气候变化是中国黄土高原半干旱高山湖泊近期生态变化的主要驱动力

日期：2021年04月30日

作者: Yan, Xinwei; Liu, Jianbao; Ruhland, Kathleen M.; 等.

Semi-arid areas of northern China are under increasing pressures from anthropogenic activities and climate change. Although wetland areas in these drylands have experienced dramatic, unidirectional shifts in their ecological status in recent centuries, fundamental driving forces are poorly quantified. Here, we examine changes in sedimentary proxies (diatoms, spectrally-inferred chlorophyll-a, stable isotopes) preserved in a radiometrically-dated core from Tianchi Lake, an alpine lake within the margin of the East Asian Summer Monsoon (EASM) limit in China's southwestern Loess Plateau. Our algal trends were compared with regional instrumental records, changes in EASM intensity, and with previously published paleolimnological data from this same lake to determine the principal drivers of regional ecological changes. We found no clear evidence that geochemical and biological proxies were strongly affected by

deforestation and other human activities. Major environmental changes during the past similar to 200 years were found to be predominantly driven by climatic fluctuations, extreme precipitation events, and changes in EASM intensity. Prior to similar to 1965 CE, diatom assemblages indicate an oligotrophic, clear water state. Shifts in dominance between benthic Staurosirella pinnata and planktonic Lindavia comensis were likely controlled by ice-cover dynamics. Between similar to 1965 and 1980 CE an abrupt shift to a turbid water state during a period of extreme precipitation events was caused by excessive nutrient-laden soil erosion in the already susceptible deforested catchment. This turbid period was evidenced by a rapid increase to dominance of Achnanthidium minutissimum, a sharp decline in oligotrophic Lindavia comensis, increased primary production, and peaks in sediment grain size and SiO2 content. Post- similar to 1980 CE, we provide evidence that a shift towards planktonic diatom dominance can best be explained by changes in climate and EASM intensity, despite substantial nitrogen deposition in the region during the past few decades. Specifically, a drier and warmer climate together with weakened EASM wind strength resulted in decreased erosion and a return to a clear water state, coupled with enhanced thermal stability. Collectively, these observations expand our understanding of how changes in climate, extreme precipitation events, and fluctuations in EASM intensity influence semi-arid alpine lakes in northern China, as well as climate's leading role in driving ecological change over the past two centuries, despite the intensification of human disturbances during recent decades.

（来源：JOURNAL OF PALEOLIMNOLOGY DOI: 10.1007/s10933-020-00167-5 出版年： 2021）

地址: 南京市北京东路73号 邮编：210008
电话: 025-86882010　025-86882020　025-86882030
传真：025-57714759
电子邮件:niglas@niglas.ac.cn
(mailto:niglas@niglas.ac.cn)