

Interactive comment on “Variations of Mediterranean–Atlantic exchange across the late Pliocene climate transition” by Ángela García-Gallardo et al.

Anonymous Referee #2

Received and published: 17 December 2017

The manuscript by García-Gallardo et al. presents a novel study on fluctuations in the Atlantic-Mediterranean exchange during the late Pliocene. This work is interesting for the broad readership of Climate of the Past. Authors explain in a straightforward way changes in the intensity and climate forcing of the oceanic circulation across the Strait of Gibraltar during the late Pliocene. The manuscript is well written, results are clearly described and interpretations are sound. However, I suggest to make several major and minor changes before publication.

Authors assume that most of the d18O signal in their records is due to Sea Surface Temperatures (SST). Nonetheless, the contribution of Sea Surface Salinity to d18O

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values must be also discussed. It has to be justified why d18O records are only reflecting SST. Usually, paired d18O and Mg/Ca paleotemperature analyses in the same samples must be performed in order to separate the salinity and temperature signal (see Cacho et al., 2006). Hence, d18O values cannot be used as temperature proxy without taking into account salinity changes, which are significant between Atlantic and Mediterranean waters.

It is mentioned that difference in SST between the 2 sites was little to none and estimated SST offsets cannot fully explain the d18O gradients of >-0.05 (page 8, lines 211-215). I think a new figure comparing available SST records from both studied sites and the d18O records is necessary to assess the SST offsets and the relationship between d18O and SST records. This might help to analyze the contribution of SST to the d18O records presented in this study. In addition, the SST offsets must be specified with numbers.

In 5.1 section (lines 185-187), authors state that *G. ruber* blooms in spring-summer and *G. bulloides* in fall-winter. Yet, according to Bárcena et al., 2004. (see fig 5) *G. ruber* blooms in fall-spring and *G. bulloides* in spring in the Alboran Sea. Therefore, both species can bloom in spring and, perhaps, the offset in d18O is due to other factors (calcification depths?).

I think it is necessary to include a figure showing the main surface currents in the Gulf of Cadiz and Alboran Sea to illustrate what is describe in the Regional setting section.

I suggest to include a table with all age datums used for the age model and the age of the main biostratigraphic events.

Authors must be consistent with the age of bioevents in text and figure 2.

Since most of the d18O records used in this study are already published, the number of new analyzed samples in this study has to be specified. This can be done in section 3.2 Stable isotope analysis.

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Authors use Ma and Myr; and Ka and Kyr. They should use only one type of nomenclature to be consistent in both figures and text.

Instead of using Gdes. ruber, authors must use G. ruber throughout the manuscript.

Some minor comments were included in the pdf file.

Bárcena, M.A., Flores, J.A., Sierro, F.J., Pérez-Folgado, M., Fabres, J., Calafat, A., Canals, M. (2004). Planktonic response to main oceanographic changes in the Alboran Sea (Western Mediterranean) as documented in sediment traps and surface sediments. *Marine Micropaleontology* 53, 423-445.

Cacho, I., Shackleton, N.J., Elderfield, H., Sierro, F.J., Grimalt, J.O., 2006. Glacial rapid variability in deep-water temperature and d18O from the Western Mediterranean Sea. *Quaternary Science Reviews* 25, 3294-3311.

Please also note the supplement to this comment:

<https://www.clim-past-discuss.net/cp-2017-134/cp-2017-134-RC2-supplement.pdf>

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2017-134>, 2017.

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