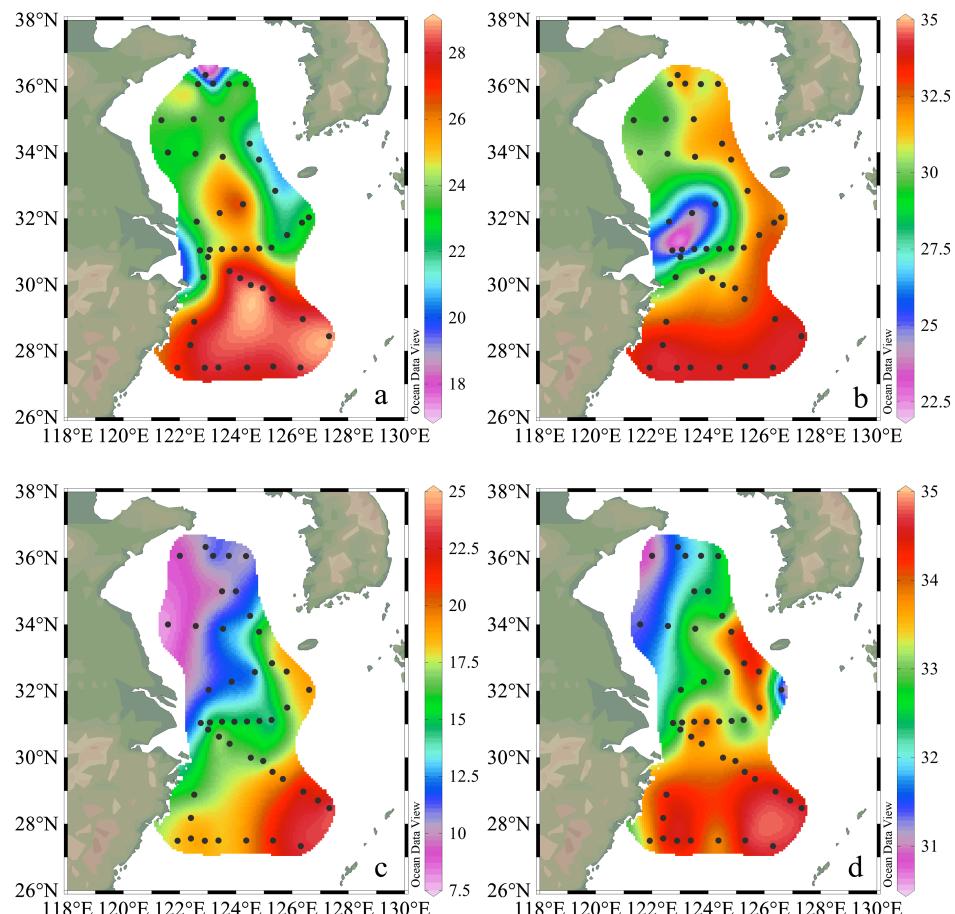
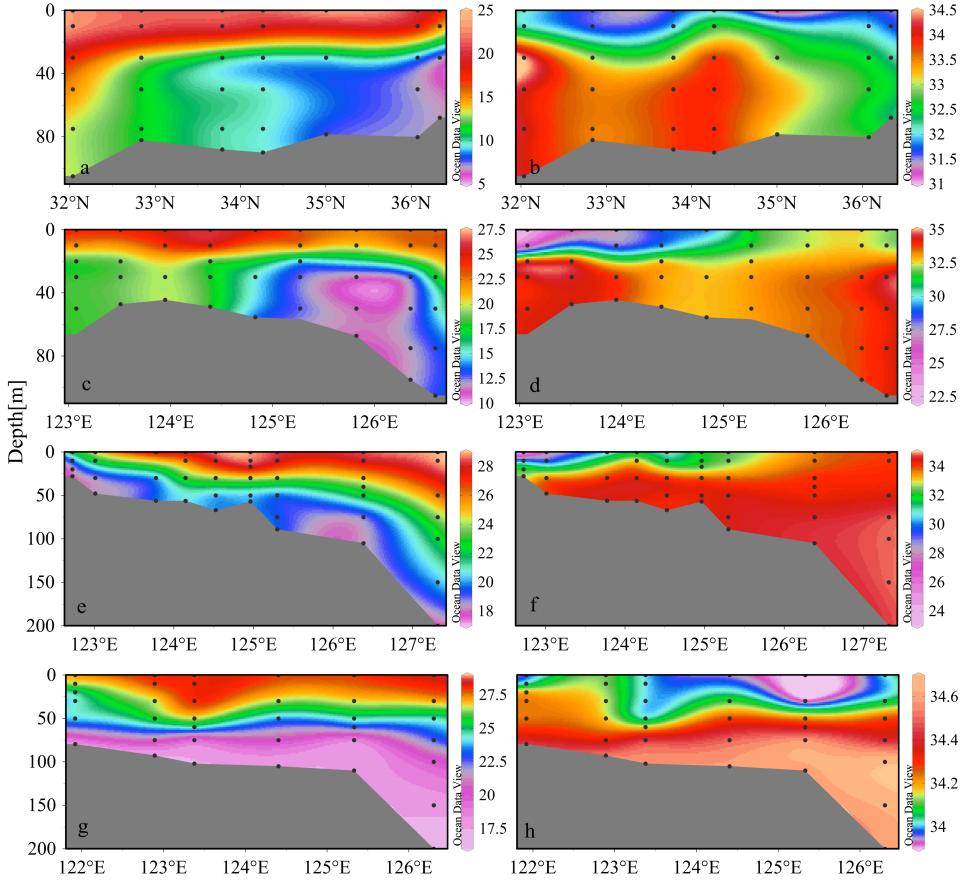


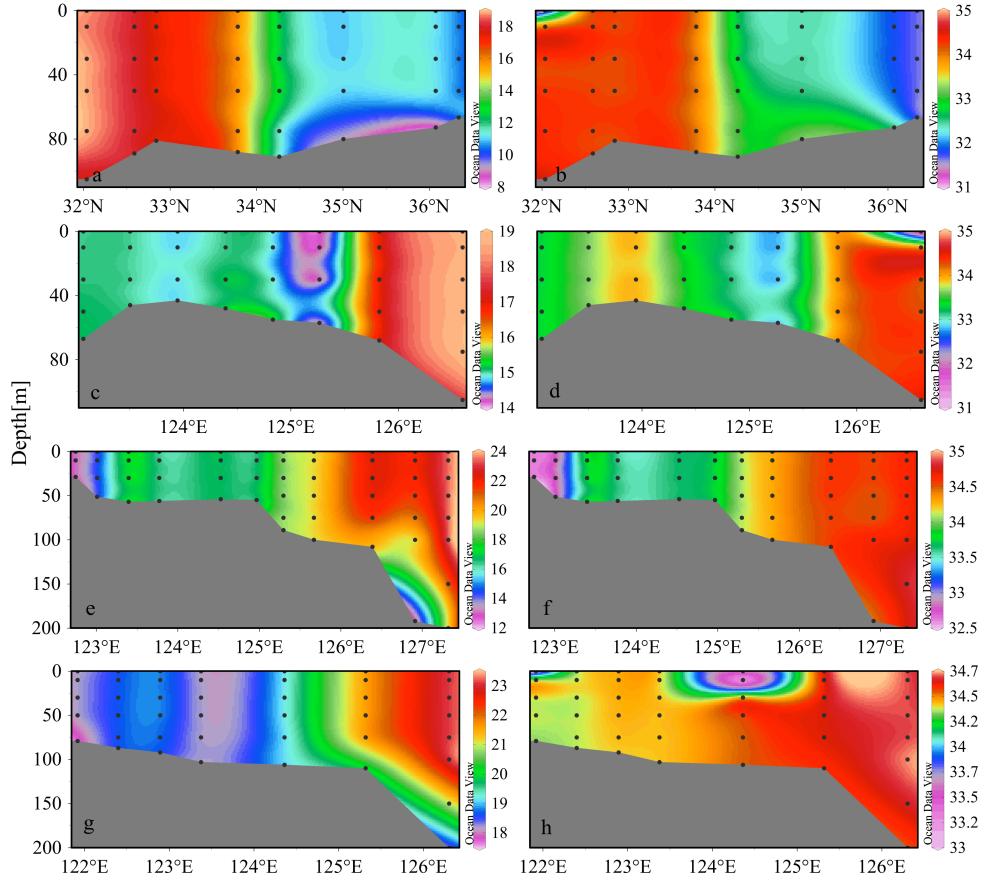
**Figure 1.** Sampling stations of living coccolithophores in the Yellow Sea and East China Sea in summer and winter, 2011. **(a)** summer; **(b)** winter



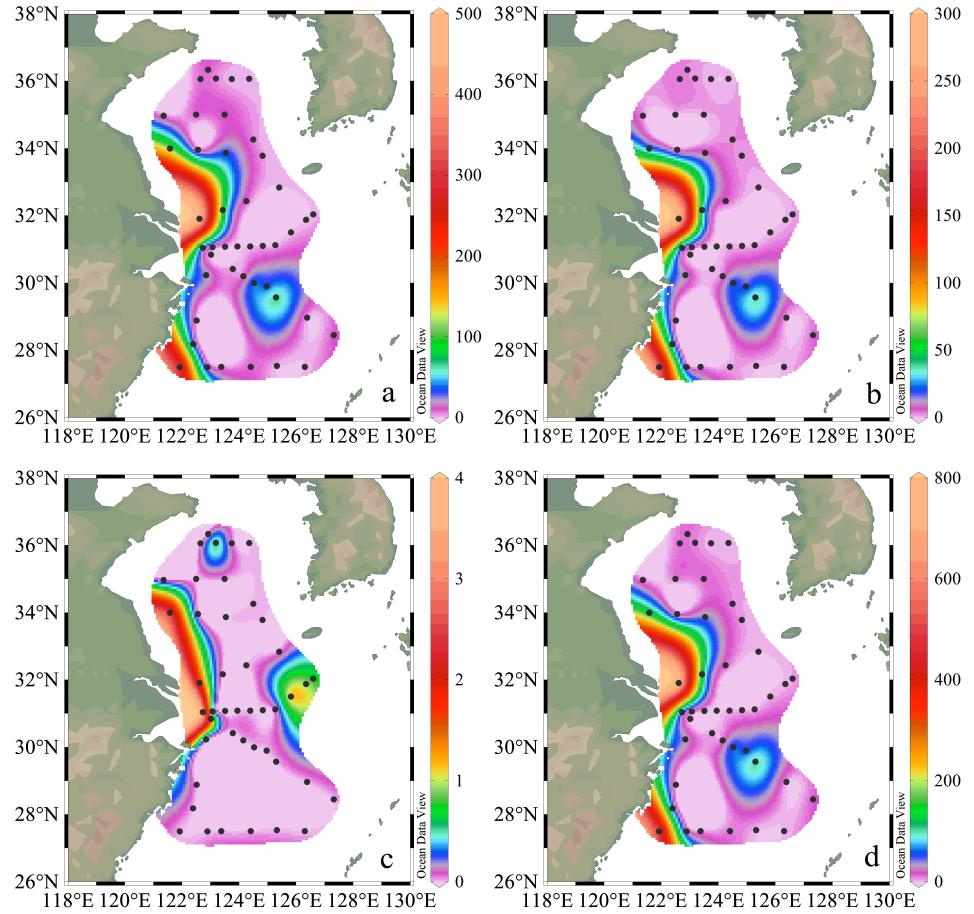
**Figure 2.** The distribution of temperature and salinity in the surface layer in summer and winter. **(a)** Temperature distribution in summer ( $^{\circ}\text{C}$ ); **(b)** Salinity distribution in summer (psu); **(c)** Temperature distribution in winter ( $^{\circ}\text{C}$ ); **(d)** Salinity distribution in winter (psu).



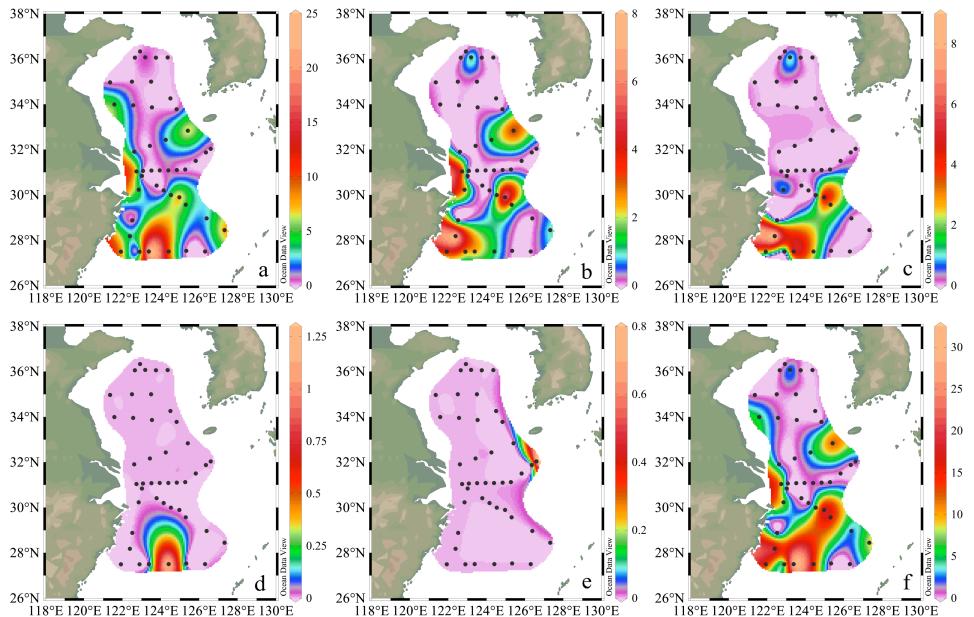
**Figure 3.** Vertical distribution of temperature and salinity along the four sections in summer. **(a)** Temperature distribution along section A ( $^{\circ}\text{C}$ ); **(b)** Salinity distribution along section A (psu); **(c)** Temperature distribution along section F ( $^{\circ}\text{C}$ ); **(d)** Salinity distribution along section F (psu); **(e)** Temperature distribution along section P ( $^{\circ}\text{C}$ ); **(f)** Salinity distribution along section P (psu); **(g)** Temperature distribution along section E ( $^{\circ}\text{C}$ ); **(h)** Salinity distribution along section E (psu).



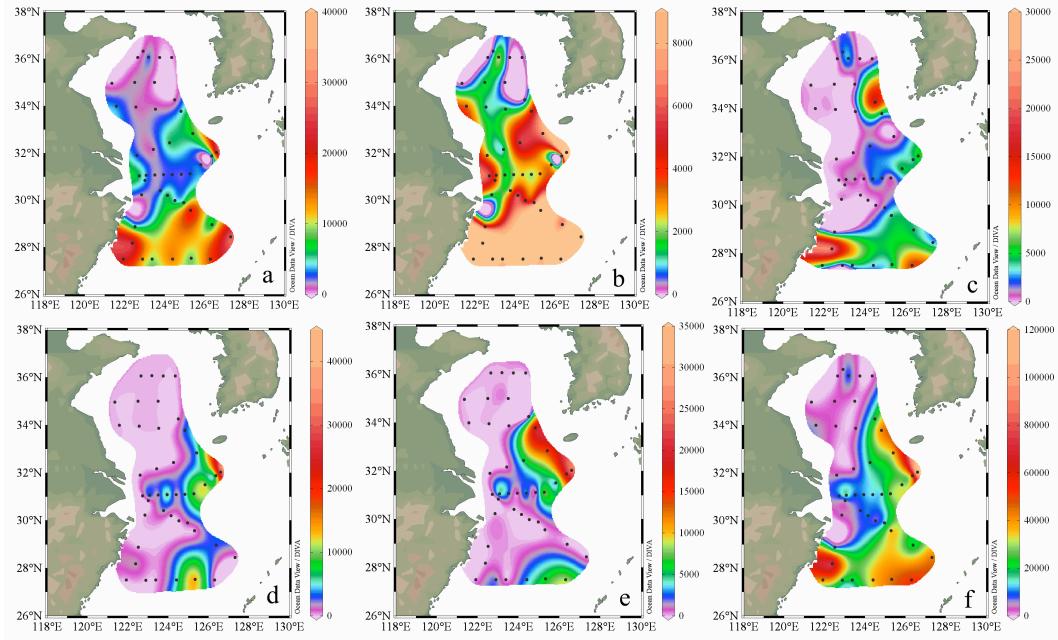
**Figure 4.** Vertical distribution of temperature and salinity along the four sections in winter. **(a)** Temperature distribution along section A ( $^{\circ}\text{C}$ ); **(b)** Salinity distribution along section A (psu); **(c)** Temperature distribution along section F ( $^{\circ}\text{C}$ ); **(d)** Salinity distribution along section F (psu); **(e)** Temperature distribution along section P ( $^{\circ}\text{C}$ ); **(f)** Salinity distribution along section P (psu); **(g)** Temperature distribution along section E ( $^{\circ}\text{C}$ ); **(h)** Salinity distribution along section E (psu).



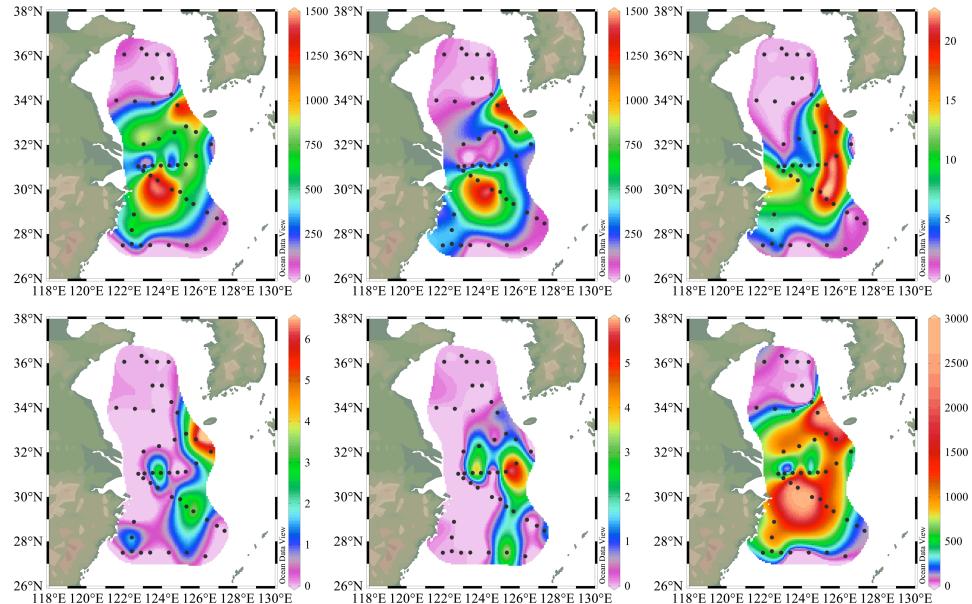
**Figure 5.** the abundance distribution of coccolith on surface layer in summer.(unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Helicosphaera carteri*; and (d) sum.



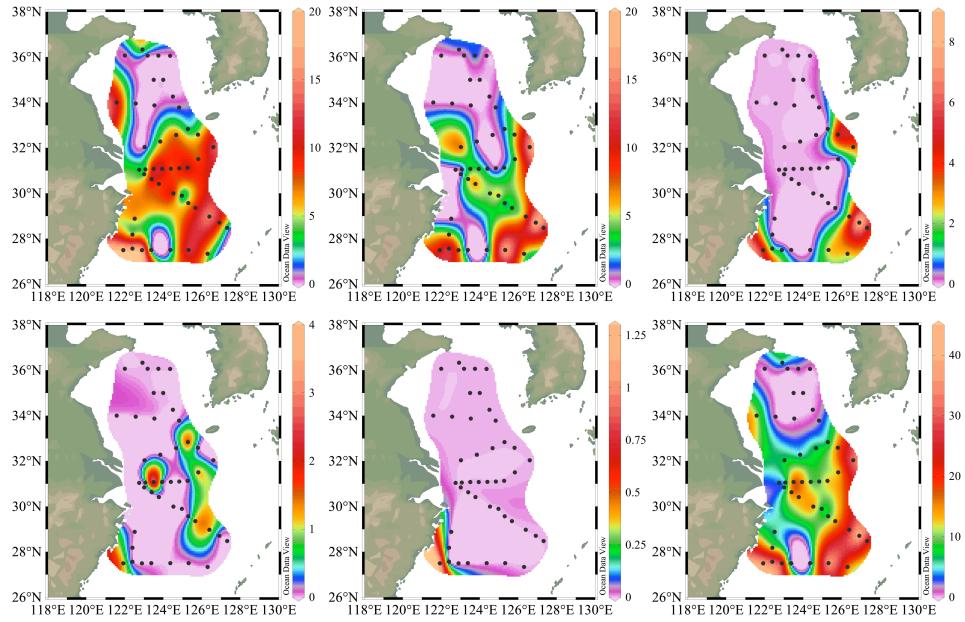
**Figure 6a.** the abundance distribution of coccospHERE on surface layer in summer. (unit: cells  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Caldiscus leptoporus*; (e) *Helicosphaera carteri*; and (f) sum.



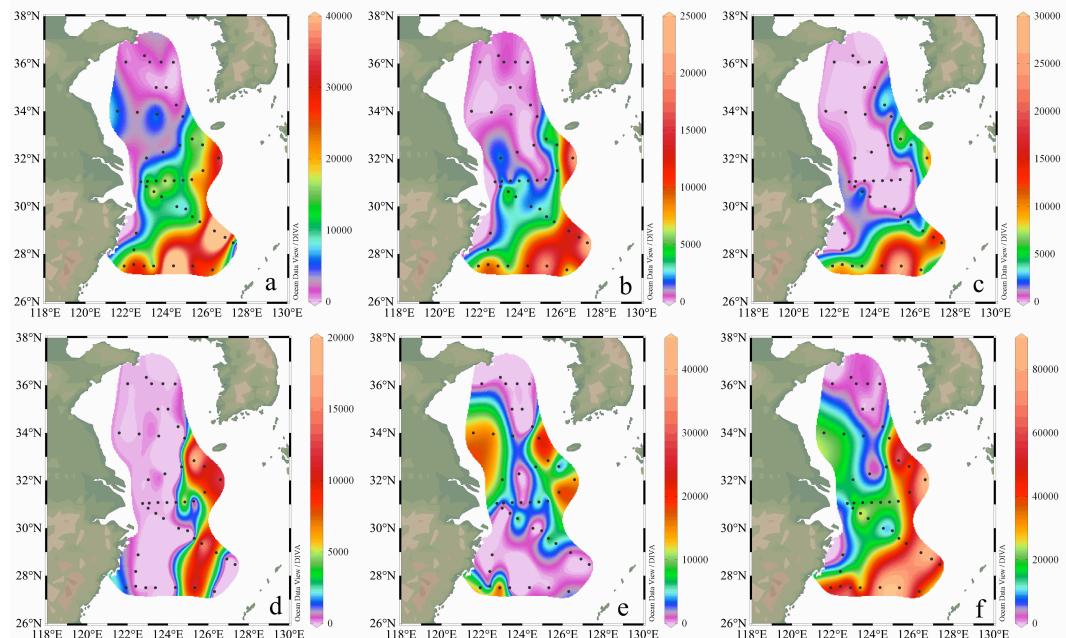
**Figure 6b.** the water column vertical integrated carbon biomass distribution of coccosphere in summer. (unit:  $\text{mgC m}^{-2}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Caldicidiscus leptoporus*; (e) *Helicosphaera carteri*; and (f) sum.



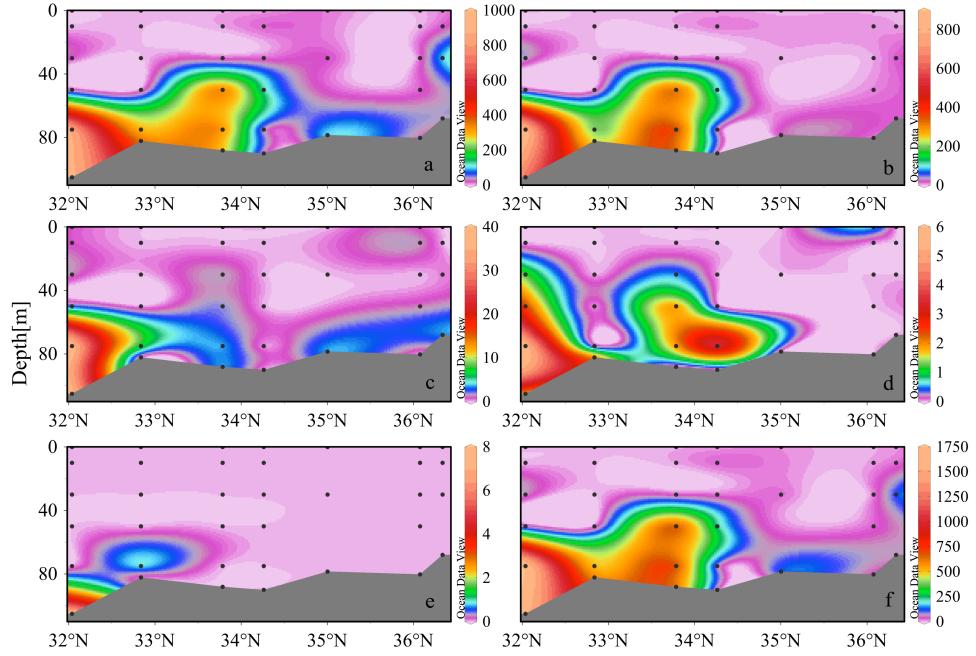
**Figure 7.** the abundance distribution of coccoliths on surface layer in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Helicosphaera carteri*; (d) *Caldicidiscus leptoporus*; (e) *Braarudosphaera bigelowii*; and (f) sum.



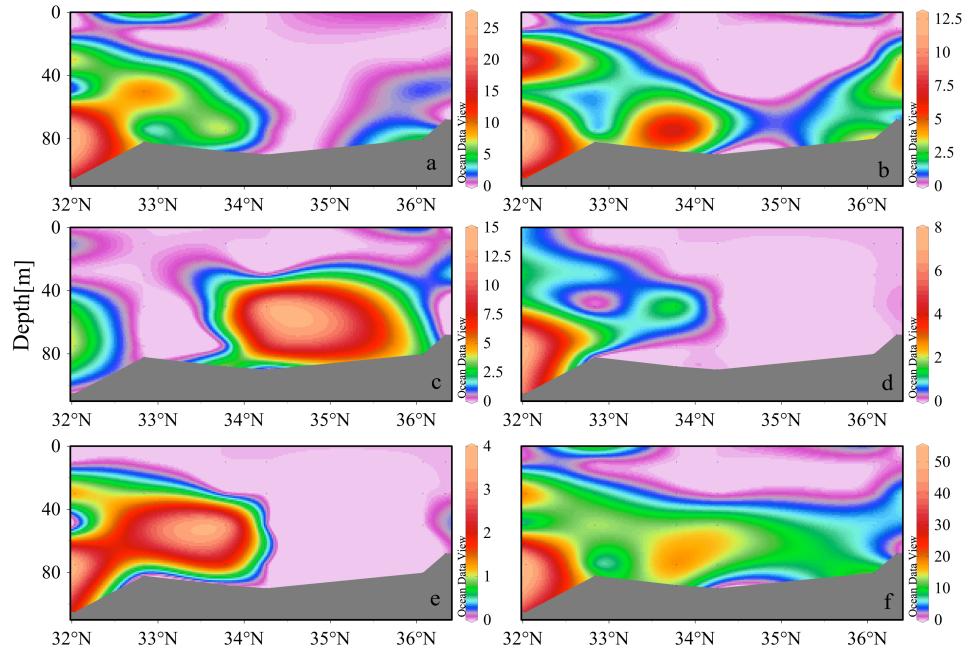
**Figure 8.** the abundance distribution of coccospores on surface layer in winter. (unit: cells  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliana huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptopus*; and **(f)** sum.



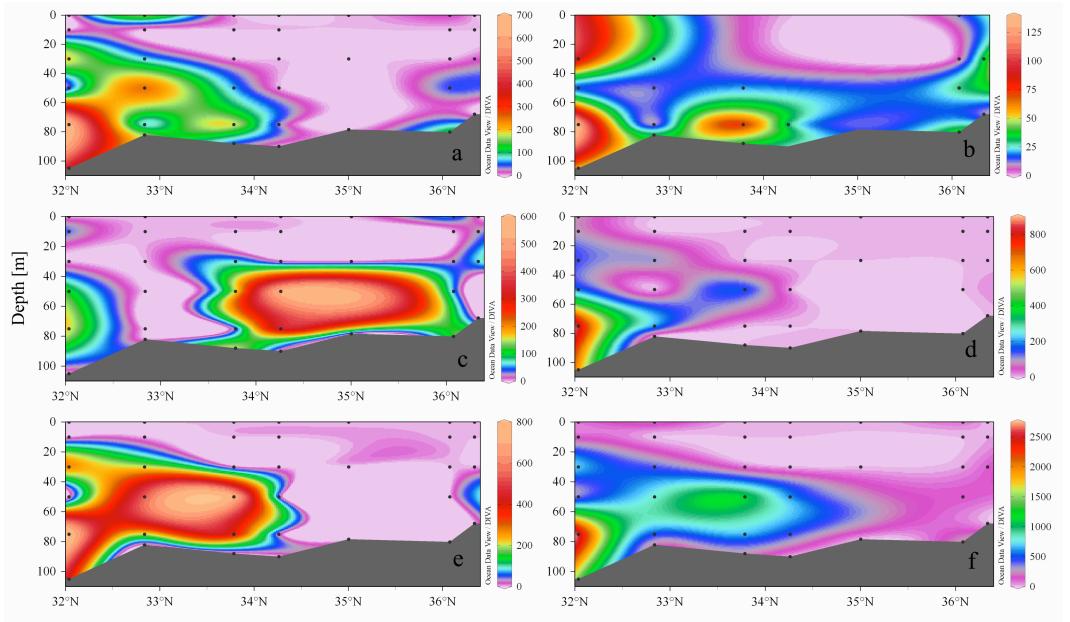
**Figure 8b.** the water column vertical integrated carbon biomass distribution of coccospores in winter. (unit:  $\text{mgC m}^{-2}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliana huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Calcidiscus leptopus*; **(e)** *Helicosphaera carteri*; and **(f)** sum.



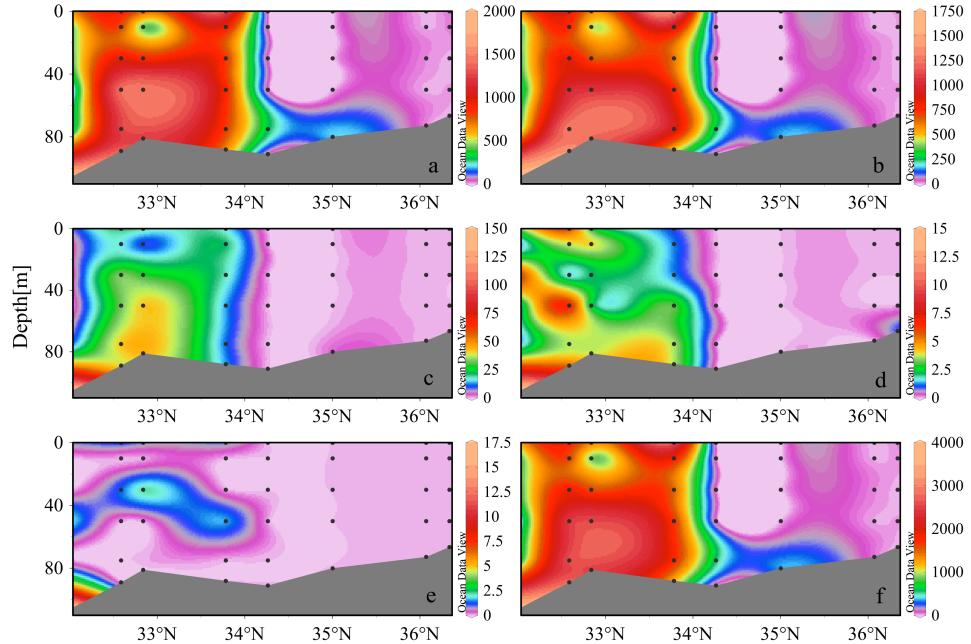
**Figure 9.** Vertical distribution of coccolith abundance along the section A in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Helicosphaera carteri*; (d) *Calcidiscus leptoporus*; (e) *Braarudosphaera bigelowii*; and (f) sum.



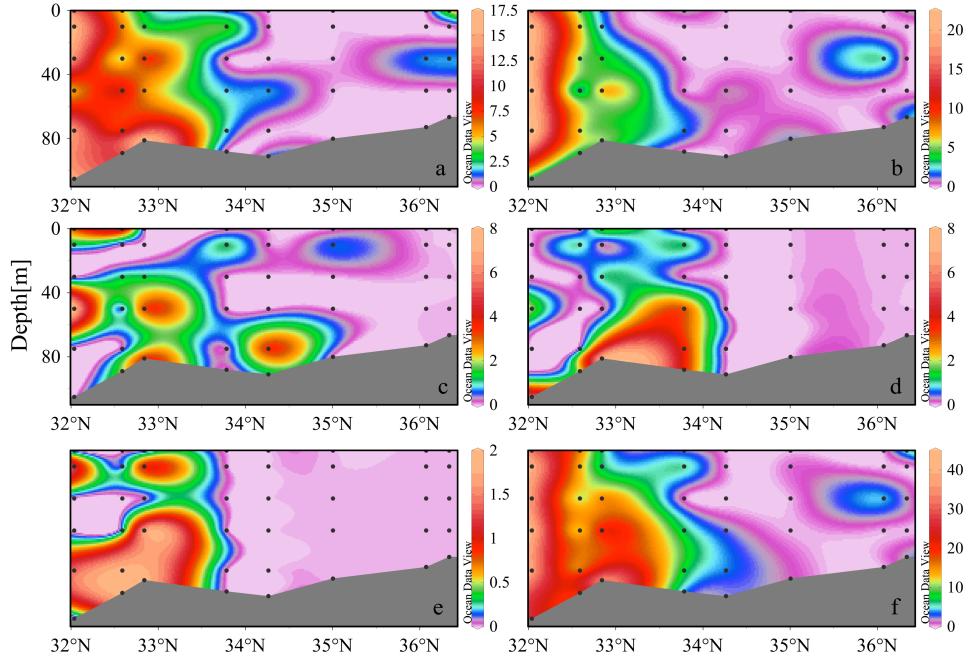
**Figure 10a.** Vertical distribution of coccospHERE abundance along the section A in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



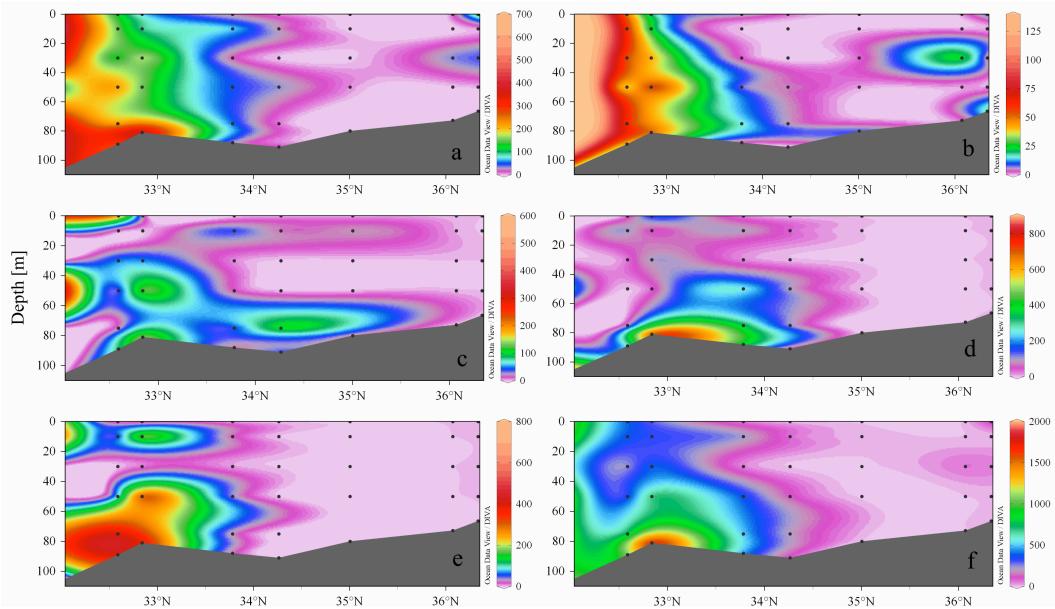
**Figure 10b.** Vertical distribution of coccospHERE carbon biomass along the section A in summer. (unit:  $\text{ugC L}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Caldidiscus leptoporus*; and (f) sum.



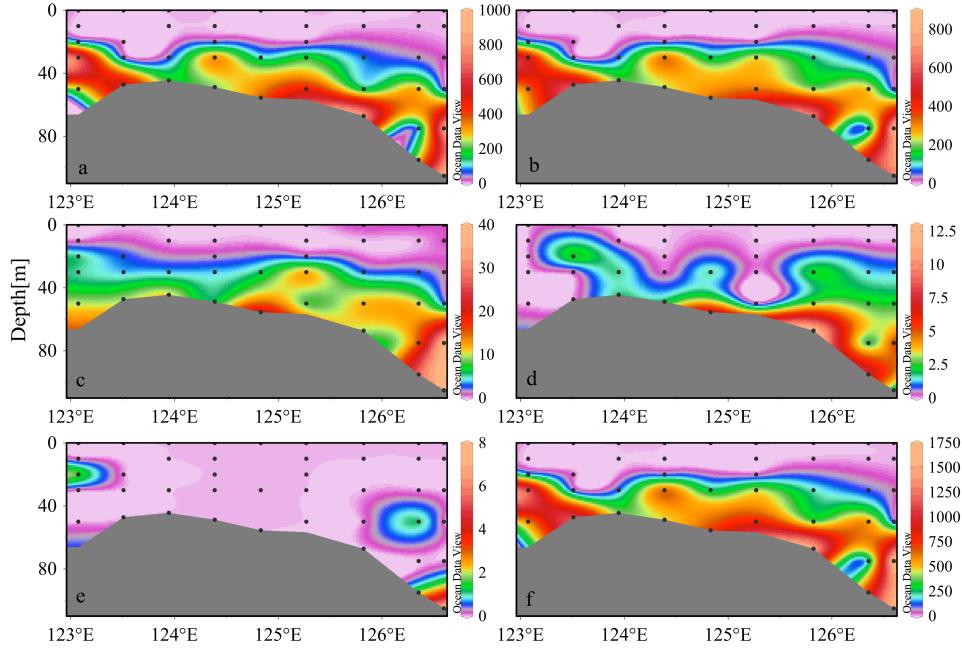
**Figure 11.** Vertical distribution of coccolith abundance along the section A in winter. (unit:  $\text{coccoliths mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Helicosphaera carteri*; (d) *Caldidiscus leptoporus*; (e) *Braarudosphaera bigelowii*; and (f) sum.



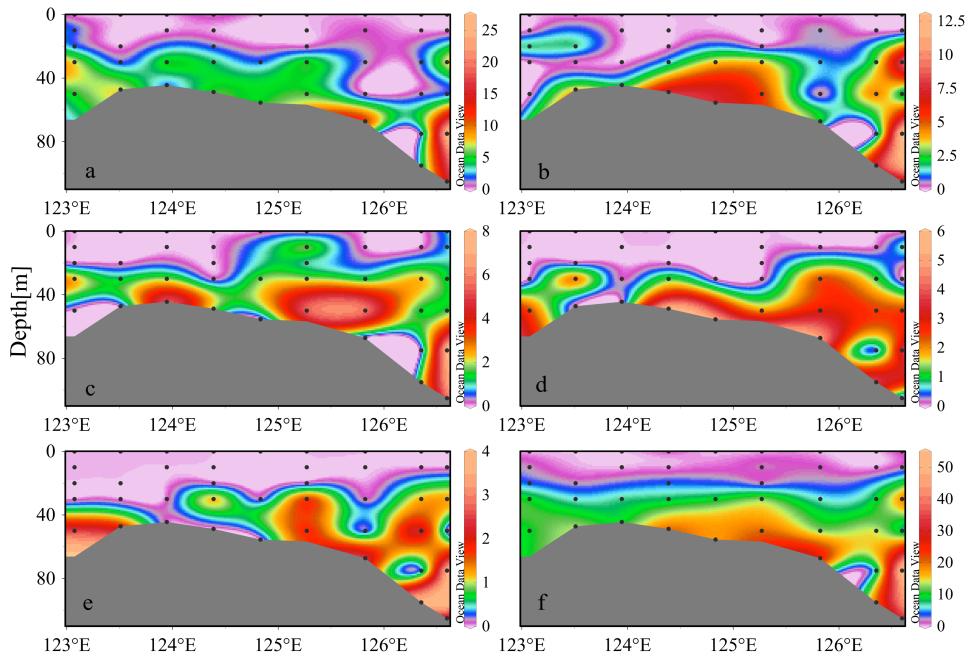
**Figure 12a.** Vertical distribution of coccospHERE abundance along the section A in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



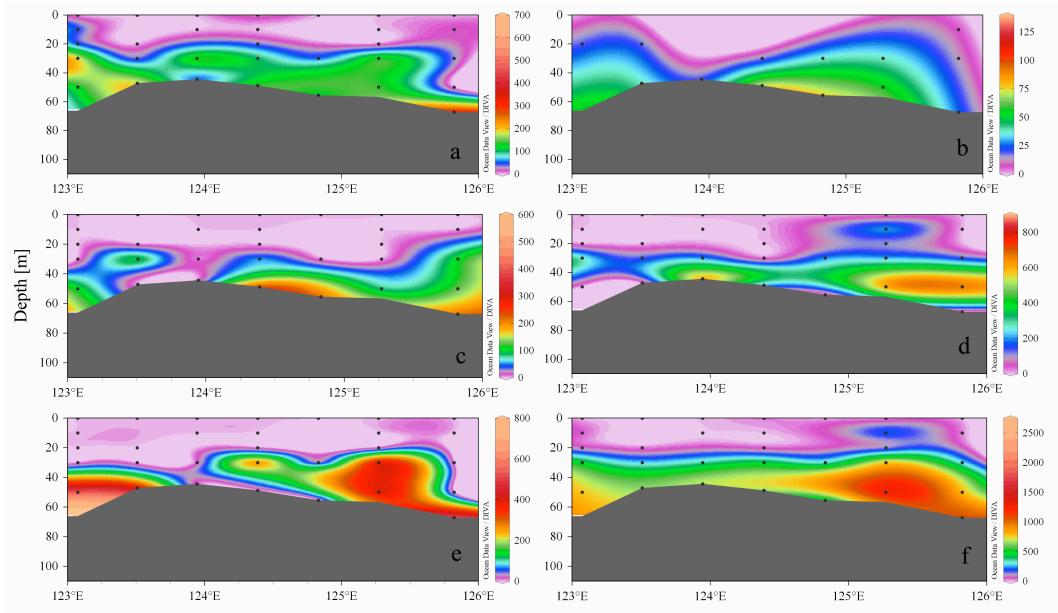
**Figure 12b.** Vertical distribution of coccospHERE carbon biomass along the section A in winter. (unit:  $\text{ugC L}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



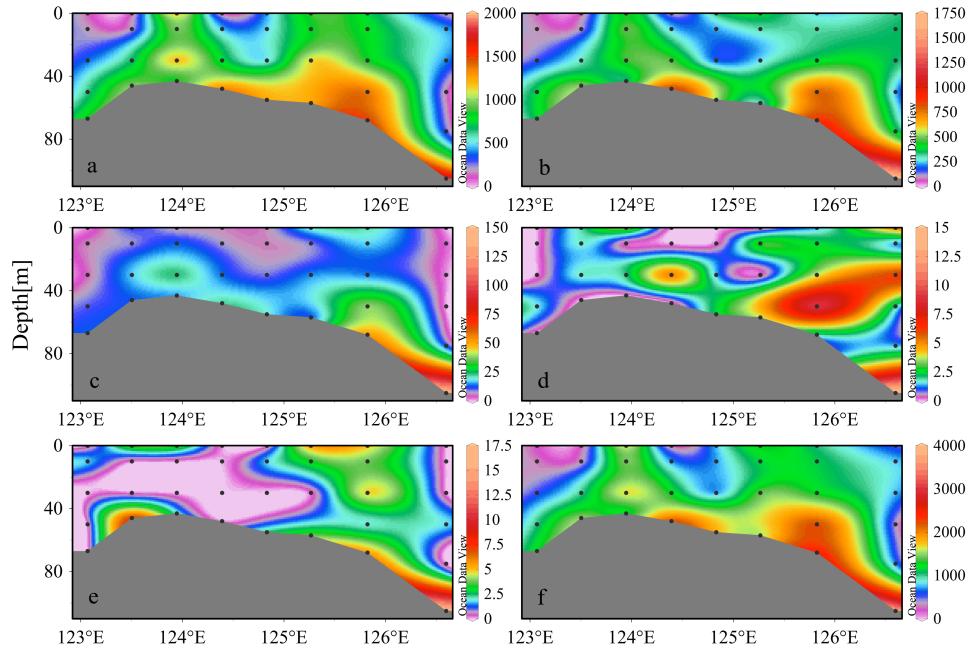
**Figure 13.** Vertical distribution of coccolith abundance along the section F in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Helicosphaera carteri*; **(d)** *Caldidiscus leptoporus*; **(e)** *Braarudosphaera bigelowii*; and **(f)** sum.



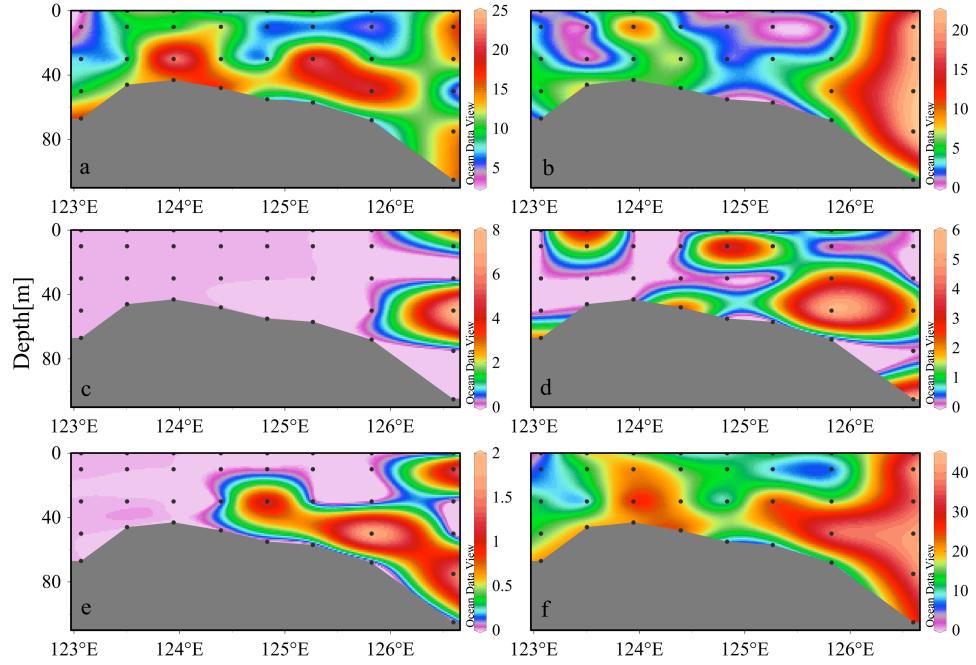
**Figure 14a.** Vertical distribution of coccospHERE abundance along the section F in summer. (unit: coccospHERE  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Caldidiscus leptoporus*; and **(f)** sum.



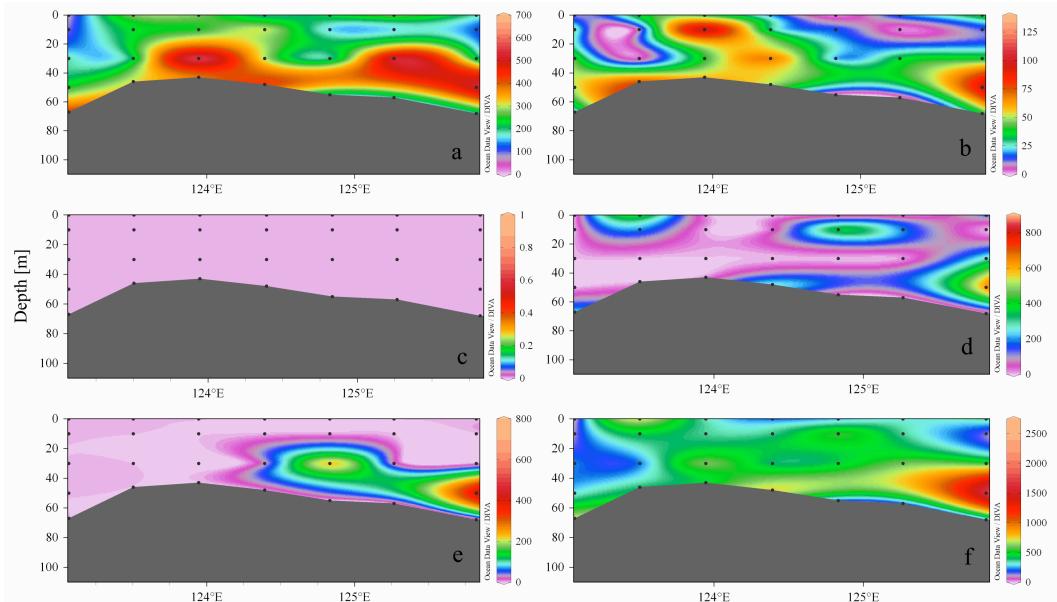
**Figure 14b.** Vertical distribution of coccospHERE carbon biomass along the section F in summer. (unit: ugC L<sup>-1</sup>); (a) *Gephyrocapsa oceanica*; (b) *Emiliana huxleyi*; (c) *Algiosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum



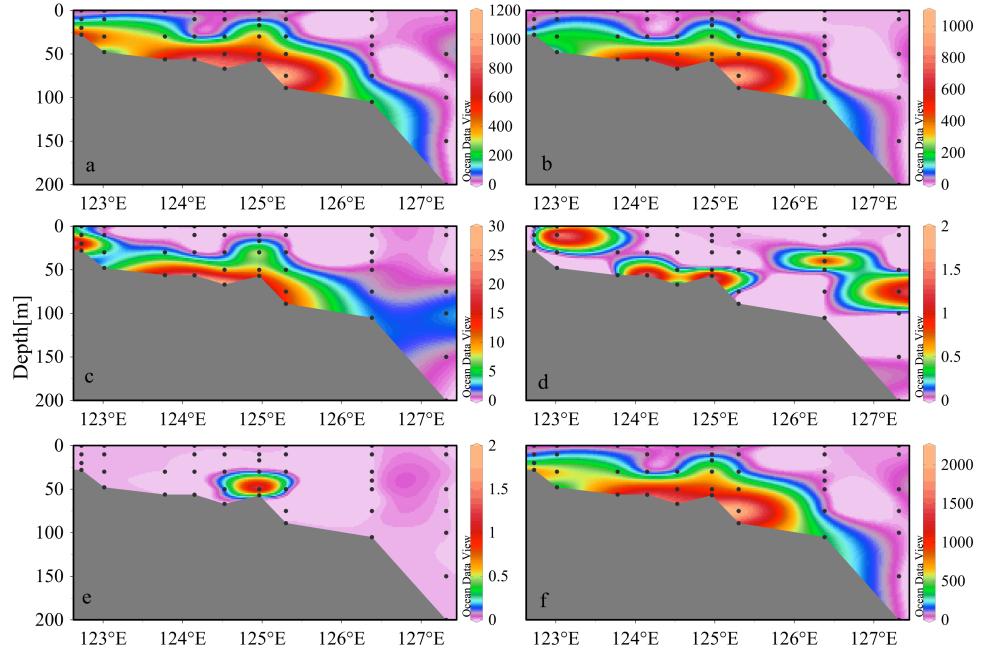
**Figure 15.** Vertical distribution of coccolith abundance along the section F in winter. (unit: coccoliths mL<sup>-1</sup>); (a) *Gephyrocapsa oceanica*; (b) *Emiliana huxleyi*; (c) *Helicosphaera carteri*; (d) *Calcidiscus leptoporus*; (e) *Braarudosphaera bigelowii*; and (f) sum.



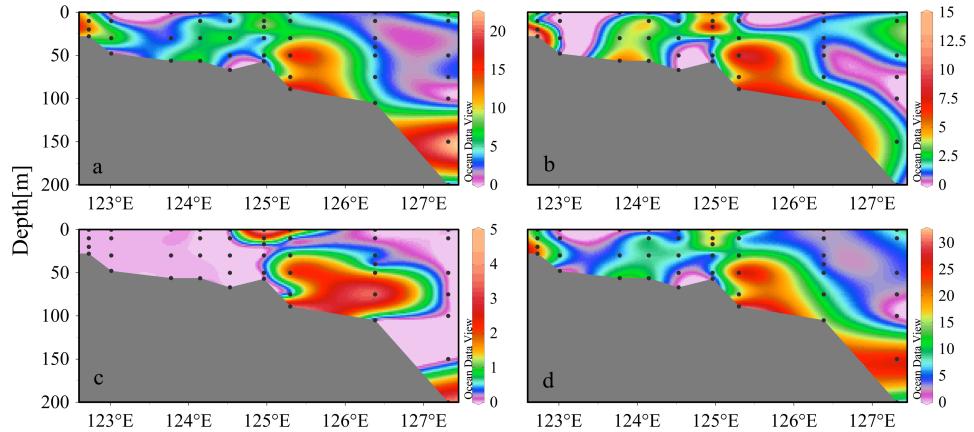
**Figure 16a.** Vertical distribution of coccospHERE abundance along the section F in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



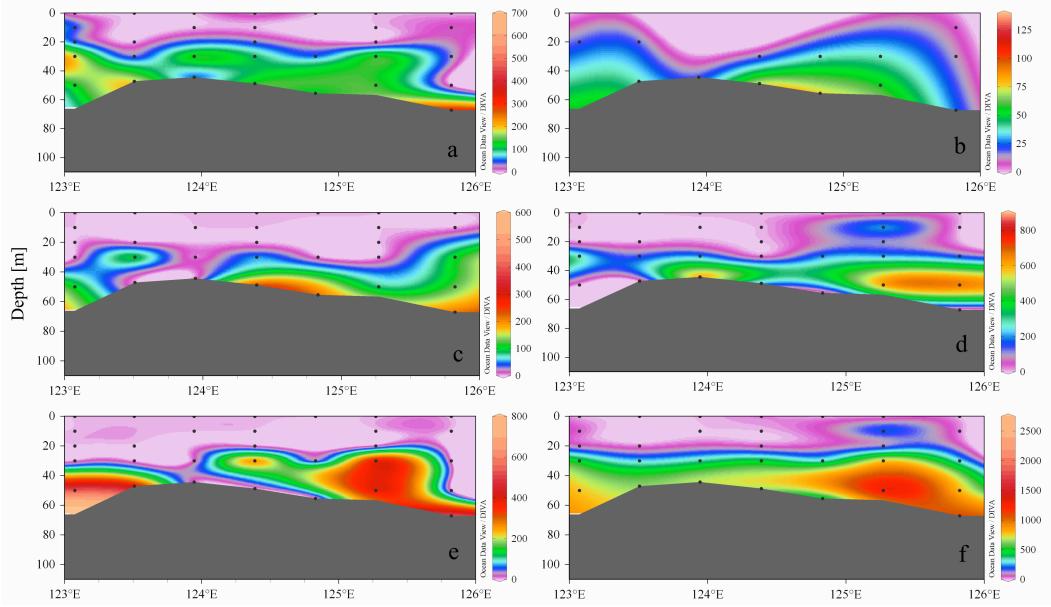
**Figure 16b.** Vertical distribution of coccospHERE carbon biomass along the section F in winter. (unit:  $\text{ugC L}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



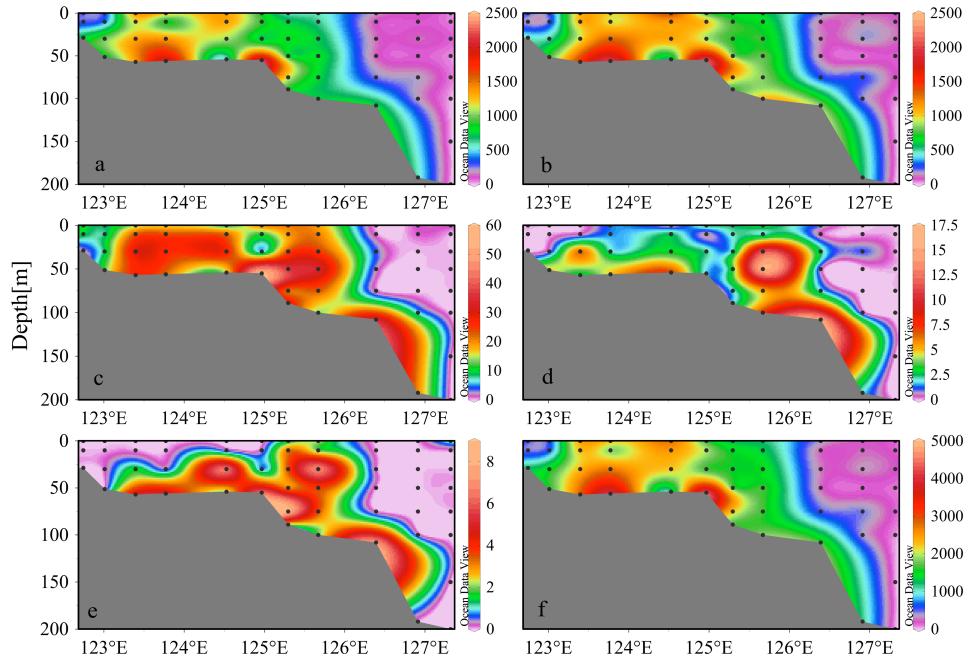
**Figure 17.** Vertical distribution of coccolith abundance along the section P in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Helicosphaera carteri*; **(d)** *Calcidiscus leptoporus*; **(e)** *Braarudosphaera bigelowii*; and **(f)** sum.



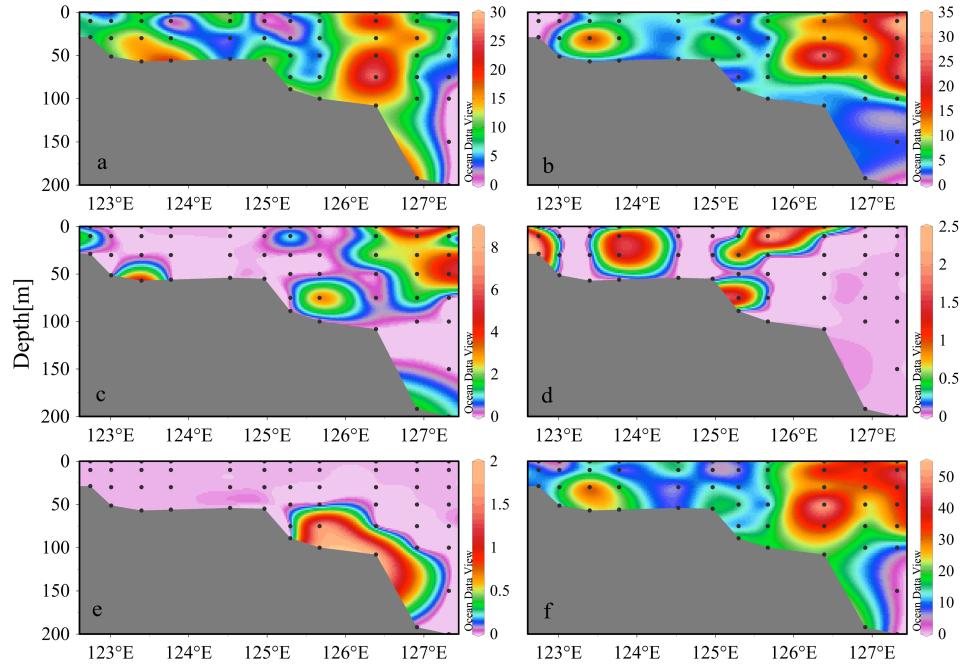
**Figure 18a.** Vertical distribution of coccospHERE abundance along the section P in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptoporus*; and **(f)** sum.



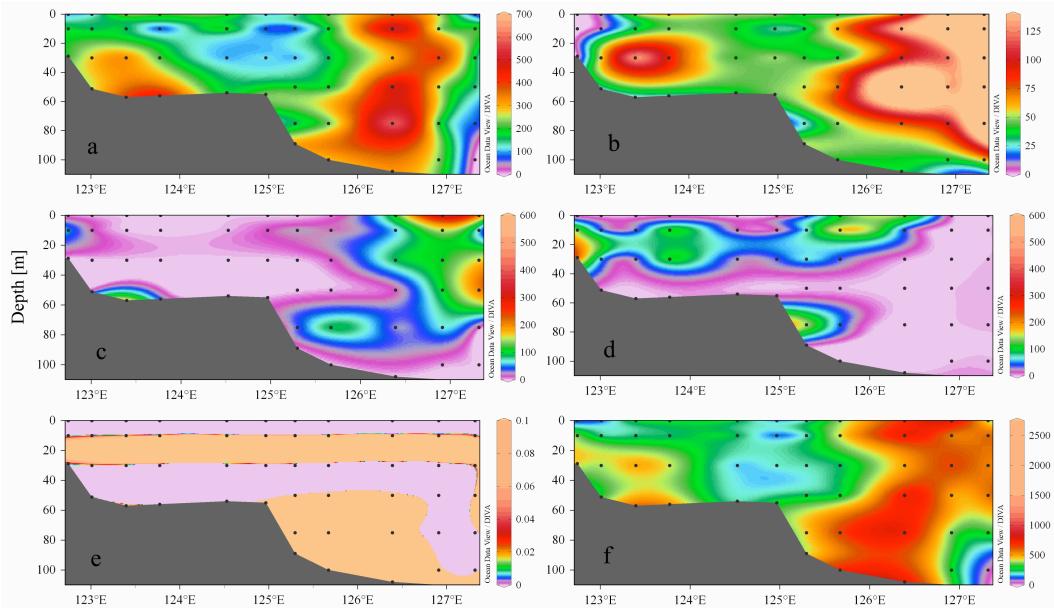
**Figure 18b.** Vertical distribution of coccospHERE carbon biomass along the section P in summer. (unit:  $\text{ugC L}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptoporus*; and **(f)** sum



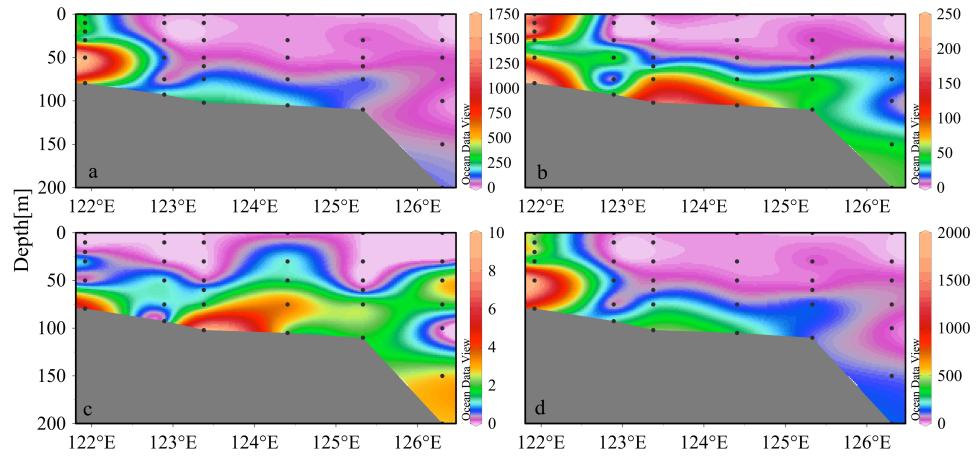
**Figure 19.** Vertical distribution of coccolith abundance along the section P in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Helicosphaera carteri*; **(d)** *Calcidiscus leptoporus*; **(e)** *Braarudosphaera bigelowii*; and **(f)** sum.



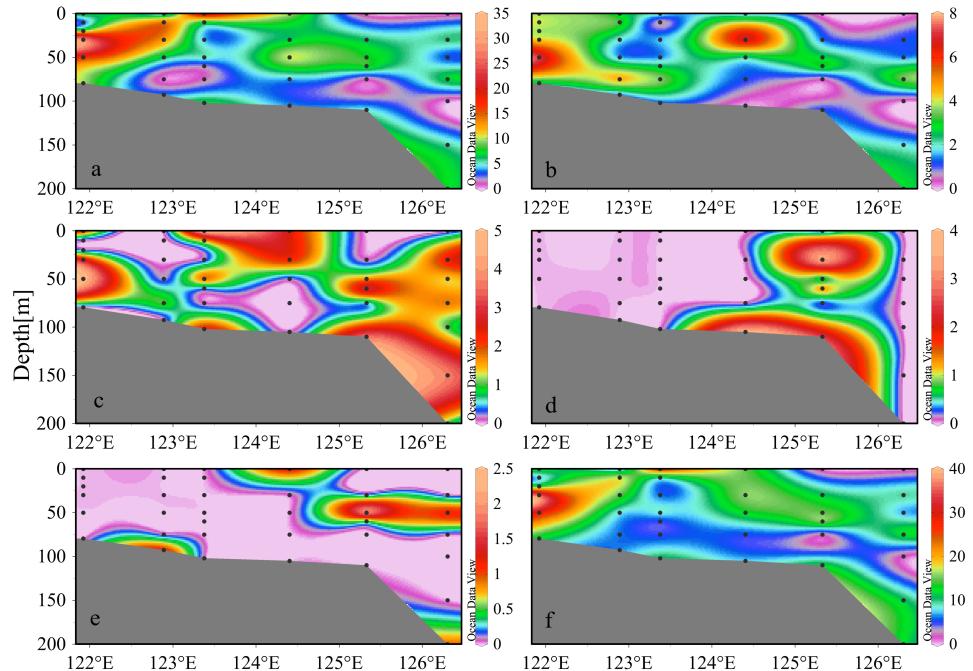
**Figure 20a.** Vertical distribution of coccospHERE abundance along the section P in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptoporus*; and **(f)** sum.



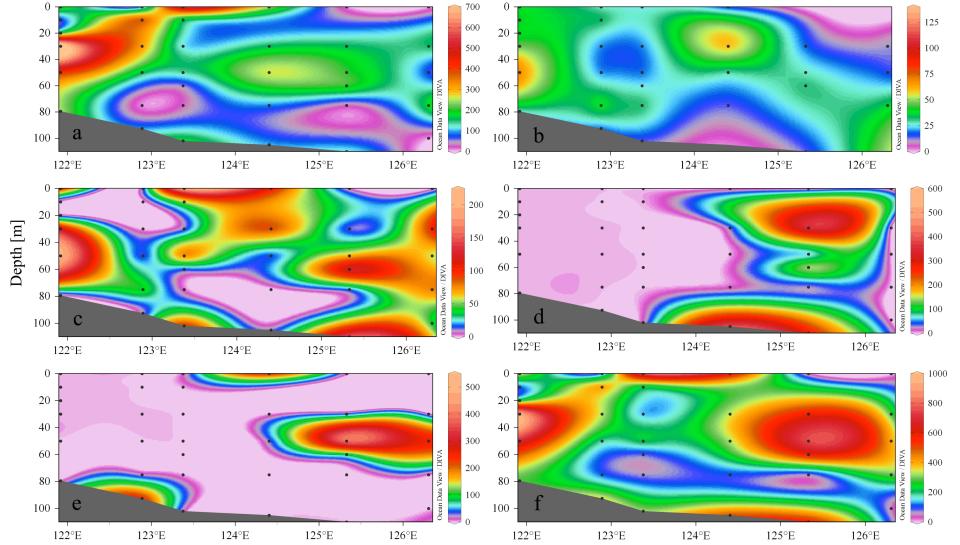
**Figure 20b.** Vertical distribution of coccospHERE carbon biomass along the section P in winter. (unit:  $\text{ugC L}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptoporus*; and **(f)** sum.



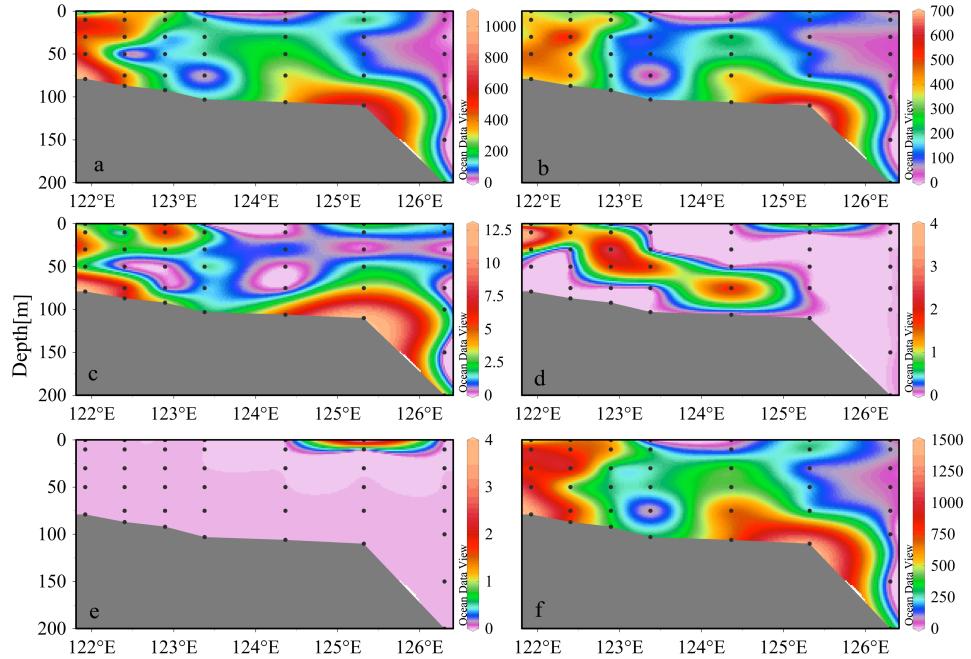
**Figure 21.** Vertical distribution of coccolith abundance along the section E in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Helicosphaera carteri*; (d) *Caldidiscus leptoporus*; and (e) *Braarudosphaera bigelowii*; and (f) sum.



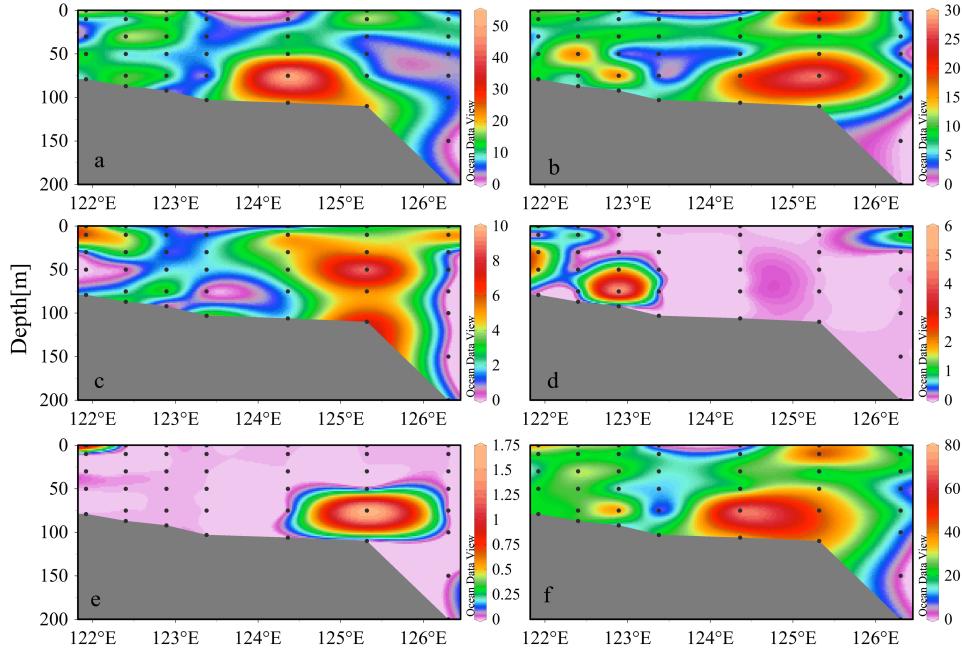
**Figure 22a.** Vertical distribution of coccospHERE abundance along the section E in summer. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Caldidiscus leptoporus*; and (f) sum.



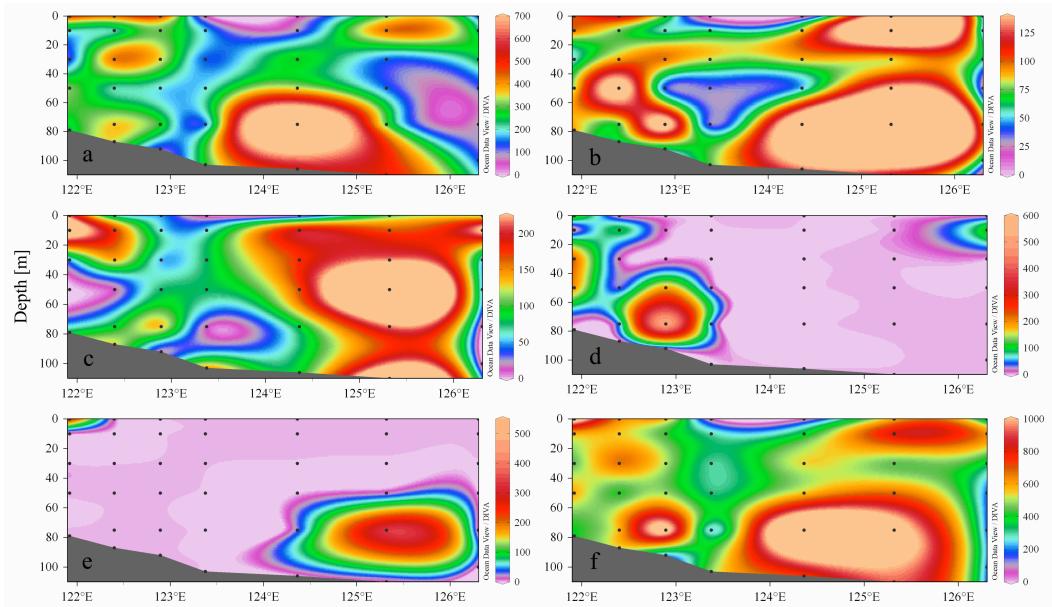
**Figure 22b.** Vertical distribution of coccospHERE carbon biomass along the section E in summer. (unit:  $\text{ugC L}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Algirosphaera robusta*; **(d)** *Helicosphaera carteri*; **(e)** *Calcidiscus leptopus*; and **(f)** sum



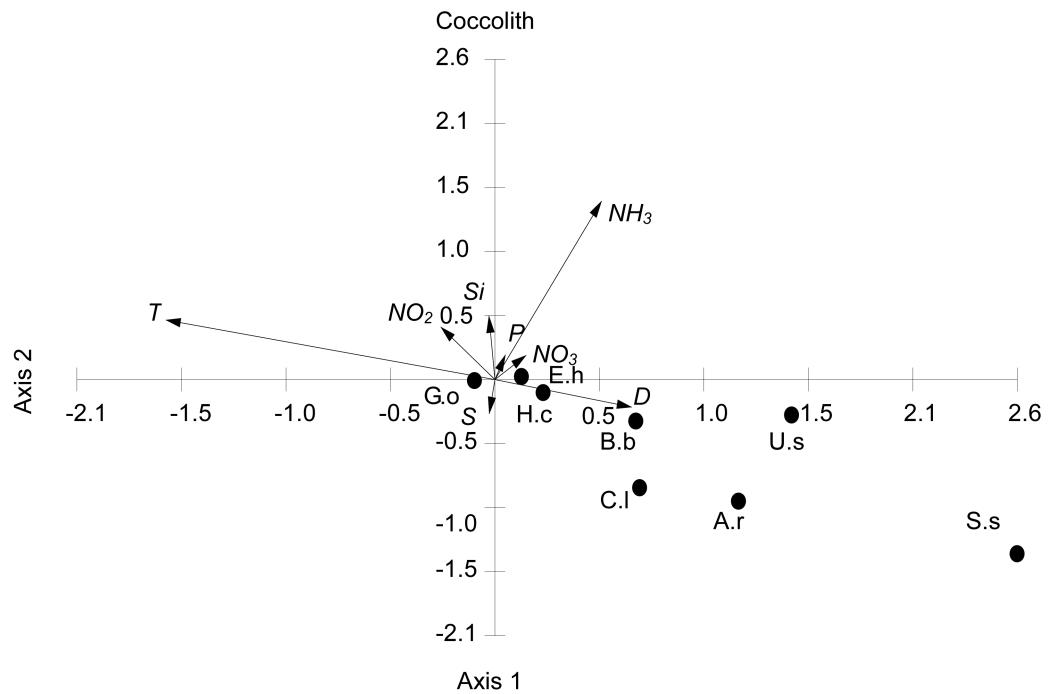
**Figure 23.** Vertical distribution of coccolith abundance along the section E in winter. (unit:  $\text{coccoliths mL}^{-1}$ ); **(a)** *Gephyrocapsa oceanica*; **(b)** *Emiliania huxleyi*; **(c)** *Helicosphaera carteri*; **(d)** *Calcidiscus leptopus*; **(e)** *Braarudosphaera bigelowii*; and **(f)** sum.



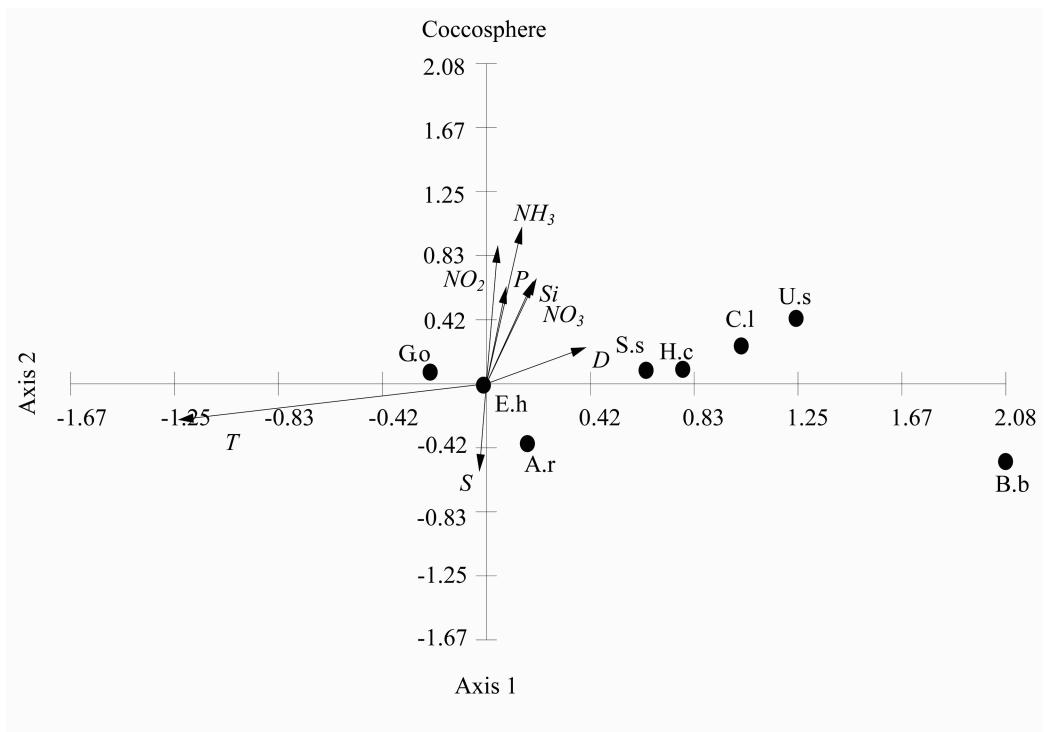
**Figure 24a.** Vertical distribution of coccospHERE abundance along the section E in winter. (unit: coccoliths  $\text{mL}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



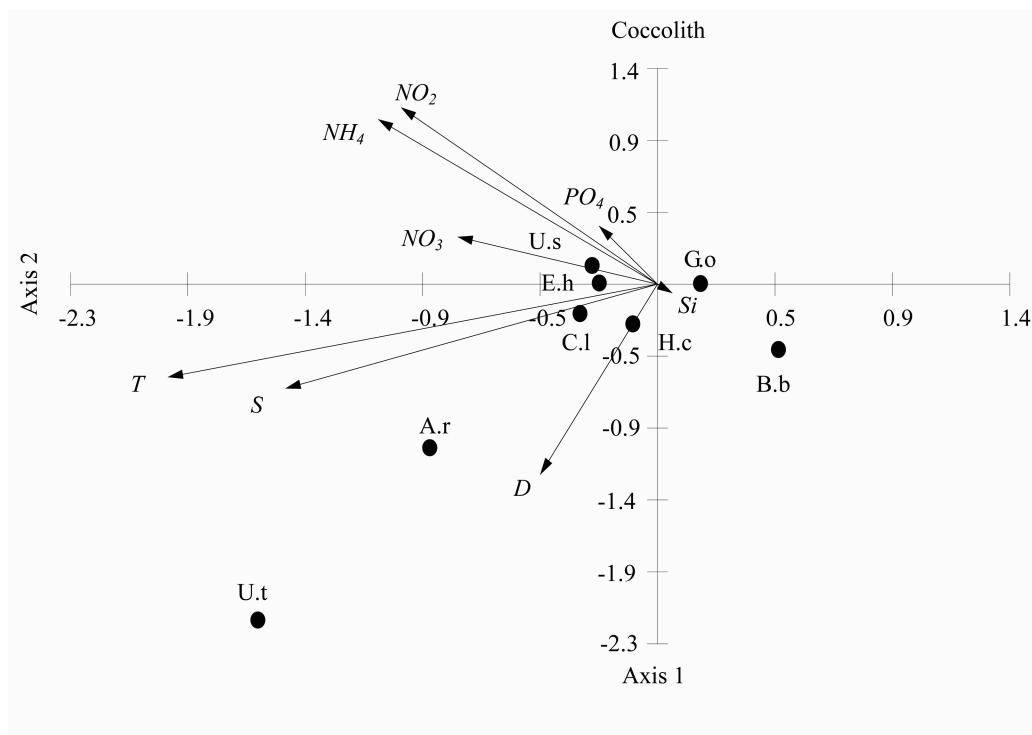
**Figure 24b.** Vertical distribution of coccospHERE carbon biomass along the section E in winter. (unit:  $\text{ugC L}^{-1}$ ); (a) *Gephyrocapsa oceanica*; (b) *Emiliania huxleyi*; (c) *Algirosphaera robusta*; (d) *Helicosphaera carteri*; (e) *Calcidiscus leptoporus*; and (f) sum.



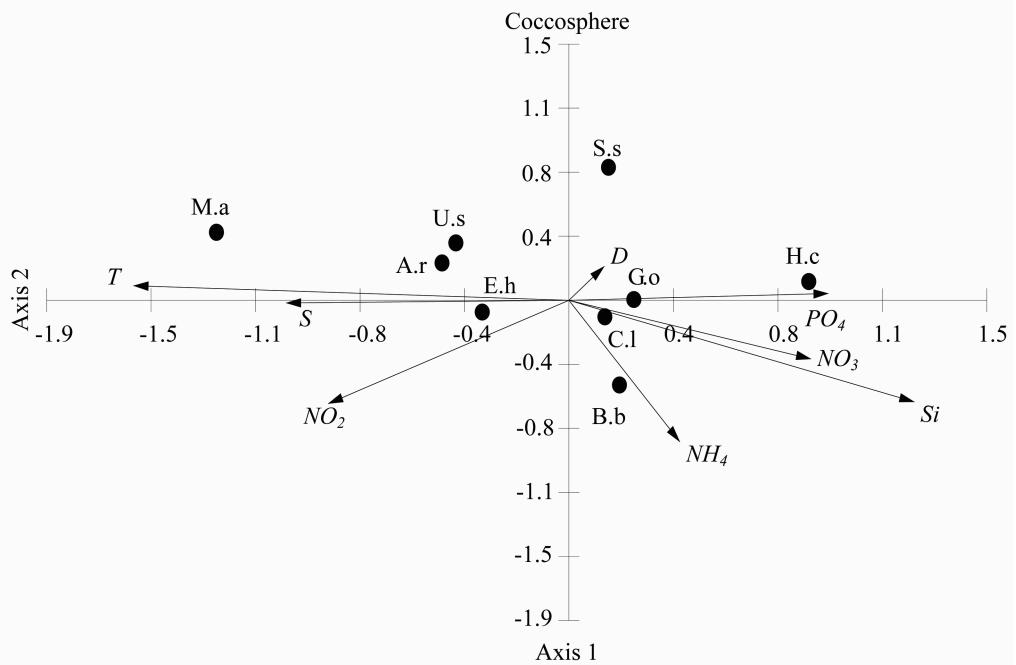
**Figure 25.** Results of the CCA of coccolith abundance vs. environmental factors in summer. ( $T$ : Temperature;  $S$ : Salinity;  $D$ : Sampling Depth;  $NO_2$ : Nitrite;  $NO_3$ : Nitrate;  $NH_3$ : Ammonium;  $Si$ : Silicate;  $P$ : Phosphate; G.o: *Gephyrocapsa oceanica*; E.h: *Emiliania huxleyi*; H.c: *Helicosphaera carteri*; B.b: *Braarudosphaera bigelowii*; A.r: *Algiosphaera robusta*; C.l: *Calcidiscus leptoporus*; U.s: *Umbilicosphaera sibogae*; S.s.: *Syracosphaera* spp.)



**Figure 26.** Results of the CCA of coccospHERE abundance vs. environmental factors in summer. ( $T$ : Temperature;  $S$ : Salinity;  $D$ : Sampling Depth;  $NO_2$ : Nitrite;  $NO_3$ : Nitrate;  $NH_3$ : Ammonium;  $Si$ : Silicate;  $P$ : Phosphate; G.o: *Gephyrocapsa oceanica*; E.h: *Emiliania huxleyi*; H.c: *Helicosphaera carteri*; B.b: *Braarudosphaera bigelowii*; A.r: *Algiosphaera robusta*; C.l: *Calcidiscus leptoporus*; U.s: *Umbilicosphaera sibogae*; S.s.: *Syracosphaera* spp.)



**Figure 27.** Results of the CCA of coccolith abundance *vs.* environmental factors in winter. (*T*: Temperature; *S*: Salinity; *D*: Sampling Depth;  $NO_2$ : Nitrite;  $NO_3$ : Nitrate;  $NH_4$ : Ammonium; *Si*: Silicate; *P*: Phosphate; *G.o*: *Gephyrocapsa oceanica*; *E.h*: *Emiliania huxleyi*; *H.c*: *Helicosphaera carteri*; *B.b*: *Braarudosphaera bigelowii*; *A.r*: *Algiosphaera robusta*; *C.l*: *Calcidiscus leptoporus*; *U.s*: *Umbilicosphaera sibogae*; *U.t*: *Umbellopsphaera tenuis*)



**Figure 28.** Results of the CCA of coccospHERE abundance *vs.* environmental factors in winter. (*T*: Temperature; *S*: Salinity; *D*: Sampling Depth;  $NO_2$ : Nitrite;  $NO_3$ : Nitrate;  $NH_4$ : Ammonium; *Si*: Silicate; *P*: Phosphate; *G.o*: *Gephyrocapsa oceanica*; *E.h*: *Emiliania huxleyi*; *H.c*: *Helicosphaera carteri*; *B.b*: *Braarudosphaera bigelowii*; *A.r*: *Algiosphaera robusta*; *C.l*: *Calcidiscus leptoporus*; *U.s*: *Umbilicosphaera sibogae*; *M.a*: *Michaelsarsia adriaticus*; *S.s.*: *Syracosphaera* spp.)

