Geophysical Research Abstracts
Vol. 20, EGU2018-15074, 2018
EGU General Assembly 2018

Observing silent and slow slip along continental strike slip faults from space

Romain Jolivet (1), Cécile Lasserre (2), Mark Simons (3), Baptiste Rousset (4), Jean-Philippe Avouac (3), Zacharie Duputel (5), Harsha Bhat (1), and Pierre Romanet (6)

(1) Laboratoire de Géologie, Département des Géosciences, École Normale Supérieure, PSL Research University, 24 rue Lhomond, Paris, 75005, France. (jolivetinsar@gmail.com), (2) Laboratoire de Géologie de Lyon : Terre, Planètes, Environnement (LGL-TPE), Université Lyon 1, Lyon, France., (3) Seismological Laboratory, Geological and Planetary sciences, California Institute of Technology, Pasadena, California, USA, (4) Berkeley Seismological Laboratory and Department of Earth and Planetary Science, University of California, Berkeley, CA 94720, USA, (5) Institut de Physique du Globe de Strasbourg, CNRS and EOST/Université de Strasbourg, France, (6) Department of Earth and Planetary Science, The University of Tokyo, Tokyo, Japan

Over the last 20 years, developments of geodetic methods allowed to discover a wide range of unexpected modes of slip along active faults, shaking our vision of the earthquake cycle. For instance, it is now commonly accepted that aseismic slip affects the budget of strain along faults and is related to the nucleation, the propagation and the arrest of seismic ruptures. In addition, models of the earthquake cycle have been developed to explain the first order spatio-temporal evolution of slip over all phases of the earthquake cycle. Most of these discoveries have been driven by geodetic and seismological observations along subduction zones where strain rates are relatively high resulting in large geodetic signals. However, because offshore geodesy still remains sparse, few observations of the small spatial scale (i.e. smaller than a kilometer) of aseismic slip are available. We will discuss our recent explorations of active fault slip – seismic and aseismic – along continental strike slip faults, illustrating what can be learned with long, high resolution time series of surface displacements derived from Synthetic Aperture Radar Interferometry. Using examples from Tibet, California and Turkey, we will show evidences of occurrences of slow, aseismic slip over various spatial and temporal scales. Using Bayesian inference, we will present how we extract quantitative information from surface displacements and what can be learned from stochastic exploration of fault slip. Finally, we will discuss some of the mechanical implications of these small scale, slow slip events, suggesting that persistent aseismic slip might be not as persistent as it seems.