Geophysical Research Abstracts
Vol. 14, EGU2012-10247-1, 2012
EGU General Assembly 2012

Seismic tomographic constraints on the India-Asia collision using the 3D geometries of mapped and unfolded subducted slabs

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We interpret the 3D geometries of mapped and unfolded subducted slabs of mantle lithosphere beneath the India-Asia collision zone. Earlier studies have interpreted some of these high velocity tomographic anomalies as the Greater Indian and Neotethyan slabs. When unfolded and restored in Gplates, the mapped slab geometries add constraints to the timing and convergence estimates of the India-Asia collision.

Published studies estimate that the Tethyan Himalaya and southern Tibet collided sometime between 35 to 65 Ma. Plate tectonic reconstructions interpret approximately 2000-3000 km of convergence across the collision zone, far more than crustal shortening estimates indicate. The difference in shortening estimates has been explained by the subduction of Greater Indian mantle lithosphere. Seismic tomographic images have revealed subducted slab anomalies beneath India.

In this study slabs were mapped based on the MITP08 global P-wave seismic tomography dataset and Benioff zone seismicity. Gocad software was used to map in 3D subducted slabs and their seismic velocity anomalies. The slabs were unfolded using Gocad to determine their original shape and extent. GPlates plate reconstruction software was used to compare the unfolded slab geometries to those predicted by published plate reconstructions.