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Session : Seismotectonics and the Earthquake Cycle

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We used the ability of InSAR technique to provide precise displacement map in line of sight to characterise the post-seismic deformation following the 28 September 2004 (Mw 6) Parkfield earthquake between 2005 and 2010 (San Andreas Fault, California). Measuring the post-seismic displacement distribution and its spatio-temporal evolution is one of the most important steps to constrain the slip budget upon the fault plain and consequently to improve our knowledge concerning the seismic cycle. The expected 2004 Parkfield event, by its time delay and its magnitude, has been classified as an outsider compare to the previous events and led researchers to reconsider the validity of the seismic cycle at Parkfield (e.g. W. H. Bakun et al, Nature, 2005). Up to now, the analysis of seismic and space-geodetic data covering all the seismic cycle around the 2004 event seconded with numerical models provided new elements such as the co-seimic and post-seismic slip distribution and its evolution upon the fault plain (e.g. S. Barbot et al, Science, 2012). Thanks to its hight spatial resolution, the use of InSAR could provide complementary new insight on the shallower part of the fault slip behavior. In this study, we propose to use both ERS and ENVISAT interferograms to increase the temporal data sampling on the Parkfield section of the San Andreas Fault. Firstly, we combined 5 years of available SAR acquisitions including both ERS-2 and Envisat covering the post-seismic period from 2005 to 2010 to provide stacks of unwrapped interferograms that represent the estimation of the mean velocity per year. Secondly, we stacked selected interferogram (both from ERS2 and Envisat) in the attempt to measure the temporal evolution of the surface velocities associated with the post seismic surface displacement. Here we present the first result from our study. The measured detailed space distribution and the decay of the displacement velocity rate during the post-seismic period is used as input for slip budget assessment.