New constraints on subduction and collision processes in the Central Andes from P-to-S converted seismic phases

[1]YUAN, X., [1]SOBOLEV, S.V., [1]KIND, R., [1]ASCH, G., [1]BOCK, G., [1]WYLEGALLA, K., [1]HANKA, W., [1]ONCKEN, O., [2]ZANDT, G and [2]BECK, S. [1]GeoForschungsZentrum Potsdam, Potsdam, Germany; [2]Department of Geosciences, University of Arizona, Tucson, Arizona, USA

The Central Andes is the Earth's highest mountain belt related to ocean-continent collision. It was uplifted during the last 20-30my due to the continental crust thickening, only some 60% of which seems to be possible to explain by tectonic shortening. We employ teleseismic converted waves from temporal networks operated in the Central Andes between 1994 and 1997 to image deep structures. A 10-20 km thick intra-crustal low velocity zone, which links directly with the basal detachment under the Santa Barbara System in Eastern Cordillera, is evident below the entire Altiplano and Puna plateau. We interpret this as a partially molten zone resulting from under-thrusting of the Brazilian shield crust further to the west under the Altiplano/Puna than previously thought, thus explaining the observed crustal thickening entirely by tectonic shortening. The continental Moho is imaged underneath the entire system. The subducted low-velocity oceanic crust is imaged in the mantle down to 120 km depth where it becomes invisible to converted seismic waves, likely due to the completed gabbro-eclogite transformation. Most of the intermediate depth seismicity stops at the same depth, suggesting a relation with phase transformation.