

**RC2: Comment from Anonymous Referee #2:**

**Publisher's note: this comment was edited on 6 May 2025. The following text is not identical to the original comment, but the adjustments were minor without effect on the scientific meaning.**

Thanks for the note! We hereby provide responses to the newest version of comments.

**Comments: This is a very interesting work with results showing the benefit of using directional wave spectra from wave scatterometer SWIM of CFOSAT. The paper focuses on the development of a parametric wave spectrum that includes an enhancement parameter depending on sea state conditions such as wave steepness, wave age, and wind. The use of L2 SWIM spectra allows for the adaptation and calibration of this enhancement parameter. Validation of the established combined spectrum, in comparison with other parametric wave spectra (Goda and El-fouhaily) and NDBC buoys and SWIM observations, demonstrates more consistency with observations from C spectrum and opens very interesting perspective of using the combined spectrum for remote sensing applications. The analysis is well detailed, taking into account the variability of parameters describing sea state. I would recommend to authors to outline in the conclusions a room of improvement related to using wind speed from observations instead of model's one, which include uncertainties in some key ocean regions.**

**The paper is well-written, and the sections are clearly defined. Below are some comments to improve reading the text and also points to clarify :**

**Reply:**

We sincerely appreciate the positive feedback and constructive suggestions for improving our manuscript from the reviewer. We have included a sentence in the conclusion following this suggestion, as the last sentence in the last paragraph has been modified from: "...and is our further research based on the established C spectrum." to "...and is our further research based on the established C spectrum, when the collocated measured wind will be applied for better characterize the observed scene".

Below are responses to the specific comments:

**1. figure 4 a, b and c are not indicated on figures, you can just mention left, middle and right**

**Reply:** Thanks a lot for this correction. To keep consistency with other figures with sub-plots, we have added (a), (b), and (c) labels to each panel of Figure 4 in the previous manuscript(Figure 5 in the revised manuscript, as one figure has been included according to the comments of another reviewer). From here we also notice the same problems exist for Figure 2 and Figure 3 in our previous manuscript, the sub-plots are also labeled accordingly. (Figure 3 and Figure 4 in the revised manuscript)

**2. figure 7 & 8 : more comprehensive title, for instance validation of  $R^2$  and DI from C and G spectra.**

**Reply:** Following this suggestion, we have revised the titles of Figure 7 and Figure 8. As the figure number has also been changed due to inclusion of another figure according to another reviewer's comment, the annotations are changed from: "Figure 7: This is the comparisons of the validation index of E spectrum with C spectrum, (a), (c), (e) is DI of height, curvature and slope spectrum, (b), (d), (f) is  $R^2$  of height, curvature, and slope spectrum." and "Figure 8: This is the comparisons of the validation index about G spectrum with C spectrum with SWIM in 2022, (a), (c) is DI of height and curvature spectrum, (b), (d) is  $R^2$  of height and curvature spectrum." to: "Figure 8: Validation of DI and  $R^2$  Metrics from C and E Spectra with SWIM in 2022, (a), (c), is DI of height and curvature spectrum, (b), (d) is  $R^2$  of height and curvature spectrum" and "Figure 9: Validation of DI and  $R^2$  Metrics from C and E Spectra with SWIM in 2022, (a), (c), is DI of height and curvature spectrum, (b), (d) is  $R^2$  of height and curvature spectrum".

Similar modifications were also made to the previous Figures 9 and 10, The titles are changed to "Figure 10: Validation of DI and  $R^2$  Metrics from C and G Spectra Comparisons of the validation index of G spectrum and C spectrum with buoys, (a), (c) is DI of height and curvature spectrum, (b), (d) is  $R^2$  of height and curvature spectrum." And "Figure 11: **Validation of DI and  $R^2$  Metrics from C and E Spectra** with buoys, (a), (c) is DI of height and curvature spectrum, (b), (d) is  $R^2$  of height and curvature spectrum."

### **3. Line 330 : there is a typo on this line "better than G spectrum" I guess.**

**Reply:** Thanks again for pointing this. We have corrected the typo. Now this sentence has been changed from "Results indicate the C spectrum has a good fit with NDBC buoy measurements than the C spectrum." to "Results indicate the C spectrum has a better fit with NDBC buoy measurements than the G spectrum."

### **4. Figure 9 & 10 : same remarks as for figure 7 and 8, you can remove the "this is the comparison", put just the title.**

**Reply:** We have simplified the titles as suggested, removing "This is" in the annotation of Figure 7, 8, 9 and 10 of the previous manuscript to make them more concise. See also the reply to comment 2 here from RC2.

### **5. Line 420: rephrasing "higher proportion superiority"**

**Reply:** This sentence has now been modified from "The evaluation indexes of the C spectrum model show the highest proportion of superiority, indicating that the C spectrum is closer to the measured data compared to the G and E spectra." to: "The evaluation indices of the C spectrum model show the superior performance, indicating that the C spectrum is closer to the measured data compared to the G and E spectra."