

## ***Interactive comment on “Application of the adjoint approach to optimise the initial conditions of a turbidity current” by Samuel D. Parkinson et al.***

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We would like to thank the reviewer for her/his constructive comments.

Below, we provide answers for each of the reviewer's comments:

» Major: » 1. [...] “Towards inverse modeling of turbidity currents: The inverse lock-exchange problem” published » in *Computers and Geosciences*, authored by Lutz Lesshafft et. al., 2011 ([http://www.offladyx.polytechnique.fr/people/lutz/pdfs/Lesshafft\\_CAGEO\\_2011.pdf](http://www.offladyx.polytechnique.fr/people/lutz/pdfs/Lesshafft_CAGEO_2011.pdf)) » provides a similar » approach, however, their approach is gradient-free optimization. It is also suggested to include » reference to this article.

The reference is very relevant and has been added to the manuscript.

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» 2a. [...] and generate scatter plots similar to the plots presented in section 1.1.5 of the article » “Towards the construction of a standard adjoint GEOS-Chem model”, Proceedings of the » 2009 Spring Simulation Multiconference (paper draft: » [http://people.cs.vt.edu/asandu/Deposit/draft\\_2009\\_gc-adj.pdf](http://people.cs.vt.edu/asandu/Deposit/draft_2009_gc-adj.pdf)). This would ensure that » the adjoint code produced by dolphin-adjoint tool is correct.

We have extended section 4.3 by explicitly stating the Taylor test. In addition, we added table 1, which shows the Taylor remainders and the convergence order (similar to the mentioned scatter plot) for a specific example.

» 2b. Although this step is not mandatory for publication of this article, it would also be useful » to set up a reference profile and conduct an experiment similar to Lesshafft et. al. to » test if the implementation of all the numerical methods solving the shallow water model » and the adjoint are in fact working correctly, before applying it to the deposit profile of » Marnoso Arenacea Formation We have performed such tests successfully during the code development. For the interested reader, the code for these tests is submitted in the code repository [https://bitbucket.org/simon\\_funke/adjoint-turbidity/src/master/tests/optimise\\_scalar\\_params](https://bitbucket.org/simon_funke/adjoint-turbidity/src/master/tests/optimise_scalar_params)

Specific comments ————— All specific comments have been addressed. In particular, we now to use  $\eta_T$  rather than  $\eta^T$  throughout the paper.

Please also note the supplement to this comment:

<http://www.geosci-model-dev-discuss.net/gmd-2016-136/gmd-2016-136-AC3-supplement.pdf>

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-136, 2016.

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