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The Nile Delta: climate pacing and vulnerability to Holocene change

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Deltas are potentially important sentinels to investigate climate-driven changes in palaeohydrology and human impacts, but, paradoxically, have often been overlooked as palaeoclimate records. In this paper, we present two time-series from the Nile Delta to probe both millennial and centennial-scale changes in deltaic hydrogeomorphology over the past 8000 years. In a global Holocene context, the long-term decrease in Nile Delta accretion rates is consistent with insolation-driven changes in the 'monsoon pacemaker', attested throughout the mid-latitude tropics. Using a second record we suggest that, at shorter timescales, many of the major phases of deltaic modification were mediated by climate events linked to El Niño Southern Oscillation- type (ENSO) variability. In the final part of the paper, we propose that following the early to mid-Holocene growth of the Nile's deltaic plain pronounced deltaic erosion is first recorded after $\sim$4000 years ago, the corollaries of falling sediment supply and an intensification of anthropogenic impacts from the Pharaonic period onwards. The study highlights the importance of the world's deltas as sensitive archives to investigate Holocene geosystem responses to climate change, risks and hazards, and societal interaction.