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# Geometry, timing and consequences of subduction processes in the Pamir and Hindu Kush regions

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We used tomographic images to obtain the geometry of slabs under the Hindu Kush and Pamir regions. The change of depth and dip of the slabs shows the same trend as seismicity: from steep northward dipping of the Indian slab under the Hindu Kush to southward dipping of a shallower Asian slab under the Pamir. Tomography permits to estimate the total length of the slab, reaching 600km, deeper than seismicity, reaching 350km.
The lack of vertical continuity of high wavespeed anomalies from the lower to the upper mantle is a clear evidence of slab break-off, occuring about 45 Ma ago. After slab break-off, India followed its northward motion horizontally, until the northern boundary of India reached the southward dipping Asian slab. It began to subduct vertically some 8 Ma ago. A velocity of subduction under Hindu Kush as high as 5 cm yr-1, during the last 8 Ma, is then required to reproduce the observed length of the Indian slab. We perform thermo-kinematic and rheological modelling using this high velocity of subduction for India, and slower one for Asia, deduced from previous geological studies (1.5 cm yr-1). This results in a higher slab temperatures and shallower brittle region, for the Asian plate. It is consistent with shallower intermediate-depth seismicity in Pamir than that which occurs in the Hindu Kush region. Different slab dynamics are observed, slow and flat for Asia, fast and steep for India. It could results from different petrologic transformation within the slab during subduction, eclogitic for Indian slab, granulitic for Asian one. This model seems to apply also to the formation of the Tibetan Plateau, and could explain the wide deformation zone of the Asian upper crust compare to the narrow Indian one.
We completed this scenario by making analogic models of the upper crust evolution above an horizontal decoupling level. We model the thrust behaviour between vertical boundaries disposed in funnel shape, standing for Chaman and Karakorum faults. Thrusts initiated alternatively from one side to the other one, and relays are observed at the junction between them. We compare the analogic fault geometry to the thrust and fold geometry observed in the Indian upper crust. Competition between 2 trends of thrust is observed in both case, but, in models, it did not result in the formation of syntaxe. Next step will be to study the influence of the continental subduction deduced from tomography.