Geophysical Research Abstracts
Vol. 12, EGU2010-6094, 2010
EGU General Assembly 2010

Have the northwest Negev dunefield sands reddened since their deposition?

Joel Roskin (1), Haim Tsoar (1), Dan G. Blumberg (1), Naomi Porat (2), and Ofer Rozensten (3)

(1) Dept. of Geography and Environmental Development, Ben-Gurion University in the Negev. , (2) Israel Geological Survey, Jerusalem., (3) Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sede-Boker.

Sand grain coating redness has been extensively both in coastal and inland desert dunes. In Israel, sand redness has been quantified by calculating a spectral redness index (RI) using single RGB bands (RI= R2/(B*G3)) from reflectance spectroscopy. The RI values have been correlated to ferric oxide mass that was dissolved from sand grain coatings (Ben Dor et al., 2006; Tsoar et al., 2008).

Five main requirements have been proposed to enhance sand grain reddening: iron source from the weathering of iron-bearing minerals originating from parent rock or aeolian dust, minimum moisture content, oxidizing interstitial conditions, sediment stability and time. Thus, as many researches have suggested, when the source factors and climatic conditions are homogenous, redder sands indicate increased maturity.

The northwest Negev dunefield has been classified by Tsoar et al. (2008) into 3 incursion units based upon contouring a grid of RI values for surface sand samples. The central incursion unit has been suggested to be younger due to relatively lower RI values that decrease to the east.

This work tests the relationship between RI values and optically stimulated luminescence (OSL) ages of aeolian sand sampled from the near surface down to dune substrate throughout the NW Negev dunefield. Room-dried sand samples were measured in the laboratory with an ASD FieldSpec spectrometer and RI was calculated.

Dune sections have been found to usually have similar RI values throughout their vertical profile despite OSL ages ranging between recent and Late Pleistocene. Along a W-E transect, RI values also tend to be similar. The central (Haluzza) part of the dunefield exhibits significantly lower RI values than RI of sands south of the Qeren Ridge. Dune base OSL ages possibly representing burial/stabilization of an initial incursion are slightly more mature in the south and may be evidence of the earliest dune incursion into the Negev. Thus the increased redness may be attributed to an older sand source but not to reddening in situ with time. Remotely sensed RI calculated from Landsat TM 5 (30 m pixel) RGB bands of bare Sinai sands also portrays the spatial RI difference between the central and southern sands.

To summarize, we find no direct connection between dune sand deposition age and sand grain coating redness in the Negev dunes. It seems that stable aeolian sand and dune sections in the Negev have not reddened since their deposition. Sand grain coating redness was probably inherited during an earlier diagenetic stage in an environment different than today's.

References

Ben-Dor, E., Levin, N., Singer, A., Karnieli, A., Braun, O. & Kidron, G.J., 2006. Quantitative mapping of the soil rubification process on sand dunes using an airborne hyperspectral sensor. Geoderma, 131:1-21.

Tsoar, H., Wenkart, R. & Blumberg, D.G., 2008. Formation and geomorphology of the north-western Negev sand dunes. In (Breckle, S.W., Yair, A.& Veste, M.) eds., Arid dunes ecosystems: The Nizzana sands in the Negev Desert. Springer pub. 475 pp.