Geophysical Research Abstracts
Vol. 13, EGU2011-13897, 2011
EGU General Assembly 2011

8.2 Ka climatic cooling event deciphered from equatorial Arabian Sea

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Equatorial Arabian Sea has been found to be an excellent area to understand the climate dynamics causing changes in Quaternary climate in general and monsoonal changes during the Holocene in particular. By virtue of the regularly reversing monsoon each year in the Indian subcontinent, the salinity along with the isotopic composition of the Arabian Sea water varies to a great extent. In order to understand the monsoonal activity in Indian subcontinent during the Holocene, two ∼1.5 m long offshore sediment cores, one from water depth ∼1600 m (3104G – 12º 49.9'N, 71º 45.6'E), and the other from a water depth ∼2800 m (3101G – 08˚ 00.7'N, 74˚ 01.3'E) in the eastern Arabian Sea have been retrieved. These two locations have been proved to be the strategic locations for the understanding of the Early Holocene global climatic cooling. Planktonic foraminiferal tests constitute a significant part of the off-shore sediment in this area.

Tests of select species of Planktonic foraminifera provided valuable information on climate dynamics during the Early Holocene. The chronology of the cores is based on the dating of the hand-picked foraminiferal separates (250-400 μm) belonging to 'upper water plankton' at an interval of 10-20 cm in the core, using accelerator mass spectrometry (AMS). Calibrated calendar ages have been obtained from the ^{14}C ages after the reservoir age correction. To look at the monsoonal precipitation induced changes in the water mass, two planktonic foraminiferal species viz., *Globorotalia menardii* and *Globigerinoides sacculifer* belonging to different niche in the water column at these locations were considered for the measurement of δ^{18}O and δ^{13}C. *Gs. sacculifer* being a dweller in the upper layers, precisely records isotopic changes in the surface water because of various reasons viz., overhead precipitation, surface runoff, evaporation vis-à-vis precipitation, etc., *Gr. menardii* being a deeper dweller is less affected by the above factors and hence difference in δ^{18}O between *Gs. sacculifer* and *Gr. menardii* at a particular time depicts climate induced changes in surface water mass.

While a major depletion in δ^{18}O of *Gs. sacculifer* occurs at around 8.5 ka BP in the southern location of the present study, the depletion in δ^{18}O of *Gs. sacculifer* has been found to be weak in the northern location. It is apparent from δ^{18}O data of both the species that surface waters got perturbed by the influx of fresh water (^{18}O depleted) in the southern Arabian Sea from the southern Bay of Bengal through down the Indian southern tip. As the surface waters from down south of the Indian subcontinent move towards north, looses its depleted characteristic by mixing with the existing higher salinity surface waters in the north. The source of freshwater at the equatorial sea surface in the southern Arabian Sea is probably the north-east monsoon induced precipitation in the southern India during the extended winter at around 8.2 Ka ago rather than the usual south-west monsoonal precipitation. The cooling at the equator during this time thus is an analogue of the cooling event earlier recorded in the Greenland ice core at around 8.2 ka ago.