Geophysical Research Abstracts
Vol. 16, EGU2014-10764, 2014
EGU General Assembly 2014

New aerogeophysical evidences of riftogenic crust over Princess Elizabeth Land, East Antarctica

Dmitry Golynsky (1), Alexander Golynsky (1), and Alexander Kiselev (2)

(1) VNIIOkeangeologia, Angliysky Avenue 1, St-Petersburg, 190121, Russia (dmitry.a.golynsky@gmail.com), (2) PMGE, Pobeda Street 24, Lomonosov 189510, Russia

Analysis of radio-echosounding and RADARSAT mosaic data by Golynsky & Golynsky (2007) reveals at least 500 km long structure called the Gaussberg rift over the eastern part of Princess Elizabeth Land, East Antarctica. This previously unknown continuous structure consists of two sub-parallel depressions separated by segmented horst-like escarpments that are largely hidden under the East Antarctic Ice Sheet. One of these segments is Mount Brown escarpment, which reaches a height of 1982 m. It was suggested that the rift was probably initiated at the same time as the Lambert graben, marked by the deposition of coal-bearing Permian sediment and probably inherited the tectonically weak zone of the Proterozoic igneous belt along its boundary with the Vestfold-Rauer Archean cratonic block. The Gaussberg rift may be considered as a hypothetical accommodation zone of the Carboniferous-Permian intracontinental rift along 4000 km of the West Australian and East Indian margins, which filled with thick Permian-Triassic sediment including alluvial coals (Harrowfield et al., 2005). Supposedly, the Gaussberg rift corresponds to the Mahanadi Valley of East India and the Lambert rift system has across-rift alignment with Godavari Valley.

New Russian ice penetrating radar data collected in 2012-13 over western part of the suggested rift shows that in places the floor of the central depression is more than 1000 m below sea level. Horst and graben systems are heavily segmented by N-S running transverse lineaments that in addition clearly discernible in the RADARSAT data. New high-quality magnetic data show that severe changes in the magnetic fabric observed in vicinity, along strike and over borders of the structure are though to be due to the tectonic nature. Interruption of the long wavelength high-intensity magnetic anomaly belt associated with southern boundary of the Vestfold-Rauer cratonic block near the western depression can't be explained by a subglacial erosion, in our interpretation it is caused by the initial stage of rift development. Linear short-wavelength anomalies of low amplitude developed over rises and depressions apparently associated with mafic dykes or thrust zones.

Depth-estimates of magnetic anomaly sources indicate that the investigated area is likely underlain by a 3-5 km thick sedimentary basin, thereby supporting our idea of existence of riftogenic structure in the eastern part of Princess Elizabeth Land. Future geophysical investigations allow to better understand the crustal architecture of the East Antarctic shield, geology and geodynamics of rifting in an ice-covered environment.

References

Harrowfield, M., Holdgate, G.R., Wilson, C.J.L. 2005. Tectonic significance of the Lambert graben, East Antarctica: Reconstructing the Gondwanan rift. Geology, v. 33 (3), 197–200.

Golynsky, D.A. and Golynsky, A.V. 2007. Gaussberg Rift – illusion or reality? In Antarctica: A Keystone in a Changing World. Online Proceedings of the 10th ISAES, edited by A.K. Cooper and C.R. Raymond et al., USGS Open-File Report 2007-1047, Extended Abstract 168, 5 p.