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Surface deformation analysis of the Napoli bay (Italy) area: sixteen years of ERS and ENVISAT DInSAR observations

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Differential Synthetic Aperture Radar Interferometry (DInSAR) is a microwave remote sensing technique that allows us to investigate surface deformation phenomena with a centimeter to millimeter accuracy with a large spatial coverage capability. Firstly applied to investigate single deformation events, the DInSAR algorithms have further been developed to analyze the temporal evolution of the detected displacements via the generation of deformation time series.

We exploit in this work the advanced DInSAR technique referred to as Small BAseline Subset (SBAS) approach [1]. In particular, we take advantage of the SBAS multi-sensor DInSAR capability [2] which allows us to generate mean deformation velocity maps and corresponding time series by jointly exploiting SAR images collected by the ERS and ENVISAT SAR sensors of the European Space Agency (ESA). We also benefit from the use of multi-orbit (ascending and descending) data which permit us to discriminate the vertical and east-west components of the retrieved displacements.

In this study we investigate the ongoing deformation occurring in the Napoli bay area (Italy), which includes three volcanic systems (the Campi Flegrei caldera, the Somma-Vesuvio volcanic complex and the Ischia island) and highly urbanized zones, such as the city of Napoli.

More specifically, the performed analysis is carried out by applying the SBAS-DInSAR technique to a set of 165 ERS and 62 ENVISAT SAR data acquired on ascending (track 129, frame 809) and descending (track 36, frame 2781) orbits from 1992 to the end of 2007.

The presented results provide spatially dense information on the temporal evolution of the detected deformation, demonstrating the powerful survey capability of the multi-sensor SBAS-DInSAR technique.

References

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