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Atmospheric Chemistry and Physics
Discussions

Interactive comment on "Characterization of the air-sea exchanges mechanisms during a Mediterranean heavy precipitation event using realistic sea state modelling" *by* César Sauvage et al.

Anonymous Referee #2

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This paper describes how to directly add the impact of ocean waves in the parameterisation of the aerodynamical roughness length scale used by an atmospheric model to prescribe the momentum exchange between the atmosphere and the sea surface. A single case study is then used to illustrate the impact on short range prediction of a heavy precipitation event. This type of work is not entirely new as I would encourage the author to refer to Peter Janssen book (Janssen 2004), which clearly supports the concept of two-way active coupling between an operational atmospheric model and a wave model. What is novel and worthy of publication is the WASP parameterisation.

For this reason, the actual expression of A and B would be a very good addition to the paper. However, the authors need to explain a bit more their choice of the WASP parameterisation, rather than using the Charnock values that WW3 can produce. A comparison of the WW3 Charnock and the WASP counterpart will be required and any major differences would need to be justified. Anemometers mounted on buoys are rarely at 10m height. Nothing is mentioned regarding the adjustment of the buoy winds to 10m. The discussion regarding the bias reduction of 10m winds is only relevant if the buoy winds have been adjusted to 10m. Revise the manuscript accordingly. The peak wave period is not a very stable quantity in situation of multi peak wave spectra. In the Mediterranean Sea, it is not too often the case, but over open ocean conditions, this is more often the norm. How would the WASP parameterisation deal with such situation? Is Tp computed from the full 2D-spectrum? Should one instead only determine Tp from the windsea part of the spectrum? Obviously, this paper is only a one case study. It has focussed on short range forecasts. This needs to be clearly highlighted and discussed. In Janssen (2004), the impact of the coupling to waves is shown to be even more important at longer lead time. In the final section, it is discussed that ocean waves have an impact on the momentum flux across the air-sea interface. However, according to Janssen and Bidlot (2018), waves might also impact on the latent and sensible heat fluxes https://doi.org/10.1016/j.piutam.2018.03.003 https://www.sciencedirect.com/science/article/pii/S2210983818300038

Minor corrections: At a few places: biais -> bias P2, line 26: waves, known as sea spray, occurs -> waves occurs, generating sea spray P3, line 2: add Janssen 2004 P4, line 9: the adjustments of Bidlot et al. are only relevant if you use ST3, otherwise with ST4, there is an all new prescription of the whitecap dissipation that does not use Bidlot et al. P5, in (7), the first term is the Charnock relation, the second term is the viscous contribution to z0. See Beljaars, A. C. M. (1994). The parametrization of surface uxes in large-scale models under free convection. Q. J. R. Meteorol. Soc., 121, 255{270.

P5, line 28: the Charnock parameter is -> the surface roughness is P6, line 15: to an untrained person, the relation between Tp and Ua would appear to be not correct. Truly speaking, one can find a relation between Tp $\sim$ c * Ua/g, with c non dimensional and from empirical fetch relation find that for a typical non dimensional fetch c $\sim$ 5, hence why one can simply write Tp $\sim$ 0.5 Tp P8, line 7: well represents -> represents well P8, line 8: It also can be noticed a delay -> Also, there is a delay P14, line 18: In this purpose -> For this purpose P14, line 21: coupled way -> coupled mode P14, line 30: affected all the event – affected during all the event

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