

# Supplement to:

## Effects of dry and wet Saharan dust deposition in the tropical North Atlantic Ocean

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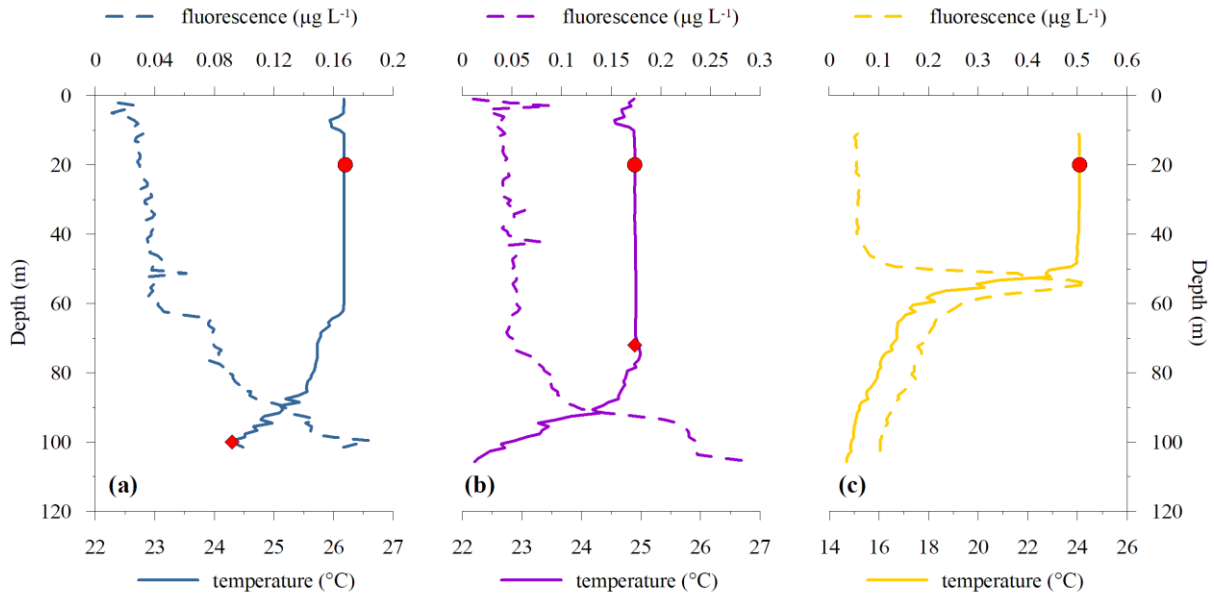


Figure S1. Temperature and fluorescence profiles from the upper 120 m at the incubation sites a) M4, b) M3 and c) M1. Water sampling depths in the deep layer are indicated with red diamonds, in the mixed layer with red circles.

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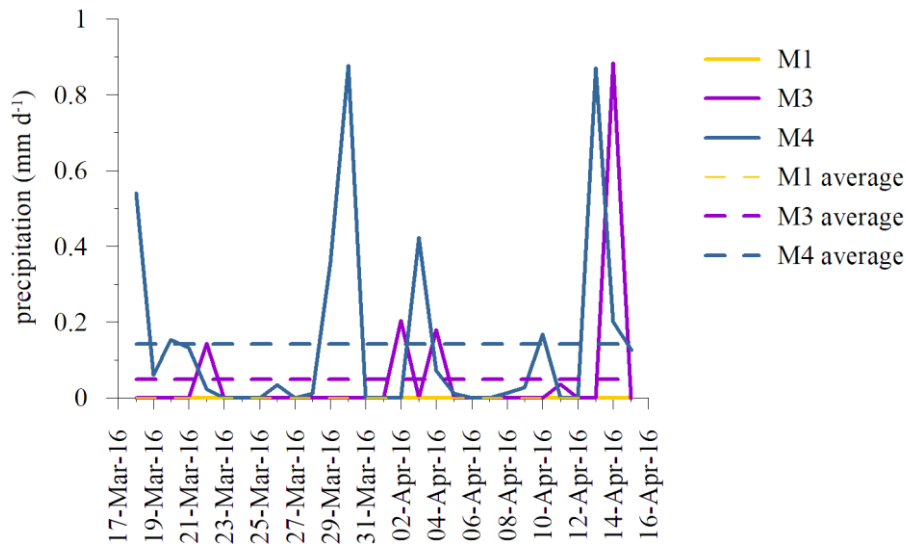


Figure S2. Daily and averaged satellite-derived precipitation data (TRMM) at the incubation stations M1, M3 and M4.

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**Table S1. Temperature and irradiance at specific incubation sites.**

	Temperature (°C)	Irradiance (PAR, W m <sup>-2</sup> )
M1 20m	24	25
M3 20 m	25	88
M3 72m	25	14
M4 20m	26	220
M4 100m	24	7

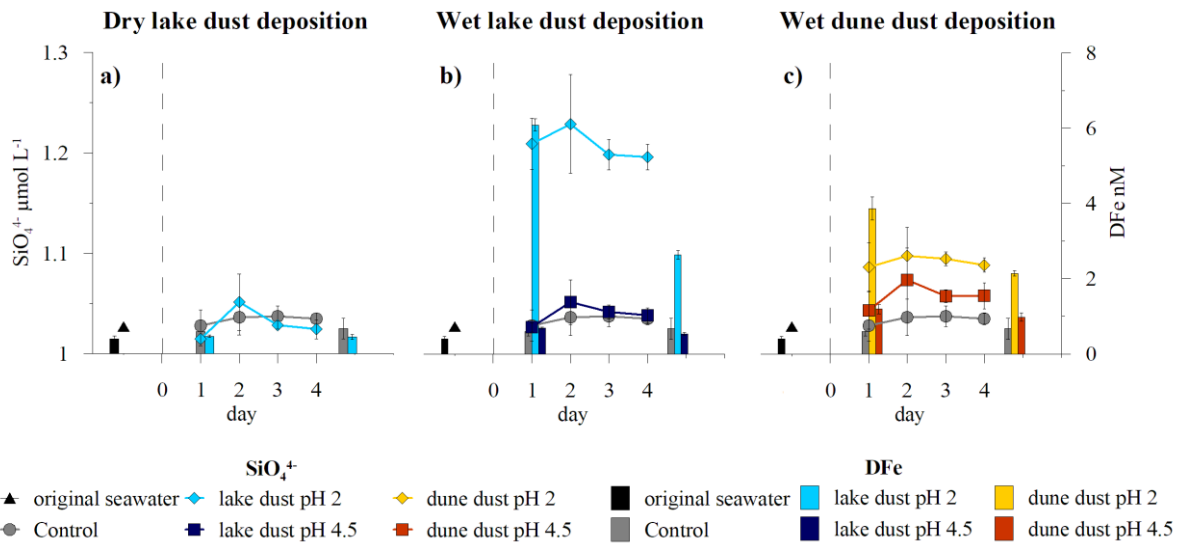
**S4. Incubations at M4, 49°W**

5 The first incubations of our experiment were carried out at the westernmost station M4. The surface water temperature was 26° C and remained this warm from the surface down to 65 m depth (Fig. S1a), from which depth the temperature started to decrease, and the fluorescence started to increase until reaching the DCM at 100 m under a temperature of 24° C. At this station, seawater was sampled at 20 and 100 m depth. For both depths, the seawater from all individual CTD rosette bottles was gently filled into a darkened 240 L tank to homogenize the water before filling it into the 6 L incubation bottles. Lake and dune dust were added in a concentration of 0.25 mg L<sup>-1</sup>. While the lake dust was added as dry and wet deposition, the dune dust was only added as wet deposition (Table 1). The incubations lasted 4 days and were terminated by filtration.

10 Already after the first day, flow cytometry measurements performed on board showed that most of the picoplankton groups disappeared whereas only *Synechococcus* spp. survived to some extent until day 4 (starting value of about 1 · 10<sup>3</sup> cell mL<sup>-1</sup>, ending values between 4 and 7 · 10<sup>3</sup> cells mL<sup>-1</sup>). We interpret this as reflecting the handling of the seawater during the mixing in the tank, which probably slowed down the incubation process and also exposed the phyto- and picoplankton to additional stress. Back at NIOZ, nutrient measurements performed on these samples also revealed some anomalies with PO<sub>4</sub><sup>3-</sup> and NO<sub>3</sub><sup>-</sup> showing concentrations below the detection limit in most of the samples. In addition, the filtration of the samples was problematic since the volume of the filtered seawater was too small to yield an appropriate sample for POC analysis, even when triplicate samples were filtered on a single filter. Therefore, we only show concentrations of SiO<sub>4</sub><sup>4-</sup> and DFe concentrations and DIC for the ML, omitting the DL incubation, also considering the temperature difference between the deep sampling and incubation conditions on deck.

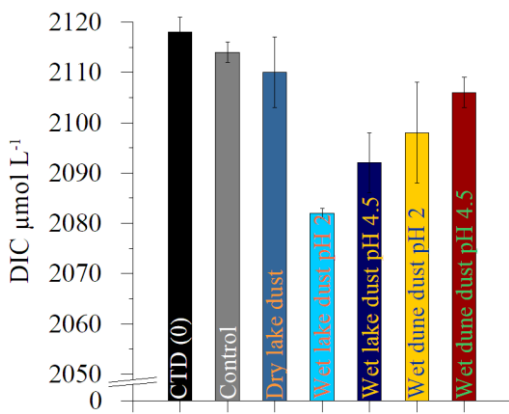
**Development of the 20 m ML incubation at M4**

25 The original SiO<sub>4</sub><sup>4-</sup> and DFe concentrations were 1.03 μmol L<sup>-1</sup> and 0.4 nmol L<sup>-1</sup>, respectively. While SiO<sub>4</sub><sup>4-</sup> concentration strongly increased to 1.2 μmol L<sup>-1</sup> for the wet lake dust deposition leached in pH 2 rain, concentrations remained comparably low after adding wet lake dust leached in pH 4.5 rain and dry lake dust deposition (Fig. S3). Also, the wet dune dust deposition leached in pH 2 rain showed elevated SiO<sub>4</sub><sup>4-</sup> concentrations up to 1.1 μmol L<sup>-1</sup> during the experiment while the wet dune dust leached in pH 4.5 remained low. The DFe did not change from the original value after dry deposition, while wet deposition showed a strong increase in DFe at day 1 for both the lake and dune dust leached in pH 2 rain but remained low when dust was leached in pH 4.5 rain (Fig. S3). At the end of the experiments, DFe decreased to about 3 and 2 nmol L<sup>-1</sup> for the wet lake and dune dust, respectively. The original DIC concentration of 2120 μmol L<sup>-1</sup> did not change in the control sample nor in the dry lake dust deposition treatment, yet for all wet dust deposition treatments DIC values decreased, especially after adding wet lake dust deposition leached in pH 2 rain (Fig. S4).



**Figure S3. Silicate concentrations (lines) and DFe concentrations (bars) with error bars showing standard deviation of triplicate measurements for ML incubation at M4 for a) dry lake dust b) wet lake dust and c) wet dune dust additions.**

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**Figure S4. DIC concentrations at station M4 in the mixed layer depth for the different treatments. CTD is the start value at day 0, and other bars represent DIC at the end of the experiment at day 4.**

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