

Comparison and Registration of LRO Laser Altimeter and Stereo Topographic Data

P. Gläser, I. Haase, F. Scholten, J. Oberst, M. Robinson, D. Smith

We compare and merge Lunar Reconnaissance Orbiter (LRO) topographic data obtained by the onboard laser altimeter LOLA (Lunar Orbiter Laser Altimeter) and computed from stereo images taken by the orbiter's camera LROC NAC (LRO Narrow Angle Camera).

While LOLA is collecting precise altimetric measurements along individual profiles, the NAC models provide contiguous coverage and context information. LOLA and LROC nominal data may suffer from combinations of time tag-, orbit-, and pointing data uncertainties. Hence, the precise registration of the two data sets (in particular, if obtained in different orbits) is often not obvious. In order to bring these two DTMs together, a surface matching routine has been developed.

First, the NAC DTM is re-sampled to match the spatial resolution of the LOLA laser spots (5 m). Height differences between subsequent LOLA points are calculated and compared with height differences of corresponding points in the NAC DTM. The LOLA track or the NAC DTM is shifted vertically and horizontally to minimize the height differences.

With this method, we obtain data on lateral and vertical offsets between the LOLA and LROC topographic data sets at the level of the LOLA spot size. Offset data from different orbits will provide crucial information on the precise alignment angles of NAC and LOLA. The procedure also allows us to merge NAC and LOLA data for studies of surface morphology at detail with available area context. Examples will be demonstrated at the meeting.