Microfossils and Monsoons: What Is Their Relationship across the Deglaciation?

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The Indian Monsoon phenomenon affects upwards of a billion people and through its influence on upwelling, ocean currents, and changes in salinity, plays a critical role in supporting marine ecosystems of the Northern Indian Ocean. Primarily driven by temperature gradients between the land and ocean, the monsoon is projected to intensify with future, human -caused warming. However, the response of marine ecosystems is unclear. Here I focus on identifying relationships between changes in the monsoon and the calcification of planktic foraminifera. We concentrated on the last deglaciation, a period of global warming from 20,000 to 10,000 years ago, where many proxies indicate the intensification of the Indian Monsoon. We measure morphometrics of the planktic foraminifer Neogloboquadrina dutertrei – a salinity-sensitive species thought to prefer fresher water conditions. Using individuals (n=20 per sample) from sediment core U1446 (19.5°N, 85.44°E), drilled offshore from the Mahanadi Basin, Bay of Bengal, we calculated average length, width, radius, coiling direction, chamber number, and mass from 24 sediment samples, evenly distributed across the deglaciation. Surprisingly, we found that the average size and overall calcification of N. dutertrei shows a declining trend across the deglaciation. However, on millennial timescales, we find that N. dutertrei calcification was poorest during Heinrich Event 1 (~18- 15ka). Thus, we hypothesize that salinity is not the only control on shell morphologies across the deglaciation but that a combination of temperature and salinity drive changes in N. dutertrei calcification. Our results have strong implications for plankton population, and therefore the marine environment, in the Northern Indian Ocean with ongoing and future warming.

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