



## **Monitoring small land subsidence phenomena in the Marmara see region by new SAR generation satellite ESA Sentinel 1**

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### **Abstract**

The Marmara see region is a large and dense urbanized area affected by tectonics deformations due to the presence of the underlying North Anatolia Fault. This area is affected by strong seismic phenomena (Izmit and Duzce earthquake), and by landslide and small surface deformation.

The new generation ESA SAR satellites Copernicus Sentinel-1 system TOPS (Terrain Observation with Progressive Scans in azimuth) permit a short acquisition repetition cycle, an extreme large coverage, a high spatial resolution to respect the covered area and a small baseline separation. All of those characteristics suggest an intensive exploitation of these data through the usage of the interferometry technology and in particular the stacking interferometry for the small terrain displacement monitoring. The Sentinel-1 mission is made up of a constellation of two satellites (A and B units) each carrying a C-band SAR sensor. The objective of the S-1 mission is to acquire systematically with a 12-day repeat orbit cycle for each satellite with a small orbital baselines, characteristics particularly suited for interferometry application. In the near future, when both satellites will be active, there will be an acquisition every 6 days, covering the whole area.

The first TOPSAR interferogram has been successfully produced, and the SARscape<sup>®</sup> stacking processing chains (SBAS and PSI) have been update to support this new sensor. The SBAS (Small Baseline) technique seems to be the best candidate for this application relatively to the morphology and large extension of Marmara region. Moreover the new incremental SBAS will permit a velocity map (at about 25 meters spatial resolution) estimation at near real time at each Sentinel-1 acquisition.

We are collecting imaging over the Marmara since October 2014 within the framework of European FP7 Marsite project. In February-March 2015 we will have enough acquisition to perform the first SBAS TOPSAR monitoring of this area. The SBAS processing chain has been updated to support and to exploit external information sources such as atmospheric phase distortion removal (two services are supported: ECMWF-European Center Medium Weather Forecast, and OSCAR-Online Services for Correcting Atmosphere in Radar) or earthquakes modeling for a more precise time series estimation.