Geophysical Research Abstracts
Vol. 21, EGU2019-12456, 2019
EGU General Assembly 2019

The response of dune morphological transformation and sedimentological reorganization to wind reduction in the northern Mu Us Desert

Deguo Zhang (1), Peng Liang (2), Xiaoping Yang (1), and Hongwei Li (1)

(1) Zhejiang University, School of Earth Sciences, Hangzhou, P.R.China (dgzhang@zju.edu.cn), (2) Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, P.R.China (liangpeng@mail.iggcas.ac.cn)

The development and transformation of barchan-parabolic dune can be led by vegetation establishment, which may be induced by climate change (precipitation, temperature, and wind strength) and/or human intervention. The impact of wind strength change-induced vegetation restoration on dunes morphology and theirs surface sedimentary features is neglected in the Maowusu Sandy Land. In this study, we combined datasets of Normalized Difference Vegetation Index (NDVI) and climatic factors to analyze temporal changes in vegetation growth and their response to changes in temperature, precipitation and wind strength in the northern margin of Maowusu Sandy Land from 1982 to 2015. Growing season NDVI is related to the significant decrease in drift potential (DP) during the entire study period. Further temporal analyses indicate that the growing season NDVI trends are largely contributed by wind strength and temperature changes during the earlier study period 1982-2006. And then, the increasing NDVI is consistent with the slightly increasing trend of precipitation during the recent study period 2006-2015. Thus, the transformation of the transitional dune cannot be explained by the increasing trend of wind strength change-induced vegetation alone. During the recent period, once dunes are covered by vegetation, the change in wind strength cannot mobilize the stable dunes because the vegetation provides an effective buffer preventing sand erosion. To reveal the response of sedimentological reorganization during the dune transformation processes, grain-size characteristics along the longitudinal profile of three different types of dunes were examined. From barchan dune through transition dune to parabolic dune, with the increase of the fine sands (125-250μm) proportions, the mean grain size $\mathrm{M_Z}$ gradually decreases; in addition, as the very fine sands (<125μm) class increases, the sorting σ_1 of sand dunes gradually became worse. The decreasing wind strength lead to partly transport of fine sands on the upper part of dune windward slope, resulting in the progress coarsening and the reduction of dune height at the crest area. No distinct trend in sorting and mean grain size on the windward slope of transition dune, indicating that sand in transport had little influence on the particle size distributions. Conversely, the progressive of sorting and coarsening of sands towards the crest of parabolic dune, implying that vegetation limited the sands from upwind of dune, changed the effective source of dune into the underlying source deposits or reworking pre-existing aeolian deposits and trapped the sands on the crest area.