

**Centennial-scale precipitation variations in the past 400 years: Implications from lake level fluctuations deduced from multiple element records from Lake Daihai, China**

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Closed-basin lakes located near the outer margin of the Asian summer monsoon are subject to sensitive variations in level in response to changes in monsoonal rainfall. Such variations left behind geochemical signals in the bottom sediments of the lakes detectable and useful for the reconstruction of past environmental change. This study applied XRF core scanning technique to detect multiple element contents in the cored sediments recovered from the profundal area of Lake Daihai, Inner Mongolia. Based on results from <sup>210</sup>Pb dating and extrapolation of averaging sedimentation rate, a 400-yr record in multi-elements was established. Multivariate statistic methods were applied for assessing the element data in order to ascertain the correlations of the elements with allogenic detritus, authigenic carbonate and their association with water level and hydrochemical change of the lake. Results show that elements Si, Al, Ti, K, Fe and Rb are well correlated among each other, displaying a similar variation pattern, and that the element contents are related to the quantity of detrital minerals transported into Lake Daihai by main rivers. Variations in Ca largely reflect fluctuations in aragonite and calcite precipitated from the alkaline water. Cu, Zn and Cr in the sediments is most likely related to the impact of human activities in the catchment area. The patterned downcore variations in Si, Al, Ti, K, Fe, Rb and Ca suggest some centennial-scale fluctuations in level and water chemistry in 4 stages, which were overall controlled by precipitation-dominated water budget in the drainage basin and summer evaporation.

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