

We thank you for your constructive suggestions and comments.

Both reviewers found the paper too descriptive and requested that more results should be presented in order to show how the project allowed some progress on the scientific questions. A dedicated section is now available highlighting the main results. Also, since the initial submission of our paper, the following progress was made regarding the papers from PEACETIME results:

- 2 papers have been accepted to the Special Issue (Tovar-Sanchez et al. and Taillandier et al.)
- 4 papers have been submitted to the Special Issue (Freney et al., Trueblood et al., Feliu et al., Gazeau et al.)
- 4 papers are published in other journals (Bressac et al., Nat. Geosc. And Whitby et al., in GRL, Garel et al., 2019, Menna et al., 2019)
- 1 paper has been submitted to PNAS (Sellegrì et al.)
- 14 other papers are still in preparation for this special issue with submissions in June and July.
- We decided also to remove from this list the papers that are in prep for a different journal

We choose in our first version to provide a full description of the decision tools and we agree that leaving that section and adding a long new section summarizing the content of the papers that are/will be presented in the SI would make a too long paper. That section (along with 5 figures) is now presented as Supplemented Material. Because we removed part of the text, the outline changed a bit also. A marked-up manuscript version is also available.

Specific suggestions :

Line 22 (also 108), what does “state of the art regarding” refer to? Please correct wording.

Sentence changed

Line 33, please revise word choice for “valorization”

Sentence removed. The abstract was changed accordingly

Line 58-59, this is worded like iron is not a trace metal, perhaps revise “iron and other trace metals”

Changed

Line 68, “metal” not “metals”

Changed

Line 74, revise wording “also allowing quantifying the export below”

Changed « equipped with sediment traps »

Line 75, revise wording “P and N for marine biosphere”

« for marine biosphere » was removed

Line 76, “several days” requires more context. Several days from the initial part of a multi-day event? After a multi-day event?

« after the rain event was simulated » was added

Line 93-98, this is a long sentence, please break.

Done

Line 138, 140, correct to “33-day” and “on-board”, respectively

Done

Line 149-152, please see general comment.

The end of the introduction was changed. Please check the marked-up manuscript version.

Line 165, revise wording “dust transport associated to rain period”

« period » removed

Line 175, PM10 has not been defined, a casual reader will not be familiar with this term

« particles with diameter smaller than 10  $\mu\text{m}$  (PM10) » have been added

Line 216 “station” should be plural

Done

Line 253, correct use of three periods “: : :”

Done

Line 261-266, this is just basic cruise planning

We do not really agree on that as the R/V had to move 800 km (450 nm) far from its initial route and be at its new position on time to sample a rain event, which is not very common in oceanographic cruises. Moreover this had to be done without delay in order to be at station before the event impacted the targeted area. Anyway, a long part of all that section is now moved to Supplementary Material (8 pages), we hope that the reading will get easier that way.

Line 285, unlike prior sections, this one is not numbered

The section order and numbering is now changed to have a stronger focus – as requested by both reviewers – on outputs.

Line 321, revise to “, on a regular basis,” or the sentence could be modified to not need the commas

Done

Note that all that section is now in the Supplementary Material

Line 332, correct the units currently “mn”

Done

Note that all that section is now in the Supplementary Material

Line 458, correct spelling of “reacher”

The whole sentence was changed for « where the influence of Atlantic waters characterized by different nutrients pattern than Mediterranean waters should be limited compared to the more western Alboran Sea ».

Line 480, remove extra period between mg and m<sup>-2</sup>  
Done

Line 487, correct the acronym (“MVP” not VMP)  
Done

Line 528, please consider revising use of “kept lain”  
Sentence changed : “The density horizons being maintained along isobars in the upper layer, sign the absence of geostrophic perturbations during the long station”

Line 547, meaning no biomass was accumulated but what about increase of biological rates (e.g. primary productivity), how were these affected?

At FAST, after the rain, we observed first an increase in nutrients (DIN and DIP) in the mixed layer followed by a decrease in the 24h (DIN) and 48h (DIP). This was concomitant to increases in PP and BP. Yet, no increase in biomass (from pigments) was observed. But we know from previous experiments that stocks are not good proxies to evaluate the impact (for ex. grazing can hide the increase of biomass and visible changes in zooplankton community followed the dust event (Feliu et al., in revision). The N and P demand to fulfil this increase in PP and BP was calculated and compared to the decrease in nutrients and we concluded that the atmospheric deposition could explain these metabolic fluxes changes (van Wambeke et al., in prep). Importantly, we also checked the fluxes from below and found that diapycnal flux of phosphate to the mixed layer was particularly weak at FAST and was 2 order of magnitude lower than atmospheric soluble flux for P for example (in Pulido-Villena et al., in prep). Vertical diffusion fluxes from the interior into the depleted layer (across nutriclines) were much higher (Taillandier et al., 2020; Pulido-Villena et al. in prep); however, those nutrients were not injected up to the shallower mixed layer that was rather directly impacted by atmospheric deposition. (see section 6)

Line 548, please consider revising wording of “was displayed”  
« A deep chlorophyll maximum of about 20-m thickness was located at the base of the thermocline (about 75 m). »

Line 550, the increased intensity is an intriguing result. A simple mass balance is merited, e.g. could enough Fe be introduced from the dust lead to this much increase in the deep chlorophyll maximum? Given the spatial separation between surface Fe input and deep chlorophyll increases, I think this would be tenuous; therefore, I think the authors are internal wave idea (line 555-556) is more likely.

As described in Bressac et al. in prep, the DFe concentrations could be well followed after the dust event. However, DFe was not limiting and high concentrations are usually found in the Med sea due to the accumulation from dust deposition during the stratification period as shown for PEACETIME and from previous studies. Atmospheric input does not impact DCM, too deep and well below the stratification. (see also our comment on diffusion at different depths), so our hypothesis about internal wave seems correct.

Line 599-601, this manuscript does not provide any synopsis of these other studies (presumably because a vast majority are still “in prep”) and thus reads more like a pre-cruise planning report.

The whole section 6 is now dedicated to an overview of the results and associated papers.

Figure 1 – why does the scale jump to 1100 meters?

The maximum values of the MLD are observed in February and in February–March for the Gulf of Lions and the Southern Adriatic Sea respectively, which are regions of Deep Water Formation.

Figure 4 – why is a “proposed” cruise track relevant? As stated above, most cruises not following a pre-determined section (e.g. GEOTRACES) will nearly always have to modify a cruise track.

Indeed, cancel/add or shift a station is common but we believe that, a 800 km ‘deviation’ is not that common. Rerouting a ship from such a distance based on dust plume/rain forecast in order to catch an atmospheric deposition event was something innovative, wet deposition sampling on board R/Vs are often opportunist.