



Three decades of BGR airborne geophysical surveys over the polar regions – a review

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The Federal Institute for Geosciences and Natural Resources (BGR) has been conducting geological polar research since 1979. A few years later BGR engaged in airborne geophysical projects. Investigation of the lithosphere of the continent and the continental margins was one of the key issues for BGR.

Right from the beginning geophysical research was closely associated with the geological activities. The GANOVEX (German Antarctic North Victoria Land Expedition) program combined geological research with geophysical (mainly airborne) investigations. This proved to be a fruitful approach to many of the open questions regarding the tectonic development of the Ross Sea region. Aeromagnetic surveys evolved into a powerful tool for identifying geological structures and following them underneath the ice covered areas – not accessible to direct geological investigations. To achieve this aim it was essential to lay out these surveys with a relatively closely spaced line separation on the expense of covering large areas at the same time. Nevertheless, over many years of continuous research areas of more than a just regional extent could be covered.

This was, however, only possible through international collaboration. During the first years, working in the Ross Sea area, the cooperation with the US and Italian programs played a significant role, especially the GITARA (German-Italian Aeromagnetic Research in Antarctica) program has to be mentioned. GEOMAUD (Geoscientific Expedition to Dronning Maud Land) and the German-Australian joint venture PCMEGA (Prince Charles Mountains Expedition of Germany & Australia) expanded research activities to the East Antarctic shield area. In the International Polar Year (IPY), BGR played a leading role in the international project AGAP (Antarctica's GAMburtsev Province) as part of the main topic "Venture into Unknown Regions". AGAP was jointly conducted by the USA, Great Britain, Australia, China and Germany.

While in the Ross Sea area even smaller scale surveys – getting close to industry standards – targeted specific geological questions, the reconnaissance type of aerogeophysical projects continued in Dronning Maud Land, now in close cooperation with the Alfred-Wegener-Institute (AWI). This very successful cooperation between the two German institutions - both working continuously in the polar regions - was already established in Arctic projects, namely in northern Greenland. Also, since the late 1990's BGR conducted together with Canada airborne surveys as part of PMAP (Polar Margins Aeromagnetic Program), thematically linked to the predominantly geological CASE (Circum Arctic Structural Events) program of BGR. A joint project of GSC (Geological Survey of Canada) and BGR in the Nares Strait was a highlight of combined geological and aeromagnetic research addressing the still widely discussed Wegener fault between Greenland and Ellesmere Island and the extent of tertiary basins in the Nares Strait itself.

BGR intends to continue its successful combined geological-geophysical work in both polar regions. The increasing logistic and financial challenges to work in these extreme areas will demand not only a continuation but an intensification of national and international collaboration.