



Recent results from MARSIS and SHARAD radar sounders

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We present the latest results from the Mars Advanced Radar for Subsurface and Ionospheric Sounding (MARSIS) and SHARAD radar sounders that are currently operating at Mars. MARSIS echoes can be obtained at any of the four MARSIS subsurface sounding bands with center frequencies of 1.8, 3.0, 4.0 and 5.0 MHz with a one MHz bandwidth. MARSIS has successfully mapped the south polar layered deposit of Mars and has obtained significant coverage of the Northern layered deposits. SHARAD on the other hand is a high resolution radar sounder operating at 20 MHz with 10 MHz of bandwidth. SHARAD has improved the maps obtained by MARSIS by providing more details about the layering structures. MARSIS radar data along with SHARAD data has provided new insight into the nature of the material forming these geological features. The two radar sounders have discovered radio transparent deposits in the equatorial regions. Both MARSIS and SHARAD have also revealed other intriguing structures in mid-latitude of Mars that will shed new light on Mars past geological history. We expect to map the 3-D volume of the south and the north polar layered deposit of Mars using combined MARSIS and SHARAD data, providing the first 3-D volumetric images of the entire polar deposit from space. Some preliminary results of this effort will be presented.

In addition to probing the Mars subsurface, MARSIS is a very capable topside ionospheric sounder operating over the 0.1-5.5 MHz frequency band. MARSIS has provided a wealth of new information about Mars' ionosphere. Even over subsurface sounding mode frequencies (1.3-5.5 MHz), the roundtrip propagation of radar pulse through the ionosphere causes frequency dependent slowing of the wave. This information needs to be corrected during subsurface data processing step. The correction values have provided us with another means of studying the Mars ionosphere. SHARAD signal is also sensitive to Mars ionosphere and can be used to characterize Mars ionosphere in a similar fashion.

MARSIS and SHARAD instruments have opened the possibility of similar explorations at icy moons and small bodies.

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