



New aerogeophysical views of crustal architecture in the Recovery frontier of East Antarctica

Fausto Ferraccioli (1), Rene Forsberg (2), Tom Jordan (1), Kenichi Matsuoka (3), Arne Olsen (1), Owen King (1), and Marta Ghidella (4)

(1) British Antarctic Survey, Geological Sciences, Cambridge, United Kingdom (ffe@bas.ac.uk), (2) Danish Technical Institute, Lyngby, Denmark, (3) Norwegian Polar Institute, Tromsø, Norway, (4) Instituto Antartico Argentino, Buenos Aires, Argentina

East Antarctica is the least known continent on Earth, despite being regarded as a keystone in Gondwana, Rodinia and possibly Columbia supercontinents. Significant progress has however been made in recent years in the exploration of East Antarctica using airborne geophysical techniques. Spurred by the International Polar Year major collaborative aerogeophysical campaigns have been performed over the Wilkes Subglacial Basin, the Aurora Subglacial Basin and the Gamburtsev Subglacial Mountains. Analyses of these recent datasets is providing fundamental new glimpses into the crustal architecture in interior East Antarctica, as well as several new interpretations regarding its linkages with tectonic and geodynamic evolution from the Precambrian to the Mesozoic.

Here we present the first results of a major reconnaissance aerogeophysical survey over the largely unexplored Recovery ice stream catchment in East Antarctica, flown during the IceGRAV 2012-13 field season, as part of a new international Danish, Norwegian, UK and Argentine collaboration. Over 29,000 line km of new radio-echo sounding, laser altimetry, gravity and magnetic data were acquired using a British Antarctic Survey Twin Otter. We will focus primarily on presenting the new potential field datasets and discuss the anomaly patterns seen in aeromagnetic anomaly maps, free air, Bouguer and isostatic residual maps.

The aerogeophysical datasets we will present provide a new foundation to address a cascade of open questions regarding this part of East Antarctica, including: i) Where are and what is the nature of the major tectonic boundaries separating the Coast block, the Shackleton Range and the Dronning Maud Land crustal provinces? Specifically is there new geophysical evidence in support of a Pan-African age suture zone in the Shackleton Range linked to Gondwana assembly?; ii) is there evidence in support of an older Grenvillian-age orogenic belt, extending across the interior of East Antarctica?; Or, is there a continuation of a collage of provinces recognised further in the interior of East Antarctica, including the Gamburtsev, South Pole and Recovery provinces (Ferraccioli et al., 2011, Nature)?; iii) are there any major subglacial rift structures and sedimentary basins beneath the Recovery catchment, e.g. similar to those identified in the adjacent Weddell Sea Rift, in the Transantarctic Mountains and its hinterland, or in the East Antarctic Rift System?; and finally, iv) how significant are geological controls on the subglacial topography, hydrology and ice sheet dynamics in this part of East Antarctica?