

## **New Russian aerogeophysical data providing compelling evidences of riftogenic crust in eastern Princess Elizabeth Land, East Antarctica**

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Analysis of radio-echosounding and RADARSAT mosaic data reveals at least 500 km long structure called the Gaussberg rift over the eastern part of Princess Elizabeth Land, East Antarctica. New Russian ice penetrating radar data shows that the floor of the central depression placed more than 1000 m below sea level. Horsts and grabens are heavily dissected by N-S running transverse lineaments that were discovered by analysis of ice surface satellite imagery.

High-quality aeromagnetic data show that outstanding changes of the magnetic anomaly patterns observed in vicinity, along strike and over shoulders of the inferred Gaussberg rift are thought to have the tectonic origin. Abrupt disappearance of the long-wavelength high-intensity magnetic anomaly belt with a number of short-wavelength anomalies associated with eastern boundary of the Vestfold-Rauer cratonic block in vicinity of western depression can't be explained simply by subglacial erosion. In our interpretation, these changes of magnetic anomaly pattern apparently associated with development of regional fault zones during initial stages of rifting.

The Mount Brown horst is clearly evident in magnetic data as an area of concentration of high-intensity anomalies with amplitude up to 1575 nT. The observed trends are in agreement with the strike of the metamorphic rocks in Mount Brown, which experienced c. 980–920 Ma high-grade metamorphism. This suggests that this area experienced the Rayner Orogeny, distinguished in Kemp Land and the northern Prince Charles Mountains and may represent suspect suture of the Mesoproterozoic age, as evidenced by new date for Mount Brown mafic rocks at c. 1480 Ma.

Depth-estimates of magnetic anomaly sources indicate that the central depression of the rift 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. Crustal two-dimensional modelling by using gravity data also shows over 4 km deep sedimentary basins beneath central depression of the rift.

Linear short-wavelength anomalies of low amplitude developed over horsts and grabens are interpreted to be responsible for the Pan-African mega-scale shear zone system of Princess Elizabeth Land. The distinguished length of this curvilinear feature exceeds 900 km, while it might be extended up to the Leopold and Astrid Coast, where similar linear anomalies with NE-SW trend are recognised. The early Paleozoic shear zone with NE-SW trend is collinear with orientation of the Gaussberg rift thereby contradicts to the idea that ca 500 Ma event is concentrated along coastal regions and attenuated inland. This idea based on extensive indications of a ca 500 Ma event in coastal areas (granitoid intrusions in Mirny Oasis and inherited zircons found in Gaussberg volcano), together with the lack of indications of this age in Mount Brown. The mega-scale Princess Elizabeth Land shear zone has fundamental implications in terms of tectonic inheritance and intraplate strain localization for later reactivation linked to development of the Lambert and Gaussberg rifts and rifting and intraplate strike-slip motion in interior of East Antarctica before and during Gondwana break-up.