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George V Land paragneisses xenoliths dating. New insights for the Antarctica-Australia connection and geodynamic reconstructions.

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George V Land is constituted of terrains that are considered as the southern extension of Australia in Antarctica. This region plays a key role to better understand the assembly, evolution and separation of the Gondwana and Rodinia supercontinents. In the studied area two distinct continental domains in ages, nature, structures and crustal thicknesses are juxtaposed: the 1.7-2.4 Ga Terre Adélie Craton to the west and a younger domain, comprised of 500 Ma old intrusive complex to the east. The latter is mainly composed of granitoids and is associated with the Ross Orogeny. From field evidences, these two domains are likely separated by a major dextral strike-slip structure: the Mertz shear zone (MSZ, 145°E). The MSZ was activated at 1.7 and 1.5 Ga respectively in amphibolite and greenschists facies conditions.

The tectonic evolution of the eastern region between 1.5 Ga (last activation of the MSZ) and 500 Ma (age of the domain bordering the craton) is a key question to geodynamic reconstructions. For this purpose we studied samples of paragneisses xenoliths hosted by the Palaeozoic granitoids, as they represent relics from the underlying basement of this domain. Xenoliths are few-centimeters to several decimeters in size and include different types of paragneisses that may coexist. U-Pb analyses were carried out on 130 zircons from three different xenoliths.

Extracted detritic zircons have similar ages from a sample to another showing a common origin of the sedimentary protolith. A large variety of ages were found from 580 Ma to 3.4 Ga and the best-represented age is about 580 Ga that may correspond to a metamorphic stage predating the intrusive event. Another interesting result is that almost no 1.6 to 2.4 Ga zircons were found, suggesting that sedimentary protolithes cannot be derived from erosion of the neighbouring Terre Adélie Craton. This result argues for a tectonic collage between the two domains. By comparing our results with previous similar studies in South Australia and West Antarctica, we propose a new scenario for the geodynamic evolution of the region before the opening of the Southern Ocean.