Late Cenozoic climate and carbon-cycle dynamics from the Arabian Sea (IODP 355)

K. E. NEWTON[1]*, J. BENDLE[1], K. EDGAR[1], H. M. LIDDY[2], S. J. FEAKINS[2], P. D. CLIFT[3], L. TAUXE[4], D. K. KULHANEK[5], G. SCARDIA[6], S. WARNY[3], P. ANAND[7] AND IODP EXPEDITION 355 SCIENCE PARTY

[1]University of Birmingham, Birmingham, UK, (*correspondence: ken155@student.bham.ac.uk)
[2] University of Southern California, Los Angeles, CA, USA
[3] Louisiana State University, Baton Rouge, LA, USA
[4] Scripps Institution of Oceanography, La Jolla, CA, USA
[5] Texas A&M University, College Station, TX, USA
[6] Sao Paulo State University (UNESP), Rio Claro, SP, Brazil
[7]The Open University, Milton Keynes, UK

The Indian Summer Monsoon is one of the most significant features of the climate system. Its evolution has been linked to large scale changes in the solid earth throughout the Cenozoic, associated with extensive impacts on climate and vegetation.

The role of the Indian Monsoon in driving the late Miocene C_4 plant expansion is a key outstanding question. This vegetation shift was globally widespread, recorded at various sites across Asia, Africa and the Americas. However, identifying the key driver of this shift is still uncertain, with transitions to either warmer and more arid conditions, or declining pCO_2 being potential candidates.

Sediments recovered from Site U1457 (IODP 355) include expanded and well-dated sections across this C_4 expansion interval, containing well preserved marine microfossils (foraminifera and nannofossils), algal biomarkers (alkenones) and plant-wax biomarkers (n-alkanoic acids). $\delta^{13}C$ of plant-waxes indicate a clear positive excursion over this C_4 plant expansion interval. Thus comparison of these new data with parallel proxy records for temperature, hydrological conditions and CO_2, provides an opportunity to directly compare the inferred C_4 shift with potential drivers.

Here we present new alkenone sea-surface temperature and $\delta^{13}C$ records from sites U1457 and U1456, giving an initial insight into climate and carbon-cycle dynamics over the past 10 Ma. Alkenone $\delta^{13}C$ is hypothesised to predominantly reflect changing pCO_2.