PSIC4: the IREA contribution based on the exploitation of the SBAS approach

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Abstract

We present in this work the results achieved by the IREA team within the ESA project entitled PSIC4, Persistent Scatterer Interferometry Codes Cross−Comparison and Certification for long−term differential interferometry. In particular, the presented results have been obtained by applying the technique referred to as Small Baseline Subset (SBAS) approach [1]; this algorithm is based on the use of small baseline differential SAR interferograms, allowing us to mitigate decorrelation phenomena, and on the application of the singular value decomposition (SVD) method for combining independent SAR acquisition data sets, thus increasing the number of images used for the DInSAR analysis. More specifically, we have applied the two−scale resolution SBAS procedure discussed in [2], that is based on the joint analysis of both low and full resolution interferograms; the former provide information on the large scale displacements, the latter allows us to extend the deformation analysis to the full resolution products for investigating selected areas. Moreover, we have exploited the multi−sensor extension of the SBAS algorithm [3], which permits to integrate the ERS data with a set of ASAR ENVISAT acquisitions relevant to the IS2 swath; this integration is achieved by treating the ENVISAT images as an independent subset which is easily merged with the ERS data with no need of major modifications of the SBAS procedure and fully avoiding the use of ERS/ENVISAT cross− interferograms.

The data processing operation has been focused on the generation of deformation time−series produced from SAR data acquired by the ERS−1/2 and ENVISAT sensors from one descending track (track: 65, frame: 2727); the processed data spans the 1993−2005 time interval and involves 89 acquisitions (81 from the ERS sensors and 8 from the ASAR ENVISAT one, the latter operating on the IS2 swath) imaging an area located in the south of France, near the city of Marseilles. Overall, we have generated 221 interferograms characterized by a perpendicular baseline component smaller than 300 m, a maximum temporal baseline of 4 years and a doppler frequency separation between the data pairs not exceeding 1000Hz; precise satellite orbital information and an SRTM DEM of the investigated area have also been used. We will present in this work the results of the low resolution analysis carried out on a large portion of the entire frame (about 80x80 Km) as well as the full resolution products related to the zone selected for the project, that extends for about 40x30 Km. Moreover, the low resolution results will be also made accessible through the IREA web GIS site [4].

References