

Referee comment on “*A data-driven wind-to-current response function and application to Ocean surface current estimates*” 2025, Clément Ubelmann et al.

Submitted by Jack Reeves Eyre
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Overview

This manuscript presents an empirical method to calculate a response function of ocean surface current to near-surface wind. Such a function can then be used to estimate the surface current resulting from any arbitrary wind forcing. In this case the response function varies only with latitude and season, but is still able to capture a significant fraction of the current variation observed with drifting buoys.

The paper is a significantly amended version of an earlier submission, and the changes have improved the paper. In particular, I commend the authors on much clearer dataset descriptions, as well as clearer mathematical notation and improved physical interpretation. I recommend publishing after minor revisions.

Minor comments

Line numbers refer to the version with tracked changes.

Line 36: Please say what kind of application “(e.g. Shrira and Almelah, 2020)” is.

Line 37: “... but also for practical and societal...”. I suggest this should be a new sentence, to avoid a long and slightly awkward sentence.

Line 99: Unclear what “hourly mean and output frequency” means. Please clarify.

Figure 2: Y-axis units needed.

Lines 233-234: I would recommend adding another equation to spell out “from the adjoint of the linear operations in Eq. 13 and from the adjoint of the convolution Eq. 6.”

Line 245: A word is needed between “phase” and “quite accurate”, or rearrange the word order.

Line 272: “Except for the CMEMS MOB-TAC...inertial band.” I think you are saying here that the CMEMS MOB-TAC is an exception from the previous sentence (“phases ...are correct”). However, it is quite ambiguous because it isn’t a full sentence. I would suggest something like “One exception to this is the CMEMS MOB-TAC... inertial band.”

Line 289” “short time wavelength” is a confusing phrase. Do you mean “short period”?

Line 293: “proposed” does not seem like the right word here.

Figure 7 caption: Is the averaging simple (linear in latitude) or area-weighted?

Figure 8 caption: Seems to be missing description of upper right panel. Some detail on the different lines would be helpful here (I know it is mentioned in the text elsewhere). The description of the lower panels does not seem consistent with the figure. The real-imaginary plane does not seem to be part of this figure. Maybe a copy-paste error?

Line 366: “... some wind-driven surface current...”. “Some” is a bit vague here – does it mean in some places/seasons, or some component of?

Line 386: Might be nice to remind readers of the “reduced space” here - maybe like “reduced space (capturing only latitude and seasonal cycle)...”.