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Integration of light attenuation measurements from Earth Observation into 3D Geobiochemical models of the North Sea.

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The FP7 CoBiOS project aims to develop a near-real-time information system to diagnose high-biomass blooms in the Baltic Sea and North Sea. The core information in such a system will result from integration of ocean colour remote sensing with 3D geobiochemical modelling. A key parameter is the description of available solar energy in these complex waters, where optically active substances such as silt, algae and dissolved organic material all contribute to the light extinction. A new approach is presented to consistently define the light extinction coefficient Kd of the downward irradiance over PAR from an EO perspective and a numerical modelling perspective. An analysis of a few hundred in-situ Kd-profiles in the North Sea demonstrates that irradiance extinction by the various substances as a function of their PAR-representative absorption and scattering properties works better than a linear model of 'specific extinction' coefficients. In addition to adopting consistent coefficients, it is recommended to apply a nonlinear approach to couple absorption and scattering properties for deriving Kd [1,2]. This approach enables obtaining a consistently defined set of Kd values that will facilitate assimilation of geobiochemical models with ocean colour observations.

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