Study of geochemical behaviour of pollutants in the Belgian coastal marine environment

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Introduction

The metallic and organic contamination of marine ecosystem in the Belgian coasts has lead to a better understanding of their impact on the aquatic environment. The fate and the ecotoxicity of these trace elements are strongly linked with their **chemical speciation**, which constantly evolves in space and time.

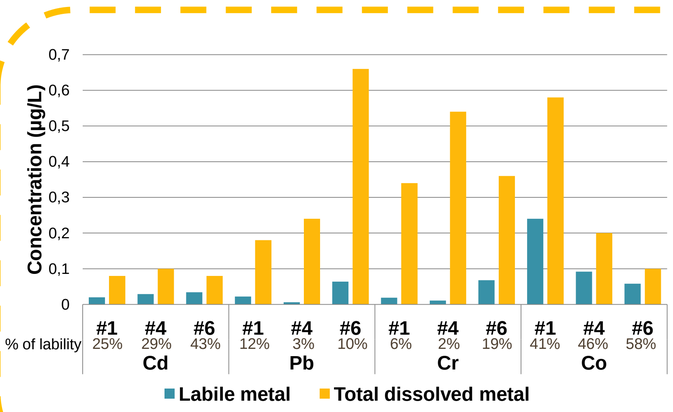
Objectives of the study

- Within the framework of the NewSTHEPS project, development of novel speciation-sensitive procedures for the monitoring of **contamination levels** in the Belgian coastal environment
- Trace the suspended particulate matter towards its **origin** and monitor the chemical **anthropogenic pressures** on coastal ecosystems

Figure 1: Sampling map

Labile metals VS Total dissolved metals

- Labile metal contents do not differ significantly in between the studied stations
- However station #1 shows slightly higher levels for several elements



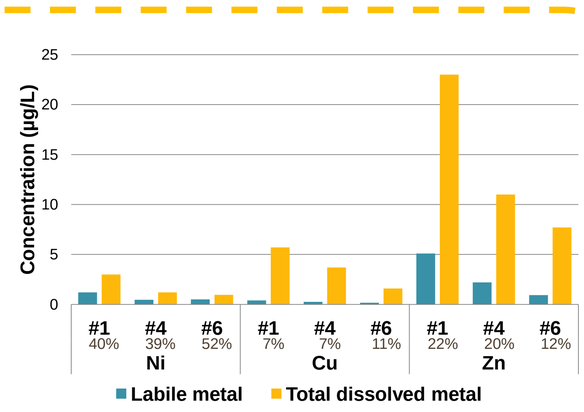


Figure 3: Analysis of metals speciation in March 2016, the case of labile and total dissolved fractions

- Total dissolved metals are more abundant at the harbor stations (except for Pb)
- Labile metals only represent a small fraction of the total dissolved, but it is higher for Co and Ni

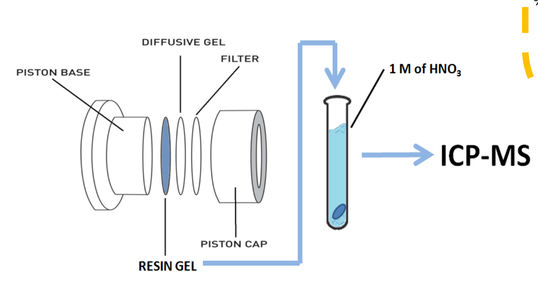


Figure 2: Use of DGT passive samplers for the labile metals assessment

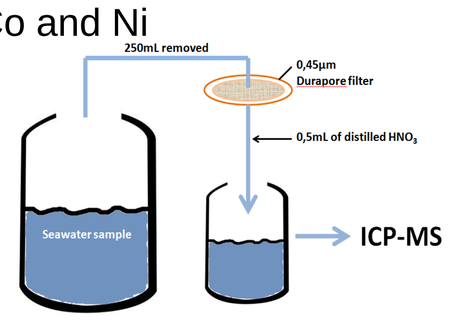


Figure 4: Dissolved metals assessment from filtered and acidified seawater samples

dissolved phase
0,45 µm
particulate phase

Particulate metals

- Harbor station #1 shows higher concentrations in particulate metals
- Lowest particulate metal content for the other stations (except #5 for Co)

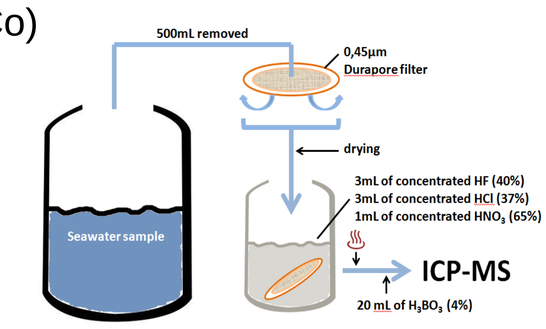
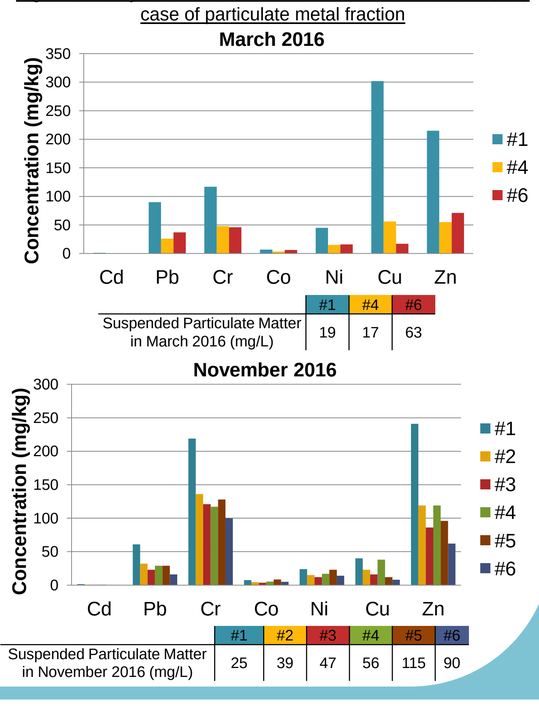


Figure 6: Particulate metal assessment from dried and digested Durapore filters (0,45µm)

Figure 5: Analysis of metals in March and November 2016 , the case of particulate metal fraction



Particulate organic Matter

- Different behavior in between harbor (#1, #2, #3, #4) and marine (#5, #6) stations
- Particulate organic carbon at #1, #2, #3, #4 should be from allochthonous source

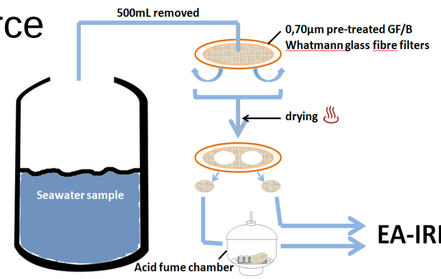


Figure 8: Isotope determination of particulate matter from pre-traeted and acidified glass fibre filters (0,70µm)

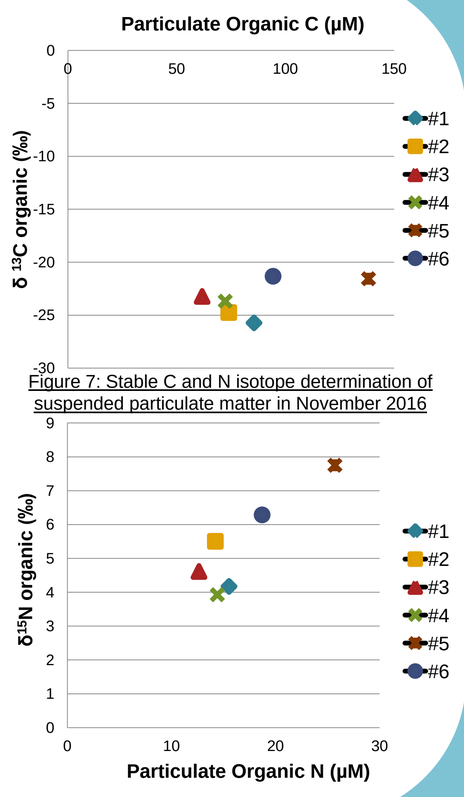


Figure 7: Stable C and N isotope determination of suspended particulate matter in November 2016

Future work

- Follow-up sampling in 2017
- Study of seasonal variations of trace elements and organic matter
- Validation of a new seawater extraction method
- Investigating the correlation between metal speciation and salinity
- Investigating the correlation between the solubility and the lability of each trace metal

These results will further be used for the development and the validation of an **integrated model** to quantify the environmental status of the Belgian coastal zone.

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