

# INDEX

- Absolute humidity, 16-3  
Absolute magnitude, 25-4, 25-13, 25-14  
Absorption coefficient, 18-4  
Absorption cross section, 19-10, 22-2  
Absorption index, 19-10  
Absorption line parameters, 18-5  
Acceleration due to gravity, 14-7, 14-8, 14-28–14-30  
Acetylene ( $C_2H_2$ ), 21-23  
Active experiments in space plasmas, 10-96  
Activity indices, 4-27  
     $\Delta$ , 4-32  
    Ak, 4-29  
    Ap, 4-29  
    K, 4-12, 4-27  
    Km, 4-29  
    Kn, 4-29  
    Kp, 4-28, 4-30, 5-26, 7-5, 8-20, 8-22, 8-23, 10-60, 17-30, 17-35  
    Ks, 4-29  
    U, 4-32  
    aa, 4-29  
    ak, 4-29  
    am, 4-29  
    ap, 4-29  
    u, 4-32  
    u<sub>1</sub>, 4-32  
Adiabatic invariants, 5-3, 5-4, 5-11, 5-13, 5-19, 5-38, 5-45, 8-7  
Advanced Inertial Test Laboratory, 23-40  
Advection, 15-6  
Advective fog, 18-29, 18-48  
AE-C, 8-13  
AE-D, 8-13, 8-23  
AE-E, 2-19  
Aerosol  
    absorption, 18-20  
    extinction, 18-15, 18-18, 18-21–18-23  
    models, 18-10, 18-14, 18-26–18-27, 18-46  
    particles, 18-9–18-10  
    refractive index, 18-12, 18-16, 18-17  
    scattering, 18-15, 18-19  
    sources, 21-15  
Aerospace Guidance and Metrology Center, 23-40, 23-41  
AF-72-1, 5-29  
AFGWC, 1-23, 10-59  
Air coupled seismic waves, 23-20  
Air Force—National Severe Storms Project, 20-23  
Air Force Global Weather Center (AFGWC), 1-23, 10-59  
Air Force Reference Atmosphere (0-90 km), 14-7  
Air Force Satellite Interactions Model (AFSIM), 7-26  
Air Weather Service (AWS), 16-43  
Air-earth conduction current, 20-4  
Aircraft icing, 16-41  
Aircraft lightning strike, 20-25  
Airglow, 13-1, 12-20, 12-25, 12-27  
Aitken nuclei, 16-46  
Alachogen: plate fracture, 23-5  
ALADDIN 1 experiment, 21-44  
Albedo, 15-1, 18-35  
Alfvén layer, 8-9  
Alfvén speed-waves-velocity, 4-23, 4-24  
Alfvén waves, 1-11, 3-4, 3-13–3-16, 3-24, 3-30  
All sky camera, 10-18  
All sky imaging photometers, 10-18  
Alouette 1, 9-8  
Ames, 21-16  
Amplitude fluctuation, 19-9  
Amplitude and phase scintillation, 10-84  
Anelastic damping factor, 23-11  
Angular gyrofrequency, 5-6  
Angular refraction, 10-87  
Antenna pattern, 10-54  
Antenna temperature, 11-1  
Antipode, 10-29  
Apparent brightness, 25-7  
Appleton anomaly, 9-4, 9-8, 10-20, 10-78  
Appleton dispersion formula, 10-3  
Appleton-Hartree formula, 10-29, 10-37  
Arc discharge, 7-7, 7-9  
Archimedian spiral, 3-21, 6-8, 6-23–6-25, 6-26  
Arcing, 7-5, 7-7, 7-9, 7-16  
Argon, 21-47  
Artificial modification: ionosphere, 10-96  
Artificial radiation belts, 5-50  
Aseismic uplift, 23-22  
Astrogeodetic deflection, 24-8  
Astromonic azimuth, 23-34  
Astronomical latitude, 24-1  
Astronomical longitude, 24-1  
Asymmetry parameter, 18-24  
Asymptotic cones of acceptance, 6-3  
Atmosphere  
    composition of, 21-1  
    composition models, 18-1  
    electric fields, 20-3, 20-4  
    minor species, 21-1, 21-14, 21-41  
    molecular species, 18-6  
    number density, 14-2  
    properties of, 14-2  
    structure of, 14-3, 14-6  
Atmospheric exchange layer 20-1, 20-5, 20-11, 20-13  
Atmospheric humidity atlas, 16-3  
Atmospheric loss cone, 8-10  
Atmospheric radiance, 18-37, 18-42, 18-47–18-49, 22-1  
Atmospheric refraction, 18-65  
Atmospheric transmittance, 18-37, 18-42, 18-45, 18-47–18-49

# INDEX

- Atmospherics, 10-27  
Atomic emission lines, 12-22, 12-24, 12-25, 12-27–12-33, 12-36  
Atomic frequency standards, 24-16  
Atomic nitrogen, 12-28–12-33, 22-2, 21-50  
Atomic oxygen, 12-28–12-33, 21-26, 21-42, 21-43, 21-48, 21-49, 21-53, 22-2, 22-4  
ATS-5, 7-4, 7-5, 7-7, 7-29  
ATS-6, 5-10, 7-4, 7-5, 7-7, 7-10, 7-29, 10-95  
Attachment coefficients, 20-7  
Attenuation, 19-9, 19-13  
Attenuation rate, 10-27, 10-28, 10-30–10-33, 10-35  
Aurora, 12-1  
absorption, 10-57  
activity, 10-63, 12-17–12-19  
arcs, 8-25, 10-82  
boundaries, 8-20, 8-22, 12-9, 12-10, 12-12  
color type, 12-25  
continuous, 12-2, 12-3, 12-5, 12-6, 12-11, 12-13, 12-14, 12-16  
convection, 8-20, 8-24  
diffuse, 9-5, 12-2, 12-6  
discrete, 12-2, 12-3, 12-5, 12-7–12-9, 12-14, 12-17–12-19  
distribution, 12-4  
E layer, 12-16  
echo power frequency law, 10-66  
electrojet, 17-35  
electron-induced radiant efficiencies, 12-24  
emissions, 8-1  
frequency of occurrence, 12-5  
green line, 12-25  
IBC III intensities, 12-24  
infrared bands, 12-35  
infrared spectrum, 12-27, 12-31–12-33, 12-35  
ionization, 20-20  
mantle, 12-2, 12-6  
models, 12-21  
morphology, 12-1, 12-17  
optical emissions, 12-19, 12-20, 12-22  
oval, 8-1, 8-19, 9-4, 9-5, 12-2, 12-3, 12-5, 12-7, 12-11, 21-52  
radiative processes, 12-22  
scintillations, 10-80  
sporadic E layer, 12-20  
substorms, 12-20  
TEC, 10-94  
Type-B red, 12-25  
ultraviolet emission, 22-2  
ultraviolet spectrum, 12-27, 12-28, 12-29  
unstructured, 12-4  
visible spectrum, 12-27, 12-29, 12-30, 12-31  
Auroral-electrojet indices  
AE, 4-31, 14-36  
AL, 4-31  
AU, 4-31  
Ao, 4-31  
Axford-Hines model, 8-4  
Azimuth data base, 23-40  
Azimuth laying set gyrocompass, 23-37  
Azimuthal relation, 23-34
- Backscatter, 7-2, 7-10, 7-13  
Backscattered electrons, 7-13, 7-14, 7-16, 7-19, 7-22, 7-25  
Backscattering cross section, 19-10  
Ballistic wind, 17-17
- Band models, broad-band radiation, 18-44  
Beam-plasma discharge, 7-16  
Benioff zone, 23-3  
Bidirectional reflection function, 18-35, 18-36  
Biot-Savart law, 5-42  
B-L coordinate system, 4-4, 4-25, 6-12  
Bolometric magnitude, 25-13  
Bond albedo, 25-6–25-8  
Bottomside instabilities, 10-75  
Bottomside profile, 10-18  
Bouguer extinction law, 18-15  
Boulder workshop proceedings, HF propagation, 10-62  
Bounce loss cone, 5-18, 5-21  
Bounce time integral, 5-5  
Boundary conditions—steady state, 5-22  
Bow shock, 3-1, 3-24, 3-29, 4-6, 12-2  
    collisionless shocks, 3-29  
    instantaneous shock, 3-30  
    quasi-parallel shocks, 3-30  
    quasi-perpendicular shocks, 3-30  
Bremmer: spherical earth model, 10-24  
Bremsstrahlung radiation, 11-2  
Brewster's angle, 10-31, 10-32  
Brightness temperature, 25-6, 25-7  
Broad band radiation, 18-44  
Bubbles, ionospheric, 9-9, 10-58, 10-60, 10-75  
Bureau International de l'Heure, 24-15–24-17  
Burst climatology, 11-6  
Burst component, 11-2  
Burst parameters, 11-12, 11-13  
Butterfly distribution, 5-37
- C layer, 10-35  
Carbon dioxide ( $\text{CO}_2$ ), 12-31, 12-34–12-37, 21-16, 21-21, 21-44–21-46  
Carbon monoxide (CO), 21-16, 21-21, 21-45  
Carrier phase advance, 10-84  
Celestial sphere, 25-1  
Centimeter-wave bursts, 11-3  
Cepheid variables, 25-5  
Chandler wobble, 23-5, 24-15  
Chapman distribution function, 10-43  
Chapman layers, 10-50  
Character indices, 4-31  
    C, 4-31  
    C9, 4-31  
    Ci, 4-31  
    Cp, 4-31  
Characteristic waves, 10-4  
    extraordinary component, 10-4  
    ordinary component, 10-4  
Charge buildup, 7-1  
Charge exchange, 5-13, 5-15–5-17, 5-23  
Charged particle trajectory, 5-1  
Charged spacecraft surfaces, 7-10  
Chemical release experiments, 10-96  
Chemical release effects on radiation belts, 5-51  
Chemiluminescence, 13-2  
Child-langmuir model, 7-17  
Chlorine nitrate ( $\text{ClONO}_2$ ), 21-39, 21-40  
Chlorine oxide ( $\text{ClO}$ ), 21-38  
CIRA 1972 (Cospar International Reference Atmosphere), 14-27  
Clear air turbulence, 17-28  
Climatic change, 15-2  
Climatic Extremes for Military Equipment, 16-3, 17-3

- Cloud cover models, 16-30  
 beta distribution, 16-30  
 ceiling model, 16-31  
 model B, 16-31  
 S distribution, 16-30
- Cloud droplets, 18-25, 18-27–18-29
- Cloud-free field-of-view (CFFOV), 16-37
- Cloud-free line-of-sight (CFLOS), 16-34
- Clouds, 16-26, 18-25, 18-27–18-34  
 cirriform, 16-26  
 cirrus, 16-43  
 cumuliform, 20-20  
 liquid water content, 16-41  
 skycover, 16-27, 16-30, 16-36  
 subvisible cirrus, 16-45
- $C_p^2$ , 18-71, 18-72, 19-6, 19-7, 19-8
- $CO_2$ , 12-31, 12-34–12-37, 21-16, 21-21, 21-44–21-46
- $CO_2$  15  $\mu m$  emission, 12-32, 12-34, 12-35
- $CO_2$ , 4.3  $\mu m$  emission, 12-22, 12-24, 12-31–12-37
- $CO_2$  radiation, 13-10
- Collision frequency, 10-29, 10-33, 10-35–10-37
- Collisional halfwidth, 18-5
- Color temperature, 25-6
- Comets, 25-8
- Combined release and radiation effects satellite (CRRES), 10-97
- Complex cluster ions, 20-11
- Condensation nucleii, 16-46
- Conduction current, 20-6
- Conductivity of air, 20-1, 20-3
- Conductivity of ionosphere, 10-26, 10-27, 10-30–10-32, 10-35, 10-36
- Continental drift, 23-3
- Contrast  
 apparent, 18-60  
 inherent, 18-60  
 modulation, 18-60  
 transmittance, 18-60–18-64
- Convection, 5-10  
 auroral, 8-20–8-24  
 atmospheric, 20-1  
 magnetic merging driven, 8-4  
 magnetospheric, 8-3  
 polar cap, 8-13, 8-14  
 viscous driven, 8-3
- Convection current, 20-5
- Convection electric field, 5-10, 5-14, 9-4
- Coordinate systems  
 celestial, 25-1  
 corrected geomagnetic, 4-3  
 ecliptic, 25-1  
 galactic, 25-1  
 geocentric solar-ecliptic, 4-3  
 geocentric solar-magnetospheric, 4-3  
 geographic, 23-1  
 horizon (alt-azimuth), 25-1  
 magnetospheric, 8-2  
 solar-magnetic, 4-3
- Coordinated universal time, 24-16, 25-3
- Corona, solar, 1-9, 1-16, 1-18, 1-22, 2-15, 6-24, 6-25  
 "K" corona, 1-11  
 coronal holes, 1-11, 1-20, 3-17  
 coronal plasma, 3-1  
 coronograph, 1-11  
 critical point, 3-2, 3-3  
 critical radius, 3-2, 3-3  
 electron density, 3-1  
 electron temperatures, 3-11, 3-12
- Corona solar (*Continued*)  
 hydrostatic equilibrium, 3-1, 3-2  
 isothermal, 3-2  
 temperature, 3-2
- Coronal holes, 1-11, 1-20, 10-59
- Cosmic radiation, 6-1, 6-3, 20-1–20-3, 20-18, 21-52  
 albedo electron flux, 6-15, 6-19  
 albedo neutron flux, 6-16, 6-19  
 albedo proton flux, 6-15  
 anomalous component  
 composition, 6-3, 6-4  
 cosmogenic isotopes, 6-6, 6-14  
 cyclic variations, 6-8  
 differential energy spectra, 6-4, 6-5, 6-8  
 electron spectrum, 6-6  
 flux, 20-15, 20-16  
 ionization rates in the atmosphere, 6-12, 6-14  
 isotopic composition, 6-6  
 Jovian electrons, 6-3, 6-6  
 modulation parameter, 6-7  
 primary, 6-3, 6-12  
 secondary, 6-12, 6-13  
 solar cycle modulation, 6-3, 6-4, 6-6  
 solar modulation theory, 6-7  
 transient variations, 6-8  
 universal abundance, 6-3
- Cosmic ray event, 6-9
- Cosmic ray penumbra, 6-10
- Cosmic ray shower, 6-13
- Coulomb collisions, 5-13–5-15, 5-22
- Counter electrojet, 9-7
- Cowling conductivity, 4-20, 9-6
- Critical frequencies; 10-1, 10-38, 10-48, 10-56  
 FoE, 10-1, 10-41, 10-49  
 FoF1, 10-1, 10-41  
 FoF2, 10-1, 10-41, 10-59, 10-89
- Cross-modulation, 10-37
- Crustal motion, 23-21
- Cryoseisms, 23-20
- Current balance on satellite surfaces, 7-10, 7-11, 7-16
- Cutoff frequencies, 10-29
- Cutoff rigidity, 6-2, 6-9, 6-10, 6-12, 6-18
- Cyclotron harmonic resonances, 5-19, 5-20
- D region, 9-1, 10-28, 10-34, 10-36, 10-37, 12-1, 12-3, 12-4, 21-46, 21-52, 21-56, 21-57
- D region negative ion chemistry, 20-10
- D region positive ion chemistry, 20-9
- Data centers, 4-32
- Dayglow emission, 21-47
- Debye length, 3-7, 10-15, 7-16–7-18, 7-21, 7-22, 7-24
- Decimeter-radio bursts, 11-3
- Defense Mapping Agency, 23-35
- Defense Meteorological Satellite Program (DMSP), 8-1, 8-17, 8-20, 12-2, 12-9, 12-12, 12-17, 16-33
- Definitive geomagnetic reference field, 4-27
- Degree day, 15-29
- Density scale heights, 14-28, 14-30
- Density, atmospheric, 14-1, 14-3, 14-27, 15-31  
 correlation coefficients, 15-33  
 diurnal variations, 15-38  
 high altitude, 14-27–14-32, 14-37, 14-38  
 latitudinal variations, 14-8, 14-13–14-16, 15-31  
 longitudinal variations, 14-21, 14-22  
 seasonal variations, 14-8, 14-13–14-16, 15-31  
 warm and cold winter stratosphere/mesosphere, 14-23, 14-24

# INDEX

- Depolarization factor, 18-8  
Dew point, 16-1  
Dielectrics  
  charge on, 7-29  
  deposition of charge in, 7-15  
  surface potential, 7-5  
Differential carrier phase, 10-85  
Differential charging, 7-4, 7-5, 7-7, 7-24, 7-25, 7-28  
Differential time delay, 10-88  
Diffusion coefficients, 20-7  
Diffusion equation, 5-12  
Dipolar magnetic field strength, 5-1, 5-5  
Dipole field lines, 5-2  
Dipole moment of the earth, 4-25  
Dipole earth models, 10-22–10-24, 10-26, 10-29, 10-30, 10-34  
Dispersion formula (Edlen), 19-1  
Displacement current, 20-6  
Disturbing potential, 24-8, 24-9  
Disturbance-daily variation field, 4-8  
Diurnal propagation variation, 10-35, 10-36  
Diversity techniques: HF propagation, 10-57  
Doppler method: satellite tracking, 24-12, 24-15  
Doppler observations, 24-4  
Doppler radar frequency spectrum, 10-69  
Doppler ranging: satellite tracking, 24-12, 24-14  
Doppler shift, 25-4  
Doppler widths, 18-38, 18-39, 18-42  
Drift orbit, 5-5  
Drift time, 5-5, 5-7  
Drift velocity, 5-6, 5-7, 8-8  
Dynamic method: satellite tracking, 24-12  
Dynamic viscosity, 14-5  
Dynamics explorer (DE), 12-5, 17-30, 17-43, 17-54
- E-folding particle energy, 6-1  
E region, 9-1, 10-27, 10-28, 10-34, 10-36, 12-1, 12-2, 12-4, 12-25, 21-52–21-54, 21-57  
Earth  
  gravitational field, 24-12  
  magnetic field polarity, 23-5  
  potential field, 24-10  
Earth interior, 23-1  
  crust, 23-1  
  inner core, 23-2  
  mantle, 23-1  
  outer core, 23-2  
Earth motion, 23-21  
  horizontal, 23-21  
  measurements, 23-22  
  vertical, 23-21  
Earth tides, 23-21, 23-24, 23-25  
Earth-ionosphere duct, 10-34  
Earthlimb, 12-37  
Earthlimb experiment, 13-5, 13-6  
Earthquakes, 23-6, 23-7, 23-9, 23-11  
  fault plane solution, 23-14  
  hazard evaluation, 23-15, 23-16–23-18  
  intensity scale, 23-12  
  magnitude, 23-13  
  prediction, 23-18  
  rate of occurrence, 23-15  
  recurrence curves, 23-15  
  seismic hazard maps, 23-18  
  seismic moment, 23-13  
  strong ground motion, 23-15
- Earthshine, 13-1  
Eckman spiral, 17-1  
Eclipse charging, 7-4  
Eddy circulations, 4-16  
Eddy diffusion, 21-42  
Effective bandwidth, 25-4  
Effective brightness temperature, 25-7, 25-8  
Effective wavelength, 25-4  
Einstein A coefficient, 12-22, 12-26, 12-34, 13-1, 13-9  
Ekman spiral, 17-1  
Electric charge generation, 20-20  
Electric field  
  atmospheric, 20-1, 20-3, 20-4, 20-15, 20-17  
  auroral, 8-21, 8-22  
  convection, 5-10, 5-14  
  in earth's equatorial plane, 5-10  
  ionospheric, 8-12  
  magnetospheric, 8-8, 8-9, 8-10  
  parallel to magnetic field, 8-24  
  polar cap, 8-13, 8-14  
  thunderstorm, 20-21, 20-22, 20-24, 20-25, 20-28  
Electrical conductivity, 20-2–20-4, 20-12–20-15, 20-17  
Electrode effect, atmospheric, 20-6  
Electrodynamics, magnetospheric, 8-1  
Electrojet current, 12-1  
Electron density profile, ionospheric, 10-1, 10-4, 10-19, 10-39  
Electron density, ionospheric, 10-27, 10-33, 10-35, 10-37  
Electron flux, 7-2  
Electron pitch angle distribution, 5-37  
Electron precipitation, 10-34  
Electron temperature, 10-14  
Electron volt, 6-1  
Electron and ion temperatures, 10-1  
Electrosphere, 20-17  
Elevated antennas, 10-23, 10-29–10-33  
Elevation angle errors, 10-88  
ELF, 10-20, 10-22, 10-25–10-28, 10-34  
Elsasser band model, 18-44  
Energetic electrons, 7-5  
Energetic particles, 5-1  
Energy budget campaign, 13-4  
Energy cycles, earth/atmosphere system, 15-1, 15-3  
Energy diffusion equation, 5-13  
Energy level diagrams  
  atomic oxygen, 12-25  
  CO<sub>2</sub>, 12-34  
  N<sub>2</sub> and N<sub>2</sub><sup>+</sup>, 12-23  
  NO, 12-33, 12-34  
  O<sub>2</sub> and O<sub>2</sub><sup>+</sup>, 12-23  
Energy spectrum, 6-1  
Energy of a nucleon, 6-1  
Environmental Technical Applications Center (ETAC), 17-1, 20-33  
Ephemeris time, 24-16, 25-2  
Equatorial airglow, 10-18  
Equatorial anomaly, 9-8, 10-51, 10-58, 10-94  
Equatorial bubbles, 10-58, 10-60, 10-75  
Equatorial electrojet, 4-12, 4-20, 9-4, 9-6  
Equatorial Es, 9-7  
Equatorial pitch angle, 5-13, 5-29, 5-42  
Equatorial spread F, 9-9  
Equatorially mirroring particles, 5-4, 5-9, 5-15, 5-22  
Ethane (C<sub>2</sub>H<sub>6</sub>), 21-23  
EXCEDE program, 12-21, 12-22, 12-27, 12-31  
Exchange layer, 20-1, 20-5, 20-11, 20-13  
Excitation factor, 10-26, 10-30, 10-31, 10-33  
Exosphere, 14-7

- Exospheric temperature, 14-27, 14-38  
 Explorer 8, 7-2, 7-3  
 Explorer 31, 7-15, 7-22  
 Explorer 45, 5-24, 8-11  
 External field models, 4-27  
 Extinction coefficient, 16-49  
 Extragalactic distances, 25-5  
 Extraterrestrial ring current, 5-42, 5-43, 5-45
- F region, 9-1, 10-34, 10-36, 10-37, 12-1, 12-3, 12-4, 21-52, 21-53  
 F region trough, 10-57, 12-3  
 Fabry-Perot interferometer, 10-18  
 Fades, ELF, 10-28  
 Faraday cup, 10-17  
 Faraday maximum height, 10-95  
 Faraday rotation, 10-16, 10-84  
 FASCODE, 18-1, 18-37-18-39, 18-42-18-44  
 Fast mode MHD waves, 3-4, 3-13  
 Fast neutron flux, 6-15  
 Feldstein-Starkov belt model, 10-63  
 Field aligned currents, 4-20, 4-23, 8-12, 8-19  
 Flare continuum, 11-3  
 Fleetsat geostationary satellite, 10-74  
 Fluorocarbon 1 ( $\text{CCl}_3\text{F}$ ), 21-17, 21-19, 21-20  
 Fluorocarbon 12 ( $\text{CF}_2\text{Cl}_2$ ), 21-16, 21-18, 21-19  
 Flux limit—radiation belt, 5-21  
 Focusing of ELF modes, 10-26, 10-28, 10-29  
 Fog, 16-46, 18-25, 18-27, 18-29-18-33  
 Fog droplets, 18-25, 18-27-18-29  
 Forbush decrease, 6-8, 20-16, 20-17  
 Forecasting HF conditions, 10-60, 10-61  
 FOT, 10-39  
 Fountain effect, 9-8  
 Frequency management, 10-61  
 Frequency spreading, 10-58  
 Fresnel filter function, 10-74  
 Fresnel formulas, zones, 10-23, 10-25, 10-28  
 Frost point, 16-1
- Galactic cosmic rays, 6-3  
 Galactic rotation, 25-5  
 Galaxies  
     ellipticals, 25-18, 25-19  
     Seyfert, 25-19  
     spiral, 25-18  
 Gaussian spectra, 12-14, 12-15  
 General atmospheric circulation theory, 16-6  
 Geocentric solar-ecliptic coordinate system, 4-3  
 Geocentric solar-magnetospheric coordinate system, 4-3  
 Geodesy, 24-1  
     geometric, 24-1  
     physical, 24-1  
 Geodetic azimuth, 23-24, 24-3  
 Geodetic coordinates, 4-3  
 Geodetic latitude, 24-1  
 Geodetic longitude, 24-1  
 Geodetic reference system 1980, 24-8  
 Geographic coordinate system, 4-2  
 Geoid, 24-1, 24-6, 24-8, 24-9, 24-15  
 Geoid undulation, 24-2, 24-3, 24-8, 24-11, 24-14  
 Geokinetics, 23-1  
 Geomagnetic activity, 7-10  
 Geomagnetic bay, 4-23  
 Geomagnetic disturbance, 4-8  
 Geomagnetic field, 4-1, 10-26, 10-29, 10-33, 10-35-10-38  
     coordinate systems, 4-2, 4-3  
     dipole strength, 4-16, 4-19  
     disturbed variation field, 4-7  
     equatorial surface field, 4-7  
     GSFC 9/80 model, 4-13  
     L variation field, 4-7  
     lunar daily variation, 4-20  
     magnetic declination, 4-1  
     magnetic elements, 4-2, 4-13  
     main field, 4-5, 4-13  
     observatories, 4-12  
     quiet variation fields, 4-7, 4-19  
     regional anomalies, 4-17  
     secular variation, 4-1, 4-5, 4-16  
     self-exciting dynamo system, 4-13  
     solar quiet (sq) variation field, 4-7, 4-19  
     sources of, 4-5  
     steady field, 4-5, 4-13  
     transient variations, 4-1  
     variation field, 4-5  
     vector, 4-2  
 Geomagnetic indices, 10-28  
 Geomagnetic pulsations, 4-8, 4-23  
 Geomagnetic storm, 1-20, 3-17, 3-22, 3-23, 4-21, 5-11, 5-26, 5-28, 5-31, 5-32, 5-45, 10-28, 10-34, 10-59, 10-80, 17-31  
     geomagnetic bay, 4-23  
     initial phase, 4-21, 4-22  
     main phase, 4-22  
     recovery phase, 4-22  
     ring current plasma, 4-22  
     solar wind discontinuities, 4-22  
     sudden commencement, 4-21, 4-22  
     sudden impulse, 4-22, 4-23  
 Geomagnetic substorm, 3-31, 4-21, 4-22  
 Geomagnetic tail, 4-6  
 Geometric method, 24-12  
 Geopotential altitude, 14-7  
 GEOS 1 (ESA), 4-12, 7-29  
 GEOS 2 (ESA), 4-13, 7-29  
 GEOS 3 (NASA), 24-9, 24-14  
 GEOSAT, 24-15  
 Geosynchronous charged particle environment, 5-38- 5-41  
 Geosynchronous environment, 7-9, 7-10  
 Giant stars, 25-10, 25-19  
 Global datum (WGS72), 24-5  
 Global mean energy cycles, 15-3  
 Global warming, 15-2  
 GOES 1, 2, 3, 4-13  
 Goddard earth model 9, 24-10  
 Goody band model, 18-44  
 GPS satellite, 10-78, 10-85, 24-13, 24-14  
 Gradient drift, 5-7  
 Gradiometer, air-borne, 24-12  
 Gradiometry, 24-12  
 Graupel (hail), 16-16  
 Gravimeter surveys, 23-22  
 Gravimetric deflection of the vertical, 24-8, 24-10  
 Gravimetry, 24-11  
 Gravitational constant, 24-8  
 Gravity anomaly, 24-8, 24-9, 24-10  
 Gravity disturbance, 24-8  
 Gravity field, 24-7, 24-8, 24-12-24-14  
 Gravity formula, 24-8

# INDEX

- Gravity measurements, 24-11  
absolute, 24-11  
relative, 24-11, 24-12  
Gravity waves, 14-38, 17-45, 17-47  
Great plains turbulence field program, 17-2  
Green flash, 18-65  
Greenland, 10-33  
Ground albedo, 18-62  
Ground level events, 1-20  
Groundwater, 23-31  
Groundwave, 10-22-10-24, 10-25, 10-34-10-36  
Group delay, 10-84  
Gumbel distribution, 15-10  
Gyro (cyclotron) radius, 5-4, 5-6  
Gyrofrequency, 5-19, 10-3, 10-29  
Gyro (cyclotron) resonance, 5-18  
Gyrocompass, 23-37  
Gyroperiod, 5-4  
Gyrosopes, 24-7  
Gyrosynchrotron radiation, 11-2
- Hail, 16-16  
Hailstorm duration, 16-16  
Hailstorm frequency, 16-17  
Hall conductivity, 20-20  
Hall current, 4-20, 4-24, 8-13, 9-6  
Hamilton-Jacobi action variable, 5-3  
Harang discontinuity, 8-13, 8-20  
Heat conduction equation, 25-6  
Heavy ion effects on microcircuitry, 5-49  
Heavy ion fluxes, 5-28, 5-30, 5-31  
Heavy ions, 5-24, 5-31  
Height of reflection, 10-35  
Height-gain factors, 10-23, 10-30, 10-31  
Helium ions, 5-16, 5-17, 5-24, 5-26, 5-30, 5-31  
Herzberg bands, 22-2  
Herzberg continuum, 22-4  
Herzsprung-Russel diagram, 25-13  
Heterosphere, 21-51  
HF  
    backscatter radar, 10-65, 10-66  
    conditions, forecasting, 10-60, 10-62  
    communication, 10-1  
    propagation, 10-1, 10-45  
    propagation, Boulder Workshop, 10-62  
    propagation, diversity techniques, 10-57  
    radars, 10-1, 10-6  
    radiation, 21-52  
High altitude nuclear bursts, 10-28, 10-34  
High energy protons, 10-57  
HIRIS experiment, 12-32, 12-36  
Horizontal wind shear, 17-14  
Hubble constant, 25-5  
Humidity extremes, 16-3  
Humidity, diurnal cycles, 16-3  
Hurricanes, 17-27  
Hydrogen ( $H_2$ ) 21-21, 21-22, 21-47, 21-48  
Hydrogen 21 cm emission, 25-17  
Hydrogen chloride (HCl), 21-39, 21-40  
Hydrogen fluoride (HF), 21-40, 21-41  
Hydrogen lyman- $\alpha$ , 2-14, 2-16, 2-19, 2-20, 12-28, 20-18, 20-20, 21-46, 21-52, 22-2, 22-4  
Hydromagnetic waves, 4-22, 4-23  
Hydronium ions, 21-54  
Hydroperoxy (HO<sub>2</sub>), 21-38, 21-39  
Hydrostatic equation, 14-2  
Hydroxyl (OH), 21-37, 21-38
- Ice  
    accretion, 16-20, 16-21  
    particles, 18-27, 18-28, 18-29  
    pellets, 16-16  
    storms, 16-21  
ICECAP experiment, 12-34, 12-36  
IMP 2, 7-5  
Impedance, 10-23, 10-25, 10-26  
Incoherent rupture, 23-6  
Incoherent scatter, 10-1, 10-14  
Inelastic collisions, 12-22  
Inert gases, 21-50  
Inertial instrument error sources, 23-39  
Inertial navigation, 24-10, 24-12  
Inertial positioning, 24-7  
Infrared airglow, 13-1  
Infrared radiance, 13-1  
Infrared radiators, 13-10  
    CO<sub>2</sub>, 13-10  
    H<sub>2</sub>O, 13-12  
    NO, 13-12  
    O<sub>3</sub>, 13-12  
    OH, 13-13  
Infrared sources, AFGL astronomical, 25-17  
    GL 2688, 25-17  
    GL 618, 25-17  
    GL 915, 25-17  
Infrared spectrophotometry, 25-16, 25-17, 25-18  
Initial phase, geomagnetic storm, 4-21, 4-22  
INJUN 5, 7-3, 8-13  
Insolation, solar, 15-1, 15-11  
Institute of Telecommunication Sciences (ESSA), 10-39  
Integral equation, 10-25  
Interference, 10-22, 10-28, 10-29, 10-32, 10-34-10-36  
Interior cusp, 8-5  
International Association of Geomagnetism and Aeronomy (IAGA), 4-33  
International Atomic Time, 24-16  
International Auroral Atlas, 12-25  
International Brightness Coefficient, 12-16, 12-25  
International Bureau of Standards, 24-16  
International Civil Aviation Organization (ICAO), 14-1  
International Council of Scientific Unions (ICSU), 4-33  
International Geomagnetic Reference Field, 4-25, 4-27  
International gravity standardization network, 24-12  
International latitude service, 24-15, 24-16  
International Magnetospheric Study (IMS), 4-12  
International Polar Motion Service, 24-15  
International Reference Ionosphere, 10-56  
International Time, 25-2  
International Union of Geodsy and Geophysics (IUGG), 4-33  
International Ursigram and World Data Service, 10-59  
Interplanetary Magnetic Field (IMF), 1-21, 3-22, 3-23, 3-24  
Interplanetary medium, 6-25  
Interstellar absorption, 25-17  
Interstellar gas, 25-17  
Interstellar reddening, 25-18  
Inversion of VLF/LF data, 10-35, 15-5  
Inverted-V events, 8-19, 8-23, 8-24, 9-5  
Ion beams, 8-24  
Ion chemistry, 20-9, 20-10, 20-18  
Ion composition, 5-44  
Ion temperature, 10-15  
Ion-pair production rate, 20-16  
Ionization profile with ionized layers, 9-1  
Ionogram, 10-1, 10-2, 10-7, 10-8  
Ionosonde, 10-1, 10-5, 10-6

- Ionosonde network, 10-1, 10-13  
 Ionosounding, 10-35  
 Ionosphere, 9-1, 5-8, 5-9, 21-51  
     artificial modification of, 10-96  
     bubbles, 9-9, 10-58, 10-60, 10-75  
     chemistry of, 9-3  
     electric fields, 8-12–8-15, 8-18, 8-19, 8-24  
     heating experiments, 10-98  
     irregularities, 10-58, 10-63, 10-71, 10-74, 10-75, 10-77, 10-81, 10-98  
     irregularities type I, 9-7  
     irregularities type II, 9-7  
     minor constituents, 9-2  
     modification, 10-96  
     production of, 9-2  
     refractive index, 10-87  
     scintillation, 10-71, 10-72, 10-74, 10-75, 10-77, 10-78, 10-99  
     structure of, 9-1  
 Ionospheric absorption, 10-36  
 Ionospheric clutter, 10-63, 10-71  
 Ionospheric convection, 8-3  
 Ionospheric currents, 4-7, 4-8, 9-4  
 Ionospheric dispersion, 10-88  
 Ionospheric hole, 10-96  
 Ionospheric index, 10-48, 10-50, 10-55, 10-61, 12-1, 12-3, 12-4  
 Ionospheric layers  
     D layer, 9-1, 10-3, 10-39, 10-51, 12-1, 12-2, 12-4  
     E layer, 9-1, 10-1, 10-39, 10-50, 10-63, 10-70  
     F1 layer, 9-1, 10-50, 12-1, 12-3, 12-4  
     F2 layer, 10-1, 10-39, 10-50, 10-60, 10-75  
 Ionospheric models, 10-46, 10-47, 10-56, 10-57  
     AFGWC 4-D, 10-43, 10-90  
     Bent, 10-40, 10-45, 10-90  
     Bradley, 10-42  
     IONCAP, 10-41, 10-42, 10-45  
     IRI-79, 10-43, 10-45  
     ITS-78, 10-39, 10-42, 10-45, 10-89  
 Ionospheric parameters, 10-41  
 Ionospheric parameters contour maps, 10-55  
 Ionospheric range delay, 10-96  
 Ionospheric resonance, 10-11  
 Ionospheric scaling factor, 10-84  
 Ionospheric sounders, 10-1, 10-14  
 Ionospheric substorms, 10-34  
 Ionospheric time delay, 10-96  
 Ionospheric trough, 10-51, 10-79  
 IRAS, 12-38  
 Irradiance approximations, 18-57, 18-58  
 Irregularity patches, 10-75, 10-76, 10-77  
 Island arcs, 23-5  
 Isostatic equilibrium, 23-1  
  
 Jacchia model (1977), 14-26  
 Jet streams, 17-27, 17-28  
 Josephson junctions, 4-11  
  
 Kelvin-Helmholtz instability, 4-23, 4-24  
 Keplerian orbit, 24-12  
 Kinematic viscosity, 14-5  
 Kirchhoff's law, 18-61  
 Koschmieder theory, 18-64  
 Kp index, 4-28, 4-30, 5-26, 7-5, 8-20, 8-22, 8-23, 10-60, 14-36, 17-30, 17-35, 17-44, 17-54  
 Kursk anomaly, 4-16  
  
 L-field, 4-20  
 LAGEOS, 24-14  
 Lambert-Beers law, 18-5  
 Landau resonance, 5-19, 5-20  
 Langmuir probe, 7-1, 7-10, 7-18, 10-17  
 Laplace azimuths, 24-4  
 Larmor frequency, 4-9  
 Lateral reflection, ELF waves, 10-28  
 Lethal dosage, radiation, 5-50  
 Leveling networks, 24-6  
 LF-VLF radiation, 21-52  
 Lidar, 16-34, 21-48  
 Light ion trough, 9-4  
 Light ray bending, 18-65–18-67  
 Lightening, 10-37  
     discharges, 20-6, 20-26  
     induced radio burst noise, 20-32  
     parameters, 20-26, 20-27  
     VLF and ELF signals, 20-27  
 Line intensity, 18-5  
 Linearized space charge, 7-17  
 Liouville's theorem, 5-45, 7-18, 7-22  
 Lithosphere, 23-2, 23-3  
 Local thermodynamic equilibrium, 13-3  
 Long waves (below 3000 KHz), 10-20, 10-22–10-24, 10-37  
 Loran-C, 10-22  
 Lorentz force, 5-3  
 Lorentz line shape, 18-4  
 Loss cone, 5-2  
 Loss cone angle, 5-2  
 Loss cone electrons, 12-12  
 Love waves, 23-9, 23-10  
 Low latitude boundary layer, 8-5  
 Low level jet streams, 17-5  
 LOWTRAN, 18-1, 18-44, 18-46–18-53, 18-58  
 LUF, 10-39, 10-51  
 Luminosity function, 25-19  
 Lunar albedo, 25-7  
 Luxemburg effect, 10-37  
 Lyman-Birge Hopfield Bands, 22-2  
 Lyman- $\alpha$  radiation, 2-14, 2-16, 2-19, 2-20, 12-28, 20-18, 20-20, 21-46, 21-52, 22-2, 22-4  
  
 Magnetic dip equator, 4-20  
 Magnetic dipole, 5-1  
 Magnetic index, 10-79  
 Magnetic merging, 3-24, 8-24  
 Magnetic mirroring, 8-7  
 Magnetic moment (relativistic-non relativistic), 5-4  
 Magnetic Q index, 12-2, 12-6  
 Magnetic reconnection, 3-24  
 Magnetic rigidity, 6-2  
 Magnetic storm, 4-8  
 Magnetic-ionic splitting, 10-4  
 Magnetoacoustic waves, 3-13–3-16, 3-29  
 Magnetohydrodynamic waves, 3-4, 3-13  
 Magnetometers, 4-9  
     alkali-vapor, 4-9  
     fluxgate, 4-8, 4-10  
     helium, 4-8, 4-9  
     induction-coil, 4-8  
     proton precession, 4-8, 4-9  
     proton vector, 4-9  
     rubidium vapor, 4-8  
     SQUID, 4-8, 4-11, 4-12  
     searchcoil, 4-8

# INDEX

- Magnetopause, 4-6, 4-22, 8-1, 8-2, 8-3, 8-20  
Magnetopause current, 4-7  
Magnetosheath, 3-1, 3-24, 4-6, 8-1, 12-1, 12-2  
  density, 3-24  
  electric fields, 3-27  
  field fluctuations, 3-29  
  magnetoacoustic modes, 3-29  
  plasma clouds, 3-29  
  power spectra, 3-27  
  rotational wave modes, 3-29  
  stagnation point, 3-24  
Magnetosphere, 5-1  
  convection, 8-3, 8-5, 8-11, 17-35, 17-41–17-43, 17-47  
  coordinate systems, 8-2  
  coupling to ionosphere, 8-11, 8-12  
  dimensions, 8-1  
  electric fields, 8-8–8-10  
  potential distribution, 8-8–8-10, 8-20–8-22  
  substorms, 8-25  
  storms, 4-8  
Magnetosphere-ionosphere coupling theory, 8-1, 8-11  
Magnetotail, 5-8, 5-9, 5-40, 8-3, 8-6, 8-9, 8-16  
Main phase, magnetic storm, 4-22  
Mantle aurora, 12-2, 12-6  
Mantle plumes, 23-5  
Marisat satellite, 10-74, 10-78  
Mars albedo, 25-8  
Maunder minimum, 1-14, 3-24  
Maxwellian spectra, 12-13, 12-14  
McIlwain L-shell parameter, 4-23, 5-33, 5-37  
Mead and Beard model, 8-3  
Mean CIRA (25-500 km), 14-28–14-32  
Mean collision frequency, 14-3  
Mean free path, 14-4  
Mean Greenwich Meridian, 24-16  
Mean molecular weight, 14-4, 14-29, 14-31, 14-38  
Mean particle speed, 14-3  
Mean sea level, 24-1, 24-6  
Mean solar time, 25-2  
MF, 10-20–10-22, 10-28, 10-36, 10-37  
Meridional wind, 17-7, 17-10, 17-29, 17-32–17-34, 17-39, 17-45  
Mesopause, 14-7  
Mesosphere, 13-8, 13-9, 14-7, 21-9, 21-41  
  warm/cold atmospheric models, 14-23  
  water vapor, 16-6  
Meteoric debris, 21-47  
Meteoric dust, 18-10, 18-15  
Meteoric ions, 21-54  
Meteorological rocket network, 17-7  
Methane ( $\text{CH}_4$ ), 21-22  
Methylchloride ( $\text{CH}_3\text{Cl}$ ), 21-16, 21-20  
Micropulsations, 4-23, 5-11  
Microseisms, 23-19  
Microwave burst, 11-4  
Middle atmosphere, 20-17, 20-18, 20-20  
Mic scattering, 18-15  
Mic theory, 18-15, 18-30  
Millington, 10-25  
Mirages, 18-65  
Mirror equation, 5-5  
Mirror points, 5-2, 5-5  
Mixing ratio, 16-1  
Models, ionospheric, 10-22–10-25, 10-29, 10-30  
  flat earth model, 10-22  
  numerical models, 10-33  
  spherical earth model, 10-24  
Modulation transfer function, 18-60  
Mohorovicic discontinuity, 23-1, 23-3  
Molecular absorption, 18-4, 22-5  
Molecular nitrogen, 22-3, 22-4  
Molecular oxygen, 22-3, 22-4  
Molecular temperature, 14-28, 14-30  
Moving type IV bursts, 11-3  
MUF, 10-39, 10-41, 10-42, 10-52, 10-53, 10-60  
Multi-hop circuit, 10-53  
Multipath fading, 10-57  
Multipath interference, 10-54  
Multipath propagation, 10-57  
Multiple scattering, 18-53, 18-54  
  
N( $^2\text{D}$ ), 12-32, 12-33  
 $\text{N}_2$  First Positive Band, 12-30, 12-33  
 $\text{N}_2$  IR Afterglow, 12-31  
 $\text{N}_2$  Second Positive Band, 12-29  
 $\text{N}_2$ Vegard-Kaplan Band, 12-29  
 $\text{N}_2$ Wu-Benesch Bands, 12-31  
 $\text{N}_2^+$  First Negative Band, 12-19, 12-30, 12-37  
 $\text{N}_2^+$  Meinel Bands 12-30–12-33  
NASA Atmospheric Explorer (AE-E), 2-19  
NASA Charging Analysis Program (NASCAP), 7-26, 7-27, 7-28, 7-30  
NASA Model AP-8, 5-27  
NASA OSO 3, 2-15, 2-20  
NASA OSO 4, 2-20  
NASA POGO, 4-26  
NAVSTAR - Global Positioning System (GPS), 10-85, 24-13  
National Center for Atmospheric Research (NCAR), 17-30  
National Geodetic Vertical Datum, 24-6  
National Geophysical Data Center, 4-12  
National Horizontal Control Network, 24-3  
National Solar Observatory at Kitt Peak, 1-13  
National Solar Observatory at Sacramento Peak, 1-11  
National Space Science Data Center, 5-27  
Negative ions, 9-3, 21-51, 21-56, 21-57  
Nephanalysis, 16-32  
Neutral minor constituents, 21-41  
Neutral sheet, 4-6, 4-27  
Neutral winds, 9-4  
Neutron differential energy spectrum, 6-15  
Neutron flux, 5-8, 6-18  
Neutron monitor, 6-7–6-9, 6-20, 6-21  
Nimbus 3, 18-50, 18-53  
Nimbus 4, 18-51  
Nitric acid ( $\text{HNO}_3$ ), 21-35, 21-36, 21-37  
Nitric oxide ( $\text{NO}$ ), 21-26, 21-31, 21-50, 21-54  
Nitric oxide bands, 22-2  
Nitrogen  
  (atomic), 21-50  
  dioxide ( $\text{NO}_2$ ), 21-30–21-35, 21-50  
  pentoxide ( $\text{N}_2\text{O}_5$ ), 21-37  
  trioxide ( $\text{NO}_3$ ), 21-35, 21-37  
Nitrous oxide ( $\text{N}_2\text{O}$ ), 21-15, 21-16, 21-17, 21-18  
NNSS—Navy navigation satellite system, 10-86, 24-13  
NO, 12-31–12-36  
NO 2.3  $\mu\text{m}$  emission, 12-22, 12-24, 12-31–12-36  
NO 2.7  $\mu\text{m}$  emission, 12-22, 12-24, 12-32–12-36  
NO 5.3  $\mu\text{m}$  emission, 12-22, 12-24, 12-31–12-36  
NO radiation, 13-12  
 $\text{NO}^+$ , 12-33, 12-35, 12-37  
 $\text{NO}^+$  4.3  $\mu\text{m}$  emission, 12-35, 12-37

NOAA, 21-16  
 Noctilucent clouds, 21-50  
 Non-linear radio wave propagation, 10-37  
 Normal gravity, 24-7, 24-8  
 Nuclear detonations, 5-50  
     effects on radiation belts, 5-50  
 Nyquist condition, 18-38

$O_2$  (a) state, 12-32  
 $O_2$  atmospheric bands, 12-31, 12-32  
 $O_2^+$  first negative band, 12-31  
 $O_3$  9.6  $\mu\text{m}$  emission, 12-32, 12-35  
 Obliquity factor, 10-52  
 Ocean loading, 23-27  
 Odd halogens, 21-15, 21-38  
 Odd hydrogen, 21-15, 21-37  
 Odd nitrogen, 21-15, 21-26  
 Odd oxygen, 21-15, 21-25  
 Offset pole, 12-6, 12-10, 12-12  
 OGO 1, 5-32, 5-33, 7-3, 7-5  
 OGO 3, 5-32, 5-33, 7-3  
 OGO 4, 5-33  
 OGO 5, 4-12, 5-23, 5-33, 5-36, 7-3  
 OGO 6, 4-12, 8-13, 8-14  
 Olson-Pfizer models, 4-27  
 Onset time, 6-26  
 Ophiolites, 23-4  
 Optical air mass, 18-68–18-70  
 Optical depth, 18-37  
 Optical pumping, 4-9  
 Optical refractive modulus, 19-1  
 Optical thickness, 18-5  
 Optical turbulence, 18-65, 18-69, 18-71  
 Optical turbulence effects, 18-71  
     beam spreading, 18-71  
     beam steering, 18-71  
     image dancing, 18-71  
     scintillations, 18-71  
     spatial coherence degradation, 18-71  
 Optimum working frequencies (OWF), 10-59  
 Orthometric correction, 24-6  
 Orthometric height, 24-6  
 Outer radiation zone boundary conditions, 5-10  
 OV1-13, 5-33  
 OV1-19, 5-33, 5-35  
 OV3-3, 5-33  
 Oxygen ions, 5-17, 5-25, 5-26  
 Ozone, 21-1, 2-1, 18-71, 20-18  
     absorption, 22-3, 22-4  
     absorption coefficient, 18-47  
     annual cycle, 21-11  
     anthropogenic modification of distribution, 21-3, 21-9  
     catalytic reactions, 21-3  
     Chapman reactions, 21-3, 21-9  
     chemical detectors, 21-6  
     data sources for, 21-7  
     density profiles, 18-3  
     diurnal modulation, 21-3  
     longitudinal distribution, 21-11  
     measurement, 21-5, 21-45  
     meridional cross section, 21-11  
     mixing ratio, 21-10, 21-11  
     models, 21-13, 21-45  
     photochemical reactions in the stratosphere, 21-2  
     photolysis, 21-6

Ozone (*Continued*)  
     poleward transport of, 21-4  
     production of, 21-2, 21-44  
     quasibiennial oscillation, 21-11  
     satellite instrumentation, 21-6  
     semiannual oscillation, 21-11  
     spectrum, 13-8  
     total, 21-8, 21-9, 21-13  
     transition zone, 21-4  
     units of measurement, 21-2  
     variability, 21-12  
     vertical cross-section of concentration, 21-4  
     vertical distribution, 21-9

Paleomagnetism, 4-17  
 Palmdale bulge, 23-22  
 Pangaea, 23-5  
 Parsec, 25-4  
 Particle  
     densities in plasma sheet, 8-1  
     drift motion, 5-5  
     gyroradius, 5-2, 5-6  
     motion in dipole field, 5-3  
     pitch angle, 5-5  
     pushing codes, 7-25, 7-26, 8-7, 8-18, 8-23  
     reflection of long waves, 10-37  
 Particle-wave interaction, 5-18, 5-19  
 Pc pulsations, 4-23  
 Pedersen conductivity, 9-6, 20-20  
 Pedersen current, 4-24, 8-13, 8-20  
 Perfect gas law, 14-2  
 Peroxynitric acid ( $\text{HO}_2\text{NO}_2$ ), 21-37  
 Pfotzer maximum, 6-12  
 Phase fluctuation, 19-9  
 Phase refractive index, 19-1, 19-10  
 Phase scintillation, 10-86, 10-87  
 Phase scintillation index, 10-73  
 Phase velocity, 10-30, 10-35, 19-1  
 Photo cross section  
     atomic oxygen, 22-3  
     molecular nitrogen, 22-3  
     molecular oxygen, 22-3  
     ozone, 22-3  
 Photodissociation, 13-2, 13-3, 21-2, 22-4  
     processes, 22-7  
     rates, 22-5–22-7  
 Photoelectron current, 7-12, 7-19  
 Photoelectron flux, 7-5, 7-10, 7-13, 7-20  
 Photoemission, 7-2, 7-26  
 Photoionization, 9-2, 21-2, 22-4  
 Photoionization cross section, 22-2  
 Photometers, 10-18  
 Pi pulsations, 4-24  
 Pi2 pulsations, 4-25  
 Pilot tone sounding, 10-62  
 Pinhole effect, 7-16, 7-29  
 Pitch angle diffusion, 5-13, 5-22, 8-10  
 Pitch angle diffusion coefficient, 5-20  
 Pitch angle diffusion flux, 5-18  
 Pitch angle scattering, 5-18, 5-19, 5-44  
 Plasma bubbles, 9-10, 10-58, 10-60, 10-75  
 Plasma frequency, 10-3, 10-37  
 Plasma mantle, 8-5  
 Plasma radiation, 11-2

# INDEX

- Plasma sheet, 5-9, 8-6–8-11, 12-1–12-3, 12-12  
Plasma sheet boundary layer, 8-5  
Plasma sheet electrons, 8-10  
Plasma wake, 7-15  
Plasma waves, 5-18  
Plasmapause, 5-14, 8-1, 9-2, 10-79  
Plasmasphere, 5-8, 5-14, 5-20, 9-2  
Plasmaspheric hiss, 5-19  
Plate boundaries, 23-3, 23-11, 23-21  
Plate boundary types, 23-4  
Plate tectonics, 23-2  
Plumes, 9-10  
Point positioning, 24-12, 24-13  
Poisson's equation, 7-2, 7-16, 7-17, 7-24, 7-27  
Polar cap, 8-13, 10-20, 10-82, 12-3  
absorption, 1-20, 4-7, 6-27, 10-28, 10-34, 10-63, 20-9,  
21-52  
auroral arcs, 8-17  
convection patterns, 8-13, 8-14  
electric fields, 8-13  
ionosphere, 9-5, 10-57  
potential, 8-22  
precipitation, 8-16  
TEC, 10-94  
Polar cap absorption (PCA), 1-20, 4-7, 6-27, 10-28, 10-34,  
10-63, 20-9, 21-52  
Polar flattening, 24-1  
Polar ionosphere, 8-16  
Polar motion: conventional international origin, 24-12, 24-16,  
24-18  
Polar rain, 8-17, 9-5  
Polar scintillations, 10-81  
Polar showers, 8-16  
Polar squalls, 8-16  
Polar wander, 24-15, 24-17  
Polar wind, 5-8  
Polarization conversion, 10-29, 10-34  
Polarization rotation, 10-87  
Poloidal-Toroidal-Mode waves, 4-23  
Positive ion chemistry, 20-8  
Positive ion concentration, 21-51, 21-53–21-56  
Post-burst event, 11-3  
Potential equation, 20-4  
Potential gradient, 20-16  
Power flux density, 11-1  
Precipitable water, 16-1  
Precipitating electrons, 10-28  
Precipitating particles, 10-20, 12-1, 12-9, 12-20  
Pressure scale heights, 14-28, 14-29, 14-30  
Pressure tensor, 8-2  
Pressure, atmospheric, 14-1, 14-3, 15-39  
diurnal/semidiurnal variations, 15-51  
high altitude, 14-28–14-30, 14-32, 14-35  
latitudinal variations, 14-8, 14-17–14-20, 15-47  
longitudinal variations, 14-23  
sea level, 15-46  
seasonal variations, 14-8, 14-17–14-20, 15-47  
warm and cold winter stratosphere/mesosphere, 14-24  
Primary standard stars, 25-3  
Principle of reciprocity, 10-24, 10-25  
Probe theory, 7-22, 7-25  
Project BIME, 10-97  
Project COLOURED BUBBLES, 10-97  
Project FIREFLY, 10-96  
Project LAGOPEDO, 10-97  
Project WATERHOLE, 10-97  
Propagation modes, 10-59  
Propane ( $C_3H_8$ ), 21-23, 21-24  
Proton aurora, 12-15  
Proton flux contours, 5-29  
Proton gyromagnetic ratio, 4-9  
Pyrolite, 23-2  
Q index, 4-31  
Quiet solar wind, 4-21  
Quiet sun flux density, 11-2, 11-4, 11-6  
Rad, 5-47, 6-1, 6-2  
Radar altimetry, 24-14  
Radar  
auroral data, 10-65, 10-70  
cross section of ionospheric clutter, 10-67, 10-68  
equation, 10-64  
reflectivity, 19-11  
weather, 16-34  
Radial diffusion, 5-10, 5-12, 5-22–5-24  
Radial diffusion coefficient, 5-13  
Radial diffusion equation, 5-25  
Radiation dose, 6-1  
Radiation belts, 5-1, 10-28, 12-1  
boundary, 5-2  
electron models, 5-31, 5-36, 5-39  
electron speed, 5-2  
electrons, 5-2, 5-22, 5-31, 5-34  
ion fluxes, 5-26  
proton models, 5-27, 5-28, 5-30  
Radiation exposure effects, 5-47  
Radiative fog, 18-29, 18-48  
Radiative transfer equation, 18-53–18-55, 18-56, 18-57, 18-58  
Radio interferometry, 24-14  
Radio wave  
doppler shift, 10-84, 10-86  
effects on radiation belts, 5-51  
propagation, 10-1  
refractive modulus, 19-2  
Rain drops, 18-28, 18-29  
Rain rate, 18-29  
Rainfall, 16-8, 19-13  
clock-hour rates, 16-8  
duration, 16-15  
extreme intensities, 16-14  
instantaneous rate, 16-9  
Raman scattering, 13-3  
Range rate errors, 10-86  
Range spreading, 10-58  
Ray tracing, 10-56  
Rayleigh fading, 10-73  
Rayleigh phase function, 18-9, 18-54  
Rayleigh scattering, 18-7, 18-8  
Rayleigh Taylor instability, 9-10  
Rayleigh waves, 23-9, 23-10  
Rayleigh-Jeans approximation, 11-1  
Reaction rates, 9-3  
Real-time channel evaluation, 10-61, 10-62  
Recombination rates, 9-2, 21-52  
Recombination reactions, 9-3  
Recovery phase, 4-22  
Reference atmospheres  
Air Force Reference Atmosphere (0-90 km), 14-7  
CIRA 1972 (Cospar International Reference Atmosphere)  
(25-2000 km), 14-26  
U. S. Standard Atmosphere Supplements 1966, (0-1000 km),  
14-26, 14-27

# INDEX

- Reference ellipsoid, 24-1, 24-3, 24-8, 24-10, 24-14  
 Reflection coefficients, 10-35  
 Refractive index, 10-3, 19-1  
 Refractive modulus, 18-7, 18-65  
 Refractive modulus profiles, 19-2, 19-4, 19-5  
 Refractivity structure, 19-2  
 Relative humidity, 16-1  
 Relativistic factor, 5-4  
 Rem, 6-1, 6-2  
 Remanent magnetism, 4-17  
 Residue series solution, 10-24  
 Rest mass energy, 6-1  
     electron, 6-1  
     neutron, 6-1  
     proton, 6-1  
 Revised Uniform Summaries of Surface Weather Observations (RUSSWO), 16-27, 17-21  
 Reversely Magnetized Rocks, 4-19  
 Riming, 18-28, 18-34, 18-35  
 Ring current, 4-7, 4-8, 4-22, 4-27, 5-8, 5-27, 8-2, 8-6, 8-9, 8-16, 9-4  
     extraterrestrial, 5-42, 5-43, 5-45  
     plasma, 4-22  
     storm index Dst, 4-31, 5-26  
 Ring laser gyroscope, 23-38  
 Riometer absorption, 6-20, 6-21  
 Rotational transitions, 13-1  
 Rotational wave modes, 3-29  
 RUSSWO (Revised Uniform Summaries of Surface Weather Observations), 16-27, 17-21
- S3-2, 8-13, 8-14, 8-17, 8-20  
 S3-3, 8-13, 8-14, 8-23, 8-24  
 $S_4$  index, 10-72  
 San Andreas fault, 23-4  
 Satellite laser ranging, 23-23, 24-14  
 Satellite operations anomalies, 7-7, 7-9  
 Satellite potential, 7-2, 7-11, 7-12, 7-21  
 Satellite sheath, 7-17, 7-22, 7-25, 7-27, 7-29  
 Satellite tracking  
     doppler ranging, 24-12, 24-15  
     dynamic method, 24-12  
     geometric method, 24-12  
     Keplerian orbit, 24-12  
     point positioning, 24-12, 24-13  
     short arc method, 24-12, 24-13  
 Satellite to satellite tracking, 24-13  
 Satellite to space potential, 7-1, 7-19, 7-28, 7-29  
 Satellite-borne altimeter, 24-9  
 Satellite-borne gradiometer, 24-12  
 Satellites  
     AE-C, 4-12, 8-13  
     AE-D, 8-13, 8-23  
     AE-E, 2-19  
     AF 72-1, 5-29  
     ATS 5, 4-13, 7-4, 7-5, 7-7, 7-29  
     ATS 6, 4-13, 5-10, 7-4, 7-5, 7-7, 7-10, 7-29  
     Alouette 1, 9-8  
     DMSP, 8-1, 8-17, 8-20, 12-2, 12-9, 12-12, 12-17, 16-33  
     Dynamics Explorer (DE), 12-5, 17-30, 17-43, 17-54  
     Explorer 8, 7-2, 7-3  
     Explorer 31, 7-15, 7-22  
     Explorer 45, 4-12, 5-24, 8-11  
     FLEETSAT, 10-74  
     GEOS 1 (ESA), 4-12, 7-29  
     Satellites (*Continued*)  
         GEOS 2 (ESA), 4-13, 7-29  
         GEOS 3 (NASA), 24-9, 24-14  
         GEOSAT, 24-15  
         GOES 1, 2, 3, 4-13  
         GPS, 10-78, 10-85, 24-13, 24-14  
         Hawkeye 1, 4-12  
         HEOS 1, 2, 4-12  
         IMP 2, 7-5  
         IMP H, I, J, 4-12  
         INJUN 5, 7-3, 8-13  
         IRAS, 12-38  
         ISEE 1, 4-12  
         ISIS 2, 4-12  
         Jikiken, 4-12  
          Lageos, 24-14  
         MARISAT, 10-74  
         MAGSAT, 4-12  
         NAVSTAR, 24-13  
         NASA OSO 3, 2-15, 2-20  
         NASA OSO 4, 2-20  
         NASA POGO, 4-26  
         NNSS, 24-13, 10-86  
         Nimbus 3, 18-49, 18-51  
         Nimbus 4, 18-51  
         OGO 1, 5-32, 5-33, 7-3, 7-5  
         OGO 3, 5-32, 5-33, 7-3  
         OGO 4, 5-33  
         OGO 5, 4-12, 5-23, 5-33, 5-36, 7-3  
         OGO 6, 4-12, 8-13, 8-14  
         OVI-13, 5-33  
         OVI-19, 5-33, 5-35  
         OV3-3, 5-33  
         Prognоз 4, 5, 6, 7, 4-12  
         S3-2, 4-12, 8-13, 8-14, 8-17, 8-20  
         S3-3, 4-12, 8-13, 8-14, 8-23, 8-24  
         SCATHA, 4-13, 5-39  
         SEASAT-1, 7-5, 7-8, 7-16, 7-25, 7-27-7-29, 24-9, 24-14, 24-15  
         SMM, 1-5, 1-13  
         SMS 1, 2, 4-13  
         Skylab, 1-9, 1-13, 1-22, 12-20  
         Sputnik 3, 4-12, 7-2  
         TOPEX, 24-15  
         TRIAD, 4-12  
         Vanguard 3, 4-12  
         Vela 6, 7-4  
         Voyager, 7-5  
         Saturation vapor pressure, 16-1  
         Scale height, 10-26  
         Scale of turbulence, 19-6  
         Scanning photometers, 10-18  
         SCATHA, 4-13, 5-39  
         Scattering  
             coefficient of E and F layer irregularities, 10-68  
             cross section, 19-8  
             efficiency factor, 18-15  
             properties of snow, 19-11  
         Schmidt coefficients, 4-26  
         Schumann resonance, 10-27  
         Schumann-Runge bands, 22-4  
         Scintillation, 10-1, 18-65, 18-71  
             index, 10-72  
             model (WBMOD), 10-82, 10-83  
         Seafloor spreading, 23-3  
         Seasurface topography, 24-9, 24-14, 24-15  
         Secondary electrons, 7-13, 7-14, 7-16, 7-19, 7-22, 7-25

# INDEX

- Secondary emission, 7-2, 7-10, 7-13  
Secondary neutron flux, 6-14  
Secondary standard stars, 25-3  
Seismic low velocity zone, 23-2  
Seismic noise, 23-19  
Seismic waves, 23-7  
air coupled, 23-20  
body waves, 23-7, 23-8  
Love waves, 23-9, 23-10  
P-waves, 23-7, 23-8, 23-9  
Rayleigh waves, 23-9, 23-10  
S-waves, 23-7  
surface waves, 23-7, 23-9  
Seismology, 23-6  
Shell splitting, 5-36, 5-37  
Short arc method, 24-12, 24-13  
Short term forecasts, 10-61  
Short wave fadeout, 10-58, 10-62  
Sidereal time, 25-2  
Signal to noise ratio, 10-55  
Single particle effects, 5-47  
Single scattering albedo, 18-23, 18-24  
Skin depth, 10-24, 10-27  
Skip zone, 10-53  
Sky light polarization, 18-60  
Sky radiance, 18-35, 18-58, 18-59  
Skycover, 16-27, 16-30, 16-36  
Skylab, 1-9, 1-13, 1-22, 12-20  
Skywave, 10-22, 10-35, 10-36  
Sleet, 16-16  
SMM (solar maximum mission), 1-5, 1-13  
Snell's law, 23-7  
Snow, 16-19, 16-23  
  crystals, 18-28, 18-29, 18-30, 18-34, 18-35  
  phase function, 18-34  
Snowfall extremes, 16-19  
Snowloads, 16-19  
Soft errors, 6-3  
Soil  
  soil-temperature variation, 15-28  
  thermal admittance, 15-21  
  thermal conductivity, 15-21  
  thermal diffusivity, 15-21  
Solar constant, 1-4, 2-1, 2-14, 15-1  
Solar cycle, 3-7, 3-22, 10-78, 12-5, 12-6, 12-10, 15-1  
Solar EUV flux, 11-4  
Solar Electro Optical Network (SEON), 1-23  
Solar energy input, 15-2  
Solar flares, 1-18, 3-16, 10-58, 11-2, 20-16, 21-52  
  classification, 1-19  
  disturbances, 3-22  
  effects, 4-7, 10-63  
  energetic, 3-8  
  importance, 1-19  
  particles, 6-17, 6-23  
  prediction, 1-23  
  spectra, 1-19, 1-20  
  white light, 1-20  
Solar flux, 22-4  
Solar flux unit, 11-1  
Solar geophysical data, 11-12  
Solar index, 10-55, 10-56  
Solar insulation, 15-1, 15-11  
Solar irradiance, 2-1, 1-4, 1-22, 15-1, 22-5  
Solar microwave emission, 11-4  
Solar noise storms, 11-14  
Solar particle events (SPE), 6-17, 6-19, 6-22, 6-23, 10-28, 10-31, 10-32  
Solar particle flux composition, 6-24  
Solar power flux density, 11-2, 11-6  
Solar proton events, 6-17, 6-19, 6-20, 6-24, 20-15, 20-16, 21-15, 21-52  
Solar radio emissions, 11-1  
  Type I bursts, 11-3  
  Type II bursts, 11-3  
  Type III bursts, 11-2  
  Type IV bursts, 11-3  
  Type V bursts, 11-3  
Solar spectral irradiance curves, 18-60, 18-61  
Solar spectrum, 1-4, 2-1, 11-2  
  1-3000 Å, 2-5  
  below 1200 Å, 2-14  
  continuum, 1-7, 2-14  
  Hα; (Lyman-α); (H Ly-α), 2-14, 2-16, 2-19, 2-20, 12-28, 20-18, 20-20, 21-46, 21-52, 22-2, 22-4  
  soft x rays, 1-13, 1-17  
  UV, 2-15, 2-16, 2-18  
  wiggly lines, 1-7, 1-8  
Solar synodic rotation rate, 6-26  
Solar system, 25-5  
Solar system dust, 25-9, 25-10  
Solar tides, 14-33  
Solar UV, 2-16  
  atmospheric absorption of, 2-16  
  variability, 2-18  
Solar wind, 3-1, 1-20, 4-5, 4-7, 5-1, 7-5, 8-1, 8-2, 12-2, 12-20  
  acceleration of, 3-4  
  adiabatic process, 3-1  
  archimedes spiral, 3-21  
  conductivity, 3-24, 4-5  
  contact discontinuity, 3-15, 3-16  
  cycle, 3-23  
  debye length, 3-7  
  discontinuity, 4-22  
  electric field, 3-3  
  electron distribution function, 3-9  
  electrons, 3-1, 3-7-3-9  
  expansion time scale, 3-12  
  flux fluctuation, 3-12  
  “freezing in” particles, 3-11  
  heavy ions, 3-12  
  helium ions, 3-7, 3-11, 3-21-3-23  
  hydrogen, 3-11  
  isothermal gas, 3-1  
  magnetic field, 3-4, 3-5, 3-6  
  magnetic field “frozen in”, 3-3, 4-5  
  magnetic sector, 3-4  
  magnetosphere, interaction with, 3-31  
  non-radial flow, 3-8  
  particles, 5-8, 5-9  
  plasma, 6-26  
  plasma density, 4-5  
  plasma flow, 3-3, 3-7, 3-8  
  polytropic law, 3-1, 3-2  
  quiet, 4-21  
  pressure of, 4-5  
  protons, 3-7, 3-8, 3-19, 3-21  
Rankine-Hugoniot conditions, 3-16  
rotational discontinuity, 3-15  
sector boundaries, 3-4, 3-17, 3-21  
sector orientation, 3-4  
shocks, 3-5, 3-16, 3-22  
speed, 3-23

## INDEX

- Solar wind (*Continued*)  
streams, 3-17, 3-18, 3-21, 3-23, 10-59  
supersonic flow, 3-3  
tangential discontinuity, 3-15, 3-16  
velocity, 3-23
- Solar wind theory  
magnetohydrodynamic turbulence theory, 3-12  
spherically symmetric fluid expansion, 3-1, 3-3  
two fluid model, 3-3
- Solar x-ray flares, 10-28, 10-34
- Sommerfeld, 10-23
- SOON (Solar Observing Optical Network), 10-59
- Sounders  
chirp, 10-8  
digital, 10-5, 10-6  
topside, 10-10
- South Atlantic magnetic anomaly, 5-29, 5-30
- Space charge, 20-5, 20-13
- Space Environment Services Center, 1-23
- Space-charge potential, 7-17, 7-24, 7-26
- Spacecraft charging, 7-1, 5-46
- Spectral density, 19-6, 19-8
- Spectral reflectance, 18-36
- Spectroscopic parallax, 25-4
- Speed of sound, 14-4
- Spherical polar system coordinate system, 4-3
- SPIRE, 13-4, 13-6
- Sporadic E, 9-7, 10-39, 10-50, 10-57, 10-28, 21-50, 21-53, 21-54
- Spread F, 9-9, 10-2, 10-58, 10-63, 10-75, 10-98
- Sputnik 3, 7-2
- Sq currents; fields, system, 4-12, 4-19, 4-20, 9-4, 9-6
- Squall line thunderstorm complex, 20-21, 20-22
- Stable auroral red arcs, 9-4
- Standard atmosphere, 0-1000 km, 14-1
- Standard candles, 25-4
- Standard station temperature, 15-2
- Starfish nuclear explosion, 5-32
- Static charge, 7-1
- Stars  
classification, 25-13  
effective temperature, 25-13  
luminosity, 25-13  
spectrum, 25-13
- Stochastic coefficients, 5-11
- Storm continuum, 11-3
- Storm time variation field, 4-8
- Stormer approximation, 6-11
- Stormer cutoff equation, 6-12
- Stratopause, 14-7
- Stratosphere, 14-7, 18-10, 21-14  
clouds, 16-45  
composition, 20-8, 20-9, 20-10  
warm/cold atmospheric models, 14-32  
water vapor, 16-4, 16-6, 16-45  
wind, 17-11
- Strike-slip fault, 23-4
- Structured auroras, 12-4
- Subduction zone, 23-3
- Sublimation, 16-1
- Subsidence inversion layers, 19-5
- Subsidence rates, 23-32
- Subsoil temperature, 15-21
- Substorms, 8-19, 8-25, 9-5, 17-44  
morphology, 8-25  
onsets, 4-25
- Sudden commencements, 3-23, 4-21, 4-22
- Sudden cosmic noise absorption, 10-62
- Sudden enhancement of atmospheres, 10-63
- Sudden enhancement of signal, 10-62
- Sudden frequency deviation, 10-63
- Sudden impulse, 4-22, 4-23
- Sudden ionospheric disturbance (SID), 1-20, 10-62, 21-52
- Sudden phase anomaly, 10-62
- Summary of synoptic meteorological observations (SSMO), 16-27
- Sun, 1-1  
acoustic waves, 1-9  
active, 1-13, 1-16, 20-15  
chromosphere, 1-9, 2-15, 11-1  
convection zone, 1-3  
corona, 1-9, 1-16, 1-18, 1-22, 2-15, 11-1  
coronagraph, 1-11  
coronal holes, 1-11, 1-20  
current sheet, 1-21, 3-5  
cycle, 1-14, 3-7  
density, 1-1  
diameter, 1-3  
ephemeral regions, 1-17  
filigree, 1-16  
flares, 1-18, 3-11  
granulation, 1-6, 1-7, 1-8  
K corona, 1-11  
luminosity, 1-1  
magnetic field, 1-13, 1-14  
oscillations, 1-3, 1-5, 1-8  
photosphere, 1-5, 11-1  
plages, 1-16  
prominences, 1-17, 1-20, 1-22, 3-11, 3-15  
radio flux, 1-11, 1-20, 2-16, 11-2, 11-3, 2-19  
rotation, 1-5, 2-20, 3-3  
spicules, 1-9  
streamers, 1-11, 1-21  
temperature, 1-1, 2-14  
transition region, 1-9  
variability, 1-22  
core, 1-1  
mass, 1-1  
pressure, 1-1  
quiet, 1-1
- Sunspot  
cycle, 1-14, 3-17, 20-15  
groups, 1-14, 1-17  
maunder minimum, 1-14, 3-24  
number (Wolf-Zurich), 1-15, 2-16-2-19, 14-26  
polarity law, 1-14
- Super refracting layers, 19-5
- Supergiant stars, 25-10, 25-19
- Surface discharges, 7-7
- Surface loading, 23-29
- Surface potential, 7-5
- Surface wind speeds, 17-21
- TEC (total electron content), 10-40, 10-43, 10-84, 10-89
- TEC variability, 10-92
- Tectonic processes, 23-21
- Temperature, atmospheric, 14-1, 14-3, 14-27, 15-15  
daily mean range, 15-4  
degree day, 15-29  
diurnal cycles, 15-3, 15-4

# INDEX

- Temperature, atmospheric (*Continued*)  
duration, 15-11, 15-13, 15-14  
earth-air interface, 15-19  
extremes, 15-7-15-11  
high altitude, 14-26-14-34, 14-36, 14-38  
interlevel correlation coefficients, 15-18, 15-22-15-27  
inversion, 15-5  
latitudinal variations, 14-8-14-12, 15-15  
longitudinal variations, 14-21, 14-22  
mean monthly values, 15-18, 15-22  
mean standard duration, 14-9, 14-30, 15-18  
runway, 15-7  
seasonal variations, 14-8-14-12, 15-15  
standard station, 15-2  
subsoil, 15-21  
surface air, 15-4  
surface oscillation, 15-28  
warm and cold winter stratosphere/mesosphere, 14-23, 14-24  
wind chill, 15-29  
vs speed of sound, 15-19  
TEP mode, 10-59  
Terrestrial exosphere, 5-14, 5-17  
Thermal conductivity, 14-6  
Thermal pole, 25-6  
Thermoelastic strains and tilts, 23-30  
Thermosphere, 13-6, 13-7, 14-36  
Thermospheric neutral winds, 14-7, 14-36, 17-29, 21-42, 21-51  
Thermospheric winds, 10-59, 12-34  
Thick sheath, 7-17, 7-18, 7-30  
Thin sheath, 7-17, 7-18, 7-21  
Thompson scatter, 10-14  
Thunderstorm, 20-20  
Thunderstorm electric field, 20-21, 20-22, 20-24, 20-25, 20-28  
Tidal gravity meter, 23-27  
Tide gages, 23-22  
Tide models, 23-28  
Tilt, 23-28, 23-29, 23-31-23-33  
Tiltmeters, 23-28, 23-29, 23-31-23-33  
Time scales  
coordinated universal time, 25-3  
ephemeris time, 25-2, 24-16  
international time, 25-2  
mean solar day, 25-2  
sidereal time, 25-2  
universal time, 25-2  
Time of flight approximation (WKB), 4-23  
TOPEX, 24-15  
Topside ionogram, 10-11  
Topside ionosphere, 9-1, 9-2, 10-10  
Topside profile, 10-18, 10-84, 10-89  
Total electron content (TEC), 10-40, 10-43, 10-84, 10-89  
Total ionization trough, 9-4  
Total volumetric scattering coefficient, 18-7  
Transcontinental traverse, 24-2  
Transionospheric radio propagation, 10-20  
Transmitter power, 10-56  
Transport equation, 5-11  
Transverse coherence length, 18-71  
Transverse electric (TE), 10-22, 10-29, 10-30, 10-32-10-34  
Transverse electromagnetic (TEM), 10-25, 10-28  
Transverse magnetic (TM), 10-22, 10-24, 10-29-10-34  
Traveling ionospheric disturbances, 10-96  
Triangulation networks, 24-2  
Trigonometric parallax, 25-4  
Trilateration networks, 24-2  
Tropopause, 14-6  
Tropopause clouds, 16-46
- Troposphere, 14-16, 18-9, 18-10, 21-9  
water vapor, 16-4  
wind, 17-11  
composition, 20-8, 20-10  
True height, 10-4  
Turbulence, 19-6, 17-28, 18-71, 18-72, 19-7  
Twilight spectrum, 22-2  
Two micron sky survey, 25-13
- U-shaped spectral signature, 11-4, 11-5  
UV Hartley and Huggins bands, 21-6  
Ultraviolet absorption and ionization, 22-2  
Ultraviolet airglow, 22-2  
Ultraviolet radiance, 22-1  
Unidirectional integral intensity, 6-1  
U. S. Naval Observatory, 24-16  
U. S. Standard Atmosphere, 1976, 14-1, 14-26, 14-27  
USAF Environmental and Technical Applications Center, 16-27  
Universal time, 25-2  
Unkehr/Dobson measurements, 21-6
- Van der Pol residue series, 10-24  
Van Rhijn enhancement, 12-5  
Vapor pressure, 16-1  
Variable stars, 25-5  
Vehicle potential, 7-2, 7-3, 7-6  
Vela 6, 7-4  
Vertical gradient, 24-12  
Vertical wind shear, 17-14  
Very long baseline interferometry, 23-23, 24-4, 24-14, 24-15, 24-18  
Vibrational temperature, 13-3  
Vibrational-rotational transitions, 13-1  
Virtual height, 10-4  
Visibility code, 18-65  
Visibility, atmospheric, 16-49  
extinction coefficient, 16-49  
threshold contrast, 16-49  
threshold illuminance, 16-49  
Vlasov equation, 7-2, 7-16, 7-22  
Vlasov-Maxwell equations, 8-1  
VLF propagation, 10-1  
VLF/LF, 10-20, 20-25, 10-28-10-37  
Voigt line profile, 18-38-18-40, 18-42, 18-43  
Volcanoes, 23-21  
Volume scattering coefficient, 10-64  
Voyager, 7-5
- W measure, quiet fields, 4-32  
Water cluster ions, 20-8, 20-9, 20-10, 21-46  
Water vapor, 16-1, 16-3, 16-4, 16-6, 16-45, 18-71, 19-1, 19-2, 19-5, 21-23-21-25, 21-46, 21-48  
coefficient, 18-47  
density profiles, 18-2  
Wave damping, 5-13  
Wave guide modes, 10-22, 10-25, 10-29, 10-31, 10-37  
Wave-Hop: LF, 10-29, 10-34, 10-36  
Weather radar, 16-34  
Weibull distribution, 16-54  
Weyl, 10-23  
Whispering gallery, 10-31

## INDEX

Whistler modes, 10-22, 10-37  
wave propagation, 5-19, 5-22  
waves, 3-32  
White dwarfs, 25-10  
Wind chill, 15-29  
Winds, 17-1  
    average profiles, 17-6  
    backing, 17-3  
    ballistic, 17-17  
    direction shifts, 17-4  
    diurnal variation, 17-4  
    equinoctal circulation, 17-31  
    gradient, 17-4  
    gradient level, 17-1  
    gusts, 17-23, 17-24  
    high latitude heating, 17-35  
    horizontal distribution, 17-6  
    logarithmic model, 17-2  
    maximum speed, 17-25, 17-26  
    meridional, 17-7, 17-32, 17-34  
    polar cap, 17-43, 17-47, 17-54  
    power model, 17-2  
    radar measurements, 17-11  
    roughness parameter, 17-2  
    seasonal circulation, 17-31  
    seasonal variations, 17-31  
    shear, 17-14  
    solar heating effects, 17-35, 17-36, 17-37, 17-42  
    solstice variations, 17-34  
    space variability, 17-13  
    speeds, 15-31

Winds (*Continued*)  
    statistics, 17-21  
    three-dimensional general circulation model, 17-34  
    tidal effects, 17-4  
    veering, 17-3-17-5  
    velocity profile, 17-1  
    vertical, 17-32, 17-34  
    vertical distribution, 17-6  
    zonal, 17-7, 17-10, 17-29, 17-32-17-34, 17-39  
Windspeed frequency distribution, 14-33  
    circular normal distribution, 17-22  
    gamma distribution, 17-21  
    Weibull distribution, 17-21  
WKB method, 10-28, 10-38  
Wolf-Rayet stars, 25-17  
World data centers, 4-33, 10-11  
World geodetic system, 24-4  
World Meteorological Organization (WMO), 14-1, 17-1, 20-33, 21-15  
World vertical datum, 24-6  
  
Z-R relations, 19-11  
Zeeman splitting, 4-9  
Zenck wave, 10-23  
Zenith looking experiment, 13-5, 13-6  
Zero sunspot component, 11-2  
Zodiacal light, 25-8, 25-9-25-12, 25-21  
Zonal harmonics, 10-34  
Zonal wind, 17-7, 17-10, 17-29, 17-32-17-34, 17-39