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Gravity stripping supports tectonic interpretation of the Eastern Alps

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Large scale refraction and reflection seismic experiments in the Eastern Alps (e.g. ALP2002) imaged the European and Adriatic Moho and suggest the existence of a Pannonian fragment as a separate lithospheric block. The triple junction at Moho level between Europe (EU) in the north, Adria (AD) in the south, and the Pannonian fragment (PA) in the south-east is located at ∼46.7°N 13.7°E. At surface the Pannonian fragment comprises parts of the ALCAPA units and the western part of the Tisza unit. The Bouguer gravity map of this area reflects the root of the Alpine orogen and to some extent the boundary between EU and PA. However, a gravity signal from the tectonic boundary between AD and PA cannot clearly be seen. We assume that this gravity signal is hidden by the inhomogeneous mass distribution in the upper crust (down to 10 km depth). Low pass wave number filtering did not enhance the gravity signal of the deep structures. Therefore we carried out gravity stripping using different density models for the upper crust. One density model was derived from density probes sampled at surface, others use correlations of density with P-wave velocity (Vp). We applied several criteria to decide between the different density models. These criteria consider the wave number spectrum, the correlation of the stripped Bouguer anomaly with Moho depth, and the density gradient. We found that the conversion of Vp to density by the Christensen & Mooney relation was the best choice. The resulting gravity effect of the upper crust is dominated by its low wave number component. In contrast to the original Bouguer anomaly, the stripped Bouguer anomaly reflects well the tectonic boundaries interpreted from the seismic data, especially the boundary between AD and PA, thus supporting the tectonic interpretation and confirming the existence of the Pannonian fragment.