

# ***Interactive comment on “Hydrological variations of the intermediate water masses of the western Mediterranean Sea during the past 20 ka inferred from neodymium isotopic composition in foraminifera and cold-water corals” by Quentin Dubois-Dauphin et al.***

## **Anonymous Referee #1**

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This paper presents new an interesting data to reconstruct hydrological variations in the western Mediterranean since the Last Glacial Maximum. The study is mainly based on neodymium isotopic composition of cold-water corals from the Alboran Sea and the south Sardinian continental margin and on neodymium and stable isotopic composition of foraminifera from a sediment core recovered in the Balearic basin. This is a relevant contribution that strengthens the need of further investigations of the Mediterranean circulation, in particular during the time intervals corresponding to the sapropel S1

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and ORL1 deposition, when major changes occurred. The paper is well written and structured and the study deserves publication. However, some comments may be considered in the revised version:

- From the first part of the abstract, it seems that the neodymium isotopic composition of both mixed planktonic foraminifera and cold-water corals (CWC) have been investigated at the three selected locations. This could be made clear since CWC have been analyzed only at the Alboran Sea and the south Sardinian continental margin and foraminifera only at the Balearic basin. This aspect could be clarified, also explaining how the data have been integrated. The abstract includes the main implications of the study for hydrological variations during the deposition of the S1 sapropel but the data are also relevant to the deposition of the ORL1.

- The introduction could better highlight the aim of the work. Moreover, the classical references on Mediterranean climate variability are cited but more recent ones could also be included, for instance Martrat et al (2014) provide interesting high-resolution data on surface water variability of the Mediterranean Sea during the last two deglaciations, including the Holocene.

- In the material and methods section, though references are provided to get detailed information about CWC cores, additional information on core description could also be included in this paper to facilitate the whole picture of the analyzed materials. Similarly, a new core recovered in the Balearic Sea has been investigated but little is said about the description of the materials sampled except for barren of any CWC fragments. It is also mentioned that samples from this core have been used for multiproxy analyses but other than dating and estimation of SST by modern analogue techniques only neodymium and stable isotopes been analyzed so this could be better specified in section 3.1.

- Regarding the results section, there are three different subsections on core SU92-33 that may be omitted and the results could be synthesized in just one as for CWC.

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Some general sentences referred to sedimentation rate as “the lowest values observed during the Holocene” could be more specific. In this section the information concerning the core MD90-917 is insufficient, it is cited as a well dated record but it is not clear if the references cited in the paragraph (line 294) are those providing the data included in Fig. 2a (in which a reference is not cited).

- The discussion is relevant and highlights the most important aspects of the hydrological variations in the Mediterranean. However, some aspects could be further discussed as the role of the eolian input in the  $\epsilon\text{Nd}$  variability and why it is not affected by changes in such input. Concerning this, some additional papers on eolian input could be considered, for instance Scheuven et al. (2013) on bulk composition of northern African dust or Rodrigo-Gamiz et al (2015) on terrigenous input provenance in the western Mediterranean. Also regarding the Nile discharge, some other recent papers could be considered as Hennekam et al (2014). In general, the results on SST are not sufficiently compared with other SST records, see for instance the previously mentioned paper from Martrat et al (2014) and also some recent papers on sea surface temperature variations in the western Mediterranean sea over the last 20 kyr (Rodrigo-Gamiz et al., 2014). It is also concluded that  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  values indicate a stratification of the water masses after 16 cal ka BP, but why the data are supporting this conclusion could be further explained in the conclusions section. The implications of the obtained results for the deposition of the ORL1 could also be included in this section.

## References

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