Geophysical Research Abstracts
Vol. 18, EGU2016-12279, 2016
EGU General Assembly 2016

The Pilot Project 'Optical Image Correlation' of the ESA Geohazards Thematic Exploitation Platform (GTEP)

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Since more than 20 years, "Earth Observation" (EO) satellites developed or operated by ESA have provided a wealth of data. In the coming years, the Sentinel missions, along with the Copernicus Contributing Missions as well as Earth Explorers and other, Third Party missions will provide routine monitoring of our environment at the global scale, thereby delivering an unprecedented amount of data. While the availability of the growing volume of environmental data from space represents a unique opportunity for science, general R&D, and applications, it also poses major challenges to fully exploit the potential of archived and daily incoming datasets. Those challenges do not only comprise the discovery, access, processing, and visualization of large data volumes but also an increasing diversity of data sources and end users from different fields (e.g. EO, in-situ monitoring, and modeling).
In this context, the GTEP (Geohazards Thematic Exploitation Platform) initiative aims to build an operational distributed processing platform to maximize the exploitation of EO data from past and future satellite missions for the detection and monitoring of natural hazards.
This presentation focuses on the "Optical Image Correlation" Pilot Project (funded by ESA within the GTEP platform) which objectives are to develop an easy-to-use, flexible and distributed processing chain for:
1) the automated reconstruction of surface Digital Elevation Models from stereo (and tristereo) pairs of Spot 6/7 and Pléiades satellite imagery,
2) the creation of ortho-images (panchromatic and multi-spectral) of Landsat 8, Sentinel-2, Spot 6/7 and Pléiades scenes,
3) the calculation of horizontal (E-N) displacement vectors based on sub-pixel image correlation.
The processing chains is being implemented on the GEP cloud-based (Hadoop, MapReduce) environment and designed for analysis of surface displacements at local to regional scale (10-1000 km2) targeting in particular co-seismic displacement and slow-moving landslides. The processing targets both the analysis of time-series of archived data (Pléiades, Landsat 8) and current satellite missions Spot 6/7 and Sentinel-2. The possibility of rapid calculation in near-real time is an important aspect of the design of the processing chain.
Archived datasets will be processed for some 'demonstrator' test sites in order to develop and test the implemented workflows.