Response to Reviewer's Comments

With the help of machine learning, Dr Gao et al., provides a nice dataset of weekly green tide in the Yellow Sea. Several methodology and data sources were considered. They performed a cross validation to show the quality of the generated dataset. I believe this dataset will be useful for the further studies with other purposes; for example, a joint analysis with the wind or sea surface velocity, to have a better understanding the underlying dynamics. I would like to recommend a publication after several minor revisions. I list my comments below.

1 in line 16: There should be a space between ")" and "This".

A space was added between ")" and "This" in Line 16.

2 Figure 2, 9, 11, 12: the quality of these figures are bad. Please provide a high resolution version of these figures.

High resolution versions of these images are provided in new manuscript.

3 line 140: please provide a value of "the submerged portions", for example, 0.5 meter beneath the sea surface.

The depth to which MODIS can detect underwater signals depends on several factors, including water clarity and the specific wavelengths of light being measured. Generally, MODIS can detect signals in clear ocean waters up to a depth of around 10 to 20 meters. In the Yellow Sea, the detection depth of MODIS is generally limited due to high turbidity and a significant amount of suspended sediments. Under such conditions, the effective detection depth is typically much shallower compared to clearer waters. Specifically, in the Yellow Sea, MODIS is usually able to detect underwater signals to a depth of approximately 5 to 10 meters. Ulva prolifera algae rely on the thalli's hollow tubular structure to float on the sea surface, and the submerged part does not exceed 1–2 meters (Ding et al., 2019; Gao et al., 2022). Therefore, MODIS can effectively detect green algae on the water surface and submerged portions up to 1–2 meters beneath the sea surface. Therefore, "the submerged portions" was revised to "the submerged portions of 1-2 meters".

Ding, L., and Luan, R.: The taxonomy, habit, and distribution of a green alga enteromorpha prolifera (ulvales, chlorophyta), Oceanologia et Limnologia Sinica, 40(8), 68–71, 2009.

Gao, L., Li, X., Kong, F., Yu, R., Guo, Y., and Ren, Y.: AlgaeNet: A deep-learning framework to detect floating green algae from optical and SAR imagery, IEEE J. Sel. Top. Appl., 15, 2782-2796, https://doi.org/10.1109/JSTARS.2022.3162387, 2022.

4 line 162: please remove the duplication of "the" when mention "The fifth generation atmospheric reanalysis data"

The redundant "the" has been removed. Additionally, another reviewer believes that the data quality of environmental factors such as HYCOM and EAR5 in the Yellow Sea cannot be guaranteed and suggested removing the relevant part of the environmental factor analysis. We accepted this suggestion, and the related Section 3.5 was removed.

5 line 203: please provide the full name of "VGG16"

The full name of VGG16, Visual Geometry Group 16, is provided in the introduction section when it first appeared.

6 line 206: "We used the unique physical multichannel combination of all bands of MODIS surface reflectance products as input". Is it possible to have an optimization combination of these bands? Or in other way, do we have contamination problem when all bands are involved?

The AI model can automatically assign weights to each input channel during the training process, preventing contamination issues with any physical input bands. Additionally, we can use the AI model to screen multichannel combinations through ablation experiments and determine the optimal combination.

7 line 215: "1.10 km2" should be "1.10 km^2"

"1.10 km2" was revised to "1.10 km^2"

8 line 232: "256 256" pixels should be "256×256"

"256 256" was revised to "256×256".

9 line 233: "These enhancements have ... to 85.41%". Please specific from what value to "85.41%". 我们进行了补充 These enhancements have raised the model's performance to 85.41% (see Table 2)

These enhancements have raised the model's performance to 85.41% **from past 78.58%**

10 Figure 5: "view of the white square part". But in the figure 5, it is a green square. Please correct this typo.

We modified the caption in Figure 5b: "view of the green square part".

11 line 264: "beneath a certain water depth": see comment 3. please provide a value here.

Similarly, the response to comment 3, "beneath a certain water depth" was revised to "beneath a certain water depth of 1-2 meters".

12 Figure 8: the box in the left panel is unclear.

Figure 8 (Figure 10 of the new manuscript) has been revised to make the box in the left panel clear, as shown below.

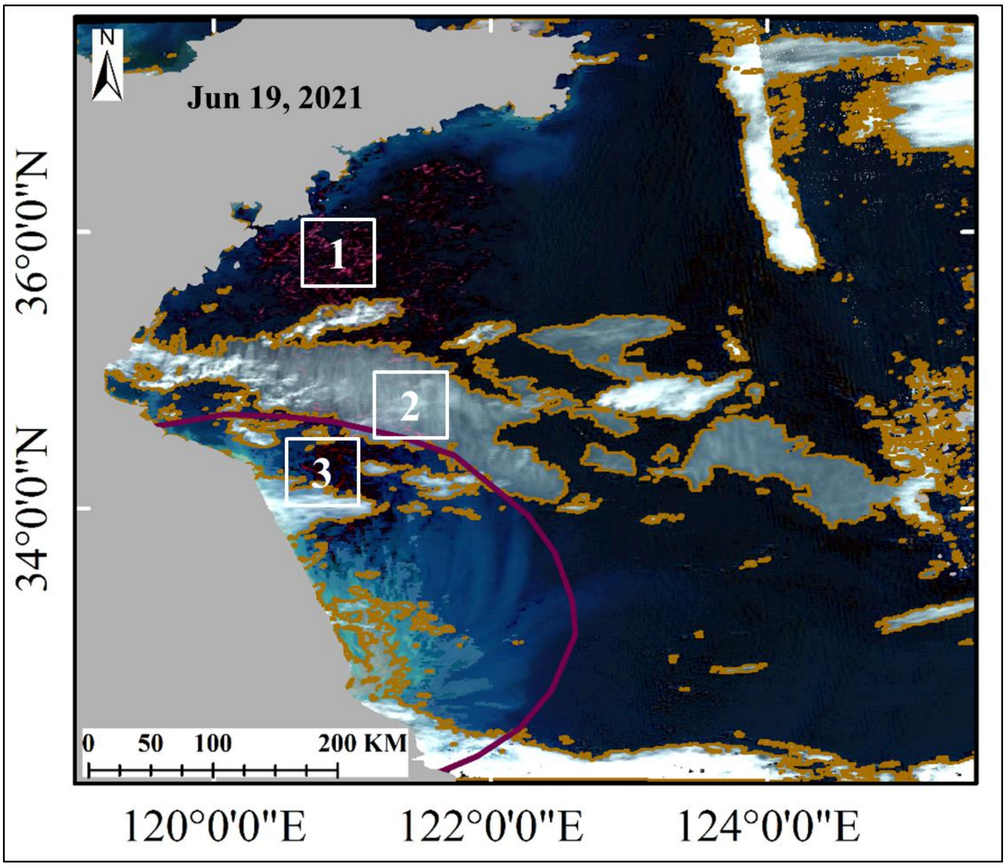

Figure 10. Green tide detection result analysis from randomly selected optical images

13 line 320: the terminology "dissipation" is used. Is it possible to find another proper terminology? This is because in the fluid dynamics, "dissipation" means something else. For example, the energy dissipation means the conversion the kinetic energy to heat.

The term "dissipation" in the full manuscript was revised to "decaying".

14 Figure 9: For a large value variation, we often use log-log plot. I strongly suggest authors to replot this figure in a log-log view to see possibility of lognormal or other distribution of areas.

Figure 9 (Figure 11 of the new manuscript) illustrates the frequency of occurrence of green algae patches of varying sizes as detected by MODIS. The data reveals that large patches (>100 km^2) are less common, while small patches (<100 km^2) occur more frequently, suggesting that the green tide in the Yellow Sea predominantly consists of smaller green algae patches. The size of these patches influences the satellite's ability to detect them. Although we attempted to replot the figure using a log-log scale to explore the possibility of a lognormal or other distribution, no clear pattern emerged. Consequently, we redrew the figure with the vertical axis in a log scale to convey the data more accurately.

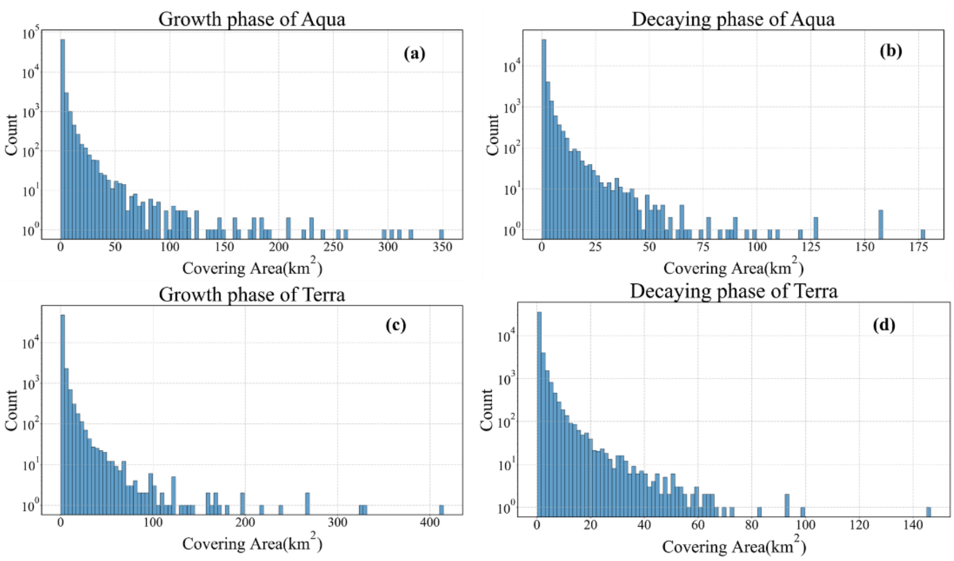

Figure 11. Statistical analysis of green algae patch size derived from optical imagery.

15 Figure 10: please keep the label of "(g)" in the same style as others.

We revised the labels and subfigure numbers in Figure 10 (Figure 12 of the new manuscript) to maintain a consistent style.

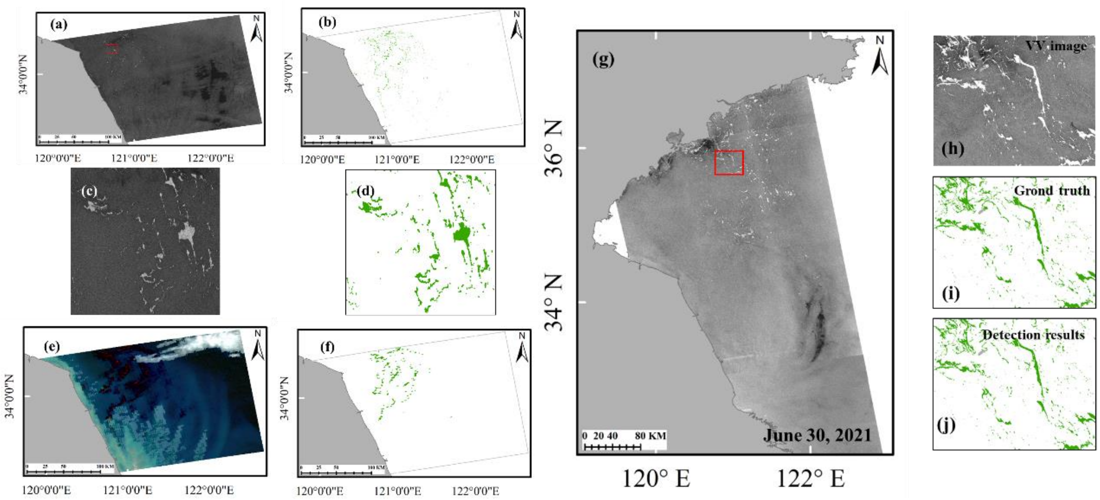

Figure 12. Randomly selected SAR image detection results on the Subei Shoal (a-f) and the entire Yellow Sea (g-j) regions. (Date: June 22, 2018, and June 30, 2021).

16 Figure 11: R^2=1 and RMSE=0 seems too good to be true. Please double check this result.

Figure 11 in previous version shows two methods for calculating the monthly average green tide coverage. Their completely consistent results are expected and confirmed because their data sources are identical, both using daily green tide coverages, and the weekly product is also derived from daily data fusion. The only difference is that one method uses a weekly product derived from our daily data fusion, while the other method directly uses statistical daily data.

The first method is to count the number of pixels based on the distribution of green tide coverage provided by the weekly product we released, and then directly calculate the average green tide area for each week. The second method is to first count the area of daily green tide coverage pixels for each day, and then average all daily areas within a week to get the weekly average green tide area.

The difference between the two methods is that the former (the weekly product we released) provides both the coverage and distribution of green tides, as well as the green tide area for this coverage, while the latter only provides the overall green tide area for each week (a specific number) without indicating the actual distribution of green algae.

Another reviewer felt that this comparison was not very meaningful. Therefore, to avoid ambiguity and follow the suggestion of another reviewer, we have removed previous Figure 11 and Section 3.2.1 from new manuscript

17 line 370: the Gompertz curve model is used to fit the data without further justification. Please provide more comments here.

The Gompertz curve model is a widely used mathematical model for describing growth processes and has been particularly effective in modeling biological phenomena, such as population growth, tumor growth, and the spread of diseases. Its applicability extends to various domains where growth initially accelerates rapidly but then slows down as it approaches an asymptotic limit. The growth process of Yellow Sea green tide outbreaks also meets these characteristics. The decaying process of the green tide can be seen as the reverse process of the growth stage. Previous studies have demonstrated a good empirical fit to other similar types of data, including green tide data (Winsor, 1932; Xu et al., 2023).

Winsor, C.P. The Gompertz curve as a growth curve. Proc. Natl. Acad. Sci. USA 1932, 18, 1

Xu S, Yu T, Xu J, Pan X, Shao W, Zuo J, Yu Y. Monitoring and Forecasting Green Tide in the Yellow Sea Using Satellite Imagery. Remote Sensing. 2023; 15(8):2196. https://doi.org/10.3390/rs15082196