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The first DTM generated by STC/SIMBIOSYS that will be on board the BepiColombo mission

Cristina Re (1), Emanuele Simioni (2), Gabriele Cremonese (1), Riccardo Roncella (3), Gianfranco Forlani (3), Vania Da Deppo (2), and Giampiero Naletto (4)

(1) INAF Astronomical Observatory, Padova, Italy, (2) CNR-IFN Luxor, Padova, Italy, (3) Dept. of Civil Engineering, Parma University, Parma, Italy, (4) Centro Interdipartimentale Studi e Attività Spaziali (CISAS) - G. Colombo, University of Padova, Padova Italy

The STereo Camera for the BepiColombo mission to Mercury, integrated in the SIMBIO-SYS suite, has been designed to provide the three dimensional global mapping of the surface of the innermost planet of the Solar System. The camera will acquire images from two different points of view. The new stereo push-frame configuration adopted for the camera, with two different points of view with unique and simultaneous acquisition system, needs a pre-flight verification of the actual accuracies in obtaining elevation information from stereo couples. The generation of a Digital Terrain Model (DTM) from a series of stereo pairs acquired in laboratory has been considered a robust method to validate the new concept adopted for STC. A stereo validation setup, based on the used of two rotational stages, to get an indoor reproduction of the flight observing condition of the instrument has been developed in order to give a much greater confidence to the novel instrument design. Since in-flight STC will have to deal with source/target placed at infinity, an auxiliary optical system (collimator lens of 1 m focal) that collimates the light rays coming from the target, has been necessary to realize the indoor acquisition of the images. The stereo-pairs of a series of rock samples (anorthosite, basalt stones and a modelled piece of concrete that should simulate the Hermean surface by the characteristic scaled features) acquired in laboratory, have been introduced in the photogrammetric pipeline that consider the Dense Matcher as image matching program for the DTM generation. The actual accuracy evaluation of the instrument capability has been performed by comparing the STC DTMs produced by Dense Matcher software and the DTM produced by an high resolution laser scanning system as reference data. The latter has a much higher precision (ca. 20 μm) of the expected in-lab STC photogrammetric image network (190 μm).
We will show the first DTM generated by STC revealing a final accuracy of around 90 μm; demonstrating the great performance of a so original instrument.