

## ***Interactive comment on “Modeling the Nd isotopic composition in the North Atlantic basin using an eddy-permitting model” by T. Arsouze et al.***

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Review of Arsouze et al by Mark Siddall

This is a nice paper and it should be accepted with the correction of a few typos mentioned below. The finding is important and an interesting result from a unique modelling attempt to look at Nd using such a high resolution modelling. This is key because higher-resolution models capture the dynamics of ocean mixing, rather than simply parameterising it. The finding that the parameterisation of ocean mixing biases the Nd exchange time is an important result.

I have reviewed this paper for another journal and I made substantial comments at that time. I note this because the authors have included all of the changes I suggested in

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this version. Therefore I am happy to recommend publication.

Optional suggestion

If there is one significant addition to the paper that would be useful to both authors and readers, it would be some discussion as to how to parameterise these effects in lower resolution models (useful because they can model the globe and not just the high-latitude north Atlantic). Similarly it would be useful to discuss what the implications might be for models that include the flux of Nd into the ocean, rather than simply EpsNd.

Minor Comments

1. Abstract, 1st sentence: reference needed
2. P977, L15-20: would it be useful to mention the scope for using the high-res model to develop more realistic parameterisations of exchange/input of Nd here?
3. P980, L18-20: is the better fit simply a function of capturing more heterogeneity in the Nd boundary condition?
4. P982,L9: ‘...surface water...’
5. P982, L17: ‘...river discharge...’
6. P982, L24: ‘...which are more realistic...’
7. P982, L28: ‘...the ORCA2...’
8. P983, L2: ‘...boundary current representation to simulating...’
9. P983, L4-8: I don’t quite understand this sentence, please make clearer and check with a new reader that the meaning is clear.
10. P984, L1-2: this needs further explanation for the non-expert. For example, what is a topographic sediment delivery map?
11. P984, L7: ‘The characteristic...’

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12. P984, L23: ‘...very satisfying...’ remove this term, it is superfluous

13. P990, Fig.1: You may like to note (and show in a graph) that the error appears to be normally distributed for the best simulations – for these the model is not is not generating a systematic bias. This is not true for other modelling attempts, many of which have systematic bias.

14. P993: Would it be useful to show a few depth transects from west to east and north to south along the basin?

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Interactive comment on Ocean Sci. Discuss., 7, 973, 2010.