



MARSIS over Elysium Planitia: mapping a subsurface structure in an area with a complex geological history

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MARSIS is a low-frequency radar sounder on board ESA’s Mars Express spacecraft, capable of detecting dielectric discontinuities in the Martian subsurface down to depths of a few kilometers, depending on the nature of the medium being sounded. MARSIS has been acquiring data over Mars since mid-2005, but until recently operational constraints have determined a concentration of coverage at the high latitudes of the southern hemisphere.

Recent data acquired by MARSIS over Elysium Planitia have revealed a subsurface structure extending a few hundred kilometers in the north-south direction, with a thickness well above one kilometer in places, and evidence of layering at scales comparable to the instrument vertical resolution (150 m in free space). This structure, located in the southeastern part of Elysium Planitia close to the highland-lowland boundary scarp, has no obvious surface expression. The observed layering is somewhat reminiscent of morphologies found in the southern polar layered deposits.

Interpretation of results starts from estimation of subsurface dielectric parameters from the strength of observed subsurface reflections, but dielectric properties alone do not define unambiguously the material constituting the subsurface structure. Geologic interpretation of surface morphology and correlation with other data sets are necessary to determine the nature and origin of a structure located in an area such as the Elysium region, which is thought to be associated with very young volcanic, fluvial and glacial activity.