MESUR NETWORK AND PATHFINDER MISSIONS

M. P. Golombek (Jet Propulsion Laboratory, Caltech, Pasadena, CA 91109 USA)

A network of surface landers on Mars, MESUR (for Mars Environmental SURvey), is currently being studied by JPL for NASA and is being coordinated with the ESA MARSNET study of a similar, complementary mission. In addition, a single launch of a network-like lander, MESUR Pathfinder is planned in 1996 as the first Discovery mission (inexpensive planetary mission of limited scope). MESUR Pathfinder is being designed as an engineering demonstration and prototype of the entry, descent and landing approach to be employed by Network landers. Pathfinder is currently conceived of as one or two small individual landers, each packaged within an aeroshell with a minimal cruise stage. The vehicles are launched, injected on a trans-Mars trajectory, fly independently to Mars, and enter the atmosphere directly on approach. Each vehicle is slowed by parachute for a semi-hard landing on a number of vented airbags. Within the airbags is a small tetrahedron shaped lander, whose petals open up, righting the vehicle. Instruments planned for Pathfinder include a surface imager, atmospheric structure instrument and an alpha proton x-ray spectrometer. A microrover is being considered to carry the alpha proton x-ray spectrometer to a number of different rocks and surface materials; a microrover camera is also being considered for closeup imaging, and for assessing lander condition. A scaled version of the Pathfinder lander structure is expected to be used by the MESUR Network mission, which is anticipated to follow Pathfinder by a few years. The MESUR Network mission involves emplacing 16 small landers on the surface of Mars over one or more launch opportunities. The scientific objectives of the mission and prospective strawman payload are: internal structure from surface seismometers, global atmospheric circulation from surface meteorology (pressure, temperature, humidity, wind, and atmospheric opacity), surface morphology and geology at meter scale from descent and surface imaging, atmospheric structure from entry packages (temperature, pressure, density), low-temperature geochemistry from thermal analysis/evolved gas analyzers, elemental composition of surface units from alpha-proton-x-ray spectrometers, and Mars planetary geodesy from radio tracking of surface stations. Landers are expected to survive concurrently for one martian year for the long-term seismology and meteorology measurements and to be globally distributed. Study over the next year will concentrate on communications options using a relay orbiter or transmitting directly to Earth, launch and network architecture strategy and microrovers on the Network landers to deploy instruments and explore locally.

1 Matthew Golombek
Jet Propulsion Laboratory, Mail Stop 183-501
4800 Oak Grove Drive
Pasadena, CA 91109 USA
Tel. (818)354-0424
Fax (818)393-4679

2. PS 5" A Network of Surface Stations on Mars: an International Approach for the Multidisciplinary Exploration of the Red Planet"

3. Professor Heinrich Wänke (Max- Planck Institut fur Chemie)

4. Overhead Projector

5. Oral Presentation