Reply to editor comments for "Was the Little Ice Age more or less El Niño-like than the Medieval Climate Anomaly? Evidence from hydrological and temperature proxy data" (cp-2015-166)

Editor comments are italicised, followed by author responses.

1) I'm a bit uncomfortable about the choices around coral records to use for the temperature network. In particular, some coral d18O records are excluded because of the additional influence of precipitation/SSS on these signals. This is fine but it is a very grey line around which coral d18O records are included and which are not. All coral d18O records will have some influence from seawater d18O/rainfall, so perhaps a more objective decision would be to only use coral Sr/Ca records, which should more purely record SST only.

In the revised ms, all coral d18O records are excluded from the reconstruction process. This led to the effective removal of eight proxies that were previously used in the ensemble, and four that were previously considered but rejected during the 'add-one-in' process. Others were already getting rejected due to length. The exclusion of these records makes no difference to the conclusions in terms of temperature--precipitation relationships and MCA—LIA differences. Note that the timeseries (Fig. 3) looks quite different to the previous version mainly due to the difference in y-axis scale.

2) The PDO paragraph at line 681 feels a bit "tacked on" at the moment. Throughout the manuscript I kept on wondering about whether the method was reconstruction ENSO or IPO – the 30y windows are on the IPO rather than ENSO timescale. The temperature EOF in figure 6 of your paper looks strikingly similar to the IPO pattern shown in Figure 1 of Henley et al (2015) Climate Dynamics, DOI 10.1007/s00382-015-2525-1. I feel that this aspect hasn't yet been clearly dealt with from the original reviews, even though I understand why the 30-y method has been employed.

We agree that the ENSO and IPO/PDO spatial pattern are very similar. However, since we are interested in climate change that follows an ENSO-*like* pattern, rather than ENSO-specific variability, this similarity does not actually matter. The relationship between ENSO and PDO is now introduced in Sect. 1, and a brief note on the nomenclature of "ENSO-like" has been added in Sect. 2.2. In addition, the original discussion on the potential influence of the PDO/IPO is extended in Sect. 5 and integrated better with the rest of the discussion.

3) How reliably do global/NH/SH temperature reconstruction ensembles document a robust temperature difference between the LIA and the MCA. (e.g. line 98, line 387)? In particular, I'm thinking of the Neukom et al 2014 Nature Climate Change SH reconstruction ensemble. Also a finding of the PAGES2k Consortium 2013 Nature Geoscience paper was that the LIA and MCA were not global events.

The (non) global nature of the MCA/LIA is now introduced in the literature review, and discussion on this issue has been added in Sect. 5.

4) Could the lack of T-P relationship be related to P changes being dominated by ITCZ shifts rather than changes in ENSO mean state?

It is possible that the lack of T-P relationship is due to ITCZ, but the poor quality of the T reconstruction precludes any such conclusions. Nevertheless, the point about the influence of the ITCZ is very valid. As such, discussion has been added in Sect. 5 on the

role of the ITCZ, addressing links with ENSO and the recently highlighted conflicting hypotheses of a southward shift versus a latitudinal contraction of the ITCZ.

5) Would it be possible to include some statistics to demonstrate if 20CRv2c has a good representation of ENSO indicies, for the period where it overlaps with more widely used datasets.

The 20CRv2c datasets are compared to three ENSO indices (NINO3.4, MEI.ext and SOI), with the results now listed in Table 1 for clarity. All three correlate highly with 20CRv2c, both for precipitation ($R^2 > 0.62$) and temperature ($R^2 > 0.65$). In addition, reference is made to a study which compares 20CRv2c to other reanalysis datasets in Sect. 2.2.

Additional changes

Fig. 7 in the previous version (showing the MCA-LIA difference) has been removed, and the text now only references what was previously Fig. 9 (sensitivity to MCA/LIA definitions).

The equations in Appendix B4 have been simplified.