EGU21-15479
https://doi.org/10.5194/egusphere-egu21-15479
EGU General Assembly 2021

Atmospheric and oceanographic forcing impact on particle flux composition and carbon sequestration in the Eastern Mediterranean Sea: a three-year time-series study in the deep Ierapetra Basin

Rut Pedrosa-Pamies[1,2], **Constantine Parinos**[3], Anna Sanchez-Vidal[2], Antonio Calafat[2], Miquel Canals[2], Dimitrios Velaoras[3], Nikos Mihalopoulos[4,5], Maria Kanakidou[4], Nikolaos Lampadariou[3], and Alexandra Gogou[3]

[1]The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA, USA
[2]Consolidate Research Group in Marine Geosciences, Dept. of Earth and Ocean Dynamics, Faculty of Earth Sciences, University of Barcelona, Barcelona, Spain
[3]Institute of Oceanography, Hellenic Centre for Marine Research (HCMR), Greece
[4]Environmental Chemical Processes Laboratory (ECPL), Department of Chemistry, University of Crete, Heraklion, Crete, Greece
[5]Institute for Environmental Research and Sustainable Development (IERSD), National Observatory of Athens, P. Penteli, Athens, Greece

Sinking particles are a critical conduit for the export of organic material from surface waters to the deep ocean. Despite their importance in oceanic carbon cycling, little is known about the biotic composition and seasonal variability of sinking particles reaching abyssal depths. Herein, sinking particle flux data, collected in the deep Ierapetra Basin for a three-year period (June 2010 to June 2013), have been examined at the light of atmospheric and oceanographic parameters and main mass components (lithogenic, opal, carbonates, nitrogen, and organic carbon), stable isotopes of particulate organic carbon (POC) and source-specific lipid biomarkers. Our aim is to improve the current understanding of the dynamics of particle fluxes and the linkages between atmospheric dynamics and ocean biogeochemistry shaping the export of organic matter in the deep Eastern Mediterranean Sea (EMS). Overall, particle fluxes showed seasonality and interannual variability over the studied period. POC fluxes peaked in spring April-May 2012 (12.2 mg m^{-2} d^{-1}) related with extreme atmospheric forcing. Summer export was approximately fourfold higher than mean wintertime, fall and springtime (except for the episodic event of spring 2012), fueling efficient organic carbon sequestration. Lipid biomarkers indicate a high relative contribution of natural and anthropogenic, marine- and land-derived POC during both spring (April-May) and summer (June-July) reaching the deep-sea floor. Moreover, our results highlight that both seasonal and episodic pulses are crucial for POC export, while the coupling of extreme weather events and atmospheric deposition can trigger the influx of both marine labile carbon and anthropogenic compounds to the deep Levantine Sea. Finally, the comparison of time series data of sinking particulate flux with the corresponding biogeochemical parameters data previously reported for surface sediment samples from the deep-sea shed light on the benthic-pelagic coupling in the study area. Thus, this

study underscores that accounting the seasonal and episodic pulses of organic carbon into the deep sea is critical in modeling the depth and intensity of natural and anthropogenic POC sequestration, and for a better understanding of the global carbon cycle.

Acknowledgments

We acknowledge support of this work by the project 'PANhellenic infrastructure for Atmospheric Composition and climatE change – **PANACEA'** (MIS 5021516) which is implemented under the Action 'Reinforcement of the Research and Innovation Infrastructure', funded by the Operational Programme 'Competitiveness, Entrepreneurship and Innovation' (NSRF 2014-2020) and co-financed by Greece and the European Union (European Regional Development Fund).