

Development of a multi-isotope tracer tool for aquatic ecosystems on the example of the German Wadden Sea

JOHANNA IRRGEHER^{1,2*}, DANIEL PROEFROCK¹,
THOMAS PROHASKA², ANDREAS ZITEK² AND
ANDREAS PRANGE¹

¹Helmholtz-Centre for Materials and Coastal Research,
Institute for Coastal Research, Dept. for Marine
Bioanalytical Chemistry, Max-Planck-Strasse, D-21502
Geesthacht, Germany (*correspondence:
johanna.irrgeher@hzg.de)

²University of Natural Resources and Life Sciences Vienna,
Dept. of Chemistry, Division of Analytical Chemistry,
VIRIS Laboratory, A-3430 Tulln, Austria

Environmental monitoring of complex ecosystems requires reliable sensitive techniques based on sound analytical strategies to identify the source, fate and sink of elements mobilized by e.g. emission, landscape use, natural erosion processes and extreme events. Therefore, the exploration of (novel) isotopic systems in marine compartments for the characterization of a complex aquatic ecosystem is currently a key issue in ecosystem research.

In aquatic ecosystems, sediments are considered as ‘the memory of a river or water body’ and thus improved understanding of the mobilisation, transfer and fate of sediments within catchments is of utmost importance for their potential use as tracer carriers.

This study is dedicated to the exploitation and validation of possible isotopic systems besides Sr and Pb accessible by MC ICP-MS (multi collector inductively coupled plasma mass spectrometry) for tracing elemental pathways from source to sink from freshwater to estuary, coastal and marine ecosystems focusing on the example of the German Wadden Sea. The Wadden Sea is of central importance for the accumulation and distribution of elements in the German North Sea and represents an enduringly contaminated highly anthropogenically impacted ecosystem.

The major focus in the first phase of the project is set on the fundamental characterization of isotopic signatures in selected samples originating from different HZG ship sampling campaigns within the context of the German BMBF founded NOAH Project (North Sea-Observation and Assessment of Habitats) and the ‘HZG-Wattkampagne 2014’. The metrological aspects allowing a sound method validation comprise blank, interferences, isotopic fractionation and instrumental isotopic fractionation investigations along with the calculation of combined standard uncertainties.