



The Sabrina Subglacial Basin – What lies in it? And does it influence the East Antarctic Ice Sheet?

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The ICECAP (International Collaborative Exploration of the Cryosphere through Airborne Profiling) project has defined a broad topographic low (which we term the Sabrina Subglacial Basin or SSB) under the East Antarctic Ice Sheet in Wilkes Land, using long range aerogeophysics. This previously unknown topographic basin lies between the Aurora and Vincennes Subglacial Basins in the ice sheet interior and the the Totten Glacier and Moscow University Ice Shelf catchments at the margin, which are some of East Antarctica's largest glacial catchments, and possibly some of the most vulnerable to change. Here we outline evidence for a major sedimentary basin that occupies the SSB, which is defined primarily by airborne magnetic data using depth to magnetic basement estimates that indicate platform basin geometry. Airborne gravimetry shows a broad free air gravity high over the SSB region, reflecting dense basement rocks beneath, and possibly a shallow Moho. The gravity signature of the sedimentary basin itself is subtle. Nevertheless, a weak anti-correlation exists between depth to magnetic basement and the isostatic residual gravity anomaly, albeit with significant scatter. Through 2.5D gravity and magnetic forward modelling we define some candidate geological scenarios for the fundamental properties of this sedimentary basin (density, thickness and magnetic susceptibility). Plausible scenarios include a high-density carbonate-dominated platform basin above a moderate-density basement, a low-density (carbonate or clastic) sedimentary basin above a high-density basement, and a high-density but non-magnetic metasedimentary basin. We go on to discuss the likely influence that each of these scenarios may have had on the structure, development and dynamics of the East Antarctic Ice Sheet. We suggest that the existence of a broad, low lying platform sedimentary basin, perhaps geologically similar to Australia's Eucla Basin, provides the opportunity for extensive deglaciation through the lateral expansion of weakly bounded ice-streams. This system may be exacerbated by a distributed subglacial hydrologic system, and moderated by the susceptibility of the bed to erosion by ice and water.