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GR Focus Review

A Full-Plate Global Reconstruction of the Neoproterozoic

Andrew S. Merdith[1,2,*], Alan S. Collins[3], Simon E. Williams[1], Sergei Pisarevsky[4], John. F Foden[3], Donnelly Archibald[3,5], Morgan L. Blades[3], Brandon L. Alessio[3], Sheree Armistead[3], Diana Plavsa[3], Chris Clark[4], and R. Dietmar Müller[1]

[1] EarthByte Group, School of Geosciences, The University of Sydney, Madsen Building F09, Camperdown, NSW 2006, Australia

[2] Data61, CSIRO, Australian Technology Park, Eveleigh, NSW 2015, Australia

[3] Centre for Tectonics, Resources and Exploration (TRaX), Department of Earth Sciences, The University of Adelaide, Adelaide, SA 5005, Australia.

[4] Earth Dynamics Research Group, ARC Centre of Excellence for Core to Crust Fluid Systems (CCFS) and The Institute for Geoscience Research (TIGeR), Department of Applied Geology, Curtin University, GPO Box U1987, WA 6845, Australia

[5] Department of Earth Sciences, St. Francis Xavier University, Antigonish, Nova Scotia, B2G 2W5, Canada

*Corresponding author: Andrew.merdith@sydney.edu.au

Abstract

Neoproterozoic tectonic geography was dominated by the formation of the supercontinent Rodinia, its break-up and the subsequent amalgamation of Gondwana. The Neoproterozoic was a tumultuous time of Earth's history, with large climatic variations, the emergence of complex life and a series of continent-building orogenies of a scale not repeated until the Cenozoic. Here we synthesise available geological and palaeomagnetic data and build the first full-plate, topological model of the Neoproterozoic that maps the evolution of the tectonic plate configurations during this time. Topological models trace evolving plate boundaries and facilitate the evaluation of "plate tectonic rules" such as subduction zone migration through time when building plate models. There is a rich history of subduction zone proxies preserved in the Neoproterozoic geological record, providing good evidence for the existence of continental and intra-oceanic subduction zones through time. These are preserved either as volcanic arc protoliths accreted in continent-continent, or continent-arc, collisions, or as the detritus of these volcanic arcs preserved in successor basins. Despite this, we find that the model presented here only predicts, on average, ~90% of the total length of subduction active today, suggesting that we have