Estimating pCO2 from remote sensing in the Belgian Coastal Zone

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In coastal waters, a purely field observation based approach will probably be insufficient to better constrain estimates of air-sea CO2 fluxes, to study their inter-annual variability and their long-term changes. One approach to achieve these goals is to use remotely sensed fields of relevant biogeochemical variables to extrapolate available data, and produce maps of the partial pressure of CO2 (pCO2) and air-sea CO2 fluxes. In the open ocean this approach has to some extent been successfully used based on fields of chlorophyll-a (Chl-a) and sea surface temperature (SST). This approach remains challenging in coastal waters that have complex optical properties (Case-II waters) and that exhibit highly dynamic pCO2 temporal and spatial variations. In the frame of the Belgian funded BELCOLOUR-II project (Optical remote sensing of marine, coastal and inland waters; http://www.mumm.ac.be/BELCOLOUR/), three field cruises per year (April, July and September) for optical measurements were carried in 2007, 2008, 2009 in the Southern Bight of the North Sea (SBNS). Based on these data-sets, we derived algorithms to compute pCO2 from Chl-a and sea surface salinity (SSS) using multi-polynomial regressions (MPR). Here we report the first application of the MPR algorithms to derive pCO2 fields in the Belgian coastal zone based on data gathered in 2007, using remote sensed Chl-a (MERIS) and SSS computed with a 3-D hydrodynamical model of SBNS (COHERENS).