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Analysis of 20 years of daily cloud-free chlorophyll and suspended particulate matter in the North Sea

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The evolution of chlorophyll concentration (CHL) and suspended particle matter (SPM) in the North Sea over the period 1998-2017 is analysed. The domain covers 48 to 66 degrees North and -8 to 13 degrees East. Through the years between 76% and 87% of marine pixels are missing data due to cloud cover and satellite product quality control. A daily cloud-free dataset is produced with the help of DINEOF (Data Interpolating Empirical Orthogonal Functions). The gap-free dataset is used to investigate interannual variability and trends in the concentration of these variables in the North Sea, and their relation to long-term climatic signals such as the Atlantic Multidecadal Oscillation (AMO). The interannual variability of the initiation and length of the Spring bloom is studied, as well as its spatial dispersion. High latitudes (higher than 60°N) present large amounts of missing data due to the presence of clouds and low sun angles in winter, and therefore are more difficult to study using optical satellite data. The spatial and temporal variability of the CHL and SPM signals is assessed in these zones, like the occurrence and strength of the Spring bloom around the Faroe islands.