

# **Contribution of InSAR Deformation Analysis to Monitoring Coastal Erosion in the Region of Central Macedonia**

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**Key words:** Deformation measurement; Remote sensing; InSAR; SBAS; erosion; subsidence; monitoring

## **SUMMARY**

The combined effects of climate change and human activities are the primary source of soil erosion and its acceleration, which has substantial impact to the anthropogenic environment and financial consequences. The focus of the present work is on the development of processing algorithms and geographic databases for the determination and simulation of coastal erosion and its acceleration within the Region of the Central Macedonia, Greece. Remotely sensed, through the Sentinel constellation as well as heterogenous in-situ data are employed in order to derive reliable time-series of vertical deformations. In that respect, the Interferometric Synthetic Aperture Radar (InSAR) technique for the detection and monitoring of deformation phenomena has been exploited, while possible correlations to the malformation of the coastal area of Central Macedonia have been analyzed.

A large set of ascending and descending C-band Sentinel – SAR Single Look Complex (SLC) images, covering the period between 2017 and 2020, was employed to an advanced multipass technique that combines unwrapped interferograms with small spatial and temporal baselines to minimize the topographic and atmospheric artifacts. The results obtained by this method showed the existence of subsidence phenomena in urban as well as rural areas. The detected subsidence trend reached absolute values of 2mm/yr over some of the investigated areas. As a final step, the correlation of the obtained results with those obtained from a 50- and 100-year simulation, under the pressure of tidal waves, has been performed. Finally, the generated geospatial infrastructure is outlined, referring to an online platform employing visualization and analysis tools aiming at the creation of an Integrated Observatory of Climate Change in the Region of Central Macedonia.

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