The Martian Upper Atmosphere as Revealed by Mars Global Surveyor’s Aerobraking

Paul Withers & Steve Bougher

LPLC II
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Periapsis during Phase 2

Periapsis Latitude (\textdegree N)

Periapsis Local Solar Time (hours)

One sol = 24.6545 hours
Data and Predictions

- Density, density scale height & temperature at 130 km (in & out) and periapsis (100-110 km)
- Mars Thermosphere Global Circulation Model predicts mean atmospheric behaviour
- Predictions cover ~ 1 month
Outbound Density at 130 km

Density (kg km⁻³)

Latitude (° N)

Complete Phase 2: Orbits 574 - 1283

, = MGS, + = MTGCM
Wave-5 fit to outbound densities at 130km
25 orbits P824 - P848, 13 - 19 'N
Wave-5 fits to outbound densities at 130 km
25 orbit running means

Amplitude of harmonic
mean density

Latitude ('N)
wave1=red, wave2=green, wave3=blue
waves 4 and 5 omitted for clarity
SMITH-ZUBER TOPOGRAPHY, Zonal Wavenumbers $m = 1.5$
Points to remember

• Unexpected stationary longitudinal variations mean surface effects propagating up over 100km
• Mid-latitude models useful
• Polar night badly modelled