

AGU FALL MEETING

San Francisco | 14 – 18 December 2015

- DI44B-03: Control of high velocity lithosphere roots on crustal scale density variations seen in Gondwana reconstructions (Invited)
- Abstract

Thursday, 17 December 2015

16:30 - 16:45

Moscone South - 301

The GOCE gravity field is globally homogeneous at the resolution of about 80km or better allowing for the first time to identify tectonic structures at continental scale. The large scale structures are presumably controlled by the rheology of the underlying crust down to the base of the lithosphere. Seismic tomography identifies the presence of the deep lithosphere roots by increased velocity. The joint analysis of the tomography results and the GOCE gravity reveals that at global scale the two data have some common patterns. The correlations are enhanced by applying geodynamic plate reconstructions to the GOCE gravity field and to the tomography models which places today's observed fields at the Gondwana pre-breakup position. There are several examples for which it is found that the deep lithospheric roots, as those found below cratons, control the position of the positive gravity values outboard of the deep roots. This could be explained by the deep lithospheric roots focusing asthenospheric upwelling outboard of the root protecting the overlying craton from magmatic intrusions. Over several of the deep roots the gravity is systematically negative, which could be due to a compositional effect, with deep roots of increased velocity having reduced density. The study is carried out globally, with focus on the African and South American continents.

The background for the study can be found in the following publications where the techniques which have been used are described:

Braitenberg, C., Mariani, P. and De Min, A. (2013). The European Alps and nearby orogenic belts sensed by GOCE, *Boll. Bollettino di Geofisica Teorica ed Applicata*, 54(4), 321-334.
doi:10.4430/bgta0105

Braitenberg, C. and Mariani, P. (2015). Geological implications from complete Gondwana GOCE-products reconstructions and link to lithospheric roots. *Proceedings of 5th International GOCE User Workshop*, 25 - 28 November 2014.

Braitenberg, C. (2015). Exploration of tectonic structures with GOCE in Africa and across-continents. *Int. J. Appl. Earth Observ. Geoinf.* 35, 88-95. <http://dx.doi.org/10.1016/j.jag.2014.01.013>

Braitenberg, C. (2015). A grip on geological units with GOCE, *IAG Symp.* 141

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