



## **Geochemical evidence of the provenance of aeolian deposits in the Yarlung Zangbo River Basin (Southern Tibet, China)**

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Tracing sources of aeolian sediment is important in reconstructing earth surface processes in arid areas and correctly interpreting the paleoenvironmental significance of aeolian sequences. Previous studies regarding the provenance of aeolian deposits in the Tibetan Plateau are based mainly on field investigations of geomorphological and stratigraphic relationships, whereas fewer studies have used geochemical methods for this purpose. Here, we collected 30 surface sediment samples in the Yarlung Zangbo River Basin, including 12 aeolian sand samples, 3 sandy loess samples, 9 fluvial sediment samples, 4 proluvial deposit samples, and 2 eluvial-deluvial sediment samples. We determined the grain-size distributions, the major element composition of the bulk samples, and the trace and rare earth element (REE) composition of the coarse (75-500  $\mu\text{m}$ ) and fine (<75  $\mu\text{m}$ ) fractions. To trace the sediment sources, we conducted multivariate statistical analysis with multidimensional scaling (MDS) of the 19 elemental ratios that were the most effective. Comparison of the immobile trace element and REE ratios and the MDS results between the aeolian deposits in the Yarlung Zangbo River Basin and the different types of sediments in the potential source areas revealed the following: (1) the fine fractions of the deposits contain more environmental information, which means that this size fraction cannot be directly compared between different climate zones for provenance identification, and that an appropriate coarse fraction, based on the grain-size distribution of the sediments, is preferable for tracing sediment sources; and (2) aeolian deposits in the Yarlung Zangbo River Basin are predominantly derived from the adjacent fluvial sediments. Proluvial deposits might be a secondary source in some local regions, and eluvial-deluvial sediments contribute very little to the aeolian sands in the study area.