

Release of 12+ years of MEX-MARSIS Subsurface data in the ESA's Planetary Science Archive

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Abstract

The European Space Agency's (ESA) Mars Express (MEX) mission to Mars has been returning valuable scientific data for ~15 years. This data is available to the public for free via the Planetary Science Archive (PSA), which houses the raw, calibrated, and higher-level data returned by the ESA's planetary missions, including data provided by the various MEX instrument teams. Previously the Mars Advanced Radar for Subsurface and Ionospheric Sounding (MARSIS) [1] instrument's subsurface data had a gap of several years, but in 2018 this issue was fixed and now 12+ years of subsurface radar sounding data, both in raw and calibrated form, are available for further scientific analysis by the public. This poster will also cover the ways in which to search for the data via the various PSA interfaces.

1. Introduction

MEX was inserted into Mars orbit in December 2003, though several instrument test observations also exist from the cruise phase of the mission, prior to arrival at Mars. Thus, this long-lived Mars mission covers 15+ years of data with its 7 instruments. Note that MARSIS uses 3 antenna booms, which were not extended, in stages, until mid-2005 [2, 3]. The MEX instruments can have various sub-channels and/or operating modes. In the case of MARSIS, the two primary types of data collection modes are active ionospheric sounding (AIS) and subsurface sounding. The AIS data has been published regularly through the PSA over the mission's lifetime. For the subsurface data, initial data has been available, but then some problems with the data pipeline caused a gap of several years in delivery of this type of data. Thanks to the effort of the MARSIS Principal

Investigator (PI) Roberto Orosini and his team, with assistance from the PSA, an updated pipeline was created. Thus, the entirety of the MARSIS subsurface data, covering 12+ years of observations (~300 GB of data, 34,000+ observations) are now available in the PSA, in both raw and calibrated format.

2. The PSA user interfaces

The ESA's PSA uses the Planetary Data System (PDS) format developed by NASA to store the data from its various planetary missions. In the case of MEX, the data is stored in the PDS3 format, which primarily uses ASCII files to store and describe the data. Newer missions, from ExoMars onward use the PDS4 data standard, which uses XML files. There are two primary ways in which to find the data. One is the FTP area, which houses all the public data in the PSA. Here, there are no advanced search capabilities, but it does provide access to all the supporting files and documentation for the various datasets. When first searching for new data, users would benefit from using the newly developed Table View search interface [4]. Here the user can search using various parameters, such as mission name, target (e.g. Mars), instrument name, processing level, observation times, etc. The development of the PSA's search capabilities continues, thus more search parameters will be added over time. Also available in the Table View interface is a section for "Free Search", allowing one to use Contextual Query Language (CQL) to search over additional parameters. These various search methods rely on the metadata provided by the instrument teams in the labels associated with each of the data products.

3. Summary and Conclusions

Thanks to the efforts of the MARSIS PI team, over 12 years worth of subsurface radar sounding data are now available to the public. This data can be freely accessed at the ESA's PSA, at <https://archives.esac.esa.int/psa/>. There are multiple ways of browsing the MARSIS and other instrument teams' data, including from other planetary missions, which will be explained in this poster. The development of the PSA's user interface is an ongoing project, and we welcome feedback from the community for suggestions on new ways to search this wealth of data. Feedback and suggestions can be sent to psahelp@cosmos.esa.int.

Acknowledgements

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References

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