Mars Pathfinder: Photogrammetric Processing of Lander Images and
Cartographic Analysis of the Landing Site from Orbit

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Following the successful landing of the Mars Pathfinder, DLR has carried out a comprehensive study of the Pathfinder landing site in terms of geology, mineralogy, and surface photometric properties. In this context, the Pathfinder image data were subjected to a variety of photogrammetric processing techniques to support the geoscientific analysis of the terrain. We selected 33 horizon images from a complete panoramic image sequence, corrected their nominal pointing data by block adjustment techniques, and compiled a 360¡ horizon mosaic. Sunrise/sunset images were used to determine precise North direction. Using these images as a frame, we derived a semi-controlled multispectral panorama of the landing site involving 155 images for each filter. Using stereo image matching techniques developed at DLR, we derived DTMs of the lander area and panoramas showing equal-distance and equal-elevation contours. In addition, we derived slope maps, as these were needed to compute precise illumination angles and to study photometric effects in images. In order to study the regional geological context of the landing site, we selected 19 Viking Orbiter images and compiled an orthoimage mosaic, geometrically precise with respect to the Pathfinder landing site. Coordinates of several hundreds of landmarks were measured in the images to establish a small control point network. Block adjustment techniques were used to improve the nominal camera pointing. Thereby, the precisely known Pathfinder image- and Mars-fixed coordinates were considered as a fixed control point. Images were reprojected to a sinusoidal map projection at a scale of 40 m/pixel using the pointing data from the adjustment.