

THE MARS EXPRESS/NASA PROJECT AT JPL

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Introduction: ESA's Mars Express Mission is an international collaboration between the European Space Agency (ESA) and the European space agencies with the National Aeronautics and Space Administration (NASA) as a junior partner. The primary objective of the mission is to conduct a search for potential hydrologic resources from orbit and on the surface of Mars. Launch was from Baikonur, Kazakhstan on June 2, 2003; arrival at Mars was on December 25, 2003.

Mars Express Experiments: ESA selected eight experiments for Mars Express. Eleven U.S. investigators were selected by ESA as instrument Co-Investigators. NASA and the Italian Space Agency (ASI - Agenzia Spaziale Italiana) are jointly sponsoring an advanced radar sounder (MARSIS). Also, NASA is funding hardware development, data reduction, and archiving tasks for the ASPERA instrument via NASA's Discovery Mission of Opportunity.

The Mars Express Mission experiments and sponsoring countries are:

- 1) ASPERA (Analyser of Space Plasmas and Energetic Atoms), Sweden
- 2) HRSC (High-Resolution Stereoscopic Camera), Germany
- 3) MARSIS (Mars Advanced Radar for Subsurface and Ionospheric Sounding), Italy/United States
- 4) OMEGA (Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité), France
- 5) PFS (Planetary Fourier Spectrometer), Italy
- 6) MaRS (Mars Radio Science Experiment), Germany
- 7) SPICAM (Spectroscopic Investigation of the Characteristics of the Atmosphere of Mars), France
- 8) Beagle2 Lander, United Kingdom

NASA/U.S. Participation in Mars Express: Most of the U.S. participation in ESA's Mars Express Mission is supported by the Mars Express/NASA Project at the Jet Propulsion Laboratory (JPL) in Pasadena, California. U.S./ASPERA Participation in Mars Express is supported by the Discovery Program.

A key NASA objective is to archive Mars Express science investigation data in a format compatible with the Planetary Data System (PDS) via ESA's Planetary Science Archive and NASA's Planetary Data System.

Mars Express/NASA Project Objectives:

- Provide the Radio Frequency (RF) subsystem (integrated transmitter, antenna, and receiver) for MARSIS. Alenia Spazio (ALS), Italy is responsible for the digital subsystem and instrument integration and test, under direction of the JPL Instrument Manager. A MARSIS Co-Principal Investigator from JPL serves as the lead scientist for the NASA side of the experiment.
- Assist in achieving Mars Express science objectives through U.S. Co-Investigator support
- Support the HRSC with image-processing software
- Deploy NASA's SPICE (Spacecraft, Planet, Instrument, C-matrix, Events) System to ESA and Instrument Teams
- Secure Deep Space Network (DSN) tracking
- Conduct joint navigation verification studies
- Plan relay communications to/from Beagle2 and Mars Exploration Rover (MER) Landers using NASA and ESA orbital assets.

NASA Discovery Program: Two ASPERA sensors, the Electron Spectrometer and the Ion Mass Analyser, were funded by NASA and built by Southwest Research Institute. ASPERA will address the question of how strongly interplanetary plasma and electromagnetic fields affect the Martian atmosphere, which is directly related to the many questions about water on Mars.