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Performance Analysis of Tandem-L Mission for Modeling Volcanic and Seismic Deformation Sources

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Although a great number of publications have focused on the application of InSAR in deformation source modeling as well as the development of different algorithms in this regard, little investigation has been dedicated to the sensitivity analysis of the InSAR in deformation source modeling. Our purpose is to address this issue by analyzing the reliability of InSAR in modeling the deformation sources due to landslides, seismic and volcanic activities, with special focus on the L band SAR measurements.

The sensitivity analysis is considered for three commonly used geophysical models in case of subsidence, seismic and volcanic activities; namely, the Gaussian subsidence bowl, Okada and Mogi point source, respectively. In each of the cases, the InSAR sensitivity is analytically formulated and its performance is investigated using simulated SAR data. The investigations are carried out using stochastic error propagation approaches to infer the precision of the models' parameters as well as their mutual covariance. The limiting factors in SAR interferometry are categorized in two groups and investigated separately in sensitivity analysis; with the first dealing with the geometrical limits imposed by the side looking geometry of the SAR measurements and the second focusing on the InSAR stochastic characteristics in the L band.