

Interactive comment on “A new roughness parameterization accounting for wind-wave (mis)alignment” by Sara Porchetta et al.

Anonymous Referee #1

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This paper analyzed two large datasets of the atmospheric surface layer turbulence measurements and the underlying ocean waves. The authors attempt to come up with a new parameterization for the momentum roughness length z_{om} . The work is very interesting and the datasets are valuable for people interested in air-sea interactions. There are a few points that the authors may want to consider to improve the manuscript:

1. P2, line15, one relevant recent paper you could refer to is : Li, Qi, et al. "Signatures of Air–Wave Interactions Over a Large Lake." *Boundary-Layer Meteorology* 167.3 (2018): 445-468.
2. P4, " should be function of the wave age and proposed Eq. (10) for the Charnock parameter." should be A function of the wave age ...

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3. Throughout the paper, the authors are using roughness to mean roughness length z_0 , which I find the single word 'roughness' is uncommon and it's better to refer to z_0 as roughness length.
4. As for the parameterization, would you clarify "This new roughness parameterization, including the alignment of the wind and wave direction, reduces the scatter around the Drennan et al. (2003) parameterization considerably." on page 16? Which figure shows the reduced scatter? i.e. do you mean plotting $\log(z_0/h)$ vs. u^*/c_p and for each different wind-wave angle?
5. For the new parameterization, how to infer if an upward momentum transfer occurs? i.e. using the new parameterization in large-scale models and the Monin-Obukhov Similarity Theory, we can compute u^* , but we still do not know its direction. Can the authors comment on that?
6. Discussions about the validity of Monin-Obukhov similarity theory under swell condition: such as in Smedman, A., et al. "Observational study of marine atmospheric boundary layer characteristics during swell." *Journal of the Atmospheric Sciences* 66.9 (2009): 2747-2763. There could be discussions of whether a roughness length is even a valid concept when swell is present. Even though this is not central to your research, it would be good to address such points.

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