Quaternary marine ecosystem response to fertilization: Mediterranean sapropel events and implications for marine carbon uptake (MERF, FP35)

Within the Late Quaternary record of the Eastern Mediterranean basin, sapropel horizons indicating periodic anoxia have long been recognised. Recent research has shown that these form in response to natural fertilization of the Mediterranean Sea and occur every 23,000 years, suggesting that the forcing mechanism is a precessional modulation of monsoon strength. The mechanisms of ecological change and propagation of nutrients through the surface ocean ecosystem remain poorly constrained. This limits our ability to use anoxic events to predict likely analogue situations as a result of present day climate change and eutrophication. A new multi-proxy approach will be implemented to reconstruct both, the extent of the response in marine productivity and the supporting nutrient fluxes to climate change. Further, we aim to monitor changes in the carbon system by analysing the key Mediterranean calcifying marine phytoplankton, coccolithophorids. To quantify the change in trophic conditions in the past, we will refine our proxies using a unique combination of culture samples, sediment trap material, core top sediments, and sub-recent sediments (to evaluate diagenetic overprinting). These refined proxies will then be applied to time intervals corresponding to three defined phases of enhanced fertility over the last 200 kyr (sapropels 1, 5, and 6).

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