



# Joel Roskin

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## Post-Doc researcher

The Department of Geography and Environmental Development

### Advisor

Dr. Itzhak Katra; Prof. Dan G. Blumberg

### Topic

**The sedimentological aspects of the Late Quaternary mobilizations of the Sinai – Negev dunes and their palaeoclimatic and environmental impact upon the northern Negev, Israel**

### Abstract

#### **Background**

The northwestern (NW) Negev dunefield composes the eastern edge of the northern Sinai – NW Negev (Sinai-Negev) Erg and is straddled in the northern Negev by loess deposits. Loess deposits are recognized to be excellent terrestrial palaeoclimate markers and along with dunes, loess sections also compose unique recorders of past windiness. Recently, several works from different parts of the globe have tied Late Quaternary loess formation with upwind dune activity; though the aeolian and sedimentological sand mobilization and loess deposition mechanisms in regard, are far from being understood. My Ph.D. concentrated on the morphology, stratigraphy and OSL ages of the NW Negev dunes. Dune encroachments into the Negev between 23-11.5 ka mainly occurred in short episodes, at 16-13.7 ka followed by a 12.4-11.6 ka episode. These episodes are contemporaneous with the Heinrich 1 and Younger Dryas cold-events and suggest dune mobilization and stabilization as a response to Northern Hemisphere climate changes.

Beyond the fact that both the dunes and loess of the northern Negev show similar final stabilization and depositional ages at the onset of the Holocene, there are sharp discrepancies between the Late Quaternary chronologies of loess deposition and dune mobilization-stabilization episodes. The Negev loess sections date back to ~ 180 ka (Crouvi et al., 2009, 2009) while the upwind Sinai portion of the Erg based on several radiocarbon ages, date to no earlier than ~35 ka.

My post-doc research will concentrate on the sedimentological characteristics and processes along the proposed Nile Delta - Sinai - Negev sand transport path. The finds will contribute novel insights into the sedimentological processes of supposed synchronous dune mobilization and dust formation and their connection to palaeoclimate and climate change. The finds will provide tools for analyzing loess and sand relationships and their impact on dustiness and climate modeling. This will improve terrestrial paleoclimatic reconstruction and depicting scenarios for both future extreme and endemic events and climate and environmental change. The data and finds will be important for future dynamic experiments of silt and dust emission and fluxes by sandblasting and aeolian erosion of palaeosols and for identifying and estimating dust erosion, and entrainment rates.

#### **Research Plan**

- (1) Analyze particle-size, geochemical and mineralogical trends between Nile Delta sands, northern Sinai sands, and sands from the NW Negev dunefield.
- (2) Sedimentologically analyze and date palaeosol sections beneath dunes.
- (3) Analyze sedimentological and microfauna properties of standing-water sediments formed by dune-damming.
- (4) Analyze the relationship between man and past Negev dunal environments.
- (5) Develop a conceptual sedimentological and palaeoclimatic model for the northern Negev and discuss its future climatic and environmental implications.

<b>Publications</b>	<ol style="list-style-type: none"> <li>1. Roskin, J., Porat, N., Tsoar, H., Blumberg, D.G., Zander, A.M., 2011a. Age, origin and climatic controls on vegetated linear dunes (VLDs) in the northwestern Negev desert (Israel). <i>Quaternary Science Reviews</i>, 30: 1649-1674.</li> <li>2. Roskin, J., Tsoar, H., Porat, N., Blumberg, D.G., 2011b. Late Pleistocene regional and global palaeoclimate of dune mobilization and stabilization; evidence from the vegetated linear dunes of the northwestern Negev Desert, Israel. <i>Quaternary Science Reviews</i>, 30: 3364-3380</li> <li>3. Roskin, J., Rozenstein, O., Blumberg, D.G., Tsoar, H., Porat, N. Do dune sands redden with age? – the case of the northwestern Negev dunefield, Israel. <i>Aeolian Research - online</i></li> <li>4. Bergman, N., Sholker, O., Roskin, J. and Greenbaum, N. The geomorphic impact of the Nahal Oz reservoir dambreak flood on a small ephemeral loess-channel in the NW Negev Desert. Israel. Submitted to <i>Geomorphology</i></li> <li>5. Barilzai, O., Roskin, J., Ashkenazi, H. The environment of the Natufian campsites at Nahal Sekher IV in the Negev, Israel (in prep. for <i>Palaeorient</i>)</li> <li>6. Muhs, D.R., Roskin, J., Katra, I., Blumberg, D.G. Mineralogical maturity and origin of the Sinai-Negev erg (in prep. for <i>Sedimentology</i>)</li> </ol>
<b>MSc. Thesis</b>	<p style="text-align: center;"><b>Classification and evolution of recent open fractures along the western margins of the Dead Sea Rift, Israel</b></p> <p style="text-align: center;">Dept. of Geology and Environmental Science, Ben-Gurion University of the Negev</p>
<b>Ph.D. Thesis</b>	<p style="text-align: center;"><b>The timing and environmental significance of the Late Quaternary dune incursions into the northwestern Negev Desert, Israel</b></p> <p style="text-align: center;">Dept. of Geography and Environmental Development, Ben-Gurion University of the Negev</p>
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