



## **The SBAS Sentinel-1 Surveillance service for automatic and systematic generation of Earth surface displacement within the GEP platform.**

Francesco Casu, Claudio De Luca, Riccardo Lanari, Michele Manunta, and Ivana Zinno  
IREA - CNR, Naples, Italy (deluca.c@irea.cnr.it)

The Geohazards Exploitation Platform (GEP) is an ESA activity of the Earth Observation (EO) ground segment to demonstrate the benefit of new technologies for large scale processing of EO data. GEP aims at providing both on-demand processing services for scientific users of the geohazards community and an integration platform for new EO data analysis processors dedicated to scientists and other expert users.

In the Remote Sensing scenario, a crucial role is played by the recently launched Sentinel-1 (S1) constellation that, with its global acquisition policy, has literally flooded the scientific community with a huge amount of data acquired over large part of the Earth on a regular basis (down to 6-days with both Sentinel-1A and 1B passes). Moreover, the S1 data, as part of the European Copernicus program, are openly and freely accessible, thus fostering their use for the development of tools for Earth surface monitoring. In particular, due to their specific SAR Interferometry (InSAR) design, Sentinel-1 satellites can be exploited to build up operational services for the generation of advanced interferometric products that can be very useful within risk management and natural hazard monitoring scenarios.

Accordingly, in this work we present the activities carried out for the development, integration, and deployment of the SBAS Sentinel-1 Surveillance service of CNR-IREA within the GEP platform. This service is based on a parallel implementation of the SBAS approach, referred to as P-SBAS, able to effectively run in large distributed computing infrastructures (grid and cloud) and to allow for an efficient computation of large SAR data sequences with advanced DInSAR approaches.

In particular, the Surveillance service developed on GEP platform consists on the systematic and automatic processing of Sentinel-1 data on selected Areas of Interest (AoI) to generate updated surface displacement time series via the SBAS-InSAR algorithm. We built up a system that is automatically triggered by every new S1 acquisition over the AoI, once it is available on the S1 catalogue. Then, tacking benefit from the SBAS results generated by previous runs of the service, the system processes the new acquisitions only, thus saving storage space and computing time and finally generating an updated SBAS time series.

The same P-SBAS processor underlying the Surveillance service is also available through the GEP as a standard on-demand DInSAR service, thus allowing the scientific community to generate S1 SBAS time series on areas not covered by the Surveillance service itself.

It is worth noting that the SBAS Sentinel-1 Surveillance service on GEP represents the core of the EPOSAR service, which will deliver S1 displacement time series of Earth surface on a regular basis for the European Plate Observing System (EPOS) Research Infrastructure community. In particular, the main goal of EPOSAR is to contribute with advanced technique and methods, which have already well demonstrated their effectiveness and relevance, in investigating the physical processes controlling earthquakes, volcanic eruptions and unrest episodes as well as those driving tectonics and Earth surface dynamics.