Addressing emerging issues in marine metal ecotoxicology with novel analytical techniques

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Introduction

Bottom salinity

- < 5 psu
- 5-7.5 psu
- 7.5 - 11 psu
- 11 - 18 psu
- 18 - 30 psu
- > 30 psu

Transitional waters
How does metal ecotoxicology interact with animal physiology (elemental homeostasis)?

Metal mixture toxicity
Synergistic or antagonistic effects? Mechanisms? Effects on physiology?

Materials & Methods

Control 40 µg/L Cu
Gill dissection

Control 100 µg/L Cu
1 mg/L Zn
MIXTURE of above Cu and Zn
Gill dissection

Dehydration and chemical fixation in HMDS

Synchrotron-based micro X-ray-fluorescence (XRF) analysis at HASYLAB, Hamburg

Laboratory-source micro XRF analysis at UGent

Results & Discussion

Control Cu exposed
Cu – Kz, cts
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Control Cu exposed
Cu – Kz, cts
Cu – Kz, cts

K K exposed
K – Kz, cts
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HMDS embedding: good sample preparation technique

Cu accumulation and K depletion in gill of Cu exposed mussels

Mussels exposed to mixture of Cu and Zn:
- Less Cu accumulation than Cu only exposure
- No K depletion
- Zn accumulation comparable to Zn only exposure

Conclusion

Mechanistic knowledge on physiological effects of metal toxicity

Different physiological consequences of metal mixture exposures versus single metal exposures

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