Atlas of Japan (East) Sea hydrographic properties in summer, 1999: Supplementary material

Lynne D. Talley[a], Pavel Tishchenko[b], Vladimir Luchin[c], Alexander Nedashkovskiy[b], Sergey Sagalaev[b], Dong-Jin Kang[d], Mark Warner[e] and Dong-Ha Min[f]

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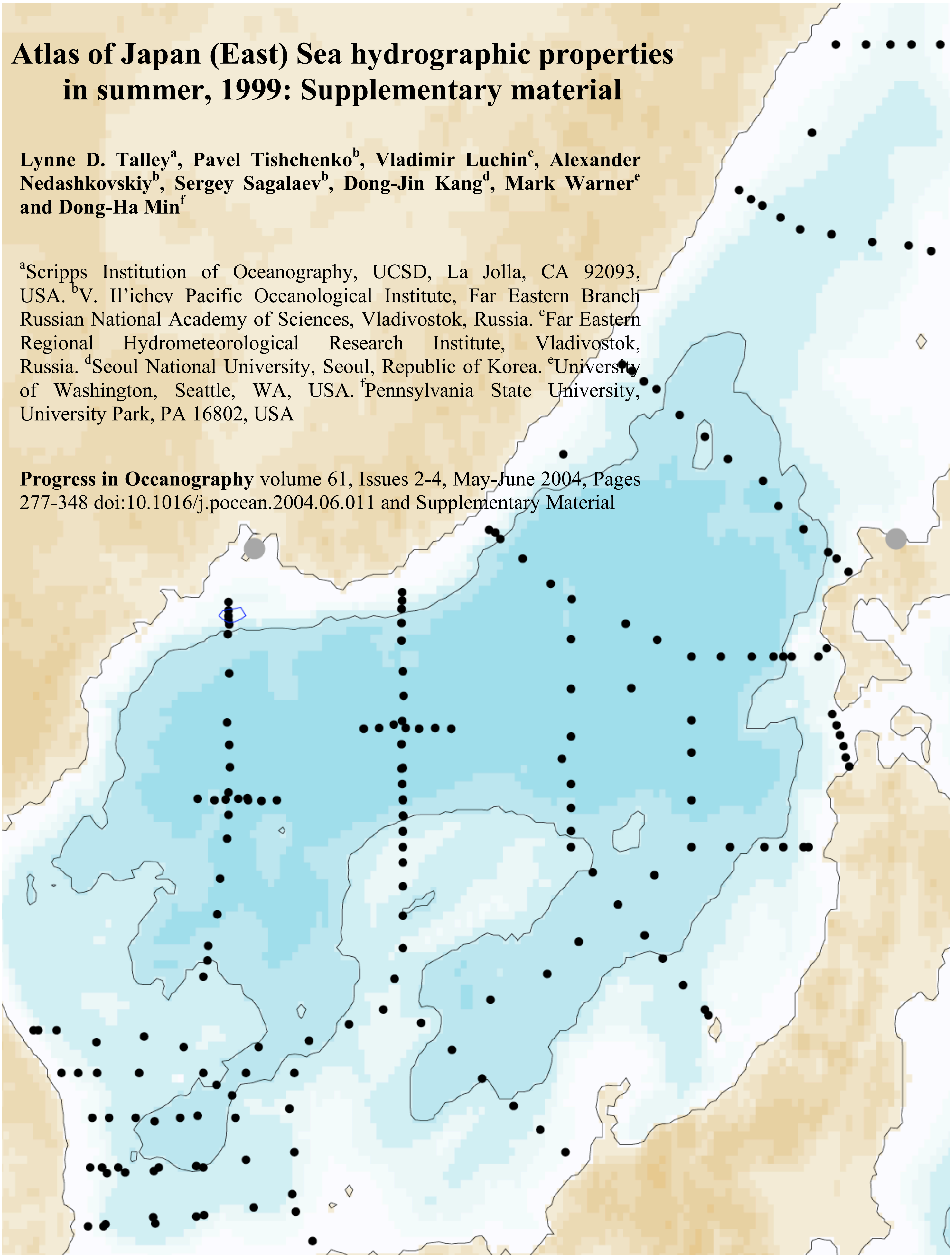
Progress in Oceanography volume 61, Issues 2-4, May-June 2004, Pages 277-348 doi:10.1016/j.pocean.2004.06.011 and Supplementary Material



Atlas of Japan (East) Sea hydrographic properties in summer, 1999

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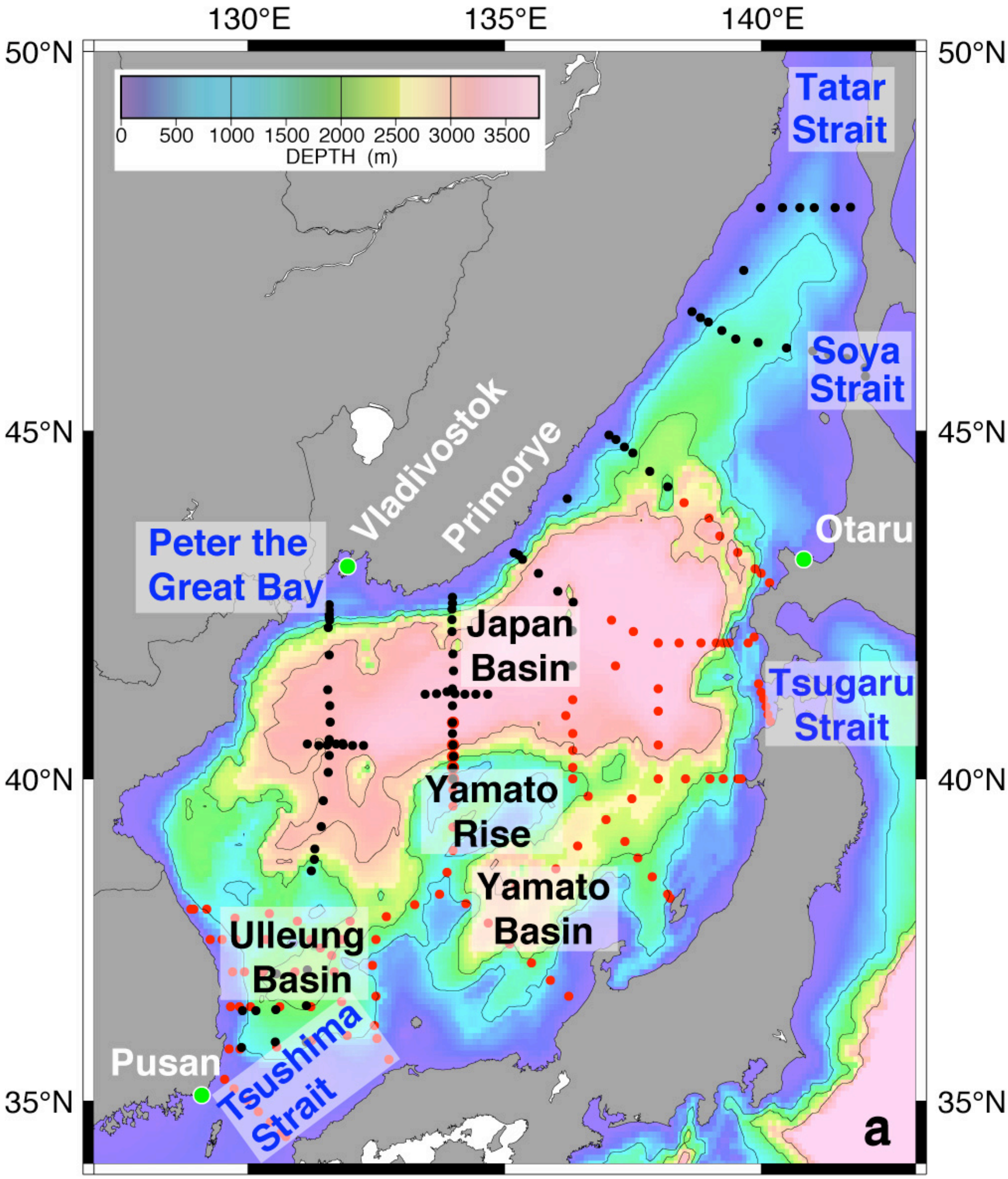
This is a pdf of all of the linked online material (all color material), formatted and including a table of contents, in order to facilitate perusal and printing. Some corrections have been made (see attached Errata). The original material is online at http://www.sciencedirect.com in Vol. 61 of Progress in Oceanography; click "Full Text + Links". A separate pdf contains the print version of the paper (primarily black and white images).

Table of contents for the Japan (East) Sea digital atlas

Errata for online figures and captions

Figure D1a. Figure conversion by Elsevier had errors. Corrected.
Figure D2a,b. Figure conversion created error in units "°C". Corrected
Figure D7. P1 Sigma 2 figure caption incorrect. Corrected.
Figure D9. P3 oxygen: original figure was unedited. Corrected.
Figure D10. P4 potential temperature: contour label error in figure. Corrected.
Figure D10. P4 all sections: section header in all figures corrected to "Ulleung Basin".
Figure D12. J1 caption: erroneously read "(black and white versions)". Corrected.
Figure D12. J1 all sections: include (2500:1) in captions. Deleted from all.
Figure D13. J2 all sections: section header in all figures corrected to "Japan Basin 134°E"
Figure D13. Y1J2 nitrate: drafting error in figure. Corrected.
Figure D16. J5 potential temperature: drafting error in figure. Corrected.
Figure D21. Y2J3 alkalinity: drafting errors in figure. Corrected.
Figure D41. Oxygen etc. maps, drafting error. Corrected.
Figure D62. Caption for potential density incorrect. Corrected.
Figure D105. Caption should include only (a) – (d).


130°E
135°E
140°E
50°N
45°N
40°N
35°N
0 500 1000 1500 2000 2500 3000 3500
DEPTH (m)
Tatar Strait
Soya Strait
Vladivostok
Primorye
Peter the Great Bay
Otaru
Japan Basin
Tsugaru Strait
Yamato Rise
Yamato Basin
Ulleung Basin
Pusan
Tsushima Strait
a

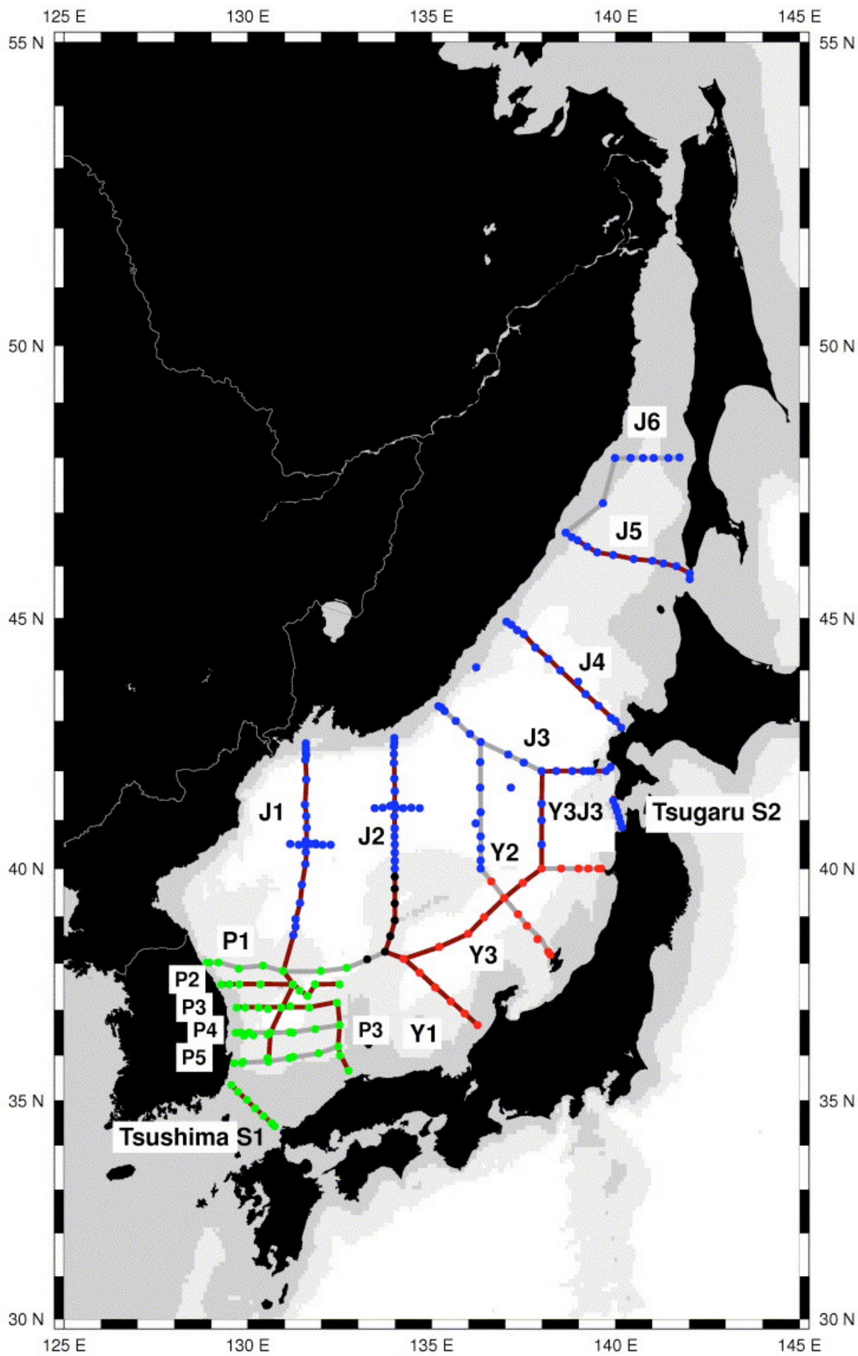


Figure D1. (a) Stations from the R/V Revelle (24 June - 17 July, 1999: red) and Professor Khromov (22 July - 11 August, 1999: blue), superimposed on etopo5 bathymetry. (b) Sections in this publication (brown) and sections in the online atlas (gray and brown). Station color indicates use in property-property distributions: Ulleung Basin (green), Yamato Basin (red), Japan Basin (blue), Yamato Rise (black).

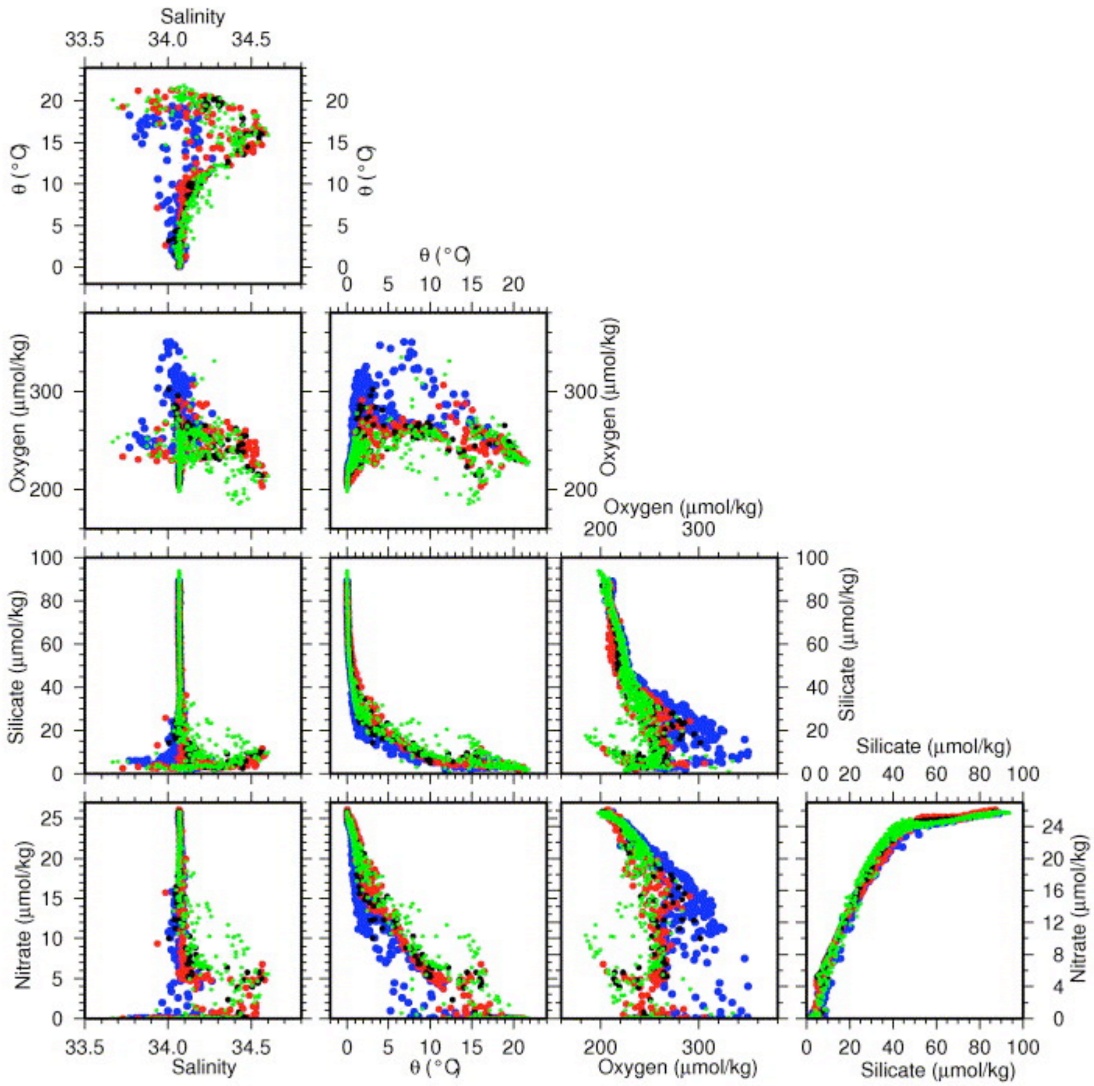


Figure D2a. For the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black): Salinity, potential temperature (°C), oxygen (μmol/kg), dissolved silicate (μmol/kg), nitrate (μmol/kg), phosphate (μmol/kg), pH, and alkalinity (mmol/kg). Property ranges were selected for full coverage, with the exception of a small number of very low salinity values.

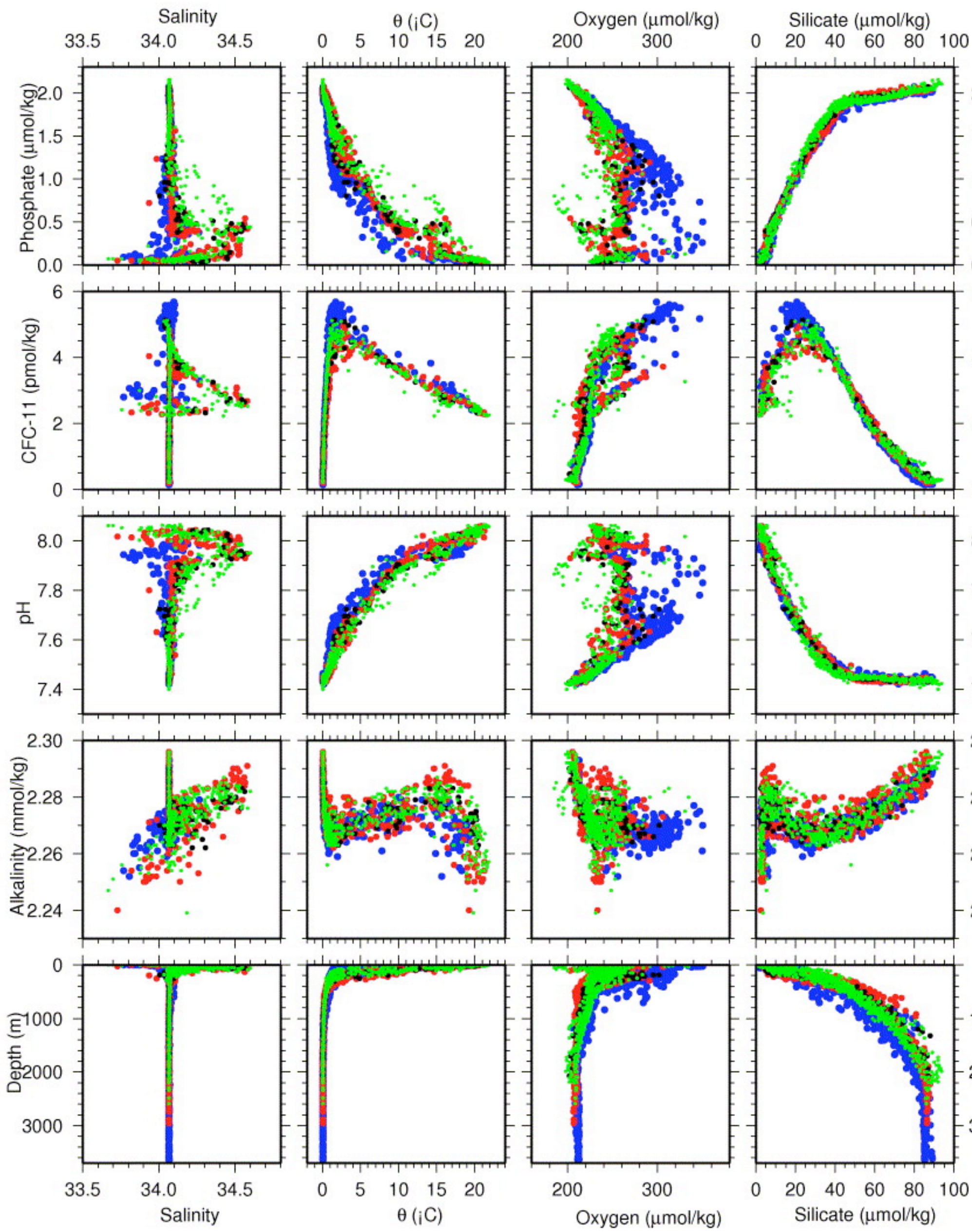


Figure D2b. For the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black): Salinity, potential temperature (°C), oxygen (μmol/kg), dissolved silicate (μmol/kg), phosphate (μmol/kg), CFC-11 (pmol/kg), pH, alkalinity (mmol/kg), and depth (m). Property ranges were selected for full coverage, with the exception of a small number of very low salinity and alkalinity values.

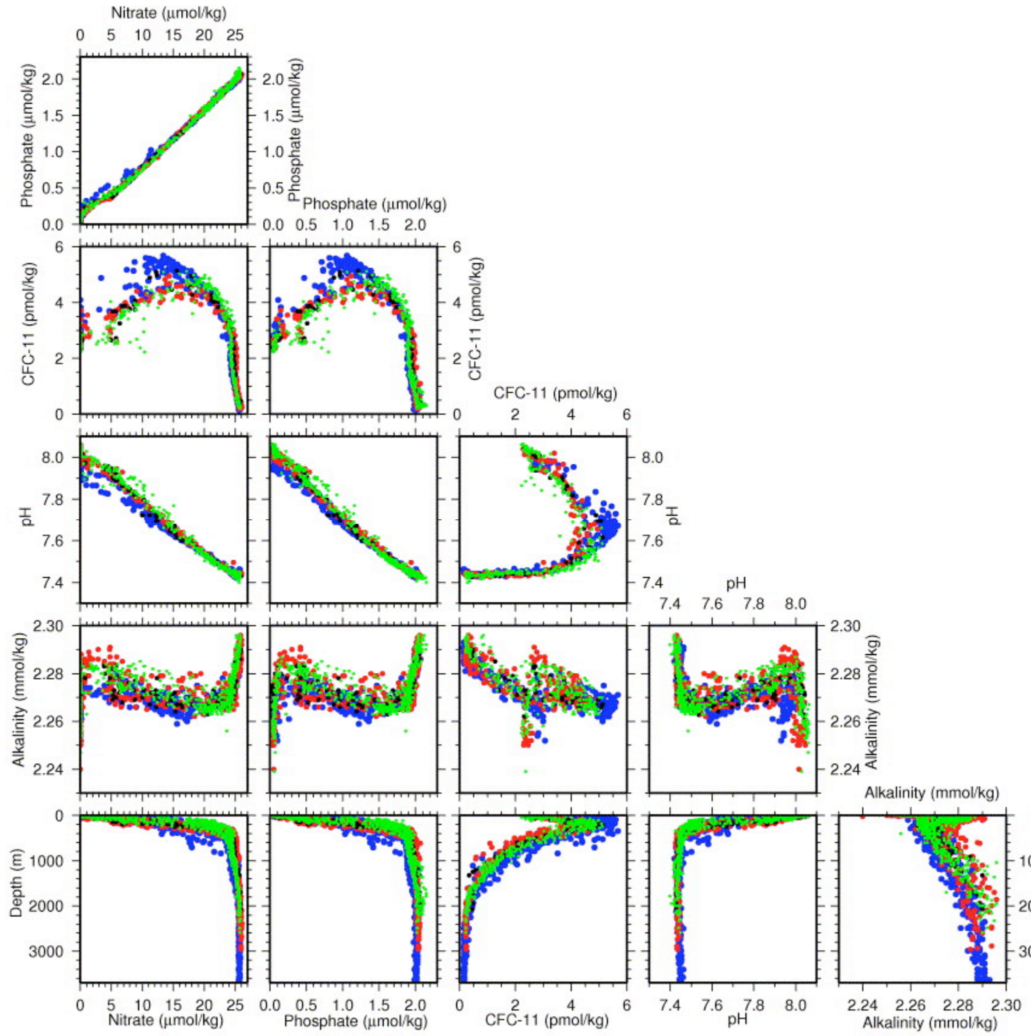


Figure D2c. For the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black): Nitrate (μmol/kg), phosphate (μmol/kg), CFC-11 (pmol/kg), pH, alkalinity (mmol/kg), and depth (m). Property ranges were selected for full coverage, with the exception of a small number of very low alkalinity values.

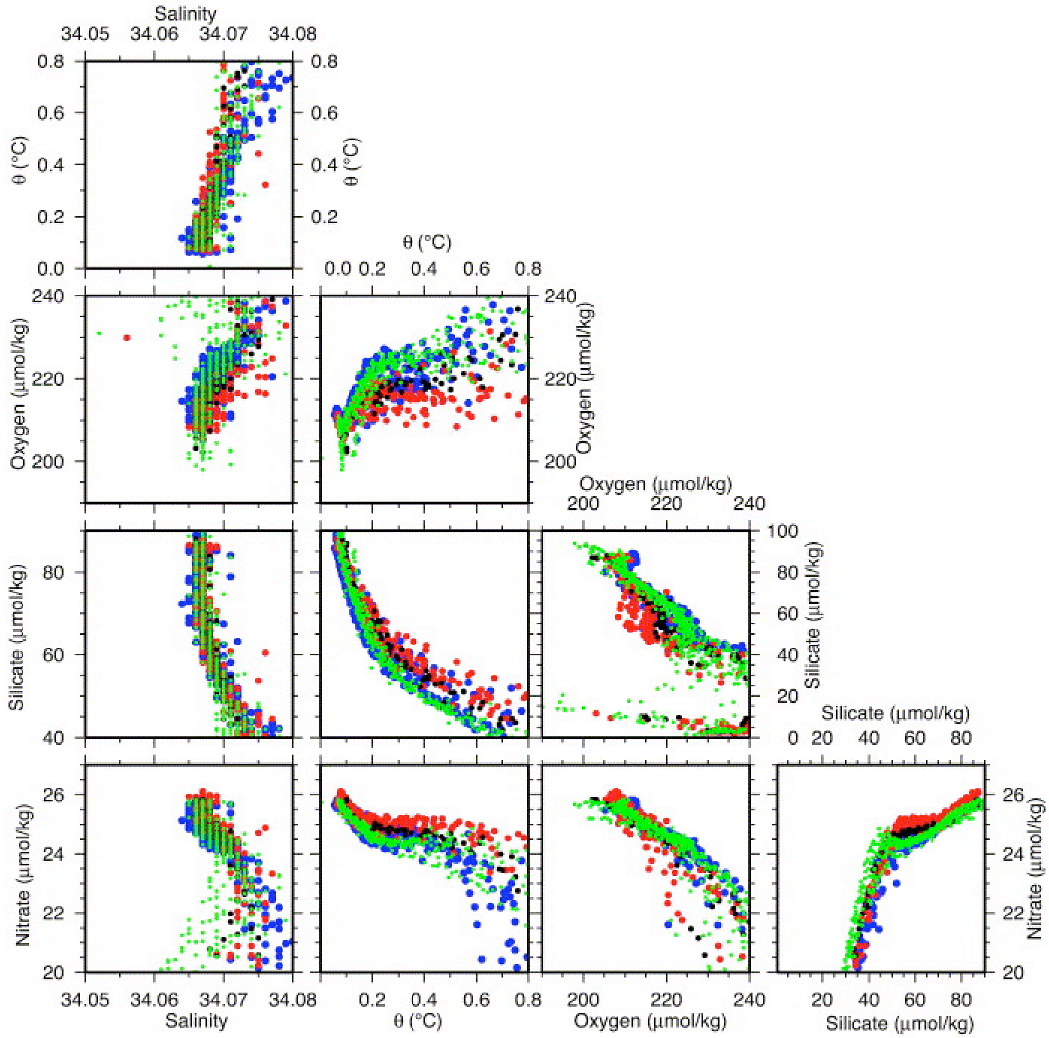


Figure D3a. Subthermocline and deep properties for the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black), as in Figure D2a.

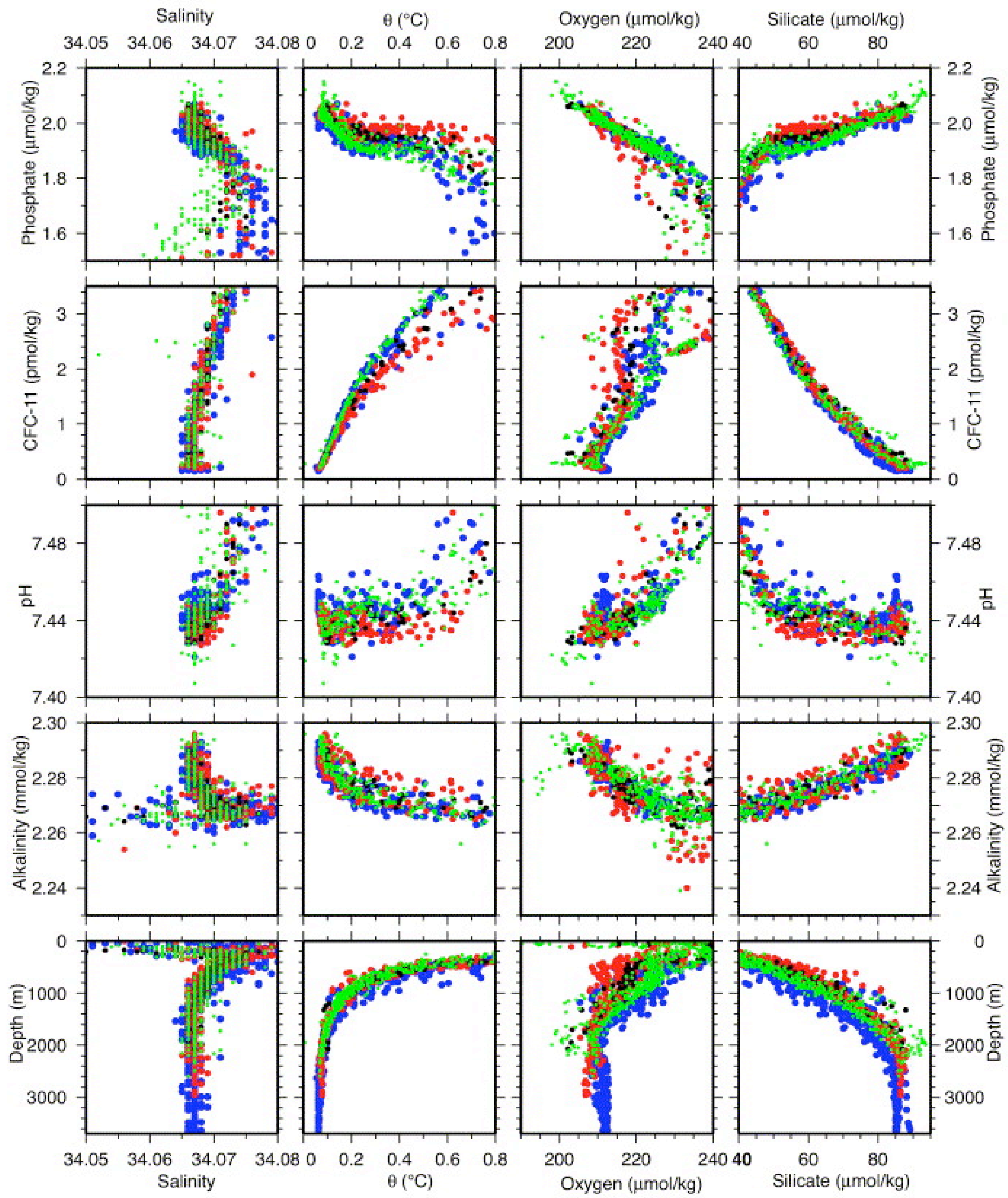


Figure D3b. Subthermocline and deep properties for the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black), as in Figure D2b.

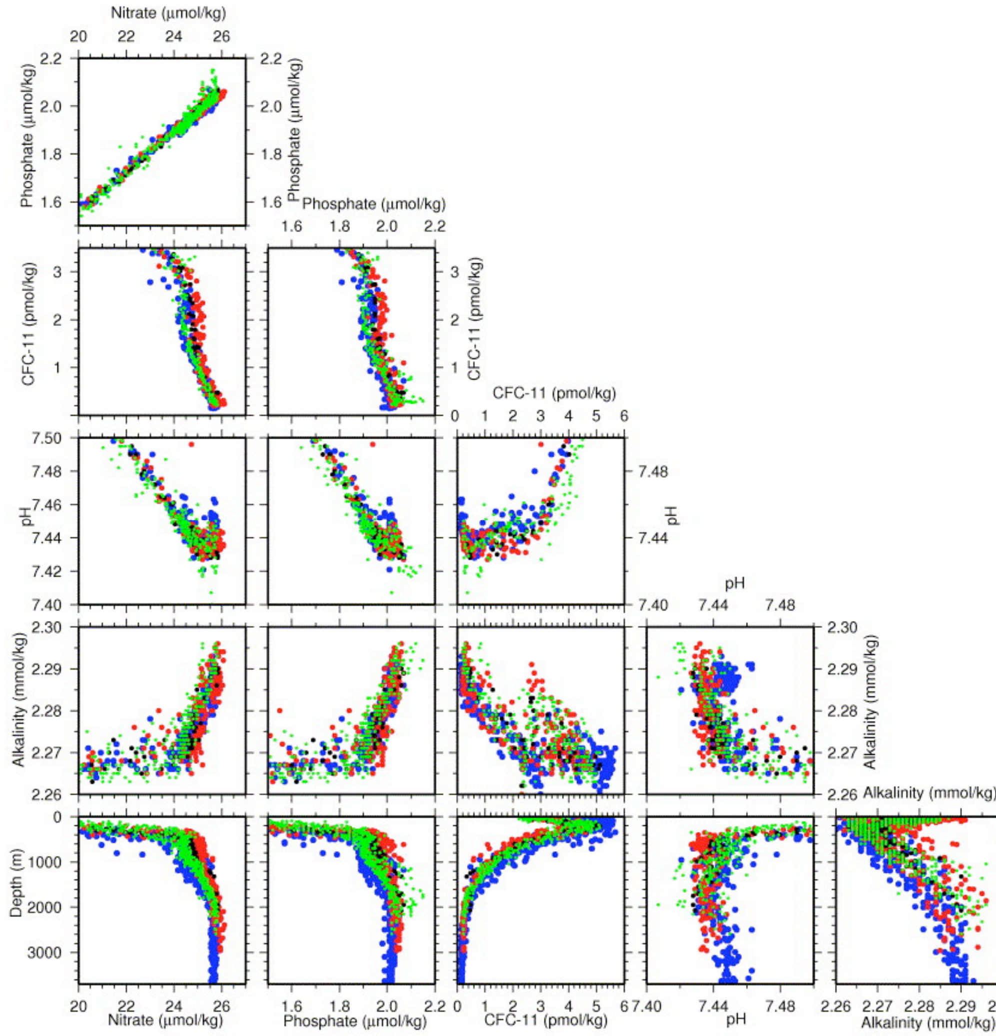


Figure D3c. Subthermocline and deep properties for the stations shown in Fig. 1b (Ulleung Basin - green, Yamato Basin - red, Japan Basin - blue, Yamato Rise black), as in Figure D2c.

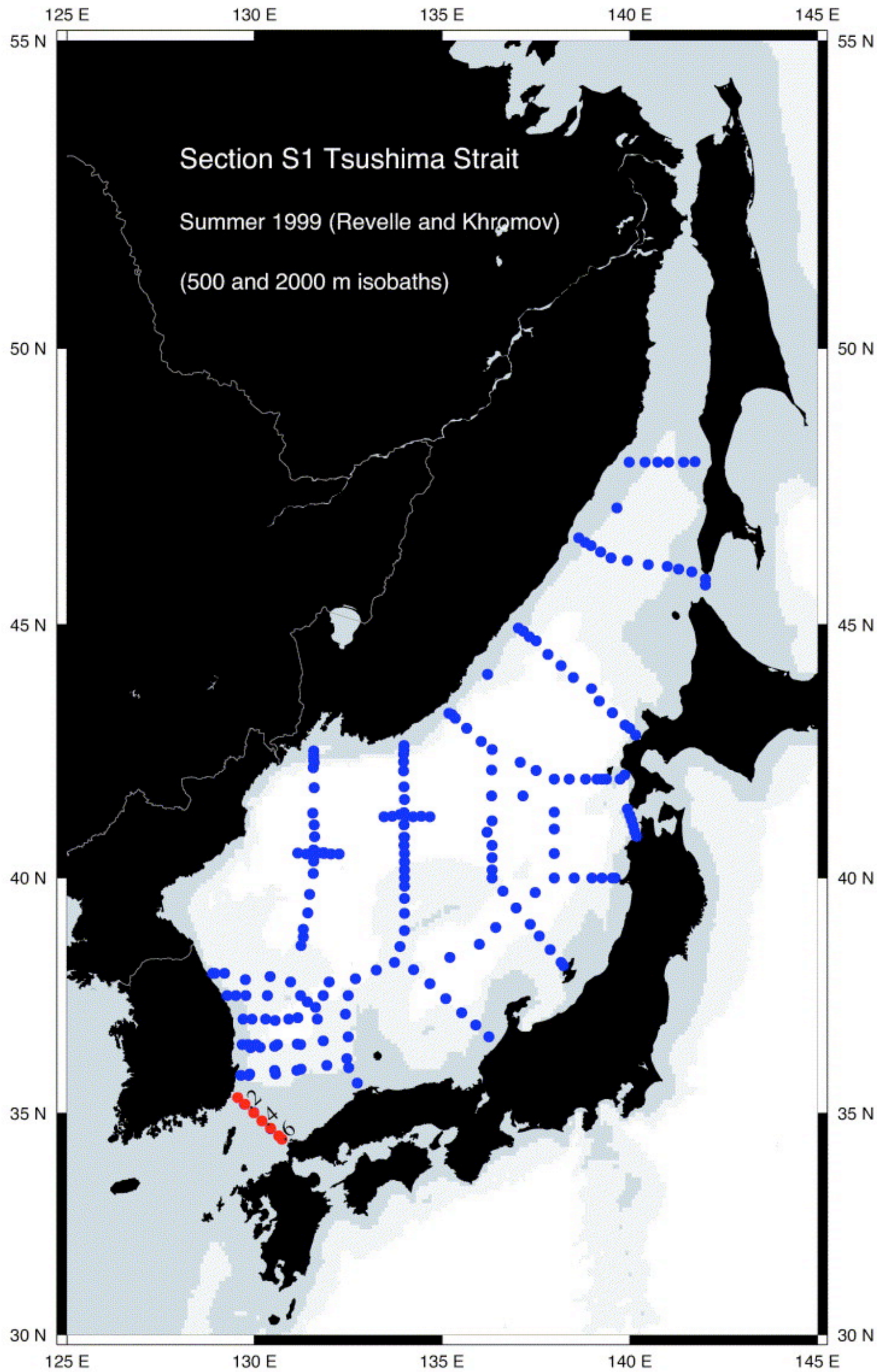
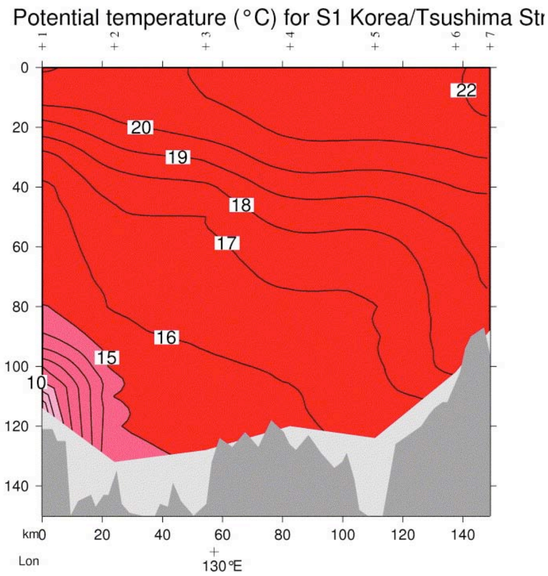
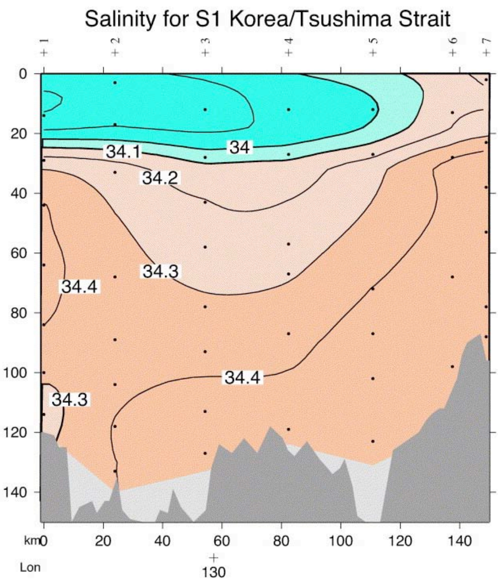
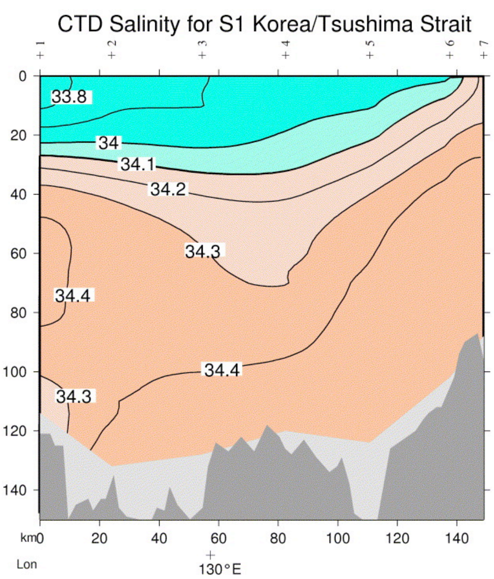
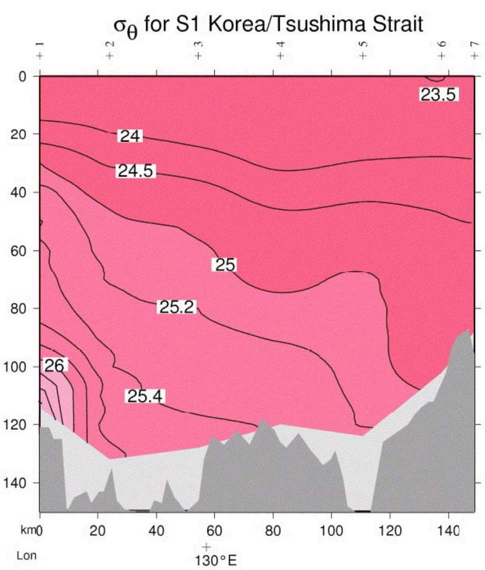


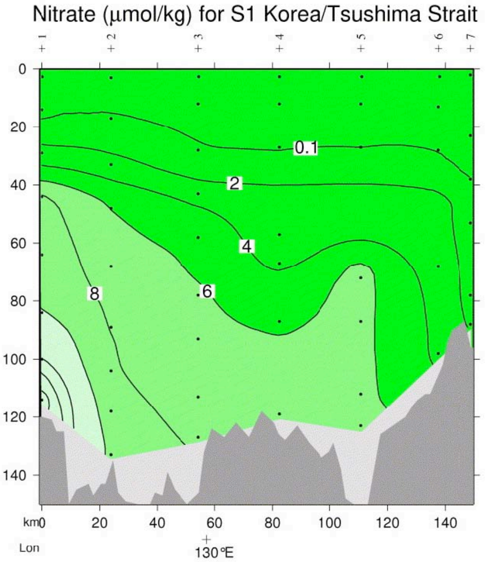
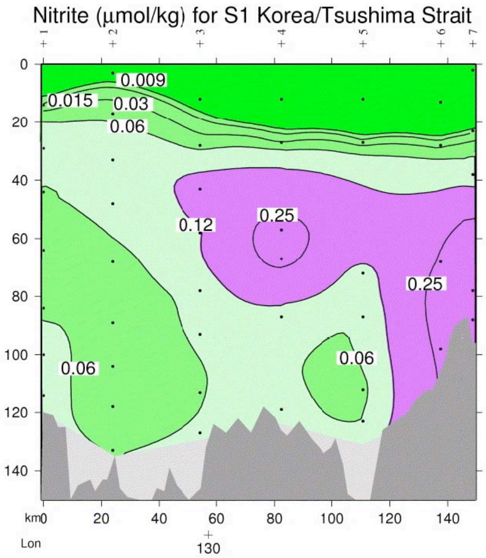
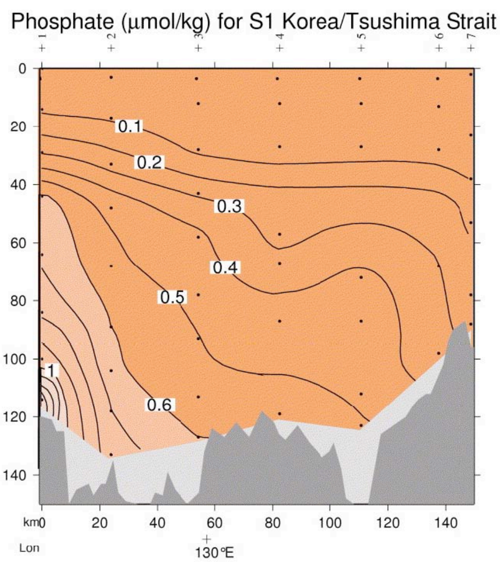
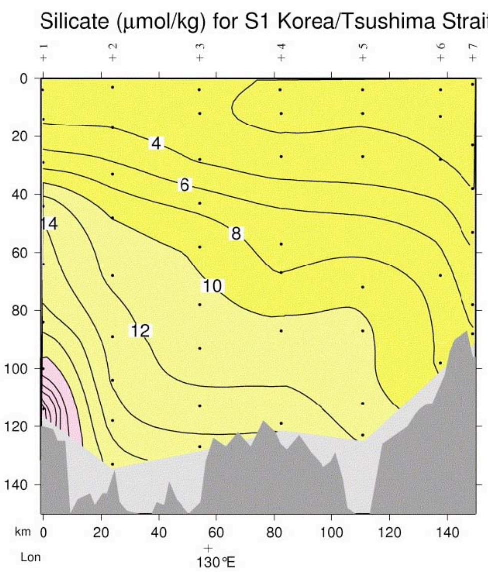
Figure D4. Vertical sections at Tsushima Strait (section S1): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) oxygen (μmol/kg), (g) nitrate (μmol/kg), (h) nitrite (μmol/kg), (i) phosphate (μmol/kg), (j) dissolved silica (μmol/kg), (k) CFC-11 (pmol/kg), (l) CFC-12 (pmol/kg), (m) pH, and (n) alkalinity (mmol/kg).

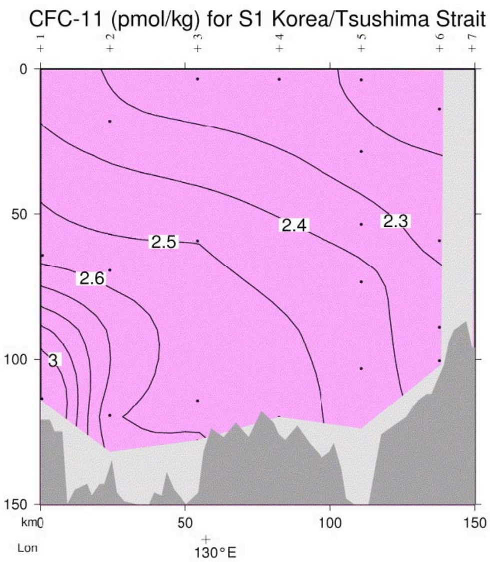

Potential temperature (°C) for S1 Korea/Tsushima Str
22
20
19
18
17
16
15
10
km
Lon
130°E

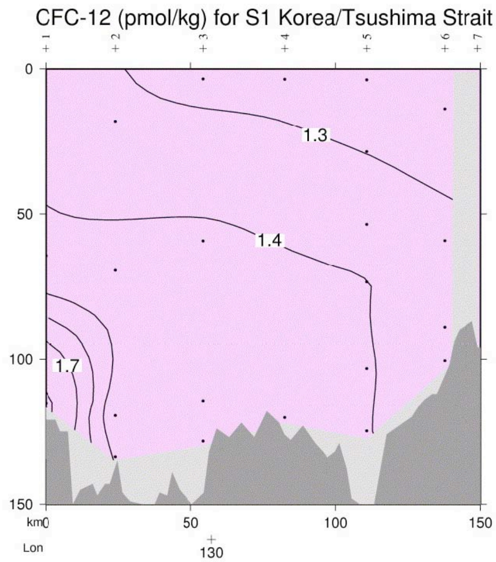

Salinity for S1 Korea/Tsushima Strait
34
34.1
34.2
34.3
34.4
34.4
34.3
km
Lon
130

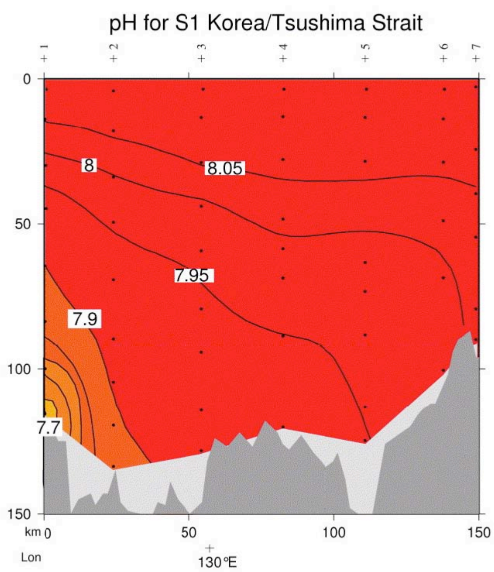

CTD Salinity for S1 Korea/Tsushima Strait
33.8
34
34.1
34.2
34.3
34.4
34.4
34.3
km
Lon
130°E

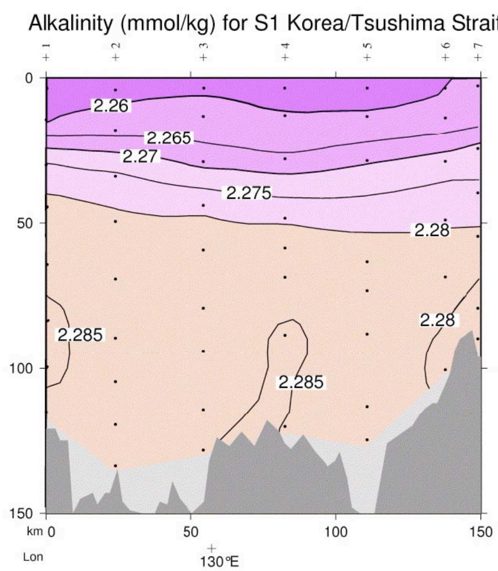

σ_θ for S1 Korea/Tsushima Strait
23.5
24
24.5
25
25.2
26
25.4
km
Lon
130°E


Nitrate (μmol/kg) for S1 Korea/Tsushima Strait
0.1
2
4
6
8
km
Lon
130°E

Nitrite (μmol/kg) for S1 Korea/Tsushima Strait
0.009
0.015
0.03
0.06
0.12
0.25
0.25
0.06
0.06
km
Lon
130

Phosphate (μmol/kg) for S1 Korea/Tsushima Strait
0.1
0.2
0.3
0.4
0.5
0.6
1
km
Lon
130°E

Silicate (μmol/kg) for S1 Korea/Tsushima Strait
4
6
8
10
12
14
km
Lon
130°E


CFC-11 (pmol/kg) for S1 Korea/Tsushima Strait
2.3
2.4
2.5
2.6
3
km
Lon
130°E


CFC-12 (pmol/kg) for S1 Korea/Tsushima Strait
1.3
1.4
1.7
km
Lon
130


pH for S1 Korea/Tsushima Strait
8
8.05
7.95
7.9
7.7
km
Lon
130°E


Alkalinity (mmol/kg) for S1 Korea/Tsushima Strait
2.26
2.265
2.27
2.275
2.28
2.285
2.28
2.285
km
Lon
130°E

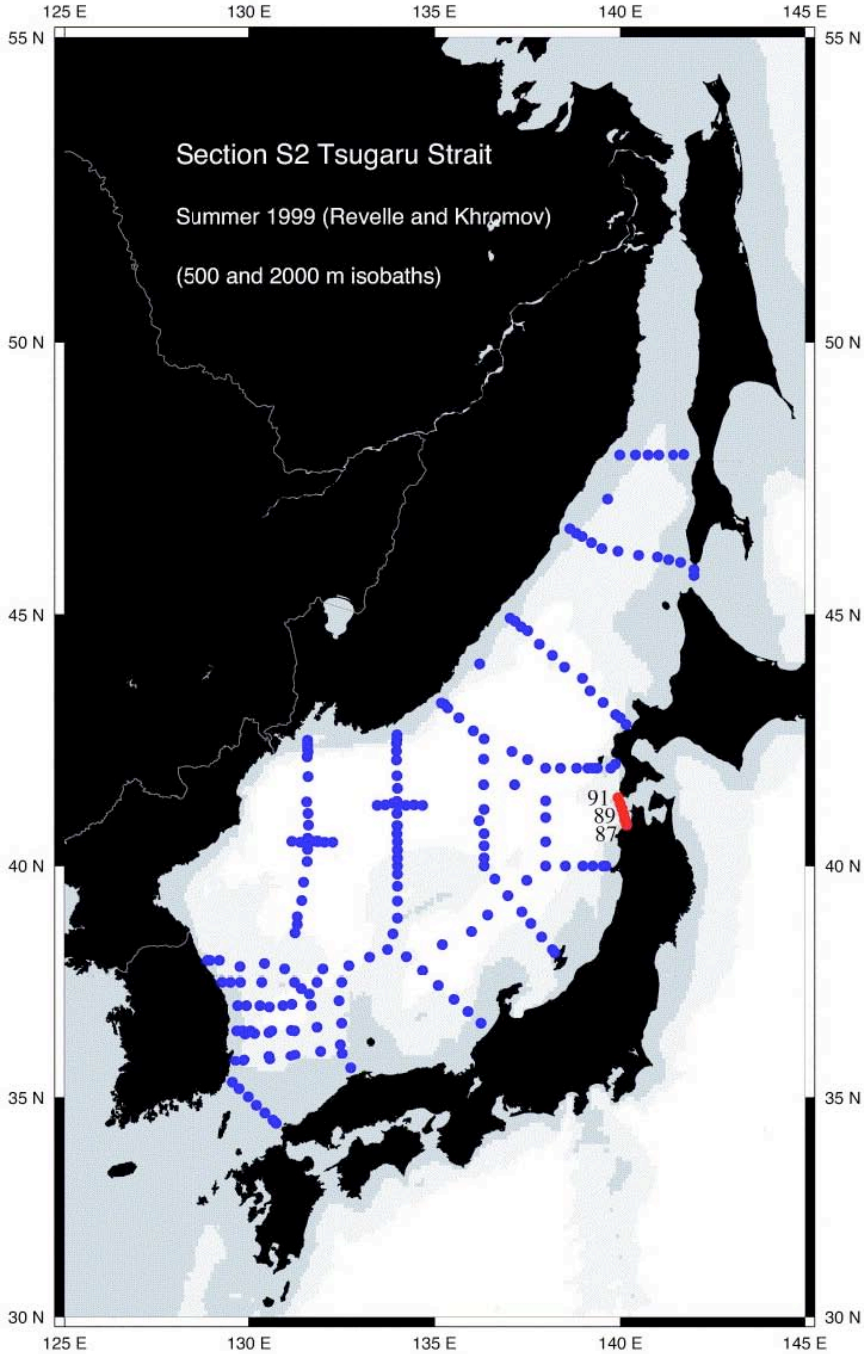
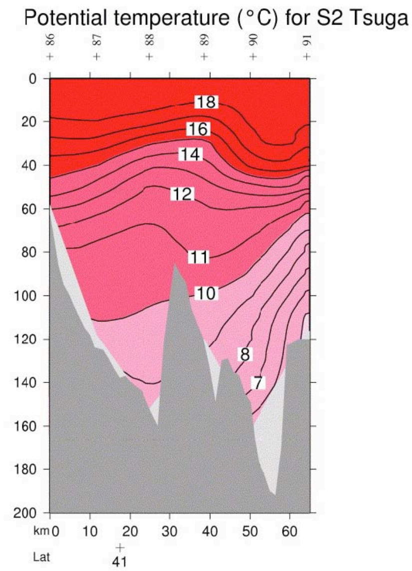
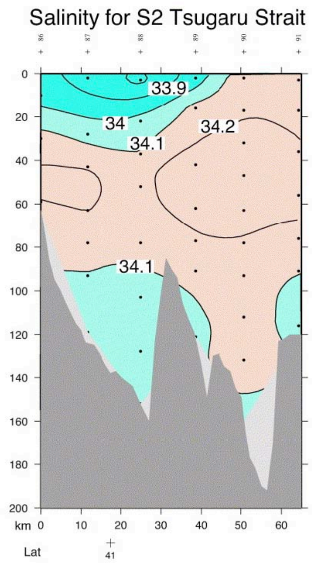
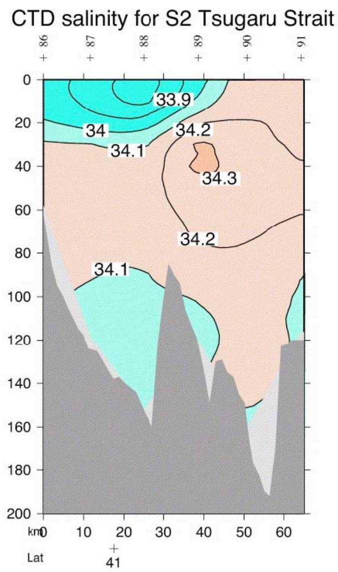
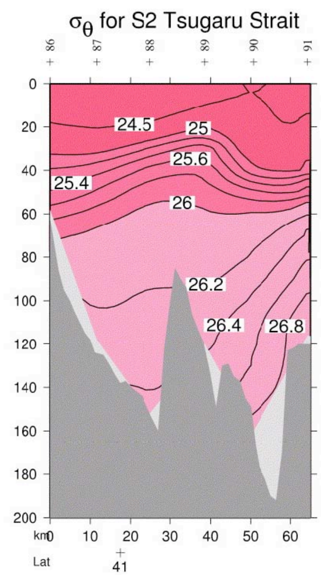


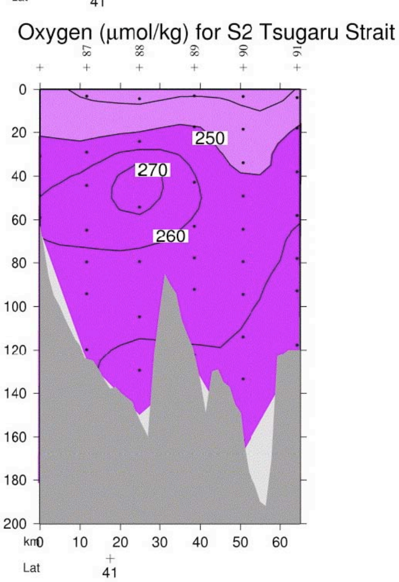
Figure D5. Vertical sections at Tsugaru Strait (section S2): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) oxygen (μmol/kg), (g) nitrate (μmol/kg), (h) nitrite (μmol/kg), (i) phosphate (μmol/kg), (j) dissolved silica (μmol/kg), (k) CFC-11 (pmol/kg), (l) CFC-12 (pmol/kg), (m) pH, and (n) alkalinity (mmol/kg).

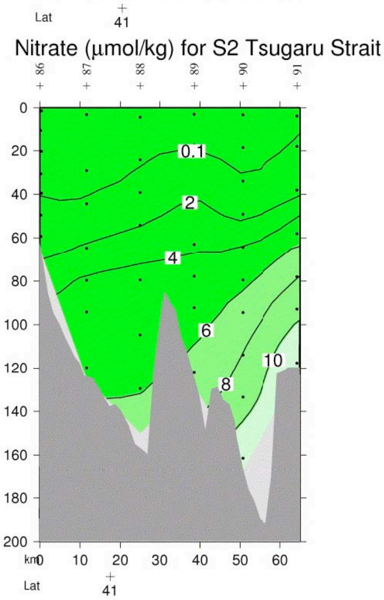

Potential temperature (°C) for S2 Tsuga
18
16
14
12
11
10
8
7
km
Lat
41


Salinity for S2 Tsugaru Strait
33.9
34
34.2
34.1
34.1
km
Lat
41

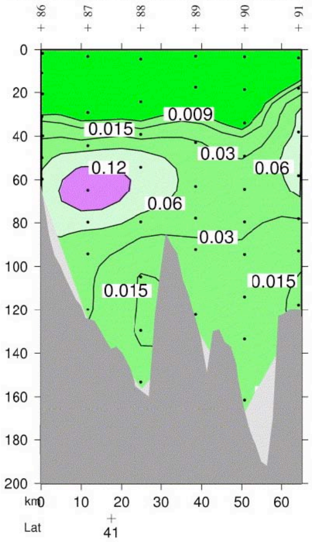

CTD salinity for S2 Tsugaru Strait
33.9
34
34.2
34.1
34.3
34.2
34.1
km
Lat
41


σθ for S2 Tsugaru Strait
24.5
25
25.6
25.4
26
26.2
26.4
26.8
km
Lat
41

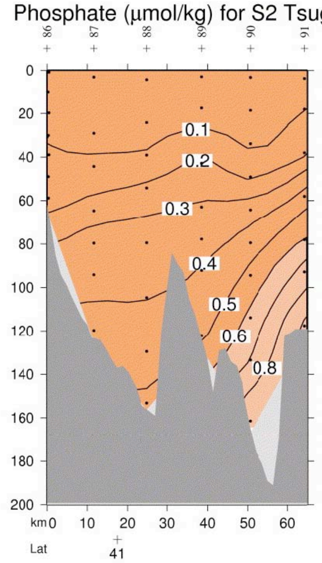

Oxygen (μmol/kg) for S2 Tsugaru Strait
250
270
260
km
Lat
41


Nitrate (μmol/kg) for S2 Tsugaru Strait
0.1
2
4
6
10
8
km
Lat
41

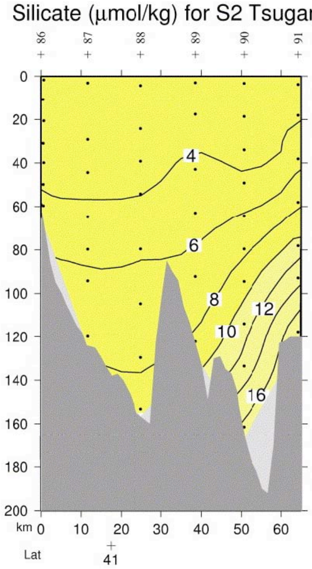
Nitrite (μmol/kg) for S2 Tsugaru Strait



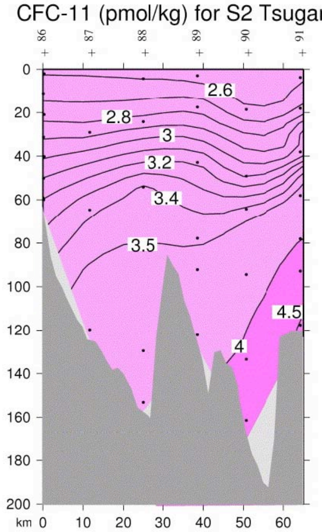
Phosphate (μmol/kg) for S2 Tsugaru Strait



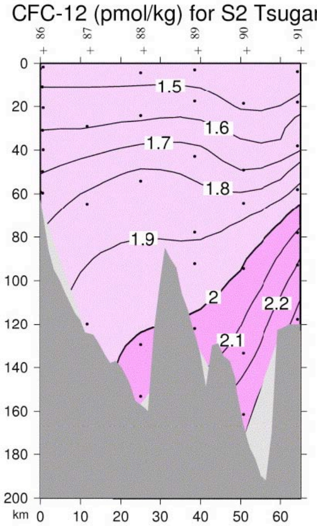
Silicate (μmol/kg) for S2 Tsugaru Strait



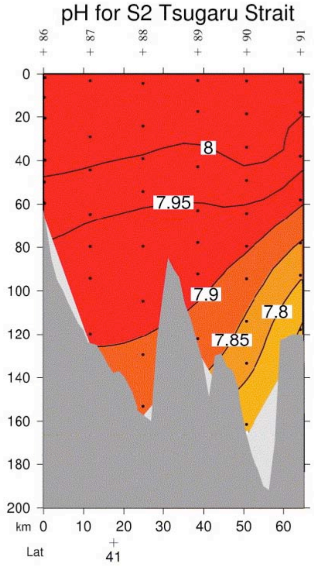
CFC-11 (pmol/kg) for S2 Tsugaru Strait



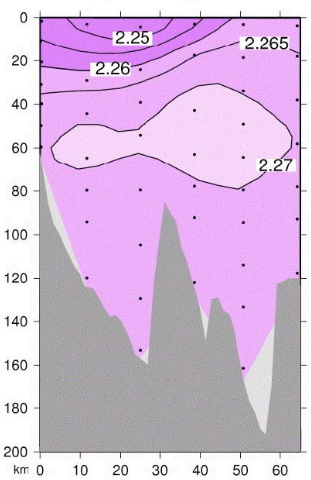
CFC-12 (pmol/kg) for S2 Tsugaru Strait



pH for S2 Tsugaru Strait



Alkalinity (mmol/kg) for S2 Tsugaru Strait



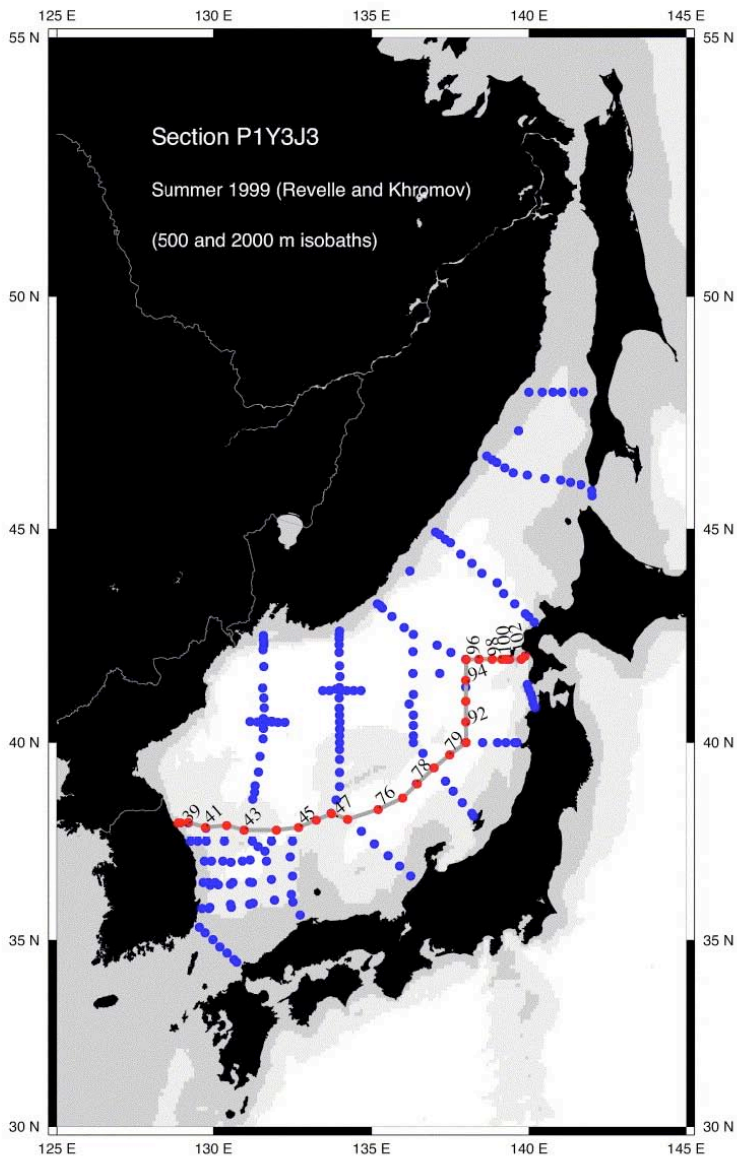
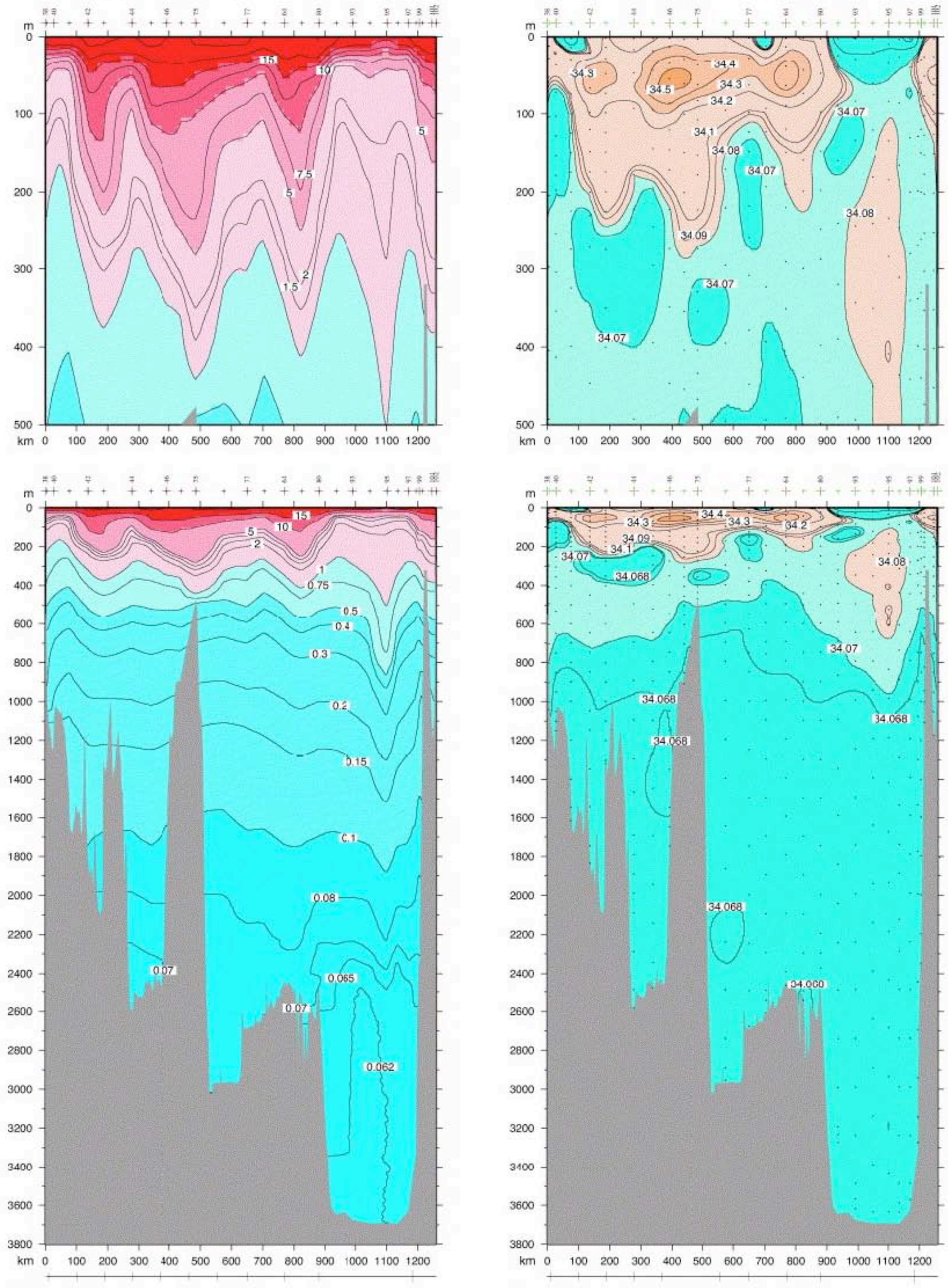
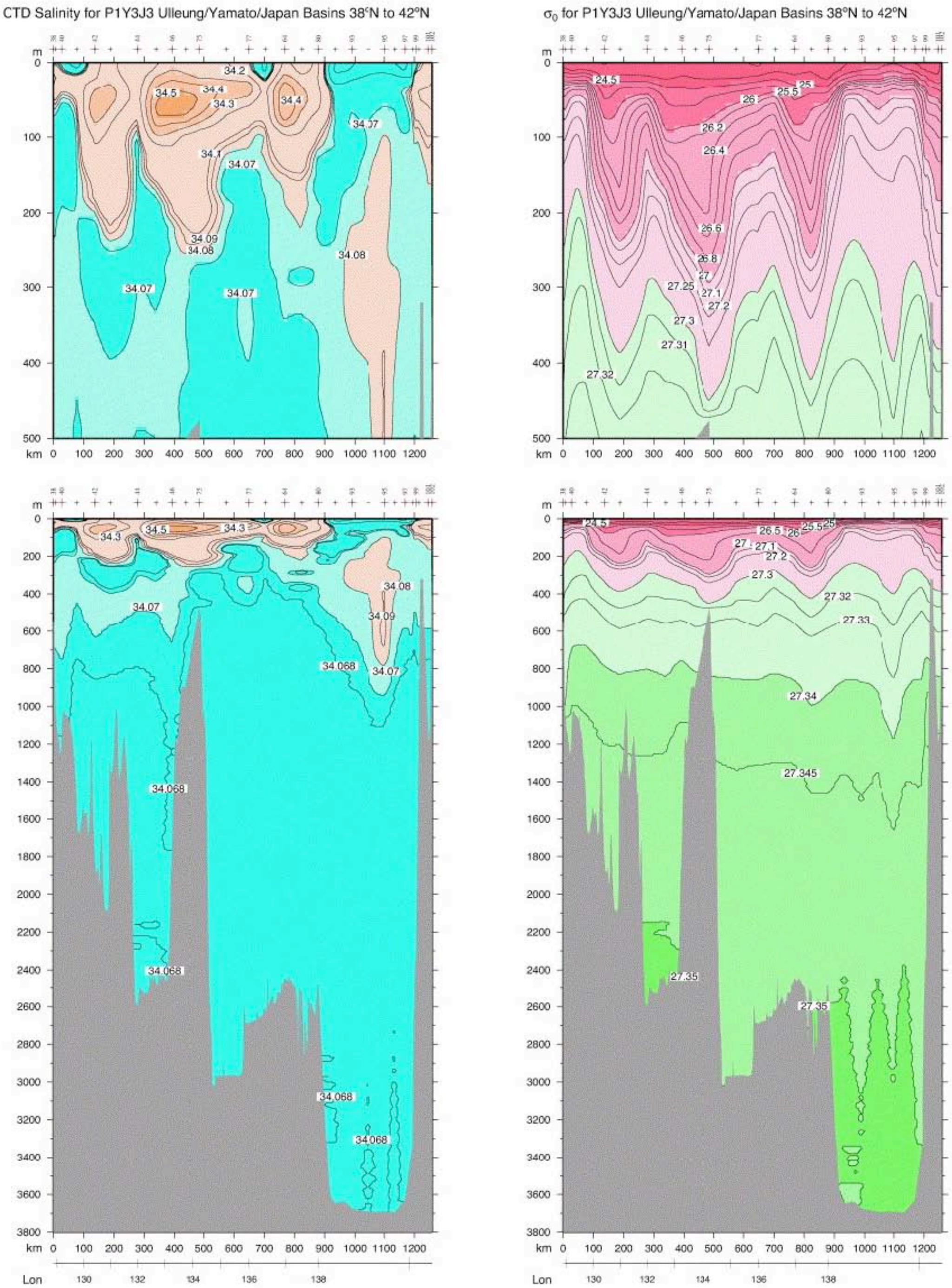


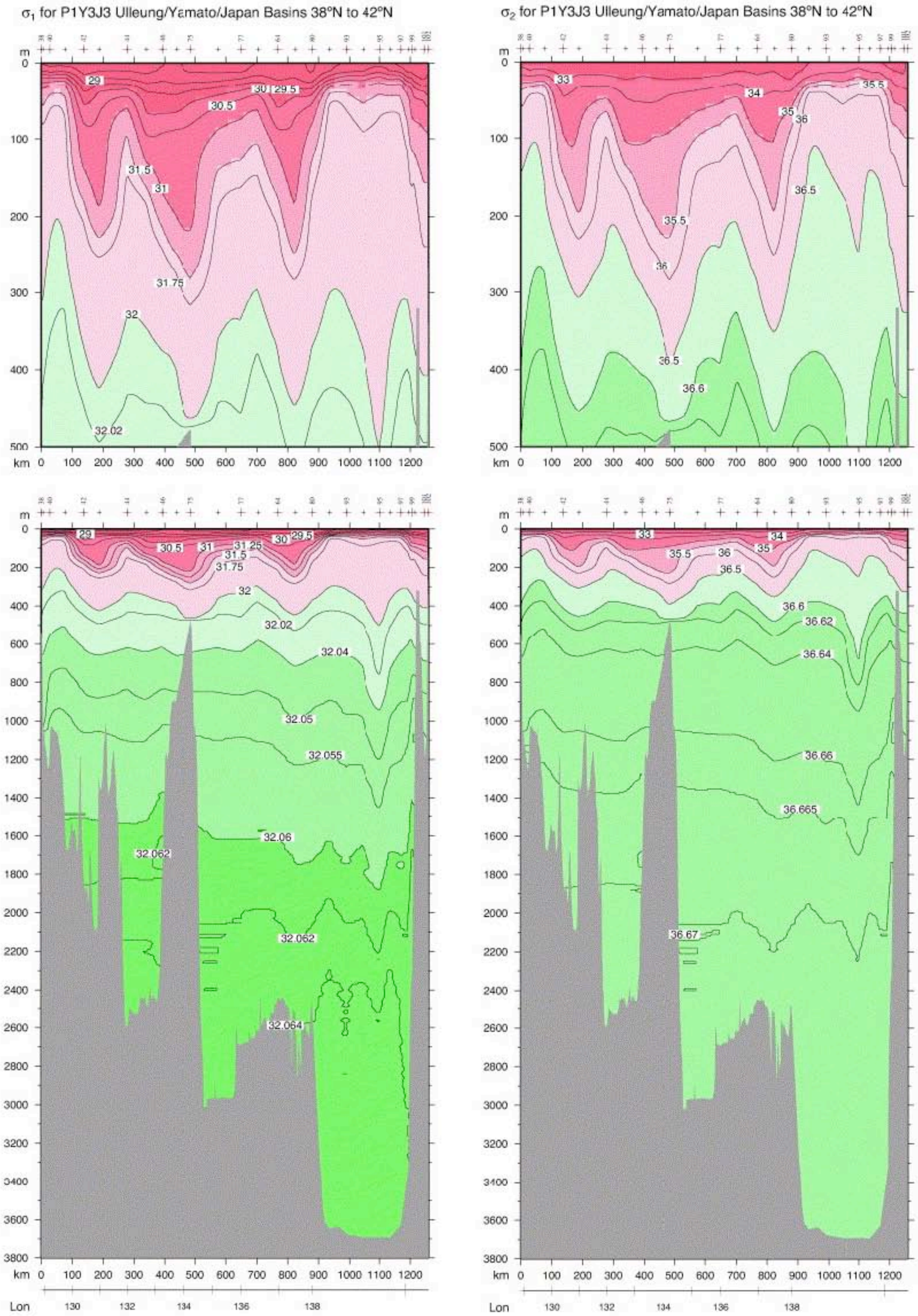
Figure D6. Vertical sections through the Ulleung, Yamato, and Japan Basins (combined sections P1, Y3J3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

Potential Temperature (C) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N

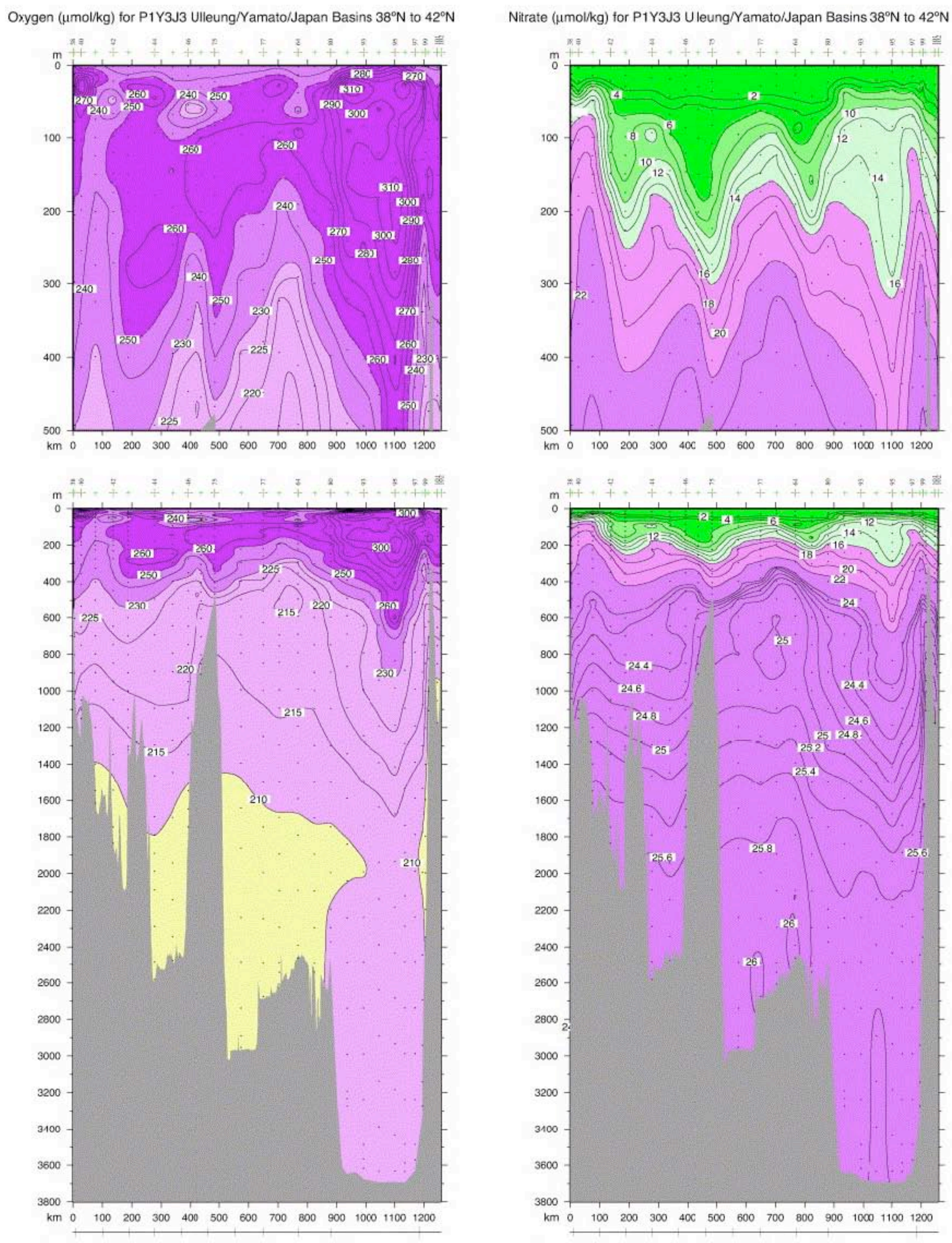
Salinity for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N




CTD Salinity for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N
σ_0 for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N

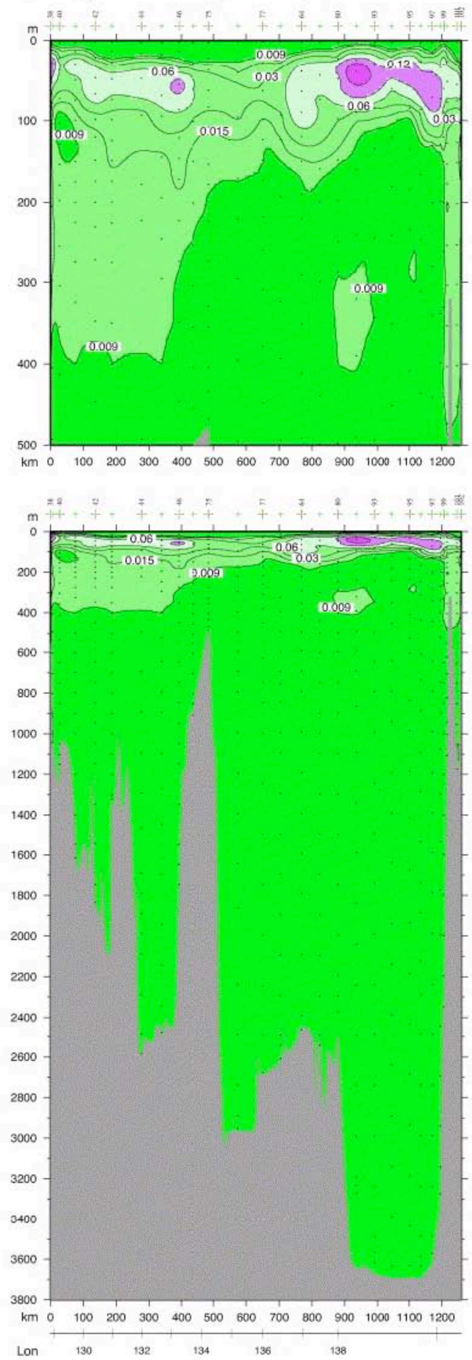


σ1 for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N
σ2 for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N
m
km
Lon

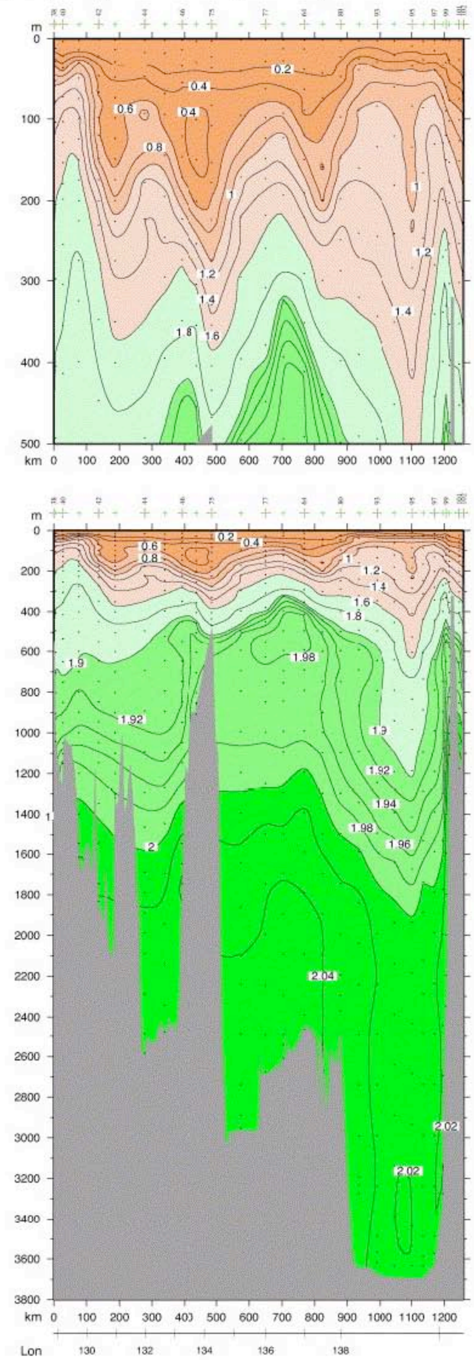


Oxygen (μmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N
Nitrate (μmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N
m
km
Lon

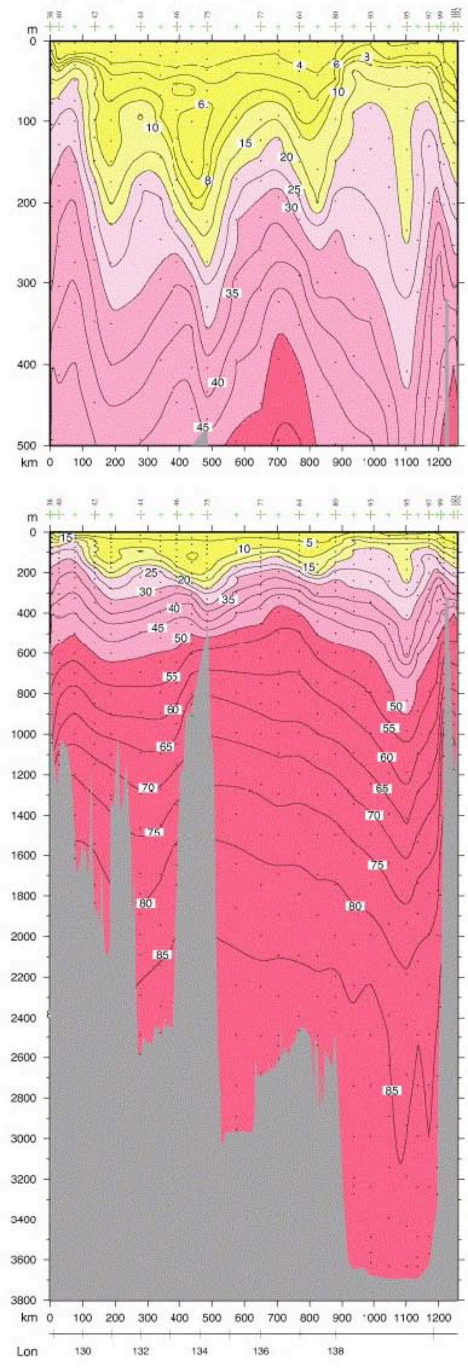
Nitrite (μmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N



Phosphate (μmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N

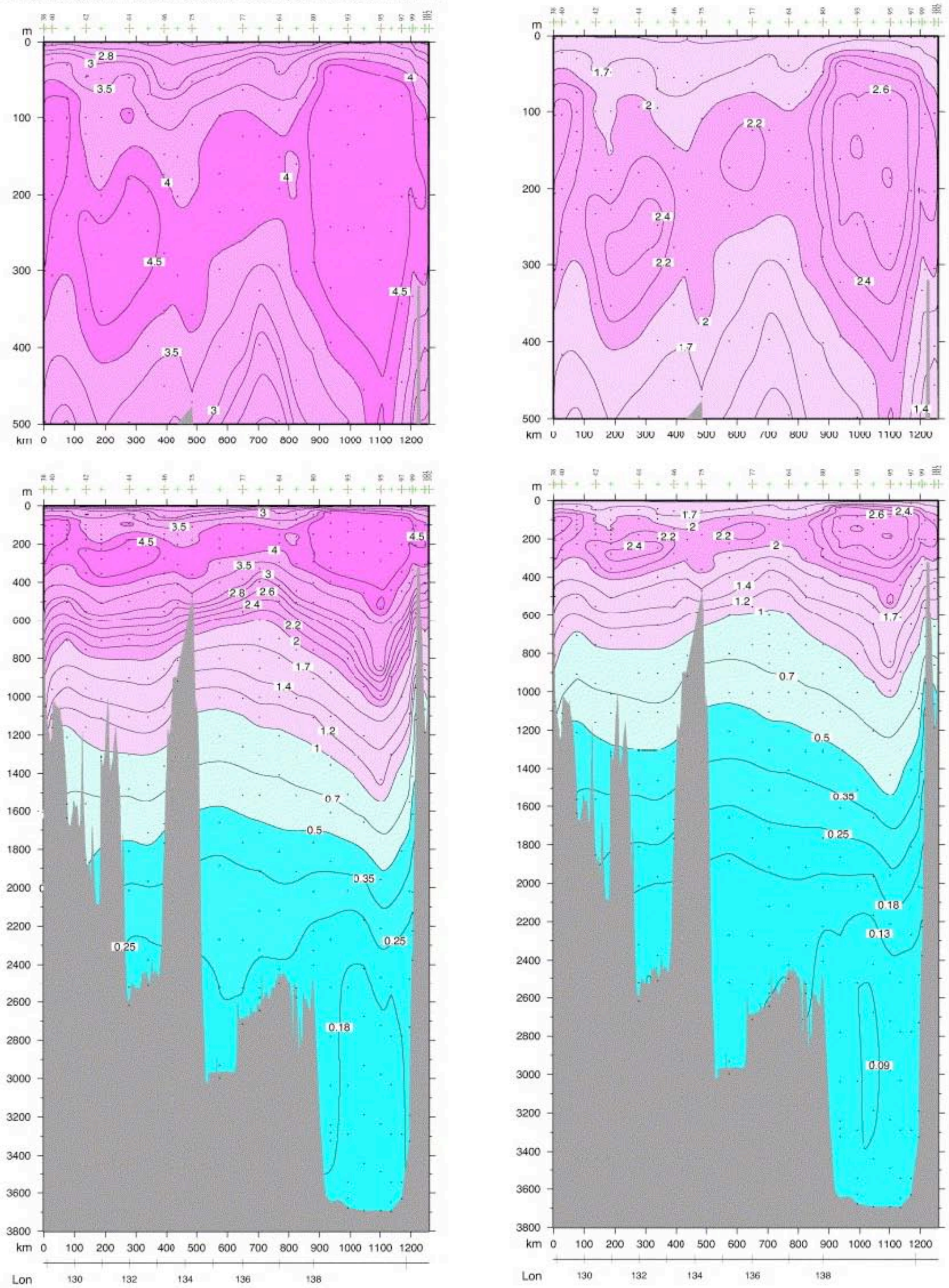


Dissolved Silica (μmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N

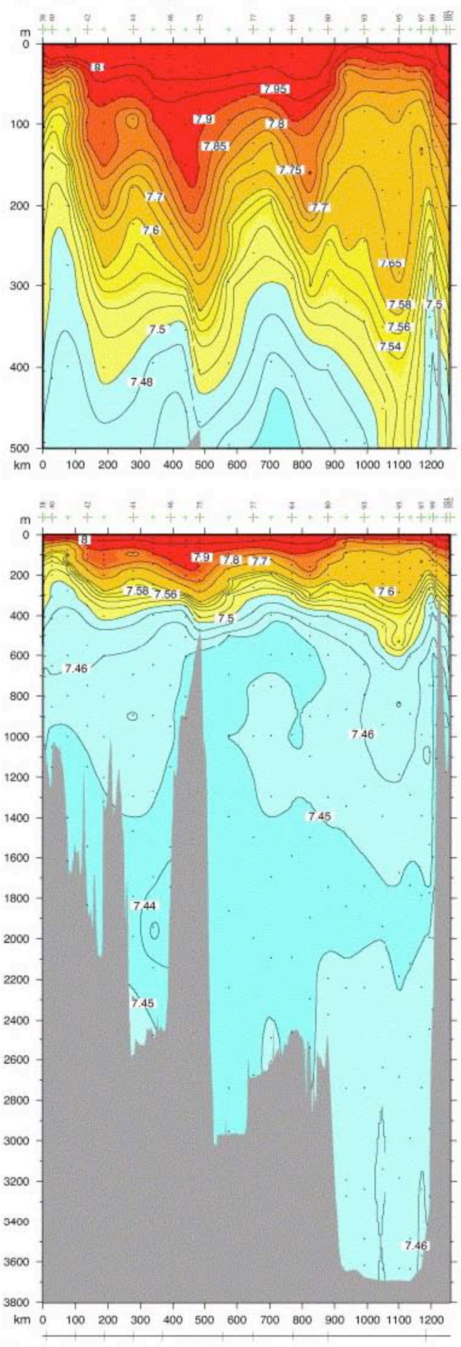


CFC-11 (pmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N

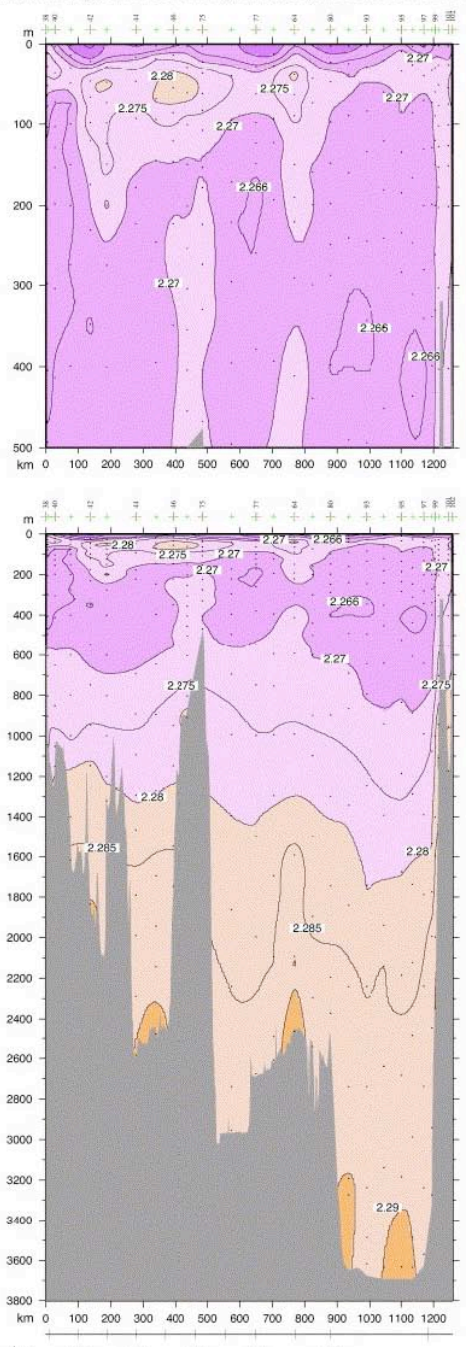
CFC-12 (pmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N



pH for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N



Alkalinity (mmol/kg) for P1Y3J3 Ulleung/Yamato/Japan Basins 38°N to 42°N



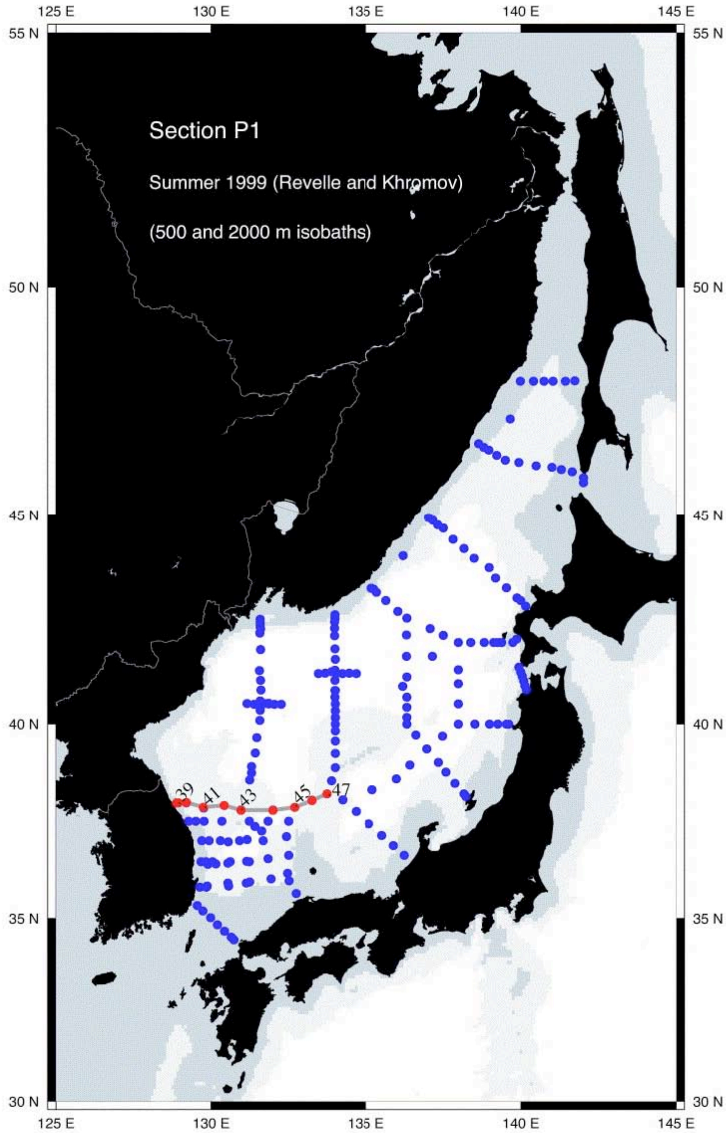
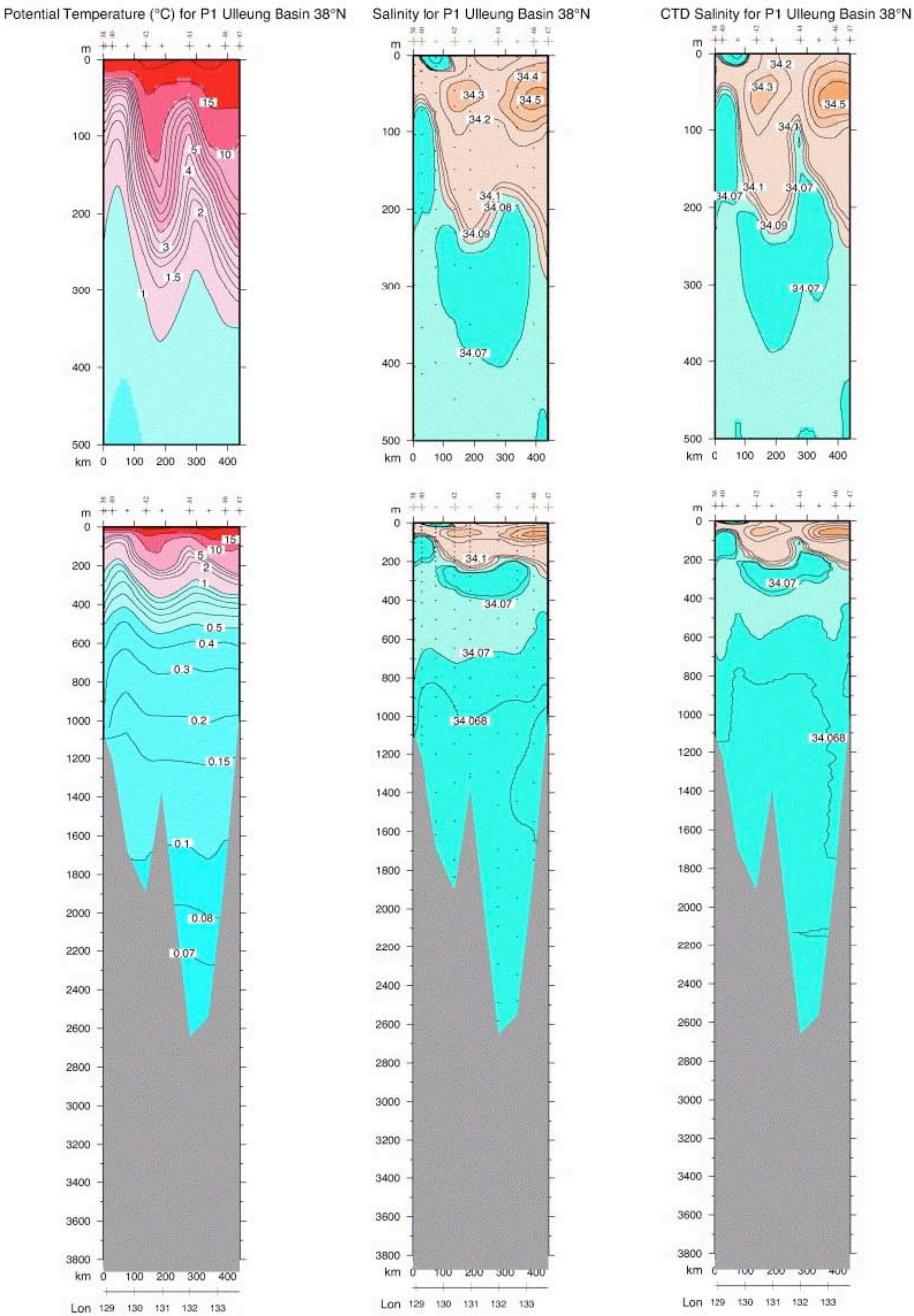
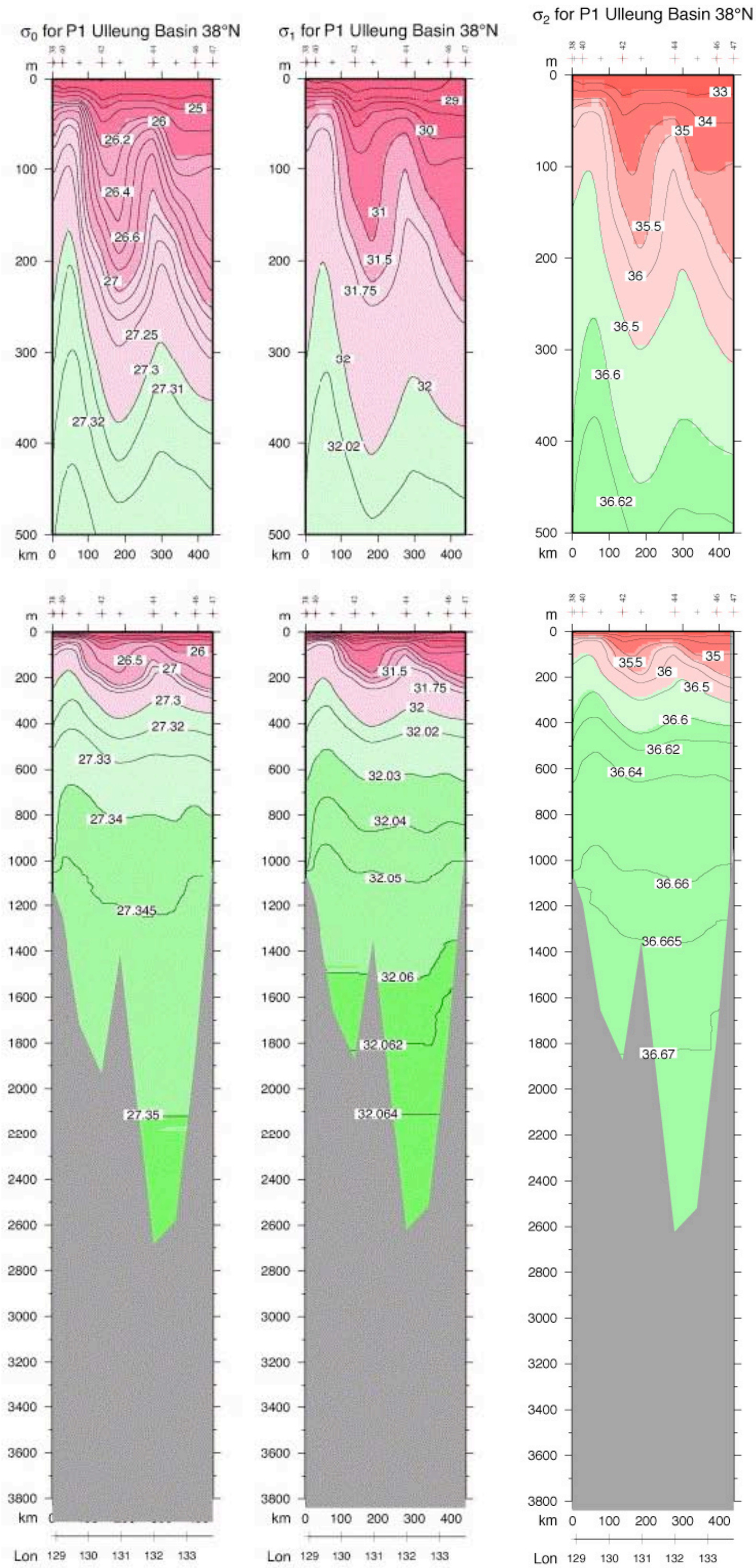
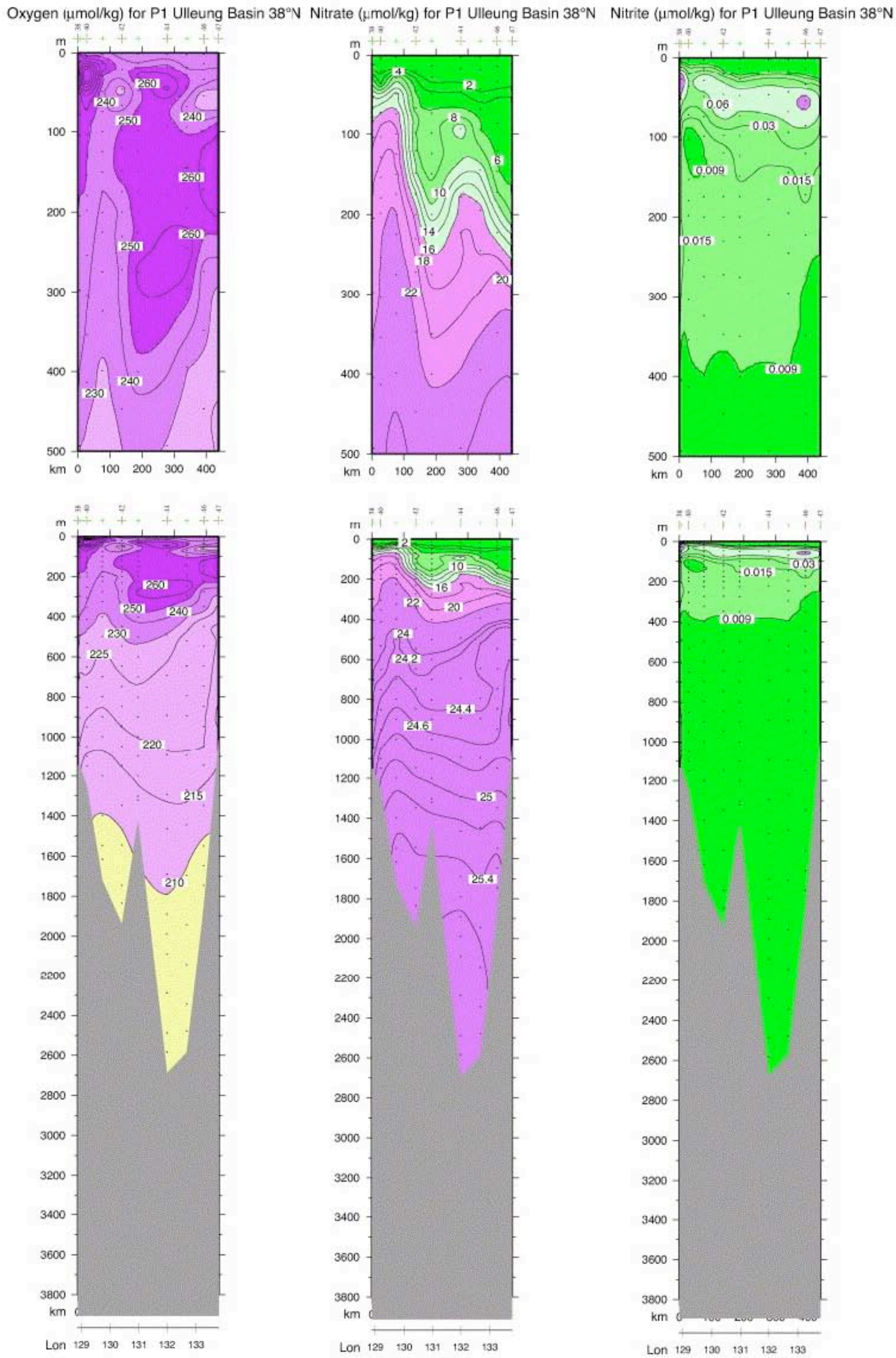
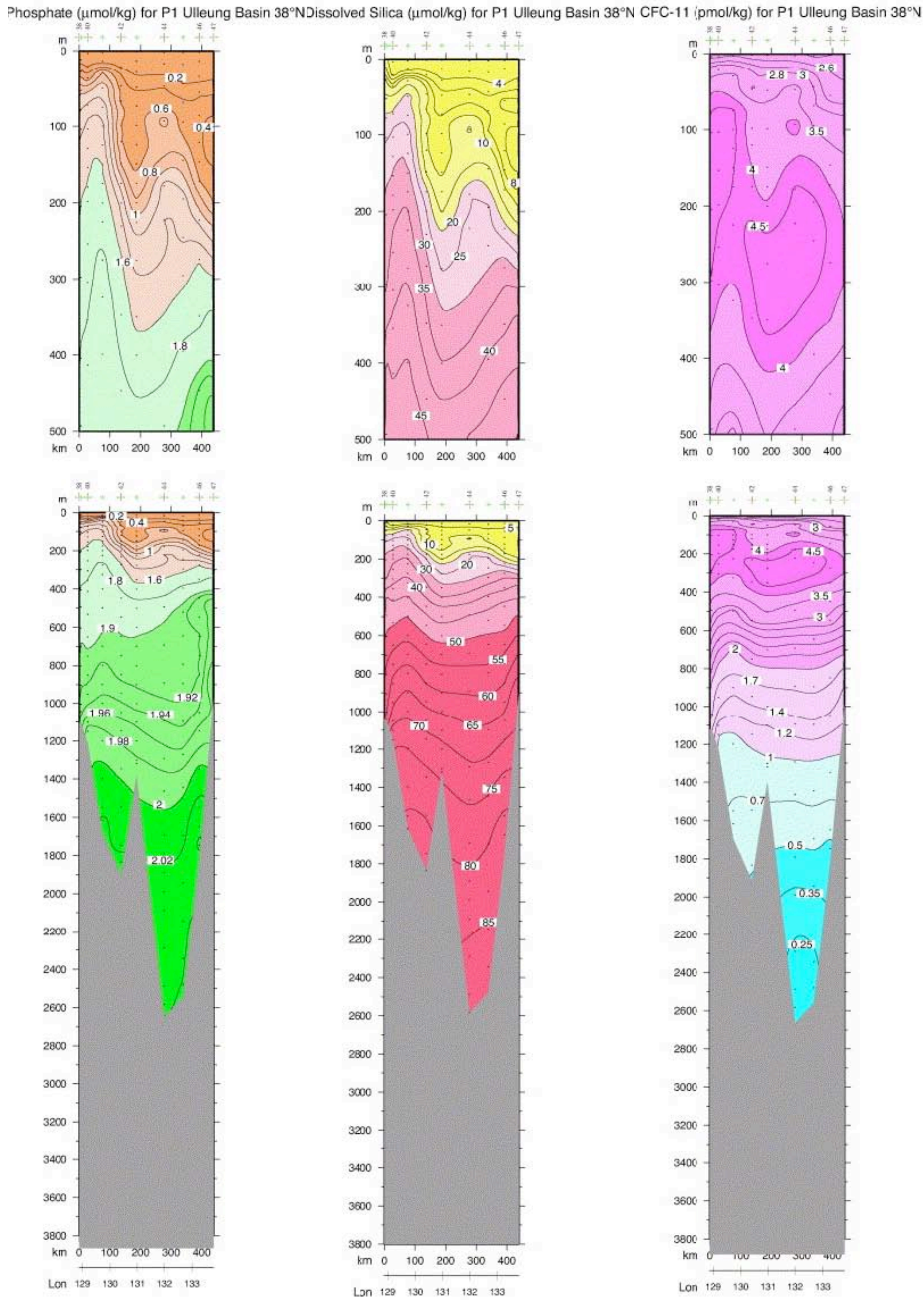


Figure D7. Vertical sections through approximately 38°N (Ulleung Basin) (P1 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1. The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

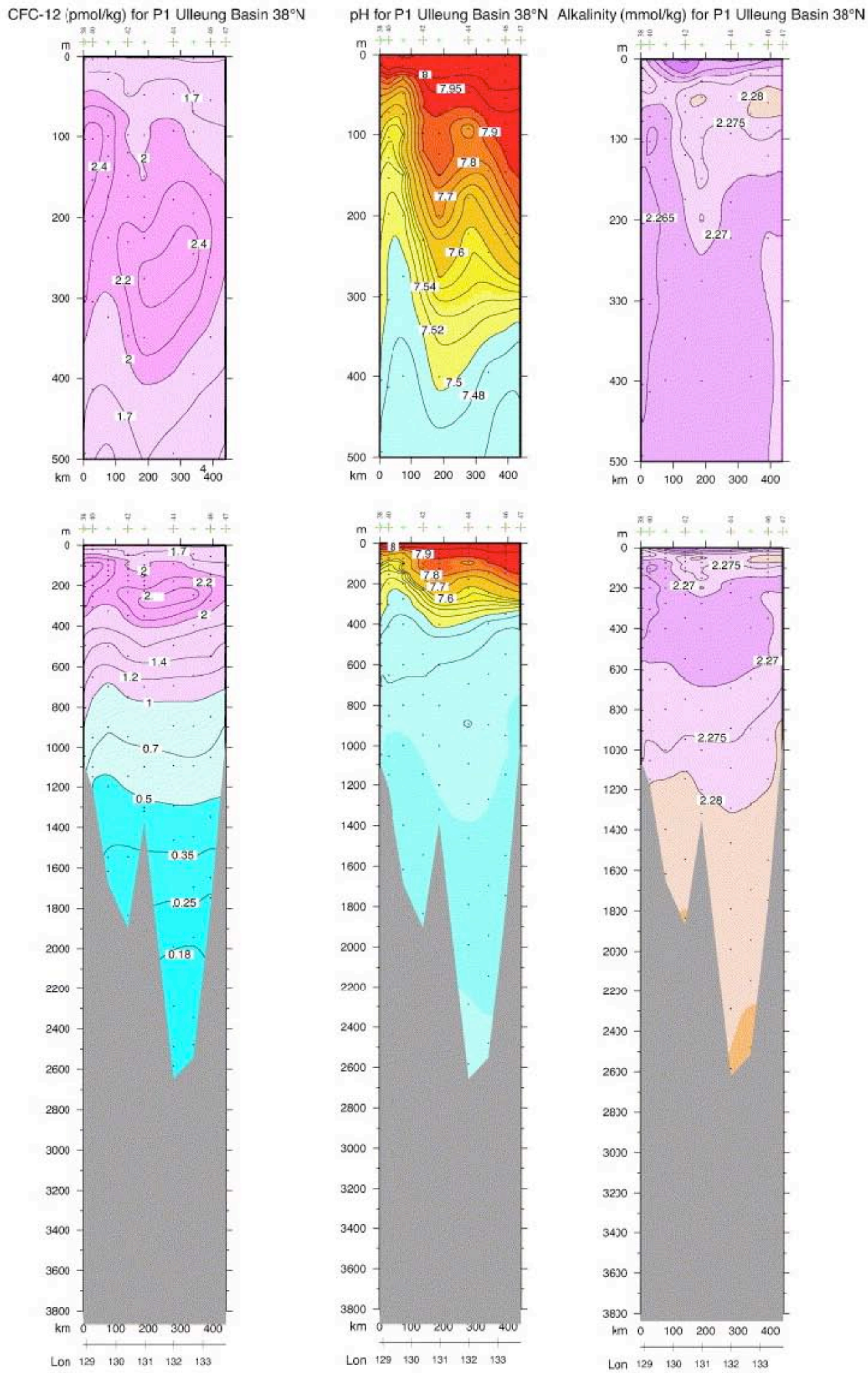

Potential Temperature (°C) for P1 Ulleung Basin 38°N
Salinity for P1 Ulleung Basin 38°N
CTD Salinity for P1 Ulleung Basin 38°N
m
km
Lon


σ0 for P1 Ulleung Basin 38°N
σ1 for P1 Ulleung Basin 38°N
σ2 for P1 Ulleung Basin 38°N
m
km
Lon


Oxygen (µmol/kg) for P1 Ulleung Basin 38°N
Nitrate (µmol/kg) for P1 Ulleung Basin 38°N
Nitrite (µmol/kg) for P1 Ulleung Basin 38°N
m
km
Lon



Phosphate (μmol/kg) for P1 Ulleung Basin 38°N
Dissolved Silica (μmol/kg) for P1 Ulleung Basin 38°N
CFC-11 (pmol/kg) for P1 Ulleung Basin 38°N
m
km
Lon


CFC-12 (pmol/kg) for P1 Ulleung Basin 38°N
pH for P1 Ulleung Basin 38°N
Alkalinity (mmol/kg) for P1 Ulleung Basin 38°N
m
km
Lon
129 130 131 132 133

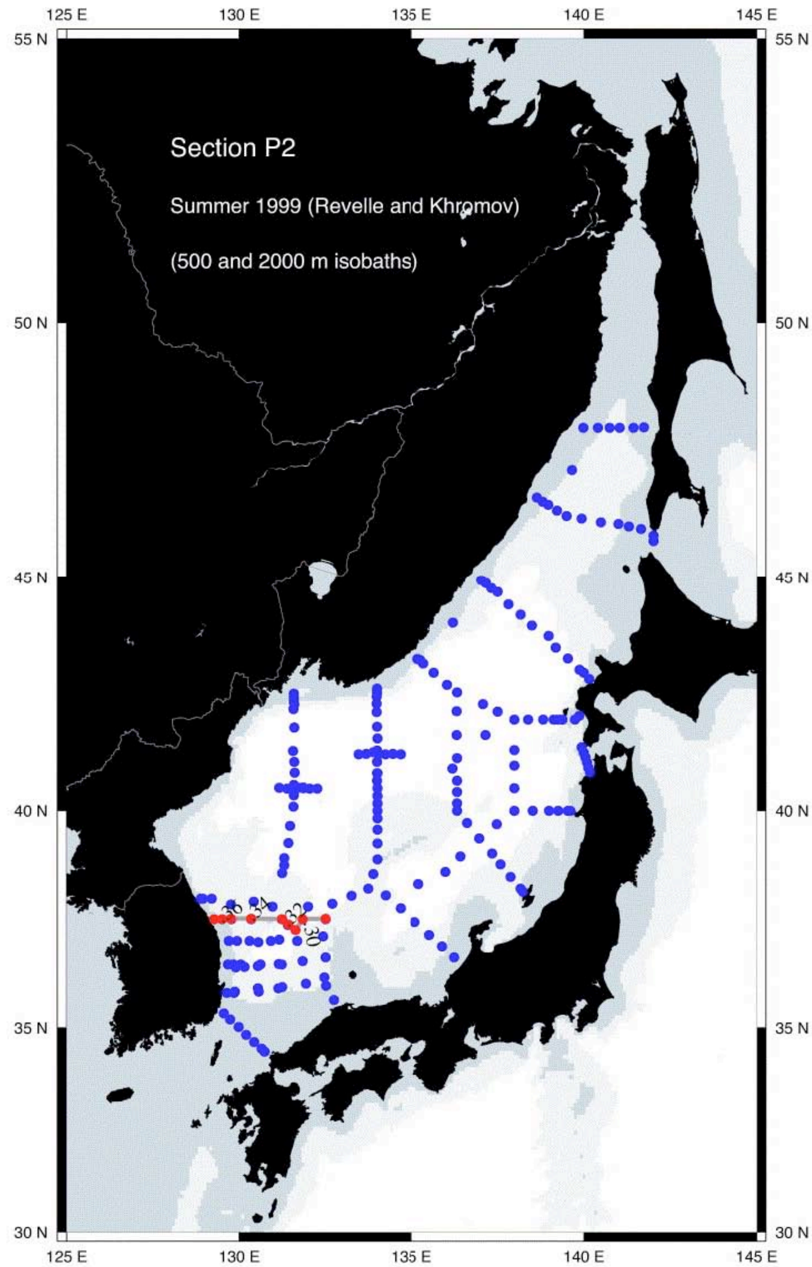
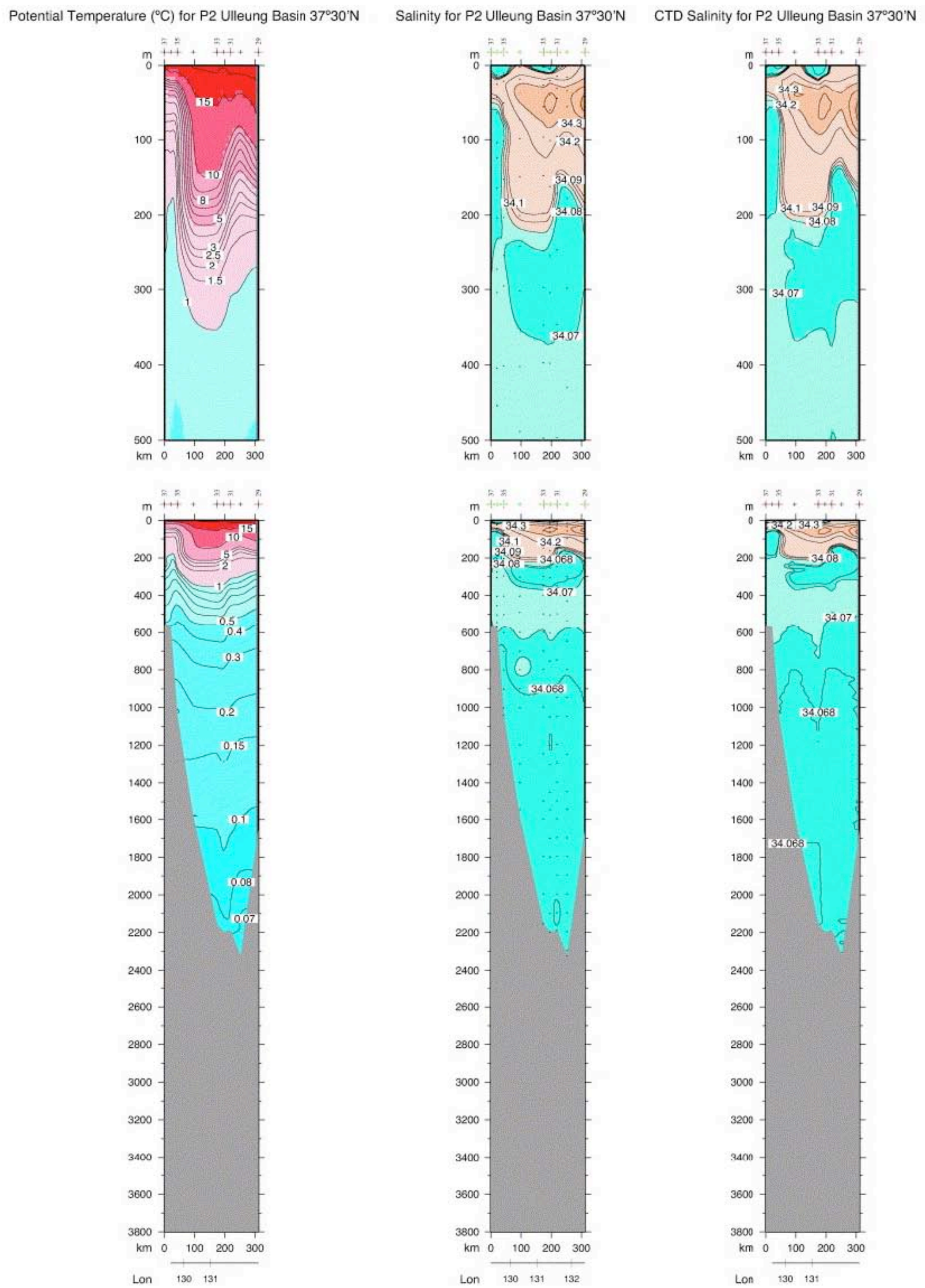
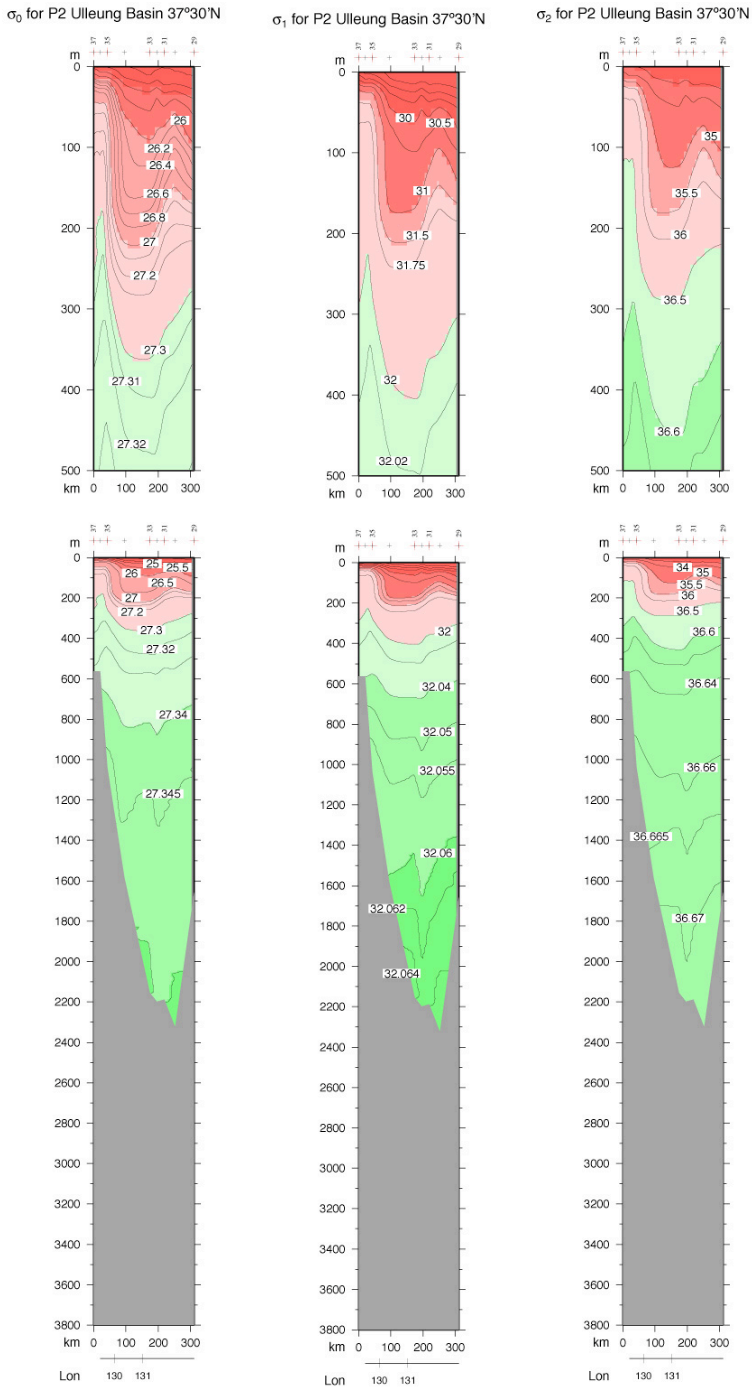
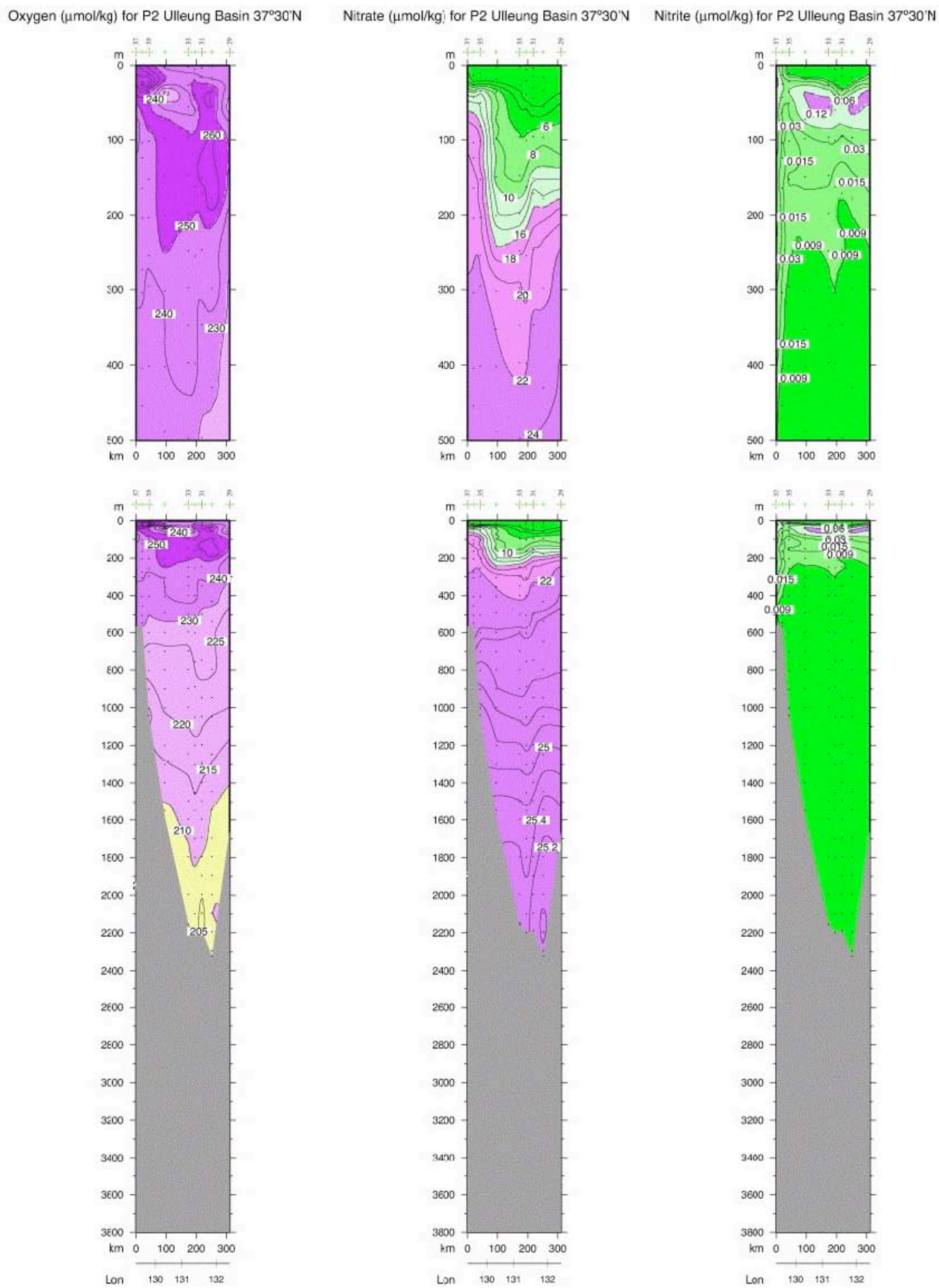


Figure D8. Vertical sections at approximately 37°30'N (Ulleung Basin) (P2 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg).The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1. The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

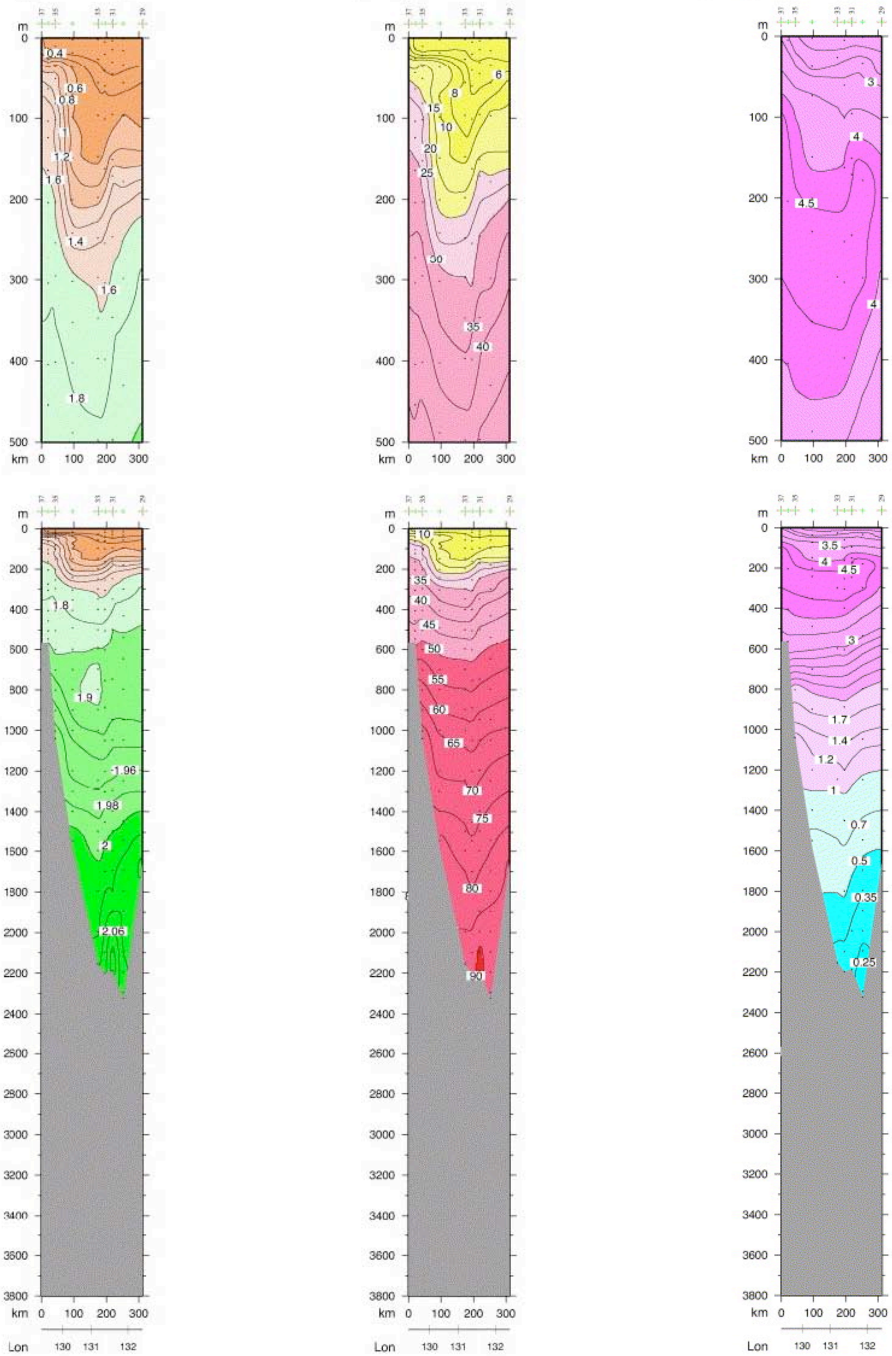

Potential Temperature (°C) for P2 Ulleung Basin 37°30'N
Salinity for P2 Ulleung Basin 37°30'N
CTD Salinity for P2 Ulleung Basin 37°30'N


σ0 for P2 Ulleung Basin 37°30'N
σ1 for P2 Ulleung Basin 37°30'N
σ2 for P2 Ulleung Basin 37°30'N
m
km
Lon
130
131

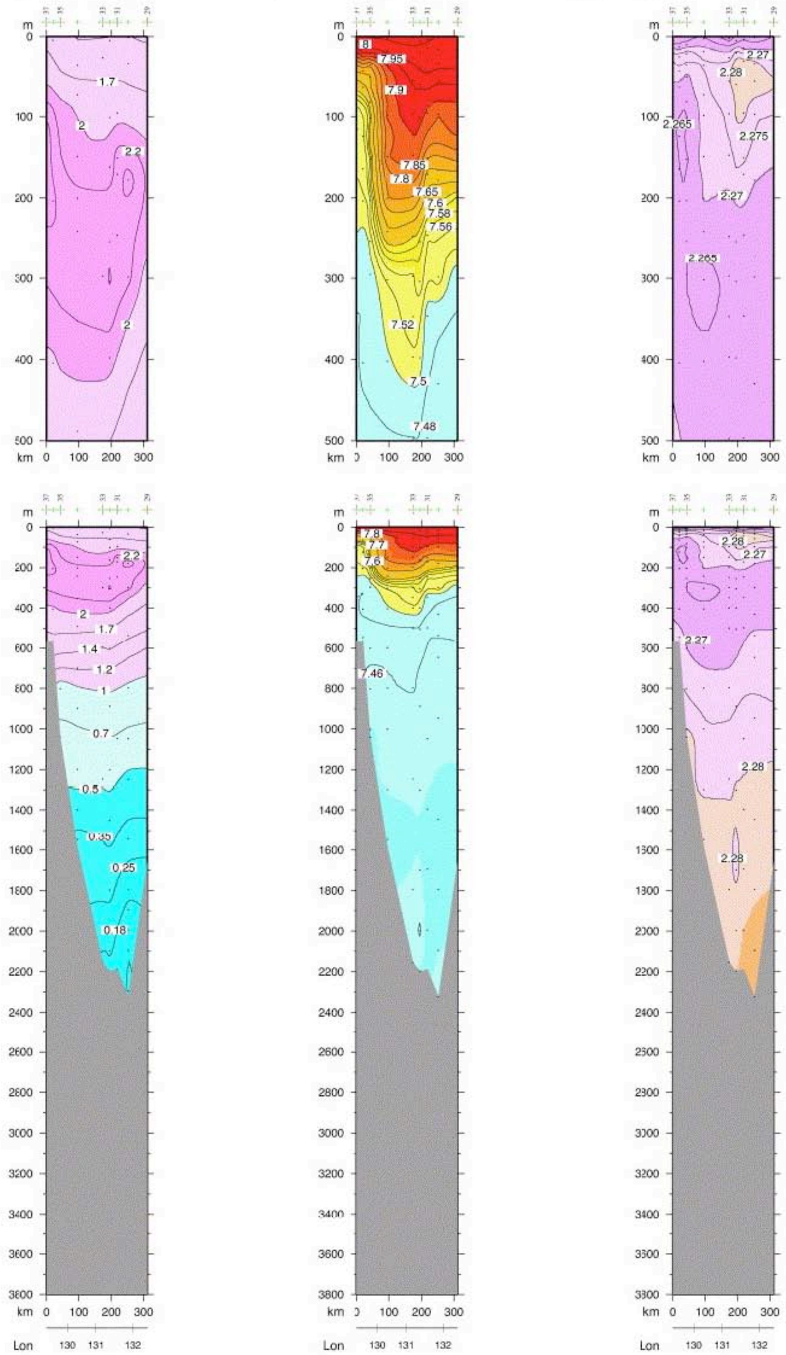


Oxygen (µmol/kg) for P2 Ulleung Basin 37°30'N
Nitrate (µmol/kg) for P2 Ulleung Basin 37°30'N
Nitrite (µmol/kg) for P2 Ulleung Basin 37°30'N

Phosphate (µmol/kg) for P2 Ulleung Basin 37°30'N   Dissolved Silica (µmol/kg) for P2 Ulleung Basin 37°30'N   CFC-11 (pmol/kg) for P2 Ulleung Basin 37°30'N



CFC-12 (pmol/kg) for P2 Ulleung Basin 37°30'N pH for P2 Ulleung Basin 37°30'N Alkalinity (mmol/kg) for P2 Ulleung Basin 37°30'N



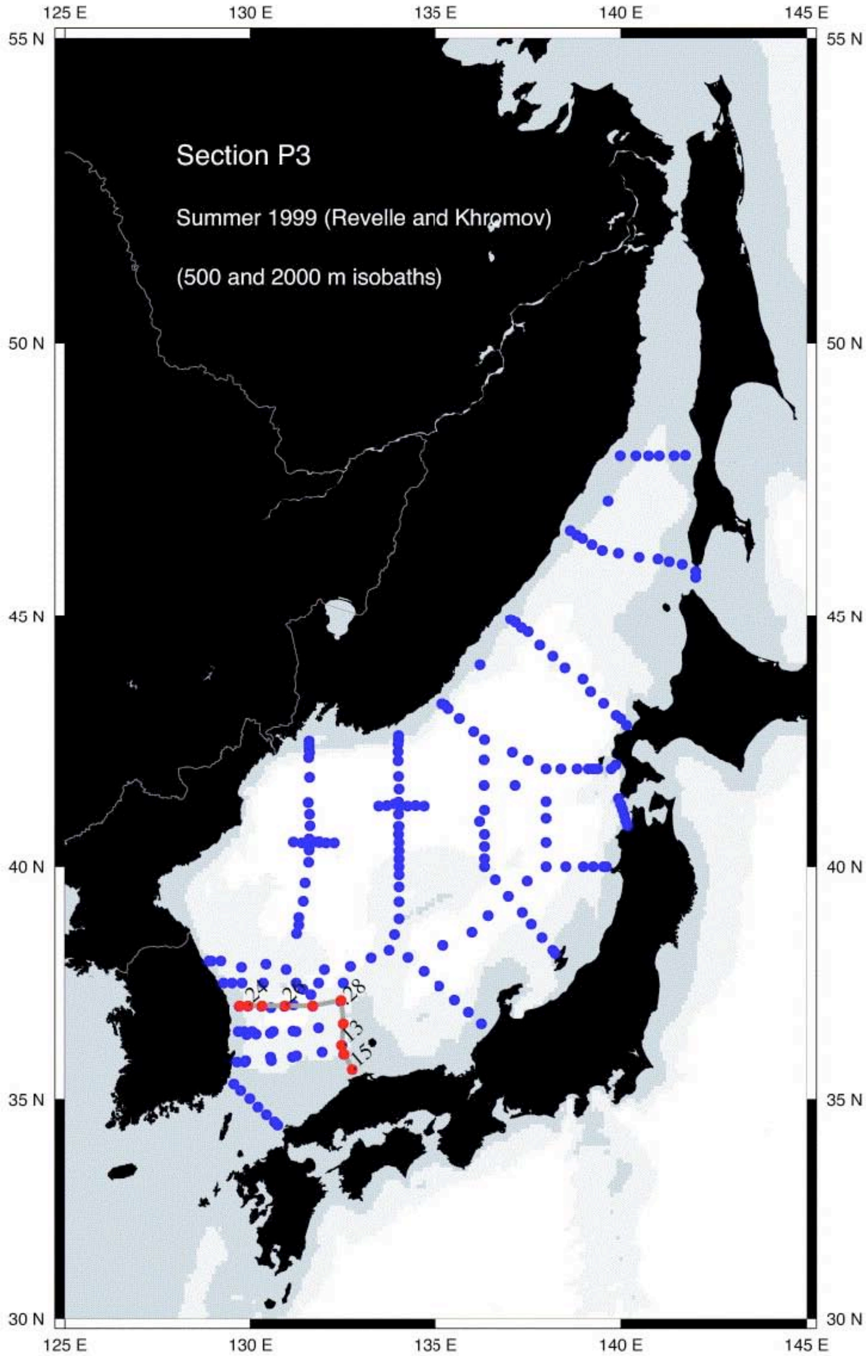
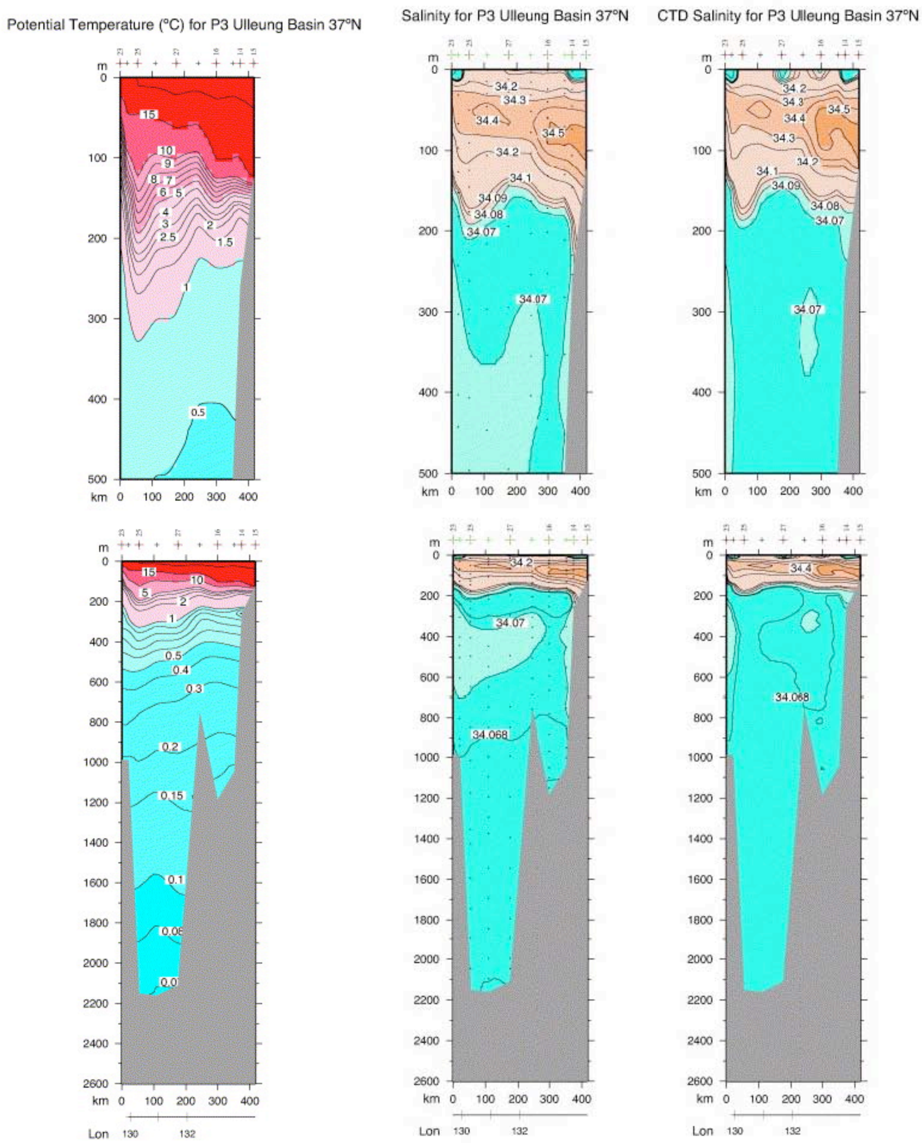
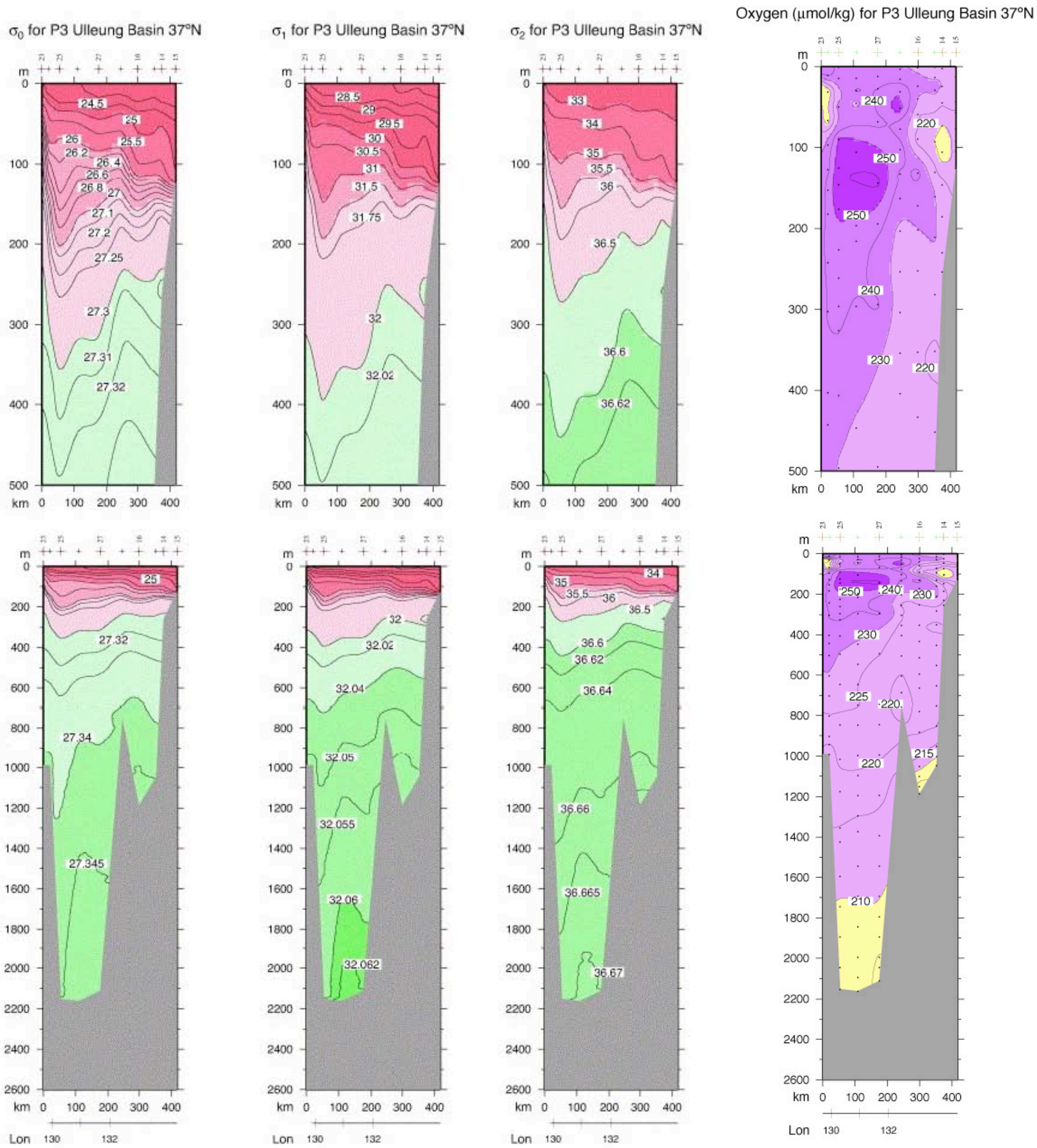
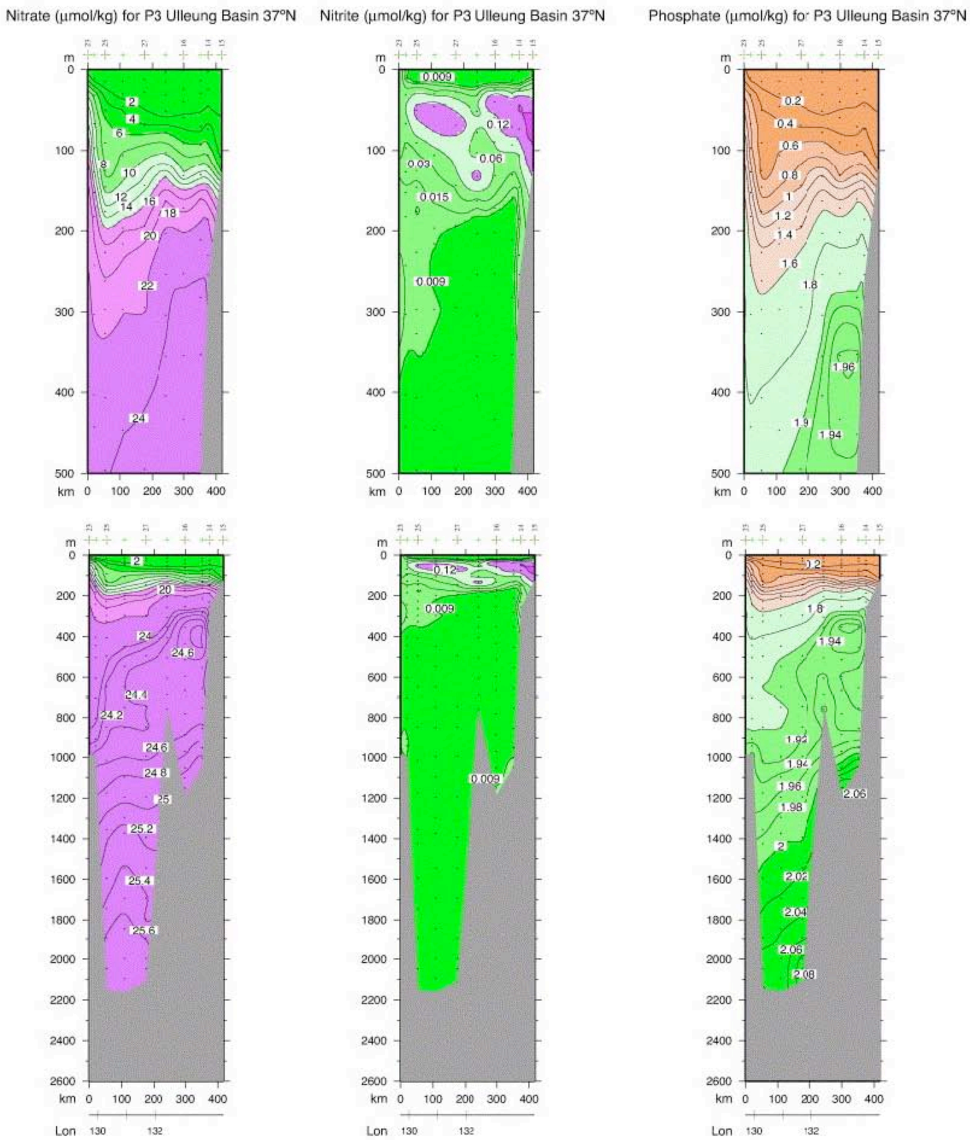
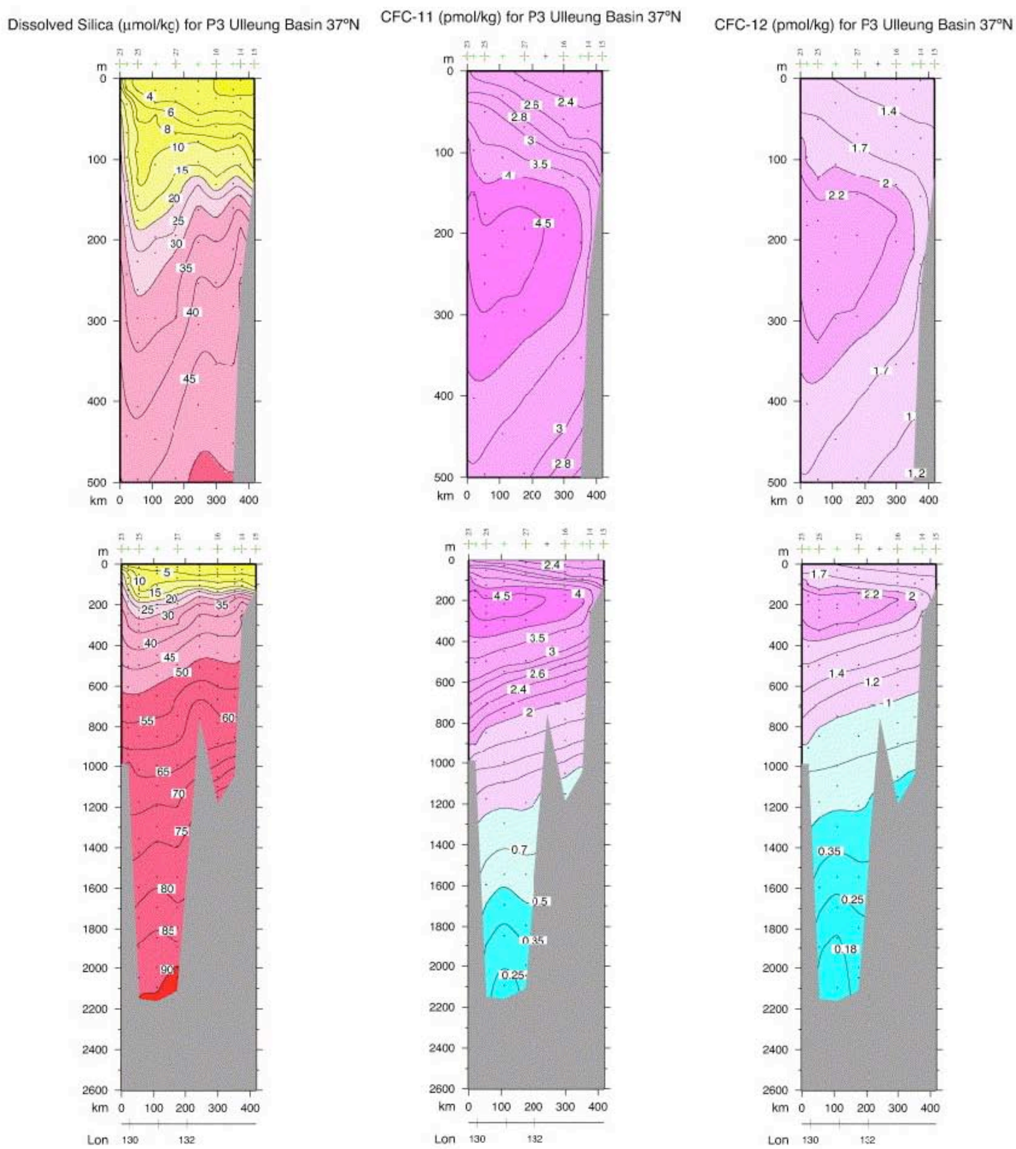


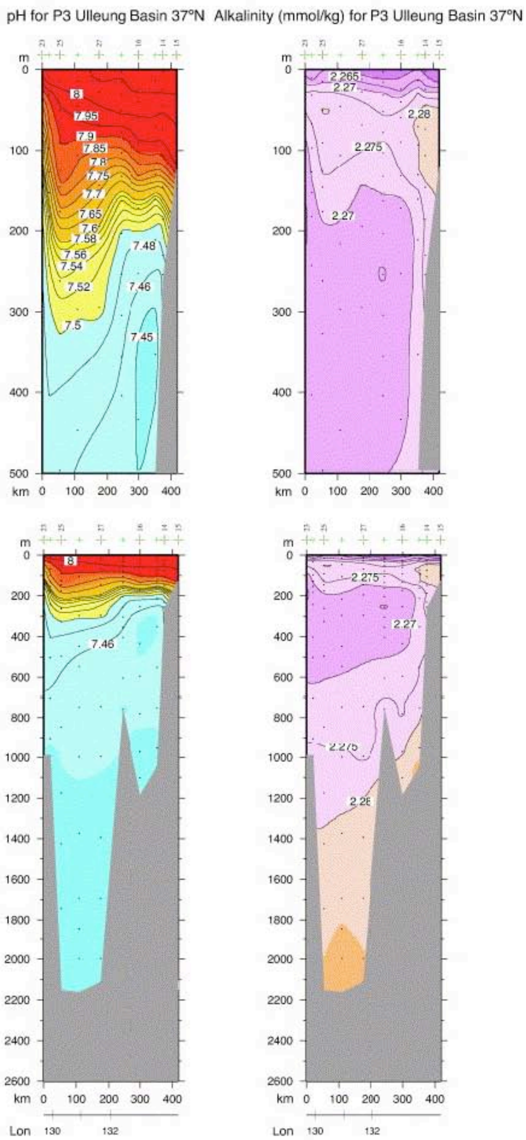
Figure D9. Vertical sections at approximately 37°N (Ulleung Basin) (P3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.


Potential Temperature (°C) for P3 Ulleung Basin 37°N
Salinity for P3 Ulleung Basin 37°N
CTD Salinity for P3 Ulleung Basin 37°N
m
km
Lon
130
132
15
10
5
2
1
0.5
0.4
0.3
0.2
0.15
0.1
34.2
34.3
34.4
34.5
34.1
34.09
34.08
34.07
34.068


σ0 for P3 Ulleung Basin 37°N
σ1 for P3 Ulleung Basin 37°N
σ2 for P3 Ulleung Basin 37°N
Oxygen (μmol/kg) for P3 Ulleung Basin 37°N
m
km
Lon
130
132


Nitrate (µmol/kg) for P3 Ulleung Basin 37°N
Nitrite (µmol/kg) for P3 Ulleung Basin 37°N
Phosphate (µmol/kg) for P3 Ulleung Basin 37°N
m
km
Lon


Dissolved Silica (µmol/kg) for P3 Ulleung Basin 37°N
CFC-11 (pmol/kg) for P3 Ulleung Basin 37°N
CFC-12 (pmol/kg) for P3 Ulleung Basin 37°N


pH for P3 Ulleung Basin 37°N
Alkalinity (mmol/kg) for P3 Ulleung Basin 37°N
m
km
Lon
130
132
8
7.95
7.9
7.85
7.8
7.75
7.7
7.65
7.6
7.58
7.56
7.54
7.52
7.5
7.48
7.46
7.45
2.265
2.27
2.28
2.275

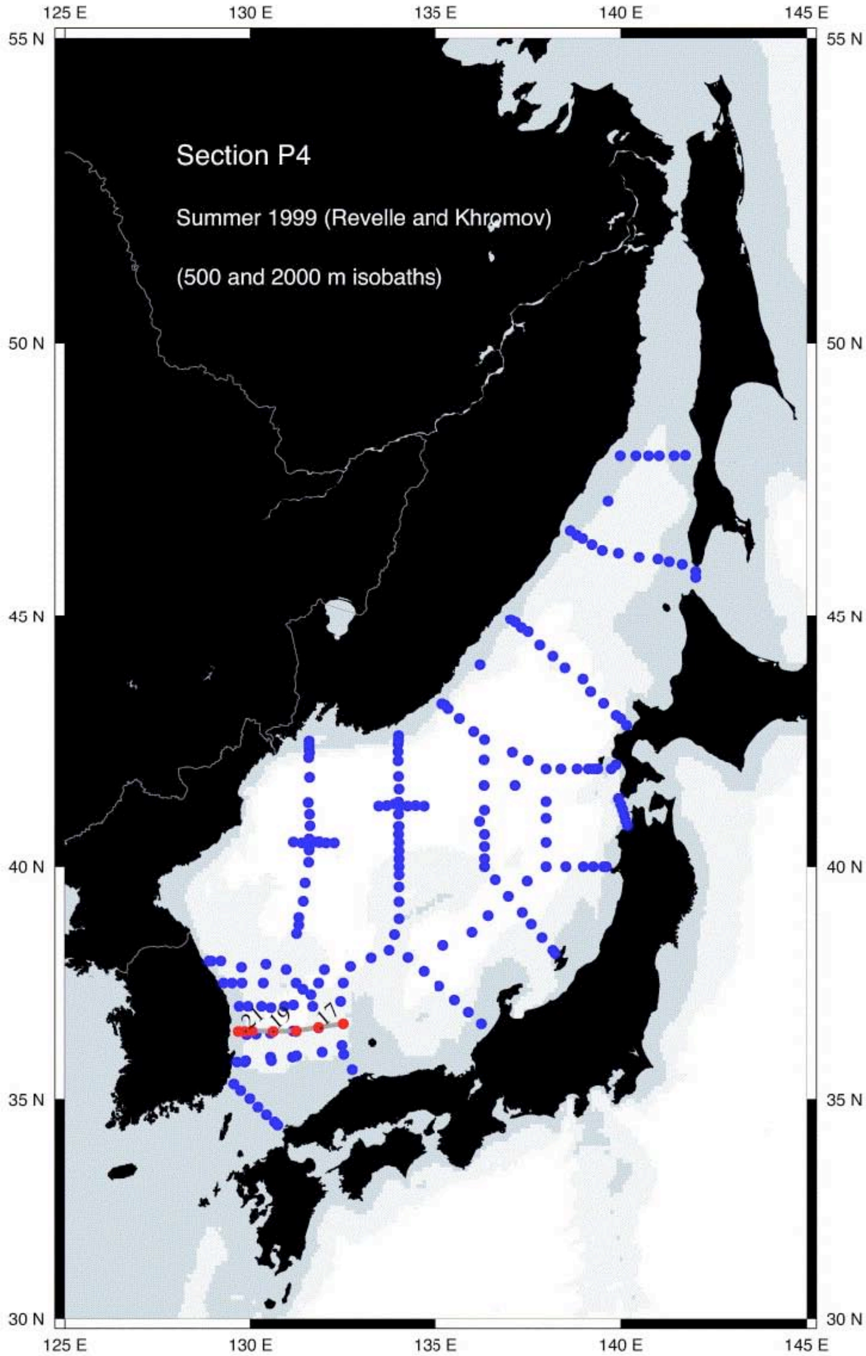
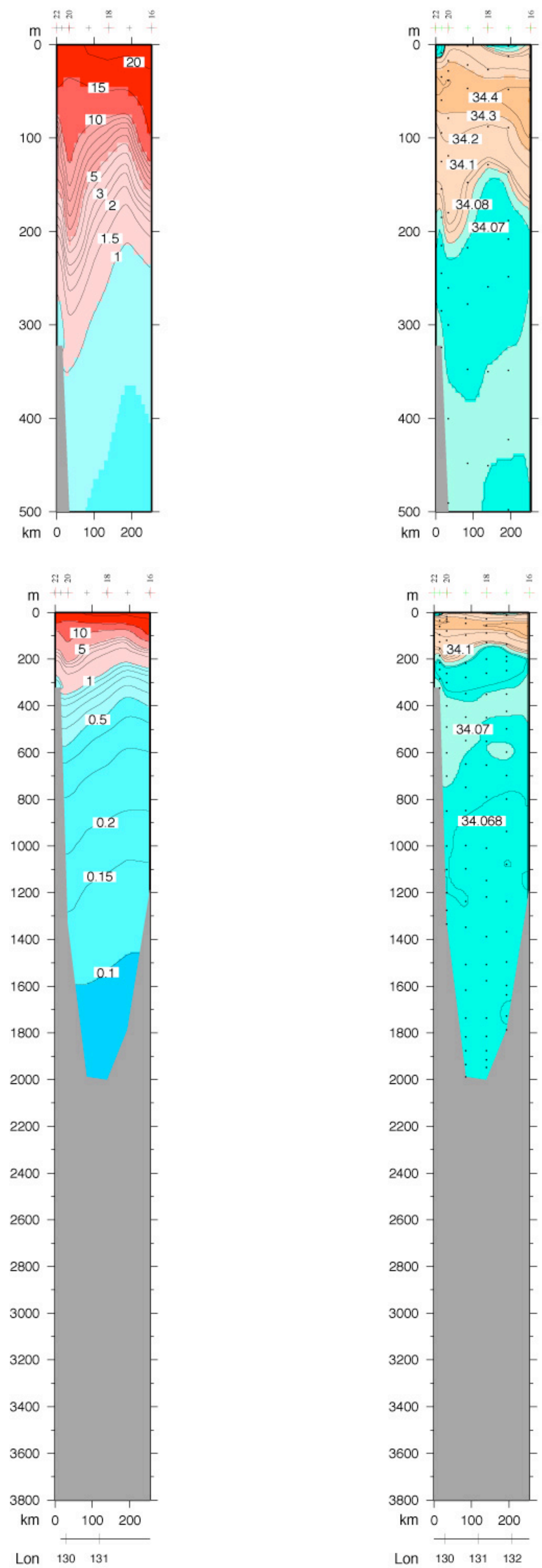
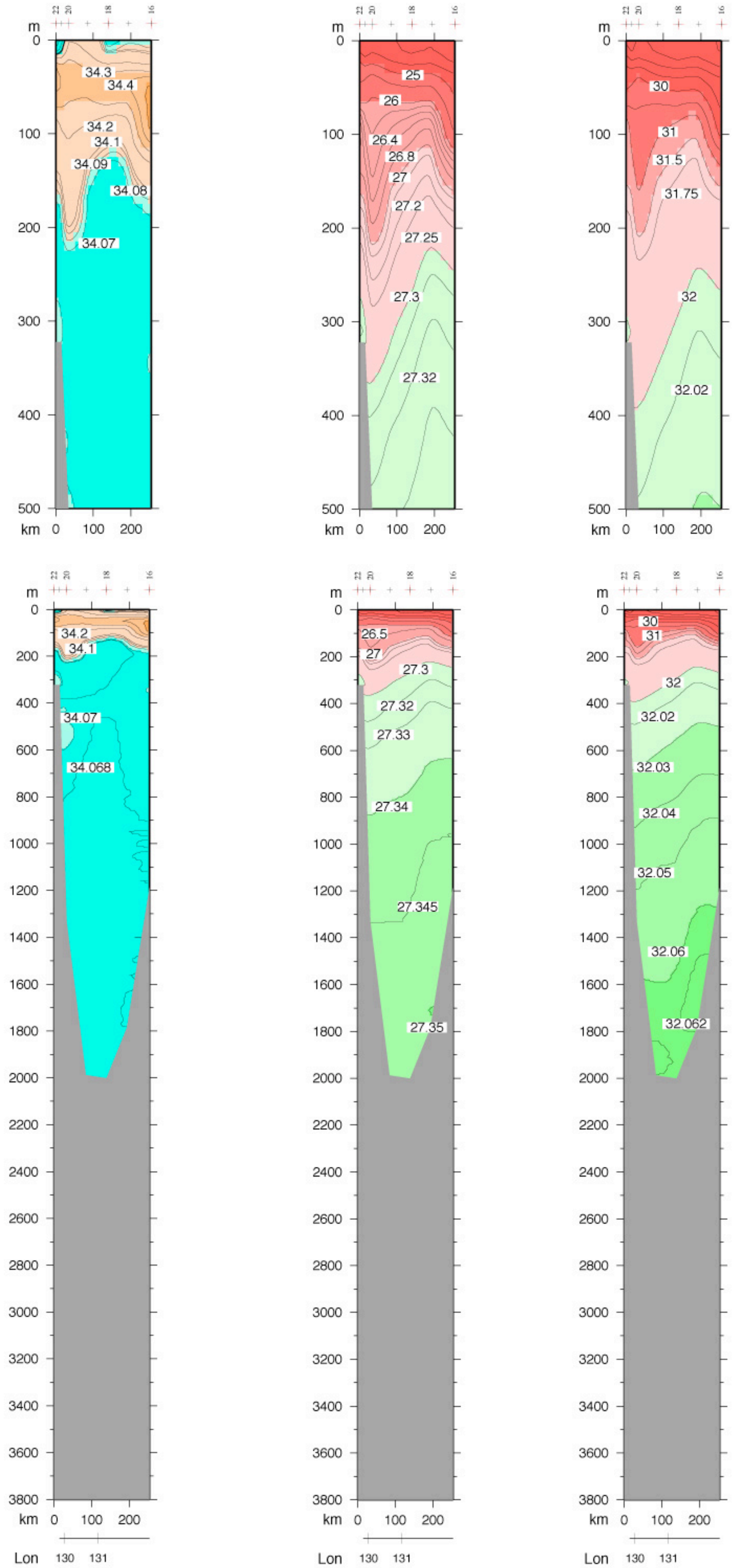


Figure D10. Vertical sections at approximately 36°30’N (Ulleung Basin) (P4 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

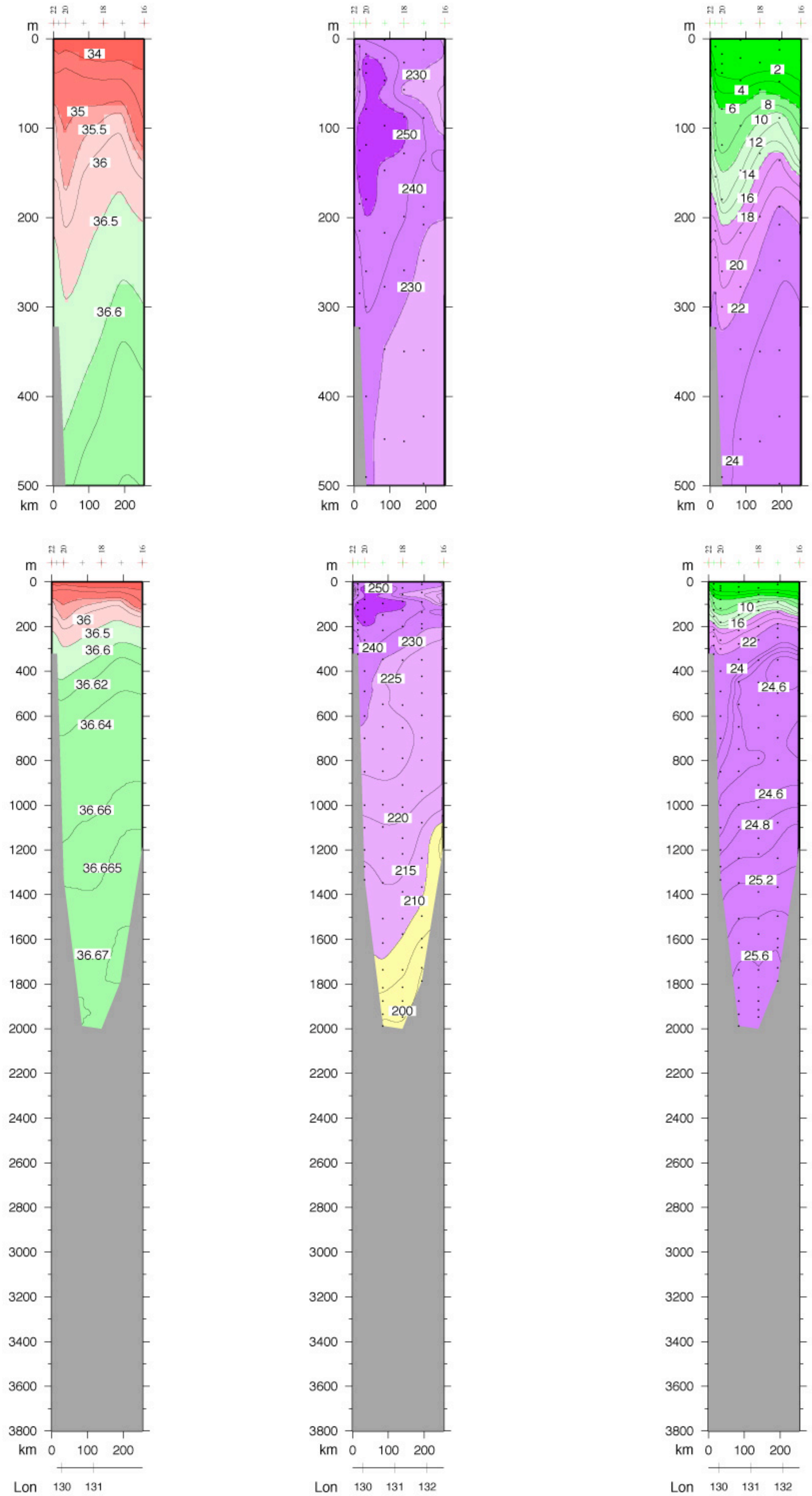
Potential Temperature (°C) for P4 Ulleung Basin 36° 30' N Salinity for P4 Ulleung Basin 36° 30' N



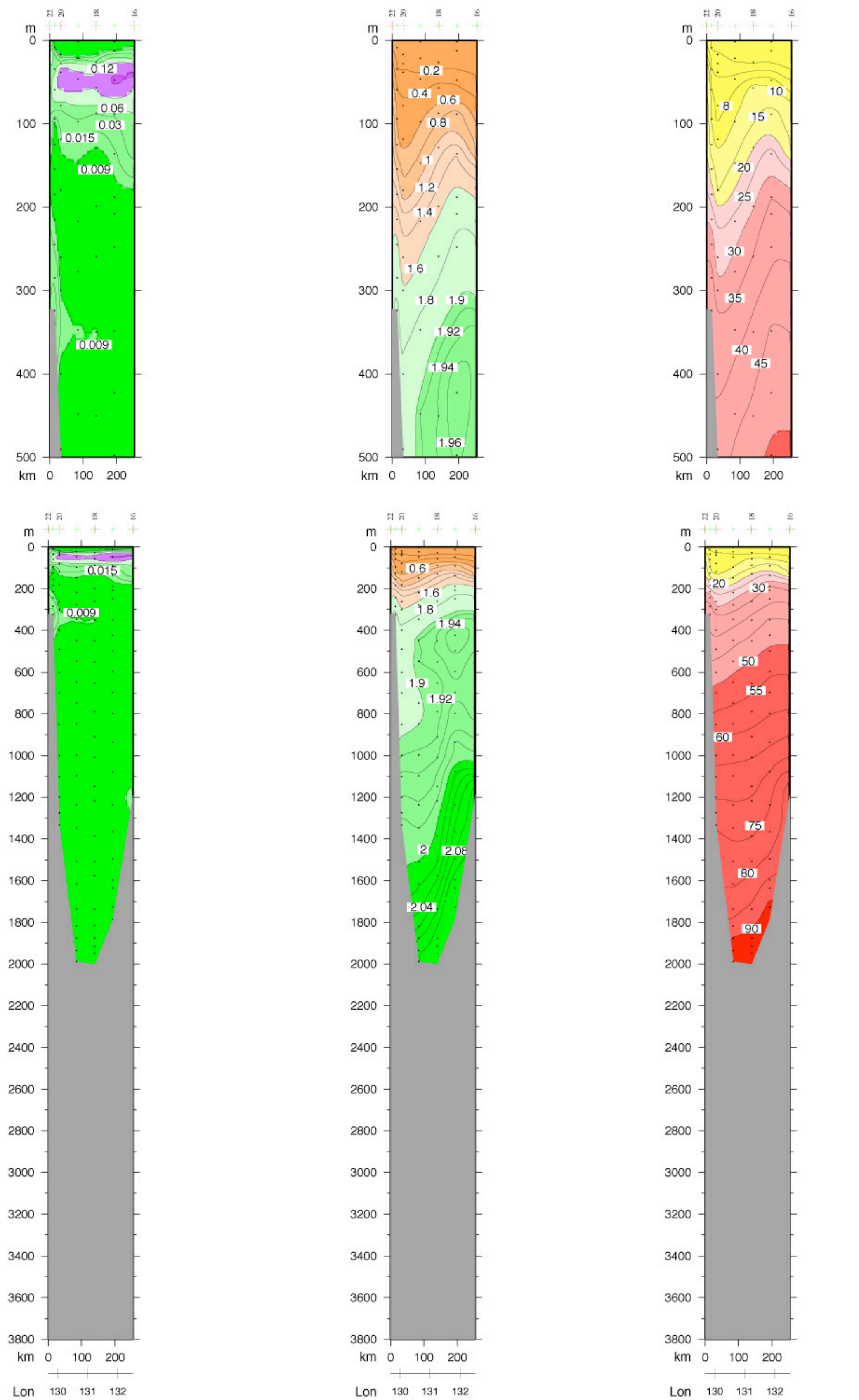
CTD Salinity for P4 Ulleung Basin 36° 30' N σ_0 for P4 Ulleung Basin 36° 30' N σ_1 for P4 Ulleung Basin 36° 30' N



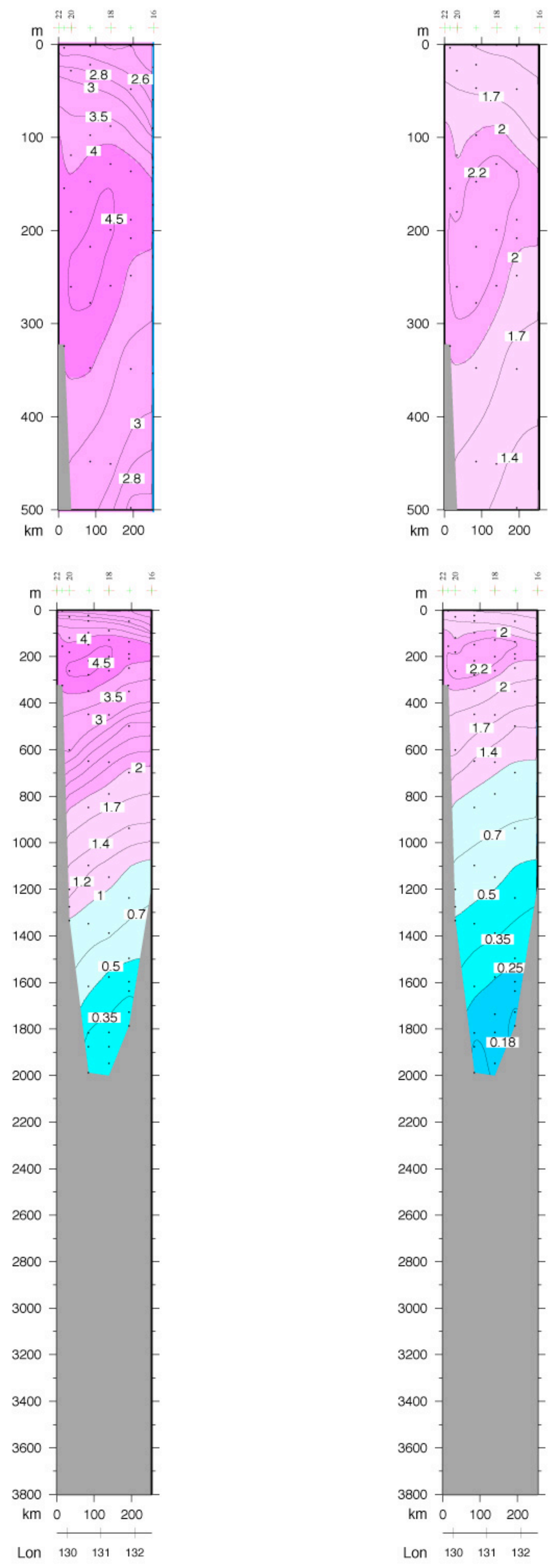
σ_2 for P4 Ulleung Basin 36° 30' NOxygen (µmol/kg) for P4 Ulleung Basin 36° 30' NNitrate (µmol/kg) for P4 Ulleung Basin 36° 30' N



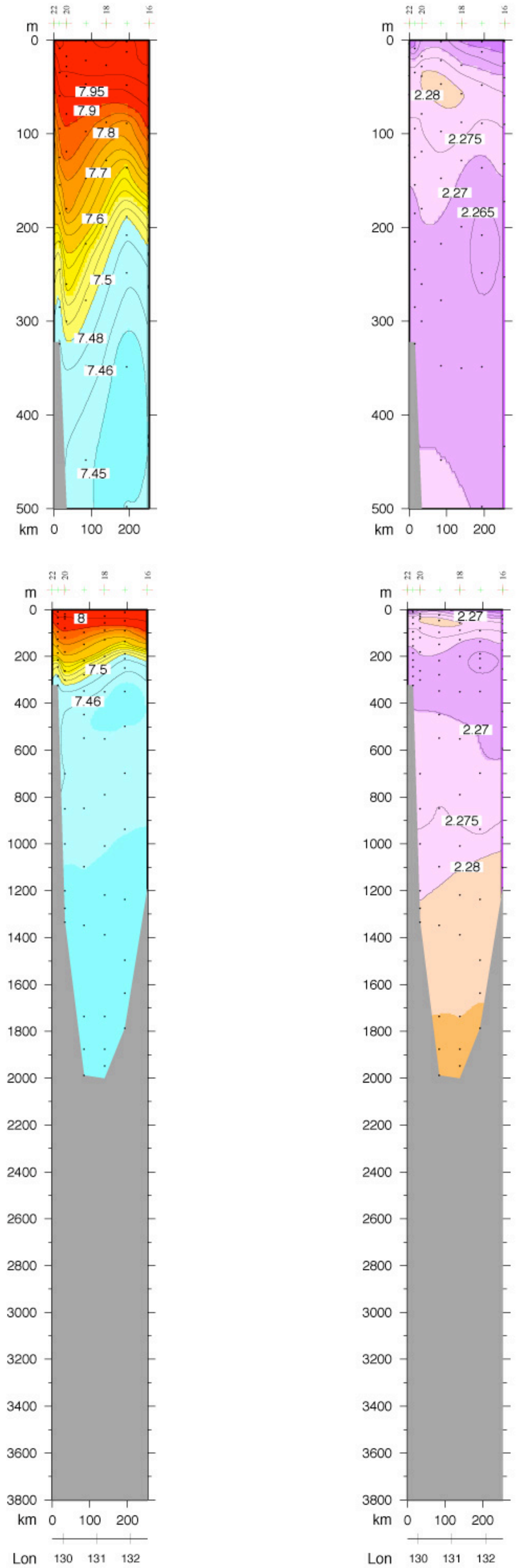
Nitrite (µmol/kg) for P4 Ulleung Basin 36° 30' N Phosphate (µmol/kg) for P4 Ulleung Basin :Dissolved Silica (µmol/kg) for P4 Ulleung Basin



CFC-11 (pmol/kg) for P4 Ulleung Basin 36° 30' N CFC-12 (pmol/kg) for P4 Ulleung Basin 36° 30' N



pH for P4 Ulleung Basin 36° 30' N Alkalinity (mmol/kg) for P4 Ulleung Basin 36° 30' N



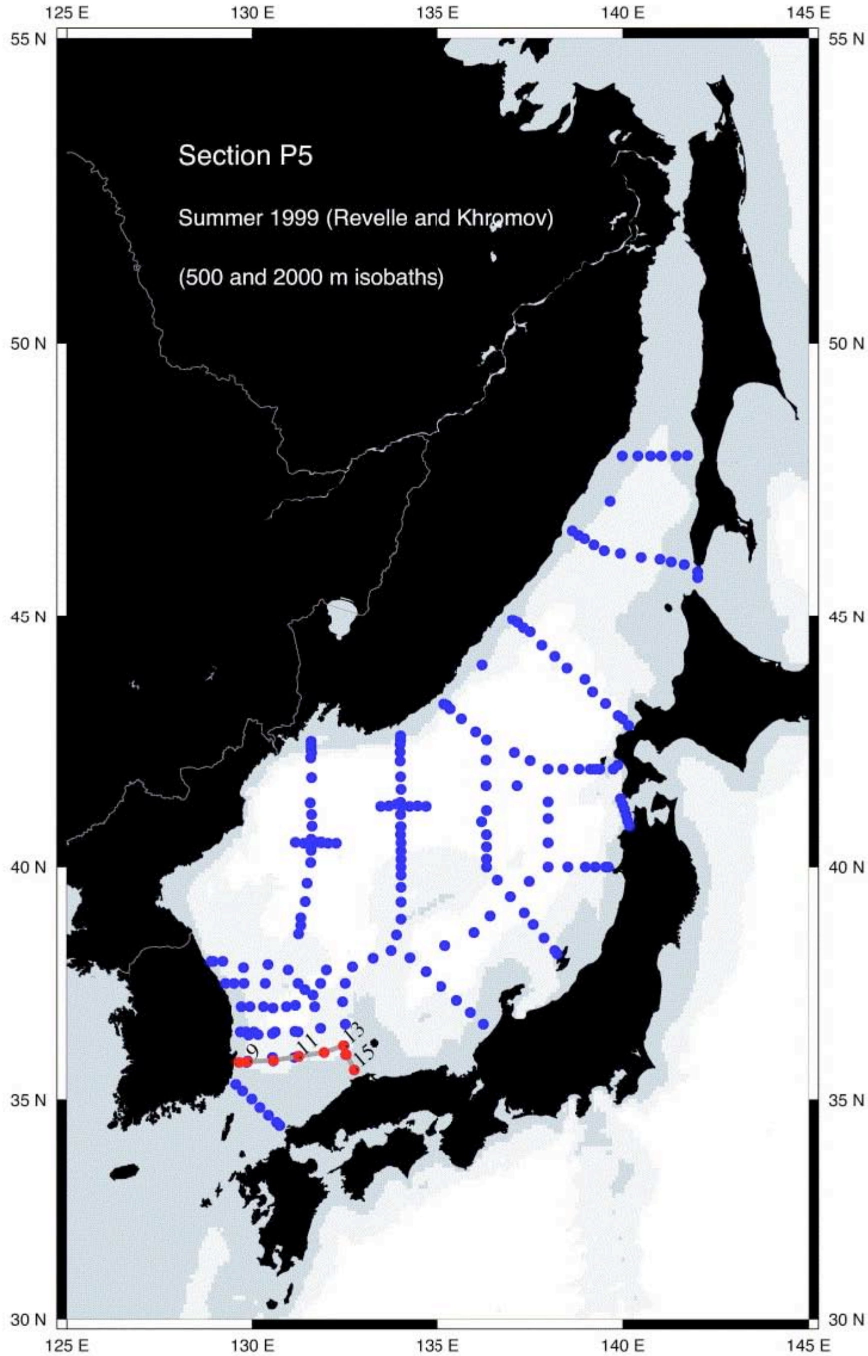
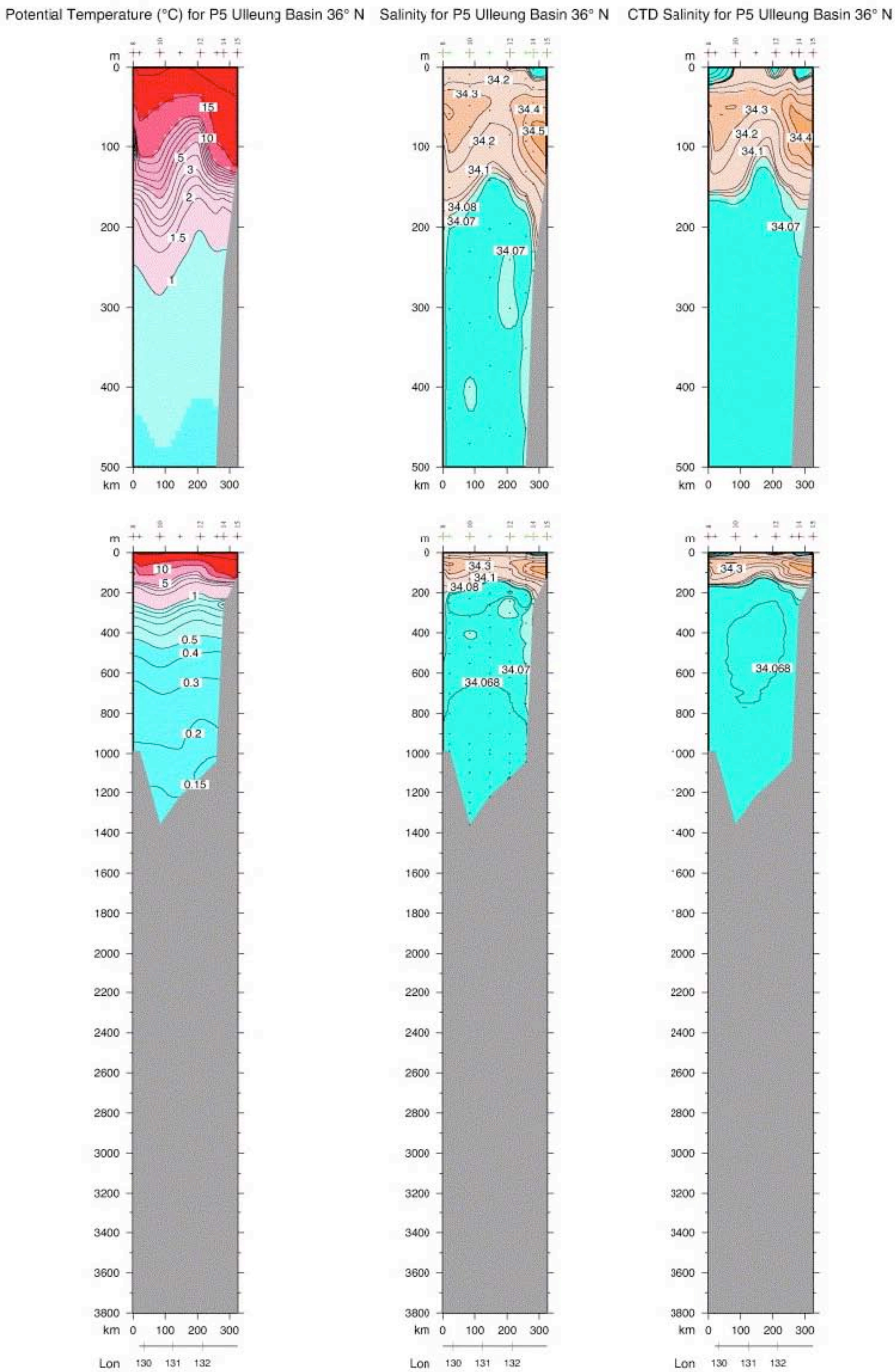
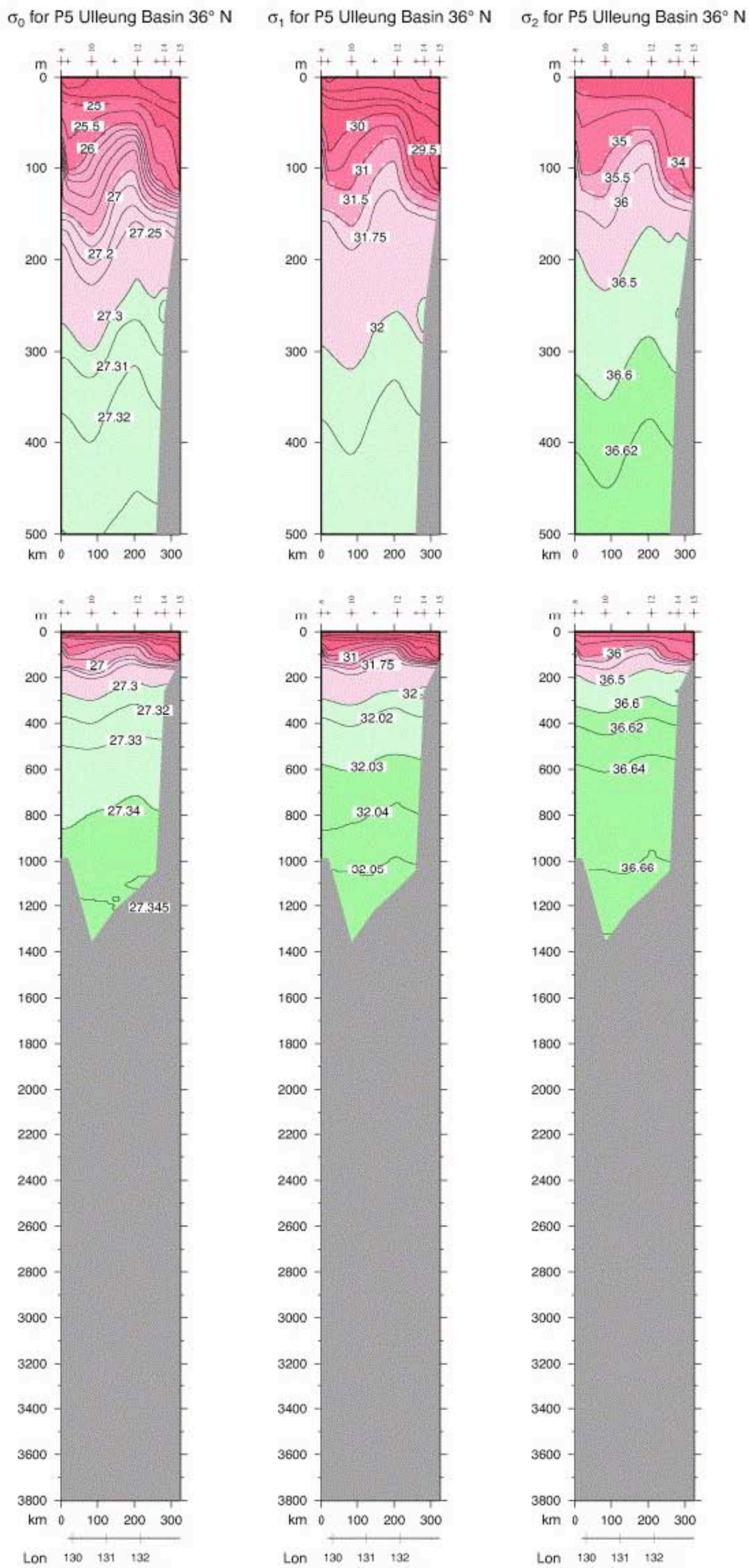


Figure D11. Vertical sections at approximately 36°N (Ulleung Basin) (P5 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

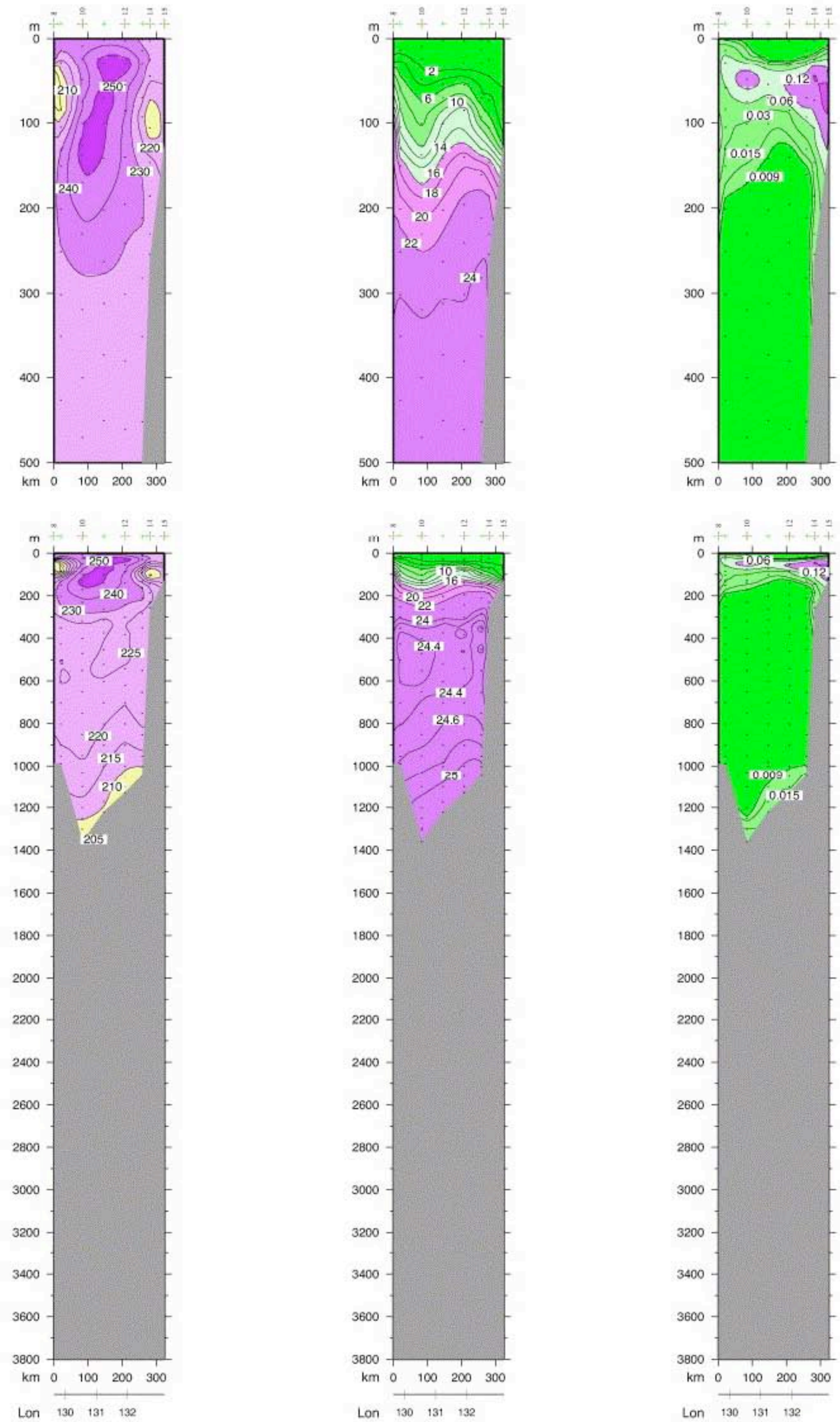

Potential Temperature (°C) for P5 Ulleung Basin 36° N
Salinity for P5 Ulleung Basin 36° N
CTD Salinity for P5 Ulleung Basin 36° N
m
km
Lon
130
131
132

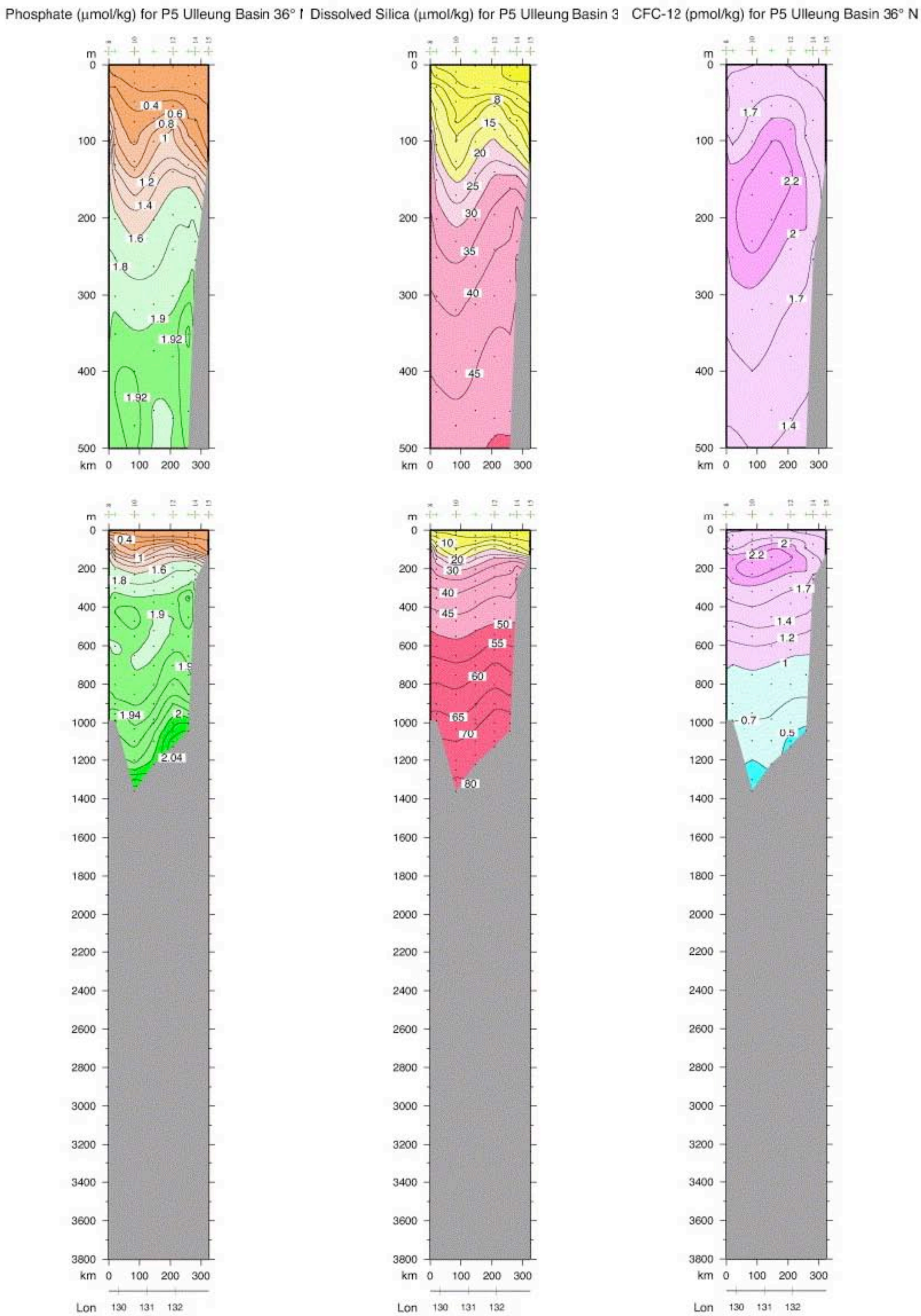

σ0 for P5 Ulleung Basin 36° N
σ1 for P5 Ulleung Basin 36° N
σ2 for P5 Ulleung Basin 36° N
m
km
Lon
130
131
132
25
25.5
26
27
27.25
27.2
27.3
27.31
27.32
27.33
27.34
27.345
30
29.5
31
31.5
31.75
32
32.02
32.03
32.04
32.05
34
35
35.5
36
36.5
36.6
36.62
36.64
36.66

Oxygen (µmol/kg) for P5 Ulleung Basin 36° N

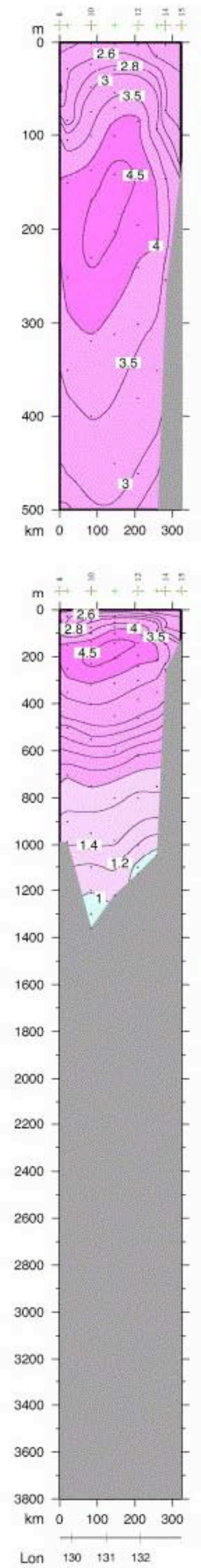
Nitrate (µmol/kg) for P5 Ulleung Basin 36° N

Nitrite (µmol/kg) for P5 Ulleung Basin 36° N

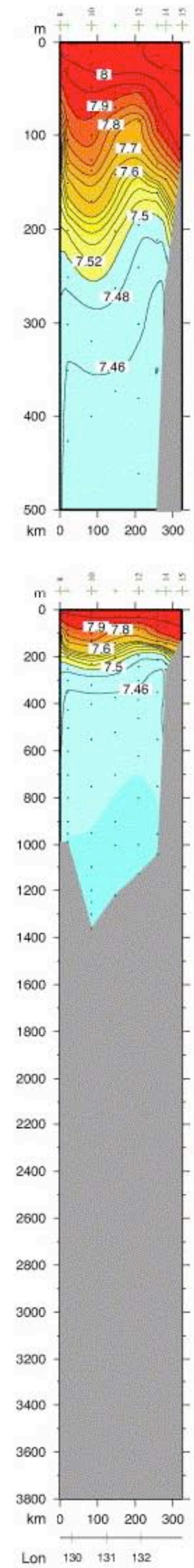



Phosphate (µmol/kg) for P5 Ulleung Basin 36° N
Dissolved Silica (µmol/kg) for P5 Ulleung Basin 3
CFC-12 (pmol/kg) for P5 Ulleung Basin 36° N
m
km
Lon
130
131
132

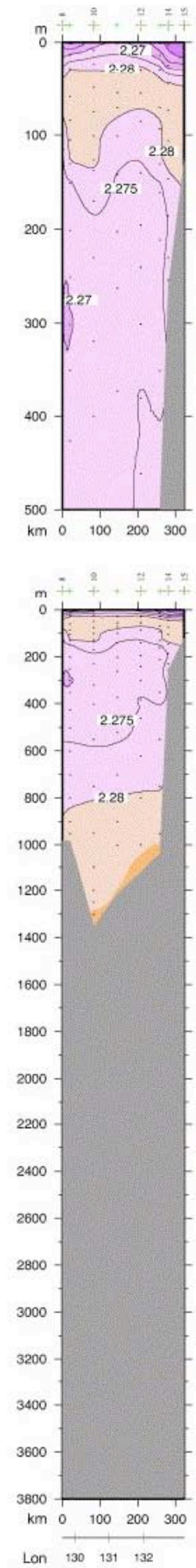
CFC-11 (pmol/kg) for P5 Ulleung Basin 36° N



pH for P5 Ulleung Basin 36° N



Alkalinity (mmol/kg) for P5 Ulleung Basin 36° N



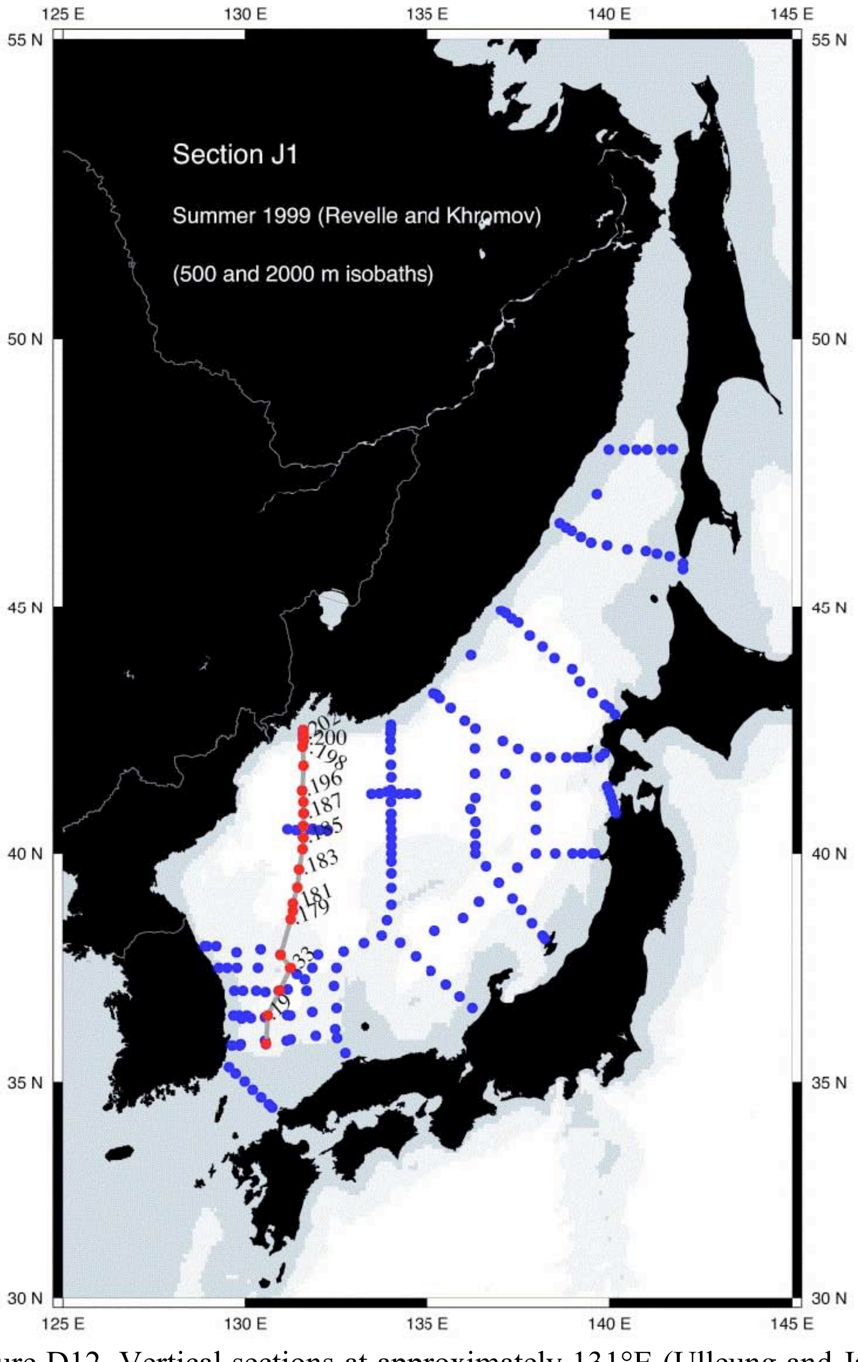
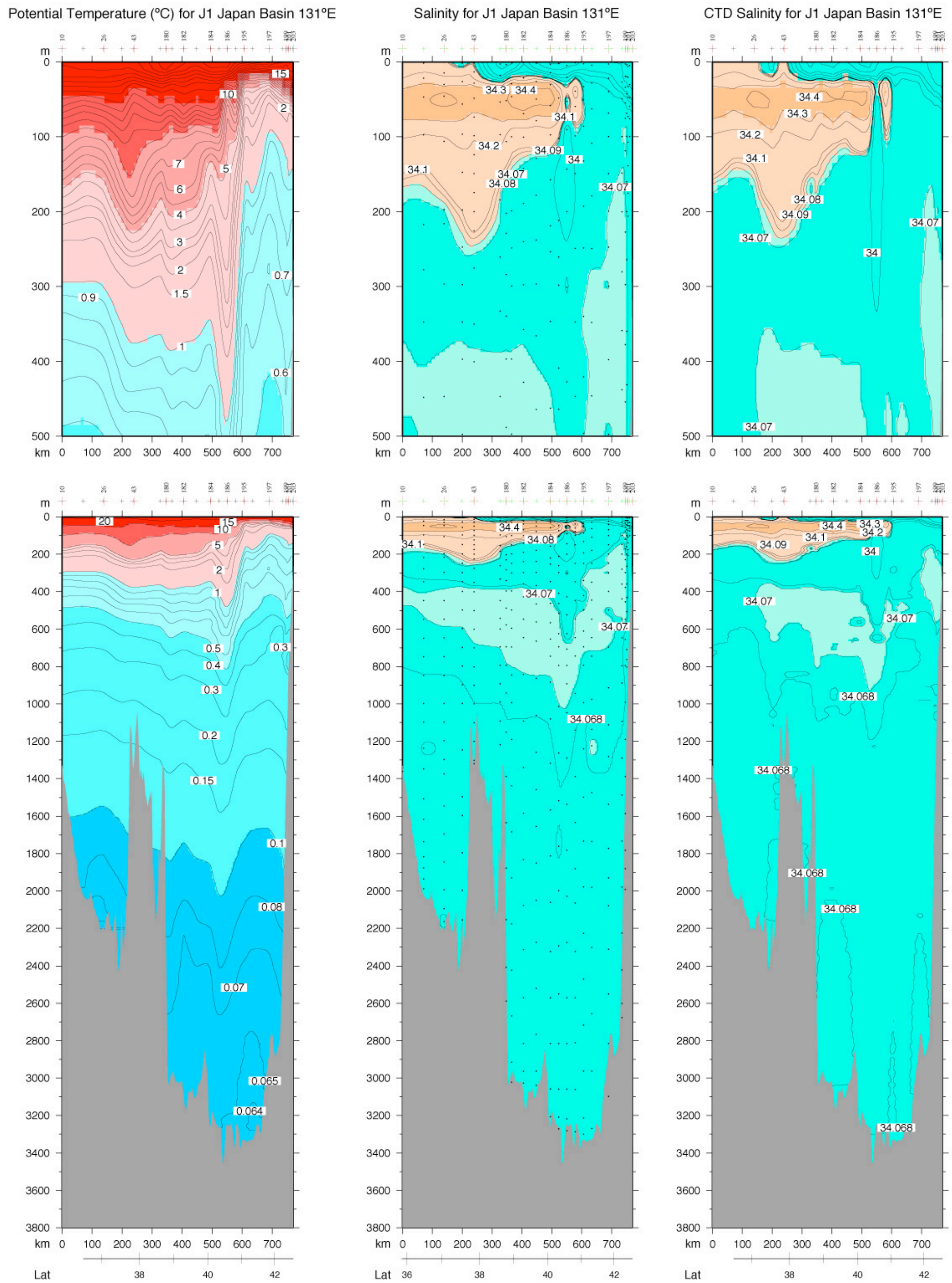
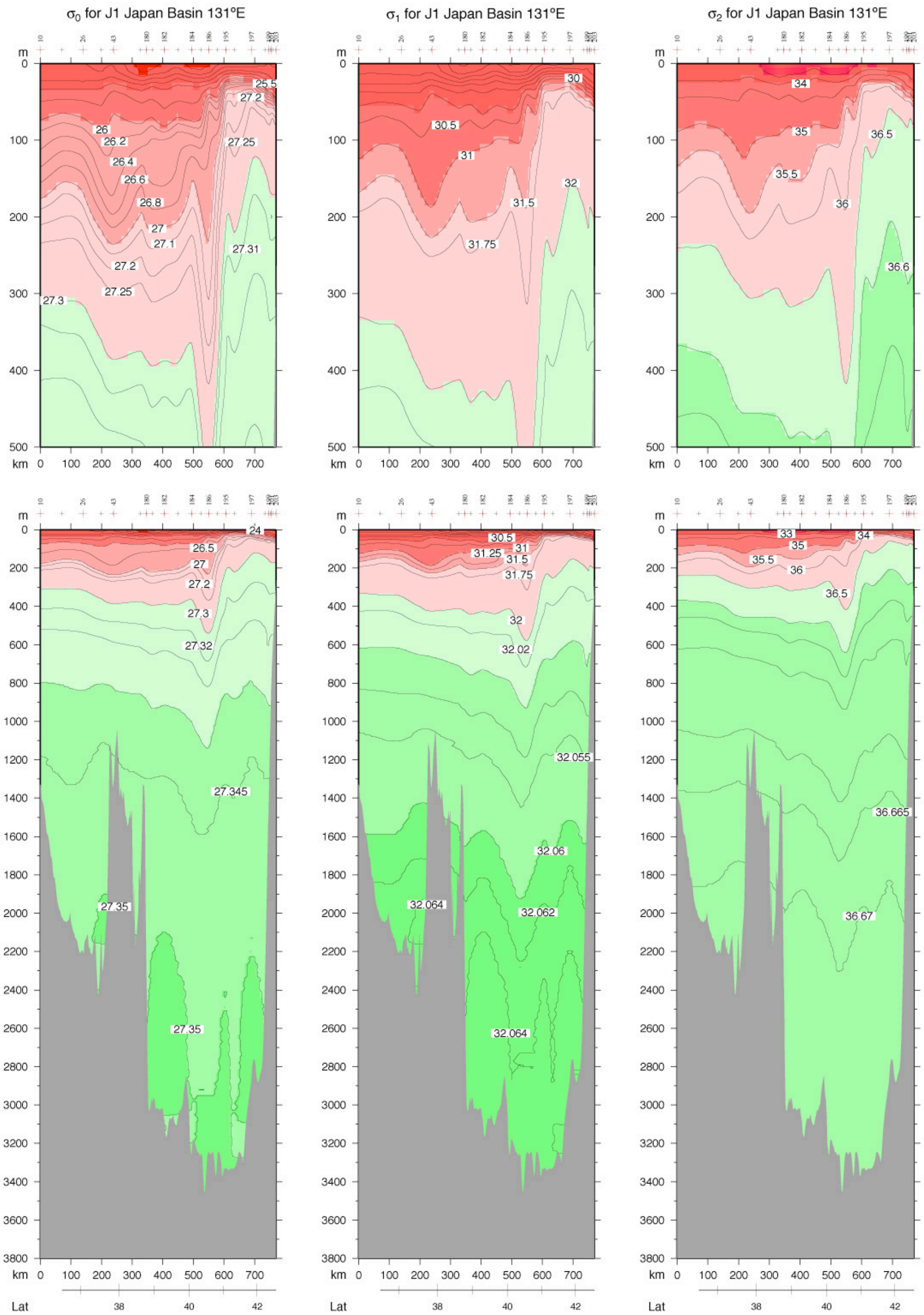
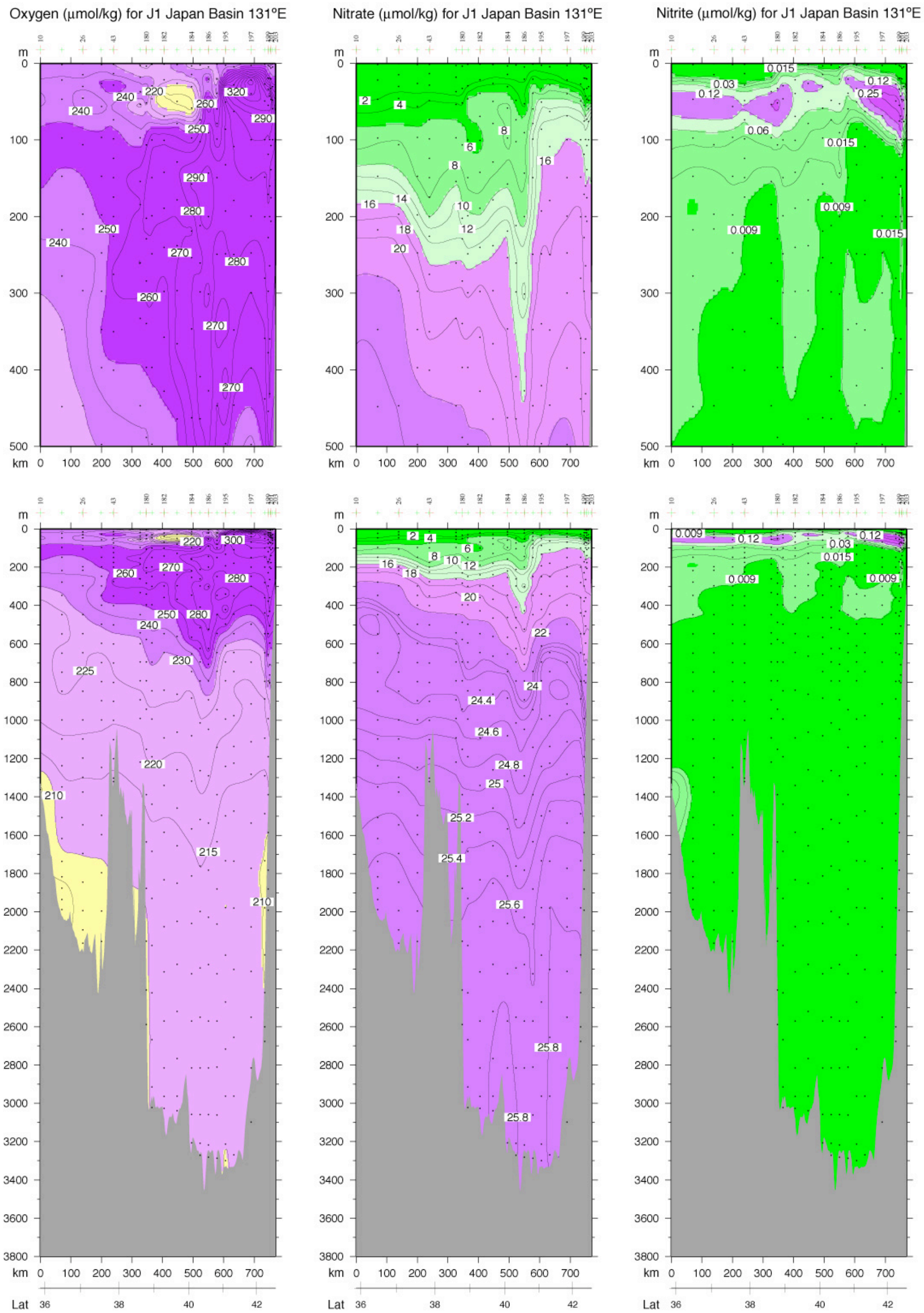


Figure D12. Vertical sections at approximately 131°E (Ulleung and Japan Basins) (J1 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panelvertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.


Potential Temperature (ºC) for J1 Japan Basin 131ºE
Salinity for J1 Japan Basin 131ºE
CTD Salinity for J1 Japan Basin 131ºE

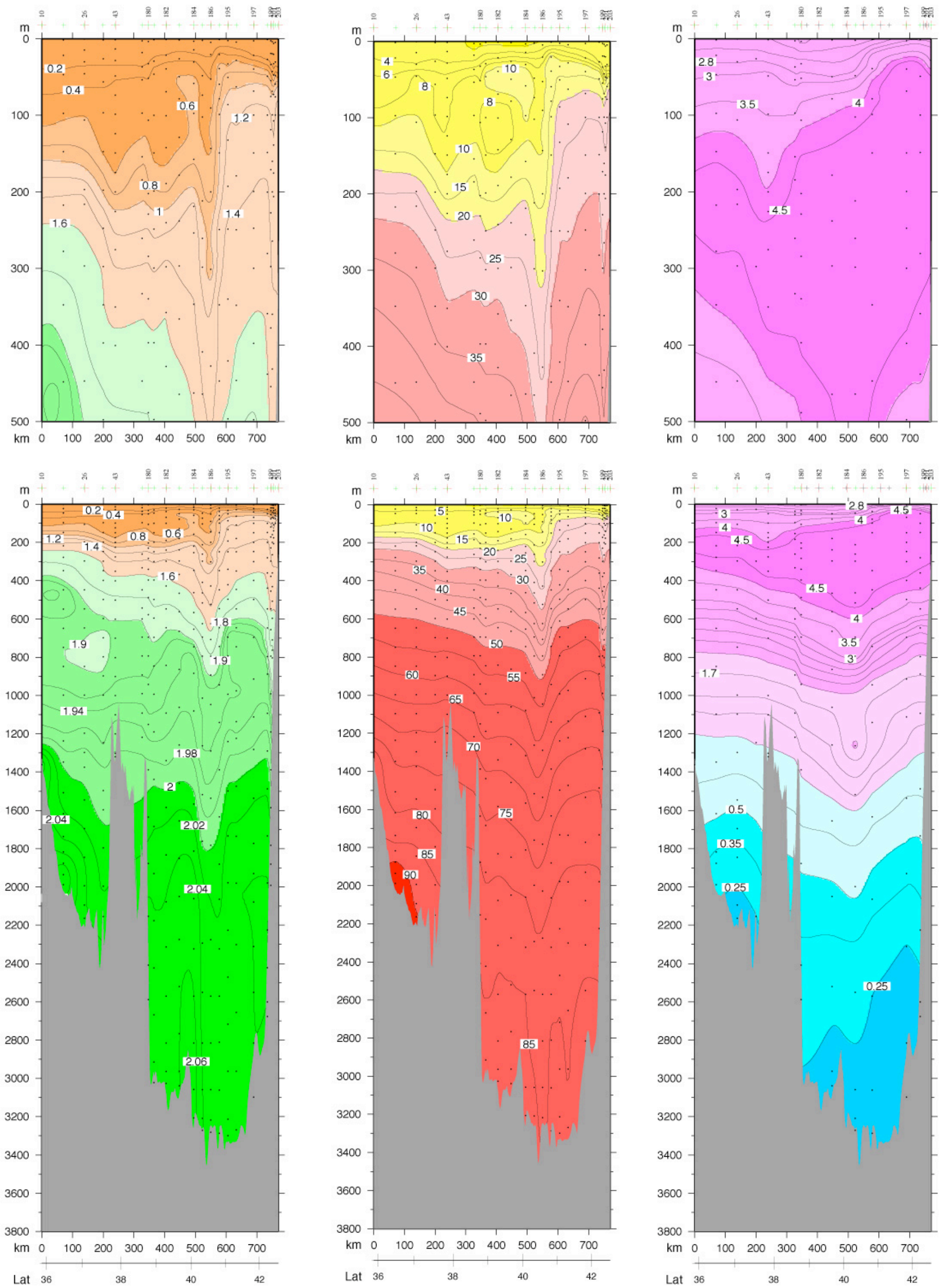

σ_0 for J1 Japan Basin 131ºE
σ_1 for J1 Japan Basin 131ºE
σ_2 for J1 Japan Basin 131ºE
m
km
Lat

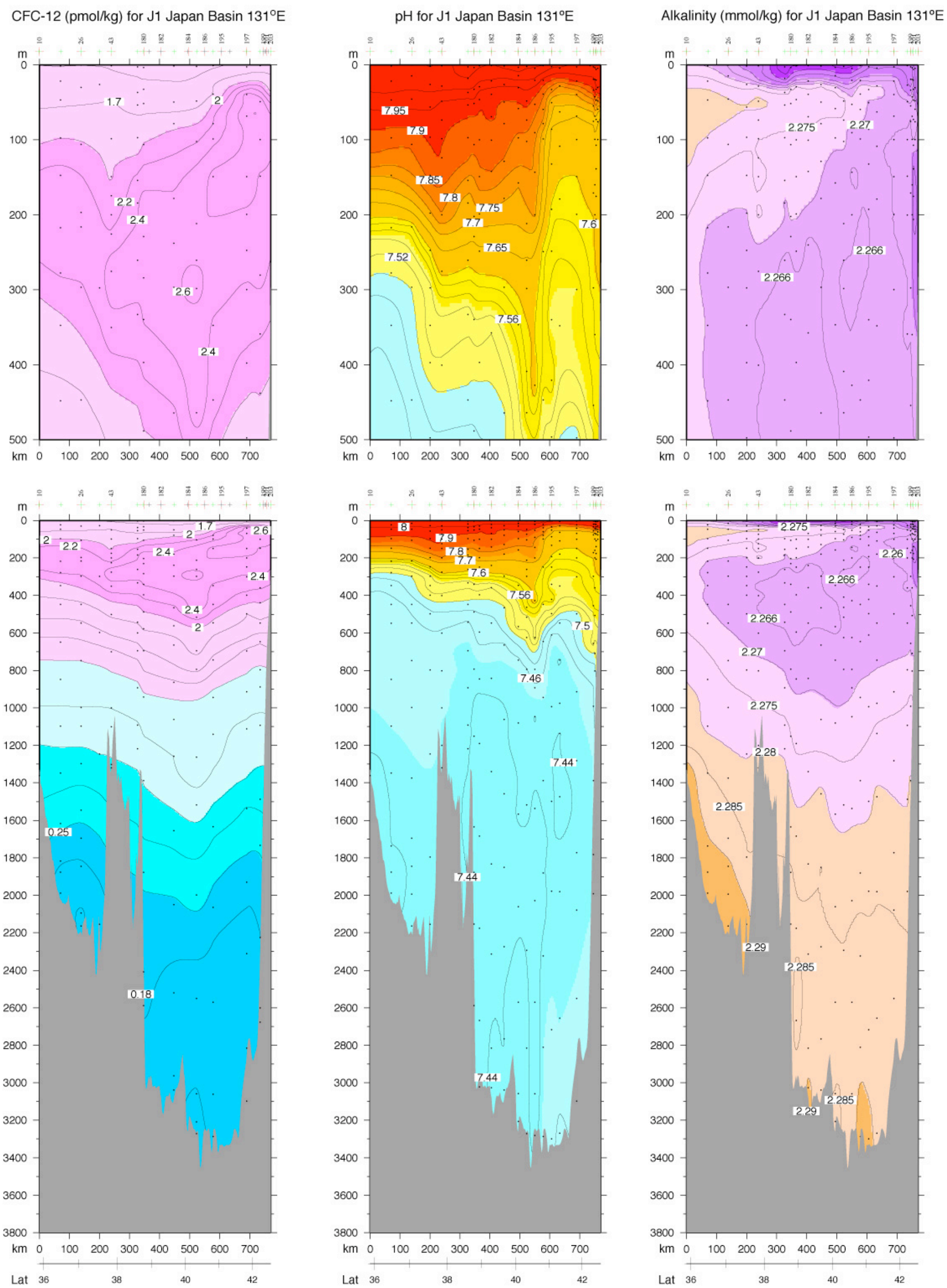

Oxygen (μmol/kg) for J1 Japan Basin 131ºE
Nitrate (μmol/kg) for J1 Japan Basin 131ºE
Nitrite (μmol/kg) for J1 Japan Basin 131ºE

Phosphate (μmol/kg) for J1 Japan Basin 131ºE

Dissolved Silica (μmol/kg) for J1 Japan Basin 131

CFC-11 (pmol/kg) for J1 Japan Basin 131ºE




CFC-12 (pmol/kg) for J1 Japan Basin 131°E
pH for J1 Japan Basin 131°E
Alkalinity (mmol/kg) for J1 Japan Basin 131°E

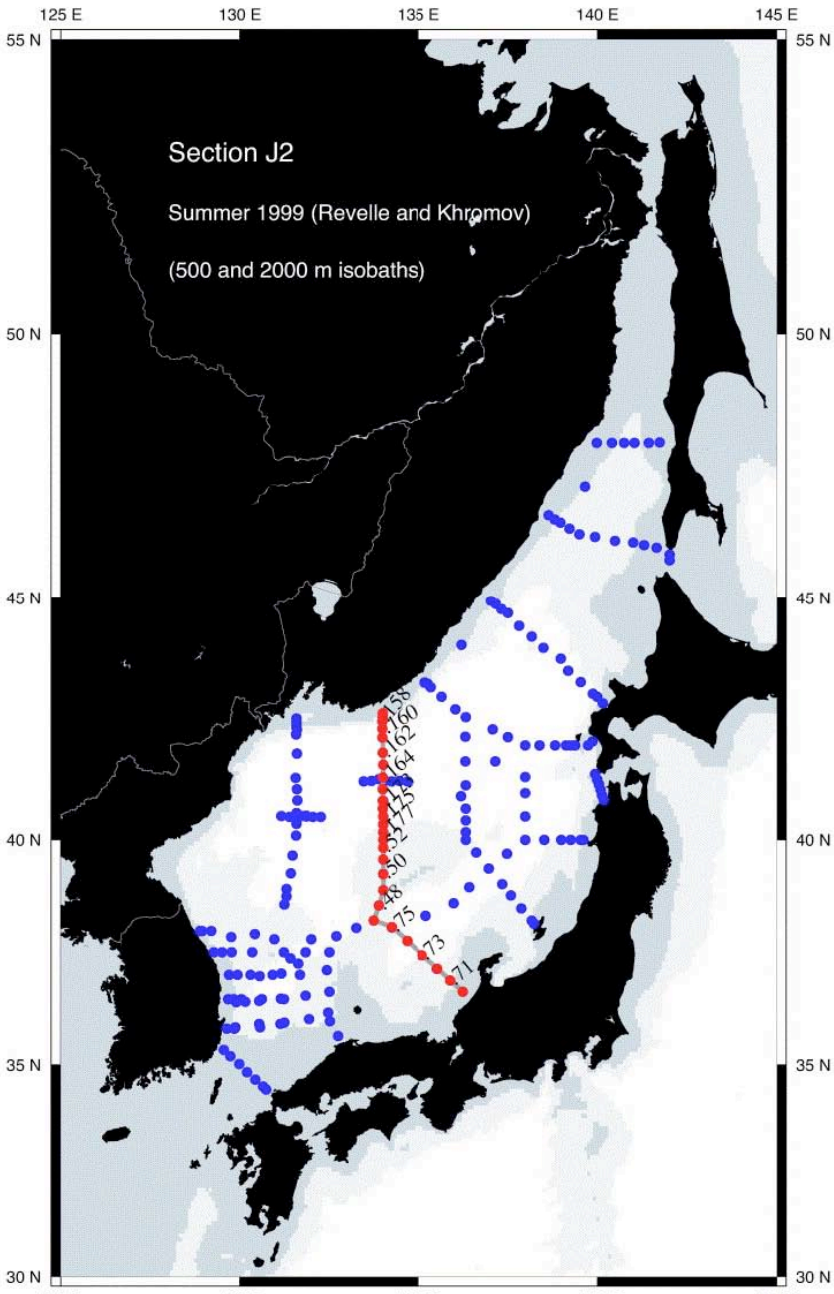
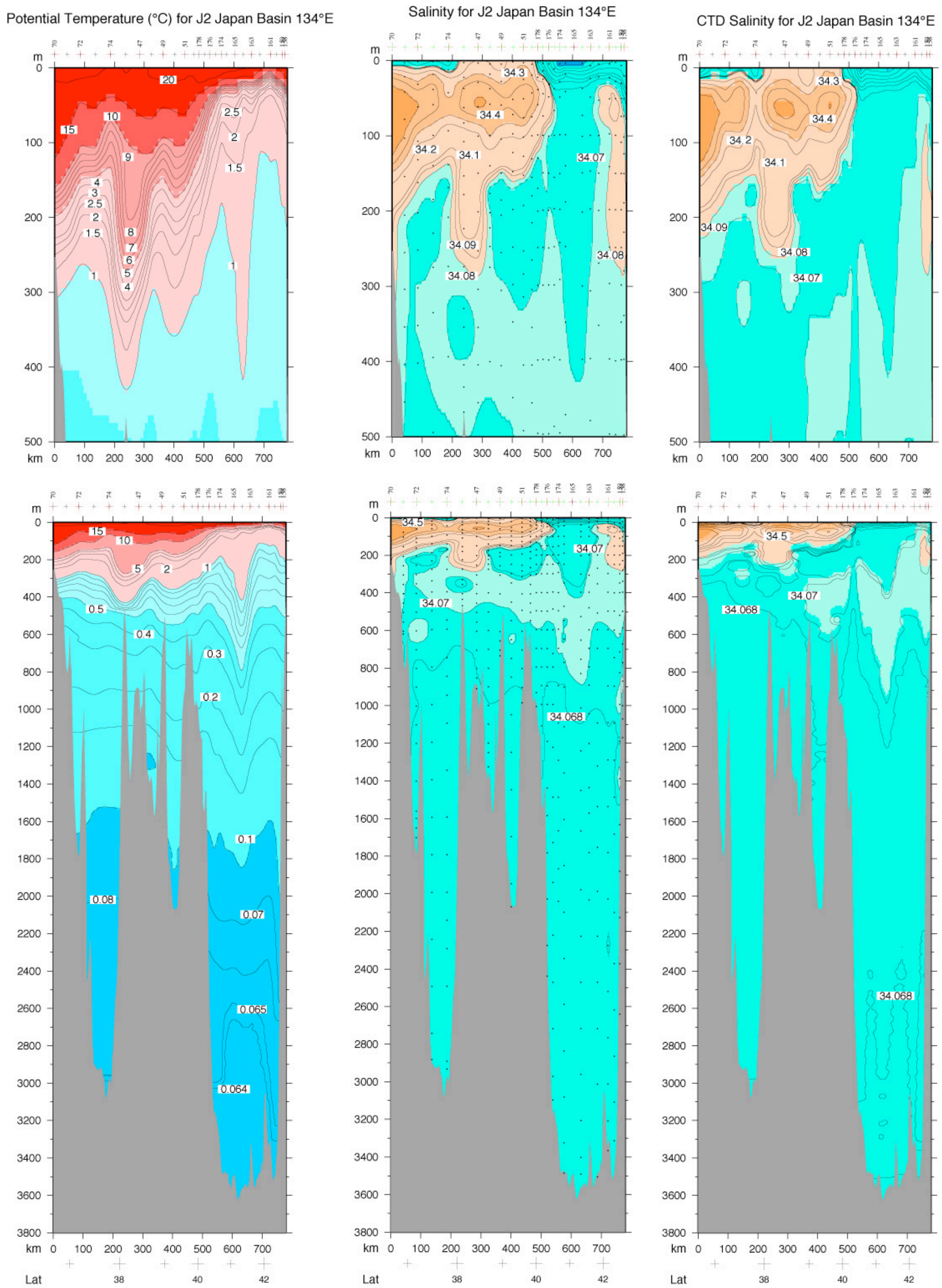
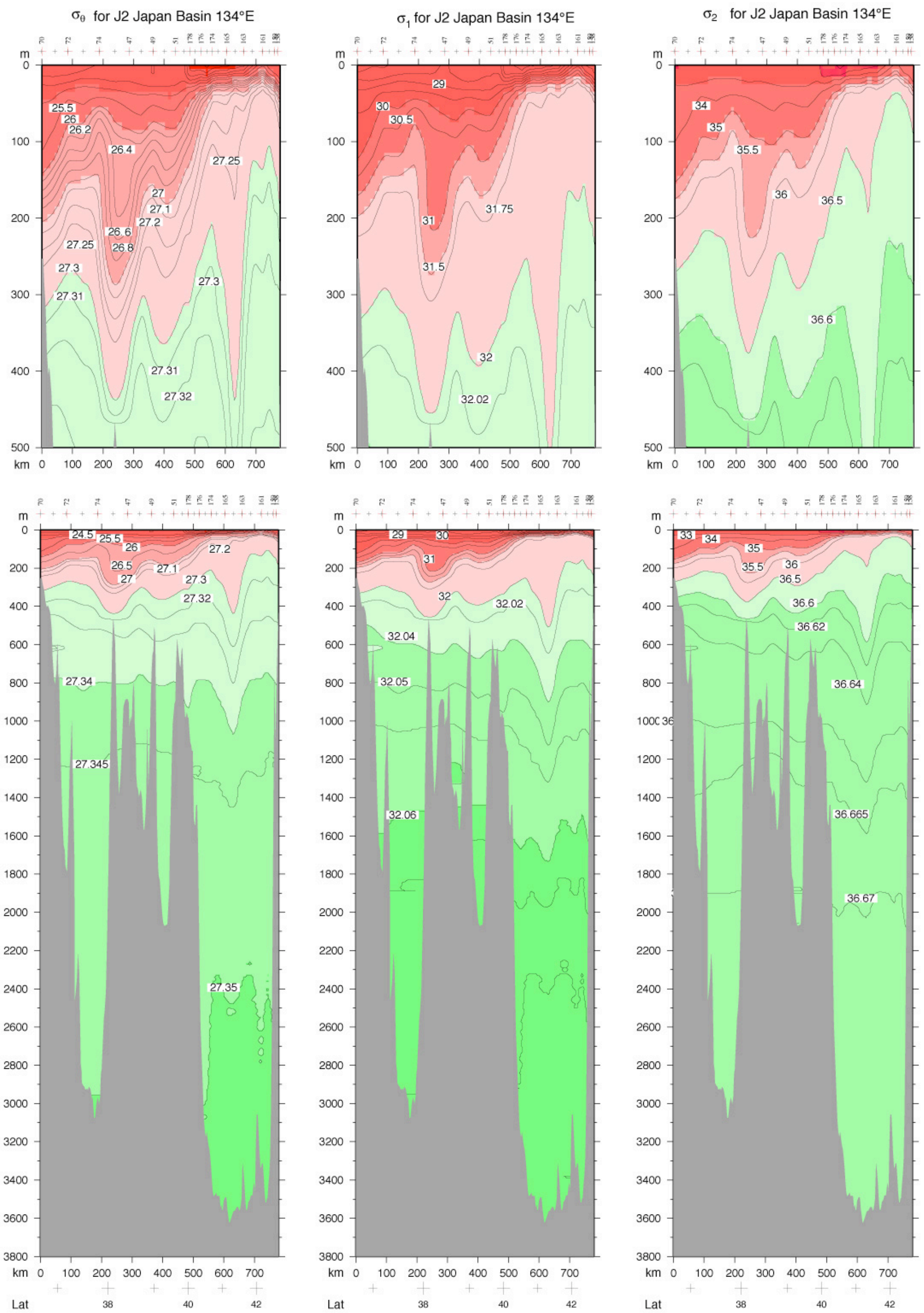


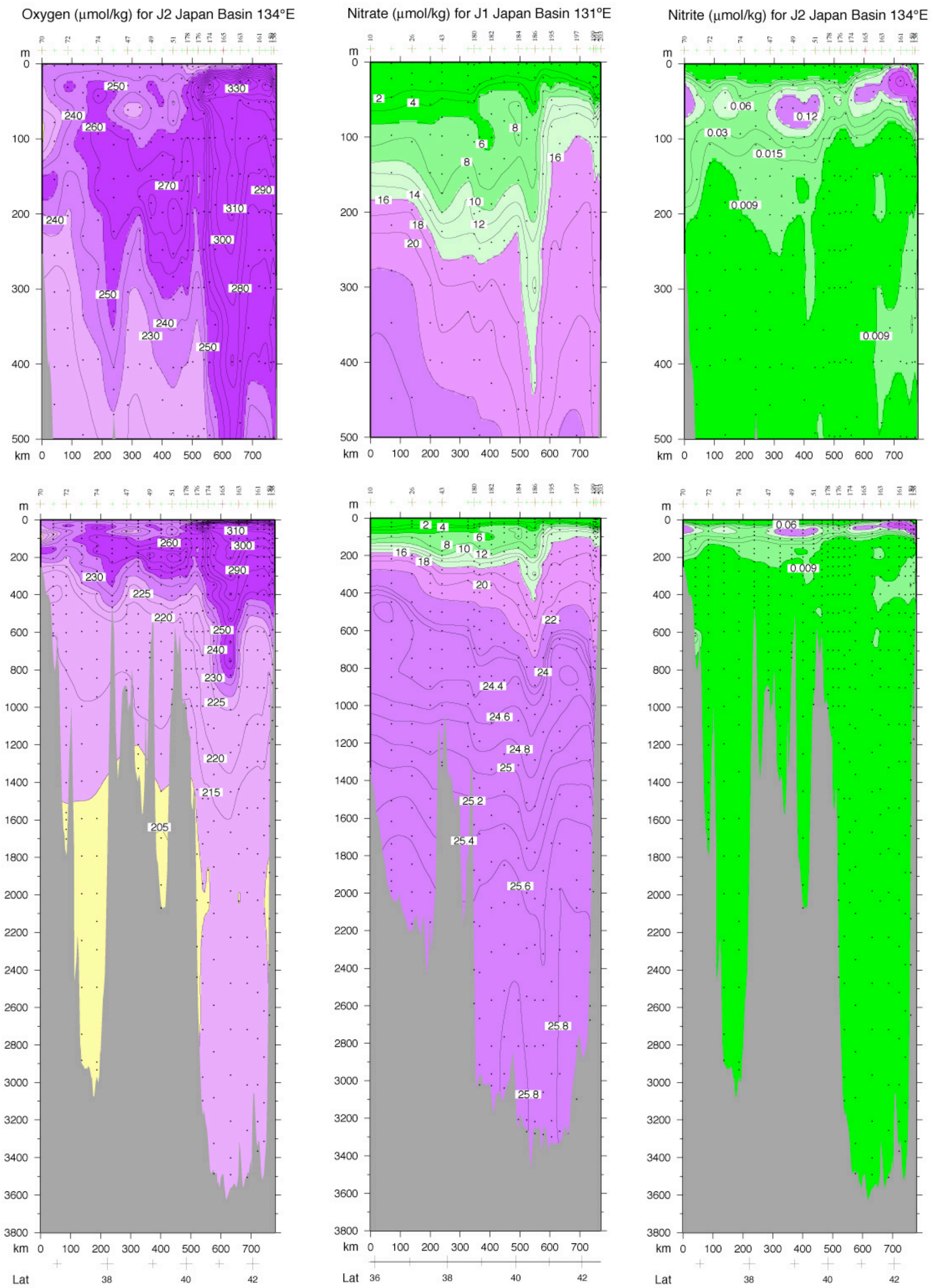
Figure D13. Vertical sections at approximately 134°E (Yamato Basin, Yamato Rise, and Japan Basin) (Y1 and J2 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panelvertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.



Potential Temperature (°C) for J2 Japan Basin 134°E
Salinity for J2 Japan Basin 134°E
CTD Salinity for J2 Japan Basin 134°E
m
km
Lat



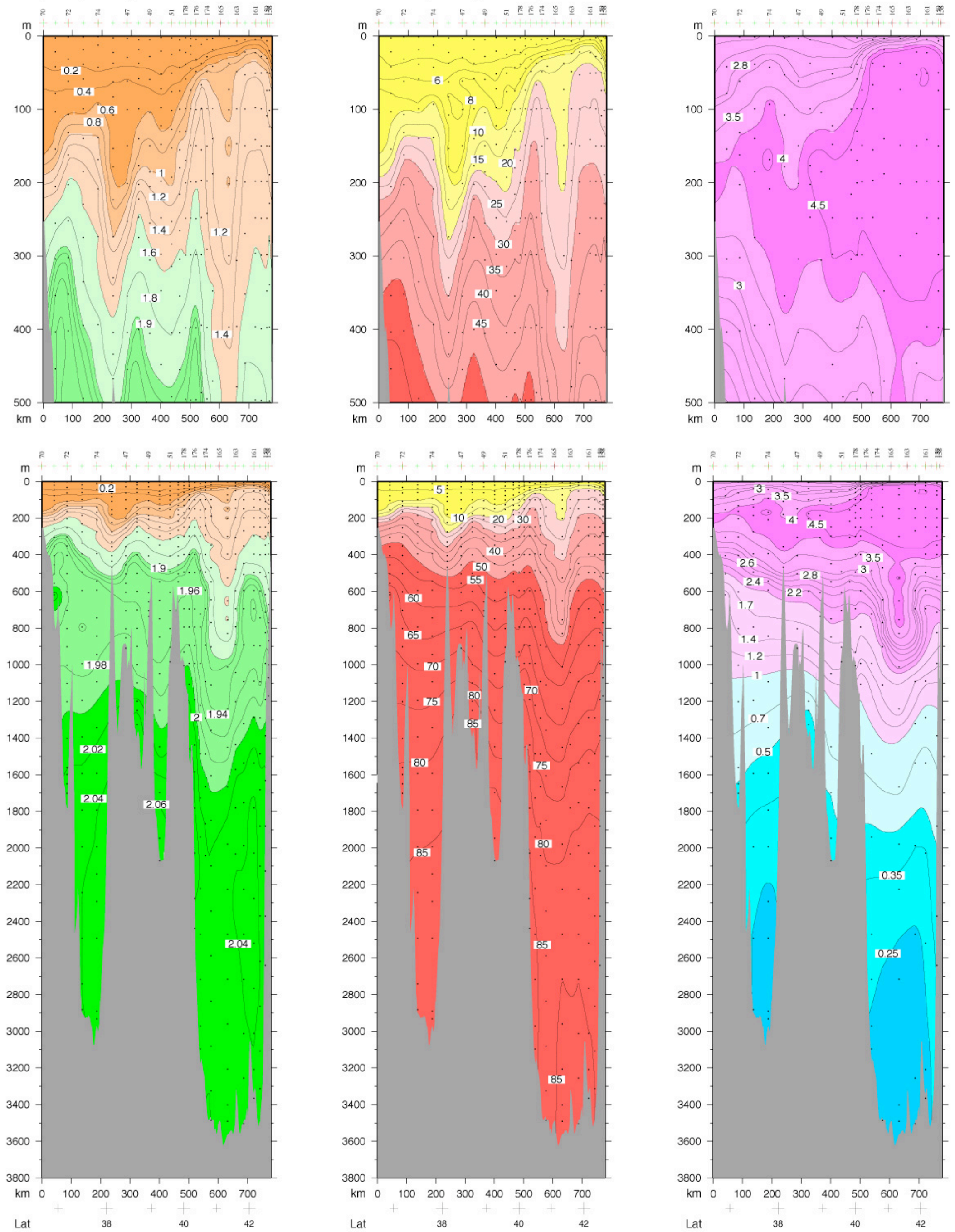
σθ for J2 Japan Basin 134°E
σ1 for J2 Japan Basin 134°E
σ2 for J2 Japan Basin 134°E
m
km
Lat

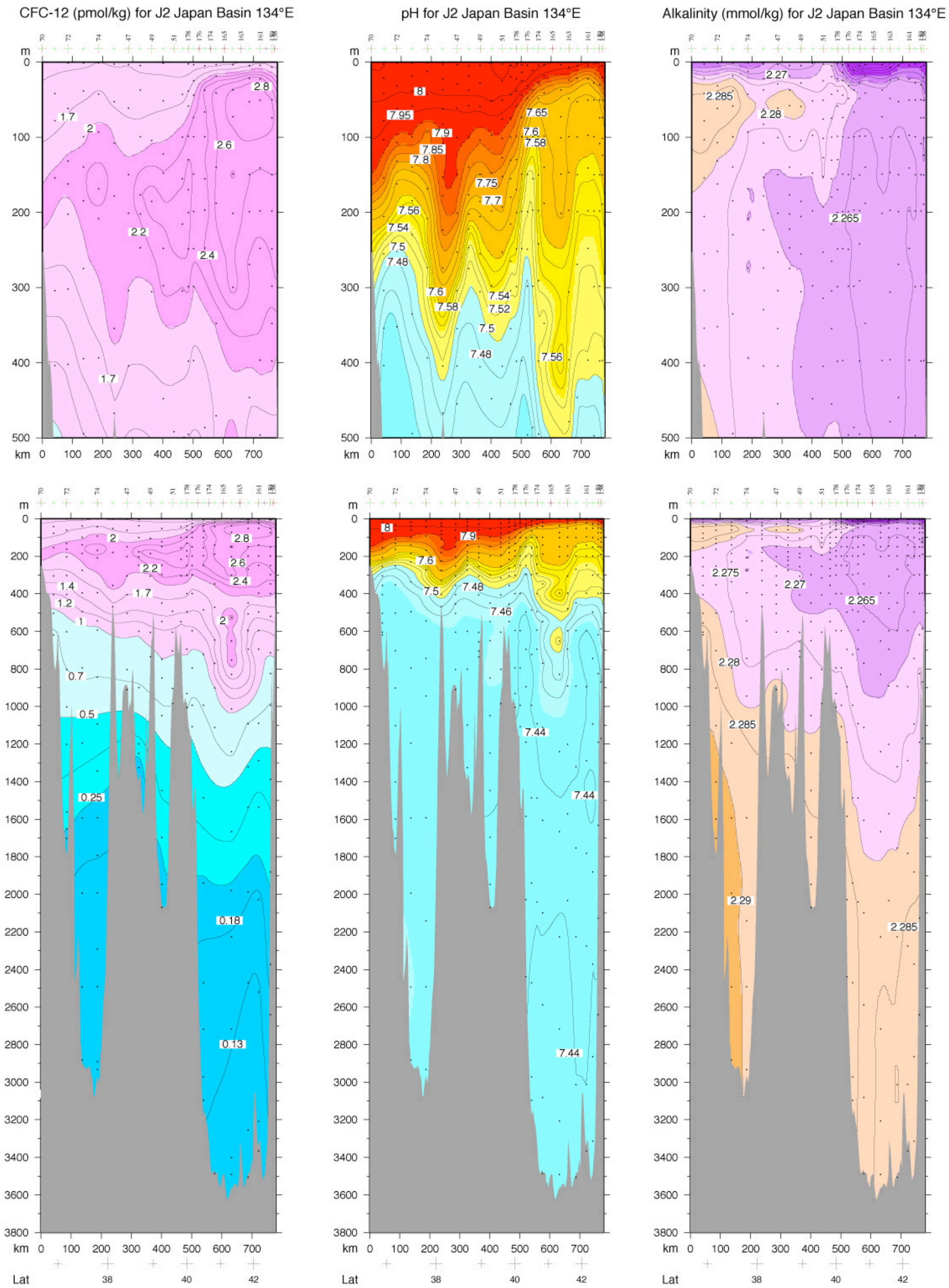

Oxygen (μmol/kg) for J2 Japan Basin 134°E
Nitrate (μmol/kg) for J1 Japan Basin 131°E
Nitrite (μmol/kg) for J2 Japan Basin 134°E
m
km
Lat

Phosphate (μmol/kg) for J2 Japan Basin 134°E

Dissolved Silica (μmol/kg) for J2 Japan Basin 134°E

CFC-11 (pmol/kg) for J2 Japan Basin 134°E




CFC-12 (pmol/kg) for J2 Japan Basin 134°E
pH for J2 Japan Basin 134°E
Alkalinity (mmol/kg) for J2 Japan Basin 134°E

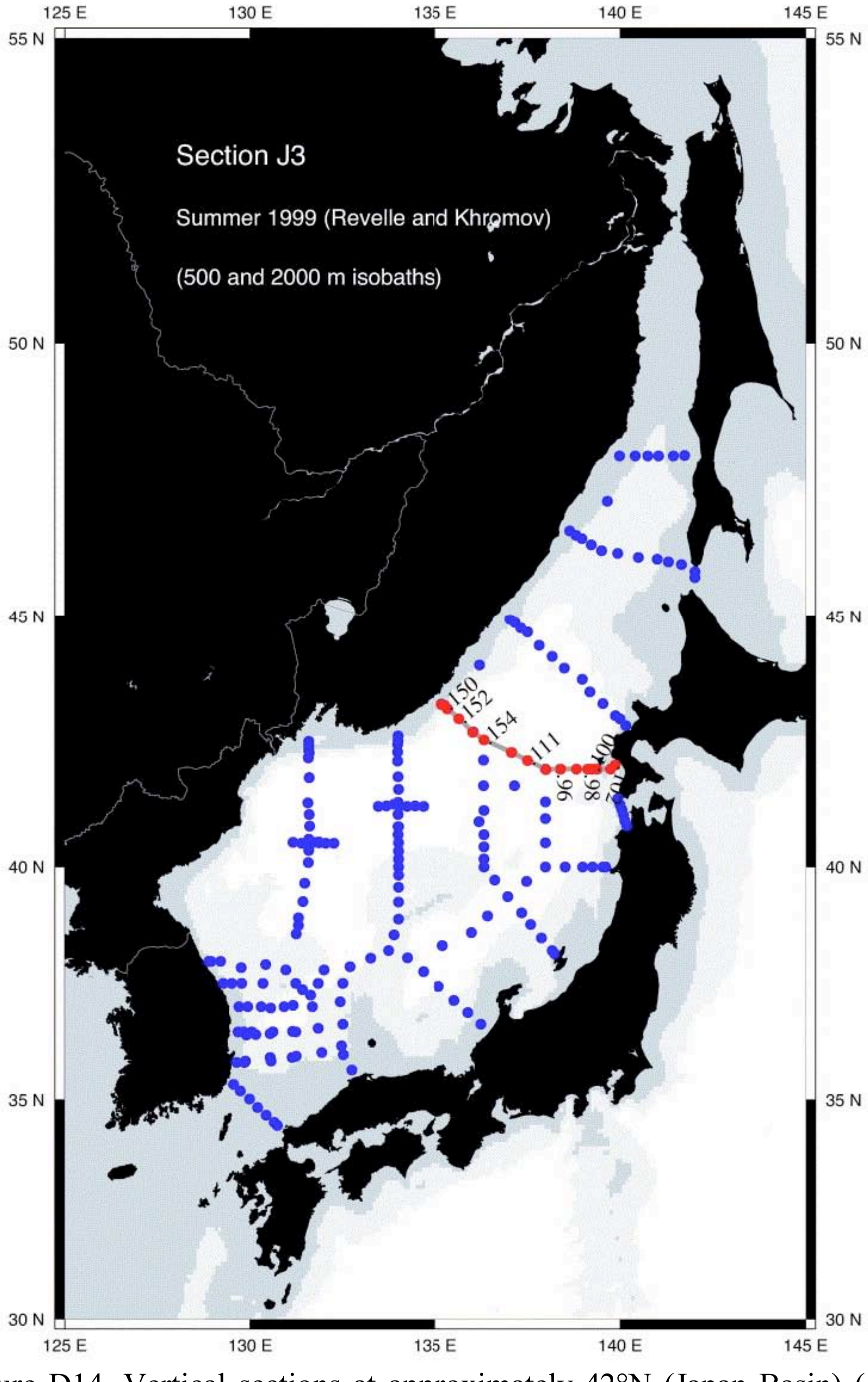
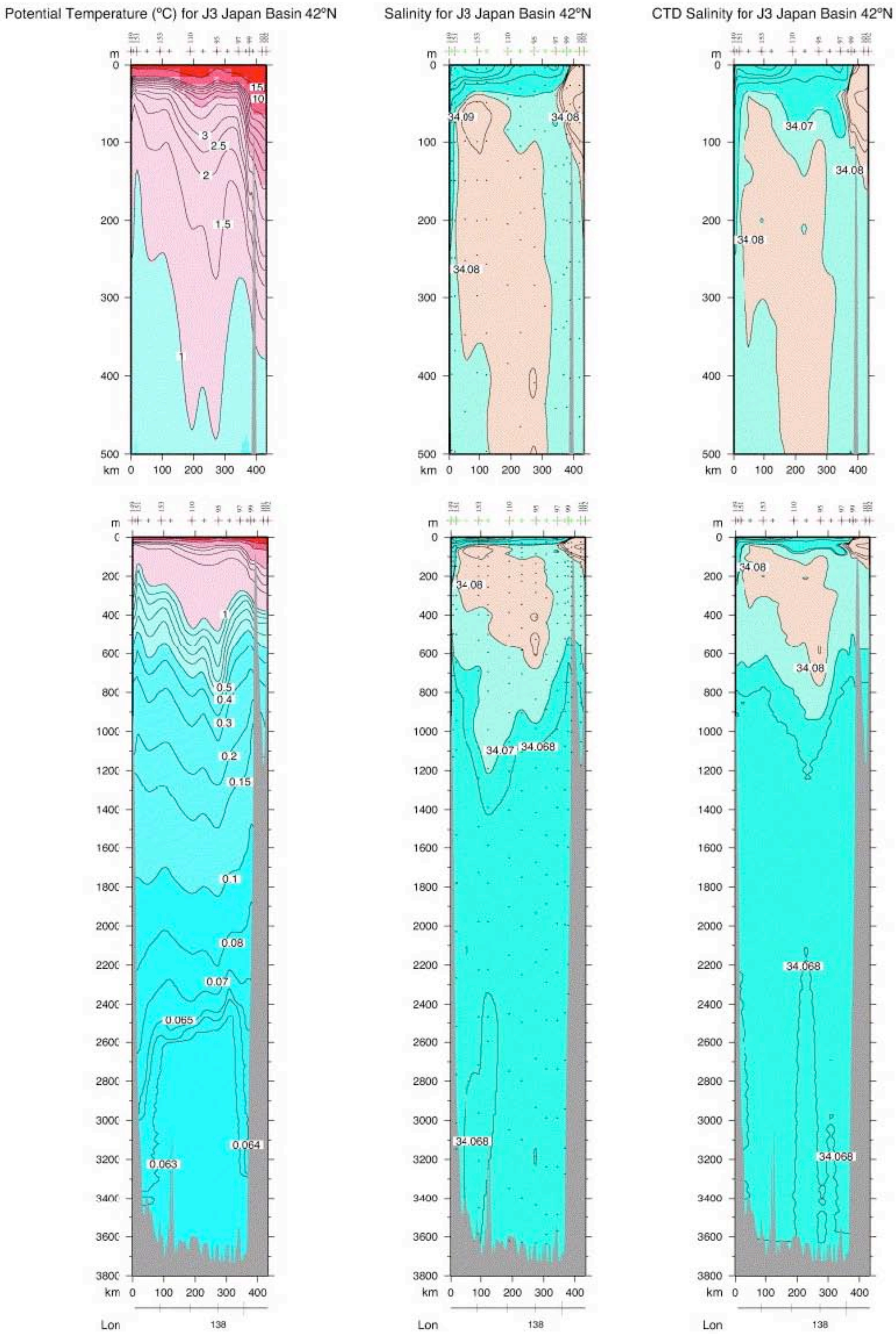
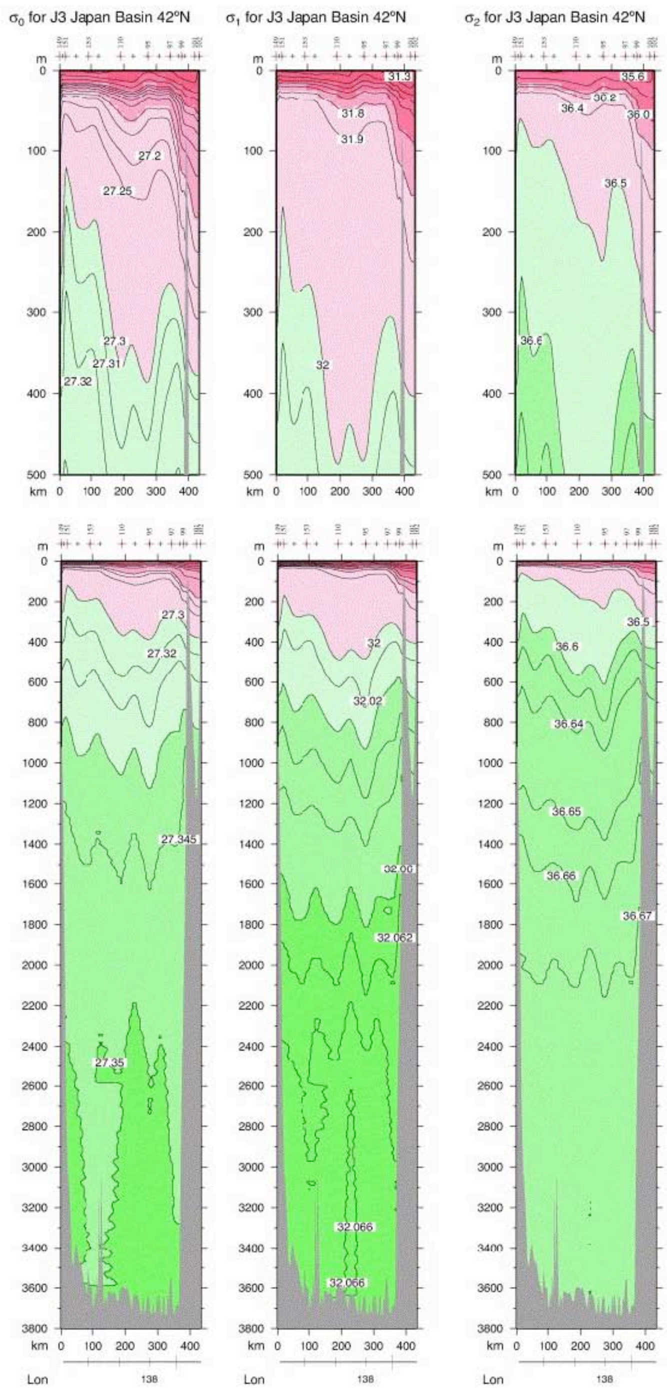
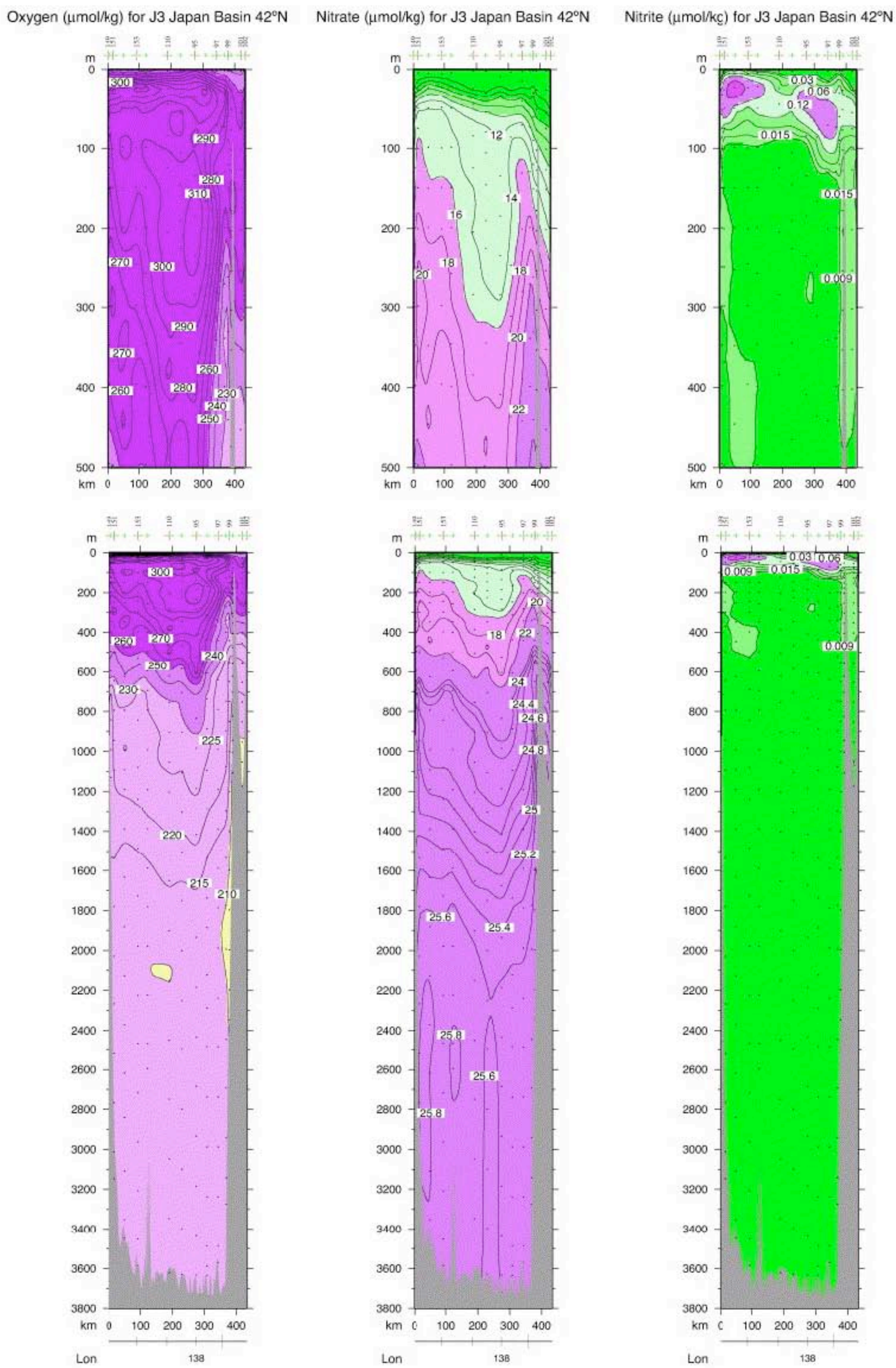


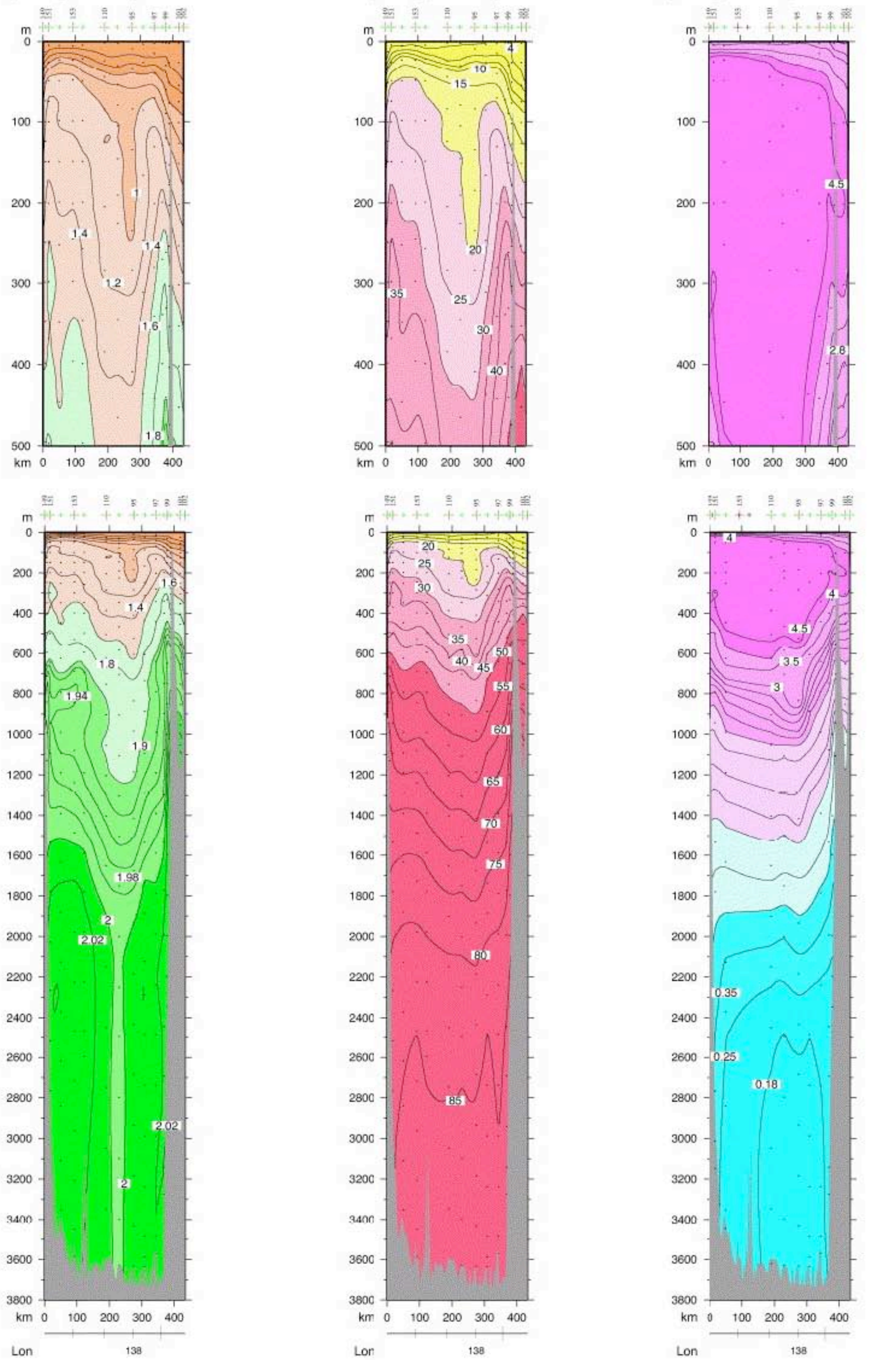
Figure D14. Vertical sections at approximately 42°N (Japan Basin) (J3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

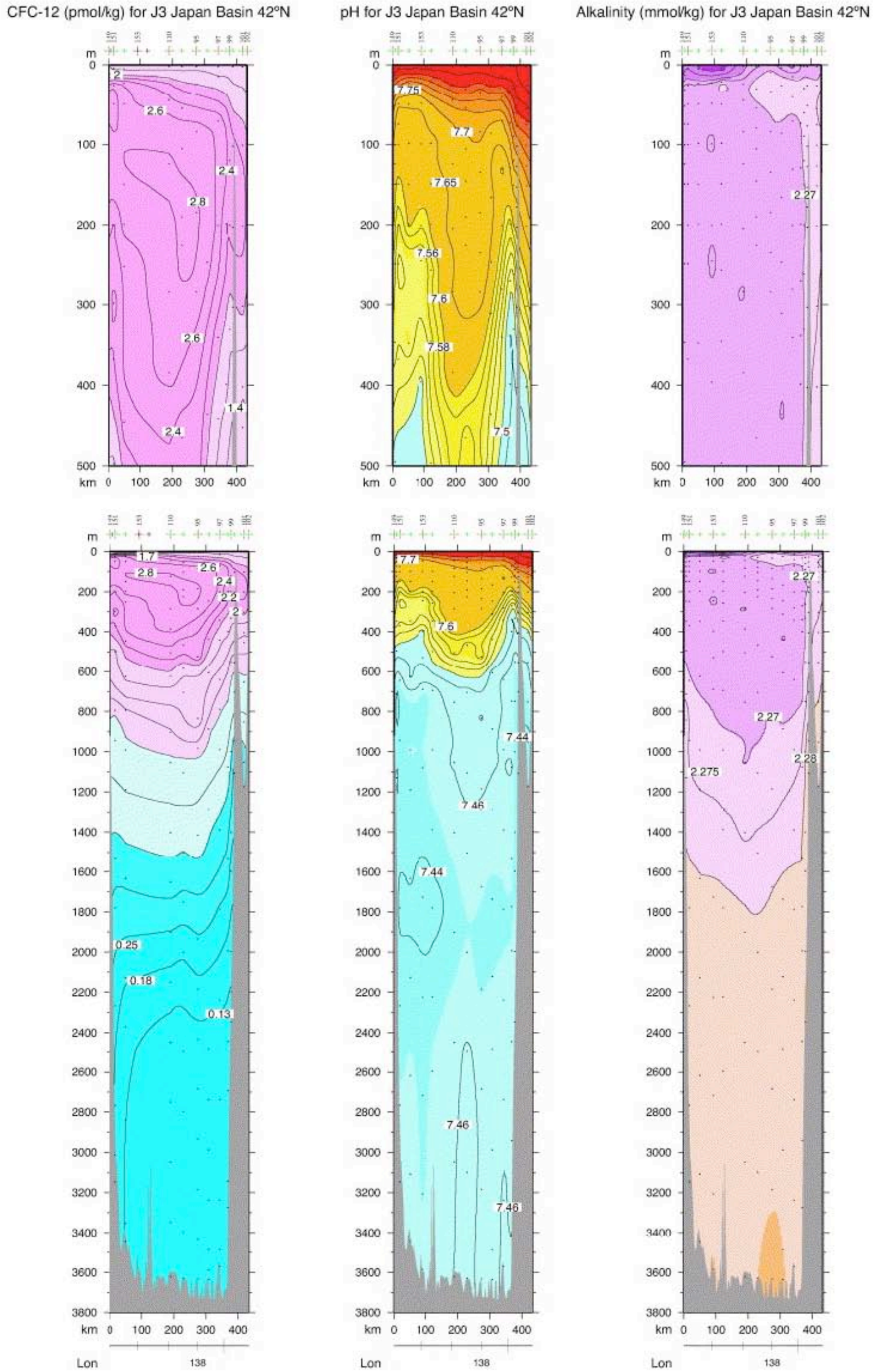

Potential Temperature (ºC) for J3 Japan Basin 42ºN
Salinity for J3 Japan Basin 42ºN
CTD Salinity for J3 Japan Basin 42ºN
m
km
Lon
138
15
10
3
2.5
2
1.5
1
0.5
0.4
0.3
0.2
0.15
0.1
0.08
0.07
0.065
0.064
0.063
34.09
34.08
34.07
34.068


σ0 for J3 Japan Basin 42°N
σ1 for J3 Japan Basin 42°N
σ2 for J3 Japan Basin 42°N
m
km
Lon
138
27.2
27.25
27.3
27.31
27.32
27.345
27.35
31.3
31.8
31.9
32
32.02
32.06
32.062
32.066
35.6
36.2
36.4
36.0
36.5
36.6
36.64
36.65
36.66
36.67


Oxygen (μmol/kg) for J3 Japan Basin 42°N
Nitrate (μmol/kg) for J3 Japan Basin 42°N
Nitrite (μmol/kg) for J3 Japan Basin 42°N
m
km
Lon
138

Phosphate (μmol/kg) for J3 Japan Basin 42°N Dissolved Silica (μmol/kg) for J3 Japan Basin 42°N CFC-11 (pmol/kg) for J3 Japan Basin 42°N




CFC-12 (pmol/kg) for J3 Japan Basin 42ºN
pH for J3 Japan Basin 42ºN
Alkalinity (mmol/kg) for J3 Japan Basin 42ºN
m
km
Lon
138
2
2.6
2.4
2.8
1.4
1.7
2.2
0.25
0.18
0.13
7.75
7.7
7.65
7.56
7.6
7.58
7.5
7.44
7.46
2.27
2.275
2.28

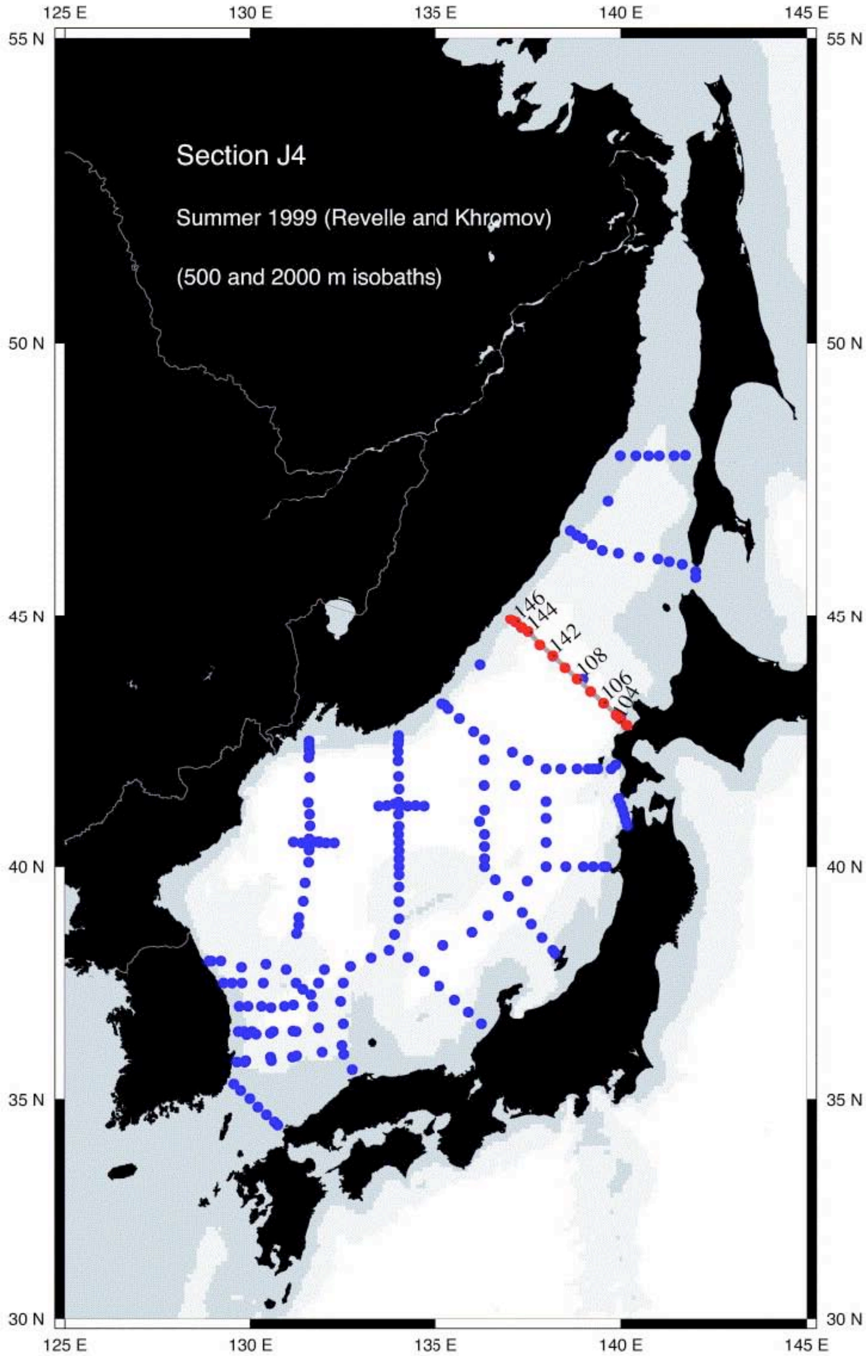
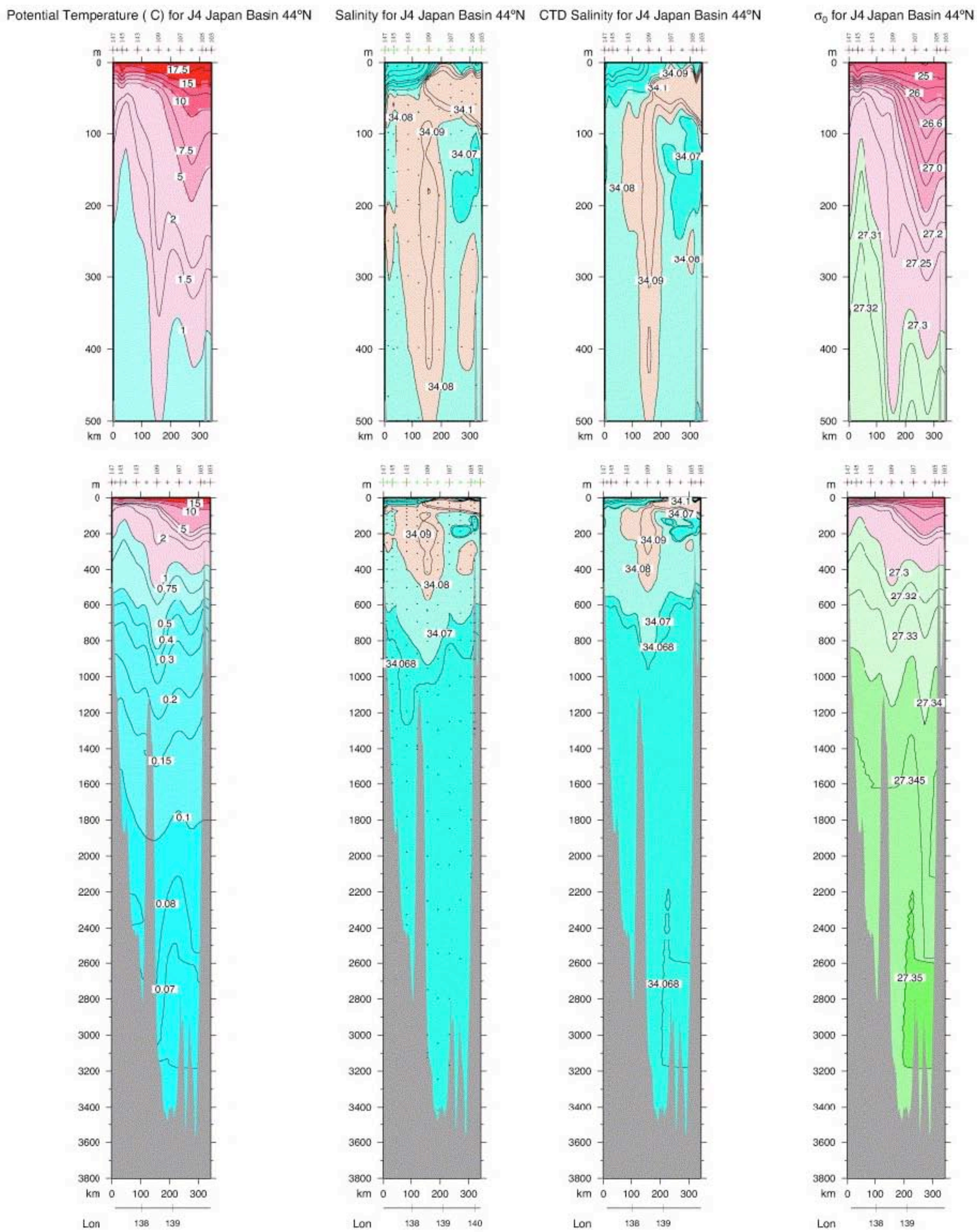
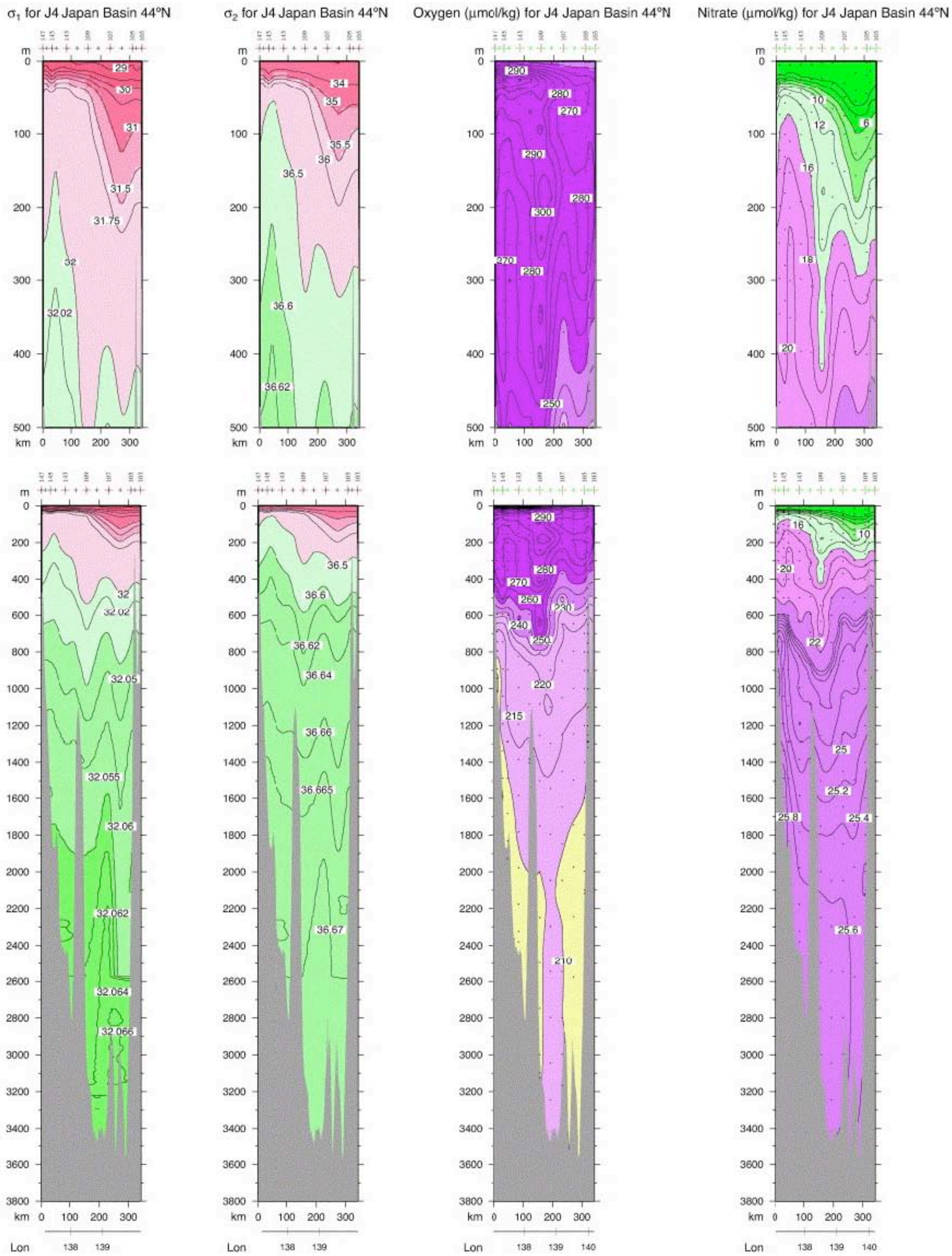
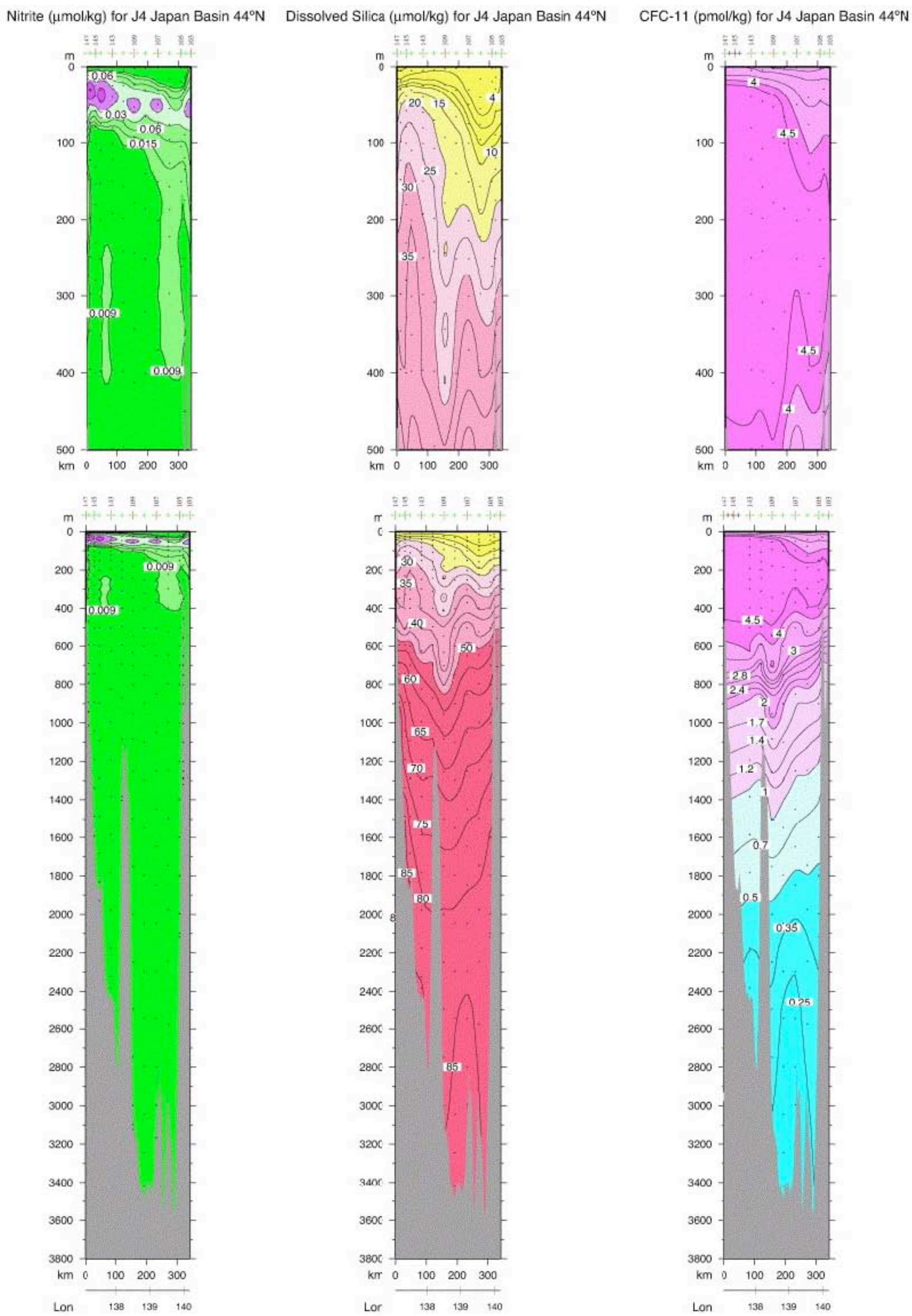


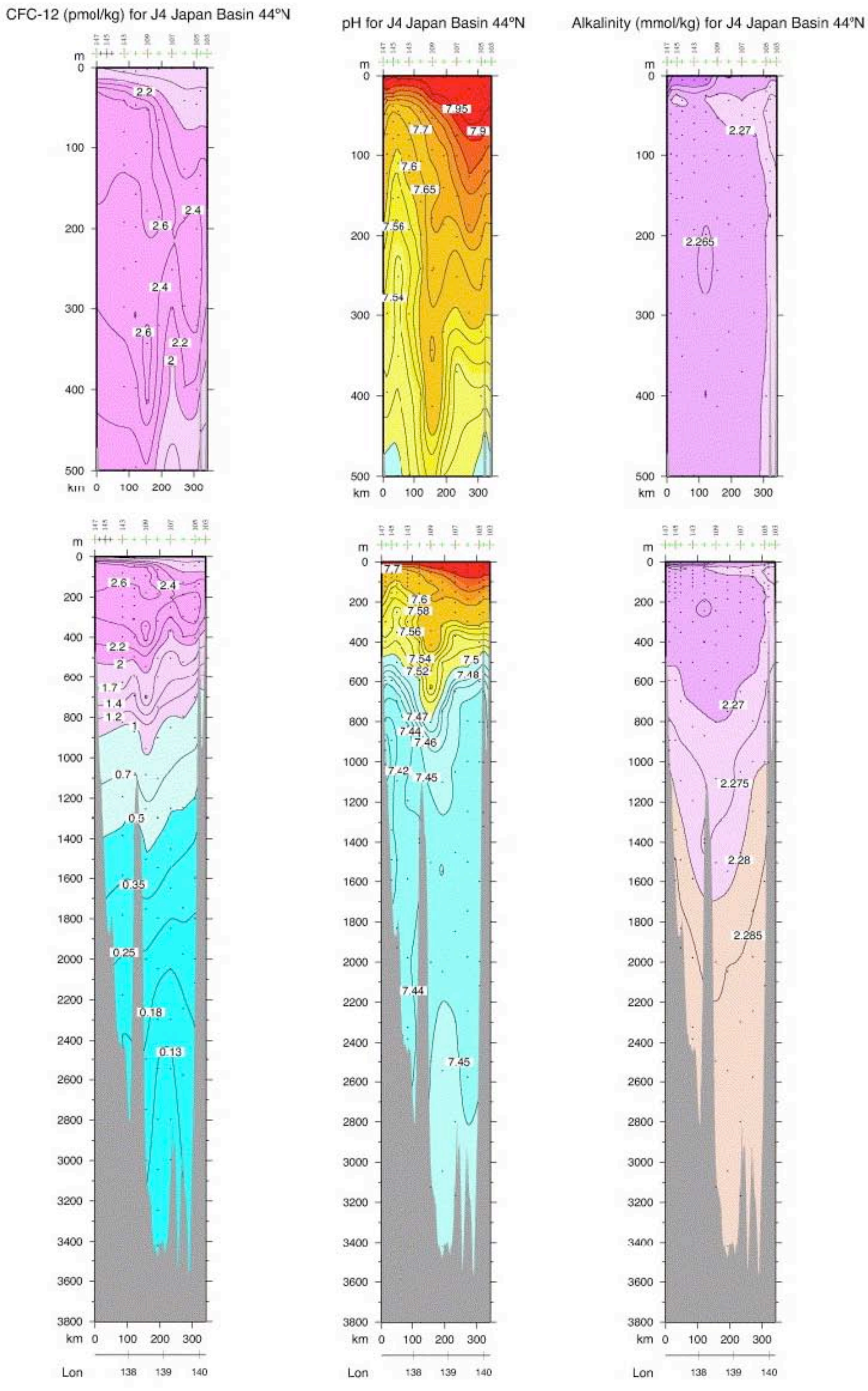
Figure D15. Vertical sections at approximately 44°N (Japan Basin) (J4 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.



Potential Temperature (C) for J4 Japan Basin 44°N
Salinity for J4 Japan Basin 44°N
CTD Salinity for J4 Japan Basin 44°N
σ_0 for J4 Japan Basin 44°N
m
km
Lon
138
139
140


σ1 for J4 Japan Basin 44ºN
σ2 for J4 Japan Basin 44ºN
Oxygen (µmol/kg) for J4 Japan Basin 44ºN
Nitrate (µmol/kg) for J4 Japan Basin 44ºN
m
km
Lon
138
139
140


Nitrite (µmol/kg) for J4 Japan Basin 44ºN
Dissolved Silica (µmol/kg) for J4 Japan Basin 44ºN
CFC-11 (pmol/kg) for J4 Japan Basin 44ºN


CFC-12 (pmol/kg) for J4 Japan Basin 44°N
pH for J4 Japan Basin 44°N
Alkalinity (mmol/kg) for J4 Japan Basin 44°N
m
km
Lon
138
139
140

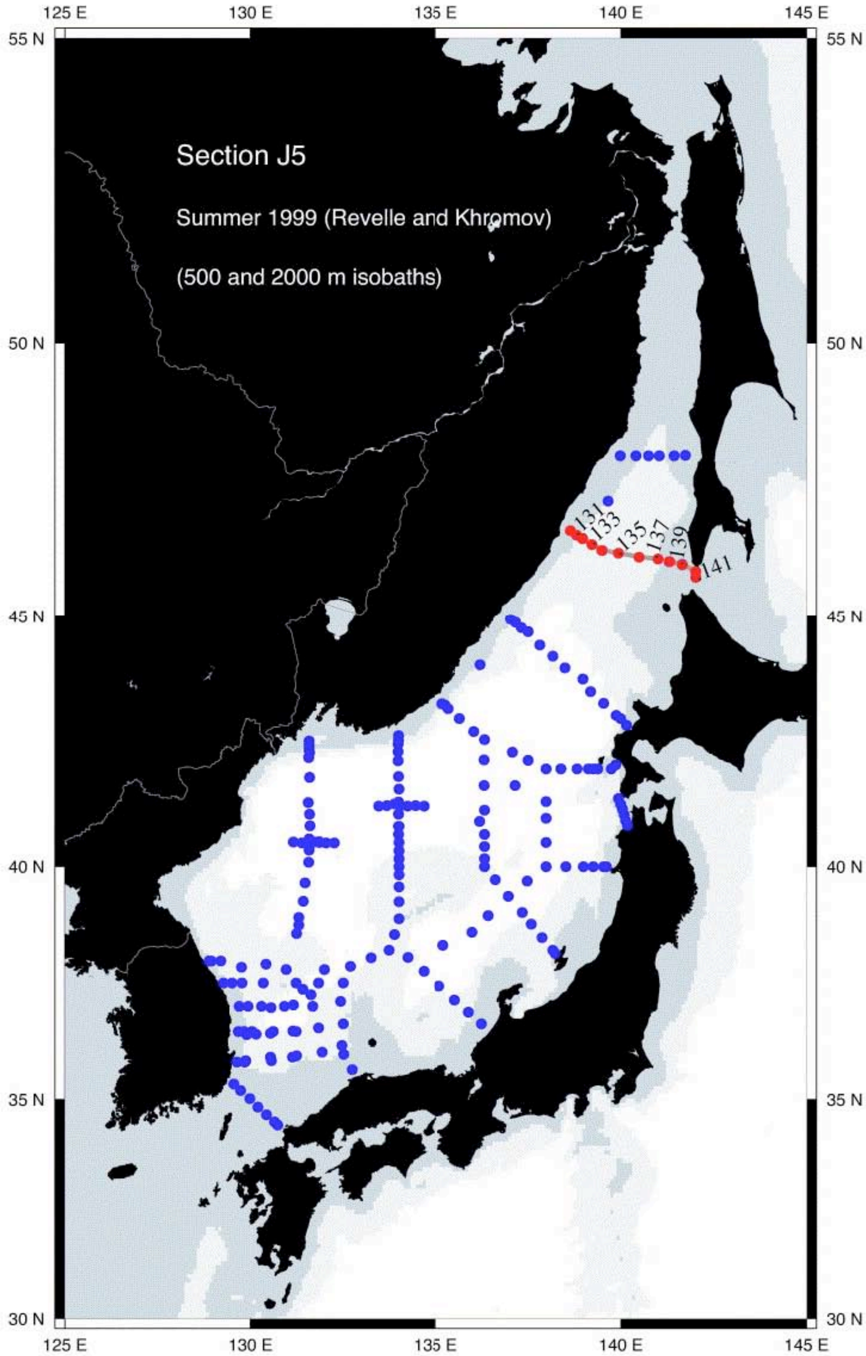
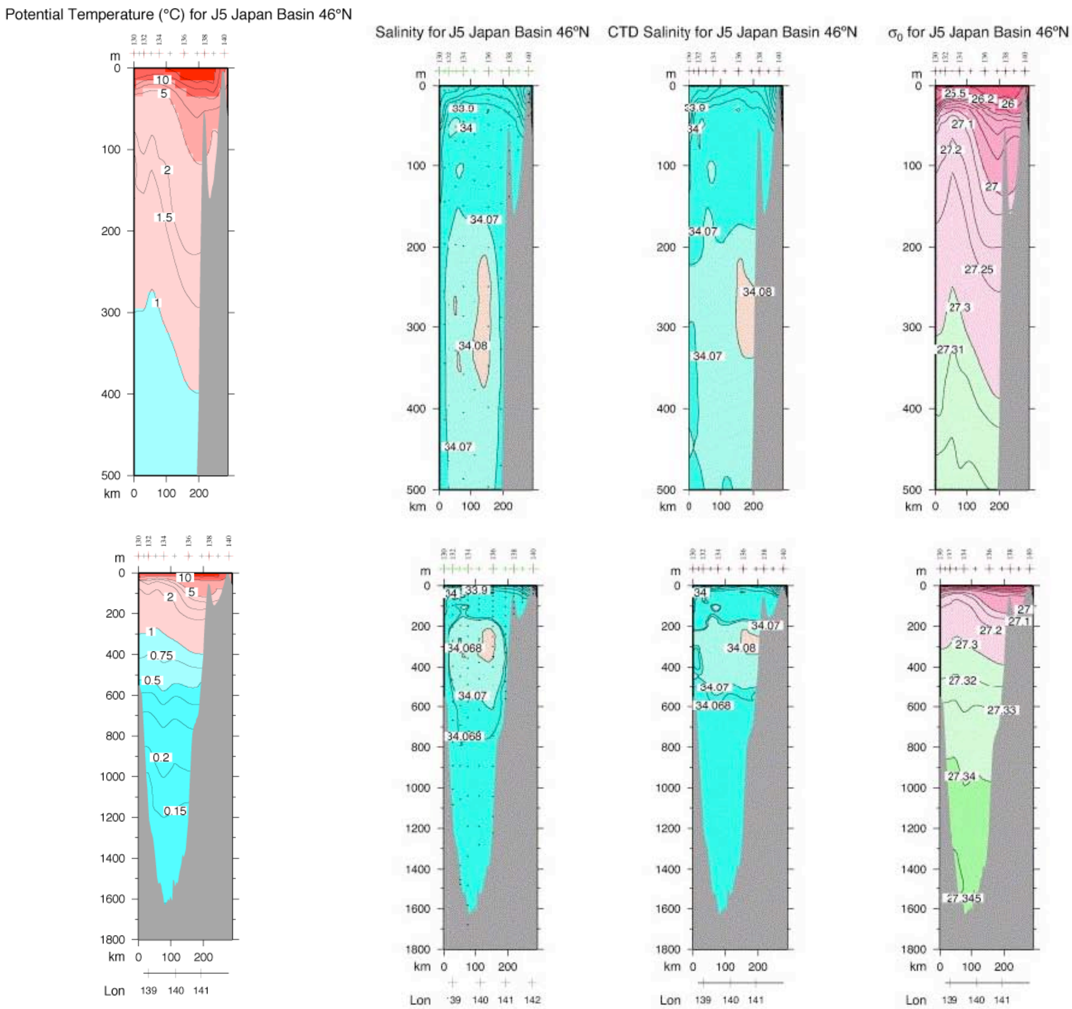
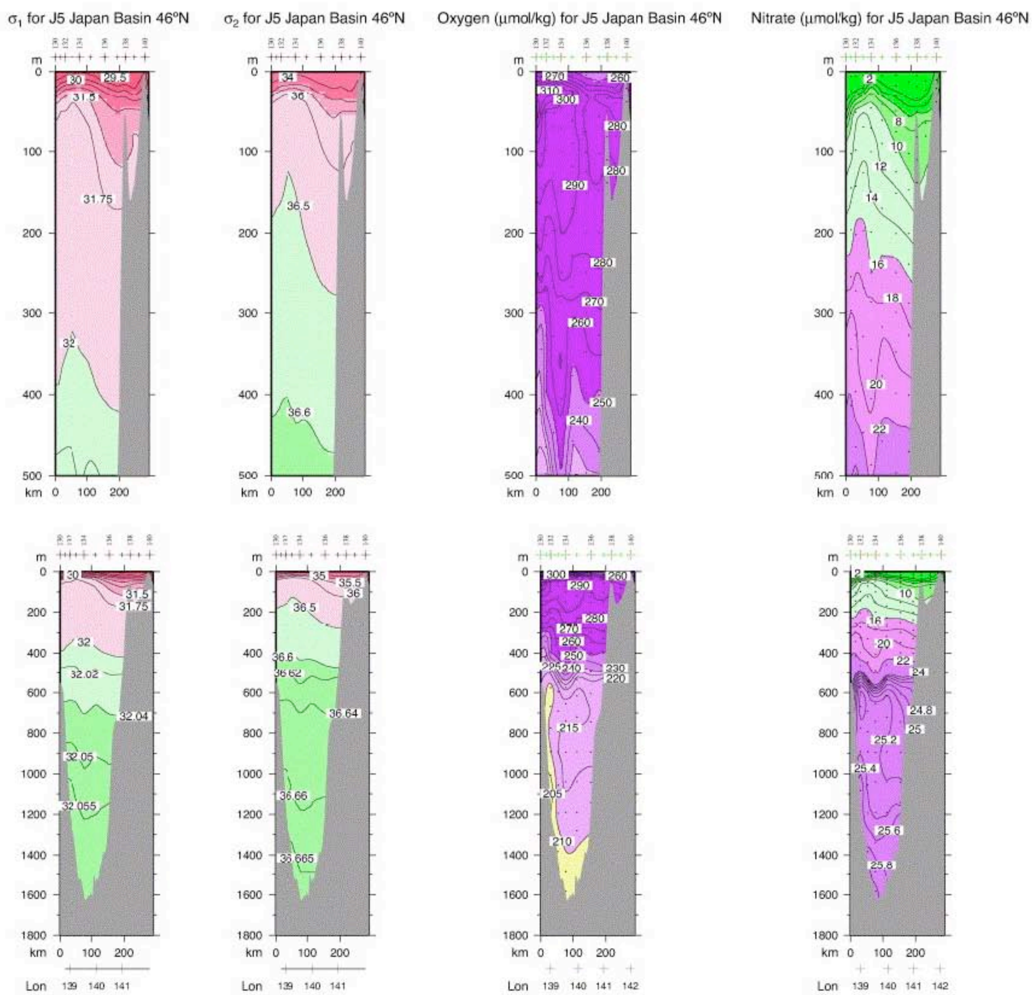
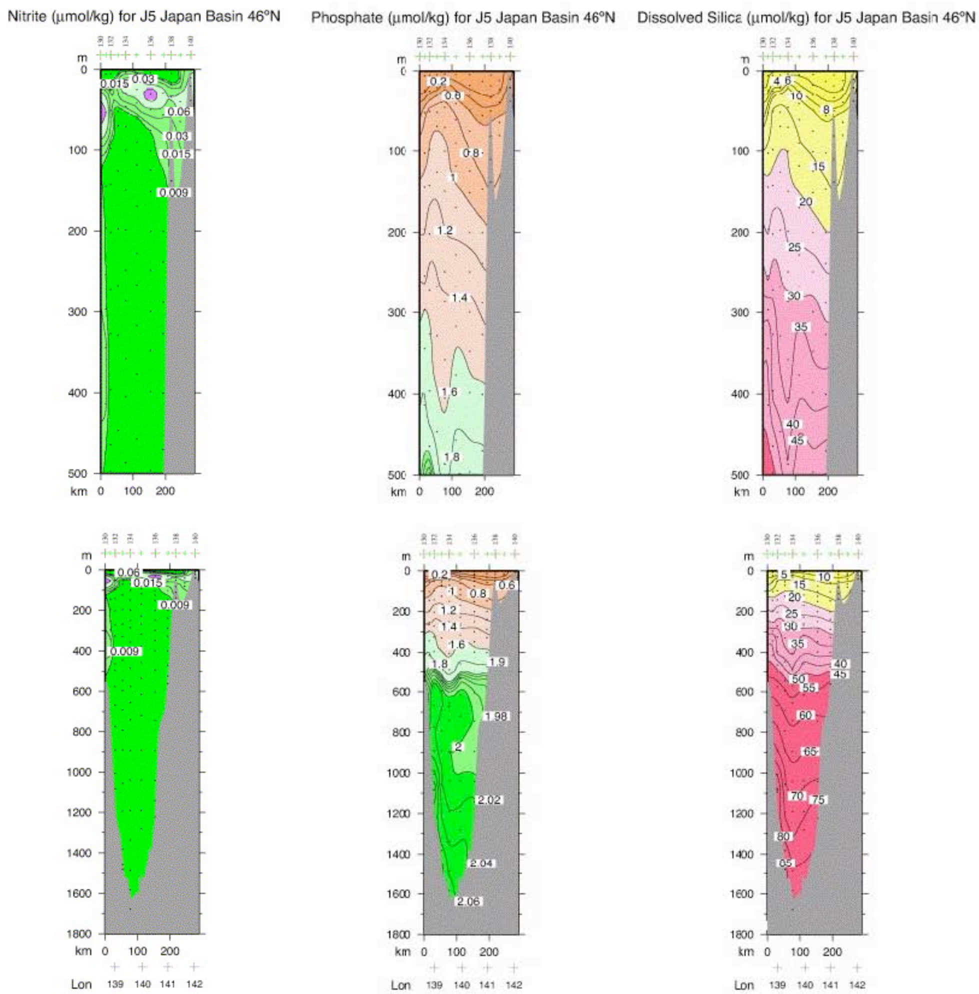
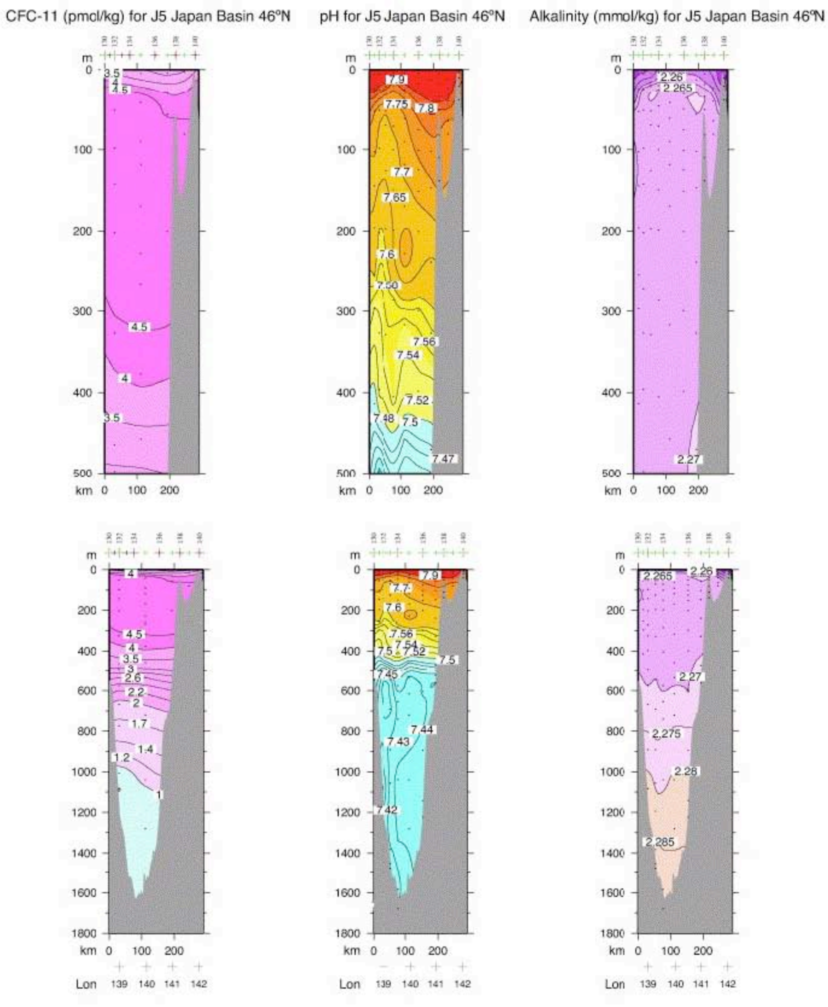


Figure D16. Vertical sections at approximately 46°N (Japan Basin) (J5 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.


Potential Temperature (°C) for J5 Japan Basin 46°N
Salinity for J5 Japan Basin 46°N
CTD Salinity for J5 Japan Basin 46°N
σ_0 for J5 Japan Basin 46°N


σ_1 for J5 Japan Basin 46ºN
σ_2 for J5 Japan Basin 46ºN
Oxygen (μmol/kg) for J5 Japan Basin 46ºN
Nitrate (μmol/kg) for J5 Japan Basin 46ºN


Nitrite (µmol/kg) for J5 Japan Basin 46°N
Phosphate (µmol/kg) for J5 Japan Basin 46°N
Dissolved Silica (µmol/kg) for J5 Japan Basin 46°N


CFC-11 (pmol/kg) for J5 Japan Basin 46°N
pH for J5 Japan Basin 46°N
Alkalinity (mmol/kg) for J5 Japan Basin 46°N

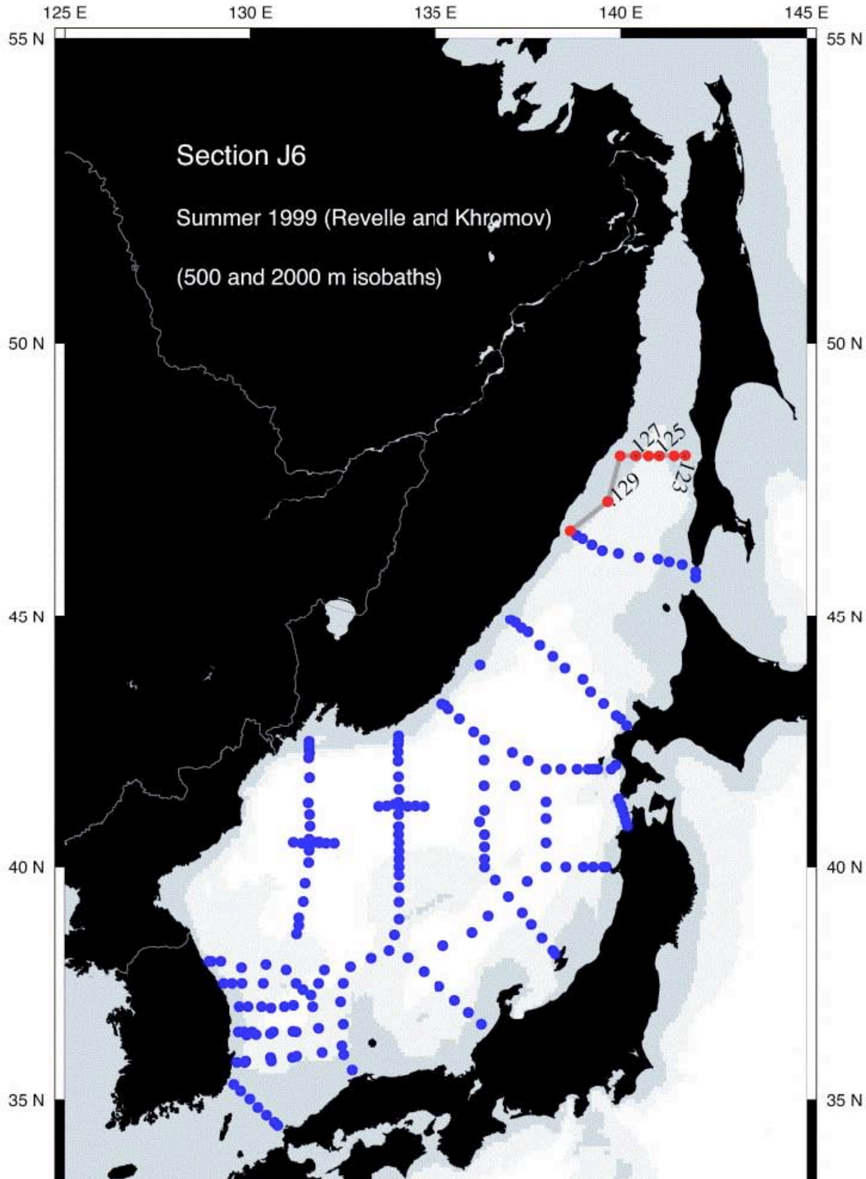
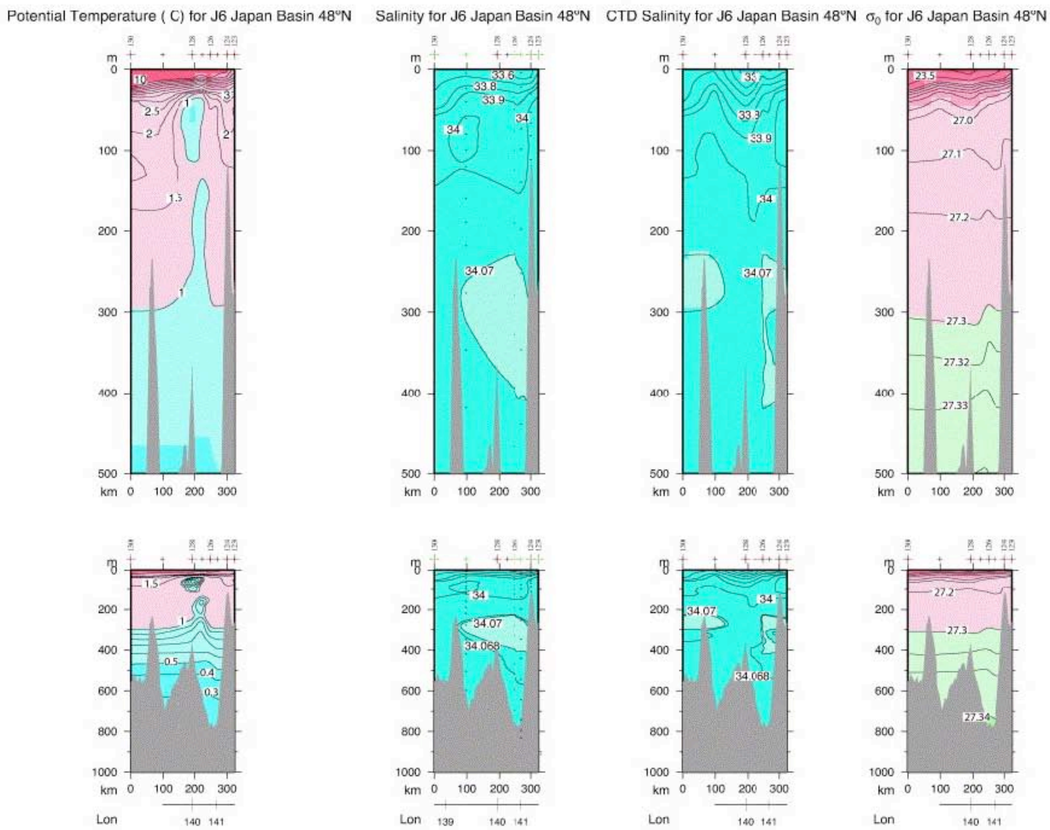
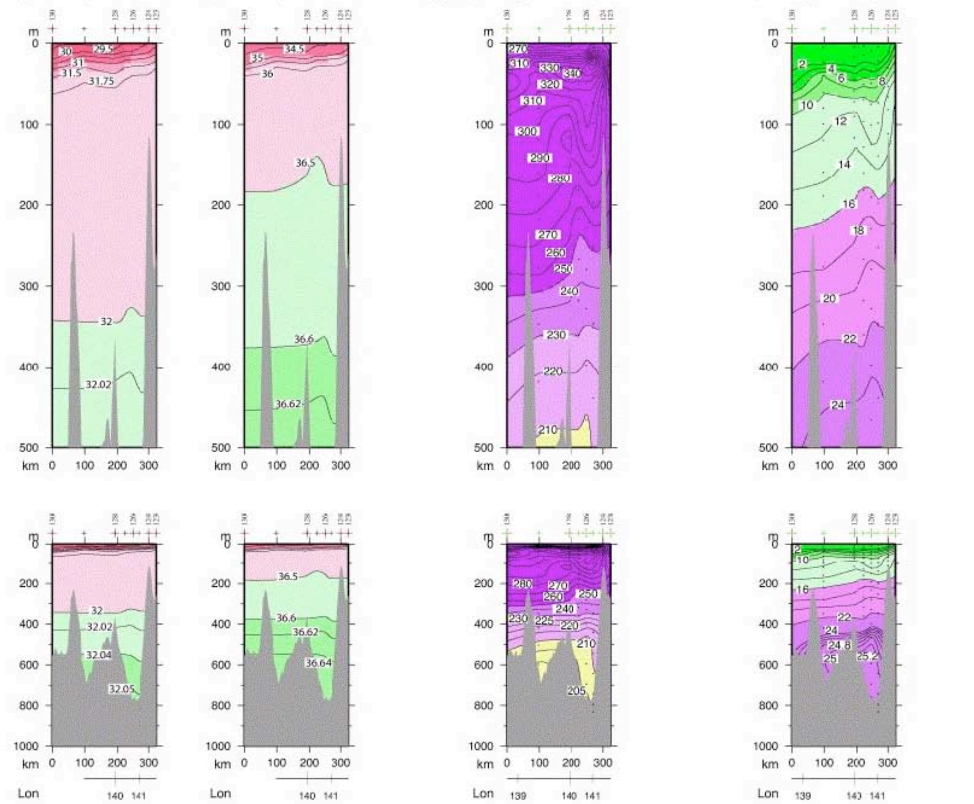


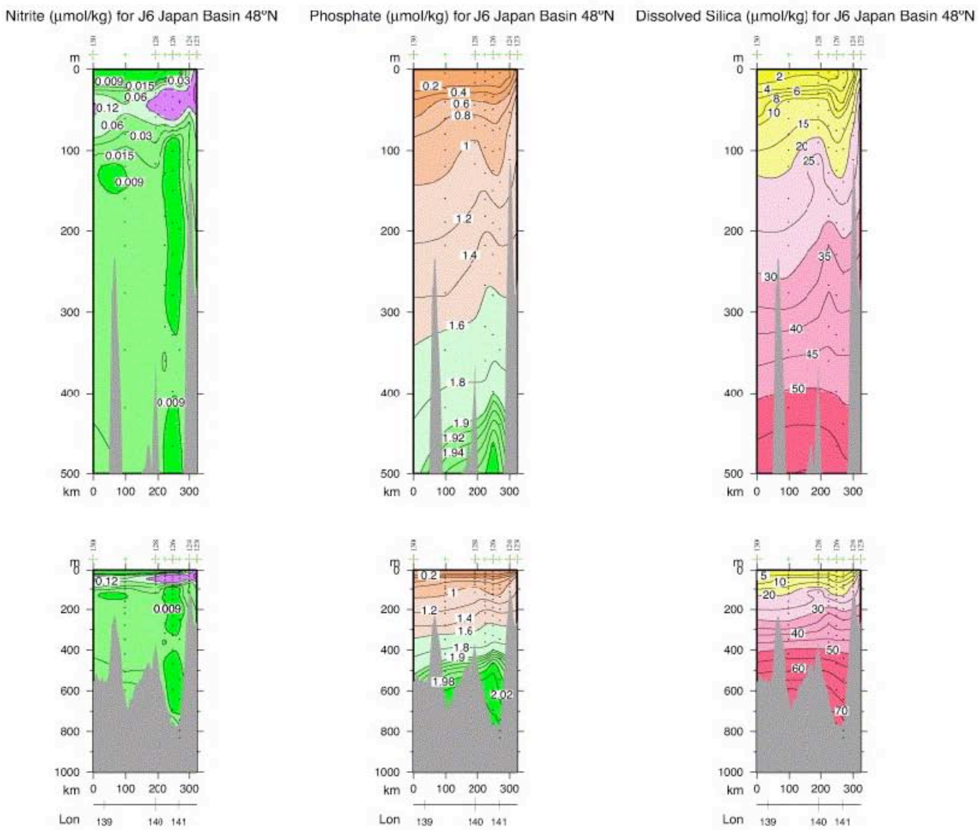
Figure D17. Vertical sections at approximately 48°N (Japan Basin) (J6 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

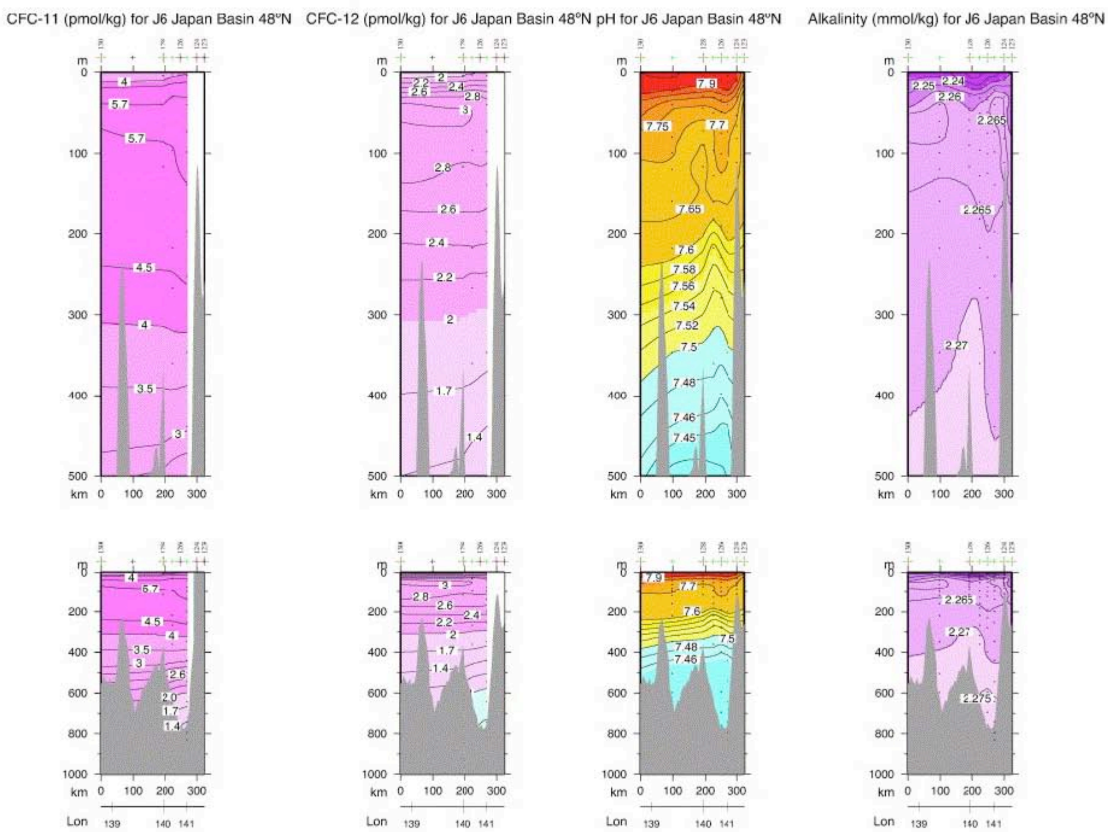


Potential Temperature (C) for J6 Japan Basin 48°N
Salinity for J6 Japan Basin 48°N
CTD Salinity for J6 Japan Basin 48°N
σ0 for J6 Japan Basin 48°N

σ_1 for J6 Japan Basin 48°N σ_2 for J6 Japan Basin 48°N Oxygen (μmol/kg) for J6 Japan Basin 48°N Nitrate (μmol/kg) for J6 Japan Basin 48°N




Nitrite (μmol/kg) for J6 Japan Basin 48°N
Phosphate (μmol/kg) for J6 Japan Basin 48°N
Dissolved Silica (μmol/kg) for J6 Japan Basin 48°N


CFC-11 (pmol/kg) for J6 Japan Basin 48°N
CFC-12 (pmol/kg) for J6 Japan Basin 48°N
pH for J6 Japan Basin 48°N
Alkalinity (mmol/kg) for J6 Japan Basin 48°N

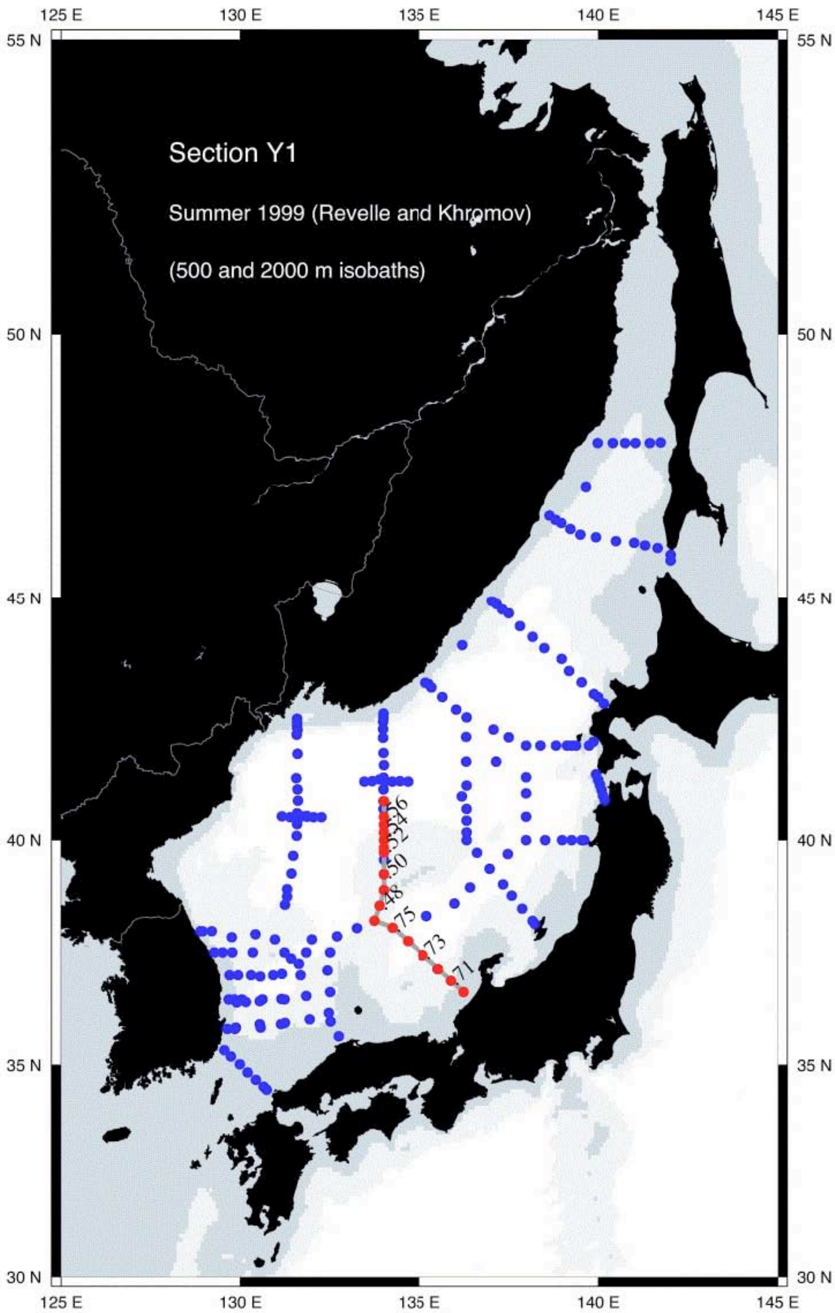
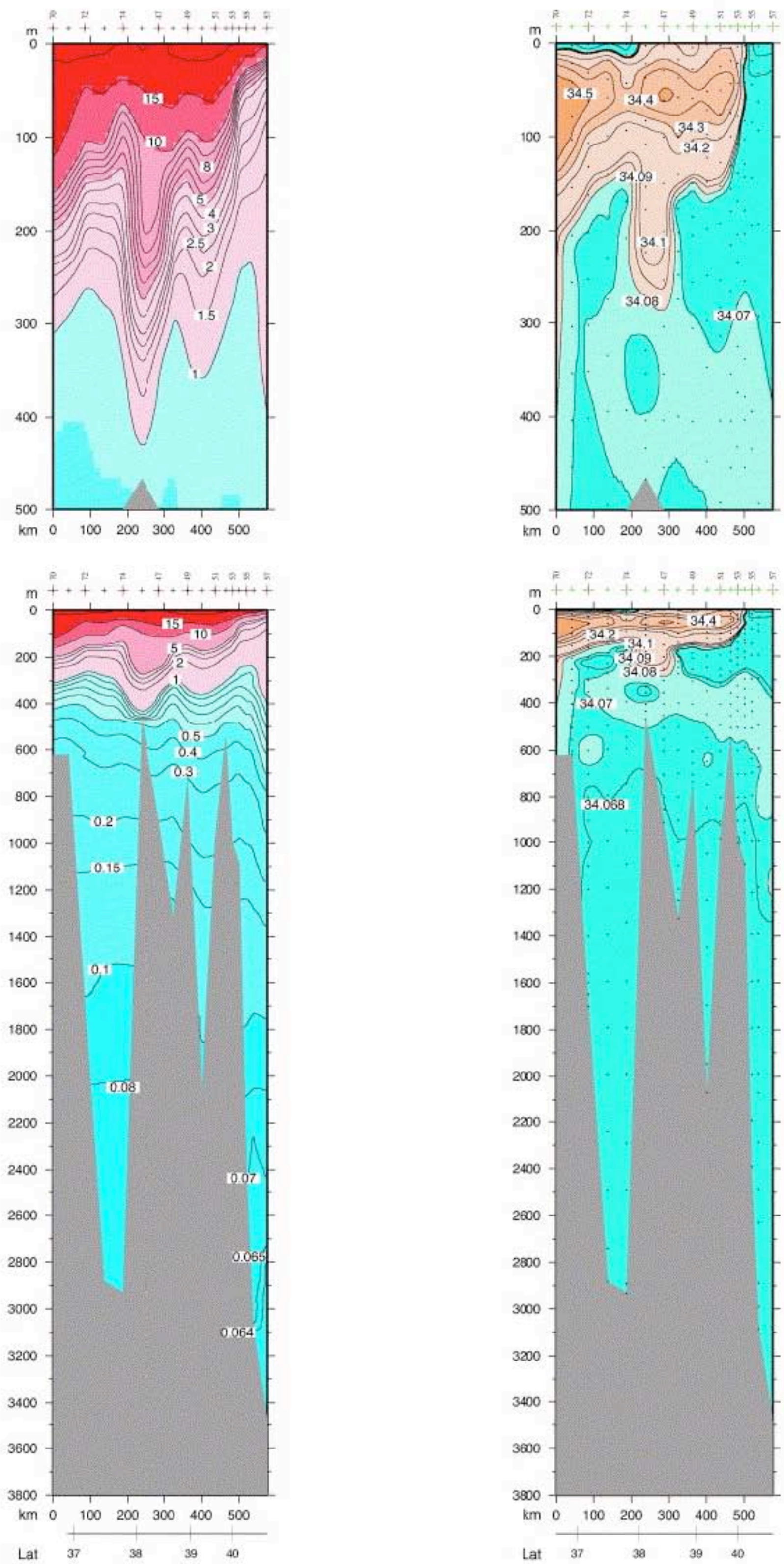
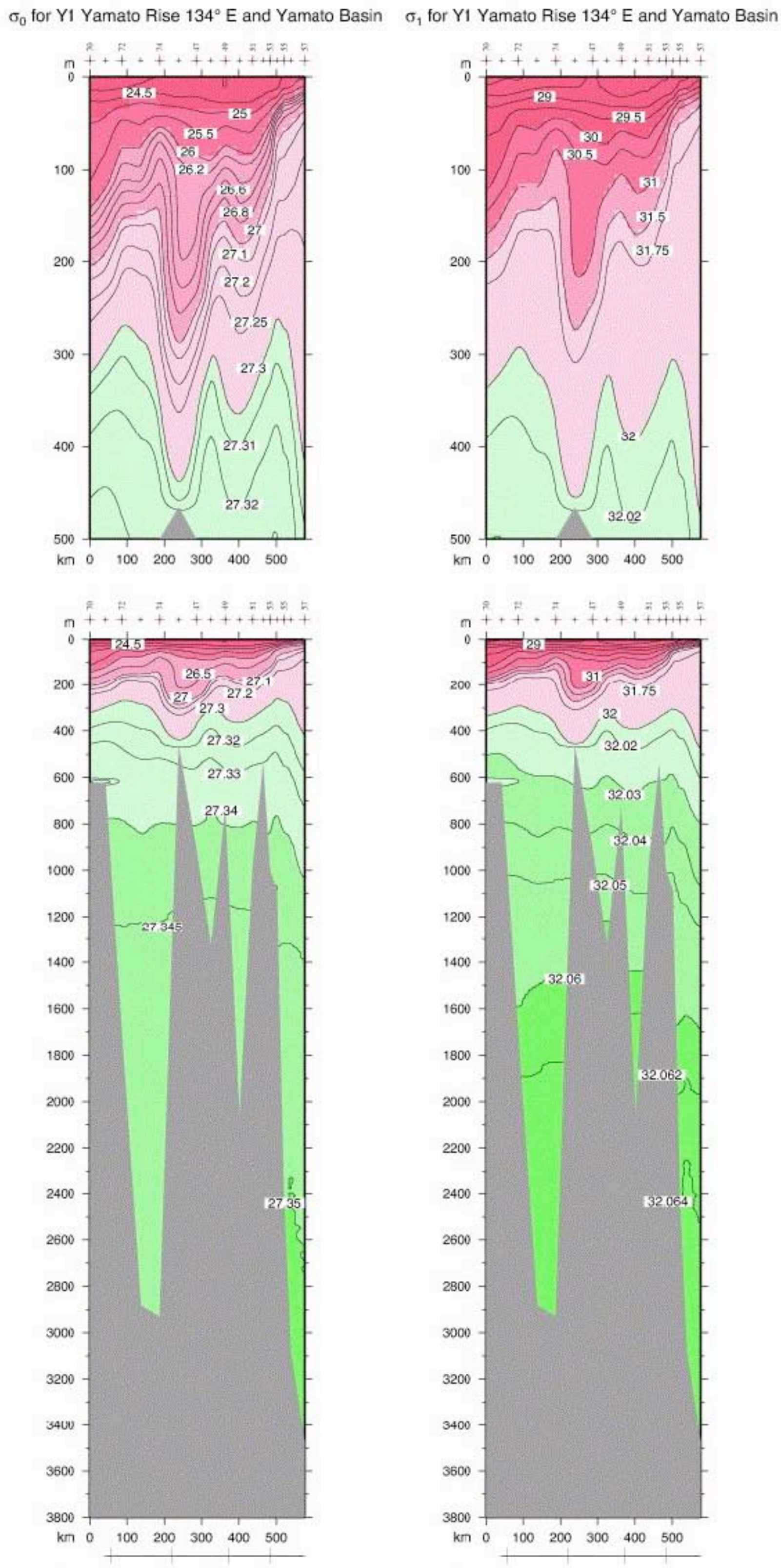


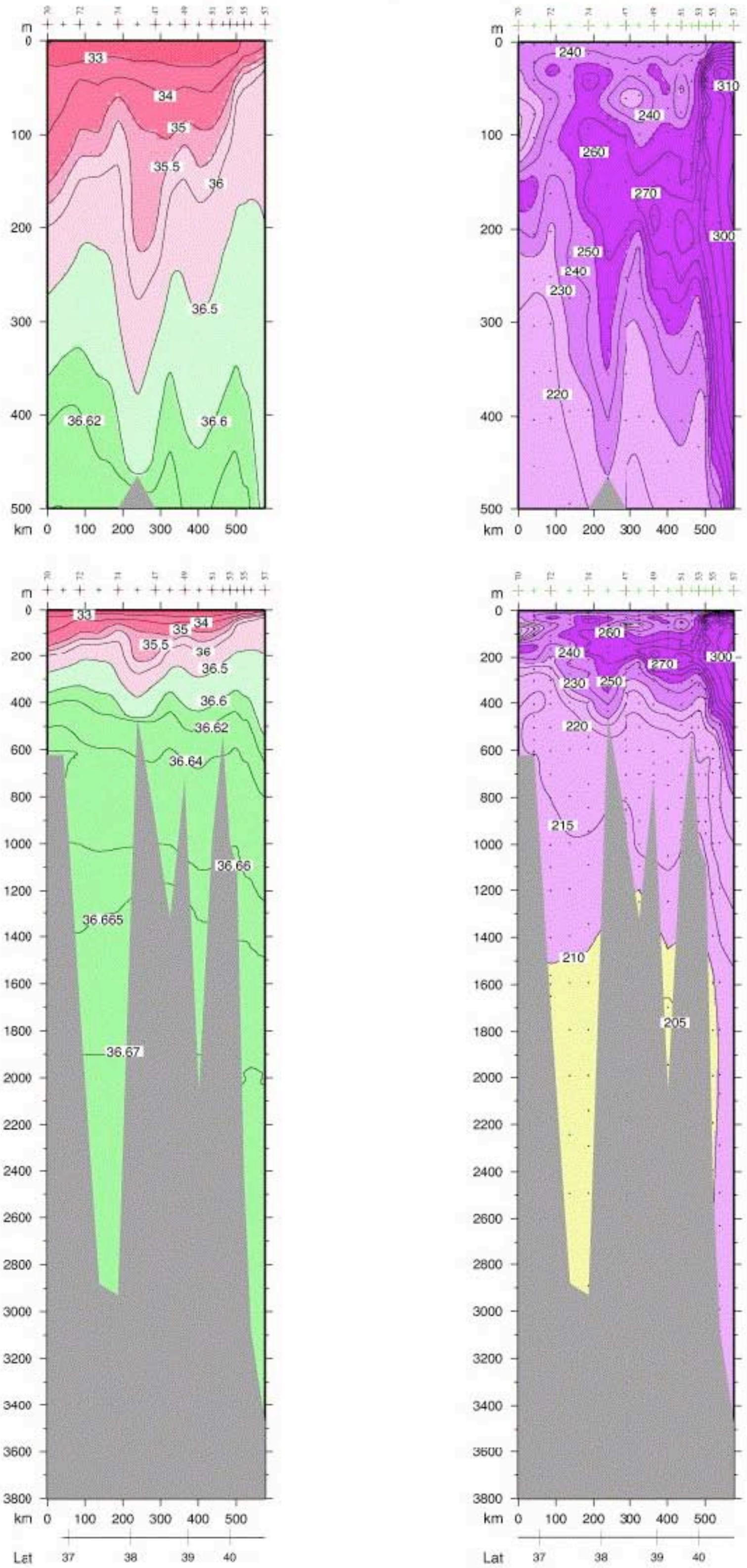
Figure D18. Vertical sections at approximately 135°E (Yamato Rise and Yamato Basin) (Y1 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated latitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

Potential Temperature (C) for Y1 Yamato Rise 134° E and Yamato Basin Salinity for Y1 Yamato Rise 134° E and Yamato Basin

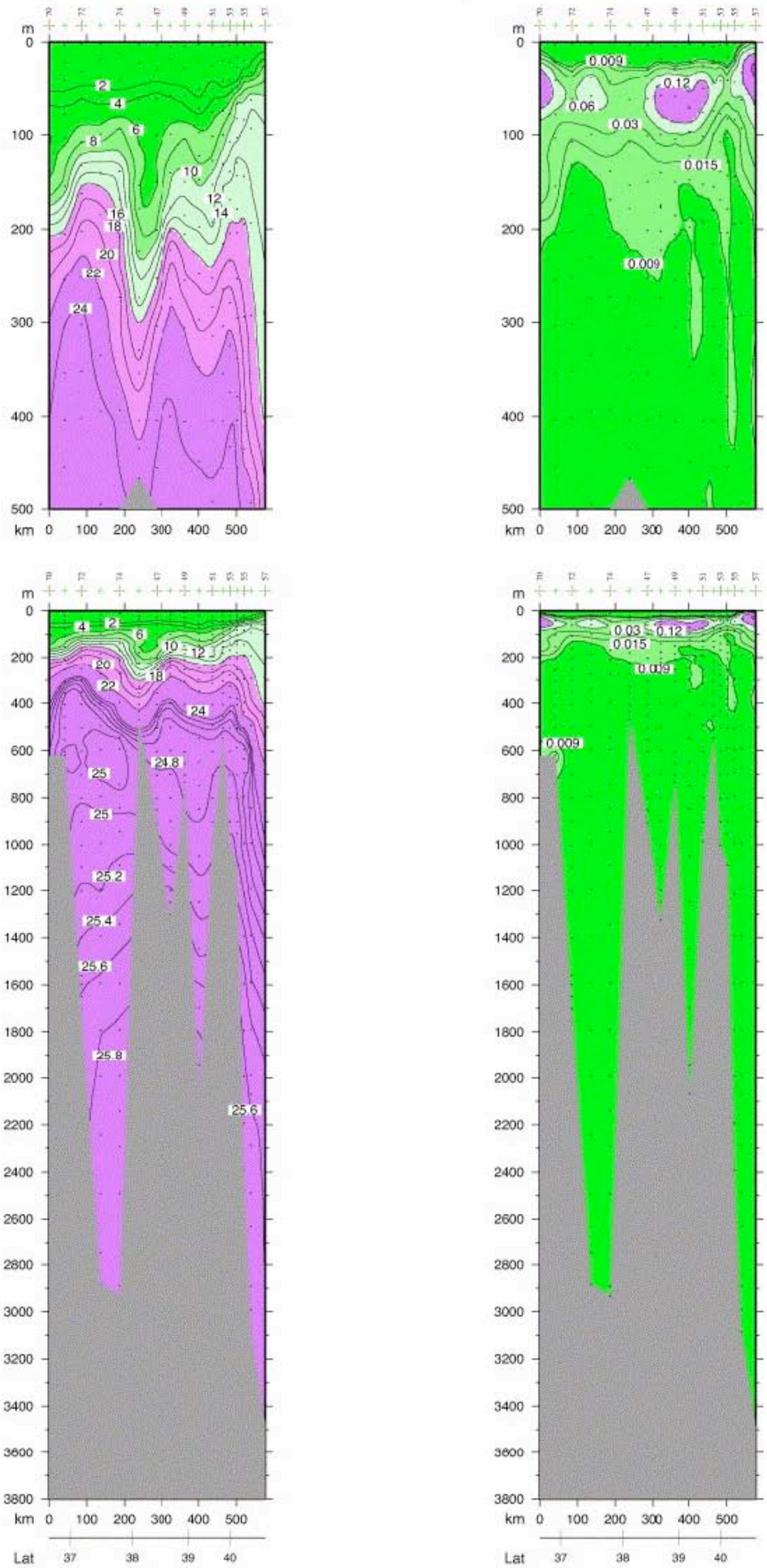



σ_0 for Y1 Yamato Rise 134° E and Yamato Basin
σ_1 for Y1 Yamato Rise 134° E and Yamato Basin
m
km
Lat

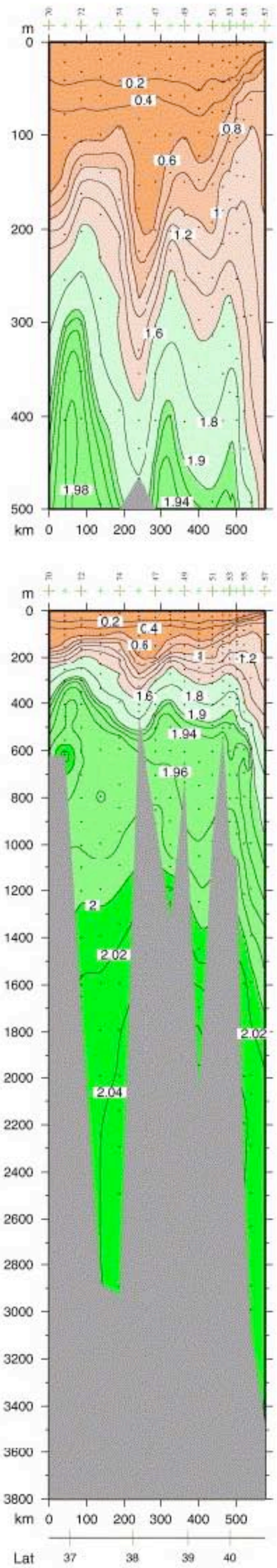
σ_2 for Y1 Yamato Rise 134° E and Yamato Basin   Oxygen (μmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin



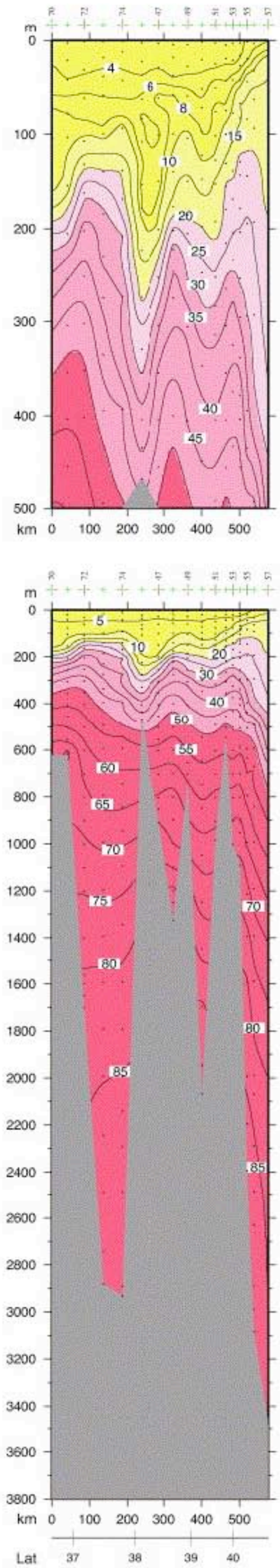
Nitrate (μmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin Nitrite (μmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin



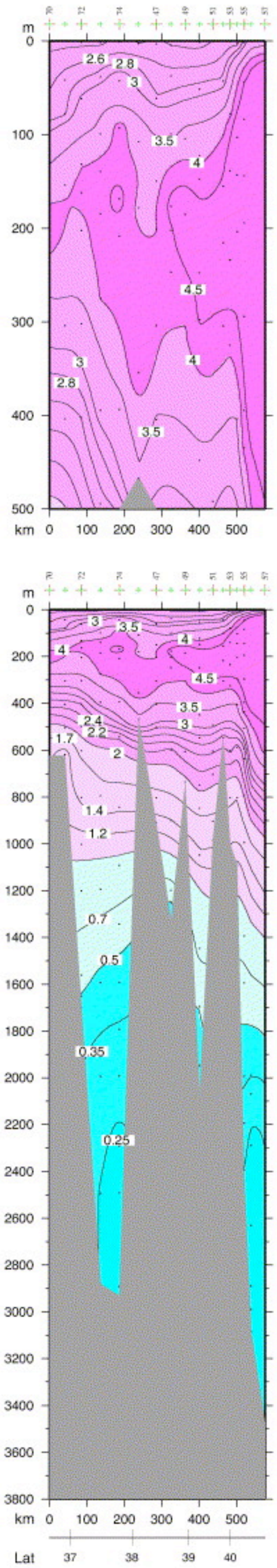
Phosphate (µmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin



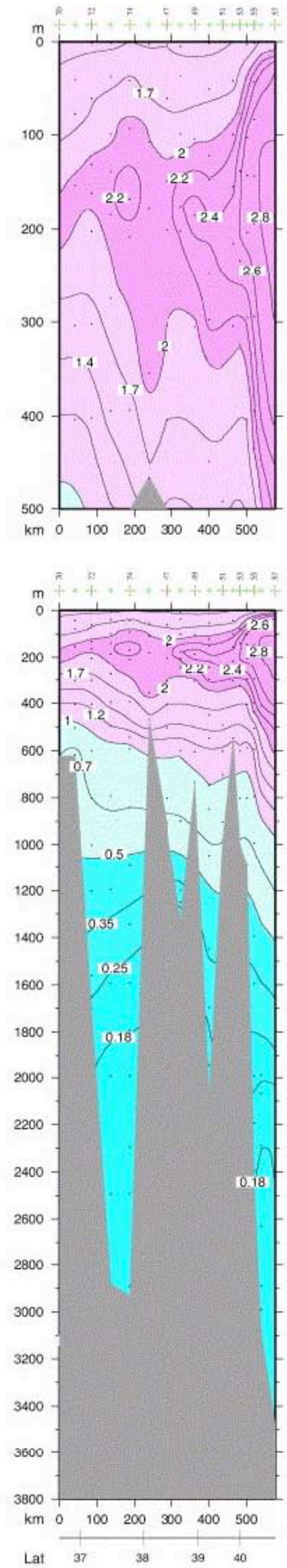
Dissolved Silica (µmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin



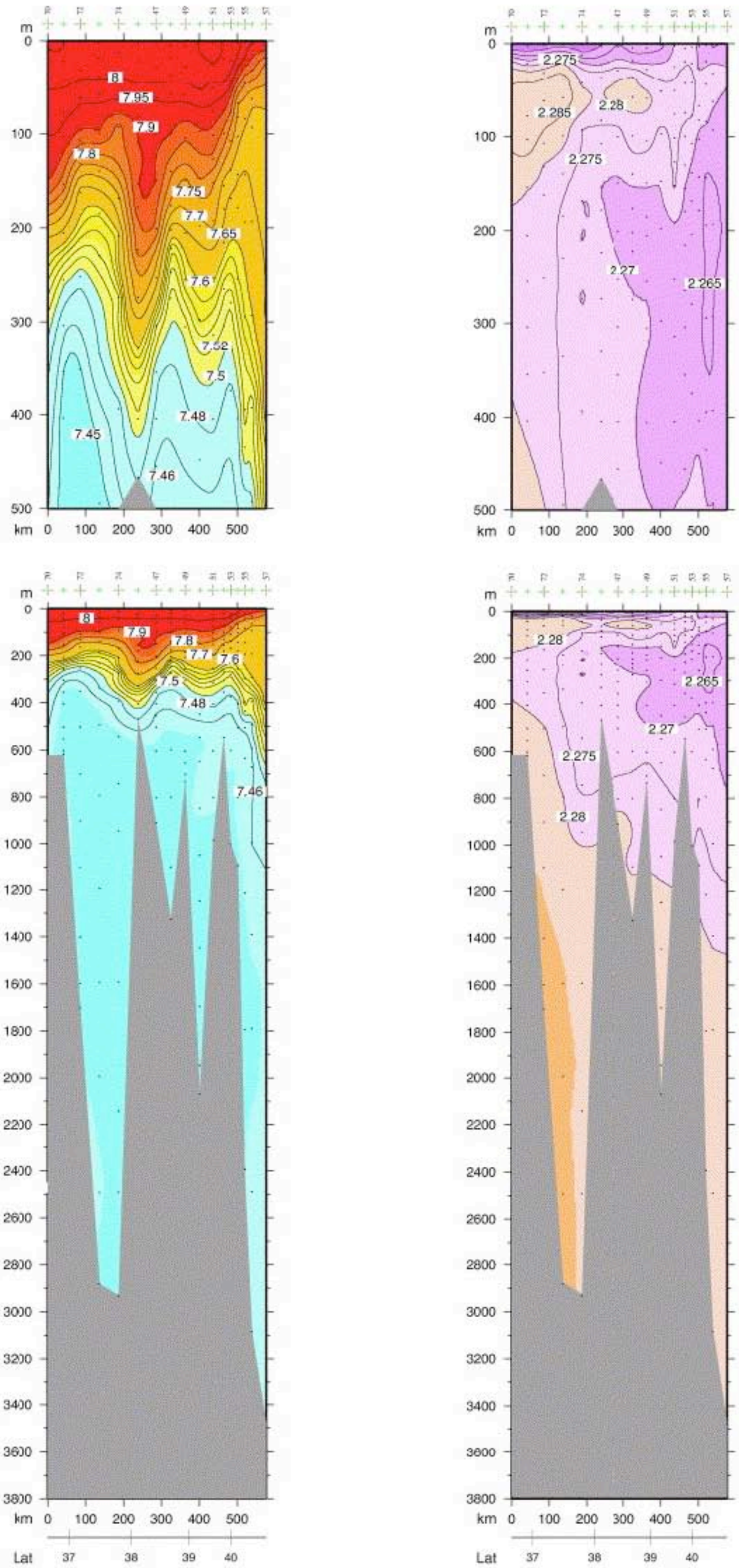
CFC-11 (pmol/kg) for Y1 Yamato Rise 134 E and Yamato Basin



CFC-12 (pmol/kg) for Y1 Yamato Rise 134 E and Yamato Basin



pH for Y1 Yamato Rise 134° E and Yamato Basin   Alkalinity (mmol/kg) for Y1 Yamato Rise 134° E and Yamato Basin



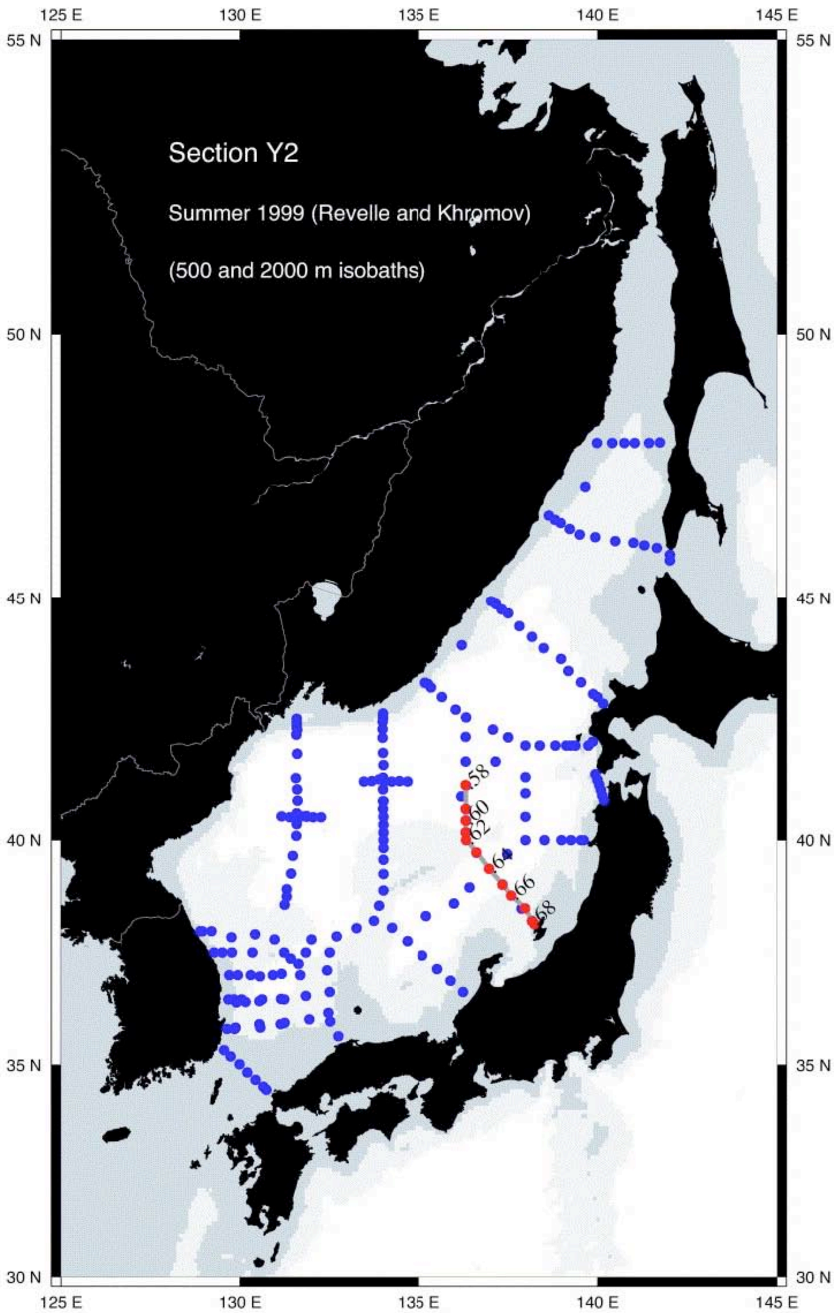
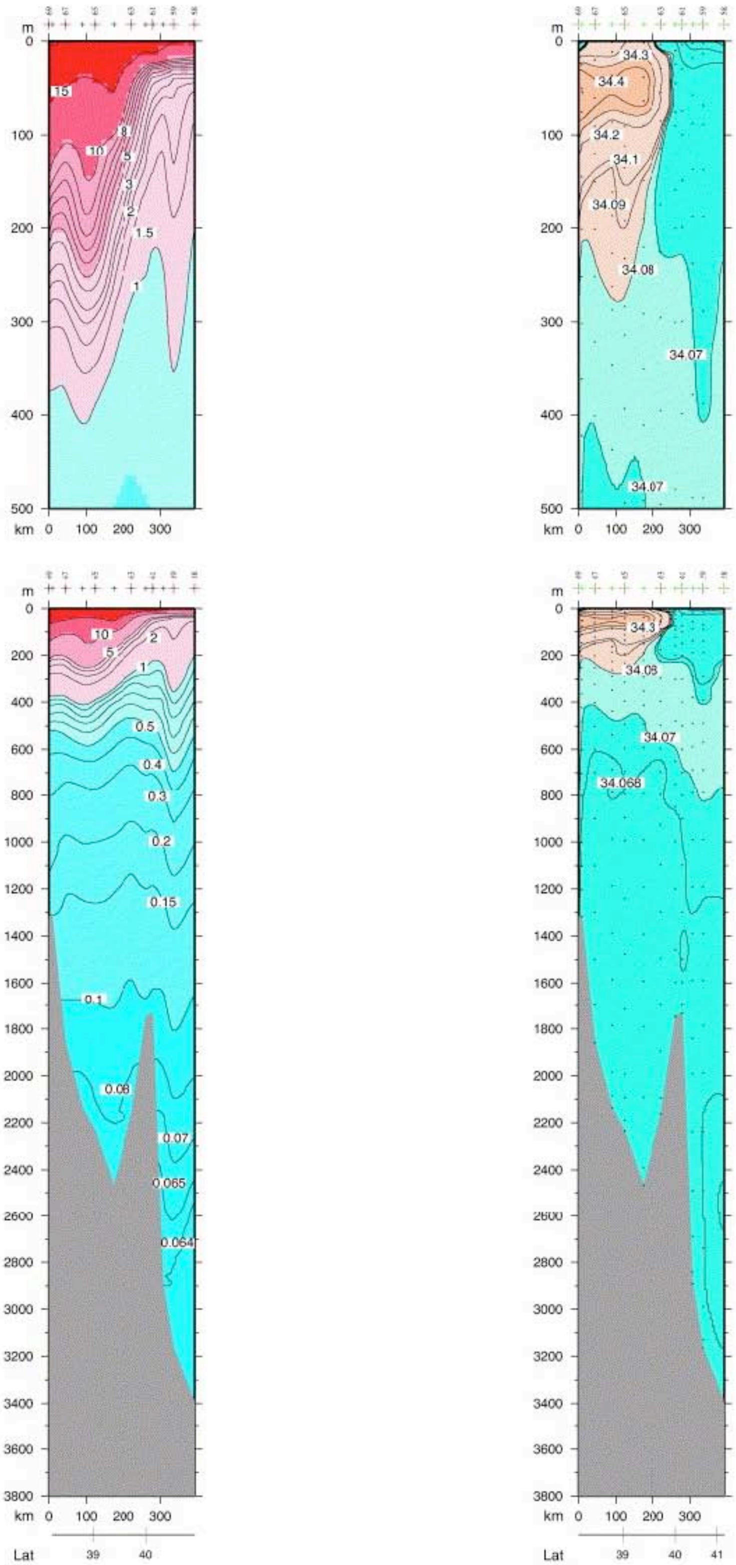
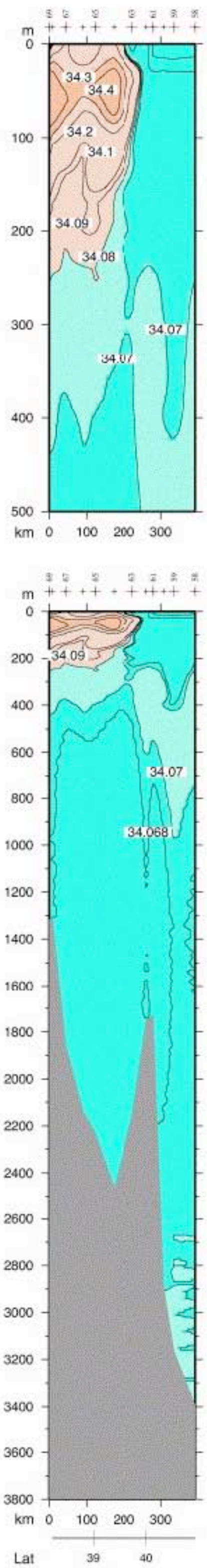


Figure D19. Vertical sections at approximately 136°20'E (Yamato Rise and Yamato Basin) (Y2 and part of J3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated latitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

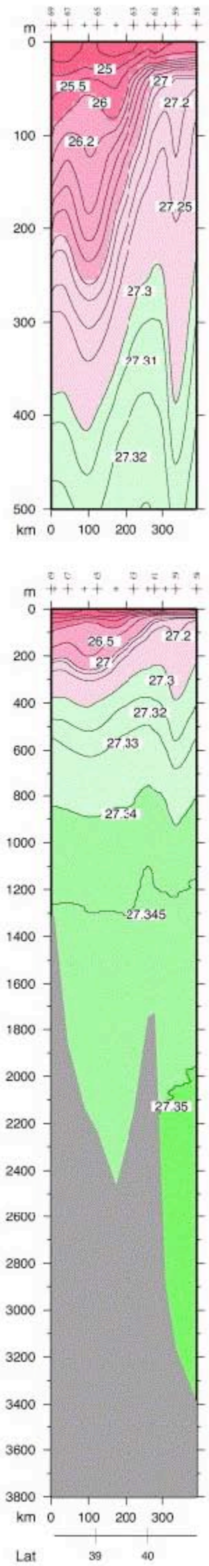
Potential Temperature (°C) for Y2 Yamato Rise 136° 20'E and Yamato Basin   Salinity for Y2 Yamato Rise 136° 20'E and Yamato Basin



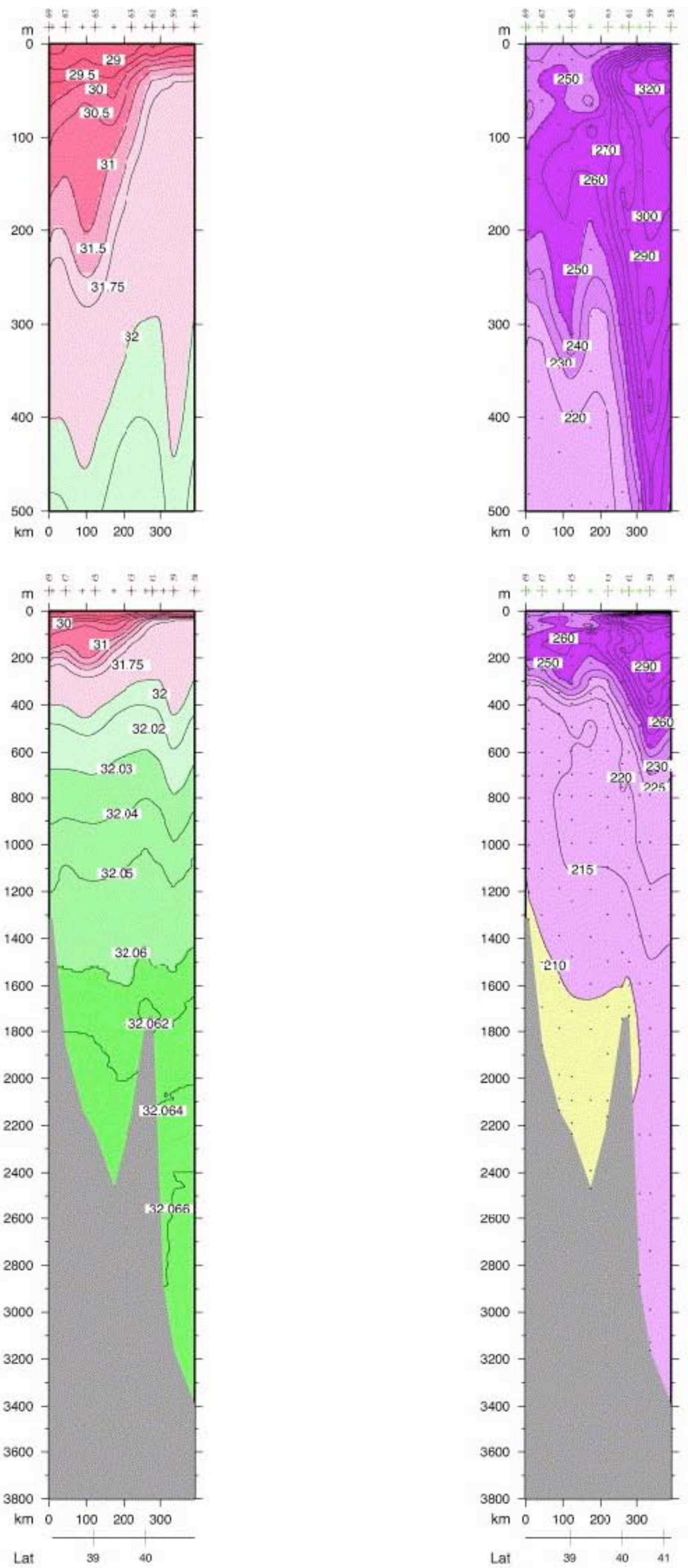
CTD Salinity for Y2 Yamato Rise 136° 20'E and Yamato Basin



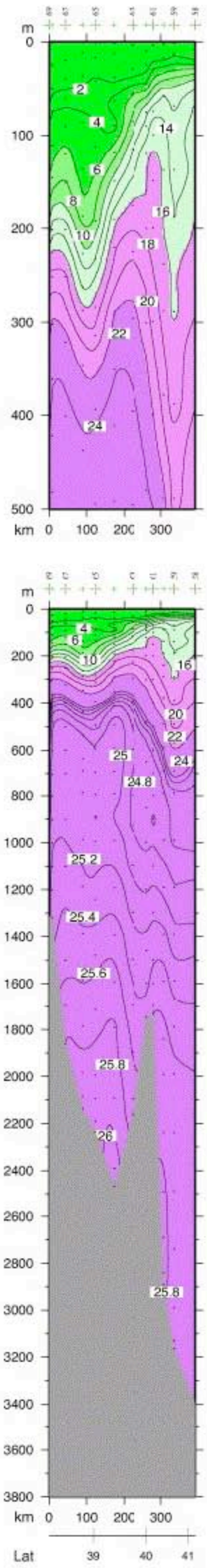
σ_0 for Y2 Yamato Rise 136° 20'E and Yamato Basin



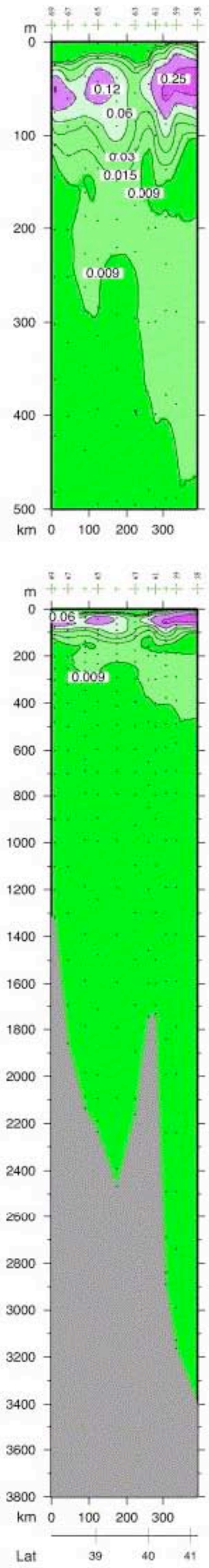
σ_1 for Y2 Yamato Rise 136° 20'E and Yamato Basin   Oxygen (µmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



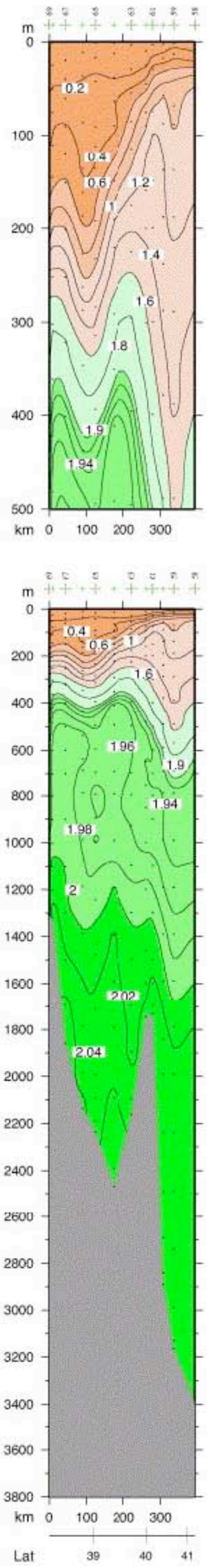
Nitrate (µmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



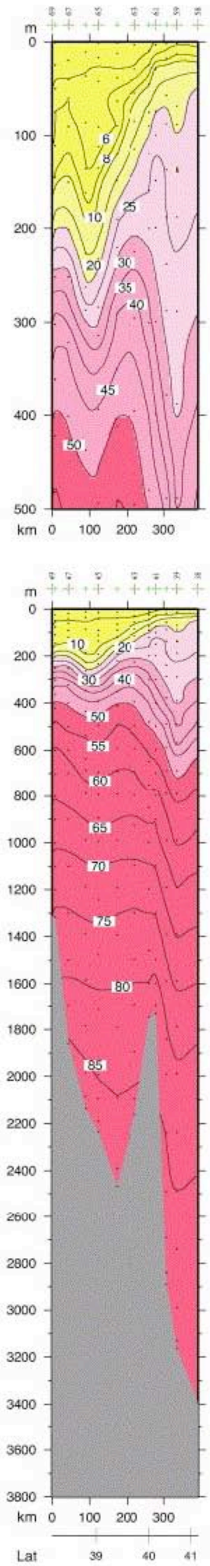
Nitrite (µmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



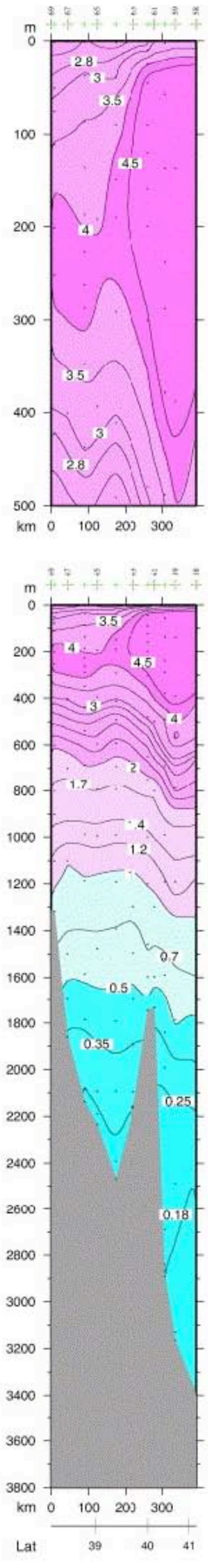
Phosphate (µmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato



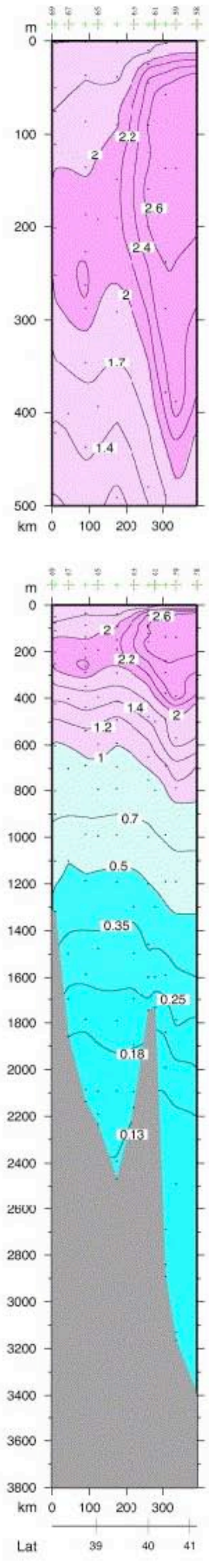
Dissolved Silica (µmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato B



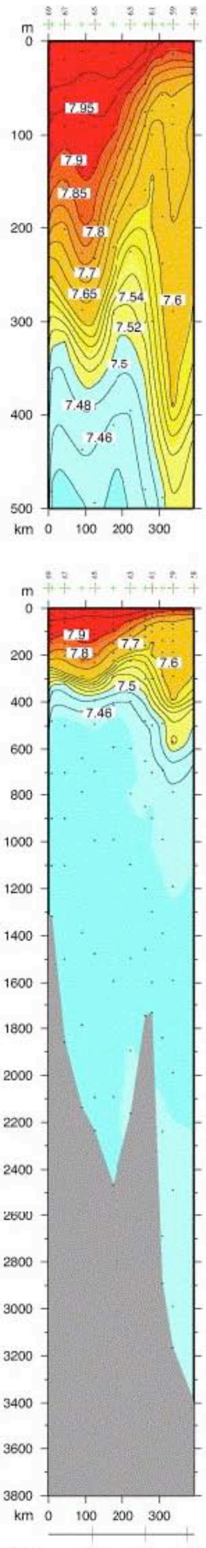
CFC-11 (pmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



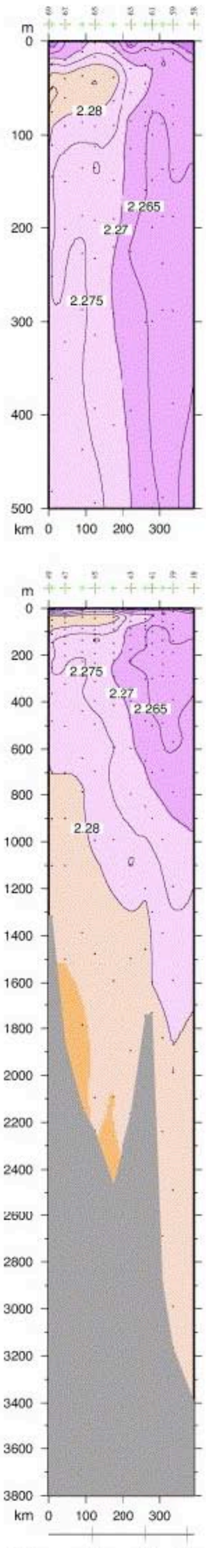
CFC-12 (pmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



pH for Y2 Yamato Rise 136 20E and Yamato Basin



Alkalinity (mmol/kg) for Y2 Yamato Rise 136° 20'E and Yamato Basin



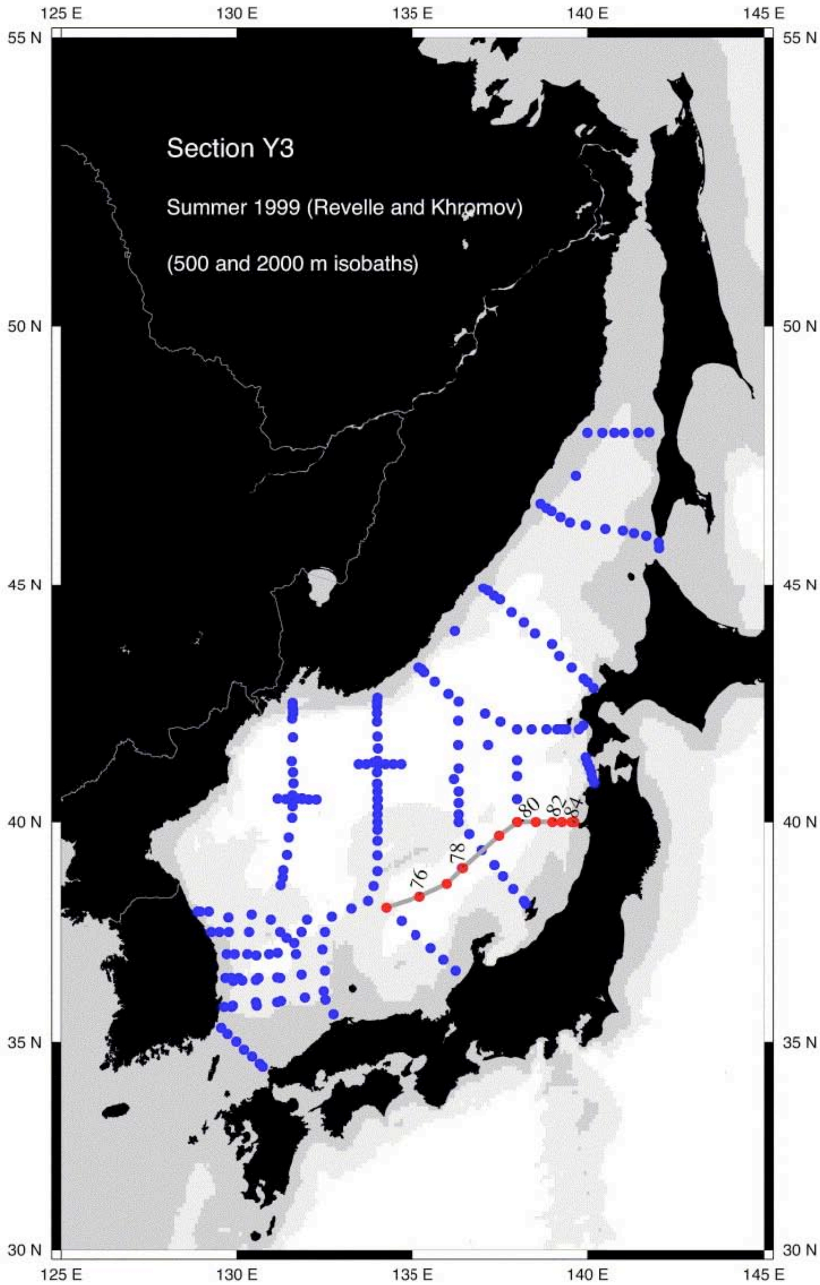
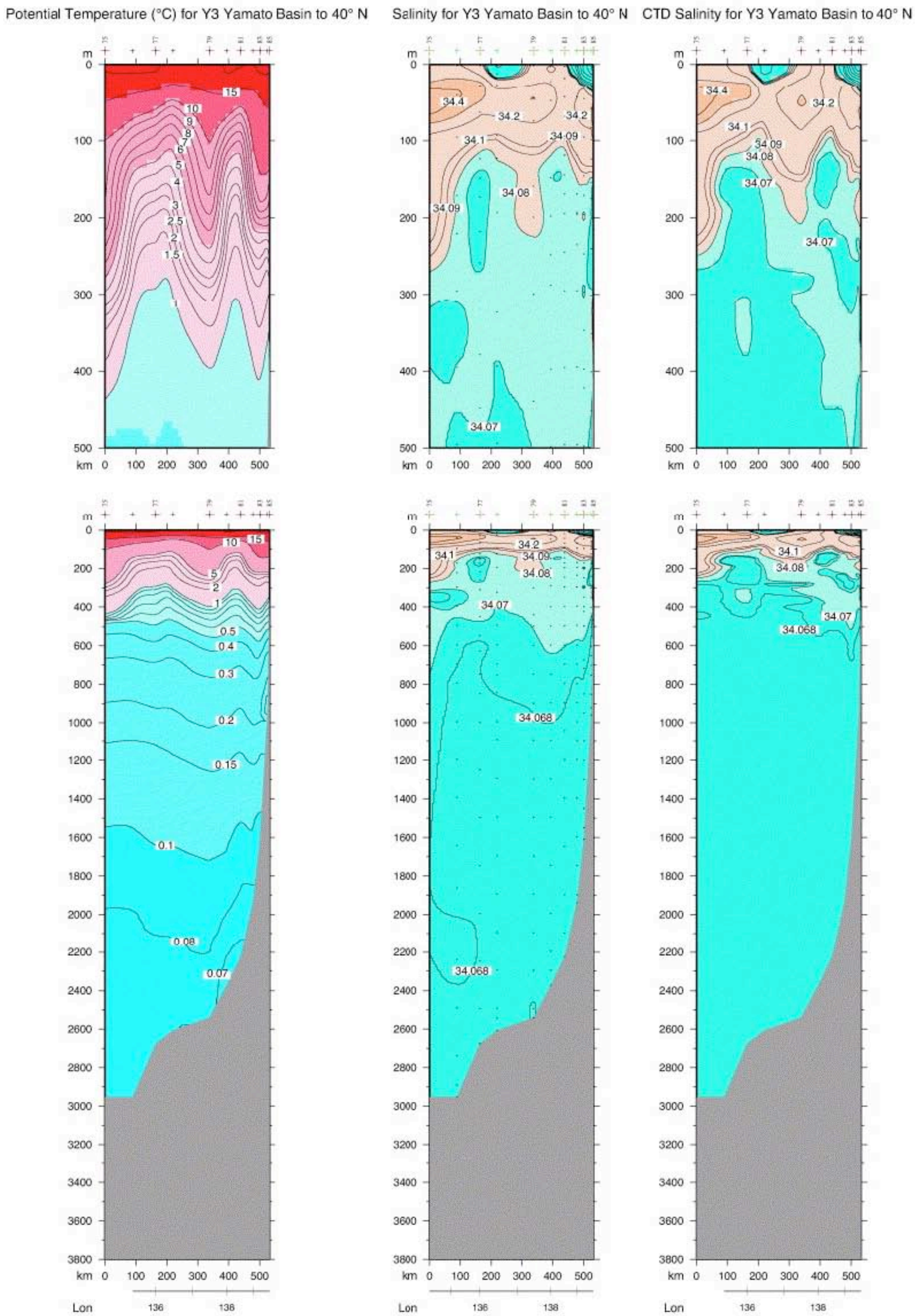
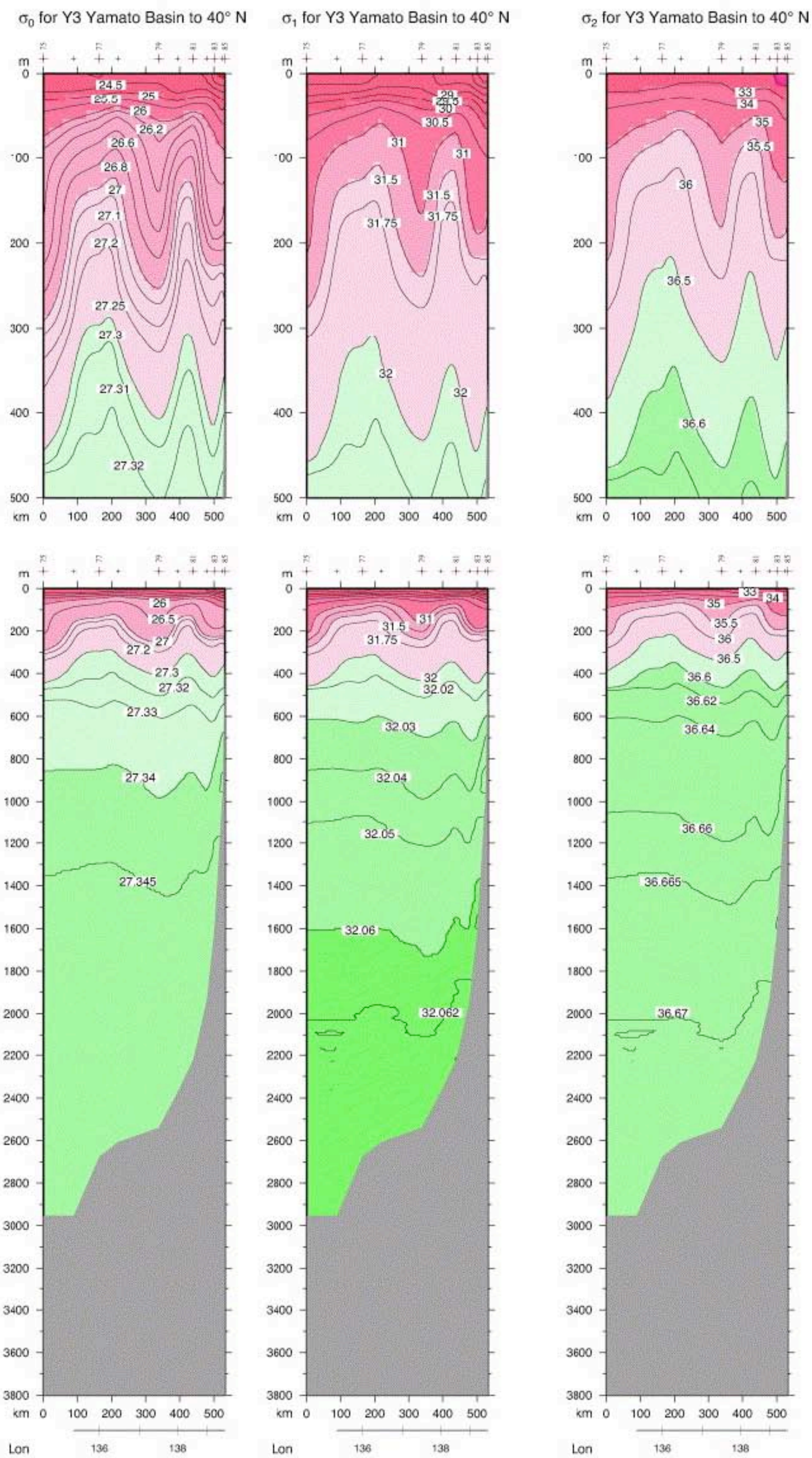


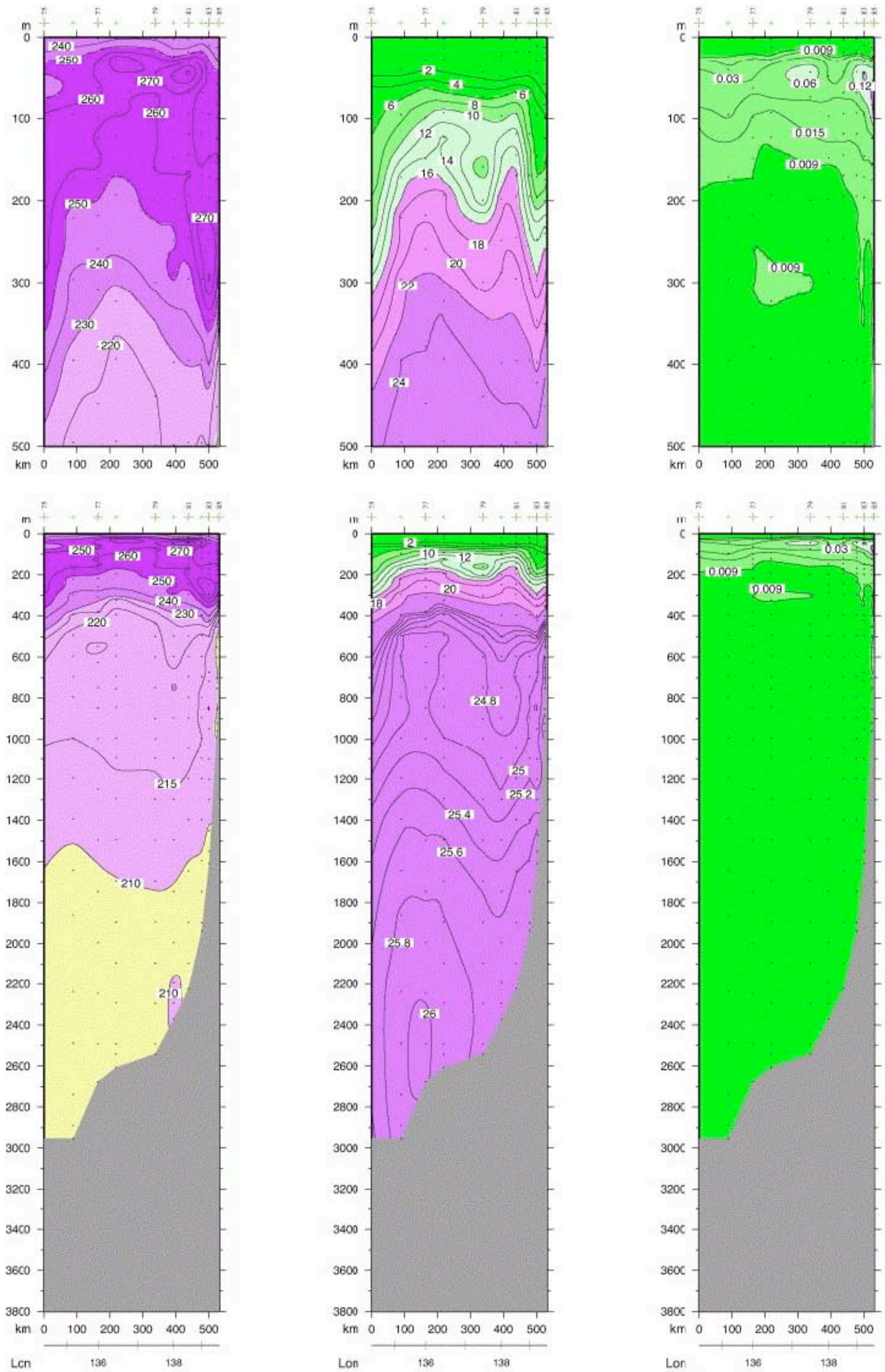
Figure D20. Vertical sections at approximately 137°E to 40°N (Yamato Basin) (Y3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC-12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated longitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

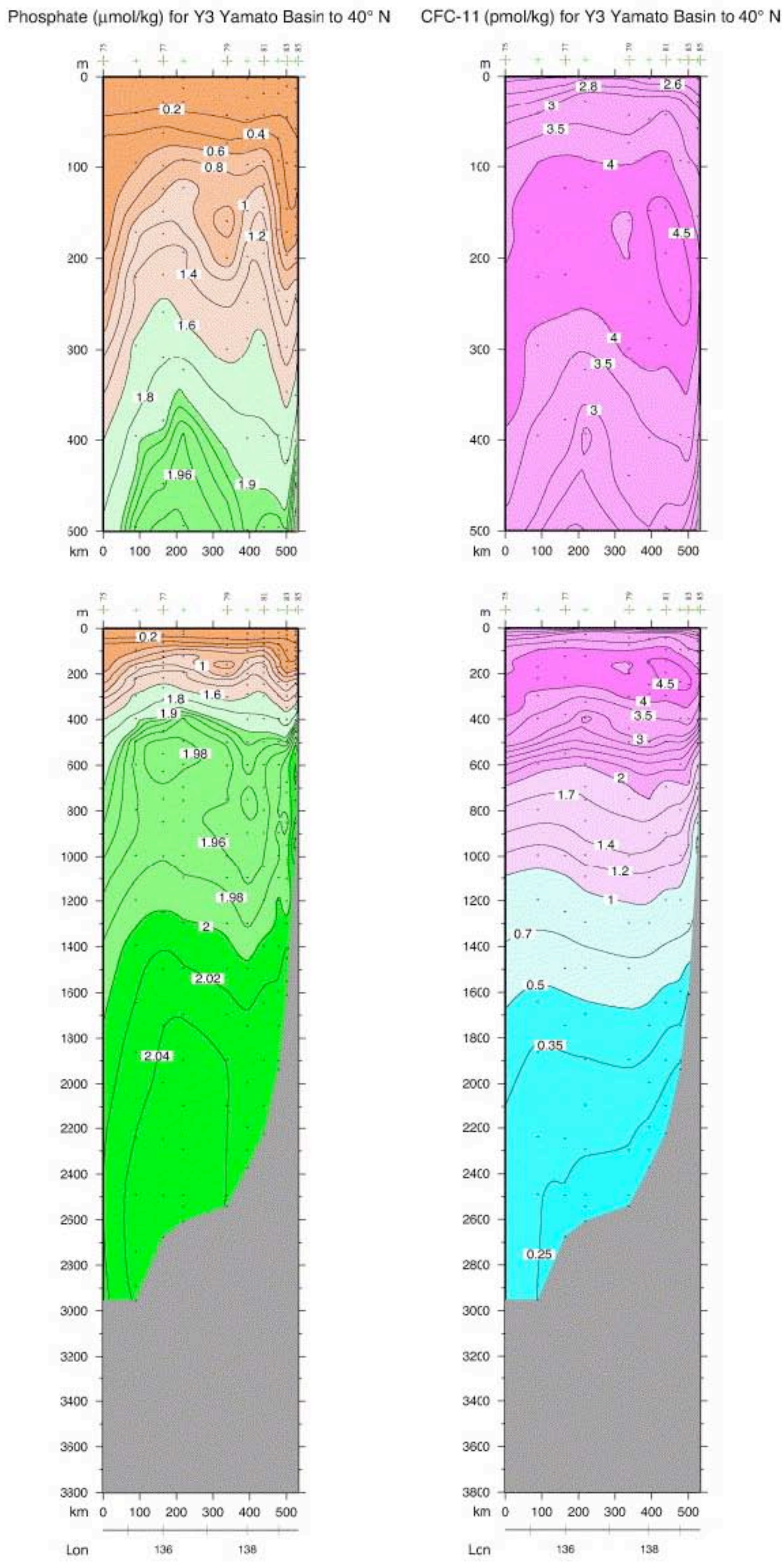

Potential Temperature (°C) for Y3 Yamato Basin to 40° N
Salinity for Y3 Yamato Basin to 40° N
CTD Salinity for Y3 Yamato Basin to 40° N
m
km
Lon
136
138



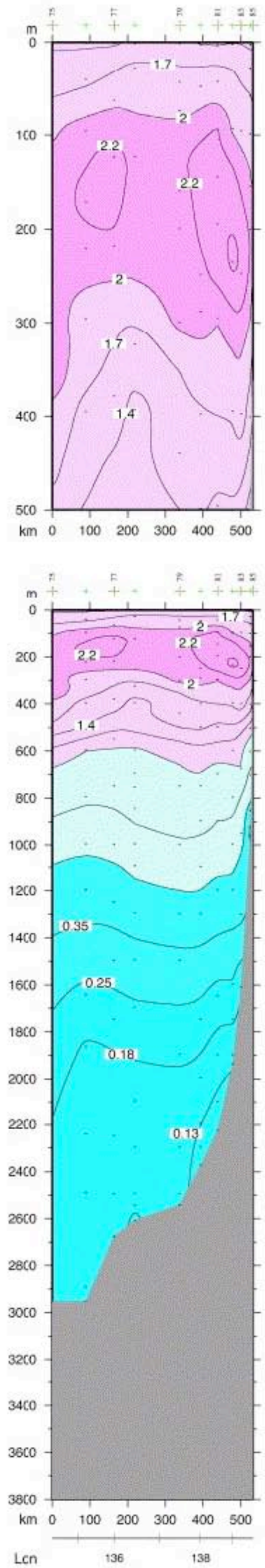
σ_0 for Y3 Yamato Basin to 40° N
σ_1 for Y3 Yamato Basin to 40° N
σ_2 for Y3 Yamato Basin to 40° N
m
km
Lon
136
138
24.5
25
25.5
26
26.2
26.6
26.8
27
27.1
27.2
27.25
27.3
27.31
27.32
26.5
27.33
27.34
27.345
29
30
30.5
31
31.5
31.75
32
32.02
32.03
32.04
32.05
32.06
32.062
33
34
35
35.5
36
36.5
36.6
36.62
36.64
36.66
36.665
36.67

Oxygen (μmol/kg) for Y3 Yamato Basin to 40° N Nitrate (μmol/kg) for Y3 Yamato Basin to 40° N Nitrite (μmol/kg) for Y3 Yamato Basin to 40° N

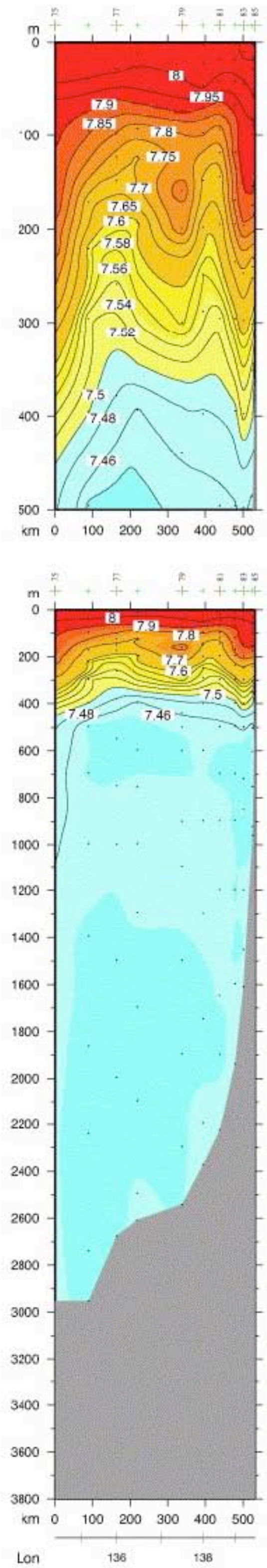



Phosphate (µmol/kg) for Y3 Yamato Basin to 40° N
CFC-11 (pmol/kg) for Y3 Yamato Basin to 40° N
m
km
Lon
136
138

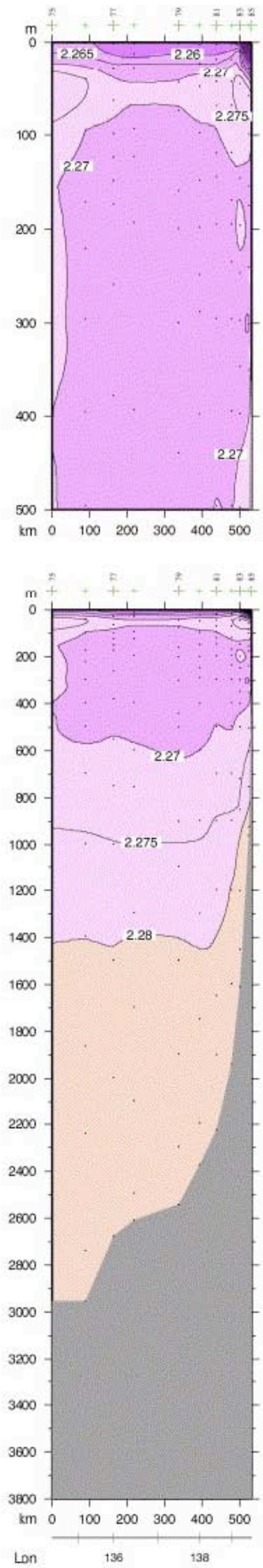
CFC-12 (pmol/kg) for Y3 Yamato Basin to 40° N



pH for Y3 Yamato Basin to 40° N



Alkalinity (mmol/kg) for Y3 Yamato Basin to 40° N



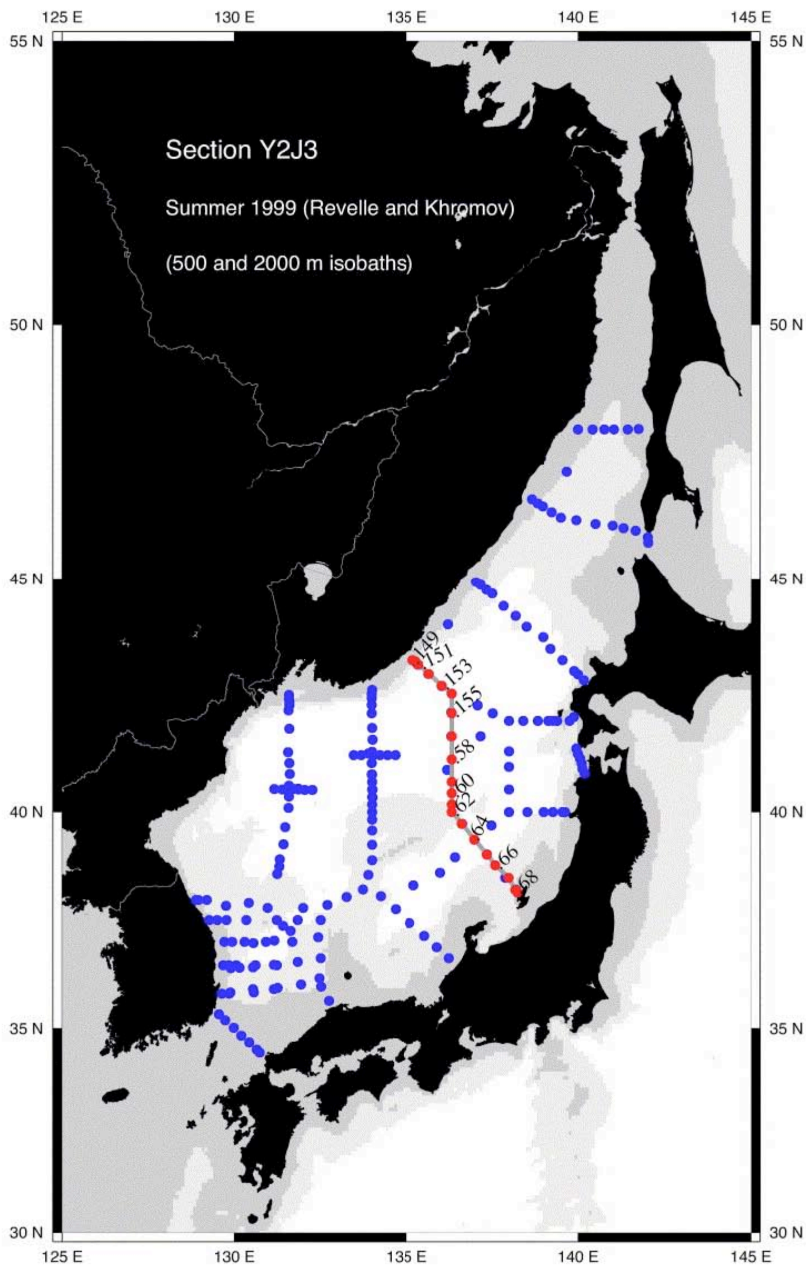
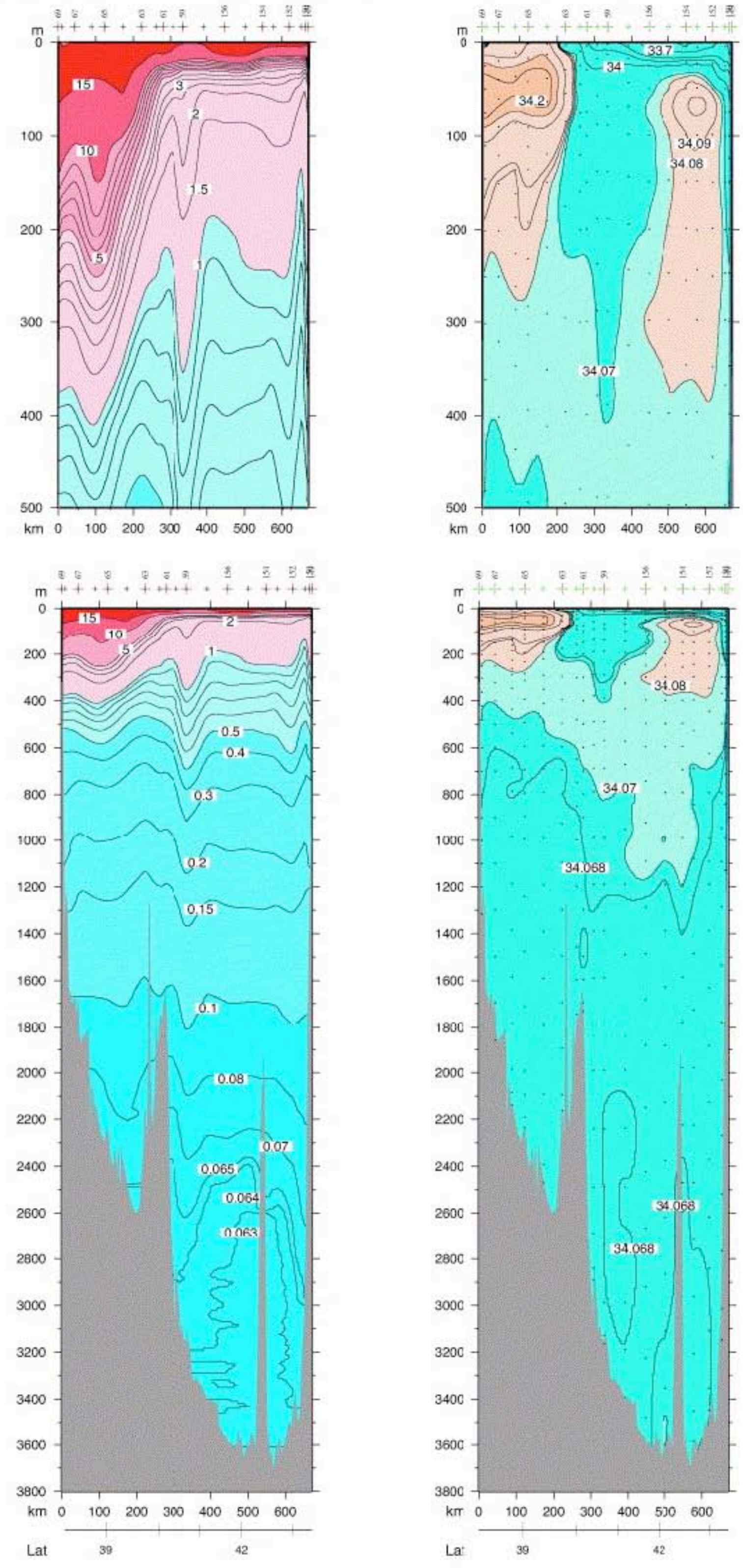
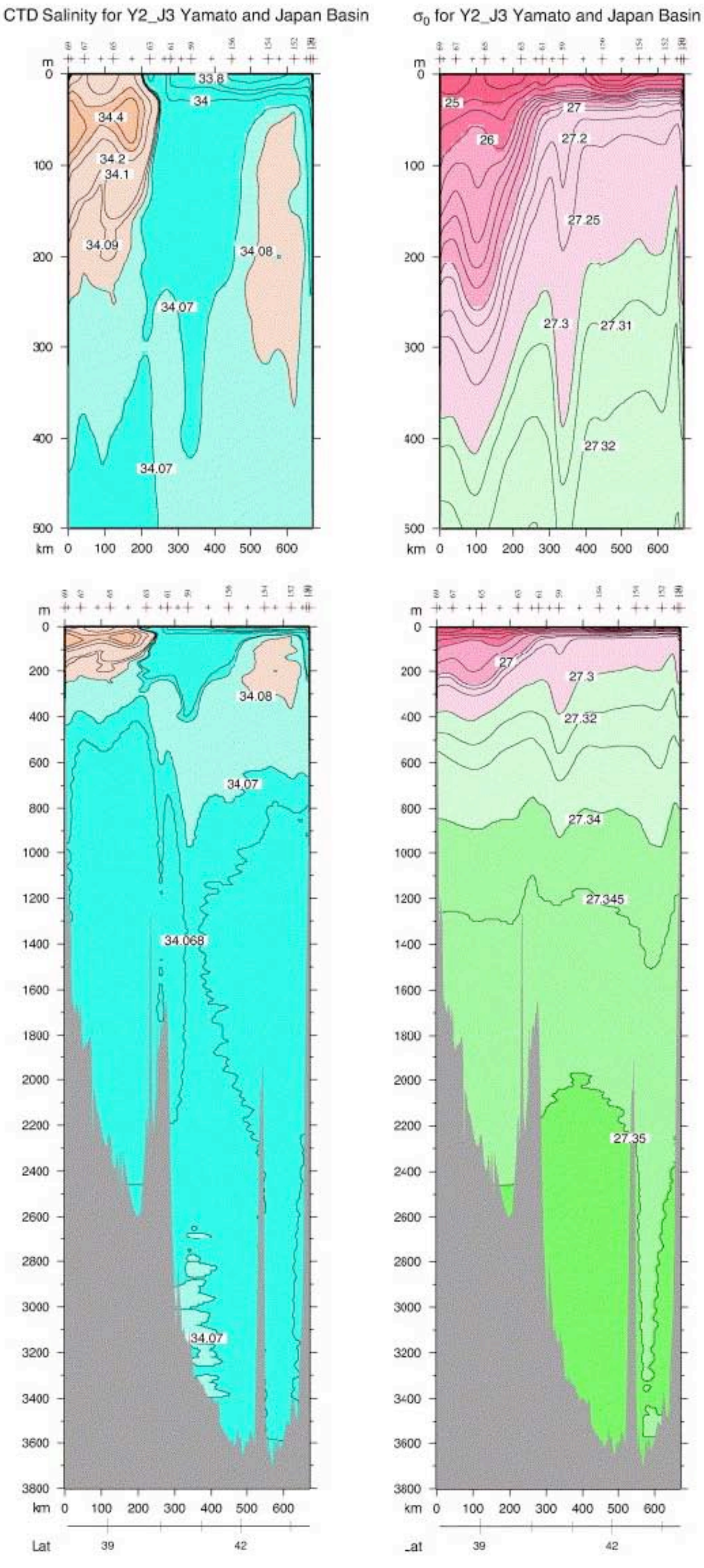
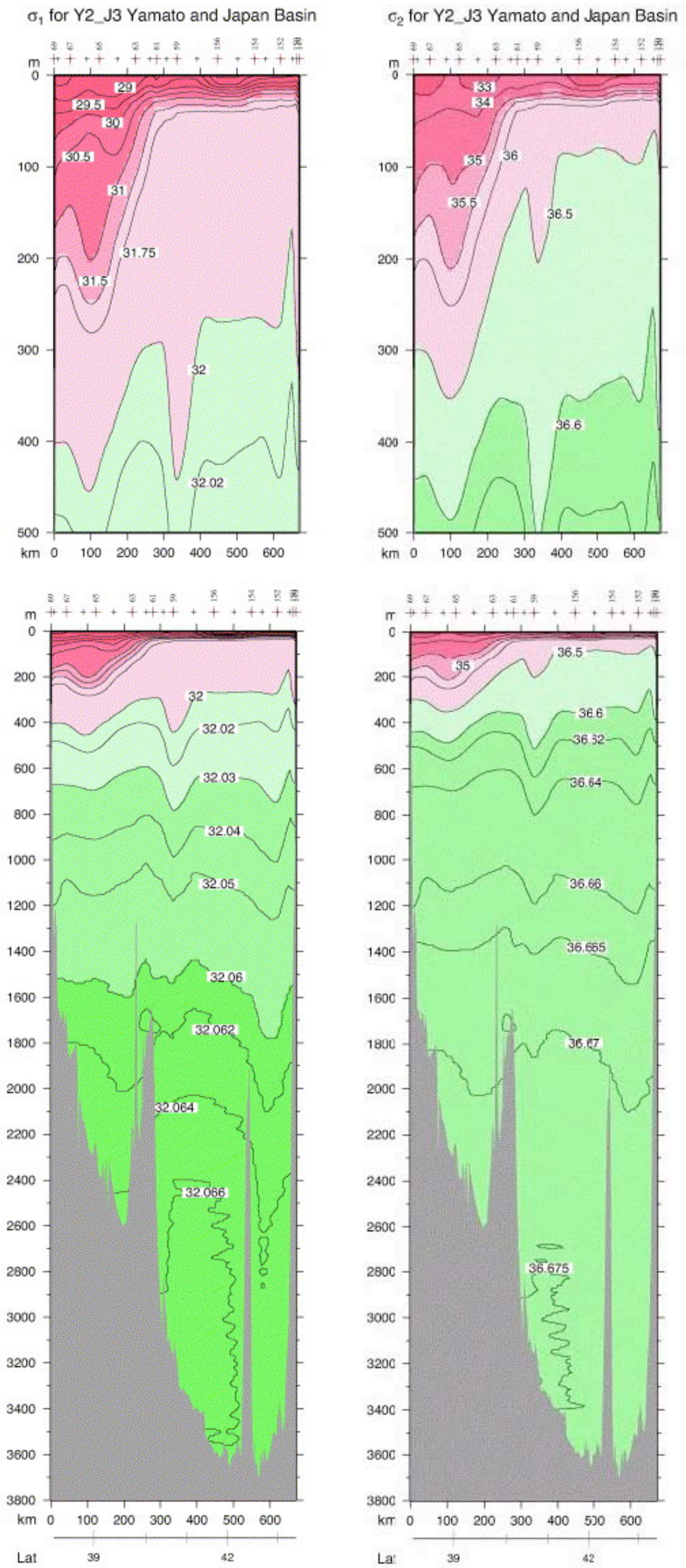


Figure D21. Vertical sections at approximately 136°E (Yamato and Japan Basins) (combined Y2 and J3 in Fig. 1b): (a) Station locations, (b) potential temperature (°C), (c) salinity (bottle data), (d) salinity (CTD data), (e) potential density σ_θ, (f) potential density σ_1, (g) potential density σ_2, (h) oxygen (μmol/kg), (i) nitrate (μmol/kg), (j) nitrite (μmol/kg), (k) phosphate (μmol/kg), (l) dissolved silica (μmol/kg), (m) CFC-11 (pmol/kg), (n) CFC12 (pmol/kg), (o) pH, and (p) alkalinity (mmol/kg). The vertical axis is depth (m) and the horizontal axis is distance (km). Interpolated latitudes along the sections are also shown. Upper panel vertical exaggeration is 2500:1. Lower panel vertical exaggeration is 625:1.

Potential Temperature (C) for Y2_J3 Yamato and Japan Basin   Sal nity for Y2_J3 Yamato and Japan Basi

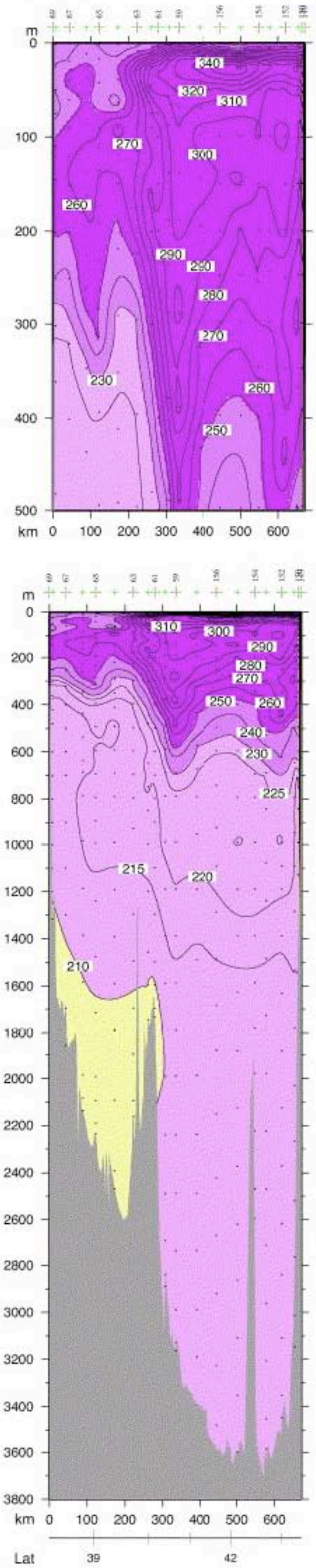



CTD Salinity for Y2_J3 Yamato and Japan Basin
σ_0 for Y2_J3 Yamato and Japan Basin
33.8
34
34.4
34.2
34.1
34.09
34.08
34.07
34.068
25
26
27
27.2
27.25
27.3
27.31
27.32
27.34
27.345
27.35
m
km
Lat
39
42

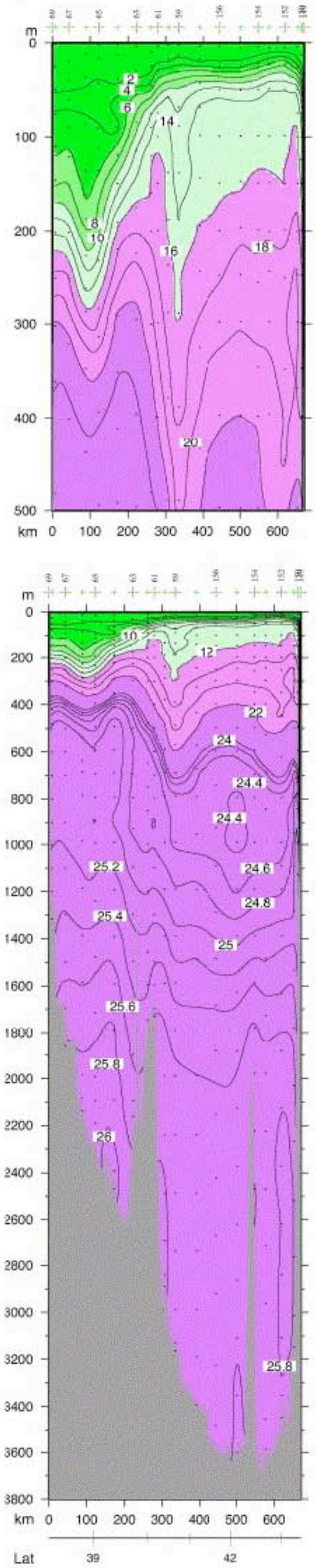


σ1 for Y2_J3 Yamato and Japan Basin
σ2 for Y2_J3 Yamato and Japan Basin
m
km
Lat
39
42
29
29.5
30
30.5
31
31.5
31.75
32
32.02
32.03
32.04
32.05
32.06
32.062
32.064
32.066
33
34
35
35.5
36
36.5
36.6
36.62
36.64
36.66
36.665
36.67
36.675

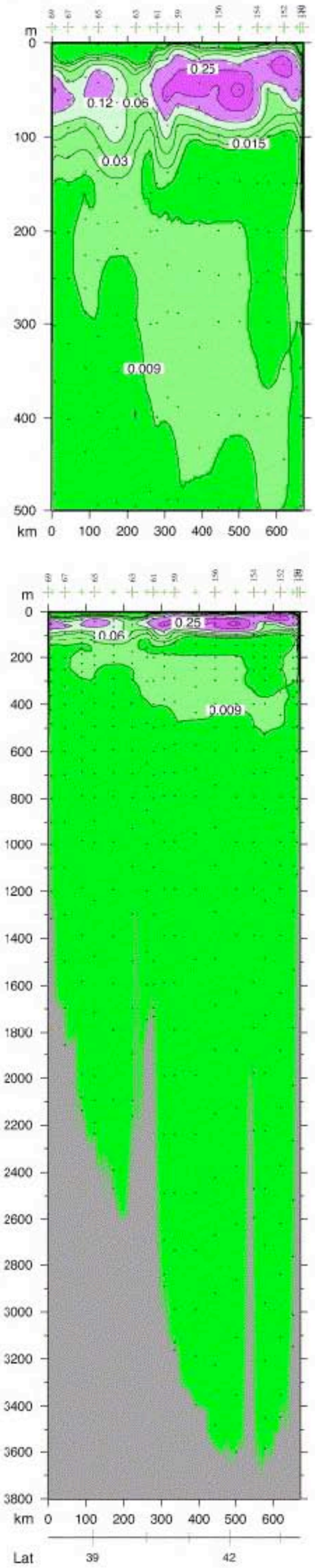
Oxygen (μmol/kg) for Y2_J3 Yamato and Japan Basin



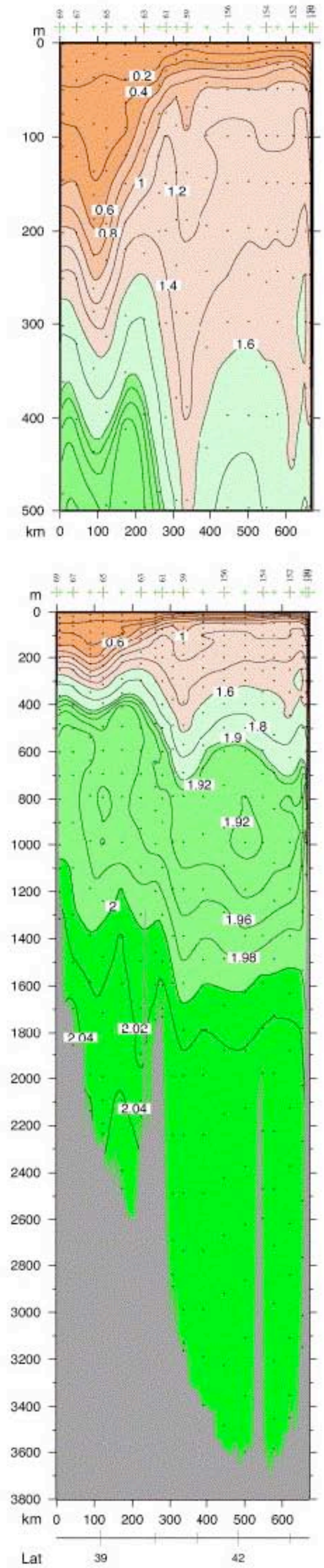
Nitrate (μmol/kg) for Y2_J3 Yamato and Japan Basin



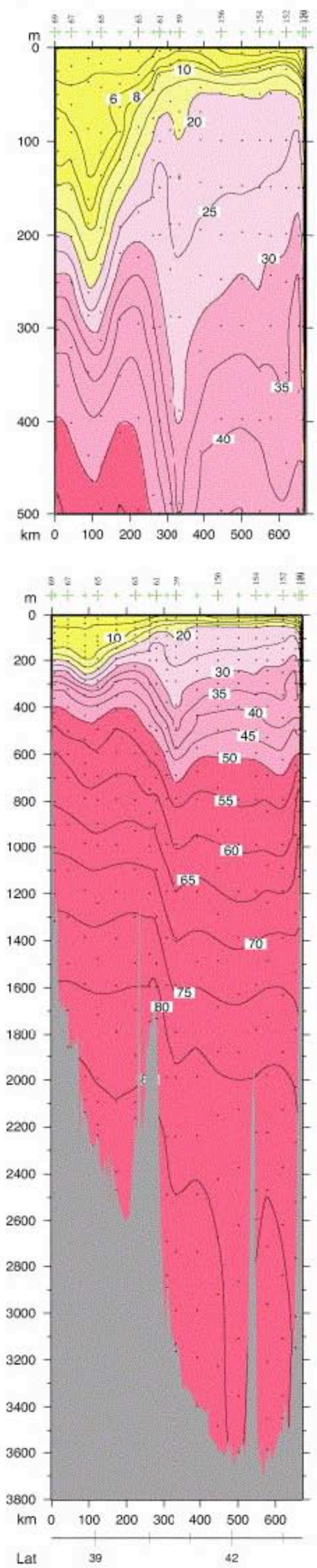
Nitrite (µmol/kg) for Y2_J3 Yamato and Japan Basin



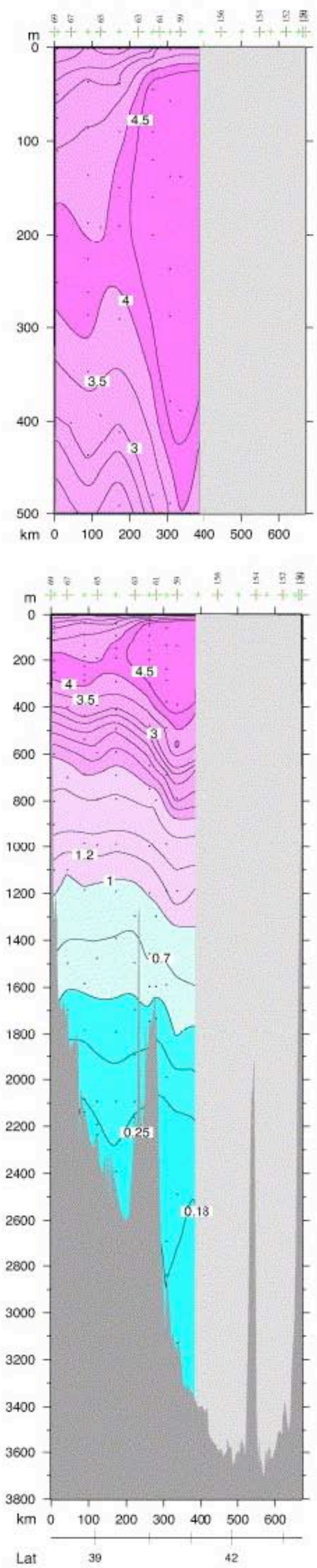
Phosphate (µmol/kg) for Y2_J3 Yamato and Japan Basin

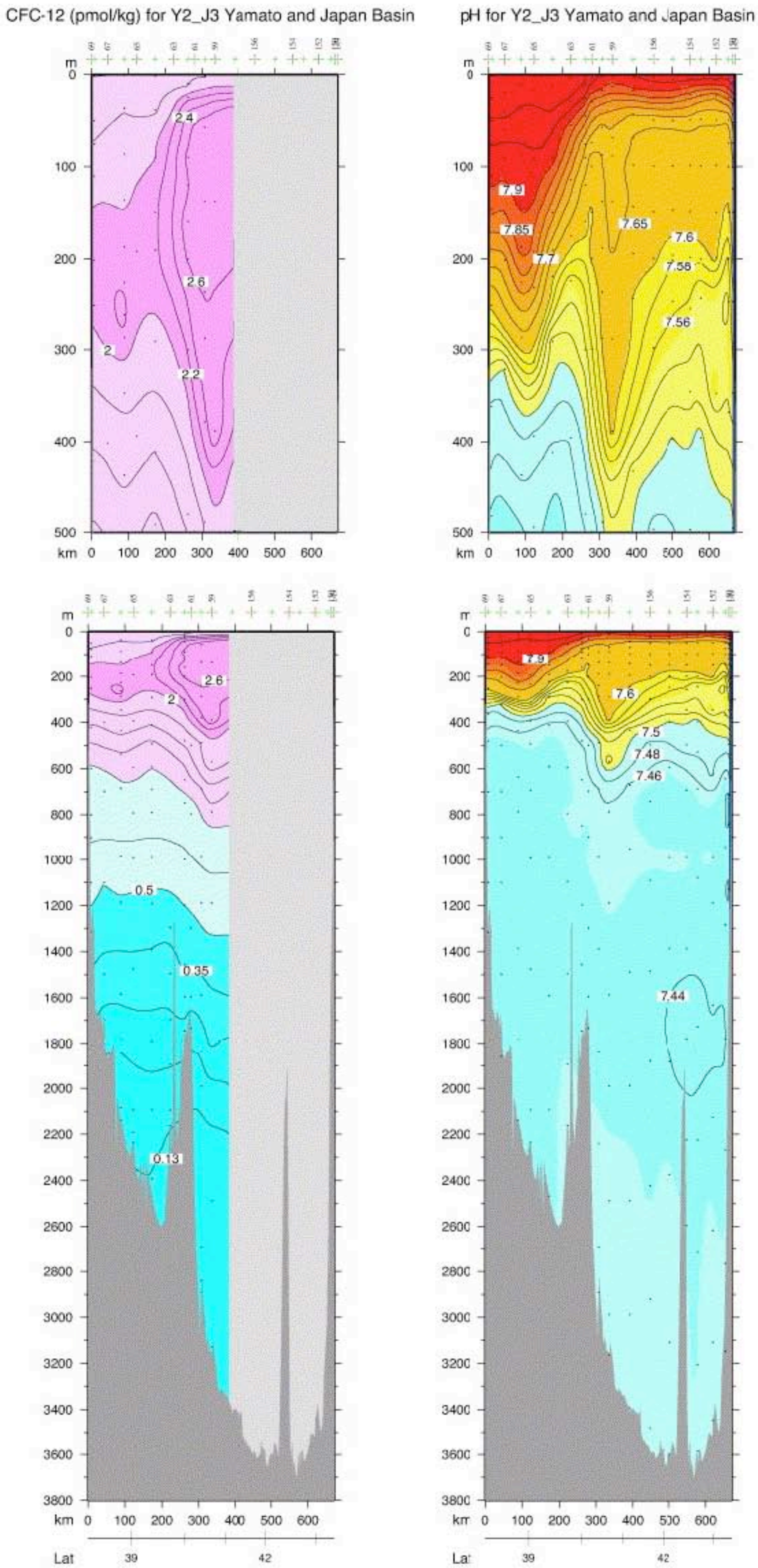


Dissolved Silica (µmol/kg) for Y2_J3 Yamato and Japan Basin

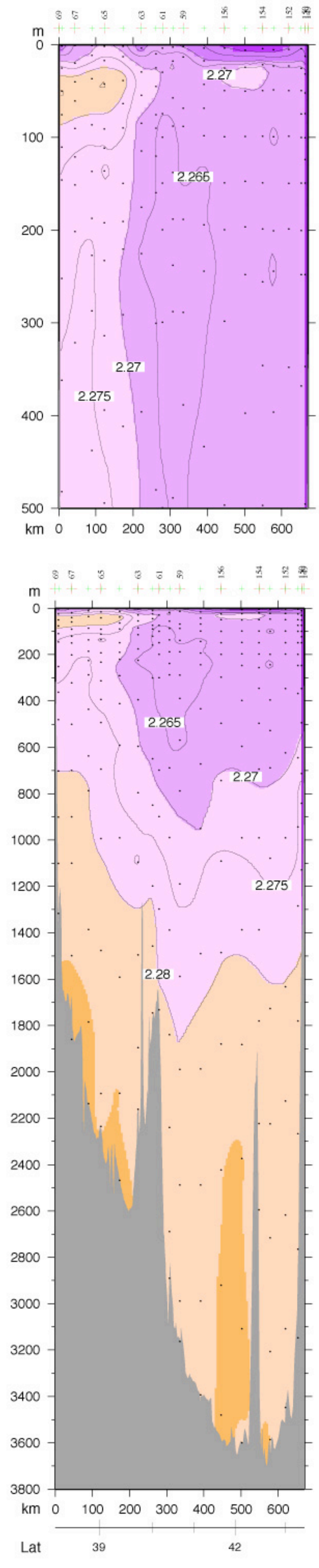


CFC-11 (pmol/kg) for Y2_J3 Yamato and Japan Basin




CFC-12 (pmol/kg) for Y2_J3 Yamato and Japan Basin
pH for Y2_J3 Yamato and Japan Basin
m
km
Lat
39
42
2.4
2.6
2
2.2
0.5
0.35
0.13
7.9
7.85
7.7
7.65
7.6
7.58
7.56
7.5
7.48
7.46
7.44

Alkalinity (mmol/kg) for Y2_J3 Yamato and Japan Basin



2

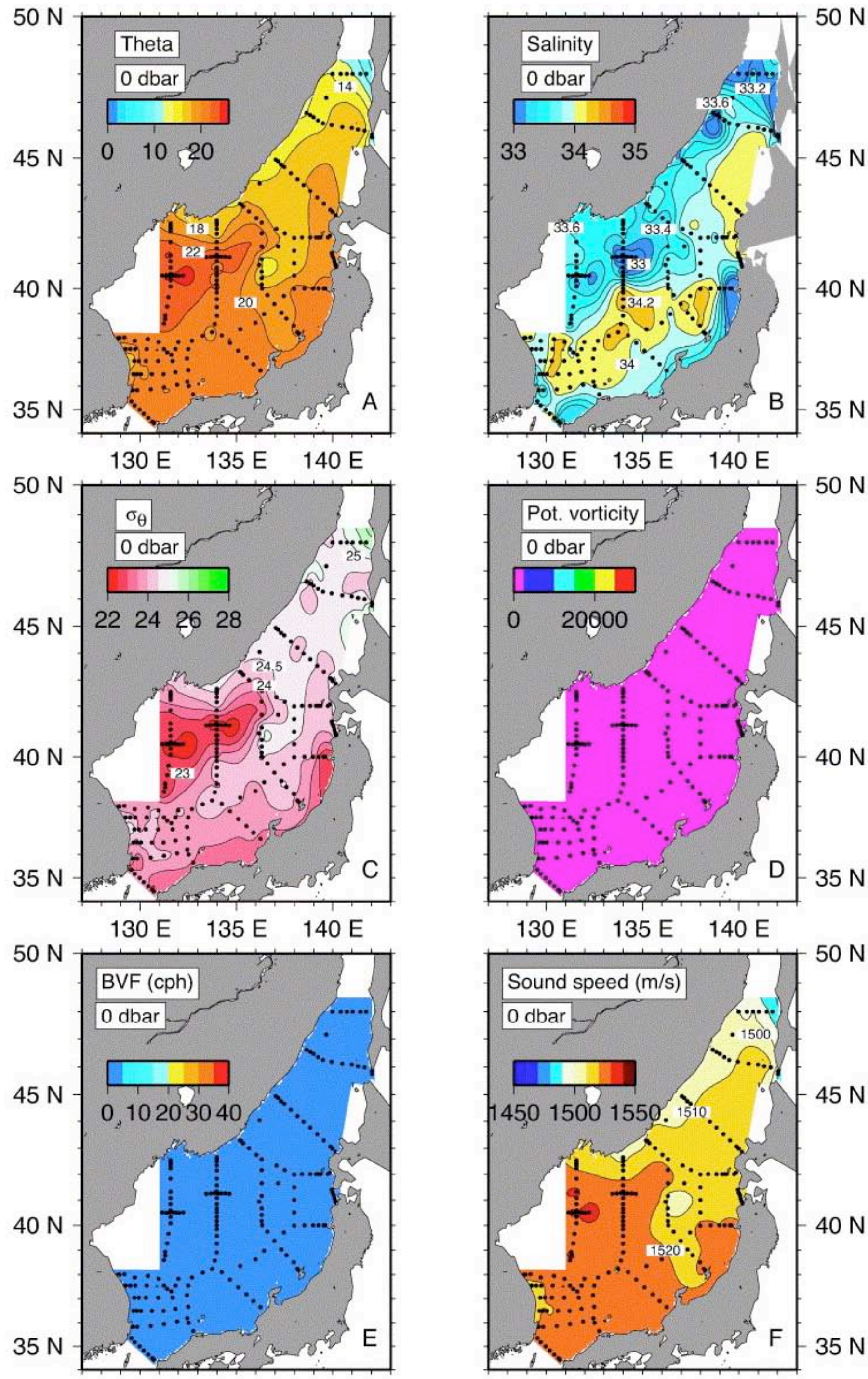
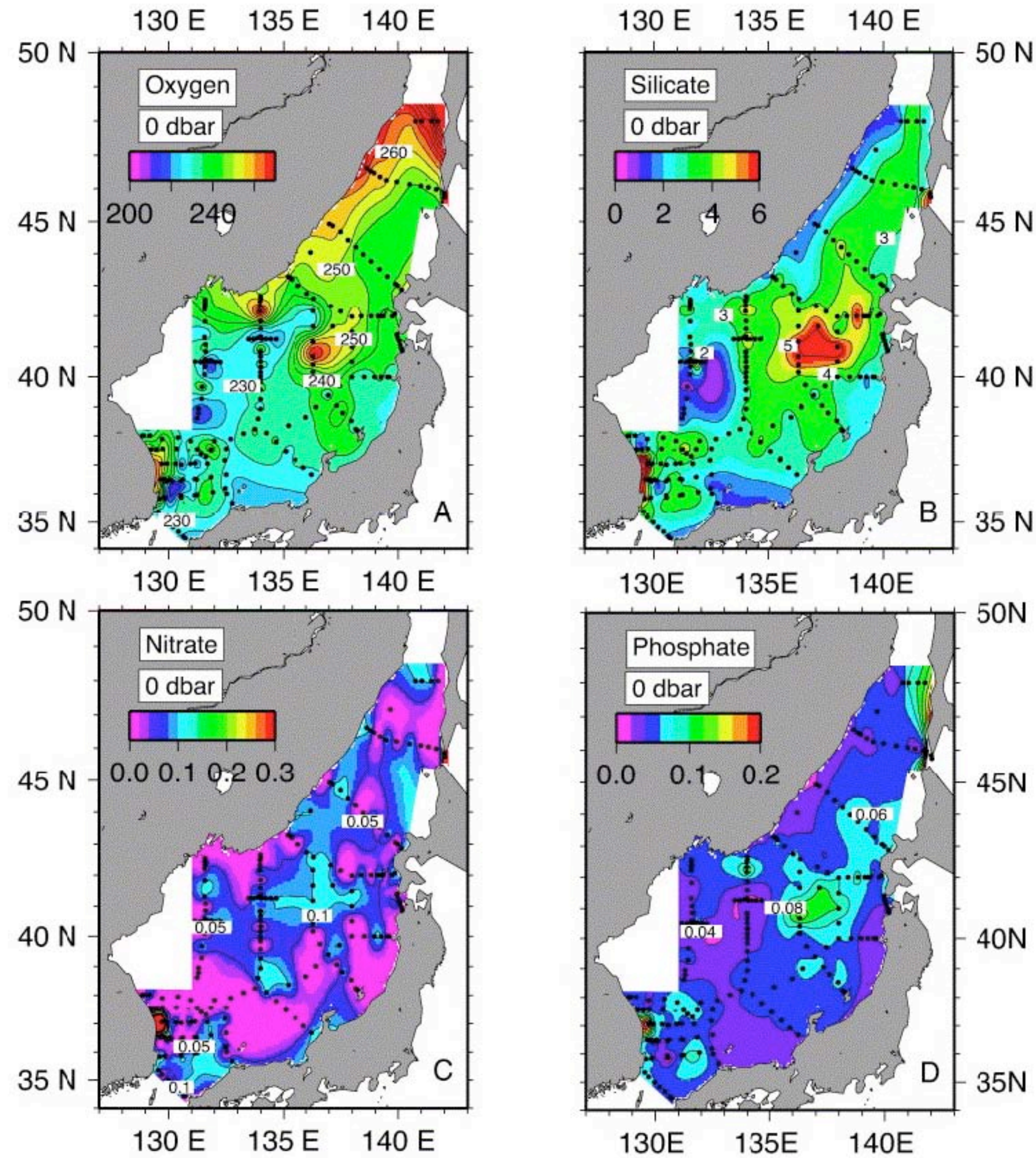


Figure D22. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at the sea surface.


Oxygen
0 dbar
200
240
260
250
250
230
240
230
A
Silicate
0 dbar
0
2
4
6
3
3
2
5
4
B
Nitrate
0 dbar
0.0
0.1
0.2
0.3
0.05
0.05
0.1
0.05
0.1
C
Phosphate
0 dbar
0.0
0.1
0.2
0.06
0.08
0.04
D
130 E
135 E
140 E
50 N
45 N
40 N
35 N

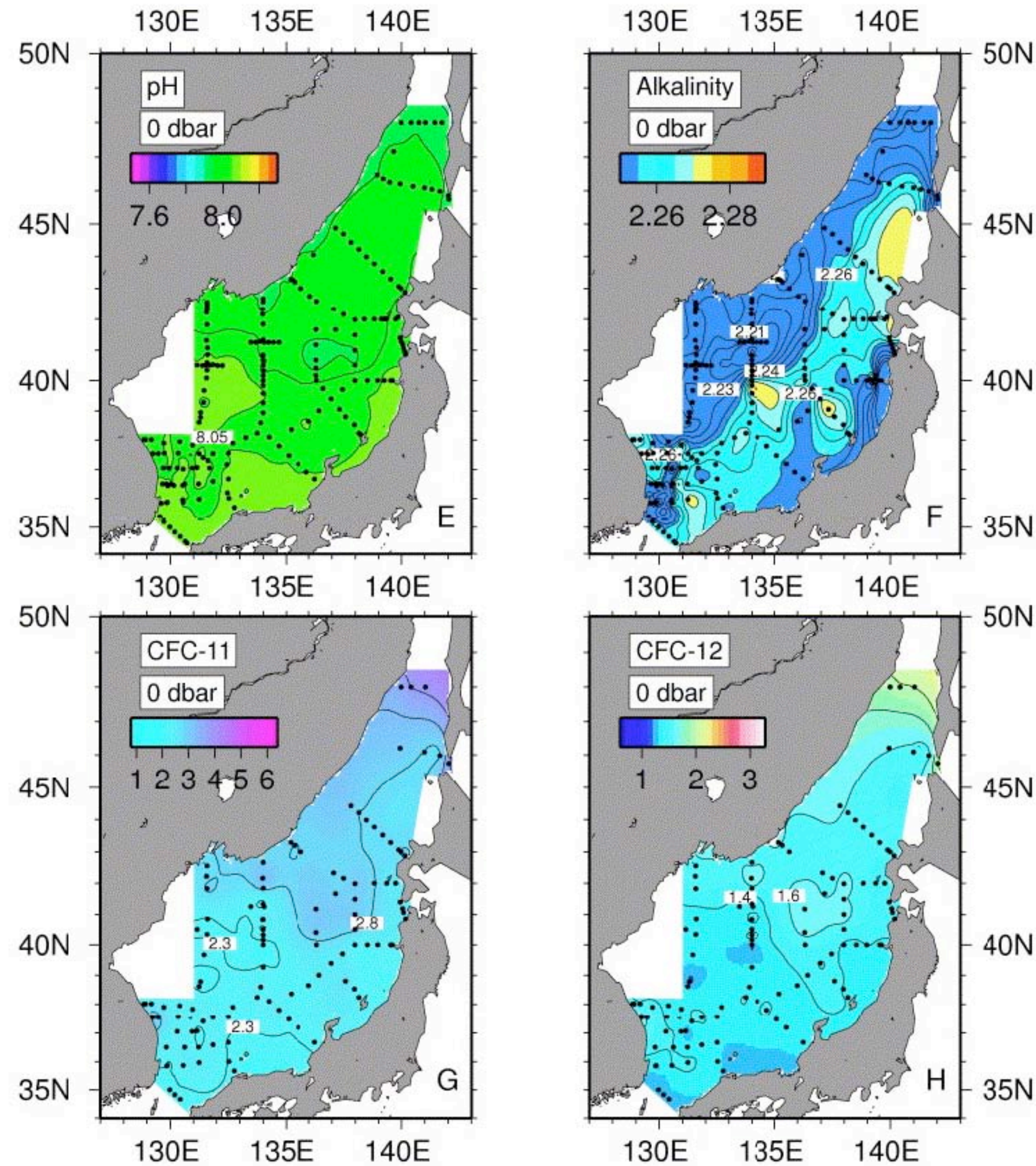


Figure D23. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at the sea surface.

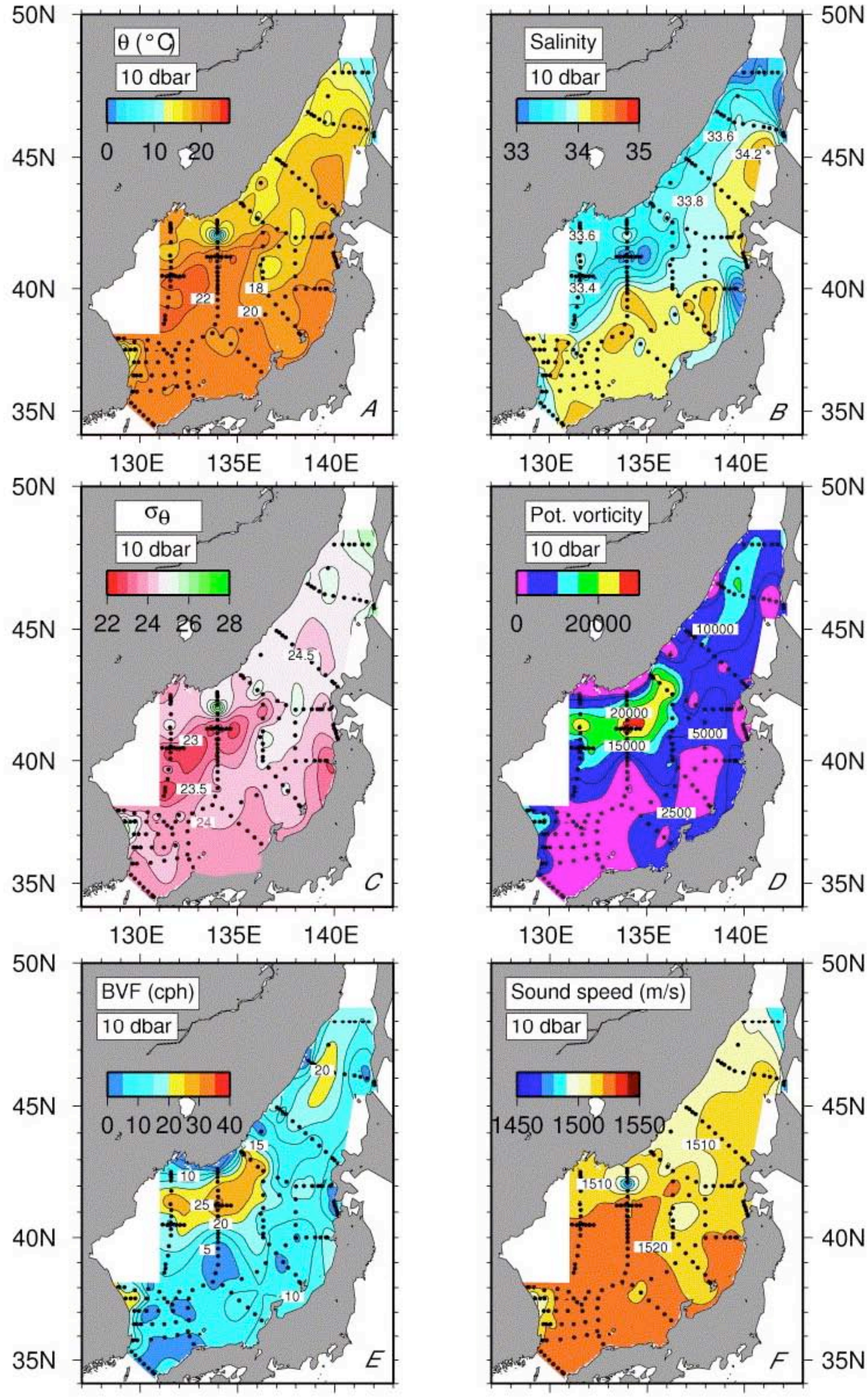
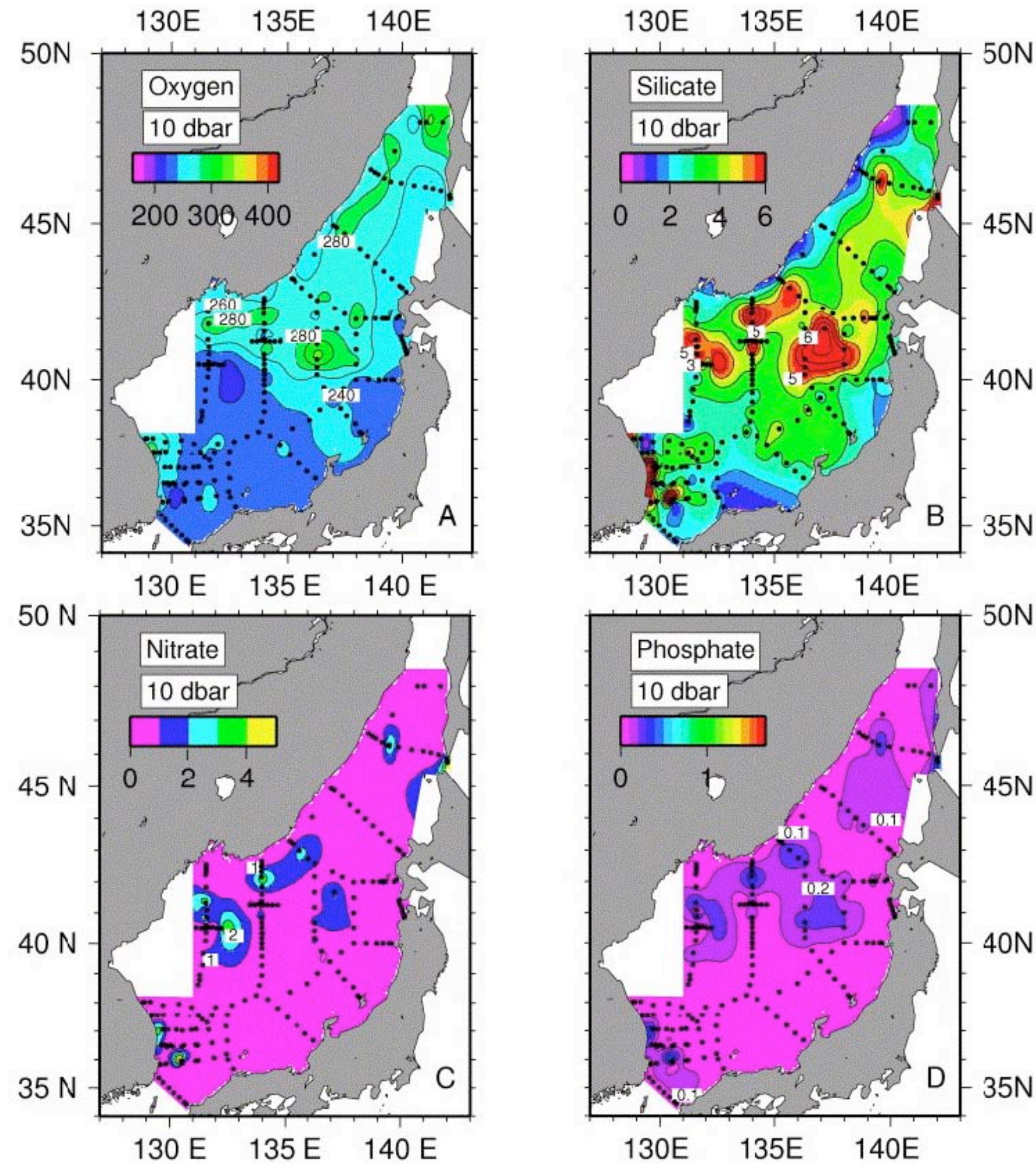


Figure D24. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 10 dbar.



Oxygen
10 dbar
200 300 400
280
260
280
280
240
A
Silicate
10 dbar
0 2 4 6
5
3
5
6
5
B
Nitrate
10 dbar
0 2 4
1
2
1
C
Phosphate
10 dbar
0 1
0.1
0.1
0.2
D
130E 135E 140E
50N 45N 40N 35N

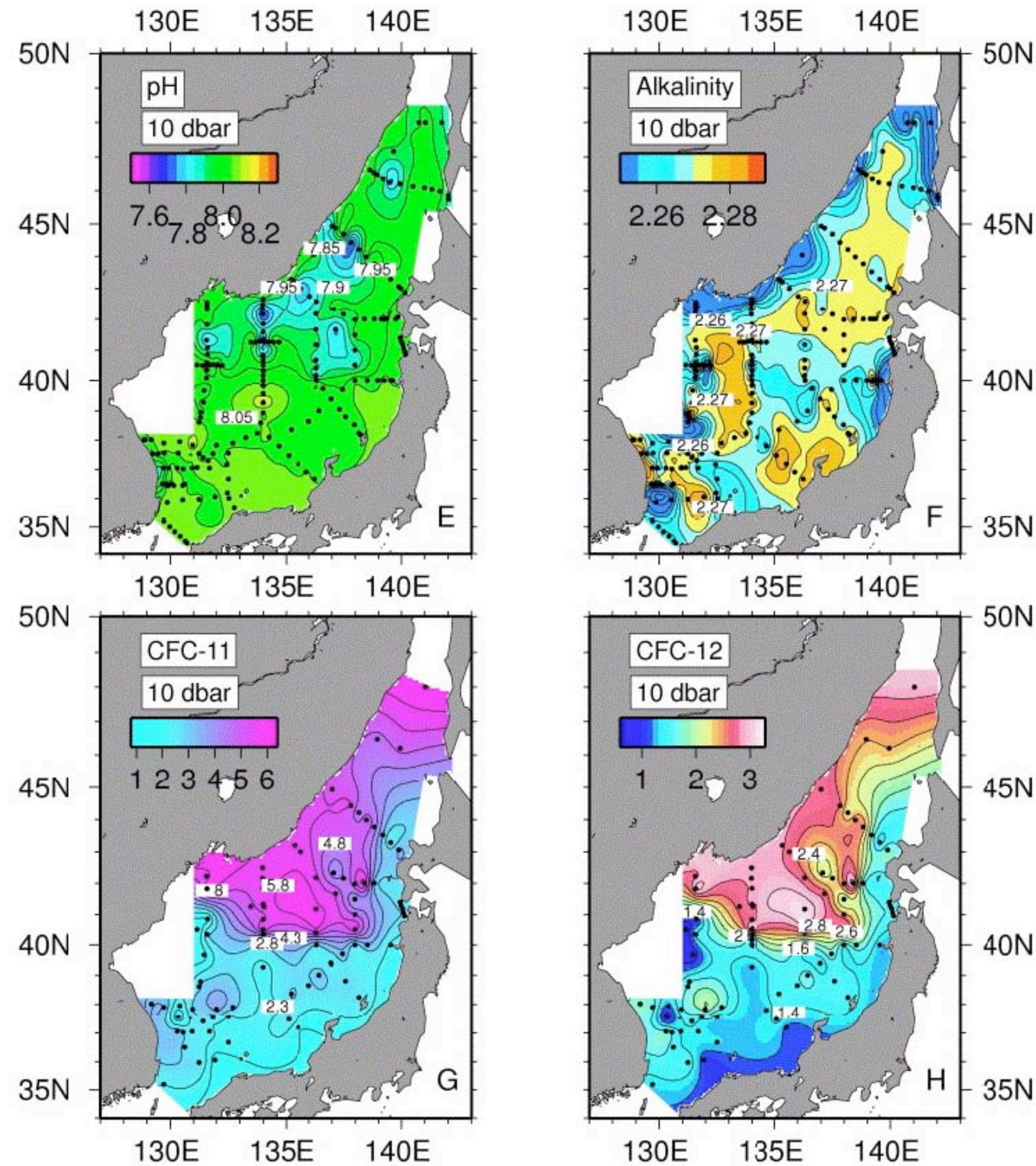


Figure D25. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 10 dbar.

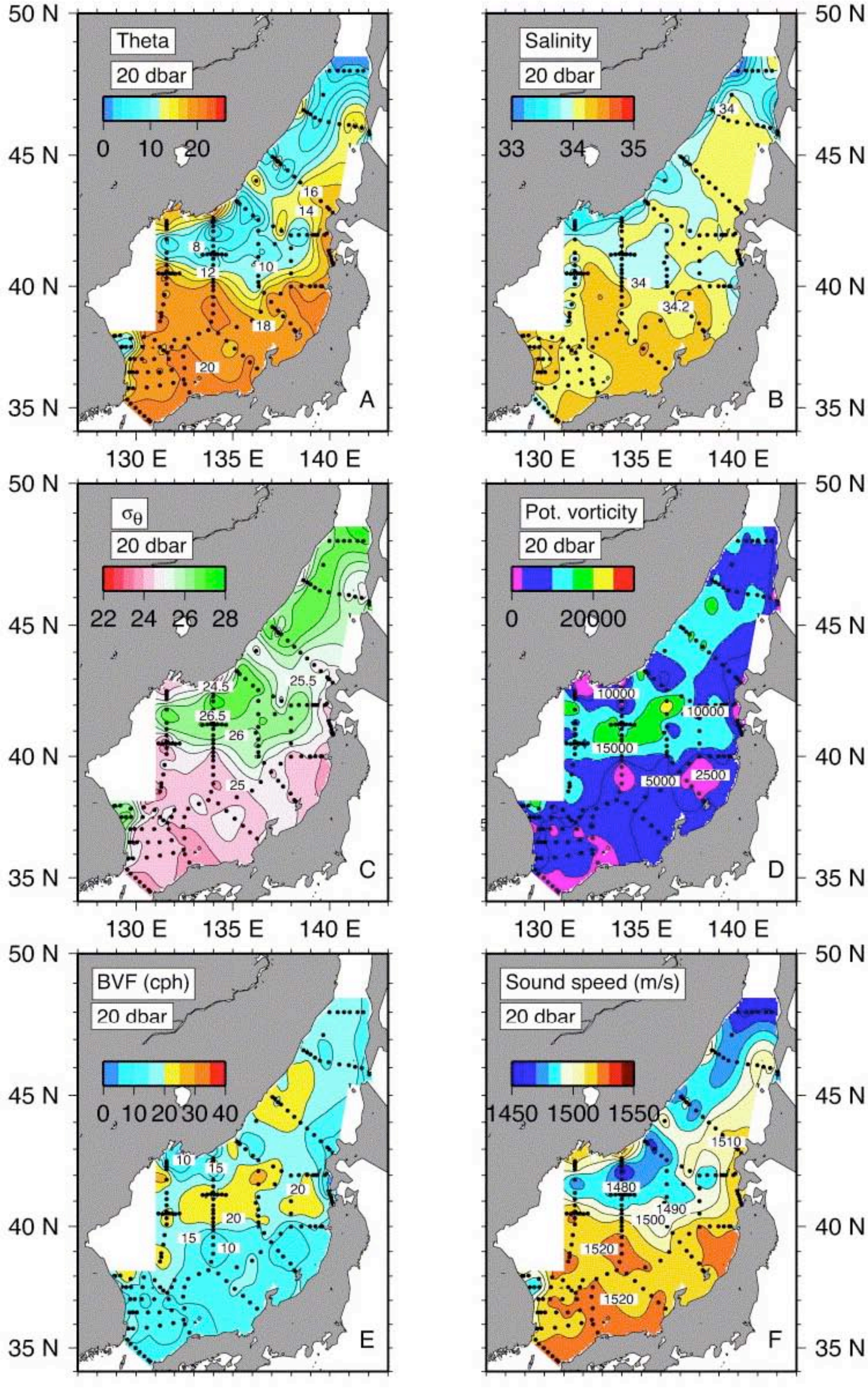
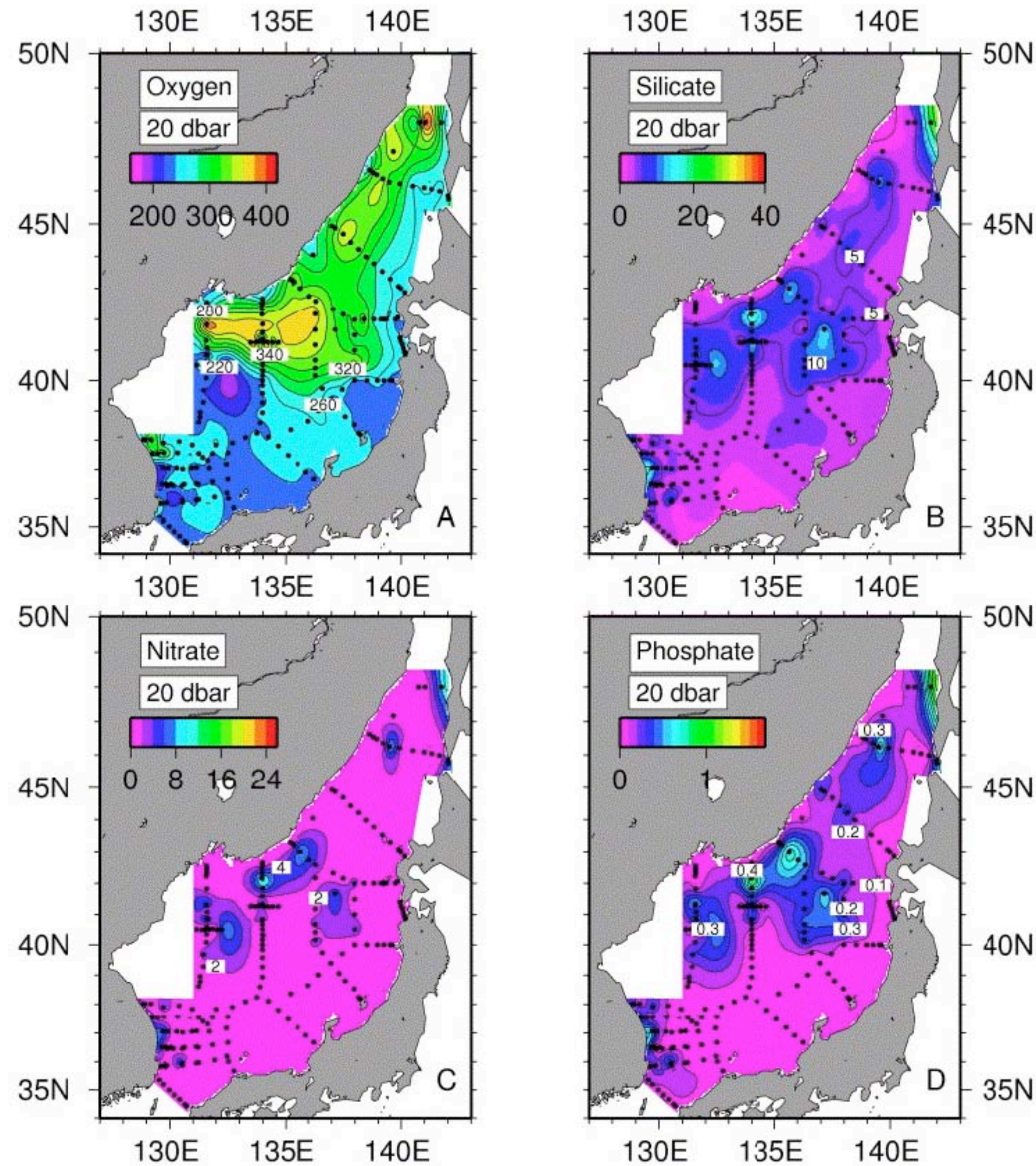


Figure D26. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 20 dbar.


Oxygen
20 dbar
200 300 400
A
Silicate
20 dbar
0 20 40
B
Nitrate
20 dbar
0 8 16 24
C
Phosphate
20 dbar
0 1
D
130E
135E
140E
50N
45N
40N
35N

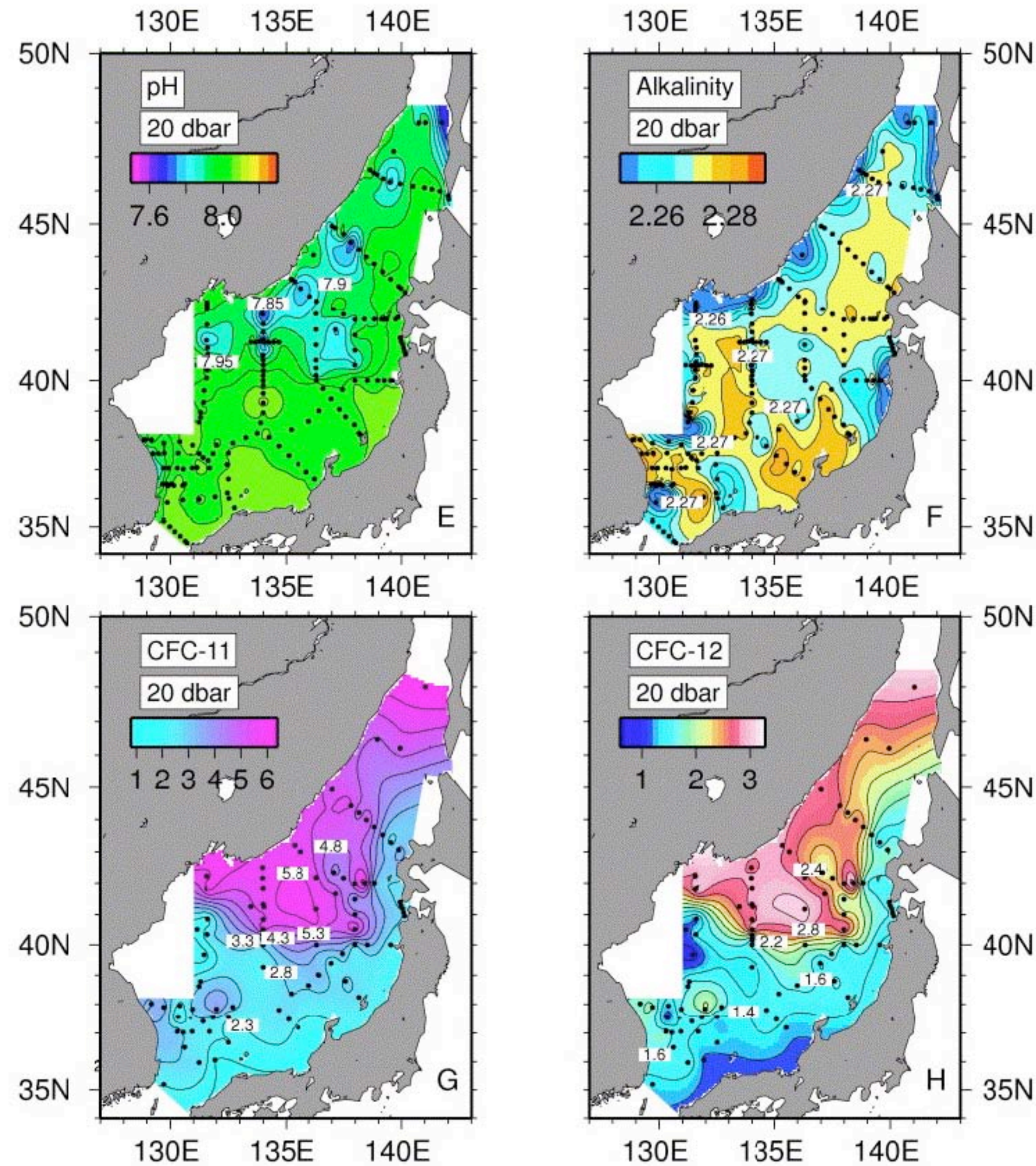


Figure D27. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 20 dbar.

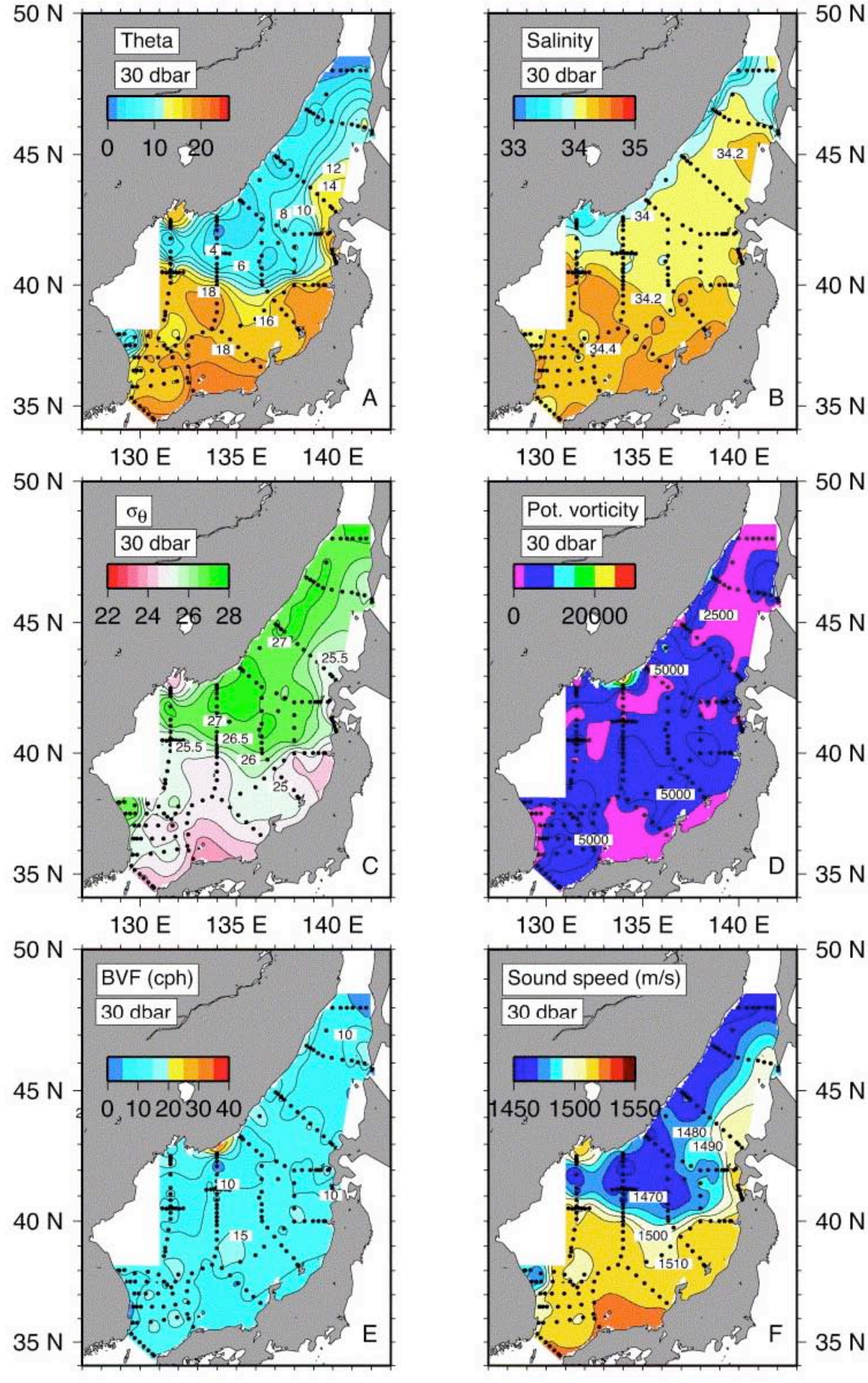
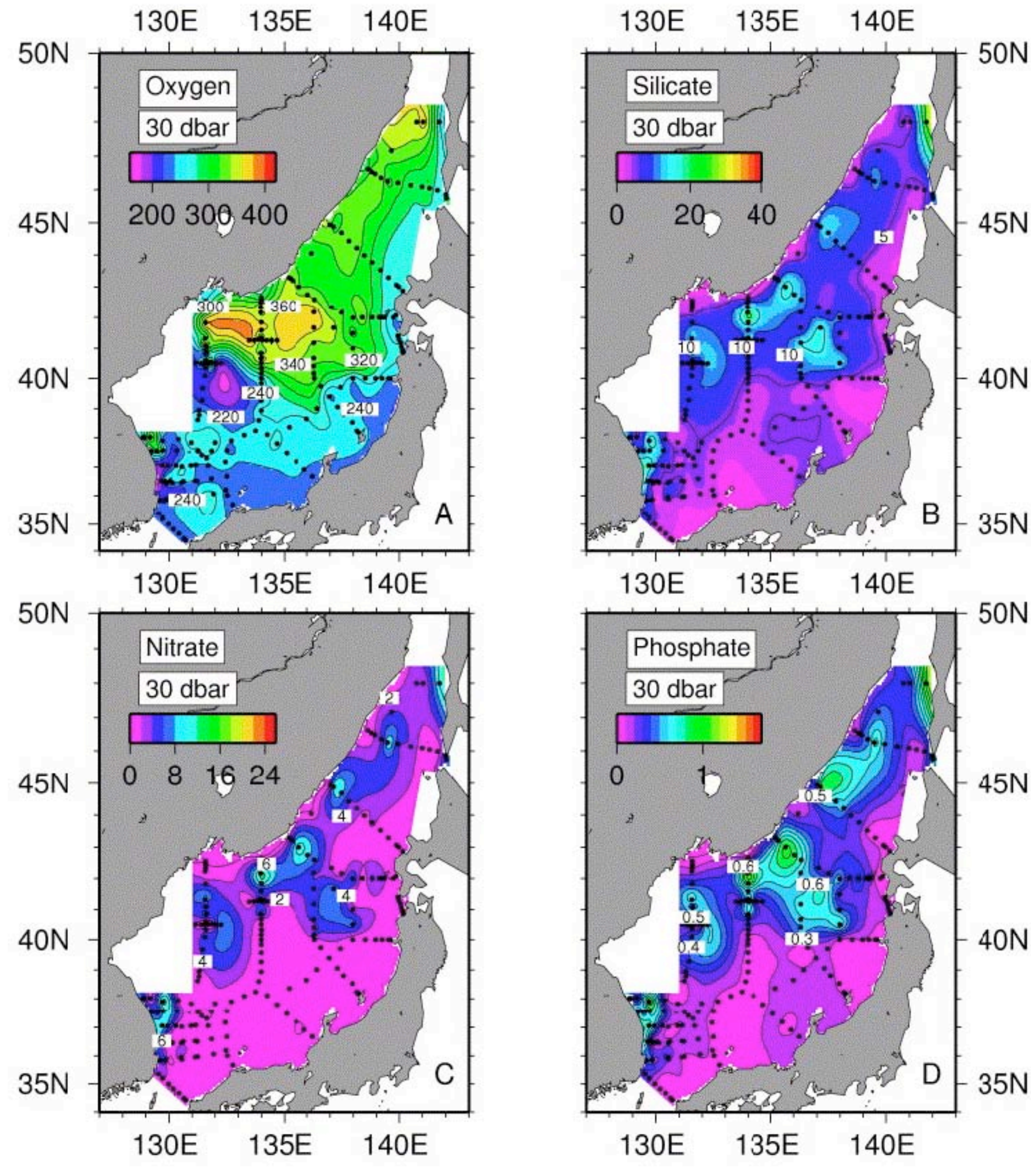


Figure D28. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 30 dbar.


Oxygen
30 dbar
200 300 400
300
360
340
320
240
220
240
240
A
Silicate
30 dbar
0 20 40
5
10
10
10
B
Nitrate
30 dbar
0 8 16 24
2
4
6
2
4
4
6
C
Phosphate
30 dbar
0 1
0.5
0.6
0.6
0.5
0.4
0.3
D
130E 135E 140E
50N 45N 40N 35N

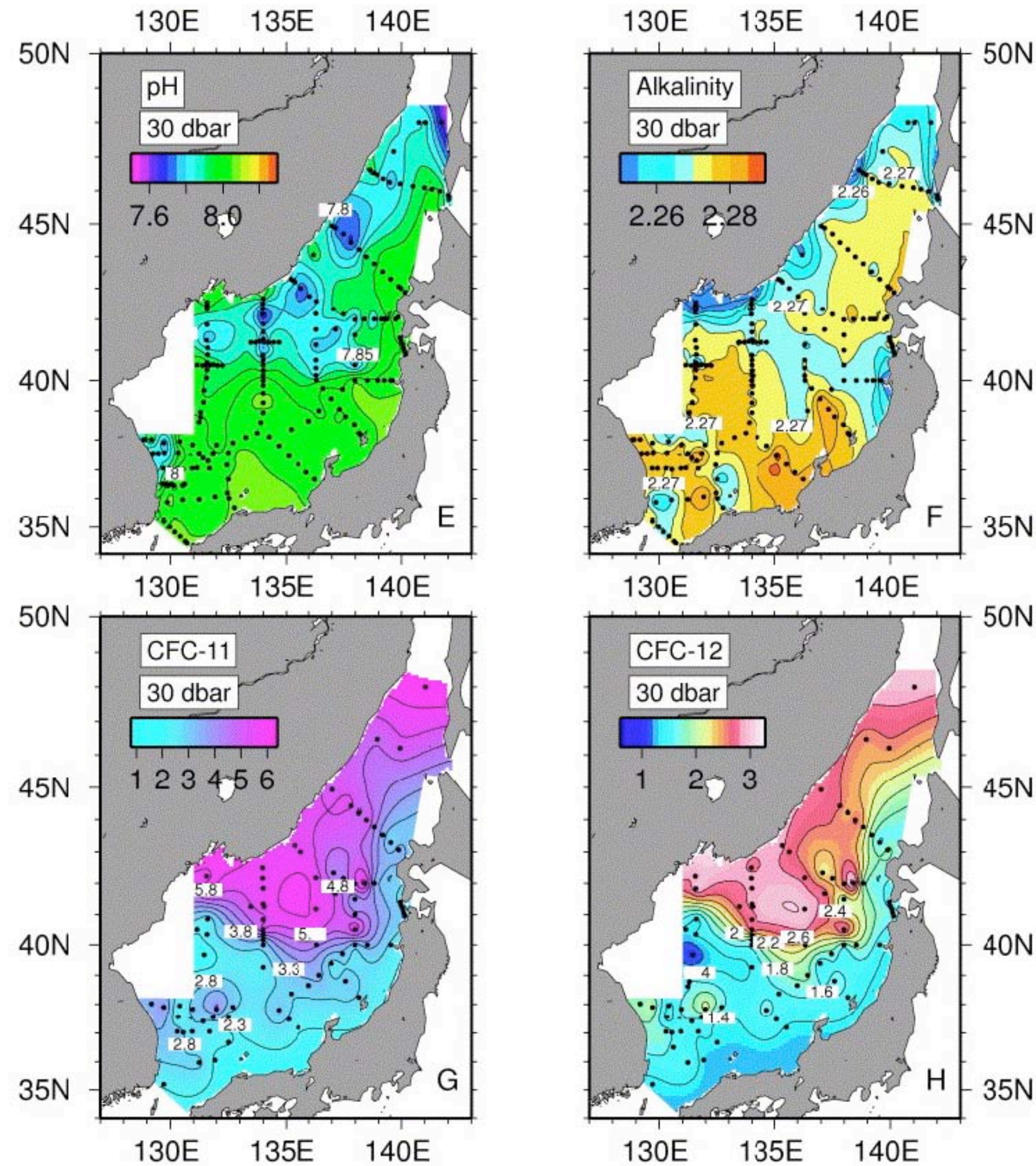


Figure D29. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 30 dbar.

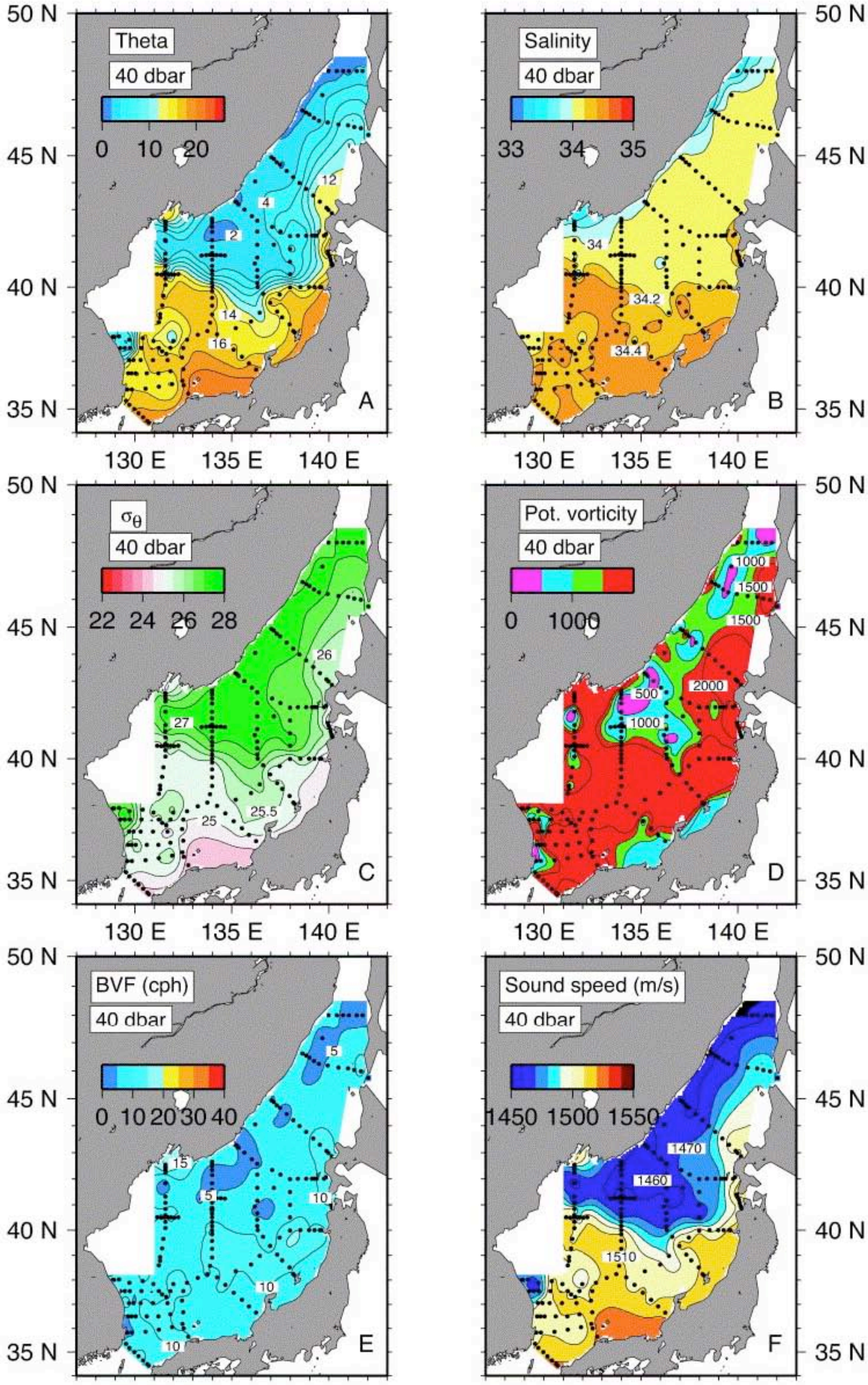
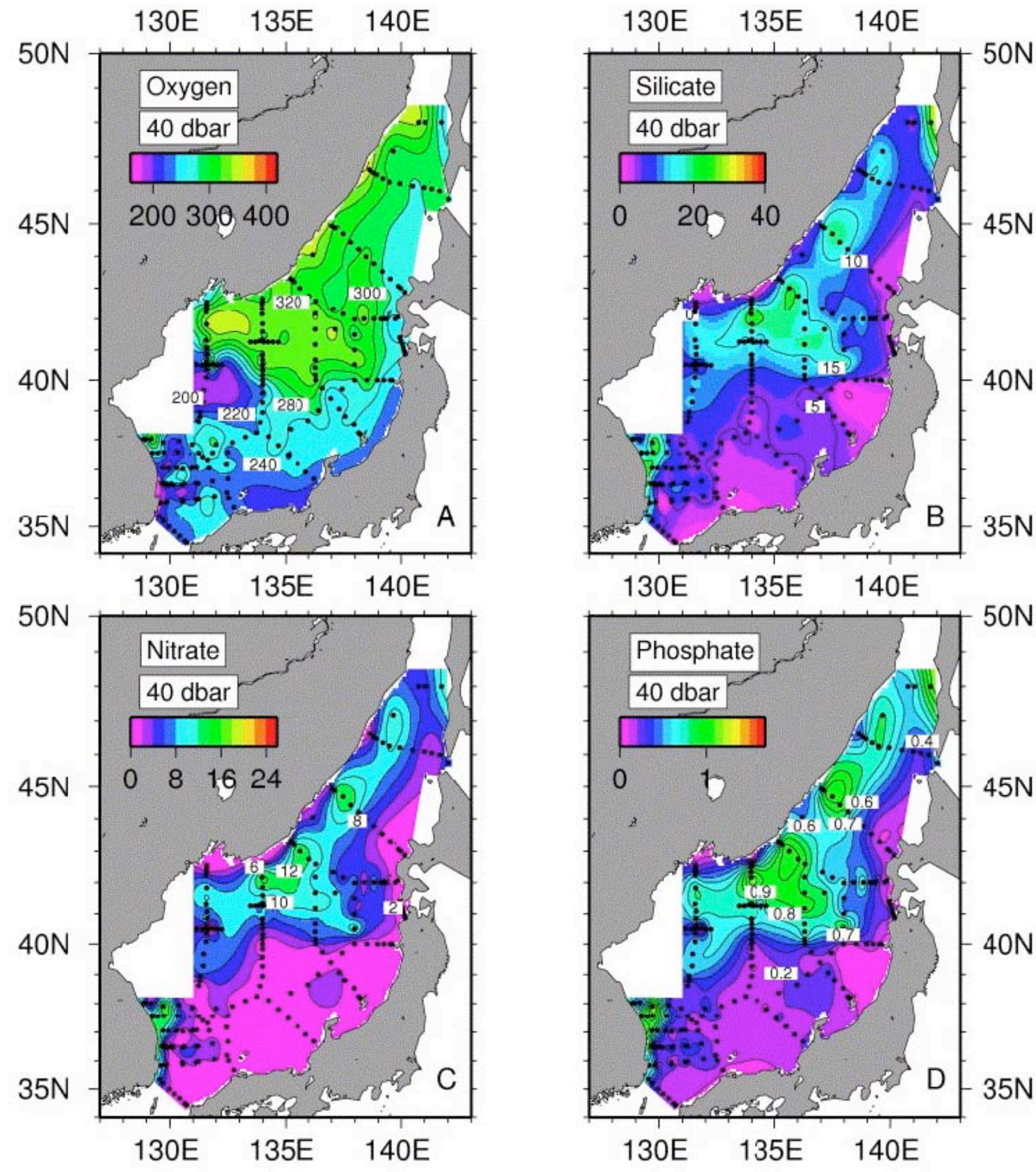


Figure D30. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 40 dbar.


Oxygen
40 dbar
200 300 400
320
300
200
220
280
240
A
Silicate
40 dbar
0 20 40
10
15
5
B
Nitrate
40 dbar
0 8 16 24
8
6
12
10
2
C
Phosphate
40 dbar
0 1
0.4
0.6
0.6
0.7
0.9
0.8
0.7
0.2
D
130E 135E 140E
50N
45N
40N
35N

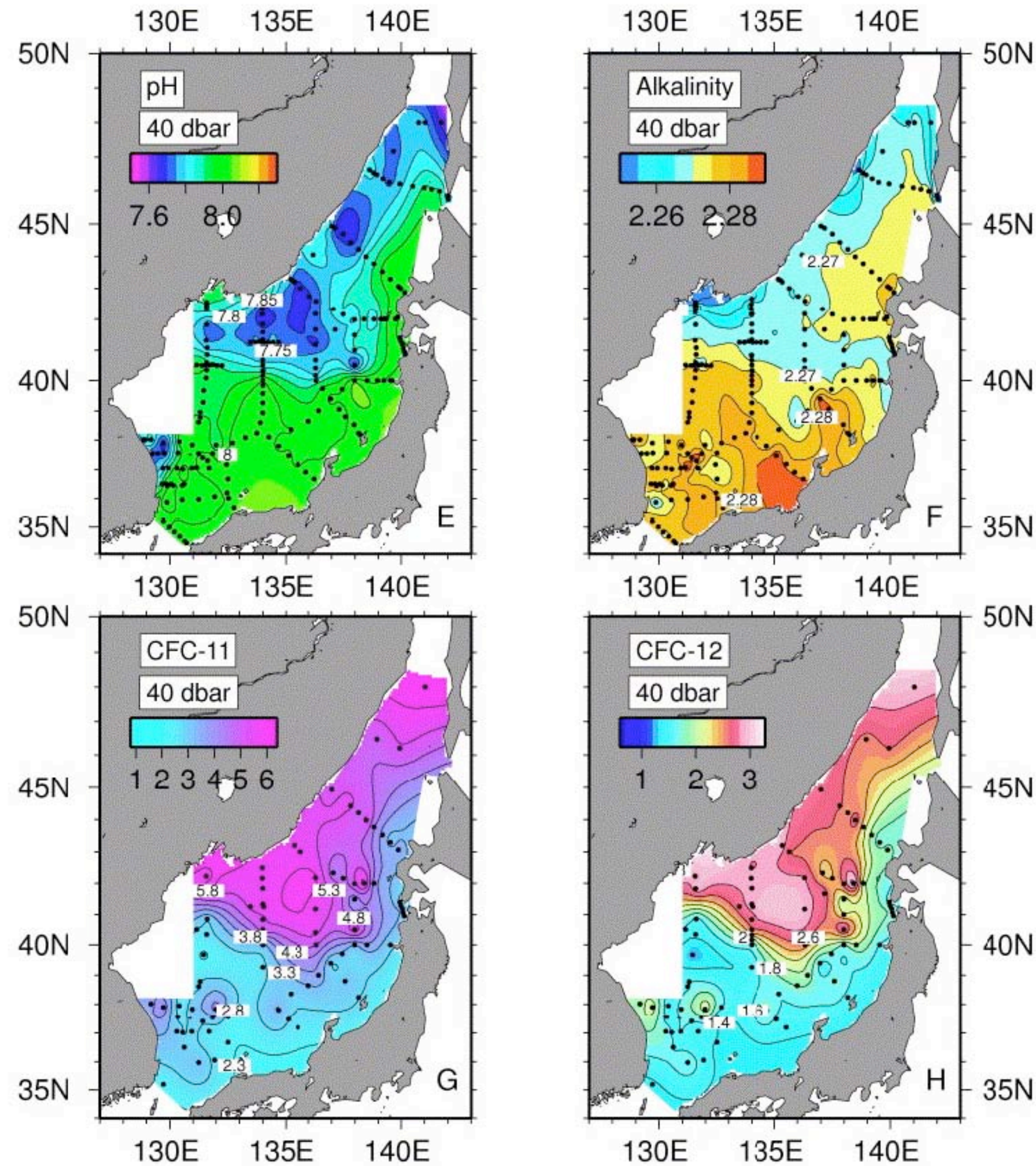


Figure D31. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 40 dbar.

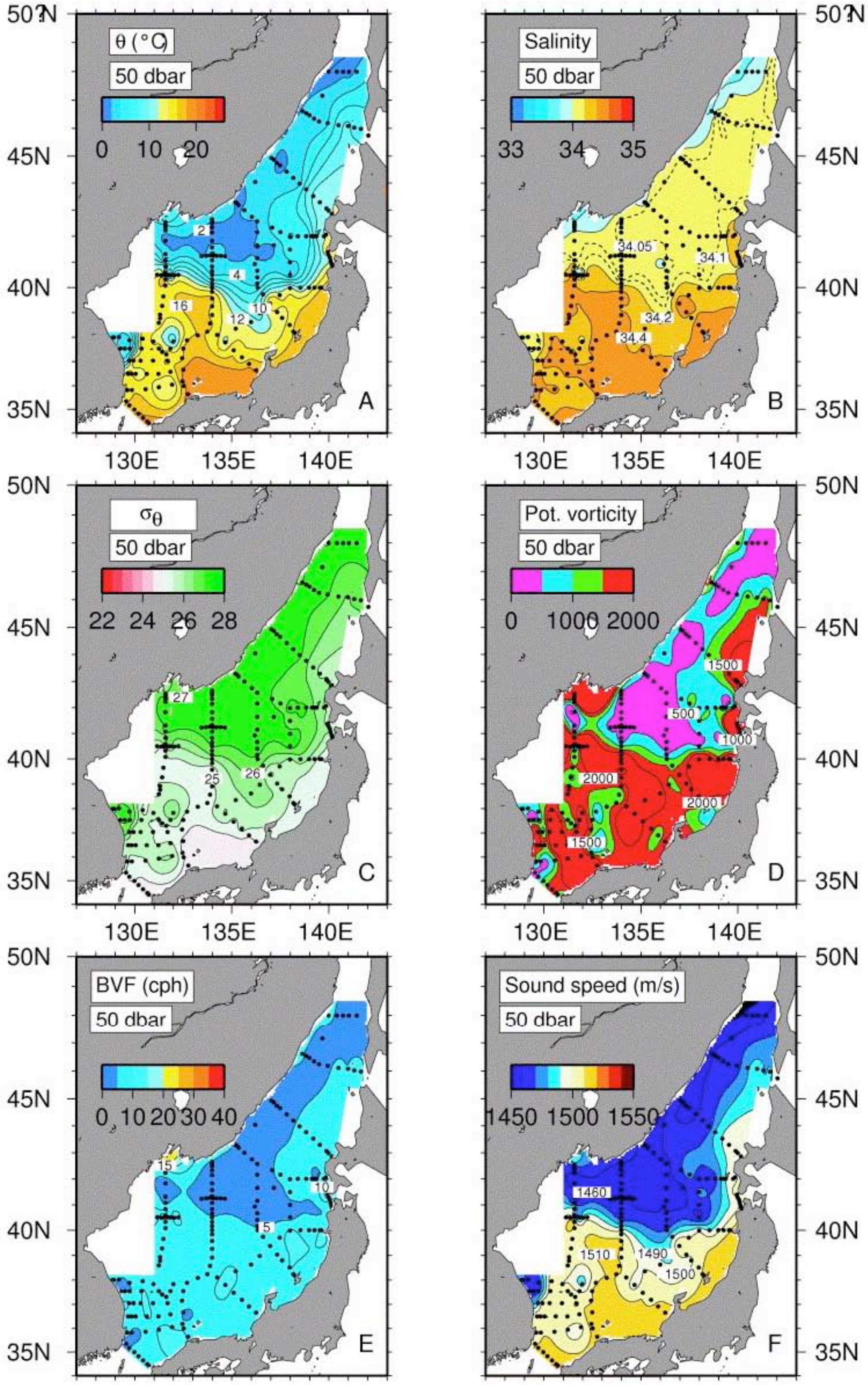
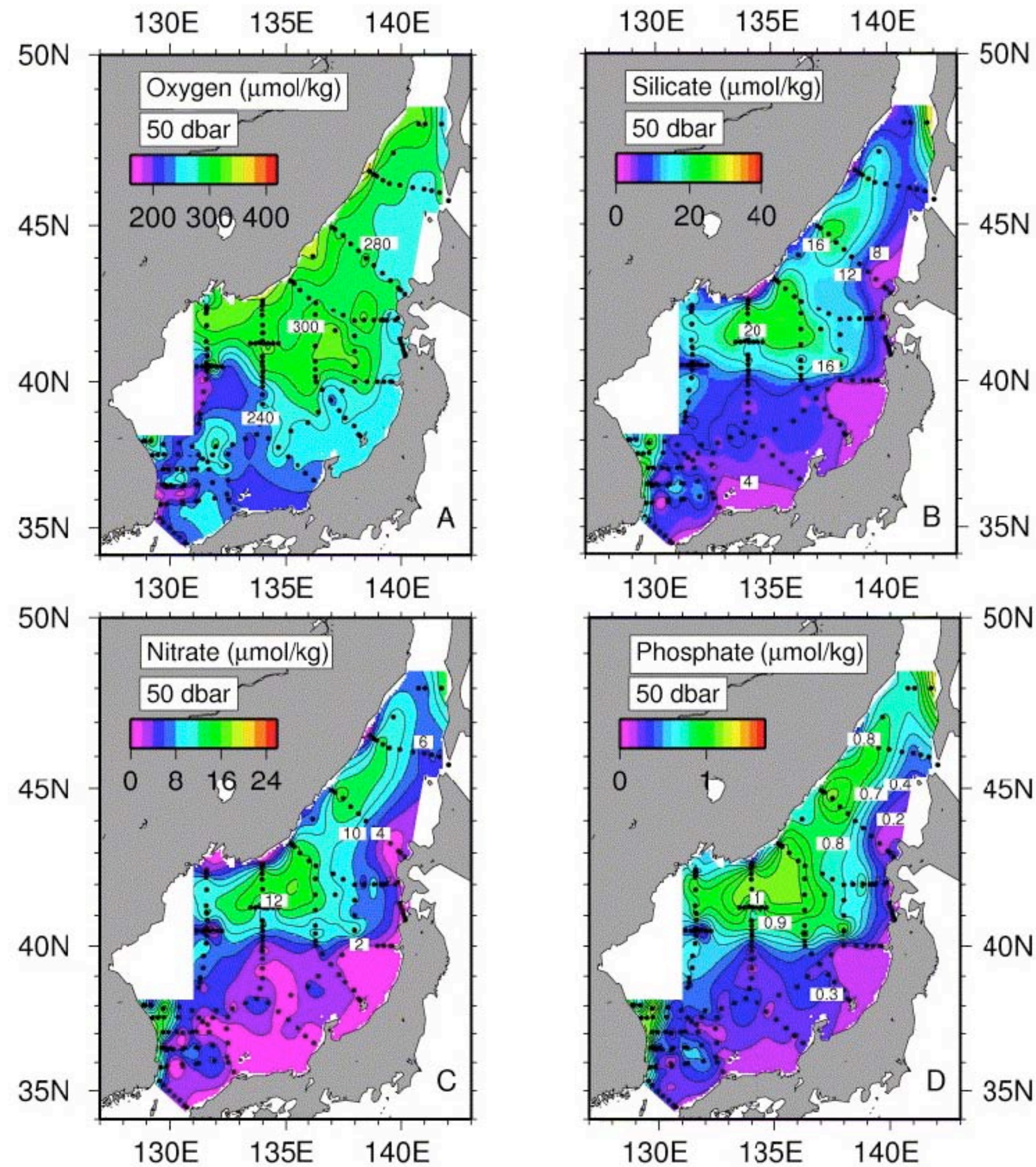


Figure D32. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 50 dbar.


Oxygen (μmol/kg)
50 dbar
200 300 400
280
300
240
A
Silicate (μmol/kg)
50 dbar
0 20 40
16
8
12
20
16
4
B
Nitrate (μmol/kg)
50 dbar
0 8 16 24
6
10 4
12
2
C
Phosphate (μmol/kg)
50 dbar
0 1
0.8
0.7 0.4
0.2
0.8
1
0.9
0.3
D
130E 135E 140E
50N
45N
40N
35N

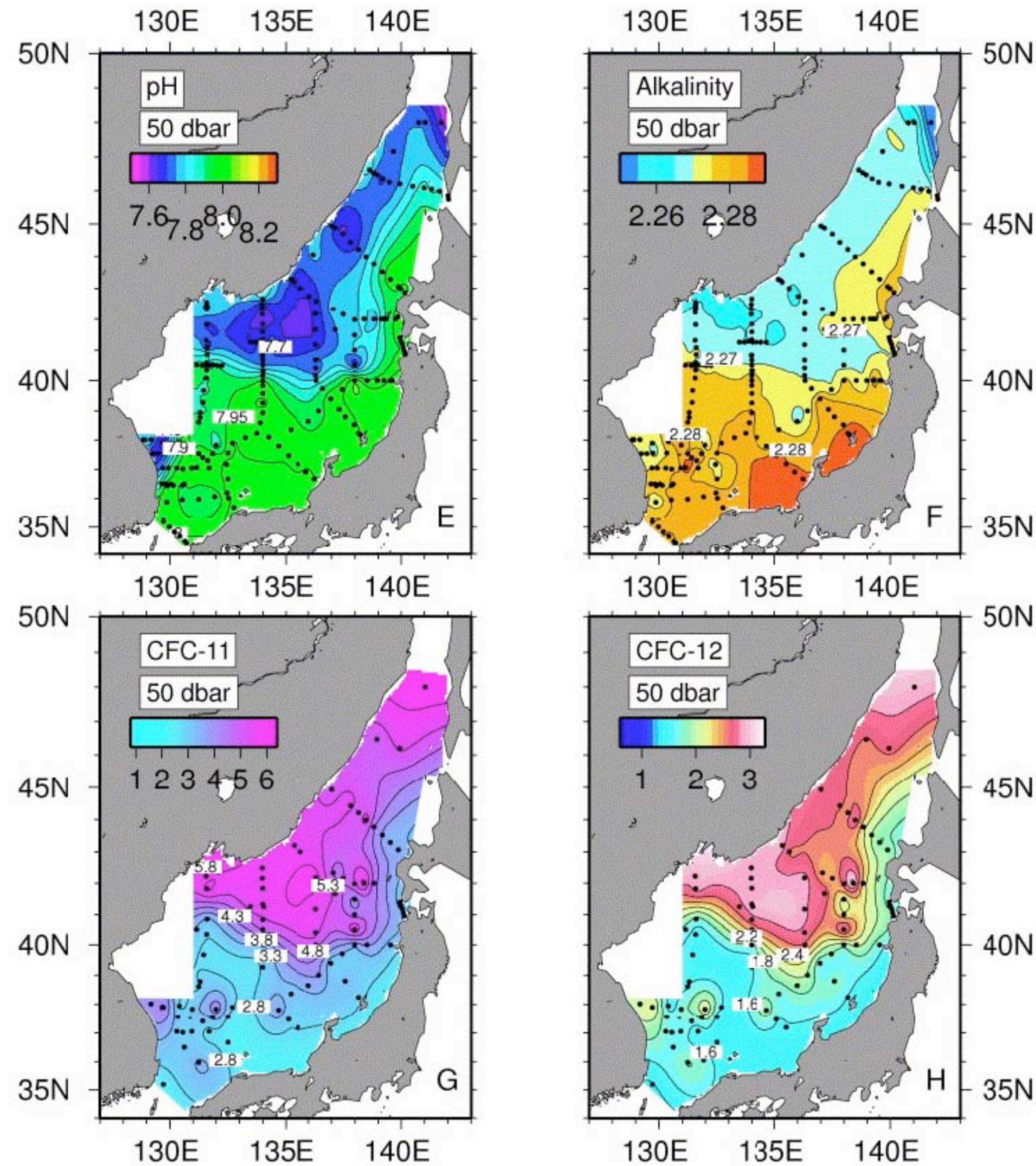


Figure D33. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 50 dbar.

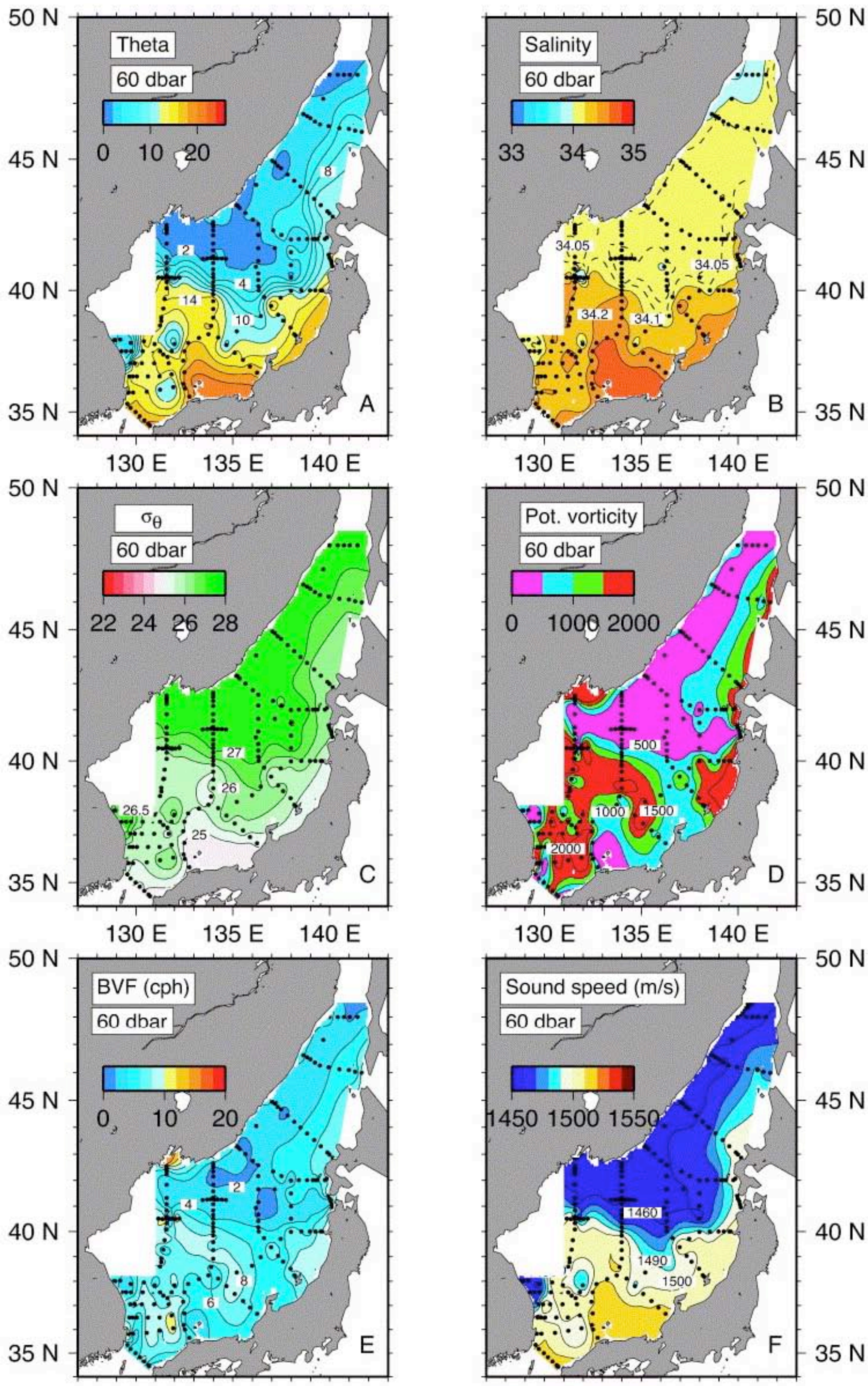
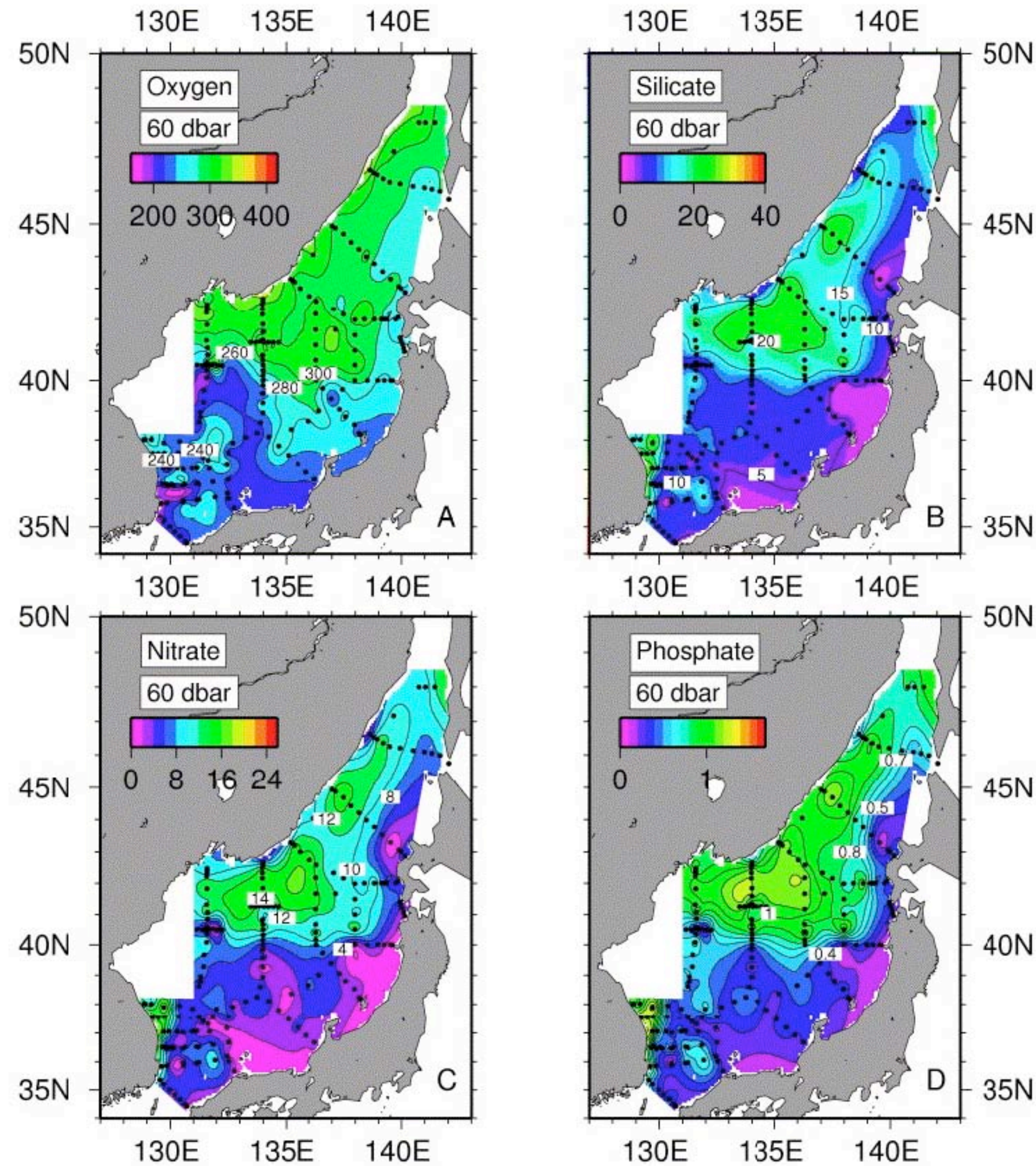


Figure D34. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 60 dbar.



Oxygen
60 dbar
200 300 400
260
300
280
240
240
A
Silicate
60 dbar
0 20 40
15
10
20
5
10
B
Nitrate
60 dbar
0 8 16 24
8
12
10
14
12
4
C
Phosphate
60 dbar
0 1
0.7
0.5
0.8
1
0.4
D
130E 135E 140E
50N 45N 40N 35N

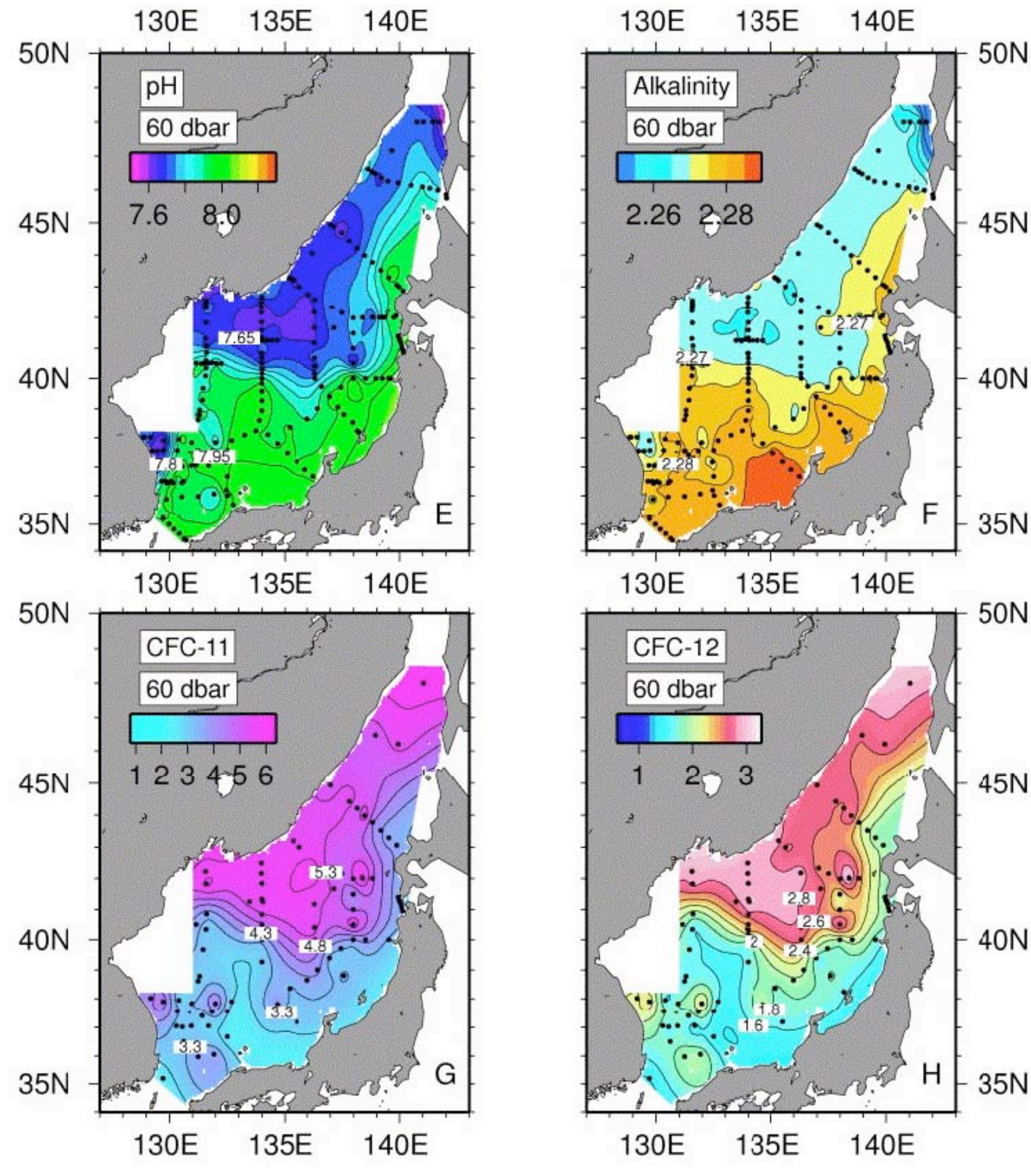


Figure D35. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 60 dbar.

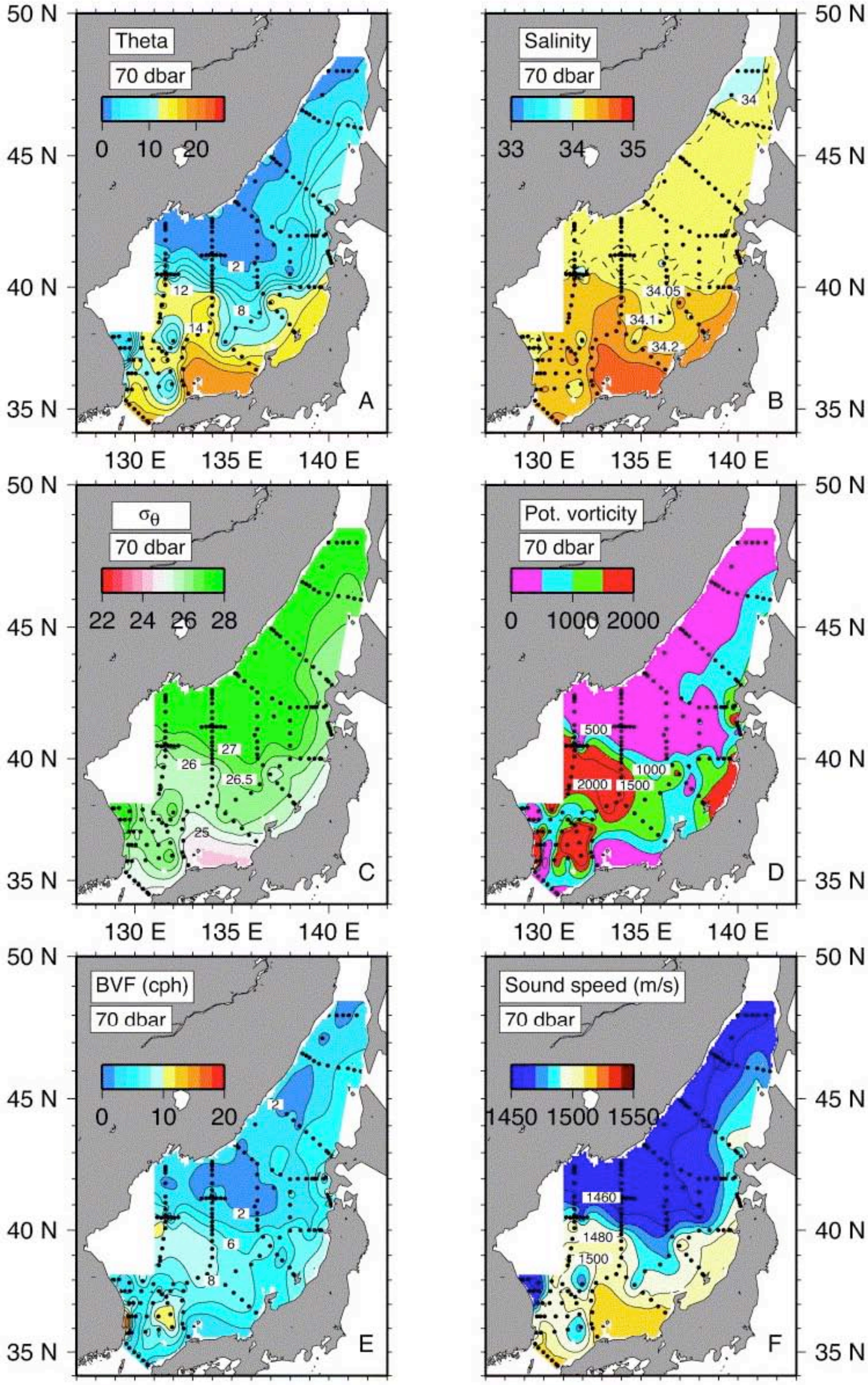
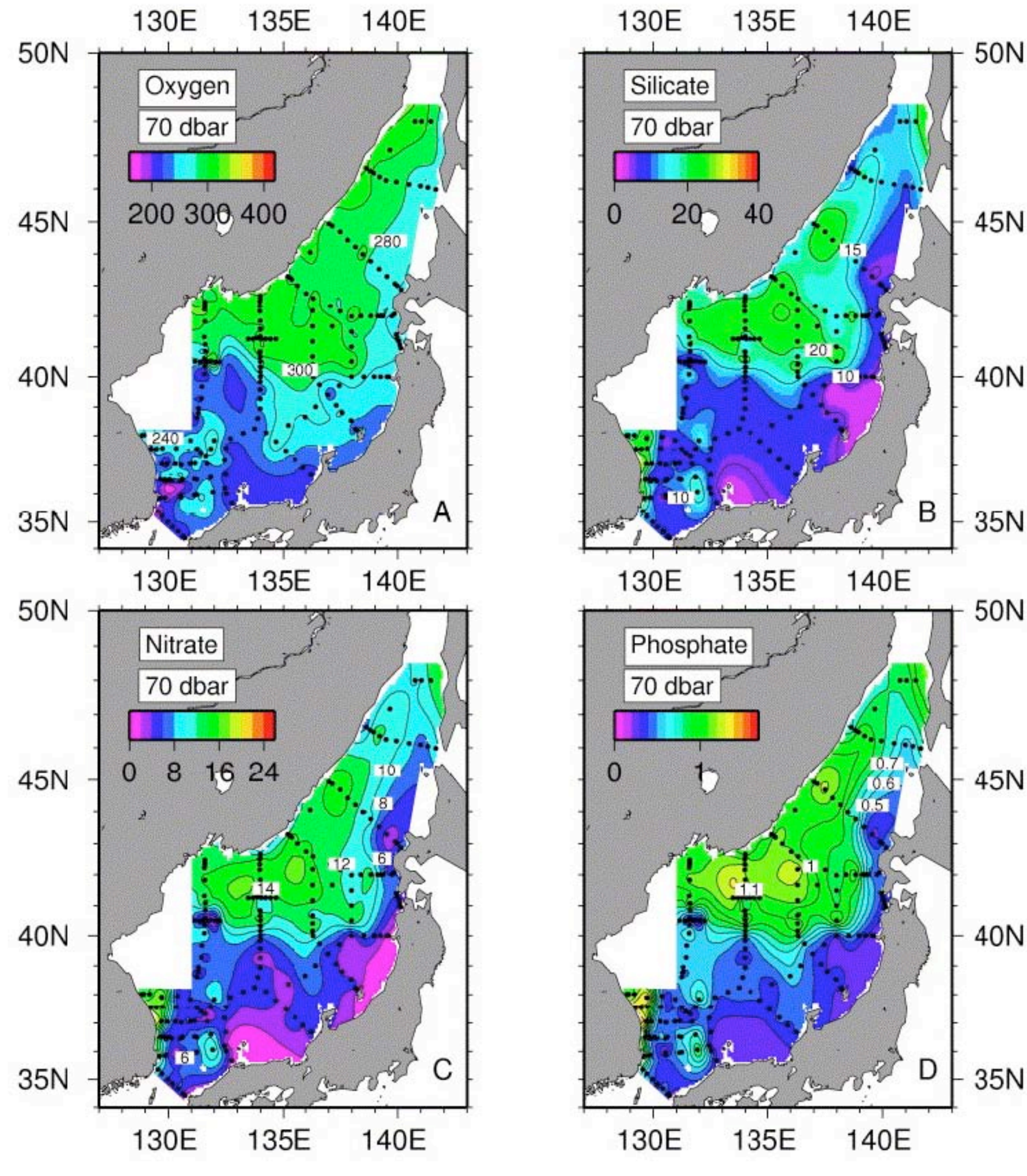


Figure D36. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 70 dbar.


Oxygen
70 dbar
200 300 400
280
300
240
A
Silicate
70 dbar
0 20 40
15
20
10
10
B
Nitrate
70 dbar
0 8 16 24
10
8
12
6
14
6
C
Phosphate
70 dbar
0 1
0.7
0.6
0.5
1
1.1
D
130E 135E 140E
50N 45N 40N 35N

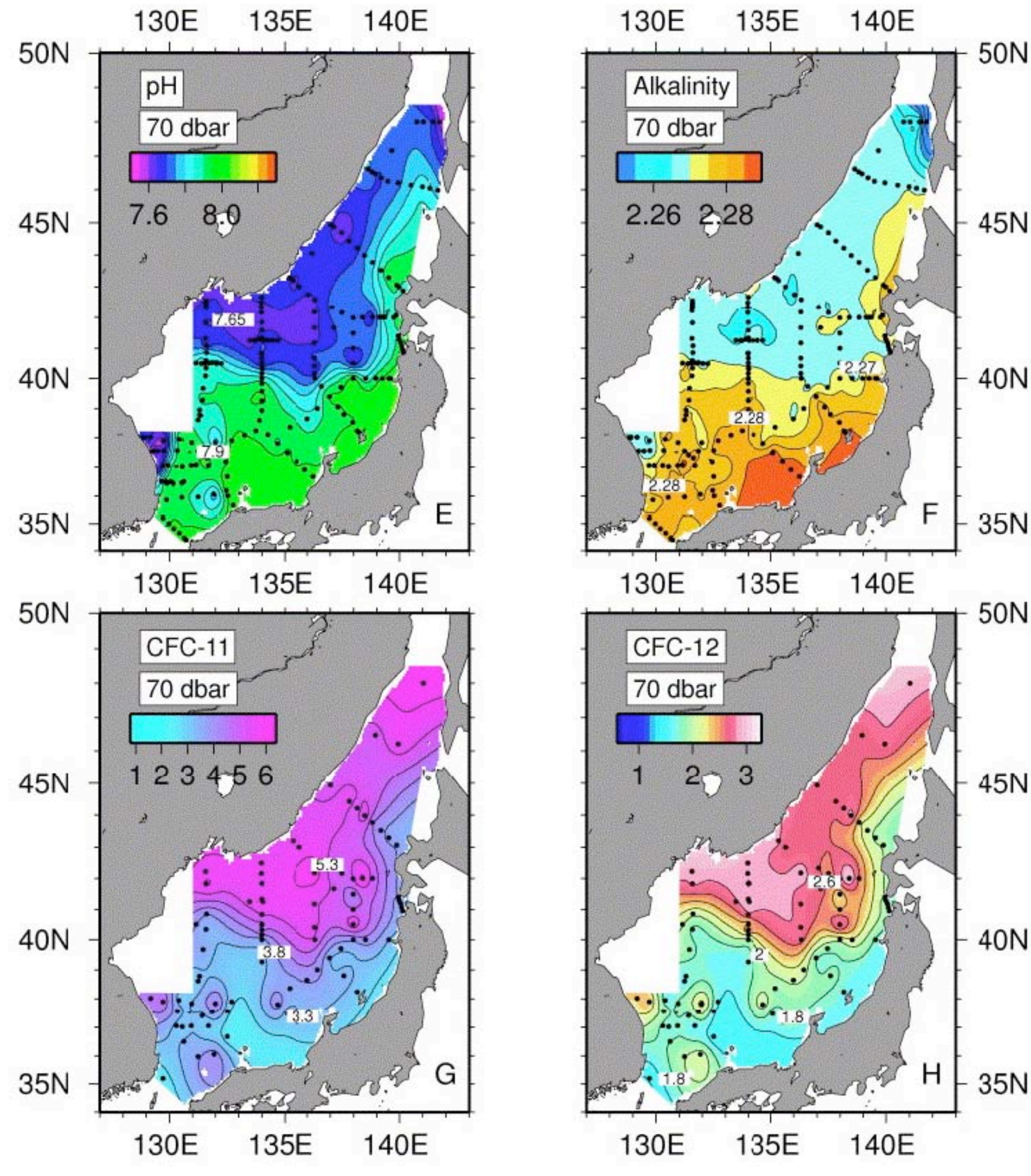


Figure D37. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 70 dbar.

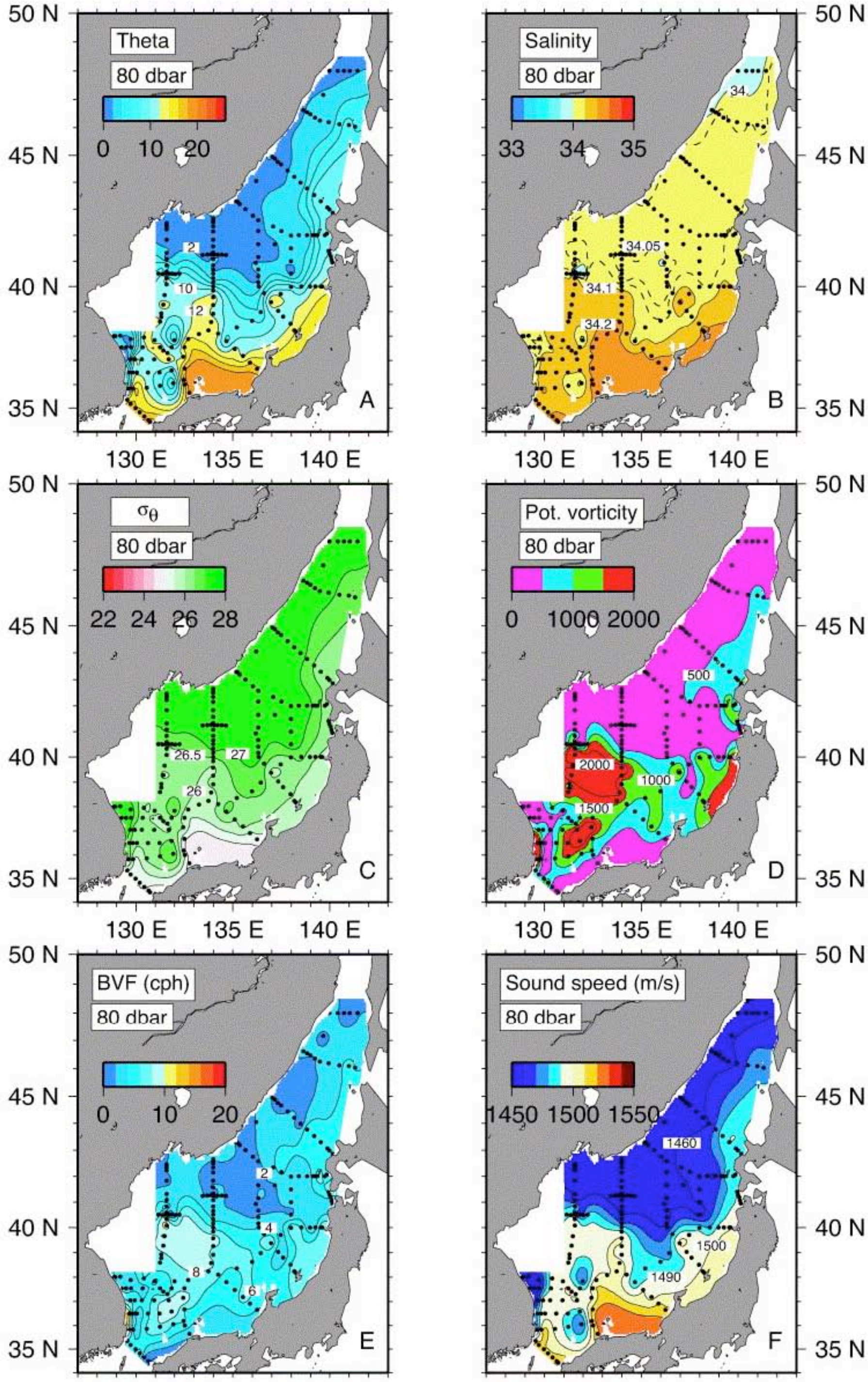


Figure D38. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 80 dbar.

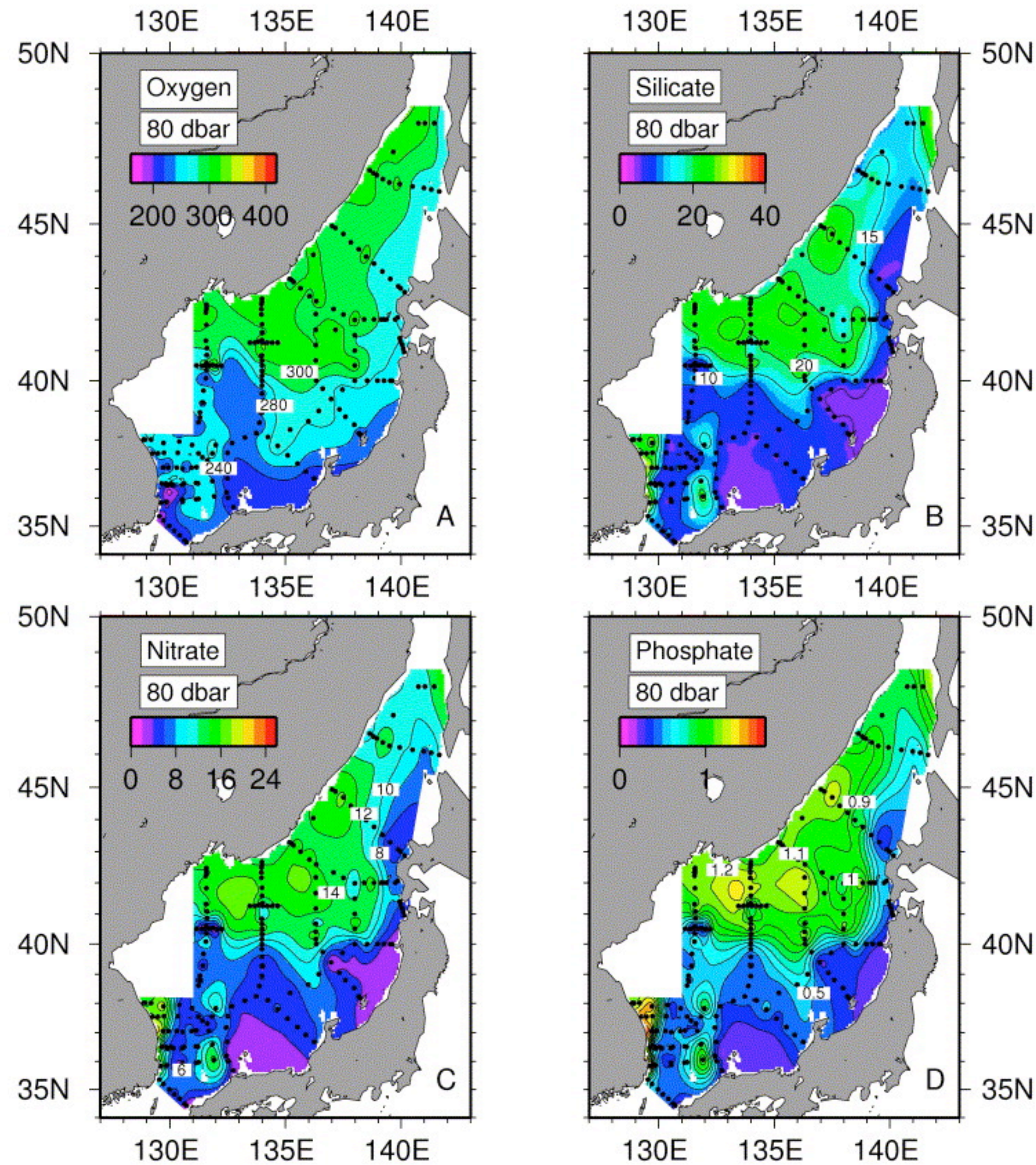
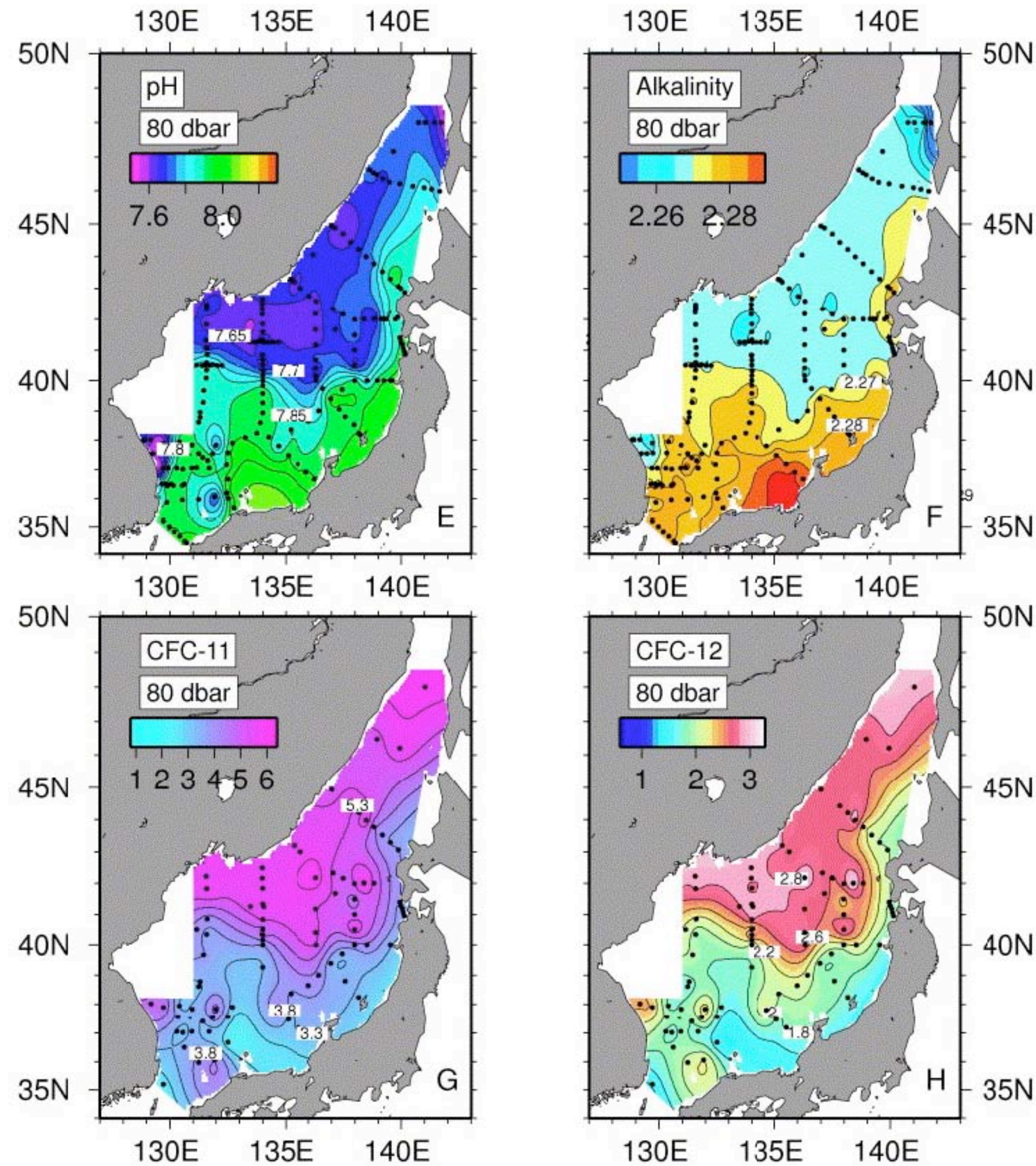


Figure D39. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 80 dbar.


pH
80 dbar
7.6
8.0
7.65
7.7
7.85
7.8
E
Alkalinity
80 dbar
2.26
2.28
2.27
2.28
F
CFC-11
80 dbar
1 2 3 4 5 6
5.3
3.8
3.3
3.8
G
CFC-12
80 dbar
1
2
3
2.8
2.6
2.2
2
1.8
H
130E 135E 140E
50N 45N 40N 35N

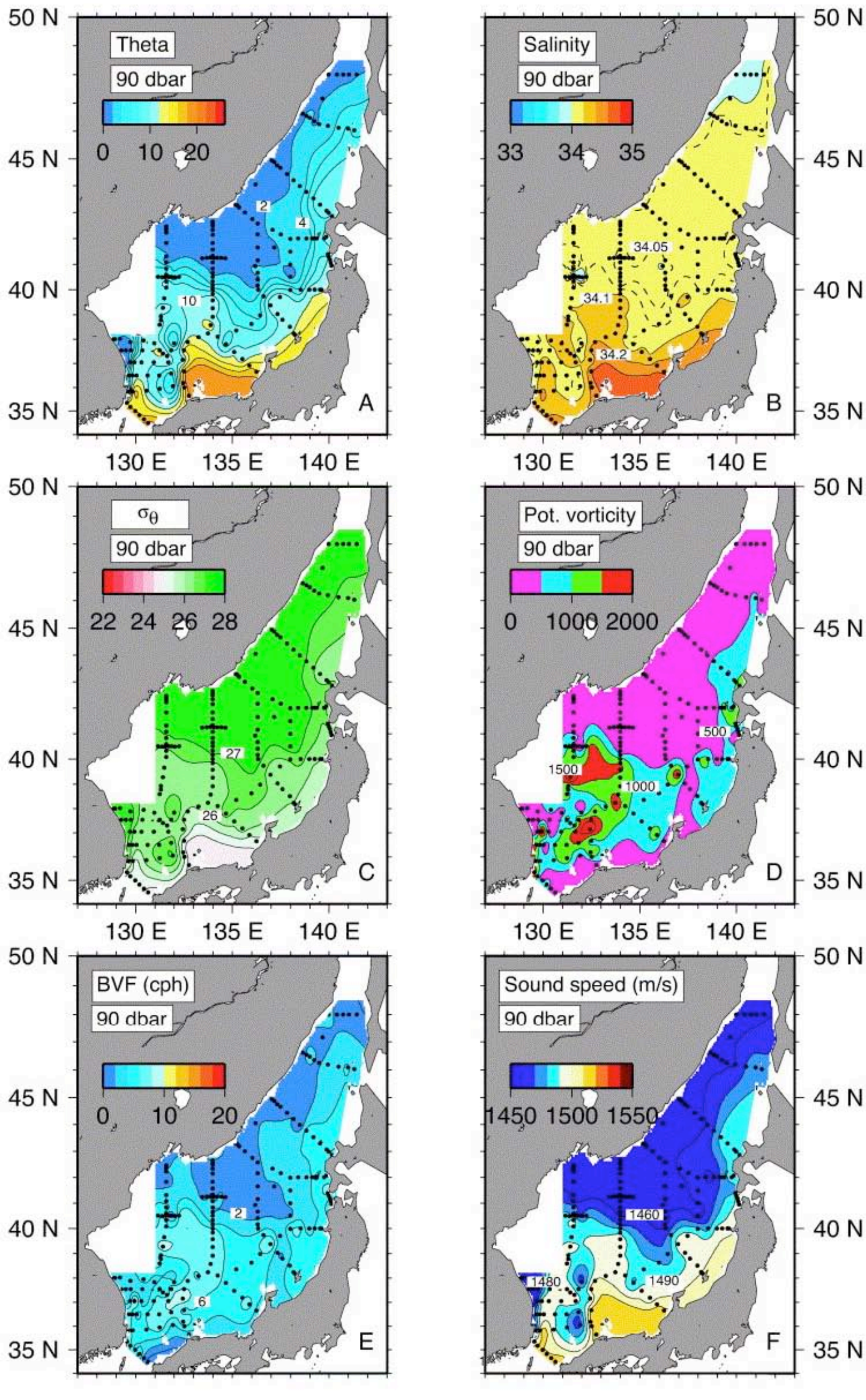
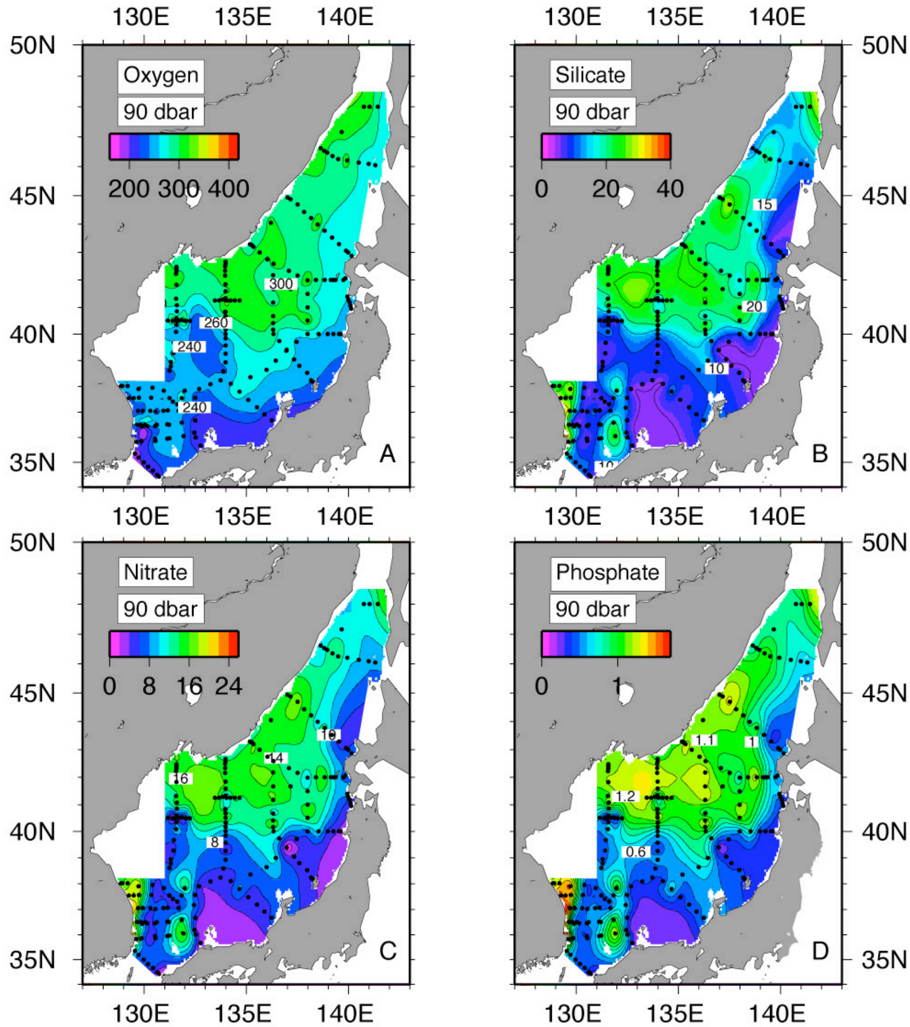


Figure D40. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 90 dbar.



Oxygen
90 dbar
200 300 400
Silicate
90 dbar
0 20 40
Nitrate
90 dbar
0 8 16 24
Phosphate
90 dbar
0 1
130E 135E 140E
50N 45N 40N 35N
A
B
C
D

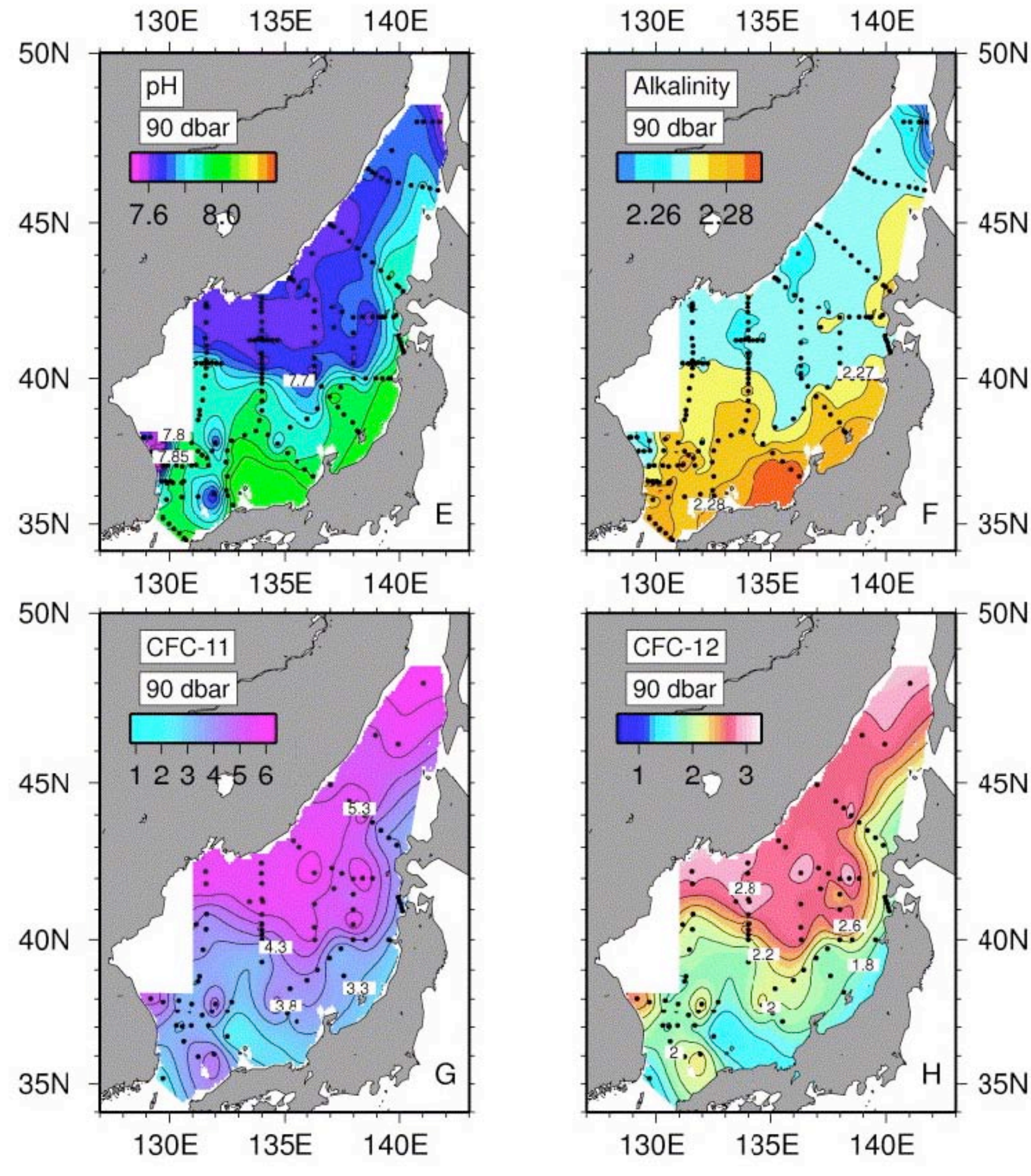


Figure D41. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 90 dbar.

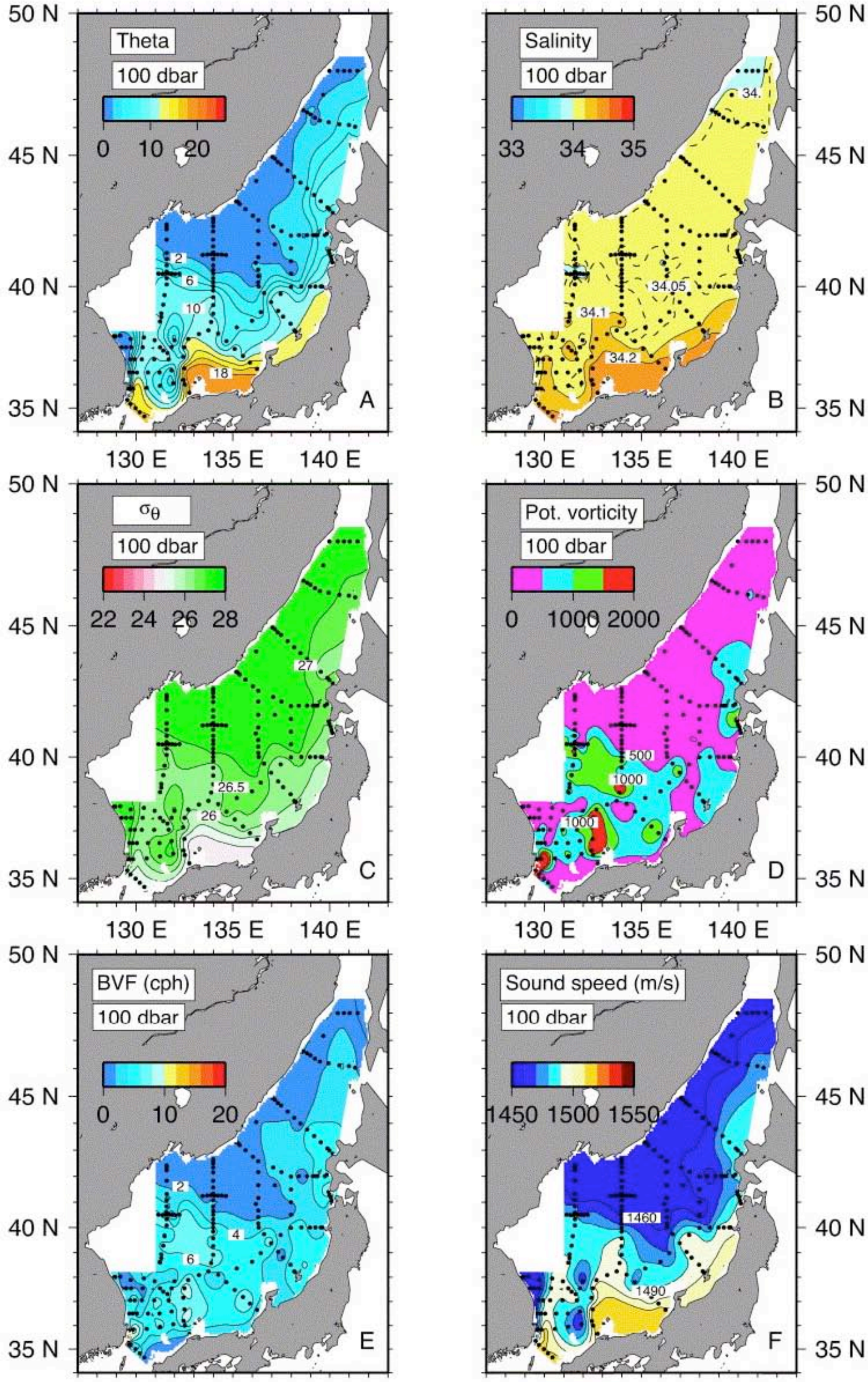
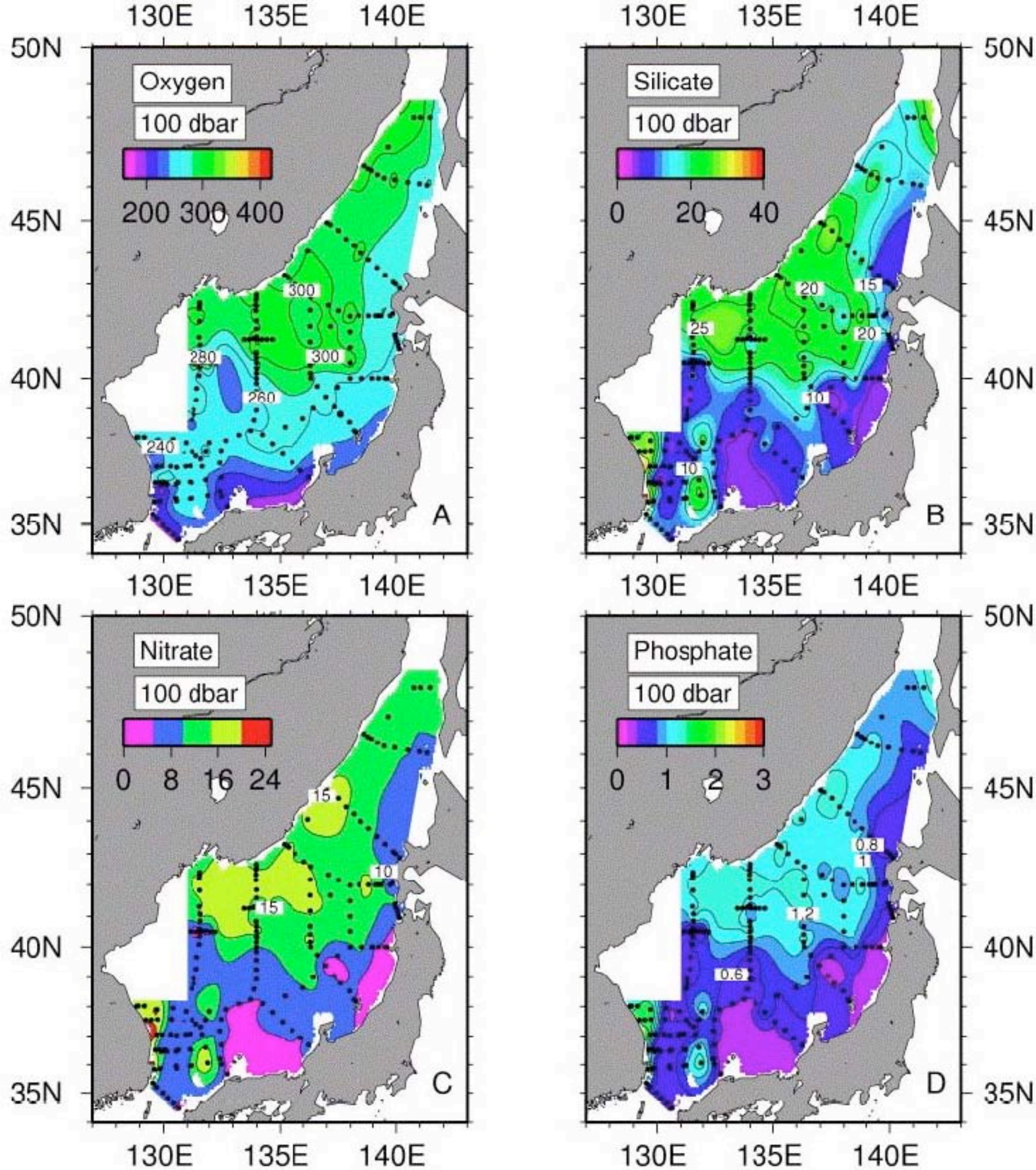


Figure D42. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 100 dbar.


Oxygen
100 dbar
200 300 400
Silicate
100 dbar
0 20 40
Nitrate
100 dbar
0 8 16 24
Phosphate
100 dbar
0 1 2 3
A
B
C
D
130E 135E 140E
35N 40N 45N 50N

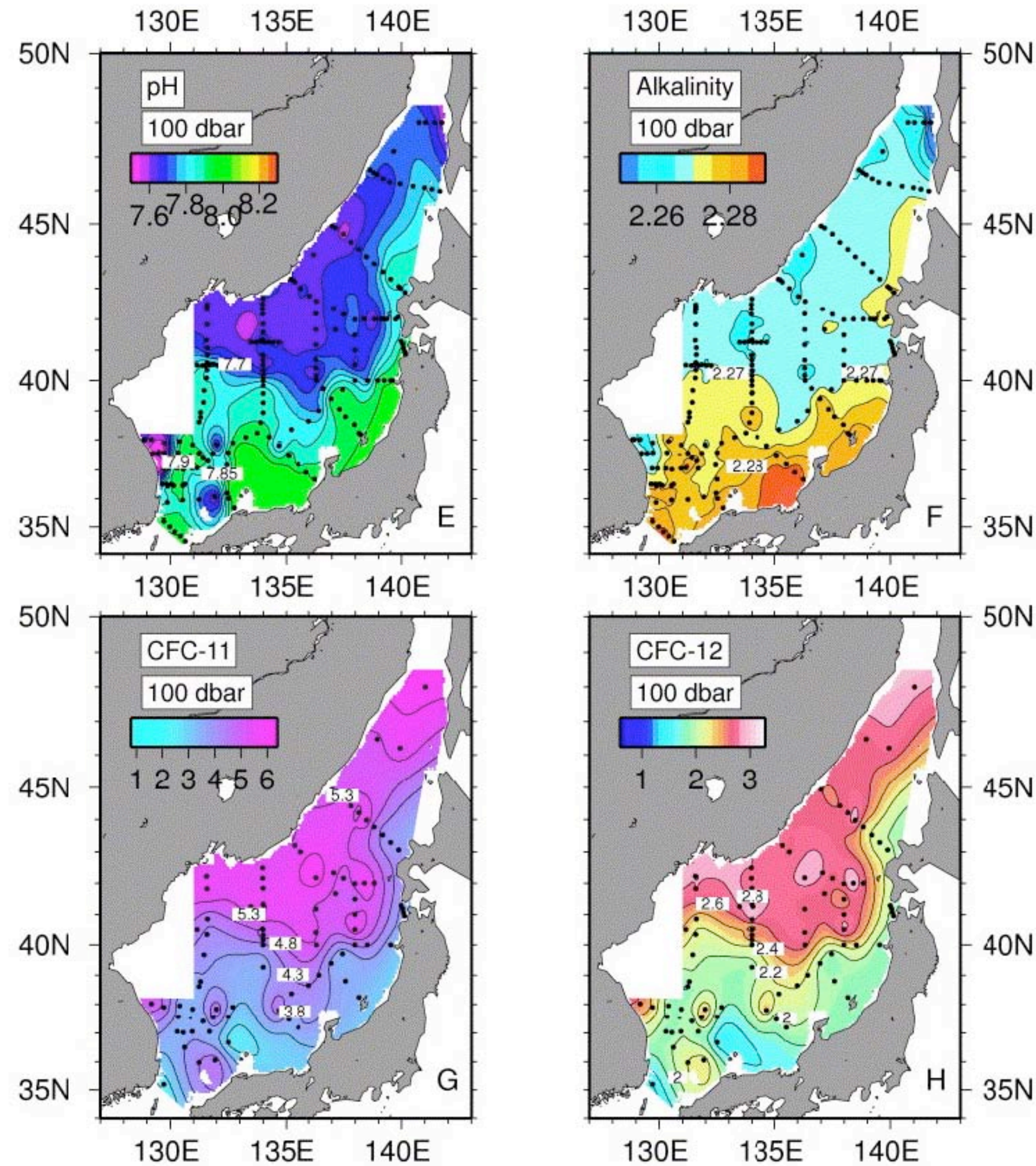


Figure D43. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 100 dbar.

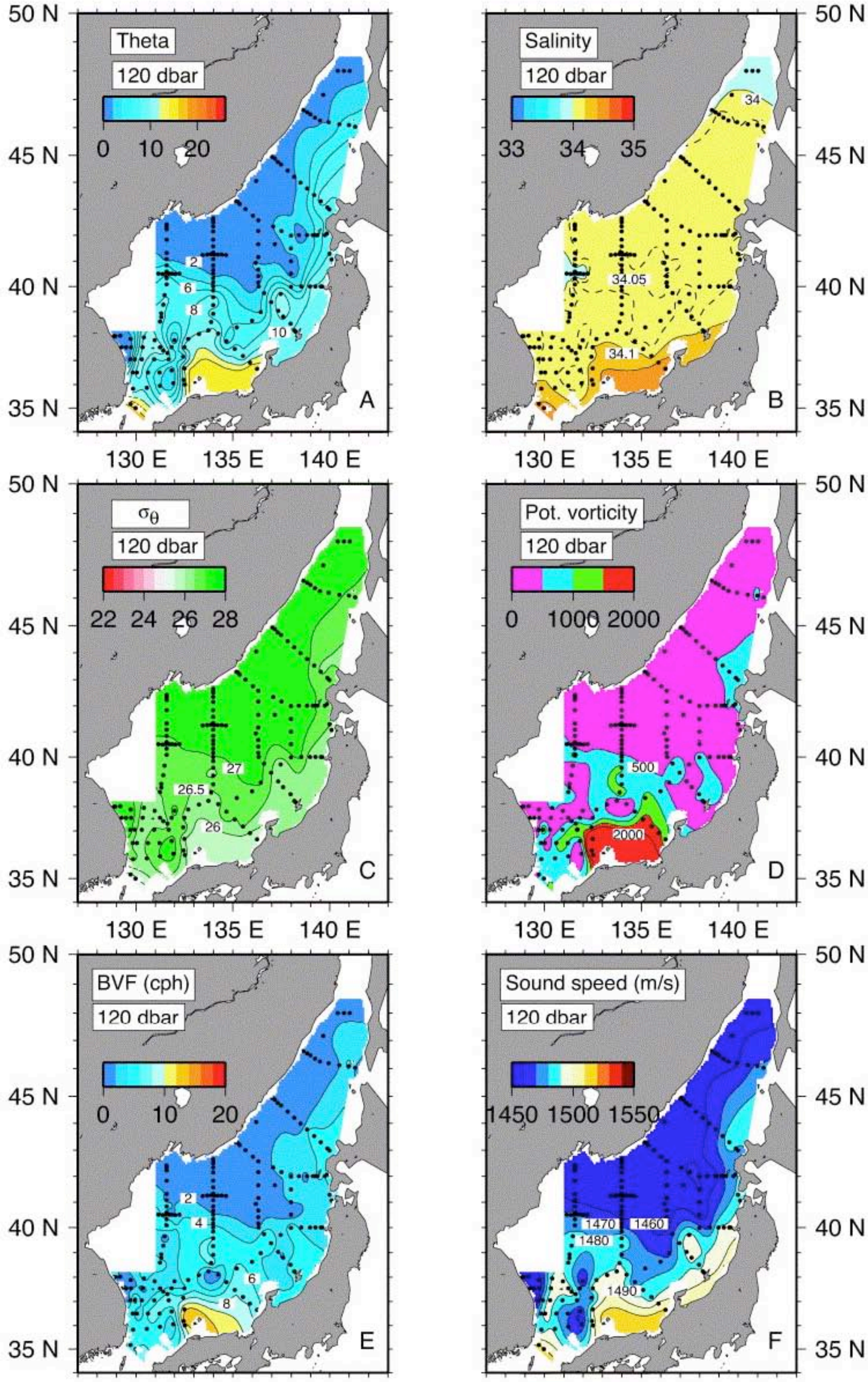
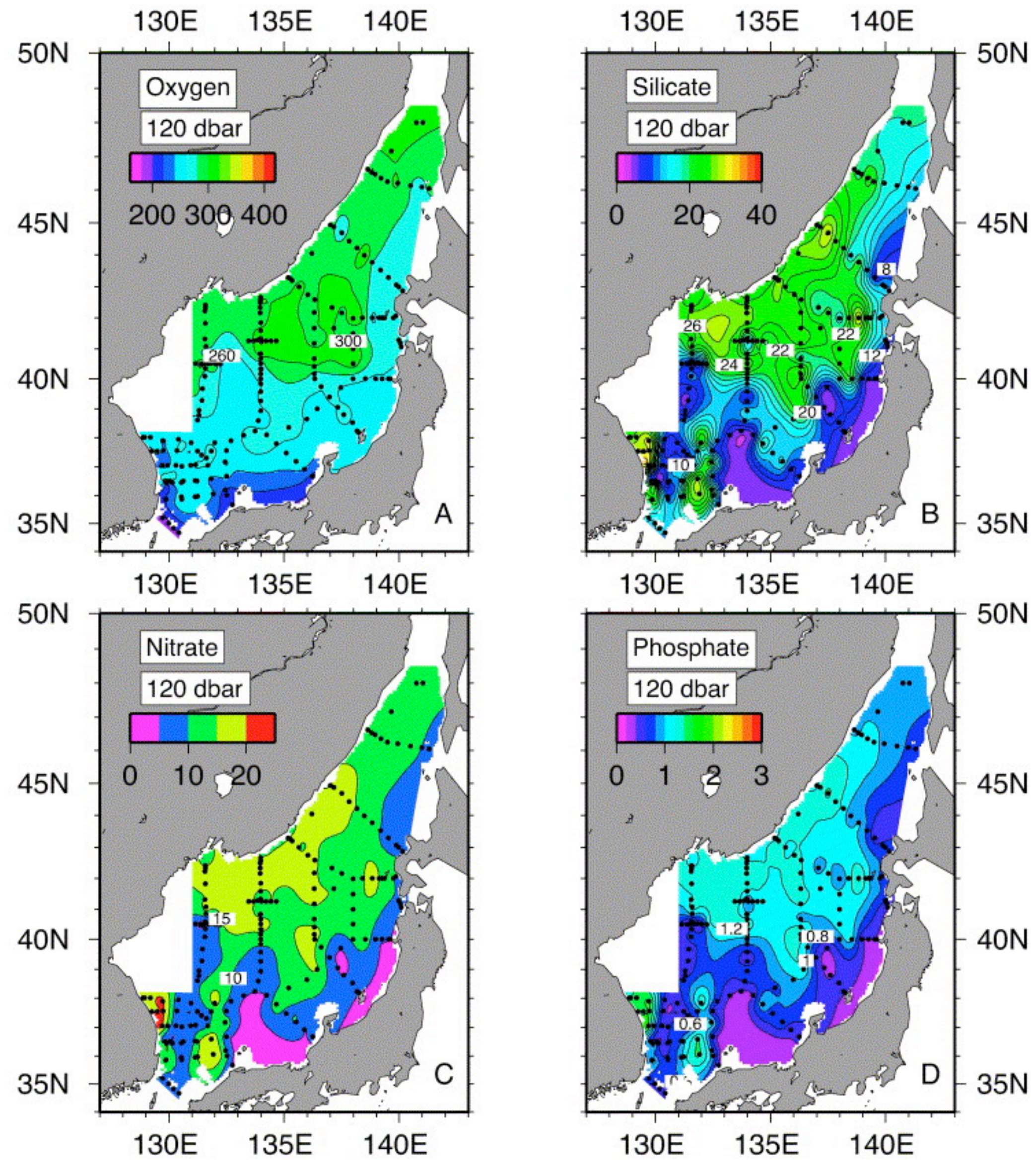


Figure D44. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 120 dbar.



Oxygen
120 dbar
200 300 400
260
300
A
Silicate
120 dbar
0 20 40
8
26
24
22
22
12
20
10
B
Nitrate
120 dbar
0 10 20
15
10
C
Phosphate
120 dbar
0 1 2 3
1.2
0.8
1
0.6
D
130E 135E 140E
50N 45N 40N 35N

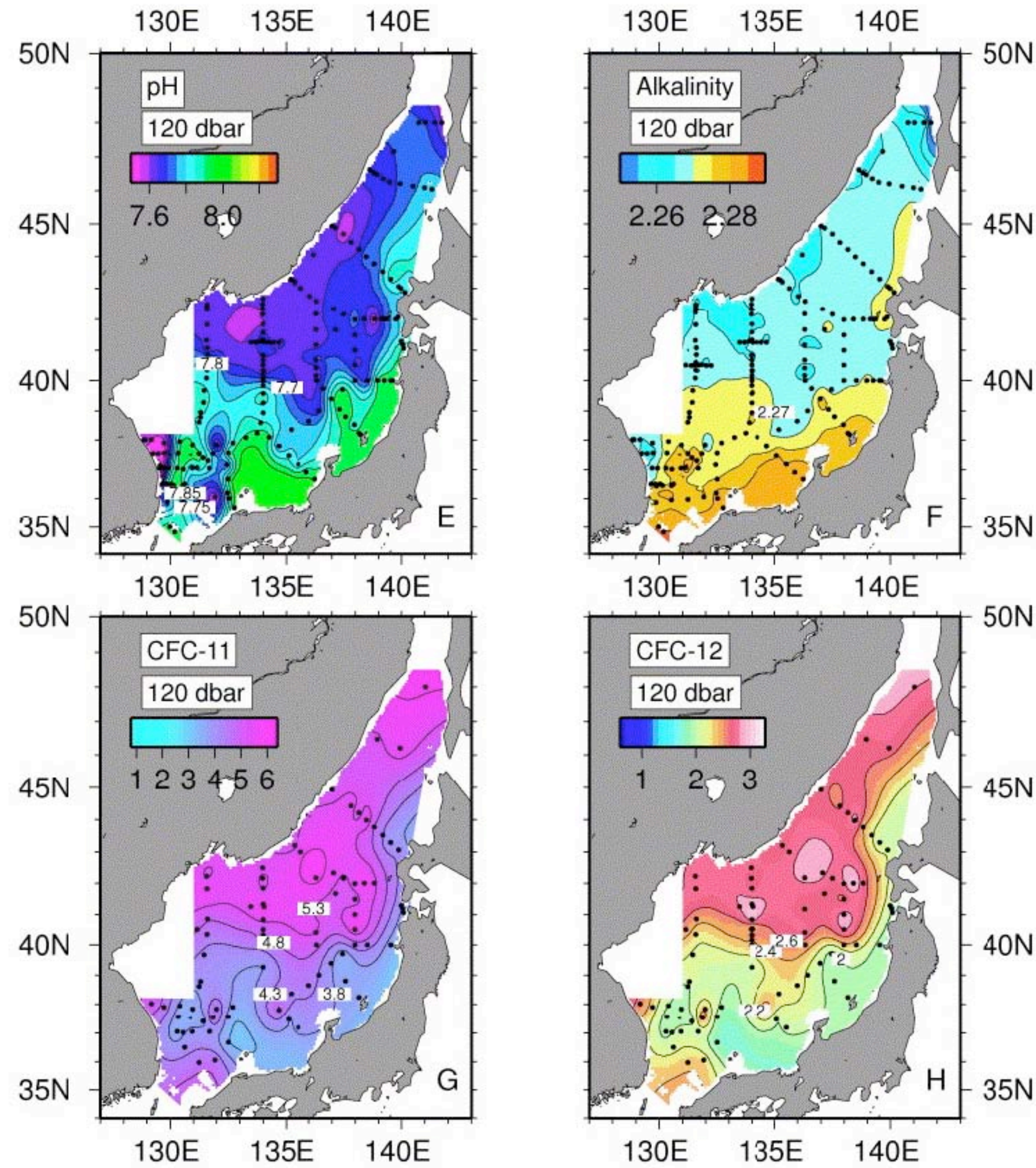


Figure D45. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 120 dbar.

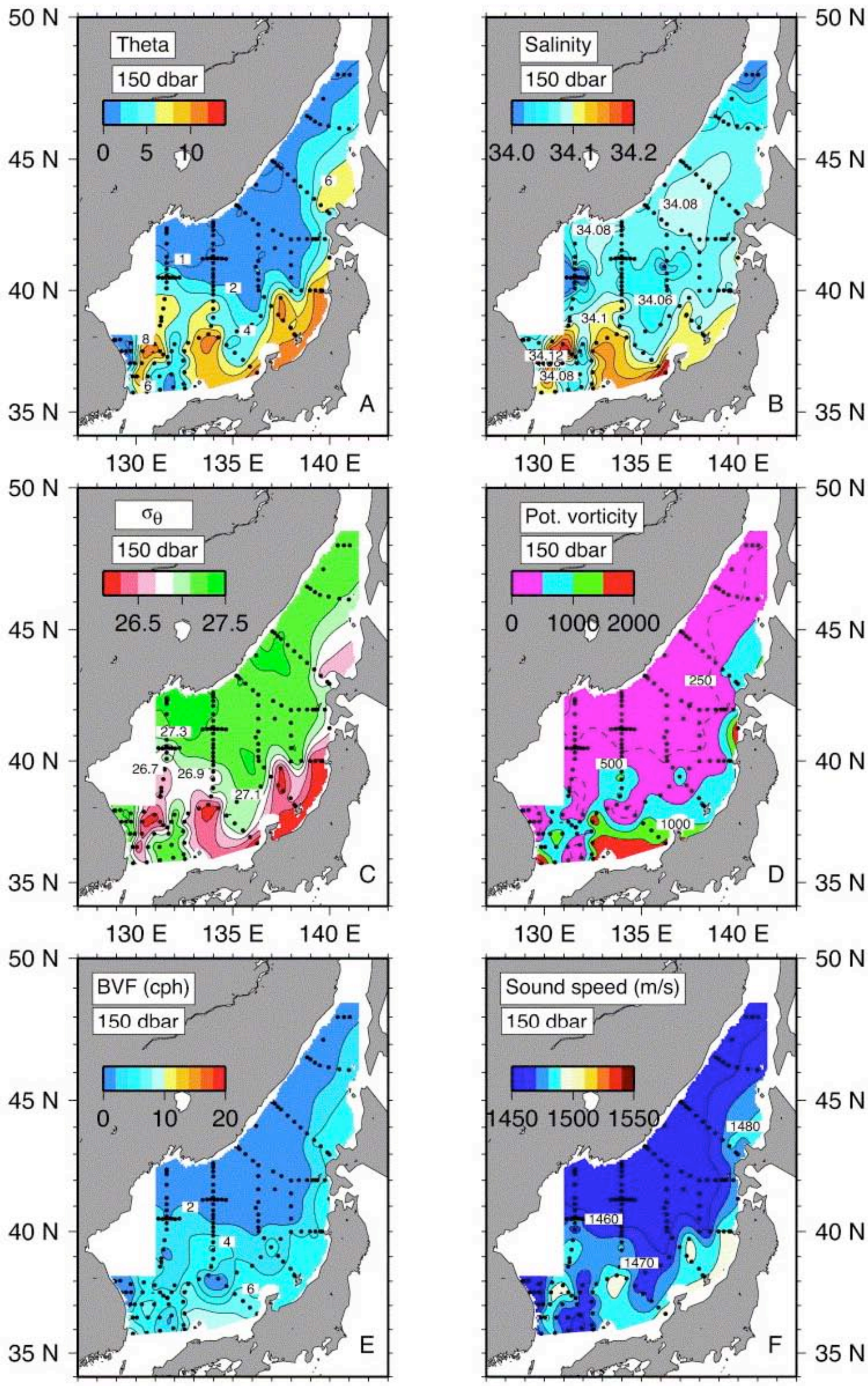
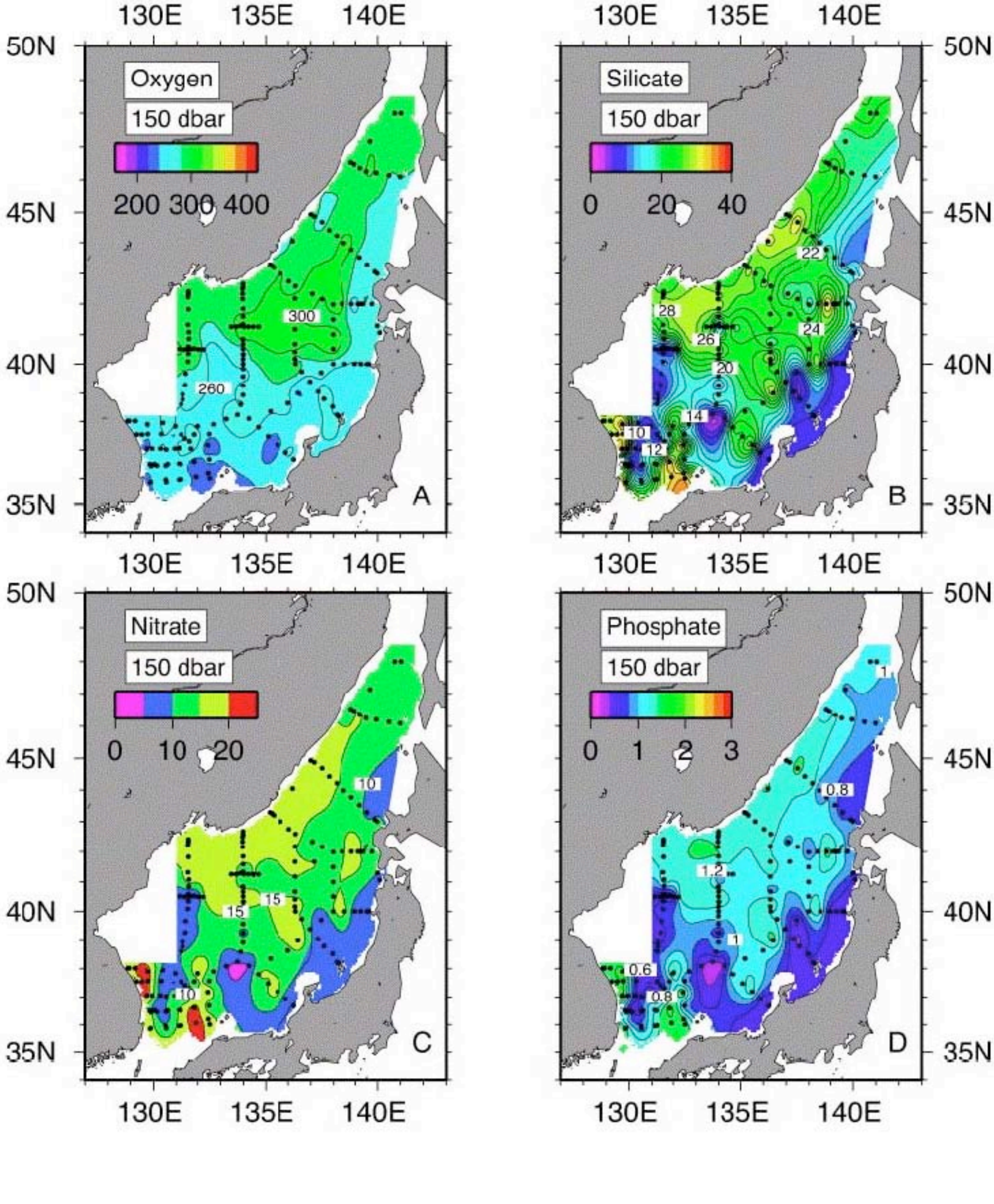


Figure D46. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 150 dbar.



Oxygen
150 dbar
200 300 400
300
260
A
Silicate
150 dbar
0 20 40
22
28
26
24
20
14
10
12
B
Nitrate
150 dbar
0 10 20
10
15
15
10
C
Phosphate
150 dbar
0 1 2 3
1
0.8
1.2
1
0.6
0.8
D
130E
135E
140E
50N
45N
40N
35N

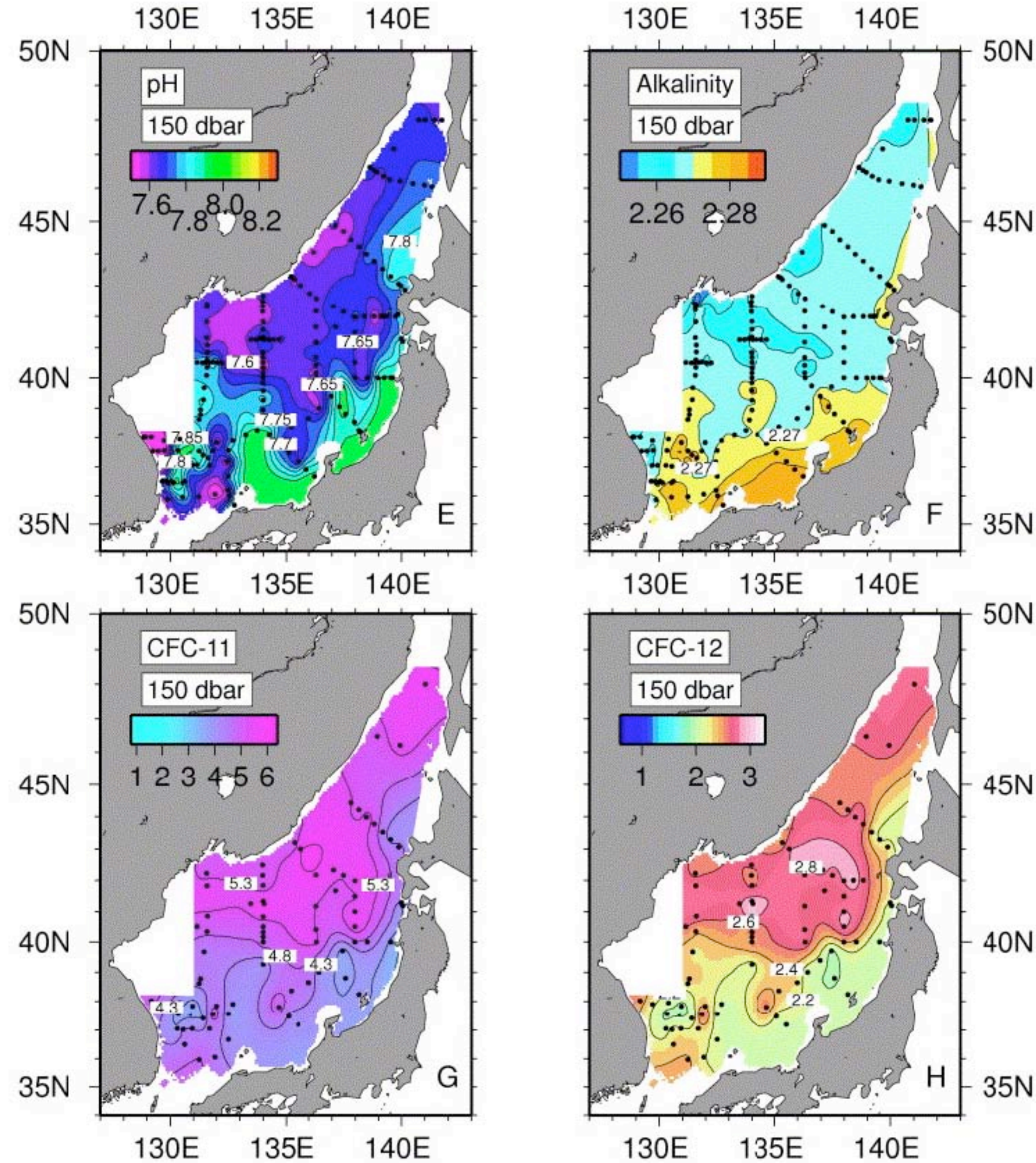


Figure D47. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 150 dbar.

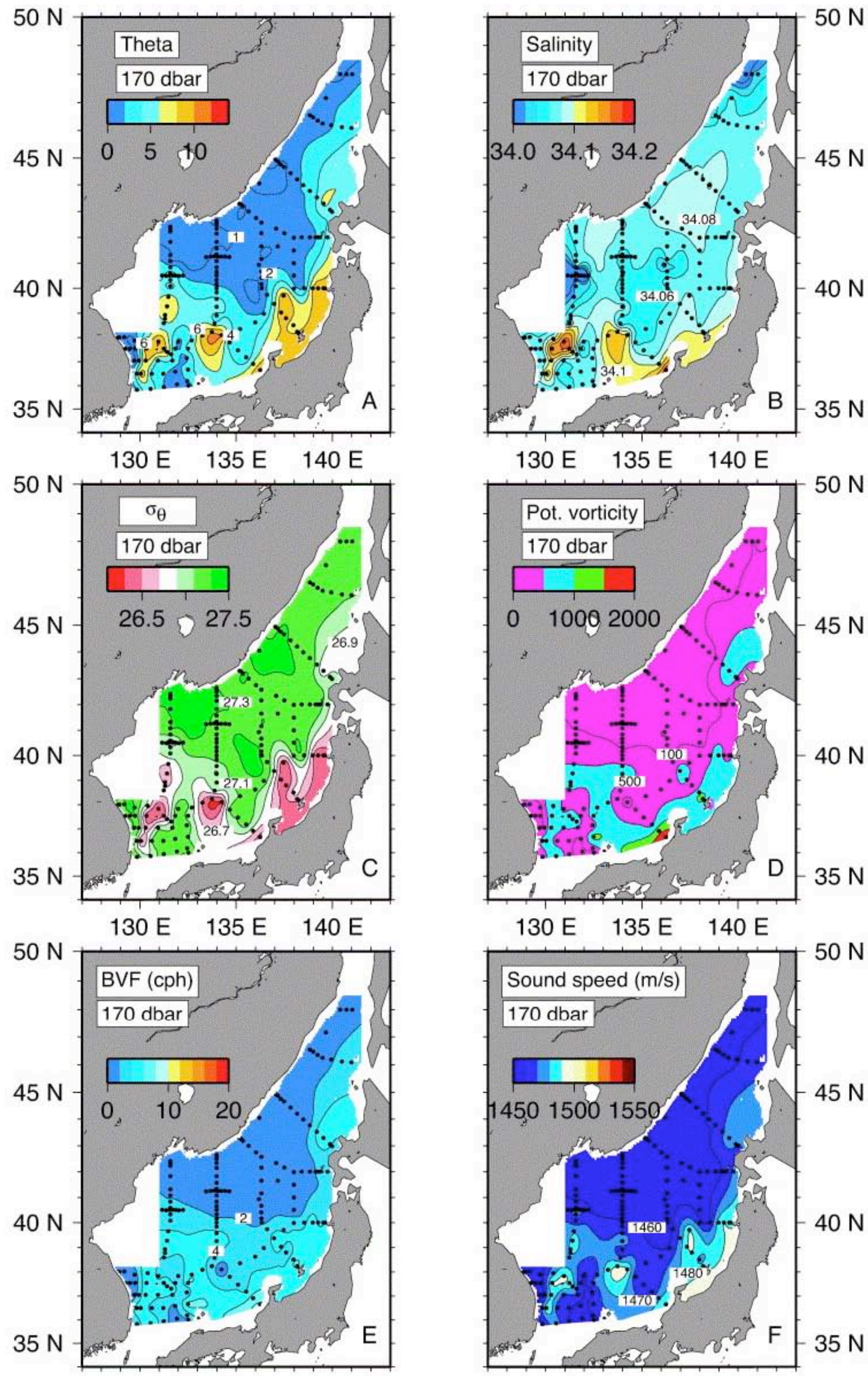
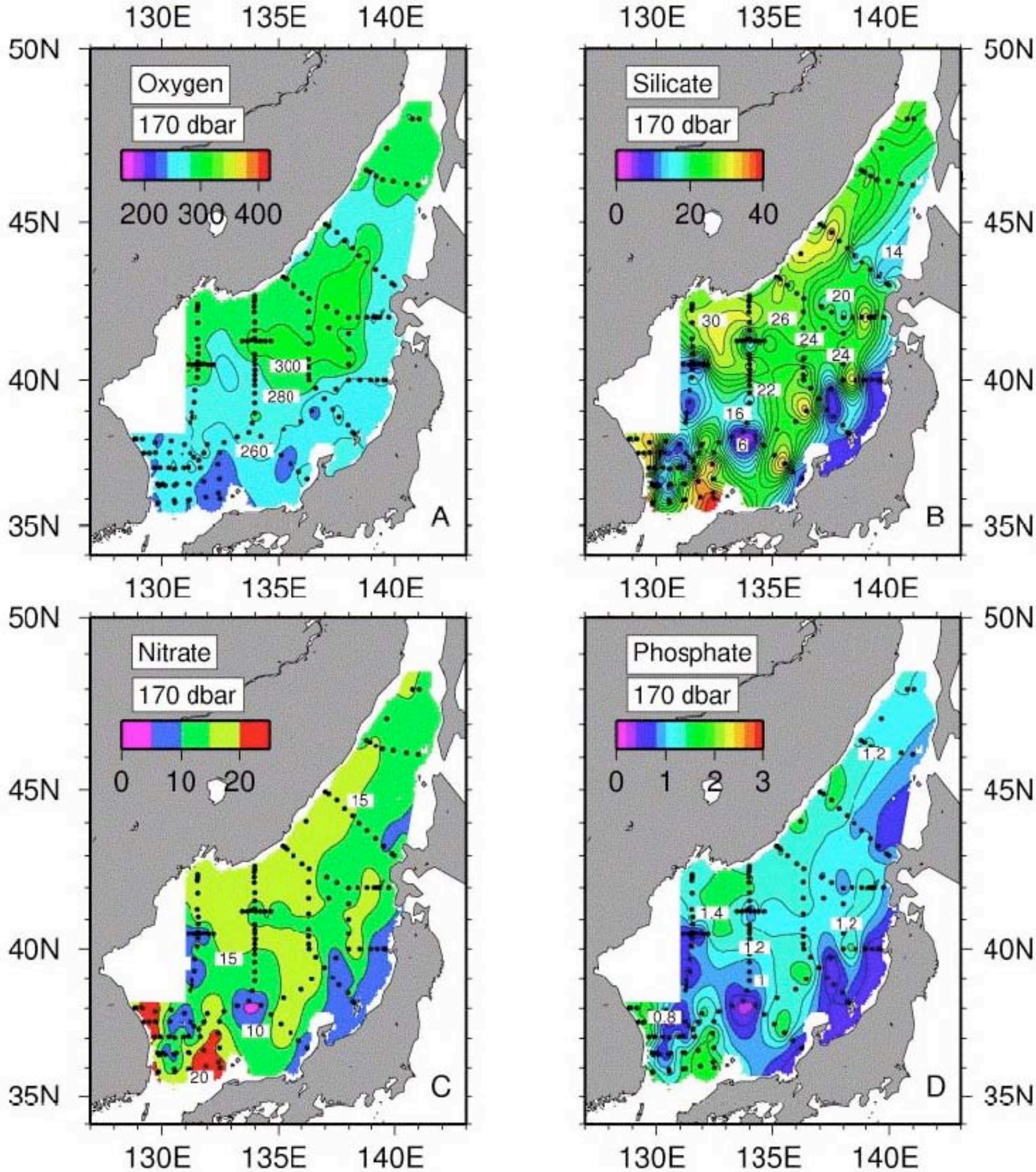


Figure D48. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 170 dbar.



Oxygen
170 dbar
200 300 400
300
280
260
A
Silicate
170 dbar
0 20 40
14
20
30
26
24
24
22
16
6
B
Nitrate
170 dbar
0 10 20
15
15
10
20
C
Phosphate
170 dbar
0 1 2 3
1.2
1.4
1.2
1.2
1
0.8
D
130E 135E 140E
50N 45N 40N 35N

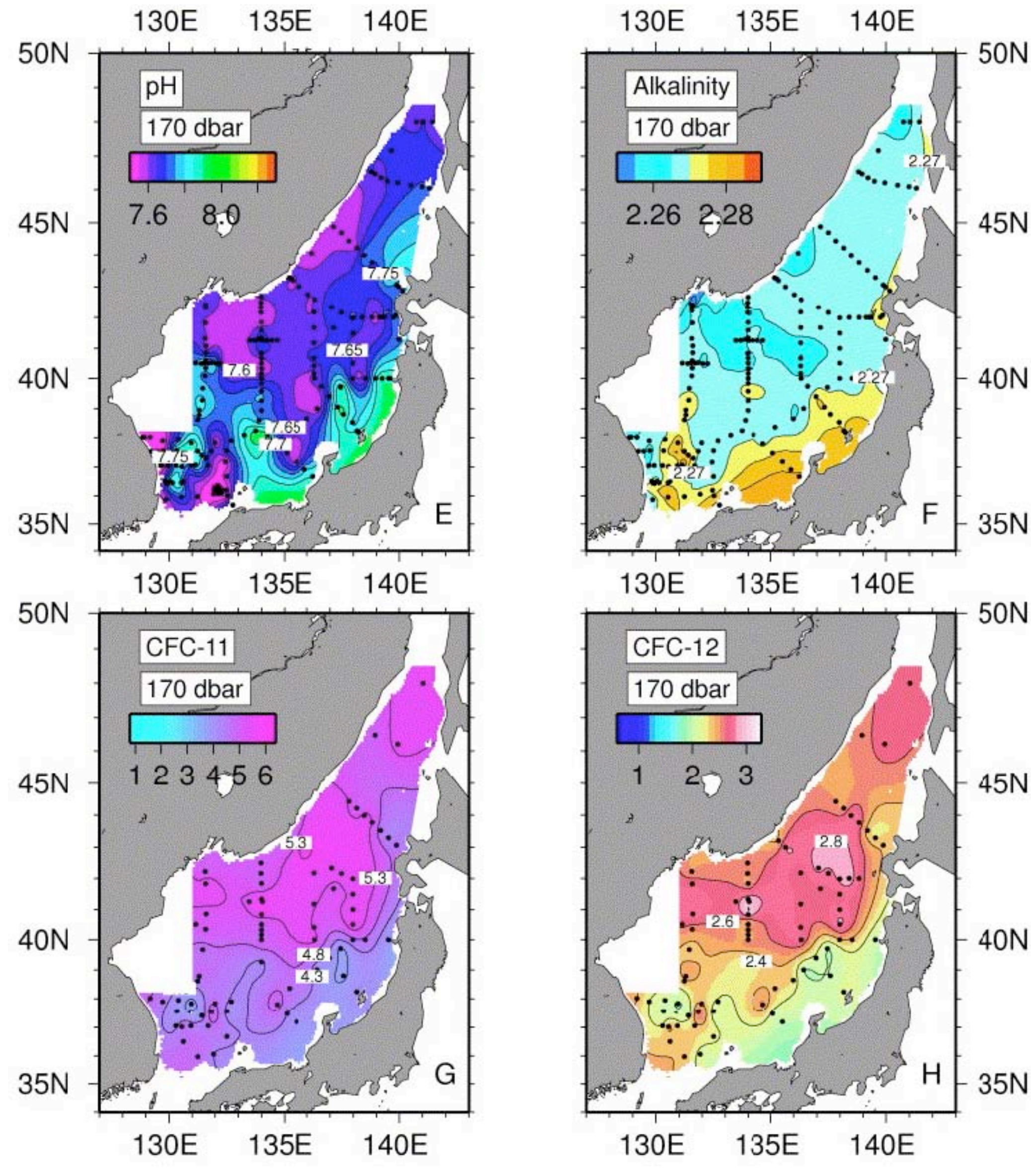


Figure D49. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 170 dbar.

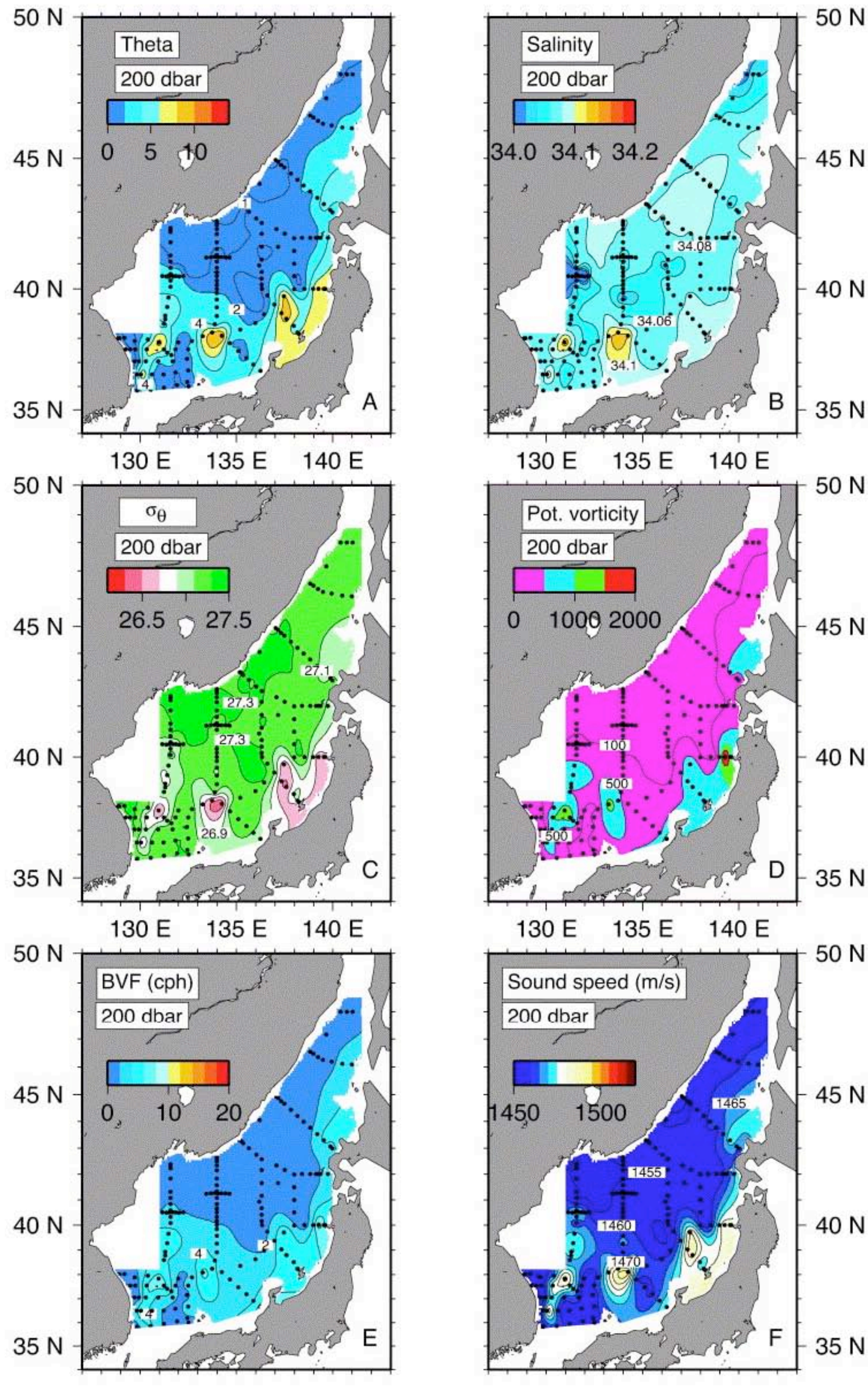
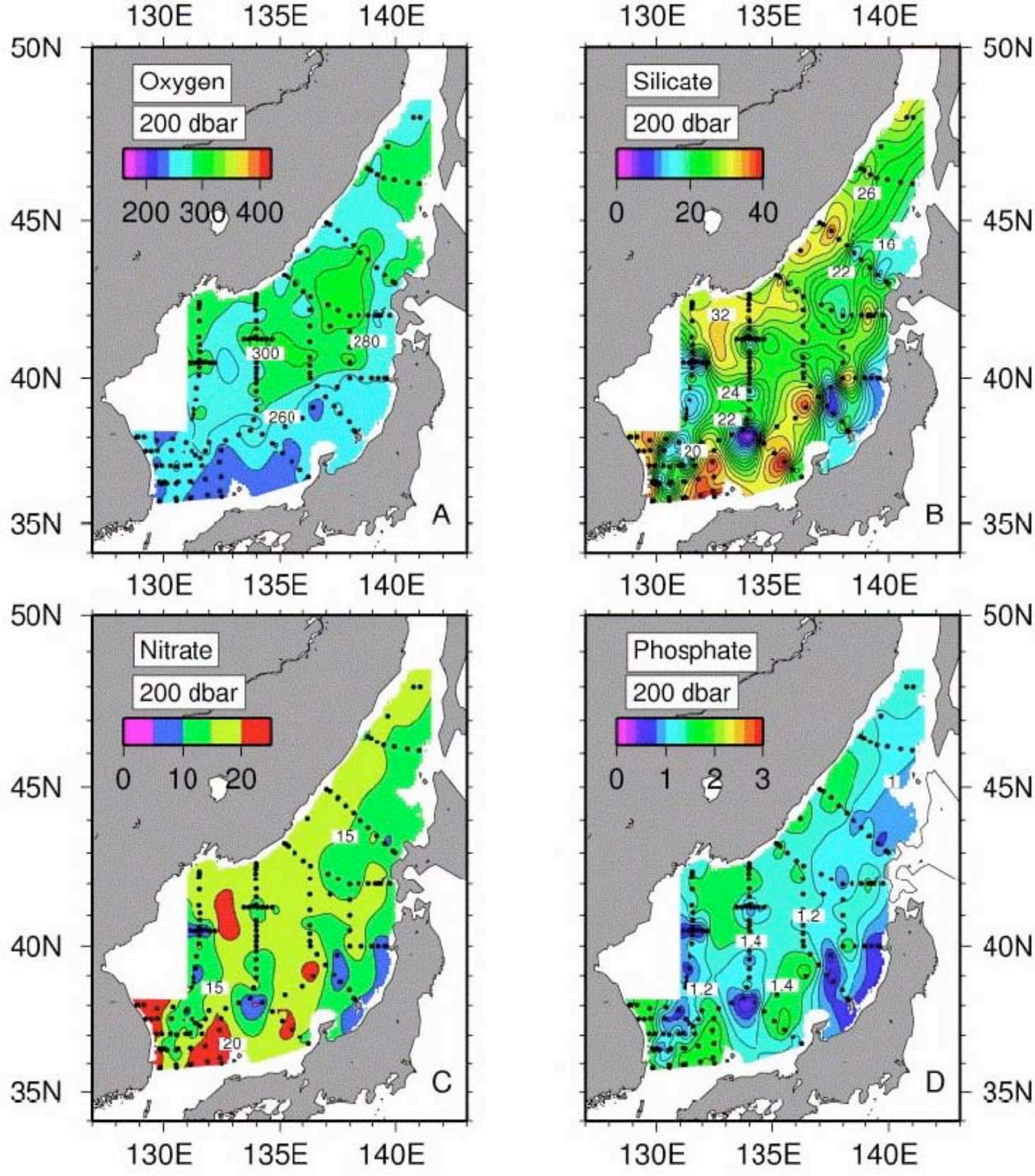


Figure D50. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 200 dbar.



Oxygen
200 dbar
200 300 400
300
280
260
A
Silicate
200 dbar
0 20 40
26
16
22
32
24
22
20
B
Nitrate
200 dbar
0 10 20
15
15
20
C
Phosphate
200 dbar
0 1 2 3
1
1.2
1.4
1.2
1.4
D
130E 135E 140E
50N 45N 40N 35N

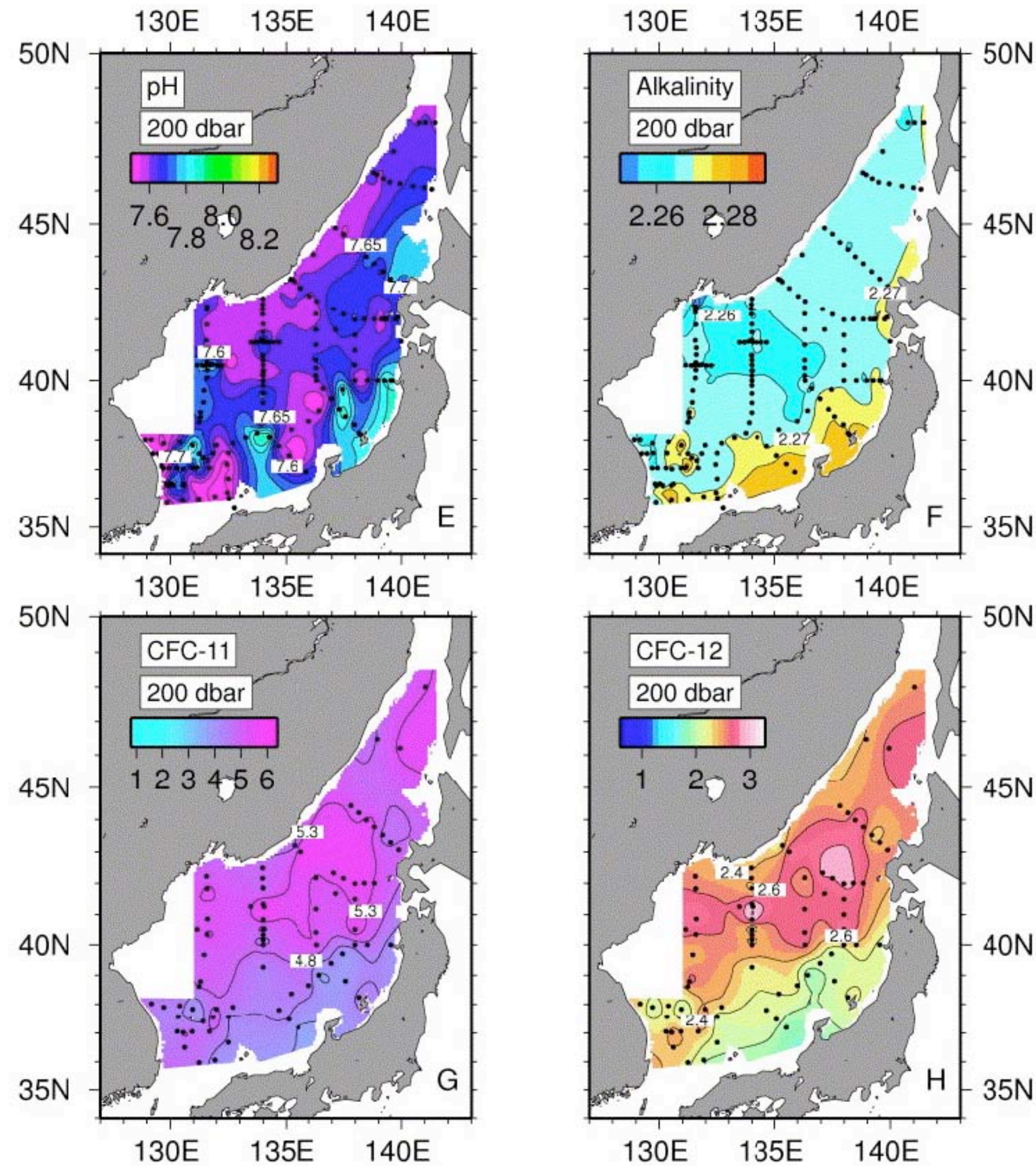


Figure D51. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 200 dbar.

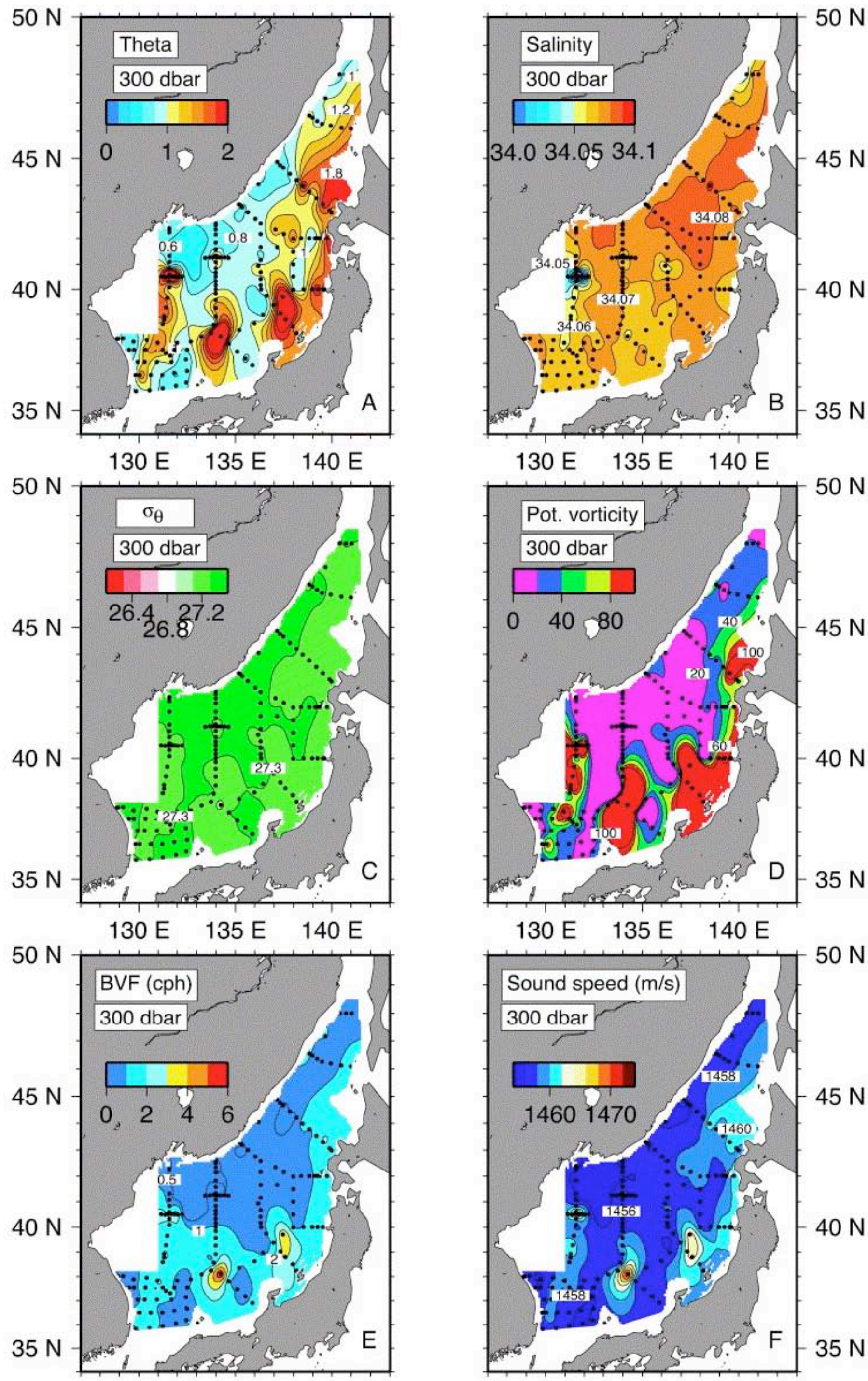
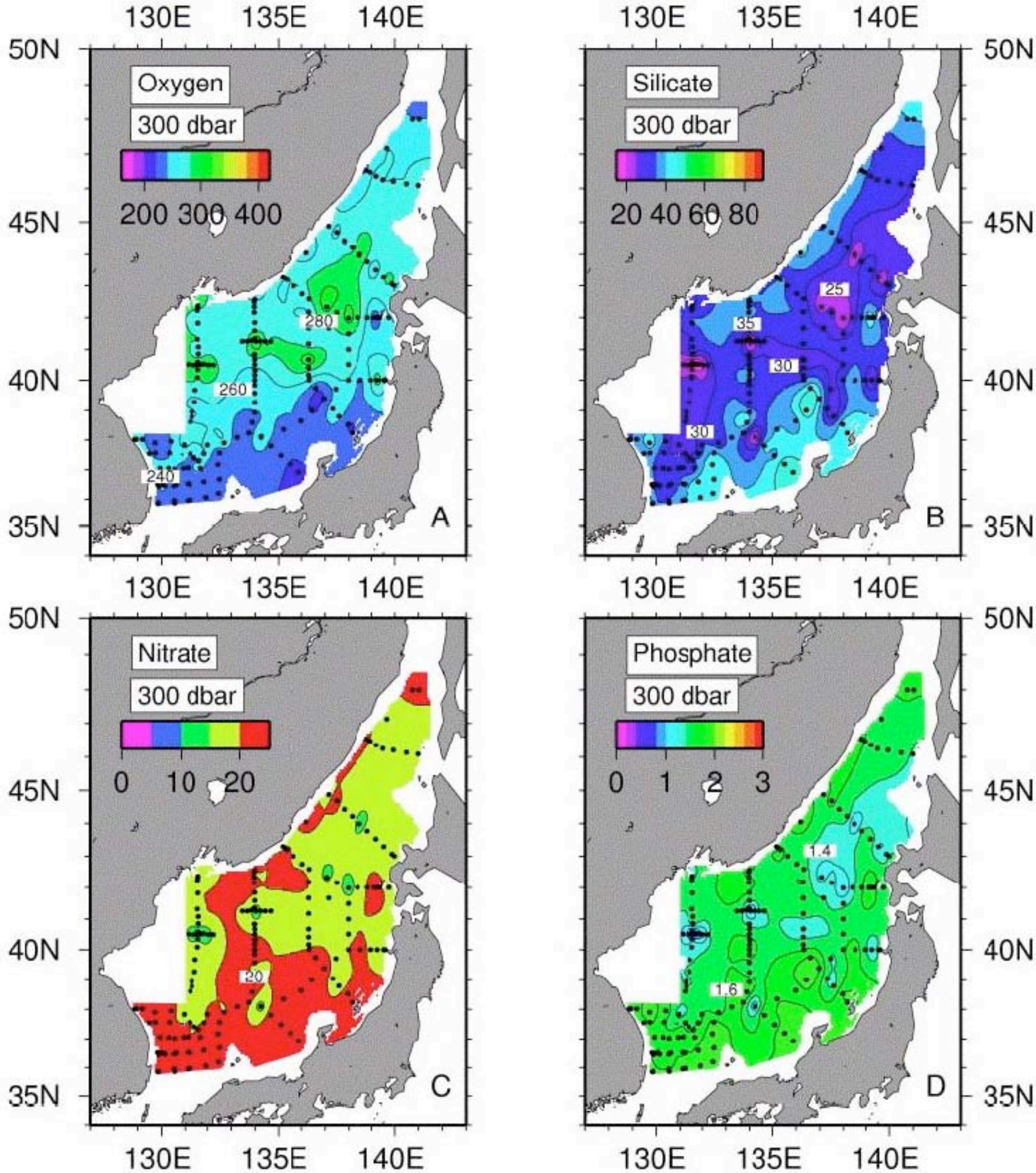


Figure D52. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 300 dbar.



Oxygen
300 dbar
200 300 400
280
260
240
A
Silicate
300 dbar
20 40 60 80
25
35
30
30
B
Nitrate
300 dbar
0 10 20
20
C
Phosphate
300 dbar
0 1 2 3
1.4
1.6
D
130E
135E
140E
50N
45N
40N
35N

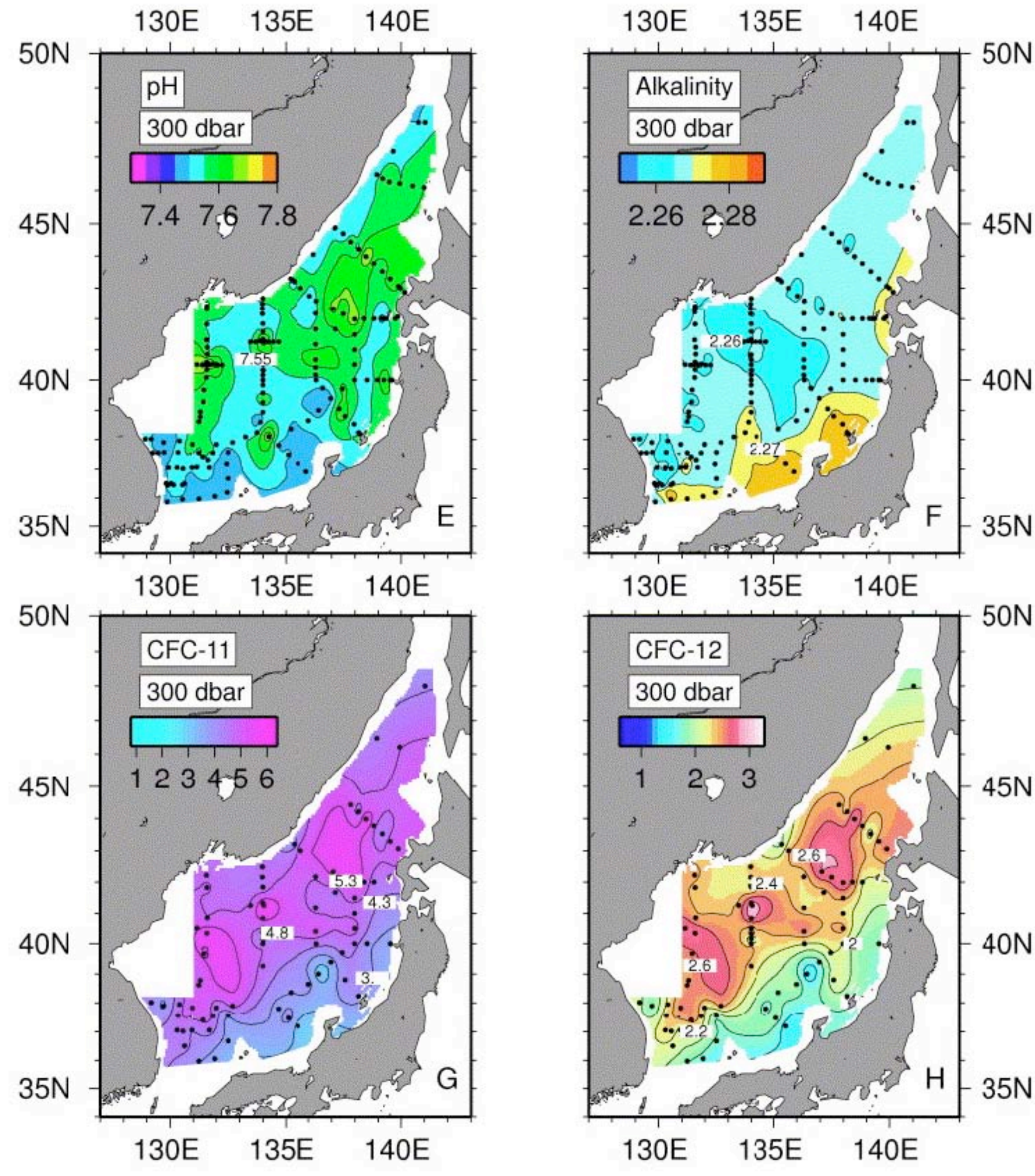


Figure D53. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 300 dbar.

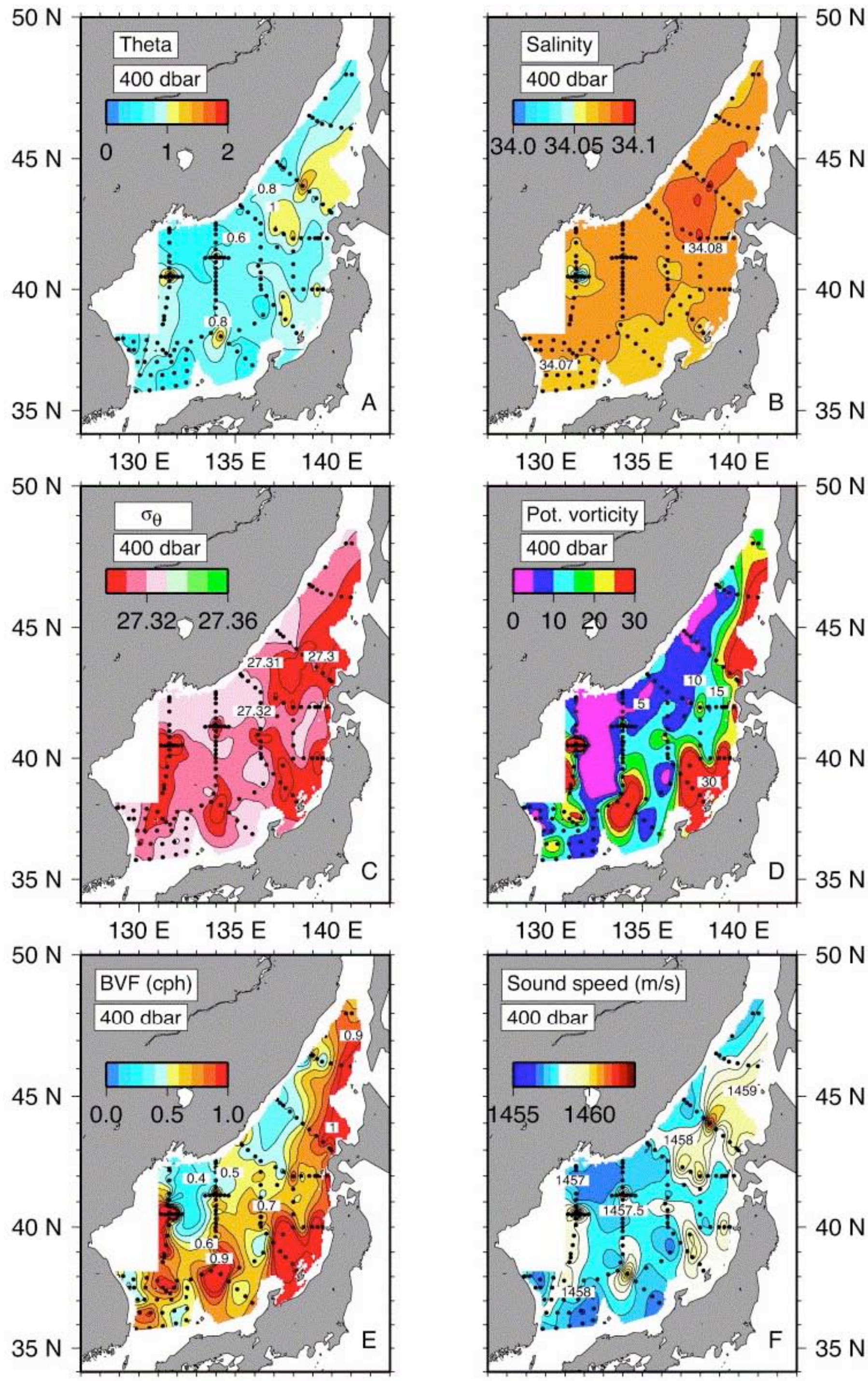
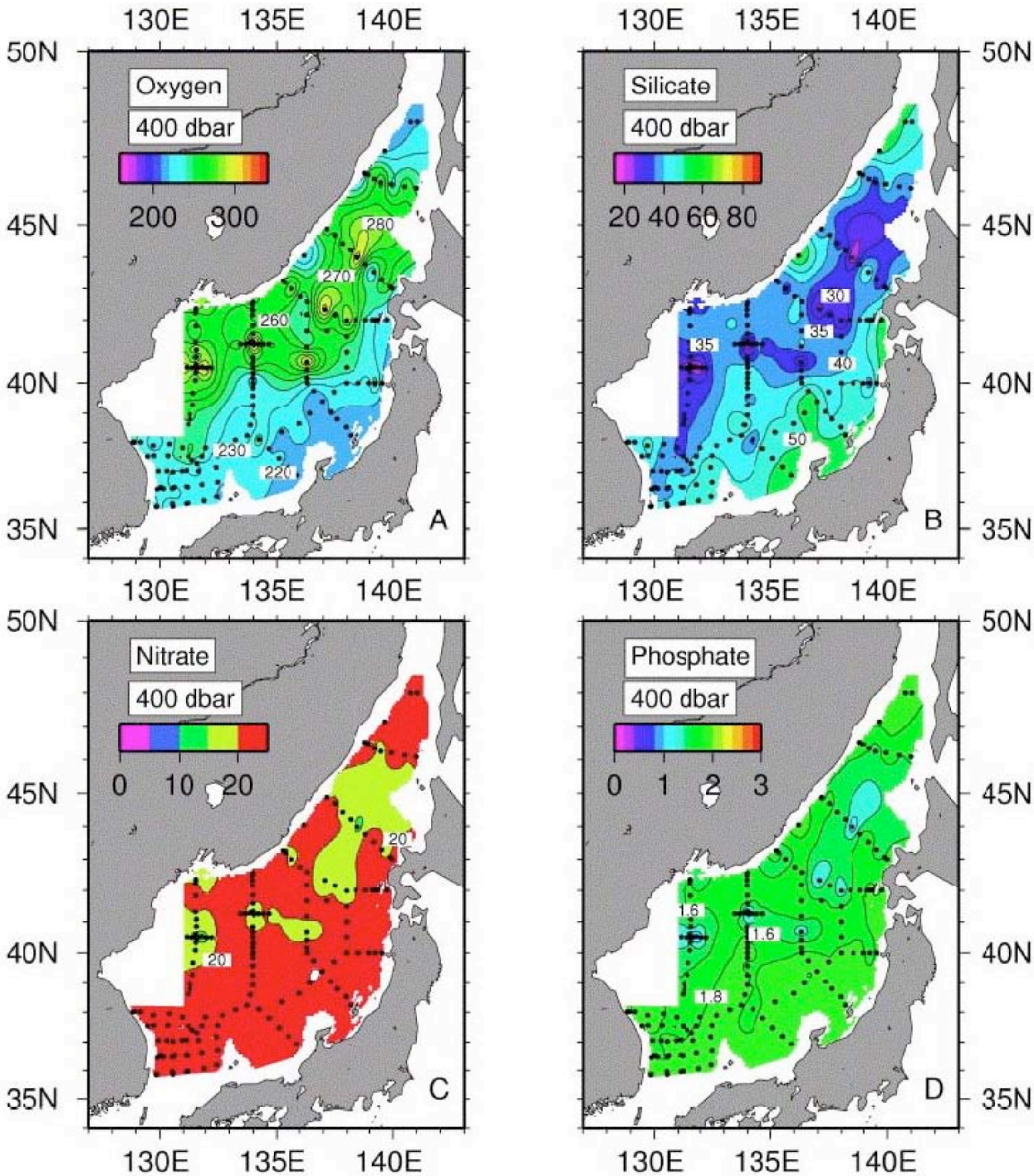


Figure D54. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 400 dbar.


Oxygen
400 dbar
200 300
280
270
260
230
220
A
Silicate
400 dbar
20 40 60 80
30
35
35
40
50
B
Nitrate
400 dbar
0 10 20
20
20
C
Phosphate
400 dbar
0 1 2 3
1.6
1.6
1.8
D
130E 135E 140E
50N 45N 40N 35N

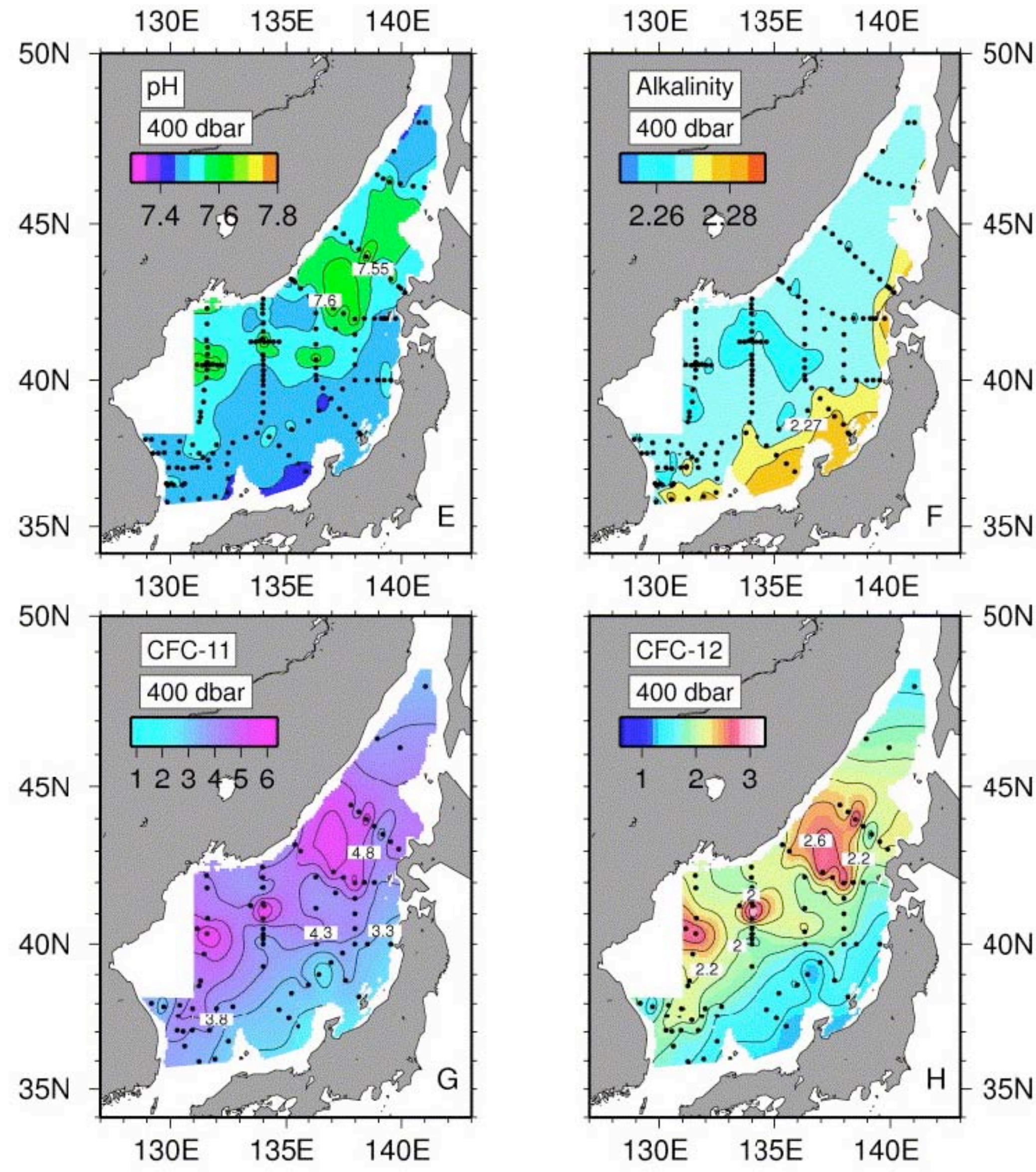


Figure D55. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 400 dbar.

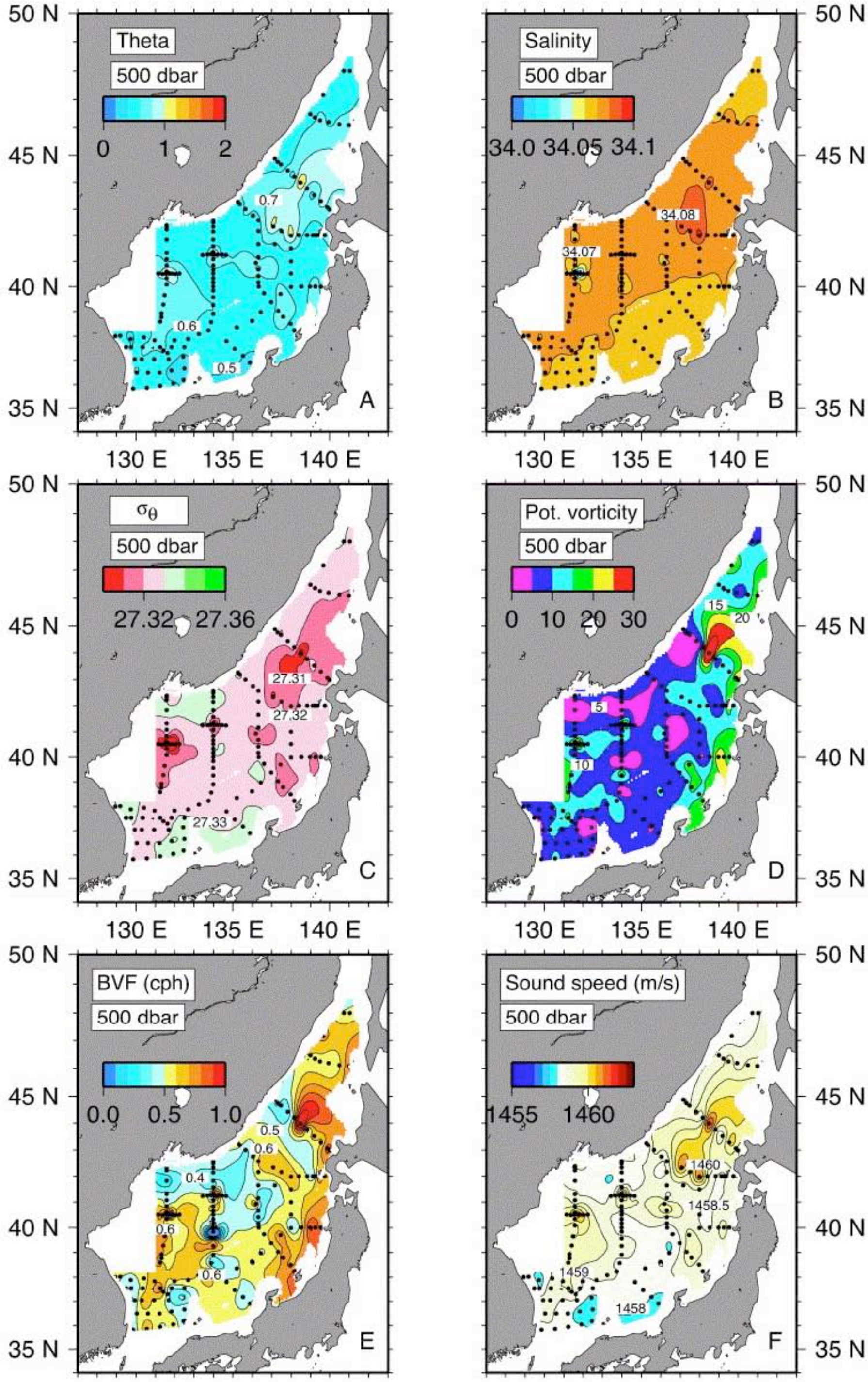
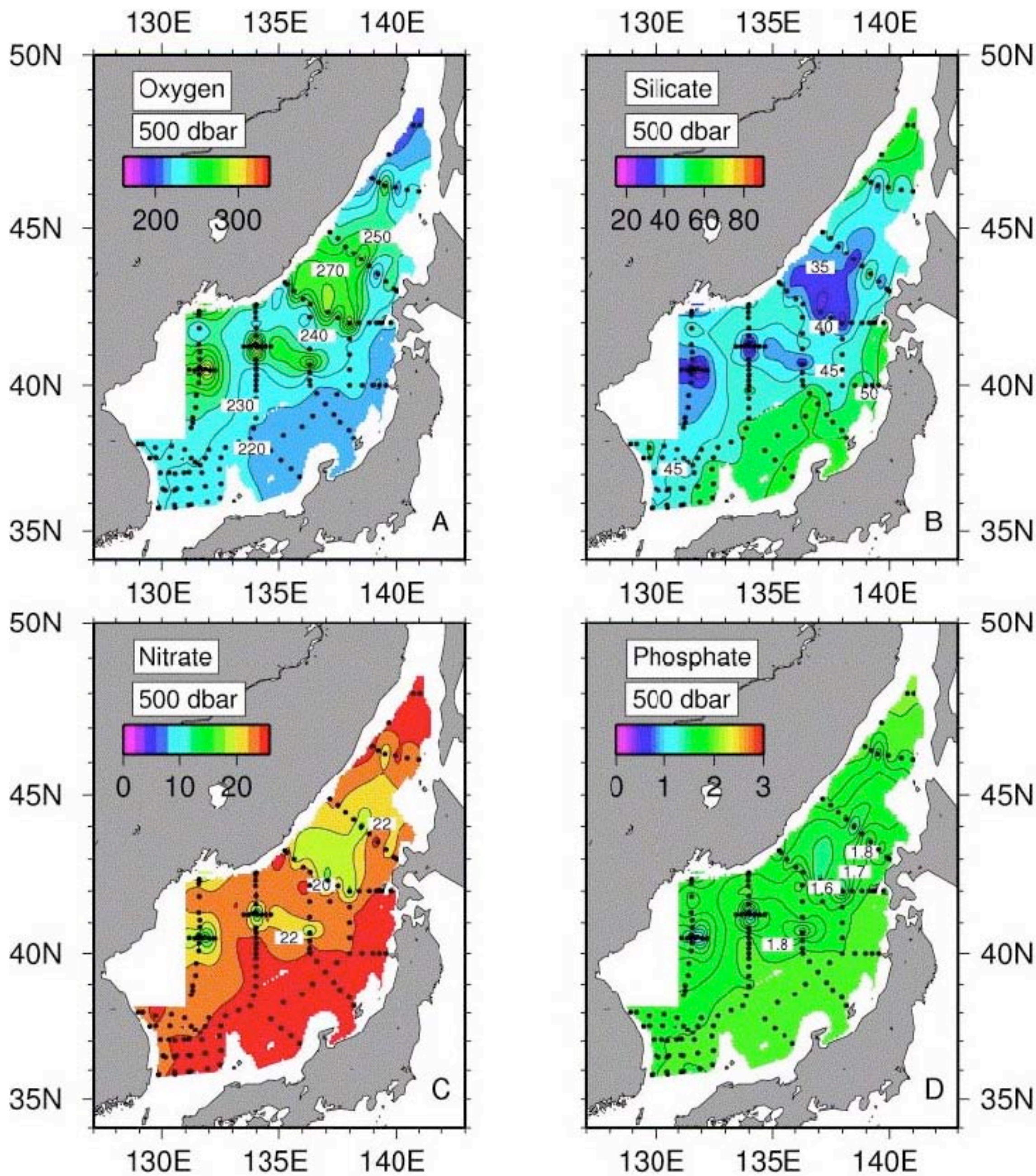


Figure D56. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 500 dbar.


Oxygen
500 dbar
200 300
250
270
240
230
220
A
Silicate
500 dbar
20 40 60 80
35
40
45
50
45
B
Nitrate
500 dbar
0 10 20
22
20
22
C
Phosphate
500 dbar
0 1 2 3
1.8
1.7
1.6
1.8
D
130E 135E 140E
50N 45N 40N 35N

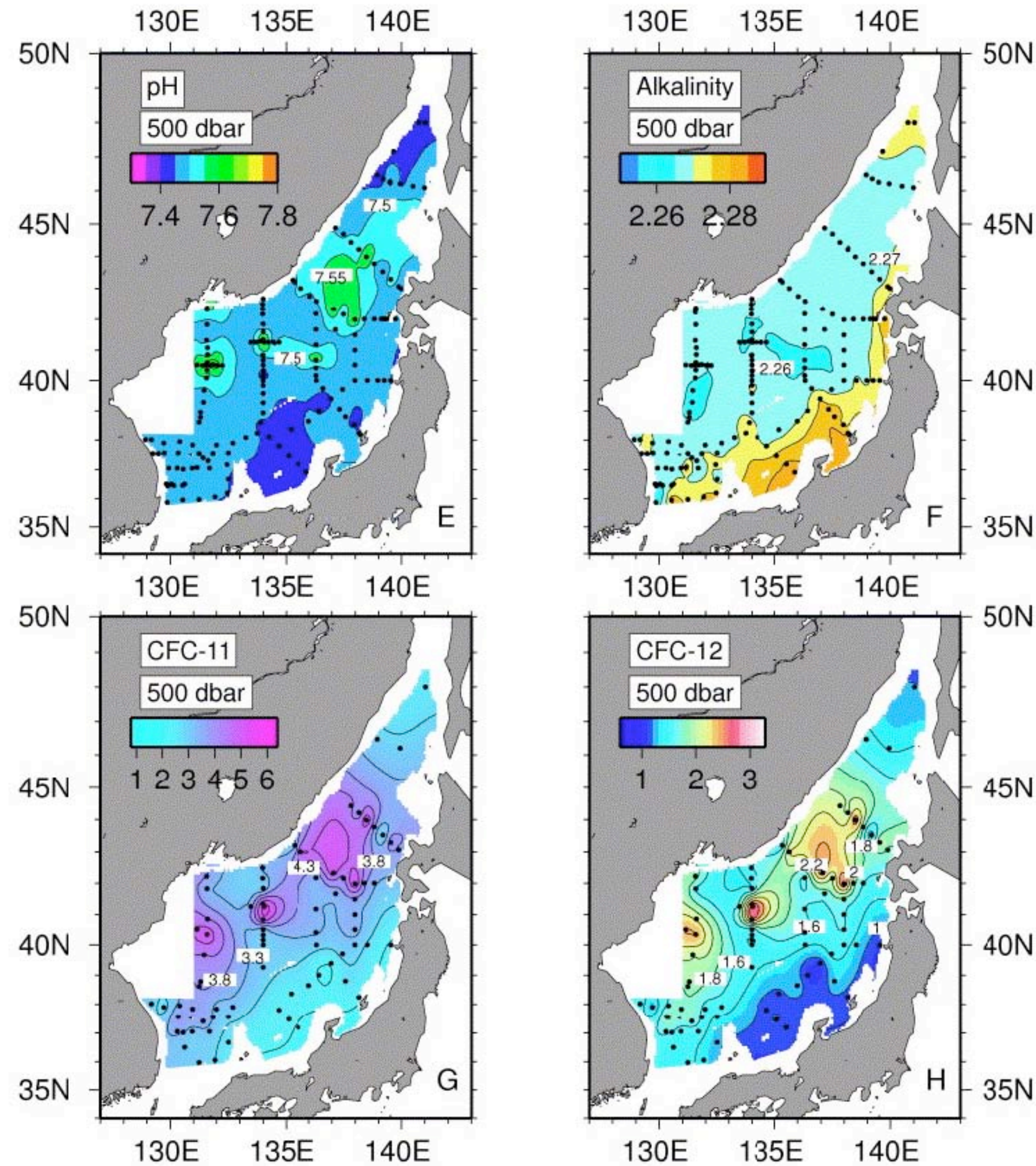


Figure D57. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 500 dbar.

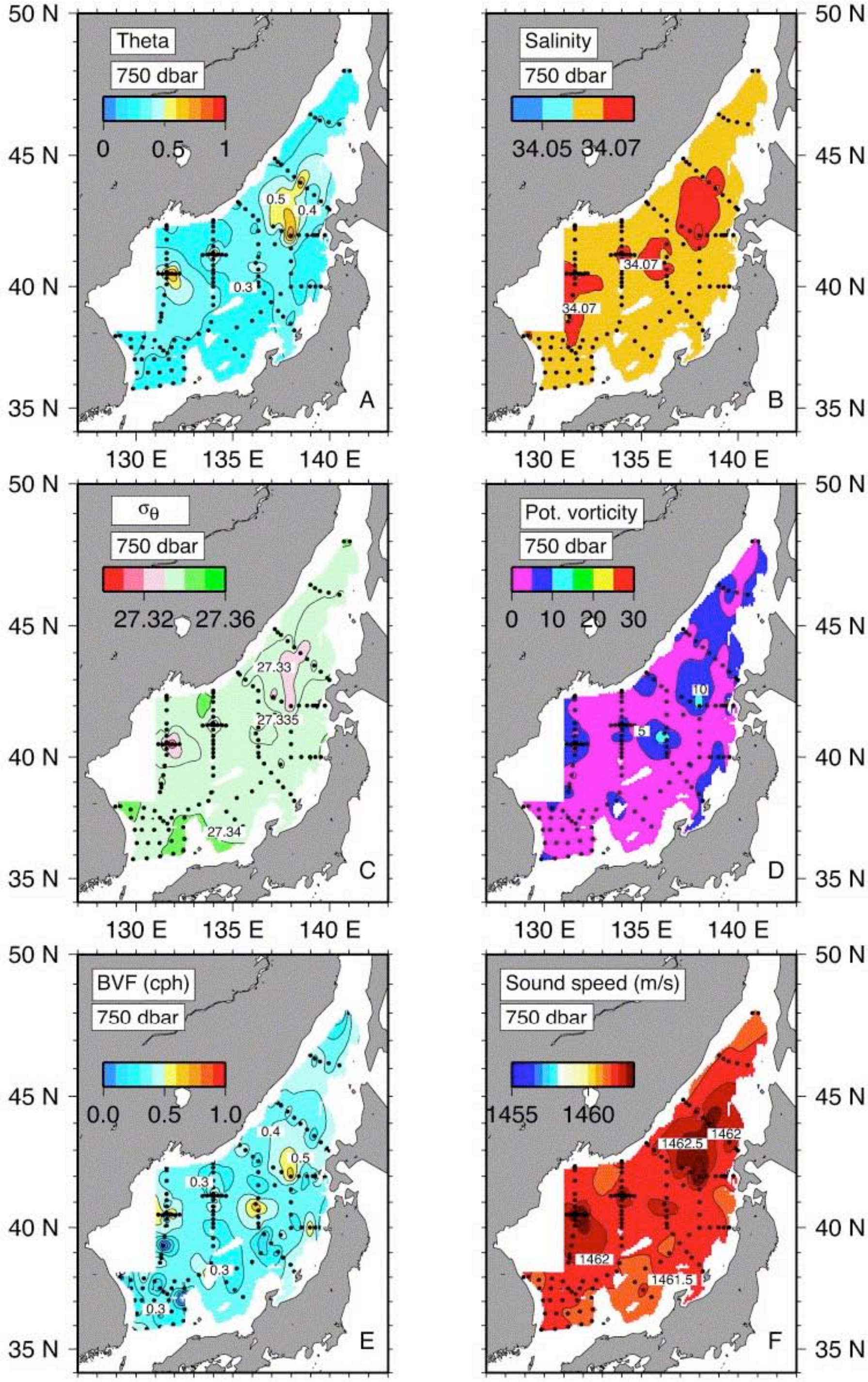
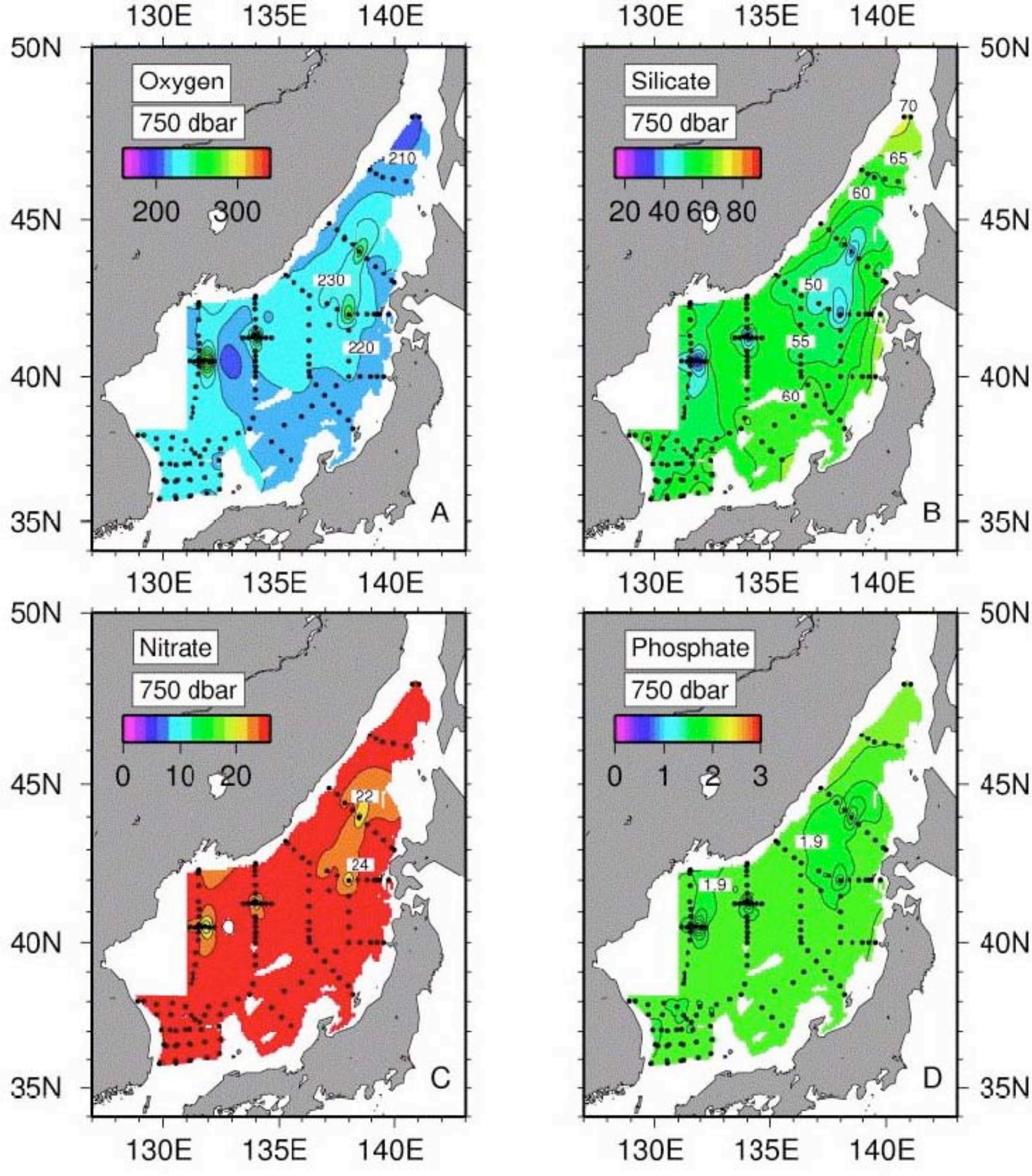


Figure D58. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 750 dbar.


Oxygen
750 dbar
200 300
210
230
220
A
Silicate
750 dbar
20 40 60 80
70
65
60
50
55
60
B
Nitrate
750 dbar
0 10 20
22
24
C
Phosphate
750 dbar
0 1 2 3
1.9
1.9
D
130E 135E 140E
50N 45N 40N 35N

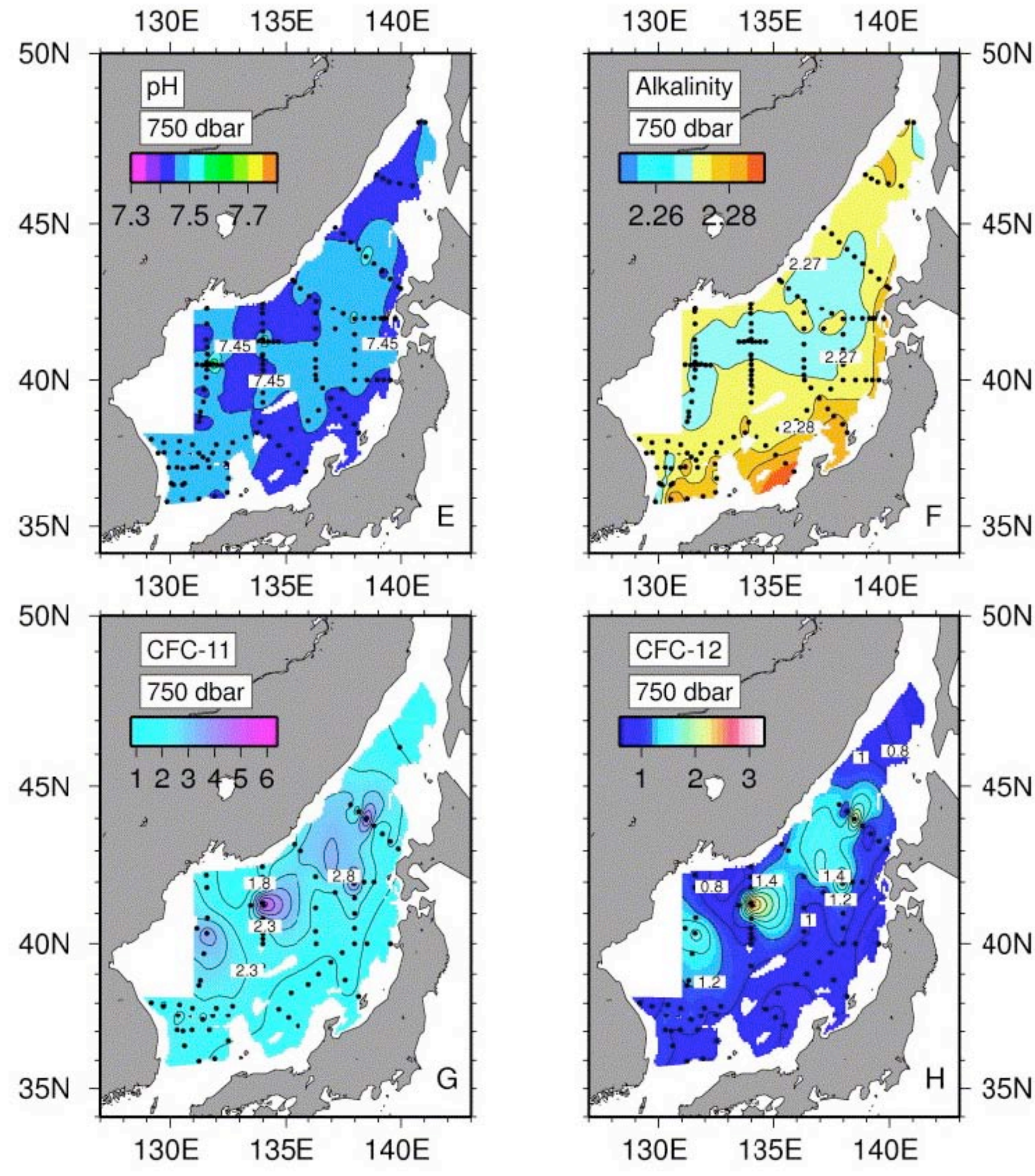


Figure D59. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 750 dbar.

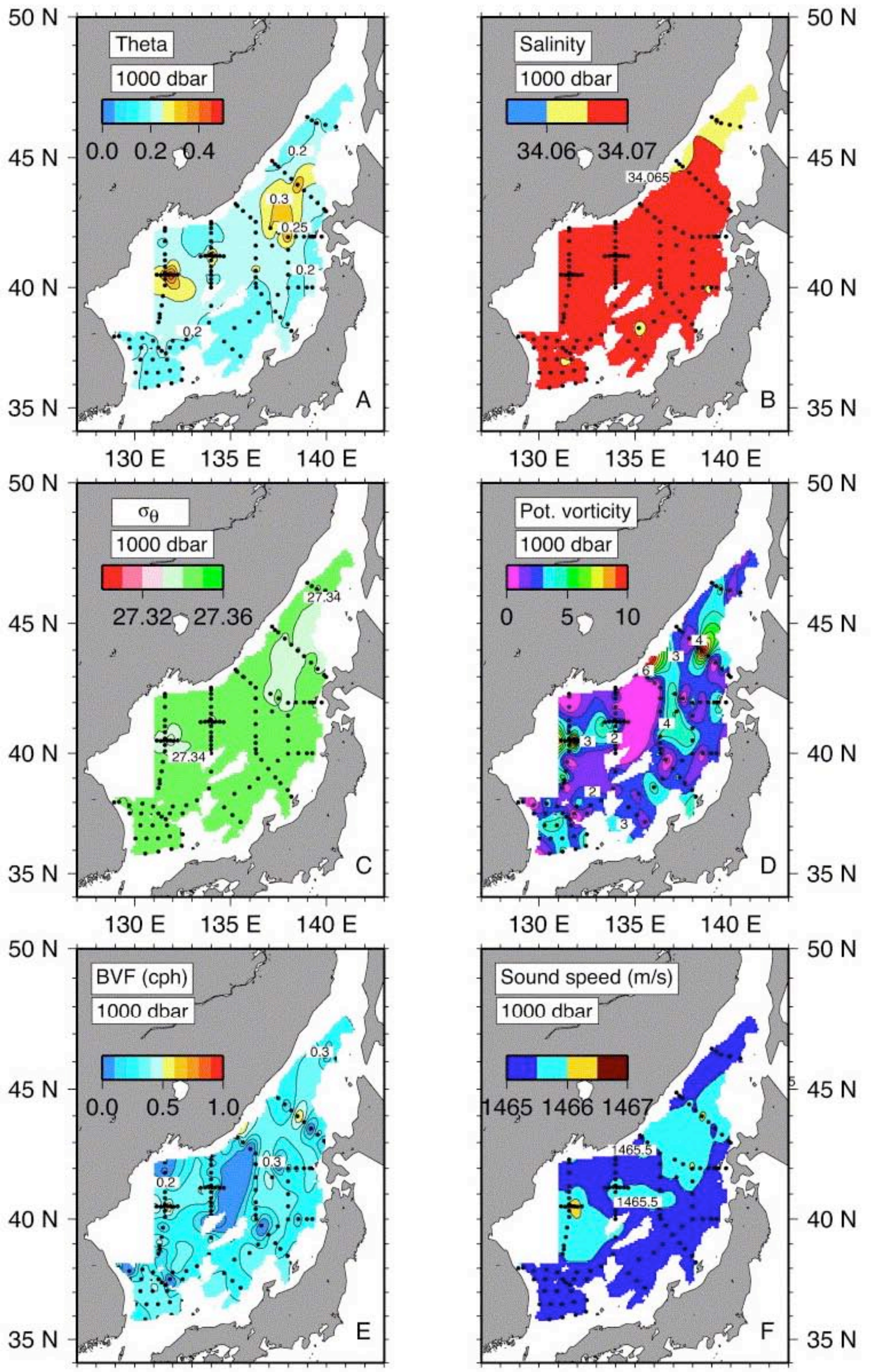
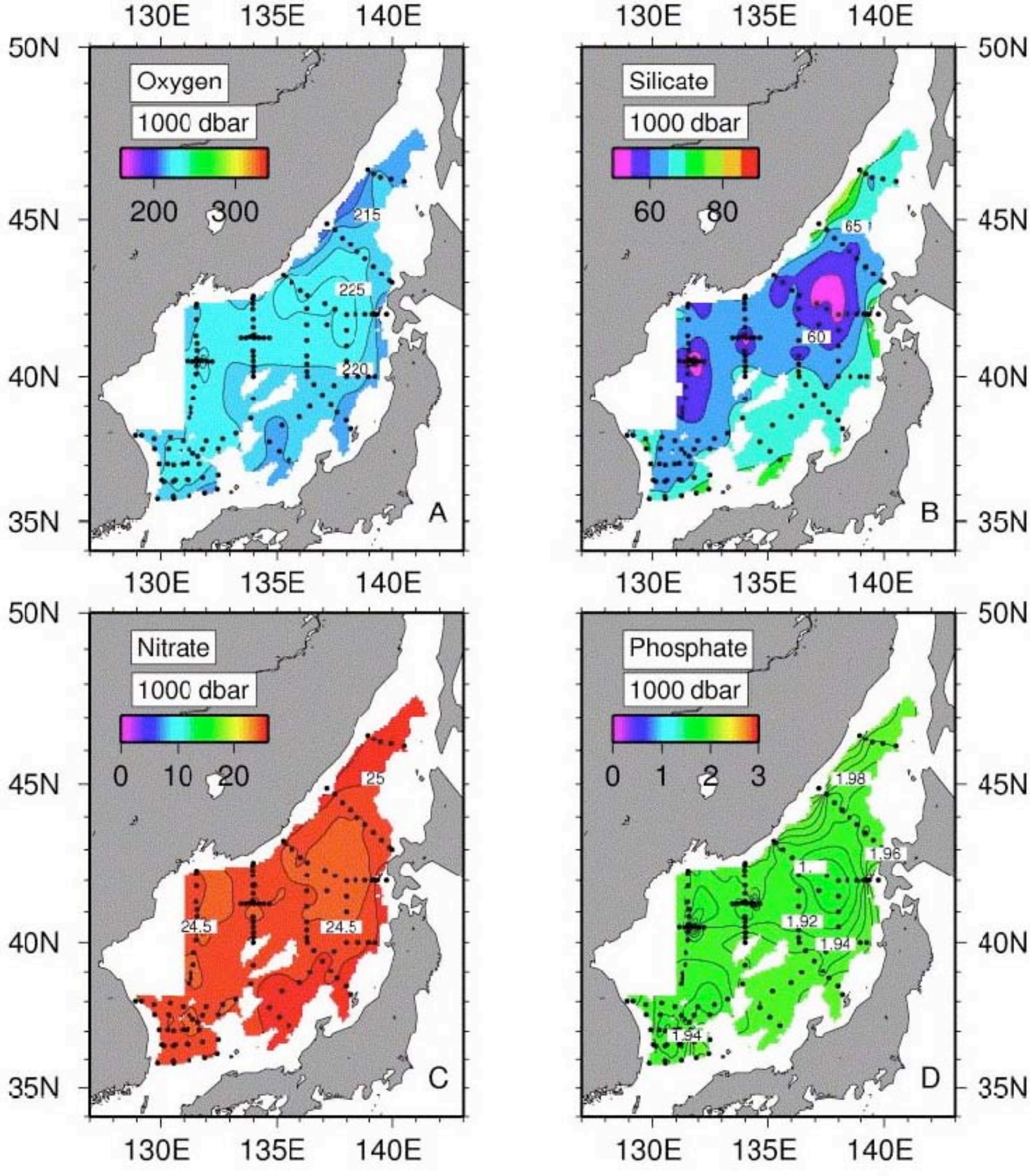


Figure D60. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 1000 dbar.



Oxygen
1000 dbar
200
300
215
225
220
A
Silicate
1000 dbar
60
80
65
60
B
Nitrate
1000 dbar
0
10
20
25
24.5
24.5
C
Phosphate
1000 dbar
0
1
2
3
1.98
1.96
1.92
1.94
1.94
D
130E
135E
140E
50N
45N
40N
35N

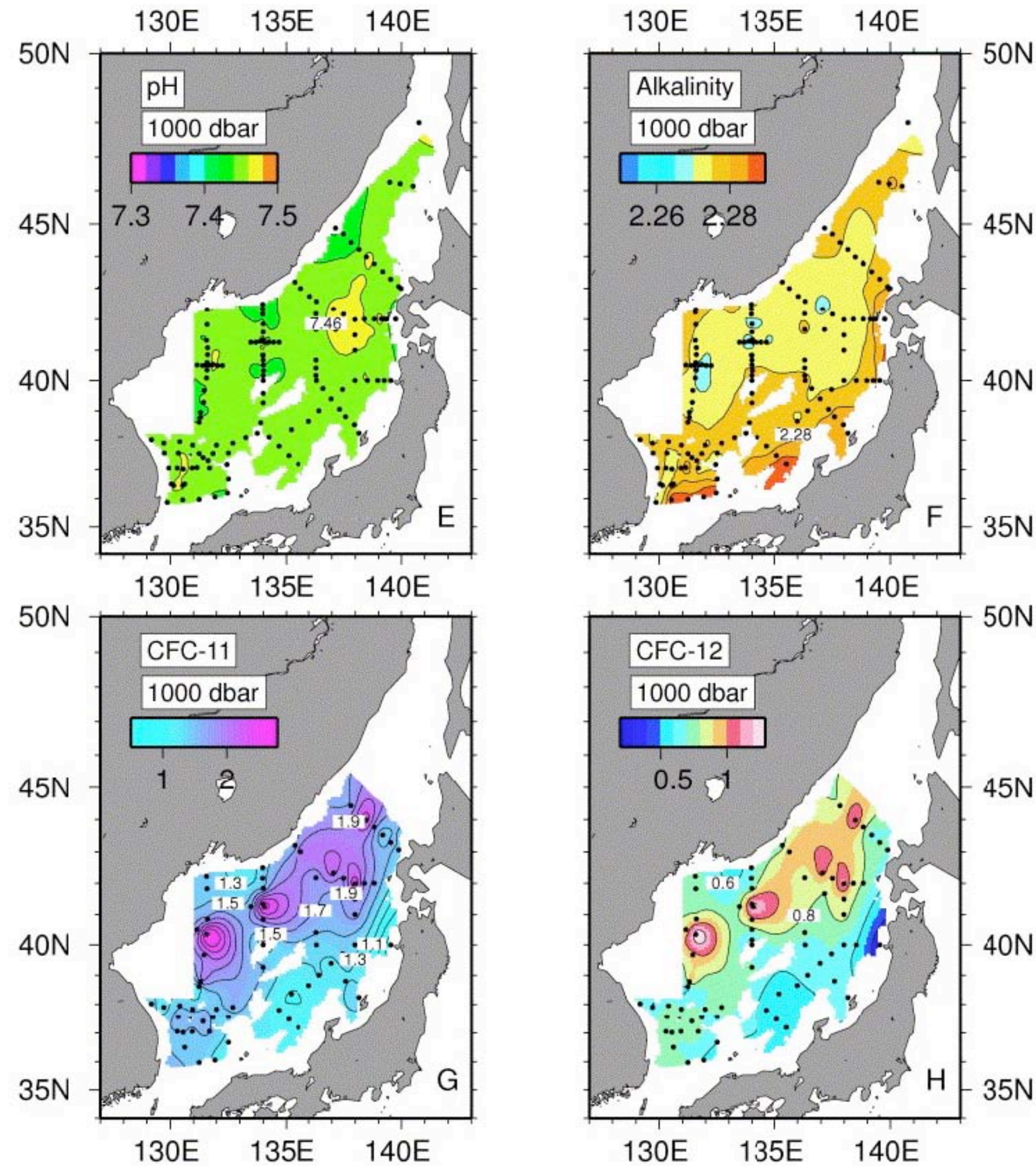


Figure D61. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 1000 dbar.

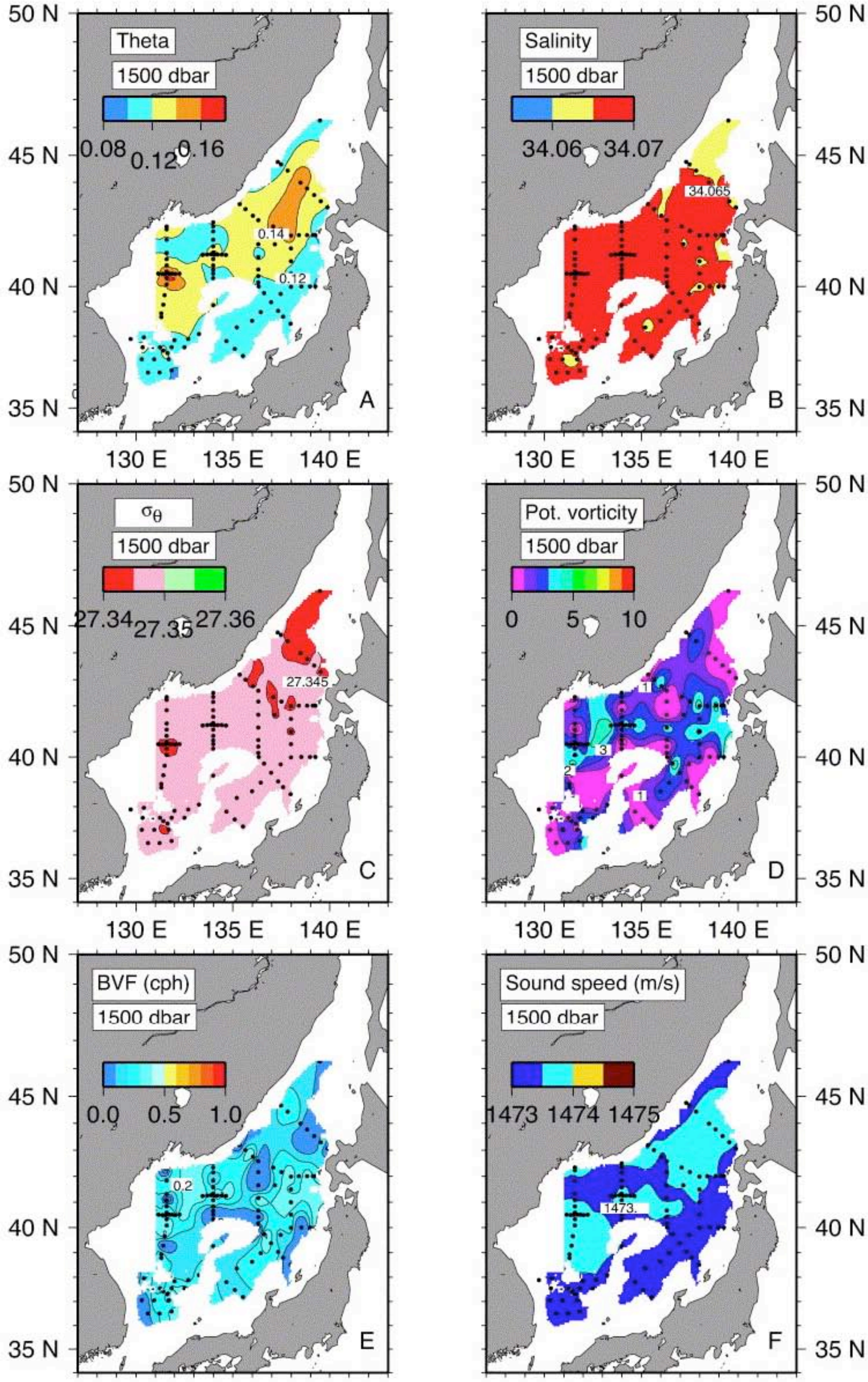
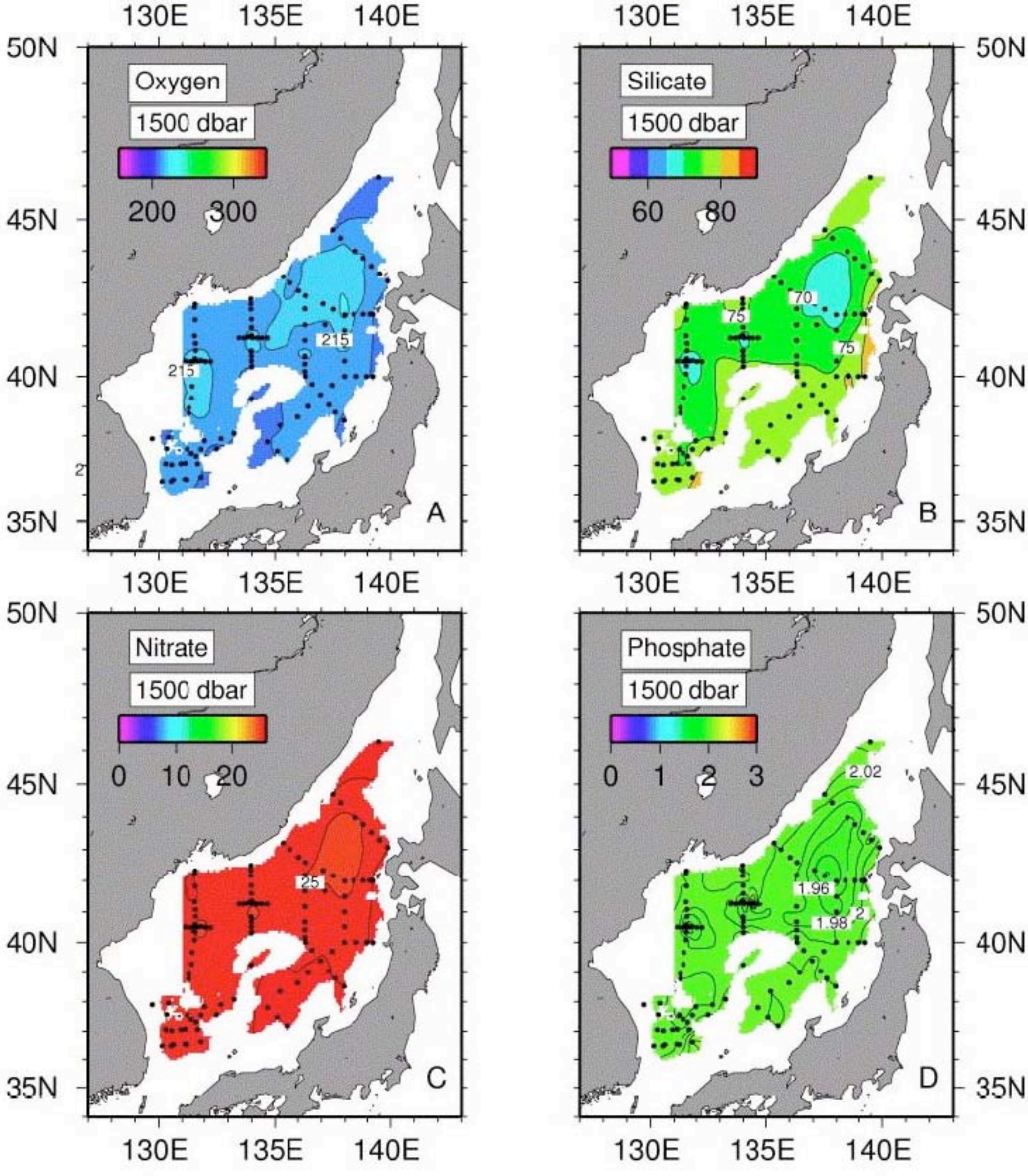


Figure D62. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 1500 dbar.


Oxygen
1500 dbar
200
300
215
A
Silicate
1500 dbar
60
80
75
70
B
Nitrate
1500 dbar
0
10
20
25
C
Phosphate
1500 dbar
0
1
2
3
2.02
1.96
1.98
D
130E
135E
140E
50N
45N
40N
35N

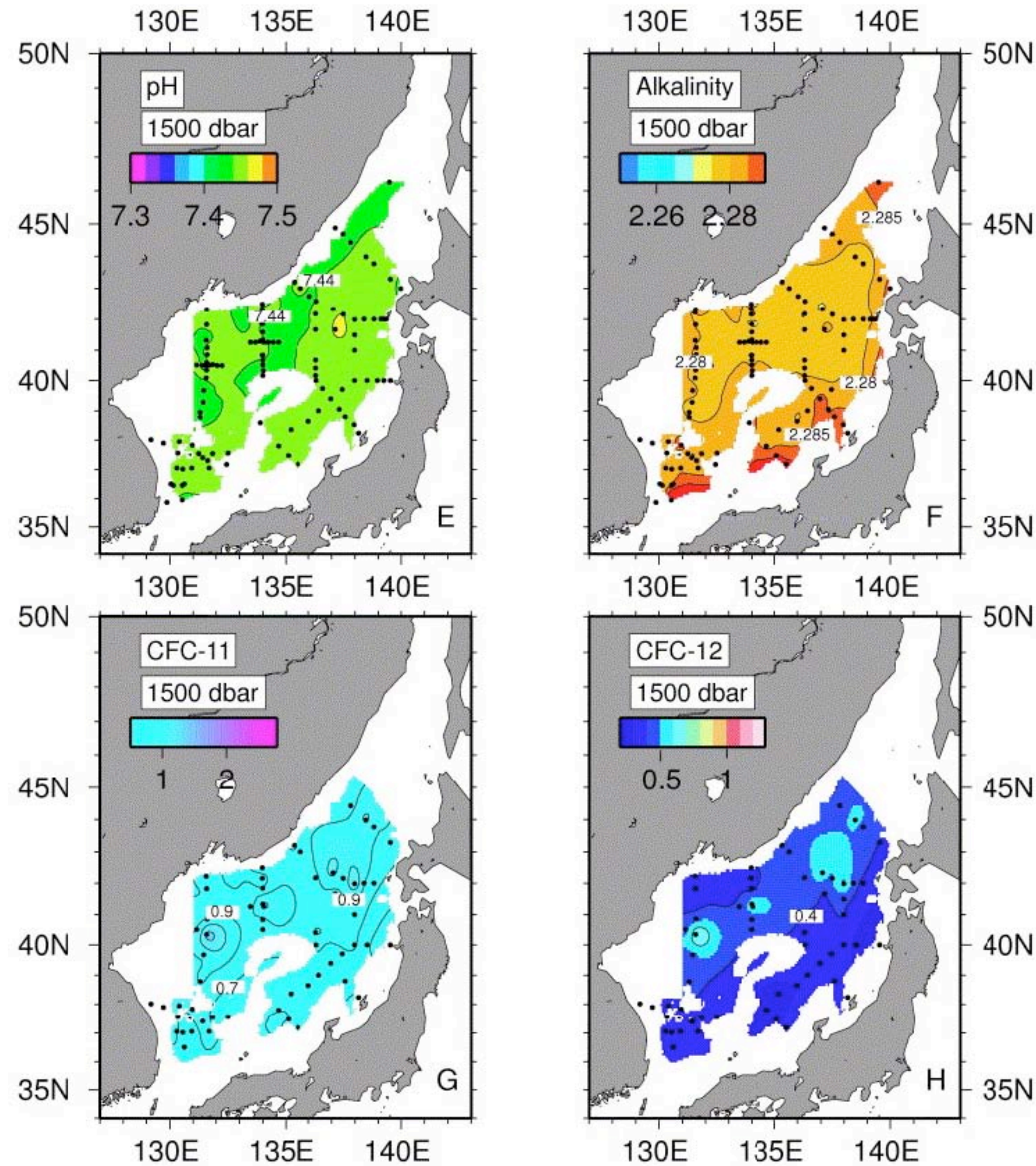


Figure D63. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 1500 dbar.

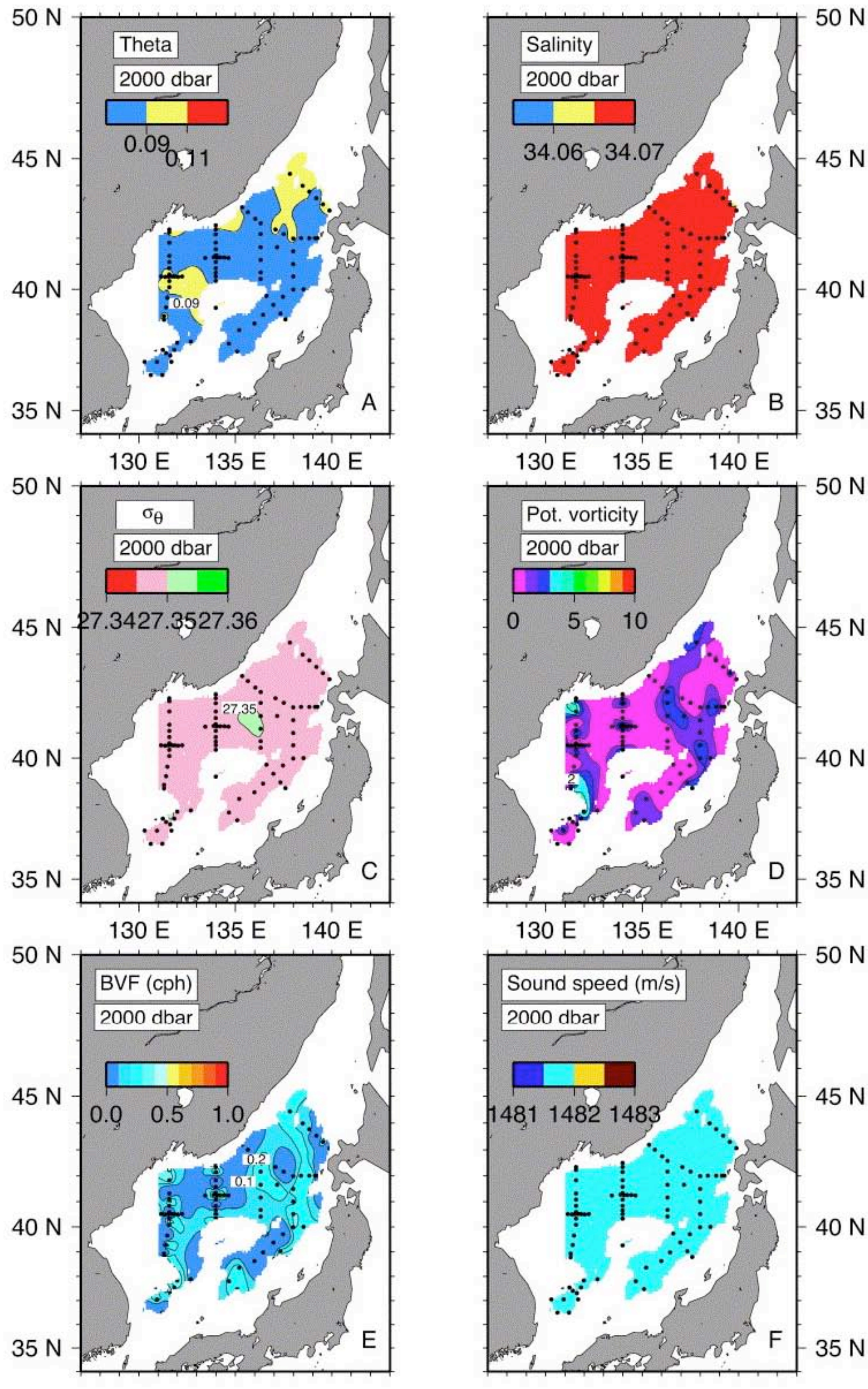
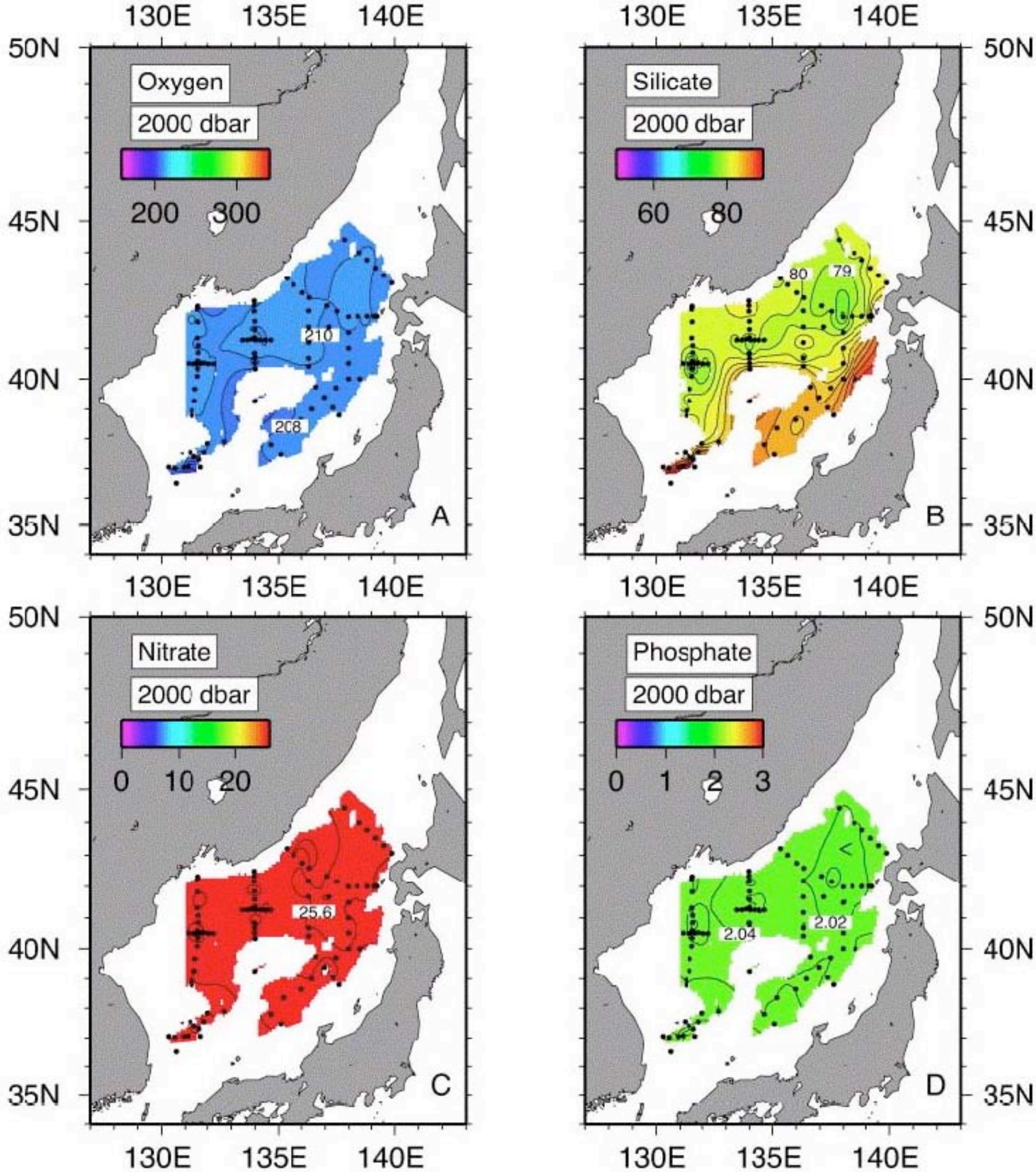


Figure D64. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 2000 dbar.


Oxygen
2000 dbar
200
300
210
208
A
Silicate
2000 dbar
60
80
80
79
B
Nitrate
2000 dbar
0
10
20
25.6
C
Phosphate
2000 dbar
0
1
2
3
2.04
2.02
D
130E
135E
140E
50N
45N
40N
35N

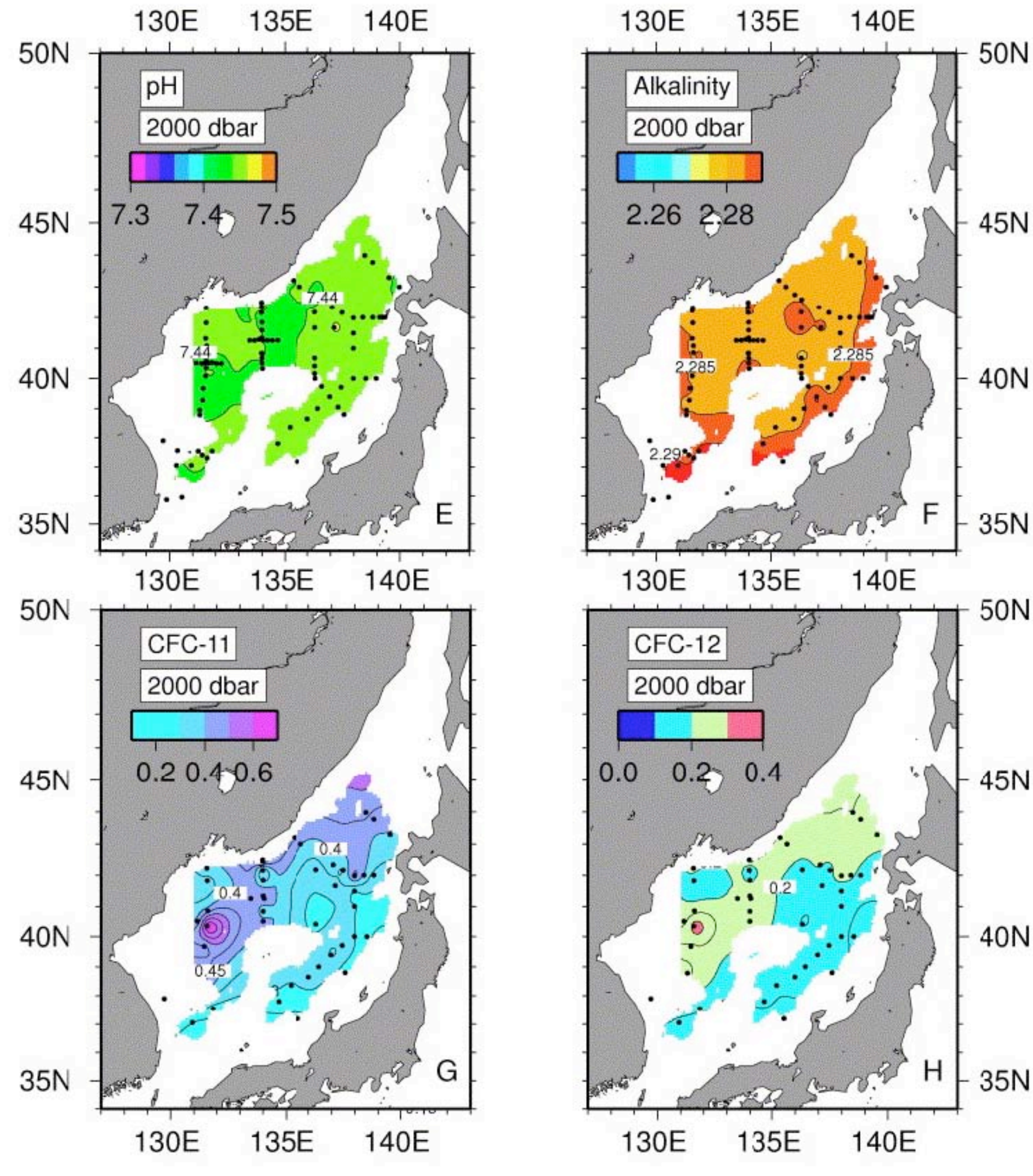


Figure D65. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 2000 dbar.

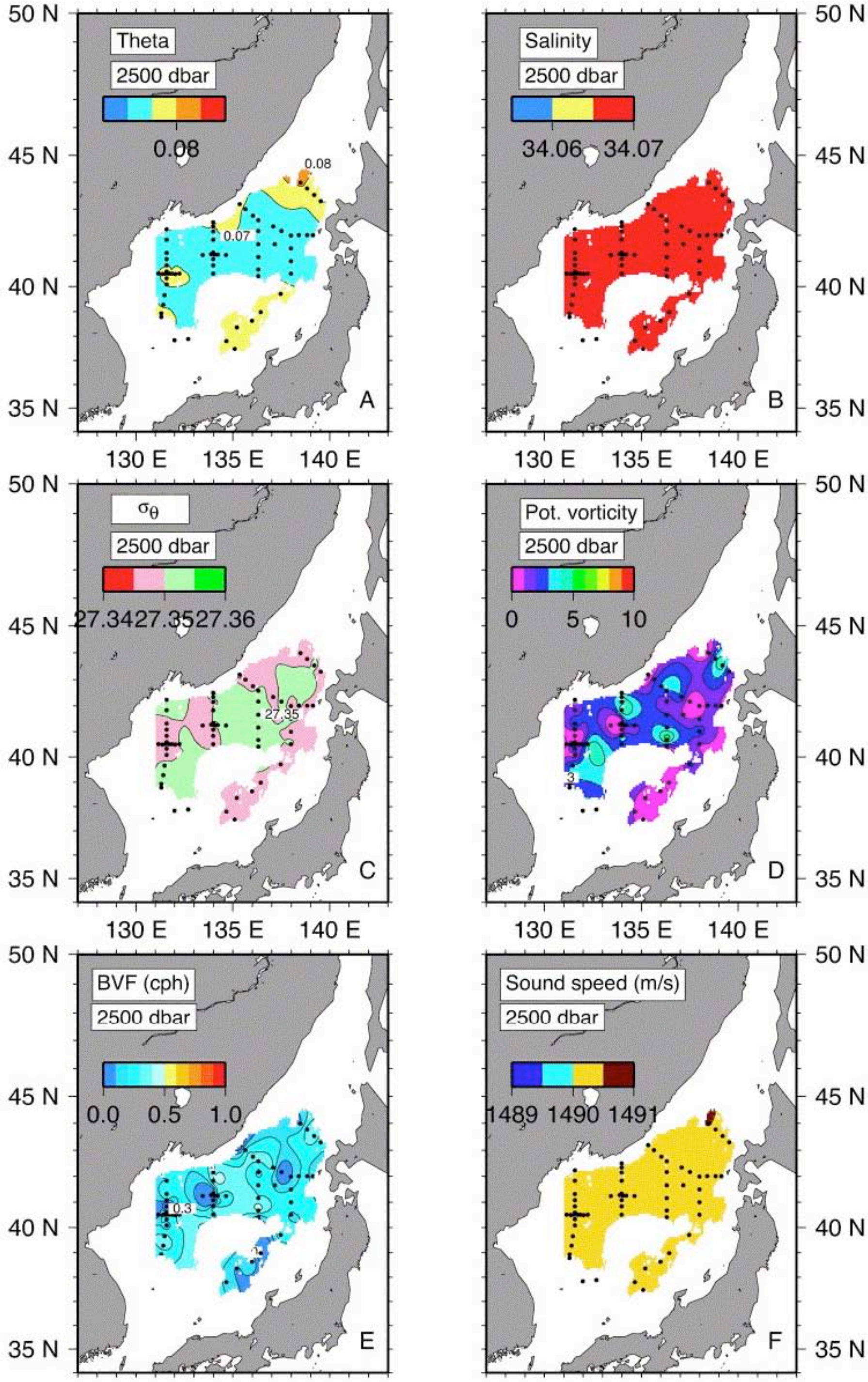
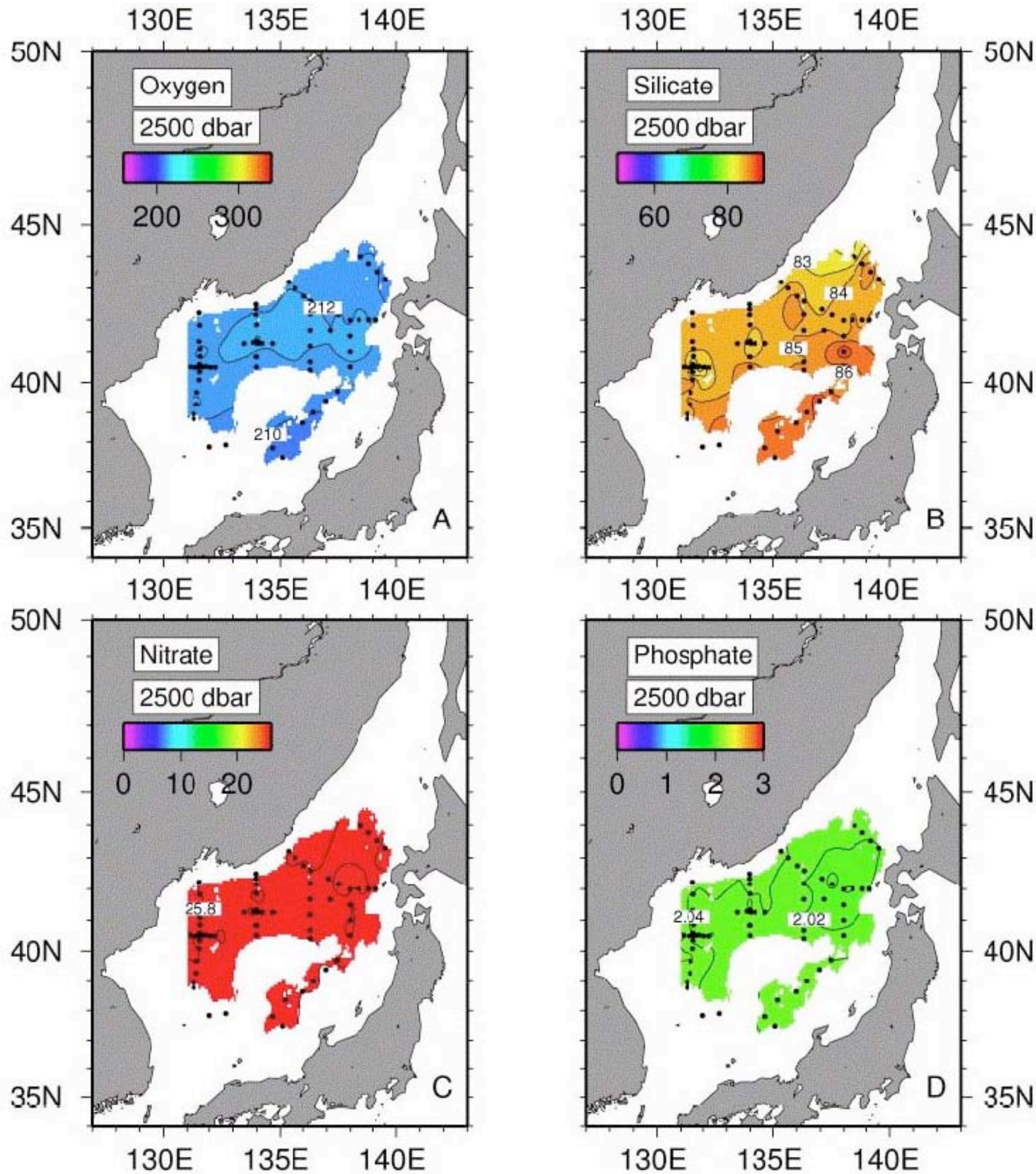


Figure D66. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 2500 dbar.



Oxygen
2500 dbar
200 300
212
210
A
Silicate
2500 dbar
60 80
83
84
85
86
B
Nitrate
2500 dbar
0 10 20
25.8
C
Phosphate
2500 dbar
0 1 2 3
2.04
2.02
D
130E 135E 140E
50N 45N 40N 35N

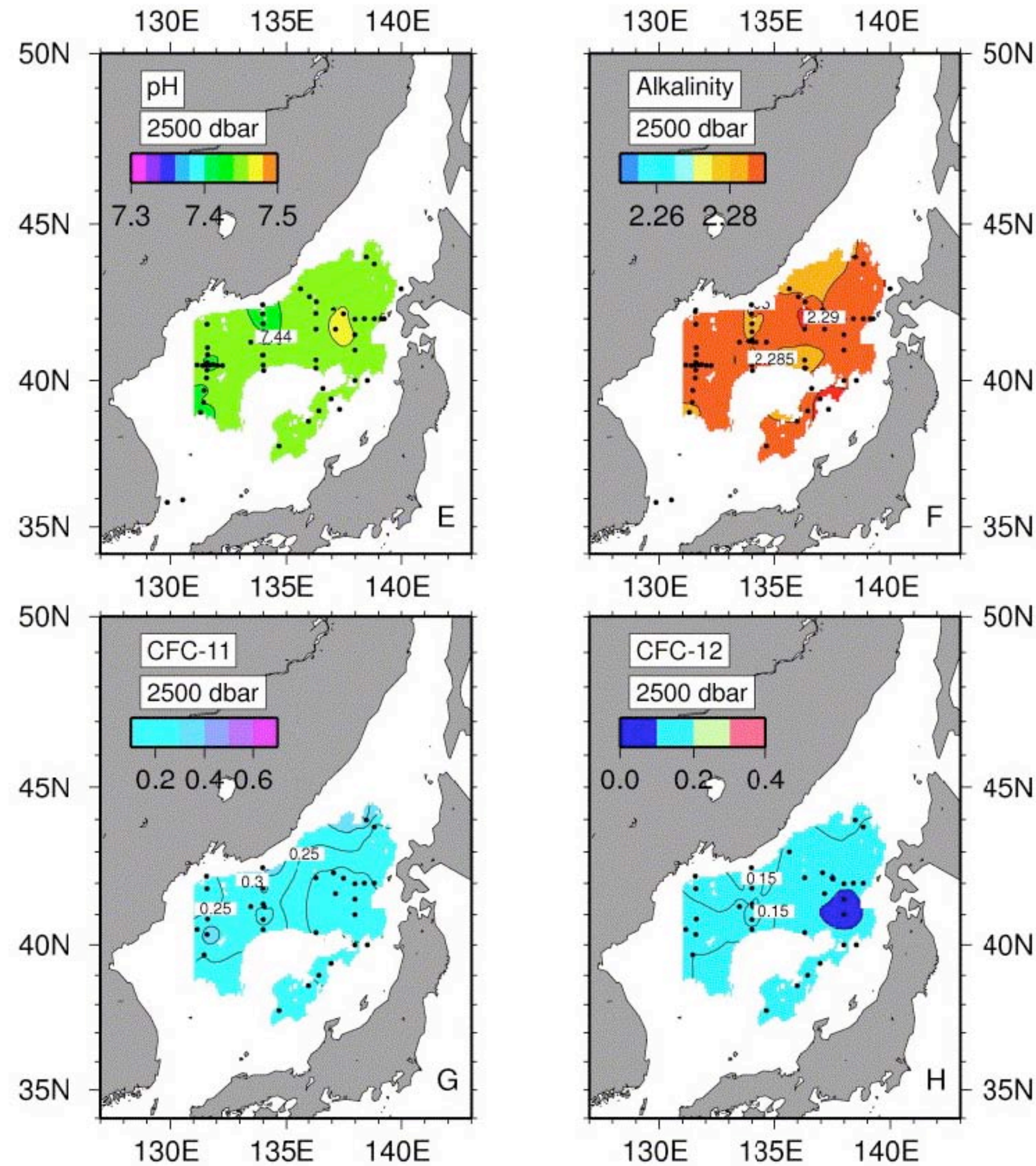


Figure D67. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 2500 dbar.

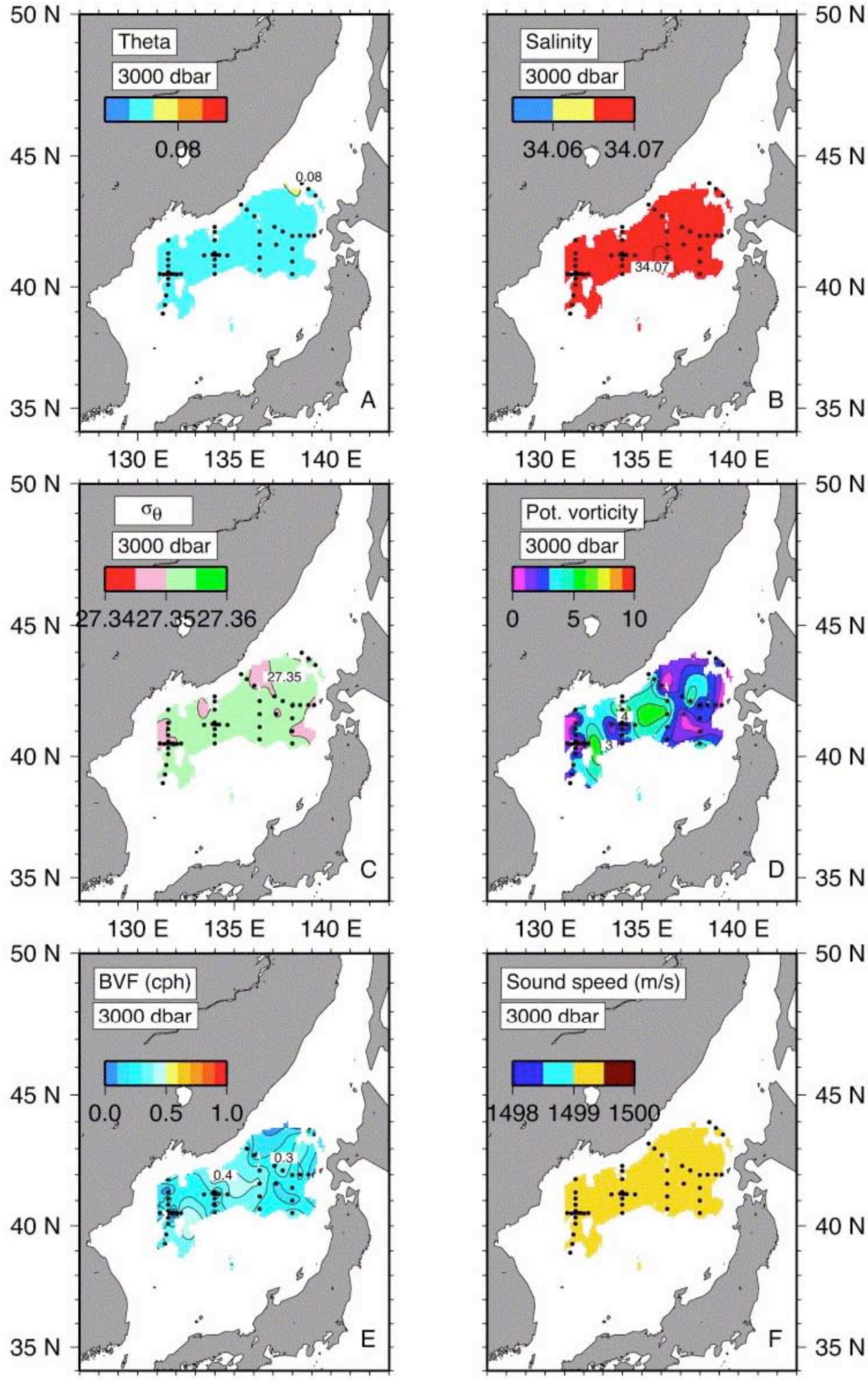
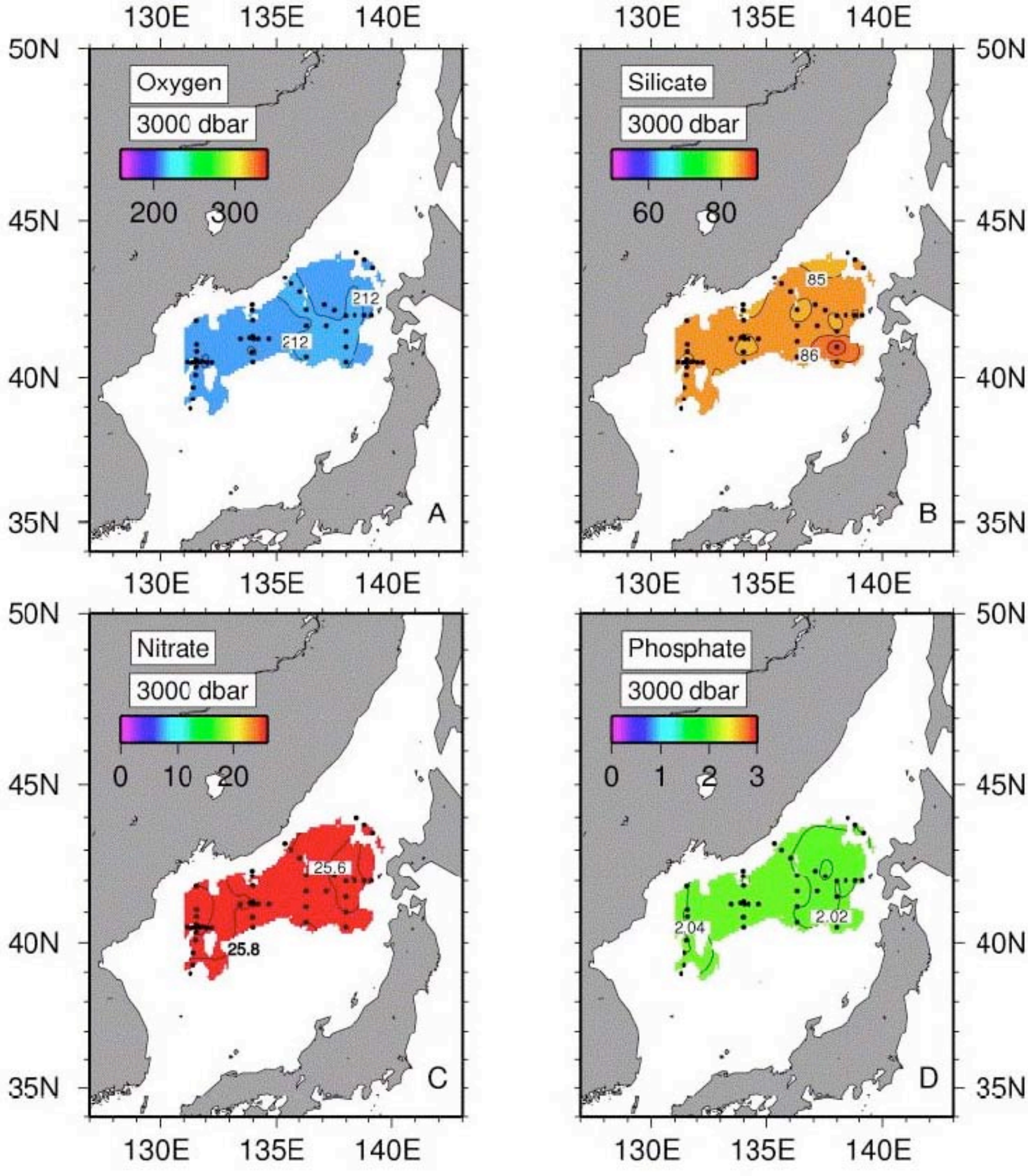


Figure D68. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 3000 dbar.



Oxygen
3000 dbar
200
300
212
212
A
Silicate
3000 dbar
60
80
85
86
B
Nitrate
3000 dbar
0
10
20
25.6
25.8
C
Phosphate
3000 dbar
0
1
2
3
2.04
2.02
D
130E
135E
140E
50N
45N
40N
35N

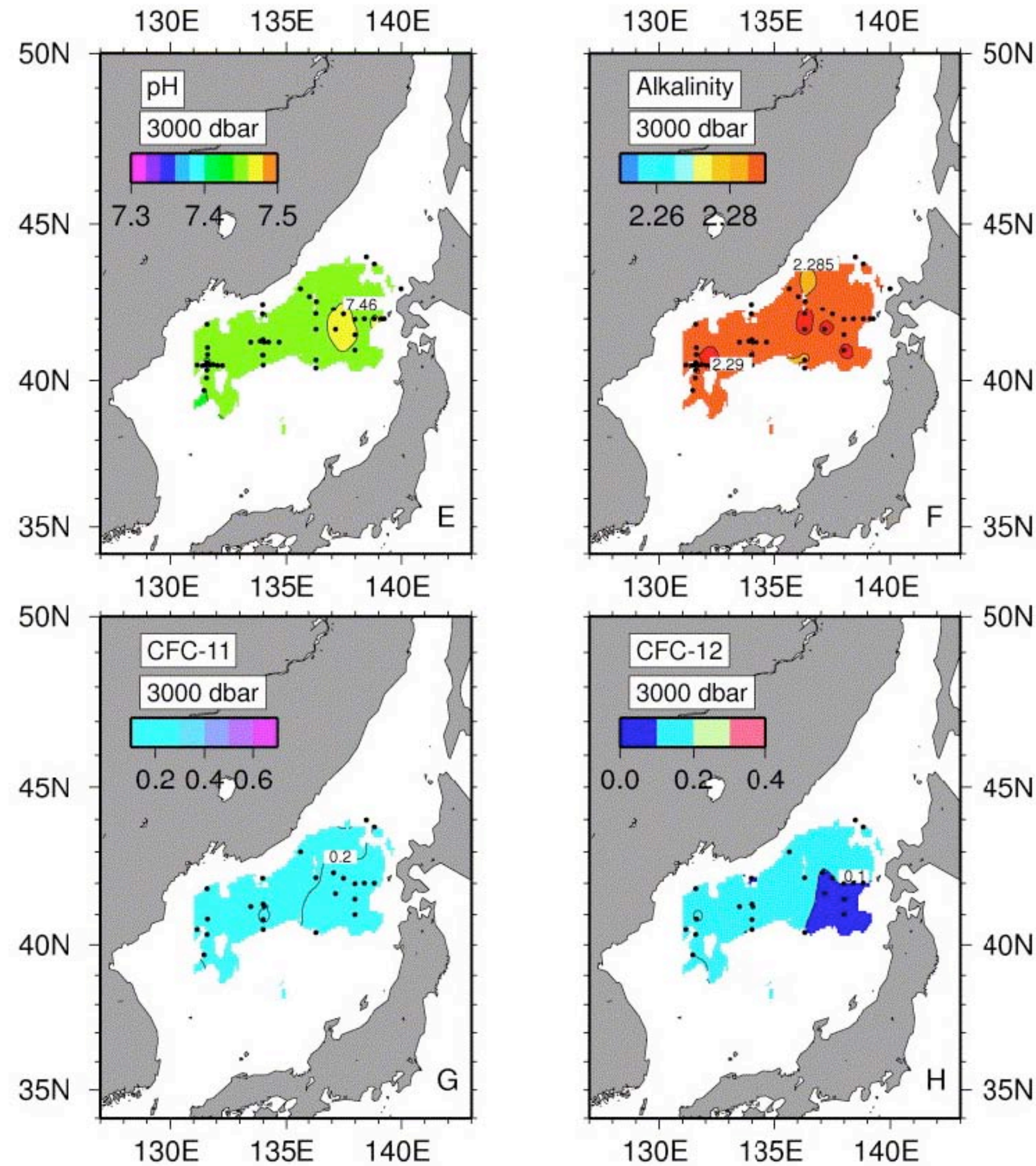


Figure D69. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 3000 dbar.

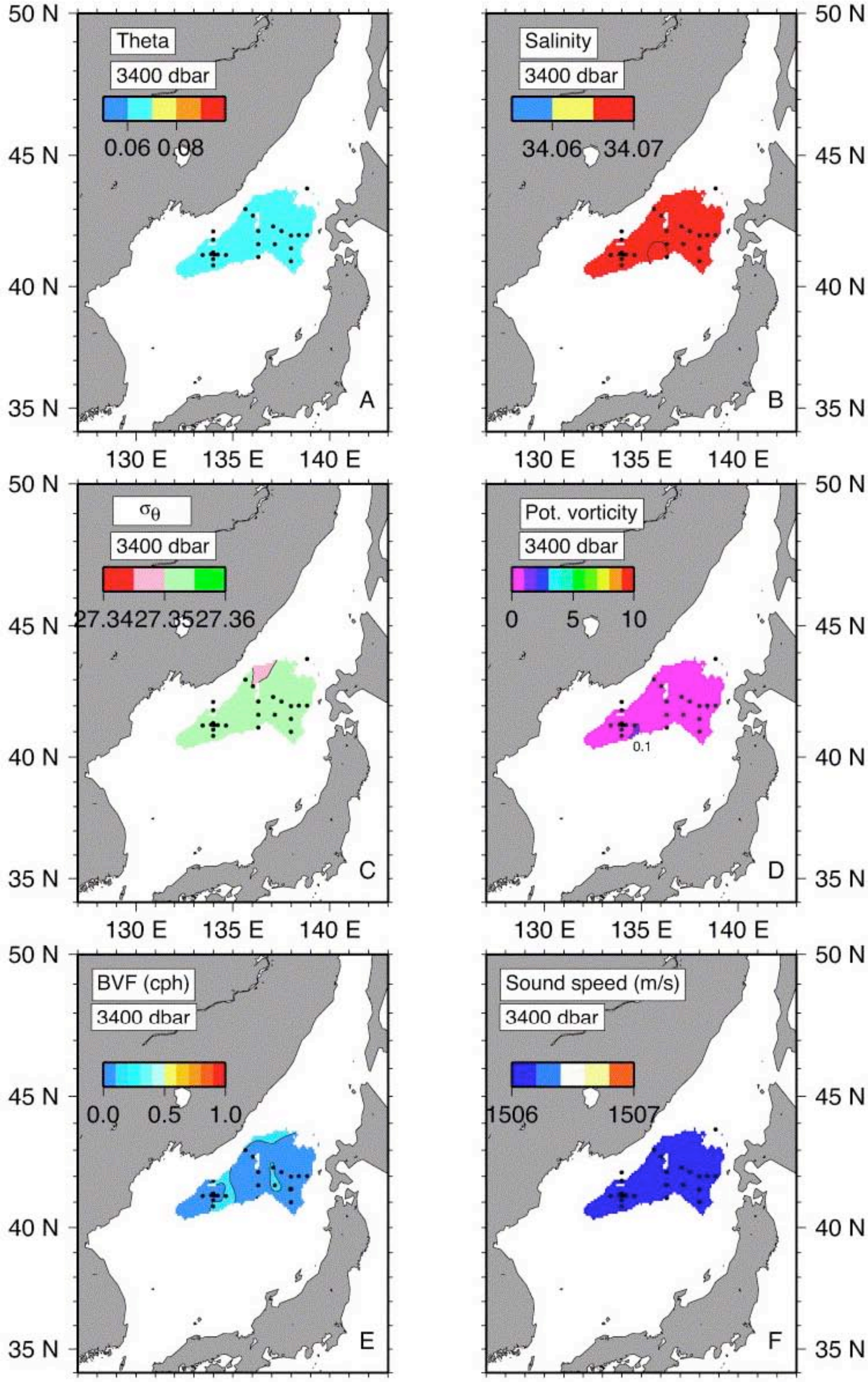
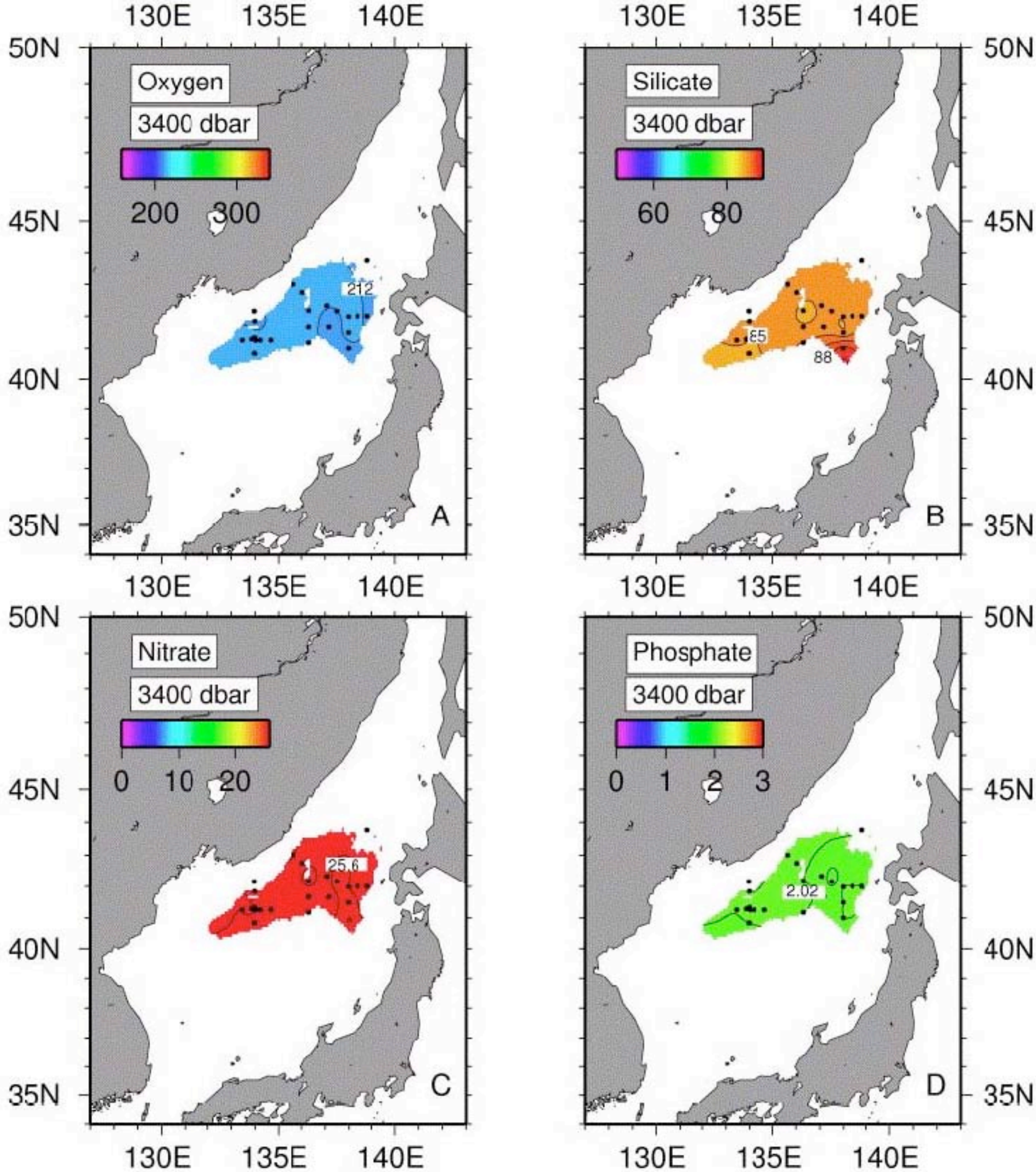


Figure D70. Maps of (a) potential temperature (°C), (b) salinity, (c) potential density (σ_θ), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}), (e) Brunt-Vaisala frequency (cph), and (f) sound speed (m/sec) at 3400 dbar.


Oxygen
3400 dbar
200 300
212
A
Silicate
3400 dbar
60 80
85
88
B
Nitrate
3400 dbar
0 10 20
25.6
C
Phosphate
3400 dbar
0 1 2 3
2.02
D
130E 135E 140E
50N 45N 40N 35N

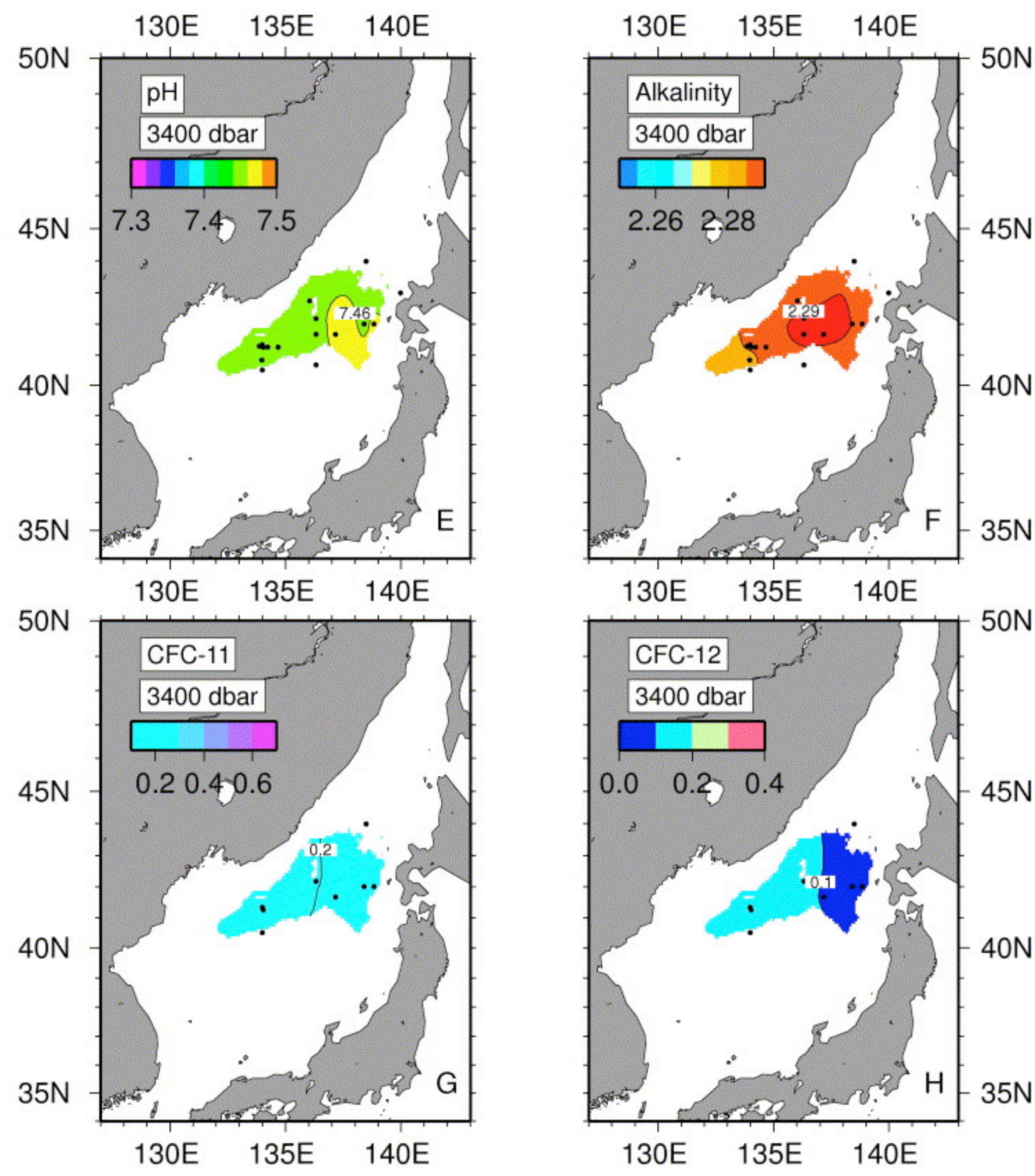


Figure D71. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 3400 dbar.

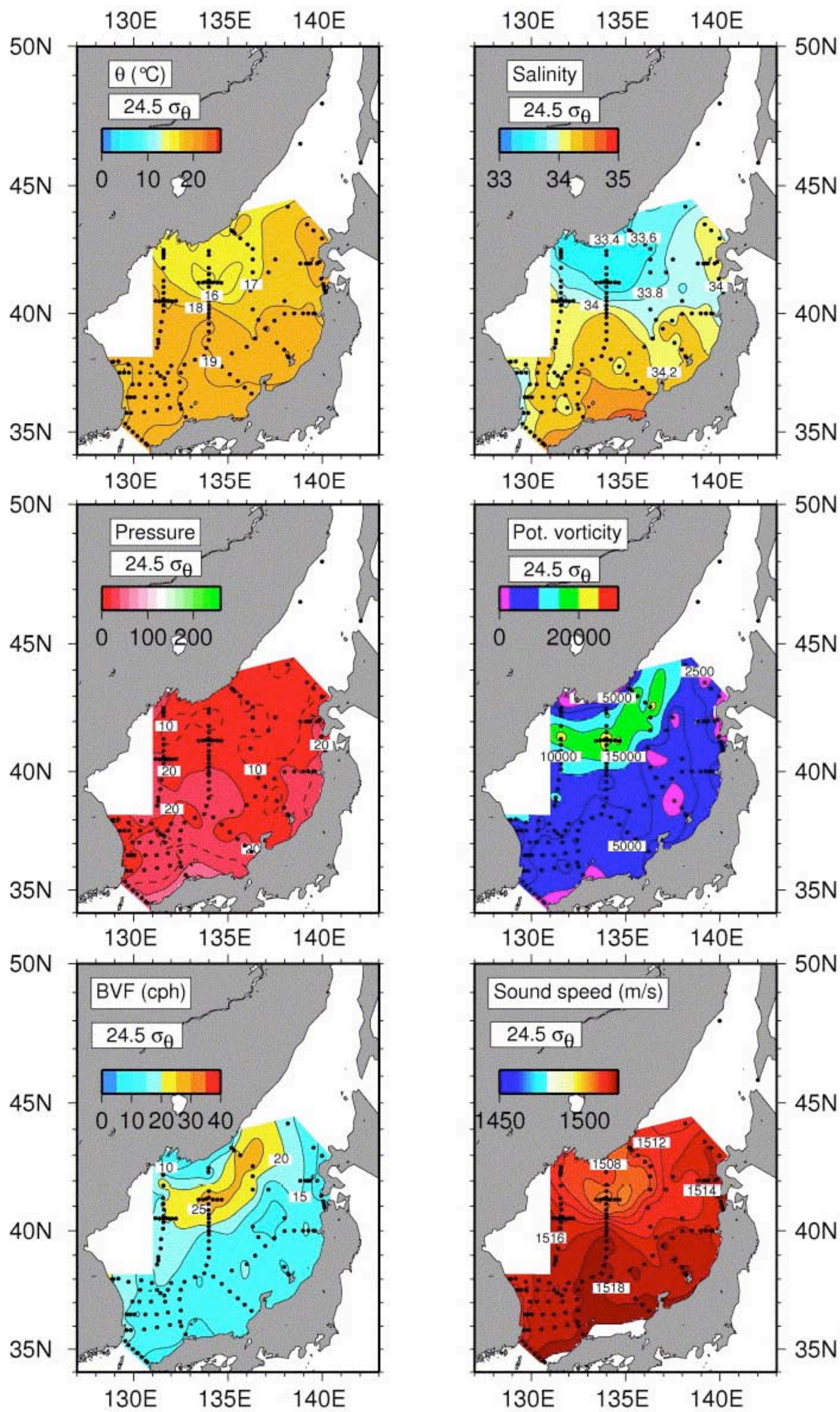
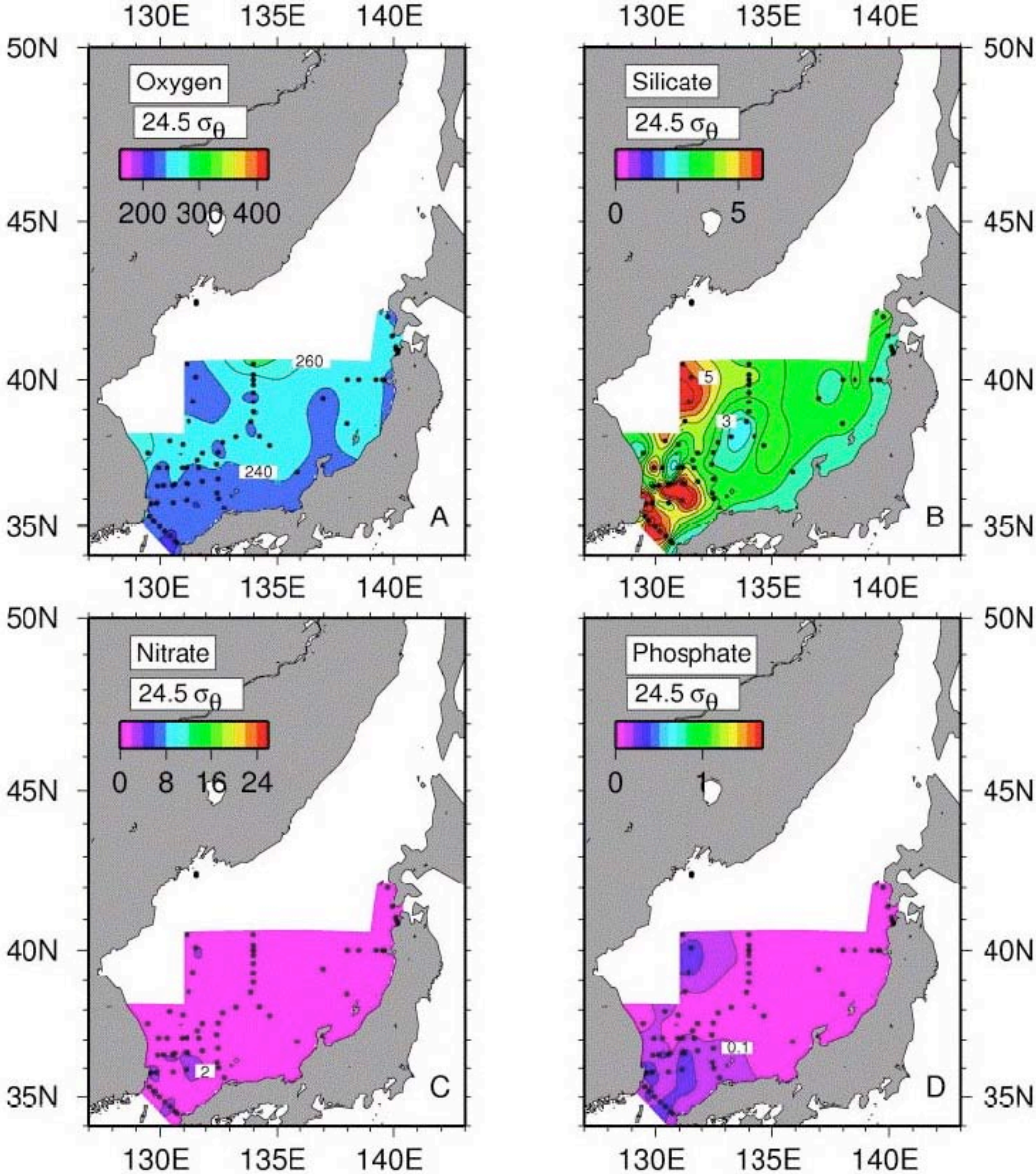


Figure D72. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 24.5 σ_θ.


Oxygen
24.5 σθ
200 300 400
260
240
A
Silicate
24.5 σθ
0 5
5
3
B
Nitrate
24.5 σθ
0 8 16 24
2
C
Phosphate
24.5 σθ
0 1
0.1
D
130E 135E 140E
50N 45N 40N 35N

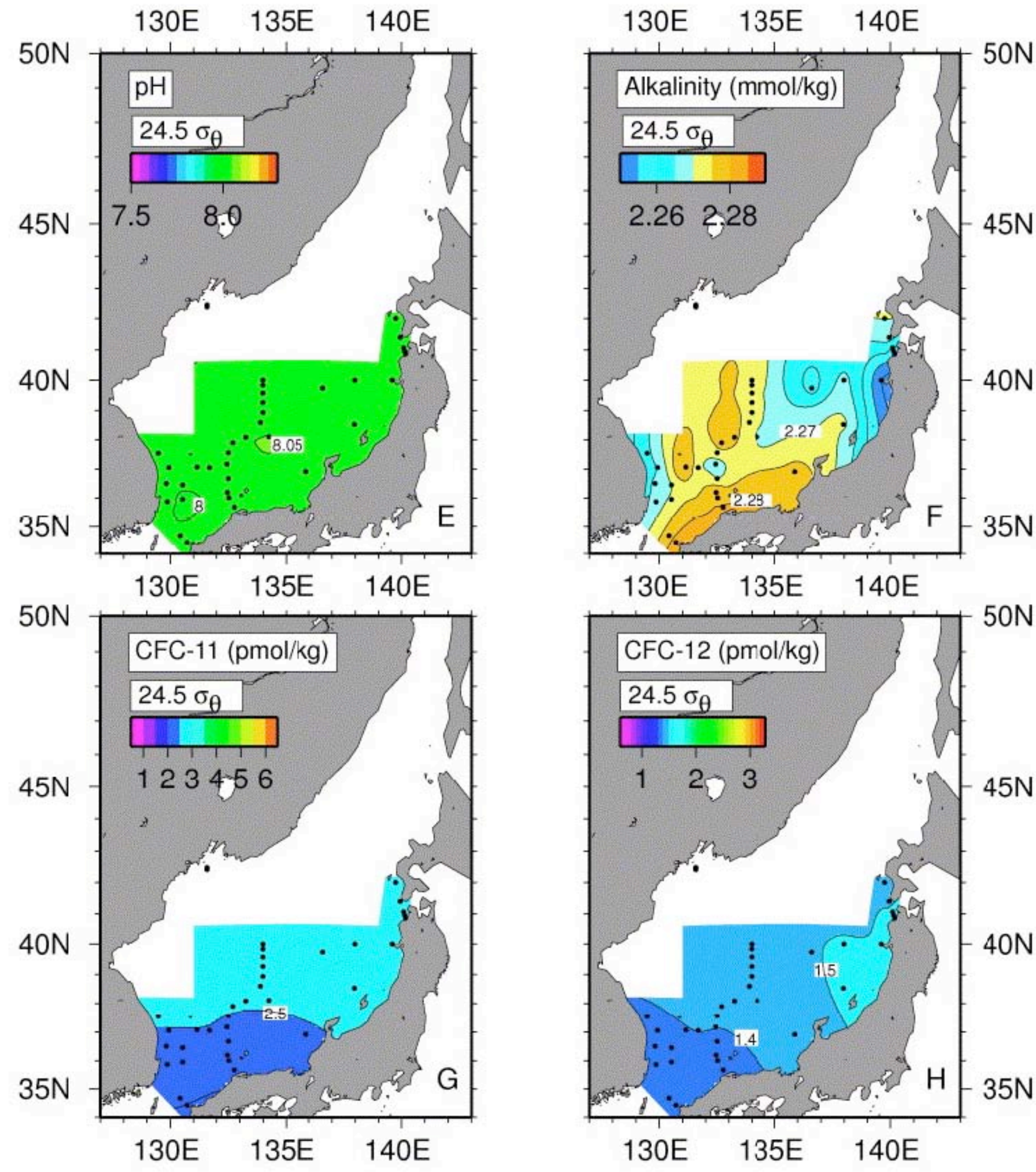


Figure D73. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 24.5 σ_θ.

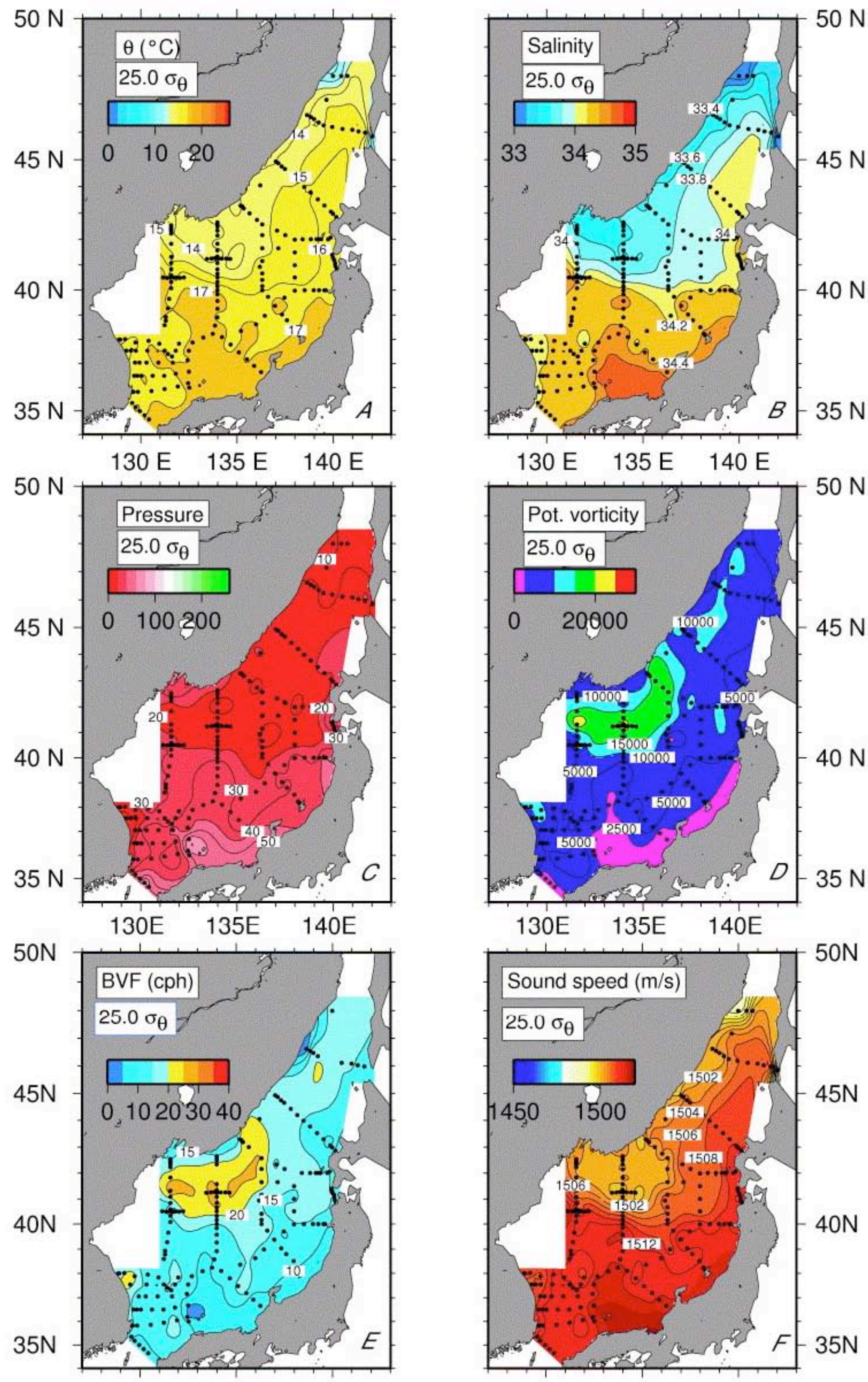
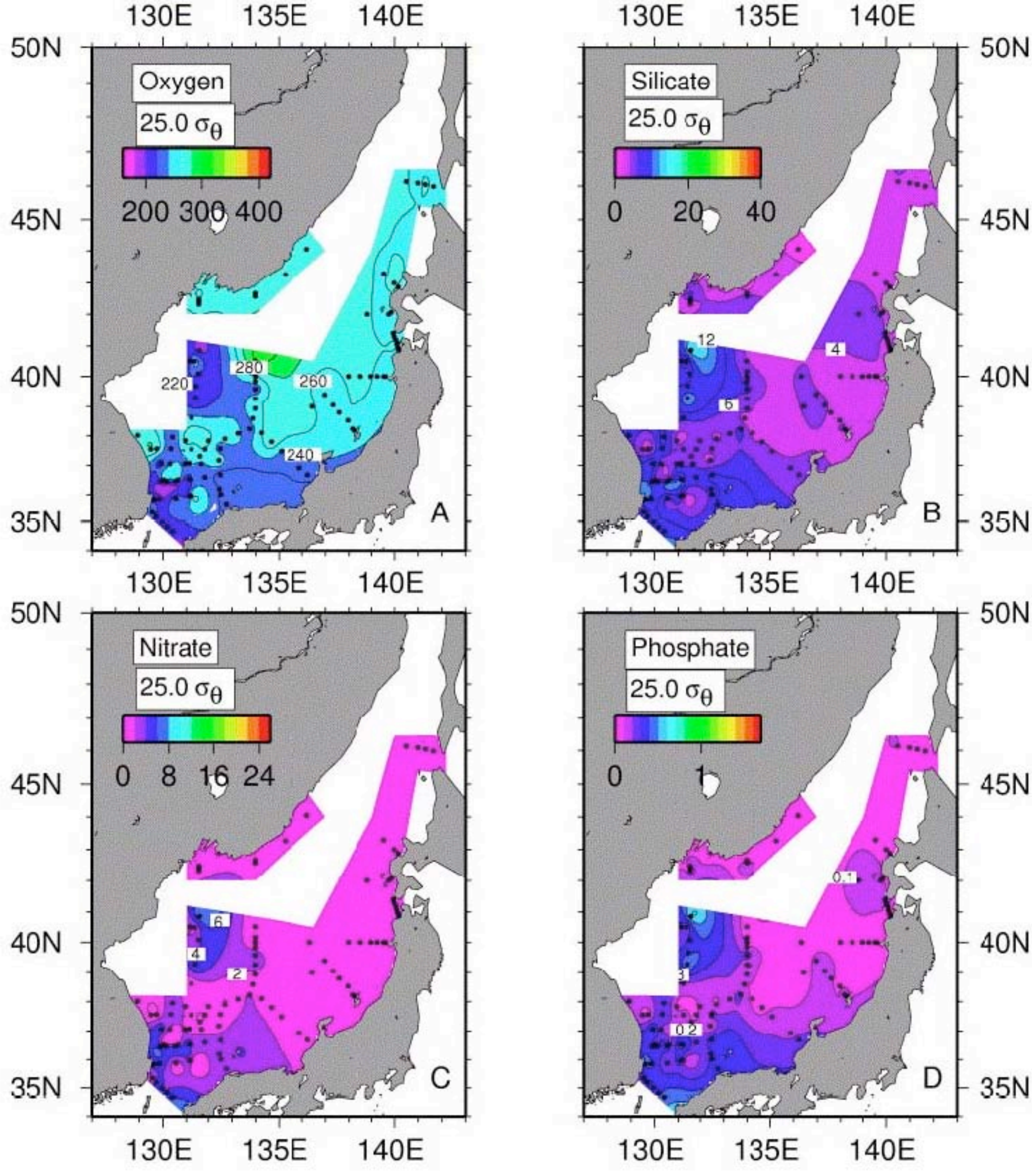


Figure D74. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 25.0 σ_θ.


Oxygen
25.0 σ_θ
200 300 400
220
280
260
240
A
Silicate
25.0 σ_θ
0 20 40
12
4
6
B
Nitrate
25.0 σ_θ
0 8 16 24
6
4
2
C
Phosphate
25.0 σ_θ
0 1
0.1
0.2
D
130E 135E 140E
50N 45N 40N 35N

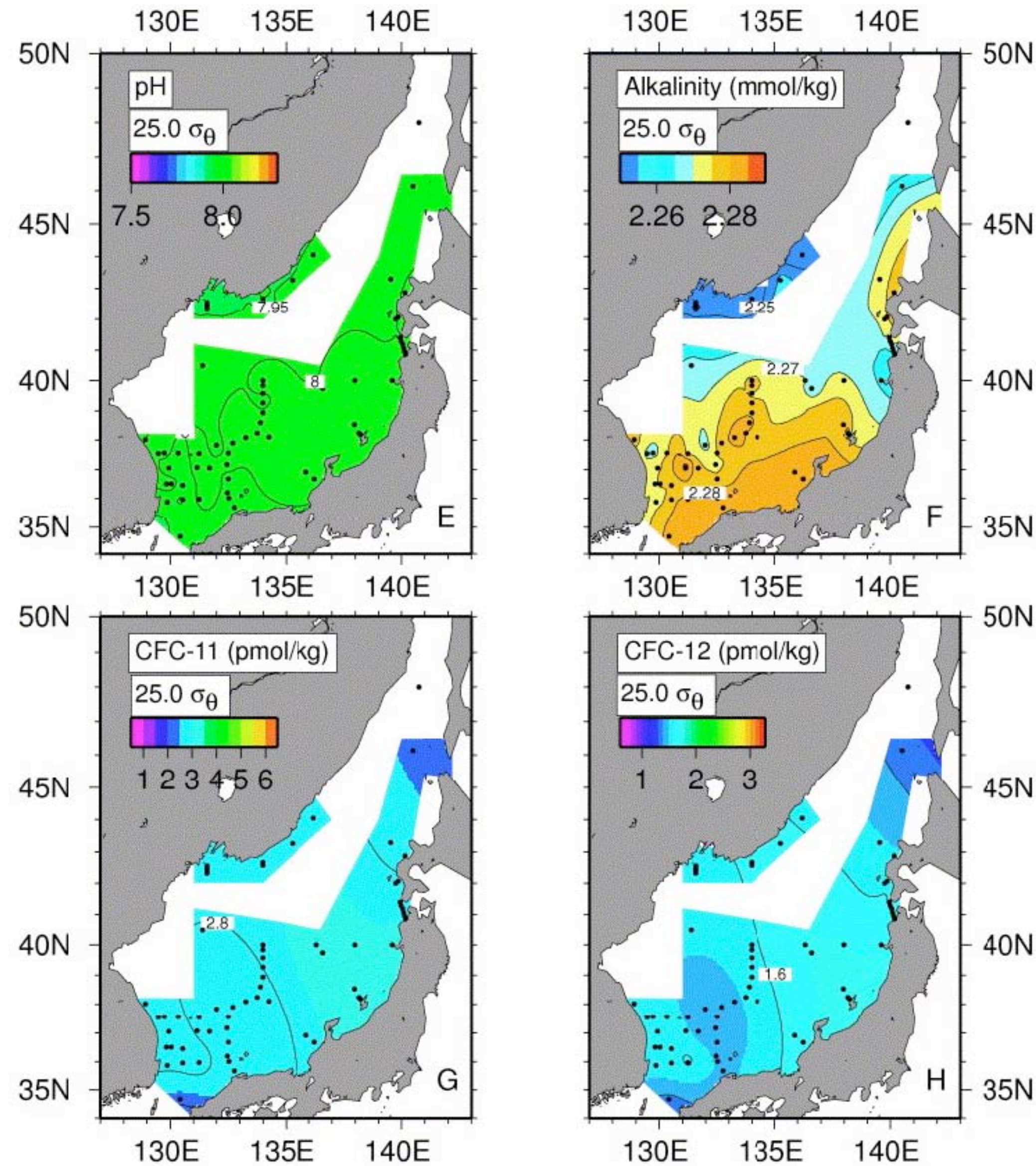


Figure D75. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 25.0 σ_θ.

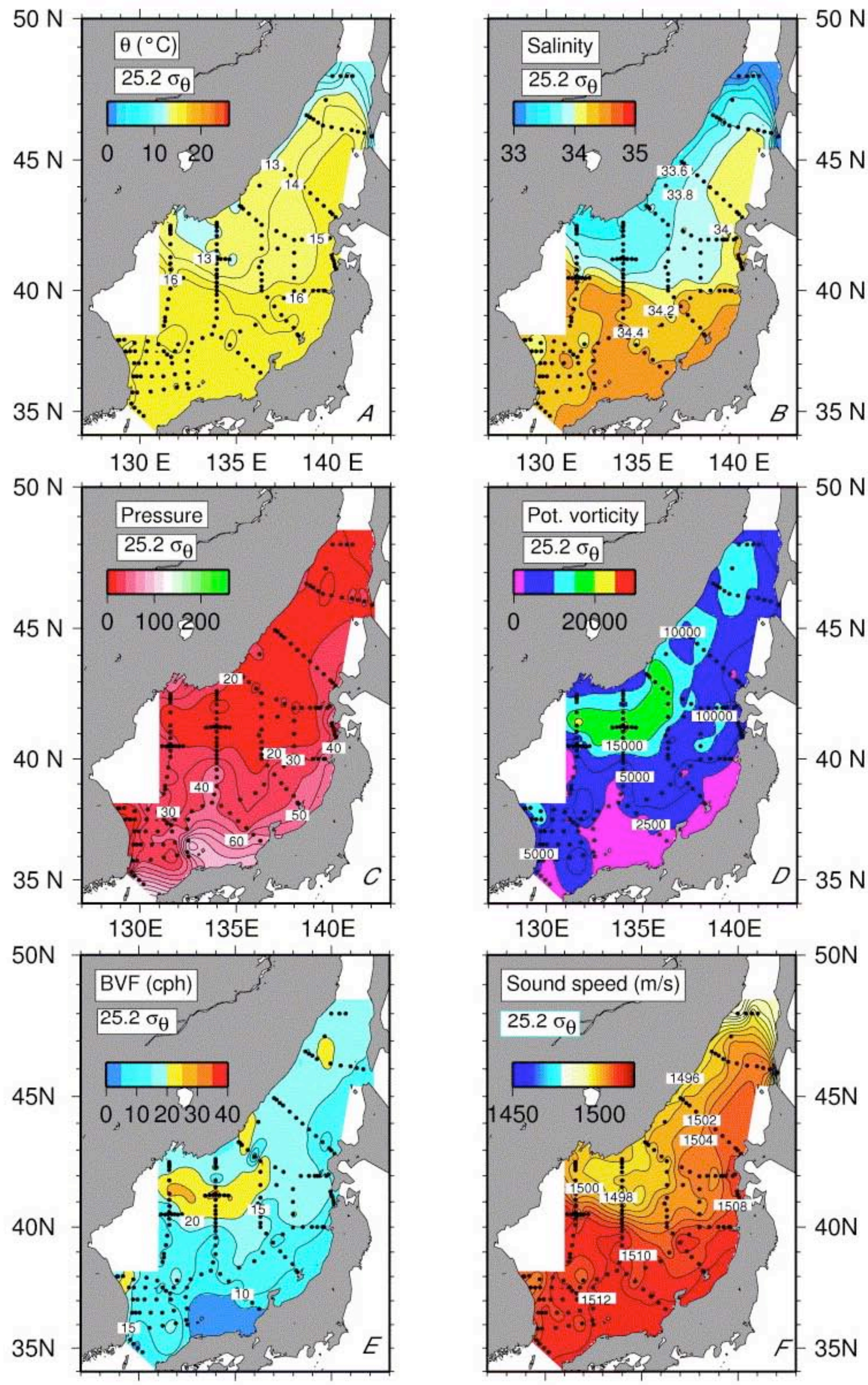
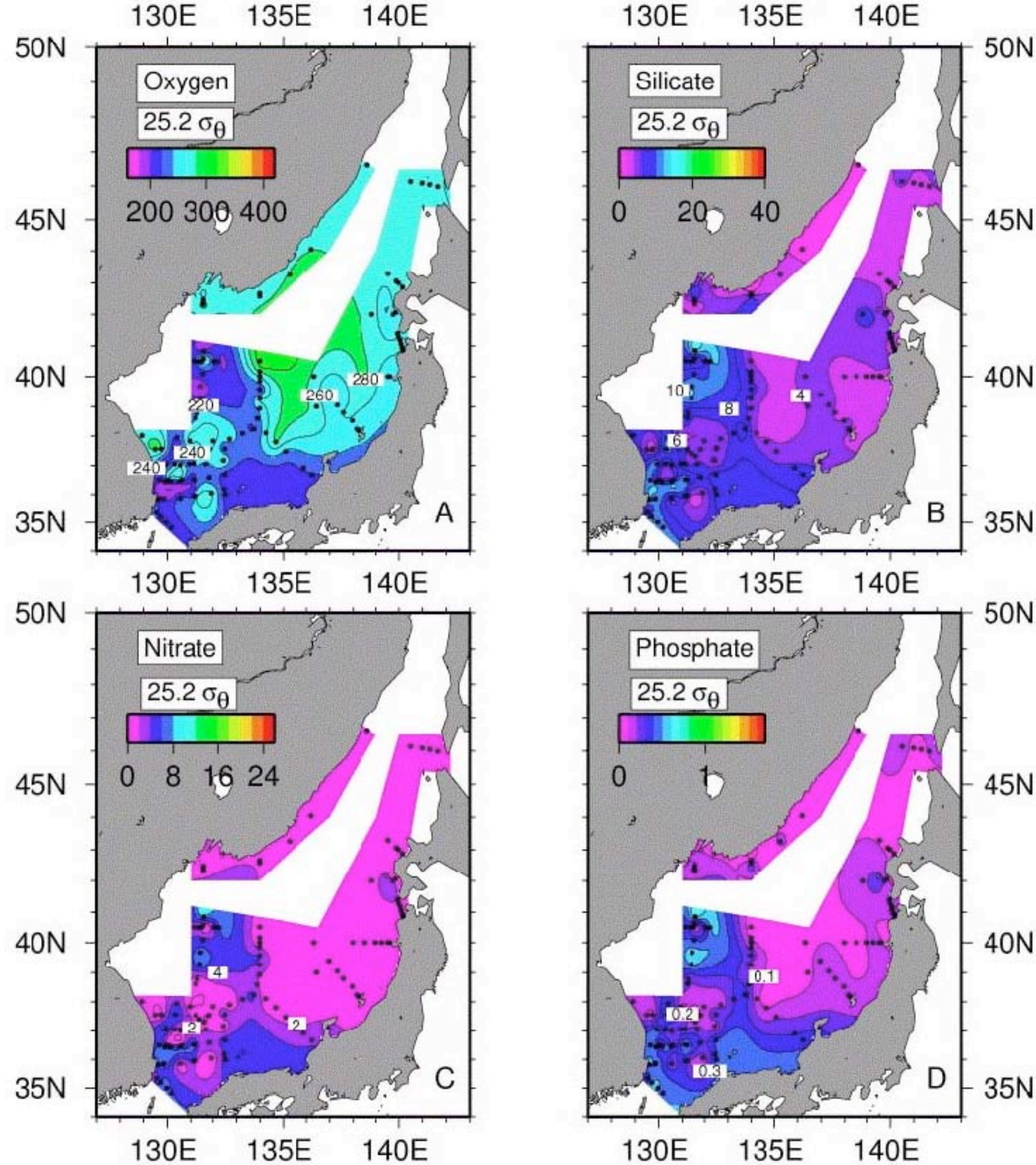


Figure D76. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 25.2 σ_θ.



Oxygen
25.2 σ_θ
200 300 400
220
260
280
240
240
A
Silicate
25.2 σ_θ
0 20 40
10
8
4
6
B
Nitrate
25.2 σ_θ
0 8 16 24
4
2
2
C
Phosphate
25.2 σ_θ
0 1
0.1
0.2
0.3
D
130E 135E 140E
50N 45N 40N 35N

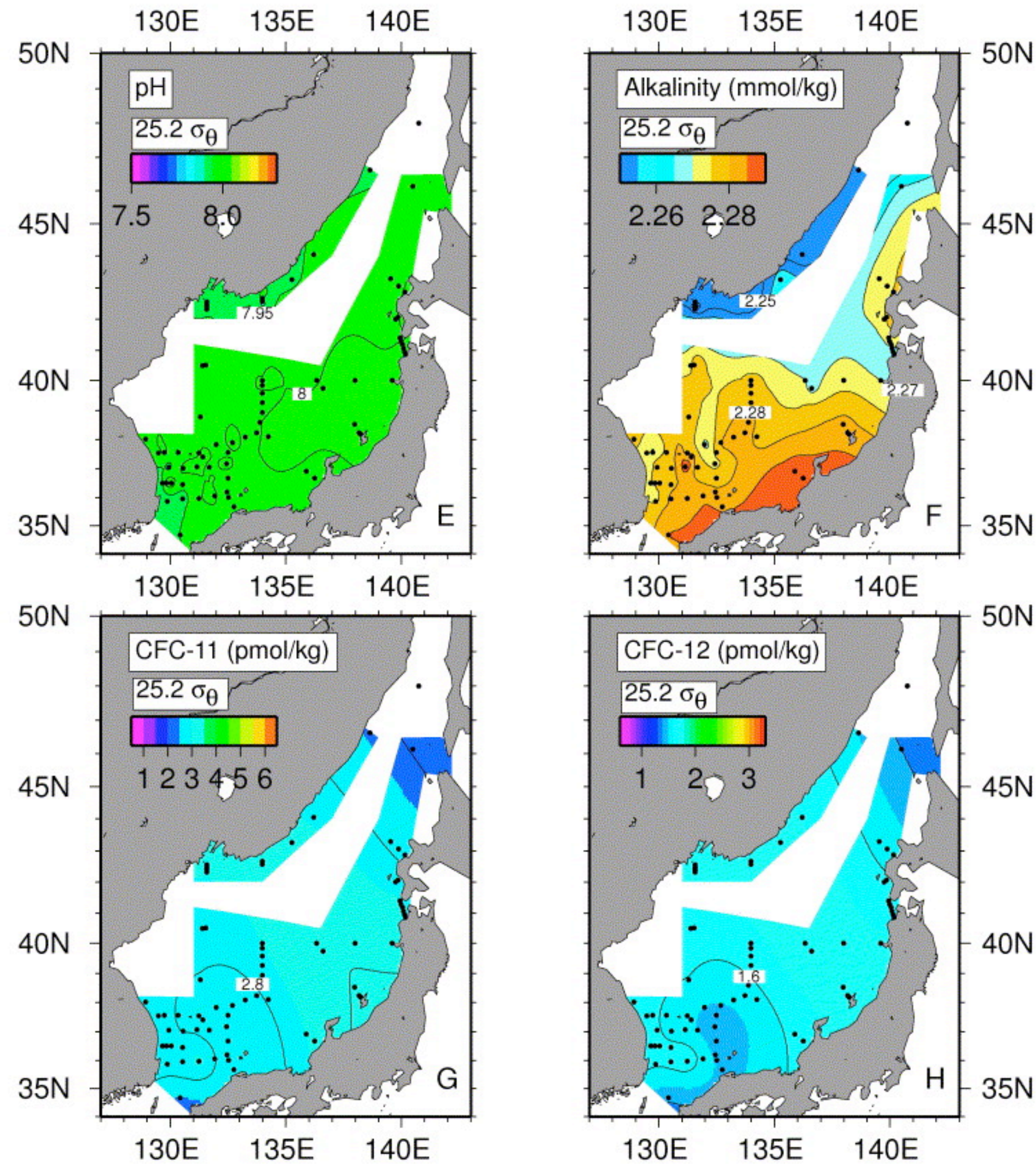


Figure D77. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 25.2 σ_θ.

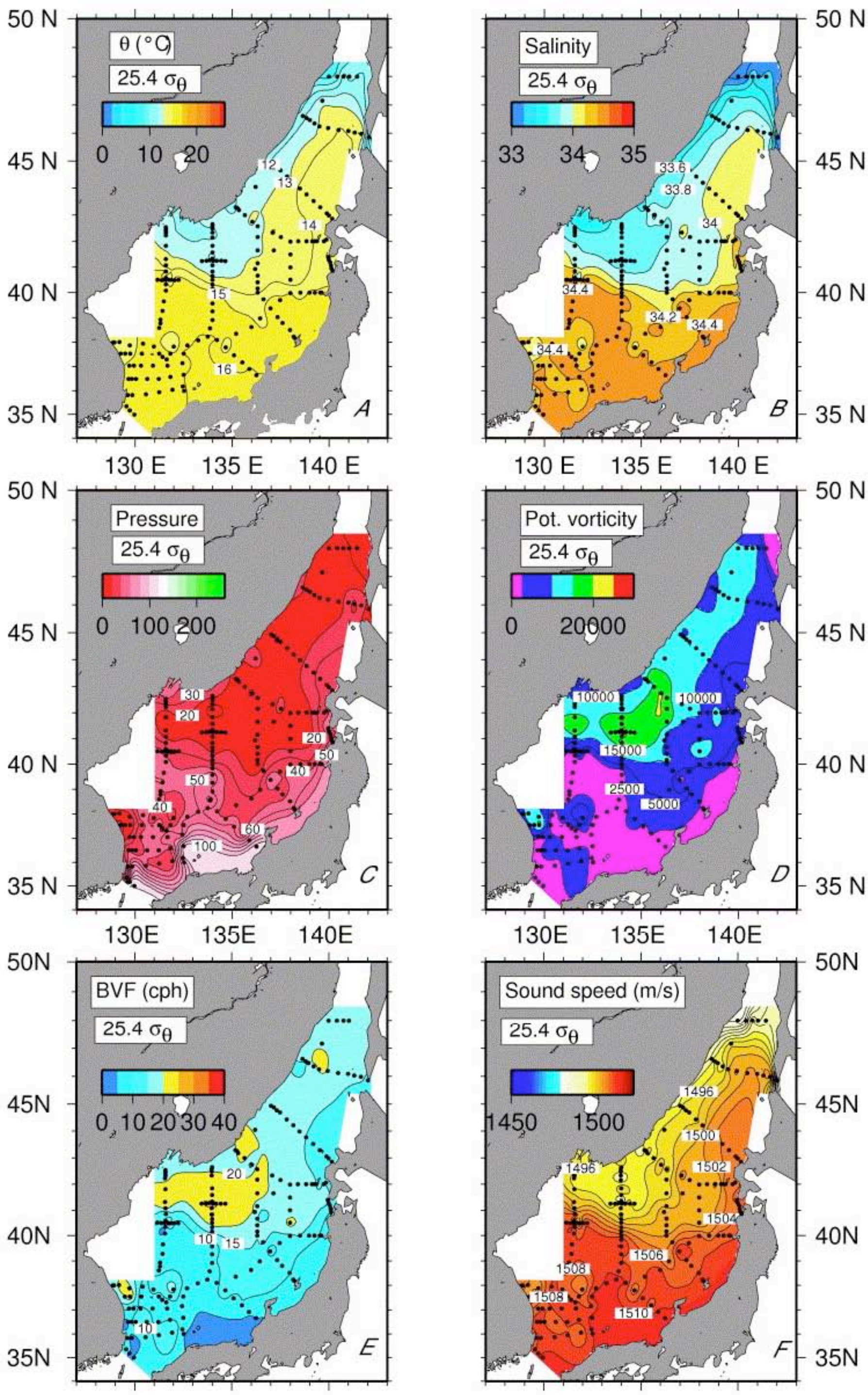
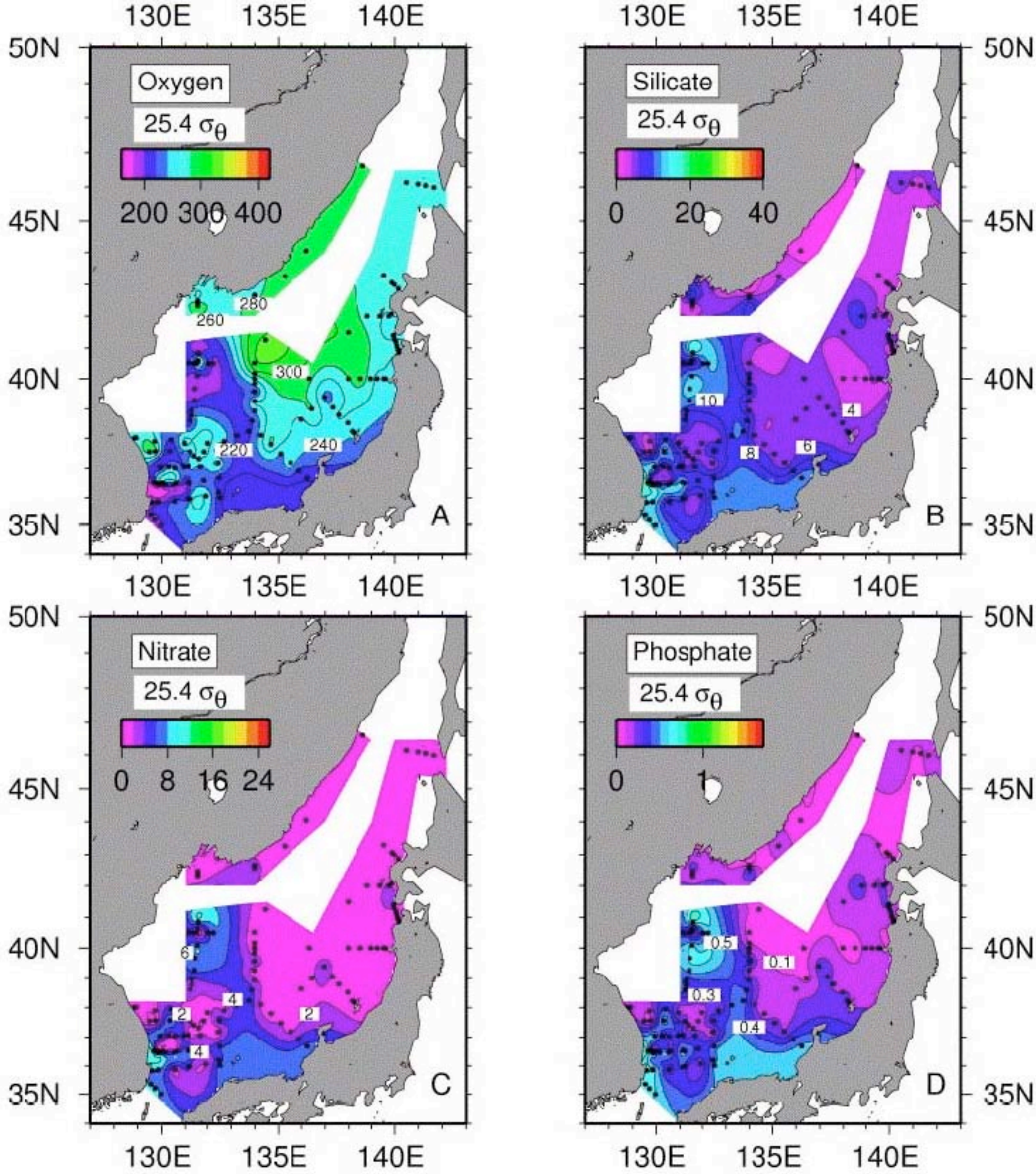


Figure D78. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 25.4 σ_θ (Tsushima water shallow salinity maximum).


Oxygen
25.4 σθ
200 300 400
280
260
300
220
240
A
Silicate
25.4 σθ
0 20 40
10
4
8
6
B
Nitrate
25.4 σθ
0 8 16 24
6
4
2
2
4
C
Phosphate
25.4 σθ
0 1
0.5
0.1
0.3
0.4
D
130E 135E 140E
50N 45N 40N 35N

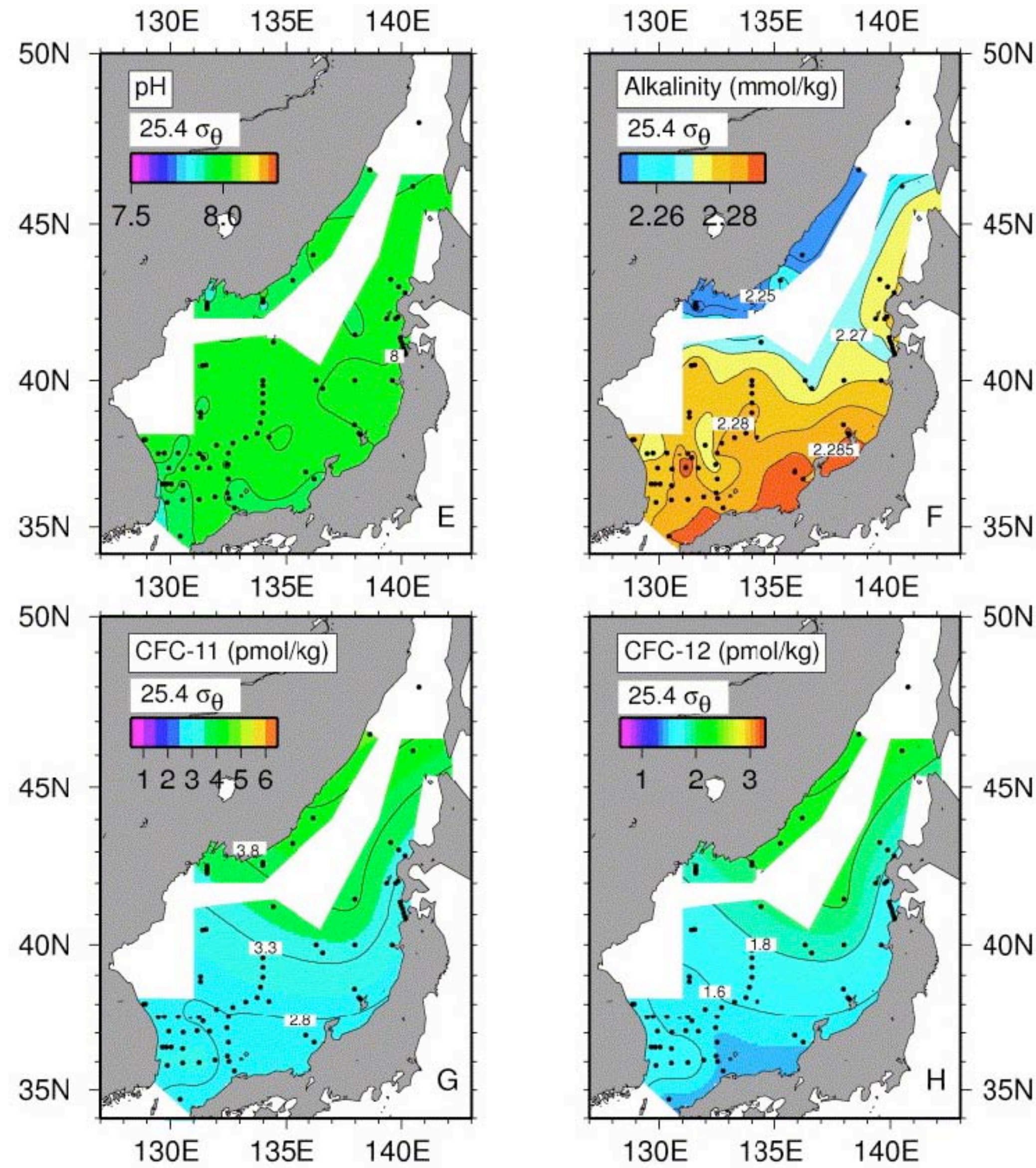


Figure D79. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 25.4 σ_θ (Tsushima water shallow salinity maximum).

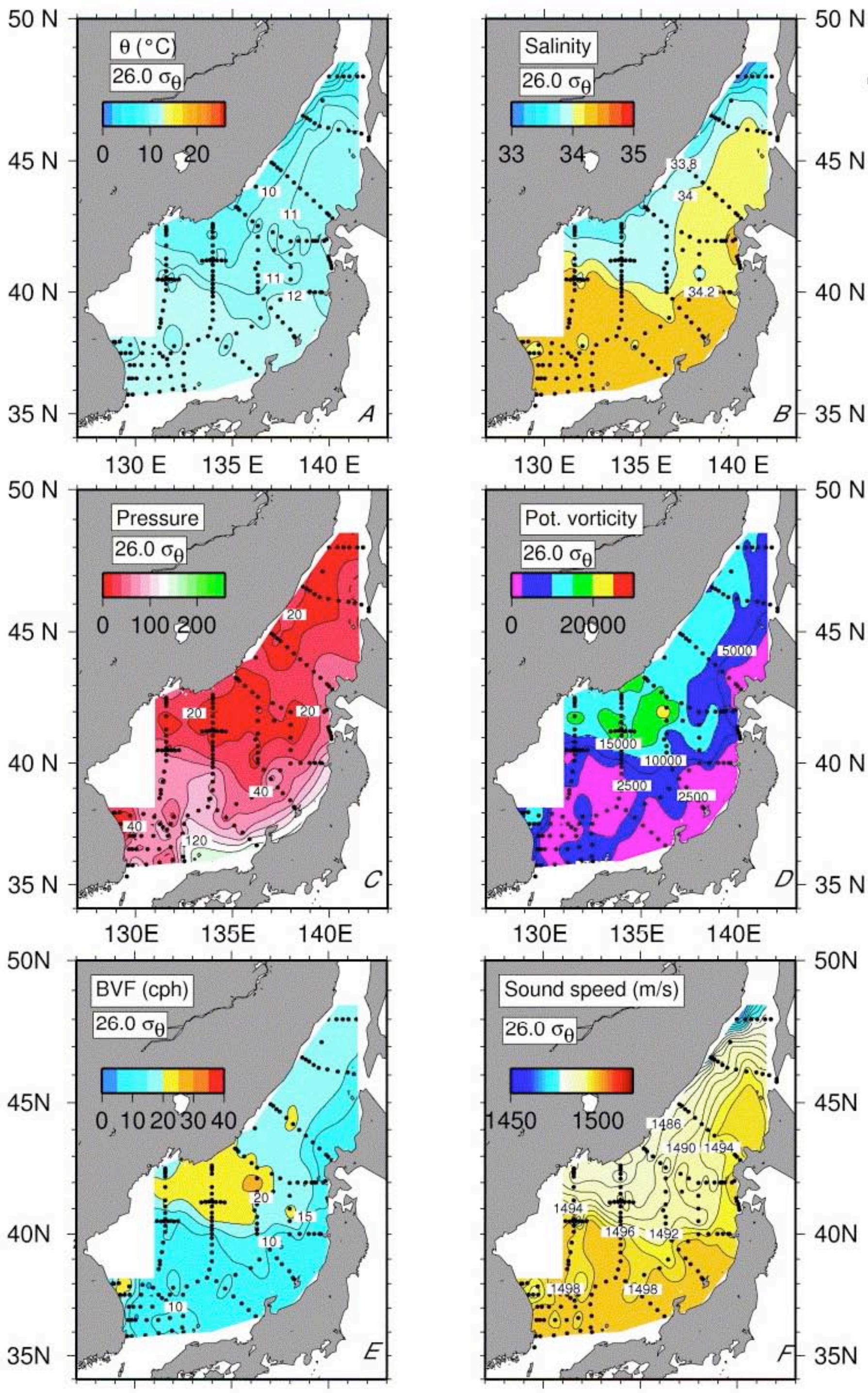
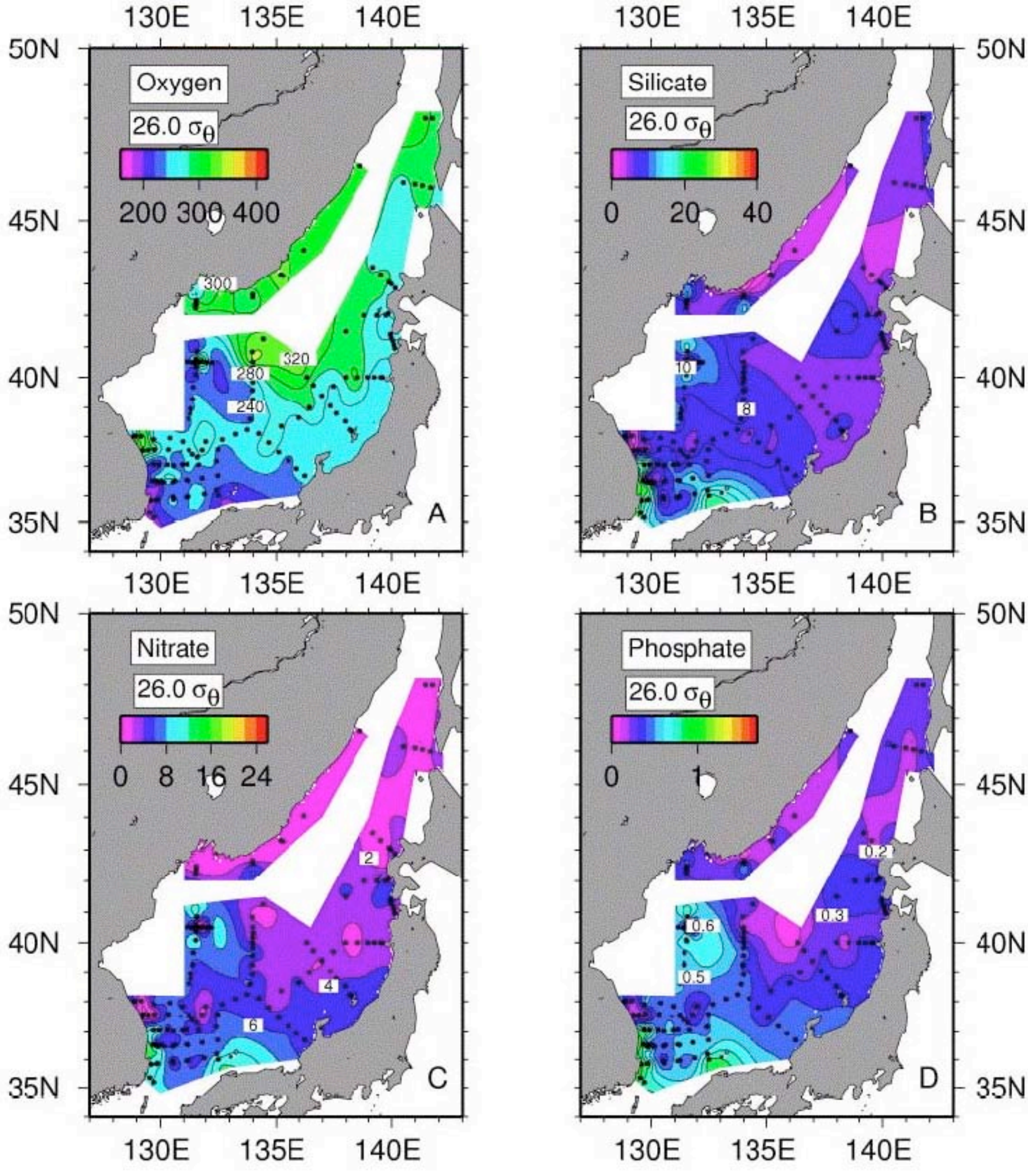


Figure D80. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 26.0 σ_θ.


Oxygen
26.0 σ_θ
200 300 400
300
320
280
240
A
Silicate
26.0 σ_θ
0 20 40
10
8
B
Nitrate
26.0 σ_θ
0 8 16 24
2
4
6
C
Phosphate
26.0 σ_θ
0 1
0.2
0.3
0.6
0.5
D
130E 135E 140E
50N 45N 40N 35N

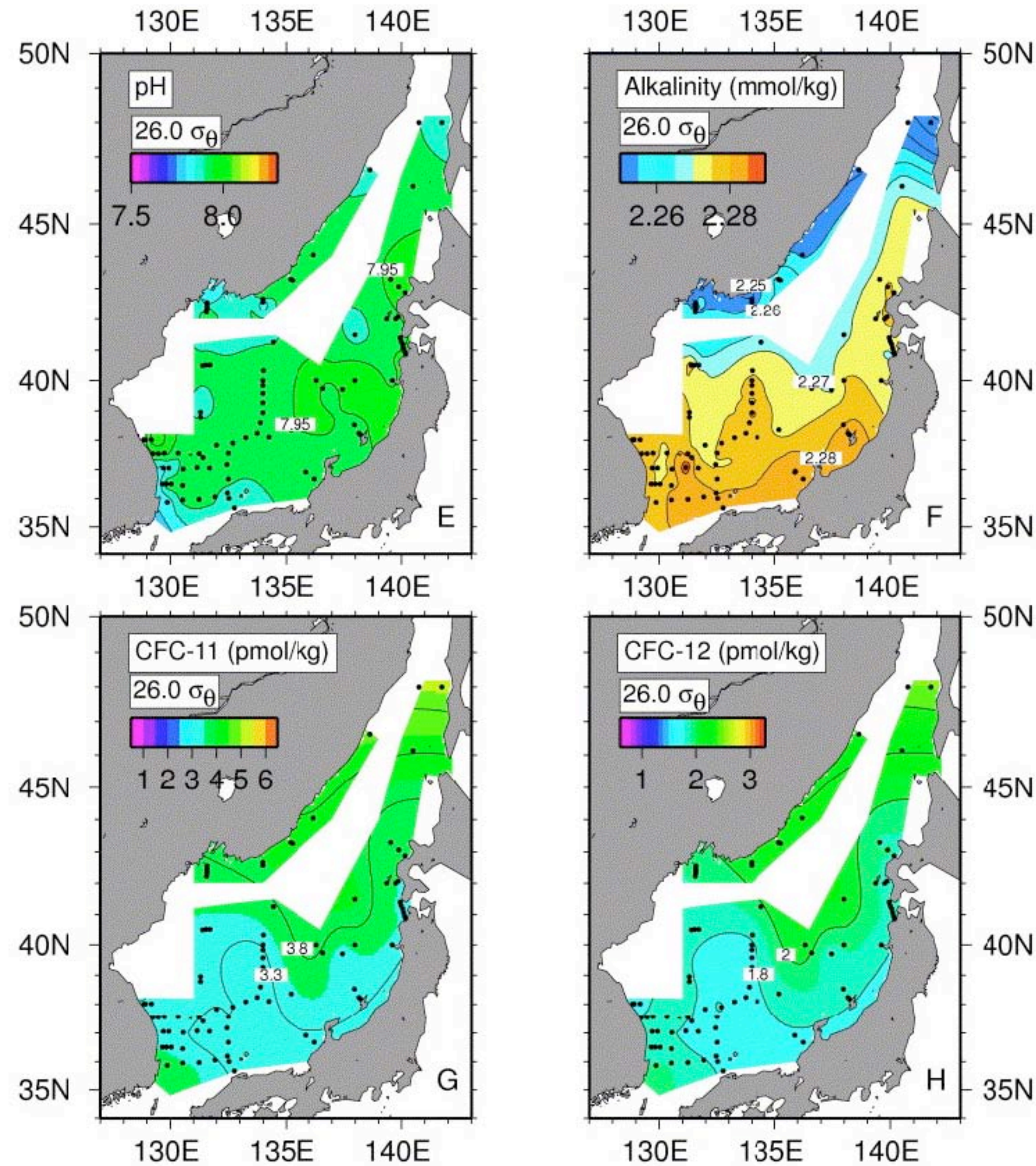


Figure D81. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 26.0 σ_θ.

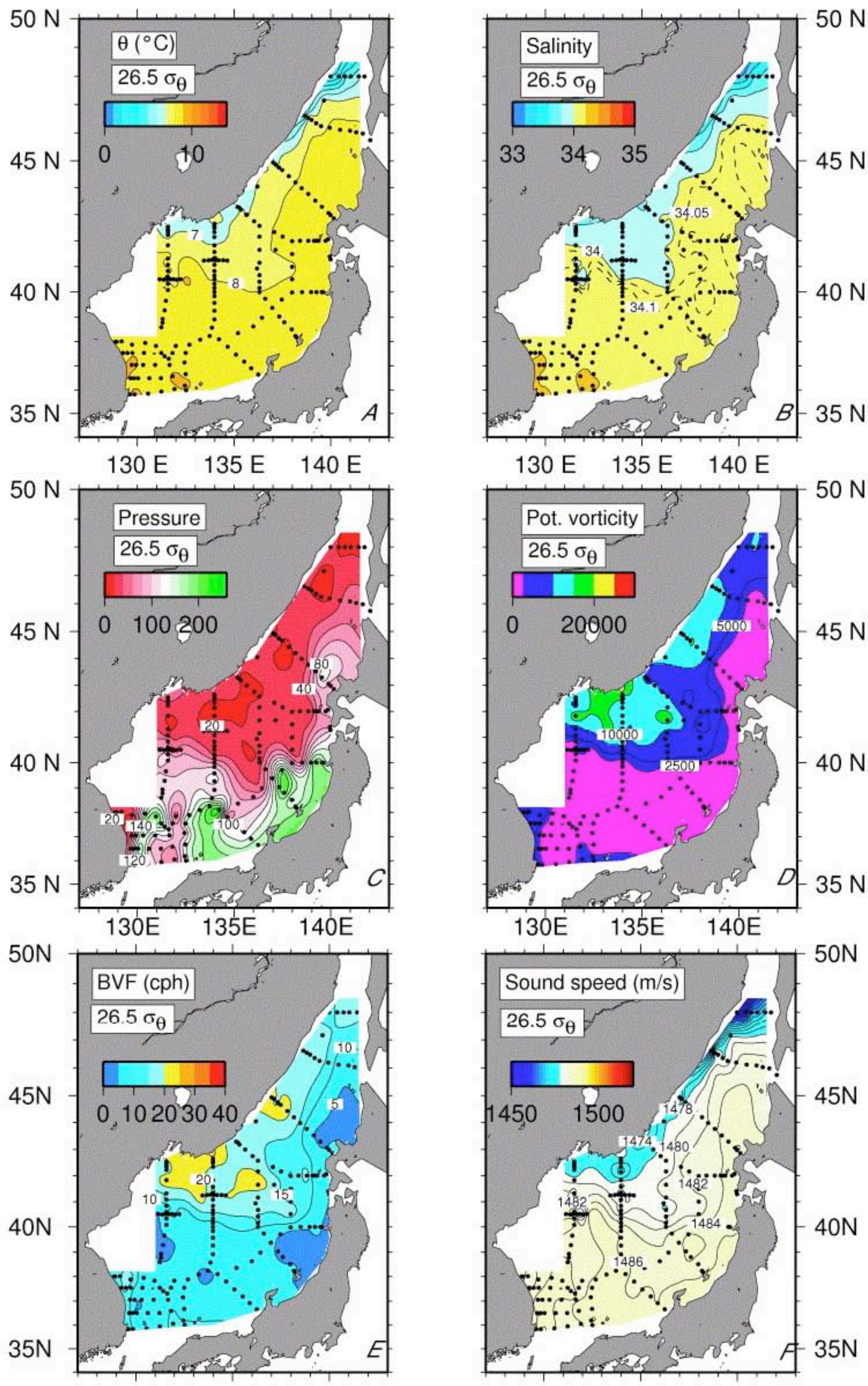
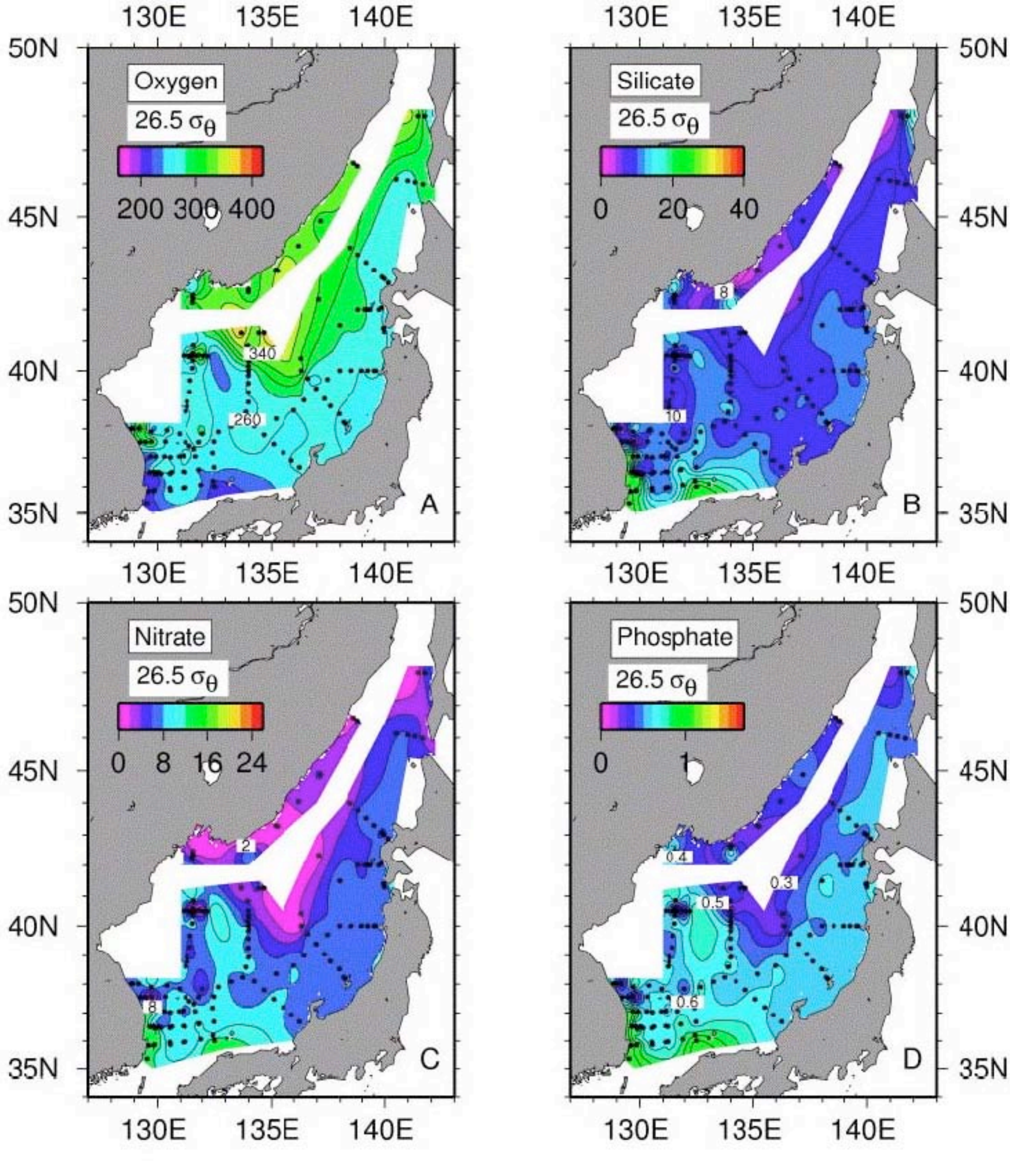


Figure D82. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 26.5 σ_θ.


Oxygen
26.5 σθ
200 300 400
340
260
A
Silicate
26.5 σθ
0 20 40
8
10
B
Nitrate
26.5 σθ
0 8 16 24
2
8
C
Phosphate
26.5 σθ
0 1
0.4
0.3
0.5
0.6
D
130E 135E 140E
35N 40N 45N 50N

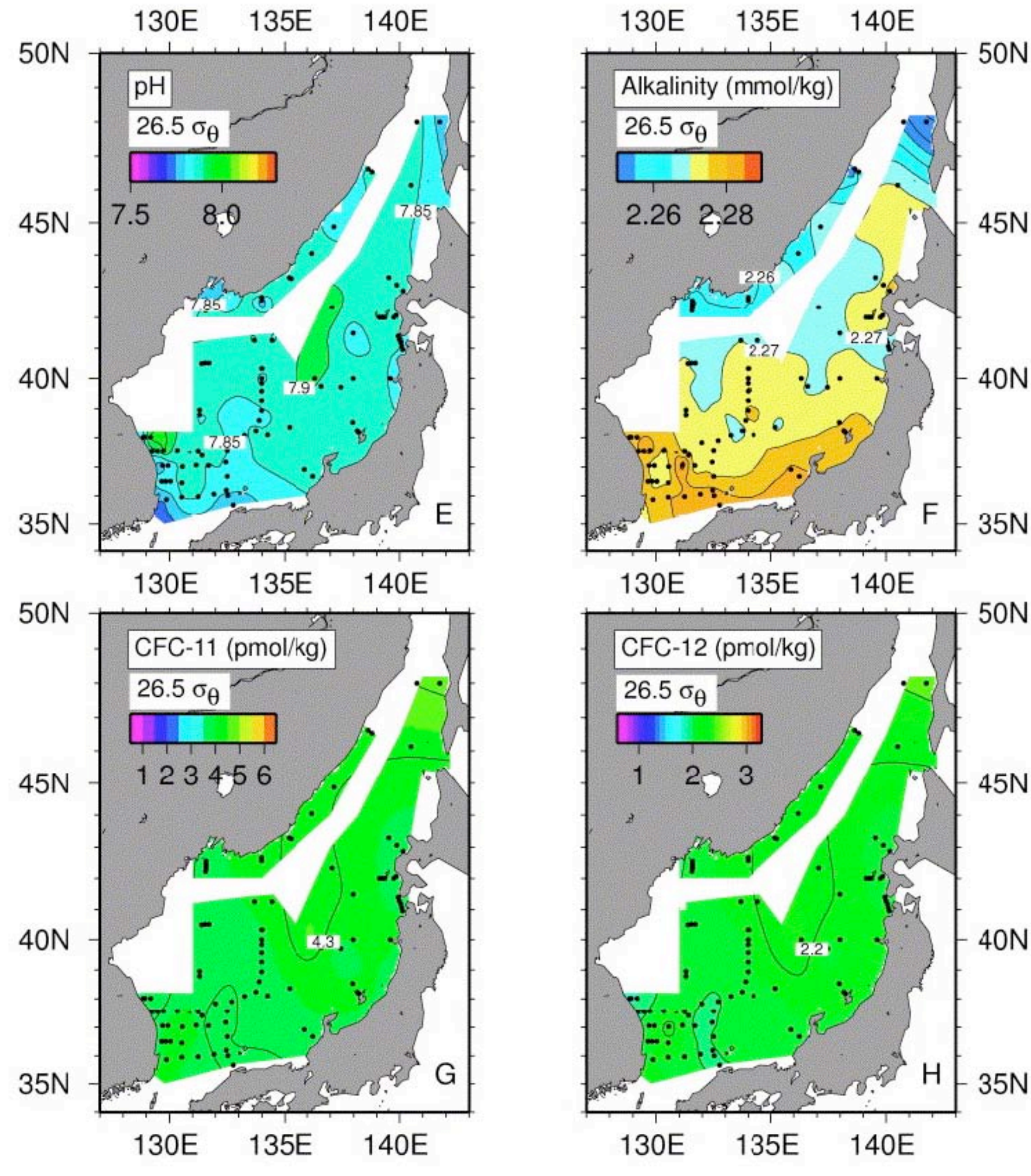


Figure D83. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 26.5 σ_θ.

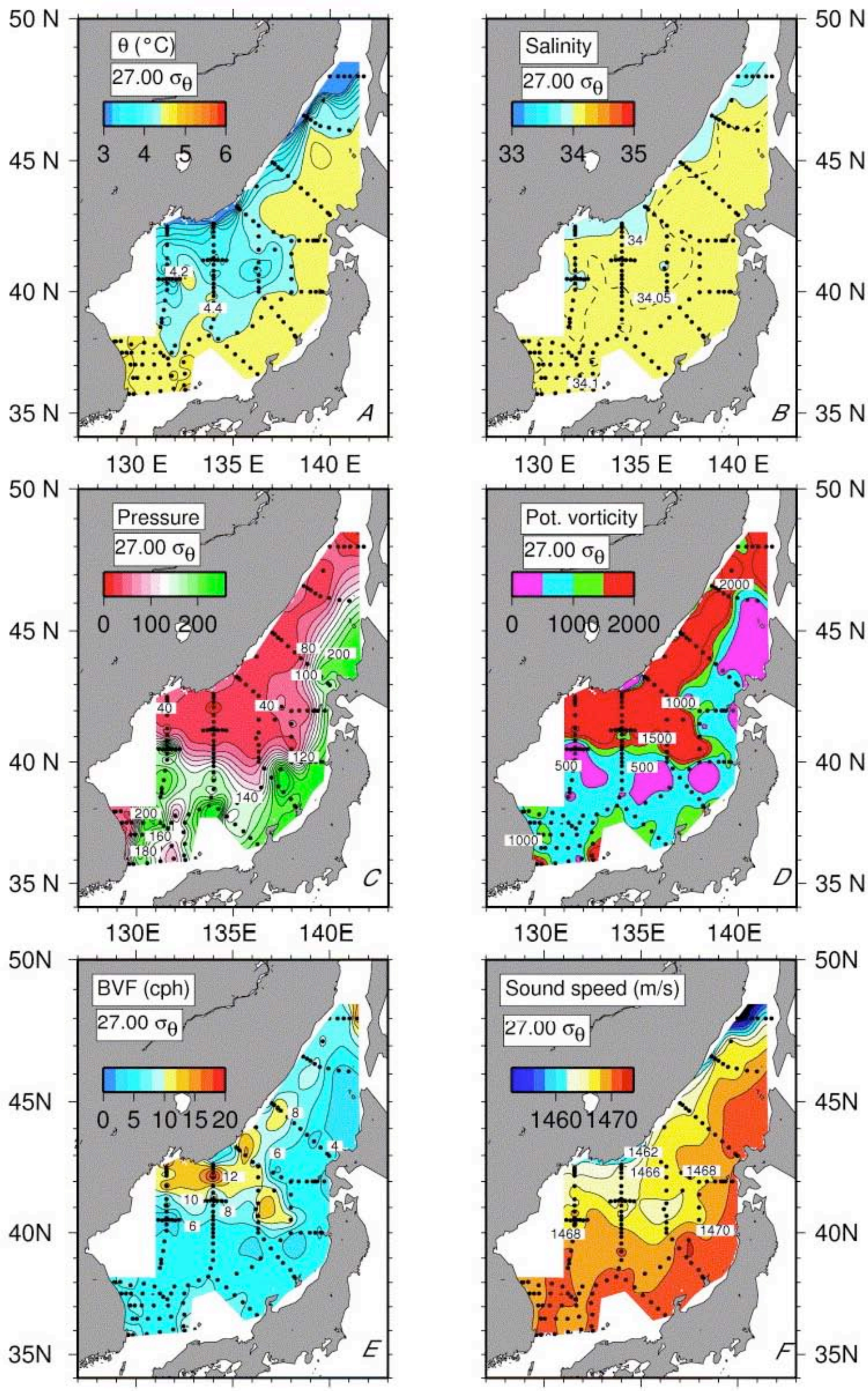
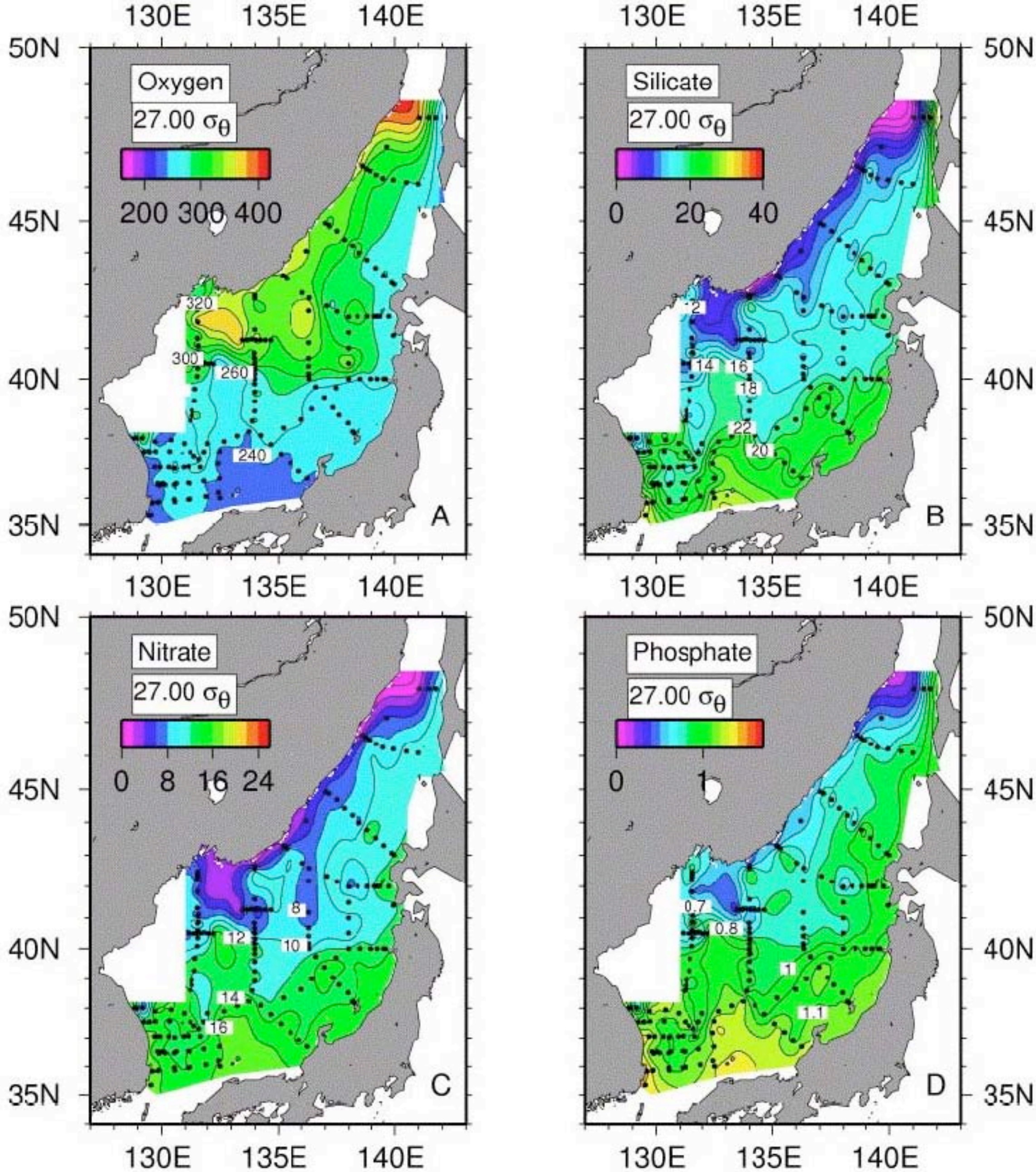


Figure D84. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.0 σ_θ.



Oxygen
27.00 σθ
200 300 400
320
300
260
240
A
Silicate
27.00 σθ
0 20 40
2
14
16
18
22
20
B
Nitrate
27.00 σθ
0 8 16 24
8
12
10
14
16
C
Phosphate
27.00 σθ
0 1
0.7
0.8
1
1.1
D
130E 135E 140E
50N 45N 40N 35N

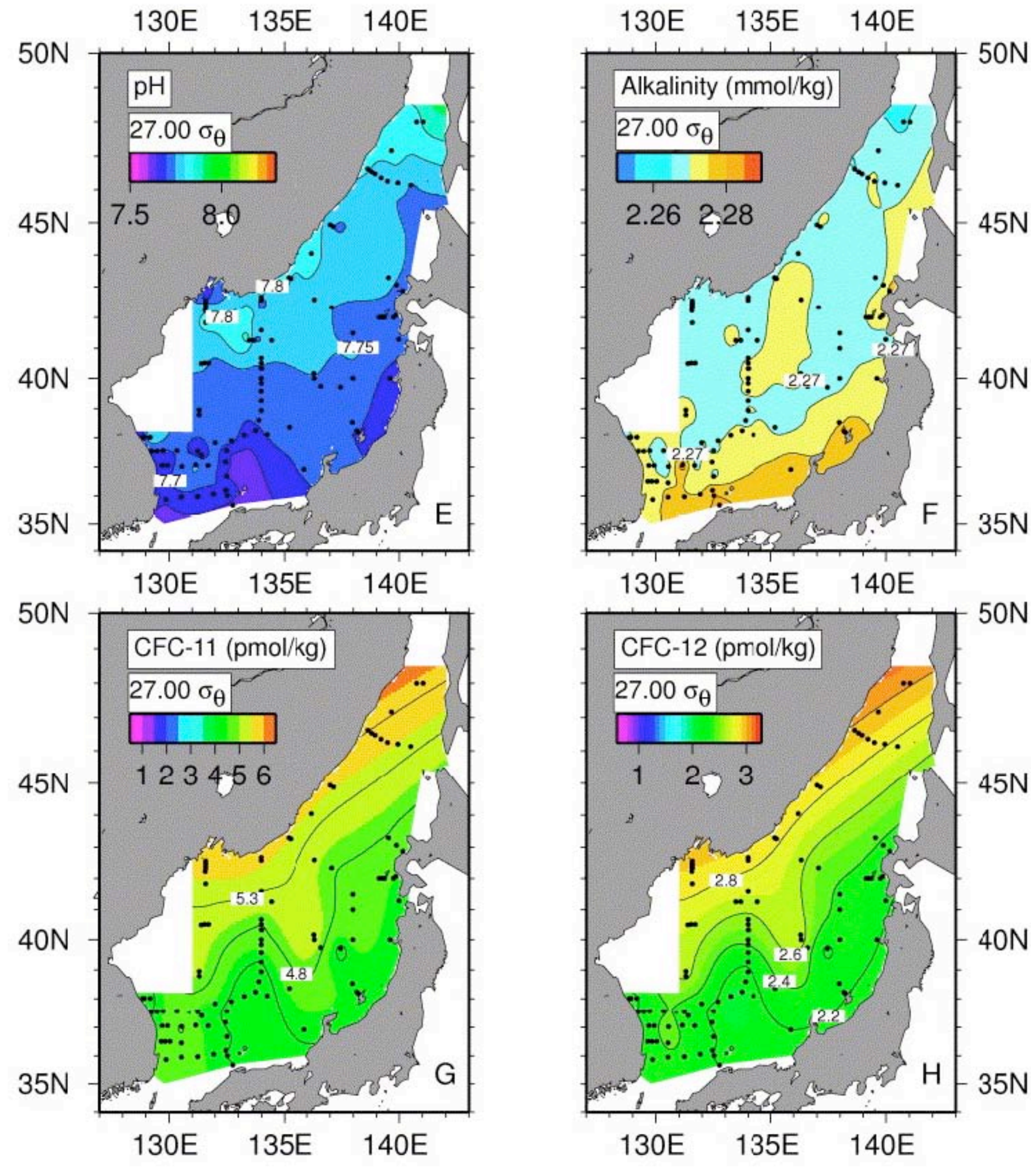


Figure D85. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.0 σ_θ.

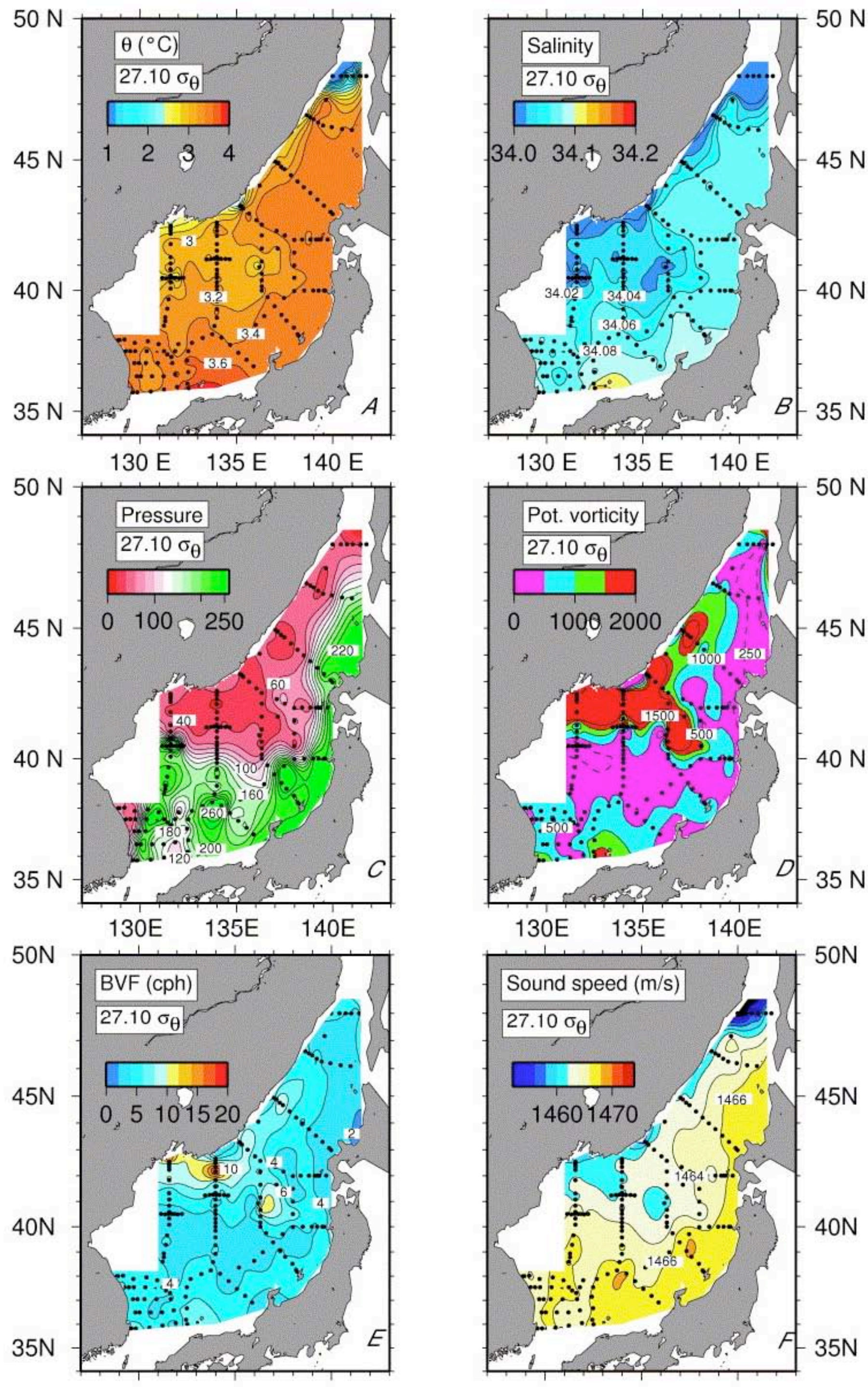
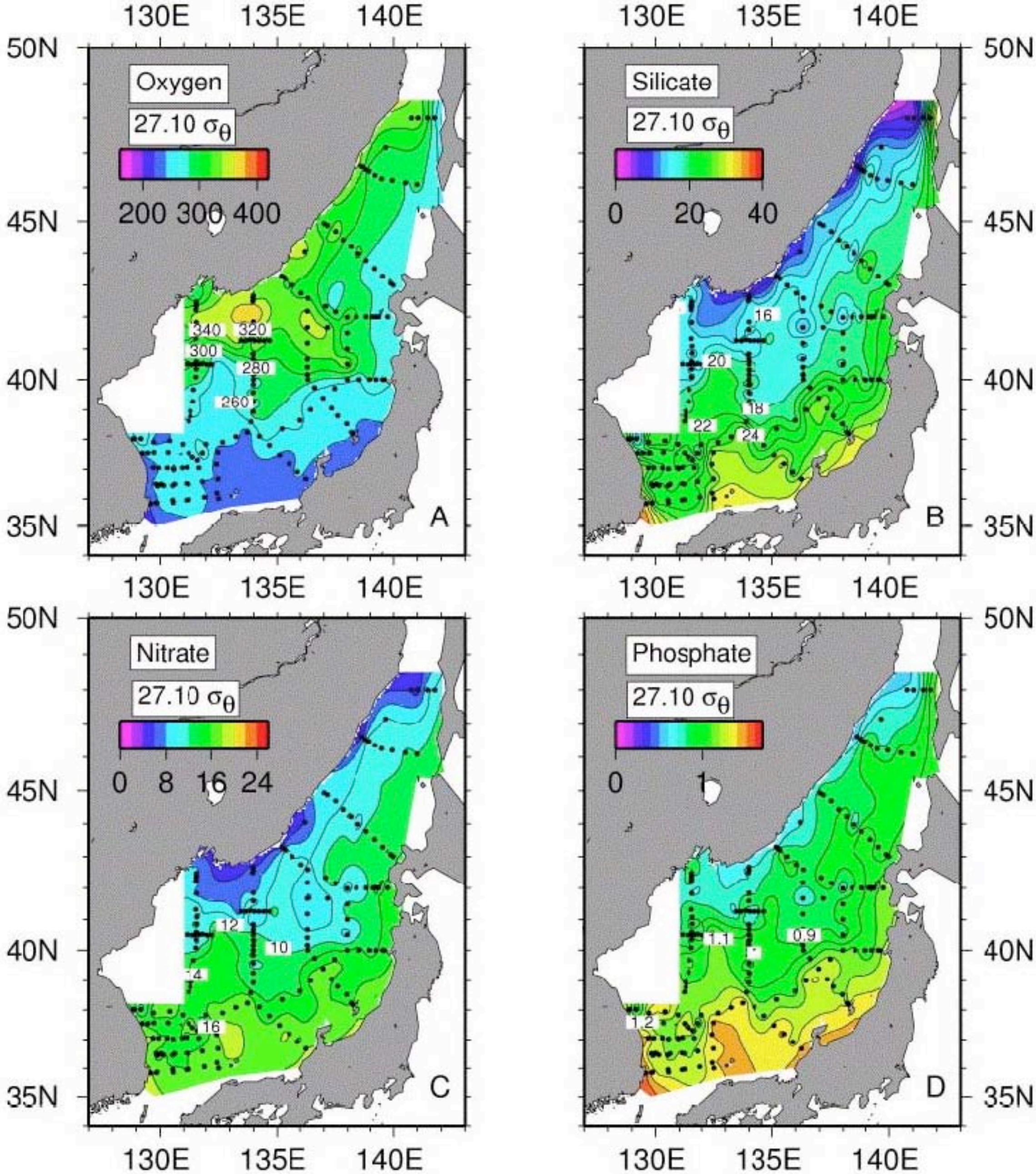


Figure D86. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.1 σ_θ.


Oxygen
27.10 σ_θ
200 300 400
340
320
300
280
260
A
Silicate
27.10 σ_θ
0 20 40
16
20
18
22
24
B
Nitrate
27.10 σ_θ
0 8 16 24
12
10
14
16
C
Phosphate
27.10 σ_θ
0 1
1.1
0.9
1.2
D
130E 135E 140E
50N 45N 40N 35N

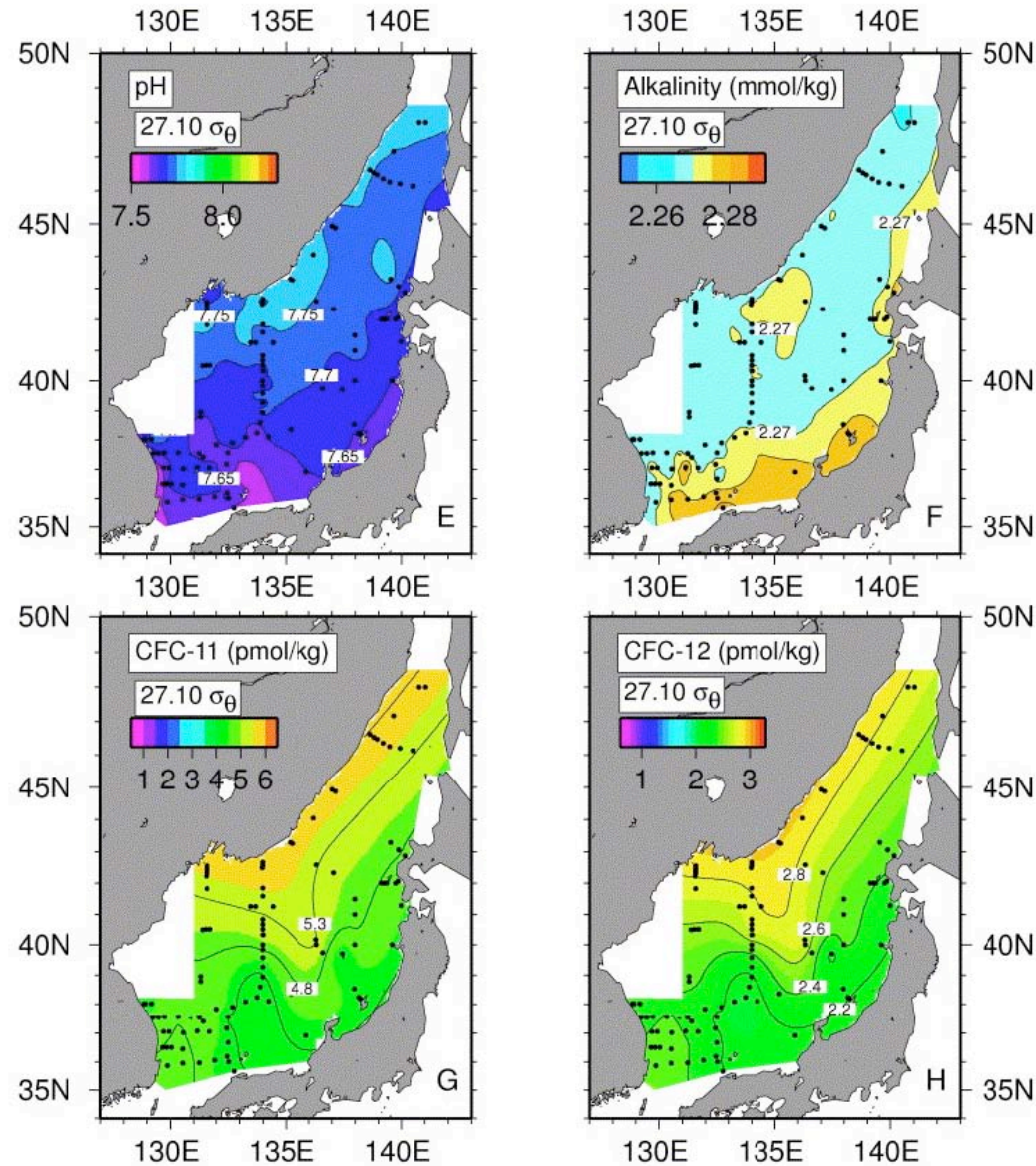


Figure D87. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.1 σ_θ.

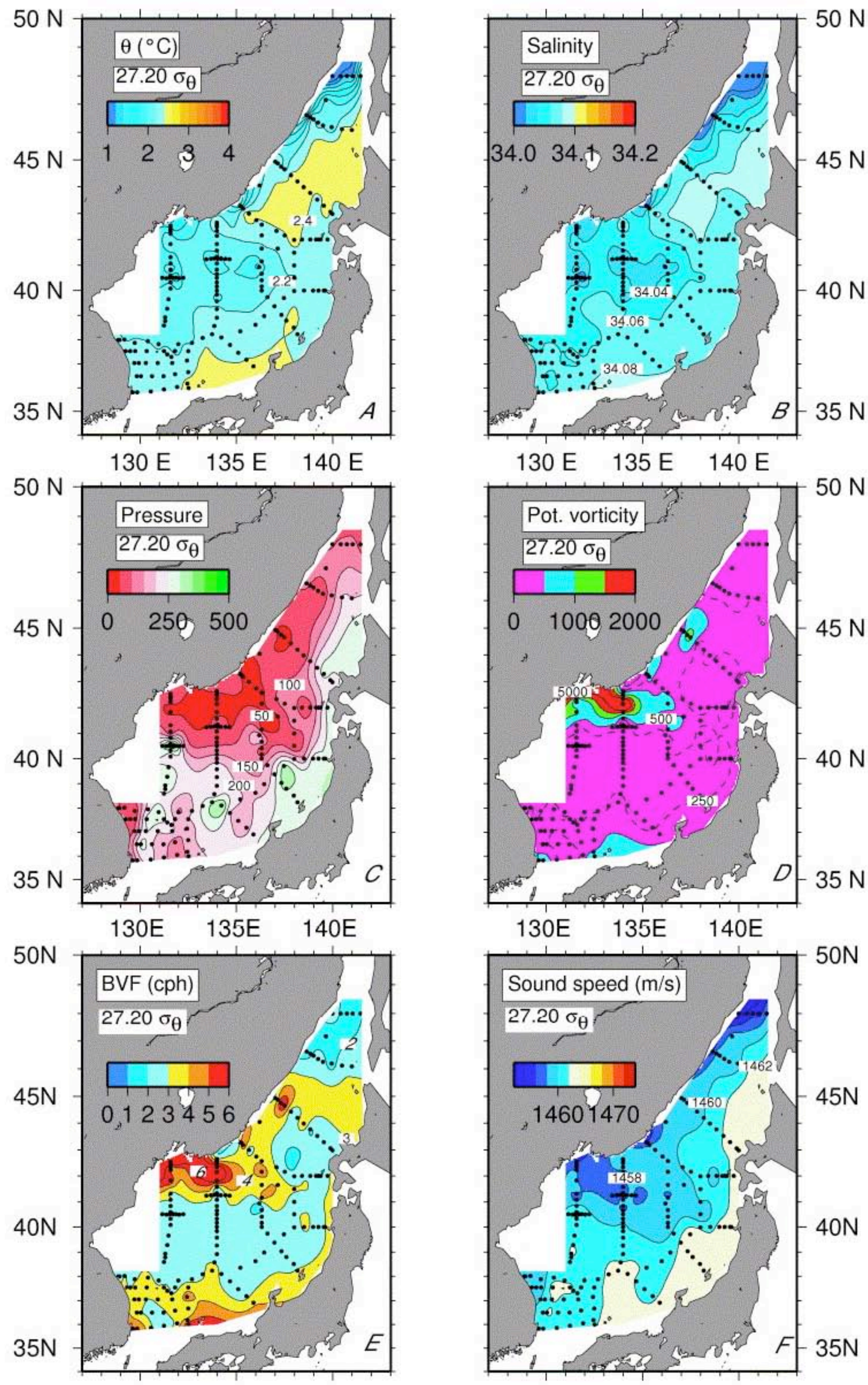
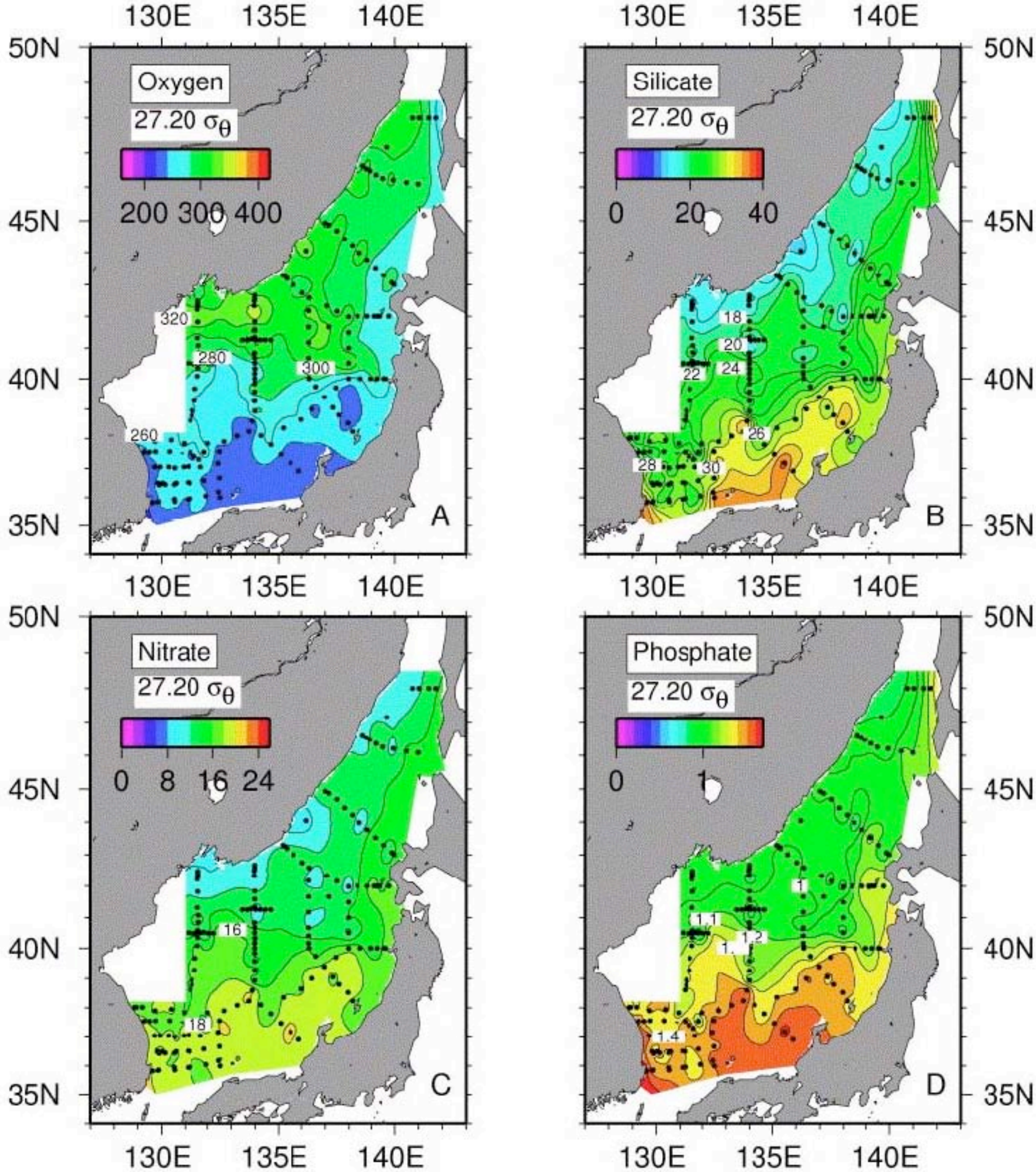


Figure D88. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.2 σ_θ.


Oxygen
27.20 σ_θ
200 300 400
320
280
300
260
A
Silicate
27.20 σ_θ
0 20 40
18
20
22
24
26
28
30
B
Nitrate
27.20 σ_θ
0 8 16 24
16
18
C
Phosphate
27.20 σ_θ
0 1
1
1.1
1.2
1.4
D
130E 135E 140E
35N 40N 45N 50N

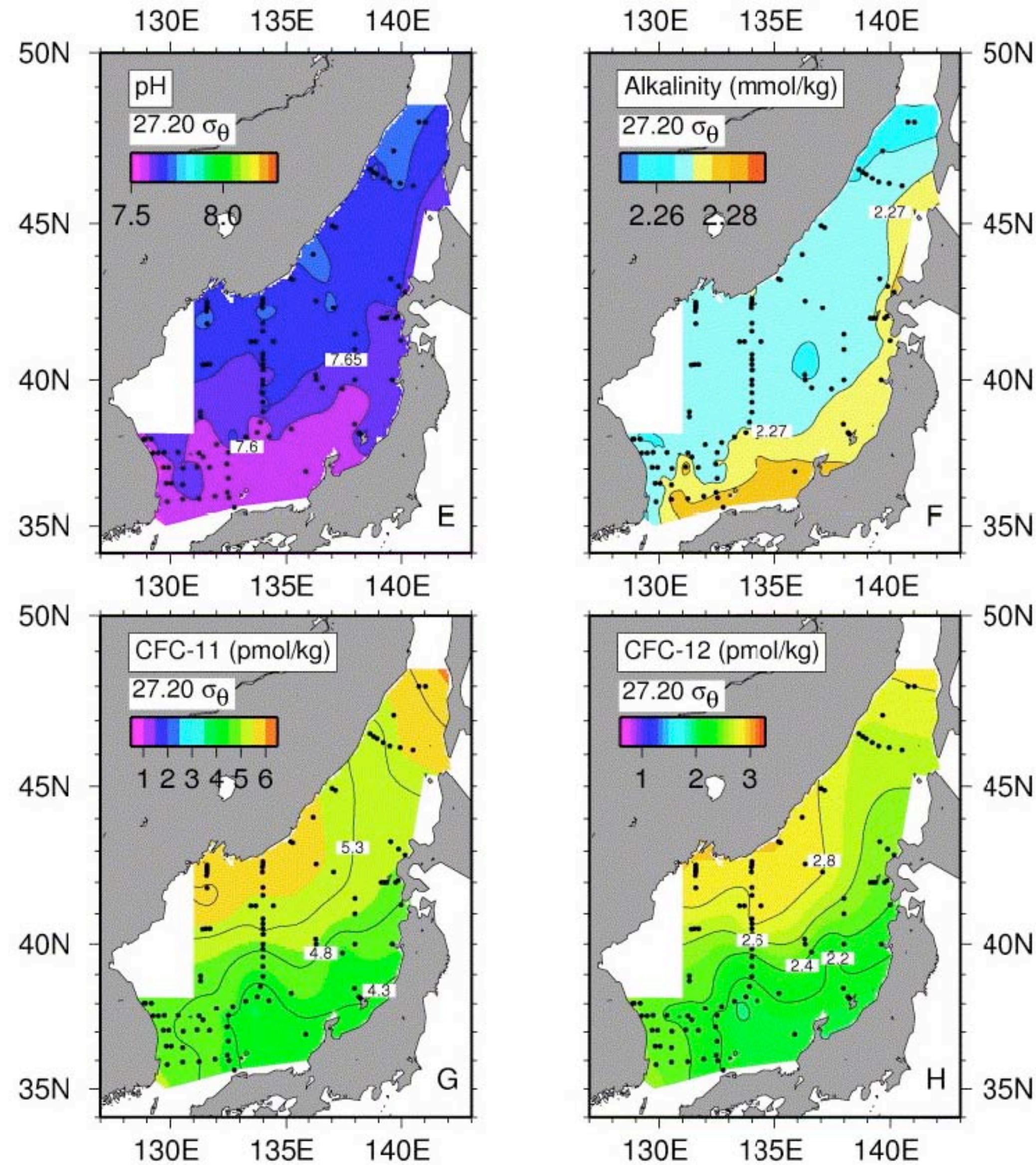


Figure D89. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.2 σ_θ.

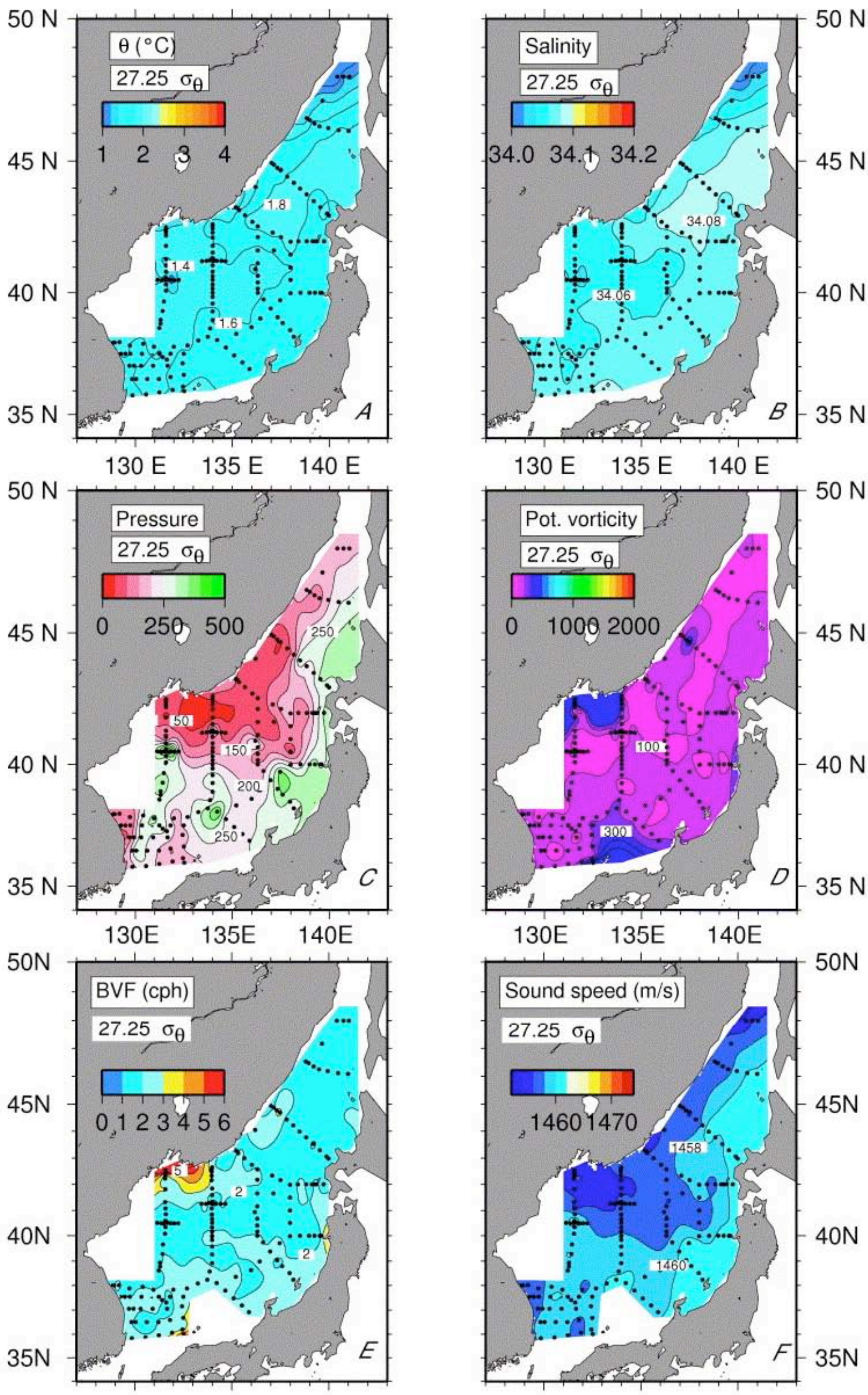
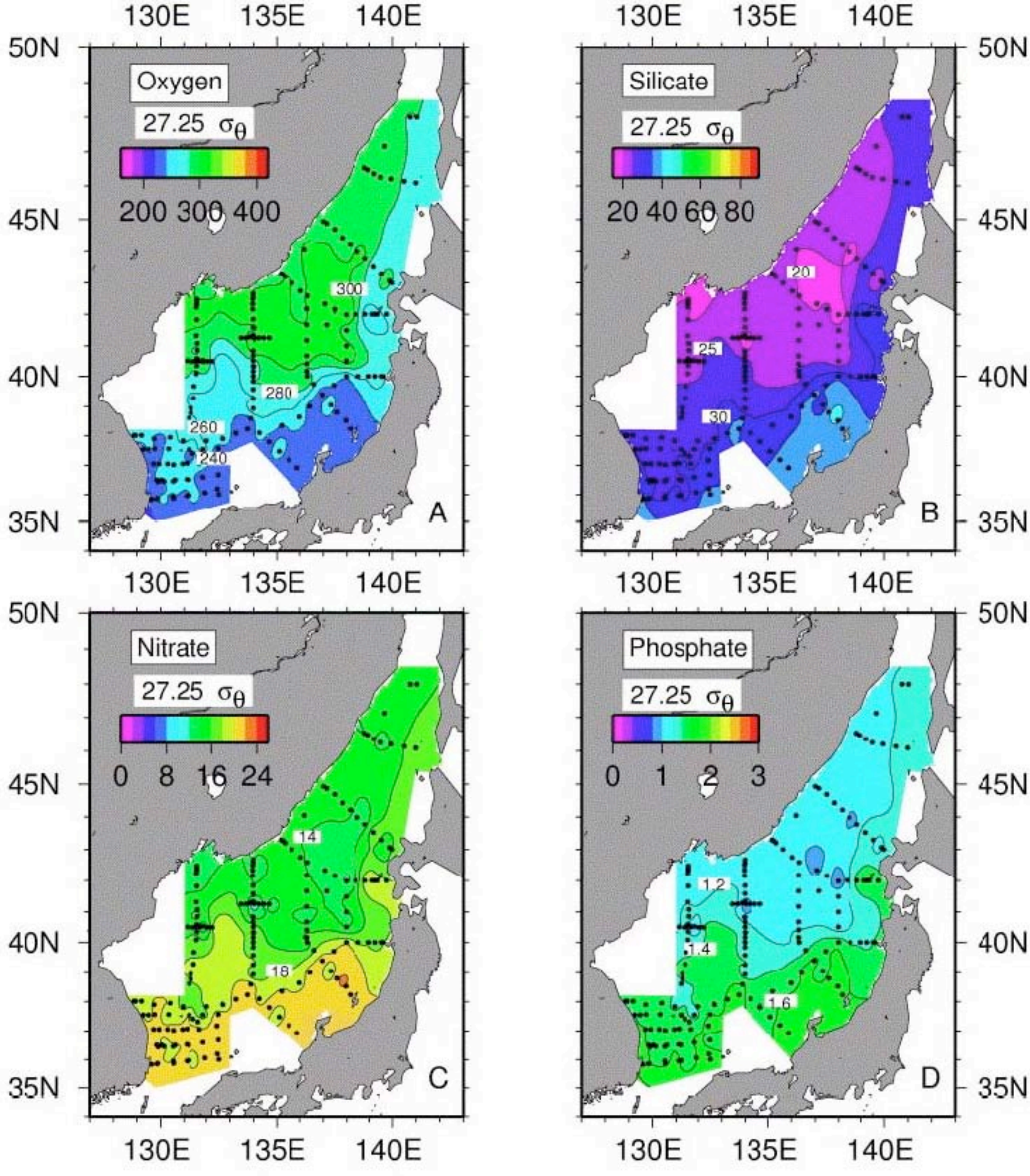


Figure D90. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at $27.25\sigma_\theta$ (East Sea Intermediate Water salinity minimum).


Oxygen
27.25 σθ
200 300 400
300
280
260
240
A
Silicate
27.25 σθ
20 40 60 80
20
25
30
B
Nitrate
27.25 σθ
0 8 16 24
14
18
C
Phosphate
27.25 σθ
0 1 2 3
1.2
1.4
1.6
D
130E 135E 140E
50N 45N 40N 35N

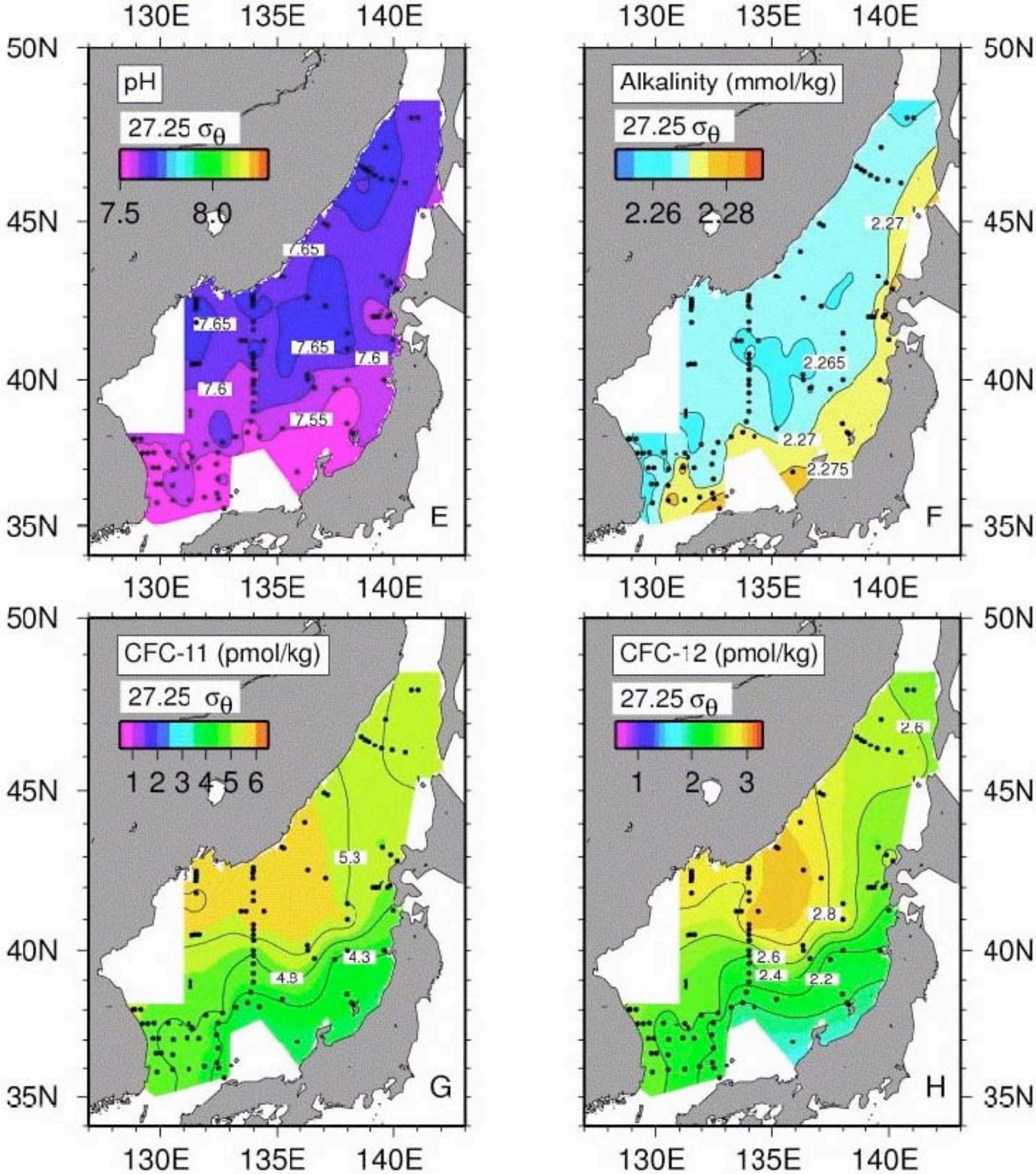


Figure D91. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.25σ_θ (East Sea Intermediate Water salinity minimum).

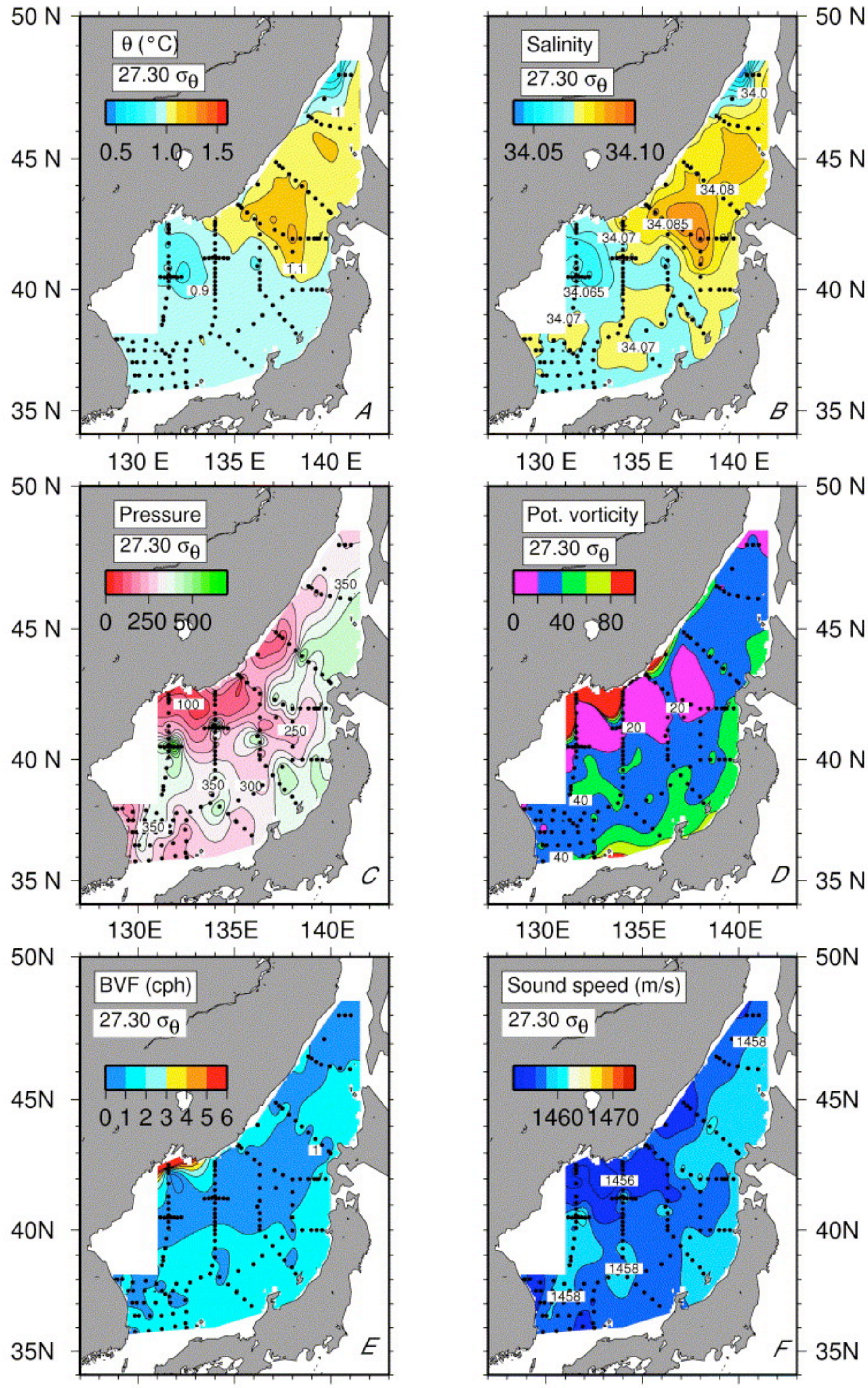
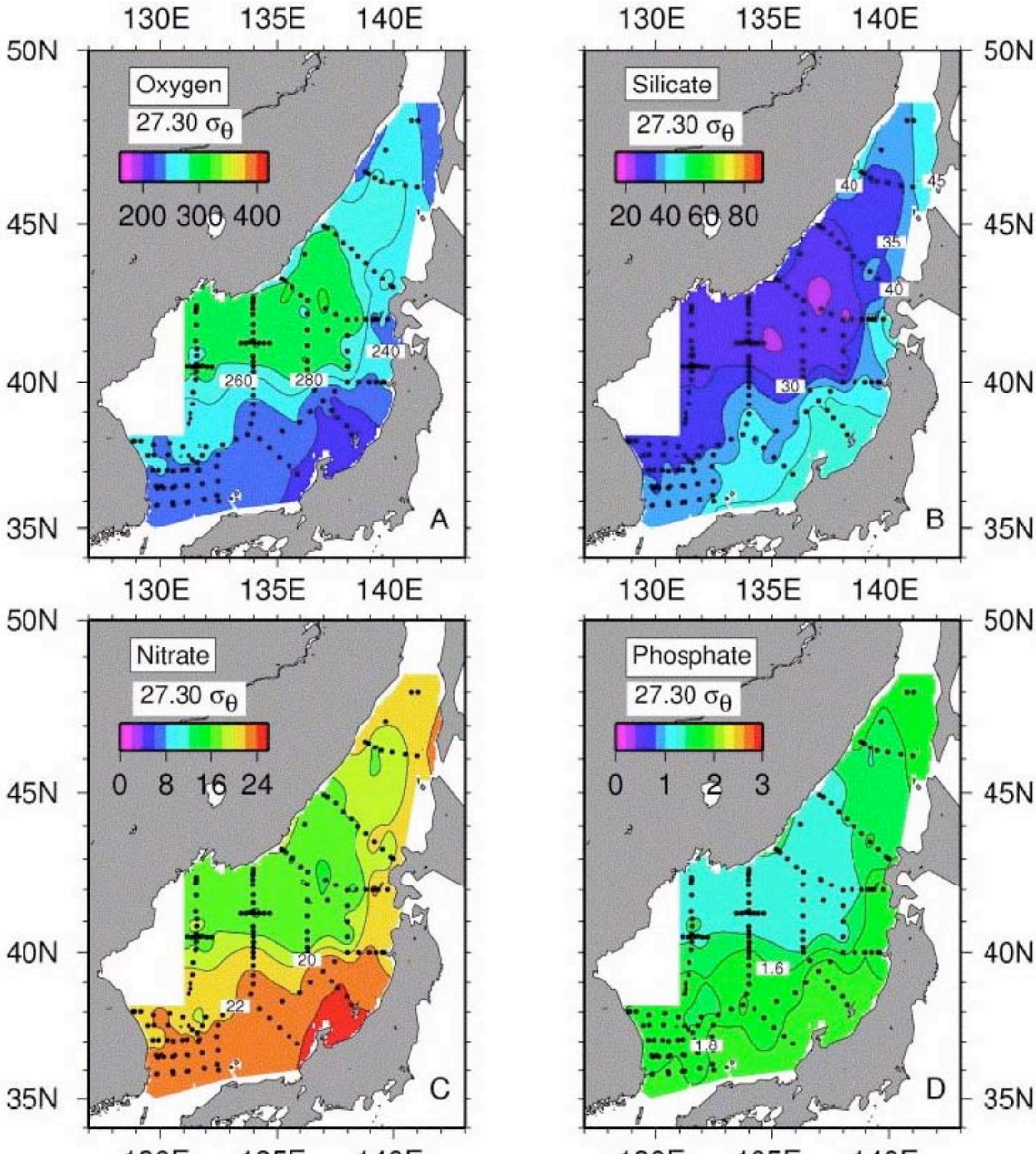


Figure D92. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.3 σ_θ.


Oxygen
27.30 σθ
200 300 400
240
260
280
A
Silicate
27.30 σθ
20 40 60 80
40
45
35
40
30
B
Nitrate
27.30 σθ
0 8 16 24
20
22
C
Phosphate
27.30 σθ
0 1 2 3
1.6
1.8
D
130E 135E 140E
50N 45N 40N 35N

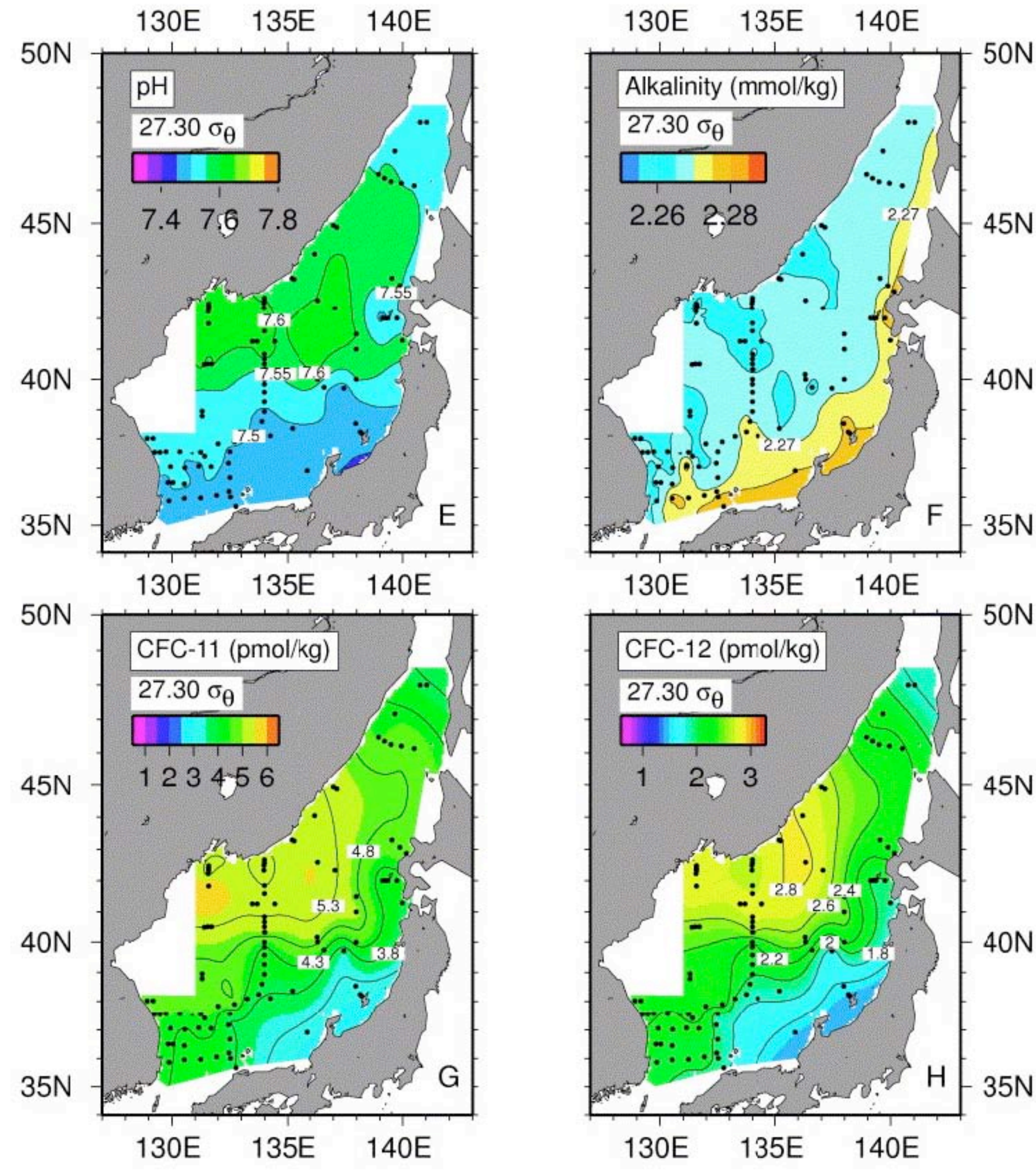


Figure D93. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.3 σ_θ.

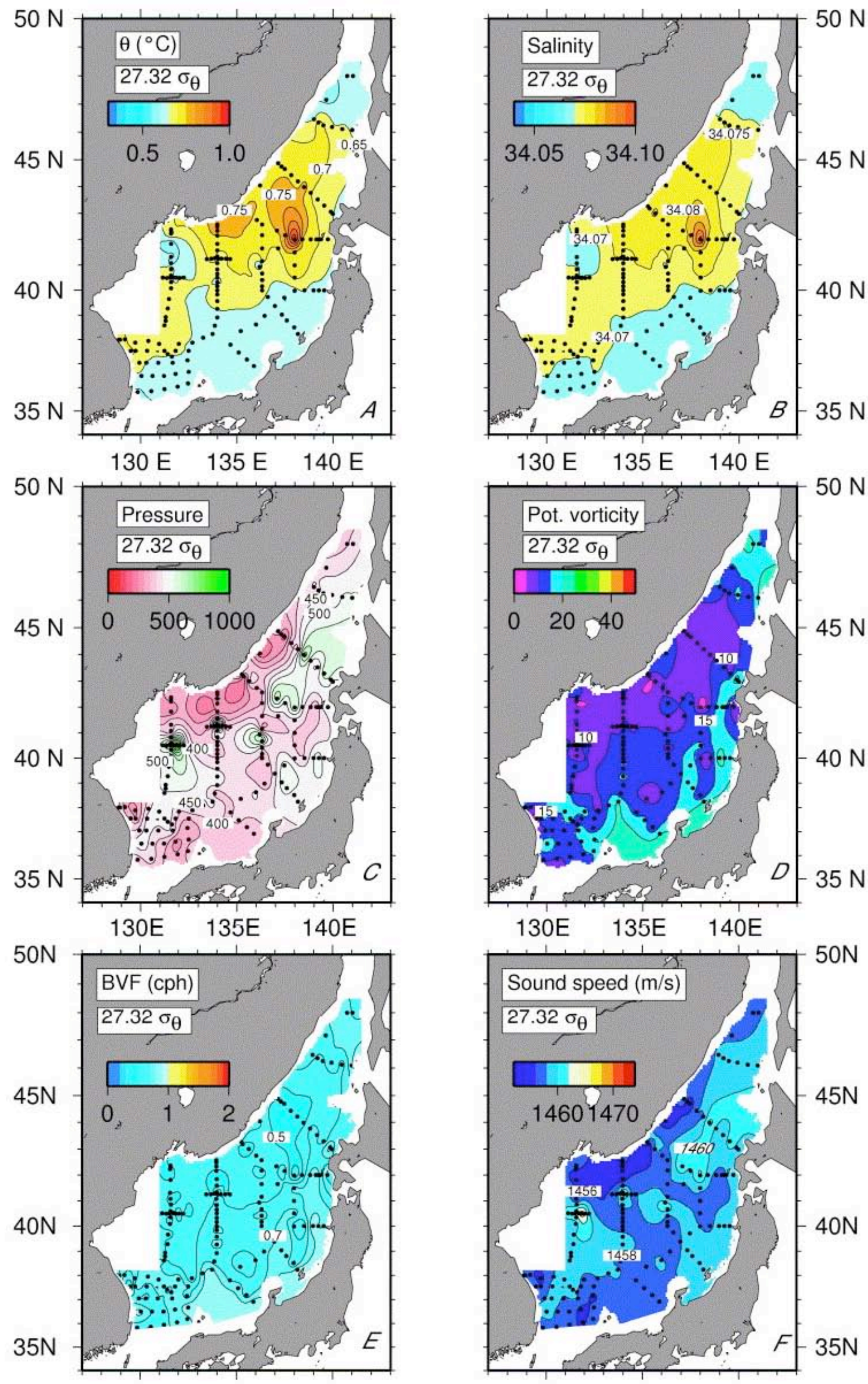
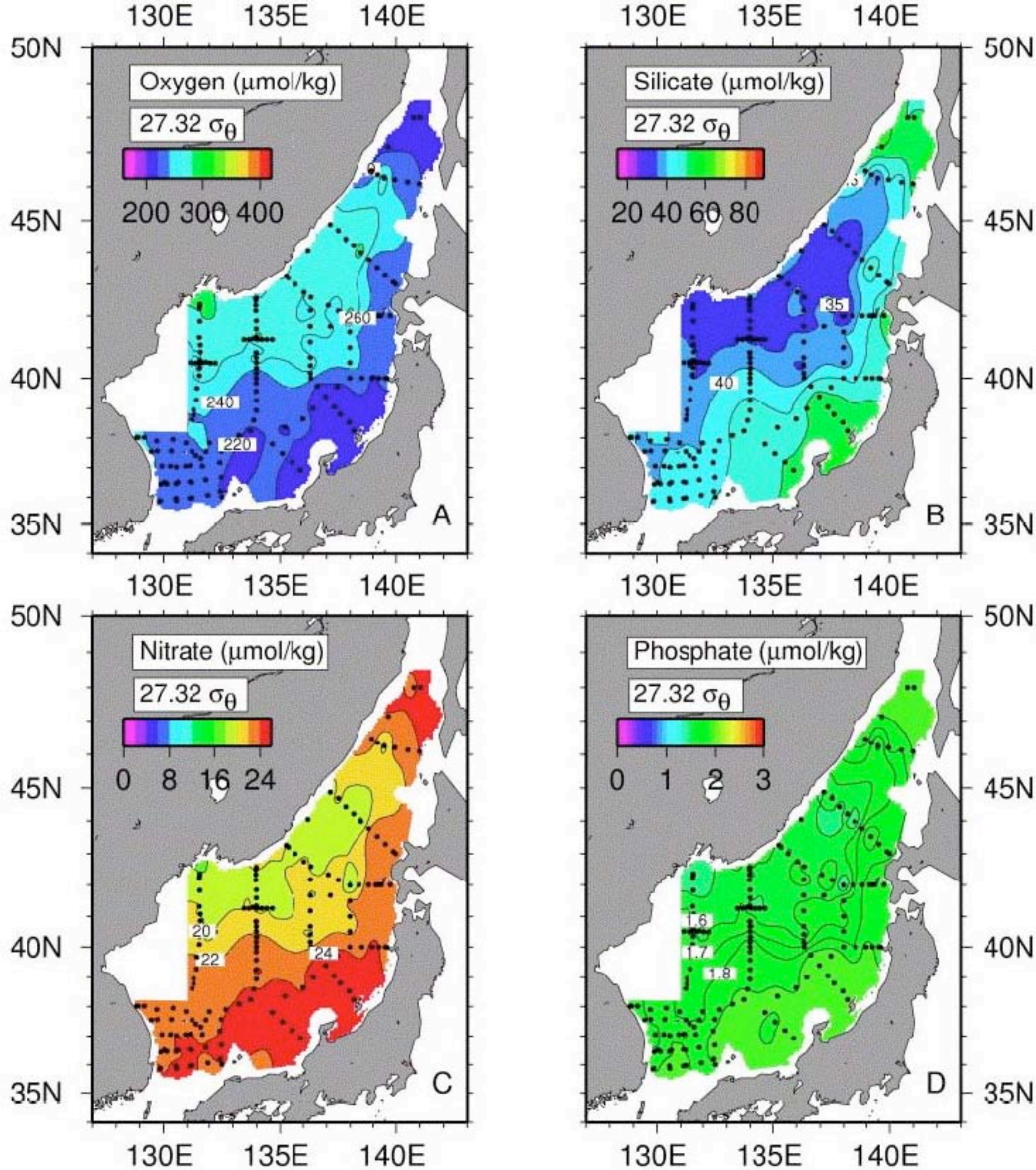


Figure D94. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.32 σ_θ (Upper Japan Sea Proper Water main salinity maximum).


Oxygen (μmol/kg)
27.32 σθ
200 300 400
260
240
220
A
Silicate (μmol/kg)
27.32 σθ
20 40 60 80
35
40
B
Nitrate (μmol/kg)
27.32 σθ
0 8 16 24
20
22
24
C
Phosphate (μmol/kg)
27.32 σθ
0 1 2 3
1.6
1.7
1.8
D
130E 135E 140E
50N
45N
40N
35N

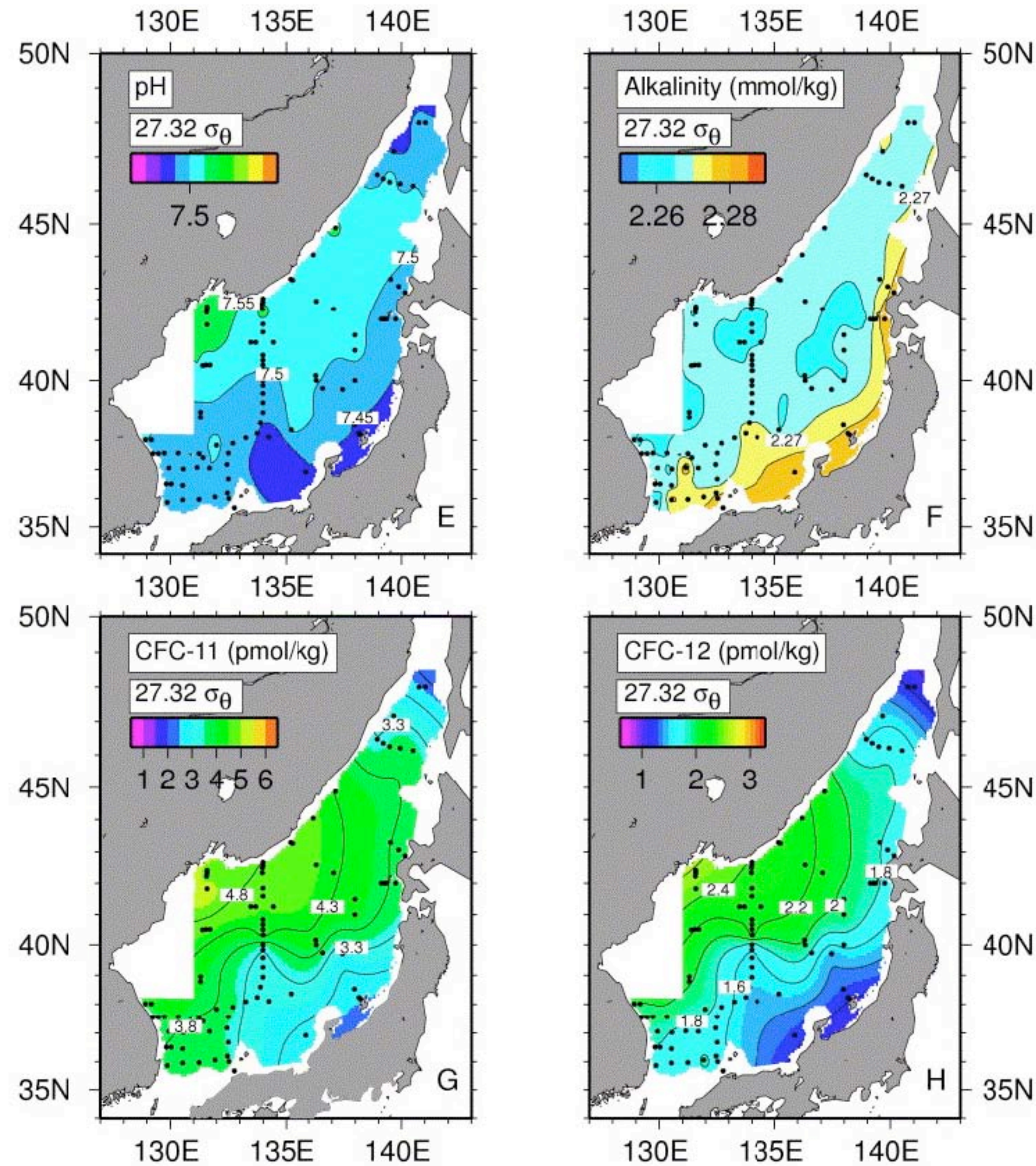


Figure D95. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.32 σ_θ (Upper Japan Sea Proper Water main salinity maximum).

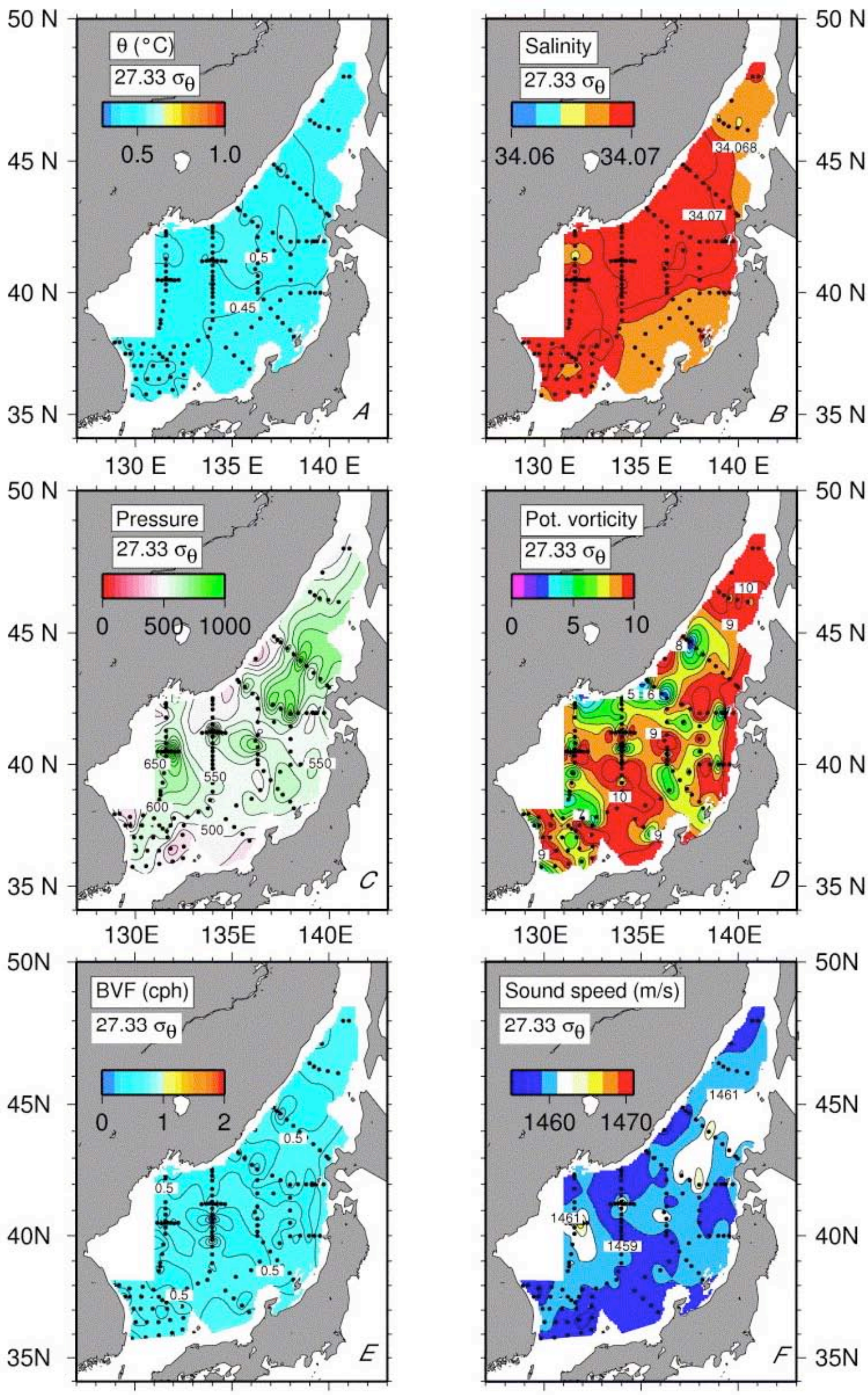
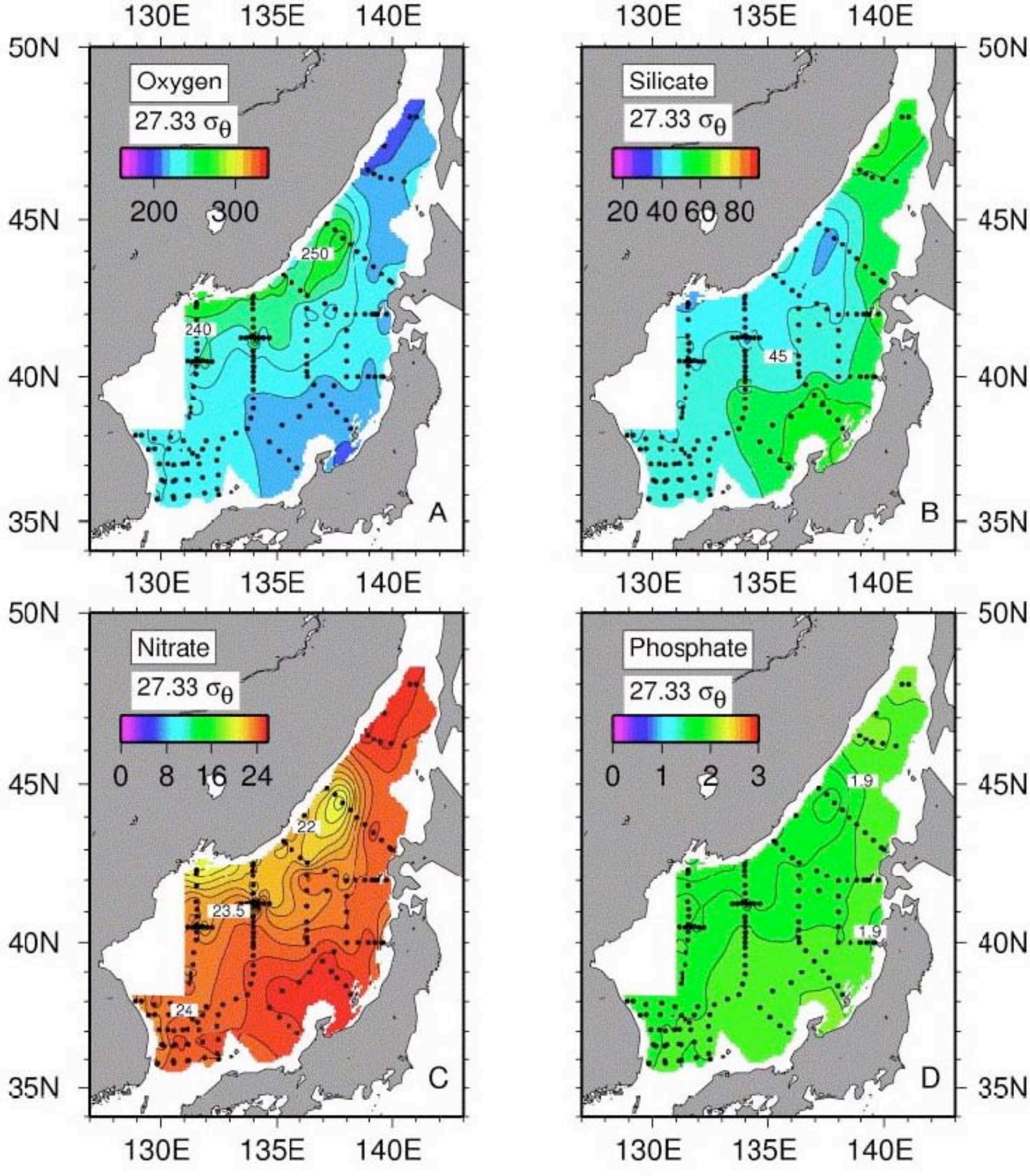


Figure D96. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.33 σ_θ.


Oxygen
27.33 σθ
200 300
250
240
A
Silicate
27.33 σθ
20 40 60 80
45
B
Nitrate
27.33 σθ
0 8 16 24
22
23.5
24
C
Phosphate
27.33 σθ
0 1 2 3
1.9
1.9
D
130E 135E 140E
50N 45N 40N 35N

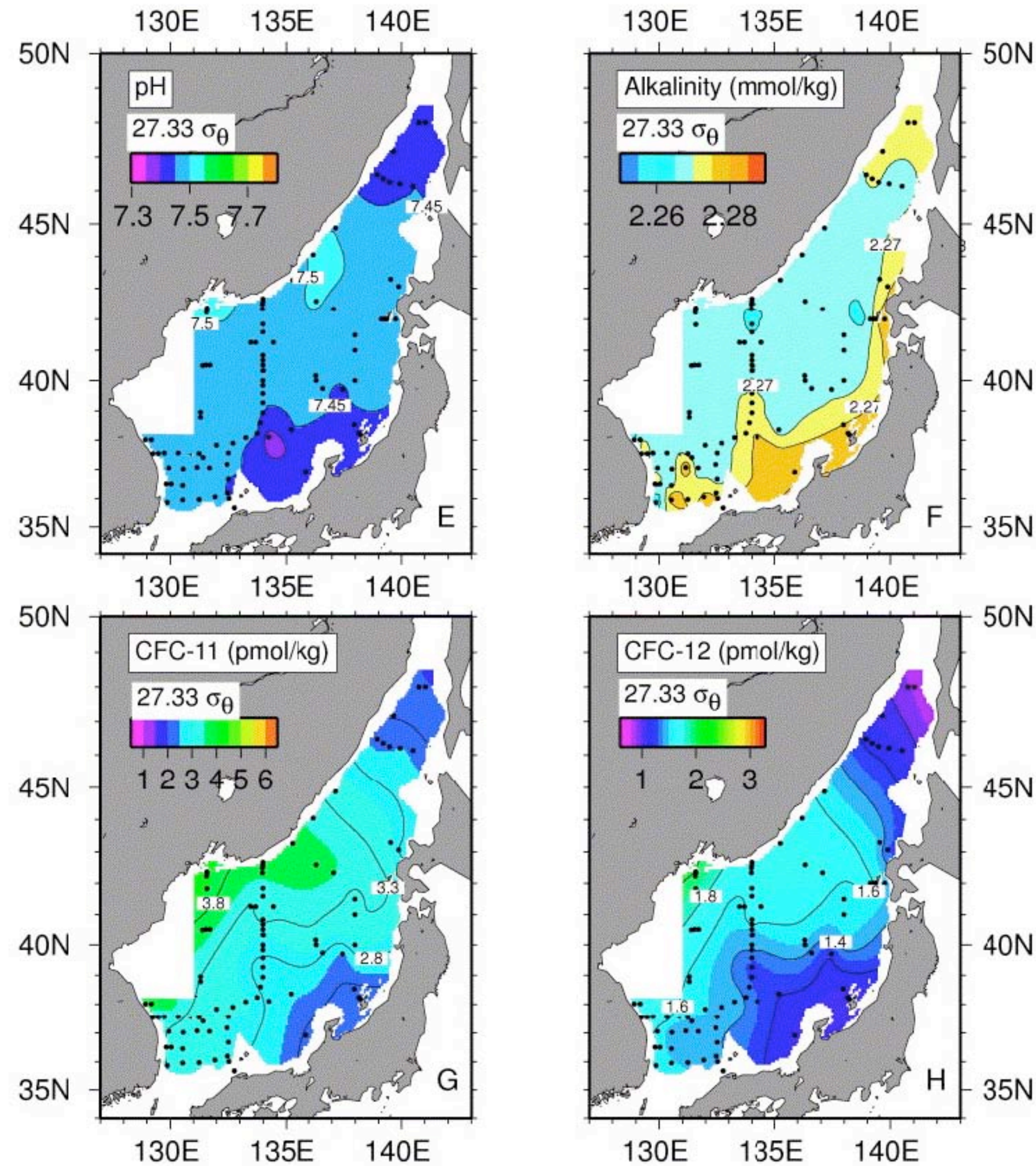


Figure D97. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.33 σ_θ.

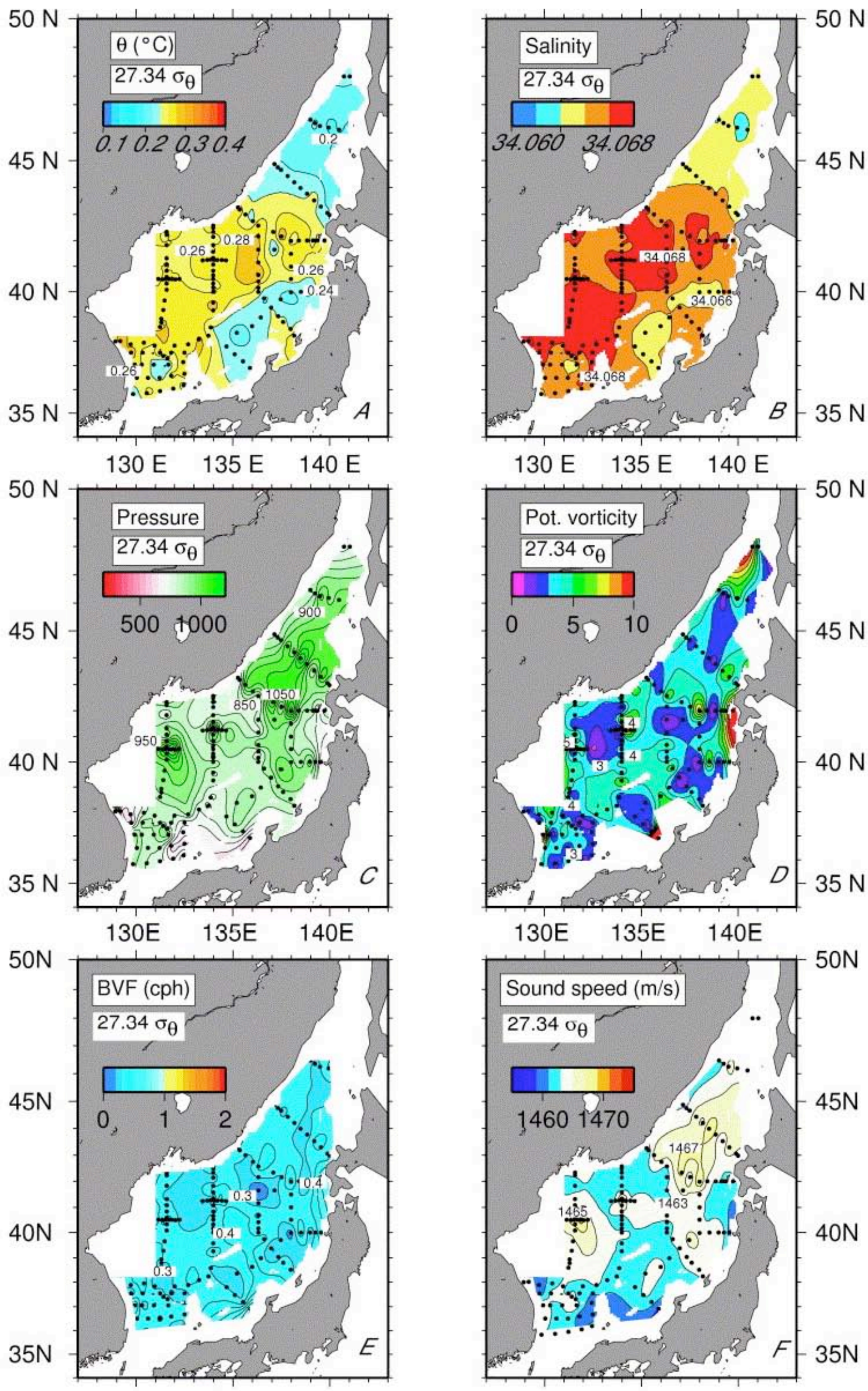
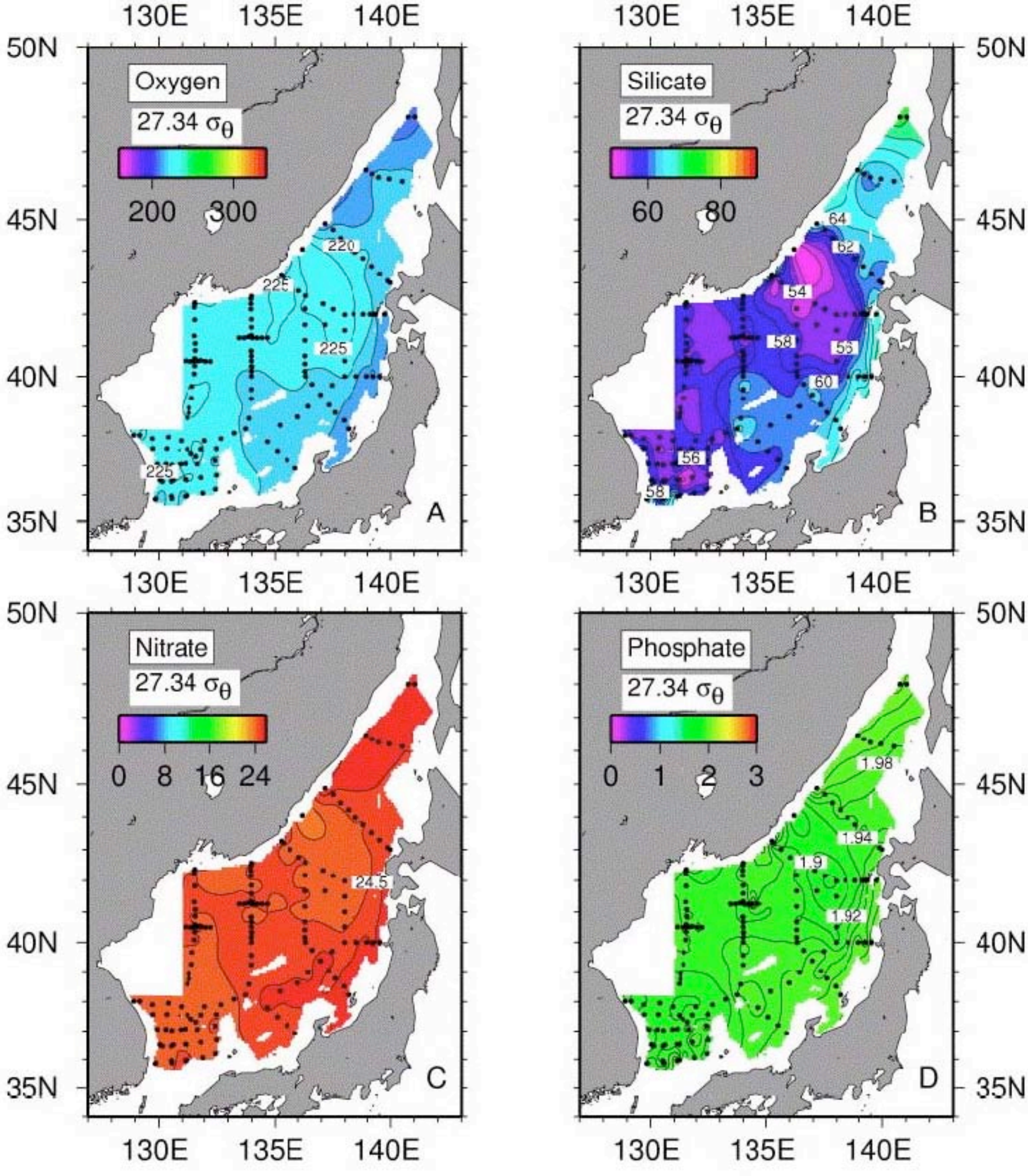


Figure D98. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 27.34 σ_θ.


Oxygen
27.34 σθ
200 300
220
225
225
225
A
Silicate
27.34 σθ
60 80
64
62
54
58
56
60
56
58
B
Nitrate
27.34 σθ
0 8 16 24
24.5
C
Phosphate
27.34 σθ
0 1 2 3
1.98
1.94
1.9
1.92
D
130E 135E 140E
50N 45N 40N 35N

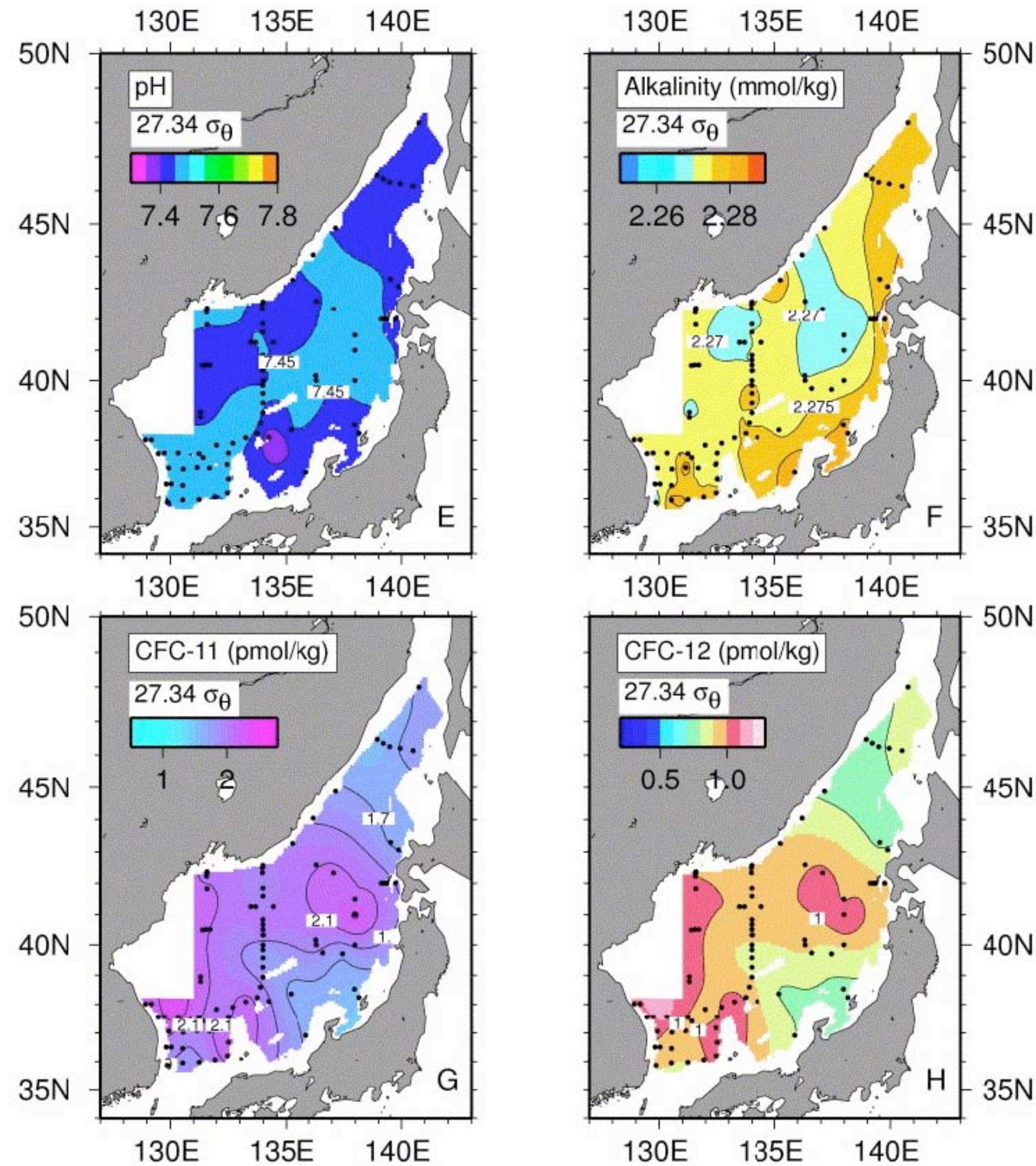


Figure D99. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 27.34 σ_θ.

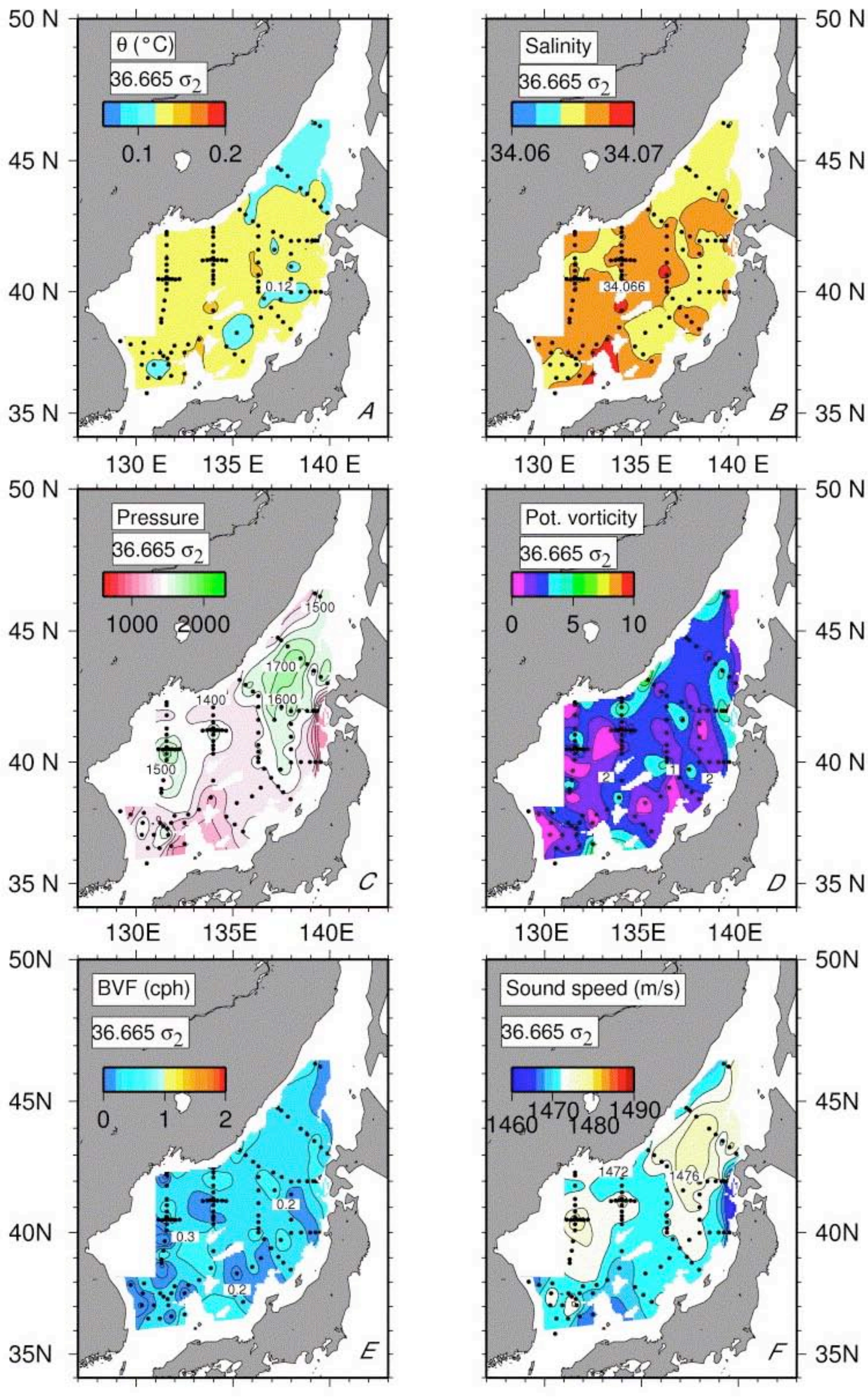
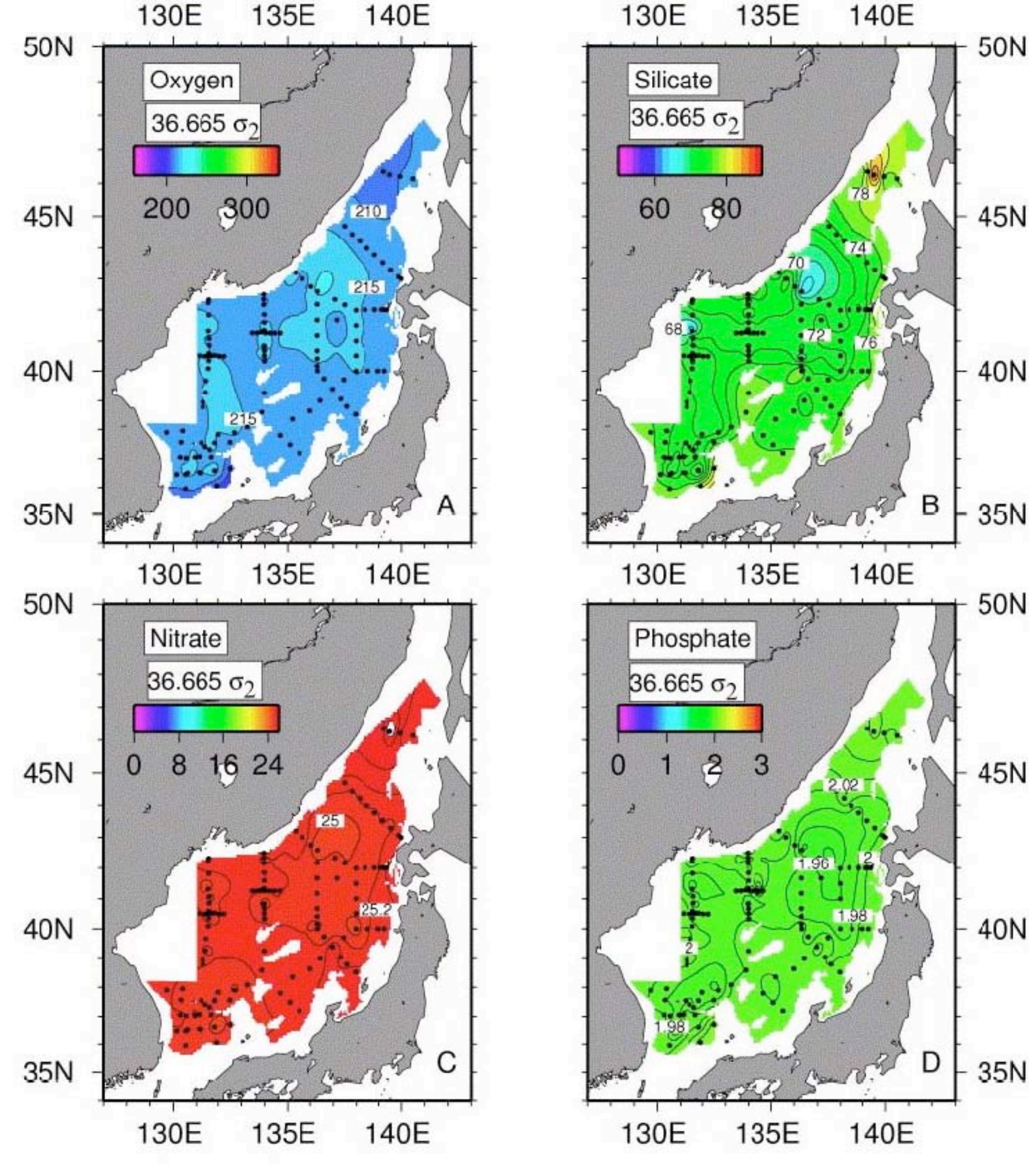


Figure D100. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 36.665 σ_2 (East Sea Deep Intermediate Water salinity minimum).



Oxygen
36.665 σ_2
200 300
210
215
215
A
Silicate
36.665 σ_2
60 80
78
74
70
68
72
76
B
Nitrate
36.665 σ_2
0 8 16 24
25
25.2
C
Phosphate
36.665 σ_2
0 1 2 3
2.02
1.96
2
1.98
2
1.98
D
130E 135E 140E
50N 45N 40N 35N

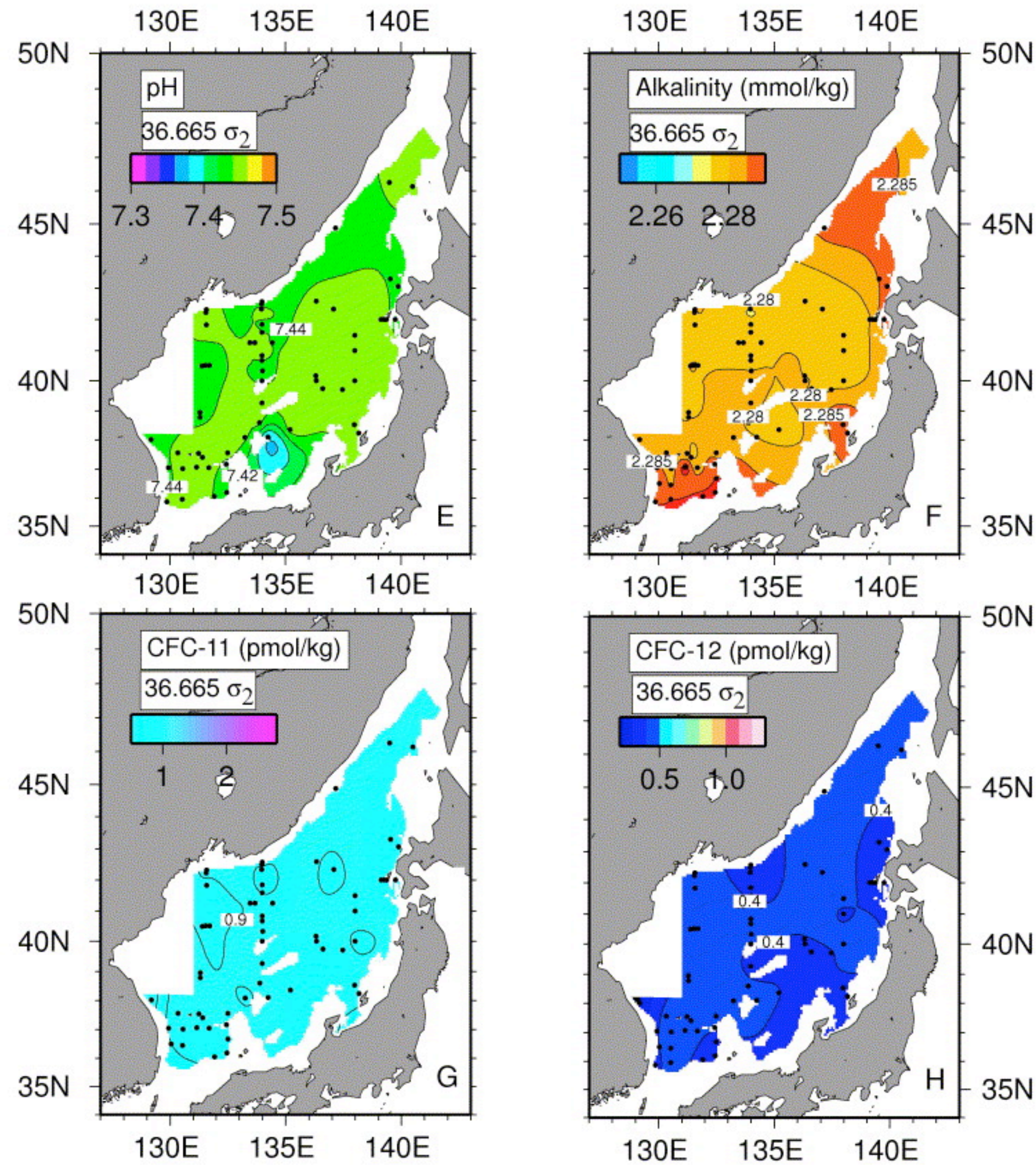


Figure D101. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 36.665 σ_2 (East Sea Deep Intermediate Water salinity minimum).

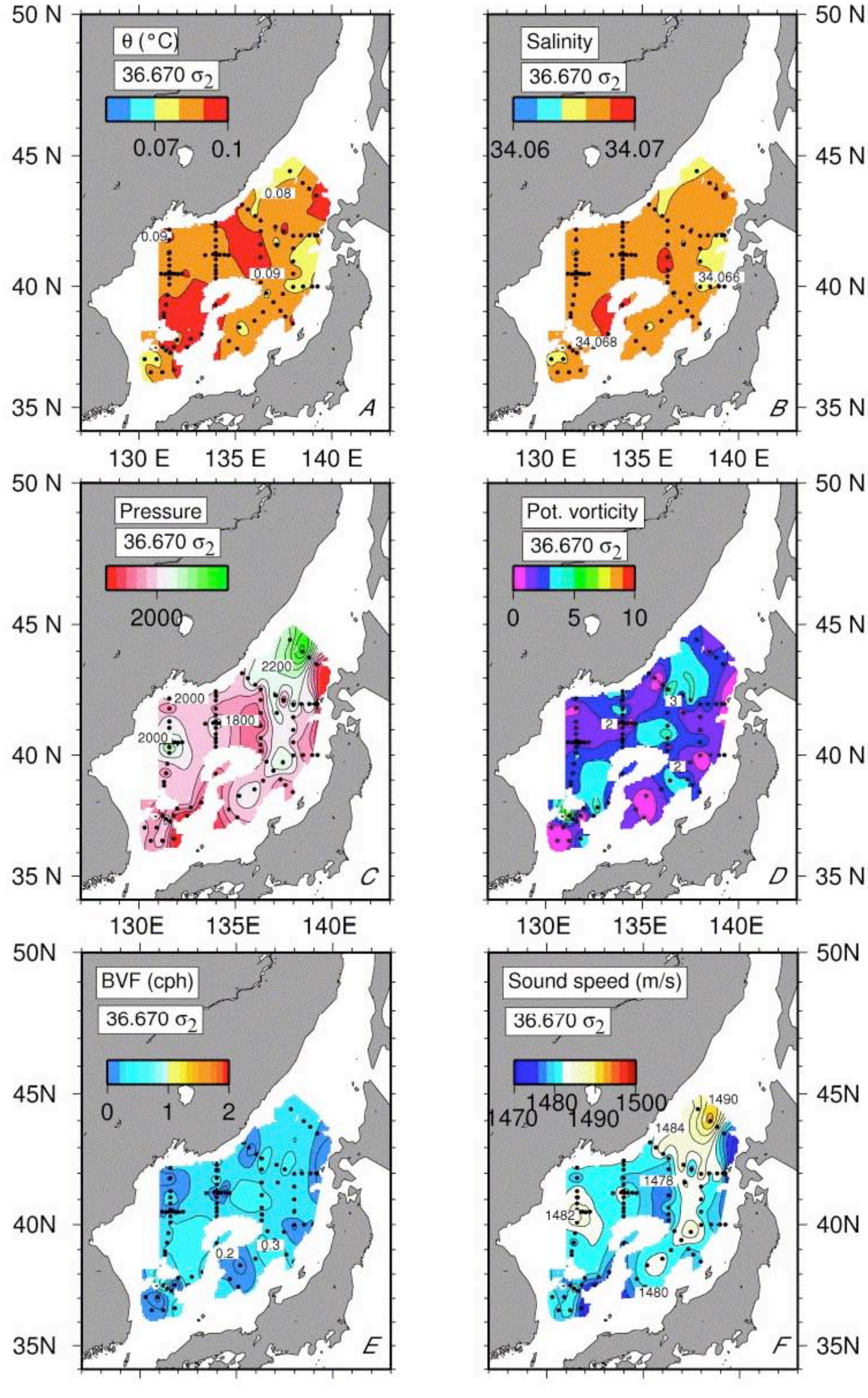
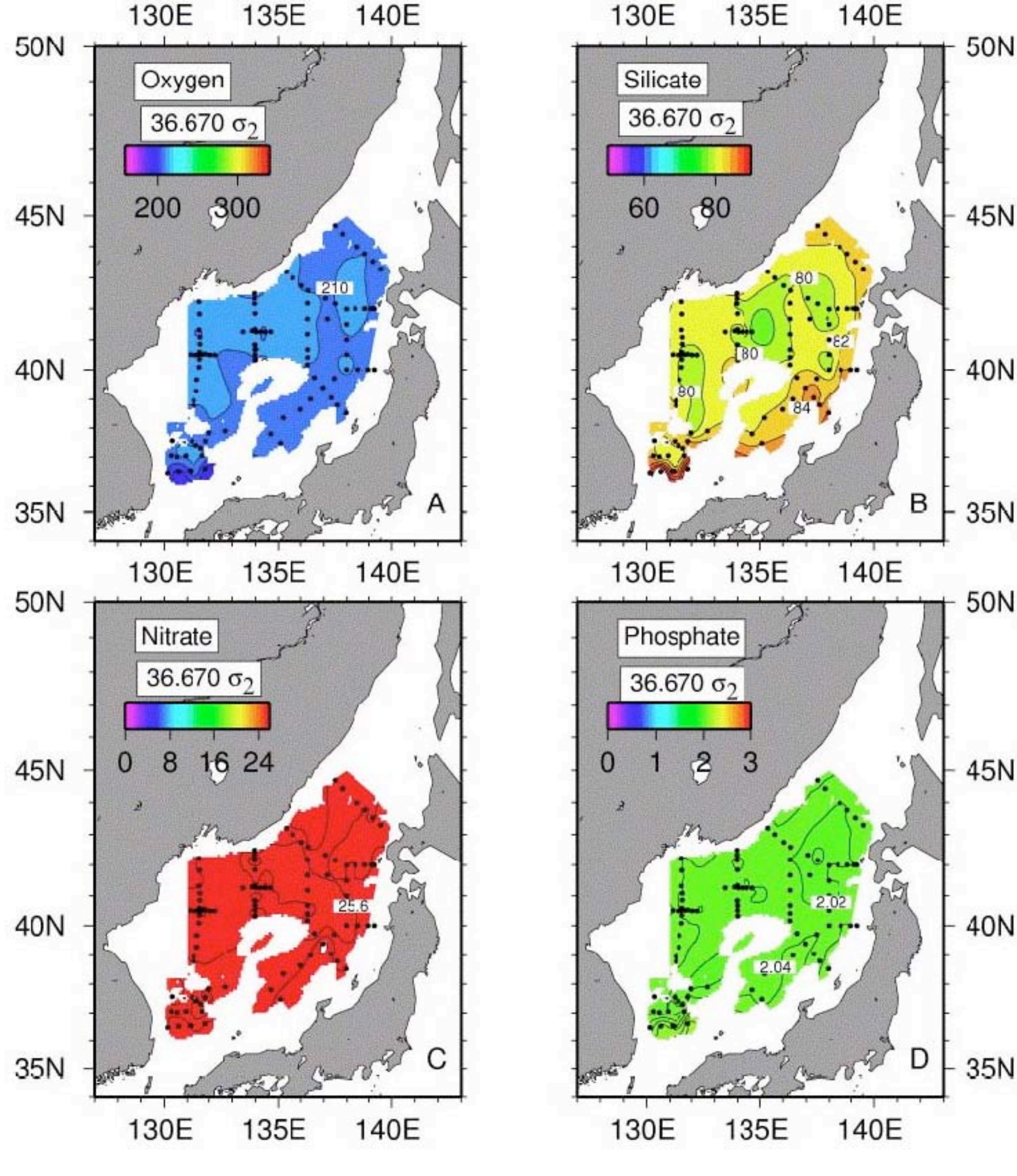


Figure D102. Maps of (a) potential temperature (°C), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 36.670 σ_2 (oxygen minimum).


Oxygen
36.670 σ2
200
300
210
A
Silicate
36.670 σ2
60
80
80
82
84
B
Nitrate
36.670 σ2
0
8
16
24
25.6
C
Phosphate
36.670 σ2
0
1
2
3
2.02
2.04
D
130E
135E
140E
50N
45N
40N
35N

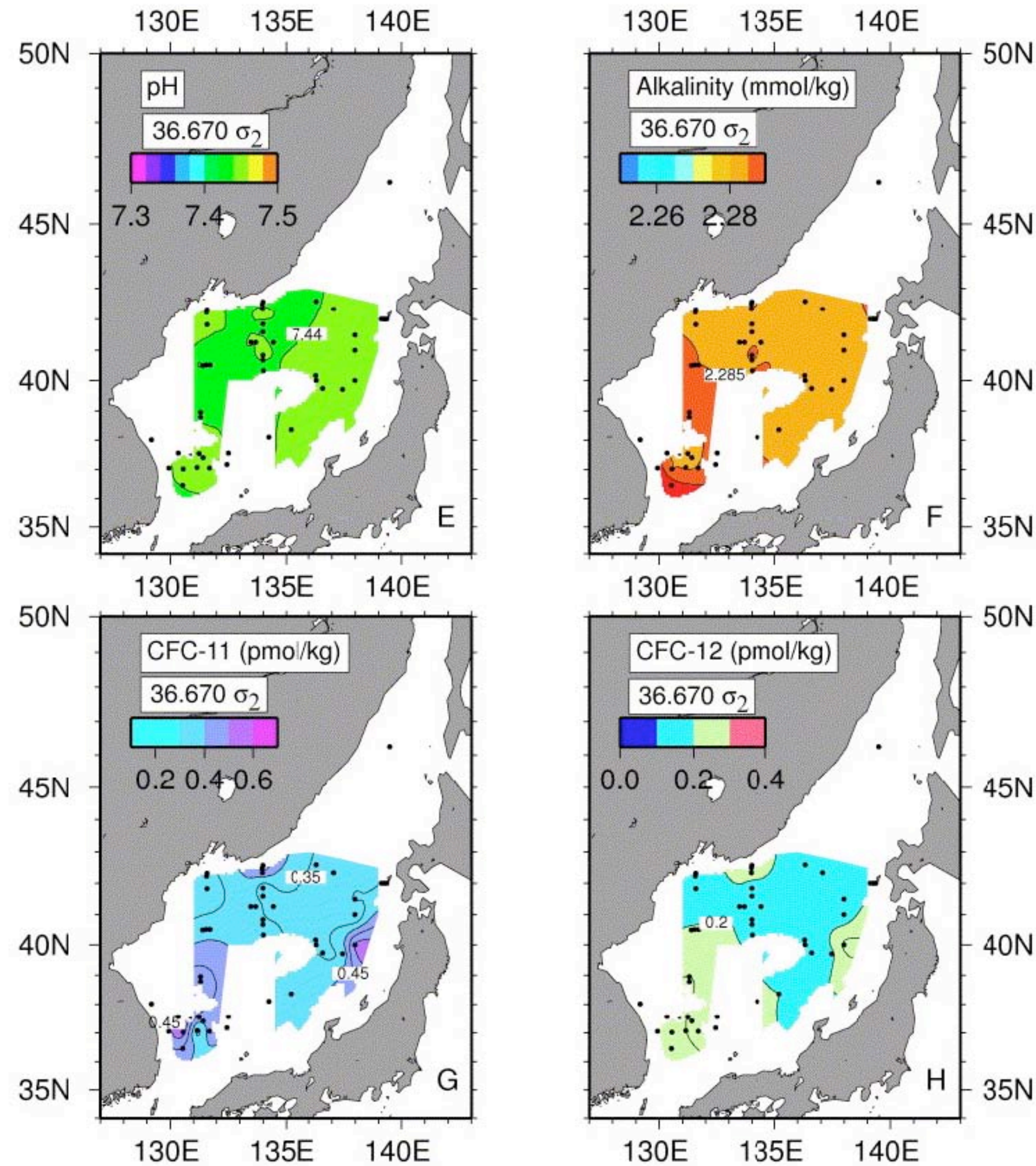


Figure D103. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg), (e) pH, (f) alkalinity (mmol/kg), (g) CFC-11 (pmol/kg), and (h) CFC-12 (pmol/kg) at 36.670 σ_2 (oxygen minimum).

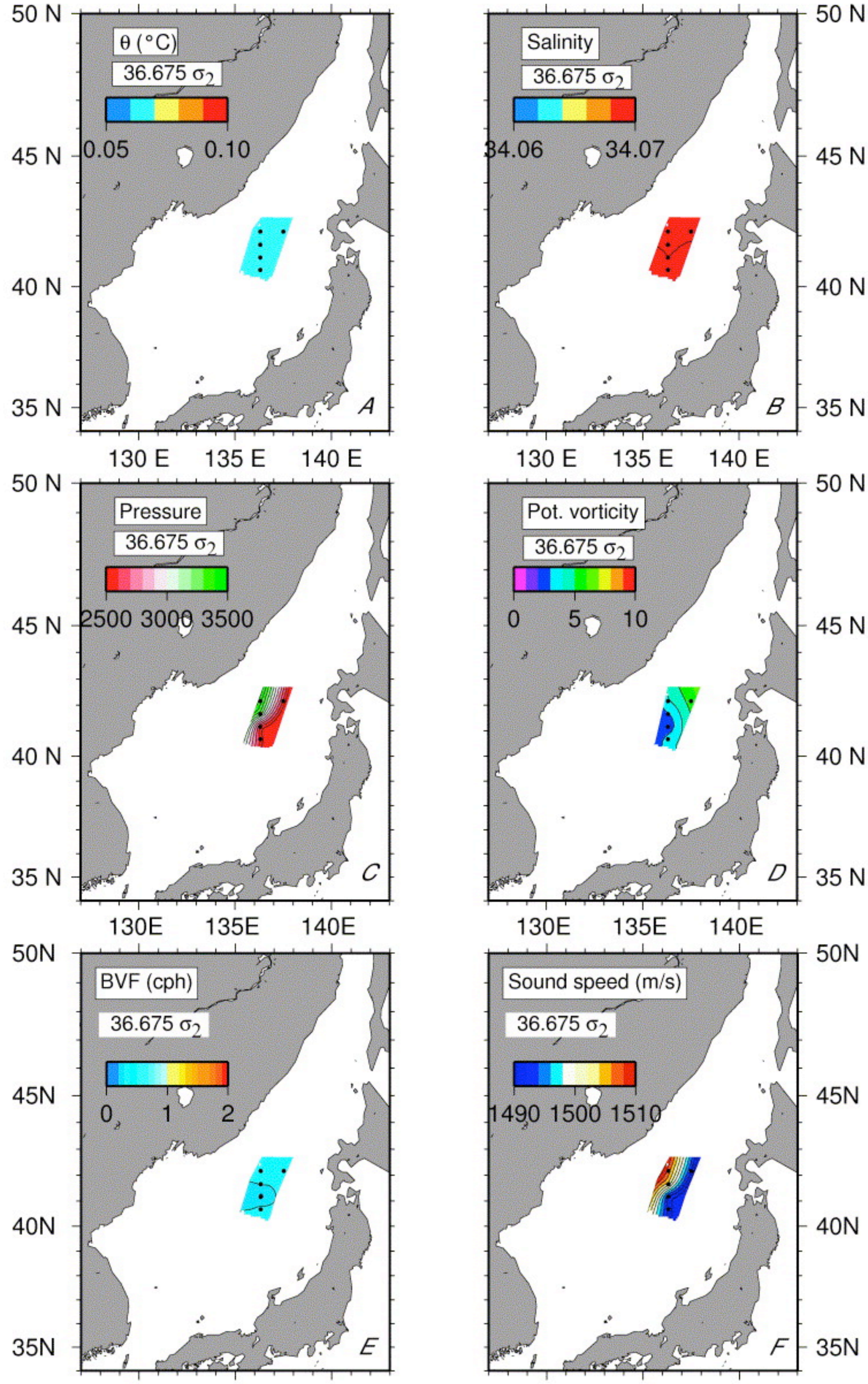


Figure D104. Maps of (a) potential temperature (℃), (b) salinity, (c) pressure (dbar), (d) isopycnal potential vorticity (x 10^{-14} cm^{-1} sec^{-1}) at 36.675 σ_2 (near bottom).

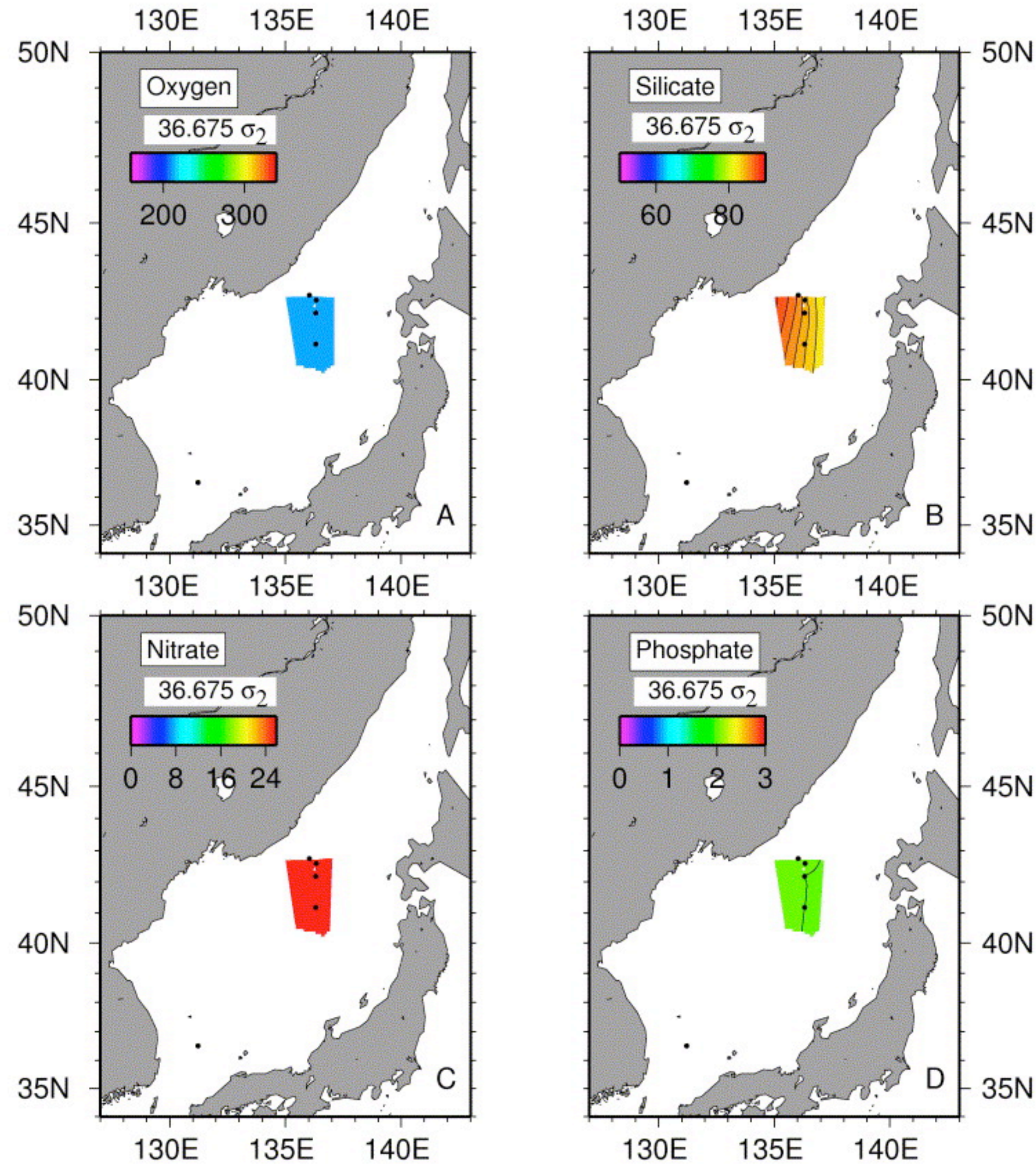


Figure D105. (a) Oxygen (μmol/kg), (b) dissolved silica (μmol/kg), (c) nitrate (μmol/kg), (d) phosphate (μmol/kg) at 36.675 σ_2 (near bottom).