



Rollback and decapitation of a south-facing subduction beneath the Tadjik Basin and the Hindu Kush

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3D models based on seismic hypocentre and tomographic velocity anomaly data admit to the existence of a south-facing subduction zone beneath the Hindu Kush. However, multiple alternative geodynamic scenarios have been proposed to produce the current observed configuration. We test these different models using seismotectonic analysis and 3D model building. Models with minimum slab surface area were constructed using hypocentre and p-wave tomography data sets. The slab models were floated using the Pplates computer program to produce estimates for the extent and magnitude of subducted lithosphere. Between 820 and 920 km of subducted Asian lithosphere, and 780 to 1100 km of Indian lithosphere were reconstructed, measured approximately normal to the proposed continental suture zone. The strain distribution in the floated mesh models was used as a tool to evaluate the plausibility of two conflicting tectonic scenarios. The case for a rolling back Asian slab dipping south-east beneath the Hindu Kush was examined, potentially explaining evidence for regional extensional tectonism and the formation of metamorphic core complexes in the Neogene. In this case, the western part of the Asian slab has been pushed past the vertical, and is currently being 'decapitated' by an advancing north-west dipping Indian lithosphere.