Fluxes and dynamics of suspended particles in a river plume by combining in situ autonomous measurements and multi-sensor ocean colour satellite data

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A fixed station at the mouth of the Rhône River (NW Mediterranean Sea) was equipped with autonomous optical sensors including hyperspectral above-water radiometers and subsurface light backscattering and fluorescence meters. The system continuously measured the seawater reflectance (Rw) and proxies of the suspended particulate matter (SPM) and chlorophyll-a concentrations over several flood events. It allowed establishing a robust relationship between Rw in the red waveband of selected satellite sensors (OLI, MSI, MODIS and SEVIRI) and the SPM concentration. It also provided regular quality match-ups with ocean colour satellite data for the validation of remote sensing products (Rw at several spectral bands, SPM and Chla concentrations). In situ data were finally combined with multi-sensor ocean colour satellite data to estimate SPM fluxes at the river mouth and monitor the dynamics of SPM in the river plume at several (from daily to seasonal) temporal scales.

Results are first reported in terms of :

- Intercomparison between several atmospheric correction algorithms and selection of the best performer
- validation of the satellite-derived SPM concentration product and computation of the associated uncertainty.

Results are then obtained in terms of:

- Estimation of SPM fluxes exported by the river to the coastal ocean
- Monitoring the spatio-temporal dynamics of SPM concentrations from the downstream part of the river to the offshore extension of the river plume.

Conclusions and perspectives are finally presented regarding the ideal combination of in situ measurements and satellite observations for the monitoring of SPM at river mouths and in river plumes, notably for the calibration and validation of 3D sediment transport models.