

Interactive comment on “Open ocean dead-zone in the tropical North Atlantic Ocean” by J. Karstensen et al.

Anonymous Referee #1

Received and published: 3 February 2015

The paper presents new observations of unexpected low oxygen concentrations in eddies of the eastern tropical North Atlantic Ocean. Observations are derived from the Cape Verde Ocean Observing mooring, from a RV Meteor survey and from an Argo float. The low oxygen zones are located below the mixed layer in the eddy euphotic zone. Evolution of the oxygen content suggests important net respiration that would explain the low oxygen content.

The study deals with new observations of major importance to understand the oxygen distribution in the eastern North Atlantic. Results are quite interesting. The paper should thus be published in Biogeosciences but the authors will need to significantly improve it. Some parts seem to have been written in a rush and others should be better synthesized. Discussion on differences between anticyclonic mode water eddies and

C8119

cyclonic eddies is also unclear. A synthetic explanation of the DO low values should be given in the conclusion.

Specific comments:

1. Abstract. I found the abstract poorly written. The sentence “a dynamic boundary. . .” makes no sense to me. Observation types are not presented.
2. Page 4 (section 2.1). CVOO meaning should be given the first time this acronym is used.
3. Page 5 (section 2.2). pressure correction of 4%. Explanation needed.
4. Page 5 (section 2.3). SLA. Meaning. You should explain you are using altimeter data and describe them !
5. Page 6. I found the discussion on the anticyclonic eddy vertical structure confusing. There is indeed a structure of downward/upward bended isopycnals at about 40 m (mode water eddy) but the eddy has a deep (> 400 m) velocity and salinity signature (the temperature structure should be given in figure 3).
6. A discussion on vertical circulation associated to the different eddies should be given as it is related to the inputs of nutrients (to be added in the paragraph just before section 3.3).
7. Page 7. There is no figure 4d !
8. Page 7. Geostrophic surface currents of 5 to 10 cm/s (as derived from altimetry). Please check that similar results are obtained from your temperature and salinity observations (assuming a deep reference level).
9. Page 9. First paragraph. A figure showing the evolution of the velocity structure is needed.
10. Page 9. “which should be minimal given the constancy”. To be rephrased.

C8120

11. Page 10. So far not routinely measured.

12. Page 11. This discussion should be related to your observations. What are the differences in intensity/lifetime and dead zones in your cyclonic and anticyclonic mode eddies ?

13. Page 11. In principle open ocean dead zones ... Explanation?

Interactive comment on Biogeosciences Discuss., 11, 17391, 2014.