Reply on RC1

Jenny Choo et al.

Author comment on "Spatial and temporal dynamics of suspended sediment concentrations in coastal waters of the South China Sea, off Sarawak, Borneo: ocean colour remote sensing observations and analysis" by Jenny Choo et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-347-AC1, 2022

Comment #1:

The approach undertaken for retrieving sediment concentrations is not new. Empirically parameterized spectral band ratio algorithms have been around for a long time. Nevertheless, this, in and of itself, is not a disqualifying factor because if the band ratio algorithm gives the best results then it does not matter that the algorithm or its basic approach is not new. However, it would have been better to see a comparative analysis of a few different algorithms. Are the same spatial and temporal patterns captured by more than one algorithm? Are there differences in the spatio-temporal patterns across various algorithms? I believe that these are important questions and, if addressed, would add significant value to the manuscript. The authors have mentioned – on page 9, above Eqn. (2) – that they tried a variety of models; however, no results are shown. It would be helpful to see results of this analysis, showing what other models were tried and how each performed.

Reply:

Received with thanks for your comments to strengthen my manuscript. I agree that it will be helpful to show the results of various model functions being tested, which will give a better insight into the performance of each model and how we come about selecting the best model. As such, the performance error metric of the various model functions (power, linear, exponential, logarithmic) has been added in Table 2 (Line 232 – 236). As a result, the content of section 2.3.2 has been slightly rearranged to fit the changes made. Thank you.

Comment #2:

In general, the description is a bit too long. There is a lot of discussion about the spatial and temporal variations in sediment concentration, with observations made regarding discrepancies from expected patterns. However, the reasons attributed to the discrepancies are presented more as reasonable conjectures rather than confirmed facts. It might very well be the case that there is not enough data to make anything more than a reasonable conjecture, and that is understandable. In this case, it would be helpful to tighten up the discussion, focusing on what is important. Do the results indicate anything new or surprising? If not, focus on the main inferences that might be of value to regional

environmental managers and decision makers, and shorten the discussion.

Reply:

Thank you for your further comment and suggestion to tighten up the discussion.

As this study presents the application of ocean colour remote sensing technologies in studying large spatial and long-term temporal changes of TSS within Sarawak's coastal areas, new observations were uncovered in how TSS distribution varies (spatially and temporally) within this region across large spatial extent since the year 2003. These observations were not available previously due to limited spatial and field coverage by conventional field campaigns. As such, we would like to highlight new observations that have been gathered from our study:

- **Study on potential TSS hotspots revealed that Lupar and Rajang coastal areas have received sustained levels of TSS input over a period of 17 years.**
- **A spatial map of the TSS coefficient of variation (CV) showed that large TSS variability was identified within the Samunsan-Sematan coastal areas (CV > 90%), which could potentially impact nearby coral reefs and socio-economic activities in this region.**
- **While it is generally understood that monsoonal influence is one of the main drivers of TSS changes, this study presents spatial maps of large coverage which exhibited substantial differences in TSS plumes between northeast (wet) and southwest (dry) monsoon periods within these coastal areas.**
- **Our temporal maps of TSS anomalies with respect to long-term TSS mean enable detection and study of TSS distribution changes annually, which provide visualization insights into the potential effects of extreme rainfall events in intensifying TSS release into coastal and open ocean waters.**

These new observations, coupled with the study on river discharge influence and TSS variability across coastal waters, present important findings to relevant authorities and regional environmental managers in enhancing coastal management and conservation strategies.

While this study presents the first observation of TSS distributions in Sarawak coastal regions, it is agreed that there is room for refinement to further tighten up the discussion. As such, changes have been made and are as follows:

- **In Section 3.2, a paragraph from Line 414-417 has been removed and added into Section 2.0 Methodologies section, under Section 2.5 "Precipitation data and computation of river discharge", as the paragraph outlines how the precipitation data was retrieved. Hence, it is more fitting to be included under the methodologies section.**
- **Paragraphs from line 437-445 in Section 3.2 has been trimmed off to strengthen the focus on the discussions of flood and drought events in driving TSS distribution.**
- **Discussions from lines 472-490 are important observations which may have been overshadowed by the previous discussions in Section 3.2. As such, these discussions (Line 472-490) have been inserted into a new sub-section - in "Section 3.2.1 Temporal TSS anomalies", to further highlight these observations in a new extension.**
- **In Section 3.4, paragraphs from lines 599-609 have been removed as these may carry redundancy to the Conclusion section.**
- **In Section 4.0 Conclusion, the line starting from 696-700 has been edited to as follows: "Overall, these coastal areas of Sarawak are dominantly categorized**

as Class I quality, which remains within local quality standards to support various marine and socio-economic activities in this region. Our findings in the southwest coastal areas (Sematan and Stamin-Sampadi) showed that the coral reefs there can be well-maintained with negligible impacts from TSS loadings.", to highlight these important observations which may be of value to regional environmental managers, authorities, and decision-makers.

A Few Minor Comments:

The manuscript is written well, in general. However, there are a few instances of minor issues with the grammar and sentence structure that need to be corrected:

1. In the Abstract, for the sentence starting towards the end of line 21, consider something like the following: "The average TSS concentration in these coastal waters was in the range of 15 – 20 mg/L".

Reply: Received with thanks on the suggestion made. The sentence has been edited accordingly.

2. In the Abstract, on line 27, "Map of relative…" => "**A** map of relative…"

Reply: Noted with thanks. It has been edited.

3. In page 7, Section 2.2, line 169, the phrase "TSS measurements data" sounds a bit awkward. Consider rephrasing it as either "TSS measurements were taken from…" or "Data of TSS concentrations were taken from…".

Reply: Received with thanks for the rephrasing suggestion. The phrase has been edited to "TSS measurements were taken from…"

4. On page 8, line 182, consider replacing "high-sun elevation angle condition" with "high solar elevation angles".

Reply: Thank you for your suggestion. The phrase has been edited accordingly.

5. On page 8, line 192, "apply regional" => "apply **a** regional".

Reply: Received with thanks for the addition of the article 'a'.

6. On page 8, lines 192 and 193, it might be better to replace "a total number of 35 TSS datasets" with "a total of 35 different datasets of TSS concentrations" in order to make it clear that you mean 35 different datasets and not one dataset with 35 data points.

Reply: Noted with thanks on the suggestion made. The sentence has been edited.

7. On page 10, line 231, "Equation (3), (4), and (5)" => "Equation**s** (3), (4), and (5)" (add an "s" to make equations plural).

Reply: Thank you for pointing out this mistake. The correction has been made.

8. On page 11, line 250, the sentence is rather awkwardly phrased. Please consider rephrasing it to something like the following: "…waters of this type do not have the same spectral characteristics as phytoplankton-rich waters" or "this type of waters is not spectrally similar to phytoplankton-rich waters".

Reply: Received with thanks for your suggestions. The phrase has been edited.

9. On page 14, line 310, the word "part" or "region" should be added in between "northeast" and "of the study area".

Reply: Noted with thanks for your suggestions. The word "region" has been added.

10. On Page 14, line 312, "temporally average" => "temporally average**d**"

Reply: Thank you for correcting this grammatical mistake.

11. On page 16, line 348, it's not clear what the authors mean by "6192 time steps" – are these 6192 images taken of the same area at different times?

Reply: Yes, these 6192 images were taken at different times in the same area.

12. On page 31, line 593, the authors probably mean figure "1**3**d", not "15d".

Reply: Thank you for correcting the mistake.

13. On page 34, line 644, "impede" => "impede**s**"

Reply: Thank you for correcting this grammatical error.

14. On page 35, line 677, "reported a low" => "reported low"

Reply: Received with thanks for the suggested correction.