Marine habitat mapping, classification and monitoring in the coastal North Sea: Scientific vs. stakeholder interests

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Producing detailed maps of the seafloor that include both, water depth and simple textural characteristics has always been a challenge to scientists. In this context, marine habitat maps are an essential tool to comprehend the complexity, the spatial distribution and the ecological status of different seafloor types. The increasing need for more detail demands additional information on the texture of the sediment, bedforms and information on benthic sessile life. For long time, taking samples and videos/photographs followed by interpolation over larger distances was the only feasible way to gain information about sedimentary features such as grain-size distribution and bedforms. While ground truthing is still necessary, swath systems such as multibeam echo sounders (MBES) and sidescan sonars (SSS), as well as single beam acoustic ground discrimination systems (AGDS) became available to map the seafloor area-wide (MBES, SSS), fast and in great detail. Where area-wide measurements are impossible or unavailable point measurements are interpolated, classified and modeled. To keep pace with environmental change in the highly dynamic coastal areas of the North Sea (here: German Bight) monitoring that utilizes all of the mentioned techniques is a necessity. Since monitoring of larger areas is quite expensive, concepts for monitoring strategies were developed in scientific projects such as "WIMO" ("Scientific monitoring concepts for the German Bight, SE North Sea"). While instrumentation becomes better and better and interdisciplinary methods are being developed, the gap between basic scientific interests and stakeholder needs often seem to move in opposite directions. There are two main tendencies: the need to better understand nature systems (for theoretical purposes) and the one to simplify nature (for applied purposes). Science trends to resolve the most detail in highest precision employing soft gradients and/or fuzzy borders instead of crisp demarcations and classifications of habitats wherever this is suitable. At the same time e.g. the European authorities put much effort into the standardization of habitat classifications (e.g. EUNIS) which is essentially a massive reduction of the information content. While standardization is a necessary and important task aiming at aiding e.g. the public authorities in protecting and managing marine habitats, much information is lost on the way without actually knowing its role in explaining the natural system. In this study we show examples from various coastal areas of the North Sea concerning raw data, processed data, interpolated, modeled and classified data. We compare classifications and evaluate the information contents as well as the entropy change across the data processing stages.