Geophysical Research Abstracts
Vol. 19, EGU2017-4481, 2017
EGU General Assembly 2017

Generation of Digital Surface Models from satellite photogrammetry: the DSM-OPT service of the ESA Geohazards Exploitation Platform (GEP)

André Stumpf (1), David Michéa (2), and Jean-Philippe Malet (3)

(1) École et Observatoire des Sciences de la Terre - CNRS UMS 830, University of Strasbourg, 5 rue René Descartes, 67084 Strasbourg, (2) Laboratoire des sciences de l'ingénieur, de l'informatique et de l'imagerie - ICube CNRS UMR 7357, University of Strasbourg, 300 bd Sébastien Brant, 67412 Illkirc, (3) Institut de Physique du Globe de Strasbourg - CNRS UMR 7516, University of Strasbourg, 5 rue Descartes, 67084 Strasbourg

The continuously increasing fleet of agile stereo-capable very-high resolution (VHR) optical satellites has facilitated the acquisition of multi-view images of the earth surface. Theoretical revisit times have been reduced to less than one day and the highest spatial resolution which is commercially available amounts now to 30 cm/pixel. Digital Surface Models (DSM) and point clouds computed from such satellite stereo-acquisitions can provide valuable input for studies in geomorphology, tectonics, glaciology, hydrology and urban remote sensing The photogrammetric processing, however, still requires significant expertise, computational resources and costly commercial software.

To enable a large Earth Science community (researcher and end-users) to process easily and rapidly VHR multi-view images, the work targets the implementation of a fully automatic satellite-photogrammetry pipeline (i.e DSM-OPT) on the ESA Geohazards Exploitation Platform (GEP). The implemented pipeline is based on the open-source photogrammetry library MicMac [1] and is designed for distributed processing on a cloud-based infrastructure. The service can be employed in pre-defined processing modes (i.e. urban, plain, hilly, and mountainous environments) or in an advanced processing mode (i.e. in which expert-users have the possibility to adapt the processing parameters to their specific applications).
Four representative use cases are presented to illustrate the accuracy of the resulting surface models and ortho-images as well as the overall processing time. These use cases consisted of the construction of surface models from series of Pléiades images for four applications: urban analysis (Strasbourg, France), landslide detection in mountainous environments (South French Alps), co-seismic deformation in mountain environments (Central Italy earthquake sequence of 2016) and fault recognition for paleo-tectonic analysis (North-East India). Comparisons of the satellite-derived topography to airborne LiDAR topography are discussed.

[1] Rupnik, E., Pierrot Deseilligny, M., Delorme, A., and Klinger, Y.: Refined satellite image orientation in the free open-source photogrammetric tools APERO/MICMAC, ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci., III-1, 83-90, doi:10.5194/isprs-annals-III-1-83-2016, 2016.