



Horizon 2020
H2020 LC-SPACE-04-EO-2019-2020
 Copernicus Evolution – Research for harmonised and
 Transitional-water Observation (CERTO)

Project Number: 870349

Deliverable No: D5.3		Work Package: 5	
Date:	13-APR-2023	Contract delivery due date	30-SEP-2022
Title:	Update of the prototype and documentation		
Lead Partner for Deliverable	HYGEOS		
Author(s):	François Steinmetz, Didier Ramon, HYGEOS		
Dissemination level (PU=public, RE=restricted, CO=confidential)			PU
Report Status (DR = Draft, FI = FINAL)			DR

Acknowledgements

This project has received funding from the European Union's Horizon 2020 research and innovation programme grant agreement N° 870349



1 Update of the prototype and documentation

The Polymer atmospheric correction software has been updated to version v4.15 to include the developments carried out in WP5:

- Update of the water reflectance model to improve the adequacy to highly turbid waters
- Modifications to improve the stability and performance of the algorithm over complex waters
- Addition of an option to correct for vegetation adjacency
- Addition of an uncertainty propagation scheme for OLCI and MSI

These modifications are detailed in D5.4 and their activation is described in the [changelog](#) included with the software.

The code is publicly available on Hygeos forum after free registration:

<https://forum.hygeos.com/viewtopic.php?f=5&t=200>

This page can also be accessed from <http://www.hygeos.com/polymer>.

2 Addressing review comments from the RP2 review

From Comments on D5.3

- 1) We agree with the reviewer's comment, that „The update of the water reflectance model is a key element for further applications of the CERTO prototype. The analyses carried out for highly turbid waters or the correction algorithm performance for adjacency or turbidity gradients could be enriched by the combination of new in situ and satellite data, proposing limits for applications that would facilitate a wider uptake of the prototype.“

Indeed, the rich in-situ database gathered in CERTO, together with the Sentinel-2 and Sentinel-3 images, have been essential to the work carried out in WP5, in particular to develop the prototype update provided in this deliverable. However, as noted in section 4.4.1 of D5.4, “the analysis was delayed until the in-situ data from 2022, and the historical data, were available (only in December 2022 resulting in the delay to this Deliverable [D5.4])”.

So, we confirm that all available in-situ data in the case study sites have been considered in the prototype development (D5.3) and in the atmospheric correction evaluation and analysis (D5.4). The exploitation of further in-situ data that may be collected in 2023 would be impossible in the time frame of the project.

- 2) To answer the last review comment on this deliverable: “In the same line, the estimation of uncertainties, if possible, would enhance the application field, with possibly different uncertainty propagation schemes for OLCI and MSi Data.”, we would also like to clarify that an uncertainty propagation scheme for OLCI and MSI has been provided in the software prototype and we agree on the value of providing uncertainties.

From Comments on D5.4

Finally, we take the opportunity to answer some useful comments from the reviewer on D5.4 which has been formally accepted:

- 1) The use of SWIR bands in the analysis of the water reflectance model adequacy is indeed very interesting, especially for the most turbid waters, but the in-situ data cover only wavelengths up to 950 nm, thus it was not possible with these data to cover the bands at 1020 nm from OLCI and the band at 1610 from MSI. However, this does not prevent the use of these bands in the atmospheric correction scheme.
- 2) In the analysis of the performance of the MSI atmospheric correction, the reviewer commented on the increase of the mean absolute deviation in the green band: our interpretation is that since the case study sites covers a majority of “green waters”, this peak corresponds to higher reflectances, thus mean absolute deviations. We agree that a better coverage of highly turbid waters, especially from the Elbe estuary, would be welcome, but could not be achieved, even when considering all available CERTO campaigns and historical data.