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# Toward the assimilation of biogeochemical data in the CMEMS BIOMER coupled physical-biogeochemical operational system

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The operational production of data-assimilated biogeochemical state of the ocean is one of the challenging core projects of the Copernicus Marine Environment Monitoring Service. In that framework – and with the April 2018 CMEMS V4 release as a target - Mercator Ocean is in charge of improving the realism of its global $\frac{1}{4}^\circ$ BIOMER coupled physical-biogeochemical (NEMO/PISCES) simulations, analyses and re-analyses, and to develop an effective capacity to routinely estimate the biogeochemical state of the ocean, through the implementation of biogeochemical data assimilation. Primary objectives are to enhance the time representation of the seasonal cycle in the real time and reanalysis systems, and to provide a better control of the production in the equatorial regions.

The assimilation of BGC data will rely on a simplified version of the SEEK filter, where the error statistics do not evolve with the model dynamics. The associated forecast error covariances are based on the statistics of a collection of 3D ocean state anomalies. The anomalies are computed from a multi-year numerical experiment (free run without assimilation) with respect to a running mean in order to estimate the 7-day scale error on the ocean state at a given period of the year. These forecast error covariances rely thus on a fixed-basis seasonally variable ensemble of anomalies. This methodology, which is currently implemented in the "blue" component of the CMEMS operational forecast system, is now under adaptation to be applied to the biogeochemical part of the operational system. Regarding observations – and as a first step - the system shall rely on the CMEMS GlobColour Global Ocean surface chlorophyll concentration products, delivered in NRT.

The objective of this poster is to provide a detailed overview of the implementation of the aforementioned data assimilation methodology in the CMEMS BIOMER forecasting system. Focus shall be put on (1) the assessment of the capabilities of this data assimilation methodology to provide satisfying statistics of the model variability errors (through space-time analysis of dedicated representers of satellite surface Chla observations), (2) the dedicated features of the data assimilation configuration that have been implemented so far (e.g. log-transformation of the analysis state, multivariate Chlorophyll-Nutrient control vector, etc.) and (3) the assessment of the performances of this future operational data assimilation configuration.