This manuscript presents a framework for evaluating climatic signals at millennial to centennial timescales in Holocene paleoclimate data, to overcome the challenge of discerning between signal and noise in reconstructions. The author demonstrates how the structure of synthetic datasets changes in a scenario with or without a prescribed signal; these changes can then help us differentiate between signal and noise in actual paleoclimate data. Across a variety of spatial and temporal scales, two excursions and/or patterns of climate signal are identified: 1) millennial temperature and moisture fluctuations between 5500 and 2100 on many spatial scales; and 2) multi-centennial hydroclimate fluctuations along the Atlantic coast. The author proposes that further work should be devoted to investigating the mechanisms driving these fluctuations.

Overall, I think the manuscript presents a useful potential solution to an important problem in our community. Similar methods could be widely applied in paleoclimate data compilations, to either confirm or disprove the existence of fluctuations in paleo-data that are attributed to climatic changes, even if they might occur spuriously. My comments mainly concern the presentation of results; with so many datasets, spatial scales, and temporal scales of interest, I sometimes found myself a bit lost when trying to draw out the major conclusions from all these analyses on all these regions / scales. Prior to publication, I hope Dr. Shuman will consider the following suggestions, which I believe would strengthen the analysis and conclusions:

1. **Spatial scale visualization:** I found that I had to re-read the descriptions of the different spatial scales of interest (L72-80), which then becomes a bit more confusing when the author refers to "continent" and "mid-continent" and "mid-latitude" (the latter two of which correspond to "regional" and "sub-regional" I believe?) etc. I think a series of maps as an introductory figure would be very helpful. As it stands, we don't get to visualize the spatial scales we're looking at until Fig. 6, which feels a bit of an afterthought. As an alternative to having the reader pull up the referenced studies repeatedly, it might be nice to have a multi-panel figure that shows a) the spatial extent of each different scale / dataset, and b) the records included in each.

2. **Concise presentation of findings across spatial / temporal scales:** Again, I found it difficult to follow the presentation of results with so many different, but similar sounding, regions and timescales considered. I think it would be helpful to have a table that summarizes the results; a similar concept to what's presented in Fig. 4, but a bit more easily digestible. For example, the reader could quick look to see whether there are significant relationships between X variable and Y region and Z timescale. I think it's reasonable to have something similar to Fig. 4 but with fewer acronyms, more words, and overall less burden on the reader to quickly pull key findings. You could also integrate information about other aspects of the study such as power spectra, potential drivers / mechanisms of recognized shifts, etc.

3. **Broad relevance**: The author explains early in the manuscript that he is using the chosen datasets as an illustrative example of these methods, and then in Sec. 4.4 (Signal detection) mentions that it might be challenging to apply this framework to other types of proxy records (e.g., isotope records that are more often (compared to pollen) influenced by multiple climate variables). Rather than simply stating this, I think the paper would be more broadly useful if the author proposed some ways to overcome multi-variate issues that might be encountered in other proxy types. As it stands, this would appear to be less an illustrative example of how the method can be applied, and more an argument that this

can only be done with very specific types of paleoclimate data. So, if possible, I suggest closing the paper with some forward looking suggestions gleaned from this effort.

A few minor editorial comments:
L35: start list with a colon and separate components using semicolons
L152: "signal to noise" instead of "sign to noise"
Fig 2: it's somewhat confusing that European data (here and elsewhere) is included in a paper about North America; maybe explicitly state why this is done (presumably either because its important for capturing Atlantic-related variability, or because its already a feature of the existing datasets), or remove?
L522: "millennial" instead of "millennia"