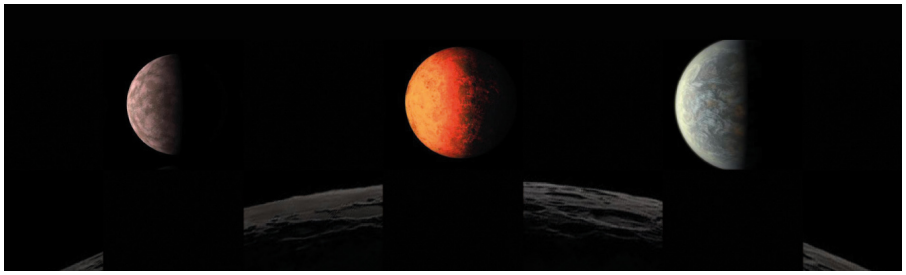

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Observing the Martian surface and subsurface using the Marsis and Sharad radars

Friday 24 October 2025 11:00 (30 minutes)

The sounding radar operating from the orbiting platforms for studying the surfaces and subsurface of planets began to be applied, systematically, in the early 2000s with the Japanese Selene mission to the moon and MARSIS and SHARAD for Mars. These radars work, by transmitting a low frequency pulse, in the altimetric mode and some SAR processing is implemented on board or on the received data on Earth. The ability of low frequency electromagnetic waves to penetrate subsurface, propagate through them, and interact with materials and structures is used to image them, detect layers, and determine their composition. In this conference, we will present and discuss, using selected examples of real data obtained by the MRO and MEX missions, the capabilities of radars to obtain measurements, their accuracy, and what physical parameters can be deduced from these measurements. We will discuss the data processing and kind of necessary information to be able to interpret measurements. Sounding radars are also relevant tools to determine the composition of the surface, since the radar-waves reflectivity is sensitive to the dielectric properties of the sounding materials. It also has the originality to be representative of the first tens of metres in depth of the surface (depending on the bandwidth).

Then we describe the radars built for Europa Clipper and JUICE missions that were launched to explore the Jupiter's satellites.

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