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Primary production variability in the northeast Atlantic: driving physical mechanisms at different scales.

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Primary production (PP) exhibits contrasted responses to the physics depending on the involved time and space scales. In the northeast Atlantic, PP changes over a variety of scales, ranging from the filamentary sub-mesoscales, to the interannual large scales. This region is critical to the oceanic carbon cycle because it is a large sink of atmospheric CO2 and the region of formation of subpolar mode waters. By combining satellite imagery, coupled 1D and 3D dynamical-biogeochemical models, and field data acquired during the POMME surveys, the physical/biogeochemical coupling at different scales is investigating and quantified.

The seasonal cycling is characterized by a middle-range spring bloom, which shows a succession from nanoplankton to picoplankton. During the bloom, it is shown that on short time scales (2-3) days, space and time variability have the same order of magnitude; on the seasonal time scale, time variability is larger than space variability. Much stronger variability is revealed by a high-resolution model than seen in the data. It results both from atmospheric variability at small (50km) scale, and from the stirring induced by oceanic mesoscale eddies. Large interannual and intra-seasonal variability is also observed, driven by the synoptic and low frequency atmospheric variability.