Modern radial sand ridges in the southern Yellow Sea Sediment: sources and transport trajectories

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The radial sand ridges (RSRs) in the southwestern Yellow Sea off the Jiangsu Coast, East China have been intensively studied at least since 1975. Despite decades of studies, the provenance of the RSR sediments remains uncertain. In this study, we employ the Nd-Sr isotopic and mineral compositions of the acid-insoluble fractions to determine the provenance of the RSR sediments.

SEM observations show that Changjiang sediments tend to be partly armored with smaller grains of clay minerals. Mineralogical composition of RSR sediments consists mainly of quartz and feldspar as framework constituents. Changjiang sediments generally have a lower feldspar/quartz ratio than those from the Yellow River and RSR. The higher abundance of K-feldspar and plagioclase in the sand ridges suggest the Yellow River (Old Yellow River) is a potentially significant sediment contributor for the modern RSR. Goethite/hematite values show a gradual rise from Yellow River to the Changjiang sediments, reflecting climate effects and latitude influence, and therefore can be used as a sediment sources proxy in the Yellow Sea. However, the relative high abundance of goethite in RSRs sediments may be associated with the possibility of diagenetic modification. Based on the current circulation of the study area, the fine grained sediments of the Changjiang could influence the Jiangsu coastal zone.

The Nd isotopic compositions of coastal and estuary sediments are solely associated with source rocks while the Sr isotopic compositions are affected by multiple influences. The onshore RSR sediments originate mainly from mixing of the fine-grained sediments from various parts of the offshore RSR. Surface sediments from the Yangtze River Mouth are directly dispersed to the RSRs along the Jiangsu Coast and significantly affect the seaward part of the offshore RSR and the old Yellow River Delta area by a northward branch of the Yangtze plume. Our findings highlight the potential of the Nd isotopes in combination with the Sr isotopes to trace the provenance of coastal sediments.