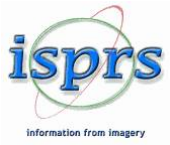

ISPRS Workshop on
Geospatial Data Infrastructure: from data acquisition and updating to smarter services
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ABSTRACT SUBMISSION FORM

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Title of the Paper **Photogrammetric Processing of Rover Images by example of NASAs MER Mission Data**
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Technical Session [3] workshop on Planetary Mapping organized by Working Group IV / 7 - Planetary Mapping and Databases
Keywords (5-8) [4] Planetary image data, close range imagery, matching, orientation, bundle block adjustment, Three-dimensional reconstruction

ABSTRACT(more than 300 words) [5]

We have developed a photogrammetric processing scheme for planetary rover image data which involves several main steps: dense image matching, improvement of orientation, and 3d-reconstruction. The first step uses DLR matching software which originally was built for matching orbital imagery [1]. The main problem with close range imagery is the wide range of disparities caused by the varying distances to the surface in the foreground and in the background. If not specifically dealt with, this problem typically requires large search areas for tie points and results in large numbers of mismatches. The workflow we adapted uses image pyramids where the matching starts at the top level where the image resolutions are sufficiently coarse to obtain reliable disparities for the entire image. At lower pyramidal levels the image matching is performed only for sub-images. Since for these sub-images the variation in disparities is predictable over a small range, the search range for the disparities can be reduced. In order to further reduce the number of mismatches, the matching is repeated with interchanged images.

The next step uses bundle adjustment in order to improve the exterior orientation [2]. A subset of corresponding points from the prior image matching step serve as tie points. Again, the varying distances to the surface affects the precision and even the numerical stability of the adjustment. During the adjustment, bad points are identified by using the Baarda method [3], and thus exluded from further analysis [2]. The final step uses the improved orientation and image points from the matching for a 3d-reconstruction which finally results in the desired description of topography.

We present results for the described photogrammetric processing by example of NASAs Mars Exploration Rover (MER) mission [4, 5, 6, 7]. Also, we present results from a field trial carried out within PRoVisG [8], a project supported the European Union FP7 program.

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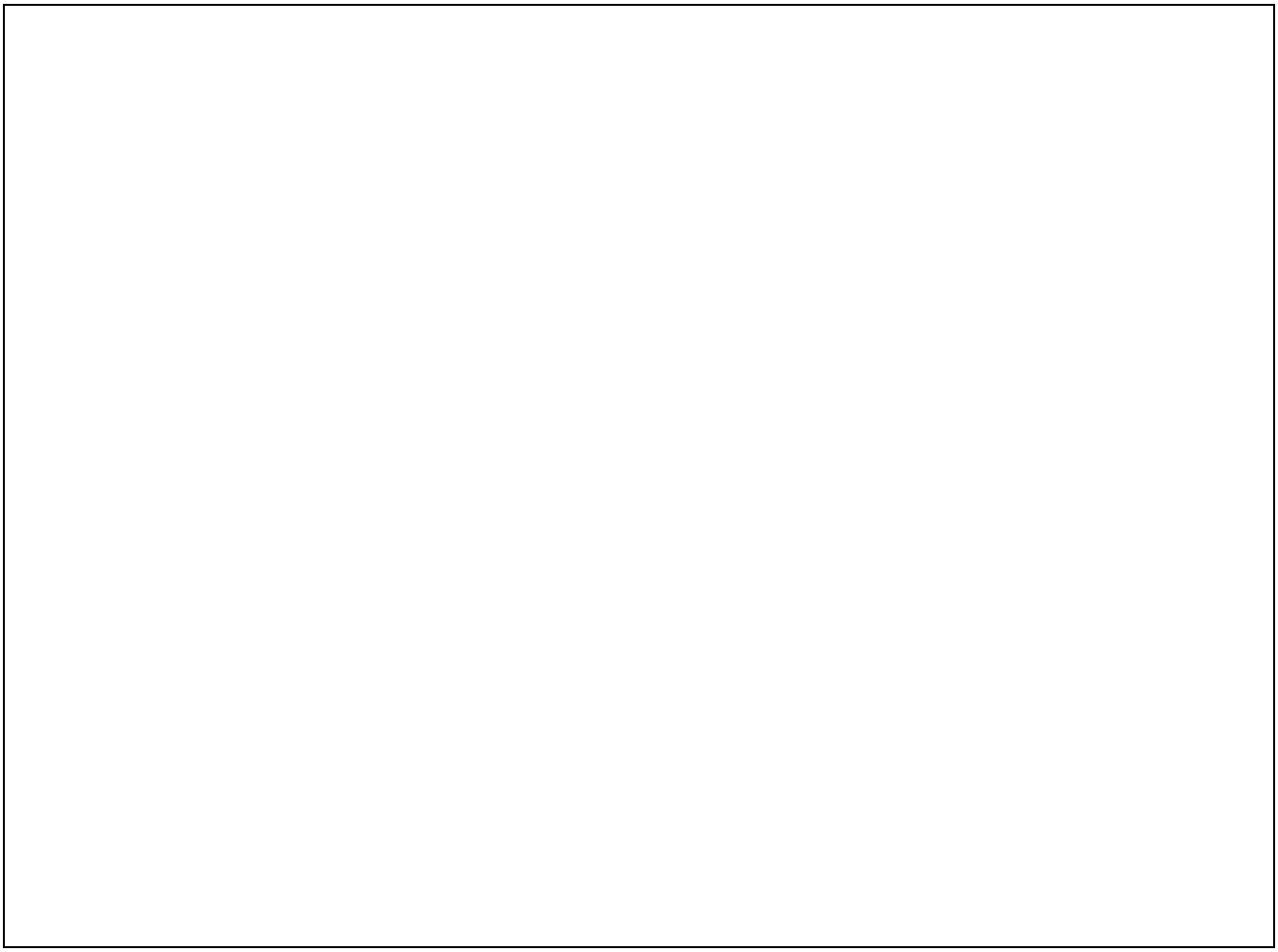
(If space is not enough, extra pages may be attached.)



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