

## ***Interactive comment on “Effects of the arrival of fresh organic matter on eroded and nutrient-depleted trawling grounds (Gulf of Castellammare, SW Mediterranean)” by Sarah Paradis et al.***

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We would like to thank Dr. Durrieu de Madron for the time taken to read and review our manuscript. Our detailed responses to his remarks and how they were addressed in the revised manuscript are provided below:

Page 2, Lines 18-19. The comparison of the impact of storms versus trawling is not discussed in the article by Durrieu de Madron et al, 2005, but by Ferré et al, 2008. (Ferré B., X. Durrieu de Madron, C. Estournel, C. Ulses, G. Le Corre (2008). Impact of

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natural and anthropogenic (trawl) resuspension on the export of particulate matter to the open ocean. Application to the Gulf of Lion (NW Mediterranean). Continental Shelf Research, 28, 2071–2091).

RESPONSE: The reference has been corrected in the amended manuscript.

Page 3, Lines 6-8 Since when has bottom trawling been practiced on the continental slope? Is it since the 1990 ban or was this area trawled before? This information would be useful to give an effective duration of trawling activity in the study area.

RESPONSE: Intense bottom trawling activities in the Castellammare region has been practiced for decades prior to the banning. The following sentence has been included in the revised manuscript: "First data of bottom trawlers in the area go back to the 1960s, but this fishery became more active since the 1980s (European Commission Fisheries & Maritime Affairs, 2014), as a result of the modernization of the Sicilian trawling fleet (L.R. 1/1980, L.R. 26/1987)."

Page 2, Line 26. It is a cyclonic circulation (anti-clockwise) and not an anticyclonic circulation. On the other hand, I imagine that currents on the continental shelf are variable and strongly impacted by wind, while the circulation along the continental slope is probably more permanent. I suggest simply writing "A cyclonic along-slope current dominates the Gulf's circulation".

RESPONSE: This mistake has been corrected in the amended manuscript.

Page 3, Lines 12-13. The sampling strategy includes three multi-tube corer deployments at the same station from which 3 cores are collected. Did you analyze each slice of sediment of the 9 cores thus collected and then estimate the mean and standard deviations, or did you mix all the sedimentary material of the different cores before analyzing it and the error bars shown correspond then to the instrumental error.

RESPONSE: Three sediment cores from triplicate multicorer deployments were retrieved at each station for organic matter analyses (proteins, carbohydrates, lipids, phy-

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top pigment, and turnover rate analyses). These analyses were conducted for each slice of the 9 sediment cores. The mean and standard errors of each sampled section was calculated for each depth at both sites (trawled and untrawled) and these results are presented in Figs. 5 and 7. On the other hand, a single sediment core from one of the three deployments was used to analyse the remaining parameters (sediment dry bulk density, grain size, radiochemical analyses). For these analyses, the error bars of Figs. 2-4 correspond to their analytical error. This has been clarified in the Figure captions of the revised manuscript.

Page 3, Line 21-24. Can you indicate the size limits between clays and silts, and silts and sands?

RESPONSE: The size limits between clays ( $< 4 \mu\text{m}$ ), silts ( $4\text{-}63 \mu\text{m}$ ), and sands ( $> 63 \mu\text{m}$ ) were given in Table 1. However, they have also been included in-text under Sect. 2.3.

Page 4, Line 2. Indicate the maximum depth of the cores on which these analyses were performed.

RESPONSE: Pb-210 analyses were conducted downcore until 37 cm and 49 cm for the trawled and untrawled site, respectively. This information has been included in the revised manuscript.

Page 7, Line 8-13. It would be useful here and for the discussion to know more about the fishing gears. Can you specify the main types and characteristics of bottom trawls used by fishermen in this region? Are they beam or otter trawls? Are they equipped with rollers or chains?

RESPONSE: Bottom trawling in the Gulf of Castellammare is mainly conducted by bottom otter trawls. The following sentence has been included in the revised manuscript: "Bottom trawlers in this gulf operate using otter trawl gear, a trawling technique which consist of dragging a wide net that is held open and in contact with the seafloor by two

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otter doors (Martín et al., 2014a)."

Page 10, Lines 14-16. Do you have any information on the intensity of the bottom current to estimate their capacity to transport or even remobilize fine sediment?

RESPONSE: Bottom current in the upper shelf of the Gulf of Castellammare has an average speed of 0.1-0.2 m/s, but can sometimes reach 0.4 m/s (Sarà et al., 2006). Unfortunately, there is no data of bottom currents on the slope close to our sampling sites, but assuming similar bottom current intensities as those observed on the shelf, it wouldn't cause enough shear stress to remobilize the fine-grained cohesive sediment of our study site. This information has been included both in 2.1 Study area and in the aforementioned section.

Page 10, Lines 29-34. Do you think that the benthic and epi-benthic communities are the same between the two sites (trawled and untrawled) given the differences in the substrate? Could different species induce significant differences in the organic matter turnover rate? Meiofauna biodiversity is not addressed in this article, but I think it would be interesting to consider this possibility in the discussion (if it makes sense)?

RESPONSE: Turnover rates were calculated from extracellular enzymatic activities produced by bacteria, hence, the turnover rates presented in our manuscript don't reflect metazoan consumption of organic matter. Nevertheless, trawling will undoubtedly cause differences not only in sedimentary organic matter, but also in epi-benthic communities, as observed in deep bottom trawling grounds off the NW Mediterranean (Pusceddu et al., 2014, PNAS). A separate paper dealing with epi-benthic community in sediment cores collected during the ISLAND cruise is under development. This under-construction paper will partly deal with the effects of bottom trawling, using our current manuscript as reference of the physical impacts of bottom trawling and its effect in organic matter content and degradation in the Gulf of Castellammare.

Captions of Figures 2, 3, 4, 5 and 7. Explain the vertical blue and red scales, as well as acronyms (SML: Surface Mixed Layer, constant SR : constant Sedimentation Rate)

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RESPONSE: The vertical annotations have been explained in the figure caption of the revised manuscript.

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