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East Antarctic Rift Systems - key to understanding of Gondwana break-up

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The results of analysis of radio-echo sounding surveys, the RADARSAT satellite data, magnetic and gravity information give evidence that East Antarctica contains 13 riftogenic systems and/or large linear tectonic structures. Among known and suggested rifts of East Antarctica the Lambert rift has a pivotal position and it manifests oneself as symmetry axis. Six additional systems are revealed on both sides of it and any one of them possesses special features in geologic and geomorphologic aspects. In most cases they inherited the anisotropy of long-lived cratonic blocks.

Riftogenic and/or large linear tectonic structures along the East Antarctica coastal regions are distributed with a steady regularity with average distance between them about 650 km. For six (7) structures from 13 (Lambert, Jutulstraumen-Pencksökket, Vestfjella, Mellor-Slessor (Bailey), Wilkes Basin, Gaussberg (?) and Rennick) there is a distinct spatial coupling with trough complexes of the Beacon Supergroup and their subsequent reactivation in Late Jurassic – Permian time when the East Gondwana started break-up.

Rift system of the Lambert-Amery Glaciers and Prydz Bay is related to Mesozoic extension events and it inherited structures of Paleozoic grabens. The total length of the rift system exceeds 4000 km of the same scale as largest the World rift belts. The length of the western branch of the Lambert rift that includes the Mellor rift and graben-like structures of the Bailey and Slessor glaciers exceeds 2300 km.

Results of radio-echo sounding investigation of the subglacial Aurora Basin allow to suggest that this large basin of sub-meridian extension is underlain by an extensive (> 1000 km) riftogenic structure that is running towards the Transantarctic Mountains where it forms a triple junction with the eastern branch of the Lambert rift and structures of the Wilkes Basin. It is hereby proposed that Aurora-Scott rift is formed by complex system of sub-parallel depressions divided by fragmentary horsts. The spatial correlation of the Aurora-Scott rift system, Permian basins of the Western Australia margin and coal-bearing basins in Rajmahal Hills allows suggesting that this East Antarctic structure was also formed during Permian time and about the existence of triple junction rift systems (Aurora-Scott, Perth, Rajmahal) in the pre-breakup Gondwana.