

## ***Interactive comment on “Importance of the variability of hydrographic preconditioning for deep convection in the Gulf of Lion, NW Mediterranean” by L. Grignon et al.***

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### General comments

The paper addresses a topic of great interest for the oceanographic community studying the Mediterranean Sea, ie. the relative importance of preconditioning and buoyancy fluxes in the properties and volume of the Western Mediterranean Deep Water formed every year in the Gulf of Lion. They used the worthy data series of Dyfamed station to assess the importance of preconditioning in the vertical reach of deep convection and conclude that it is as important as winter buoyancy fluxes to set the convective mixed layer depth. Figures are very illustrative, contain a lot of information and, in my opinion,

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are the robust point of the manuscript.

I only have two remarks: the first one is about the selected thickness and depths of the layer: looking at figure 10 it appears that LIW core (in fall-winter) is at 400 m or below. Why then authors select the layer 100-400m as representative of LIW (section 2.1, line 10)

The second one is about salinity trends observed in upper and intermediate layer after year 2003. Looking at Figure 3 of Millot's 2007 GRL paper (doi 10.1029/2007GL031179) about the salinification of the inflow through Gibraltar one wonders whether or not the salinity trend in Figure 5 could be connected to that trend, particularly when the salinity increase from 2003 to 2006 is comparable in both data sets. I am surprised to see that authors don't seem to be aware of this noticeable feature.

### Specific comments

Authors should indicate which N2 is plotted (fig 2&3) or analysed (section 3.4). I understand it is a depth averaged value but I miss an explicit mention to this in the text.

I agree with the "striking similarities" between potential density and the winter N2 maximum between 2000 and 2005 but they do not seem to correlate (anti-correlate, in fact) so well before 2000. Some suggestion about this?

I think Tables 1 and 5 are not necessary as the information can be incorporated in the text easily. Probably Tables 2,3 and 4 could be merged in a unique Table which would facilitate comparisons to the reader.

I miss a more detailed caption in Figure 11. I know it is a Figure not made by the authors but taken from another paper, but I was confused trying to understand the meaning of all bars in the plot; are they "seasonal" values as they seem to be?

### Technical corrections

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Section 2.2.1 line 16 "..interpolating the profiles daily between..." daily?

Section 3.1, page 58, line 3 ".. and 2005." Is it 2005 or 2004?

Section 3.3 page 59, line 25. In Figure 6a the potential density increase seems to be 0.4kg/m<sup>3</sup>, not 0.04kg/m<sup>3</sup>

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