

Supplementary Material
Table S1. Chemical and biological properties of the NRS water used in the experiment (before amendments).

Parameter	Unit	Average ± std
NO ₃ + NO ₂	nM	140 ± 13
PO ₄	nM	8 ± 1
DOC	μM	74 ± 1
Fe	nM	8.5 ± 1.8
Zn	nM	8.7 ± 2.1
Cu	nM	1.4 ± 0.9
Bacterial abundance	Cells × 10 ⁴ /mL	350 ± 15
Bacterial production	μg C L ⁻¹ h ⁻¹	1.41 ± 0.08
Primary production	μg C L ⁻¹ h ⁻¹	0.60 ± 0.01
β-Gl	nM L ⁻¹ h ⁻¹	1.42 ± 0.07
APA	nM L ⁻¹ h ⁻¹	5.58 ± 0.17
AMA	nM L ⁻¹ ·h ⁻¹	2.60 ± 0.09
<i>Chl-a</i>	μg/L	0.28 ± 0.01
Prochlorococcus	cells × 10 ⁴ /mL	1.49 ± 02
<i>Synechococcus</i>	cells × 10 ⁴ /mL	5.14 ± 1.04
pico-eukaryot	cells × 10 ³ /mL	1.58 × 0.1

Table S2. Nutrients and trace metals concentrations added from the aerosols to each mesocosm.

Variable	Unit	Average ± std
NO ₃ + NO ₂	nM	48 ± 2
PO ₄	nM	2.4 ± 1
DOC	μM	165 ± 2
Fe	nM	2.6 ± 1.5
Zn	nM	6.7 ± 2.5
Cu	nM	0.6 ± 0.2

Table S3. ANOVA test results between control, 'UV-treated' and 'live-dust' treatments at 20 h or 44 h, with significantly different values shown in bold.

ANOVA	df	Sum Sq	Mean Sq	F Value	<i>p</i> -value
Chl-a					
20 H	2, 6	0.03, 0.02	0.02, 0	4.52	0.0634
44 H	2, 6	0.02, 0	0.01, 0	23.13	0.002
Synechococcus Abundance					
20 H	2, 7	8.23 × 10 ⁷ , 4.11 × 10 ⁷	4.11 × 10 ⁷ , 4.51 × 10 ⁷	0.91	0.4509
44 H	2, 7	5.31 × 10 ⁸ , 6.97 × 10 ⁷	2.65 × 10 ⁸ , 1.16 × 10 ⁷	22.84	0.0016
Prochlorococcus Abundance					
20 H	2, 8	4.22 × 10 ⁷ , 2.11 × 10 ⁷	2.11 × 10 ⁷ , 2.71 × 10 ⁶	7.77	0.0216
44 H	2, 8	9.02 × 10 ⁷ , 1.47 × 10 ⁷	4.51 × 10 ⁷ , 2.45 × 10 ⁶	18.38	0.0028
Pico-eukaryote Abundance					
20 H	2, 9	1.37 × 10 ⁷ , 6.87 × 10 ⁶	6.87 × 10 ⁶ , 1.91 × 10 ⁵	35.91	0.0005
44 H	2, 9	2.20 × 10 ⁷ , 9.71 × 10 ⁵	1.10 × 10 ⁷ , 1.62 × 10 ⁵	68.05	0.0001
Heterotrophic bacteria abundance					
20 H	2, 10	6.87 × 10 ¹¹ , 3.43 × 10 ¹¹	3.43 × 10 ¹¹ , 5.63 × 10 ⁹	61	1.0 × 10⁻⁴
44 H	2, 10	5.40 × 10 ¹¹ , 4.90 × 10 ⁹	2.70 × 10 ¹¹ , 8.17 × 10 ⁸	330.56	7.3 × 10⁻⁷
Primary Productivity					
20 H	2, 11	0.04, 0.02	0.02, 0	7.56	0.0229
44 H	2, 11	0.7, 0.03	0.35, 0.01	67.95	0.0001
Bacterial Productivity					
20 H	2, 12	3.54, 1.77	1.77, 0.03	60.44	0.0001
44 H	2, 12	2.07, 0.26	1.03, 0.04	23.84	0.0014
Beta-glucosidase activity					
20 H	2, 13	21.51, 10.76	10.76, 0.11	95.55	0.0000
44 H	2, 13	23.5, 0.93	11.75, 0.15	75.83	5.5 × 10⁻⁵
APA					
20 H	2, 14	10.2, 5.1	5.1, 0.07	78.46	0.0001
44 H	2, 14	7.88, 1.04	3.94, 0.17	22.82	0.0016
AMA					
20 H	2, 15	15.44, 7.72	7.72, 0.48	15.96	0.0040
44 H	2, 15	8.07, 0.94	4.04, 0.16	25.8	0.0011

Table S4. Tukey Post-hoc test results between ‘UV-treated’ and control, ‘live-dust’ and control and ‘live-dust and UV-treated’ treatments at 20 h or 44 h, with significantly different values shown in bold.

Tukey Post-hoc Test	20 h		44 h	
	diff	p-value	diff	p-value
Chl-a				
‘UV-treated’ and ‘live-dust’	0.14666667	0.0564	0.1	0.0012
‘live-dust’ and control	0.05333333	0.559	0.1	0.0222
‘live-dust’ and ‘UV-treated’	−0.09333333	0.2214	−0.1	0.052
Synechococcus Abundance				
‘UV-treated’ and ‘live-dust’	4266	0.7291	−9786.2	0.0292
‘live-dust’ and control	−3111.1	0.8417	−18809.6	0.0012
‘live-dust’ and ‘UV-treated’	−7377.1	0.4237	−9023.4	0.0405
Prochlorococcus Abundance				
‘UV-treated’ and ‘live-dust’	−3127.954	0.1276	−5548.8	0.0116
‘live-dust’ and control	−5274.4183	0.0183	−7467.8	0.0027
‘live-dust’ and ‘UV-treated’	−2146.4643	0.3176	−1919	0.3554
Pico-eukaryote Abundance				
‘UV-treated’ and ‘live-dust’	2675.219	0.0007	3326.7	0.0001
‘live-dust’ and control	2561.88567	0.0009	3310	0.0001
‘live-dust’ and ‘UV-treated’	−113.333333	0.9465	−16.7	0.9986
Heterotrophic bacteria abundance				
‘UV-treated’ and ‘live-dust’	622666.667	0.0001	521666.7	1.40 × 10^{−6}
‘live-dust’ and control	540666.667	0.0003	517666.7	1.40 × 10^{−6}
‘live-dust’ and ‘UV-treated’	−82000	0.4269	−4000	0.984
Primary Productivity				
‘UV-treated’ and ‘live-dust’	0.16666667	0.019	0.7	0.0001
‘live-dust’ and control	0.08333333	0.207	0.1	0.1181
‘live-dust’ and ‘UV-treated’	−0.08333333	0.207	−0.5	0.0003
Bacterial Productivity				
‘UV-treated’ and ‘live-dust’	1.46	0.0001	0.3	0.259
‘live-dust’ and control	1.14333333	0.0004	1.1	0.0013
‘live-dust’ and ‘UV-treated’	−0.3166667	0.1375	0.8	0.0065
Beta-glucosidase Activity				
‘UV-treated’ and ‘live-dust’	2.27	0.0004	2.6	0.0004
‘live-dust’ and control	3.76	2.30 × 10^{−5}	3.9	4.90 × 10^{−5}
‘live-dust’ and ‘UV-treated’	1.49	0.0039	1.2	0.0192
Alkaline Phosphate Activity				
‘UV-treated’ and ‘live-dust’	−2.35333333	0.0001	−2.2	0.0016
‘live-dust’ and control	−2.15	0.0001	−1.7	0.0056
‘live-dust’ and ‘UV-treated’	0.20333333	0.6166	0.5	0.4097
Leu-aminopeptidase Activity				
‘UV-treated’ and ‘live-dust’	2.50333333	0.0108	1.6	0.0067
‘live-dust’ and control	2.99	0.0046	2.3	0.001
‘live-dust’ and ‘UV-treated’	0.48666667	0.6845	0.7	0.1623

Table S5. Eukaryotes, relative abundances (Abundance), and general information on taxa (Details).

Taxa	Abundance (%)	Details
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Blastocladiomycota, Incertae Sedis, Blastocladiomycetes, Blastocladales	0.65	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Chytridiomycota, Incertae Sedis, Chytridiomycete	0.65	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Dothideomycetes, Capnodiales	14.08	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Dothideomycetes, Pleosporales, Pleosporaceae	20.97	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Dothideomycetes, Pleosporales	1.49	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Dothideomycetes	4.34	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Pezizomycetes, Pezizales,	1.02	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina, Sordariomycetes, Sordariales, Chaetomiaceae	0.08	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Pezizomycotina	7.8	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Ascomycota, Saccharomycotina, Saccharomycetes, Saccharomycetales, Saccharomycetaceae	0.74	Fungi
Eukaryota, Opisthokonta, Nuclemycea, Fungi, Dikarya, Basidiomycota, Agaricomycotina, Tremellomycetes	5.29	Fungi
Eukaryota, Archaeplastida, Chloroplastida, Charophyta, Phragmoplastophyta, Streptophyta, Embryophyta, Tracheophyta, Spermatophyta, Magnoliophyta	26.15	Land plants
Eukaryota, Archaeplastida, Chloroplastida, Charophyta, Phragmoplastophyta, Streptophyta, Embryophyta, Tracheophyta, Spermatophyta, Pinophyta	2.6	Land plants
Eukaryota, Archaeplastida, Chloroplastida, Chlorophyta, Mamiellophyceae	0.94	Marine
Eukaryota, Archaeplastida, Chloroplastida, Chlorophyta, Trebouxiophyceae	2.52	Marine
Eukaryota, Centrohelida	0.14	Marine
Eukaryota, Cryptophyceae	0.06	Marine
Eukaryota, Haptophyta, Prymnesiophyceae, Prymnesiales	0.83	Marine
Eukaryota, Incertae Sedis, Palpitomonas	0.2	Marine
Eukaryota, Opisthokonta, Holozoa, Choanoflagellida, Acanthoecida, Stephanoecidae, Marine Choanoflagellates	0.09	Marine

Eukaryota, Opisthokonta, Holozoa, Metazoa (Animalia), Eumetazoa, Bilateria, Arthropoda, Crustacea, Maxillopoda, Copepoda	0.02	Marine
Eukaryota, Opisthokonta, Holozoa, Metazoa (Animalia), Porifera, Calcarea, Calcaronea, Leucosolenida	0.09	Marine
Eukaryota, Opisthokonta, Holozoa, Metazoa (Animalia), Porifera, Calcarea, Calcinea, Clathrinida	0.14	Marine
Eukaryota, SAR, Alveolata, Dinoflagellata, Dinophyceae, Gymnodiniphycidae, Gymnodinium clade, Lepidodinium	0.26	Marine
Eukaryota, SAR, Alveolata, Dinoflagellata, Dinophyceae	0.51	Marine
Eukaryota, SAR, Alveolata, Dinoflagellata, Incertae Sedis, Haplozoon	0.03	Marine
Eukaryota, SAR, Alveolata, Protalveolata, Syndiniales, Syndiniales Group I	0.12	Marine
Eukaryota, SAR, Alveolata, Protalveolata, Syndiniales, Syndiniales Group II	0.06	Marine
Eukaryota, SAR, Alveolata, Protalveolata, Syndiniales, Syndiniales Group II	0.03	Marine
Eukaryota, SAR, Alveolata, Protalveolata, Syndiniales, Syndiniales Group III	0.15	Marine
Eukaryota, SAR, Alveolata	0.12	Marine
Eukaryota, SAR, Stramenopiles	0.74	Marine
Eukaryota, SAR, Stramenopiles, Ochrophyta, Chrysophyceae	0.25	Marine
Eukaryota, SAR, Stramenopiles, Ochrophyta, Diatomea, Bacillariophytina, Bacillariophyceae	0.63	Marine
Eukaryota, SAR, Stramenopiles, Ochrophyta, Dictyochophyceae, Dictyochales, Florenciella	0.14	Marine
Eukaryota, SAR, Alveolata, Apicomplexa, Conoidasida, Gregarinasina, Eugregarinorida, Stylocephalus, Stylocephalus gigas	0.88	Unknown
Eukaryota, Amoebozoa, Discosea, Longamoebia, Centramoebida, Balamuthia, Balamuthia mandrillaris	0.38	Unknown
Eukaryota, Incertae Sedis, Telonema	0.2	Unknown
Eukaryota, Opisthokonta, Holozoa, Metazoa (Animalia), Eumetazoa, Bilateria, Chordata, Vertebrata, Gnathostomata, Euteleostomi	0.6	Unknown
Eukaryota, Opisthokonta, Holozoa, Metazoa (Animalia), Eumetazoa, Bilateria	0.42	Unknown
Eukaryota, Opisthokonta	0.71	Unknown
Eukaryota, SAR, Stramenopiles, Peronosporomycetes, Pythium	0.42	Unknown
Eukaryota, SAR, Stramenopiles	0.05	Unknown
Eukaryota	2.43	Unknown

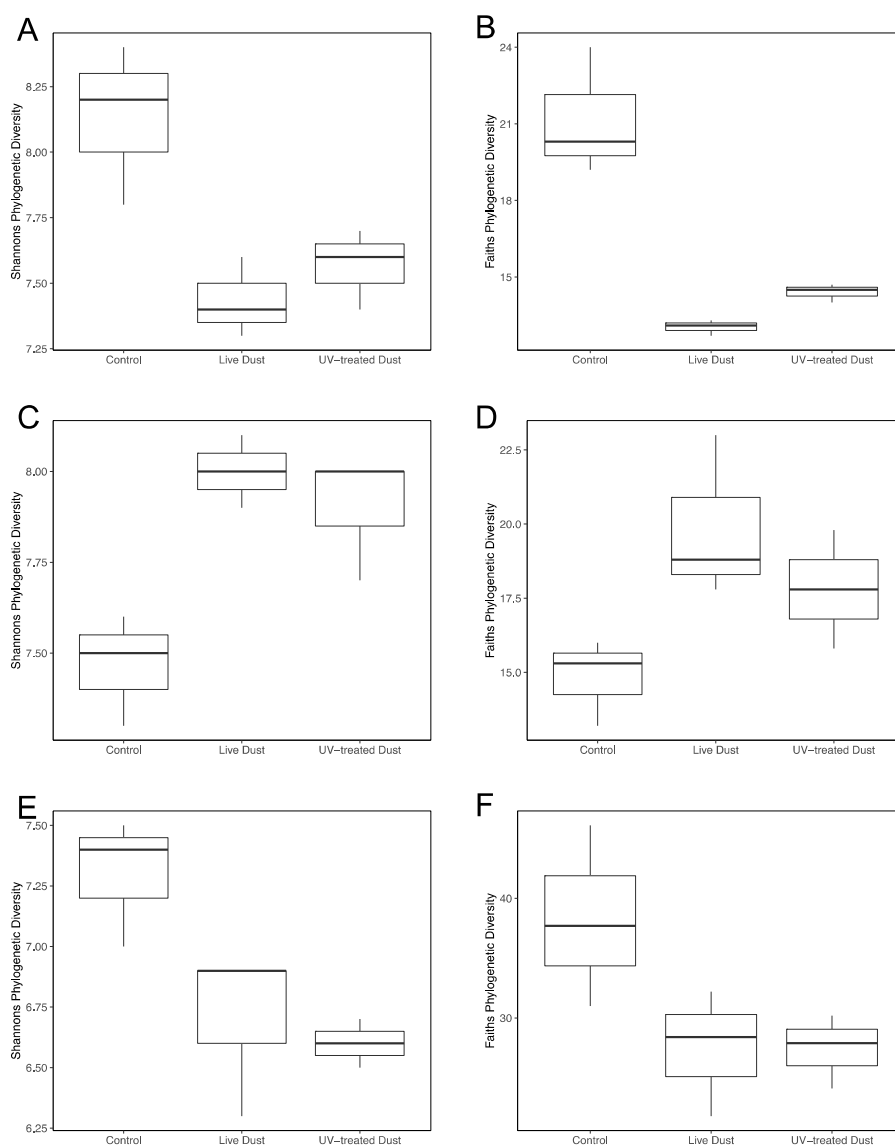


Figure S1. Alpha diversity (Faith's Phylogenetic or Shannon's diversity indices) for control, 'live dust', 'UV-treated dust' treatments. **(A)** Shannon' DI for prokaryotes at 20 h. **(B)** Faith's PD for prokaryotes at 20 h. **(C)** Shannon' DI for prokaryotes at 44 h. **(D)** Faith's PD for prokaryotes at 44 h. **(E)** Shannon' DI for eukaryotes at 20 h. **(F)** Faith's PD for eukaryotes at 20 h.