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CGC-04 Neoproterozoic ice ages: Quo vadis? - Part 2

How many Neoproterozoic glacial events does the diamictite-rich Macaúbas group record?

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The Macaúbas Group (s.s.) represents the precursor basin of the Araçuaí orogen, located to the east of the São Francisco craton in southeastern Brazil. This group includes a very extensive (up to 50,000 square km) diamictite-rich pile metamorphosed from the chlorite to garnet zones of the greenschist facies, which total thickness seems to be up to 5 km.

The Macaúbas diamictites have been correlated with glacigenic formations located on the São Francisco craton, as well as with diamictites of the West Congo Belt (the counterpart of the Araçuaí orogen located in Africa). The lowermost units of the Macaubas Group, named Duas Barras and Rio Peixe Bravo formations, are free of diamictite and represent fluvial to marine successions deposited during the continental rift stage.

The oldest glacigenic unit, named Serra do Catuni Fm, covers the fluvial Duas Barras Fm and consists of massive diamictite with few arenite and rhythmite (varvite) lenses, representing mainly glacioterrestrial sediments also deposited during the rift stage. U-Pb SHRIMP data from detrital zircon grains suggest a maximum sedimentation age of ca. 900 Ma for the Duas Barras and Serra do Catuni formations. The U-Pb ages of mafic dikes and anorogenic granites constrain the onset of the rift stage at 906-875 Ma so that the Serra do Catuni Fm could record a pre-Sturtian glaciation.

The Serra do Catuni Fm passes upward to the Lower Chapada Acauã Fm, a thick succession of interlayered diamictite, graded arenite and pelite, representing glacio-marine debris flows and turbidites, with intercalations of pillowed basalts which transitional signature suggests deposition during the very late rift stage of the Macaúbas basin. The Lower Chapada Acauã Fm is tentatively correlated to the Sturtian Carrancas diamictite, a cratonic cover that is capped by the ca. 740 Ma Sete Lagoas carbonate on the São Francisco Craton, and to the Lower Mixtite Formation of the West Congo Belt. In the northern part of the orogen, the Nova Aurora Fm, a probable equivalent of the Lower Chapada Acauã Fm (and also a candidate to be Sturtian), covers the Rio Peixe Bravo Fm and is rich in ferruginous diamictite and non-ferruginous diamictite, both with layers of graded arenite and minor pelite, representing glacio-marine deposits. Carbonate intercalations occur in the Nova Aurora and Lower Chapada Acauã formations, but they lack detailed studies.

The youngest units of the Macaúbas Group are free of diamictite and represent post-glacial successions deposited from proximal (Upper Chapada Acauã Fm) to distal passive margin and oceanfloor (Ribeirão da Folha Fm) environments. The onset of the passive margin stage is unknown, but the oceanic opening lasted until ca. 660 Ma (U-Pb, zircons from ophiolitic plagiogranite). The regional metamorphic event took place from 585 Ma to 560 Ma. The available data suggest no record of glaciation younger than the Sturtian event.

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Diametito glaciais