Fault Behavior During the Seismic Cycle, Lithosphere Rheology and Continental Deformation Mechanisms : Insights from InSAR (Progress Summary)

Lasserre, Cecile[1]; Jolivet, Romain[1]; Doin, Marie-Pierre[2]; Grandin, Raphaël[2]; Ducret, Gabriel[2]; Wright, Tim[3]; Sun, Jianbao[4]; Wang, Hua[5]; Peltzer, Gilles[6]; Guillaso, Stephane[7]

[1]ISTerre, FRANCE; [2]ENS Geology Lab, FRANCE; [3]University of Leeds, UNITED KINGDOM; [4]Institute of Geology, CEA, CHINA; [5]Guangdong University of Technology, CHINA; [6]UCLA, UNITED STATES; [7]Technische Universitat Berlin, GERMANY

We exploit the archive of radar images acquired by the ERS and Envisat satellites over the tibetan plateau and its margins. It allows us to characterize the present-day behavior of active faults in China, within the seismogenic crust and below, to probe the short-term rheology of the lithosphere, and to analyze the large scale crustal velocity field in terms of mechanical processes of continental deformation. Using a time-series analysis based on the small-baseline approach, combined with 2D corrections of the stratified tropospheric phase delays affecting interferograms, we map and model along-strike variations of interseismic strain accumulation along strike-slip faults in northern Tibet (Haiyuan, Kunlun and Altyn Tagh faults) and across the Himalayas. In particular we show evidence for transient, shallow creep at a rate of ~ 8 mm/yr at the eastern end of the 'Tianzhu'seismic gap along the Haiyuan fault, near the junction with the fault section that ruptured during the M~8 1920 earthquake. Temporal variations in this creep rate are detected as well, associated with microseismicity fluctuations. From a similar type of analysis, we also detect the crustal flexure associated with the increase of the Siling Co lake load on the lithosphere in central Tibet (bowl-shaped subsidence at a rate of ~ 5 mm/yr near the lake shores, as a response to a ~ 1m/yr lake level increase since 2000). The subsidence modelling should bring constraints on the lithosphere visco-elastic behavior at short time scales. Finally, GPS and InSAR data in western Tibet are combined to provide a large scale velocity field. This joint geodetic data analysis allows to describe strain distribution across and in between the major active faults within the tibetan plateau, and discuss the validity of rigid block models in modelling continental deformation in China.