Response to Reviewer #1:

*We thank you very much for your review. Our responses to your suggestions and questions are noted below.*

Line 139: This is not a unit of heat content. May be "corresponds to" instead of "is"

*Changed as suggested*

142: What is the same period? It is unclear for which period the mean heat flux is calculated. Is it calculated from the temperaure difference between 2018 to 2019?

*Clarified to read “from 1993—2019”.*

445: delete “in the tropical Atlantic”

*Done.*

478: Is the basin regionally defined? Also for the other basins. Subpanels c, f, i includes part of the Southern and Arctic Ocean?

495: What is meant here? Freshening at about 40°N?

Comment: It might be useful to discuss changes in the total salt contents of the different oceans (vertical integrals of Fig. 3.9a,d,g) also pointing to changes in the global hydrological cycle.

541-542: better: redistributed

also why just surface circulation? I think the transfer into the subsurface ocean has to be mentioned as well.

*Changed to “redistributed by the ocean’s circulation”.*

620: I cannot see this in the figure. Do you mean Nordic Seas?

*Yes; changed from “subpolar North Atlantic” to “Nordic Seas”.*

641: tau must be explained as well.

*Added “tau is wind stress magnitude”*

641: change “Coriolis force” to “Coriolis parameter”

*Done.*

695: change “fresh water” to “freshwater”

*We prefer “fresh water” here to contrast with the salty water of the oceans.*

848: BC is used in caption of Fig. 3.19

*Caption of Fig. 3.19 now reads “Brazil Current (BC)”.*

858: change “fresh water” to “freshwater”

*We prefer “fresh water”for consistency with other sections.*

859: include reference, e.g., Balaguru et al. 2012.

*This reference has been added.*

888: I think here should be mentioned the DWBC measurements at the exit of Labrador Sea since 1997 (Zantopp et al. (2017). Zantopp, R., J. Fischer, M. Visbeck, andJ. Karstensen (2017), From interannualto decadal: 17 years of boundarycurrent transports at the exit of theLabrador Sea, J. Geophys. Res. Oceans,122, 1724–1748, doi:10.1002/2016JC012271.

923-924: The longest record of the DWBC transport is actually at 53°N (Zantopp et al. 2017).

1058: seems to be wrong: of carbon. Maybe: of carbon-containing compounds

Change “physical forces” to “physical conditions”.

*Changed*.

1082-1084: Is this correct? I would expect to subtract climatological means from the mean values ... and not the other way around.

1108: I can not see this in the Fig. 3.23. Eastern equatorial Atlantic seems to be associated with reduced values. Maybe off Northwest Africa and in the Gulf of Guinea.

1187: Why these values are negative in comparison to the other values before.

Should be positive. However, check also consistency with following text and Fig. 3.26.

1241-1243: The ONI index in 2019 was mostly positive in agreement with the discussion on lines 667ff. There were weak El-Niño conditions in 2019. Nevertheless, in the second half of 2019 cold anomalies start to develop in the eastern equatorial Pacific (Fig. 3.2). The discussion of El Niño should be consistent throughout the report.

Fig. 3.3: fix captions to match subpanel titles.

*Fixed*

Fig. 3.6: ICCES is not in the figure. There is IAP/CAS, which is not explained.

Fig.3.9: What is shown in c, f, i? Zonally averaged change in salinity from 2018 to 2019 for the ...

Fig. 3.10: Unit would indicate that this is a change and not a tendency. Also in Figure 3.11 and 3.12.

*Changed from “tendency” to “change”.*

Fig. 3.11: Change “moisture” to “freshwater”.

*Changed to “fresh water” for consistency with other sections.*

Fig. 3.17: anomalies relative to what?

*Added “with respect to 1993—2007 climatology”*

Fig. 3.18: derived for which period?

*This is now added to Fig. 3.17.*

Fig. 3.19: Brazil Current? BC not explained

*Caption now reads “Brazil Current (BC)”.*

Fig. 3.21: For the moving averages, half of the averaging period at the beginning and at the end of the time series should be omitted.

Fig. 3.24: Please include a), b) ...

*This will be done in typesetting by BAMS and checked in the galleys.*

Fig. 3.24: Please, define NH and SH. What are the latitude limits?

*The change from “Northern Hemisphere” to “NH” (etc.) was done by our lead editors and should be clear to the reader in context.*

Fig. 3.25: Please incle a), b) and enhance figure quality. Larger axis labels

*This will be done in typesetting by BAMS.*

Fig. 3.28b: x-axis in lower panel is missing/unclear. What kind of topography is shown? Where is N/S? Is this a zonal average? Must be explained in the caption.