

Paper Number: 3572

OSL-based Chronology of Sand Mobilisation in Golestan Province of Northern Iran

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In the Caspian Lowland of Northern Iran, linear dunes and barchans cover the flat lowlands of the Turkmen steppe south of River Atrek. The dunes strike WNW-ESE and attain maximum heights between 15 m and 30 m. Most of the dunes in the study area are nowadays stabilized or semi-stabilized. Geomorphological studies and OSL-based dating are excellent tools to reconstruct the timing and formation of Late Quaternary and Holocene inland and coastal dune fields. In this first case study, linear dunes at Lake Almogol and the village of Daneshmand located in the very north of the Caspian Lowland of Northern Iran were studied using optically stimulated luminescence (OSL) to test the suitability of these sediments for dating and to reconstruct the depositional history. The dune activity was most likely triggered by sediment input from rivers Atrek and Gorgan coming from the Koppet Dagh and Alborz Mountains and to rapid sea-level change during the Holocene (and the Pleistocene as well). The deposition ages as determined by OSL dating range from 5.2 to 6.5 ka indicating that at least the studied Holocene dunes do not show a teleconnection with the thick Pleistocene loess deposits of the Iranian Loess Plateau or from the Gorgan area. The age range correlates with an important period of Caspian Sea regression. Furthermore, we have not yet found evidence of more recent sand mobilisation owing to human influence, e.g. overgrazing, or climate change. It is likely that the stabilisation of the studied dunes was due to climate change during the middle part of the Holocene. Our results are the first to understand aeolian history and dune dynamics in Northern Iran.

