

Evolution of *Gephyrocapsa oceanica*: Equatorial seasonality at play

Luc Beaufort

Aix-Marseille University, CNRS, IRD, INRAE, CEREGE, Aix-en-Provence, France. beaufort@cerege.fr

Josué Dauvier

Aix-Marseille University, CNRS, IRD, INRAE, CEREGE, Aix-en-Provence, France

Today, there is virtually no seasonal change at the equator because the Earth orbits the sun in a nearly circular orbit. This orbit was periodically more eccentric, producing a significant annual asymmetry in the amount of sunlight received at the equator, which we call equatorial seasonality (ES). The evolution of the Noelaerhabdaceae has recently been shown to have been driven by ES cycles (Beaufort et al., 2022). Another study shown that the extent species of Noelaerhabdaceae evolved from a common ancestor that lived 500 ka ago by progressively diverging in size toward the present large spectrum of species specific coccolith length (Bendif et al., 2019). This presentation aims to quantify the evolution of the coccolith length in one of those species, *Gephyrocapsa oceanica*, during the last 500 ka. We measure more 100 *G. oceanica* coccolith size in high resolution samples collections from 6 cores selected in the Indian and Pacific oceans and in the Mediterranean Sea.

These records of *G. oceanica* coccolith size show similar trends: size increases progressively from 500 ka to 100 ka, then decreases rapidly from 100 ka to the present value. This peak in size in the middle of the life of this species, indicates a non-monotonic evolutionary pattern. Because this peak is synchronous with a maximum eccentricity in this time period, we conclude that this pattern supports the hypothesis of an influence of ES cycles on the size evolution of Noelaerhabdaceae.

References:

- Beaufort, L., Bolton, A.C.T., Sarr, A.-C., Suchéras-Marx, B., Rosenthal, Y., Donnadiou, Y., Barbarin, N., Bova, S., Cornuault, P., Gally, Y., Gray, E., Mazur, J.-C. & Tetard, M. 2022. Cyclic evolution of phytoplankton forced by changes in tropical seasonality. *Nature* **601**: 79–84.
- Bendif, E.M., Nevado, B., Wong, E.L., Hagino, K., Probert, I., Young, J.R., Rickaby, R.E.M. & Filatov, D.A. 2019. Repeated species radiations in the recent evolution of the key marine phytoplankton lineage *Gephyrocapsa*. *Nature communications* **10**: 1–9.