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Biogeosciences Discussions

Interactive comment on "High resolution neodymium characterization along the Mediterranean margins and modeling of ε_{Nd} distribution in the Mediterranean basins" *by* M. Ayache et al.

Anonymous Referee #2

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General comments

This MS deals with a modeling of εNd distribution in the Mediterranean based on the high resolution Nd concentration and IC databases along the Mediterranean margins. I greatly appreciate authors' tremendous effort to compile and establish database for model calculation. I admit that the model partly seems to reproduce the real distribution. I think, however, several issues should be clearly addressed before final publication.

Specific comments

4.3 The εNd distribution

Authors seems to insist that the main features of εNd distribution in the Mediterranean are well reproduced assuming only the BE operating Nd oceanic source. Authors also admit that the reproduced results are apparently more radiogenic than the in-situ data reported by Tachikawa et al. (2004). Although I partly agree that their model successfully reproduced some features of the distribution, I have two concerns on their approach. First, I am not quite sure whether the number and locality of in-situ data for comparison is sufficient or not. The data reported by Tachikawa do not cover whole the Mediterranean; the data are localized in the eastern and western parts, and almost no data in the central part. I do not think these data are sufficient for verifying the simulated results. I have found one depth profile at station Villefranche (43°24'N, 7°52'E) located in the central part (Henry et al., 1994), which seems to show great shifts from the simulated data. I do not understand why authors neglect this data and believe that authors should discuss the data. Second, in my opinion, the evaluation on contribution of dust and river inputs should be more quantitative. In discussion section (p12 L31), authors claim that an incorporation of dust and river inputs should solve the discrepancy between simulated results and in-situ data. This does not say anything because besides BE processes these two inputs exclusively control Nd flux. Although I agree that it is not so easy to incorporate dust and river inputs into simulation, authors is highly expected to add more quantitative comments on these inputs, say, how much additional Nd with low εNd is required to lower the simulated results.

4.4 The inter-annual variability

Although I found this is an interesting approach, I wonder how authors verify the results. Are there any marine samples recording the EMT events or any chances to observe the EMT in near future?

Technical corrections

p5 L16; "24" of "24N" should not be superscript. Also correct for HNO3 and HClO4.

p5 2.1.2; According to this section, the authors analyzed Nd IC of several sediment sample. Unfortunately, however, I could not understand how the Nd IC data are used in the model. I have checked Appendix 1 and could not find out. Please clarify this point.

p15-p17 References; Some unnecessary information, such as link to paper, is shown. Should be deleted.

p17 L10; This reference is from EPSL. Please write down the correct journal information.

Figure 5; “EXP3” should be “EXP2”.

Appendix 1; What “λ” and “ÏŢ” stand for? Please explain. I could not find a list of reference for Appendix 1. Please add somewhere.

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