Geophysical Research Abstracts
Vol. 18, EGU2016-7320, 2016
EGU General Assembly 2016

The mechanisms of driving lithospheric deformation in India-Asia collision zone: a perspective from 3-D numerical modeling

Jianfeng Yang (1,2) and Boris Kaus (2)

(1) Key Laboratory of the Earth's Deep Interior, Institute of Geology and Geophysics, Chinese Academy of Sciences, China (yangjf@mail.iggcas.ac.cn), (2) Institute of Geosciences, Johannes Gutenberg University of Mainz, Germany

The mechanism of intraplate deformation remains incompletely understood by plate tectonics theory. The India-Asia collision zone is the largest present-day example of continental collision, which makes it an ideal location to study the processes of continental deformation. Existing models of lithospheric deformation are typically quasi two-dimensional and often assume that the lithosphere is a thin viscous sheet, which deforms homogeneously as a result of the collision, or flows above a partially molten lower crust, which explains the exhumation of Himalayan units and lateral spreading of Tibetan plateau. An opposing view is that most deformation localize in shear zones separating less deformed blocks, requiring the lithosphere to have an elasto-plastic rather than a viscous rheology. In order to distinguish which model best fits the observations we develop a 3-D visco-elasto-plastic model, which can model both distributed and highly localized deformation. In our preliminary result, most of the large-scale strike-slips faults including Altyn-Tagh fault, Xianshuihe fault, Red-River fault, Sagaing fault and Jiali fault can be simulated. The topography is consistent with observations that flat plateau in central Tibet and steep, abrupt margins adjacent to Sichuan basin, and gradual topography in southeast Tibet. These models suggest that the localized large-scale strike-slip faults accommodate the continental deformation. These results show the importance of a weak lower crust and topographic effects, as well as the effect of rheology and temperature structure of the lithosphere on the deformation patterns.