# The geochemical behaviour of trace metals in the water column of the Belgian Coastal Zone

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Most trace metals exhibit a dual role in marine waters, they act as nutrients in low concentrations, but have toxic effects in the higher concentration ranges. Continuous monitoring efforts in the Belgian Coastal Zone (BCZ) has led to a better understanding of the fate of trace metals in the marine environment. However, the toxicity of these trace elements is strongly linked with their biogeochemical speciation, which shows both seasonal and spatial variation. Furthermore, classical speciation measurements of dissolved vs. particulate trace metals do not correlate well with the bioavailability of these species.

Here, we compare the classical trace metal sampling procedure with an assessment of their bioavailability using Diffusive Gradient in Thin Films (DGT). This dual approach allows to shed light on the relation between trace metal concentrations and the actual bio-available fraction. Based on stable carbon and nitrogen isotope measurements of suspended particulate matter (SPM) we attempt to trace back the origin and identify the anthropogenic fingerprint on the trace metal geochemistry. The BCZ is an ideal place to study trace metal behaviour, as the proximity of strong industrial activity has led to high concentrations of trace metals, as well as a strong anthropogenic impact. For this study, six stations were selected and sampled during two sampling campaigns (March & November 2016): 4 stations in the harbour zone and 2 stations in the North Sea (~ 5km offshore). Our results show that: (i) particulate and total dissolved metal concentrations are higher at harbour stations than the offshore ones; (ii) The higher dissolved and particulate concentrations do not correlate with their bioavailability; and (iii) SPM in the harbour zone is likely from allochthonous sources, while in the offshore stations it is mainly from marine origin.

These results indicate that, even though contamination is higher in the harbour zones, the effect of trace metal toxicity is most likely not higher than in the open sea. However, with increasing acidification of the ocean, the higher particulate trace metal concentrations might lead to increasing adverse effects on the coastal environment.