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Research on texture features for typical sand dunes using multi-source data

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Deserts have obvious textural features. In detail, different types of sand dunes have significant differences in their morphological texture features. Existing studies on desert texture have mainly focused on extracting dune ridges or sand ripples using remote sensing images. However, comprehensive understanding of desert texture at multiple scales and quantitative representation of texture features are lacking. Our study area is in the Badain Jaran Desert. Four typical sand dunes in this desert are selected, namely, starlike chain megadune, barchans chain, compound chain dune, and schuppen chain megadune. Based on Sentinel-2 and ASTER 30m DEM data, the macroscopic and microscopic texture features of the desert are extracted using positive and negative topography, edge detection and local binary pattern (LBP) methods, respectively. Eight texture indexes based on gray level co-occurrence matrix (GLCM) are calculated for the original data and the abstract texture data respectively. Then these texture parameters are clustered based on the result of Spearman correlation. Finally, the coefficient of variation is used to determine representative indicators for each cluster in order to construct a geomorphological texture information spectrum library of typical dune types. The results show that the macroscopic and microscopic texture features of the same type of sand dunes have high similarity. And geomorphological texture information spectrum can well distinguish different types of sand dunes by curve features.