Anuário do Instituto de Geociências - UFRJ
ISSN 0101-9759 Vol. 29 - 1 / 2006 p. 587

FORAMS 2006

Distribution of planktonic foraminifera: A modeling approach

Igaratza Fraile[1]; Michael Schulz1,[2]; Stefan Mulitza[2] & Gerald Ganssen[3]

1Department of Geoscinces, University of Bremen, Bremen, Germany
igaratza@palmod.uni-bremen.de
2Research Center of Ocean Margins, University of Bremen, Bremen, Germany
3Institut of Earth Sciences, Free University of Amsterdam, Amsterdam, Netherlands

Planktonic foraminifera are widely used for paleoceanographic reconstructions. Their assemblages are a good proxy to quantify past environmental conditions, such as sea-water temperature, stratification, and biological productivity. In general, all estimation procedures are based on the correlation between modern sea-surface temperature and the observed foraminiferal fauna ("transfer function"). The estimation process is, however, complicated by different ecological needs (season, depth of habitat and food requirement) of the employed foraminifera species.

Any change in the timing of the maximum in foraminiferal flux with respect to, say, summer temperature, that may have occurred in the past, may lead to a bias in estimated paleotemperature. This bias arises, because the sedimentary record will ultimately reflect the convolution of foraminifera flux throughout the year with the annual temperature cycle. Moreover, differences in seasonality hinder comparison of reconstructed temperatures based on assemblages of planktonic foraminifera with those derived by other sea-surface temperature proxies (*e. g*. prymnesiophyte-based U^{k}_{37} ratio).

Climate changes could induce variations in the seasonal succession of the planktonic foraminifera typically used in transfer functions. This variations need to be quantified to understand corresponding proxy-based reconstructions.

To study the seasonal variations of planktonic foraminifera species at glacial-interglacial timescales, we developed a foraminiferal distribution model. This model is forced with a global hydrographic dataset (*e.g*. temperature, mixed layer depth) and with biological information taken from an ecosystem model (*e.g*. "food type", zooplankton abundance) to predict monthly foraminiferal fluxes of the most common species used in transfer functions. The sensitivity of each species with respect to temperature (optimal temperature and range of tolerance) is derived from sediment trap studies.

We present results for the global distribution of the most important modern planktonic foraminifera used in transfer functions. The model output is compared with measured foraminiferal fluxes of globally distributed sediment traps.