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Rapid paleoenvironmental variations in NE Brazil during the Lateglacial. Insights from TpS2, S3CO2 and S3CO Rock Eval parameters.

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Abstract

The Rock-Eval pyrolysis technique was first developed as a rapid mean for evaluating the petroleum potential of source rocks, via the measurement of bulk organic parameters such as Total Organic Carbon (TOC), Hydrogen Index (HI), Oxygen Index (OI) and the maximum pyrolysis temperature Tmax (Espitalié et al., 1985; Lafargue et al., 1998). This method was then used to rapidly estimate organic matter quality and quantity in sedimentary series for paleoenvironmental studies (Talbot and Livingston, 1989). Recently, it has been proposed that there could be more information gained from the Rock-Eval parameters (Disnar et al., 2003). When considering also the recent analytical developments available from the Turbo6 version of the apparatus, there is a large field of investigation that remains unexplored in paleoenvironmental studies. Here we present results from the sedimentary infill of Lagoa do Caçó (Northern Brazil) that records paleoenvironmental changes since the Last Glacial Maximum (Jacob et al., 2004). The present study focuses on the Lateglacial interval (ca. 17,000 to 11,000 cal yrs BP), a time period where different Rock-Eval parameters such as TpS2 (Tmax equivalent), HI and OI produce controversial information. In order to better understand the meaning of these parameters, we propose an original mean of obtaining more pertinent information. S3CO2/S3CO ratio and TpS2 surprisingly display similar trends over the considered period, in two different cores. Furthermore, the evolution of these parameters is comparable with that of δ18O in the ice core record of Sajama (Bolivia) during the Lateglacial (Figure 1). Although the significance of these parameters and the origin of these variations remain to be cleared, our results confirm a pattern of rapid climate variability over the South American Tropics during the last deglaciation, as seen in the Northern Hemisphere.

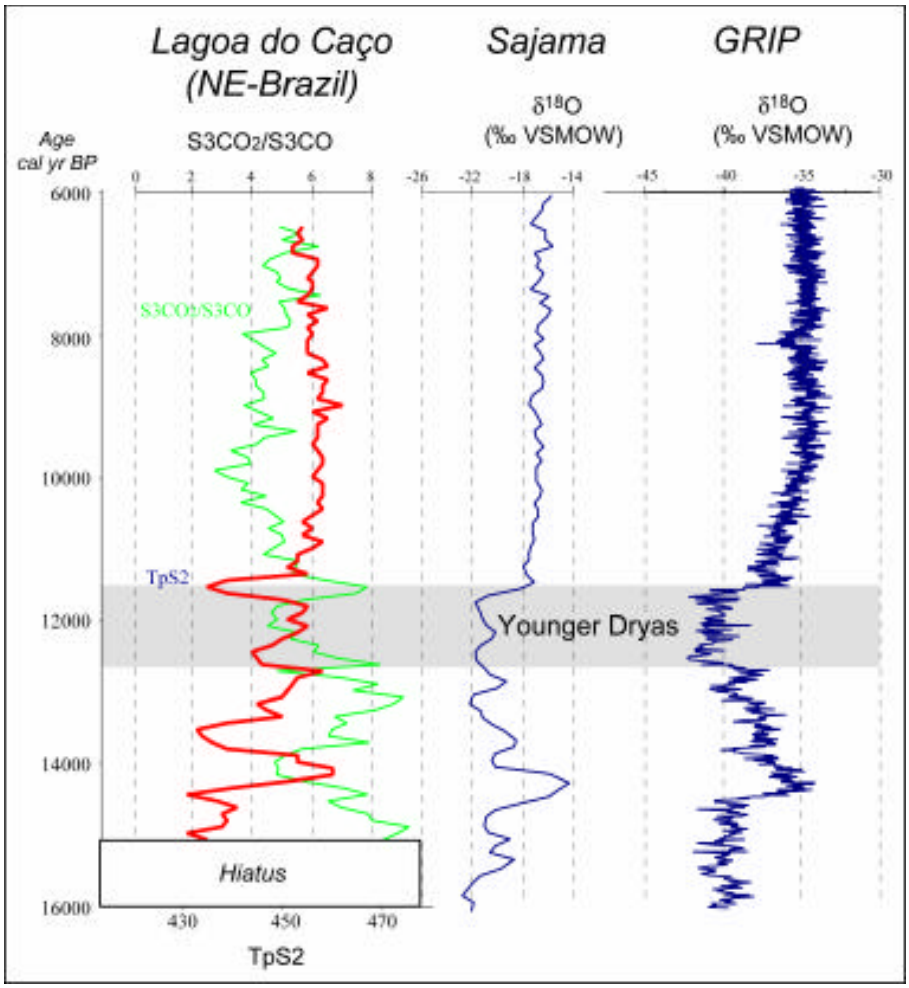

Figure 1: Comparison of $S3CO_2/S3CO$ and TpS2 Rock Eval parameters variations in the Lateglacial interval of core 98-3 (Lagoa do Caço, NE Brazil) with South American (Sajama) and Greenland (GRIP) ice core $\delta_{18}O$ records.

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