Strain partitioning estimation in the eastern part of the tibetan plateau from block models constrained by GPS measurements and automated FLATSIM time series analysis of Sentinel-1 InSAR data

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The use of high spatial and temporal resolution data is a key condition for characterizing interseismic deformation along major faults and understanding their roles in accommodating the deformation. Here we present an analysis using 4 years of Sentinel-1 InSAR data to characterize interseismic deformation along the Xianshuihe (XSH) fault system and the Kunlun (KUN) fault in the eastern edge of the Tibetan plateau.

Thanks to the NSBAS automated processing chain (Doin et al., 2011, Grandin, 2015), implemented at the CNES high-performance computing center in Toulouse as part of the FLATSIM project (ForM@Ter LArge-scale multi-Temporal Sentinel-1 Interferometry processing chain in Muscate), we automatically perform high-resolution time series analysis of 2014-2019 Sentinel-1 InSAR data set, acquired along 1200 km-long ascending and descending orbits, over the study area. According to an elastic block model approach, InSAR times series are combined to the latest published GPS velocity field and inverted using the block modeling software TDEFNODE (McCaffrey., 2009) to model fault slip rates and coupling distribution along these two major strike-slip faults and identify asperities and potential creeping areas as well as analyze internal block deformation.

Our models suggest the existence of a fault connecting the XSH fault and the KUN fault and accomodating part of the deformation at a constant slip rate of 10 mm/yr. It shows that the slip rate on the XSH fault system increases from west to east, from 5 mm/yr to 14 mm/yr between latitudes 34.3°N and 29.3°N, while the slip rate on the Kunlun fault slightly decreases from west to east from 10 mm/yr to 9 mm/yr. The slip deficit rate observed along the XSH fault system shows strong lateral variations, that we analyze with respect to the seismic history of the fault, and suggests the presence of shallow creep on the eastern part of the fault. The slip deficit rate observed along the Kunlun fault appears more homogeneous. However, we observe a strong deformation gradient that we interpret as a post-seismic signal at the eastern tip of the rupture of the 2001 Kokoxili earthquake and we analyze its temporal evolution.

Mots-Clés : Seismic cycle, block models, Sentinel-1, time series analysis, InSAR, GPS, tibetan Plateau.

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.