

## ***Interactive comment on “North Atlantic Oscillation model projections and influence on tracer transport” by S. Bacer et al.***

### **Anonymous Referee #3**

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Review of: “North Atlantic Oscillation model projections and influence on tracer transport” by Bacer et al.

This paper examines the NAO in two model simulations: 1) a model nudged to the ECMWF ERA-Interim analysis data (1979-2013) and 2) a model driven by SST and SIC taken from simulations from the HadGEM2-ES (1950-2099).

The authors show:

1) The first two EOFs look rather similar between these simulations although the variance explained by the EOFs is rather different. This is essentially a sanity check: if the two simulations did not show similar EOFs something would be rather dramatically wrong.

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2) The two methodologies for calculating the EOF index in the nudged simulation give similar variations to the observed pressure-derived index. Again this seems like a sanity check for a nudged simulation although somewhat surprisingly the amplitude of the model derived index is somewhat smaller than observed. The indexes derived from the second simulation evaluated over the present-day period give similar variance, a check that the simulation is reasonable.

3) The authors show the trend of the NAO over various window lengths for the present-day period in the two simulations. Unsurprisingly the nudged simulation looks like the observations. The present day NAO trends have been analyzed in greater detail elsewhere. The second simulation gives surprisingly similar trends. The interpretation is not clear.

4) The authors show the trend of the NAO over various window lengths for the second simulation from 1950-2099. As a previous reviewer pointed out the future trend of the NAO has been evaluated elsewhere. Moreover, it is somewhat difficult to interpret the result as the trend is simulated in a model driven by changed SSTs. It is not clear to what extent the atmospheric forcing (e.g., CO<sub>2</sub> concentration) is responding to future conditions.

5) The authors briefly discuss the correlation between CO and CO<sub>25</sub> (a CO like tracer with a 25 day lifetime) and the first EOF timeseries for the present day and future periods. As the authors point out their findings are in agreement with those of Christoudias et al. (2012), so it is not clear what is new here. The long-term and future correlations with CO<sub>25</sub> are similar to those of the present-day, not surprising as the authors show little change in the long-term NAO.

This paper seems to add very little to the existing literature. I would recommend against publication.

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