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| Title: | Impact of precipitation and temperature changes on limnology and sediment characteristics in NW Himalaya |
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| Abstract: | In recent decades, the ecologically sensitive region of NW Himalaya, a transition zone between the westerlies and the Indian summer monsoon (ISM), has witnessed extreme precipitation events as well as an increase in seasonal temperatures, the impact of which on the lacustrine systems is unknown. In this study, we use a two-pronged approach involving (1) reconstruction of precipitation pathways and moisture sources using the HYSPLIT model during years with extreme (seasonal) precipitation in NW Himalaya; and (2) documentation of the impact of climate extremes on limnology and sediment characteristics by comparing μ-XRF and mineralogical data from a Manasbal Lake sediment core (Kashmir) with the lake monitoring data. Our results show that (a) the most significant change in precipitation pathways is observed during summer when the Bay of Bengal branch of the ISM, in addition to the Arabian Sea branch, also contributes to the regional precipitation; (b) moisture pathways from the Bay of Bengal and the Arabian Sea at different levels also indicate that moisture availability at mid tropospheric level plays an important role in creating extreme wet conditions over Kashmir during the summer monsoon season. In the years with above normal spring precipitation, back trajectories from the Arabian Sea and the Middle East carry more moisture at 1.5 km and 5 km levels; (c) the sub-decadal extremes in seasonal temperature and precipitation can be linked to drier events preserved in the core demonstrating the high sensitivity of the lake systems to short term climate variability; (d) changes in hydrochemistry resulting from inflow of groundwater can provide insights into prolonged anoxia and hypolimnion ventilation; (e) the lake level appears to be insensitive to isolated extreme rainfall events, and anomalous winter and spring warming observed in recent decades. The results of this study have wider implications for understanding changes in moisture pathways and sources during prolonged extreme events, and their impact on lacustrine systems. |
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