Geophysical Research Abstracts
Vol. 17, EGU2015-6748-1, 2015
EGU General Assembly 2015

EPOSAR: an innovative service to provide EPOS community with advanced DInSAR products

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The quantitative evaluation of ground deformation is traditionally based on in-situ surveying techniques that, through the intensive use of GPS stations, automatic total stations and levelling benchmarks, can measure up to sub-centimetre displacements. In the last decades, the extensive use of satellite remote sensing data, such as Synthetic Aperture Radar (SAR) images, has represented an important breakthrough in the context of non-invasive ground deformation analyses over large areas, thanks to their large spatial coverage and relatively short revisit time, as well as to their medium-high ground resolution. In such a context, the well-known Differential SAR Interferometry (DInSAR) technique allows us to map and measure deformation phenomena due to both natural and man-made causes with centimetre to millimetre accuracy.

The Earth Science community has a wide interest in the use of DInSAR displacement maps both for crisis management and risk mitigation activities, and for surveillance, monitoring and analysis of geophysical phenomena. In areas characterized by high level of hazards the availability of routinely generated advanced DInSAR products would allow a fast analysis of their current status, providing a near real time monitoring. Similarly, an on-demand service would allow the customization of the products by selecting the area of interest, the SAR data to be processed, and other processing parameters to be set by the users to edit/correct/improve the final products.

In this work we discuss the Satellite Data Thematic Core Service of EPOS and we present the EPOSAR service. In particular, the EPOSAR service, based on the well-known DInSAR approach referred to as Small Baseline Subset (SBAS), accomplishes a shared and synergic Earth Observation (EO) service aimed at designing, implementing and harmonizing efficient satellite data processing chains capable of ingesting the significantly increased data stream expected from the ESA Sentinel-1 satellites. EPOSAR provides validated services and products targeted for institutional, scientific and educational uses, for advanced monitoring, analysis, and management. The key user of the EPOSAR service is the Earth Science Community represented by the EPOS infrastructure.

EPOSAR service is developed to be accessible via web and permits user to select satellite data from on-line catalogues and process them on-demand via SBAS-DInSAR algorithm on dedicated computing facilities in unsupervised way. The results are made available to the user to be integrated in his own environment. Furthermore, the EPOSAR service can systematically generate displacement maps on areas of particular interest (i.e. supersites), immediately after the availability of new acquisitions. EPOSAR service is fully automatic, so that user intervention, usually required by conventional DInSAR software packages, is not needed. With EPOSAR, the user interaction should be reduced to the selection of the SAR dataset to be processed, the specification of some few initial parameters and the identification of the required products.

A first release of EPOSAR service is already available through the ESA's G-POD environment, and allows remotely processing, via a web interface, the historical ESA SAR archives.