

Automated measurement of sand dune migration rates using multi-temporal LiDAR data and GIS

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Understanding how sand dunes form and migrate has long been a research topic in Earth and planetary surface processes. An automated method was developed for measuring sand dune migration rates along the prevailing wind direction using multi-temporal light detection and ranging (LiDAR) data and geographic information systems (GIS). Compared with traditional methods which involve labor-intensive and time-consuming measurements at individual locations, the new method allows for automated measurement of sand dune migration rates at hundreds or thousands of locations in a study area, and generation of continuous raster datasets showing the spatial pattern of sand dune migration rates. Multi-temporal LiDAR data from White Sands, New Mexico (USA) were used to demonstrate the application of the new method.

Keywords: Multi-temporal LiDAR, GIS, Digital elevation model, Sand dune migration, White Sands