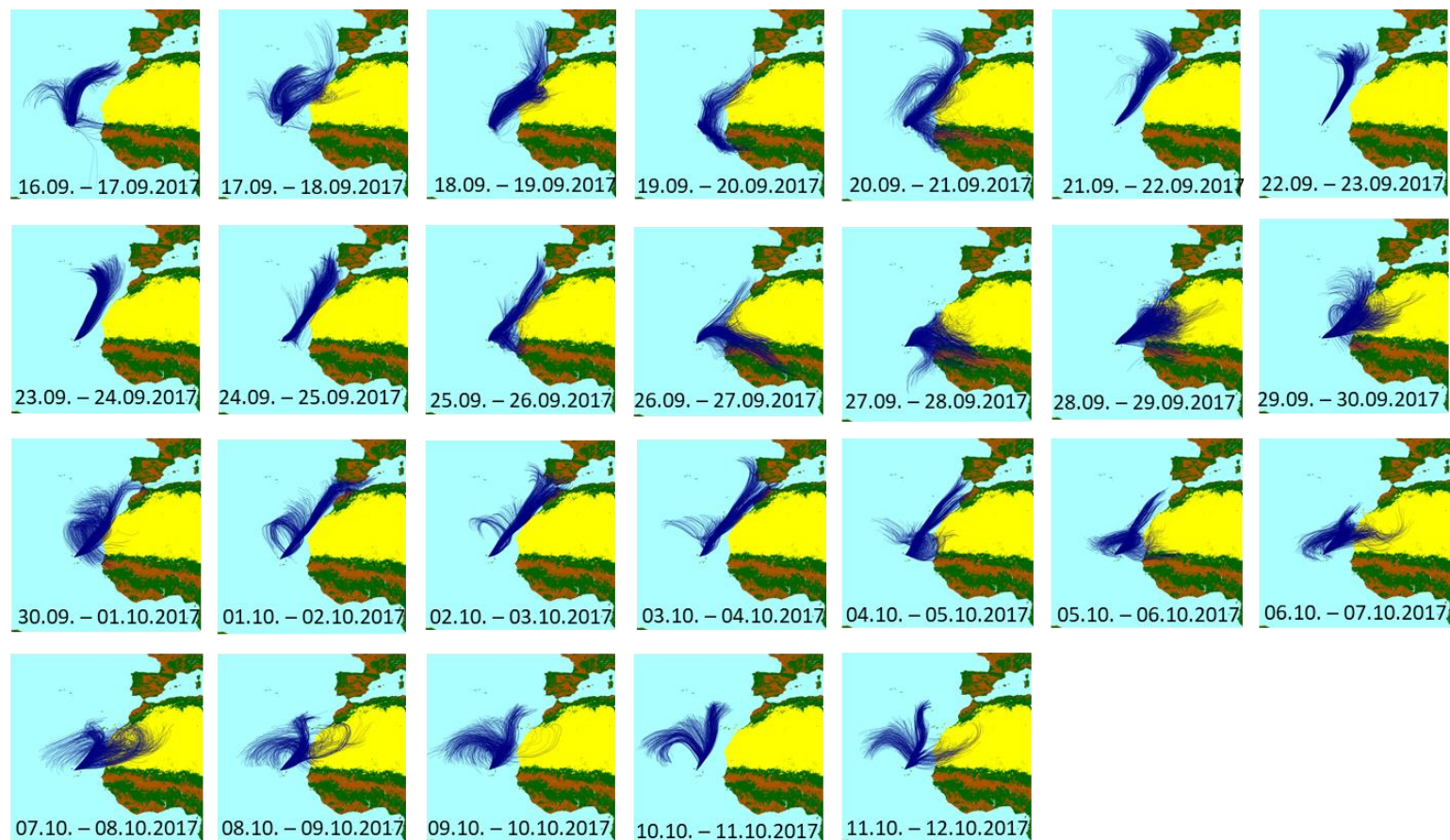


1



2

3

4 Fig. S1: 96 hour back trajectories calculated on an hourly basis within the intervals of the aerosol particle filter sampling at the CVAO, using the
 5 NOAA HYSPLIT model (HYbrid Single-Particle Lagrangian Integrated Trajectory, <http://www.arl.noaa.gov/ready/hysplit4.html>, 26.07.19) in the
 6 ensemble mode at an arrival height of $500 \text{ m} \pm 200 \text{ m}$ ((van Pinxteren, et al. 2010)). Starting time of the trajectories corresponded with the sampling
 7 time of the aerosol particles and was 21.00 UTC from 16th – 21st September and 16.00 UTC from 22nd September – 12th October.

8 **Helikite**

9 The measurements were done next to the CVAO using a Helikite (Allsopp Helikites Ltd,
10 Hampshire, UK). A Helikite is a unique combination of a tethered balloon and a kite. Helikites
11 are designed to be operated under extreme weather conditions. They fly stable even in strong
12 winds and due to the kite wing additional lift is generated in windy conditions. For the
13 measurements at the CVAO a 16 m³ Skyhook Helikite was used. The kite was attached to a 3
14 mm Dyneema rope (2000m long, ~ 4,6kg/1000m, Lyros D-Pro 3mm, breaking load 950 daN,
15 working elongation < 1%) and operated by a winch (TROPOS built). Under calm conditions
16 the Helikite has a net load capacity of ~ 8kg. At windy conditions the pull increases significantly
17 and reaches about 16 kg at 6 m s⁻¹. Depending on the prevailing conditions, measurements up
18 to an altitude of about 1000 m could be carried out. The payload with meteorological sensors
19 was attached to rope about 20 m below the helikite. The payload here was a measuring system
20 for standard meteorological parameters (p, T, rH, wind direction and velocity). The device is
21 based on a microcontroller-based data logger (TROPOS). The sensors were digital sensors,
22 tested and selected in the TROPOS wind tunnel (LACIS-T). Wind speed was measured using
23 a differential pressure sensor together with a pitot tube, wind direction was determined from an
24 orientation sensor (compass) of the wind vane. Data were recorded with a measuring frequency
25 of 2 Hz, stored on SD card and additionally transmitted to a ground station (via XBee). In total
26 19 flights measured at 10 days are available.

27

28 **Meteorological parameters and trace gases**

29 Temperature, relative humidity and wind measurements were measured using a meteorological
30 station fitted with various sensors (Campbell Scientific Ltd, UK).

31 Ozone was measured using a UV absorption instrument (Model 49i Thermo Scientific).

32 VOCs and OVOCs were measured using a dual channel gas chromatograph with flame
33 ionization detection (Agilent 7890-A). The instrument has two parallel columns, which
34 simultaneously resolve C₂- C₈ NMHCs and o-VOCS methanol and acetone using a more polar
35 LOWOX column. VOCs are pre-concentrated onto a multi-adsorbent bed at -30 °C and then
36 rapidly desorbed at 350 °C into helium flow using a desorption unit (Markes International
37 Unity2). NMHCs are calibrated monthly using a multicomponent hydrocarbon standard
38 (National Physics Laboratory, UK, typical concentrations ~ 5 ppbV) whilst for OVOCs a
39 permeation system is used for calibration at levels of 8 to 25 ppbv in conjunction with relative
40 detector response. Weighings of the OVOC permeation tubes are typically carried out every 6
41 weeks. The accuracy of the OVOC calibration is estimated as 10% for methanol and 5% for
42 acetone. DMS was measured using a gas chromatograph with mass spectrometric detection
43 (Agilent 7890-A, 5977 MSD). A Unity2 (Markes International) was used for the
44 preconcentration of DMS onto a Tenax trap at -30° C which was desorbed at 350 °C into a flow
45 of helium onto the GC. DMS was calibrated every ten hours during the campaign using a
46 working standard manufactured at the University of York and quantified using relative detector
47 response to benzene (10 ppm DMS standard, Korea Research Institute of Standards and
48 Science, Republic of Korea (KRISS). All trace gas and meteorological measurements were
49 made from a height of 17.5 m asl.

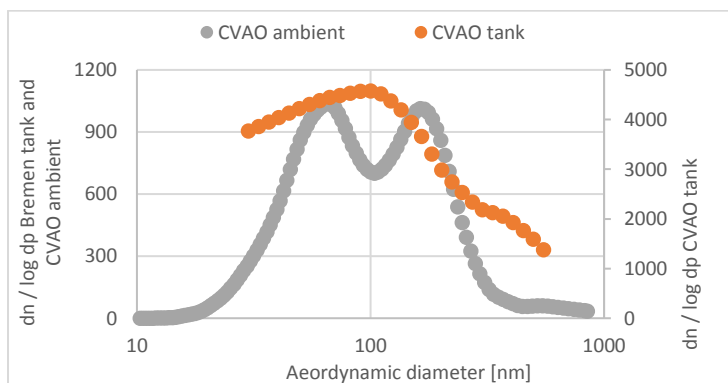
50

51

52 **Plunging waterfall tank at the CVAO**

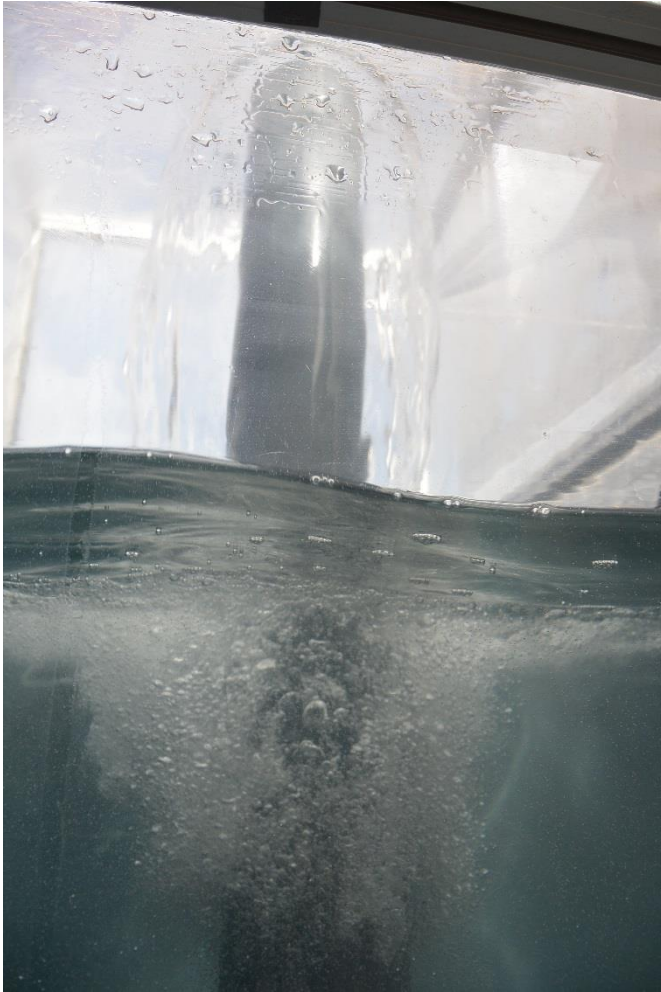
53 The tank was designed to study the bubble driven transfer of organic material from the bulk
54 water via the SML into the aerosol phase. It consisted of a 1400 L basin with a 500 L aerosol
55 chamber on top. The basin (120 cm length x 110 cm width x 100 cm height) was made of 10
56 mm polyvinyl chloride (PVC) plates, held together by an aluminum frame. One side was
57 transparent allowing for visual inspection. To minimize contamination from the tank walls, the
58 entire basin was lined with a Teflon FEP bag. Inlet and sampling ports were made from
59 Swagelok stainless steel fittings. PVC in contact with seawater was rinsed with artificial
60 seawater for at least two weeks prior to use inside the basin. The head air space was made of
61 Teflon FEP and had a total volume of 500 L (60 cm length, 110 cm width, 60 cm height).
62 Sampling ports for bulk water and the SML were located on top of the basin. Bulk water
63 samples were taken from 50 cm above the bottom and sampled into 1 L Duran glass bottles
64 through a Teflon PFA tube using the hydrostatic pressure. Prior to each sampling, the tubing
65 was first flushed with 100 mL of bulk water. SML samples were taken with a boron silicate
66 glass plate (4 mm, 15 x 60 cm) via a slit in the enclosure. The SML sampling volume was
67 limited to about 55 mL, corresponding to SML loss by about 50% when assuming SML layer
68 thickness to be 60 to 80 μm (Falkowska 1999). The glass plate was cleaned with ultrapure water
69 and ethanol prior to each sampling. Bubble driven transport of organic material was simulated
70 using a skimmer on a plunging waterfall. The plunging waterfall (Fig. SI3) was made from a
71 tubular pump (Osaga ORP 25000) that was placed at the bottom of the tank and a PVC tube of
72 100 cm length and 10 cm inner diameter. The tube towered 40 cm above the water surface.
73 Water was pumped at a flow rate of approximately 200 L min^{-1} through the tube. The large
74 diameter of the tubular pump and the tube ensured resulted in small pressure fluctuations and
75 hence prevent the pelagic phytoplankton and microbial community from damage. The falling
76 seawater simulated the process of wave breaking and was assumed to mimic the natural size
77 spectra of rising air bubbles. A stainless steel inlet was inserted in the headspace of the tank and
78 connected with three filter holders for offline aerosol particle sampling without size segregation
79 (TSP). In addition, the stainless steel inlet was connected to a SMPS (same type as used for
80 ambient aerosol particle characterisation) for online aerosol measurements. This method of
81 aerosol generation resulted in a very efficient generation of nascent sea salt aerosols with
82 aerosol particle size spectra centred around 100 nm as shown in Figure S2.

83



84

85 Fig. S2: Size distribution of the aerosols generated in the tank experiments in comparison to
86 the size distribution of ambient aerosols at the CVAO.



87

88 Fig. S3: *View of the plunging waterfall.*

89

90 **The MarParCat**

91 The MarParCat is a remotely controllable catamaran designed as a platform for water and SML
92 sampling. It has a size of 245 x 180 x 140(l, w, h) and a total weight of 125 kg. The payload is
93 approximately 160 kg. The catamaran is made from two Technus PE-floats (Type 90/150, 245
94 x 31 x 38 cm) hold together by an aluminum frame. The catamaran is powered with a 12V
95 outboard motor (Minn Kota Traxxis 55) and uses two 12V 60 Kwh lead batteries for power
96 supply.

97 The SML is sampled by means of rotating glass plates (Duran, DWK Life Sciences, Germany).
98 The glass plates have a diameter of 60cm and are placed 10 cm above the water surface in the
99 gravity center of the catamaran. The plates rotated at a speed of 8 rpm. Depending of the
100 thickness of the SML the sampling volume typically varied between 80 and 120 ml min⁻¹
101 allowing to sample about 10 L SML within 2 h. The water collected in the wiper was transferred
102 into 2x 5 L Duran glass bottles with a peristaltic pump (Verder M25, 12V. Prior sampling the
103 SML sampling device was flushed for at least 15 minutes at the sampling site. Bulk water
104 samples were collected at a rate of 120 ml min⁻¹ from a depth of 70 cm using a peristaltic pump
105 (Verder M25, 12V) and collected in two 5 L Duran glass bottles. The material of the tubing is
106 Teflon PFA.

107 During the campaign, the catamaran was towed to the sampling site with a fishing boat and
108 typically operated 20 m apart from the fishing boat where manual SML sampling took place.
109

110 **Aerosol particle sampling and chemical analysis of inorganic ions, OC/EC and WSOC**

111 Aerosol particles (PM₁ and PM₁₀) were collected on preheated 150 mm quartz fiber filters
112 (Minktel, MK 360) at a flow rate of 700 L min⁻¹. Size-resolved aerosol particles were sampled
113 on pre-combusted aluminium rings with a Berner impactor. Sampling time was typically 24 h.
114 After sampling, filters and aluminium foils were stored in aluminum boxes at -20 °C and
115 transported in dry ice to the TROPOS laboratories in Leipzig, Germany. The chemical analysis
116 of inorganic ions, the water soluble organic carbon (in the aerosol particles as well as in the
117 ocean water and cloud water) and elemental carbon are described in detail in (van Pinxteren, et
118 al. 2017; van Pinxteren, et al. 2015) and in Triesch, et al. (2019).

119

120 **Ice nucleating particles: sampling and analysis**

121 The quartz fiber filters mentioned in the previous paragraph (PM₁₀, PM₁ at CVAO and Mt.
122 Verde) were used for INP measurements. INP concentrations were also analysed for bulk
123 seawater and SML seawater collected at the seawater station Bahia das Gatas and in cloud water
124 collected during cloud events on the mountain top (Mt. Verde). All of the filter and water
125 samples were stored at -20 °C at Cape Verde and cooled below -20 °C during transportation to
126 TROPOS, where all samples were again stored at -20 °C until they were prepared for the
127 measurements. Two droplet freezing devices called LINA (Leipzig Ice Nucleation Array) and
128 INDA (Ice Nucleation Droplet Array) (Chen, et al. 2018; Hartmann, et al. 2019) were deployed
129 to characterize INP number concentrations (N_{INP}) from filter samples and in bulk and SML
130 seawater, and cloud water, yielding results in the temperature range from roughly -5°C to -
131 25°C.

132

133 **SAS analysis**

134 Phase sensitive alternating current (AC) voltammetry was applied for SAS analysis, being
135 already used as a successful tool for the determination of SAS in a plethora of environmental
136 aquatic samples (Frka, et al. 2009; Frka, et al. 2012; Kroflič, et al. 2018). Measurements (out-
137 of-phase mode, frequency 77 Hz, and amplitude 10 mV) were performed with µAutolab-type
138 II (Eco Chemie B. V., The Netherlands), GPES 4.6 software (Eco Chemie B. V., The
139 Netherlands), followed the method of Čosović and Vojvodić (1998). A standard polarographic
140 Metrohm cell of 50 cm³ with a three-electrode system was used: working electrode - hanging
141 mercury drop electrode (HMDE; Metrohm, Switzerland; A = 0.01245 cm²), reference electrode
142 - Ag/AgCl/3 mol L⁻¹ KCl, auxiliary electrode - platinum coil. Before each measurement,
143 previously purified (450 °C for 5 h; charcoal organic residue removal) saturated NaCl (Kemika,
144 Croatia) solution was added to the sample to adjust the electrolyte concentration to 0.55 mol
145 L⁻¹.

146

147 **Lipid analysis: seawater**

148 Total lipid and lipid class quantitation was performed by Iatroscan thin layer chromatography–
149 flame ionization detection (TLC–FID) (Iatroscan MK-VI, Iatron, Japan). Lipids were separated
150 on Chromarods-SIII and quantified by an external calibration with a standard lipid mixture.

151 Quantified lipid classes include hydrocarbons (HC), lipid degradation indices (DI) (fatty acid
152 methyl esters (ME), free fatty acids (FFA), alcohols (ALC), 1,3-diacylglycerols (1,3DG), 1,2-
153 diacylglycerols (1,2DG) and monoacylglycerols (MG)), wax esters (WE), phytoplankton
154 energy reserves (triacylglycerols (TG)), membrane lipids including three phospholipids (PL)
155 (phosphatidylglycerols (PG), phosphatidylethanolamines (PE) and phosphatidylcholines (PC)),
156 glycolipids (GL) (sulfoquinovosyldiacylglycerols (SQDG), monogalactosyldiacylglycerols
157 (MGDG) and digalactosyldiacylglycerols (DGDG)), sterols (ST) and pigments (PIG). Lipids
158 indicating OM degradation (DegLip) comprise the sum of ME, FFA, ALC, DG, MG. The
159 standard deviation accounted for 3 to 11% of the signal magnitude of lipid classes (Gašparović,
160 et al. 2015; Gašparović, et al. 2017).

161

162 **Lipid biomarker and isotope analysis: aerosol particles**

163 Typically one half of the filter was used for the lipid analysis. The lipids were extracted with a
164 3:1 DCM mixture (4 times 40 ml) and the combined extracts were evaporated to a volume of 1
165 ml. The concentrated extract was dried with NaSO₄ and subsequently saponified with
166 KOH/MeOH (50 g L⁻¹, 1h, 80°C) and then evaporated to dryness. Afterwards the extract was
167 fractionated over an aminopropyl-column into four fractions of different polarity following
168 standard geochemical procedures (Hinrichs, et al. 2000). The fatty acids were converted to their
169 respective methylester using a BF₃/MeOH reagent and the alcohols were silylated with BSTFA
170 in the presence of pyridine. Each fraction was dried under nitrogen and picked up in a small
171 amount of hexane for the following analysis. Quantification was carried out with GC-FID and
172 GC-MS was used for identification. Compound specific carbon isotope analysis was done by
173 GC-C-IRMS.

174

175 **Trace metal analysis**

176 Size resolved aerosol particles were collected on polycarbonate foils (Wicom, Heppenheim,
177 Germany) using a low-pressure Berner impactor with a PM10 isokinetic inlet at a flow rate of
178 75 l min⁻¹. The collected particles were impacted on the foils creating spots of compressed
179 particles. The impacted spots were analyzed for their trace metal content using a Total
180 Reflection X-Ray Fluorescence (TXRF) S2 PICOFOX (Bruker AXS, Berlin, Germany)
181 spectrometer equipped with a Molybdenum X-ray source. Trace metals including Fe, Mn, Ca,
182 Cu, Zn, Se, V, Cr, Pb, Ni, Ti, Rb, Sr, Ba, La, and Ce were analyzed with a detection limit of a
183 few picograms. The sample preparation procedure and instrument specifications are described
184 in detailed in Fomba, et al. (2013). Trace metals were used to identify days of mineral dust
185 influence and its estimation.

186

187 **Pigments and Chlorophyll-a**

188 For pigment analysis, several liters of bulk water were collected in a water depth of
189 approximately 30 cm by filling 5 L polypropylene bottles. The bulk water was filtered over GF-
190 F filters (Whatman, Germany) and the filters were immediately frozen at -20 °C until analysis.
191 For analysis, the GF-F filters were extracted in 5 mL ethanol, and 20 µL of the extract were
192 injected into the HPLC (Dionex, Sunnyvale, CA, USA) under gradient elution using
193 methanol/acetonitrile/water systems as eluents. Chlorophyll a, chlorophyll b, phaeophorbide a,
194 phaeophorbide b as well as chlorophyllide a were detected with fluorescence detection (FLD)
195 as described in van Pinxteren, et al. (2017). All other pigments were analyzed with a diode array
196 detector (DAD). Standard components were used for peak assignment and external calibration.

197

198 **DOM classes**

199 SML, bulk and cloud samples and aqueous aerosol extracts for DOM classes were filtered
200 through 0.45 μm Polyethersulfone (PES) syringe filters and stored chilled (0 to 4 $^{\circ}\text{C}$) in pre-
201 combusted glass “TOC” vials until analysis, which occurred within 2 days of sample
202 preparation. LC-OCD-OND (Liquid chromatography with organic carbon detection and
203 organic nitrogen detection), allows $\sim 1\text{ml}$ of whole water to be injected onto a size exclusion
204 column (SEC; 2 ml min^{-1} ; HW50S, Tosoh, Japan) with a phosphate buffer (potassium
205 dihydrogen phosphate 1.2 g L^{-1} plus 2 g L^{-1} di-sodium hydrogen phosphate $\times 2 \text{H}_2\text{O}$, pH 6.58)
206 and separated into five “compound-group specific” DOM fractions. The resulting fractions are
207 identified using unique detectors for organic carbon, UV-amenable carbon and organic nitrogen
208 Huber, et al. (2011). All peaks were identified and quantified with bespoke software (Labview,
209 2013) normalized to International Humic Substances Society humic and fulvic acid standards,
210 potassium hydrogenphthalate and potassium nitrate. Cloud water and aerosol samples were
211 blank corrected based on sample blanks that were extracted in the same way. No sample blanks
212 were available for SML and bulk water samples.

213

214 **TEP**

215 Water samples (SML, cloud and bulk water) are then filtered onto 0.2 μm polycarbonate filters
216 at low pressure and stained with alcian blue. We used the spectrophotometric method to
217 analyse the stain (Passow and Alldredge 1995) which gives TEP in μg of xanthum gum
218 equivalent (μgXeql^{-1}).

219

220 **Microbial cell counts**

221 Prokaryotic cell numbers were counted via flow cytometry after water samples were fixed,
222 flash-frozen in liquid nitrogen, and stored at -20°C . Prior measurements, all samples were
223 stained with SYBR Green solution. Counting was performed after addition of latex beads
224 serving as an internal standard. Further details can be found in Robinson, et al. (2019).
225 Small autotrophic cells were counted after addition of red fluorescent latex beads (Polysciences,
226 Eppenheim, Germany) and were detected by their signature in a plot of red (FL3) vs. orange
227 (FL2) fluorescence, and red fluorescence vs. side scatter (SSC). This approach allows
228 discrimination between different groups of prokaryotic and eukaryotic autotrophs (Marie, et al.
229 2010) which in our case were size classes defined as *Synechococcus*-like cells and
230 Nanoeukaryotes.

231

232 **Nitrous acid (HONO) using a LOng Path Absorption Photometer (LOPAP)**

233 Nitrous acid (HONO) was continuously measured using a commercialized LOPAP HONO
234 analyzer (LOng Path Absorption Photometer, QUMA Elektronik & Analytik GmbH), which
235 has been described in more details elsewhere. The instrument was placed in a ventilated
236 aluminum box. The temperature of the stripping coil was held at 25°C using a thermostat.
237 HONO was collected into a stripping coil and immediately converted in azodye. HONO
238 concentration is indirectly measured through the azodye absorption from 550 to 610 nm into
239 long path optical cell (2 meters). Temporal resolution of HONO was fixed to 30 seconds.
240 Sampling flow of the gas was 1 L min^{-1} . The uncertainty of HONO concentration was 10%
241 (2σ) with a detection limit of few ppt under our measurement condition. HONO concentration

242 was calibrated using a standard solution of NO_2^- (Titritisol Nitrite standard, $1000 \text{ mg L}^{-1} \text{ NO}_2^-$
243 in water). The instrument was frequently calibrated over the measurement period. To account
244 for zero drift, automatic zero air measurements were operated for 1 hour every 6.5 hours.

245

246 **GO: PAM**

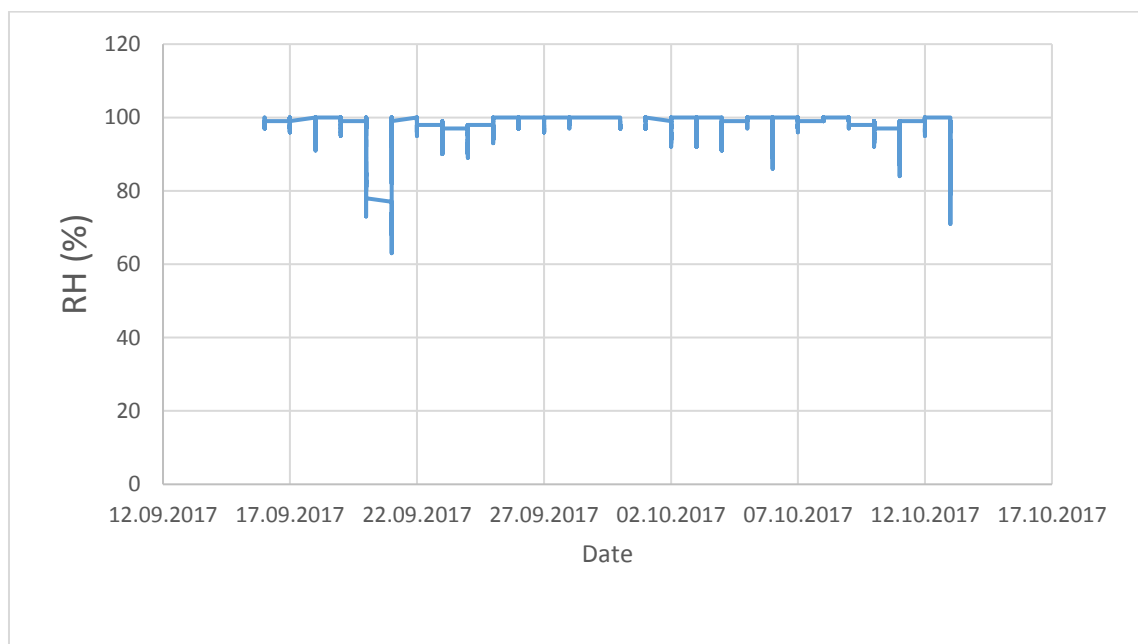
247 The photochemical setup consisted of a Quartz cell (2 cm diameter and 5 cm length) half filled
248 with SML samples collected the previous day and irradiated by means of a Xenon lamp. This
249 reactor was flushed by a flow of air containing a large concentration of ozone (ppm levels),
250 triggering O_3/OH reactions at the surface, but also in the bulk of the SML samples. The gaseous
251 products of these reactions were then injected into the Go:PAM where aerosol production could
252 take place.

253

254 **Characterization of cloud events at the Mt. Verde**

255 Cloud events were frequently observed at Mt. Verde and characterized by relative humidity
256 (RH) values of 100 %. In addition, cloud events were verified from the PNSD as described in
257 Gong, et al. (2019).

258



259

260 Fig. S4: Time series of RH measured at the Mt. Verde. A cloud event is indicated by RH of 100%.

261

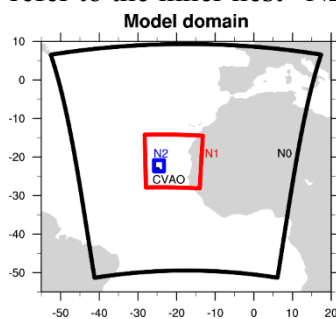
262 **Simulations I**

263 The meteorological model data by COSMO are used to define a vertical meteorological data
264 field as radio sounding data provided from the meteorological station Sal (Station number:
265 8594) are missing during the campaign. These data are used for meteorological 2D-simulations
266 with COSMO-MUSCAT (Wolke, et al. 2012) that is done to calculate if a cloud will also occur
267 over a flat surface area as from the 3D-simulations the effect of topography cannot be
268 completely ruled out. Therefore, the meteorological model data by the Consortium for Small-
269 scale Modeling-Multiscale Chemistry Aerosol Transport Model (COSMO), (Baldauf, et al.
270 2011) were used to define a vertical meteorological data field. For analyzing important
271 multiphase chemical pathways, and the impact of the horizontal and vertical transport on the

272 aerosol and cloud droplet composition within the MBL, the first model approach will be a box
273 modeling study with the air parcel model SPACCIM (Spectral Aerosol Cloud Chemistry
274 Model, Wolke, et al. 2005). SPACCIM is designed to investigate complex atmospheric
275 multiphase chemistry processes. It has proven its excellent capability to investigate important
276 multiphase chemical pathways (Hoffmann, et al. 2016; Hoffmann, et al. 2019; Tilgner and
277 Herrmann 2010) Therefore, the simulations enable the determination of the most relevant
278 multiphase chemical pathways for the chemical processing of marine aerosols during the
279 campaign. The second model approach will apply 2D-simulations of the marine multiphase
280 chemistry with the chemical transport model COSMO-MUSCAT (Baldauf, et al. 2011), which
281 numerical scheme is able to treat cloud droplet chemistry (Schrödner, et al. 2014). Hence, the
282 COSMO-MUSCAT simulations are able to investigate (i) the impact of horizontal and vertical
283 transport on the chemical aerosol as well as cloud droplet composition and (ii) the direct and
284 indirect impact of clouds on multiphase chemistry within, above and below the cloud. At the
285 end of the simulations the model results will be compared with the measured aerosol
286 concentration and composition and the in-cloud measurements at top of the Monte Verde
287 mountain. For this purpose, a novel reduced marine multiphase chemistry module will be
288 applied.

289 Simulations II

290 The simulations for the marine boundary layer height were carried out on three domains centred
291 on Sao Vicente, Cape Verde, applying one-way offline nesting. The outer domain “N0” has a
292 horizontal resolution of around 14 km and the two inner nests “N1” and “N2” have a grid
293 spacing of 3.5 km and 0.875 km, respectively (see Fig. S5). The results shown in this work only
294 refer to the inner nest “N2”.



295
296
297 Fig. S5: Model domains of COSMO-MUSCAT simulations performed within the MarParCloud
298 project and geographical location of the Cape Verde Atmospheric Observatory (CVAO) at Sao
299 Vicente, Cape Verde. Nested 14 km (black line), 3.5 km (red line), and 0.875 km (blue line).

300
301
302
303
304
305
306

307 Table S1: Instruments employed at the CVAO during the campaign.

308

Measured parameter	Instrument	Performance	No. of measurements /samples (incl. blanks)	Running period	Responsible Institution
Chemical and biological composition of aerosol particles (PM ₁ , PM ₁₀ , TSP _{h.v.} , TSP _{l.v.}), INP measurements	Digitel sampler. 5-stage Berner impactor. High volume (h.v.) sampler. Low Volume (l.v.) samplers	8h to 48 h sampling	PM ₁ : 30 PM ₁₀ : 30 TSP _{h.v.} : 12 TSP _{l.v.} : 23 Impactor: 18x5 stages	15 th Sept – 11 th Oct	TROPOS. Leipzig, Germany
Physical characterization of aerosol size distribution	MPSS, APS, PNSD, CCNc	15 min sampling		13 th Sep – 13 th October	TROPOS. Leipzig
Meteorology	Automatic weather station	Minute samples		Continuous	NCAS. University of York. UK
VOCs, OVOCs,	Dual channel, gas chromatograph with flame ionization detection	Hourly samples		15 th Sep – 8 th October	NCAS. University of York. UK
Ozone	UV absorption	Minute samples		Continuous	NCAS. University of York. UK
Vertical profiles of meteorological parameters	Helikite	10 days of measurements	19 profiles	13 th Sep – 13 th October	TROPOS. Leipzig
SML and aerosol particles	Plunging waterfall tank	9 days of measurements	5 x SML and bulk water, 2 x 7 TSP samples	2 nd Oct – 10 th Oct	ZMT, Bremen, Germany
HONO	LoPAP	Continuously		15 th Sept – 11 th Oct	ICARE, Orleans, France
SOA forming potential	Go:PAM	Continuously for ambient air sampling	3 SML samples	15 th Sept – 11 th Oct	IRCELYON, Lyon, France.

309

310

311

312

313

314

315

316 Table S2: Instruments employed at the Mt. Verde during the campaign.

Measured parameter	Instrument	Performance	No. of measurements /samples (incl. blanks) during campaign	Running period	Responsible Institution
Chemical and biological composition of aerosol particles (PM ₁ , PM ₁₀ , TSP _{h.v.} , TSP _{l.v.}), INP measurements	Digitel sampler. 5-stage Berner impactor. Low Volume (l.v.) sampler	8h to 48 h sampling	PM ₁ : 19 PM ₁₀ : 19 TSP _{l.v.} : 3 Impactor: 7x5 stages	21 th Sept – 09 th Oct	TROPOS. Leipzig
Physical characterization of aerosol size distribution	MPSS, APS, PNSD, CCNc	15 min sampling		13 th Sep – 13 th October	TROPOS. Leipzig
Meteorology	Automatic weather station (Davis)	5 min sampling		Continuous	TROPOS. Leipzig
Cloud water for chemical, biological and INP measurements	Cloud water sampler (six samplers run in parallel)	2.5 – 13 h sampling	155	20 th Sept – 09 th Oct	TROPOS. Leipzig

317

318

319

320

321

322

323

324

325

326

327

328

329

330 Table S3: Details on bulk water and SML sampling at Bahia das Gatas at N16°53. W24°54.

331

Sampling date	Local sampling time (UTC-1)	Exact coordinates	Sampling device	Sampling conditions	Bulk water			SML			Sample ID
					salinity [ppt equals psU]	pH - value	temperature [°C]	salinity [ppt equals psU]	pH - value	temperature [°C]	
18.09.2017	11:35 -12:00	No data	GP*	very windy, big waves	34.1	8.1	25.0	-	-	-	Seawater 1
19.09.2017	8:38 -9:05	No data	GP	not reported	36.1	8.2	25.2	-	-	-	Seawater 2
20.09.2017	8:32 -9:54	N16°53.341 W24°54.360	GP	Slick and foam at the end of the sampling	36.3	8.1	26.7	36.2	8.1	26.7	Seawater 3
22.09.2017	8:56 -9:20	N16°53'48.002 W24°54'13.858	GP	very windy with big waves	-	-	-	-	-	-	Seawater 4
25.09.2017	9:45 -10:48	N16°53.753 W24°54.117	GP	calm sea	36.4	8.2	26.0	36.4	8.1	25.5	Seawater 5
26.09.2017	10:05-10:51	N16°53.934 W24.54.556	GP	not reported	36.3	8.2	25.1	36.1	8.1	26.4	Seawater 6
26.09.2017	11:10-11:50	N16°53.742 W24°54.061	CAT**	not reported	36.2	8.0	26.1	36.4	8.0	26.1	Seawater 6 (2)

27.09.2 017	8:50 -10:03	N16°53.748 W24°54.134	GP	not reported	36.4	8.1	24.0	36.3	8.1	23.7	Seawater 7
27.09.2 017	8:50 -10:03	N16°53.623 W24°54.257	CAT	not reported	36.2	7.9	27.0	36.0	7.9	26.7	Seawater 7 (2)
28.09.2 017	9:15 -10:05	N16°53.623 W24°54.257	GP	not reported	36.5	8.1	27.8	36.6	8.1	26.8	Seawater 8
28.09.2 017	9:15 -10:05	N16°53.623 W24°54.257	CAT	not reported	36.3	8.1	27.1	36.0	8.1	27.8	Seawater 8 (2)
02.10.2 017	8:30 - 9:30	No data	GP	very windy, drift during sampling	36.0	8.2	20.9	36.5	8.3	20.9	Seawater 9
02.10.2 017	8:30 -9:30	No data	GP	very windy, drift during sampling	35.9	8.2	22.7	36.1	8.1	23.9	Seawater 9 (2)
03.10.2 017	8:15 - 9:35	N16°53.341 W24°54.360	GP	Not reported	36.1	8.2	22.8	36.6	8.2	21.0	Seawater 10
03.10.2 017	8:15 - 9:35	N16°53.341 W24°54.360	CAT	not reported	36.2	8.2	23.5	36.3	8.2	22.4	Seawater 10 (2)
04.10.2 017	8:15 - 9:00	N16°53'48.002 W24°54'13.858	GP	not reported	36.2	8.23	23.7	-	-	-	Seawater 11
04.10.2 017	8:15 - 9:55	N16°53.934 W24.54.556	CAT	not reported	36.3	8.2	22.8	-	-	-	Seawater 11 (2)

05.10.2 017	9:24 - 9:41	N16°53'44.824 W24°54'7.021	GP	smaller and higher waves in change	36.5	8.2	22.9	-	-	-	Seawater 12
06.10.2 017	08:04- 09:47	N16°53.753 W24°54.117	GP	windy	36.3	8.2	23.7	36.6	8.2	20.7	Seawater 13
07.10.2 017	09:22 - 10:35	N16°53.742 W24°54.061	GP	very windy with long and short waves in change	36.4	8.2	21.8	36.7	8.2	21.2	Seawater 14
07.10.2 017	9:17 - 10:46	N16°53.742 W24°54.061	GP CAT	very windy with long and short waves in change	36.5	8.2	22.4	36.7	8.2	24.5	Seawater 14 (2)
09.10.2 017	8:30 - 9:17	N16°53.623 W24°54.257	GP	windy	36.4	8.1	23.6	36.6	8.2	21.5	Seawater 15
10.10.2 017	8:30 - 9:30	N16°53.623 W24°54.257	GP	windy up to very windy with long waves	36.3	8.2	22.4	36.4	8.2	21.7	Seawater 16

332

333

334 *GP = glass plate, **cat = catamaran

335

336 Table S4: Concentrations of pigments, DOC and microbial parameters in the SML and bulk water samples.

337

Sampling date	18.09. 2017	19.09. 2017	20.09. 2017	22.09. 2017	25.09. 2017	26.09. 2017	27.09. 2017	28.09. 2017	02.10. 2017	03.10. 2017	04.10. 2017	05.10. 2017	06.10. 2017	07.10. 2017	09.10. 2017	10.10. 2017	
Sample ID	Sea-water 1	Sea-water 2	Sea- water 3	Sea- water 4	Sea- water 5	Sea- water 6	Sea- -water 7	Sea- water 8	Sea- water 9	Sea- water 10	Sea- water 11	Sea- water 12	Sea- water 13	Sea- water 14	Sea- water 15	Sea- water 16	
Parameter	unit																
<i>pigments</i>																	
chlorophyll c ₂	µg L ⁻¹	0.016	-	0.026	-	0.031	-	0.041	0.023	0.029	0.028	-	0.025	-	0.039	0.039	0.062
19 butanoyl oxyfucoxanthin	µg L ⁻¹	0.000	-	0.017	-	0.002	-	0.018	0.004	0.019	0.012	-	0.013	-	0.026	0.031	0.058
hexanoyloxyfuco xanthin	µg L ⁻¹	0.015	-	0.044	-	0.018	-	0.045	0.027	0.045	0.033	-	0.031	-	0.062	0.069	0.110
chlorophyll b	µg L ⁻¹	0.021	-	0.042	-	0.055	-	0.038	0.032	0.050	0.061	-	0.035	-	0.063	0.065	0.109
chlorophyll a	µg L ⁻¹	0.112	-	0.216	-	0.323	-	0.335	0.184	0.264	0.298	-	0.192	-	0.346	0.437	0.604
fucoxanthin	µg L ⁻¹	0.014	-	0.044	-	0.093	-	0.171	0.040	0.045	0.060	-	0.037	-	0.105	0.153	0.223
phaeophorbide a	µg L ⁻¹	0.031	-	0.032	-	0.047	-	0.041	0.037	0.034	0.036	-	0.033	-	0.037	0.039	0.038
phaeophytin a	µg L ⁻¹	0.017	-	0.018	-	0.027	-	0.023	0.023	0.026	0.029	-	0.020	-	0.025	0.026	0.027
chlorophyllide a	µg L ⁻¹	0.000	-	0.010	-	0.010	-	0.010	0.000	0.000	0.010	-	0.000	-	0.010	0.010	0.000
violaxanthin	µg L ⁻¹	0.000	-	0.003	-	0.005	-	0.003	0.003	0.004	0.006	-	0.003	-	0.005	0.006	0.007
diadinoxanthin	µg L ⁻¹	0.009	-	0.018	-	0.016	-	0.021	0.014	0.017	0.017	-	0.013	-	0.023	0.030	0.034
lutein	µg L ⁻¹	0.001	-	0.002	-	0.005	-	0.003	0.002	0.003	0.003	-	0.002	-	0.003	0.003	
chlorophyll c ₃	µg L ⁻¹	0.014	-	0.022	-	0.027	-	0.038	0.017	0.025	0.025	-	0.022	-	0.035	0.034	0.059
peridinin	µg L ⁻¹	0.003	-	0.005	-	0.007	-	0.006	0.003	0.007	0.005	-	0.006	-	0.005	0.005	0.008
zeaxanthin	µg L ⁻¹	0.108	-	0.106	-	0.134	-	0.089	0.136	0.141	0.206	-	0.165	-	0.185	0.148	0.129
β-carotene	µg L ⁻¹	0.006	-	0.009	-	0.017	-	0.011	0.010	0.013	0.018	-	0.010	-	0.014	0.015	0.015
<i>DOC</i>																	
DOC SML (GP*)	µg L ⁻¹	3260	2240	2780	2580	1680	2390	2020	2270	2020	2190	2050	-	3330	1610	1940	1820
DOC SML (cat**)	µg L ⁻¹	-	-	-	-	-	2040	1450	1940	1520	1520	-	-	-	1850	-	-
DOC bulk water (GP)	µg L ⁻¹	2800	1480	1090	1419	2370	1640	1070	1370	1340	1370	1090	1140	1290	947	1160	1290

DOC bulk water (cat)	$\mu\text{g L}^{-1}$	-	-	-	-	-	1810	1160	1280	1260	1260	1840	-	-	1480	-	-
microbial parameters																	
LNA (SML)	cells mL^{-1}	-	-	1.06E+06	-	1.48E+06	9.34E+05	1.05E+06	1.20E+06	9.90E+05	1.30E+06	1.15E+06	-	1.06E+06	-	-	-
HNA (SML)	cells mL^{-1}	-	-	8.91E+04	-	1.62E+05	5.85E+04	1.03E+05	1.23E+05	1.40E+05	7.84E+04	7.04E+04	-	9.58E+04	-	-	-
TCN (SML)	cells mL^{-1}	-	-	1.15E+06	-	1.64E+06	9.92E+05	1.15E+06	1.33E+06	1.13E+06	1.38E+06	1.22E+06	-	1.16E+06	-	-	-
synechococcus (SML)	cells mL^{-1}	-	-	4.42E+04	-	6.70E+04	2.71E+04	2.63E+04	2.61E+04	3.41E+04	7.40E+04	4.53E+04	-	2.42E+04	-	-	-
nanoecaryotes (SML)	cells mL^{-1}	-	-	6.76E+02	-	1.64E+02	5.16E+01	5.16E+01	5.16E+01	1.85E+02	1.02E+01	2.05E+01	-	-	-	-	-
LNA (bulk water)	cells mL^{-1}	-	-	9.70E+05	-	1.24E+06	1.06E+06	1.07E+06	1.05E+06	1.72E+06	1.32E+06	1.21E+06	1.24E+06	1.18E+06	-	-	-
HNA (bulk water)	cells mL^{-1}	-	-	7.19E+04	-	1.17E+05	7.49E+04	9.15E+04	8.66E+04	6.07E+05	1.44E+05	7.91E+04	9.31E+04	9.88E+04	-	-	-
TCN (bulk water)	cells mL^{-1}	-	-	1.04E+06	-	1.36E+06	1.13E+06	1.16E+06	1.14E+06	2.32E+06	1.46E+06	1.28E+06	1.34E+06	1.28E+06	-	-	-
synechococcus (bulk water)	cells mL^{-1}	-	-	2.45E+04	-	4.27E+04	2.05E+04	2.63E+04	1.99E+04	6.82E+04	5.31E+04	3.79E+04	2.96E+04	2.42E+04	-	-	-
nanoecaryotes (bulk water)	cells mL^{-1}	-	-	5.16E+01	-	1.54E+02	6.18E+01	1.23E+02	1.03E+02	1.46E+03	1.74E+02	6.14E+01	6.18E+01	1.06E+01	-	-	-

338

339

340

341

342

*GP: glass plate; *cat: catamaran (MarParCat)

TCN: total bacterial cell numbers

HNA: high nucleic acid containing cells

LNA : low nucleic acid containing cells

- : no measurements available

343

*LOD: limit of detection

344

345

346

347

348

349

350 Table S5: Concentrations and standard deviations (ng m⁻³) of size resolved aerosol particle constituents measured in parallel during parallel measurements between
 351 2.10 and 9.10 obtained from the CVAO (mean value of 5 blocks) and the Mt.Verde (mean value of 6 blocks) station. Aerosol particles were sampled in five different
 352 size fractions with aerodynamic particle diameter D_P (50% cut-off) from: 0.05-0.14 μm (stage 1), 0.14-0.42 μm (stage 2), 0.42-1.2μm (stage 3), 1.2-3.5 μm (stage
 353 4) and 3.5-10 μm (stage 5).
 354
 355

CVAO	Sodium	Chloride	MSA	Sulfate	Nitrate	Oxalate	Ammonium	Potassium	Magnesium	WSOM	EC
stage 1	<LOD*	<LOD*	0.5±0.4	28.0±12	<LOD*	<LOD*	12.5±4	<LOD*	<LOD*	9.4±21	6.3±0.9
stage 2	<LOD*	<LOD*	12.7±2	741.9±111	<LOD*	3.2±4	232±48	3.7±5	0.3±0.6	38.6±16	27.5±14
stage 3	148±27	50.1±47	6.6±07	472.2±26	13.7±15	0.9±1	23.3±10	11.4±6	16.0±5.3	49.1±3	14.0±10
stage 4	1430±375	2300±680	4.5±0.9	572±159	698±76	22.1±8	16.6±4	54.4±11	156±33	108±6	12.5±1
stage 5	1520±306	2820±697	0.9±0.3	503±123	536±59	2.8±4	17.6±5	56.9±14	181±42	91.5±13	3.1±4

Mt. Verde	Sodium	Chloride	MSA	Sulfate	Nitrate	Oxalate	Ammonium	Potassium	Magnesium	WSOM	EC
stage 1	<LOD*	<LOD*	0.2±0.4	7.4±8	<LOD*	<LOD*	1.4±4	<LOD*	<LOD*	15.8±18	1.8±2
stage 2	<LOD*	<LOD*	2.1±1	111±54	<LOD*	0.3±0.4	36.5±22	0.3±0.7	<LOD*	26.9±21	15.0±12
stage 3	24.9±22	<LOD*	3.7±1	254±86	<LOD*	0.4±0.7	51.8±20	1.3±2.1	1.5±2.6	44.6±29	21.4±11
stage 4	163±110	277±171	2.3±0.7	156±62	96.5±68	0.3±0.8	12.6±10	2.9±5.1	13.4±8.5	80.2±29	3.6±5
stage 5	143±85	256±143	2.1±1	109±35	79.3±46	<LOD*	6.9±7	2.6±4.4	9.2±11	137±56	21.0±16

356

357 *LOD: limit of detection

358

359

360

361

362

363

364 Table S6: Average concentrations and standard deviations of DOM fractions in the SML, bulk water and cloud water (ng L⁻¹) and in aerosol particles (PM₁₀)
 365 sampled at the CVAO and at the Mt. Verde (ng m⁻³) sampled in parallel within the periods: 26. – 27.09., 01. – 02.10., and 08. – 09.10.2017.
 366
 367
 368

	N	Biopolymers	Humic Substances	Building Blocks	LMW Neutrals	LMW Acids
SML	3	77±27	205±11	163±21	359±84	38±31
Bulk water	3	67±19	234±44	137±40	362±127	2±3
aerosol particles at CVAO	3	<LOD*	<LOD*	114±25	84±38	2±3
aerosol particles at Mt. Verde	2	<LOD*	<LOD*	55±23	58±22	6±4
Cloud water	4	27±21	354±222	242±224	301±227	58±98

369
 370 *LOD: limit of detection
 371
 372
 373
 374

375 References:
376

- 377 Baldauf, M., Seifert, A., Forstner, J., Majewski, D., Raschendorfer, M., and Reinhardt, T.:
378 Operational Convective-Scale Numerical Weather Prediction with the COSMO Model:
379 Description and Sensitivities, *Monthly Weather Review*, 139, 3887-3905, 10.1175/mwr-d-10-
380 05013.1, 2011.
- 381 Chen, J., Wu, Z. J., Augustin-Bauditz, S., Grawe, S., Hartmann, M., Pei, X. Y., Liu, Z. R., Ji,
382 D. S., and Wex, H. K.: Ice-nucleating particle concentrations unaffected by urban air pollution
383 in Beijing, China, *Atmospheric Chemistry and Physics*, 18, 3523-3539, 10.5194/acp-18-3523-
384 2018, 2018.
- 385 Ćosović, B., and Vojvodić, V.: Voltammetric analysis of surface active substances in natural
386 seawater, *Electroanalysis*, 10, 429-434, 10.1002/(sici)1521-4109(199805)10:6<429::Aid-
387 elan429>3.3.Co;2-z, 1998.
- 388 Falkowska, L.: Sea surface microlayer: a field evaluation of teflon plate, glass plate and screen
389 sampling techniques. Part 2. Dissolved and suspended matter, *Oceanologia*, 41, 223-240, 1999.
- 390 Fomba, K. W., Müller, K., van Pinxteren, D., and Herrmann, H.: Aerosol size-resolved trace
391 metal composition in remote northern tropical Atlantic marine environment: case study Cape
392 Verde islands, *Atmos. Chem. Phys.*, 13, 4801-4814, 10.5194/acp-13-4801-2013, 2013.
- 393 Frka, S., Kozarac, Z., and Ćosović, B.: Characterization and seasonal variations of surface
394 active substances in the natural sea surface micro-layers of the coastal Middle Adriatic stations,
395 *Estuarine Coastal and Shelf Science*, 85, 555-564, 10.1016/j.ecss.2009.09.023, 2009.
- 396 Frka, S., Pogorzelski, S., Kozarac, Z., and Ćosović, B.: Physicochemical Signatures of Natural
397 Sea Films from Middle Adriatic Stations, *Journal of Physical Chemistry A*, 116, 6552-6559,
398 10.1021/jp212430a, 2012.
- 399 Gašparović, B., Kazazić, S. P., Cvitešić, A., Penezić, A., and Frka, S.: Improved separation and
400 analysis of glycolipids by Iatrosan thin-layer chromatography-flame ionization detection,
401 *Journal of Chromatography A*, 1409, 259-267, 10.1016/j.chroma.2015.07.047, 2015.
- 402 Gašparović, B., Kazazić, S. P., Cvitešić, A., Penezić, A., and Frka, S.: Improved separation and
403 analysis of glycolipids by Iatrosan thin-layer chromatography-flame ionization detection (vol
404 1409, pg 259, 2015), *Journal of Chromatography A*, 1521, 168-169,
405 10.1016/j.chroma.2017.09.038, 2017.
- 406 Gong, X., Wex, H., van Pinxteren, M., Triesch, N., Fomba, K. W., Lubitz, J., Stolle, C.,
407 Robinson, T.-B., Müller, T., Herrmann, H., and Stratmann, F.: Characterization of aerosol
408 particles at Cape Verde close to sea and cloud level heights – Part 2: ice nucleating particles in
409 air, cloud and seawater, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-729>,
410 2019.
- 411 Hartmann, M., Blunier, T., Brugger, S.O., Schmale, J., Schwikowski, M., Vogel, A., Wex,
412 H., and Stratmann, F.: Variation of Ice Nucleating Particles in the European Arctic Over the
413 Last Centuries, *Geophysical Research Letters*, 46: 4007-16, 2019.
- 414
415 Hinrichs, K. U., Summons, R. E., Orphan, V., Sylva, S. P., and Hayes, J. M.: Molecular and

416 isotopic analysis of anaerobic methane-oxidizing communities in marine sediments, *Organic*
417 *Geochemistry*, 31: 1685-701, 2000.

418

419 Hoffmann, E. H., Tilgner, A., Schrödner, R., Brauer, P., Wolke, R., and Herrmann, H.: An
420 advanced modeling study on the impacts and atmospheric implications of multiphase dimethyl
421 sulfide chemistry, *Proc Natl Acad Sci USA*, 113, 11776-11781, 10.1073/pnas.1606320113,
422 2016.

423 Hoffmann, E. H., Tilgner, A., Wolke, R., and Herrmann, H.: Enhanced chlorine and bromine
424 atom activation by hydrolysis of halogen nitrates from marine aerosols at polluted coastal areas,
425 *Environmental Science & Technology*, 53, 771-778, 10.1021/acs.est.8b05165, 2019.

426 Huber, S. A., Balz, A., Abert, M., and Pronk, W.: Characterisation of aquatic humic and non-
427 humic matter with size-exclusion chromatography–organic carbon detection–organic nitrogen
428 detection (LC-OCD-OND), *Water research*, 45, 879-885, 2011.

429 Kroflič, A., Frka, S., Simmel, M., Wex, H., and Grgić, I.: Size-Resolved Surface-Active
430 Substances of Atmospheric Aerosol: Reconsideration of the Impact on Cloud Droplet
431 Formation, *Environmental Science & Technology*, 52, 9179-9187, 10.1021/acs.est.8b02381,
432 2018.

433

434 Marie, D., Shi, X.L., Rigaut-Jalabert, F., and Vaultot, D.: Use of flow cytometric sorting to
435 better assess the diversity of small photosynthetic eukaryotes in the English Channel, *Fems*
436 *Microbiology Ecology*, 72: 165-78, 2010.

437

438 Passow, U., and Alldredge, A. L.: A dye-binding assay for the spectrophotometric measurement
439 of transparent exopolymer particles (TEP), *Limnology and Oceanography*, 40, 1326-1335,
440 10.4319/lo.1995.40.7.1326, 1995.

441 Robinson, T.-B., Wurl, O., Bahlmann, E., Jürgens, K., and Stolle, C.: 2019 b. 'Rising bubbles
442 enhance the gelatinous nature of the air–sea interface', *Limnology and Oceanography*,
443 10.1002/lno.11188, 2019.

444

445 Schrödner, R., Tilgner, A., Wolke, R., and Herrmann, H.: Modeling the multiphase processing
446 of an urban and a rural air mass with COSMO–MUSCAT, *Urban Climate*, 10, 720-731,
447 10.1016/j.uclim.2014.02.001, 2014.

448 Tilgner, A., and Herrmann, H.: Radical-driven carbonyl-to-acid conversion and acid
449 degradation in tropospheric aqueous systems studied by CAPRAM, *Atmos. Environ.*, 44, 5415-
450 5422, 10.1016/j.atmosenv.2010.07.050, 2010.

451 Triesch, N, van Pinxteren, M., Engel, A., and Herrmann, H.: Concerted measurements of free
452 amino acids at the Cape Verde Islands: High enrichments in submicron sea spray aerosol
453 particles and cloud droplets, submitted to *Atmos. Chem. Phys.*, 2019.

454

455 van Pinxteren, D., Brüeggemann, E., Gnauk, T., Mueller, K., Thiel, C., and Herrmann, H.: A
456 GIS based approach to back trajectory analysis for the source apportionment of aerosol
457 constituents and its first application, *Journal of Atmospheric Chemistry*, 67, 1-28,
458 10.1007/s10874-011-9199-9, 2010.

459 van Pinxteren, M., Fiedler, B., van Pinxteren, D., Iinuma, Y., Koertzinger, A., and Herrmann,
460 H.: Chemical characterization of sub-micrometer aerosol particles in the tropical Atlantic
461 Ocean: marine and biomass burning influences, *Journal of Atmospheric Chemistry*, 72, 105-
462 125, 10.1007/s10874-015-9307-3, 2015.

463 van Pinxteren, M., Barthel, S., Fomba, K., Müller, K., von Tümpling, W., and Herrmann, H.:
464 The influence of environmental drivers on the enrichment of organic carbon in the sea surface
465 microlayer and in submicron aerosol particles – measurements from the Atlantic Ocean, *Elem
466 Sci Anth*, 5, <https://doi.org/10.1525/elementa.225>, 2017.

467 Wolke, R., Sehili, A. M., Simmel, M., Knoth, O., Tilgner, A., and Herrmann, H.: SPACCIM:
468 A parcel model with detailed microphysics and complex multiphase chemistry, *Atmos.
469 Environ.*, 39, 4375-4388, 10.1016/j.atmosenv.2005.02.038, 2005.

470 Wolke, R., Schroder, W., Schrodner, R., and Renner, E.: Influence of grid resolution and
471 meteorological forcing on simulated European air quality: A sensitivity study with the modeling
472 system COSMO-MUSCAT, *Atmos. Environ.*, 53, 110-130, 10.1016/j.atmosenv.2012.02.085,
473 2012.
474
475
476