Geophysical Research Abstracts
Vol. 15, EGU2013-11820-7, 2013
EGU General Assembly 2013

Ongoing subduction of Eurasian continental crust beneath the Pamir constrained by teleseismic receiver functions

Felix M. Schneider (1), Xiaohui Yuan (1), Christian Sippl (1), Bernd Schurr (1), James Mechie (1), Ilhomjon Oimahmadov (2), Mustavo Gadoev (2), Christian Haberland (1), Sobit Negmatullaev (3), and Ulan Abdybachaev (4)

(1) Helmholtz Centre Potsdam - German Research Centre for Geosciences (GFZ), Seismology, Berlin, Germany (felix@gfz-potsdam.de), (2) Geological Institute Tajik Academy of Sciences, Dushanbe, Tajikistan, (3) PMP International, Dushanbe, Tajikistan, (4) Central Asian Institute for Applied Geosciences (CAIAG), Bishkek, Kyrgyzstan

Exhumation of ultra-high pressure metamorphic rocks testifies that the continental crust can subduct to greater depth in the mantle despite its buoyancy. However, direct observation of ongoing subduction of continental crust is rare. The Pamir is regarded as a possible place of active continental subduction because of the observed intermediate-depth seismicity, findings of crustal xenoliths from upper mantle depths and estimates of high cenozoic convergence for this region that could hardly be accommodated by crustal deformation alone. Here we present receiver function results from the seismological part of the Tien Shan Pamir Geodynamic program (TIPAGE). In a high resolution north-south cross section along the main TIPAGE profile, we observe a southerly dipping thin (with a thickness of 11 km) low-velocity zone (LVZ) that starts from the base of the crust and extends to a depth of more than 150 km with an increasing dip angle to subvertical. A diagonal northwest to southeast cross section shows that towards the western Pamir the dip direction of the LVZ bends to the southeast resulting in an arcuate subduction configuration of Eurasian lithosphere beneath the Pamir. In both profiles, the LVZ identified with receiver functions appears to envelope the intermediate-depth earthquakes of the Pamir Hindu-Kush seismic zone.
For imaging of the dipping interface a migration procedure is used and tested that accounts for the inclination of the conversion layers. Migrated cross sections of Q- and T-components of the P-RFs are compared. The crustal thickness is determined and mapped for this region by stacking direct Ps and multiple PpPs and PpSs phases. At the most places in the Pamir, it is ranging between 65 km and 75 km, while the greatest Moho depths of around 80 km are observed at the upper end of the LVZ. The surrounding areas namely the Tajik Depression, the Ferghana and Tarim Basins show Moho depths of around 40 to 45 km giving an estimate of the pre-collisional crustal thickness of the former Basin area that was overthrusted by the Pamir.