

Interactive comment on “Characterization of Ocean Mixing and Dynamics during the 2017 Maud Rise Polynya Event” by Jhon F. Mojica et al.

Anonymous Referee #1

Received and published: 12 July 2019

Dear editor,

I recommend that the manuscript be sent back for Major Revisions. The authors present and analyze unique observations of ocean properties during an open ocean polynya in the Lazarev Sea. However, the manuscript is not written very clearly and the results are presented in a confusing way. Moreover, the manuscript focuses exclusively on convection and various mixing processes but does not explore wind-driven advection, that may be constrained using reanalysis products. That is despite the fact that the title of the manuscript refers broadly to “dynamics” during the polynya. It seems that the authors do not present and test a hypothesis or a set of hypotheses about the causal chain of mechanisms that give rise to such open ocean polynyas.

Major issues:

C1

1) The manuscript does not clearly present the observations and the analysis in the context of testing a hypothesis about the mechanisms behind a Polynya formation although it hints to such possible mechanisms in a very confusing manner. It seems that the authors are aware of ways in which their observations and analysis fit into the broader picture, but are not communicating this efficiently to the reader. I have not worked on the formation of open ocean polynyas, but my general understanding is that multiple processes with positive feedback mechanisms are at play, and this makes distinguishing cause and effect difficult. Could the authors’ observations help disentangle the chain of events triggering and sustaining this open ocean polynya?

2) The manuscript title refers broadly to dynamics but the analysis focuses exclusively on convection and mixing processes. The contemporaneous anomalies in wind driven circulation are not given attention. Could the authors consider anomalies in the wind-driven circulation from reanalysis? Or alternatively, they could narrow down the scope of the paper, but be clear from the start that they are not fully exploring the dynamics of polynya formation.

3) The manuscript needs serious proofreading by the authors. This is not a minor issue because the text can be confusing at times. I may accept to review an updated version only if the quality of the text is substantially improved! That is why I indicated that I am not willing to review this again.

4) The introduction includes a broad overview but does not emphasize the important role of the halocline, the salt-stratification that allows a vertical temperature inversion (e.g., lines 59-65). Also, the introduction does not highlight differences between coastal and open ocean polynyas.

Minor issues:

Lines 16, 160, 163, 187, etc. You switch between present and past tense, but maybe you should stick to using present tense consistently throughout the text.

C2

Line 95 and others. You vaguely talk about “physical properties” when you can be specific that you mean density.

Line 64, Line 368 and other instances – you talk about “production of sensible heat” when you mean “transport” and “release”

Line 100 “providing” → “facilitating”

Line 114 “within” → “during”

Line 119 You do not have to keep the reader waiting. Briefly state what we should expect.

Line 55 “by associated Ekman transport” – awkward phrasing

176 “near to the surface” → “near the surface”

Line 200. Diapycnal “diffusivity” is not “a process.” Diffusion is a process, while diffusivity is an inherent characteristic of the system.

Section 3 title. Why do you refer to the following as “methodology?” It seems that you are doing an overview of theory.

Lines 113, 137-140, 193-194, 202-206, 286, 289, 297, 325-326, 349-353, 394, 444, 450 – awkward or confusing phrasing

Line 226 “quantified as” → “defined as”

Line 271 expand the abbreviation ASW to explain what it stands for

Line 301 drop “a”

Line 335 – if the isopycnals are steep, then there is both a lateral and a vertical component to isopycnal mixing. So I would not label diapycnal and isopycnal mixing as vertical and lateral.

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