

PALEOMAGNETISM OF NEOPROTEROZOIC CAP CARBONATES FROM SÃO FRANCISCO AND AMAZON CRATONS, BRAZIL

R.I.F. TRINDADE¹, M.S. D'AGRELLA-FILHO¹, F.T. FIGUEIREDO¹, E. FONT¹, M. BABINSKI², A.C.R. NOGUEIRA³ & C. RICCOMINI⁴

¹Departamento de Geofísica, Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Rua do Matão, 1226, 05508-900 São Paulo, SP, Brazil; rtrindad@iag.usp.br

²Departamento de Mineralogia e Geotectônica, Instituto de Geociências, Universidade de São Paulo, São Paulo, SP, Brazil

³Departamento de Geociências, Universidade Federal do Amazonas, Manaus, AM, and Programa de Pós-Graduação em Geologia Sedimentar, Instituto de Geociências, Universidade de São Paulo, Rua do Lago, 562, 05508-000 São Paulo, SP, Brazil

⁴Departamento de Geologia Sedimentar e Ambiental, Instituto de Geociências, Universidade de São Paulo, São Paulo, SP, Brazil

The low-latitude paleomagnetic record of some Neoproterozoic glacial successions has long been cited as evidence for dramatic changes in Earth climate (snowball Earth events). But the test for such events demands a global-scale paleomagnetic database in the Neoproterozoic glacial/carbonate successions. In order to constrain these extreme climatic events better, an extensive paleomagnetic survey has been conducted in carbonates that cap the Neoproterozoic glacial rocks of the São Francisco (SFC) and Amazon (AMC) cratons, Brazil. These rocks present the isotopic signatures and the sedimentary structures that typify such successions (see Nogueira *et al.*, this volume).

In the SFC, sampling was performed at 104 sites (horizontal beds) distributed in two sectors (Bambuú and Salitre), about 1000 km apart, within the stable area of the craton. For some sites, Pb-Pb ages were also obtained. Most of the Pb-Pb ages are coeval or younger than the tectonic activity on the marginal *Brasiliano* fold belts, and range from 550 to 500 Ma. Only two ²⁰⁷Pb-²⁰⁶Pb isochron ages are older than 600 Ma, and may thus represent the time of deposition. The most reliable one indicates 762 ± 29 Ma as the depositional age for cap carbonates from the Samba quarry in the southern part of the basin. In the AMC, sampling included 15 sites in undeformed, sub-horizontal beds, and 25 sites along the limbs of regional folds at the margin of the craton. Age constraints are given by shifts in ⁸⁷Sr/⁸⁶Sr ratios towards values greater than 0.7081 and by the microfossil assemblage (Hidalgo *et al.*, this volume), consistent with a Neoproterozoic III age for sedimentation.

After paleomagnetic cleaning, most samples from both the SFC and AMC yielded similar virtual geomagnetic poles. In the SFC, magnetic directions for both sectors are northeast, positive, and steeply dipping, giving paleomagnetic poles at 33°N, 322°E ($A_{95}=3.8^\circ$) for Salitre and 30°N, 321°E ($A_{95}=3.8^\circ$) for Bambuú with overlapping confidence circles. In the AMC most sites from the deformed sector and some sites at brecciated levels from the undeformed sector, have shown a northeast (positive) component with a corresponding paleomagnetic pole at 31°N, 336°E ($A_{95}=6.8$). As these poles plot into the 520 Ma sector of the Gondwana APW path after rotation of the Amazon Craton to Africa and because they coincide with the high-quality Ntonya Ring pole (West Africa), dated at 522 ± 13 Ma, these data are indicative of a remagnetization acquired at this time at the end of the *Brasiliano* Orogeny. This interpretation is corroborated by the magnetic mineralogy signature obtained for these sites (wasplastic hysteresis loops, contradictory Lowrie-Fuller and Cisowski tests, and anomalously high hysteresis ratios), the coincidence (within error) of this age with the Pb-Pb ages obtained for the SFC samples, and a negative fold-test obtained for the AMC sites. Some sites from both cratons, however, seem to have not been affected by the Cambrian remagnetization. They correspond to undeformed layers at the base of the carbonate succession, close to the contact with the glacial rocks. Two mean poles were calculated for SFC (66°S, 198°E; $A_{95}=5.4$) and AMC (77°S, 66°E; $A_{95}=8.8$). Since all these sites were sub-horizontal no fold-test was performed, but the presence of consistent magnetic reversions along the pile suggests that magnetization is primary. This being the case, the sedimentation of the glacial rocks and the overlying cap carbonates occurred at moderate latitude (51°) in SFC (Sturtian-age glaciation) and at low latitude (24°) in the AMC (Varanger-age glaciation). These results reinforce the hypothesis of Neoproterozoic global-scale ice-ages.

Hidalgo, R., Fairchild, T.R., Nogueira, A.C.R., and Riccomini, C. (this volume) Neoproterozoic fossils of the Paraguai Belt, Brazil.

Nogueira, A.C.R., Riccomini, C., Sial, A.N., Moura, C.A.V. and Fairchild, T.R. (this volume) Late Neoproterozoic Puga cap carbonate succession from southeastern Amazon Craton, Brazil: a record of snowball earth in South America.