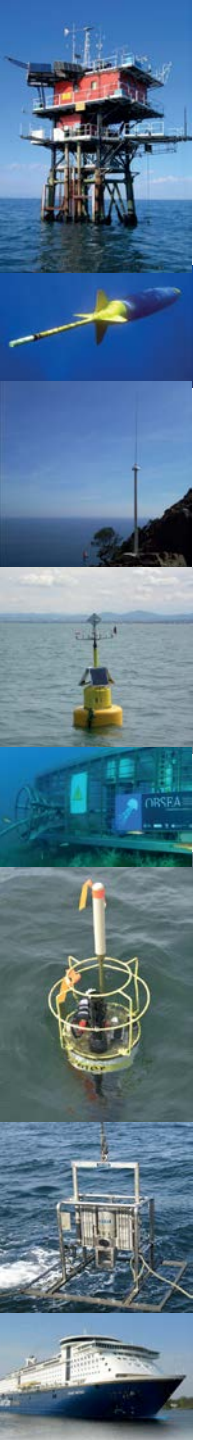
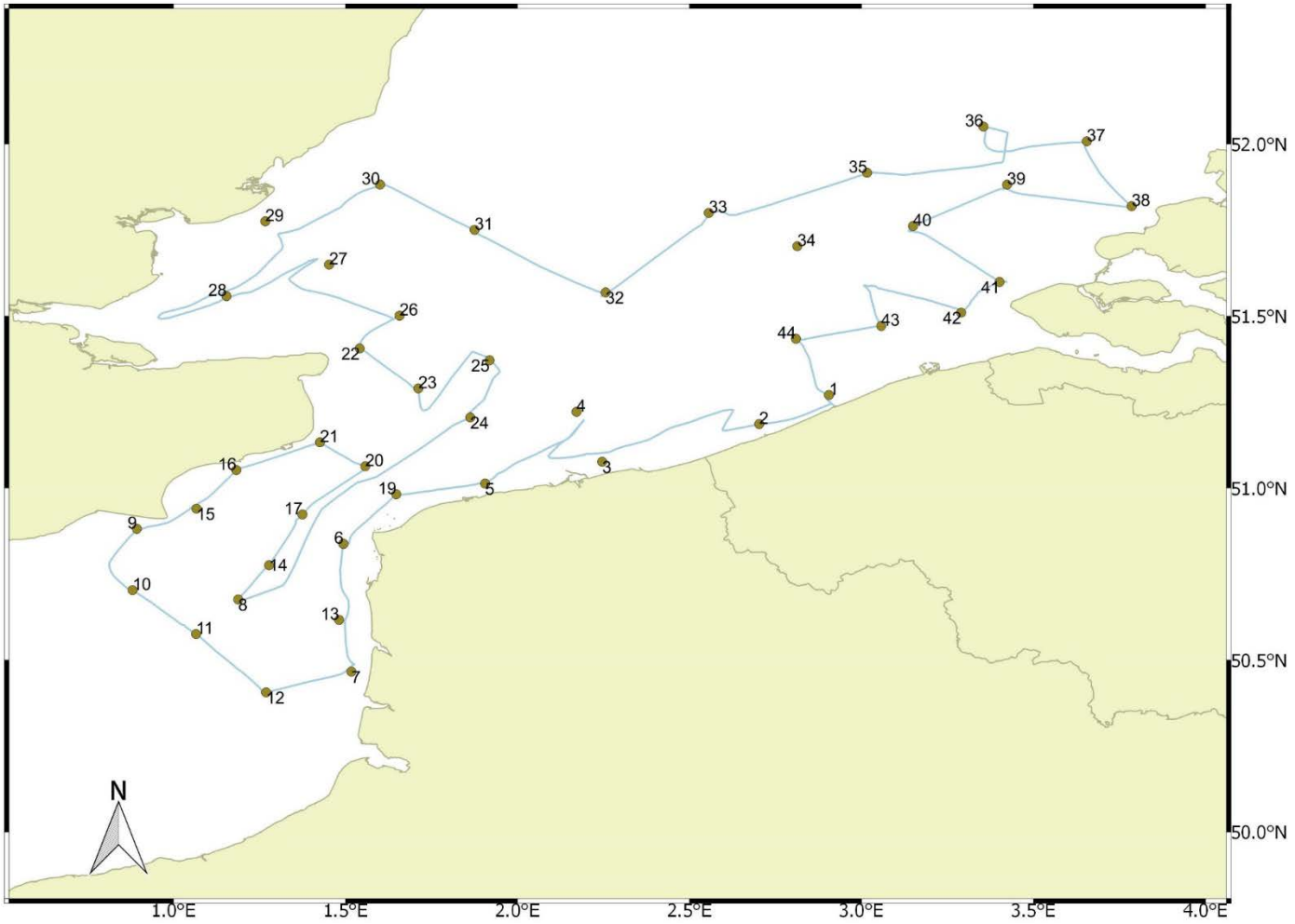


Results from campaign in the Channel-North Sea and Belgian Coastal Zone – RV Simon Stevin

Debusschere Elisabeth, Deneudt Klaas, De Blok Reinhoud, Vyverman Wim, Louchart Arnaud, Lizon Fabrice, Mortelmans Jonas, Tyberghein Lennert; Beauchard Olivier & Rijkeboer Machteld
Elisabeth.debusschere@vliz.be

Third JERICO-NEXT Workshop on Phytoplankton Automated Observation/ MIO/ Marseille/ France/ 19th to 21st March 2018

Jerico Next JRAP1: Cruise 8-12 May 2017



Map of the working area (*Eastern English Channel, Southern Bight of the North Sea, Thames estuary*) with scheduled sampling stations marked from 1 to 44.

Total trajectory: 1281 km

Area submitted to high nutrient input (coastal areas) with responses of phytoplankton specially *Phaeocystis globosa* and diatoms during spring bloom

- Primary production measures (FRRf):
  - Along the water column, at station. F. Lizon, **CNRS-LOG/UL**
  - Relationship between PP and ETR, C-fixation and phytoplankton composition. J. Kromkamp, **NIOZ**
  - PP of the area? Coupled to PSFCM? H.M. Aardema, **RWS**

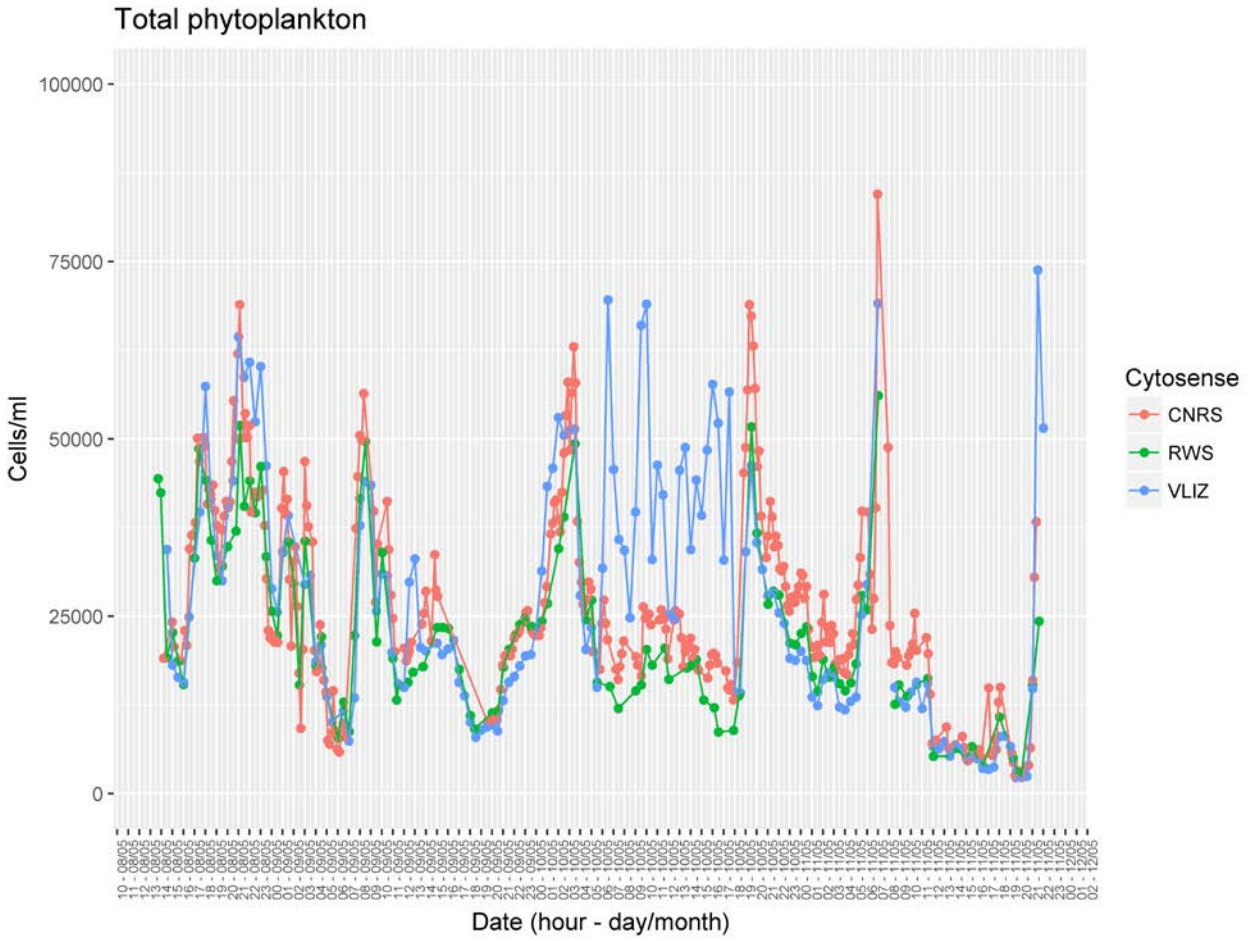
- Spatial distribution of phytoplankton functional groups (by PSFCM):
  - Towards multispectral fluorometry. A. Louchart, **CNRS-LOG/ULCO**
  - Biodiversity difference with bulk sensor. M. Rijkeboer, **RWS**
  - Specialy harmful algae. R. de Blok, **U.Gent**

- Zooplankton diversity: WP2 net + zooscan, CTD, pigment. J.Mortelmans, **VLIZ**

Comparison of the three flow cytometers, analysis done by Machteld Rijkeboers (RWS)

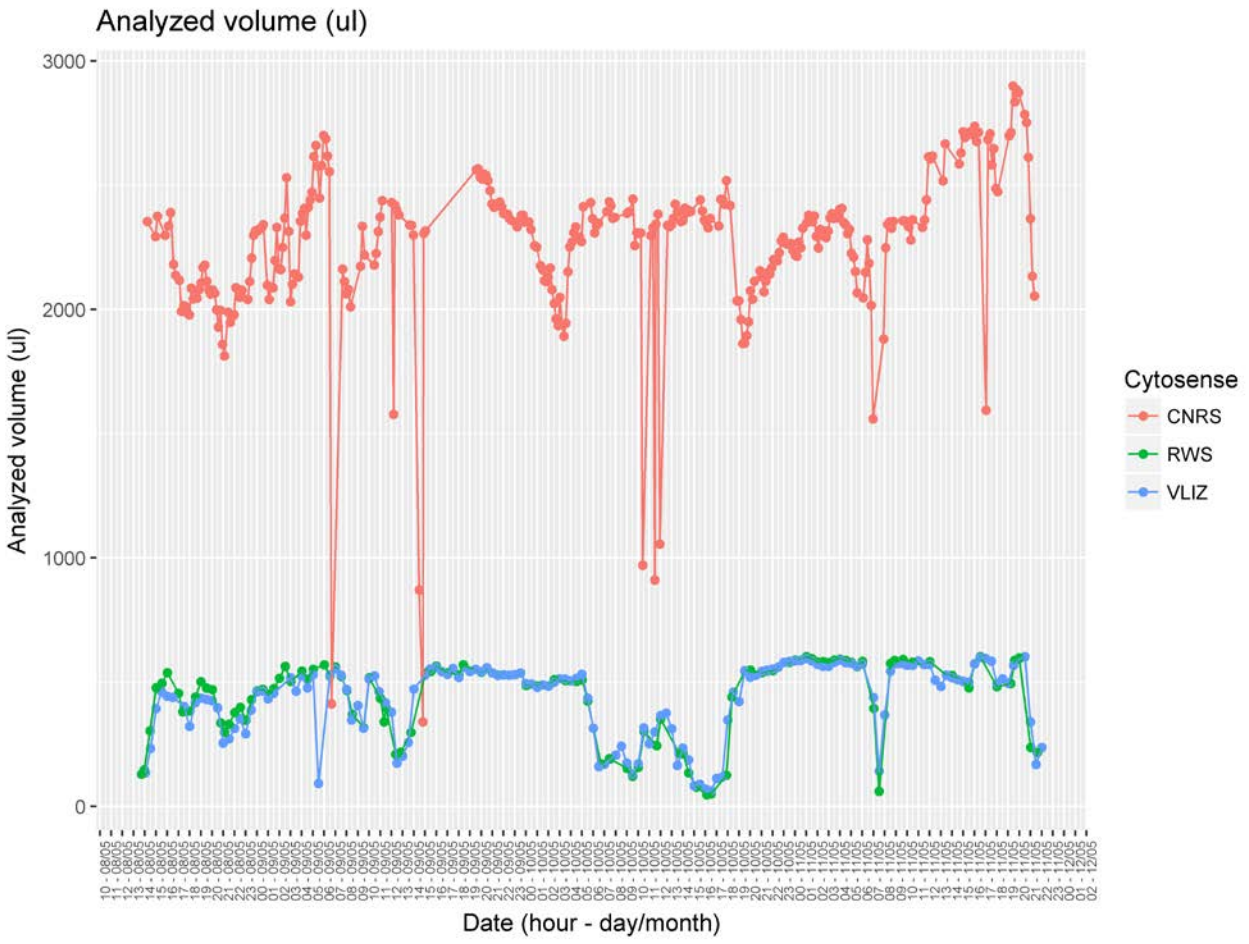
©Machteld Rijkeboer, RWS

All phytoplanton cells/ml



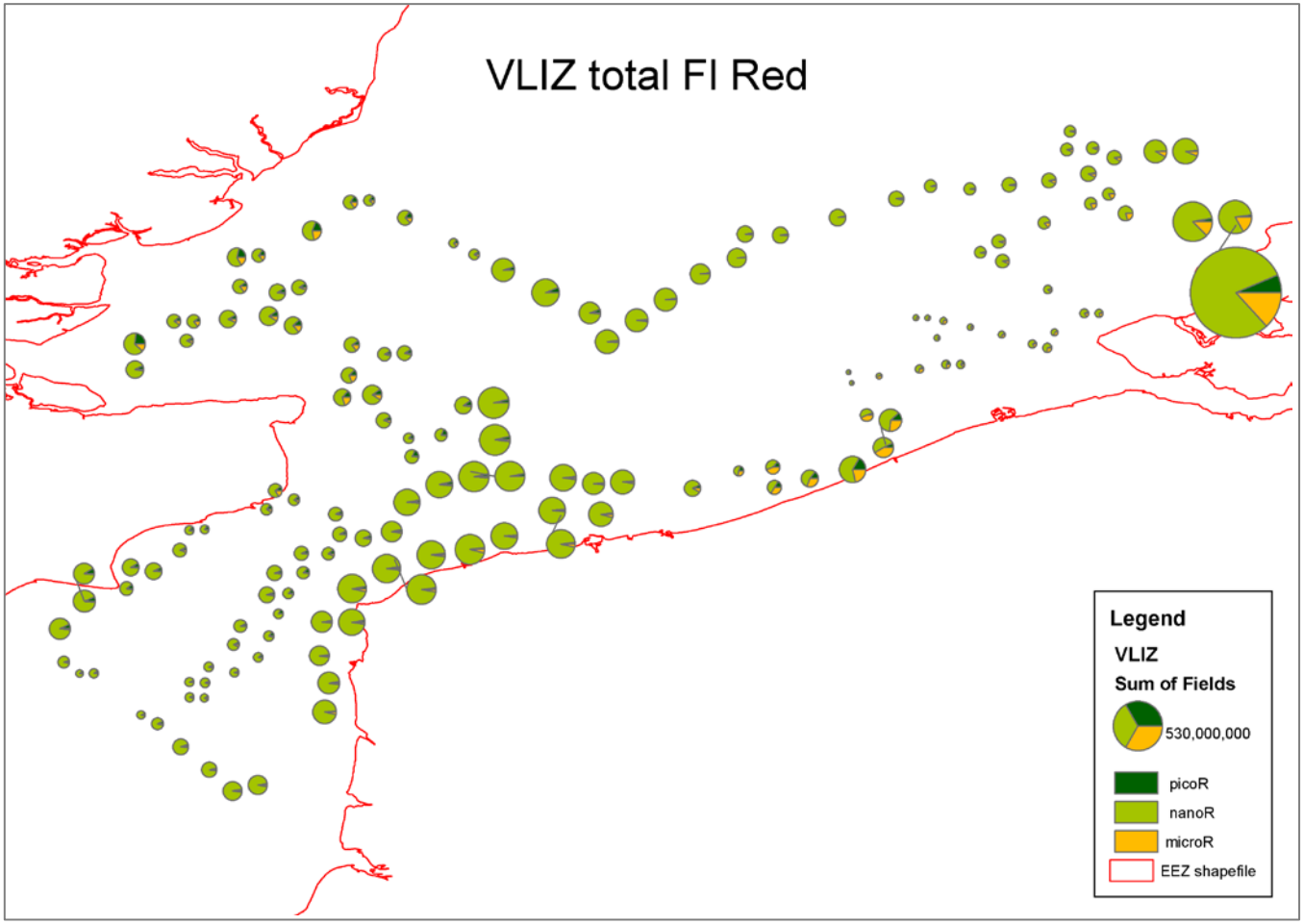
All three fcm's show us the same trend!

Analyzed volume

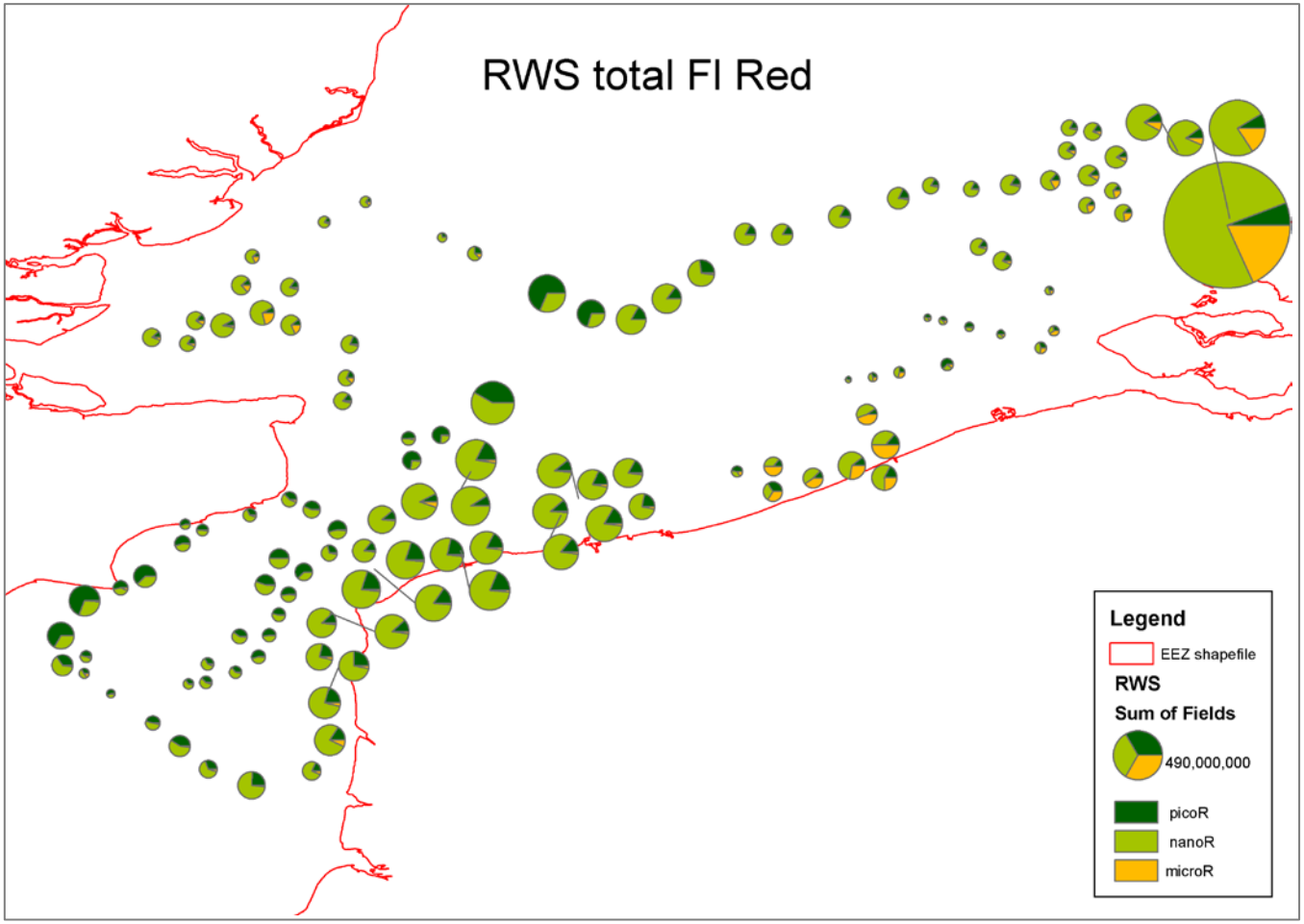


Reduction in analyzed volume due to turbidity, increases the variation in phytoplankton groups

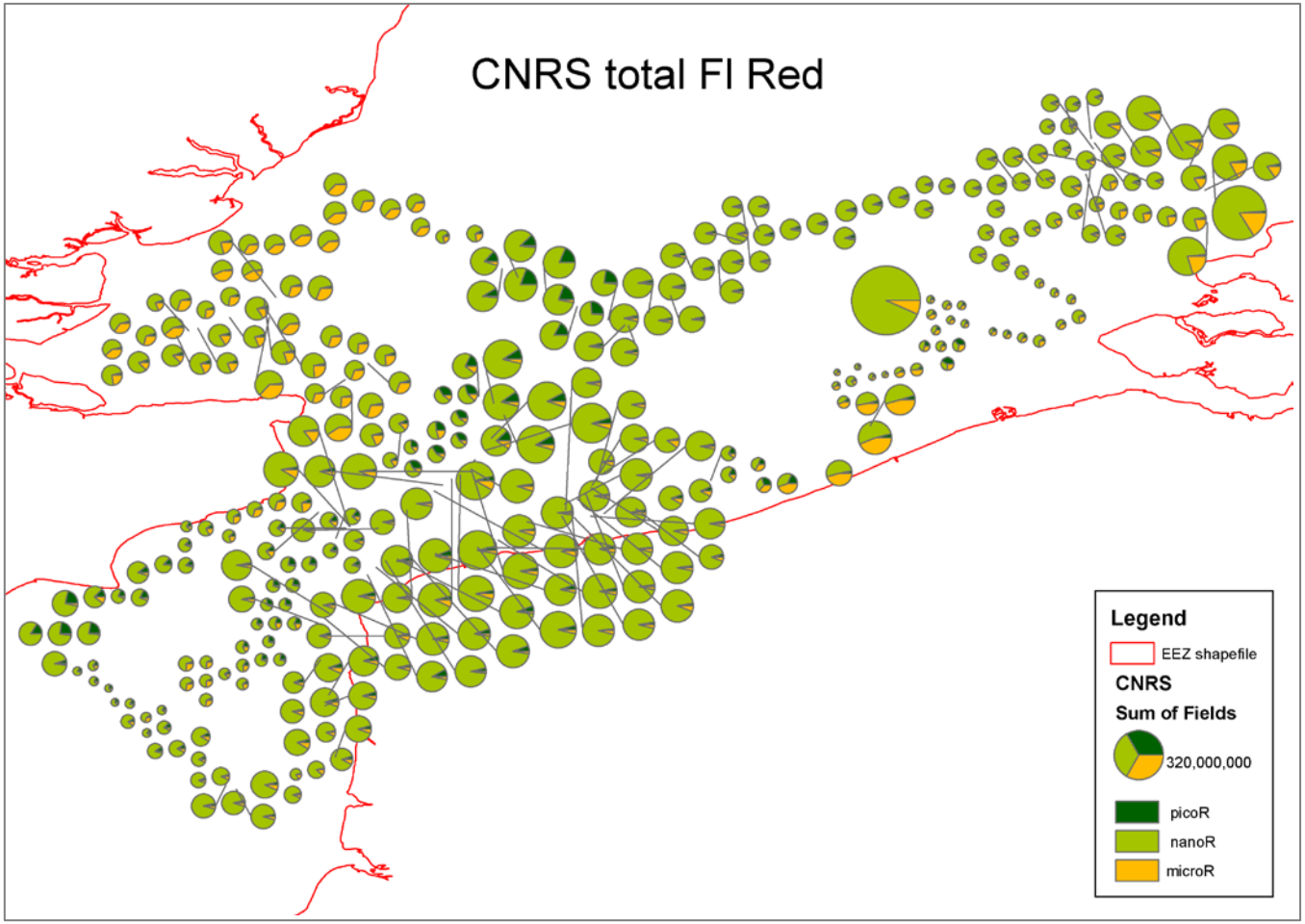
VLIZ Total Fl. red



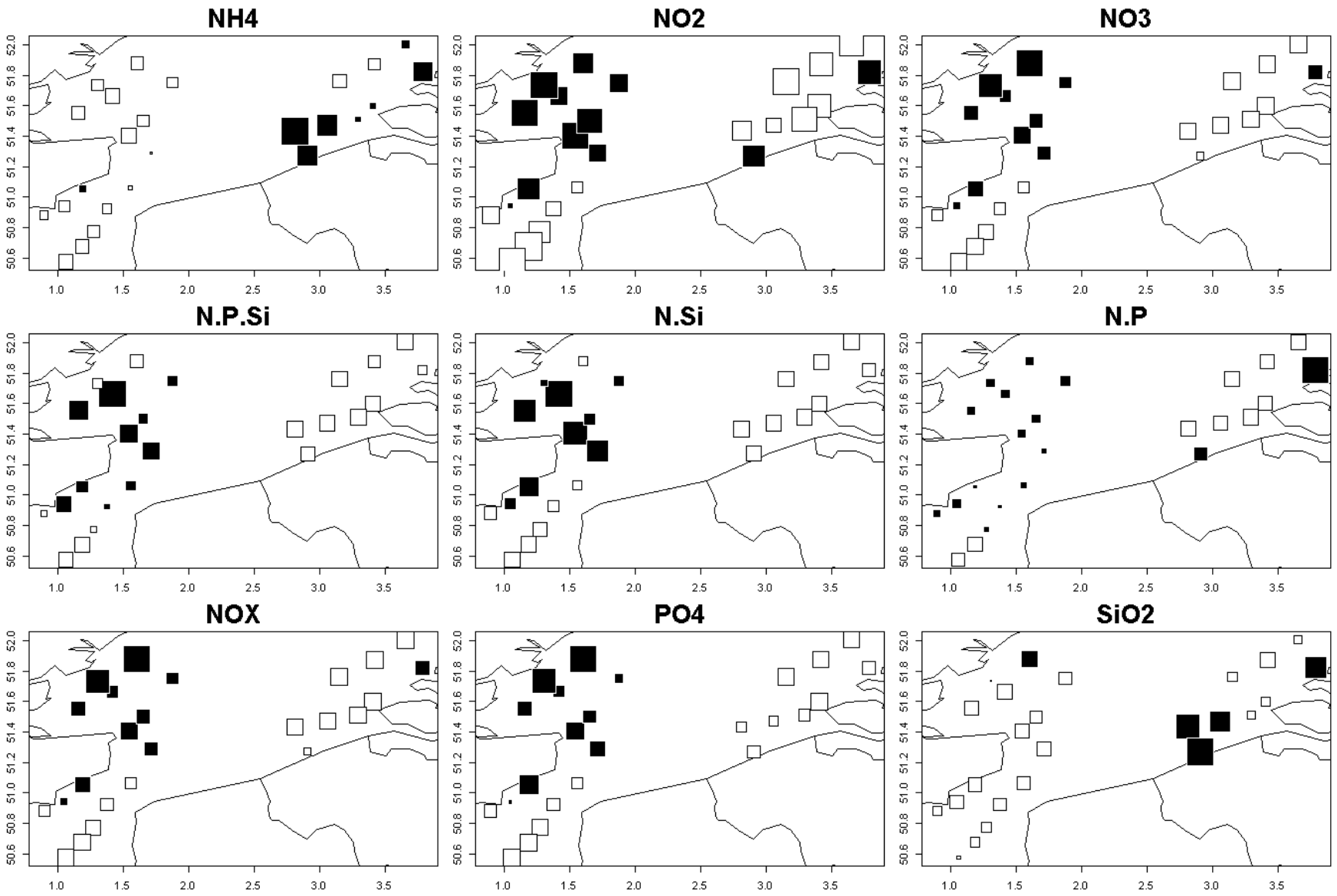
RWS Total Fl. red

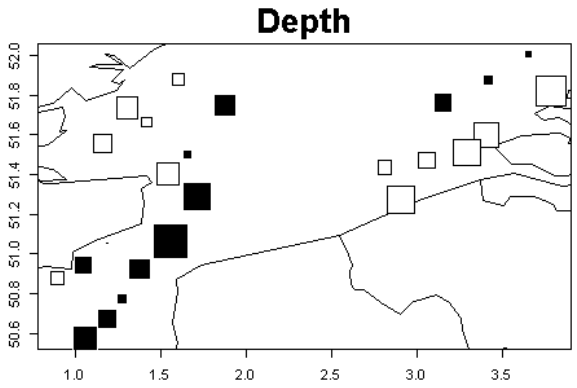


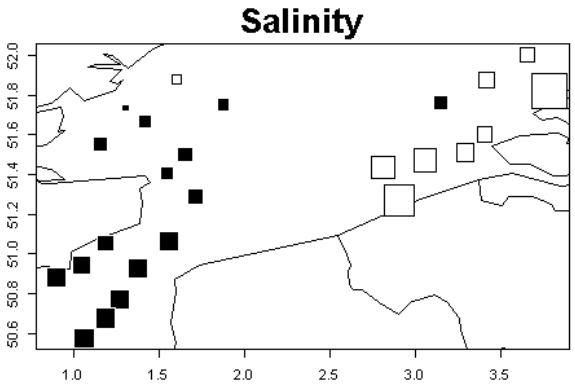
CNRS Total Fl. red

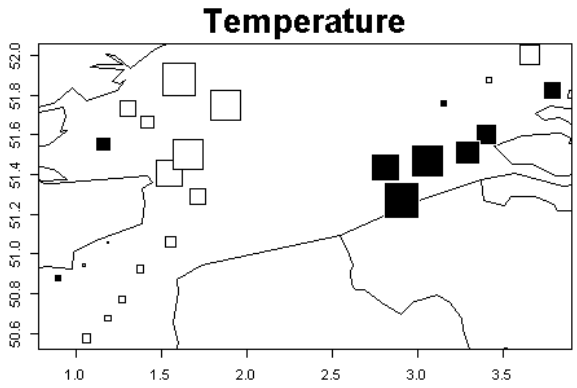


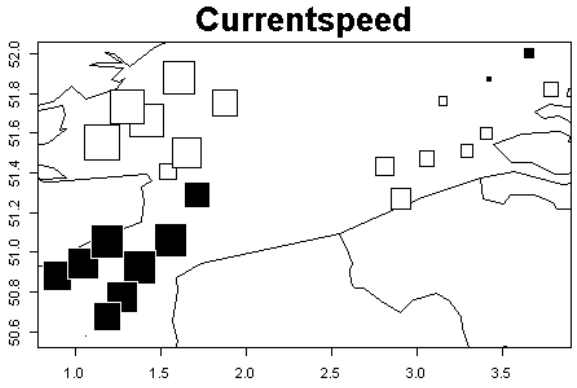
PCA on Instrumental Variables (PCAIV) on size groups of each fcm separately

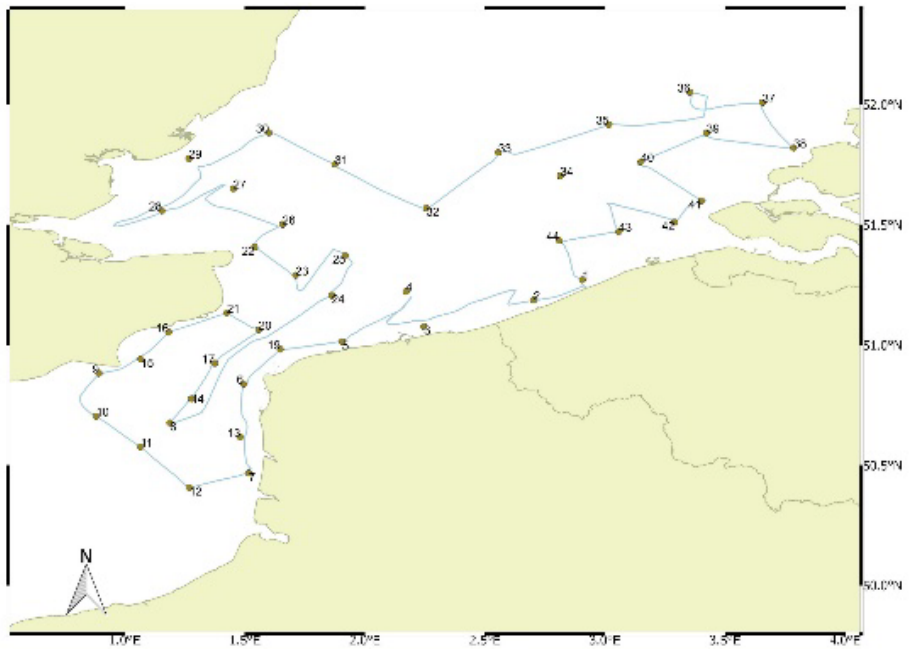

NH4
NO2
NO3
N.P.Si
N.Si
N.P
NOX
PO4
SiO2
52.0
51.8
51.6
51.4
51.2
51.0
50.8
50.6
1.0
1.5
2.0
2.5
3.0
3.5


Depth
52.0
51.8
51.6
51.4
51.2
51.0
50.8
50.6
1.0
1.5
2.0
2.5
3.0
3.5

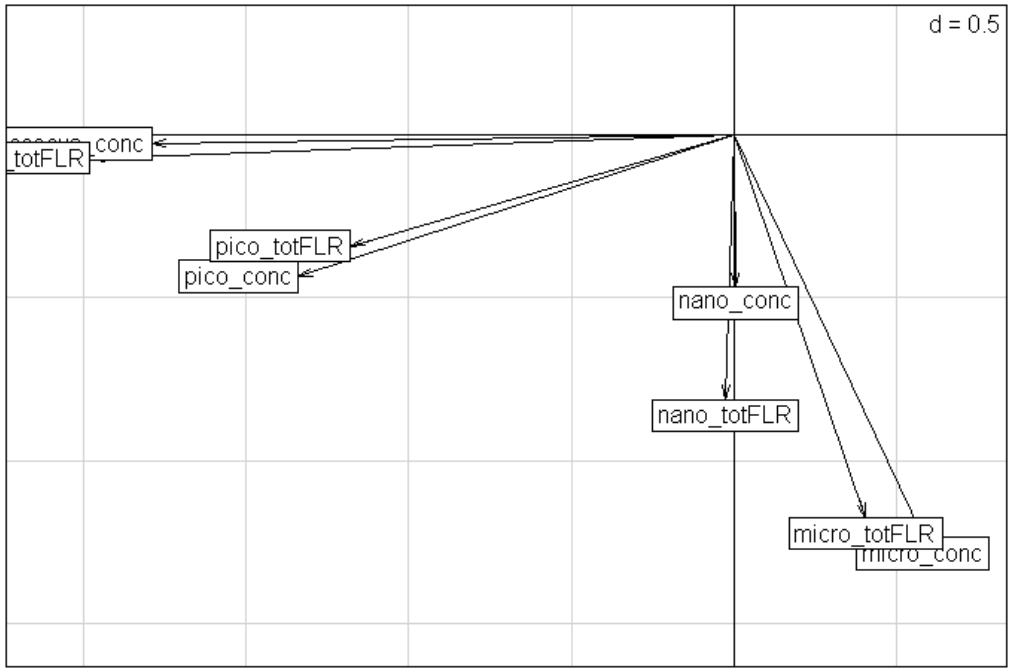

Salinity
52.0
51.8
51.6
51.4
51.2
51.0
50.8
50.6
1.0
1.5
2.0
2.5
3.0
3.5

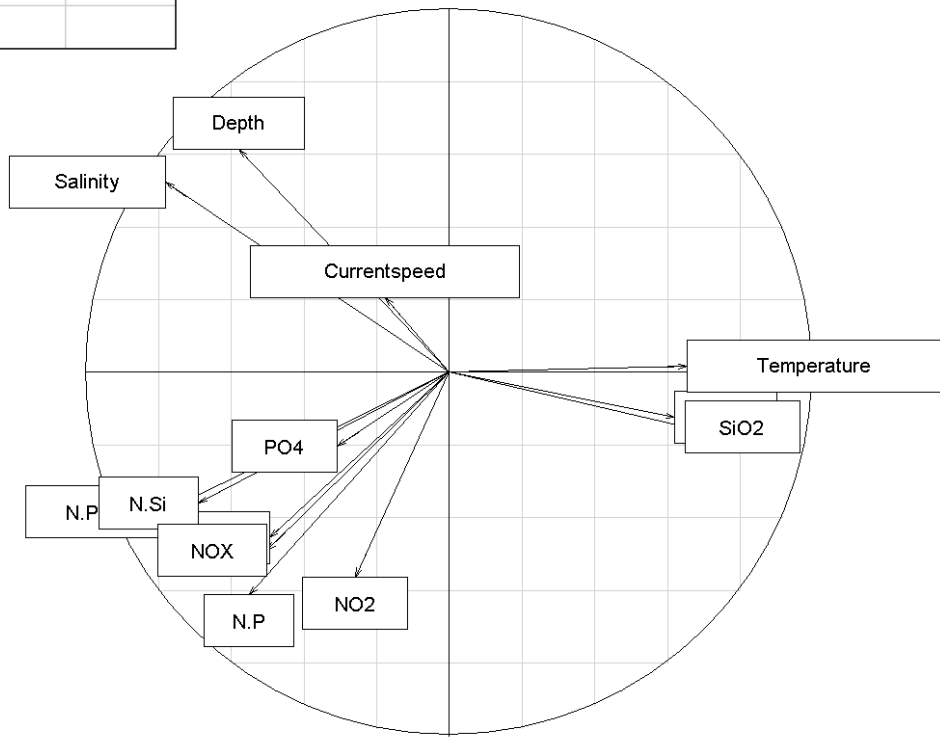

Temperature
52.0
51.8
51.6
51.4
51.2
51.0
50.8
50.6
1.0
1.5
2.0
2.5
3.0
3.5


Currentspeed
52.0
51.8
51.6
51.4
51.2
51.0
50.8
50.6
1.0
1.5
2.0
2.5
3.0
3.5


N
52.0°N
51.5°N
51.0°N
50.5°N
50.0°N
1.0°E
1.5°E
2.0°E
2.5°E
3.0°E
3.5°E
4.0°E

CNRS-LOG

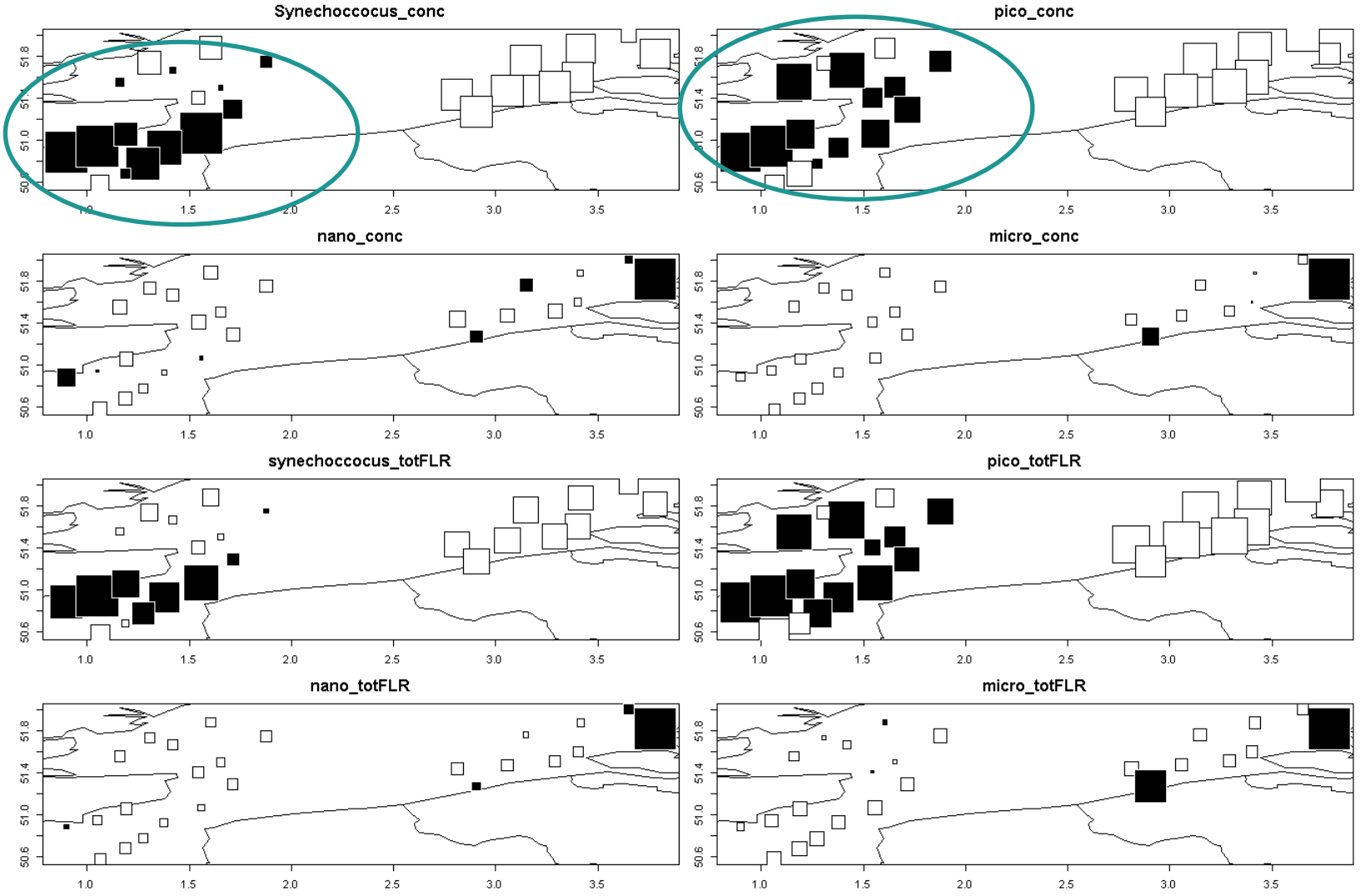




Axis 1: Salinity , T, NH4, SiO2

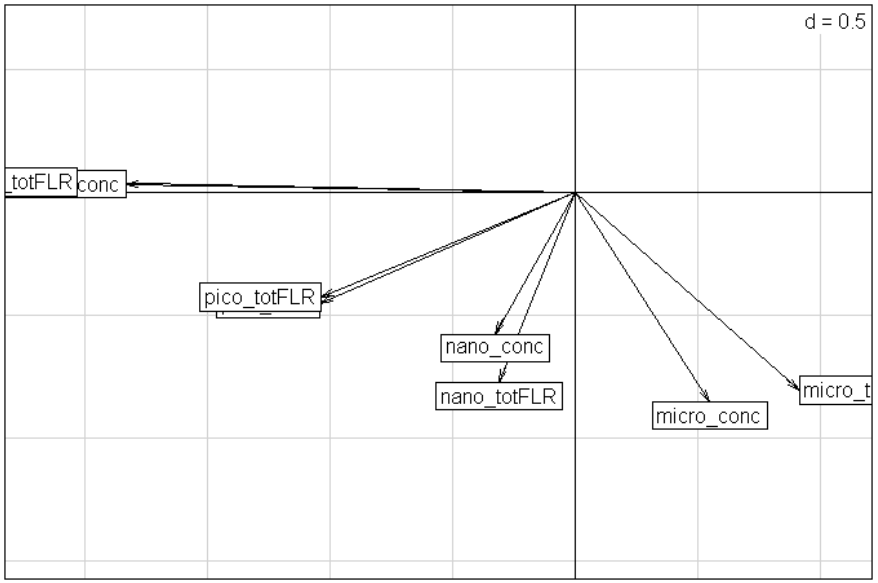
Axis 2: N:P ratio, NO2

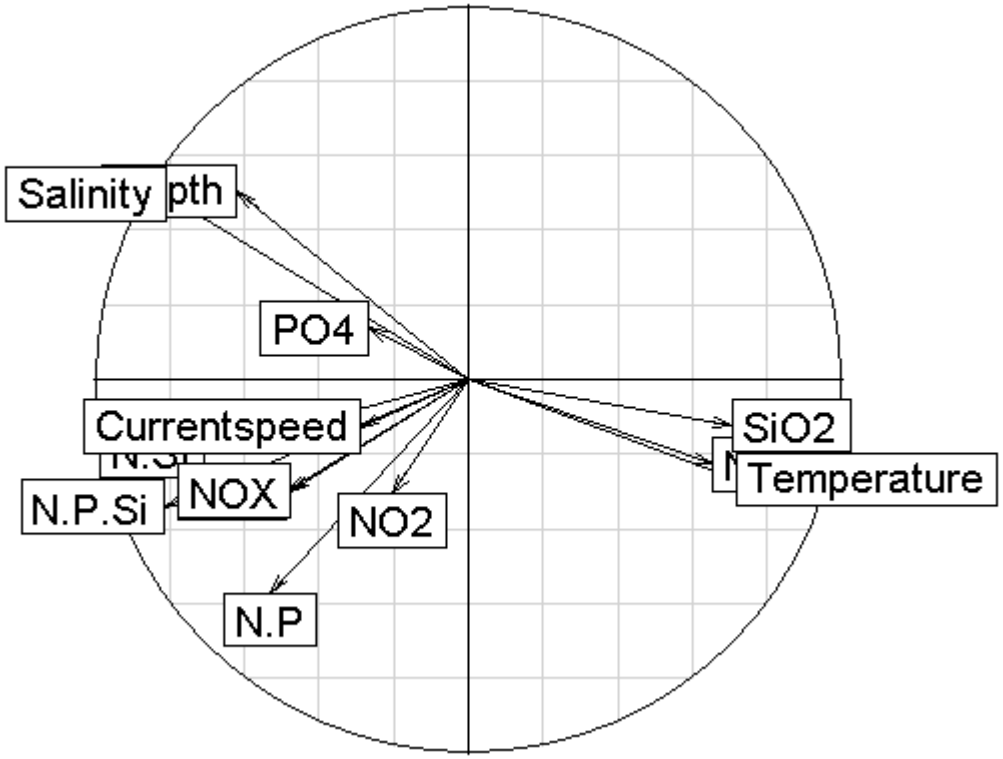
High salinity, depth, high nutrient conc



High N:P ratio

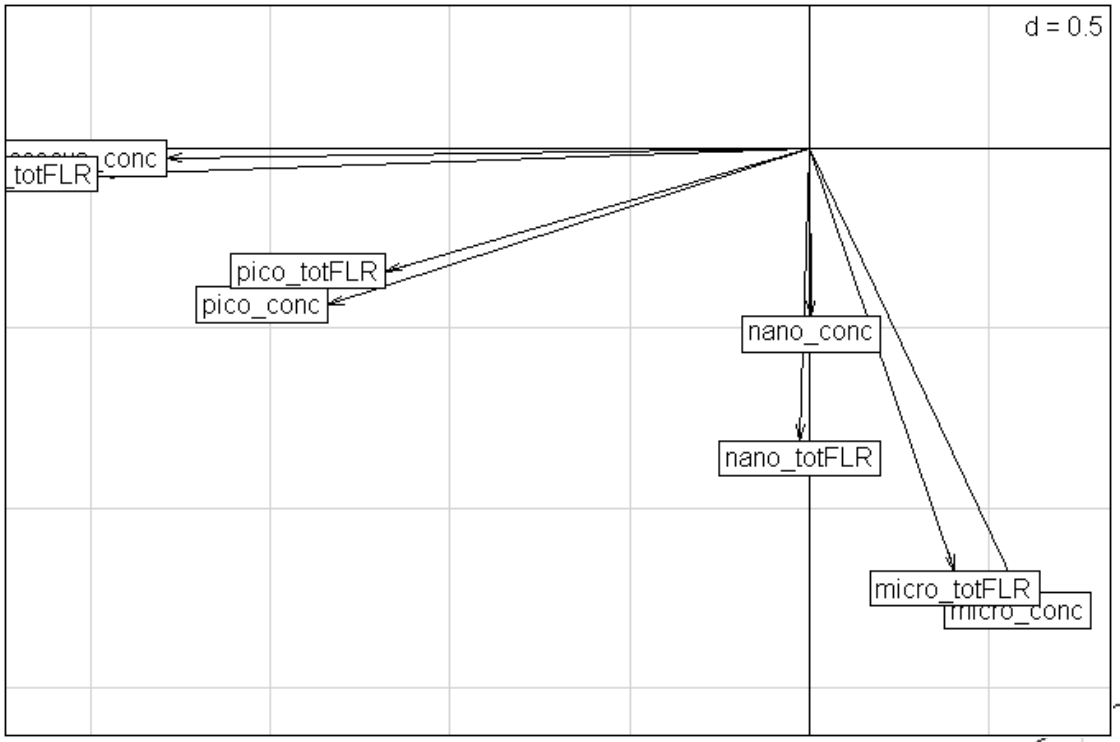
RWS



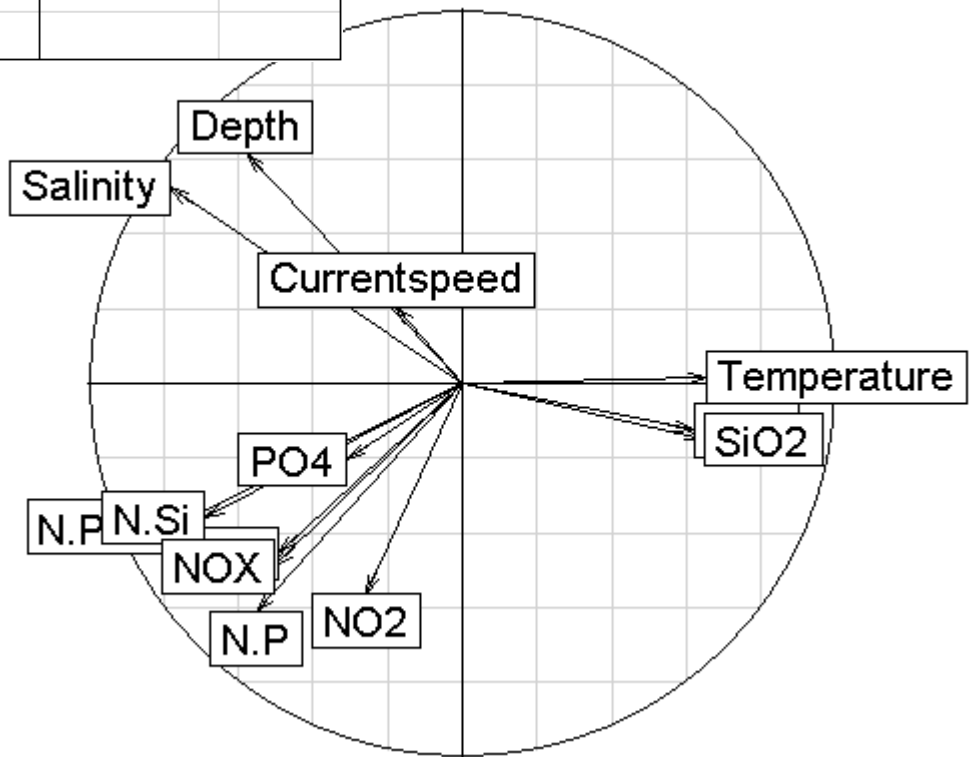


Axis 1: Salinity , T, NH4, N:P:Si, SiO2
Axis 2: N:P ratio

Not significant! Explained variance cannot be ascribed to environmental parameters



VLIZ



Axis 1: Salinity , T, SiO2, nutrients

Axis 2: N:P ratio, NO2

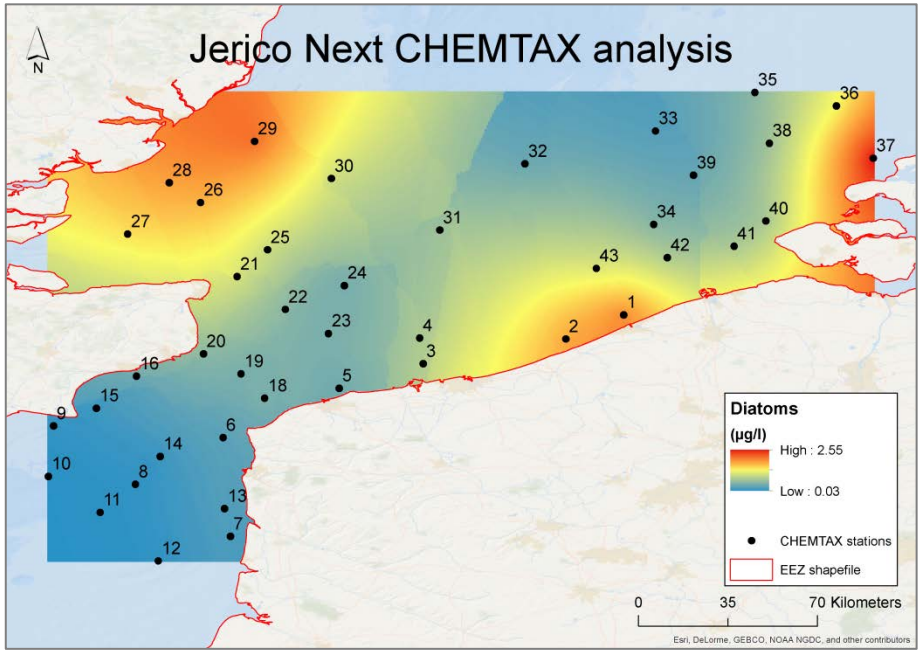
HPLC CHEMTAX pigment fingerprinting

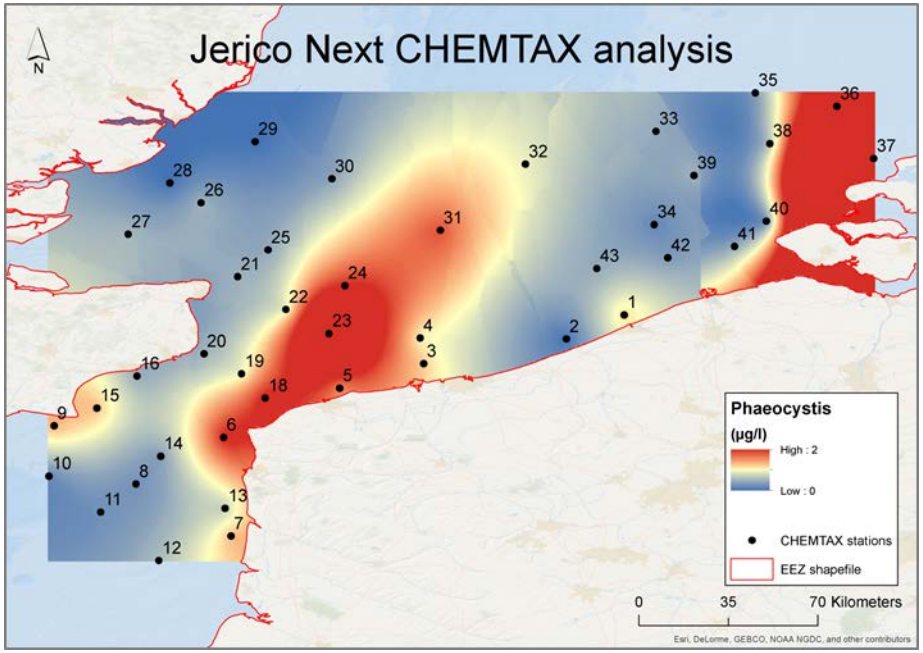
Pigments - HPLC CHEMTAX fingerprinting

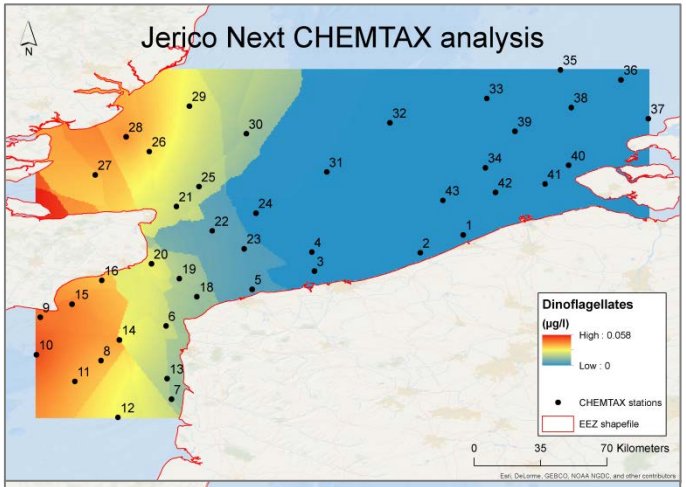
North Sea matrix (Muylaert et al. (2006)):

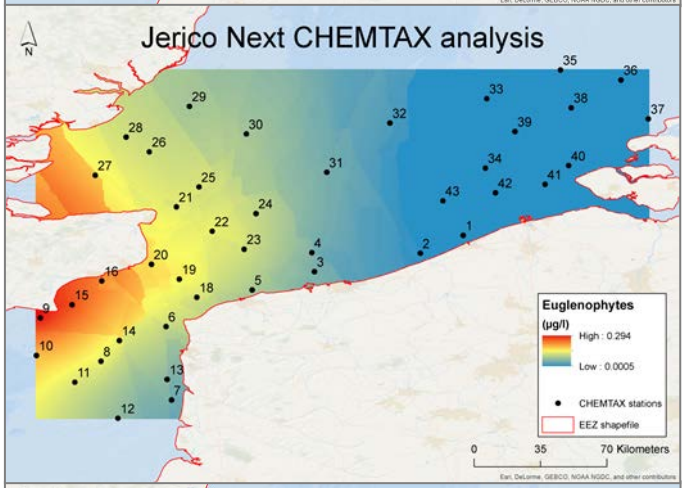
Class / Pigment	perid	fuco	chlc3	diadino+diato	lut	zea	chl_b	chl_a
Chlorophytes	0.00	0.00	0.00	0.00	0.06	0.03	0.24	1.00
Cyanobacteria	0.00	0.00	0.00	0.00	0.00	0.23	0.00	1.00
Diatoms	0.00	0.38	0.00	0.04	0.00	0.00	0.00	1.00
Dinoflagellates	0.37	0.00	0.00	0.15	0.00	0.00	0.00	1.00
Euglenophytes	0.00	0.00	0.00	0.14	0.00	0.00	0.28	1.00
Phaeocystis	0.00	0.39	0.08	0.01	0.00	0.00	0.00	1.00

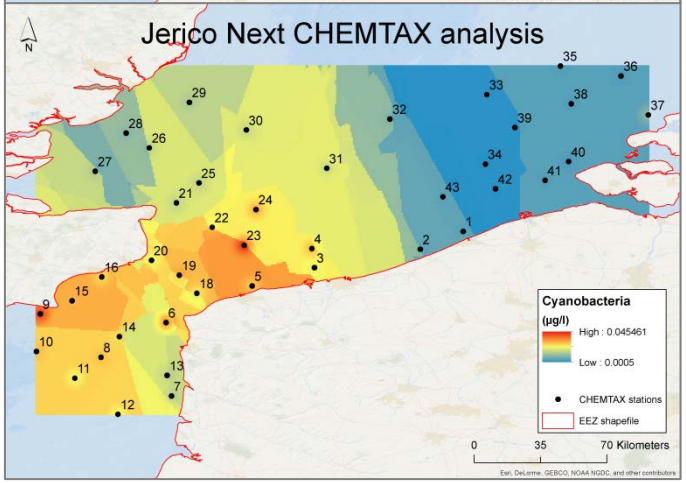
Pigments - North Sea matrix

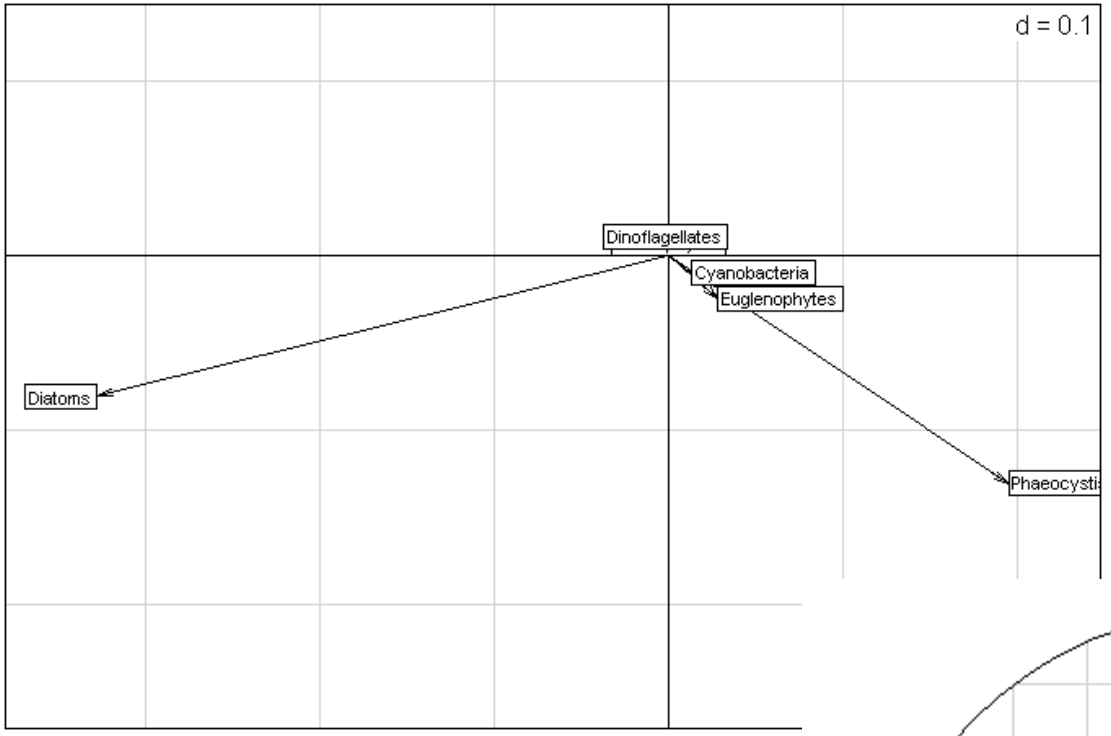


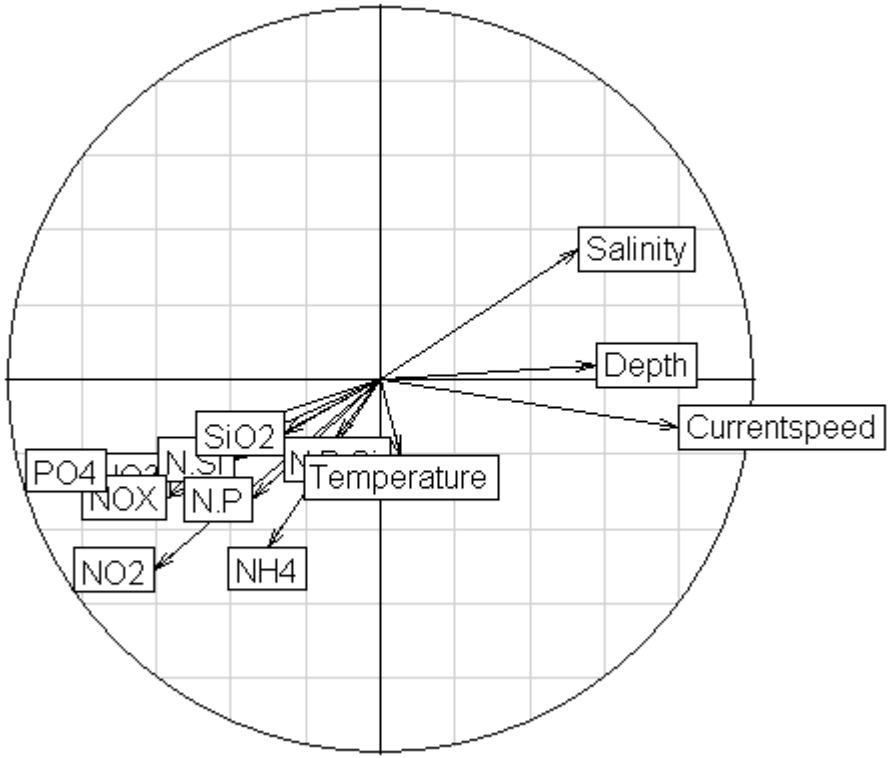








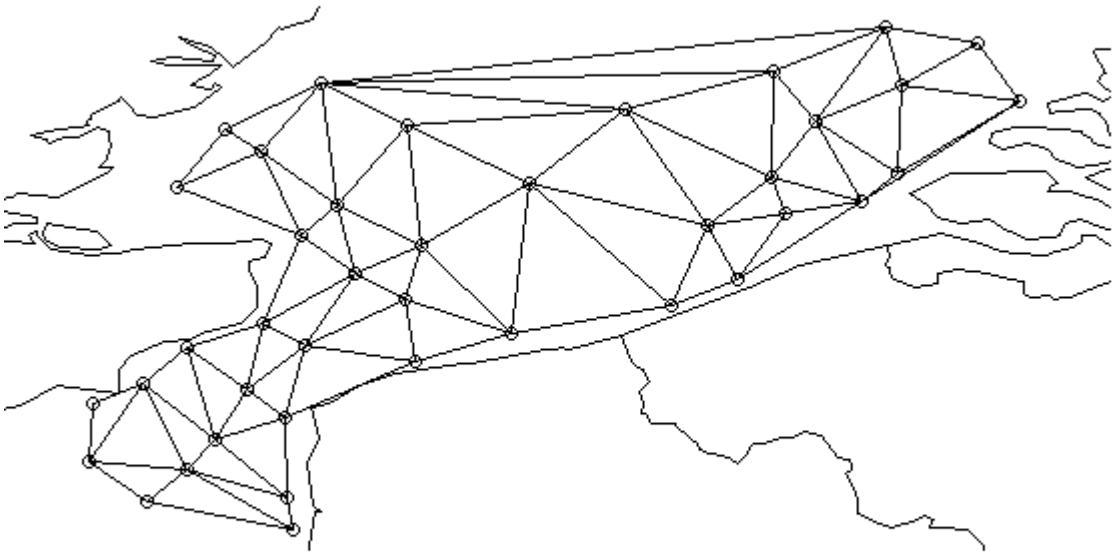




Axis 1: Current velocity, NO2, NO3

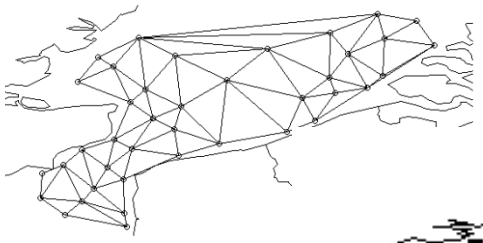
Spatial analysis of zooplankton

Spatial correlation: pcaiv with latitude and longitude

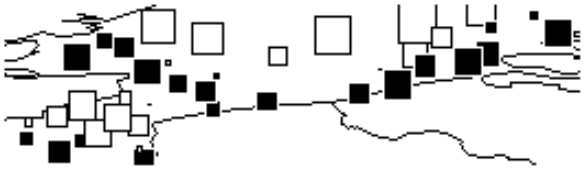


Zooplankton and environmental parameters strongly correlated to Latitude and longitude → data detrending necessary through Orthogonal PCAIV

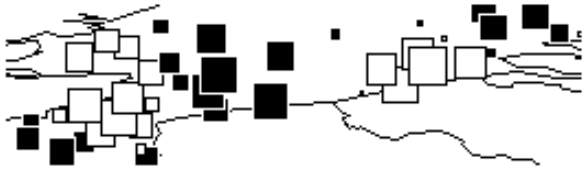
Moran's Eigenvector Maps



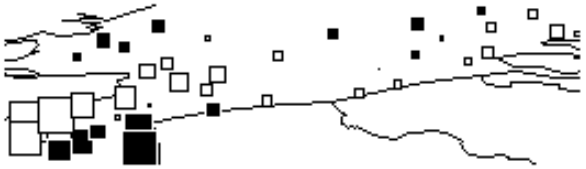
MEM7



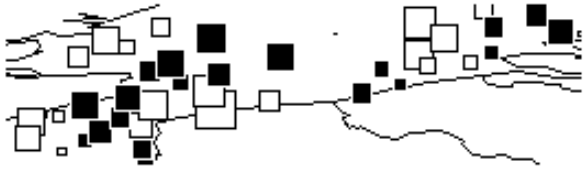
MEM5



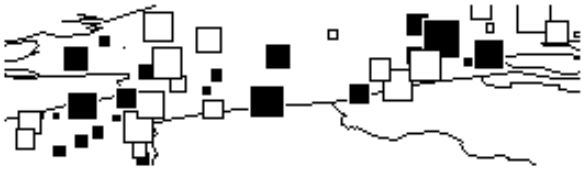
MEM6



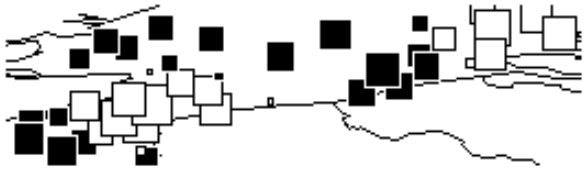
MEM9



MEM11

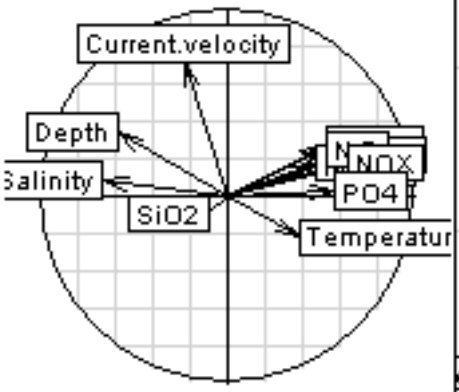


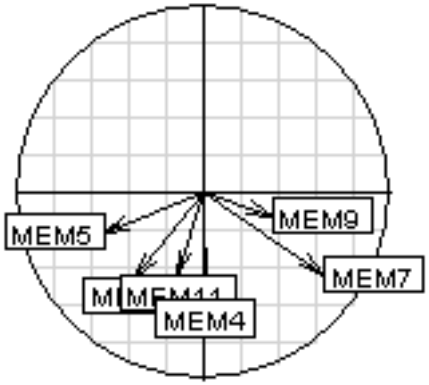
MEM4

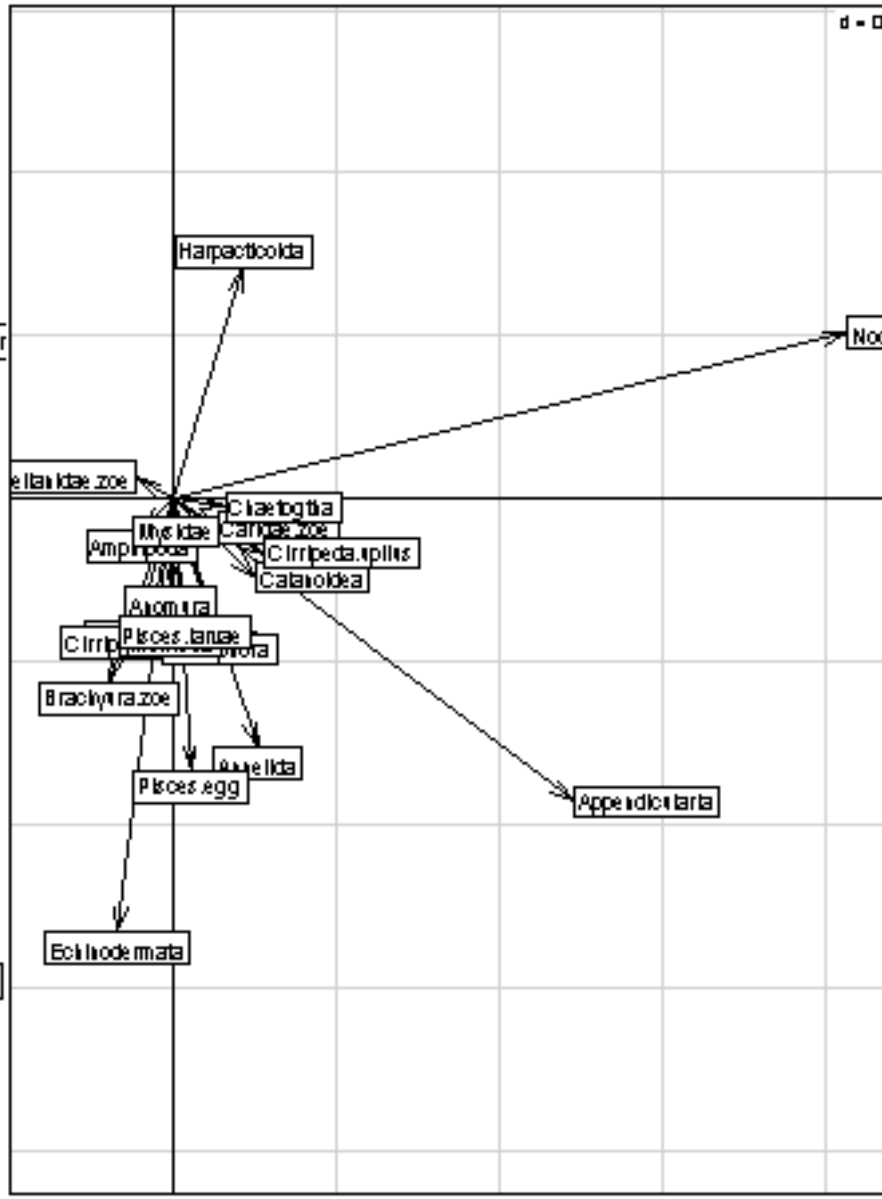


Six significant spatial trends, explaining together 47% of variance

PCAIV on MEMs (under spatial constraint)







Conclusion

Some parameters could not be used as they were only measured during day time
→ Next cruise: samples will only be taken during daytime

The combination of nutrient ratios and concentrations, salinity, depth, temperature and current velocity are important for phytoplankton and zooplankton groups

Suggestions to incorporate extra environmental parameters?

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.