2024 UvA AI\_Plankton\_ABIO coupling project

To monitor and predict the effect of climate change on the North Sea food web long-term data need to be collected and analyzed. The Dutch government has performed plankton and abiotic measurements in 1990-2019 (three decades) and stored the data in several databases. The plankton consists of 50 species in total, measured at 30 locations. Simultaneously, abiotic data such as water temperature, salinity and nitrogen from these locations were measured but stored in a separate database. The challenge is to build a new database combining plankton and abiotic variables in order to directly extract information for statistical analyses.

An example of such a statistical analysis is the correlation between climate change and variations in the abundance of Harmful Algal Bloom (HAB) species. In the early 1990s the first identifications of presumed invasive fish-killing HAB-raphidophytes in Dutch marine waters were made. A model study in 2003 showed that in contrast to indigenous species, raphidophytes could double their growth rates in a 2100 climate scenario (+4°C). At the NIOZ jetty reference station (Texel, The Netherlands), used as benchmark, the annual average water temperature increased significantly by 0.052 ± 0.031°C per year from 1970 to 2019 (+1.6°C) with a 3°C difference between the coldest and warmest year (8.9°C in 1996 and 12.7°C in 2014), which indicates improved temperatures for HAB-raphidophyte growth. In a first step, plankton data will be used to examine long-term trends in raphidophytes and selected indigenous phytoplankton species, and their correlations with water temperature. The null-hypothesis tested is that there are no significant correlations. Other abiotic variables such as nitrogen and light- climate may follow and the study can eventually be extended to other HAB species.  
  
Company info:

NIOZ, the Royal Netherlands Institute for Sea Research, is the national oceanographic institute and the Netherlands’ center of expertise for ocean, sea and coast. We advance fundamental understanding of marine systems, the way they change, the role they play in climate and biodiversity, and how they may provide sustainable solutions to society in the future.