

## ***Interactive comment on “Lessons from a high CO<sub>2</sub> world: an ocean view from ~ 3 million years ago” by Erin L. McClymont et al.***

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McClymont and co-authors compiled a data base of sea-surface temperature (SST) data for the KM5c interglacial period during the late Pliocene and use that data to evaluate temperature changes in the Pliocene relative to the pre-industrial period and to climate modeling results for the late Pliocene warm period. The authors made a thorough (re-)evaluation of the age models of the sediment records included in their compilation and also converted the Uk37' values to SST applying the same calibrations (Mueller et al., 1998 and the newer BAYSPLINE). The Mg/Ca trace element based temperature reconstructions are also presented with the SST values reconstructed originally and with BAYMAG. The reconstructed SST values are a thoroughly evaluated including pointing out potential bias in the proxy data or caused by local hydrographic

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conditions. The manuscript is well-written, suitable for publication in *Climate of the Past* and presents a major step-forward in data-model comparison for the late Pliocene warm period.

I only have a few minor comments for the authors that could help improve the manuscript.

1) The references for the original data for each Site are provided on the Pliovar webpage, which is a very informative tool. However, from past experience with "local" data bases, I am wondering for how long this link will be maintained, i.e. can the authors guarantee that this link still exists in 5 or 10 years. So I would like to see a "paper" version as Table S1, especially since the age model related information is not necessarily "hidden" in the references listed in Tables S3 and S4.

2) p. 5 line 152: correct site to state after saturation

3) p. 6 line 183: I suggest to include a short comment clarifying that the pre-industrial period selected has no overlap with the Little Ice Age.

4) p. 11 line 355: since there is evidence for the existence of Mediterranean Outflow Water (MOW) during the Pliocene along the southern Iberian margin, one should expect the Azores Current, whose existence is linked to the formation of MOW in the Gulf of Cadiz (see for example Oezgoekmen, T.M., Chassignet, E.P., Rooth, C.G.H., 2001. On the connection between the Mediterranean Outflow and the Azores Current. *Journal of Physical Oceanography* 31, 461-480), also to be present. Nowadays, the subtropical surface waters in the Gulf of Cadiz seem to be more derived from the Azores Current and its northern branches extending into the Gulf of Cadiz and towards the SW Iberian margin than the southward gyre recirculation (Portugal Current). So besides the southward recirculation you would also have the direct across-North Atlantic basin transport between 32 and 36°N and those waters might be warmer than the southward recirculation. Most models do not resolve the MOW, so the (heat) transport associated with the Azores Current might also not exist. I also suggest to include

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(Iberian margin) behind Gulf of Cadiz because not every reader will know where the Gulf of Cadiz is located.

5) Fig. S5: mention in the figure caption what the gray envelope represents.

6) Fig. S2 and S3: with the start of IODP (2003-2013) program Site names include a letter to identify the platform with which they were drilled. So correctly, it should say U1313, U1337, U1387 and U1417.

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