18 years of dinoflagellate cyst export flux deposition recovered from a sediment trap in the upwelling region off Cape Blanc (NW Africa)

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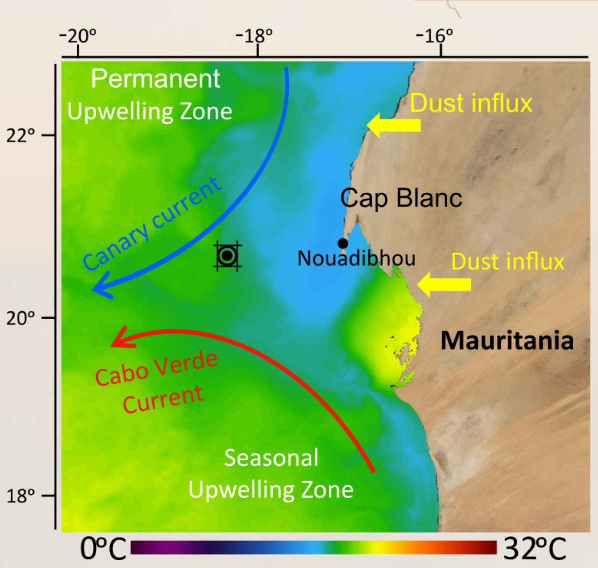
Introduction

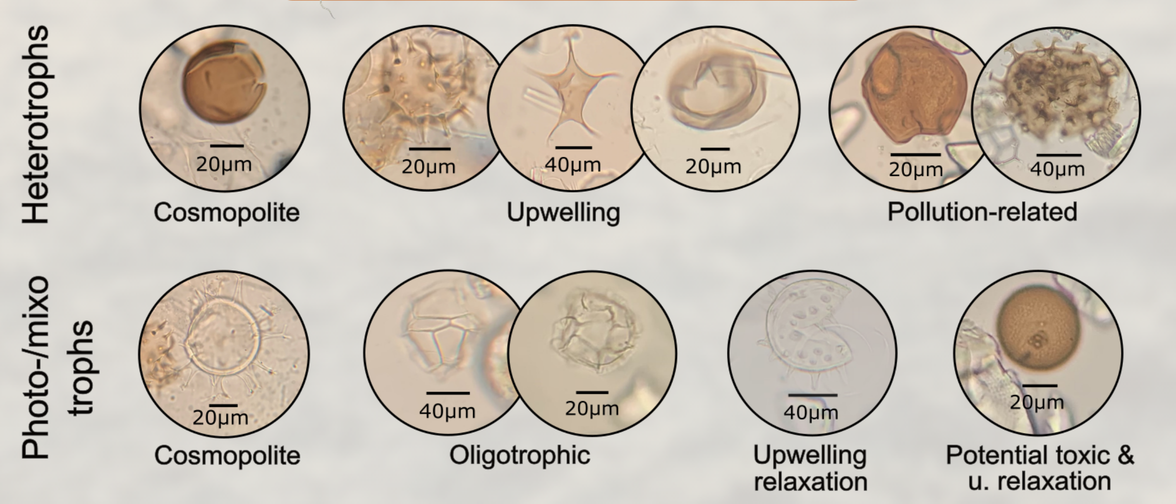


NASA (SOTO) satelite image of sea surface temperature (SST) on March 24th, 2021.

The upwelling system off Cap Blanc forms one of the most productive region in the world. Permanent upwelling bearing nutrient rich water and mineral dust input from Sahara fertilize this coastal area as such, it becomes a key area in the global carbon cycle. In the scope of current global climate change, it is crucial to obtain insight into the effects of this change on the Cap Blanc ecosystem. This can be achieved by monitoring the production and association composition of key organisms of this ecosystem representing different trophic levels.

Dinoflagellates as marine planktonic organisms are a useful tool to study the dynamic of upwelling system off Cap Blanc because they consist of both photo- and heterotrophic organisms. Here we studied the export production of dinoflagellate cysts over an 18 years period by analyzing materials collected by a sediment trap located under the upwelling filament track of the major Cap blanc upwelling cell at a depth ~1300m.

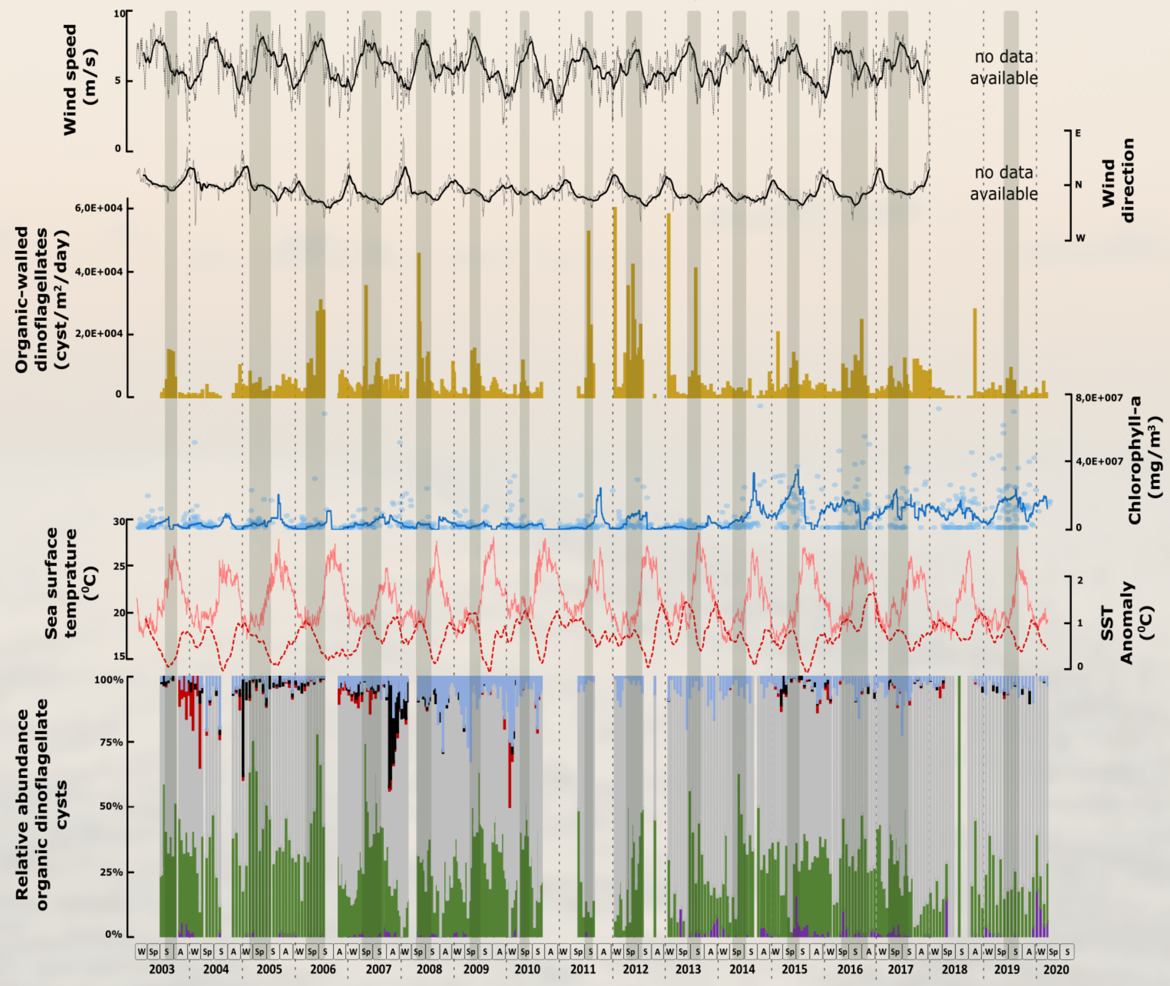
Ecology of local species



Heterotrophs: Cosmopolite; Upwelling; Pollution-related

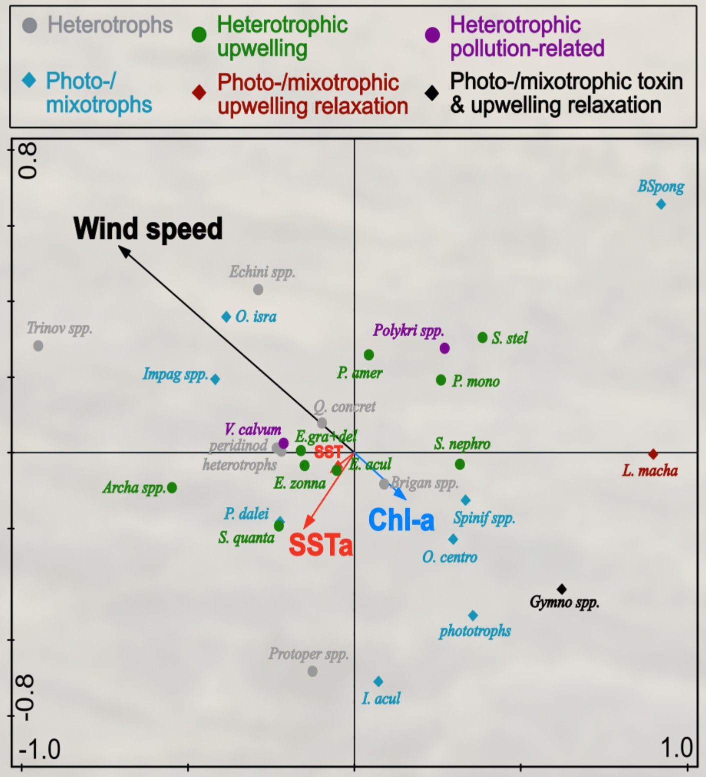
Photo-/mixo trophs: Cosmopolite; Oligotrophic; Upwelling relaxation; Potential toxic & u. relaxation

Result and Discussion



A major change in species association is observed to occur in 2009 and 2010. Prior to those years, the species association is highly dynamic whereas after 2008 species from a genus (*Echinidinium*) dominates the upwelling group. This turn-over is also hinted by changes in some environmental parameters during those two years.

In the year of 2011 but more prominent after 2014, Chlorophyll-a concentration increases simultaneously correspond to the increas in the relative abundance of anthropogenic pollution species. This finding indicates enhanced eutrophication in the system.



Maximum annual production occurred at time of maximal upwelling recorded mainly in spring - summer.

Equatorward wind trade is the prominent driving-factor influencing the upwelling intensity reflected by the SSTa; the SST difference between the trap site and a location at the same latitude 200 km offshore. Canonical Correspondence Analysis (CCA) reveals wind system to be strongly related to the variability in cyst association.

Short time irregular pulses of species association changes are observed in the dataset. For instance, potential toxic species have short increases in relative abundance in 2004 and 2007. This indicates the ecosystem is highly variable and implies that longer time series have to be studied to distinguish between ecosystem perturbations and ecosystem change.

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