

Pattern and Distribution of Complex Dune Structures using Residual Relief Separation, Central Saudi Arabia

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The complex Nafud (dune field) al Thuwayrat around the Wadi al Rimah, Central Saudi Arabia, encompasses some of the most unusual and remarkable dune formations, described in the literature as 'dome' dunes (e.g. McKee, 1979). These 'dome' dunes have a circular shape in plan view, with radiating arms; but they do not have the same form as star dunes mainly due to a lack of slip faces. Remote sensing offers a way to investigate the curious nature of these dunes. The method of residual relief separation, first undertaken by Hiller and Smith (2008) in their research of drumlins, has been used to analyse the dome dunes of Nafud Thuwayrat. Using ASTER Global Digital Elevation Model data, cross sections of DEM data have been taken from the terrain, producing topographic dune profiles. The computational method of residual relief separation has been used to 'unstack' and reveal the complexity of the dune form. Initial findings from this process are presented suggesting that the underlying terrain is made up of larger dune forms with superimposed smaller dune ridges and limbs. The original classification of dome dunes is now under scrutiny in this area leading to further investigation of process form relationships in the Nafud alongside future fieldwork methods such as ground penetrating radar to more fully understand these complex dune forms.

Hiller, J.K. and Smith, M. 2008. Residual relief separation: digital elevation model enhancement for geomorphological mapping. *Earth Surface Processes and Landforms*, 33, pp. 2266-2276.

McKee, E.D. 1979. Sedimentary structures in dunes. In: McKee, E.D. eds. *A study of global sand seas: Geological Survey Professional Paper*, United States: Geological Survey, pp. 83-137.