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Supplement of

Linking marine phytoplankton emissions, meteorological processes, and downwind particle properties with FLEXPART

Kevin J. Sanchez et al.

Correspondence to: Kevin J. Sanchez (kevin.j.sanchez@nasa.gov) and Richard H. Moore (richard.h.moore@nasa.gov)

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Table S1. Abbreviations and descriptions of biochemical and subsurface optical satellite measurements obtained from the GlobColour Archive (<http://hermes.acri.fr/index.php>), modeled net primary production obtained from satellite, model data obtained from the Oregon State Ocean Productivity archive (<http://sites.science.oregonstate.edu/ocean.productivity/index.php>) and meteorological variables from the NOAA's Global Data Assimilation archive (<https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/global-data-assimilation-system-gdas>). Bold rows are the variables used in the main text.

Abbreviation	Units	Description
Satellite (8-day average)		
CHL_{GSM}	mg m³	Chlorophyll-a product derived from Garver-Siegel-Maritonena ocean color model
CHL _{NN}	mg m ³	Chlorophyll-a product derived from a Neural Network Algorithm
CHL _{OC5}	mg m ³	Chlorophyll-a product derived from the Gohin algorithm
POC	mg m³	Marine particulate organic carbon
PIC	mol m ³	Marine particulate inorganic carbon
CDM	m⁻¹	Colored dissolved and detrital organic materials absorption coefficient
ZEU	m	Depth of the euphotic zone
ZHL	m	Depth of the Heated Layer
NPP Models (8-day average)		
CbPM	mg C m ⁻² day ⁻¹	Carbon based model of Westberry et al. (2008)
VGPM	mg C m ⁻² day ⁻¹	Vertically Generalized Production model of Behrenfeld and Falkowski (1997)
VGPM _{Eppley}	mg C m ⁻² day ⁻¹	VGPM Eppley variation (Behrenfeld and Falkowski, 1997; Eppley, 1972)
CAFE	mg C m⁻² day⁻¹	Carbon, Absorption, and Fluorescence Euphotic-resolving model of Silsbe et al. (2016)
GDAS		
CF _{Total}	%	Total cloud cover (3-hour average)
CF _{Low}	%	Low-level cloud cover (3-hour average)
DSWF	W m⁻²	Downward shortwave forcing (3-hour average)
PBLH	m	Planetary boundary layer height
Precip.	m	Precipitation (6-hour accumulation)
SST	K	Sea surface temperature
U	m s⁻¹	Sea surface wind speed

Table S2. Ship measurements used for comparison with FLEXPART-residence-time-weighted trajectories.

Ship Measurements	Units	Full name	Instrument
CN	cm ⁻³	Total condensation nuclei	CPC
N _{>100nm}	cm ⁻³	Condensation nuclei (D _p > 100nm)	SEMS
N _{<100nm}	cm ⁻³	Condensation nuclei (D _p < 100nm)	SEMS
Org	µg m ⁻³	Organic mass	AMS
SO ₄	µg m ⁻³	Sulfate mass	AMS
NO ₃	µg m ⁻³	Nitrate mass	AMS
DMS	ppt	Dimethyl sulfide	CIMS
N _{PMA}	cm ⁻³	Sea spray aerosol number	SEMS and APS
BC _m	ng m ⁻³	Black Carbon mass	SP2
Rn	mBq m ⁻³	Radon	Dual-flow-loop two-filter 103 radon detector

Table S3. Correlation of 5-day FLEXPART-residence-time-weighted GlobColour satellite products with all 5-day FLEXPART-residence-time-weighted explanatory variables during clean marine conditions shown as the Pearson's coefficient (r). Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	CHL _{GSM}	CHL _{NN}	CHL _{OC5t}	POC	PIC	CDM	ZEU	ZHL
Satellite Measurements								
CHL _{GSM}	1.00	0.94	0.87	0.78	0.48	0.90	-0.74	-0.72
CHL _{NN}	0.94	1.00	0.92	0.67	0.36	0.87	-0.73	-0.71
CHL _{OC5}	0.87	0.92	1.00	0.69	0.15	0.86	-0.74	-0.73
POC	0.78	0.67	0.69	1.00	0.40	0.89	-0.77	-0.76
PIC	0.48	0.36	0.15	0.40	1.00	0.51	-0.39	-0.38
CDM	0.90	0.87	0.86	0.89	0.51	1.00	-0.88	-0.87
ZEU	-0.74	-0.73	-0.74	-0.77	-0.39	-0.88	1.00	1.00
ZHL	-0.72	-0.71	-0.73	-0.76	-0.38	-0.87	1.00	1.00
NPP Model								
CbPM	0.21	0.14	0.14	0.26	0.12	0.16	0.07	0.07
VGPM _{EPPLEY}	0.74	0.78	0.78	0.52	0.04	0.61	-0.48	-0.47
VGPM	0.79	0.82	0.83	0.59	0.07	0.68	-0.58	-0.57
CAFE	0.76	0.83	0.76	0.46	0.06	0.58	-0.40	-0.38
GDAS								
CF _{Total}	0.45	0.41	0.41	0.50	0.37	0.60	-0.72	-0.72
CF _{Low}	0.51	0.46	0.40	0.52	0.52	0.63	-0.69	-0.68
DSWF	0.13	0.17	0.14	-0.14	-0.26	-0.13	0.36	0.37
PBLH	-0.15	-0.18	-0.26	-0.13	0.11	-0.16	0.09	0.09
Precip.	-0.06	-0.04	-0.02	-0.12	-0.23	-0.06	-0.03	-0.04
SST	-0.69	-0.62	-0.58	-0.73	-0.64	-0.83	0.85	0.84
U	0.22	0.23	0.23	0.29	0.18	0.36	-0.50	-0.50

Table S4. Correlation of 5-day FLEXPART-residence-time-weighted modeled net primary production with all 5-day FLEXPART-residence-time-weighted explanatory variables during clean marine conditions shown as the Pearson's coefficient (r). Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	CbPM	VGPM _{EPPELEY}	VGPM	CAFE
Satellite Measurements				
CHL _{GSM}	0.21	0.74	0.79	0.76
CHL _{NN}	0.14	0.78	0.82	0.83
CHL _{OC5}	0.14	0.78	0.83	0.76
POC	0.26	0.52	0.59	0.46
PIC	0.12	0.04	0.07	0.06
CDM	0.16	0.61	0.68	0.58
ZEU	0.07	-0.48	-0.58	-0.40
ZHL	0.07	-0.47	-0.57	-0.38
NPP Model				
CbPM	1.00	0.54	0.46	0.44
VGPM _{EPPELEY}	0.54	1.00	0.99	0.93
VGPM	0.46	0.99	1.00	0.91
CAFE	0.44	0.93	0.91	1.00
GDAS				
CF _{Total}	-0.32	0.10	0.21	0.05
CF _{Low}	-0.34	0.06	0.15	0.08
DSWF	0.60	0.59	0.49	0.64
PBLH	-0.51	-0.50	-0.44	-0.44
Precip.	-0.36	-0.20	-0.18	-0.15
SST	0.22	-0.20	-0.30	-0.19
U	-0.61	-0.19	-0.07	-0.15

Table S5. Correlation of 5-day FLEXPART-residence-time-weighted model reanalysis meteorological variables with all 5-day FLEXPART-residence-time-weighted explanatory variables during clean marine conditions shown as the Pearson's coefficient (r). Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	CF _{Total}	CF _{Low}	DSWF	PBLH	Precip	SST	U
Satellite Measurements							
CHL _{GSM}	0.45	0.51	0.13	-0.15	-0.06	-0.69	0.22
CHL _{NN}	0.41	0.46	0.17	-0.18	-0.04	-0.62	0.23
CHL _{OC5}	0.41	0.40	0.14	-0.26	-0.02	-0.58	0.23
POC	0.50	0.52	-0.14	-0.13	-0.12	-0.73	0.29
PIC	0.37	0.52	-0.26	0.11	-0.23	-0.64	0.18
CDM	0.60	0.63	-0.13	-0.16	-0.06	-0.83	0.36
ZEU	-0.72	-0.69	0.36	0.09	-0.03	0.85	-0.50
ZHL	-0.72	-0.68	0.37	0.09	-0.04	0.84	-0.50
NPP Model							
CbPM	-0.32	-0.34	0.60	-0.51	-0.36	0.22	-0.61
VGPM _{EPPLEY}	0.10	0.06	0.59	-0.50	-0.20	-0.20	-0.19
VGPM	0.21	0.15	0.49	-0.44	-0.18	-0.30	-0.07
CAFE	0.05	0.08	0.64	-0.44	-0.15	-0.19	-0.15
GDAS							
CF _{Total}	1.00	0.90	-0.59	0.17	0.39	-0.71	0.70
CF _{Low}	0.90	1.00	-0.57	0.30	0.26	-0.81	0.71
DSWF	-0.59	-0.57	1.00	-0.49	-0.32	0.49	-0.65
PBLH	0.17	0.30	-0.49	1.00	0.16	-0.13	0.53
Precip.	0.39	0.26	-0.32	0.16	1.00	-0.02	0.38
SST	-0.71	-0.81	0.49	-0.13	-0.02	1.00	-0.60
U	0.70	0.71	-0.65	0.53	0.38	-0.60	1.00

Table S6. Correlation between ship measurements shown as the Pearson's coefficient (r). Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	N	N _{>100nm}	N _{<100nm}	Org	SO ₄	NO ₃	DMS	N _{PMA}	BC _m	Rn
N	1.00	0.54	0.90	0.29	0.45	0.34	0.17	0.06	0.20	0.14
N _{>100nm}	0.54	1.00	0.40	0.65	0.83	0.61	0.45	0.36	0.64	0.16
N _{<100nm}	0.90	0.40	1.00	0.21	0.39	0.38	0.05	-0.03	0.08	0.18
Org	0.29	0.65	0.21	1.00	0.39	0.35	0.46	0.52	0.53	0.29
SO ₄	0.45	0.83	0.39	0.39	1.00	0.56	0.34	0.02	0.39	0.24
NO ₃	0.34	0.61	0.38	0.35	0.56	1.00	0.34	0.20	0.35	0.24
DMS	0.17	0.45	0.05	0.46	0.34	0.34	1.00	0.64	0.07	0.23
N _{PMA}	0.06	0.36	-0.03	0.52	0.02	0.20	0.64	1.00	0.38	0.19
BC _m	0.20	0.64	0.08	0.53	0.39	0.35	0.07	0.38	1.00	0.04
Rn	0.14	0.16	0.18	0.29	0.24	0.24	0.23	0.19	0.04	1.00

Table S7. Pearson coefficient values for log of in-situ sea water particulate organic carbon (POC_{in-line}) and chlorophyll-a (CHL_{in-line}) measurements compared to log of satellite CHL_{GSM} and POC products at the R/V Atlantic location. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	1-Day satellite average		8-Day satellite average	
	CHL _{in-line}	POC _{in-line}	CHL _{in-line}	POC _{in-line}
CHL _{GSM}	0.87	0.78	0.62	0.62
CHL _{NN}	0.72	0.66	0.63	0.60
CHL _{OC5}	0.72	0.75	0.68	0.73
POC	0.69	0.70	0.46	0.47
PIC	0.41	0.62	0.33	0.48
CDM	0.64	0.62	0.57	0.58
ZEU	-0.82	-0.76	-0.62	-0.63
ZHL	-0.83	-0.76	-0.62	-0.62

Table S8. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to organic aerosol mass (Figure 4a) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.34	0.33	0.37	0.39	0.39	0.37	0.36
CHL _{NN}	0.36	0.33	0.35	0.38	0.40	0.40	0.35
CHL _{OC5}	0.38	0.31	0.37	0.38	0.39	0.36	0.28
POC	0.23	0.17	0.22	0.22	0.14	0.09	0.13
PIC	0.31	0.24	0.32	0.36	0.19	0.12	-
CDM	0.34	0.31	0.33	0.35	0.32	0.25	0.15
ZEU	-0.09	-0.09	-0.09	-0.10	-0.10	-	-
ZHL	-	-	-	-	-	-	-
NPP Model							
CbPM	0.29	0.38	0.39	0.39	0.41	0.45	0.50
VGPM _{EPPLEY}	0.49	0.47	0.49	0.52	0.56	0.58	0.60
VGPM	0.46	0.44	0.46	0.49	0.52	0.53	0.53
CAFE	0.45	0.47	0.50	0.54	0.59	0.62	0.62
GDAS							
CF _{Total}	0.10	0.11	0.11	-	-	-	-0.14
CF _{Low}	0.13	0.12	0.11	-	-	-	-0.14
DSWF	0.11	0.15	0.26	0.45	0.52	0.55	0.58
PBLH	-0.19	-0.16	-0.21	-0.27	-0.34	-0.32	-0.38
Precip.	-	-	-	-	-	-	-
SST	-	-	-	-	-	-	0.10
U	-	-	-0.15	-0.26	-0.32	-0.30	-0.34

Table S9. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to sulfate aerosol mass (Figure 4b) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	-	-	-	-	-	-0.09	-0.16
CHL _{NN}	-	-	-	-	-	-	-0.12
CHL _{OC5}	-	-	-	-	-	-0.11	-0.20
POC	-	-	-	-0.15	-0.22	-0.26	-0.33
PIC	-	-	-	-	-	-0.13	-0.18
CDM	-	-	-	-	-0.15	-0.23	-0.35
ZEU	0.39	0.40	0.41	0.42	0.42	0.46	0.53
ZHL	0.40	0.42	0.42	0.43	0.44	0.48	0.54
NPP Model							
CbPM	0.22	0.26	0.28	0.34	0.39	0.40	0.40
VGPM _{EPPLEY}	0.14	0.12	0.13	0.15	0.20	0.21	0.18
VGPM	-	-	-	-	0.12	0.12	-
CAFE	0.14	0.12	0.13	0.16	0.23	0.24	0.28
GDAS							
CF_{Total}	-0.13	-0.14	-0.19	-0.27	-0.43	-0.48	-0.51
CF_{Low}	-0.18	-0.19	-0.23	-0.30	-0.43	-0.48	-0.47
DSWF	0.25	0.25	0.41	0.66	0.69	0.71	0.69
PBLH	-0.28	-0.29	-0.30	-0.32	-0.37	-0.39	-0.35
Precip.	-	-	-	-	-	-0.17	-0.26
SST	0.26	0.29	0.30	0.34	0.42	0.46	0.49
U	-0.25	-0.28	-0.34	-0.41	-0.50	-0.53	-0.56

Table S10. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to DMS (Figure 4c) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.59	0.56	0.60	0.60	0.60	0.58	0.48
CHL _{NN}	0.67	0.65	0.66	0.64	0.66	0.67	0.64
CHL _{OC5}	0.58	0.60	0.65	0.65	0.65	0.63	0.59
POC	0.55	0.46	0.57	0.53	0.26	0.17	0.17
PIC	0.60	0.52	0.53	0.48	0.23	0.13	-
CDM	0.50	0.49	0.57	0.55	0.46	0.41	0.34
ZEU	-0.35	-0.35	-0.37	-0.34	-0.33	-0.32	-0.29
ZHL	-0.34	-0.34	-0.35	-0.32	-0.31	-0.30	-0.28
NPP Model							
CbPM	0.37	0.31	0.28	0.22	-	-	-
VGPM _{EPPLEY}	0.38	0.51	0.51	0.50	0.57	0.60	0.60
VGPM	0.37	0.50	0.49	0.47	0.54	0.59	0.60
CAFE	0.64	0.66	0.66	0.64	0.66	0.68	0.71
GDAS							
CF _{Total}	0.13	0.17	0.14	0.13	0.13	0.15	0.14
CF _{Low}	0.19	0.26	0.24	0.28	0.26	0.24	0.17
DSWF	0.16	0.14	0.23	0.42	0.40	0.40	0.45
PBLH	-0.19	-0.18	-0.25	-0.31	-0.32	-0.29	-0.41
Precip.	-	0.37	-	-	-0.17	-0.16	-
SST	-0.57	-0.52	-0.52	-0.48	-0.36	-0.27	-0.15
U	-	-	-	-	-	0.15	-

Table S11. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to $N_{<100\text{nm}}$ (Figure 4d) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.15	0.17	0.20	0.22	0.24	0.25	0.27
CHL_{NN}	0.28	0.29	0.29	0.25	0.26	0.25	0.22
CHL_{LOC5}	0.28	0.25	0.26	0.24	0.26	0.27	0.27
POC	-	-	-	0.11	0.10	0.11	0.12
PIC	-	-	-	-	-	-0.10	-0.17
CDM	0.24	0.22	0.23	0.23	0.23	0.21	0.14
ZEU	-0.19	-0.17	-0.17	-0.15	-0.13	-0.11	-
ZHL	-0.17	-0.16	-0.16	-0.14	-0.13	-0.10	-
NPP Model							
CbPM	0.11	0.14	0.14	0.21	0.26	0.30	0.30
VGPM_{EPPLEY}	0.44	0.39	0.44	0.46	0.46	0.45	0.45
VGPM	0.43	0.39	0.44	0.45	0.45	0.44	0.42
CAFE	0.41	0.38	0.40	0.41	0.42	0.39	0.37
GDAS							
CF_{Total}	-	-	-	-	-	-	-
CF_{Low}	-	-	-0.11	-0.10	-	-	-0.11
DSWF	-	0.10	0.24	0.31	0.32	0.34	0.39
PBLH	-0.22	-0.21	-0.24	-0.29	-0.32	-0.34	-0.32
Precip.	-	-	-0.23	-0.24	-	-	-
SST	-	-	-	-	-	-	0.12
U	-0.11	-0.13	-0.20	-0.29	-0.24	-0.22	-0.19

Table S12. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to $N_{>100nm}$ (Figure 4e) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.16	0.22	0.24	0.24	0.23	0.19	0.13
CHL_{NN}	0.23	0.22	0.22	0.21	0.22	0.20	0.15
CHL_{OC5}	0.27	0.26	0.28	0.25	0.22	0.18	0.11
POC	0.13	0.14	0.17	-	-	-	-
PIC	0.22	0.19	0.19	0.15	-	-	-
CDM	0.19	0.22	0.24	0.21	0.14	-	-
ZEU	0.18	0.17	0.18	0.22	0.22	0.25	0.31
ZHL	0.20	0.19	0.20	0.24	0.24	0.27	0.32
NPP Model							
CbPM	0.29	0.36	0.38	0.40	0.44	0.46	0.48
VGPM_{EPPLEY}	0.33	0.36	0.37	0.39	0.42	0.42	0.42
VGPM	0.29	0.31	0.32	0.33	0.36	0.35	0.34
CAFE	0.31	0.32	0.34	0.37	0.43	0.44	0.46
GDAS							
CF_{Total}	-	-	-	-0.11	-0.29	-0.29	-0.35
CF_{Low}	-	-0.10	-0.14	-0.19	-0.27	-0.26	-0.28
DSWF	0.27	0.30	0.46	0.67	0.71	0.71	0.70
PBLH	-0.24	-0.22	-0.25	-0.28	-0.31	-0.33	-0.34
Precip.	-	-	-	-	-	-	-0.17
SST	-	0.10	0.10	0.16	0.25	0.29	0.32
U	-	-	-0.15	-0.26	-0.34	-0.37	-0.42

Table S13. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to N_{PMA} (Figure 4f) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.20	0.25	0.29	0.40	0.46	0.46	0.48
CHL_{NN}	0.28	0.27	0.32	0.43	0.48	0.49	0.50
CHL_{OC5}	0.30	0.32	0.40	0.49	0.49	0.49	0.50
POC	0.18	0.20	0.24	0.30	0.30	0.26	0.35
PIC	0.40	0.34	0.42	0.37	0.26	0.19	-
CDM	0.23	0.25	0.31	0.43	0.42	0.40	0.40
ZEU	-0.25	-0.25	-0.26	-0.26	-0.27	-0.30	-0.35
ZHL	-0.24	-0.24	-0.25	-0.25	-0.26	-0.29	-0.35
NPP Model							
CbPM	0.28	0.45	0.40	0.26	0.23	0.20	0.19
VGPM_{EPPLEY}	0.31	0.33	0.32	0.37	0.37	0.40	0.47
VGPM	0.33	0.34	0.32	0.36	0.36	0.40	0.48
CAFE	0.37	0.36	0.35	0.39	0.42	0.46	0.47
GDAS							
CF_{Total}	-	-	-	0.15	0.14	0.19	0.19
CF_{Low}	0.18	-	0.16	0.19	0.19	0.26	0.24
DSWF	-	-	-	-	0.15	0.14	0.16
PBLH	0.25	0.23	0.19	-	-	-	-
Precip.	-	-	-	-	-	-	-
SST	-0.29	-0.30	-0.31	-0.34	-0.33	-0.32	-0.30
U	0.59	0.55	0.54	0.44	0.27	0.24	0.23

Table S14. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to black carbon mass (Figure S4a) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	-	-	-	-	-	-	-
CHL _{NN}	-	-	-	-	-	-	-
CHL _{LOC5}	-	-	-	-	-	-	-0.10
POC	-	-	-0.09	-0.14	-0.14	-0.16	-0.18
PIC	-	-	-	-	0.09	0.10	0.11
CDM	-	-	-	-	-	-	-0.13
ZEU	0.11	0.12	0.12	0.12	0.12	0.16	0.22
ZHL	0.13	0.14	0.14	0.13	0.13	0.16	0.22
NPP Model							
CbPM	-	0.17	0.20	0.26	0.34	0.34	0.39
VGPM _{EPPLEY}	0.17	0.12	0.15	0.22	0.26	0.24	0.23
VGPM	0.14	0.10	0.13	0.19	0.21	0.17	0.14
CAFE	0.11	0.10	0.12	0.17	0.23	0.23	0.23
GDAS							
CF _{Total}	-	-	-	-0.12	-0.21	-0.23	-0.31
CF _{Low}	-	-	-	-0.11	-0.19	-0.21	-0.25
DSWF	-	0.09	0.17	0.39	0.44	0.46	0.47
PBLH	-	-	-	-	-0.12	-0.15	-0.20
Precip.	-	-	-	-	-	-0.11	-0.22
SST	0.18	0.19	0.19	0.22	0.25	0.25	0.22
U	-0.17	-0.15	-0.19	-0.28	-0.34	-0.40	-0.48

Table S15. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to nitrate mass (Figure S4b) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.20	0.21	0.20	0.21	0.26	0.25	0.19
CHL_{NN}	0.29	0.26	0.23	0.22	0.26	0.25	0.22
CHL_{LOC5}	0.29	0.26	0.28	0.29	0.30	0.28	0.23
POC	0.21	0.19	0.22	0.20	0.16	0.13	0.09
PIC	0.18	-	-	0.13	0.09	-	-
CDM	0.30	0.28	0.29	0.30	0.27	0.23	0.13
ZEU	-0.18	-0.18	-0.17	-0.17	-0.16	-0.13	-
ZHL	-0.17	-0.16	-0.16	-0.16	-0.15	-0.12	-
NPP Model							
CbPM	0.25	0.32	0.34	0.40	0.43	0.41	0.38
VGPM_{EPPLEY}	0.34	0.33	0.33	0.39	0.47	0.48	0.46
VGPM	0.33	0.31	0.32	0.38	0.44	0.45	0.41
CAFE	0.29	0.31	0.31	0.34	0.42	0.43	0.43
GDAS							
CF_{Total}	0.18	0.19	0.17	0.13	-	-	-
CF_{Low}	0.22	0.19	0.16	0.13	-	-	-
DSWF	-	-	0.14	0.27	0.34	0.38	0.43
PBLH	-0.30	-0.28	-0.30	-0.33	-0.36	-0.36	-0.41
Precip.	-	-	-	-0.22	-	-	-0.14
SST	-0.16	-0.14	-0.14	-0.10	-	-	-
U	-0.13	-0.12	-0.16	-0.21	-0.18	-0.16	-0.23

Table S16. Pearson's Coefficients (r) of satellite measurements, modeled NPP and reanalysis meteorological variables weighted by FLEXPART back trajectories from 0-5 days compared to Radon (Figure S4c) measured on the R/V Atlantis. Bold explanatory variables are included in main text. Descriptions of explanatory variables are in Table S1. Values are excluded when $p > 0.05$. Weak correlations ($0.25 \leq |r| < 0.50$) are highlighted in red, moderate correlations ($0.50 \leq |r| < 0.80$) are highlighted in yellow, and strong correlations ($|r| \geq 0.80$) are highlighted in green.

	0-Hours	6-Hours	12-Hours	1-Day	2-Days	3-Days	5-Days
Satellite Measurements							
CHL_{GSM}	0.09	0.13	0.14	0.15	0.20	0.23	0.22
CHL_{NN}	0.18	0.26	0.23	0.20	0.21	0.24	0.23
CHL_{OC5}	0.15	0.19	0.19	0.19	0.23	0.26	0.22
POC	-	0.10	0.11	0.13	0.19	0.22	0.21
PIC	0.15	0.11	0.09	-	-	-	-
CDM	0.17	0.21	0.21	0.23	0.25	0.26	0.20
ZEU	-	-0.11	-0.10	-0.11	-0.13	-0.13	-0.08
ZHL	-	-0.09	-0.09	-0.10	-0.11	-0.11	-
NPP Model							
CbPM	0.31	0.37	0.39	0.39	0.34	0.31	0.29
VGPM_{EPPLEY}	0.19	0.21	0.21	0.22	0.27	0.30	0.32
VGPM	0.18	0.20	0.20	0.21	0.25	0.27	0.28
CAFE	0.27	0.32	0.31	0.29	0.30	0.33	0.35
GDAS							
CF_{Total}	0.17	0.16	0.13	-	-	-	-0.11
CF_{Low}	0.09	0.17	0.16	0.13	-	-	-
DSWF	0.18	0.16	0.19	0.25	0.26	0.27	0.31
PBLH	-	-	-0.10	-0.18	-0.24	-0.29	-0.38
Precip.	-	-	-	-	-	-	-
SST	-0.10	-0.09	-0.10	-0.11	-0.09	-	-
U	-	-	-	-0.11	-0.10	-0.11	-0.17

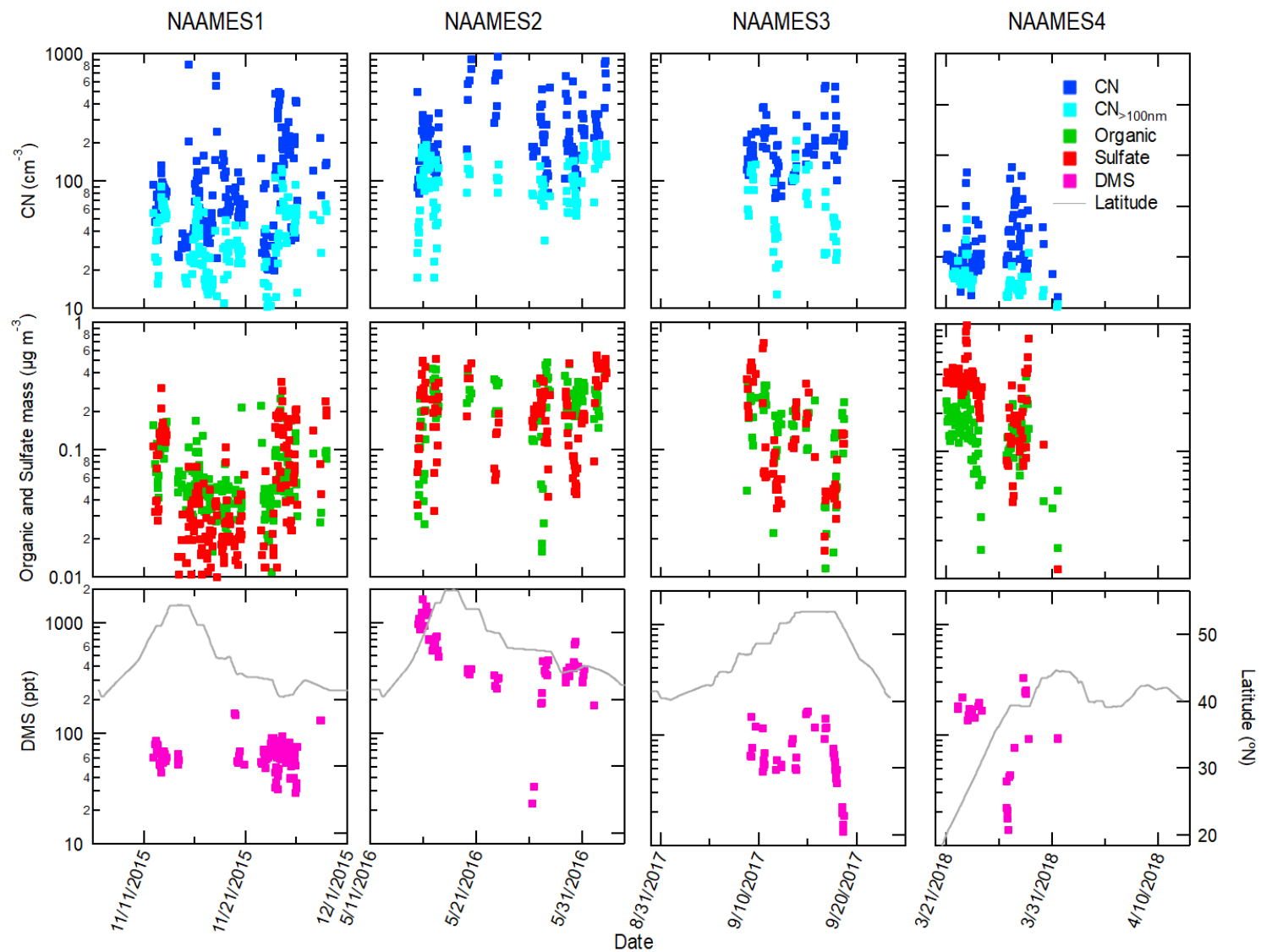


Figure S1. Time series of hourly CN and $CN_{>100nm}$, non-refractory organic and sulfate concentration, DMS concentration and *R/V Atlantis* latitude for each NAAMES campaign. Data has been filtered for clean marine conditions (see section 2.6).

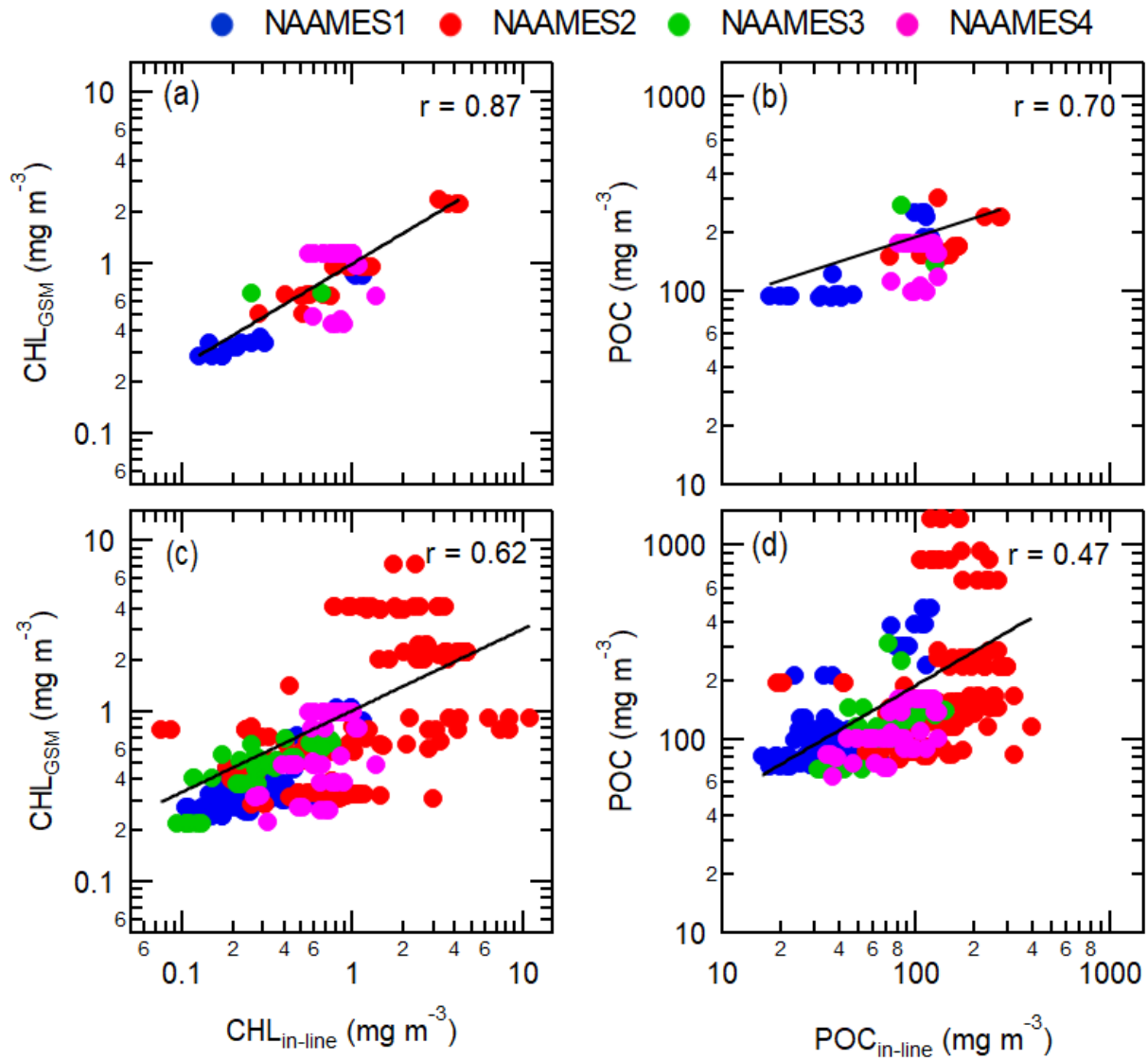


Figure S2. Hourly in-situ sea water particulate organic carbon (POC_{in-line}) and chlorophyll-a (CHL_{in-line}) compared to (a, b) day averaged and (c, d) 8-day averaged 100 km resolution OceanColour merged satellite CHL_{GSM} and POC. Pearson's coefficients (r) are included for each plot along with best fit lines shown as black lines.

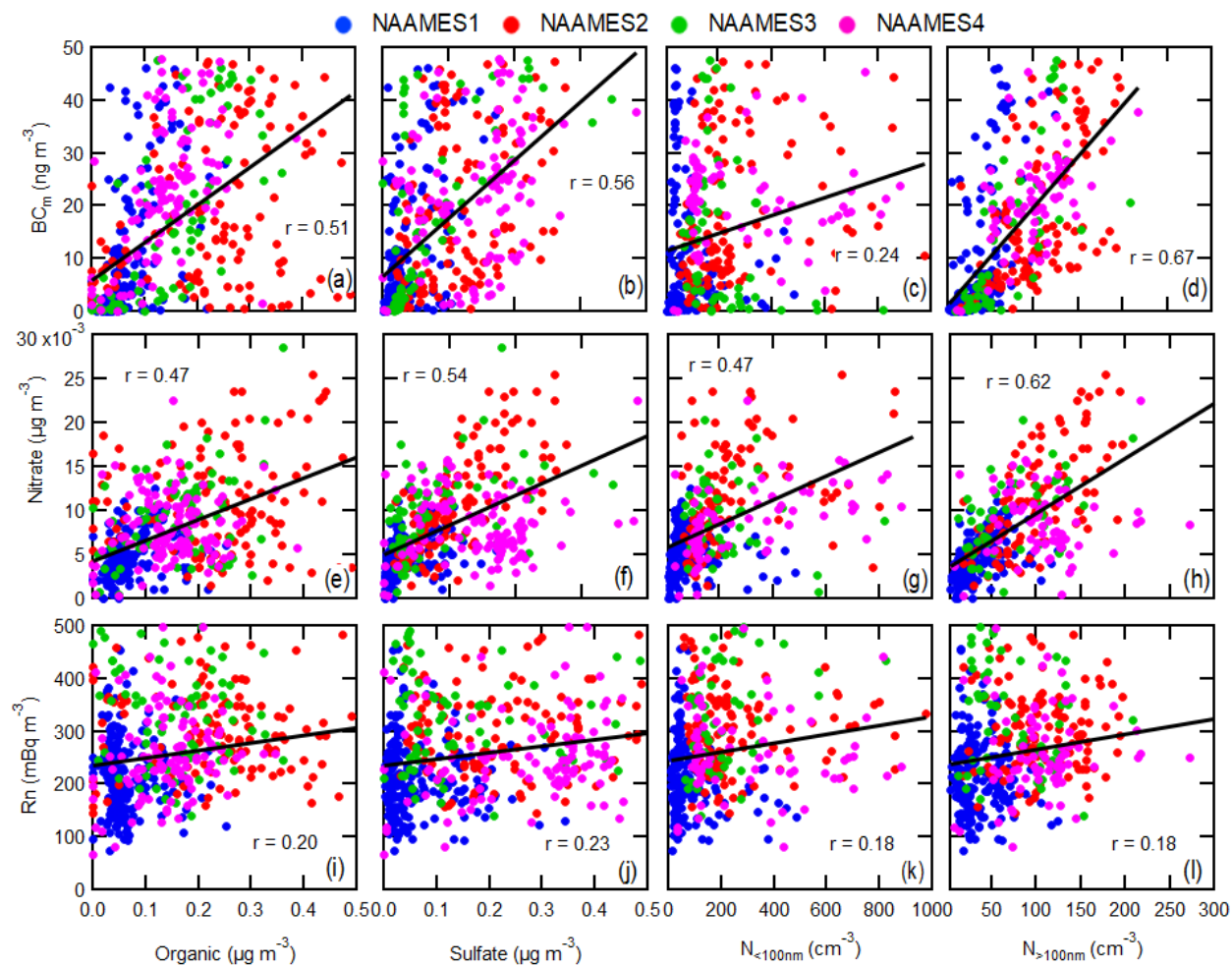


Figure S3. Measured black carbon mass, nitrate mass and radon concentration are compared to measured organic and sulfate aerosol mass and $N_{<100nm}$ and $N_{>100nm}$. Pearson's coefficients (r) are included for each plot along with best fit lines shown as black lines.

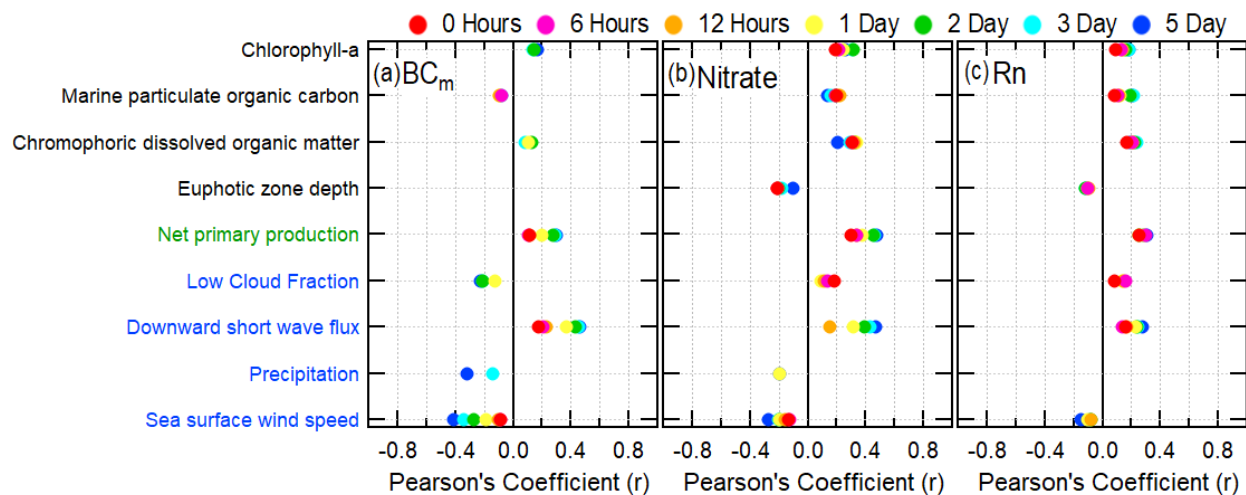


Figure S4. Pearson's correlation coefficients between FLEXPART-residence-time-weighted explanatory variables and the following atmospheric measurement variables: (a) black carbon mass, (b) nitrate aerosol mass and (c) radon concentrations. The explanatory variables listed on the ordinate axis are colored to denote satellite-derived parameters (black text), CAFE ocean biology model parameters (green text), and atmospheric model reanalysis products (blue text). Pearson's correlation coefficients are only included for statistically significant cases where $p < 0.05$.

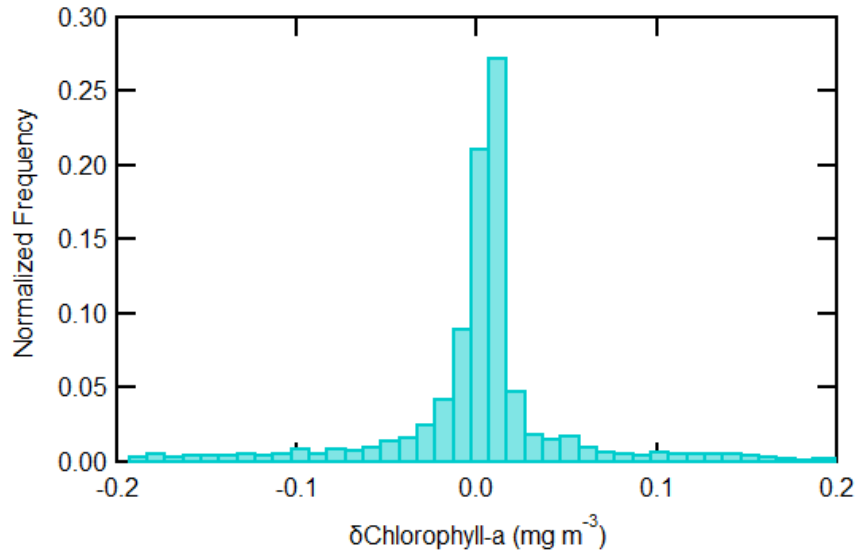


Figure S5. The normalized distribution of the difference in Chlorophyll-a between two consecutive satellite 8-day averages (24 May 2016 – 1 Jun 2016, shown in Figure 3b, and 1 Jun 2016 and 9 Jun 2016). The distribution includes the difference in chlorophyll-a from every $1^\circ \times 1^\circ$ cell between 0° W and 90° W, and 10° N and 70° N, excluding cells on continents or with missing values.

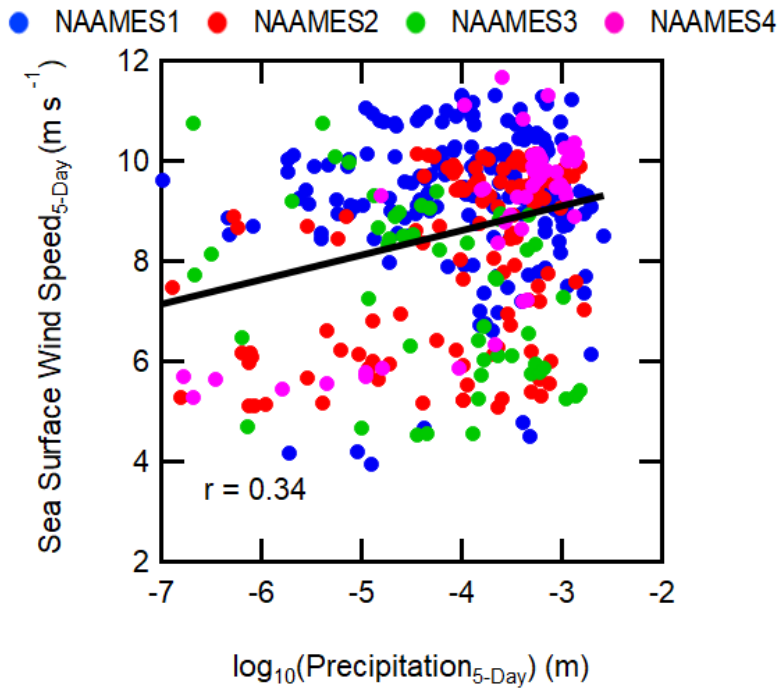


Figure S6. 5-day FLEXPART-residence-time-weighted wind speed is compared to the base 10 logarithm of the 5-day FLEXPART-residence-time-weighted 6-hour total precipitation. Pearson's coefficients (r) are included for each plot along with best fit lines shown as black lines.