



Coccolith chemistry response to nutrient limitation

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A main objective of the Euroclimate MERF* project is to reconstruct - the gradients in biological productivity, expected if nutrients entered the Mediterranean Sea from distinct sources such as rivers, and – the variations in the productivity of species in different ecological niches throughout the water column. The Mediterranean basin was selected since it is characterized by monsoon cycles which increased nutrient fluxes to the ocean every 23,000 years. A suite of new proxy indicators derived largely from inorganic chemistry of primary producing coccolithophores (dominant calcareous phytoplankton group in the Mediterranean Sea), $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ of organic compounds, and C:P ratios in sediments, are all well-suited to this work. We will present here the first calibration from culture experiments of the carbonate chemical signatures with respect to the influence of major nutrients. We will discuss how the chemistry ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$, Sr/Ca) and morphological and physiological characteristics (cell size, growth rates, calcification rates) of key species respond to variable nutrient levels (phosphate/nitrate) and temperature. The selected key species constitute an important component of modern and Quaternary sediments of the Mediterranean Sea. The culture calibrations will form the basis for continued calibration in surface sediments, ultimately yielding the means for improved proxy measurements of past environments. * Quaternary marine ecosystem response to fertilization: Mediterranean sapropel events and implications for marine carbon uptake (MERF) (EUROCORES-EUROCLIMATE)