General comments

This paper analyses the variations of the ocean heat content averaged over the first 700 m (OHT700) of the ocean into an area surrounding the Labrador Sea region for the period 1970-2014. For this purpose, it uses observational data available and two multi-model sets of climate simulations, one with only the external forcing (historical simulations) and the other with decadal hindcasts starting from observation-based estimate. The analysis shows a very wide range of response in the models, especially for the historical simulations. The authors try to estimate the skill of the different systems to reproduce the OHT700 in decadal prediction and historical simulations, and found an interesting link between this skill and the capability of the models to reproduce observed mean state of stratification and ocean heat fluxes in the Labrador area.

This is an interesting and well-written paper. The analysis led is impressive given how difficult it is to deal with so many climate model data. The interpretation of the results is wise and useful, even though no definitive conclusions can be drawn from this type of multi-model analysis. At least, this is presenting an interesting intercomparison of present-day models to reproduce heat storage in the Labrador Sea area and a few interesting predictors that might be of use for observations constraints approaches.

I therefore think this paper is suitable for publication. I have mainly some comments that might allow to strengthen the demonstrations and possibly improve the interpretation of the results.

- Line 35-40: here the authors are mixing discussions about the subpolar gyre and the wider North Atlantic and ocean heat content and SST. It might be worth to be a bit more specific in the description of those papers.
- Line 61: a reference after forecast range might be useful to support this claim.
- Line 202: The LS, as represented in Figure 2, does not entirely correspond to the Labrador Sea but is going far the east, including the Irminger Sea for instance. In this respect the agreements between observation-based datasets are not that clear to the east (cf. Figure A.1), while the good agreement is taken as a reason to focus on this region in line 204. Please clarify. Have the authors tried a more tied region?
- Line 249-253: ocean stratification and heat fluxes are two variables clearly linked in the convection region. If the halocline is too strong, convection is not allowed and heat fluxes can lead to sea ice formation. It might be worth to state this coupling between these two variables (maybe in the discussion).
- Line 266: it is said line 155 that density is computed with reference 1000 m (sigma_1) while in Figure 6, the caption talks about reference to the surface. Given that the numbers in Figure 6 are larger than 28, I assume this is actually sigma_1. This choice is surprising given that then authors are focusing on the very upper layer. I think it might be better to consider sigma_0 as stated in the caption (while it is not what is shown).
- Line 291-296: why are the observations are not shown on Figure 7?
- Line 395-400: The use of residual ACC (Scaife & Smith 2018) might be interesting as well. I'm wondering if this might work for this type of complex quantity like OHT700,

especially given the complexity of its forced response. A discussion on this aspect might be interesting here I think.

- Line 412-416: I have the feeling that this aspect has not been much depicted in the result section, so that this discussion seems a bit coming out of the blue. Maybe useful to add a few points on this in the results section.
- Line 431: Yes, the omission of advective processes is clearly missing in this paper, but I can understand that it is far from easy to have those quantities from such a large ensemble of simulations. What about citing Ortega et al. (2015) that was also discussing this type of processes in details? + typo at “mechanisms”

References

Scaife A.A., Smith D., 2018. A signal-to-noise paradox in climate science. *npj Clim. Atmos. Sci.,* 1, 28. doi: 10.1038/s41612-018-0038-4

Ortega P., et al. (2015) Reconciling two alternative mechanisms behind bidecadal AMOC variability. *Progress in Oceanography* 137, pp. 237-249.