

## ***Interactive comment on “Changes in Holocene meridional circulation and poleward Atlantic flow: the Bay of Biscay as a nodal point” by Yannick Mary et al.***

**J. Scourse (Referee)**

j.scourse@bangor.ac.uk

Received and published: 17 August 2016

Mary et al. present an excellent high resolution record of Holocene palaeoceanographic changes (SST) from the southern Bay of Biscay based on two closely positioned cores. The SST record is based on MAT transfer functions on planktonic foraminiferal assemblages and is compared with other palaeoceanographic records from the Biscay/Iberian margin and the wider North Atlantic. The raw planktonic foram dataset is excellent and the way in which the transfer function has been applied is well explained. The data for the Roman Warm Period interval and their correlation with the wider North Atlantic datasets for this period are impressive. Records of this quality covering the entire Holocene are not common and it is important that the data are

C1

published.

However, 1. in places I feel there is a tendency to over-interpret the record, 2. sometimes the explanation is not as clear as it might be, 3. some fundamental contextual information is lacking, 4. independent lines of evidence to corroborate the transfer function SST reconstruction are lacking, and 5. most importantly, there are some generalised statements not supported by either numerical model simulations or tests of statistical significance.

At the outset (and in the Abstract) the authors emphasize the strategic location of the core sites in the context of the wider North Atlantic circulation/AMOC. It would be good to support this assertion with some spatial correlation plots between this site and wider North Atlantic SST/SSS fields over the calibration period. What key elements of the surface circulation correlate with SSTs at this location? The core locations are actually quite distal from the main centres of North Atlantic hydrographic variability so firming up this relationship with evidence is important. There is significant discussion in the Introduction on the relationships between the regional hydrography and the wider North Atlantic circulation, and with modes of North Atlantic climate variability (AMO/NAO) but this remains (and feels) speculative unless it can be supported by evidence. In terms of the excellent reconstructed time-series for the last 2000 years, how do these compare with the CMIP5 simulations, and the earlier data with the CMIP5 mid-Holocene simulations?

Whilst the quality/resolution of the foram-based transfer function SSTs are not in question, I would have liked to see some corroboration from independent data (e.g. oxygen isotopes, trace element ratios, alkenones) of at least sections of the record. The PP10-07 long Holocene record is spliced with data for the last 2000 years from MD03-2693; what are the correlation statistics for this overlap?

It is essential to provide some key information about the cores at the start of the Methods section. I note that the water depths are included in Table 1, but what is the

C2

geomorphological context of the core locations, why does the sedimentation rate differ so much between the two cores, what are the sediment sources to these locations including biogenic/lithic ratios and, in particular, what is the local hydrographic regime at this location and how does it relate to the wider North Atlantic circulation discussed above? It is also essential at this point to present lithostratigraphic logs for the cores. Unless these data have been published elsewhere they should be included here, or in the Supplementary info.

Detailed comments:

Some small grammatical/word selection changes are suggested on the attached annotated pdf.

Line 30 (and elsewhere): the records are described as being of “unprecedented” resolution. This has to be more specific – unprecedented for this region, for the North Atlantic? There are certainly sediment-based records of comparable resolution elsewhere and this record does not compare with annual-banded records of SST (coral, bivalves).

Line 34: be more specific over the temporal frequency being referred to here.

Line 49: “latitudinal and/or longitudinal migrations”: do you literally mean migrations or intensification/relaxation of gyre circulation?

Lines 53-54: “this paper aims at testing Western European temperate oceanic signals vs. those from a broader North Atlantic view with a focus on the SPG dynamics”: what is meant by “Western European temperate oceanic signals and how are these separated from broader North Atlantic/SPG dynamics. This seems a bit vague/loose to me.

Lines 94-96: this sentence requires rephrasing.

Line 128: what is an “undated point” in a surface sample dataset?

C3

Line 156: what is meant by “focused” in this context?

Line 171: what do you mean by “typical”?

Line 187: what do you mean by the “modulation of the split” between the SPG and STG?

Lines 321-323: this is the last line of the Conclusion and I’m not clear what it actually means.

Figure 1: “seasonal” spelling in figure legend.

James Scourse Menai Bridge 17th August 2016

Please also note the supplement to this comment:

<http://www.clim-past-discuss.net/cp-2016-32/cp-2016-32-RC2-supplement.pdf>

---

Interactive comment on Clim. Past Discuss., doi:10.5194/cp-2016-32, 2016.

C4