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Extended Abstracts

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Correlation between the Una and Bambuí carbonatic sequences: Paleomagnetic evidence

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Introduction

Recent papers revitalized the discussion on the age of carbonatic sequences from the Una and Bambui Groups[1-6]. These papers present new radiometric data (K/Ar, Rb/Sr, U/Pb and Sm/Nd) and chemio-stratigraphic studies that allowed new interpretations for the large age interval for those rocks. Based on Pb/Pb ages, Babinski and co-authors[1,5] consider 690 Ma the minimum age for the Bambui carbonate sedimentation. Pb isotopes suggest that a fluid flow event affected the Pb/Pb system in a regional scale at 550-500 Ma, including the stable areas in the basin. Sm/Nd, Rb/Sr and K/Ar data in the 774-528 Ma time interval[6] point to a diagenetic to epimetamorphic event by 580±25Ma[6]. However, based on the $^{87}Sr/^{86}Sr$ ratios, ages of 595 Ma and 550Ma are associated with the sedimentation of the Bambui and Una carbonates, respectively[2,4,6]. Although there is no consensus yet about the interpretation of the geochronological and chemio-stratigraphic data, the similar Sr isotopic ratios for Una and Bambui Groups[2] suggests that these basins were formerly interconected or, at least, contemporaneous[3,6].

This paper presents preliminary results from 280 samples from 46 stratigraphic layers of the Bambuí Group (limestones and carbonatic shales). Samples were collected in the Arcos-Pompeu region which was probably not affected by the Brasiliano Orogenesis. These paleomagentic results will be compared with those from Salitre Formation[7] (Una Group), and discussed taking into account the isotopic interpretations mentioned above.

Results and discussion

Two specimens from each site were submitted to alternating field and thermal demagnetizations. Magnetic directions were measured using a cryogenic magnetometer. Treatments were efficient for separating a NNE, positive steep inclination remanence in almost all samples, including the shales (Fig. 1a,b). This magnetization component is carried by magnetic minerals with unblocking temperatures between 300°C and 400°C (Fig. 1d).

These results are very similar to those obtained for the Salitre carbonates (Fig. 1c), indicating that the acquisition of the characteristic magnetization in both sequences was contemporaneous and associated with the same magnetic carrier. Secular variation of the geomagnetic field seems to have not been fully recorded throughout the sampled profiles, although they may be as thick as 100m. Moreover, all samples displayed the same magnetic polarity. These features may suggest that remanence was acquired in a short time interval. Considering the steep inclinations (Fig. 1a) this remanence was imprinted while the studied regions were at moderate to high latitudes (ca. 50° for the Salitre region[7]). An age of about 500 Ma may be attributed to the Salitre characteristic magnetization when the corresponding paleomagentic pole is compared to other poles from the West Gondwana[7].

If this magnetization is of depositional origin a high sedimentation rate must be admitted to account for the observed magnetic features as described above. This assumption is in agreement with a detailed study of the Bambuí sedimentary sequence in the Arcos region[8]. The inferred high paleolatitudes, however, require a non-uniformitarian model for the formation of wide carbonatic platforms during the Proterozoic.

On the other hand, if the sediments were magnetized in a post-depositional process, either the 580±25Ma diagenetic to epimetamorphic event[6] or the 550-500Ma fluid flow that affected the Pb/Pb system[5] are suitable mechanisms. The latter one is more consistent with the age suggested for the Salitre pole (500 Ma[7]). It is worth noting that this interpretation does not discard the contemporaneity of the Una and Bambuí sedimentations[2,6]. A detailed study of the magnetic mineralogy (in progress) could shed some light upon the origin of this magnetic component.

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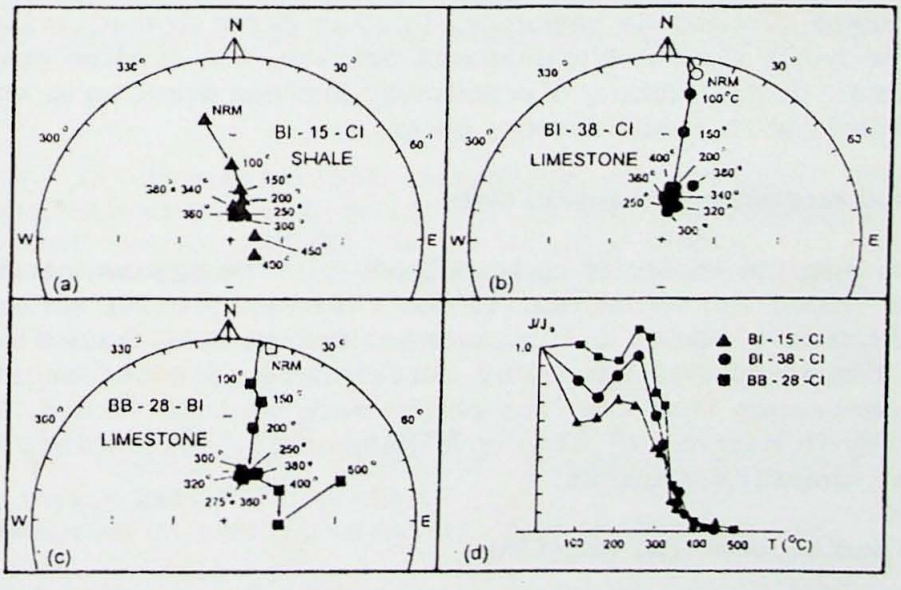

Fig. 1. Magnetic behavior for some samples during thermal treatment: a, b) Bambui Group; c) Salitre Formation; d) corresponding normalized intensity curves. Open/full symbols represent upward/downward inclinations.