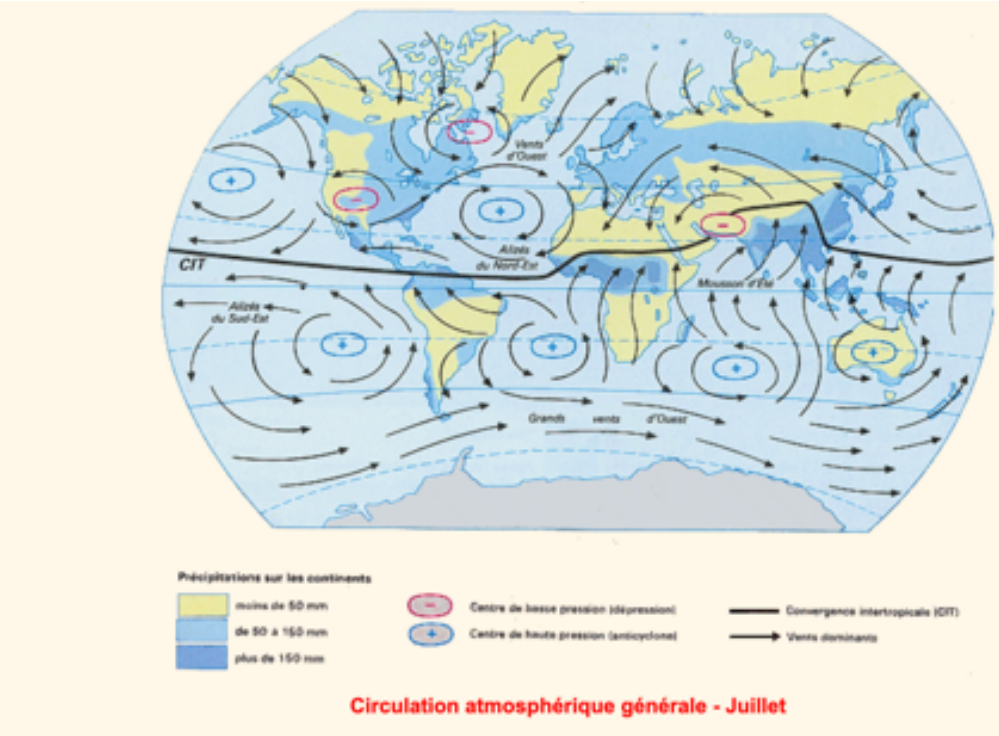
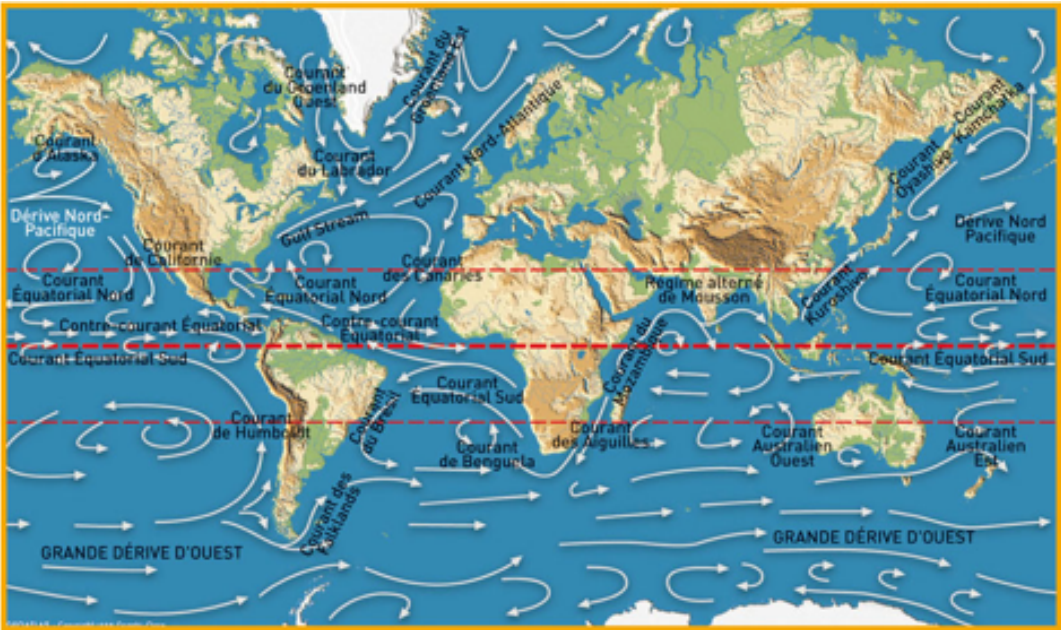


Partie I : étude des courants de surface

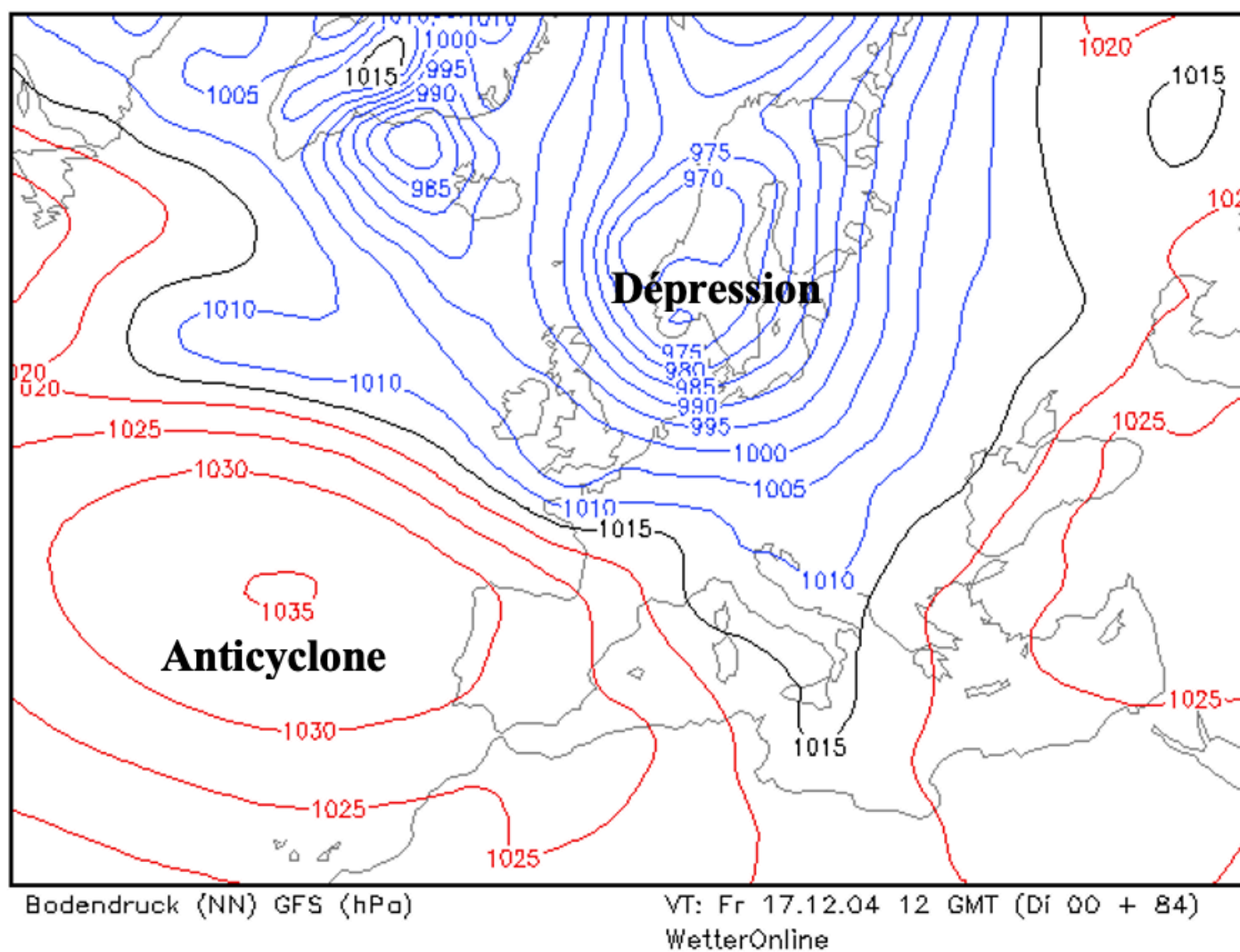
Carte de la circulation atmosphérique



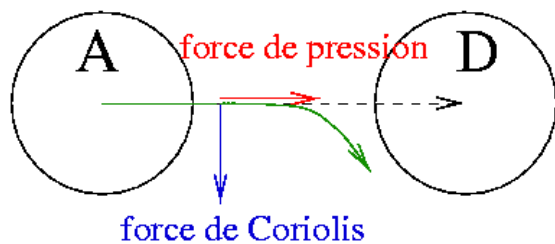
Carte de la circulation océanique de surface



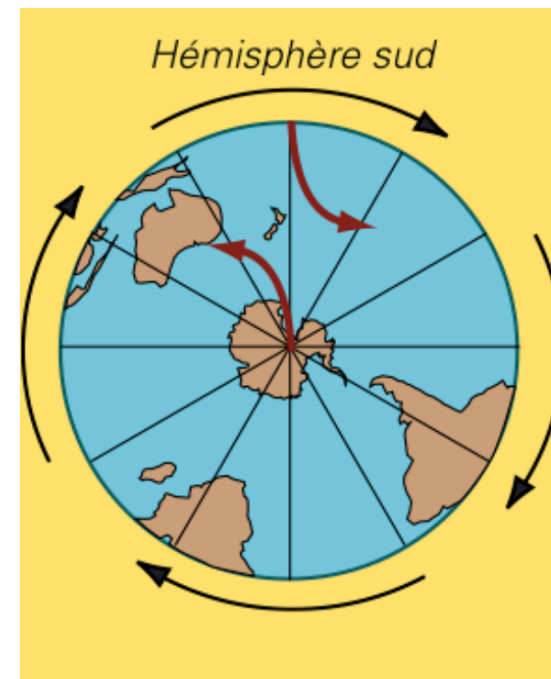
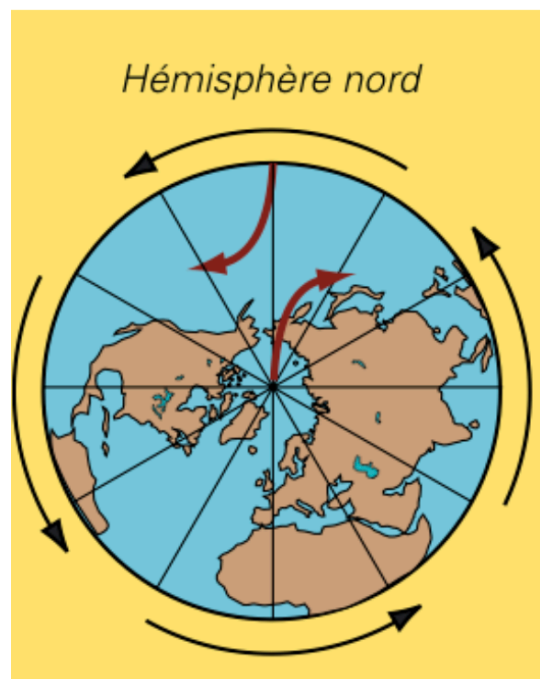
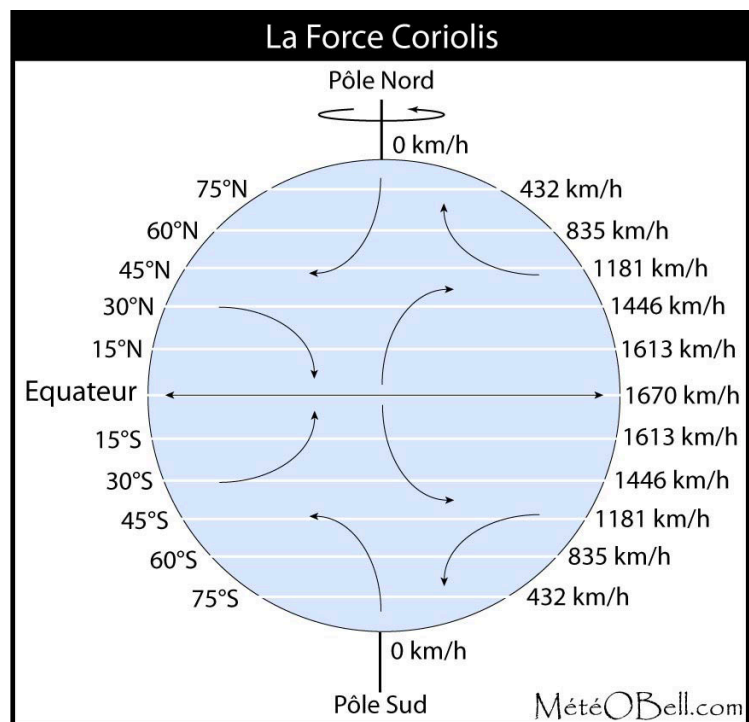
Partie I : étude des courants de surface



Partie I : étude des courants de surface



En pointillés, la trajectoire sans force de Coriolis.
La vraie trajectoire est en vert.

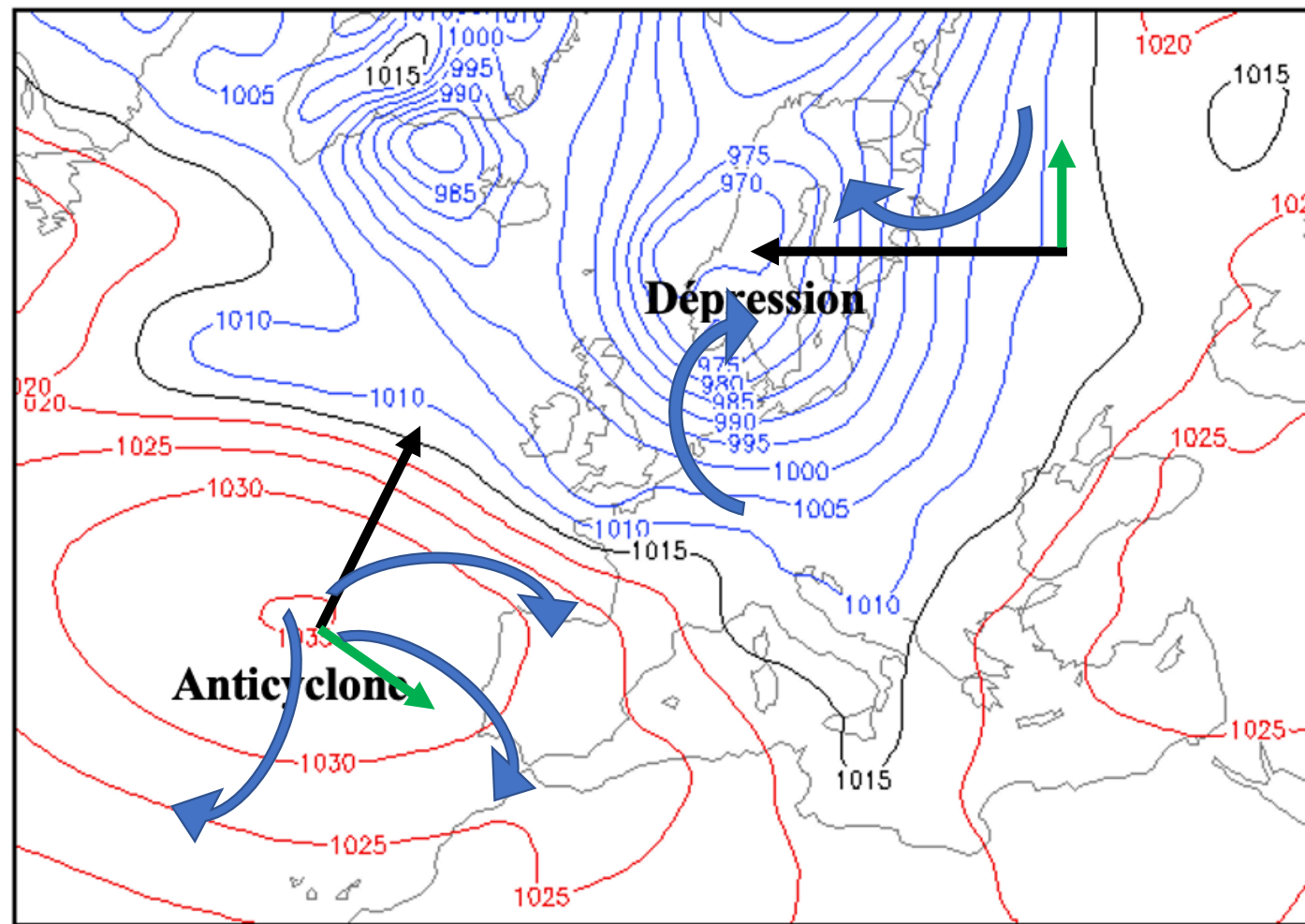




Force de gradient de pression



Force Coriolis

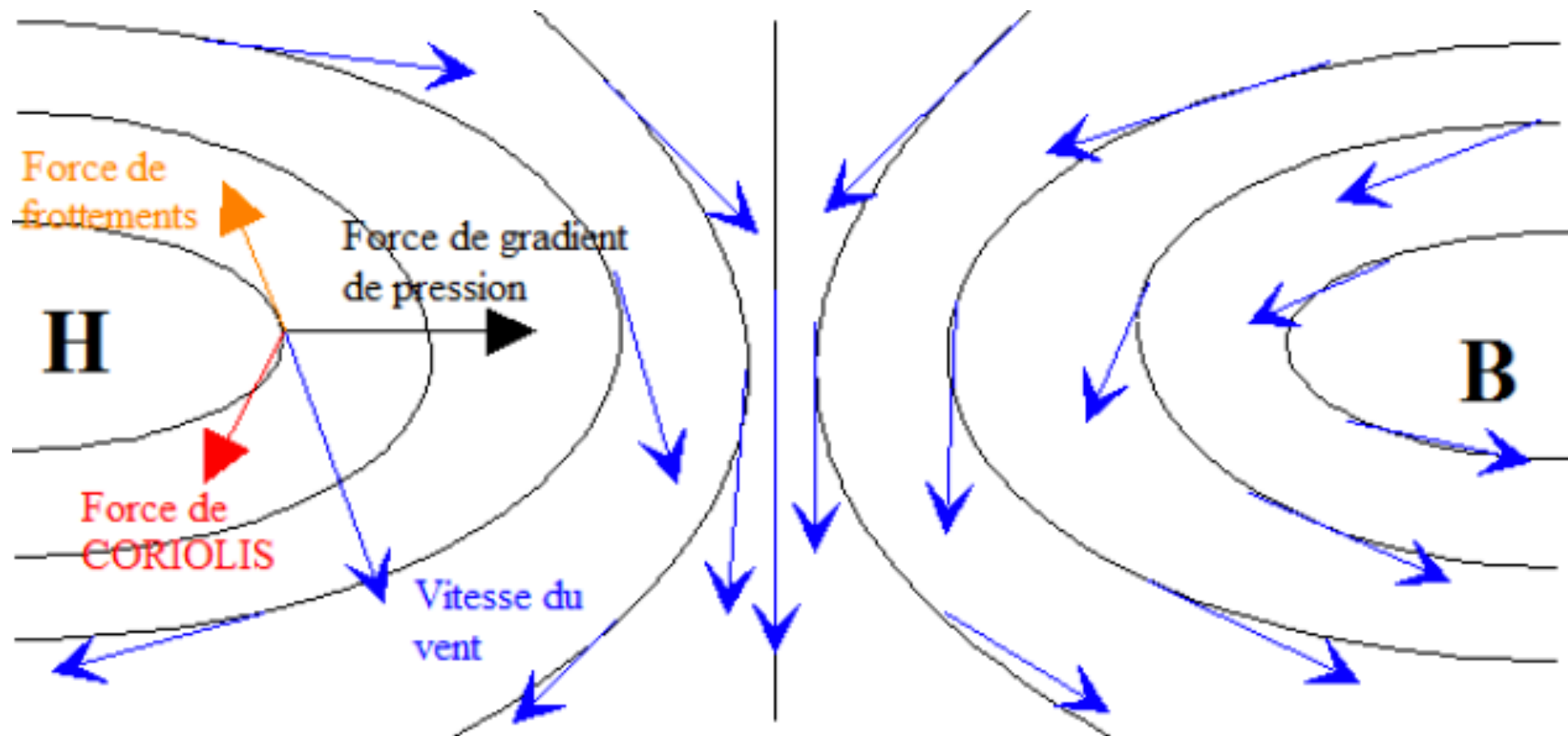


Bodendruck (NN) GFS (hPa)

VT: Fr 17.12.04 12 GMT (Di 00 + 84)

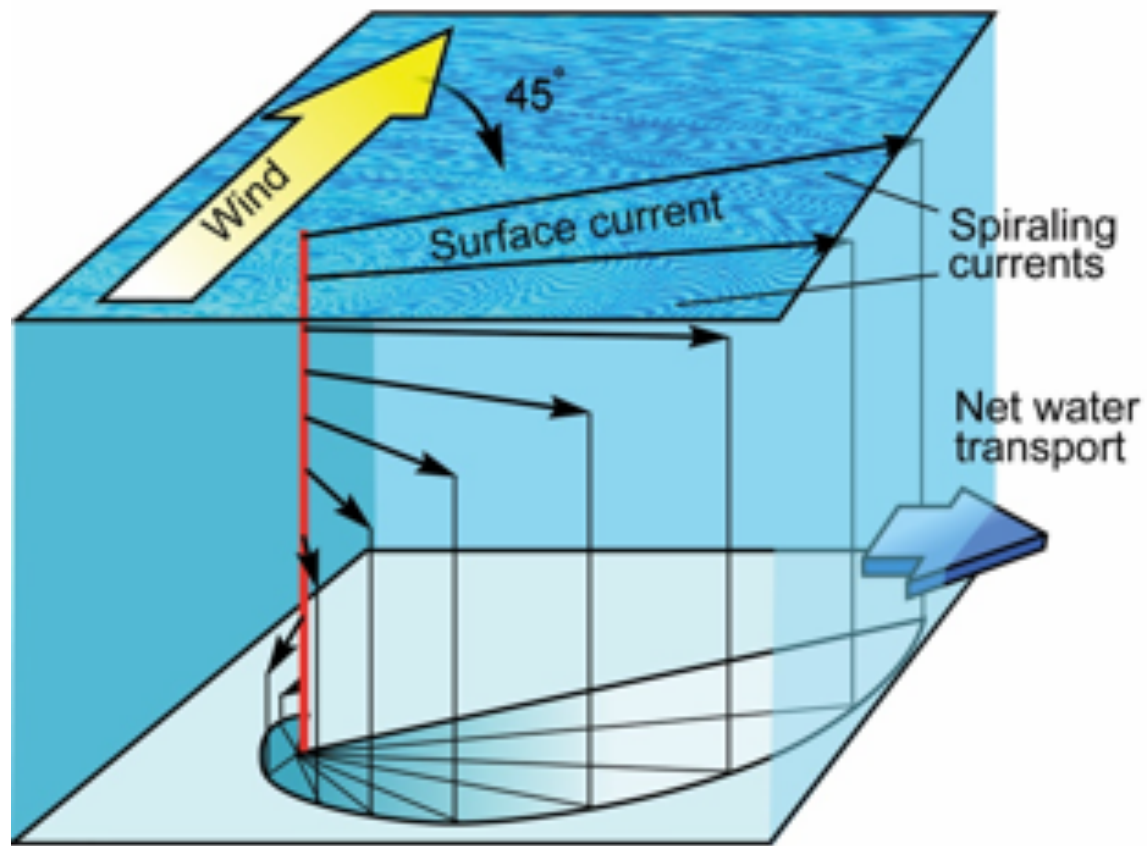
WetterOnline

Déplacement des vents au niveau d'un anticyclone
et d'une dépression



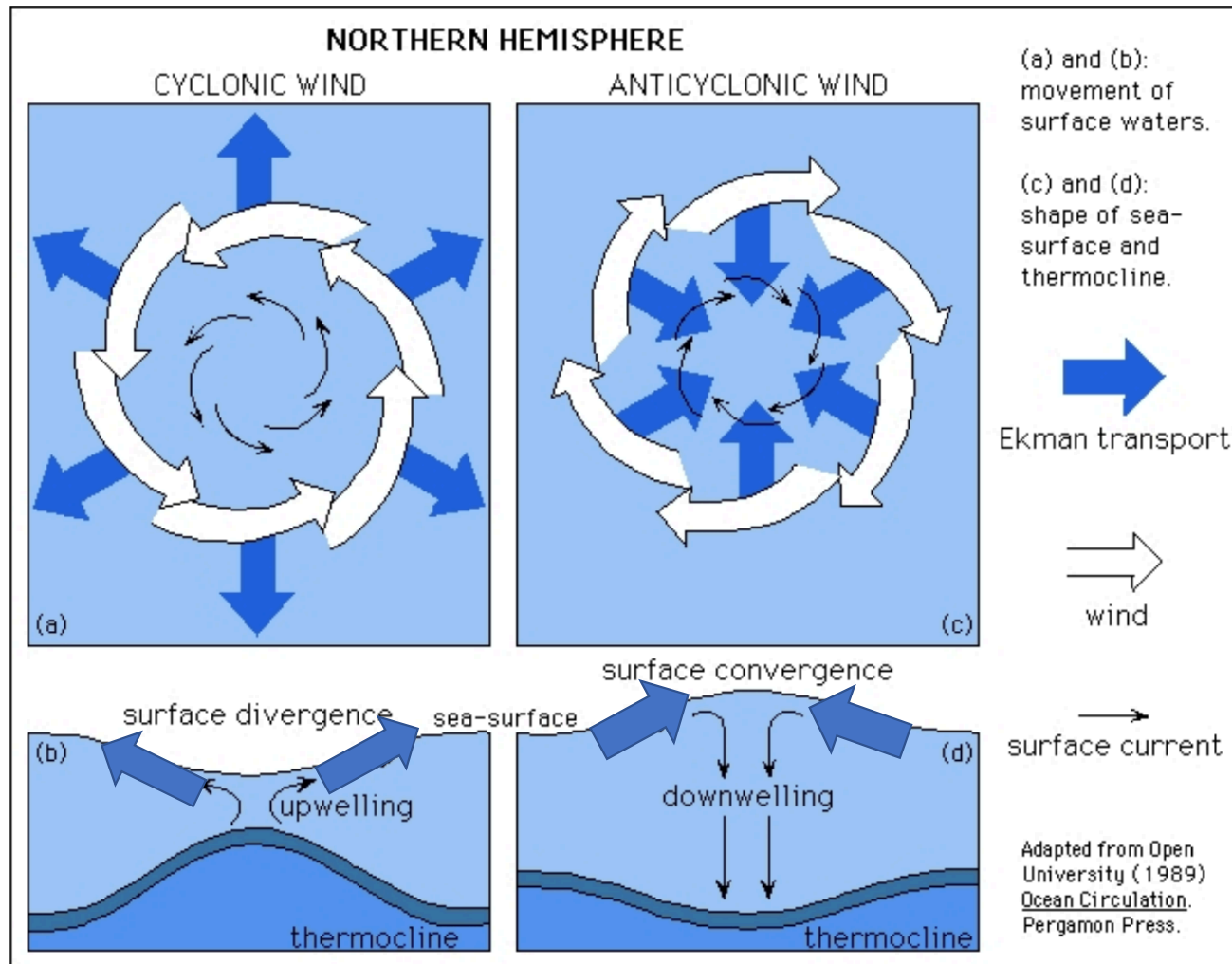
Partie I : étude des courants de surface

Spirale d'Ekman

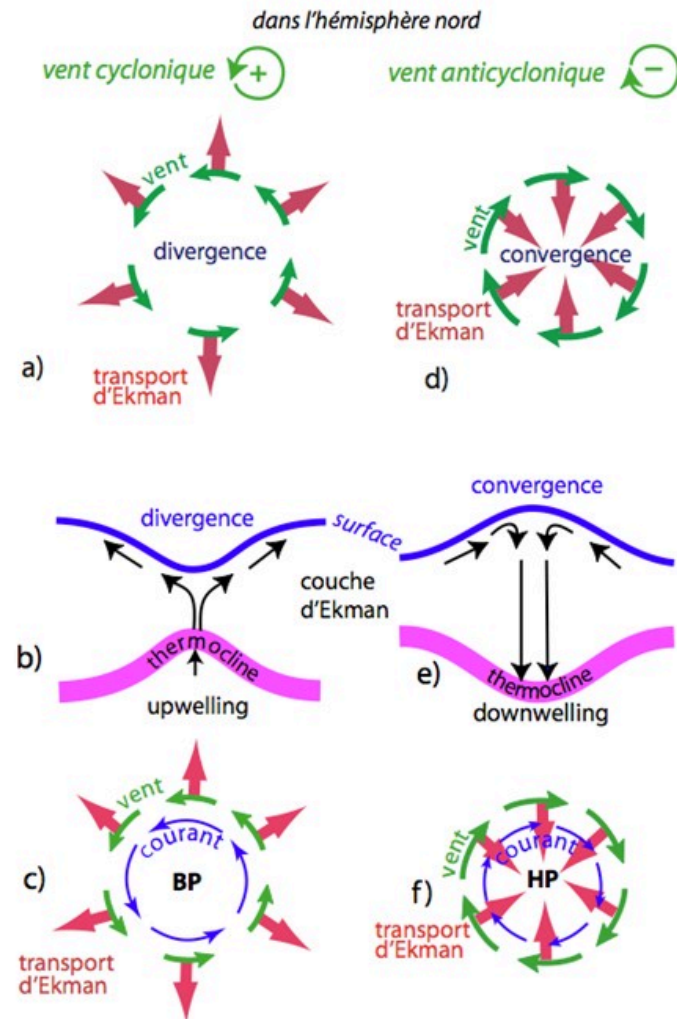


Copyright © 2006 by John Wiley & Sons, Inc. or related companies. All rights reserved.

Partie I : étude des courants de surface



Partie I : étude des courants de surface

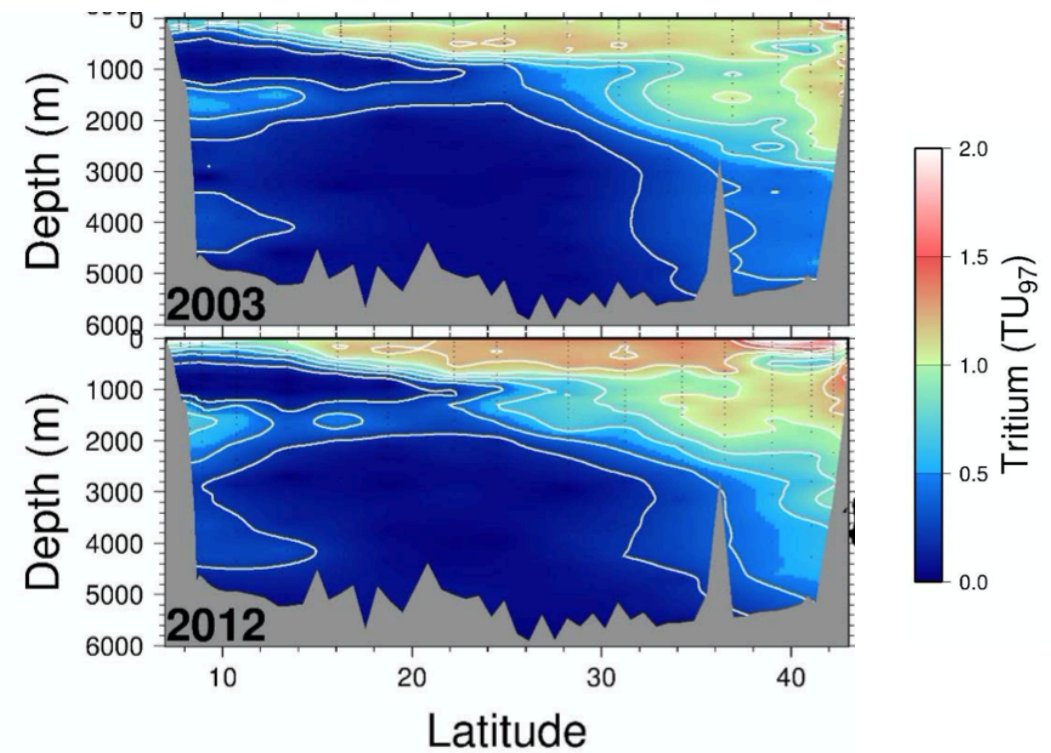
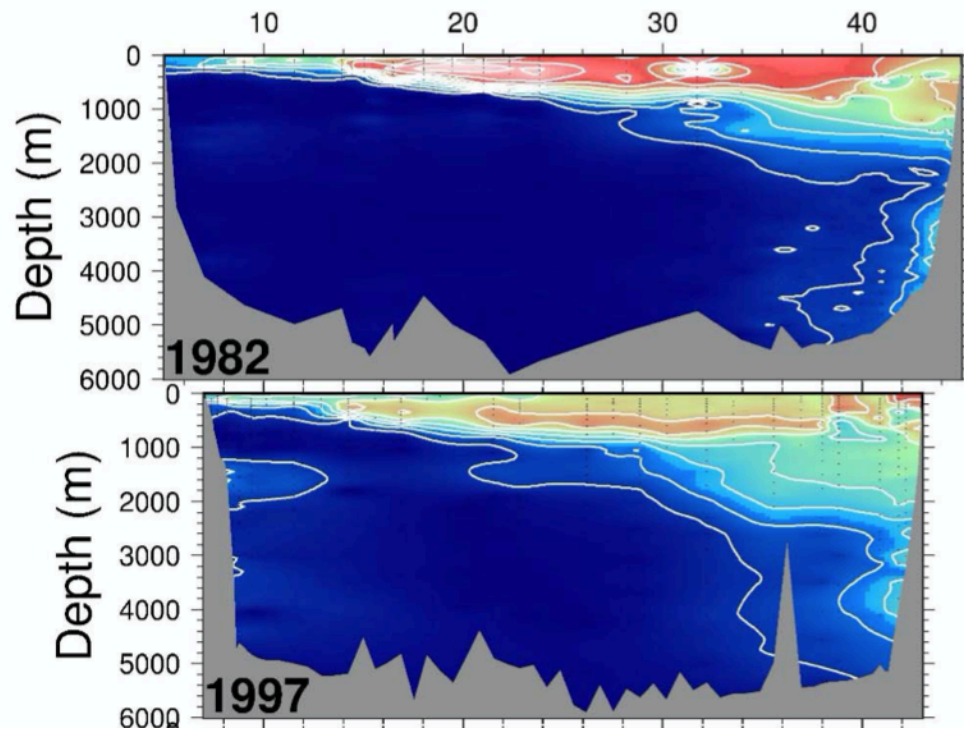


L'océan planétaire, Michèle Fieux et Chantal Andrié, ENSTA, 2010

Figure 1-65- Transports d'Ekman associés
 (a) à des vents cycloniques et une divergence ou
 (d) à des vents anticycloniques et une convergence ;
 (b) upwelling et (e) downwelling et pentes de la surface et de la thermocline associées ;
 (c) et (f) courants géostrophiques engendrés par les gradients de pression résultants
 (d'après Ocean Circulation, 1989).

Partie 2 : étude de la circulation océanique profonde

Teneur en tritium dans l'Atlantique



Partie 2 : étude de la circulation océanique profonde

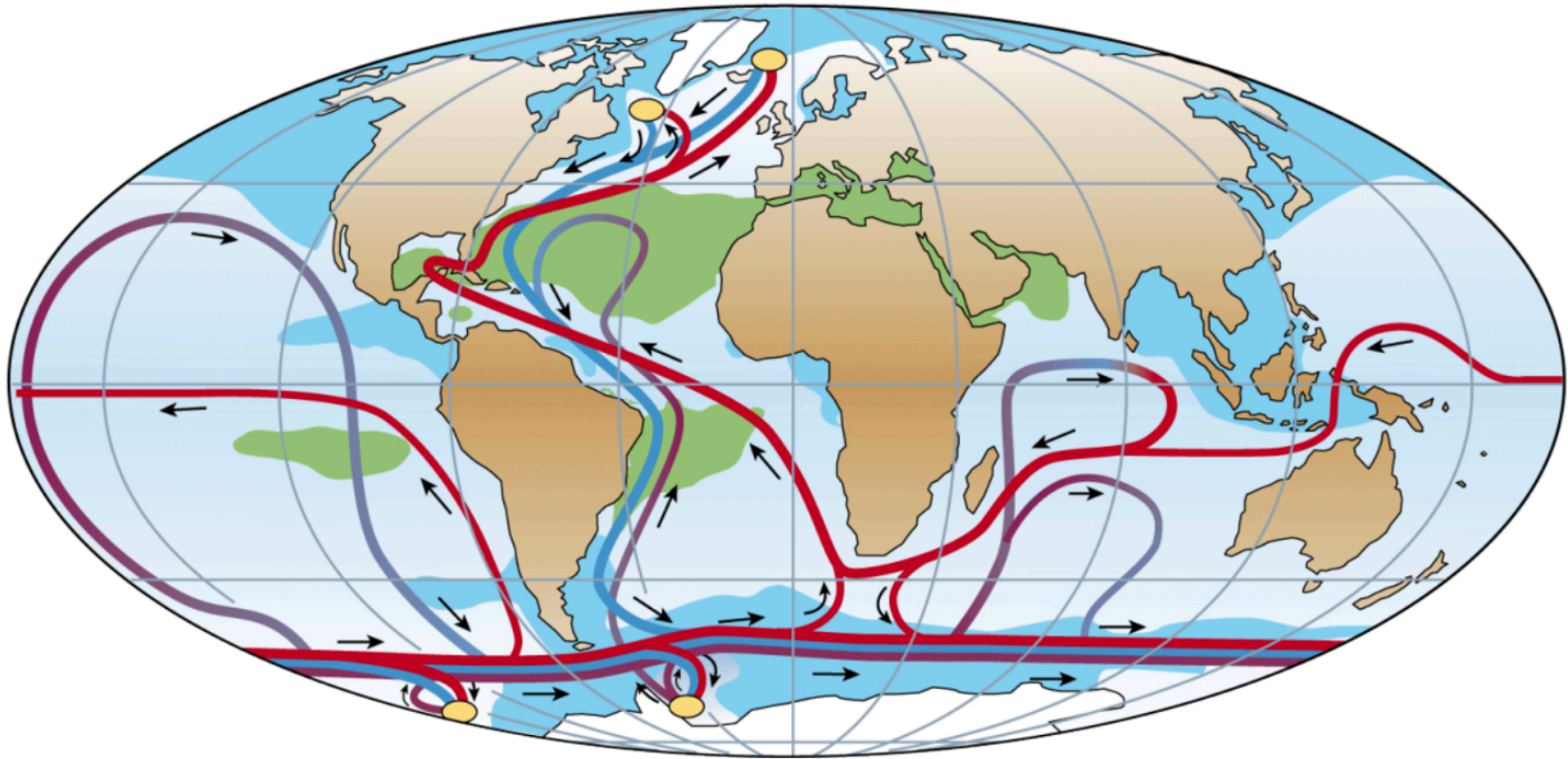
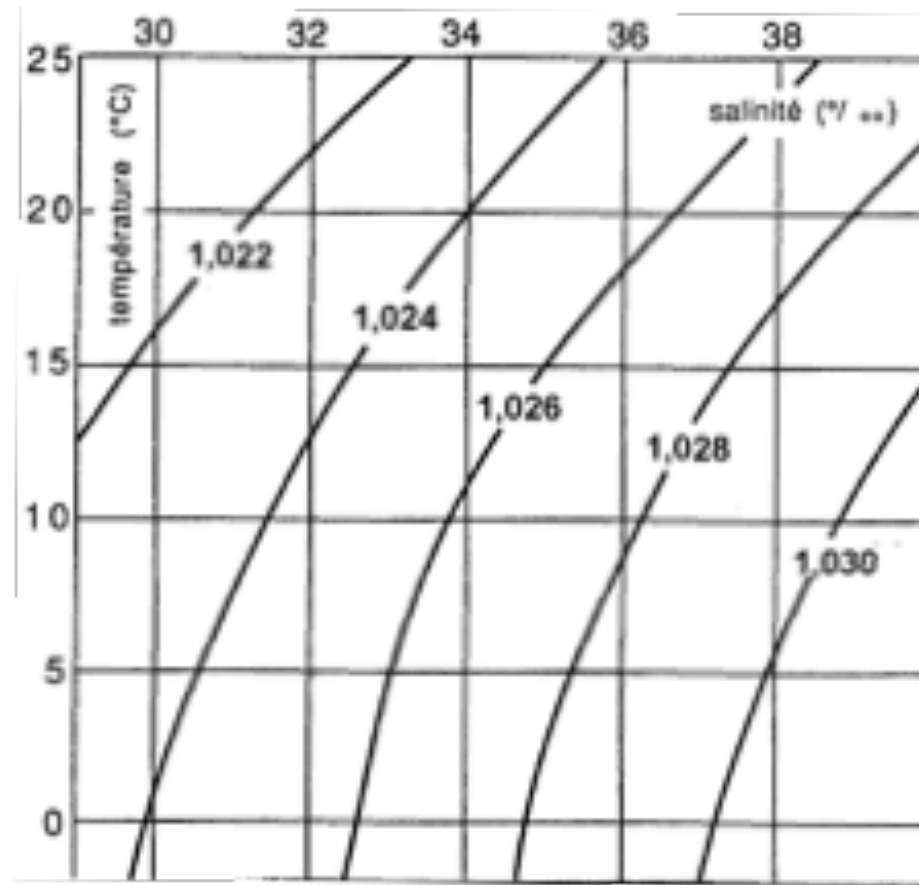


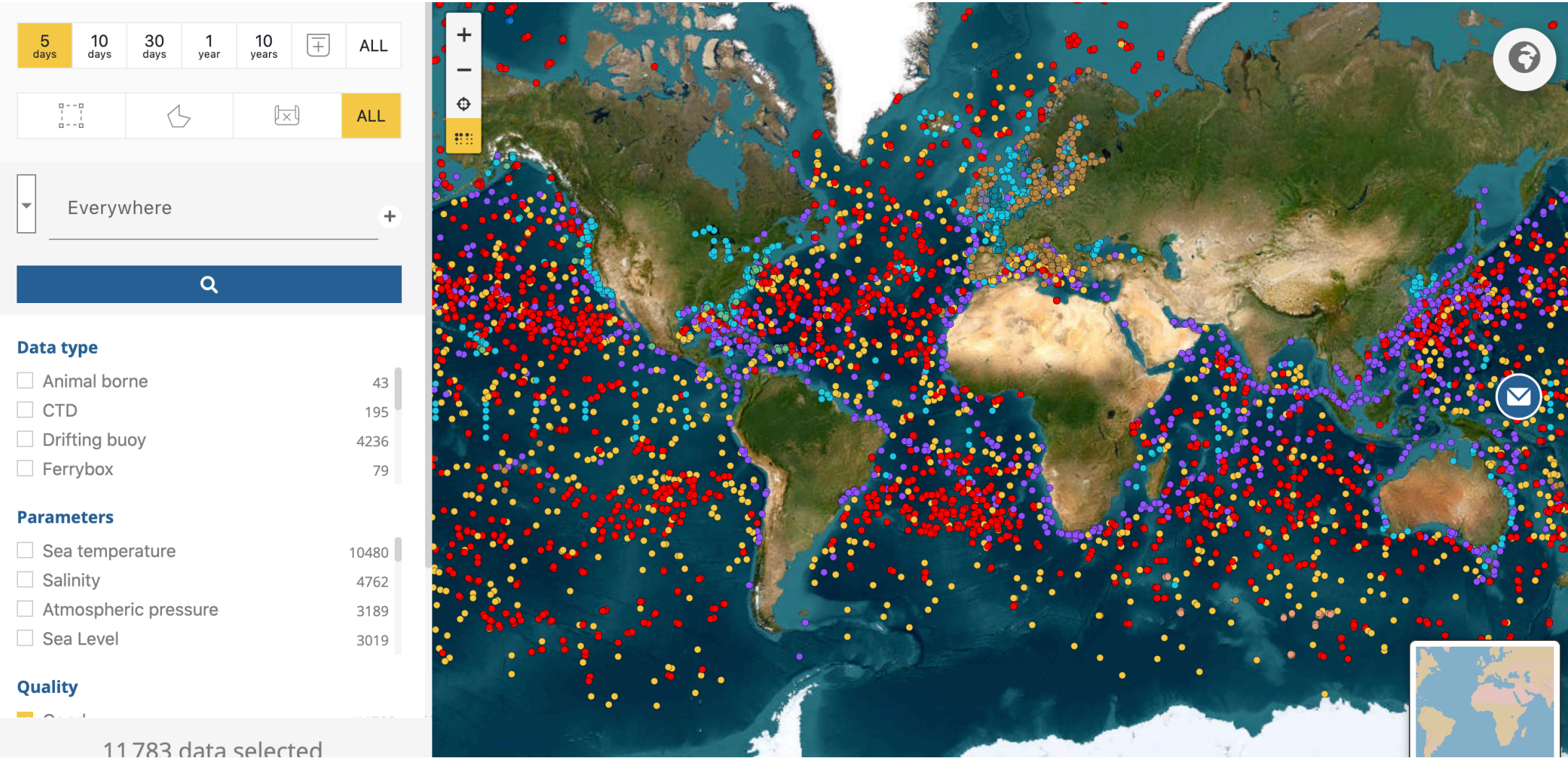
Figure 1.3. Simplified sketch of the global thermohaline circulation pathway, whereby yellow dots represent regions of deep-water formation; red path: near-surface ocean circulation; blue path: deep-water circulation and; purple path: bottom currents. The surface salinity gradient is also represented: green > light blue > blue. Figure from Rahmstorf, 2002.

Partie 2 : étude de la circulation océanique profonde



Partie 2 : étude de la circulation océanique profonde

<https://data-selection.odatis-ocean.fr/coriolis>



Partie 2 : étude de la circulation océanique profonde

Balises ARGOS



FEMELLE ÉLÉPHANT DE MER ÉQUIPÉE D'UNE BALISE ARGOS ET PRÊTE À PARTIR EN MER. © FRANEK2, WIKIMEDIA



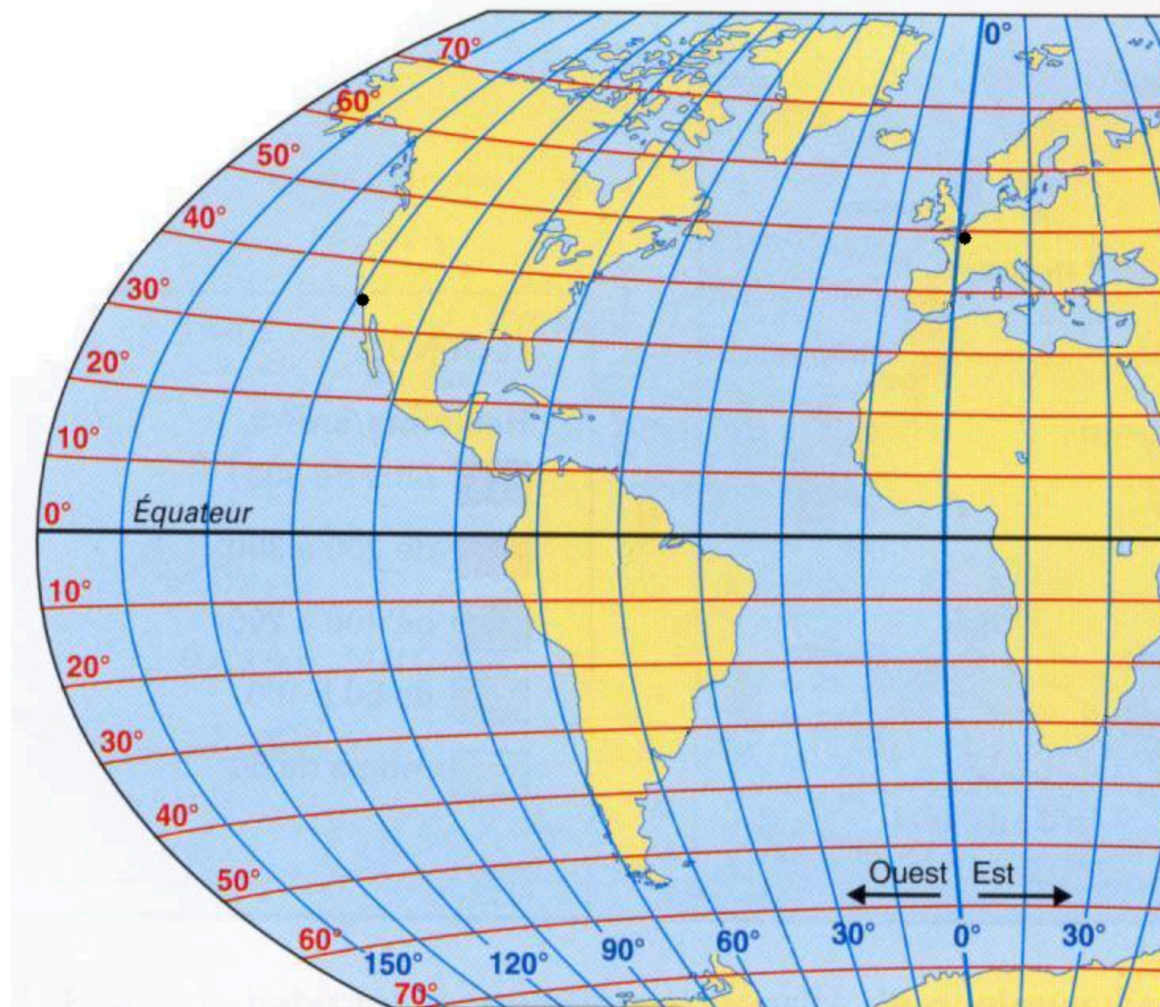
Balise Argos.

Partie 2 : étude de la circulation océanique profonde

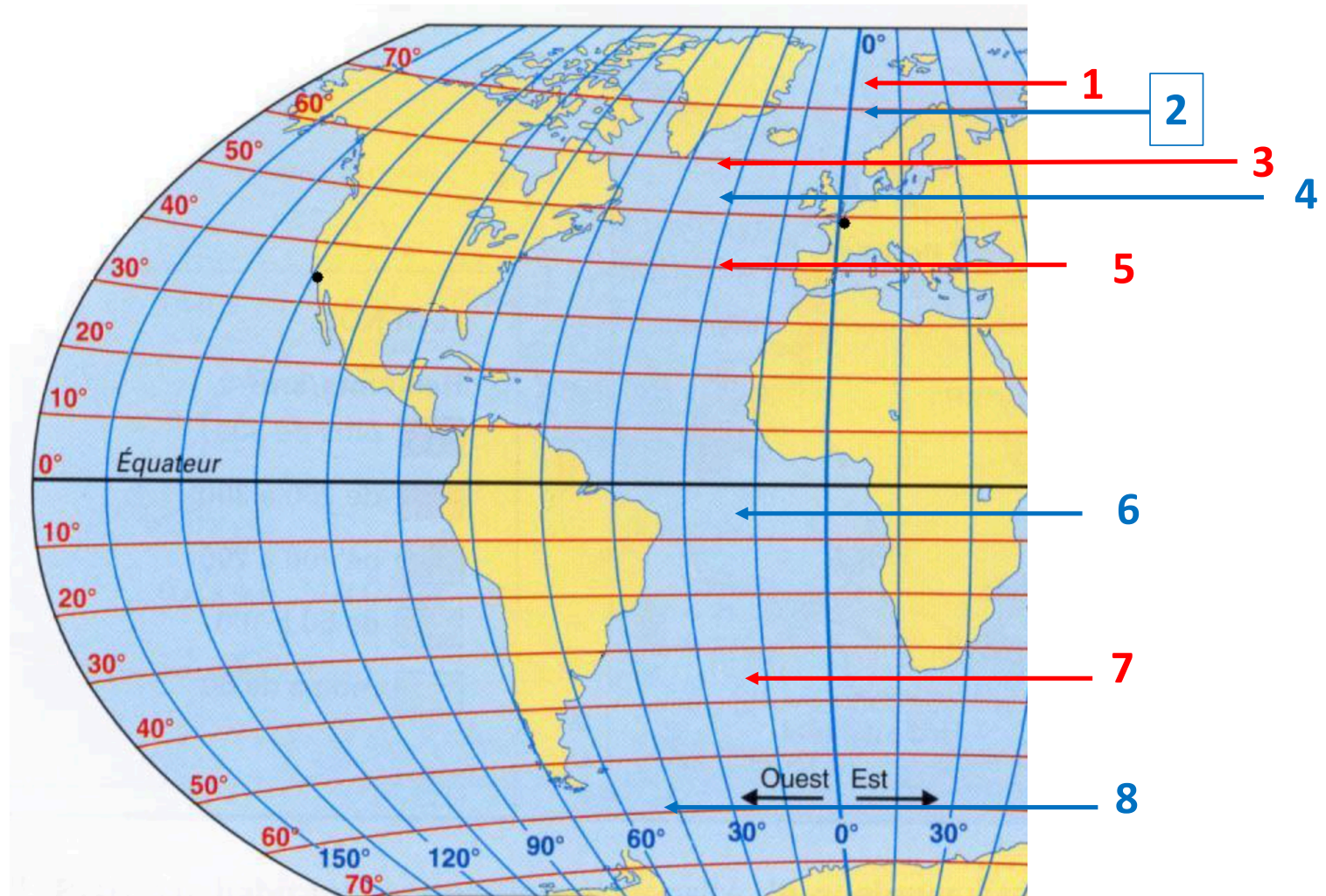
Balise 1

TIME	DEPTH	DIRECTION	LATITUDE	LONGITUDE	POSITION_Q	PRES	PRES_ADJUS	PRES_ADJUS	PRES_QC	PSAL	PSAL_ADJUS	PSAL_ADJUS	PSAL_QC	TEMP	TEMP_ADJUS	TEMP_ADJUS	TEMP_QC	TIME_QC
23/12/2021	0	65	75,4240036	1,05200005	1	0	0	1	1	34,953	34,953	3	3	2,046	2,046	3	3	1
23/12/2021	1	65	75,4240036	1,05200005	1	1	1	1	1	34,946	34,946	3	3	2,052	2,052	3	3	1
23/12/2021	2	65	75,4240036	1,05200005	1	2	2	1	1	34,947	34,947	3	3	2,052	2,052	1	1	1
23/12/2021	3	65	75,4240036	1,05200005	1	3	3	1	1	34,948	34,948	3	3	2,053	2,053	1	1	1
23/12/2021	4	65	75,4240036	1,05200005	1	4	4	1	1	34,946	34,946	3	3	2,055	2,055	1	1	1
23/12/2021	5	65	75,4240036	1,05200005	1	5	5	1	1	34,946	34,946	3	3	2,057	2,057	1	1	1
23/12/2021	6	65	75,4240036	1,05200005	1	6	6	1	1	34,947	34,947	1	1	2,056	2,056	1	1	1
23/12/2021	7	65	75,4240036	1,05200005	1	7	7	1	1	34,946	34,946	1	1	2,059	2,059	1	1	1
23/12/2021	8	65	75,4240036	1,05200005	1	8	8	1	1	34,951	34,951	1	1	2,044	2,044	1	1	1
23/12/2021	9	65	75,4240036	1,05200005	1	9	9	1	1	34,944	34,944	1	1	2,041	2,041	1	1	1
23/12/2021	10	65	75,4240036	1,05200005	1	10	10	1	1	34,947	34,947	1	1	2,036	2,036	1	1	1
23/12/2021	16	65	75,4240036	1,05200005	1	16	16	1	1	34,943	34,943	1	1	2,024	2,024	1	1	1
23/12/2021	26	65	75,4240036	1,05200005	1	26	26	1	1	34,942	34,942	1	1	2,014	2,014	1	1	1
23/12/2021	35	65	75,4240036	1,05200005	1	35	35	1	1	34,941	34,941	1	1	2,012	2,012	1	1	1
23/12/2021	45	65	75,4240036	1,05200005	1	45	45	1	1	34,94	34,94	1	1	2,001	2,001	1	1	1
23/12/2021	56	65	75,4240036	1,05200005	1	56	56	1	1	34,941	34,941	1	1	2,007	2,007	1	1	1
23/12/2021	65	65	75,4240036	1,05200005	1	65	65	1	1	34,942	34,942	1	1	2,006	2,006	1	1	1
23/12/2021	75	65	75,4240036	1,05200005	1	75	75	1	1	34,94	34,94	1	1	1,993	1,993	1	1	1
23/12/2021	86	65	75,4240036	1,05200005	1	86	86	1	1	34,941	34,941	1	1	1,983	1,983	1	1	1
23/12/2021	95	65	75,4240036	1,05200005	1	95	95	1	1	34,94	34,94	1	1	1,978	1,978	1	1	1
23/12/2021	106	65	75,4240036	1,05200005	1	106	106	1	1	34,941	34,941	1	1	1,979	1,979	1	1	1
23/12/2021	116	65	75,4240036	1,05200005	1	116	116	1	1	34,941	34,941	1	1	1,975	1,975	1	1	1
23/12/2021	126	65	75,4240036	1,05200005	1	126	126	1	1	34,942	34,942	1	1	1,974	1,974	1	1	1
23/12/2021	135	65	75,4240036	1,05200005	1	135	135	1	1	34,943	34,943	1	1	1,976	1,976	1	1	1
23/12/2021	145	65	75,4240036	1,05200005	1	145	145	1	1	34,944	34,944	1	1	1,978	1,978	1	1	1
23/12/2021	156	65	75,4240036	1,05200005	1	156	156	1	1	34,946	34,946	1	1	1,984	1,984	1	1	1
23/12/2021	166	65	75,4240036	1,05200005	1	166	166	1	1	34,948	34,948	1	1	1,888	1,888	1	1	1
23/12/2021	176	65	75,4240036	1,05200005	1	176	176	1	1	34,954	34,954	1	1	1,727	1,727	1	1	1
23/12/2021	186	65	75,4240036	1,05200005	1	186	186	1	1	34,946	34,946	1	1	1,547	1,547	1	1	1
23/12/2021	196	65	75,4240036	1,05200005	1	196	196	1	1	34,945	34,945	1	1	1,491	1,491	1	1	1
23/12/2021	210	65	75,4240036	1,05200005	1	210	210	1	1	34,935	34,935	1	1	1,296	1,296	1	1	1
23/12/2021	230	65	75,4240036	1,05200005	1	230	230	1	1	34,933	34,933	1	1	1,134	1,134	1	1	1
23/12/2021	250	65	75,4240036	1,05200005	1	250	250	1	1	34,928	34,928	1	1	0,98	0,98	1	1	1
23/12/2021	270	65	75,4240036	1,05200005	1	270	270	1	1	34,921	34,921	1	1	0,771	0,771	1	1	1

Partie 2 : étude de la circulation océanique profonde

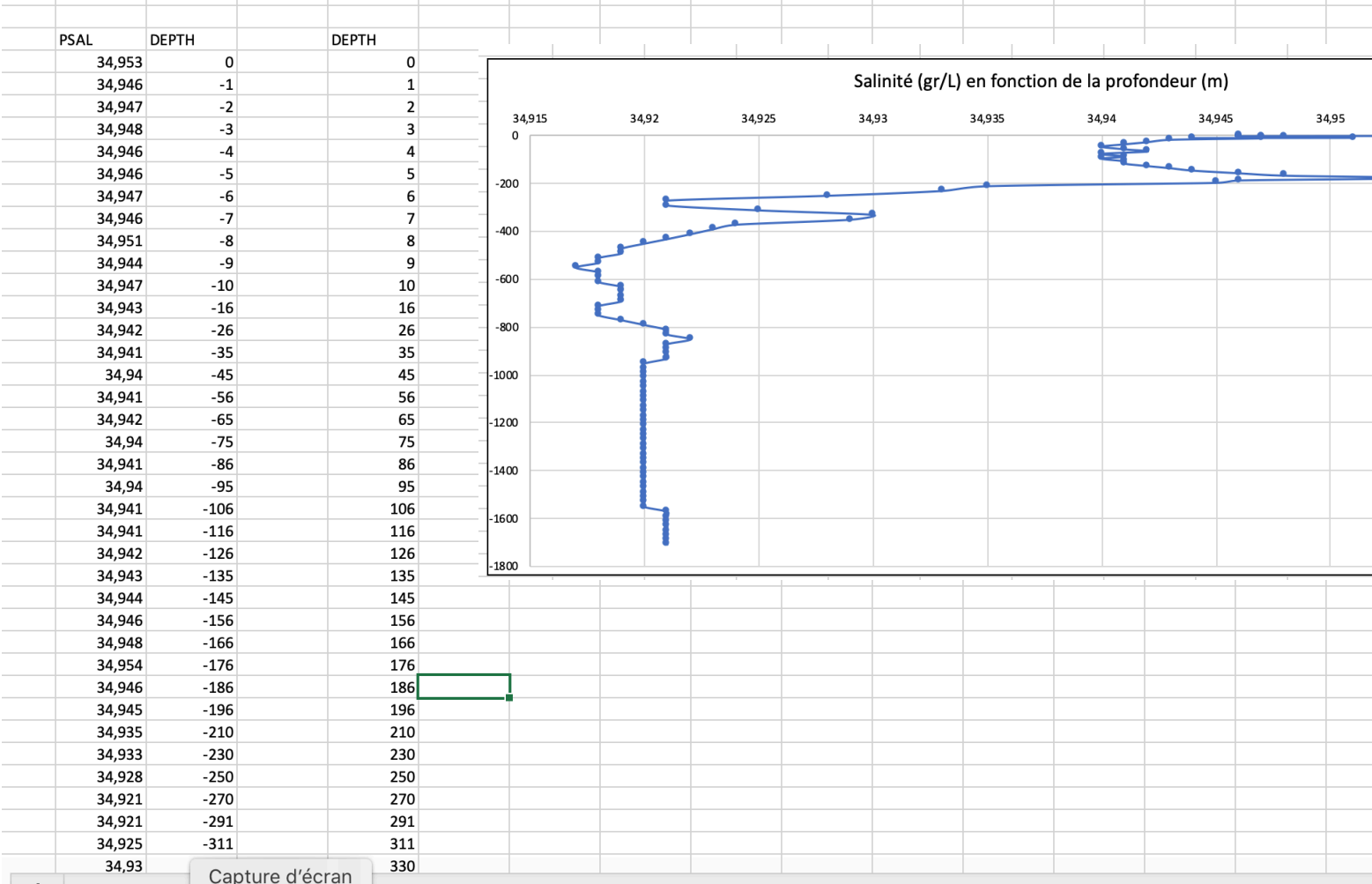


Partie 2 : étude de la circulation océanique profonde



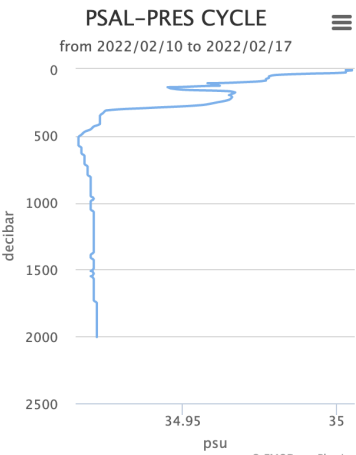
Partie 2 : étude de la circulation océanique profonde

Balise 1

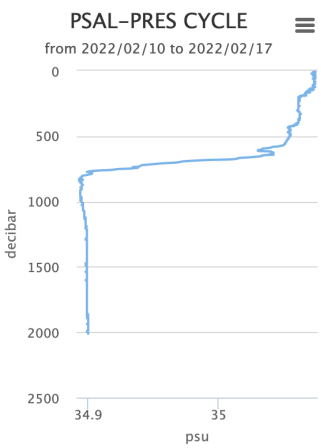


Partie 2 : étude de la circulation océanique profonde

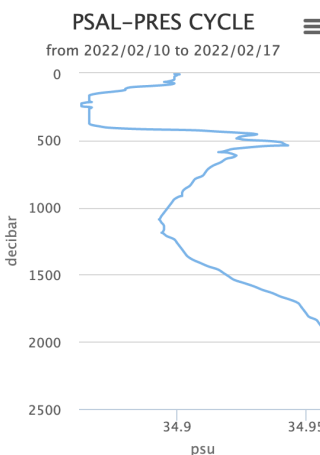
Balise 1



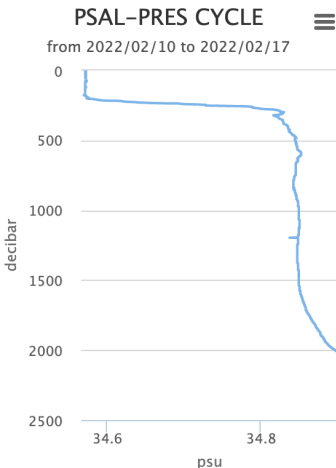
Balise 2



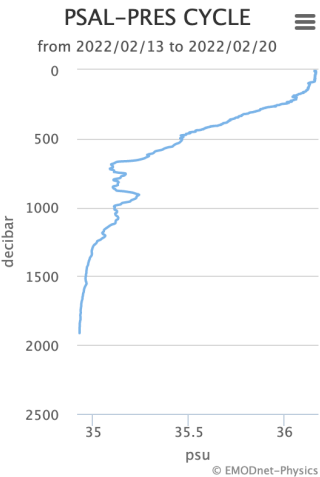
Balise 3



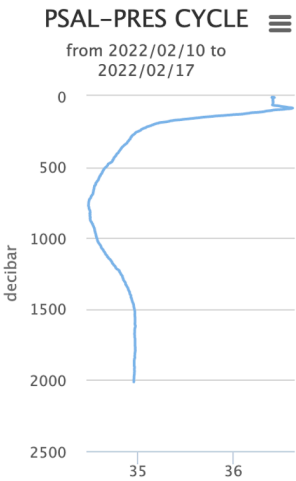
Balise 4



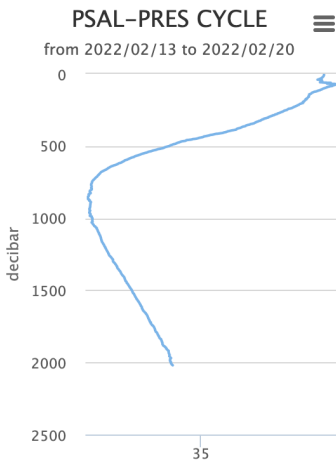
Balise 5



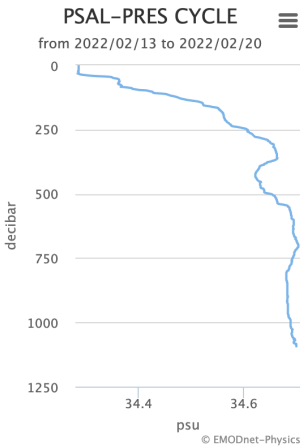
Balise 6



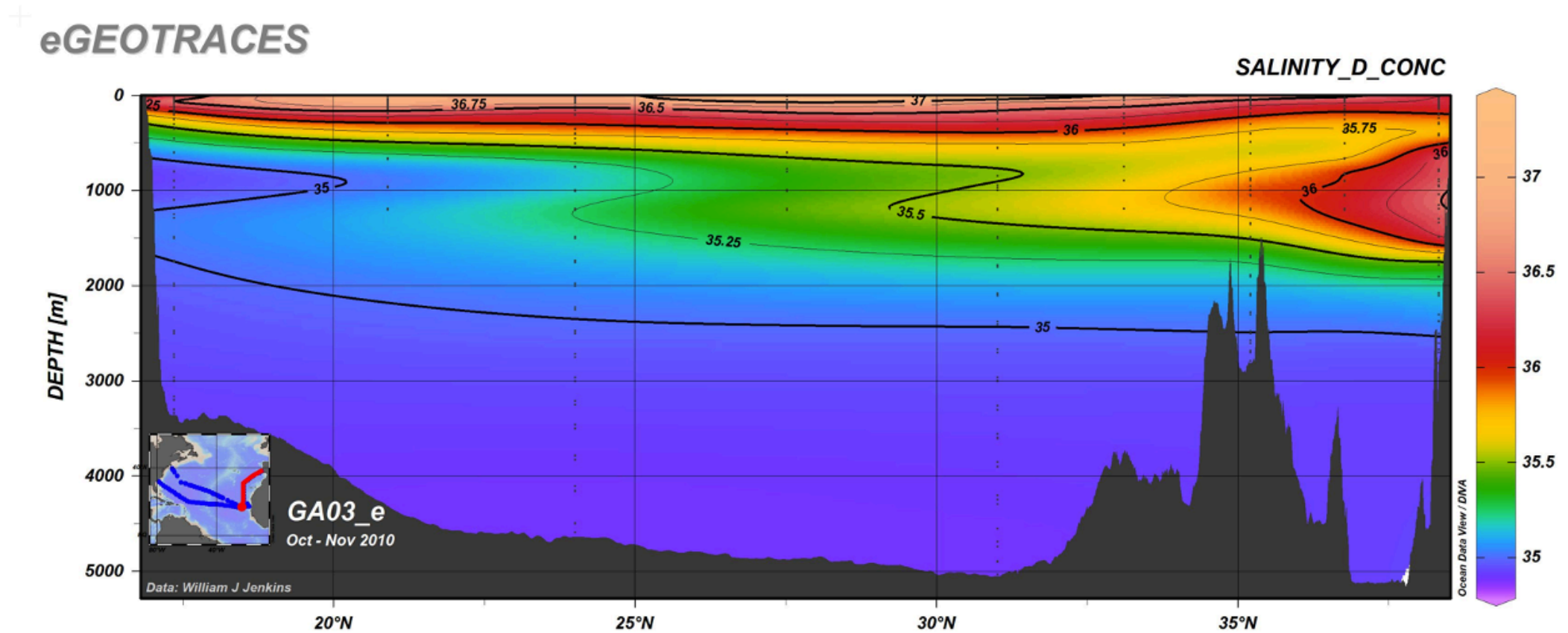
Balise 7



Balise 8

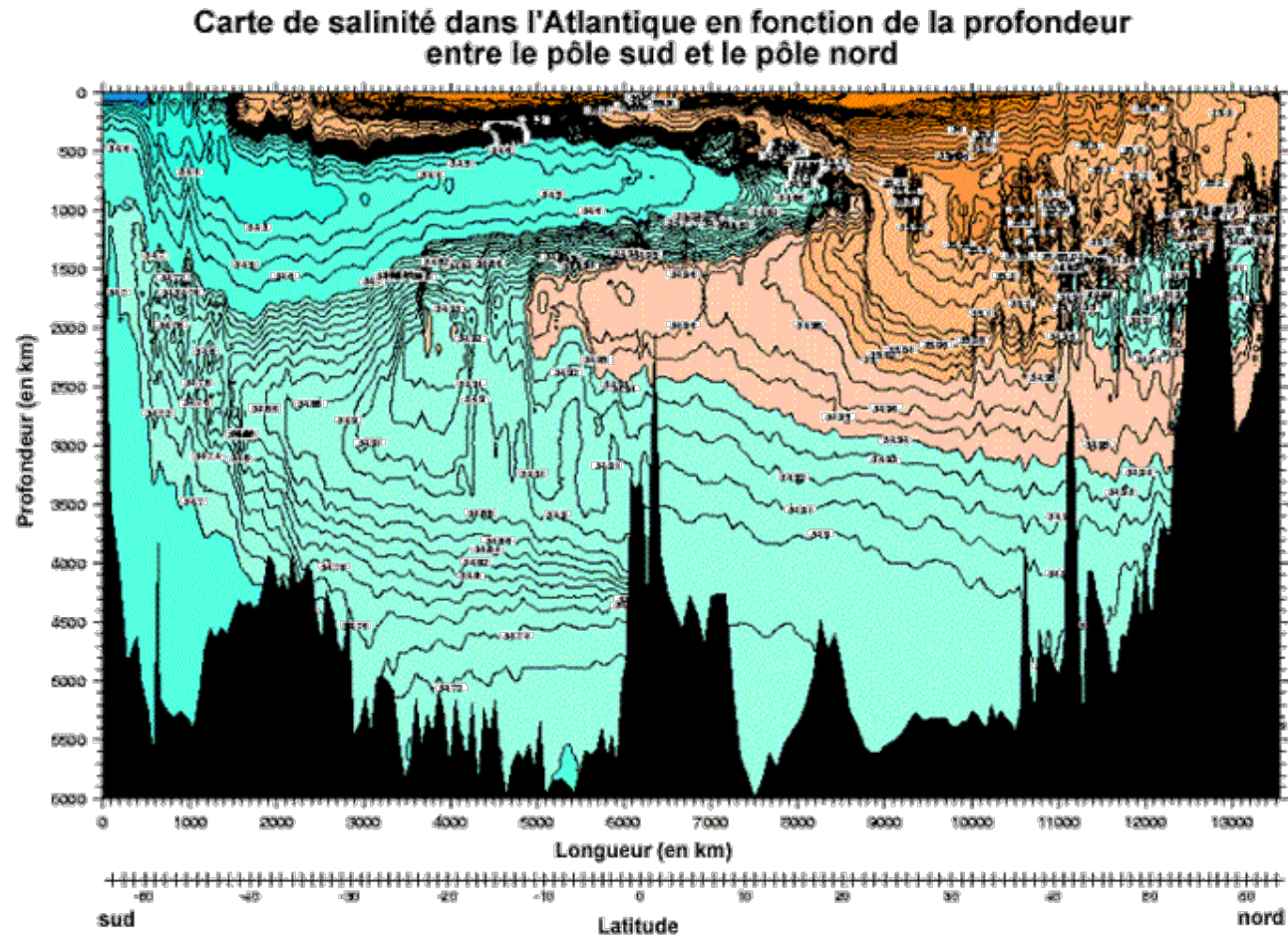


Partie 2 : étude de la circulation océanique profonde



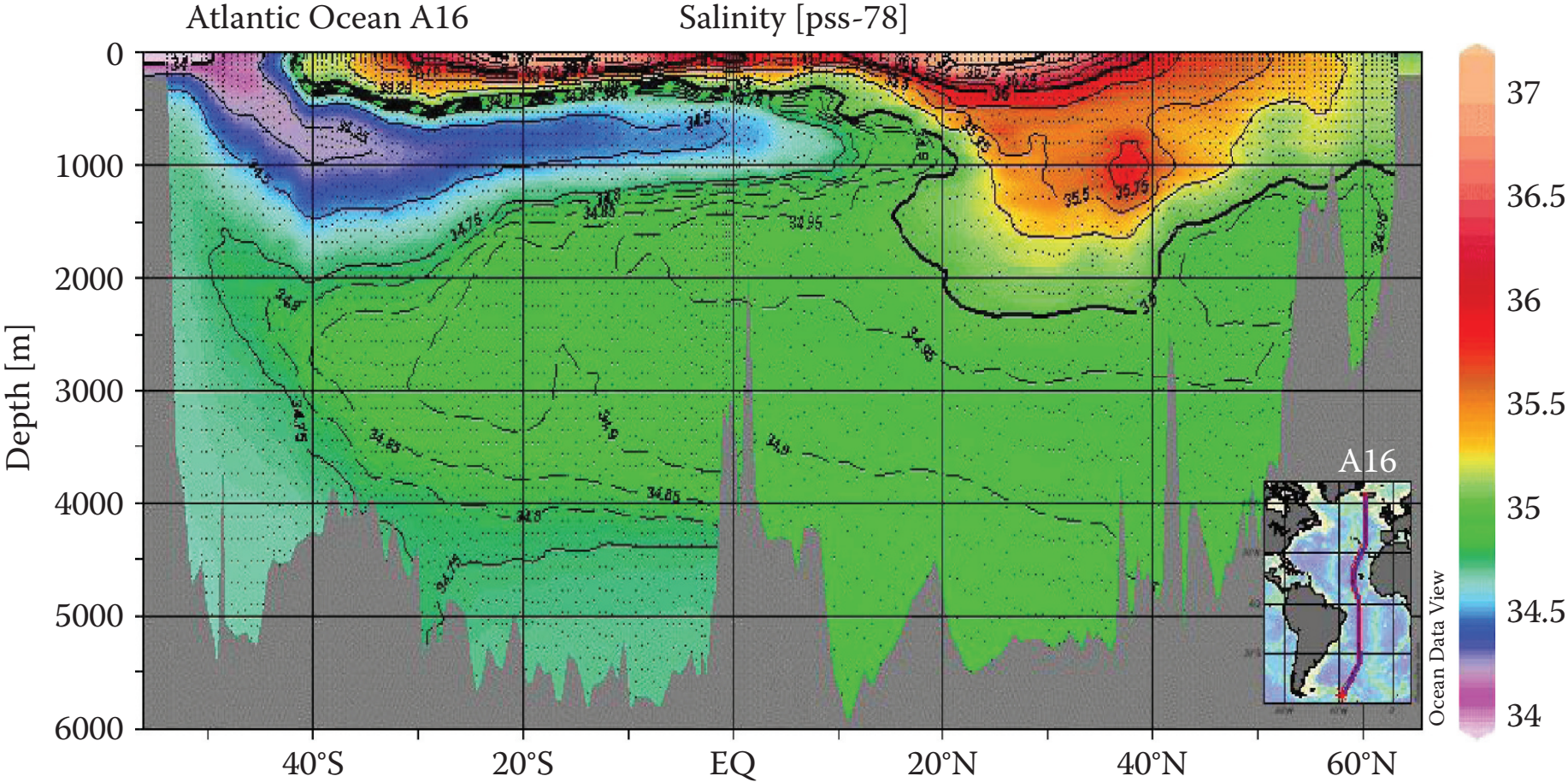
https://www.egeotrases.org/sections/jpg/300dpi/GA03_e_SALINITY_D_CONC.jpg

Partie 2 : étude de la circulation océanique profonde

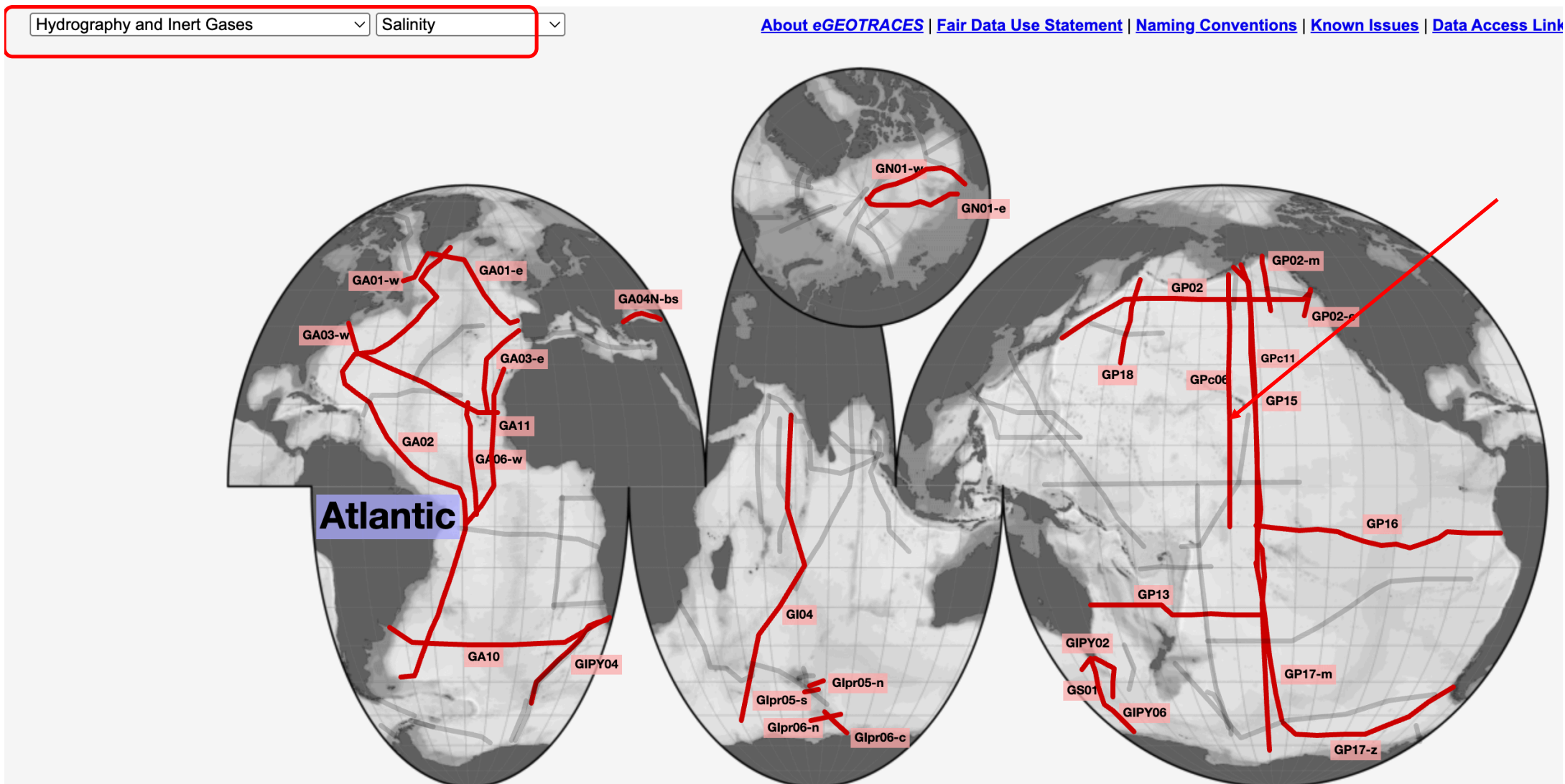


<https://planet-terre.ens-lyon.fr/ressource/thermohalin-antarctique.xml>

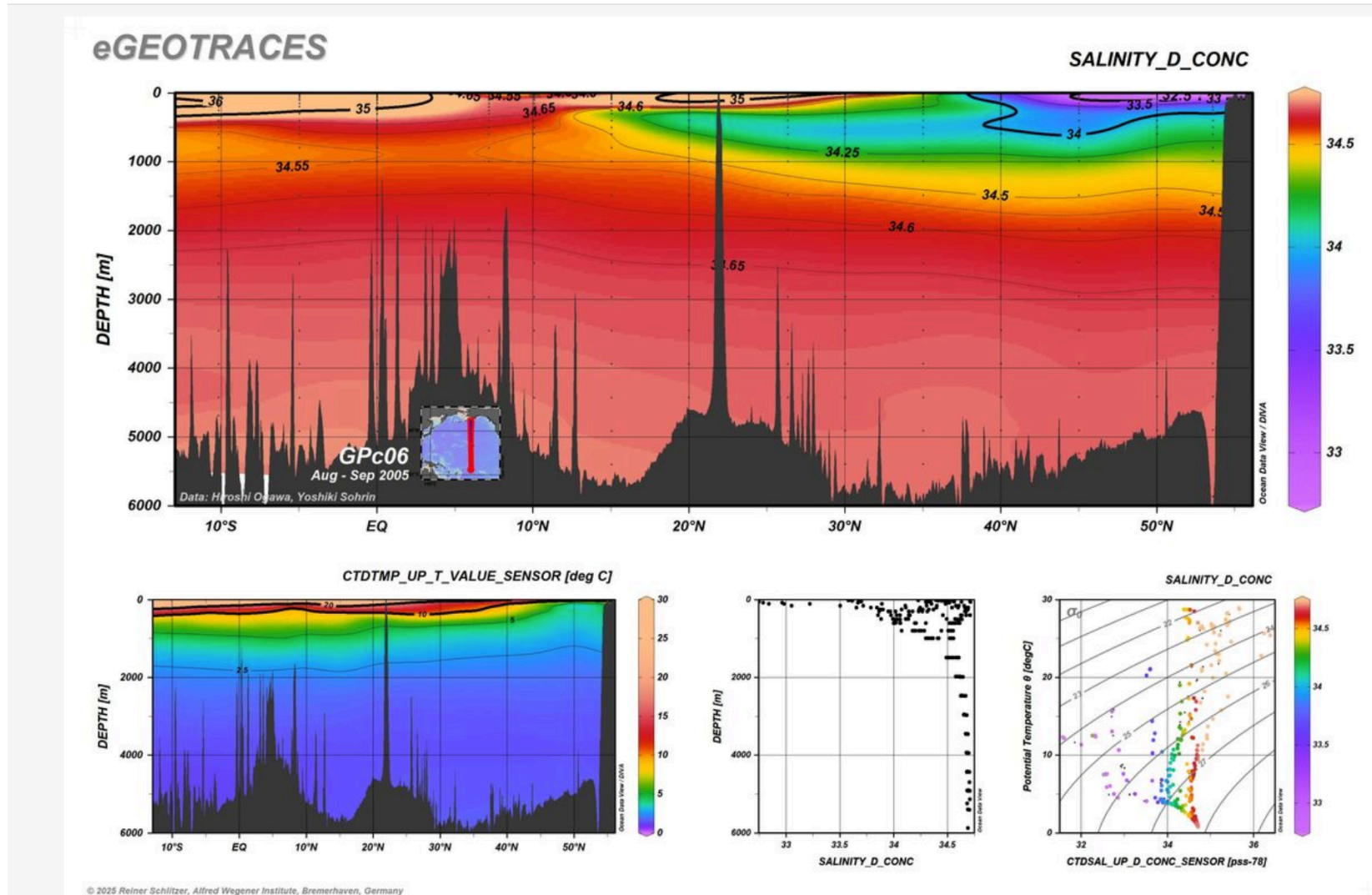
Partie 2 : étude de la circulation océanique profonde



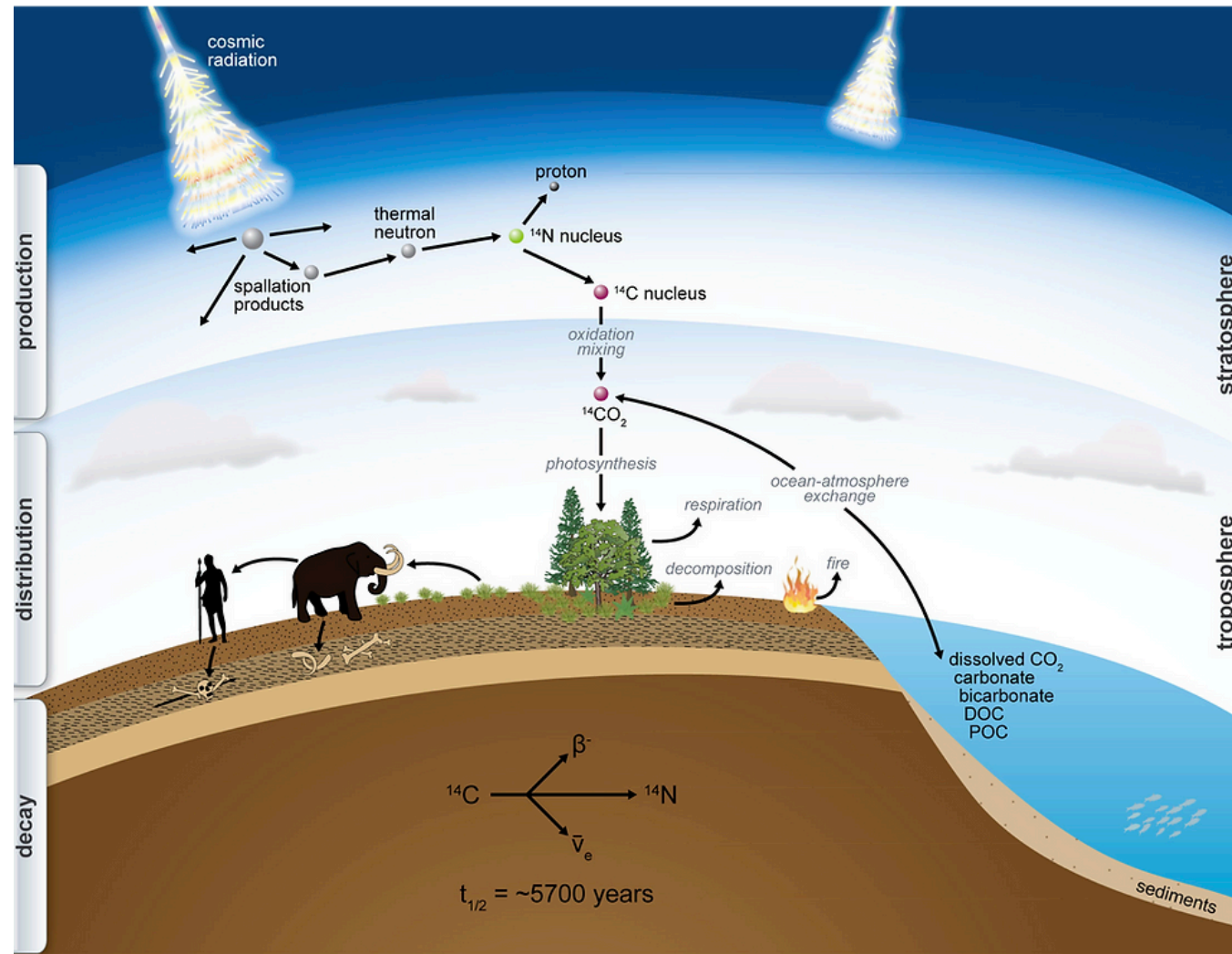
Partie 2 : étude de la circulation océanique profonde



Partie 2 : étude de la circulation océanique profonde



Partie 2 : étude de la circulation océanique profonde



Partie 2 : étude de la circulation océanique profonde

âges des masses d'eau à 1500m de profondeur calculées en utilisant le ^{14}C et exprimées en années

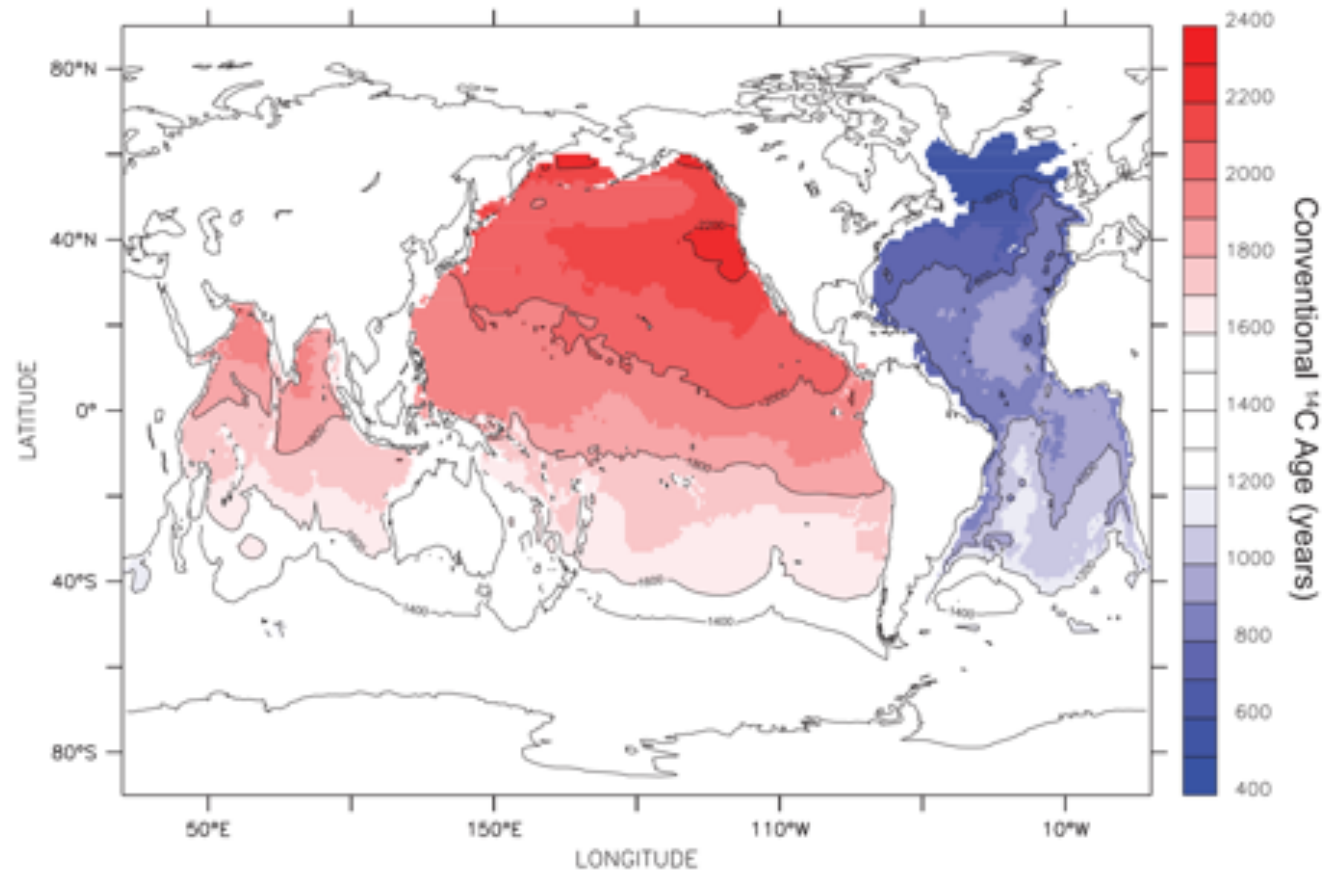
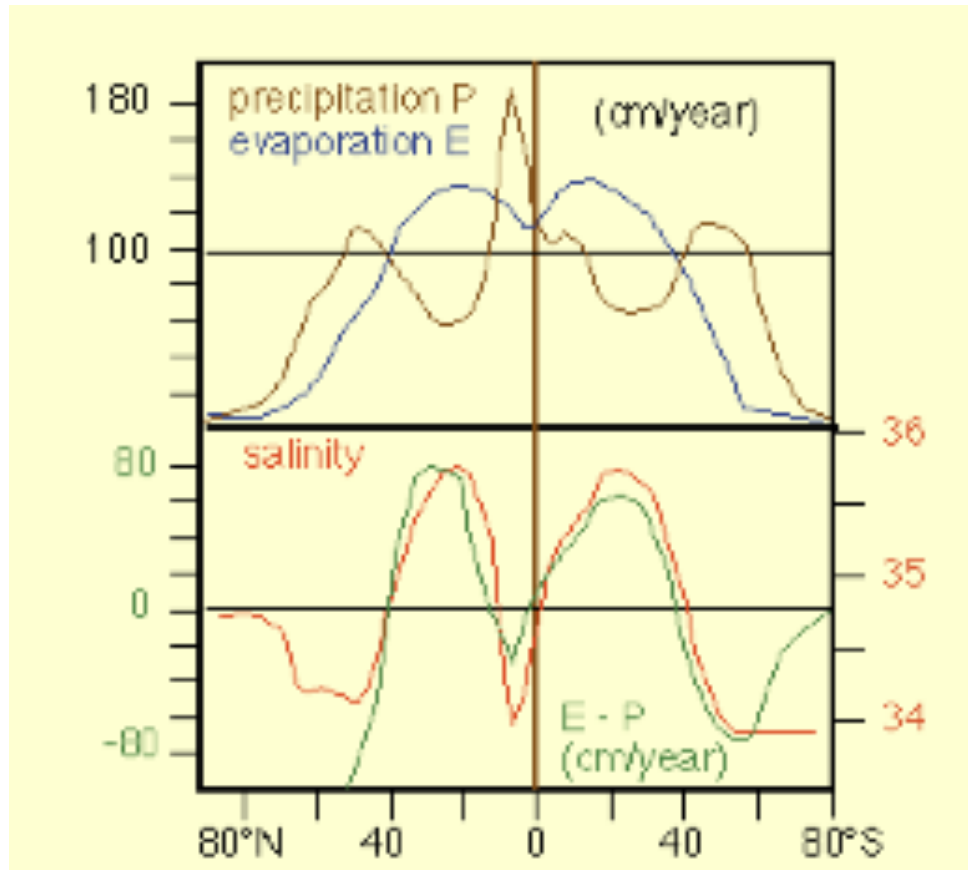


Figure 1. An objectively mapped conventional ^{14}C age of natural radiocarbon below 1500 m, following Matsumoto and Key [2004]. Unit is years.

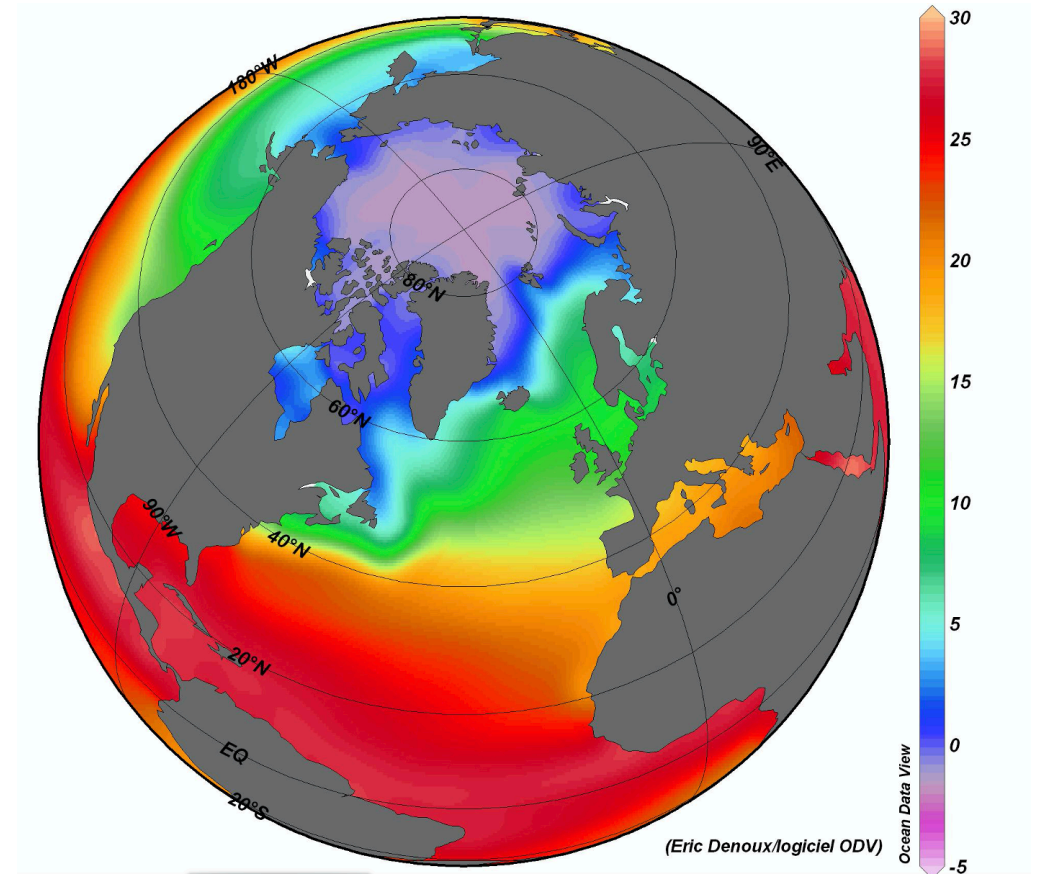
Partie 2 : étude de la circulation océanique profonde

Bilan hydrologique.

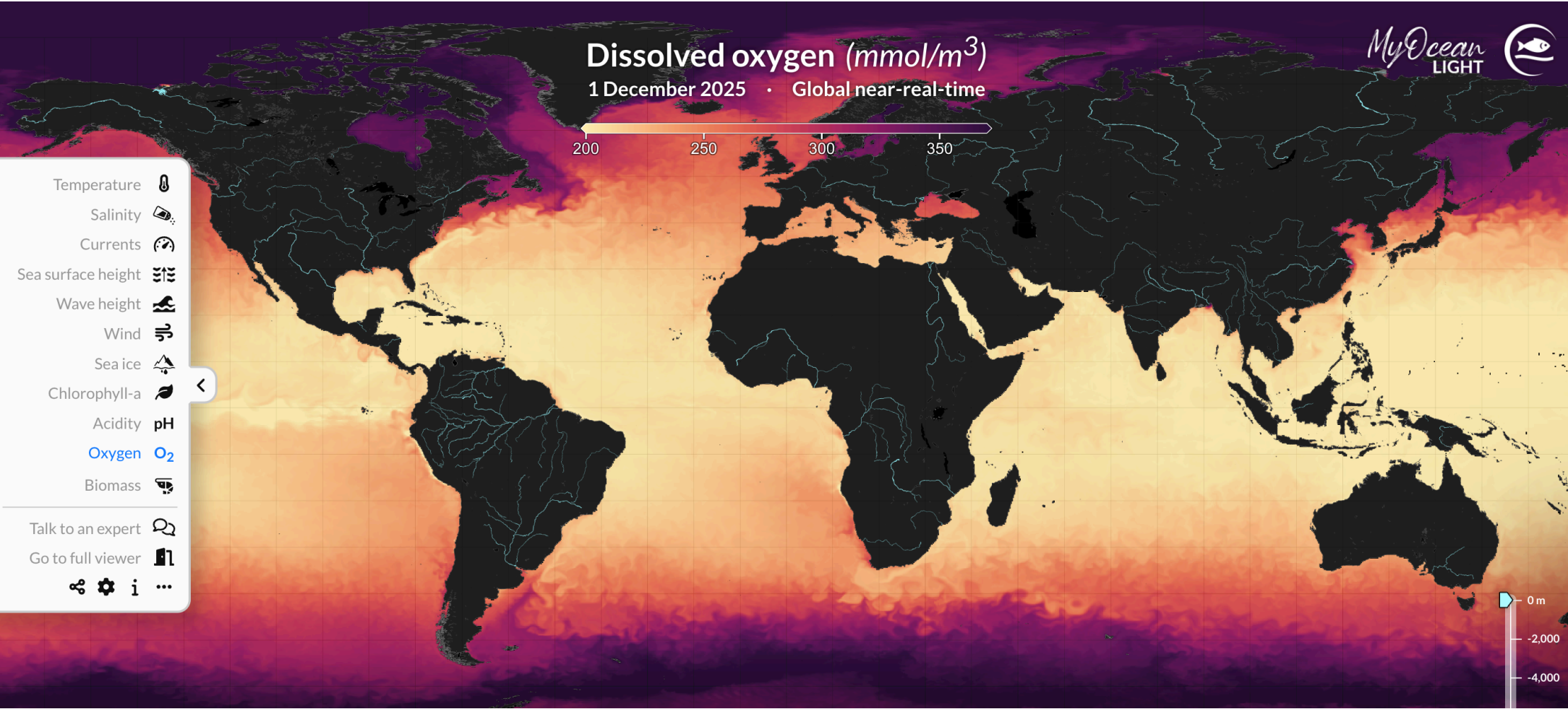


La salinité est exprimée en ‰.

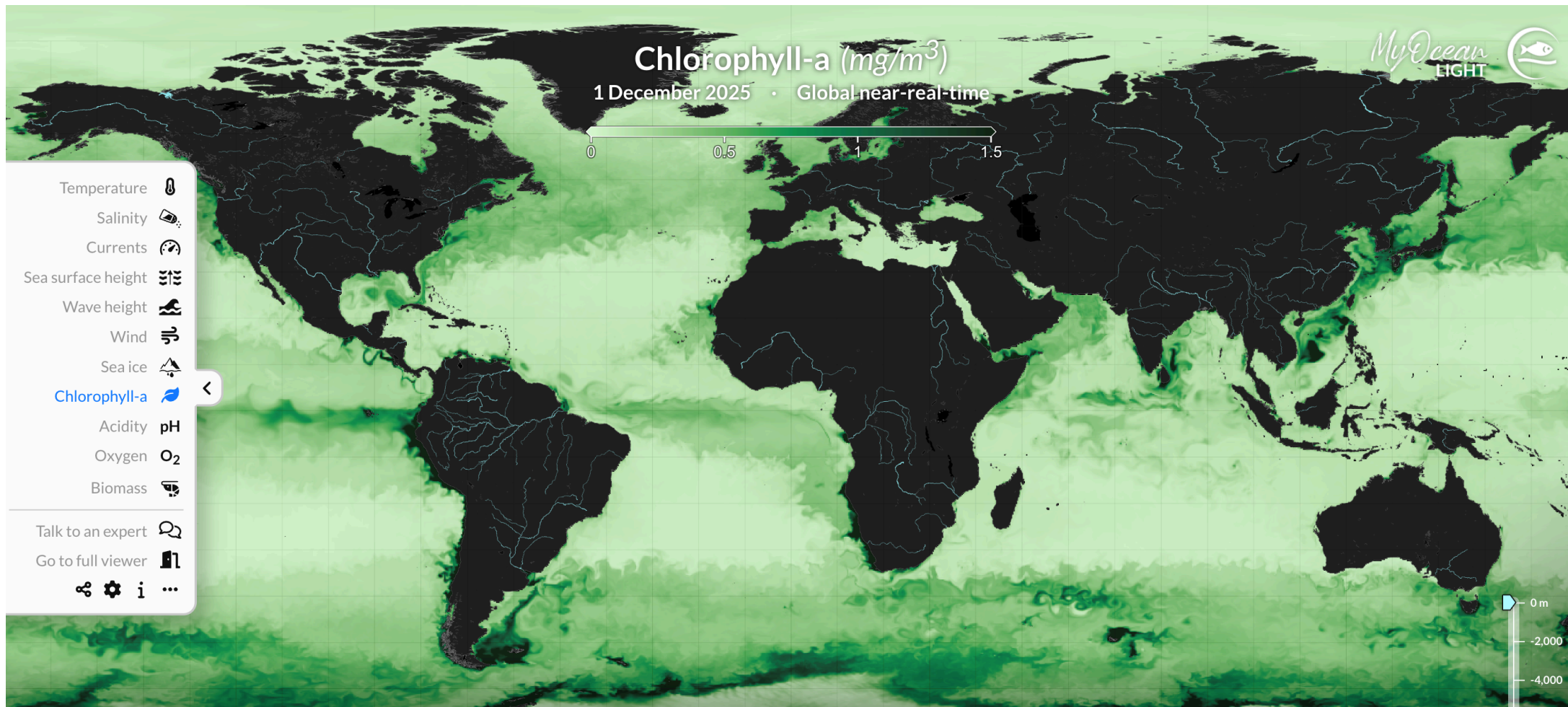
Température de surface océanique moyenne en 2001 en °C



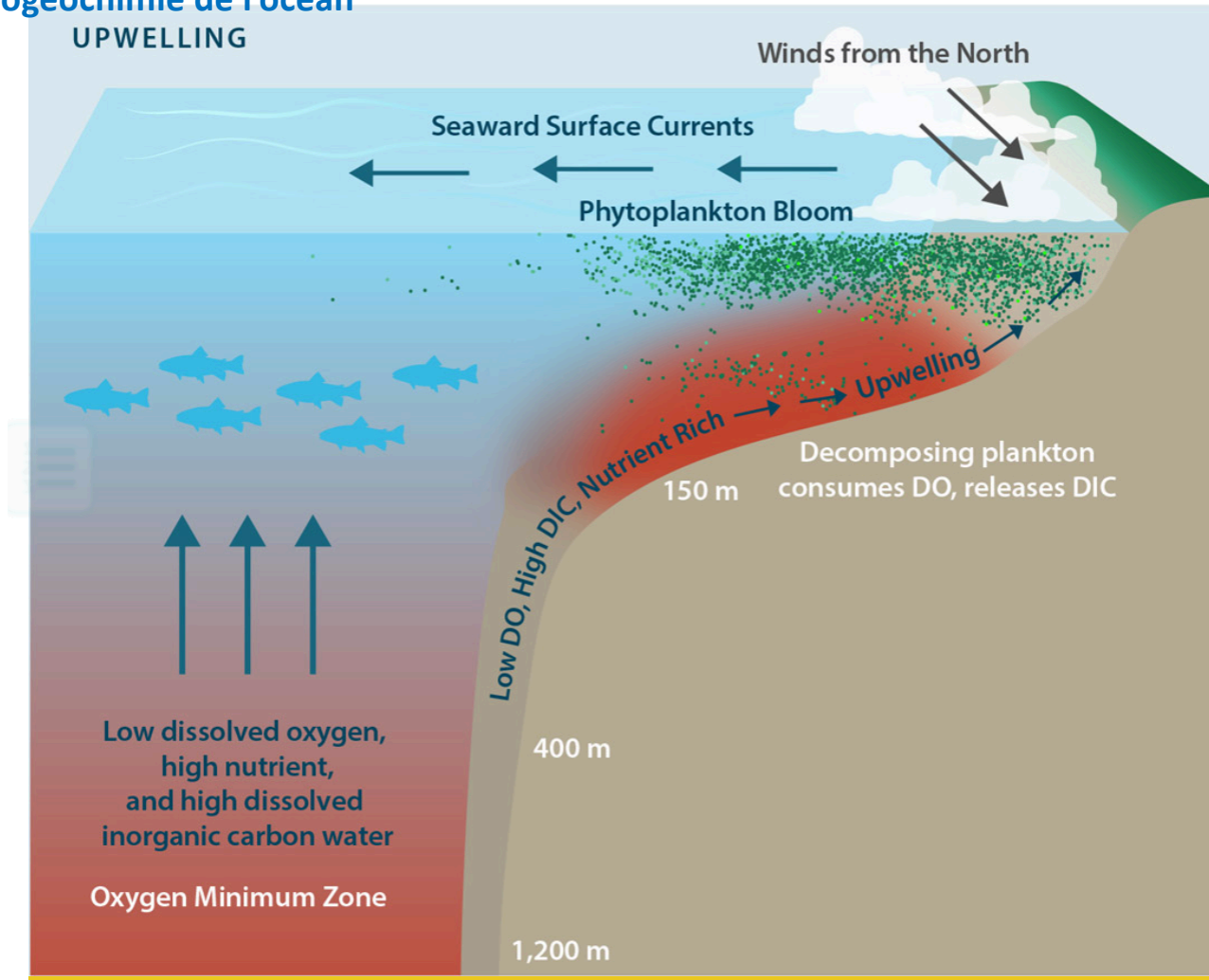
Partie 3 : étude de la biogéochimie de l'océan



Partie 3 : étude de la biogéochimie de l'océan



Partie 3 : étude de la biogéochimie de l'océan



Mécanisme de formation des blooms à travers un phénomène d'upwelling. Crédit photo : Francis Chan, John A. Barth, Kristy J. Kroeker, Jane Lubchenco and Bruce A. Menge. Modified from Gewin (2010) by Moni Kovacs., CC BY-SA 4.0 via Wikimedia Commons

Partie 3 : étude de la biogéochimie de l'océan

