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# Gravity effect of Alpine slab segments based on geophysical and petrological modelling

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The direction and location of subducting slab segments in the Alpine area is highly debated. Here, we use seismic crustal depth estimates and different upper mantle tomographies to define hypotheses for the geometry of the subducting slab segments. Based on a new surface wave tomography of the upper mantle in the Alpine region, we also include a new hypothesis with a long Eurasian slab in the central Alps, a short slab segment in the western Alps, and bivergent subduction in the eastern Alps. In addition, we consider the south-dipping slab segment beneath the northern Apennines.

Next, we study the possible slab related effects of the various considered slab geometries on the gravity field. Specifically, we calculate the gravity effects at the surface and at satellite altitude. In addition to the vertical gravity effect we also show gravity gradients. Two approaches are compared. First, we convert seismic velocities directly to density using accepted conversion factors. Such direct conversion results in relatively scattered gravity anomalies. In the second approach, we assign density contrasts to predefined slab geometries. Starting from simple models with a constant slab density, we increase the complexity by considering temperature and pressure related density changes according to mantle composition. For such models, the density contrast of the slabs to the ambient mantle diminishes with depth. These models based on predefined slab geometries allow to analyse contributions by the different slab segments independently in greater detail. Combining the slab models with recent 3D crustal models of the Alps is needed in order to establish realistic density models of the Alpine realm for geodynamic applications.