

Mars Lander Cameras for Pathfinder, Polar Lander, and Beyond

Peter H. Smith(psmith@lpl.arizona.edu)

Lunar and Planetary Lab, University of Arizona, Tucson, AZ 85721, U.S.A.

The Imager for Mars Pathfinder (IMP) returned 16,000 pictures of the Ares Vallis landing site. These images have been photometrically corrected, mosaicked, and geometrically corrected into maps of various kinds. The resolution of the images is 1 mrad/pixel and the height of the camera above the ground is about 1.8 m. With stereoscopic vision (baseline separation of 15 cm) a digital terrain map can be produced. We are in the process of making hyperspectral cubes with the 12 filters spanning the range from 440 to 1000 nm, correcting for the parallax between left and right eyes.

The Mars Polar Lander will have a copy of the IMP plus a camera on the robotic arm (RAC). The RAC has a focusable lens and provides 2 mrad resolution at infinity and 23 microns resolution when used as a microscope. Since it is positioned on the wrist of the arm which has an articulated shoulder and elbow, it can be used in a panoramic mode. Overlaps between frames can even provide stereoscopic capability. In the closeup mode there are 3-color illuminators used to separate ice crystals from mineral grains.

The 2001 lander will also have a robotic arm and RAC. The panoramic imaging will be accomplished by the rover payload, Athena; the resolution is planned to be 0.25 mrad/pixel. In addition, the RAC can take its lower resolution panoramas with a FOV of 28 degrees V x 56 degrees H. The limits to imaging on Mars are set by the data volumes that can be transmitted to Earth. Higher resolution is offset by increased data compression factors; the martian surface has an extremely high entropy and is not easily compressed. Future camera may incorporate smart algorithms that maximize the data volume around regions of highest interest.