

# Can satellite altimetry observe coastally trapped waves on sub-monthly timescales?

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**Does the paper address relevant scientific questions within the scope of OS?**

Yes, the manuscript addresses the capacity of new altimetric products to detect CTW signals at periods shorter than 29 days, a challenging task for existing altimetry products. Observing coastal sea level is crucial for understanding variability along the coast.

**Does the paper present novel concepts, ideas, tools, or data?**

Yes, the study used the new MIOST dataset, which includes SWOT altimetric satellite measurements.

**Are substantial conclusions reached?**

Yes, the results indicate that including SWOT data enhances the ability to capture coastal signals.

**Are the scientific methods and assumptions valid and clearly outlined?**

The scientific methods are clearly described. However, further clarification and adjustments may improve certain analyses.

**Are the results sufficient to support the interpretations and conclusions?**

More details are needed regarding the statistical significance of results. An analyses on CTWs associated spatial patterns would be nice to show the improvement of the inclusion of SWOT in altimetric DATA in the representation of fine scale cross-shore structures .

**Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?**

The methodology is well described.

**Do the authors give proper credit to related work and clearly indicate their own new/original contribution?**

Yes, the author appropriately cite related work and clearly distinguish their contributions.

**Does the title clearly reflect the contents of the paper?**

Yes, the title accurately reflects the content of the paper.

**Does the abstract provide a concise and complete summary?**

Yes overall the abstract provides a concise summary but could include the different used altimetric products and mentioned SWOT.

**Is the overall presentation well structured and clear?**

The manuscript is well-structured but requires additional clarification in some sections.

**Is the language fluent and precise?**

The language is mostly fluent and precise, but minor improvements could enhance clarity.

**Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?**

Yes, mathematical expressions, symbols, abbreviations, and units are correctly used.

**Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?**

I Answer this in the specific comments.

**Are the number and quality of references appropriate?**

Yes , it is appropriate.

**Is the amount and quality of supplementary material appropriate?**

Yes , it is appropriate.

The manuscript evaluates the capacity of new altimetric products which include new satellites especially SWOT which measures sea level along 2D swath, and new processing techniques to capture Coastal trapped waves (CTWs) signal at submonthly time-scales. The author describes the methodology and applies statistical analysis ( correlations and Empirical Orthogonal function decomposition ) to assess the different products and found that the submonthly signals are overall well detected by altimetry. This manuscript presents a valuable analysis of new altimetric products for capturing CTWs. However, several aspects require further clarification and refinement. Hereafter the specific comments. I think addressing these points will strengthen the manuscript and improve its impact.

## **Introduction**

- To improve clarity, I suggest reorganizing the introduction into two distinct paragraphs:  
A discussion on CTWs as the primary study objective, emphasizing the importance of accurately representing CTWs and a description of the different altimetric products (MIOST with and without SWOT) to avoid repetition and potential confusion.
- Additionally, it would be helpful to include an outline of the paper at the end of the introduction.

## **Data**

### *Tide Gauges :*

How many tide gauges were excluded?

### *Altimetry :*

Introducing the different products at the beginning and specifying their names would improve clarity.

### *Lines 82–85:*

Does the inclusion of SWOT in the MIOST product significantly affect the dataset compared to DT2024 in the study region during the scientific phase? Specifically, does it affect spatial patterns ? To address this in the results, it would be helpful to add snapshots of a CTW event.

## **Methods**

*Section 3.2 :* This paragraph may not be necessary, as the method is well-known.

*Section 3.3 :* This section may also be unnecessary.

## **Results and Discussion**

### *Time series :*

I think that conducting a spectral analysis of the unfiltered time series would be useful to quantitatively compare the different products and support the affirmation in line 145-146. Figure 2 and 3 could be also combined.

### *Correlations ( Figure 4) :*

- Are the correlations shown statistically significant, particularly offshore? Some correlation values on the shelf appear to be of the same magnitude as those offshore. Applying a mask could help focus on shelf values.
- Could the lag provide an estimated CTW period? Is this period consistent with those observed in the Hovmöller diagrams?
- Additionally, the continuous colorbar makes it difficult to discern correlation values.

#### Section 4.3 :

- Can you indicate the track used for the Hovmöller diagram in Figure 1 for more clarity. Does selecting a more offshore track affect CMES and MIOST results (Line 189)?

- Lines 186–187 : that can be move to the figure caption.

#### Phase Speed Computation :

- The computed phase speed appears to be underestimated since the dashed line does not cross SLA maxima for BLUELINK, and the maxima are difficult to identify in CMES data. I was wondering how does the Radon transform method compute phase speed in the absence of a clear propagation pattern?
- Is the phase speed computed only for the first propagation, and does it remain consistent with subsequent propagations? For example, the CTWs propagating between 10/15/2023 and 11/01/2023 seem better captured by MIOST and CMES. Do these waves share the same phase speed?
- I suggest to compute SLA lagged correlations along the track from a reference point (e.g., Bermagui) . Then, estimate phase speed using a distance vs. lagged correlation plot.

#### EOF Analyses:

- Using EOFs to study CTWs might introduce biases, as the same propagation pattern could be projected onto different modes of variability. To better capture propagative patterns, consider using complex EOFs.
- How does the other EOFs modes appear?
- Consider presenting EOFs results in a "Hovmöller aesthetic," with distance on the x-axis, days on the y-axis, and EOF amplitude in color. This could help reduce figure size and enhance clarity.
- Merging Figures 6 and 7 may also be beneficial.

#### CTW characterizations:

I think the paper lacks a clear description of the CTWs observed in terms of period and spatial patterns. You could apply a complex EOF analysis on offshore-masked maps to estimate wave wavelengths and phase. Or Adding snapshots would illustrate how different products reproduce spatial patterns associated with CTWs.