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Supplement of

Spatio-temporal distribution, photoreactivity and environmental control of dissolved organic matter in the sea-surface microlayer of the eastern marginal seas of China

Lin Yang et al.

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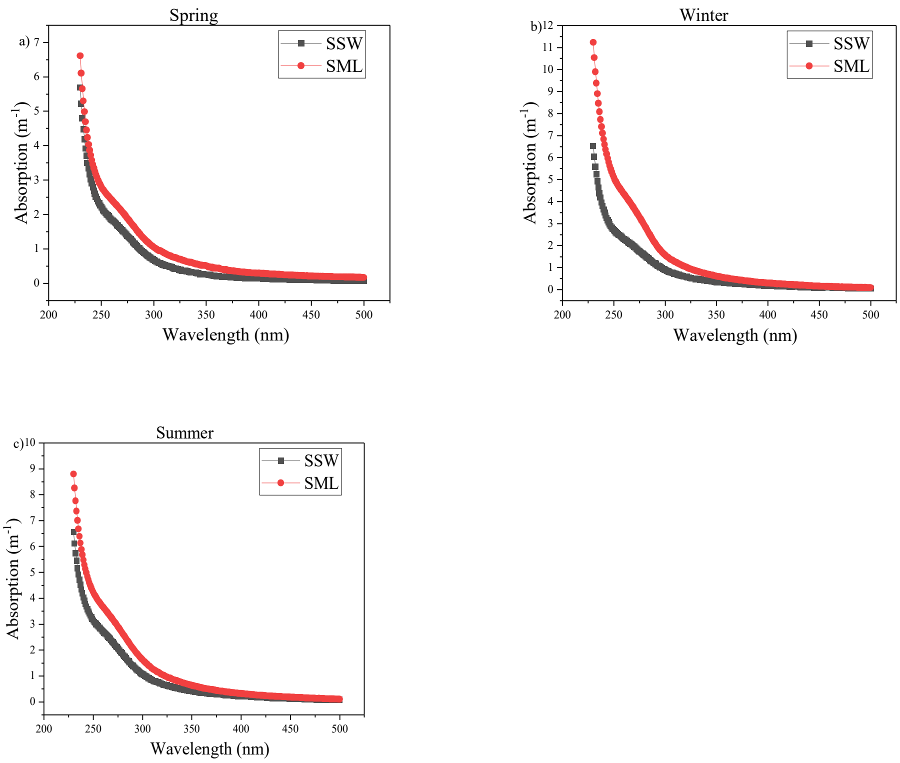
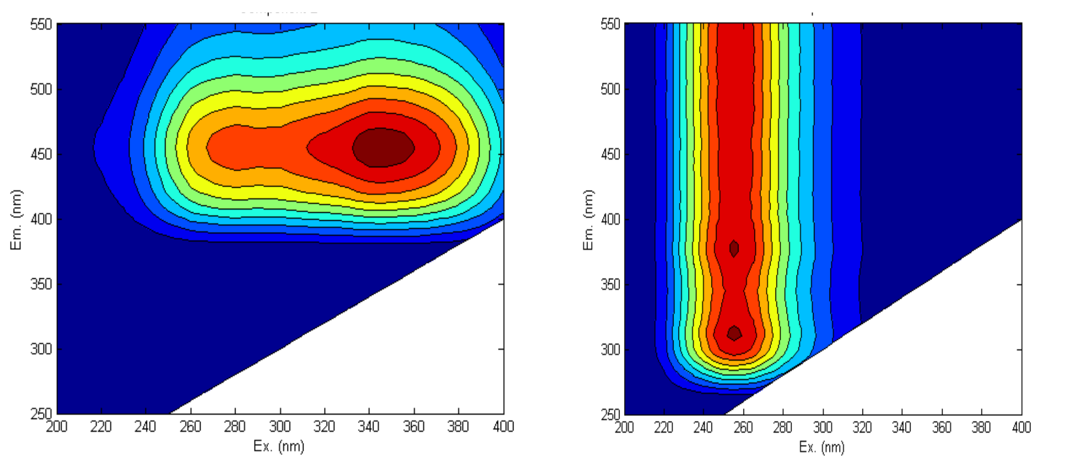


Fig. S1. Absorption spectra averaged by seawater samples between 230 to 500 nm in the SSW and SML during spring (a), winter (b), and summer (d).



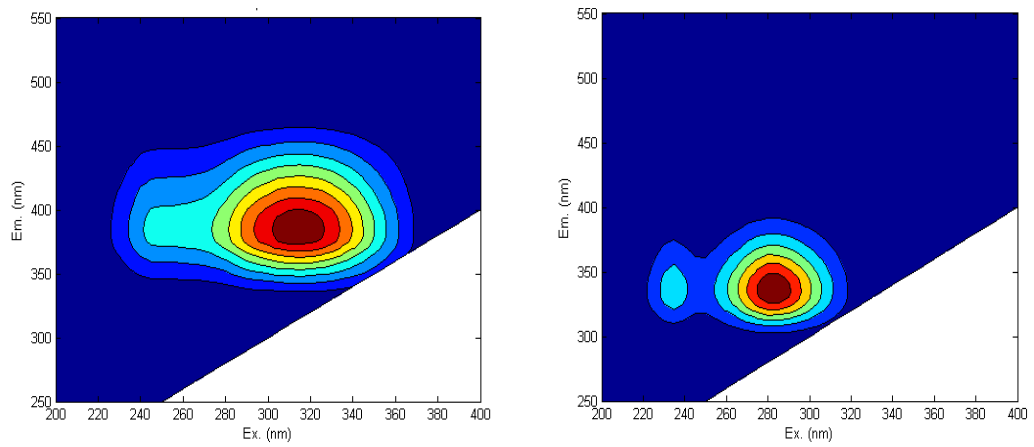
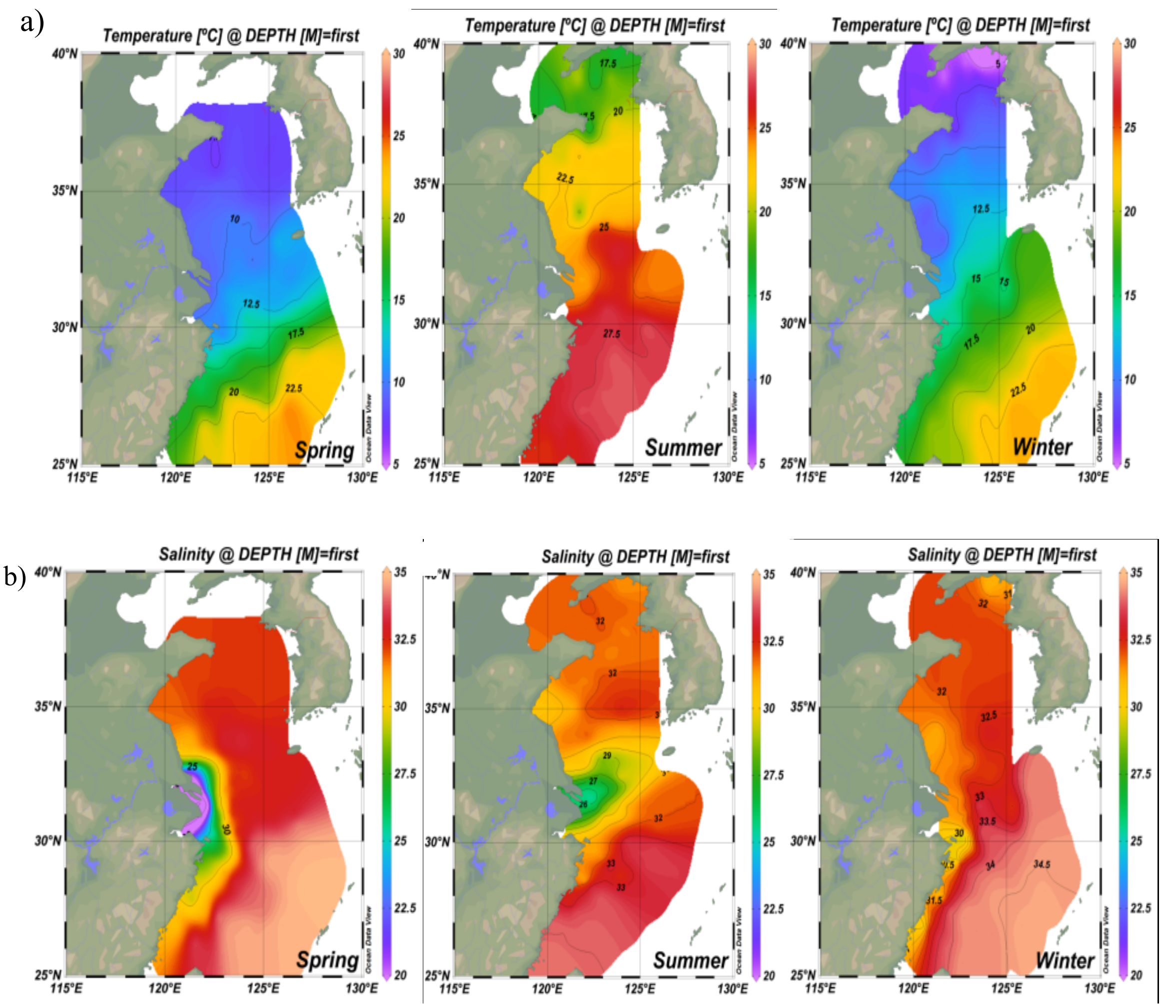
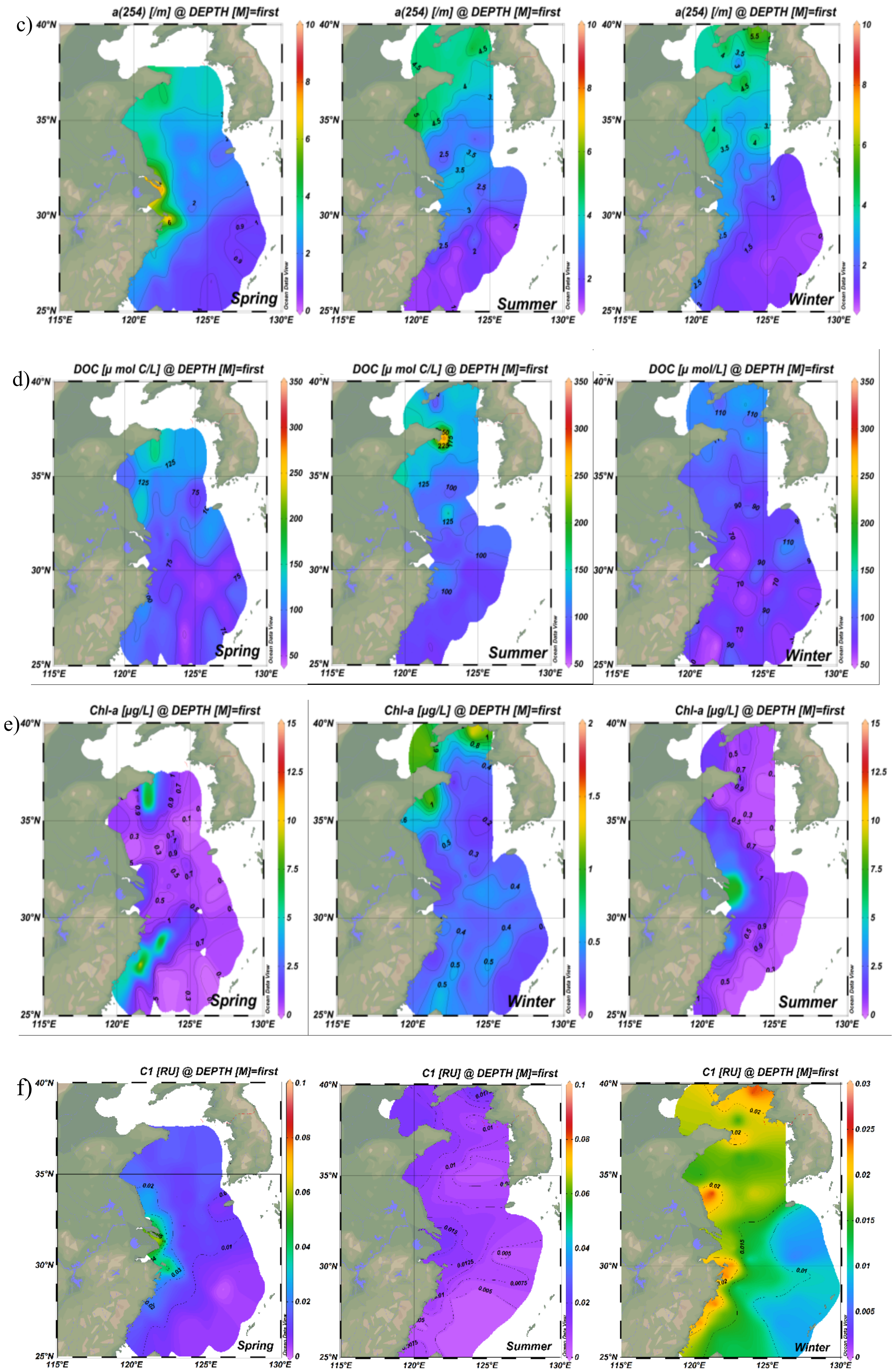
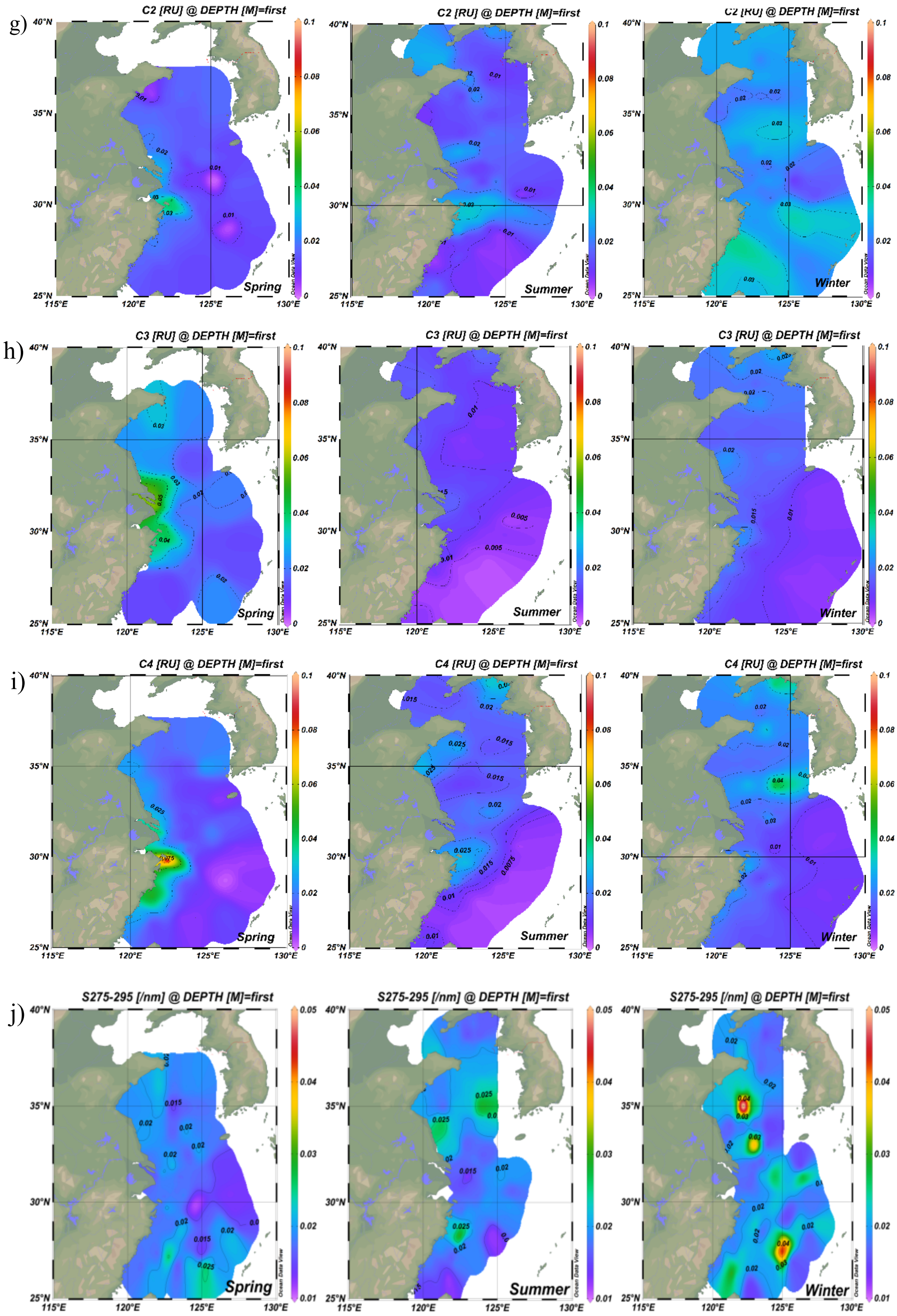


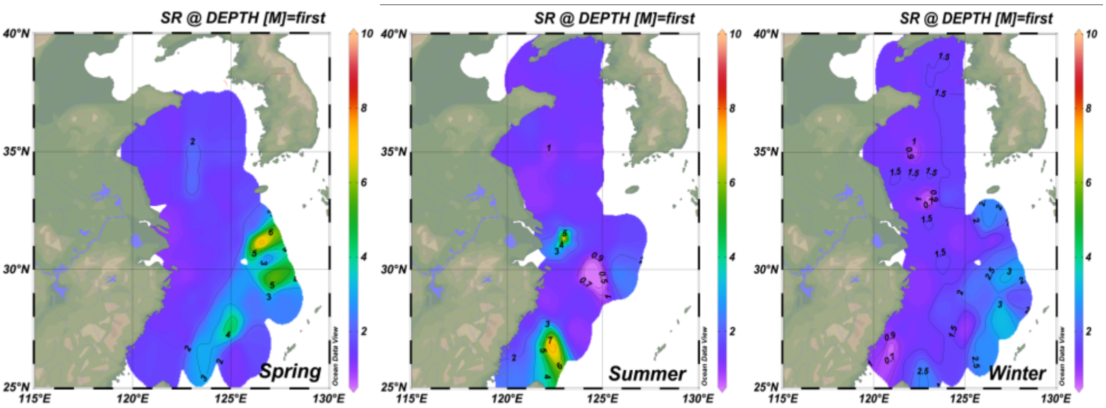
Fig. S2. Representative fluorescence excitation-emission matrix spectra (EEM) contours from samples in the SML and the SSW of the East China Sea (ECS) and the Yellow Sea (YS) during spring, summer, winter, and spring. The fluorescence intensities were quantified using Raman units (RU).




c)
a(254) [/m] @ DEPTH [M]=first
Spring
Summer
Winter
d)
DOC [μ mol C/L] @ DEPTH [M]=first
DOC [μ mol/L] @ DEPTH [M]=first
Spring
Summer
Winter
e)
Chl-a [μg/L] @ DEPTH [M]=first
Spring
Winter
Summer
f)
C1 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E
Ocean Data View


g)
C2 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
h)
C3 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
i)
C4 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
j)
S275-295 [/nm] @ DEPTH [M]=first
Spring
Summer
Winter
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E

k)



l)

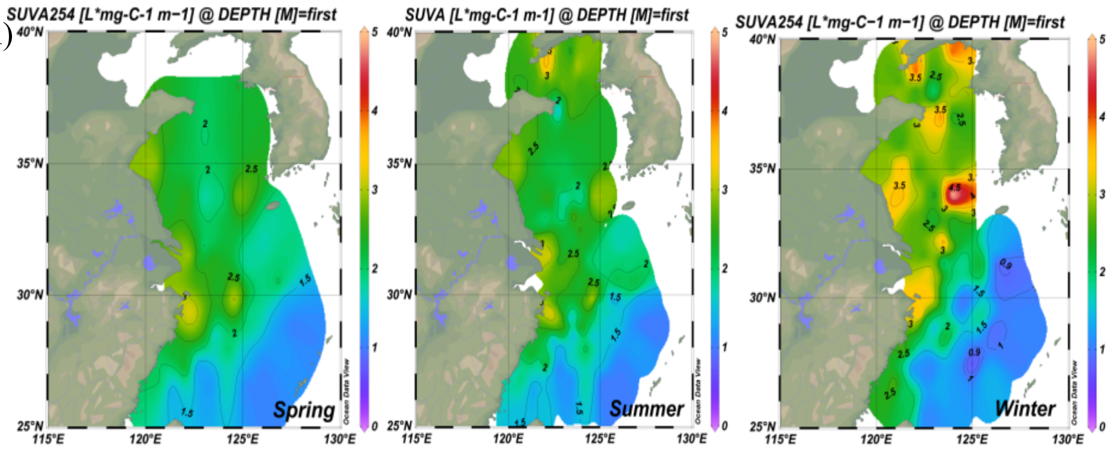
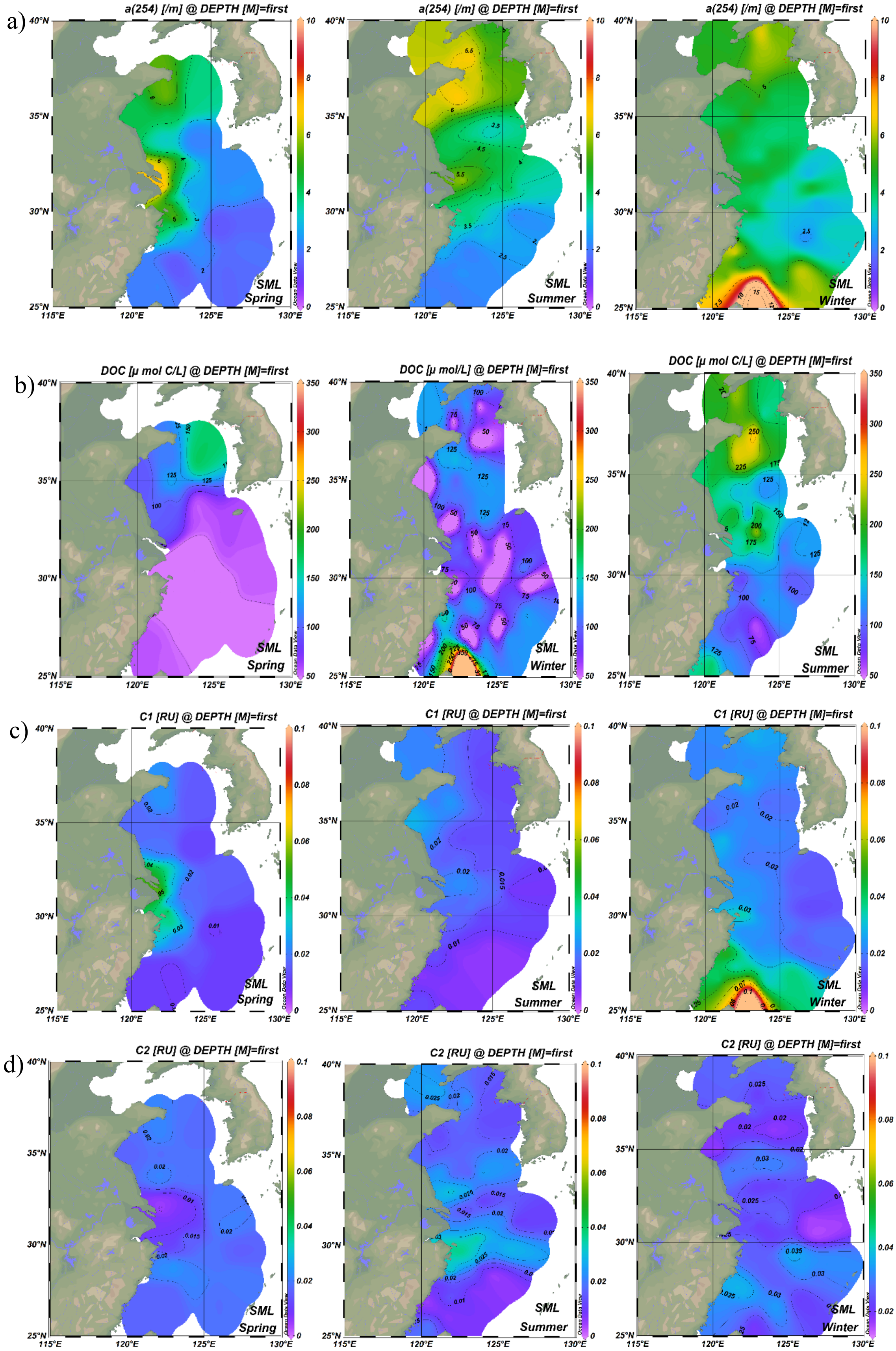
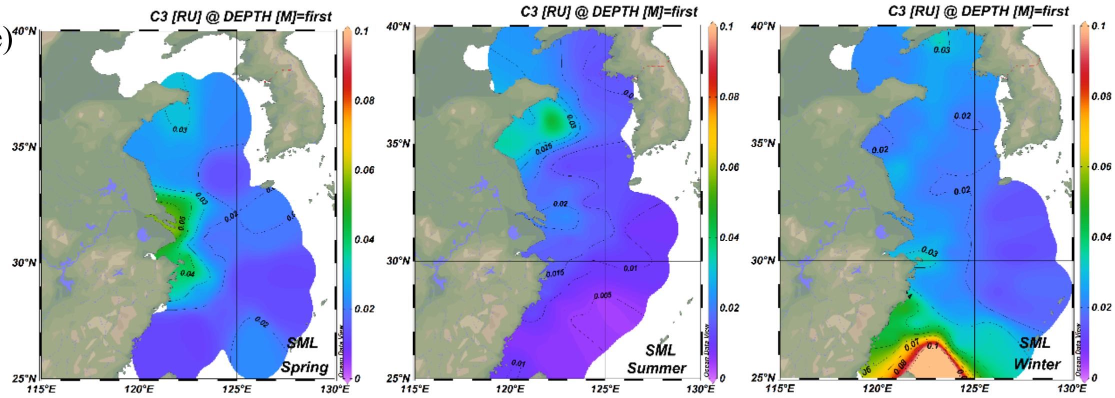


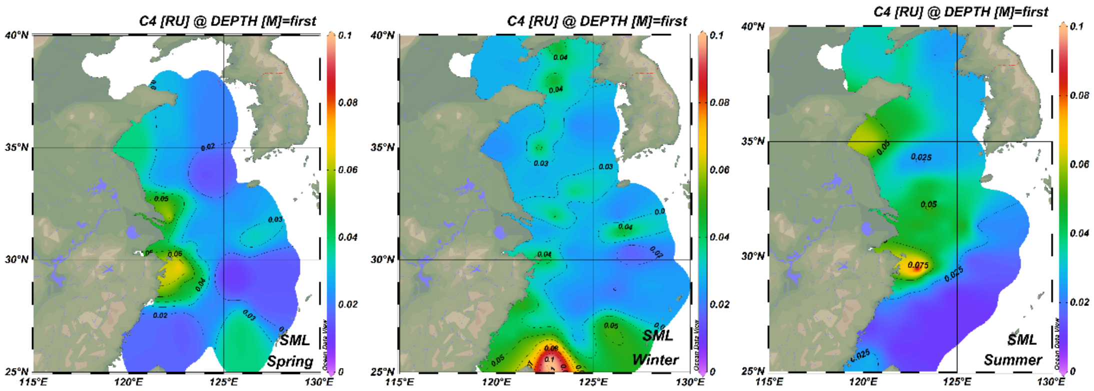
Fig. S3. Distributions of temperature, salinity, CDOM, DOC, Chl-*a*, four fluorescence components, $S_{275-295}$, S_R and $SUVA_{254}$ in the subsurface water during spring, summer, and winter. (a) Temperature, b) Salinity, c) a(254), d) DOC, e) Chl-*a*, f) C1, g) C2, h) C3, i) C4, j) $S_{275-295}$, k) S_R and l) $SUVA_{254}$)


a)
a(254) [/m] @ DEPTH [M]=first
SML
Spring
SML
Summer
SML
Winter
b)
DOC [μ mol C/L] @ DEPTH [M]=first
DOC [μ mol/L] @ DEPTH [M]=first
SML
Spring
SML
Winter
SML
Summer
c)
C1 [RU] @ DEPTH [M]=first
SML
Spring
SML
Summer
SML
Winter
d)
C2 [RU] @ DEPTH [M]=first
SML
Spring
SML
Summer
SML
Winter
115°E
120°E
125°E
130°E
25°N
30°N
35°N
40°N

e)



f)



g)

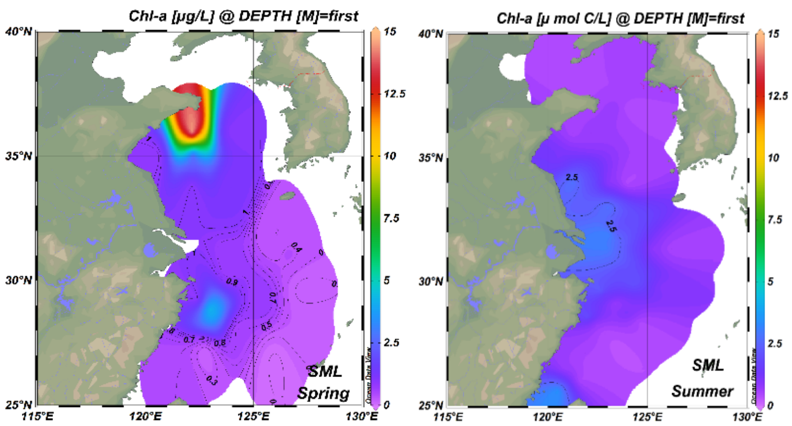
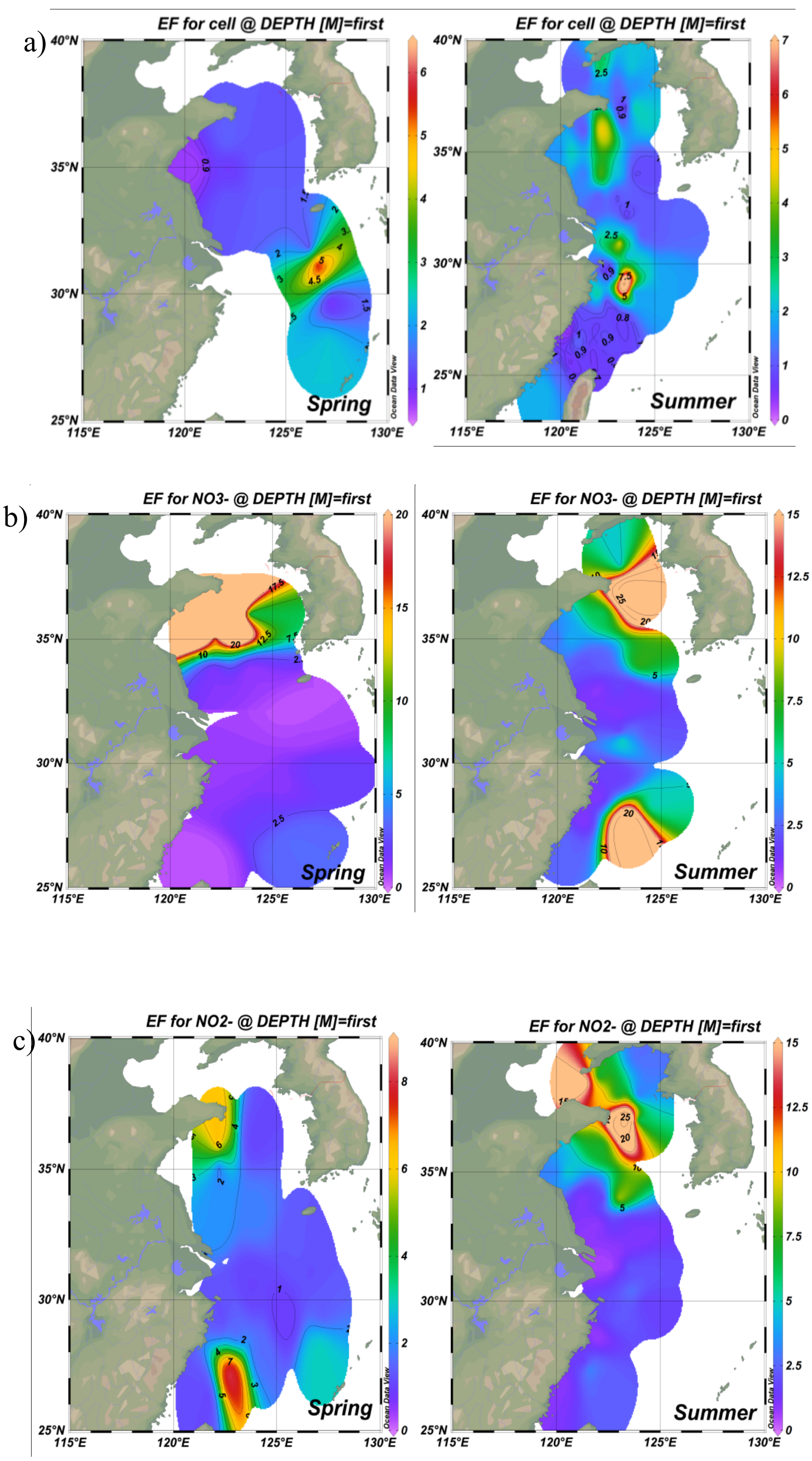


Fig. S4. Distributions of concentrations CDOM, DOC, chl-*a* and four fluorescence components in the


a)
EF for cell @ DEPTH [M]=first
Spring
EF for cell @ DEPTH [M]=first
Summer
b)
EF for NO3- @ DEPTH [M]=first
Spring
EF for NO3- @ DEPTH [M]=first
Summer
c)
EF for NO2- @ DEPTH [M]=first
Spring
EF for NO2- @ DEPTH [M]=first
Summer
Ocean Data View

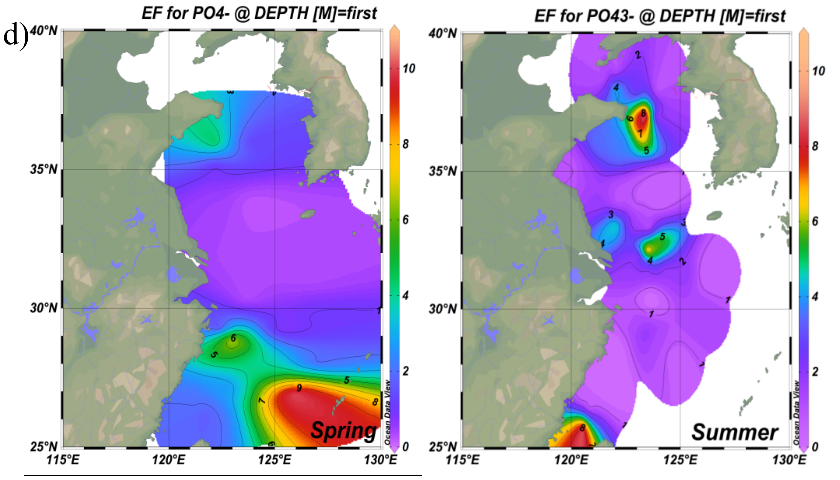
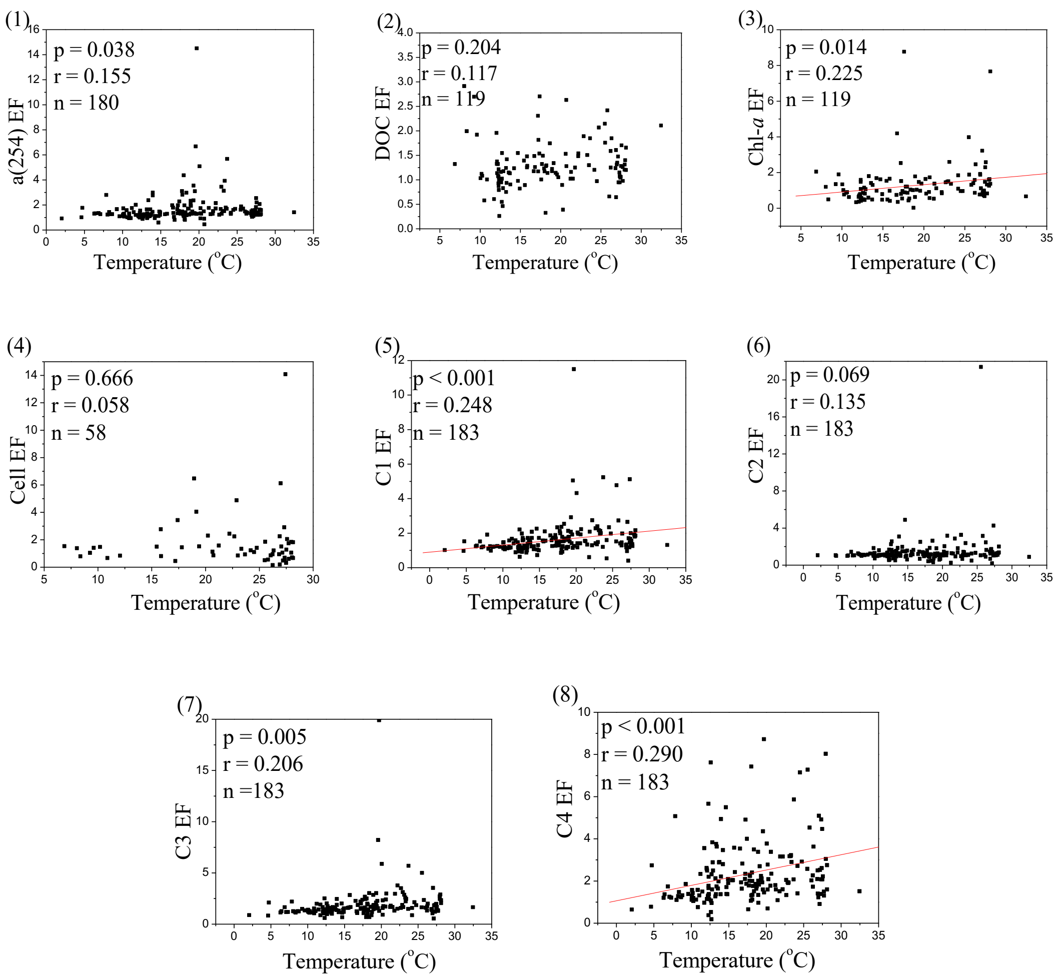


Fig. S5. Distributions of enrichment factors of bacterial abundance and nutrients in the surface microlayer water during spring, summer, and winter.

a



b

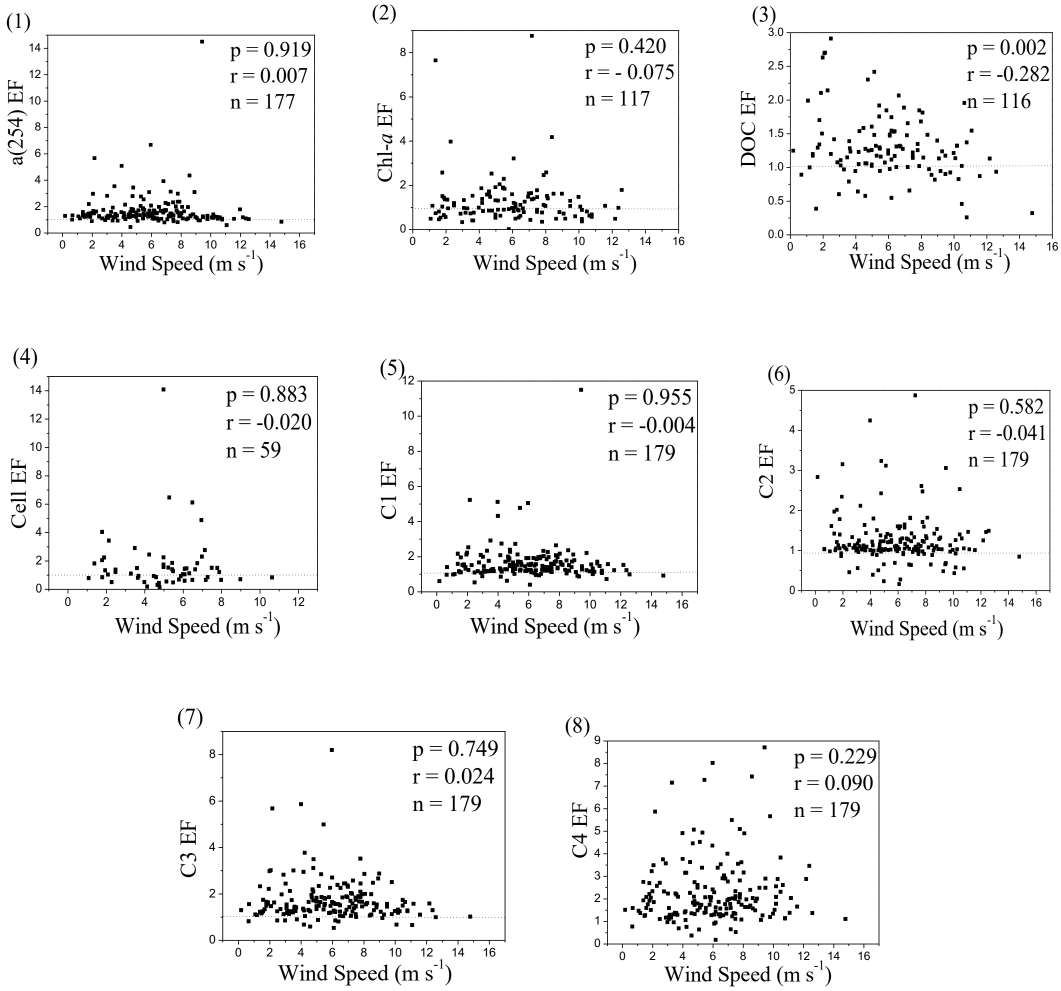


Fig. S6. Relationships between temperature and wind speeds and EFs of a(254), Chl-*a*, DOC, and four fluorescence components.

Fig. S7. The Screen Sampler.

Table S1 Correlation coefficients between CDOM optical properties, DOC, salinity, Chl-*a*, DO, and cell in the SSW in the ECS and the YS during spring, summer, and winter.

Spring

	a(254)	DOC	$S_{275-295}$	$S_{350-400}$	S_R	C1	C2	C3	C4	$SUVA_{254}$	Chl-*a*	DO	Cell
DOC	$.679^{**}$												
$S_{275-295}$	-0.221	0.157											
$S_{350-400}$	0.207	0.218	$.808^{**}$										
S_R	$-.315^{**}$	-0.258	$-.421^{**}$	$-.677^{**}$									
C1	$.883^{**}$	$.327^{*}$	-0.092	$.368^{**}$	$-.327^{**}$								
C2	$.615^{**}$	0.199	0.003	$.331^{**}$	-0.195	$.722^{**}$							
C3	$.846^{**}$	$.375^{**}$	-0.071	$.361^{**}$	$-.337^{**}$	$.980^{**}$	$.677^{**}$						
C4	$.813^{**}$	$.337^{*}$	-0.166	0.215	$-.277^{*}$	$.708^{**}$	$.678^{**}$	$.674^{**}$					
$SUVA_{254}$	$.698^{**}$	-0.032	-0.13	0.214	$-.307^{*}$	$.598^{**}$	0.223	$.573^{**}$	$.458^{**}$				
Chl-*a*	0.177	0.163	-0.045	0.054	-0.134	0.159	0.125	0.16	0.201	0.182			
DO	$.683^{**}$	$.512^{**}$	-0.045	0.103	-0.235	$.436^{**}$	$.288^{*}$	$.433^{**}$	$.391^{**}$	$.457^{**}$	$.556^{**}$		
Cell	-0.192	-0.25	-0.073	-0.036	-0.083	-0.184	-0.248	-0.191	-0.115	0.037	0.103	-0.042	
Salinity	$-.821^{**}$	$-.327^{*}$	0.158	-0.235	$.263^{*}$	$-.916^{**}$	$-.538^{**}$	$-.893^{**}$	$-.502^{**}$	$-.691^{**}$	-0.175	$-.433^{**}$	0.133

Summer

	a(254)	DOC	$S_{275-295}$	$S_{350-400}$	S_R	C1	C2	C3	C4	$SUVA_{254}$	Chl-*a*	DO	Cell
DOC	$.661^{**}$												
$S_{275-295}$	0.075	0.14											
$S_{350-400}$	-0.066	-0.058	$.475^{**}$										
S_R	-0.213	-0.148	$-.409^{**}$	$-.448^{**}$									
C1	$.571^{**}$	$.433^{**}$	-0.091	-0.067	-0.117								
C2	-0.009	0.215	0.014	0.178	-0.123	$.569^{**}$							
C3	$.733^{**}$	$.492^{**}$	-0.019	-0.062	-0.155	$.941^{**}$	$.424^{**}$						
C4	$.614^{**}$	$.373^{**}$	-0.024	-0.005	-0.155	$.678^{**}$	$.400^{**}$	$.763^{**}$					

$SUVA_{254}$	.779**	0.13	-0.007	-0.026	-0.177	.459**	-0.084	.597**	.512**				
Chl-*a*	0.234	0.002	-0.113	0.004	0.04	.525**	0.182	.554**	0.234	.337**			
DO	.641**	.551**	0.118	0.009	-0.222	0.238	-0.058	.303*	.297*	.418**	-.246*		
Cell	-.254*	-.261*	-0.193	-0.096	0.035	0.034	0.001	-0.035	0.012	-0.13	0.153	-.343**	
Salinity	-.505**	-0.166	0.158	0.109	0.069	-.551**	-0.047	-.639**	-.377**	-.609**	-.735**	-0.065	0.001

Winter

	a(254)	DOC	$S_{275-295}$	$S_{350-400}$	S_R	C1	C2	C3	C4	$SUVA_{254}$	Chl-*a*	DO
DOC	.536**											
$S_{275-295}$	-0.204	-0.007										
$S_{350-400}$	.270*	0.057	-0.06									
S_R	-.292*	-0.15	.538**	-.567**								
C1	.750**	.278*	-0.179	.286*	-.330**							
C2	-0.084	-0.075	0.027	0.041	-0.02	.347**						
C3	.886**	.358**	-0.206	.279*	-.312**	.950**	0.127					
C4	.777**	0.221	-.260*	.337**	-.297*	.745**	0.204	.822**				
$SUVA_{254}$	.834**	0.016	-0.232	.317**	-.258*	.718**	-0.093	.827**	.795**			
Chl-*a*	.333**	.353**	0.084	-.243*	0.109	0.121	-0.049	0.199	.252*	0.126		
DO	.884**	.581**	-0.092	0.119	-0.139	.649**	-0.194	.779**	.516**	.675**	.380**	
Salinity	-.716**	-.254*	0.099	-0.224	.240*	-.837**	0.078	-.852**	-.567**	-.724**	-0.092	-.723**

** Correlation is significant at the 0.01 level (two-tailed)

* Correlation is significant at the 0.05 level (two-tailed)

Table S2 Correlation coefficients between CDOM optical properties, DOC, salinity, Chl-*a*, DO, and nutrients in the SML in the ECS and the YS during spring, summer, and winter.

Spring

	a(254)	DOC	$SUVA_{254}$	Chl-*a*	$S_{275-295}$	$S_{350-400}$	S_R	PO_4^-	NO_3^-	NO_2^-
DOC	0.706**									
$SUVA_{254}$	0.051	-0.530*								
Chl-*a*	0.662**	0.241	0.208							
$S_{275-295}$	-0.19	-0.325	0.251	0.063						
$S_{350-400}$	-0.036	-0.19	0.233	0.144	0.938**					
S_R	-0.33	-0.205	-0.02	-0.251	-0.465*	-0.730**				
PO_4^-	-0.005	-0.108	0.324	0.322	0.238	0.281	-0.241			
NO_3^-	0.714**	0.259	0.066	0.963**	-0.07	-0.006	-0.176	0.24		
NO_2^-	0.232	0.068	-0.129	.542*	0.101	0.075	-0.111	0.346	0.976**	
SiO_3^{2-}	-0.269	-0.125	-0.126	-0.149	-0.303	-0.252	0.071	0.229	-0.086	-0.137

Summer

	a(254)	DOC	$SUVA_{254}$	Chl-*a*	$S_{275-295}$	$S_{350-400}$	S_R	PO_4^-	NO_3^-
DOC	0.756**								
$SUVA_{254}$	-0.537**	-0.746**							
Chl-*a*	0.089	0.061	-0.233						
$S_{275-295}$	0.17	0.102	-0.336*	0.046					
$S_{350-400}$	-0.175	-0.202	0.244	-0.067	0.154				
S_R	0.134	0.227	-0.098	-0.182	-0.315*	-0.708**			
PO_4^-	0.193	0.375**	-0.232	0.242	-0.096	-0.084	0.024		
NO_3^-	0.306*	0.097	-0.104	0.579**	0.042	-0.052	-0.17	0.456**	
NO_2^-	0.195	0.125	-0.137	0.501**	0.063	-0.075	-0.115	0.647**	0.838**

Winter

	a(254)	DOC	$SUVA_{254}$	$S_{275-295}$	$S_{350-400}$
DOC	0.897**				
$SUVA_{254}$	0.14	-0.272	1		
$S_{275-295}$	0.14	0.245	-0.283*		
$S_{350-400}$	-0.26	-0.298*	0.17	-0.778**	
S_R	0.044	0.216	-0.417**	0.968**	-0.728**