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# Quality assessment of DInSAR deformation measurements in volcanic areas by comparing GPS and SBAS results

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Differential Synthetic Aperture Radar Interferometry (DInSAR) is a methodology able to measure ground deformation rates and time series of relatively large areas. Several different approaches have been developed over the past few years: they all have in common the capability to measure deformations on a relatively wide area (say 100 km by 100 km) with a high density of the measuring points. For these reasons, DInSAR represents a very useful tool for investigating geophysical phenomena, with particular reference to volcanic areas.

As for any measuring technique, the knowledge of the attainable accuracy is of fundamental importance. In the case of DInSAR technology, we have several error sources, such as orbital inaccuracies, phase unwrapping errors, atmospheric artifacts, effects related to the reference point selection, thus making very difficult to define a theoretical error model.

A practical way to obtain assess the accuracy is to compare DInSAR results with independent measurements, such as GPS or levelling. Here we present an in-deep comparison between the deformation measurement obtained by exploiting the DInSAR technique referred to as Small BAseline Subset (SBAS) algorithm and by continuous GPS stations. The selected volcanic test-sites are Etna, Vesuvio and Campi Flegrei, in Italy.

From continuous GPS data, solutions are computed at the same days SAR data are acquired for direct comparison. Moreover, three dimensional GPS displacement vectors are projected along the radar line of sight of both ascending and descending acquisition orbits. GPS data are then compared with the coherent DInSAR pixels closest to the GPS station.

Relevant statistics of the differences between the two measurements are computed and correlated to some scene parameter that may affect DInSAR accuracy (altitude, terrain slope, etc.).