

# ESTIMATE OF THE DTM DEGRADATION AS A FUNCTION OF THE COMPRESSION RATIO IN THE SIMBIO-SYS CONTEXT

C.Re<sup>a\*</sup>, E.Simioni<sup>b</sup>, G.Cremonese<sup>a</sup>, Yves Langevin<sup>c</sup>, R.Roncella<sup>d</sup>, G.Forlani<sup>d</sup>, V. Da Deppo<sup>b</sup>, G. Naletto<sup>e</sup>, G. Salemi<sup>f</sup>

<sup>a</sup> INAF Astronomical Observatory, 35122, Padova, Italy - [cristina.re@studenti.unipr.it](mailto:cristina.re@studenti.unipr.it), [gabriele.cremonese@oapd.inaf.it](mailto:gabriele.cremonese@oapd.inaf.it)

<sup>b</sup> CNR-Institute for Photonics and Nanotechnologies UOS Padova LUXOR, 35131, Padova, Italy

<sup>c</sup> Institut d'Astrophysique spatiale, 91405 Orsay, France

<sup>d</sup> Dept.of Civil Engineering, Parma University, 43124, Parma, Italy - ([riccardo.roncella](mailto:riccardo.roncella@unipr.it), [gianfranco.forlani](mailto:gianfranco.forlani@unipr.it))@unipr.it

<sup>e</sup> Centro Interdipartimentale Studi e Attività Spaziali (CISAS) - G. Colombo, University of Padova, Padova Italy,

<sup>f</sup> Department of Cultural Heritage: Archaeology and History of Art, Cinema and Music, University of Padova, Italy

## Commission IV , WG IV/8

**KEY WORDS:** Compression, Accuracy, DTM, Stereo Imaging, Image Matching

### ABSTRACT:

The Stereo Camera (STC), one of the three SIMBIO-SYS channels, for the BepiColombo Mission to Mercury will have as main scientific objective the global mapping in 3D of the entire surface of the Planet. The great amount of data that will be produced during the imaging experiments needs a compromise with the restrictions imposed by the band downlink that could drastically reduce the duration and frequency of the observations. The implementation of a real time compression is the best method to help the scientific data production. Since the STC imaging system is aimed at an high accurate and precise DTMs generation, the evaluation of the image compression on the final DTM production has been considered a process condition that is worth to be investigated. During the stereo-validation procedure of the innovative STC imaging system, several image pairs of known targets (anorthosite stone and modelled piece of concrete) have been acquired under different illumination angles. The availability of this set of images gave the opportunity to apply and test the compression algorithm [Said-Pearlman tree-coding algorithm- Y. Langevin]. The idea is based on the evaluation of the image compression effects on the accuracy of the DTM deriving from several processing configurations taking in account at the same time both the illumination of the surface and the compression ratio. The accuracy of the DTMs is evaluated from the comparison with a high resolution laser-scanner acquisition of the same surfaces (known targets) involved in the stereo-validation procedure developed for the STC characterization in laboratory. In order to test how the morphology could affect the 3D-reconstruction besides the analysis of the two targets proposed in laboratory, a set of MDIS-MESSENGER images have been examined for their high frequency features characteristics that could not be reproduced in the target images. By superimposing the dark fraction (DSNU) computed from the STC images on that real images of the Mercury surface; after the compression process, the generated DTMs have been compared with reference DTMs helpful in the accuracy evaluation. With this kind of available dataset an investigation about the influence of the space-images compression has been carried on providing information regarding the future Mercury DTM production quality.

---

\* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.