

Review of

Towards high resolution mapping of 3D mesoscale dynamics from observations: preliminary comparison of retrieval techniques and models within MESCLA project.

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Recomendation

In my opinion, this paper is interesting and timely but results are still too preliminary to be published. Therefore, **I would not recommend it for publication in Ocean Science in its present state.** On the contrary, I encourage the authors to resubmit it when they will have maturer conclusions.

Overall evaluation

Principal Criteria	
Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Ocean Science (substantial new concepts, ideas, methods, or data)?	Poor
Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?	Fair
Presentation Quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)?	Good

Specific questions

1. **Does the paper address relevant scientific questions within the scope of OS?** Yes. The reconstruction of 3D density and velocity fields (including vertical velocities) is a key question for many fields of oceanography.
2. **Does the paper present novel concepts, ideas, tools, or data?** Not really. From my understanding of the paper, it does not present particularly new concepts or ideas. Indeed, their approach consists on the reconstruction of sub-surface fields using EOF and then apply the omega equation to retrieve vertical velocities, which was already proposed by e.g. Ruiz et al. 2009. The details

of the used techniques have been already published (e.g. Buongiorno Nardelly and Santoleri 2005, Buongiorno Nardelly et al. 2001) or have been submitted for publication to this special number (e.g. Guinehut et al. 2012). The novel ingredient of this paper is its application to different datasets and numerical simulations. However, the results they present are still too preliminary to reach a significant conclusion.

3. **Are substantial conclusions reached?** No. It is a preliminary study.
4. **Are the scientific methods and assumptions valid and clearly outlined?** Yes.
5. **Are the results sufficient to support the interpretations and conclusions?** In my opinion, this study requires additional work to reach significant conclusions.
6. **Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?** Results are reasonably traceable.
7. **Do the authors give proper credit to related work and clearly indicate their own new/original contribution?** Yes.
8. **Does the title clearly reflect the contents of the paper?** Yes.
9. **Does the abstract provide a concise and complete summary?** Yes.
10. **Is the overall presentation well structured and clear?** Yes.
11. **Is the language fluent and precise?** Yes.
12. **Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?** Yes.
13. **Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?** The description of the experiments could be slightly clarified but, in general, their work can be easily understood.
14. **Are the number and quality of references appropriate?** A lot of effort has been devoted to the estimation of vertical velocities in the ocean from observations. In my opinion, the authors miss some important references in this field. In addition, they should improve the discussion of their results and compare them with some of these previous works.
15. **Is the amount and quality of supplementary material appropriate?**