

Geosci. Model Dev. Discuss., referee comment RC3  
<https://doi.org/10.5194/gmd-2020-426-RC3>, 2021  
© Author(s) 2021. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## Further clarification...

Baylor Fox-Kemper (Referee)

---

Referee comment on "The interpretation of temperature and salinity variables in numerical ocean model output and the calculation of heat fluxes and heat content" by Trevor J. McDougall et al., Geosci. Model Dev. Discuss.,  
<https://doi.org/10.5194/gmd-2020-426-RC3>, 2021

---

Let me be explicit about the data download overhead point I made above.

To do the TEOS-10 calculation of OHC, we need model T (thetao or bigthetao, hopefully not thetato recalculated from bigthetao!), model S (interpreted as the paper directs) and in situ density (not specified in this paper if it is to be recalculated or archived) and  $c_p \rho$ . In Griffies et al. 2016, the seawater density is not specifically recommended for archiving, thus its calculation from archived data would require regeneration from T, S which might imply temporal aliasing (e.g., from using monthly-mean T, S rather than instantaneous). I suppose similar issues are at hand for using the EOS-80 approach to estimating OHC as well. What I'd like is a bit of comparison between the two approaches **from a data archive perspective**, specifically calling back to the list of data recommended for collection in the Griffies et al. OMIP protocol, and any advice for what we **should have** recommended to save but didn't (e.g., in situ density? potential enthalpy? depth integrated potential enthalpy?, etc.)