Intercomparison of Phytoplankton functional types dynamics from satellite observations

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Copernicus marine environment monitoring service (CMEMS) gives users access to a wide range of ocean descriptors. Both physics and biogeochemistry of the marine environment can be studied with complementary source of data, such as in situ data, modelling output and satellite observations at global scale and/or for European marginal seas. Among the ocean descriptors supplied as part of CMEMS, phytoplankton functional types (PFTs) describe the phytoplanktonic composition at global level or over European marginal seas. Studied phytoplankton assemblage is particularly important as it is the basis of the marine food-web. Composition of the first trophic level is a valuable indicator to infer the structure of the ecosystem and its health. Over the last decades, ocean colour remote sensing has been used to estimate the phytoplanktonic composition. The algorithms developed to estimate PFTs composition based on ocean colour observation can be classified in three categories: the spectral approaches, the abundance-based approaches (derived from the chlorophyll concentration) and the ecological approaches. The three approaches can lead to differences or, conversely, to similar patterns. Difference and similarity in PFTs estimation from remote sensing is a useful information for data assimilation or model simulation, as it provides indications on the uncertainties/variability associated to the PFT estimates. Indeed, PFT estimates from satellite observations are increasingly assimilated into ecological models to improve biogeochemical simulations, what highlights the importance to get an index or at least information describing the validity range of such PFTs estimates.

In this study, four algorithms (two abundance-based, and two spectral approaches) are compared. The aim of this study is to compare the related PFT products spatially and temporally, and to study the agreement of their derived PFT phenology. This study proposes also to compare PFT algorithms developed for the global ocean with those developed for specific regions in order to assess the potential strength and weakness of the different approaches. Once similarities and discrepancies between the different approaches are assessed, this information could be used by model to give an interval of confidence in model simulation.