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# Surface deformation analysis of very extended areas by applying the SBAS-DInSAR technique

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Differential Synthetic Aperture Radar Interferometry (DInSAR) is a remote sensing technique allowing us to analyze surface deformation phenomena on a centimeter (in some cases millimeter) scale [1]. The DInSAR methodology has been originally applied to investigate single deformation events but, more recently, several advanced approaches have been developed in order to investigate the temporal evolution of the detected displacements via the generation of deformation time series.

In this work we focus on the advanced DInSAR technique referred to as Small BAseline Subset (SBAS) approach [2] and investigate the possibility of applying this algorithm to produce deformation maps of very extended areas by exploiting low resolution SAR data. The basic idea is to combine several contiguous SAR data frames, belonging to the same satellite track, in order to compute long SAR image strips relevant to the investigated zone. Moreover, the image resolution along the azimuth direction is deliberately degraded in order to reduce the amount of data to be processed. Starting from these data, multilook interferograms are produced and subsequently inverted via the standard SBAS procedure, thus allowing to generate mean deformation velocity

maps and the corresponding time series.

The proposed approach has been applied to a set of 44 European Remote Sensing (ERS) SAR data (track 442, frames: 2781-2871) relevant to an area, located in Nevada (USA), extending for about 600 x 100 km, with the generated DInSAR products having a spatial resolution of about 200 x 200 m.

The presented results demonstrate the large scale deformation retrieval capability of the proposed approach.

**References**

[1] Gabriel, A. K., Goldstein, R. M., & Zebker, H. A. (1989). Mapping small elevation changes over large areas: Differential interferometry. *J. Geophys. Res*., 94, 9183-9191.

[2] Berardino, P., Fornaro, G., Lanari, R., & Sansosti, E. (2002). A new Algorithm for Surface Deformation Monitoring based on Small Baseline Differential SAR Interferograms. *IEEE Transactions on Geoscience and Remote Sensing*, 40, 11, 2375-2383.