

Entering in the BGC-Argo era: improvements of the Mediterranean Sea biogeochemical operational system

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Abstract

Biogeochemical Argo floats (BGC-Argo) provide an unprecedented availability of high-resolution biogeochemical and optical vertical profiles at near real time (NRT). The integration of biogeochemical and optical observations with marine ecosystem models allows to improve the model capability to describe marine ecosystem dynamics at different spatial and temporal scales, also resulting in an increase of the model skill.

The focus of this work is to present the recent advancements and future upgrades of the Copernicus (CMEMS) Mediterranean Sea biogeochemical modelling system, that benefits from the particularly rich and high quality level of the BGC-Argo network in this semi-enclosed sea.

Major achievements include the development of a multiplatform (i.e., from satellite and BGC-Argo) and multivariate data assimilation scheme that has improved the forecast skill of the NRT operational system, the building of a novel skill assessment framework oriented to assess key biogeochemical processes and ecosystem dynamics (e.g. deep chlorophyll maximum depth, nitracline depth, minimum oxygen depth), and the development of a coupling of bio-optical data with biogeochemical model that has improved primary producer and optical component (e.g., CDOM) dynamics and introduced to a full optical-biogeochemical model coupling.

The development of these research activities has been carried out mainly in the frame of two CMEMS Service Evolution projects (MASSIMILI and BIOPTIMOD), and has been implemented in the operational service fulfilling the CMEMS's continuous improvement philosophy.