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Comparative assessment of coupled physical-biogeochemical models in the NW Mediterranean

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This work aims to assess the skills of different physical-biological coupled models from CMEMS, using several sources of in situ biogeochemical (BGC) data, in the Balearic Sea (NW Mediterranean). We focused in this area due to the presence of different ecoregions with divergent planktonic seasonal cycle and different drivers of the primary production, due to the diversity of observational data for validation, and the interest for fisheries and tourism. The three modelling systems used, with different degree of data assimilation, were: (i) NEMO-BFM, which assimilates physical and BGC data, (ii) NEMO-PISCES, which assimilates only physical data, and (iii) POLCOMS-ERSEM, which does not include any data assimilation. Observational data for validation included physical and biogeochemical data from CMEMS satellite products, in-situ profiles, and high spatial resolution glider data from SOCIB. The results showed that all models captured the basic hydrodynamic patterns reasonably well (including persistent currents and mixing) and the seasonal modulation and spatial heterogeneity, although there were some biases that modify the advection of BGC properties. The BGC outputs showed partial agreement in the main spatial and temporal patterns of each ecoregion, but absolute nutrient and chlorophyll values were, in some cases, largely over or underestimated. We discuss potential implications of our work concerning both, future model development and recommendations for end users.