Geophysical Research Abstracts
Vol. 18, EGU2016-14960, 2016
EGU General Assembly 2016

Unsupervised DInSAR processing chain for multi-scale displacement analysis

Francesco Casu and Michele Manunta
IREA - CNR, Napoli, Italy (casu.f@irea.cnr.it)

Earth Observation techniques can be very helpful for the estimation of several sources of ground deformation due to their characteristics of large spatial coverage, high resolution and cost effectiveness. In this scenario, Differential Synthetic Aperture Radar Interferometry (DInSAR) is one of the most effective methodologies for its capability to generate spatially dense deformation maps at both global and local spatial scale, with centimeter to millimeter accuracy. DInSAR exploits the phase difference (interferogram) between SAR image pairs relevant to acquisitions gathered at different times, but with the same illumination geometry and from sufficiently close flight tracks, whose separation is typically referred to as baseline. Among several, the SBAS algorithm is one of the most used DInSAR approaches and it is aimed at generating displacement time series at a multi-scale level by exploiting a set of small baseline interferograms.
SBAS, and generally DInSAR, has taken benefit from the large availability of spaceborne SAR data collected along years by several satellite systems, with particular regard to the European ERS and ENVISAT sensors, which have acquired SAR images worldwide during approximately 20 years. Moreover, since 2014 the new generation of Copernicus Sentinel satellites has started to acquire data with a short revisit time (12 days) and a global coverage policy, thus flooding the scientific EO community with an unprecedent amount of data. To efficiently manage such amount of data, proper processing facilities (as those coming from the emerging Cloud Computing technologies) have to be used, as well as novel algorithms aimed at their efficient exploitation have to be developed.
In this work we present a set of results achieved by exploiting a recently proposed implementation of the SBAS algorithm, namely Parallel-SBAS (P-SBAS), which allows us to effectively process, in an unsupervised way and in a limited time frame, a huge number of SAR images, thus leading to the generation of Interferometric products for both global and local scale displacement analysis. Among several examples, we will show a wide displacement SBAS processing, carried out over the southern California, during which the whole ascending ENVISAT data set of more than 740 images has been fully processed on a Cloud Computing environment in less than 9 hours, leading to the generation of a displacement map of about 150,000 square kilometres.
The P-SBAS characteristics allowed also us to integrate the algorithm within the ESA Geohazard Exploitation Platform (GEP), which is based on the use of GRID and Cloud Computing facilities, thus making freely available to the EO community a web tool for massive and systematic interferometric displacement time series generation.
This work has been partially supported by: the Italian MIUR under the RITMARE project; the CNR-DPC agreement and the ESA GEP project.