Integrating BGC-Argo and ocean biogeochemical models to advance carbon sequestration estimation in the Mediterranean Sea

Sinking particulate organic matter is a key component of the ocean carbon pump and contributes to long term carbon storage in the deep ocean. Abundant observations of marine particulate matter are becoming available in the form of backscattering profiles from BGC-Argo floats and other autonomous observation platforms. Yet this information is at present not fully exploited in ocean biogeochemistry prediction systems that are needed to estimate carbon budgets, extrapolate to undersampled regions, and for future scenarios. Here, we integrate observations from BGC-Argo and the Copernicus Marine Mediterranean biogeochemical model system to characterise the downward flux of detritus throughout the Mediterranean Sea, to test model parameterizations for carbon sink and mineralization and to calibrate modelled processes. Our model accounts for two detritus classes, characterised by different sinking velocities and remineralisation rates, representing small (<100 um) and large (>100 um) particles. Our results allow us to improve the capability of the Mediterranean high resolution model system to estimate the carbon sequestration, by quantifying the downward flux of particles, its relation with gradients in productivity, mixing and other ocean regimes, and the differential contributions of small and large particles to the total flux.

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