Masas de Agua

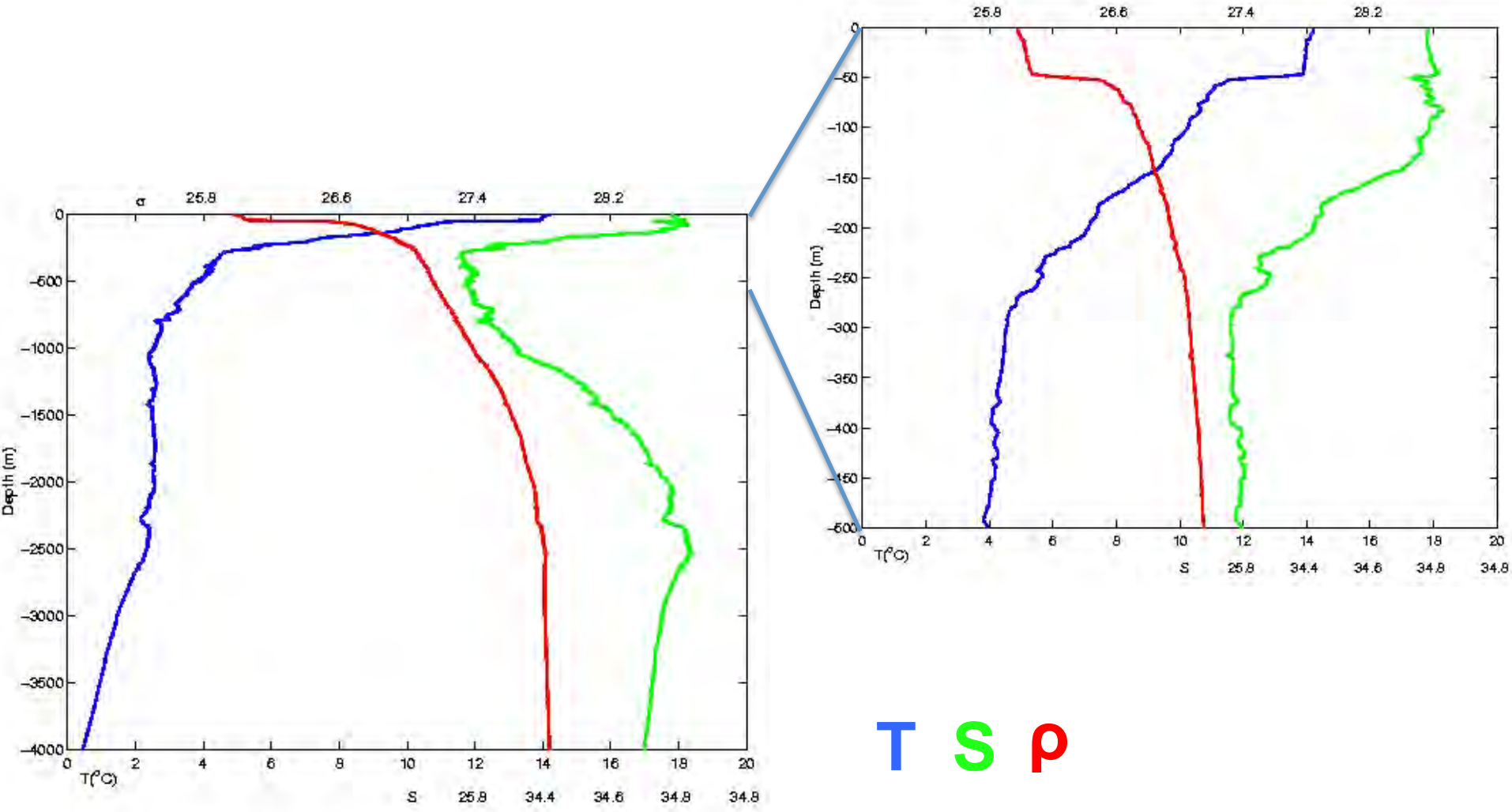
- Distribución de propiedades
- Diagramas T-S. Identificación
- Mezcla de Aguas

Masa de agua: Cuerpo de agua con una formación común.

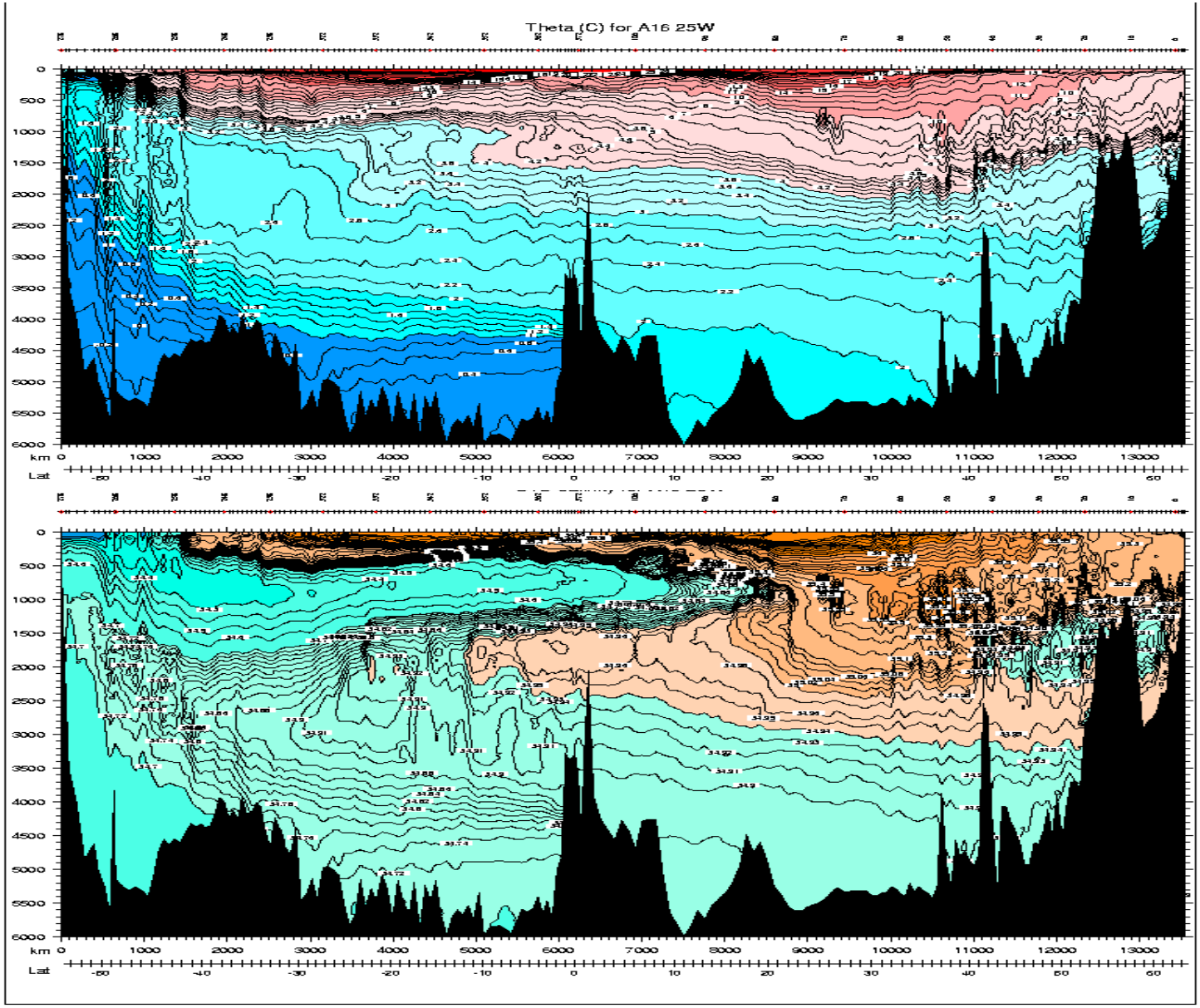
- Tiene una propiedad identificable (un extremo de algún tipo)

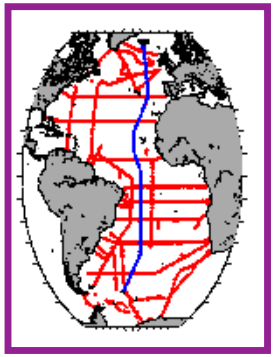
- Tiene un proceso de formación identificable

Perfiles verticales

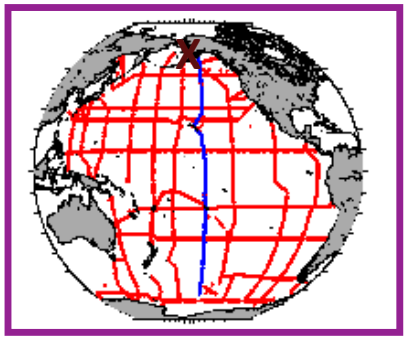


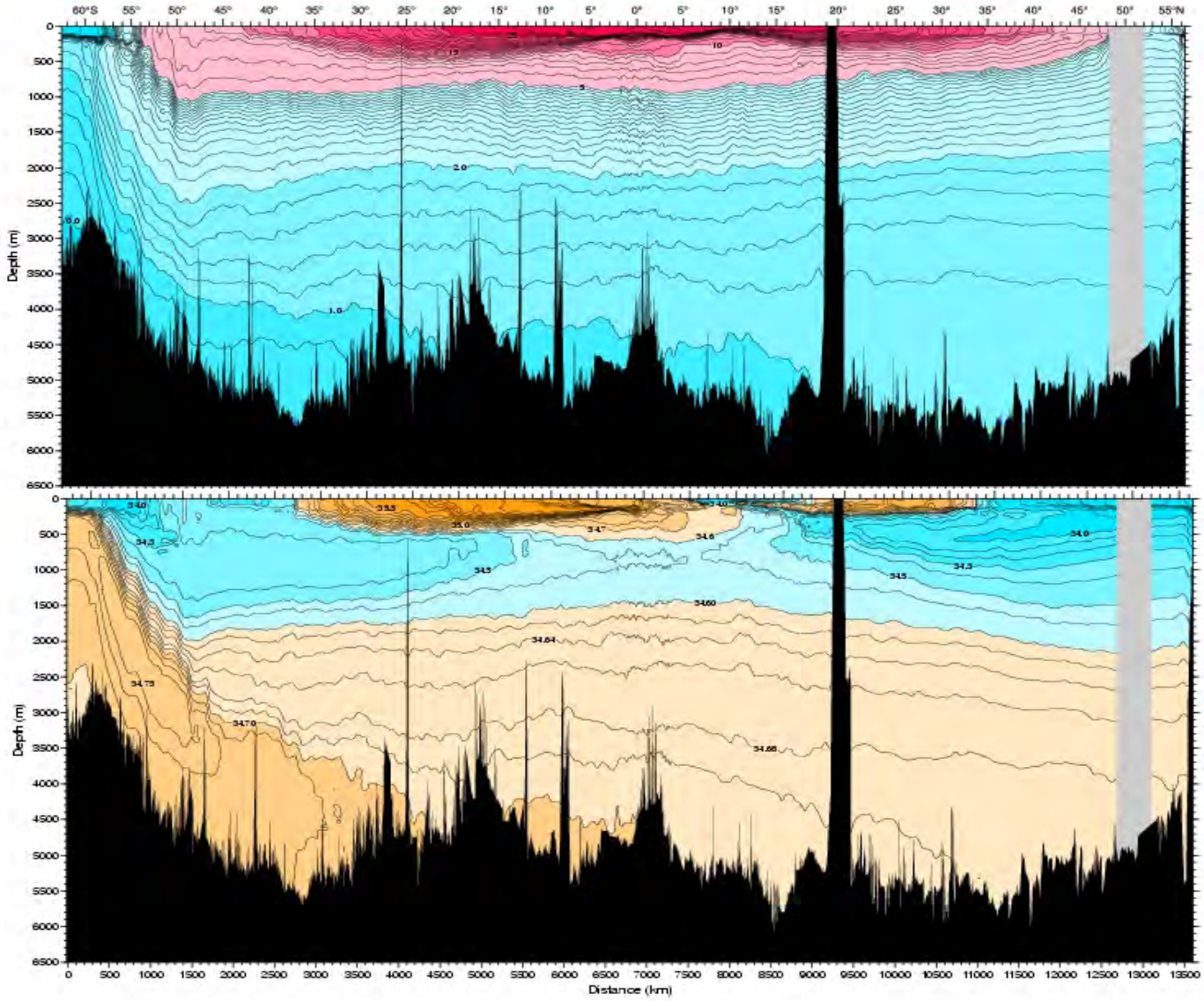
Temperatura y Salinidad, 25W

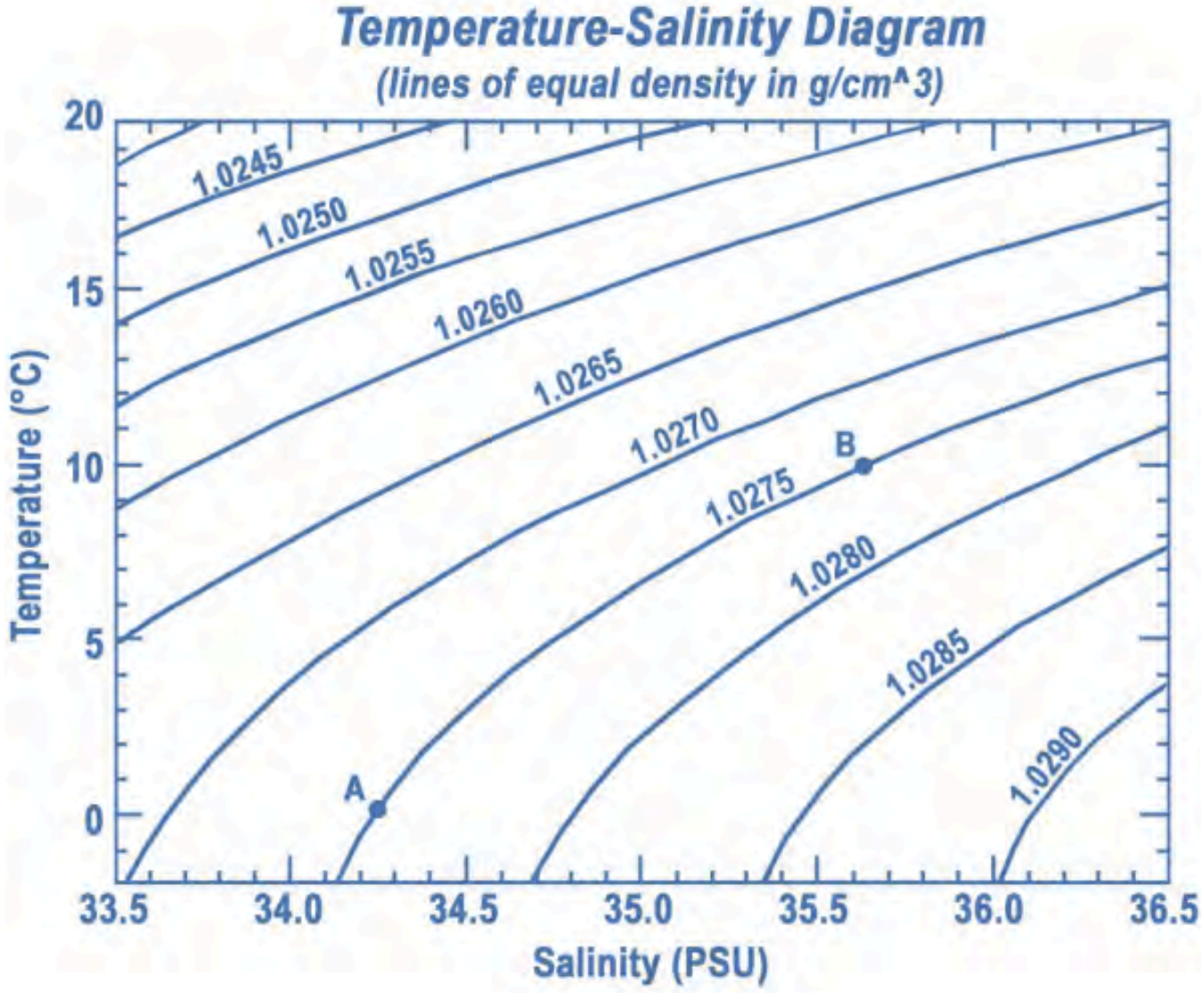




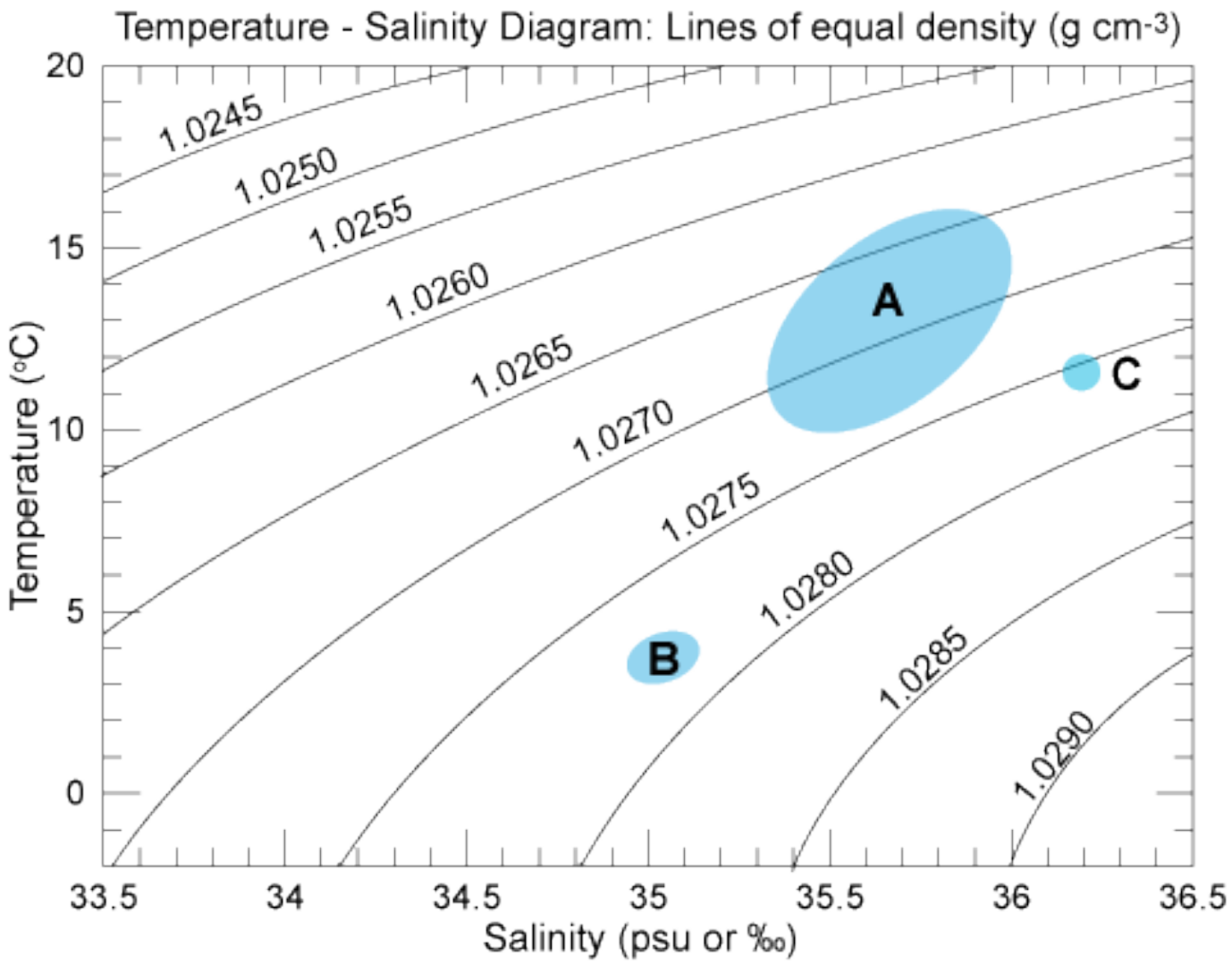
Temperatura y Salinidad, 150W

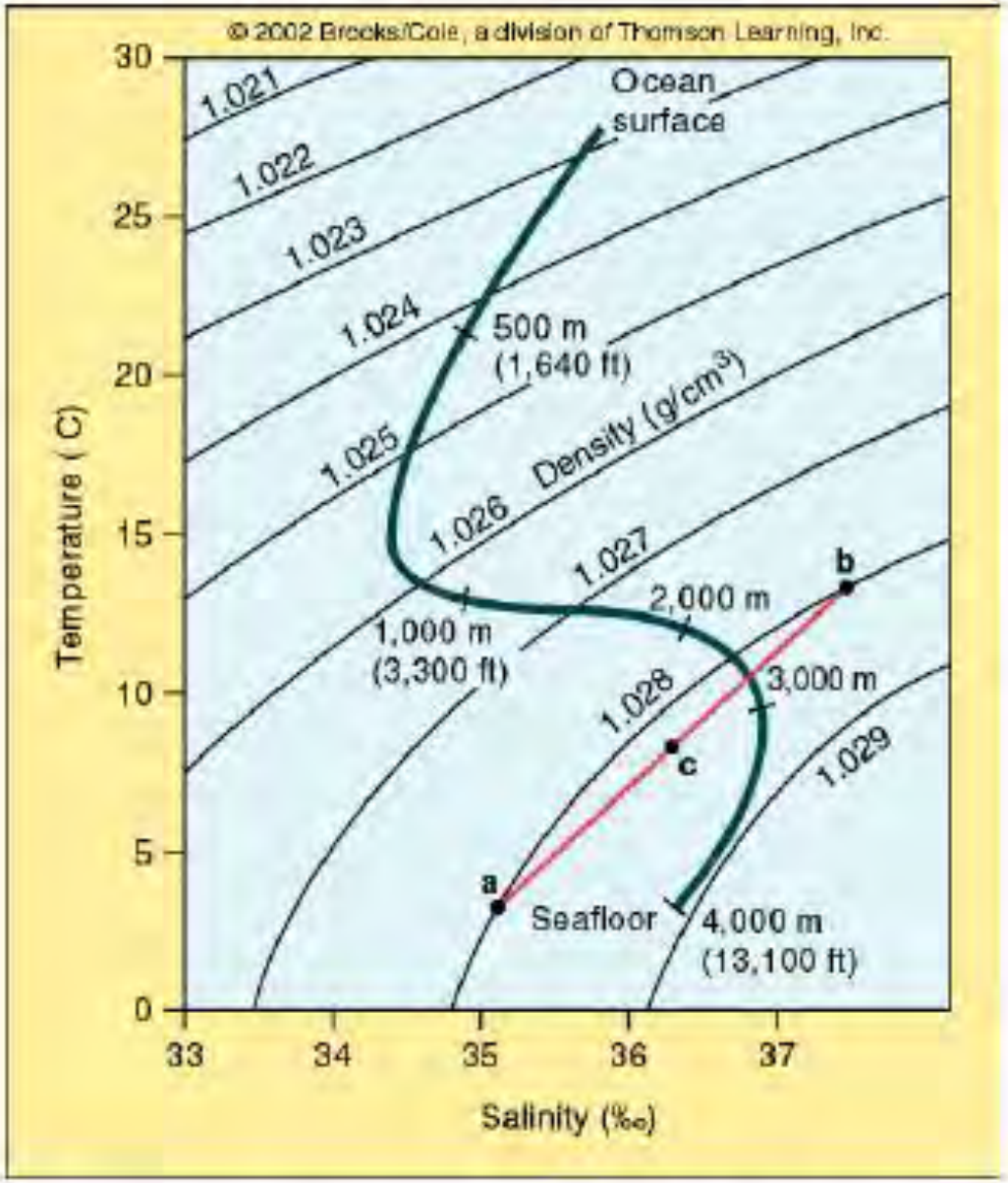





Temperature-Salinity Diagram
(lines of equal density in g/cm^3)
Temperature (°C)
Salinity (PSU)
20
15
10
5
0
33.5
34.0
34.5
35.0
35.5
36.0
36.5
1.0245
1.0250
1.0255
1.0260
1.0265
1.0270
1.0275
1.0280
1.0285
1.0290
A
B

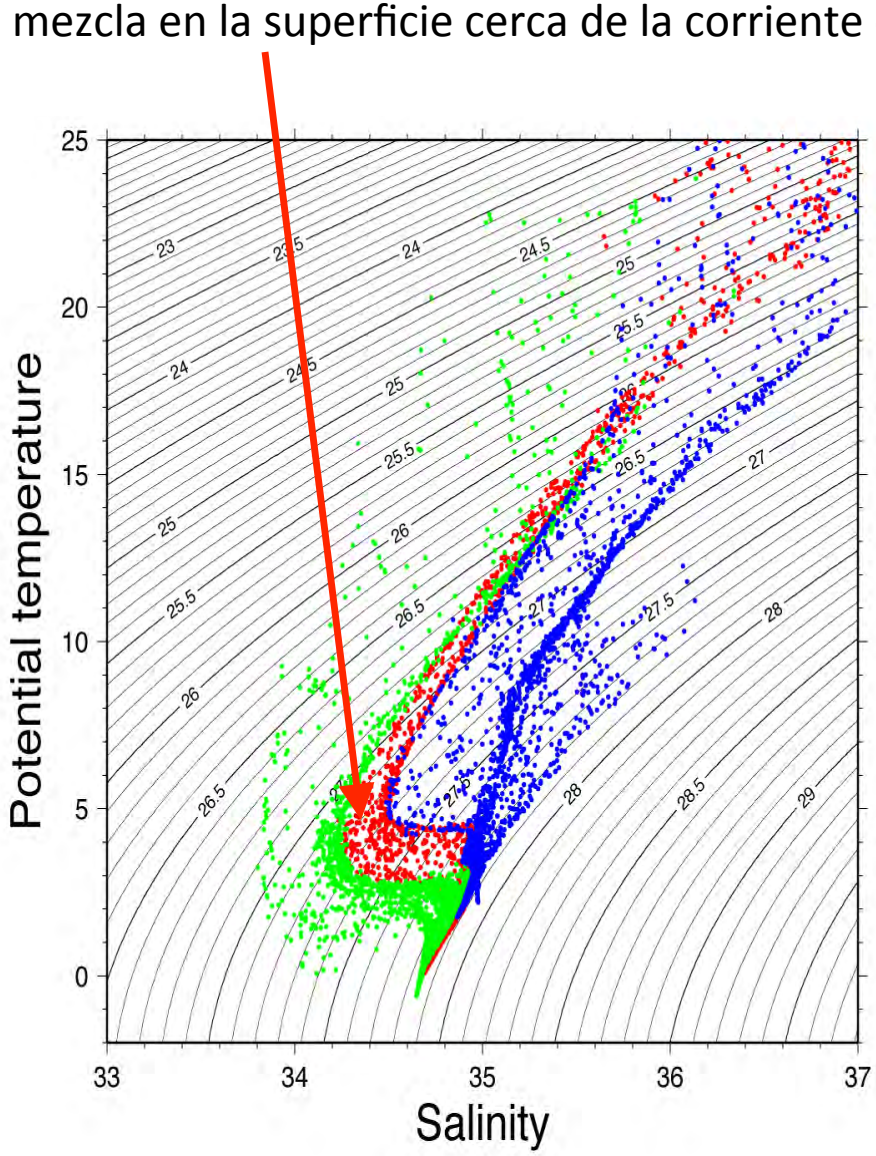
Tres masas de agua, A, B y C

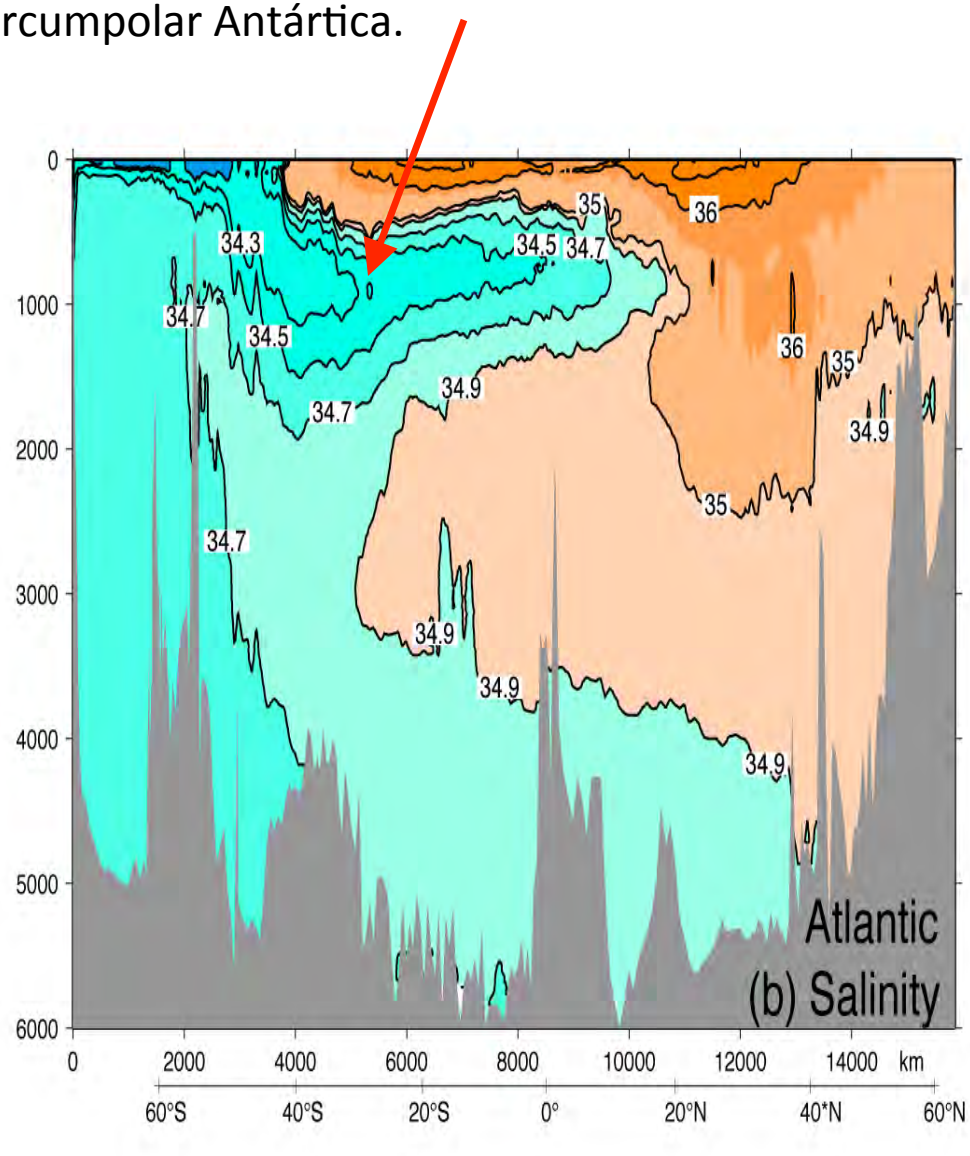


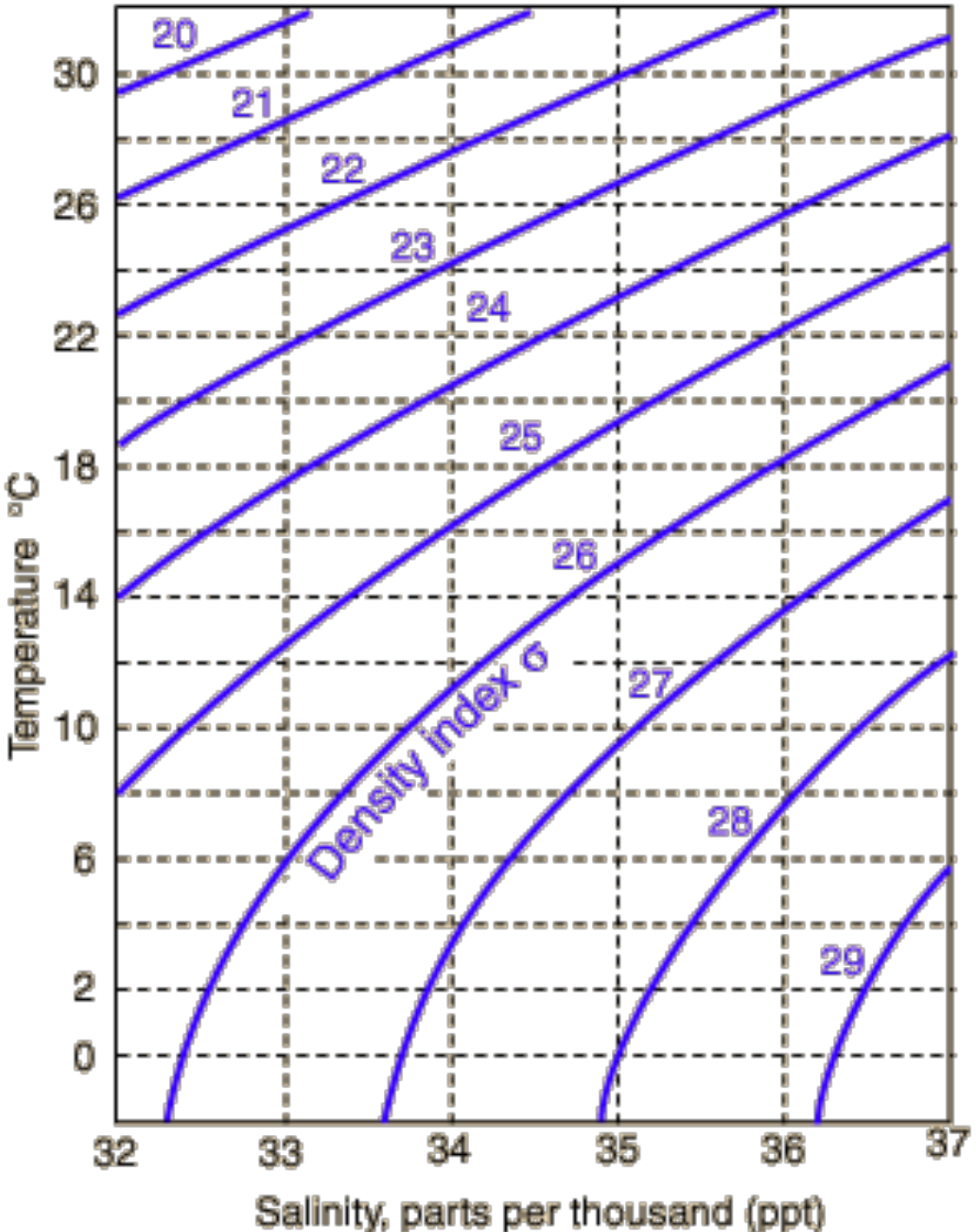

© 2002 Brooks/Cole, a division of Thomson Learning, Inc.
Temperature (C)
30
25
20
15
10
5
0
33
34
35
36
37
Salinity (‰)
1.021
1.022
1.023
1.024
1.025
1.026
1.027
1.028
1.029
Density (g/cm³)
Ocean surface
500 m (1,640 ft)
1,000 m (3,300 ft)
2,000 m
3,000 m
4,000 m (13,100 ft)
Seafloor
a
b
c

Masa de agua

Ejemplo: Agua intermedia del Antártico. (a) Capa de baja salinidad, (b) se origina en la capa de mezcla en la superficie cerca de la corriente circumpolar Antártica.



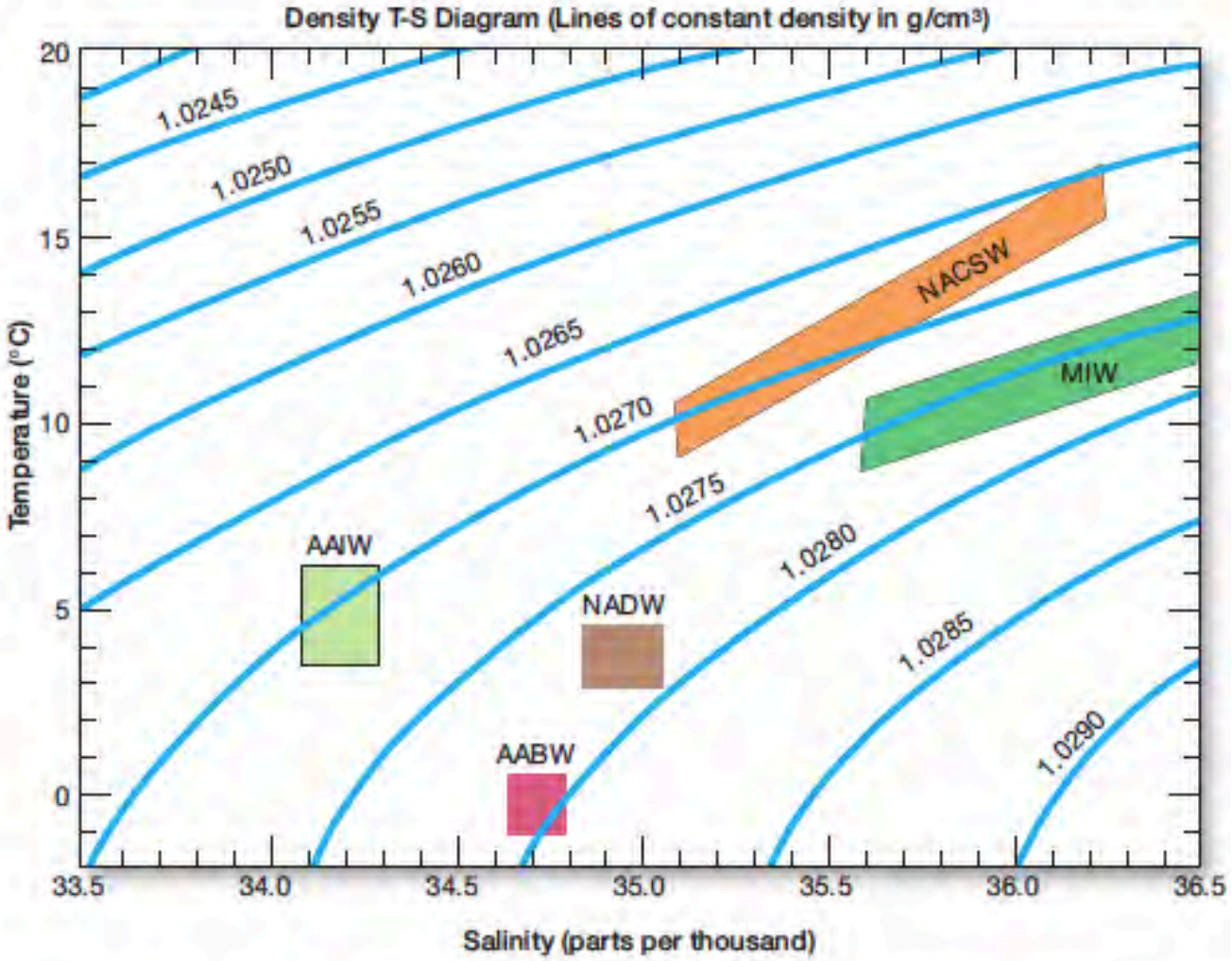




Respuesta No Lineal

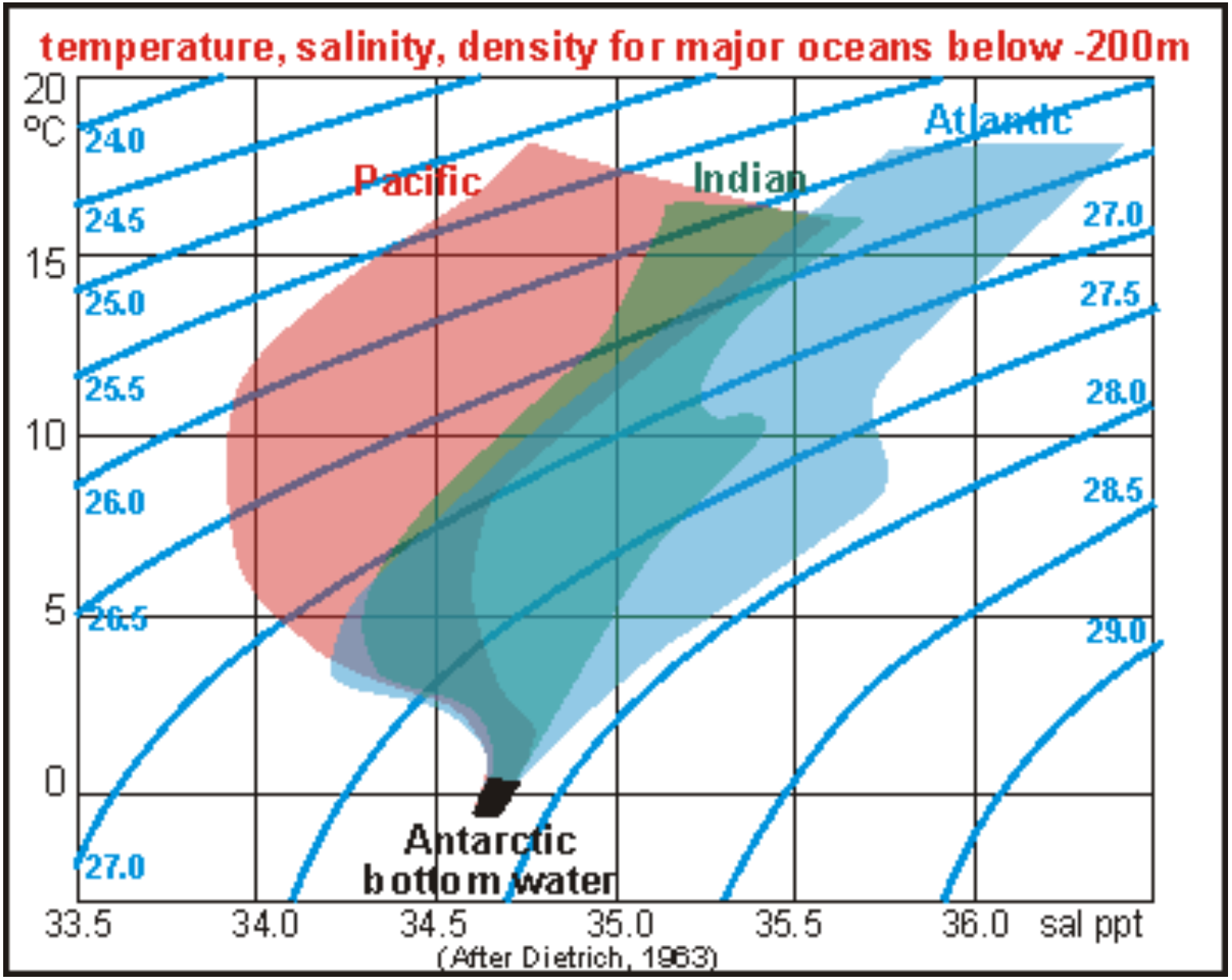
ΔT

ΔS



North Atlantic Water Masses:

- (AAIW) Antarctic Intermediate Water
- (AABW) Antarctic Bottom Water
- (NADW) North Atlantic Deep Water
- (NACSW) North Atlantic Central Surface Water
- (MIW) Mediterranean Intermediate Water

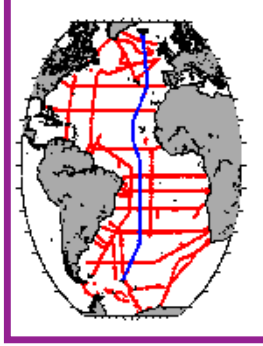

temperature, salinity, density for major oceans below -200m
20
°C
15
10
5
0
24.0
24.5
25.0
25.5
26.0
26.5
27.0
Pacific
Indian
Atlantic
27.0
27.5
28.0
28.5
29.0
Antarctic
bottom water
33.5
34.0
34.5
35.0
35.5
36.0
sal ppt
(After Dietrich, 1963)

Estructura (aproximada) de 4 capas en el océano

Se pueden usar 4 capas para describir los océanos del mundo.

1. Capa superior (hasta la picnoclina permanente)
2. Capa intermedia
3. Capa profunda
4. Capa de fondo

Sección vertical en el Atlántico: estructura general

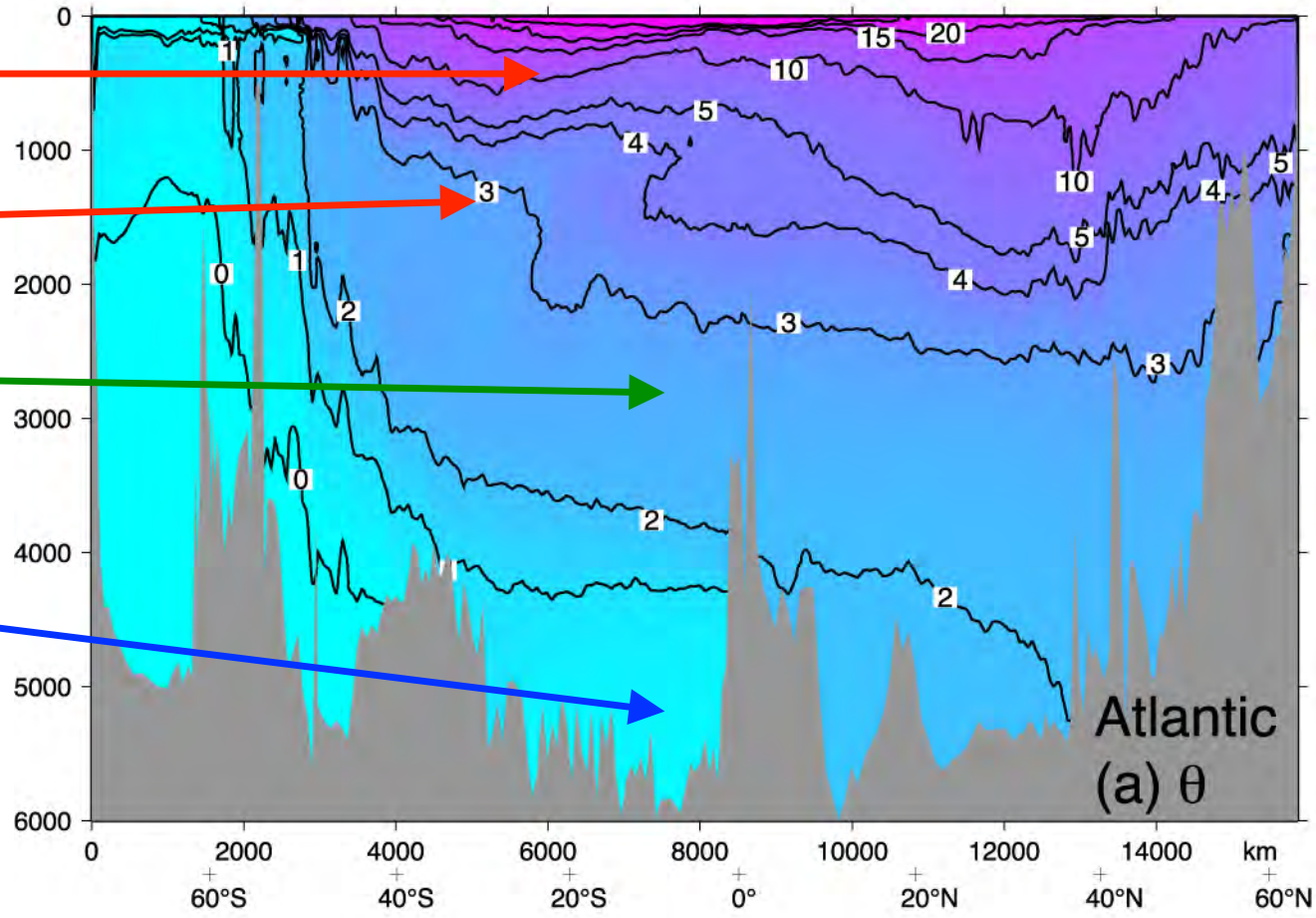


Superior

Intermedia

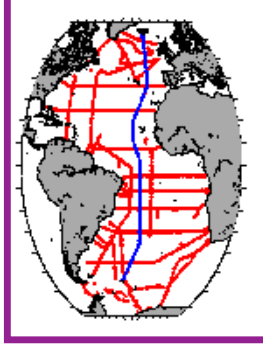
Profunda

Fondo



DPO Fig. 4.11

Sección vertical del Atlántico: ejemplo de masas de agua

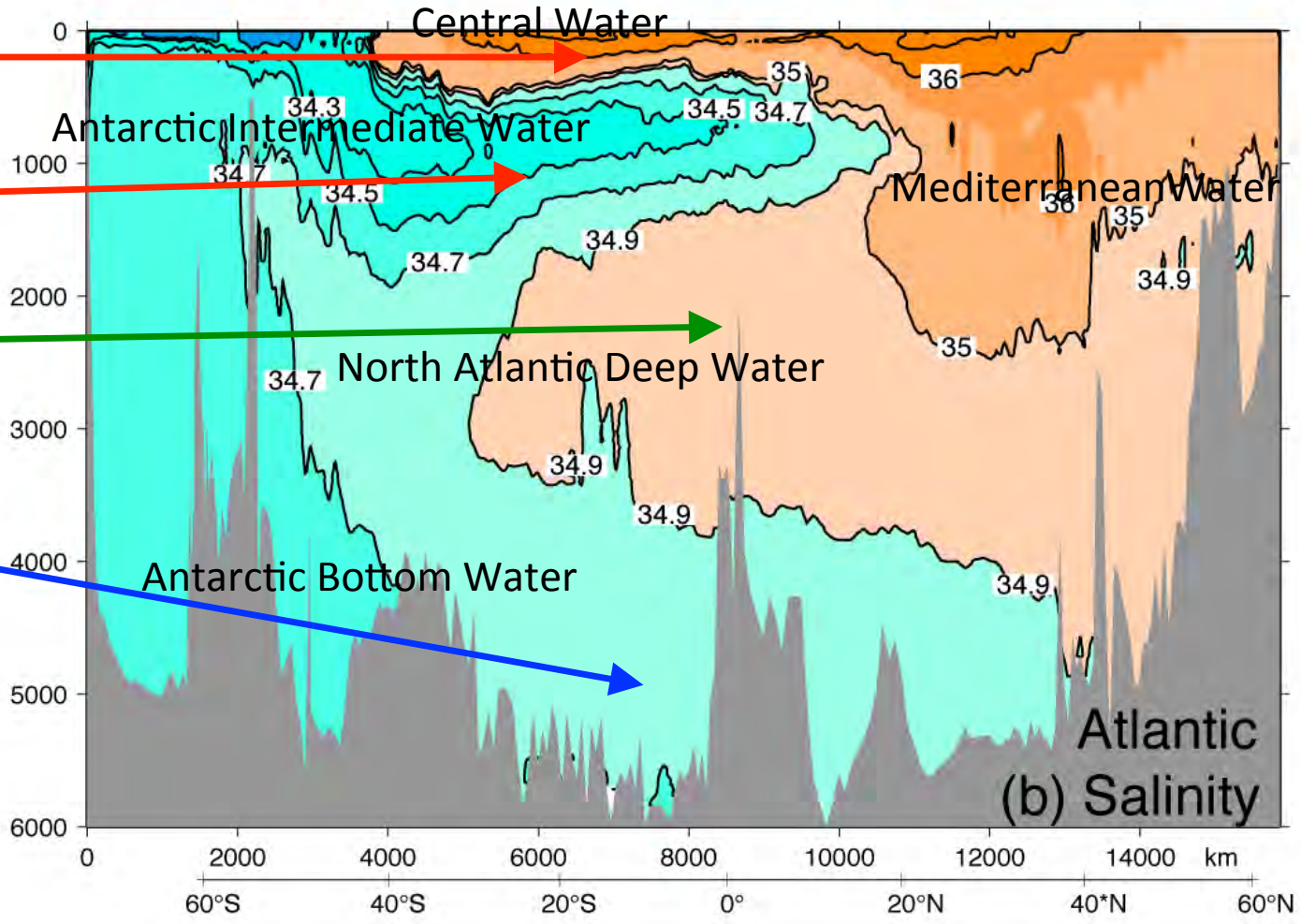


Superior

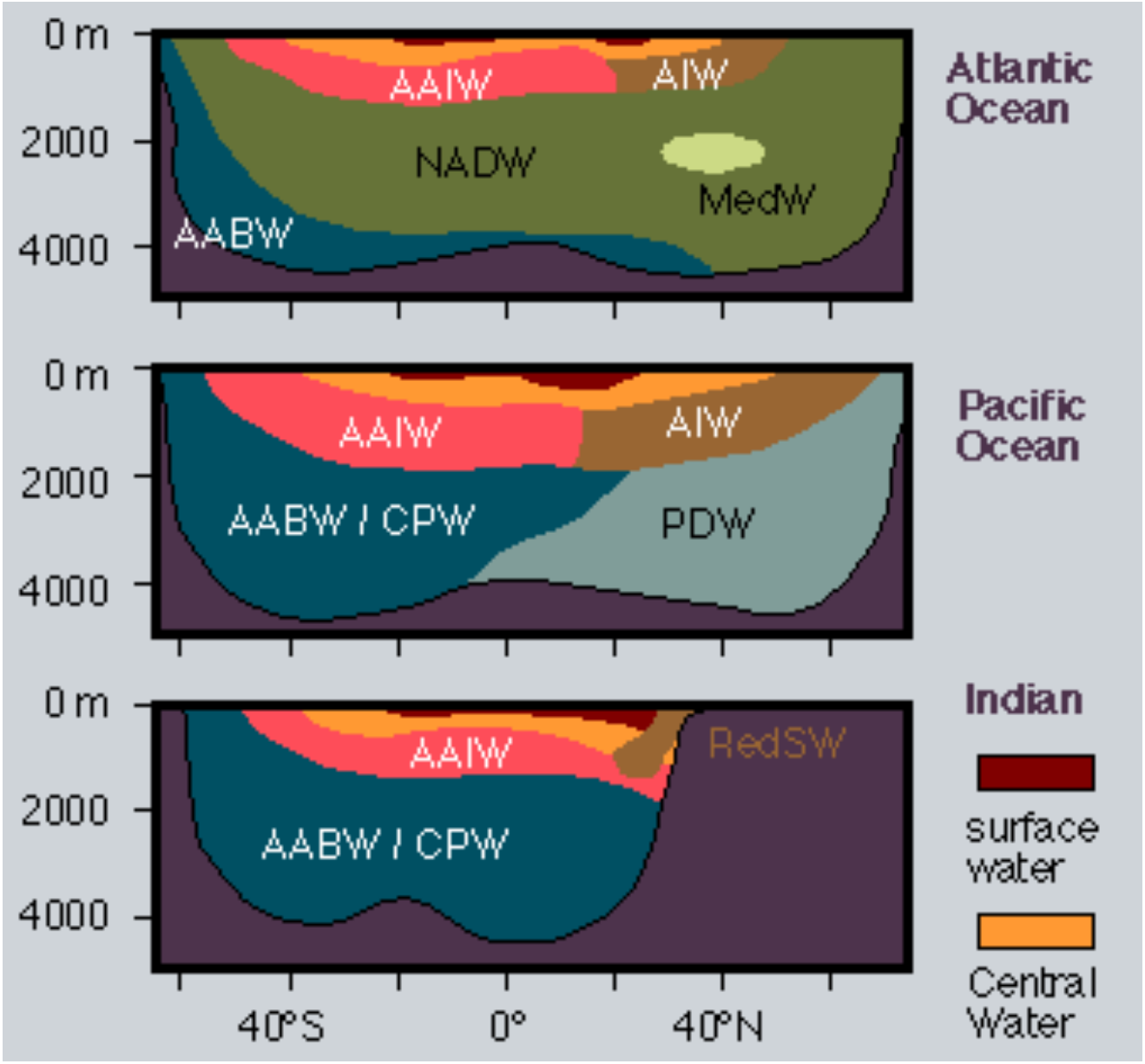
Intermedia

Profunda

Fondo



DPO Fig. 4.11


0 m
2000
4000
AAIW
AIW
NADW
MedW
AABW
Atlantic Ocean
0 m
2000
4000
AAIW
AIW
AABW / CPW
PDW
Pacific Ocean
0 m
2000
4000
AAIW
RedSW
AABW / CPW
Indian
surface water
Central Water
40°S
0°
40°N

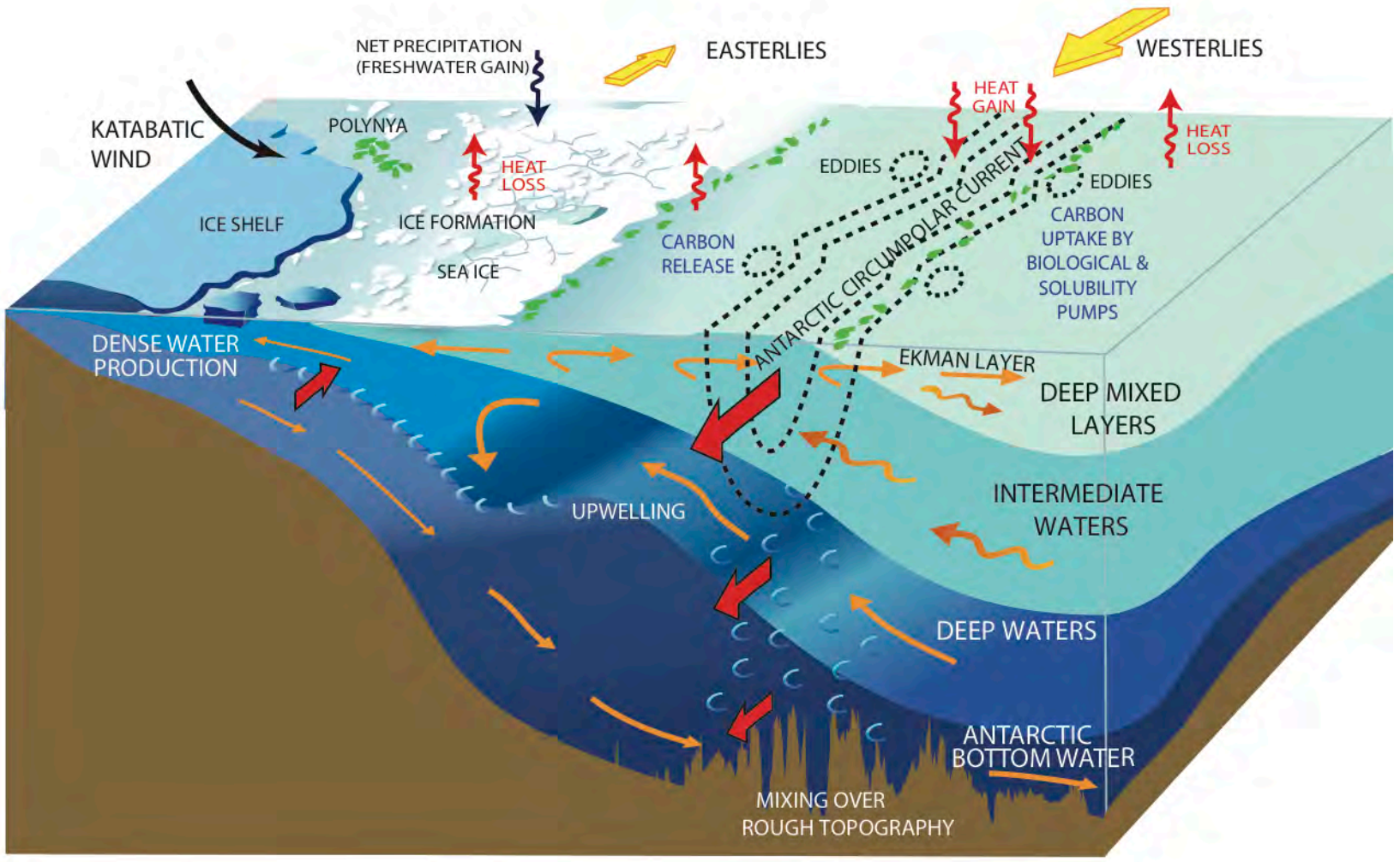
Capa profunda

Características: Capa ancha por debajo de la capa intermedia, se caracteriza por extremos de salinidad, oxígeno, nutrientes.

Ubicación: Entre 2000 a 4000 m de profundidad.

Origen: *Atlántico Norte, Pacífico norte e Índico.* En el Atlántico Sur, la Circumpolar.

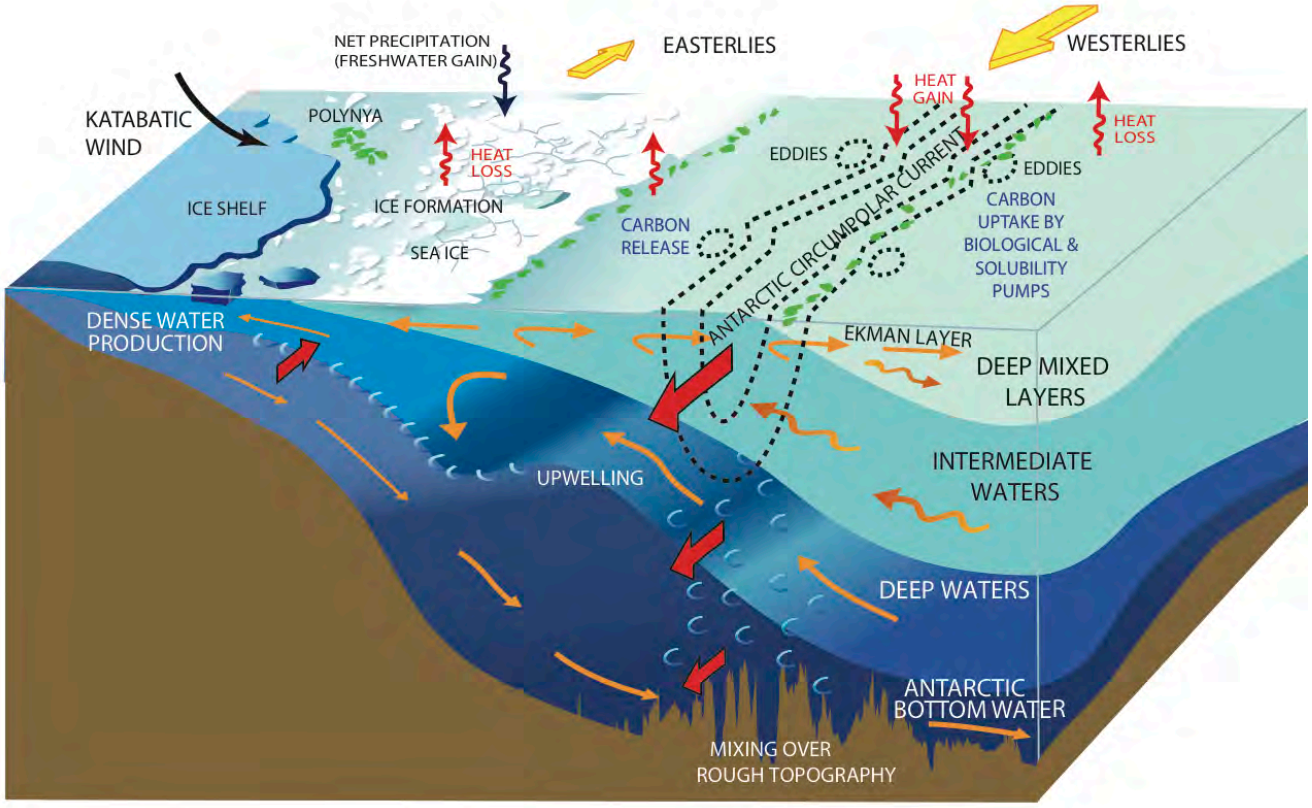
Capa del fondo



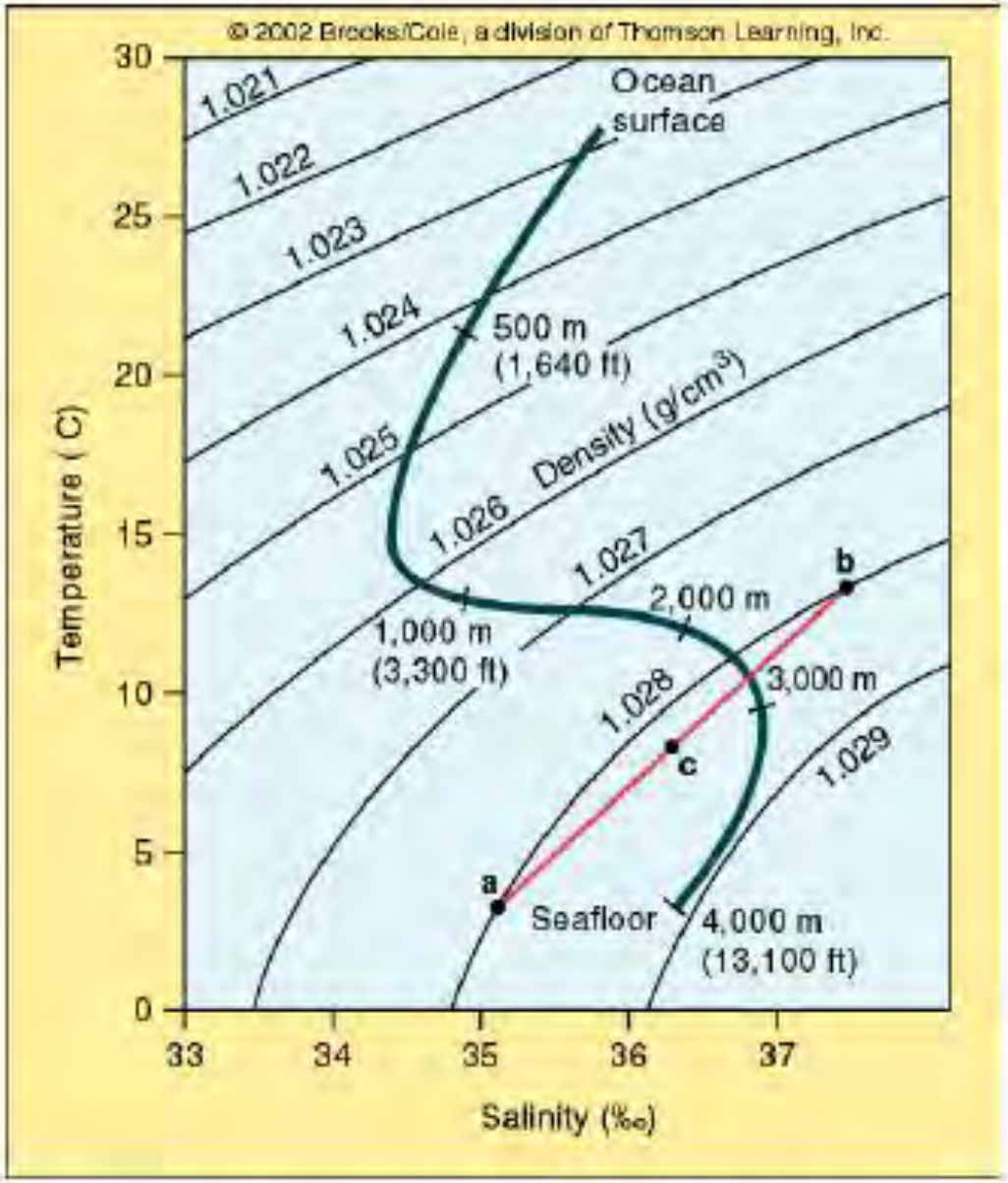
Capa del fondo

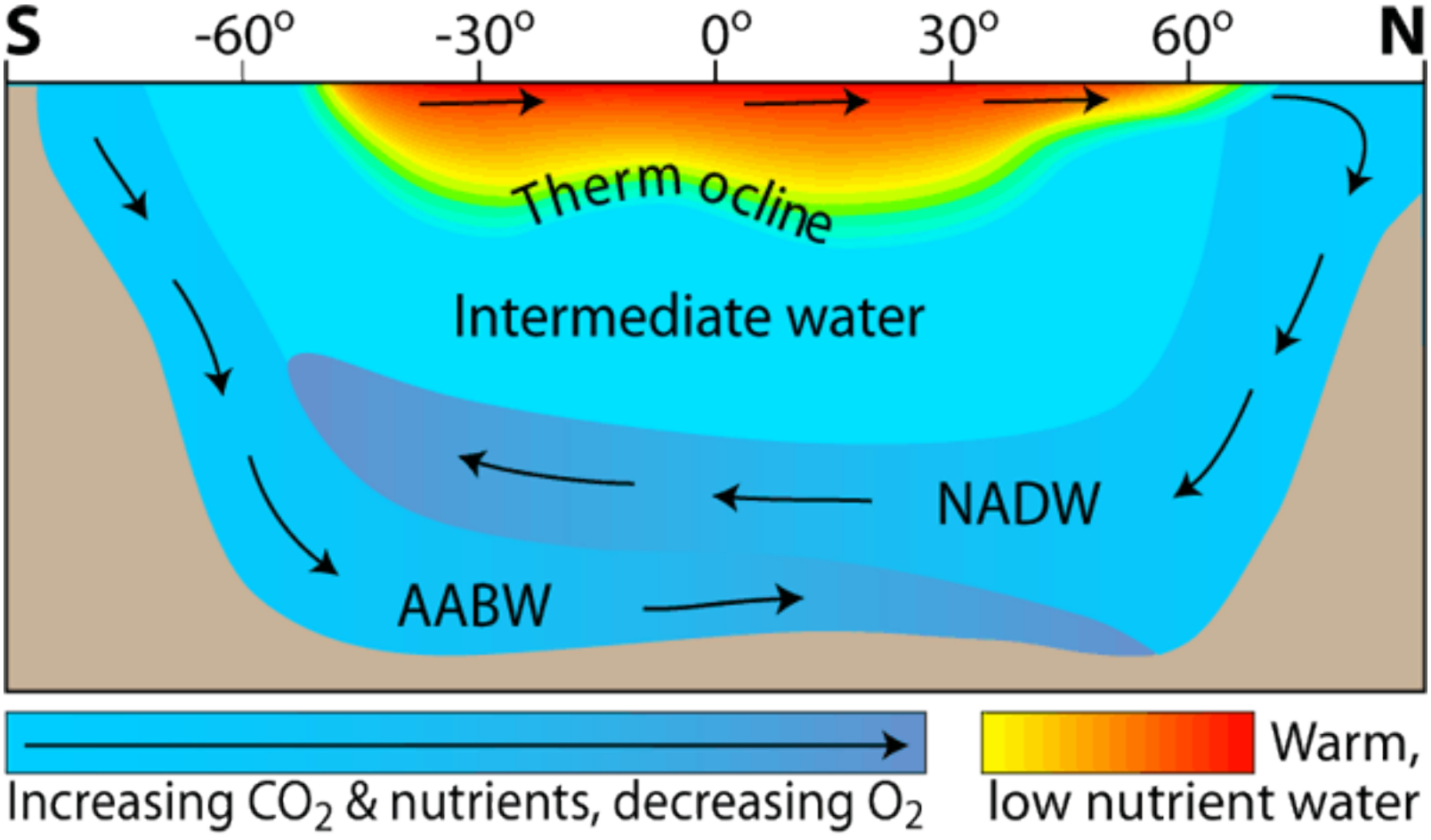
Características: La más densa y fría

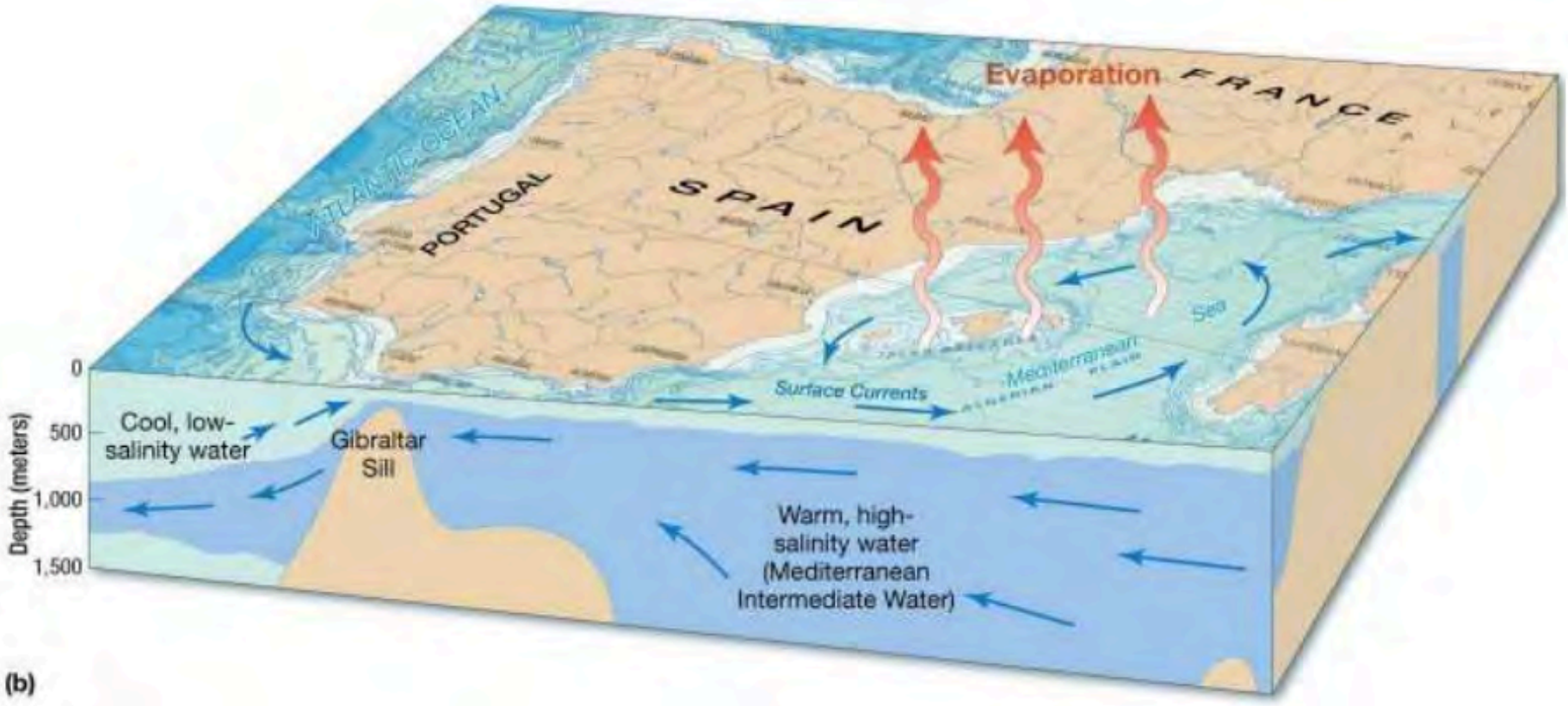
Mecanismos de formación: expulsión de sal en el proceso de formación de hielo cerca de la Antártica



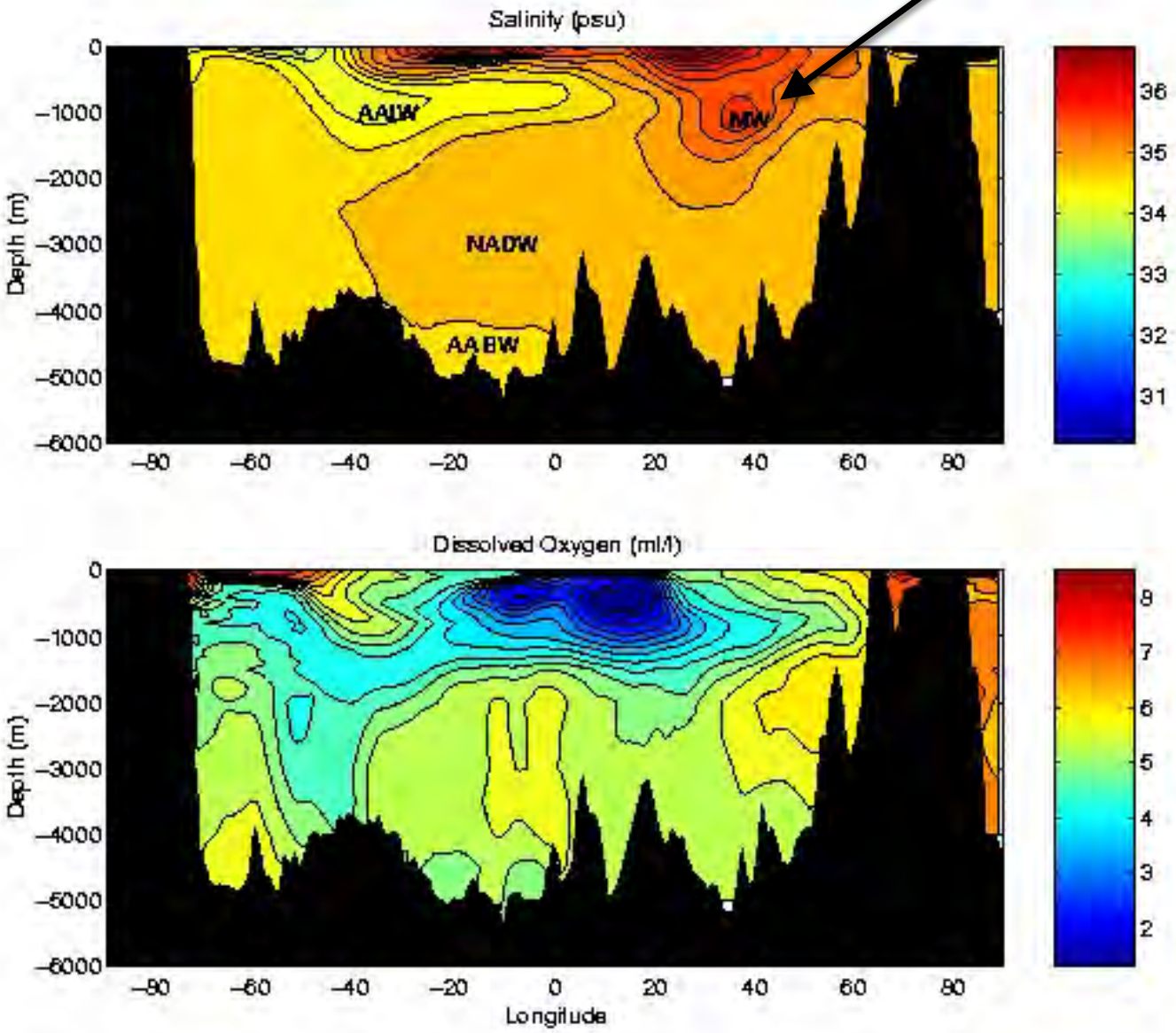
Cabelling

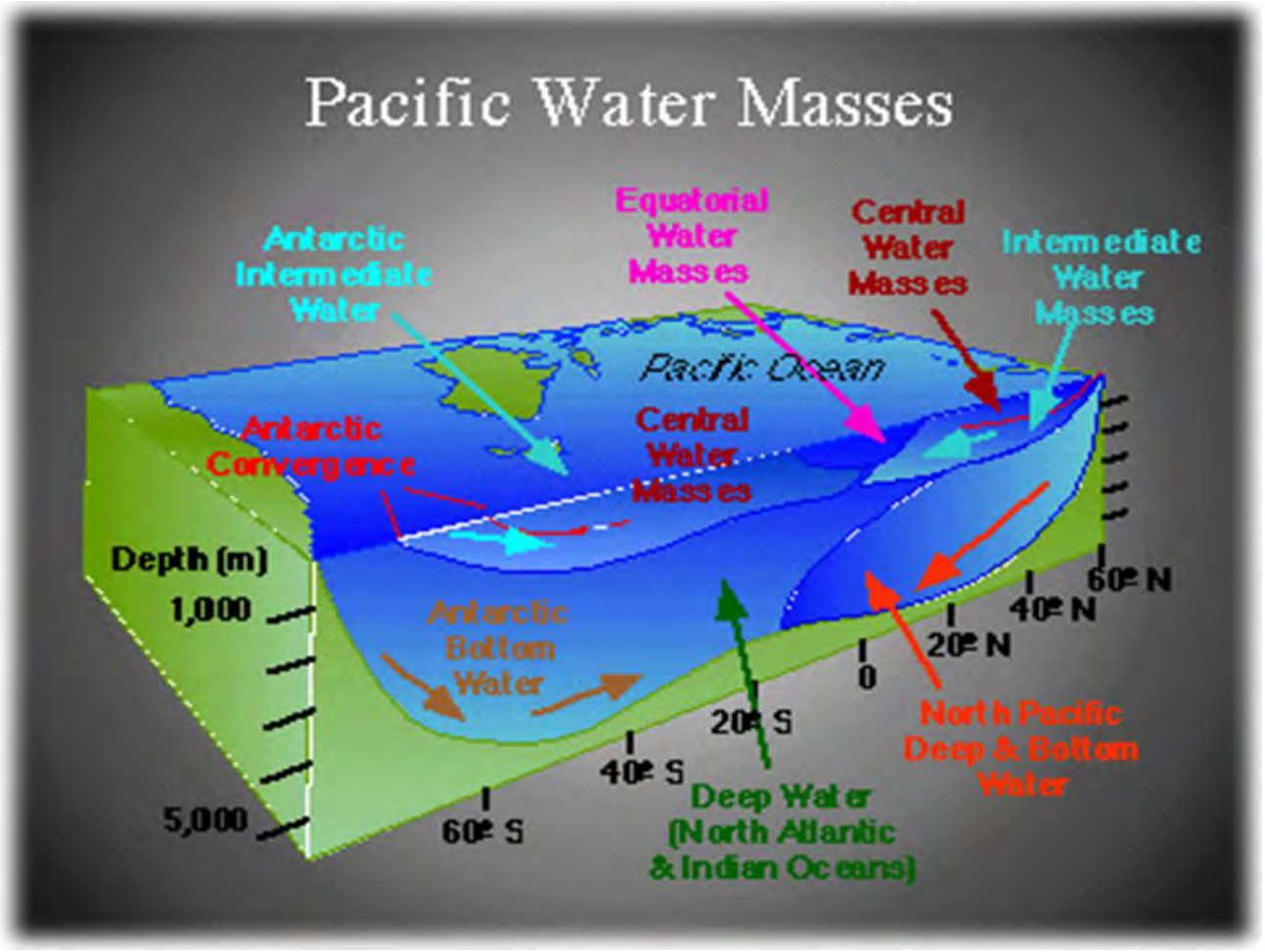

© 2002 Brooks/Cole, a division of Thomson Learning, Inc.
Ocean surface
1.021
1.022
1.023
1.024
1.025
1.026
1.027
1.028
1.029
Density (g/cm³)
500 m (1,640 ft)
1,000 m (3,300 ft)
2,000 m
3,000 m
4,000 m (13,100 ft)
Seafloor
a
b
c
Temperature (°C)
Salinity (‰)
30
25
20
15
10
5
0
33
34
35
36
37


S
-60°
-30°
0°
30°
60°
N
Therm ocline
Intermediate water
NADW
AABW
Increasing CO_2 & nutrients, decreasing O_2
Warm, low nutrient water


Evaporation
FRANCE
ATLANTIC OCEAN
PORTUGAL
SPAIN
Sea
Mediterranean
Surface Currents
0
500
1,000
1,500
Depth (meters)
Cool, low-salinity water
Gibraltar Sill
Warm, high-salinity water (Mediterranean Intermediate Water)
(b)

AMM


Salinity (psu)
AAIW
MW
NADW
AABW
Depth (m)
0
−1000
−2000
−3000
−4000
−5000
−6000
−80
−60
−40
−20
0
20
40
60
80
36
35
34
33
32
31
Dissolved Oxygen (ml/l)
9
7
6
5
4
3
2
Longitude


Pacific Water Masses
Antarctic Intermediate Water
Equatorial Water Masses
Central Water Masses
Intermediate Water Masses
Pacific Ocean
Antarctic Convergence
Central Water Masses
Depth (m)
1,000
5,000
Antarctic Bottom Water
60º S
40º S
20º S
0
20º N
40º N
60º N
North Pacific Deep & Bottom Water
Deep Water (North Atlantic & Indian Oceans)