



HAL
open science

Linking water quality to lake size: a database analysis

V. Roubaix, J. Prats, P.A. Danis

► **To cite this version:**

V. Roubaix, J. Prats, P.A. Danis. Linking water quality to lake size: a database analysis. 5th European Large Lakes Symposium, Sep 2018, Évian, France. pp.1, 2018. hal-02607895

HAL Id: hal-02607895

<https://hal.inrae.fr/hal-02607895>

Submitted on 16 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

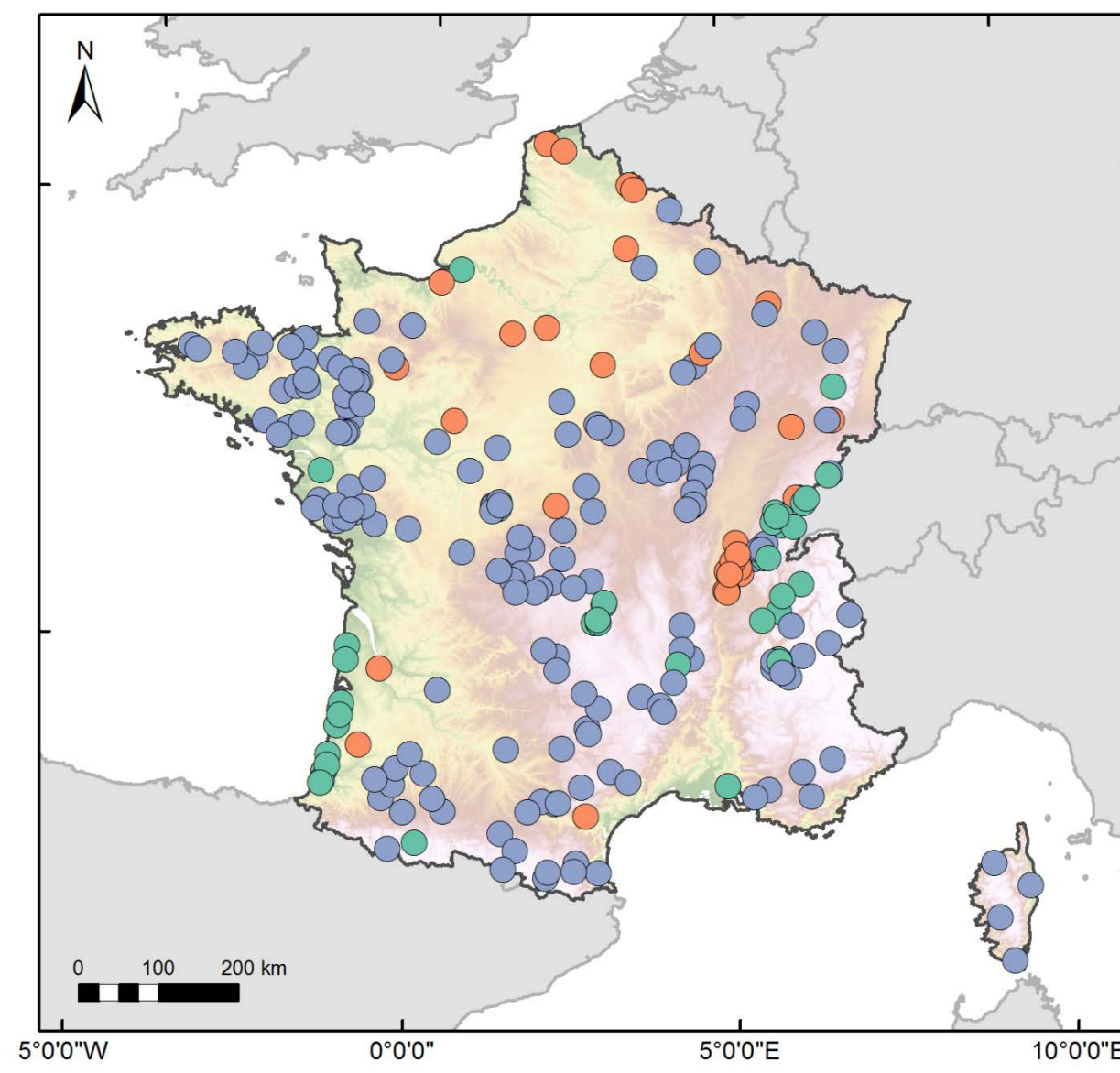
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

LINKING WATER QUALITY TO LAKE SIZE: A DATABASE ANALYSIS

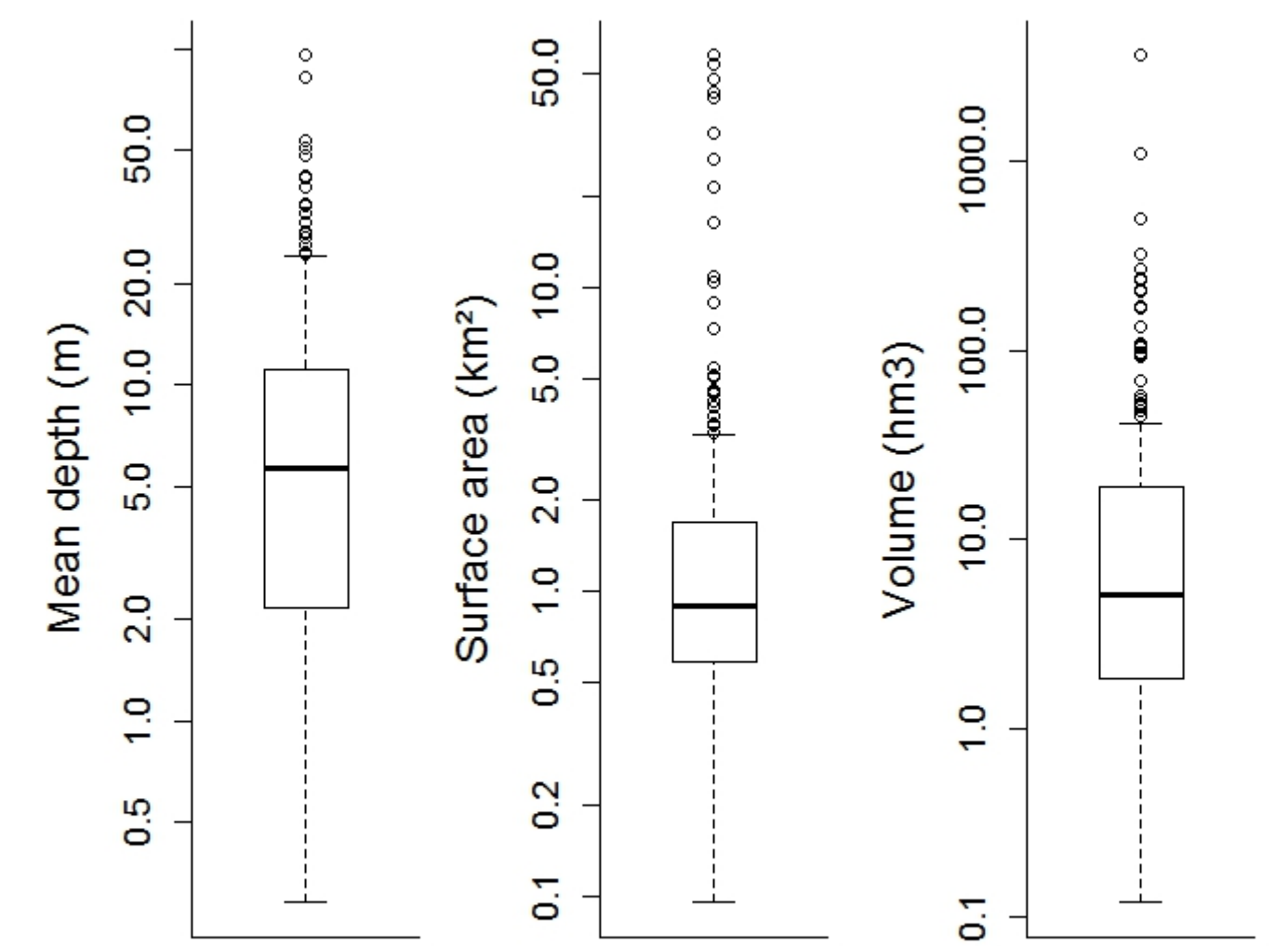
Vincent Roubeix, Jordi Prats and Pierre-Alain Danis
Pôle R&DAFB-Irstea Hydroécologie des Plans d'eau, Irstea Aix en Provence

Lake database

- 244 lakes in France, of various types (>0.1 km²)
- 4 water samples/year, in the euphotic zone, at one point (of maximal depth)
- 38 water physico-chemical variables
- biovolumes of 275 phytoplankton taxa in 8 phyla



Map of the lakes considered (● natural lakes, ● reservoirs, ● artificial lakes)

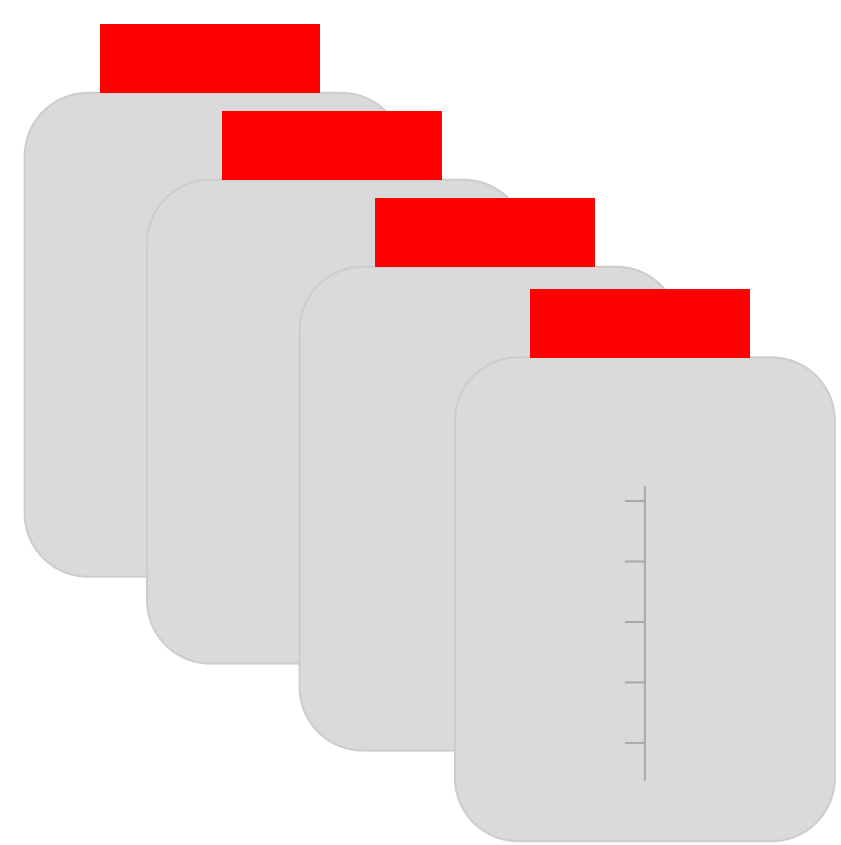


Distribution of lake dimensions in the database

Objective

Water quality

Lake size



?

Predictability

using random forest

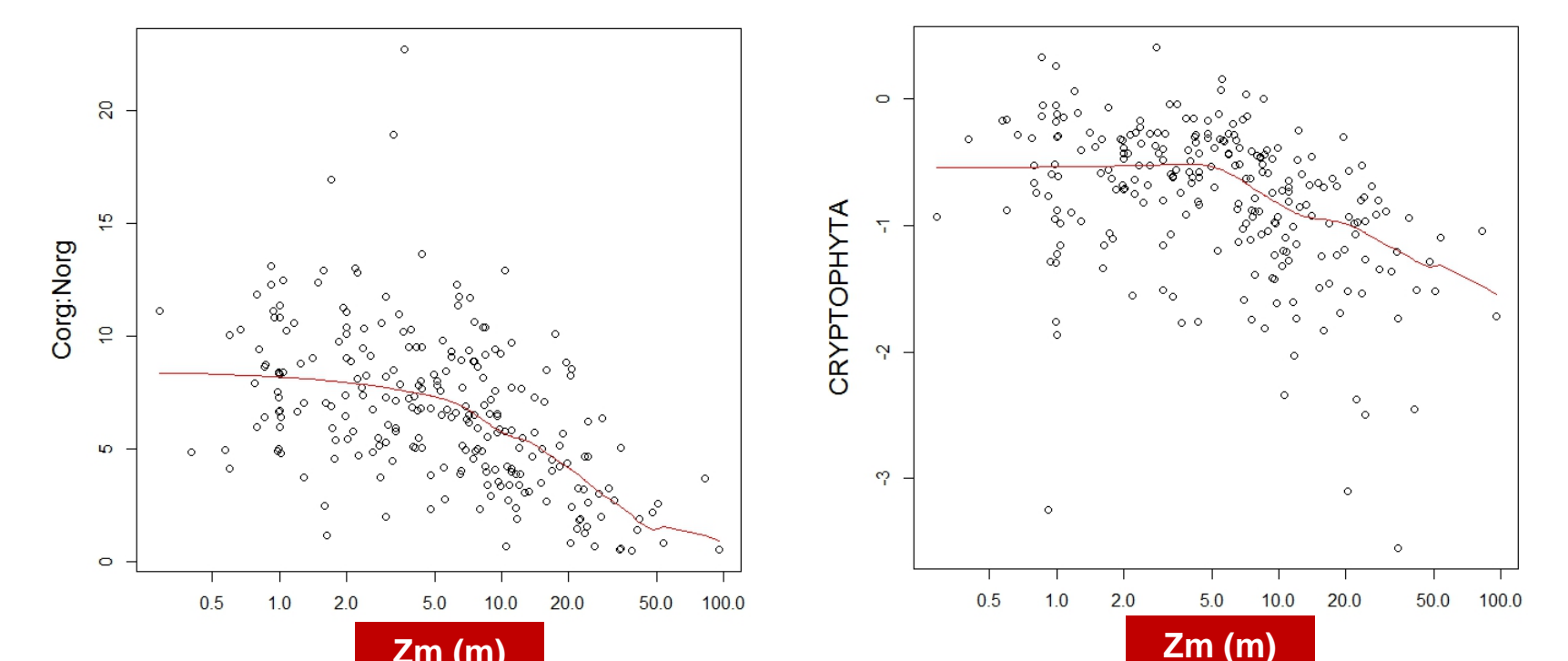
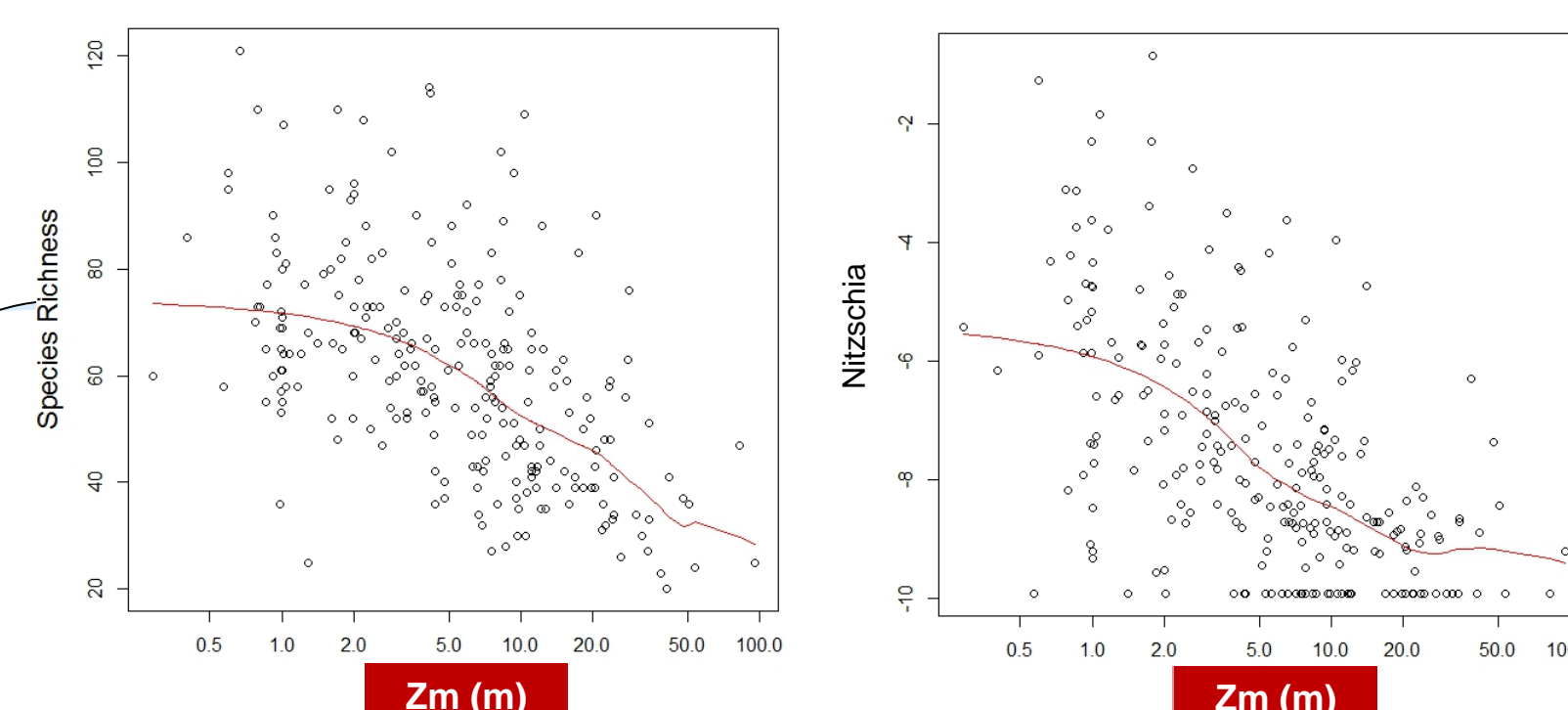
models ?

Lake dimensions

Surface area (Area)

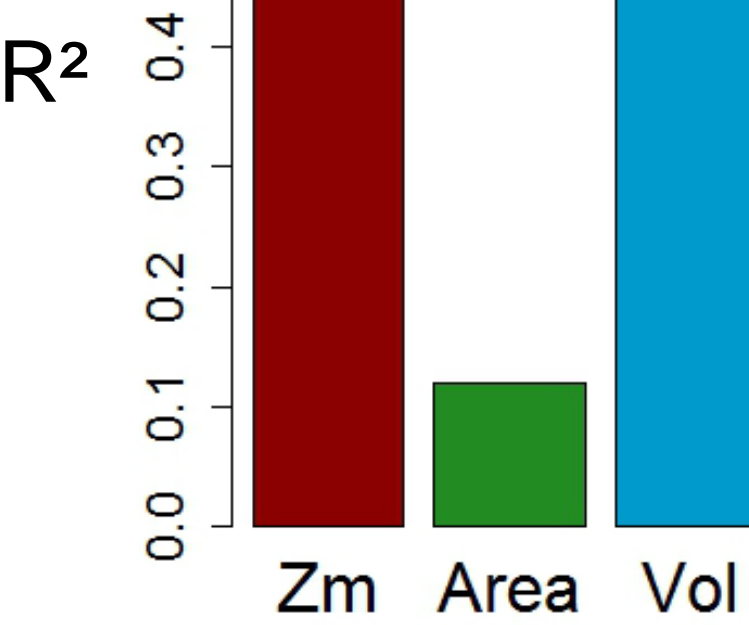
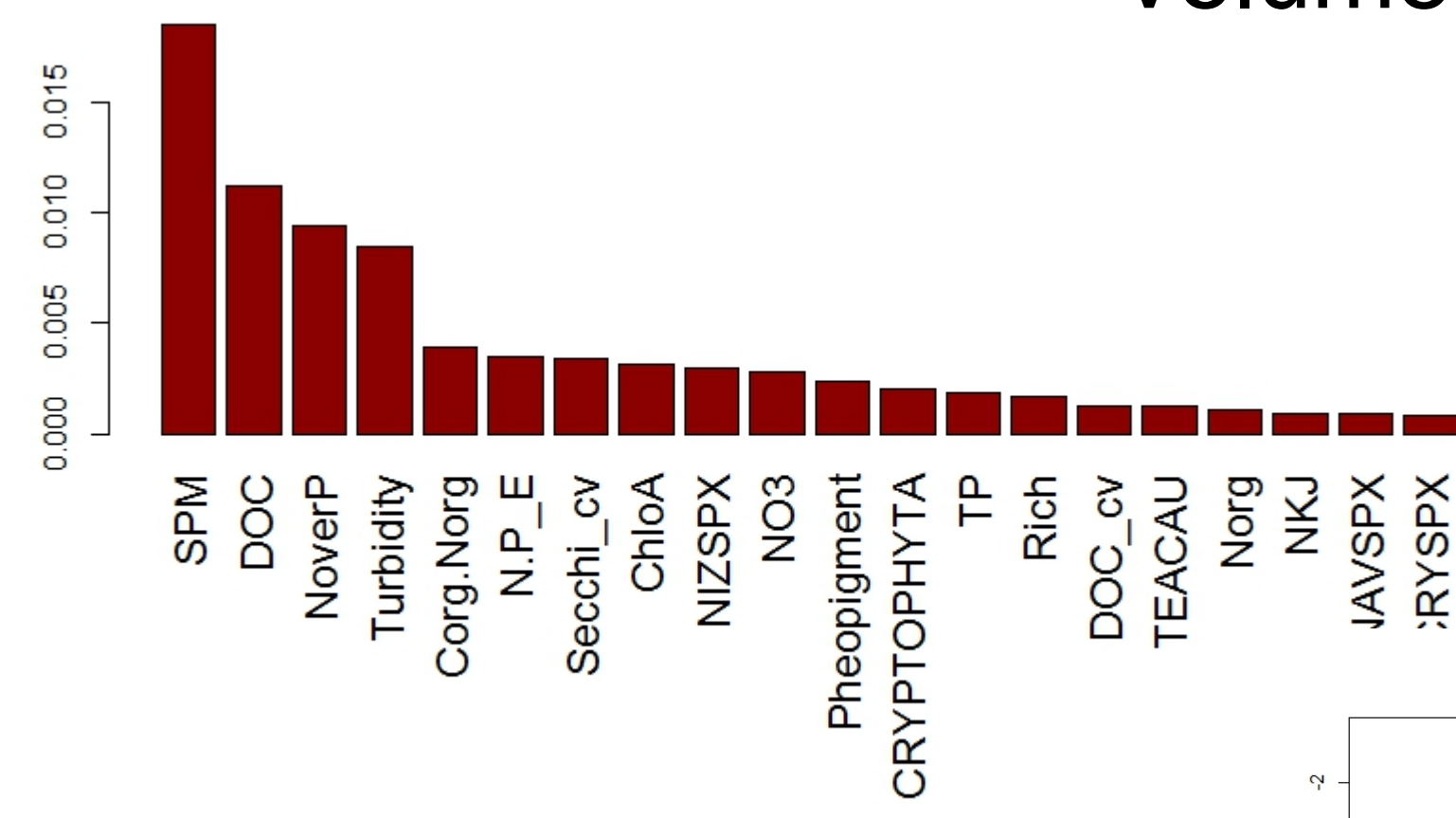
Mean depth (Zm)

Volume (Vol)

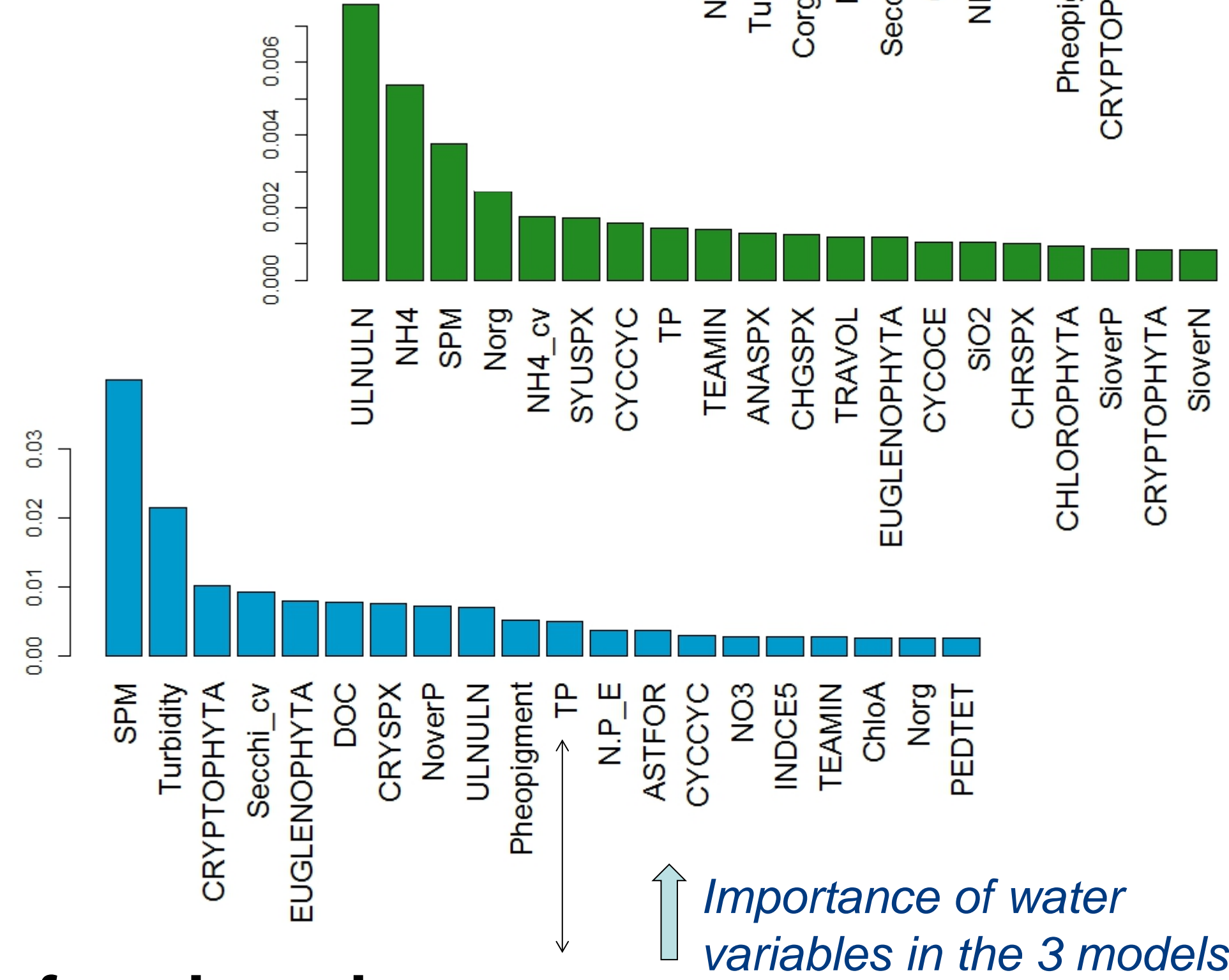


Water samples
physico-chemical variables
(annual means+CV)
+ phytoplankton biovolumes
(annual means)

Results

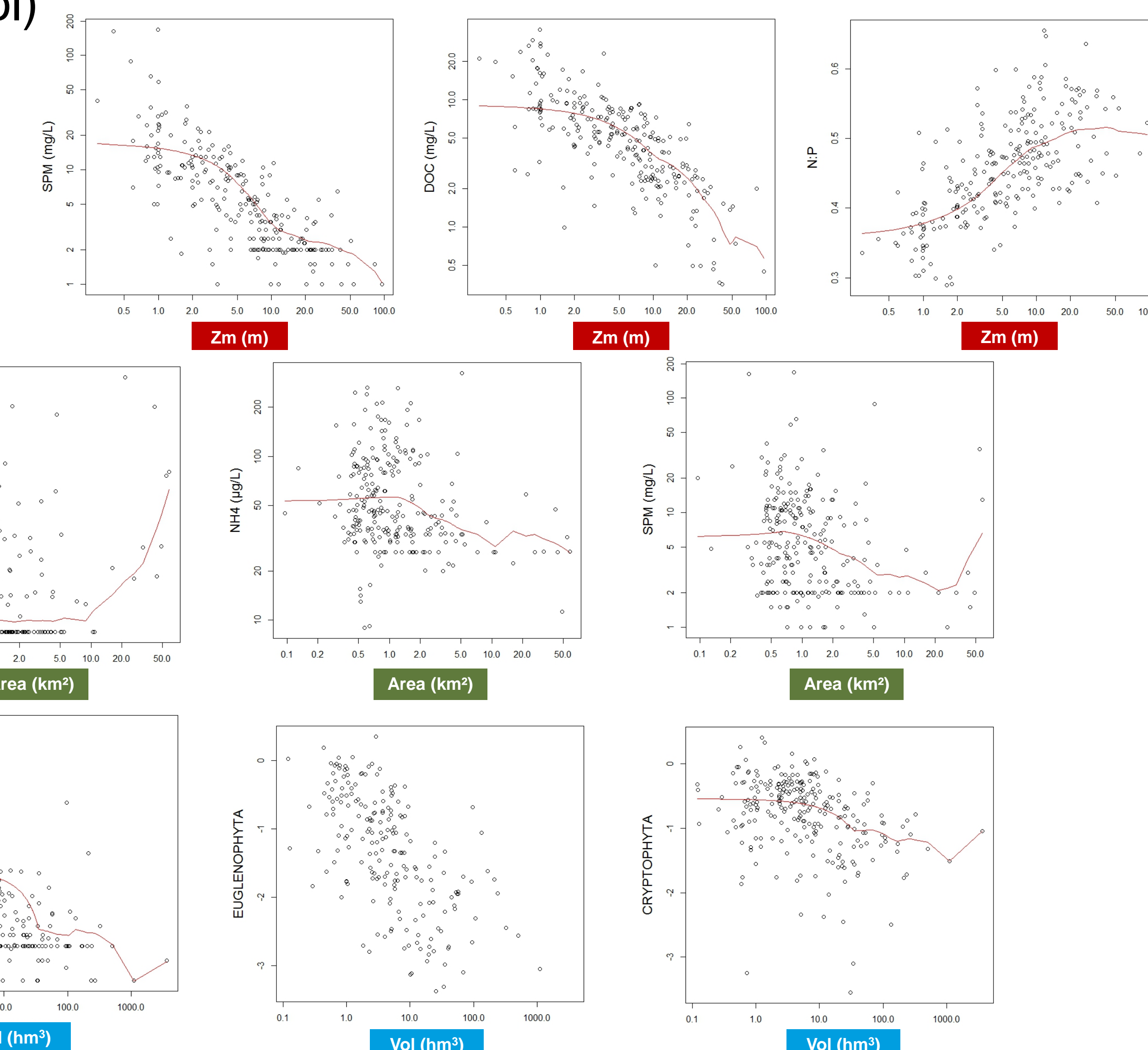
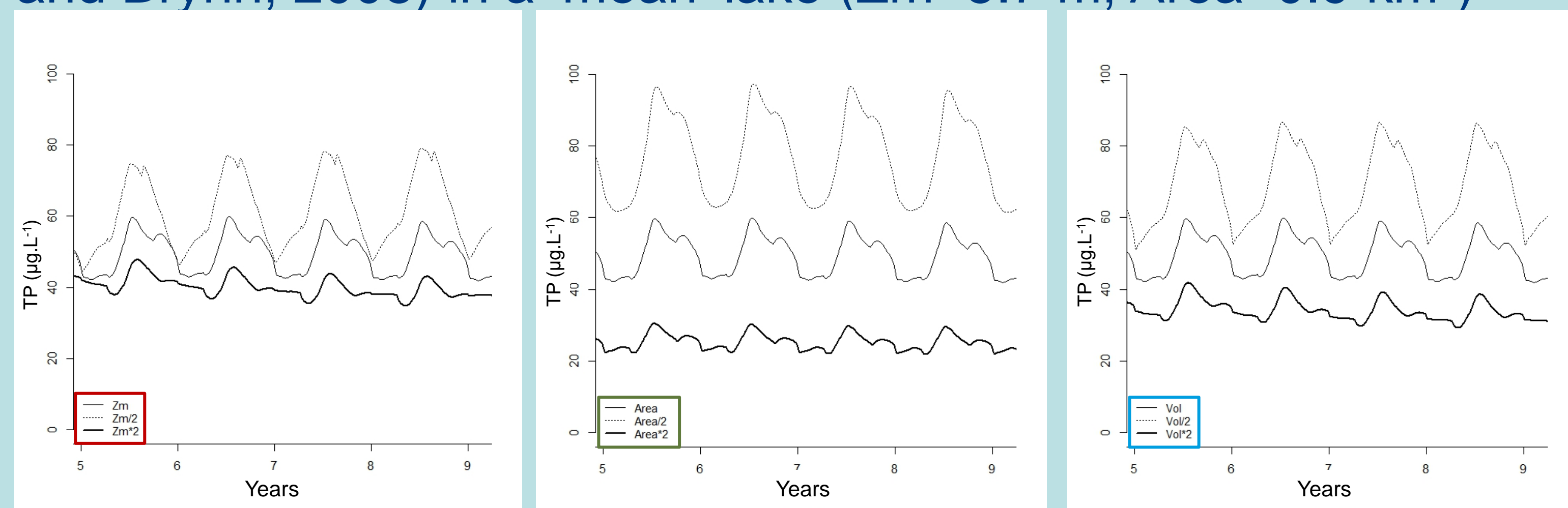


Performance of models to predict the 3 morphological variables



Model analysis for phosphorus

Total phosphorus concentration simulated with LakeMab (Hakanson and Bryhn, 2008) in a 'mean' lake (Zm=5.7 m, Area=0.9 km²)



Conclusion

- Lake mean depth is the most predictable dimension
- This study highlights interesting relations to depth
- Area is poorly related to water quality and phytoplankton
- Phosphorus appears more sensitive to Area in the model than in the data