Comparison of aeolian desertification between the Moltsog dune field in Mongolia and Ujimqin dune field in China

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Abstract

Aeolian desertification is a severe ecological and environmental problem in arid regions. Research on its temporal and spatial distribution, development model, and driving force is necessary to prevent the development of aeolian desertification. In this study, the Moltsog dune field in Mongolia and the Ujimqin dune field in China were selected as the study areas, as both contain dunes with similar natural conditions. Using Landsat data from 1988, 1995, 2002, 2009, 2016, and 2020, the spatial-temporal distribution and degree of development of aeolian desertification in the two dune fields over the past 30 years were compared. Two periods of high-resolution images were then used to compare the surface morphological changes induced by aeolian desertification in the dune fields. Climatic and socio-economic data of the same period were used to compare and analyze the causes of changes in aeolian desertification in these regions. The results show that: (1) Over 30 years, the degree and development rate of aeolian desertification in the Ujimqin dune field were generally higher than those in the Moltsog dune field, and the former had a high degree of fragmented aeolian desertification patches with an expanding range. (2) The main form of aeolian desertification is the reactivation of fixed dunes, which includes the development of blowouts on the flat grassland under the influence of human activities in the Ujimqin dune field. (3) The desertification in Moltsog is mainly affected by climatic factors, while that in Ujimqin is mainly affected by human activities. The latter is specifically affected by the high grazing intensity before 2000 and increased mining activities after 2000. These findings provide a reference for comparing the aeolian desertification process and meaningful information for preventing and managing aeolian desertification and enabling the sustainable development of dune fields in arid regions.

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