Ocean Science Discussions

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Comment on os-2021-72

Anonymous Referee #2

Referee comment on "Untangling the mistral and seasonal atmospheric forcing driving deep convection in the Gulf of Lion: 2012–2013" by Douglas Keller Jr. et al., Ocean Sci. Discuss., https://doi.org/10.5194/os-2021-72-RC2, 2021

The paper investigates the impact of Mistral events and Mistral event features on deep convection in the Gulf of Lion. A better understanding of the processes of deep convection in the region is very important. The authors show that a meteorological forcing without Mistral pulses is not producing deep convection events in the ocean simulation with NEMO for one seasonal cycle. Additionally they build a toy model which allows studying the impact of Mistral features, which is very interesting. I have some questions and remarks as given in the following.

- The authors do moving average filtering with a monthly time window of the meteorological forcing data to get rid of the impact of Mistral events in the Seasonal NEMO simulation. I am not sure if they are successful. They give the Mistral event length to 5.6 days and the distance between Mistral events ca. 10 days. In other words, Mistral influences about 1/3 of the month (and more in the investigated winter?). Therefore, I assume that the delta SI in Fig. 7 is only the high-frequency part of the impact of Mistral on the stratification. This might lead to an underestimation of the Mistral impact and favours the Mistral strength over the duration? Why not construct a Mistral-free time series from a longer meteorological time series?
- Who triggers deep convection? For me, it is more reasonable to blame the seasonality for pre-conditioning and the pulse events, i.e. the Mistral events, as triggering events. Even if there is an accumulation of destratification by Mistral events.
- Figure 7: it looks like a Mistral event accumulation process and the authors argue that weak Mistral events can even lead to re-stratification. Is it possible, that the system is most sensitive to pulsed disturbances if it is already preconditioned by seasonality? This would fit to the delta SI time series too with an increase in Mistral destratification, followed by a delta SI plateau with smaller changes in the seasonal SI, and a decrease in late spring. And, the simulations are initialised in summer without accumulation but after one seasonal cycle, there is a negative delta SI next summer. So, what about multi-year accumulation?
- The authors ask if the Mistral-induced destratification maximum needs to be before the seasonal destratification peak. I assume there is no reason for it and it is just like that in the chosen period. In another season such an extreme Mistral outlier might easily be later in the plateau period. So, why not more years investigated? It seems not to be

very difficult.

line 34: here, in the introduction, the main conclusion is given already. I suggest skipping it here.

line 74: the heat (and kinetic energy) flux by rainfall is considered?

line 89: the year in one reference is missing.

line 110: intra-day variability is misleading. Only, the average diurnal cycle is kept as is clarified later in the text.

line 188: Can it be something else besides Mistral events?

line 390: next -> net

Figure 6: the box is difficult to be seen