



Russian aeromagnetic surveys of the Prince Charles Mountains and adjacent regions into the 21st century

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Russian aeromagnetic investigations in the Prince Charles Mountains (PCM) and surrounding areas, seek to contribute data on the tectonics of Precambrian igneous belts and cratonic fragments, the crustal structure of the Lambert Rift system and other major aspects of Antarctic geology, critical to understanding continental growth processes (Golynsky et al., 2006). Over the past decade, the Polar Marine Geoscience Expedition projects acquired approximately 77,400 line-km of aeromagnetic data over the largely ice-covered regions of MacRobertson Land and Princess Elizabeth Land. The airborne surveys were performed with a standard profile spacing of 5 km and tie-line interval of 15–25 km. The total amount of the Russian aeromagnetic data collected in this region exceeded more than 165,000 line-km. Together with the PCMEGA and AGAP surveys (Damaske and McLean, 2005; Ferraccioli et al., 2011) the PMGE dataset forms the longest transect ever mapped in East Antarctica exceeding 1950 km in length.

Several distinct crustal subdivisions are clearly differentiated in the magnetic data. The high-amplitude positive anomalies that extend around the Vestfold Hills and Rauer Islands are likely be attributed to the southern boundary of high-grade metamorphic Late Archean craton. The northern PCM that are composed by ~1 Ga orthogneiss and charnockite display a predominantly northeasterly trending magnetic fabric that continues to the eastern shoulder of the Lambert Rift. The aeromagnetic data from the Southern PCM reveal the spatial boundary of the Archaean Ruker Terrane that is characterized by a short-wavelength anomalies and the prominent Ruker Anomaly that is associated with a banded iron formation. The prominent alternating system of linear NE-SW positive and negative anomalies over the eastern shoulder of the Lambert Rift may reflect the western boundary of the Princess Elizabeth Land cratonic(?) block, although its relationships and tectonic origin remained largely ambiguous. The aeromagnetic data clearly indicate no obvious link of the Pan-African mobile belt in Prydz Bay with Lützow-Holm Bay, and provide no evidence that it extends inland towards the Mawson Escarpment or Grove Mountains. This allows suggesting that the Early Paleozoic Kuunga suture in East Antarctica represents a zone of intraplate reactivation that formed within a cratonized East Gondwana.