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Solving uncertainties in Neoproterozoic paleogeographic reconstructions: the key to understanding the links between the Earth's outer and inner envelopes?

Melina Macouin[1], Sonia Rousse[1], and Paul Antonio[2]
[1]Géosciences Environnement Toulouse, CNRS-IRD-UPS UT3, Toulouse, France (melina.macouin@get.omp.eu)
[2]Universidade de São Paulo (USP), Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG), Rua do Matão, 1226, Cidade Universitária, 05508-090 São Paulo – SP, Brazil.

The Neoproterozoic is marked by unusual perturbations of the climate system (global glaciations), biogeochemical cycles (e.g. oxygenation, Carbon), and life diversity that will lead to a world as we know it today. These upheavals can be considered from the point of view of paleogeographic reconstructions to decipher the forcing mechanisms and consequences. The paleopositions of the continents and their geology impact the continental weathering, a fundamental element in the feedbacks driving the climate. Besides, the position of the supercontinent Rodinia and the nature of its margins influence degassing, itself a major factor in biogeochemical cycles. Neoproterozoic paleogeographic reconstructions are based on some reliable paleomagnetic data and geological evidence of kinship between the cratons. Uncertainties in Neoproterozoic paleogeographies hinder our understanding of the relationship between deep Earth and superficials layers. Notably, the positions of the cratons that will constitute the Arabian-Nubian shield are poorly constrained. The paleomagnetic results we obtained in Oman on well-dated mafic dykes, indicate a mid-latitude position at the dawn of the Sturtian glaciation. These results show the potential of these small cratons, which represent a zone of arcs and arc collisions, in our understanding of the geodynamics of the Rodinia supercontinent. We then propose a refined configuration at ca. 720 Ma, highlighting the extent of snowball Earth deposits.