Geometry and Slip Patterns of the Main Himalaya Thrust Fault in the India-Eurasia Collistion Zone Constrained by Geodetic Observations

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Like a subduction trench where oceanic lithosphere moves beneath a continental plate, the Indian continental lithosphere, in the India-Eurasia collision zone, is subthrusting beneath another continent (Asia) along the Main Himalaya Thrust (MHT) fault. The sudden significant slips along this thrust fault due to accumulated strain are accommodated by strong earthquakes. Hence, the investigations for the geometry and slip patters of the main thrust fault are essential for both scientific study and geo-hazard research.

Seismic data can be used to image the detailed underthrusting structures beneath Himalaya and southern Tibet (Zhao and others, 1993). However, the seismic-derived cross section is not sensitive to lateral structure variation. In addition, seismic data alone can not offer information about ongoing interseismic slip of the MHT. In contrast geodetic observations, such as GPS and levelling, are able to provide precise constrains for both slip pattern and geometric character of the subthrusting fault (Jackson and Bilham, 1994; Chen and others, 1999). Especially for inferring interseismic slip, geodetic measurements play an irreplaceable role. Consequently, seismic data and geodetic observations can complement each other to better understand the geometry and slip patterns of the main thrust fault in the collision zone.

We therefore assemble published geodetic measurements for the Himalaya and southern Tibet, map out comprehensive velocity fields for the India-Eurasia collision zone, and investigate the present detailed slip pattern of the main thrust fault based on the geometry information constrained from seismic study.

References

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