Review of revised draft of EGUsphere-2024-2431, "Observation based temperature and freshwater noise over the Atlantic Ocean" by A.A. Boot and H.A. Dijkstra.

Recommendation: Acceptable for publication after minor revisions.

The authors have responded thoroughly to the concerns I raised in the original manuscript. I have a few minor comments on the revised draft; when these have been addressed it is my recommendation that the manuscript be accepted for publication.

1. K-means clustering is based on a distance metric. In the description of the clustering analysis, please indicate how (if at all) the standard deviation, skewness and kurtosis are standardized before the clustering is calculated, in order to avoid combining dimensionally inhomogeneous variables and dominance of the distance by variables with larger dynamical ranges.

2. L120: Please cite a reference describing the relationship between skewness and kurtosis for a system with multiplicative noise.

3. L217: I believe it is more appropriate to say that such grid points have variability that is "not statistically distinguishable from Gaussian", rather than saying that they "are likely Gaussian". The authors may consider revising the text accordingly.

4. L271-272: Please provide a reference to the distance correlation metric, as this is not commonly used in atmosphere/ocean science.

5. I am not surprised that the authors find weak dependence between the PC modes. Nevertheless, the fact that the original non-Gaussian fields can be reconstructed with the actual observed PC time series (not the sampled versions used in the surrogate models) indicates to me that such dependence must be present, even if it is subtle and difficult to model statistically. The sum in such reconstructions is also subject to the Central Limit Theorem. I recommend that a note to this effect be included in the revised manuscript.