Dear Editor,
Here are the replies to the Reviewer's comments and suggestions.
Yours,
Jean-François Berthon and Giuseppe Zibordi

Reply to Reviewer # (Piotr Kowalczuk)
Below are the comments and suggestion by Reviewer #1.
They are all appreciated. Replies and expected actions are individually provided.

- **RC1**: 'Comment on essd-2026-463', Piotr Kowalczuk, 28 Jul 2026

After reading the manuscript by Berthon and Zibordi submitted to Earth System Science Data and coded essd-2026-463 **I recommend to consider this paper for publication in this journal after minor revision.**

General opinion
Authors have presented data sets of absorption coefficients spectra of particles suspended in sea water, phytoplankton pigments, and non-pigmented particles in the spectral range between 400-750 nm measured with a 3 nm spectral resolution at 2 nm increment, in water samples collected in the surface layer of numerous marine water around Europe. The particulate absorption spectra are accompanied with absorption coefficient spectra by Chromophoric Dissolved Organic Matter – CDOM, measured in same water samples volume in the spectral range 350-680 with 1 nm resolution. Presented data set consist with two parts: Coastal Atmosphere & Sea Time Series program performed from 1998 to 2016 in the northern Adriatic Sea at the Acqua Alta Oceanographic Tower (AAOT) - CoASTS, and the Bio-Optical mapping of Marine optical Properties (BiOMaP) field program performed from 2000 to 2021 in the European Seas. The geographical extent of sampled marine basins included: Adriatic Sea, Ligurian Sea, Eastern and Western Mediterranean Sea, the Blac Sea, the Baltic Sea, Iberian Shelf, English Channel and North Sea, and Greenland Sea. Author have measured particulate and CDOM absorption spectra with use bench top spectrophotometer using well established methodology. Authors have also assessed uncertainty budget for measuring particulate and CDOM absorption spectra. They have assessed measurements uncertainty with two ways – first, by repeating spectrophotometric scans of the same sample and second measuring replicated sample taken from the same water volume. In case particulate absorption measurement of repeating sample the uncertainty was lower (the mean absolute percent differences (MAPD) ranged 2.8% - 7.4%) compared to replicated samples (the MAPD ranged 8.9% - 10.7%) and uncertainty increased toward longer wavelengths. The measurement uncertainty of CDOM absorption was higher for both for repeating and replicated spectrophotometric scans, and have the same increasing tendency toward longer wavelengths.

Author have presented data in the form of visualized spectra phytoplankton pigments absorption coefficient, a_{ph}(l), depigmented particles absorption coefficient a_{dt}(l), and CDOM absorption coefficient a_{ys}(l) for a given geographic locations. Authors have also calculated averaged and standard deviation of absorption spectra for a given constituents and given geographic subsets. Authors have also showed a tertiary plots for three constituents relative percent contribution to sum of a_{ph}(l), a_{dt}(l), and a_{ys}(l). These plots illustrated which constituent controlled a total absorption in a given European sea, or its subregion.

Comment #1

The last figure presented a relationship between $a_{ph}(442)$ versus $a_{ph}(676)$ to illustrate the impact of regional phytoplankton pigments composition. Data showed decreasing values of the average $a_{ph}(442)$ / $a_{ph}(676)$ ratio from oligotrophic waters of the Mediterranean Sea to more eutrophic Baltic Sea and the North Sea waters.

This is a very important contribution of Author, setting a benchmark for contemporary spectral values of absorption coefficient of three most important absorbing constituents. For these reason this manuscript deserves a prompt publication in Earth System Science Data journal. However I see one flaw of this presentation. Authors shall confront and compare their data with existing publications of same absorption coefficients measured with same methods. There exiting publication for many of considered regional European sea – especially in the Baltic Sea, the North Sea and the Greenland Sea. This way Authors could cross-validate quality of their contribution.

Reply and action

In view of consolidating results, additional literature will be cited and shortly discussed. This will include: Babin et al. (2003) focusing on various European sea; Kowalczuk et al. (2006), Meler et al. (2016) focusing on the Baltic Sea; Kowalczuk et al (2019) focussing on the Arctic Sea; Churilova et al. (2025) focusing on the Black Sea.

Comment #2

Page 2 Abstract Typo is Adriatic Sea at the Acqua Alta Oceanographic Tower
Should be Adriatic Sea at the Aqua Alta Oceanographic Tower

Reply and action

'Acqua Alta' is the Italian name of the oceanographic tower. To avoid confusion, the name will be provided in brackets (i.e, 'Acqua Alta').

Comment #3

Page 8 line 120
The equation: is $a_{ph}(\lambda) = a_p(\lambda) - a_{ph}(\lambda)$,
should be: is $a_{ph}(\lambda) = a_p(\lambda) - a_{dt}(l)$

Reply and action

It will be corrected! Thanks for pointing this out.

Piotr Kowalczuk
Citation: https://doi.org/10.5194/essd-2026-463-RC1

Reply to Reviwer #2 (Vittorio Brando)
Below are the comments and suggestion by Reviewer #2.
They are all appreciated. Replies and expected actions are individually provided.

- **RC2**: 'Comment on essd-2026-463', Vittorio Brando, 07 Aug 2026
The manuscript by Berthon and Zibordi describes the data release of the hyperspectral absorption coefficients for dissolved and particulate matter measured during the Coastal Atmosphere & Sea Time Series (CoASTS) and the Bio-Optical mapping of Marine optical Properties (BiOMaP) programs carried out in European waters from 1995 to 2022.
The hyperspectral absorption coefficients complete and enhance the data released by Zibordi and Berthon in 2024 (ZB24 hereafter) for the apparent and inherent optical properties, as well as the concentration of the optically significant water constituents for the same programs. The ZB24 dataset was limited to multispectral bio-optical data products distributed at spectral values restricted to key ocean color wavelengths.

The manuscript summarises several aspects of the ZB24 paper, including the details of the CoASTS and BiOMaP programs, the sampling station locations and the measurements methods and the measurement precision analysis. Then the hyperspectral absorption coefficients are summarised graphically and the spectral variability across marine regions is described, albeit very briefly.
This manuscript is suitable for publication in Earth System Science Data pending a revision addressing the following concerns and the suggested edits.

Comment #1
1) Comparison to other datasets
Related work was not adequately referenced. Throughout the text, a comparison of this new dataset to other available bio-optical data would enhance the manuscript. Further than ZB24, I suggest considering at least the COASTLOOC and the COASTCOLOUR datasets describing bio-optical data for European waters both described on ESSD (Nechad et al., 2015; Massicotte et al., 2023).
Reply and action
The COASTLOOC and COASTCOLOR measurement programs will be cited in the introduction of the work. Additional citations will be added to support results from a new statistical analysis on adt and ays slopes going to be included in the manuscript. Relevant citations are those of: Babin et al. (2003) focusing on various European sea; Kowalczuk et al. 2006, Meler et al. (2016) focusing on the Baltic Sea; Kowalczuk et al (2019) focusing on the Arctic Sea; Churilova et al. (2019) focusing on the Black Sea.

Comment #2
2) Data availability
At Lines 208-210, it is stated: "It is anticipated that the number of measurement stations included in the present dataset is slightly higher than the one constituting the multi-spectral dataset. This is explained by the quality control applied to hyperspectral data, fully independent of other measured quantities"
Then at lines 285-286 it is stated "Minor differences between Fig. 4 and the equivalent one published in Zibordi and Berthon (2024) are explained by the diverse number of spectra (see § 4)."

Nevertheless, in section 2, tables 1 and 2 and the relevant text provide the same station numbers as in ZB24. Can you please provide some more details on the number of available measurement stations for the new dataset? For which campaigns, dates are measurement available that were not distributed in ZB24?

Reply and action

As in ZB24, the number of stations listed in Tables 1 and 2 in the introductory part of the manuscript indicate the **total** number of stations of the CoASTS and BiOMaP programs considered for the current dataset (this element will be specified in the revised manuscript). Due to the diverse quality control procedures implemented for the PANGAEA-2024 and PANGAEA-2026 datasets, the number of stations constituting the two dataset is slightly different. The rationale for the diverse quality controls is the objective to maximize the number of data included in each dataset, which may not necessarily support the same scientific investigations.

The addition of new tables equivalent to those published in ZB24, but presenting statistical analysis for the hyperspectral adt and ays fitted data, will allow to specify the number of spectra included in the PANGAEA-26 'hyperspectral' dataset and consequently offer the possibility of a comparison with the PANGAEA-24 multispectral one.

Comment #3

3) Exponential decay parameters

When describing the equations of the estimate of exponential decay parameters for adt(λ) and ays(λ), at lines 258-259 it is stated "Those authors determined the parameters defining the best exponential fit versus wavelength of adt(λ) and ays(λ) within the412-665 nm spectral interval". If this was necessary in ZB24, where the data was only provided at six nominal center wavelengths (412, 443, 490, 510, 555 and 665 nm), I'm not sure it still makes fully sense for this data release where the absorption coefficients are provided at 3 nm spectral resolution at 2 nm increment in the 350-680 or 400-750 nm interval. In several papers different spectral ranges are suggested for "optimal" regressions over hyperspectral absorption coefficients, for example to avoid the pigmented spectral regions in adt(λ). For instance, In Figure 2, several adt(λ) spectra depart from a exponential decay spectral shape and at least for BLTS it seems that there are a few adt(λ) spectra with phytoplankton absorption features in the 400-450 and the 650-700 nm spectral ranges. Can you please discuss this issue?

The estimated Sdt and Sys are only summarised with a reference to ZB24 at lines 268-271. Perhaps, it could make sense presenting the estimate parameters in tabular form a as in ZB24 or graphically as scatterplots of Sys vs ays(λ0) and Sdt vs adt(λ0)? Also, it's not clear to me if the estimates of the exponential decay parameters using the hyperspectral absorption coefficients yielded the same values and regression residuals as in ZB24. Please clarify.

Reply and action

The choice of not presenting new statistical parameters for the fit of hyperspectral ays and adt data simply aimed at avoiding an apparent duplication of information. Definitively, the ays and adt values included in PANGAEA-24 and PANGAEA-26 are multispectral and hyperspectral, respectively, and also refer to diverse spectral ranges (more extended for ays). Because of this, new analyses equivalent to those proposed in ZB24, have now been produced. These will be made for the hyperspectral adt values in the 400-730 nm range and additionally in the combined 400-412 & 480-620 & 710-730 nm one (both comparable to what already applied in similar analyses). The last range of selected values aims at minimizing perturbations by portions of the spectrum that may be potentially affected by an incomplete bleaching of pigmented particles retained on filters.

Similarly, the hyperspectral ays values have been re-analysed using the 350-650 nm range and the reduced 350-550 nm one. These will allow for addressing the impact of short-wavelength values and ranges on slope statistics.
The new analysis will be summarized in additional tables and compared to results presented in ZB24, and also in independent publications. Actually, these new analysis and discussion will be a major addition to the manuscript and consolidation of the work.

Comment #4
4) aph(442) versus aph(676) relationships
In Figure the 5 scatter plots of aph(442) versus aph(676) are presented and briefly described at lines 287-293.
At line 288 it is stated "As expected, data show", can you please provide references for these expectations?
Can you please discuss these findings in reference to other published studies and/or available bio-optical data?
Reply and action
Findings presented in Fig. 5 will be duly supported by citations, which will more comprehensively identify science background. Citations will include: Babin et al. (2003), Bricaud et al. (1995), Ciotti et al. (2002) and Fishwick et al. (2006).

Comment #5
5) Figures 1-3
The Y-axis ranges in Figures 1-3 vary quite a lot for each of the ten panels, as the spectral variability across marine regions is one of the main findings of this work. I wonder if it would be possible to choose few (two, three or four) ranges for each figure to help the reader in comparing the spectra across the marine regions. if not, please consider adding to the figure caption a statement noting that the Y-axis ranges vary across the panels.
Reply and action
The y-ranges in Fig.s 1-3 were chosen to maximize the range for each marine region aiming at better illustrating spectra. Alternative solutions were also investigated, but the applied one appears to be the best choice in line with the objective to graphically present the spectral aph, adt and ays data.
Following the suggestion by the Reviewer, a statement will be added in the captions to warn the reader on the diverse ranges characterizing the plots of the various marine regions.

Comment #6
Line 72: "leading to a total of 637 stations". I believe they should be 617, as the sum of 481 and 136 reported in table 1and as reported in ZB24. Please check
Reply and action
The partial numbers are wrong. They will corrected. Thanks for noticing this.

Comment #7
Table 4: the table legend refers to MAPD, but in the table itself APD is used in the first column
Reply and action
It is MAPD everywhere. It will be corrected! Thanks.

Vittorio Brando
Citation: https://doi.org/10.5194/essd-2026-463-RC2