



A physical-biogeochemical hindcast for the Nordic Seas and Arctic 1950-2018

To understand future changes in both physical and biogeochemical ocean conditions, a good understanding of past variability is essential. Past observations alone do not provide a complete understanding, but model simulations of the past can help fill knowledge gaps and enhance our understanding of the processes involved. Here, we present a 69-year-long regional hindcast of the Nordic Seas and the Arctic using the TOPAZ-BGC-17km. This model consists of the physical Ocean model HYCOM, the sea-ice model CICE and the biogeochemical model ECOSMO. The hindcast is forced by the ERA5 atmospheric reanalysis, and the freshwater input from land is represented by climatological runoff from rivers and from Greenland. On the open oceanic boundaries the model is forced by the NorCPM Decadal Climate Prediction Project assimilation run that assimilates temperature and salinity anomalies. Temperature and salinity from NorCPM are bias-corrected using the delta method. The model is also forced at the open boundaries by currents and sea level. The biogeochemical model is forced on the open boundaries by climatological values from the World Ocean Atlas and river nutrient loads from GlobalNEWS. We will present an evaluation of the hindcast compared to climatology and available in-situ observation, focusing on repeat monitoring sections in the Norwegian Sea where we have longer time series of observations. Based on the model evaluation, we identify gaps in modelling and forcing fields and observations needed to improve long-term hindcasts and the road towards extending ocean reanalysis further back in time. The run will be part of a new series of pilot hindcast simulations that will be provided by the Copernicus Marine Services. The same system will also be used for downscaling climate scenarios and evaluate the possible consequences of global warming for the Arctic marine ecosystem.

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