Ocean Science
Discussions

Interactive comment on "Using empirical orthogonal functions derived from remote sensing reflectance for the prediction of concentrations of phytoplankton pigments" *by* A. Bracher et al.

Anonymous Referee #2

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This study provides an EOF-based ocean color approach to estimate multiple phytoplankton pigments from the radiometric signals. It is an important issue in oceanography and well within the purview of OS. However, the manuscript should be constructed more logistically. I would recommend it acceptable for publication after the necessary moderate revisions made.

General comments

1. It is better to use tables, rather than many confused sentences which are hard to follow, to describe the different data sets used for analysis. For example, in Section 2.1, create a table to clearly show what different data sets are used in developing the EOF-

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based approach and for the validation. Also, include, at least, these columns of: cruise, period, sensor, parameter, and data point. This is a paper in developing an EOF-based approach for estimating pigments from space. Thus, two independent data sets should be used in the development of the approach and in the validation, respectively.

2. It is unclear what HPLC pigments are used in the EOF analysis. It seems that the authors used the list of pigments or groups in EOF training, such as: TChl a, PSC, PPC, MVChl a, DVChl a, etc in Table 2. Since, for example, TChl a is calculated from the sum of MVChl a, DVChl a and chlorophyllide a, is it a fair way to use TChl a, MVChl a and DVChl a together to develop an EOF-based approach? To my understanding, any one of the pigments used for the EOF training should not be so relevant or dependent to another one.

Specific comments

1. P2076, L20-22: Are the functions of the photo-protective carotenoids only to protect PSC from photo-damage? Zeaxanthin may also be found in a lot of phytoplankton groups other than cyanobacteria (Jeffrey et al., 1997, Phytoplankton pigments in oceanography, UNESCO Publishing).

2. P2078, L6: Use the abbreviations consistent to all parts of the text. For example, RRS and Hex/But are used in P2079 and P2082 L17, but RRS and 19BF/19HF are used in P2080 and P2082 L24, respectively.

3. P2079, L1: Give out the full name of MERIS.

4. P2079, L5: Make sure the cruise names are consistently used in the whole text.

5. P2079, Section 2.1.1: Briefly describe what instrument and column are used for HPLC system.

6. P2079, L22: Are HPLC samples not available for other cruises?

7. P2080, Section 2.1.2: It is better to briefly describe how to make the AOP measure-

ments here. What is the spatial resolution of the radiometric sensors?

8. P2082, L1-7: What does MERMAID represent? What is the time window between the water sampling time and satellite overpass time?

9. P2082, L10: "For the field...". This sentence is unclear.

10. P2082, L16: MVChl b.

11. P2082: The definitions in PSC and PPC seem not same to those in Hooker et al. (2005). Are all these pigments/groups used for the EOF-based analysis. Please identify those used in the paper only.

12. P2083, L10: "where done"?

13. P2083, L14: "N pigment columns". Please list the pigments used.

14. P2084, L19: What do "e1,2,..." represent?

15. P2085: Why not to use the log-transformed pigments for calculating RMSE, etc.? It seems the statistical results shown in Figures 4-5 are based on log-transformed data. Is the definition in "R2" correct?

16. P2086, L15: steps 2-8.

17. P2087: Similarly to comment 15, why not to use the log-transformed data?

18. P2088, L2-6: This sentence is confused.

19. P2088, L17: Why are there only two seasons? There are three cruises.

20. P2089, second paragraph: These sentences are not well logistical.

21. P2090, L1: "3.3 nm. the hyper"?

22. P2090, first paragraph: Are the discussions on the higher-order EOF functions necessary?

23. P2091, first paragraph: The interpretations are not well clear.

24. P2095, second paragraph: Confused sentences.

25. P2099, Section 3.6: Is DVChl a not directly calculated from the EOF-based approach? If so, why to use the method to subtract MVChl a from TChl a?

26. Figure 1: The knowledge on the sampling locations at different seasons/years may be more important. Since the match-up locations based on the 1x1, 3x3 and 5x5 pixel criteria agree more or less to each other, only one set of location (e.g. based on 5x5 criterion) is needed to show here.

27. Figure 2: "standardized (subtracted mean). . .", but not divided by the SD?

28. Figure 3: add "dotted lines".

29. Figure 7: Show latitudes/longitudes.

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