

Late Holocene Shifts in Indian Summer Monsoon Rainfall from Central Nepal Stalagmites and Coupled Climate Model Simulations

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The Indian Summer Monsoon [ISM] provides approximately 80% of South Asia's annual average precipitation. Nepal represents a particularly important sector of the ISM because of its location at the base of the Himalayas, Asia's water tower, and in the zone of influence of the mid-latitude westerlies. Late Holocene ISM variability has previously been examined using high resolution resolved stable isotope records of stalagmites from northern, northeastern, and central India, but as of yet, no such records have been published from Nepal. We present high resolution stable isotopic time series from two precisely-dated and partially overlapping stalagmites spanning the last 2400 years from Siddha Baba Cave, central Nepal, as well as a year of isotopic data from rainwater collected near the cave. It has been suggested that the amount effect has only a minor effect on the oxygen isotope variability in precipitation in this area. As a result, we couple oxygen and carbon isotopes from these stalagmites to examine both regional and local-scale ISM dynamics. The Siddha Baba record reveals two periods suggestive of changes in the ISM: an apparent increase in rainfall during approximately CE 1350-1550 and a reduction in rainfall characterizing the last two centuries. We investigate these intervals using the Last Millennium Ensemble, a state-of-the-art suite of climate model simulations conducted by the National Center for Atmospheric Research with the Community Earth System Model. A primary focus is on links between Indo-Pacific ocean-atmosphere interactions and subsequent changes in the monsoon circulation over the Indian subcontinent, as well as regional moisture transport into Nepal between these periods.