Integrative Approaches for combining Earth Observation, models and in-situ data for monitoring of the North Sea and its Coastal Zone

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ABSTRACT:

Optical, thermal and radar Earth Observations data of the North Sea and its coastal zone reach back into the early 1990s with the ERS satellites, and even into the 1980's with the Landsat 5 Thematic Mapper. ENVISAT with MERIS, AATSR and ASAR provided an unprecedented dataset in the 2000's, when the requirements on coastal monitoring have substantially increased due to the EU WFD and MSFD. Traditionally field samples from both, the intertidal flats and coastal waters, were used to provide the database for reporting, and in recent years numerical models became relevant for studies and assessment of the hydrodynamics and ecosystem behaviour of the North Sea water body. It was and is the objective of the national Copernicus project DeMarine to combine these 3 major data and information sources and to improve the diagnostic and prognostic capabilities. We will report here on the recent developments to combine different EO data, in-situ data and numerical models, with the aim to support the reporting to WFD, MSFD and the trilateral monitoring of the Wadden Sea. A synergistic classification approach combining SAR data, optical data (Landsat, SPOT, Rapid Eye) and field samples for classification of sediment, macrophytes and mussel beds in the eulitoral has been developed together with the National Park Authorities for the application within the operational monitoring. Assimilation of thermal and bio-geochemical data from ocean colour sensors into numerical models has been developed for use by the Federal Maritime and Hydrographic Agency. A major requirement of our end users on the method is to be - as far as possible - independent from specific sensors but to have reliable access to EO data. This is critical for EO to be accepted as data source for long term monitoring programme. Thus, we prepared the methods to be applicable with Sentinels 1-2-3.