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Interactive comment on "Vertical Structure of Ocean Surface Currents Under High Winds from Massive Arrays of Drifters" *by* John Lodise et al.

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Dear John,

Fabrice has sent some comments to me by email (he had waived his anonymity earlier). He apologizes for the delay because of other commitments. It would be great if you could consider these when revising your paper.

Thanks, Ilker

Comments from Fabrice:

General comments: The modifications generally go in the right direction.

On the drifter velocity vs water velocity, there is no way that eq. 1 can be generally valid

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Discussion paper

in the presence of waves, because the momentum in the wave field is not confined to a layer, but instead connected throughout the water column by the vertical structure of the waves (see also Ardhuin et al. 2008, 2018 for further discussion). I thus insist that the authors distinguish between the drifter velocity and the current velocity. As a result waves drive streaming flows in boundary layers (e.g. Longuet-Higgins 1960) and a very thin film of oil can be accelerated to a much larger velocity than just the average of the Stokes drift across its thickness.

There are other still unclear aspects. The authors state in their reply "We've added a new Figure (Fig. 4) to the manuscript to provide wave validation[..] showing significant wave height, mean wave direction, wavelength, and mean wave period." This misses the point of my question: is the model any good for Stokes drift? That requires taking the wave spectra from the buoy and computing the integral weighted by the frequency cubed.

Page 2 line 24: " the upper 1 m" is only true for frequencies around 16 Hz. Multi-frequency radars, or using other peaks than the main Bragg peaks can provide vertical current shear (Ivonin et al. JGR 2005)

such that vertical shear within this depth is not detectible in the measurement (Stewart and Joy, 1974; Röhrs et al. 2015).

@ARTICLE{Longuet-Higgins1960, author = "Michael S. Longuet-Higgins", title = "Mass transport in the boundary layer at a free oscillating surface", journal = JFM, volume = 8, pages = "293–306", year = 1970, KEYWORDS={mass transport;Stokes drift;viscosity}, }

@ARTICLE{Ardhuin&al.2008b, author = "Fabrice Ardhuin and Alastair D. Jenkins and Kostas Belibassakis", title = "Comments on 'The Three-Dimensional Current and Surface Wave Equations' by {George M}ellor", journal = JPO, volume=38, pages="1340–1349", doi="10.1175/2007JPO3670.1", year = 2008, }

@ARTICLE{Ardhuin&al.2017c, author = "Fabrice Ardhuin and Nobuhiro Suzuki and James C. McWilliams and Nori Aiki", title = "Comments on “A Combined Derivation of the Integrated and Vertically Resolved, Coupled Wave-Current Equations”", journal = JPO, volume=47, number=9, pages="2377–2385", doi="10.1175/JPO-D-17-0065.1", year = 2017, keywords={3D wave-current}, }

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