



The influence of barchan shape on the moisture and temperature of the dune sand and the diversity of local climate

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The aim of the research was to determine the impact of the barchan shape on moisture and temperature of dune sand in near surface layer. The study was carried out in the spring 2010 on the dune field located 20 km to the north of Laâyoune (Western Sahara). This region is one of the most humid, located in tropical, desert areas, which is associated with the influx of air masses from the Atlantic. Moisture and temperature of the dune sand in near surface layer was analysed on the basis of measurements in different parts of barchans. The studies included also analysis of the physical condition of the atmosphere, meteorological elements within the analyzed dune fields, the grain size distribution and mineral composition of dune sand. Shape of barchans and their orientations were determined on the basis of the detailed topographic survey.

The results show important spatial variation in moisture and temperature of dune sand in near surface layer, characterized by very small differences on grain size distribution and mineral composition. It was found that variations in moisture and temperature of dune material were mainly related to the inflow of solar energy. The advection played a lesser role. The main factors affecting the distribution of moisture and temperature of dune sand as well the air surface layer were the aspect and the slope angle of the dunes. Eastern and southern (lee side) parts of the dunes were characterized by several times less moisture than their western and northern parts (stoss side). With the direction of advection from the north-west which occurred during the field studies, there was no evidence of less moisture in the sand of the stoss sides of dunes (despite the greater wind speed intensifying the process of evaporation). It can therefore be assumed that the intensity of sand transport within a dune located in the region with the impact of oceanic air masses depends mainly on the shape and spatial orientation of barchans.