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The impact of new generation SAR sensors in ground deformation studies

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Most of the Synthetic Aperture Radar (SAR) satellite missions launched in the last two decades, e.g., ERS, ENVISAT, RADARSAT-1, ALOS-1, have been recently completed or are approaching the end of their lifetime. They have given a strong contribution to geophysical analyses in many fileds, mostly due to the capability of measuring ground deformation through Differential SAR Interferometry (DInSAR) techniques.

Based on this experience, a "second generation" of SAR sensors have been recently launched (TerraSAR-X, Cosmo-SkyMed, RADARSAT-2) and/or will be launched in the near future (Sentinel, ALOS-2). Although some of them differ for the operating band, all these new systems exhibit a common characteristics: a reduced repeat time with respect to previous generation sensors and, for most of them, an improved ground resolution.

While these two characteristics, improved ground resolution and reduced repeat time, are in general highly desirable, they undoubtedly induce an significant increase of the computational load and data storage needed to process data, especially when the generation of time series is in order.

However, when the deformation information is to be inverted in order to estimate some geophysical parameters (source position and strength, for example) through mathematical models, both in the case of numerical and analytical modeling, the information increase is not always fully utilized. For instance, most of the current inversion procedures includes some kind of spatial undersampling of the data (decimation, quad-tree, etc.) to reduce the data to an amount manageable by the inversion routines. Moreover, temporal modeling is rarely performed.

In this talk we analyze the impact of the second generation SAR data on the geophysical interpretation of the deformation phenomena. We compare results obtained by processing the data at different spatial and temporal scales to highlight the possible differences in the corresponding geophysical interpretation.

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