

# PALEOENVIRONMENTAL EVOLUTION OF AN INTRACONTINENTAL BASIN: IMPLICATIONS FOR PROVENANCE, DEPOSITIONAL SETTING AND TECTONIC UPLIFT OF THE PARNAÍBA BASIN, NE BRAZIL

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We present results from a multidisciplinary sedimentological and geochemical (organic and inorganic) study of samples from the eastern and western margins of the Parnaíba intracratonic basin, NE Brazil. The aim of this research was to reveal the principal shifts in the basin's palaeoenvironmental evolution during the Palaeozoic. The results have implications for sediment provenance and tectonic uplift and indicate the presence of a hitherto undiscovered formation within the basin.

Organic geochemical analyses of fine grained rocks using the ratios of C<sub>27</sub>, C<sub>28</sub> and C<sub>29</sub> steranes to deduce palaeoenvironments strongly suggest predominance of estuarine [i.e. brackish] depositional conditions throughout the studied formations. Parallel studies of isoprenoid (Pristane and Phytane) biomarker data suggest a marked trend of decreasing oxygen availability upwards from Devonian to Permian. This is supported by data from manganese geochemistry.

Although long-term palaeoclimate was controlled by the latitudinal south to north migration of South America (and hence of the Parnaíba Basin), we can also detect some marked longitudinal variations in palaeoclimate. For example, on the western basin margin, the Pimenteiras and Pedra de Fogo formations contain significant amounts of evaporitic minerals, but such facies are absent on the eastern margin. We conclude that surface meteorological conditions varied from semi-arid in the west to humid in the east; it does appear that these climatic conditions were coeval in the basin. This may complicate efforts to undertake sequence stratigraphic correlations.

The amount of chemical weathering tends to increase upwards throughout the sediment column. Evidence for this comes from the chemical index of alteration (CIA: which is defined as the percentage of Al<sub>2</sub>O<sub>3</sub> divided by the sum of the molecular proportions of the oxides of Al, Na, K and Ca); this ratio increases throughout the Palaeozoic, as do the absolute quantities of antimony, arsenic, mercury and tungsten (Sb and As are assumed to have been weathered from mafic bodies).

As a result of our detailed field survey in the eastern Tocantins region of the Parnaíba Basin we are able to reveal a potential new sedimentary formation of Late Permian age, near the city of Filadélfia. We present a detailed characterization of this formation and the probable tectonic-related reasons for why this has hitherto been undiscovered.

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Key Words: paleoenvironmental reconstruction, climate, weathering.