



Environmental evolution of lake sedimentary carbon accumulation in the changing arid land of China over the past 150 years

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Despite the small coverage on the Earth, lakes play an important role in the terrestrial carbon cycle research. There are a large number of lakes in the arid land of China, where remarkable climate changes and human activity have been undergone over the past decades. Bosten Lake, the largest fresh water inland lake in Northwest China, was selected as the study area in this study. We designed to investigate the temporal variability of carbon burial over the past 150 years, by examining the chronology and multi-proxies (i.e. magnetic susceptibility, grain size, organic carbon, inorganic carbon and stable carbon isotopes) of lacustrine sediment in Bosten Lake. The process variations of sedimentary carbon accumulation in Bosten Lake were divided into five stages since 1860. Before 1910s, environmental changes were mainly affected by the natural factors, the sediment accumulation rates and TOC were relatively lower, TIC changed little in the eastern lake area, but a downward trend in the northwest part. During 1910s-1950s, the sediment accumulation rate (S AR) in the western lake section was much higher than that in the eastern deep area, the lake primary productivity was low and most OC was from allochthonous sources. During 1950s -1980s, a rapid increase trend was found for both TOC and TIC, especially in the northwest lake section near the Huangshui River, while OC from allochthonous showed a decrease. The S AR increased significantly in all the three cores in the 1980s – 2002s, TOC presented a similar trend and the climate was warm. After 2002s, the S AR was relatively high, but the contribution from allochthonous sources was small. During the last 150 years, the carbon accumulation rates presented an increasing trend, especially since 1960, with higher values in the eastern lake area than in the western section.