

Interactive comment on “Sequential assimilation of multi-mission dynamical topography into a global finite-element ocean model” by S. Skachko et al.

Anonymous Referee #1

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I find this article interesting, because the authors present a sequential assimilation method that takes into account the double problematic of the correction of the variability of the dynamic topography and of the mean sea surface state produced by the model. However, I have several comments which I think should be considered before the acceptance of the manuscript for the publication in Ocean Sciences. I so propose the manuscript for publication after a revision.

Specific comments:

1: I think the authors should better precise the meaning of SSH as used in the text. Actually this term is used by different scientist communities to design different quan-

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tities. When referring to altimeter measurement, SSH means the sea surface height referred to the reference ellipsoid. For modelers, SSH is used to refer to the dynamical topography given by the model. I think it is the last definition the authors gave to SSH. However as they started the article using "Dynamic Topography" and "MDT" terms, this can lead to confusion.

2: In part 3: a brief description of altimeter data treatments should be added.

3: In part 3: the geoid used need to be precised. Moreover, the authors should discuss the method that consists in combining altimeter SSH measurement with a geoid to obtain dynamical topography. Actually, short-length precision of geoids is often too low to accurately combine it with altimeter measurement. As an example, Rio and al. ("From the altimetric sea level measurement to the ocean absolute dynamic topography: Mean Sea Surface, Geoid, Mean Dynamic Topography, a three-component challenge", 15 years of progress in Radar Altimetry Symposium, Venice 2006) showed that a MDT can be estimated with sufficient accuracy (5 to 10 cm rms) at spatial scales down to 300-400 km. As a consequence a more important error is suspected to be introduced in dynamical topography computed for this study with 1.5° resolution. Geoid precision is still a limitation for high resolution dynamic topography construction from altimeter measurement. This should be addressed in the article.

4: In some parts of the ocean, the authors used MDT from Rio et al. This MDT refers to a 7-year period [1993,1999]. This should be precised since some inconsistencies with the 1-year [2004] MDT computed by the authors might be introduced.

5: Climatologic field used in the adiabatic correction need to be precised.

Technical correction:

Fig 6 : The legend does not correspond to the figure.

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