

Dear Colleague,

Two referees have submitted their reviews of the revised version of your paper. They are referees 3 and 4 of the first version, with the same identification numbers.

In particular, referee 3, who has again let his name known, is Dan Crisan. He recommends acceptance of the paper as it stands.

Referee 4 asks for minor revisions. He/she considers (main comment) that the comparison he/she had asked for in the first place should not be difficult to make. He/she also suggests a number of editing corrections.

Please consider carefully the referee's main comment. Contrary to what you write (*Making comparison to a real-world model is hardly possible*), he/she is not asking you to use a model different from the one you have used. He/she is only asking you to run your model 50 times, with varying values for the viscosity parameters. That should certainly be very instructive, and, from what I understand, should not be costly. If you consider that the referee's request is too costly or difficult, please explain more clearly why you think so.

I also have as editor a number of suggestions for minor corrections (the line numbers, as in referee 4's comments, are the ones of the Author's tracked changes (ATC) version of the paper).

- L. 65, *we facilitate*, do you mean *use* ?
- Ll. 69-70, sentence beginning *The sea level ...* is difficult to understand (syntax is clumsy).
- Caption of Fig. 6 (and other figures that follow) *Development of viscosity ...* I think *Variations of viscosity in the course of the assimilation ...* would be preferable (see also l. 261)
- L. 128, I presume there must be a minus sign in the argument of the exponential.
- L. 129, *observation residuals* have not been defined at this stage (see ll. 135-136)
- L. 150, *We follow the first approach*. You have at this stage defined four approaches, including *jittering*. Clarify.
- L. 160, formula defining  $w'_i$ . The weights  $w_j$  are to be ranked in increasing order.
- L. 162, *Stochastic Universal Resampling*. Explain what that is (or at least give reference)
- L. 229, consistency of notation would require  $N(\mu_{\text{init}}, \sigma^2_{\text{init}})$  (as on l. 172)
- L. 297, *The variance or STD ...* You show only standard deviation (*STD*) in what follows. Don't mention variance at this stage.

I had a quick look at the Appendices, and some editing is also to be done there

- The quantity  $\phi_0$  in Eq. (A1) is apparently not defined
- How is the perturbation pressure  $\Pi$  (Eqs A3-4) known ?
- L. 584, *inverse*  $\rightarrow$  *opposite*,
- I suggest you check the equations in Appendix B. Although they must be elementary, they seem erroneous in some respects (I am intrigued for instance by the product  $DG(.,) R(.,)$  in Eq. B6).

Please revise your paper taking into account all comments and suggestions of referee 4, as well as mine. In case you disagree with a particular comment or decide not to follow a particular suggestion, explain your reasons.

I look forward to receiving the revised version of your paper. I may submit it to referee 4 for further review.