Interactive comment on "Reconstructing Late Holocene North Atlantic atmospheric circulation changes using functional paleoclimate networks" *by* Jasper G. Franke et al.

Anonymous Referee #3

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In this paper, the authors use a network approach to investigate climate teleconnections across the North Atlantic region during the Common Era and relate climate in this region to the NAO. The authors take an interesting approach toward utilizing published paleoclimate records for reconstructing a regionally important climate index. I agree with the other Referees that this work should be published with some modifications outlined below.

I am in agreement with Referee 1 who suggests that the authors take a more "pedagogical" approach toward describing their methodology. Whenever possible, relating the purpose of equations in words as well, providing definitions for all variables, and including a table of variables that readers can refer back to would help to clarify the

approach taken by the authors. This will make their work more accessible and thus their approach will more likely be followed by others in the future.

I suggest that the authors include more discussion of the proxies they are including in their analysis, which archives they come from, and what the records are interpreted to show across the interval in question. If the authors are not space limited, I would suggest moving the table of proxies into the main text so that readers can clearly see what records are being used and so the original citations for the records can be included in the main text citations. As this is only 37 records, it does not seem unreasonable to include in the main text. I also suggest a more careful description of the clustering of sites with some information to validate this approach – to show that each proxy does reflect regional temperature to a reasonable degree and can be clustered with other sites in the region. Some discussion of the uncertainties involved in the proxy records, age uncertainty as well as uncertainty with what each proxy reflects, should also be included. I agree with Referee 1 that to generate space to accommodate clarifications, the section 5.4 could be reduced or removed as it seems overly speculative.

I also suggest including a plot of the Ortega NAO reconstruction as well as a description of how this was constructed and what records went into it and any potential overlap with the records used in this analysis. Something along the lines of Figure S5 would be useful in the main text to show the comparison between the reconstructions generated here and the Ortega reconstruction.

Minor comments:

Need to explain symbology for site markers – changes from figure to figure, not sure what it means. This is true for both the main text and supplementary figures (e.g. Figure S2)

Figure 4 caption needs more description – what do the line thicknesses represent? Why were these time intervals chosen? What controls when points are shown or not shown?

Elaborate on what is meant by most "informative" clusters and why this is the case (page 9, line 32 – page 10, line 2).

Are the Deininger et al., (2016) records (mentioned line 25 of page 16) included in the analysis? If not, why not? A diagram of the reconstruction presented here, the Deininger work, and the Ortega reconstruction may be informative.