

DID PROTEROZOIC MICROBIAL MATS CONTROL THE SAND AVAILABILITY OF AEOLIAN SYSTEMS, AS PRESENT TERRESTRIAL VEGETATION DOES? THE CASE OF VENKATPUR FORMATION, A PROTEROZOIC ERG IN TELANGANA STATE, SOUTH INDIA

G. Basilici¹; T. Chakraborty²

¹Geosciences Institute, State University of Campinas, Campinas, Brazil.

² Geological Studies Unit, Indian Statistical Institute, Kolkata, India.

RESUMO: Presently aeolian erosion-transport-deposition processes are strongly influenced by the vegetation covering the earth surface. Pre-Silurian earth surface was devoid of rooted-vegetation, thereby it is coherent to suppose that the wind had full dominion to mould dry, or temporally dry, terrestrial landscapes. Nevertheless, from the Archean the continental Earth was colonised by biofilms, mainly constituted of Cyanobacteria colonies. Did these organisms exercise a control on aeolian processes in the same way of the present rooted-vegetation? The Neoproterozoic Venkatpur Sandstone Formation, has been interpreted as an ancient erg deposits that displays various sedimentary structures diagnostic of microbial mats. Thus, Venkatpur Sandstone can help to define the role of Cyanobacteria colonisation on aeolian processes and perhaps elucidate the apparent irregular distribution of aeolian deposits in Precambrian stratigraphic record. In Venkatpur Sandstone four facies associations are organised into, 5-10 m thick, cyclic sedimentary sequence of strata according to the following vertical order, from bottom to the top: (i) cross-stratified, (ii) planar-laminated, (iii) irregular-laminated and (iv) wave-rippled sandstone beds. Cross-stratified beds, c. 1-m-thick, constitute c. 45% of the thickness; they were formed by small transversal dunes. Planar-laminated beds correspond to the sedimentation of climbing wind ripples and aeolian granule ripples on a dry surface. Irregular-laminated beds display microbial induced sedimentary structures corresponding to palimpsest ripples, sand dome or pustules, exfoliating sand laminae, biolaminations and petees, interlayered with adhesion structures. Wave-rippled beds record ephemeral very small lakes with waters 0.2-0.5 m deep. Each cyclic sedimentary sequence suggests a progressive upward (i) decrease of sand availability, (ii) rise of groundwater table and (iii) growth of microbial mats. Decrease of sand availability is directly proportional to the raising of groundwater and growth of microbial mats. Water adhesion and binding by microbial films brought about the increase in the shear stress threshold for sand entrainment and movement, thereby decreasing the sand availability for the construction of dunes and/or wind ripples. The lowering of the groundwater and the renewed availability of sand reactivated the dune construction at the beginning of next sequence. In Proterozoic time, Cyanobacteria colonies could be dominant on the terrestrial surface and to inhibit the aeolian processes as the present rooted-vegetation does.

PALAVRAS-CHAVE: PROTEROZOIC ERGS, MICROBIAL MATS, SOUTH INDIA.