Measuring interseismic long wavelength ground displacement with InSAR

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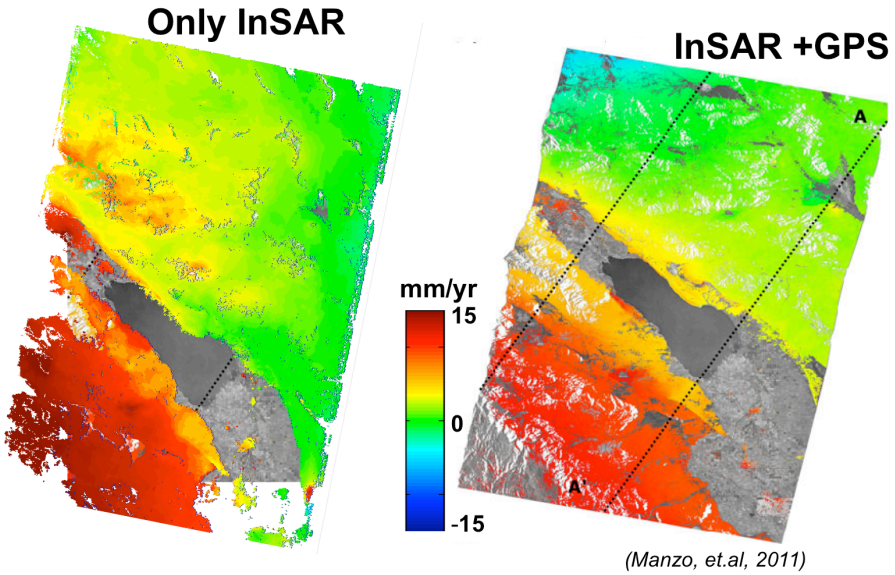
Although Interferometric Synthetic Aperture Radar (InSAR) can be successfully used to measure crustal displacement in areas with localized deformation like volcanoes, earthquake epicenters and subsiding cities, its measurements of interseismic long-wavelength displacements are inaccurate. Orbital error is traditionally considered as the source of this InSAR's limitation. However, there is a lack of studies to assess the contribution of orbital error in InSAR displacement velocity maps. To properly evaluate the InSAR ability in measuring long-wavelength displacement, we present, for the first time, the mathematical formulation of orbital error contribution in InSAR LOS displacement velocity maps. This formulation enables us to analyze the potential of past, current and future SAR missions in measuring long-wavelength displacement.

We present the interseismic long-wavelength displacement obtained from InSAR data in several test sites including Southern San Andreas Fault, Baja California and Chaman Fault. Following figure shows that our InSAR velocity field for the Southern San Andreas Fault (left) is consistent with the previous studies, which have used GPS to correct InSAR orbital error (right). Small discrepancy is due to the different time span of SAR data and different Satellite SAR data used in these studies. Our preliminary results show the potential of InSAR in measuring long-wavelength displacement.

Southern San Andreas Fault:



(Manzo, et.al, 2011)