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Partitioning of carbon export in the euphotic zone of the oligotrophic South China Sea

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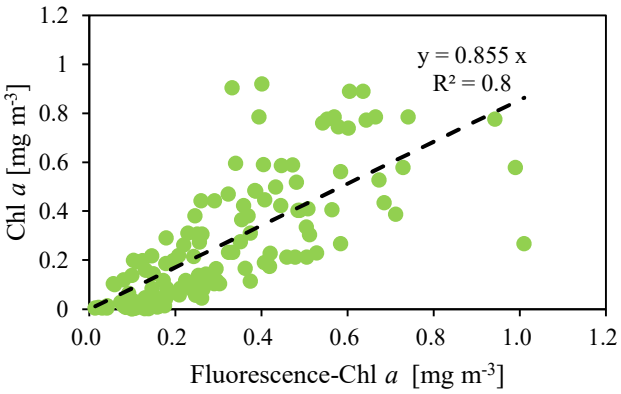

Figure S1: Relationship between bottle-derived Chl *a* (Y-axis) and CTD fluorescence-based Chl *a* (X-axis).

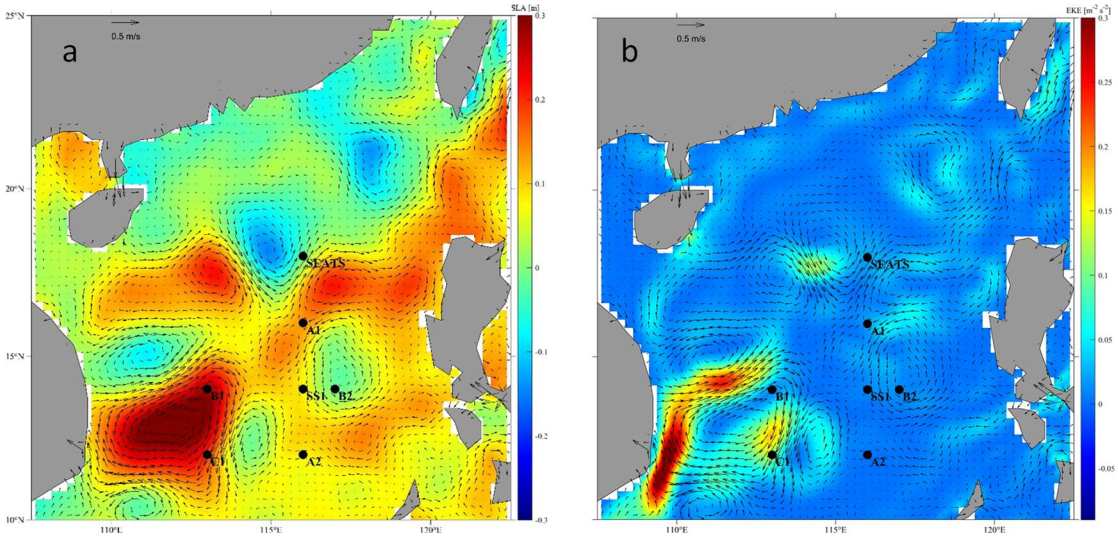

Figure S2: Surface distribution of monthly sea level anomalies (SLA, a) and eddy kinetic energy (EKE, b) with water currents during the cruise determined from modeling work. The SLA and EKE indicated stations SEATS, A1 and C1 experienced impacts of the mesoscale eddies.

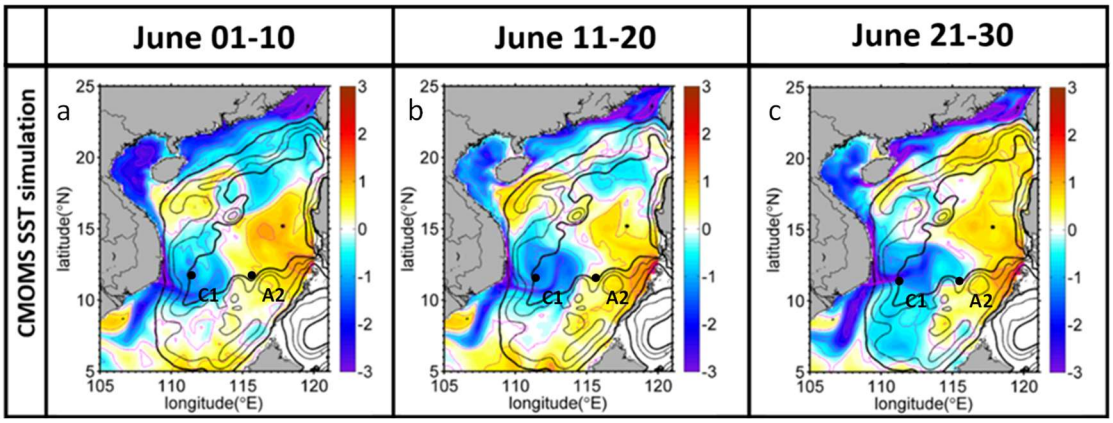

Figure S3: Climatological sea surface temperature anomalies in the SCS during June from the China Sea Multi-scale Ocean Modeling System (CMOMS). Stations C1 and A2, impacted by cold water sourced from the southwest SCS basin during the survey, are shown.

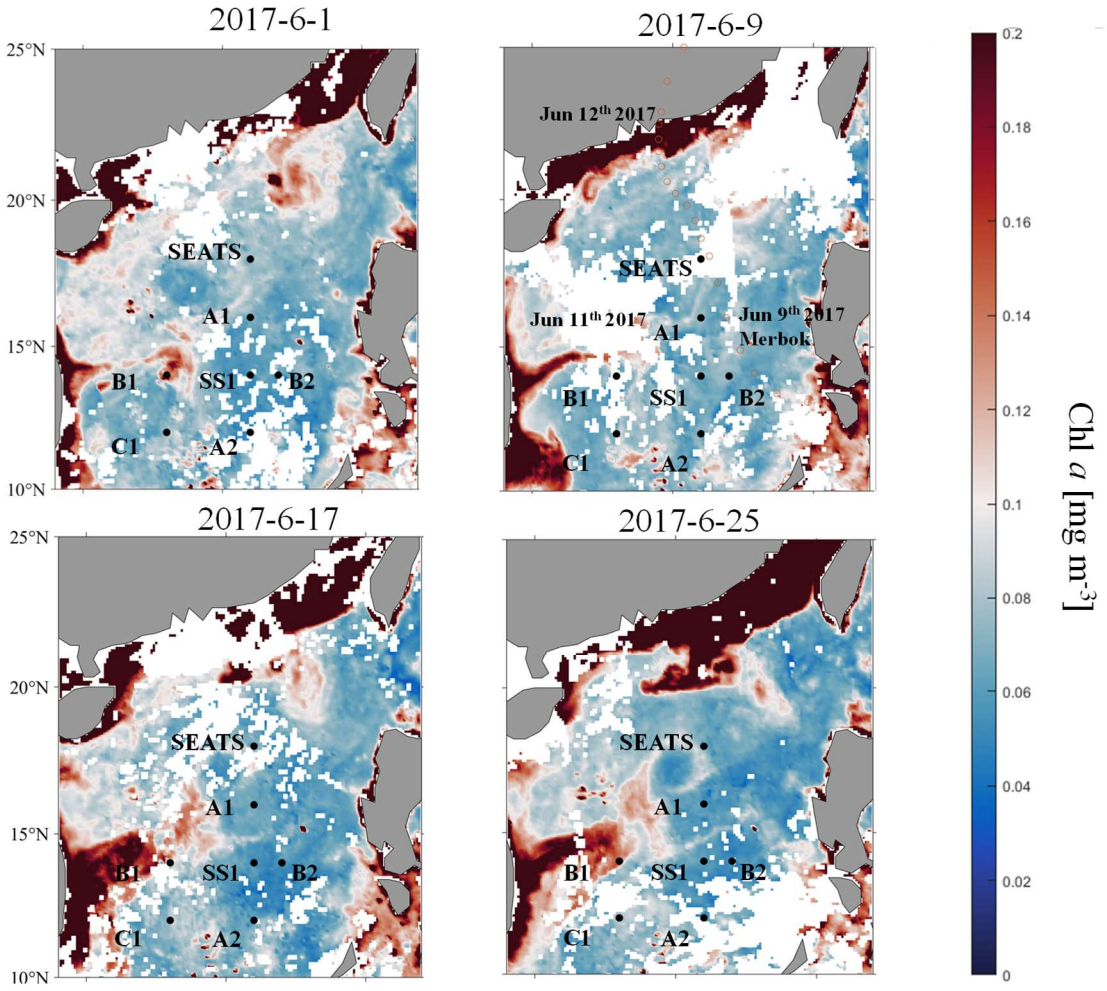

Figure S4: Satellite-derived the 8-day averaged surface Chl *a* in the SCS basin during June 2017, showing that sea surface Chl *a* concentration was little enhanced during our ship-based sampling period. Note that Station A1 was visited after typhoon Merbok, which was generated on June 9, 2017 at 13.1ºN, 119.8ºE in the southern South China Sea. Merbok landed on June 12 at 27.5ºN, 117.3ºE.

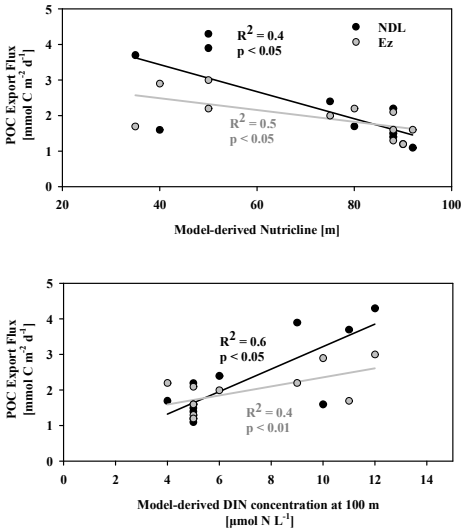

Figure S5: Relationship between POC export fluxes at the NDL base (black dots) and Ez base (grey dots) vs. the model-derived depth of the top of the nutricline (top) and DIN concentration in the subsurface water at 100 m (bottom).

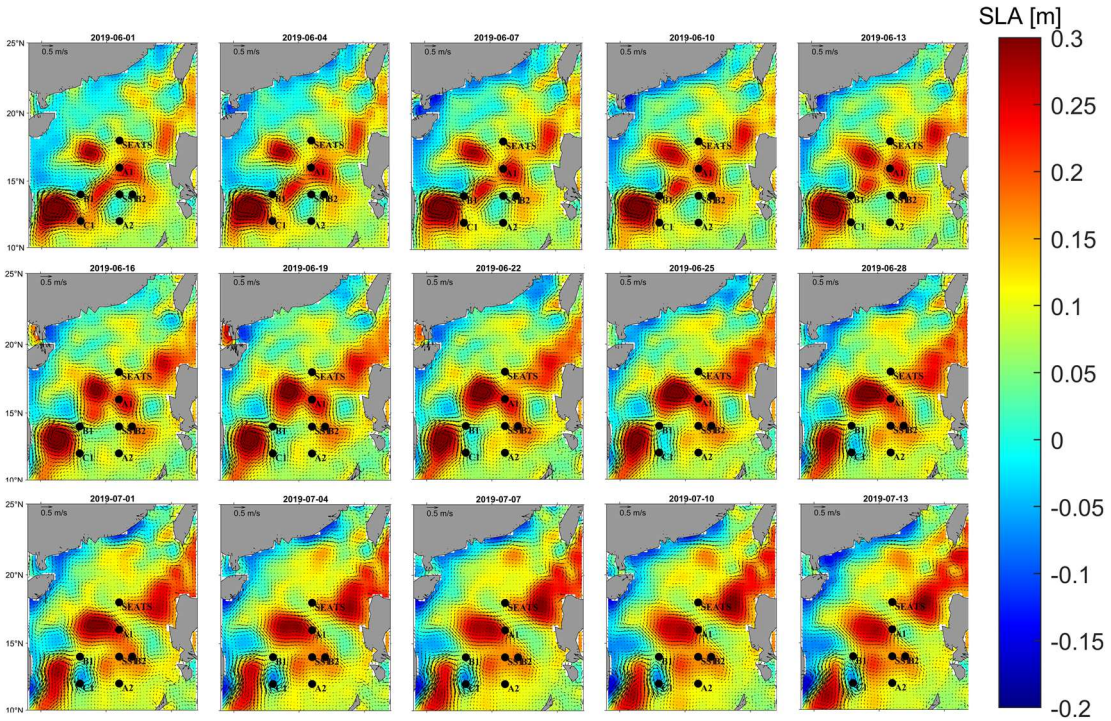

Figure S6: Surface distributions of monthly sea level anomalies (SLA) during the summer of 2019 with water currents from modeling work. The SLA show that Station SS1 was impacted by mesoscale processes for at least one week before our visit (July 13th, 2019).

Table S1: The list of total and particulate ^{234}Th activity and POC concentration at sampling depth at stations

Station	Latitude	Longitude	Depth	Tot. ^{234}Th	Tot. ^{234}Th error	POC	Part. ^{234}Th	Part. ^{234}Th error
	degree (N)	degree (E)	m	dpm L^{-1}	dpm L^{-1}	μmol L^{-1}	dpm L^{-1}	dpm L^{-1}
SEATS	18	116	130	2.55	0.06	0.6	0.13	0.01
SEATS	18	116	100	2.47	0.06	0.8	0.20	0.01
SEATS	18	116	95	2.73	0.07	2.0	0.32	0.01
SEATS	18	116	85	2.41	0.05	2.1	0.39	0.01
SEATS	18	116	75	2.29	0.06	2.4	0.47	0.01
SEATS	18	116	65	2.30	0.06	2.2	0.43	0.01
SEATS	18	116	55	2.03	0.05	1.8	0.41	0.01
SEATS	18	116	45	2.22	0.06	1.3	0.30	0.01
SEATS	18	116	35	2.13	0.05	1.4	0.16	0.01
SEATS	18	116	25	2.30	0.05	1.6	0.12	0.01
SEATS	18	116	15	2.03	0.05	1.2	0.15	0.01
SEATS	18	116	5	2.27	0.05	1.1	0.11	0.01
A1	16	116	100	2.59	0.05	1.1	0.26	0.01
A1	16	116	75	2.47	0.05	2.5	0.26	0.01
A1	16	116	50	2.17	0.05	1.8	0.29	0.01
A1	16	116	25	1.70	0.25	1.3	0.15	0.01
A1	16	116	5	2.34	0.06	1.3	0.11	0.01
SS1	14	116	125	2.44	0.05	0.8	0.25	0.01
SS1	14	116	110	2.42	0.10	0.9	0.27	0.01
SS1	14	116	100	2.39	0.06	1.3	0.42	0.01
SS1	14	116	95	2.50	0.06	1.3	0.41	0.01
SS1	14	116	85	2.32	0.06	1.7	0.41	0.01
SS1	14	116	75	1.98	0.06	1.3	0.30	0.01
SS1	14	116	65	2.06	0.05	1.5	0.35	0.01
SS1	14	116	55	2.35	0.05	1.4	0.23	0.01
SS1	14	116	45	2.15	0.06	0.6	0.20	0.01
SS1	14	116	35	2.04	0.05	1.3	0.14	0.01
SS1	14	116	25	2.15	0.05	1.1	0.18	0.01
SS1	14	116	15	1.99	0.05	1.2	0.17	0.01
SS1	14	116	5	2.15	0.07	1.2	0.19	0.01
H06	14.1	116	100	2.41	0.05	1.4	0.50	0.01
H06	14.1	116	75	2.05	0.05	1.5	0.42	0.01
H06	14.1	116	50	2.33	0.05	1.1	0.19	0.01
H06	14.1	116	25	2.21	0.05	1.0	0.13	0.01
H06	14.1	116	5	2.27	0.05	1.0	0.11	0.01
H08	13.9	116	100	2.39	0.05	1.4	0.30	0.01
H08	13.9	116	75	2.15	0.05	1.9	0.30	0.01
H08	13.9	116	50	2.25	0.05	1.4	0.23	0.01
H08	13.9	116	25	2.21	0.05	1.1	0.25	0.01
H08	13.9	116	5	2.27	0.05	0.9	0.16	0.01

Station	Latitude	Longitude	Depth	Tot. ^{234}Th	Tot. ^{234}Th error	POC	Part. ^{234}Th	Part. ^{234}Th error
	degree (N)	degree (E)	m	dpm L^{-1}	dpm L^{-1}	μmol L^{-1}	dpm L^{-1}	dpm L^{-1}
H01	14	116.1	100	2.45	0.05	1.8	0.53	0.01
H01	14	116.1	75	2.25	0.05	1.3	0.22	0.01
H01	14	116.1	50	2.29	0.05	1.8	0.34	0.01
H01	14	116.1	25	2.25	0.05	1.6	0.24	0.01
H01	14	116.1	5	2.10	0.05	1.3	0.15	0.01
H11	14	116.1	100	2.46	0.05	1.3	0.30	0.01
H11	14	116.1	75	2.23	0.04	1.1	0.40	0.01
H11	14	116.1	50	2.25	0.05	1.3	0.13	0.01
H11	14	116.1	25	2.29	0.05	1.0	0.08	0.01
H11	14	116.1	5	2.09	0.04	1.0	0.11	0.01
B1	14	113	100	2.44	0.05	1.4	0.23	0.01
B1	14	113	88	2.08	0.04	2.0	0.52	0.01
B1	14	113	75	2.30	0.08	1.8	0.41	0.01
B1	14	113	50	2.21	0.05	1.4	0.40	0.01
B1	14	113	25	2.24	0.04	1.2	0.08	0.01
B1	14	113	5	2.24	0.05	0.9	0.06	0.01
C1	12	113	100	2.55	0.05	0.7	0.21	0.01
C1	12	113	88	2.49	0.05	0.8	0.25	0.01
C1	12	113	75	2.38	0.04	1.9	0.30	0.01
C1	12	113	50	2.05	0.04	1.5	0.23	0.01
C1	12	113	25	2.10	0.09	1.6	0.25	0.01
C1	12	113	5	2.06	0.04	2.1	0.29	0.01
A2	12	116	100	2.63	0.05	1.1	0.21	0.01
A2	12	116	88	2.21	0.04	0.9	0.42	0.01
A2	12	116	75	2.16	0.04	1.5	0.25	0.01
A2	12	116	50	2.01	0.04	1.5	0.23	0.01
A2	12	116	25	2.18	0.04	1.2	0.09	0.01
A2	12	116	5	1.85	0.06	1.2	0.14	0.01
B2	14	117	108	2.51	0.04	1.1	0.13	0.01
B2	14	117	100	2.49	0.04	0.9	0.27	0.01
B2	14	117	75	2.24	0.04	1.3	0.15	0.01
B2	14	117	50	2.22	0.05	1.8	0.27	0.01
B2	14	117	25	2.40	0.05	1.1	0.12	0.01
B2	14	117	5	2.25	0.05	1.3	0.28	0.01