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Aeolian origin of Rb/Sr ratio in lacustrine sediments of enclosed Qaidam Basin in Tibetan Plateau and implications for palaeoenvironmental reconstruction

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Elements Strontium (Sr) and Rubidium (Rb) are easily fractionated during the processes of weathering, because Rb appears to be immobile while Sr appears mobile. The Rb/Sr ratio is an important environmental proxy in both loess and lacustrine sediments for reconstructing palaeomonsoon climate. In loess it serves as an indicator of chemical weathering and an index of the East Asian summer monsoon intensity. In lake sediments, if lithologies in the source area and detrital input have no significant influence on the Rb/Sr ratio, this ratio can also serve as a sensitive proxy of paleoclimate changes. The Rb/Sr ratio in loess-paleosol sequence would increase significantly with the enhancement of weathering intensity, while in lacustrine sediments the ratio shows the opposite pattern. However, in this study we found that, in a lacustrine core from the Qarhan Salt Lake of the enclosed Qaidam Basin in the Tibetan Plateau, the pattern of fluctuations in Rb/Sr ratio is similar to that of loess-paleosol sequence rather than to that of typical lacustrine sediments. In order to exam the environment significance of Rb/Sr ratio for this lake core, a number of proxies are measured (halite content, calcite content, Fe element content, grain size fractions, and values of grain-size discriminant function). Our data suggest the aeolian origin of Rb/Sr ratio. We thus attribute this unexpected pattern of fluctuations in Rb/Sr ratio to the input of abundant dust flux due to strong aeolian activity in this region. We then propose that use of Rb/Sr ratio as a climatic proxy in lacustrine sediments should be cautious in arid areas where aeolian input is abundant, and that the Rb/Sr ratio in lacustrine sediments of the Qaidam Basin could indicate geochemical information of provenance.