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The potential for unveiling lithosphere provinces and heat flow in East Antarctica

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East Antarctica constitutes 7% of the Earth's continental area (the same size as Europe) and hosts the largest single ice sheet on Earth, the East Antarctic Ice Sheet (EAIS). Because it is mostly ice-covered, its geological structure and evolution are poorly known. Understanding the geological history of East Antarctica is nevertheless critical for investigations of global crustal growth and the amalgamation and break-up of supercontinents such as Rodinia and Gondwana, of which East Antarctica was a key component. Geological structure and crustal age distribution also control heat flow, which influences rates of melting at the base of ice sheets and sub-ice hydrology, which in turn affect ice dynamics. Low heat flux and low rates of basal melting in East Antarctica may help preserve old basal ice. Understanding the spatial distribution of relatively higher and lower geothermal heat flux would assist in identifying the areas of oldest ice suitable for coring for palaeoclimate studies, help discriminate between conflicting hypotheses for the large-scale crustal structure and distribution of Archaean cratons and more recent mobile belts in East Antarctica, and provide new insights into basal conditions for the EAIS. Several aerogeophysical and satellite-derived datasets have recently become, or will soon become, available. The compilation and analysis of these new datasets is likely to yield unprecedented views of geological provinces and geothermal heat flow variations in East Antarctica.