

Interactive comment on “Reconciling North Atlantic climate modes: Revised monthly indices for the East Atlantic and the Scandinavian patterns beyond the 20th century” by Laia Comas-Bru and Armand Hernández

Anonymous Referee #1

Received and published: 2 November 2018

Reconciling North Atlantic climate modes: Revised monthly indices for the East Atlantic and the Scandinavian patterns beyond the 20th century Laia Comas-Bru, Armand Hernández Reviewer Comments General comments The paper outlines the use of climate mode indices within the North Atlantic region and identifies some limitations, particularly that the second and third modes are only available in one form from 1950 onwards. The authors construct indices from 1850, which should prove useful for studying decadal variability, and compare these with longer term station-based indices and other EOF indices from reanalysis. The paper and data are a useful contribution

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to the field, but a few issues should be clarified. The paper is generally well-written and clear, with few typographical errors. Specific Comments 1. A main comment would be that I find the title, and subsequent content a bit misleading in that it purports to provide monthly indices, whereas the indices in the paper are seasonal.

2. A further methodological point is that it is not at all clear what is meant by “composites” throughout the paper, nor is it clear how these are constructed. I guess it is a combined index using different reanalyses, or do you mean combining monthly indices into seasonal indices? Exactly how these are combined should be made clear. I found this a bit confusing, but it should be straightforward to clarify. Combination of time series from different reanalyses will involve splicing of some sort, and this should be explained clearly.

There are a number of other points listed below which should be addressed.

Page 1, Line 34: I would add the recent study by Hall and Hanna, 2018, IJOC , here, to broaden the scope of the literature. This paper also finds inconsistencies in EOFs 2 and 3 for summer. Page 2, Line 6: Other nodes are used, such as Lisbon and Gibraltar, and this should be acknowledged and referenced here Page 2, line 22: I would be more circumspect here. Although intuitively a positive EA should equate to positive SLP anomalies in line with SCA, , the CPC index is based on the reverse of this, and a number of studies take this position (Woollings et al., 2010, QJRMS; Moore et al., 2011 QJRMS; Wulff et al., 2017, GRL; Hall and Hanna, 2018, IJOC among many) so it is incorrect to promote this view of the EA as the standard one. It doesn't actually matter, the relationships are the same just inverted. It would be better to state: “Here we take the positive phase of the EA to be.....” Page 2, line 29, Again it is appropriate to cite Hall and Hanna, 2018, IJOC Page 3, lines 15-20. It is also worth noting that EOFs are statistical constructs and are not always associated with climate physics (Dommenges and Latif, 2002, J. Climate). Also some acknowledgement that the constructed EOFs are influenced by the region selected. Pages 3-4 Data section. Were timeseries of station and gridded data assessed and corrected for any inhomogeneity?

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geneties which could arise through artificial means such as changing instrumentation, changes in density of records, etc? Page 4, line 14. It is misleading to state that the common definition of a positive EA is positive SLP anomalies, in view of the comment and references above. Change to something like “our definitions” Page 4, Line 32. How are the years of the moving windows defined, in reference to the window (start, end, centred-which is not possible with a 30 year window)? Page 6, Line 31: Are the composites monthly? They look seasonal to me. It is unclear from the text how the composites are produced. This needs to be explained clearly. This section is unclear, with confusing terminology about monthly time series when the figures show seasonal time series. Page 8. Line 6. What is the 10-year filter? Is it a simple moving average, or some sort of Gaussian filter? The caption just says “bandpass” Can you be more specific? Page 8, lines 9-10 “..until a decrease towards a minimum starts in c. 1920” It is not clear what is meant by this as from the figure the minimum appears to be reached in 1920. Page 8, lines 11-14: I don’t find these descriptions particularly convincing when looking at the figure Page 8 line 15-16. I am highly sceptical about the reality of the first 20 years or so of the summer SCA figure, with its extreme maxima and minima. I think this is likely to be an artefact of data quality, See ESRL web pages https://www.esrl.noaa.gov/psd/data/gridded/20thC_ReanV2c/opportunities.html There is some evidence of this in Figure 6 panel b) as well. Technical Corrections Page 1 line 31: remove comma after “attention” Page 5 line 29: should it be DJF: $p > 0.9$?

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2018-86>, 2018.

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