



## **Oxygen isotope fractionation during calcification in *Calcidiscus leptoporus*: The influence of carbonate chemistry**

G. Langer (1, 2), P. Ziveri (2), M. Geisen (1) and S. Thoms (1)

(1) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

(2) Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona (UAB), Bellaterra, 08193, Spain

The oxygen isotopic composition ( $\delta^{18}\text{O}$ ) of shells of pelagic calcifiers is a critical tool in paleoceanography, for reconstructing both past seawater temperature and salinity (Rostek et al. 1993). The calibration of this proxy, however, relies on empirical relationships derived from experiments with extant species. In foraminifera, for example, the  $\delta^{18}\text{O}$  is also sensitive to the carbonate ion concentration ( $[\text{CO}_3^{2-}]$ ) in seawater (Spero et al. 1997, Bijma et al. 1999). In coccolithophores, the effects of seawater carbonate chemistry are still unknown. Here, we experimentally address this deficiency on a heavily calcifying extant coccolithophore, which is a major contributor to carbonate export production, *Calcidiscus leptoporus* (Ziveri et al. 2007). This species shows a similar  $\delta^{18}\text{O}$  -  $[\text{CO}_3^{2-}]$  relationship as observed for planktonic foraminifera. Our finding suggests that the  $[\text{CO}_3^{2-}]$  effect on  $\delta^{18}\text{O}$  is universal for unicellular calcifiers. We propose a model which describes this universal validity in terms of physiological features of vesicle-based calcification of unicellular organisms. In particular, we assume that pH homeostasis keeps the pH of the calcifying vesicle constant, which in turn affects inorganic carbon transport into and out of the vesicle.

### References

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