

Mars Observer:
The Primary And Extended Missions

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Abstract

The next mission to Mars, called the Mars Observer Mission, was launched on 25 September 1992. After the capture of the spacecraft by the planet on 24 August 1993 and the adjustment into a low, sun-synchronous, polar-mapping orbit to be completed in November 1993, observations will continue for a Mars year (687 days). The scientific mission for this first Mars year of observation centers around global geoscience and climatology observations of the Mars atmosphere, surface, and interior. The seven experiments carried by the spacecraft involve gamma-ray spectroscopy, magnetometry, surface and atmosphere imaging, atmospheric sounding, laser altimetry, gravity mapping, and thermal emission spectroscopy. All experiments contain microprocessors, which will be controlled remotely from the investigator's home institution providing considerable experimenter freedom. The long, planned period of continuous 24 hour a day observation promises a rich harvest of global and seasonal information.

The spacecraft also carries an eighth experiment, the Mars Balloon Relay, which will be operated in the fall of 1995 when the Mars '94 spacecraft will deliver penetrators and small stations to the surface of Mars. This relay, built by CNES, can return data from vehicles on the surface or in the atmosphere of Mars at several data rates (e.g. 8 and 128 kb) at least once a day for up to 10 minutes at a time.

Following completion of the primary mission in February 1996 Mars Observer will be a candidate for an extended mission. Current estimates of the key consumable indicate there is enough Hydrazine on-board for two additional Mars years at the three sigma level. Two additional years of observation combined with previous spacecraft based and ground based observation will provide an opportunity to begin to describe interannual climate variation on Mars. In addition the Relay would be available for use with the stations and balloon of the Mars '96 Mission and could be considered for use with other missions launched toward Mars before the end of the century.

Thus Mars Observer stands between the initial exploration of Mars and the more intensive explorations, possibly involving human landings, that are only now being planned. Mars Observer will provide key basic data -- planet shape, gravity field, geodetic positions, topography, characteristics of the surface, atmospheric profiles, dust content of the atmosphere, winds, etc. It would also be possible to produce special data products for engineering purposes. In particular, the high resolution (1.5 meter/pixel) image coverage could be greatly increased and targeted to specific problems.