KEYNOTE

Tracking the human influence on the modern sedimentary system of the North Sea

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ABSTRACT Marine ecosystems are affected by a multitude of drivers and pressures, both natural and anthropogenic. Biodiversity is to a large extent driven by the nature and dynamics of sediments, making the monitoring of changes of broad habitat types (BHT), such as mandated by the Marine Strategy Framework Directive (2008/56/EC), a valuable approach. This is linked to safeguarding the integrity of the seafloor and requires from European Member States to assess physical disturbance and loss of benthic habitats in a quantitative and spatially-explicit manner. In Belgium, we have taken the challenge of conducting shelf-wide BHT impact assessments, necessitating new ways of monitoring, setting-up assessment frameworks, making use of best available data, and promoting collaborative efforts [1].

Seabed mapping is essential for BHT change assessments. Methodology-wise rapid evolutions take place, mostly linked to the use of acoustic remote sensing and seafloor classification [2]. Whilst at the smaller scale, typically linked to case-by-case and/or application-oriented approaches, maps can be produced with good predictive power, more regional BHT maps have much lower accuracy because of integration of more fragmented data collected over a wide time span, and consequently also because of the variety of technologies and gear used over time [3]. Uncertainties in the data chain are amplifying, and when analysing depth changes, differences are usually within the confidence envelope of the measurements [4]. However, for some species, typically those associated to gravel beds, centimetric burial by sands, if irreversible, results in habitat loss.

In this keynote, we go back to the basics, i.e., the seabed itself of which diverse bedforms and features are now unveiled by increasing availability of very-high resolution (e.g., 1m) bathymetry. Examples will be given, mostly from analyses of datasets from Flemish Hydrography (agentschapmdk.be/en) covering a range of North Sea habitats. Interpretation calls for multidisciplinary cooperation since, apart its sediments, seabed nature reflects geology, morphology, biology, human influence, and modern-day processes. To cope with measurement-related error margins in change assessments, new approaches are being developed: e.g., defining geological markers, analysing pattern and bedform complexity changes. From this, more advanced workflows will be renewed, ideally based on common initiatives, and connecting to international networks such as EMODnet.eu, GeoHab.org, and the Geological Service for Europe (eurogeosurveys.org).

KEY WORDS: bedforms, seabed features, sediments, subsurface geology, geological markers, anthropogenic activity, sustainability, seabed mapping

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