Please, find the review of the manuscript entitled ”WAPOSAL: A Multi-Regional Wave Dataset from Satellite Altimetry for Significant Wave Height, Period Estimation, and Wave Power Density”.

This manuscript presents the satellite altimeter dataset. The authors develop a high-resolution wave dataset derived from Sentinel-3A/B and CryoSat-2 SAR altimetry, providing significant wave height (Hs), estimated zero-crossing wave period (Tz), and wave power density (WPD) across 11 coastal and oceanic regions. The dataset addresses the gap between sparse buoy observations and numerical model limitations, particularly in coastal environments.

The manuscript is clearly written, however methodology requires clarification. Below are my comments and questions:

1. I suggest the authors to discuss potential limitations in regions where validation relies solely on ERA5 rather than in situ measurements, and the implications for confidence in those areas.

We thank the reviewer for this valuable comment. We agree that validation against in situ wave buoy measurements is preferable, while ERA5 data serve as a practical substitute due to their global coverage and availability. We have added a statement to this effect in the manuscript, together with references reporting comprehensive validations of ERA5 wave parameters against buoy observations.

Validation studies of ERA5 significant wave height have shown good agreement with buoy measurements (V. Bessonova et al., 2025, https://doi.org/10.1016/j.apor.2025.104490; A. Anusree and V. Sanil Kumar, 2024, https://doi.org/10.1016/j.dynatmoce.2024.101478). These studies indicate that ERA5 generally underestimates significant wave height during extreme wave conditions. They also show that ERA5's accuracy improves with increasing distance from the coast, while changes in water depth have only a minor effect on its performance.

The consistency of ERA5 wave period estimates with buoy observations has also been evaluated by V. Fanti et al. (2023, https://doi.org/10.1038/s43247-023-00819-0), who compared ERA5 peak and mean wave periods with buoy measurements and found good agreement, confirming the reliability of ERA5 wave period data for wave climate studies.

Accordingly, although direct validation using buoy observations would be preferable, the published literature provides strong evidence that ERA5 wave parameters are sufficiently accurate for the purposes of this study.

2. The methodology is based on the deep-water approximation (eq. 2 in the manuscript). The limitations of this approach should be discussed, including how they may influence the results. We thank the reviewer for this insightful comment on the applicability of the deep-water formulation for wave power density in a study focused on coastal regions. We fully agree with the reviewer's comment. The deep-water formulation is strictly valid only when the water depth exceeds half the wavelength. In the revised manuscript, we have clarified this assumption and explicitly discussed its implications.

We acknowledge that for longer-period swell waves, the deep-water assumption may not be strictly valid in parts of the shelf, where intermediate-depth conditions can occur. This may lead to a moderate overestimation of wave power density when the deep-water formulation is used. We have therefore revised the manuscript to explicitly state the deep-water assumption and discuss the potential bias introduced by neglecting finite-depth effects. Future work will address this limitation by implementing finite-depth formulations of wave power density, using high-resolution bathymetry and numerical wave models to enable a more accurate assessment near the coastline.

3. There are several approaches to estimate wave period using altimeter data, for instance (Mackay et. al. 2008, 10.1029/2007JC004438), (Badulin el.al. 2014 10.1002/2013JC009336). Please, justify why the method (Gommenginger at. al. 2003 10.1029/2003GL017743) was chosen.

We thank the reviewer for this valuable suggestion. We have added a review of existing methods for estimating wave period to the manuscript. The method proposed by Gommenginger et al. (2003, https://doi.org/10.1029/2003GL017743) was selected for its simplicity and practicality. In particular, it allows regression coefficients to be derived individually for each wave buoy and then interpolated to regions where buoy observations are unavailable. We have added a discussion of the rationale for this choice and its advantages in the revised manuscript.

4. Please, clarify if for obtaining the equation for wave period and for validation the same buoys are used, or a group of buoys in each region is used to develop the model and another one to validate it.

We thank the reviewer for this comment. We used data from all available wave buoys to both derive the regression coefficients and evaluate the proposed method. Because the number of available buoys is limited, we included all buoy locations in the analysis to maximize the training data. The complete dataset was then split into training and validation subsets to ensure an independent assessment of model performance. We have clarified this procedure in the revised manuscript.

5. The energy wave period is calculated as Te=1.18Tz, however in fact wave period ratio is not constant (Cahill, 2014.). Please discuss the limitations of this approach and possible ways to solve this problem.

We thank the reviewer for this important comment. We investigated the regional and seasonal variability of the wave period ratio, Te/Tz, along the European Atlantic coast using data from the SWIM radar onboard the CFOSAT satellite. Our analysis showed that in the North Sea, where wind waves predominate, a value of Te/Tz=1.18 is appropriate. In contrast, in regions exposed to Atlantic swell, where mixed sea states dominate, the ratio reaches higher values, up to 1.32 in winter. These results indicate that using a constant value of Te/Tz=1.18 may underestimate wave power density in swell-dominated regions. Therefore, SWIM radar observations have the potential to improve wave power density estimates derived from satellite altimeter measurements by providing regionally and seasonally varying Te/Tz values. This represents a promising direction for future research.