



Validation of multi-mission ocean colour satellite products in European coastal waters as part of the EU-FP7 HIGHROC project

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Objectives / Data and Methods

Objectives are to validate the HIGHROC S2plus and S3plus satellite products at regional scales and quantify the **uncertainties** associated to these products. The validation exercise is based on quality **match-ups** with numerous field data. Satellite data are automatically processed by VITO (S2plus) and BC (S3plus) and match-ups are extracted with field data provided by partners in Belgian, French, UK and Norwegian coastal waters (Fig. 1). A **multi-platform field dataset** is used to provide match-ups with satellite data, including autonomous stations (Aeronet-OC, Smartbuoys, FerryBox, Mesurho, MAGEST) and regular oceanographic cruises. The considered satellite data are S2plus (L8-OLI and S2-MSI), S3plus (Envisat-MERIS, Aqua-MODIS, S3-OLCI) and GEO (MSG-SEVIRI).

The main **satellite products** are:

- Rrs, nLw
- Kd
- Turbidity, SPM and Chla concentrations.

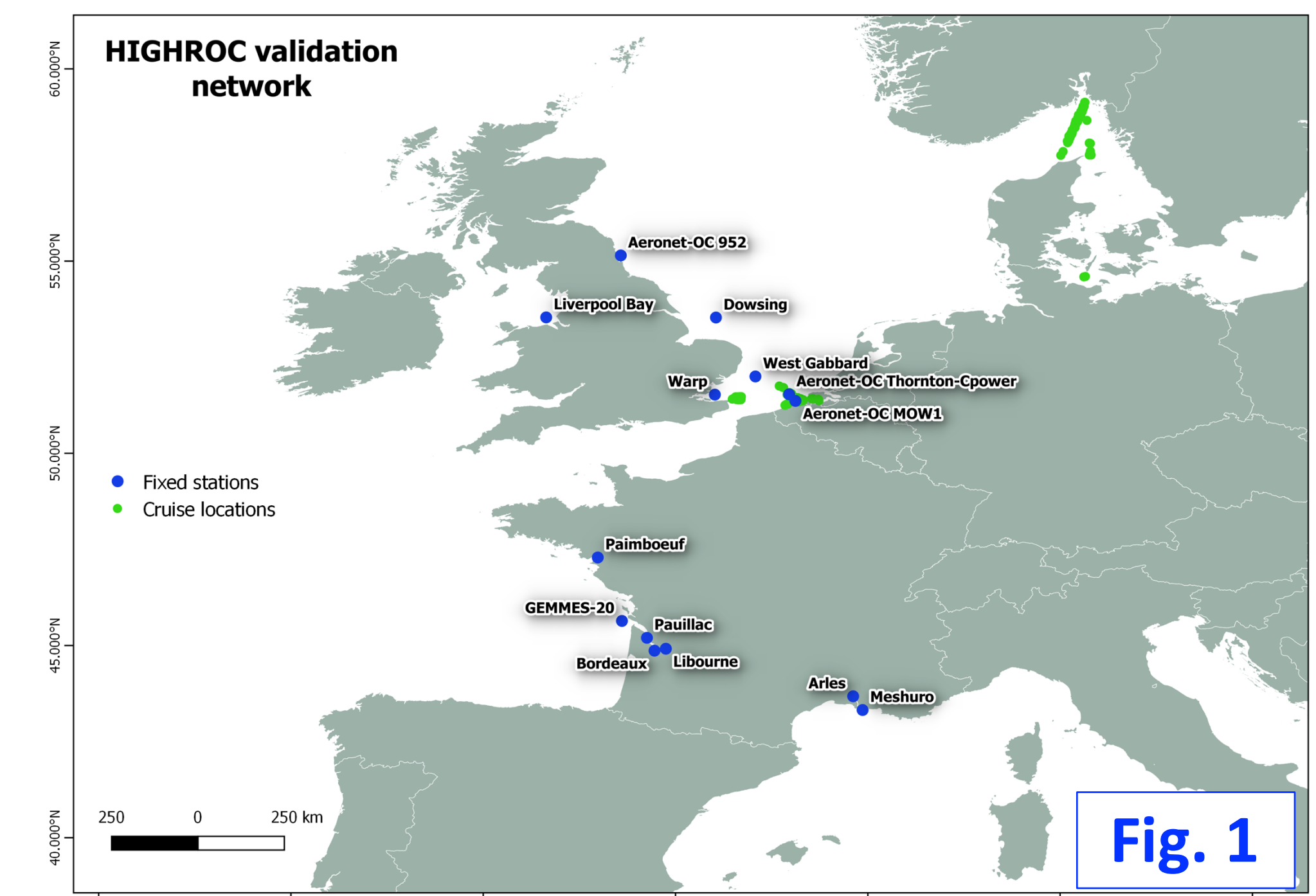


Fig. 1

Results

Fig. 2 presents typical match-ups between S2plus (A) and S3plus (B) satellite-derived water-leaving radiance or reflectance and in situ measurements in visible and near-infrared spectral bands =validation of applied atmospheric corrections.

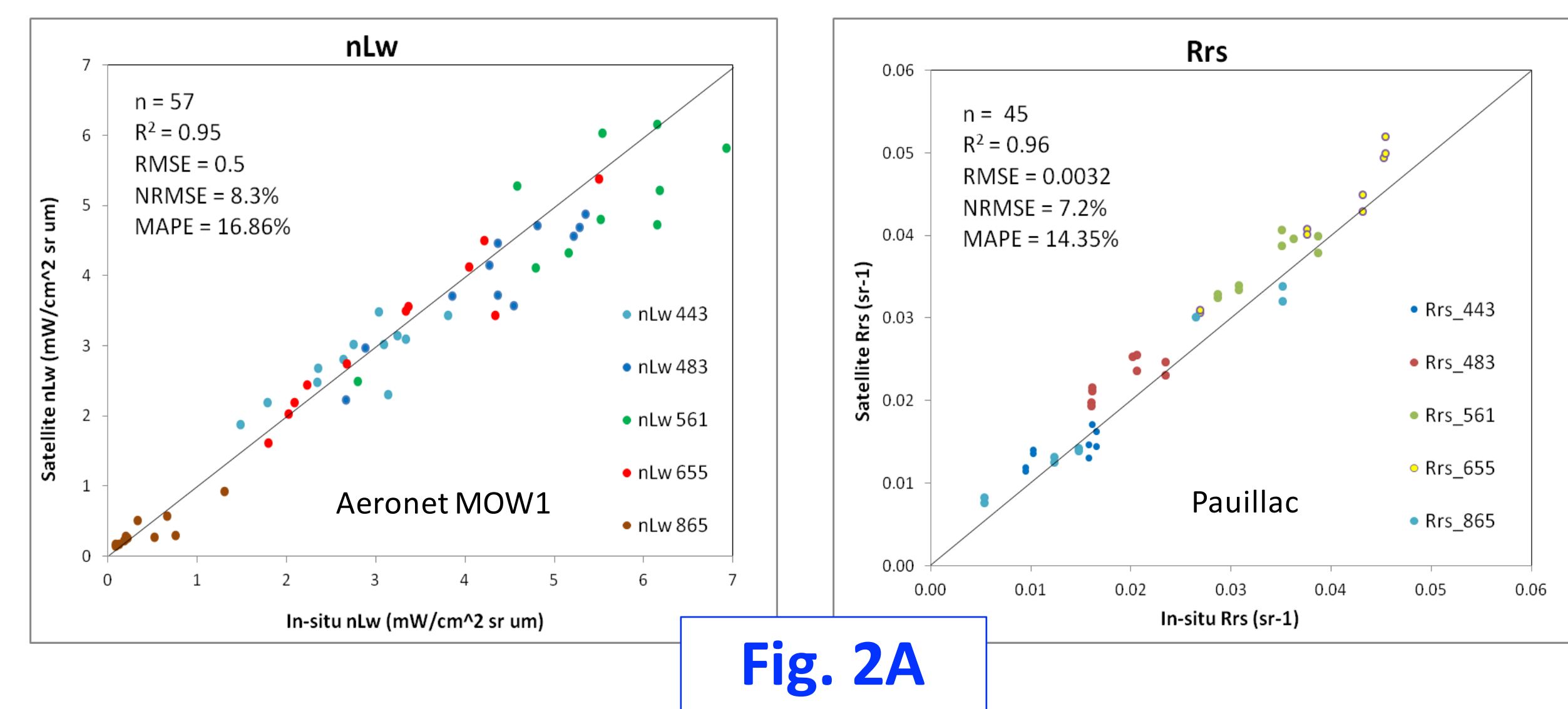


Fig. 2A

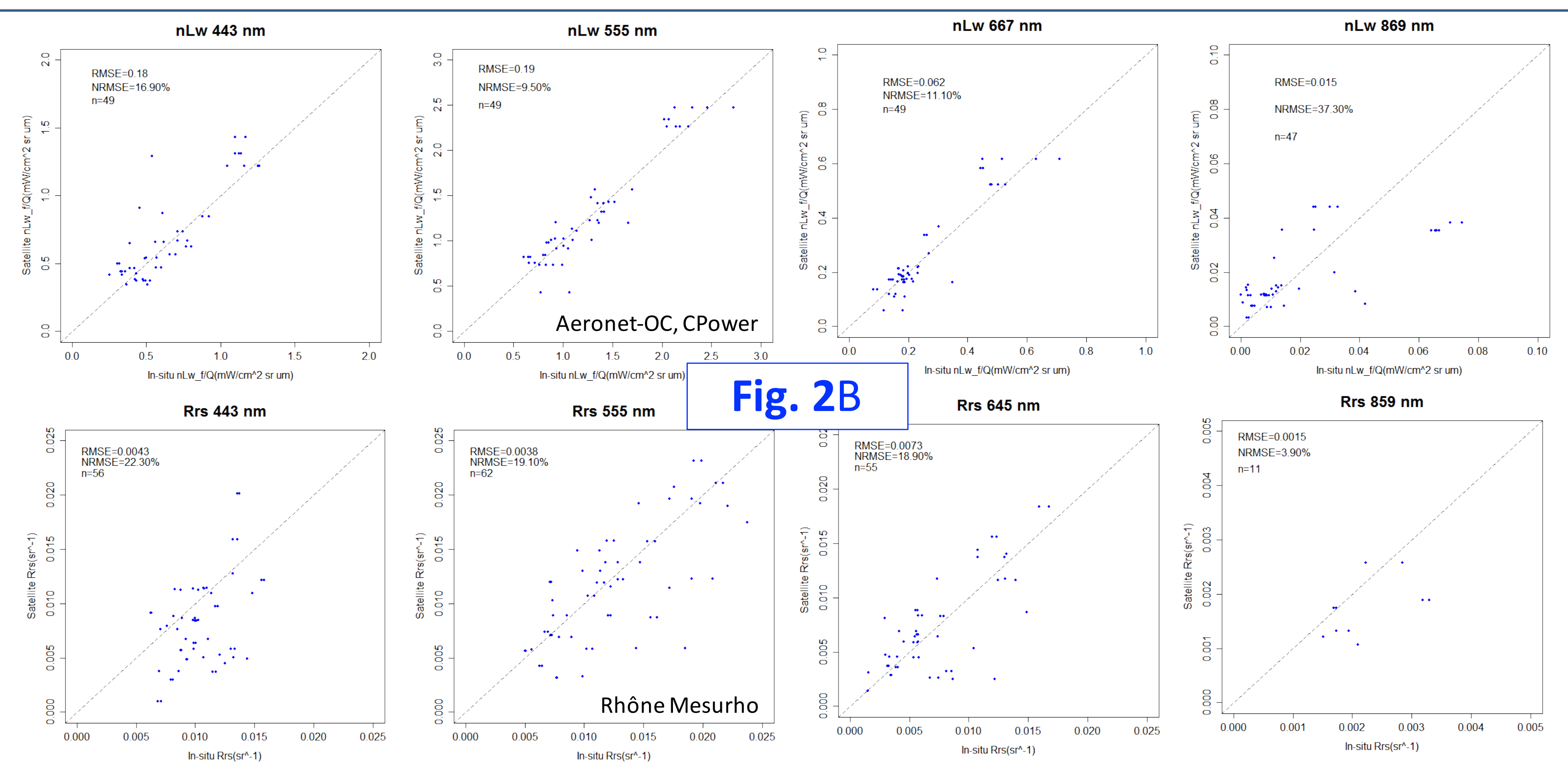


Fig. 2B

Fig. 3 reports typical match-ups between satellite-derived Turbidity, SPM concentration and Kd coefficients and in situ measurements in the Southern North Sea (SNS), Norwegian and French coastal waters. Smartbuoys data provide numerous match-ups with satellite data. In some locations significant differences are sometimes highlighted in terms of turbidity, due to sensor calibration issues. On average, uncertainties associated to the satellite-derived Turbidity, Kd and SPM are lower than 20% (NRMSE) and usually close to 10%. Temporal (e.g., weekly to montly) trends of Turbidity, Kd and Chla concentrations are well captured by satellite data, while this last parameter (Chla) is proved to be still associated to significant uncertainties in turbid coastal waters.

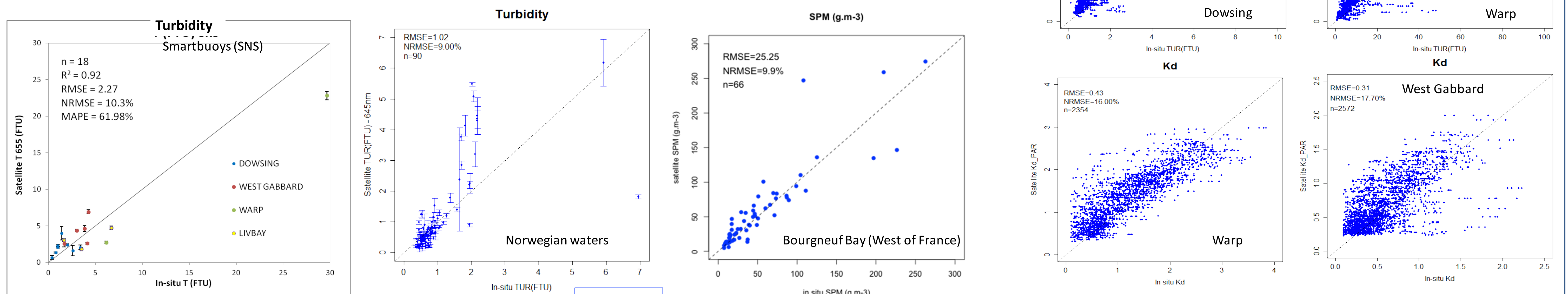
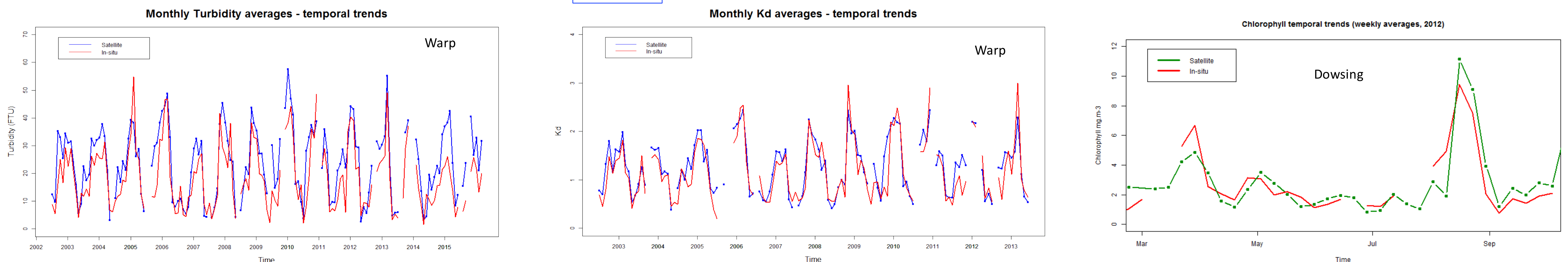


Fig. 3



Conclusions & Perspectives / References

Within the first phase of the HIGHROC project, valuable efforts were made to develop regional algorithms for contrasted European coastal waters (Fig. 1) ranging from 'clear' and Chla-dominated to extremely turbid estuarine waters. Significant efforts were then made to increase the number of quality match-ups between satellite and field measurements to validate the satellite products and quantify the associated uncertainties, notably using a network of autonomous field stations.

The results obtained were used to (i) validate the atmospheric corrections applied to S2plus and S3plus satellite data (Fig. 2), with uncertainties on Rrs and nLw in the order of 10% (NRSME), then (ii) quantify the uncertainties associated to Turbidity, Kd, SPM and Chla concentrations derived products (typically varying from 10 to 25%) (Fig. 3). Higher uncertainties were associated to satellite-derived Chla concentrations due to the failure of the blue-to-green Rrs ratio in turbid waters.

The next steps are to include S3-OLCI data in the validation exercise and provide detailed reports on the validation of GEO and multimission satellite products.

➤ For more details and access to related publications please visit the project website: www.highroc.eu

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