On mapping and monitoring geodiversity and benthic habitats in a dynamic shallow water coastal environment: example from Rødsand lagoon, western Baltic Sea

Verner Brandbyge Ernsten¹,², Signe Schilling Hansen¹, Lars Øbro Hansen², Manfred Niederwieser³, Ramona Baran³, Frank Steinbacher³, Zyad Al-Hamdani², and Aart Kroon¹

¹Department of Geosciences and Natural Resource Management, University of Copenhagen, Copenhagen K, Denmark
²Department of Marine Geology, Geological Survey of Denmark and Greenland (GEUS), Aarhus, Denmark
³AHM Airborne Hydro Mapping GmbH, Innsbruck, Austria

Shallow water coastal environments can be highly dynamic and comprise a range of dynamic geodiversity variables as well as a range of benthic habitats. It is challenging to map such dynamic shallow water coastal environments and their geodiversity variables and benthic habitats in high-resolution, high precision and full coverage, which is necessary in order to evaluate impact on the seabed and the benthic habitats from e.g. climate change (e.g. changing wind climate) or human disturbance (e.g. construction of wind parks, pipelines, etc.).

We have conducted successive high-resolution, high-precision airborne topobathymetric lidar surveys in combination with seabed groundtruthing (e.g. seabed sampling and diver observations) along existing monitoring lines in Rødsand lagoon, Denmark, in the western Baltic Sea. The coastal lagoon is a Natura 2000 site, located near the planned fixed connection between Germany and Denmark.

Here, we present high-resolution, high-precision mapping of geodiversity variables with a focus on seabed morphology and seabed sediments that constitute the abiotic structures of the benthic habitats. We demonstrate the role of the interaction between the dynamic coastal processes and the drowned underlying glacial landscape in relation to the spatial distribution of the seabed morphology and sediments as well as the benthic habitats. Finally, we discuss how to optimise the monitoring of dynamic geodiversity variables and abiotic benthic habitat structures in such dynamic shallow water coastal environments.

Acknowledgements

This work was carried out as part of “WP4 – In situ remote sensing of geodiversity for habitat mapping” within the project “ECOMAP – Baltic Sea environmental assessments by opto-acoustic remote sensing, mapping, and monitoring” funded by the BONUS EEIG and the Innovation Fund Denmark.