



Optimized plankton imaging, clustering and visualization workflows through integrative data management and application of artificial intelligence

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Phytoplankton is a diverse group of photosynthesizing organisms which account for approximately fifty percent of the primary production on Earth. Increasing our knowledge on phytoplankton dynamics (and plankton in general) is therefore of major importance.

In the present research, we aimed to reveal the spatiotemporal dynamics of the phyto- and zooplankton community in the Eastern English Channel, Southern Bight of the North Sea and the Thames estuary. To do so, we organized a JERICO-NEXT Lifewatch cruise in May 2017 on board of the RV Simon Stevin and sampled 44 stations, involving five research institutions from France (CNRS-LOG), The Netherlands (RWS, NIOZ) and Belgium (UGENT, VLIZ).

To quantify the biomass of the phytoplankton community we used a unique combination of three flow cytometers and two Fast Repetition Rate Fluorometers that were coupled to the underway ferrybox system. These observations were complemented with Water Insight Spectrometer and water profile data (by means of a CTD) and samples for zooplankton, pigment and nutrient analysis. A dedicated data workshop was organized with all partners to conduct a joint analysis on both the biotic and abiotic data. A first exploration of the data, by means of regression-based models and multivariate statistics, suggested that mainly nutrient discharges from the rivers influence the plankton structure. Furthermore, water turbidity is controlling photosynthetic activity and horizontal and vertical variations of photosynthetic properties can be discriminated