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A 3D Moho depth model for the Tien Shan from EGM2008 gravity data

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The Tien Shan, Shan, a high mountain range in Central Asia, is one of the most interesting regions in the world due to its evolutionary history and the position in the Eurasian lithosphere plate. With a distance from 1500 km to the collision-zone of the Indian and Eurasian plate, the Tien Shan is the largest intracontinental mountain range in the world. In addition, it is one of the most seismically active regions globally.
So far, seismological data have been used to explore its origin and ongoing seismic activity. In this study, for the first time, gravity data are added to these studies in order to determine the Mohorovičič discontinuity (Moho) of the Tien Shan by inversion of gravity data taken from EGM2008 (Pavlis et al., 2008). It is the best available gravity model for investigations such as this, having a horizontal resolution of 5'. Prior to that, the gravity effect of sediments is estimated and the Bouguer anomaly of the Tien Shan is analysed regarding heterogeneities in the crust. From the filtered and corrected field we calculate the Moho of the Tien Shan and compare it to results of former receiver function analyses. Additionally, an isostatic Moho is calculated with topographic data. The comparison of both CMBs gives insight in the state of isostatic compensation.
The results of the gravity inversion indicate that the Tien Shan has a mountain root with a thickness of about 70 km. The Moho can be shallow under the basins, e.g., in the Tarim and Ili basins. In general though, the crust thickness is homogeneous at a small scale. The comparison with the isostatic Moho indicates an almost complete compensation of the orogen. It can be concluded that the resolution of the EGM2008 data set is suitable for the determination of the crustal thickness of the Tien Shan. From the comparison to receiver function analyses follows that the gravity inversion presents a very good method next to seismological methods to get a crustal thickness model of a selected region.