The sedimentology and mineralogy of sand dunes of southern Neyshabour (Northeastern Iran)

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Introduction: Study of sedimentology and mineralogy properties of sandy sediments provides information on geomorphic processes and landscape evolution in arid environments. The objective of this study was to identify grain size distribution and mineralogical properties of sand dunes of southern Neyshabour in northeastern Iran to determine the nature (aeolian or fluvial) and origin of these sediments.

Material and methods: Eighty-three surface samples (0-20 cm) were collected in three sections at 1 km interval distances. Mean (Mz), median, standard deviation (σI), skweness (SKI) and kurtoses (K) of grain size distribution were calculated. Also, the mineralogical composition dominant fraction (very fine sand) were determined by polarizing microscope.

Results and Discussion: The mean values of sand, silt and clay particles were 70, 22.9 and 7.2 %, respectively. Very fine sand was the dominant fraction. Two modes at 2 and 4 φ of particle size distribution histograms indicated two sources or processes for sediment accumulation (Kasper-Zubillaga et al., 20070). The Mz, σI, SKI and K were 3.66 φ, 2.1 φ, 0.2 and 1.37, respectively. The studied sand dunes were finer than those sand dunes in known desert environments (sun, 2000; Rao et al., 2008; Zhu et al., 2014). The amount of sand, silt and clay did not show any variation trend along the sections. Comparing the drainage net and spatial distribution of the particles indicated increasing sand and decreasing the clay and silt along the water flow direction. Quartz and feldspars minerals as well igneous and sedimentary fragments (e.g. serpentine, andesite, shale and conglomerate) composed the main body of the sediments. These results indicated that sedimentary and igneous formations in Binaloud and Qasmabad mountains are the main sources of the studied sediments. According to particle size distribution, topography features and water flow direction the aeolian processes were the main factor of sand dunes accumulation which secondary alluvial processes led to disturbance and change in trend of particle size distribution.

Keywords: Sand dunes, Aeolian and alluvial processes, Sorting, Skewness
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