Review for "Synthesis and evaluation of historical meridional heat transport from midlatitudes toward the Arctic" by Liu et al.

The paper compares the meridional energy transports by the atmosphere and ocean at high latitudes in different datasets, with the general aim of validating their use in the analysis of observed slow (decadal ?) variability.

Compared to the first version, some major problems in the computation of the transports have been corrected. There is however a number of smaller issues remaining, so I would recommend at least a minor revision.

A list of specific comments follows, but more generally the paper needs to be edited to improve the English : it is barely understandable in places. Examples are page 11, lines 7-10, or page 10, lines 26-29.

- ERA-I and JRA-55 now seem very close to each other in most respects (mean, variations, regressions with surface variables...). This should be highlighted in the conclusion / abstract ?
  Merra 2 behaves very differently, and seems still noisy : a problem remaining in the computation ?

- page 6, line 24 : the moist static energy is H + I + gz, not H.

- page 7, l9 (advection schemes) : this should come later (as a potential source of errors)

- page 9, line 7 : the sentence should be "note that we have access to sub-monthly data only for SODA3. The computation of OMET in GLORYS using monthly data could miss part... eddies, while ORAS4 does not have explicit eddies (insert missing GM comment here). There is no causality between having data for SODA3 and the smoothing in GLORYS.

- Figure 1/2 : it would be useful to see a decomposition into components (at least dry static / latent) as a function of latitude.

- fig 3b : ERA-I and JRA55 look similar to me (at least compared to MERRA). The text should reflect thet.

- page 10, lines 10-20 : it would be useful to have a figure of OMET as a function of latitude, to support the discussion in this paragraph. Also, presumably the GM transport in ORAS4 would compensate ?

- page 10, line 15 : eddy-induced velocity contributes to the heat transport, not to the volume transport. (works like en overturning streamfunction).

- page 11, lines 20-30, and figure 5 : This discussion assumes that the differences in AMET are due to differences in the climatological-mean v or T (not knowing which), but why would this be true when the total transport is dominated by transients ? This figure seems unnecessary as not much can be concluded from it.

- page 12, line 30- (OHC) : why would polar cap OHC be a sign of Arctic Amplification (not just Arctic warming)? Note that the observed increasing trend of OHC can also be due to surface heat fluxes, indeed there is a downward trend of OMET at 60° over the same period...

- Section 3 : the use of "interannual" is usually year-to-year variability. To use it for a 5-yr smoothing (intending ~ decadal signals) is a bit misleading.

- section 3 (bis) : a striking point in these results is the similarity between ERA-I and JRA, and ORAS4/SODA3. For the latter, it would be good to know if it could be due to similar surface fluxes used, or to the model / data assimilation.

- page 14, lines 10-15 : Why "an increase in OMET is related to warm and humid air transport over the North Atlantic" ?? My impression on figure 10 is that an increase in OMET leads to sea-ice melt and increase in T2m around the Nordic seas. In addition, there is an AO/NAO-like SLP anomaly (that can be cause or consequence) with the associated large-scale temperature pattern (North AM-Greeland / Siberia dipole).

- figure 11 : this seems broadly consistent with a colder Arctic : colder temp, more ice, high pressure. Is this causing the increase in AMET?

- figure 12 : In the sea ice regressions, it looks like there are sea ice trends in areas with no ice in summer... Also, values are very large, may be a scale of % per 0.01 PW would be more adapted ?