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Comparison of biogeochemical dynamics in two time-series sites of a North Atlantic Ocean site (PAP and BATS): a modeling approach.

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Plankton functional type (PFT) models are highly complex ecosystem models. Indeed, the large number of processes and plankton functional groups represented in these models make the network of interactions extremely complicated. Slight differences in parameterization or formulation of single processes, therefore, may drive these models to respond in a very different way to perturbations of the system. An evaluation of such a different responses can be very useful to understand the processes regulating the functioning of the ecosystem.
In this study we analyze the sensitivity of the biological parameters in a PFT model (European Regional Seas Ecosystem Model, ERSEM) in respect to primary production and detrital export. The tests are done on a subset of key parameters that control ocean ecosystem growth in a 1-D formulation of ERSEM coupled with a turbulence model (General Ocean Turbulence Model, GOTM). Results are compared with observed data from two time-series sites Bermuda Atlantic Time-Series (BATS, 32.16 N 64.5 W) and Porcupine Abyssal Plain (PAP, 49 N 16 W).
A particular focus on factors determining the timing and intensity of the bloom is also presented on the base of literature review and on 1D(GOTM-ERSEM)-3D(NEMO-ERSEM) model simulations comparison. The different processes evaluated are: i). winter convective mixing, ii) lateral advection: mesoscale and sub-mesoscale eddies, iii) turbolent mixing iv) decoupling between euphotic zone and mixed layer depth.
The study presented here is carried out in the framework of the European project EURO-BASIN (European Basin-scale Analysis, Synthesis and Integration), where long term 3D simulation aimed to evaluate the variability of primary production and carbon export are planned. Parameterization in use by the 3D NEMO-ERSEM is referring to the global ocean, while simulations are planned for the North North Atlantic. This study aims to contribute to fulfill the development of a specific parameterization for the North Atlantic Ocean.