

General Comments

This manuscript aims to define HPLC replicate sample precision and characterize the associated uncertainties. For each available pigment, individual coefficient of variation values was computed for sample replicate sets, and the precision was thereafter assessed using five different sample parameters. Precision was found to differ between oceanic and coastal samples, from which oceanic samples had better precision in the full dataset compared to the censored dataset (samples with invariant replicates, CV%=0). Following various analyses, the authors concluded that no single variable could explain precision variability deviations across all pigments. However, it seemed that filtered volume and pigment concentrations were important for the full- and the censored dataset, respectively. Furthermore, in consensus with NASA's Ocean Biology and Biogeochemistry (OBB) program, the authors underpinned the importance of prioritizing minimum 5% of samples be collected in replicate in order to enable precision assessment.

The manuscript is highly relevant for the scientific community. Remote sensing is an emerging method from which Chl *a* and other environmental variables can be retrieved from - on a large and global scale. As more fields of science utilize remote sensing to establish time-series and to put findings into a broader context, this work benefits the broader scientific community. Quality insurance is therefore key to understanding and minimizing uncertainties. The scientific quality and presentation were excellent throughout the manuscript. The methodology and definitions were clear, and all the figures were useful tools for the reader.

Detailed Comments

In its current form, the manuscript addresses relevant scientific questions within the scope of BG and only a few minor suggestions/notes for this manuscript were found (besides the ones already addressed by RC1 and RC2 in April):

- It would be a great asset to add a table to the appendix that shows the % sample distribution for each major ocean basin as well as the distribution of coastal and oceanic samples
- Figure 2: Is panel d also global?
- Under the section "Dataset" the number of samples could be clarified: 30,000 vs 19,125
- L265-275: Please specify what is meant by "the entire datasets"
- L435: The discussion could benefit by extending the section with the guidance of implementing best practices of POM collection. How could lack of POM guidelines introduce systematic variations in data quality across different ocean basins?

- I would suggest to add the laboratory specific LOD for all the available pigments in the appendix

This was a really exciting manuscript that establishes the importance of analytical uncertainties besides instrumental sensitivity and repeatability.