MARS ODYSSEY SCIENCE: THE FIRST YEAR AND BEYOND. J. J. Plaut[1] and the 2001 Mars Odyssey team, [1]Jet Propulsion Laboratory, California Institute of Technology, Mail Stop 183-501, 4800 Oak Grove Dr., Pasadena, CA 91109, plaut@jpl.nasa.gov.

The 2001 Mars Odyssey orbital science mission officially began in late February, 2002 [1]. The spacecraft carries three science instrument packages: the Gamma Ray Spectrometer suite (GRS) [2], the Thermal Emission Imaging System (THEMIS) [3], and the Martian Radiation Environment Experiment (MARIE) [4]. The GRS suite of three instruments includes the Gamma Sensor Subsystem (GSS), the Neutron Spectrometer (NS) and the High Energy Neutron Detector (HEND). THEMIS consists of two cameras sharing a single set of telescopic optics: a 5-band visible imager and a 10-band thermal infrared imager. Spacecraft and instrument performance have been nominal to this point in the science mission.

Gamma and neutron observations of the high latitudes have been used to identify water-ice-rich soil to 1 m depth at latitudes poleward of 60 degrees north and south [5-8]. The Gamma Sensor Subsystem began nominal data collection with its boom deployed in June, 2002. A focus of THEMIS infrared and visible data acquisition has been the candidate landing sites for the 2003/2004 Mars Exploration Rovers. Daytime and nighttime infrared imaging shows a remarkable diversity of temperature signatures of surface materials, suggesting that THEMIS will truly provide a "new view" of Mars. THEMIS observations of the south polar region, combined with analysis of Mars Global Surveyor Thermal Emission Spectrometer (TES) data, were used to identify water ice deposits at the surface near the south pole for the first time [9]. MARIE began operating on March 13, 2002 following recovery from an instrument operation anomaly. The instrument has detected radiation signatures from the high solar activity during the first year of operations, including events with significantly different signatures at Mars and Earth.

The upcoming period includes many important events for the Odyssey mission. As the Earth-Mars distance decreases, the maximum downlink data rate has become available, which for Odyssey is 110 kbits/sec. This rate will be utilized on 70 m Deep Space Network stations until early 2004. The enhanced downlink bandwidth will be used primarily for additional THEMIS observations, with an emphasis on visible and nighttime infrared during periods of late afternoon local solar time. The mean local solar time of the Odyssey orbit has been in a slow drift since the start of mapping (Figure 1). An orbit trim maneuver to freeze the mean local solar time at a value of approximately 4:50 will be executed late in 2003.

In early 2004, the orbiter will serve as a data relay platform for the Mars Exploration Rovers, and as a supplement to the Mars Express relay for the Beagle 2 lander. Odyssey's nominal science mission will extend for 917 days, until August, 2004. Extended mission operations appear to be feasible, given the current inventory of propellant. Goals for a possible extended mission include inter-annual comparative observations, global high resolution mapping by the THEMIS visible camera, and synergistic science and operations support for other Mars missions.

Over 200 GBytes of validated Odyssey science data products are available to the community via the online Planetary data System [10]. Data are released on 3-month centers, after a six-month validation period. The current release includes calibrated reduced data records (RDRs) from all of the instrument suites.

References:

[1] Saunders et al. (2003) *Space Sci. Rev.,* in press. [2] Boynton et al. (2003) *Space Sci. Rev.,* in press. [3] Christensen et al. (2003) *Space Sci. Rev.,* in press. [4] Badhwar et al. (2003) *Space Sci. Rev.,* in press. [5] Boynton et al. (2002) *Science* 297, 81-85. [6] Feldman et al. (2002) *Science* 297, 75-78. [7] Mitrofanov et al. (2002) *Science* 297, 78-81. [8] Tokar et al. (2002) *GRL* 10.1029/2002GL015691. [9] Titus et al. (2002, online; 2003, in press) *Science*. [10] Arvidson et al. (2003) LPS XXXIV, this volume.

(See next page for Figure 1)

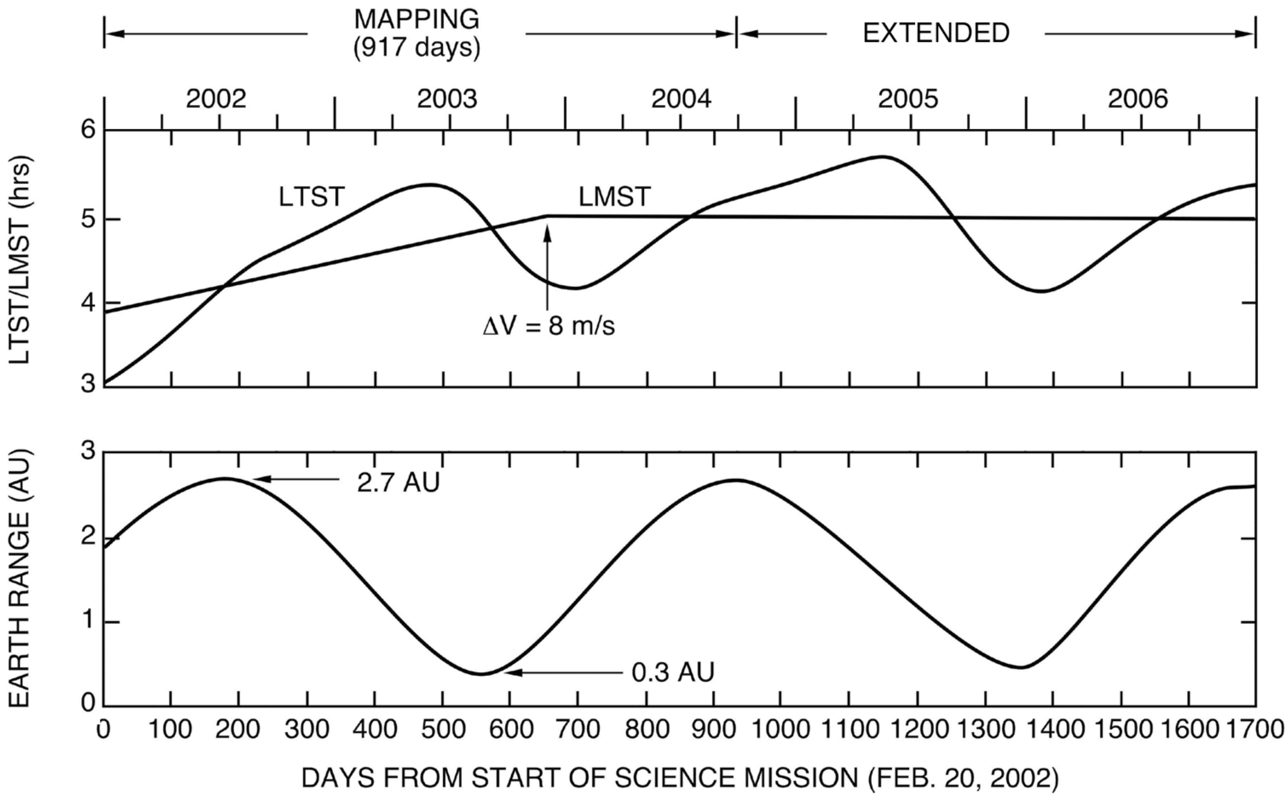

Figure 1. Orbital parameters of the 2001 Mars Odyssey mission for the nominal and possible extended mission periods. Upper plot shows the Local True and Local Mean Solar Time of the orbit (LTST, LMST). Drift in LMST will be stopped in late 2003 with a maneuver requiring ~ 8 m/s of velocity change. Lower plot shows the variation in Earth-Mars distance in astronomical units (AU). During most of 2003, proximity of the planets allows high downlink data rates.