

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

Anonymous Referee #1

Received and published: 10 February 2013

General comments

This manuscript investigates the effects of storms in shelf-slope exchanges of water and particulate matter (PM) through the submarine canyon Cap de Creus in the Gulf of Lion (GoL), NW Mediterranean Sea. Storms, together with dense water formation and cascading, have been recognized earlier as the prevailing forcing mechanisms for PM transport from the shelf to the open sea. This work adds to a number of previous publications on particle transport, and mass fluxes in GoL, focusing on episodes of significant sediment transport during a series of moderate storms. The experimental setup is excellent; a wealth of high-resolution spatial and temporal data obtained by long-term and temporary moorings, as well as meteorological, wave, river, and hydrological data are used, thus providing a solid basis for transport processes identification

C8102

and their in-depth analysis. This is a well-written manuscript; methodology is presented in detail (except some minor remarks), it is well-organized, the rationale is clear and conclusions are fully supported by the data. In my opinion, minor modifications are required before publication. My comments are as follows:

(1) The term 'flux' is used many times in the manuscript in a variety of combinations with other words: particulate matter fluxes, particle flux dynamics, fluxes of organic and inorganic matter, particle flux, sediment flux, settling flux, apparent settling flux, apparent flux, suspended sediment flux, punctual sediment flux (not correct term), downward particle flux, downward fluxes, downward mass flux, downward sediment flux, horizontal fluxes of suspended sediments. It is obvious that those terms are not all necessary, so please select the most suitable ones and correct throughout the document. However, the commonly used term 'total mass flux' does not appear anywhere in the document. In my opinion, it should be shown at least at the 'Methods' Section, to make clear that all results on fluxes refer to the total mass flux.

(2) Using previous calibrations to transform turbidimeter measurements to suspended sediment concentration is not a good option. Particulate matter variable composition makes such estimates cruise (time) dependable. I would recommend: (a) providing bottle-derived SSC obtained during or shortly before/after CASCADE cruise; or (b) presenting all turbidity plots in FTU units.

(3) In Section 3.3 I could recommend another structure: 3.1) Meteorological, wave and river discharge data; 3.2) Long-term mooring; 3.3) Temporary moorings; 3.4) Hydrological measurements 3.5) Data quality check (all data, not only moorings). Similar sequence should be followed in the Results Section.

(4) Section 5.2. There is no reference to the work of Pasqual et al., Biogeosciences 2010 'Flux and composition of settling particles across the continental margin of the Gulf of Lion: the role of dense shelf water cascading'. It is an important omission, as the paper reports mass fluxes obtained between 2005 and 2006 at the Cap de Creus

C8103

Canyon and the neighboring Lacaze-Duthiers Canyon. It is noteworthy that some co-authors of the present contribution were also co-authors in Pasqual et al. paper. A critical comparison highlighting differences in total mass fluxes occurring during dense shelf water cascading and eastern storm events should be included in the revised version of the manuscript.

(5) Several long sentences in the manuscript are confusing and make it difficult for the reader to follow the authors' line of thoughts (e.g. lines 502-505, 561-566, 589-593, 643-647). Consider rephrasing.

Minor comments

P5L125: dense shelf water cascading was not evidenced during CASCADE cruise, so it should not appear as one of the major goals of the paper

P6L135: insert reference to Fig. 1a

P7L151: "Marin"; remove quotation marks

P9L218: ... intermediate depths ...

P11L255: punctual is not the correct term; consider rephrasing or remove. Also check and correct throughout the document

P12L284-291: a description of the array behavior at $V=50\text{cm/s}$ is missing, thus there is no reference to Fig. 2a. Either add some text or remove Fig. 2a

P13L311: SeaBird 911Plus is only the deck unit. What about the underwater unit and the types of sensors used?

P15L363: Add reference

P15L364: Here the NW wind is named Tramontane, but in P6 it is Mistral; please correct and check throughout the document. Also Marin is E-SE in P15 and SE-E in P7; I believe E-SE is the correct one

C8104

P15L372-373: More information would be useful regarding coastal erosion. What was measured and what results point to increased erosion? The link http://www.languedocroussillon.developpementdurable.gouv.fr/IMG/pdf/DREAL_LR-rapport_coup_de_mer_12-841%2016_mars_2011_cle5d39f7.pdf returns error: please check and correct accordingly

P16L385: Add results for H_s and river discharge rates with reference to Fig. 3

P16L388: Briefly describe currents and SSC, and then the fluxes with reference to Fig. 3

P17L415: What acoustic sensor? Nothing is mentioned in the Methods section

P18L447: Should read 'dissolved oxygen concentration' throughout the document. Also DO units are mg/l but later ml/l (e.g. Fig. 6). Check and correct throughout the document and Figures

P23L567: What would be the density value of the water mass in order to cascade down-canyon? What is WIW's typical density range? Add references

P24L589: Latter, not later

P26L634: Missing references

P39L965: Title is 'Sediment transport to the deep canyons and open-slope of the western Gulf of Lions during the 2006 intense cascading and open-sea convection period'

Comments on Figures

Fig. 1: Missing a, b

Fig. 2: Missing a, b, c. I suggest combining Figs. 2a and 2b to a single plot, including also the $V=0\text{ cm/s}$ case (landscape orientation, across page)

Fig. 3: Missing a to h. Maintain equal length for all Y-axes. Increase font size wherever possible and maintain the same axis titles between different Figures (e.g. in Fig. 3

C8105

River discharge ($\text{m}^3 \text{s}^{-1}$) and in Fig. 4 River water discharge ($\text{m}^3 \text{s}^{-1}$); in Fig. 3 H_s (m) and in Fig. 4 Significant wave height (m), etc.)

Fig. 4: Missing a to h. Keep the same order as in the previous Figure, i.e. wind direction, wind speed, H_s , etc. Maintain the same X-axis format in Figures 3, 4, 7, 8, 9

Fig. 5: Missing a to k. Remove psu. Oxygen in mg/l or ml/l . Also kg/m^3 or kg m^{-3} ?

Fig. 6: Missing a to h. Use different colors. Increase line weight and font size for all contours. For the 21 March plots, maintain the same axes scales (0-6 km and 0-600 m) and blank the 'no data' area

Figs. 10-11: Increase font size

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