INSARAP-2: SENTINEL-1 INSAR PERFORMANCE STUDY WITH TOPS DATA

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ABSTRACT:

Although not a designated science mission, the Sentinel-1 constellation will be a game-changer for scientific applications of Synthetic Aperture Radar Interferometry (InSAR). In particular, its unprecedented regular sampling with short repeat cycle will enable deformation monitoring over a much wider range of geophysical phenomena. The system parameters ensure high coherence, which is very important for InSAR time series analysis. In addition, the operational acquisition scheme, coupled with the free and open data policy, makes planning of scientific experiments much more practical.
The manifold increase in quality and availability of InSAR data provided by Sentinel-1 comes at a cost. The novel TOPS mode was necessary to achieve the specified repeat cycle of 12 days globally. Processing algorithms for the traditional stripmap mode are generally mature in the community. However, for the new TOPS acquisition mode, several new aspects must be handled, including time varying doppler and multiple small images per product instead of one larger. Thus, common InSAR processing practices will need to be revised and extended.
The primary objective of the INSARAP project is to develop the necessary tools to handle TOPS mode data, and to validate the functionality in terms of geophysical applications by comparison to historical InSAR data and ground truth. Towards this end, number of pilot sites have been selected, covering the topics of tectonics, landslides, urban subsidence, ice motion, and system validation with corner reflectors.
In this contribution, we will briefly present the processing and algorithmic challenges related to TOPS acquisition mode and large data volumes, and show some preliminary results based on the available Sentinel-1 TOPS data from the project test sites.

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