This is a valuable contribution to the coastal bio-optical community. The dataset fills an important gap by providing modern, hyperspectral in situ measurements across a wide diversity of European coastal waters, complementing the foundational work of Babin et al. (2003b) and the long-term CoASTS-BiOMaP compilation. The documentation of non-negligible NAP absorption in the NIR and the associated critique of the historical "null-point correction" is a particularly interesting and important finding with direct implications for absorption budget calculations and algorithm development. The manuscript is generally well-written and logically organized. The methods are described in sufficient detail to be reproducible. The results are presented clearly with appropriate figures and tables.

Major comments

1. The study is explicitly positioned as an update to Babin et al. (2003b), which is appropriate. However, the manuscript would benefit from a more explicit and quantitative comparison with Babin et al. (2003b) throughout the Results section.

2. The central scientific contribution of this manuscript is stated in broad, qualitative terms, which weakens its impact and makes it difficult for readers to assess its significance. For example, the abstract states that the study "provides improved constraints on regional optical variability" and "contribute to the refinement of bio-optical models and ocean color algorithms," yet no quantitative metrics are provided to substantiate these claims. Similarly, the introduction asserts that the dataset "enables the validation and refinement of new regional bio-optical parametrizations," but the specific improvements or advances over existing datasets (e.g., Babin et al., 2003b; Zibordi and Berthon, 2024) are not quantified. To strengthen the contribution, it's better to explicitly state, with numbers, what is new relative to prior work—for example, the number of new stations, the spectral range covered, the improvement in model fit (e.g., R^2, RMSE) relative to existing parameterizations, or the reduction in uncertainty achieved. Without such quantifiable claims, the novelty and utility of the dataset remain unclear to the reader.

3. The newly developed coastal parameterization for estimating phytoplankton size fractions (Section 2.2.2) is a key claimed contribution of this study, yet its validation and comparison with existing methods are insufficient. First, the new parameterization is evaluated against only two datasets (Tara Europa and COASTlOOC), and the reported regression slopes (0.84–0.87) deviate more from the 1:1 line than those of the Chase et al. (2020) parameterization (0.94–1.05), yet the authors conclude the new parameterization performs comparably based on slightly higher R^2 values and similar MAD/MRD. This conclusion requires a more rigorous statistical comparison, including confidence intervals, significance testing, or cross-validation. Second, the new parameterization is not compared against the Uitz et al. (2006) approach in terms of predictive accuracy for size fractions, nor is it validated against independent in situ measurements of phytoplankton size structure (e.g., flow cytometry or microscopy), which would provide a direct test of its accuracy. Third, the regional parameterizations (Atlantic vs. Mediterranean) are developed and evaluated on the same regional subsets, raising concerns about overfitting; an independent regional validation is needed. Finally, the authors should quantify the improvement of the new parameterization over existing methods in terms of error reduction (e.g., RMSE, bias) to

justify its adoption over the Chase et al. (2020) benchmark.

Minor Comments

1. Line 164, 482, 484 font problem: the font appears inconsistent with the rest of the manuscript. Please unify the formatting.

2. Line 194 double period: there are two dots at the end of the sentence.

3. Line 221 typo: "absorption" appears to be misspelled.

4. Fig. 4(b) and 10(b) density plots: these histograms could be presented as density plots to better visualize the distribution shape. Consider whether this would improve interpretability.

5. Line 362–365 and Fig. 7 units: the unit format appears to be incorrect. Please verify and correct the units in the text and figure.