Responses to Anonymous Referee #3

RC4:

As stated in the introduction of the manuscript recent studies have advocated the development of regional δ18O stacks to distinguish spatial differences in the timing and amplitude of δ18O signals. Hence the contribution is timely and has the potential to provide a useful benchmark record in the Quaternary research. The manuscript is principally well-written, however there are two points in the methodology and some other specific ones which need revision before the study can be accepted for publication.

General comments:

It is not clear how was the MD97-2141 data resampled (lines 90-91): I note at this point that binning rather than smoothing and resampling would be a more adequate data processing to reduce the resolution of this record. In addition, the chosen 0.33 kyr mean sample spacing is still much finer compared to the cores from the WPWP (according to Table 1 the mean sample spacing of those cores ranges from 0.76 to 3.9 kyr). Binning to ~1ka might be more suitable to get close to the median resolution of the records representing the core area of the WPWP.

We agree there was not sufficient description of how the MD97-2141 data was resampled, and additional explanation was added to the text. We are not able to bin in the age domain because the age models change during the stack construction process. For the revised manuscript, we decreased the sampling resolution of MD97-2141 so that it now has an average sample spacing of ~0.55 kyr. This is similar to the resolution of a new core we are adding to the stack KX22-4, which has an average resolution of ~0.57 kyr (Zhang et al., 2021). We resampled by averaging non-overlapping groups of 5 adjacent d18O data points (5-point smoothing without overlap) and assigning the average d18O value to the depth of the central d18O sample. To the extent that the core is approximately evenly sampled in the depth domain, this approach is nearly the same as binning in the depth domain.

Zhang, Shuai; Yu, Zhoufei; Gong, Xun; Wang, Yue; Chang, Fengming; Lohmann, Gerrit; Qi, Yiquan; Li, Tiegang (2021): Precession cycles of the El Niño/Southern oscillation-like system controlled by Pacific upper-ocean stratification. Communications Earth & Environment, 2(1), https://doi.org/10.1038/s43247-021-00305-5

Zhang, Shuai; Yu, Zhoufei; Gong, Xun; Wang, Yue; Chang, Fengming; Li, Tiegang (2021): Sable oxygen isotope and Mg/Ca ratios of planktonic foraminifera from KX97322-4 (KX22-4). PANGAEA, https://doi.org/10.1594/PANGAEA.939377

According to my understanding the study applied a reservoir age offset (R) as 0+/-0.2 kyr (lines 129-130). The appropriateness of this R is debatable. I suggest checking Sarnthein et al., 2015 (DOI: https://doi.org/10.2458/azu_rc.57.17916). In particular, MD01-2378 was scrutinized in the study. Based on the inferred planktic reservoir ages typically >200yrs and >1kyrs during LGM (and probably in glacial conditions in general).

The Marine20 calibration curve uses a model estimate of time-dependent global mean surface reservoir age, which is ~400 yr for the Holocene and increases to 800-1000 yr for 20-50 kyr ago (Heaton et al., 2020). We set the reservoir age offset (ΔR) for our sites to 0 yr, meaning we did not change the reservoir age from the time-dependent Marine20 default. We assigned a 1-sigma uncertainty of 200 yr to the reservoir ages to account for possible changes to the reservoir age offset of the WPWP relative to the Marine20 time-dependent global mean reservoir age. Additional description has been added to clarify that a reservoir age is still being used, as well as added notation for the reservoir age offset (ΔR).

Although Sarnthein et al (2015) estimated larger reservoir ages than Marine20 for MD01-2378, we are removing that site from the stack because it is from the Timor Sea and, therefore, not strictly within the WPWP (as suggested by reviewer 4). Our choices not to apply an offset from Marine20 and to use a 200-yr uncertainty are consistent with other WPWP studies. The originally published age model for MD05-2930 used the Marine09 calibration without a reservoir age offset [Regoli et al., 2015]. Dang et al (2020) used the Marine13 calibration curve with offsets of <30 yr and an uncertainty of <100 yr for core KX21-2. Importantly, the main goal of this manuscript is to provide a record of orbital-scale variability in planktonic d18O; it is not intended to provide 1-kyr precision of absolute ages and the manuscript clearly describes the limitations of the stack's age model (e.g., lines 211-218).

Specific comments:

line 3: perhaps "greenhouse forcing" instead of "greenhouse gas"

Updated.

line 4: perhaps "covering the…" instead of "of the…"

Updated.

lines 24 to 26: Despite these are almost common knowledge some references can be needed. e.g. Wefer and Berger 1991 (https://doi.org/10.1016/0025-3227(91)90234-U) could be a pertinent reference.

Thank you for the reference suggestion, it was added in text.

line 46, 49, 226, 234, and 329: Please correct and update the citation: "(Lee and Rand et al., accepted)"

The final version of the paper has been published, the citation was updated appropriately within text and references.

line 50: "between 0-43 kyr BP" sounds strange

Updated.

line 76: the sentence sounds strange. I suggest rephrasing as follows: "Six of the cores span the last 300 to 500 kyrs, and five extend back to 750 ka."

Thank you for the suggestion, this has been rephrased within the text.

line 84: Please change to “from 450 to 800 ka”

Updated.

line 88: Ditto. Please change to “from 0.33 to 3.9 kyr”

Updated.

lines 149-150: The sentence is somehow repetitive. Please rephrase it.

Thank you for pointing this out. The sentence now reads: “We compare the amplitude of the new WPWP planktonic $\delta^{18}O$ stack with a sea level (ice volume) record and a WPWP SST stack, each of which is converted to the amount of $\delta^{18}O$ change they are expected to cause.”

line 185: The sentence needs grammar checking.

Corrected.

line 212: Please change to “between 36 and 38 ka”

Updated.

line 214: Ditto. Please change to “between 30 and 40 ka”

Updated.

lines 235-236: I suggest replacing “our WPWP…” with “the new WPWP…”

Updated.