

Suborbital scale variability in the Indian monsoon and links to Antarctic climate

KIMBERLY DELONG¹, ROSEMARIE E. CAME^{1*},
THOMAS C. LIPPMANN^{1,2}, JOEL E. JOHNSON¹,
LIVIU GIOSAN³

¹ Department of Earth Sciences, The University of New Hampshire, Durham, New Hampshire, U.S.A. (*correspondence: rosemarie.came@unh.edu).

² Center for Coastal and Ocean Mapping, University of New Hampshire, Durham, New Hampshire, USA.

³ Department of Marine Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA.

The mechanisms that control the response of the Asian monsoon to abrupt climate changes are poorly constrained. Paleo-monsoon reconstructions based on the $\delta^{18}\text{O}$ of speleothem calcite suggest that suborbital variations in the intensity of the monsoon during the last glacial period occurred synchronously with abrupt climate change events in Greenland [1], lending support to the hypothesis that northern hemisphere climate exerted a dominant control over monsoon intensity on suborbital timescales. However, an alternative hypothesis based on a re-analysis of speleothem $\delta^{18}\text{O}$ suggests that southern hemisphere climate exerted a dominant control during the last glacial period [2]. Here we present new constraints on the timing of changes in monsoon intensity relative to changes in southern hemisphere climate over the period from 55 to 24 kyrs before present (BP), which we determined using isotopic and trace/minor element signatures of planktic and benthic foraminifera from an intermediate depth sediment core from the Bay of Bengal. Our results suggest that Glacial Antarctic Intermediate Water (GAAIW) extended into the northern Bay of Bengal during the last glacial period, and that its influence waxed and waned in concert with changes in the intensity of the Indian monsoon. This link between monsoon intensity and changes in climate conditions in the region of GAAIW formation lends support to the hypothesis [2] that southern hemisphere climate exerted a dominant control on the Asian monsoon during the last glacial period.

[1] Wang *et al.* (2001) *Science* **294**, 2345-2348.

[2] Rohling *et al.* (2009) *Quat. Sci. Rev.* **28**, 3291-3302.