



Processes relevant for decadal changes in primary production of the North Sea and Baltic Sea: hindcast and scenario modelling

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Despite their geographical vicinity, the North Sea and the Baltic Sea ecosystems exhibit very different characteristics in both physical and biological parameters. Nonetheless, since both ecosystems are characterized by the same general functional groups in phytoplankton and zooplankton and, their geographical distribution indicates comparable thermal adaptation of the plankton groups, we propose that the same ecosystem parameterization can be utilized to simulate the dynamics in both ecosystems simultaneously.

Here we present results from an updated version of the 3d coupled ecosystem model ECOSMO valid for both areas. The model allows both multi-decadal hind cast simulation of primary production and specific process studies under controlled environmental conditions. Our results from a long-term hind-cast (1948-2008) indicate incoherent “regime shifts” in the primary productivity (PP) between the North Sea and Baltic Sea. Correlation analysis between atmospheric forcing and PP indicates significant correlations for both solar radiation and wind but cannot serve to identify causal relationship. Therefore additional scenario tests with perturbations in individual atmospheric condition where accomplished emphasizing specifically the role of solar radiation, wind and eutrophication. The results revealed that, although all parameters are relevant for the PP in North Sea and Baltic Sea, the dominant impact on long term variability was introduced by modulations of the wind fields.