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Biogeosciences Discussions

Interactive comment on "Sediment transport along the Cap de Creus Canyon flank during a mild, wet winter" *by* J. Martín et al.

Anonymous Referee #2

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The manuscript describes the extensive monitoring of water and sediment fluxes caused by downwelling currents during moderate storms at the flank of the Cap de Creus Canyon. Detailed hydrographic and hydrodynamic observations allow quantify sediment fluxes along the flank of the canyon and compare them with observations at the head of the canyon. From observations, main hydrographic processes and paths of sediment transport are inferred. Although the export of sediment from the continental shelf to deep areas through submarine canyons has already been described in previous studies, this manuscript provides high resolution data and adds new knowledge, especially to differentiate downwelling processes from that of dense shelf water cascading, and also shows that the entry of water and sediment into the canyon not always take place through the head of the canyon. The manuscript is well-written and interesting and I recommend publication after minor changes.

- About storm characterization: I understand that the Hs is the maximum Hs during the storm. This should be specified in the manuscript. Additionally, it is necessary to provide information, at least, about the wave period (the maximum Tp during the storm will give a better characterization of storms). Finally, the use of expressions as "under limited external forcing", "mild storms", "highly dynamic area" is quite subjective. I suggest to characterize the storm intensity in terms of "return period" or some similar quantitative expression.

- Advective and downward particle fluxes: Horizontal and downward particle fluxes mean different mechanisms and different methods were used to monitor them. Mixing both in the description is confusing. Advective fluxes represent sediment transport whereas downward particles mainly represent sediment accumulation. If the winter was "weak" or "strong" in terms of sediment transport it is more related to advective fluxes (i.e. strong advective currents can prevent settling of particles. . .). Higher downward particle fluxes mean that a high amount of sediment arrives but the sediment transport is low at the site. I suggest to clarify these concepts in the description and discussion.

- "origin" of sediment: The postulated origin of sediment that increases the turbidity (and sediment transport) in the downwelling layer is the sediment erosion at the inner shelf. This is in agreement with observations in previous studies. These studies demonstrated that sediment erosion was favoured by the presence of fresh sediment, in the form of ephemeral layers, recently deposited at the inner shelf by a combination of river floods and storm activity. In this context, it should be interesting to evaluate if this is the situation for the sequence of storms in March: previous river flood, transport of sediment towards the inner shelf (role of the 9 March storm?), and finally offshore transport to deeper areas. It seems that the sequence of storms can play a significant role in the delivery of sediment from the shelf to deeper areas.

- is the sediment transport relatively confined or more relevant near the bottom? "The present results seem to challenge that notion." Be careful with this affirmation, it is too

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general and must be qualified further. You provide observations of a water layer more than 100 m thick with high turbidity and sediment transport. Therefore, you can affirm that sediment transport is not only confined very near the bottom. However, you don't provide details about sediment transport on the bottom boundary layer, the first meters above the bottom, although it is suggested that this sediment was resuspended from the bottom by waves and wave induced currents at the inner shelf (at this point probably the concentration and sediment transport will be higher near the bottom). This opens a question: the sediment is resuspended according to usual wave dominated bottom boundary layer processes, transported offshore and re-distributed (almost homogeneously) through a 200 m thick cold water layer. Perhaps authors can suggest some ideas of how this resuspended sediment is homogenized in the water column.

Minor comments:

- Page 18221, line 2: "among other parameters", what parameters? line 21: "to average winter storms in the region" reference? - Page 18223, lines 8-9: Eastern storms and tramontane wind gust, do they produce exactly the same effect? - Page 18232, lines 1-3, I don't understand this sentence. - Page 18233, lines 9-17, the settling of particles was higher at the flank of the canyon, but settling particles is not sediment transport. . . - Section 5.4.- This section seems out of the main scope of the manuscript. If necessary, please provide additional information of erosional marks: what sediment, morphology, . . .

- Conclusions, line 6: this amount is quite speculative (as explained previously in the manuscript) and it should be noted here

- Current speed from figures 4 and 5 is difficult to compare (along canyon and total respectively). From these figures, I'm not sure that both datasets are consistent between them.

Interactive comment on Biogeosciences Discuss., 9, 18211, 2012.