



## **Closest radar observation of Phobos by MARSIS**

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We report on the first observations of Phobos ever performed by an orbiting radar sounder. The latest flyby on October 2nd 2007 brought Mars Express to a distance of only  $\sim 122$  km. During this flyby MARSIS successfully collected 8550 echoes, transmitting a signal centered at 4.0 MHz with a 1 MHz bandwidth. Taking advantages of the instrument internal mass-memory facility it has been possible to store, and then send to ground the raw unprocessed echoes received from Phobos. In order to successfully collect the echoes we had to study and then implement a particular setup for the configuration of the instrument onboard parameters. For safety reason in fact the radar prevents the execution of operations when the target is closer than  $\sim 220$  Km. We therefore had to conceive a new observation strategy "Range Ambiguity", maintaining at the same time a very high level of safety for the instrument. Results from these observations will have a profound impact on current space mission studies in which radar sounders are proposed to probe the interior of asteroids, such as in NASA's Deep Interior and in ESA's ISHTAR. With this poster presentation we intend to describe the following items:

Range Ambiguity techniques. The test campaign, performed using Mars as targets, to verify the radar performances with the Range Ambiguity techniques and the most representative science results.

*The research described in this paper was carried out by the professional collaboration*

*of the Italian and U.S teams that have successfully re-configured the radar.*