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## **THERMOLUMINESCENCE AND MAGNETICAL SUSCEPTIBILITY APPLIED TO PALEOCLIMATIC RECONSTRUCTION OF THE TAQUARUÇU REGION (CENTER- EASTERN BRAZIL), DURING THE HOLOCENE.**

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The purpose of this work was to establish the paleoclimatic reconstruction of the Taquaruçu region (MS) during the Holocene and to discuss it in the regional paleoclimatic context defined by Stevaux (1997). The studied area is located near the right margin of Paraná river, in Taquaruçu, southeast of Mato Grosso do Sul state, center-east of Brazil (lat. 22° 30' and 22° 45'S and long. 53° 15'and 53° 30'W). The area belongs to Taquaruçu Geomorphologic Unity (Stevaux, 1994),and it is dominated by a flatten reliev defined between 240 and 290 m of altitude and 40 m above average water-level of the Paraná river. The most characteristic feature of this unity is the presence of hundreds of pans (some of them dry) with diameter of 300 and 6000 m . The sedimentar covering is constituted by massive massive sand to muddy sand with a thickness of approximately 20 m layed over a 1 m bank of



limonite-cemented gravel. The geologic basement is constituted by sandstones of the Caiuá Formation.

The paleoclimatic and chronological data were obtained through magnetic susceptibility, thermoluminescence dating, micromorphologic analysis, detailed topographic profiles and granulometric and compositive analysis. It has been processed the granulometric analysis of 53 samples gotten from auger and trenches. Material is constituted of 60 to 70% of fine to medium massive, quartzose sand and 30 to 40% of mud. The highest concentration of clay in the samples is probably related to eluviation.

Analysis of 14 thin sections from samples collected in the trenches revealed that material shows a quartz composition in large part with corroded and fragmented grains. The cavities formed between the grains are fulfilled with ferruginous mud due to the scillation of the ground water, in a period it as above the present level (Figure 1).

The magnetic susceptibility values, measured in successive sampling of 0,30 m, presented two intervals with different values (superior with  $45.10^{-8} \cdot m^3 \text{ kg}^{-1}$ ; inferior  $5.10^{-8} m^3 \cdot \text{kg}^{-1}$ ) limited in the depth of 2,28 m. It has been realized 5 thermoluminescence determinations in sediments using the Additional Doses and Total Regeneration methods. Ages varied between 2,200 and 26,000 years BP (Stevaux & Kramer, 1998 and Kramer, 1998). The age/depth ratio curve (figure 1) shows an expressive inflection between the depths of 1,5m ( $3,390 \pm 300$  BP) and 2,8m ( $12,480 \pm 400$ BP), suggesting a temporal hiatus of 9,090 years in sedimentary column.

### **Intense eolic activity in middle Holocene**

The corroboration of the above- mentioned data allows important inferences about the paleoclimatic evolution of the area. An expressive erosive discordance in the depth of 2,28 m was identified by the temporal hiatus in TL datations and by the abrupt change in the magnetic

susceptibility values (Figure 1). The relief quite plain permits to suppose this discordance has been provoked by intense eolic remobilization about 3,000 years BP. Palynologic data in correlated deposits of the pans suggest a semiarid period between 3,5 and 2,5 ka BP for the region (Stevaux et al., 1997; Stevaux & Souza, 1997 and Stevaux, 1997).

### **High water level of the pans: humid period of the Holocene**

The detailed topographic survey possibilited the recognition of a former level of the lakes about 1,8 to 2,0 m above the present one. This fact is reinforced by the study of micromorphology, where it has been identified evidences of processes related to oscillation of the groundwater positioned above the present level. As such evidences are found below the discordance mentioned before, it is probable that the ground water has been standing in this position in a period posterior to 12,48 ka BP (age of the material) and inferior to 3,39 ka BP (age of the discordance). In this way, the existence of a humid period in the interval mentioned becomes quite suggestive for the region. Such fact agrees with the scheme of climatic changes of the Holocene established for the area (STEVAUX, 1997), where a period of great humidity was defined between 8,5 to 3,5 ka BP.

### **Conclusion**

The deposits of Taquaruçu Geomorphologic Unity register two important moments in the climatic history of the Holocene in the southeast region of Mato Grosso do Sul which are coherent with the pre-established evolution for the region. Due to sandy and homogeneous characteristics of the material studied, the quality and sort of the proxy data are quite limited. However the continuity of the studies in the pans correlate deposits of the region permit to anticipate an important source of paleoclimatic and paleoambiental informations.

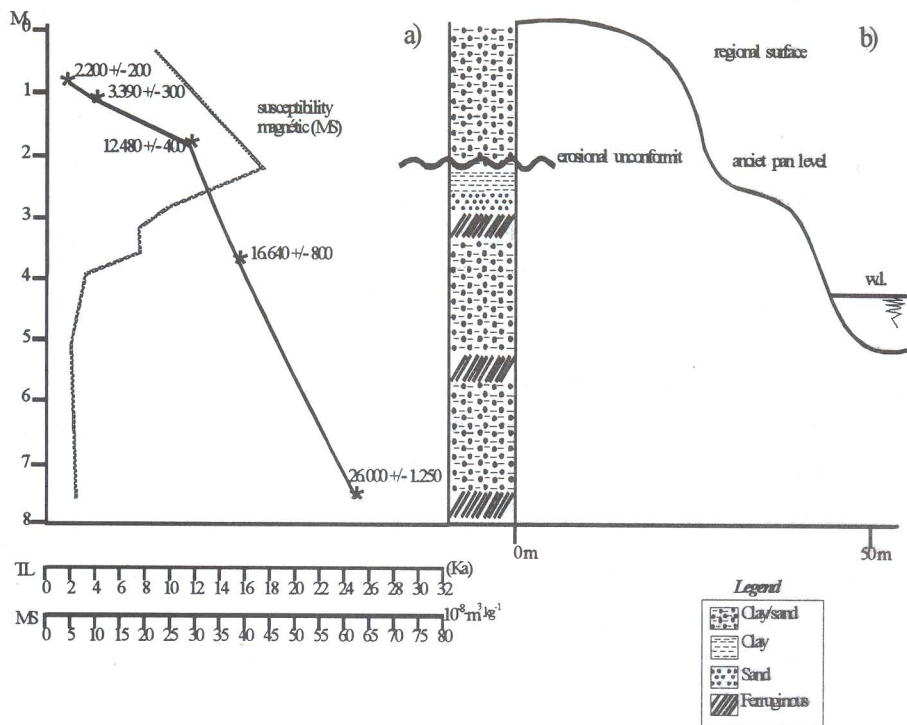


Figure 1. A) Signal the magnetic Susceptibility, TL age and lithology column. B) Topographic profile evidencing the erosional unconformity and ancient pan level.

## References

Kramer, V.M.S. Mudanças Climáticas na Região de Taquaruçu(MS) durante o Holoceno. UEM/DBI-NUPÉLIA, Maringá PR, Dissertação de Mestrado, 35p. 1998.

Stevaux, J.C. The Upper Paraná River (Brazil): Geomorphology, Sedimentology and Paleoclimatology. *Quaternary International*, **21**: 143-161. 1994.

Stevaux, J.C. Climatic events during the late Pleistocene and Holocene in the upper Paraná river and their correlation with Northeastern Argentina and Central and Southern Brazil. *Resumos Expandidos VI Congresso da Associação Brasileira de Estudos do Quaternário e Reunião sobre o Quaternário da América do Sul*. Curitiba, PR, p 493-496. 1997.

Stevaux, J.C.; Kramer, V.M.S. Genesis and Quaternary evolution of pans in the Taquaruçu(MS) Geomorphology Unit: Theme for discussion. Abstracts: Loess in Argentina Temperate and tropical. Paraná, Entre Rios, Argentina. p12. 1998.

Stevaux, J.C.; Souza, I.A. Eventos climáticos do Quaternário Superior na bacia do alto rio Paraná: uma tentativa de correlação com o centro sul brasileiro e o nordeste Argentino. *Cong. Geologia, anais v. 4, Bahia*, p 518-522. 1996.

Stevaux, J. C.; Souza Filho, E. E. & Jabur, I. C. A história quaternária do rio Paraná em seu alto curso. In: Vazzoler, A .E.A .M., Agostinho, A .A .and Hanh, N.S (eds.), *A Planície de inundação do alto rio Paraná*. Ed. UEM, Maringá, PR. p.47-72. 1997.