Nonlinear Processes
in Geophysics

Discussions

EGU

Interactive comment on "Retrieval and assimilation of velocities at the ocean surface" *by* Jordi Isern-Fontanet et al.

Anonymous Referee #2

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General coments:

The paper cannot be published in its present form. Major corrections are required.

The paper presents a valuable review of the state of the art of two different topics:

âẮc Retrieval of non-coastal ocean current information derived from satellite data âẮc Assimilation of HF coastal current in operational ocean models

The contents are generally well explained, and demonstrate a very good knowledge of the authors in the topics. Furthermore, given the importance of the problems treated, and the difficulty to obtain this kind of updated information on the state of the art, the idea behind the paper is valuable.

Nevertheless, the paper has some important problems that should be tackled to fully

unleash its potential.

Specific comments:

1) There is a clear lack of connection between the two main sections of the paper. One is dealing with global non-coastal currents derived from altimeter, while the other is dealing with data assimilation, but only from coastal HF radar currents. These two topics could be perfectly in separated papers. It is necessary to provide more coherence to the paper to avoid the feeling of two different papers pasted together. The easiest way would be to review the state of the art of assimilation from global currents into numerical models... but unfortunately, that authors already claimed that there is no successful exercise in this line. Another possible link is to review any possible work comparing altimeter derived data with HF currents, providing a link between these two worlds. If all the previous fails, the authors should reflect this dual nature of the paper both in the title and in the introduction, or split in two the paper.

2) Section 2 is failing to provide a pragmatic and consistent overview of the usefulness and validity of the techniques that are being described. For example, for some techniques the limitations are explained in much more detail than for others. It would be highly valuable to define, in a systematic way, the expectations of each technique, as well as its limitations in terms of accuracy, capability of deliver timeliness information, spatial resolution, etc...

In this sense, and being a review paper, it is obvious than additional information should be included on the pros and cons of these techniques when compared to the other main source of current information, the operational forecast models.

Finally, given the nature of the paper (a review by experts) some insight should be included on the value of the present techniques to address different specific problems, that at the end are linked with different spatial and temporal scales. Maybe some of the techniques are not valid for some uses like, for example, oils spill forecast, but could be very useful to derive a climatology. This is never addressed, and is vital.

A possible solution to most of these problems could consist on a table explaining, for each one of these techniques, the status of development, limitations and possible uses.

3) Inertial currents are in some occasions and during given time windows the main contribution to ocean currents. Nevertheless, seem like the different retrieval methods are not able to deal with this component. If this is the case, additional assessment should be included.

4) The mathematical formulation in section 2 seems to be in some occasion excessive and unjustified by the text (i.e. reference to Rossby number to define what is geostrophic and ageotropic contributions. Another point where this can be observed is in the description of ageostrophic velocities that lead to expression 16. This formula is obtained just to inform the reader some lines further than the connection is done in practice by adjusting with surface drifters.

5) Section 2.3 seems disconnected with the rest of the chapter. It is not retrieving currents, but providing streamlines. I recommend to move it to the end of section 2, including it as a part of section 2.4 (that would be converted in 2.3), and be treated as a bonus derived from analysis of data imagery (not a as a current retrieval method with its own section)

6) Section 3 should improve the information on how much improvement is expected from the different data assimilation methods. For example, it is stated that some methods improve the position of the fronts, but it is no explained properly how much. In this sense, selected figures with results should be include in a paper of this nature, providing both a more pleasant reading experience and a better insight of the benefits derived from data assimilation.