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Crustal structures from receiver functions and gravity analysis in central Mongolia

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3D forward gravity modelling combined with receiver function analysis characterize the structures of the southern part of the Mongolian collage. Recently, a multidisciplinary approach integrating potential field analysis with geology and magmatic geochemistry demonstrate that relamination of an allochtonous felsic to intermediate lower crust played a major role in southern Mongolia structure. Relamination of material induces a homogeneous layer in the lower crust, which contrasts with the highly heterogeneous upper crustal part composed of different lithotectonic domains. The seismic signals of the 48 stations of the MOBAL2003 and the IRIS-PASSCAL experiments were analyzed to get the receiver functions. The resulting crustal thickness variation is first compared with the topography of the Moho determined by the 3D forward modeling of the GOCE gravity gradients. In addition, seismic stations south of the Hangay dome display significant signal related to the occurrence of a low velocity zone (LVZ) at lower crustal level. The receiver function analysis also revealed a significant difference between the crustal structures of the Hangay dome and the tectonic zones in the south. Finally, these seismic analysis inputs such as crustal thickness, strike and dips of the seismic interfaces as well as the boundaries and the lithologies of the different tectonic zones constitute the starting points from the 3D forward gravity modelling. The combination of these two independent methods enhances the occurrence and the extent of a low velocity and a low density zone (LVLDZ) at lower crustal level beneath central Mongolia. These LVLDZ may demonstrate the existence of the relamination of a hydrous material in southern Mongolia.