

The authors would like to thank the Topical Editor for his Initial Decision to start review and discussion and his comments for the improvement of the manuscript.

Please see below is *our response (in italics)* and the *changes (in red)* following the **Topical Editors' comments (in bold)**.

Topical Editor Comments

- 1) Abstract line 5 heat and salt content differences between 1980–2015 and 1950–1979 are compared for evaluation of the climate shift - please add a short sentence explaining why these two periods have been selected and check coherence with the remaining part of the paper:**

Reply to Topical Editor:

A short sentence added to the introduction to note that the two periods selected according to the WMO recommendations. Further explanations are given at paragraph 2.2-climates

The added sentence is:

The two successive periods are chosen according to the standard WMO climate normals.

- 2) Introduction line 6 acceleration of warming, salinization as well as sea level rise - normally the effects of heat and salt on sea level are opposite, i.e. thermal expansion could be compensated by heavier salty water. How can be explained the relationship between heat and salt increase with sea level increase? Furthermore, the authors should also refer somewhere to the sea level changes calculated in IPCC (looking also at the PSMSL products).**

Reply to Topical Editor:

The following paragraph added at the Introduction, line 11:

According to the IPCC (2014) 5th assessment report, the observed global mean sea level (GMSL) has changed since the mid-19th century with a larger rate than the mean rate during the previous two millennia (high confidence). It is very likely that the mean rate of global averaged sea level rise was 1.7 [1.5 to 1.9] mmyr⁻¹ between 1901 and 2010, 2.0:[1.7to 2.3] mm yr⁻¹ between 1971 and 2010, and 3.2 [2.8 to 3.6] mm yr⁻¹ between 1993 and 2010. The most important contributions to global and regional mean sea level rise are: a) increase in the ocean volume as a result of increase in the mass of the water (due to melting of ice sheets and shrink of glaciers), and b) increase in the ocean volume as a result of decrease in ocean water density (the ocean is expanding as it warms). However, ocean observations indicate that the ocean is getting saltier and an increase in density should compensate the thermal expansion. Recent studies suggest that the water cycle has been amplified because of the global warming contributing to a saltier ocean (Skirris et al., 2016; Durack and Wijffels, 2010; Durack et al., 2012; Zika et al., 2018). The projected future changes show that the GMSL will continue to rise during the 21st century with a rate that will very likely exceed that observed during 1971 to 2010 due to increased ocean warming and increased loss of mass from glaciers and ice sheets. Sea level rise will not be uniform.

- 3) Introduction line 9 pag 2: influencing the global thermohaline - this is a sentence justifying the role of the Mediterranean at global level, but is not convincing - Mediterranean outflow is 1**

Sv, is this sufficient (considering mixing and other phenomena) to influence the Atlantic role in climate?

Reply to Topical Editor:

Even if the Mediterranean outflow is small, several studies (Lozier et al., 1995; Béthoux et al., 1998; Rahmstorf, 1998) have shown that it has an effect on the water formation processes and thermohaline circulation in the North Atlantic.

The corresponding sentence has been rephrased as:

“In turn, the Mediterranean Sea plays an essential role in influencing the water formation processes and thermohaline circulation in the North Atlantic. (Lozier et al., 1995; Béthoux et al., 1998; Rahmstorf, 1998).”

4) Introduction line 32 pag 2: Two major abrupt changes have been recorded in the Mediterranean - is the second change abrupt or is a slow restoration to a previous condition?

Reply to Topical Editor:

The corresponding sentence has been rephrased as:

“A major abrupt change has ...”

5) Introduction line 6 pag 3: may be the same author name has been written in two different ways (Schoder or Schroeder). Please check

Reply to Topical Editor:

The author name spellings in the citations are taken as they are from the publications, hence we prefer not to modify them, even if the spelling is not consistent from among different publications.

6) Introduction lines 19-20 pag3: the first publication on errors contained in the Levitus trends calculations was by Gouretsky and Koltermann in 2007 Geophys, Res. Letter; then Levitus corrected the WDC-A data base

Reply to Topical Editor:

The text modified as

“The first publication on the errors of the bathythermograph data was by Gouretski and Koltermann (2007). The proposed corrections were included in the World Ocean Database and in 2009 Levitus showed that the proposed corrections”