

Sediment chemistry and the variation of three altiplano lakes to recent anthropogenic impacts in south-western China

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Abstract

The sediments of the lakes on the Yunnan-Guizhou Plateau have been subjected to the pressures of natural and catchment area activities. An analysis of these sediments therefore offers an important opportunity to assess the quality of lake water and aquatic ecosystems. In this study, the sediment chemistry of three altiplano lakes, Lake Dianchi, Lake Qilu, and Lake Qionghai, in south-western China, was analyzed to determine the effect of natural and recent anthropogenic activities. Pb and Cu were the focus of the analysis for the three lakes as they posed the highest ecological risks compared with other heavy metals. As phosphorus is the limiting factor for the eutrophication in the three lakes total phosphorus was also focused on in this study. The results showed that the thickest sediment was in Lake Qilu, followed by Lake Dianchi and Lake Qionghai. Among the three lakes, more anthropogenic activity has occurred in Lake Dianchi than in Lake Qilu, and much more than in Lake Qionghai. Accordingly, the amounts of heavy metals and organic matter in Lake Dianchi and Lake Qilu were much higher than the amounts in Lake Qionghai. The industrial production value of the Lake Qilu watershed was 10.54-fold higher in 2003 than in 1988 whereas the concentrations of Pb and Cu were 3.80- and 1.68-fold higher than those of the baseline year. Variations in the amounts of heavy metals in lake sediments thus serve as an important indicator of industrial pollution of a lake. There was an increase in the level of total phosphorus in the lakes, which indicated the aggravation of lake eutrophication due to anthropogenic impacts.

Keywords: lake sediment, anthropogenic impacts, altiplano lakes, Lake Dianchi, Lake Qionghai, Lake Qilu