High resolution trace metal analysis of benthic foraminifera reveal nutrient excursions in Antarctic Intermediate Water

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The use of $\delta^{13}C$ within foraminifera as a nutrient proxy is complicated by air-sea exchange processes that cause isotopic deviations due to equilibrium fractionation between the ocean and atmosphere. These effects can be resolved by the utilisation of proxies such as cadmium, which co-varies with phosphate in the modern ocean.

We present a high resolution record of trace metal variability from core MD97-2120, located on Chatham Rise, near New Zealand at a depth of 1210m. MD97-2120 is located close to the core layer of Antarctic Intermediate Water (AAIW) and is thus uniquely placed to study changes in AAIW and the redistribution of heat and freshwater within the upper ocean.

A previous study of $\delta^{13}C$ and $\delta^{18}O$ in benthic foraminifera from MD97-2120 demonstrated increased production of AAIW and Southern hemisphere warming coincident with cooling and decreased deepwater convection in the North Atlantic [1]. The interdependence of water mass conversion has implications for the forcing of climatic instability and thermohaline circulation.

In this study we present Cd/Ca and Mg/Ca analysis for the Benthic foraminifera *Hoeglundina elegans, Trifarina angulosa,* and *Uvigerina sp.* from MD97-2120 for the past 150ka, at a mean temporal resolution of 161 years. Cd/Ca and Mg/Ca may be used for the determination of intermediate water nutrient content and temperature respectively. This allows separation of air-sea exchange and nutrient signals within the $\delta^{13}C$ record, which has significant implications for the movement of the SubAntarctic Front and the rate of formation of AAIW in the South Pacific.

References

[1] Pahnke K., Zahn R. (2005) *Science* **307,** 1741-1746.