

van Heteren Sytze

TNO – Geological Survey of the Netherlands

Author(s): Sytze van Heteren¹, Vera Van Lancker², Fabien Paquet³, Laure Simplet⁴, Rhys Cooper⁵, Sophie Green⁵, Markus Diesing⁶, Kristine Asch⁷, Jørgen Leth⁸, Odd Harald Selboskar⁹, Reidulv Bøe⁹, Anu Kaskela¹⁰, Ulla Alanen¹⁰, Aarno Kotilainen¹⁰, Alan Stevenson⁵

Affiliations(s) :¹ TNO - Geological Survey of the Netherlands, The Netherlands; ² Royal Belgian Institute of Natural Sciences, Operational Directorate Natural Environment, Belgium; ³ Bureau de Recherches et Géologiques et Minières (BRGM), France; ⁴ Ifremer, France; ⁵ Natural Environment Research Council, British Geological Survey, United Kingdom; ⁶ Centre for Environment, Fisheries and Aquaculture Science (CEFAS), United Kingdom; ⁷ Federal Institute for Geosciences and Natural Resources (BGR), Germany; ⁸ Geological Survey of Denmark and Greenland (GEUS), Denmark; ⁹ Norwegian Geological Survey (NGU), Norway; ¹⁰ Geologian Tutkimuskeskus (GTK), Finland

Seabed sediment: a geological surrogate for North Sea benthic ecosystems

Effective, ecosystem-based management of the North Sea brings at least three data-related challenges: transnationality, surrogacy and uncertainty. As geological process-response relationships are not bounded by country borders, there is a need for full-coverage spatial datasets, stimulating neighbors to work together and to harmonize their mapping efforts. Characterizing ecosystems, communities of living organisms in conjunction with non-living components of their environment, requires quantitative knowledge on the correspondence between physical variables such as sediment type to the occurrence of species and communities. Data on physical seabed parameters, which are widely available and relatively cheap to collect, are frequently used as proxies of biological diversity and as indicators of habitat suitability. The biological relevance of the divisions or classes defined within surrogates used is commonly unknown or merely assumed. The associated ambiguity is only one element of uncertainty that needs to be considered. Imperfect remote observation, sampling, sub-sampling, description, analysis, classification and even interpolation also reduce the overall confidence that decision makers can have in geology-based maps. Within the framework of the European Marine Observation and Data Network, 36 marine-geological organizations have been transforming fragmented region-specific data products into publicly available maps covering broader areas (<http://www.emodnet.eu/geology>). A harmonized 1:250,000 seabed-sediment map represents an important first step in tackling transnationality and in quantifying uncertainty. For the North Sea, additional work has focused on modeling the distribution of mud, sand and gravel on the basis of grain-size data and environmental predictors.

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