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BABOC: A new project aimed at analysing geological boundary conditions for the East Antarctic Ice Sheet in the Wilkes Subglacial Basin

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The Wilkes Subglacial Basin extends for ca 1,400 km from George V Land into the interior of East Antarctica and hosts several major glaciers that drain a large sector of the East Antarctic Ice Sheet (EAIS). The region is of major significance for assessing the long-term stability of the EAIS, as it lies well below sea level and its bedrock deepens inland. This makes it potentially prone to marine ice sheet instability, much like areas of the West Antarctic Ice Sheet (WAIS) that are presently experiencing significant mass loss. This sector of the EAIS has also recently become a major focus of research within IODP Leg 318 that aims to better comprehend the initial stages of glaciation in East Antarctica and the subsequent history and stability of the ice sheet in response to major paleoclimatic changes (Escutia et al., 2010 IODP Rep.). Understanding geological boundary conditions in this region is therefore important to assess their influence on ice sheet dynamics and stability. Early geophysical models inferred the existence of a major extensional sedimentary basin beneath the region, which if true, could be similar to some areas of the WAIS, There thick subglacial sediments deposited within deep rift basins or forming thin marine sedimentary drapes have been inferred to exert a key influence on the onset and maintenance of fast-glacial flow. However, later geophysical models indicated that the Wilkes Basin contains little or no sediment, is not rift-related and formed in response to Cenozoic flexural uplift of the Transantarctic Mountains (TAM). A major joint Italian-UK aerogeophysical exploration campaign over parts of the Wilkes Basin is super-seeding these earlier geophysical views of the basin: i) Precambrian and Paleozoic basement faults can now be recognised as exerting fundamental controls on the location of the topographic margins of the basin; ii) the crust underlying the basin is thinner compared to the TAM, but is unlikely to be Cretaceous or Cenozoic-age rifted crust and; iii) its bedrock is composed of a variety of rocks of different ages and bulk composition, including inferred Proterozoic basement, Neoproterozoic and Cambrian sediments intruded by Cambrian arc rocks, and cover rocks formed primarily by Beacon sediments intruded by Ferrar sills of Jurassic age. Within the framework of the collaborative Italian-US-UK BABOC project a new initiative has been launched to analyse and model variable geological boundary conditions in the Wilkes Basin, by analysing both new and existing geophysical data. A couple of new flights over the region were flown by the ICECAP team for BABOC during the 2010-11 field campaign from Mario Zucchelli Station. ICECAP independently acquired a suite of extensive aerogeophysical observations over three campaigns, centred in particular over the southern part of the basin, and some new profiles over the northern coastal margin of the basin. We present an initial analyses and interpretation of the potential field signatures over the different parts of the basin and assess regional geological controls on the subglacial topography of the basin.