

Supplementary Information

Measurement	Mode	Instrument
WP1 Atmospheric		
Organic nuclei production	C*	UltraFine Organic-Tandem Differential Mobility Analyser (UFO-TDMA)
Aerosol water uptake and volatility	C*	Volatility Humidity Differential Mobility Analyser (VH-TDMA)
Nucleation, Aitken mode size spectra	C*	Scanning Mobility Particle Sizer (SMPS)
Condensation nuclei counts	C*	Condensation Particle Counter (CPC)
Accumulation mode aerosol number	C	PCASP
Cloud condensation nuclei concentration	C*	CCN spectrometer
Aerosol filter chemistry – Major ions	C	Hi-Vol, cascade, Ion Chromatograph
Black carbon	C*	Aetholometer
PM ₁ aerosol filters	C	Organic functional groups by FTIR and inorganic composition by IBA
Column aerosol	D	Sun photometer (Microtops II)
Nascent sea spray composition via bubble burst of sea-water samples	D	Chamber experiments
DMS	C	APIMS
CO ₂ and methane	C	Picarro CRDS
Halocarbons, Iodine and halogen oxides	C	μ-Dirac ECD-GC and Multi-Axis Differential Optical Absorption Spectroscopy (Max-DOAS)
VOCs (Acetone, DMS, Acetonitrile, Methanol, Methanethiol, Isoprene, Monoterpenes, Acetaldehyde)	C	Proton Transfer Reaction Mass Spectrometer (PTR-MS)
VOCs C ₅ to C ₁₅	D	Pre-concentration and TD-GC-FID/MS
Aldehydes, ketones (including dicarbonyls), C ₂ to C ₈	D	Derivatisation and HPLC
WP2 Physics		
DMS flux	C	API-CIMS (chemical ionization mass spectrometry (mini-CIMS) Gradient/ SCD-GC
CO ₂ EC flux	C	Licors, Sonic anemometer motion sensors
DMS gradient flux	D	Catamaran, SCD-GC
Near surface TandS	D	CTD
Near-surface stratification	C	Spar buoy – temperature array, microcats
Near-surface turbulence	C	Vector, FastCat
Sea state	C	NOAA Wavewatch III Microwave radar
Whitecap coverage	D	Camera
Meteorological conditions	C	AWS
Bulk fluxes	C	Eppley radiometers, raingauge; Eppley Precision Spectral Pyranometer (PSP);
MBL Height and stability	D	Radiosonde deployment
WP3 Ocean biogeochemistry		
Chlorophyll- <i>a</i>	C, D, W	Ecotriplet
Back-scatter	C	Ecotriplet
B660 backscatter	C	Ecotriplet
pCO ₂	C	IRGA
pH	C, D, W	Spectrophotometer
DIC	D	
Nutrients	D, W	Colorimetric Autoanalyser
DOC	D, W	HTCO
CDOM	D, W	Spectrophotometer
POC/PON/PC/PN/13C/15N	D	Mass Spectrometer

Fatty Acids and Alkanes	D, W	
Dissolved DMS	C,	Meso-CIMS
Dissolved DMS	D, W	SCD/FPD
DMSP	D, W	SCD
DMSP processes	D, W	
Pigments	D	HPLC
Microbial community abundance	D, W	Flow Cytometry
Phytoplankton identification and counts	D, W	Optical Microscopy
Microzooplankton	D, W	Optical Microscopy

Supplementary Table 1. Parameters sampled, mode (C: Continuous, D- Discrete, W – Workboat, *indicates instrument sampling on common aerosol inlet), Analytical instrumentation and method reference for the SOAP voyage.

Station	NZST Date	NZST Time	Latitude	Longitude	SST (°C)	Salinity	MLD (m)	Chl-a (mg m ⁻³)	Nitrate (umol L ⁻¹)	Location
7502	15-Feb-12	9:00	-44.608	174.773	13.92	34.43	14.2	1.02	5.91	B1
7503	16-Feb-12	9:28	-44.583	174.700	14.44	34.49	13.33	0.68	5.56	B1
7504	17-Feb-12	9:14	-44.550	174.712	14.99	34.56	14.35	1.08	4.02	B1
7505	18-Feb-12	9:19	-44.574	174.736	n/a	n/a	14.35	0.52	0.11	B1
7506	19-Feb-12	7:34	-44.336	175.243	14.68	34.44	16	0.88	5.86	North of B1
7507	20-Feb-12	7:21	-45.960	173.645	13.58	34.40	22.94	0.74	3.77	S.W. station
7508	21-Feb-12	7:02	-43.741	176.965	15.12	34.61	22.95	0.65	1.26	Enroute to E
7509	21-Feb-12	17:20	-43.483	179.114	15.88	34.77	21.8	0.28	<0.07	East of B2
7510	22-Feb-12	9:22	-43.717	180.157	15.88	34.65	21.12	1.39	0.08	B2
7511	22-Feb-12	13:28	-43.597	180.179	15.90	34.66	21.12	n/a	n/a	B2
7512	22-Feb-12	18:01	-43.627	180.208	16.34	34.64	14.25	n/a	n/a	B2
7513	23-Feb-12	7:17	-43.710	180.238	15.72	34.56	18.96	0.58	2.62	B2
7514	23-Feb-12	9:43	-43.699	180.228	15.65	34.55	18.24	0.55	2.50	B2
7515	23-Feb-12	12:06	-43.691	180.257	15.92	34.64	24.91	0.64	0.47	B2
7516	23-Feb-12	17:14	-43.641	180.247	15.53	34.60	38.89	0.53	1.56	B2
7517	24-Feb-12	7:03	-43.667	180.236	15.56	34.58	38.89	0.61	1.32	B2
7518	24-Feb-12	15:17	-43.601	180.235	15.73	34.65	11.23	0.48	1.15	B2
7519	25-Feb-12	9:26	-43.557	180.316	15.44	34.56	29.23	0.67	2.86	B2
7520	25-Feb-12	14:31	-43.630	180.260	15.59	34.55	26.92	0.63	2.92	B2
7521	26-Feb-12	6:55	-43.963	180.692	15.77	34.78	25	0.51	0.13	South of B2
7522	27-Feb-12	15:28	-44.112	175.475	14.70	34.51	28.93	0.44	3.94	NE B3a
7523	28-Feb-12	7:25	-44.491	174.850	14.24	34.53	30.9	0.39	2.21	B3 a
7524	28-Feb-12	13:10	-44.542	174.873	14.36	34.49	29.46	0.29	4.40	B3 a
7525	29-Feb-12	8:52	-44.607	174.870	14.19	34.49	27.03	0.44	4.42	B3 a
7526	29-Feb-12	13:03	-44.545	174.883	14.39	34.50	27.03	n/a	n/a	B3 a
										Storm
7527	2-Mar-12	7:58	-44.191	174.925	13.62	34.52	39.07	0.42	5.28	B3 b
7528	2-Mar-12	14:57	-44.192	174.927	13.71	34.54	44.79	0.45	2.93	B3 b
7529	3-Mar-12	7:42	-44.759	174.640	13.27	34.38	30.72	0.61	5.34	B3 b
7530	3-Mar-12	14:45	-44.781	174.652	13.03	34.39	44.11	0.49	5.49	B3 b
7531	4-Mar-12	9:26	-44.243	174.523	12.88	34.50	49.55	0.74	3.86	B3 b
7532	4-Mar-12	15:23	-44.243	174.522	12.83	34.48	39.51	1.01	3.81	B3 b
7533	5-Mar-12	9:57	-44.191	174.307	12.79	34.50	40.14	0.97	2.84	B3 b

Supplementary Table 2. SOAP CTD station information, including surface water characteristics. Individual bloom occupation is indicated by the different colours. SST: Sea Surface Temperature; MLD: Surface Mixed layer depth; Chl-*a*: Chlorophyll-*a*.