Review of manuscript – egusphere-2025-2285

title: Wave-driven amplification of surf-zone bottom stress on rough seabeds.

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1 Major comments

1.1 Alongshore velocity V

The paper does not present any information on the alongshore component V of the velocity (magnitude, direction or variability), and how it compares with the cross-shore component U. Is the magnitude of V just very small compared to the magnitude of U?

Since the alongshore direction is part of equations (5) and (6), which are essential to the paper, V must be discussed in the paper. Furthermore, I am worried that the ADVs do not give accurate V because of flow distortion by the frame and alignment of the ADV's bodies in the alongshore direction.

1.2 Reflection

Wave reflection is brought up a few times (lines 97-98, 140-142, and 294), and motivates computing wave statistics based on the directional wave spectrum. However, there is no mention of how large wave reflection is at this site. How large is reflection? Have you also computed the momentum balance from wave statistics based on frequency(-only) spectra and do the results look significantly different? Could you recommend to the reader whether computing wave statistics based on the signal of incident waves alone is essential to get results you got?

1.3 Definition of near-bed velocity data point

I don't understand the velocity data point in (i), lines 104-106. There might be a more comprehensive explanation in Sous et al. (2024), but the current manuscript should include a clearer explanation of data point (i).

1. Data point is the one closest to the seabed, but it is not clear what height that corresponds to. What is the height of "two times the standard deviation of the fine seabed topography"?

2. What is the reasoning for placing the average between $\overline{U_t}$ and $\overline{U_b}$ *below* the heights of the bottom-most measurement instead of the average height?

3. If you are taking an average, shouldn't data point (i) be irrelevant for the parabolic fit because the average is a linear combination of $\overline{U_t}$ and $\overline{U_b}$?

2 Minor comments

1. Numerical simulation: Please indicate in Section 2.2 and/or 3.2 the correspondence between the field site and the geometry of the domain in the numerical simulations. Since your field site is described as a rocky platform, it appears that the flat region in numerical simulations O1-O3 would represent your field site (which is not the case).

2. l. 5 and 23: Except for these instances, the word "roughness" refers to the shape of the seabed. Because the word refers to a geometrical property, "well-developed seabed roughness" is confusing.

3. l. 9-10: You contrasted "lower mean water level" with "setup". I suggest rewriting to either contrast setdown with setup, or lower mean water level with higher mean water level.

4. l. 9 and 248: Here you wrote "while under saturation breaking conditions". This wording is a bit confusing because "undersaturation" is a scientific term in itself, I suggest rewriting, where you could use "in conditions of depth-limited wave breaking saturation".

5. l. 31: Rewrite "rough experiments". Perhaps laboratory experiments simulating rough seabeds?

6. l. 35: The word "water" here is unnecessary.

7. l. 73: Word "with" appears twice.

8. l. 79: It is stated that 4 pressure sensors were deployed, and the identification numbers are P9 to P13, which implies that 5 sensors were deployed. Please rephrase the sentence or change instrument identification to avoid confusion.

9. l. 92-93: Could you add a couple .

10. l. 173: Based on Fig. 2, isn't it better to say wave event in the singular?

11. l. 179: The terminology in parenthesis is swapped between ADV_t and ADV_b.

12. Section 3.1.2: When referencing the dots in Fig. 3, specially when differentiating between the frictional terms, I suggest referencing the color of the dots in parenthesis after referencing te corresponding term – e.g., in l. 191, write Using the wave-averaged current (blue dots in Fig. 3).

13. l. 209: commas misplaced and confusing

14. l. 210: typo. Should be "where it has been".

15. l. 256: Missing parenthesis around the Feddersen et al. reference.

16. Fig. 3: To improve the figure, add a horizontal line in the background along the coordinate 0 in the ordinate.

17. Figs. 4 and 6: Replace symbols U' and U_{m} used in these figures to match the body of the manuscript (U_{std} and U_{avg}).

18. Fig. 5: I recommend using a divergent red-blue colormap. Replace Hs with H_{m0} because you use the latter throughout the paper.

19. Section 3.1.3: If I understood correctly, $U_{avg} > 0$ can only happen at times when at least either $\overline{U_t}$ or $\overline{U_b}$ are greater than 0 in Fig. 2D. From this figure, this only happens for tiny magnitude of U_{avg}. Therefore, it seems the errors for the corresponding data points in Fig. 4A (i.e., in the onshore regime) should be very big. Remarkably, Figs. 4A and 4C show the results from the onshore case are reasonably consistent with expectations. Please either remove these data points if you think they are not reliable, or add a word of caution regarding the fit to these observations at $U_{avg} > 0$.