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Mussel bed monitoring in the Wadden Sea: From pixels to products

G. Müller [a,] *, K. Stelzer [b], M. Gade [c]

[a] Schleswig-Holstein Agency for Coastal Defence, National Park and Marine Conservation, National Park Authority, Schlossgarten 1, 25832 Tönning, Germany – Gabriele.Mueller@lkn.landsh.de
[b] Brockmann Consult GmbH, Geesthacht, Germany – Kerstin.Stelzer@brockmann-consult.de
[c] University of Hamburg, Centre for Marine and Atmospheric Sciences, Institute of Oceanography, Hamburg, Germany – Martin.Gade@uni-hamburg.de

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ABSTRACT:

The German Wadden Sea is a highly diverse coastal ecosystem. It contains a range of important habitats, for which monitoring requirements based on EU directives have increased in recent years. Some of the main monitoring parameters concern the distribution and size of individual habitats, thus requiring techniques for efficient and adequate delineation of various surface types. This is quite challenging in a highly dynamic environment such as the Wadden Sea.
Current in-situ monitoring techniques are generally very detailed and precise but also time-consuming and expensive. One major drawback is the reduced accessibility in the Wadden Sea for which reason monitoring methods using remote sensing techniques have been developed. Using the mussel bed habitat identification as an example, the paper presents processing schemes, in whose course multiple remote sensing data such as optical and radar satellite data, aerial imagery, and laser scanning data are turned into classification products used for assessing and monitoring the distribution and size of mussel beds. Because some classification features cannot be conclusively attributed to mussel beds, product quality will be improved by combining different types of data, e. g. optical and radar data.
The major advantages of these remote sensing products are the area-wide coverage at individual points in time and the detection of disappearance and re-appearance of individual mussel beds, which are not addressed by the in-situ monitoring, thus providing a more complete picture of the situation. Such multiple data source approaches are also developed for other habitats in the Wadden Sea. A key step is the identification of advantages and disadvantages of both the current monitoring methods as well as the remote sensing based techniques and to define an appropriate way to transform the available information into products suitable for fulfilling the legislation requirements in a cost-effective way.

* Corresponding author.