Geophysical Research Abstracts
Vol. 15, EGU2013-2516, 2013
EGU General Assembly 2013

Tectonic structure of East Antarctica

German Leychenkov, Garrik Grikurov, and Alexander Golynsky

Research Institute for Geology and Mineral Resources of the World Ocean, VNIIOkeangeologia, Antarctic Geoscience, St.-Petersburg, Russian Federation (german_l@mail.ru)

First overviews of tectonic structure of the Southern Continent were made by the pioneers of Antarctic earth science investigations almost 100 years ago. Despite rapidly advancing international geological studies under the Antarctic Treaty, the presentations of Antarctic tectonic structure remained largely speculative until the end of the past century when implementation of modern analytical and remote-sensing research technologies enabled compilation of more credible tectonic models of Antarctica.

The East Antarctic bedrock consists mainly of the Precambrian crystalline complexes and the Paleozoic-Early Mesozoic platform units. Crystalline Shield is locally complicated by Neoproterozoic aulacogenes and Late Paleozoic to Mesozoic rifts. Shield assemblages reliably recognized in coastal outcrops indicate the predominant occurrence of Archean cratonic nuclei and Mesoproterozoic mobile belts. The undisturbed platform cover strata are exposed in East Antarctica mainly along its boundary with West Antarctica. Tectonic structure of ice-covered regions (more that 99% of the East Antarctic territory) is interpreted using mostly magnetic and bedrock topography data, but other geophysical and geological information (satellite, airborne and over-ice gravity; seismology; active seismics; erratics; detrital zircons dates; etc.) is also important.

Archean cratons are geologically documented in western Dronning Maud Land, Enderby Land, Princess Elizabeth Land and in the southern Prince Charles Mts. Their distribution under the ice is marked by a specific magnetic pattern including low-amplitude mosaic and/or high-amplitude long-wavelength anomalies. The most extensive ancient craton being 1000 km across is believed to extend from the southern Prince Charles Mts. to the Gamburtsev Mts. Mesoproterozoic mobile belts are distinguished by elongated high-amplitude magnetic anomalies and are mapped along the costal area as the zone of 250–600 km wide. The Gamburtsev Mts. area is also interpreted to be a part of Mesoproterozoic mobile belt.

Precambrian aulacogens and Paleozoic to Mesozoic rifts are more difficult to recognize with confidence from geophysical data, except the largest Lambert-Amery rift which is well expressed in potential fields and bedrock topography. Many other linear bedrock depressions are believed to result from ice erosion which probably amplified structural features such as faults, sutures, boundaries of tectonic provinces. Extensive platform cover is assumed to occur mainly in vast subglacial lowlands of East Antarctic interior. Geophysical data, as well as erratics found in costal moraines and offshore sediments, suggest that Beacon and/or Ferrar Supergroups or their stratigraphic/structural equivalents can be expected to continue under the ice beyond the limits of the Ross Orogen where they may rest on the older platform complexes and/or directly on the crystalline basement.