

Response to reviewer comment RC2 #2

Reviewer comments are presented first in *blue italics*, then followed by the author's response in normal font. Line numbers are referring to the original manuscript and are denoted as L145 for Line 145.

Thanks to the authors sincerely response about my comments. It would be possible to be published after several minor comments listed below are corrected.

L74; sea surface height (SSH), sea surface temperature (SST)

Have added abbreviations here and removed later definitions..

L183: XBT is used in L110

Have added abbreviation at L75, removed later definition of XBT.

L298: "but by 1000 m depth the error is reduced". Is it right?

Have modified it to say "but by 1000m depth the error is lower (as it is for all OSSEs)."

L317: delete ":"

We have rewritten the sentence: "This is explained by the lower natural variability at this depth, which necessarily makes the free-running Baseline more accurate through lower impact of that initial perturbation. Furthermore, the corrections that the 4DVar scheme makes often lead to a degradation in vertical representation."

L453-454: It seems to be a similar expression by "while" and "though",

We have removed the 'though', which has made this sentence clearer: "While there is some improvement in EKE from the XBT-S transect, there was degradation in the far south of the domain."

L590: "surface observations struggle to represent these features at depth" This sentence should be mentioned about the impact of subsurface observations to logically connect to the meaning of the sentence "hence subsurface observations ...".

Thank you for picking this up. We have changed this sentence to: "While assimilating surface observations is effective at improving representation of key EAC circulation features at the surface, such as the return flow and the southern and eastern extensions, surface observations struggle to represent these features at depth. In this study, we found that assimilating subsurface observations is critical for improving representation at depth."