

Interactive comment on “The GEOVIDE cruise in May–June 2014 reveals an intense Meridional Overturning Circulation over a cold and fresh subpolar North Atlantic” by Patricia Zunino et al.

Anonymous Referee #2

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The GEOVIDE cruise in May–June 2014 reveals an intense Meridional Overturning Circulation over a cold and fresh subpolar North Atlantic, by Patricia Zunino et al.

This paper discusses the physical background of the GEOVIDE cruise in 2014. It highlights changes in transport as well as heat and freshwater content compared to the 2002–2012 mean state. The most interesting conclusion is that the large scale cooling seen in the SPG is (more than) compensated by a strengthened circulation in the net heat transport.

One comment on the structure of the paper. Although the TEI measurements do not feature in the abstract there are discussed several times in the introduction and elsewhere.

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where in the paper. It therefore reads like the discussion of the TEI measurements will be discussed later in the paper, but this never happens. It is also never mentioned where (in which other paper) these measurements will be shown. This does not improve the overall clarity of the paper. The authors should rephrase the text as to make it more clear what the focus of this paper is, why it is presented in Biogeosciences and where the other data from the GEOVIDE cruise is (or will be) presented.

The discussion section can be improved. Where increases and decreases are discussed (for example the second paragraph) the authors should mention whether this increase is statistically significant or fall with the observed variability. In the discussion on the origin of the cooling of the SPG, advection versus surface fluxes, it is important to consider the time scale that both are acting on. The changes in advection are thought to act on longer (decadal) time scales while the surface forcing has a more direct effect. In fact, the warming trend in the western SPG was halted much earlier than 2014 and much has been explained by surface forcing (Piron, 2015; de Jong and de Steur, 2016; Yashayaev and Loder, 2017). I would encourage the authors to put the 2014 anomalies into context of the recent interannual variability rather than focusing on a comparison with the mean.

Comments

- Suggest to replace MOC with AMOC (Atlantic MOC) throughout the paper since it is more appropriate in the context of the North Atlantic circulation discussed here.
- Line 63: “the ocean has taken up 90% of the heat accumulated”.
- Line 74: not sure what is meant by durable.
- Lines 139–141: this criterion seems to lead to unexpected values near the shelf of Greenland. The waters in the IC and EGC are very stratified, but the orange line shows WMLD as deep as in the central Irminger Sea.
- Line 221: This current system is not commonly known as the WBC. Elsewhere the

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authors refer to the East Greenland (Coastal) Current and the Irminger Current which is more appropriate.

- Line 252: "Note that the net transport in the northern branch is null".
- Line 274: "as well as it can" is not very readable. Even though I understand that the author is not a native English speaker I think the readability would improve if the authors took another critical look at the grammar of some of the sentences in this manuscript.
- Line 297: the section just seems to miss (cut south off) the high energy signal of the Irminger Current on the RR.
- Regarding the paragraphs between lines 284 and 325. The red squares in Figure 6 are mention, but the others are not. It would be easier to follow the eddy description if the yellow, green and orange squares were also denoted here.
- Lines 359-361: not clear which anomalies are referred to here. If it is the cooling/freshening in the western SPG (caused by ventilation) it is not surprising to see it linked to an oxygen increase.
- Lines 371-380: Please let the reader know where the data from these other measurements will be presented if not here.
- Line 430: Briefly mention why is 1997 excluded.
- In the discussion on freshwater surface fluxes it would be good to mention something about the uncertainties of these fields over the ocean.

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