

Dune redness investigations in central Saudi Arabia using remote sensing and laboratory techniques

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To date sand seas (nafuds) in the Kingdom of Saudi Arabia have been poorly studied. Initial investigations using satellite images, geographical information systems and field surveys show that the central Nafuds Al Thuwayrat and Al Mazur display distinct variations in form and redness. Our research aims to comprehend the geomorphic complexity of these nafuds. Previous research has shown colour can be related to provenance, degree of chemical and physical weathering and questionably age. We have tested these ideas in our study area taking into consideration potential source areas, dune form, thickness of sediment accumulation, sediment size and sorting and sediment mineralogy.

Satellite remote sensing was used to map the present variation of dune redness and to assist in directing sampling transects for laboratory analysis. In the laboratory, Munsell colour was recorded, particle size and magnetic susceptibility was determined, X-Ray Diffraction (XRD) and X-Ray Fluorescence (XRF) was used to determine chemical properties, a Scanning Electron Microscope (SEM) was used to summarise physical and chemical properties of the grains and a spectro-radiometer was also used to verify the satellite image reflectance.

Initial findings appear to indicate that the main control on both redness and form is due to the rate of sand movement and dune activity which appear to be the key controls in redness in this area.