

Mid-Late Holocene climatic variations in Trans-Himalaya, Ladakh, NW India

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Lake records are one of the best archive to provide high resolution climatic data of terrestrial regime. Khardung La (5602 m), one of the highest pass of the world, separates the Indus valley and Shyok valley in Ladakh. This region is a cold desert at high altitude and is mostly get rains by the Western Disturbances. The Indian Summer Monsoon (ISM) penetrates the Himalayan barrier and provide rains in this region only during periods of high monsoon due to the northward shift of the ITCZ [1]. The Khardung glacier that occupies the summit of this range presently has records of its extent till Ganglas village (near Leh) during ~90,000 yrs BP [2]. The two streams originating from the water divide are – Khardung rong (28km) to the north joins the Shyok river and Sangto tokpo (26 km) towards the south meets the river Indus. Both these streams host small glacial lakes (<0.5 sq km area) North Pulu (NP) and South Pulu (SP) on the either sides of Khardung La pass, are mostly frozen during the year round except for few months during summer. The 14C AMS chronology of sediment (1.3 m pit ; core of 80 cm) from NP lake bracketing the lake record from 4700 to 360 yrs BP and 1.32 m sediment core from SP bracketing it to 3800 to 320 yrs BP provides Mid-late Holocene lacustrine archives from this region. A multiproxy studies involving textural, sedimentological, mineral magnetic, geochemical and biotic proxies (palynofacies and diatoms) were carried out on NP and SP sediment cores. High magnetic susceptibility and clay content along with diversified diatom and other freshwater algae and land derived organic matter are indicative of fresh water supply leading to high lake level from ~4700 yr BP onwards. The multiproxy data provides evidence of much higher and stable lake level during ~3700 yr BP and ~3000 yr BP onwards in NP and SP due to high water supply in these lake. It is in contrast to the records of weak ISM conditions and low lake level in rest of the part of Indian peninsula during the period. Present study thus suggests strong western disturbance activity during ~4800-3000 yr BP leading to high lake level in this region. There are indications of a bigger lake basin at NP in the past as seen from the palaeo-strand. This data will throws light on the type of precipitation (Westerly or ISM) that was dominant in the area from 5000 yrs BP onwards in the Trans Himalaya.

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