



Improving InSAR detection of the 2006 slow slip event in the Guerrero zone (Mexico) using atmospheric corrections

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South of Mexico, in the Guerrero-Oaxaca subduction zone, three main slow slip events (SSE) lasting between 6 to 9 months has been detected by GPS since 1998 with an occurrence interval of roughly 4 years. The last event that occurred between April and December 2006 has also been captured by satellite radar interferometry (Cavalié et al. 2009). However this SSE produced small surface deformation (typically a few cm distributed over 100 km) that are close to the measurement limits of the INSAR technique. The main limitation comes from the atmospheric changes between the dates of the SAR images acquisitions.

In order to better estimate and to improve the accuracy of INSAR measurement, we investigate atmospheric correction based on the correlation between the interferometric phase and the topography and on the meteorological model NARR (North American Regional Reanalysis). When observing in an interferogram a phase-topography correlation not linked to the tectonic signal, a usual way to mitigate such atmospheric perturbations is to estimate the linear (or more complex) trend over the whole interferogram and to remove it homogeneously. However, for interferograms covering large area, as those we use to study the Guerrero SSE (100 x 400 km), we observe that the phase-topography trend can be highly variable and sometime over distance less than 60 km. This result is obtained by computing the phase-topography correlation over 32km x 32km window and keeping only area where the correlation coefficient is greater than 0.7. Comparison with the phase-topography relationship estimated from NARR confirm this variability. To take into account this effect, a spatially variable correction of each interferogram is applied using a combination of NARR estimation and direct measurement of the phase-topography correlation. This allows us to reduce the variance of the ENVISAT interferograms and to enhanced the quality in mapping the 2006 SSE event.