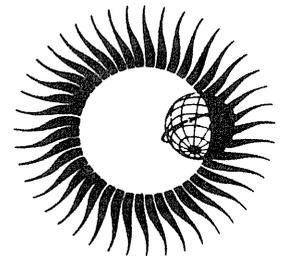


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Solar-Terrestrial Physics**



**NUMERICAL MODELING  
OF IONOSPHERIC PARAMETERS  
FROM GLOBAL IMS MAGNETOMETER DATA  
FOR THE CDAW-6 INTERVALS**



November 1983

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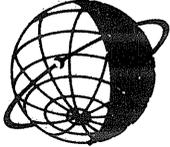
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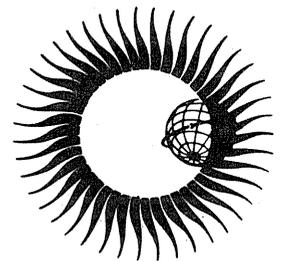
Report UAG-88

## **NUMERICAL MODELING OF IONOSPHERIC PARAMETERS FROM GLOBAL IMS MAGNETOMETER DATA FOR THE CDAW-6 INTERVALS**

by

Y. Kamide, H.W. Kroehl, B.A. Hausman, R.L. McPherron,  
S.-I. Akasofu, A.D. Richmond, P.H. Reiff and S. Matsushita

November 1983



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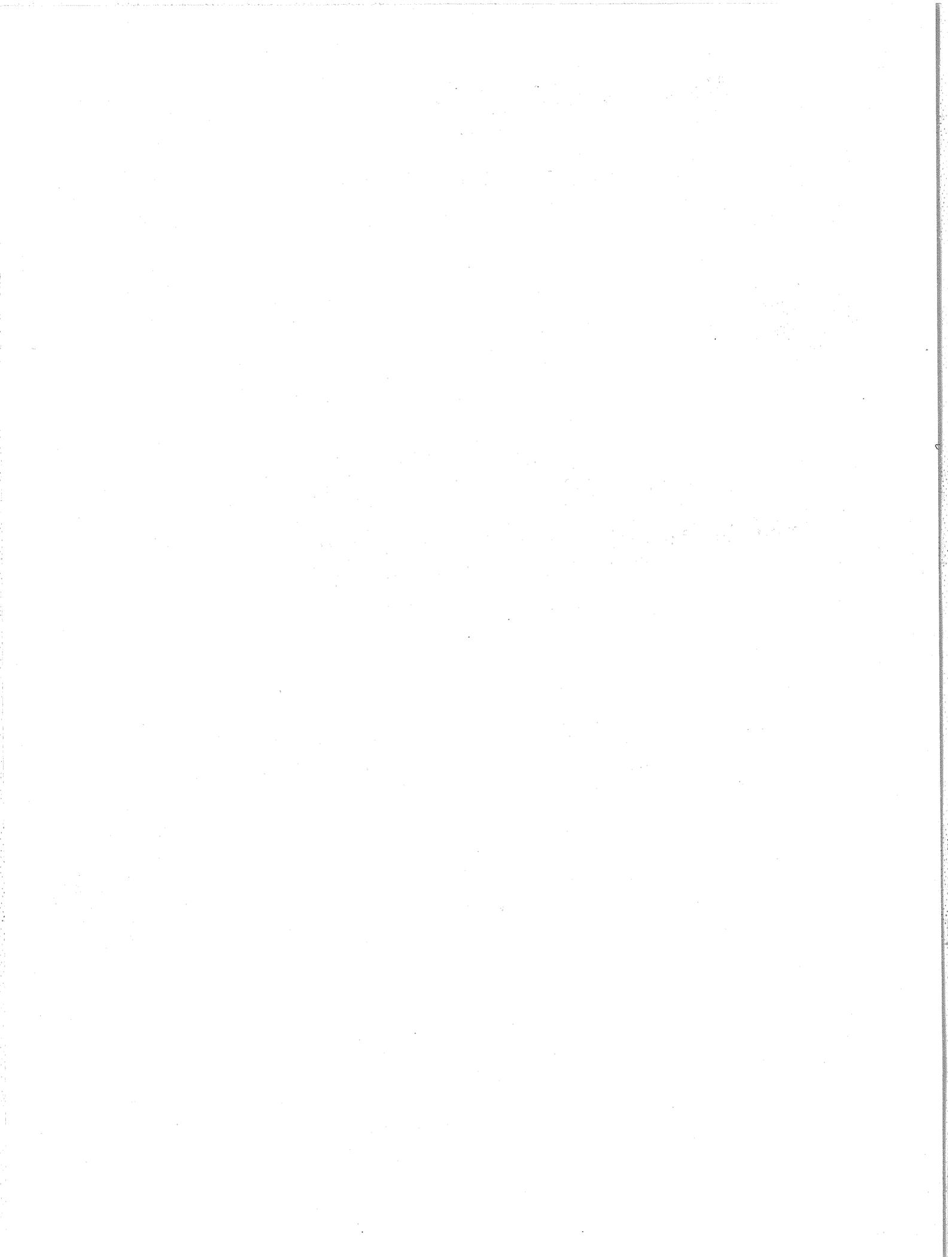
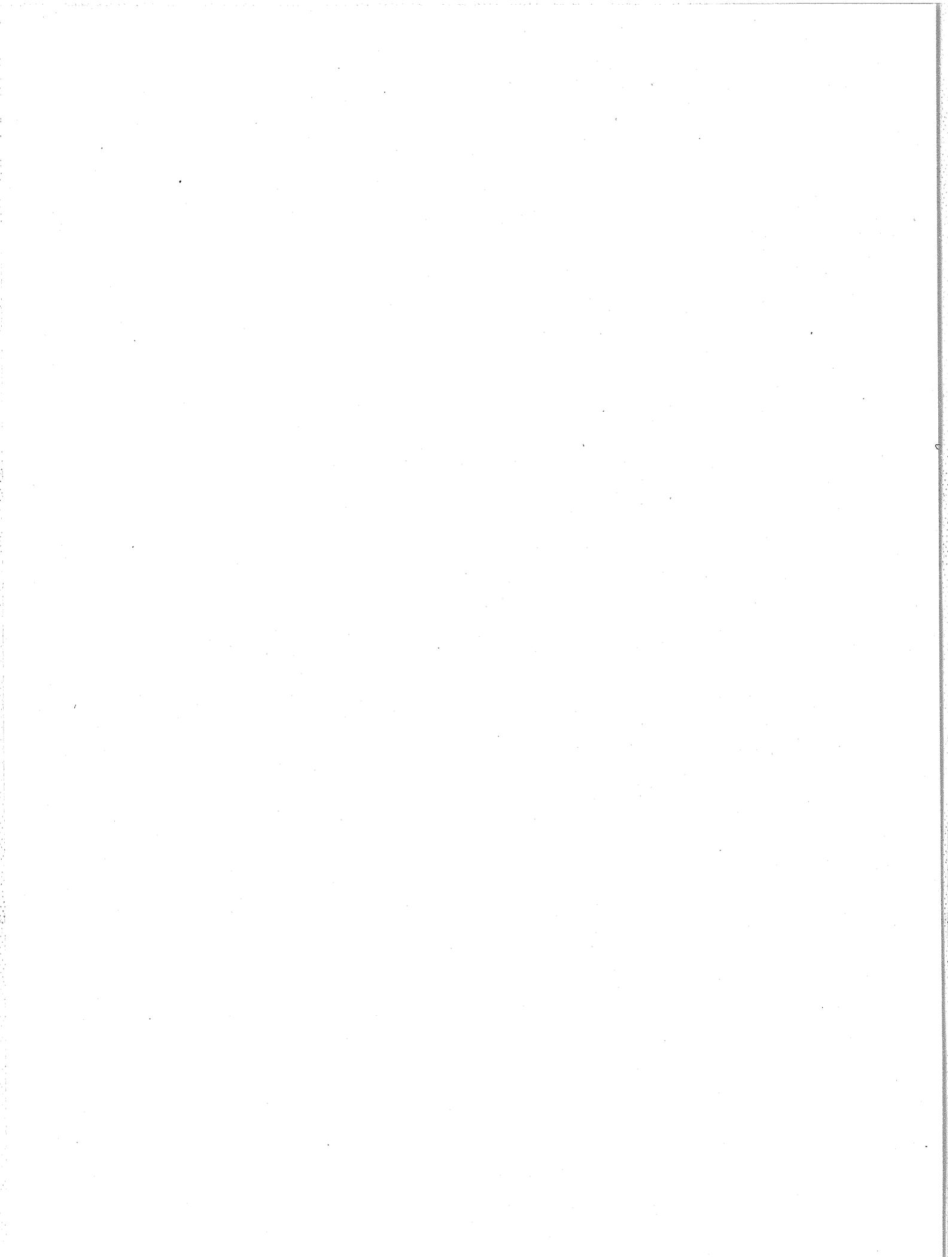


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# NUMERICAL MODELING OF IONOSPHERIC PARAMETERS FROM GLOBAL IMS MAGNETOMETER DATA FOR THE CDAW-6 INTERVALS

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## INTRODUCTION

The purpose of this technical report is to present the results of modeling efforts to estimate the distribution of ionospheric electric potential, ionospheric and field-aligned currents, and Joule heating rate from ground-based magnetic records for two intervals; (1) 0600-1800 UT on March 22, 1979, and (2) 1200 UT on March 31 to 0600 UT on April 1, 1979. This global modeling study constitutes one of the major contributions to the Coordinated Data Analysis Workshop (CDAW-6) sponsored by the National Space Science Data Center, NASA.

The CDAW series has been, and will continue to be, focused on large, cooperative analyses of multiple satellite and other platform data recorded during the International Magnetospheric Study (IMS, 1976-1979); see e.g., Roederer (1976) and Manka (1976) for the concept of the IMS. The purpose of the Analysis Phase of the IMS is to improve our understanding of the transport of energy, mass and charge through the solar terrestrial environment utilizing the most comprehensive and extensive bases obtained from space and ground-based instruments.

In this report, we briefly describe the algorithm of our numerical modeling and the characteristics of the two intervals. In Appendices I and II we show at 10-minute intervals the results of applying this algorithm to the compiled data as plots of the global distribution of the equivalent current, the electric potential, the ionospheric current, the field-aligned current and Joule heating rate. We hope that these data products provide the scientific community with new insights into our understanding of magnetospheric and ionospheric processes associated with substorms.

## THE PROCEDURE

Figure 1 outlines the steps required to prepare a motion picture of the derived parameters from the digital values of the magnetic variations. The practical procedures of each step are summarized as follows:

- 1) We started with digital values of the magnetic variations recorded every 5 minutes in magnetic coordinates (H and D) or geographic coordinates (X and Y). Approximately 70% of the data used were received directly from NSSDC as contributions to the CDAW-6 data base while the remaining 30% were digitized from analog records to fill gaps in the spatial coverage. A typical quiet day's values were removed to eliminate Sq-type currents. In this case we used March 12, 1979, as the quiet day, since the 8 Kp values were 1-, 1-, 0+, 0+, 0+, 0+, 1 and 1 and  $\Sigma Kp=5-$ . The resulting values were then transformed into the corrected geomagnetic coordinate system of Gustafsson (1969) and labeled  $X_m$  and  $Y_m$ .
- 2) In view of the fact that this data base is one of the most extensive data sets ever assembled from ground-based magnetometers, we constructed the auroral electrojet indices, AE, AU and AL, from the  $X_m$  values recorded at stations between 50° and 75° in corrected geomagnetic latitude. For the first interval, 57 stations met the latitude requirements and for the second interval 58 station data were used. Substorm activity described by these indices is presented later in this report.
- 3) The equivalent current function is calculated by fitting a magnetic potential function to the observed data estimating the portion of this potential which results from overhead currents.

- 
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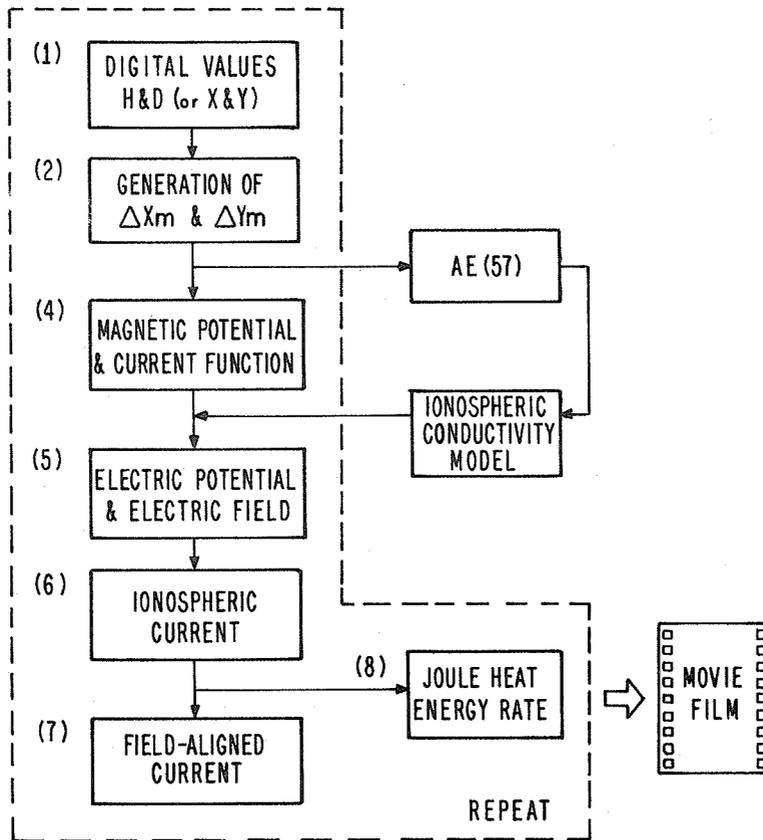


Figure 1. Required steps followed to generate the 35mm microfilm used to create the movie.

- 4) The ionospheric electrical potential is calculated for every 1° in latitude and 1 hour of local time. This process requires extensive computer computation to numerically solve a 2-dimensional, second-order, partial differential equation. A suitable model of the ionospheric conductivity, which is given as a function of the AE index, must be assumed.
- 5) Ionospheric current vectors are computed at each grid point from the electric field and the ionospheric conductivity.
- 6) The field-aligned current distribution is defined as the divergence of the ionospheric current.
- 7) The Joule heating rate is defined as the scalar product of the ionospheric current and electric field vectors.
- 8) The above parameters are computed for every 5 minutes of data. A movie was made by interpolating 15 times between the computed values, and plotting the results on a 35-mm master microfilm which was used to create the 16-mm color film.

## THE METHOD

Magnetic records from a total of 107 stations in the Northern Hemisphere (except for two which are in the Southern Hemisphere but close to the equator) are used in this project. Those stations are listed in Table 1, and their distribution in corrected geomagnetic coordinates are plotted on an orthogonic projection in Figure 2.

Details of the computations at each step outlined in Figure 1 are described in the following:

### Current Function

The observed magnetic data from the stations were fitted to a magnetic potential function  $V$  which is represented by a spherical harmonic series with longitudinal wave numbers  $m$  from 0 to 6 and order  $n=m$  to 56, as expressed by the standard form:

$$V(\theta, \lambda) = \sum_{m=0}^6 \sum_{n=m}^{56} (a_n^m \cos m\lambda + b_n^m \sin m\lambda) P_n^m(\cos \theta) \quad (1)$$

where  $\theta$  and  $\lambda$  are colatitude and east longitude (measured from midnight), respectively, in the corrected geomagnetic coordinate system. All terms involving associated Legendre polynomials  $P_n^m$  with even  $(n-m)$  are omitted from the series, except the  $n=m$  term, as the odd terms alone are basically sufficient to represent the Northern

TABLE 1. List of Magnetic Stations Whose Data Were Used

Station Name	Geographic, deg		Corrected Geomagnetic, deg	
	Latitude	E. Longitude	Latitude	E. Longitude
Alaska Chain				
1. Mould Bay	76.2	240.6	80.6	263.5
2. Johnson Point	72.5	241.7	78.0	275.7
3. Cape Parry <sup>2</sup>	70.2	235.3	74.6	273.5
4. Inuvik	68.3	226.7	71.1	268.2
5. Arctic Village	68.1	214.4	68.4	258.3
6. Fort Yukon	66.6	214.7	67.0	260.1
7. College	64.7	211.9	64.9	259.7
8. Talkeetna	63.3	209.9	61.9	259.8
Alberta Chain				
9. Resolute Bay	74.7	265.1	84.1	304.3
10. Cambridge Bay	69.1	255.0	77.8	299.7
11. Yellowknife	62.5	245.5	69.9	294.4
12. Fort Providence	61.4	242.6	68.2	291.7
13. Hay River	60.8	244.2	68.0	293.6
14. Fort Smith	60.0	248.0	68.2	299.3
15. Uranium City	59.6	251.5	68.3	304.3
16. Fort Chipewyan	58.8	248.0	67.3	302.6
17. Fort McMurray <sup>2</sup>	56.7	248.8	65.1	302.1
18. Meanook	54.6	246.7	62.6	300.9
19. Leduc	53.3	246.6	61.2	301.6
Fort Churchill Chain				
20. Pelly Bay <sup>1</sup>	68.5	270.5	79.6	329.3
21. Baker Lake	64.3	264.0	75.1	320.1
22. Rankin Inlet	62.8	267.7	74.2	327.5
23. Eskimo Point	61.1	265.9	72.4	325.1
24. Fort Churchill	58.8	265.9	70.3	326.0
25. Back <sup>1</sup>	57.7	265.7	69.2	326.0
26. Gillam	56.9	265.6	68.4	326.1
27. Thompson	55.0	263.0	66.8	321.2
28. Island Lake <sup>1</sup>	53.9	265.3	65.5	326.5
29. Whiteshell	49.8	264.8	61.4	326.5
Greenland Chain				
30. Thule	77.5	290.8	86.8	39.2
31. Upernavik	72.8	303.8	81.0	44.8
32. Umanak	70.7	307.8	78.6	46.0
33. Godhavn	69.3	306.5	77.6	41.6
34. Sondre Stromfjord	67.0	309.3	75.2	42.6
35. Godthab <sup>1</sup>	64.2	308.3	72.9	38.4
36. Frederikshab	62.0	310.3	70.5	39.3
37. Narssarssuaq	61.0	314.6	68.9	44.0
Scandinavia Chain				
38. Nord	81.6	343.3	80.8	111.7
39. Ny Alesund <sup>2</sup>	78.9	12.0	75.9	114.7
40. Bjornoya	74.5	19.2	71.3	110.5
41. Skarsyag <sup>1</sup>	71.1	25.8	67.6	111.0
42. Kunes <sup>1</sup>	70.4	26.5	66.9	110.8
43. Kevo <sup>1</sup>	69.8	27.0	66.3	110.6
44. Martti <sup>1</sup>	67.5	28.3	63.9	109.8
45. Kuusamo	65.9	29.1	62.4	109.2
IZMIRAN Chain				
46. Heiss Island	80.6	58.0	74.8	144.4
47. Cape Zhelania <sup>2</sup>	77.0	68.6	71.5	147.4
48. Karmakuly <sup>2</sup>	72.3	52.5	67.7	131.8
49. Belyy Island <sup>2</sup>	73.0	71.1	68.2	145.9
50. Tambei <sup>2</sup>	71.5	71.9	66.6	146.5
51. Kharasayey <sup>2</sup>	71.1	66.8	66.3	142.2
52. Seyakha <sup>2</sup>	70.2	65.4	65.4	146.6
53. Amderma <sup>2</sup>	69.7	61.6	65.1	136.5

Station Name	Geographic, deg		Corrected Geomagnetic, deg	
	Latitude	E. Longitude	Latitude	E. Longitude
SIBIZMIRAN Chain				
54. Golomjanny <sup>1</sup>	79.9	91.2	73.6	165.1
55. Isanchenko Island <sup>1</sup>	77.2	89.5	71.3	163.1
56. Sterlegova <sup>1</sup>	75.4	89.0	69.8	162.2
57. Ust-Tareja <sup>1</sup>	73.3	90.5	68.0	163.0
58. Kresty <sup>1</sup>	70.9	89.9	65.9	162.0
59. Igarka <sup>1</sup>	68.3	87.8	63.6	159.6
60. Turkuhansk <sup>1</sup>	65.8	88.4	61.3	159.9
UK Network				
61. Eskdalemuir <sup>2</sup>	55.3	356.8	54.6	79.0
62. Durness <sup>2</sup>	58.6	355.2	58.3	79.4
63. Faroes <sup>2</sup>	62.5	353.0	62.6	80.0
64. York <sup>2</sup>	54.0	358.9	52.9	80.0
65. Lerwick <sup>2</sup>	60.1	358.8	59.4	82.9
66. Kiruna <sup>2</sup>	67.8	20.4	64.8	104.2
67. Tromso <sup>2</sup>	69.7	18.9	66.8	104.8
AFGL Network				
68. Sudbury	42.2	288.8	55.2	2.3
69. Lompoc <sup>2</sup>	34.4	239.7	40.2	300.9
70. Rapid City	44.1	256.9	54.1	317.4
71. Camp Douglas	43.6	269.8	55.8	334.6
72. Tampa <sup>2</sup>	27.6	277.7	40.3	345.4
73. Mount Clemens	42.4	277.5	55.4	345.7
Other Stations				
74. San Juan	18.1	293.8	31.4	5.5
75. St. John's	47.6	307.3	57.6	29.1
76. Leirvogur	64.2	338.3	66.8	69.6
77. Daneborg	74.3	339.8	75.9	84.3
78. Danmarkshavn <sup>2</sup>	76.8	341.4	77.6	91.7
79. M'Bour	14.4	343.0	10.7	57.7
80. Almeria	36.8	357.5	33.5	73.8
81. Furstenfeldbruck	48.2	11.3	45.0	87.8
82. Minsk	54.1	26.5	50.3	101.9
83. Odessa	46.7	30.9	42.3	103.7
84. Tbilisi	42.1	44.7	37.4	115.3
85. Alert	82.5	297.5	86.8	124.3
86. Sverdlovsk	56.7	61.1	52.7	132.5
87. Tashkent	41.3	69.6	37.2	139.6
88. Dixon Island	73.5	80.6	68.3	154.7
89. Cape Chelyuskin	77.7	104.3	71.6	174.2
90. Irkutsk	52.3	104.3	48.3	175.0
91. Tixie Bay	71.6	129.0	65.8	195.5
92. Kanoya	31.4	130.9	25.7	200.8
93. Kakioka	36.2	140.2	29.9	209.9
94. Memambetsu	43.9	144.2	37.4	213.7
95. Guam	13.6	144.9	6.9	213.7
96. Magadan	60.1	151.0	53.9	217.4
97. Wake Island	19.2	166.7	14.1	234.1
98. Cape Wellen	66.2	190.2	62.5	242.6
99. Honolulu	21.3	202.0	21.7	267.6
100. Victoria	48.5	236.6	54.1	292.4
101. Newport	48.3	242.9	55.4	299.4
102. Tucson <sup>1</sup>	32.3	249.2	39.9	311.4
103. Boulder	40.1	254.8	49.5	315.7
104. Fort Severn	56.2	271.5	68.4	335.9
105. Fredericksburg	38.2	282.6	51.5	352.7
106. Great Whale River	55.3	282.2	68.0	353.7
107. Ottawa	45.4	284.4	58.5	356.1

1 Denotes stations data was used for the first event only.  
2 Denotes stations data was used for the second event only.

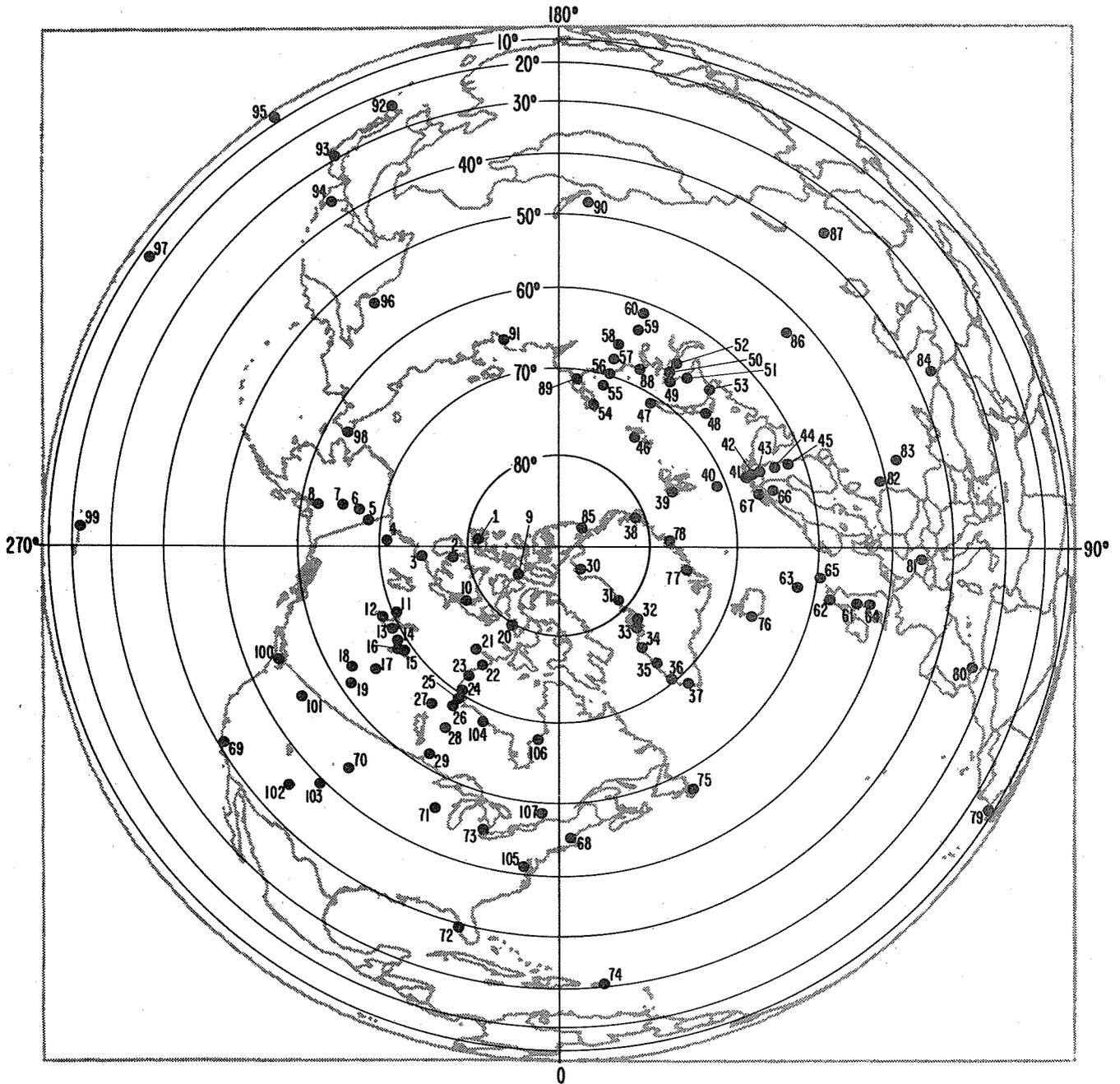


Figure 2. A view of the northern hemisphere in corrected geomagnetic coordinates and plotted on an orthographic projection, i.e. the plotted distance between latitude circles varies as a sine function in colatitude.

Hemisphere potential. The choice of these maximum  $n$  and  $m$  values is based on trial and error tests with a variety of values. There are in total 358 coefficients,  $a_n^m$  and  $b_n^m$ , to be determined in the harmonic series (1).

In seeking an appropriate potential function  $V$ , it is required here that the potential vary smoothly in space between stations. For details of the practical method of the calculation, see Kamide et al. (1982). The root-mean-square difference between computed and observed magnetic perturbations is typically 15%. However, at certain times the discrepancy rises above 20%.

It is then assumed that there is a relatively small internal contribution to the magnetic potential caused by a perfectly conducting layer 300 km below the Earth's surface. The remaining external potential  $V(e)$  is extrapolated to 110 km altitude and converted to an equivalent ionospheric current function by the standard procedure:

$$\psi_n = \frac{1}{\mu_0} \frac{2n+1}{n+1} \left(\frac{a}{R_E}\right)^n V_n(e) \quad (2)$$

where

$$a = R_E + 100\text{km}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ H/m.}$$

### Ionospheric Conductivity

At present there is no way to monitor continuously the global distribution of the ionospheric conductivity. Several conductivity models have been developed based on radar measurements of electron and ion density and temperature and satellite measurements of precipitating electrons and protons. In this report it is assumed that the conductance, that is, the height-integrated ionospheric conductivity, has two components: one is a background and is of solar ultraviolet origin and the other simulates an enhancement presumably due to substorm associated particle bombardment. We may call the former the quiet time conductance and the latter auroral enhancement conductance.

For the background conductance, we follow the quiet time distribution for equinoctial months, as described in equations (19) and (20) of Kamide and Matsushita (1979). For the auroral enhancement, we use an empirical model based on the work of Spiro et al. (1982) with updated improvements. In their work the height-integrated Hall and Pedersen conductivities ( $\Sigma_H$  and  $\Sigma_P$ ) are tabulated at every 1-2° (in latitude) and 1 hour (in MLT) for each level of auroral electrojet activity measured by the AE index. Data of precipitating particle energy flux and characteristic electron energy obtained from the Atmosphere Explorer satellites (AE-C and AE-D) were used along with the dependence of the conductivities on the characteristic energy of precipitating electrons obtained by Vickrey et al. (1981). It should be noted, however, that at two instants with the same value of the AE index, the auroral distribution and the conductivity distribution, as well as the current patterns in the polar region, may be significantly different. In our modeling the following adjustment is employed in the use of the conductivity model: by assuming that the latitude of the maximum equivalent current strength coincides with the latitude of the highest Hall conductivity, a latitudinal shift is made for the entire conductivity distribution when ever a difference between the two latitudes of the maxima is found.

### Electric Potential

During the last several years, different techniques have been developed to analyze global magnetometer data in order to infer the three-dimensional distribution of electric currents around the Earth (e.g., Kisabeth, 1979; Mishin et al., 1980; Kamide et al., 1981). These methods take the distribution of magnetic perturbation vectors observed on the Earth's surface as the input and try to estimate the distribution of ionospheric and field-aligned currents and other related quantities as outputs for a given model of ionospheric conductivities. In this report, we employ an improved version of the computer algorithm developed by Kamide et al. (1981).

The height-integrated ionospheric current can be considered to consist of two elements. The toroidal (solenoidal) current  $\underline{J}_T$  is related to the equivalent current function  $\psi$  as

$$\underline{J}_T = - \frac{\partial \psi}{a \sin \theta \partial \lambda} \quad (3)$$

$$J_T = \frac{\partial \psi}{a \partial \theta}$$

The other part, the poloidal current  $\underline{J}_P$  can be considered as a closing current for field-aligned currents  $j_{||}$ . (Note that  $j_{||} = \text{div } \underline{J}_P$  and  $\text{div } \underline{J}_T = 0$  by definition and  $j_{||}$  and  $\underline{J}_P$  together produce no ground magnetic variation under the assumption that magnetic field lines penetrate vertically into the horizontal ionosphere). The associated electric field  $\underline{E}$  is derivable from an electrostatic potential  $\Phi$ . A partial differential equation for  $\Phi$  in terms of  $\psi$  can then be written in the form

$$A \frac{\partial^2 \Phi}{\partial \theta^2} + B \frac{\partial \Phi}{\partial \theta} + C \frac{\partial^2 \Phi}{\partial \lambda^2} + D \frac{\partial \Phi}{\partial \lambda} = F(\psi, \theta, \lambda) \quad (4)$$

where coefficients A, B, C, D and F are given by the conductivities and their spatial gradients; see Kamide et al. (1982).

The above differential equation (4) is to be numerically solved with approximate boundary conditions:

$$\begin{aligned}\Phi(0, \lambda) &= 0 \text{ at the pole} \\ \frac{\partial \Phi(\pi/2, \lambda)}{\partial \theta} &= 0 \text{ at the equator}\end{aligned}\quad (5)$$

Once the electrostatic potential is obtained, the electric field  $\underline{E}$  is derivable from the potential  $\Phi$  as

$$\underline{E} = - \text{grad } \Phi. \quad (6)$$

Practically, we solve (4) numerically by a finite difference scheme over a network of grid points spaced  $1^\circ$  in  $\theta$  and  $15^\circ$  in  $\lambda$ . It was assumed in deriving (4) that the magnetic contributions of the magnetospheric ring currents and tail currents to  $\Psi$  can be neglected and geomagnetic field lines are effectively radial. The breakdown of these assumptions at lower latitudes probably invalidates the calculated potential values at low latitudes.

### Ionospheric Currents and Field-Aligned Currents

Once the electric field is determined, it is possible to derive the ionospheric current vector  $\underline{J}$  from

$$\underline{J} = \Sigma_P \underline{E} + \Sigma_H \underline{E} \times \underline{n}_r \quad (7)$$

where  $\underline{n}_r$  is a unit radial vector. From the requirement that the three-dimensional current be divergence free, the field-aligned current density  $j_{||}$  (positive downwards) can be calculated as

$$j_{||} = \text{div } \underline{J} = \text{div } \underline{J}_P \quad (8)$$

### Joule Heating Rate

The height-integrated Joule heating rate is defined by

$$\begin{aligned}u_J &= \underline{J} \cdot \underline{E} \\ &= \Sigma_P E^2\end{aligned}\quad (9)$$

The Joule heating rate in the entire Northern Hemisphere ionosphere  $U_J$  can then be obtained by integrating  $u_J$  as

$$U_J = \iint u_J a^2 \sin \theta \, d\theta d\lambda$$

## MAGNETIC ACTIVITY DURING THE CDAW-6 INTERVALS

Figures 3a and b show auroral electrojet activity as described by the AE(57) and AE(58) indices for the first and second CDAW-6 intervals, respectively. The upper envelope, AU, depicts the maximum magnetic variation and the lower envelope, AL, describes the minimum magnetic variation. The distance between the two indices is another index, called AE.

### 0600-1800UT on March 22, 1979

Mid-latitude magnetic records indicate that this interval spanned a very quiet period, a storm sudden commencement at 0826 UT and the initial and main phases of a medium-size magnetic storm as Dst reached  $-74$  nT during the 17th hour on March 22nd. From the auroral electrojet indices, we note two major substorms identified as relatively isolated enhancements in auroral electrojet activity. In the first sequence, an AE enhancement began at 1020 UT and was followed by the major expansion onset noted in the auroral zone as AL reached  $-1000$  nT and at mid-latitude by positive bays in the H-component and by Pi2 pulsations, all beginning at 1055 UT. This major onset was marked with a decrease in the strength of the eastwest electrojet as the majority of the auroral zone is engulfed in westward current which reached its maximum intensity around 1130 UT.

Soon after the recovery of the first major substorm, both the AU and AL values intensify at 1325 UT. At 1435 UT another major expansion onset was recorded. This substorm reached its maximum intensity of about 2000 nT in AE at 1450 UT.

### 1200 March 31-0600 April 1, 1979

The interval is best characterized by continuous activity of the auroral electrojets. At mid-latitudes, the Dst index bounced between  $-22$  and  $-35$  nT and  $K_p$  was fairly stable at the level of 3. Unlike the previous interval, this interval shows almost continuous auroral activity from 0100 to 2000 UT which was followed by sharp substorm developments at 2150 and 0300 UT. The maximum phases of these latter substorms reach relatively large values of  $-1000$  nT at 2320 UT and  $-740$  nT at 0315 UT as recorded in the AL index.

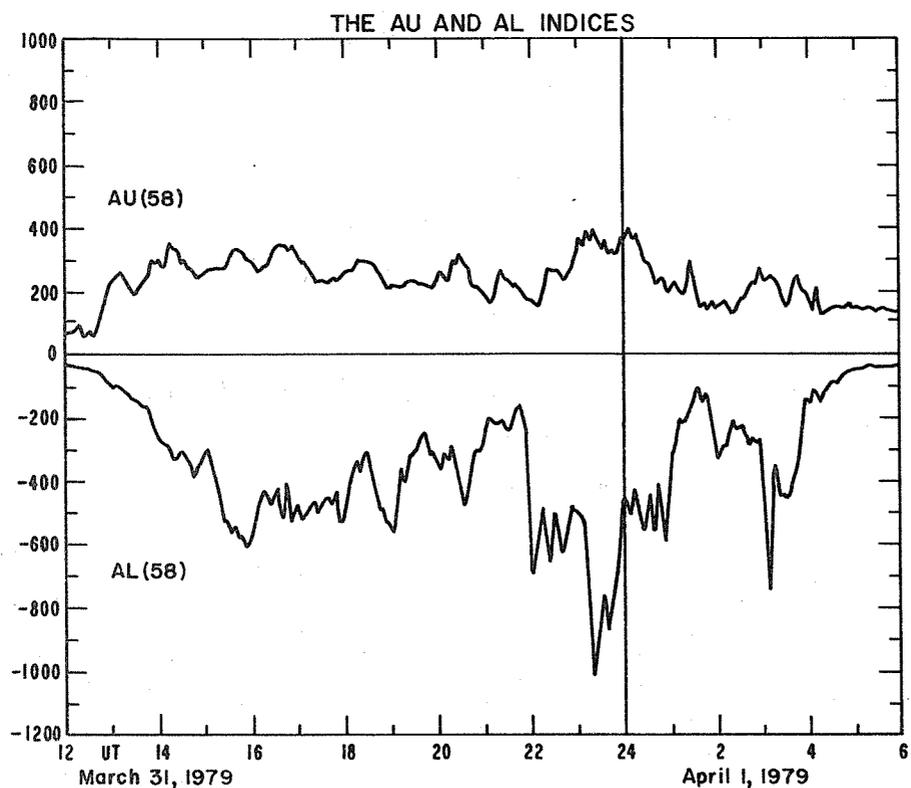
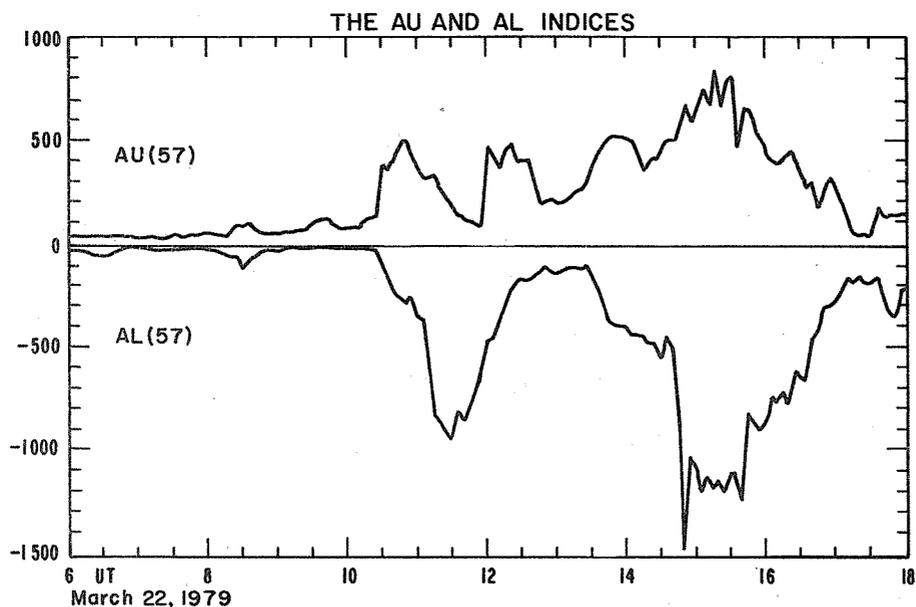


Figure 3. Nonstandard AU and AL indices showing the maximum positive and negative excursions in the  $X_m$  component at 57(a) and 58 (b) stations between  $50^\circ$  and  $75^\circ$  corrected geomagnetic latitude.

### EXAMPLES

In Figures 4a-j, we show some of the outputs from the extensive calculation for, as an example, 1125 UT on March 22, 1979, which was near the maximum epoch of the first intense substorm.

Figure 4a shows the distribution of the equivalent ionospheric current vectors which are essentially the observed magnetic perturbation vectors rotated clockwise by  $90^\circ$ . Data below  $50^\circ$  in corrected geomagnetic latitude are not shown in this diagram. One can notice that the intense westward electrojet flows in a wide local time span, from the noon sector to the premidnight sector, and maximizes in early morning hours. Unfortunately, there is a large gap in the distribution of magnetometers over eastern Siberia.

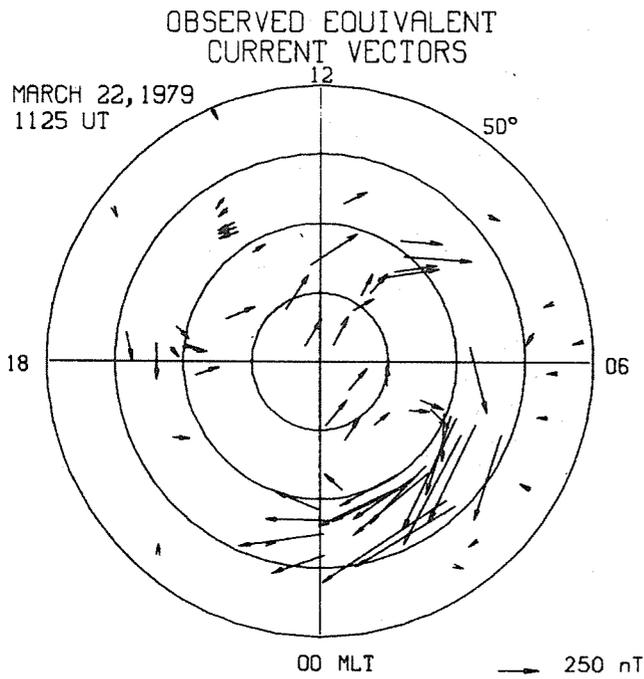


Figure 4a

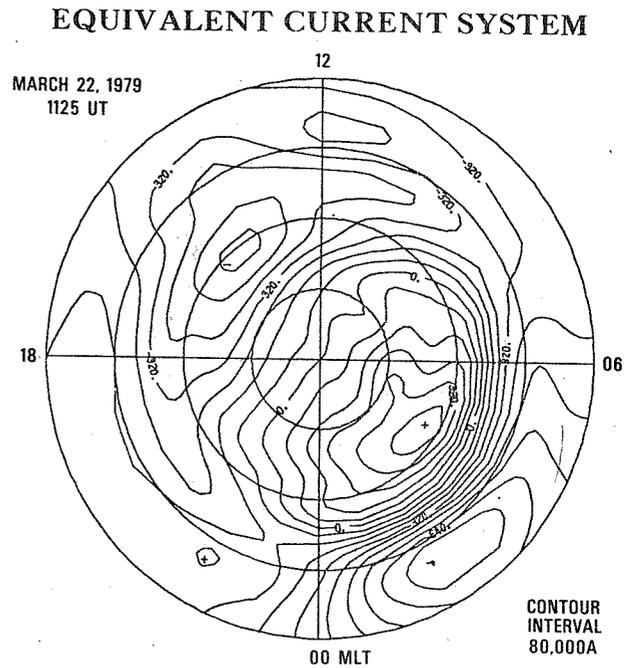


Figure 4b

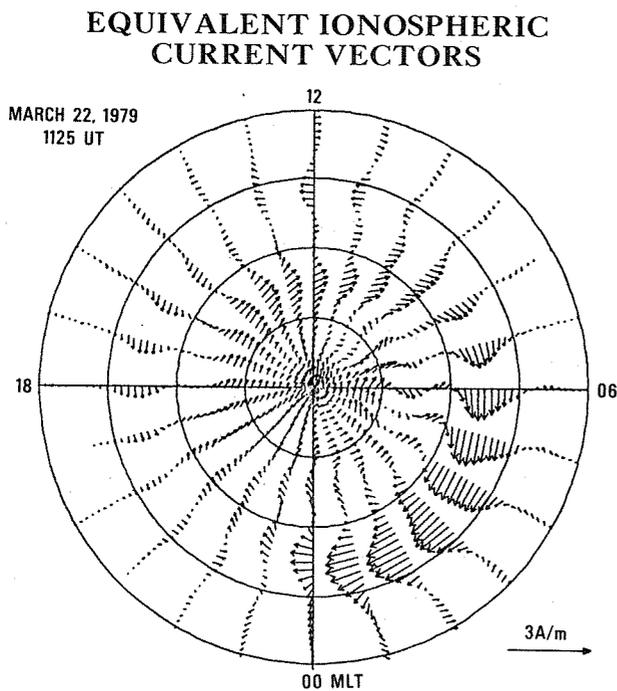


Figure 4c

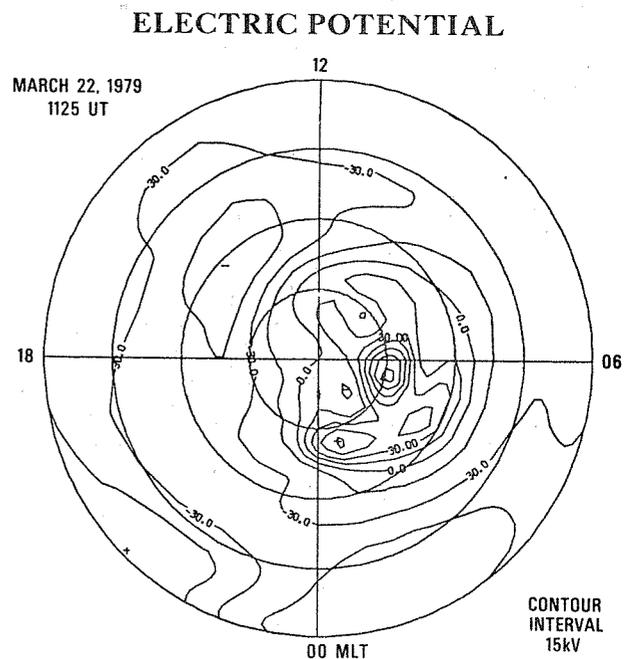
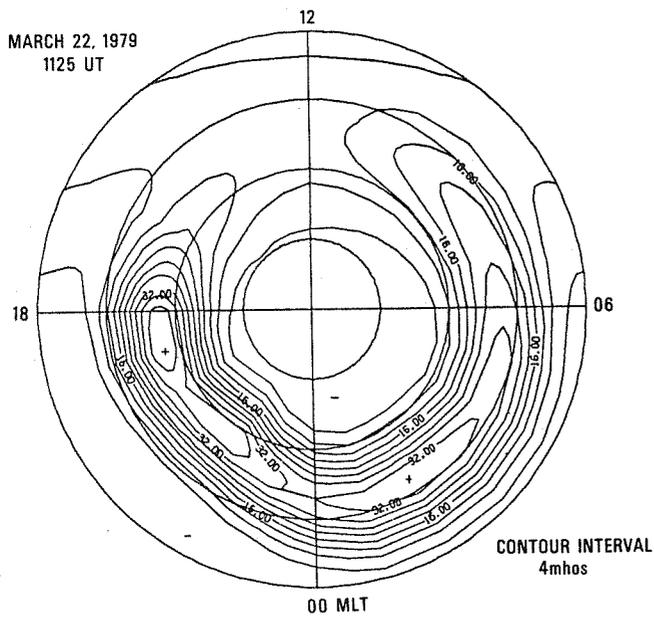


Figure 4e

### HALL CONDUCTIVITY



### PEDERSEN CONDUCTIVITY

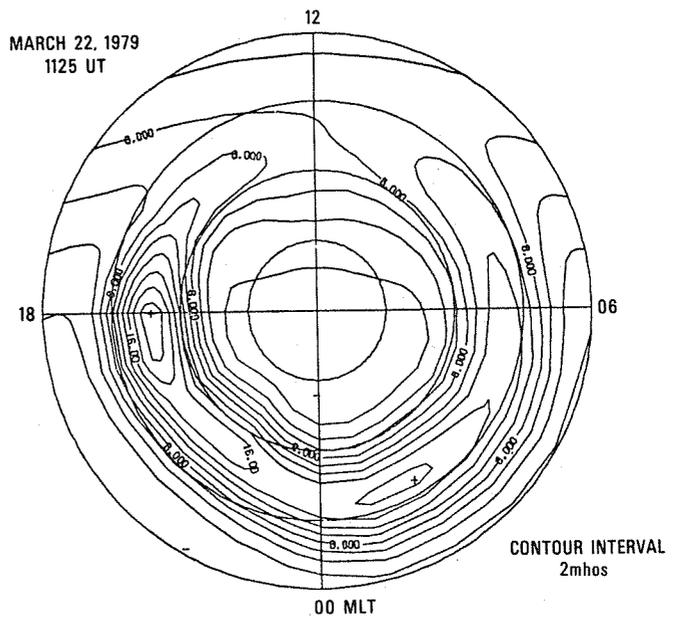


Figure 4d

### ELECTRIC FIELD VECTORS

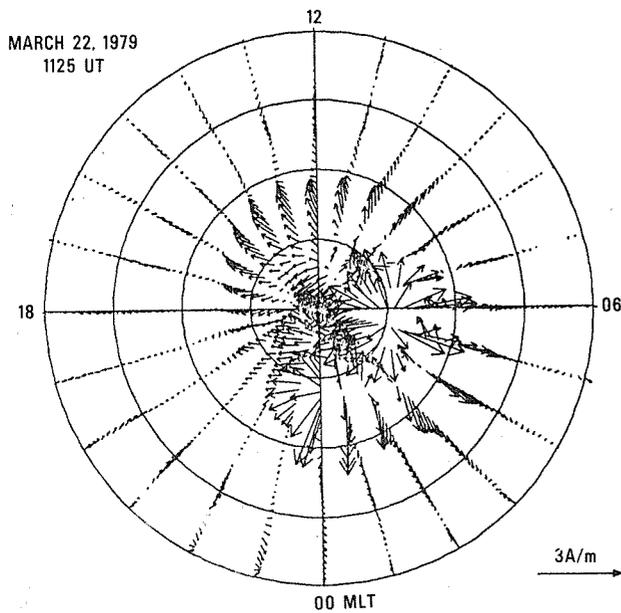


Figure 4f

### IONOSPHERIC CURRENT VECTORS

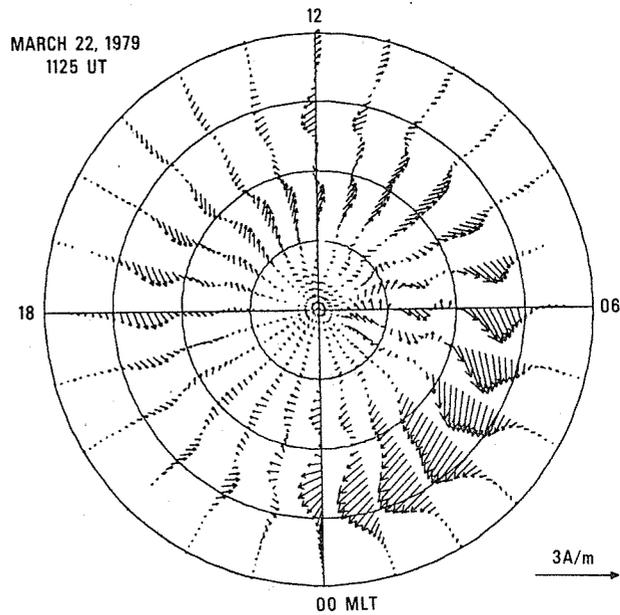
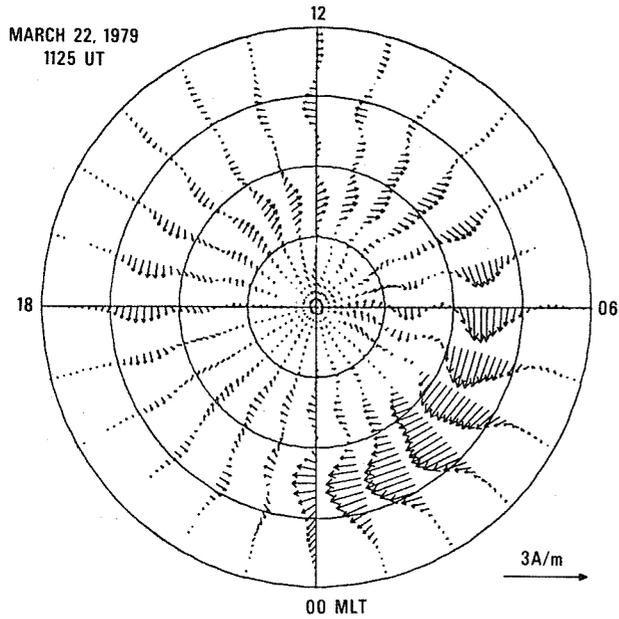


Figure 4g

### HALL CURRENT VECTORS



### PEDERSEN CURRENT VECTORS

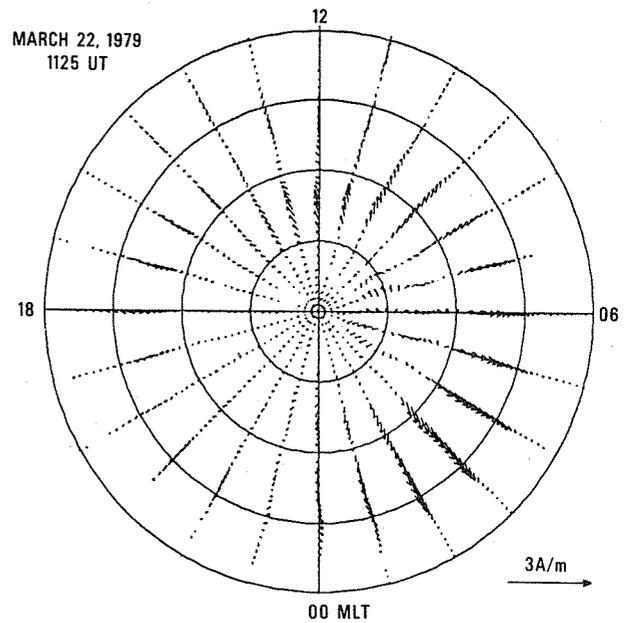


Figure 4h

### FIELD-ALIGNED CURRENTS

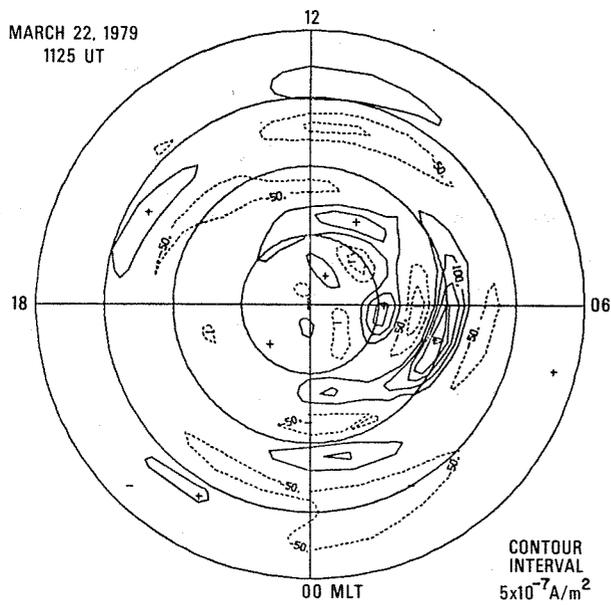


Figure 4i

### JOULE HEAT RATE

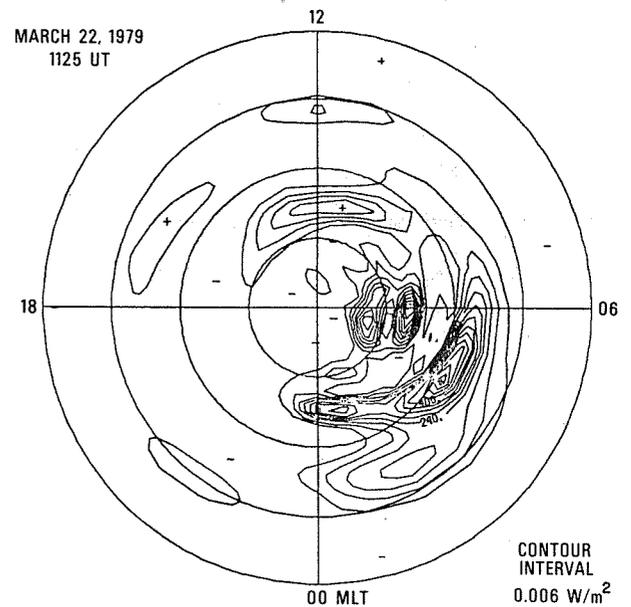


Figure 4j

In Figures 4b and 4c, we show the distribution of iso-intensity contours of calculated external current function (the so-called equivalent ionospheric current system) and of the associated equivalent current vectors, respectively. The current vectors are plotted at our grid points every 1° (in latitude) and 1 hour (in magnetic local time). Comparing Figures 4a and 4c, one must be cautious in interpreting the derived equivalent currents in regions where there is an absence of measurements. In particular, the large gap in the distribution of surface magnetometers over eastern Siberia can produce significant uncertainties. Our fitting algorithm generates a northward turning of the westward electrojet toward the polar cap through this data gap in 2000-2300 MLT sector. It is impossible to state definitely whether or not this pattern corresponds well with reality. These uncertainties must be kept in mind when interpreting the results of our subsequent outputs.

Isocontours of the height-integrated Pedersen and Hall conductivities assumed for this particular time are displayed in Figure 4d. Note the different contour intervals used for the two conductivities. Figure 4e shows isocontours of the electric potential calculated for the combined set of the current function (Fig. 4b) and the conductivity model (Fig. 4d), and Figure 4f shows the corresponding electric field computed at our grid points. The potential pattern consists essentially of twin vortices in high latitudes with the highest and lowest potentials existing in the early morning and early afternoon sectors, respectively. However, there can exist many local deformations. It is important to point out that in many earlier works, the pattern of the electric potential has been assumed to be identical to that of the equivalent current system. By comparing Figures 4e and 4b, it is noticeable that the potential pattern is significantly different from the equivalent current system at and near auroral latitudes. Such a difference is caused simply by the nonuniform distribution of the ionospheric conductance. It is also pointed out that because of vertical magnetic field lines in the potential calculation, the electric potential in subauroral latitudes, say below 60° is unrealistically large.

Figure 4g shows the distribution of the calculated ionospheric current vectors. One can notice by comparing the equivalent and 'true' ionospheric currents, that although the gross distributions of the two currents are similar, there are significant differences both in current direction and strength. The major portions of the equivalent currents flow nearly in an east-west direction, but the 'true' ionospheric currents have a considerable north-south component. For example, the westward electrojet in the morning sector has a significant southward component as well, and the eastward electrojet in the evening sector is actually flowing northeastward. In Figure 4h, we compare the Pedersen and Hall currents separately. It is evident that the Hall currents are remarkably similar to the equivalent currents. However, a significant difference can be found in the polar cap, where the Hall current is very small. This indicates that the main source of the polar cap magnetic perturbations are field-aligned currents, at least during substorms.

Figure 4i shows isocontours of the calculated field-aligned currents. There is a great variability in the field-aligned current distribution in comparison with the statistical pattern obtained by averaging a number of satellite measurements.

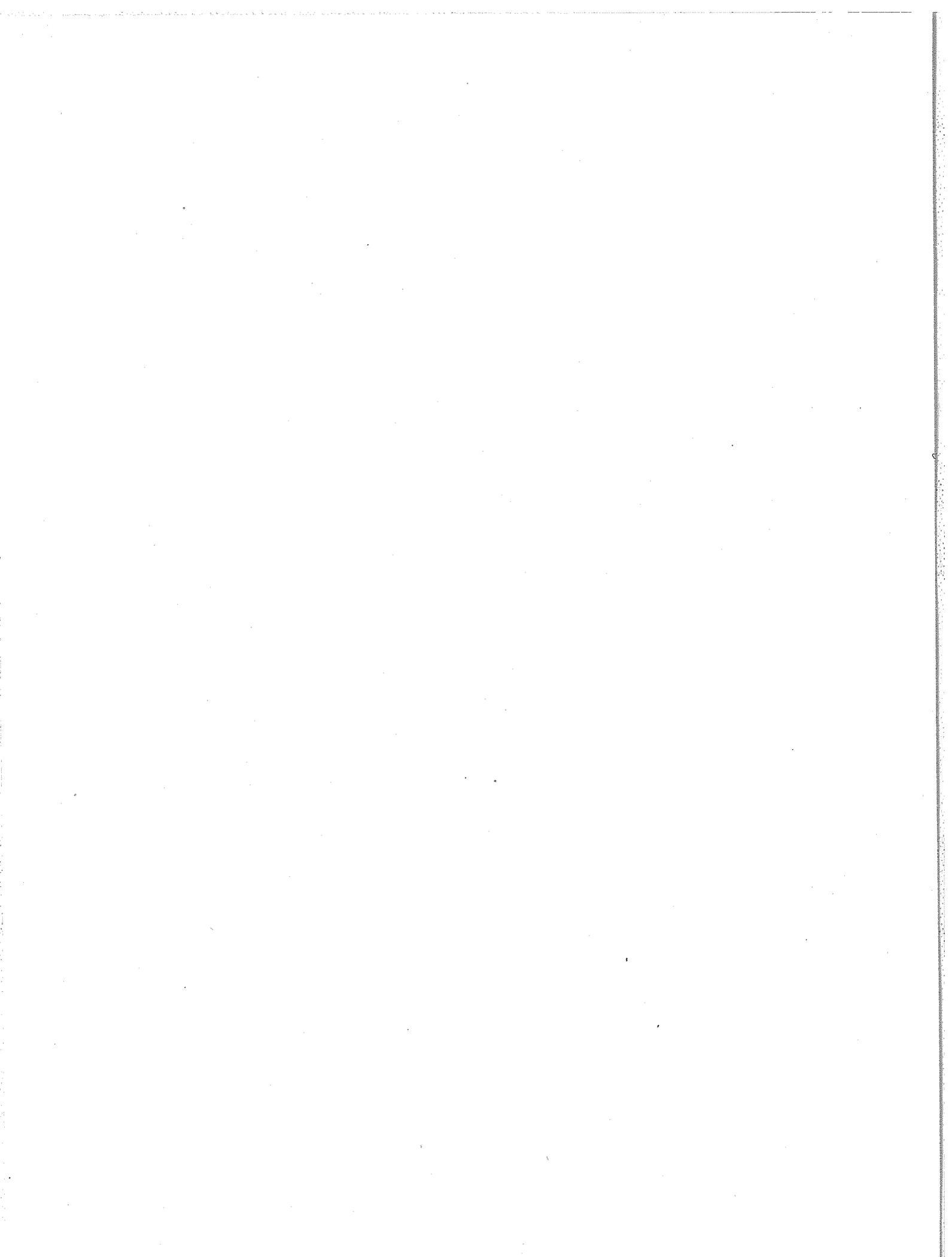
Finally, in Figure 4j, we show the distribution of the Joule heat production rate associated with the auroral electrojets. In the left-bottom corner, the total Joule heating integrated over the entire polar ionosphere (from the North Pole to 50° latitude) is indicated in the unit of watts.

## ACKNOWLEDGEMENTS

The total CDAW-6 list of participants exceeds the scope of this report though we would like to express our appreciation to R.H. Manka, the organizer, and J.I. Vette, our most gracious host. This project represents a major effort of the magnetic fields subgroup. This report results from the cooperation of many people in numerous institutions in the world as the data were recorded at remote sites, processed at home institutes, sent to NSSDC, entered into the CDAW-6 data base, and sent directly to us. Special contributions were received from W. Baumjohann, P. F. Fougere, E. Friis-Christensen, V. I. Mishin, G. Rostoker, W. F. Stuart, J. K. Walker and A. N. Zaitzev. We also wish to give a special note of thanks to the staff of Sigma Data supported by NASA/NSSDC, M. Teague, D. Sawyer and E. Teague. Parts of this study were supported by the following grants received from the Atmospheric Science Division of the National Science Foundation; ATM 80-17316, ATM 80-20376 and ATM 81-08994; from NASA; NGR-44-006137 and NSG-7-447; and from ONR; N00014-82-K-0031. The data plots and the 16-mm movie could not have been completed without the use of the computer resources made available to us by NCAR.

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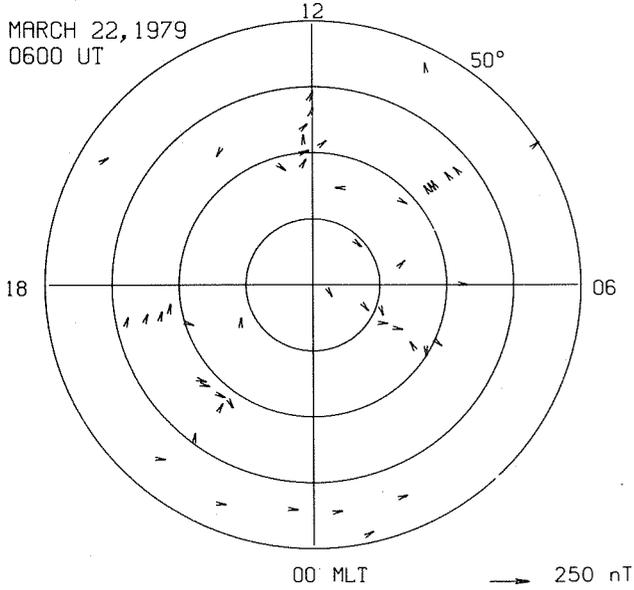
## APPENDIX I

### Data Plots for 0600-1800 on March 22, 1979

Out of the various output plots shown in Figures 4a-j, we have chosen to show 5 polar plots (equivalent ionospheric current system, electrical potential, ionospheric current vectors, Joule heating rate and field-aligned current density) as well as the distribution of the observed magnetic perturbation noted as equivalent currents. The plots are reconstructed every 10 minutes for the 12-hour interval. The outermost circle is 50°N in corrected geomagnetic coordinates, with other circles spaced 10°. Date and UT are marked on each diagram. Note that all of the scales change at 1020 UT.

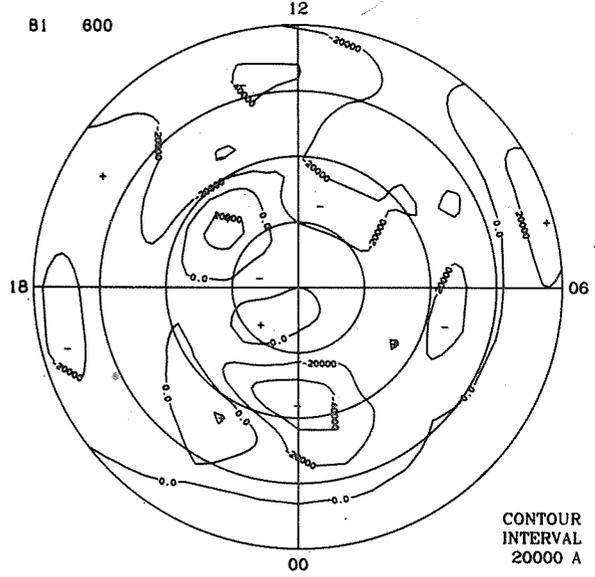
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0600 UT

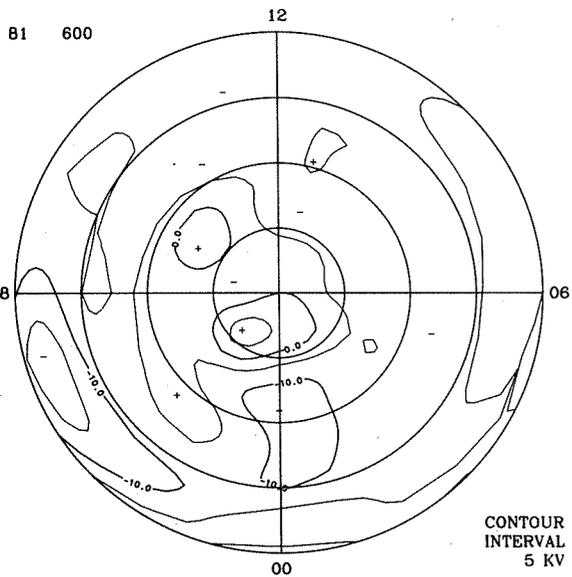


ELECTRIC POTENTIAL

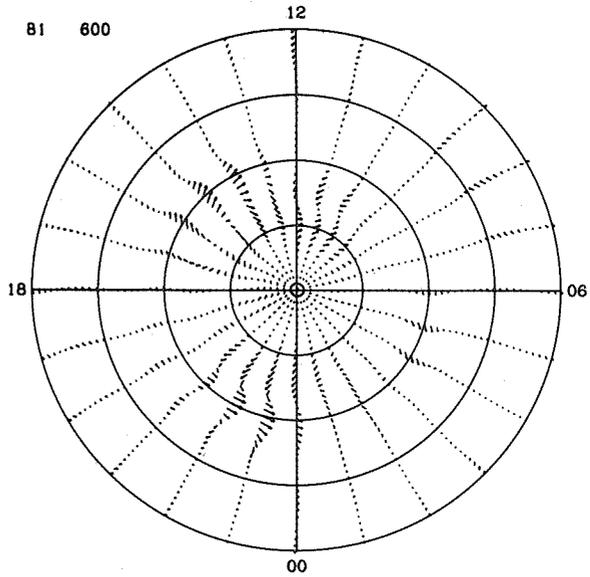
EQUIVALENT CURRENT SYSTEM



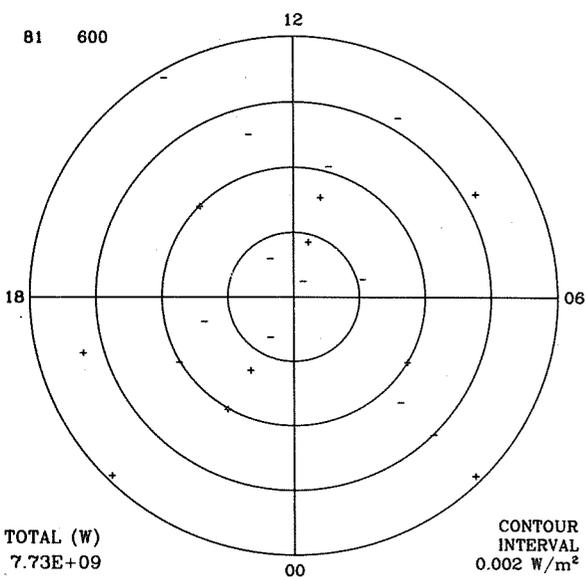
IONOSPHERIC CURRENT



JOULE HEAT RATE

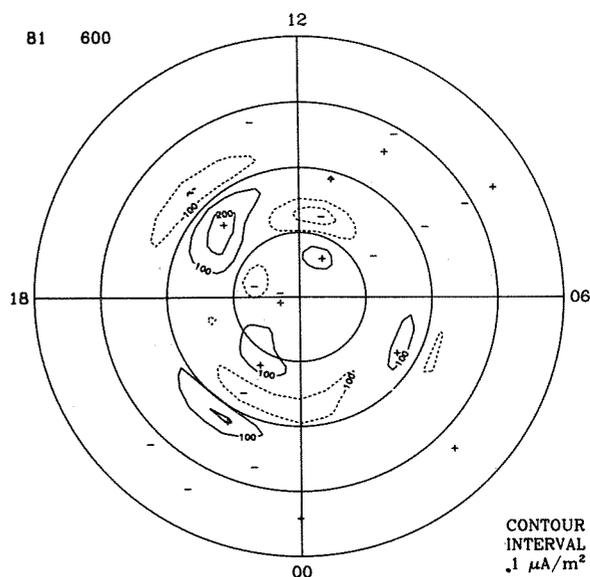


FIELD-ALIGNED CURRENTS



TOTAL (W)  
7.73E+09

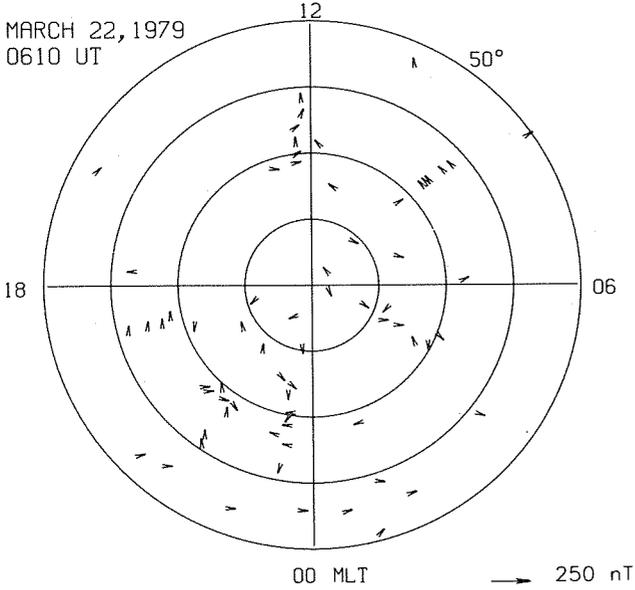
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



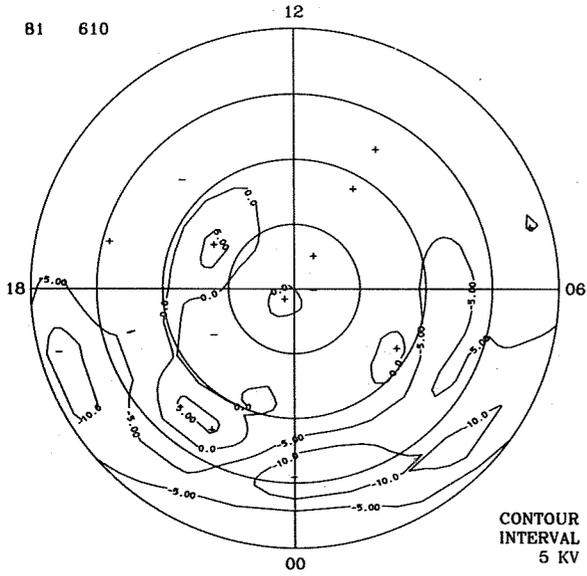
CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

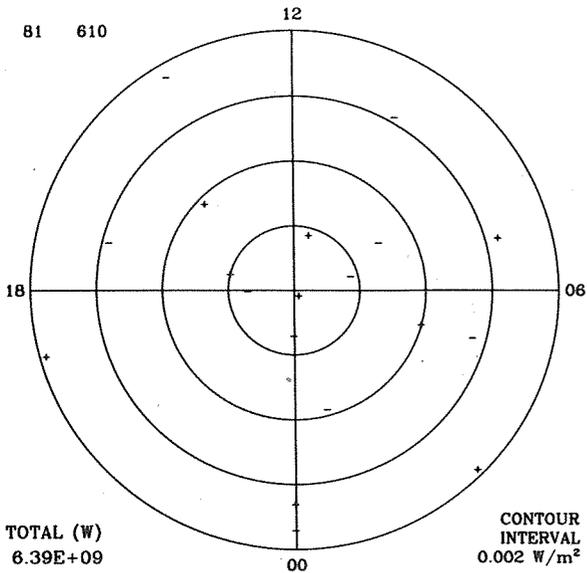
MARCH 22, 1979  
0610 UT



ELECTRIC POTENTIAL



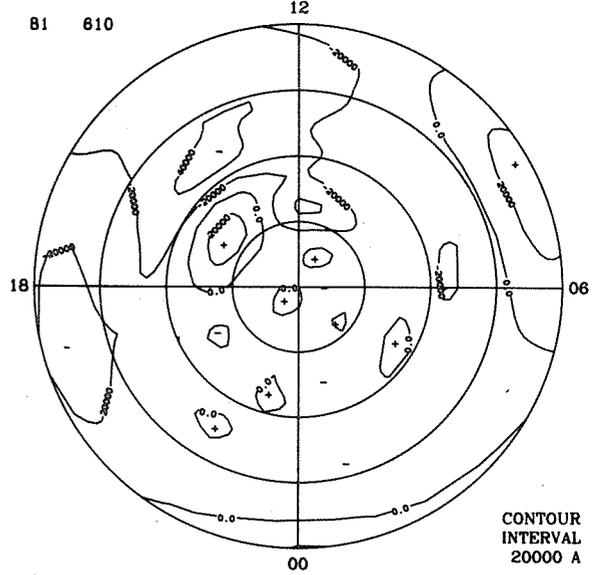
JOULE HEAT RATE



TOTAL (W)  
6.39E+09

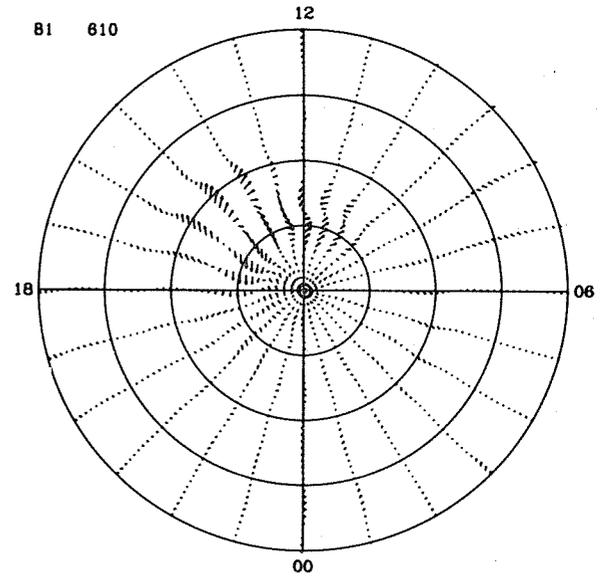
CONTOUR  
INTERVAL  
0.002 W/m²

EQUIVALENT CURRENT SYSTEM

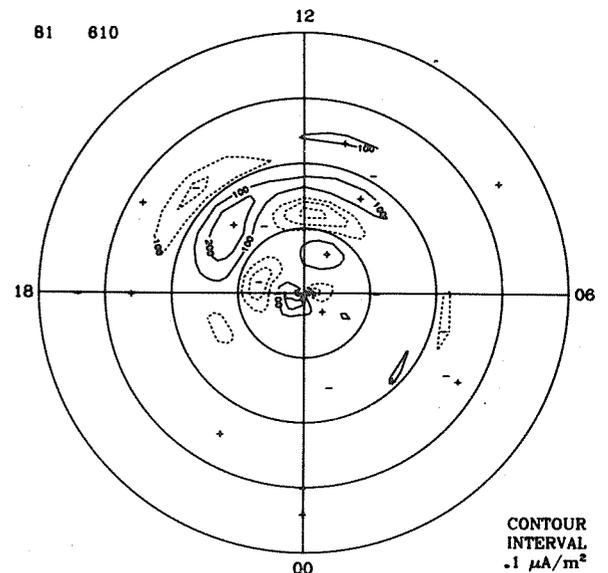


CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



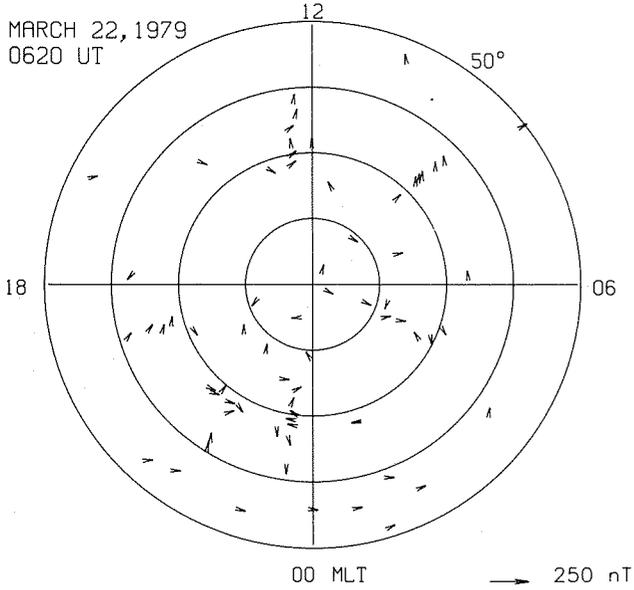
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.1 μA/m²

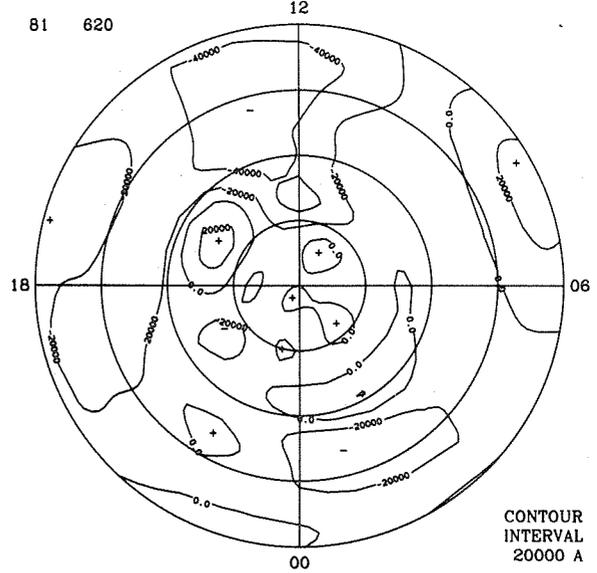
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0620 UT



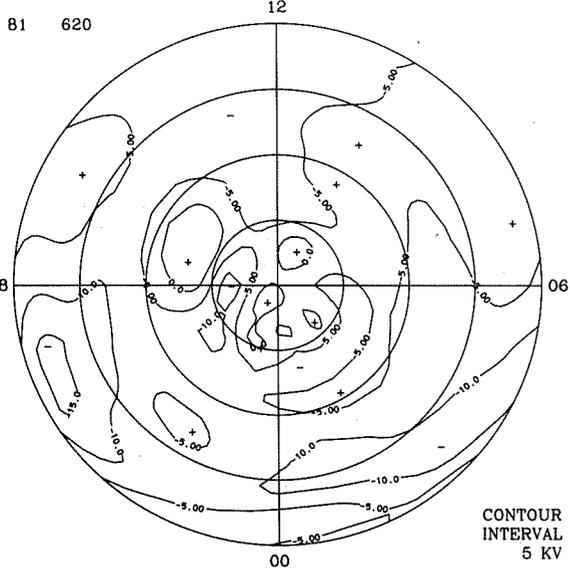
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



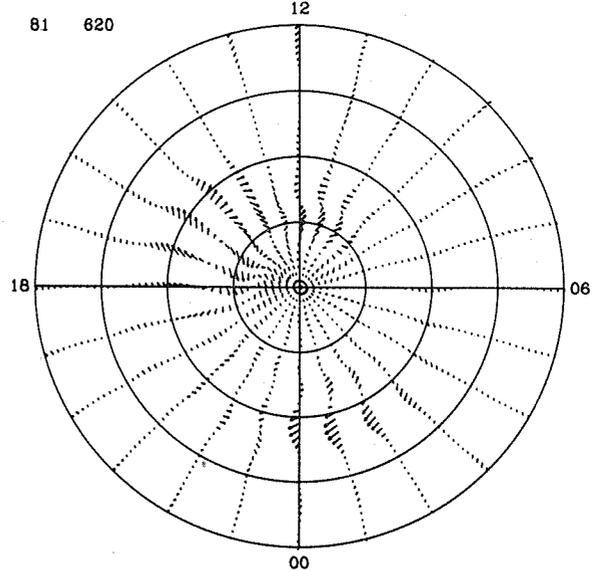
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



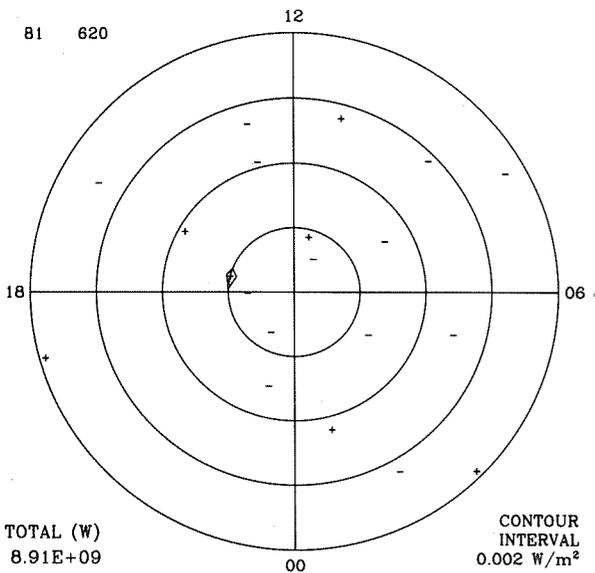
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



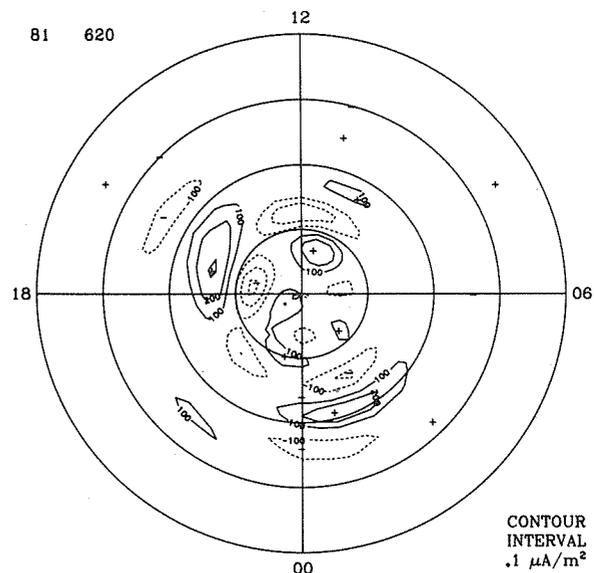
1 A/m

FIELD-ALIGNED CURRENTS



TOTAL (W)  
8.91E+09

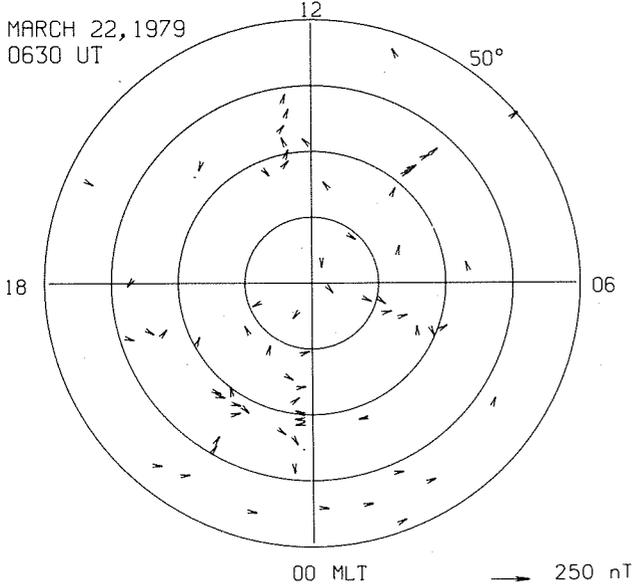
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

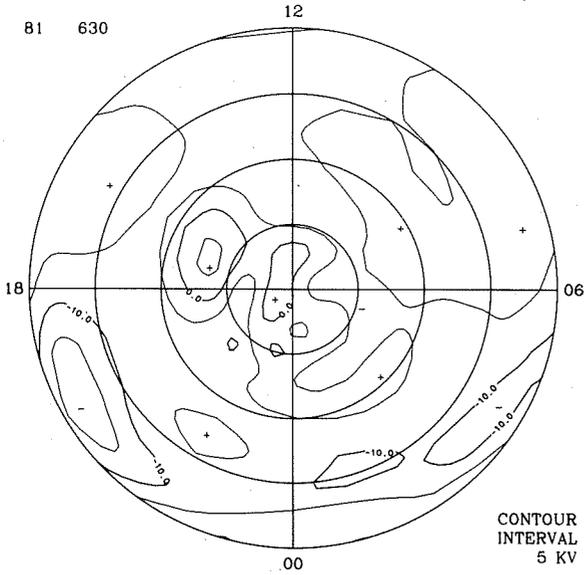
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0630 UT



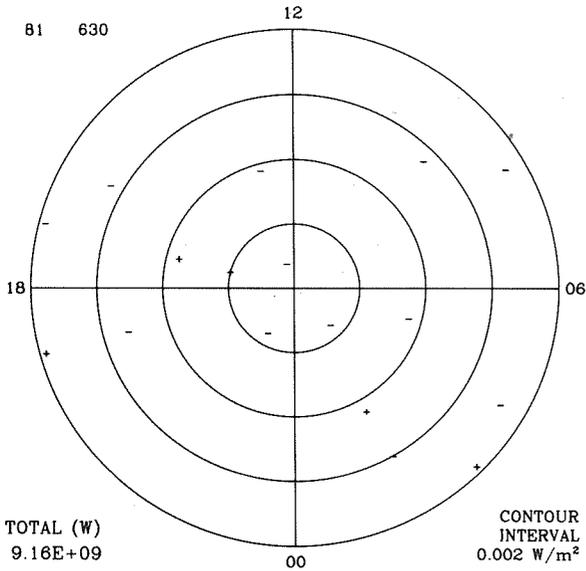
ELECTRIC POTENTIAL

81 630



JOULE HEAT RATE

81 630

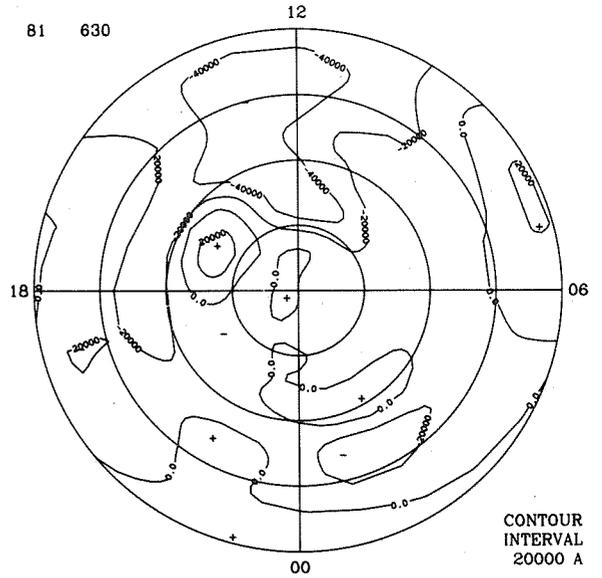


TOTAL (W)  
9.18E+09

CONTOUR  
INTERVAL  
0.002 W/m²

EQUIVALENT CURRENT SYSTEM

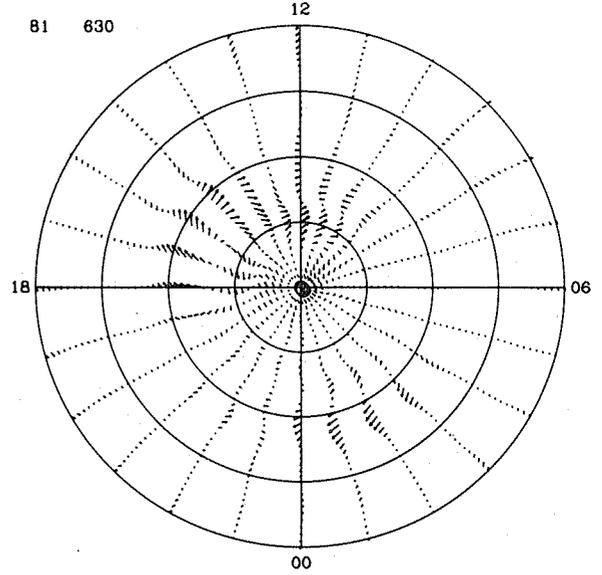
81 630



CONTOUR  
INTERVAL  
20000 A

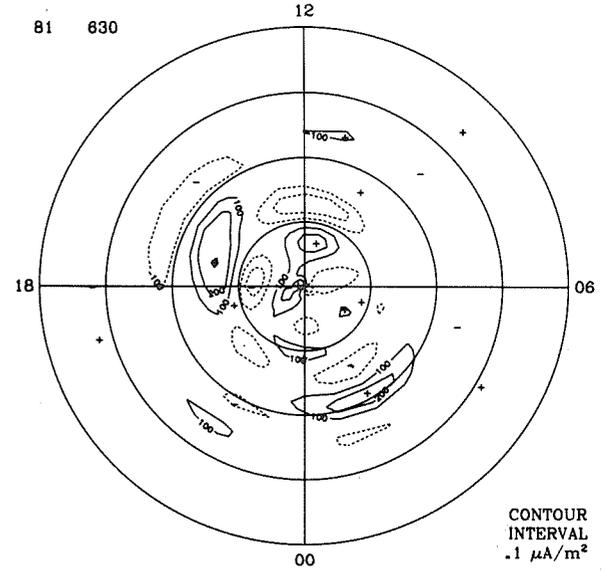
IONOSPHERIC CURRENT

81 630



FIELD-ALIGNED CURRENTS

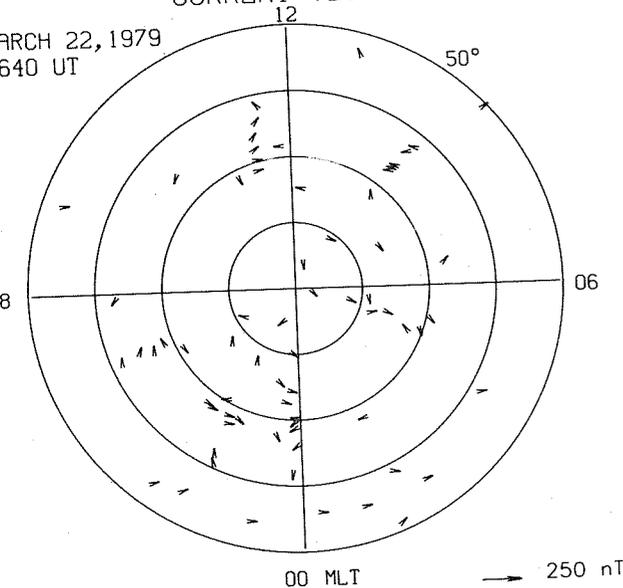
81 630



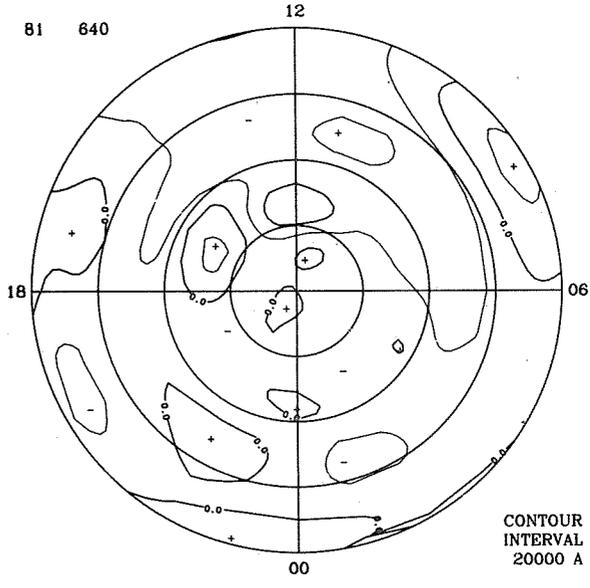
CONTOUR  
INTERVAL  
.1 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

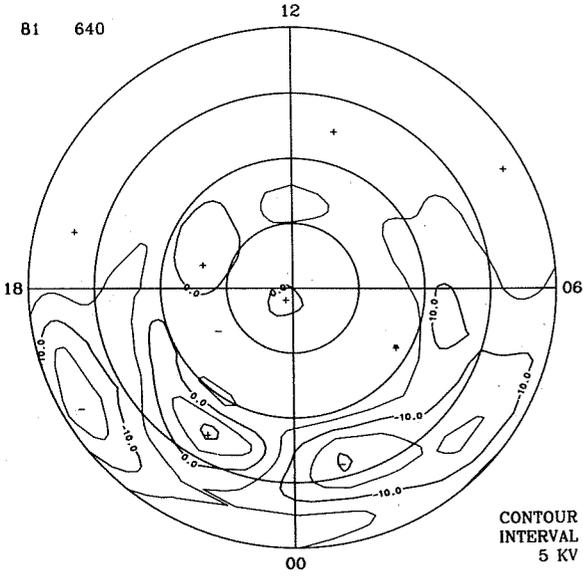
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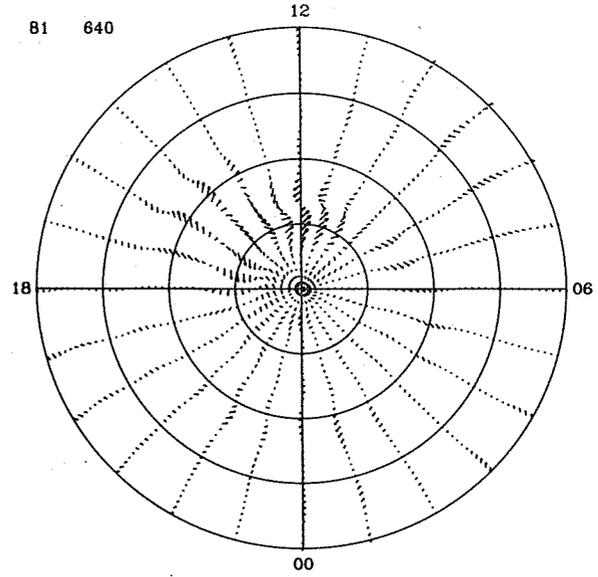
EQUIVALENT CURRENT SYSTEM



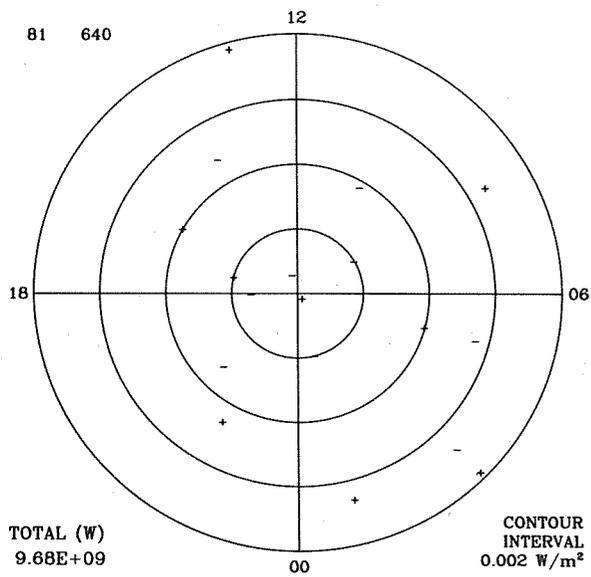
ELECTRIC POTENTIAL



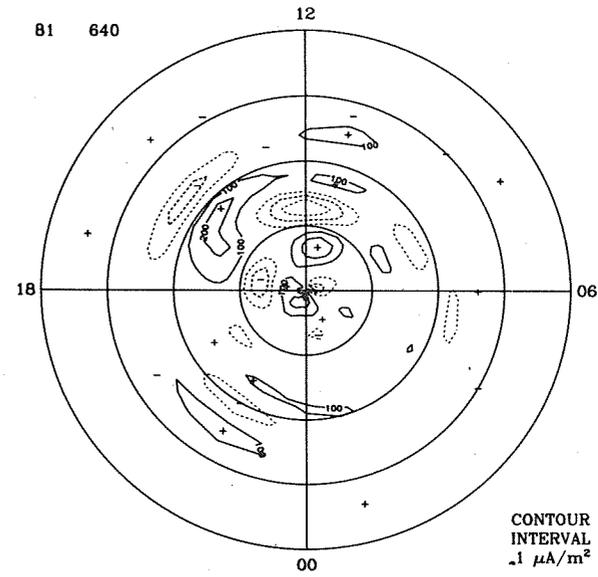
IONOSPHERIC CURRENT



JOULE HEAT RATE



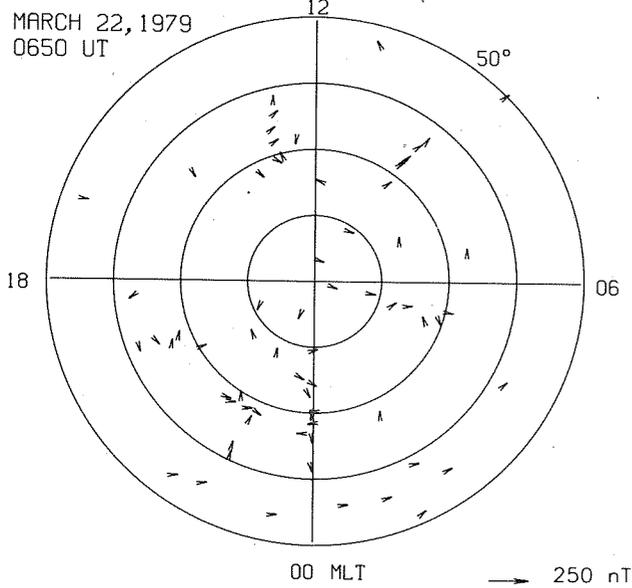
FIELD-ALIGNED CURRENTS



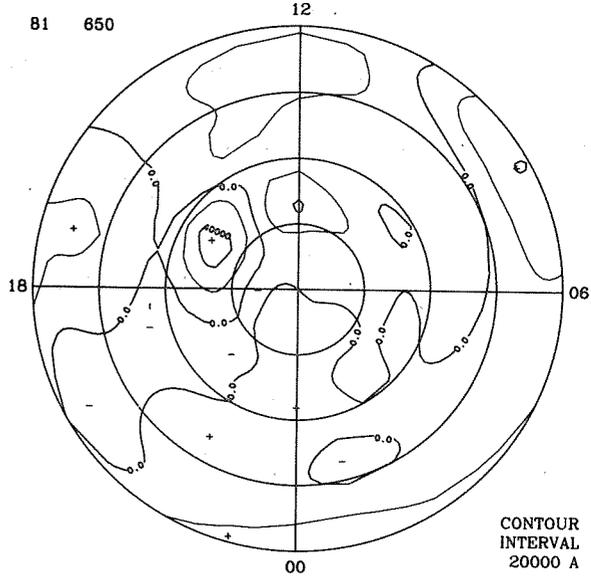
TOTAL (W)  
9.68E+09

OBSERVED EQUIVALENT  
CURRENT VECTORS

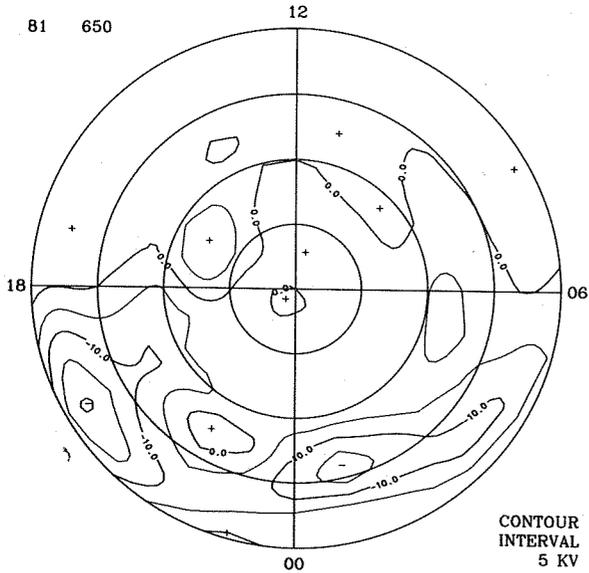
MARCH 22, 1979  
0650 UT



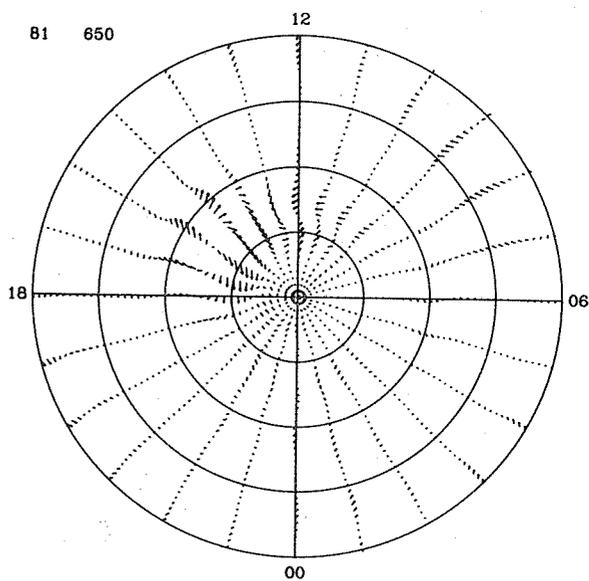
EQUIVALENT CURRENT SYSTEM



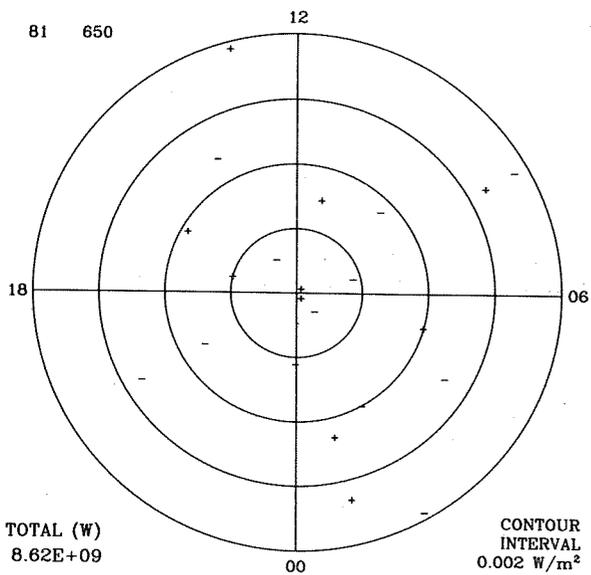
ELECTRIC POTENTIAL



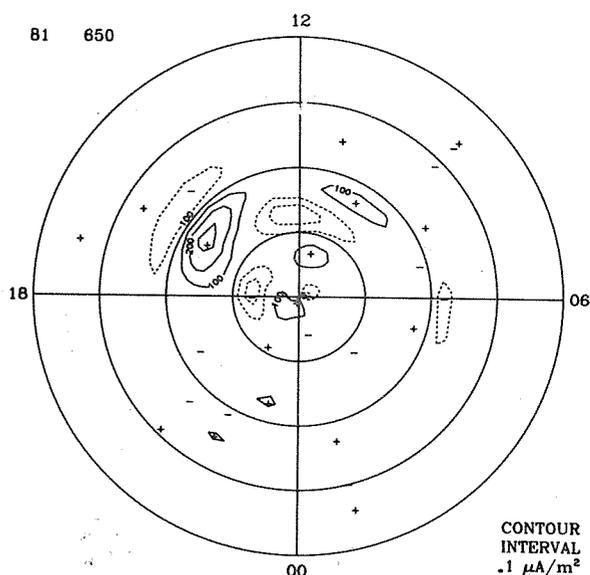
IONOSPHERIC CURRENT



JOULE HEAT RATE



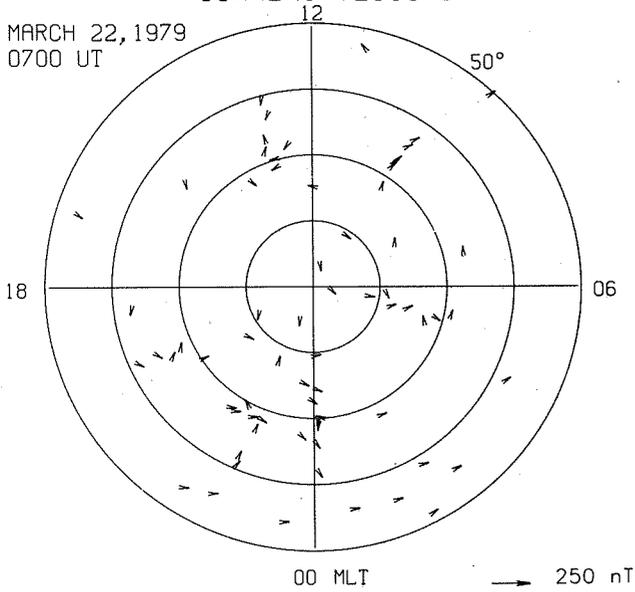
FIELD-ALIGNED CURRENTS



TOTAL (W)  
8.62E+09

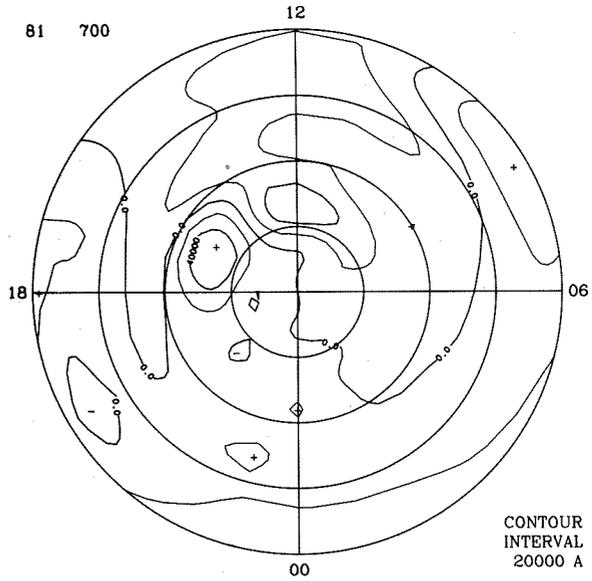
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0700 UT



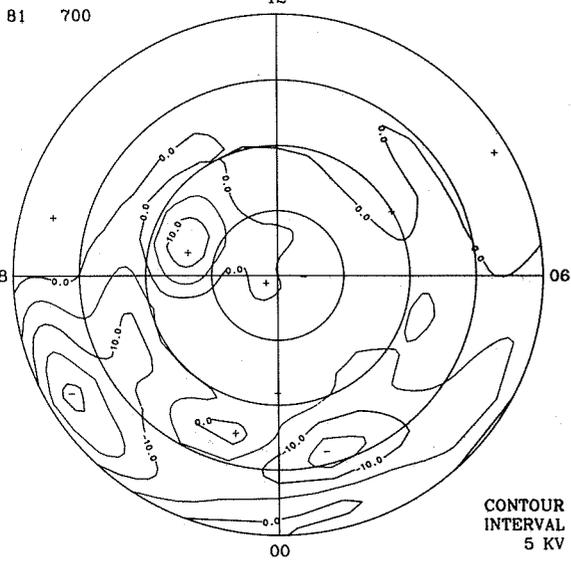
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



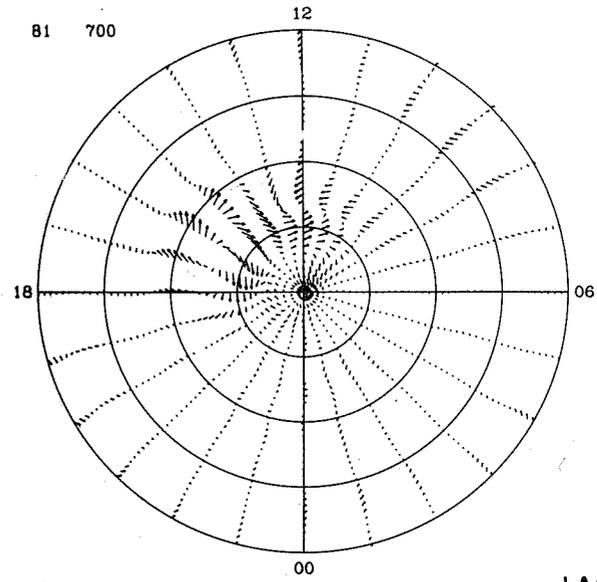
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



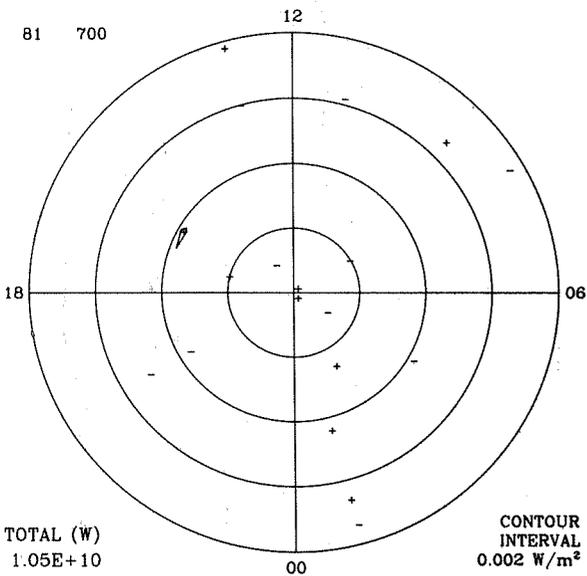
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



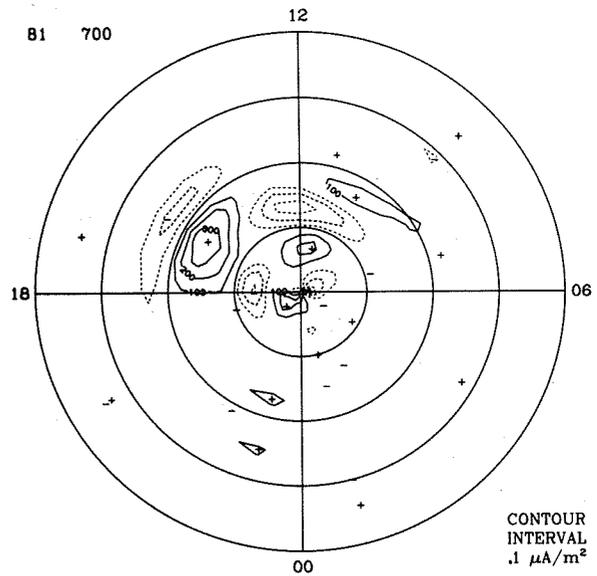
1 A/m

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

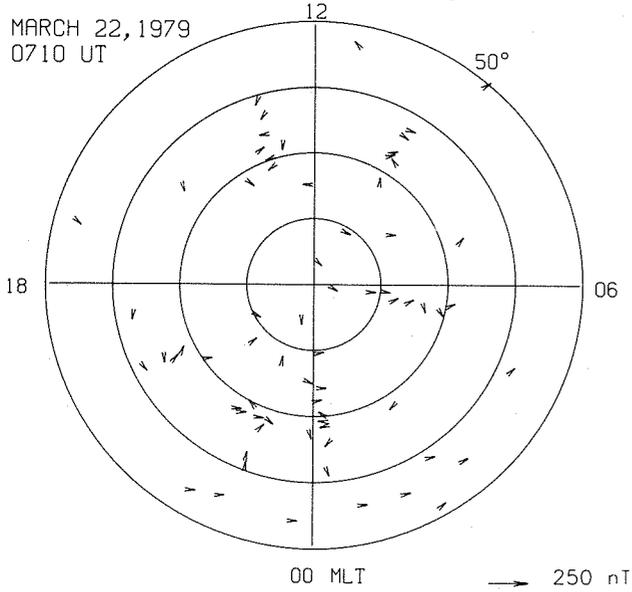
TOTAL (W)  
1.05E+10



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

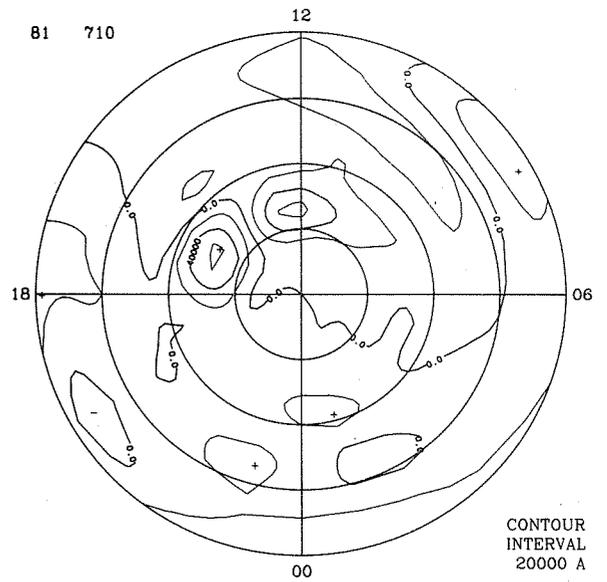
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0710 UT

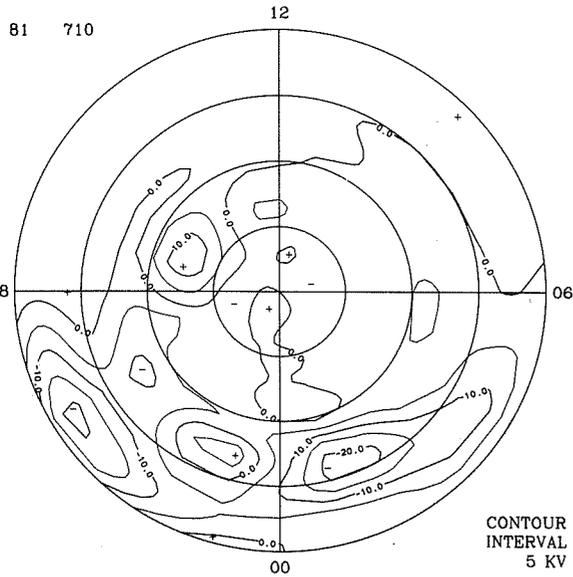


ELECTRIC POTENTIAL

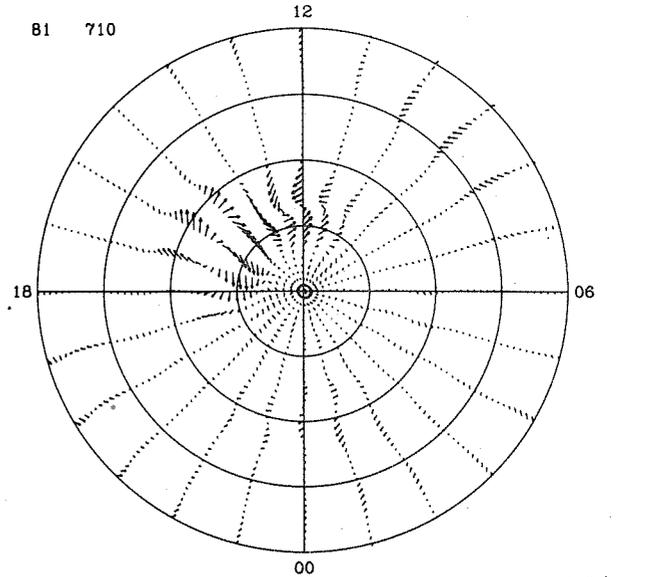
EQUIVALENT CURRENT SYSTEM



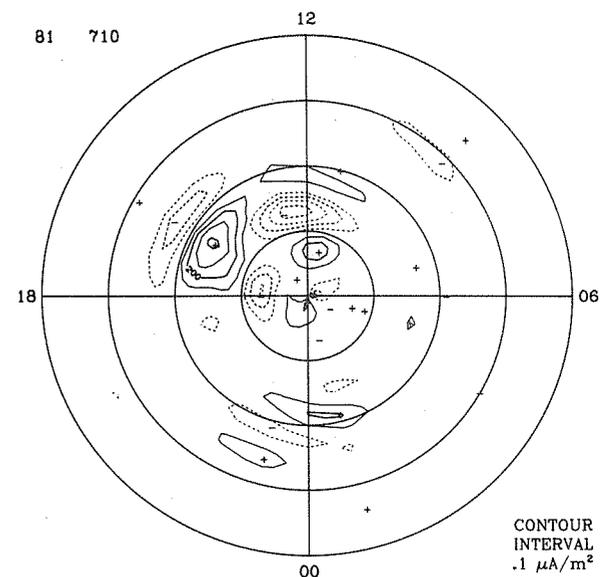
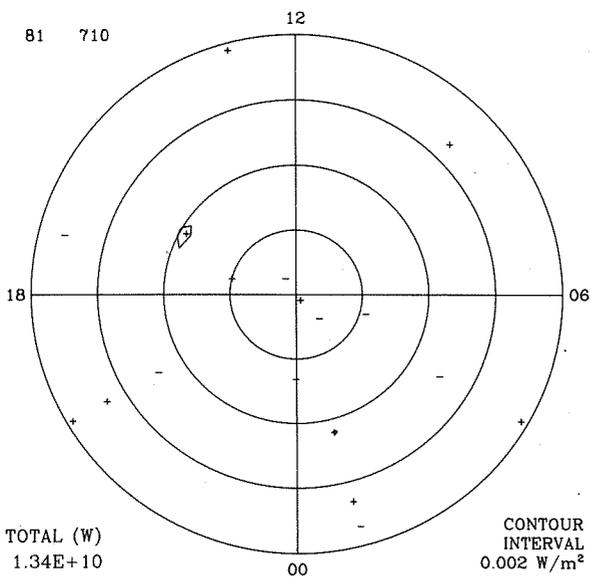
IONOSPHERIC CURRENT



JOULE HEAT RATE

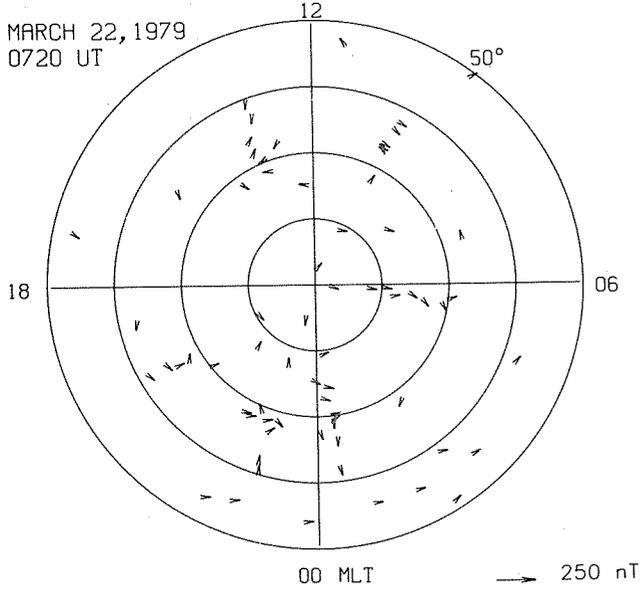


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

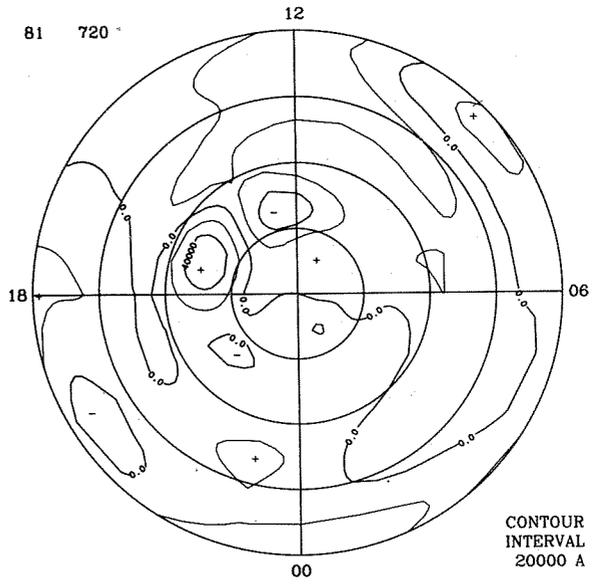
MARCH 22, 1979  
0720 UT



00 MLT  
ELECTRIC POTENTIAL

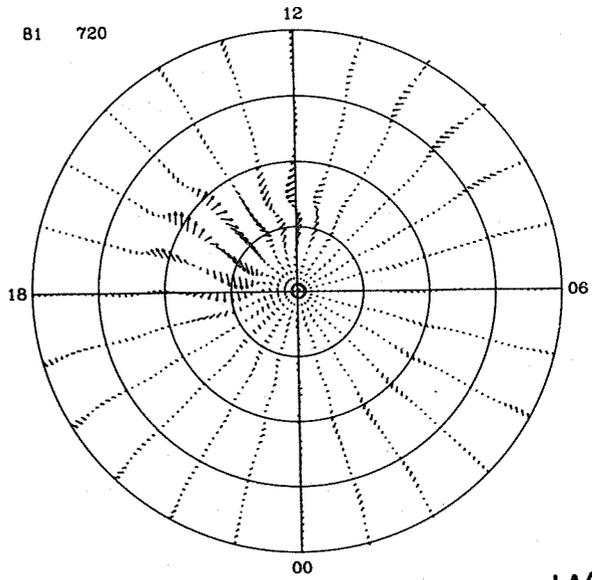
→ 250 nT

EQUIVALENT CURRENT SYSTEM



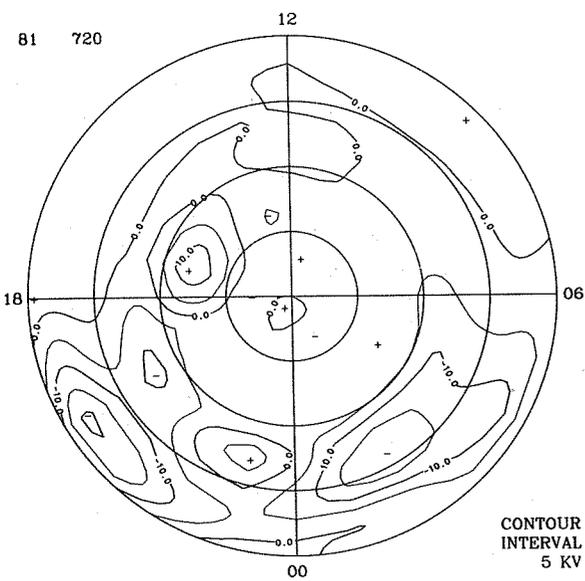
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



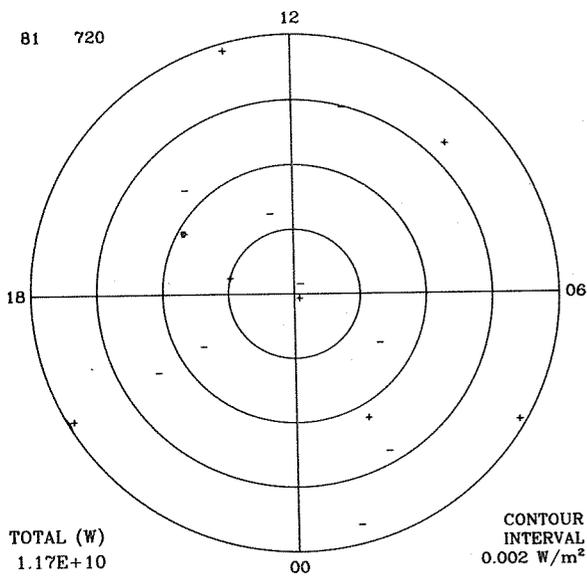
→ 1 A/m

FIELD-ALIGNED CURRENTS



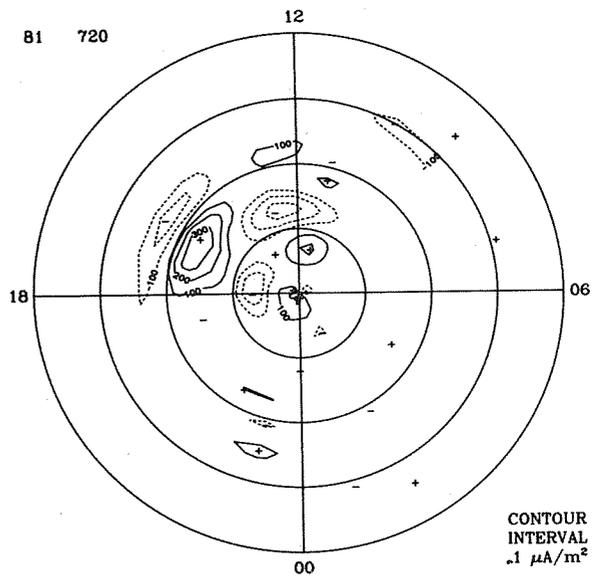
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



TOTAL (W)  
1.17E+10

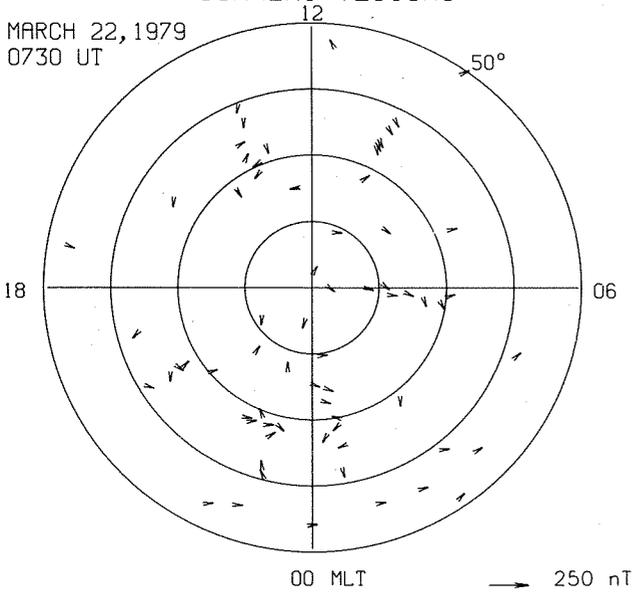
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



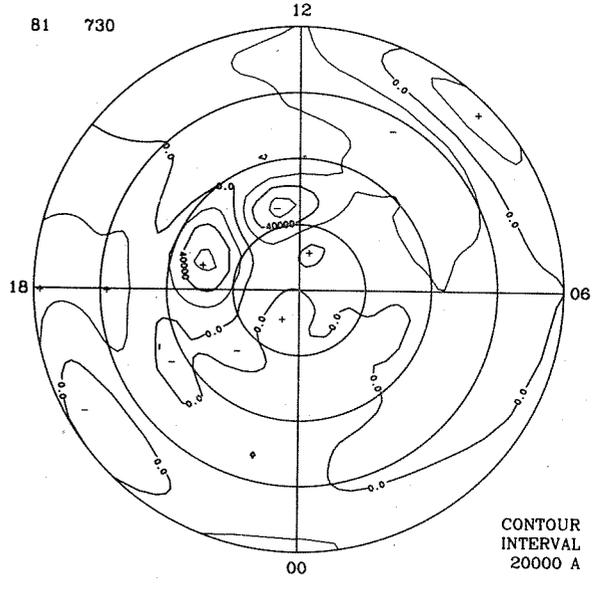
CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

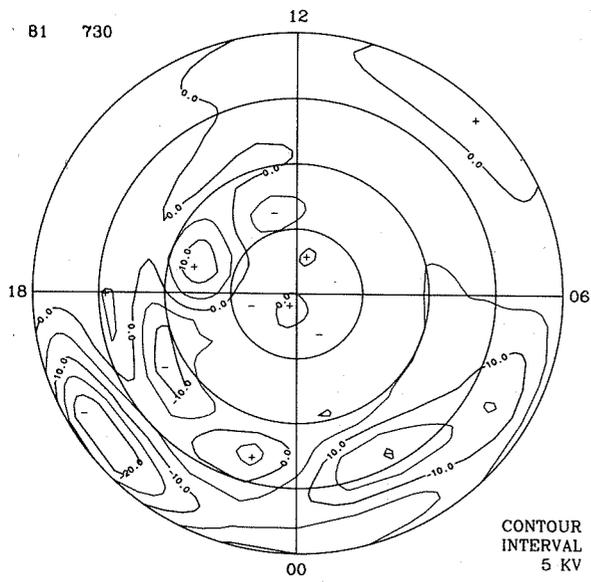
MARCH 22, 1979  
0730 UT



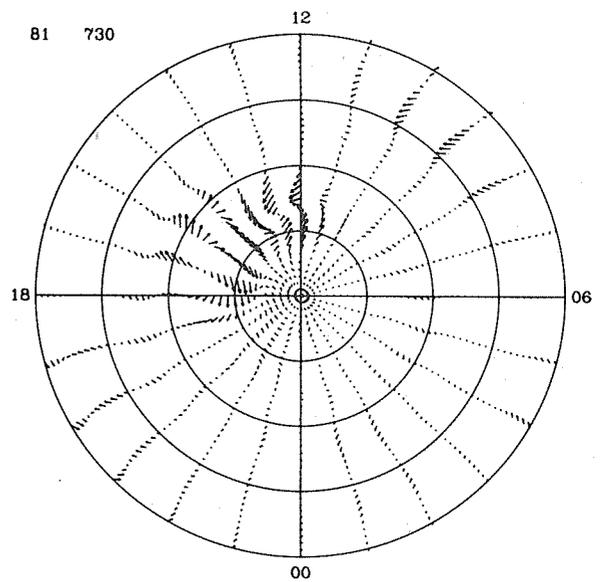
EQUIVALENT CURRENT SYSTEM



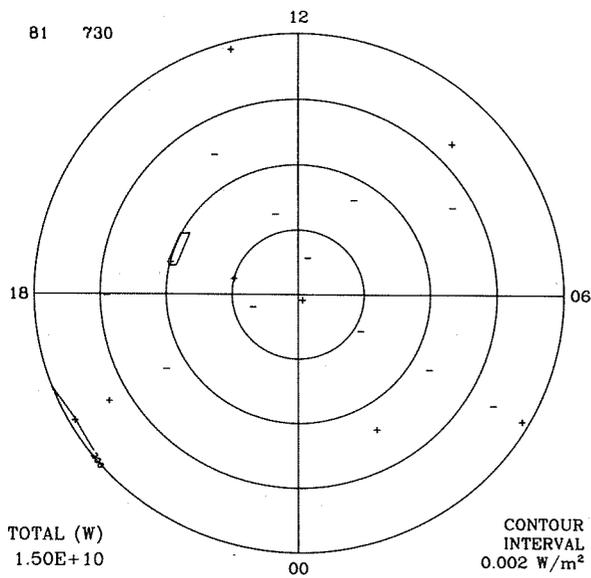
ELECTRIC POTENTIAL



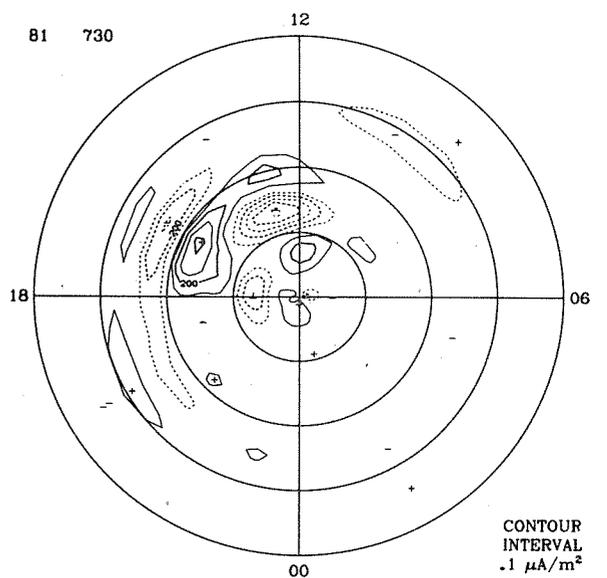
IONOSPHERIC CURRENT



JOULE HEAT RATE



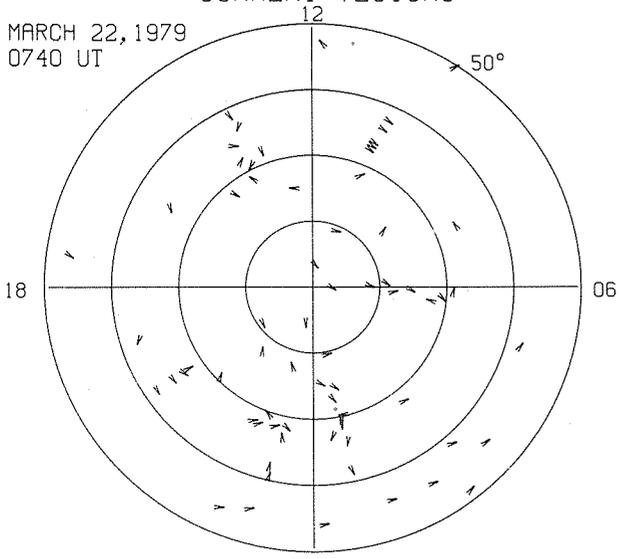
FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.50E+10

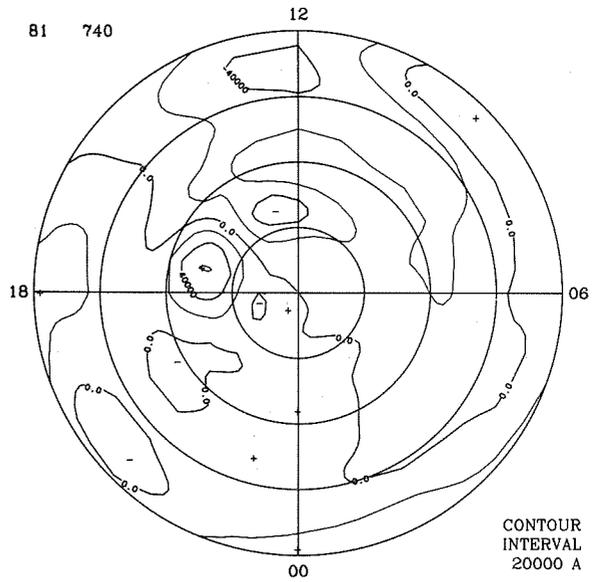
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0740 UT



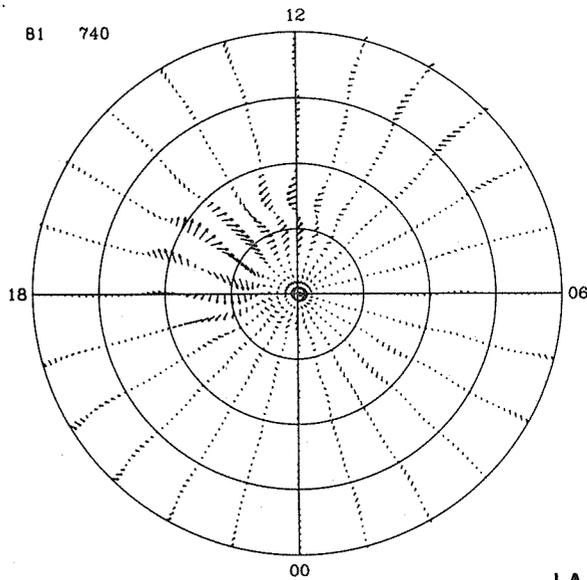
00 MLT → 250 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



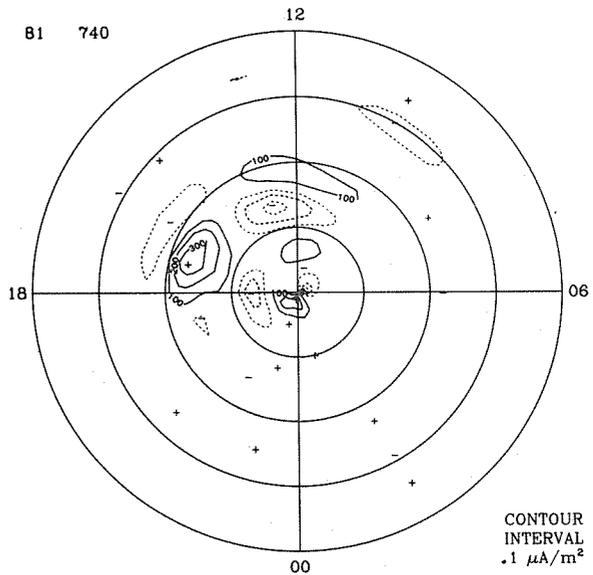
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



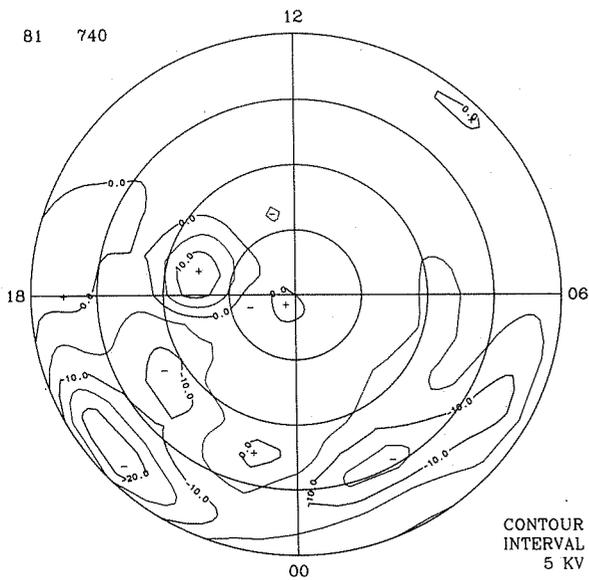
1 A/m →

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

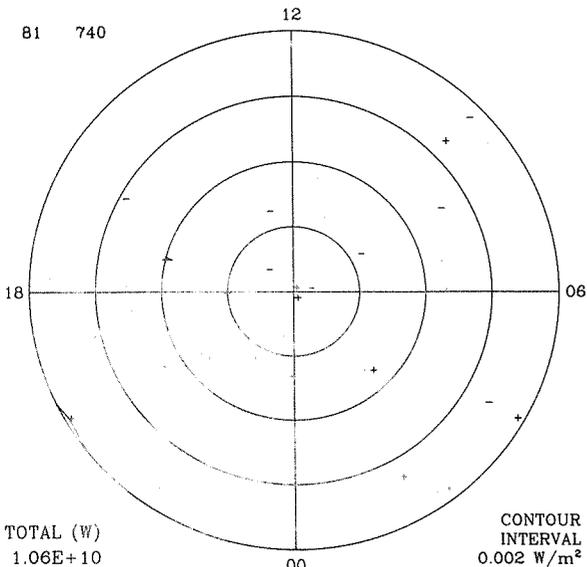
81 740



CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE

81 740

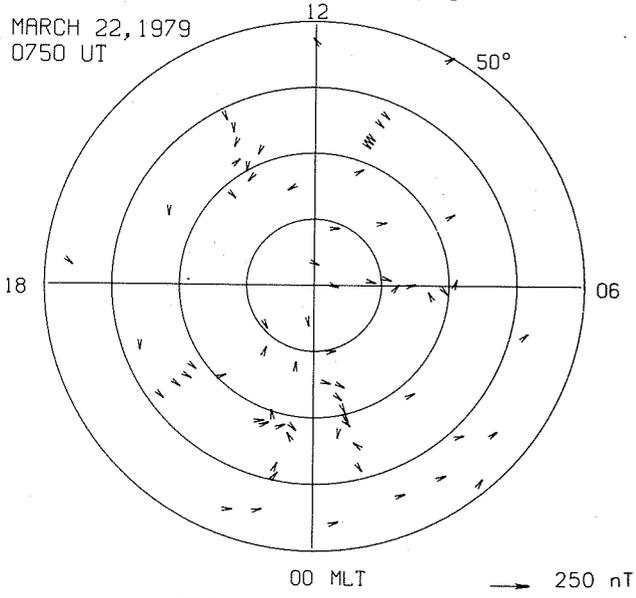


CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

TOTAL (W)  
1.06E+10

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0750 UT

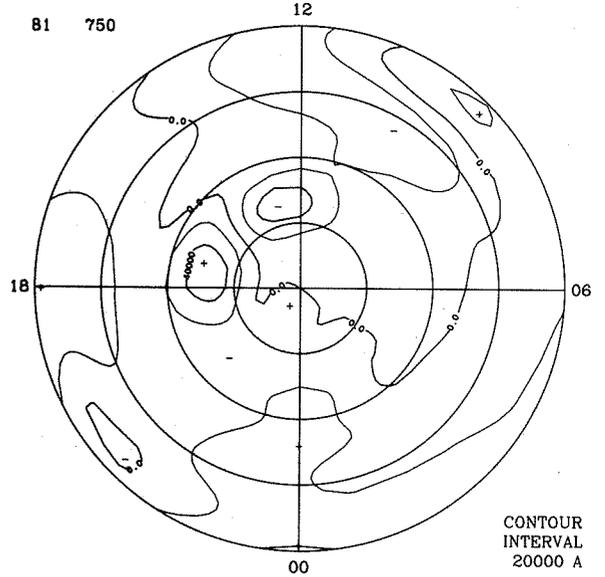


00 MLT

→ 250 nT

EQUIVALENT CURRENT SYSTEM

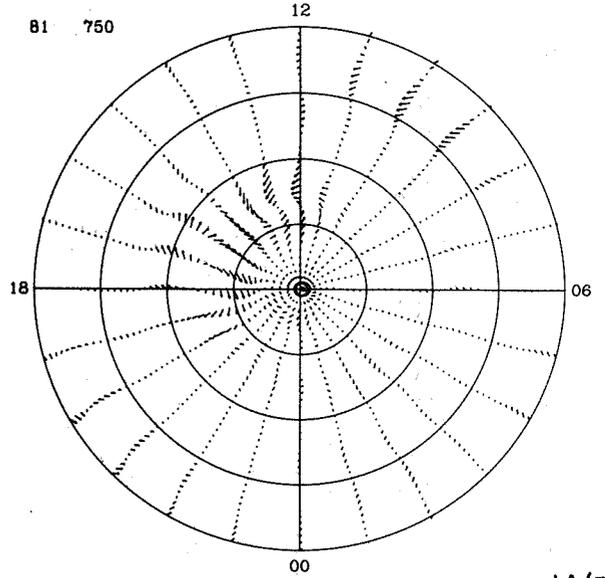
81 750



CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT

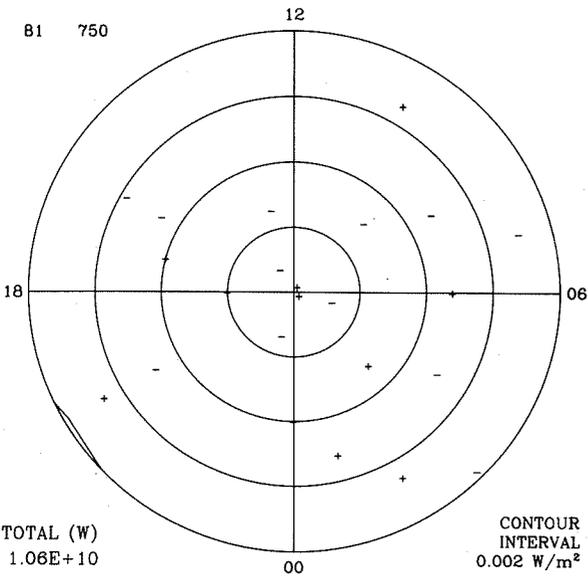
81 750



1 A/m →

JOULE HEAT RATE

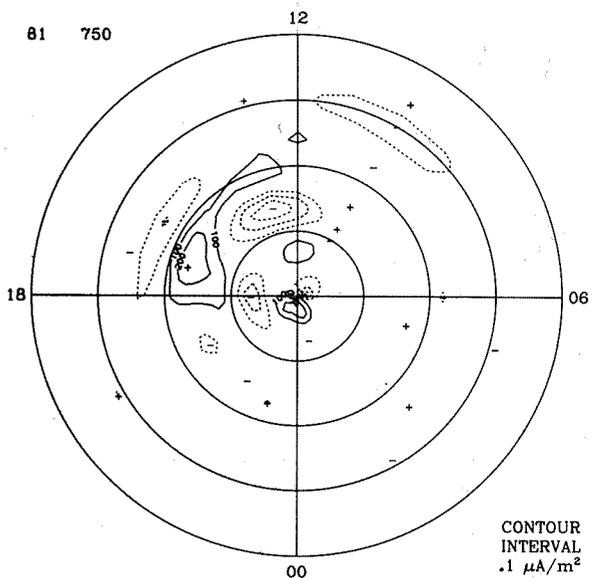
81 750



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

81 750

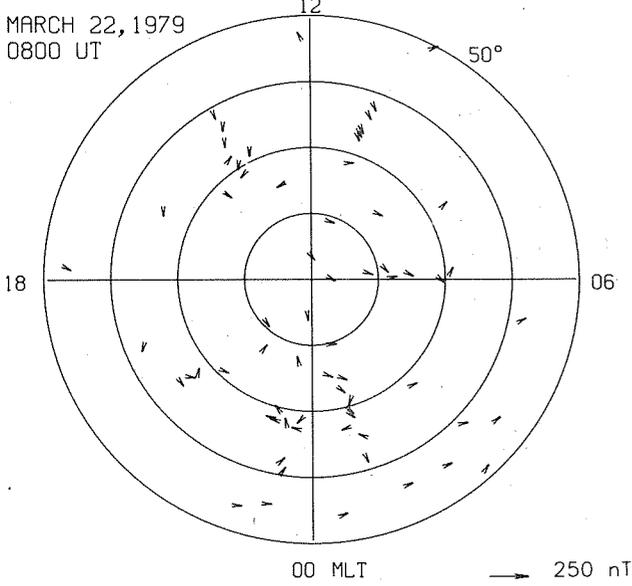


CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

TOTAL (W)  
1.08E+10

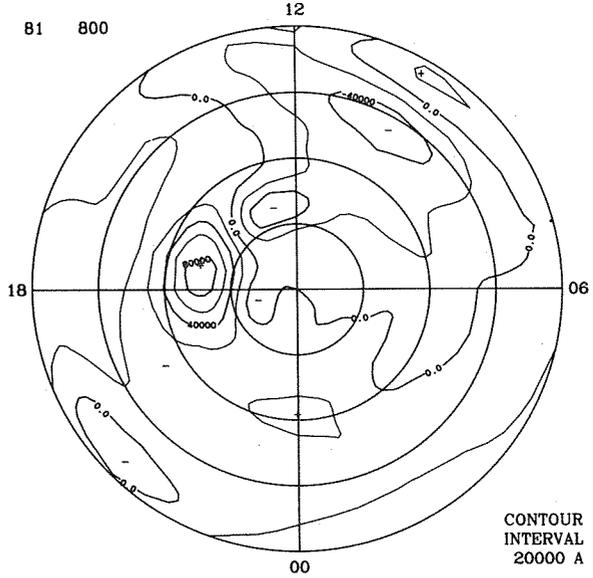
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0800 UT



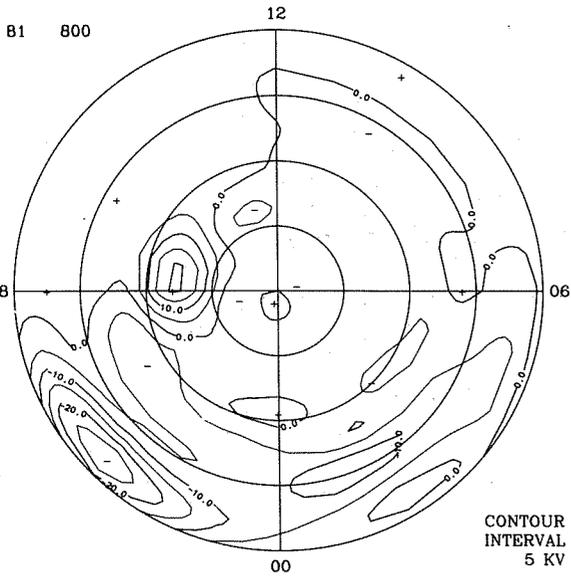
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



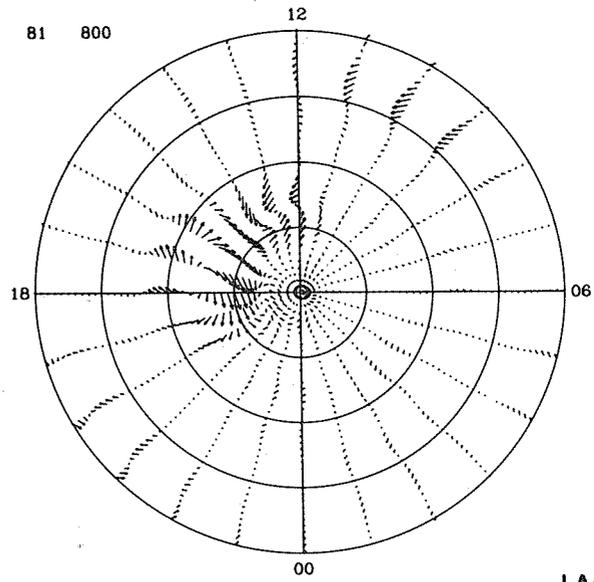
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



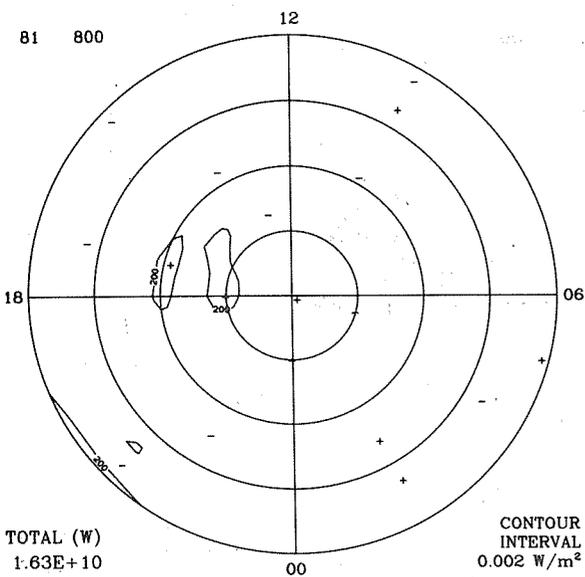
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



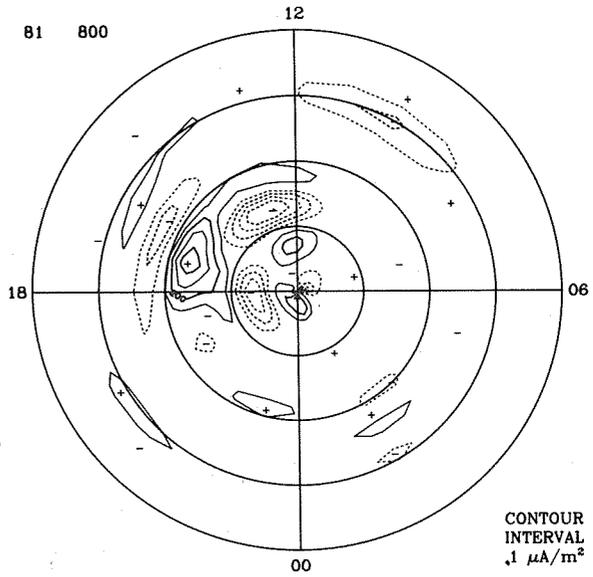
1 A/m

FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.63E+10

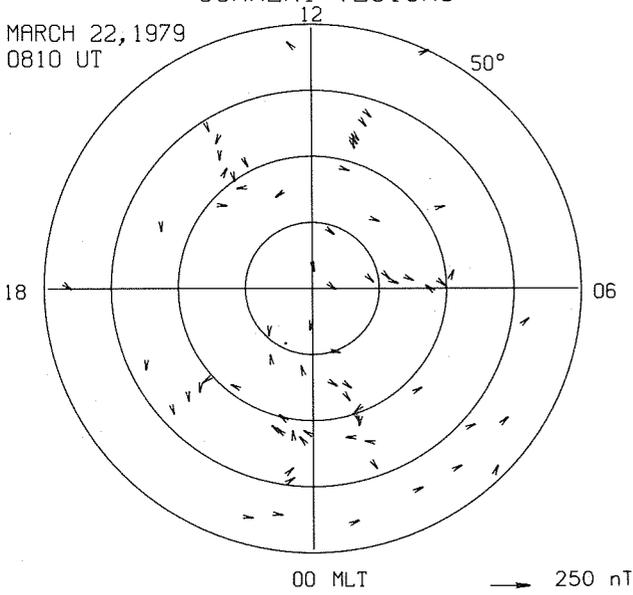
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
1 μA/m<sup>2</sup>

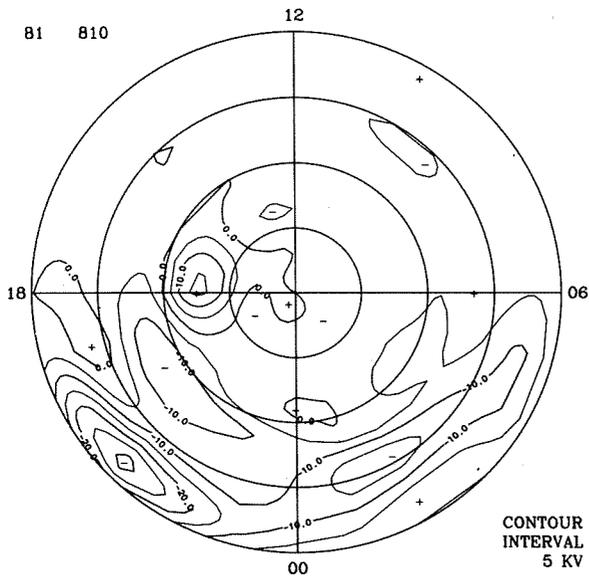
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0810 UT



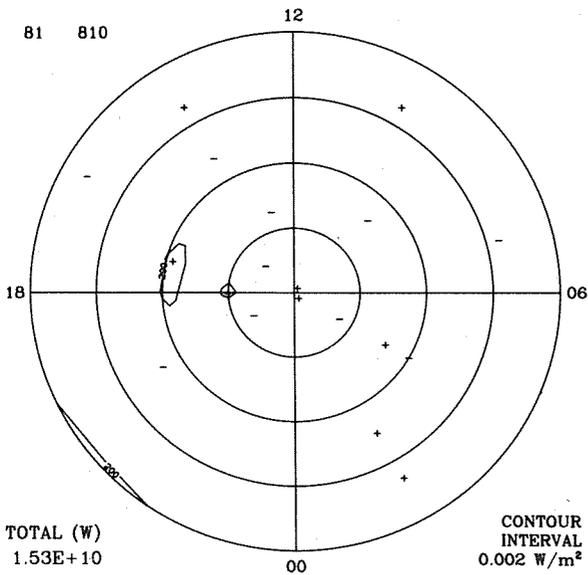
ELECTRIC POTENTIAL

81 810



JOULE HEAT RATE

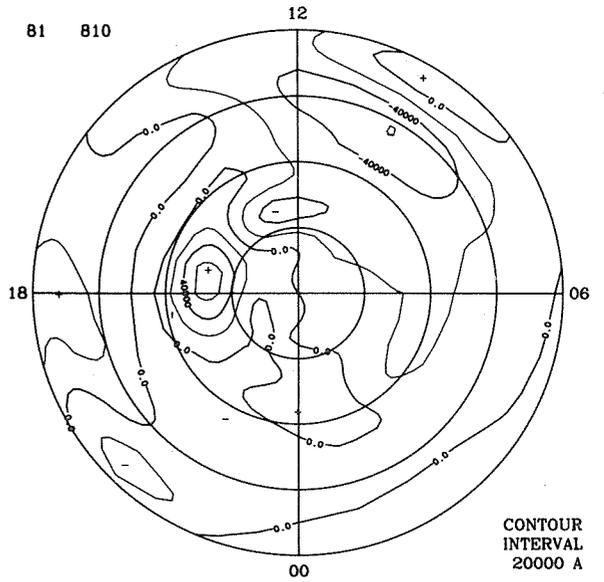
81 810



TOTAL (W)  
1.53E+10

CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

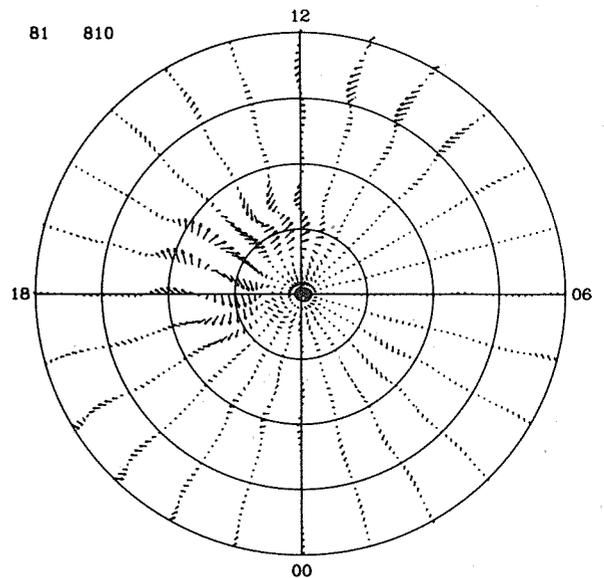
EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
20000 A

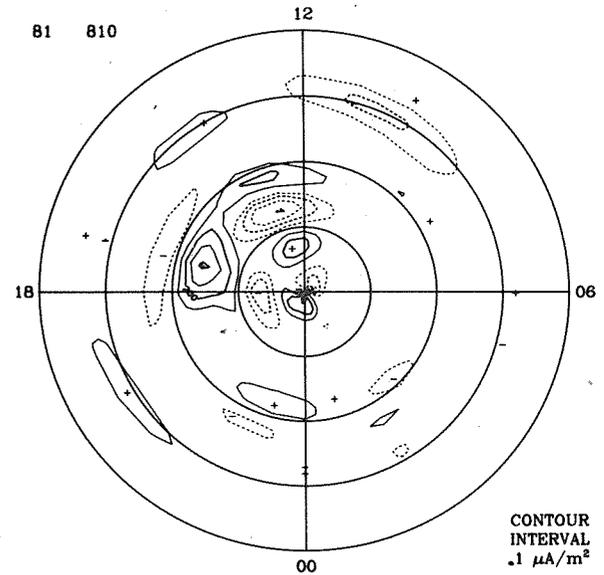
IONOSPHERIC CURRENT

81 810



FIELD-ALIGNED CURRENTS

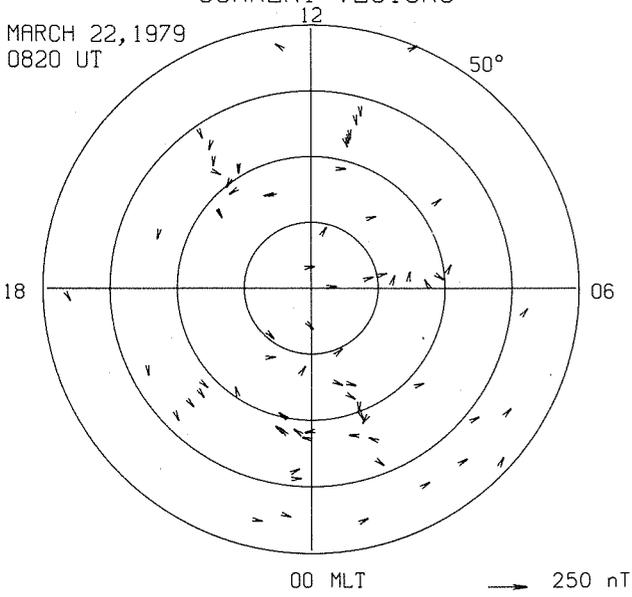
81 810



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

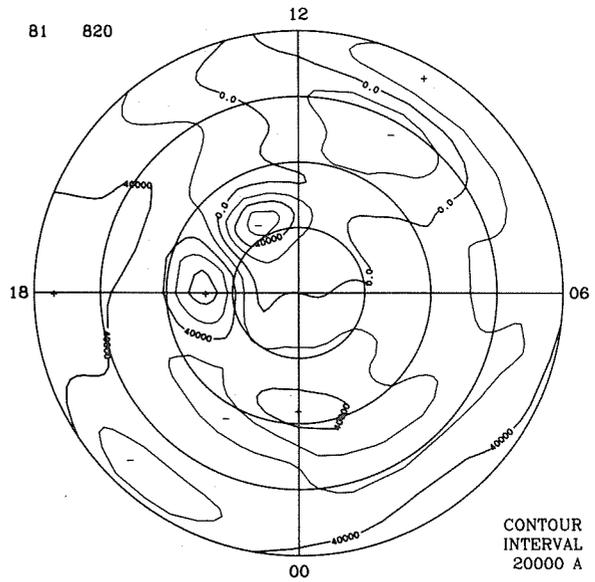
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0820 UT



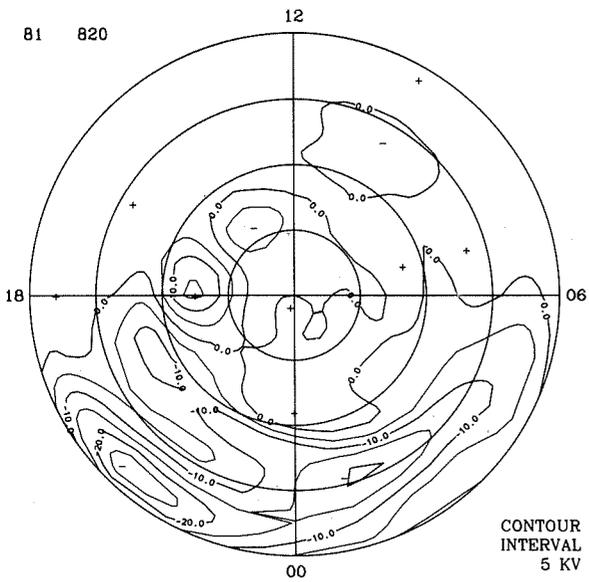
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



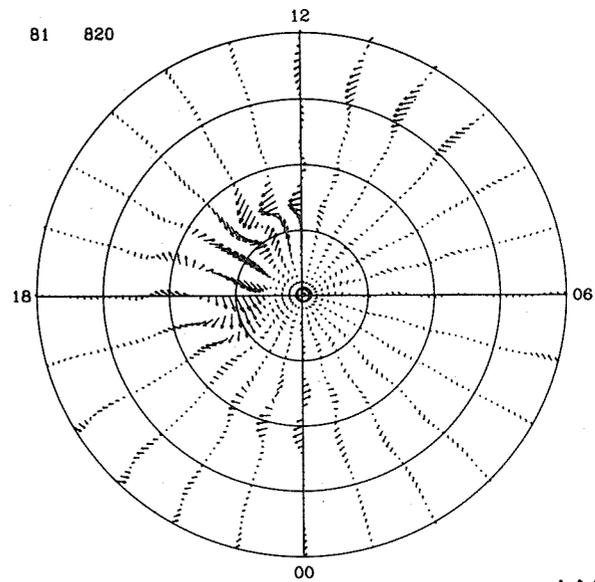
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



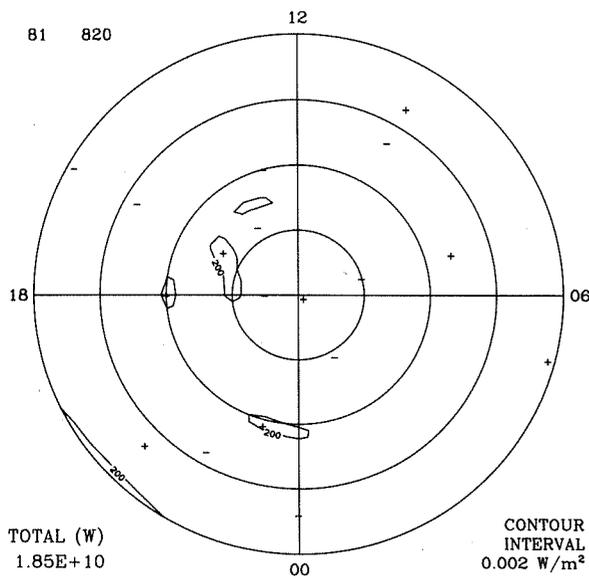
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



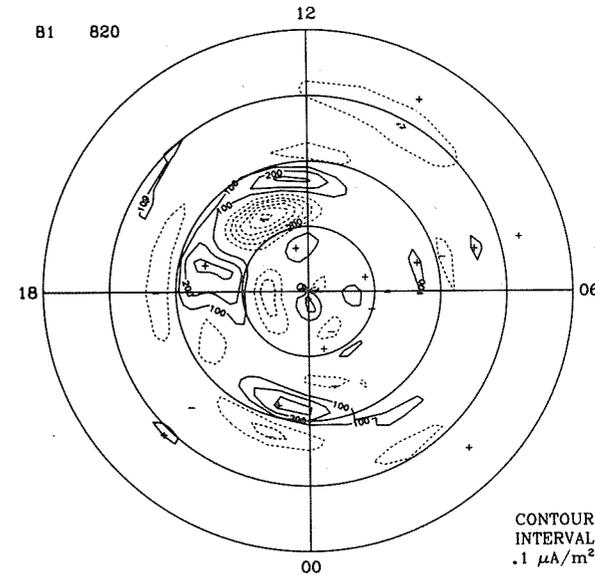
1 A/m

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

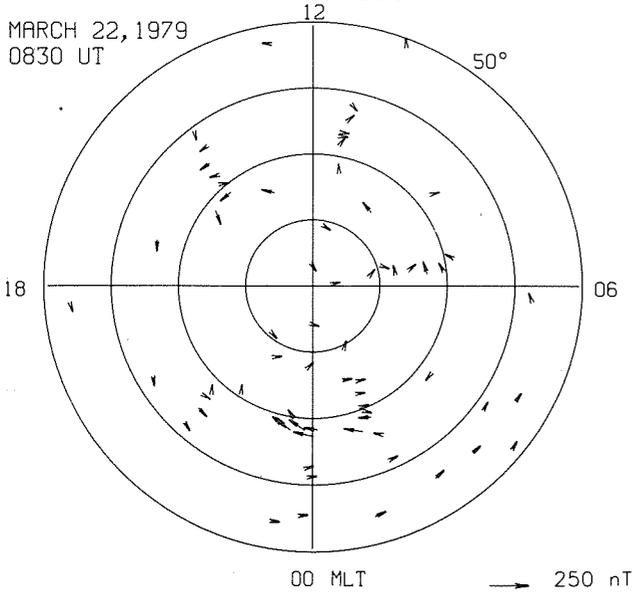
TOTAL (W)  
1.85E+10



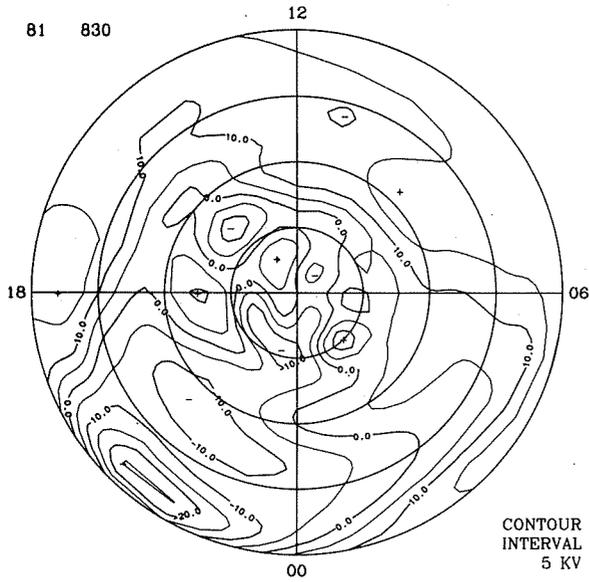
CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

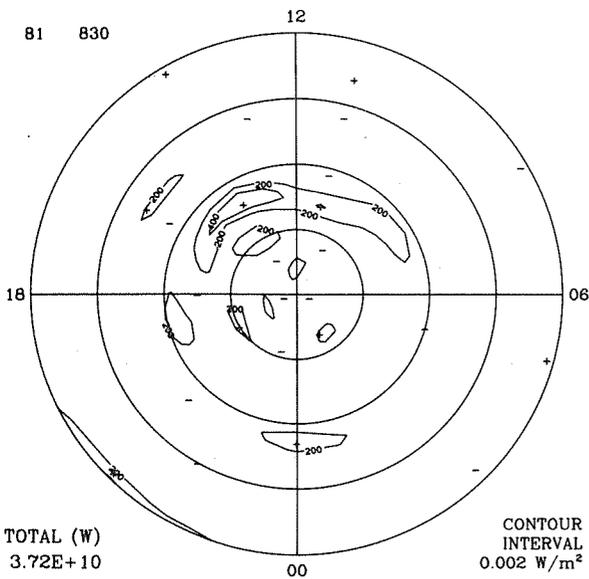
MARCH 22, 1979  
0830 UT



ELECTRIC POTENTIAL



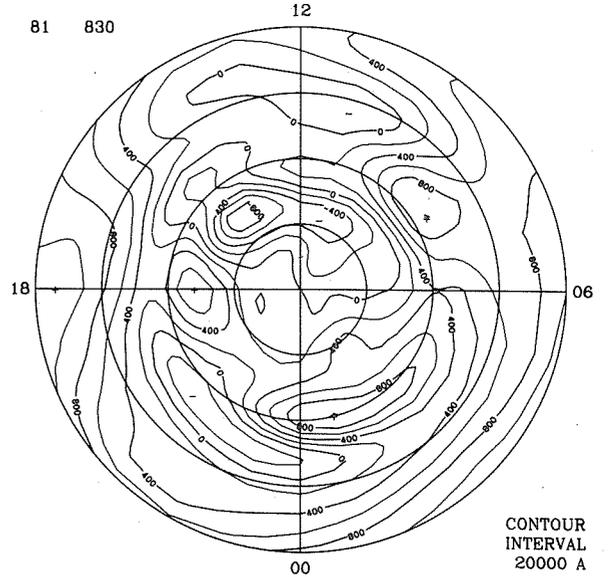
JOULE HEAT RATE



TOTAL (W)  
3.72E+10

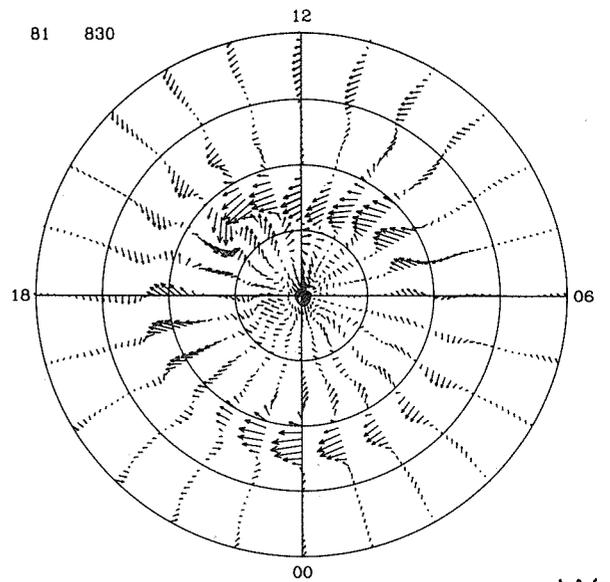
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

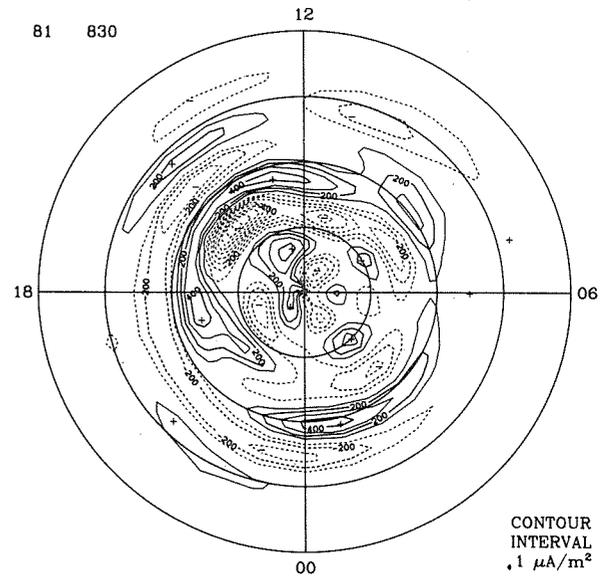


CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



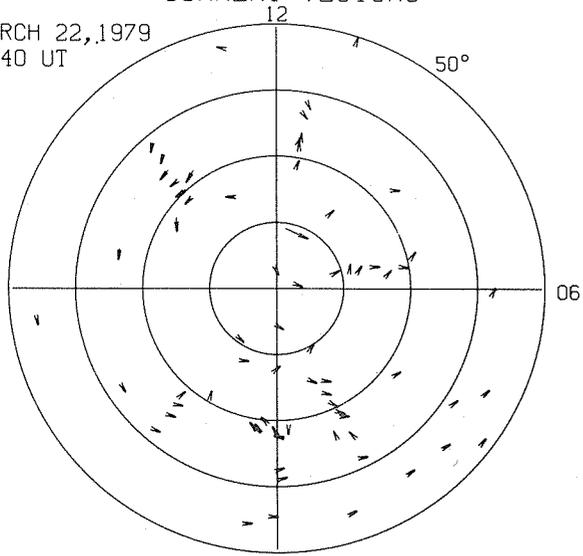
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

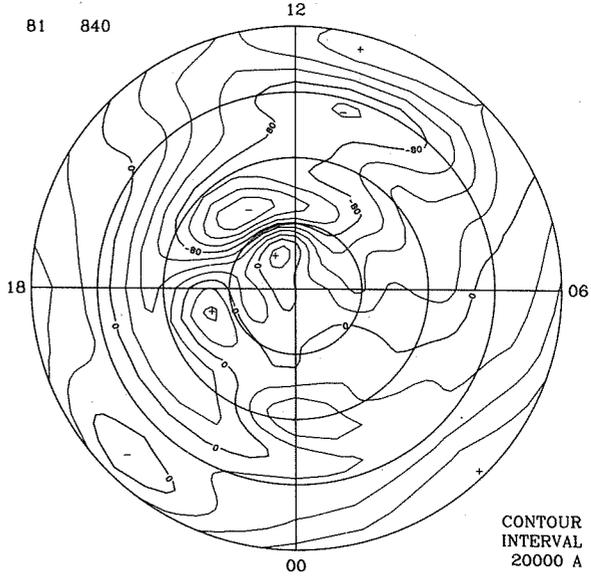
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0840 UT

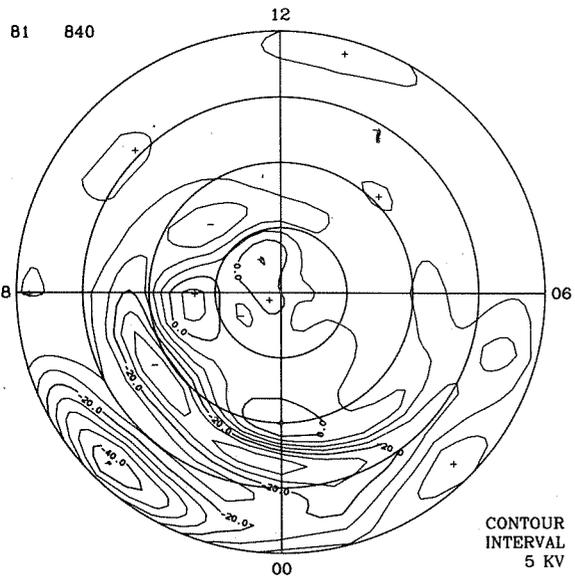


00 MLT → 250 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

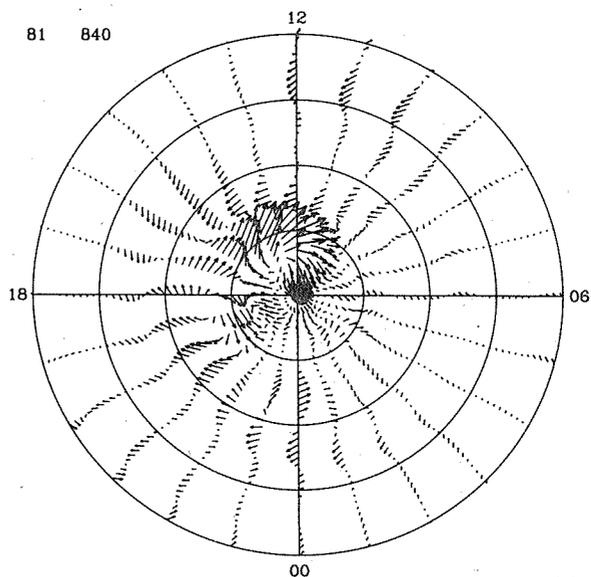


CONTOUR  
INTERVAL  
20000 A

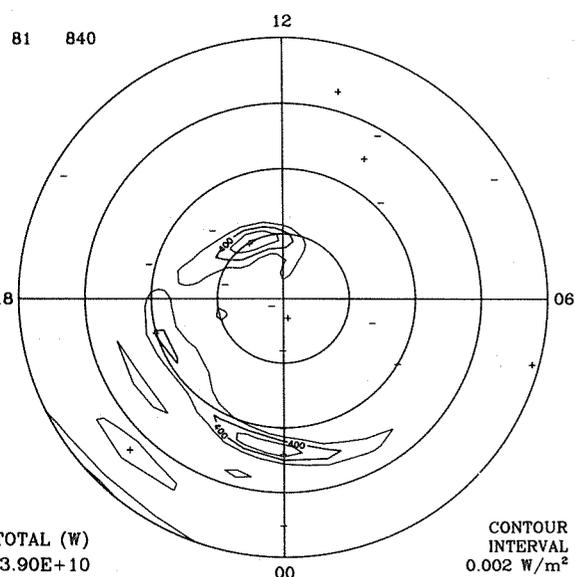


CONTOUR  
INTERVAL  
5 KV

IONOSPHERIC CURRENT

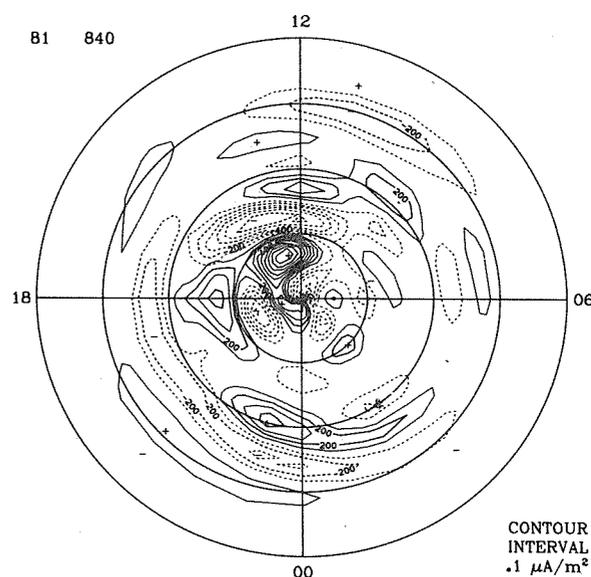


1 A/m



TOTAL (W)  
3.90E+10  
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

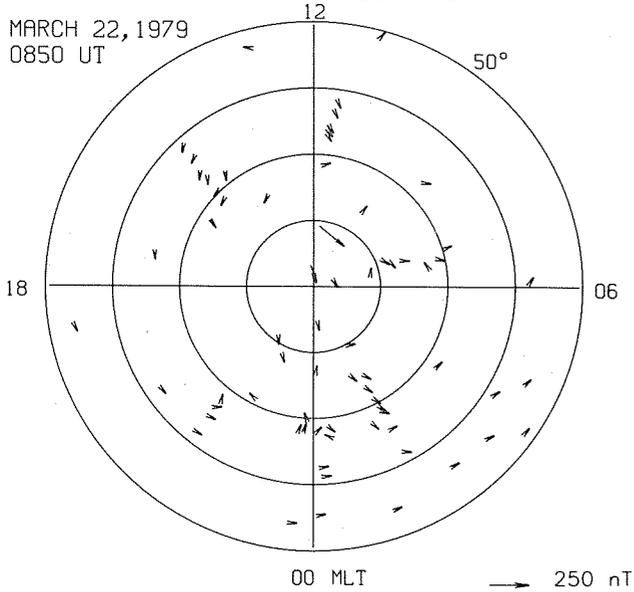
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

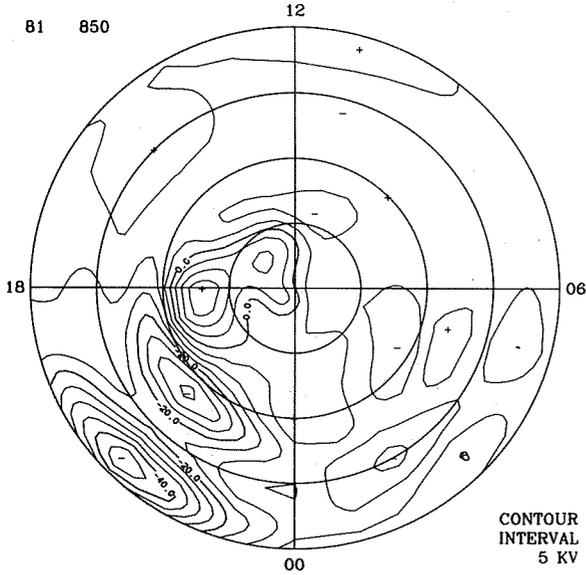
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0850 UT



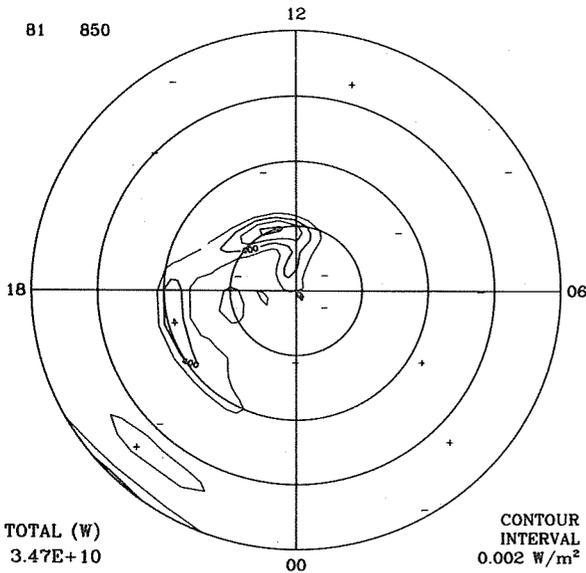
ELECTRIC POTENTIAL

B1 850



JOULE HEAT RATE

B1 850

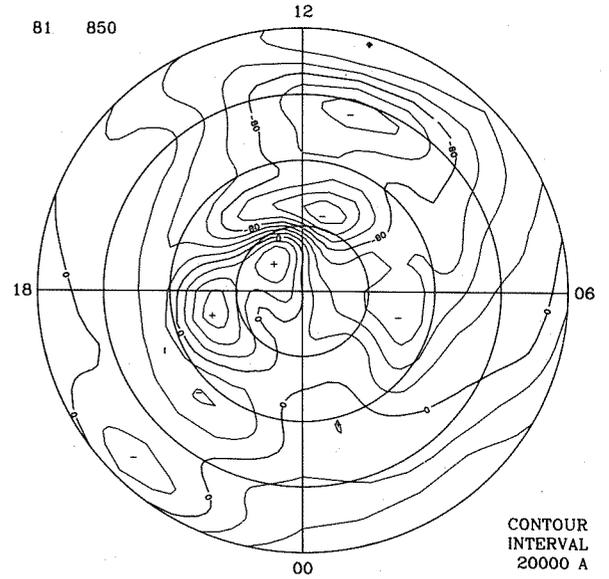


TOTAL (W)  
3.47E+10

CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

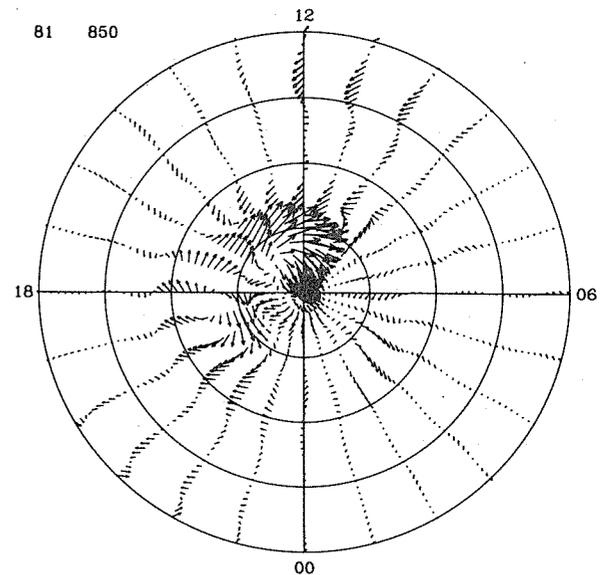
B1 850



CONTOUR  
INTERVAL  
20000 A

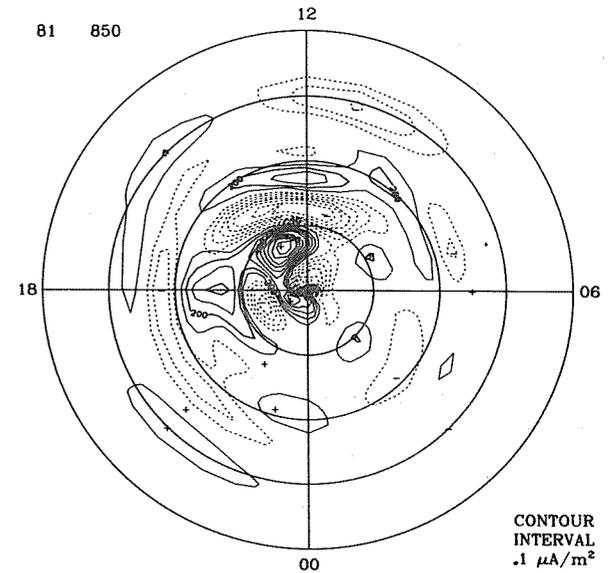
IONOSPHERIC CURRENT

B1 850



FIELD-ALIGNED CURRENTS

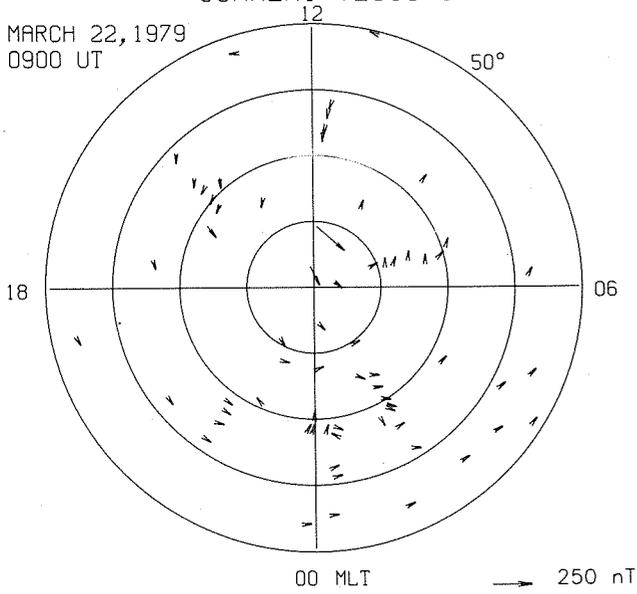
B1 850



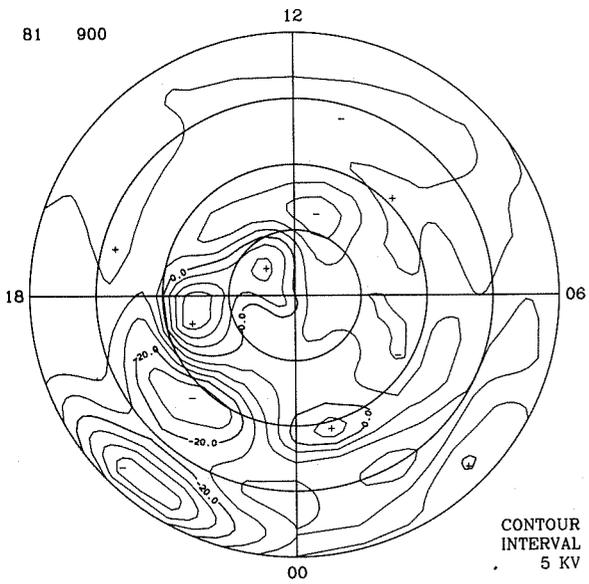
CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

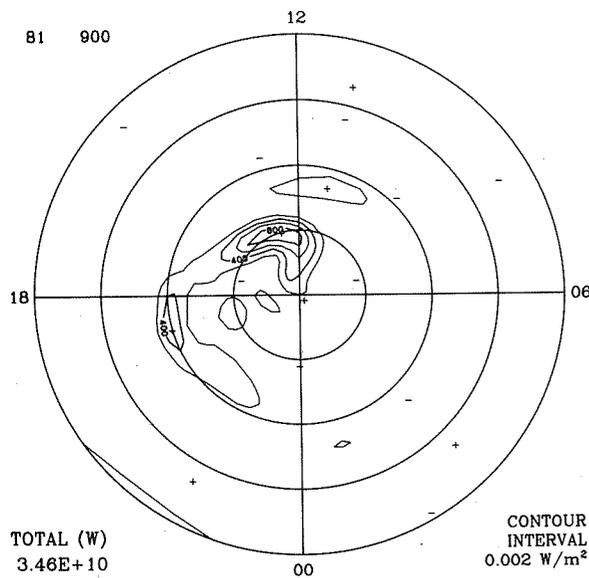
MARCH 22, 1979  
0900 UT



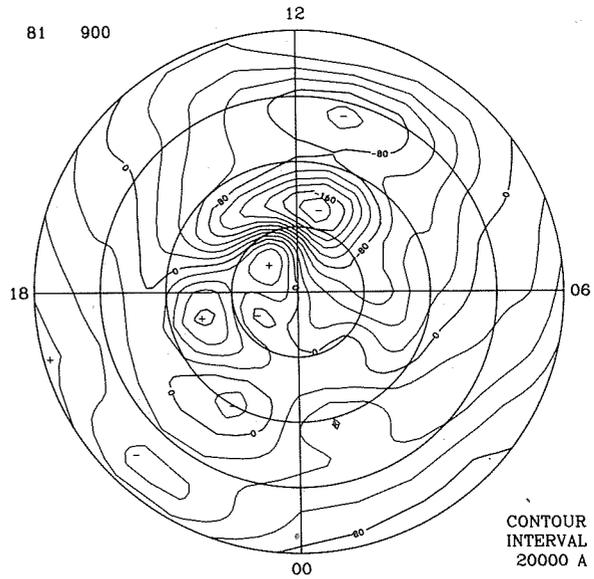
ELECTRIC POTENTIAL



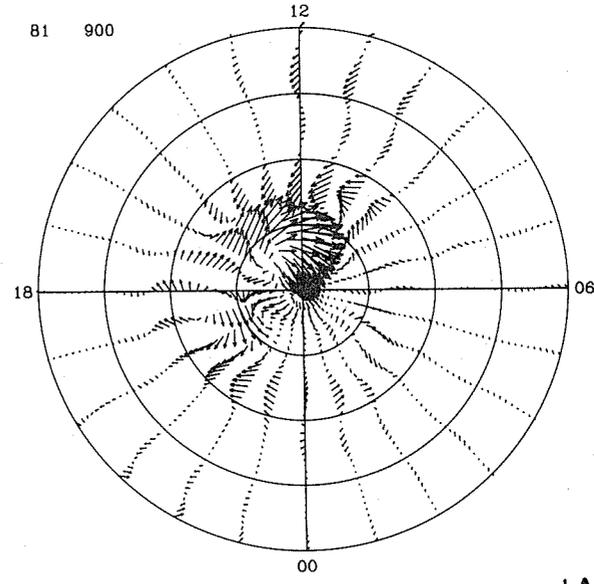
JOULE HEAT RATE



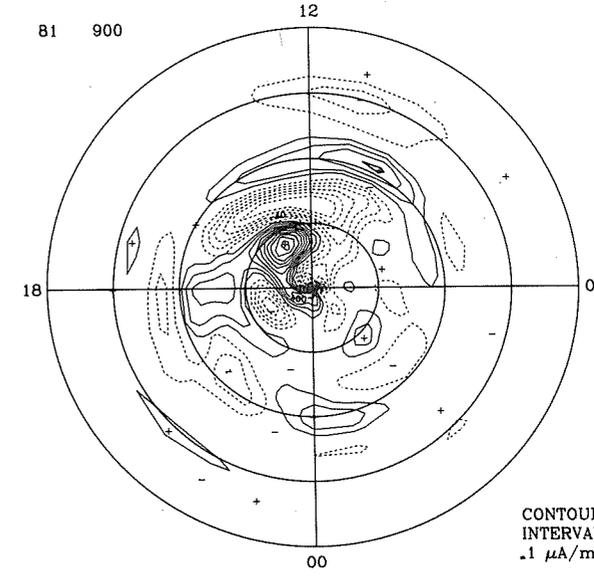
EQUIVALENT CURRENT SYSTEM



IONOSPHERIC CURRENT

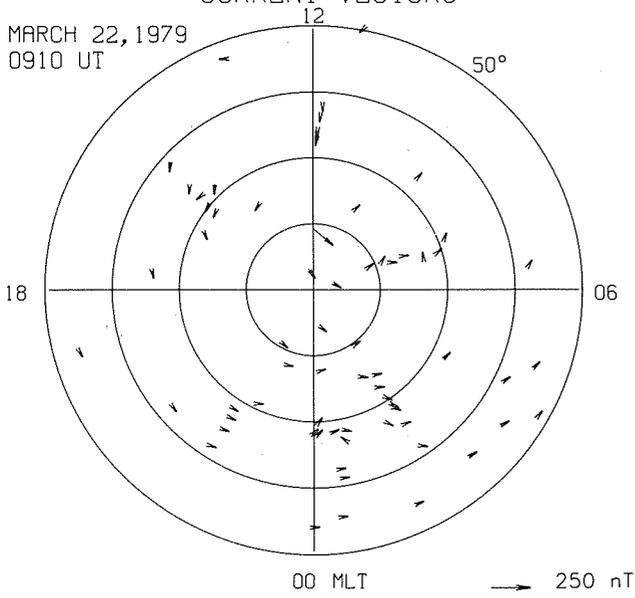


FIELD-ALIGNED CURRENTS



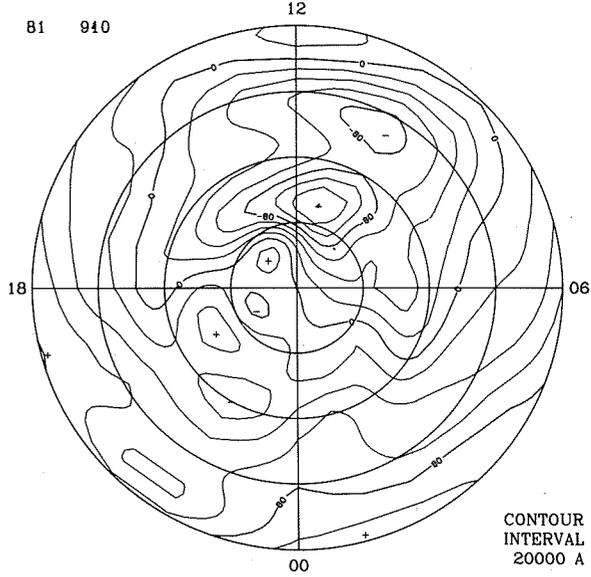
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0910 UT



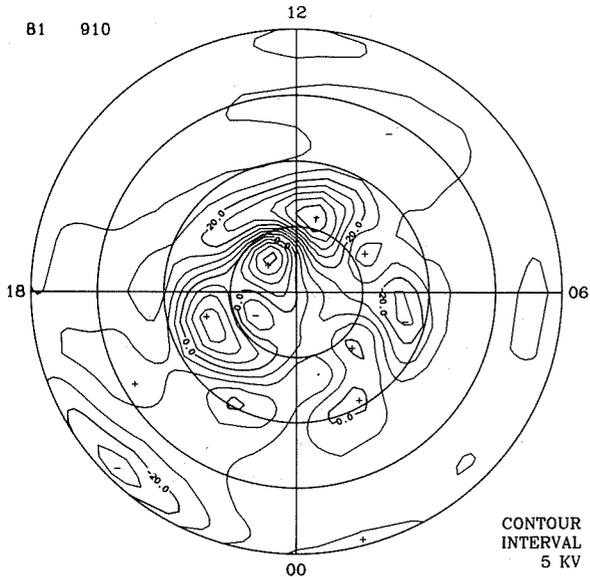
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



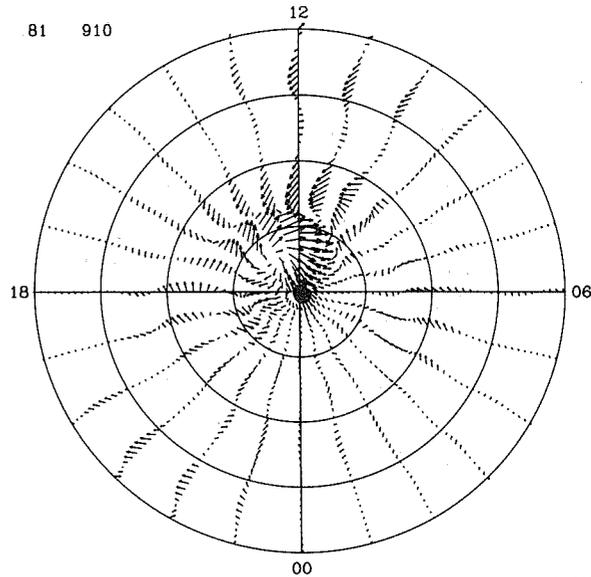
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



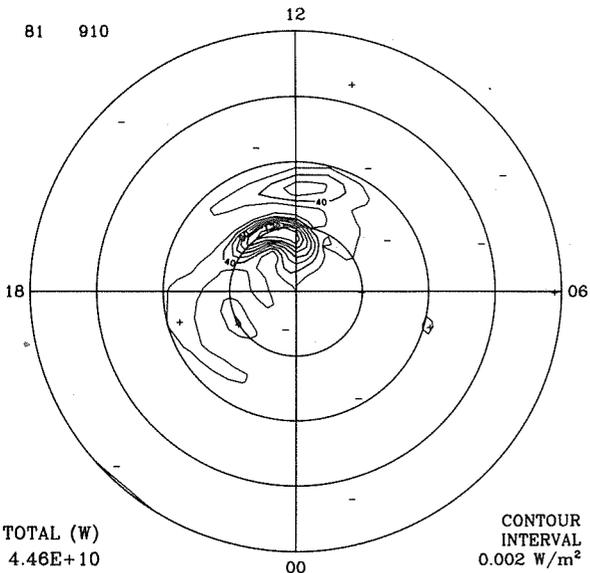
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



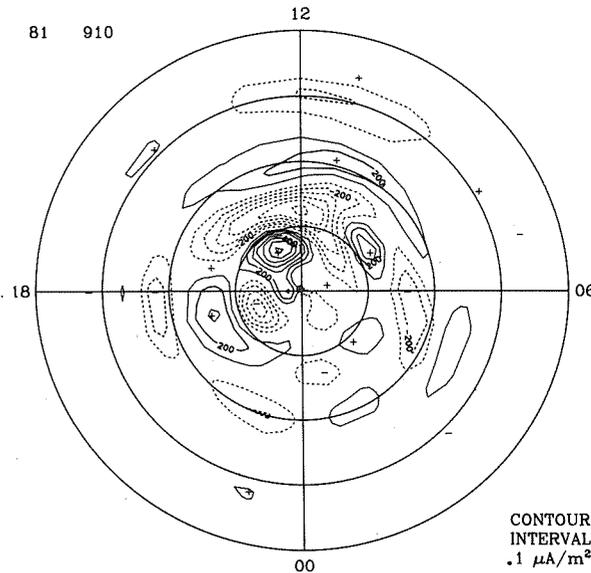
1 A/m

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

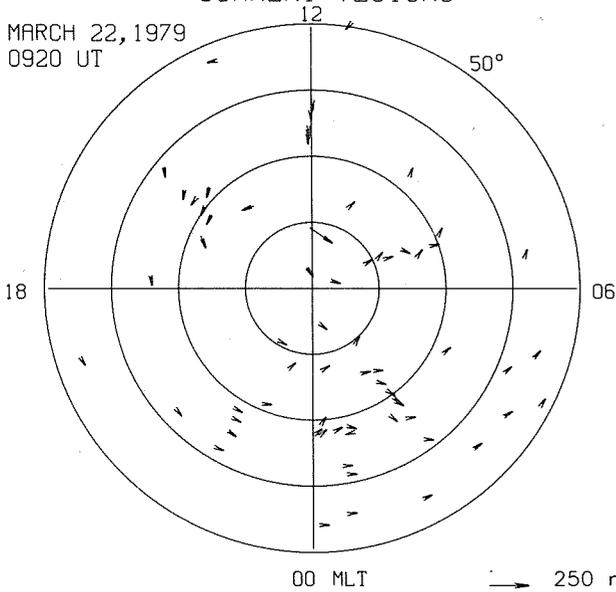
TOTAL (W)  
4.46E+10



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

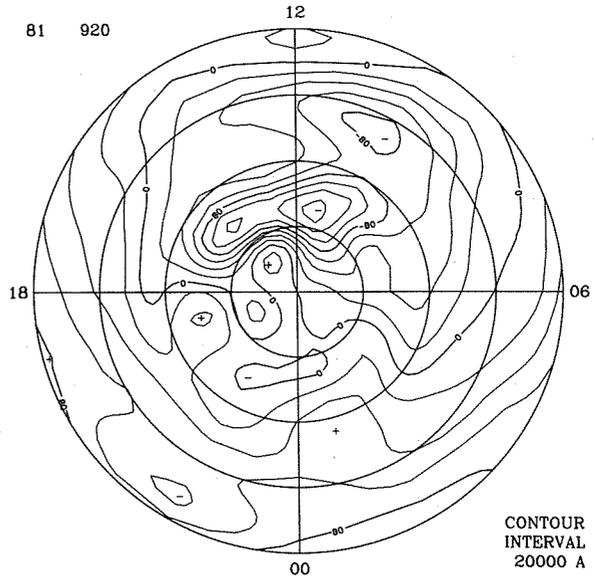
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0920 UT



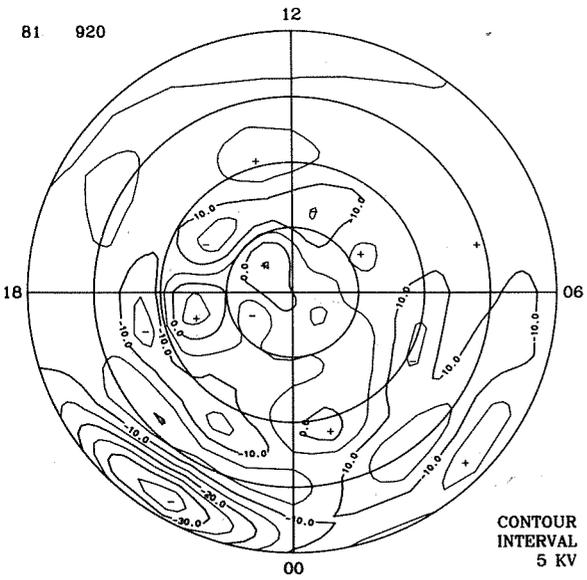
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



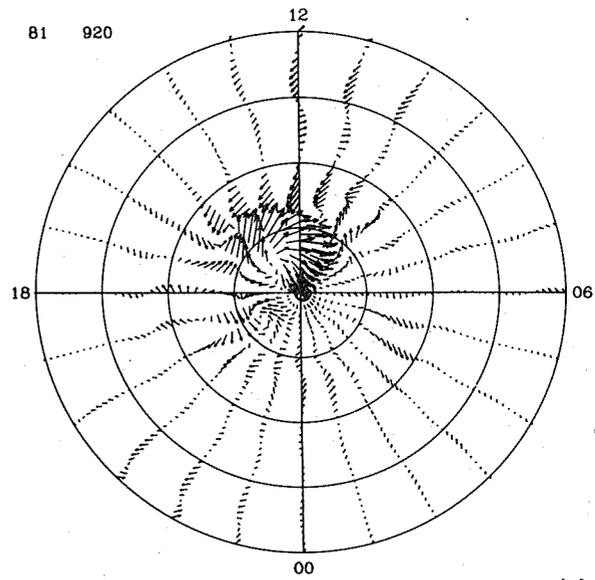
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



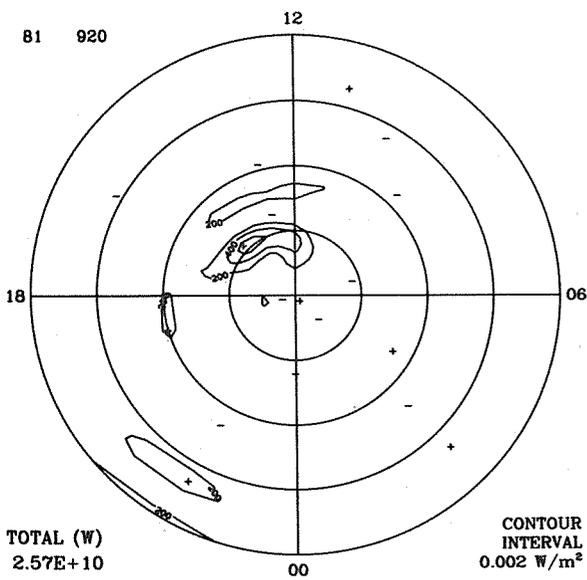
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



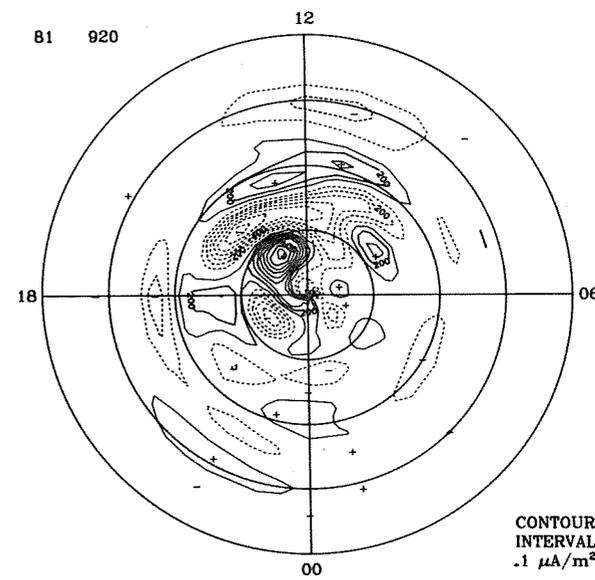
1 A/m

FIELD-ALIGNED CURRENTS



TOTAL (W)  
2.57E+10

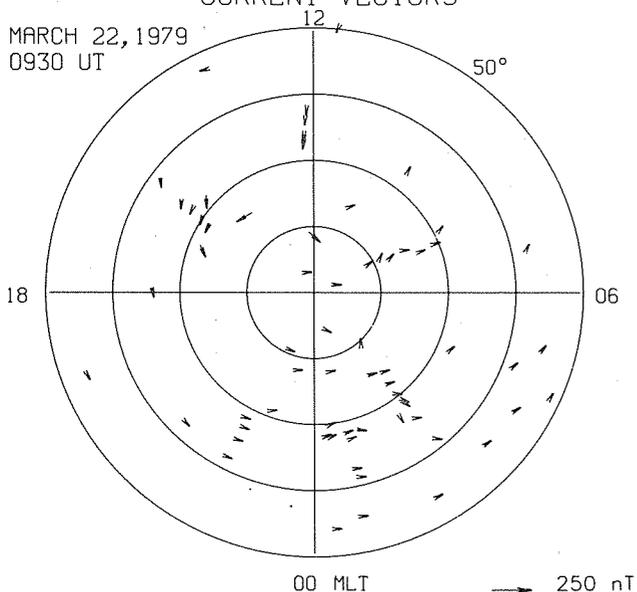
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

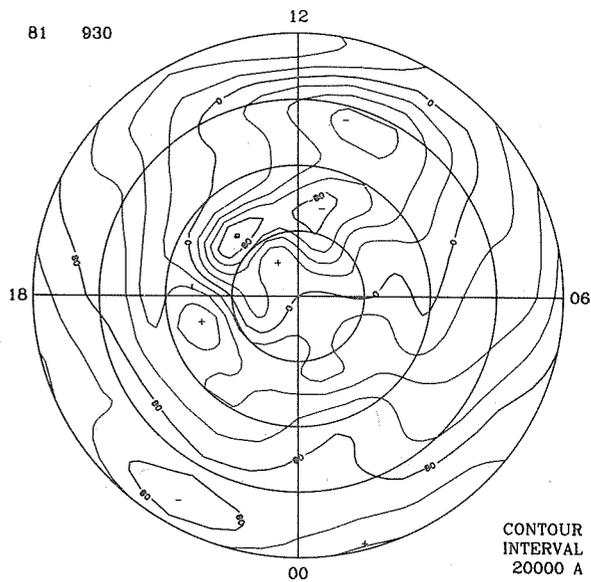
MARCH 22, 1979  
0930 UT



00 MLT → 250 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

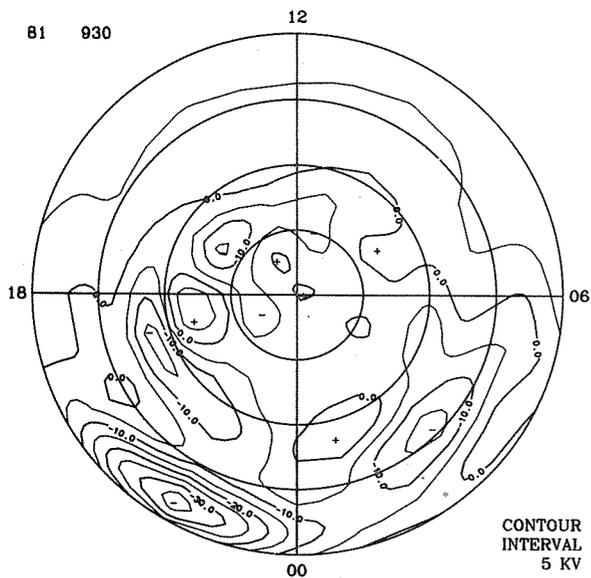
81 930



CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT

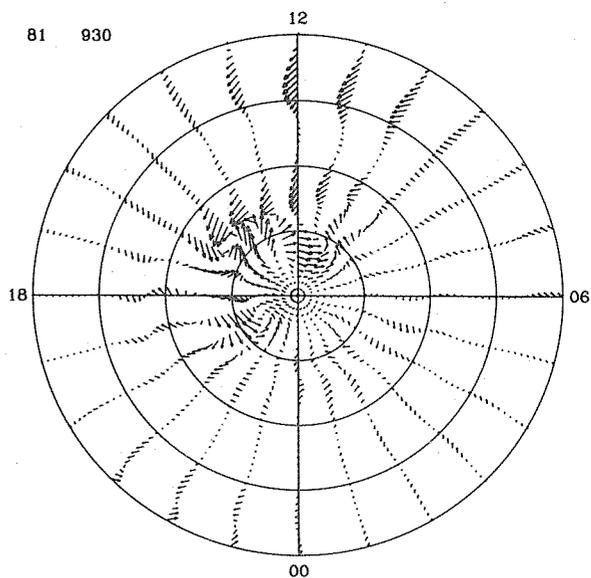
81 930



CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE

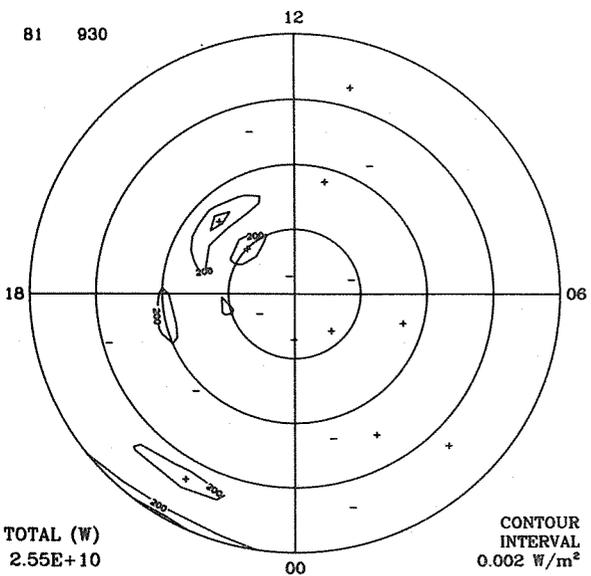
81 930



1 A/m →

FIELD-ALIGNED CURRENTS

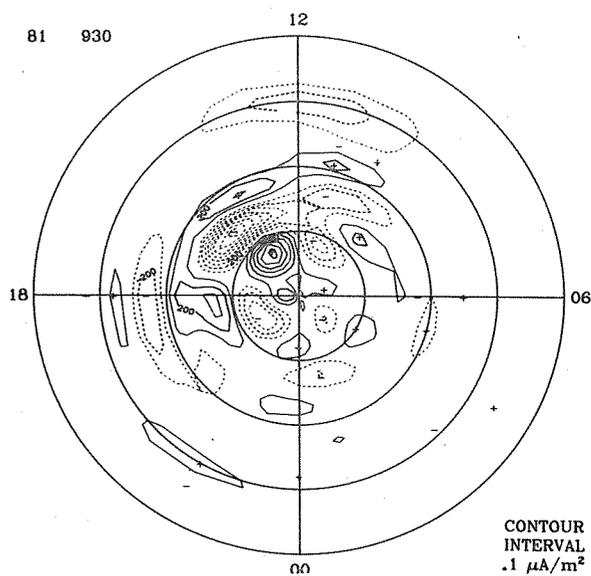
81 930



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

TOTAL (W)  
2.55E+10

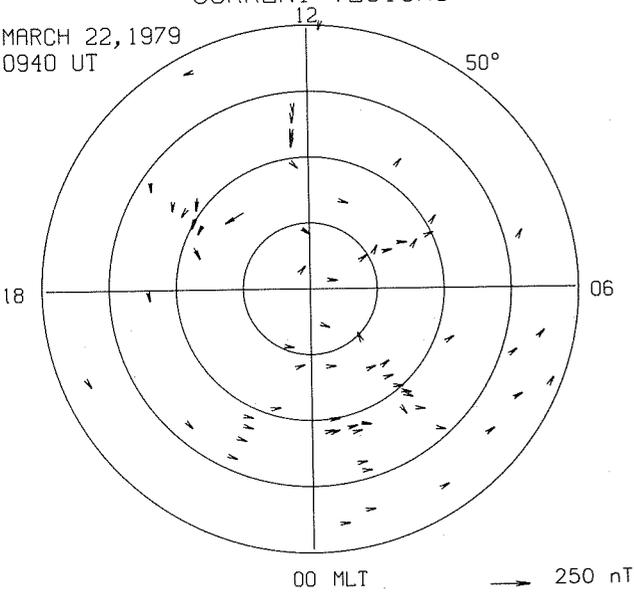
81 930



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

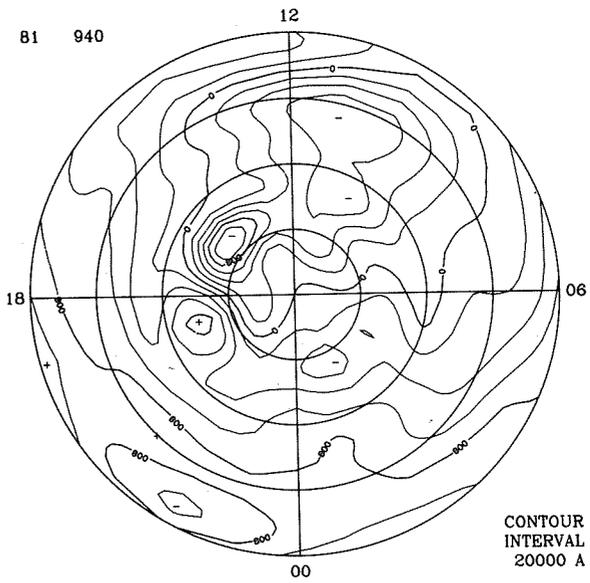
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0940 UT



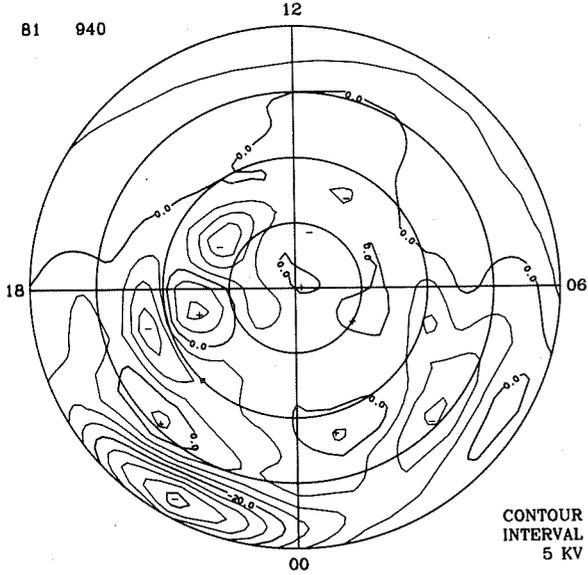
00 MLT → 250 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



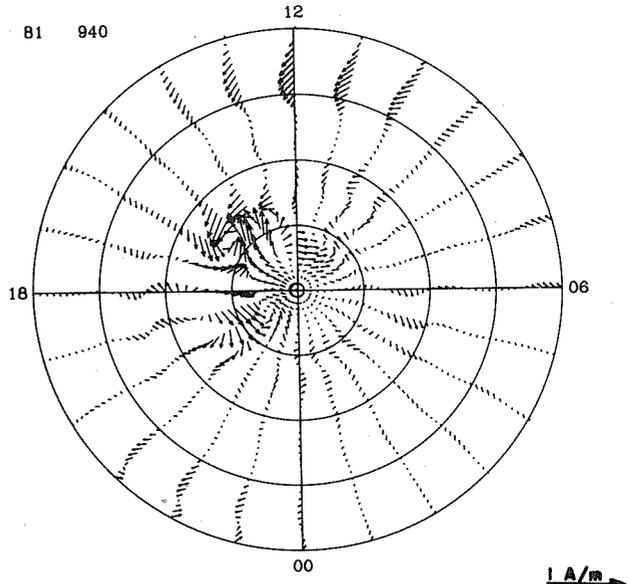
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



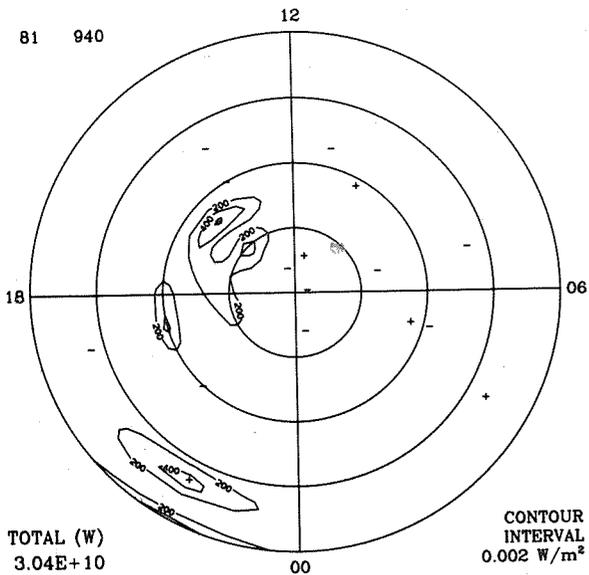
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



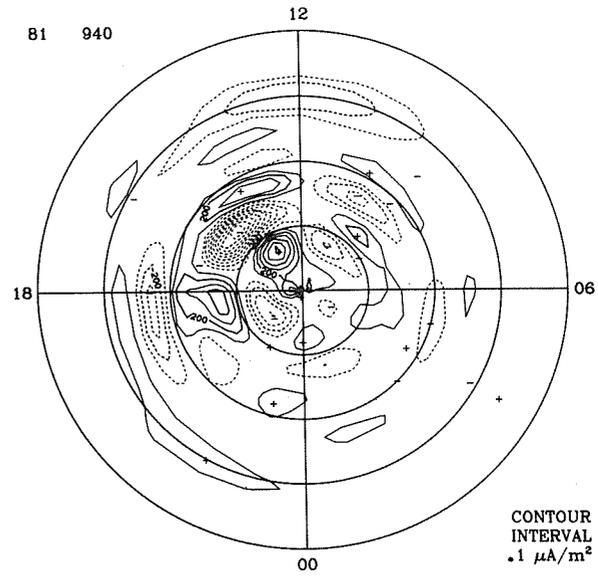
1 A/m →

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

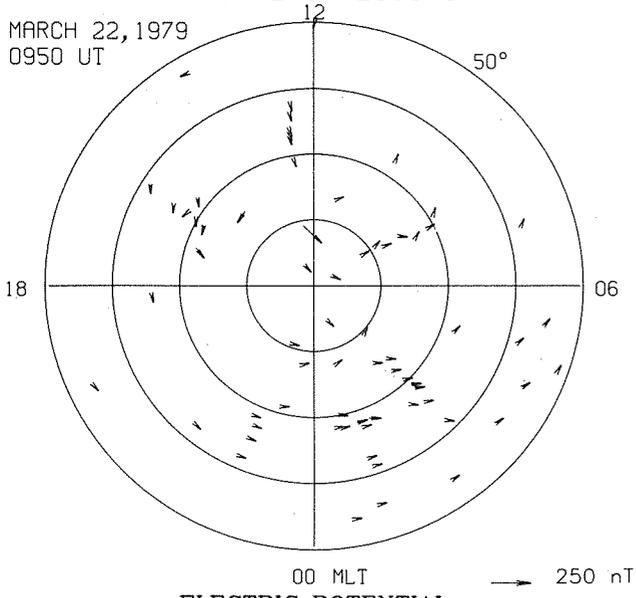
TOTAL (W)  
3.04E+10



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

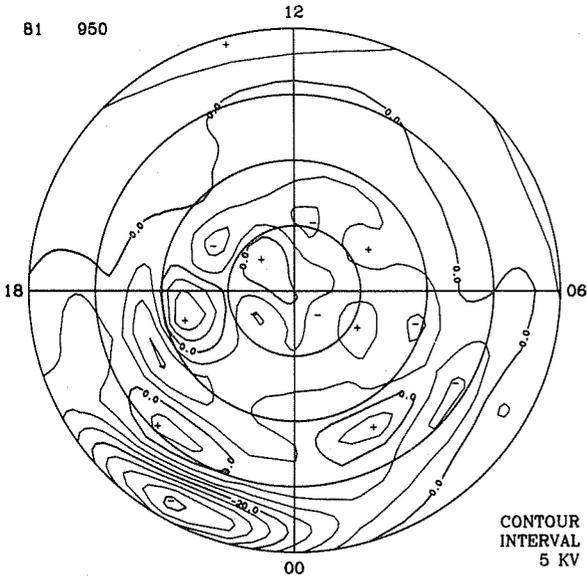
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
0950 UT



ELECTRIC POTENTIAL

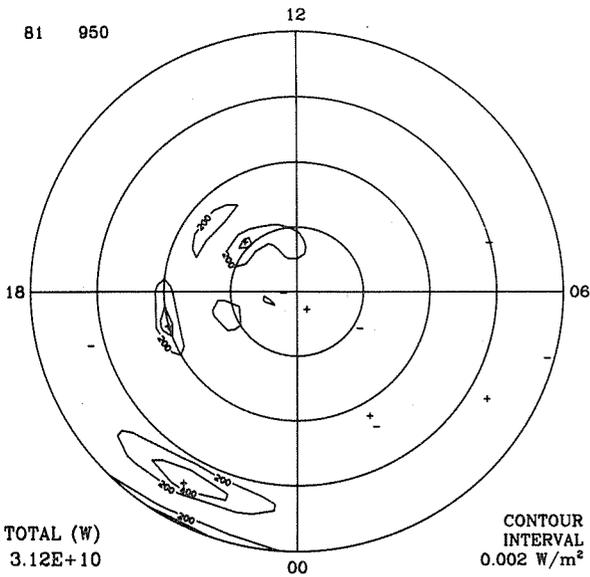
81 950



CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE

81 950

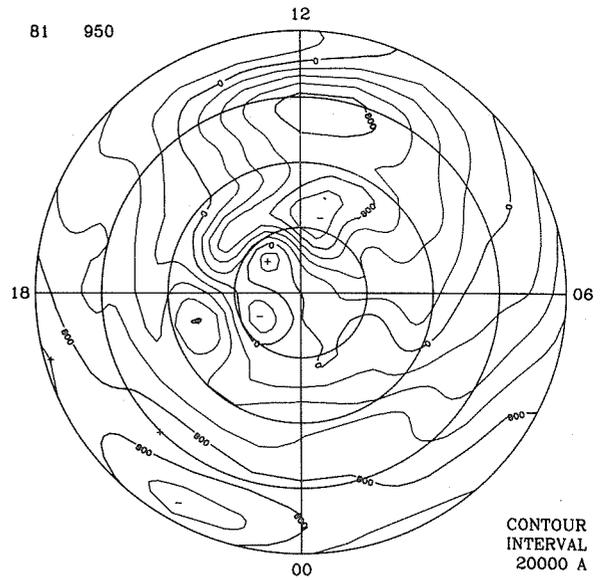


TOTAL (W)  
3.12E+10

CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

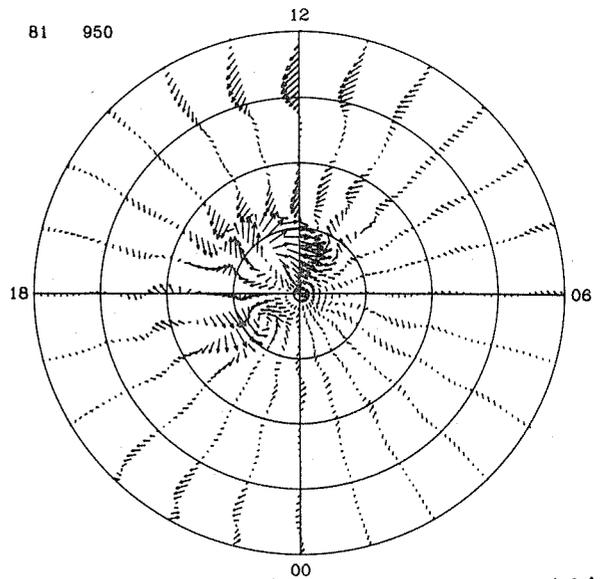
81 950



CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT

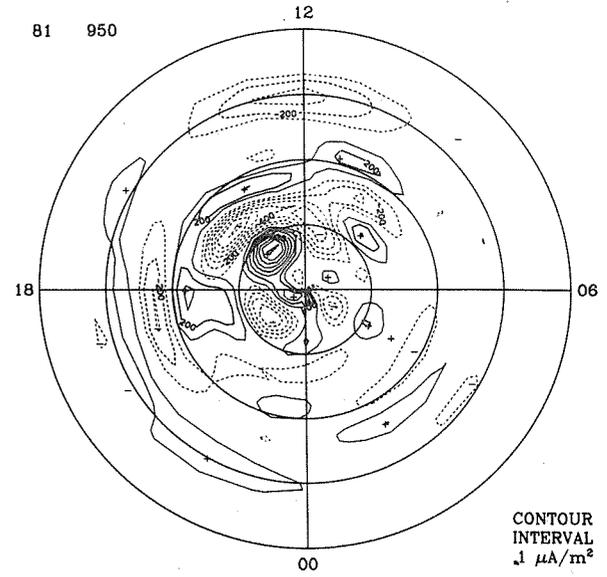
81 950



1 A/m

FIELD-ALIGNED CURRENTS

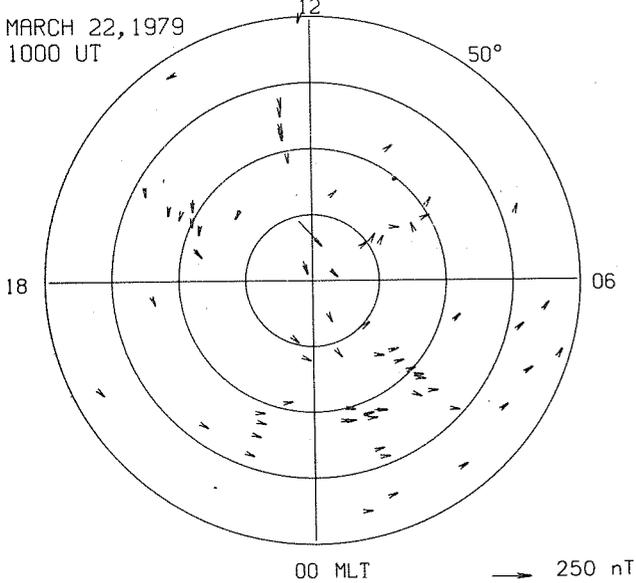
81 950



CONTOUR  
INTERVAL  
1 μA/m<sup>2</sup>

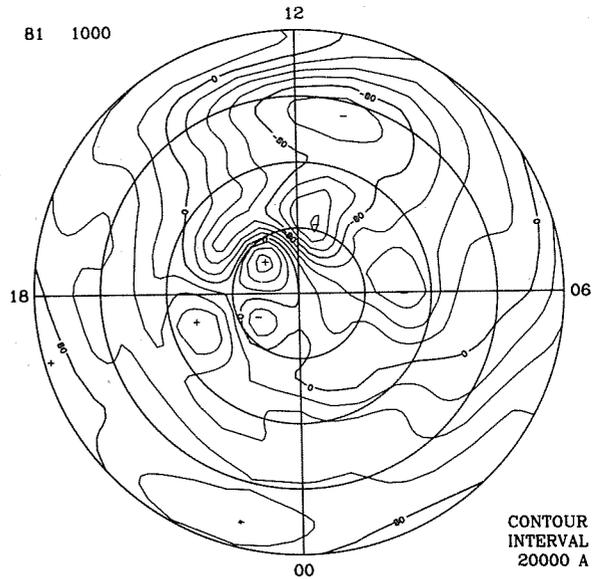
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1000 UT



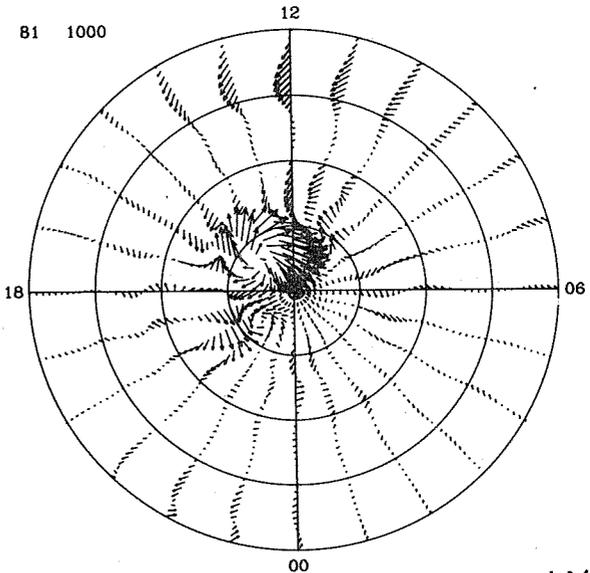
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



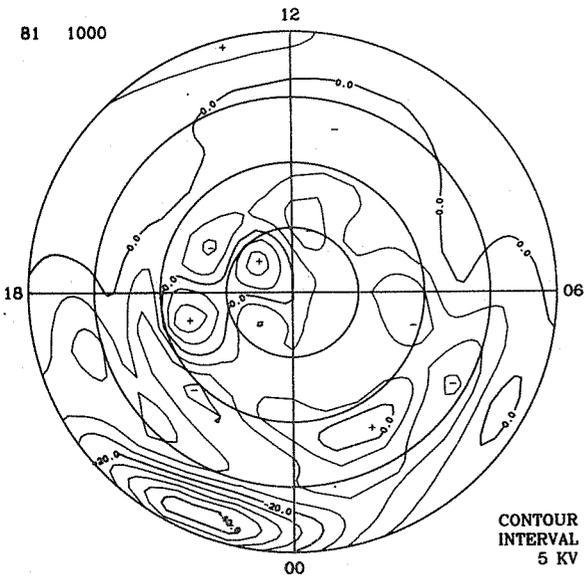
CONTOUR  
INTERVAL  
20000 A

IONOSPHERIC CURRENT



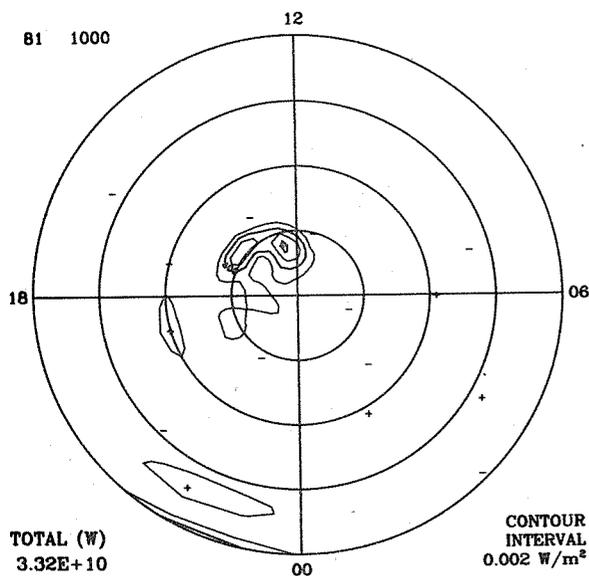
1 A/m

FIELD-ALIGNED CURRENTS



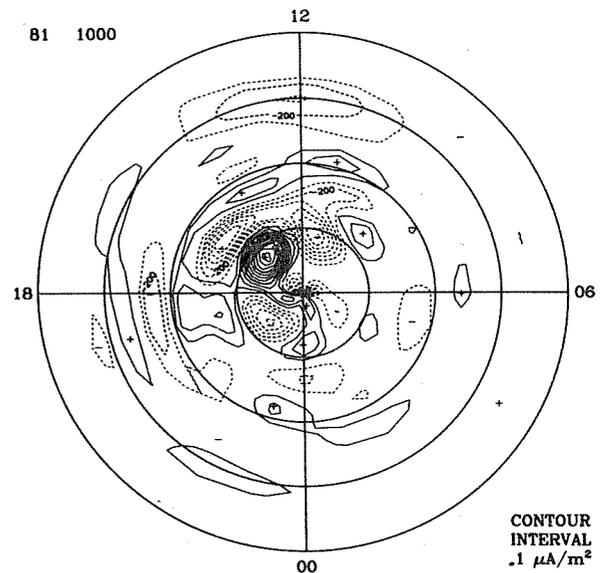
CONTOUR  
INTERVAL  
5 KV

JOULE HEAT RATE



TOTAL (W)  
3.32E+10

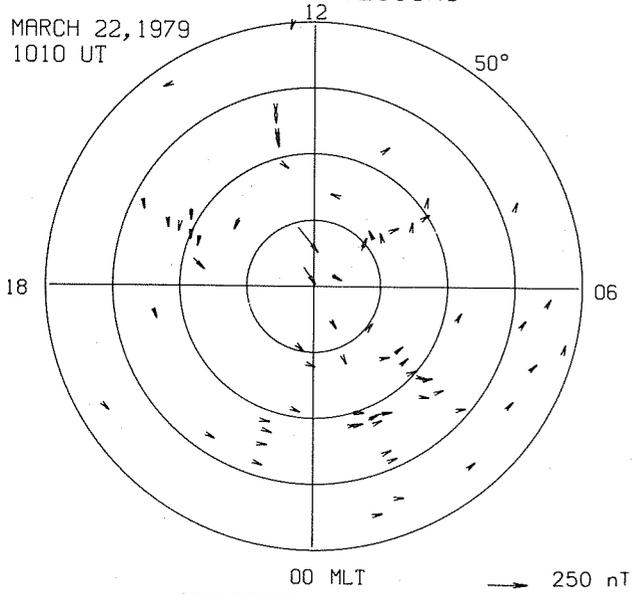
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

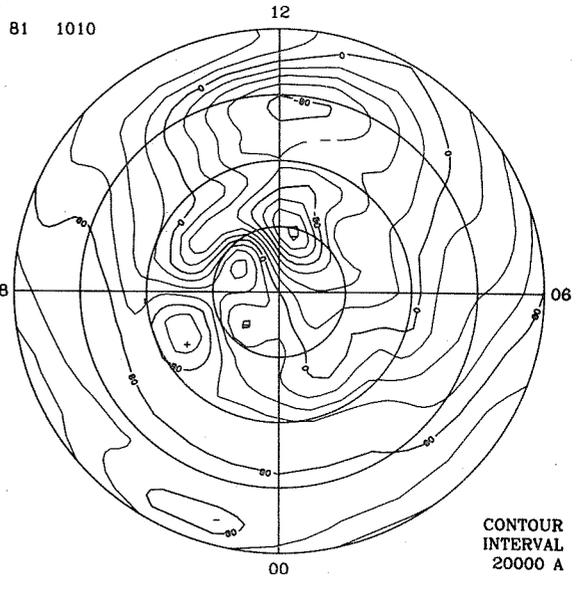
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1010 UT



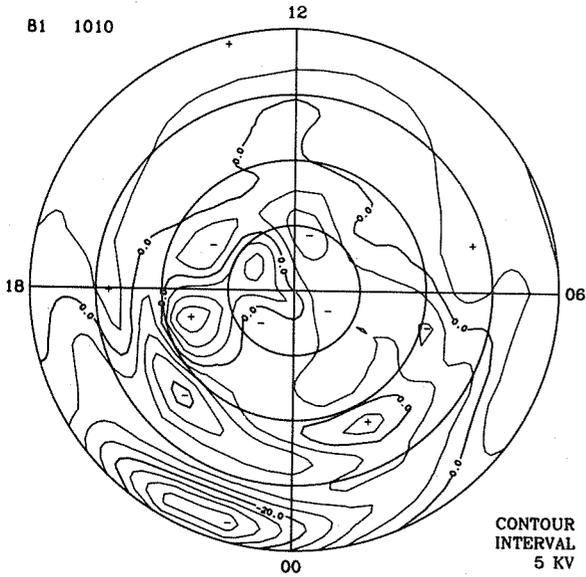
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



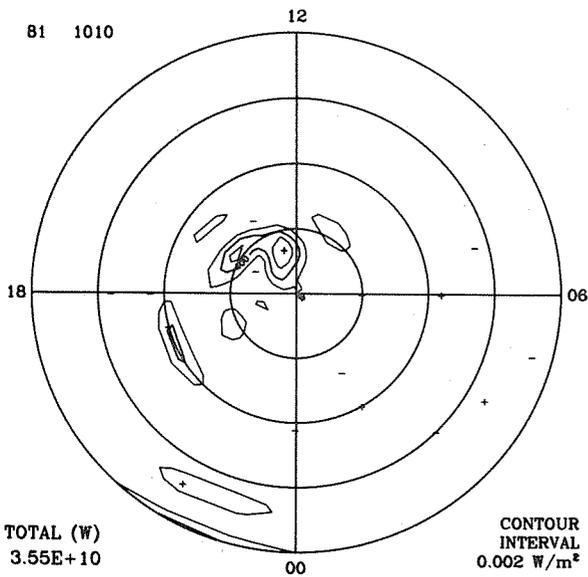
CONTOUR  
INTERVAL  
20000 A

81 1010



CONTOUR  
INTERVAL  
5 KV

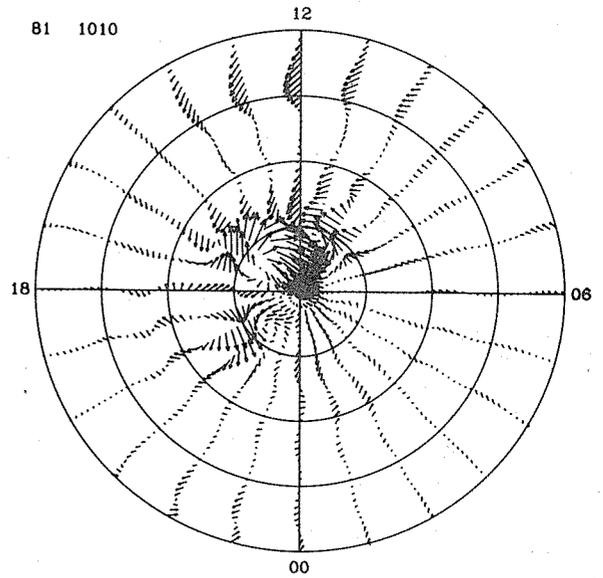
JOULE HEAT RATE



TOTAL (W)  
3.55E+10

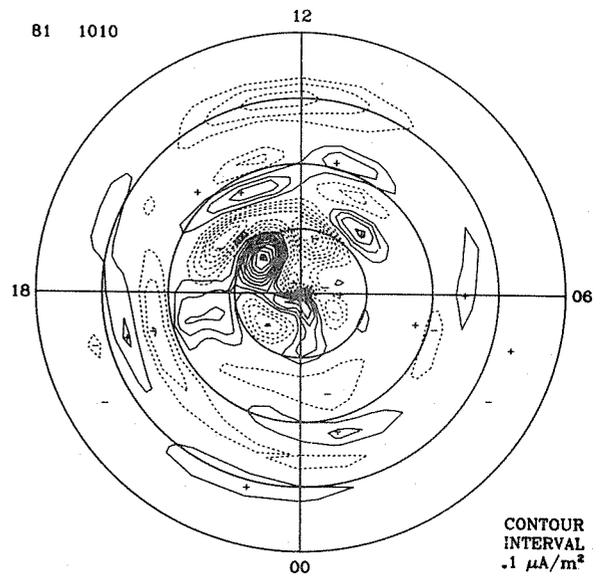
CONTOUR  
INTERVAL  
0.002 W/m<sup>2</sup>

IONOSPHERIC CURRENT



1 A/m →

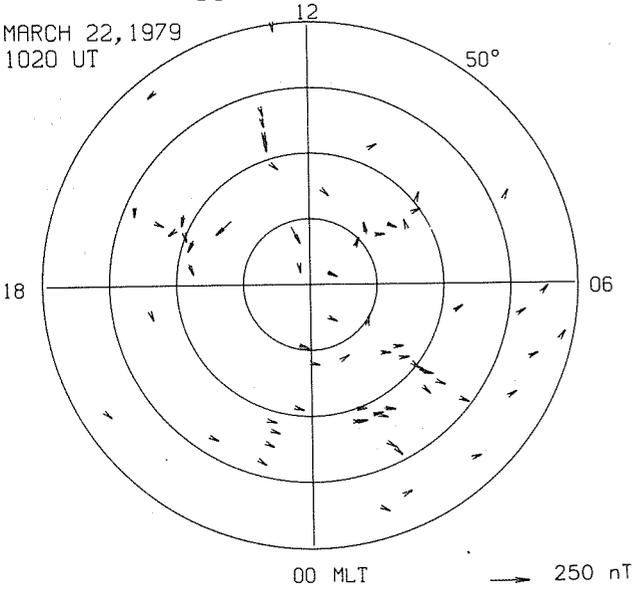
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.1 μA/m<sup>2</sup>

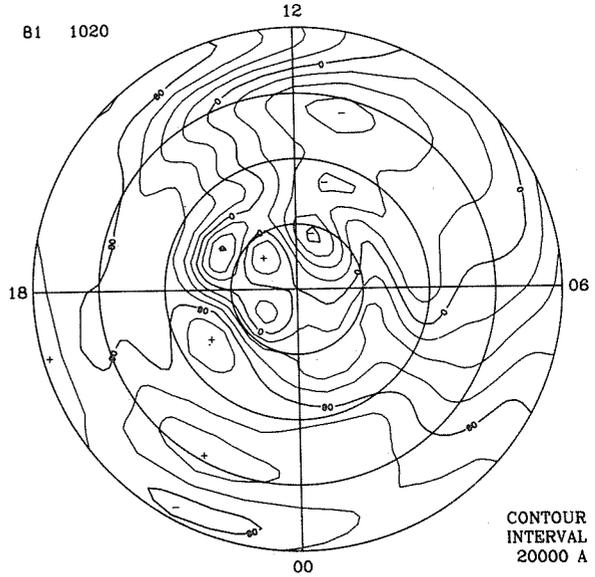
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1020 UT



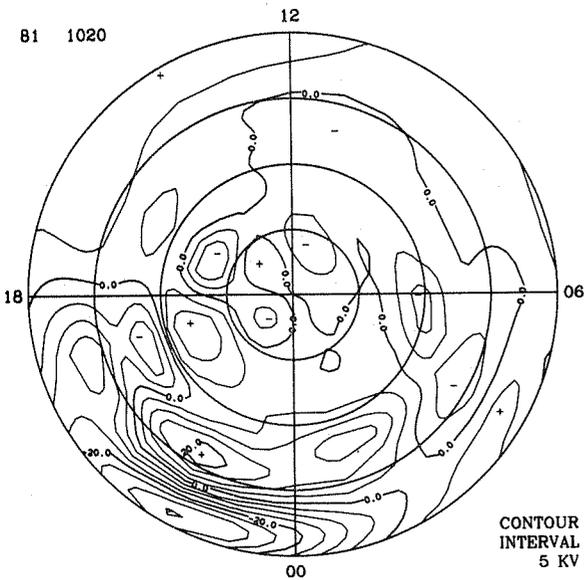
EQUIVALENT CURRENT SYSTEM

81 1020



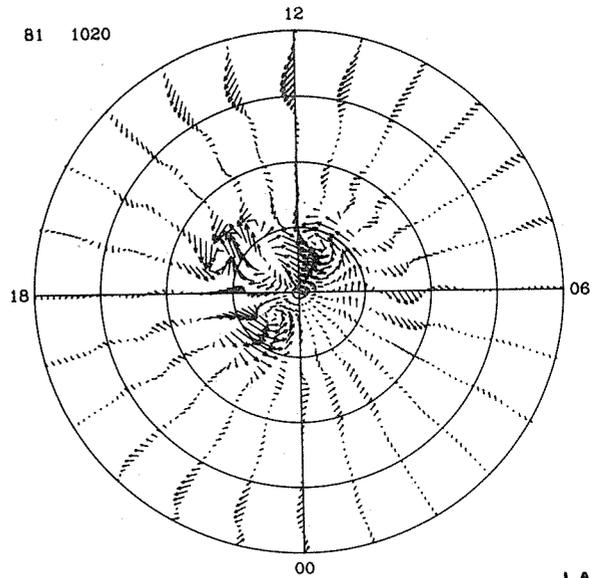
ELECTRIC POTENTIAL

81 1020



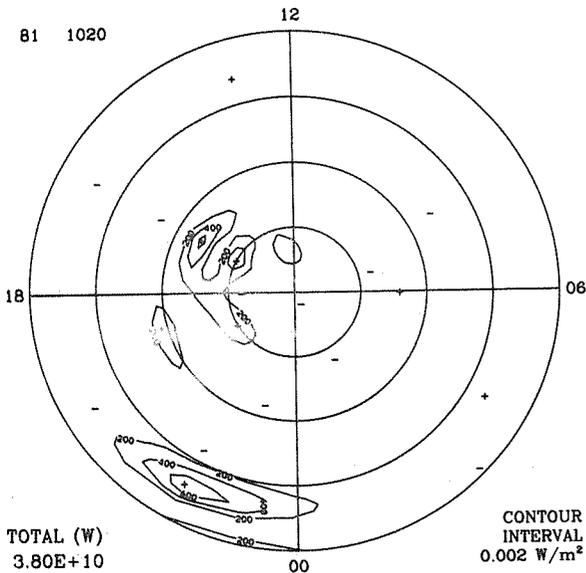
IONOSPHERIC CURRENT

81 1020



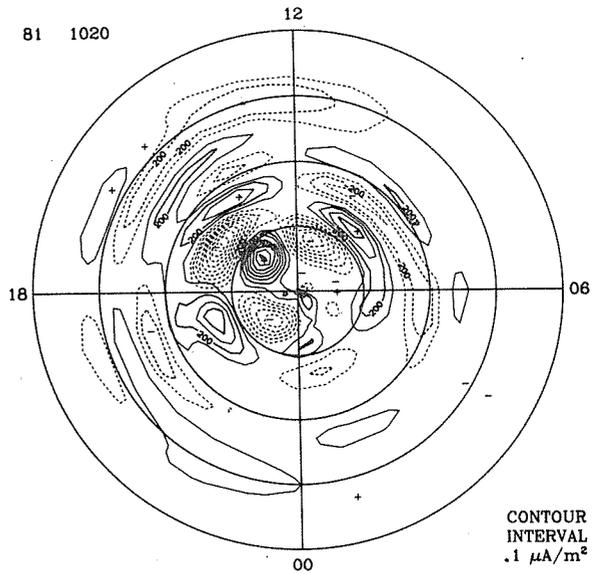
JOULE HEAT RATE

81 1020



FIELD-ALIGNED CURRENTS

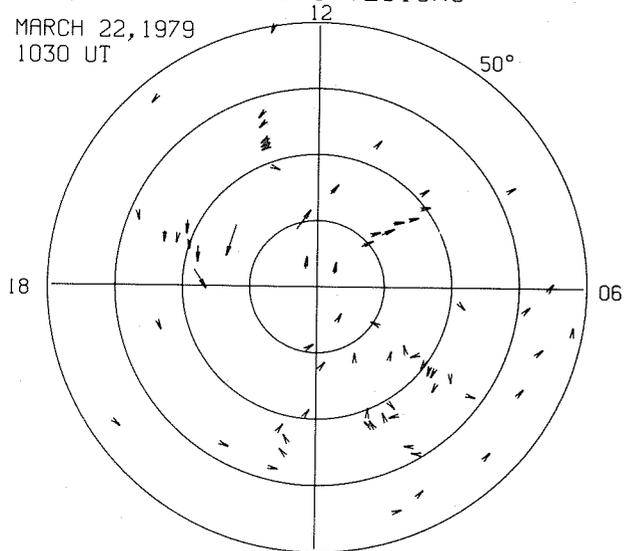
81 1020



TOTAL (W)  
3.80E+10

OBSERVED EQUIVALENT  
CURRENT VECTORS

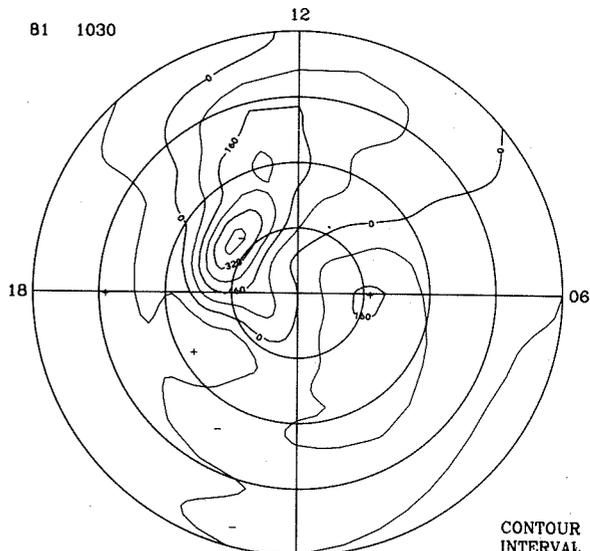
MARCH 22, 1979  
1030 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

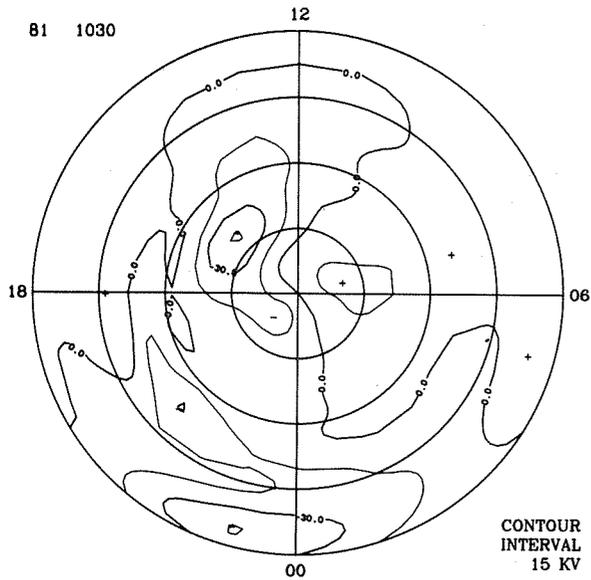
81 1030



CONTOUR  
INTERVAL  
80000 A

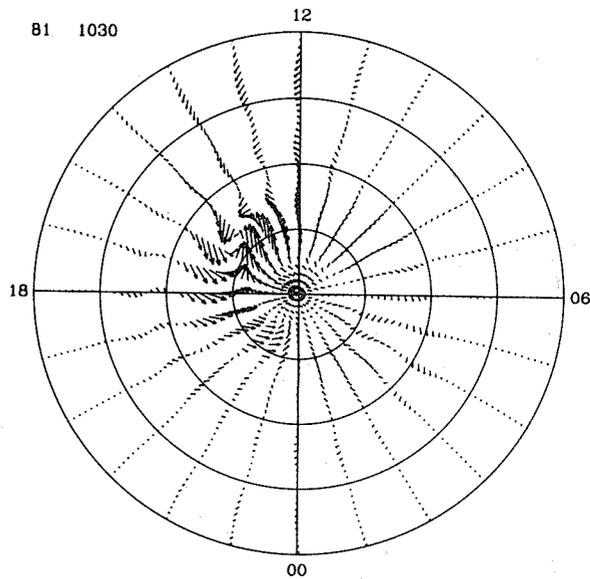
IONOSPHERIC CURRENT

81 1030



CONTOUR  
INTERVAL  
15 KV

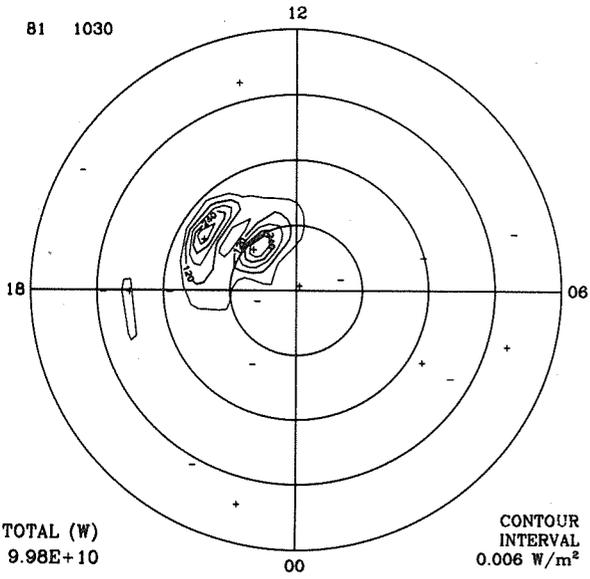
81 1030



3 A/m →

JOULE HEAT RATE

81 1030

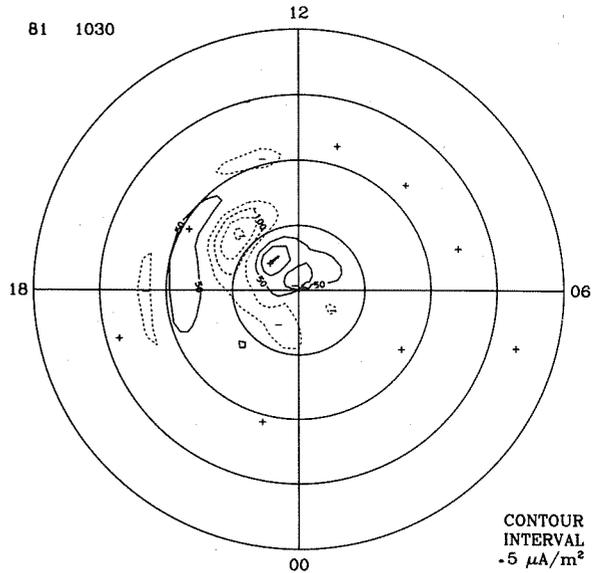


TOTAL (W)  
9.98E+10

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

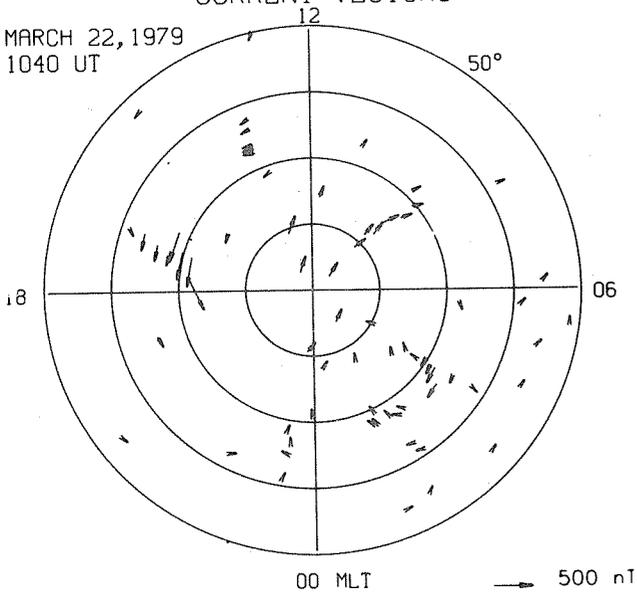
81 1030



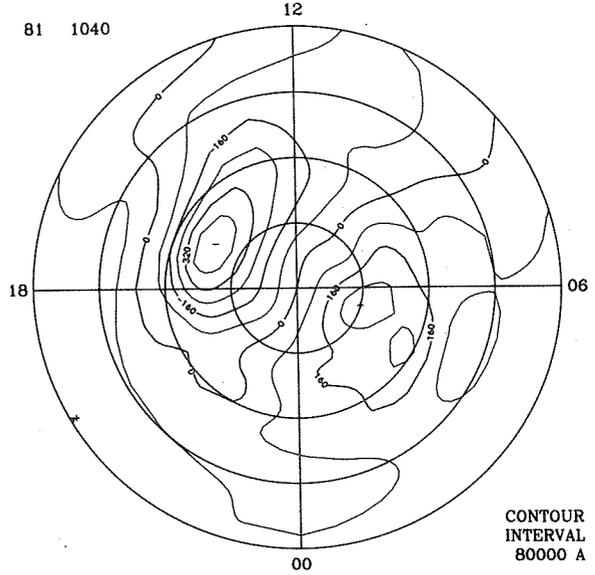
CONTOUR  
INTERVAL  
-5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1040 UT

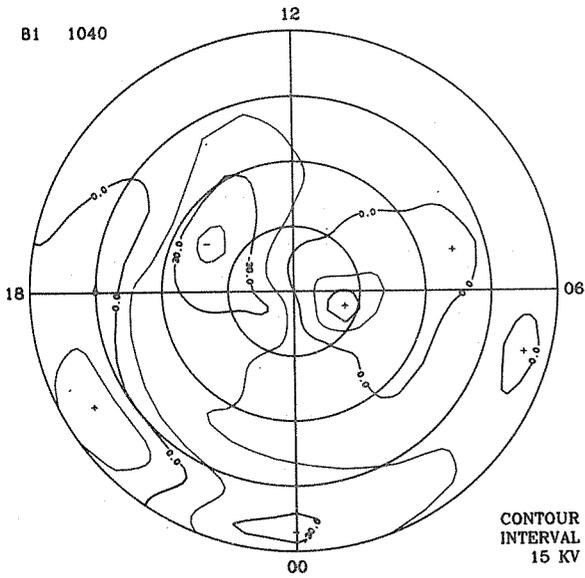


EQUIVALENT CURRENT SYSTEM



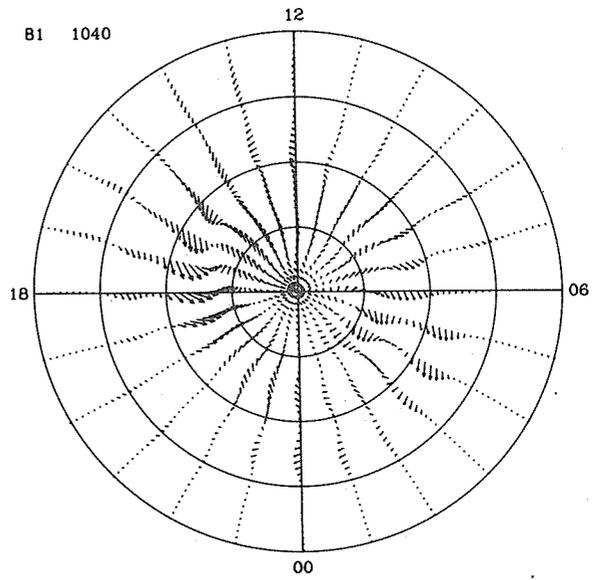
ELECTRIC POTENTIAL

81 1040



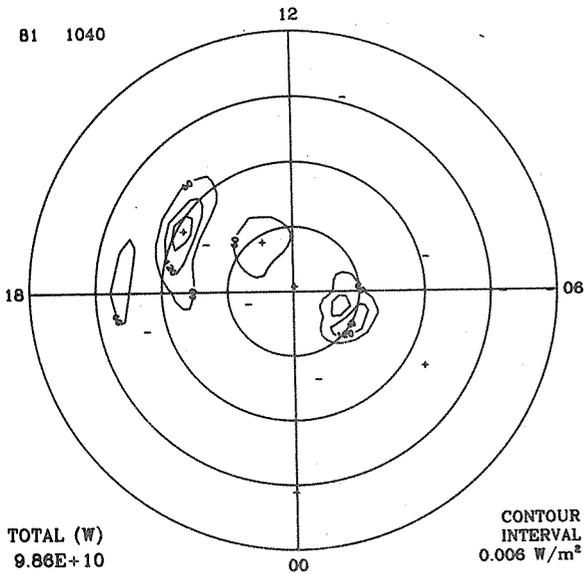
IONOSPHERIC CURRENT

81 1040



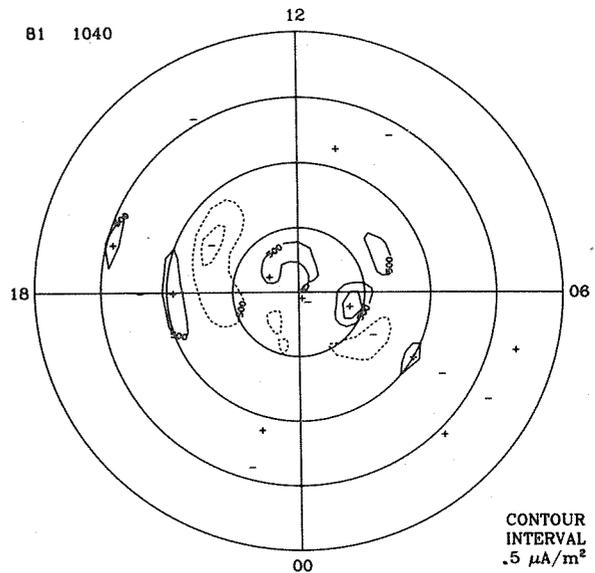
JOULE HEAT RATE

81 1040



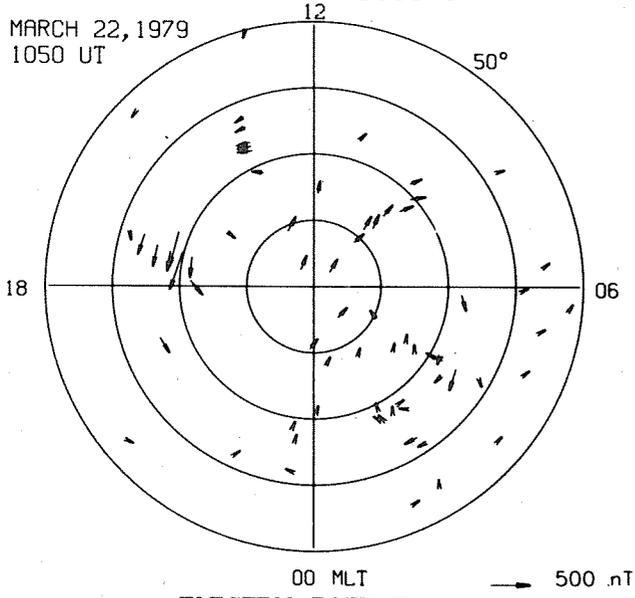
FIELD-ALIGNED CURRENTS

81 1040



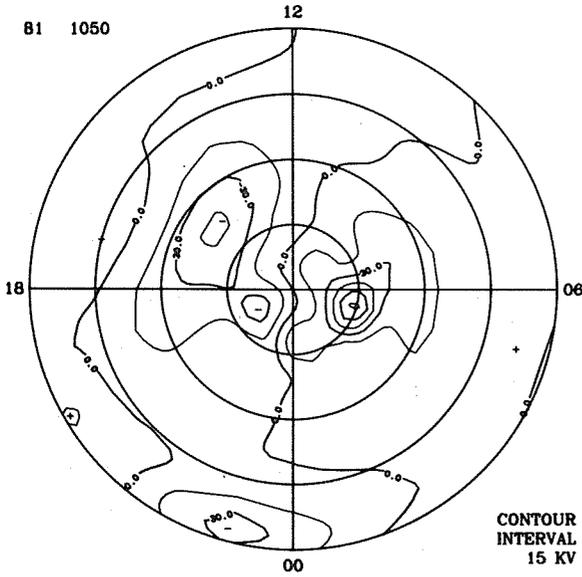
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1050 UT



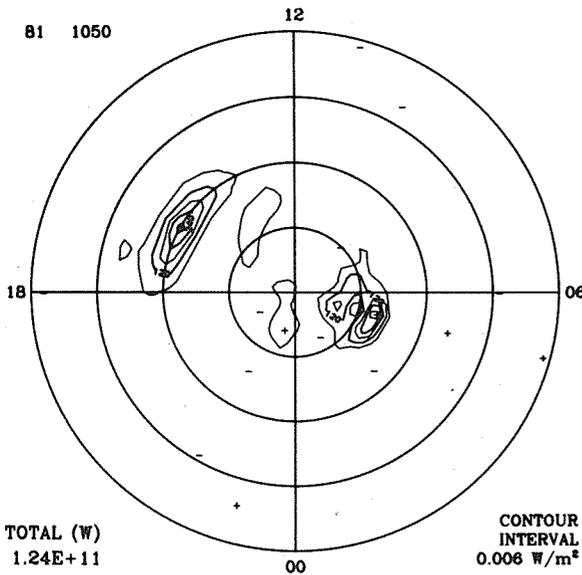
ELECTRIC POTENTIAL

81 1050



JOULE HEAT RATE

81 1050

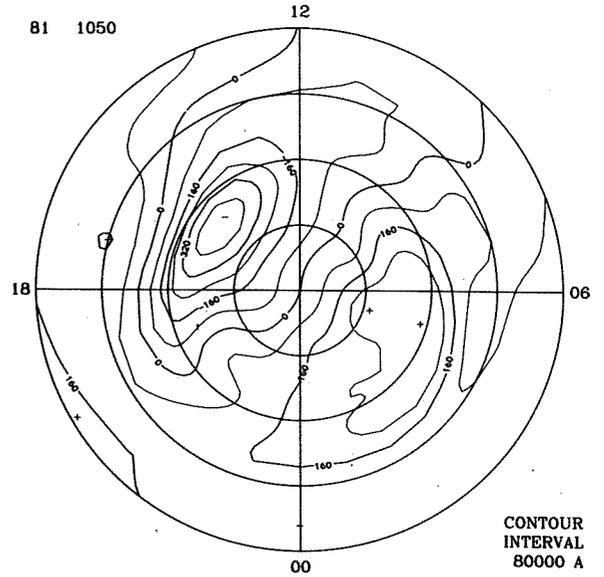


TOTAL (W)  
1.24E+11

CONTOUR  
INTERVAL  
0.006 W/m²

EQUIVALENT CURRENT SYSTEM

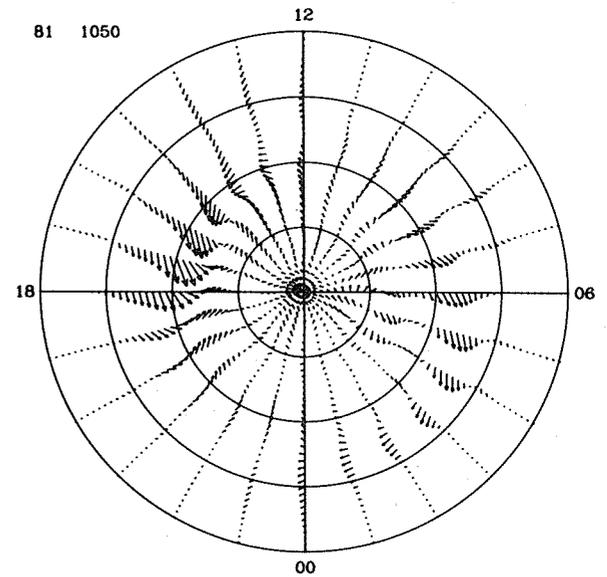
81 1050



CONTOUR  
INTERVAL  
80000 A

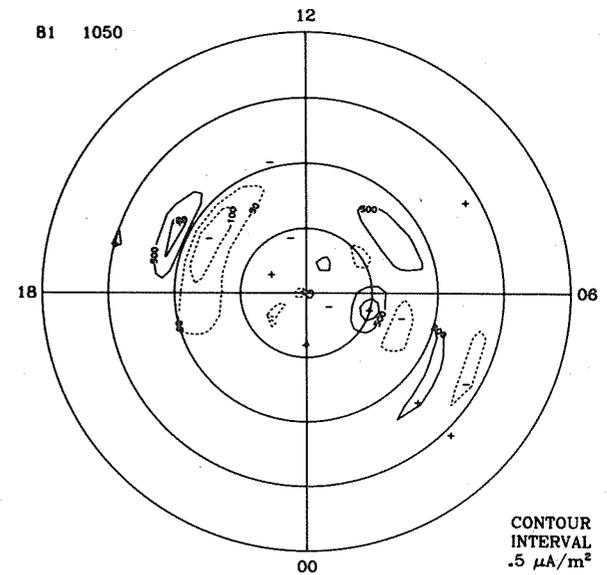
IONOSPHERIC CURRENT

81 1050



FIELD-ALIGNED CURRENTS

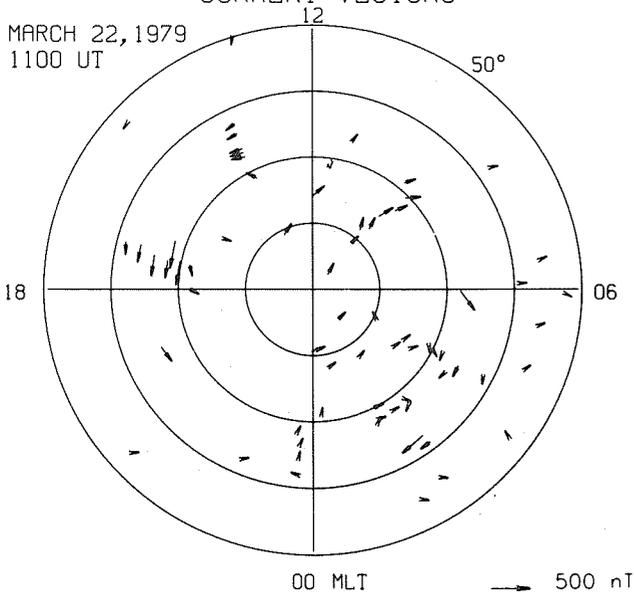
81 1050



CONTOUR  
INTERVAL  
.5 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

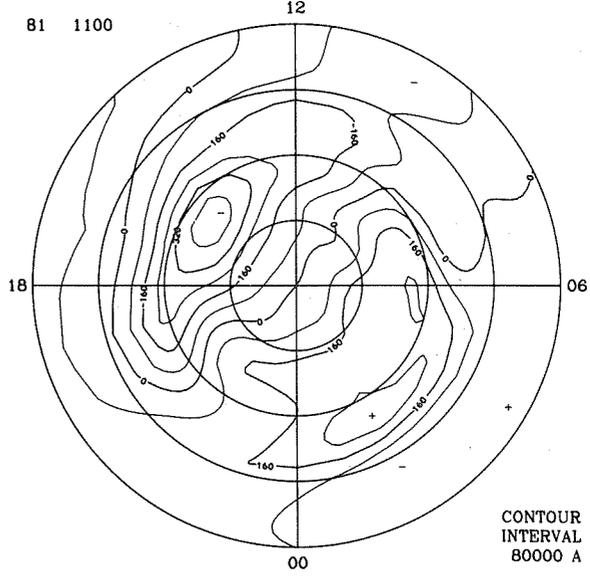
MARCH 22, 1979  
1100 UT



00 MLT

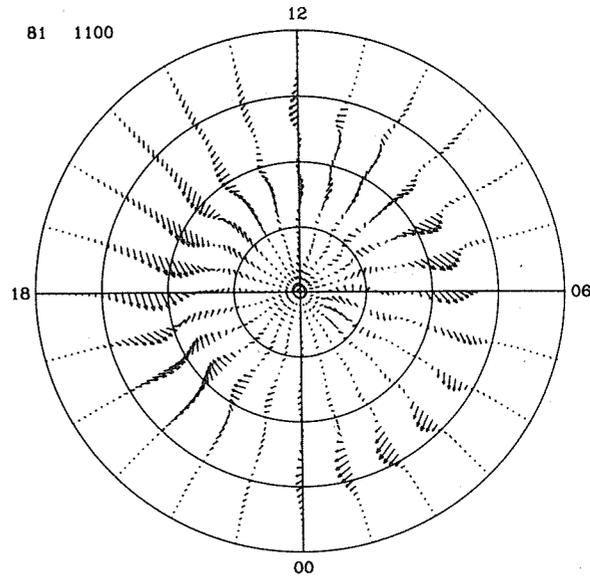
→ 500 nT

EQUIVALENT CURRENT SYSTEM



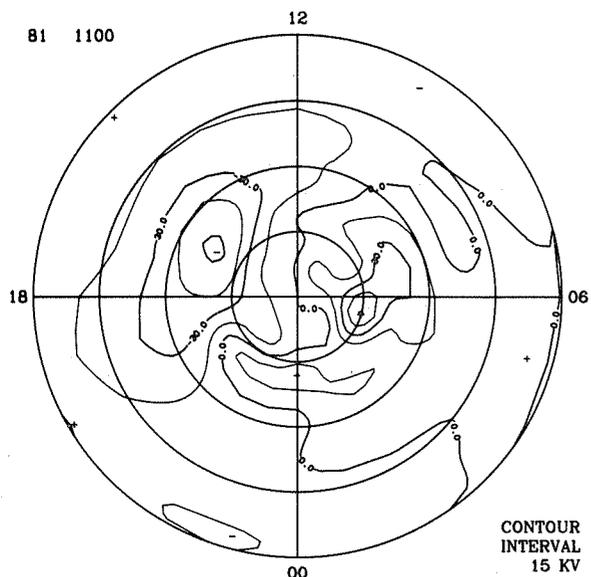
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



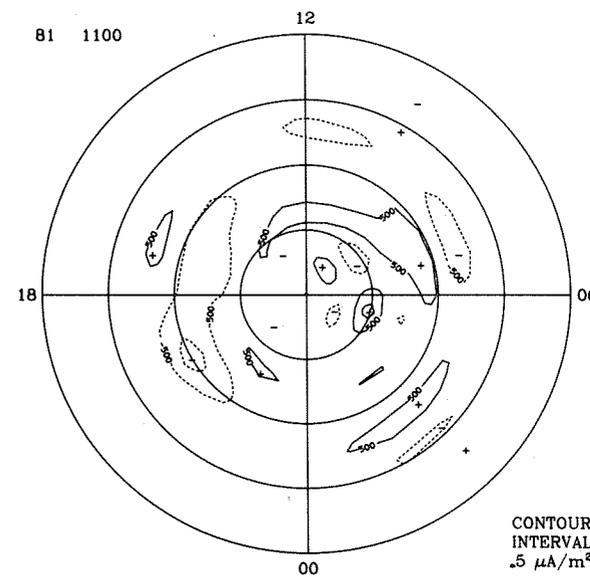
→ 3 A/m

JOULE HEAT RATE

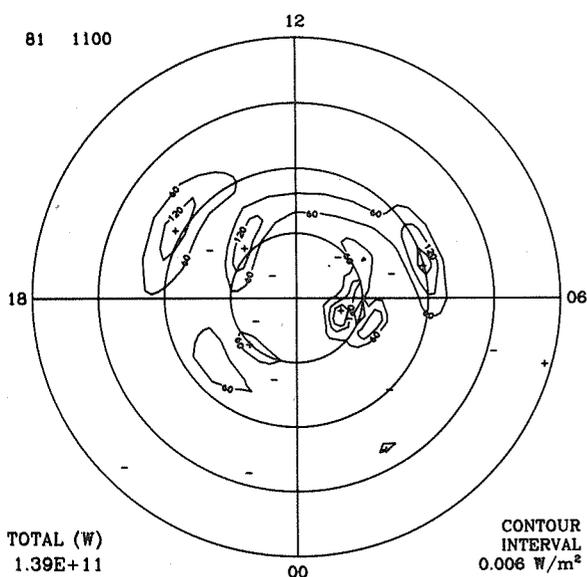


CONTOUR  
INTERVAL  
15 KV

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.5  $\mu\text{A}/\text{m}^2$

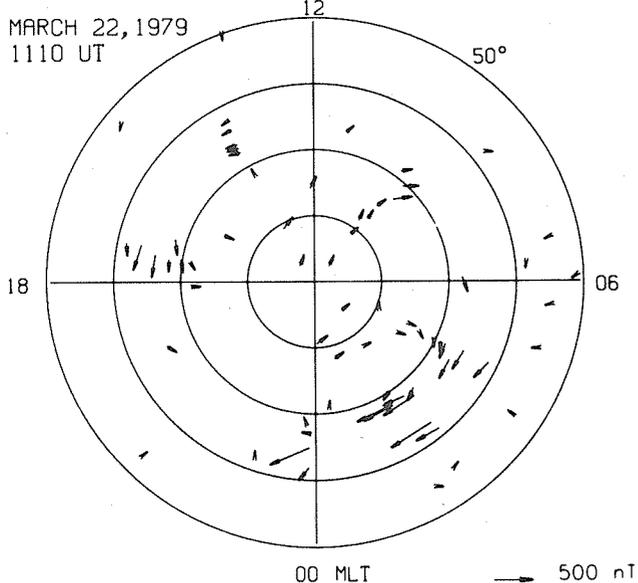


TOTAL (W)  
1.39E+11

CONTOUR  
INTERVAL  
0.006  $\text{W}/\text{m}^2$

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1110 UT

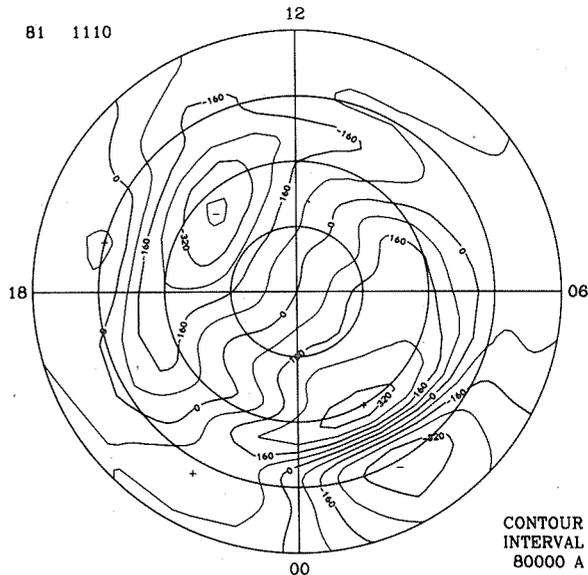


00 MLT

→ 500 nT

EQUIVALENT CURRENT SYSTEM

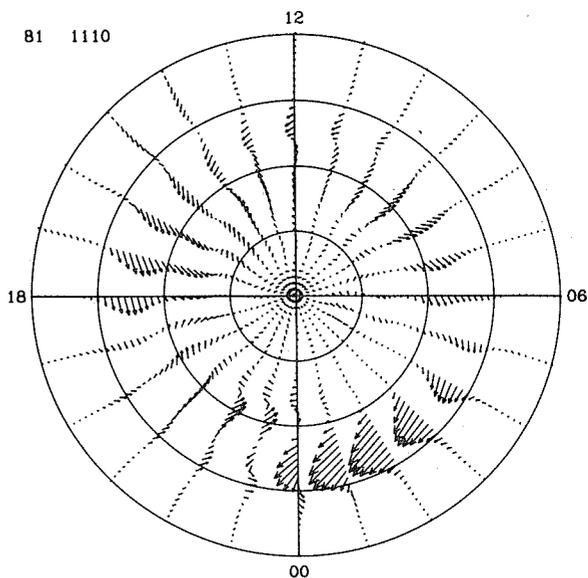
81 1110



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

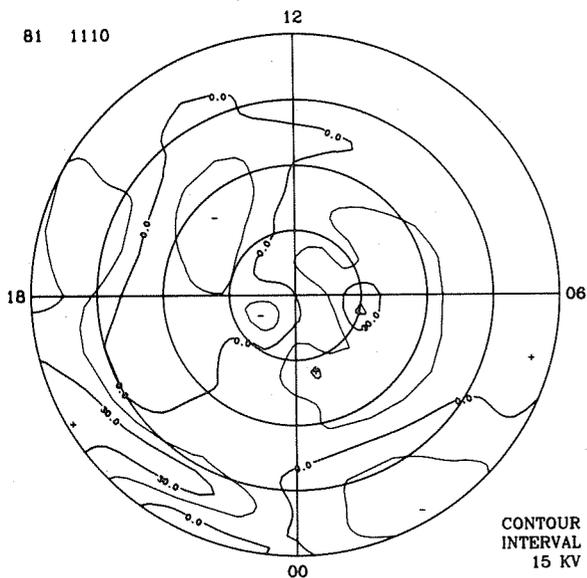
81 1110



→ 3 A/m

JOULE HEAT RATE

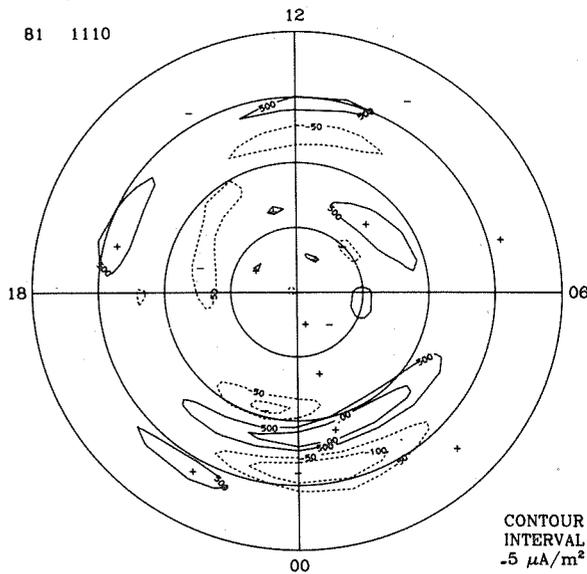
81 1110



CONTOUR  
INTERVAL  
15 KV

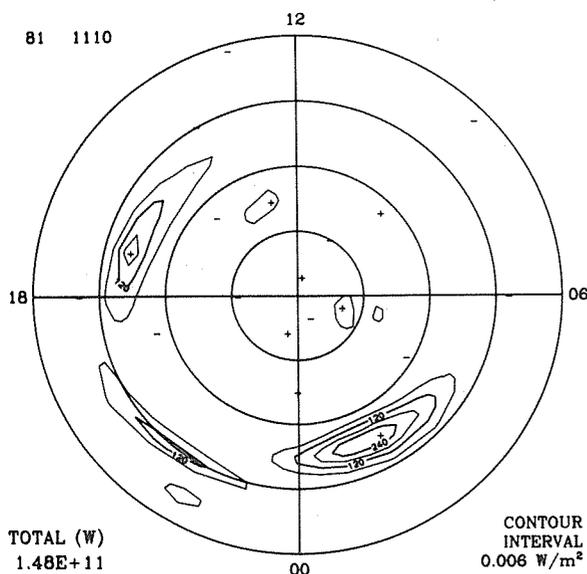
FIELD-ALIGNED CURRENTS

81 1110



CONTOUR  
INTERVAL  
-5 µA/m²

81 1110

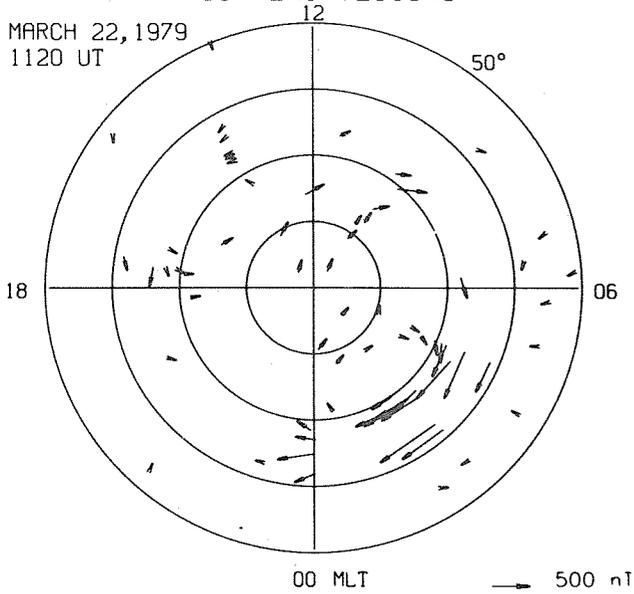


TOTAL (W)  
1.48E+11

CONTOUR  
INTERVAL  
0.008 W/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

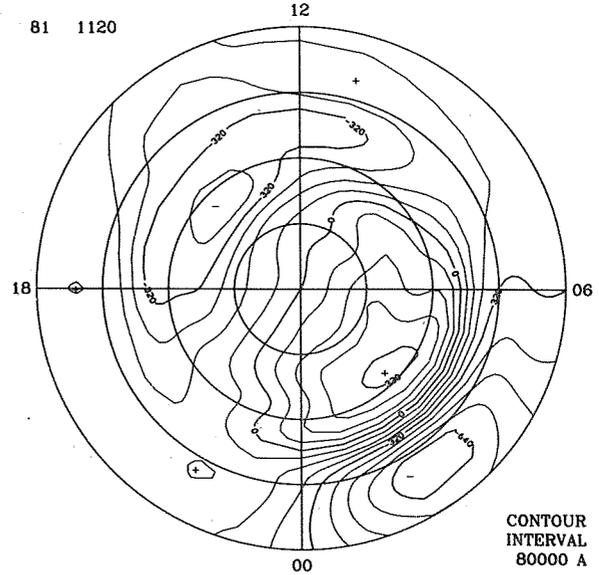
MARCH 22, 1979  
1120 UT



00 MLT  
ELECTRIC POTENTIAL

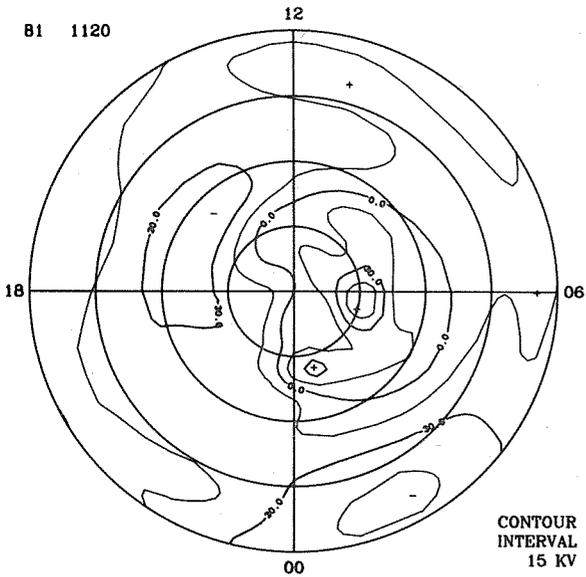
→ 500 nT

EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
80000 A

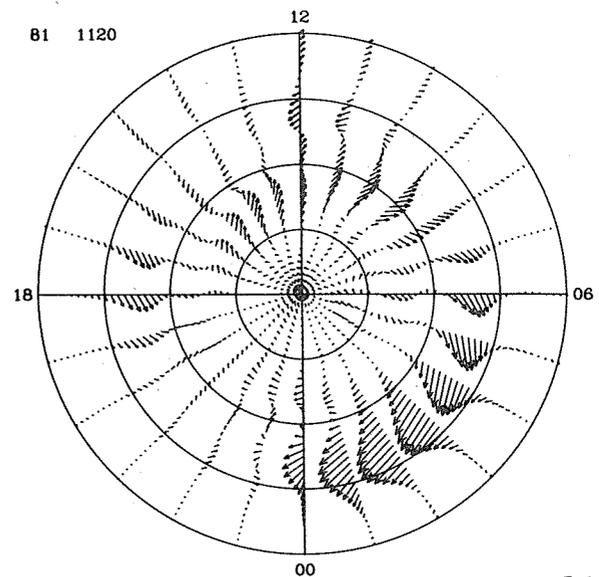
81 1120



JOULE HEAT RATE

CONTOUR  
INTERVAL  
15 KV

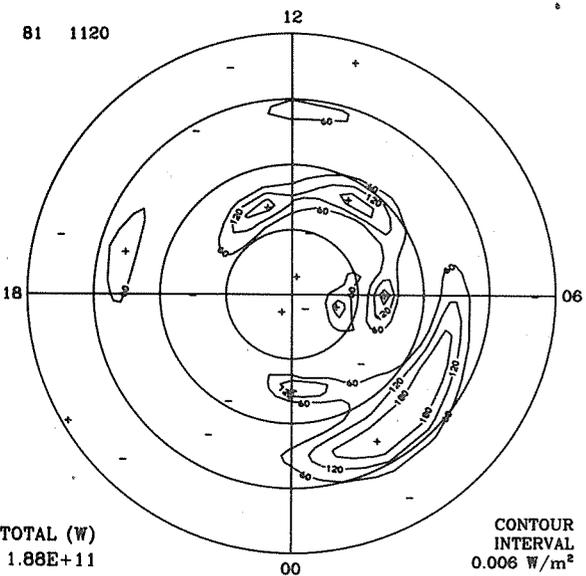
81 1120



→ 3 A/m

FIELD-ALIGNED CURRENTS

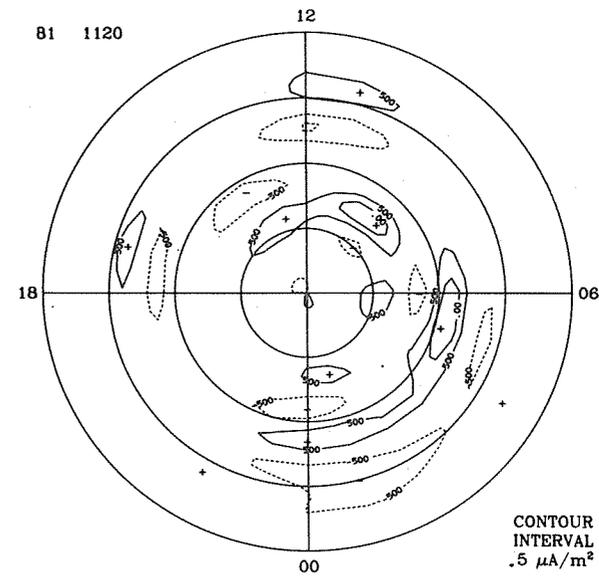
81 1120



TOTAL (W)  
1.88E+11

CONTOUR  
INTERVAL  
0.008 W/m<sup>2</sup>

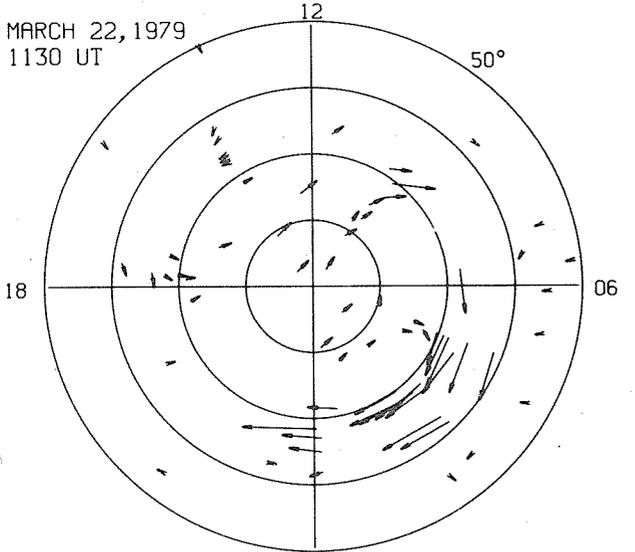
81 1120



CONTOUR  
INTERVAL  
50 μA/m<sup>2</sup>

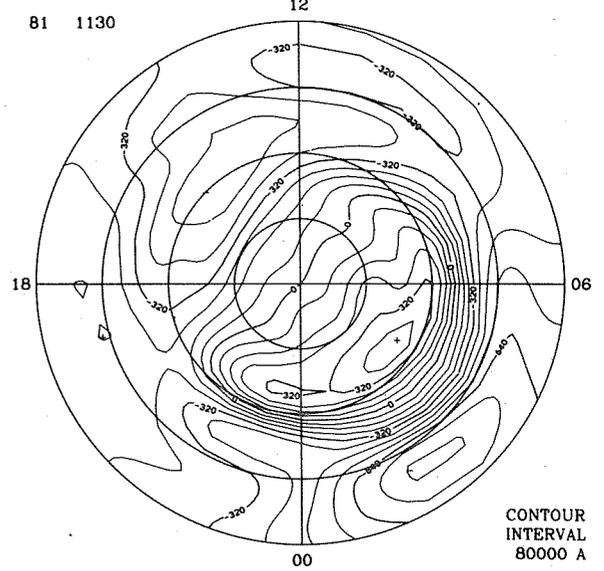
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1130 UT

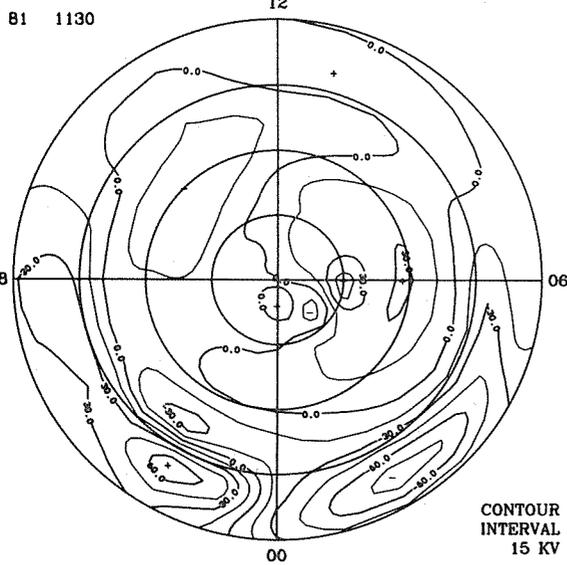


00 MLT → 500 nT  
ELECTRIC POTENTIAL

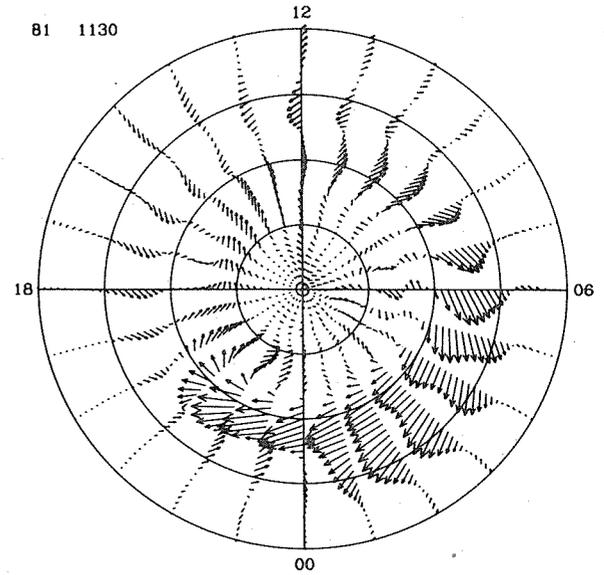
EQUIVALENT CURRENT SYSTEM



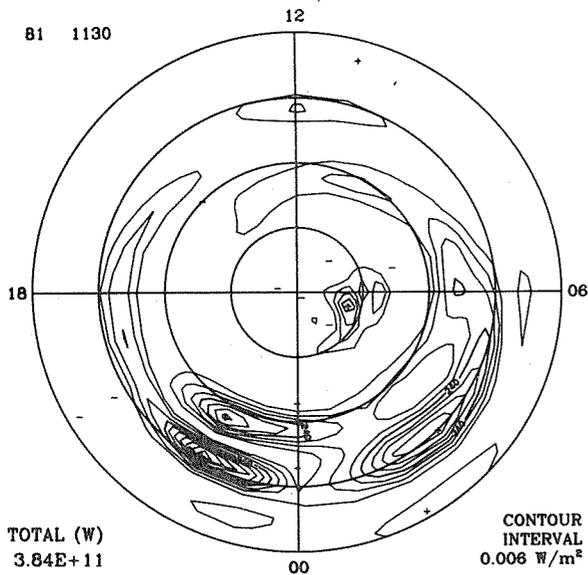
IONOSPHERIC CURRENT



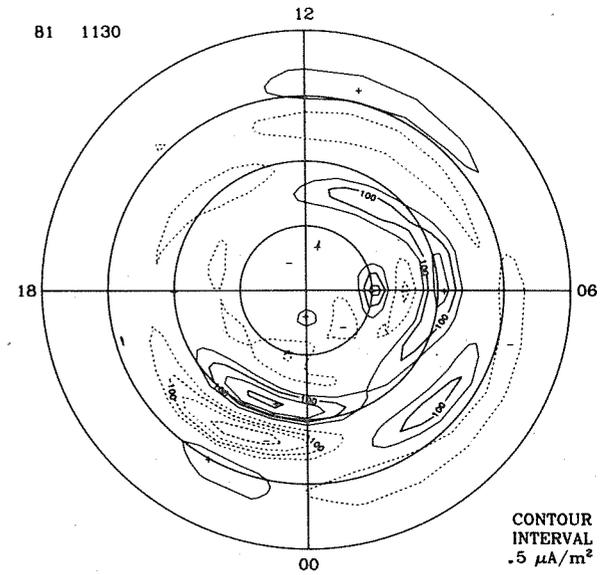
JOULE HEAT RATE



FIELD-ALIGNED CURRENTS



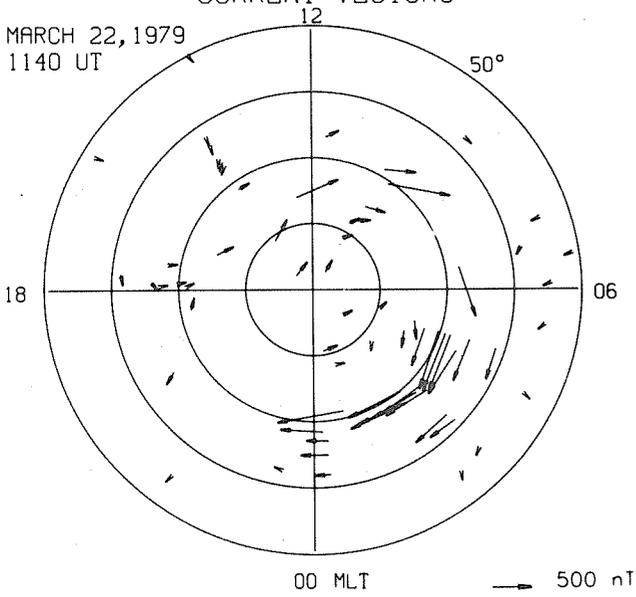
TOTAL (W)  
3.84E+11



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1140 UT

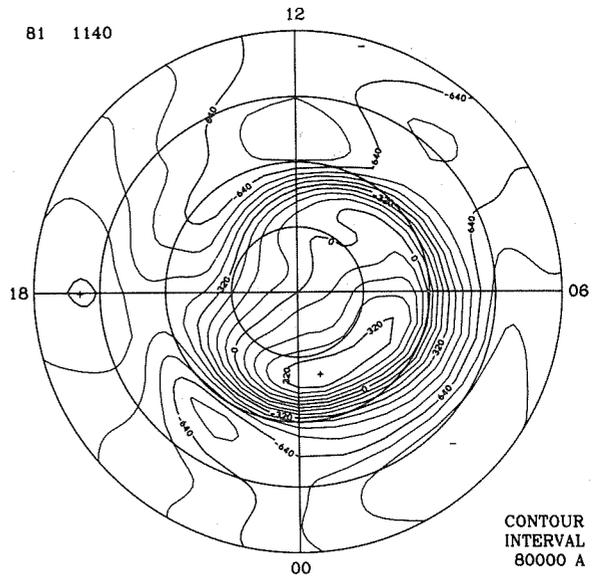


00 MLT

→ 500 nT

EQUIVALENT CURRENT SYSTEM

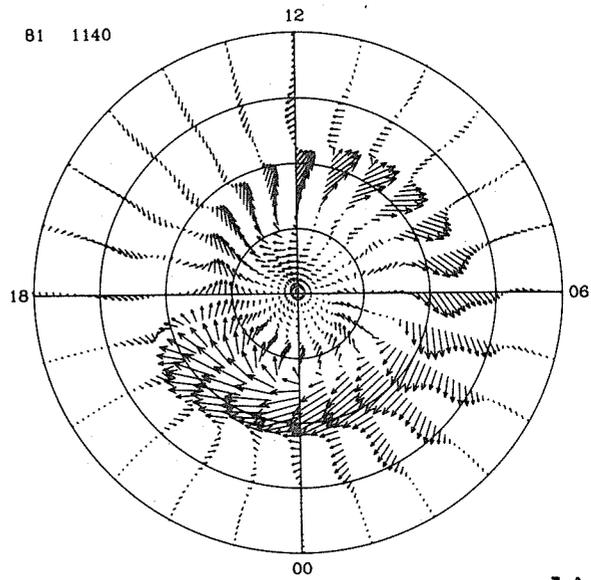
81 1140



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

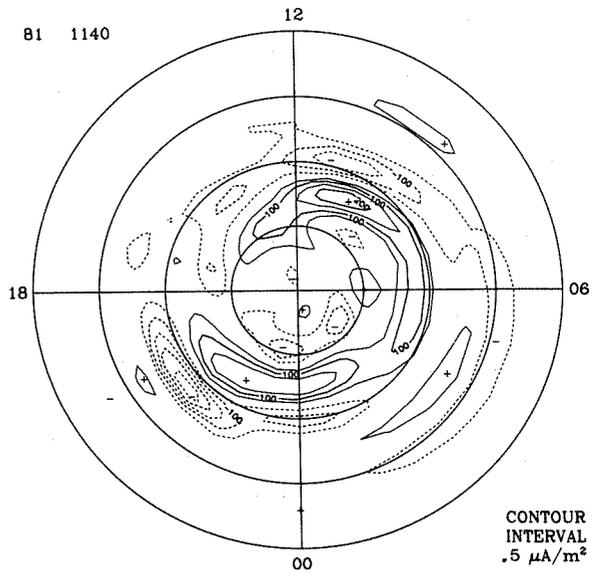
81 1140



→ 3 A/m

FIELD-ALIGNED CURRENTS

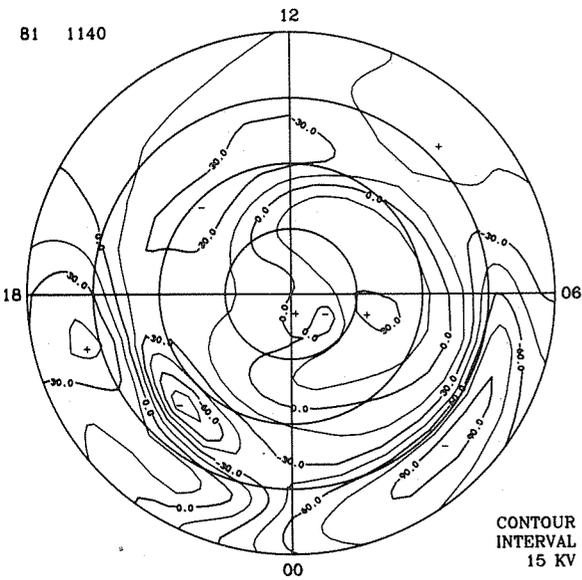
81 1140



CONTOUR  
INTERVAL  
.5  $\mu\text{A}/\text{m}^2$

ELECTRIC POTENTIAL

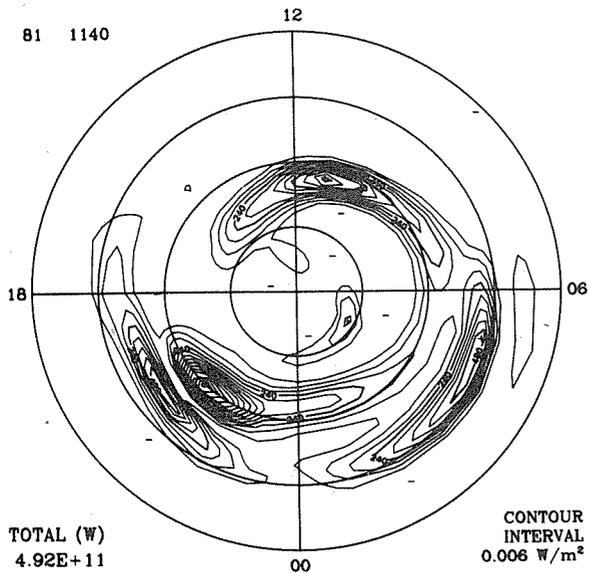
81 1140



CONTOUR  
INTERVAL  
15 kV

JOULE HEAT RATE

81 1140

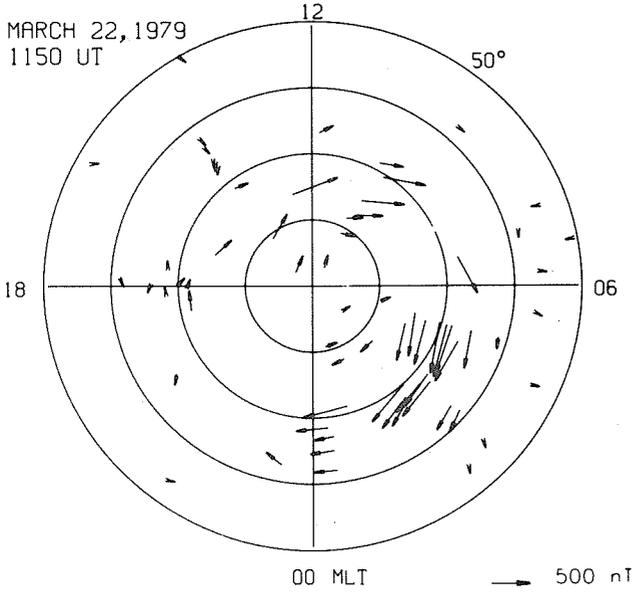


CONTOUR  
INTERVAL  
0.006  $\text{W}/\text{m}^2$

TOTAL (W)  
4.92E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

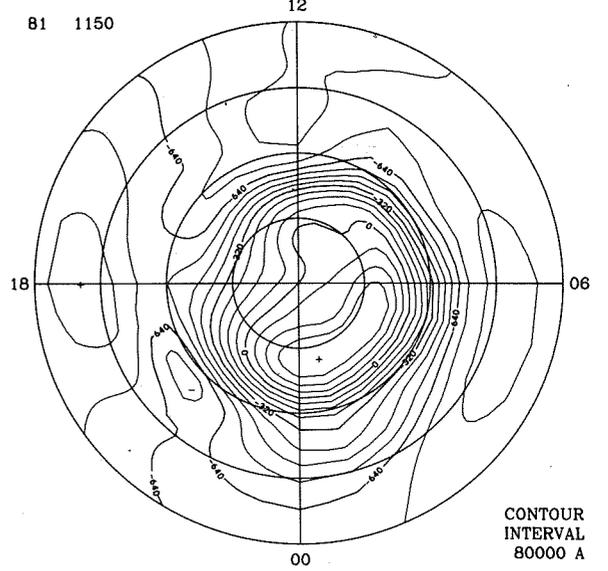
MARCH 22, 1979  
1150 UT



00 MLT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

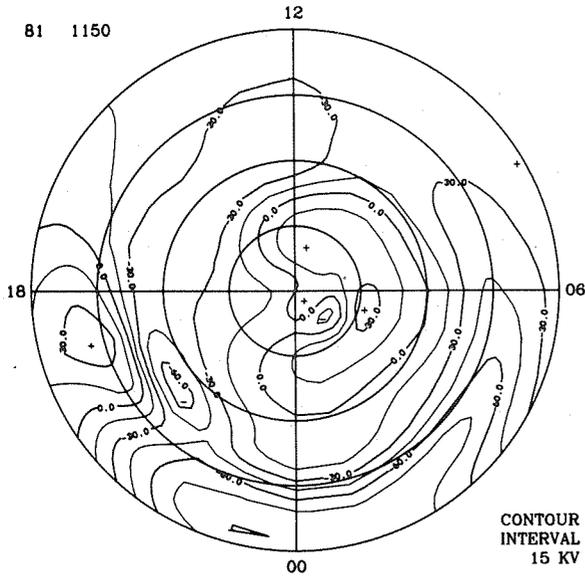
81 1150



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

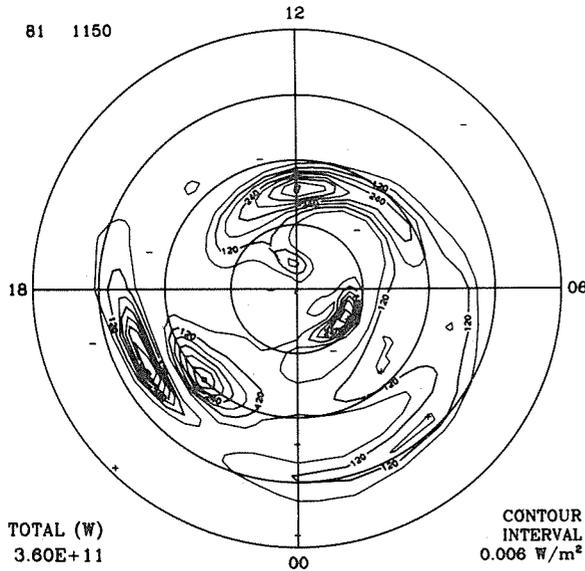
81 1150



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

81 1150

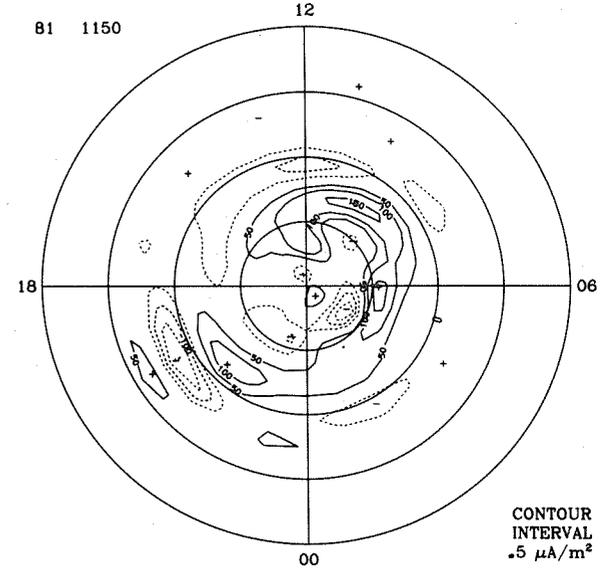


TOTAL (W)  
3.80E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

81 1150

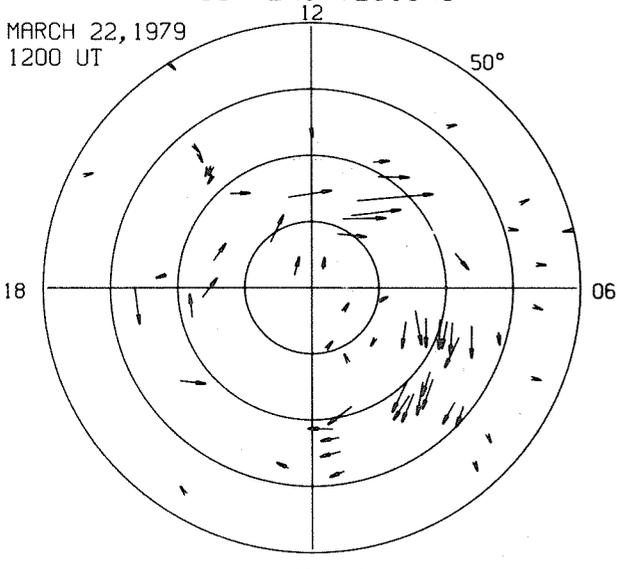


3 A/m

CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

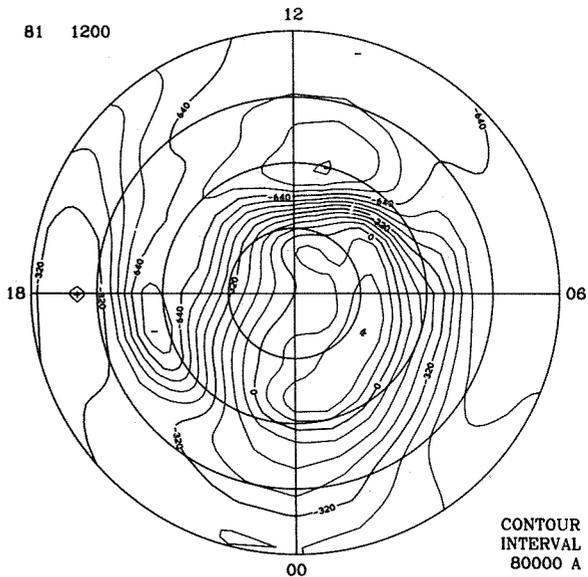
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1200 UT



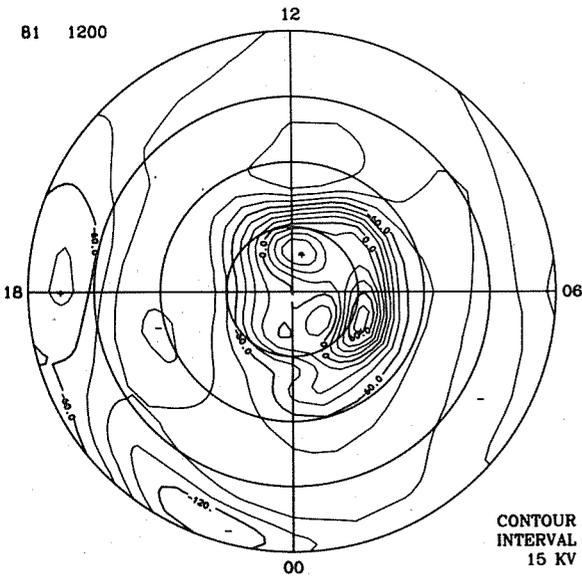
00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



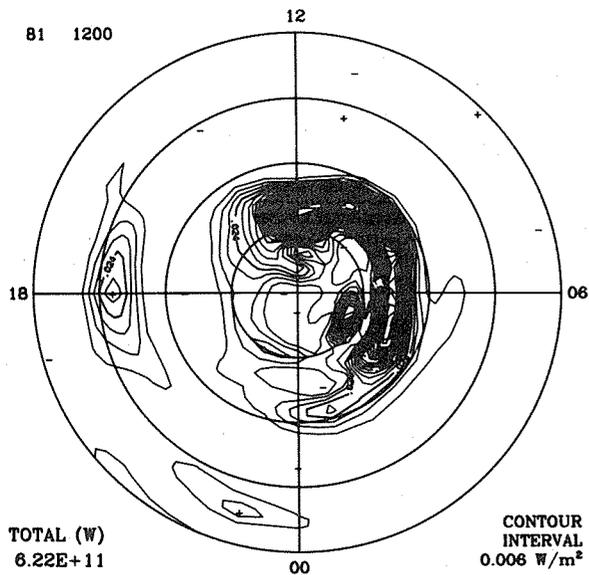
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



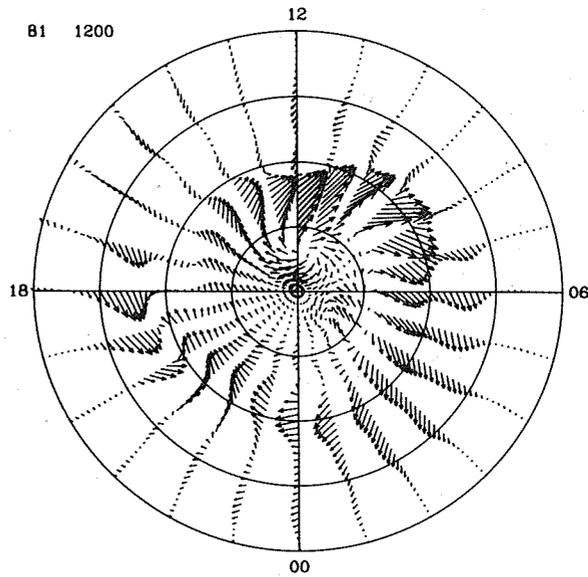
CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE



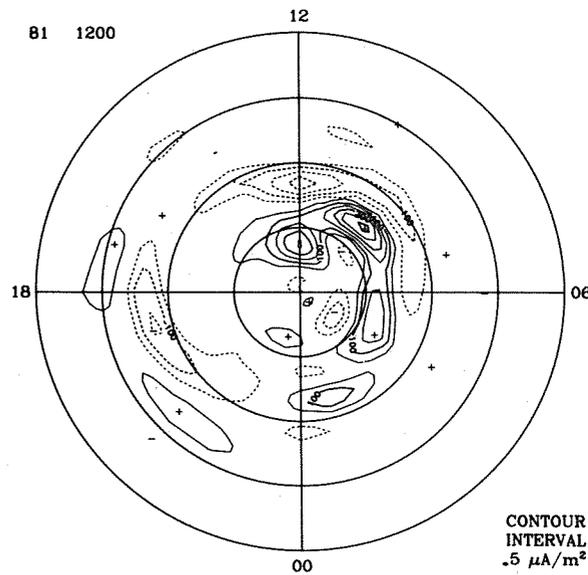
TOTAL (W)  
6.22E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>



3 A/m →

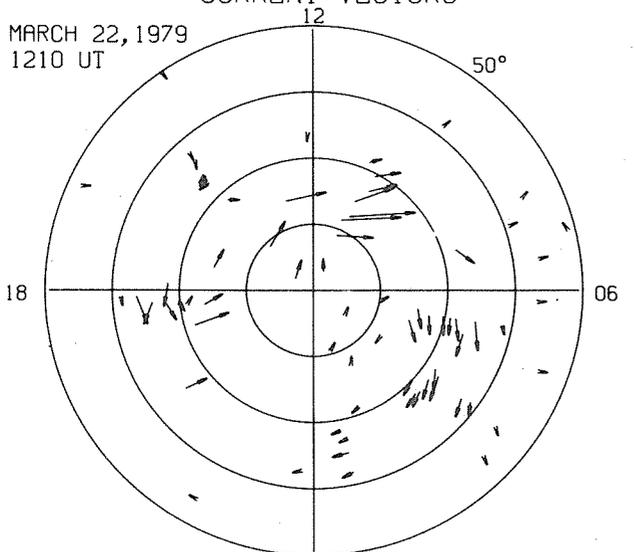
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1210 UT

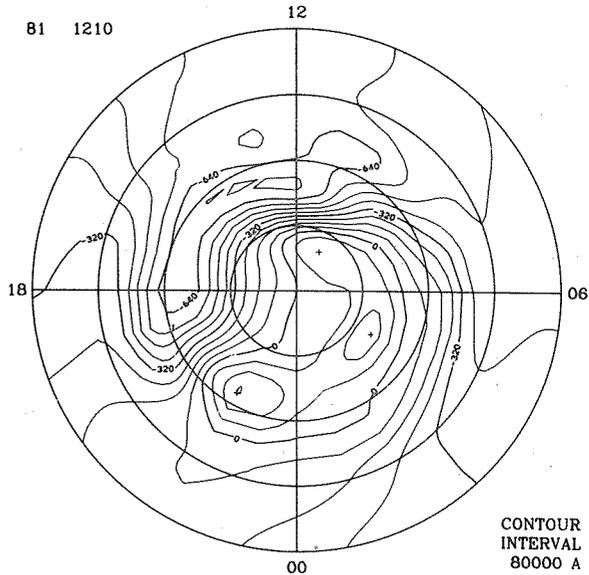


00 MLT  
ELECTRIC POTENTIAL

→ 500 nT

EQUIVALENT CURRENT SYSTEM

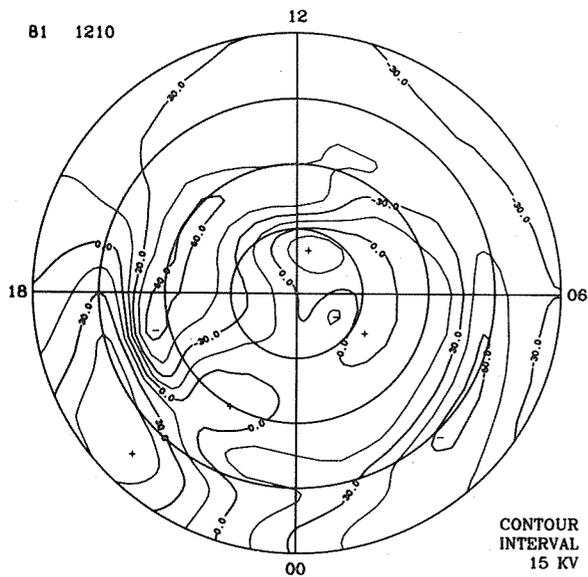
81 1210



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

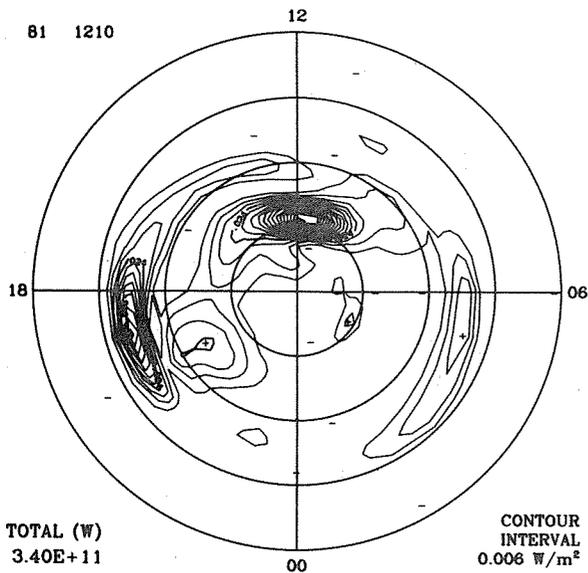
81 1210



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

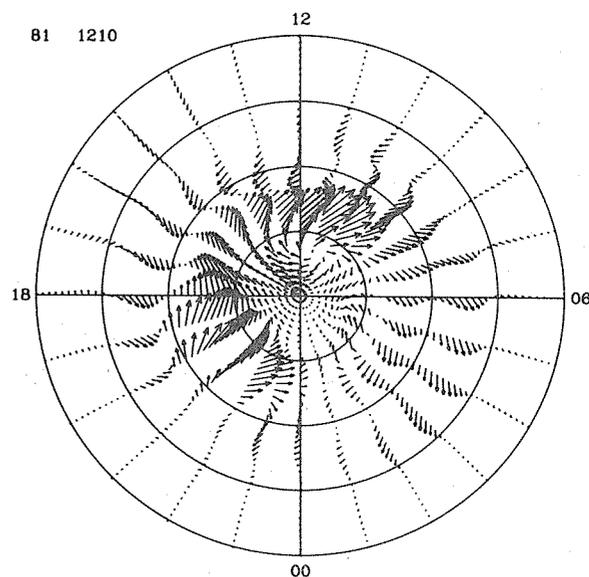
81 1210



TOTAL (W)  
3.40E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

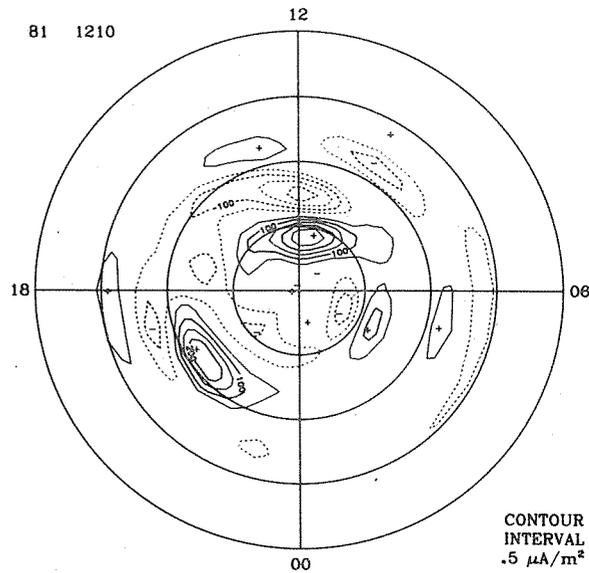
81 1210



3 A/m →

FIELD-ALIGNED CURRENTS

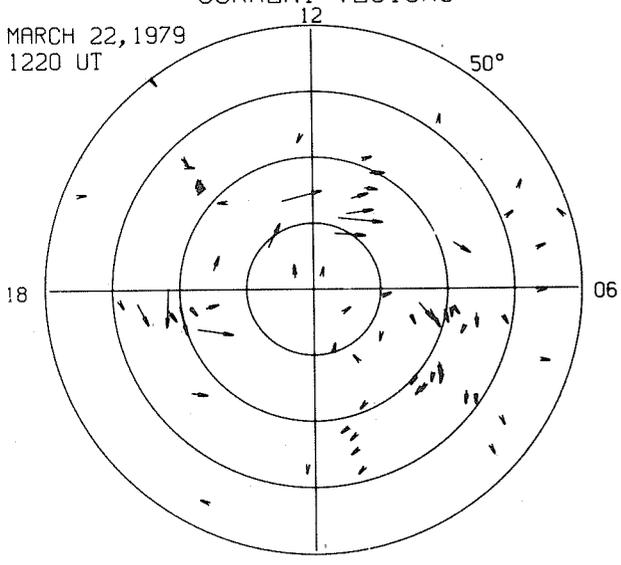
81 1210



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

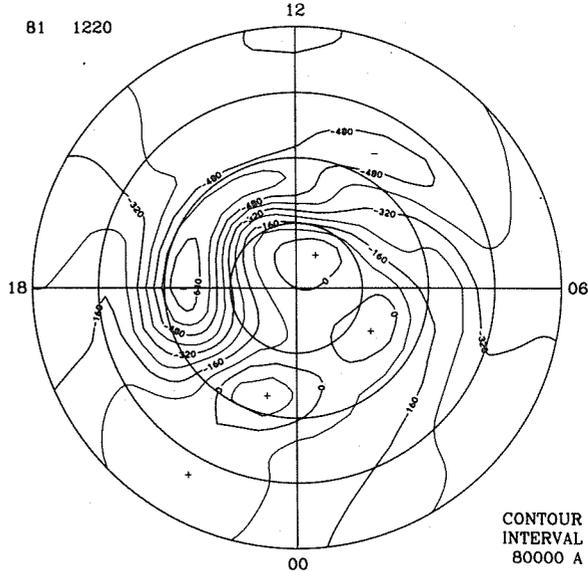
MARCH 22, 1979  
1220 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

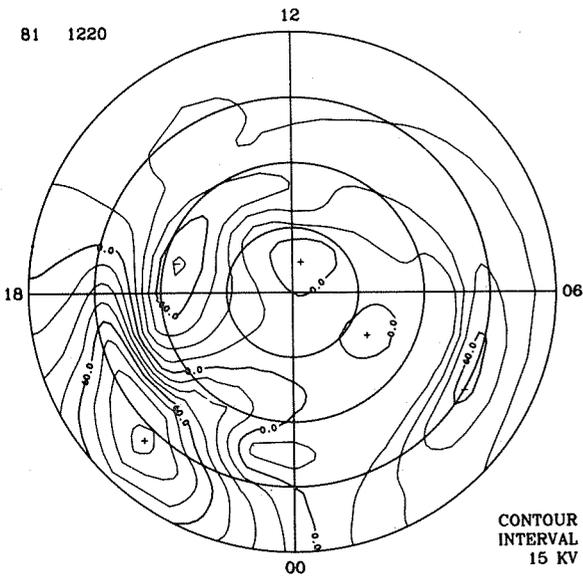
81 1220



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

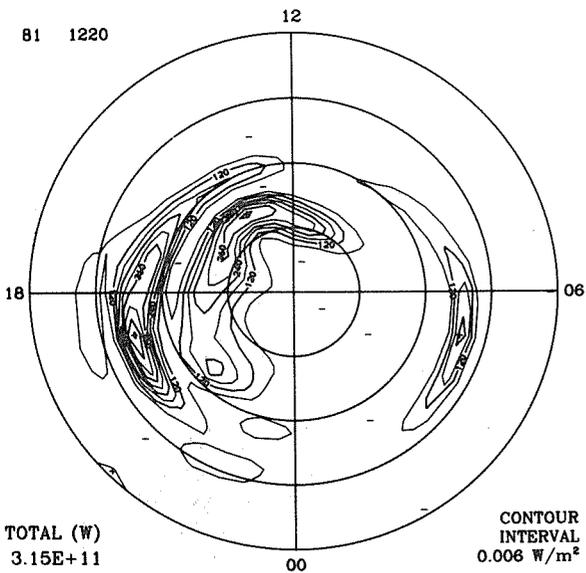
81 1220



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

81 1220

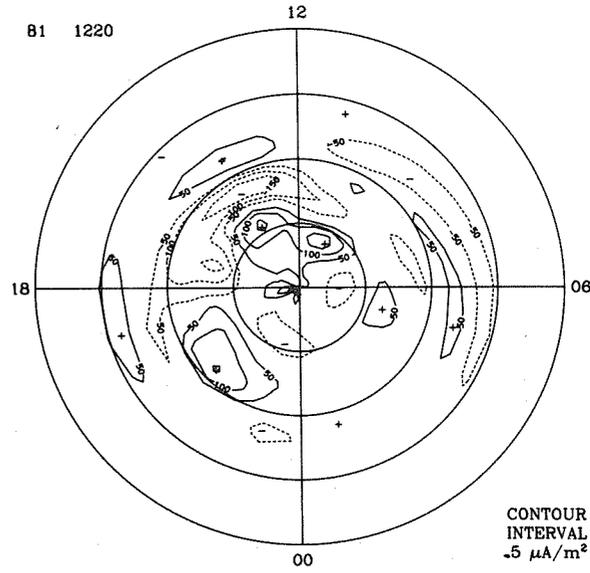


TOTAL (W)  
3.15E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

81 1220

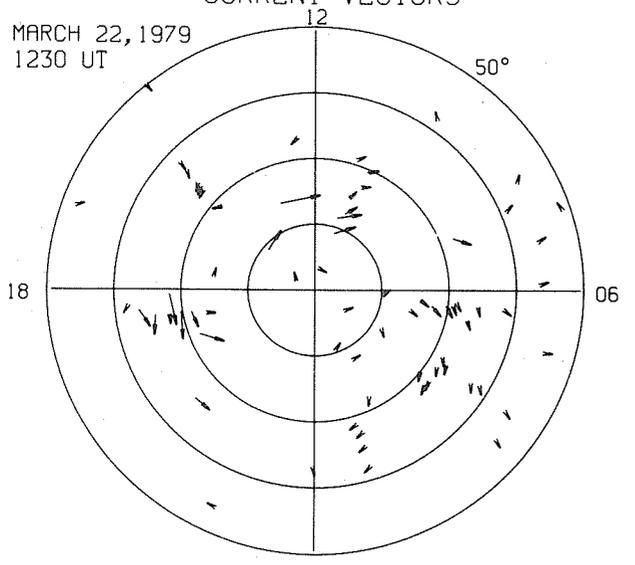


3 A/m →

CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

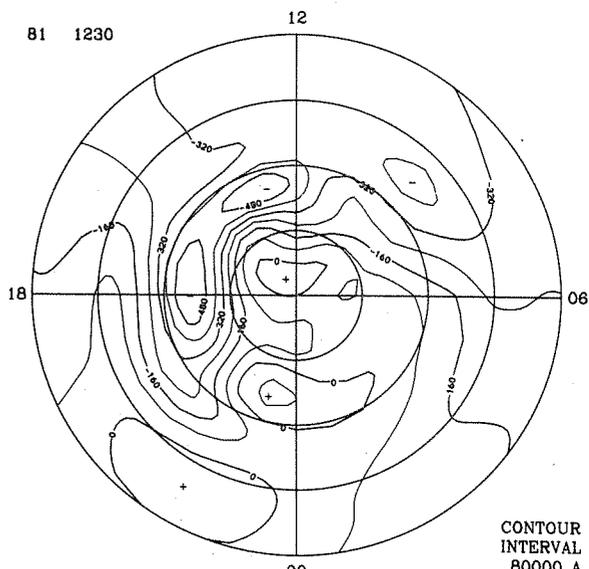
MARCH 22, 1979  
1230 UT



00 MLT → 500 nT

EQUIVALENT CURRENT SYSTEM

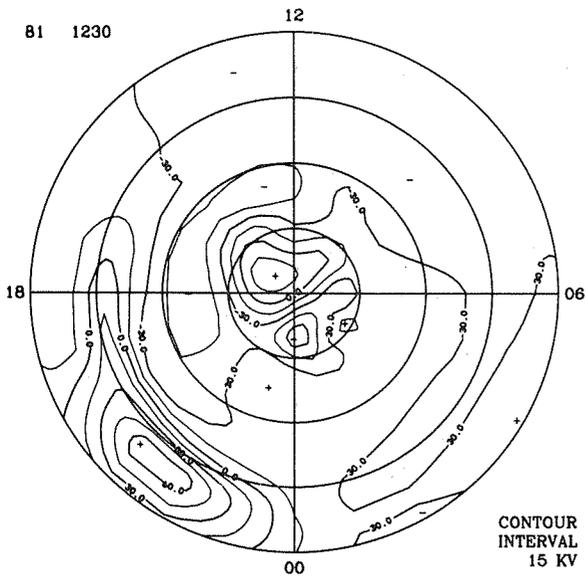
81 1230



CONTOUR  
INTERVAL  
80000 A

ELECTRIC POTENTIAL

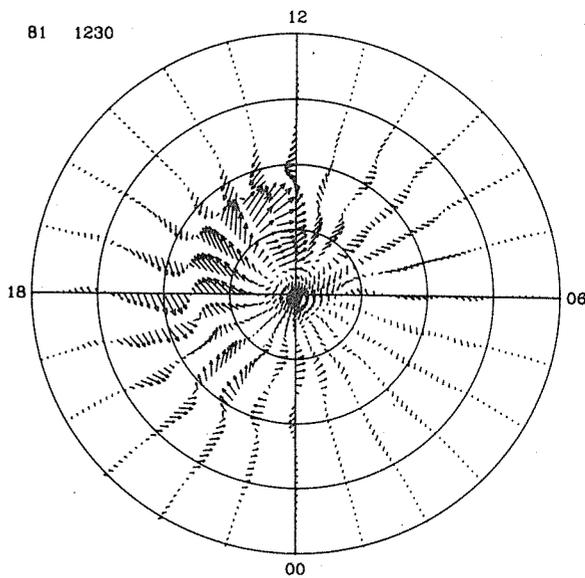
81 1230



CONTOUR  
INTERVAL  
15 KV

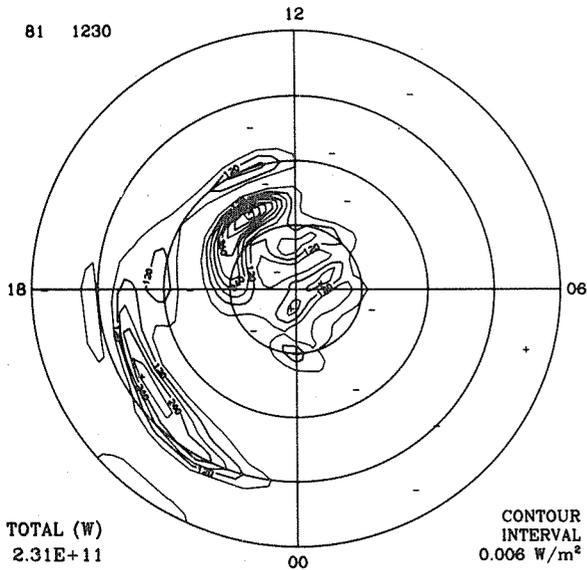
IONOSPHERIC CURRENT

81 1230



JOULE HEAT RATE

81 1230

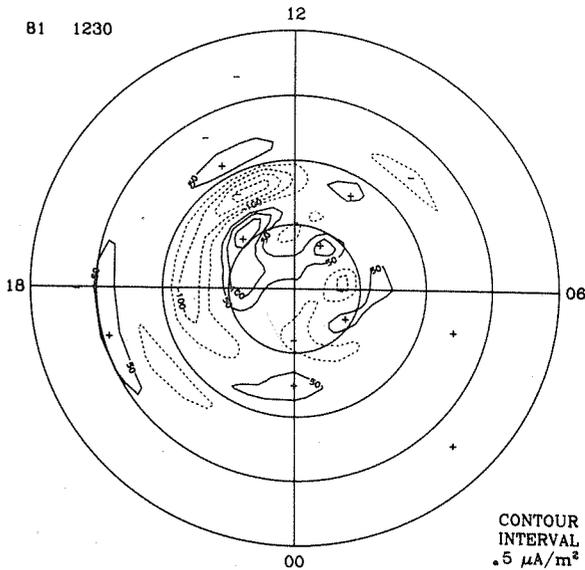


TOTAL (W)  
2.31E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

81 1230



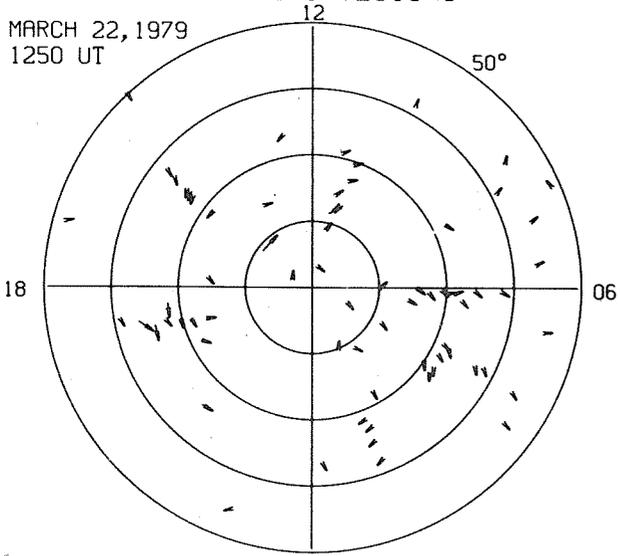
3 A/m →

CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>



OBSERVED EQUIVALENT  
CURRENT VECTORS

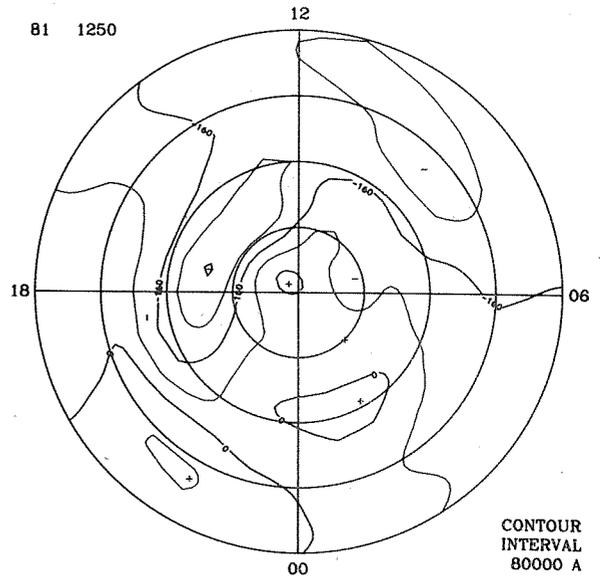
MARCH 22, 1979  
1250 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

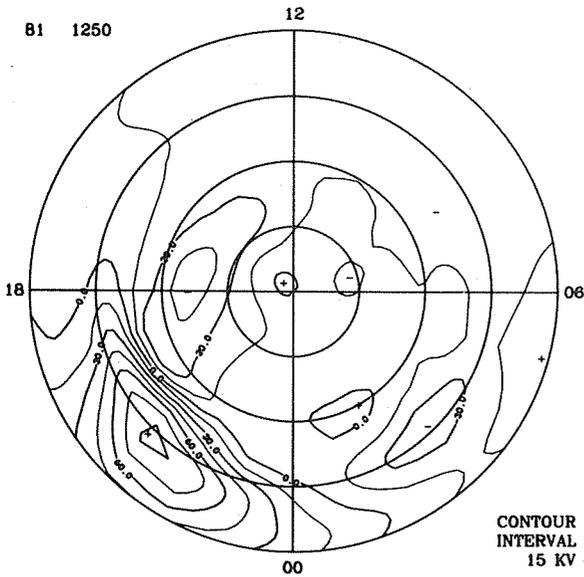
81 1250



CONTOUR  
INTERVAL  
80000 A

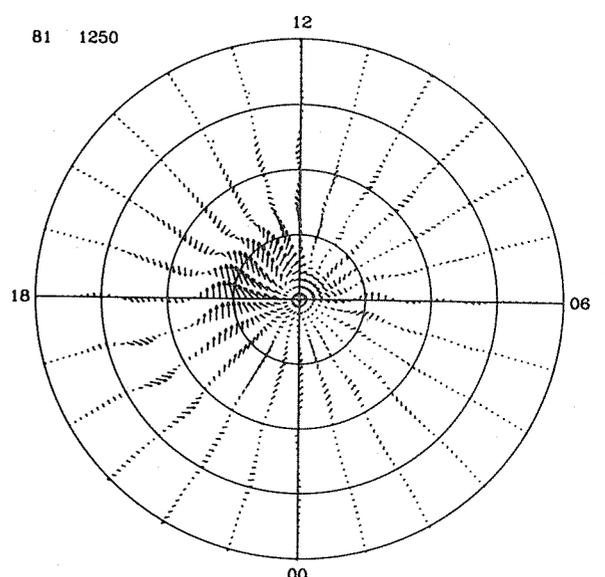
IONOSPHERIC CURRENT

81 1250



CONTOUR  
INTERVAL  
15 KV

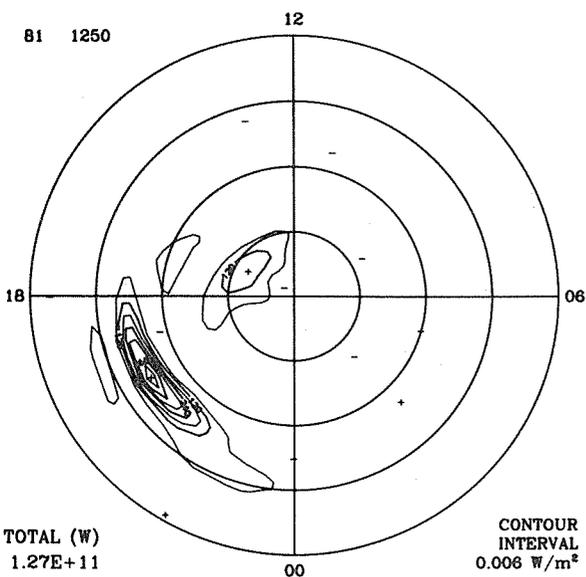
81 1250



3 A/m →

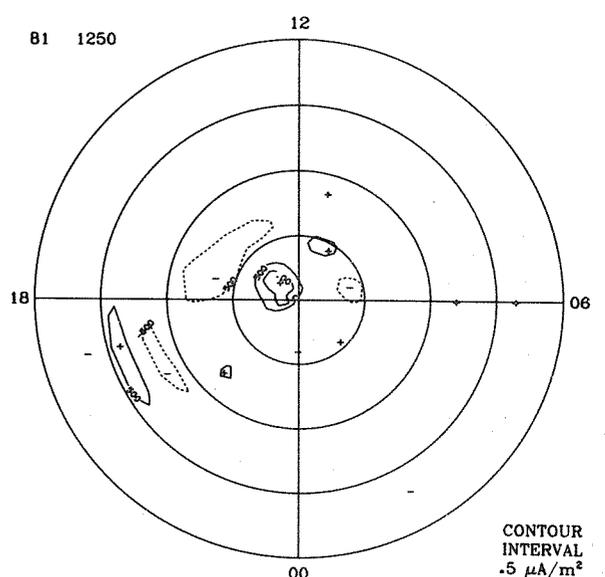
JOULE HEAT RATE

81 1250



CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

81 1250

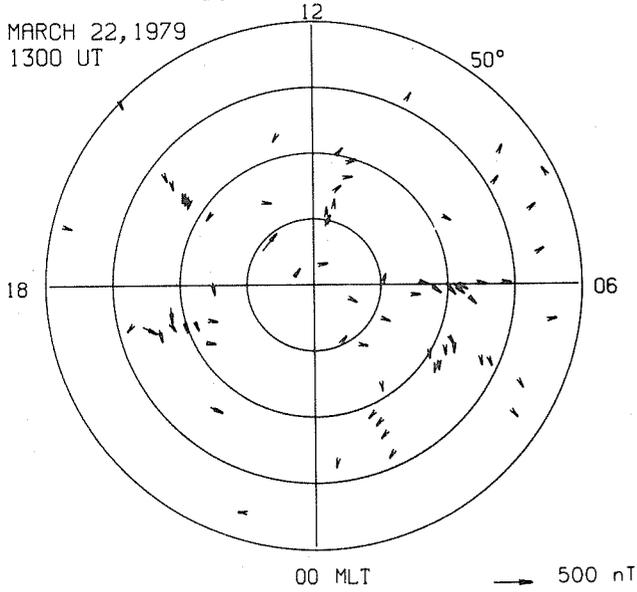


CONTOUR  
INTERVAL  
0.5 μA/m<sup>2</sup>

TOTAL (W)  
1.27E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

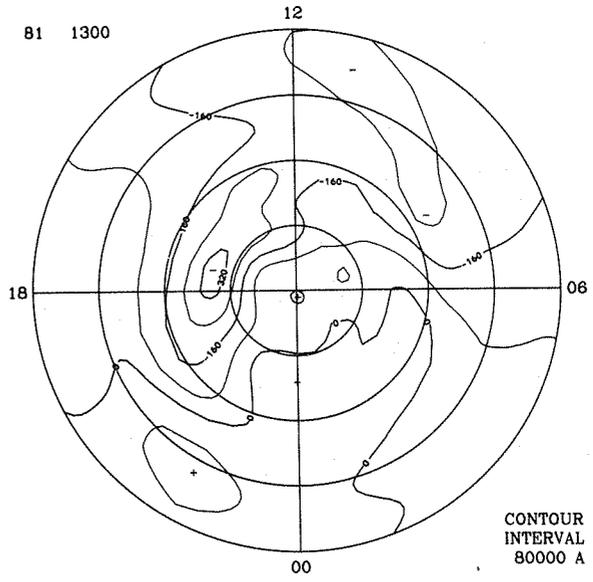
MARCH 22, 1979  
1300 UT



00 MLT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

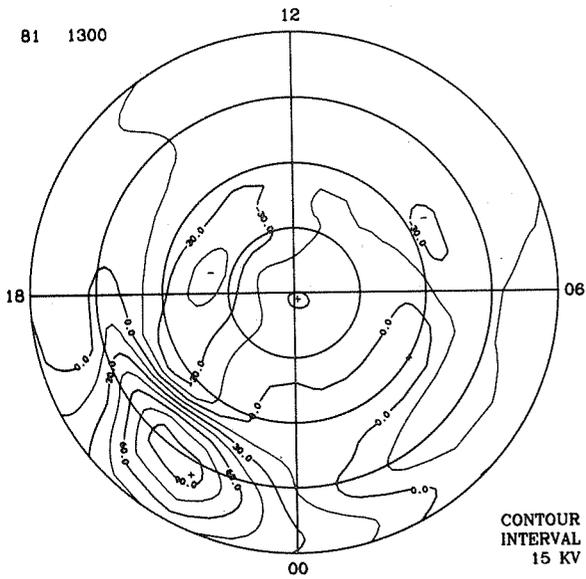
81 1300



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

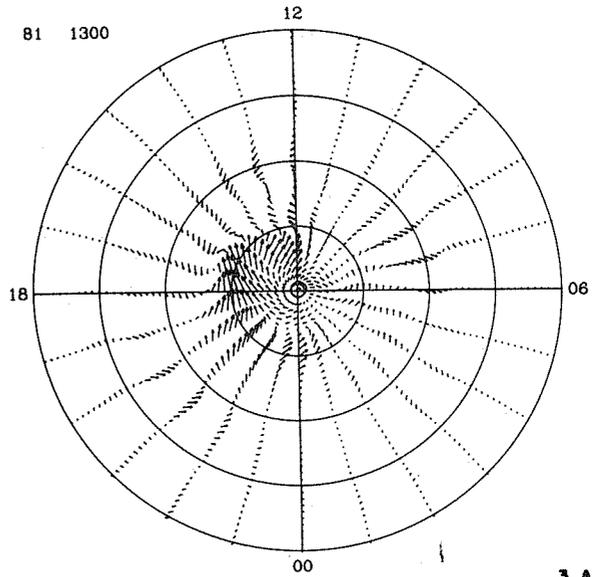
81 1300



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

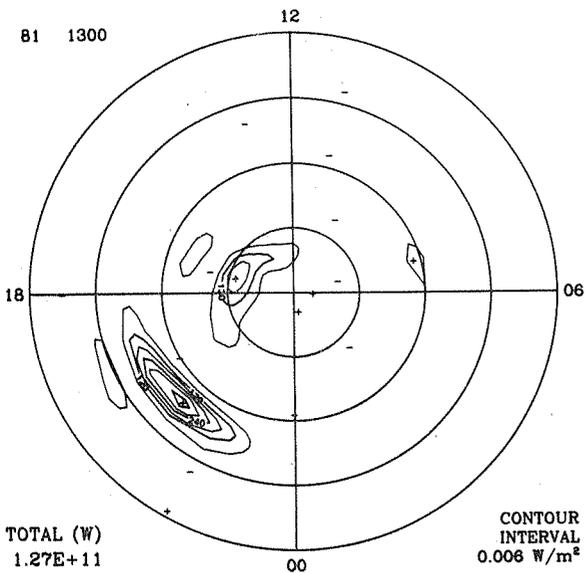
81 1300



3 A/m

FIELD-ALIGNED CURRENTS

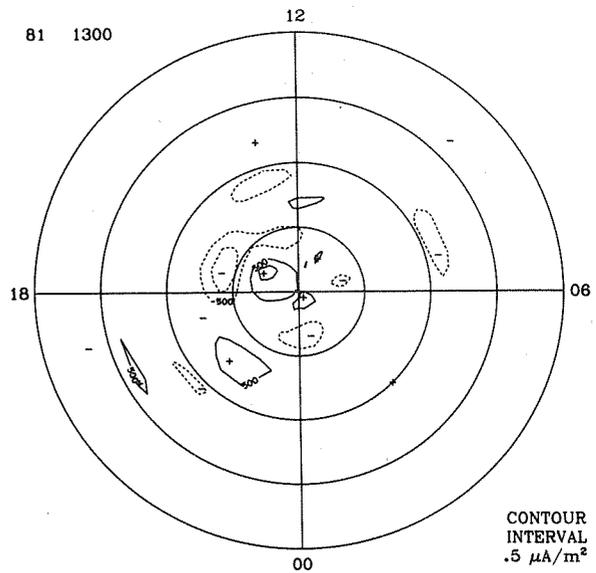
81 1300



TOTAL (W)  
1.27E+11

CONTOUR  
INTERVAL  
0.008 W/m<sup>2</sup>

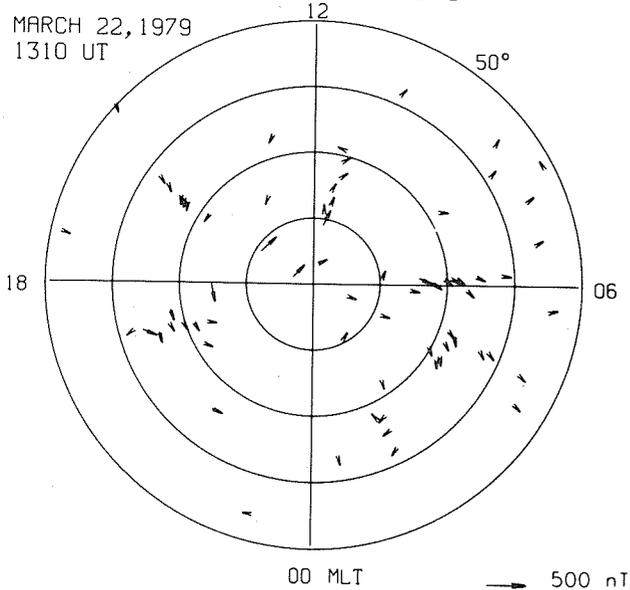
81 1300



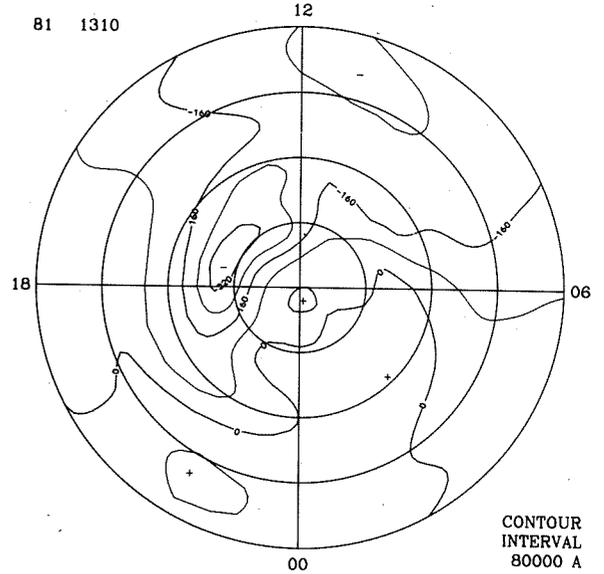
CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

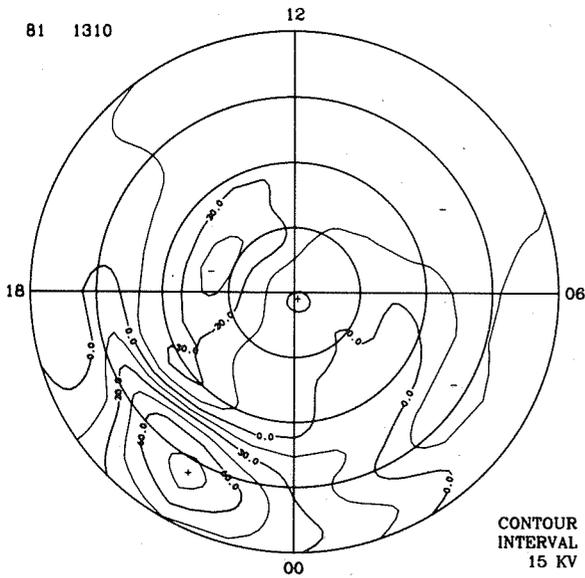
MARCH 22, 1979  
1310 UT



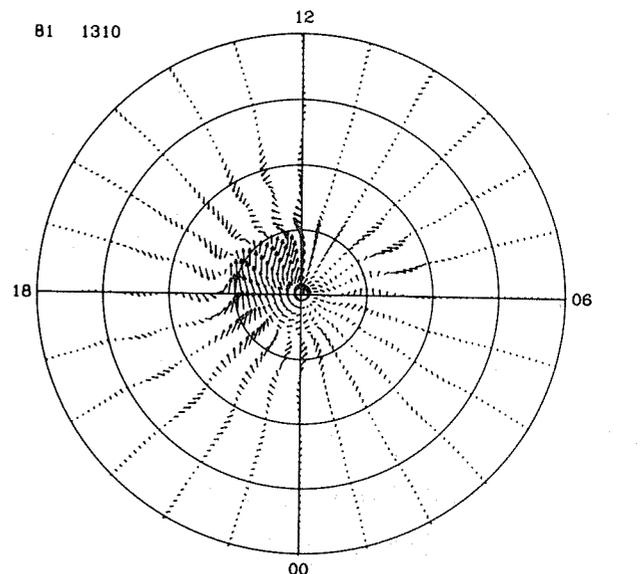
EQUIVALENT CURRENT SYSTEM



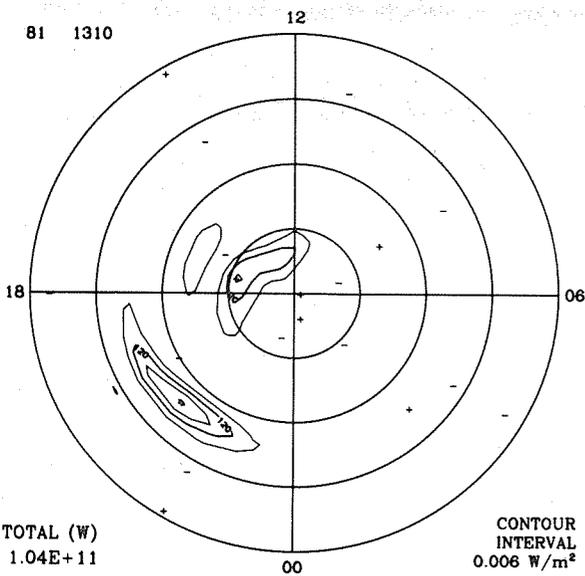
ELECTRIC POTENTIAL



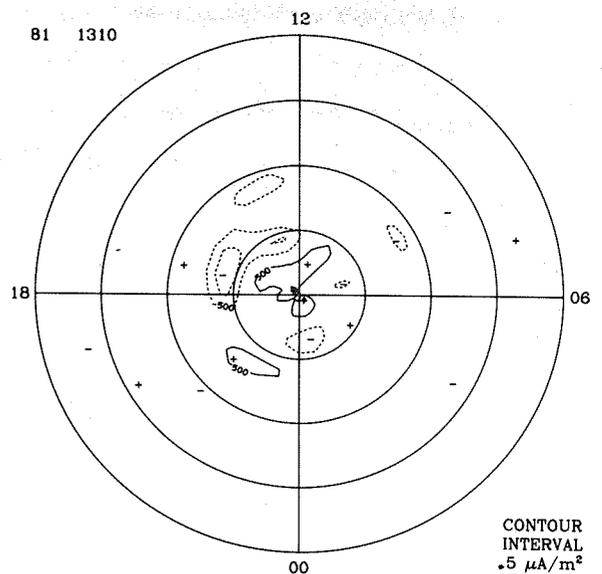
IONOSPHERIC CURRENT



JOULE HEAT RATE

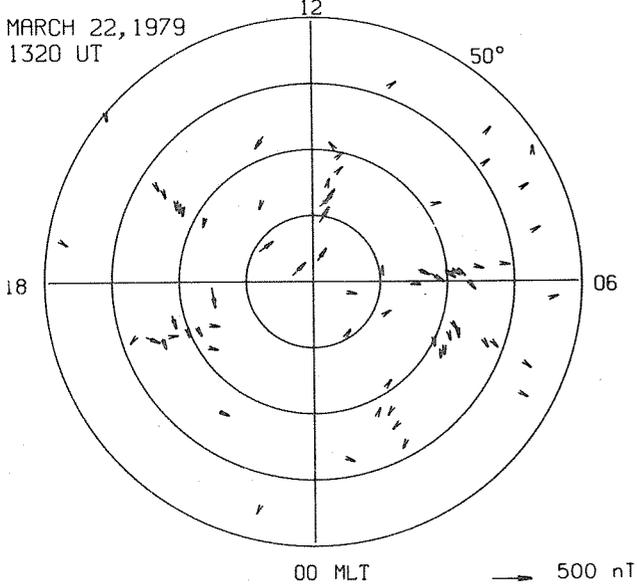


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1320 UT

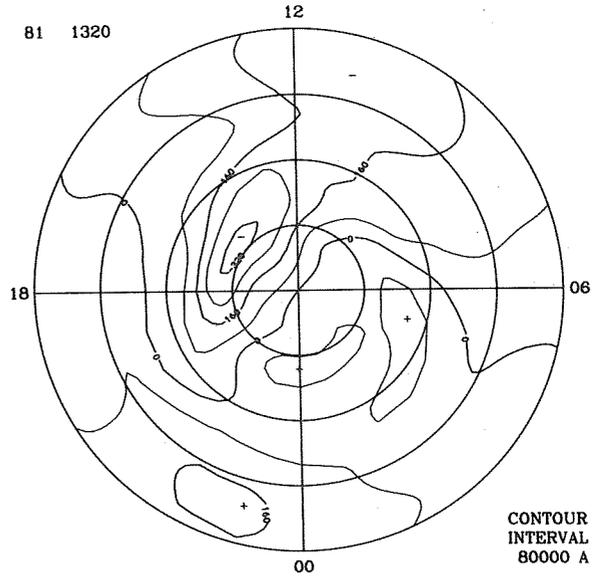


00 MLT

→ 500 nT

EQUIVALENT CURRENT SYSTEM

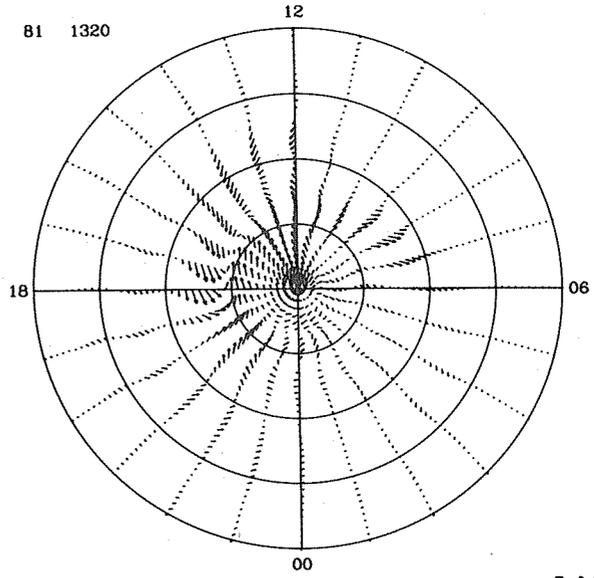
81 1320



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

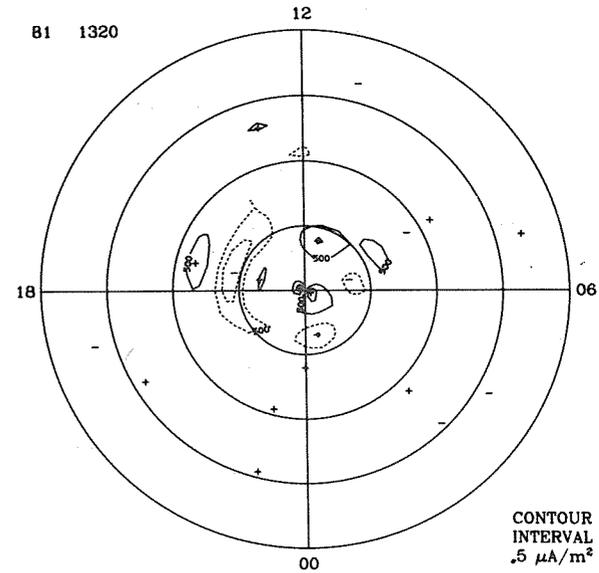
81 1320



→ 3 A/m

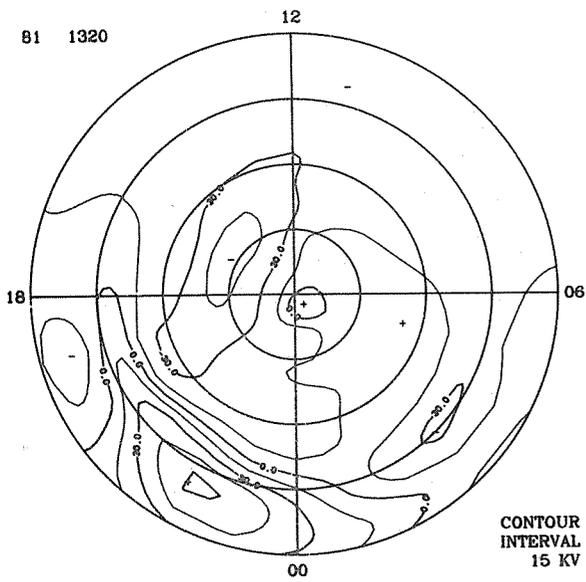
FIELD-ALIGNED CURRENTS

81 1320



CONTOUR  
INTERVAL  
.5 μA/m²

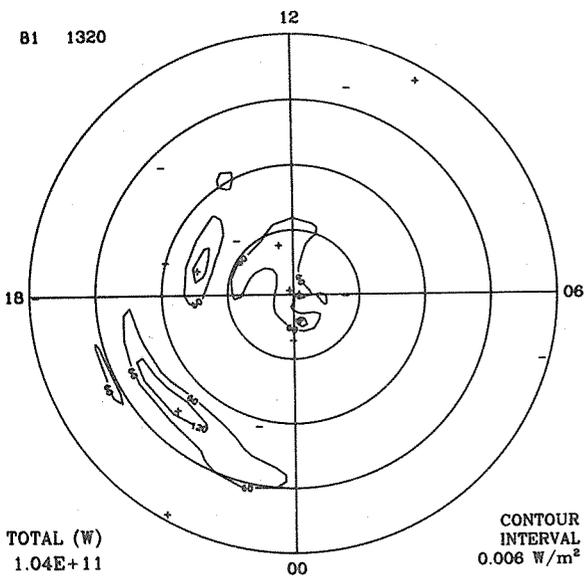
81 1320



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

81 1320

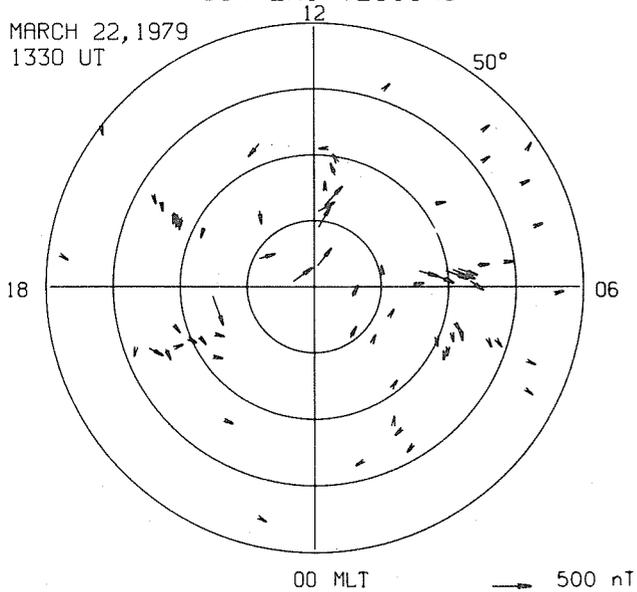


CONTOUR  
INTERVAL  
0.006 W/m²

TOTAL (W)  
1.04E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1330 UT

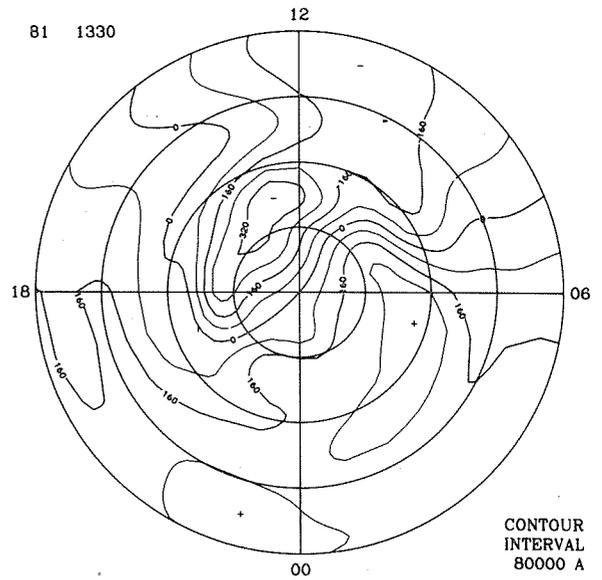


00 MLT  
ELECTRIC POTENTIAL

→ 500 nT

EQUIVALENT CURRENT SYSTEM

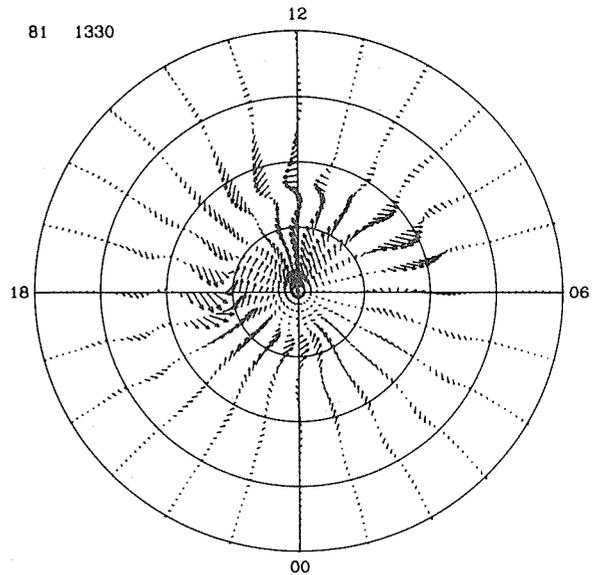
81 1330



CONTOUR  
INTERVAL  
80000 A

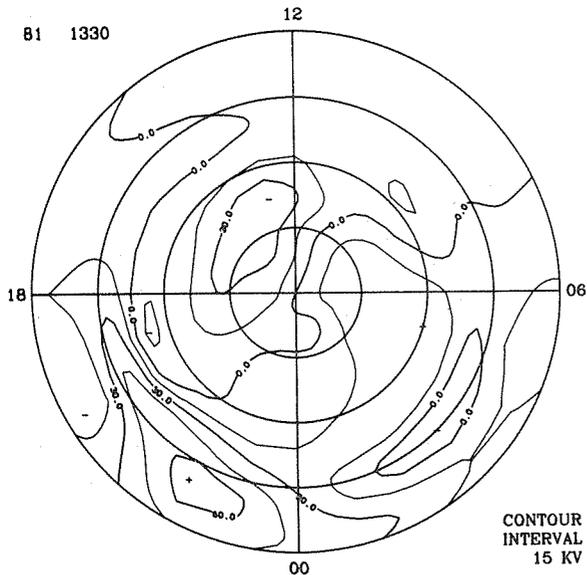
IONOSPHERIC CURRENT

81 1330



3 A/m

81 1330

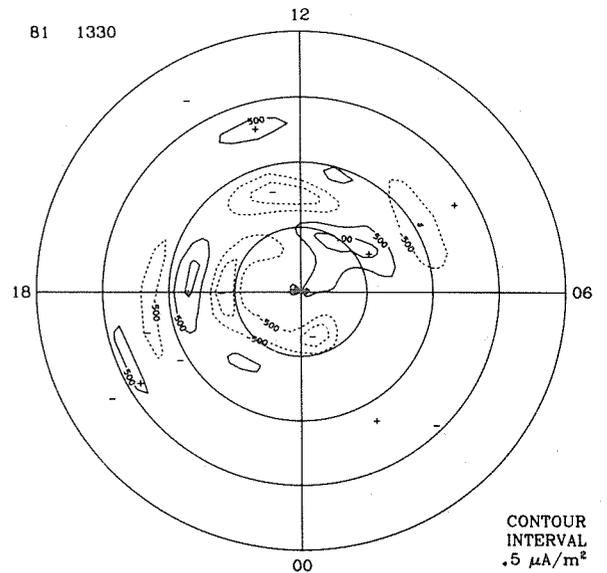


CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

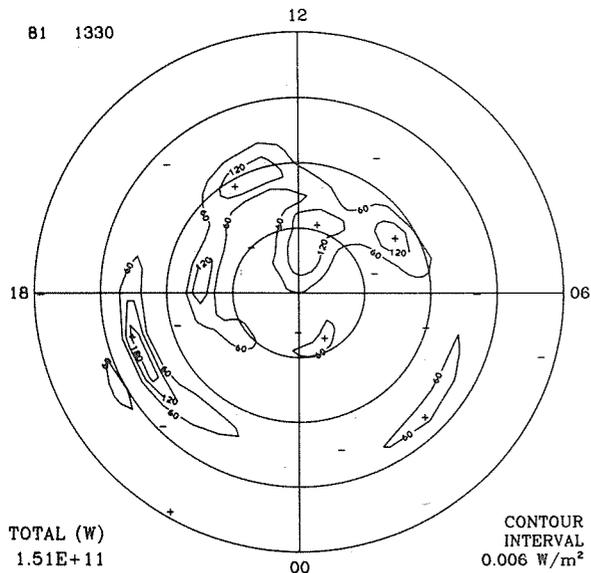
FIELD-ALIGNED CURRENTS

81 1330



CONTOUR  
INTERVAL  
.5 μA/m²

81 1330

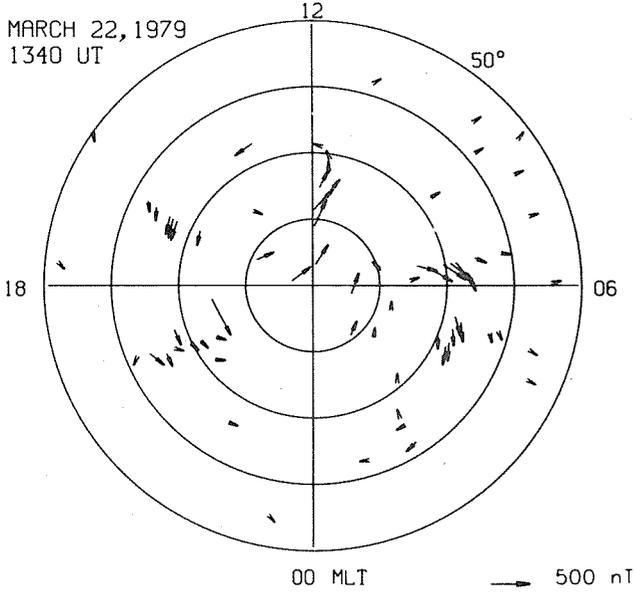


CONTOUR  
INTERVAL  
0.006 W/m²

TOTAL (W)  
1.51E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

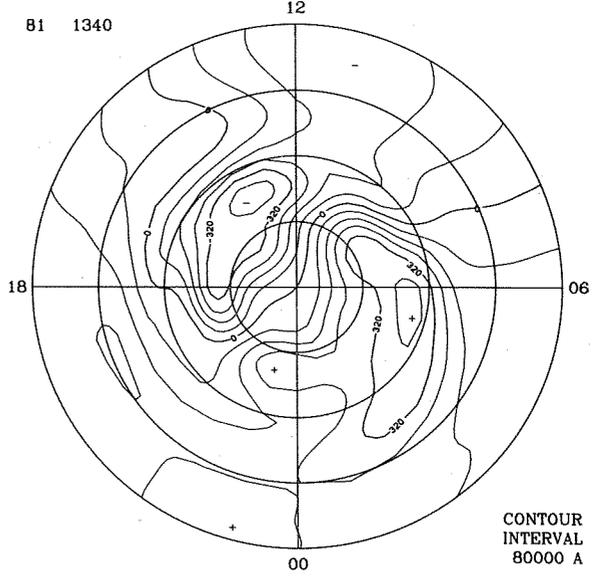
MARCH 22, 1979  
1340 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

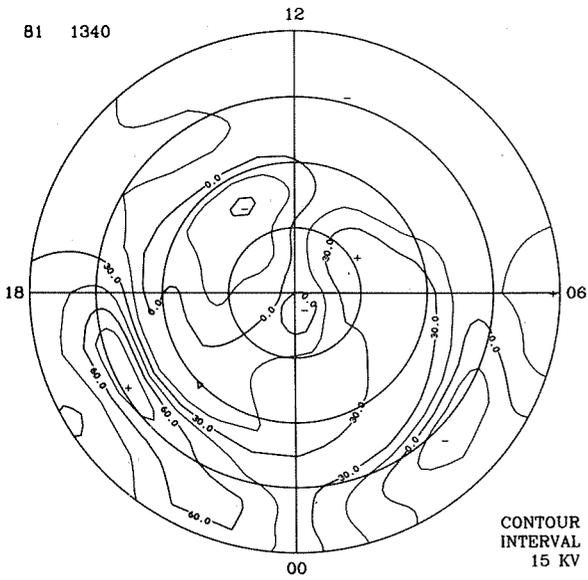
EQUIVALENT CURRENT SYSTEM

B1 1340



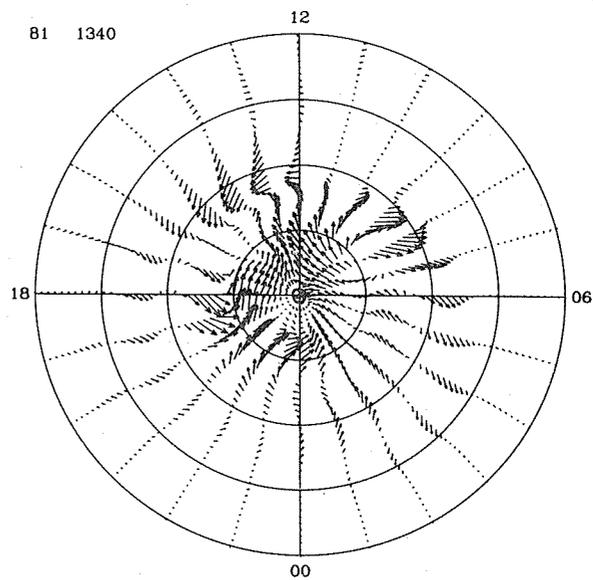
CONTOUR  
INTERVAL  
80000 A

B1 1340



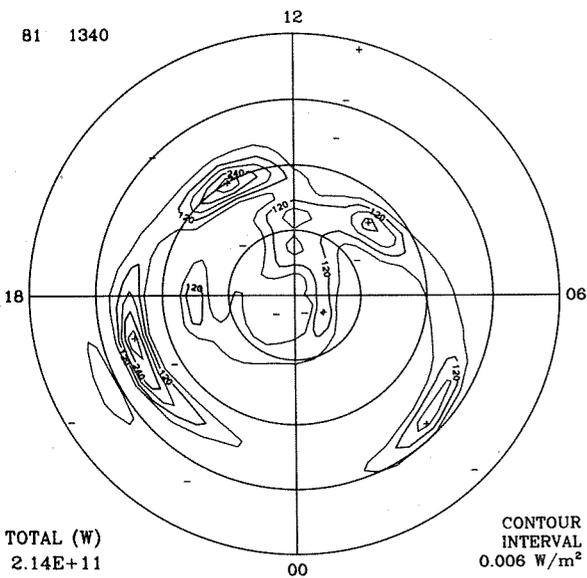
CONTOUR  
INTERVAL  
15 KV  
JOULE HEAT RATE

B1 1340



3 A/m →  
FIELD-ALIGNED CURRENTS

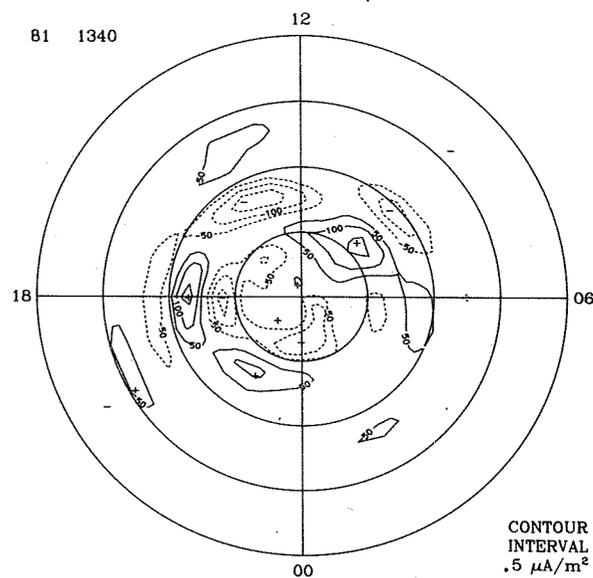
B1 1340



TOTAL (W)  
2.14E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

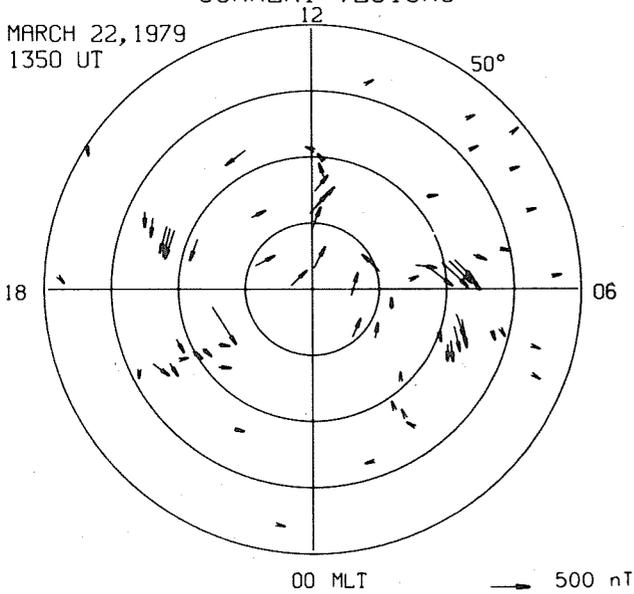
B1 1340



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1350 UT

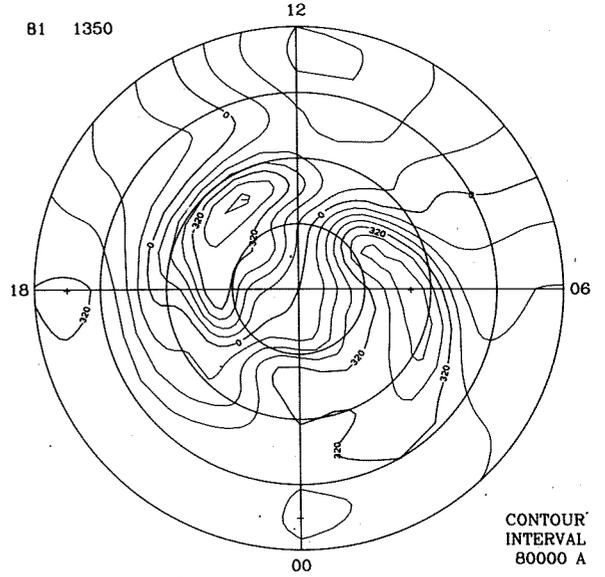


00 MLT  
ELECTRIC POTENTIAL

→ 500 nT

EQUIVALENT CURRENT SYSTEM

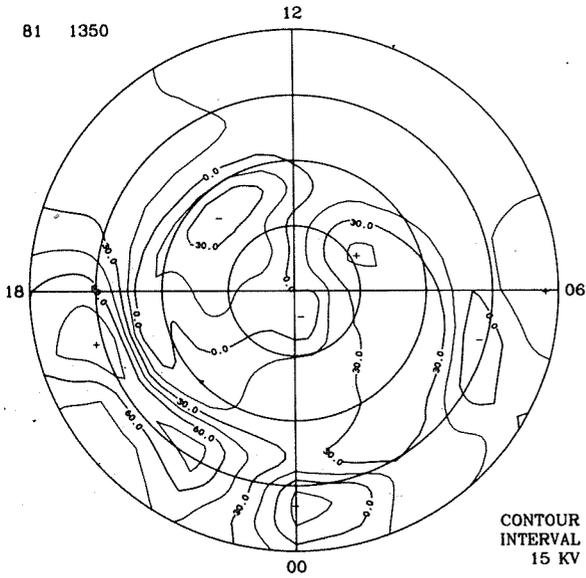
81 1350



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

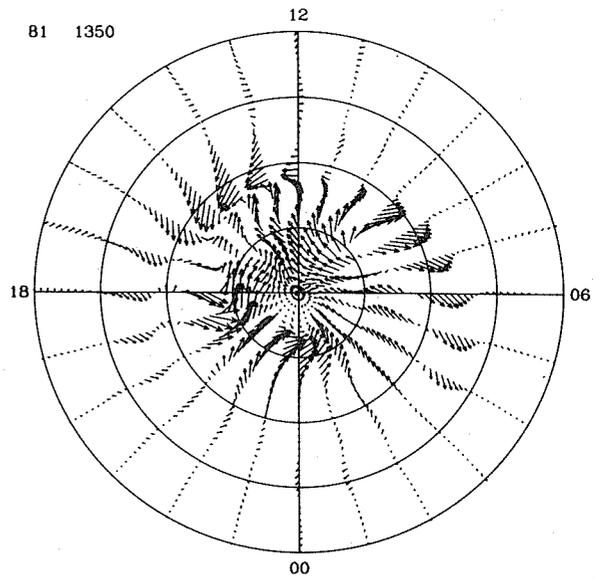
81 1350



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

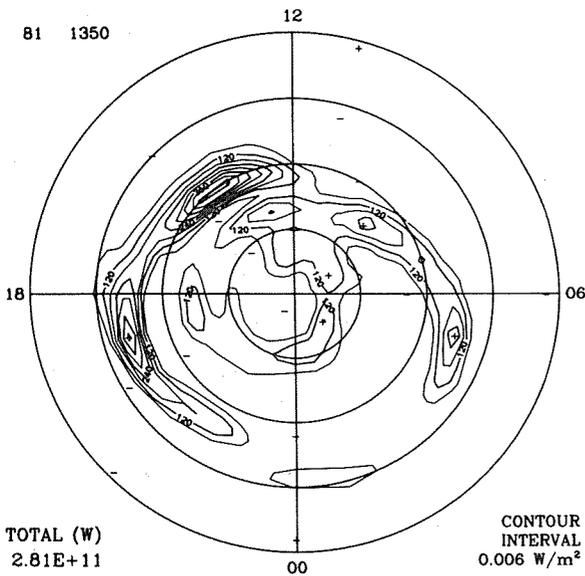
81 1350



→ 3 A/m

FIELD-ALIGNED CURRENTS

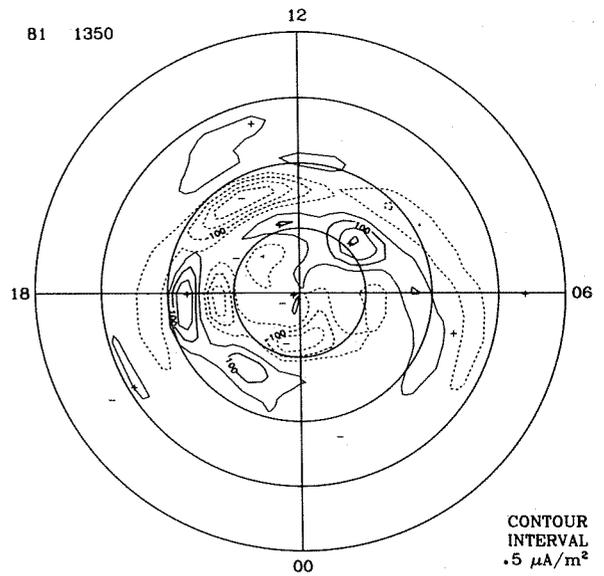
81 1350



CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

TOTAL (W)  
2.81E+11

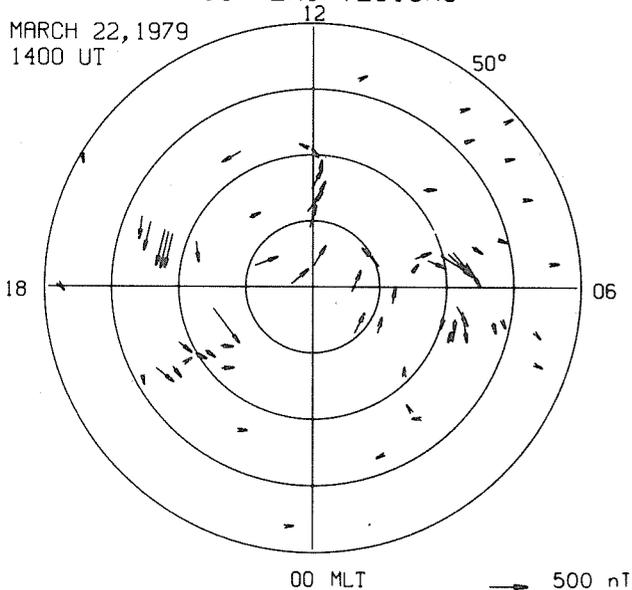
81 1350



CONTOUR  
INTERVAL  
0.5 μA/m<sup>2</sup>

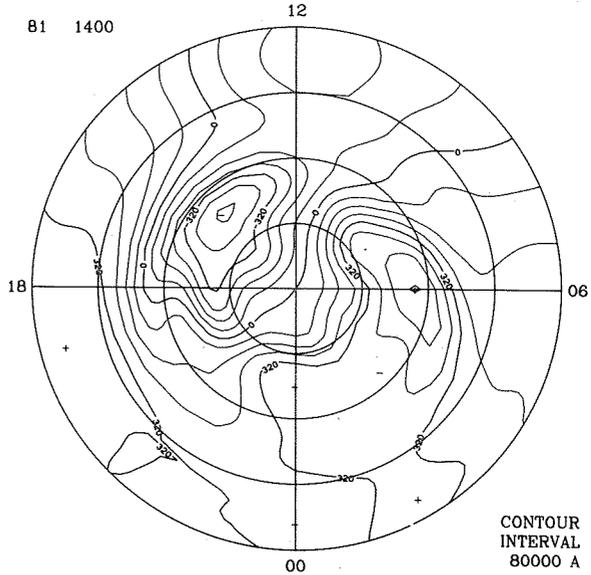
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1400 UT



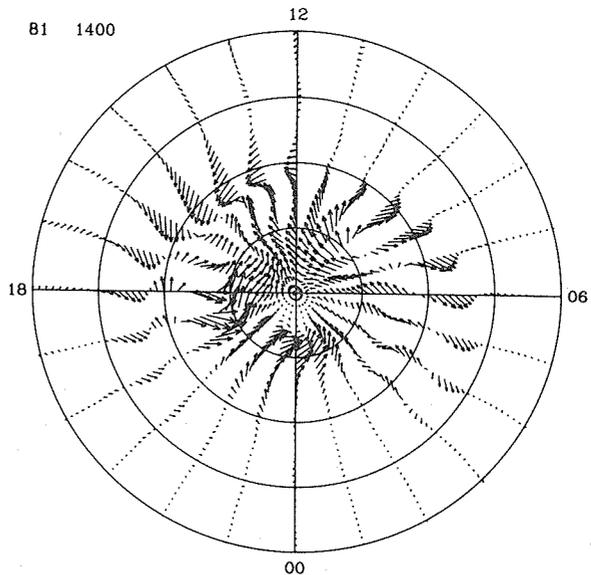
00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



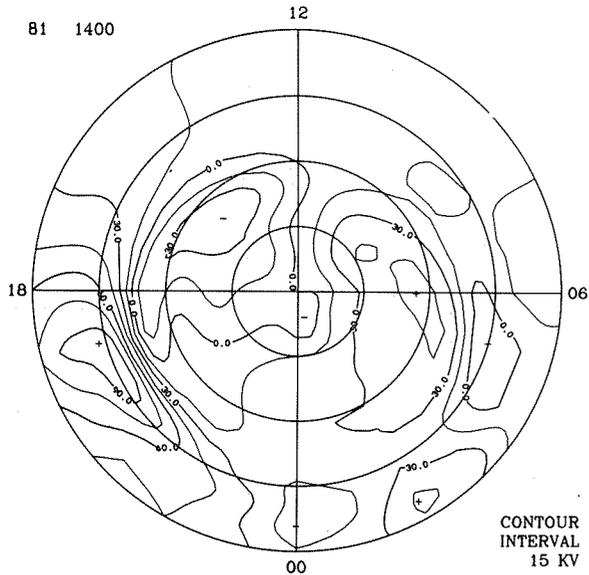
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



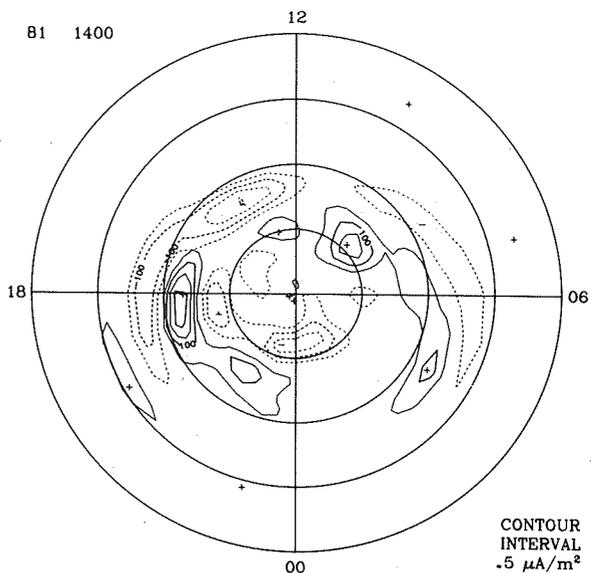
3 A/m →

JOULE HEAT RATE

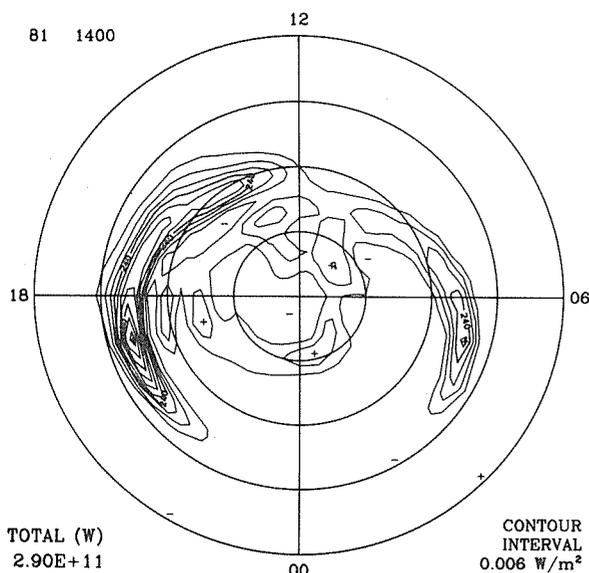


CONTOUR  
INTERVAL  
15 KV

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.5 μA/m²

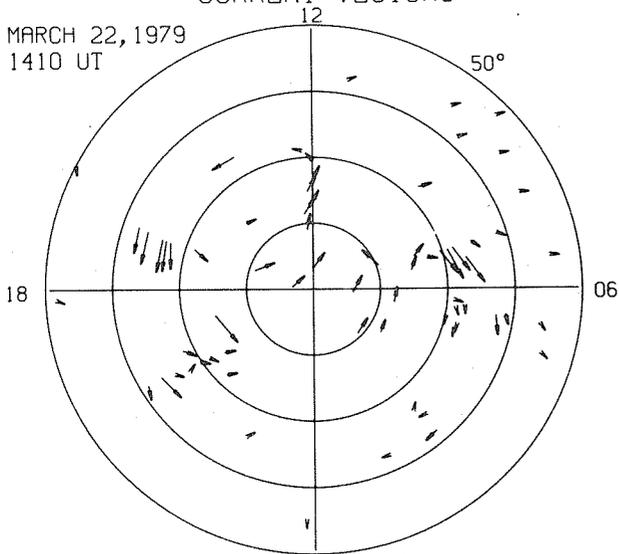


TOTAL (W)  
2.90E+11

CONTOUR  
INTERVAL  
0.006 W/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

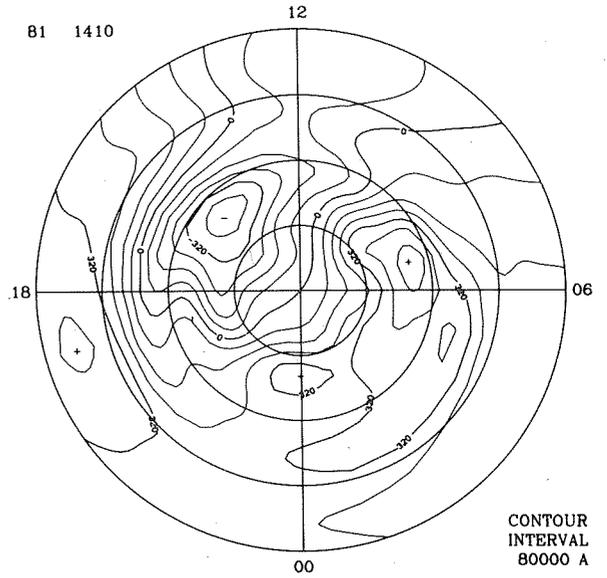
MARCH 22, 1979  
1410 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

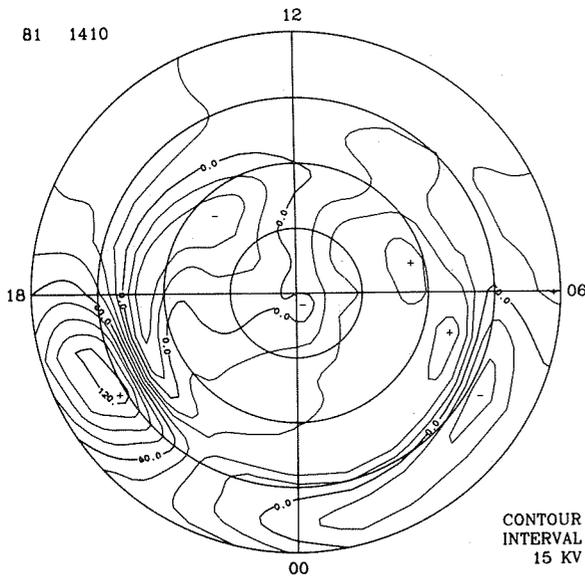
81 1410



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

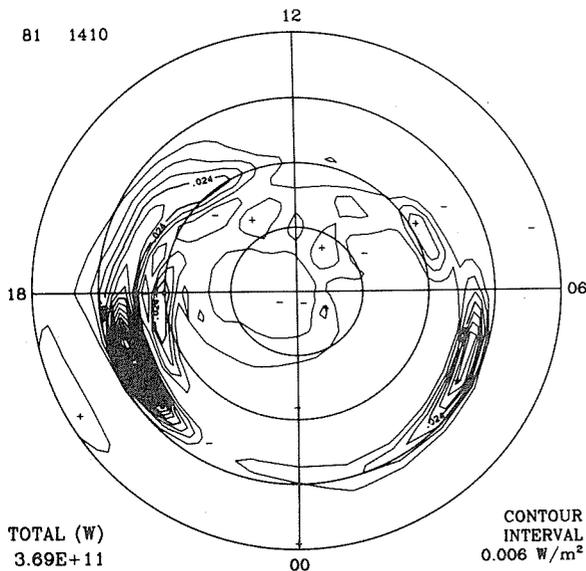
81 1410



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

81 1410

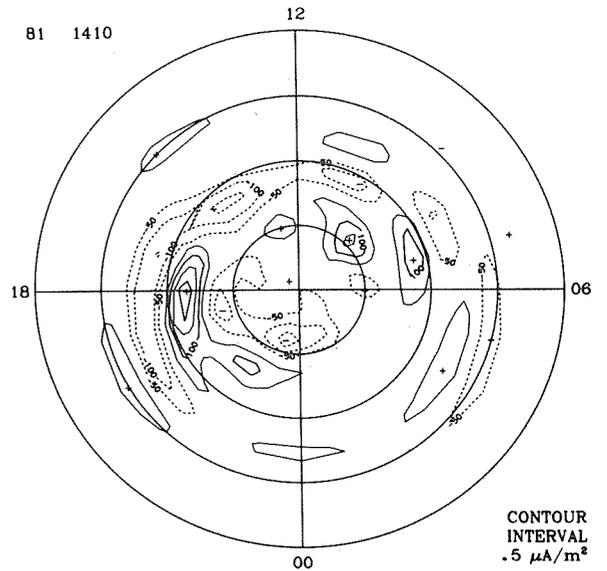


TOTAL (W)  
3.69E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

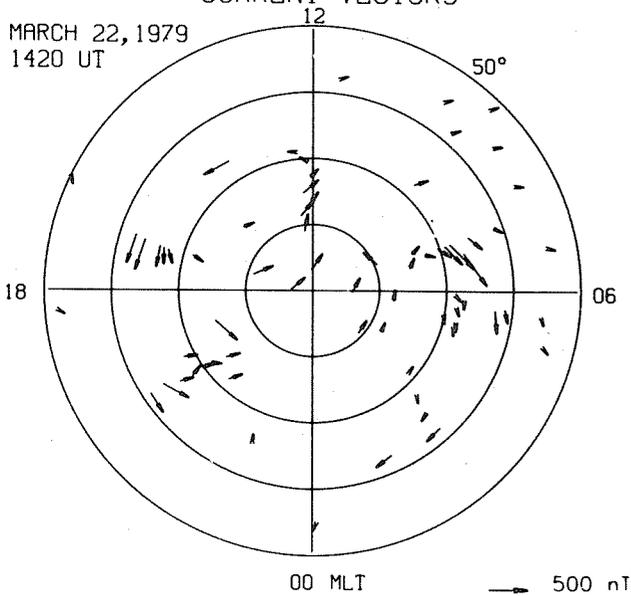
81 1410



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1420 UT

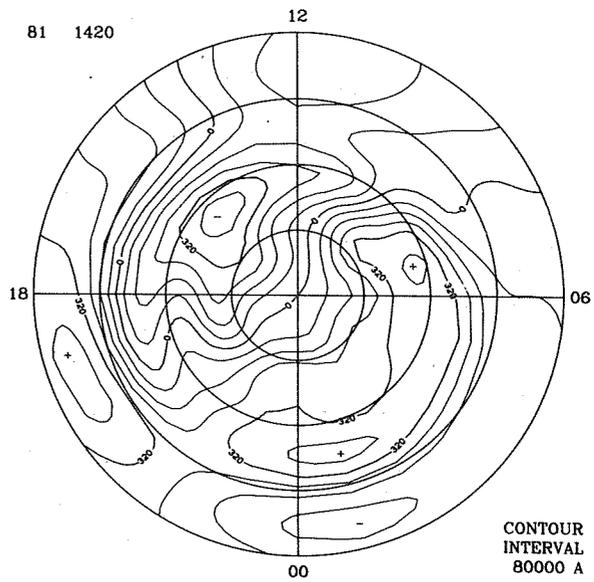


00 MLT

→ 500 nT

EQUIVALENT CURRENT SYSTEM

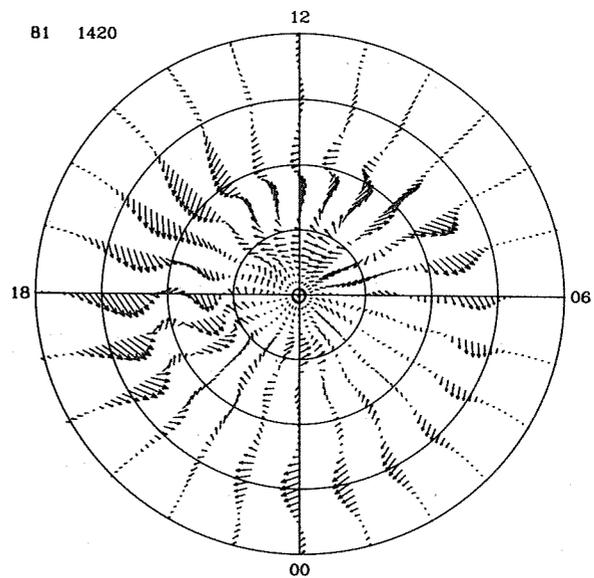
81 1420



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

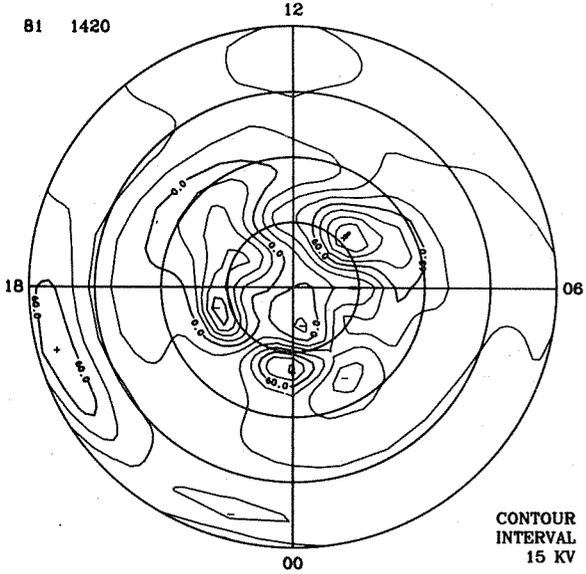
81 1420



→ 3 A/m

JOULE HEAT RATE

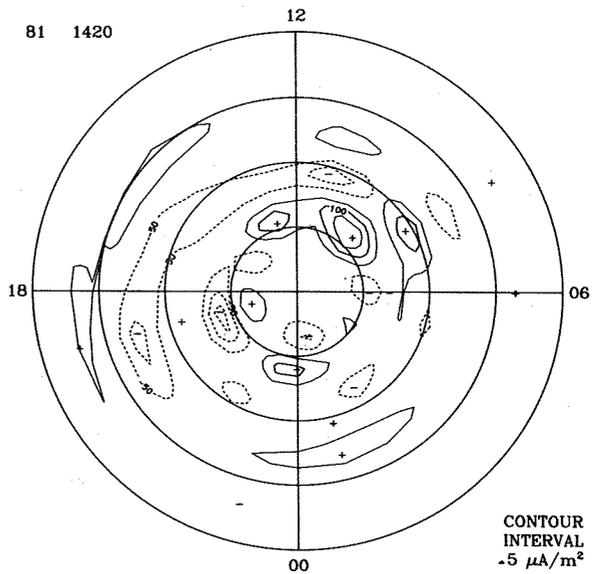
81 1420



CONTOUR  
INTERVAL  
15 KV

FIELD-ALIGNED CURRENTS

81 1420



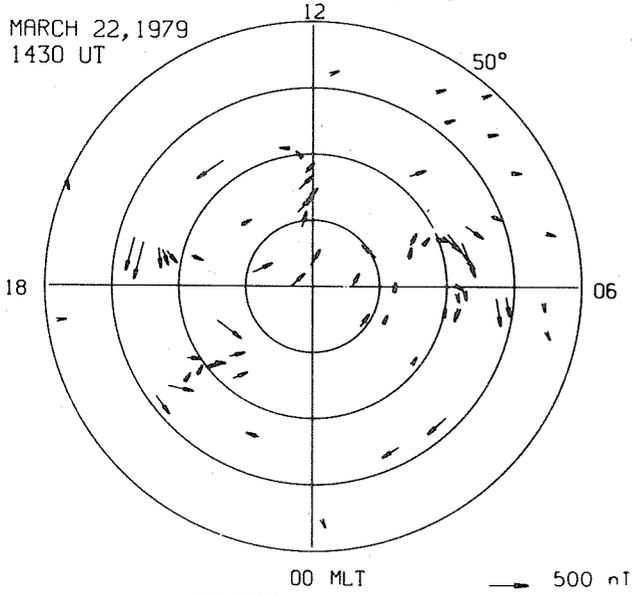
CONTOUR  
INTERVAL  
5  $\mu$ A/m<sup>2</sup>

TOTAL (W)  
3.71E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

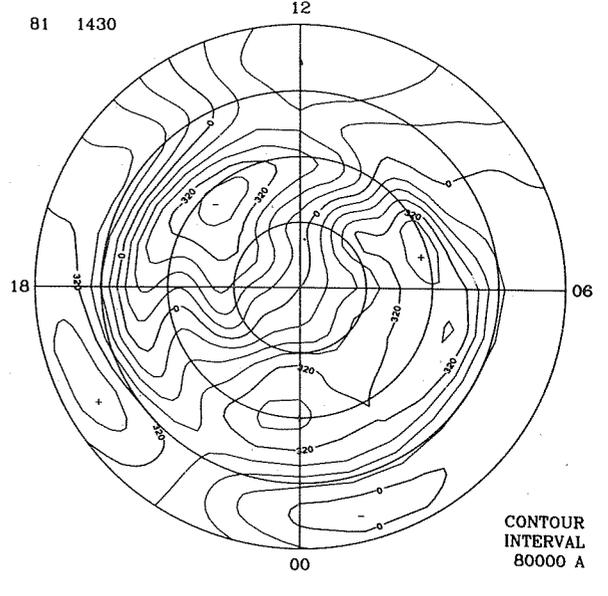
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1430 UT



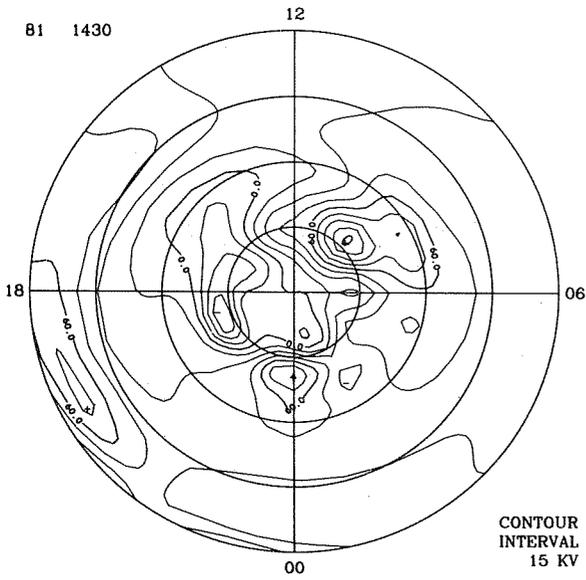
EQUIVALENT CURRENT SYSTEM

81 1430



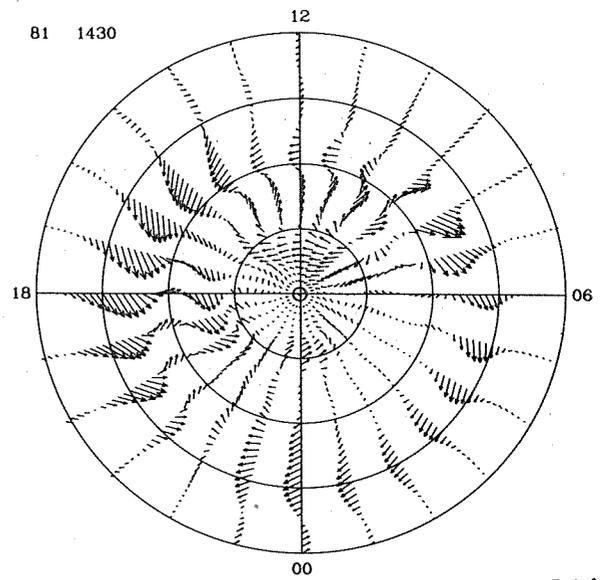
ELECTRIC POTENTIAL

81 1430



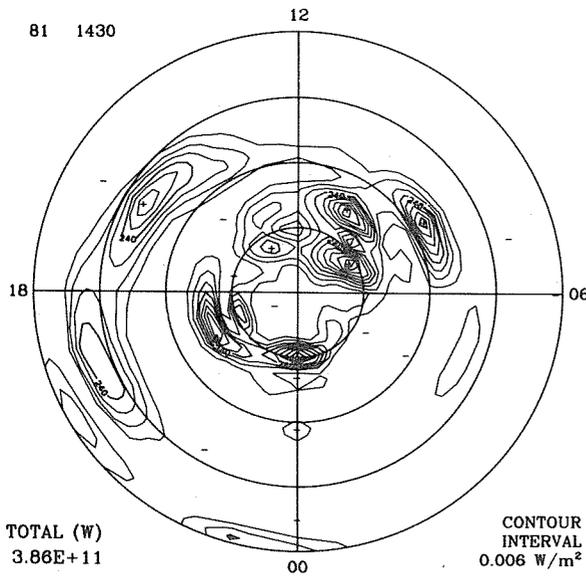
IONOSPHERIC CURRENT

81 1430



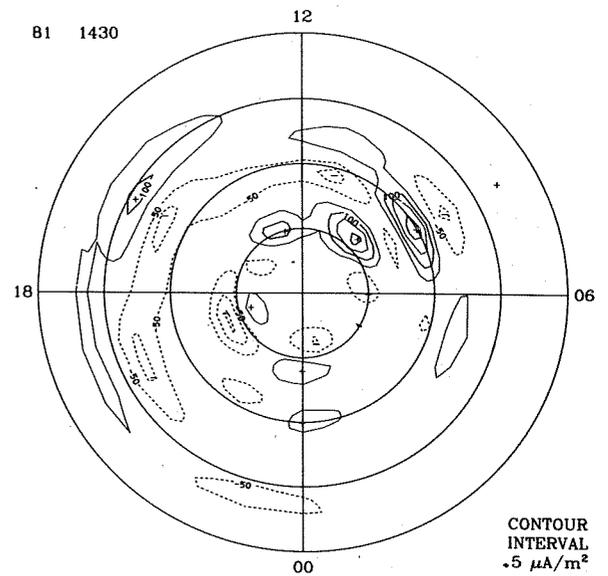
JOULE HEAT RATE

81 1430



FIELD-ALIGNED CURRENTS

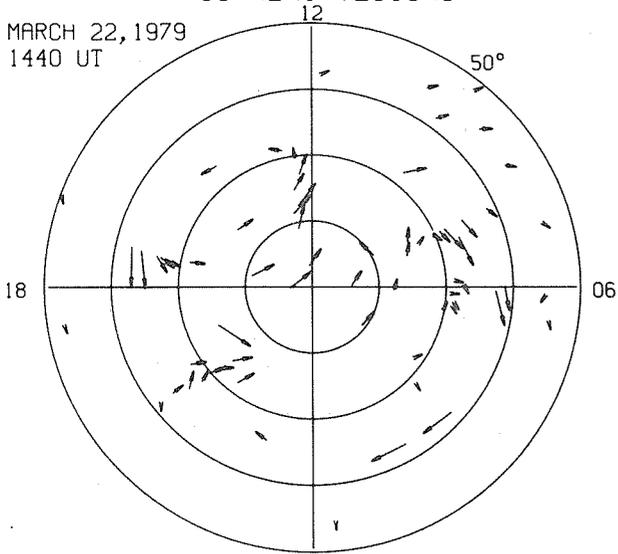
81 1430



TOTAL (W)  
3.86E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1440 UT

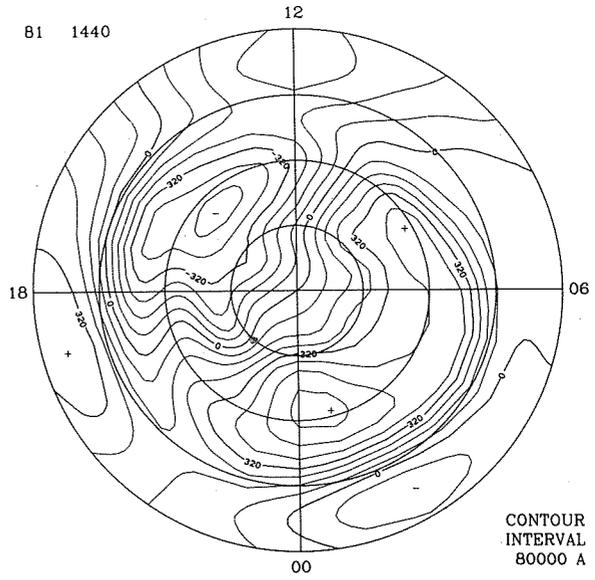


00 MLT  
ELECTRIC POTENTIAL

→ 500 nT

EQUIVALENT CURRENT SYSTEM

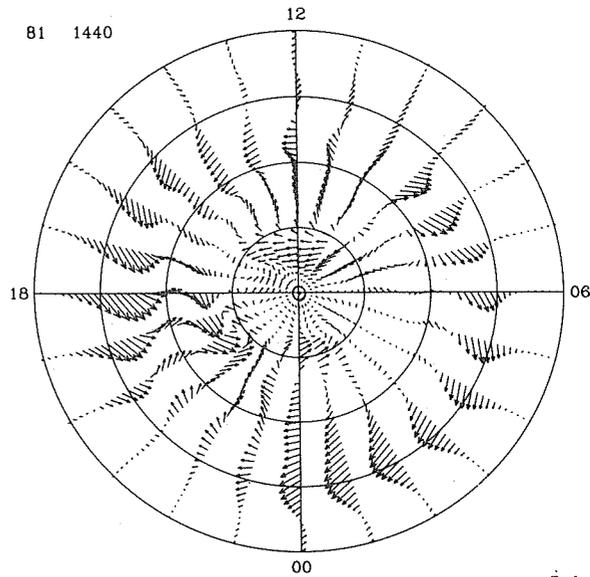
81 1440



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

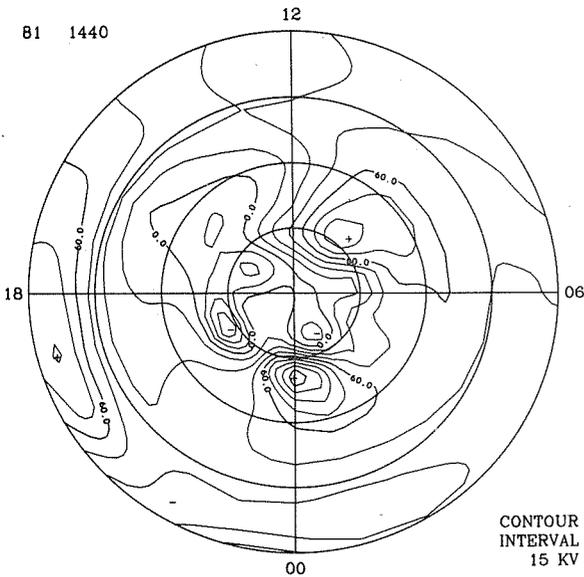
81 1440



3 A/m →

JOULE HEAT RATE

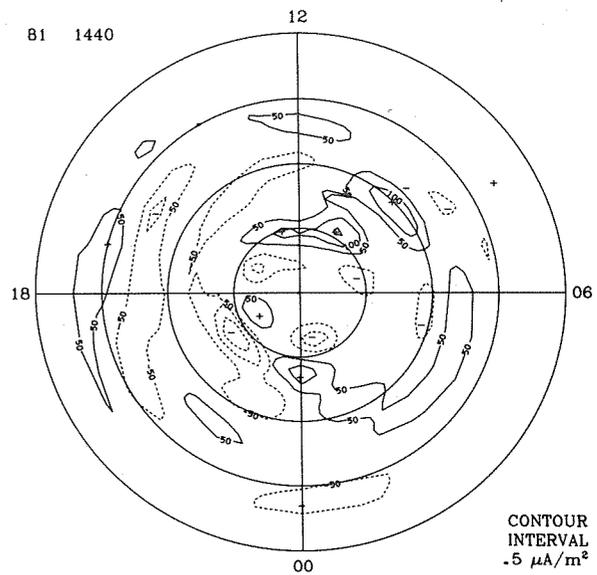
81 1440



CONTOUR  
INTERVAL  
15 KV

FIELD-ALIGNED CURRENTS

81 1440



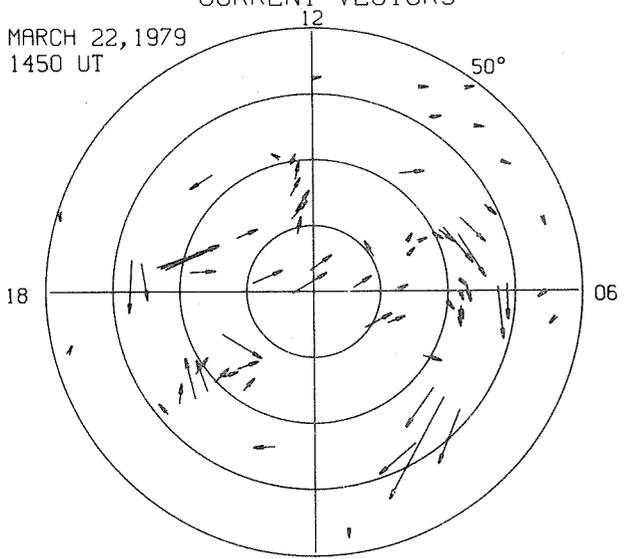
CONTOUR  
INTERVAL  
-5  $\mu\text{A}/\text{m}^2$

TOTAL (W)  
4.10E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

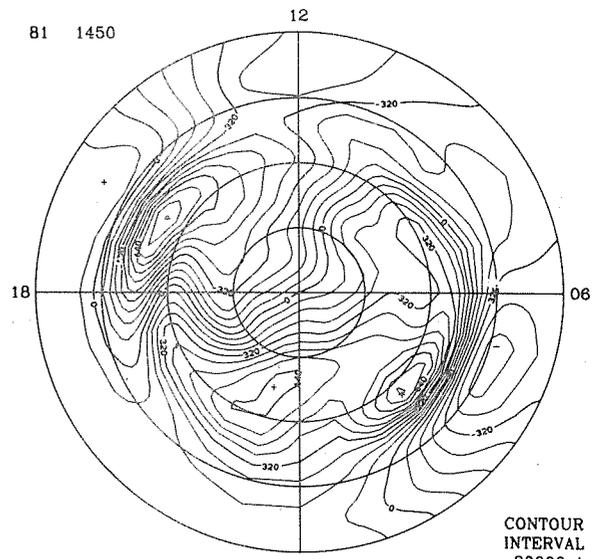
MARCH 22, 1979  
1450 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

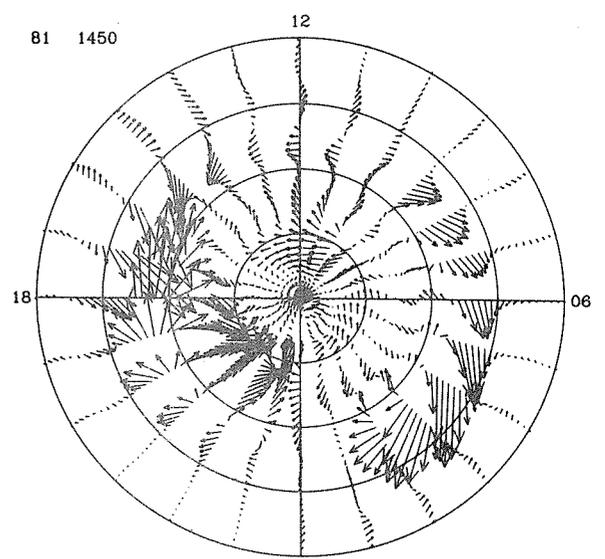
81 1450



CONTOUR  
INTERVAL  
80000 A

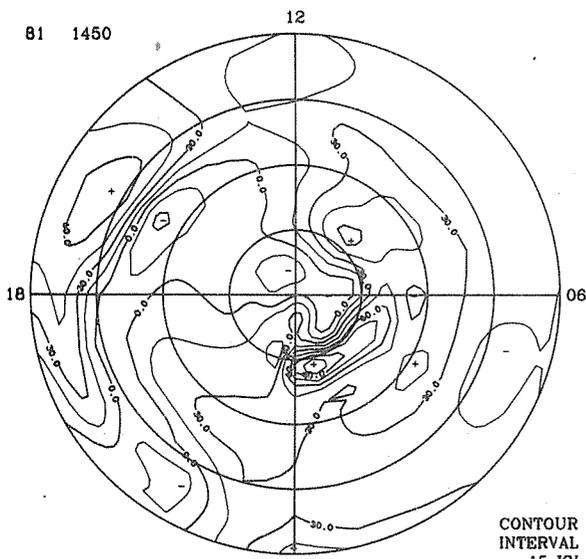
IONOSPHERIC CURRENT

81 1450



3 A/m →

81 1450

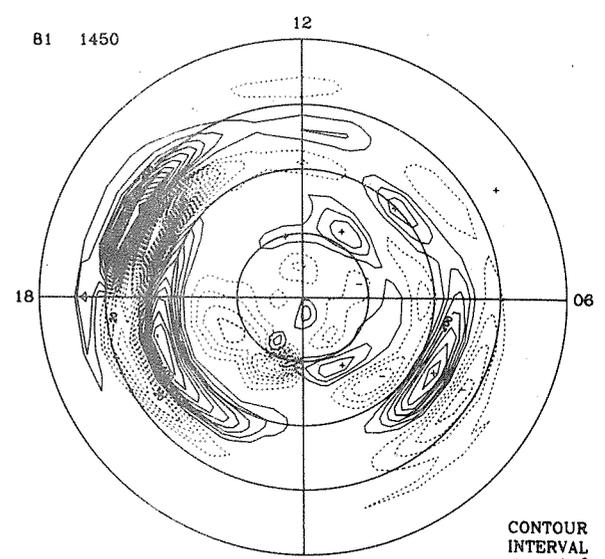


CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

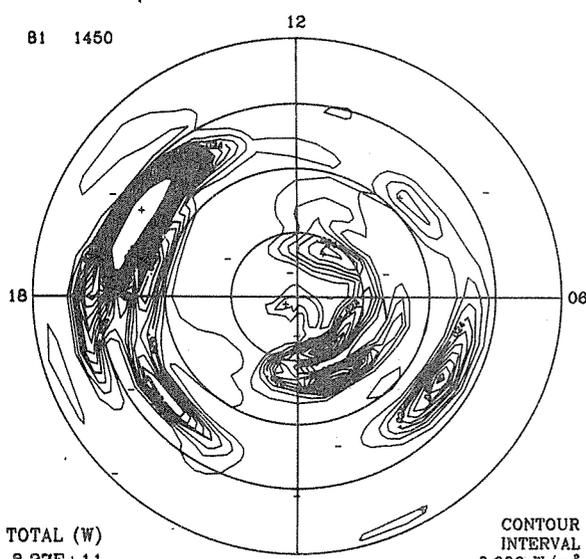
FIELD-ALIGNED CURRENTS

81 1450



CONTOUR  
INTERVAL  
.5  $\mu$ A/m<sup>2</sup>

81 1450

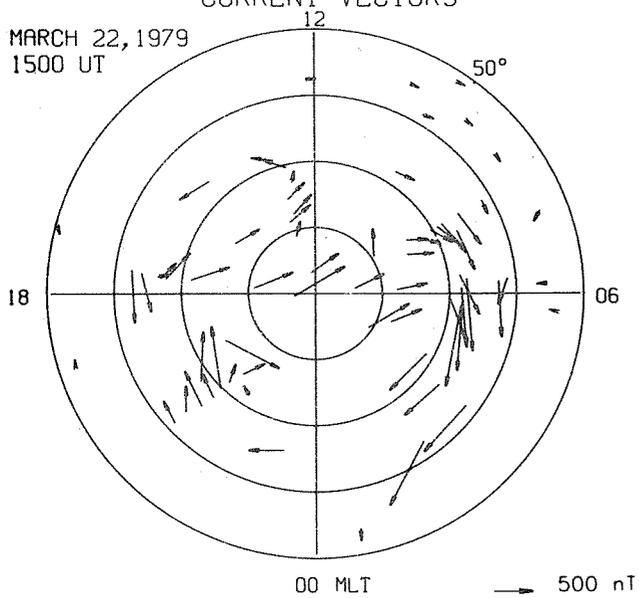


TOTAL (W)  
8.27E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

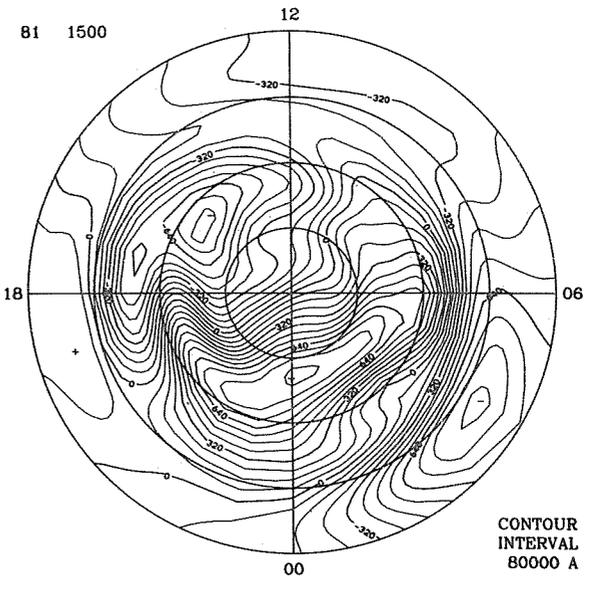
MARCH 22, 1979  
1500 UT



ELECTRIC POTENTIAL

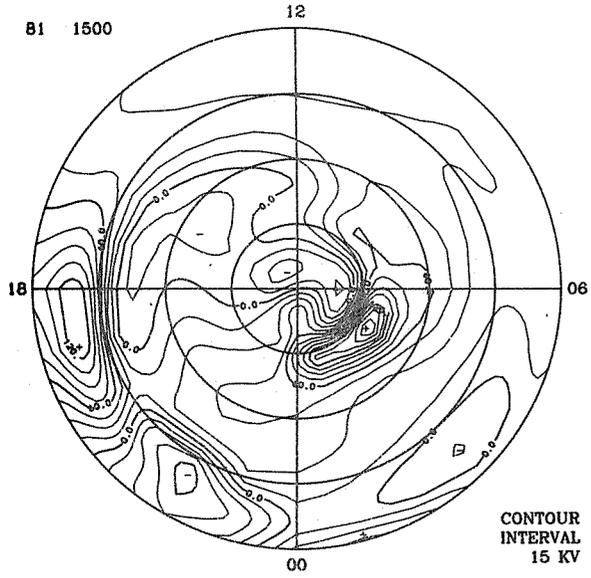
500 nT

EQUIVALENT CURRENT SYSTEM



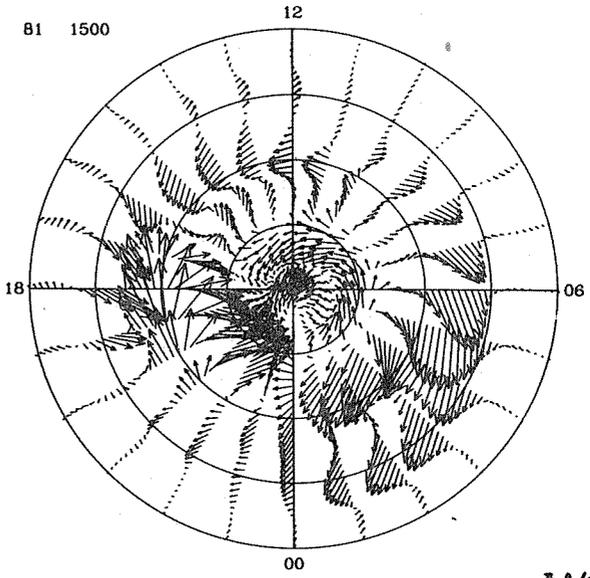
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



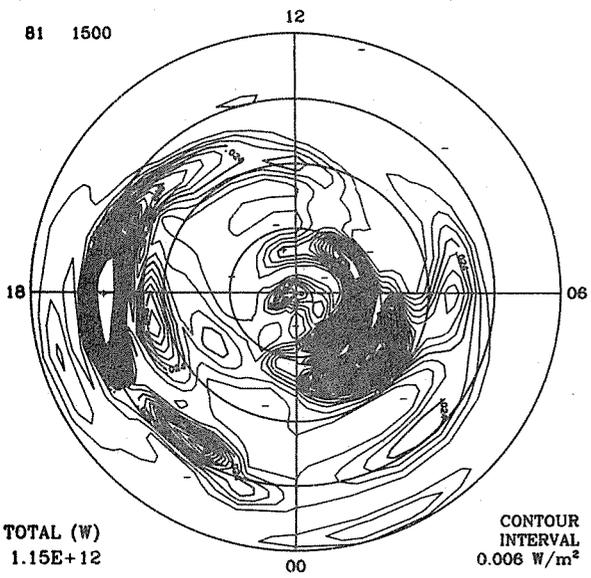
CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE



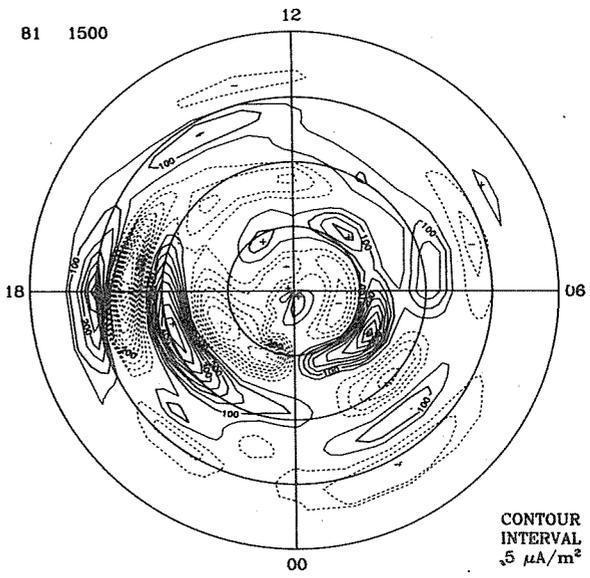
3 A/m

FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.15E+12

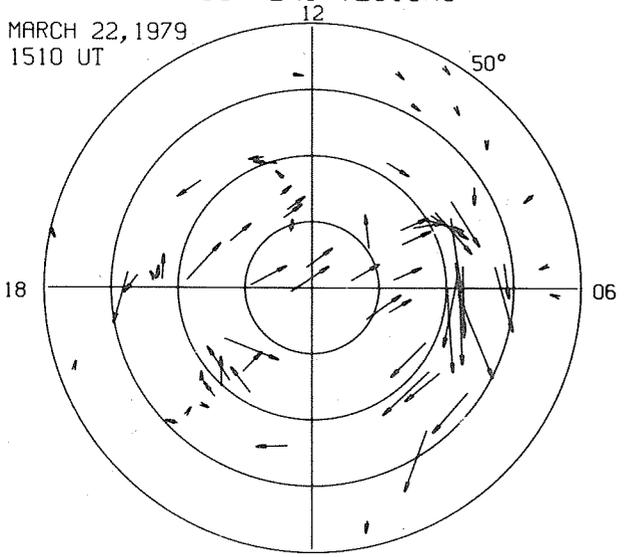
CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
0.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

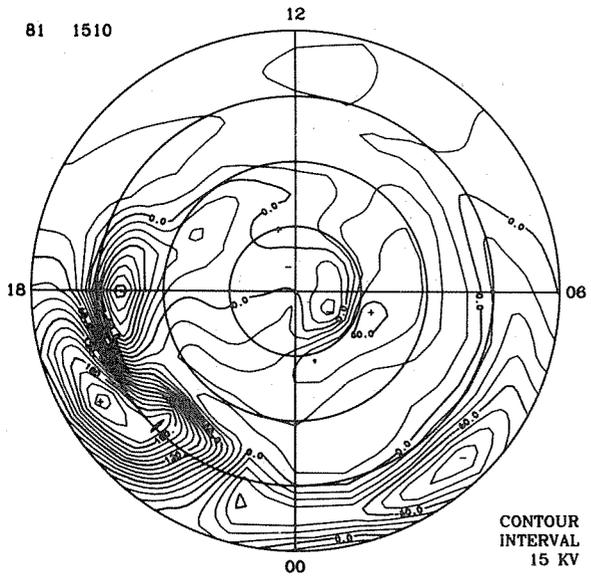
MARCH 22, 1979  
1510 UT



00 MLT → 500 nT

ELECTRIC POTENTIAL

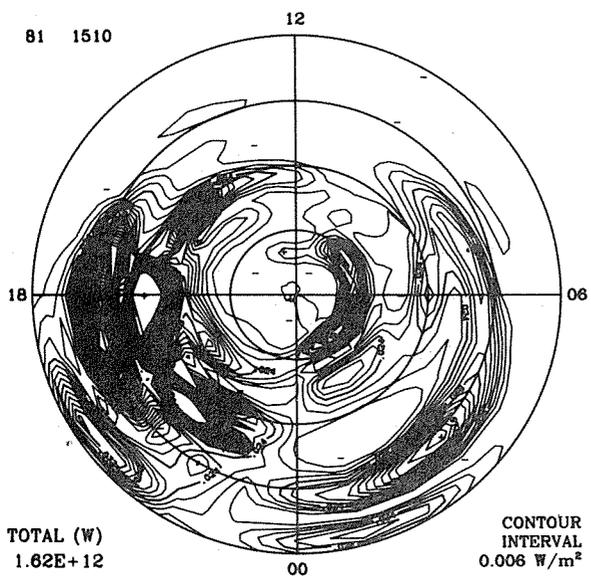
81 1510



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

81 1510

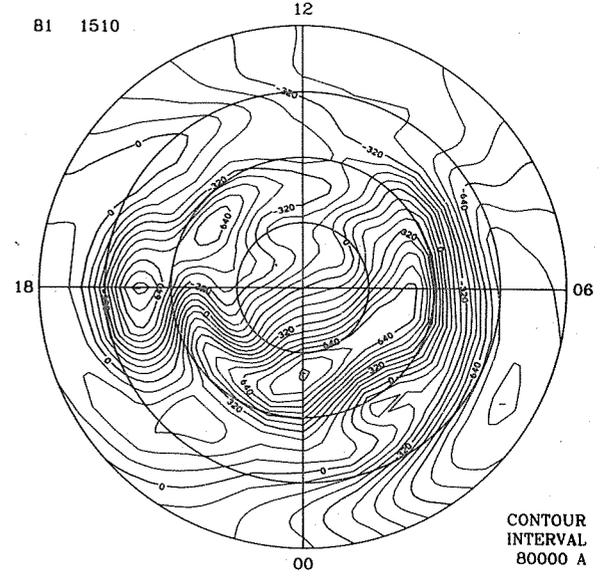


TOTAL (W)  
1.62E+12

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

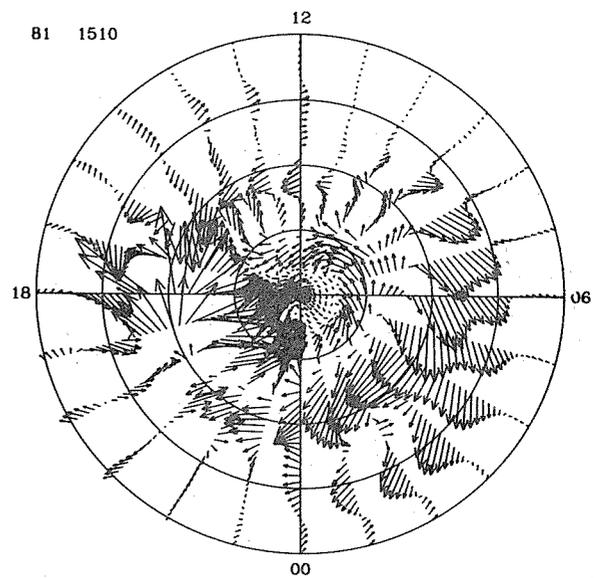
81 1510



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

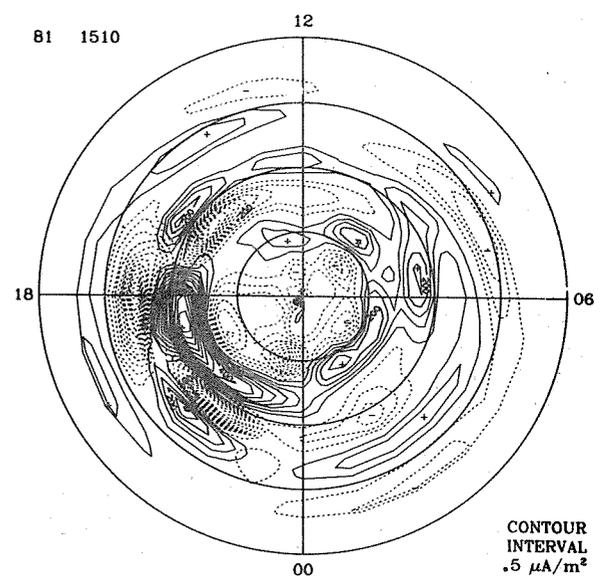
81 1510



3 A/m →

FIELD-ALIGNED CURRENTS

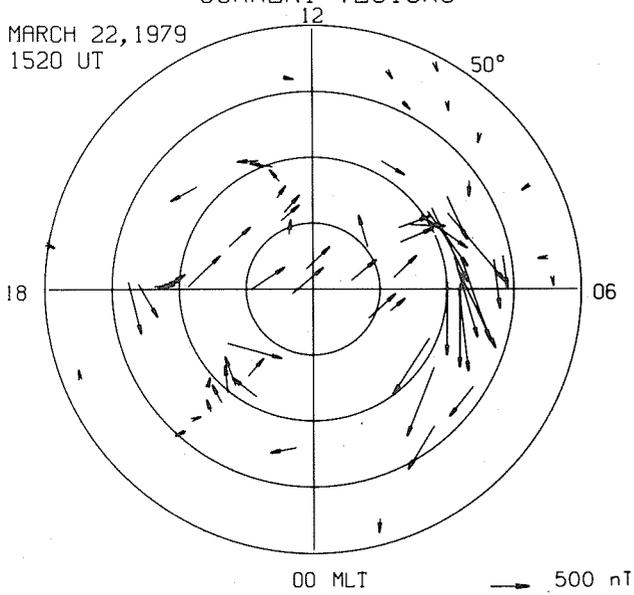
81 1510



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

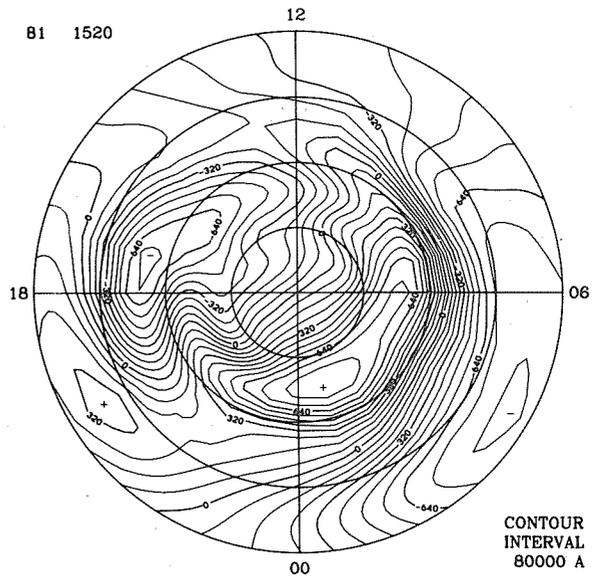
MARCH 22, 1979  
1520 UT



ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

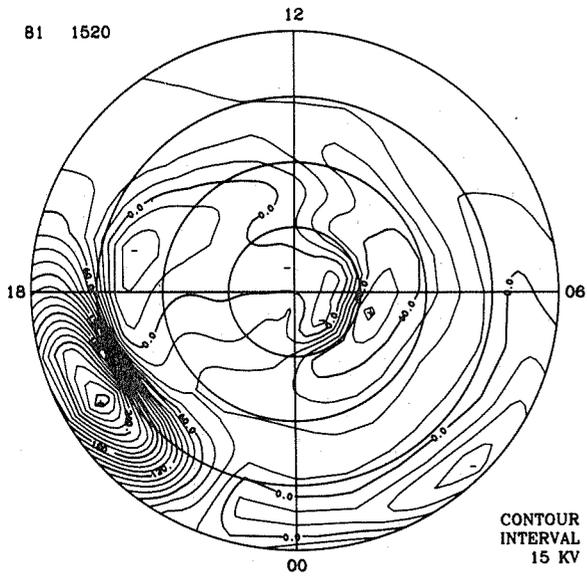
81 1520



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

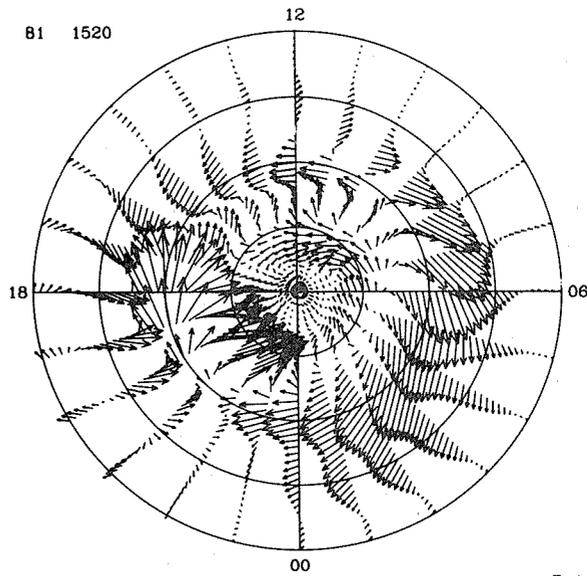
81 1520



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

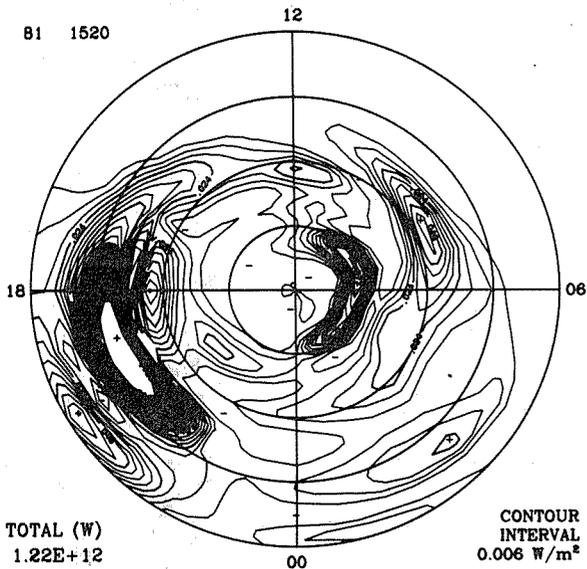
81 1520



3 A/m

FIELD-ALIGNED CURRENTS

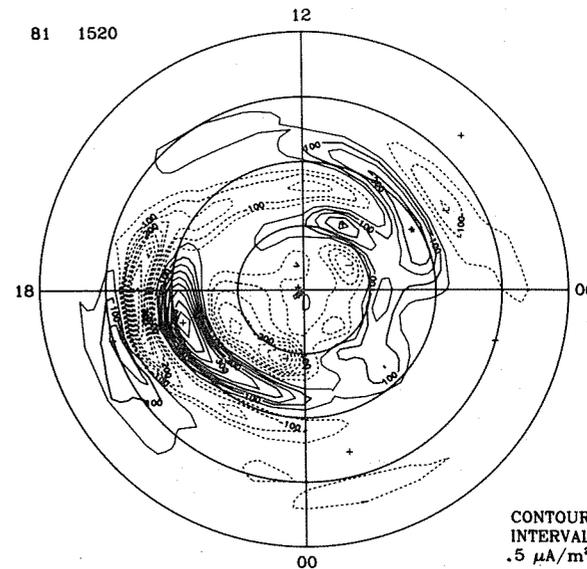
81 1520



TOTAL (W)  
1.22E+12

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

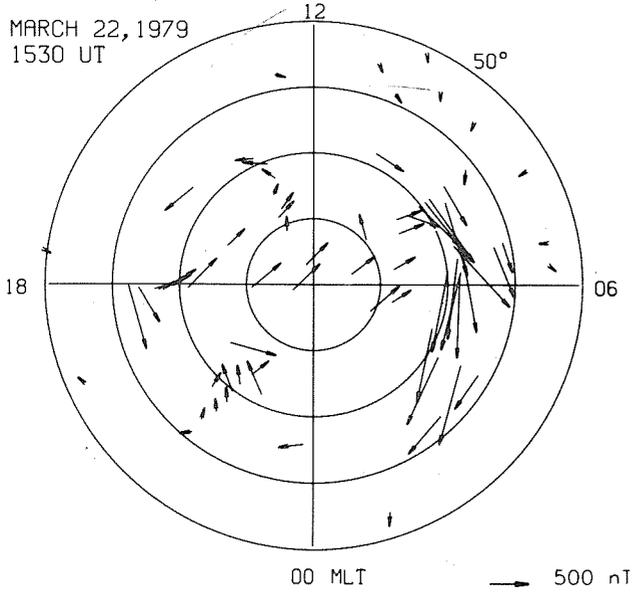
81 1520



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

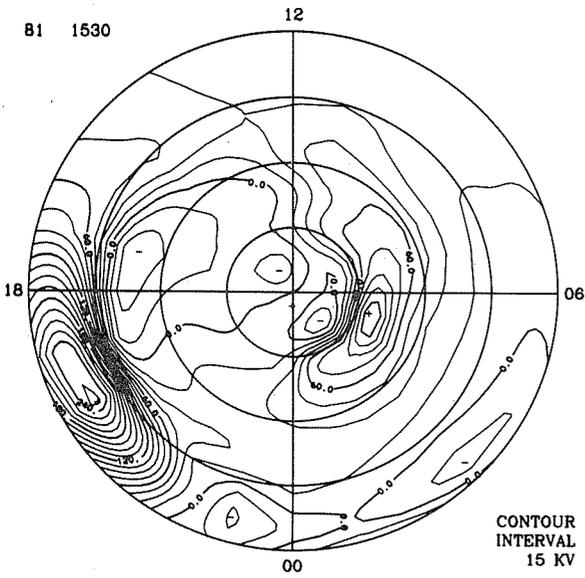
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1530 UT



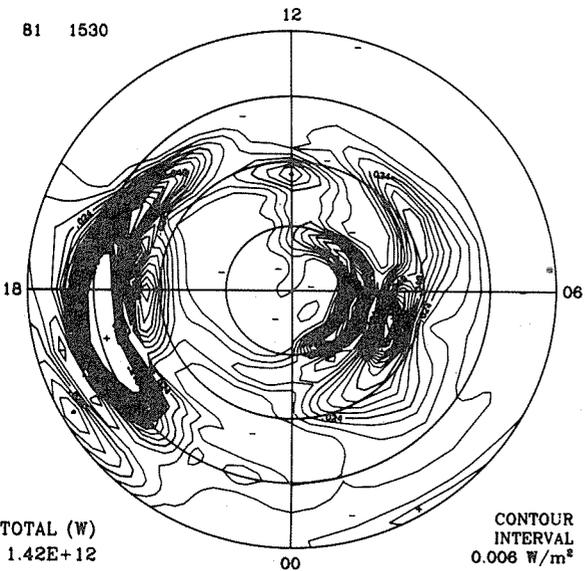
ELECTRIC POTENTIAL

B1 1530



JOULE HEAT RATE

B1 1530

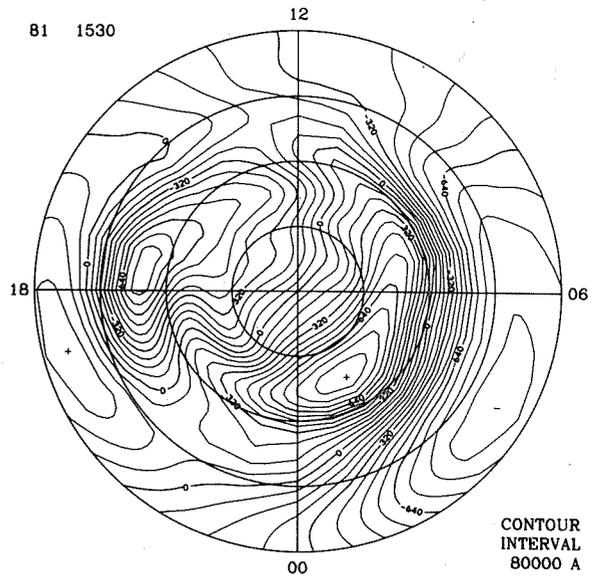


TOTAL (W)  
1.42E+12

CONTOUR  
INTERVAL  
0.008 W/m²

EQUIVALENT CURRENT SYSTEM

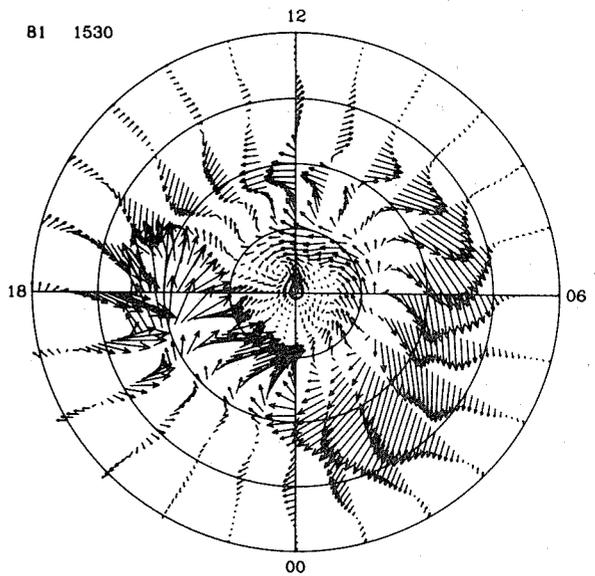
B1 1530



CONTOUR  
INTERVAL  
80000 A

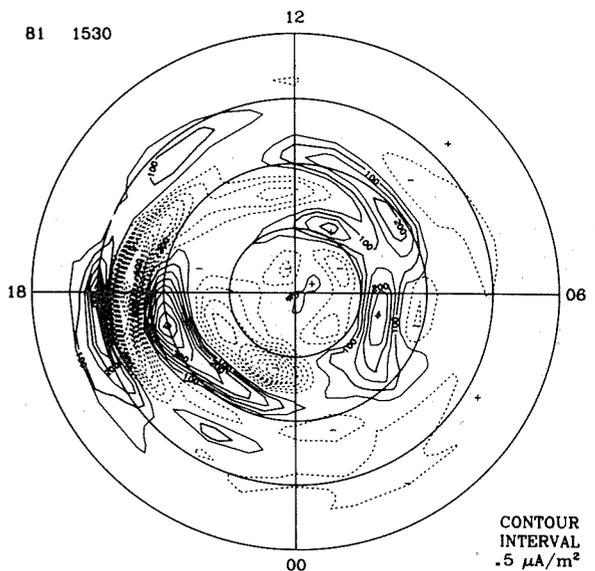
IONOSPHERIC CURRENT

B1 1530



FIELD-ALIGNED CURRENTS

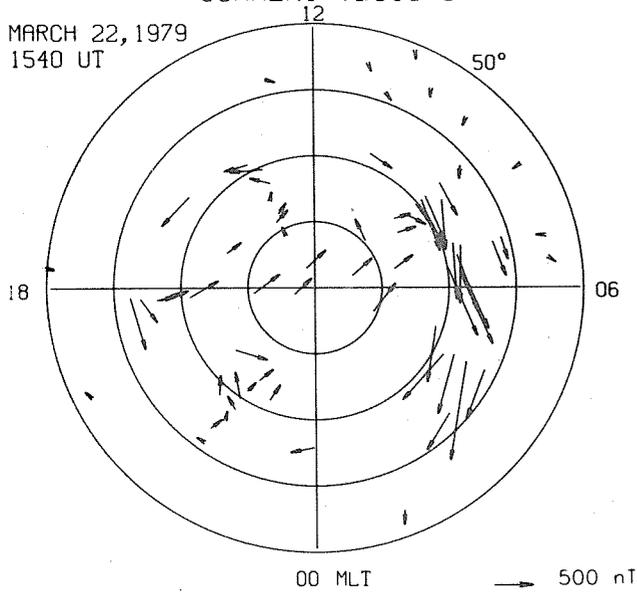
B1 1530



CONTOUR  
INTERVAL  
.5 μA/m²

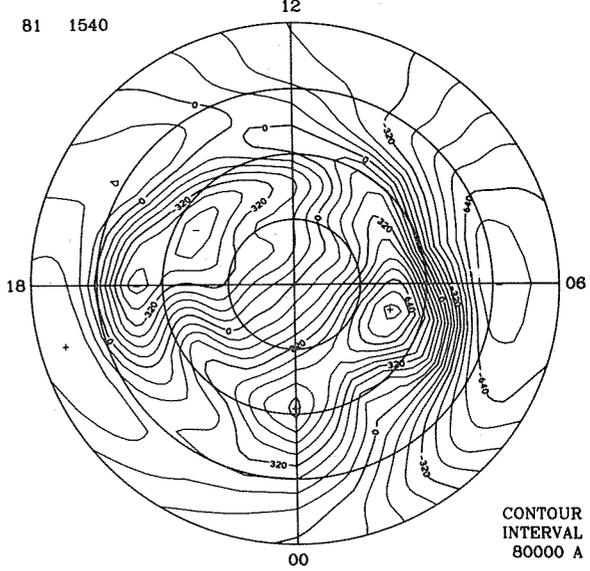
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1540 UT



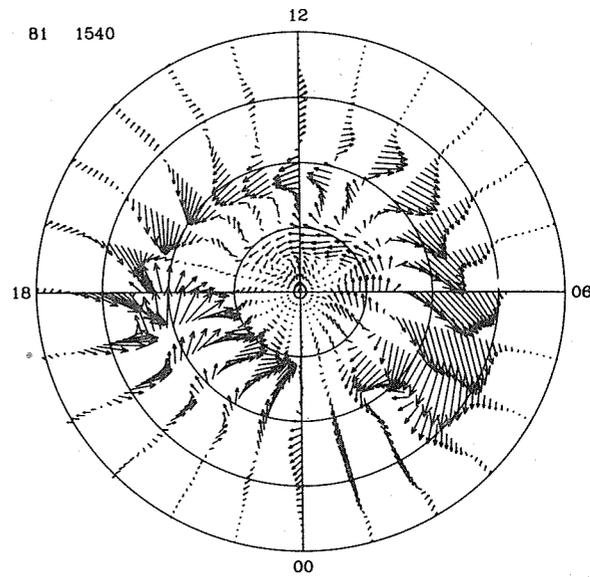
00 MLT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



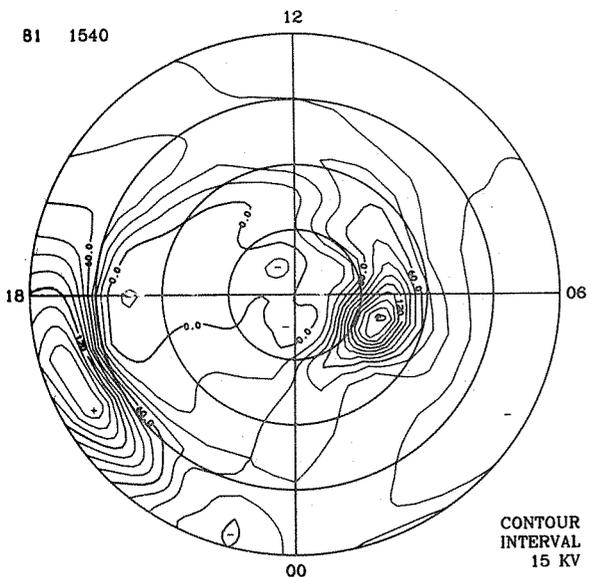
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



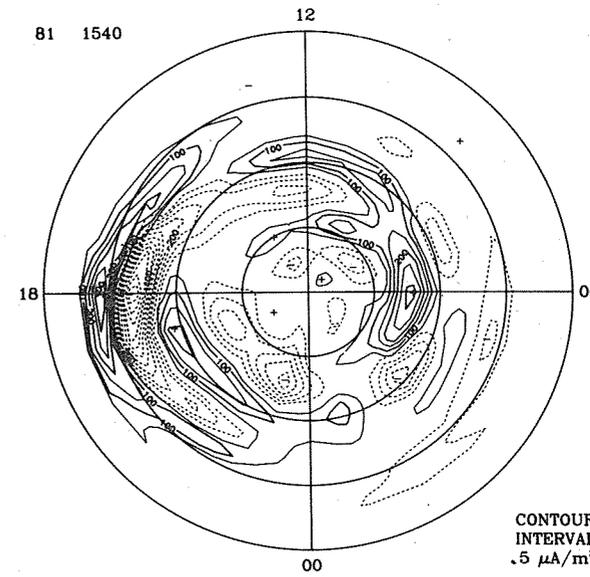
3 A/m

JOULE HEAT RATE

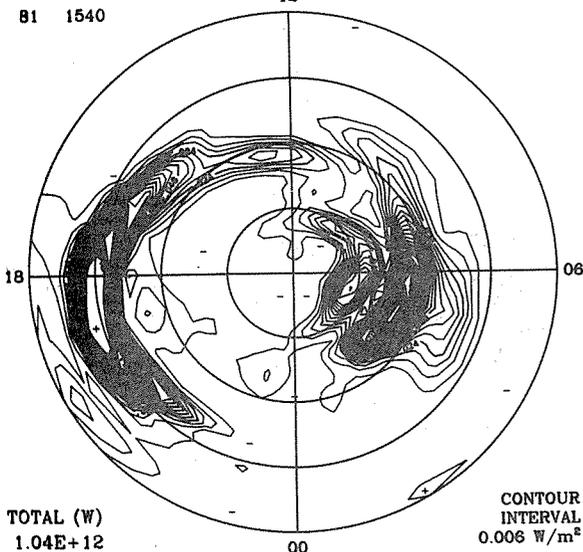


CONTOUR  
INTERVAL  
15 KV

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.5 μA/m²

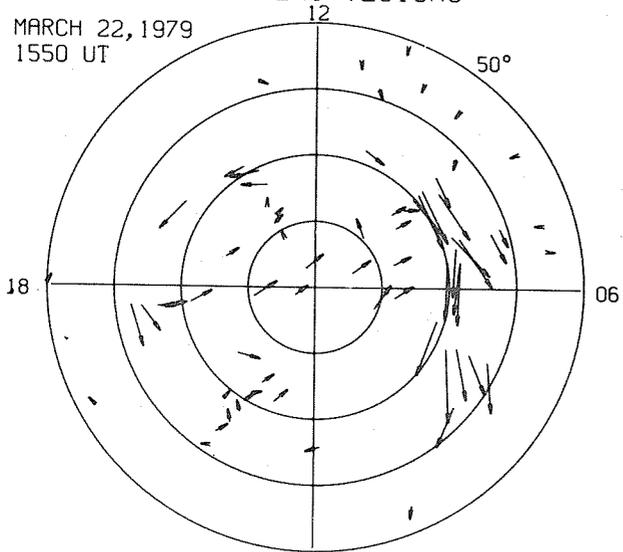


TOTAL (W)  
1.04E+12

CONTOUR  
INTERVAL  
0.006 W/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

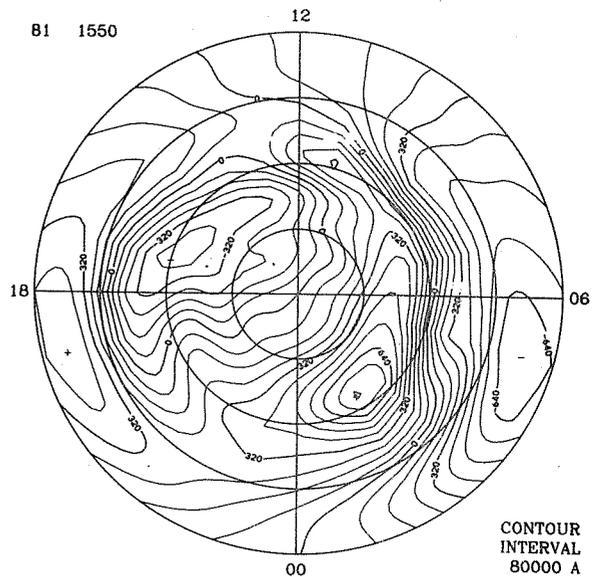
MARCH 22, 1979  
1550 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

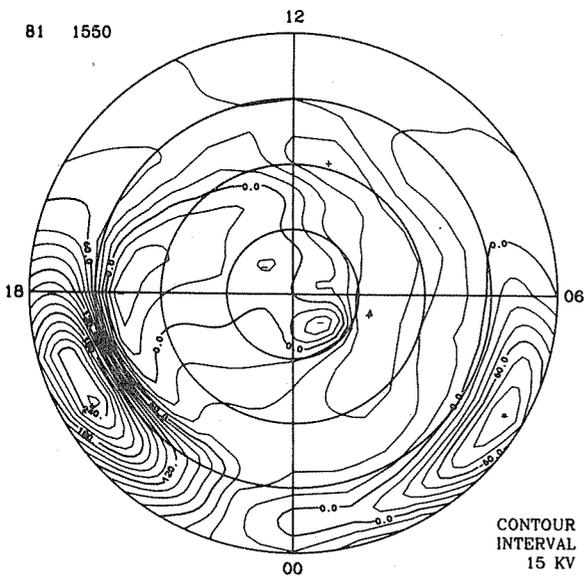
EQUIVALENT CURRENT SYSTEM

B1 1550



CONTOUR  
INTERVAL  
80000 A

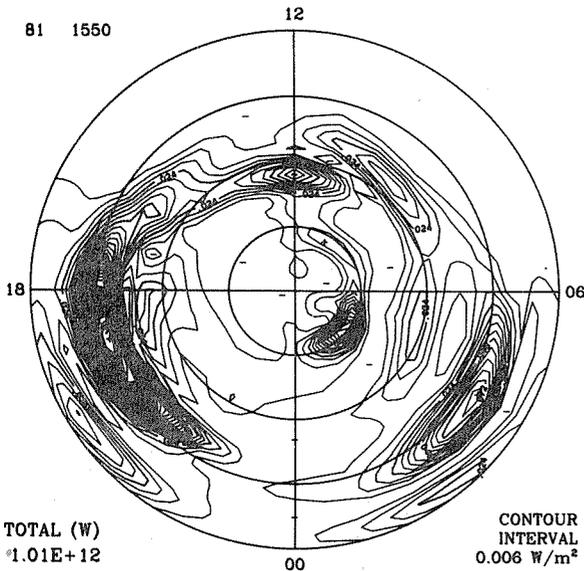
B1 1550



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

B1 1550

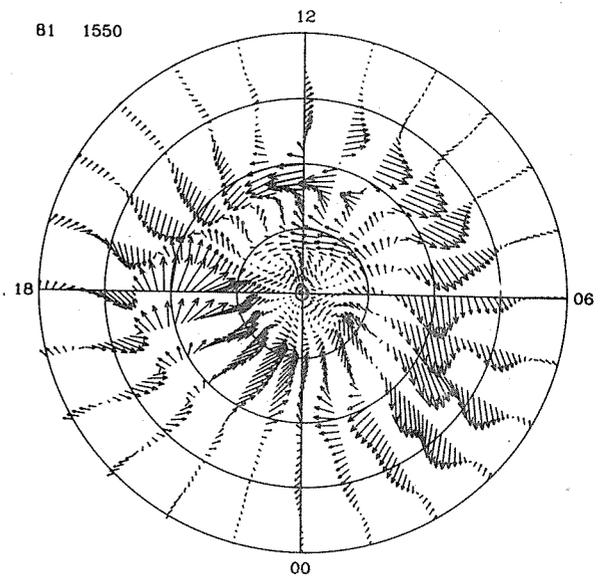


TOTAL (W)  
1.01E+12

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

IONOSPHERIC CURRENT

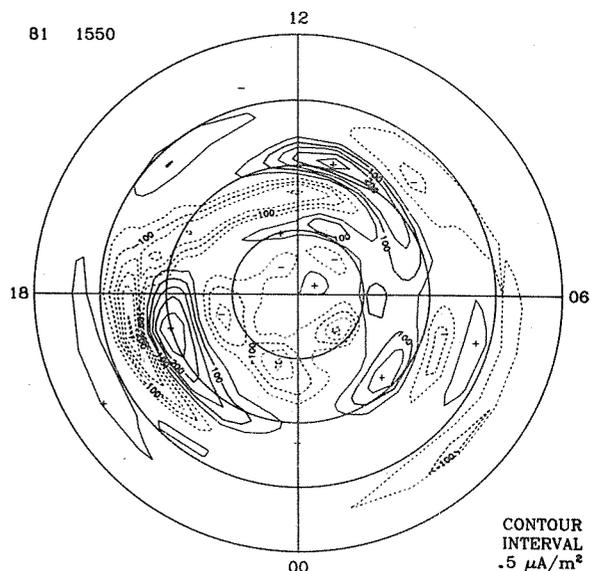
B1 1550



3 A/m →

FIELD-ALIGNED CURRENTS

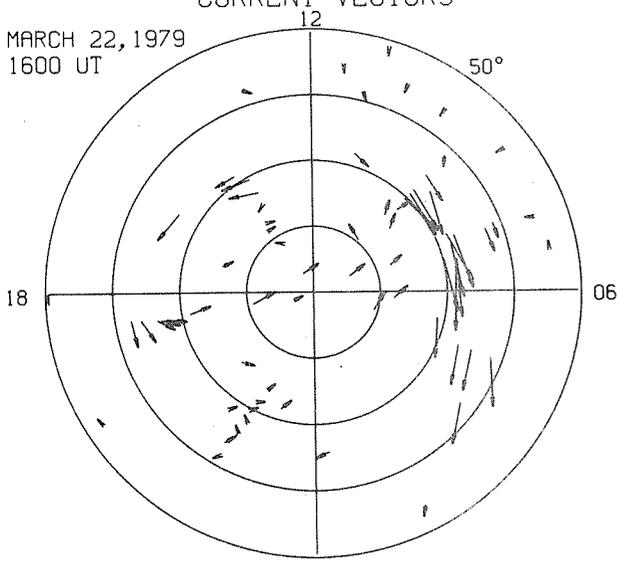
B1 1550



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

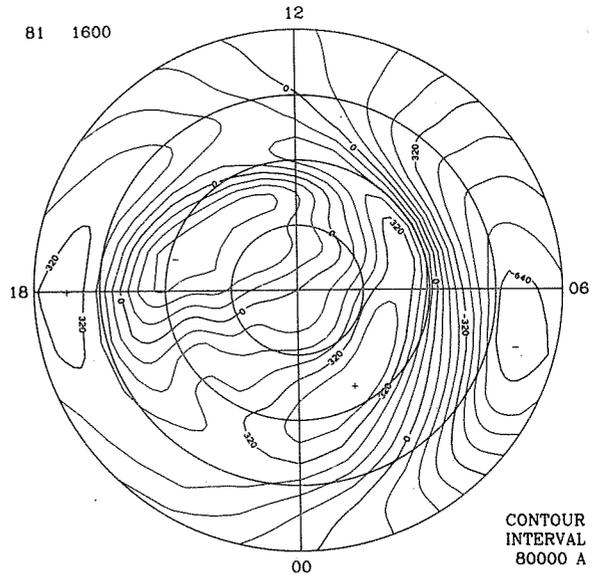
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1600 UT



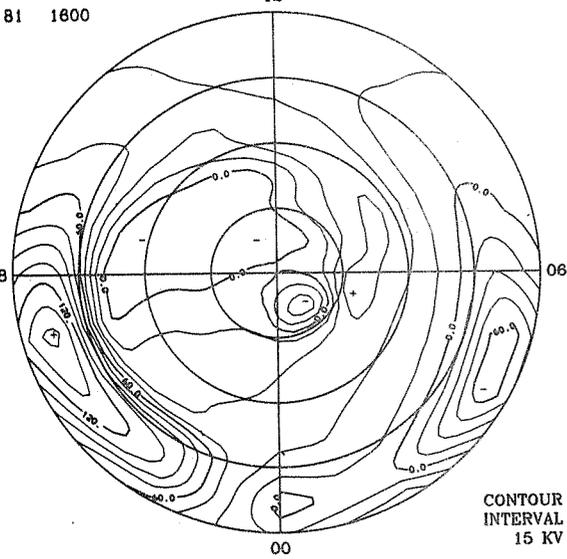
00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



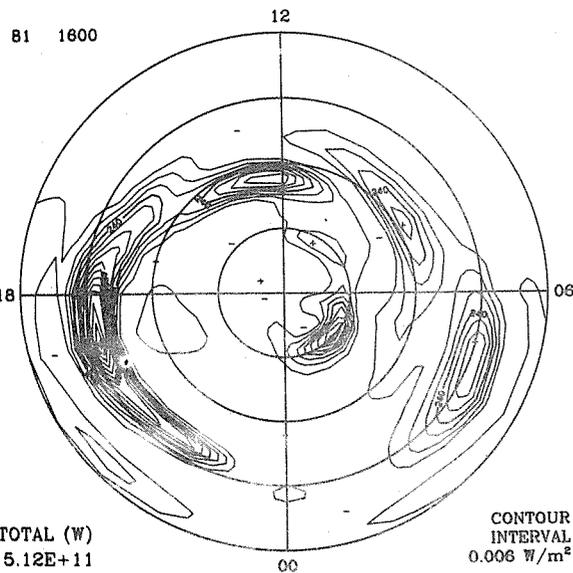
CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



CONTOUR  
INTERVAL  
15 KV

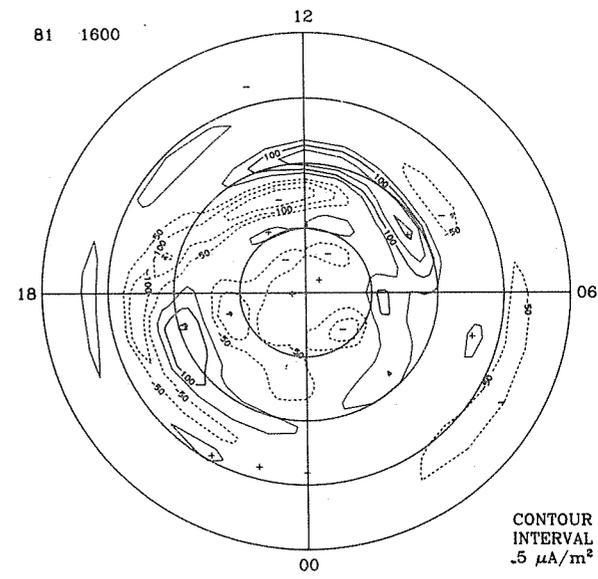
JOULE HEAT RATE



TOTAL (W)  
5.12E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

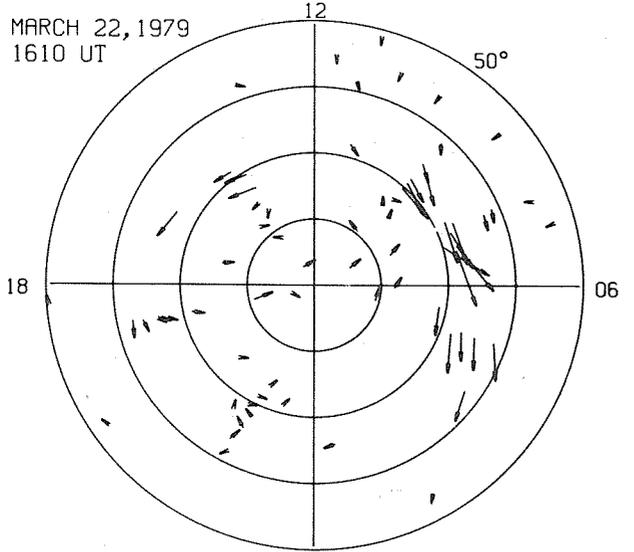


3 A/m →

CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1610 UT

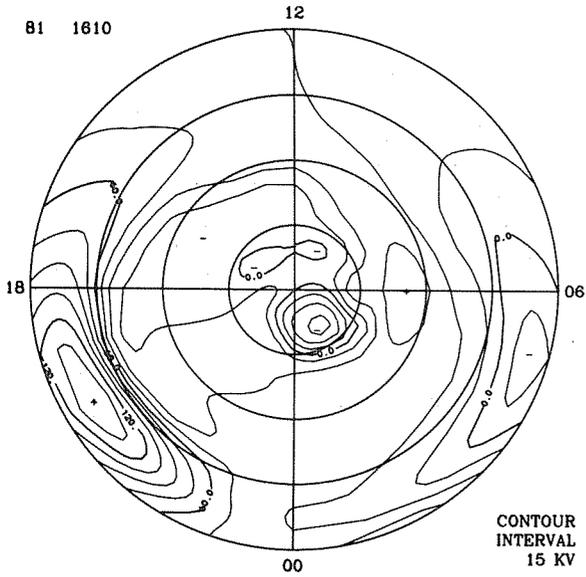


00 MLT

→ 500 nT

ELECTRIC POTENTIAL

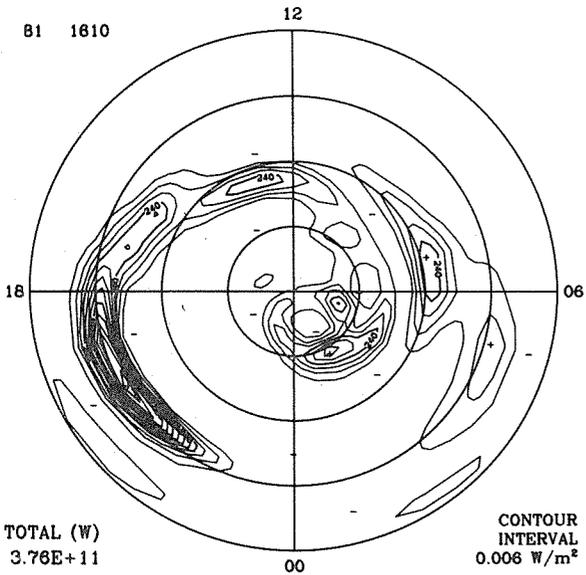
B1 1610



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

B1 1610

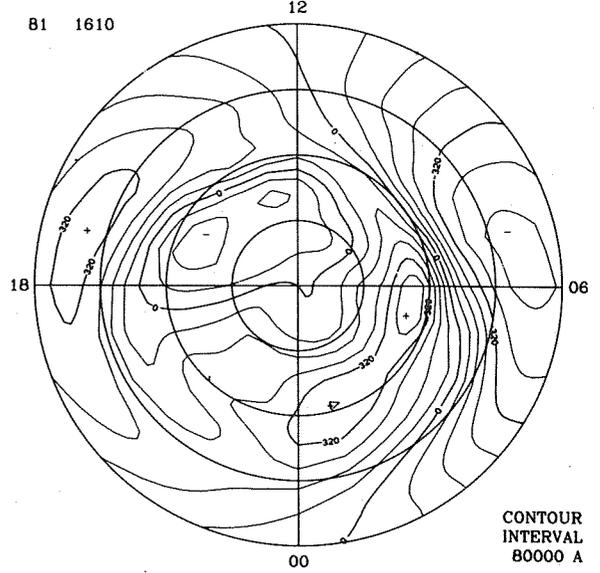


TOTAL (W)  
3.76E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

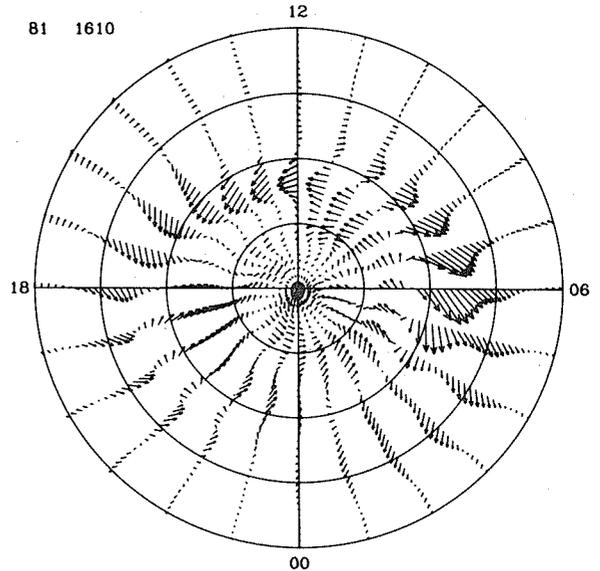
B1 1610



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

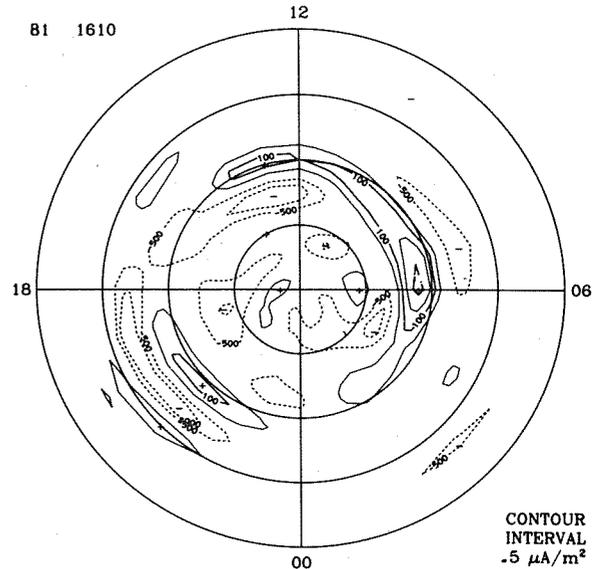
B1 1610



→ 3 A/m

FIELD-ALIGNED CURRENTS

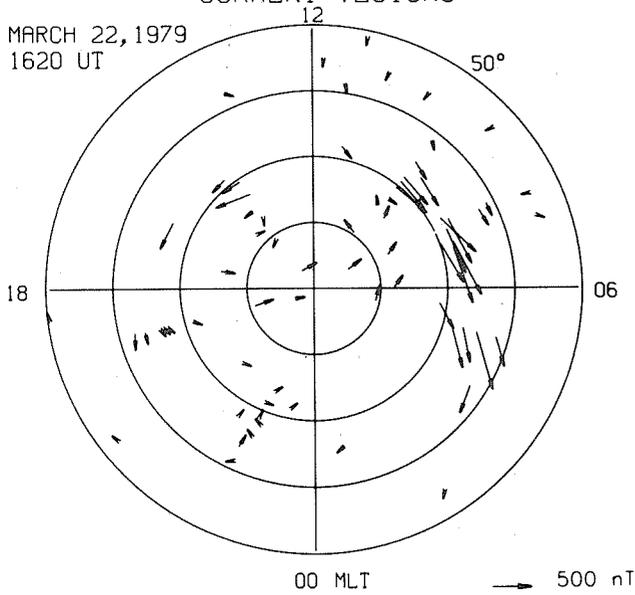
B1 1610



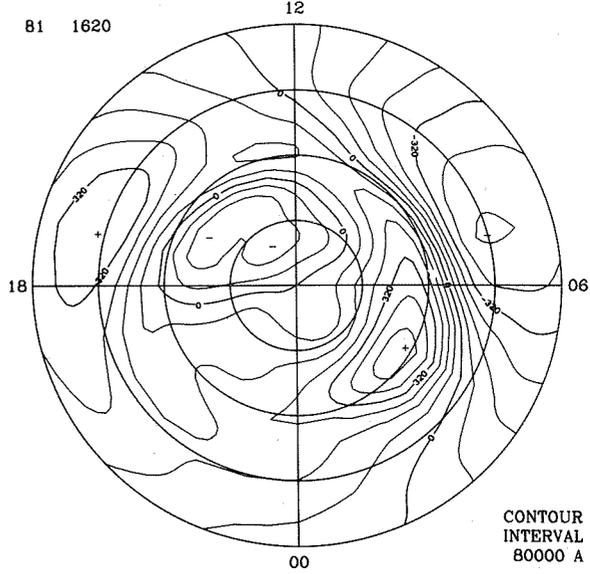
CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

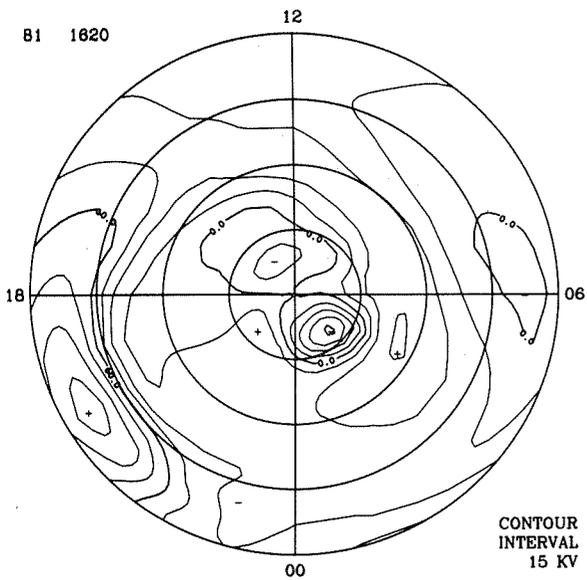
MARCH 22, 1979  
1620 UT



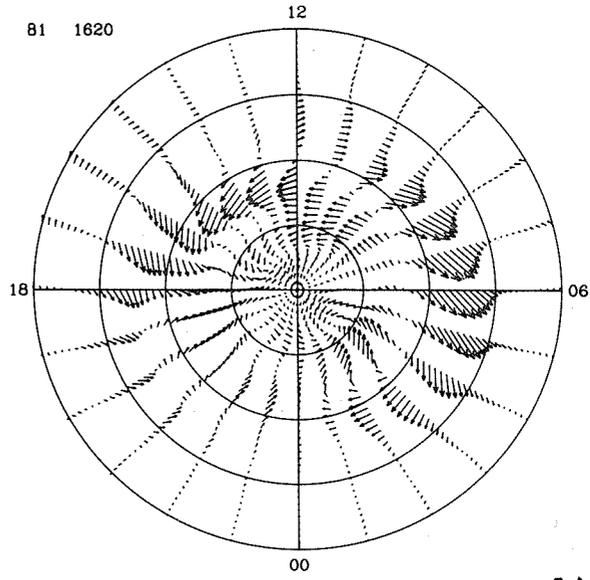
EQUIVALENT CURRENT SYSTEM



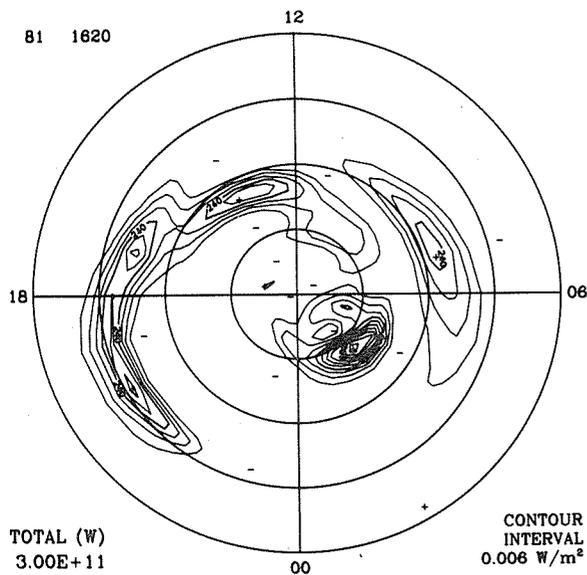
ELECTRIC POTENTIAL



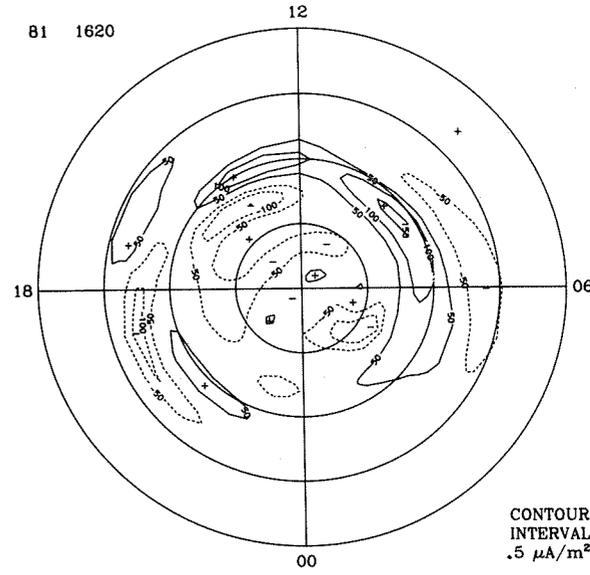
IONOSPHERIC CURRENT

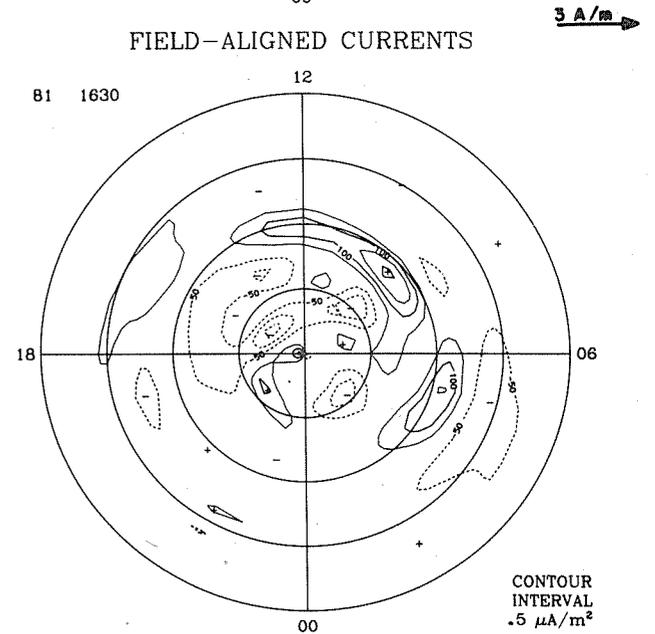
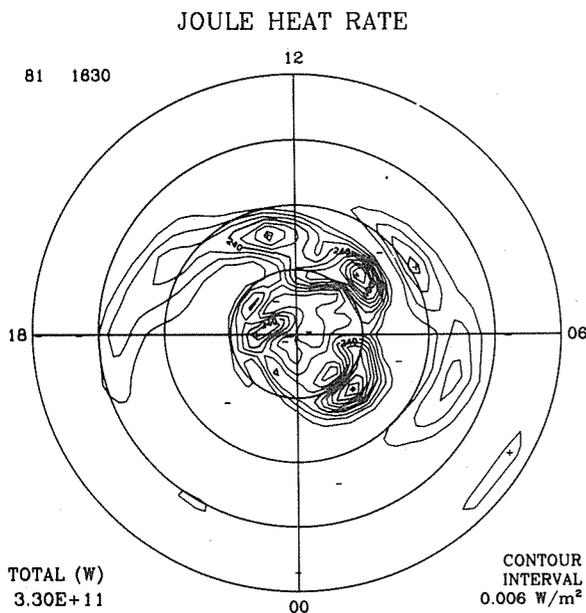
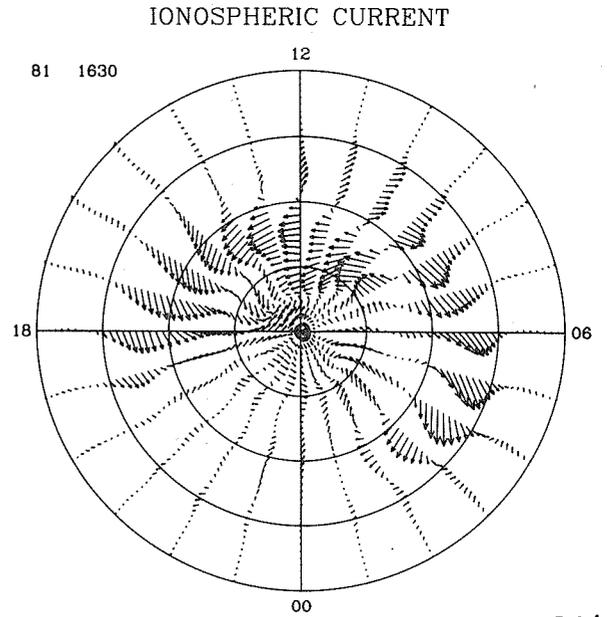
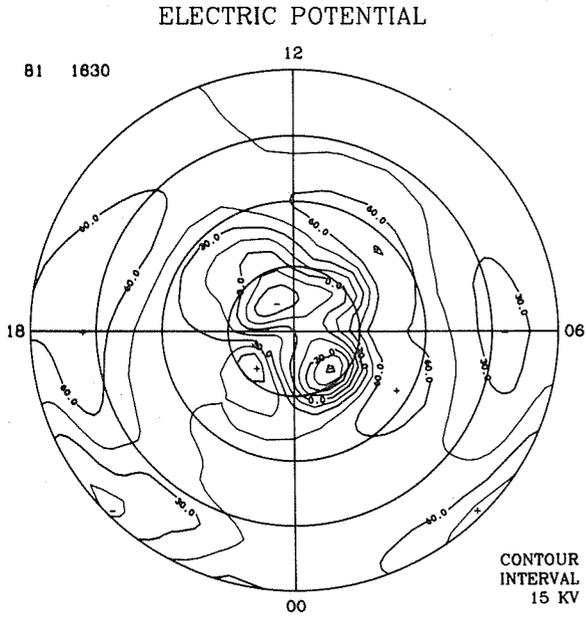
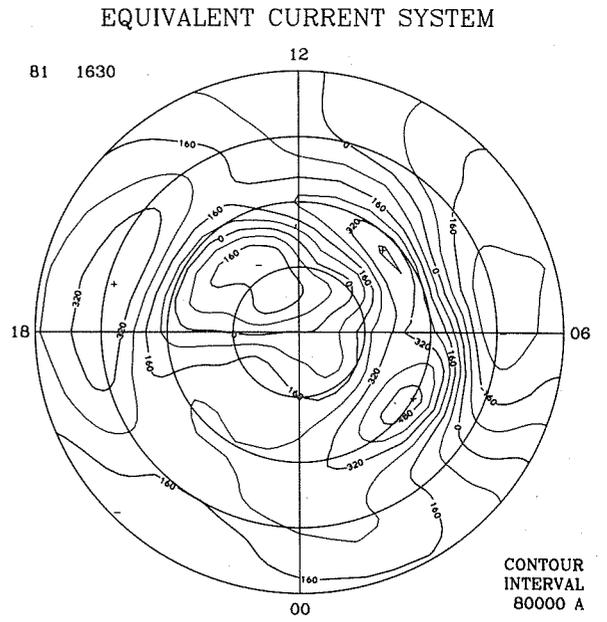
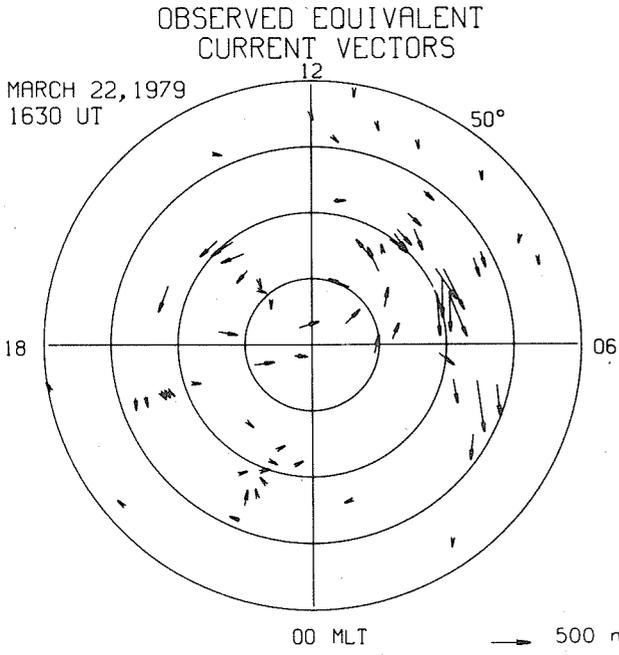


JOULE HEAT RATE



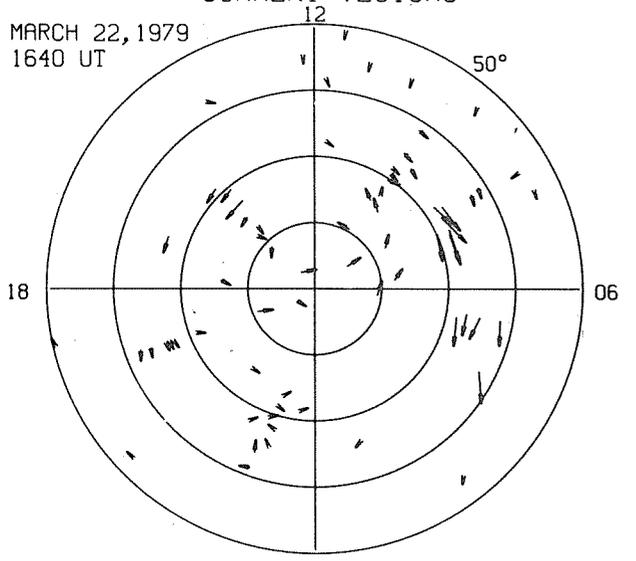
FIELD-ALIGNED CURRENTS





OBSERVED EQUIVALENT  
CURRENT VECTORS

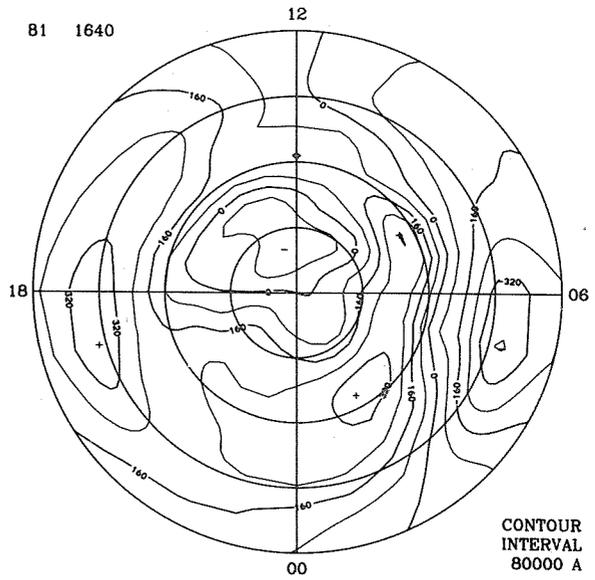
MARCH 22, 1979  
1640 UT



00 MLT → 500 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

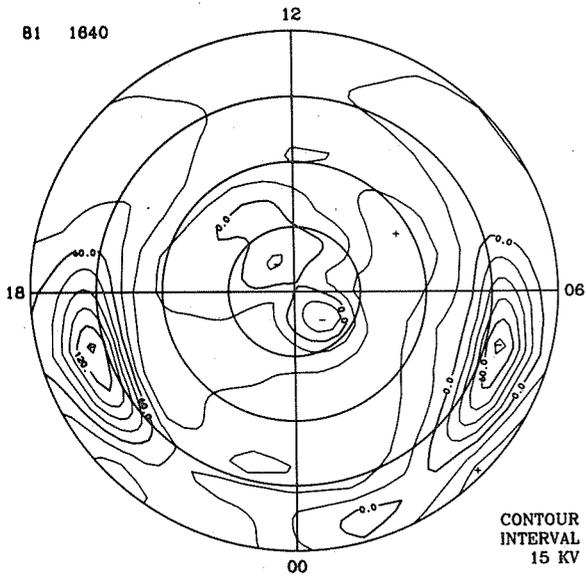
B1 1640



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

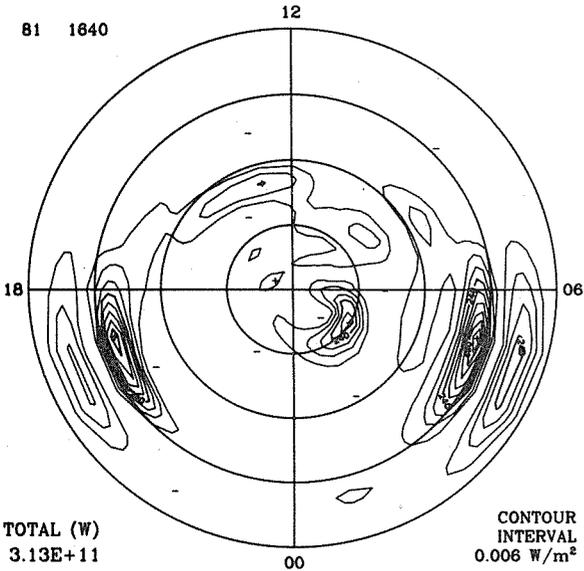
B1 1640



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

B1 1640

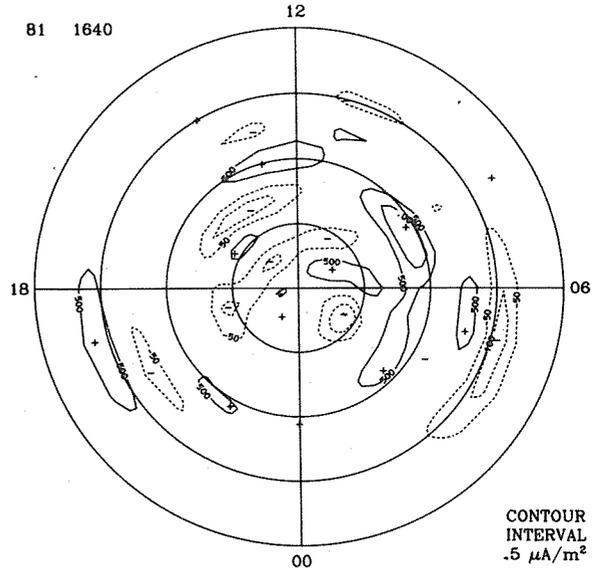


TOTAL (W)  
3.13E+11

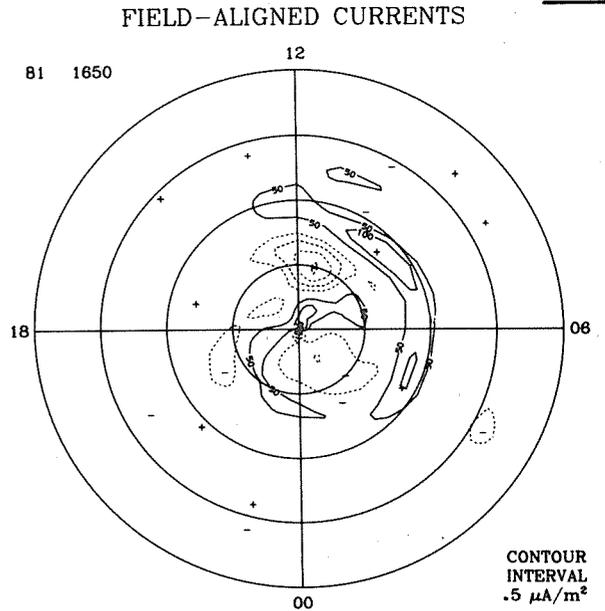
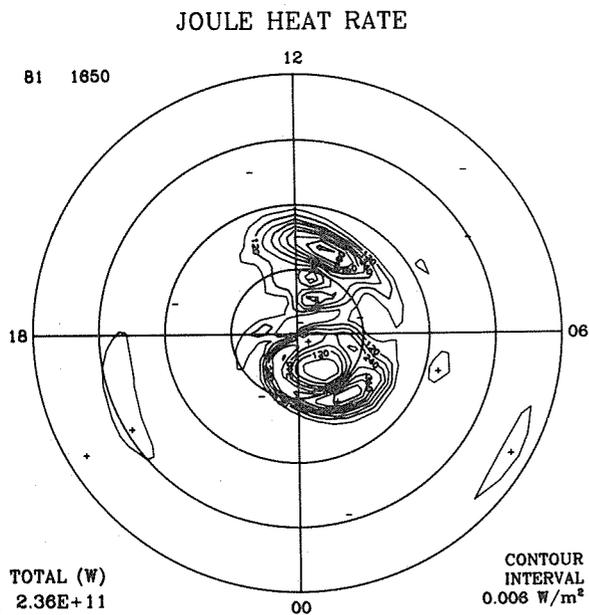
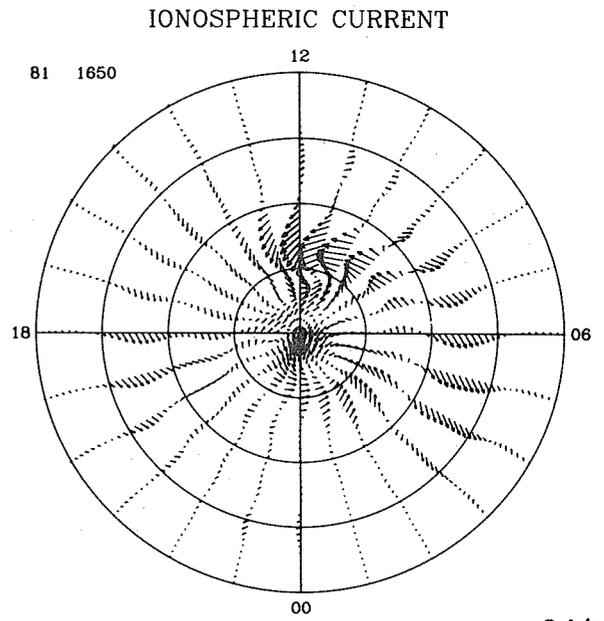
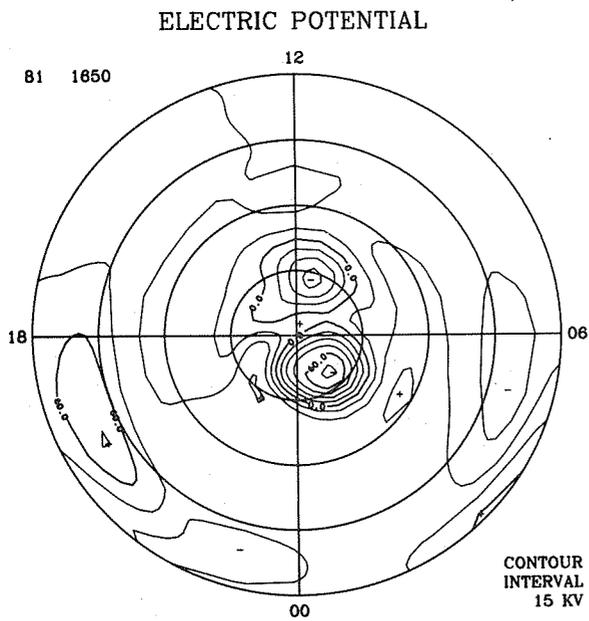
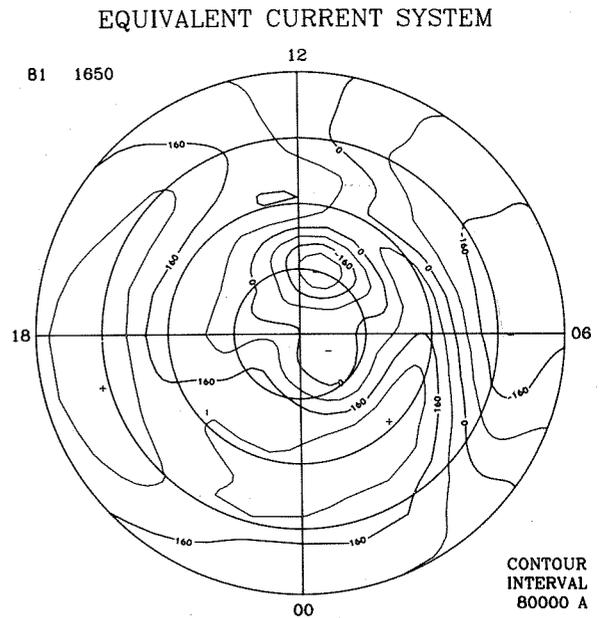
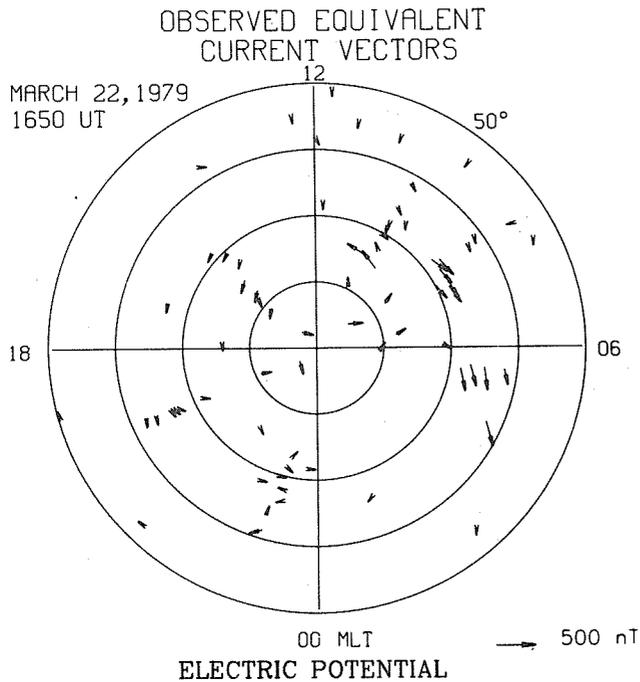
CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

B1 1640

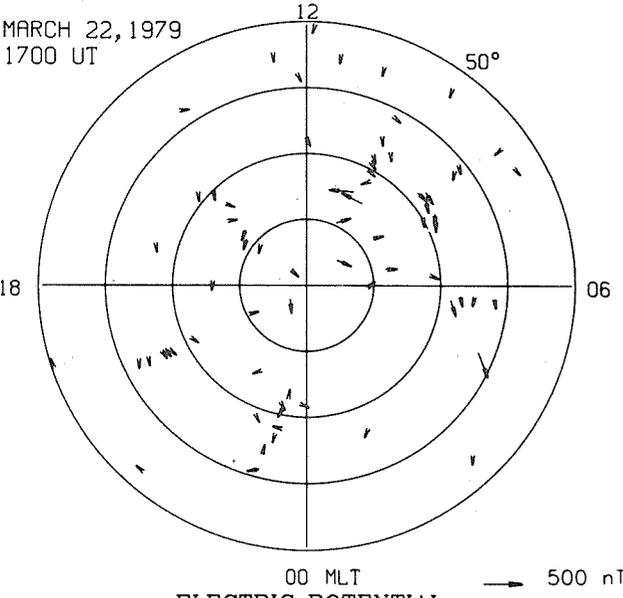


CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>



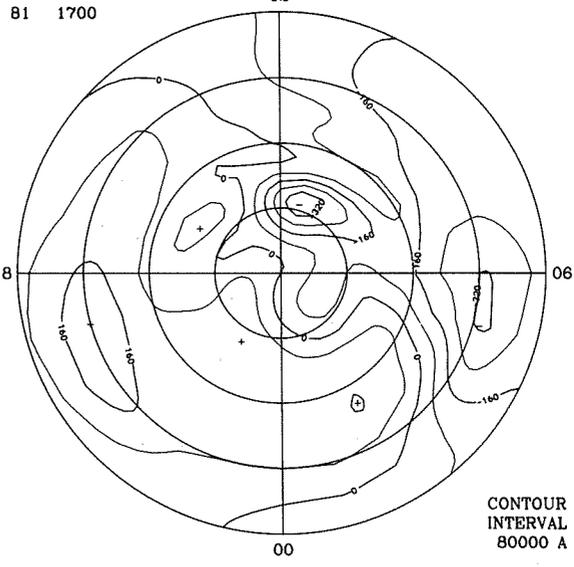
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1700 UT



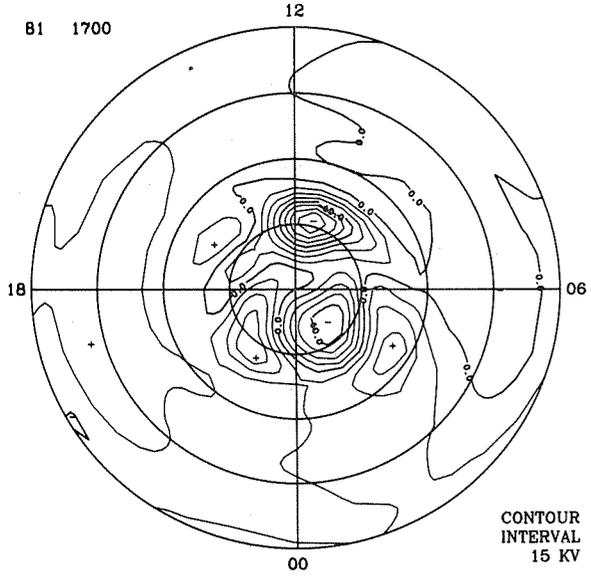
00 MLT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

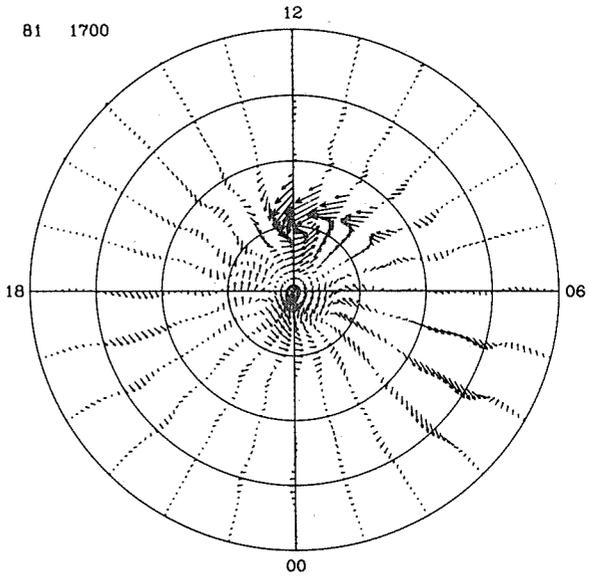


CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT



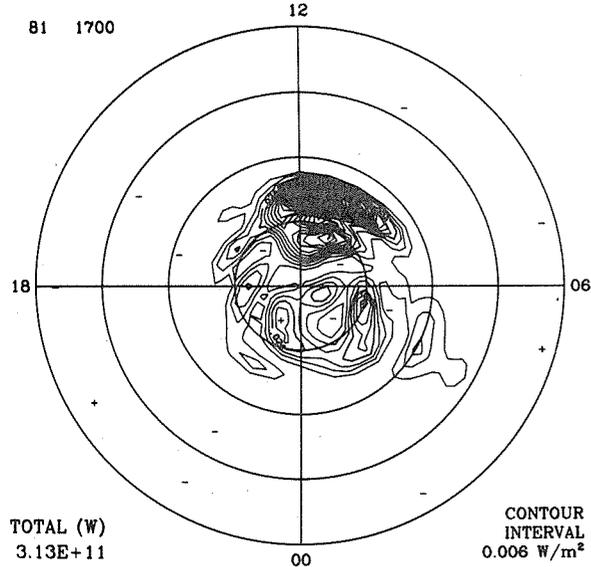
CONTOUR  
INTERVAL  
15 KV



3 A/m

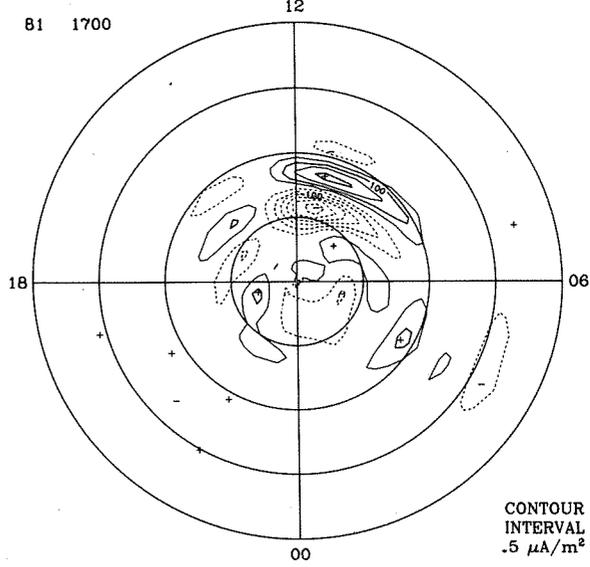
FIELD-ALIGNED CURRENTS

JOULE HEAT RATE

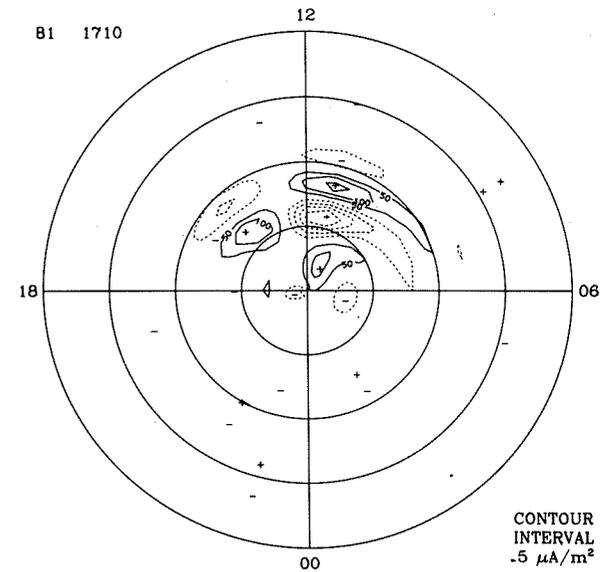
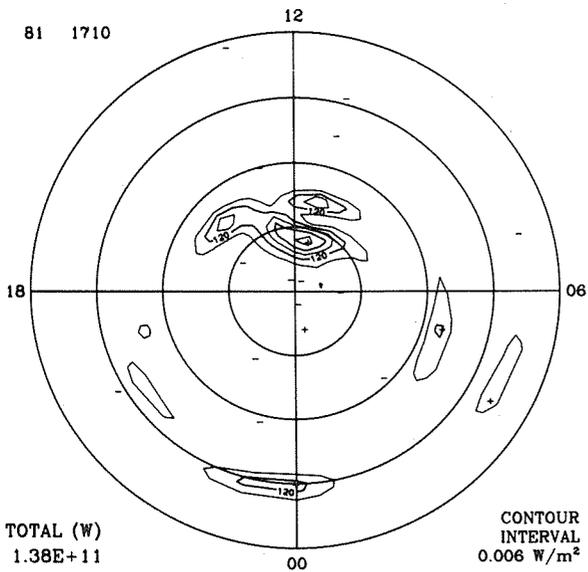
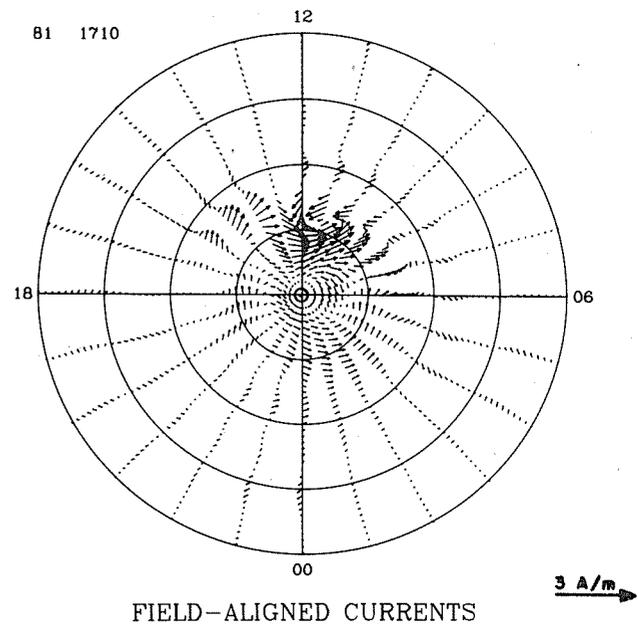
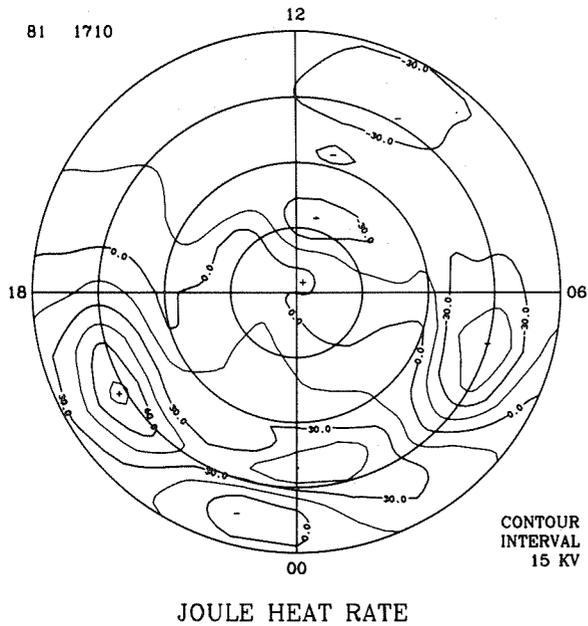
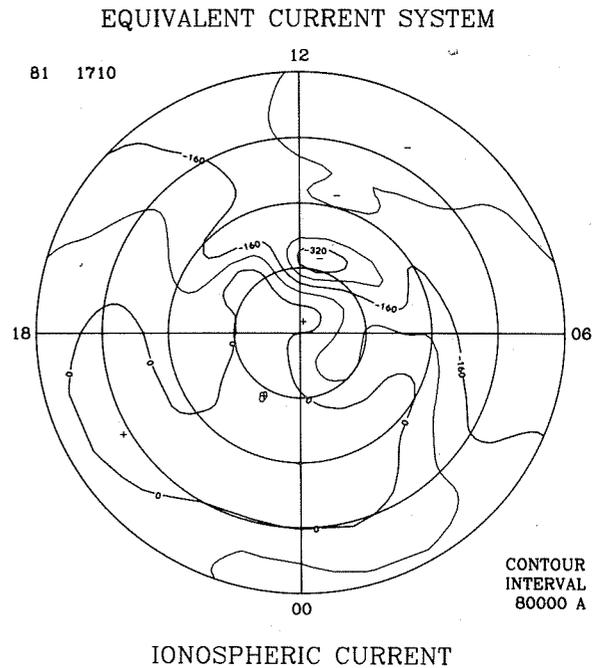
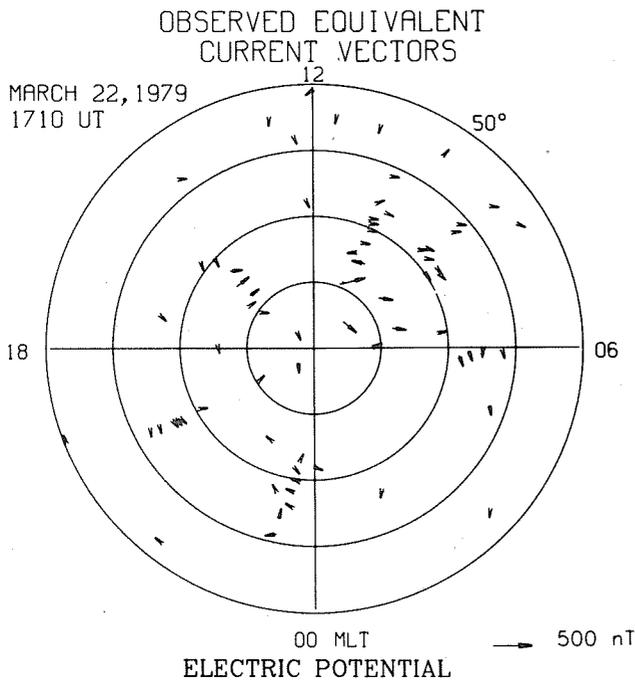


CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

TOTAL (W)  
3.13E+11



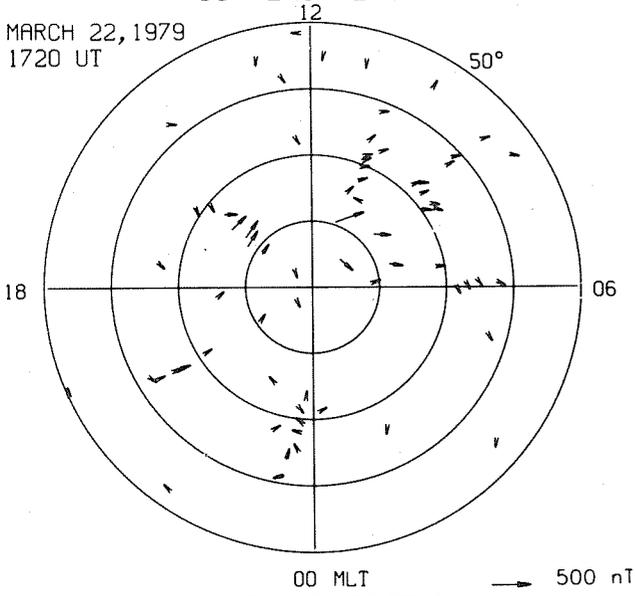
CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>



TOTAL (W)  
1.38E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1720 UT

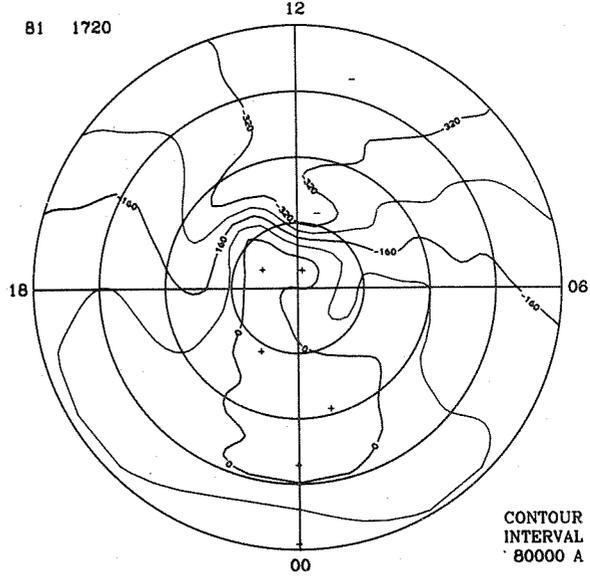


00 MLT

→ 500 nT

EQUIVALENT CURRENT SYSTEM

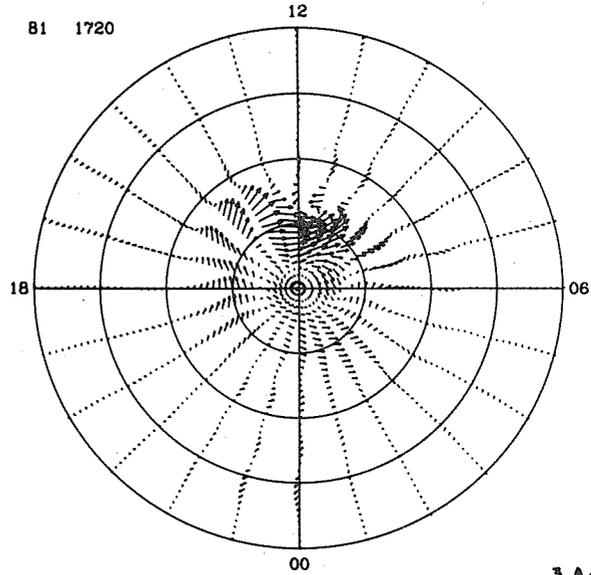
B1 1720



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

B1 1720

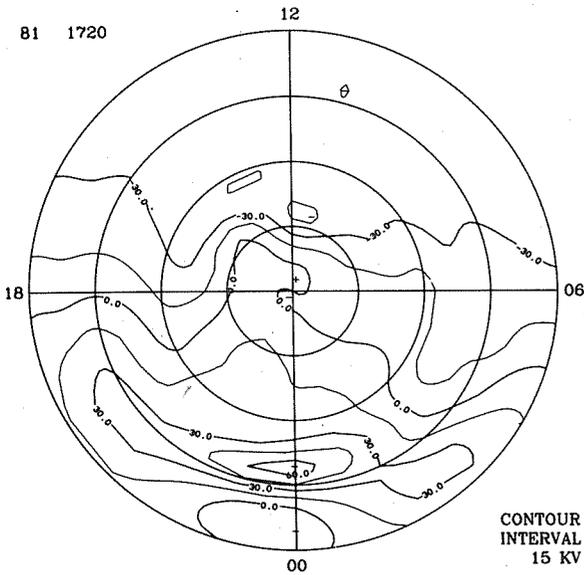


→ 3 A/m

FIELD-ALIGNED CURRENTS

JOULE HEAT RATE

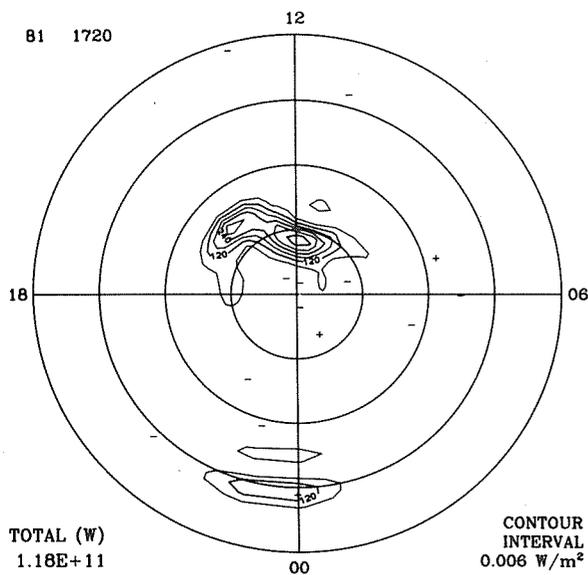
B1 1720



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

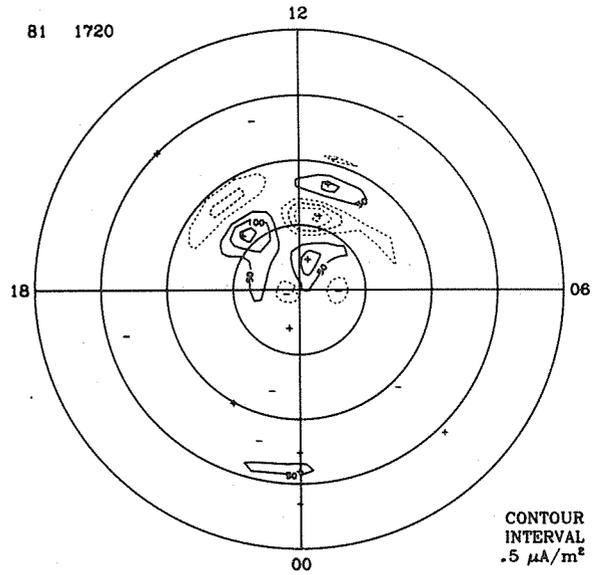
B1 1720



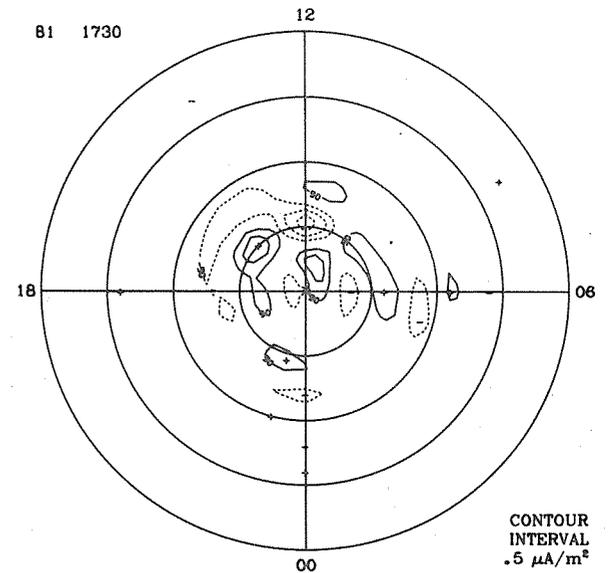
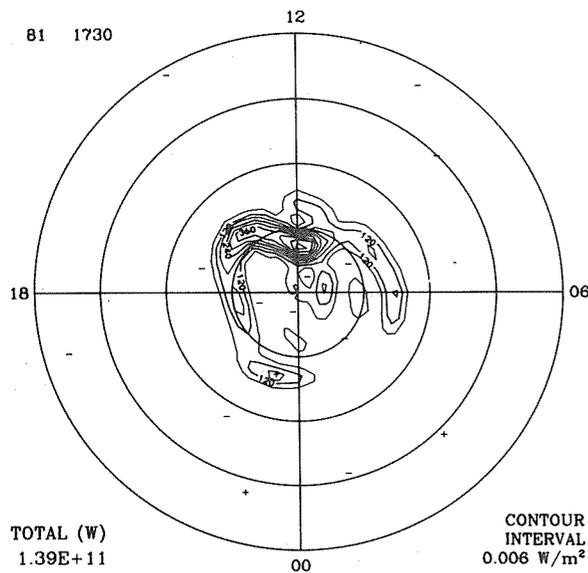
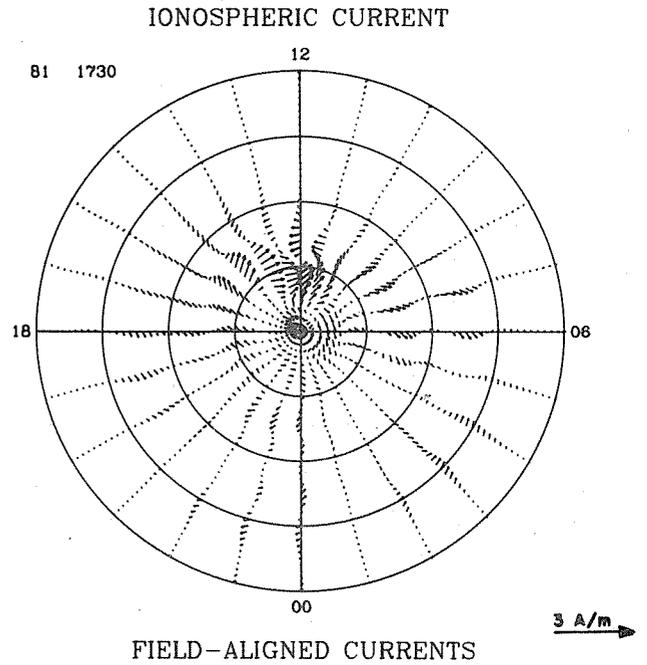
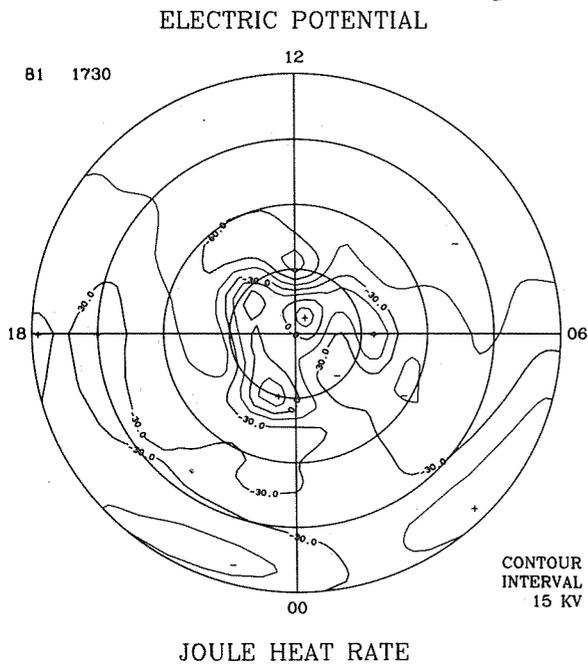
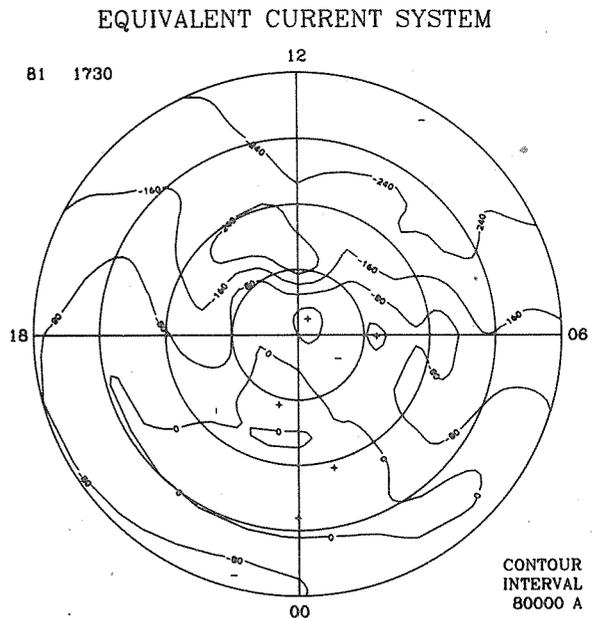
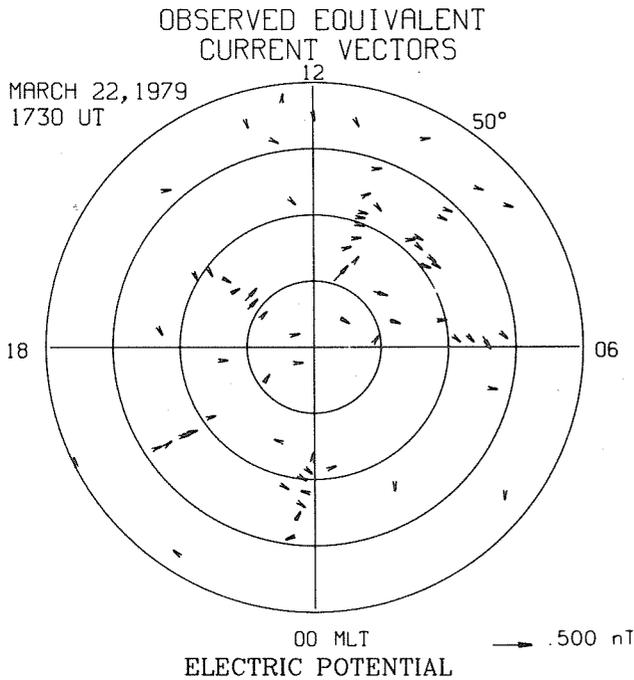
TOTAL (W)  
1.18E+11

CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

B1 1720

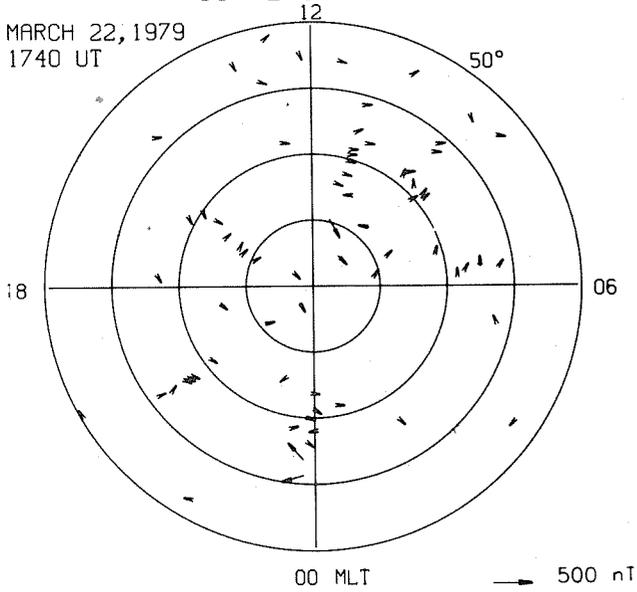


CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>



OBSERVED EQUIVALENT  
CURRENT VECTORS

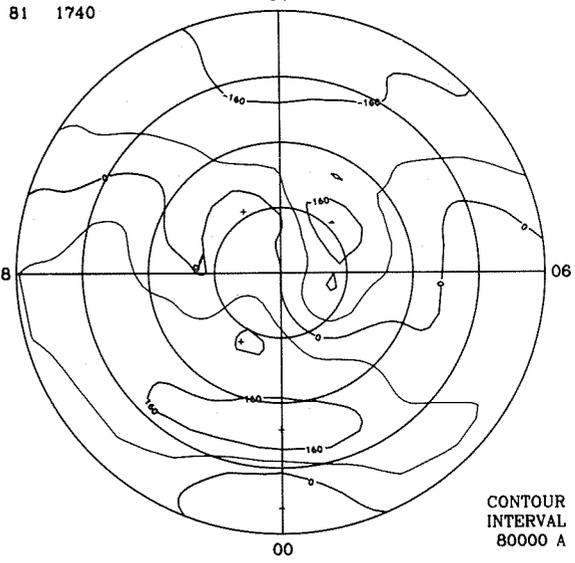
MARCH 22, 1979  
1740 UT



00 MLT  
ELECTRIC POTENTIAL

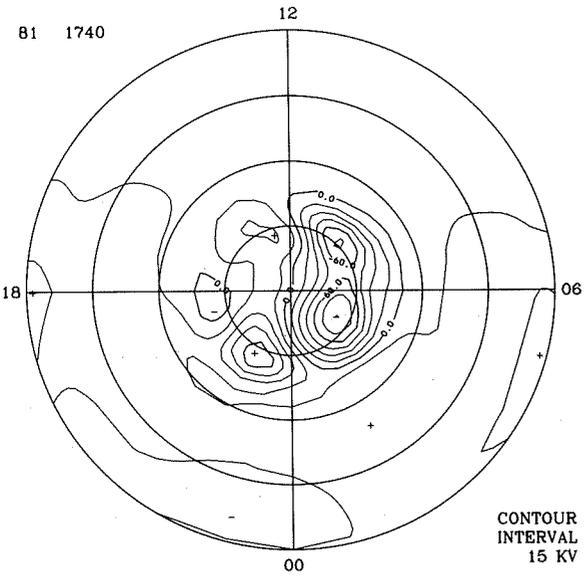
→ 500 nT

EQUIVALENT CURRENT SYSTEM

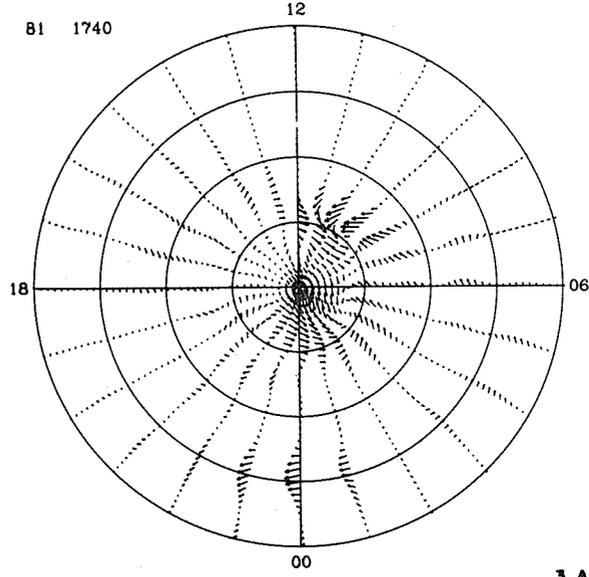


CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

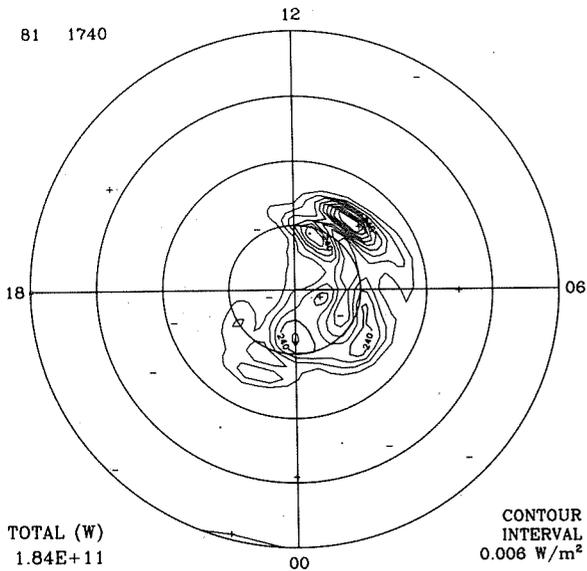


CONTOUR  
INTERVAL  
15 KV



→ 3 A/m

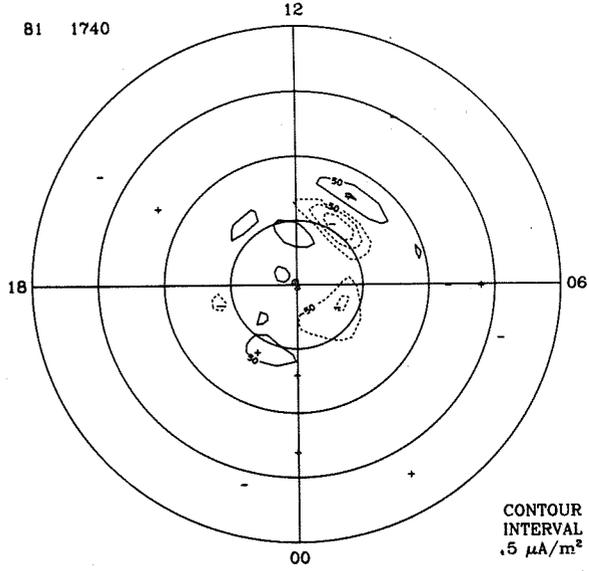
JOULE HEAT RATE



CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

TOTAL (W)  
1.84E+11

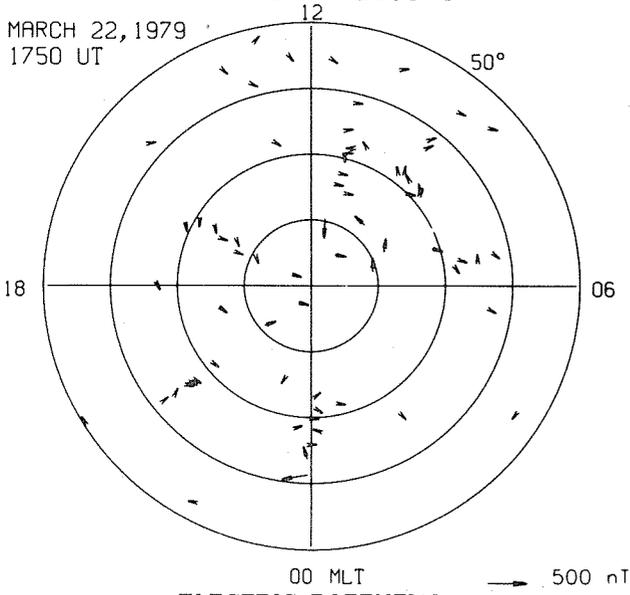
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.5 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 22, 1979  
1750 UT

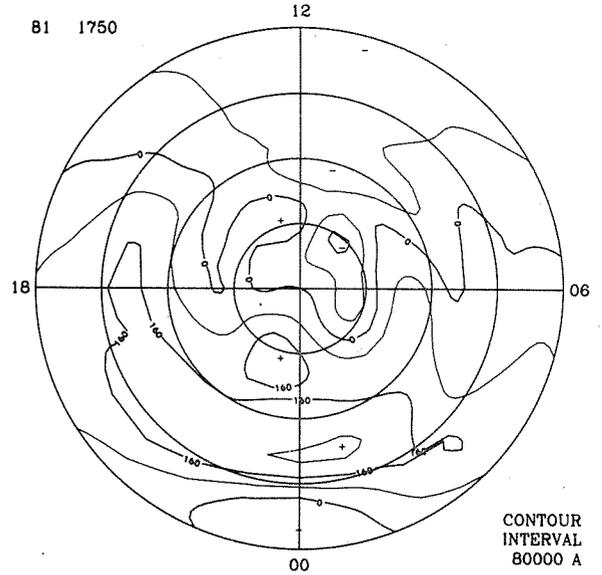


00 MLT  
ELECTRIC POTENTIAL

→ 500 nT

EQUIVALENT CURRENT SYSTEM

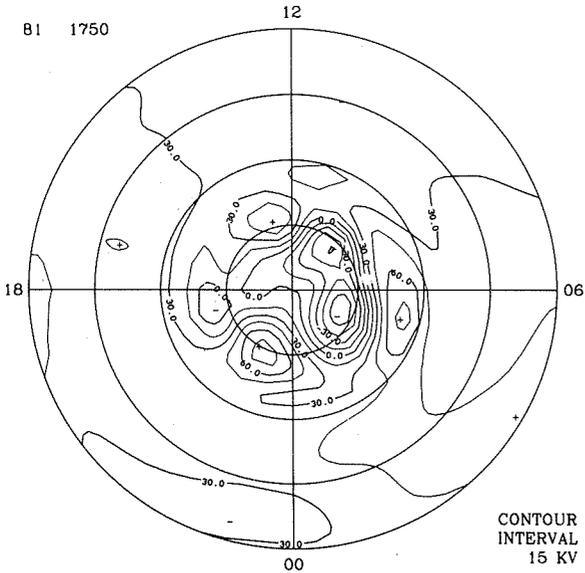
81 1750



CONTOUR  
INTERVAL  
80000 A

IONOSPHERIC CURRENT

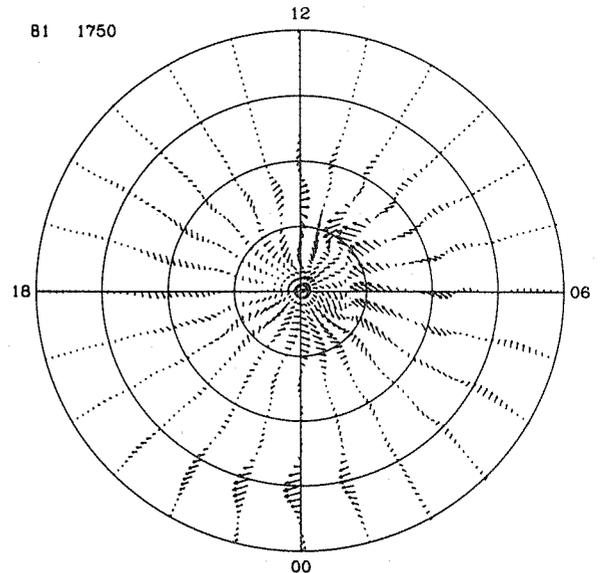
81 1750



CONTOUR  
INTERVAL  
15 KV

JOULE HEAT RATE

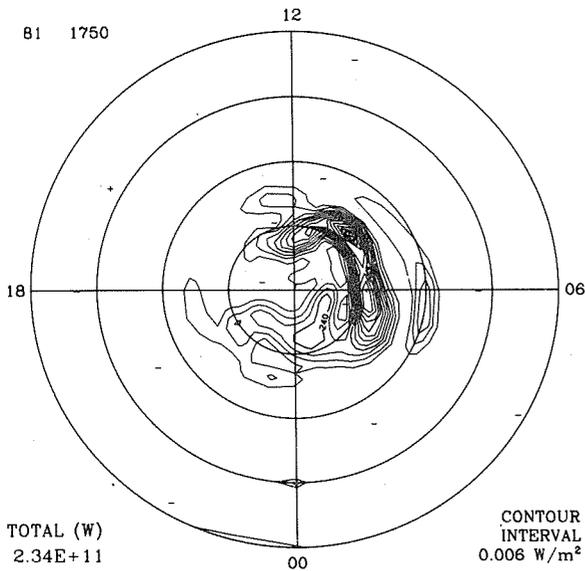
81 1750



3 A/m →

FIELD-ALIGNED CURRENTS

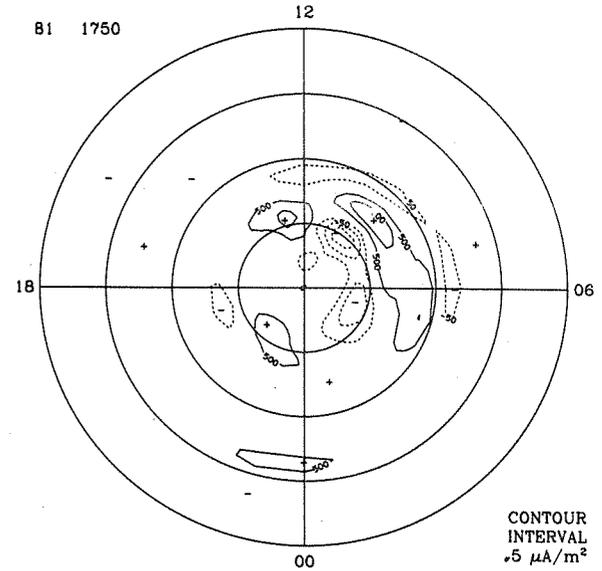
81 1750



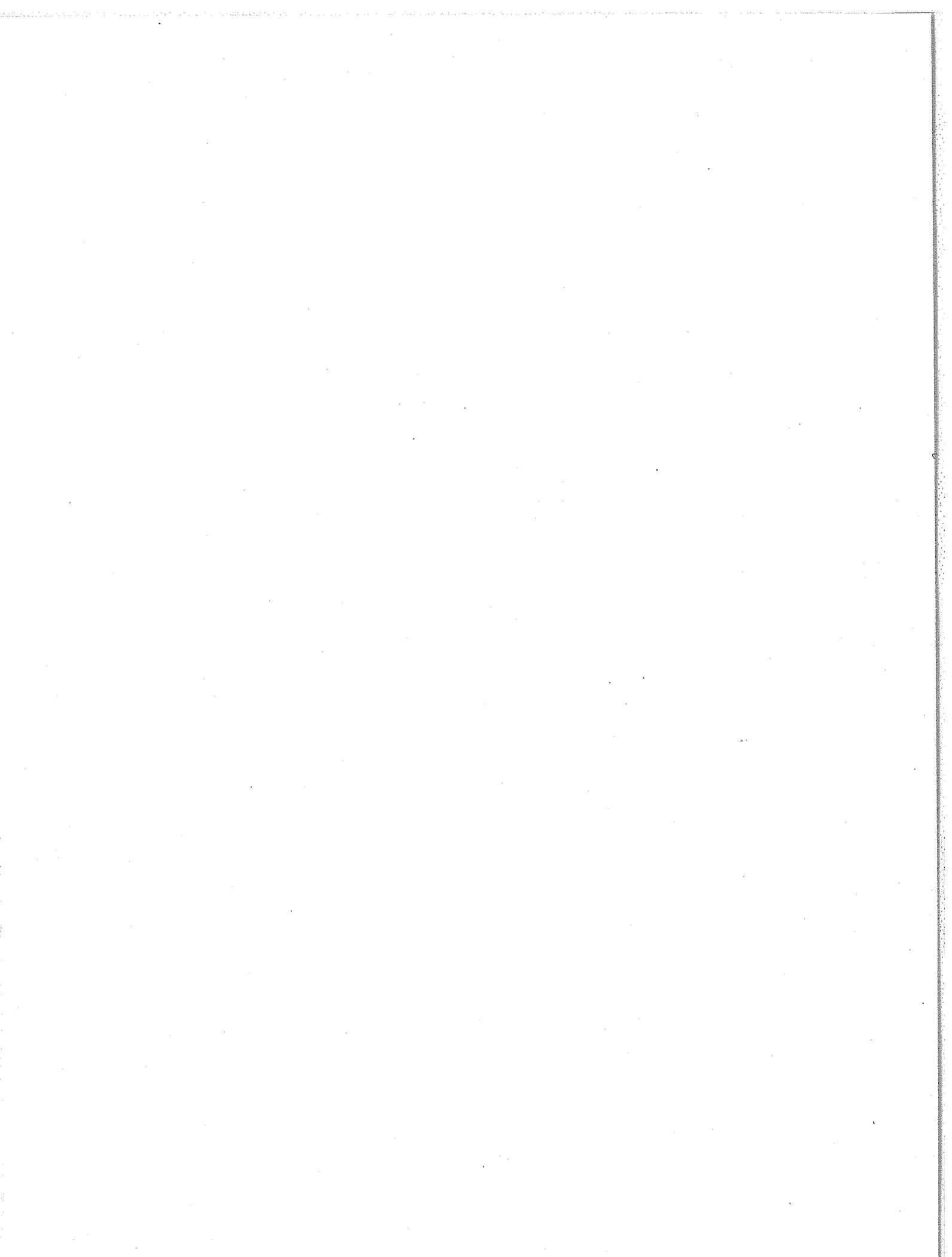
CONTOUR  
INTERVAL  
0.006 W/m<sup>2</sup>

TOTAL (W)  
2.34E+11

81 1750



CONTOUR  
INTERVAL  
0.5 μA/m<sup>2</sup>



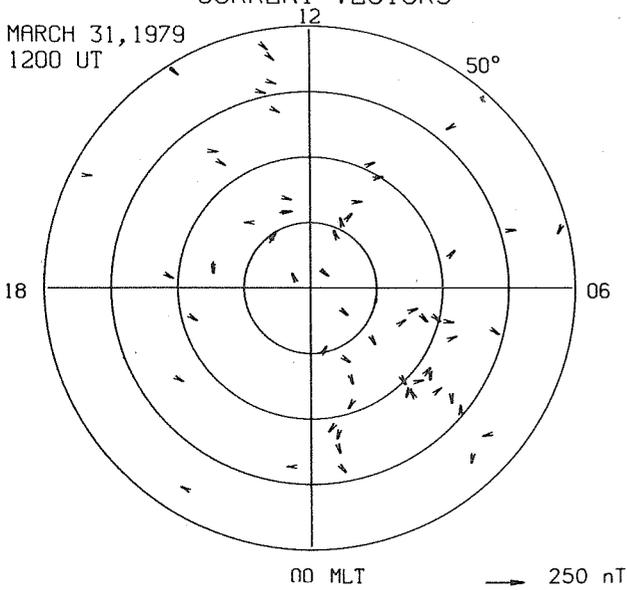
## APPENDIX II

### Data Plots for 1200 March 31-0600 April 1, 1979

Out of the various output plots shown in Figures 4a-j, we have chosen to show 5 polar plots (equivalent ionospheric current system, electrical potential, ionospheric current vectors, Joule heating rate and field-aligned current density) as well as the distribution of the observed magnetic perturbation noted as equivalent currents. The plots are reconstructed every 10 minutes for the 12-hour interval. The outermost circle is 50°N in corrected geomagnetic coordinates, with other circles spaced 10°. Date and UT are marked on each diagram.

OBSERVED EQUIVALENT  
CURRENT VECTORS

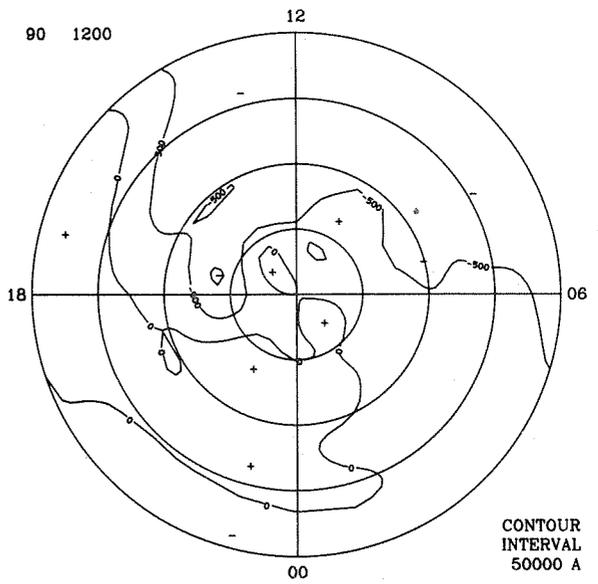
MARCH 31, 1979  
1200 UT



00 MLT  
ELECTRIC POTENTIAL

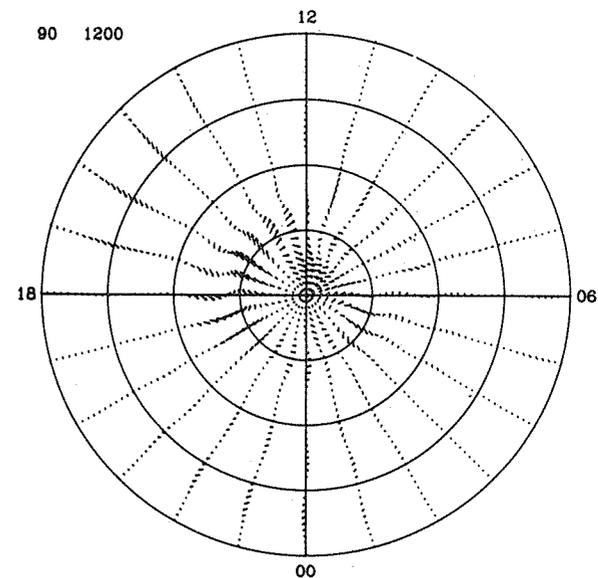
→ 250 nT

EQUIVALENT CURRENT SYSTEM



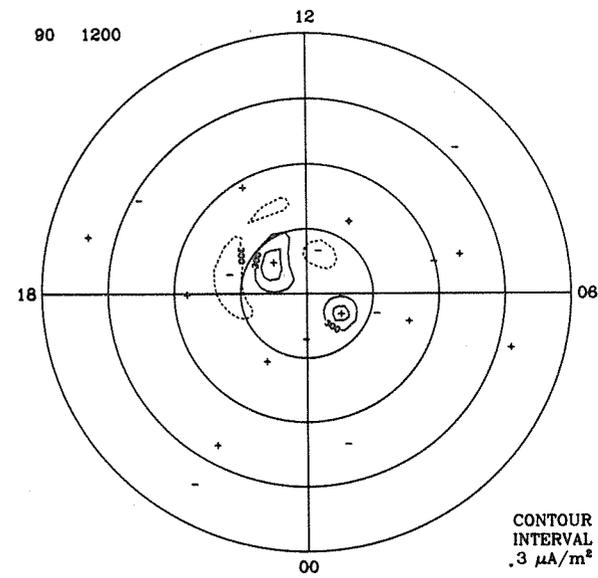
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

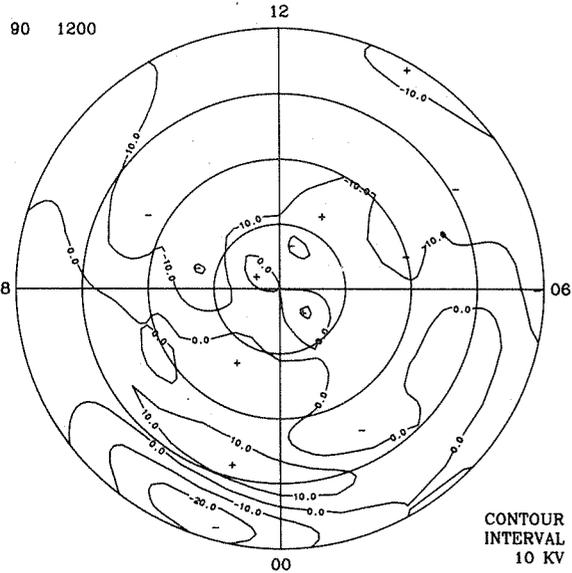


→ 2 A/m

FIELD-ALIGNED CURRENTS

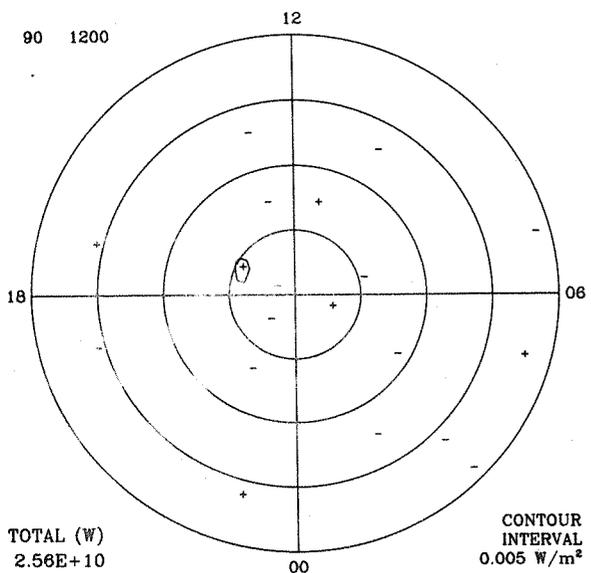


CONTOUR  
INTERVAL  
.3 μA/m²



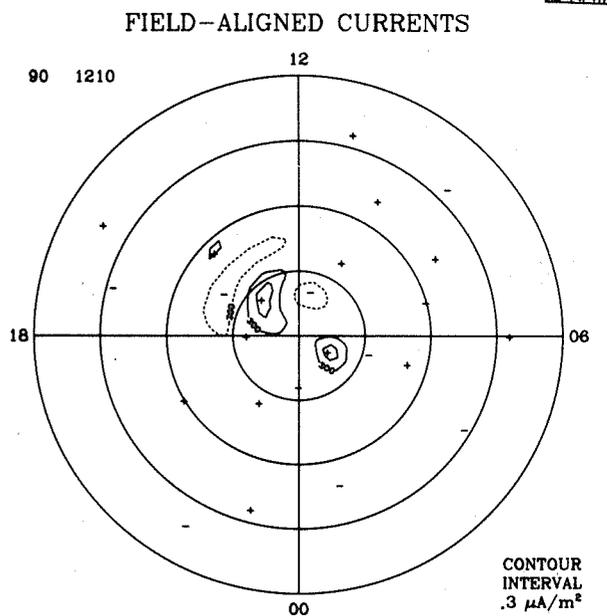
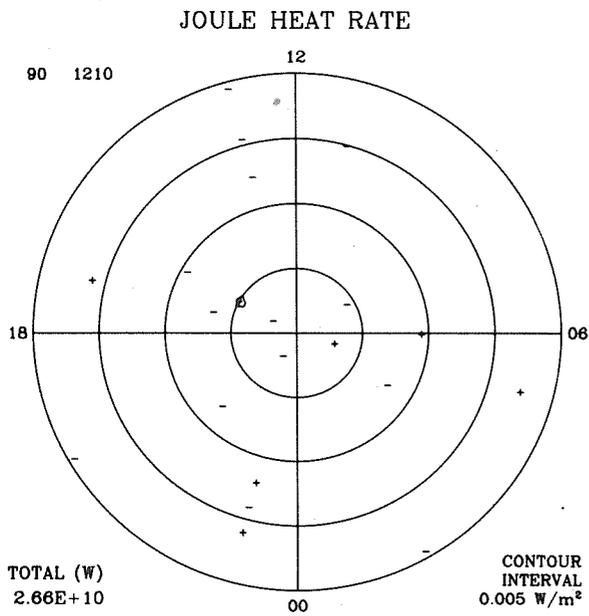
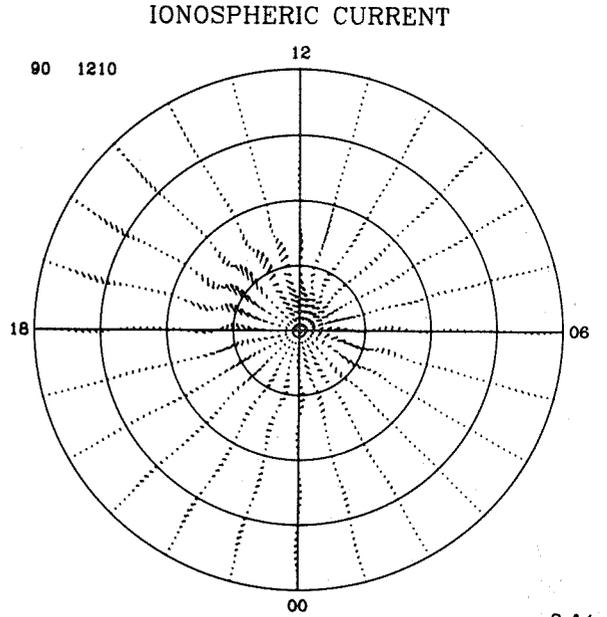
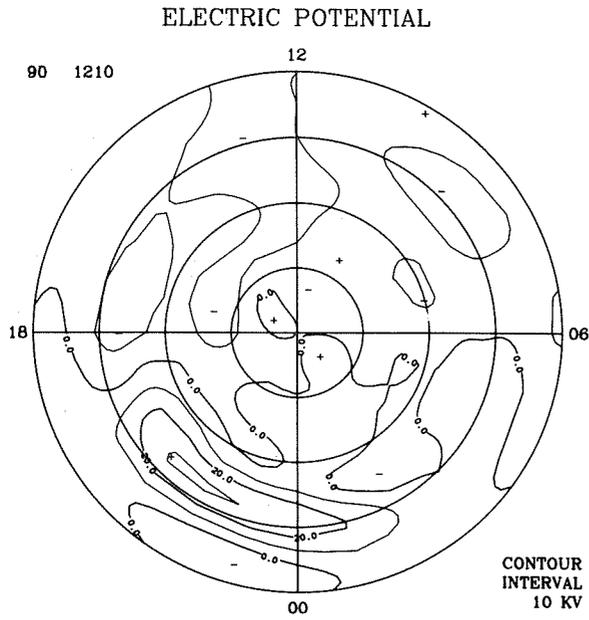
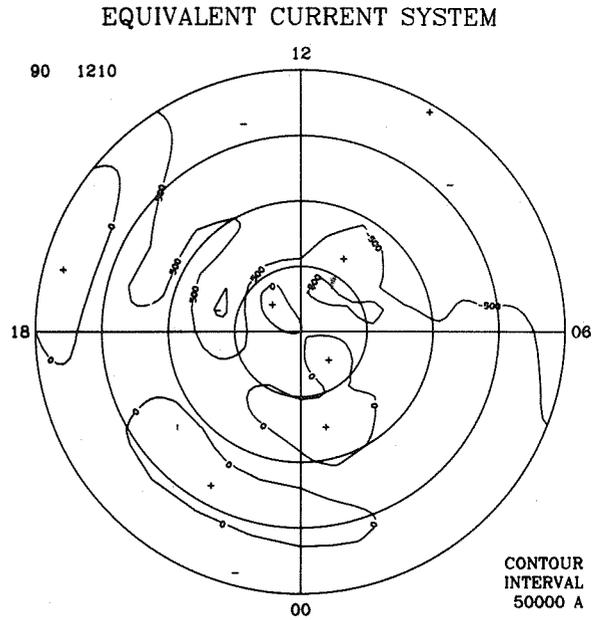
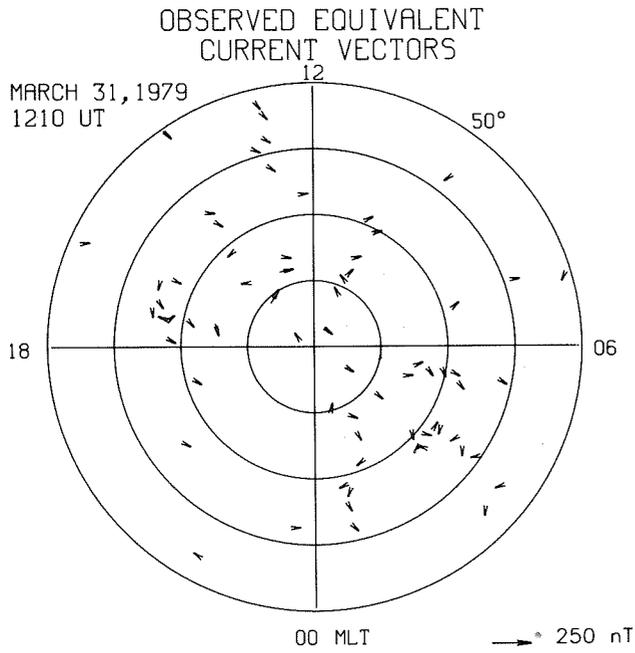
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



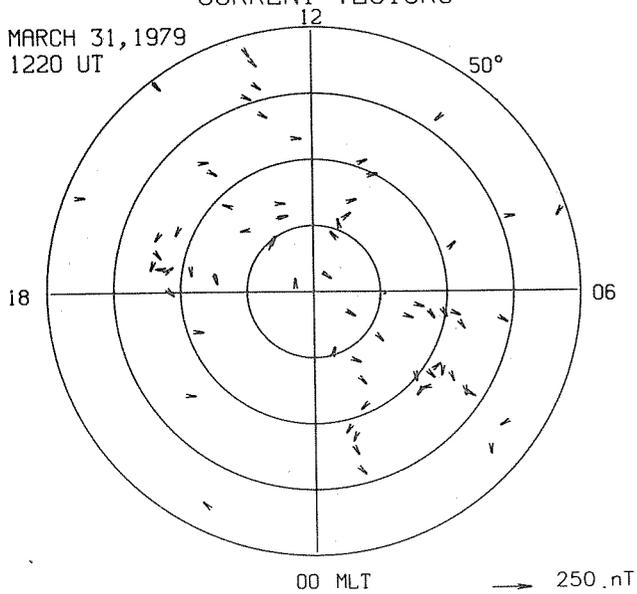
CONTOUR  
INTERVAL  
0.005 W/m²

TOTAL (W)  
2.58E+10

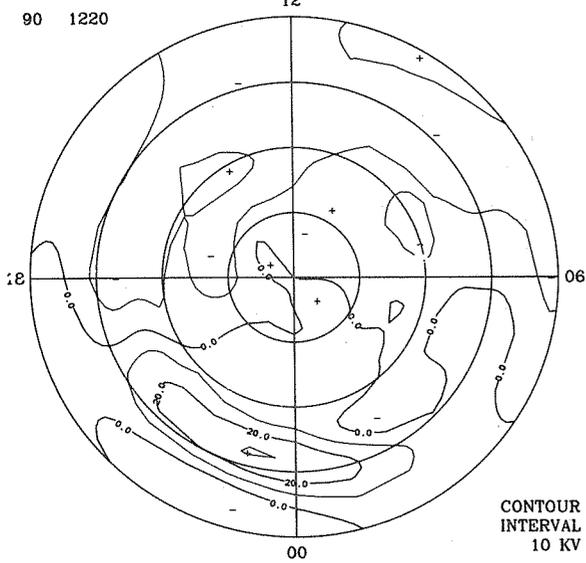


OBSERVED EQUIVALENT  
CURRENT VECTORS

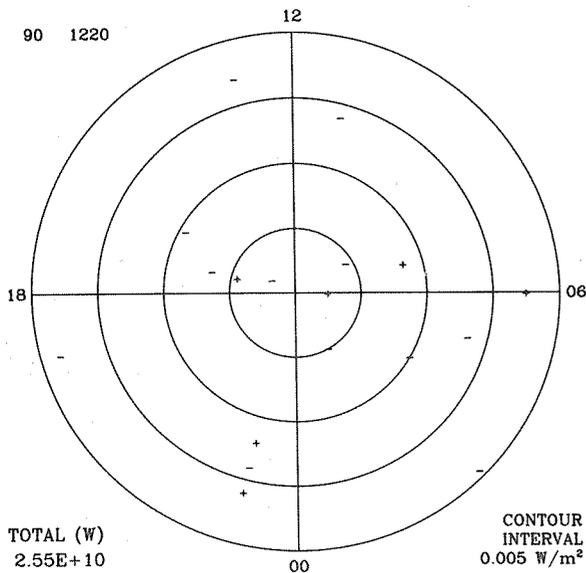
MARCH 31, 1979  
1220 UT



ELECTRIC POTENTIAL



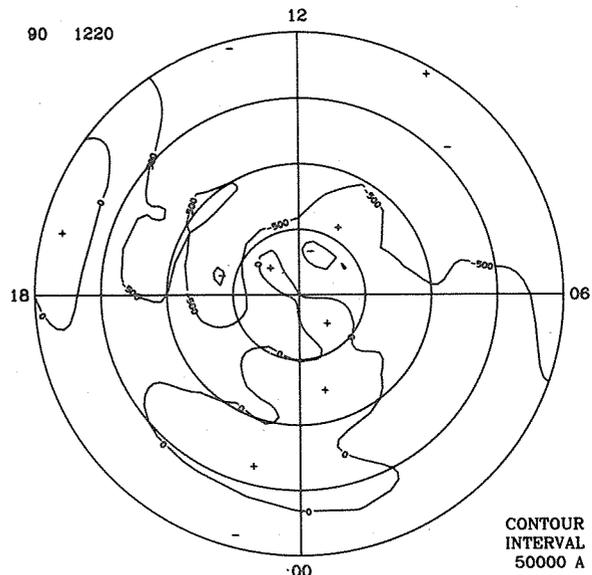
JOULE HEAT RATE



TOTAL (W)  
2.55E+10

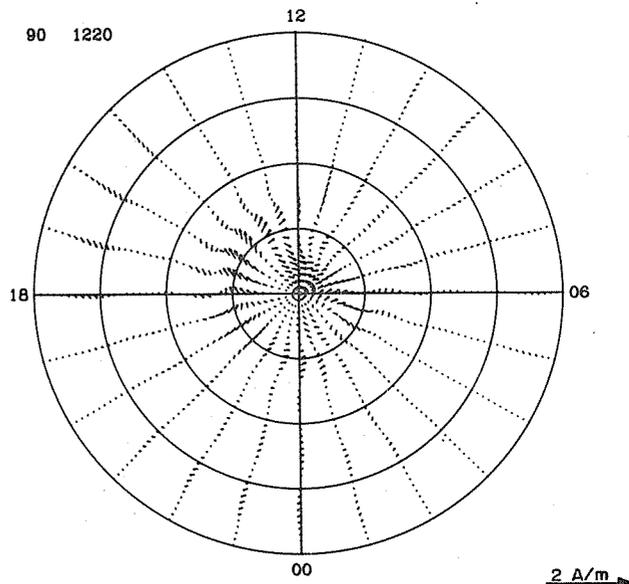
CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM



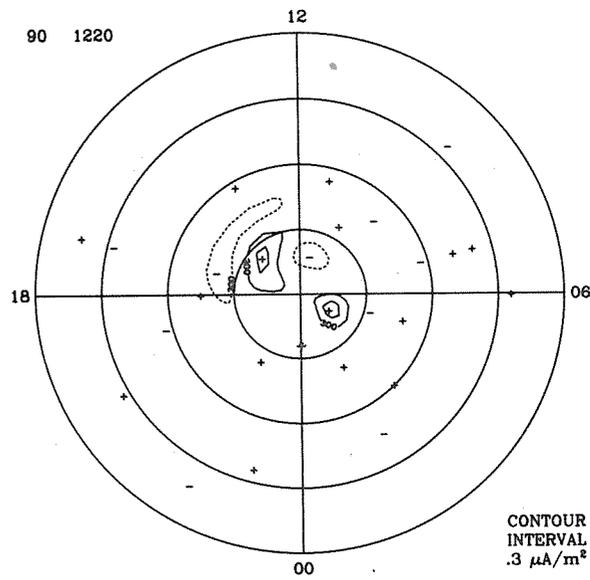
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

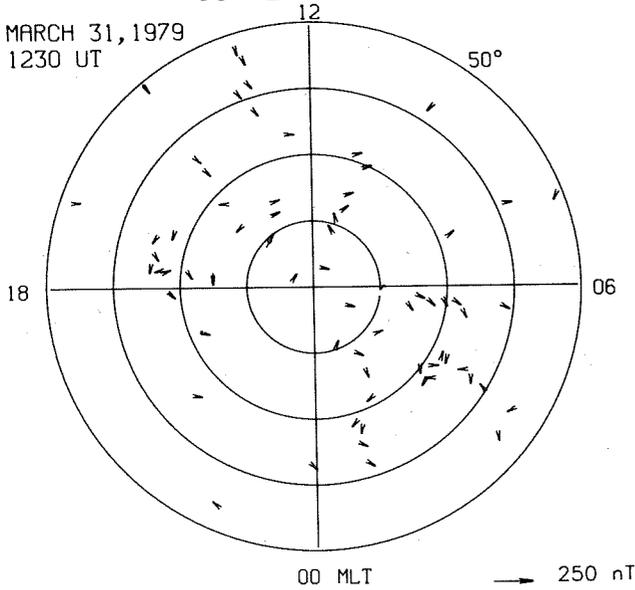
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m²

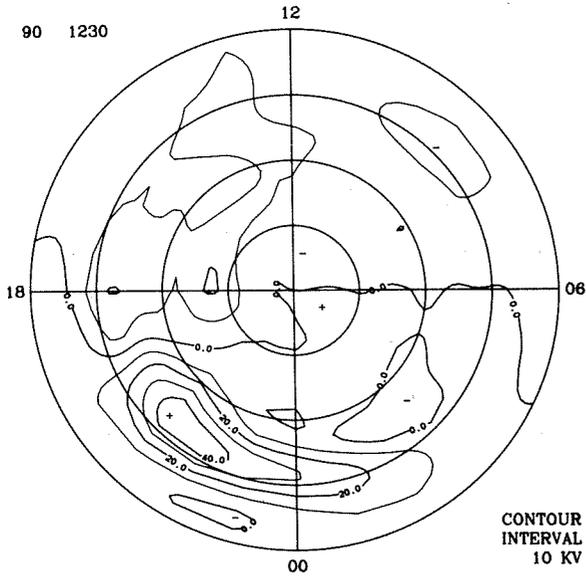
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1230 UT



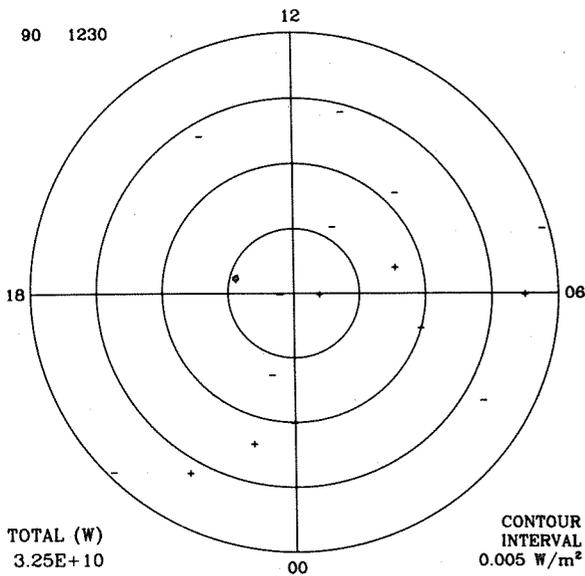
ELECTRIC POTENTIAL

90 1230



JOULE HEAT RATE

90 1230

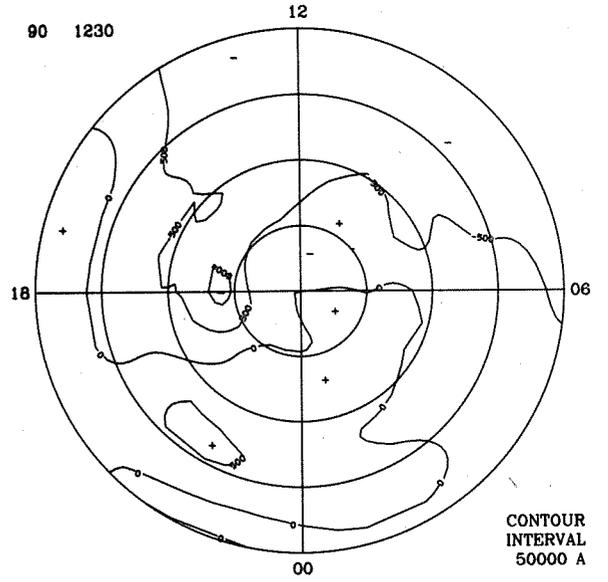


TOTAL (W)  
3.25E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

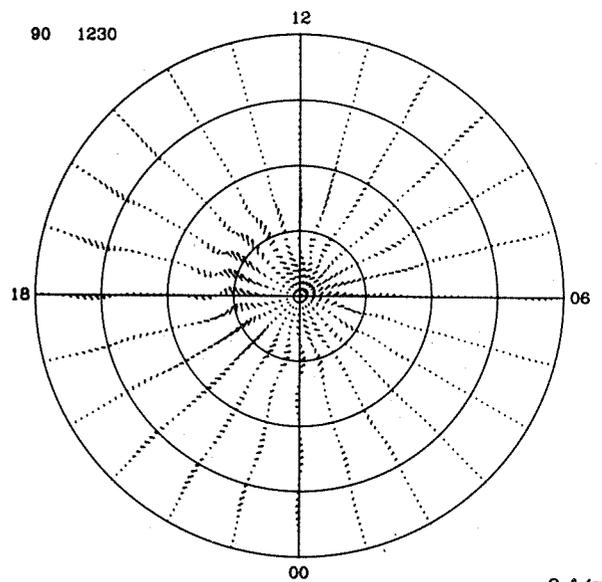
90 1230



CONTOUR  
INTERVAL  
50000 A

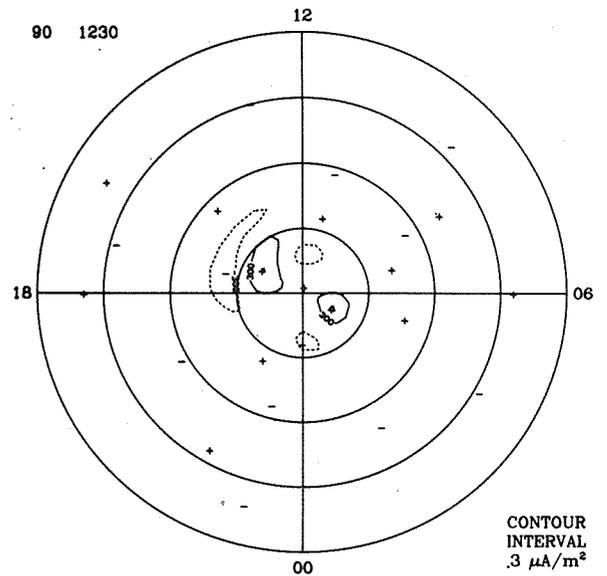
IONOSPHERIC CURRENT

90 1230



FIELD-ALIGNED CURRENTS

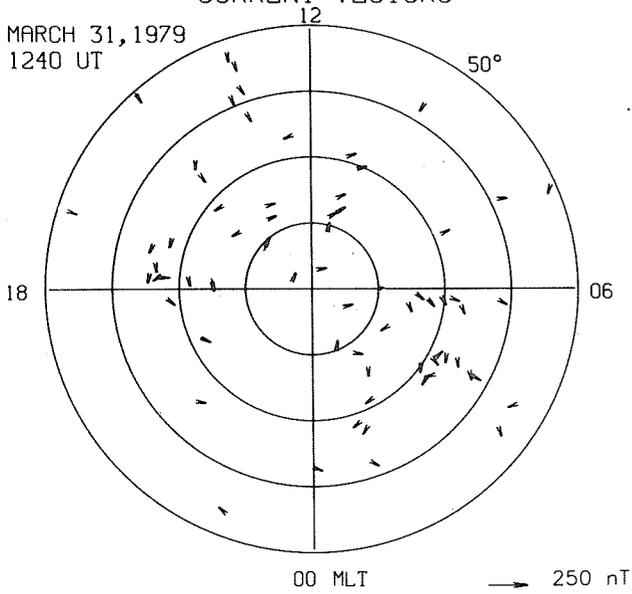
90 1230



CONTOUR  
INTERVAL  
3 μA/m²

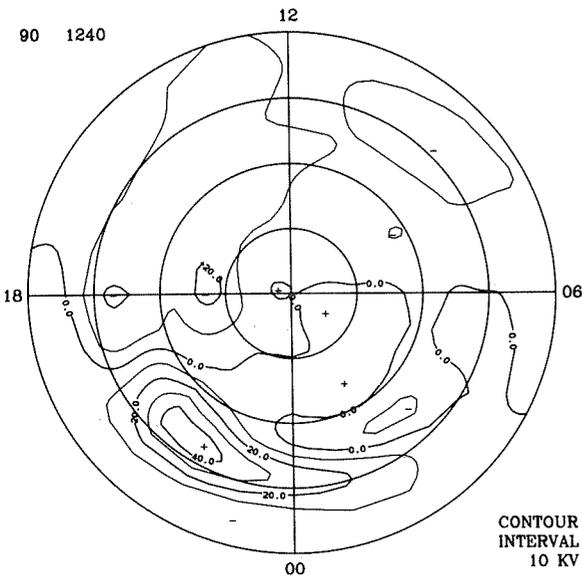
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1240 UT



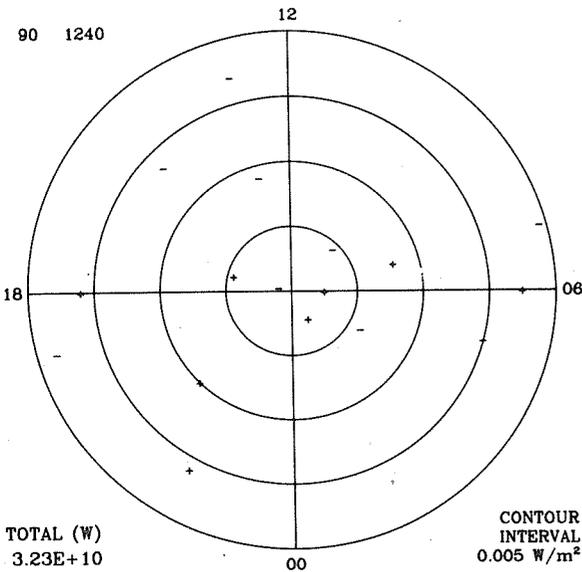
ELECTRIC POTENTIAL

90 1240



JOULE HEAT RATE

90 1240

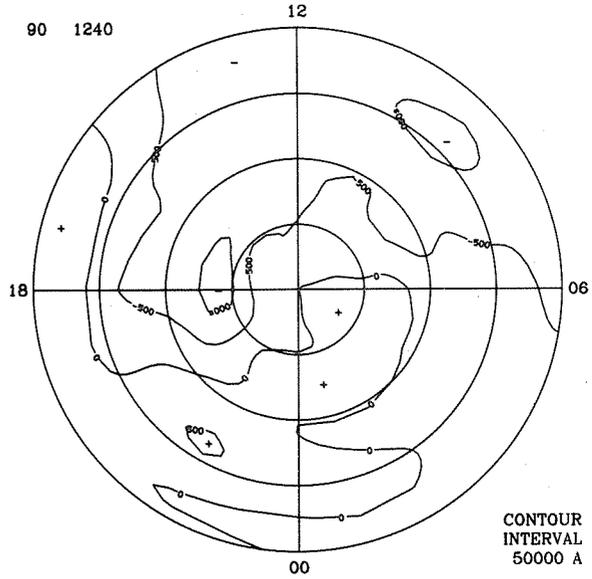


TOTAL (W)  
3.23E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

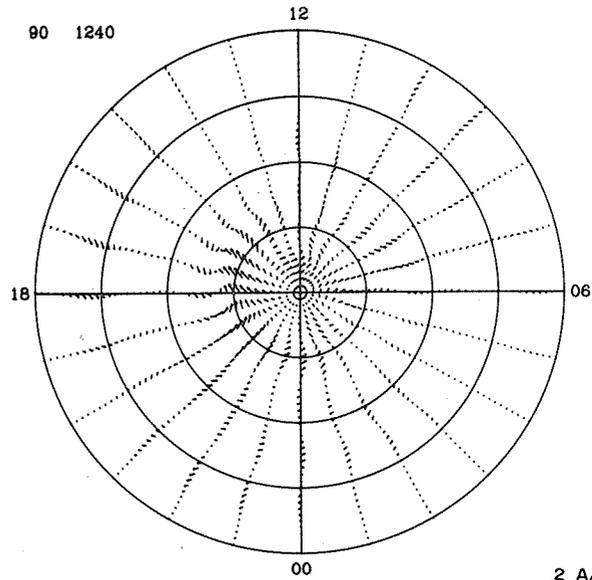
90 1240



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

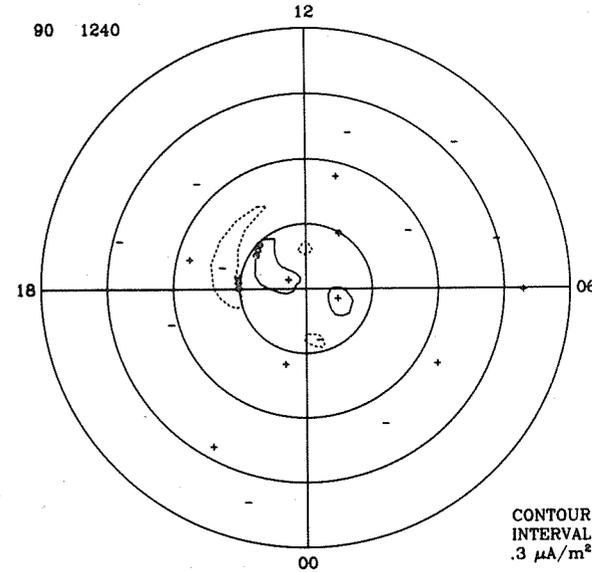
90 1240



2 A/m

FIELD-ALIGNED CURRENTS

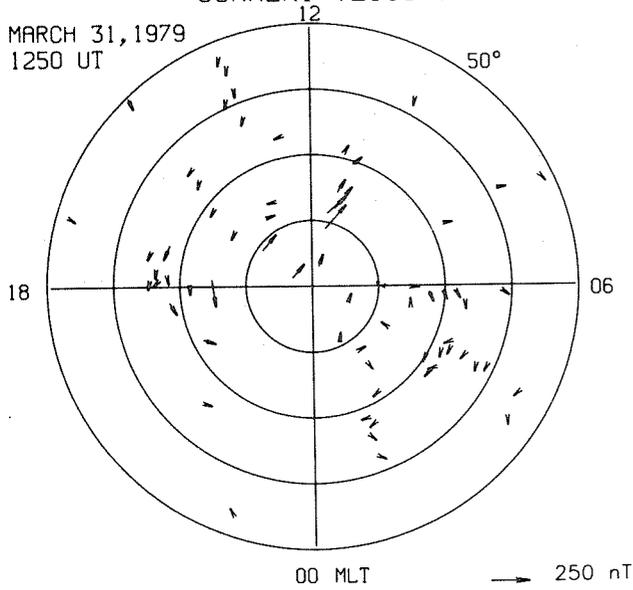
90 1240



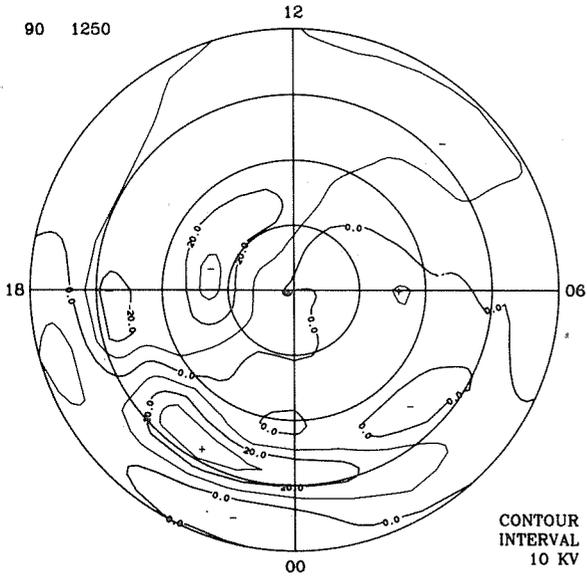
CONTOUR  
INTERVAL  
.3 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

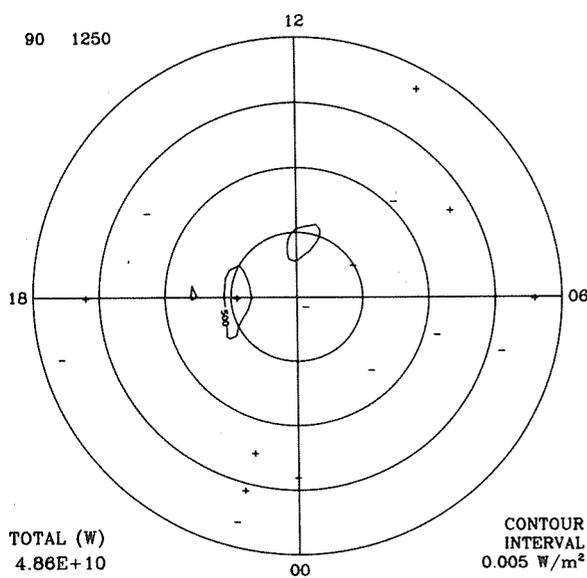
MARCH 31, 1979  
1250 UT



ELECTRIC POTENTIAL



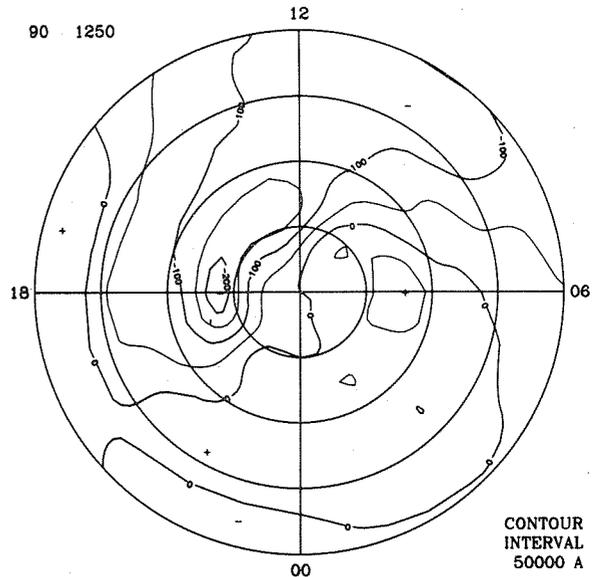
JOULE HEAT RATE



TOTAL (W)  
4.86E+10

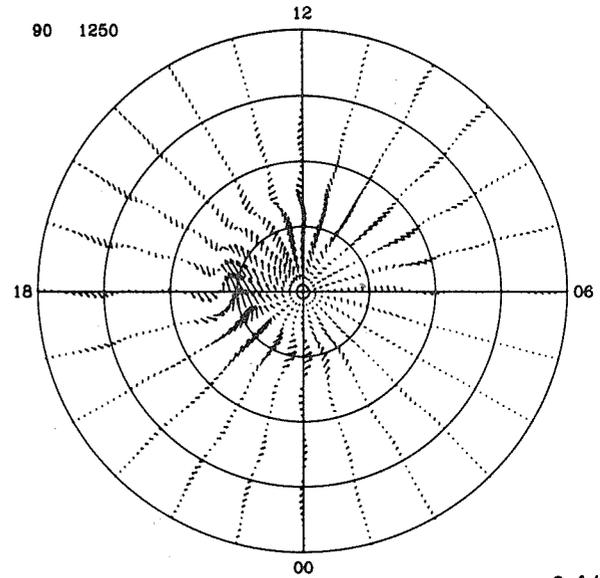
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



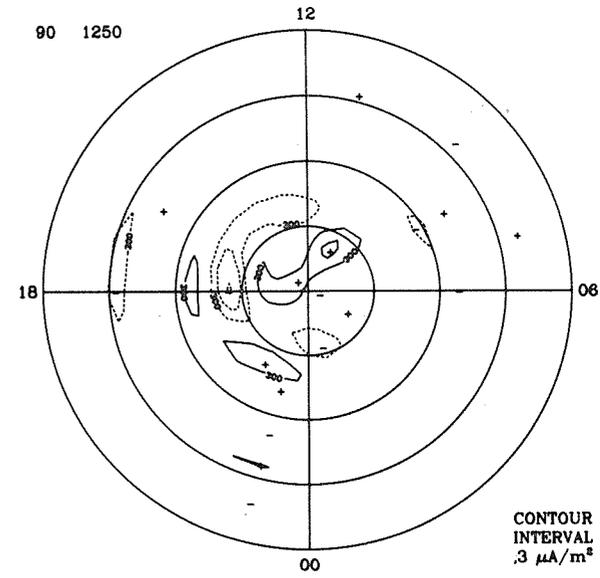
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

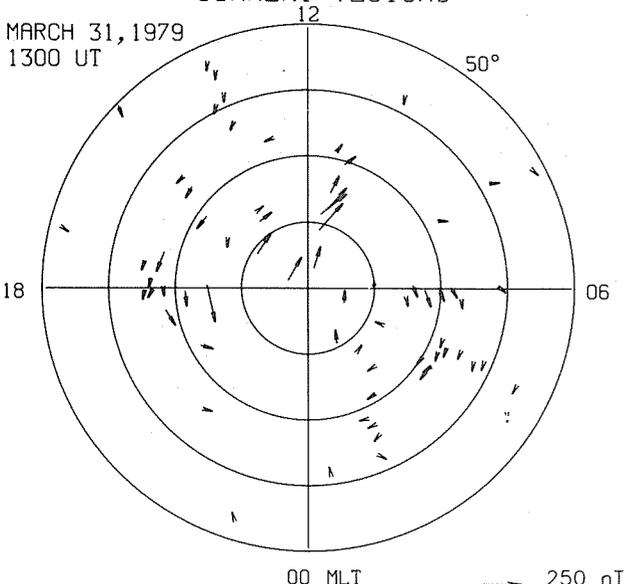
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
3 μA/m<sup>2</sup>

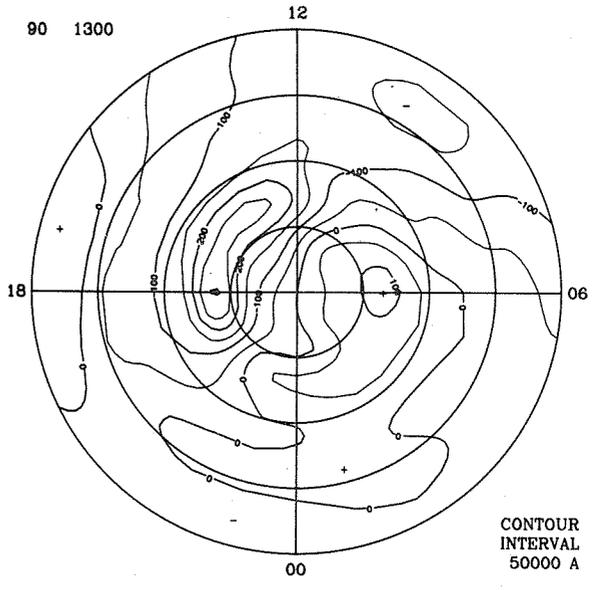
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1300 UT



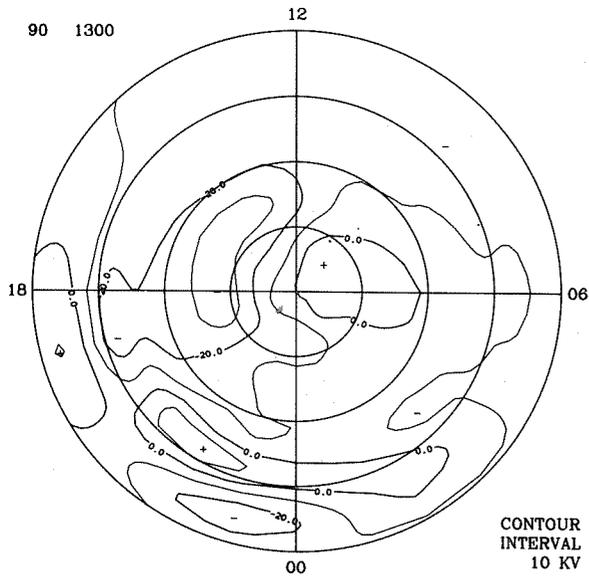
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

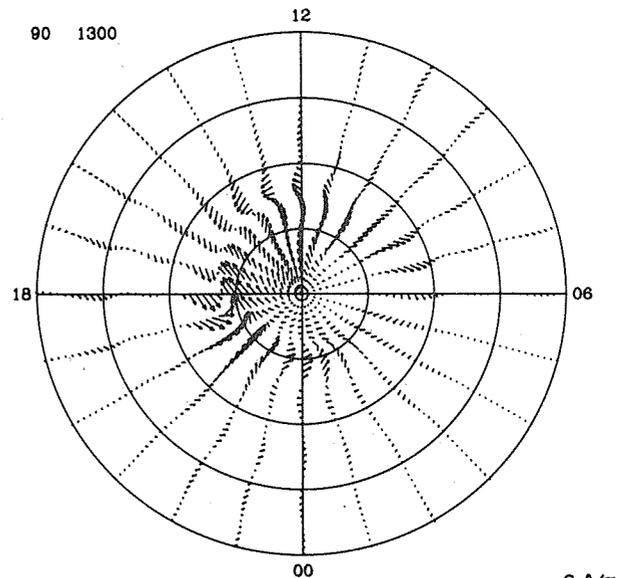


CONTOUR  
INTERVAL  
50000 A

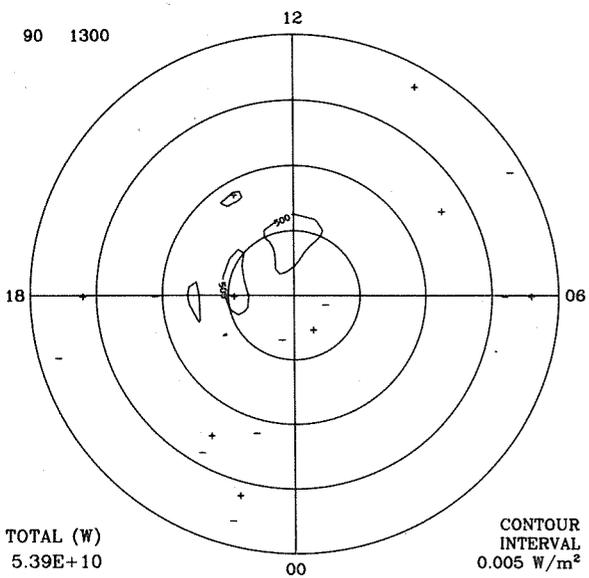
IONOSPHERIC CURRENT



JOULE HEAT RATE

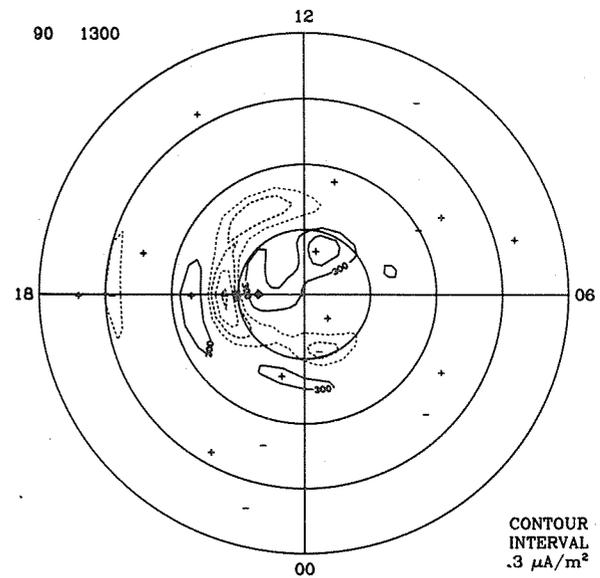


FIELD-ALIGNED CURRENTS



TOTAL (W)  
5.39E+10

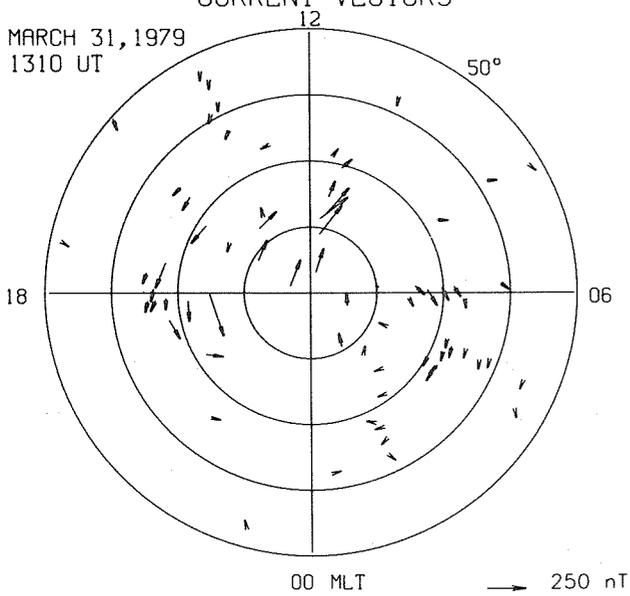
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

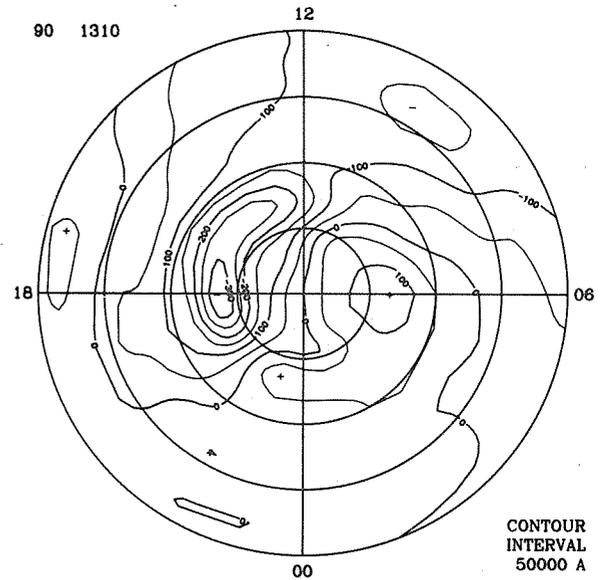
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1310 UT



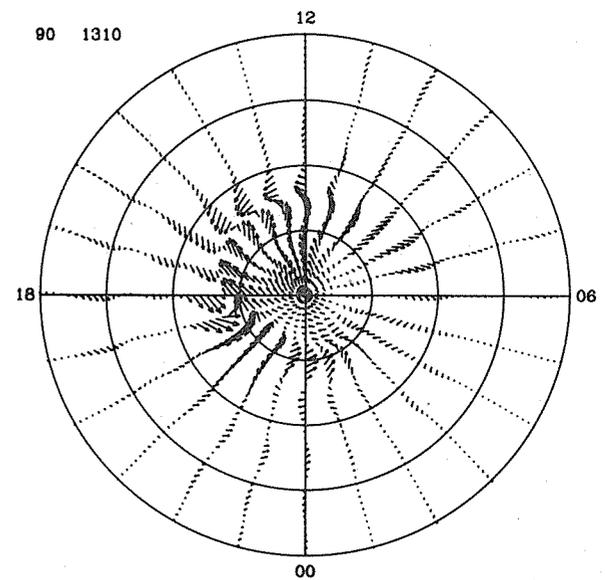
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



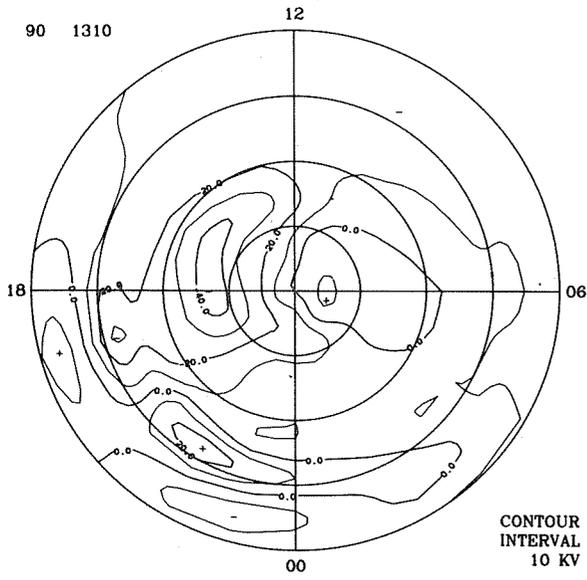
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



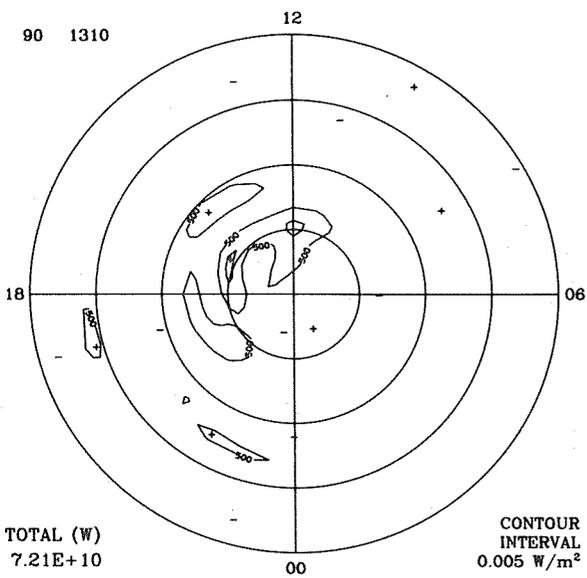
2 A/m →

ELECTRIC POTENTIAL



CONTOUR  
INTERVAL  
10 KV

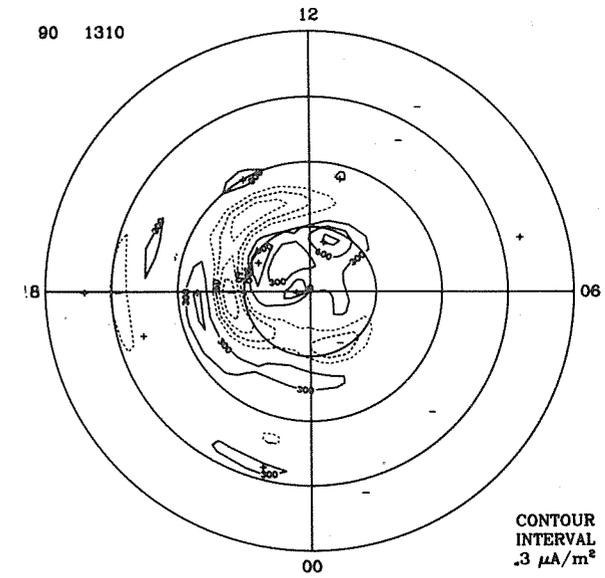
JOULE HEAT RATE



TOTAL (W)  
7.21E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

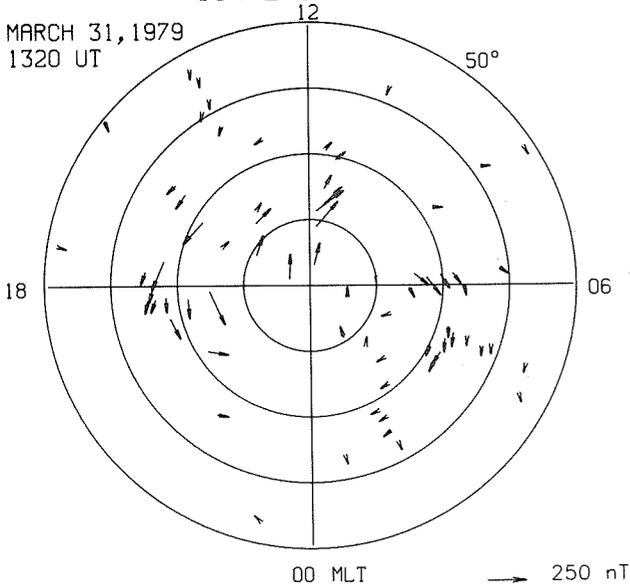
FIELD-ALIGNED CURRENTS



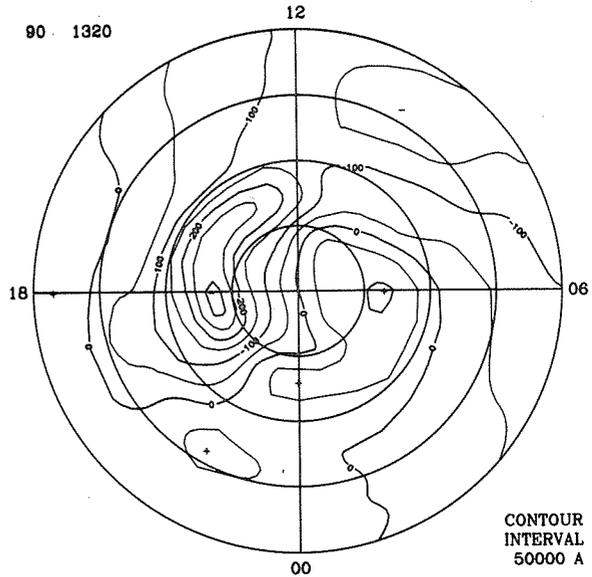
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

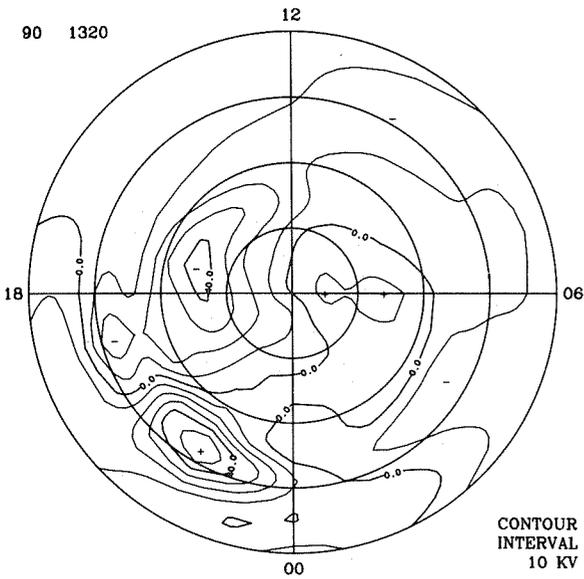
MARCH 31, 1979  
1320 UT



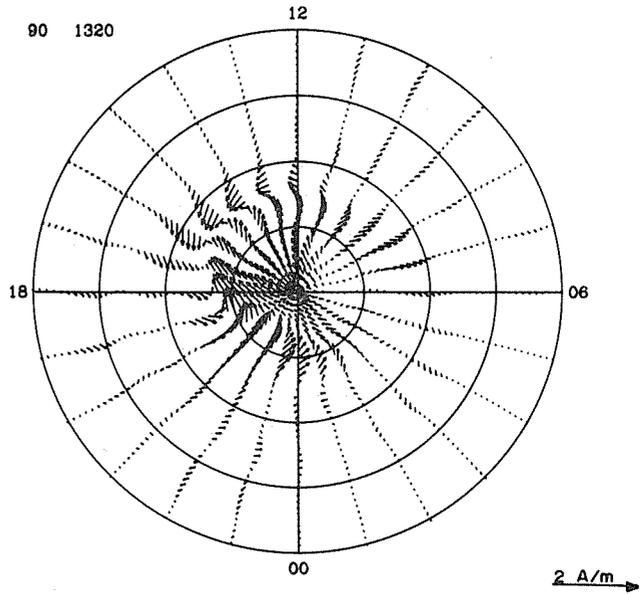
EQUIVALENT CURRENT SYSTEM



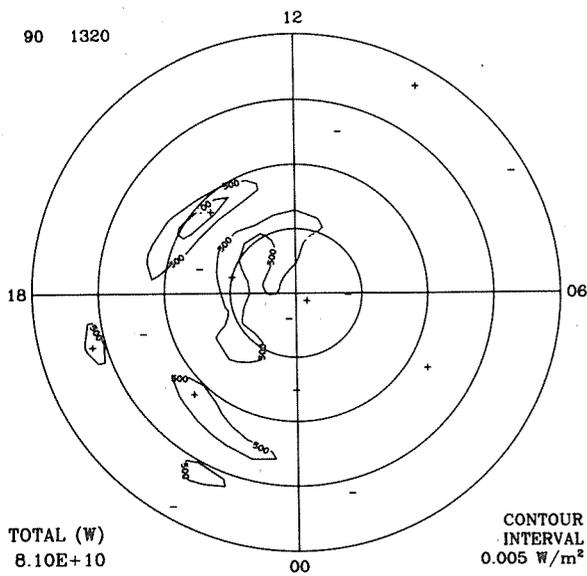
ELECTRIC POTENTIAL



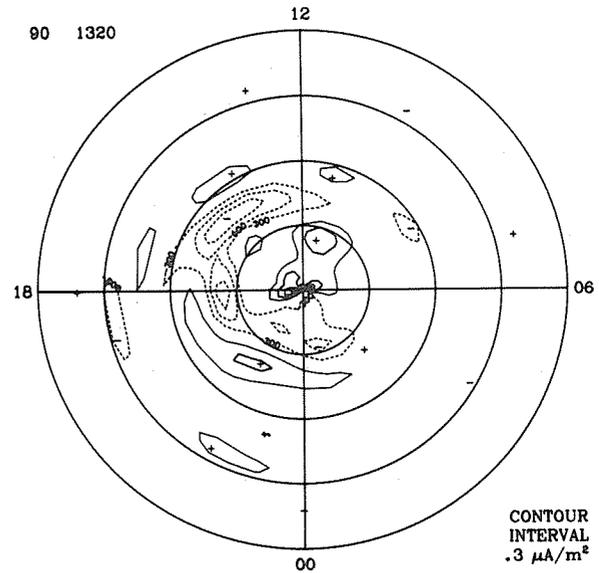
IONOSPHERIC CURRENT



JOULE HEAT RATE

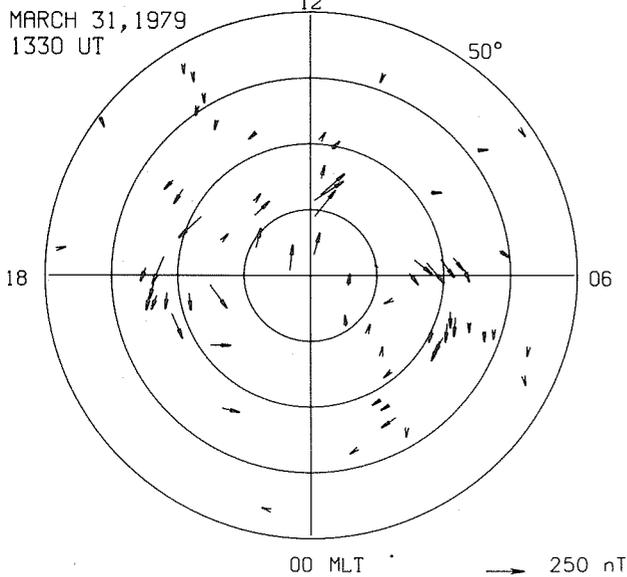


FIELD-ALIGNED CURRENTS

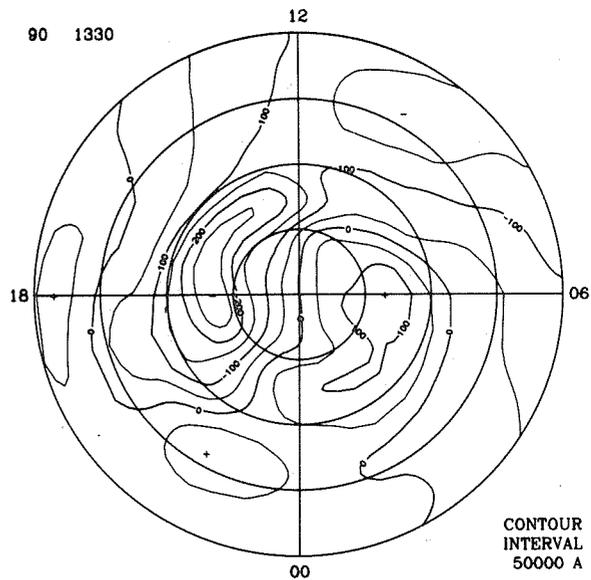


OBSERVED EQUIVALENT  
CURRENT VECTORS

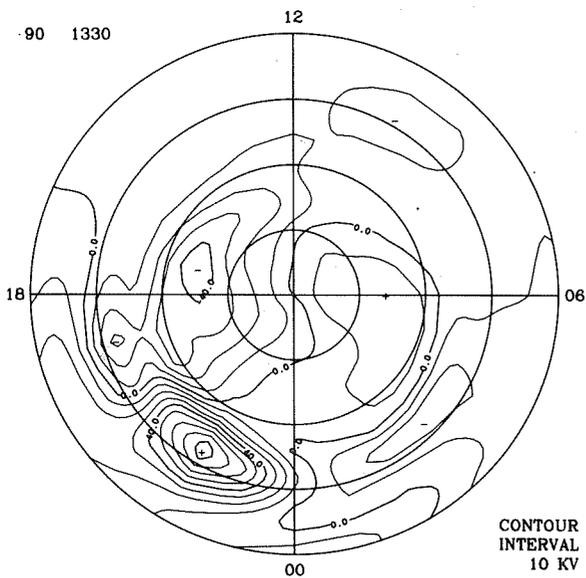
MARCH 31, 1979  
1330 UT



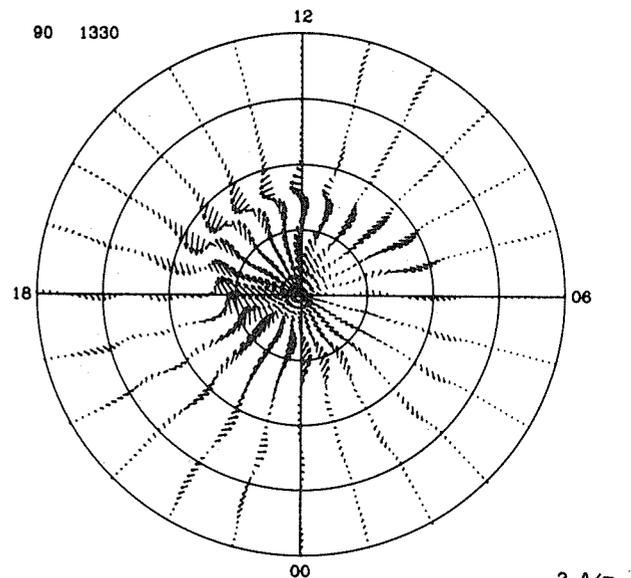
EQUIVALENT CURRENT SYSTEM



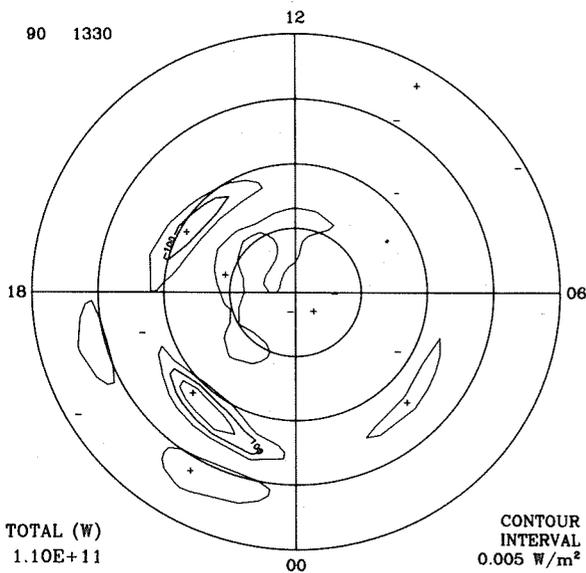
ELECTRIC POTENTIAL



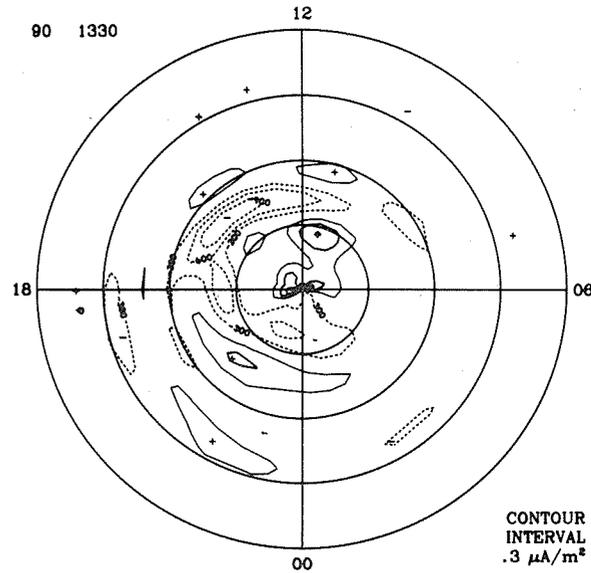
IONOSPHERIC CURRENT



JOULE HEAT RATE

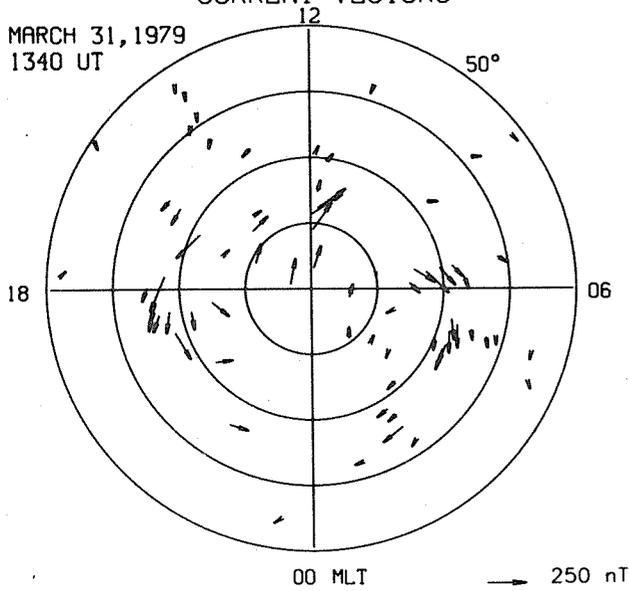


FIELD-ALIGNED CURRENTS

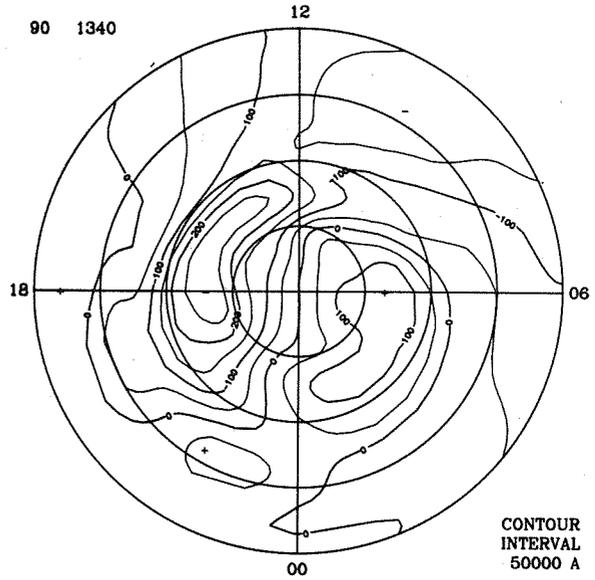


OBSERVED EQUIVALENT  
CURRENT VECTORS

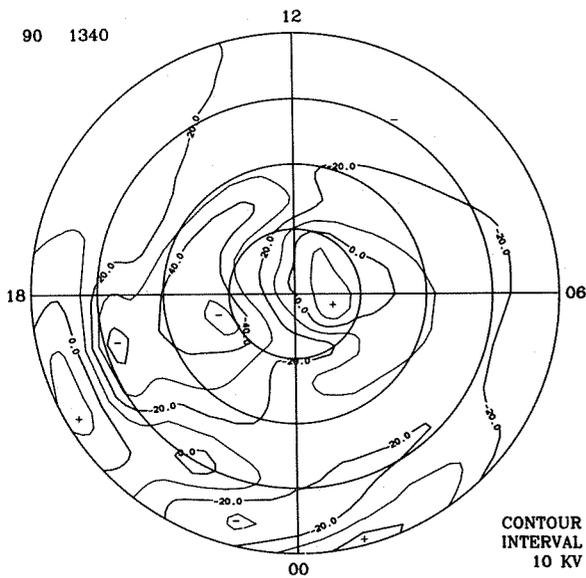
MARCH 31, 1979  
1340 UT



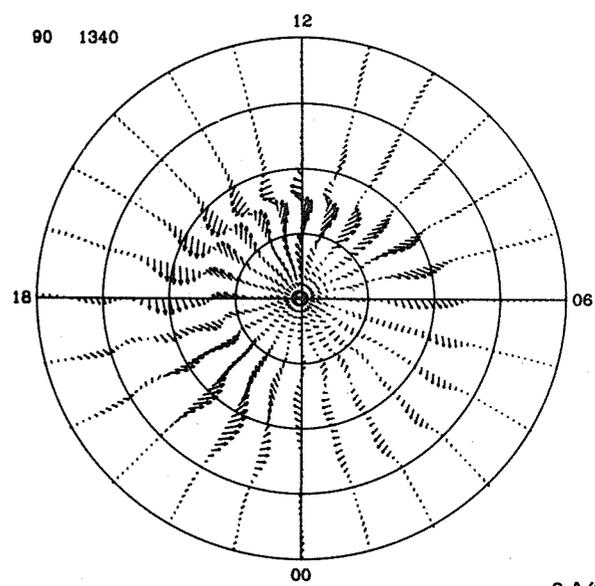
EQUIVALENT CURRENT SYSTEM



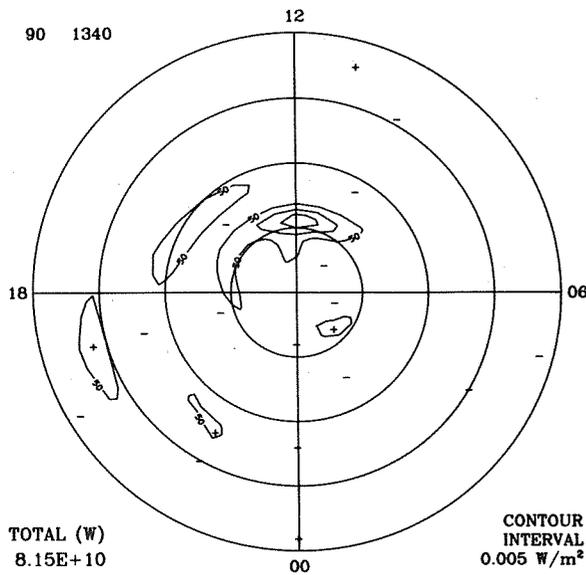
ELECTRIC POTENTIAL



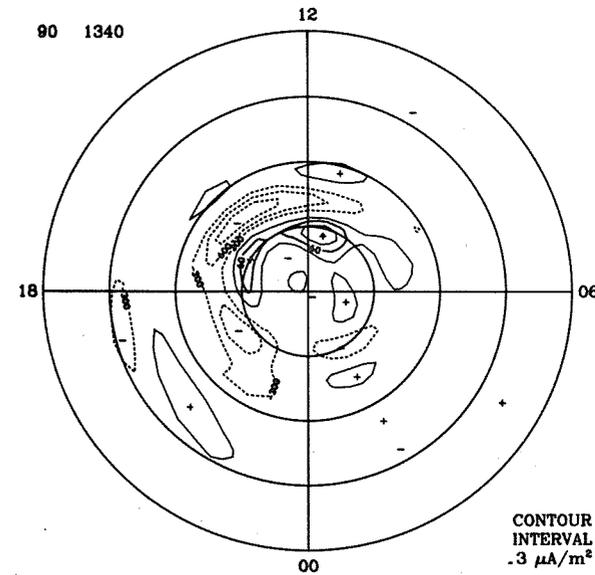
IONOSPHERIC CURRENT



JOULE HEAT RATE



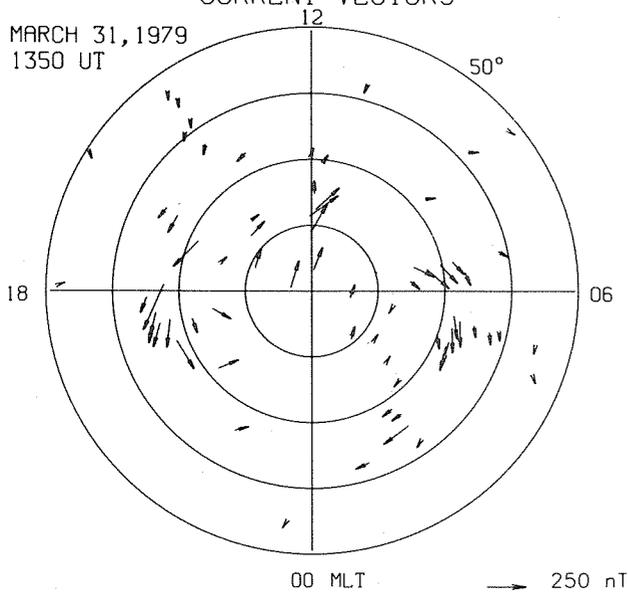
FIELD-ALIGNED CURRENTS



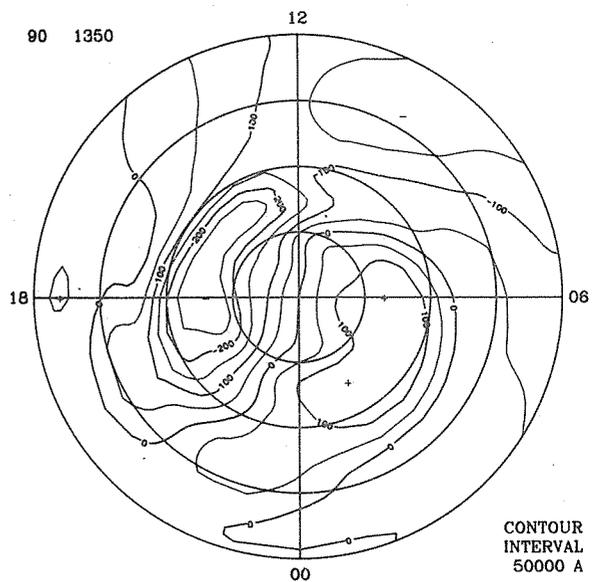
TOTAL (W)  
8.15E+10

OBSERVED EQUIVALENT  
CURRENT VECTORS

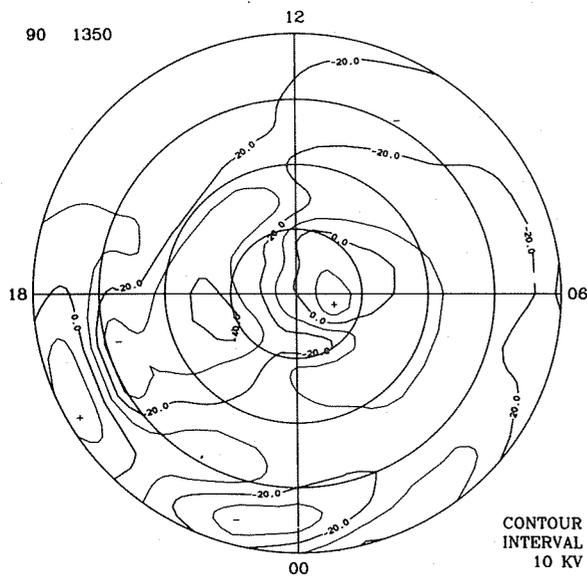
MARCH 31, 1979  
1350 UT



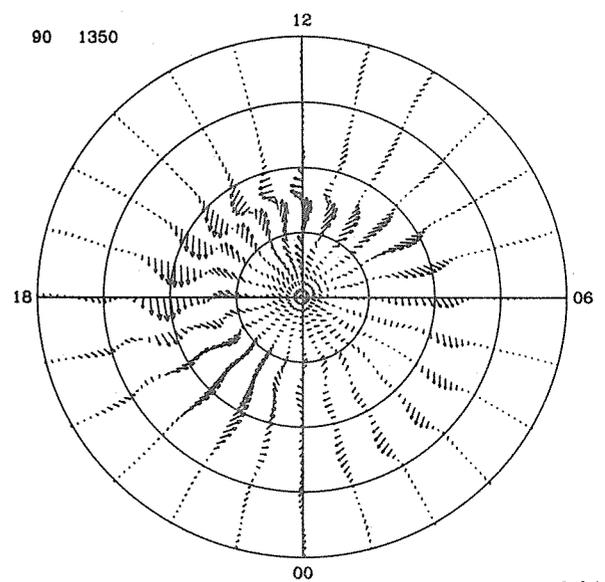
EQUIVALENT CURRENT SYSTEM



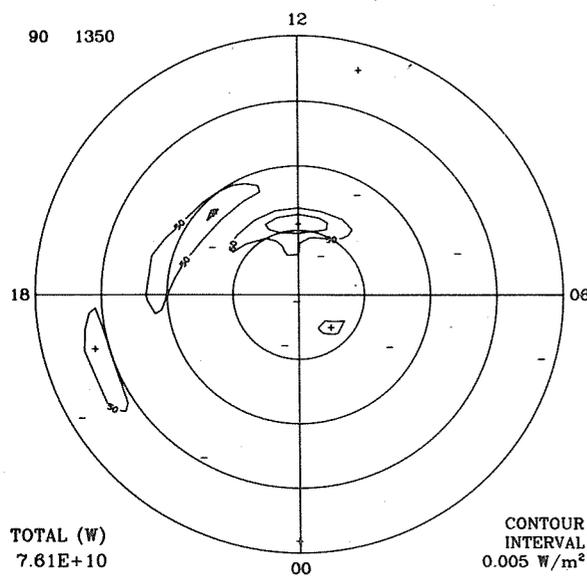
ELECTRIC POTENTIAL



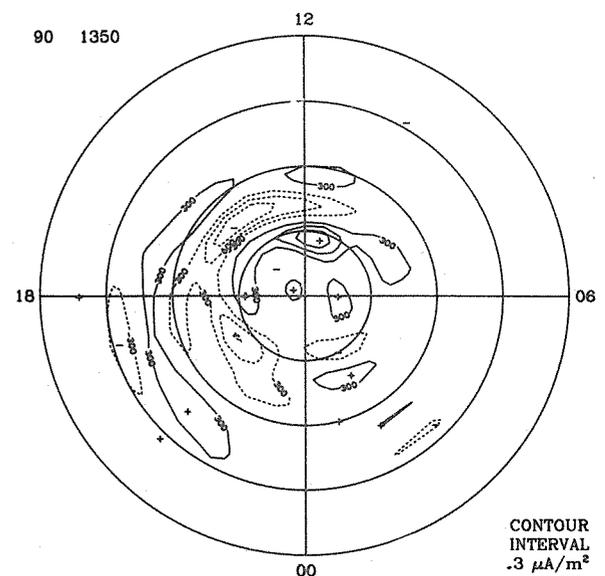
IONOSPHERIC CURRENT



JOULE HEAT RATE



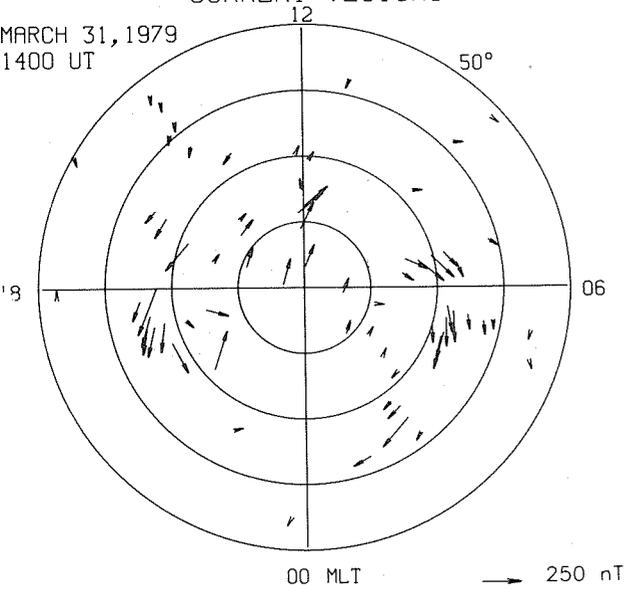
FIELD-ALIGNED CURRENTS



TOTAL (W)  
7.61E+10

OBSERVED EQUIVALENT  
CURRENT VECTORS

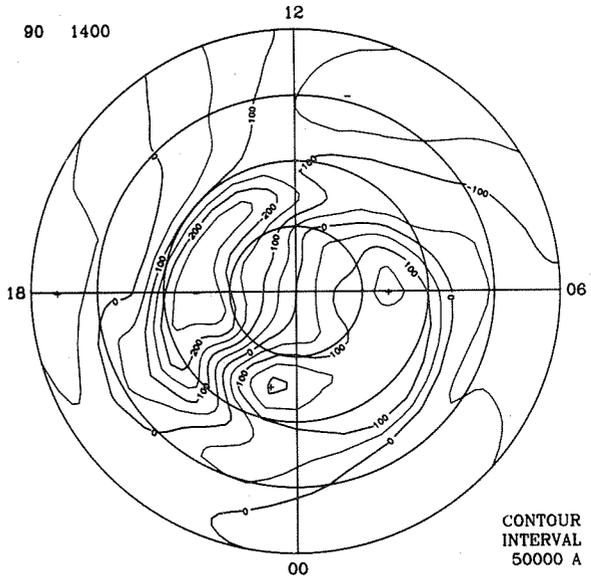
MARCH 31, 1979  
1400 UT



00 MLT

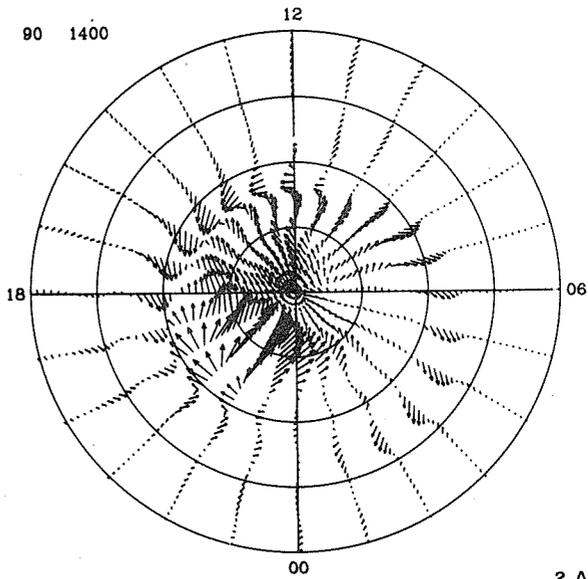
→ 250 nT

EQUIVALENT CURRENT SYSTEM



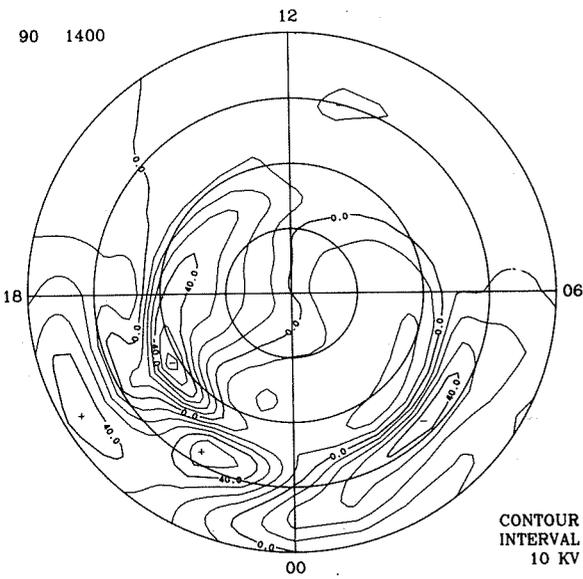
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



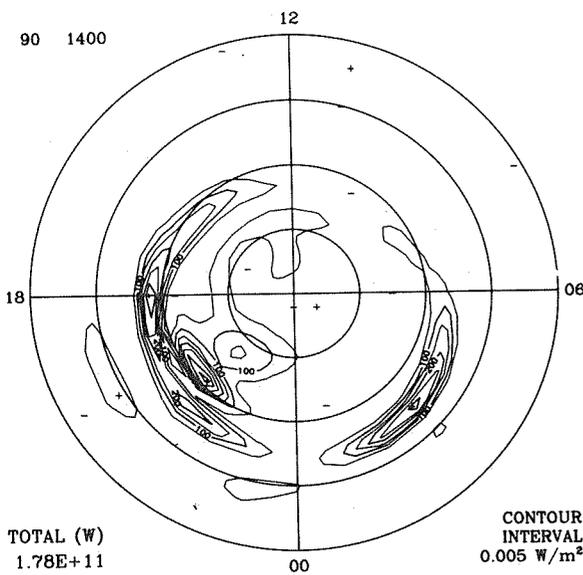
→ 2 A/m

JOULE HEAT RATE

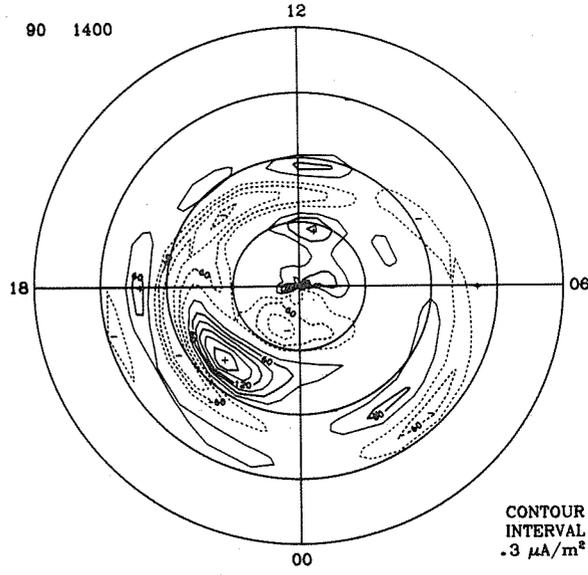


CONTOUR  
INTERVAL  
10 KV

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

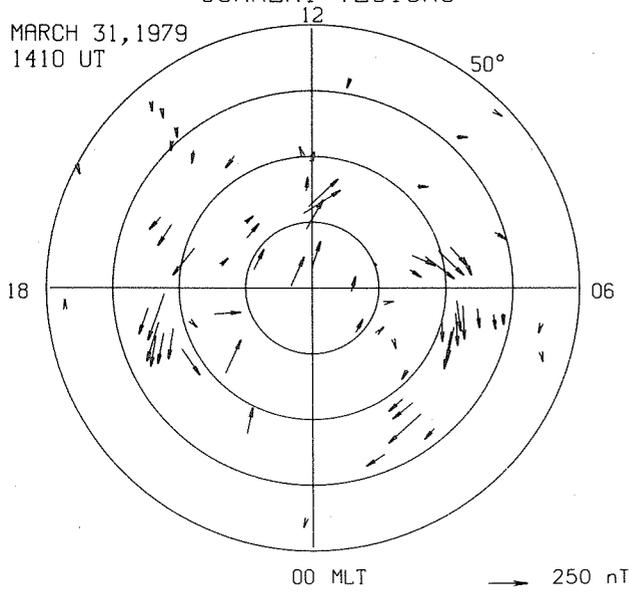


CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

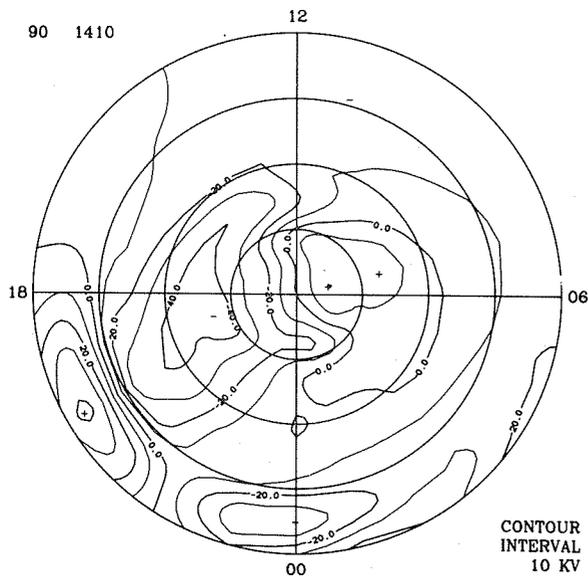
TOTAL (W)  
1.78E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

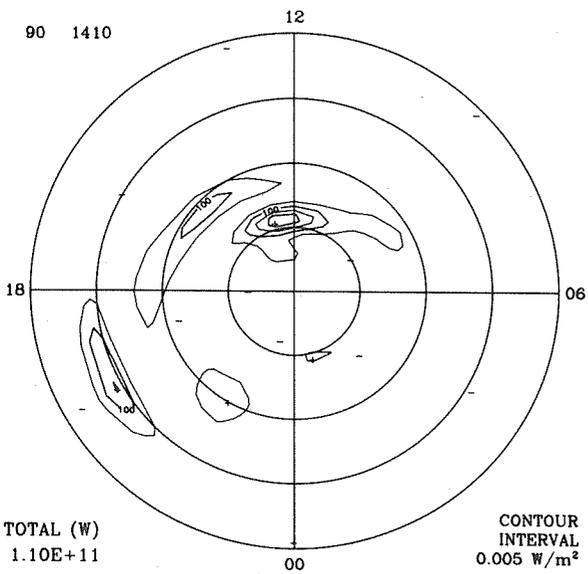
MARCH 31, 1979  
1410 UT



ELECTRIC POTENTIAL



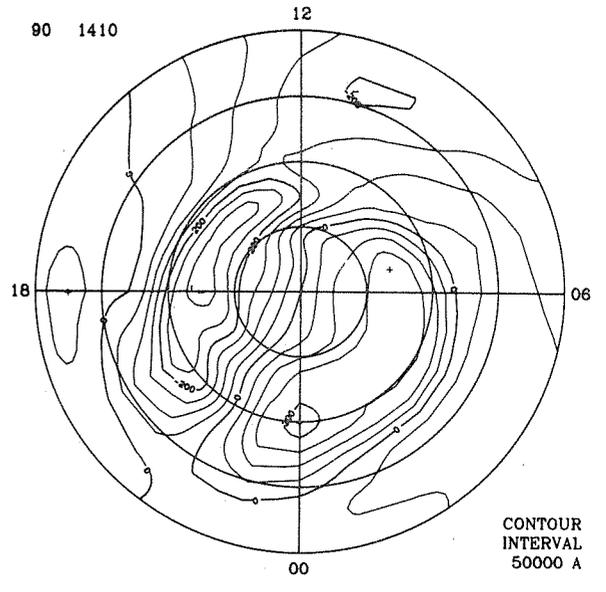
JOULE HEAT RATE



TOTAL (W)  
1.10E+11

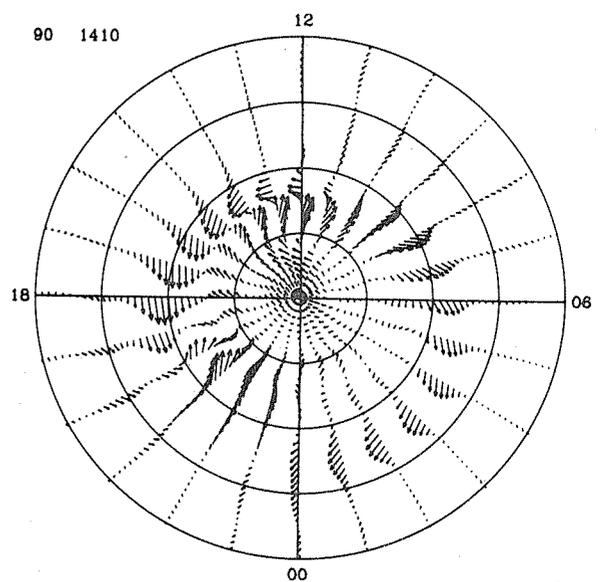
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



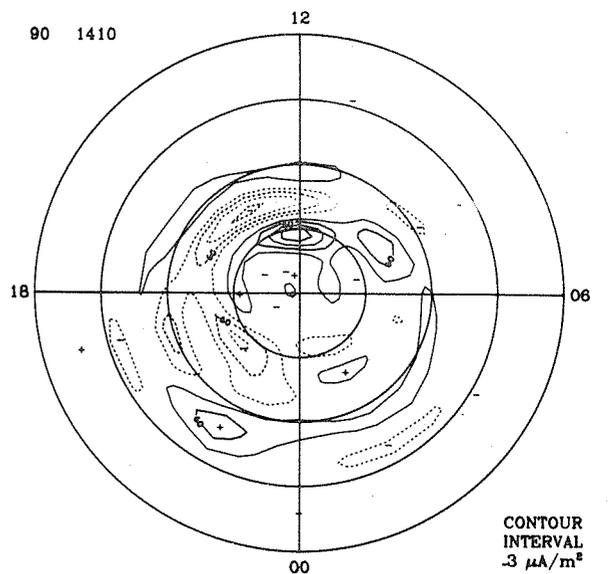
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

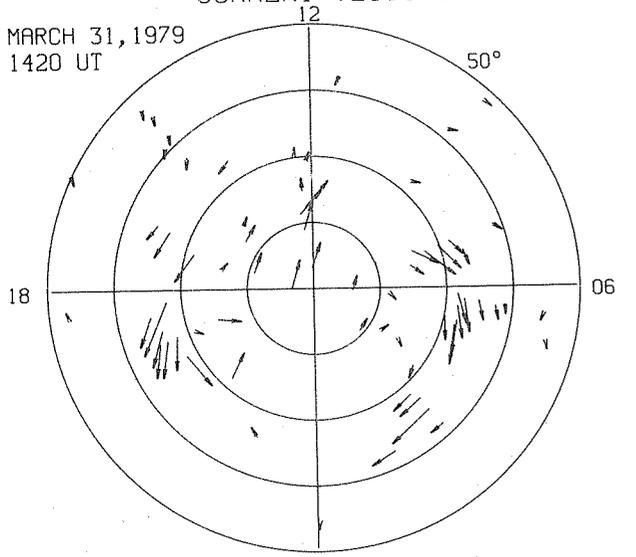
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

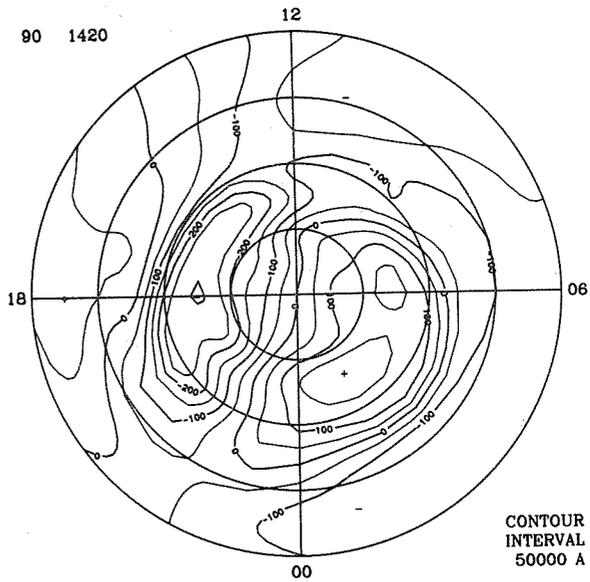
MARCH 31, 1979  
1420 UT



00 MLT  
ELECTRIC POTENTIAL

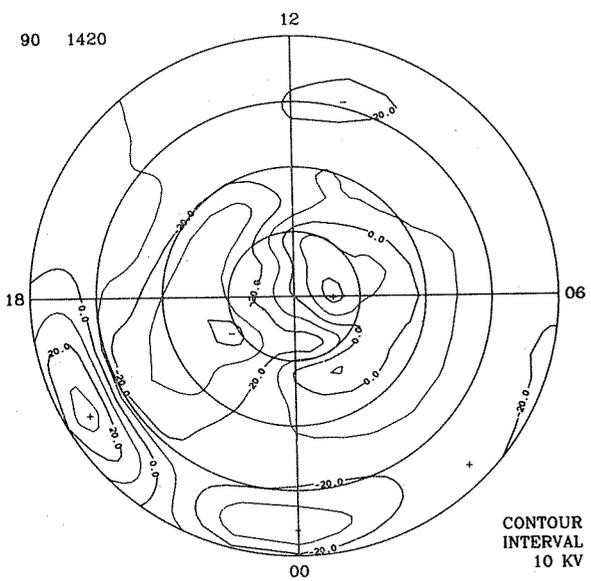
→ 250 nT

EQUIVALENT CURRENT SYSTEM

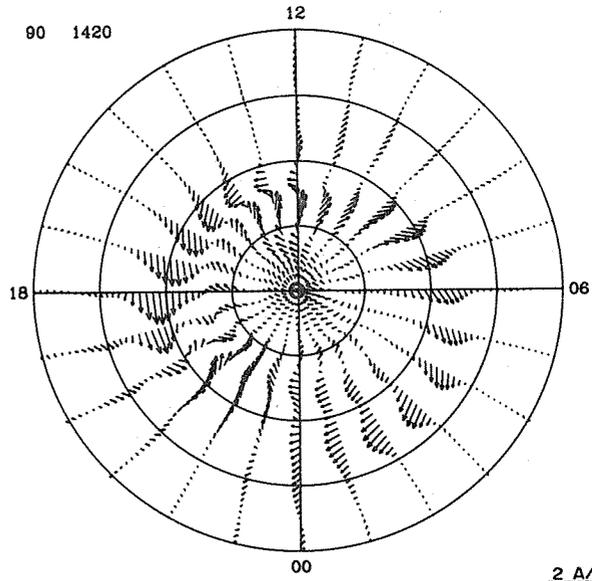


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

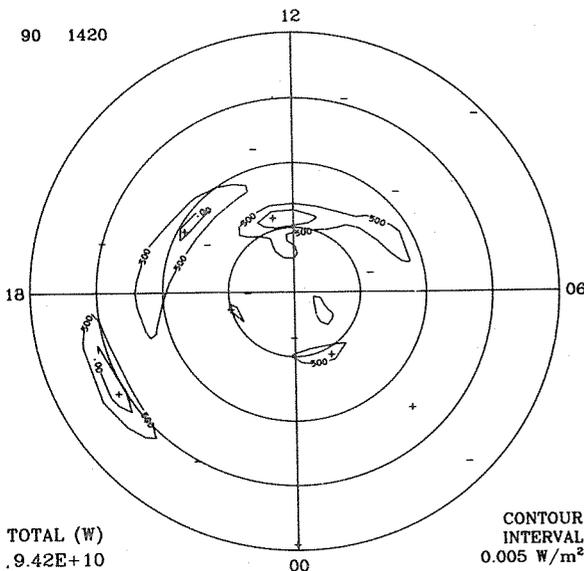


CONTOUR  
INTERVAL  
10 KV



→ 2 A/m

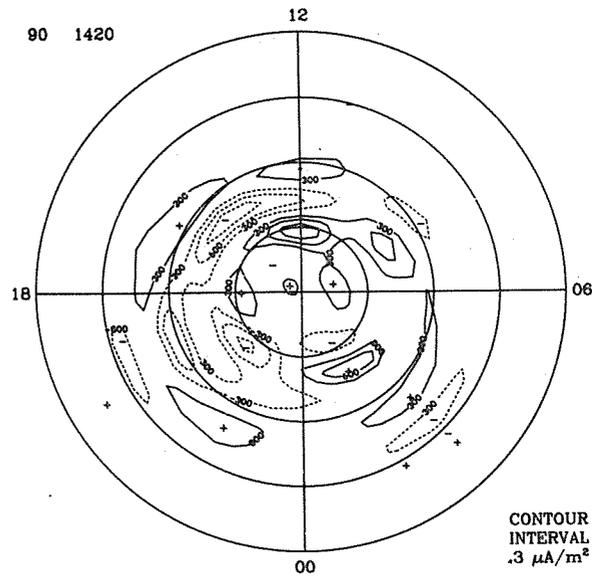
JOULE HEAT RATE



TOTAL (W)  
.9.42E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

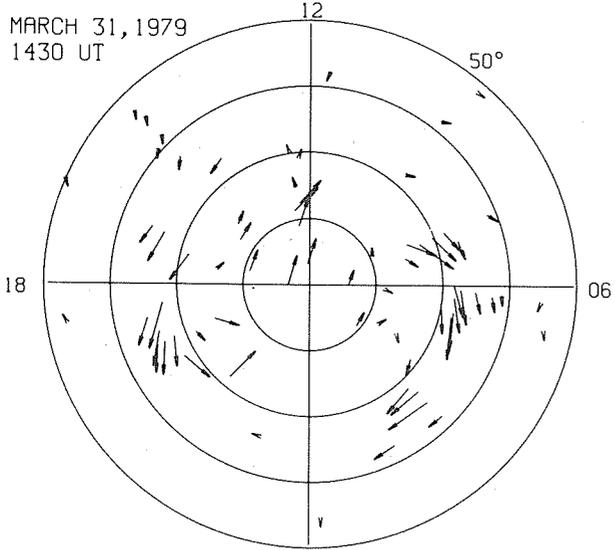
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1430 UT

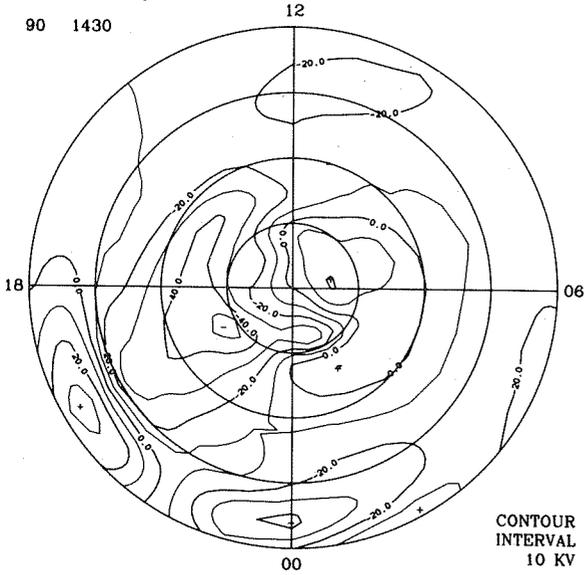


00 MLT

→ 250 nT

ELECTRIC POTENTIAL

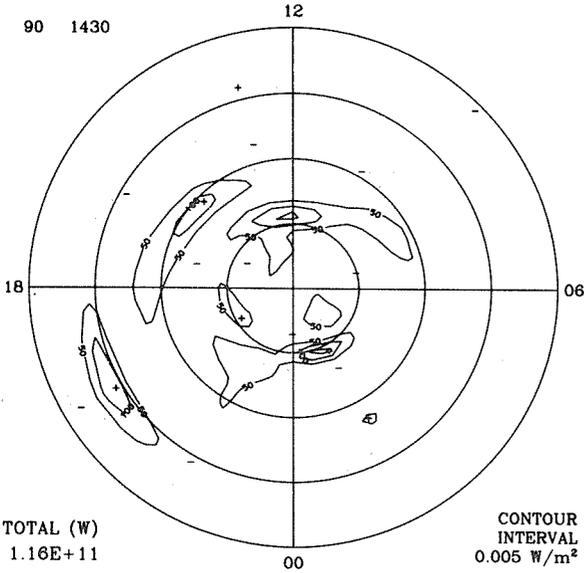
90 1430



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

90 1430

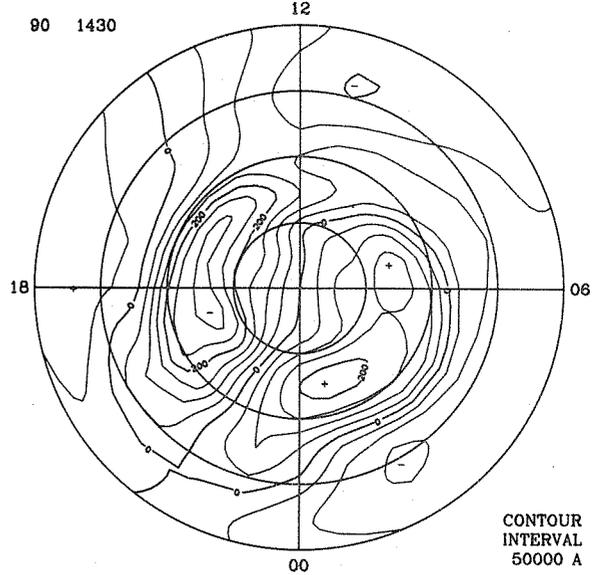


TOTAL (W)  
1.16E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

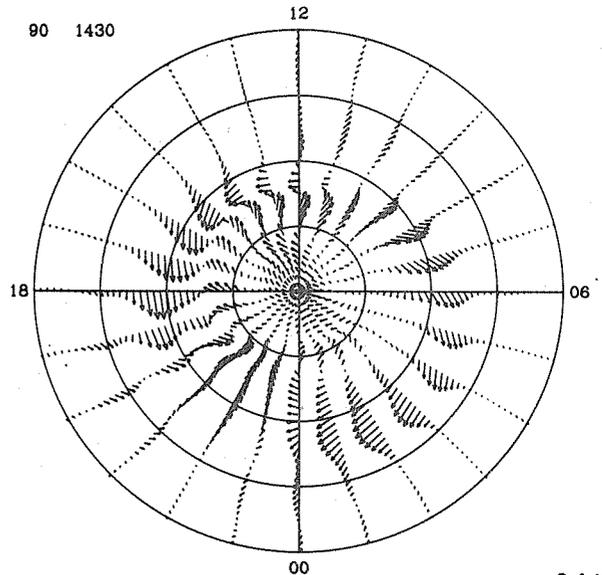
90 1430



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

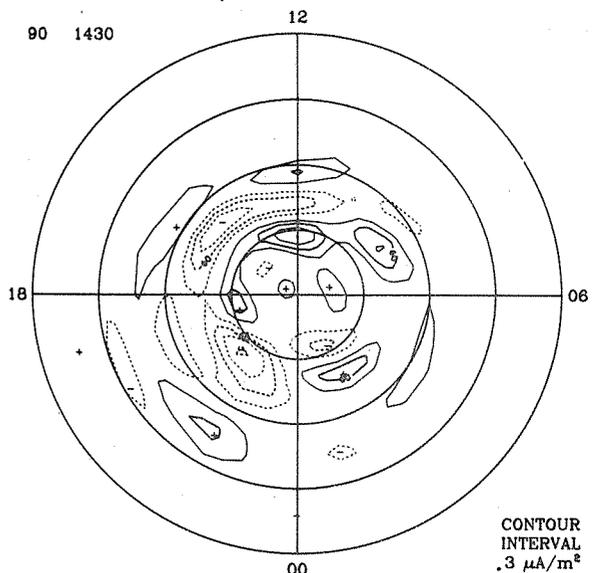
90 1430



→ 2 A/m

FIELD-ALIGNED CURRENTS

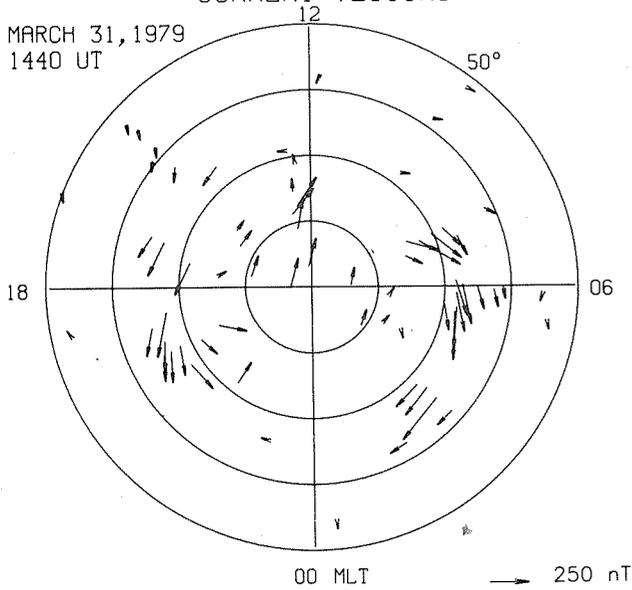
90 1430



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

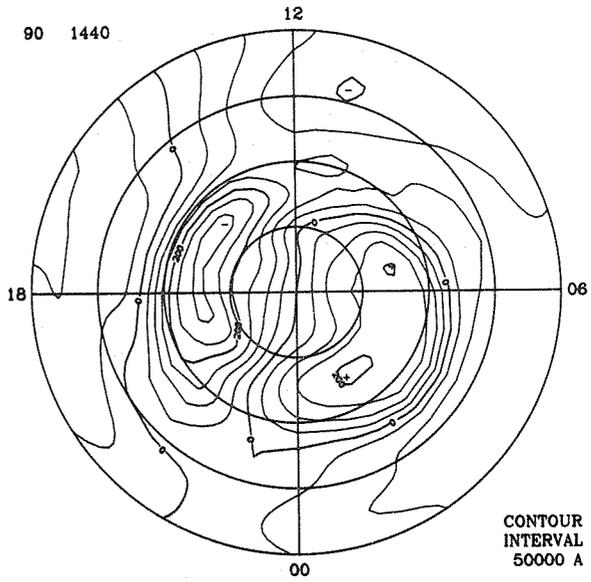
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1440 UT

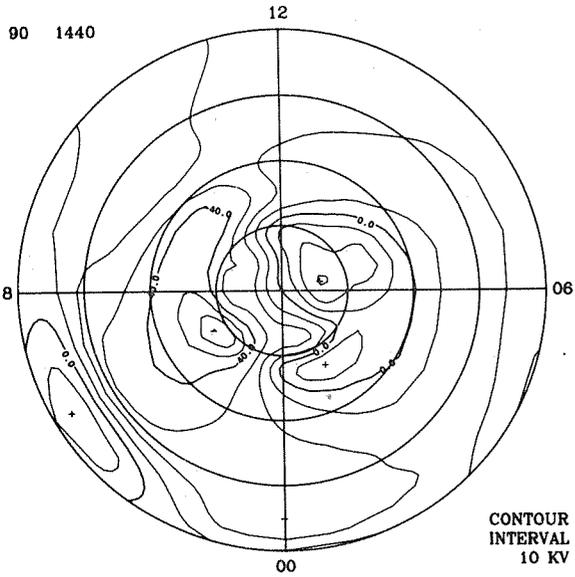


ELECTRIC POTENTIAL

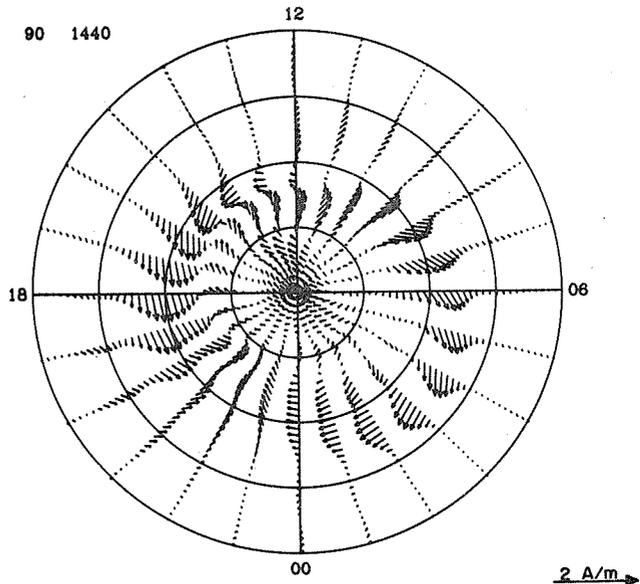
EQUIVALENT CURRENT SYSTEM



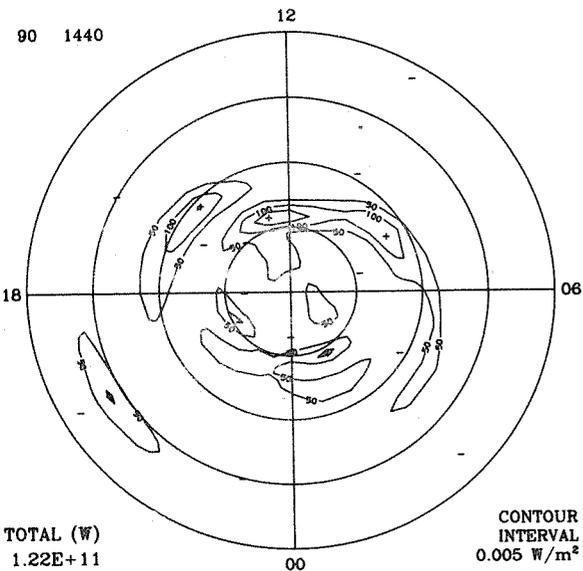
IONOSPHERIC CURRENT



JOULE HEAT RATE

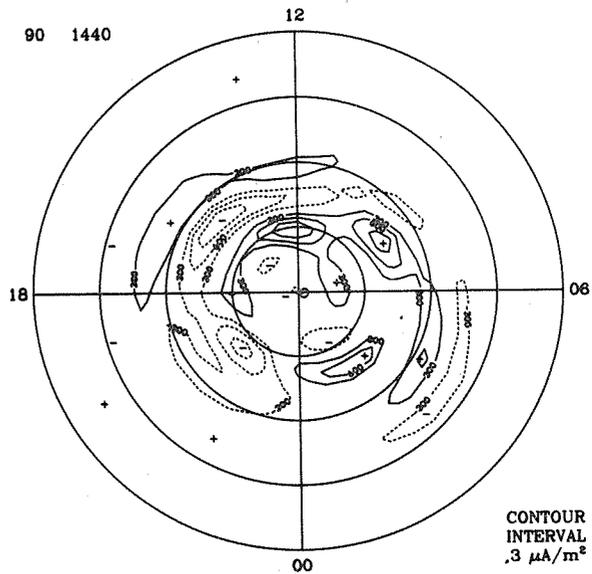


FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.22E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

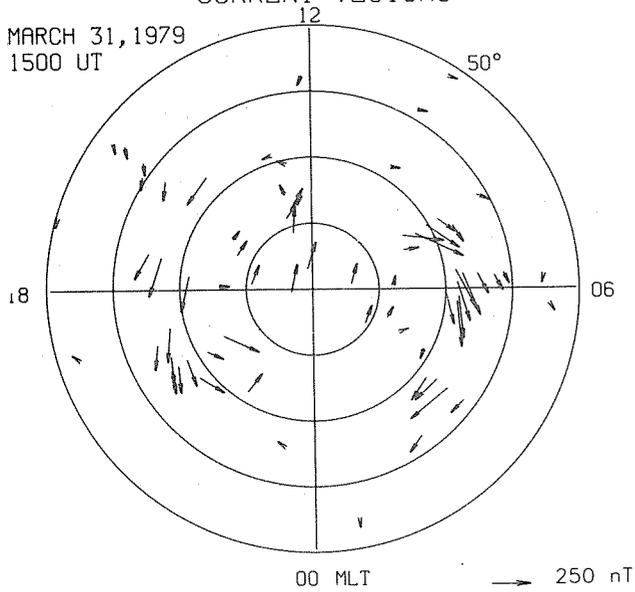


CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>



OBSERVED EQUIVALENT  
CURRENT VECTORS

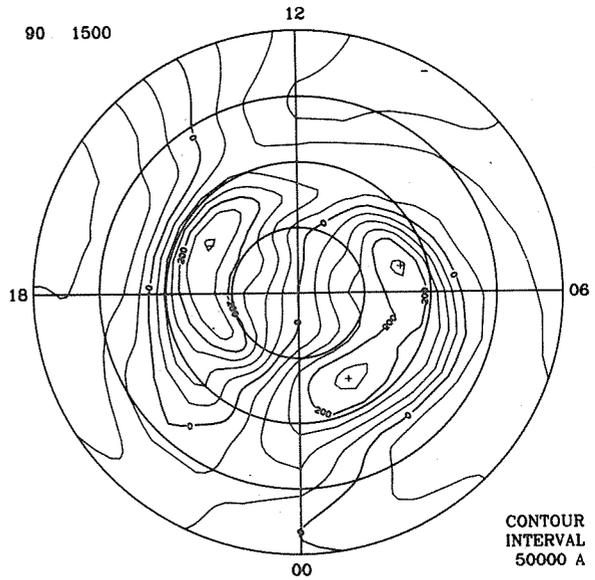
MARCH 31, 1979  
1500 UT



00 MLT

→ 250 nT

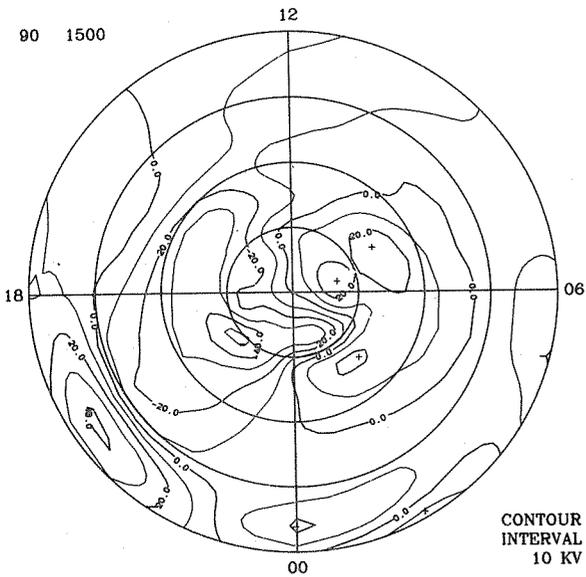
EQUIVALENT CURRENT SYSTEM



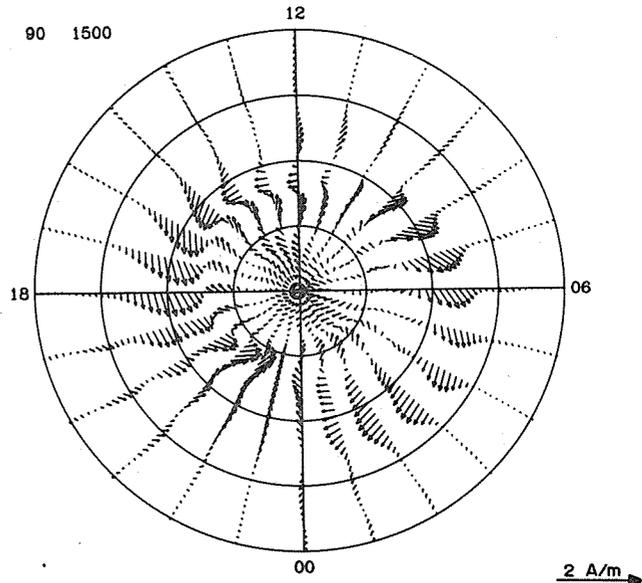
CONTOUR  
INTERVAL  
50000 A

ELECTRIC POTENTIAL

IONOSPHERIC CURRENT



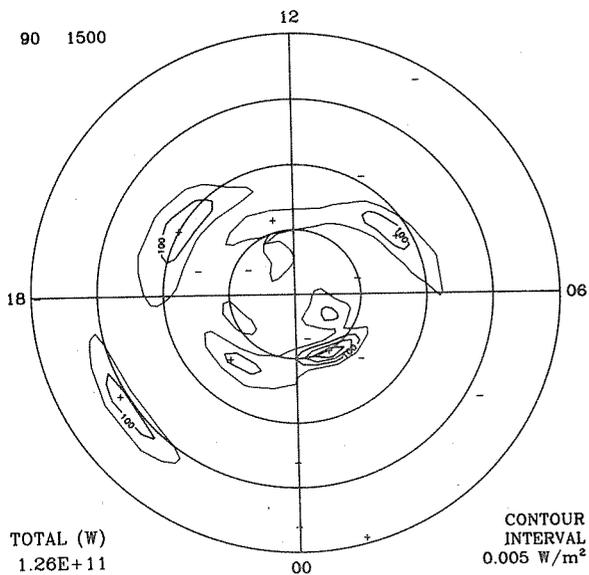
CONTOUR  
INTERVAL  
10 KV



→ 2 A/m

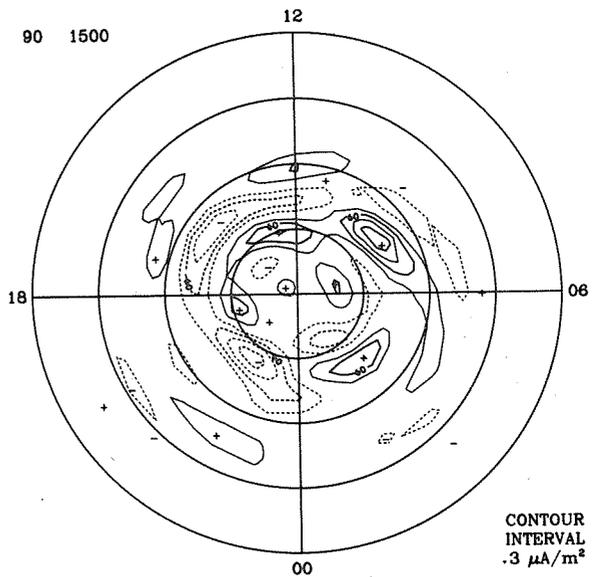
JOULE HEAT RATE

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

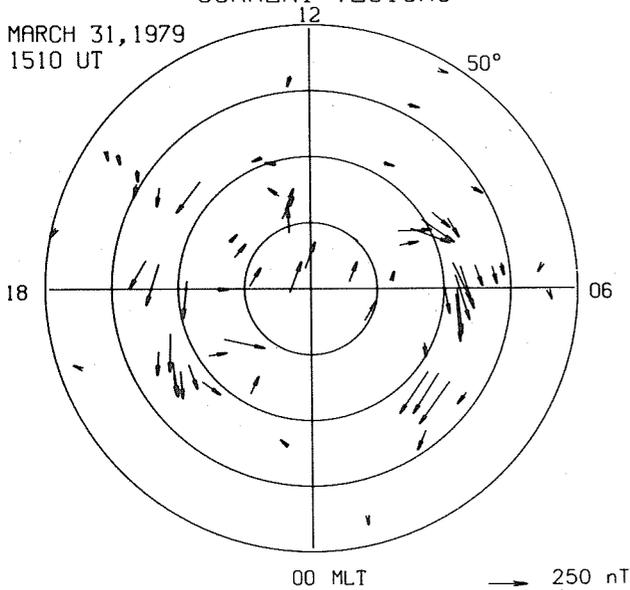
TOTAL (W)  
1.26E+11



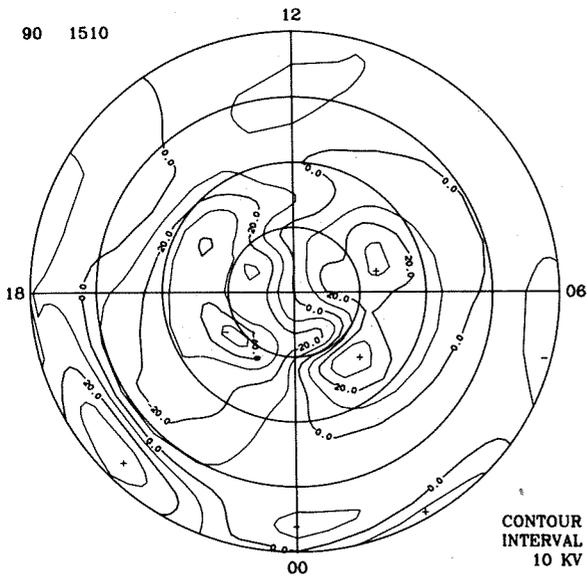
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

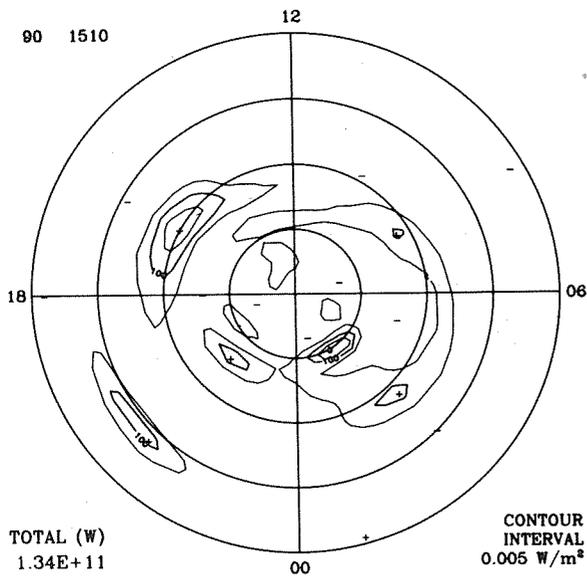
MARCH 31, 1979  
1510 UT



ELECTRIC POTENTIAL



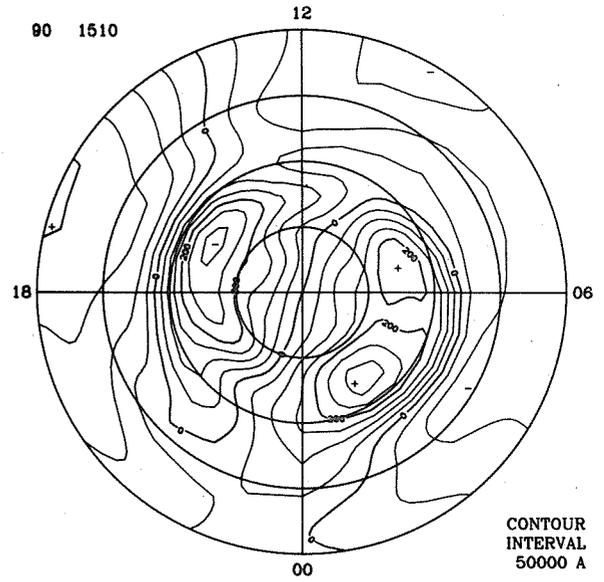
JOULE HEAT RATE



TOTAL (W)  
1.34E+11

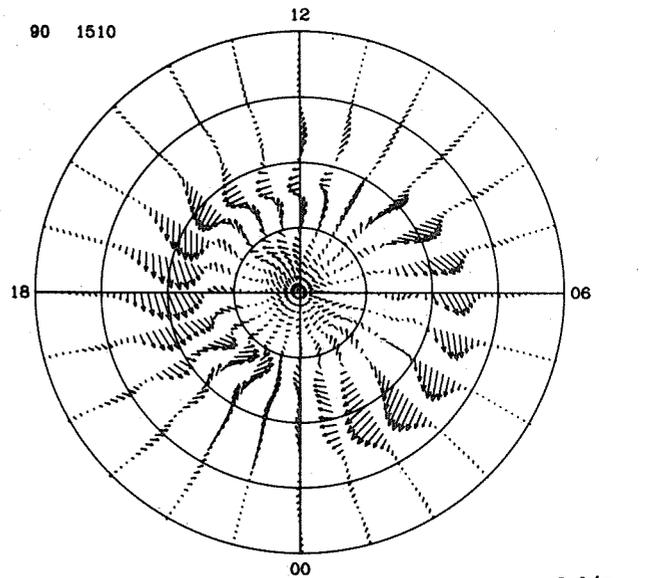
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



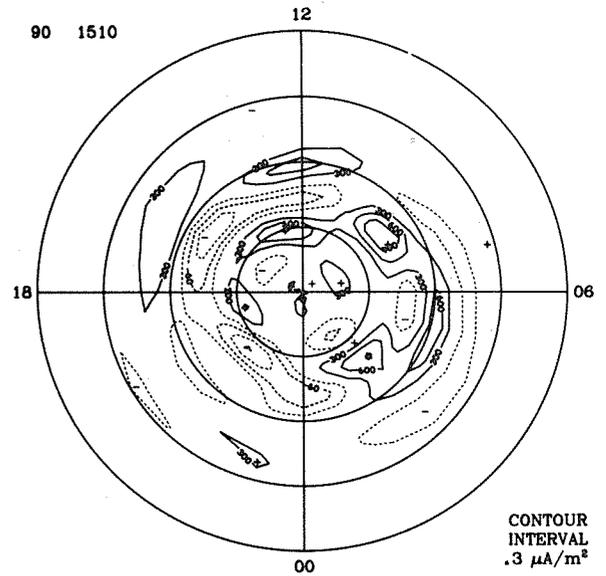
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

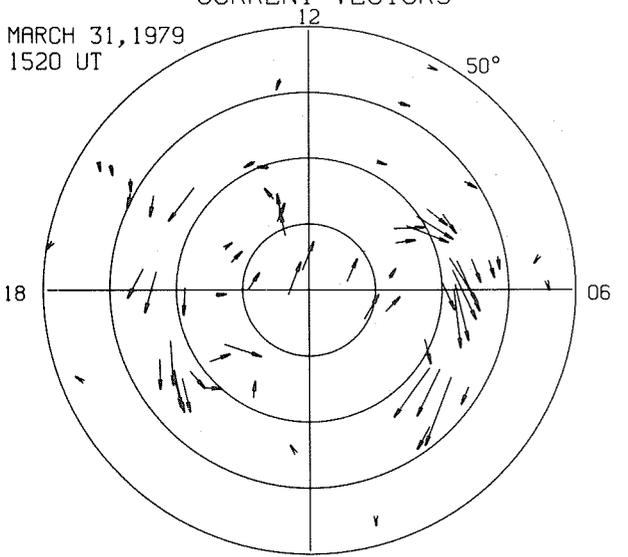
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

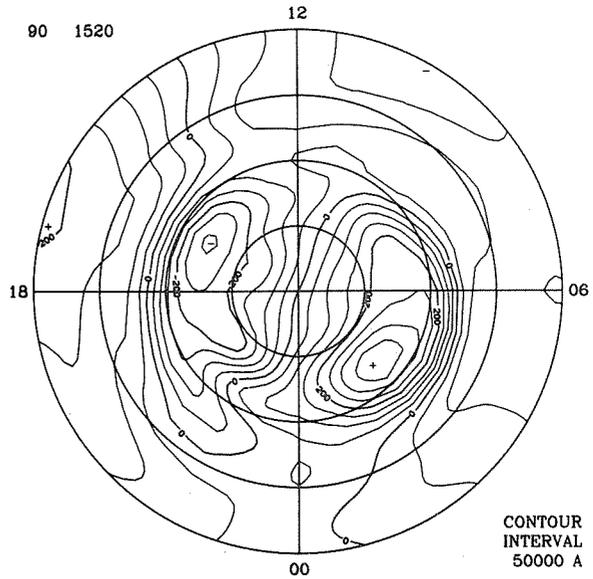
MARCH 31, 1979  
1520 UT



00 MLT  
ELECTRIC POTENTIAL

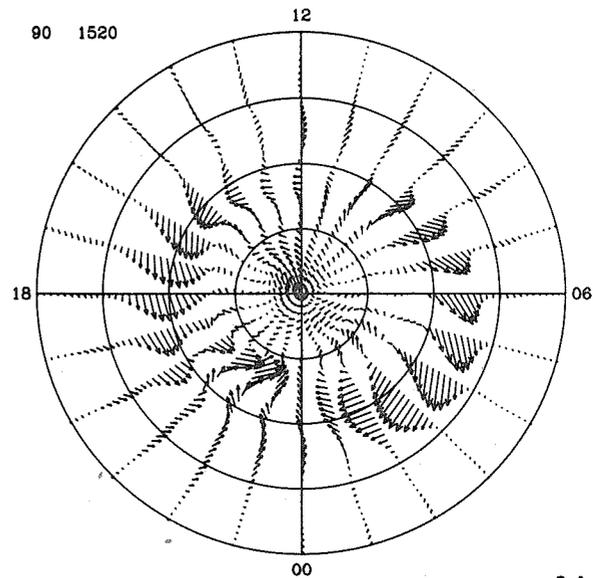
→ 250 nT

EQUIVALENT CURRENT SYSTEM



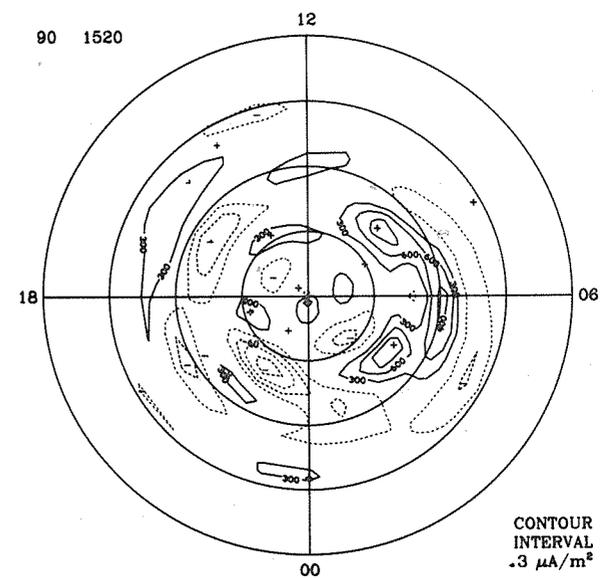
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

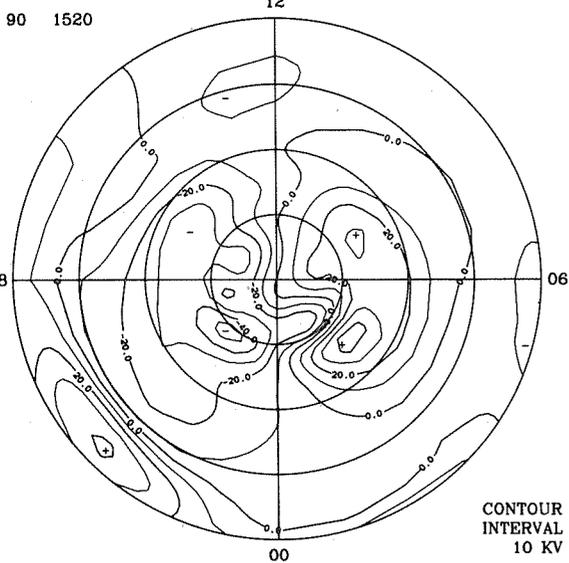


→ 2 A/m

FIELD-ALIGNED CURRENTS

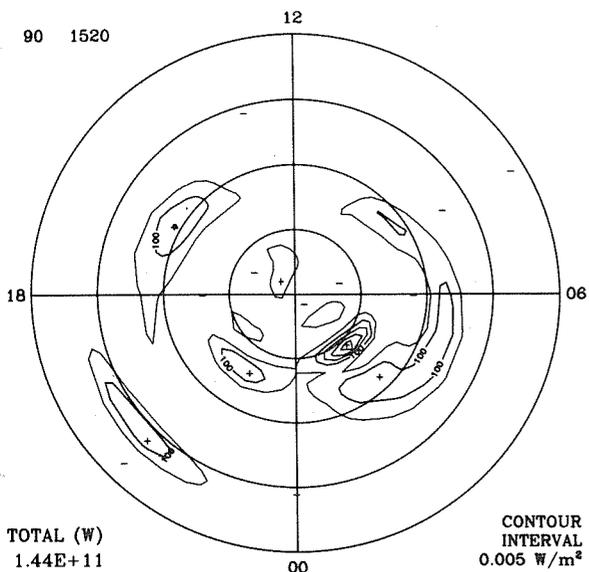


CONTOUR  
INTERVAL  
.3 μA/m²



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

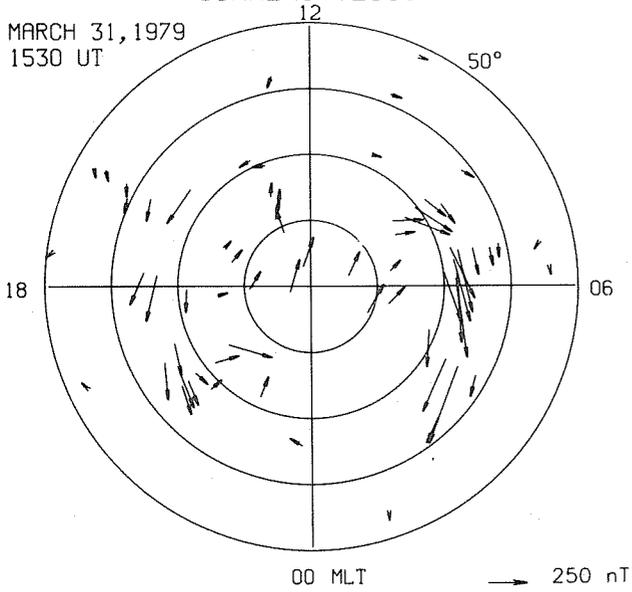


TOTAL (W)  
1.44E+11

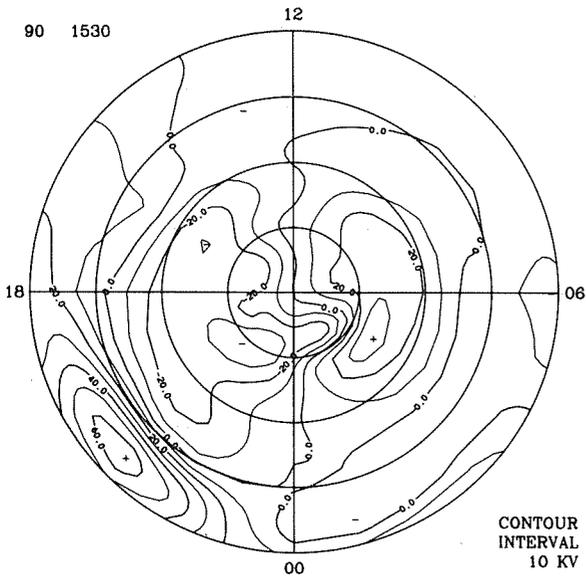
CONTOUR  
INTERVAL  
0.005 W/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

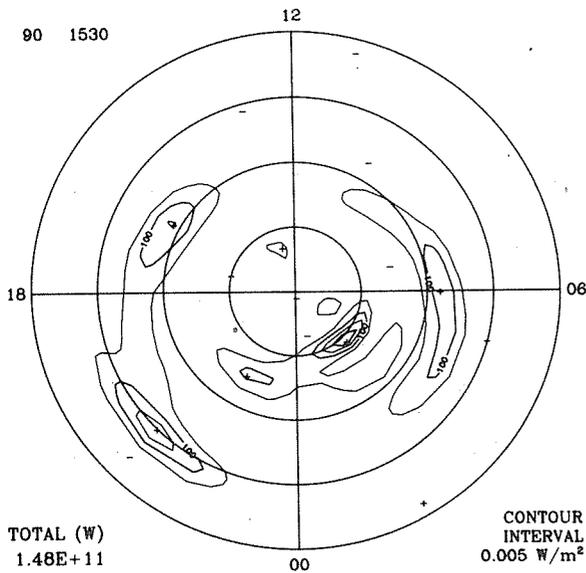
MARCH 31, 1979  
1530 UT



ELECTRIC POTENTIAL

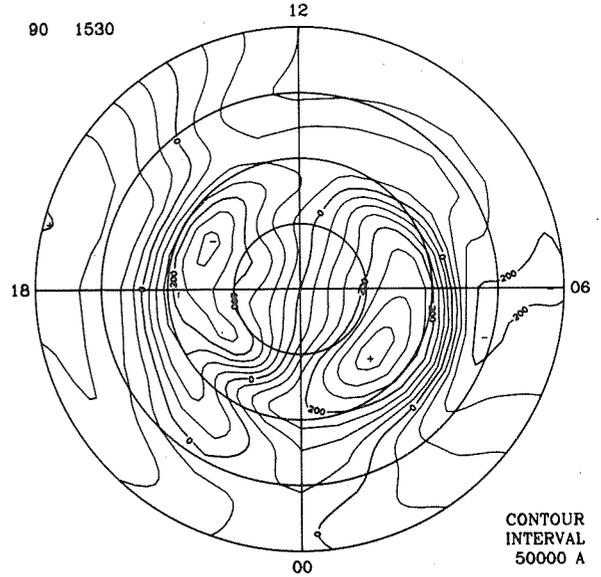


JOULE HEAT RATE

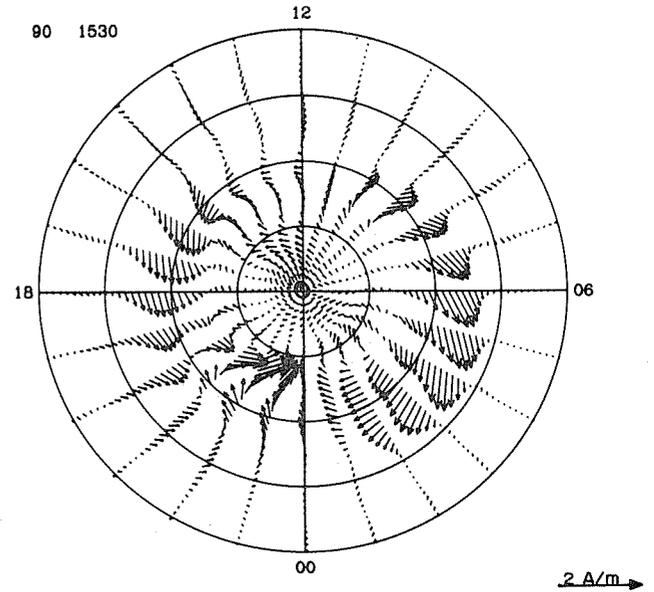


TOTAL (W)  
1.48E+11

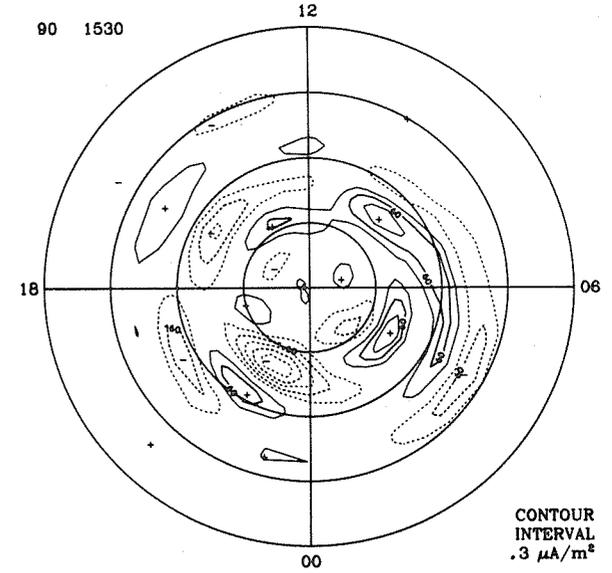
EQUIVALENT CURRENT SYSTEM



IONOSPHERIC CURRENT

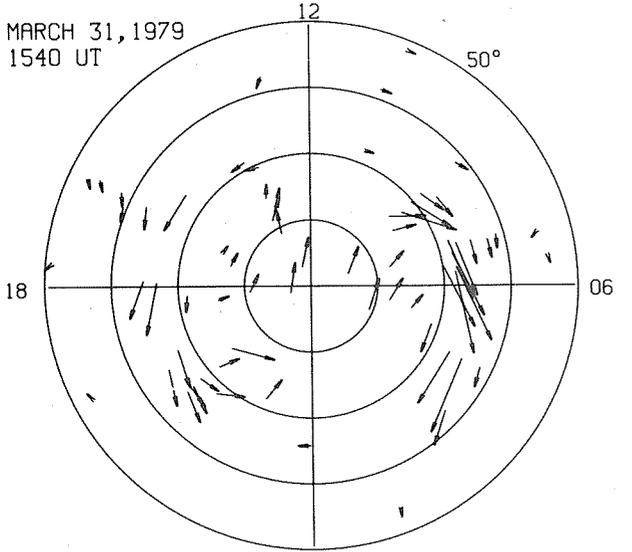


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1540 UT

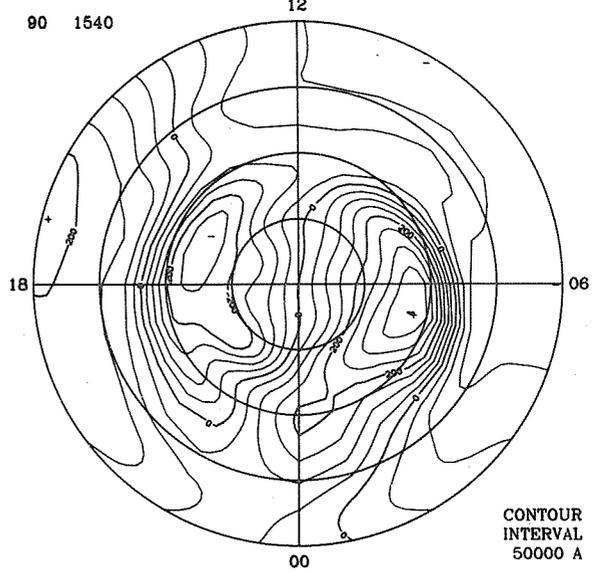


00 MLT

→ 250 nT

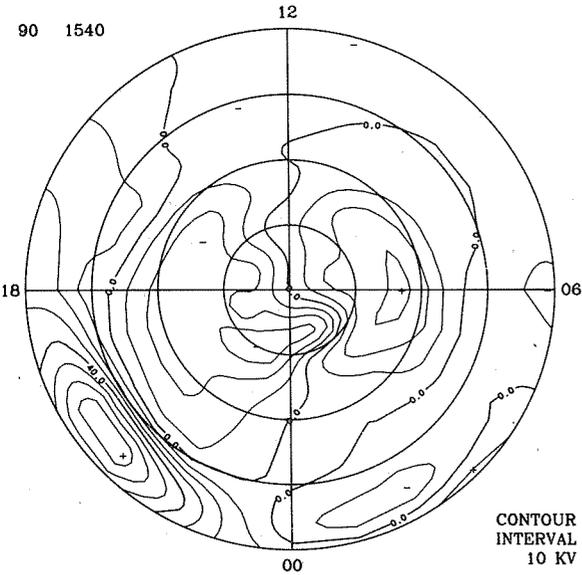
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



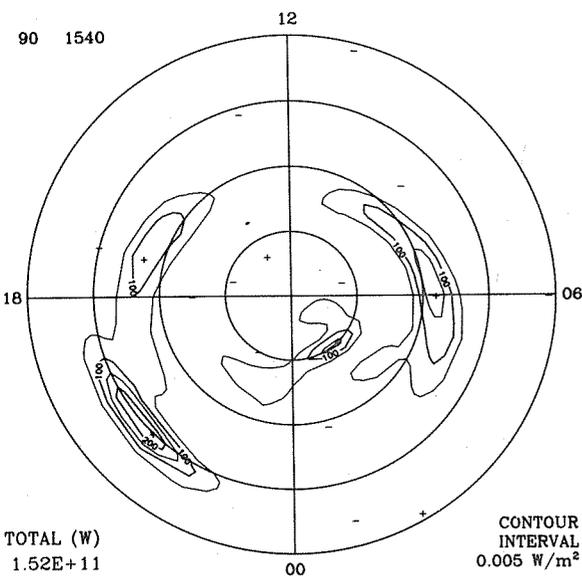
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



CONTOUR  
INTERVAL  
10 KV

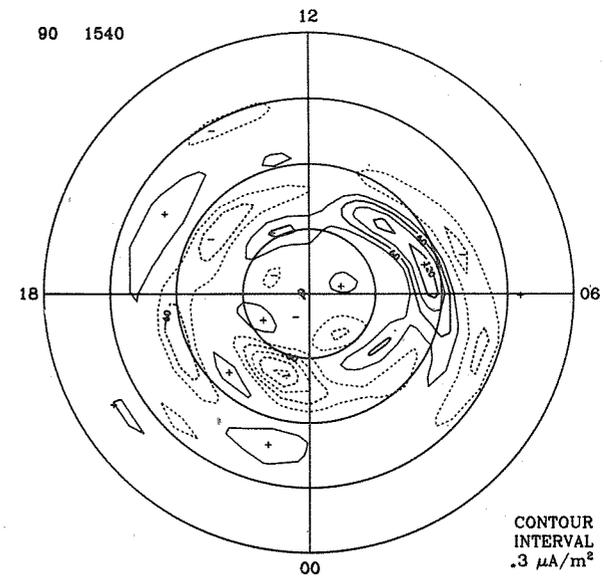
JOULE HEAT RATE



TOTAL (W)  
1.52E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

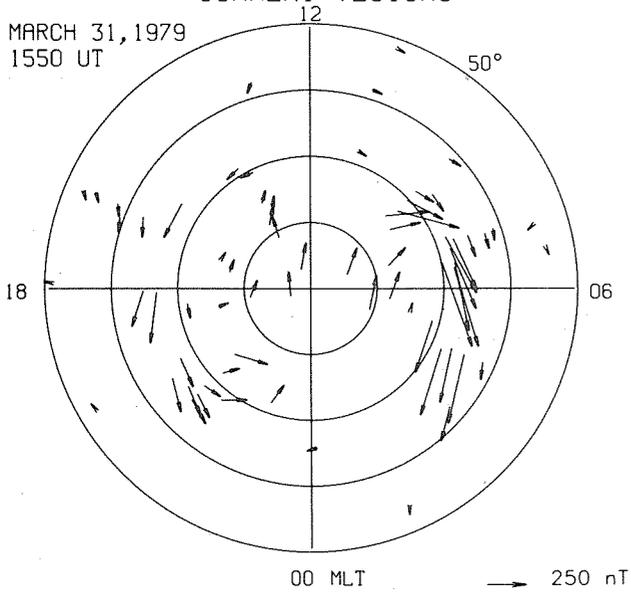
FIELD-ALIGNED CURRENTS



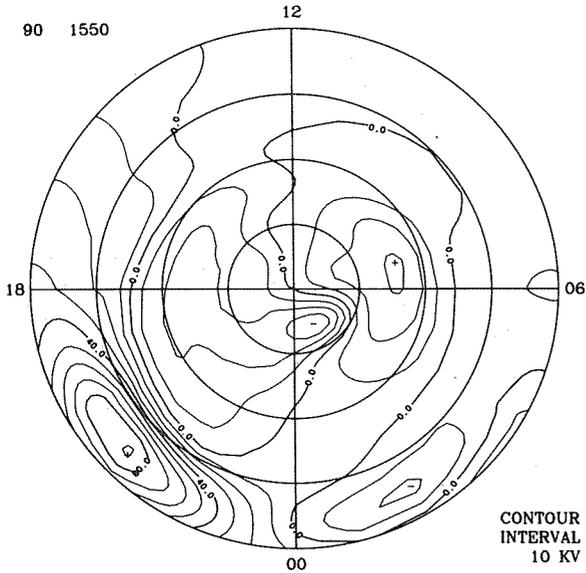
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

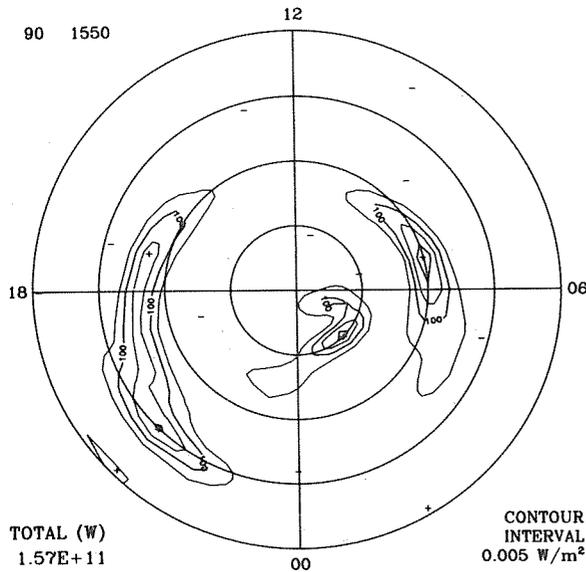
MARCH 31, 1979  
1550 UT



ELECTRIC POTENTIAL

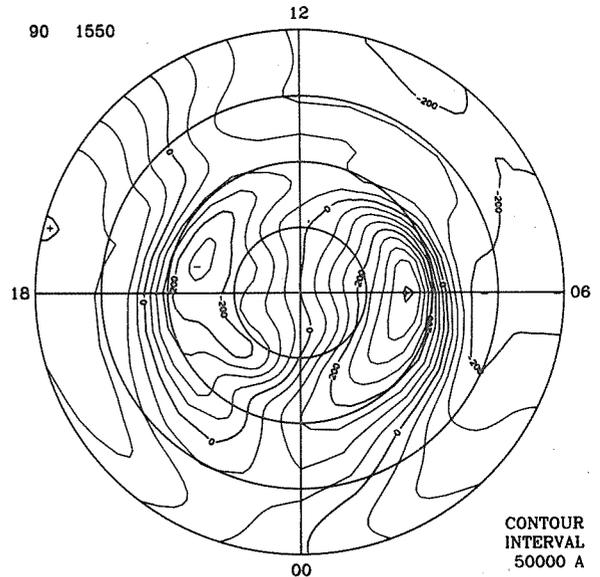


JOULE HEAT RATE

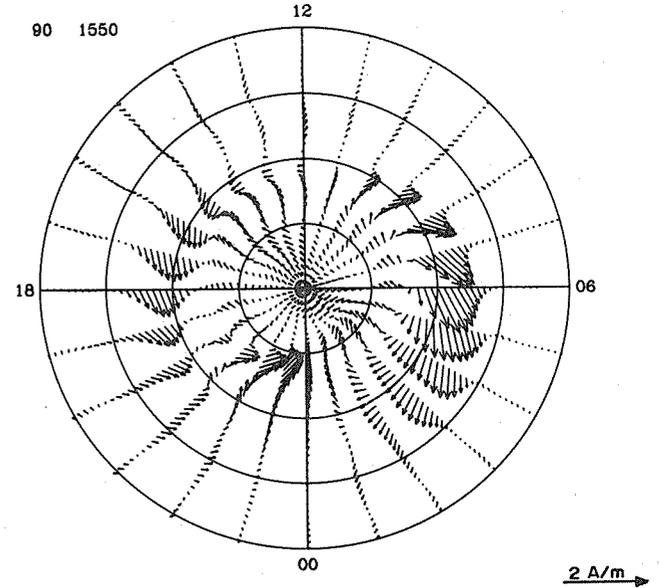


TOTAL (W)  
1.57E+11

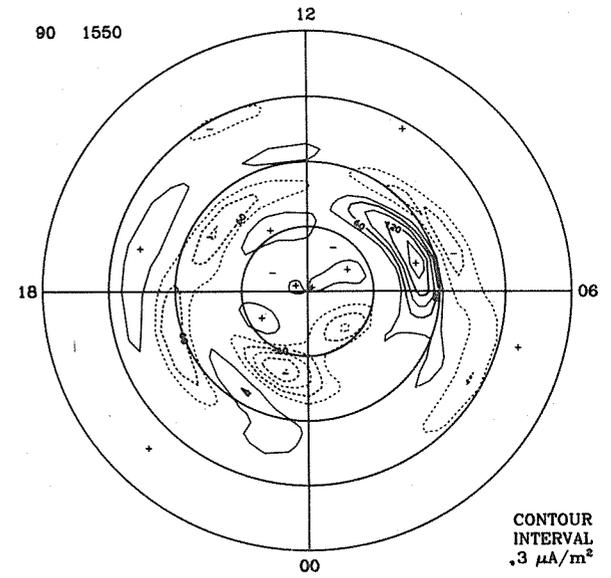
EQUIVALENT CURRENT SYSTEM



IONOSPHERIC CURRENT

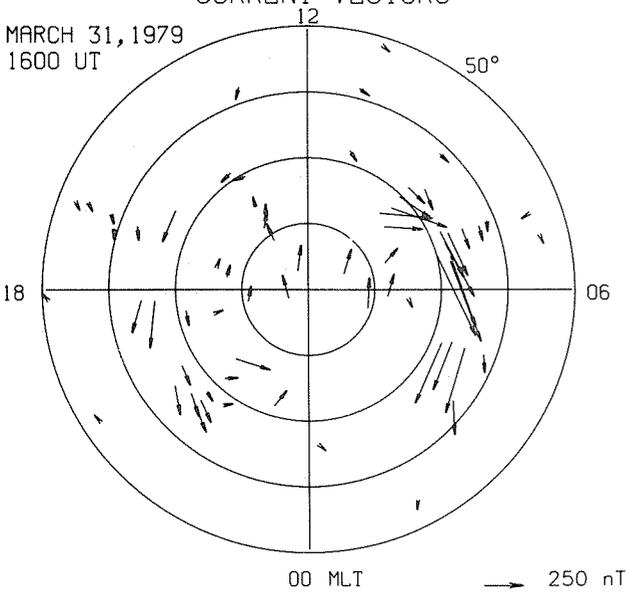


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

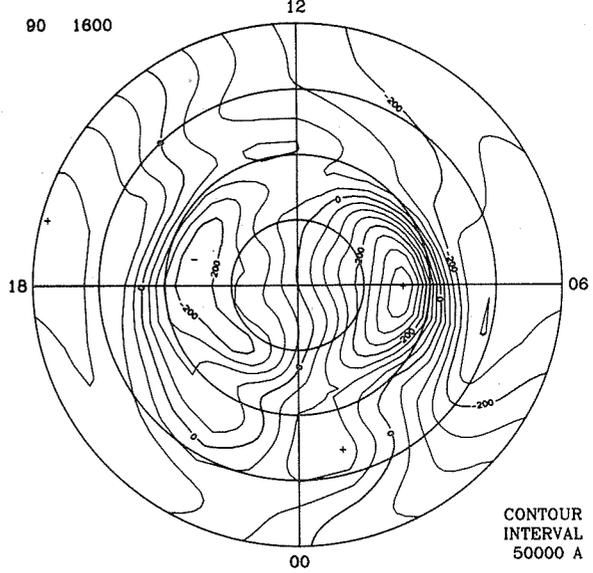
MARCH 31, 1979  
1600 UT



00 MLT

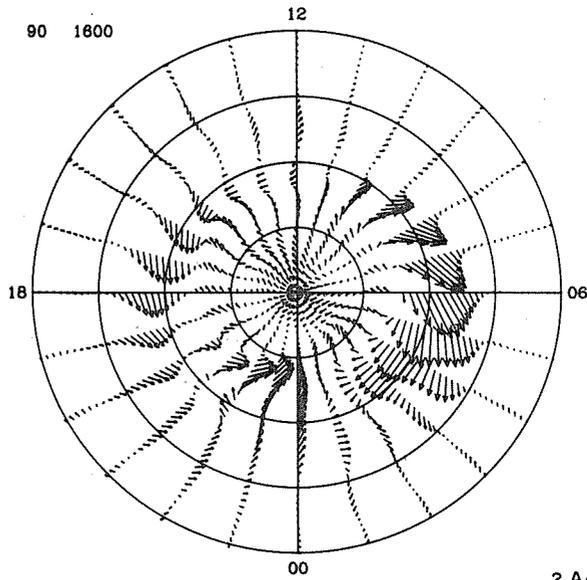
→ 250 nT

EQUIVALENT CURRENT SYSTEM



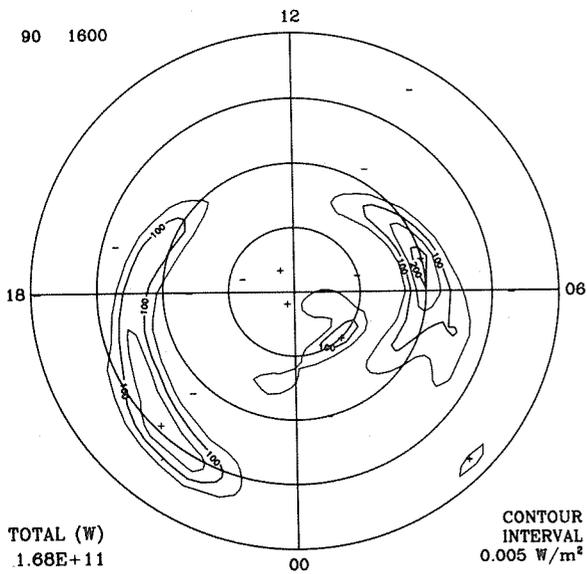
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



→ 2 A/m

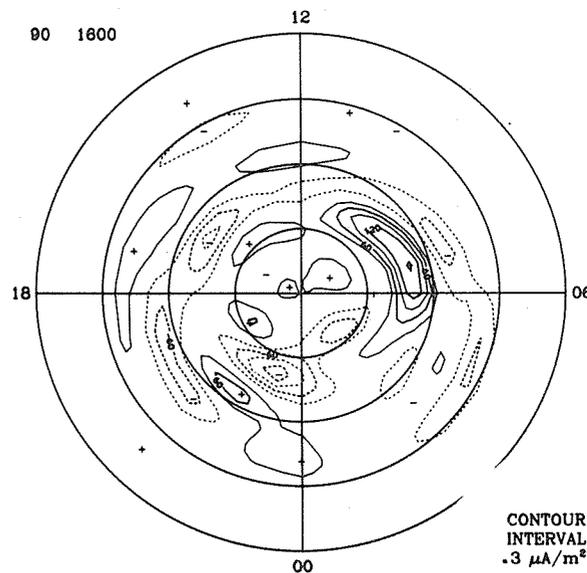
JOULE HEAT RATE



TOTAL (W)  
1.68E+11

CONTOUR  
INTERVAL  
0.005 W/m²

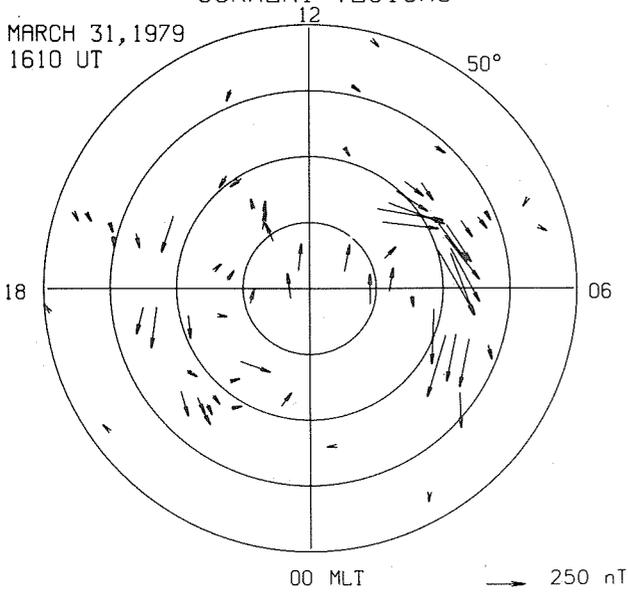
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m²

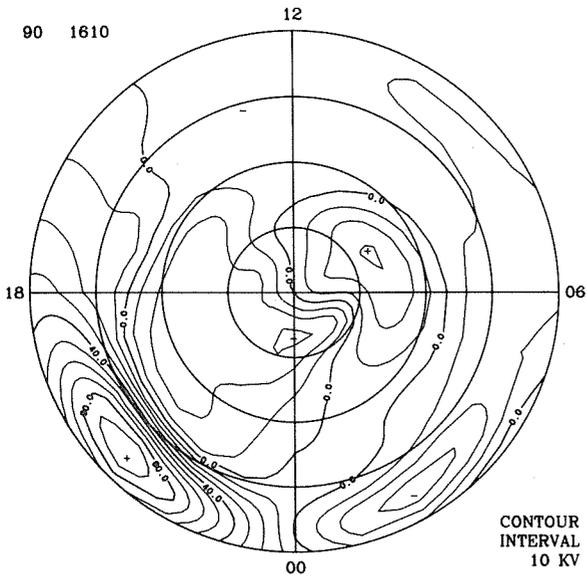
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1610 UT



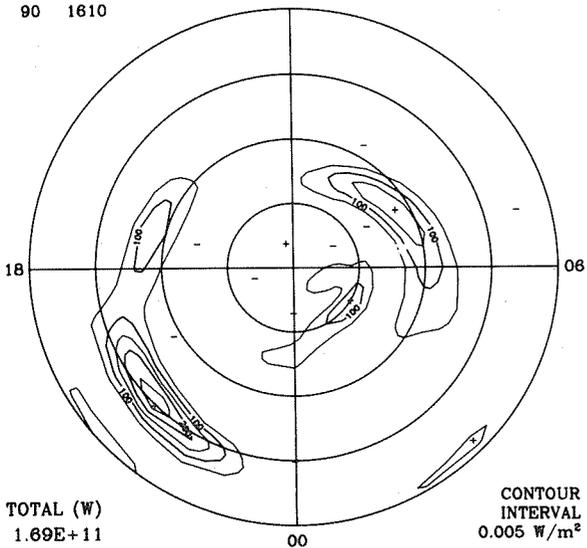
ELECTRIC POTENTIAL

90 1610



JOULE HEAT RATE

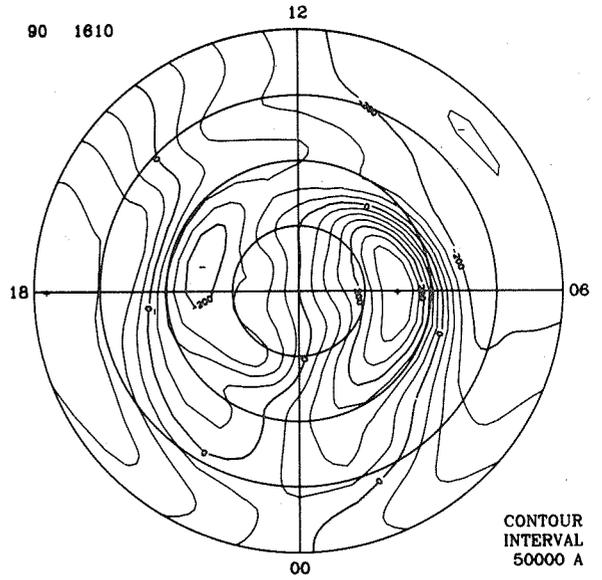
90 1610



TOTAL (W)  
1.69E+11

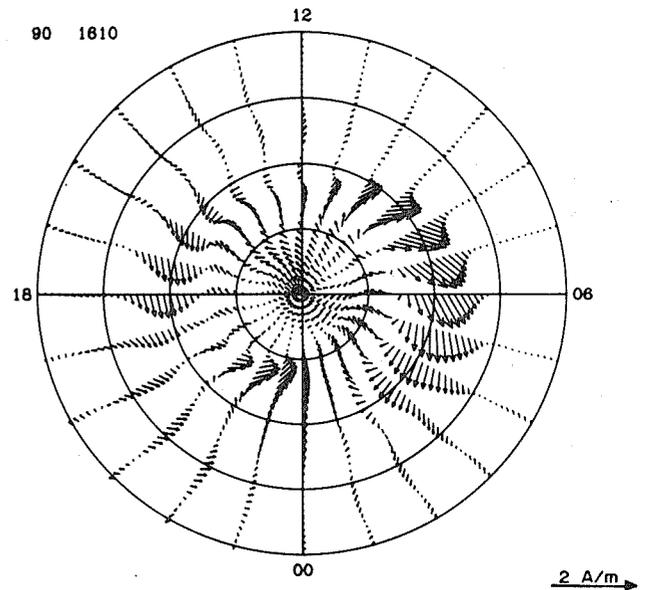
EQUIVALENT CURRENT SYSTEM

90 1610



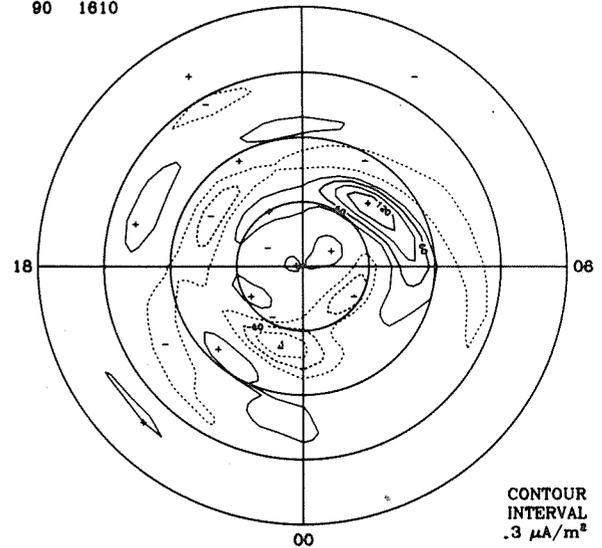
IONOSPHERIC CURRENT

90 1610



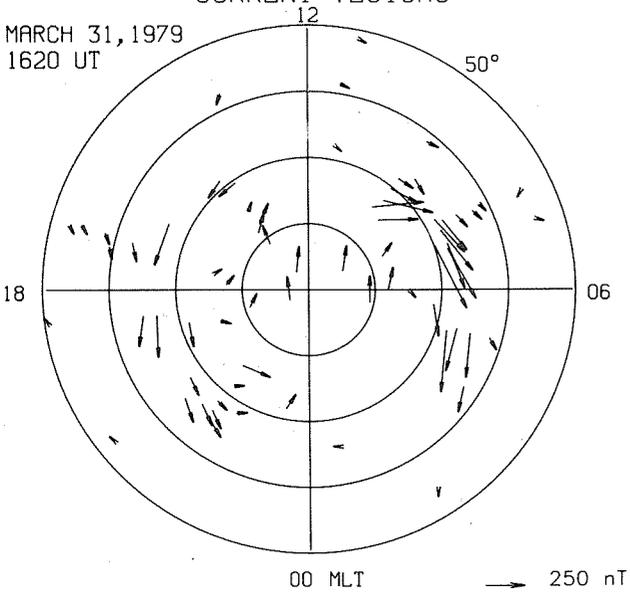
FIELD-ALIGNED CURRENTS

90 1610

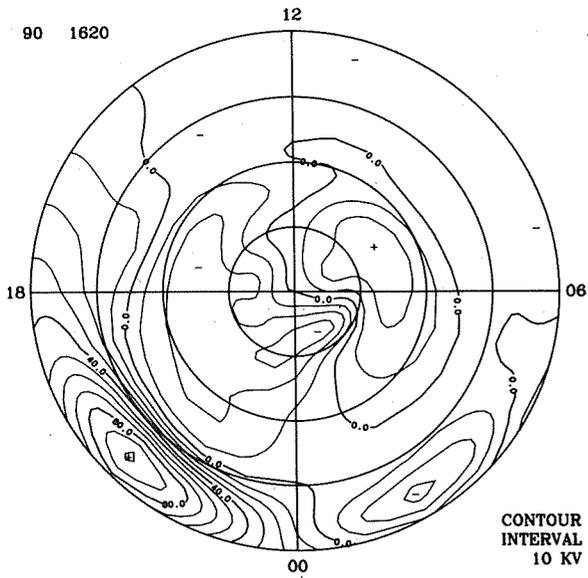


OBSERVED EQUIVALENT  
CURRENT VECTORS

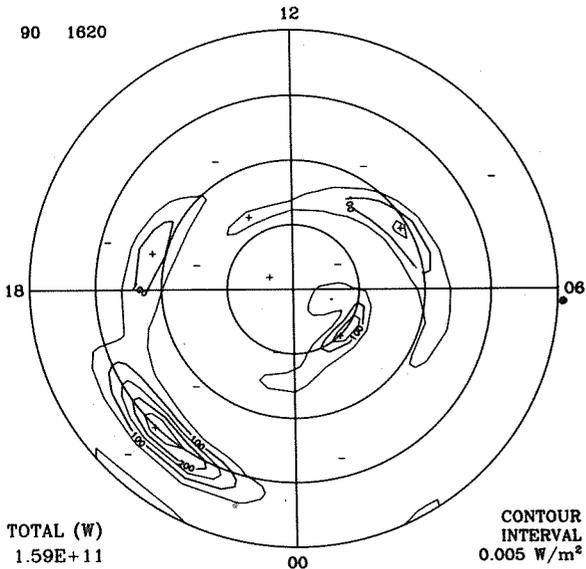
MARCH 31, 1979  
1620 UT



ELECTRIC POTENTIAL



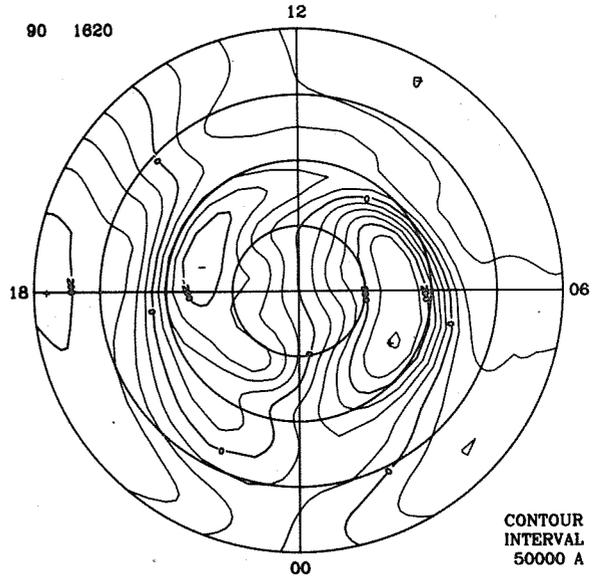
JOULE HEAT RATE



TOTAL (W)  
1.59E+11

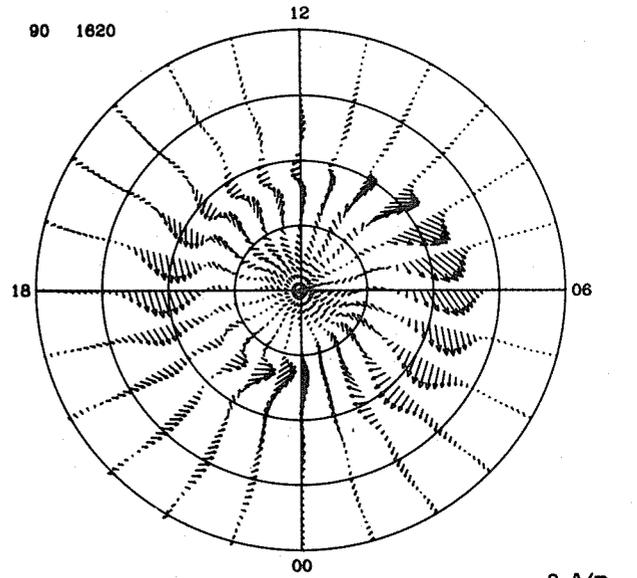
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

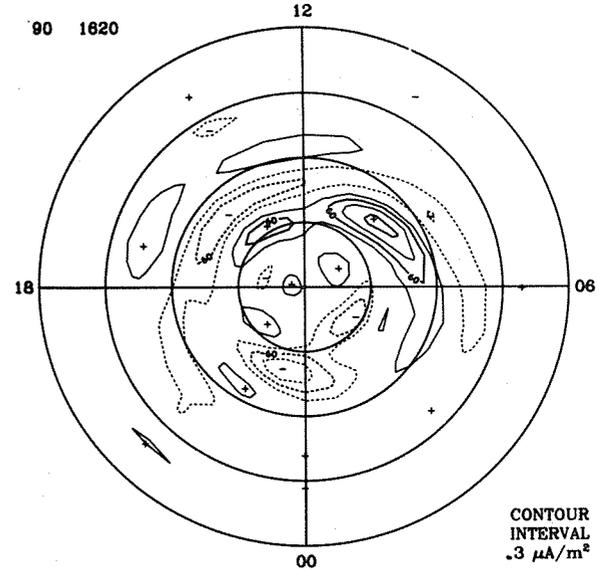


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



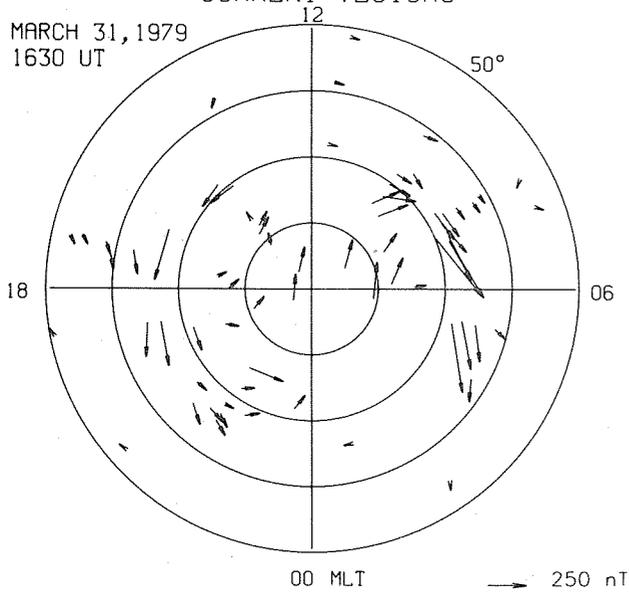
FIELD-ALIGNED CURRENTS



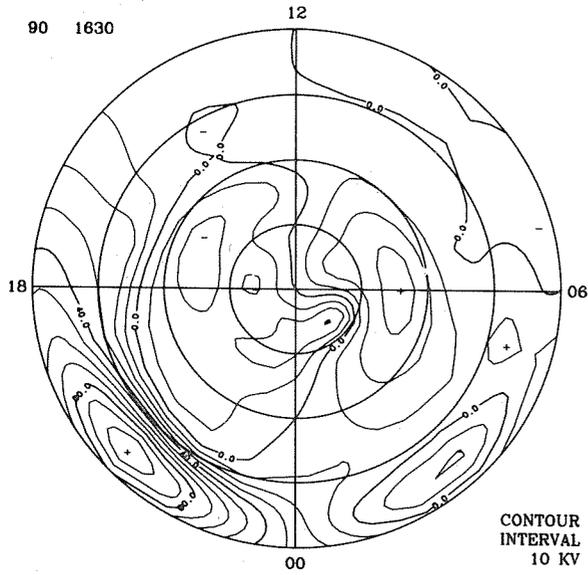
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

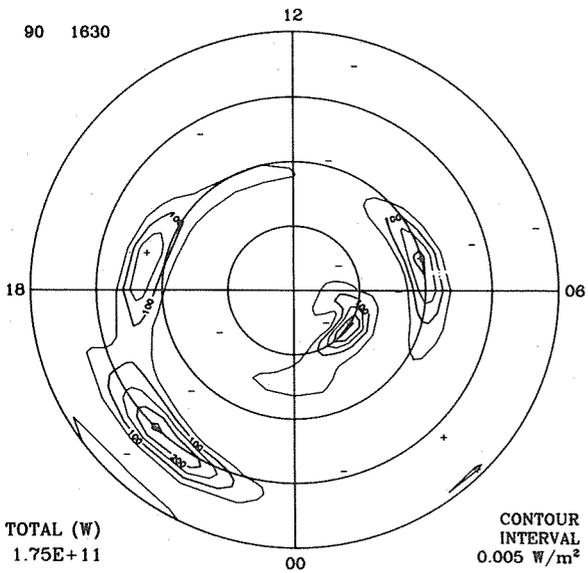
MARCH 31, 1979  
1630 UT



ELECTRIC POTENTIAL



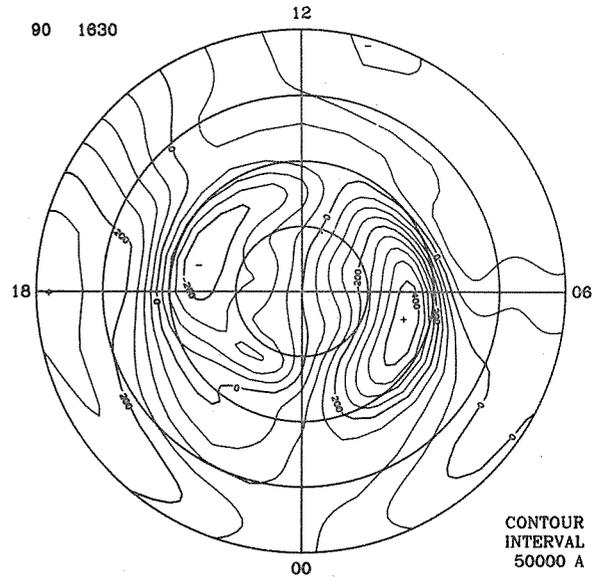
JOULE HEAT RATE



TOTAL (W)  
1.75E+11

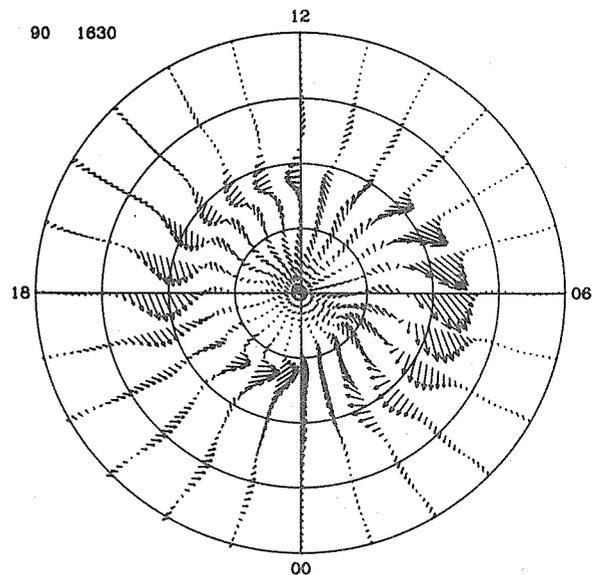
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



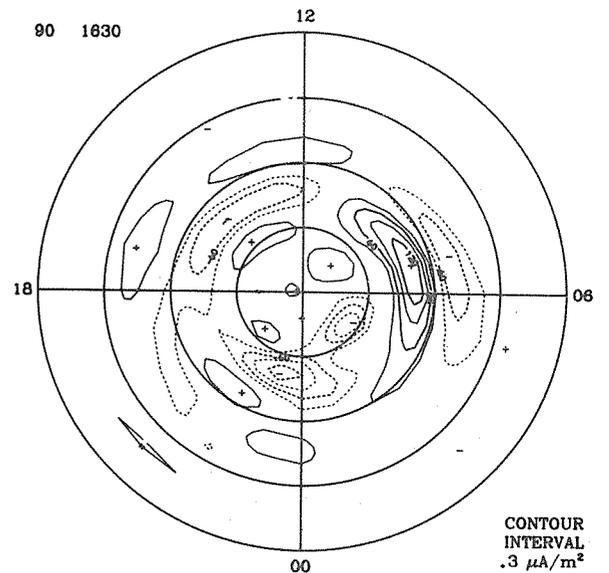
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

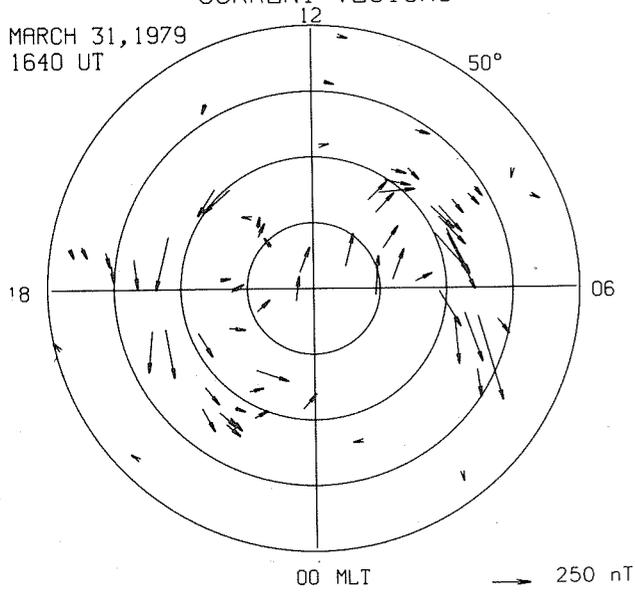
FIELD-ALIGNED CURRENTS



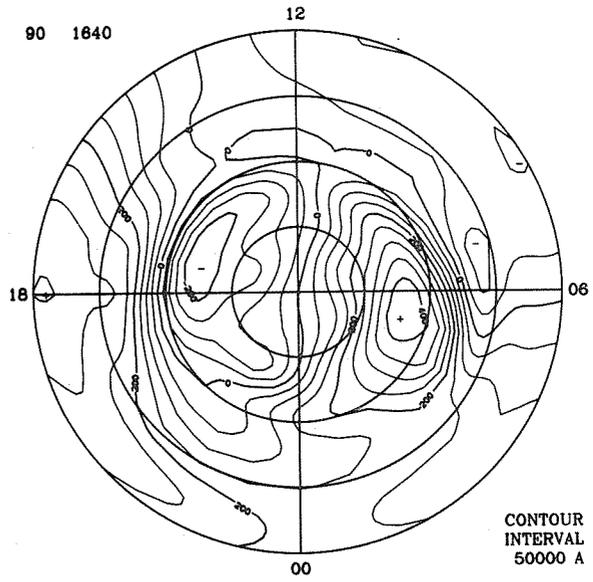
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

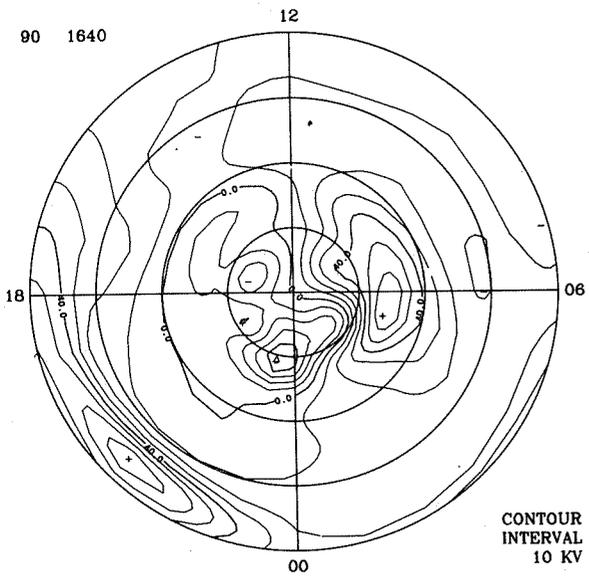
MARCH 31, 1979  
1640 UT



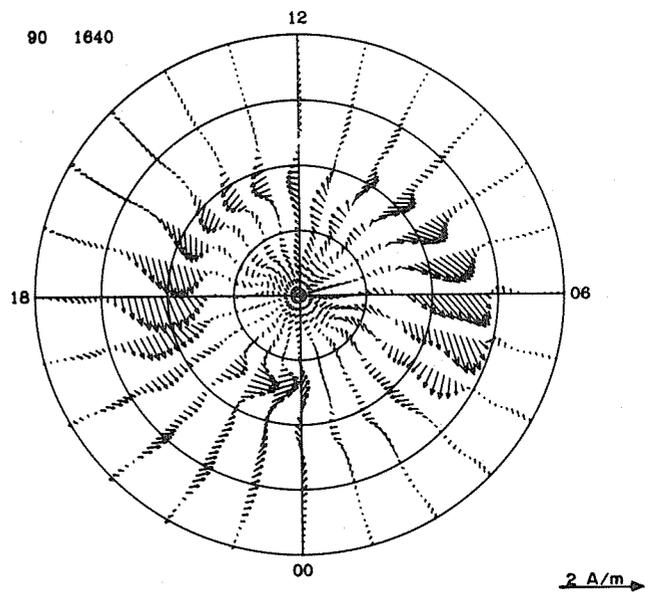
EQUIVALENT CURRENT SYSTEM



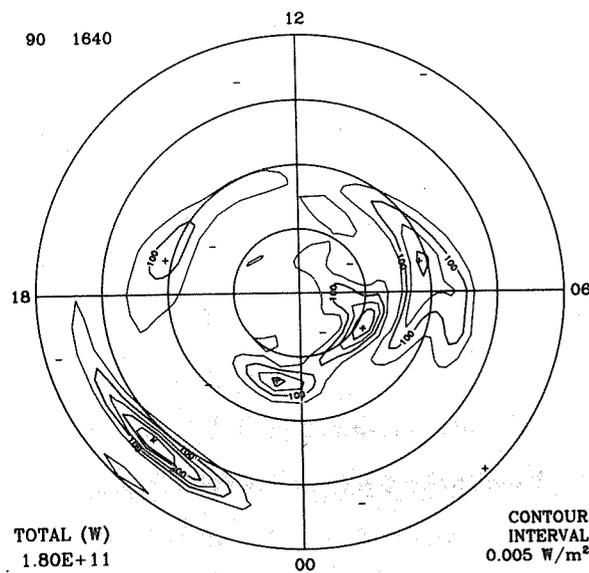
ELECTRIC POTENTIAL



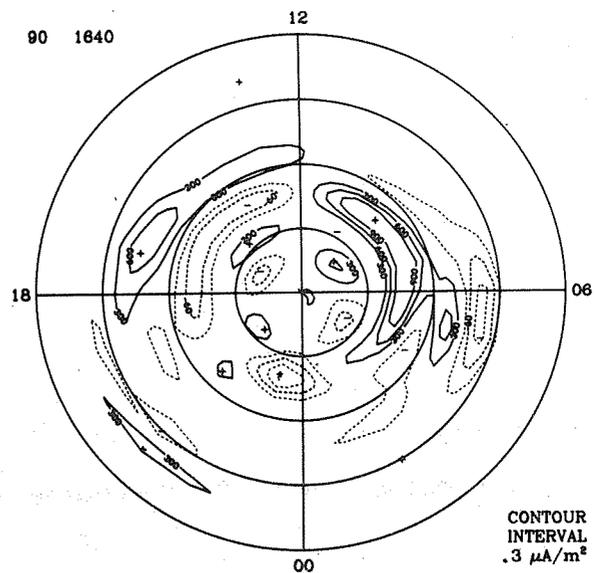
IONOSPHERIC CURRENT



JOULE HEAT RATE



FIELD-ALIGNED CURRENTS

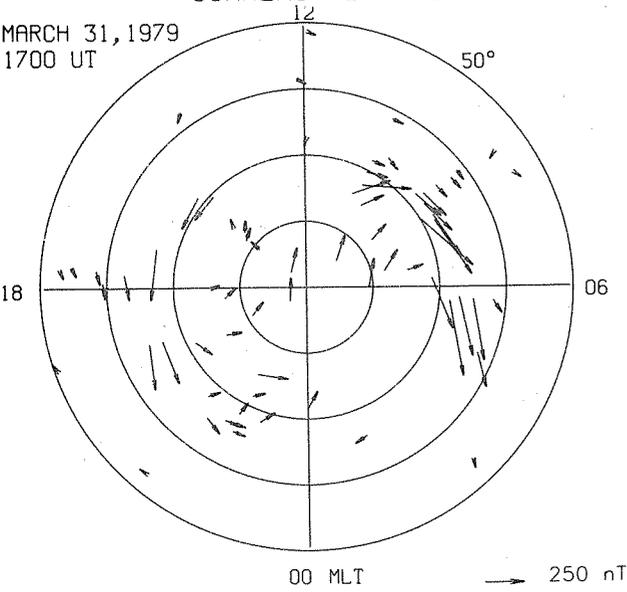


TOTAL (W)  
1.80E+11

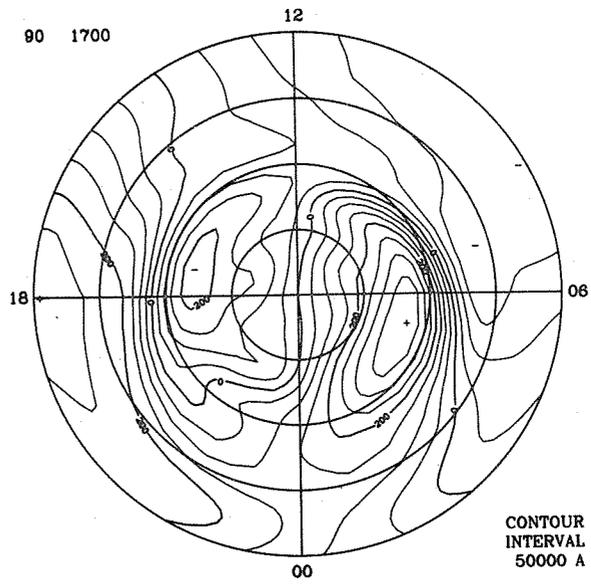


OBSERVED EQUIVALENT  
CURRENT VECTORS

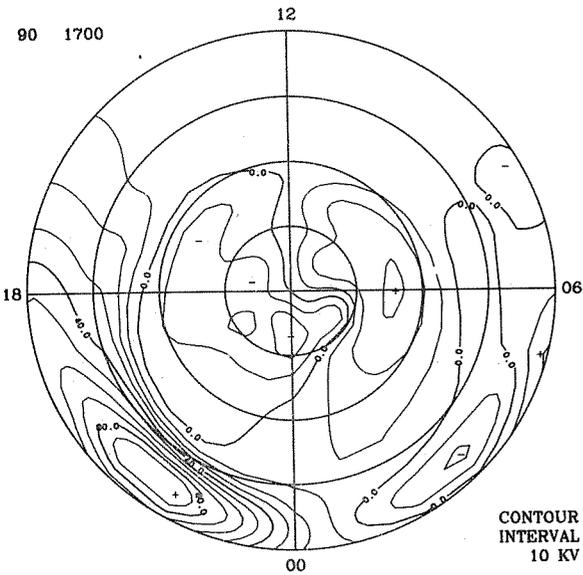
MARCH 31, 1979  
1700 UT



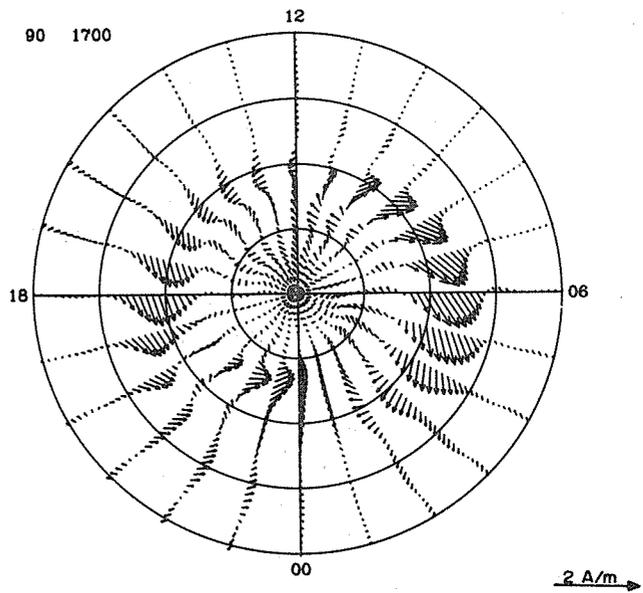
EQUIVALENT CURRENT SYSTEM



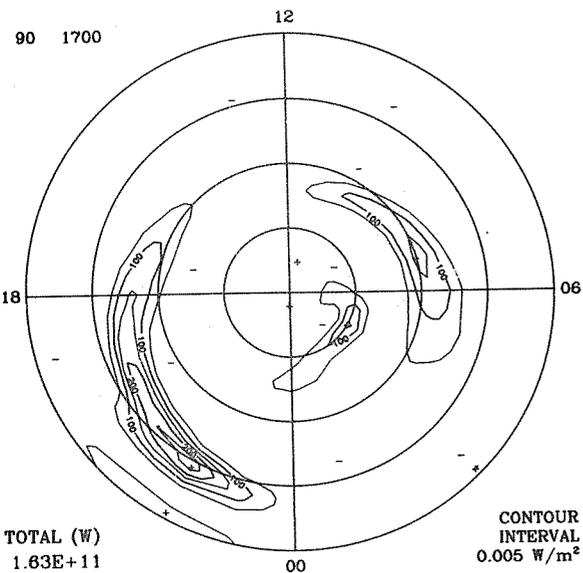
ELECTRIC POTENTIAL



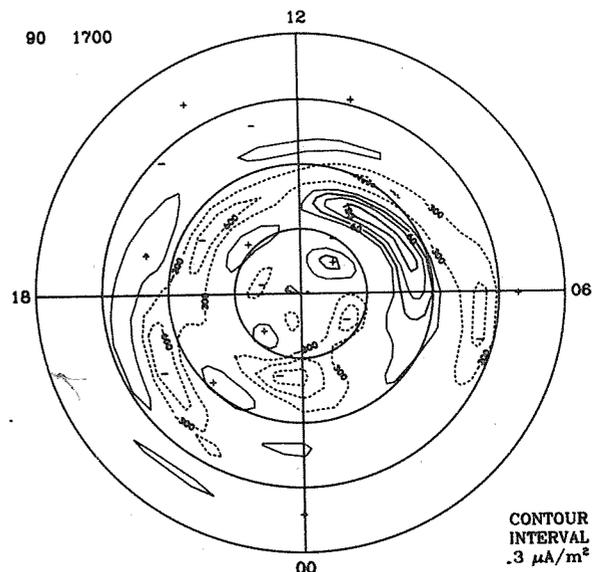
IONOSPHERIC CURRENT

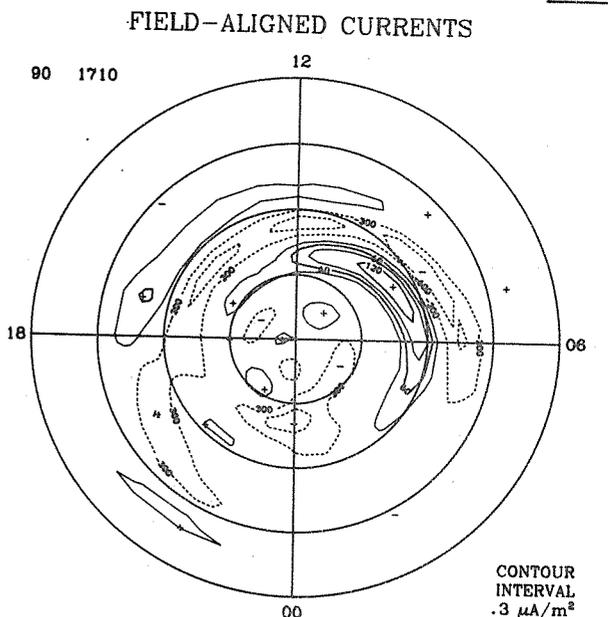
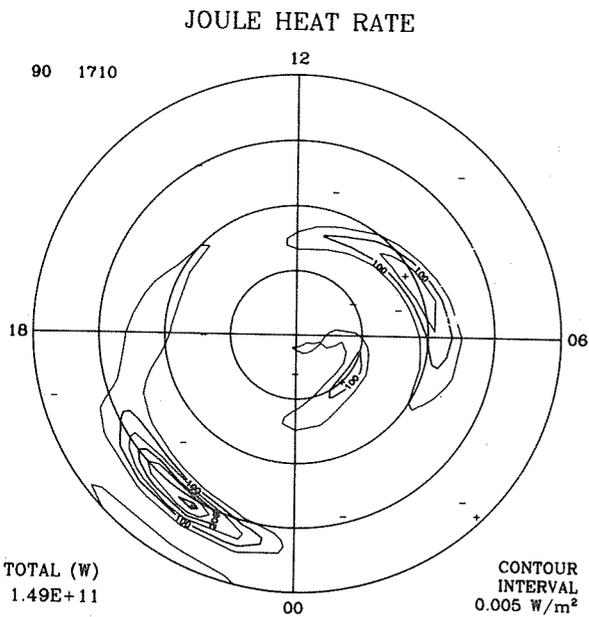
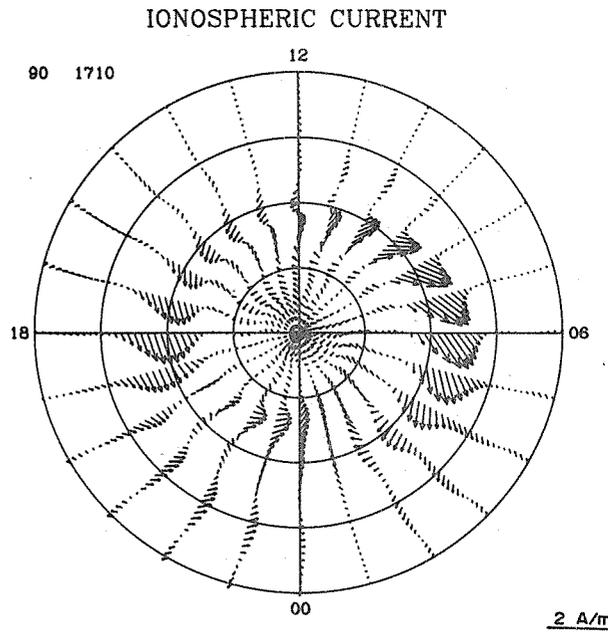
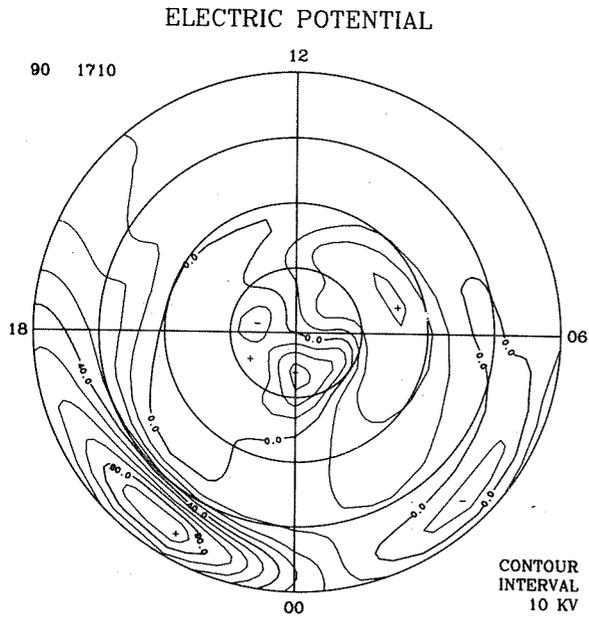
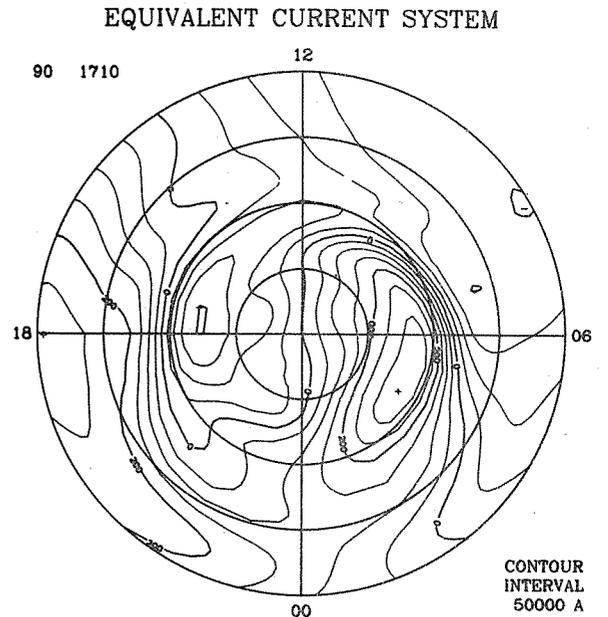
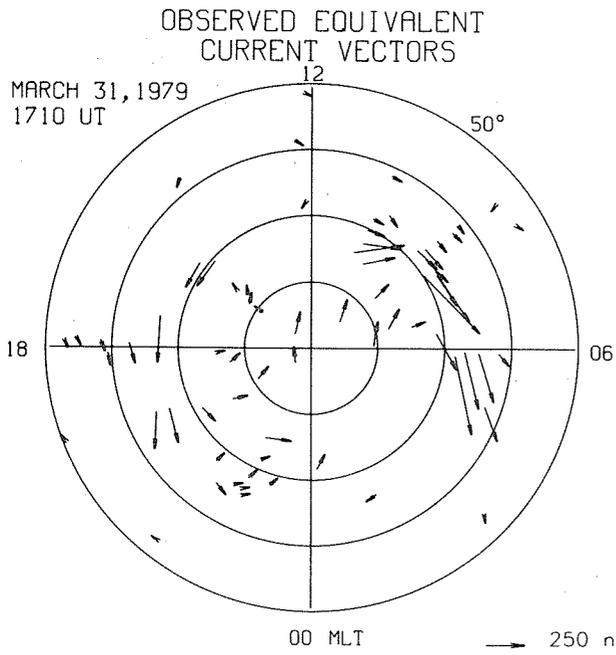


JOULE HEAT RATE



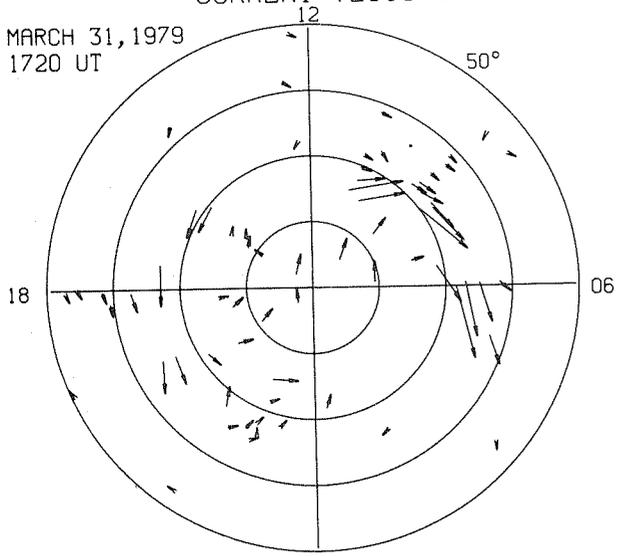
FIELD-ALIGNED CURRENTS





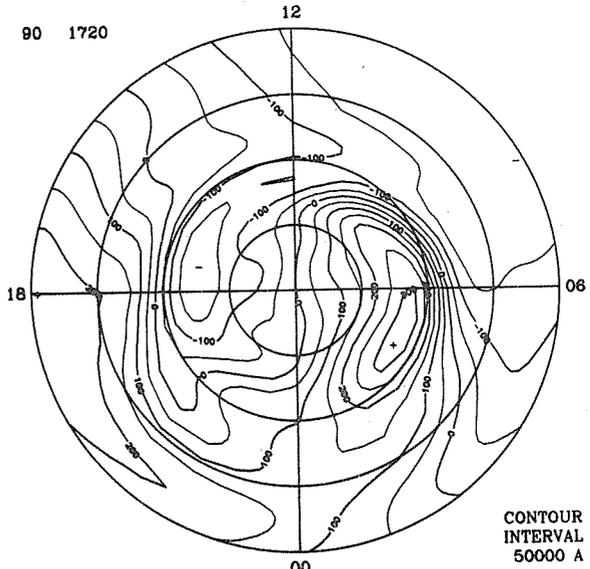
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1720 UT



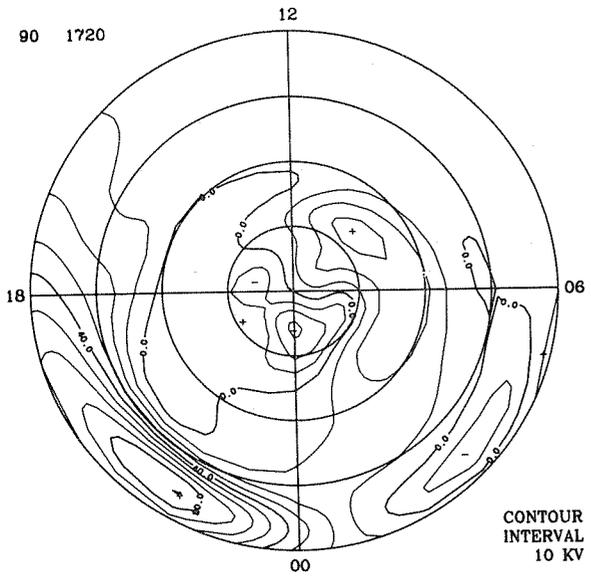
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



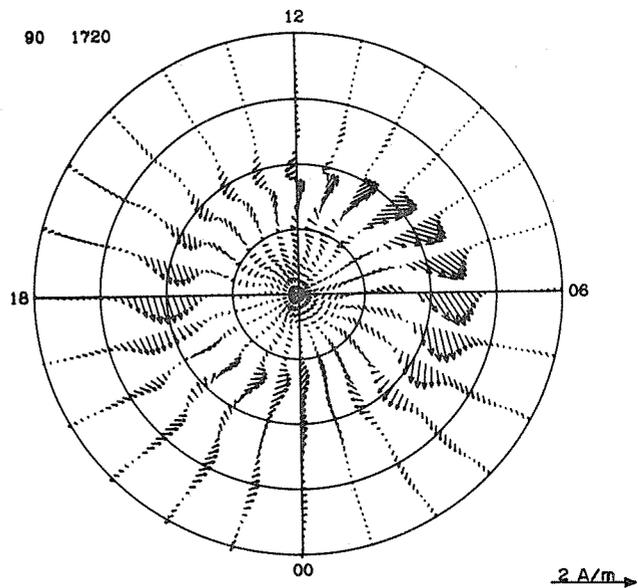
CONTOUR  
INTERVAL  
50000 A

ELECTRIC POTENTIAL



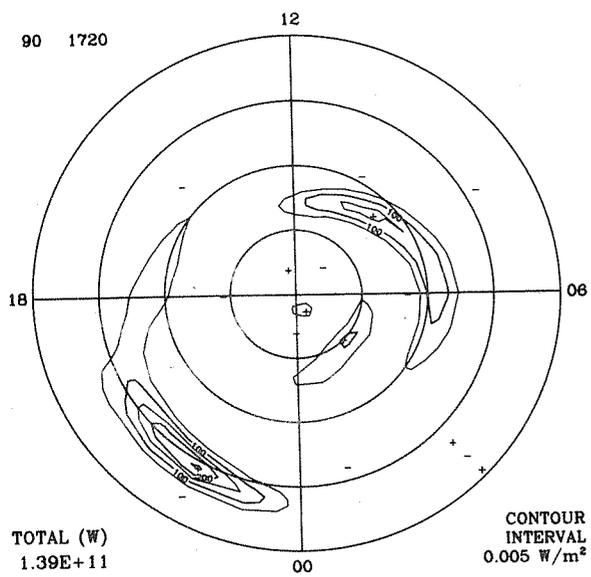
CONTOUR  
INTERVAL  
10 KV

IONOSPHERIC CURRENT



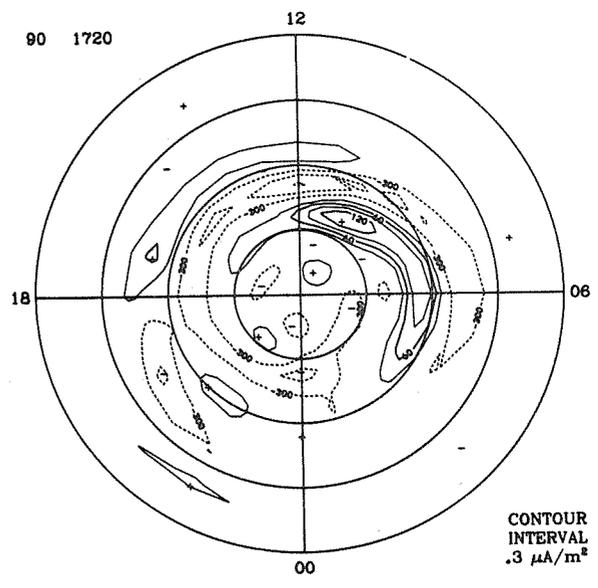
2 A/m →

JOULE HEAT RATE



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

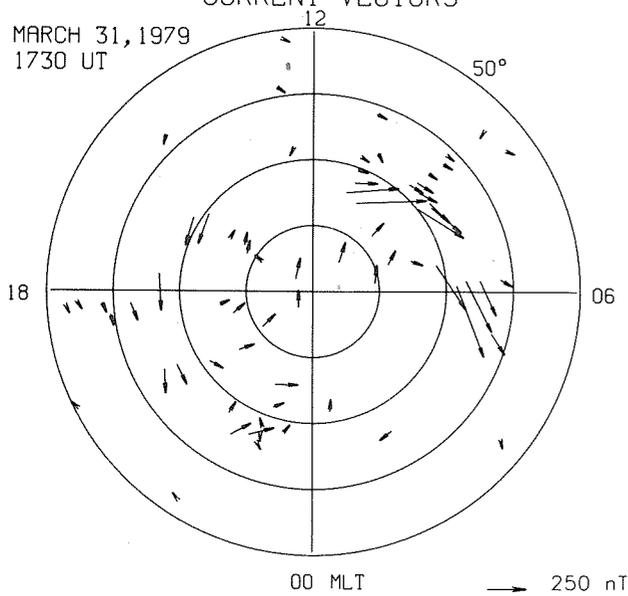


CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

TOTAL (W)  
1.39E+11

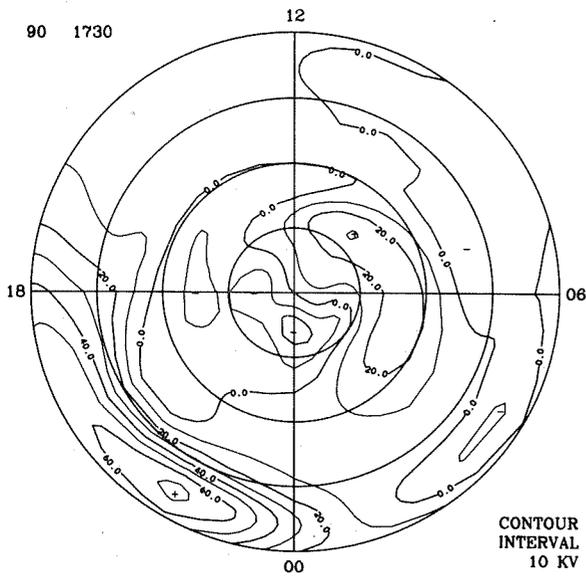
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1730 UT



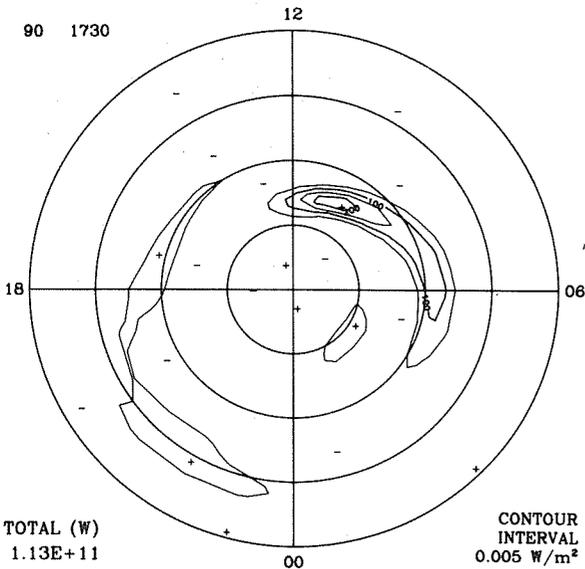
ELECTRIC POTENTIAL

90 1730



JOULE HEAT RATE

90 1730

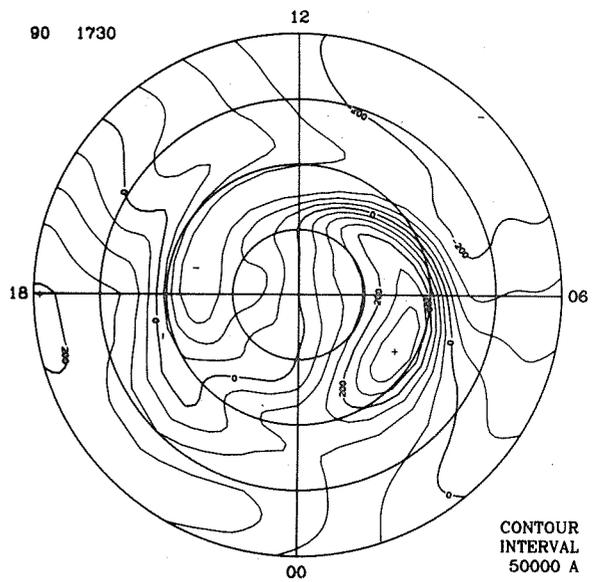


TOTAL (W)  
1.13E+11

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

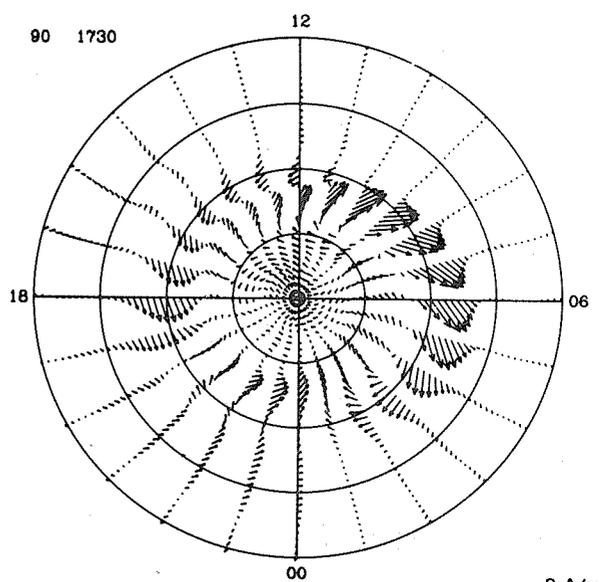
90 1730



CONTOUR  
INTERVAL  
50000 A

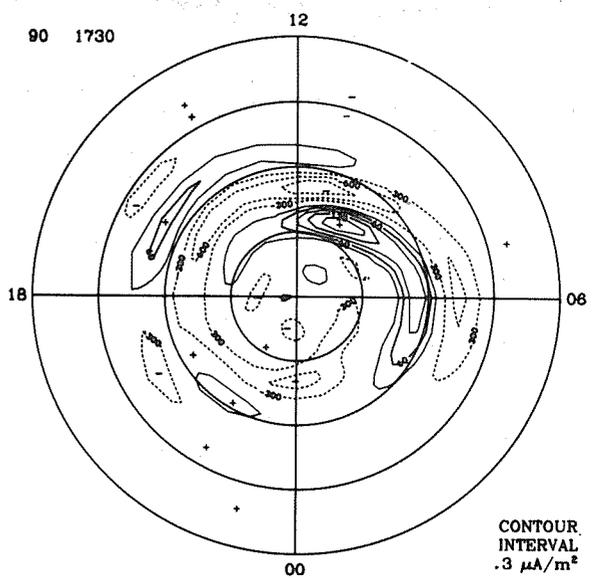
IONOSPHERIC CURRENT

90 1730



FIELD-ALIGNED CURRENTS

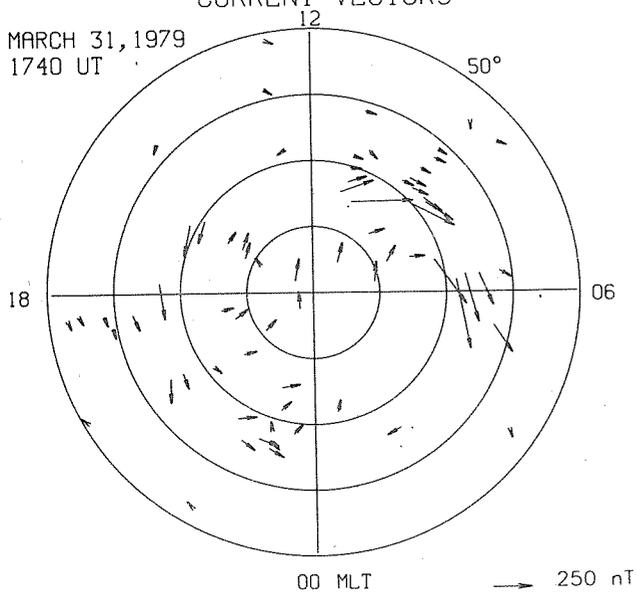
90 1730



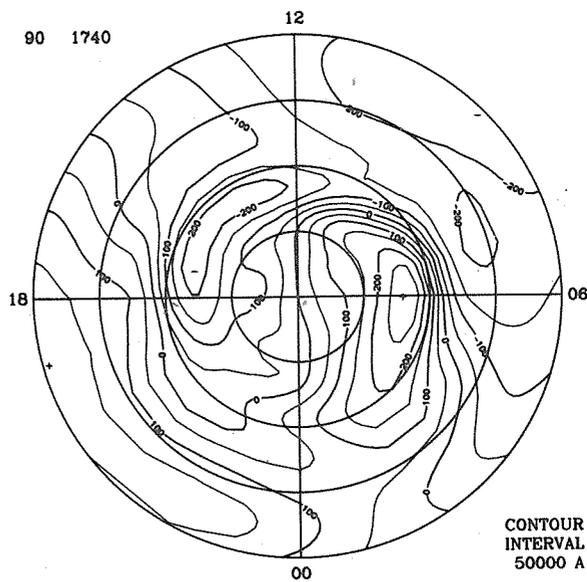
CONTOUR  
INTERVAL  
.3 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

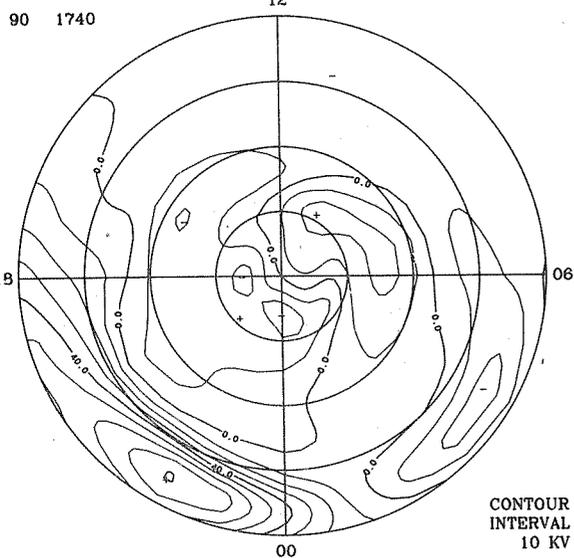
MARCH 31, 1979  
1740 UT



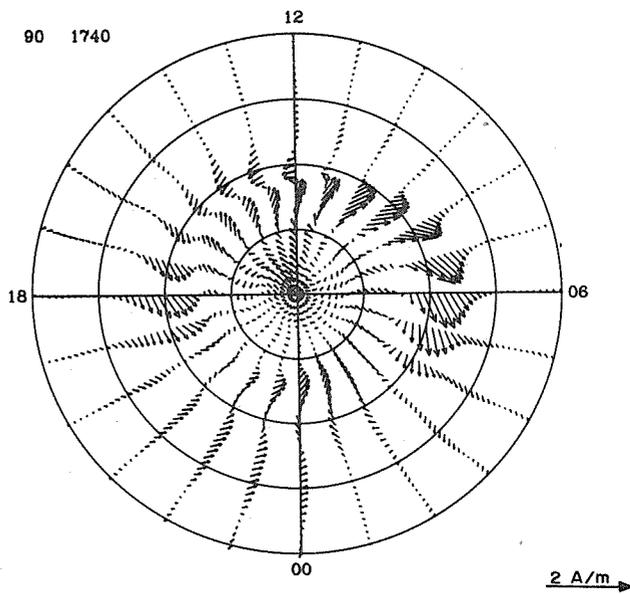
EQUIVALENT CURRENT SYSTEM



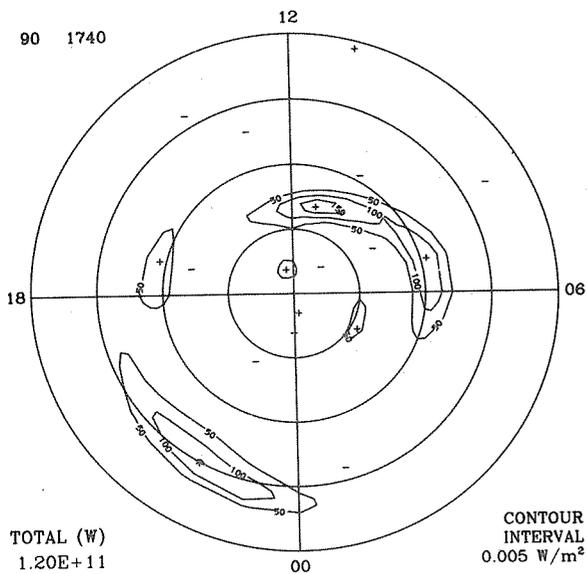
ELECTRIC POTENTIAL



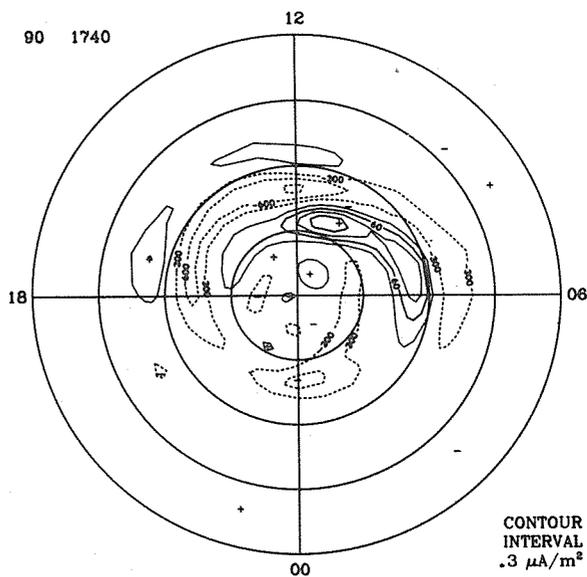
IONOSPHERIC CURRENT



JOULE HEAT RATE



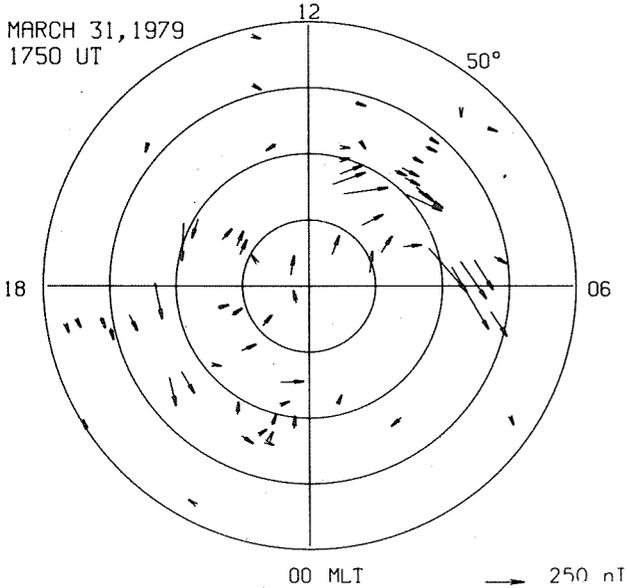
FIELD-ALIGNED CURRENTS



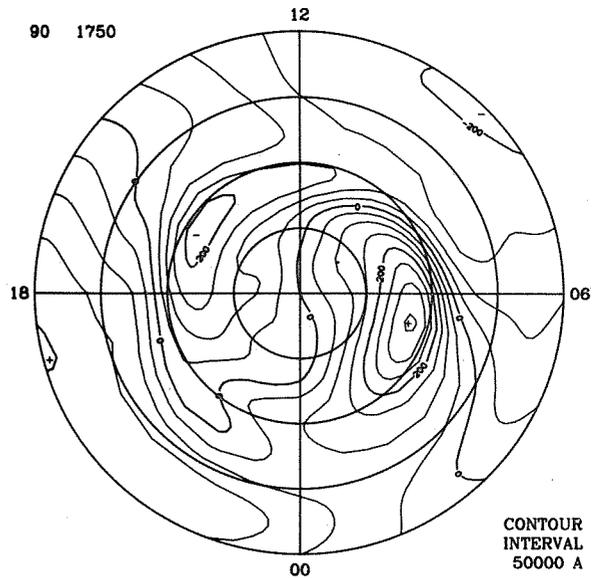
TOTAL (W)  
1.20E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

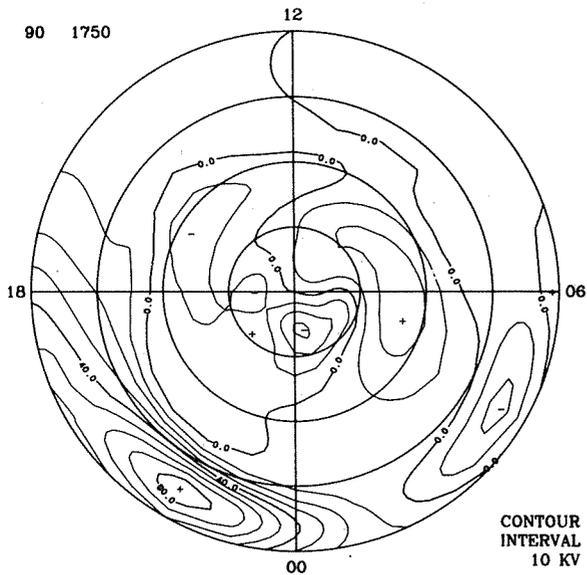
MARCH 31, 1979  
1750 UT



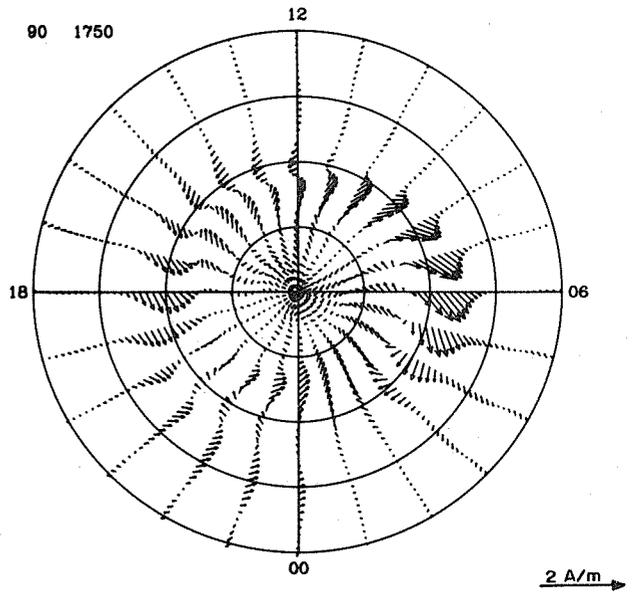
EQUIVALENT CURRENT SYSTEM



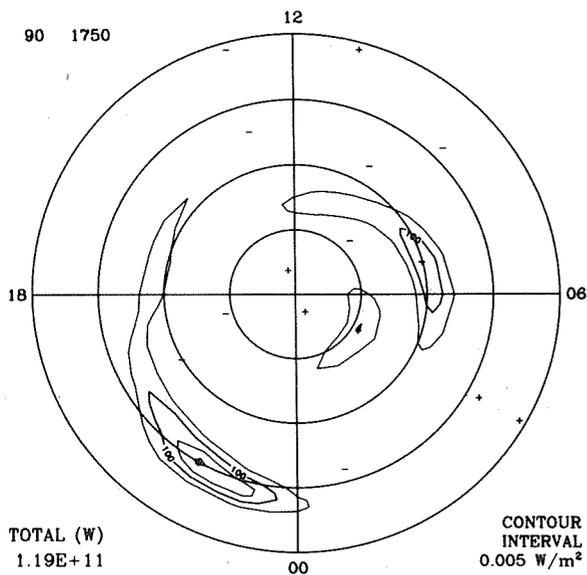
ELECTRIC POTENTIAL



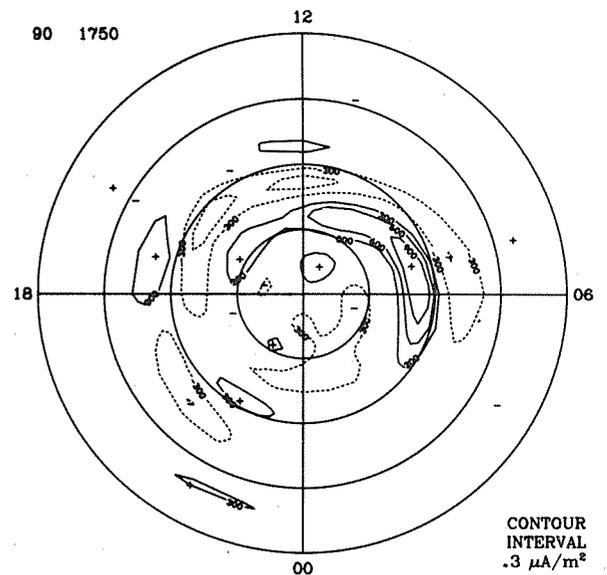
IONOSPHERIC CURRENT



JOULE HEAT RATE

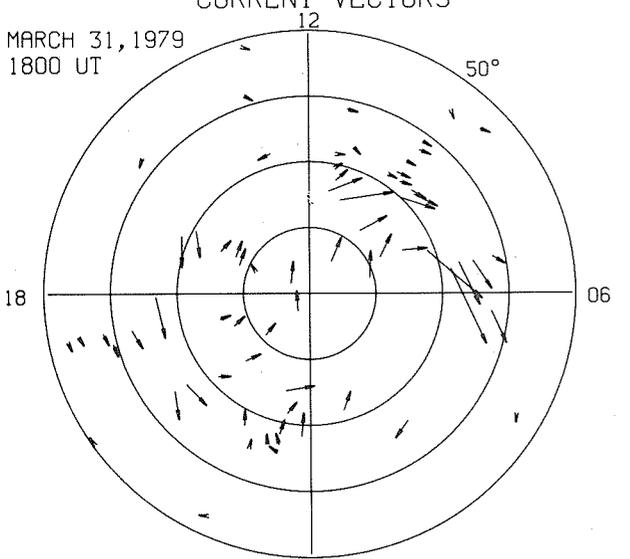


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

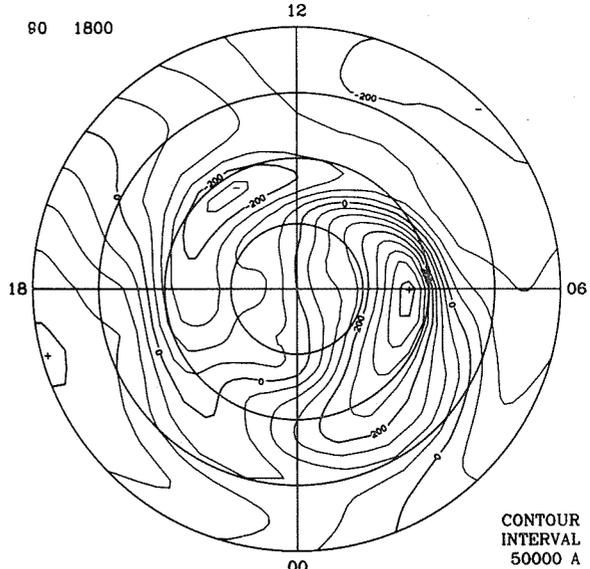
MARCH 31, 1979  
1800 UT



00 MLT  
ELECTRIC POTENTIAL

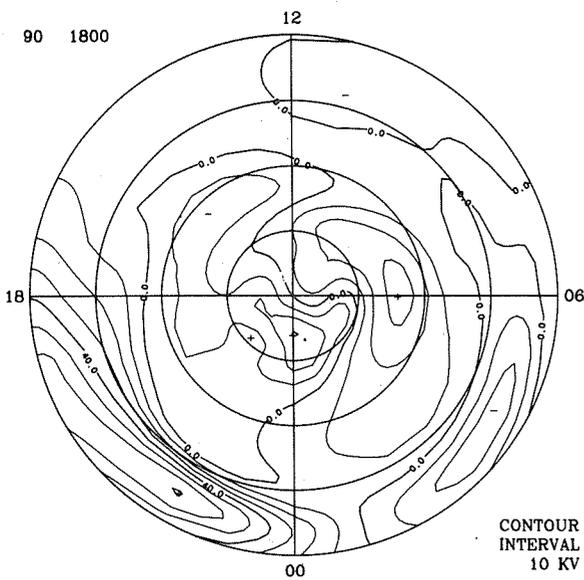
→ 250 nT

EQUIVALENT CURRENT SYSTEM

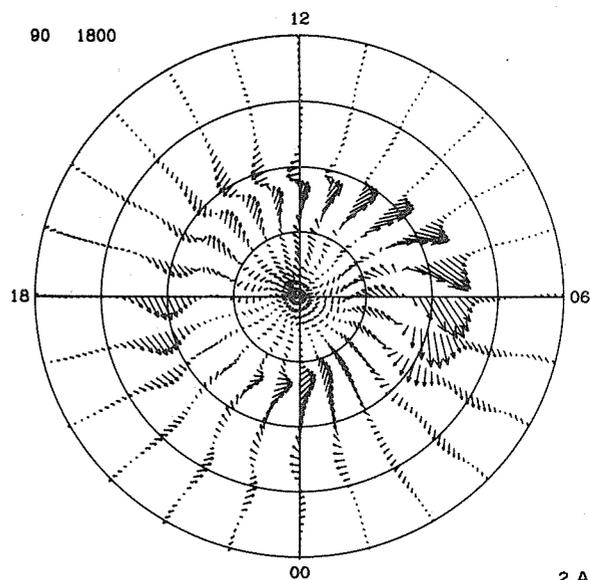


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

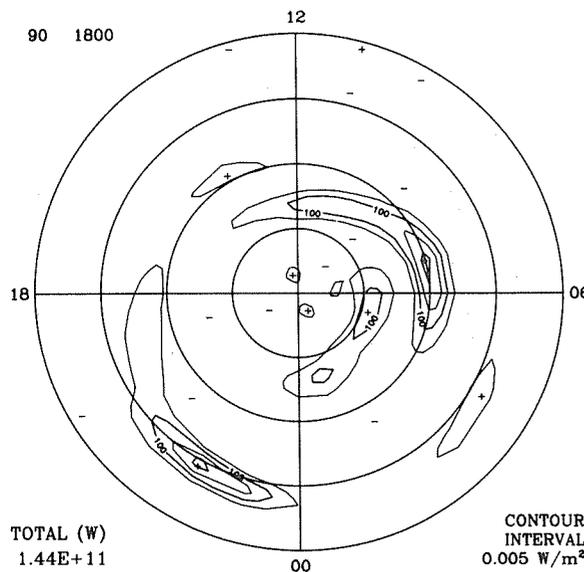


CONTOUR  
INTERVAL  
10 KV



→ 2 A/m

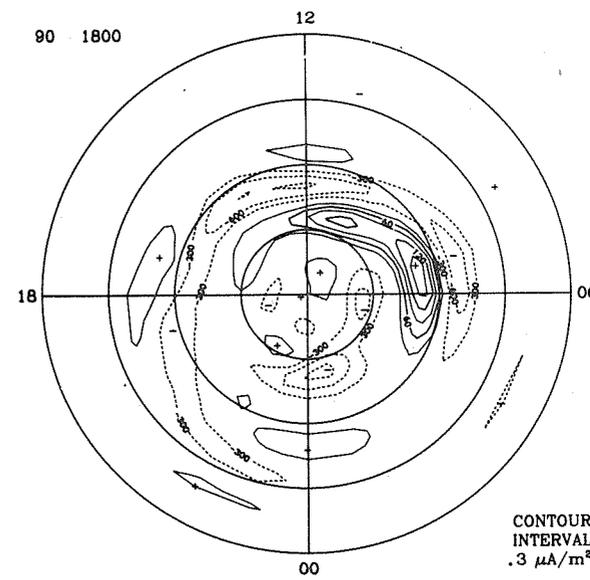
JOULE HEAT RATE



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

TOTAL (W)  
1.44E+11

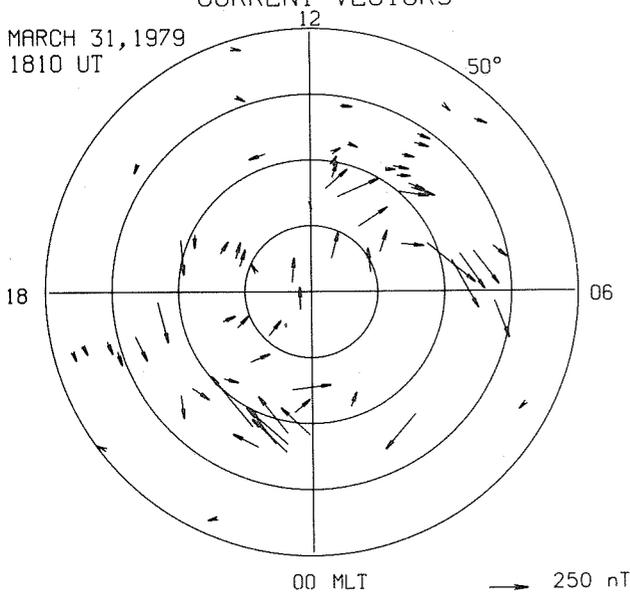
FIELD-ALIGNED CURRENTS



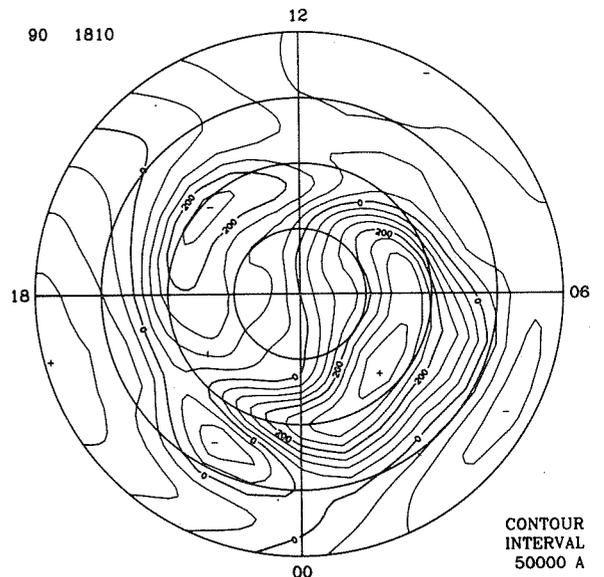
CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

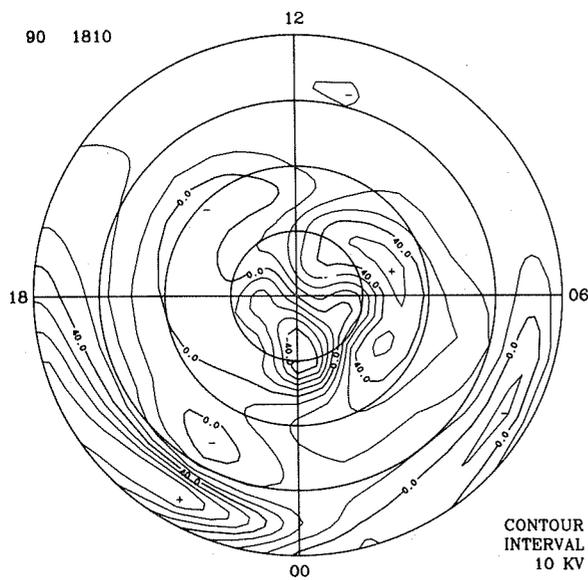
MARCH 31, 1979  
1810 UT



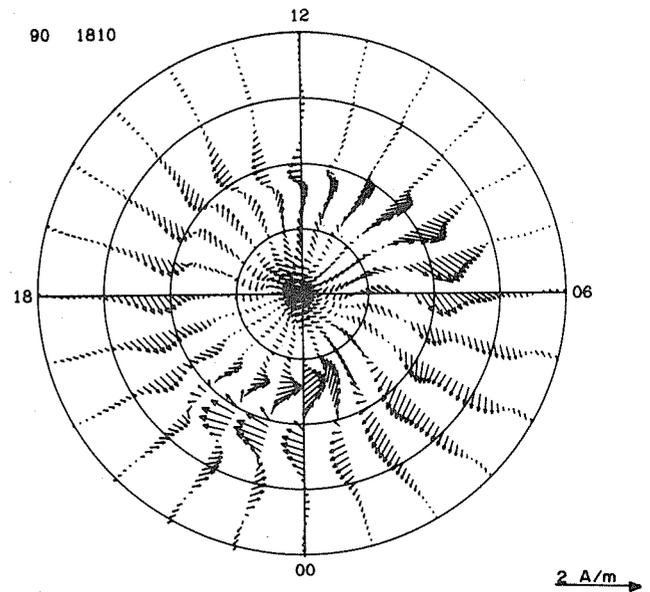
EQUIVALENT CURRENT SYSTEM



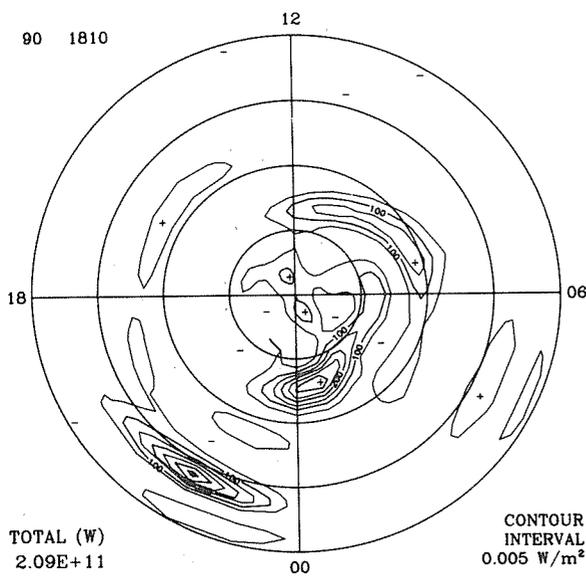
ELECTRIC POTENTIAL



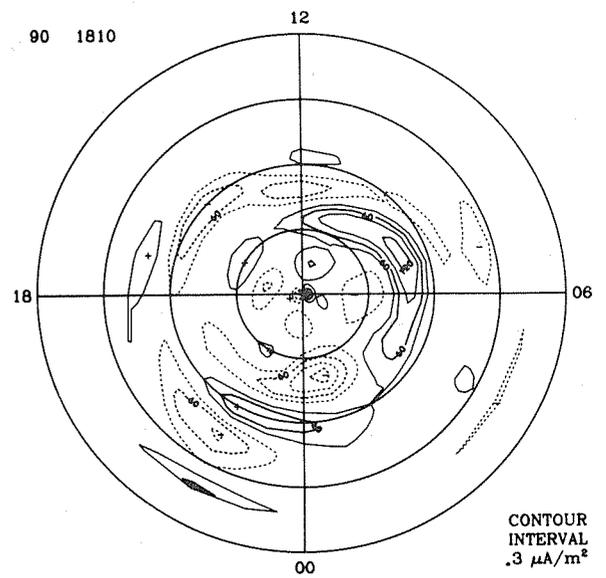
IONOSPHERIC CURRENT



JOULE HEAT RATE

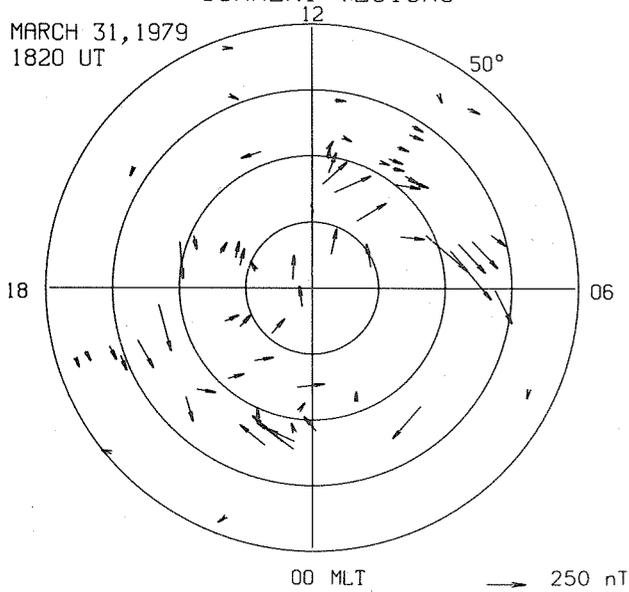


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

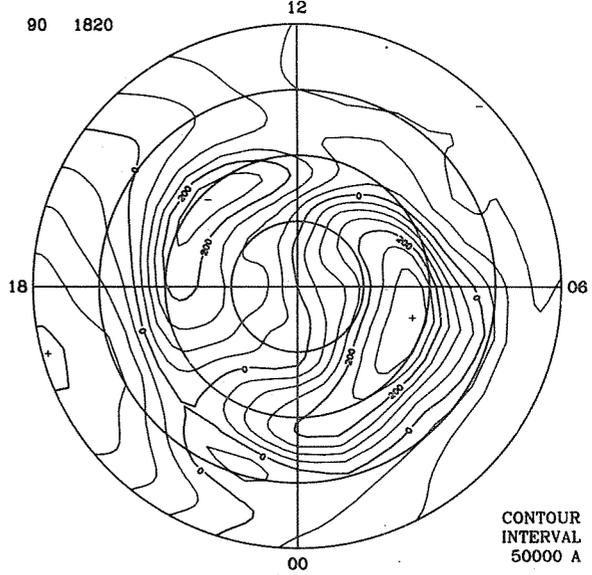
MARCH 31, 1979  
1820 UT



00 MLT

→ 250 nT

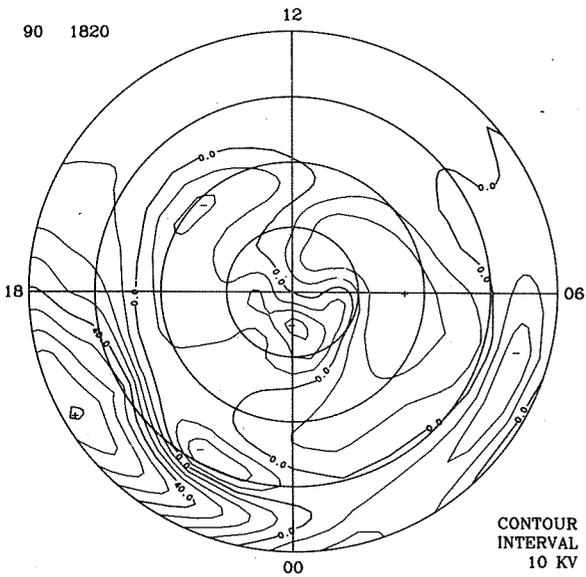
EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
50000 A

ELECTRIC POTENTIAL

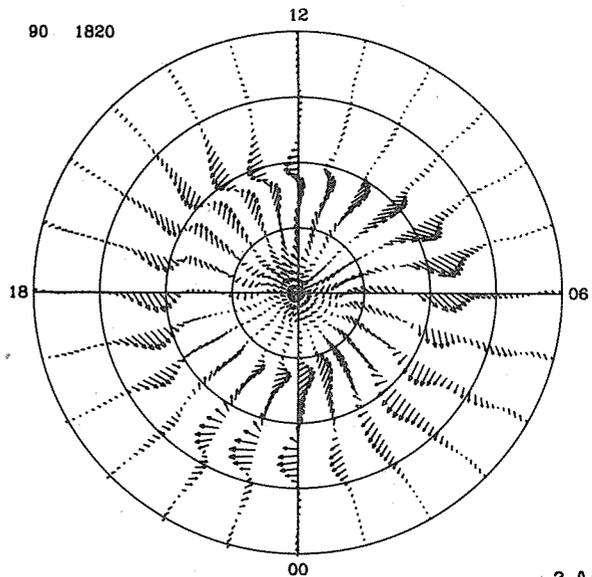
90 1820



CONTOUR  
INTERVAL  
10 KV

IONOSPHERIC CURRENT

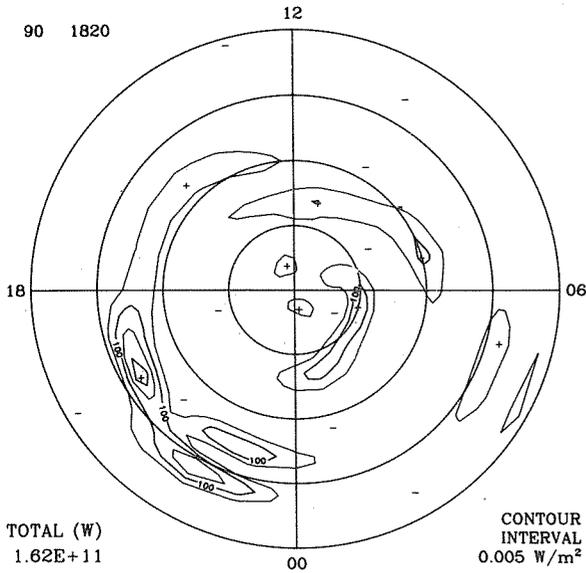
90 1820



→ 2 A/m

JOULE HEAT RATE

90 1820

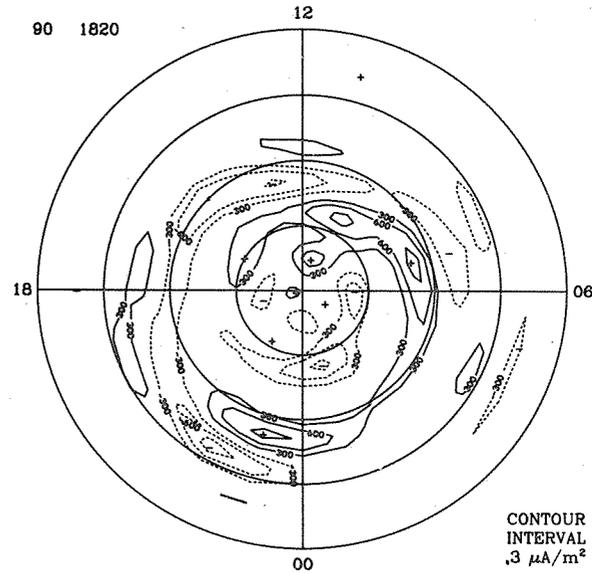


CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

TOTAL (W)  
1.62E+11

FIELD-ALIGNED CURRENTS

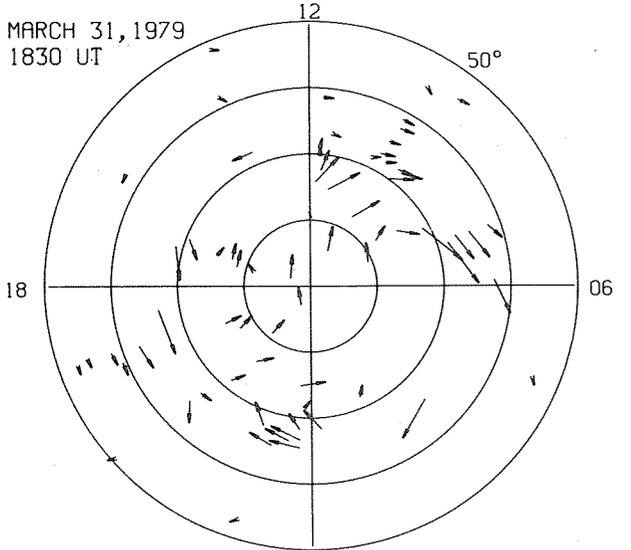
90 1820



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

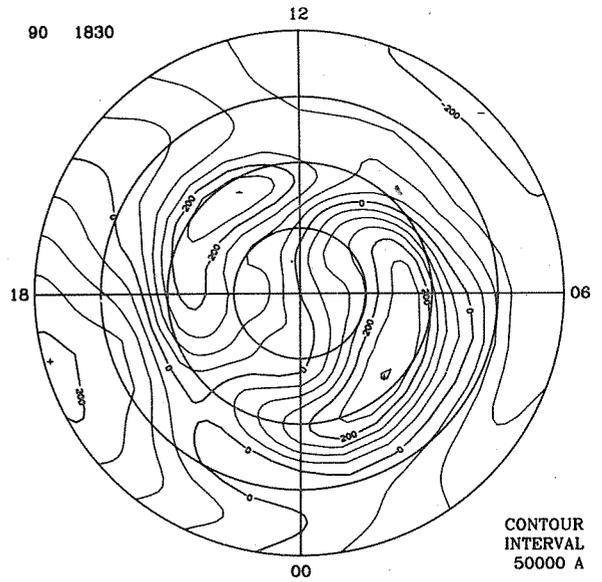
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1830 UT



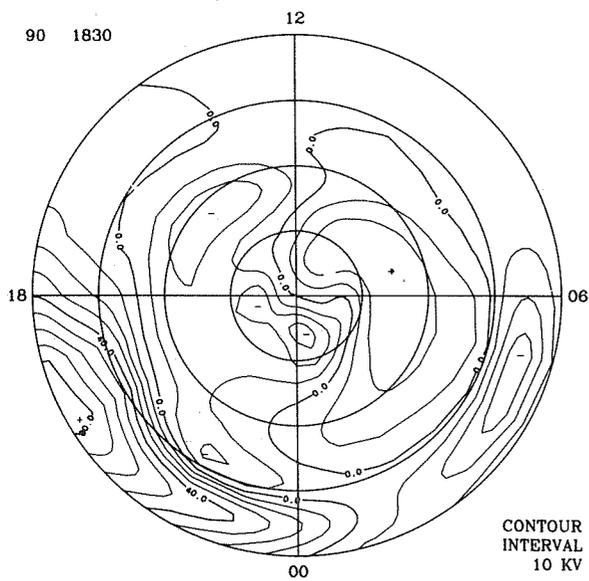
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



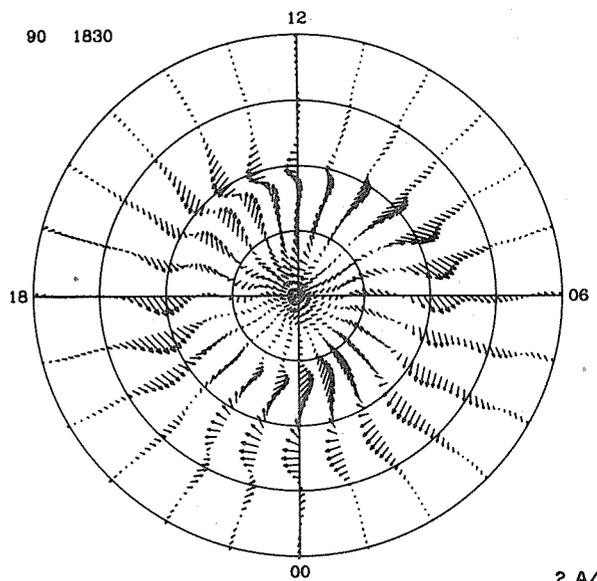
CONTOUR  
INTERVAL  
50000 A

ELECTRIC POTENTIAL



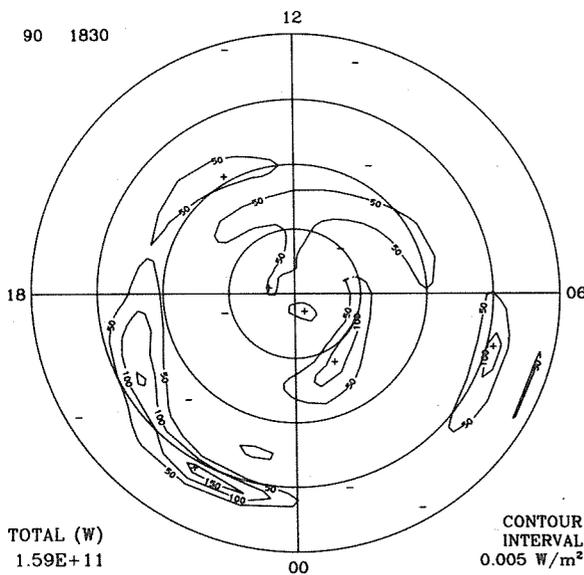
CONTOUR  
INTERVAL  
10 KV

IONOSPHERIC CURRENT



2 A/m →

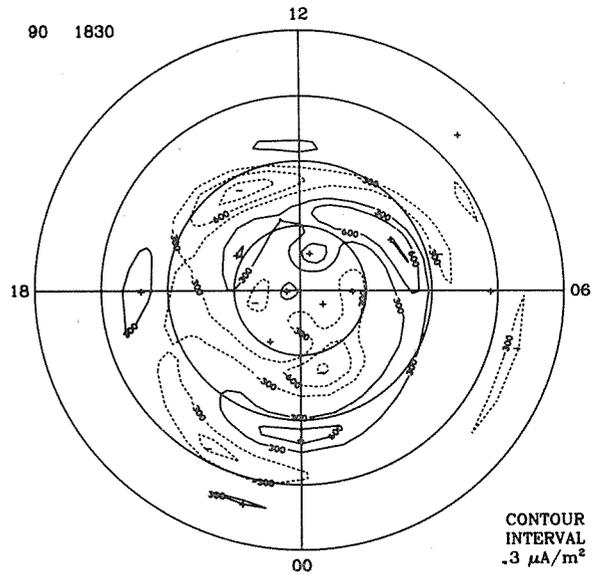
JOULE HEAT RATE



TOTAL (W)  
1.59E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

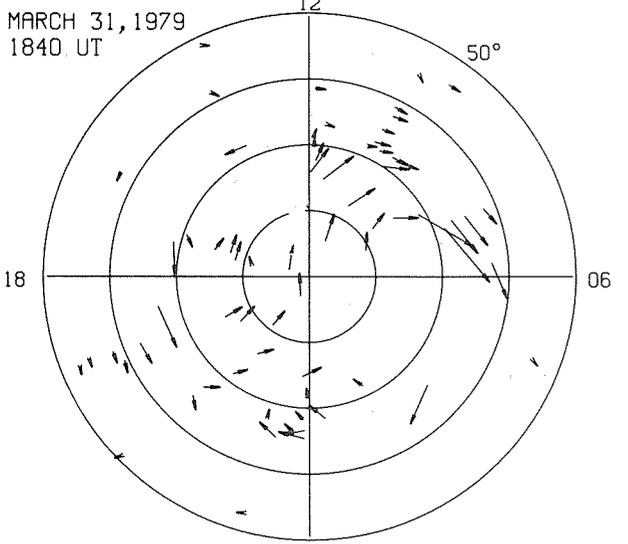
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

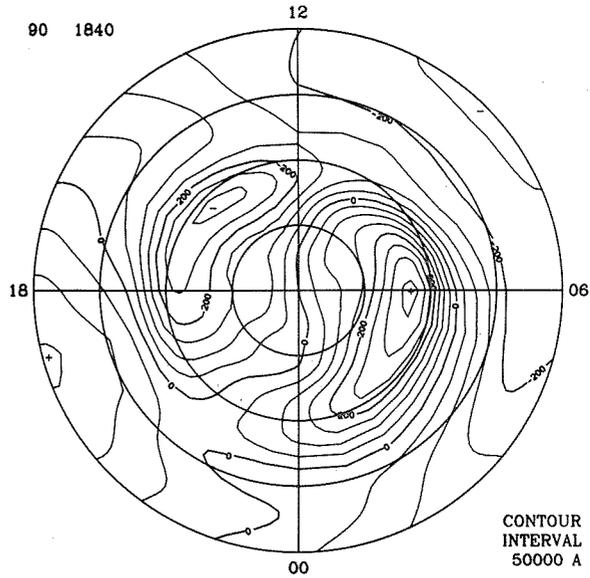
MARCH 31, 1979  
1840 UT



00 MLT  
ELECTRIC POTENTIAL

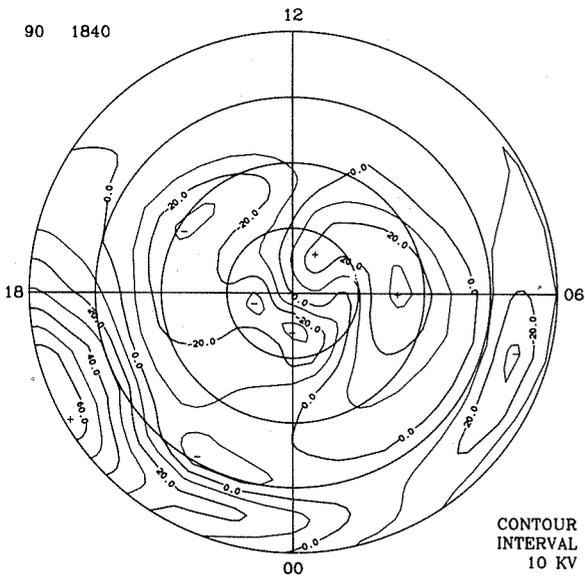
→ 250 nT

EQUIVALENT CURRENT SYSTEM



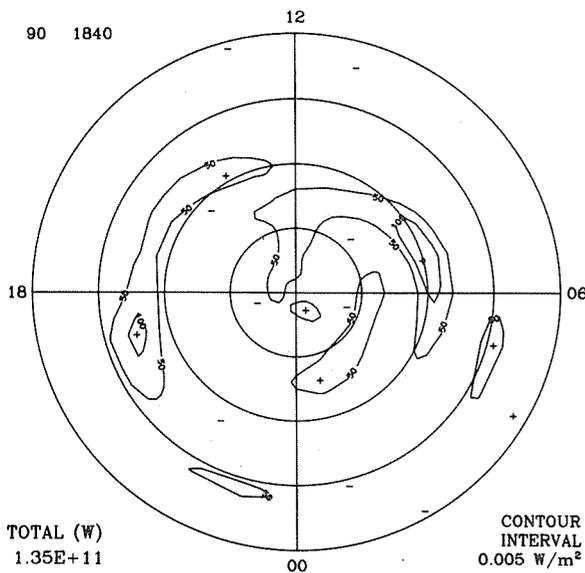
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



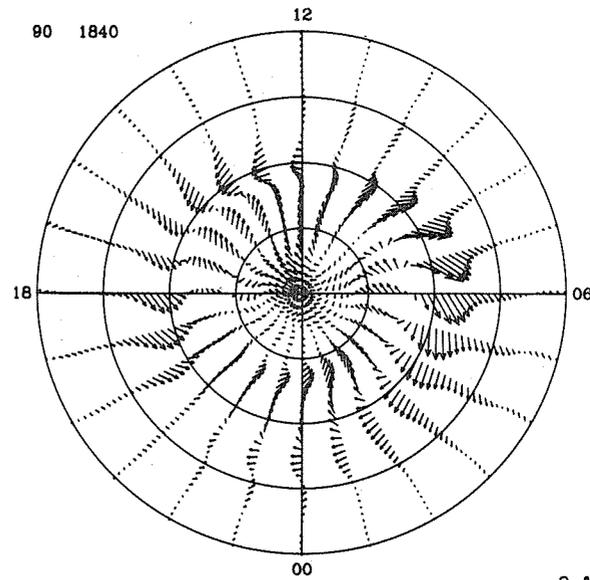
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



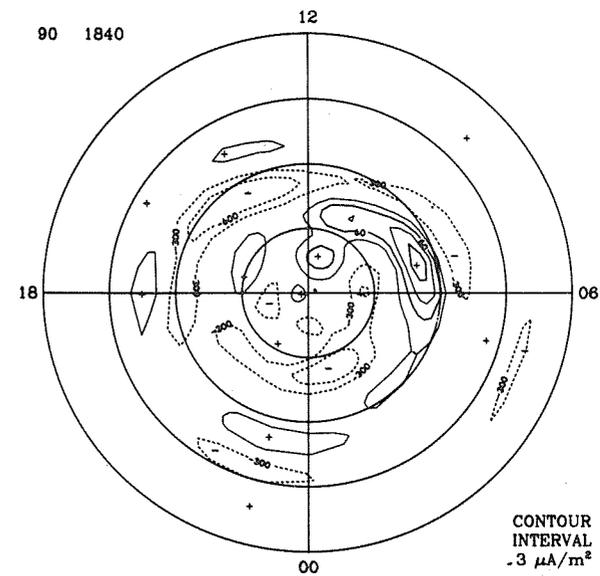
TOTAL (W)  
1.35E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>



→ 2 A/m

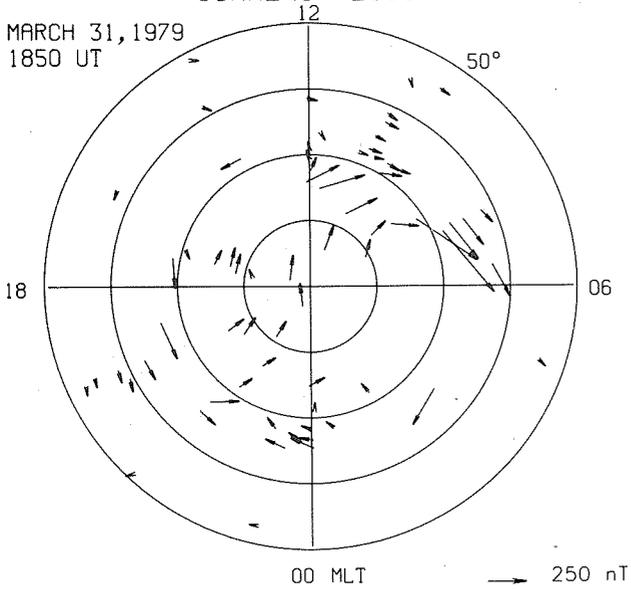
FIELD-ALIGNED CURRENTS



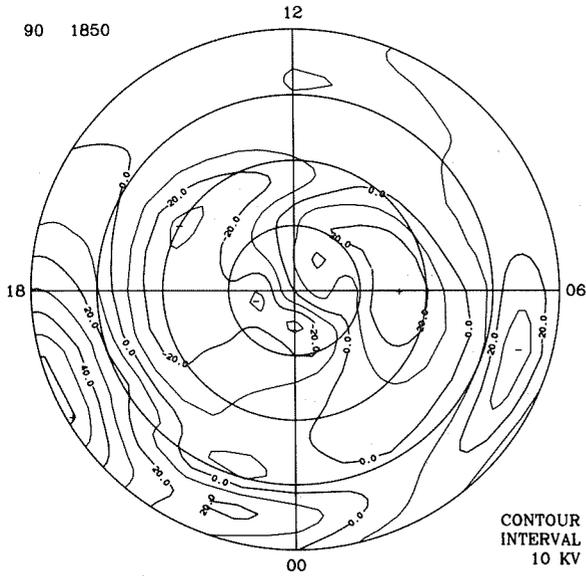
CONTOUR  
INTERVAL  
3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

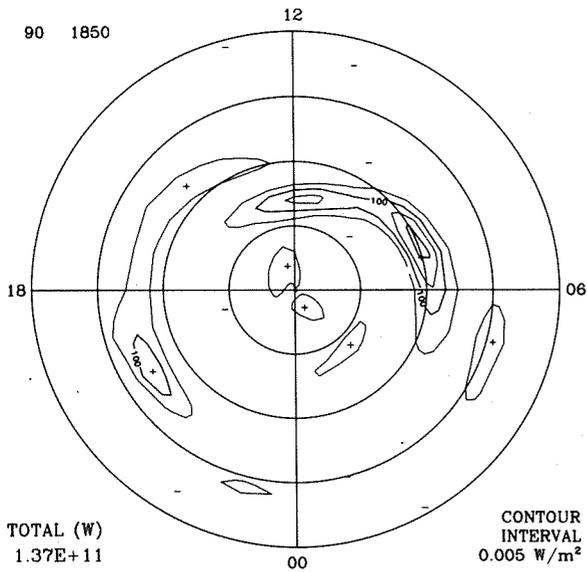
MARCH 31, 1979  
1850 UT



ELECTRIC POTENTIAL



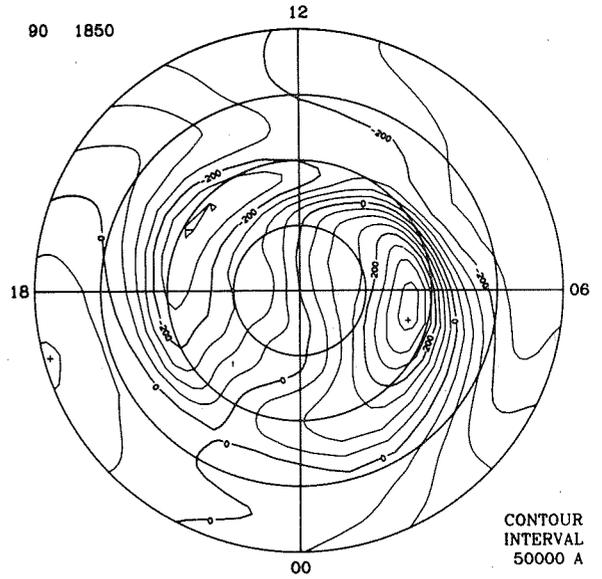
JOULE HEAT RATE



TOTAL (W)  
1.37E+11

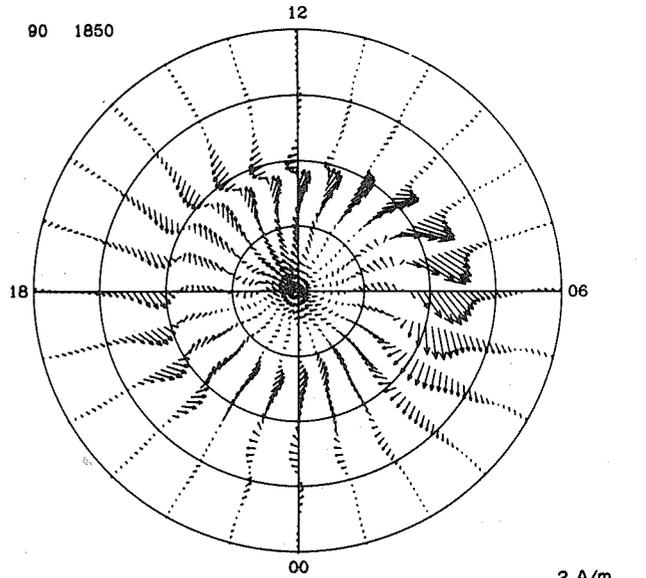
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

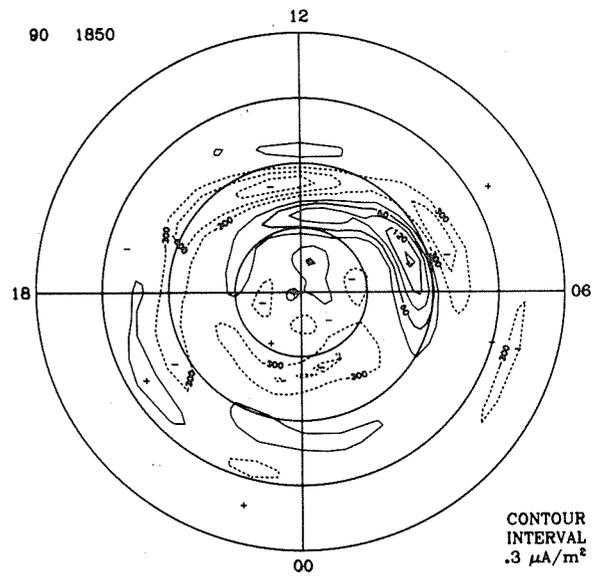


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



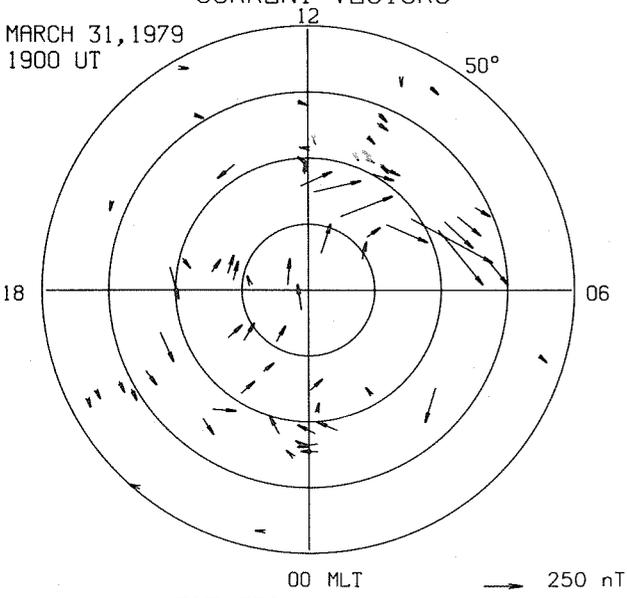
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

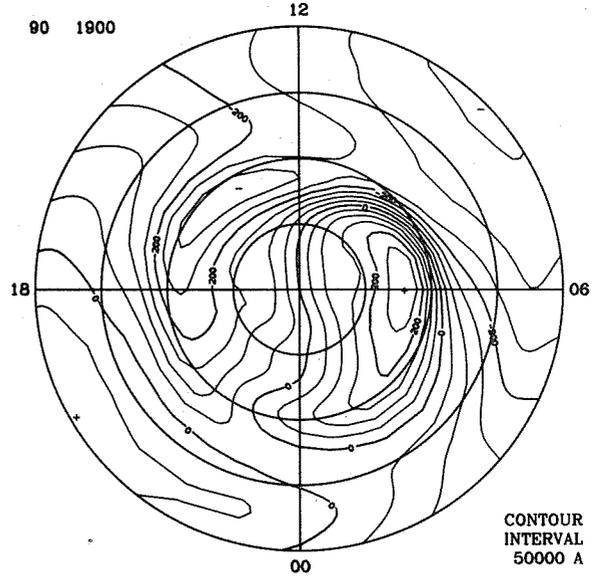
MARCH 31, 1979  
1900 UT



00 MLT

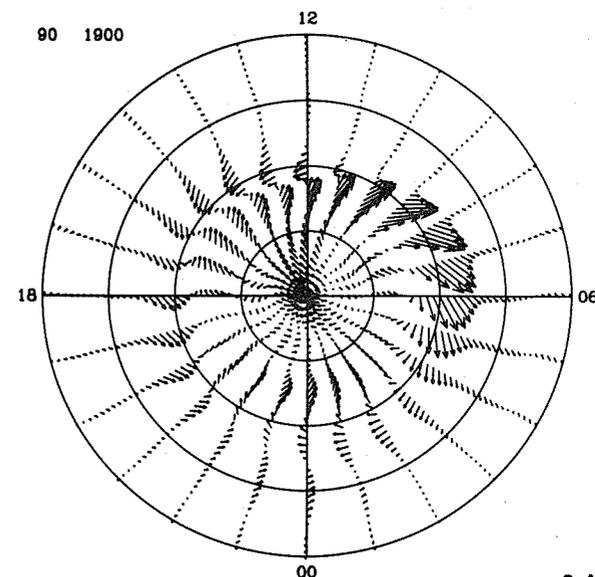
→ 250 nT

EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



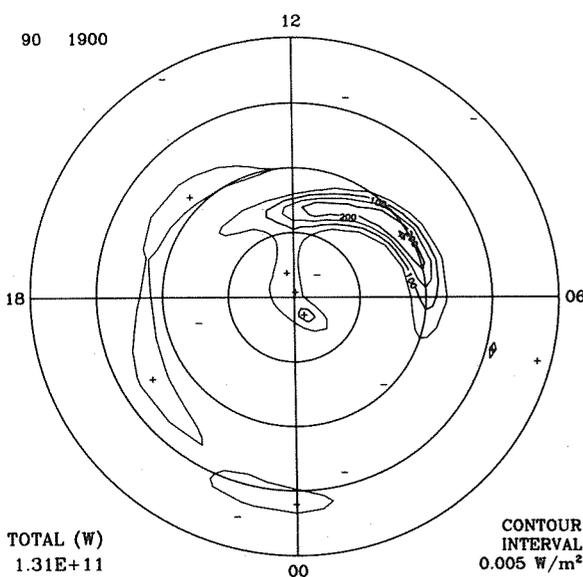
→ 2 A/m

JOULE HEAT RATE

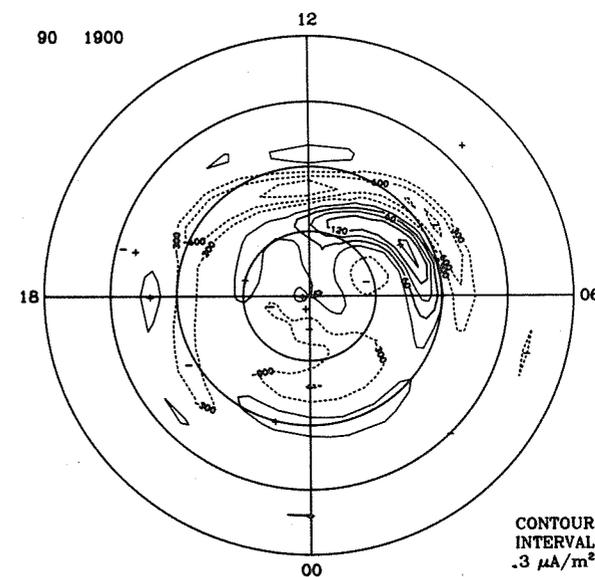


CONTOUR  
INTERVAL  
10 KV

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

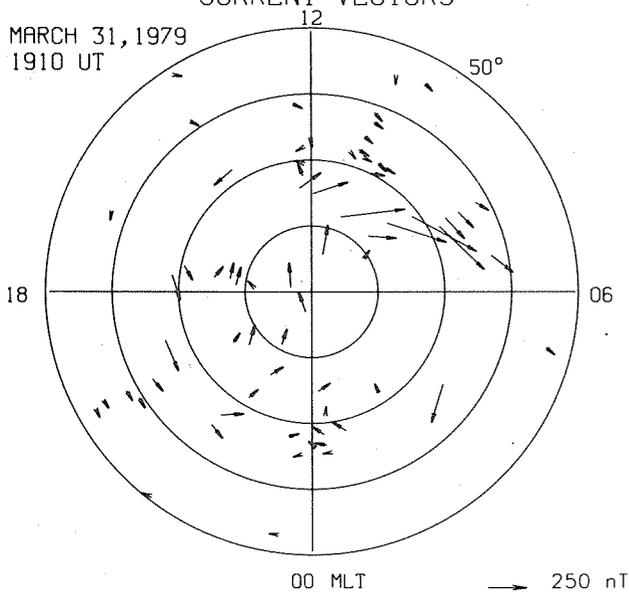


CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

TOTAL (W)  
1.31E+11

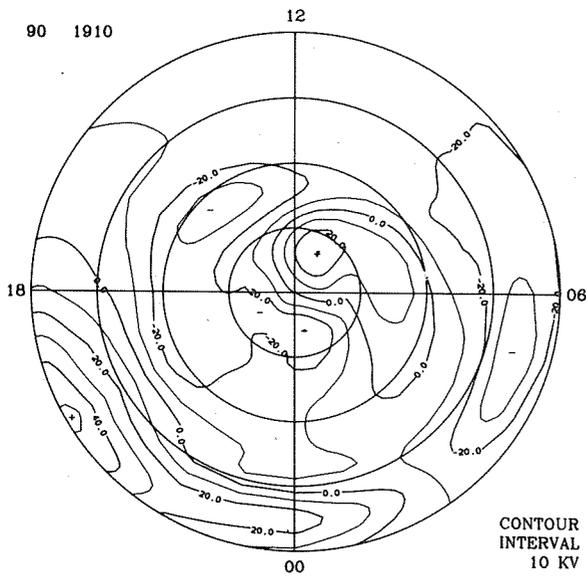
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1910 UT



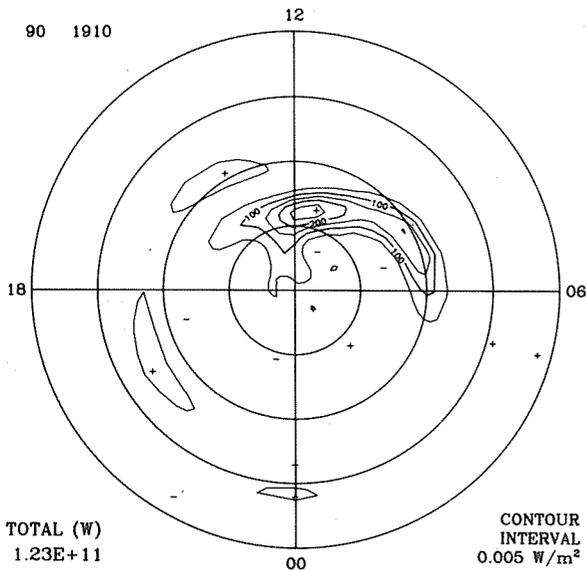
ELECTRIC POTENTIAL

90 1910



JOULE HEAT RATE

90 1910

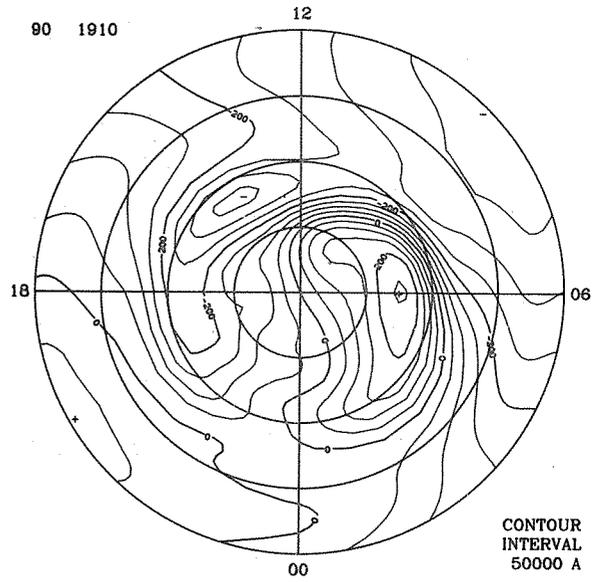


TOTAL (W)  
1.23E+11

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

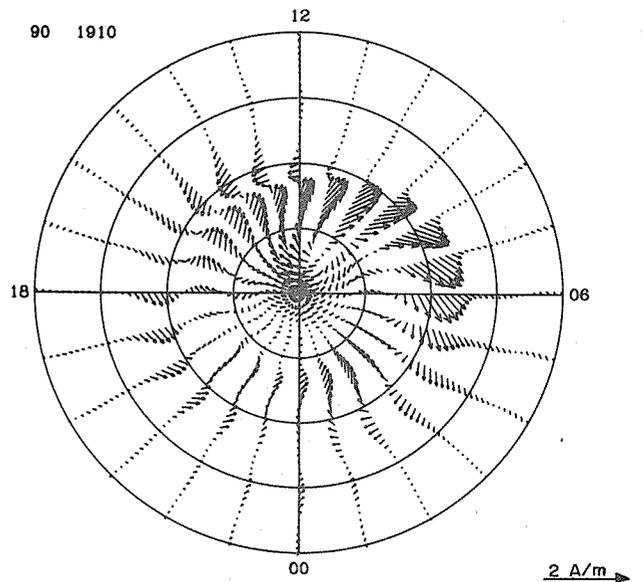
90 1910



CONTOUR  
INTERVAL  
50000 A

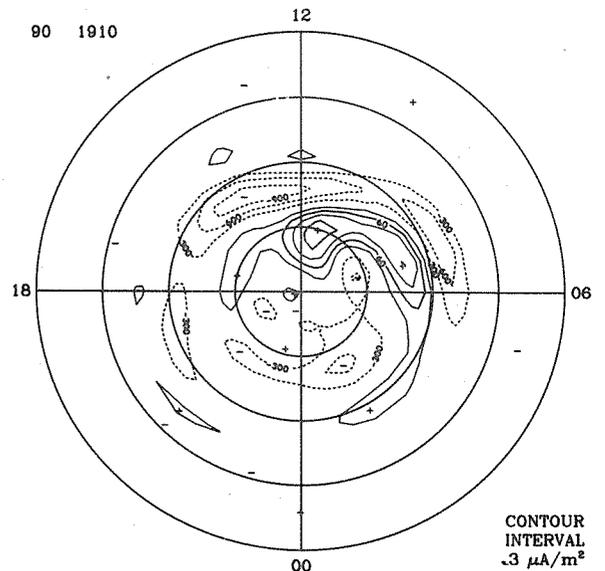
IONOSPHERIC CURRENT

90 1910



FIELD-ALIGNED CURRENTS

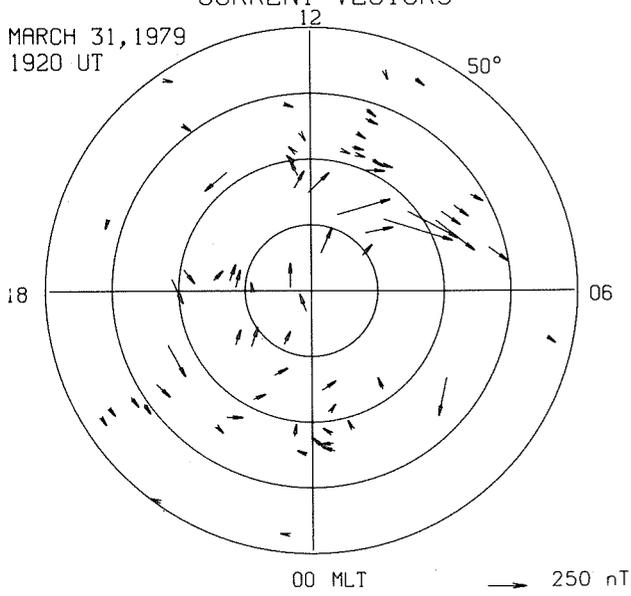
90 1910



CONTOUR  
INTERVAL  
.3 μA/m²

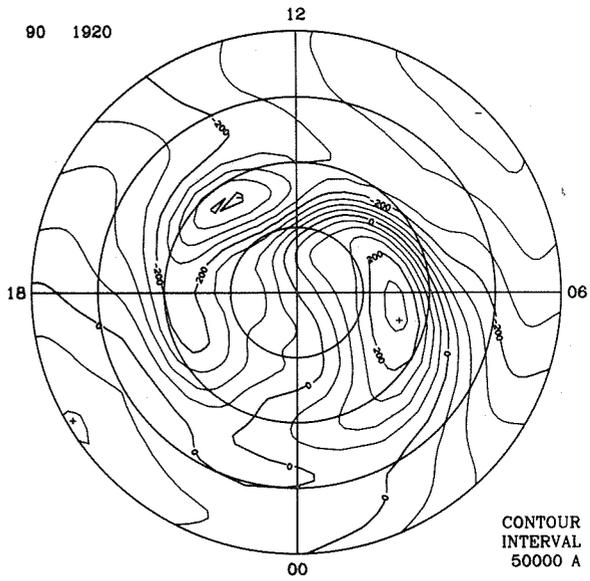
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1920 UT



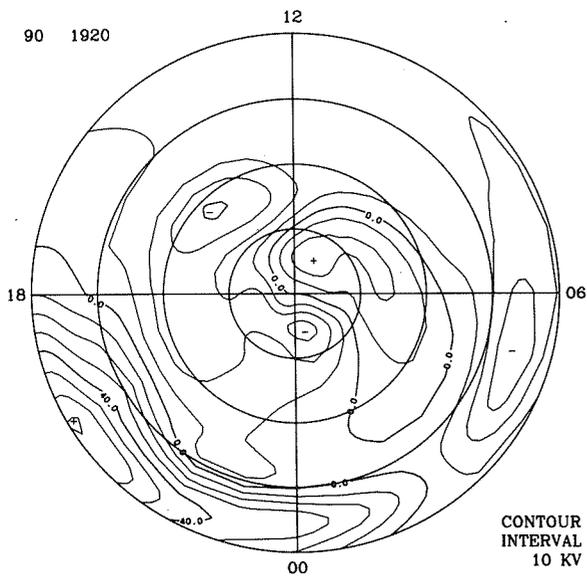
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



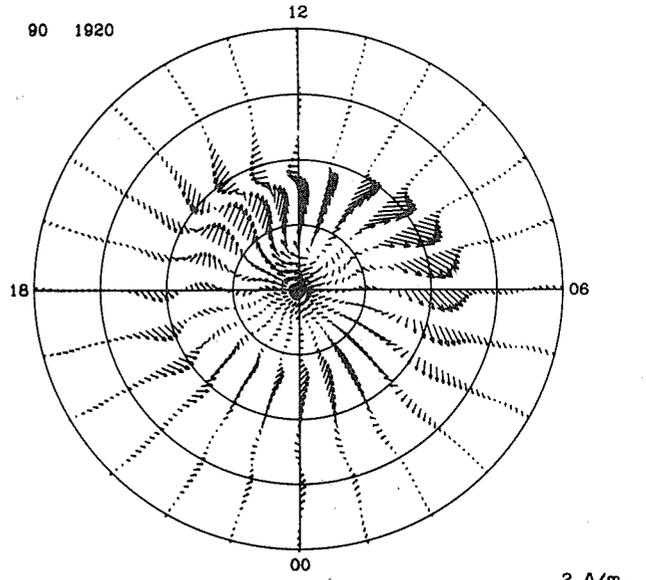
IONOSPHERIC CURRENT

90 1920



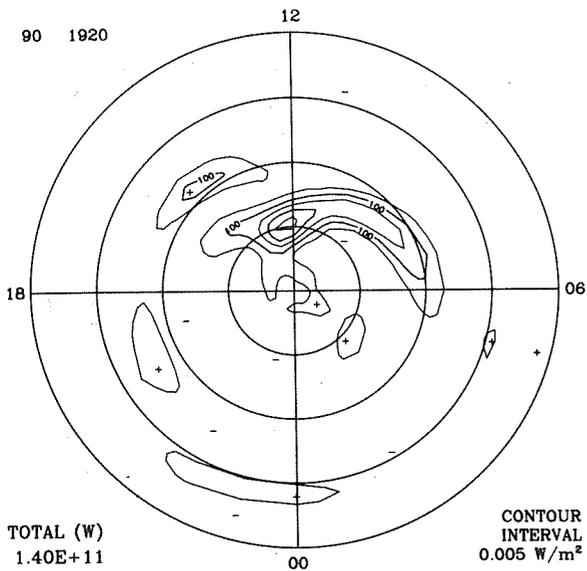
JOULE HEAT RATE

90 1920



FIELD-ALIGNED CURRENTS

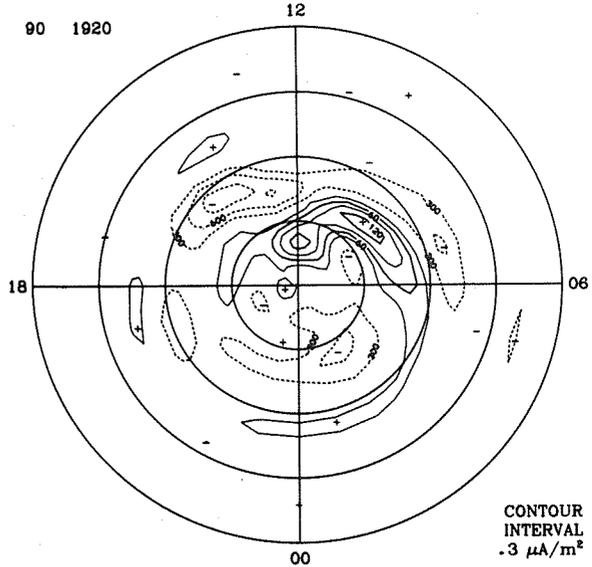
90 1920



TOTAL (W)  
1.40E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

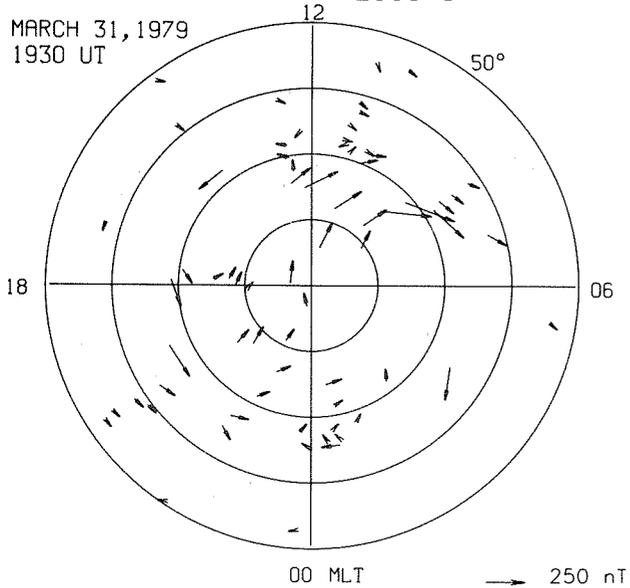
90 1920



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

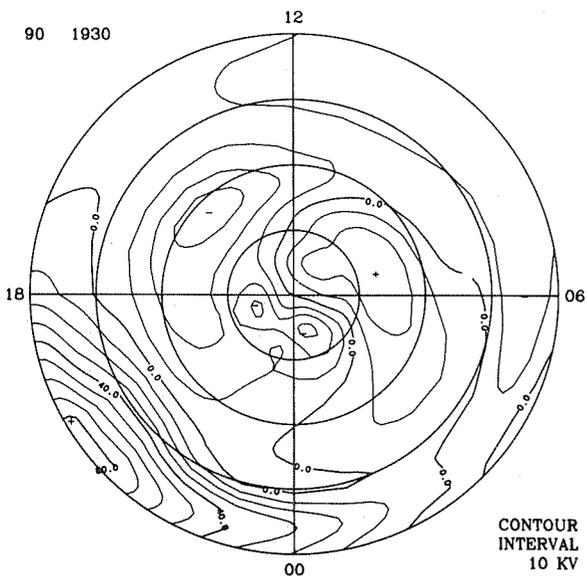
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1930 UT



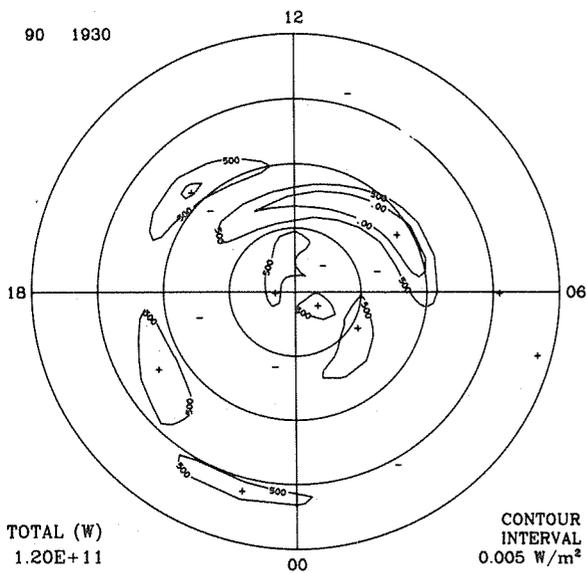
ELECTRIC POTENTIAL

90 1930



JOULE HEAT RATE

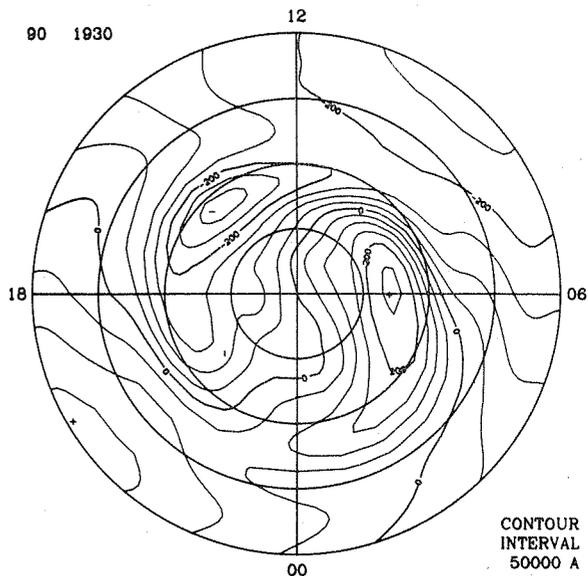
90 1930



TOTAL (W)  
1.20E+11

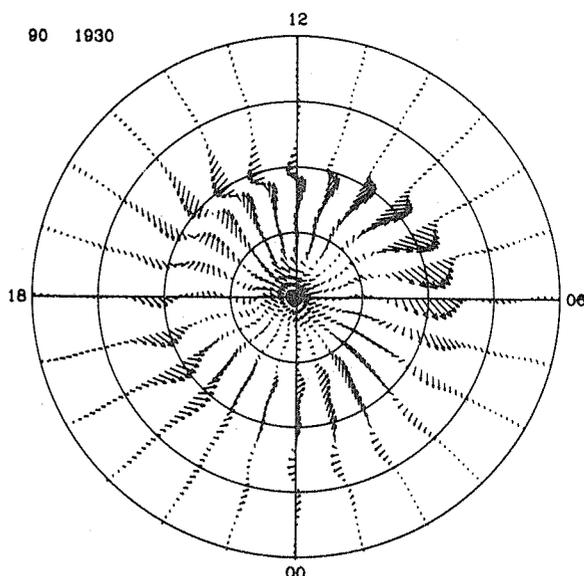
EQUIVALENT CURRENT SYSTEM

90 1930



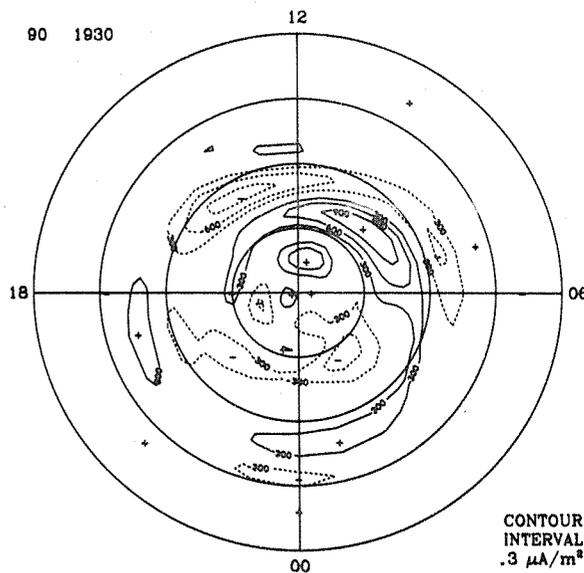
IONOSPHERIC CURRENT

90 1930



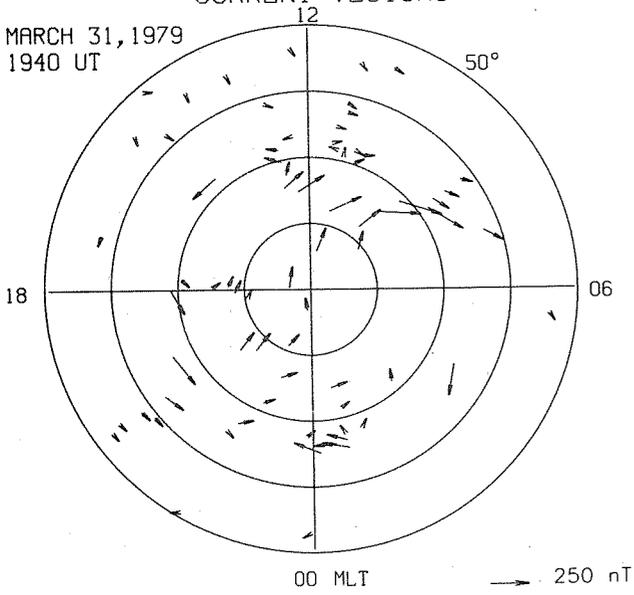
FIELD-ALIGNED CURRENTS

90 1930



OBSERVED EQUIVALENT  
CURRENT VECTORS

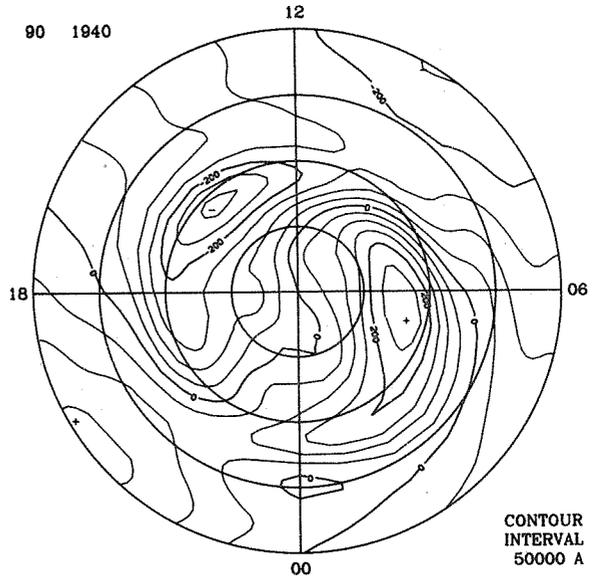
MARCH 31, 1979  
1940 UT



ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

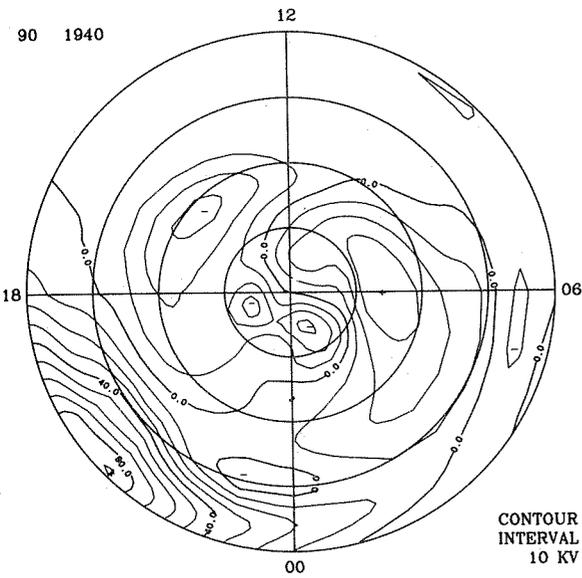
90 1940



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

90 1940

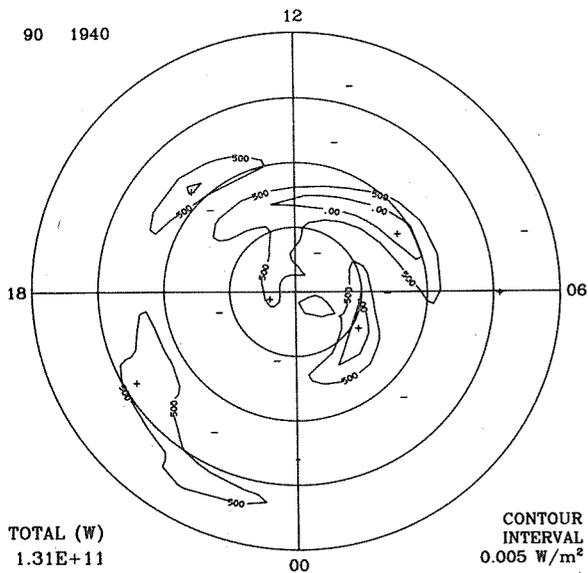


CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

FIELD-ALIGNED CURRENTS

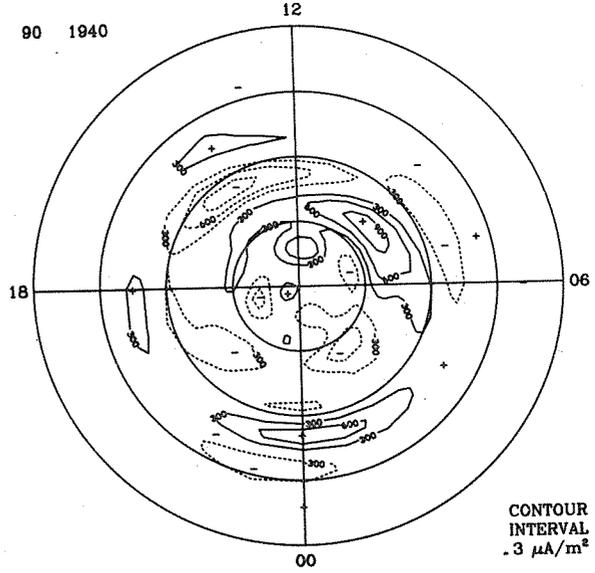
90 1940



TOTAL (W)  
1.31E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

90 1940

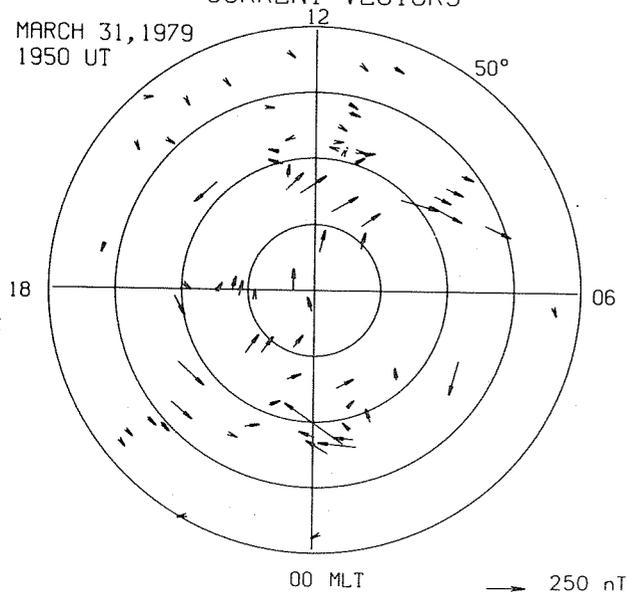


2 A/m

CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
1950 UT

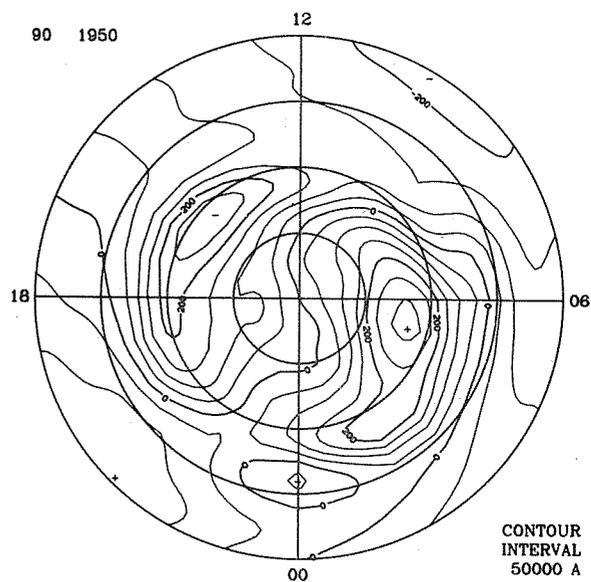


00 MLT

→ 250 nT

EQUIVALENT CURRENT SYSTEM

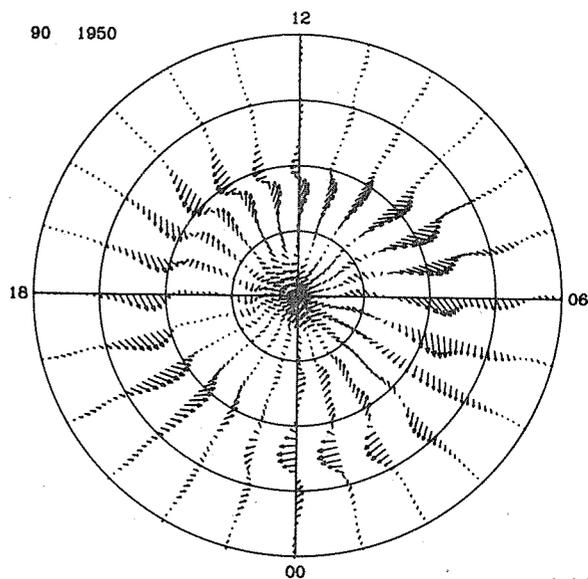
90 1950



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

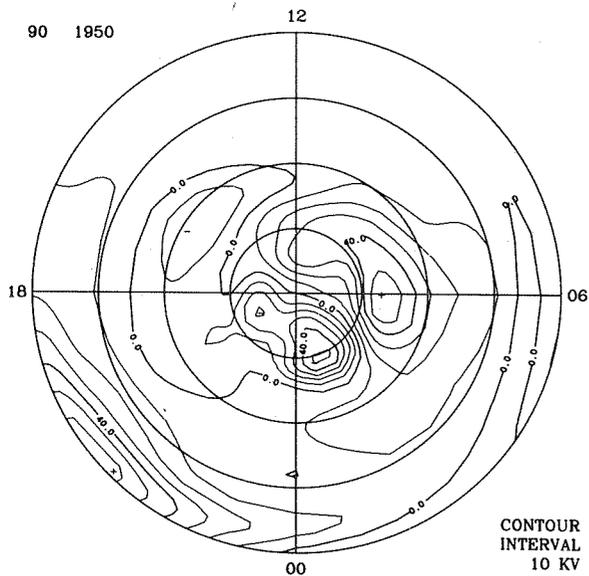
90 1950



→ 2 A/m

JOULE HEAT RATE

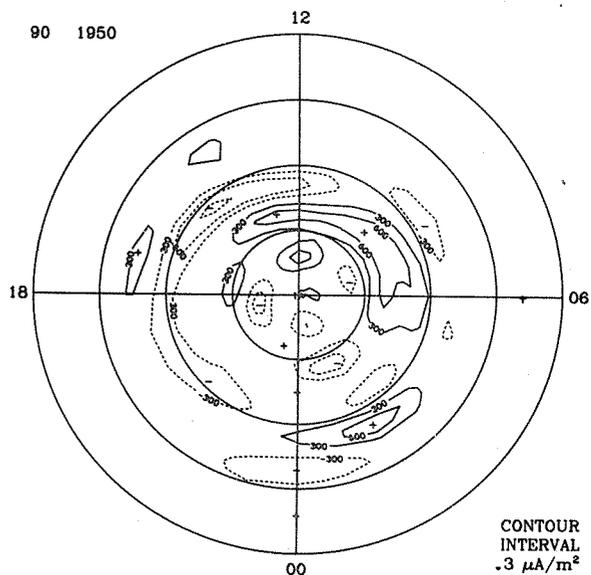
90 1950



CONTOUR  
INTERVAL  
10 KV

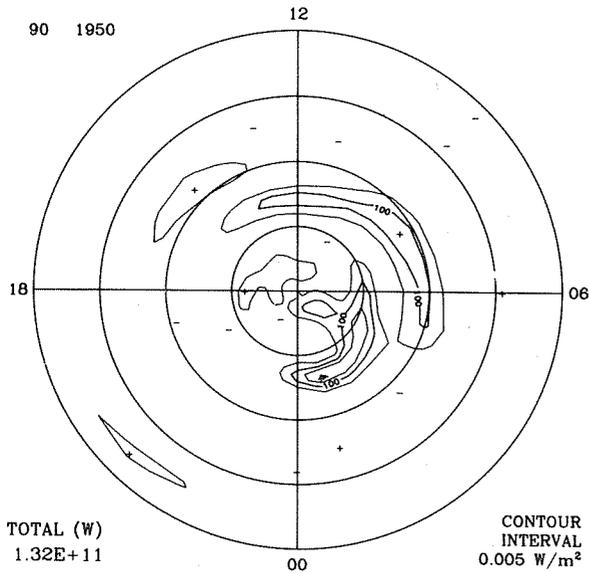
FIELD-ALIGNED CURRENTS

90 1950



CONTOUR  
INTERVAL  
.3 μA/m²

90 1950

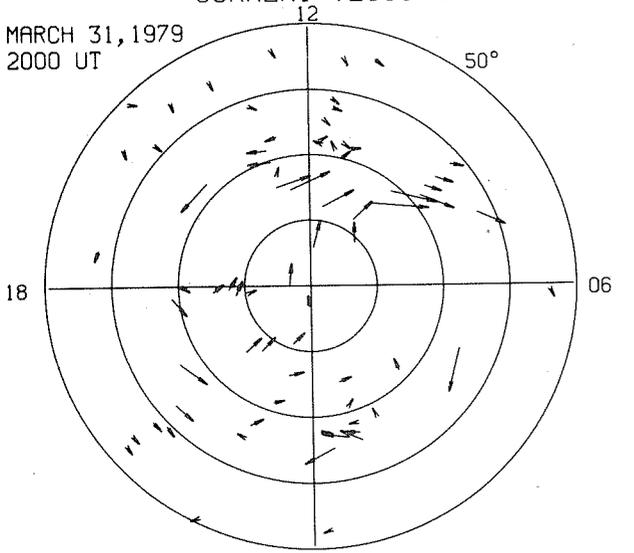


CONTOUR  
INTERVAL  
0.005 W/m²

TOTAL (W)  
1.32E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

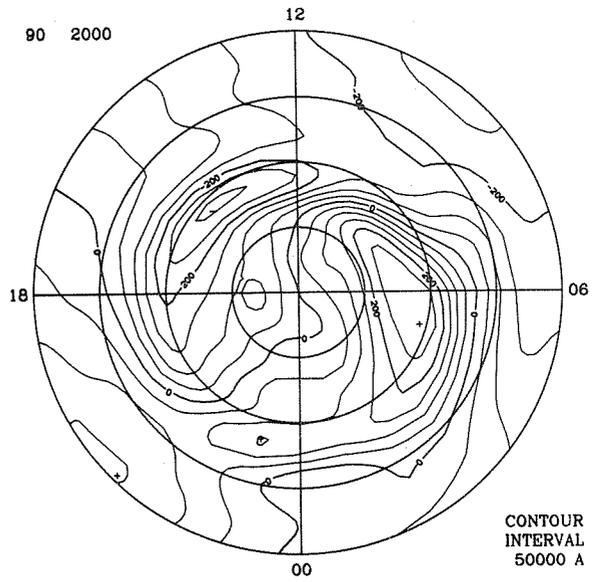
MARCH 31, 1979  
2000 UT



00 MLT  
ELECTRIC POTENTIAL

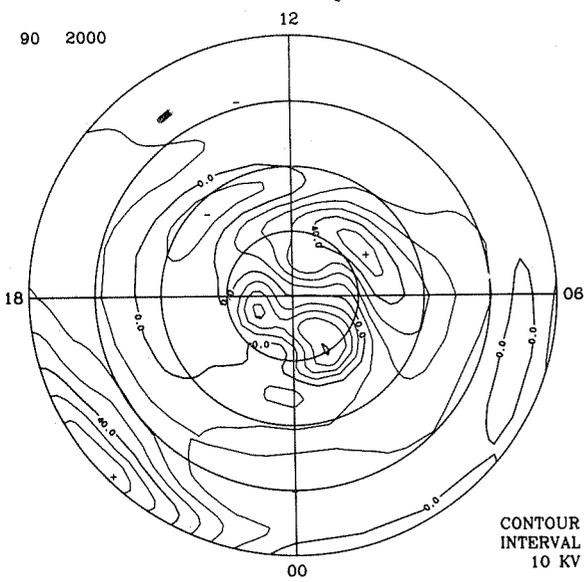
→ 250 nT

EQUIVALENT CURRENT SYSTEM



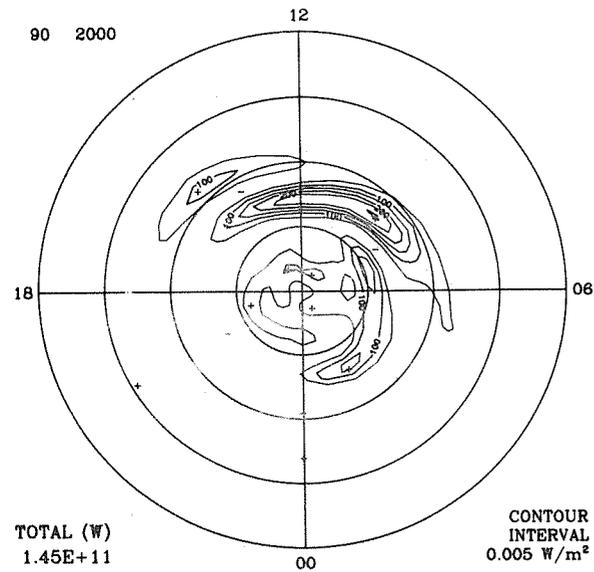
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



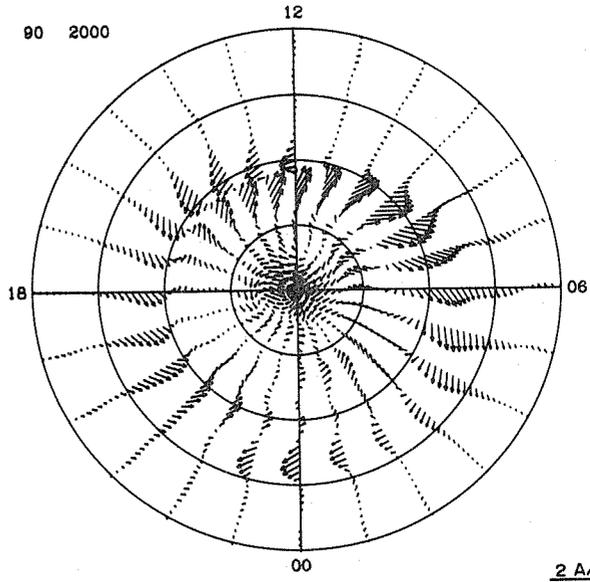
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



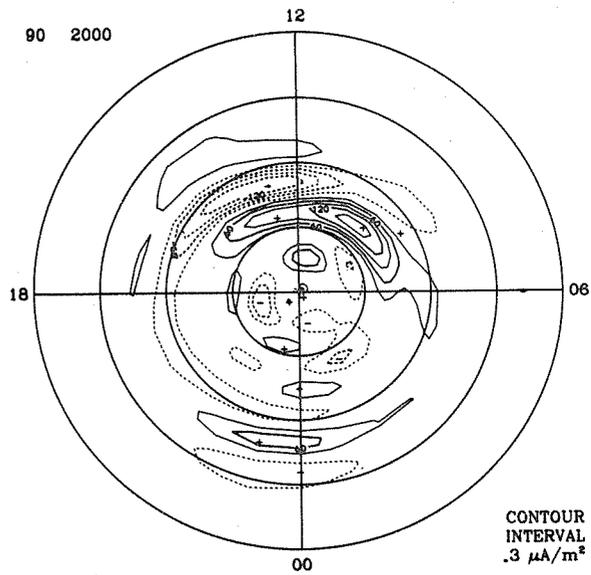
TOTAL (W)  
1.45E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>



→ 2 A/m

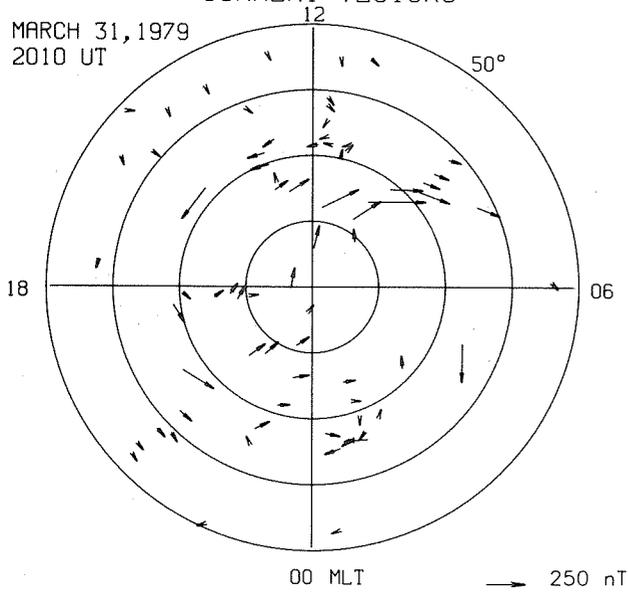
FIELD-ALIGNED CURRENTS



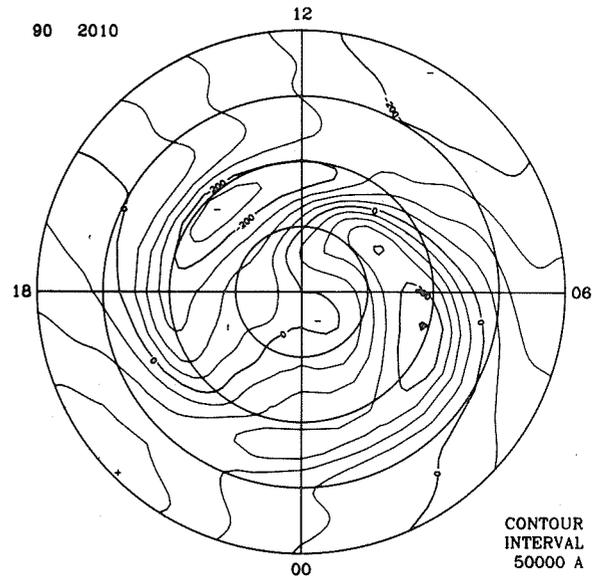
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

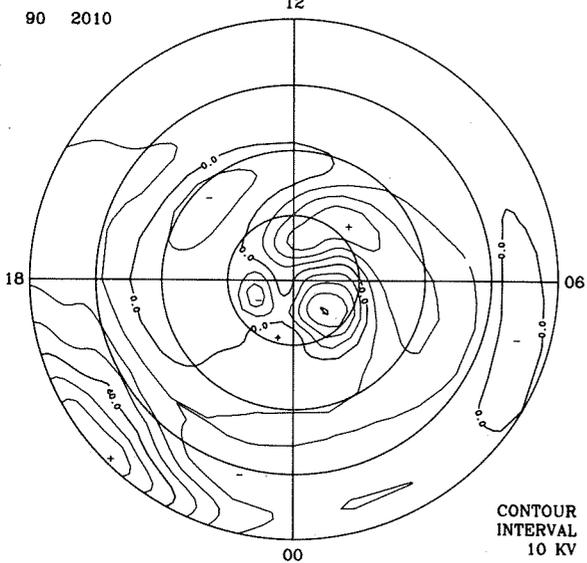
MARCH 31, 1979  
2010 UT



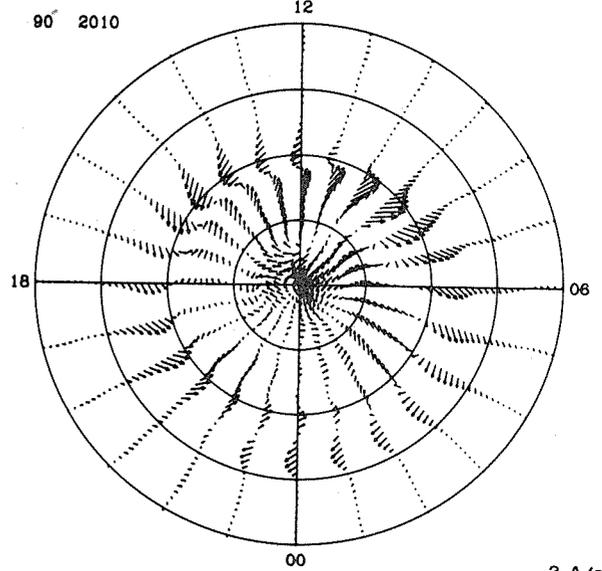
EQUIVALENT CURRENT SYSTEM



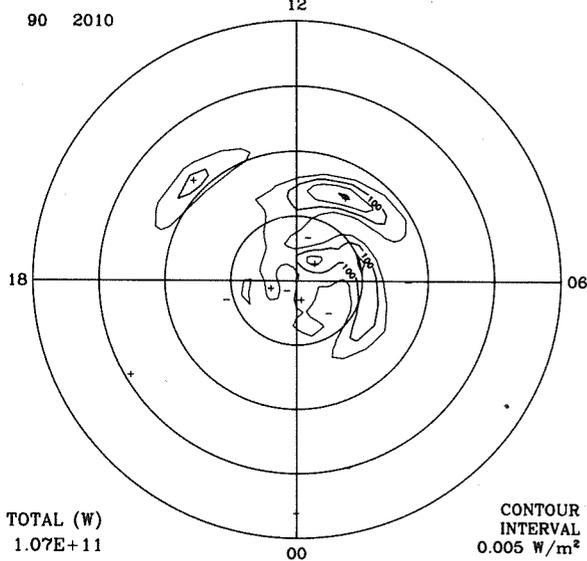
ELECTRIC POTENTIAL



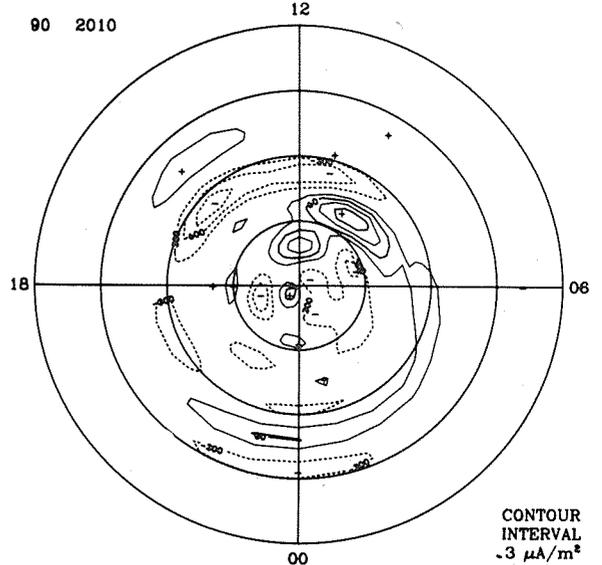
IONOSPHERIC CURRENT



JOULE HEAT RATE

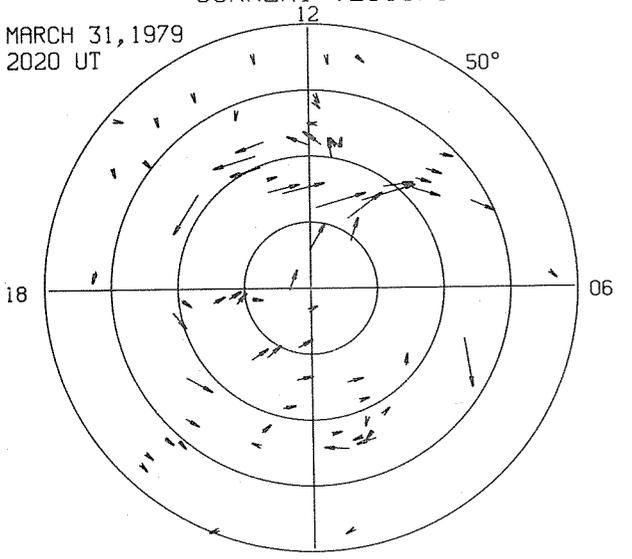


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2020 UT

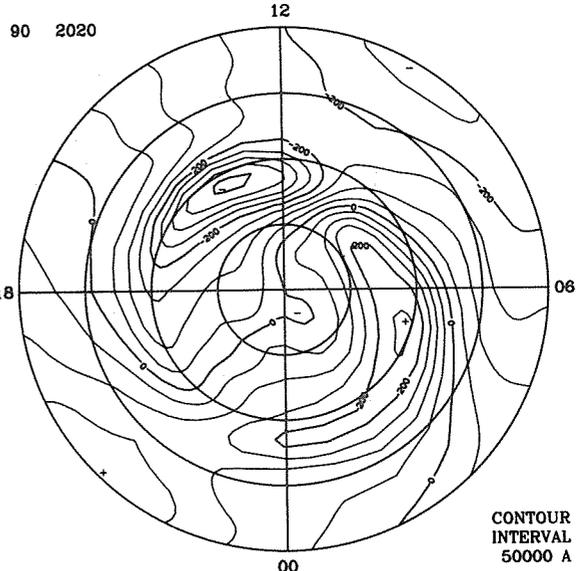


00 MLT

→ 250 nT

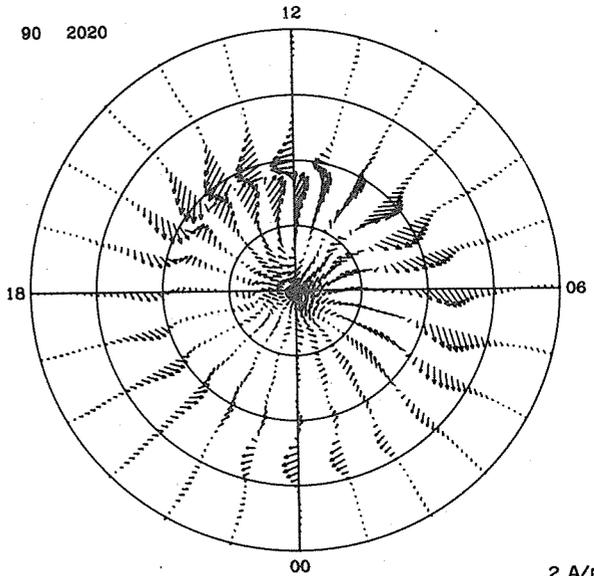
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
50000 A

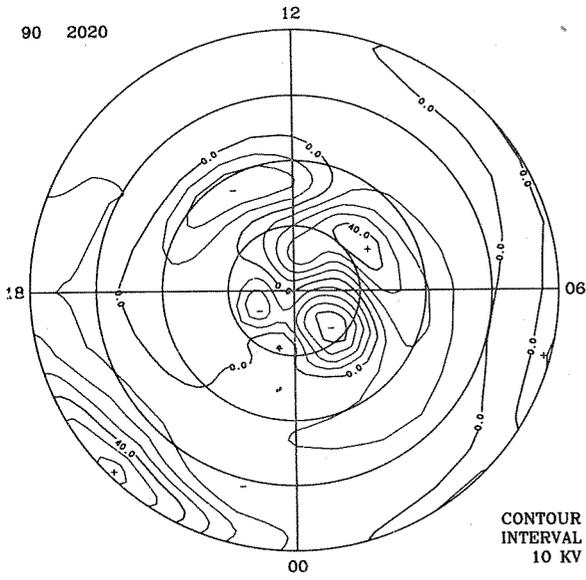
IONOSPHERIC CURRENT



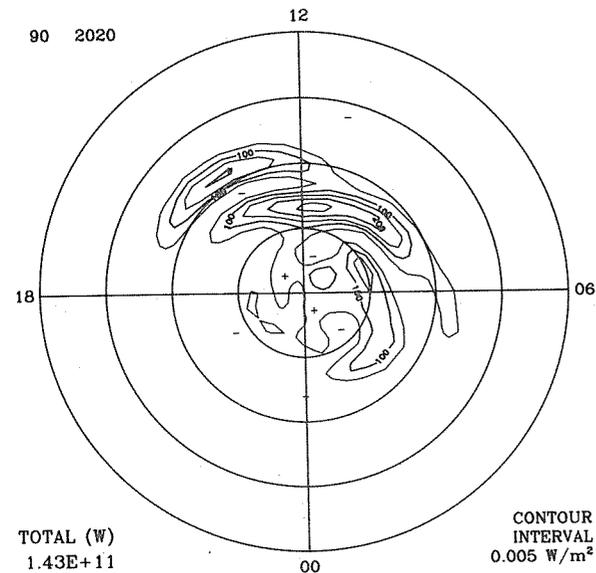
→ 2 A/m

JOULE HEAT RATE

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
10 KV



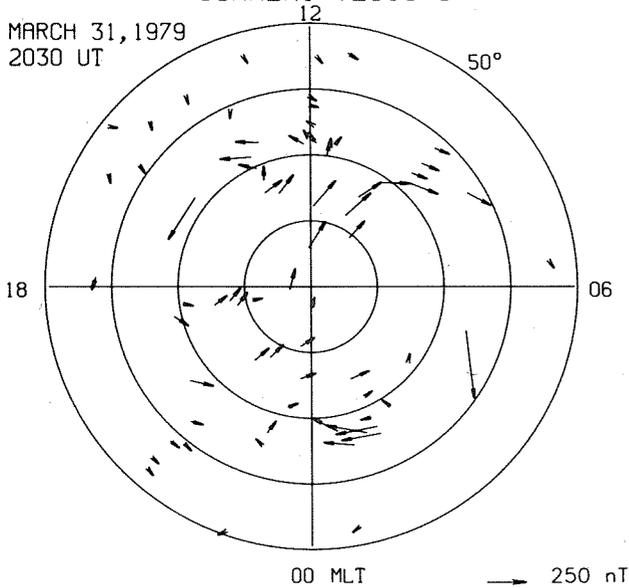
CONTOUR  
INTERVAL  
0.3 μA/m²

TOTAL (W)  
1.43E+11

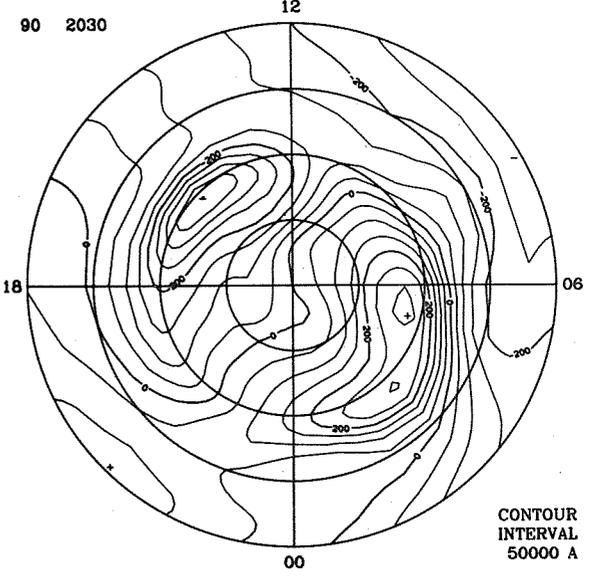
CONTOUR  
INTERVAL  
0.005 W/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

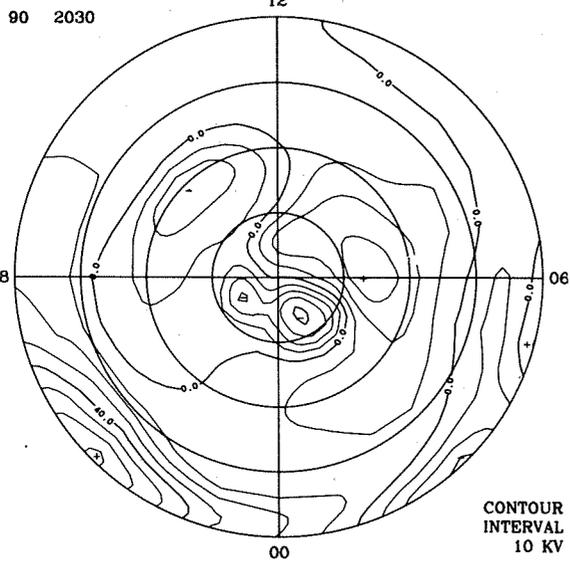
MARCH 31, 1979  
2030 UT



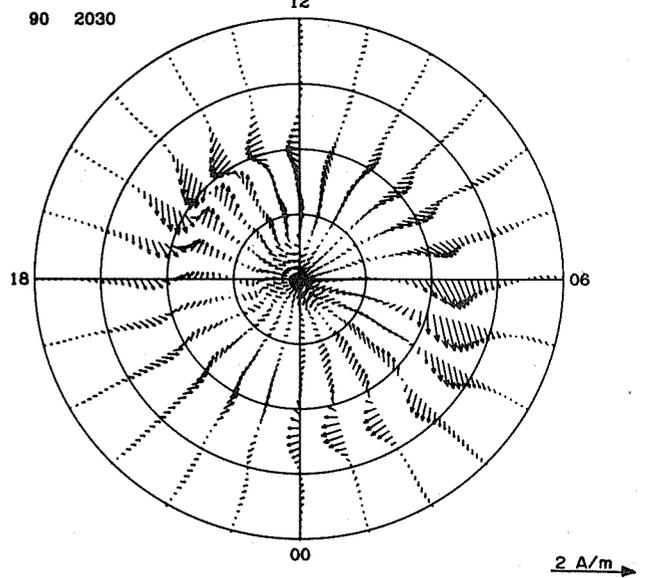
EQUIVALENT CURRENT SYSTEM



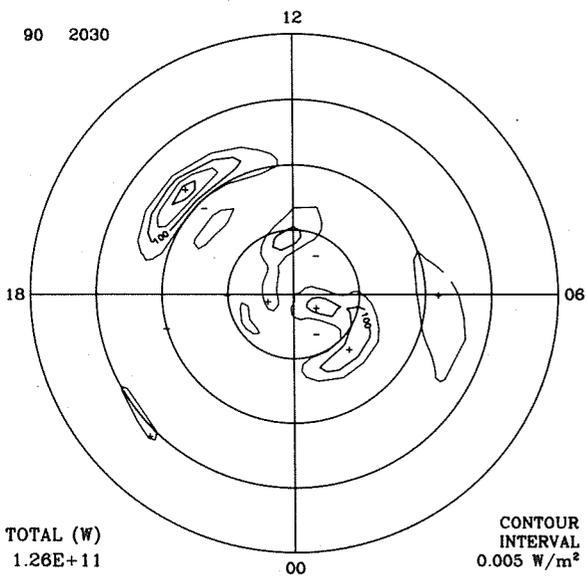
ELECTRIC POTENTIAL



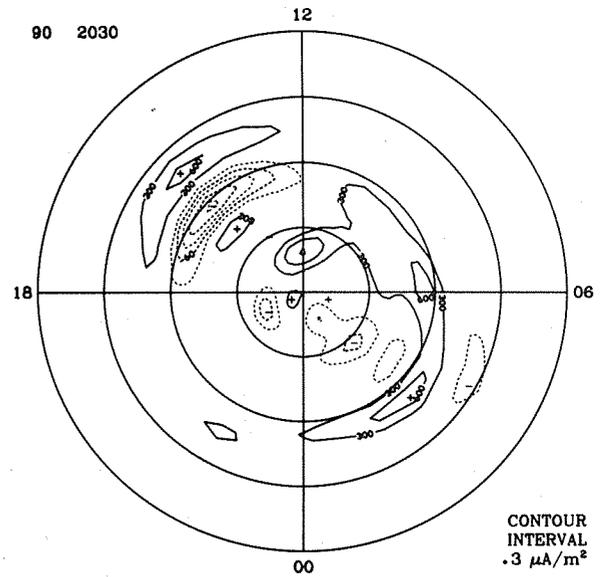
IONOSPHERIC CURRENT



JOULE HEAT RATE



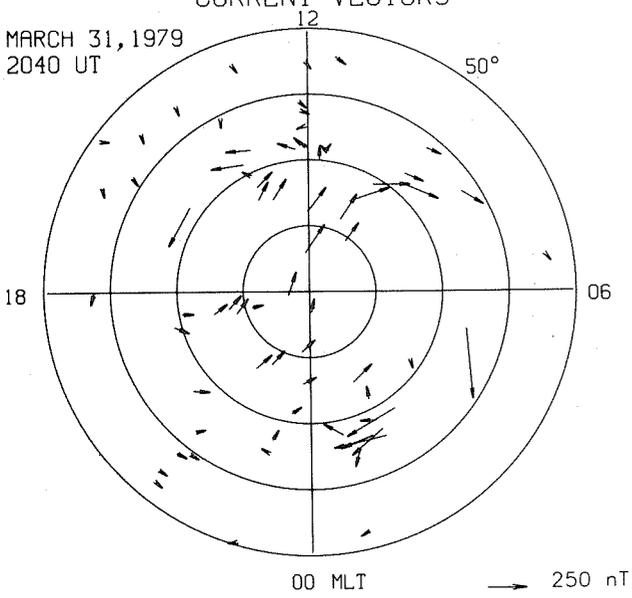
FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.26E+11

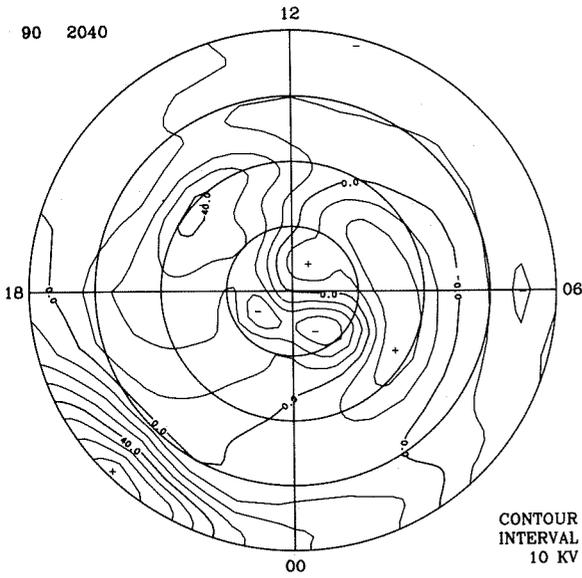
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2040 UT



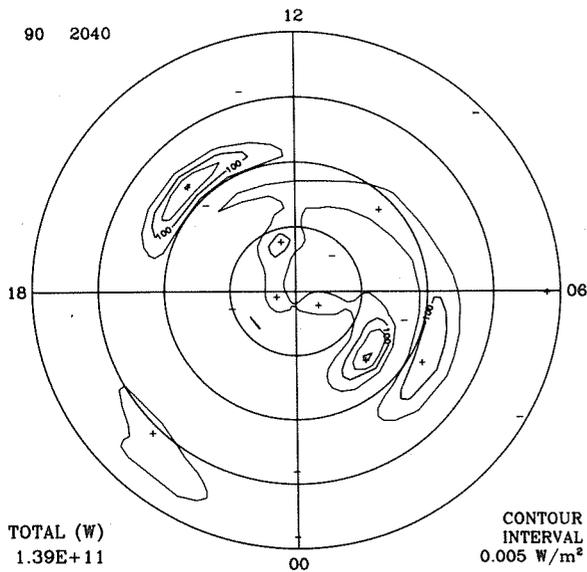
ELECTRIC POTENTIAL

90 2040



JOULE HEAT RATE

90 2040

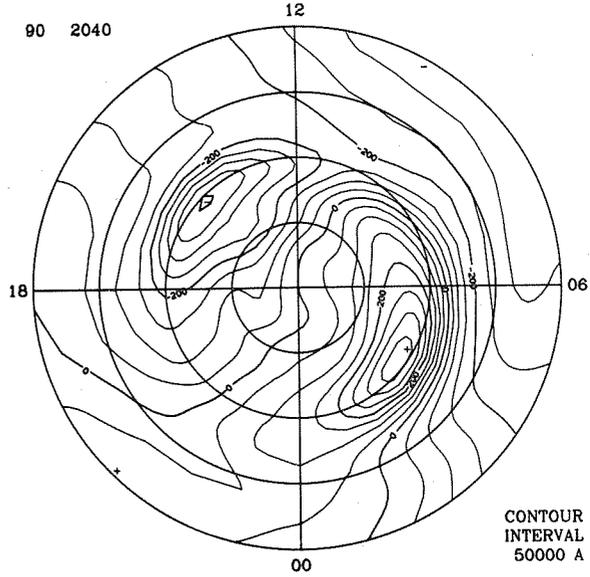


TOTAL (W)  
1.39E+11

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

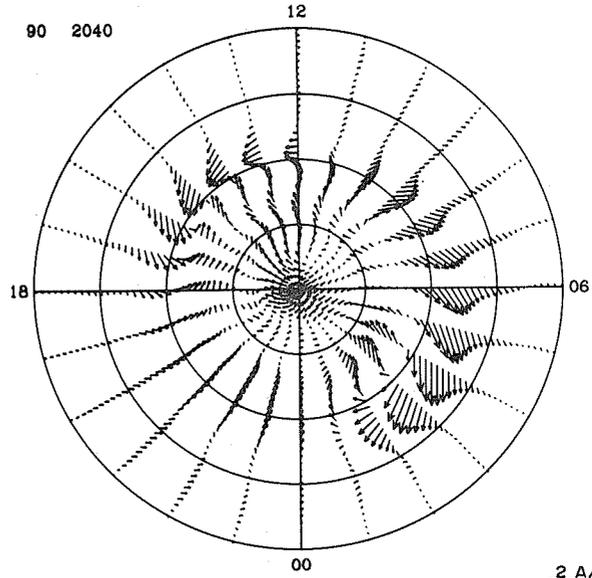
90 2040



CONTOUR  
INTERVAL  
50000 A

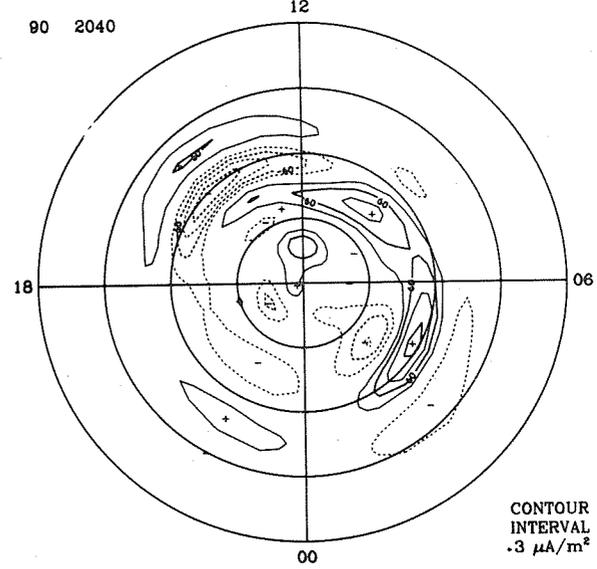
IONOSPHERIC CURRENT

90 2040



FIELD-ALIGNED CURRENTS

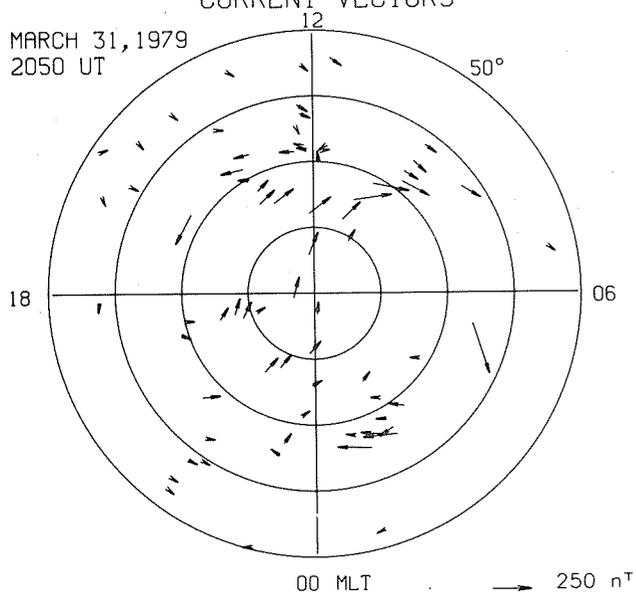
90 2040



CONTOUR  
INTERVAL  
.3 μA/m²

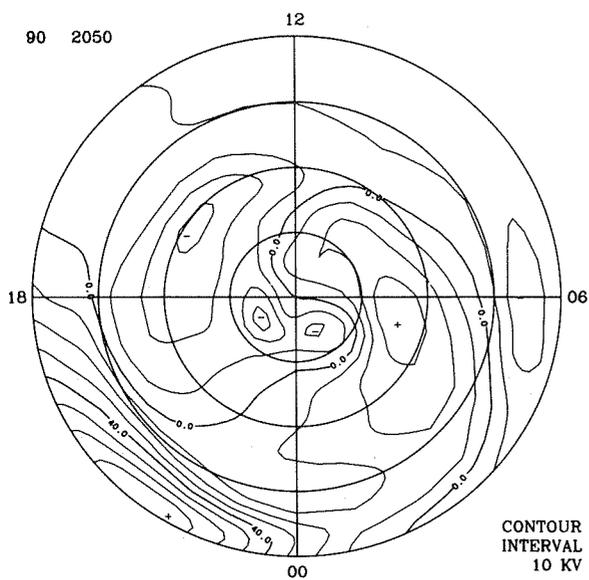
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2050 UT



ELECTRIC POTENTIAL

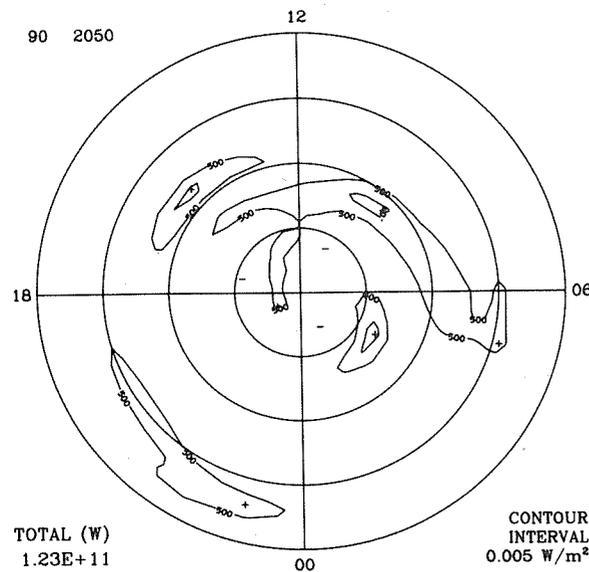
90 2050



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

90 2050

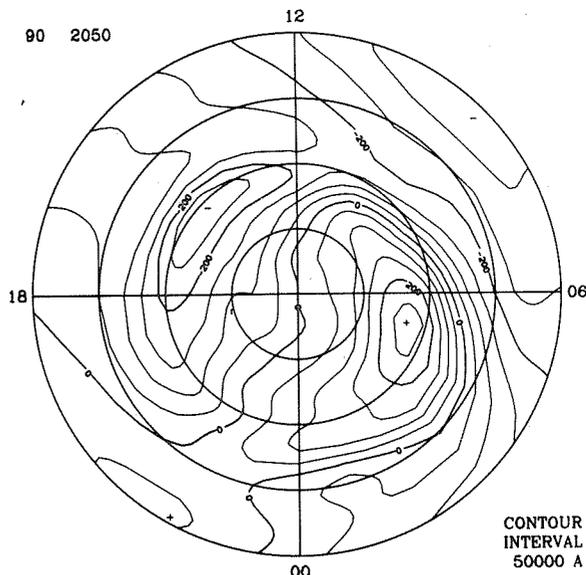


CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

TOTAL (W)  
1.23E+11

EQUIVALENT CURRENT SYSTEM

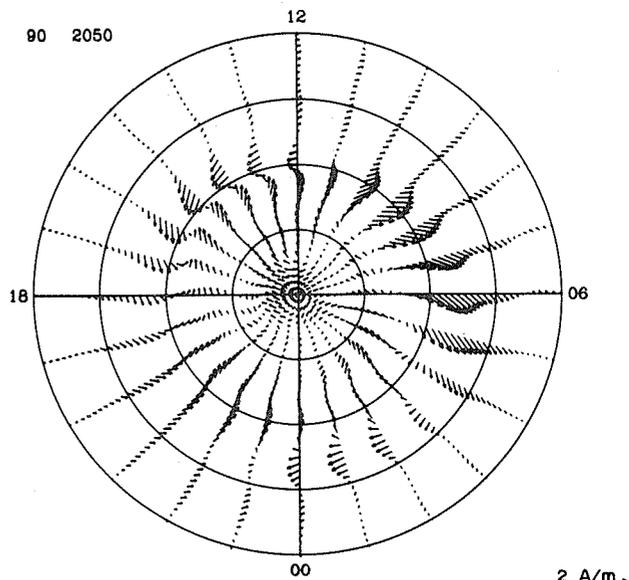
90 2050



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

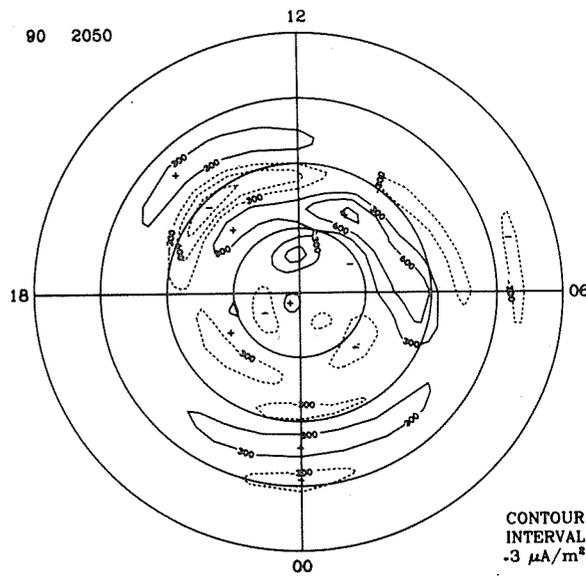
90 2050



2 A/m

FIELD-ALIGNED CURRENTS

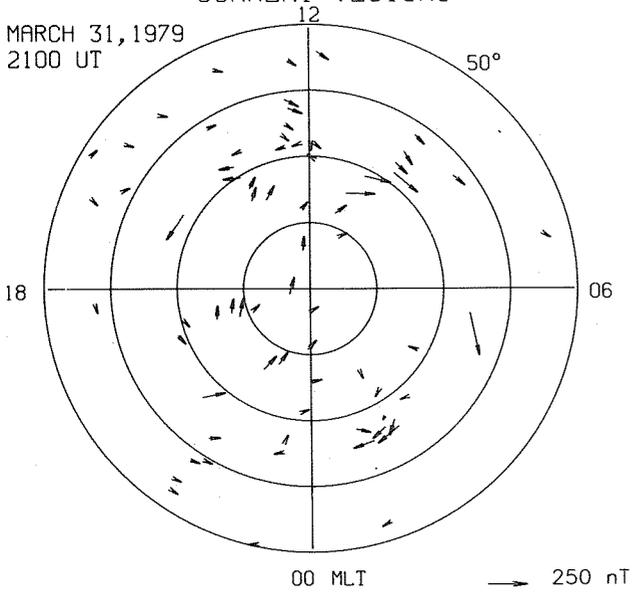
90 2050



CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

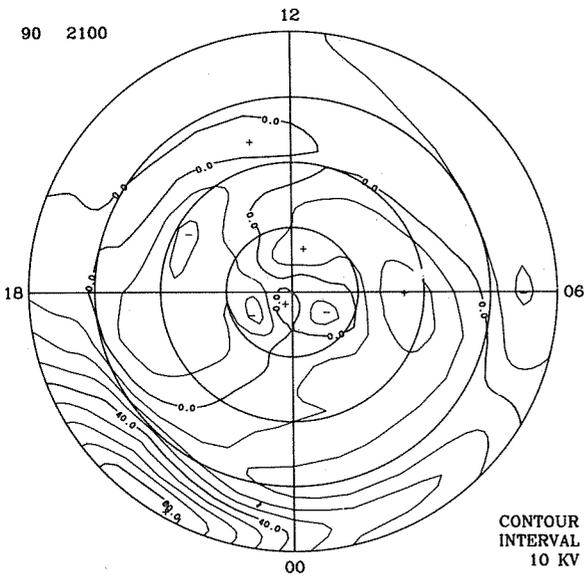
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2100 UT



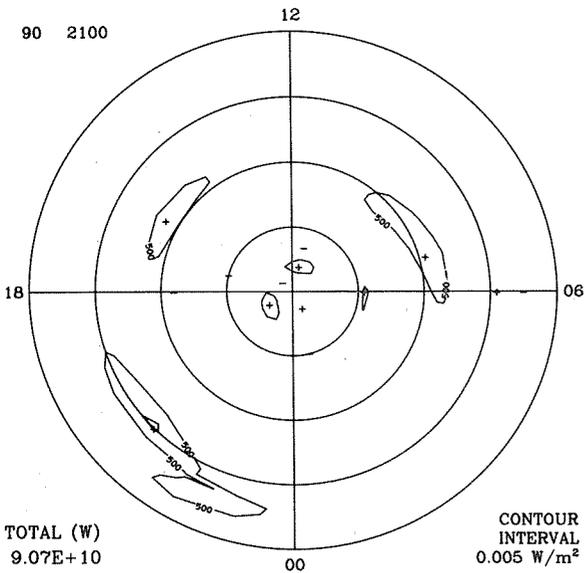
ELECTRIC POTENTIAL

90 2100



JOULE HEAT RATE

90 2100

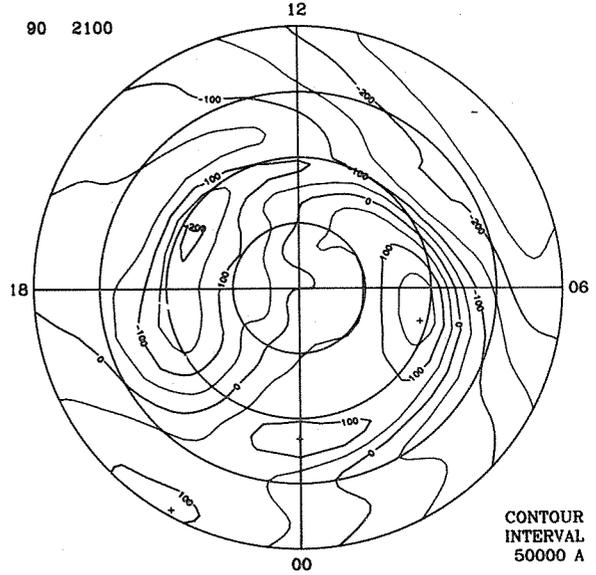


TOTAL (W)  
9.07E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

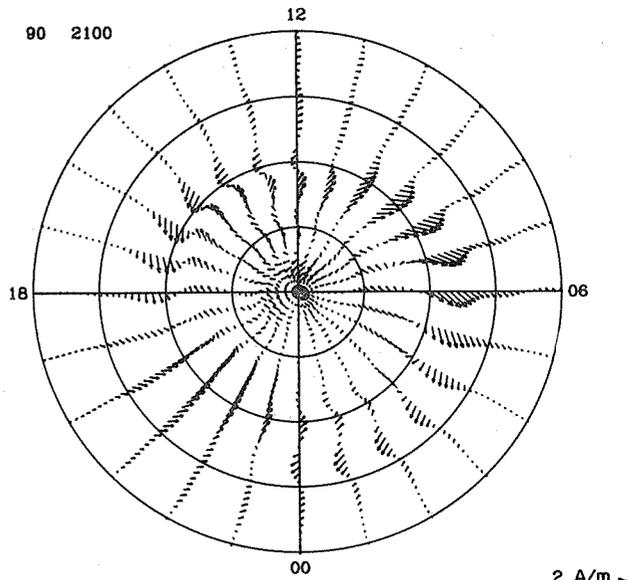
90 2100



CONTOUR  
INTERVAL  
50000 A

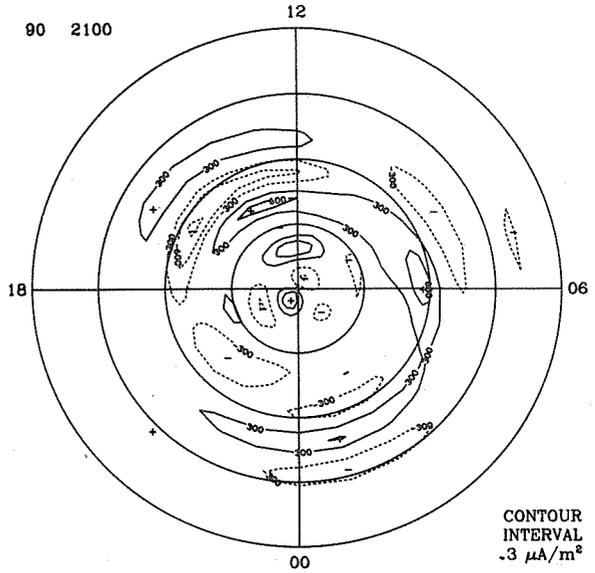
IONOSPHERIC CURRENT

90 2100



FIELD-ALIGNED CURRENTS

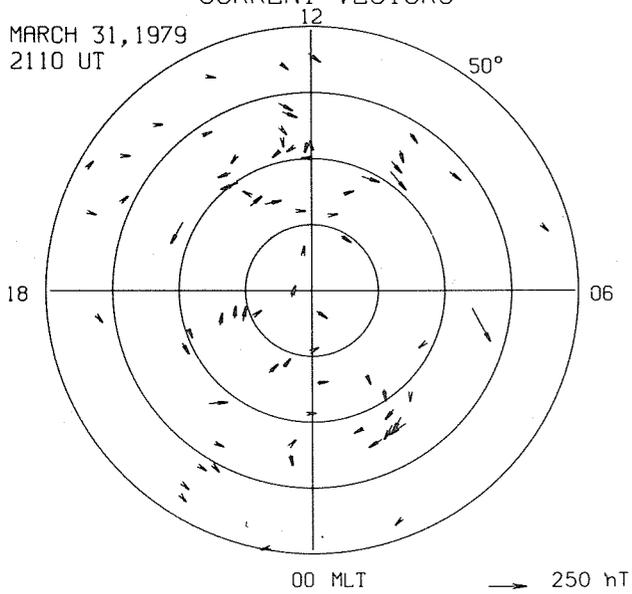
90 2100



CONTOUR  
INTERVAL  
.3 μA/m²

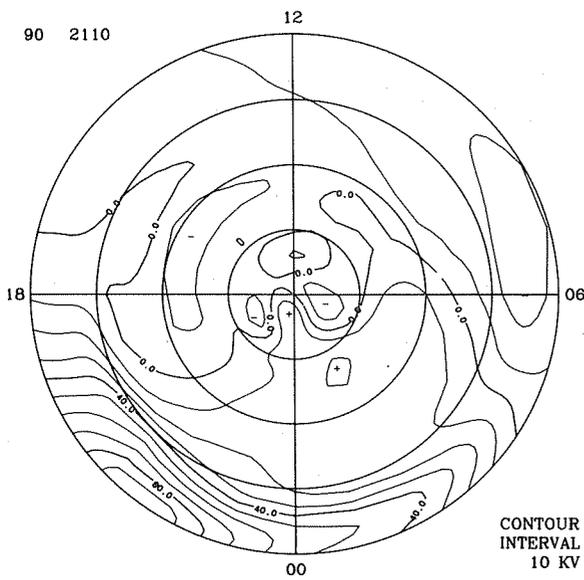
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2110 UT



ELECTRIC POTENTIAL

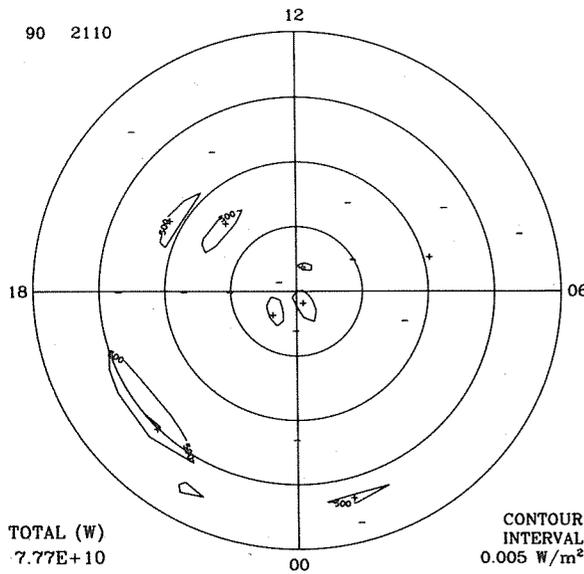
90 2110



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

90 2110

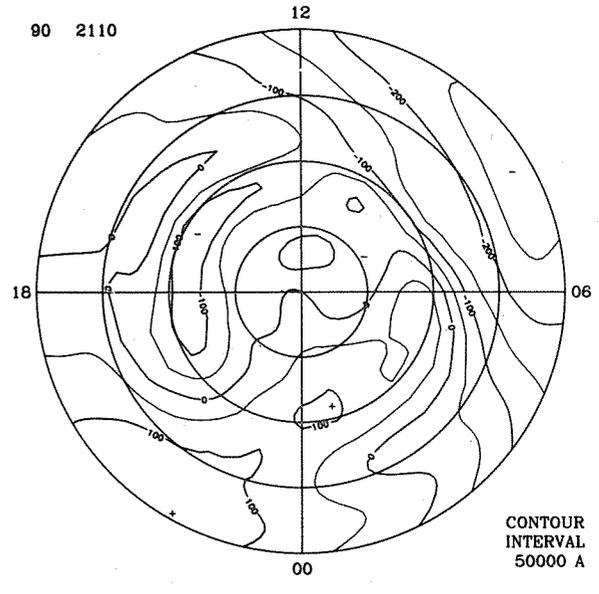


TOTAL (W)  
7.77E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

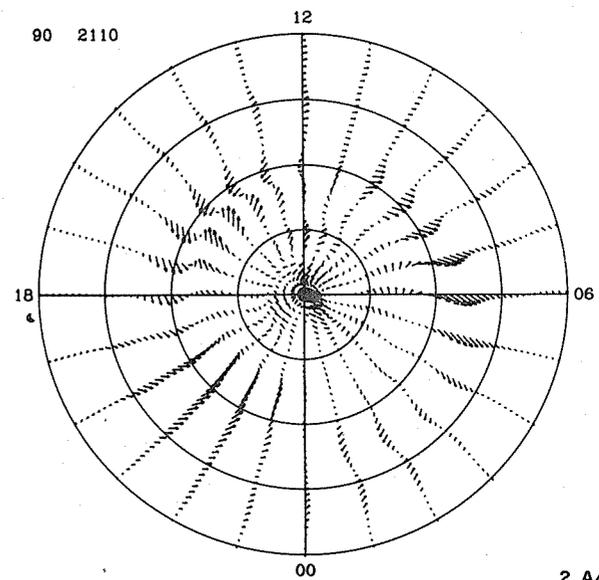
90 2110



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

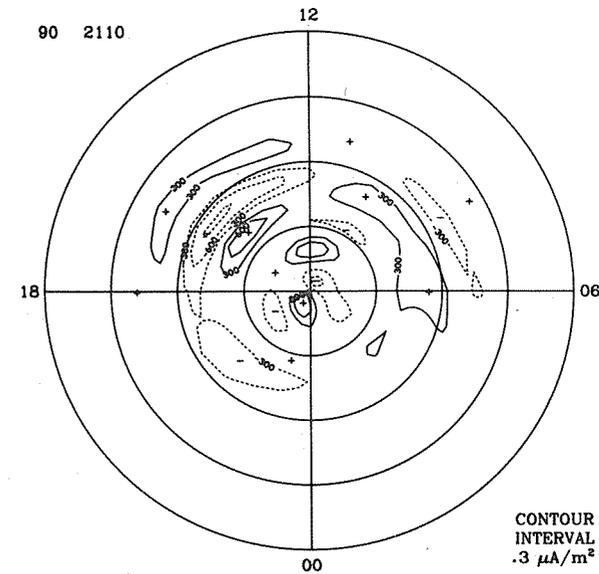
90 2110



2 A/m

FIELD-ALIGNED CURRENTS

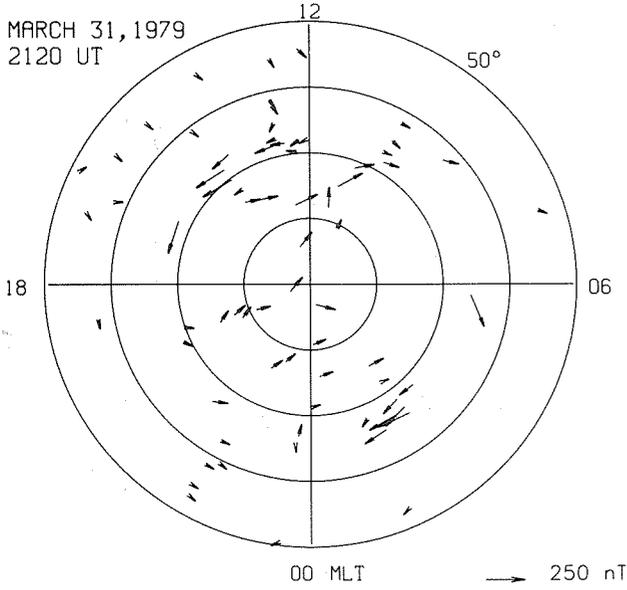
90 2110



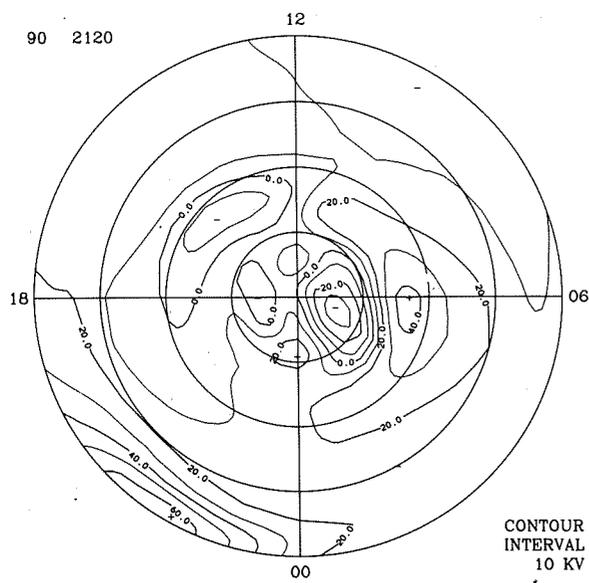
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

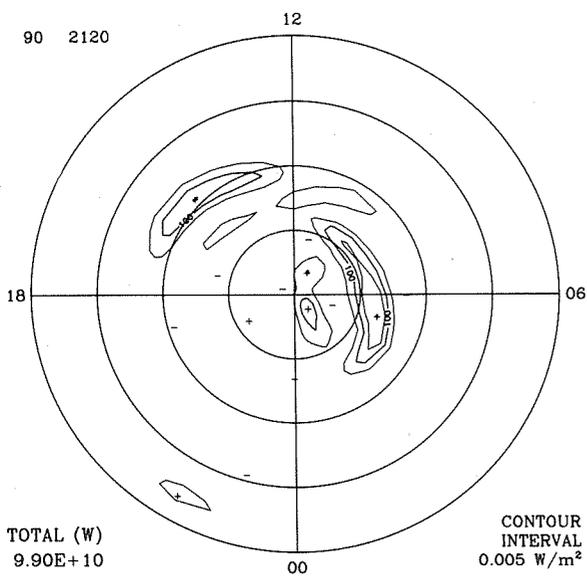
MARCH 31, 1979  
2120 UT



ELECTRIC POTENTIAL



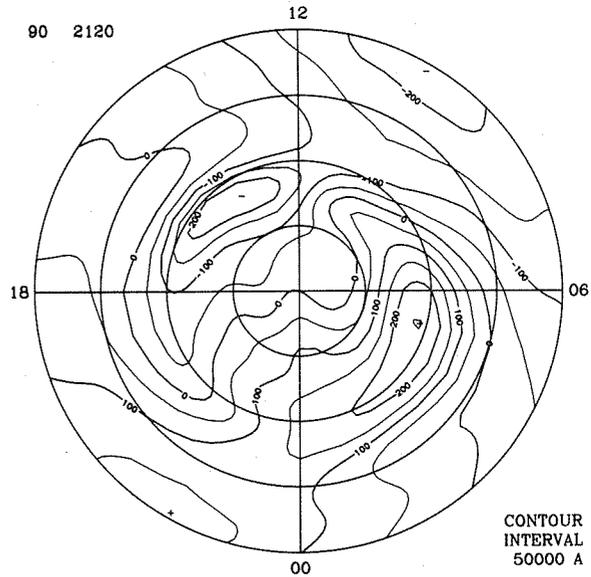
JOULE HEAT RATE



TOTAL (W)  
9.90E+10

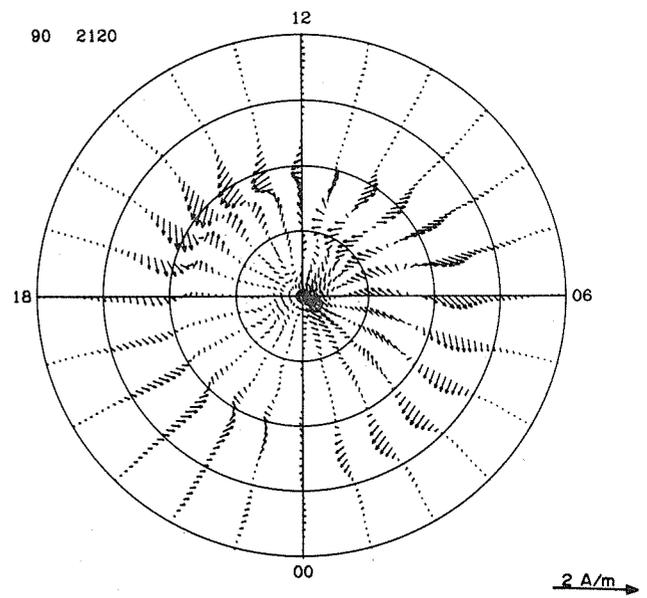
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

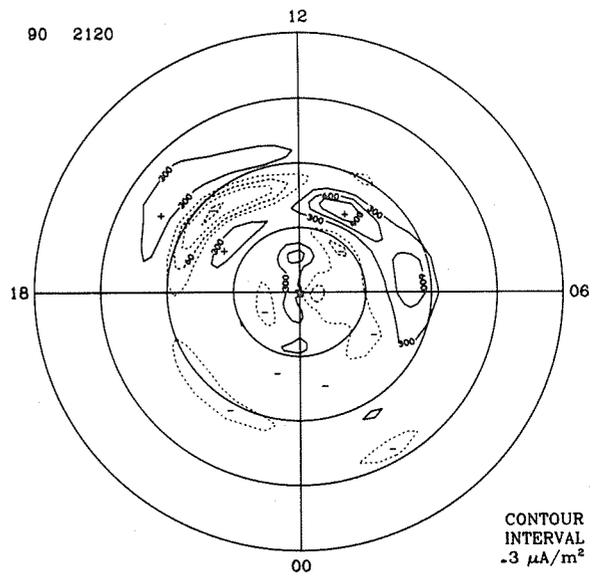


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



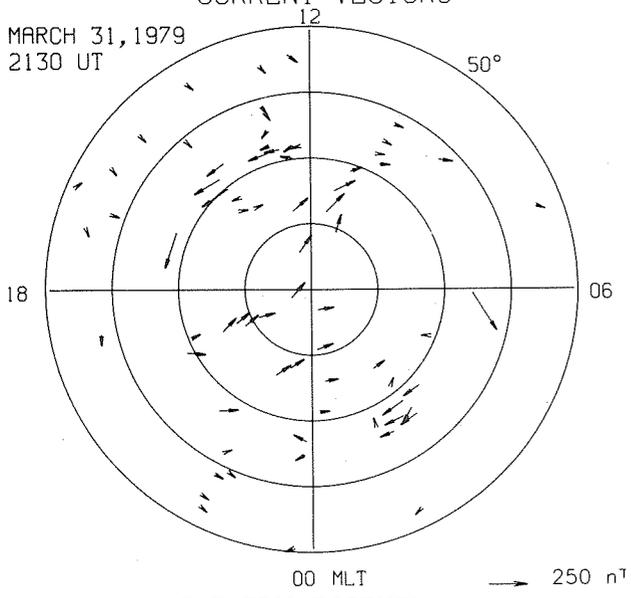
FIELD-ALIGNED CURRENTS



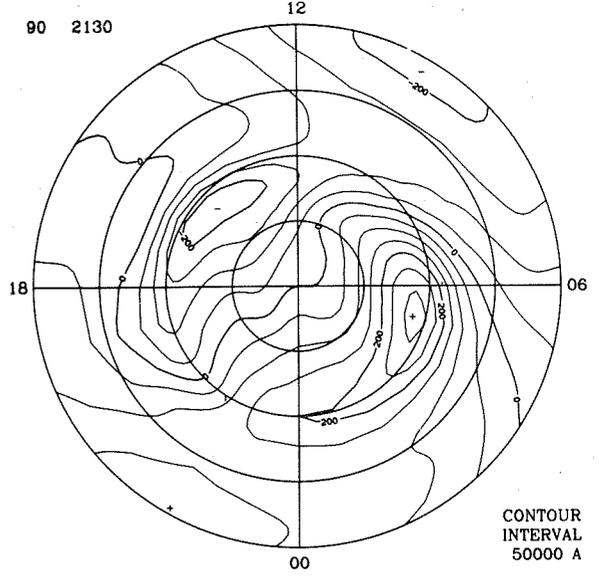
CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

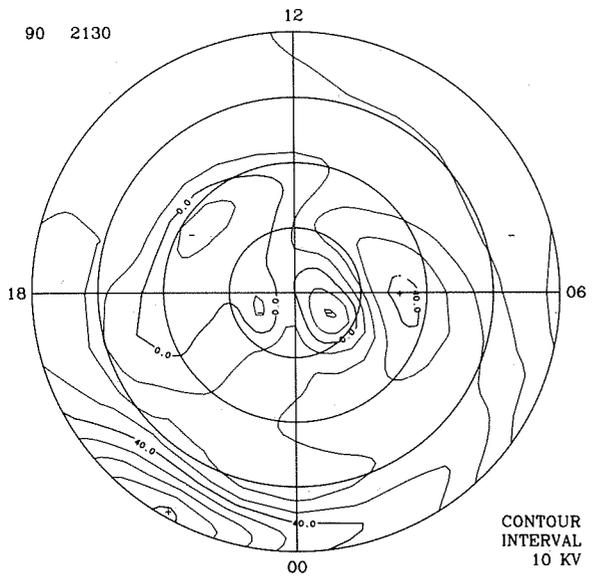
MARCH 31, 1979  
2130 UT



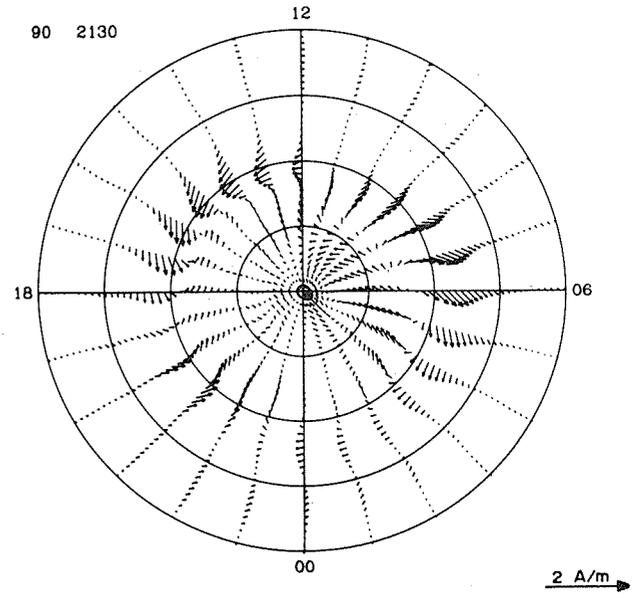
EQUIVALENT CURRENT SYSTEM



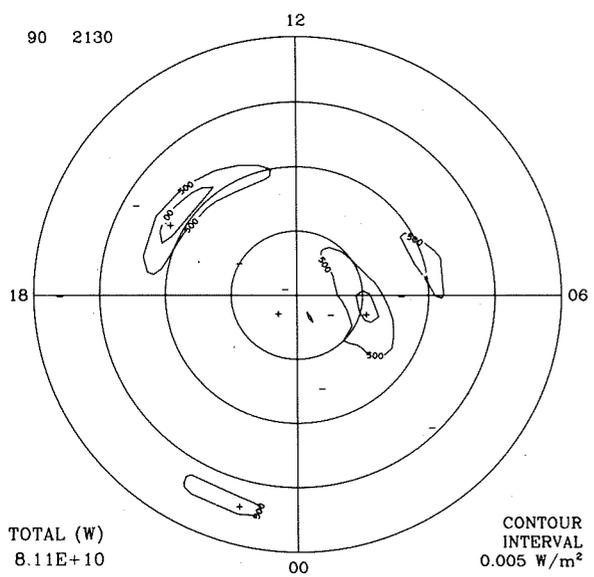
ELECTRIC POTENTIAL



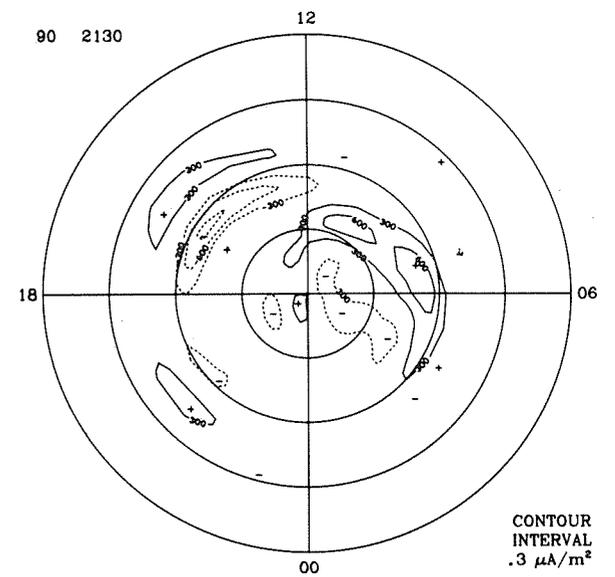
IONOSPHERIC CURRENT



JOULE HEAT RATE

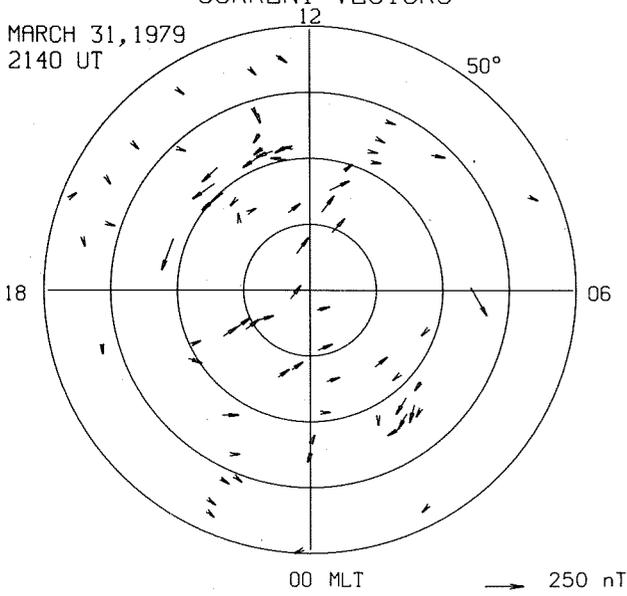


FIELD-ALIGNED CURRENTS



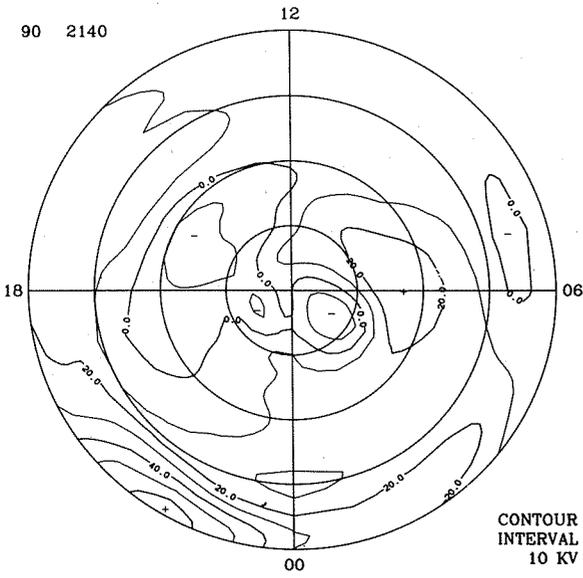
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2140 UT



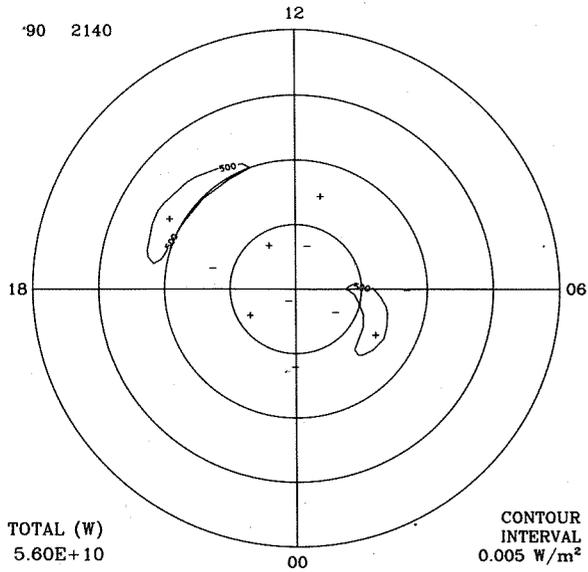
ELECTRIC POTENTIAL

90 2140



JOULE HEAT RATE

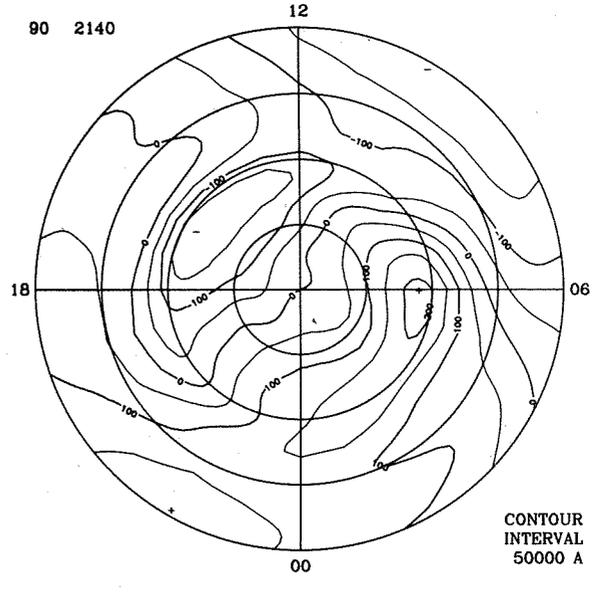
90 2140



TOTAL (W)  
5.60E+10

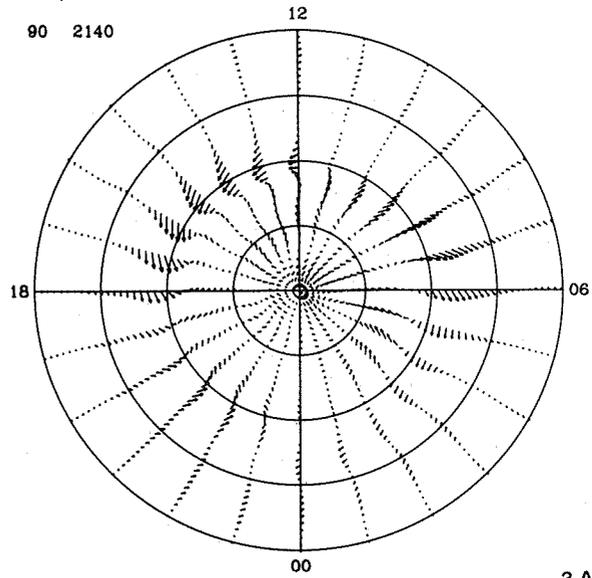
EQUIVALENT CURRENT SYSTEM

90 2140



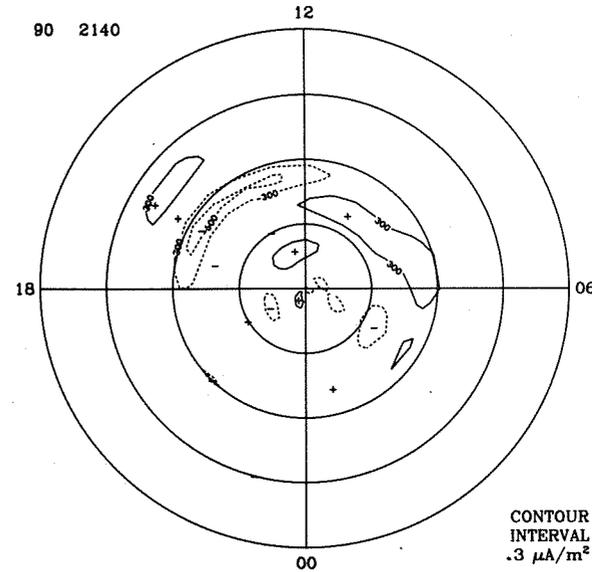
IONOSPHERIC CURRENT

90 2140



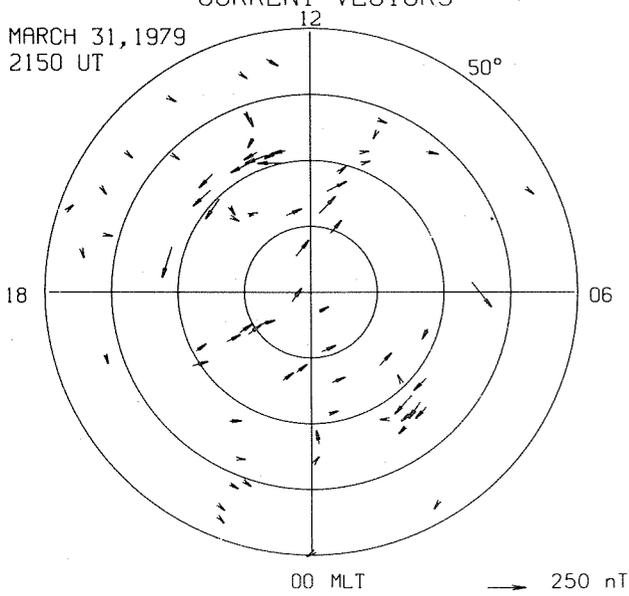
FIELD-ALIGNED CURRENTS

90 2140

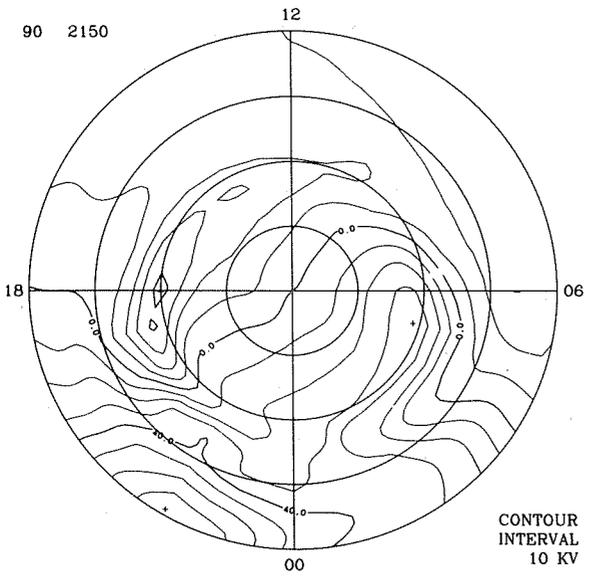


OBSERVED EQUIVALENT  
CURRENT VECTORS

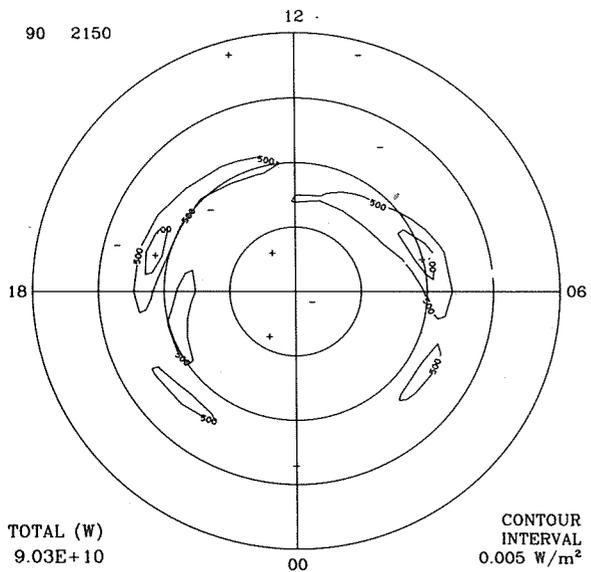
MARCH 31, 1979  
2150 UT



ELECTRIC POTENTIAL



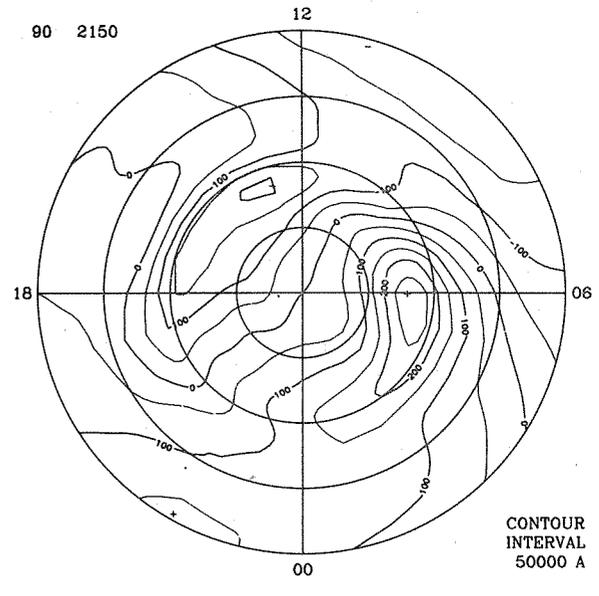
JOULE HEAT RATE



TOTAL (W)  
9.03E+10

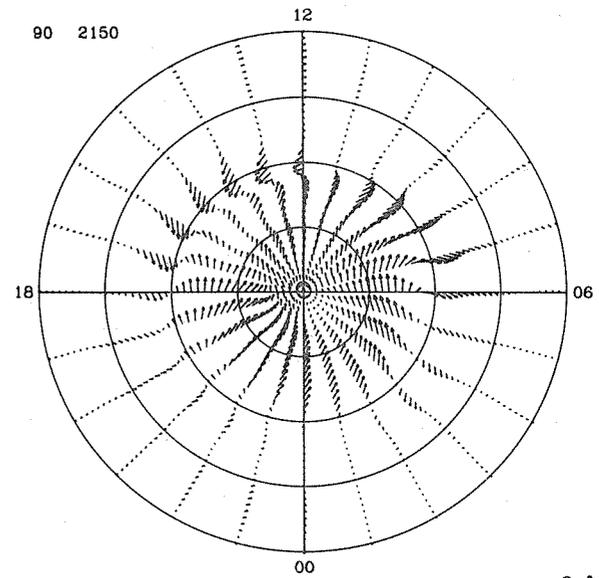
CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM



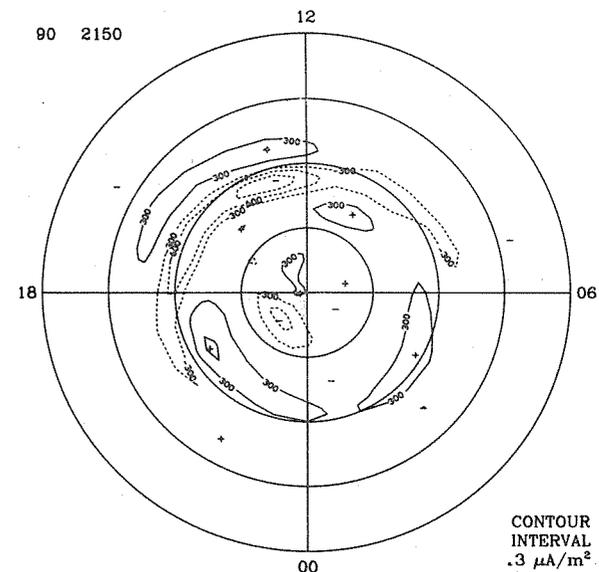
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

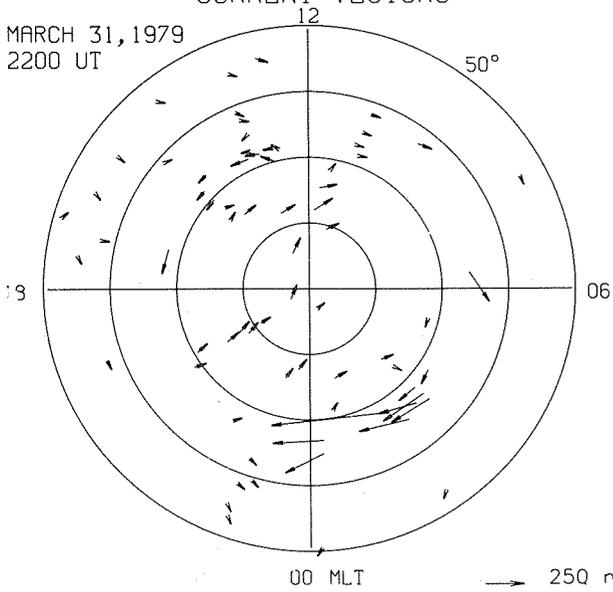
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.3 μA/m²

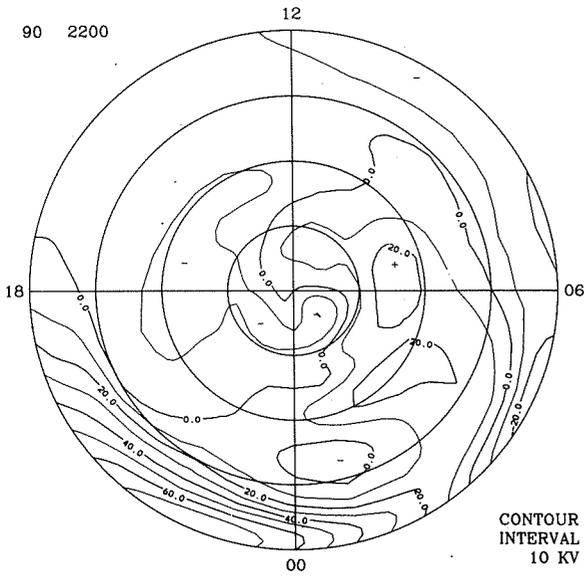
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2200 UT



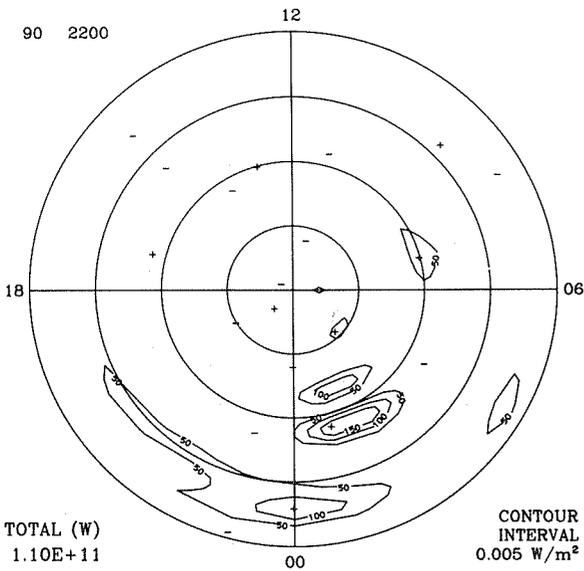
ELECTRIC POTENTIAL

90 2200



JOULE HEAT RATE

90 2200

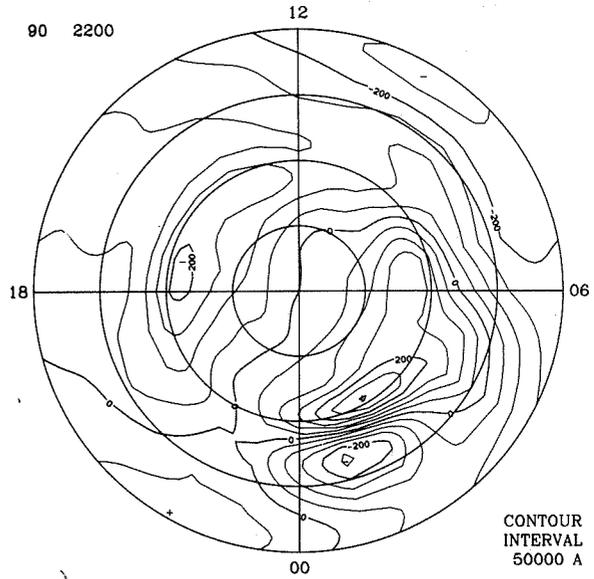


TOTAL (W)  
1.10E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

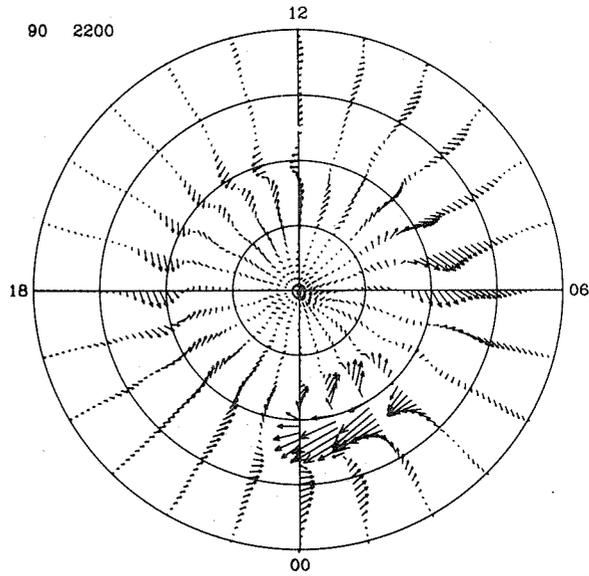
90 2200



CONTOUR  
INTERVAL  
50000 A

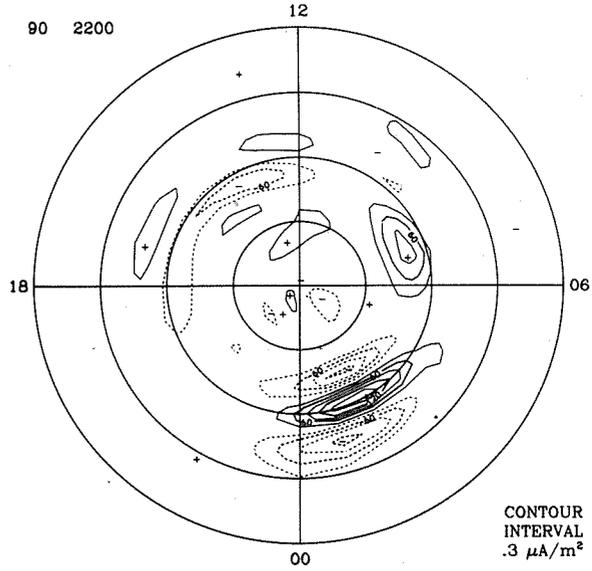
IONOSPHERIC CURRENT

90 2200



FIELD-ALIGNED CURRENTS

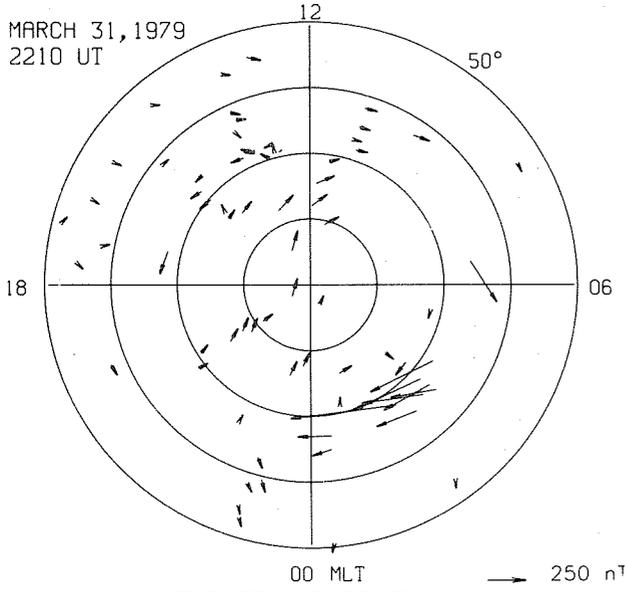
90 2200



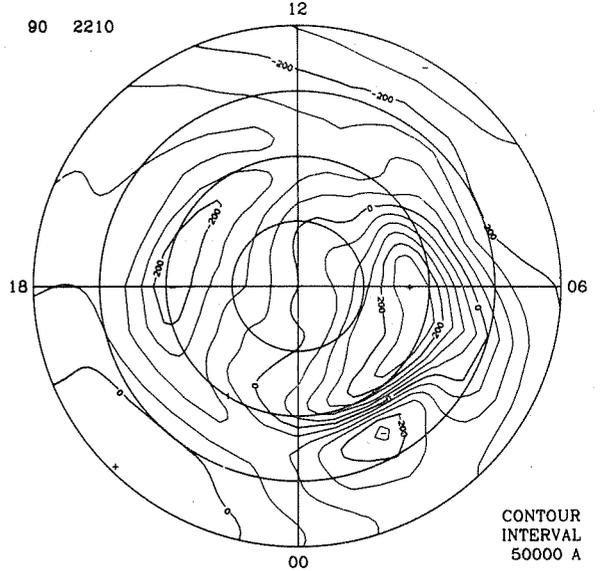
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

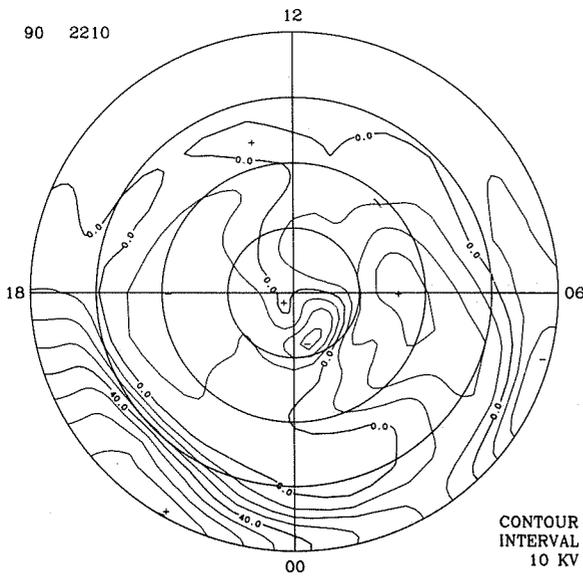
MARCH 31, 1979  
2210 UT



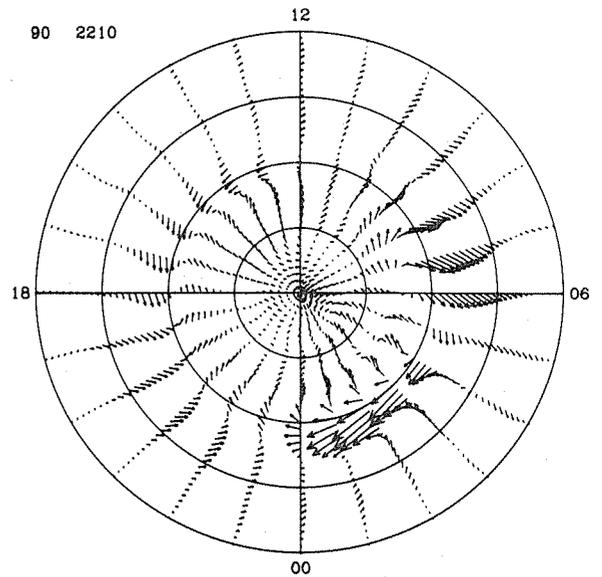
EQUIVALENT CURRENT SYSTEM



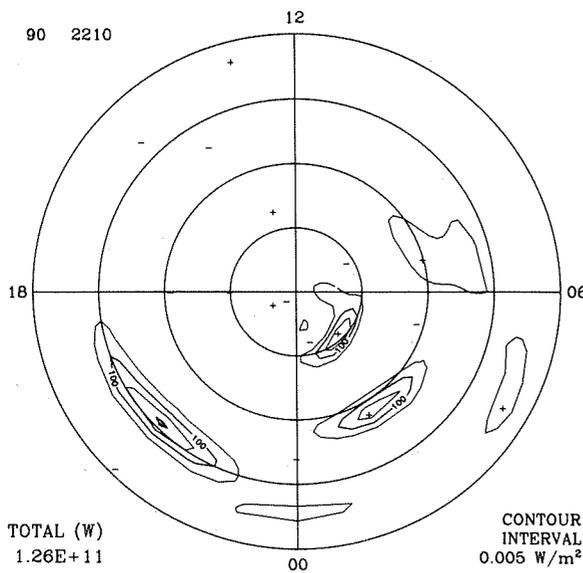
ELECTRIC POTENTIAL



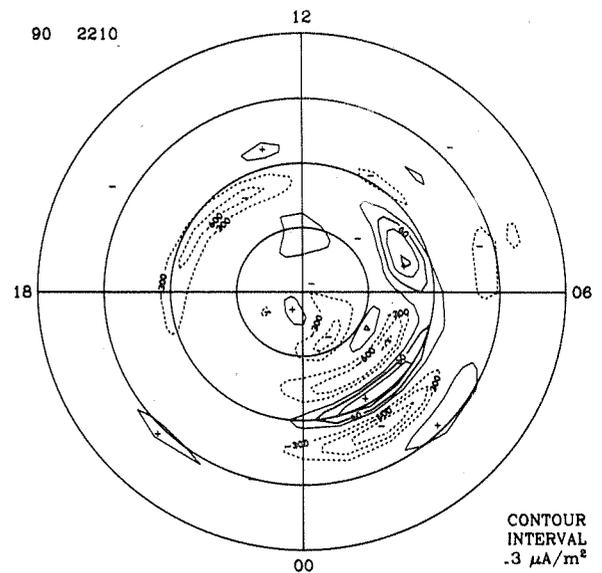
IONOSPHERIC CURRENT



JOULE HEAT RATE

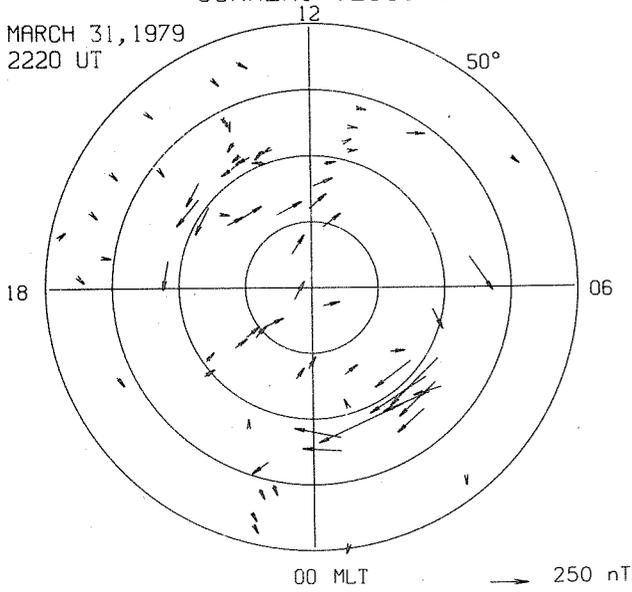


FIELD-ALIGNED CURRENTS

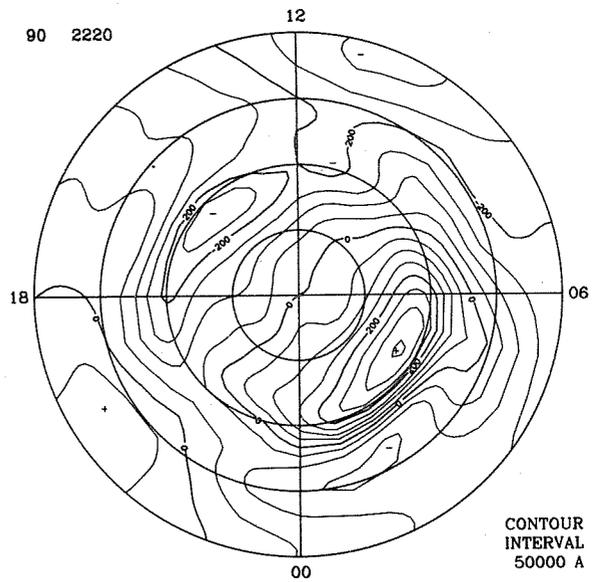


OBSERVED EQUIVALENT  
CURRENT VECTORS

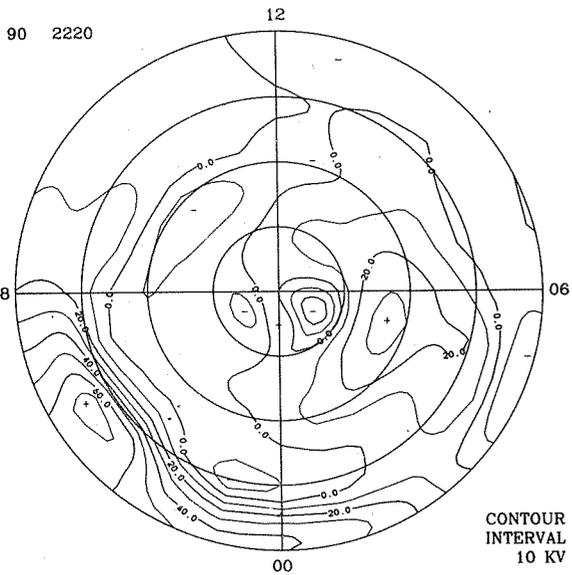
MARCH 31, 1979  
2220 UT



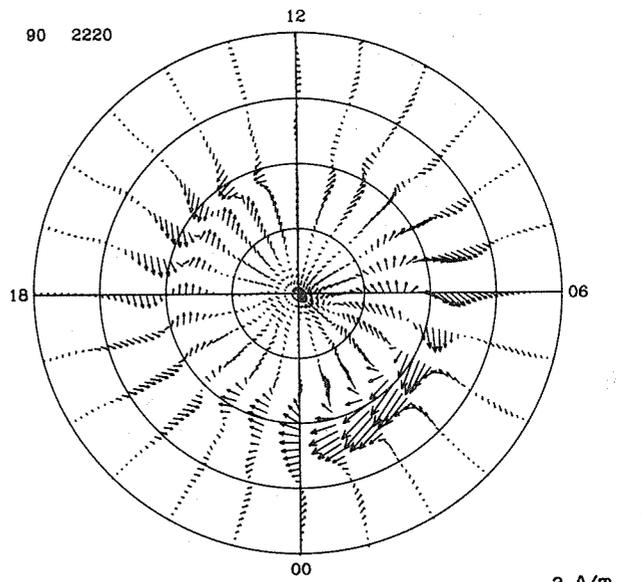
EQUIVALENT CURRENT SYSTEM



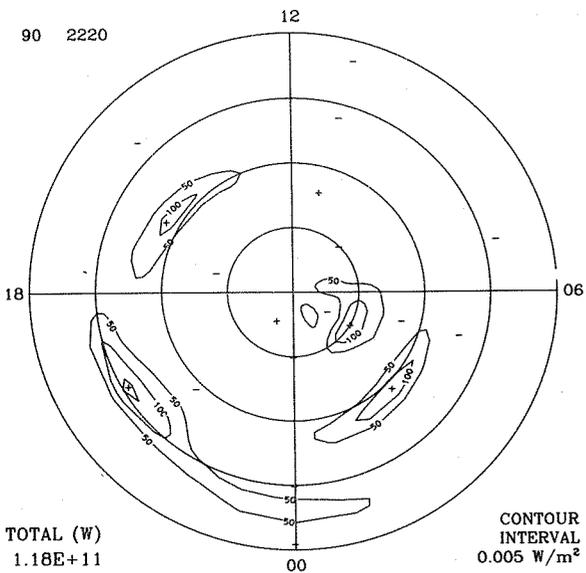
ELECTRIC POTENTIAL



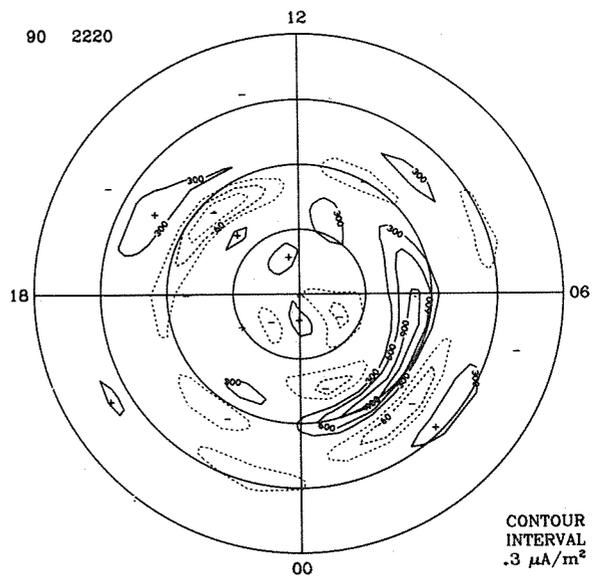
IONOSPHERIC CURRENT



JOULE HEAT RATE

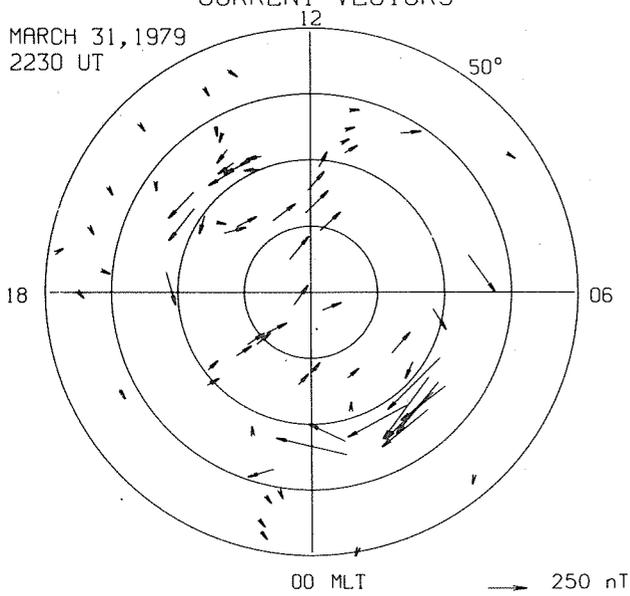


FIELD-ALIGNED CURRENTS



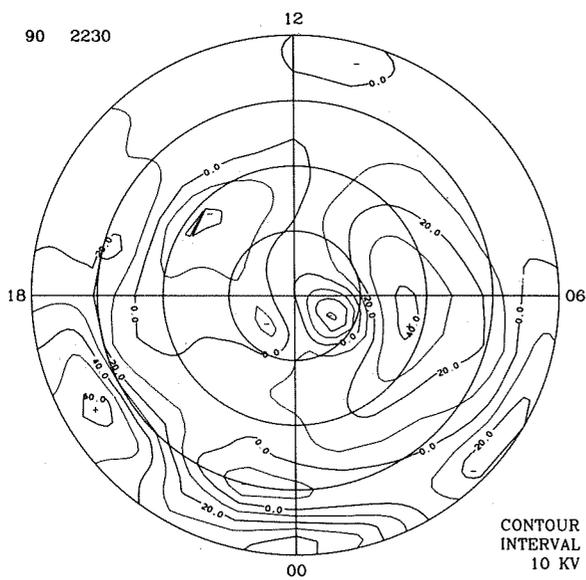
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2230 UT



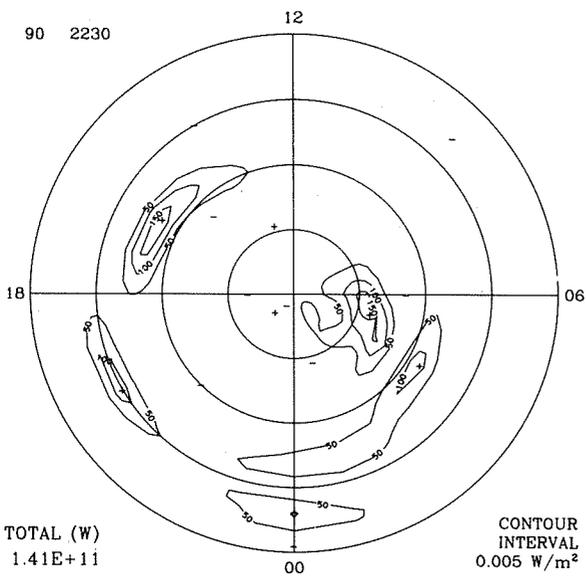
ELECTRIC POTENTIAL

90 2230



JOULE HEAT RATE

90 2230

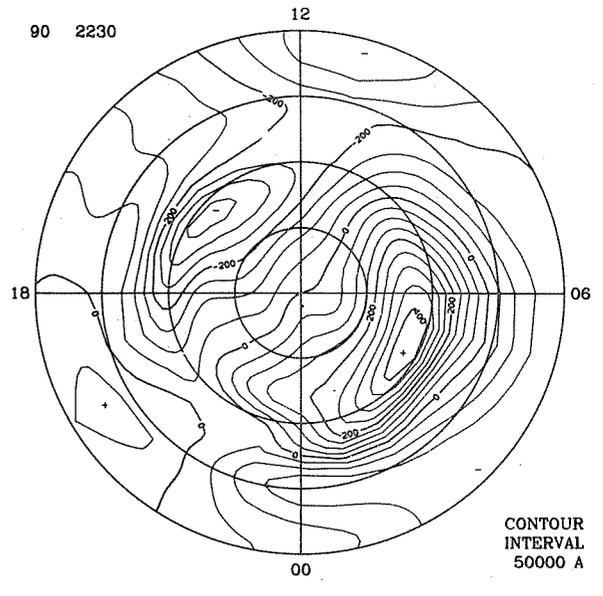


TOTAL (W)  
1.41E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

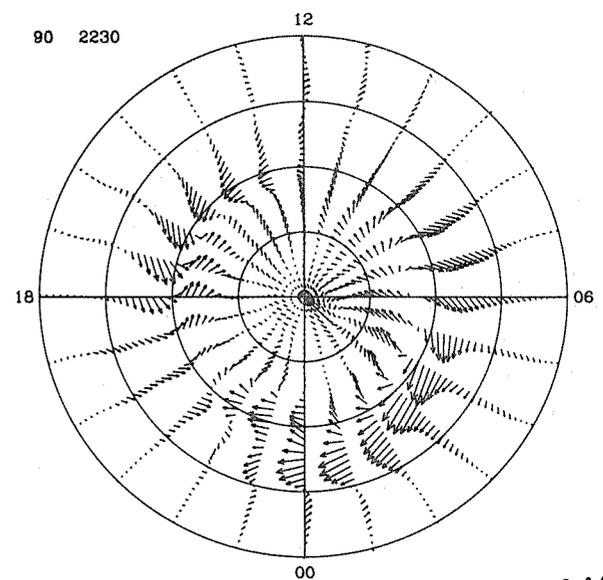
90 2230



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

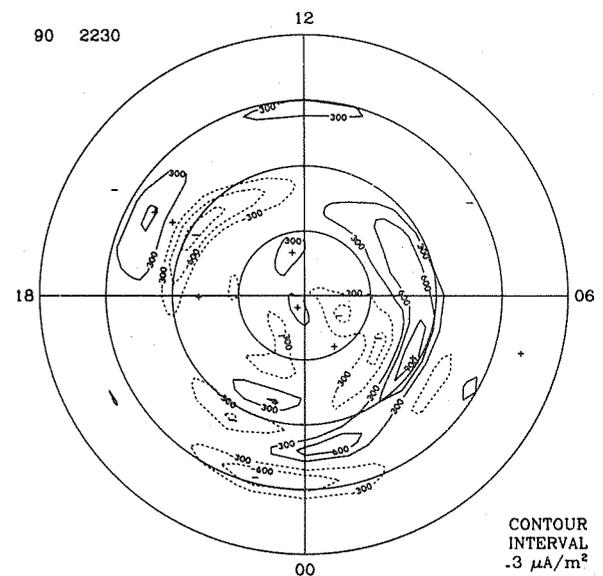
90 2230



2 A/m

FIELD-ALIGNED CURRENTS

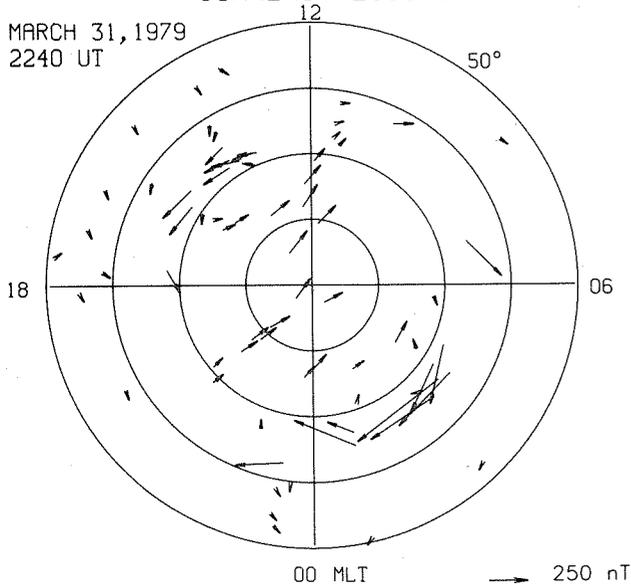
90 2230



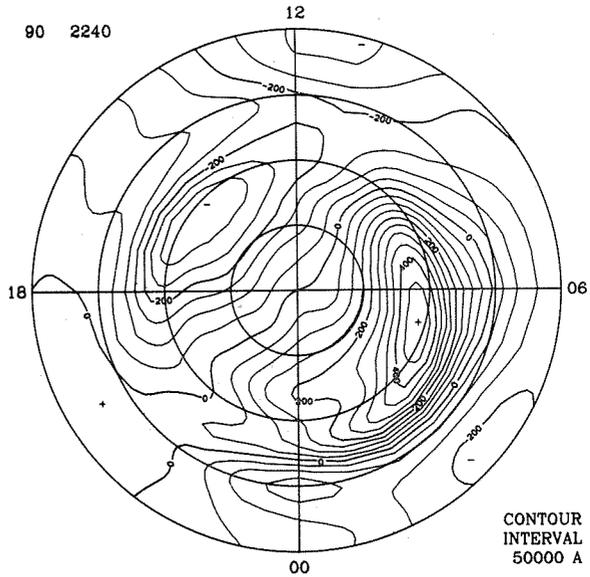
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

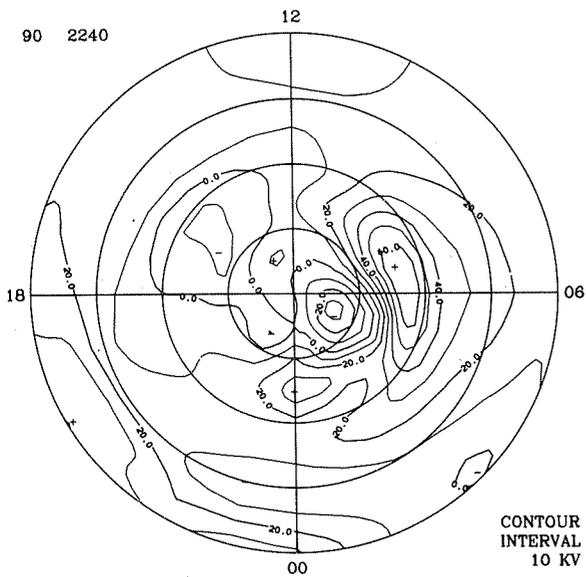
MARCH 31, 1979  
2240 UT



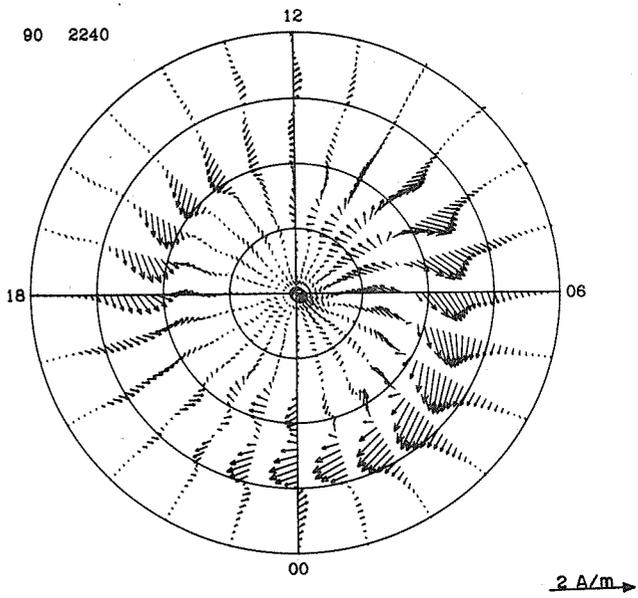
EQUIVALENT CURRENT SYSTEM



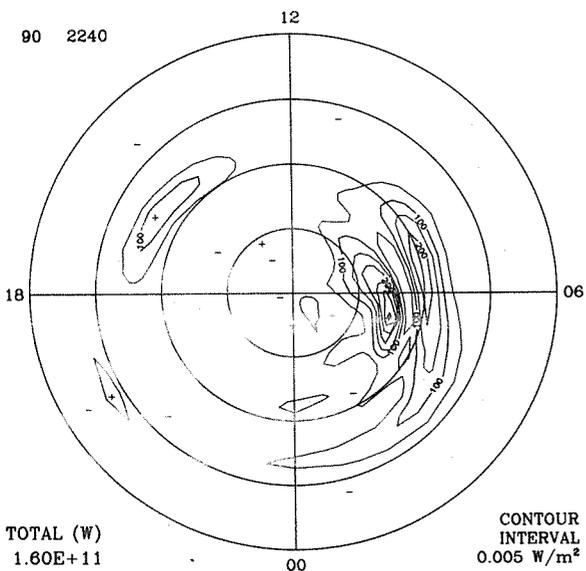
ELECTRIC POTENTIAL



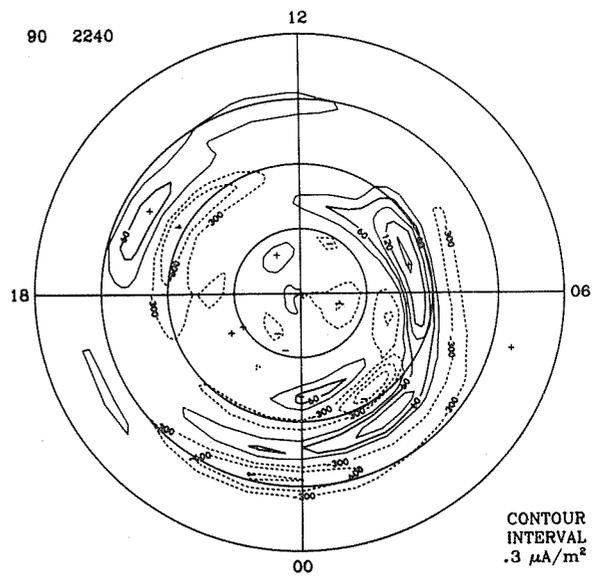
IONOSPHERIC CURRENT



JOULE HEAT RATE

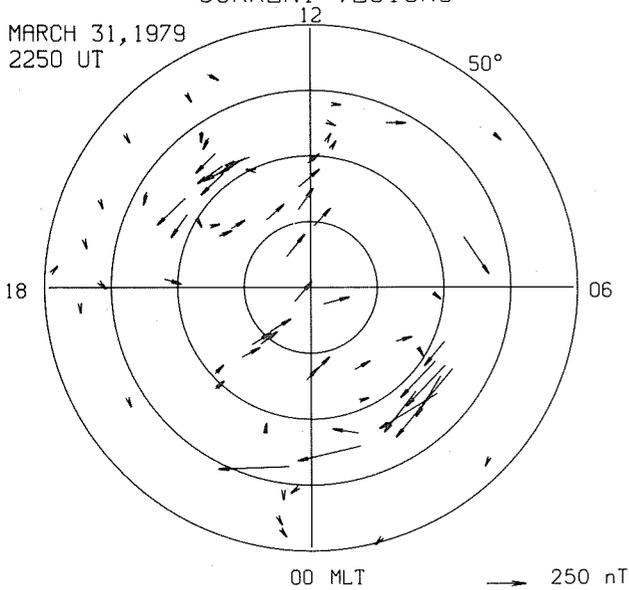


FIELD-ALIGNED CURRENTS



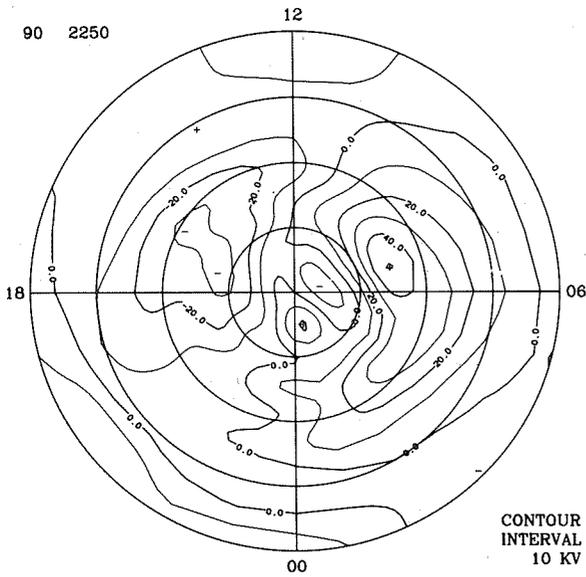
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2250 UT



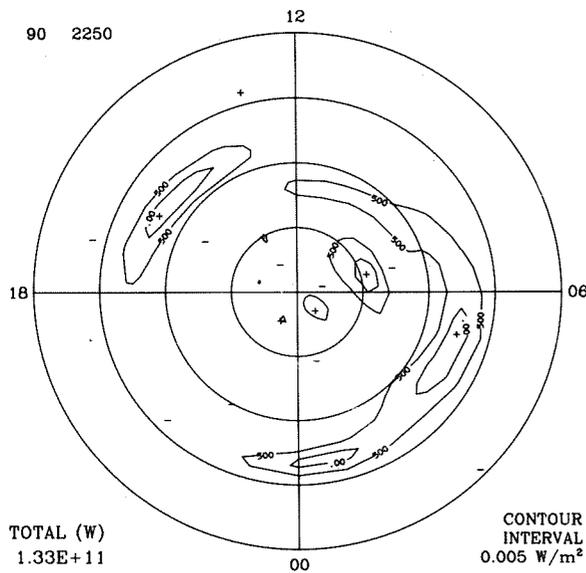
ELECTRIC POTENTIAL

90 2250



JOULE HEAT RATE

90 2250

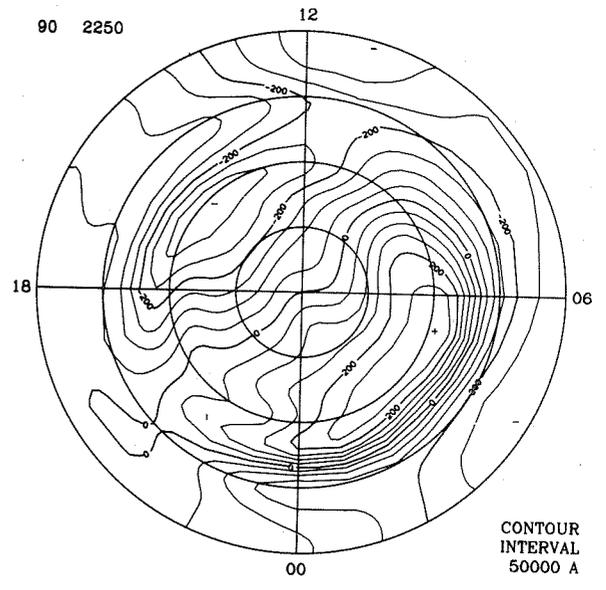


TOTAL (W)  
1.33E+11

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

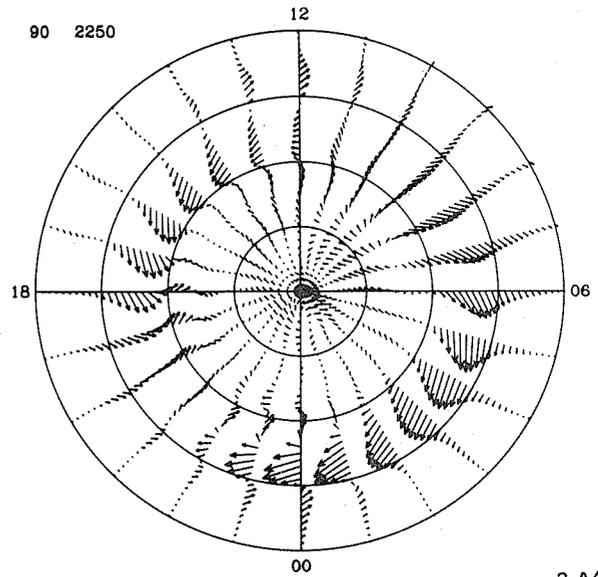
90 2250



CONTOUR  
INTERVAL  
50000 A

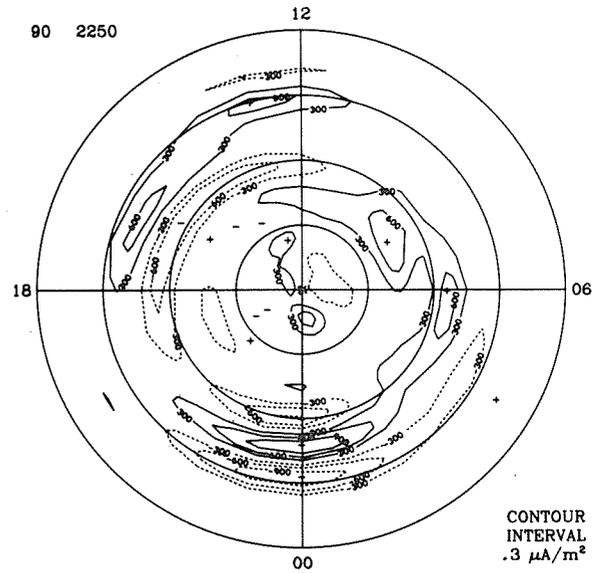
IONOSPHERIC CURRENT

90 2250



FIELD-ALIGNED CURRENTS

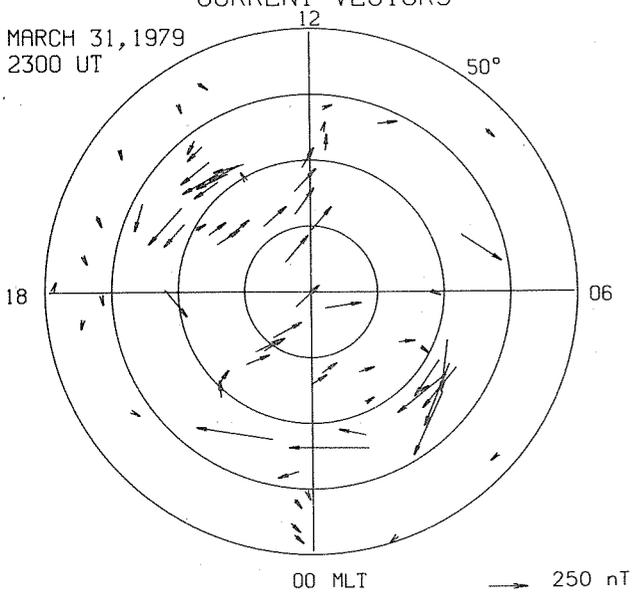
90 2250



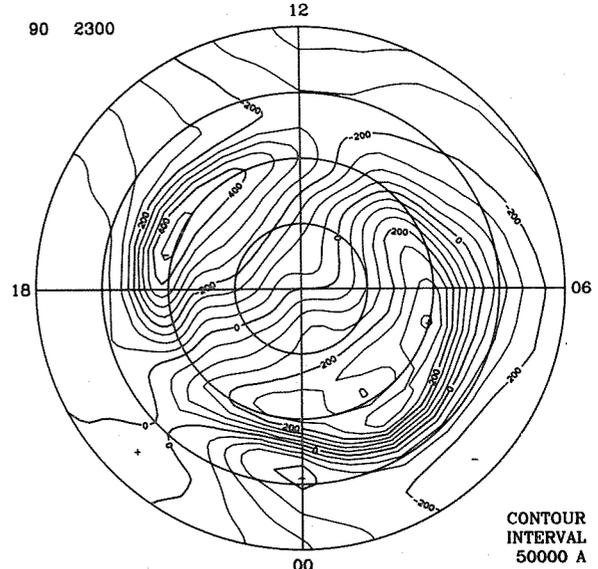
CONTOUR  
INTERVAL  
.3 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

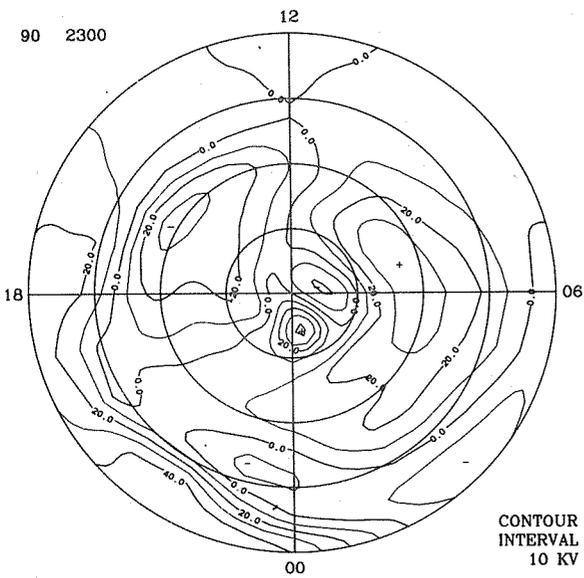
MARCH 31, 1979  
2300 UT



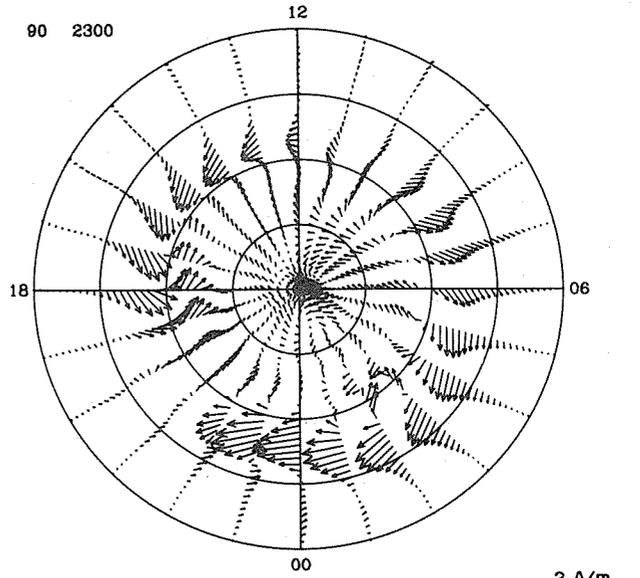
EQUIVALENT CURRENT SYSTEM



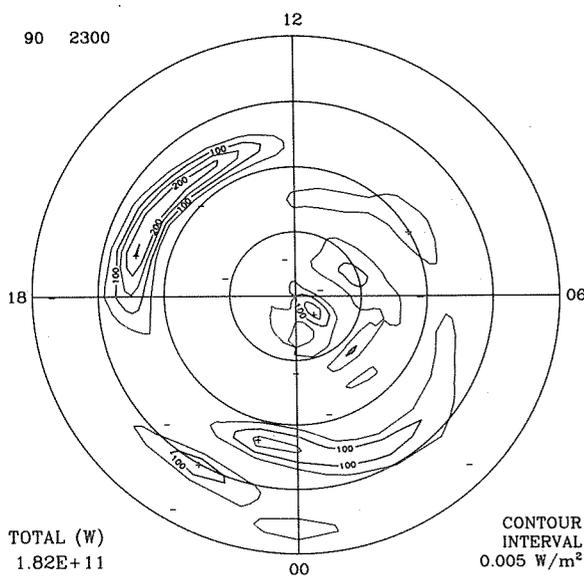
ELECTRIC POTENTIAL



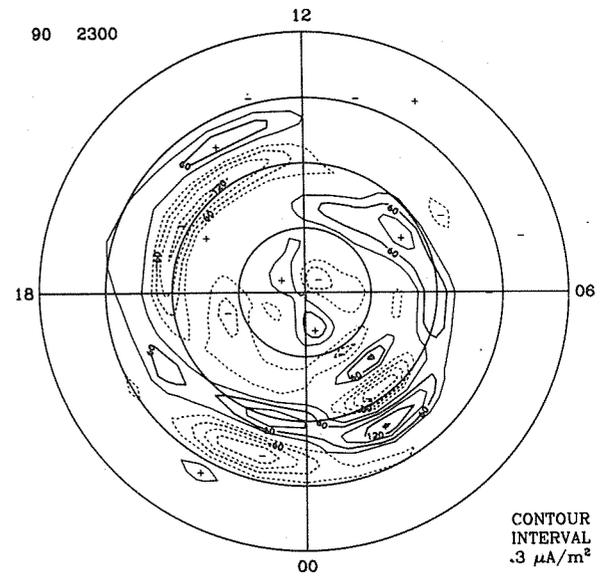
IONOSPHERIC CURRENT



JOULE HEAT RATE



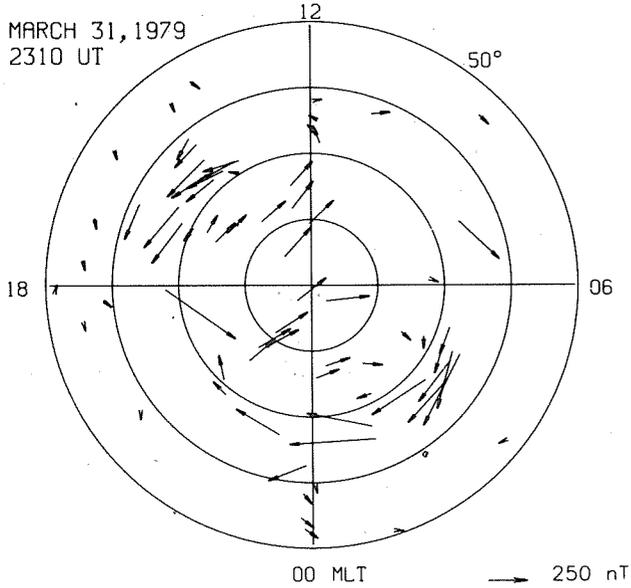
FIELD-ALIGNED CURRENTS



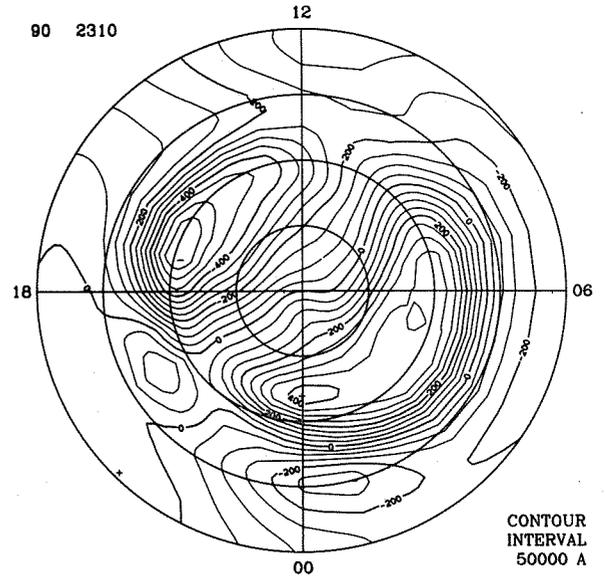
TOTAL (W)  
1.82E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

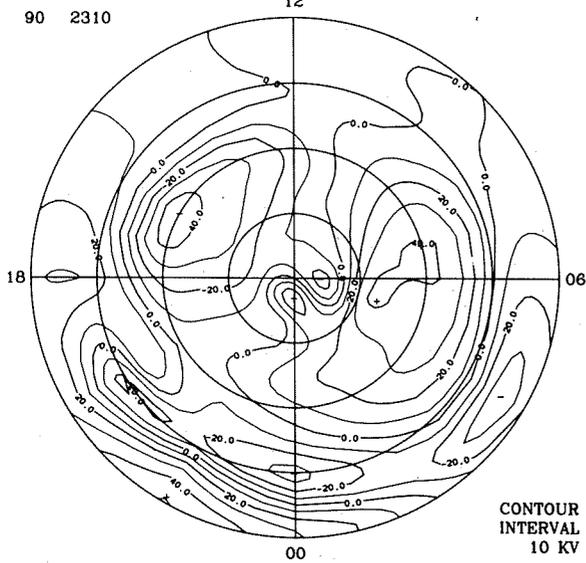
MARCH 31, 1979  
2310 UT



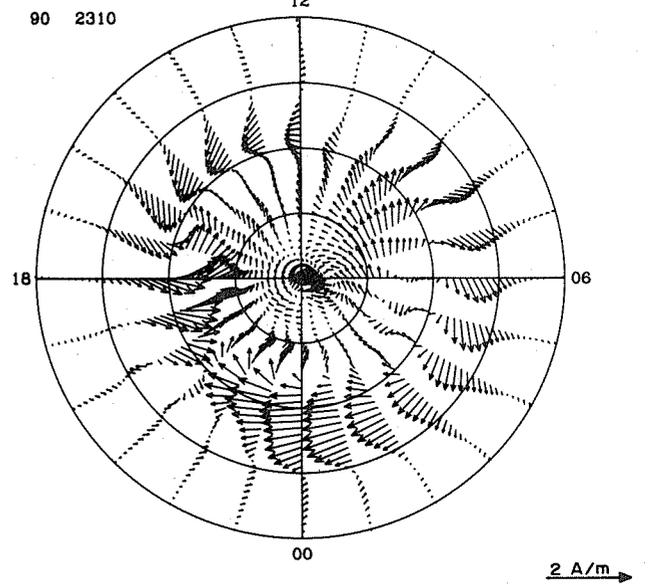
EQUIVALENT CURRENT SYSTEM



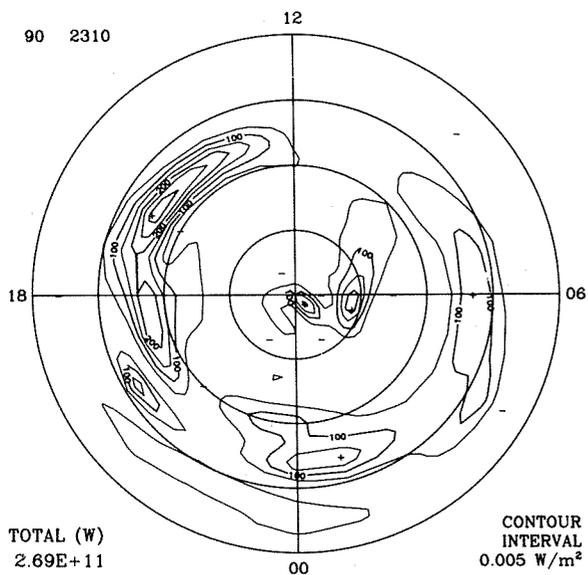
ELECTRIC POTENTIAL



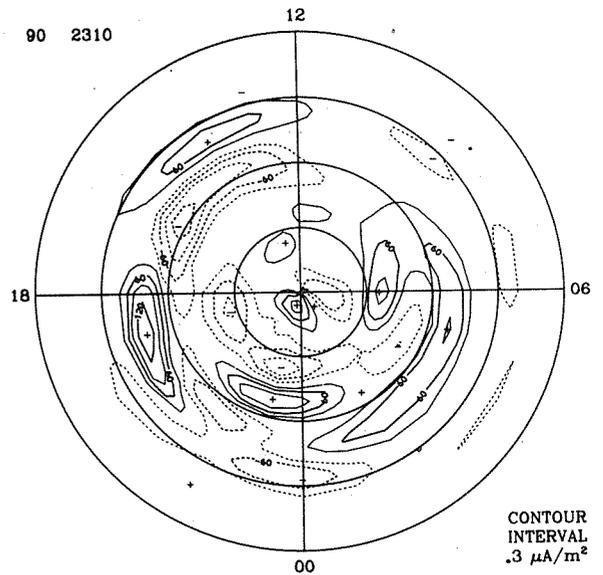
IONOSPHERIC CURRENT



JOULE HEAT RATE



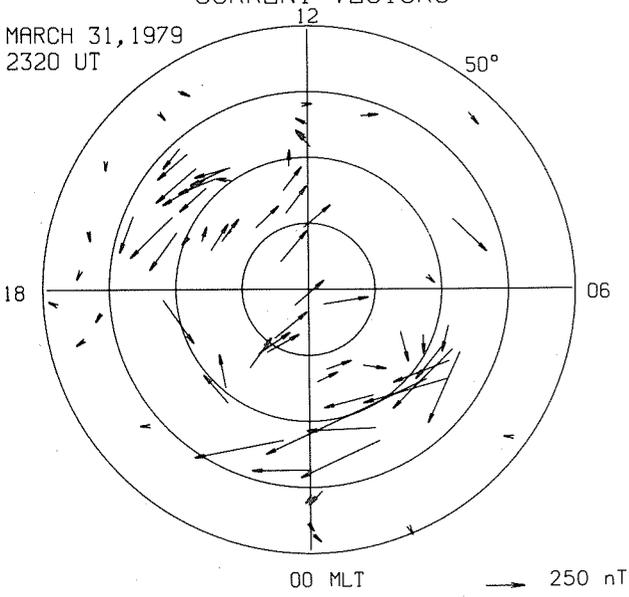
FIELD-ALIGNED CURRENTS



TOTAL (W)  
2.69E+11

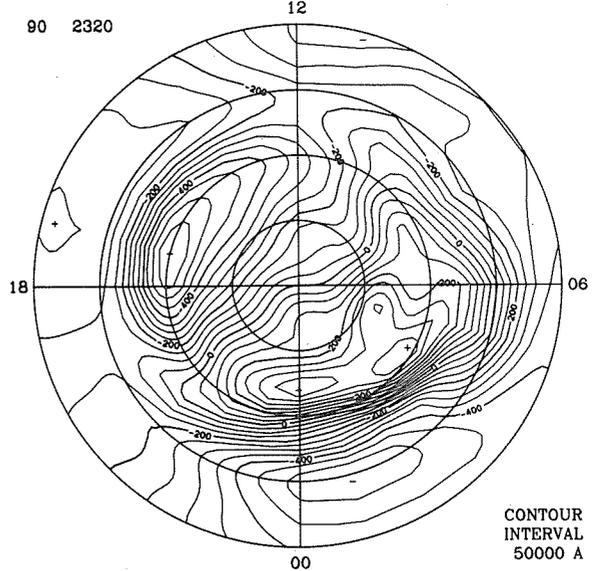
OBSERVED EQUIVALENT  
CURRENT VECTORS

MARCH 31, 1979  
2320 UT



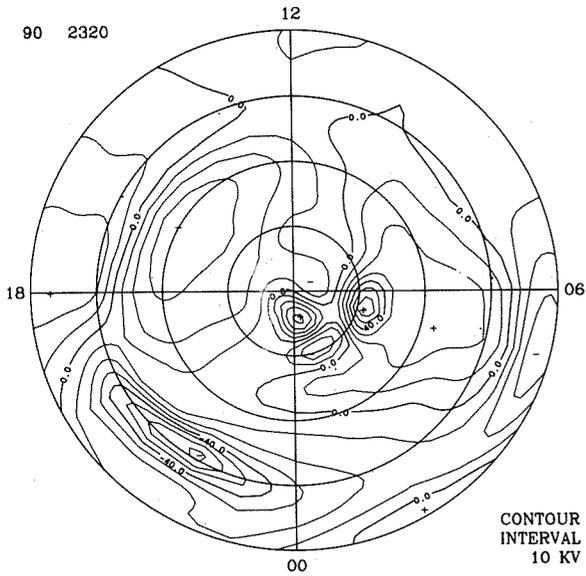
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



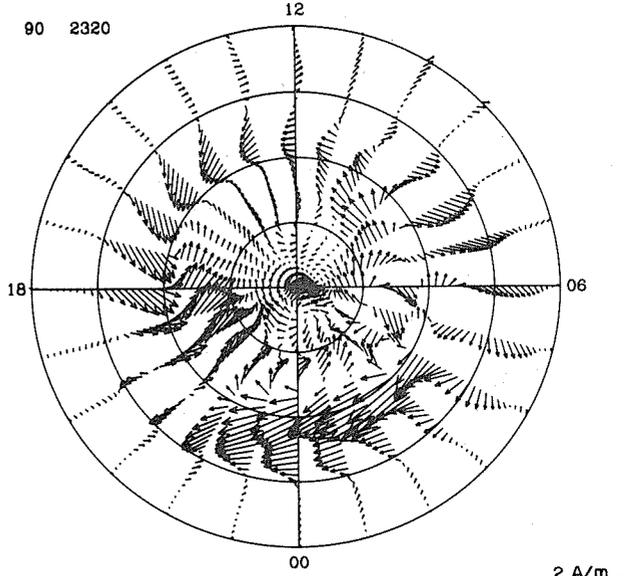
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



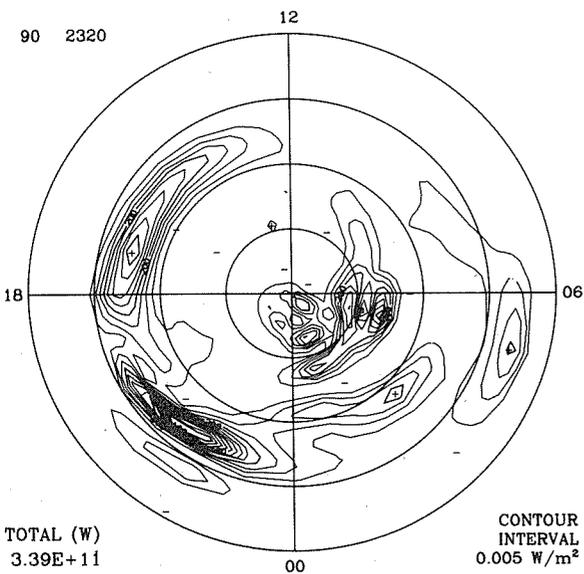
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



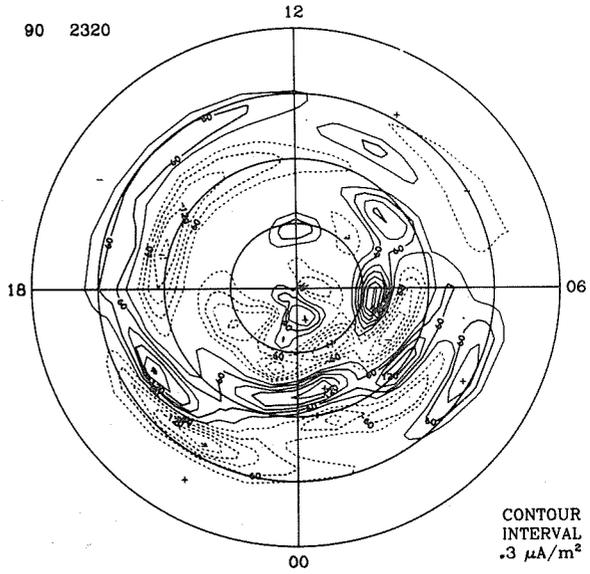
2 A/m

FIELD-ALIGNED CURRENTS



TOTAL (W)  
3.39E+11

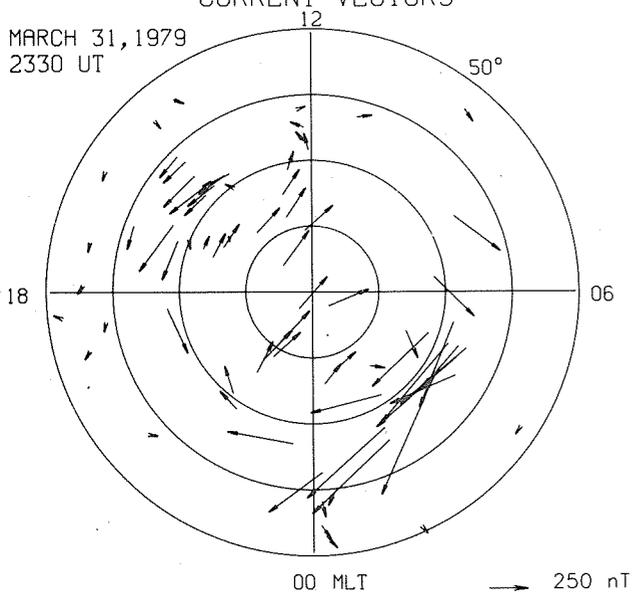
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>



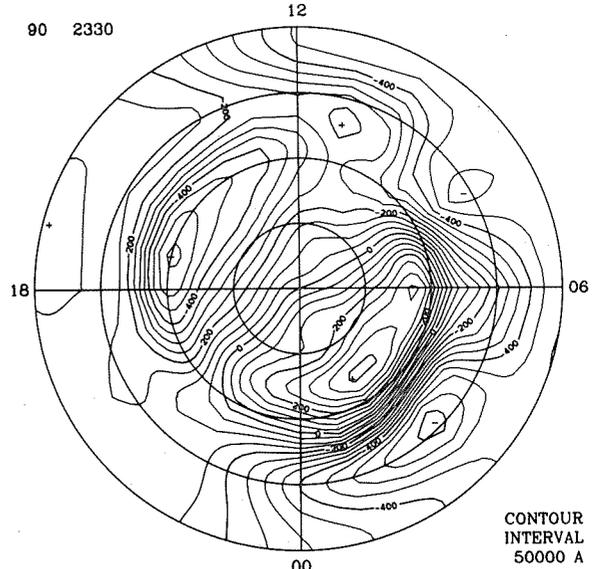
CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

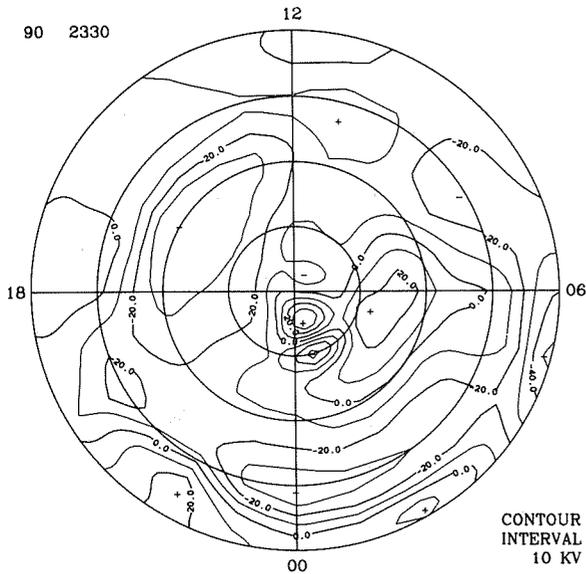
MARCH 31, 1979  
2330 UT



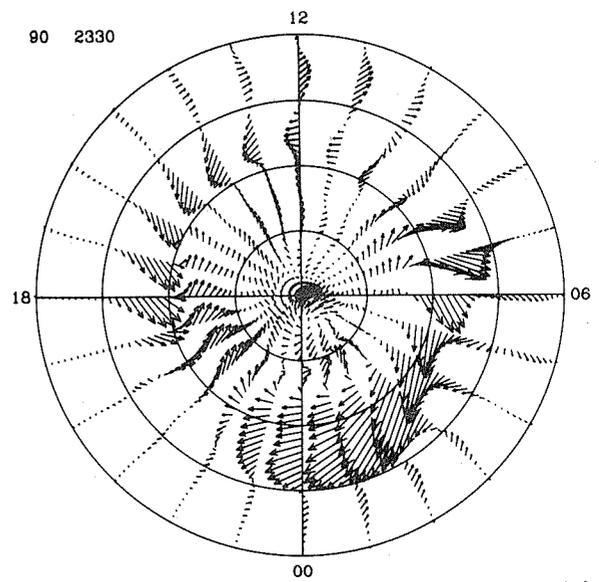
EQUIVALENT CURRENT SYSTEM



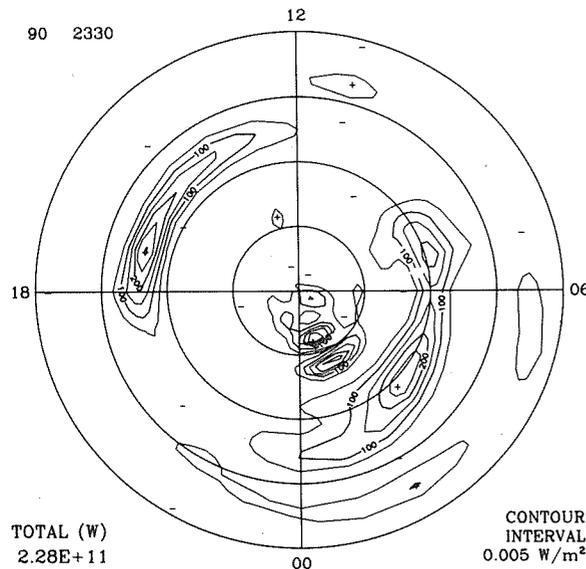
ELECTRIC POTENTIAL



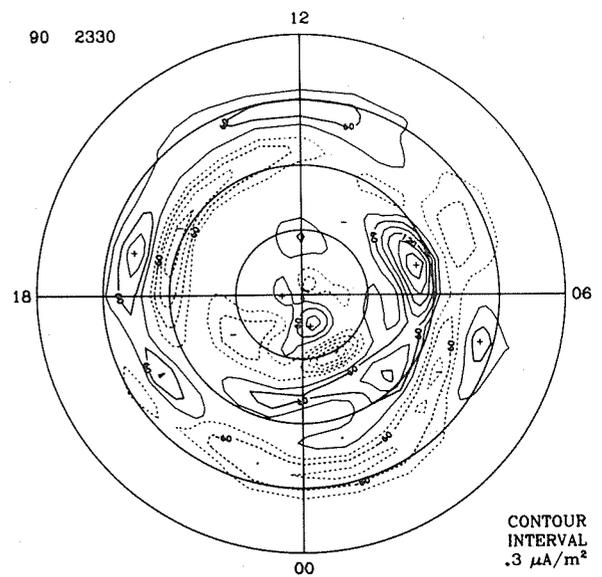
IONOSPHERIC CURRENT



JOULE HEAT RATE



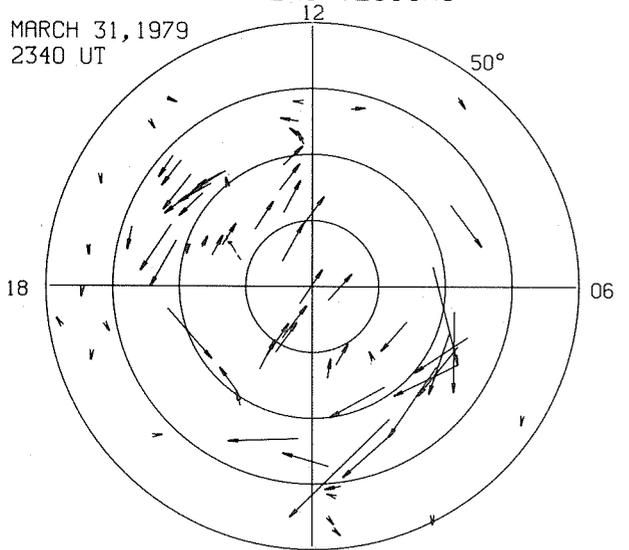
FIELD-ALIGNED CURRENTS



TOTAL (W)  
2.28E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

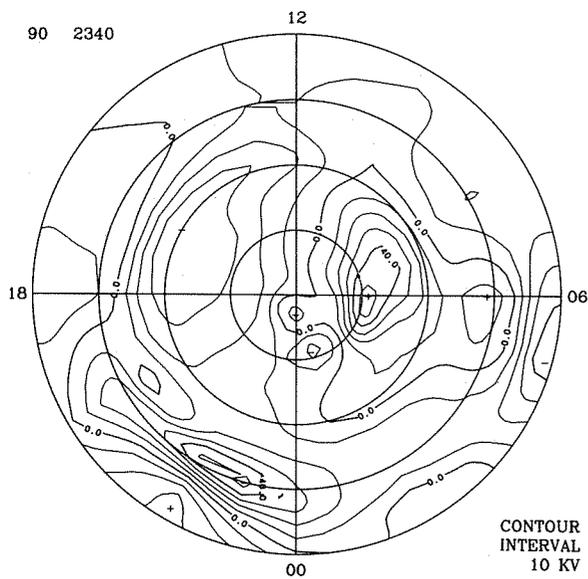
MARCH 31, 1979  
2340 UT



00 MLT → 250 nT

ELECTRIC POTENTIAL

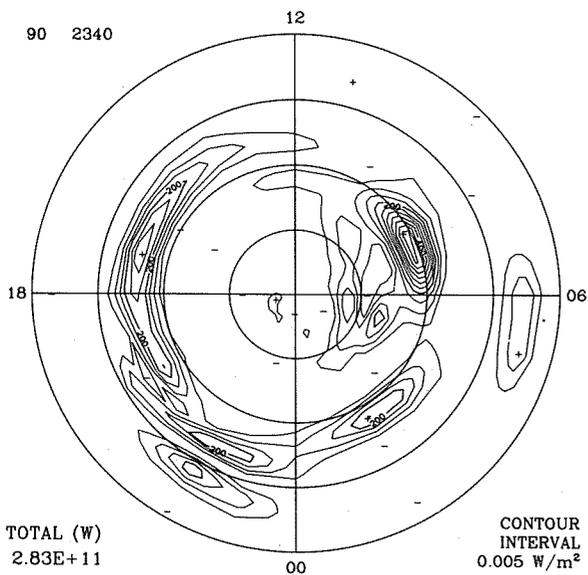
90 2340



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

90 2340

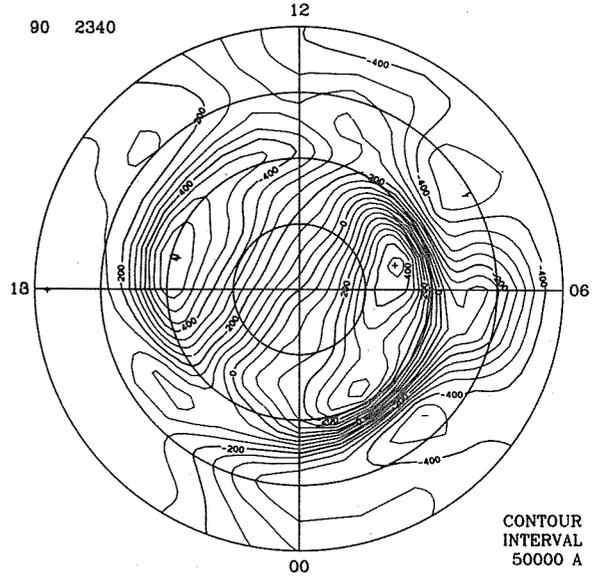


TOTAL (W)  
2.83E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

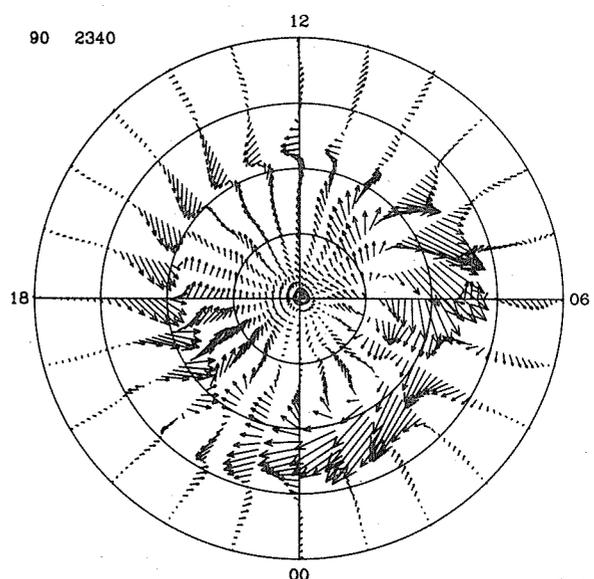
90 2340



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

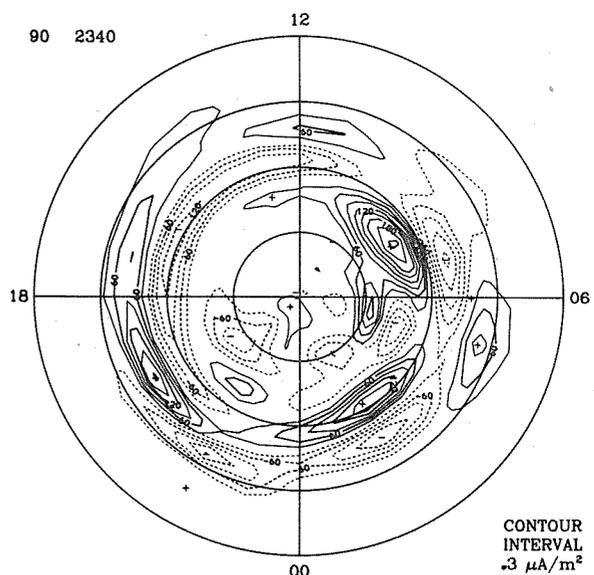
90 2340



2 A/m →

FIELD-ALIGNED CURRENTS

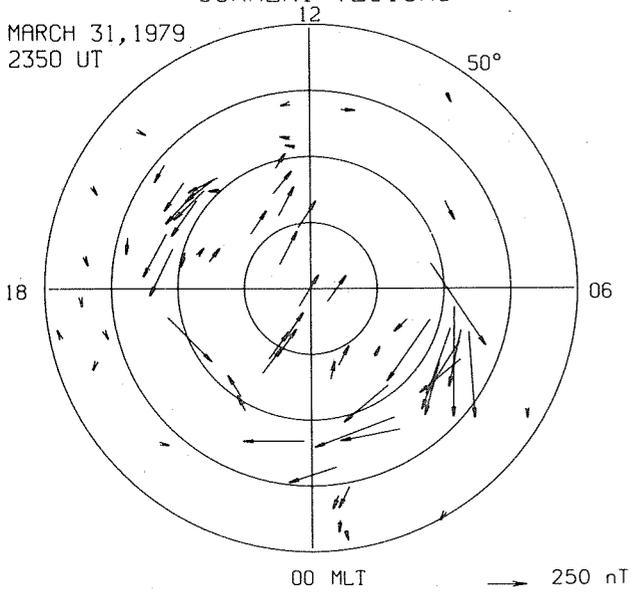
90 2340



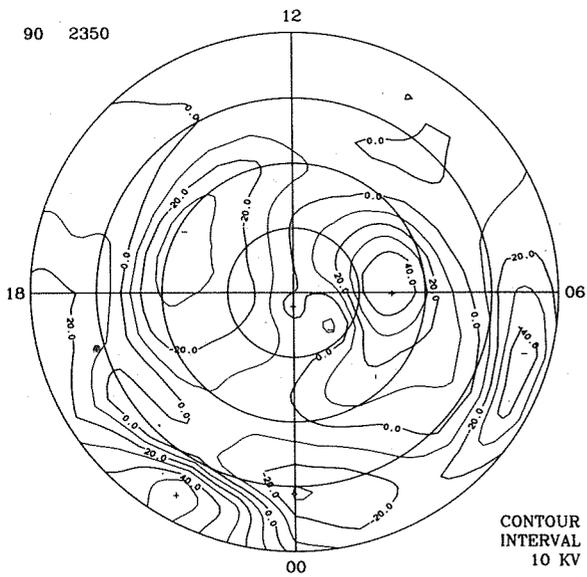
CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

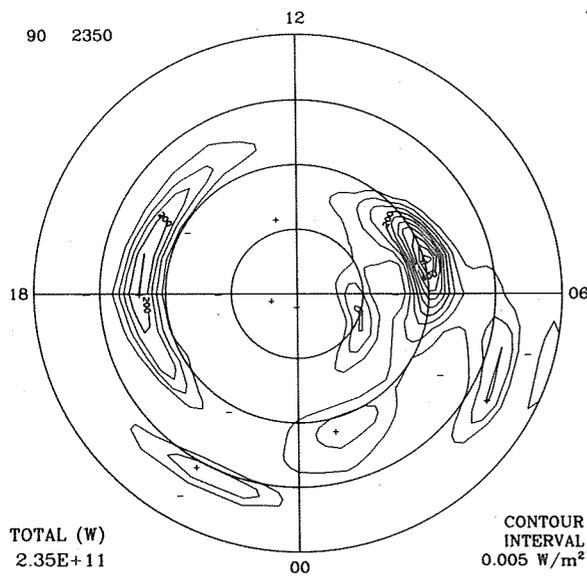
MARCH 31, 1979  
2350 UT



ELECTRIC POTENTIAL



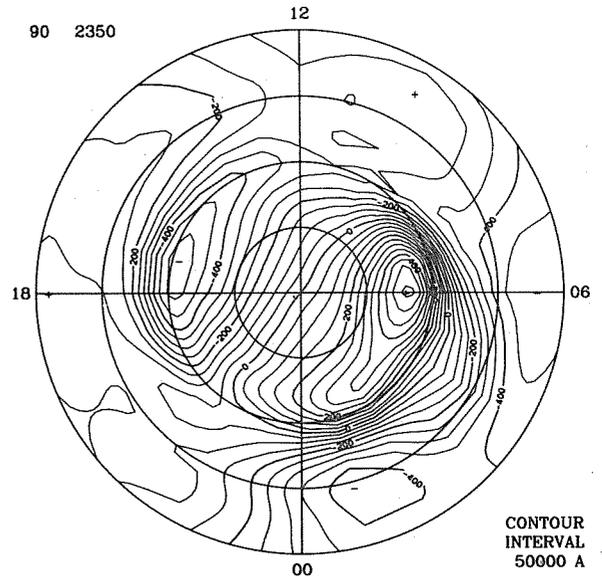
JOULE HEAT RATE



TOTAL (W)  
2.35E+11

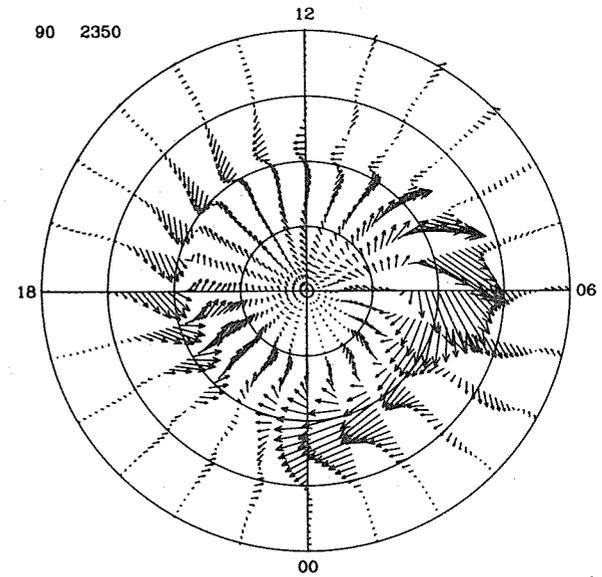
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



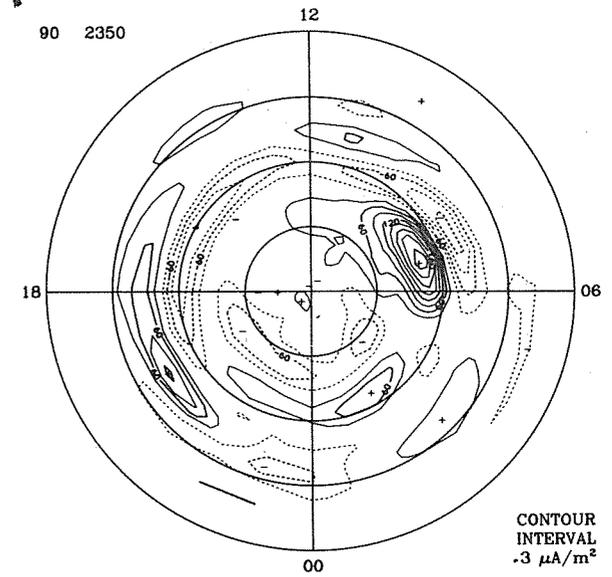
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

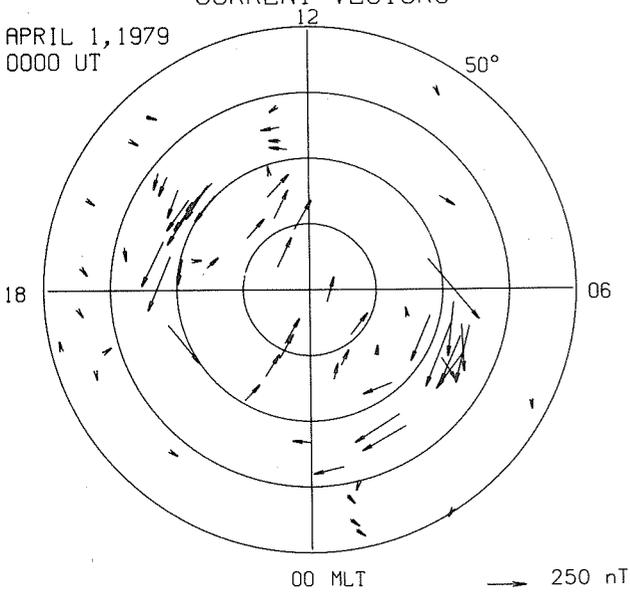
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

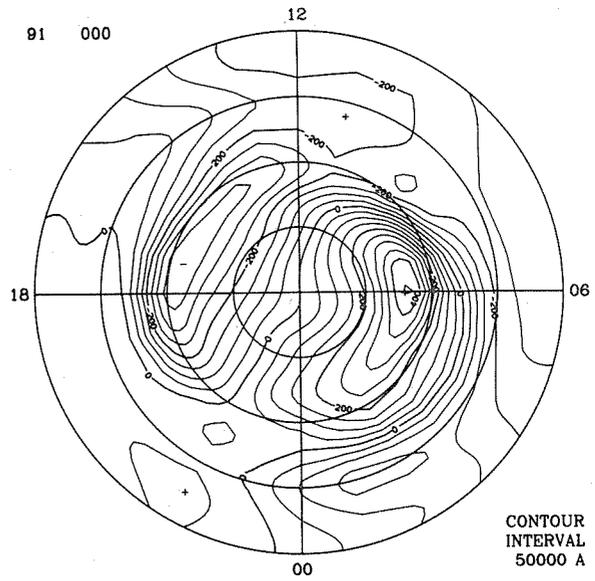
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0000 UT



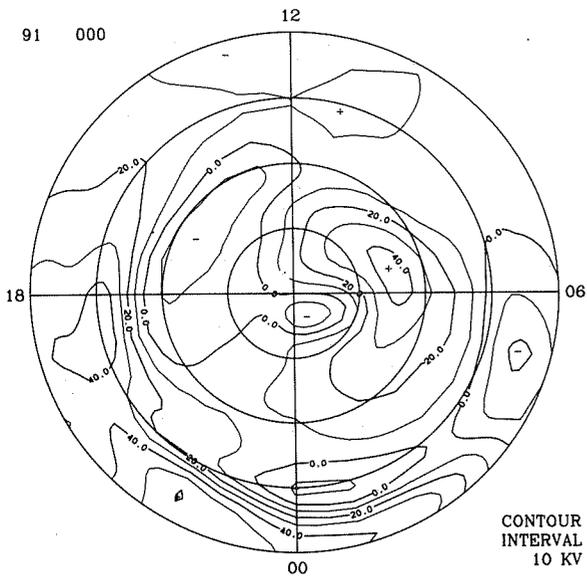
EQUIVALENT CURRENT SYSTEM

91 000



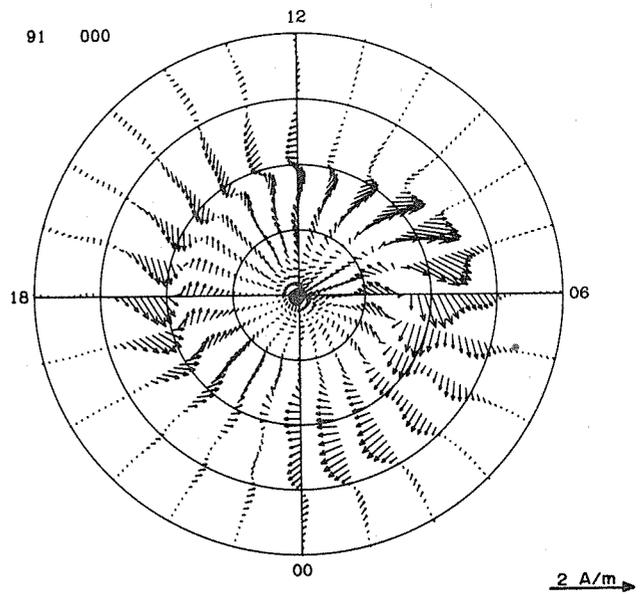
ELECTRIC POTENTIAL

91 000



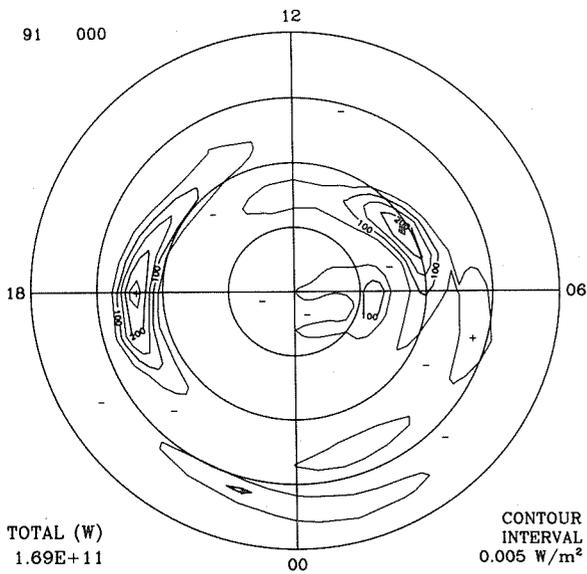
IONOSPHERIC CURRENT

91 000



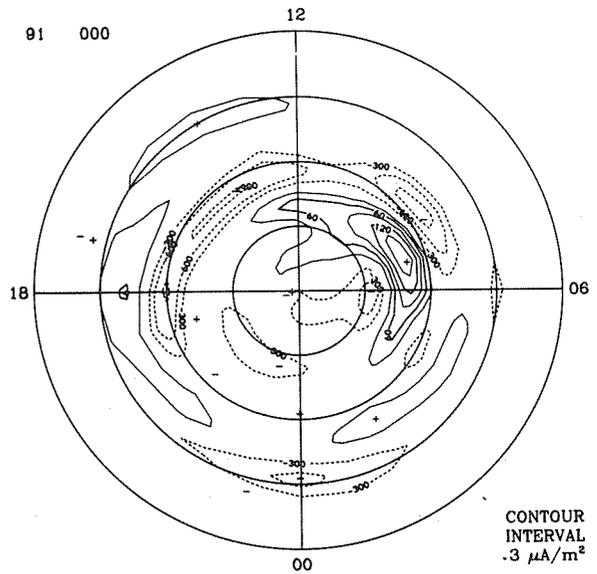
JOULE HEAT RATE

91 000



FIELD-ALIGNED CURRENTS

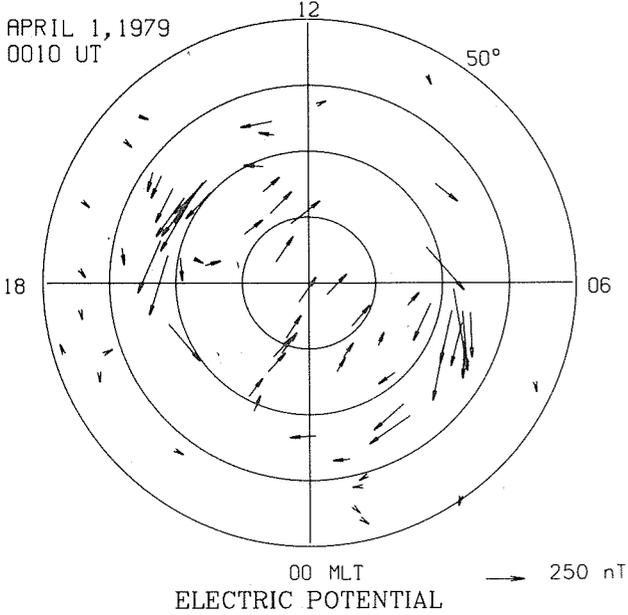
91 000



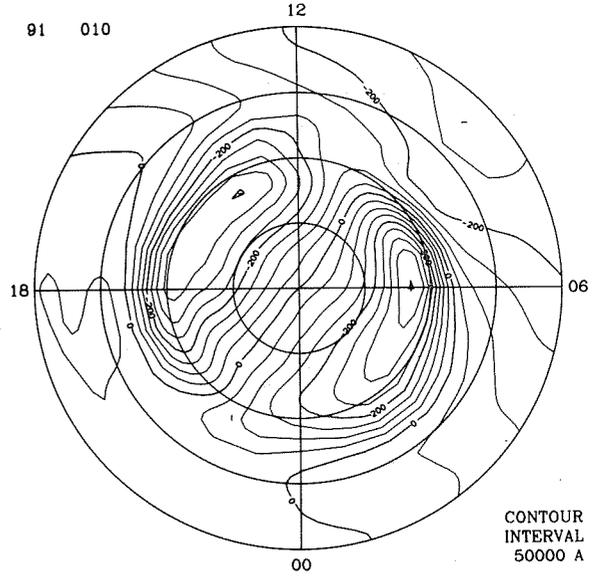
TOTAL (W)  
1.69E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

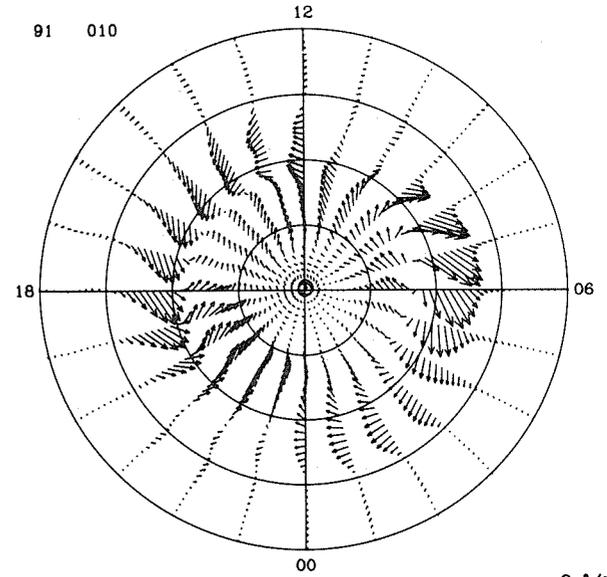
APRIL 1, 1979  
0010 UT



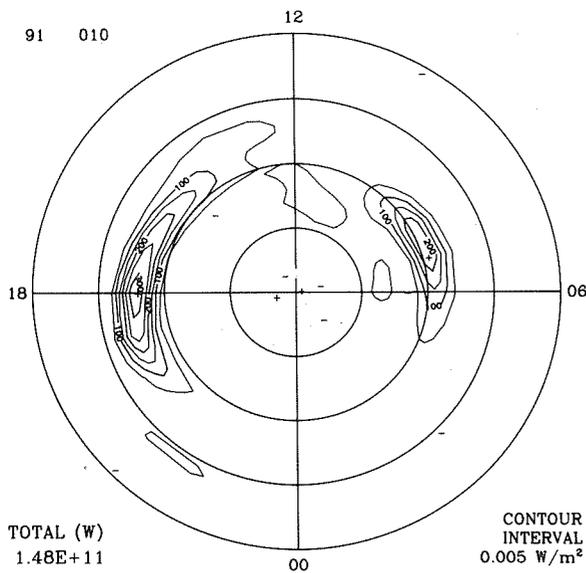
EQUIVALENT CURRENT SYSTEM



IONOSPHERIC CURRENT

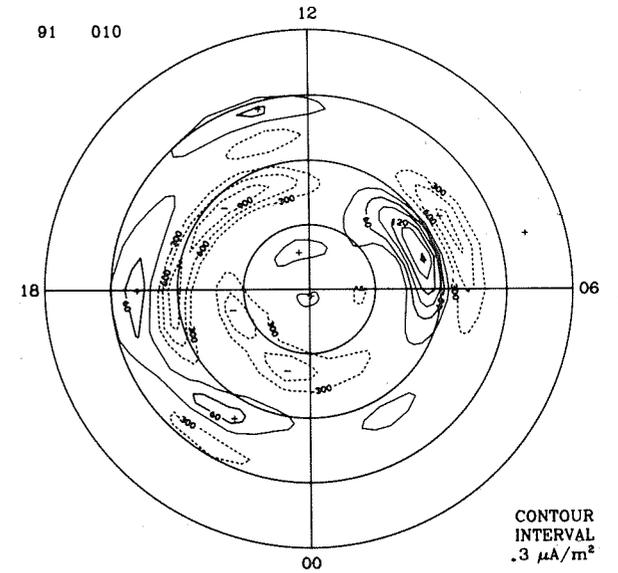


JOULE HEAT RATE



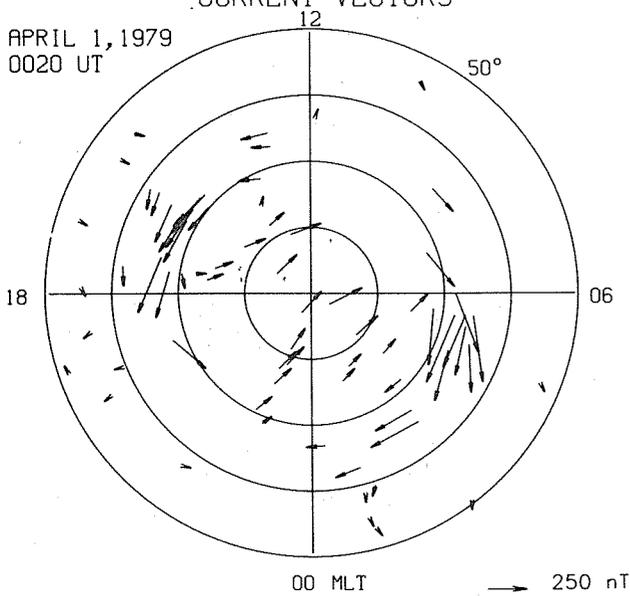
TOTAL (W)  
1.48E+11

FIELD-ALIGNED CURRENTS



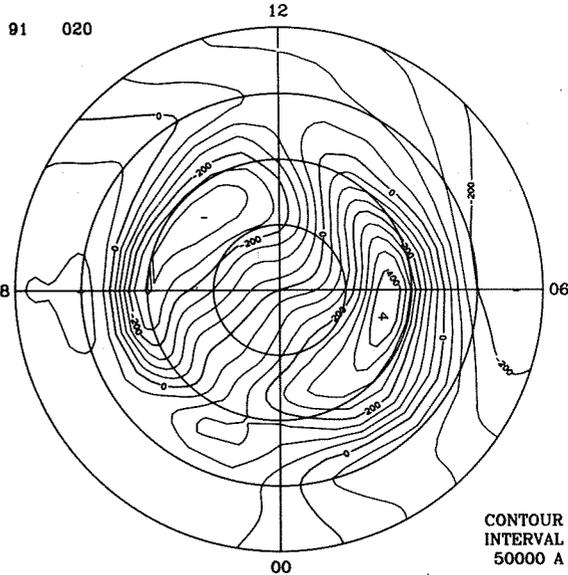
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0020 UT



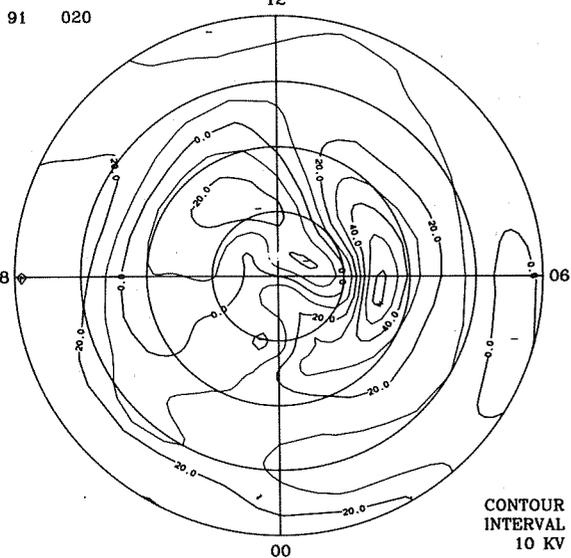
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



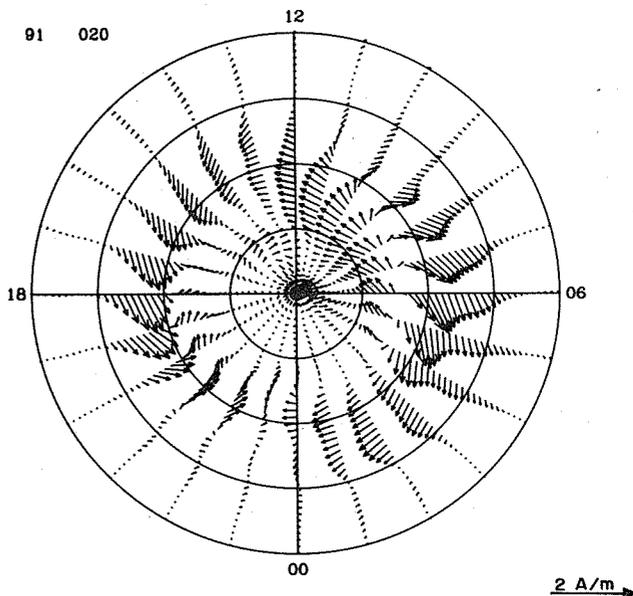
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



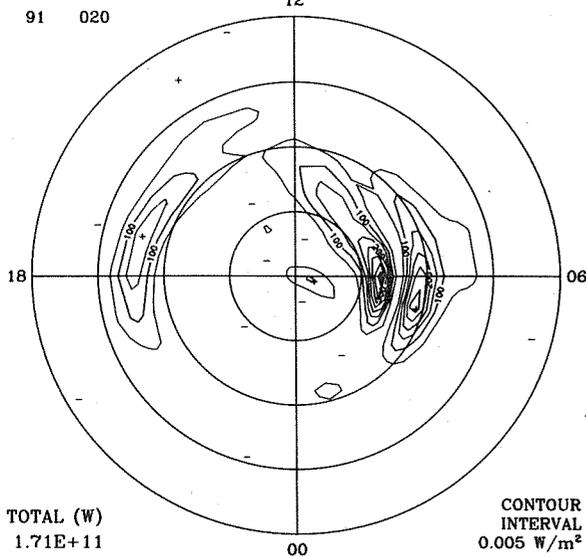
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



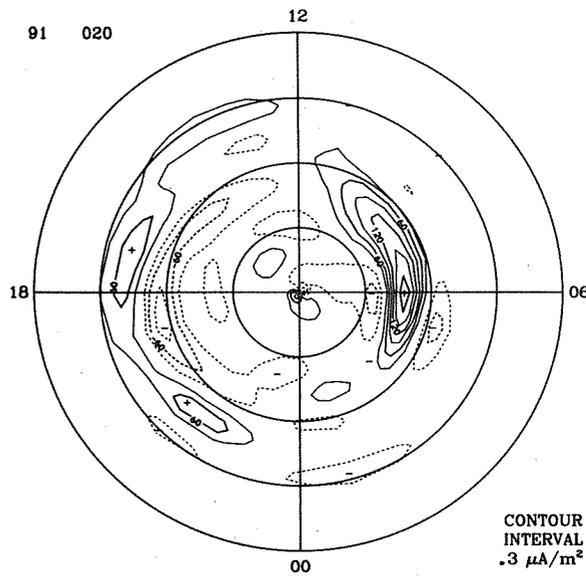
2 A/m

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

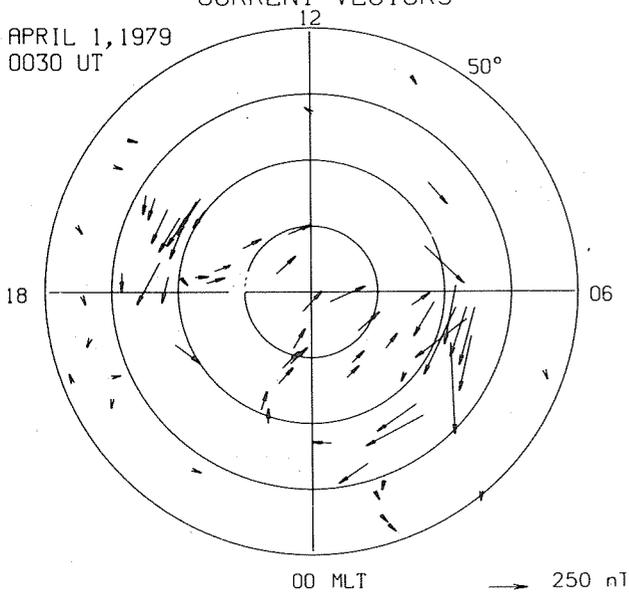
TOTAL (W)  
1.71E+11



CONTOUR  
INTERVAL  
0.3 μA/m<sup>2</sup>

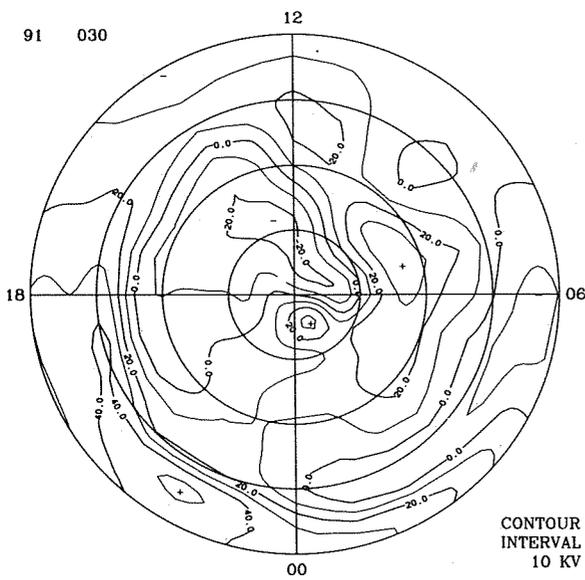
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0030 UT



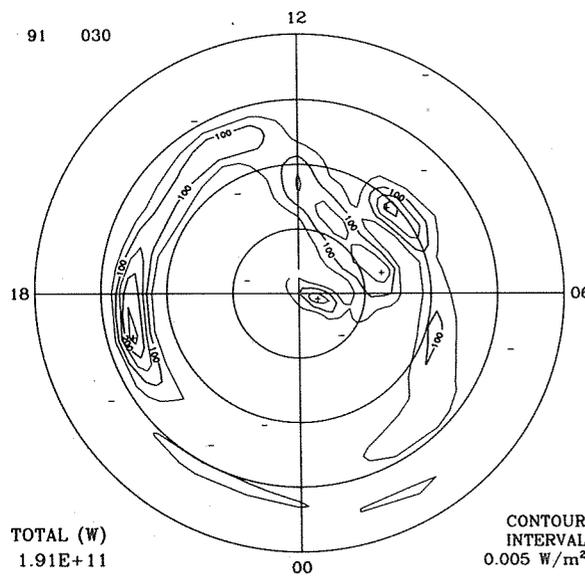
ELECTRIC POTENTIAL

91 030



JOULE HEAT RATE

91 030

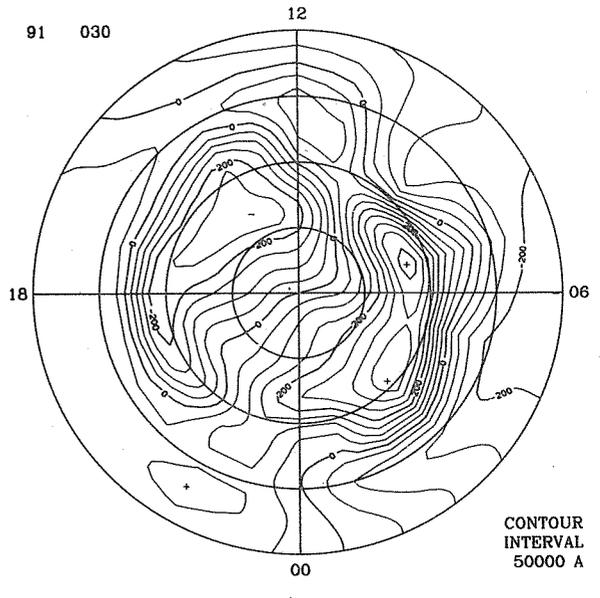


TOTAL (W)  
1.91E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

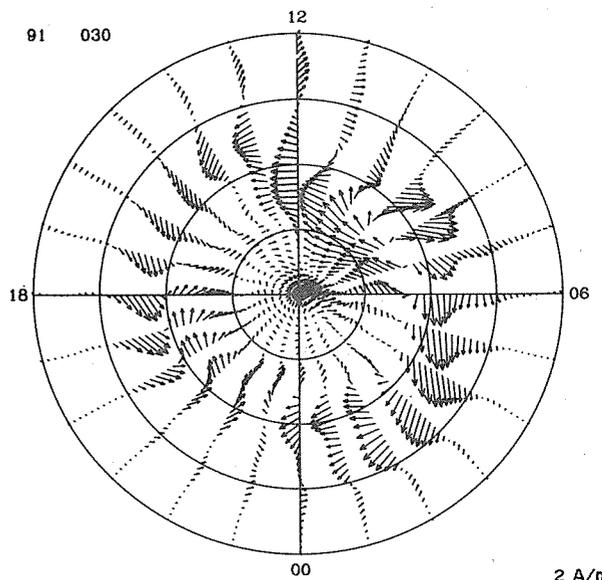
91 030



CONTOUR  
INTERVAL  
50000 A

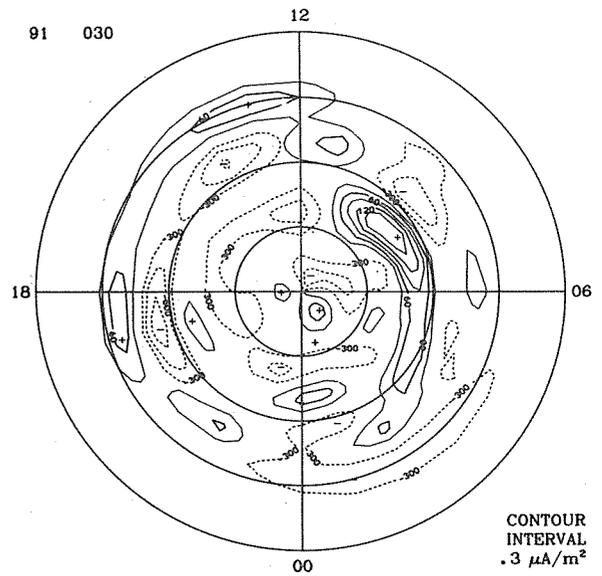
IONOSPHERIC CURRENT

91 030



FIELD-ALIGNED CURRENTS

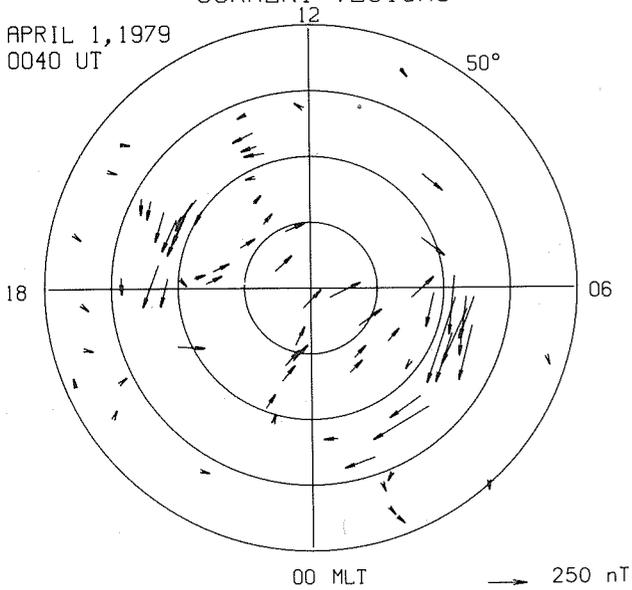
91 030



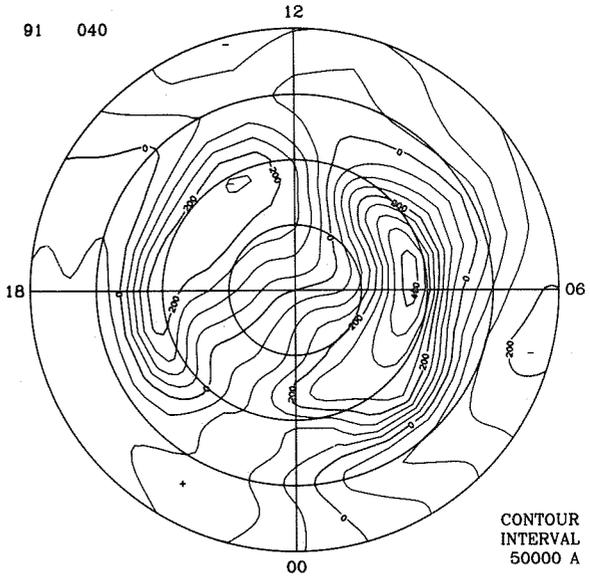
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

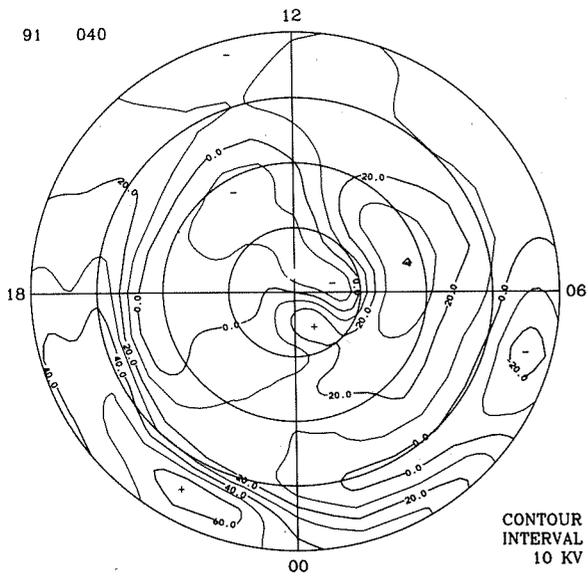
APRIL 1, 1979  
0040 UT



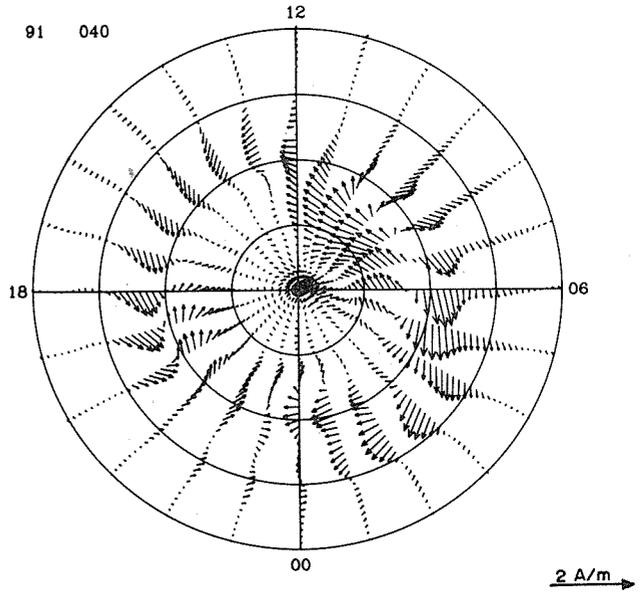
EQUIVALENT CURRENT SYSTEM



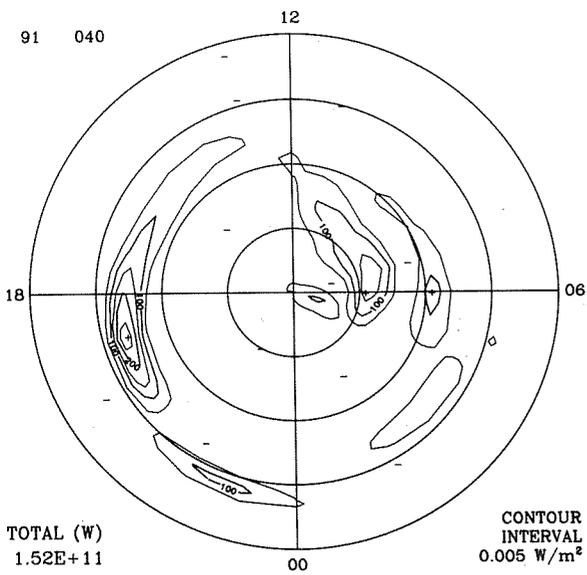
ELECTRIC POTENTIAL



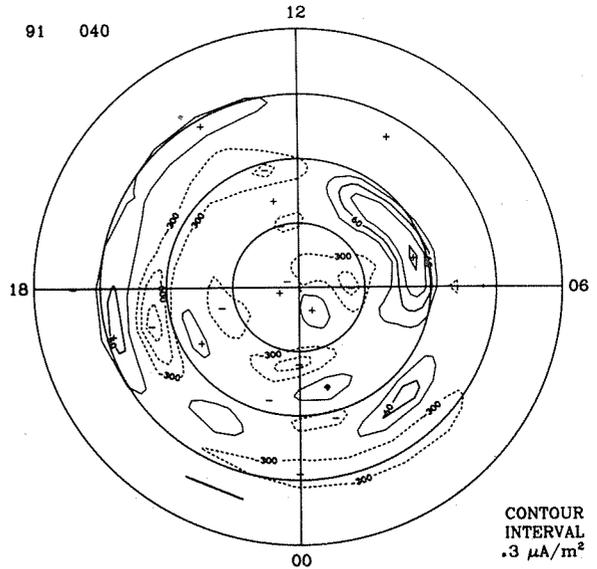
IONOSPHERIC CURRENT



JOULE HEAT RATE

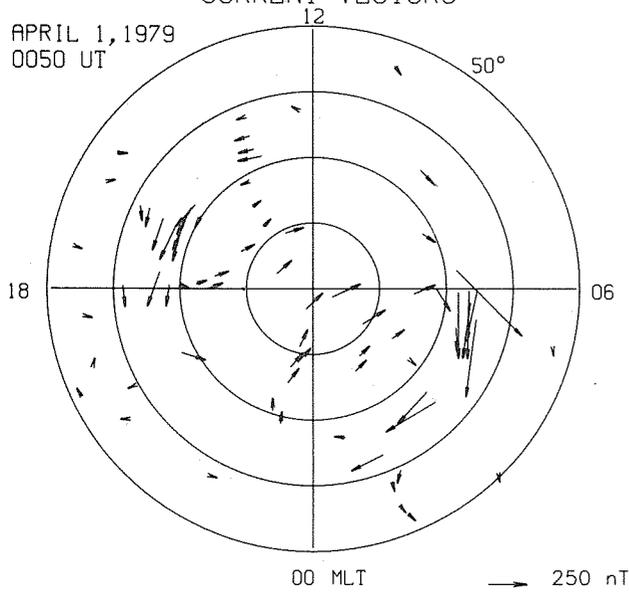


FIELD-ALIGNED CURRENTS



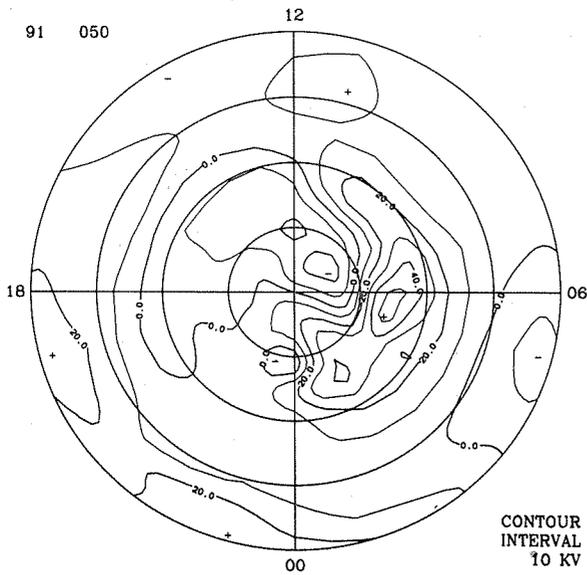
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0050 UT



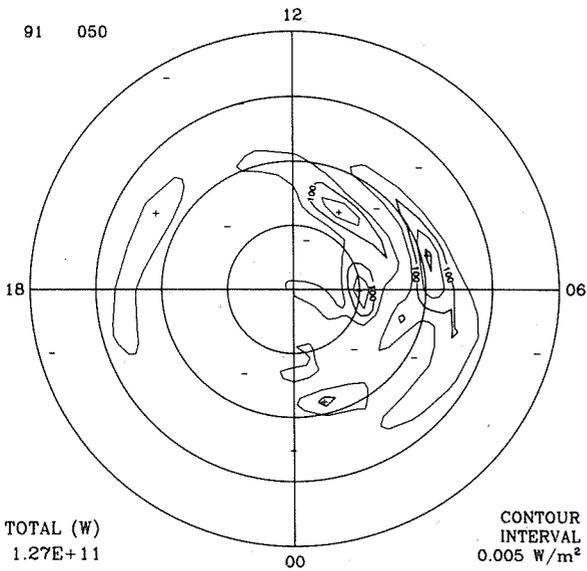
ELECTRIC POTENTIAL

91 050



JOULE HEAT RATE

91 050

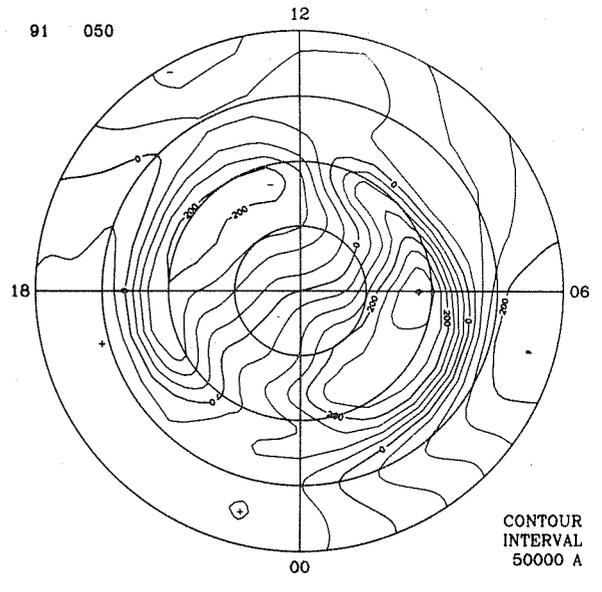


TOTAL (W)  
1.27E+11

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

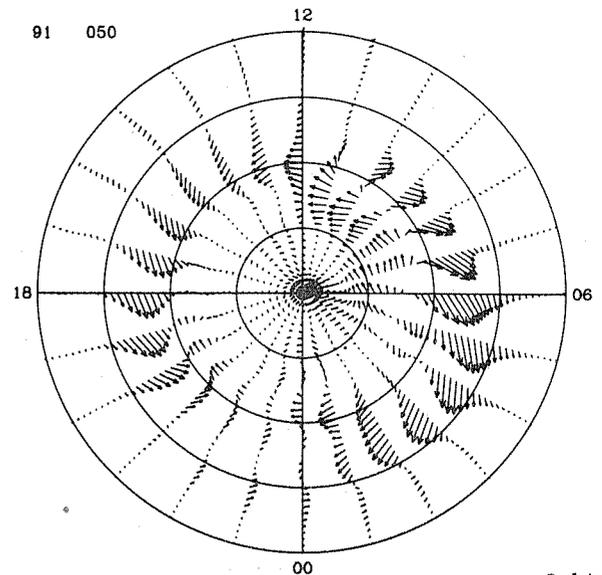
91 050



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

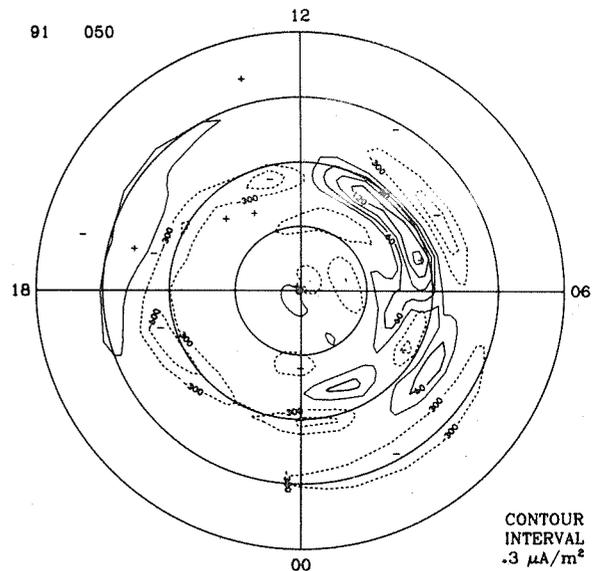
91 050



2 A/m

FIELD-ALIGNED CURRENTS

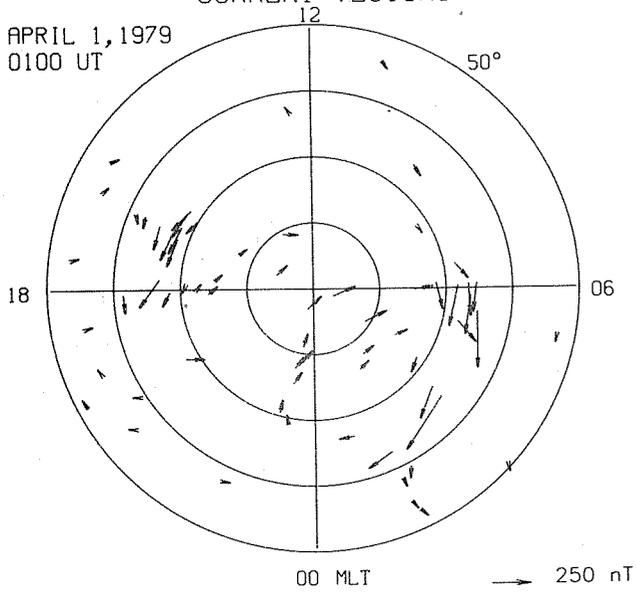
91 050



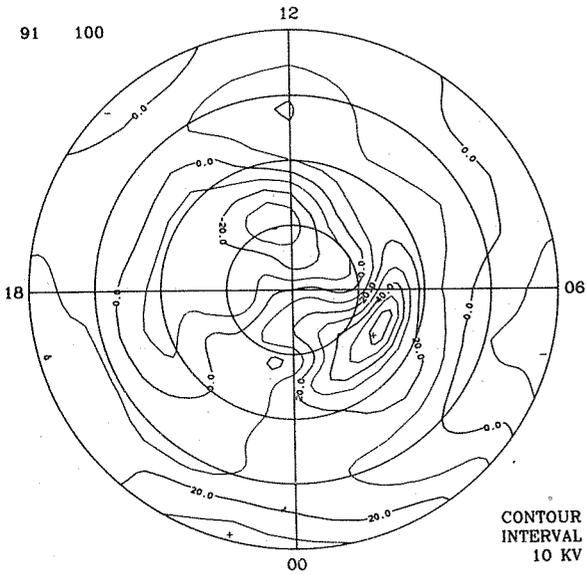
CONTOUR  
INTERVAL  
.3 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

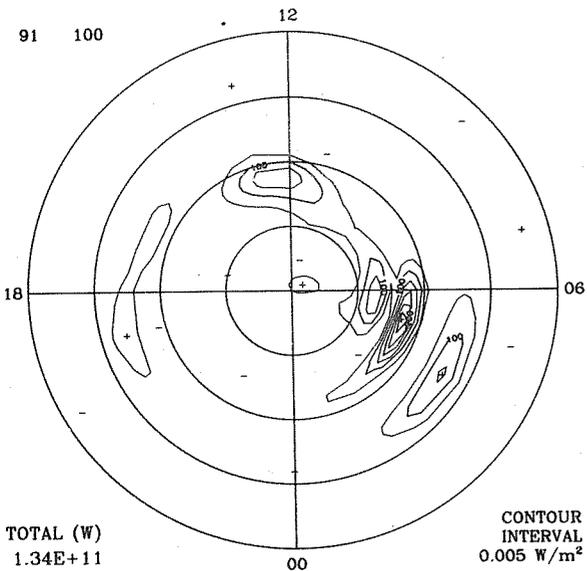
APRIL 1, 1979  
0100 UT



ELECTRIC POTENTIAL



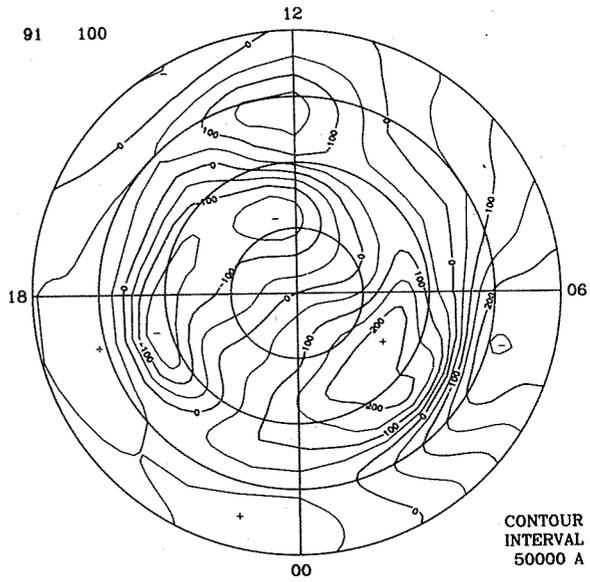
JOULE HEAT RATE



TOTAL (W)  
1.34E+11

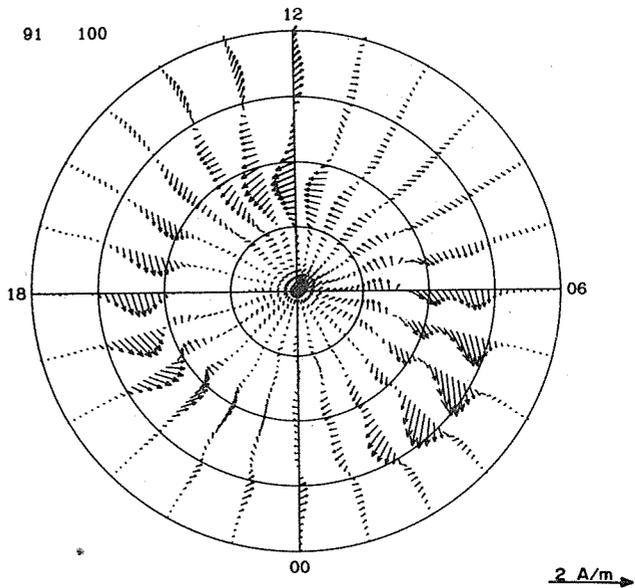
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

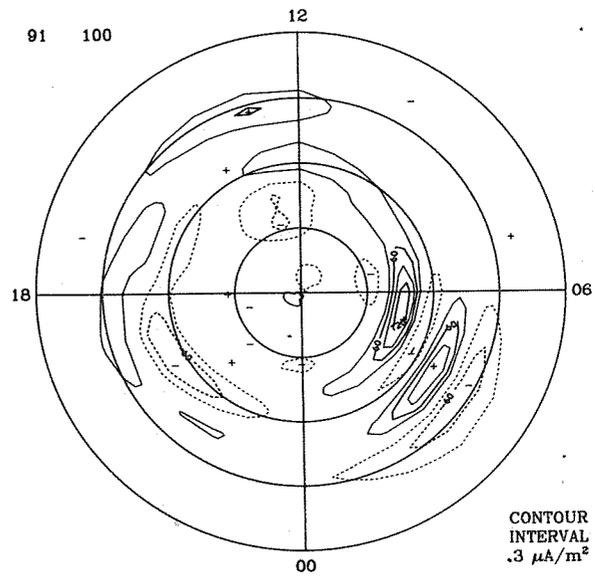


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



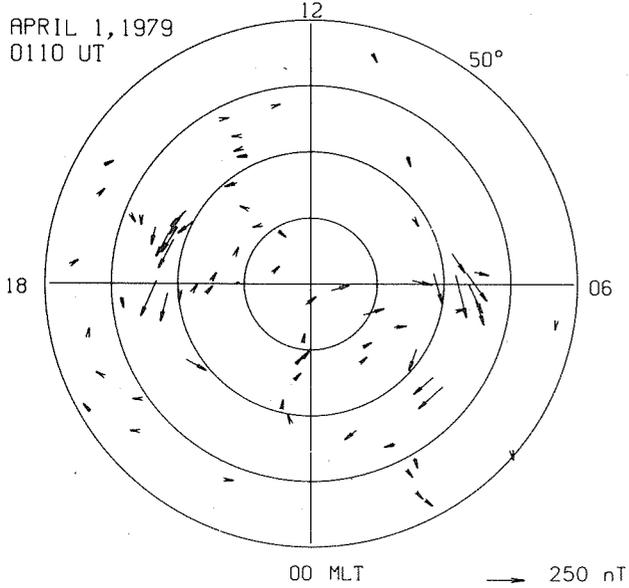
FIELD-ALIGNED CURRENTS



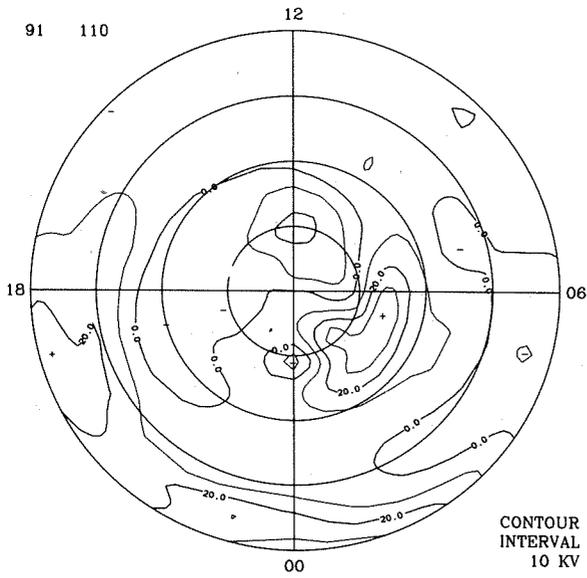
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

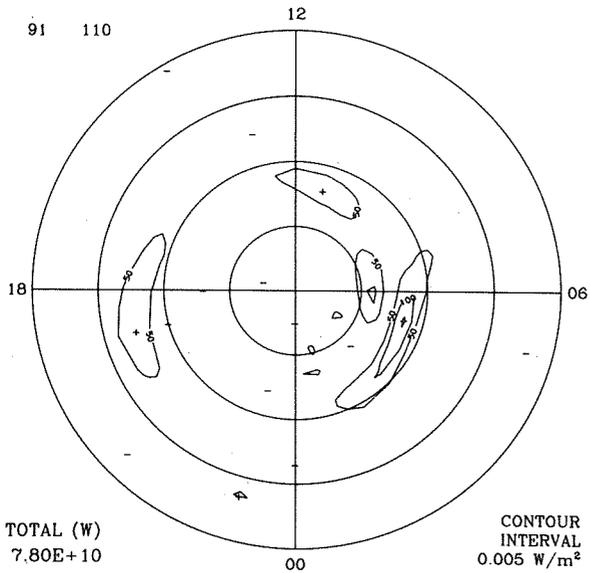
APRIL 1, 1979  
0110 UT



ELECTRIC POTENTIAL



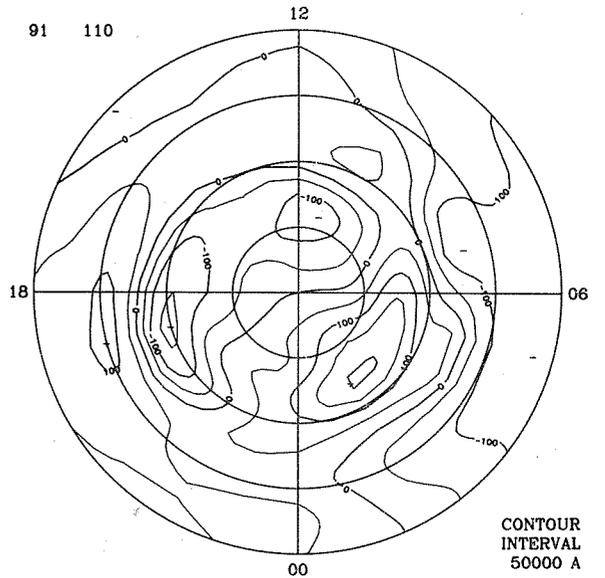
JOULE HEAT RATE



TOTAL (W)  
7.80E+10

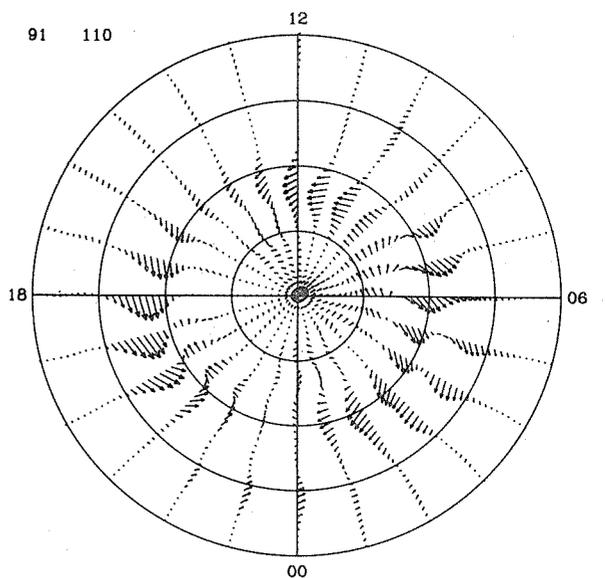
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



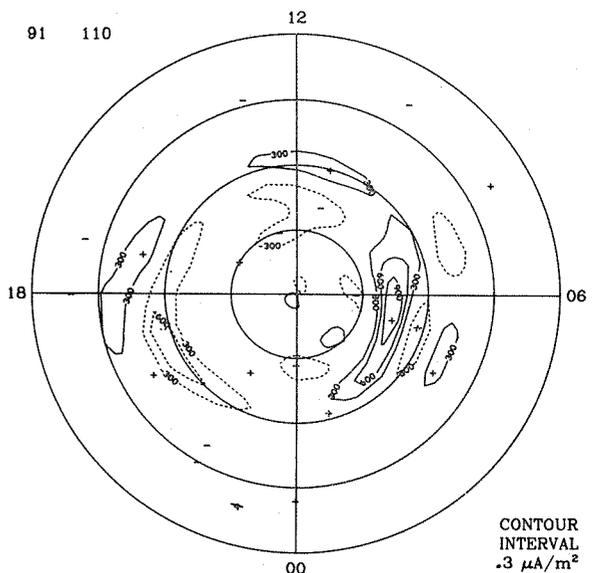
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

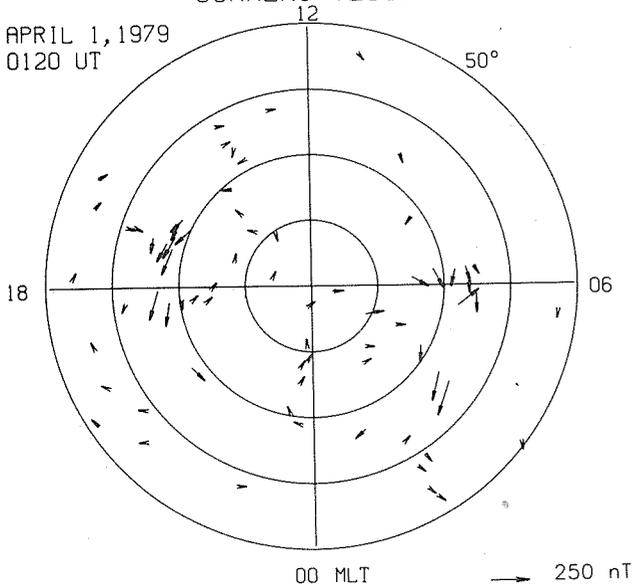
FIELD-ALIGNED CURRENTS



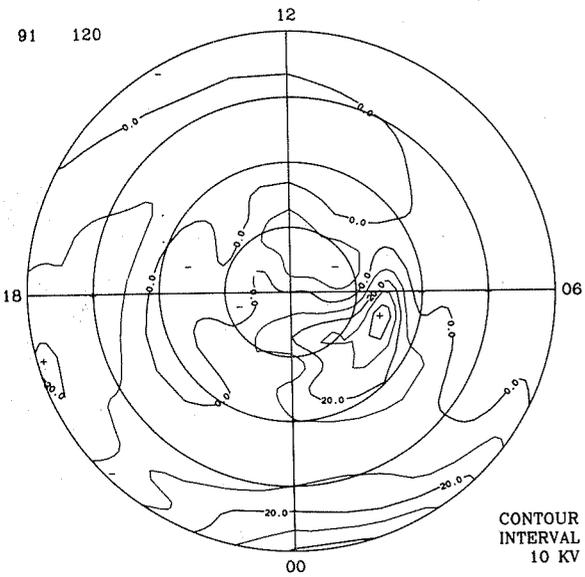
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

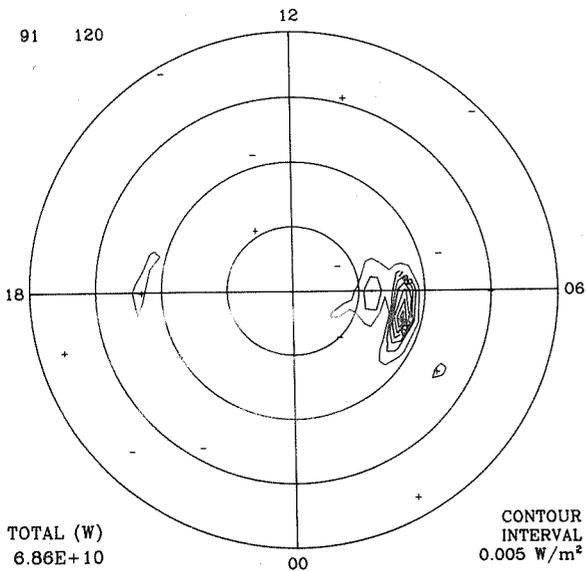
APRIL 1, 1979  
0120 UT



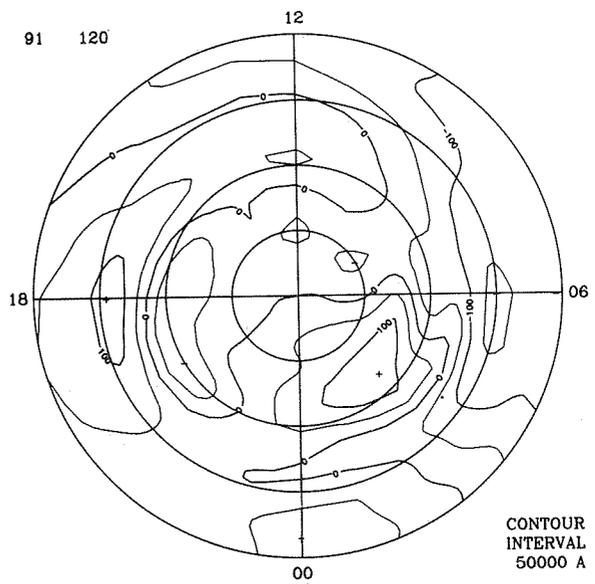
ELECTRIC POTENTIAL



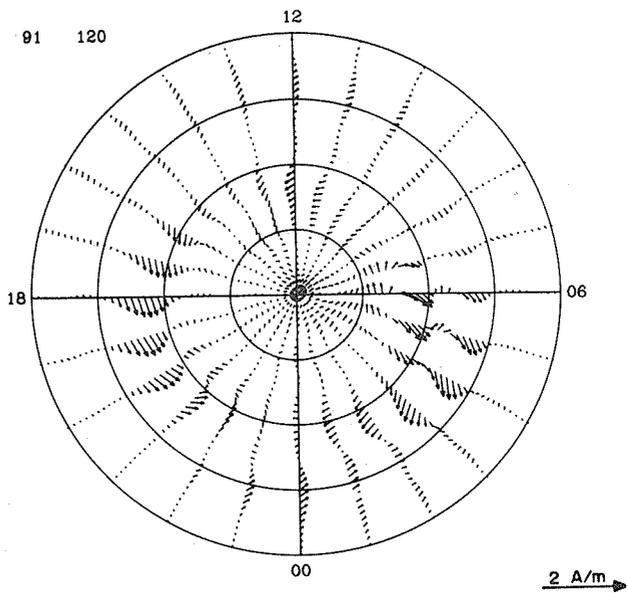
JOULE HEAT RATE



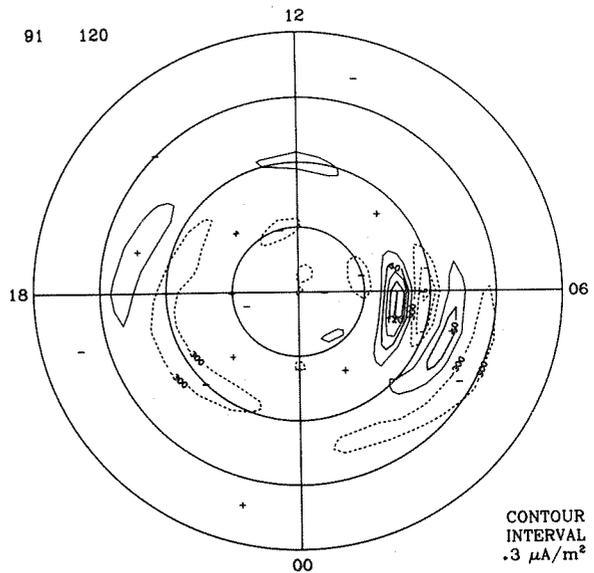
EQUIVALENT CURRENT SYSTEM



IONOSPHERIC CURRENT

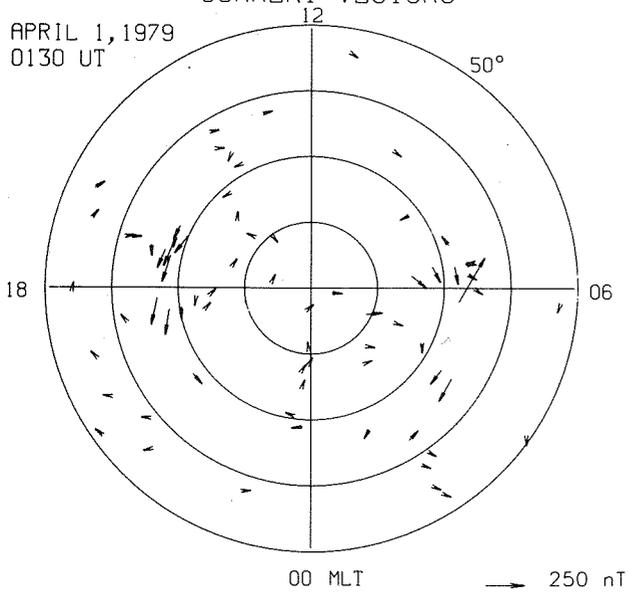


FIELD-ALIGNED CURRENTS

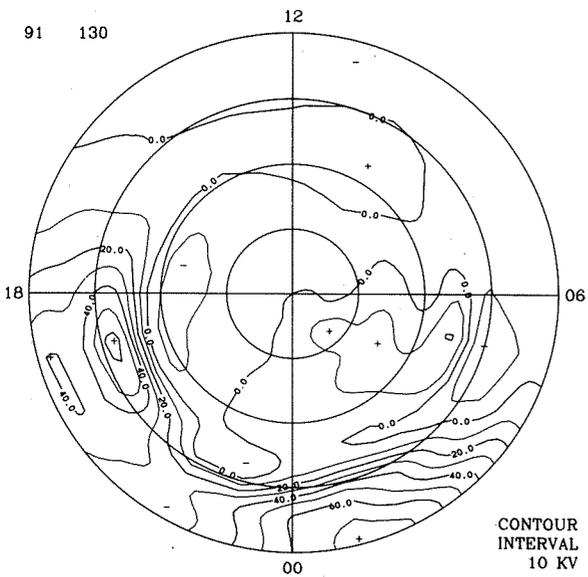


OBSERVED EQUIVALENT  
CURRENT VECTORS

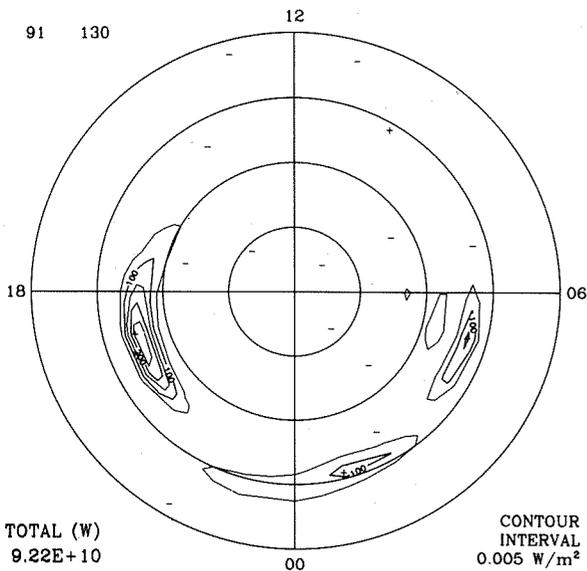
APRIL 1, 1979  
0130 UT



ELECTRIC POTENTIAL



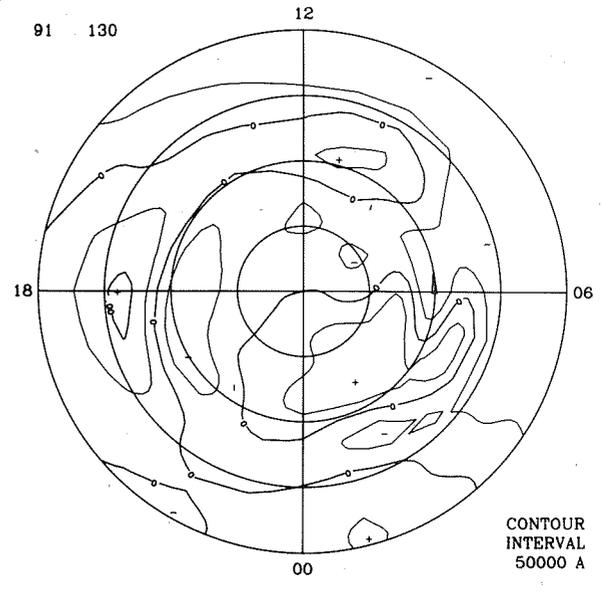
JOULE HEAT RATE



TOTAL (W)  
9.22E+10

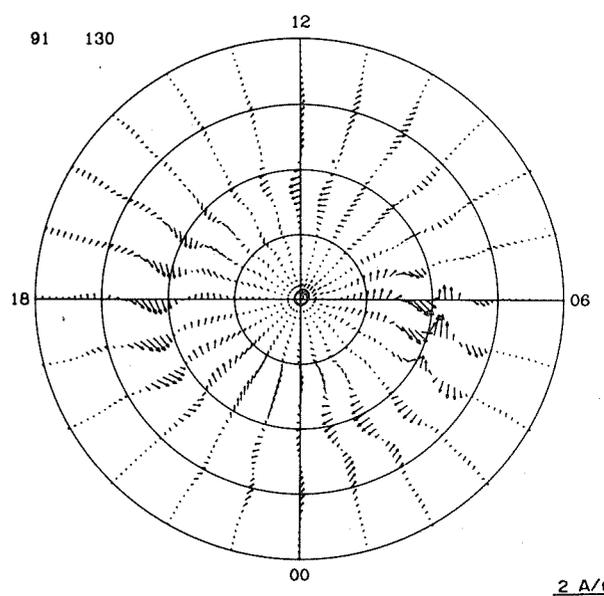
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM



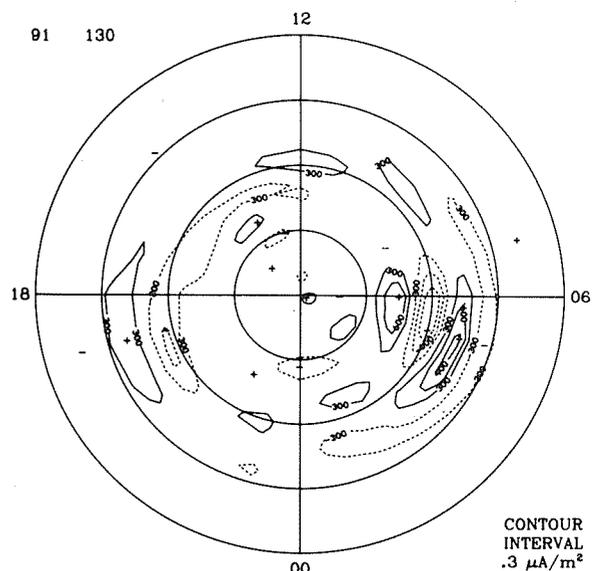
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



2 A/m

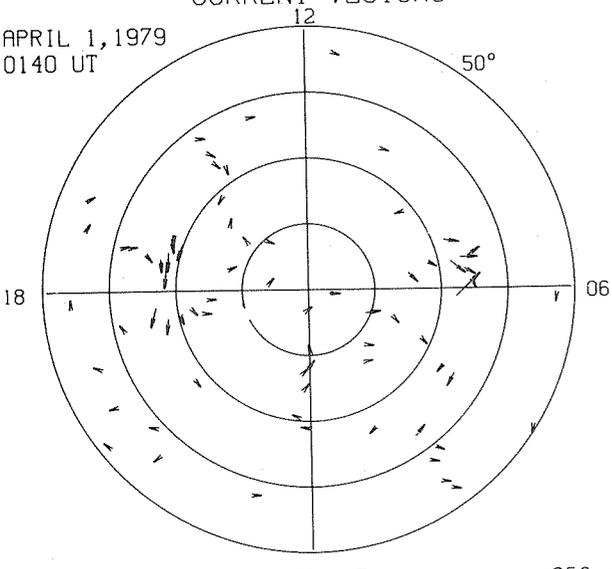
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

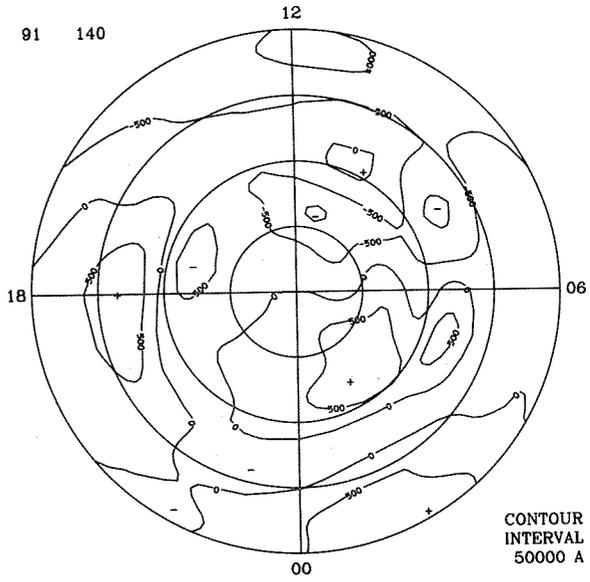
APRIL 1, 1979  
0140 UT



00 MLT  
ELECTRIC POTENTIAL

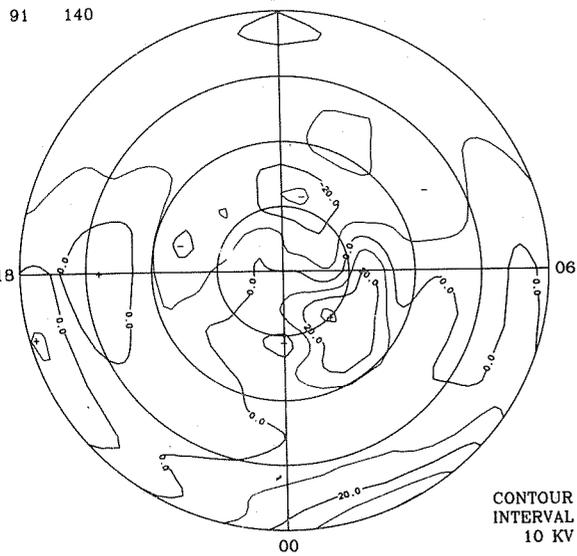
→ 250 nT

EQUIVALENT CURRENT SYSTEM



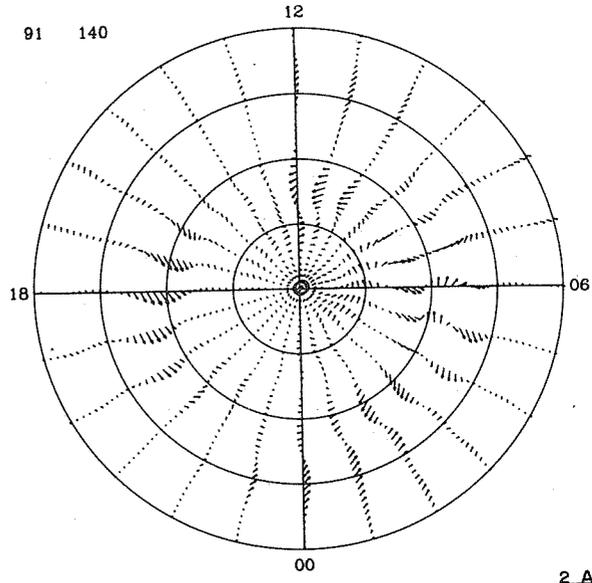
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



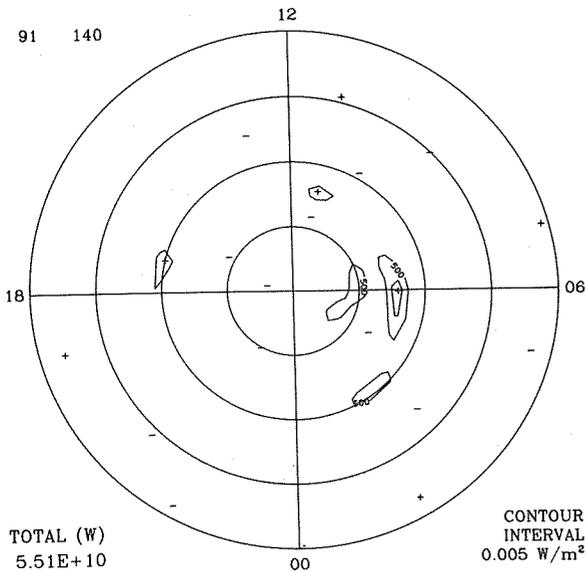
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



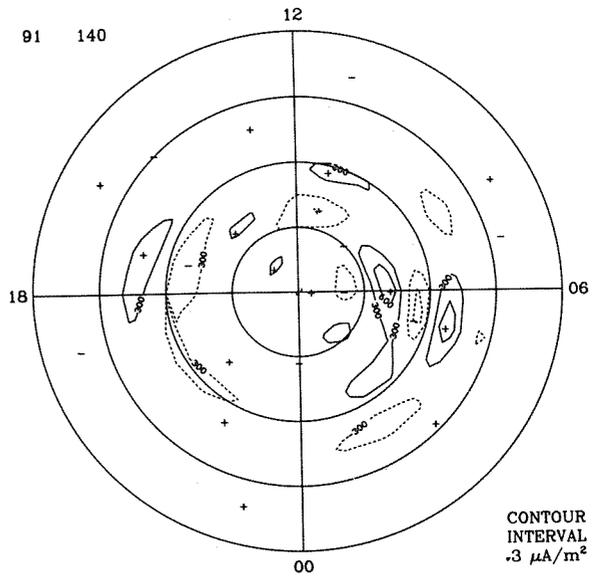
→ 2 A/m

FIELD-ALIGNED CURRENTS

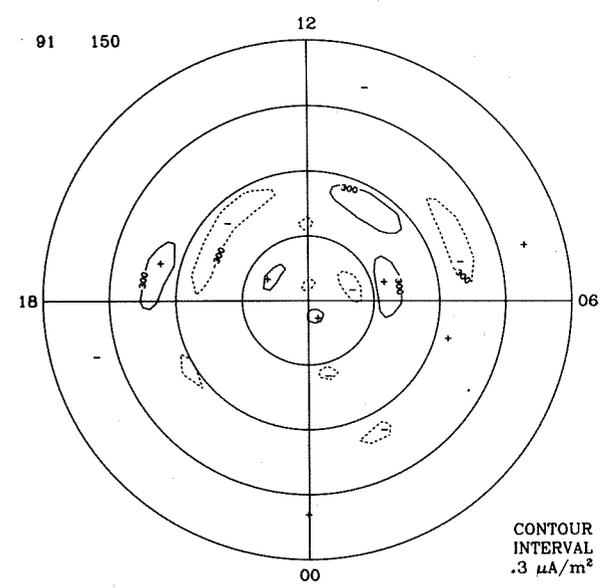
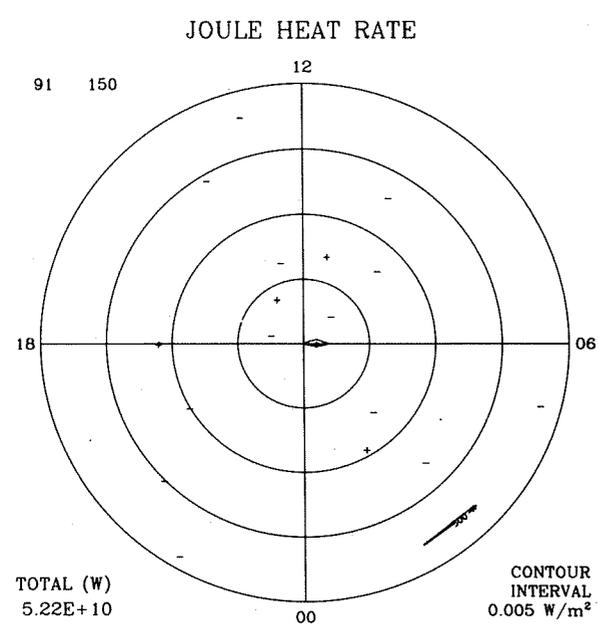
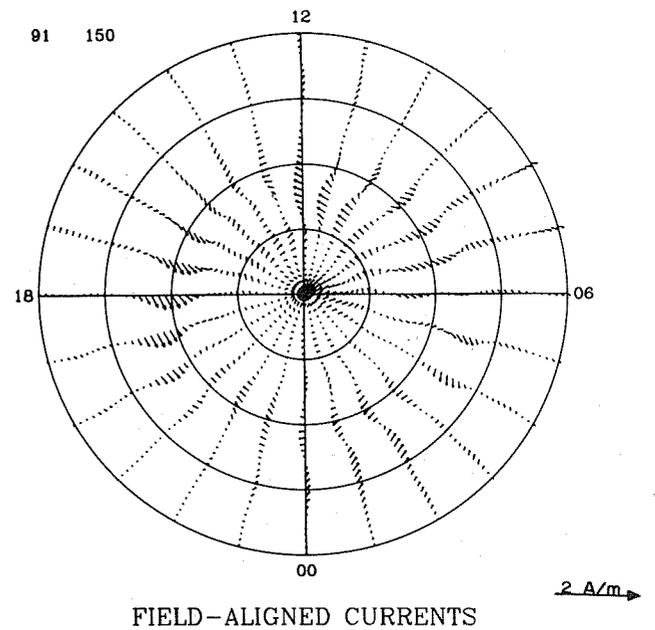
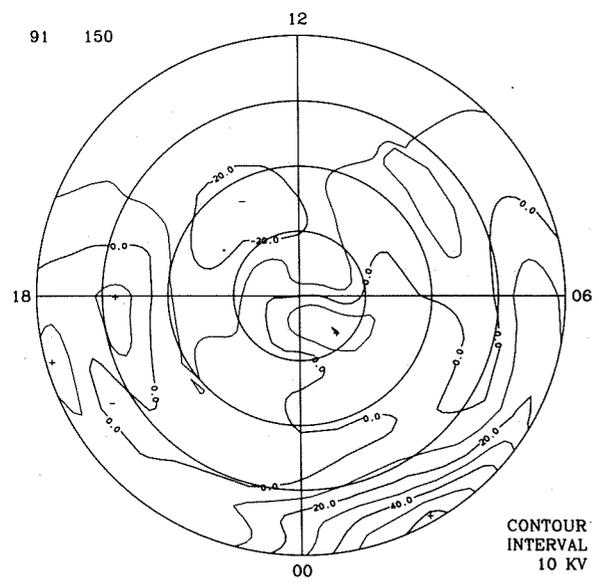
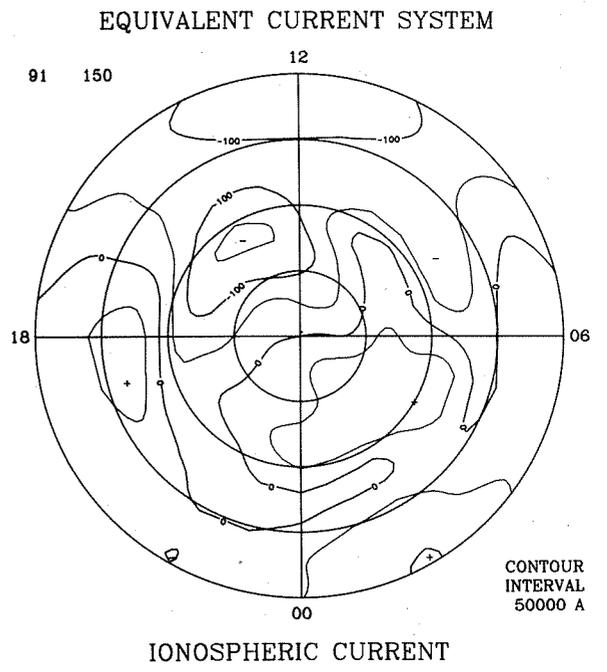
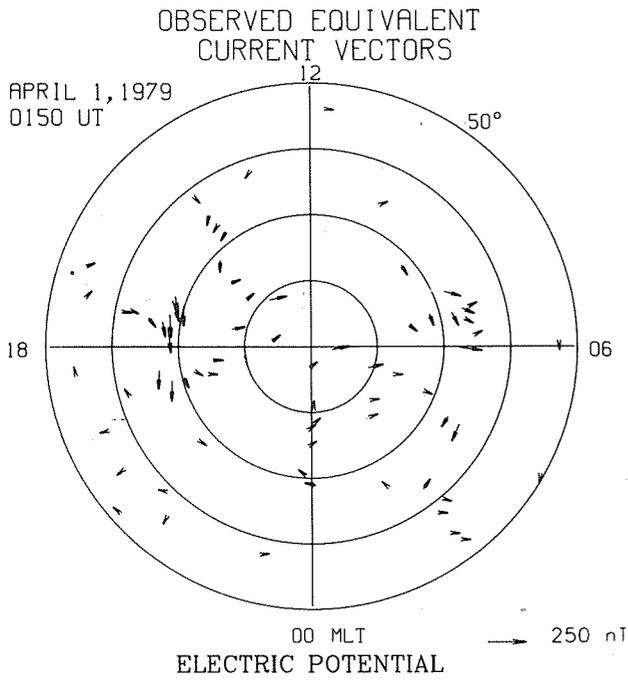


TOTAL (W)  
5.51E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

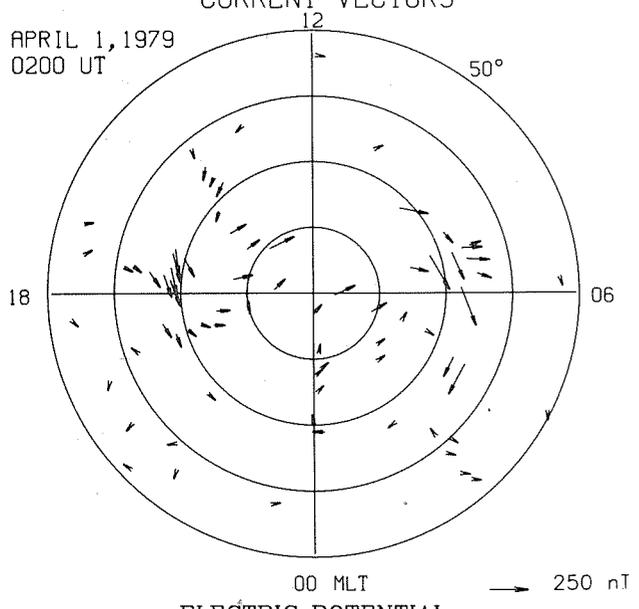


CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

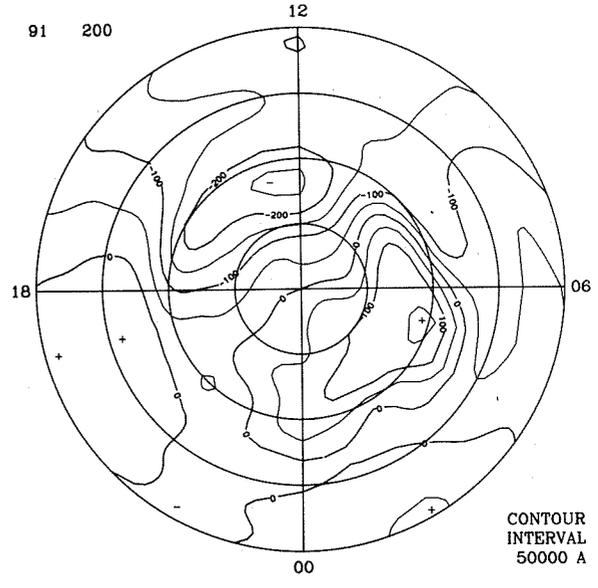


OBSERVED EQUIVALENT  
CURRENT VECTORS

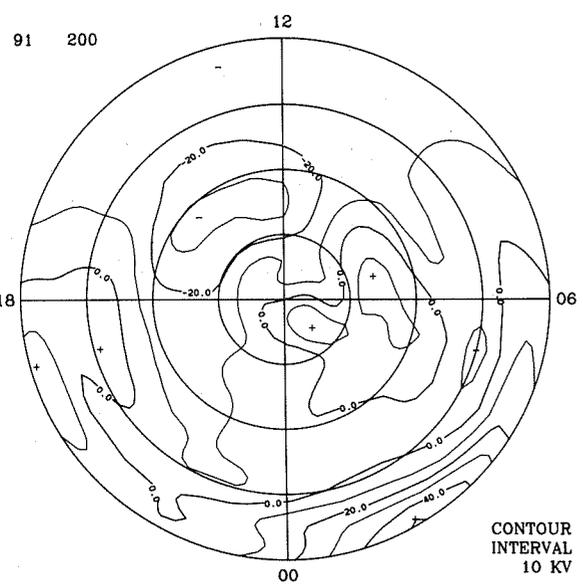
APRIL 1, 1979  
0200 UT



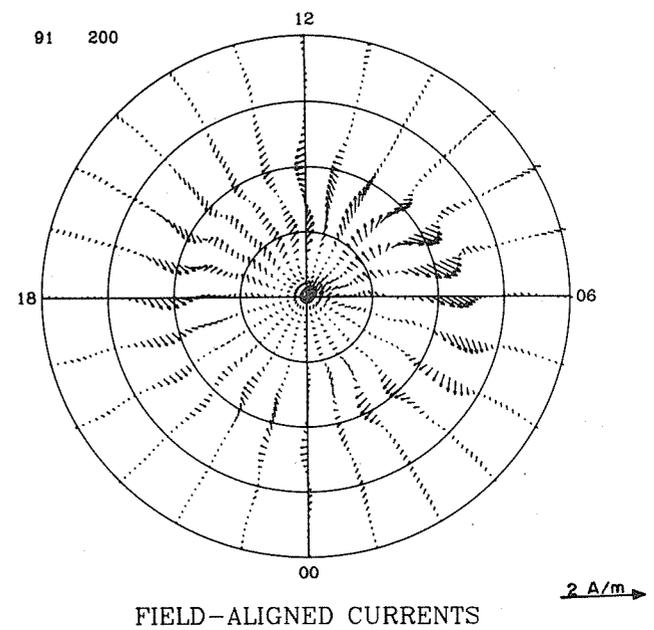
EQUIVALENT CURRENT SYSTEM



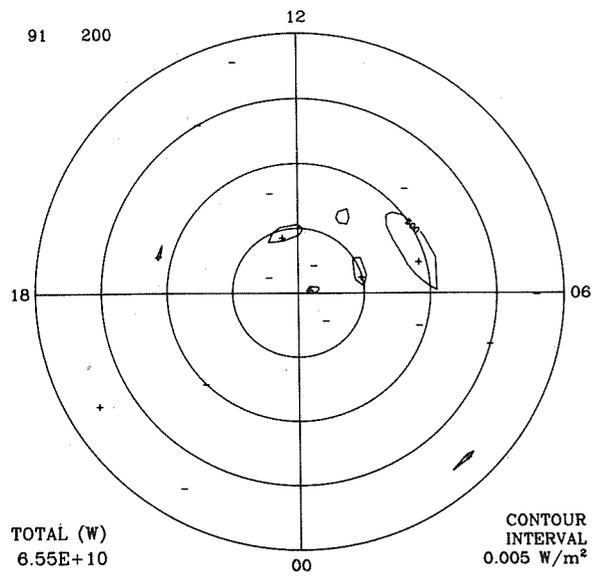
ELECTRIC POTENTIAL



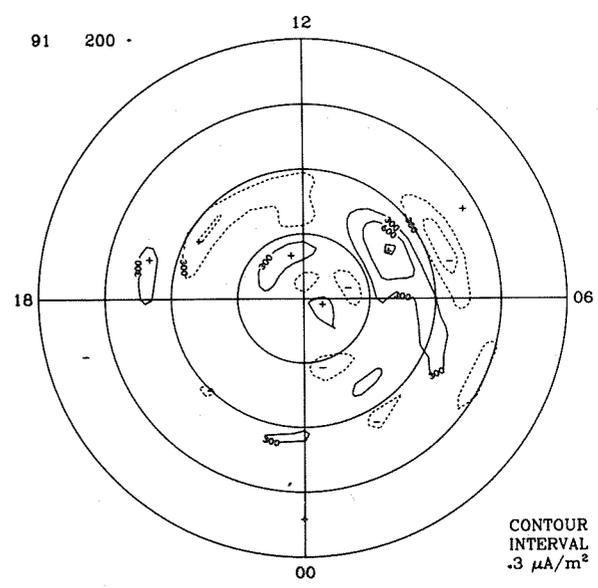
IONOSPHERIC CURRENT



JOULE HEAT RATE

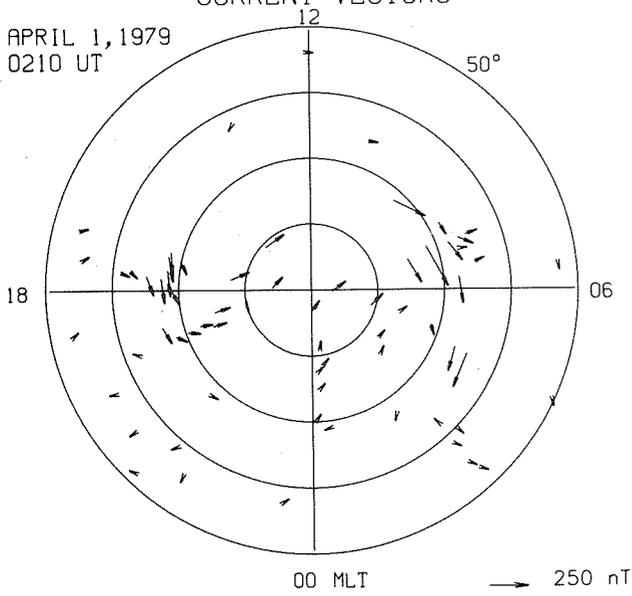


FIELD-ALIGNED CURRENTS



OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0210 UT

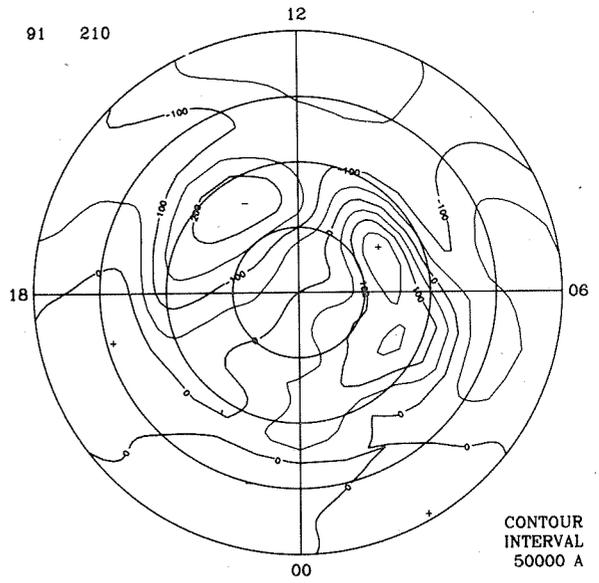


00 MLT

→ 250 nT

EQUIVALENT CURRENT SYSTEM

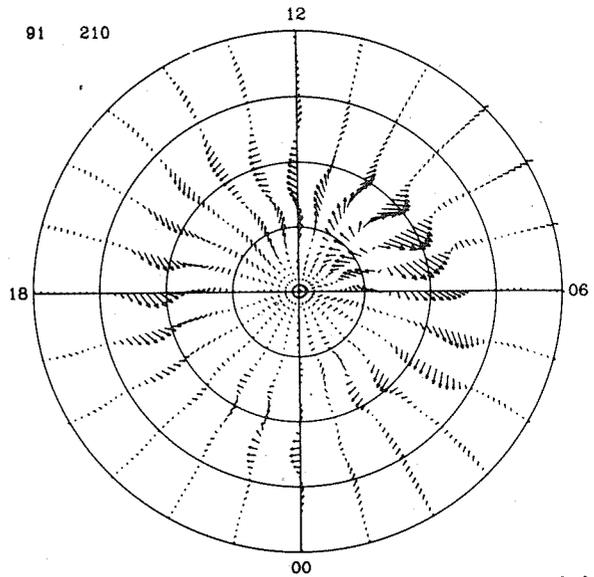
91 210



CONTOUR  
INTERVAL  
50000 A

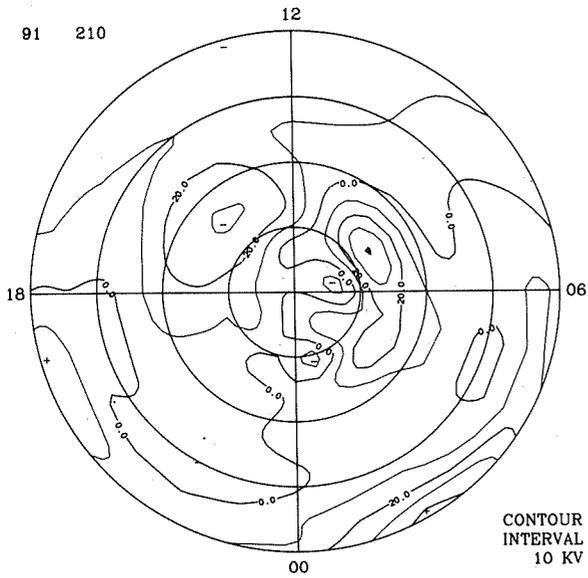
IONOSPHERIC CURRENT

91 210



→ 2 A/m

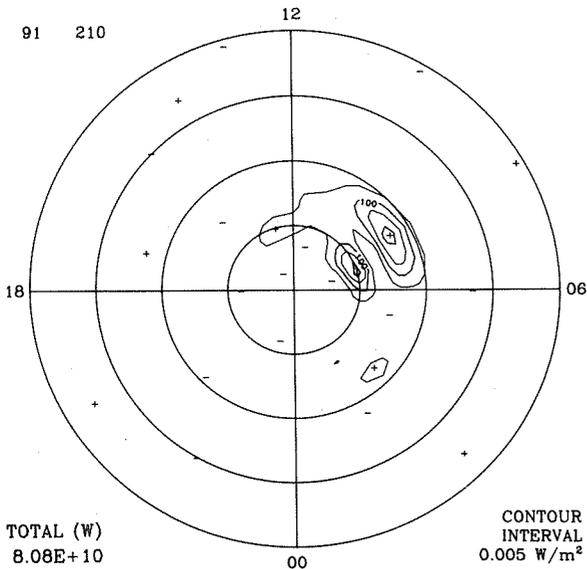
91 210



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

91 210

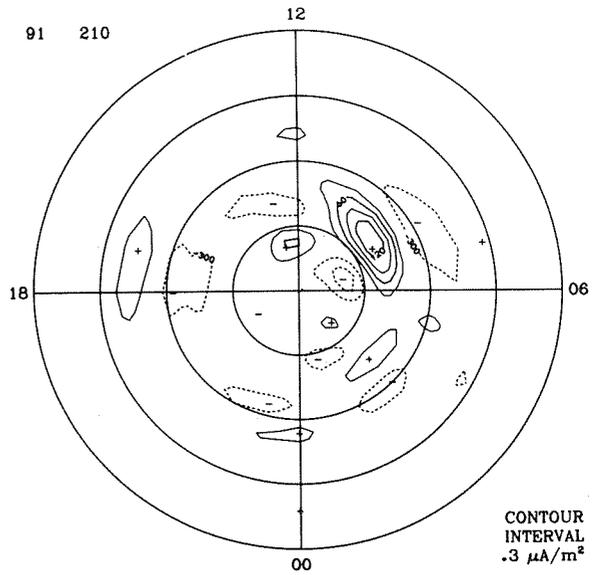


TOTAL (W)  
8.08E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

FIELD-ALIGNED CURRENTS

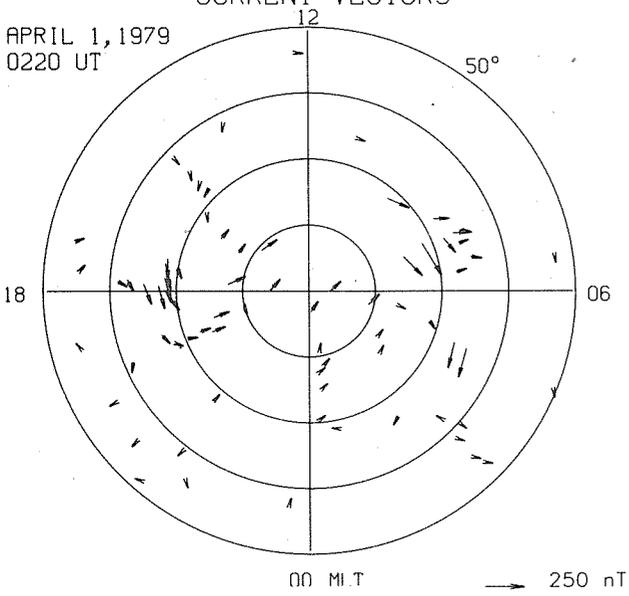
91 210



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

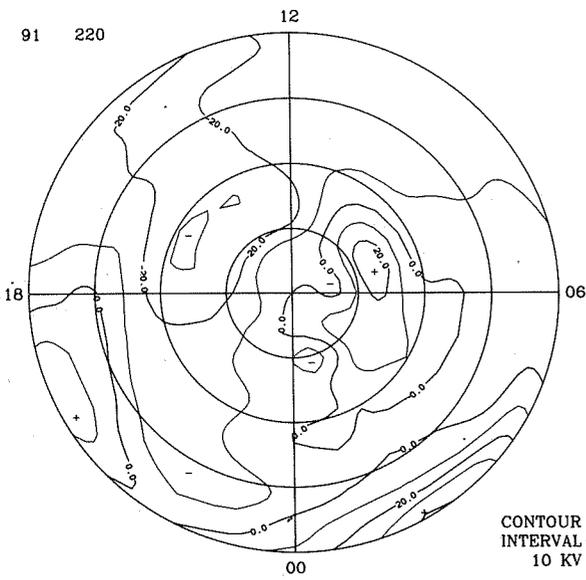
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0220 UT



ELECTRIC POTENTIAL

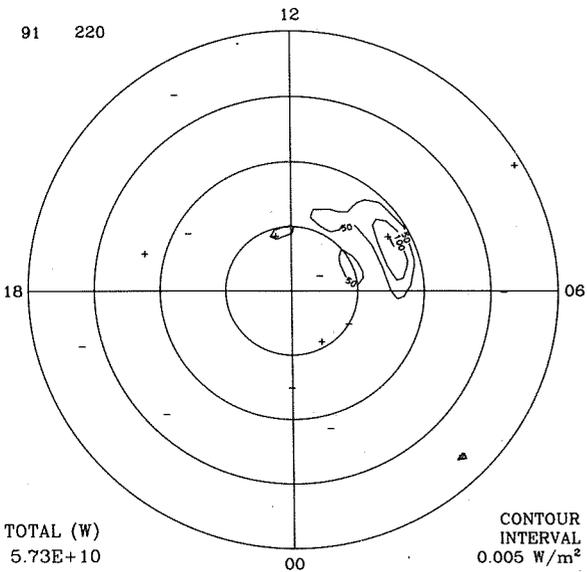
91 220



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

91 220

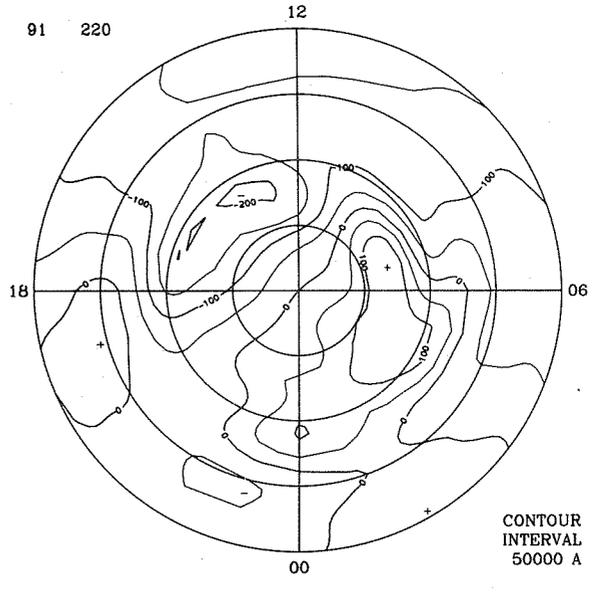


TOTAL (W)  
5.73E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

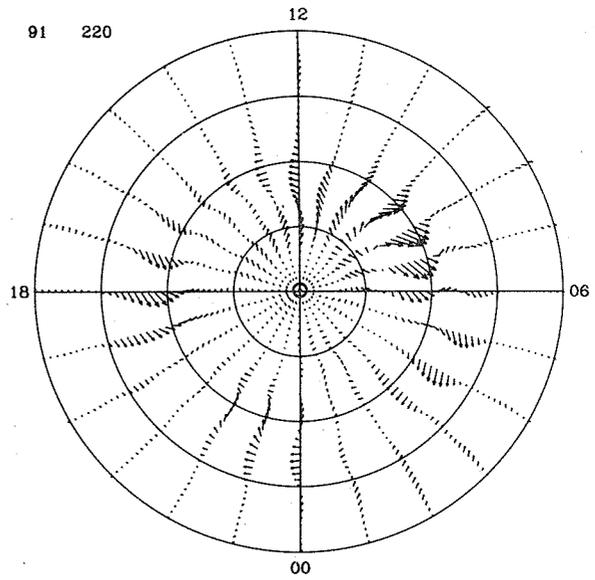
91 220



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

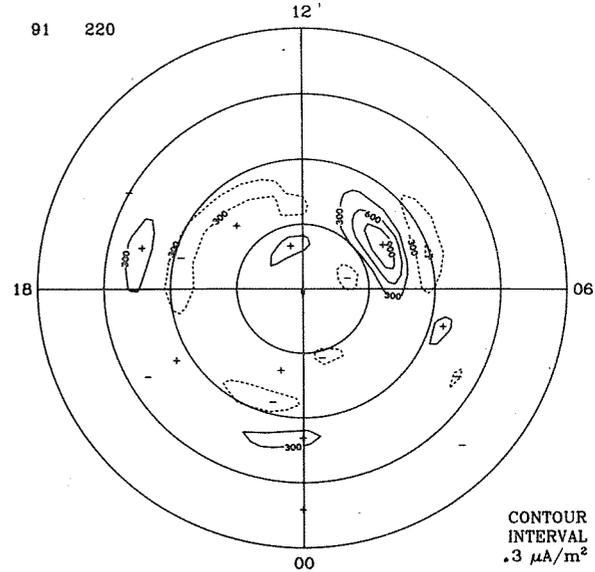
91 220



2 A/m

FIELD-ALIGNED CURRENTS

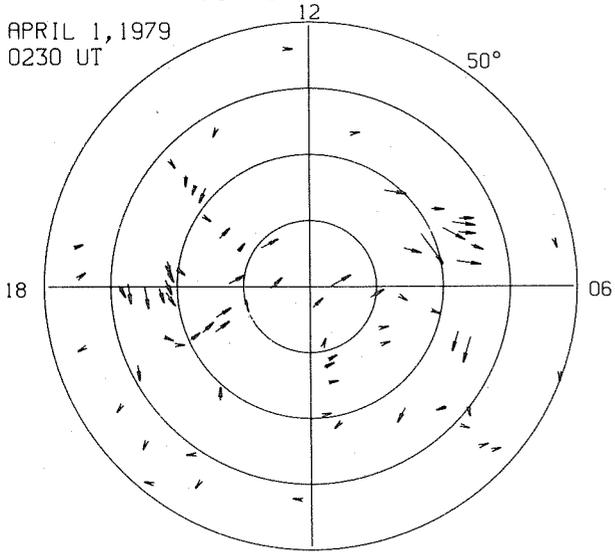
91 220



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0230 UT

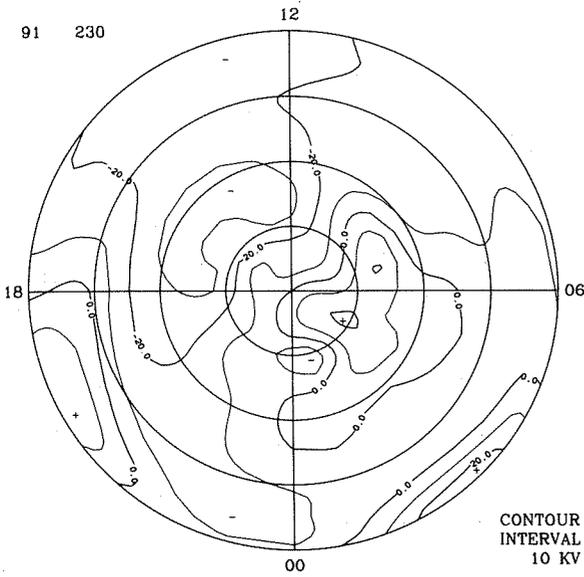


00 MLT

→ 250 nT

ELECTRIC POTENTIAL

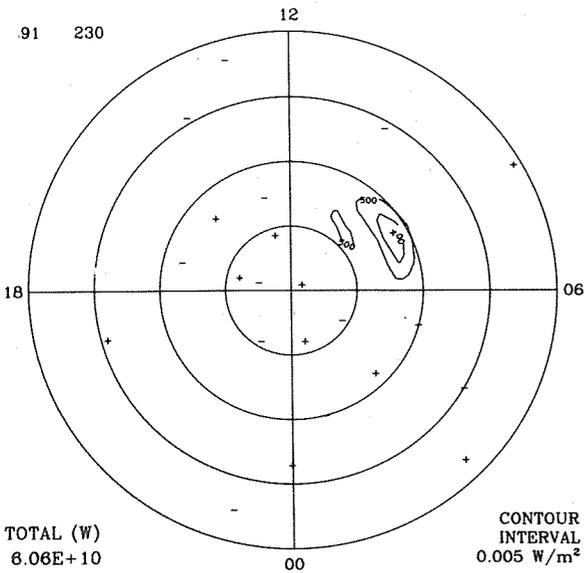
91 230



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

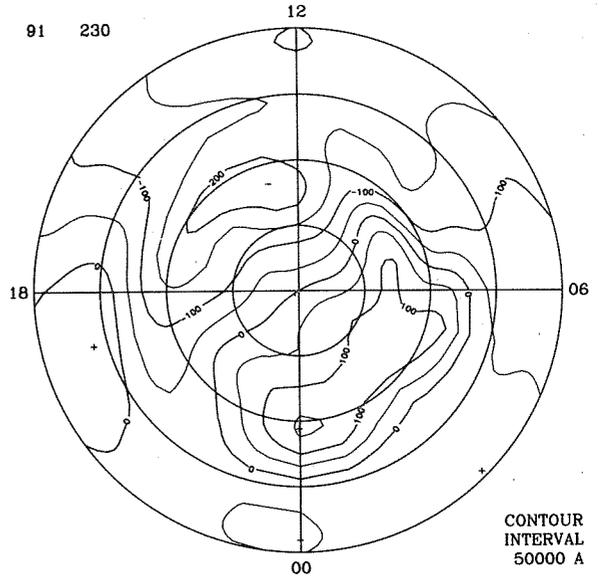
91 230



TOTAL (W)  
6.08E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

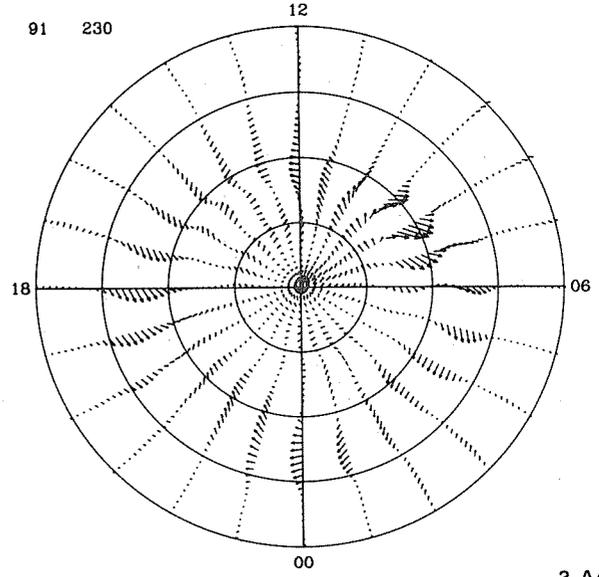
EQUIVALENT CURRENT SYSTEM



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

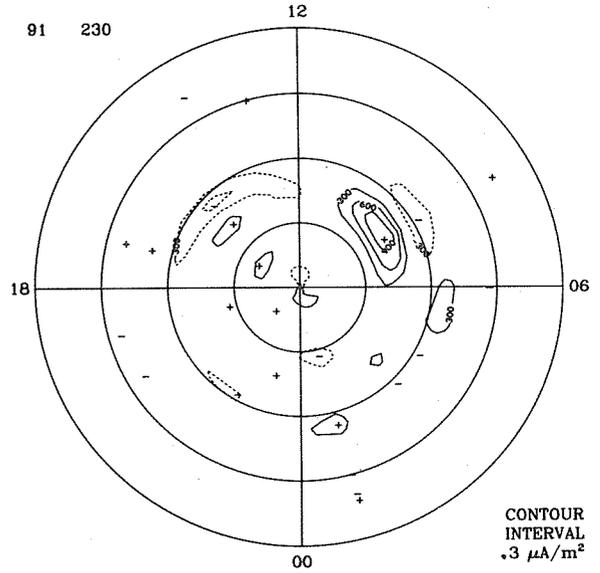
91 230



→ 2 A/m

FIELD-ALIGNED CURRENTS

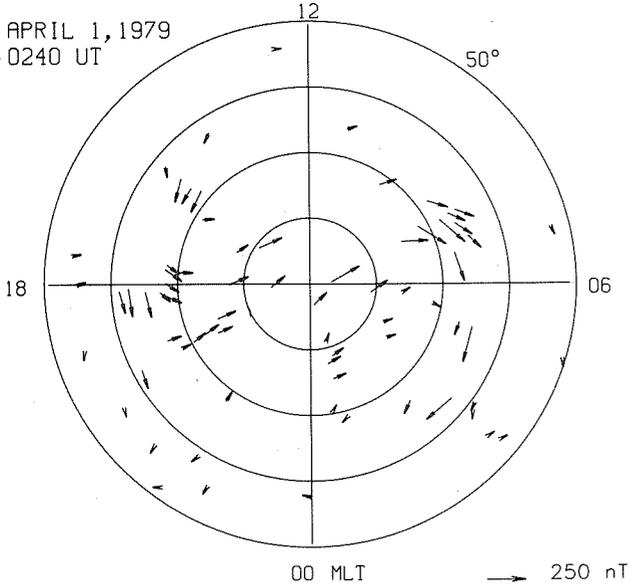
91 230



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

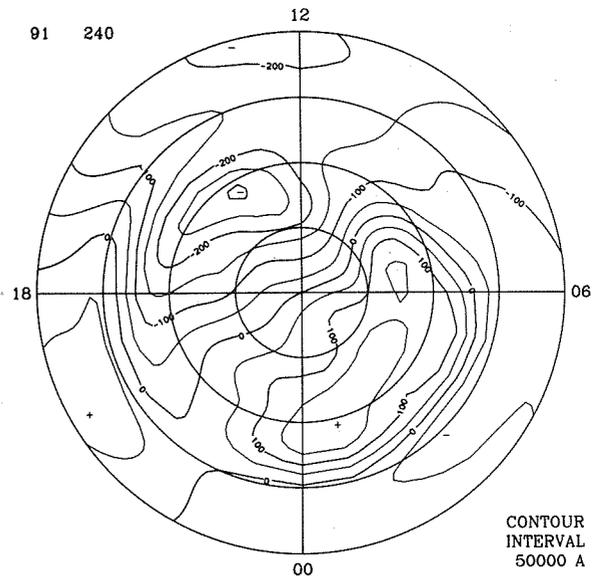
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0240 UT



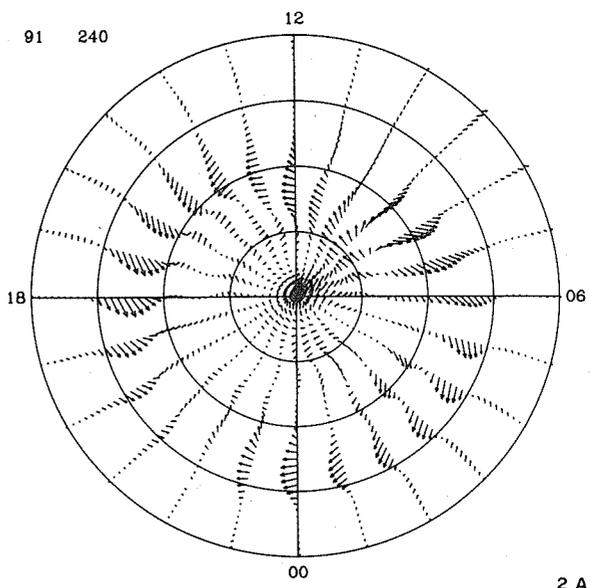
00 MLT

EQUIVALENT CURRENT SYSTEM



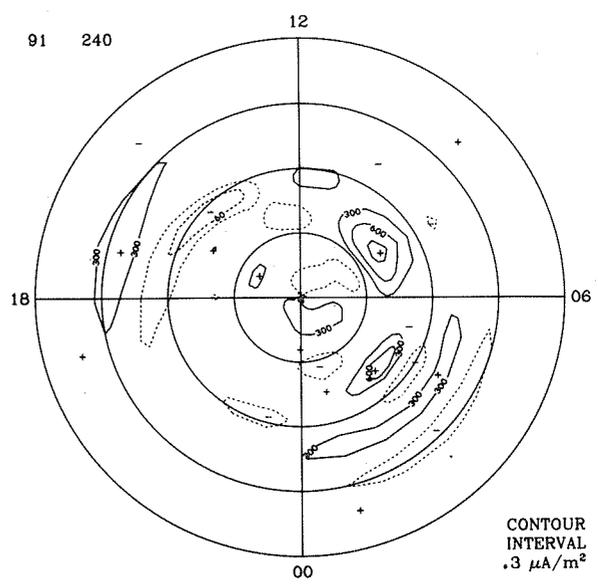
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

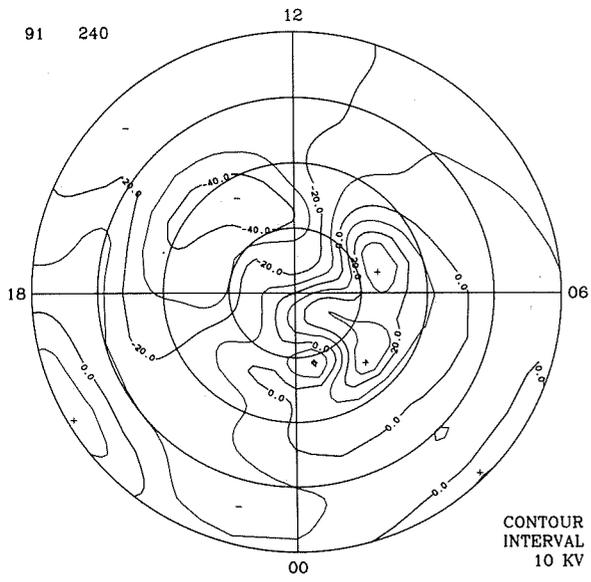


2 A/m

FIELD-ALIGNED CURRENTS

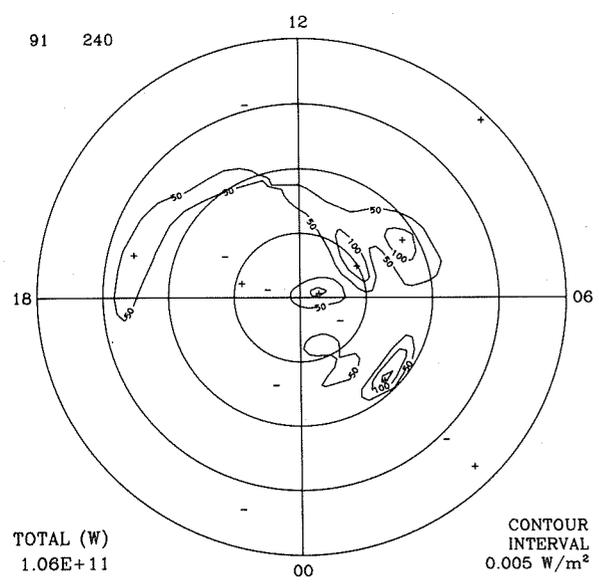


CONTOUR  
INTERVAL  
0.3 μA/m²



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

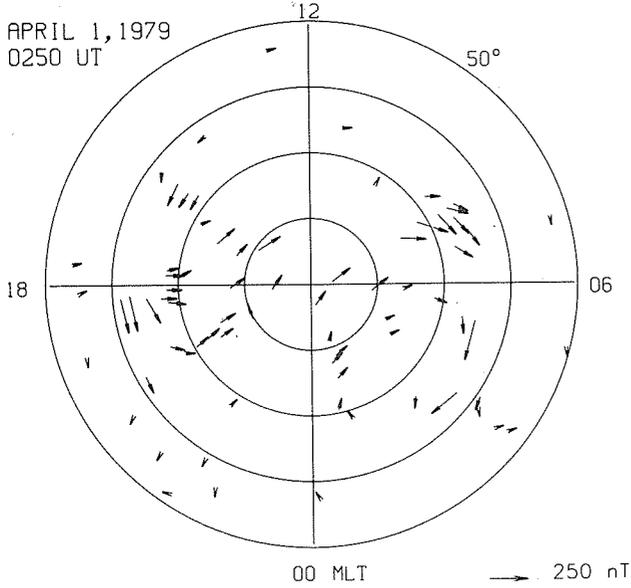


CONTOUR  
INTERVAL  
0.005 W/m²

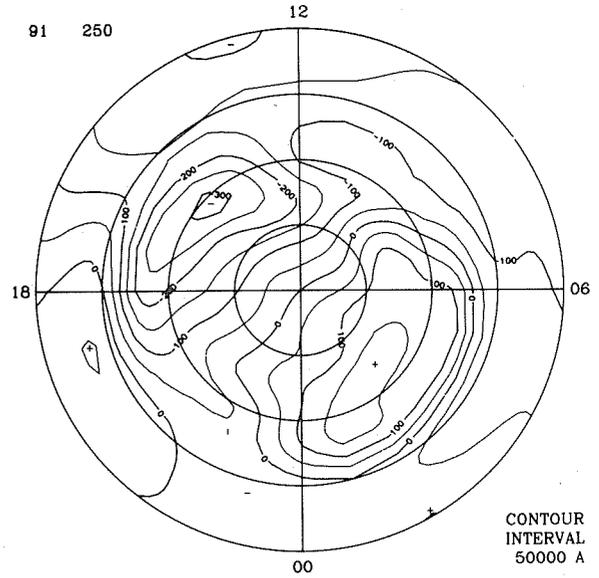
TOTAL (W)  
1.06E+11

OBSERVED EQUIVALENT  
CURRENT VECTORS

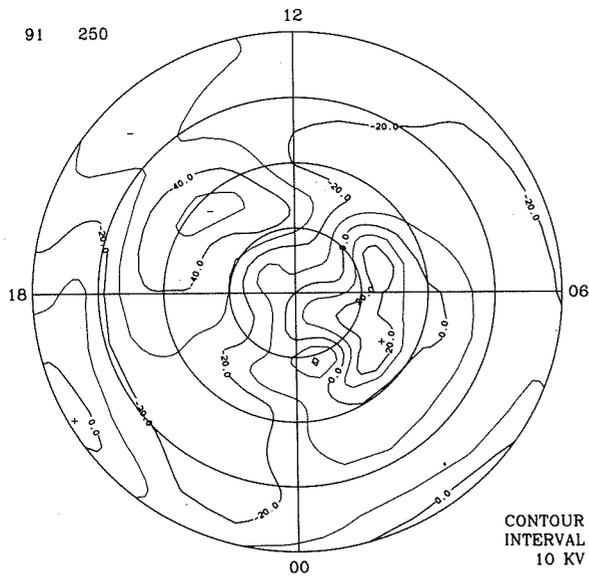
APRIL 1, 1979  
0250 UT



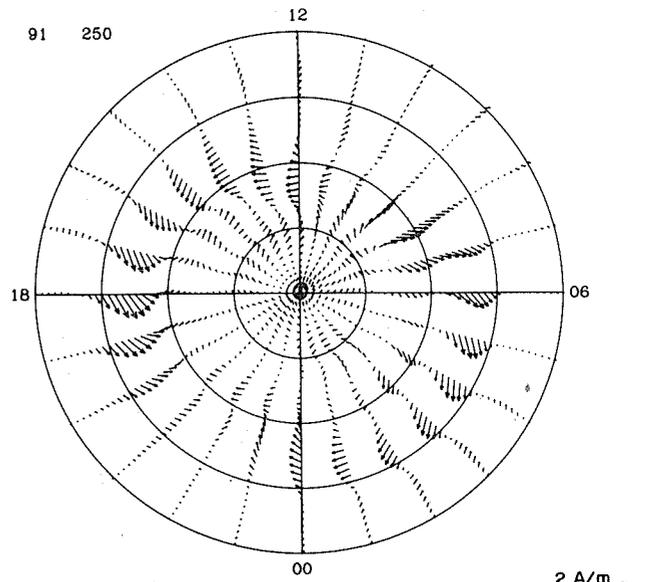
EQUIVALENT CURRENT SYSTEM



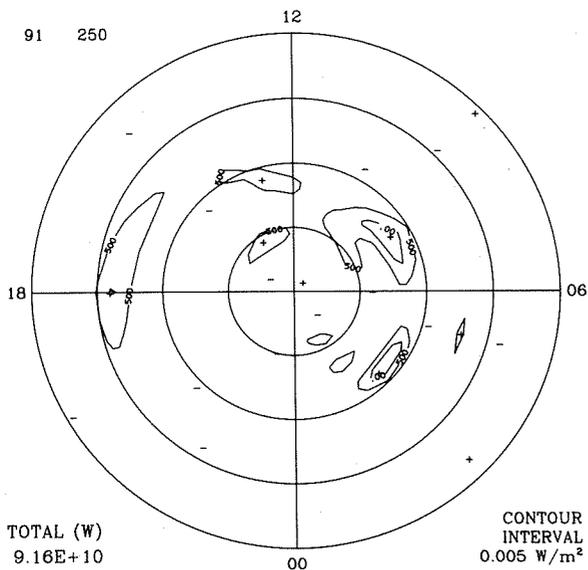
ELECTRIC POTENTIAL



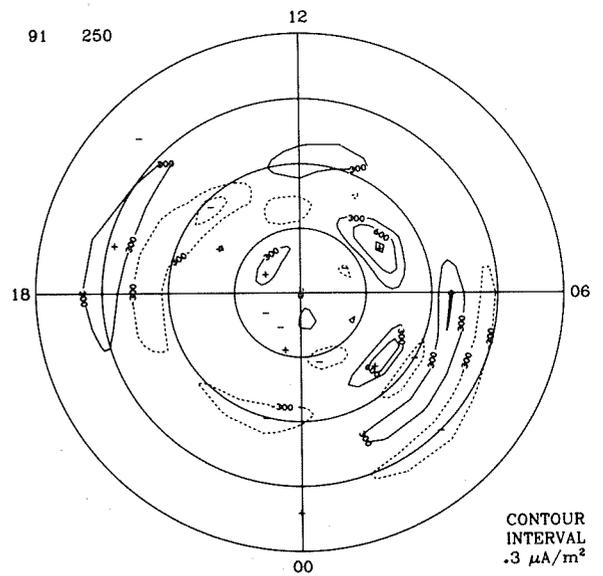
IONOSPHERIC CURRENT



JOULE HEAT RATE



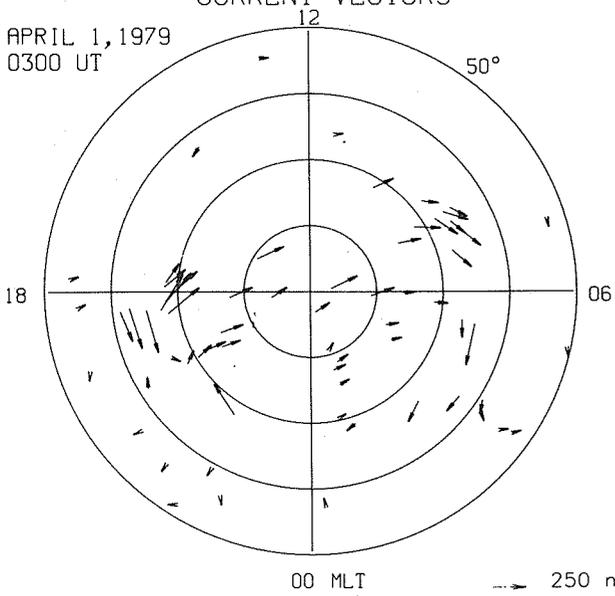
FIELD-ALIGNED CURRENTS



TOTAL (W)  
9.16E+10

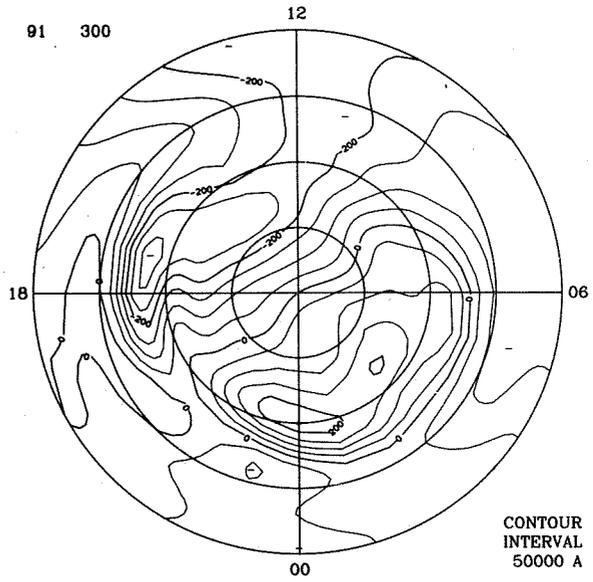
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0300 UT



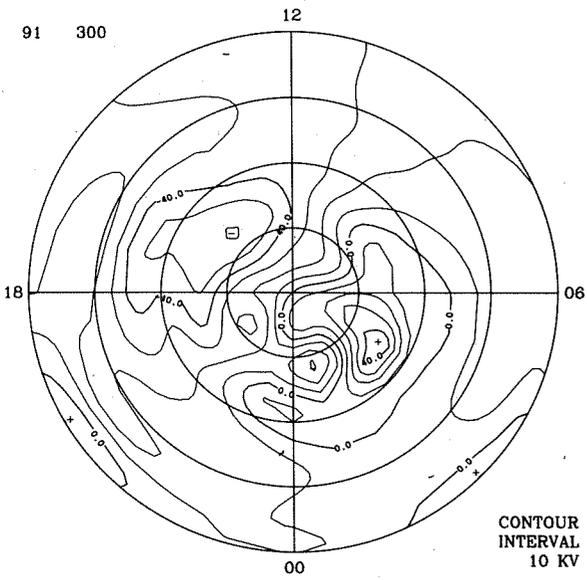
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



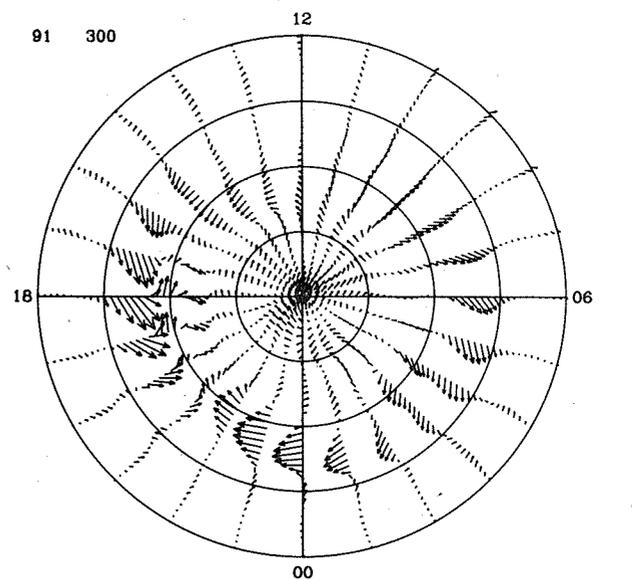
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



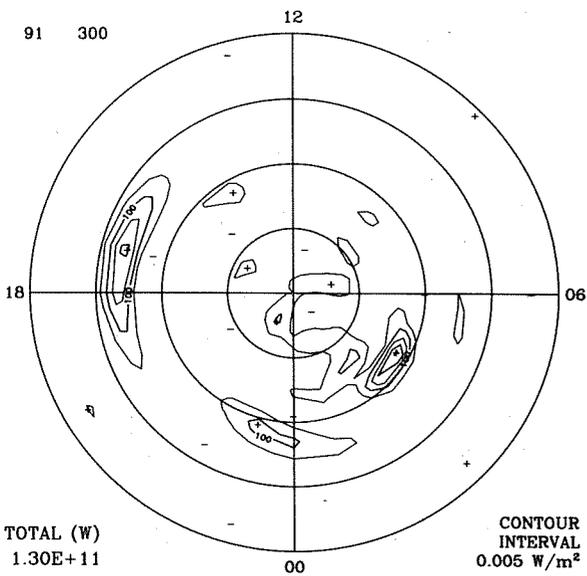
CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE



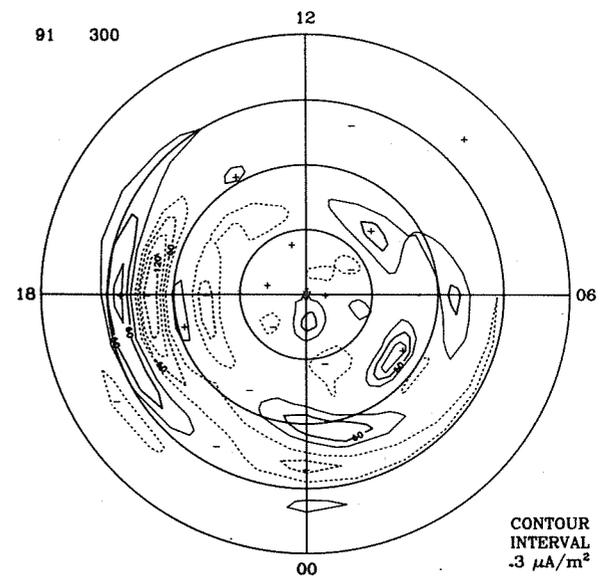
2 A/m

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

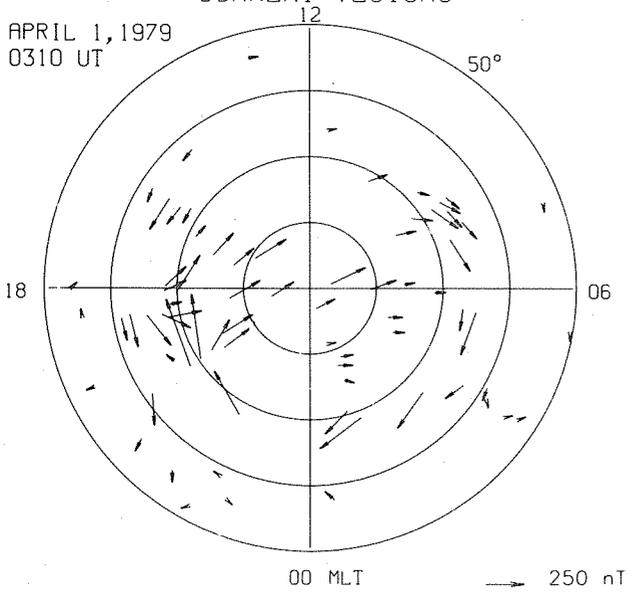
TOTAL (W)  
1.30E+11



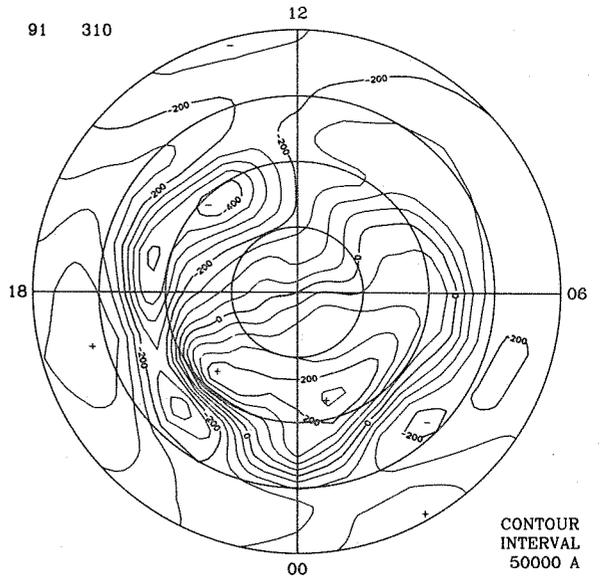
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

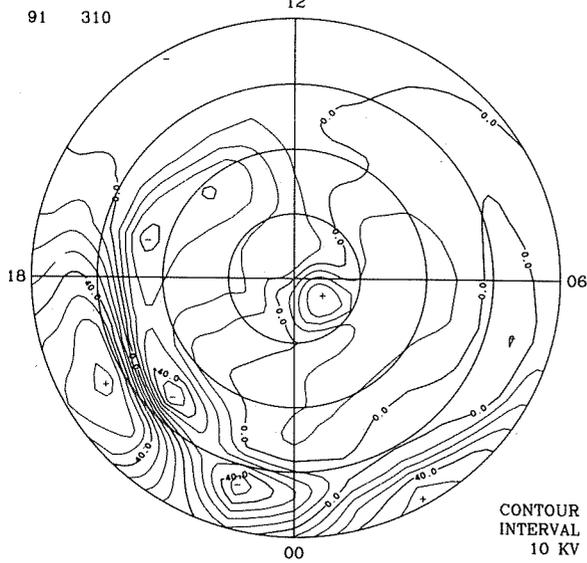
APRIL 1, 1979  
0310 UT



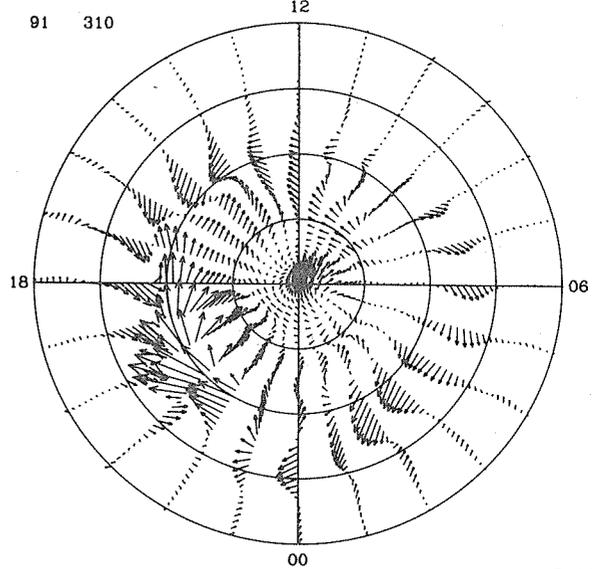
EQUIVALENT CURRENT SYSTEM



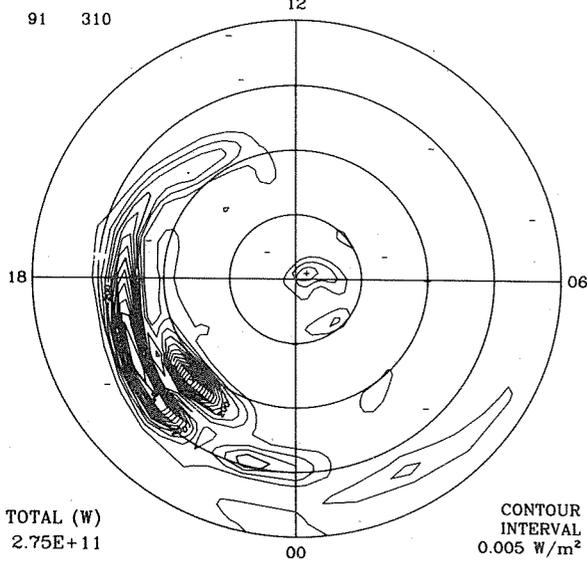
ELECTRIC POTENTIAL



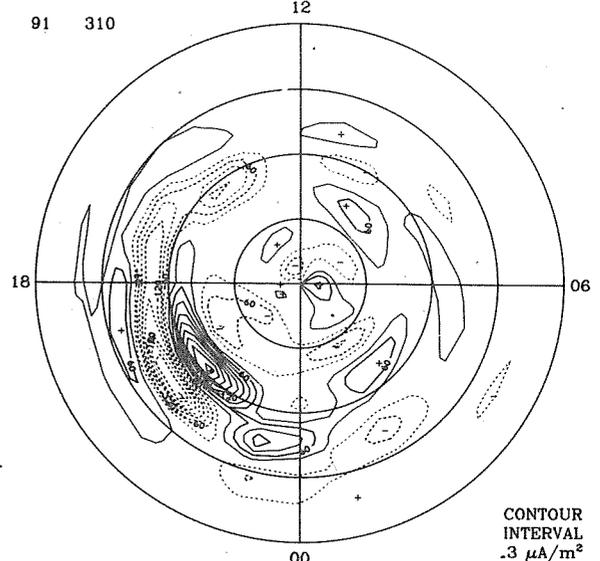
IONOSPHERIC CURRENT



JOULE HEAT RATE



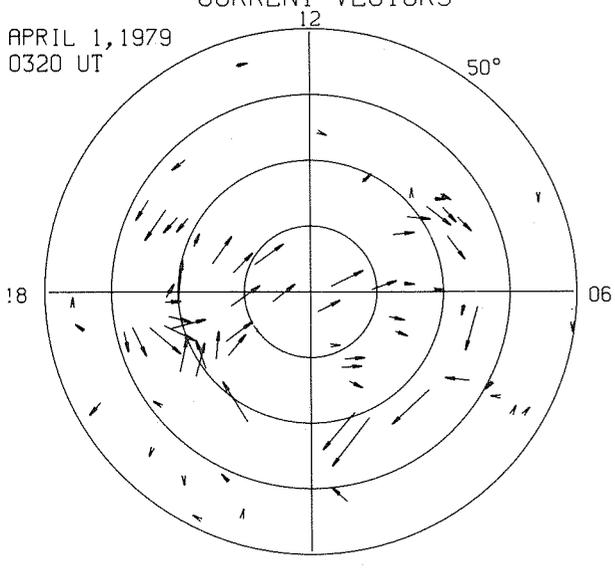
FIELD-ALIGNED CURRENTS



TOTAL (W)  
2.75E+11

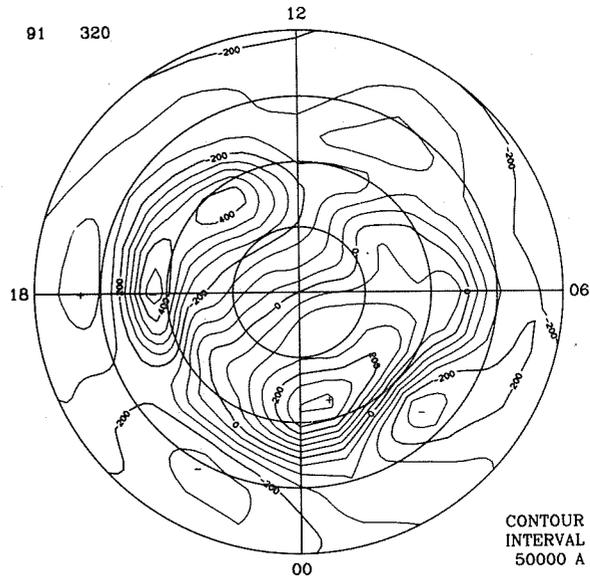
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0320 UT



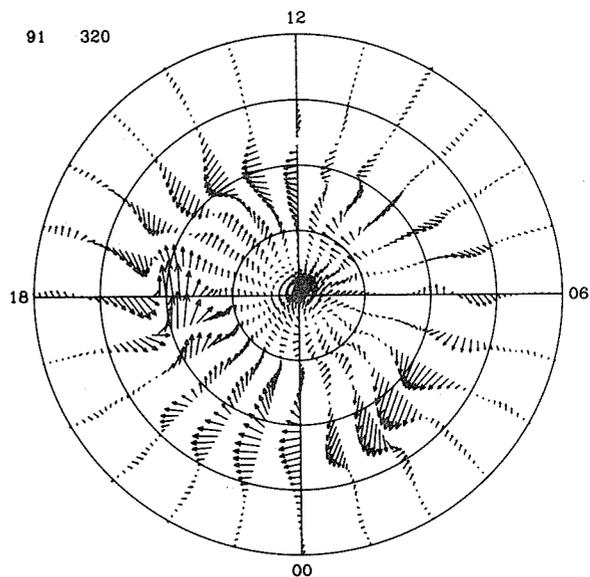
00 MLT → 250 nT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM



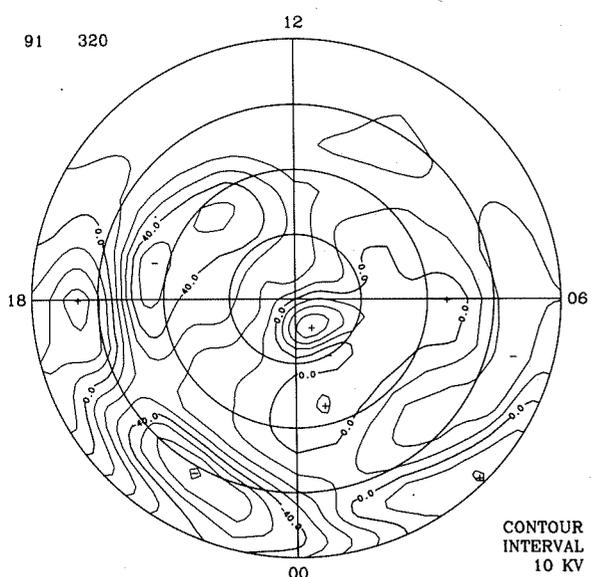
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



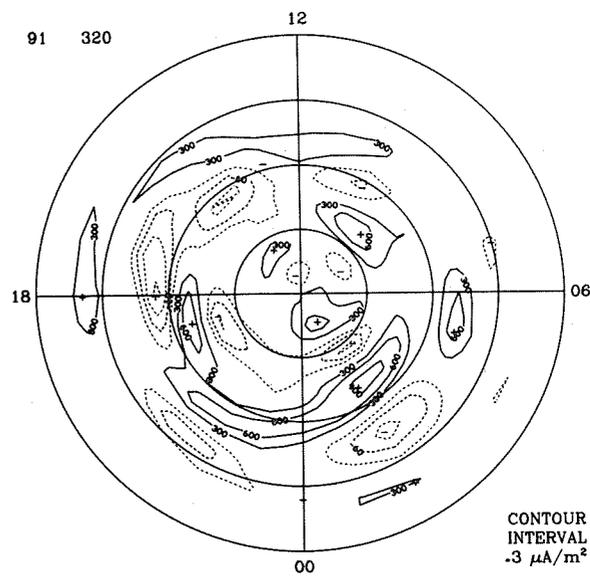
2 A/m →

JOULE HEAT RATE

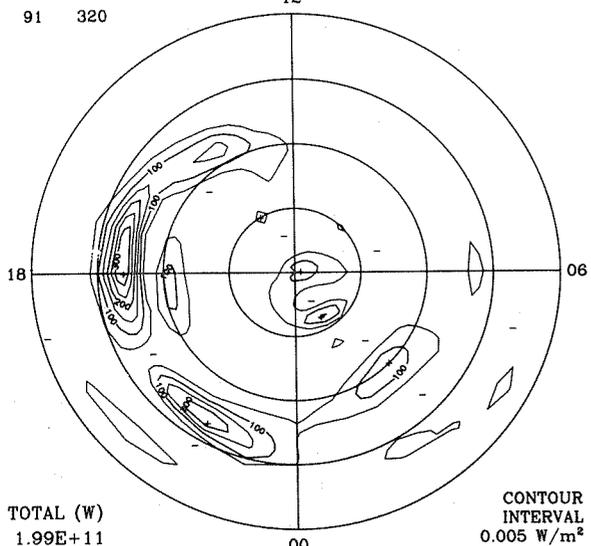


CONTOUR  
INTERVAL  
10 KV

FIELD-ALIGNED CURRENTS



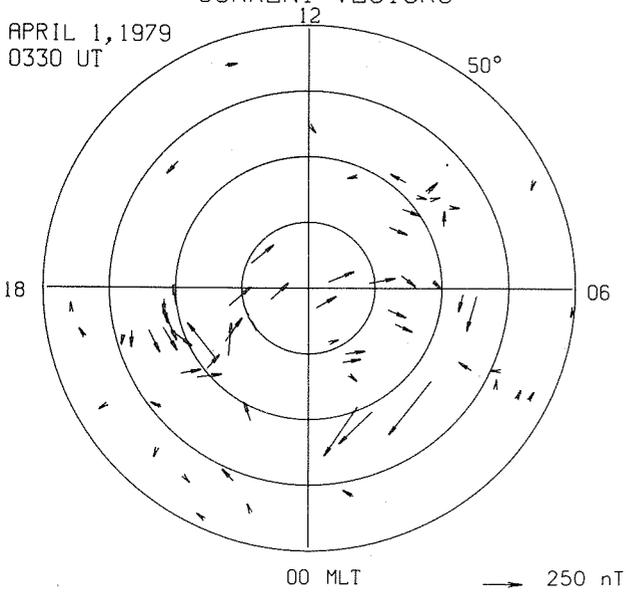
CONTOUR  
INTERVAL  
.3 μA/m²



TOTAL (W)  
1.99E+11  
CONTOUR  
INTERVAL  
0.005 W/m²

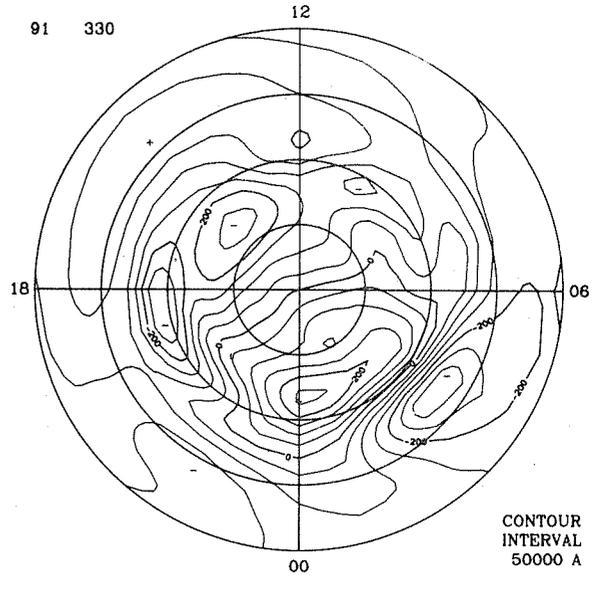
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0330 UT

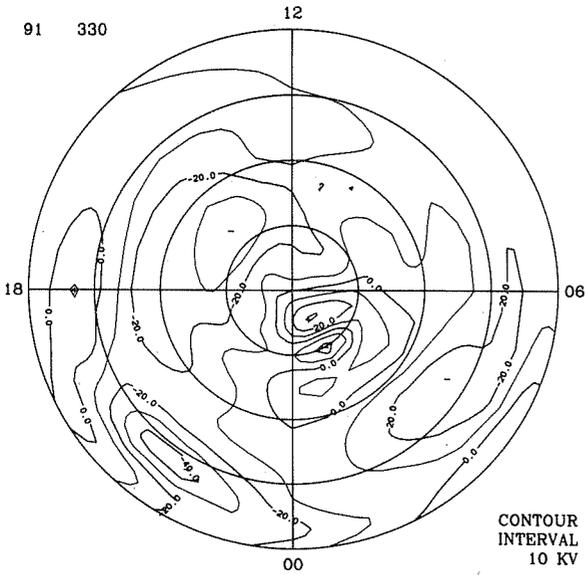


ELECTRIC POTENTIAL

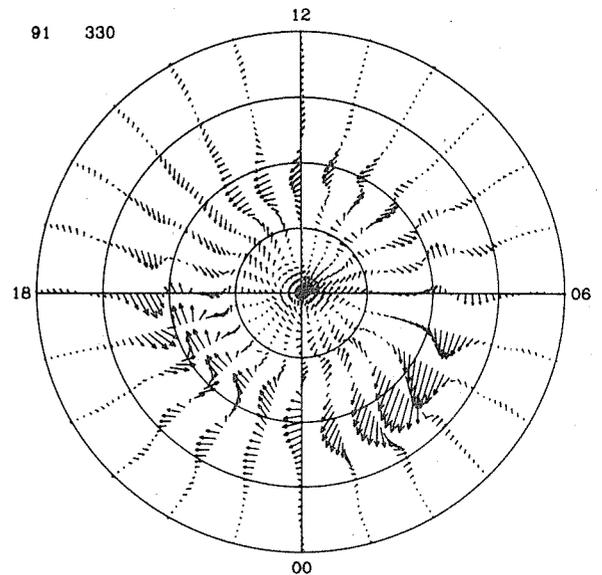
EQUIVALENT CURRENT SYSTEM



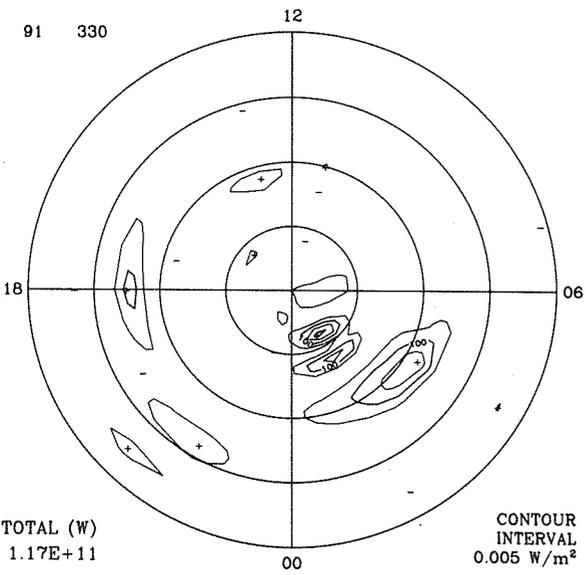
IONOSPHERIC CURRENT



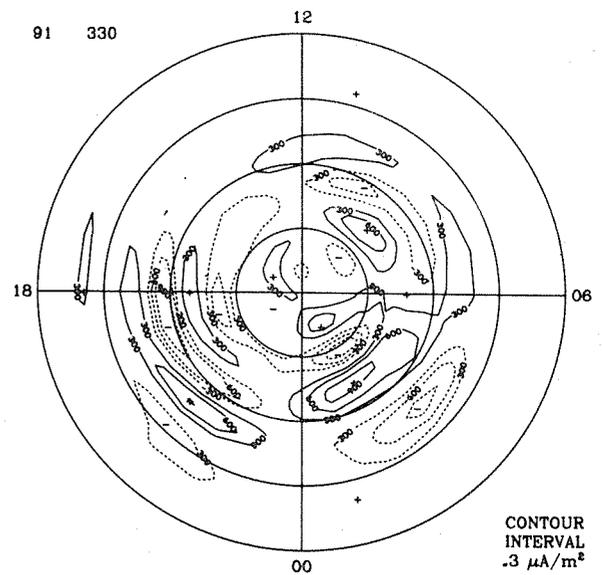
JOULE HEAT RATE



FIELD-ALIGNED CURRENTS

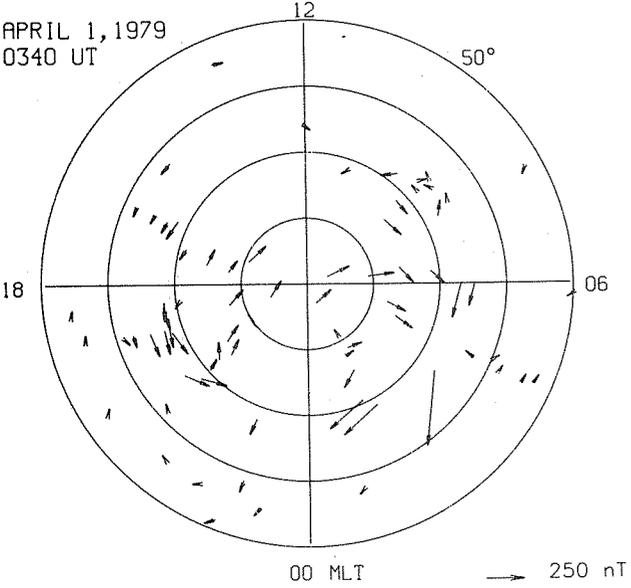


TOTAL (W)  
1.17E+11



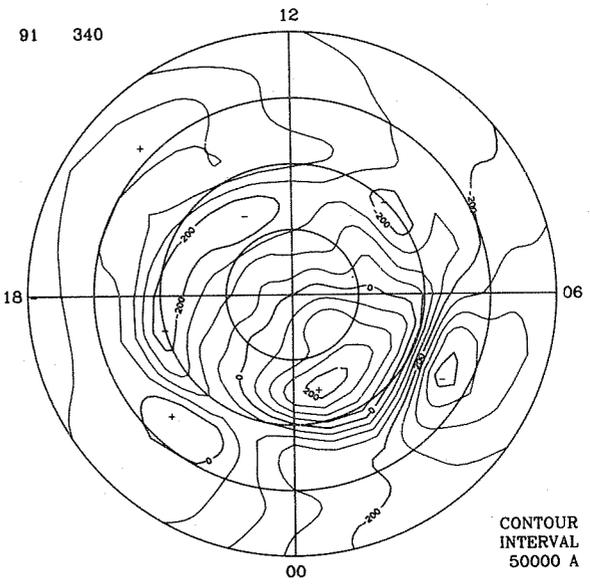
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0340 UT



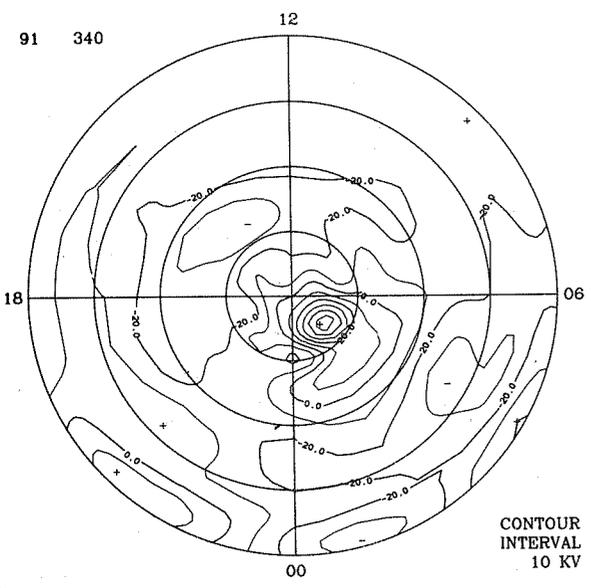
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



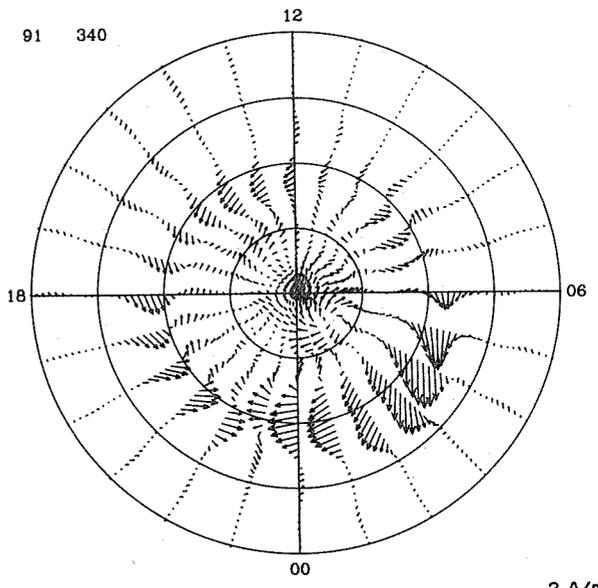
CONTOUR  
INTERVAL  
50000 A

ELECTRIC POTENTIAL



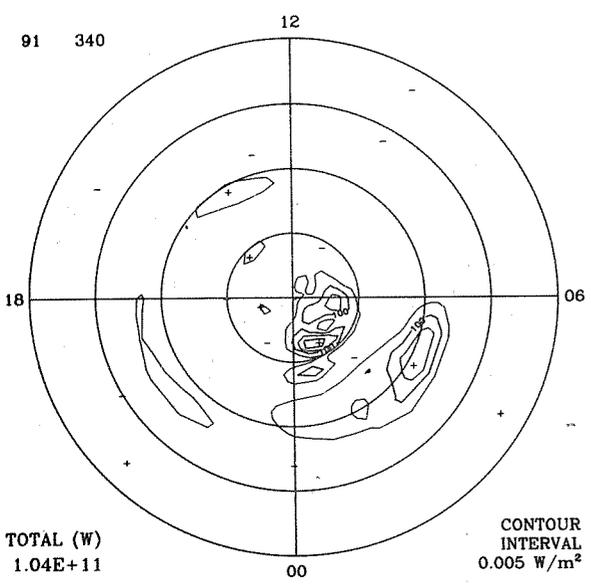
CONTOUR  
INTERVAL  
10 KV

IONOSPHERIC CURRENT



2 A/m →

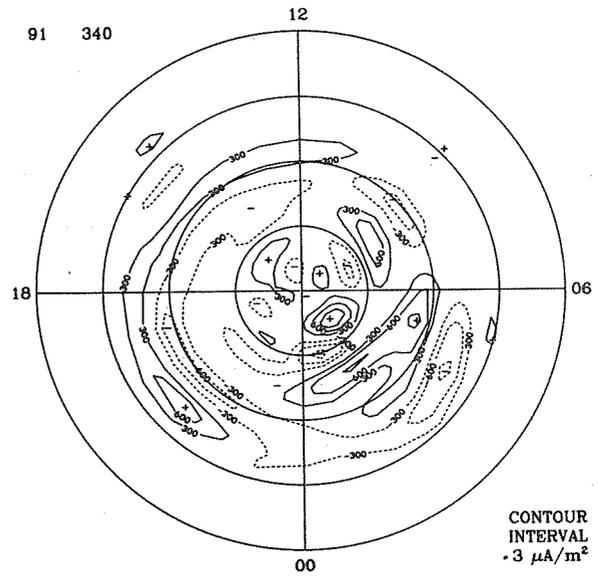
JOULE HEAT RATE



TOTAL (W)  
1.04E+11

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

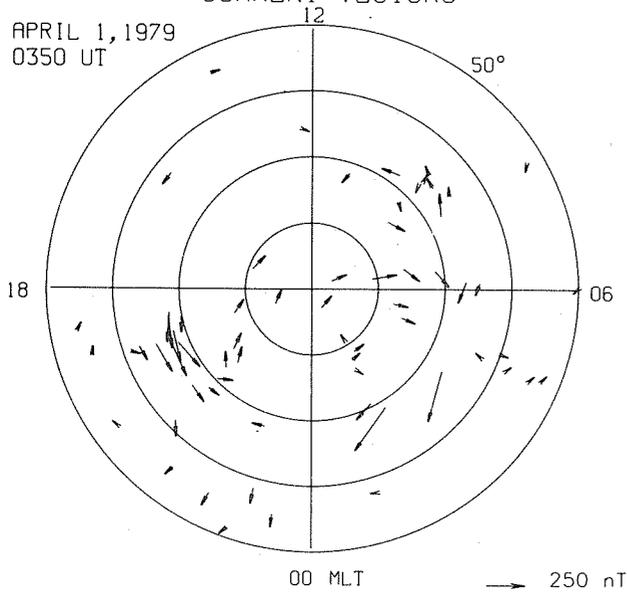
FIELD-ALIGNED CURRENTS



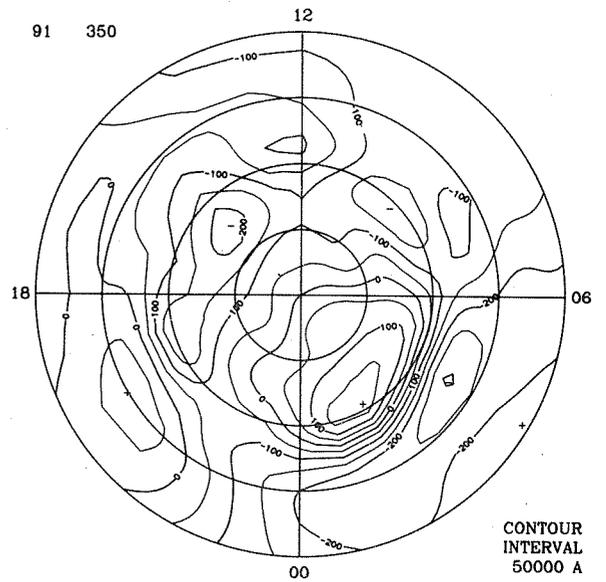
CONTOUR  
INTERVAL  
3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

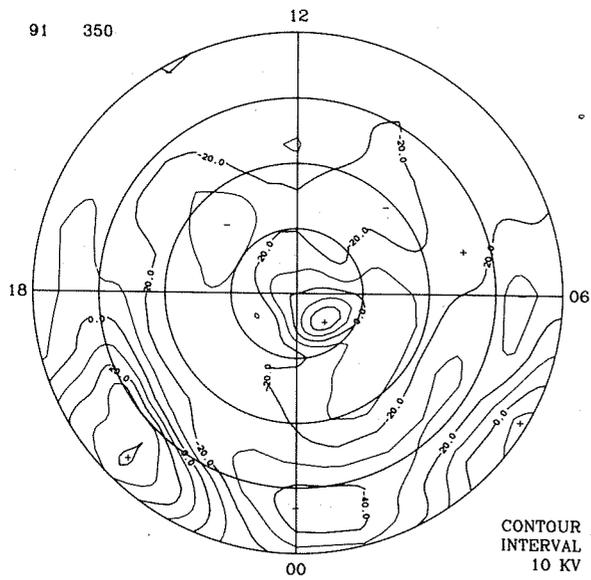
APRIL 1, 1979  
0350 UT



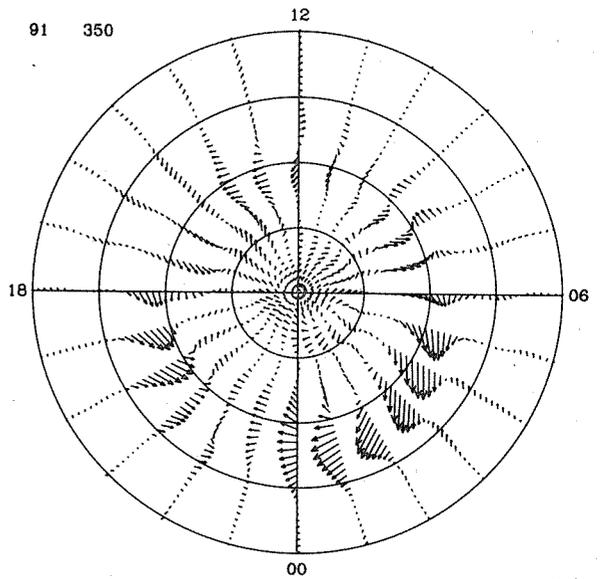
EQUIVALENT CURRENT SYSTEM



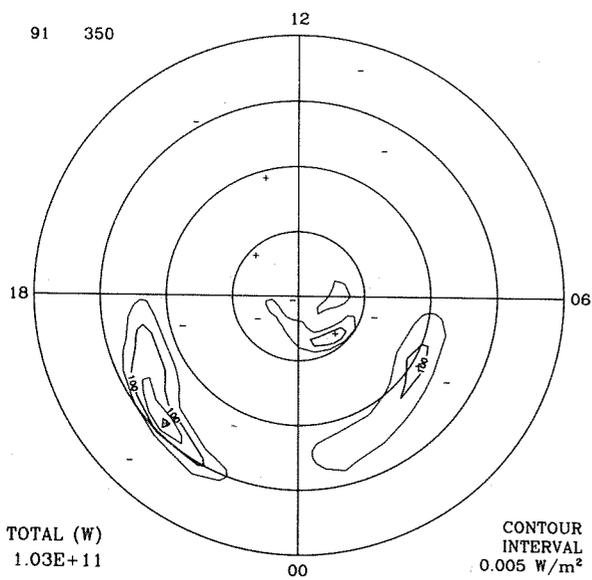
ELECTRIC POTENTIAL



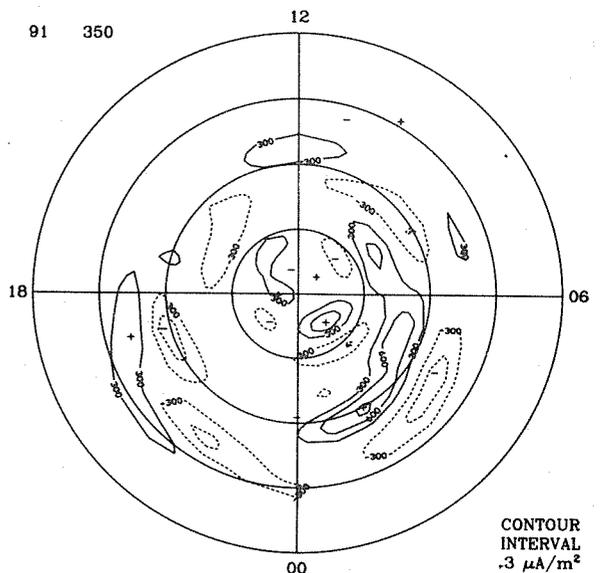
IONOSPHERIC CURRENT



JOULE HEAT RATE



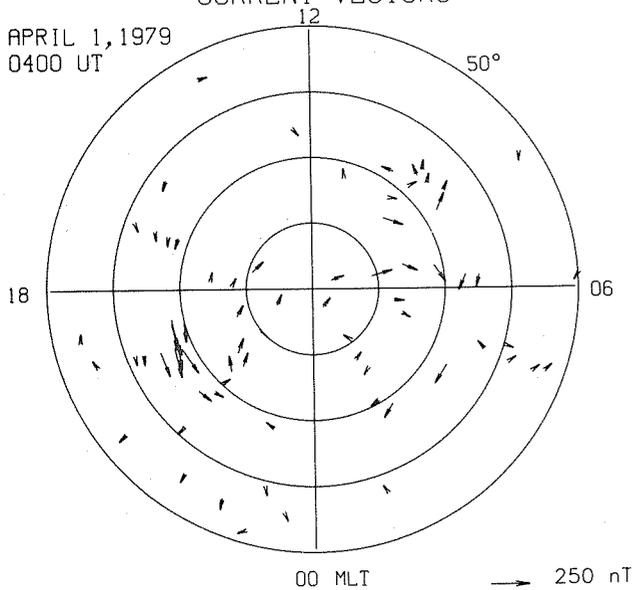
FIELD-ALIGNED CURRENTS



TOTAL (W)  
1.03E+11

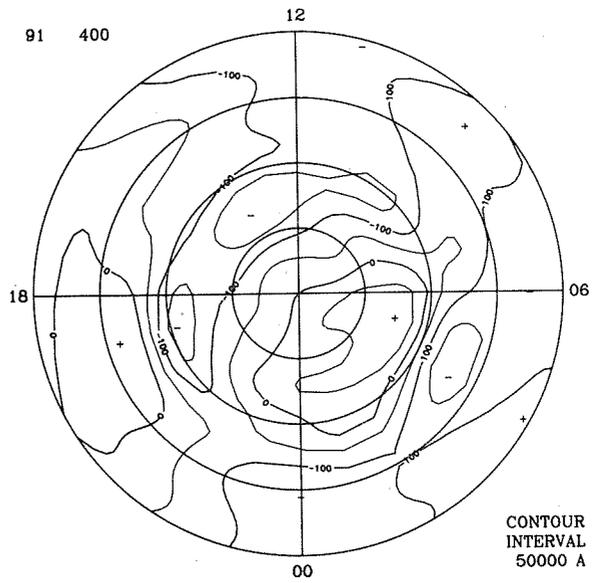
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0400 UT



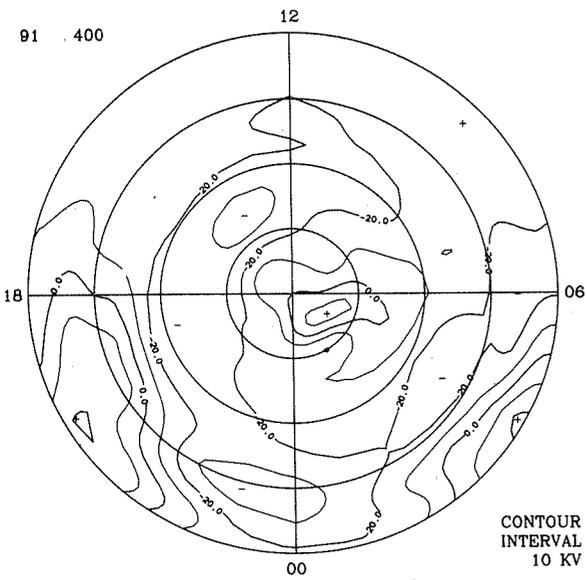
00 MLT  
ELECTRIC POTENTIAL

EQUIVALENT CURRENT SYSTEM

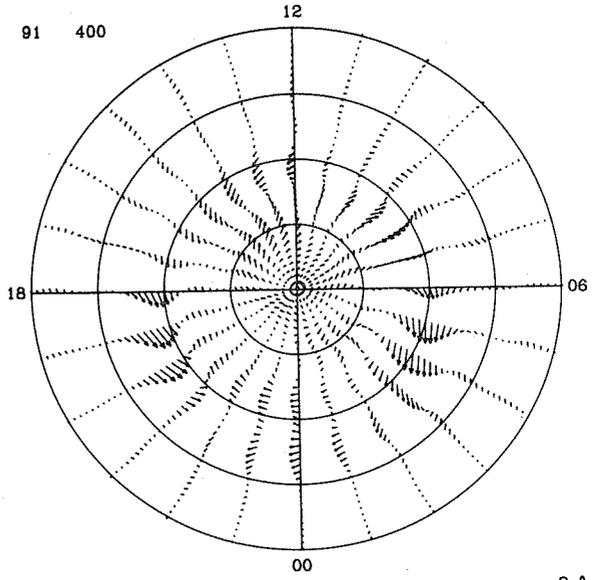


CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

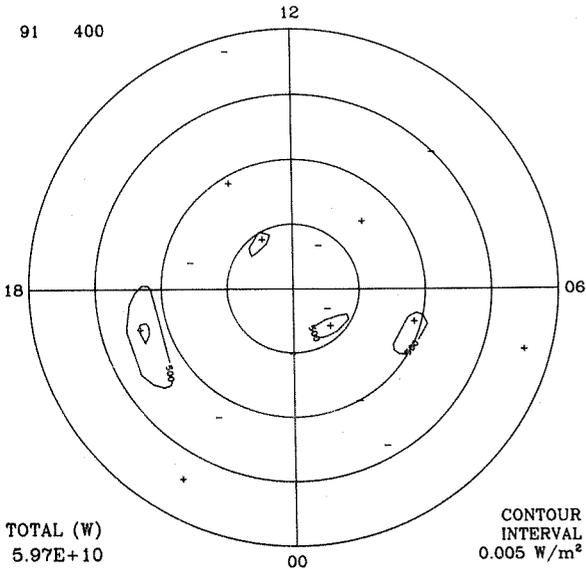


CONTOUR  
INTERVAL  
10 KV



2 A/m

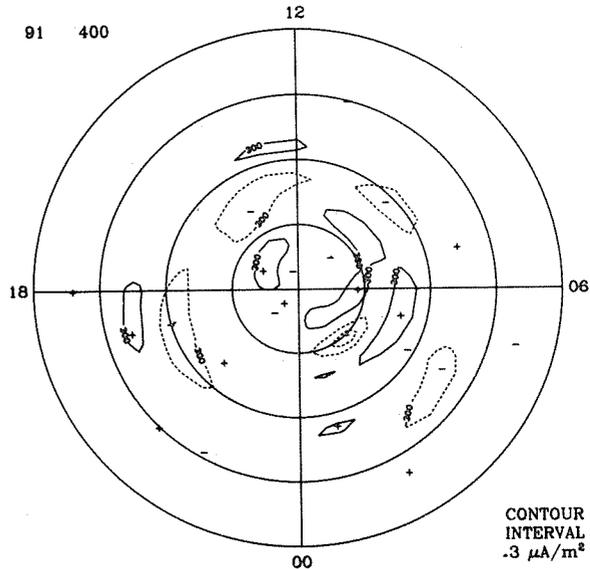
JOULE HEAT RATE



TOTAL (W)  
5.97E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

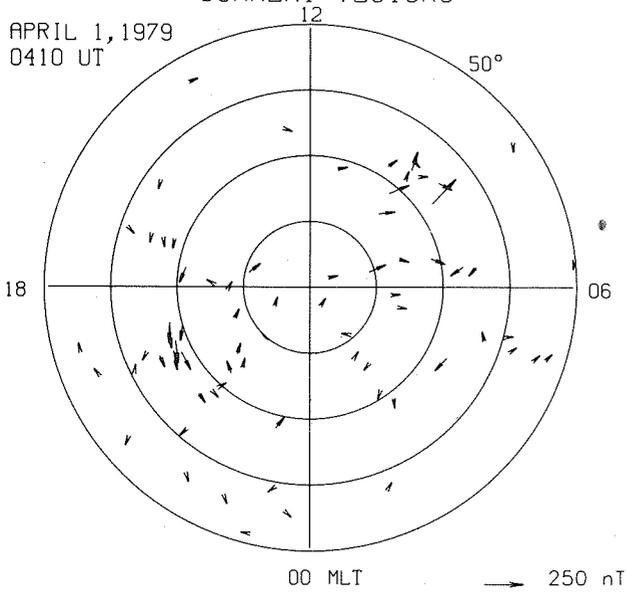
FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

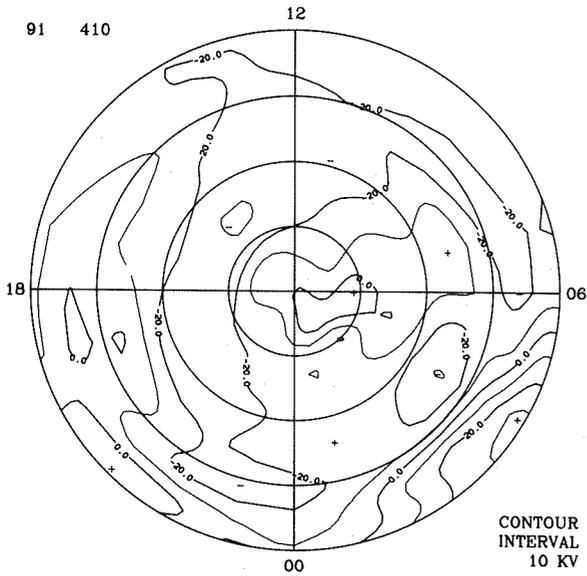
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0410 UT



ELECTRIC POTENTIAL

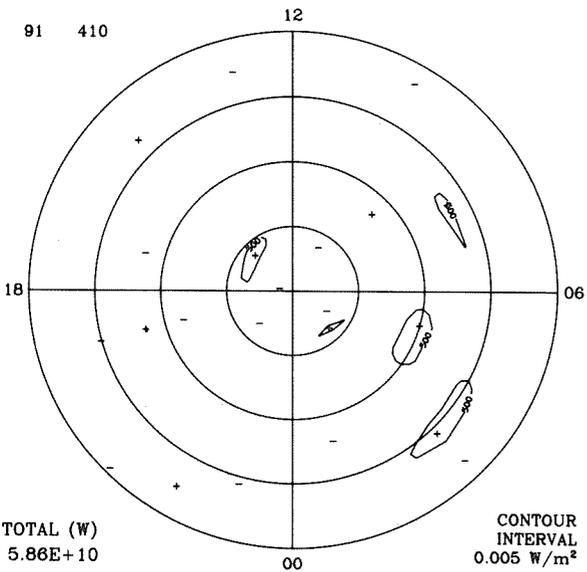
91 410



CONTOUR  
INTERVAL  
10 KV

JOULE HEAT RATE

91 410

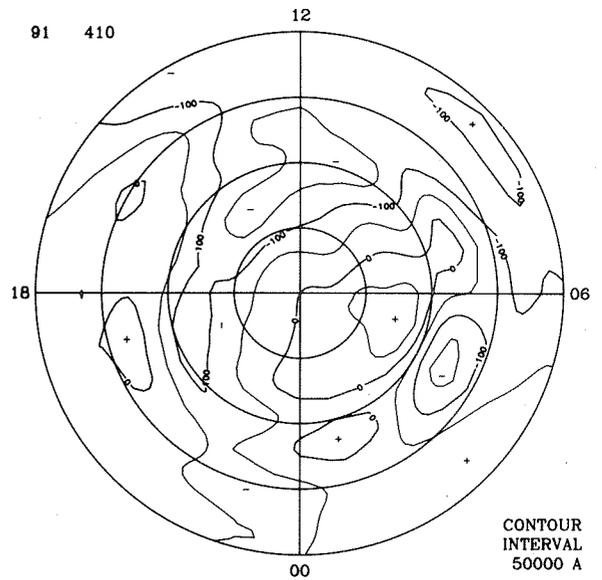


TOTAL (W)  
5.86E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

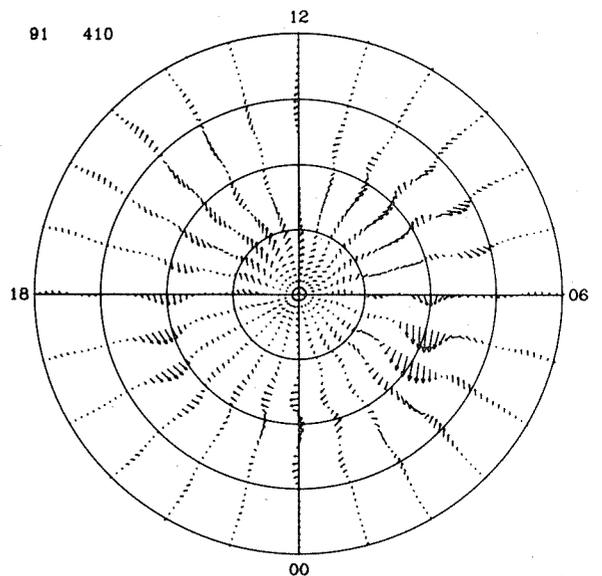
91 410



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

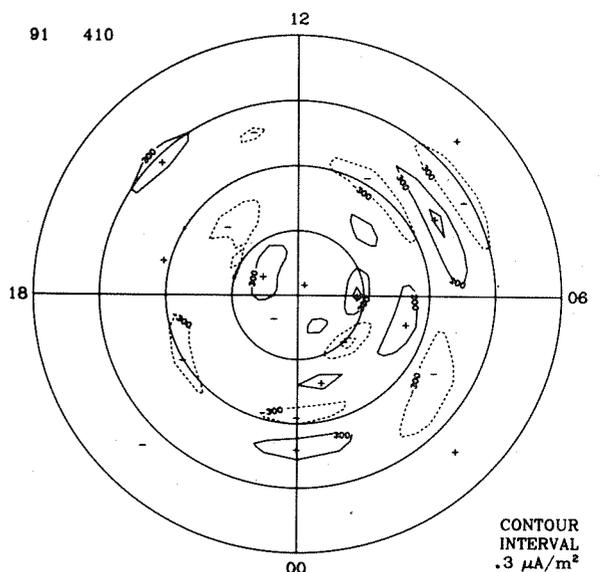
91 410



2 A/m

FIELD-ALIGNED CURRENTS

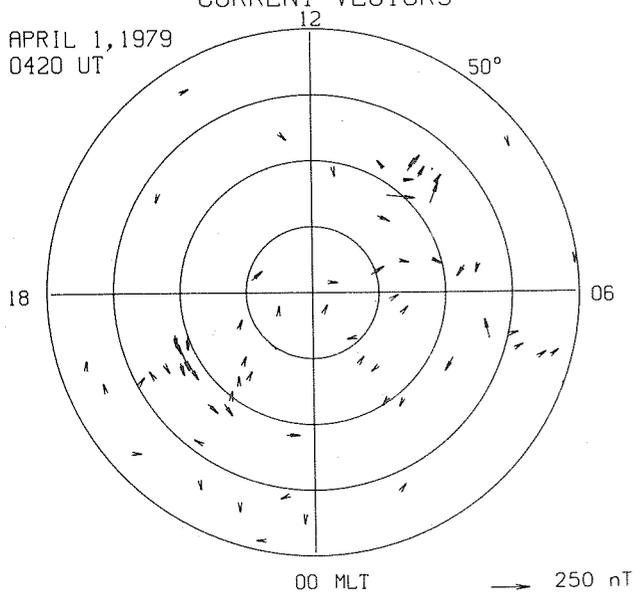
91 410



CONTOUR  
INTERVAL  
.3 μA/m²

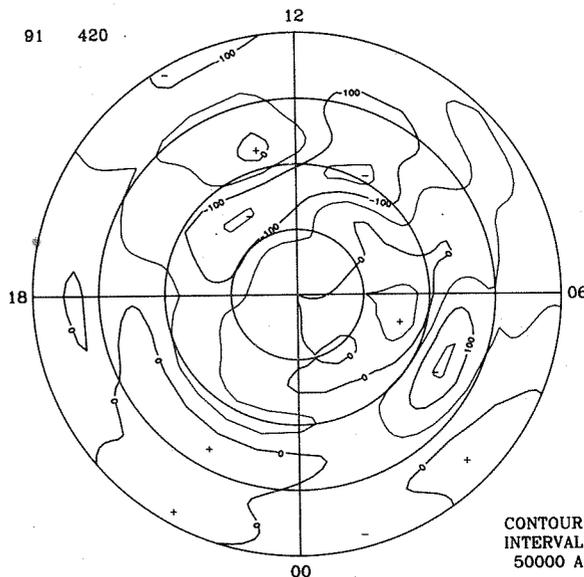
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0420 UT

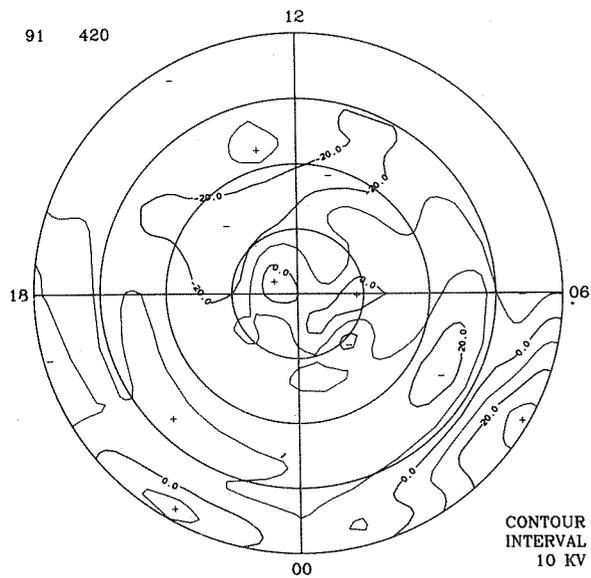


ELECTRIC POTENTIAL

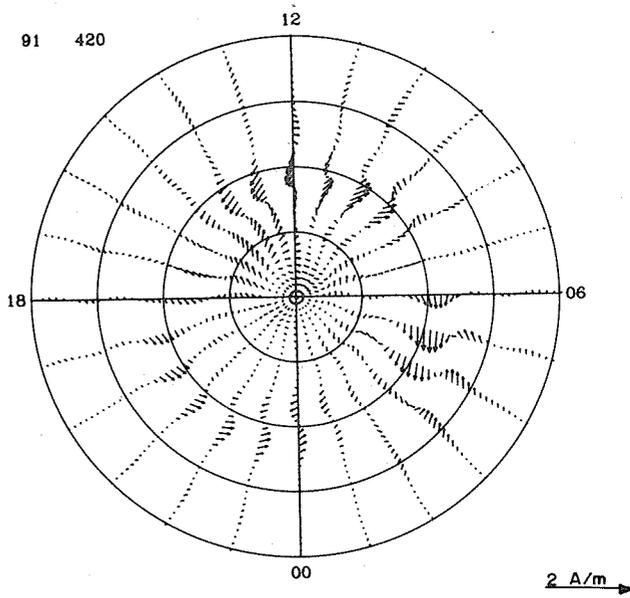
EQUIVALENT CURRENT SYSTEM



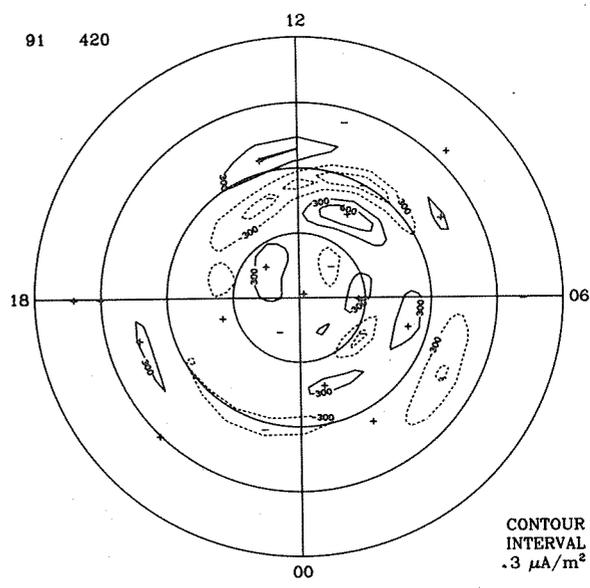
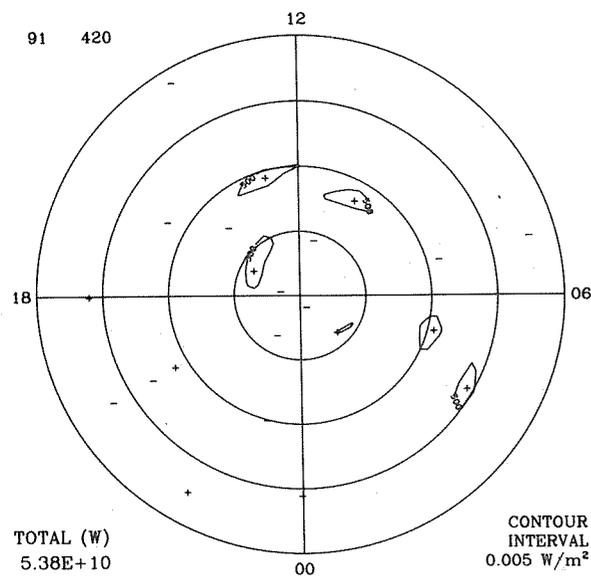
IONOSPHERIC CURRENT



JOULE HEAT RATE



FIELD-ALIGNED CURRENTS



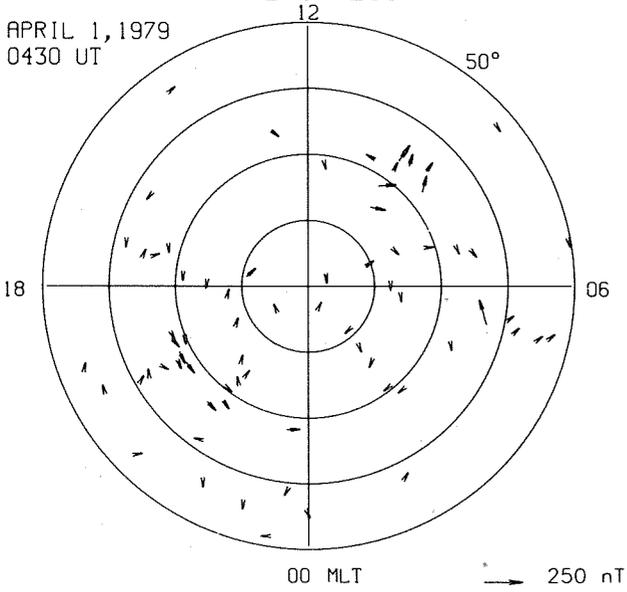
TOTAL (W)  
5.38E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

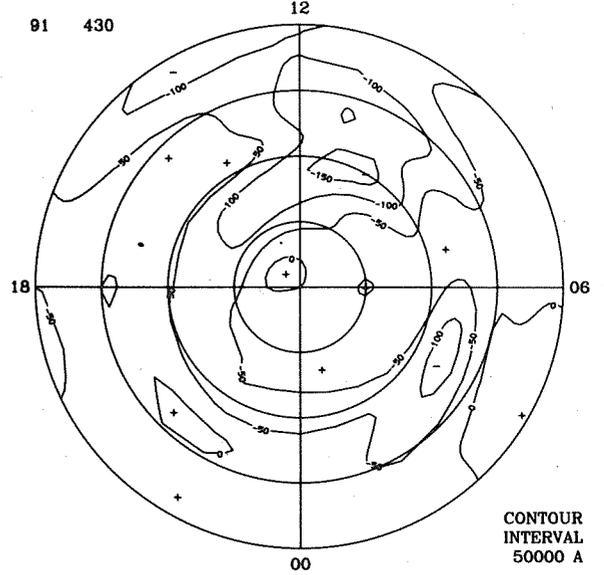
CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

OBSERVED EQUIVALENT  
CURRENT VECTORS

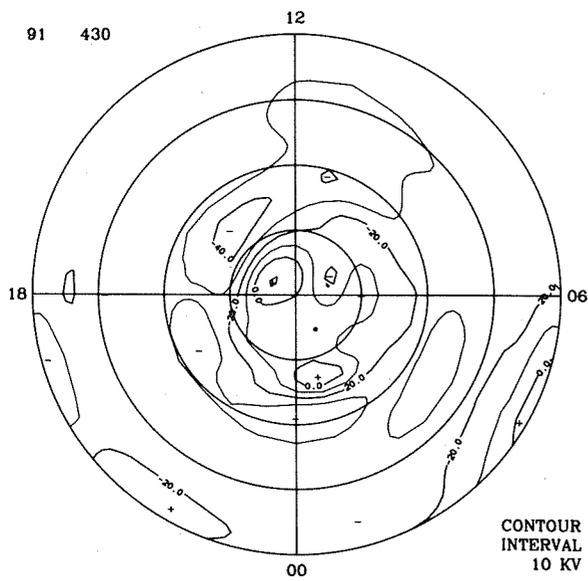
APRIL 1, 1979  
0430 UT



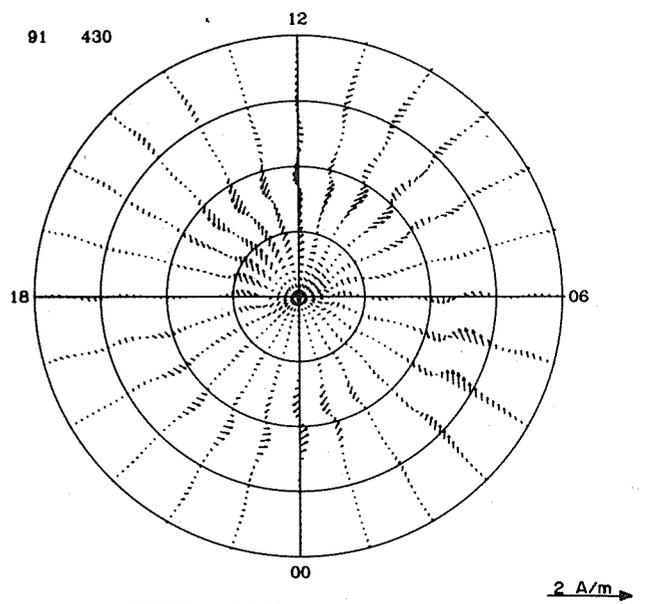
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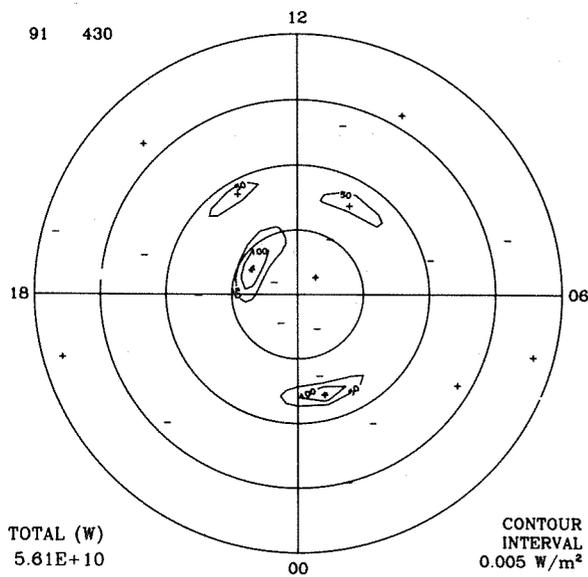
ELECTRIC POTENTIAL



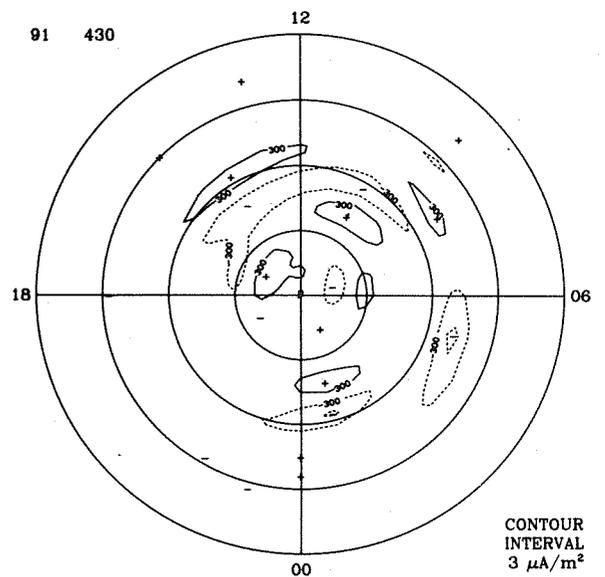
IONOSPHERIC CURRENT



JOULE HEAT RATE



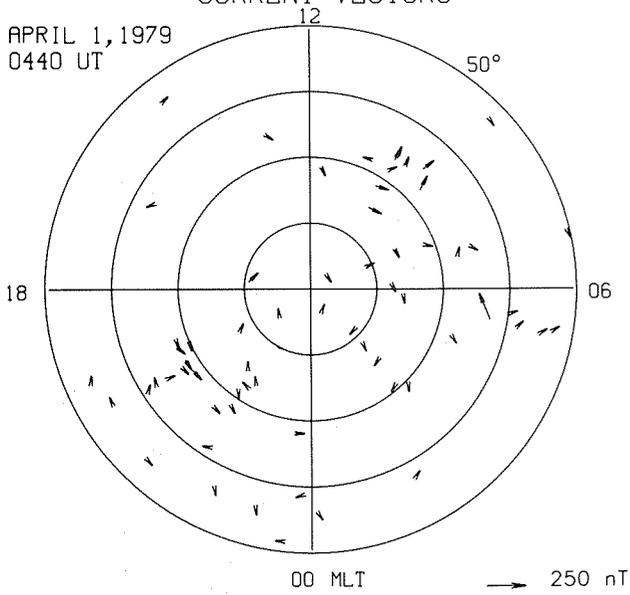
FIELD-ALIGNED CURRENTS



TOTAL (W)  
5.61E+10

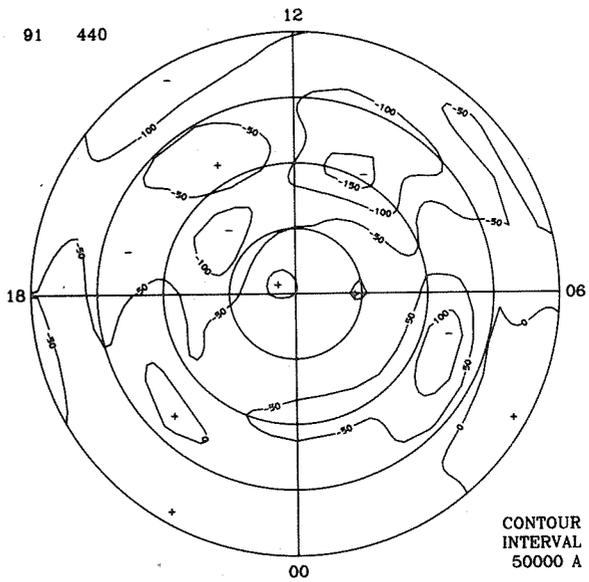
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APRIL 1, 1979  
0440 UT



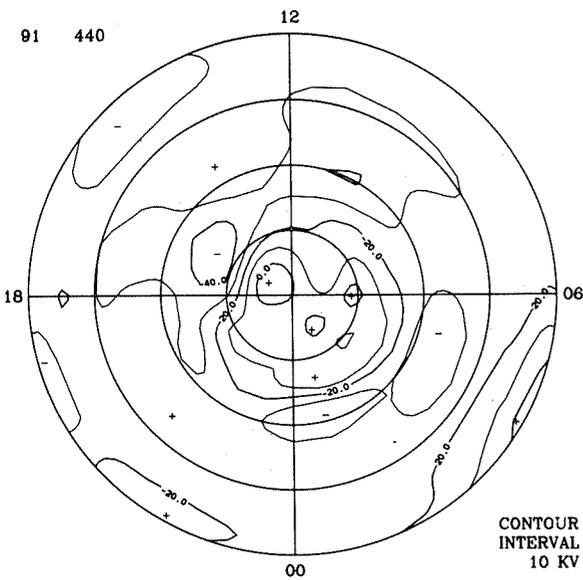
00 MLT → 250 nT

EQUIVALENT CURRENT SYSTEM



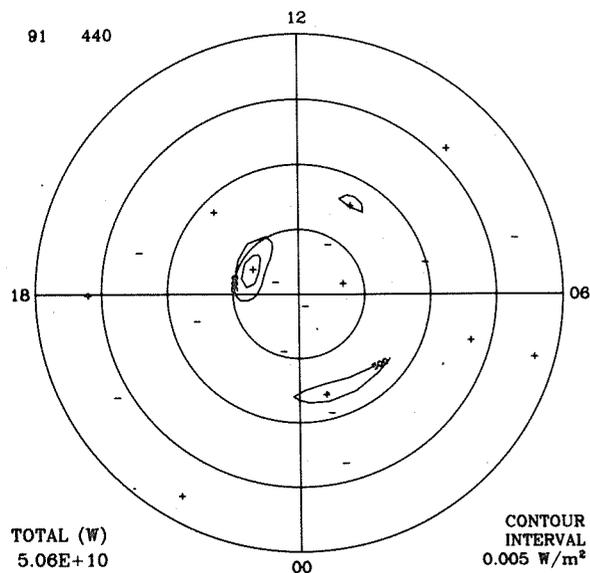
CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT



CONTOUR  
INTERVAL  
10 KV

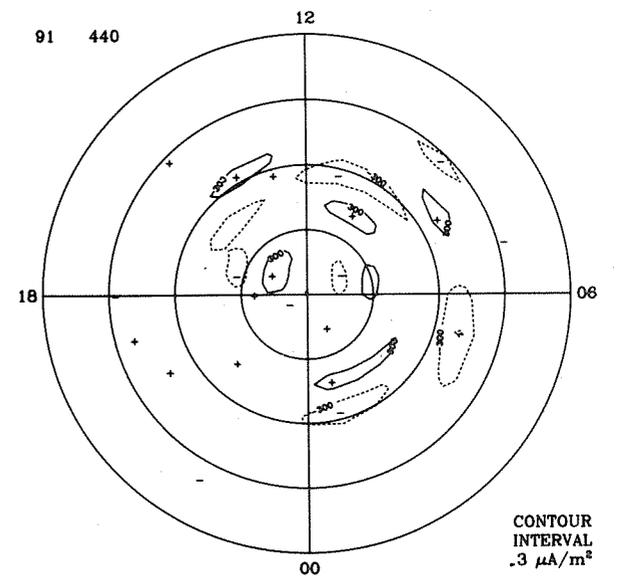
JOULE HEAT RATE



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

TOTAL (W)  
5.06E+10

FIELD-ALIGNED CURRENTS

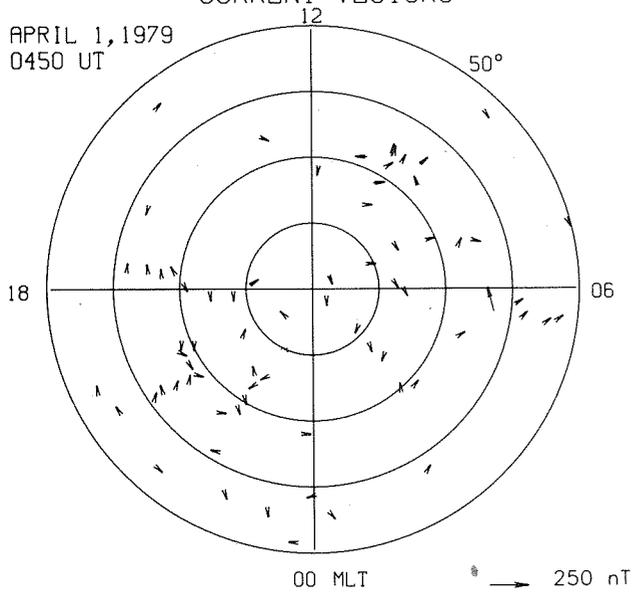


CONTOUR  
INTERVAL  
.3 µA/m<sup>2</sup>

2 A/m →

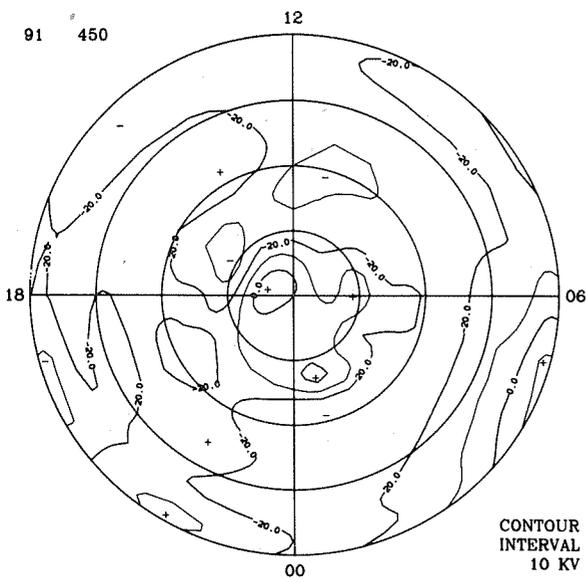
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CURRENT VECTORS

APRIL 1, 1979  
0450 UT



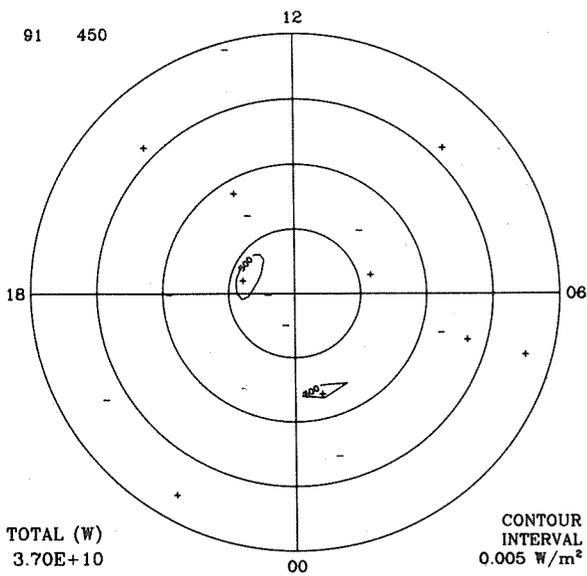
ELECTRIC POTENTIAL

91 450



JOULE HEAT RATE

91 450

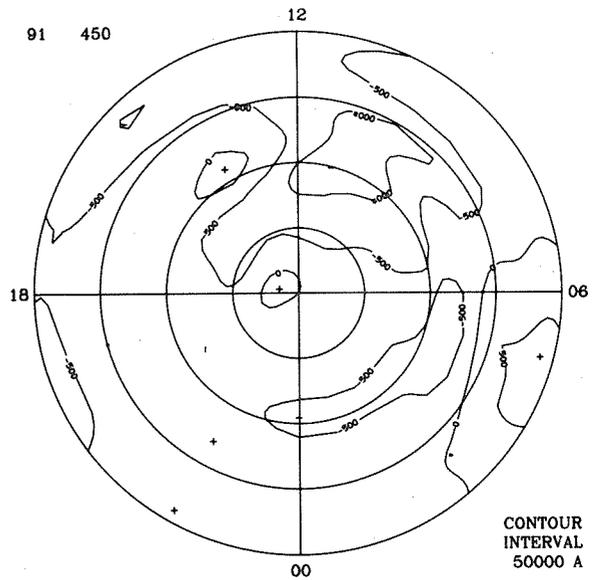


TOTAL (W)  
3.70E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

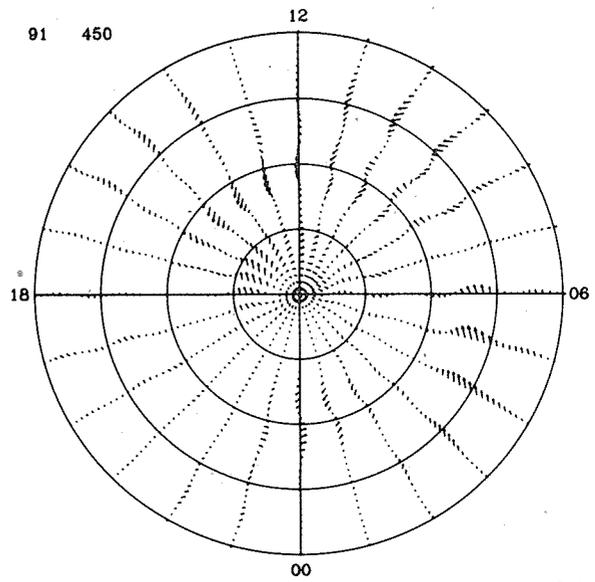
91 450



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

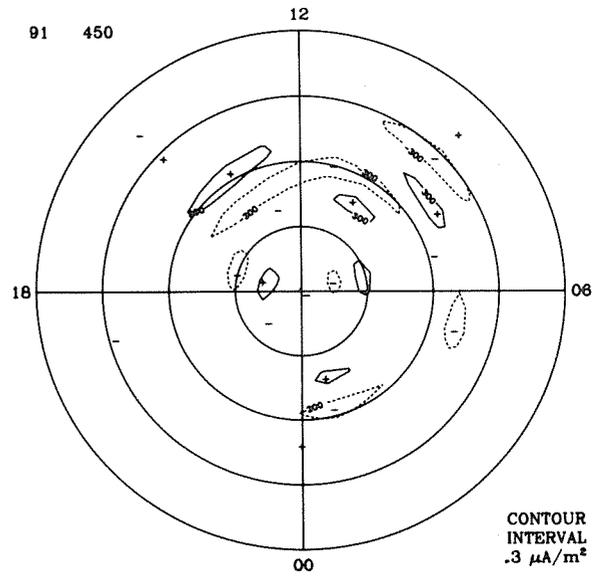
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2 A/m

FIELD-ALIGNED CURRENTS

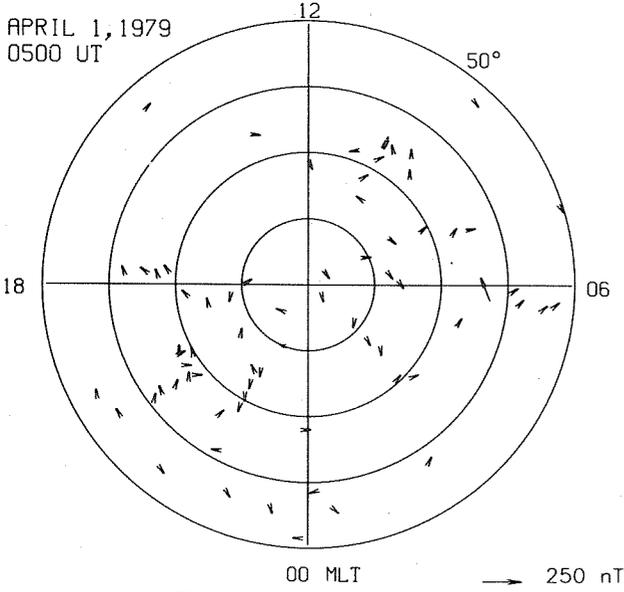
91 450



CONTOUR  
INTERVAL  
.3 μA/m²

OBSERVED EQUIVALENT  
CURRENT VECTORS

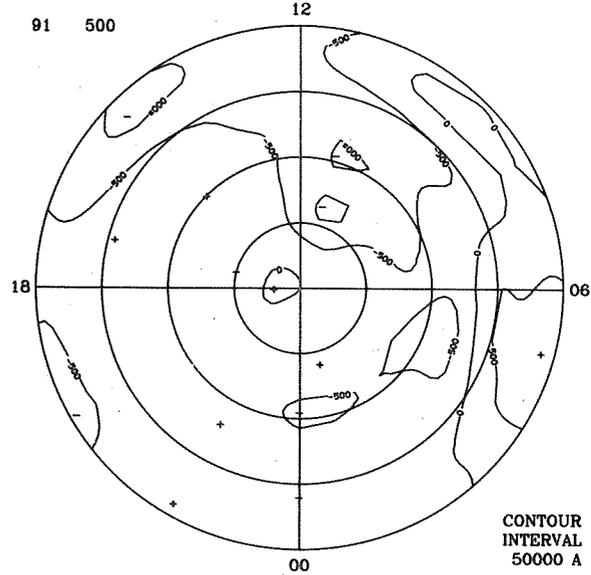
APRIL 1, 1979  
0500 UT



00 MLT

→ 250 nT

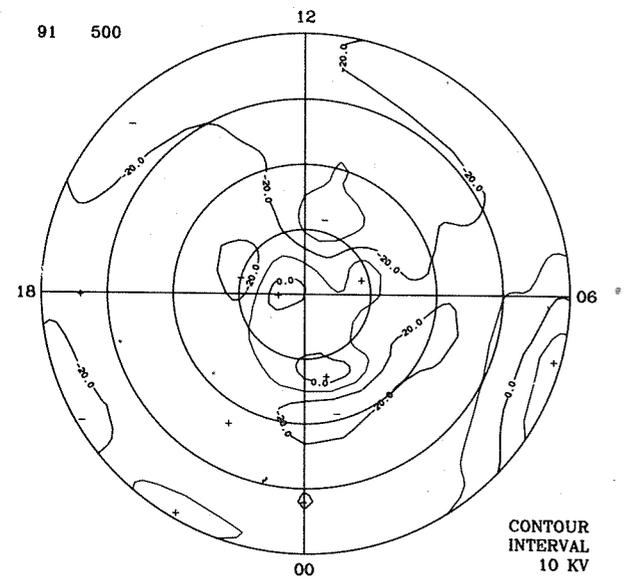
EQUIVALENT CURRENT SYSTEM



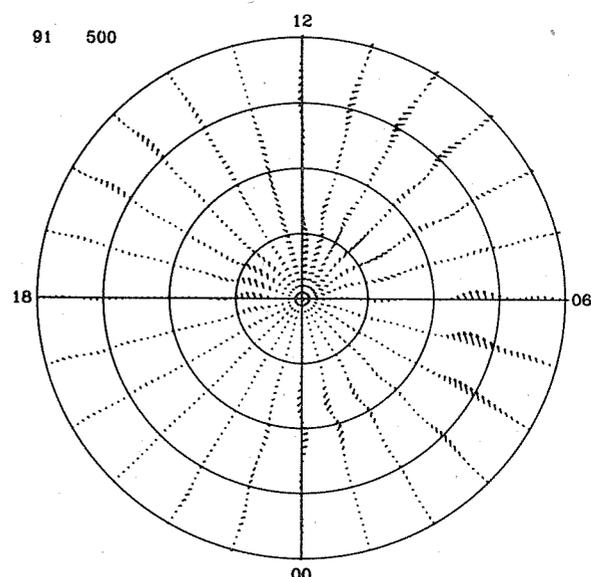
CONTOUR  
INTERVAL  
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ELECTRIC POTENTIAL

IONOSPHERIC CURRENT



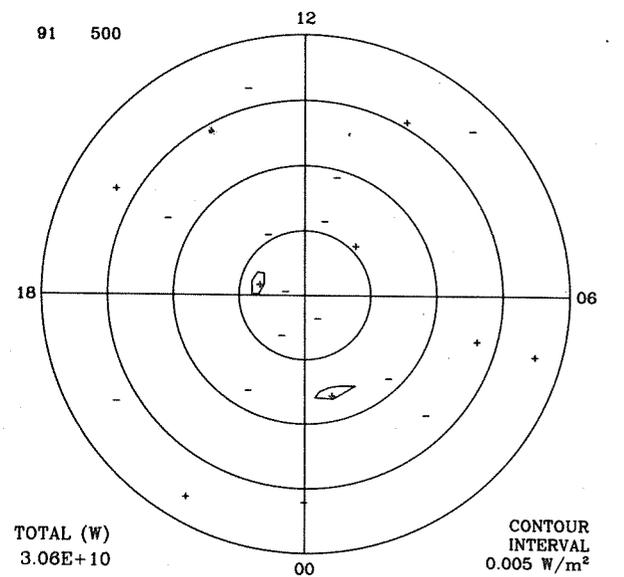
CONTOUR  
INTERVAL  
10 KV



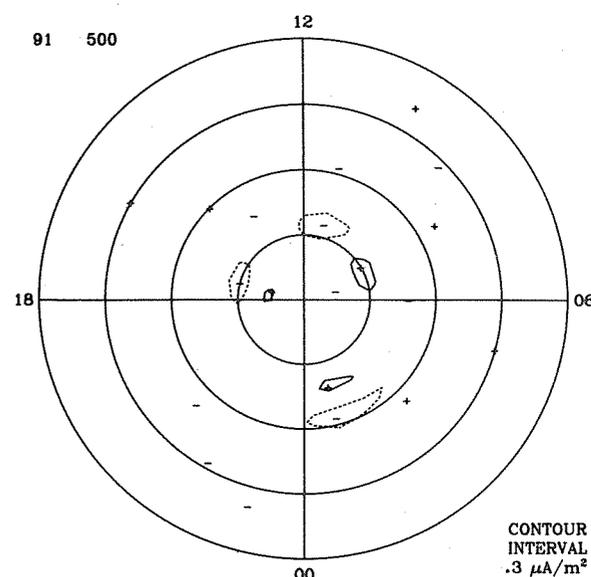
→ 2 A/m

JOULE HEAT RATE

FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

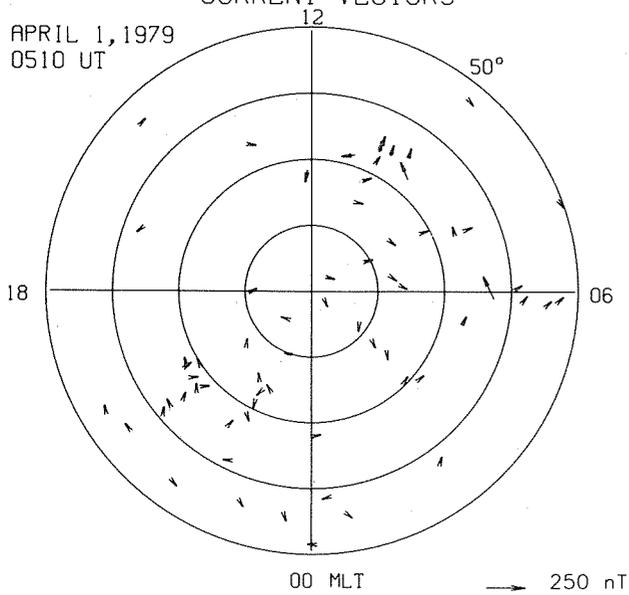


CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

TOTAL (W)  
3.08E+10

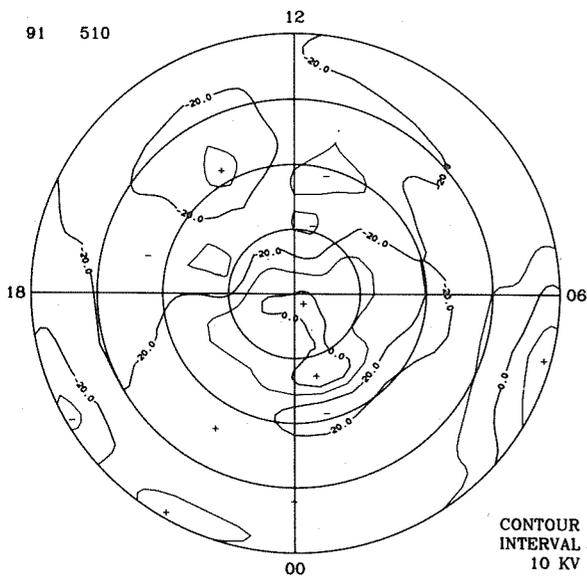
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0510 UT



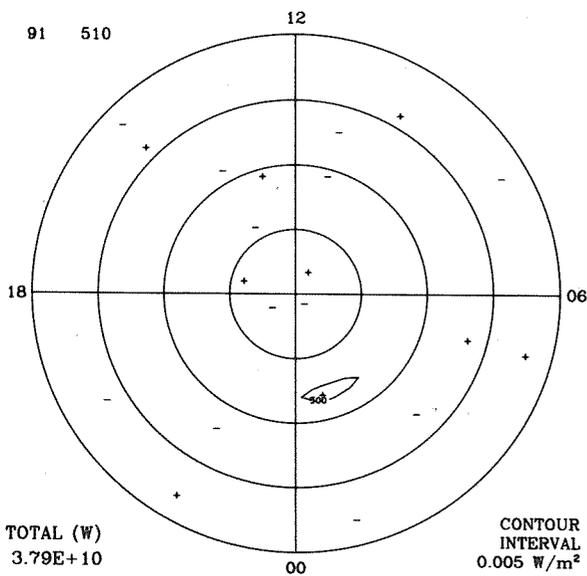
ELECTRIC POTENTIAL

91 510



JOULE HEAT RATE

91 510

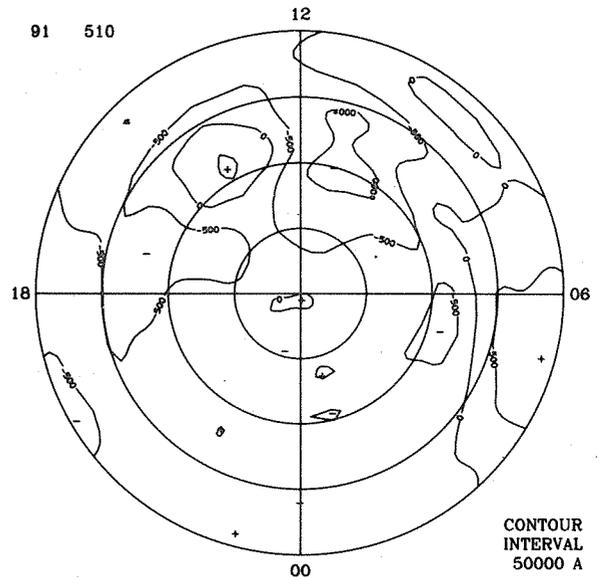


TOTAL (W)  
3.79E+10

CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

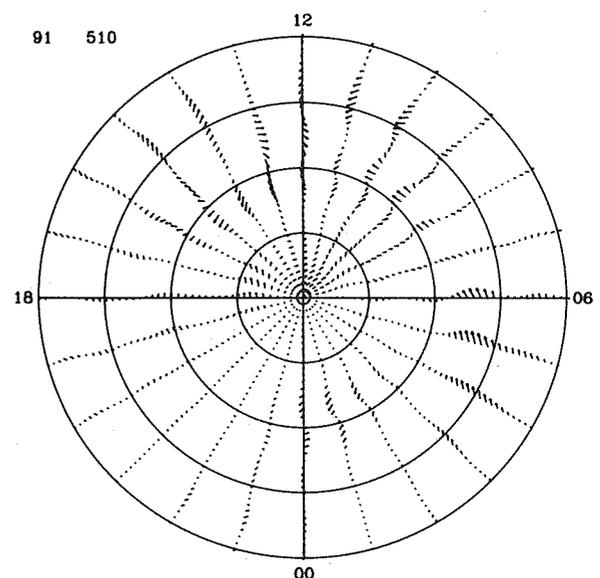
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CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

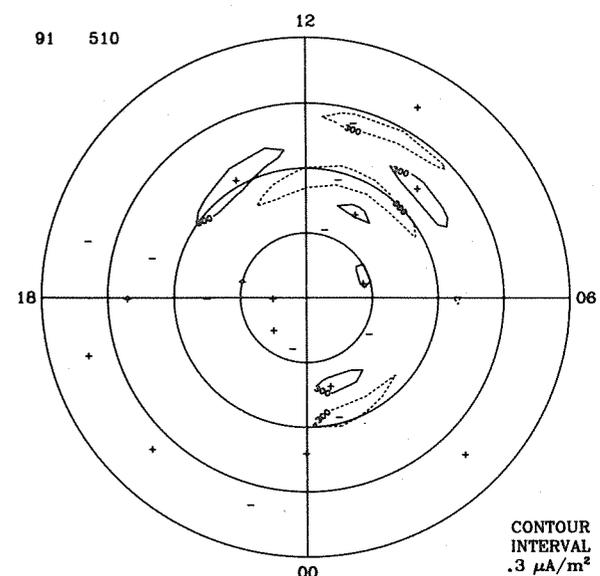
91 510



2 A/m

FIELD-ALIGNED CURRENTS

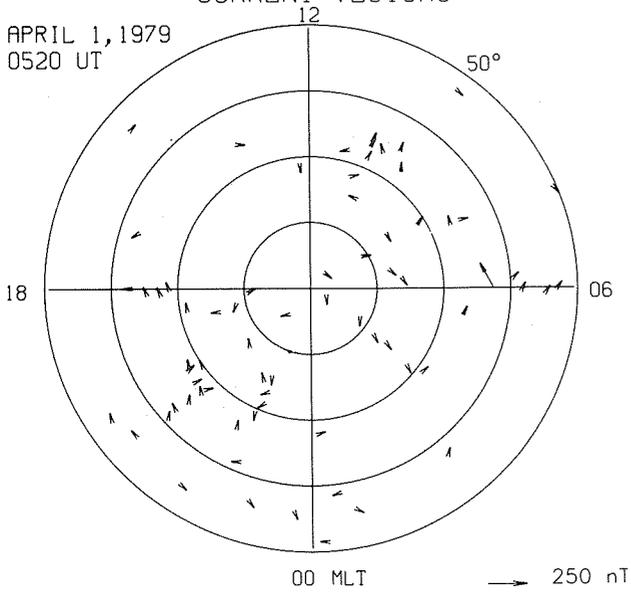
91 510



CONTOUR  
INTERVAL  
.3 μA/m<sup>2</sup>

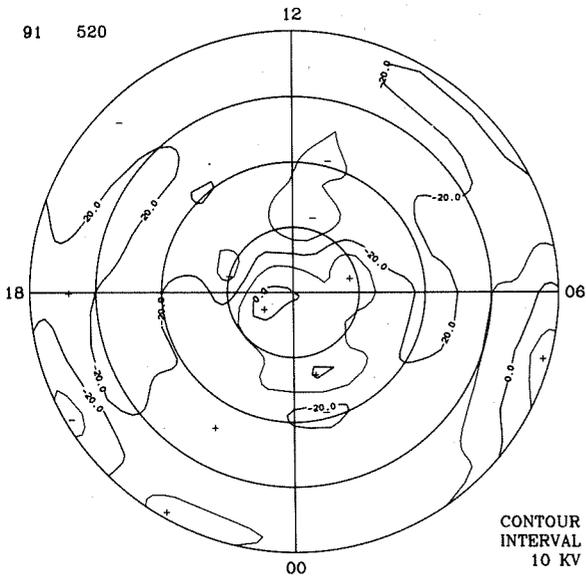
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0520 UT



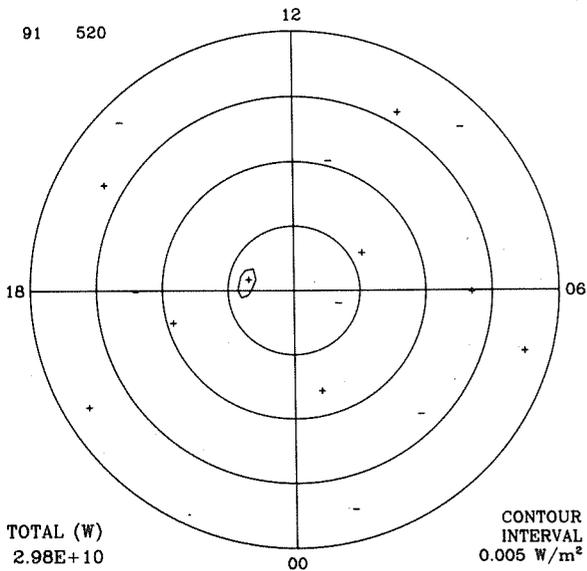
ELECTRIC POTENTIAL

91 520



JOULE HEAT RATE

91 520

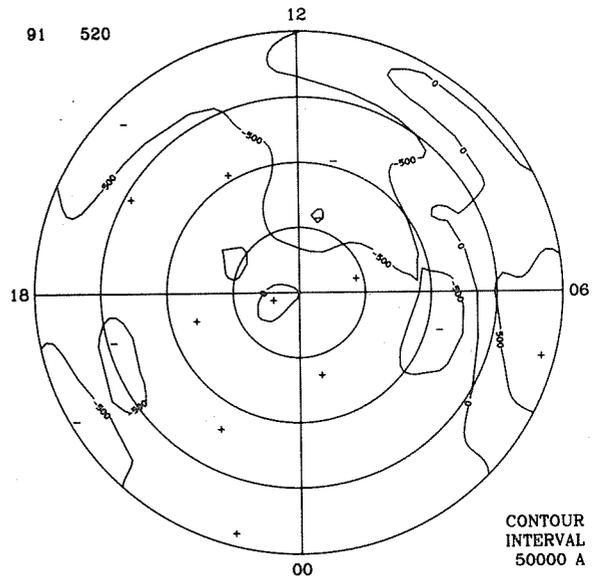


TOTAL (W)  
2.98E+10

CONTOUR  
INTERVAL  
0.005 W/m²

EQUIVALENT CURRENT SYSTEM

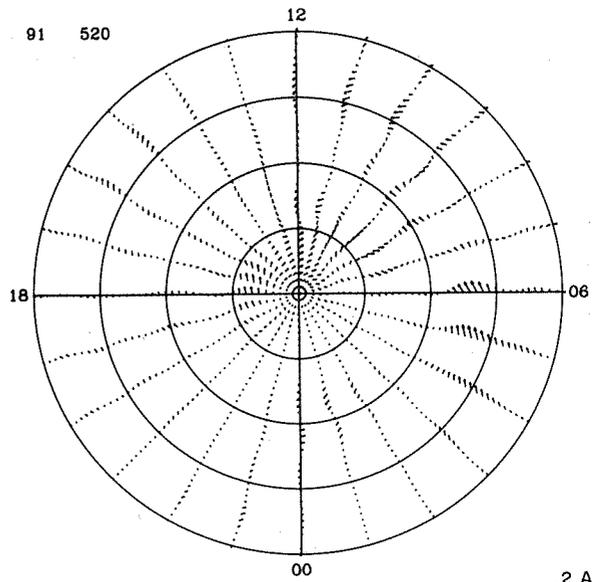
91 520



CONTOUR  
INTERVAL  
50000 A

IONOSPHERIC CURRENT

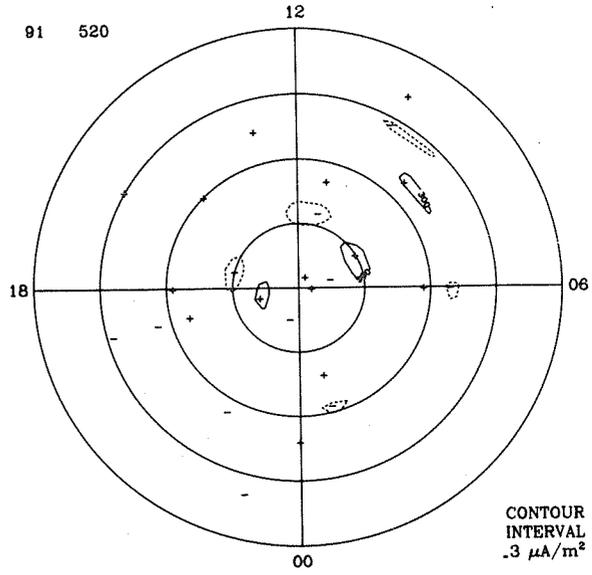
91 520



2 A/m

FIELD-ALIGNED CURRENTS

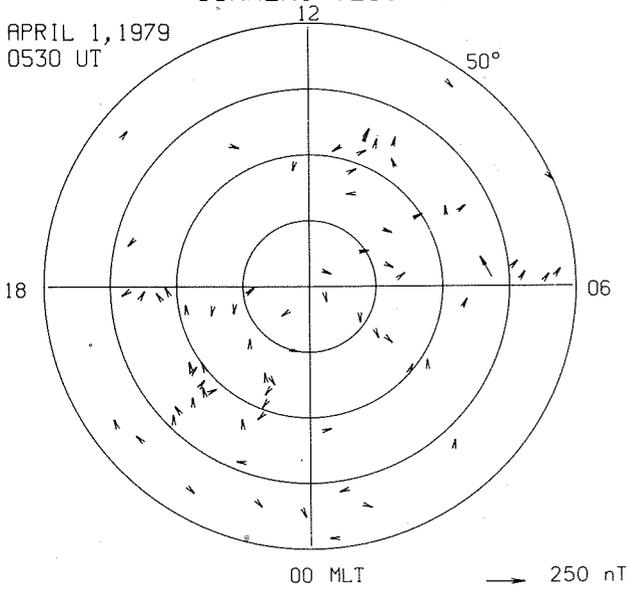
91 520



CONTOUR  
INTERVAL  
.3 μA/m²

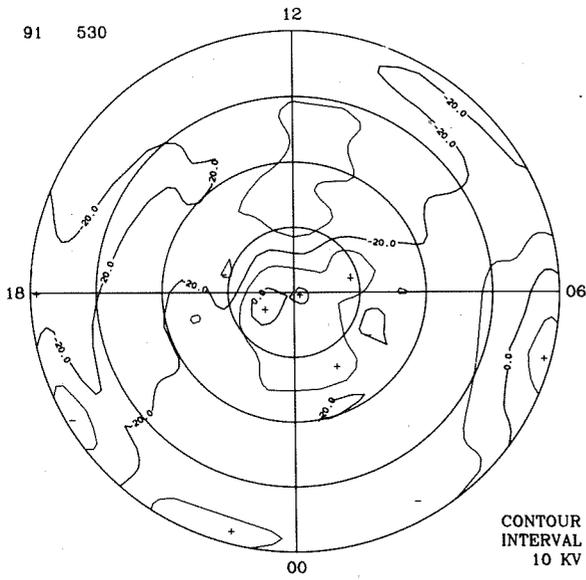
OBSERVED EQUIVALENT  
CURRENT VECTORS

APRIL 1, 1979  
0530 UT



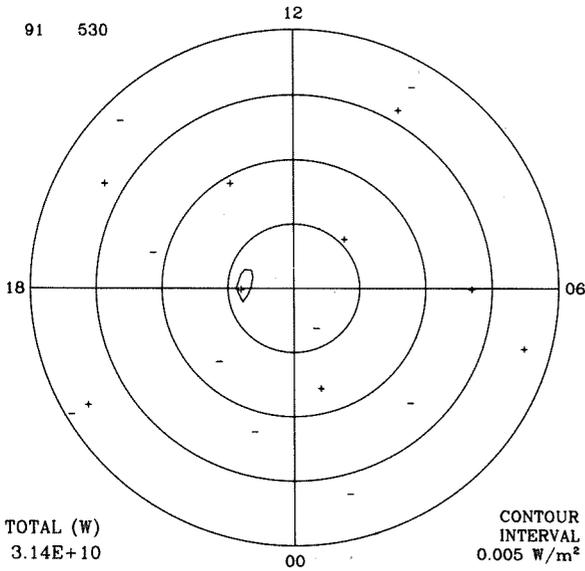
ELECTRIC POTENTIAL

91 530



JOULE HEAT RATE

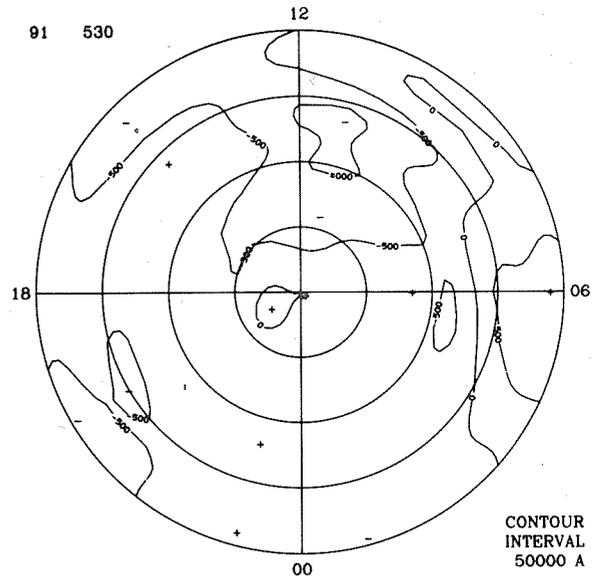
91 530



TOTAL (W)  
3.14E+10

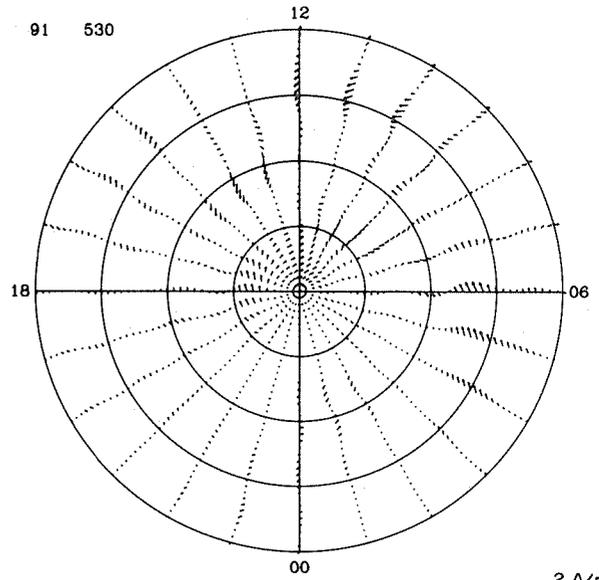
EQUIVALENT CURRENT SYSTEM

91 530



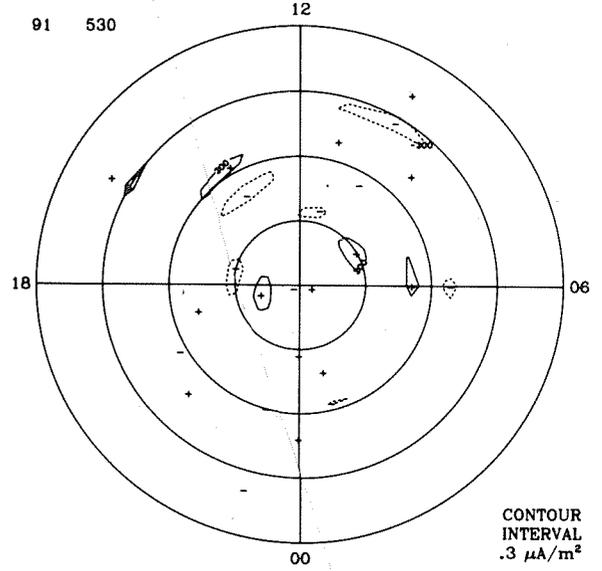
IONOSPHERIC CURRENT

91 530



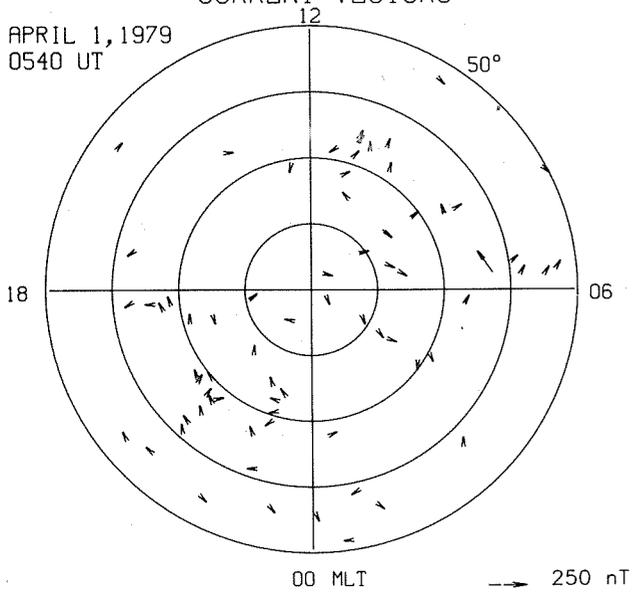
FIELD-ALIGNED CURRENTS

91 530

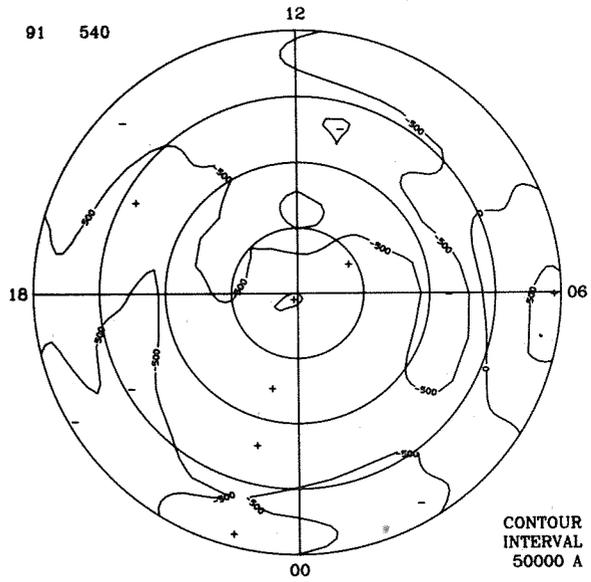


OBSERVED EQUIVALENT  
CURRENT VECTORS

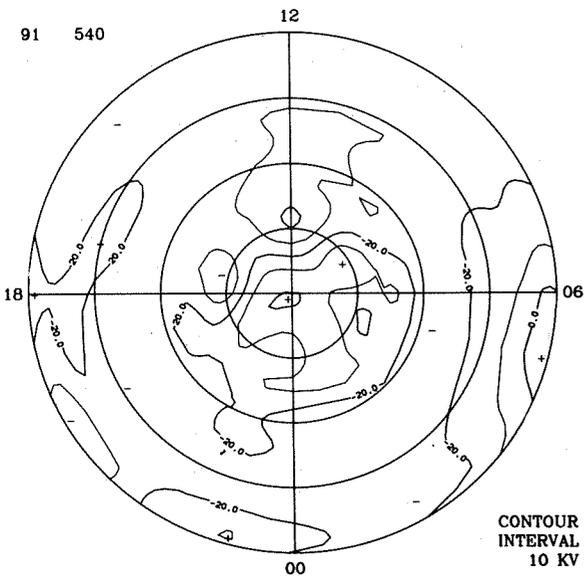
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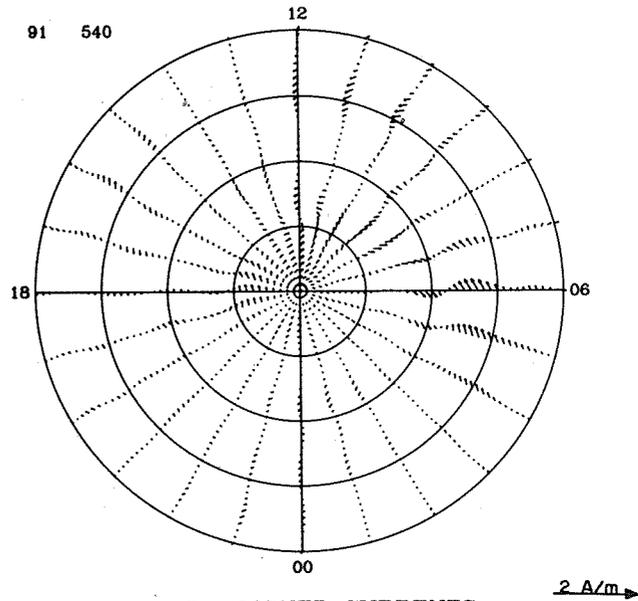
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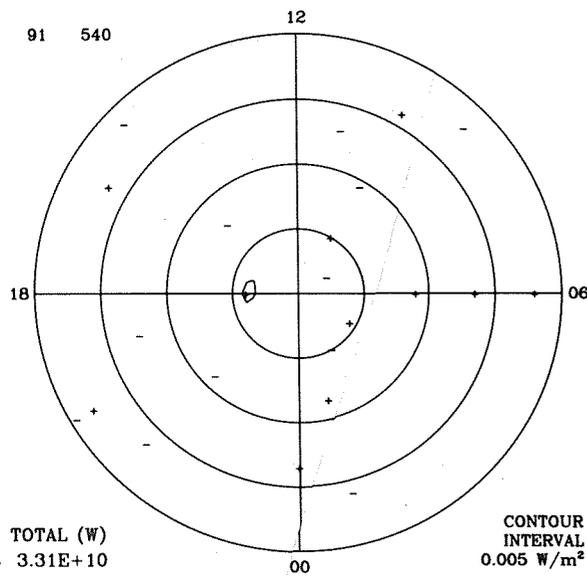
ELECTRIC POTENTIAL



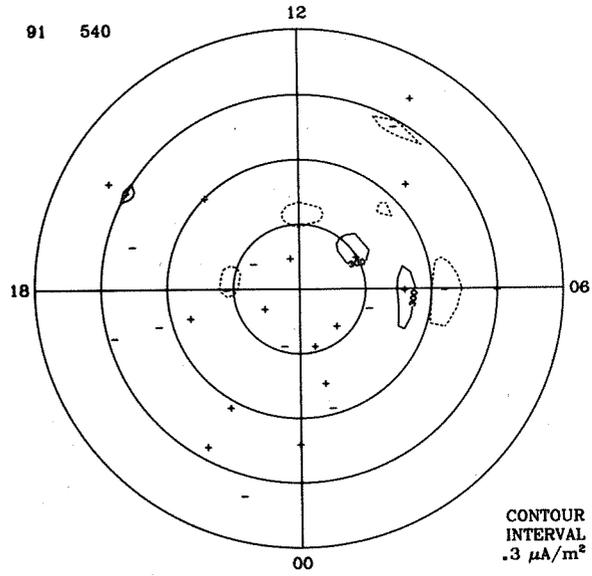
IONOSPHERIC CURRENT



JOULE HEAT RATE



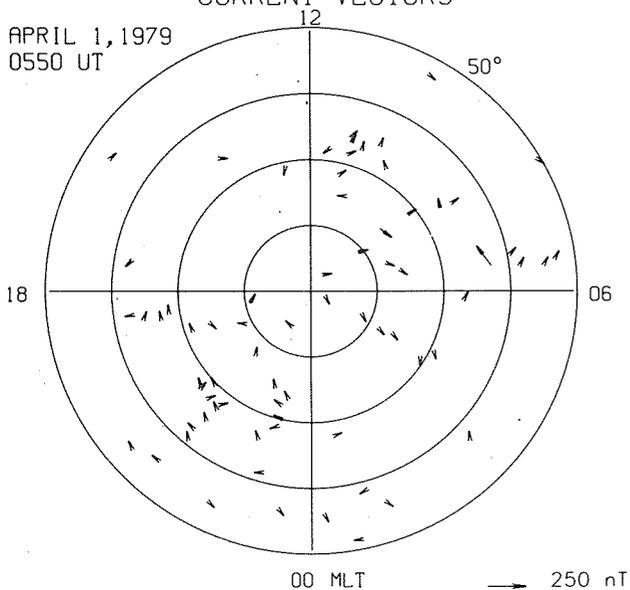
FIELD-ALIGNED CURRENTS



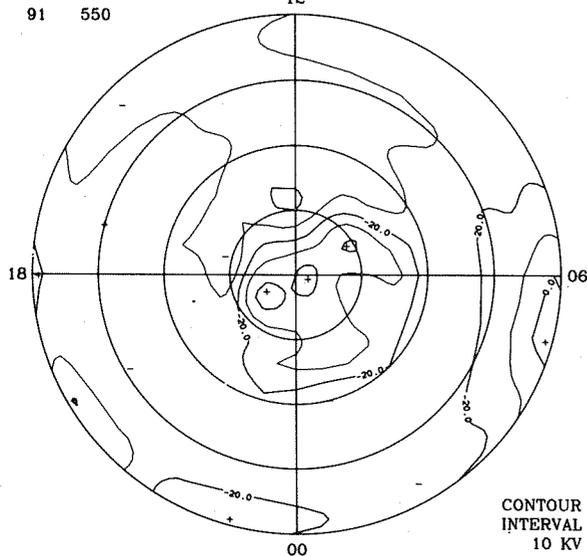
TOTAL (W)  
3.31E+10

OBSERVED EQUIVALENT  
CURRENT VECTORS

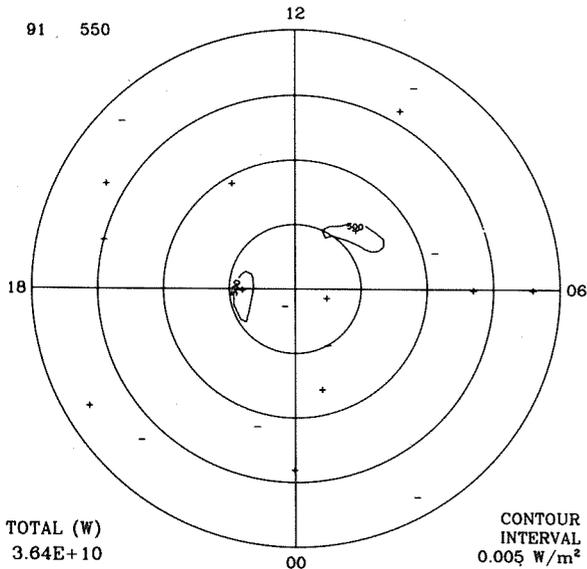
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0550 UT



00 MLT  
ELECTRIC POTENTIAL



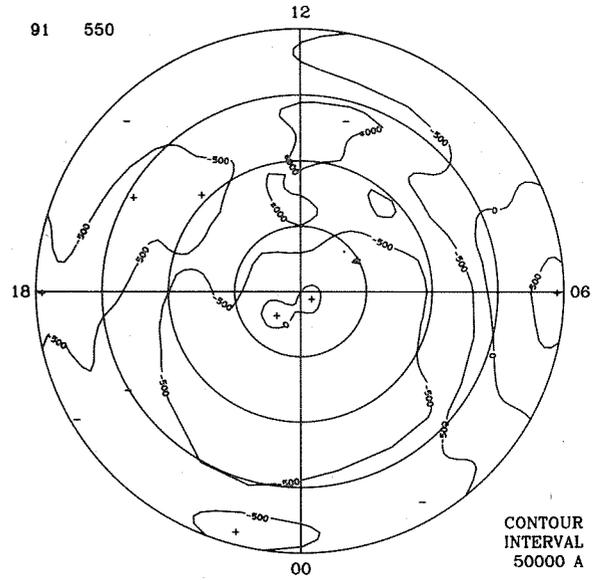
JOULE HEAT RATE



TOTAL (W)  
3.64E+10

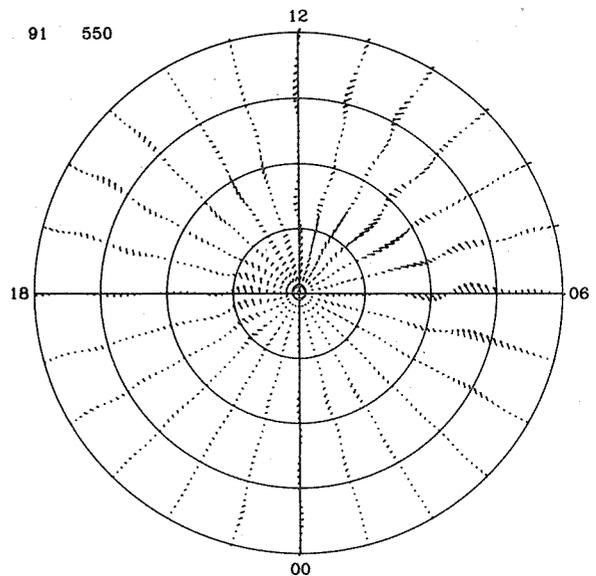
CONTOUR  
INTERVAL  
0.005 W/m<sup>2</sup>

EQUIVALENT CURRENT SYSTEM

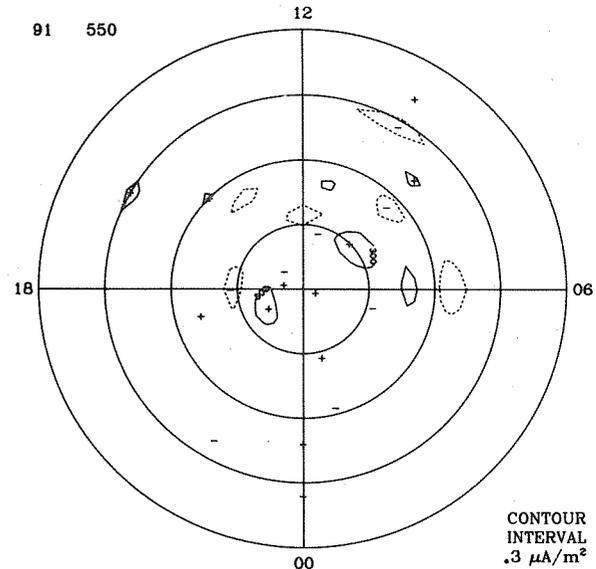


CONTOUR  
INTERVAL  
50000 A

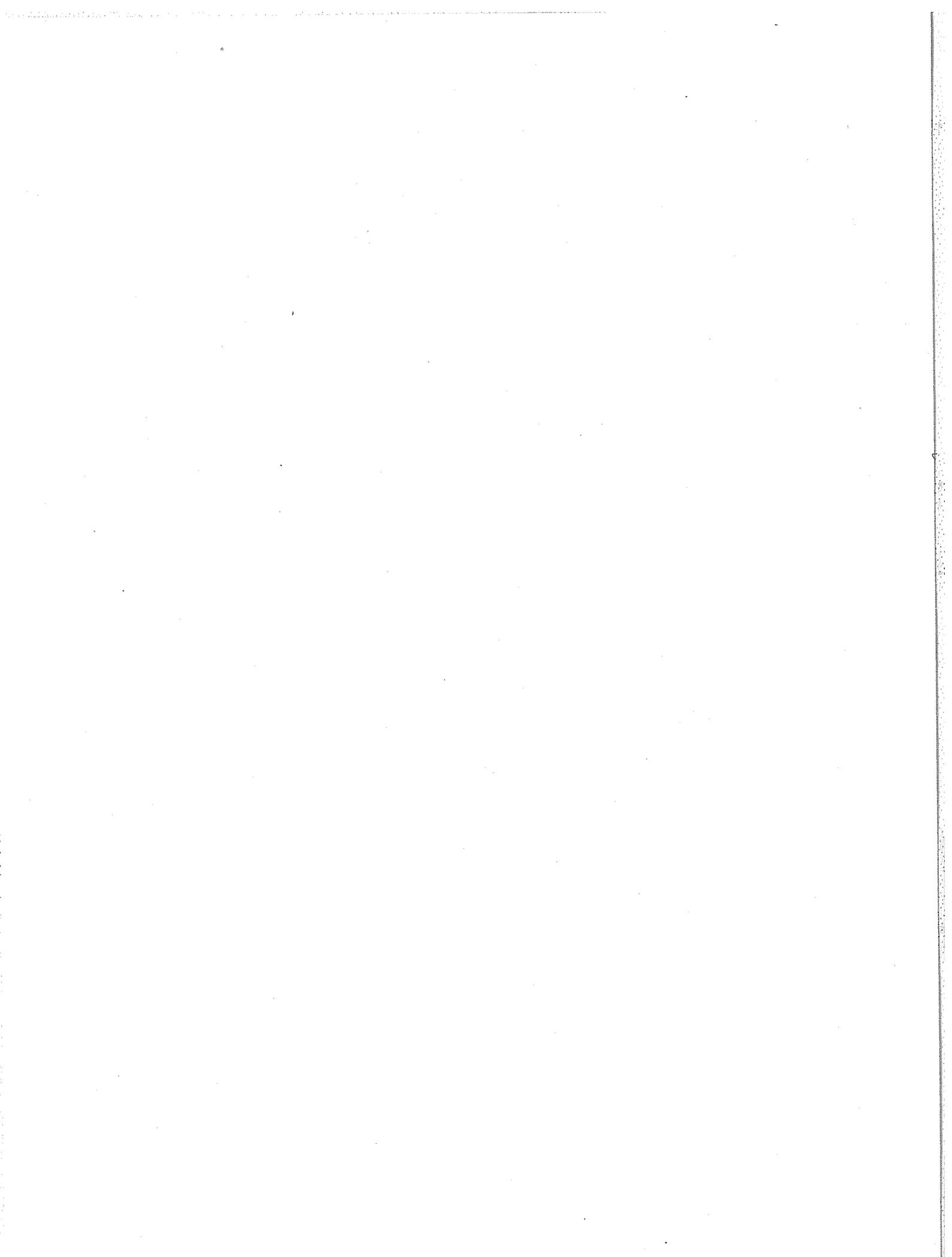
IONOSPHERIC CURRENT



FIELD-ALIGNED CURRENTS



CONTOUR  
INTERVAL  
.3  $\mu\text{A}/\text{m}^2$



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