Geophysical Research Abstracts
Vol. 17, EGU2015-7802, 2015
EGU General Assembly 2015

New perspectives and advanced approaches on effectively processing Big InSAR data: from long term ERS archives to new Sentinel-1 massive data flow

Francesco Casu (1), Claudio De Luca (1,2), Stefano Elefante (1), Riccardo Lanari (1), Michele Manunta (1), and Ivana Zinno (1)

(1) IREA - CNR, Napoli, Italy (casu.f@irea.cnr.it), (2) Università degli studi di Napoli Federico II - DIETI, Napoli, Italy

Advanced differential Synthetic Aperture Radar (SAR) Interferometry (InSAR) usually identifies a set of algorithms, tools and methodologies for the generation of Earth's surface deformation maps and time series computed from a sequence of multi-temporal differential SAR interferograms. Such techniques found their success on the large availability of SAR data archives acquired over time by several satellite systems. Indeed, the current radar Earth Observation (EO) scenario takes advantage of the widely diffused long-term C-band ESA (e.g. ERS-1, ERS-2 and ENVISAT) and Canadian (RADARSAT-1/2) SAR data archives, which have been acquired during the last 20 years, as well as of data sequences provided by the X-band generation SAR sensors, such as the COSMO-SkyMed (CSK) and TerraSAR-X (TSX) constellations. Moreover, a massive and ever increasing data flow will be further supplied by the recently launched (April 2014) Copernicus (European Union) SENTINEL-1A SAR satellite, which will also be paired during 2016 with the SENTINEL-1B twin system that will allow halving the constellation revisit time (from 12 to 6 days).
In this context, the massive exploitation of these Big InSAR Data archives for the generation of advanced products will open new research perspectives to understand Earth's surface deformation dynamics at global scale. However, to reach this ambitious goal, Big InSAR Data has to be effectively exploited to generate accurate advanced products in short time frames. Therefore the need of new InSAR processing approaches, efficient algorithms and high performance computing facilities represents the basis for fully benefiting from such a Big Data.
In this work we first present the recently proposed Parallel Small BAseline Subset (P-SBAS) InSAR algorithm that has been designed to process big volumes of InSAR data in short times and unsupervised manner by exploiting High Performance Computing (HPC) facilities. Then, we show how the P-SBAS approach is well suitable for being applied in HPC on public Cloud contexts, providing extensive tests on the Amazon Web Services (AWS), thus demonstrating its portability and scalability on a large number of processing nodes. Moreover, the P-SBAS characteristic to be fully unsupervised permitted us to release its open on-line version available through the ESA's G-POD environment, that allows remotely processing the historical ESA SAR archives via web interface. Finally, we show the extension of the P-SBAS approach to generate Sentinel-1 InSAR products in automatic manner, thus opening the way to systematically process InSAR data for Earth's surface displacement monitoring at global scale.