



Aerogeophysics with AWI aircraft in Antarctica since 2013

Graeme Eagles (1), Daniel Steinhage (1), Nanna Karlsson (1), Tobias Binder (1), Läufer Andreas (2), Ruppel Antonia (2), and Jacobs Joachim (3)

(1) Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany (graeme.eagles@awi.de), (2) Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany, (3) University of Bergen & Norwegian Polar Institute

Polar 5 and 6, the two multi-purpose polar research aircraft of the Alfred Wegener Institute, were configured for geophysical survey work in and around Dronning Maud Land, Antarctica, during the 2013/14, 2014/15, 2015/16, 2016/17, and 2017/18 seasons. In late 2013, a survey was started over the oceanic crust north of Prydz Bay, concentrating on the collection of magnetic anomaly data with the aim of mapping and dating Cretaceous seafloor spreading anomalies. The survey is planned for completion in the 2018/19 season. Later in 2013/14 and during the following season, a large flight programme concentrated on the Sør Rondane and neighbouring region as part of a long-standing collaboration between AWI and the Federal Institute for Geosciences and Natural Resources (BGR). Magnetic anomaly data from this survey have been interpreted in terms of the amalgamation of the supercontinent Gondwana by the collision of multiple volcanic island arcs between the cores of more ancient continents that today make up parts of the interiors of Antarctica, Africa and Arabia. Gravity data collected with a LaCoste and Romberg AirSea gravimeter and AWI's new Gravimetric Technologies GT2A gravimeter reveal topographic and deeper crustal information from below the region's thick ice cover, which have been interpreted in terms of erosion and sediment supply to the neighbouring Riiser-Larsen Sea via a great escarpment. A broad subglacial channel, over 300 km long and more than 1500 m deep, lies between Sør Rondane and the Yamato mountains and seems to date from pre-glacial times. In 2015/16 and 2016/17, Polar 5 operated out of Neumayer and Kohnen stations to focus on the densification of existing survey profiles over the Forster Magnetic Anomaly from 10 km to 5 km spacing. Interpretation of these data will help sharpen our understanding of the final amalgamation of Gondwana, complementing the advances that have been possible in the region around Sør Rondane. In 2015/16, a further two high-resolution survey flights have collected magnetic and gravity data over the Ekström ice shelf, much increasing our knowledge of the geophysical setting occupied by the Neumayer III station at which AWI carries out year-round observational science. Initial work has been completed on using the gravity data to model the seafloor depth beneath the ice shelf, a target for upcoming geological drilling. Using 'piggy back' installations accompanying glaciological surveys late in the 2013/14 and 2016/17 seasons, AWI also collected gravity and magnetic data over the largely-unknown Recovery Lakes and Dome F regions. In 2017/18, around 50 hours of new survey was completed to the east of the Falkland Islands, with the aim of collecting data sets that will enable interpretation of the geodynamic history of the Falkland Plateau Basin during the early stages of Gondwana breakup.