

Abiotic Forcing On Planktonic Foraminifera Shell Mass Variations

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Planktonic foraminifera are known to alter their shell mass at glacial/interglacials cycles as a function of changing CO₂ concentrations in the ocean/atmosphere system. Nevertheless, preliminary results have shown that under similar atmospheric CO₂ concentrations planktonic foraminifera alter their mass as a function of latitude (Zarkogiannis et al., 2019b). Our analysis shows that it is ambient seawater density changes that influence calcification and causes observed planktonic foraminifera shell mass increases during glacial times relative to interglacials. The reconstruction of planktonic foraminifera shell volumes from X-ray tomography scans and ambient seawater densities from Mg/Ca and $\delta^{18}\text{O}$ data showed that a heavier shell would need to be precipitated in glacial climates in order for the increased buoyant force of a denser glacial ocean to be counteracted (Zarkogiannis et al., 2019a). The relationship between shell mass and density allows reconstructions of past ocean stratification and may have implications on the uptake of atmospheric CO₂ by the oceans.

References

Zarkogiannis, S. D., Antonarakou, A., Tripathi, A., Kontakiotis, G., Mortyn, P. G., Drinia, H. and Greaves, M., 2019a. Influence of surface ocean density on planktonic foraminifera calcification. *Scientific Reports* 9(1): 533.

Zarkogiannis, S. D., Kontakiotis, G., Antonarakou, A., Mortyn, P. G. and Drinia, H., 2019b. Latitudinal Variation of Planktonic Foraminifera Shell Masses During Termination I. *IOP Conference Series: Earth and Environmental Science* 221: 012052.