Revision of Arjona-Camas et al.

This study addresses the dense-shelf water and associated sediment transport in the Cap de Creus Canyon during the mild winter of 2021-2022. This canyon has been identified as a main pathway for the transfer of dense shelf water and sediments from the shelf to the slope and deep margin. The study bases on combination of data from gliders, ship-based CTD transects, instrumented mooring lines, and a reanalysis product.

The article is very clearly written and organized. The results are supported by a set of observations covering different spatio-temporal scales, which is an asset. I do no have any problem with the manuscript other than it is a bit hard to follow because of its very descriptive nature given the different datasets involved. In contrast, I think that the relevance of the study is not very clearly stated. However I do not know the region very well, so I ignore the state of the scientific knowledge and the reach of the relevance or novelty of this study, so I prefer not to evaluate that point.
Overall, it is a good paper. Mi main criticism is about the possibilities that the use of the reanalysis product offers, and which I feel it's not exploited. I wonder why not to (really, with numbers) validate this reanalysis with your observations, and make the same computations for several years, separating mild and intense winter conditions. This would greatly strengthen the paper's conclusions. So far, the article is a very nice compilation of observations from different datasets, but it is very descriptive and the cause-effect of the findings is often weakly sustained. I really think there is potential for more robust conclusions if further analysis were carried out by adding a longer time series from the reanalysis to put this winter, and other mild winters in context. This would allow to generalize your conclusions.

General comments

Abstract :
I didn't really understand if the Cap de Creus Canyos is "**only a partial sink** of cascading waters" or if "remarkable dense shelf water and sediment transport occurs in the Cap de Creus Canyon,..., **even during mild winters** ". Isn't this a bit contradictory? Or maybe I'm missing the difference between these transports. In any case, please clarify. This is a question that remained even after reading the full manuscript.

Methods:
The interpolation method used in the sections should be stated. The figures look a bit weird and I think it might be an interpolation issue.

Particular comments
L51. What "it" makes reference to?

L74-75. More prevalent than the extreme ones, thus, reducing overall DSWC over time? Or more prevalent than the "no DSWC scenario", thus, increasing overall DSWC over time?

L99-101. I'd remove " *which was monitored during the FARDWO-CCC1 cruise, and simultaneous measurements at its adjacent shelf acquired during a glider survey as part of the MELANGE-DUNES experiment.*" from here as it's too much detail for the introduction.

L118. Export of what? Just precise

L129. What do you mean with "the concentration of water"? Are you refering to the residence time? Please rewrite, the term is awkward.

L.136. The full water column gets mixed? It would be surprising.

L.149. 300-400 m is the upper limit I guess, above which stratification prevents the full mixing of the water column? In that case that would rather be a re-stratification, because DSW forms from the surface forcing, and the a light water layer develops in the surface. Is that it?

L.151. Gain

L.164-165. However, all the point of TEOS10 is to promote the use of the more adequate conservative temperature and absolute salinity instead.

L.193-194. But what's the range of the bottom depth?

L.216. Data is a plural noun: "Data were.."

L.226-228. What type of data were used? Is it discharge volume?

L.286. Low compared to what? Give a reference please.

L.287. That's kind of surprising the existence of a storm that is not cause by strong winds, isn't it? Can you provide an explanation?

L292. This is also surprising!

L.293. Low compared to which reference value?

Fig 3. It would be better to inverse the y-axis for density, so the densest water corresponds to the bottom layers.

L319 and throughout the manuscript. It would be better to refer to the Moose stations by their location instead of LDC or CCC, which is complicated to remember.

L.336. Compared to what reference values? (please provide references whenever you state that XX values are low or high).

Fig 5. Please avoid the used of divergent color maps for non-divergent fields as in the left column. This is misleading. Also, I'd personally prefer to see latitude instead of distance in the x-axis. I think it helps the readers to know where they are.
L341. This information belongs to methods. I actually missed it when I read it.

L.340-350. I suggest to better indicate what is from glider and what from cruise. It took me a moment to understand.

Fig 6: The color bars for panels f and i are not the same, even if they have the same limits and correspond to the same variables, which is misleading and makes comparison difficult.

L430. However, the discharge was low this winter, and dense water forms other years. This makes me think that this is not a reason to justify the low density.

L.432-435. I can't really see a decrease in density, which makes me think that river discharge is not a key factor.

Fig 8. Wouldn’t it be better to plot bottom density in order to identify dense water? Also, please change the color map for a non-divergent one. This one is misleading.

L.446-447. As I said above, we cannot judge if the values are low or high if we don’t have references.

L479. Suggest.

L489. Flows.

L.500-510. This paragraph should definitely go to Methods and not in the discussion.

L.513. 0.05 Sv is practically zero, taking into account the strong variability. I actually would say the mean is negative? Have the authors double checked this mean? In any case, given the difference in the T1 and T2 value, I would not define the Cap de Creus Canyon as a partial sink, it is rather not at sink during mild winters. Wether or not this canyon is a sink, or export occurs through it remains confusing to me throughout the manuscript.

L519-520. You state you used the reanalysis “to assess the variability of dense shelf water export in the Cap de Creus Canyon during the mild winter of 2021-2022.” but the computation spans the October-May period, so, beyond winter.

L.525. I miss having some numbers to compare the reanalysis with the observations and quantify how well they match. You should plot the same variable for the T1 and T2 transects, integrated over the same depths. You could event add a line for the value of each variable in your observations. This would provide robustness to the reanalysis results.

L.546. “relatively weak wind forcing”.

L.560-562. How was this percentage estimated? I’m a bit confused. When we say export, I think about the water transport down-canyon to reach deeper depths, if water doesn’t get to leave the shelf I wouldn’t call it export. Throughout the manuscript the authors state (and the transport numbers suggest) that the actual export is very weak. I would like to know how these percentage were computed and, as asked before, what are the reference values in Sv (for instance a climatological mean, or the typical values in strong winters) for transport.