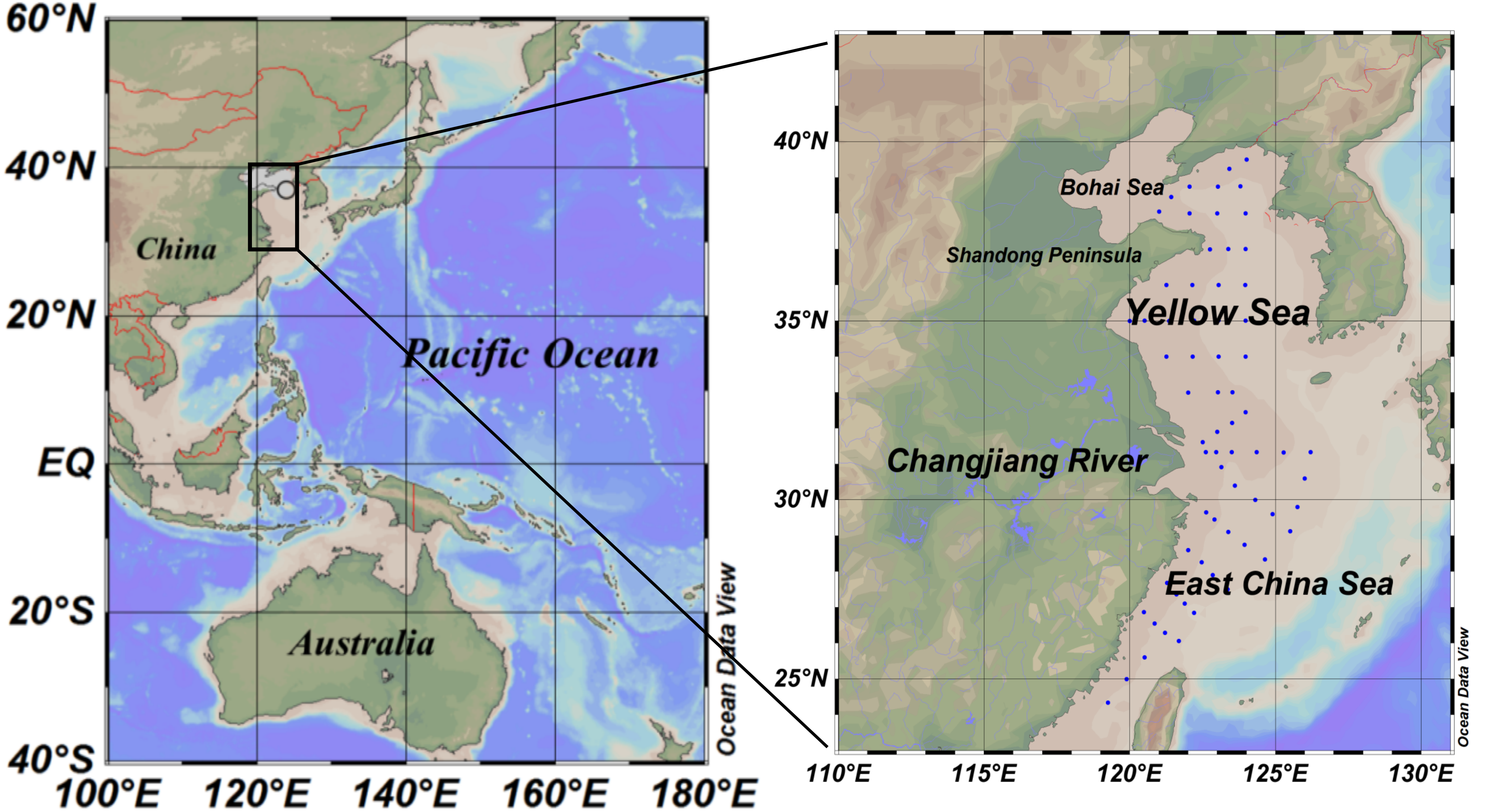
Supplementary Figures and Tables


60°N
40°N
20°N
EQ
20°S
40°S
100°E
120°E
140°E
160°E
180°E
China
Pacific Ocean
Australia
Ocean Data View
40°N
35°N
30°N
25°N
110°E
115°E
120°E
125°E
130°E
Bohai Sea
Shandong Peninsula
Yellow Sea
Changjiang River
East China Sea
Ocean Data View

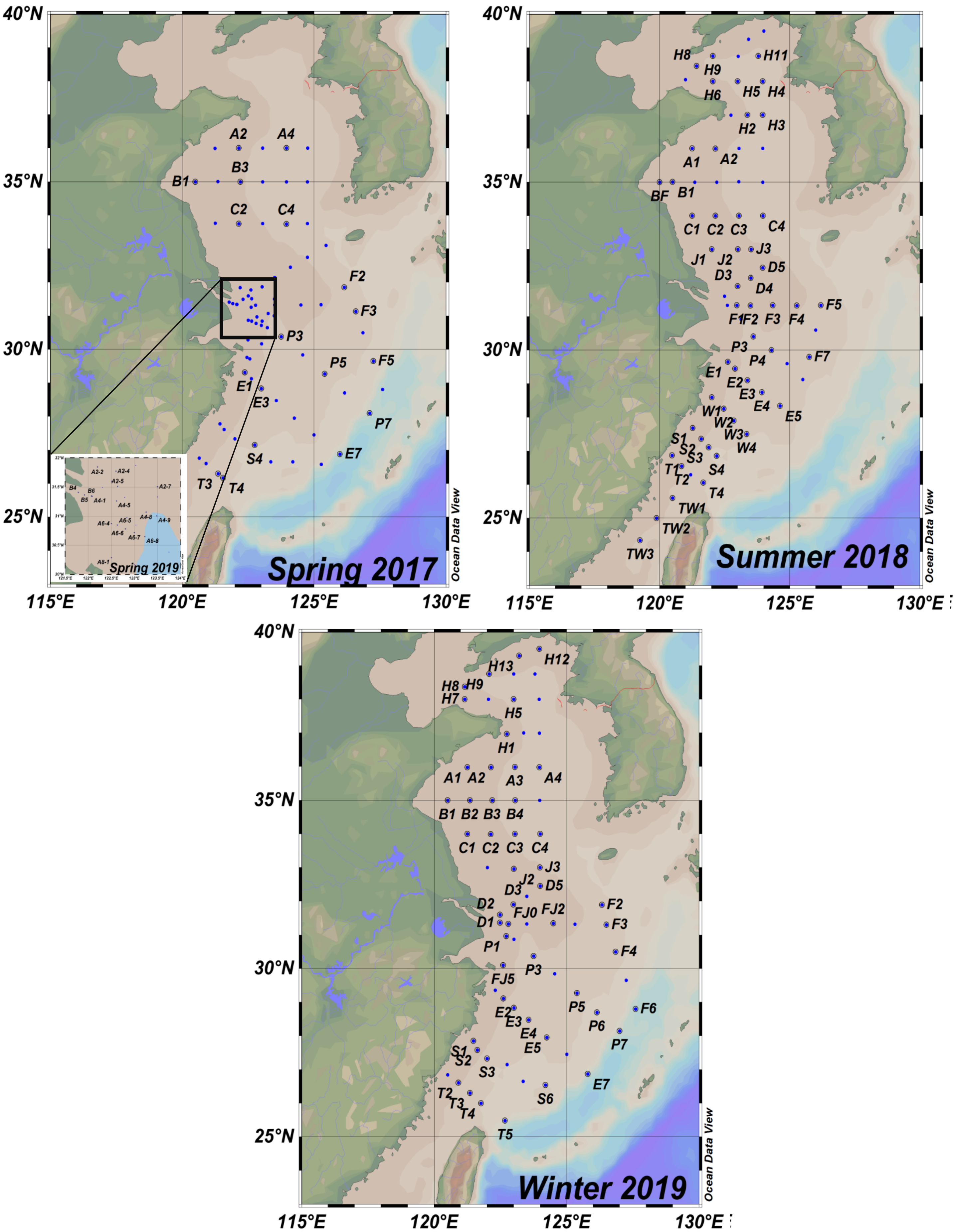


Fig. S1 Map of sampling stations.

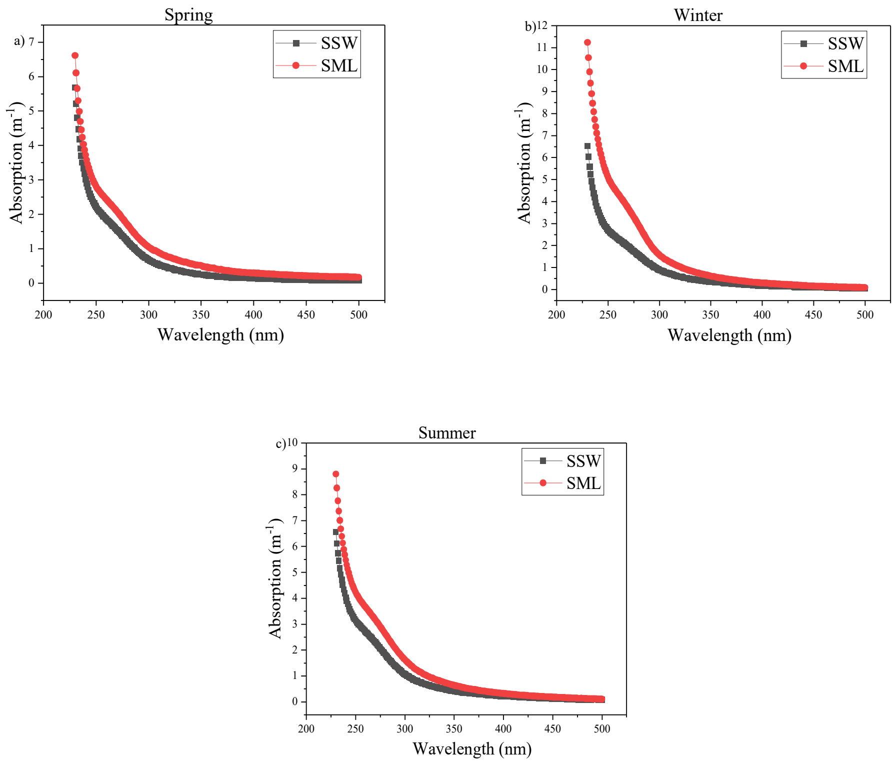
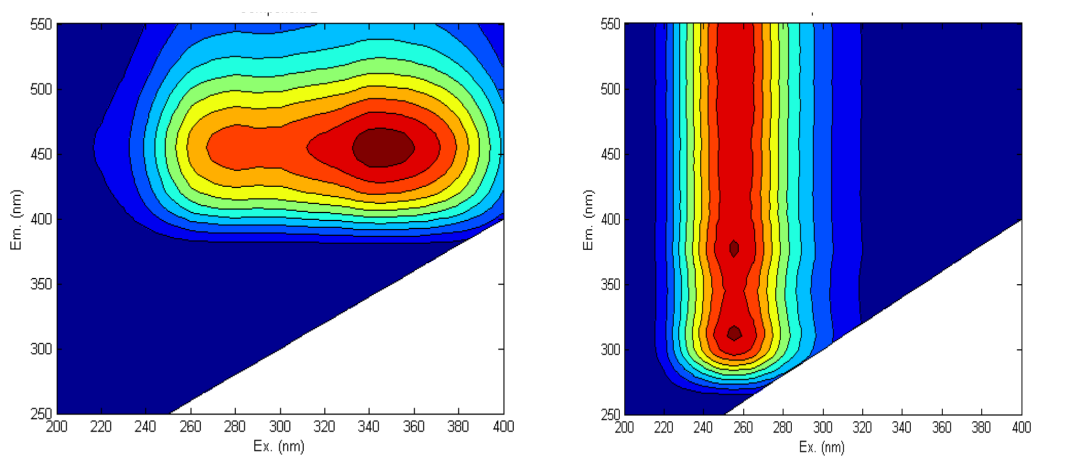


Fig. S1. Absorption spectra averaged by seawater samples between 230 to 500 nm in the SSW and SML during spring (a), winter (b), and summer (d).



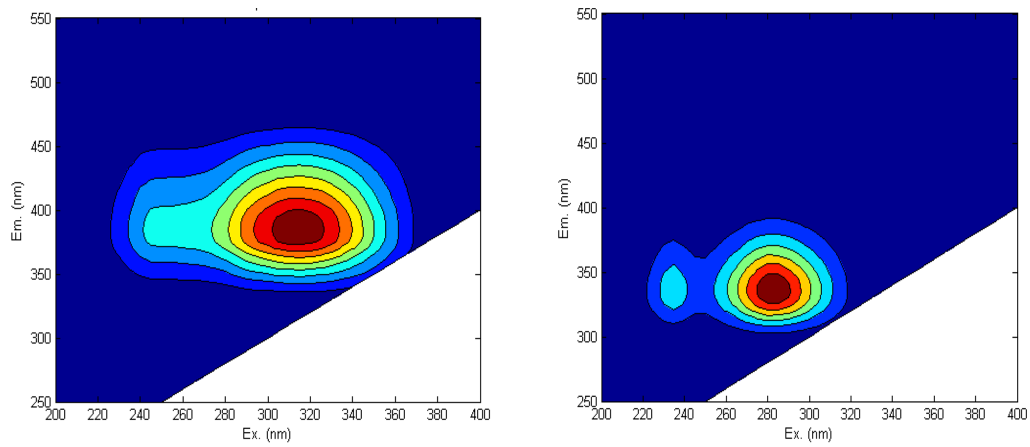
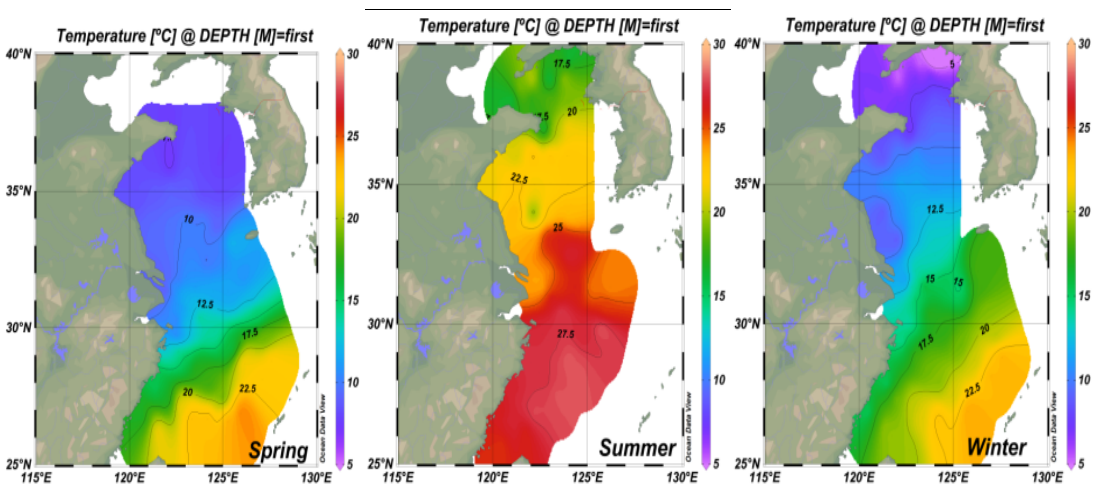
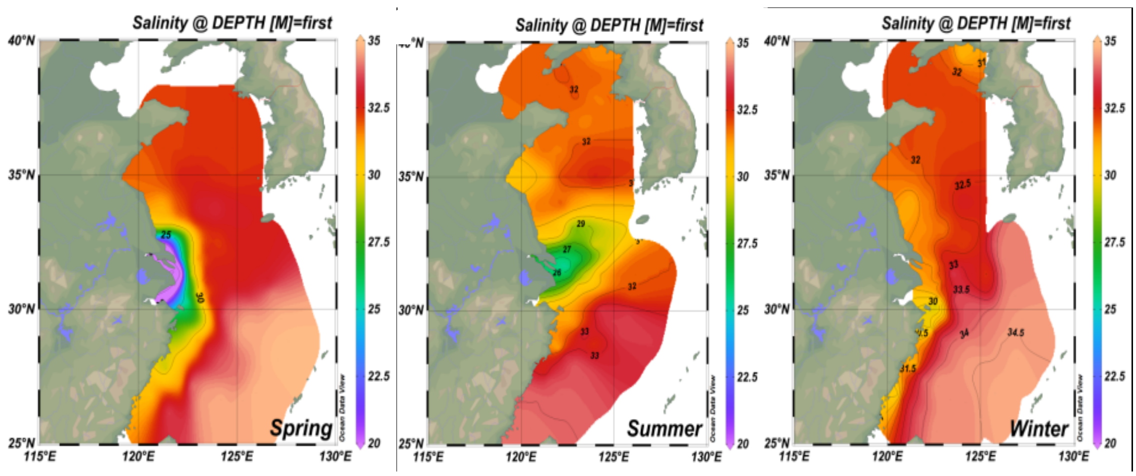


Fig. S2. Representative fluorescence excitation-emission matrix spectra (EEM) contours from samples in the SML and the SSW of the East China Sea (ECS) and the Yellow Sea (YS) during spring, summer, winter, and spring. The fluorescence intensities were quantified using Raman units (RU).

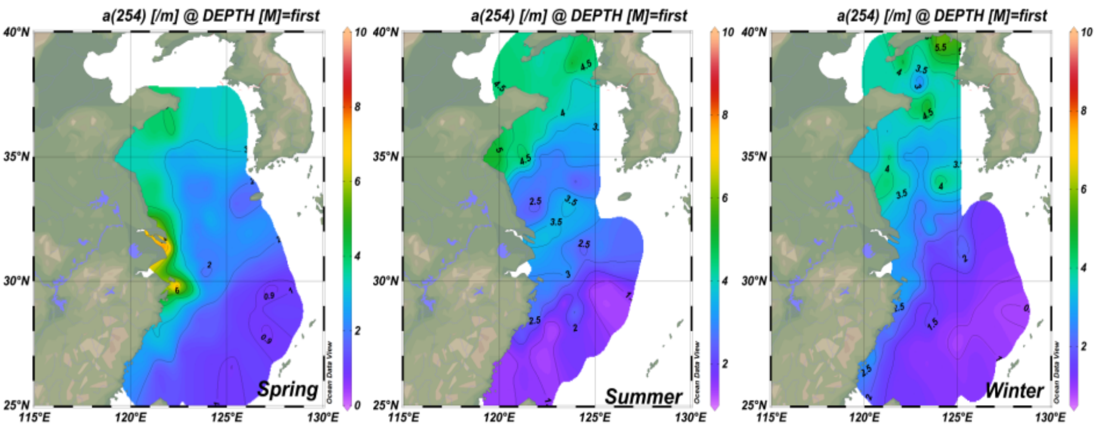
a)



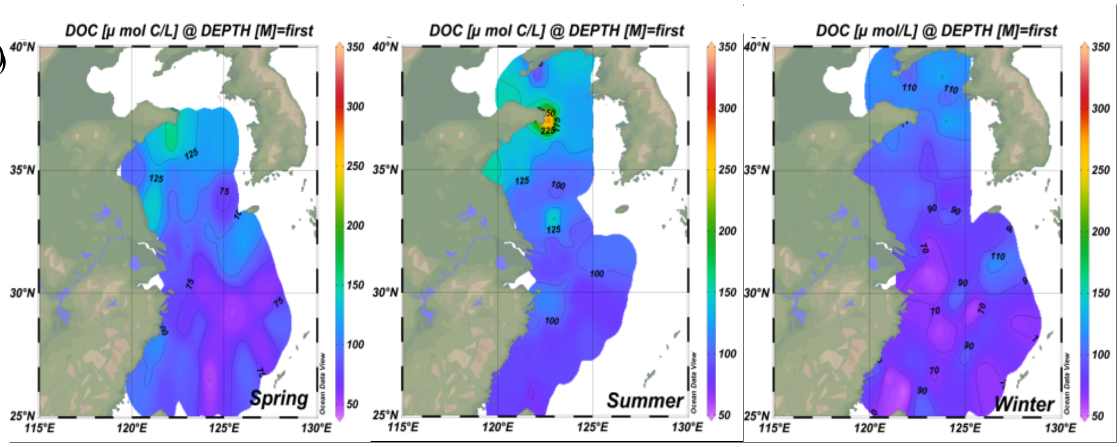
b)

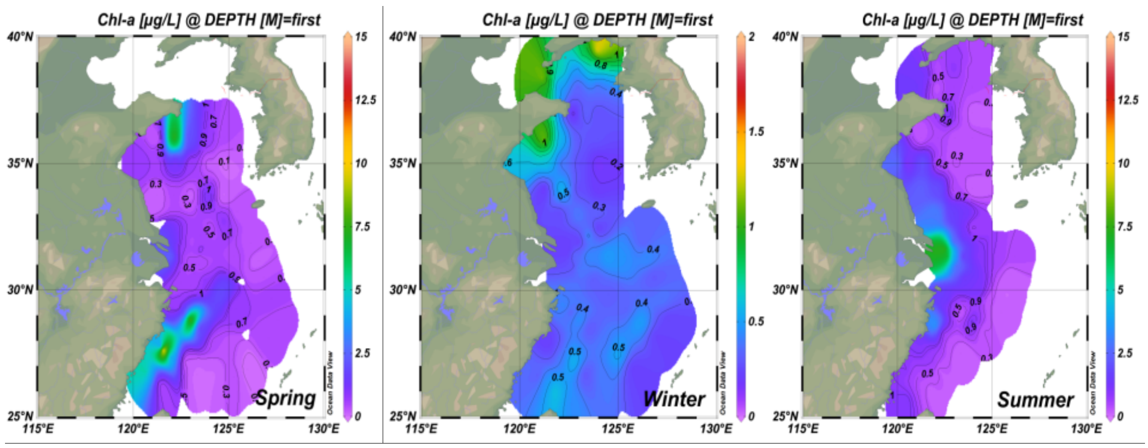


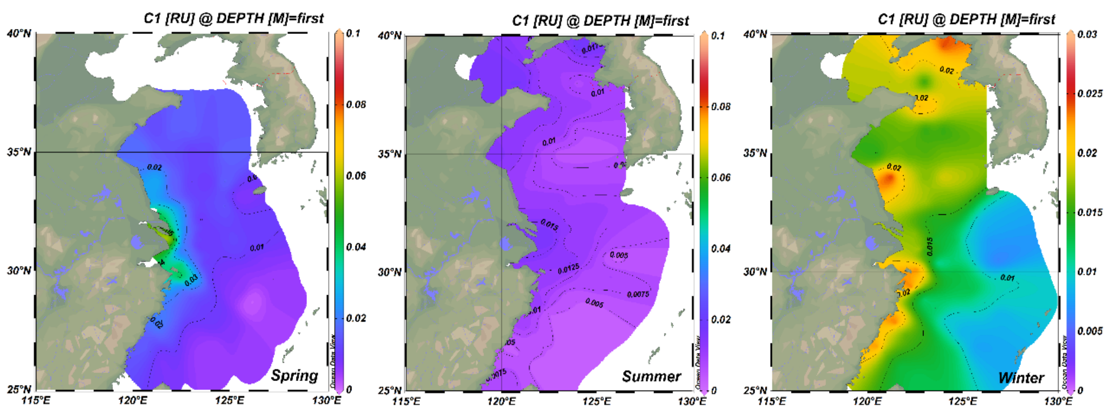
e)d)


a(254) [/m] @ DEPTH [M]=first
Spring
a(254) [/m] @ DEPTH [M]=first
Summer
a(254) [/m] @ DEPTH [M]=first
Winter

f)c)

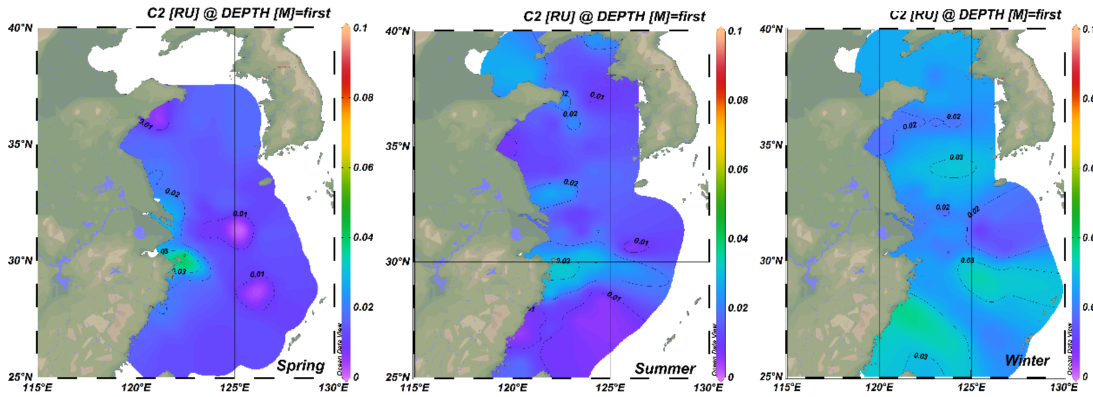

DOC [μ mol C/L] @ DEPTH [M]=first
Spring
DOC [μ mol C/L] @ DEPTH [M]=first
Summer
DOC [μ mol/L] @ DEPTH [M]=first
Winter


Chl-a [μg/L] @ DEPTH [M]=first
Spring
Chl-a [μg/L] @ DEPTH [M]=first
Winter
Chl-a [μg/L] @ DEPTH [M]=first
Summer

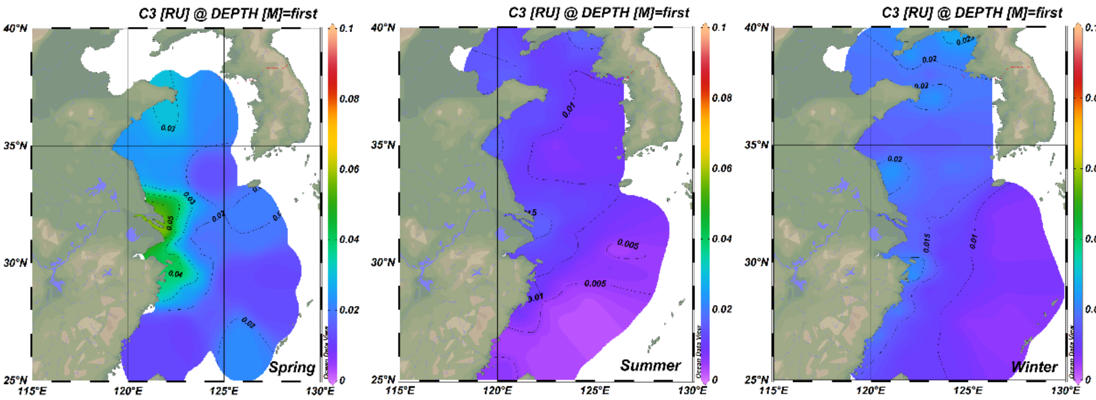

C1 [RU] @ DEPTH [M]=first
Spring
C1 [RU] @ DEPTH [M]=first
Summer
C1 [RU] @ DEPTH [M]=first
Winter

g)

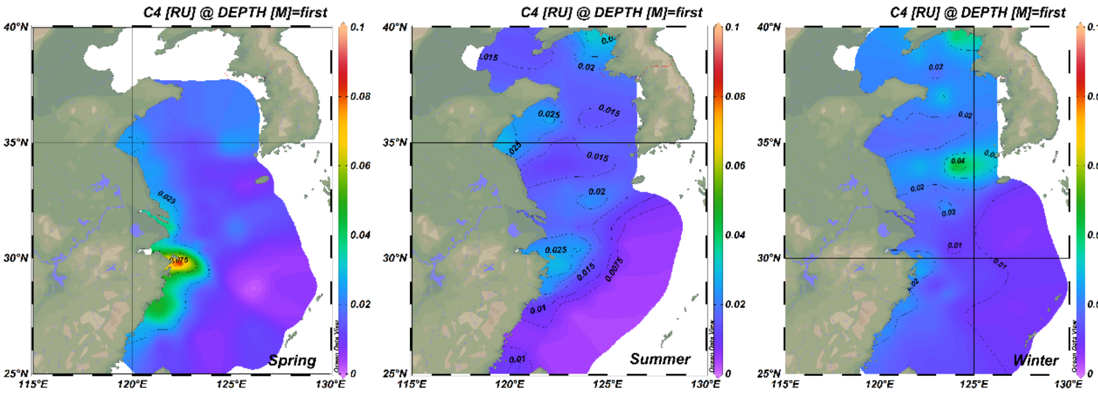
i)

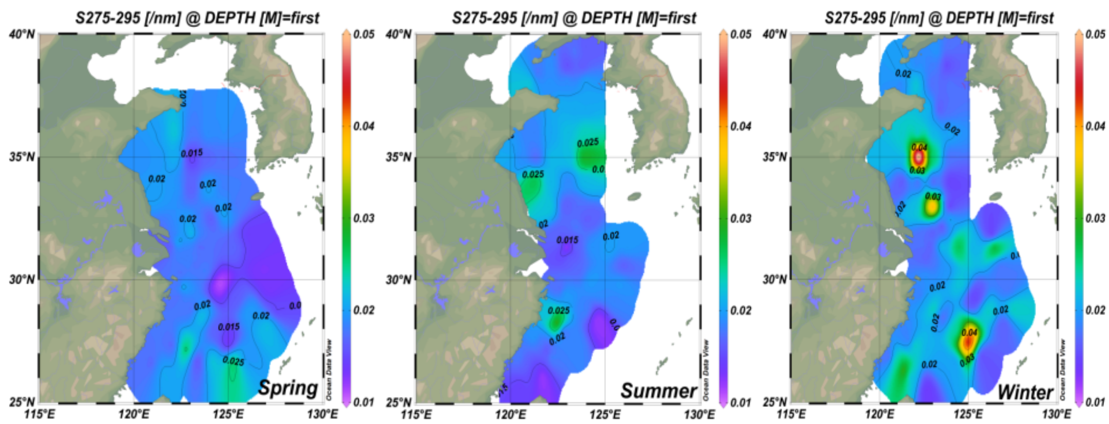

C2 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E

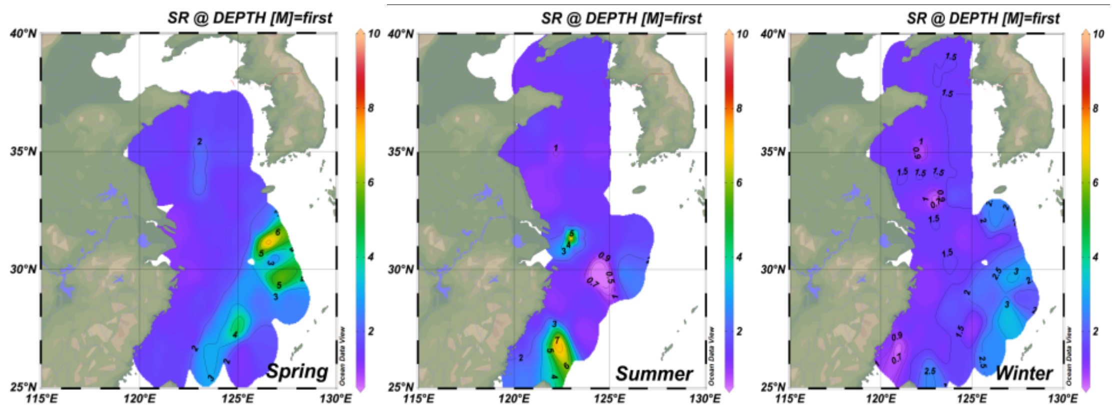
i)


C3 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E

j)


C4 [RU] @ DEPTH [M]=first
Spring
Summer
Winter
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E


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



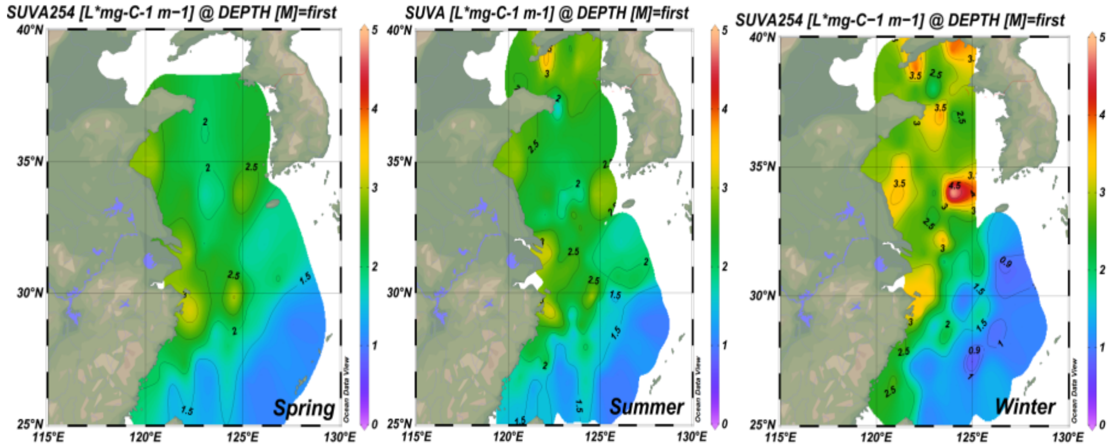
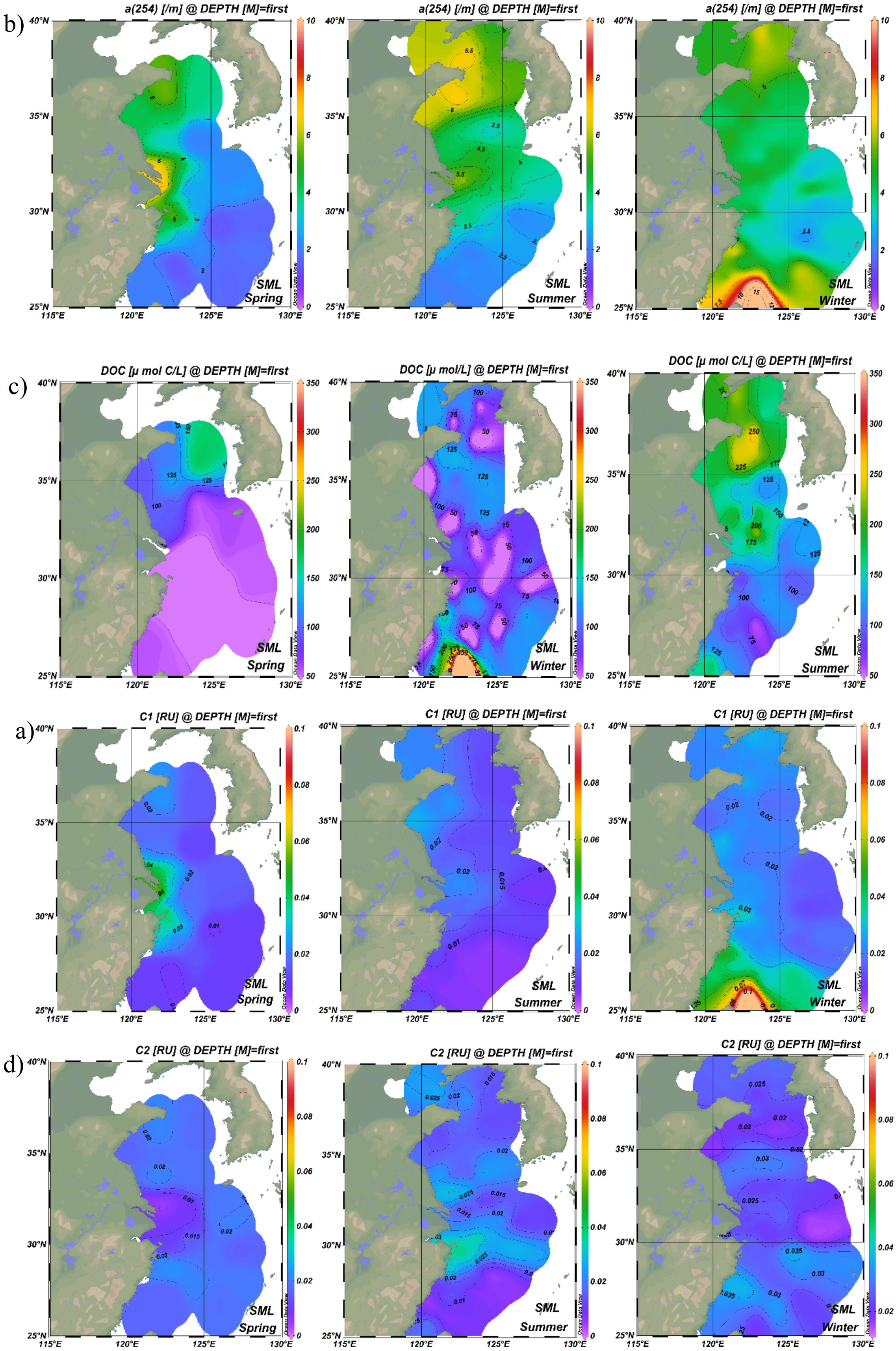
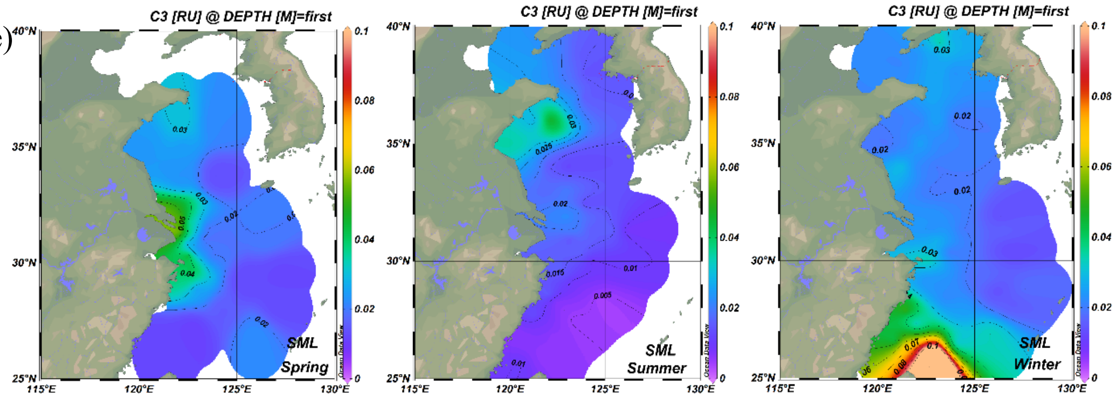


Fig. S3. Distributions of temperature, salinity, CDOM, DOC, Chl-*a*, four fluorescence components, $S_{275\text{-}295}$, S_R and $SUVA_{254}$ in the subsurface water during spring, summer, and winter. (a) Temperature, b) Salinity, c) a(254), d) DOC, e) Chl-*a*, f) C1, g) C2, h) C3, i) C4, j) $S_{275\text{-}295}$,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

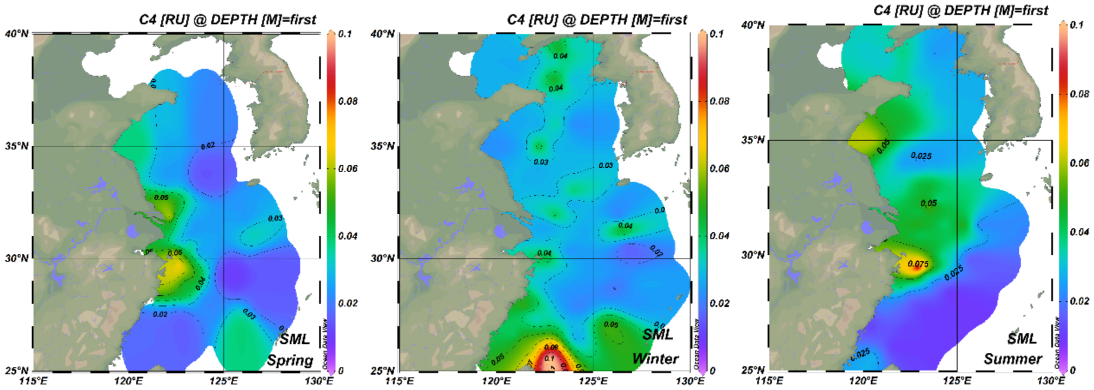
k)


b)
a(254) [/m] @ DEPTH [M]=first
SML Spring
SML Summer
SML Winter
c)
DOC [μ mol C/L] @ DEPTH [M]=first
DOC [μ mol/L] @ DEPTH [M]=first
SML Spring
SML Winter
SML Summer
a)
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)

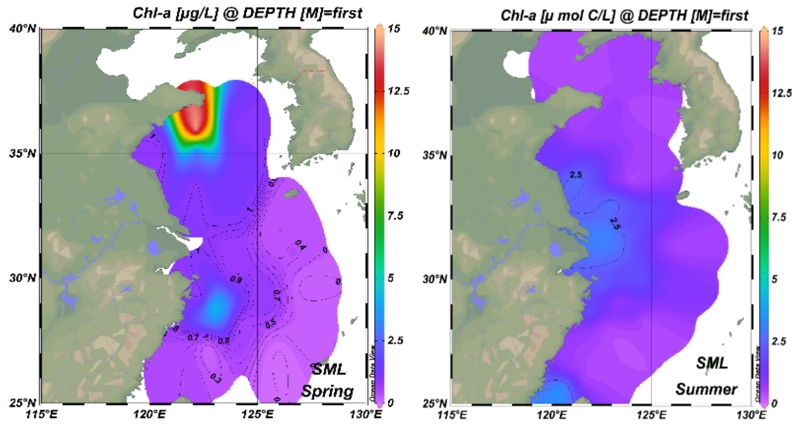
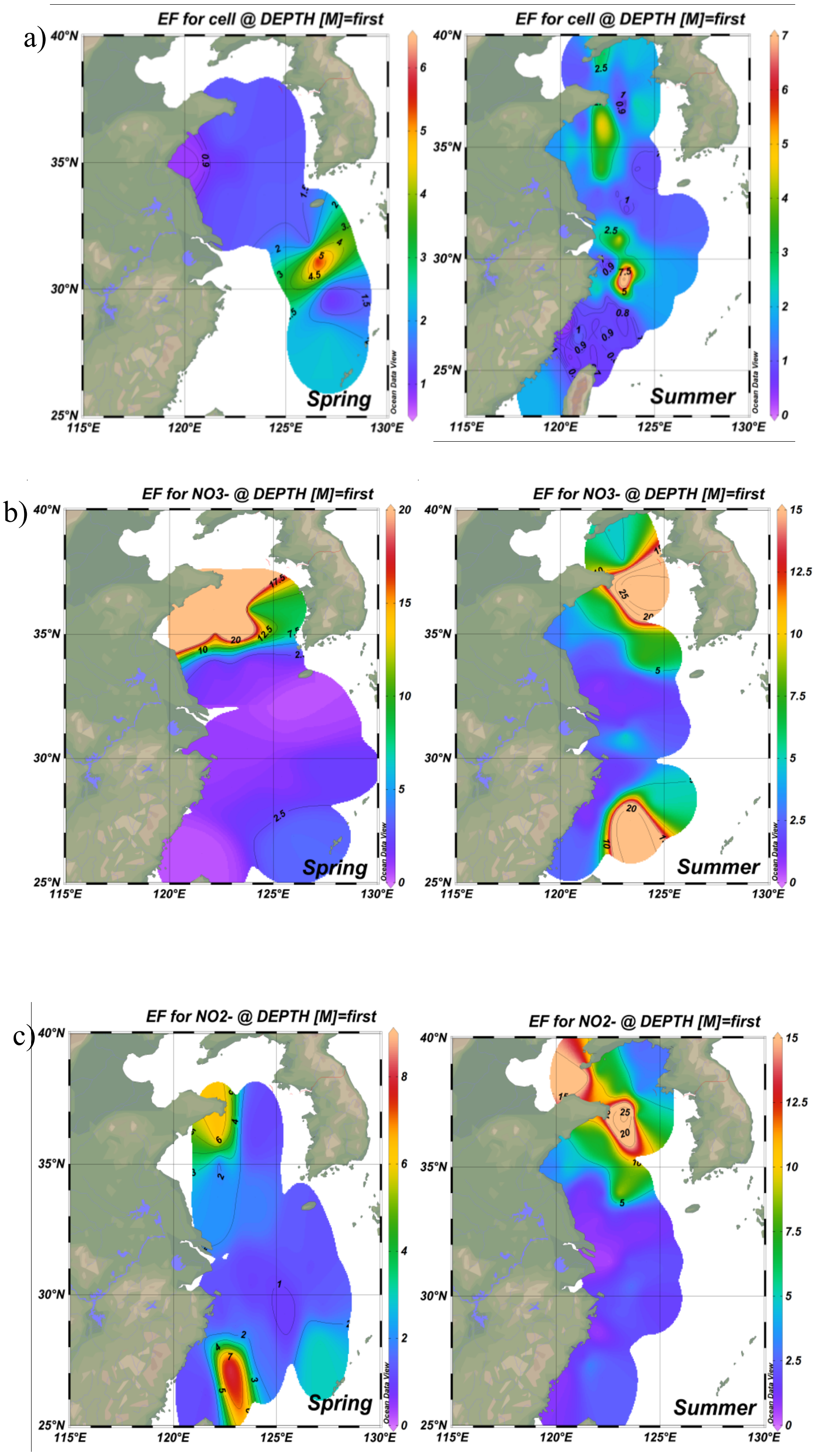


Fig. S4. Distributions of concentrations CDOM, DOC, chl-*a* and four fluorescence components in the



a)
EF for cell @ DEPTH [M]=first
EF for cell @ DEPTH [M]=first
Spring
Summer
b)
EF for NO3- @ DEPTH [M]=first
EF for NO3- @ DEPTH [M]=first
Spring
Summer
c)
EF for NO2- @ DEPTH [M]=first
EF for NO2- @ DEPTH [M]=first
Spring
Summer
40°N
35°N
30°N
25°N
115°E
120°E
125°E
130°E
Ocean Data View

d)

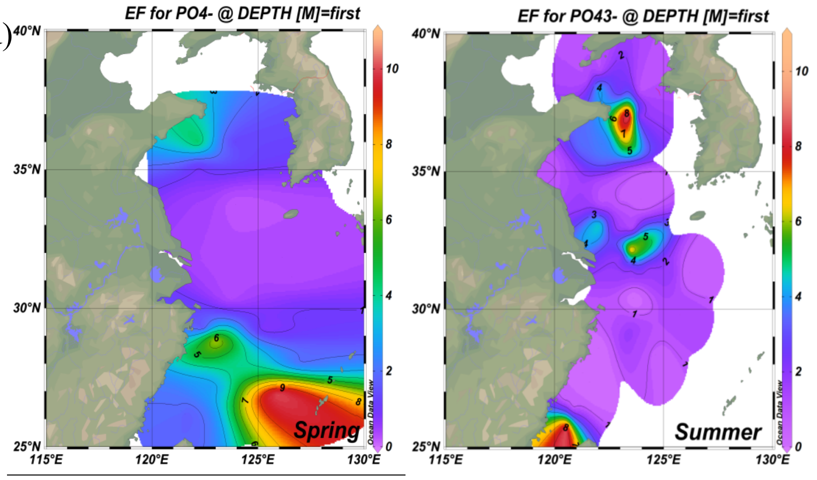
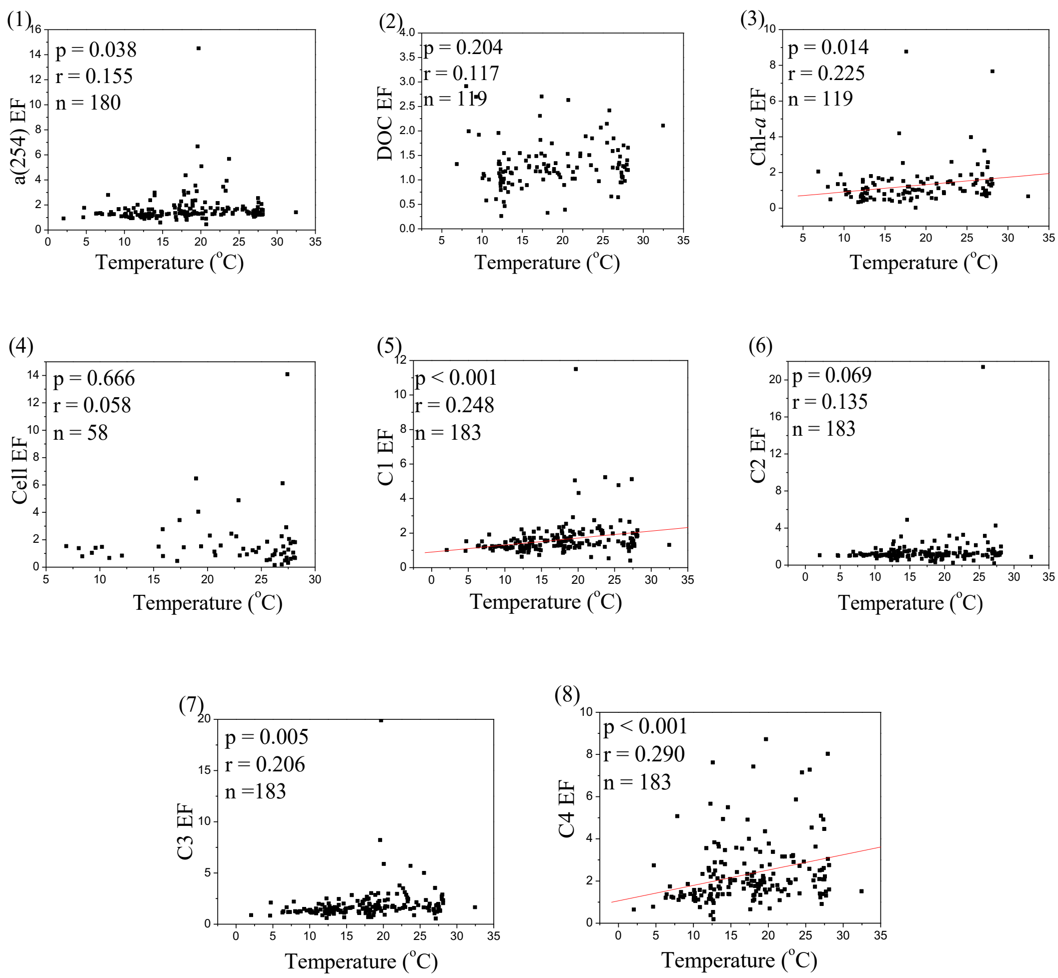


Fig. S5. Distributions of enrichment factors of bacterial abundance and nutrients in the surface microlayer water during spring, summer, and winter.

a



b

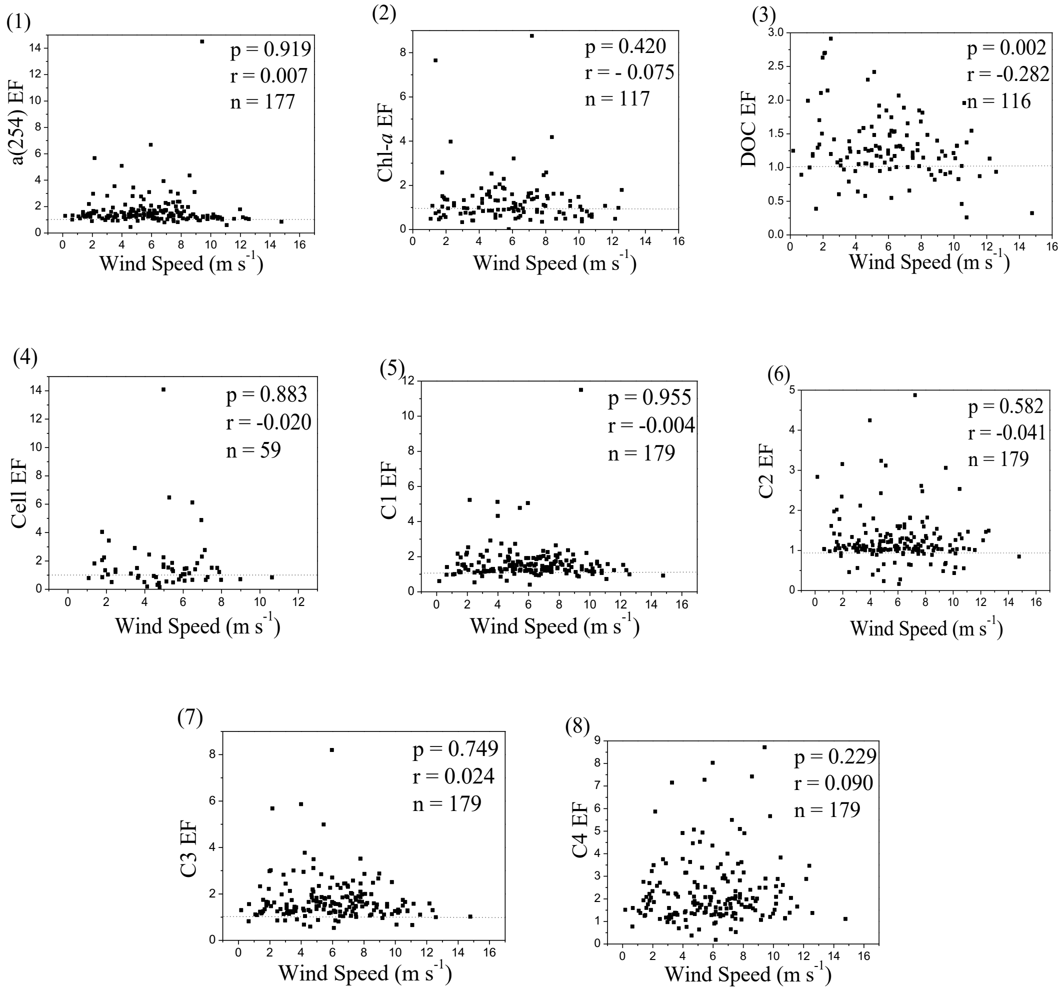


Fig. S6. Relationships between temperature and wind speeds and EFs of a(254), Chl-*a*, DOC, and four fluorescence components.

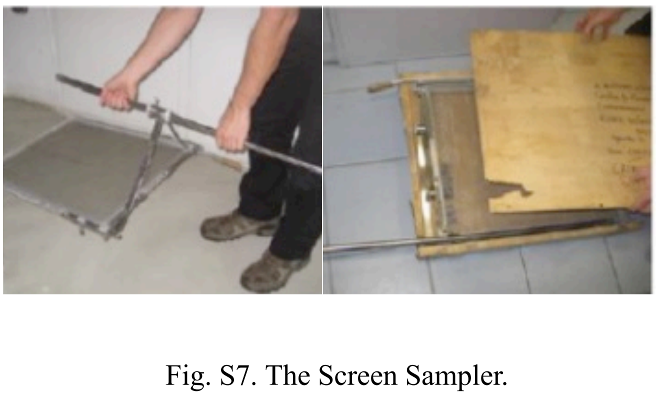


Fig. S7. The Screen Sampler.

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**