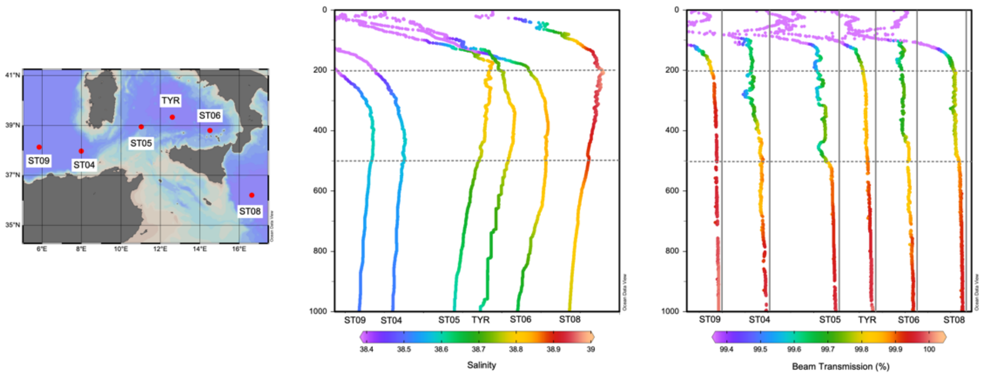
We thank Christine Klaas for her work and her comments. Please find a point-by-point response to these comments.

Dear author, while your responses do address the main issues raised by the reviewers, I do have a similar issue raised by reviewer #2 concerning your dust flux estimates for the central Mediterranean. In your response to the comment for line 445 on nepheloid layers you refer to the answer for the comment on line 256 where you actually do not address the issue of advective transport from continental margins. This should be done more robustly by discussing circulation, water masses and other potential proxies.
A new section has been added to the manuscript (Section 4.1). In this section, the formation of nepheloid layers and their advective transport are proposed as a potential mechanism that in addition to deposition could also contribute to the subsurface excess in pAl observed at ST04 and ST05. We also conclude that this mechanism can be excluded at stations TYR and ST06 considering the geographical position, the bathymetry, and the water masses circulation in this area. Note that we were not able to find a proxy for these potential nepheloid layers. Indeed, the vertical profiles of beam transmission (figure below) showed a slight anomaly between 200 and 500 m depth. However, this anomaly could also be due to the dust deposition event.

4.1 Advective transport from continental margins in the central Mediterranean Sea
In the absence of direct atmospheric measurements, large uncertainties are associated with the estimates of the dust deposition flux over the Tyrrhenian Sea. These uncertainties are partly driven by potential additional sources of pAl, and in particular the resuspension of sediments and their advective transport from continental margins (e.g., Misic et al., 2008). The Strait of Sicily, characterized by high turbidity values (Gdaniec et al., 2018), represents a zone of formation for nepheloid layers. Levantine intermediate waters (LIW) can then act as a conveyor belt that accumulates and transports particles from the eastern to western basin of the Mediterranean Sea (Taillandier et al., 2020). Stations ST04 and ST05, located in the southwestern sector of the Tyrrhenian Sea (i.e., the branch of circulation between the Strait of Sicily and the Sardinian Channel), could be potentially impacted by particles driven by this mechanism, contributing to the excess in pAl observed at those stations. At the opposite, the central part of the Tyrrhenian Sea is characterized by low turbidity values relative to the rest of the Mediterranean Sea (Gdaniec et al., 2018). During PEACETIME, lateral advection was negligible (A. Doglioli, pers. comm., 2020) at stations TYR and ST06 precluding any contribution of lithogenic particles other than from dust atmospheric deposition. Evidences of a recent dust deposition event over the Tyrrhenian Sea, traced by the excess in pAl, are discussed in the next section.



Further, based on the flux data at TYR you estimate a sinking speed of ~180m/d. With this value in mind the Al excess observed in ST04 to TYR might not have been due to the deposition event on the 11th of March. The data shown in Fig.4 further supports this. The data from FAST (line 336) also suggest fast sinking speeds. Could this also explain the lack of increase in the dAl pool described in section 4.2.1.?
This sinking velocity (SV) of 180 m d^{-1} is likely an upper limit and corresponds to rare large dust particles. Indeed, dust deposition on the ocean surface consists mostly of particles of a few microns in

size. For instance, Tafuro et al. (2006) investigated Saharan dust particles properties over the central Mediterranean basin. They observed a dominant coarse mode peaking at 1.7-3 µm, and an average coarse mode centered at ~2.2 µm at Lampedusa.
Laurenceau-Cornec et al. (2019) demonstrated that the Stokes law can be adequately used for estimating SV for dust particles and dust-loaded aggregates. According to the Stokes law and assuming a density of 2.6 g cm^{-3} for dust particles, a SV of 180 m d^{-1} would correspond to dust particles with a diameter of about 55 µm. Long-range transport and deposition of such large dust particles have already been observed (e.g., Van Der Does et al., 2018), however, they only represent a minor fraction of the flux and submicron-sized dust particles were likely responsible for the Al excess observed at our Tyrrhenian stations.

It is also unclear to the reader if the Al excess estimated for the above-mentioned stations have been corrected by the vertical fluxes measured at TYR (it seems they are only based on water column inventories). What would be the estimates of dust input when the excess is corrected for vertical export? Would the estimates be realistic?
Calculation of the dust deposition flux over the Tyrrhenian Sea has been detailed, as follows: "*Dust deposition flux over the Tyrrhenian Sea was estimated from the Al_{excess} inventories corresponding to the difference between the measured 0-1000 m pAl inventories and a background 0-1000 m pAl inventory. In the absence of pre-depositional observations and historic pAl data (to the best of our knowledge), the median pAl vertical profile obtained during the cruise at the other stations unimpacted by this event (grey bold line on Fig. 3a-d), similar or slightly higher than pAl data available for the open Mediterranean Sea (e.g., Sarthou and Jeandel, 2001), was used as a background level. The comparison between the measured pAl vertical profiles and this background level revealed a marked excess in pAl south of Sardinia (ST04) and in the southern Tyrrhenian (ST05, TYR and ST06; Fig. 3a-d and Table 2). This spatial extent is in good agreement with the maps of precipitation and dust wet deposition provided for the 11^{th} of May by the ARPEGE, SKIRON, and NMMB/BSC models (Supp. Fig. 3). The obtained Al_{excess} inventories were further corrected for the loss of pAl associated with the sinking flux using the pAl downward flux measured at 1000 m depth at the TYR station (assuming a constant flux over the 3 to 10-day period after deposition). Assuming that Al represents 7.1% of the dust in mass (Guieu et al., 2002), and further assuming that Al_{excess} resulted from a single dust event, a dust deposition flux ranging between 1.7 (ST06) and 9.2 g m^{-2} (ST04) was derived from these Al_{excess} inventories (Table 2). Large uncertainties are associated with these dust flux estimates, partly due to potential additional sources of pAl that are suspected for fluxes derived from ST04 and ST05 but unlikely for TYR and ST06 (see Section 4.1). Nevertheless, the approach remains valuable to estimate the magnitude of this dust event.*"

In short, I agree with reviewer #2 that the evidence in support for a dust deposition as the origin for the Al observations at ST04 to TYR is not quite as robust. Further, based on the above, it seems estimates of dust input based on Al excess are fraught with substantial uncertainties that should be clearly stated if not estimated.
Unfortunately, we are not able to estimate the uncertainties associated with these dust flux estimates. However, they are clearly stated, as follows: (i) *"… We acknowledge that this approach involves uncertainties, as do all the observational approaches employed so far to quantify deposition (Anderson et al., 2016). Caveats include (1) other sources of pAl, and (2) some uncertainties into the derived dust fluxes that could come from the sampling method (Twining et al., 2015a), the time lag between deposition and sampling favouring dispersion of dust by lateral mixing, and to a lesser extent, the limited vertical resolution below 500 m depth (Fig. 3a-d).*", and (ii) *"… Large uncertainties are associated with these dust flux estimates – partly due to potential additional sources of pAl (discussed in Section 4.1) – and they must be taken cautiously…*". In addition, a new section has been added to the manuscript to discuss other potential sources of pAl in the Tyrrhenian Sea, highlighting the issues existing in deriving fluxes at ST04 and ST05 but reinforcing the confidence concerning flux estimates at TYR and ST06.

Line 94-95: please provide the relevant details of the "classical" CTD in the text instead of referencing to Guieu et al. (2020).

Details of the classical CTD has been added, as follows: "*The 'classical' CTD continuously measured temperature, salinity, dissolved oxygen concentration, photosynthetically active radiation, beam transmission (at 650 nm), and the chlorophyll a fluorescence.*"

Line 239: please specify in the text that values are based on measurement of dissolved + particulate Al of rain samples collected on board.

This is now specified, as follows: "*From the total (dissolved + particulate) Al concentration measured in this rainwater sample, a dust flux of 65 ± 18 mg* m^{-2} *was measured (Desboeufs et al., in revision).*"

Legend Fig. 3: replace "Time evolution" with "Temporal evolution".

This has been corrected.

References

Laurenceau-Cornec, E.C., et al. (2020). New guidelines for the application of Stokes' models to the sinking velocity of marine aggregates. Limnology and Oceanography, 65(6), 1264-1285.

Tafuro A.M., et al. (2006). Saharan dust particle properties over the central Mediterranean. Atmospheric Research, 81(1), 67-93.

Van Der Does, M., et al. (2018). The mysterious long-range transport of giant mineral dust particles. Science advances, 4(12).