

Remote sensing of suspended sediment in the North Sea at high spatial and temporal resolution

Vanhellemont Quinten¹, Griet Neukermans² and Kevin Ruddick¹

¹ Management Unit of the North Sea Mathematical Models (MUMM), Royal Belgian Institute for Natural Sciences (RBINS), 100 Gulledele, 1200 Brussels, Belgium
E-mail: quinten.vanhellemont@mumm.ac.be

² Marine Physical Laboratory, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, CA, USA

Suspended matter concentrations (SPM) in the North Sea have been observed by ocean colour sensors for over a decade. These sensors are installed on polar orbiting satellites that typically provide data once per day, with cloud cover further reducing the available data. In Belgian waters a wide swath polar orbiting satellite typically has around 50 cloud-free observations annually. While the number of observations provided by these sensors is much higher than what is possible by using classical methods, high frequency processes, such as tidal resuspension, are completely missed by the satellite.

Sensors in a geostationary orbit appear to be in a fixed position in the sky and can deliver much higher frequency data. The main uses for the geostationary orbit are telecommunication services and weather satellites. SEVIRI, a meteorological sensor on a geostationary weather satellite, provides data every 15 minutes for a viewing disk centred on the 0° meridian. Data from this sensor's broad red band was used to observe SPM in the North Sea by Neukermans *et al.* (2009), and for the first time, the high frequency dynamics of SPM was revealed on a large spatial scale. Because SEVIRI lacks green and blue spectral bands it is limited to observe SPM or related parameters, such as turbidity and the attenuation of light in the water column. A number of problems were identified when looking at the seas that can be linked to the sensor's design - which was fine for its intended applications (a.o. cloud and ice monitoring).

In this study, we combined the marine reflectance data from SEVIRI with that from MODIS Aqua, a polar orbiter, in a synergy product that is an improvement over both data sources. The temporal frequency of the synergy product is much better than that of MODIS, and by using the latter's high quality data, the limited spatial and radiometric resolution of SEVIRI is enhanced (Vanhellemont *et al.*, 2012, submitted).

In 2010, the first geostationary ocean colour satellite (GOCI) was launched with a similar spectral configuration as SeaWiFS, and now provides hourly data for the waters around Korea, China and Japan. Due to the nature of the geostationary orbit, every sensor can only cover a given region, and a set of five sensors would be needed for global cover (Ruddick *et al.*, 2012, submitted). The European and American space agencies are planning for geostationary ocean colour sensors to monitor their seas to improve information on the marine environment. The cost of increasing the spatial resolution of a geostationary sensor is very high, but this study illustrates that a lower resolution geostationary ocean colour sensor combined with a high resolution polar orbiting sensor, can provide a high frequency synergetic product with high spatial resolution.

References

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