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A late Tonian plate reorganization event: Using a deep-time full-plate global model to unravel Neoproterozoic tectonic convulsions

Alan Collins¹, Morgan Blades¹, Andrew Merdith², and John Foden¹

¹The University of Adelaide, Tectonics and Earth Systems, Department of Earth Sciences, Adelaide, Australia
(alan.collins@adelaide.edu.au)

²Laboratoire de Géologie, Université of Lyon 1, France

Plate reorganization events are a characteristic of plate tectonics that punctuate the Phanerozoic. They fundamentally change the lithospheric plate-motion circuit, influencing the planet's tectonic-mantle system and both ocean and atmospheric circulation through changes in bathymetry and topography. The development of full-plate reconstructions for deep time allows the geological record to be interrogated in a framework where plate kinematic reorganizations can be explored. Here, the geological record of the one of the most extensive tracts of Neoproterozoic crust on the planet (the Arabian-Nubian Shield) is interpreted to reflect a late Tonian plate reorganization at ca. 800-715 Ma that switched plate-convergence directions in the Mozambique Ocean, bringing Neoproterozoic India towards both the African cratons and Australia-Mawson, instigating the closure of the intervening ocean and the future amalgamation of central Gondwana ca. 200 million years later. This plate kinematic change is coeval with constraints on break-up of the core of Rodinia between Australia-Mawson and Laurentia and Kalahari and Congo.