10. Index

diffraction: see pp72 and 78

dust devil: swirling, vertical updraft of air developed by local heating of the air above the flat desert floor. Dust devils are spinning columns of air that move across the landscape and look somewhat like miniature tornadoes. Dust devils are a common occurrence in dry and desert landscapes on Earth as well as Mars. They form when the ground heats up during the day, warming the air immediately above the surface. As the warmed air nearest the surface begins to rise, it spins. The spinning column begins to move across the surface and picks up loose dust. The dust makes the vortex visible and gives it the "dust devil" or tornado-like appearance. On Earth, dust devils typically last for only a few minutes, and the same is probably true for Mars. see pp27 and 36.

dust storms: atmospheric dust hazes or clouds, consisting of materials of silt (1/16 – 1/256 mm) and clay (< 1/256 mm) size blown by the wind, see pp59-70.

eccentricity of Mars orbit: the amount by which the orbit deviates from circularity: $e = c/a$, where c is the distance from the center to a focus and a is the semimajor axis; or $e = 1 - q/a$, where q is the periapsis distance, see p2.

hop distance: a radio wave obliquely launched from the ground will be reflected by the ionosphere, when its frequency is less than the ionospheric critical frequency. The wave will leap a hop distance after it reaches the ground again by $l=2\ h\ tan\ \theta_0$ (where θ_0 is wave launch angle and h is ionospheric height), see p16.

Huygen's principle: Every elementary area of a wavefront can be regarded as a source of secondary spherical waves, see p78.

interplanetary dust: see p90

ionosphere: a layer consisting of ionized gases (plasma) created by solar extreme ultraviolet flux, which usually extends from 100 km to several hundred kilometers in altitude, see pp7-20

ionopause: the boundary between the solar wind plasma and the Martian ionospheric plasma, see pp8 and 12

ionosheath (magnetosheath or planetsheath): the region between a planetary bow shock and ionopause in which the shocked solar wind plasma flow around the ionosphere, see pp8 and 12

ionotail (magnetotail): a comet-like region of nightside ionospheric plasma in the wake of a planetary obstacle to a plasma flow, see p8

Kelvin temperature: T K= T°C + 273.15°.

Ls: Ls is the aerocentric longitude of the Sun as measured in a Mars-centered fixed coordinate system, often used as an angular measure of the Mars year (Ls = 90°, 180°, and 270°

corresponding to the beginning of southern winter, spring, and summer, respectively), see p60.

magnetic barrier: see p8

multipath: see pp28 and 72

Neper: a dimensionless unit for optical depth. It can be expressed in (logarithms to base *e*), A (*Np*) = 4.34 A (dB), see p47

nominal mean model: see p22

optical depth: Optical depth, τ, is a measure of attenuation over the entire path taken from the ground to space. Optical depth may be obtained through the following measurements. The power received, P_r, is the power transmitted, P_t, multiplied by the attenuation: $P_r = P_t\, e^{-\tau}$ (i.e., $\tau = ln(P_t / P_r)$. Thus, a transparent object has small optical depth, while an opaque object has large optical depth, The term "opacity" is commonly also used, see pp34, 35, and 68.

opacity: a measure of the ability of an atmosphere to absorb or scatter radiation, see pp68 and 82

opposition: When Earth passes between Mars and the Sun, there is a minimum distance between the two planets, see pp 1 and 87.

perihelion: The closest point of Mars orbit from the Sun, see p 2

plasmasheath: similar to the ionosheath, a region between a bow shock and boundary layer in which the shocked and heated plasma flow around the obstacle, see p 38.

polar cap: see pp 74 and 75

polar hoods: see p80

radiation inversion: see p27

Rayleigh distribution: p85

Rayleigh scattering: p32

reflection: see pp72 and 78

reflectivity: the reflectivity (R) is the ratio of returned laser energy to the emitted laser energy. R is affected by the surface albedo (A) of the underlying terrain and extinction of the photons from the laser beam by atmospheric aerosols, see p82.

refractivity: tropospheric radio refractivity is defined as the difference between the gas refractive index and unity, that is, $N = (n-1) \times 10^6$ (N unit), see p 5.

residual caps: Residual caps are inner parts of polar ice caps which do not change with seasons, that is, they are the smallest polar ice cap. The southern residual cap is about 350 km across, compared with 1,000 km for the remnant northern cap. The northern residual cap is almost certainly water ice, while the southern cap probably consists predominantly of CO_2 ices, see pp 75 and 76.

Ricean distribution: p 85

scintillation: see p 30

seasonal caps: Seasonal caps are the Mars polar ice caps, which advance and recede with seasons. Martian seasonal polar ice caps have their maximum sizes about 2000 km across during winter, see pp 75, 76, and 77.

sol: one Martian solar day, equivalent to 24.66 terrestrial hours, see p 27

solar corona: see pp1 and 90 and 91

solar wind: see pp 7 and 90

stagnation region: see pp 39 and 40

superior conjunction: The two planets are on opposite sides of the Sun. There is a maximum distance between two planets, see pp 1 and 87.

surface (6.1 mb level): the 0-km altitude, which is defined as the Mars reference surface at atmospheric pressure 6.1 mb level (610 Pa), see pp 25 and 74

terminator: see p 12

troposphere: see pp 22–30

Valles Marineris: On the east side of Tharsis and just south of the equator, between longitudes 30°W and 110°W, there are several enormous, interconnected canyons, which have been collectively called Valles Marineris. The Valles Marineris is the most spectacular geologic feature on Mars. The canyon is 4000 km long, 150 km wide, and 10 km deep, see pp74 and 81.

wake region: see pp39 and 40