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A 1:1000 000 tectono-geological map of Mac.Robertson Land and Princess Elizabeth Land (East Antarctica)

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The area of Mac.Robertson Land – Princess Elizabeth Land in East Antarctica is a vast and relatively well-exposed terrain which is underlain by geological units and formations with a wide range of age, lithology and tectonic setting. A large number of U–Pb zircon age determinations has been published elsewhere. We accumulated data for more than 280 samples studied for zircon geochronology by means of either bulk TIMS analysis (35 samples) or local SIMS analysis (more than 245 samples, either by LA ICP-MS or SHRIMP) in different laboratories.

Our map follows the basic principles of 1:1000 000 geological map compilation standards accepted in Russia since 2009. The basic map units are assigned to two categories: stratigraphic (sedimentary, volcanic, and sedimentary-volcanic sequences, including their metamorphosed counterparts) and non-stratigraphic (intrusive bodies, and metamorphic or plutonic-metamorphic complexes). Metamorphic and plutonic-metamorphic complexes are associations of high-grade metamorphic rocks for which the protolith nature, composition and structure can be hard to identify. Commonly such complexes represent strongly deformed and often migmatitic intercalations of high-grade gneisses (ortho- and/or paragneisses) and crystalline schists. These complexes are shown by ruled color patterns, with the colour indicating both the metamorphic grade and predominant lithology (mafic, salic/psammitic or high-aluminous). Metamorphic complexes are defined by the age of the thermal/deformational peak responsible for the observed mineral paragenesis and structure. We invent a complex format of indices applicable to lithotectonic complexes. This format includes two age components. The first symbol stands for protolith age, and the second indicates the age of the observed complex, i.e., the main-stage metamorphism and pervasive deformation. In many instances it is difficult to define the structural age, as many complexes experienced recurrent metamorphism and deformation. Younger overprinting metamorphic events are shown with specific symbols.

The tectonic grid is dominated by three pre-Cambrian provinces largely structurally or thermally overprinted within the Cambrian orogen. In the southern Prince Charles Mountains the RULA Province comprises Ruker and Lambert zones. The Ruker Zone is underlain by Palaeoarchaean to Meoarchaean complexes (3500–2800 Ma with single inherited zircons as old as ca 3800–3600 Ma) overlain by Neoarchaean to supposedly late Palaeoproterozoic or Neoproterozoic covers. The Lambert Zone is composed of Palaeoproterozoic complexes derived from the Archaean protoliths. In east Prydz Bay the Vestfold Province underlies the Vestfold Hills composed of late Neoarchaean to earliest Palaeoproterozoic complexes. Vast area between the early Precambrian provinces is made up of mid Mesoproterozoic to earliest Neoproterozoic complexes which comprise three geologically distinct tectonic zones: Fisher (mid-Mesoproterozoic rocks with prominent mafic component), Beaver (largely late Mesoproterozoic to earliest Neoproterozoic mostly felsic rocks which may include mid-Mesoproterozoic component; an Archaean inlier may be distinguished in Rauer Islands), and South

Princess Elizabeth Land (cryptic Palaeoproterozoic crust covered and reworked in late Mesoproterozoic to earliest Neoproterozoic and/or in Cambrian). A vast Cambrian ensialic mobile belt (Prydz Orogen) overprints the RULA Province and most of the Rayner Province. Most workers believe this belt was formed through collisional tectonics, but accumulated data rather argue for within-plate processes responsible for its formation.

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