Geophysical Research Abstracts
Vol. 18, EGU2016-5879, 2016
EGU General Assembly 2016

Moho depth model from GOCE gravity gradient data for the Central Asian Orogenic Belt

Alexandra Guy (1), Nils Holzrichter (2), and Jörg Ebbing (2)

(1) Centre for Lithospheric Research, Czech Geological Survey, Klárov 3, Prague, Czech Republic, (2) Department of Geosciences, Kiel University, Otto-Hahn-Platz 1, Kiel, Germany

GOCE gravity gradient data are used together with published seismic data to determine the Moho geometry and the isostatic state of the Central Asian Orogenic Belt (CAOB). The CAOB is an accretionary orogen formed during the Palaeozoic at the periphery of the Siberian cratonic nucleus by the successive amalgamation of different types of crust (cratonic, oceanic, passive margin, magmatic arc, back-arc, ophiolites, accretionary wedge) followed by an oroclinal bending during Permian-Triassic times. This large area was and is still of great interest for geoscientific studies mainly because of its potential in mineral and fossil resources and also for its outstanding, but still misunderstood, geodynamic evolution. However, the geophysical investigations remain scarce due to the remoteness of the area. A systematic analysis of the crustal thickness has been omitted yet, although the geometry of the crust-mantle boundary (Moho boundary) provides crucial information on the evolution of the lithosphere and on the coupling between upper mantle and the crust – particularly interesting for oroclinal bending processes. In this study, the gravity gradient data of GOCE are used to investigate the topography of the Moho for Mongolia and its surroundings. In addition, we used inversion of gravity data and calculation of the isostatic Moho from topographic data to the World Gravity Map (WGM) 2012 satellite-terrestrial model of the Earth's gravity anomalies and these results are compared together with those obtained for the GOCE gravity data. The results of the gravity inversion are constrained by the few xenolith studies and the seismic data available: the receiver function seismic method for north and central Mongolia, deep seismic sounding and seismic reflection profiles in northern China; and tomography in southern Siberia. Then, the effects of isostatic compensation are evaluated by the comparison between the results of the gravity inversion and the isostatic Moho. Finally, a 3D forward modelling of the gravity gradients is performed over the key parts of the CAOB. These results provide new insights into the possible tectonic scenarios and point out inconsistencies for the Altai mountain range between the conclusions leading by geological studies and our model, which indicate that unusual tectonic processes may have occurred at the upper mantle and lower crustal levels.