Ocean Sci. Discuss., 12, C692–C697, 2015
www.ocean-sci-discuss.net/12/C692/2015/

Ocean Science
Discussions
Open Access

Interactive comment on "Design and validation of MEDRYS, a Mediterranean Sea reanalysis over 1992–2013" *by* M. Hamon et al.

Anonymous Referee #1

Received and published: 14 September 2015

Review of the manuscript "Design and validation of MEDRYS, a Mediterranean Sea reanalysis over 1992–2013 " by Hamon et al.

The manuscript describes and validates a Med Sea regional ocean reanalysis for the altimetry era that uses a new high-resolution atmospheric forcing downscaled from ERA-Interim. The manuscript details aspects of the configuration and presents the validation of the reanalysis with focus on the improvement borne by the data assimilation system.

I found the manuscript well-written and interesting for the ocean community. However, I ask the authors to clarify some aspects of the reanalysis system and of the discussion on the quality of the reanalysis before the manuscript can be accepted for publication. Although I have many comments below, I recommend a minor revision as all my con-

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

cerns do not require many efforts but rather aim at improving the readability of the manuscript.

General points

- It should be mentioned clearly in the text that the atmospheric forcing is not the only responsible for the temporal homogeneity of the ocean reanalysis. Reanalyses intrinsically suffer from inhomogeneity in the observing network: this applies to ERA-Interim, ALDERA (through downscaling of ERA-Interim) and MEDRYS. While the strategy of this paper aims at limiting this compared to other products, there is no evidence about the temporal homogeneity of this reanalysis and this approach compared to others.

- The description of SLA assimilation should be improved especially in Section 2.4. From Section 2.4, it seems that a correction is applied to the MDT to account for the barystatic effect. This does not look sensible, I guess the model SSH is rather corrected for the mass intake. It is also important to specify the reference period for MDT and SLA (1993-1999?) and how the regional steric effect is included: are data assimilated as they are? How are formulated the boundary conditions in the Atlantic to conserve or not the volume ? This should be clear also when commenting Figure 3. The mismatch is attributed to ORAS4 but it is not clear why. It might also be due to mismatch in the seasonality of the steric signal.

- Some results need better explanation and discussion: for biases in the top 150 m at least (Section 3.2.2) and for the seasonal cycle of bias (Figures 9a 10a) the authors should provide an explanation or at least a guess, in order to provide a justification and ideas for the next release. This won't reduce the manuscript to a validation exercise but will make it a useful summary for the interested readership. The speculation on the salinification 2000-2005 (Figure 10) in section 3.2.2 and 3.2.3 (end of 2nd paragraph, starting with "This suggests") appears confused. The authors say that it may depend only on the atmospheric forcing, propagating in depth, and not on the data assimilation system but it is not present in NM12-FREE. In Section 4 it is mentioned a possible

OSD
12, C692–C697, 2015

problem in SLA assimilation. There is no evidence the data assimilation system is not responsible for that, and probably issues in SLA data assimilation appear more convincing. The authors can compare NM12-FREE and MEDRYS in more details to reach a conclusion.

Specific points

P1817 L28 to P1818 L3 : Please rephrase as it is not clear: not clear why "especially in ocean modelling", and not clear in general the link between the persistence of small scale fields and the inaccuracies in ocean models

P1819 L23-L25 : This is not clear. First, why the NEMOMED12 with ORCA should give a resolution close to NEMOMED16 ? Second, why ORCA grid (never introduced), which is tripolar, is used in the Med Sea?

P1822 L8-10 : "a period known..." please provide a reference because this statement is not obvious

P1823 L4-6 : ERA-Interim does not have an independently generated SST/SIC analysis, which is taken externally (NOAA). By using this, it should be noted that there is a degradation in the resolution of the SST fields

P1823 L6-9 : The sentence "As ERA-Interim constitutes..." appears quite subjective in this way. The authors should cite proper work where ERA-Interim appears as the best atmospheric product over the Med Sea. Otherwise the sentence should be drop.

P1824 L27 : Introducing ALDERA, it should be earlier mentioned that (as it seems from the text on this point) that no spectral nudging nor data assimilation is used. The gain in resolution is balanced by the loss in "day-today chronology" as the authors say at this point.

P1826 L19-23 : This sentence seems in contradiction with the title of the Section 2.2.3 and with the fact that the authors are actually comparing with lower resolution atmospheric products. I suggest dropping or replacing with a sentence indicating that the

OSD
12, C692–C697, 2015

qualitative comparison highlights the superiority of ALDERA in representing the small-scale features.

P1826 L26- : "The Mercator Ocean .... has especially demonstrated" appears as a subjective speculation without corroborating references and examples. It is not proper for a general readership that can be not aware of MyOcean.

P1827 L11-12 : Not clear if the anomalies which represent the background error covariances are flow-dependent or only collected and grouped by season. Please rephrase to state it clearly.

P1827 L29 : Perhaps it would help the reader to say that while in the original formulation of SAM SSH increments are analytically computed from T,S increments through barotropic / dynamic height balances, in the Med Sea implementation they are purely statistical and derived by the covariances between SSH and T,S implied by the ensemble of anomalies (if this is the case). The fact that wind component is included (also in Section 4) is misleading.

P1828 L7-10 : It should be understood why there exists a bias between ERA-Interim and NOAA since ERA-Interim uses the NOAA SST. Maybe NOAA is corrected in ERA-Interim since the former is a foundation SST ?

P1828 L 13-14 : Not clear if the filtering/subsampling is performed by AVISO or it is specifically performed for MEDRYS

P1829 L7 : what does it mean "validated" ? I guess they are the measurements flagged as "good" by CORIOLIS

P1830 L15 : what does the "RMS of observations" mean? It is the variability, ie its standard deviation over time?

P1830 L20 : are this insitu data coming from CORA? Please specify.

P1832 L20- : This sentence, along with short description on criteria adopted for char-

OSD

12, C692–C697, 2015

acterizing observational errors should go in Section 2.4. Here it is not clear how obs error are augmented and if this applies only to the Ionian sub-basin.

P1835 L25 : To me the blue curve tells us only that with the increase of observations there is also an increase in the observation sampling, leading to worse skill scores for MedAtlas climatology. It does not necessarily mean an increase in the oceanic interannual variability.

P1837 L 17 : I think correlation difference for SSS 0.785 vs 0.783 is not significant and should be used "slightly better" or "neutral"

P1838 L 22-23 : The consistency with ORA-S4 should be by construction of the boundary conditions. I think this sentence is not needed.

P1839 L5 : Not clear how the authors compute transport from EN3. What is the assumption for the velocity as EN3 and IMEDEA provide S only? Does it affect the comparison?

P1839 L25 : "allow us" appears too strong since MLD and surface circulation variability were not presented. I suggest replacing with "suggest" or similar

P1841 L12 : "We conducted" : I don't think it is correct to present preliminary tests in the "Summary and discussions". Idea and future plans should be included; preliminary results not corroborated by anything should be taken out.

Table 1 : the fact that ALDERA has better net heat flux appears more as a compensation of errors in the individual heat components rather than an improvement. It should be discussed in the text.

Figure 14 is actually a Table and should be moved to Table 4

Technical points

P1816 L17 : "then first" » "then"

OSD

12, C692–C697, 2015

P1817 L27 : "which" » "that"

P1818 L7 : " to be as close as possible to..."

P1818 L10 : "Med. Sea due to the complex orography"

P1819 L8 : "produced" » "extended"

P1820 L8 : "results and improvements" (without "on")

P1823 L20 : "(150 and 50 km)"

P1824 L12 : "what" » "which"

P1824 L19 : "compared TO the ENSEMBLES..."

P1827 L2 : "sum up" » "summarize"

P1827 L 18 : it makes more sense to replace "reproduce" with "span"

P1828 L 13-14 : "Small scale signals"

P1832 L 22 : "a correction of about"

P1837 L12 : 30 January and other dates should be in the journal standard format

P1840 L21 : "In response thereto;" not clear

Figure 5-6 : labels report "number of profiles" but they are actually number of observations, since they depend on the depth?

Interactive comment on Ocean Sci. Discuss., 12, 1815, 2015.