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Rifts in the tectonic structure of East Antarctica

Dmitry Golynsky and Alexander Golynsky
VNIIOkeangeologia, Antarctic Geology Department, St. Petersburg, Russian Federation (Dmitry.A.Golynsky@gmail.com)

It was established that riftogenic and/or large linear tectonic structures in East Antarctica are distributed with a steady regularity with average distance between them about 650 km. All these structures (13) represent objects of undoubted scientific and practical interest and might be considered as immediate objects for conducting integrated geological and geophysical investigations. Analysis and generalization of the RADARSAT satellite system imagery and radio-echosounding survey data collected in the eastern part of Princess Elizabeth Land allow us to distinguish spatial boundaries of previously unknown continental rift system that was proposed to name Gaussberg (Golynsky & Golynsky, 2007). The rift is about 500 km long, and taking into consideration its western continuation in the form of short (fragmented) faults, may exceed 700 km. The elevation difference between depressions and horsts reaches 3 km. The rift structure consists of two sub-parallel depressions separated by segmented horst-like rises (escarpments). Deep depressions within the rift reach more than 800 m bsl near the West Ice Shelf and within the central graben occupied by the Phillipi Glacier. The width of the Gaussberg Rift system varies from 60 km in the south-western area to 150 km near the West Ice Shelf.
The Gaussberg rift is considered as a part of the Lambert rift system, which has a complicated structure clearly recognized over both the continent and also its margin. The Gaussberg rift probably exploited a weak zone between the Proterozoic mobile belt and the Archaean Vestfold-Rauer cratonic block. Supposedly it initiated at the turn of Jurassic and Permian epoch or a little bit earlier as in case of the Lambert rift where the Permian graben formation with coal-bearing deposits predetermined the subsequent development of submeridional rift zone. The Gaussberg and also the Scott rift developed in the Queen Marie Land, may be considered as continuations of the Mahanadi Valley rift and coal-bearing basins in the Rajmahal Hills of East India, respectively, in the Antarctic continent. These structures can also be considered as major drainage feeders of terrigenous sediments onto the Davis Sea continental margin. Preliminary analysis of the RADARSAT imagery shows that the Denman Glacier occupies a linear fault system (> 400 km), whereas southward continuation of the Scott Glacier area represents a continuous system of horsts that bound a wide central depression.The Scott Glacier together with graben-like structures hidden by ice and with the graben of Lake Vostok may represent an extensive rift system developed as a result of large-scale pre-breakup extension of Gondwana. We speculate that 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.