PALAEOSOL AND SEDIMENT INTERACTIONS CONTROLLED BY THE CLIMATE IN ARID AND SEMIARID PALAEOENVIRONMENT: THE LATE CRETACEOUS OF THE SOUTH AMERICAN (BAURU BASIN, SE BRAZIL)

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ABSTRACT: Since the Late Jurassic to the Late Cretaceous the area that currently corresponds to Central-Southern Brazil was characterised by dry climate conditions which brought about the formation of continental desertic depositional environments. The Late Jurassic and the Early Cretaceous were dominated by extensive *erg*, but at the beginning of the Late Cretaceous this depositional environment was drastically replaced by a widespread aeolian sand sheet, where alternating phases of topographic instability (deposition and/or erosion) and stability (pedogenesis) created a sedimentary succession characterised by interbedded aeolian sediments and palaeosols.
The Late Cretaceous in Central-Southern Brazil is represented by the Bauru Basin, an intracratonic basin about 370,000 km^2 wide and with a maximum thickness of 300 m. A sedimentary succession, 210 m thick, was studied with detail in the central and northern part of the basin. According to the sedimentological and palaeopedological features this succession was divided in three portions. The first portion, 40 m thick, is characterised by sediments (~80% of the thickness) and palaeosols. The sediments are constituted of fine- and very fine-grained sandstones with prevalent adhesion strata and subaquatic flood deposits, interbedded with translatent wind-ripple strata. The palaeosols show well-developed Bt horizon and they are lacking of calcium carbonate accumulation, that allow to interpret them as Alfisols. This portion suggests sedimentation in playa-lake and aeolian sand sheet palaeoenvironments with phases of stasis of the sedimentation in semiarid to humid conditions. The second portion, 60 m thick, shows translatent wind-ripple strata (~60% of the thickness) alternated with immature palaeosols (Entisols) developed on previous wind-rippled sandstones. This portion represents an aeolian sand sheet with active depositional processes. The third portion, 110 m thick, still represents an aeolian sand sheet palaeoenvironment, but it is predominantly constituted of mature palaeosols with thick Bk or Bkm horizons, interpreted as Aridisols, and developed on aeolian deposits (Fig. 1A). In the northern part of the Bauru Basin the Aridisols (~65% of the thickness) are interbedded with aeolian sandstones (translatent wind-ripple strata - ~26% of the thickness) testifying alternations of phases of stability (pedogenesis) and instability (deposition and/or erosion) of the topographic surface (Fig. 1A). Few conglomerate sandstones, which were deposited by ephemeral rivers, represent the main source of sediment into the basin (Fig. 1A). On the upper part of this portion palaeosols with well-developed Bt horizons and thin Bk horizons (Alfisols) indicate the transition to more humid climate conditions.
The sharp transition from *erg* to aeolian sand sheets at the beginning to the Late Cretaceous may be related to a general increase of the mean precipitation, probably due to the opening of the South Atlantic Ocean, and the consequent growth of vegetation. In effect, the formation of aeolian sand sheet depends mainly on the scarce supply and availability of sediments, which are controlled by sparse vegetation and high ground-water level. The first portion of the study succession suggests dominant playa-lake depositional environments, alternated with aeolian sand sheets, and characterised by high sedimentation rate. Few well-developed palaeosols indicate periods of stasis of the sedimentation. The second and the third portions are characterised by alternations of palaeosols and aeolian deposits (Fig. 1A). The palaeosols testify more humid phases of stability of the topographic surface, characterised by the absence or drastic reduction of erosional and depositional processes, because the vegetation cover sheltered the topographic surface from wind action, reducing erosion and sedimentation (Fig. 1B). The aeolian sand sheet deposits formed during drier phases of instability of the surface, when the absence of a vegetation cover induced erosion, transport, and sedimentation of the clastic material by the wind (Fig. 1B). However, in the second portion of the study succession the dominant sediments and the immature palaeosols testify high rates of sedimentation in arid climate, as in the third portion the prevalent Aridisols suggest a drastic decrease of the rate of sedimentation. Empirical functions, based on the thickness and depth of the Aridisols profiles of the Bk and Bt horizons indicate a mean annual precipitation around 240 mm/y and a minimum development time for the Aridisols of ~175 ky. In the upper portion of the succession

Alfisols replace Aridisols in the alternations with aeolian sand sheet deposits indicating more humid climate conditions at the end of the Late Cretaceous.

KEY-WORDS: PALAEOSOLS; AEOLIAN SAND-SHEET DEPOSITS; BAURU BASIN.

CONSTRUÇÃO, ACUMULAÇÃO E PRESERVAÇÃO DO LENÇOL DE AREIA EÓLICA LA SALINA (PROVÍNCIA DE SAN JUAN, ARGENTINA)

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RESUMO: Lençóis de areia eólica ocorrem em sistemas deposicionais desérticos caracterizados por morfologias planas a levemente onduladas e ausência de dunas com faces de avalancha. Exemplos atuais de áreas em desenvolvimento de lençóis de areia eólica são comuns em áreas marginais a sistemas deposicionais de *erg*, de leques aluviais, costeiros e de *playa*. Contudo, lençóis de areia eólica podem ocorrer isoladamente desses sistemas, em áreas caracterizadas por substratos com frequentes déficits hídricos, com alta disponibilidade de clastos e com condições enérgicas do vento que permitam o transporte eólico, somadas a condições sedimentares particulares que obstruem a formação de dunas com faces de avalancha. O lençol de areia eólica La Salina está localizado ao norte da província de San Juan, no centro-oeste da Argentina, e possui uma área de 125 km², que faz parte da depressão intermontanaTulum. A área de La Salina apresenta características de uma área desértica quente e seca, na qual, os índices de precipitação anuais inferiores a 160 mm somados a velocidades médias mensais dos ventos superiores a 6 m s^{-1}, com picos diários máximos de 40,7 m s^{-1}, e sentido predominante N20º, determinam a conformação de uma superfície plana caracterizada por sedimentação predominante eólica em pequenas dunas achatadas do tipo *nebkha*(<1 m de altura) e mega- e ondulações eólicas.A sucessão sedimentar possui 4 m de espessura e mostra alternâncias verticais entre períodos de sedimentação eólica caracterizados por arenitos com estratificação cavalgante transladante sub- e supercrítica e depósitos subaquosos de arenitos finos com marcas de corrente e arenitos lamíticos com feições de ressecamento. A datação de cristais de quartzo por LOE indica que as alternâncias entre tais processos ocorrem na área por pelo menos 3.600 AP, com taxas de sedimentação de aproximadamente 86,1 cm/10³ anos. A construção do lençol de areia vem sendo mantida pela conjunção de uma série de fatores que incluem o contínuo suprimento de sedimentos derivados da deflação de depósitos residuais do leque do rio San Juan e deflação de morros conglomeráticos miocênicos que afloram a oeste da área, somados a alta disponibilidade sedimentar e alta capacidade de transporte dos ventos, os quais atingem periodicamente o limiar para o transporte eólico. A acumulação de corpos geológicos está ligada a fatores localizados e intermitentes de estabilização da superfície de acumulação. Neste contexto, a vegetação e a presença de corpos lamíticos atuam na estabilização do substrato, diminuindo o potencial de deflação dos depósitos e aumentando o potencial de preservação. A incorporação da acumulação e consequente preservação do sistema eólico no registro sedimentar tem sido favorecida por altas taxas de criação de espaço de acomodação, em uma bacia tectonicamente ativa, e por altas taxas de sedimentação, que propiciam o contínuo soterramento dos corpos geológicos.

PALAVRAS-CHAVE: LENÇÓIS DE AREIA EÓLICA; SEDIMENTAÇÃO EÓLICA; LA SALINA.