



Is the seasonality of seawater temperature recorded by the Mg/Ca ratio of single specimens of planktonic foraminifera?

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The seasonal migration of large-scale wind patterns leads to strong seasonal differences in upwelling intensity and the structure of the water column in many regions of the oceans. Changes in upwelling can have dramatic impacts for climate and fisheries (e.g. ENSO) and as such the reconstruction of seasonal variability is a prime objective for Palaeoceanography. Planktonic foraminifera calcify over a period of ~ 1 month and therefore the range of Mg/Ca temperatures obtained from single specimens from a sediment sample potentially records the seasonality, provided that the selected species exists over the course of the year. To test this we have analysed Mg/Ca ratios of single foraminifera (*G. inflata*, *G. ruber* and *G. sacculifer*) from sediment trap and core top samples.

Sediment trap CBi-3 off Cape Blanc ($20^{\circ}45.6'N$, $18^{\circ}41.9'W$) was deployed between July 2005 and September 2006 in a water depth of 1277 m while trap JAM 2 was positioned off southern Java ($8^{\circ}17.5' S$, $108^{\circ}02.0' E$) between November 2000 and November 2002 in 2200 m water depth. Both locations are in upwelling areas exhibiting seasonal changes in water temperature with changing upwelling intensity. Hence, these traps are ideally suited to investigate if the seasonality of seawater temperature is recorded by single foraminifera tests.

Samples were cleaned using a flow through cleaning device which facilitates the analysis of single tests. The main advantage of this method over routinely applied cleaning methods for bulk samples is that no material is lost. Comparison of *G. inflata* shell Mg/Ca to water temperatures measured by CTD casts off Cape Blanc reveals a habitat depth ranging between 60-160 m, coinciding with the depth of the seasonal thermocline. Mg/Ca ratios in single specimens of the mixed-layer dweller *G. ruber* in sediment trap and core top samples are compared to measured sea surface temperatures (SST) to examine the ability of single specimens to track seasonal SST variability.

Analyses are still in progress but initial results show that it is possible to determine Mg/Ca ratios in single specimens of *G. inflata* using the flow through technique and specimens of $<40 \mu g$ can be analysed. Initial results further show single specimens of *G. sacculifer* from sediment traps track the seasonal SST off S Java. Additionally, the range of Mg/Ca temperatures from core top single specimens of *G. sacculifer* is remarkably similar to the measured seasonal range. These preliminary results demonstrate the great potential for the Mg/Ca ratio of single specimens of planktonic foraminifera to record the seasonality of seawater temperature.