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Holocene monsoon variability inferred from palaeolake sediments in NW India.

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The plains of NW India encompasses arid, semi-arid to sub-humid zones and are characterized by numerous palaeolakes and playas. The sedimentary records from these water bodies provide a rich source of paleoclimatic information. We present a high-resolution, Holocene monsoon-variation record inferred from three palaeolakes lying across the precipitation gradient in NW India; palaeolake Karsandi in arid Rajasthan and palaeolake Riwasa, palaeolake Kotla Dahar in semi-arid and sub-humid regions, respectively, in Haryana plains. Laminated and massive gypsum deposits characterize Palaeolake Karsandi in the arid region. Oxygen isotopes are being measured on the gastropod shells and gypsum hydration of water (Hodell et al 2011) for a continuous isotopic record from Rajasthan. The oxygen isotope record from palaeolake Riwasa in the semi-arid region indicates the inception of a wet period at 9700-9500 cal yr (BP) with the establishment of a deep, permanent lake coinciding with the early Holocene maximum in the Indian monsoon. The deep, permanent-lake phase ended with a desiccation event at approximately 8200 BP coinciding with the '8.2kyr' weakening of the monsoon. In contrast, palaeolake Kotla Dahar, lying further east of Riwasa in the sub-humid region, receives 500-700mm annual rainfall. At Kotla Dahar, bulk $CaCO_3$ (%), gastropod abundance and isotope data indicate that the deep lacustrine sequence ends at c.185 cm. Extrapolating from the AMS radio-carbon dated sediments at 135cm (4870-4650 BP) and 230cm (2000-1870 BP), places the 185 cm horizon at c.3970-3720 BP. Our results so far indicate that the Riwasa paleolake lying west of Kotla Dahar dries earlier than Kotla Dahar during the mid-Holocene. The precise date of the transition from a deep-lake water phase to an ephemeral lake in Kotla Dahar is pending, but the projected date suggests that the event coincides with the decline of the urban phase of the Indus Civilization at c. 3900 BP. These three lakes lying across different climatic zones will give the first high-resolution isotopic proxy record for local palaeoclimate change from the plains of NW India.

References

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