GEOMAGNETIC INDICES BULLETIN

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M O N T H L Y S U M M A R Y O F G E O M A G N E T I C A C T I V I T Y

THE GEOMAGNETIC FIELD. The intensity of the Earth's magnetic field at any point in space and time arises from the MAIN field internal to the planet; from the electrical currents flowing in the ionized upper atmosphere; and from the currents induced within the Earth's crust. The main field component varies slowly in time and can be grossly described as a bar magnet with north and south poles that extend well out into space.

The main field creates a cavity in interplanetary space called the magnetosphere, where the Earth's magnetic field dominates any field carried by the charged particles of the solar wind. The magnetosphere shape resembles a comet--a shape owing to the interaction with the solar wind; it is compressed on the side toward the sun and tail-like on the side away from the sun. The magnetosphere also directs the flow of the particles about the Earth.

Particles flowing in the magnetosphere and ionosphere generate currents, which in turn cause variations in the intensity of the Earth's magnetic field. These EXTERNAL currents generate additional currents in the Earth's upper atmospheric layers, which vary on much shorter time scales than the main field, and they create magnetic changes as large as 10% of the main field.

Certain current systems derive their energy from the regular changing solar radiation throughout the day and year. Other irregular current systems obtain their energy from the interaction of the solar wind with the magnetosphere, from the magnetosphere itself, from the interaction between the magnetosphere and the ionosphere, and from the ionosphere itself. Magnetic activity indices, including those reported below, are designed to describe variations in the Earth's main field caused by these irregular currents.

FEBRUARY 1989

----Day-----			Rank	Kp Three-Hour Indices								Kp			sc					aa Provisional			
Cal	Jul	Bart	Q/D	1	2	3	4	5	6	7	8	Sum	Ap	Cp	(UT)	AFR	An	As	Am	N	S	M1	M2
1	32	17	D2	5-	5-	3-	4-	4+	3-	3+	5+	31+	29	1.3		29	49	53	51	52	46	47	51
2	33	18		4	4-	2+	1+	3-	2	5+	4	25+	21	1.1		15	34	32	33	36	29	19	46
3	34	19	D1	6-	6-	4-	4-	5-	5+	5-	5-	38	44	1.5		33	63	60	61	73	53	56	70
4	35	20	D3	5-	4	3	4-	4	3-	4	4	30	24	1.2		18	34	40	37	43	32	31	43
5	36	21		4	4-	4-	3	3	3+	4-	4+	29-	22	1.1		17	35	35	35	42	28	30	40
6	37	22	D5	5-	3+	4-	4-	3+	4-	4-	3+	29+	23	1.1		16	37	36	36	38	37	39	37
7	38	23	D4	4-	4	4	4	4-	4	4-	4	31	25	1.2		18	38	37	37	50	41	39	52
8	39	24		4-	3+	3	3	2+	2+	2-	3	22+	14	0.8		10	22	22	22	30	19	31	18
9	40	25		4	4+	3	3	3	3	3+	3	27-	19	1.0		14	29	27	28	35	32	37	30
10	41	26		4	3	2+	3	3+	1	1-	1-	18	12	0.7		9	19	17	19	24	17	25	16
11	42	27	Q9A	1	1-	2-	2+	3-	3-	4-	3	18-	10	0.6		7	19	19	19	22	21	11	32
12	43	1		3	3-	2	2+	3-	3-	4-	4-	23-	14	0.8		11	23	23	23	32	19	20	32
13	44	2		4+	4	4-	4-	3+	4-	3	3-	28+	21	1.1		13	36	41	39	38	41	46	34
14	45	3		3	4	3-	2+	3	4-	1+	1	21	14	0.8		10	23	20	21	29	22	26	25
15	46	4		1+	3-	2-	2-	1+	3+	4	4+	20+	14	0.8		8	23	24	24	26	26	15	37
16	47	5		4	5-	2+	3	3	1+	2+	3	24-	17	0.9		16	29	33	30	29	34	35	29
17	48	6	Q3	2+	2+	2-	1+	1-	0+	1-	1+	11-	5	0.2		4	11	11	11	24	13	18	19
18	49	7	Q7A	1	3-	2-	1-	3+	3	3-	1	16	9	0.5		8	17	17	17	19	18	12	24
19	50	8	Q8A	1	1	2+	2	2+	3	2	3+	17	9	0.5		8	18	18	18	21	18	12	26
20	51	9		3+	3+	4-	3+	4	4	4	2+	28	21	1.1		16	33	33	32	36	32	34	35
21	52	10	Q10A	3-	2+	3+	3	2-	3	2-	1+	19	11	0.6		8	21	19	20	21	18	22	17
22	53	11		2	2+	4	3+	3-	2	3	2+	22-	13	0.7		14	23	20	22	26	17	25	18
23	54	12	Q2	1+	1	1+	1	1	1	1+	2+	10+	5	0.2		3	9	9	9	11	7	8	10 C
24	55	13	Q6A	3-	3-	3-	2+	3-	1+	1	1+	17-	9	0.5		9	16	15	15	22	14	23	13
25	56	14	Q5A	1	2-	3+	2	2-	1	1+	1	13	7	0.3		6	13	12	13	15	11	18	8 KK
26	57	15	Q1	1-	0+	1	1	2-	1-	0+	1	7-	4	0.1		2	6	7	7	7	6	7	7 CC
27	58	16	Q4	2	1-	1-	1+	2+	3-	2-	2-	13	6	0.3		4	13	13	13	16	11	9	19 K
28	59	17		1+	2	3-	2	3	3	3+	4-	21	13	0.7		11	29	23	23	29	28	19	38
MEAN													15	0.77			26	26	26	30	25	28	

See back side for definitions of column heading.

Kp PLANETARY 3-HOUR RANGE INDEX. K-indices isolate solar particle effects on the Earth's magnetism by classifying into disturbance levels the range of variation of the most unsettled horizontal field component during a 3-hour period. Each activity level relates almost logarithically to its corresponding amplitude. Three-hour indices discriminate conservatively between true magnetic field perturbations and the regular quiet-day variations produced by ionospheric currents.

Ap PLANETARY A-INDEX. The A-index ranges from 0 to 400. A indices are daily averages of "a" indices which convert K-values to a linear scale in field units--a scale that measures equivalent disturbance amplitude of a station at which K=9 has a lower limit of 500 nanotesia (nt). Ap is the daily average of A indices from a global array of observatories.

Dst DISTURBANCE AMPLITUDE-STORM TIME. Dst tracks variations in the solar-induced electric currents flowing about 5.6 Earth radii above the planet's surface. Each hourly value is the average symmetric disturbance amplitude of the horizontal component recorded at four stations, reduced to equatorial changes. Values are given in nt, and they can be either positive or negative; during a storm they become strongly negative.

Jul JULIAN DAY or day of the year. This number resets to 1 after the end of the year, January 1 = 1.

Bart DAY NUMBER OF BARTELS 27-DAY CYCLE. THe recurrence of geomagnetic activity every 27 days reflects the solar source. J. Bartels defined a series of 27-day periods to track more easily times of unsettled magnetic conditions. He arbitrarily defined his sequence of 27-day intervals to begin in January 1833.

Q/D MAGNETICALLY QUIET AND DISTURBED DAYS. The following criteria are used to rank selected days of the month from most (Q1) to least quiet (Q10) and from most (D1) to least disturbed (D5). The following criteria are used in the ranking: the sum of the 8 Kps, the sum of the squares of the 8 Kps, and the greatest Kp.

aa The aa indices are three-hourly indices computed from K indices of two antipodal observatories (invariant magnetic latitude 50) and provide a quantitative characterization of the magnetic activity. Half-daily and daily values are an estimation of the activity level very close to that obtained with "am" indices. Values are in nanotesia and correspond to the activiety level at an invariant magnetic latitude of 50. The aa indices are computed for:

N = daily values for the Northern Hemisphere,
S = daily values for the Southern Hemisphere,
M1, M2 = half-daily values of aa indices for Greenwich day.

What is an index and why are there so many for terrestrial magnetism? An index continously summarizes a complex measurement; its discrete values simplify and clarify the variations. Ideally each geomagnetic index should follow a single class of magnetic disturbance; in reality few do. The bewildering array of magnetic indices reflects many past attempts to define measurements that isolate a single source of variation.

The subscript "p" means planetary and designates a global magnetic activity index. The following 12 observatories, which lie between 46 and 63 north and south geomagnetic latitude, now contribute to the planetary indices: Lerwick (UK), Eskdalemuir (UK), Hartland (UK), Ottawa (Canada), Fredericksburg (USA), Meanook (Canada), Sitka (USA), Eyrewell (New Zealand), Canberra (Australia), Lovo (Sweden), Rude Skov (Denmark).

NEW ADDITIONS TO THE GEOMAGNETIC ARCHIVES:

The Data Center has received the AE Indices for July through December.

Although every effort has been made to ensure that these data are correct, we can assume no liability for any damages their inaccuracies might cause. The charge for a 1-year subscription to this monthly bulletin, January through December, is $20.00. To become a subscriber you may either call (303) 497-6135 or write the NATIONAL GEOPHYSICAL DATA CENTER, Solar-Terrestrial Physics Division (E/GC2), 325 Broadway, Boulder, Colorado 80303, USA. Please include with your written order a check or money order payable in U.S. currency to the Department of Commerce, NOAA/NGDC. Payment may be made, too, through one of three credit cards: VISA, MasterCard, or American Express.