



An OSL chronology for the development of the northwest Negev dunefield, Israel

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The Sinai-Negev erg extends from the north of the Sinai peninsula, Egypt, to the northwestern (NW) Negev, Israel. In Sinai it is characterized by active seif and linear dunes while at its easternmost extent in the NW Negev, lay stabilized vegetated linear dunes (VLD) that sustain perennial vegetation along active dune crests and biogenic crusts on dune slopes.

Current southwest and western dominant sand-moving winds attain low drift potentials (<100) that are insufficient to mobilize the dunes, and cannot explain and cannot explain past dune mobilization. Dating the periods of sand incursions from northern Sinai into the NW Negev may provide information on what were the triggering environmental conditions then.

Analysis of dune morphologies, internal structure and stratigraphy based upon over twenty-five drills and exposed sections, coupled with more than 60 optically stimulated luminescence (OSL) ages, enable an updated framework of the NW Negev dune development stages and the corresponding environmental conditions.

Based upon dune morphology and spatial characteristics, the dunefield was classified into three parallel east-west dune incursion paths and ten geomorphic units. Sand began to thinly cover the region already prior to 100 ka. Primary evidence for dune development at 25-19 ka is found only in the southwest dunefield. Ages from dune bases throughout the dunefield indicate that the major regional dune incursion was from 18 ka to 13 ka. This incursion eroded underlying sand and loess units, creating a hiatus. Episodic aeolian activity continued until the end of the Late Pleistocene, and the dunefield was generally stable in the Holocene. Since the OSL ages mark the time of sand deposition, they mostly represent the end of sand movement episodes. Only occasionally was sand trapped during earlier major aeolian transport periods.

Significant dune activity is also identified at approximately 2-1 ka, possibly related to intense human activities at that time. In the central path, a substantial incursion took place, resulting in prominent VLD buildup and elongation, with transverse dunes invading the interdunes.

Linear dune orientations and stratigraphic structures suggest that the dunes were in the past, as now, sparsely vegetated. Thus the dune-forming environment was not necessarily more arid than the current climate, but was characterized by higher wind power than that of recent years.