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Sedimentary basins and the upper crustal structure north of Iceland - Insights by a combined tomography and gravity interpretation

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North of Iceland, where Kolbeinsey Ridge meets up with the Iceland hot spot, the crust is divided by a number of seismic lineaments into small crustal features. Main features strike in NNW-SSE direction, i.e. the underlying strike of the seismic zones, or in N-S, direction, mostly near-surface faults, cracks and fissure swarms. We use a combined gravity and tomography analysis to scrutinise between the shallow sedimentary influence and crustal sources.

The Bouguer anomaly is showing three main features in the study area: (1) a regional trend oriented from the mainland to the north ; (2) a relative minimum located along the Husavik-Flatey fault (+10 mGal for the HFF surrounded by values of +40 mGal); (3) a fan shaped anomaly with its tip on Tjörnes peninsula below the Grimsey Lineament (GL). We are particularly interested in the two local features (2) and (3). Therefore we removed the regional trend by calculating an isostatic gravity anomaly.

Conversion of tomographic velocities to densities and foward density modelling along crustal transects leads us to exclude the sedimentary layering to be a major contribution to the gravity anomalies. We can further show that the main gravity anomaly of the lineaments arises in the basement and might be related to active N-S trending structures south of Grimsey. These structures can also be uncovered as a N-S trending low velocity zones in the shallow crust south of the island of Grimsey by the local earthquake tomography.