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Interactive comment on "Oxygen budget for the north-western Mediterranean deep convection region" *by* Caroline Ulses et al.

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The paper use a model to estimate the oxygen budget for the NW Mediterranean Sea, and use a range of relevant field data to validate the model.

The paper is very well organized and written, the logical structure is very helpful to navigate this comprehensive study. I am impressed by the overall very high quality of the paper, that covers a very relevant and significant topic. There are only a few things that could be considered in a minor revision.

The main issue is that the paper do not take the bubble effect into account. In a recent paper by Atamanchuk et al. (2020) this is discussed, and the authors conclude that " By neglecting the bubble-mediated flux component, global models may underestimate

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Discussion paper

oxygen and atmospheric potential oxygen uptake in regions of convective deep-water formation by up to an order of magnitude." I realize that this paper was published very recently, but a short discussion on the significance of bubble-mediated flux, and what it might mean for this study, would be appropriate. Minor comments: Line 34: I am not sure that reduction of deep convection related to climate change has been proven, although increased stratification etc. has . Line 56: "Massive supply of nutrients" – I guess this is by Mediterranean standards, having low nutrient concentrations in comparison to North Atlantic for instance. I agree with the statement, but maybe it needs to be put in context. Line 521: There is a recently published update of the Schneider et al 2014 paper that you could consider citing, and use as it contains data after 2012 (Li and Tanhua, 2020).

References:

Atamanchuk, D., Koelling, J., Send, U., and Wallace, D.W.R. (2020). Rapid transfer of oxygen to the deep ocean mediated by bubbles. Nature Geoscience 13, 232-237.10.1038/s41561-020-0532-2 Li, P., and Tanhua, T. (2020). Recent Changes in Deep Ventilation of the Mediterranean Sea; Evidence From Long-Term Transient Tracer Observations. Frontiers in Marine Science 7.10.3389/fmars.2020.00594

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