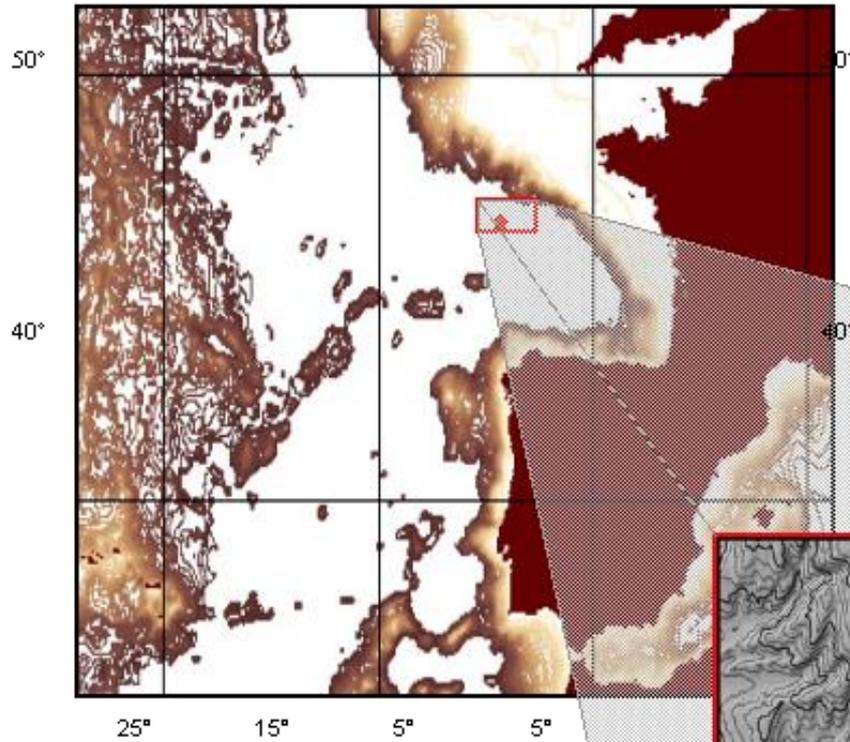
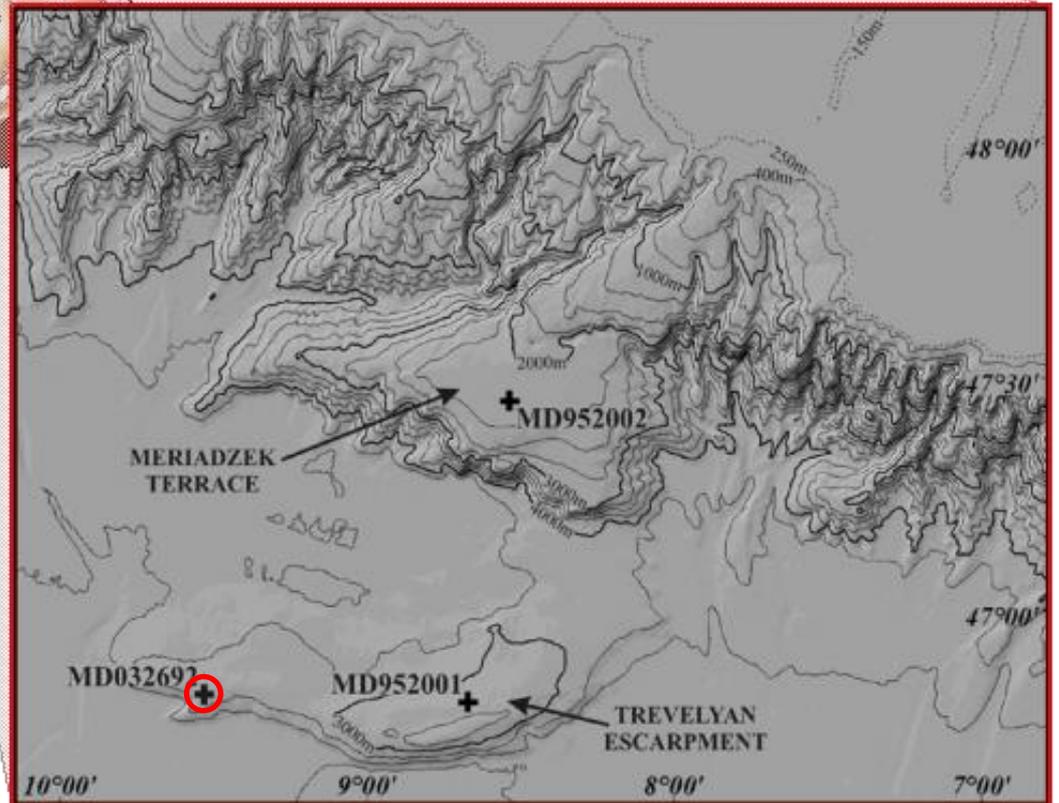


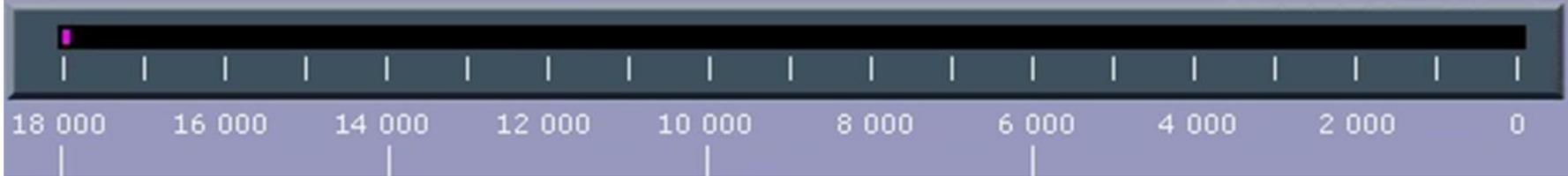
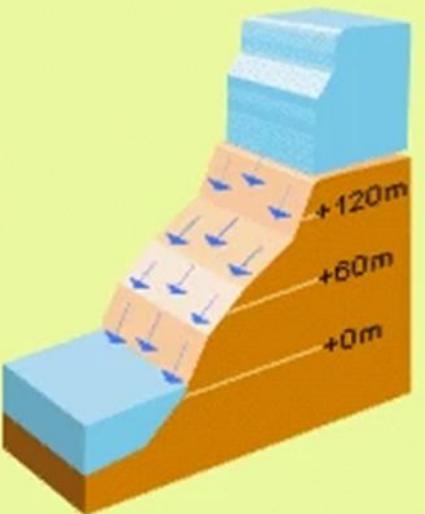
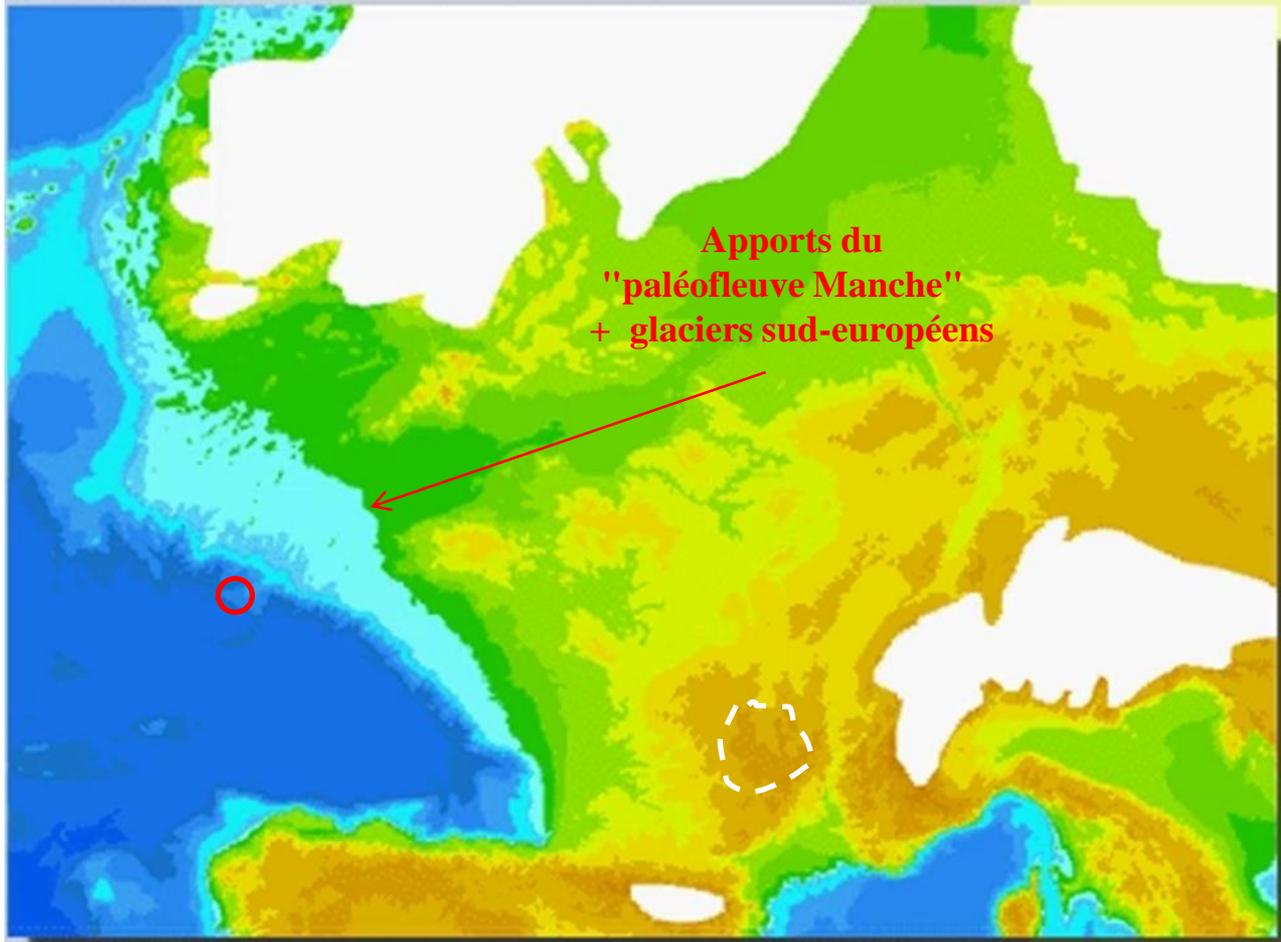
25° 15° 5° 5°

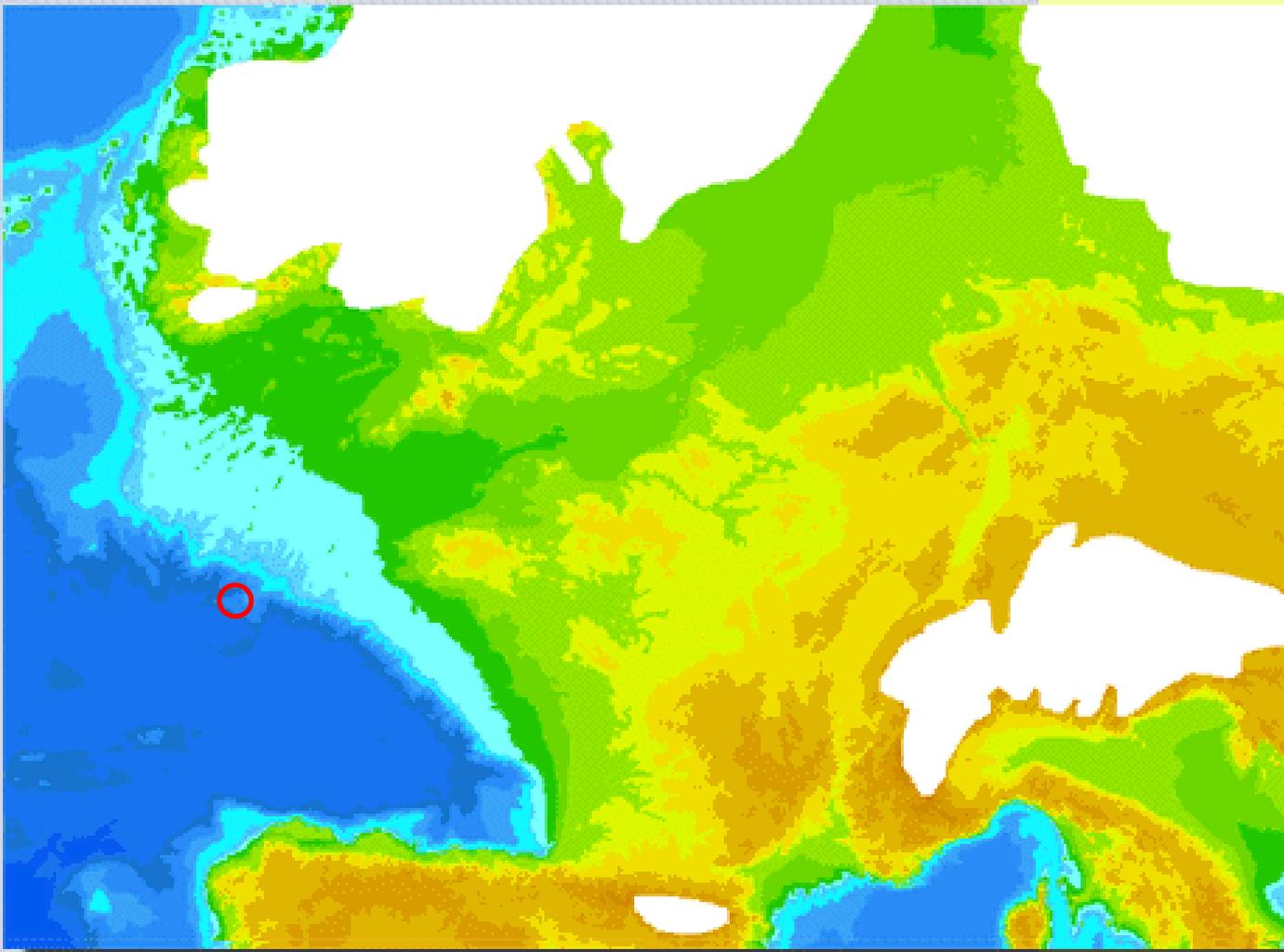
P 43 du fascicule (4TPU237)
// ou 47 (4TPU236)



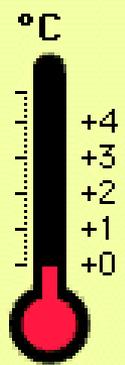
⇒ Marge celtique
(site MD03-2692)



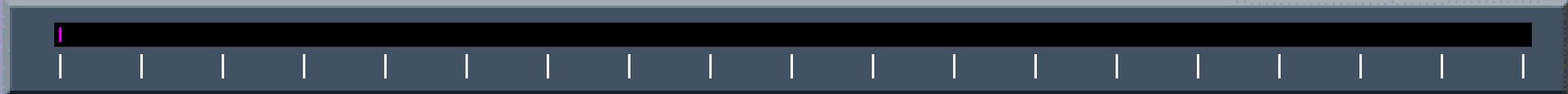
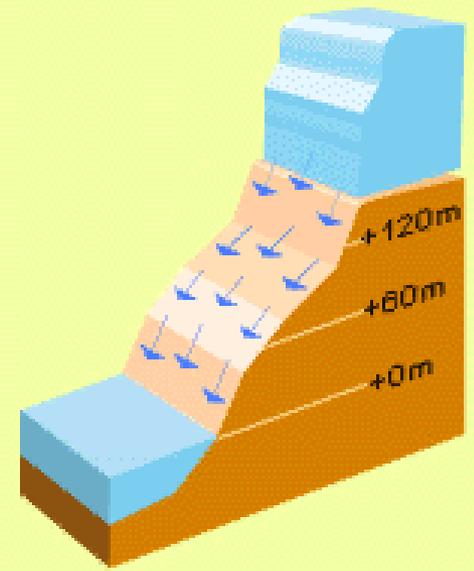




Ifremer



Elévation de la température moyenne sur la Terre

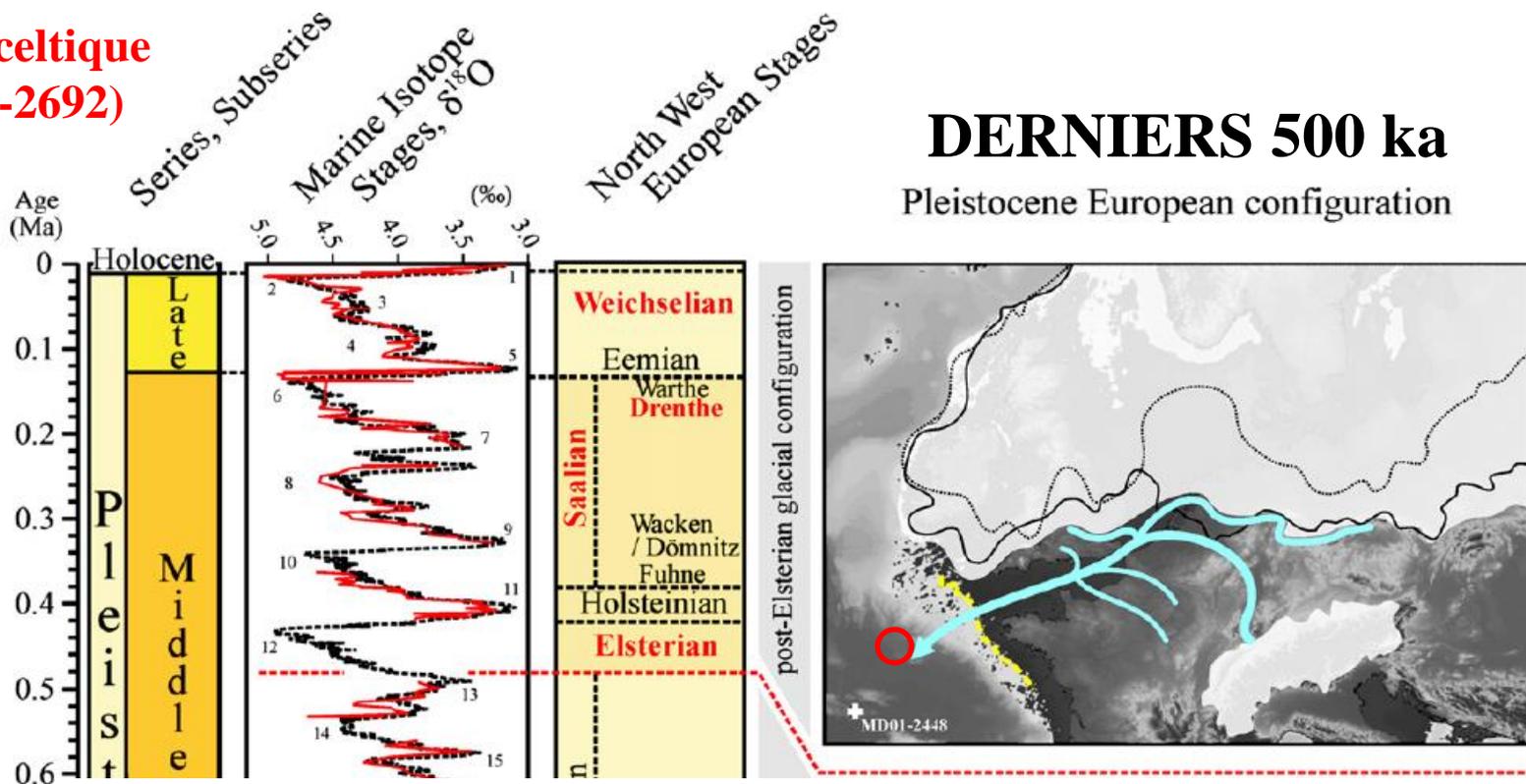


18 000 16 000 14 000 12 000 10 000 8 000 6 000 4 000 2 000 0

A 1.2 Ma record of glaciation and fluvial discharge from the West European Atlantic margin

S. Toucanne^{a,b,*}, S. Zaragosi^a, J.F. Bourillet^b, P.L. Gibbard^c, F. Eynaud^a, J. Giraudeau^a, J.L. Turon^a, M. Cremer^a, E. Cortijo^d, P. Martinez^a, L. Rossignol^a

⇒ **Marge celtique**
(site MD03-2692)

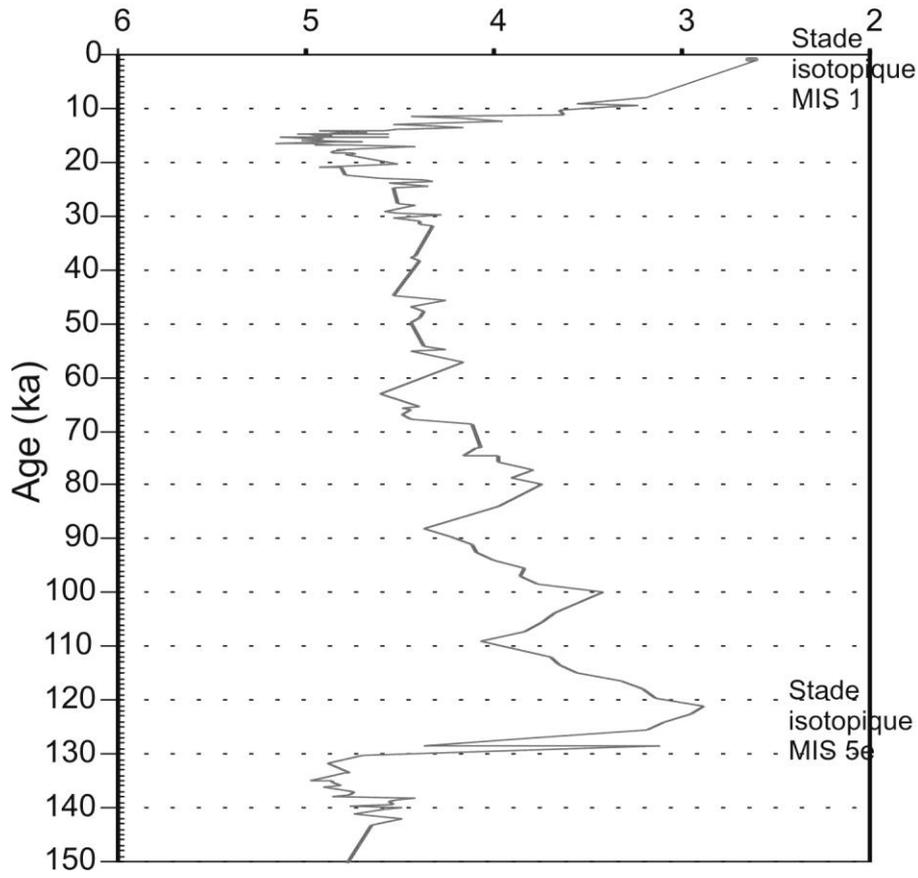


⇒ Marge celtique (site MD03-2692)

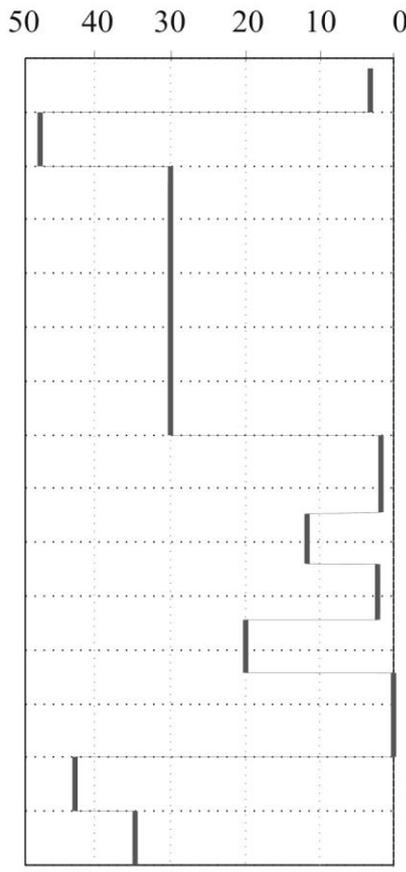


Séquence marine Golfe de Gascogne

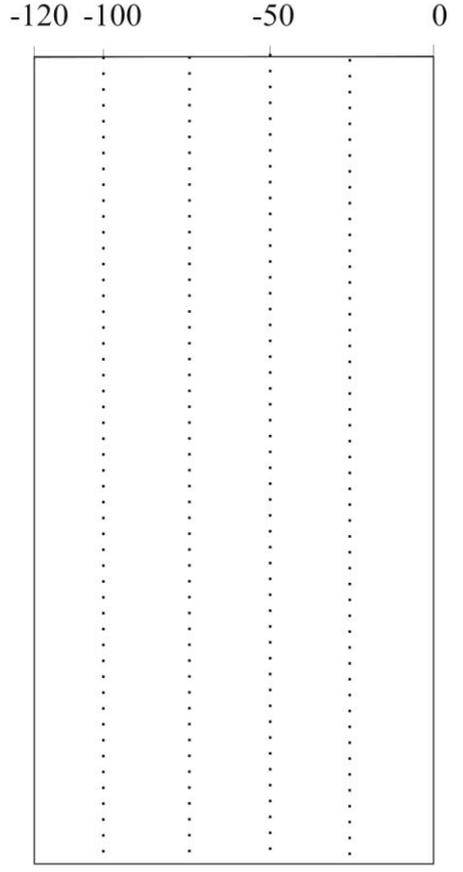
$\delta 18O$ benthique
Carotte MD03-2692 (‰)



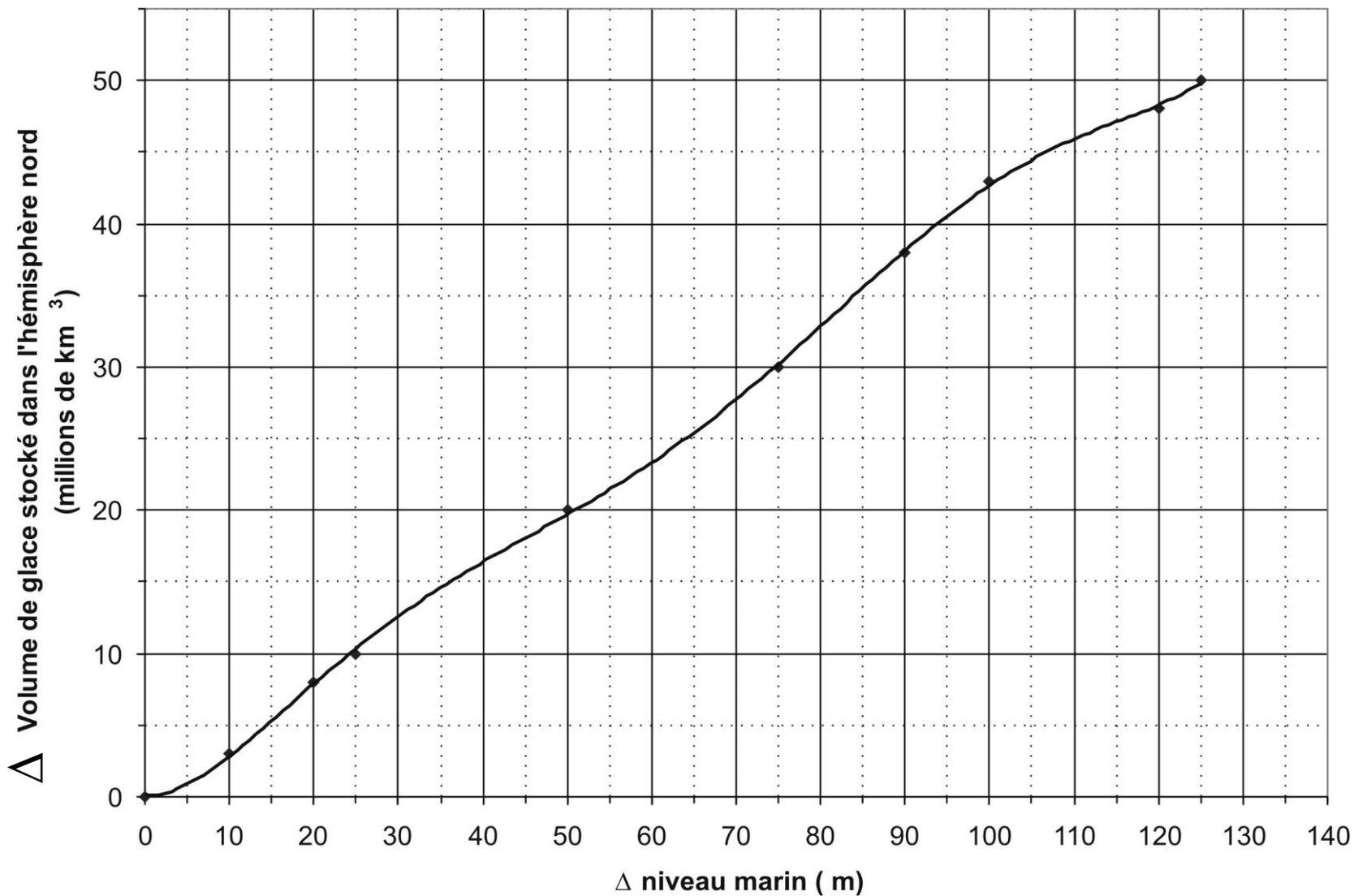
Volume de glace dans
l'hémisphère nord
(millions de km^3)



Niveau marin
(m)



⇒ Un « abaque » pour passer des volumes de glace au niveau marin

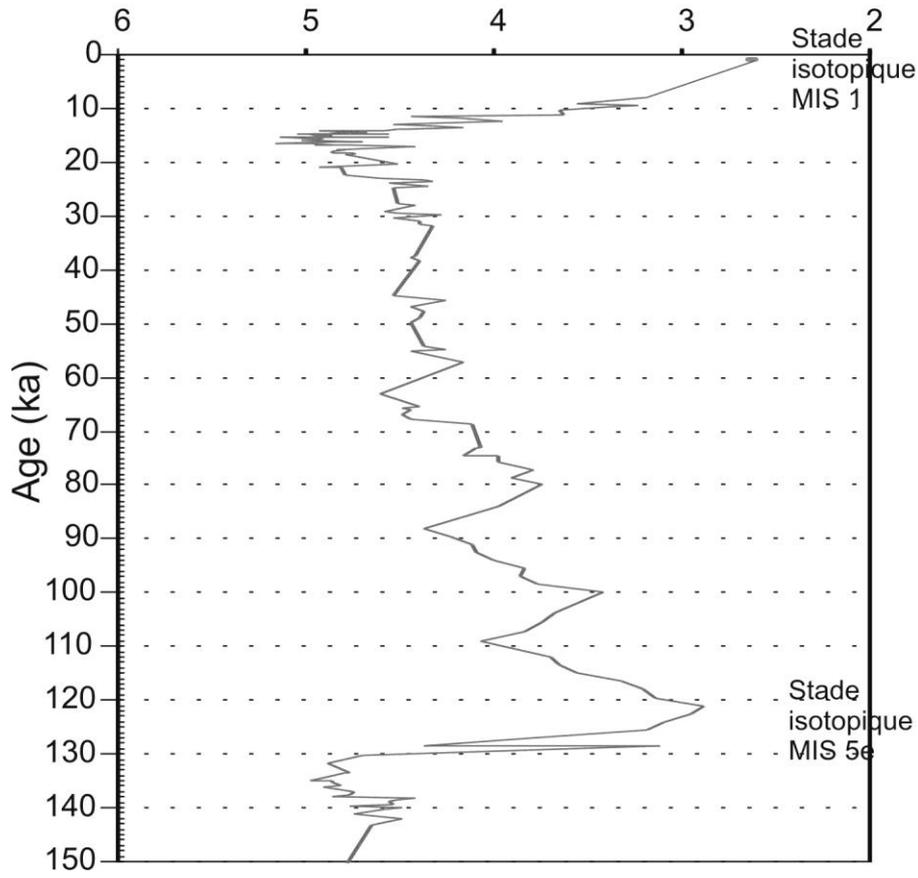


⇒ Marge celtique (site MD03-2692)

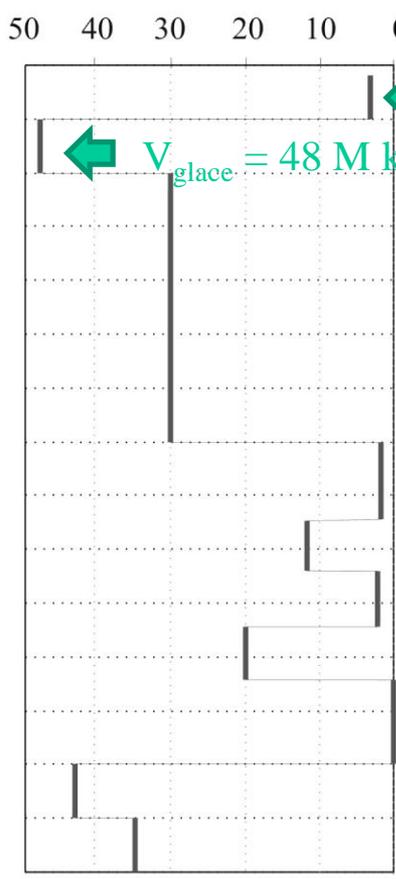


Séquence marine Golfe de Gascogne

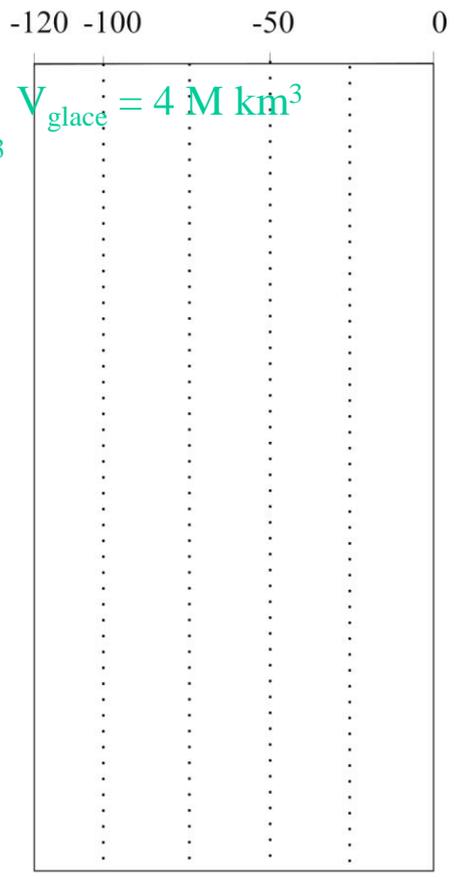
$\delta 18O$ benthique
Carotte MD03-2692 (‰)



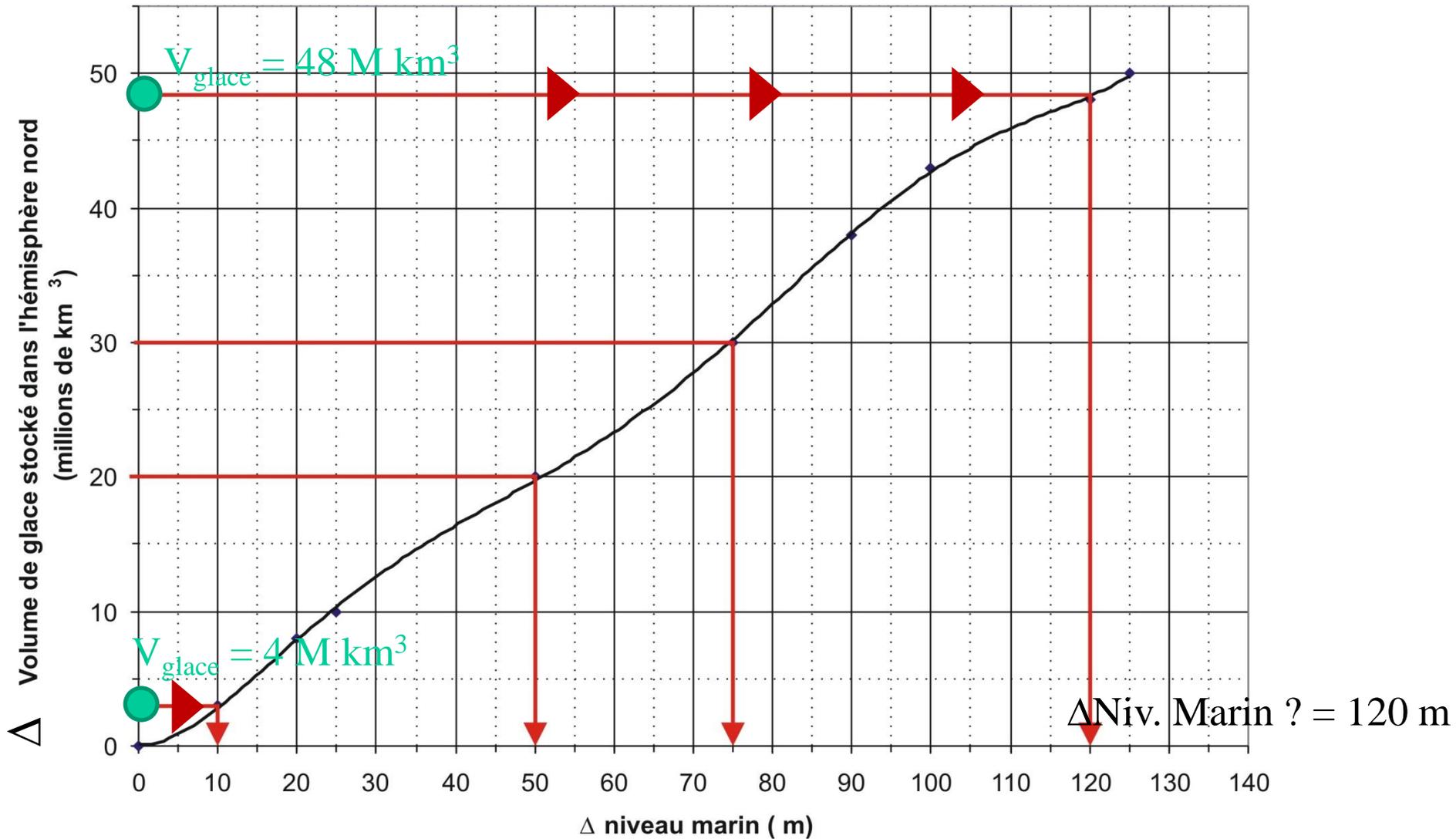
Volume de glace dans
l'hémisphère nord
(millions de km^3)



Niveau marin
(m)



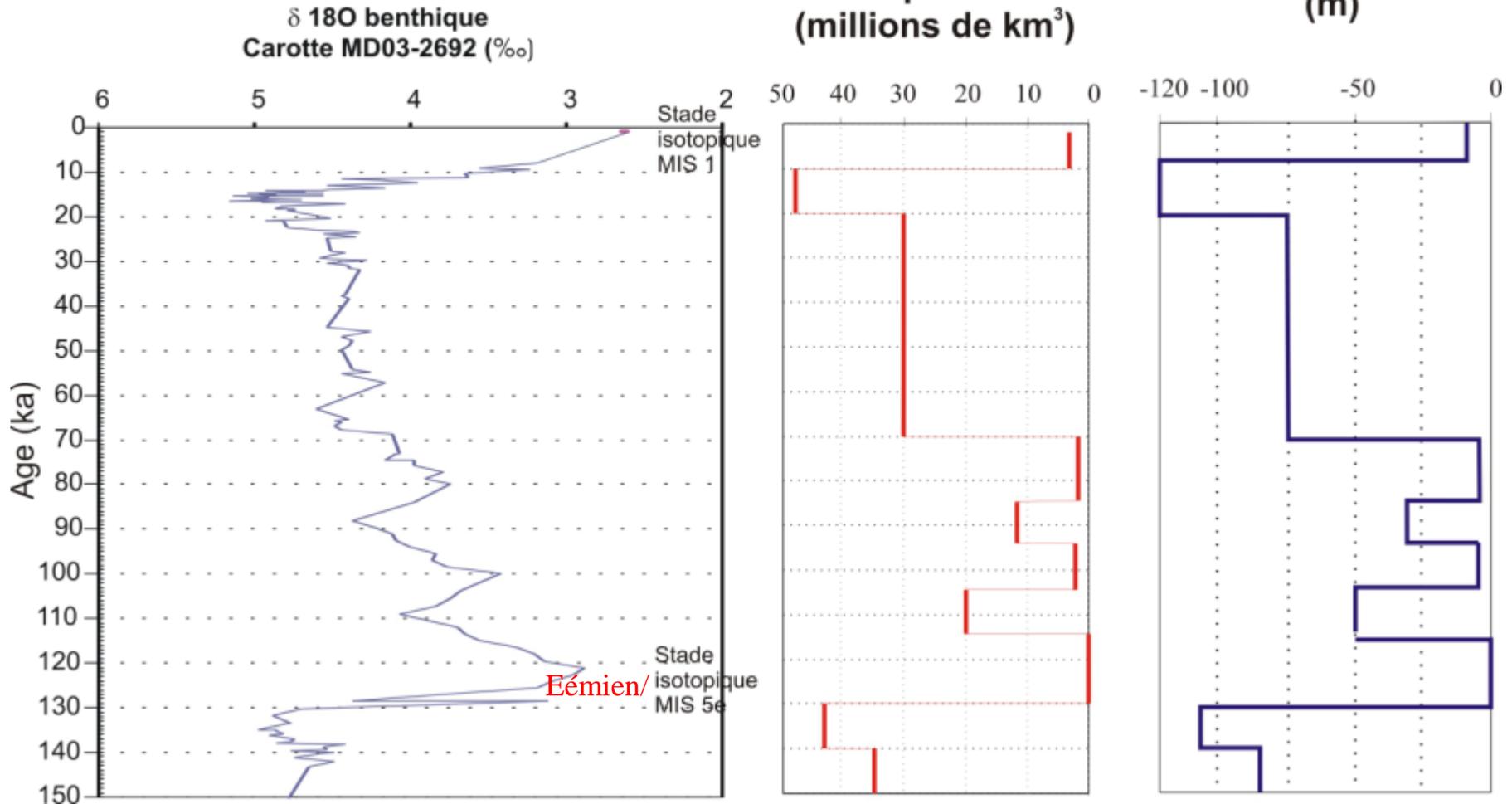
⇒ Un « abaque » pour passer des volumes de glace au niveau marin



Ect... poursuivre pour chaque V_{glace} de la figure 2

Séquence marine Golfe de Gascogne

CORRECTION



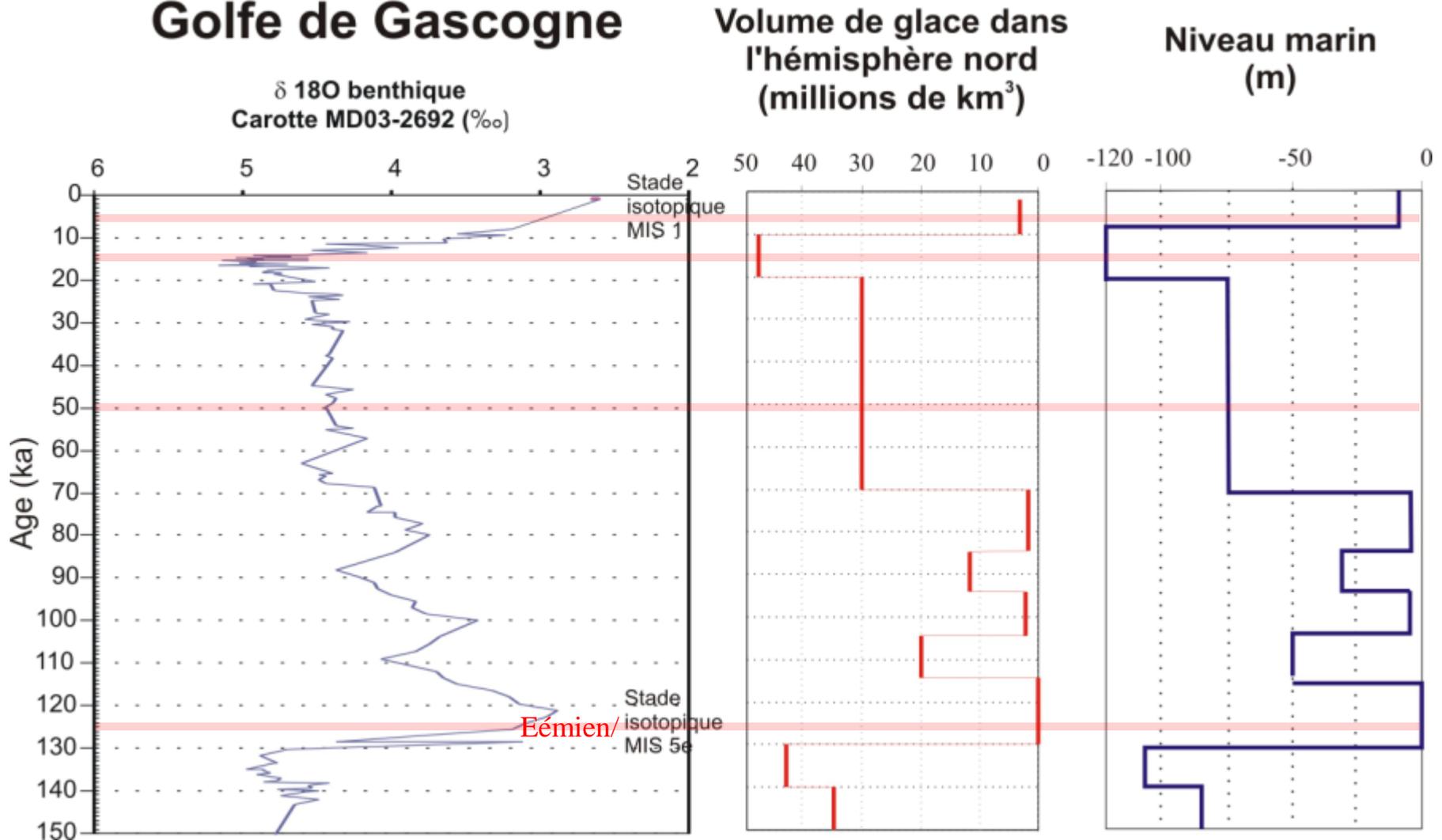
Δ Par rapport à l'actuel

Ages (BP)	Δ Niveau marin (m)	Δ Volume de glace(M km ³)	d18O benth. (‰)
-125 000 ans BP			
-50 000 ans BP			
-15 000 ans BP			
-6 000 ans BP			

Tableau 1

Séquence marine Golfe de Gascogne

CORRECTION



CORRECTION

Δ Par rapport à l'actuel

Ages (BP)	Δ Niveau marin (m)	Δ Volume de glace (M km ³)	d18O benth. (‰)
-125 000 ans BP	0	0	~3
-50 000 ans BP	-75	30	4.5
-15 000 ans BP	-120	48	5
-6 000 ans BP	-10	3	3

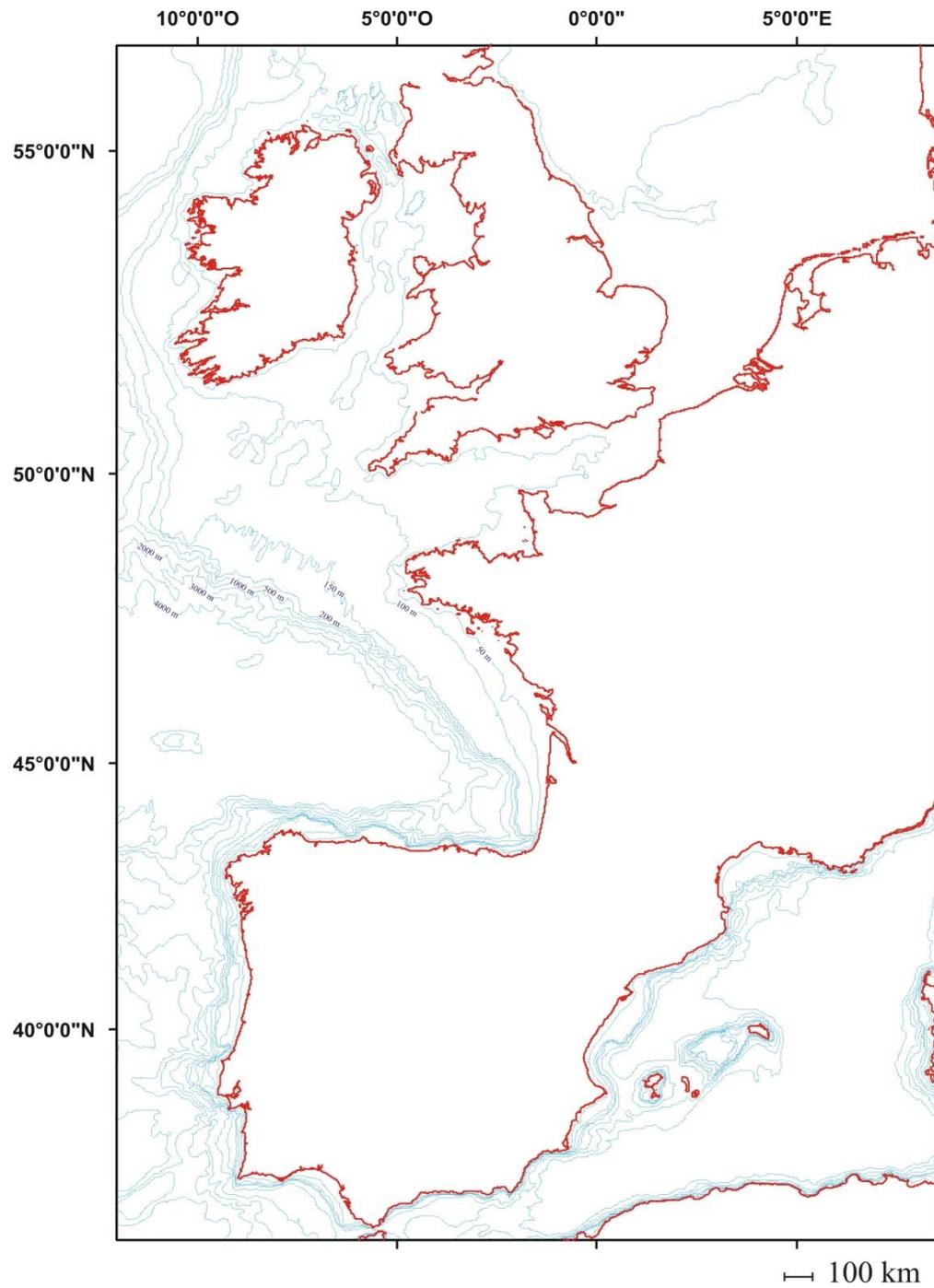
Tableau 1

(3) Positionner, de façon schématique, le trait de côte sur la carte ci-dessous pour les périodes mentionnées dans le Tableau 1.

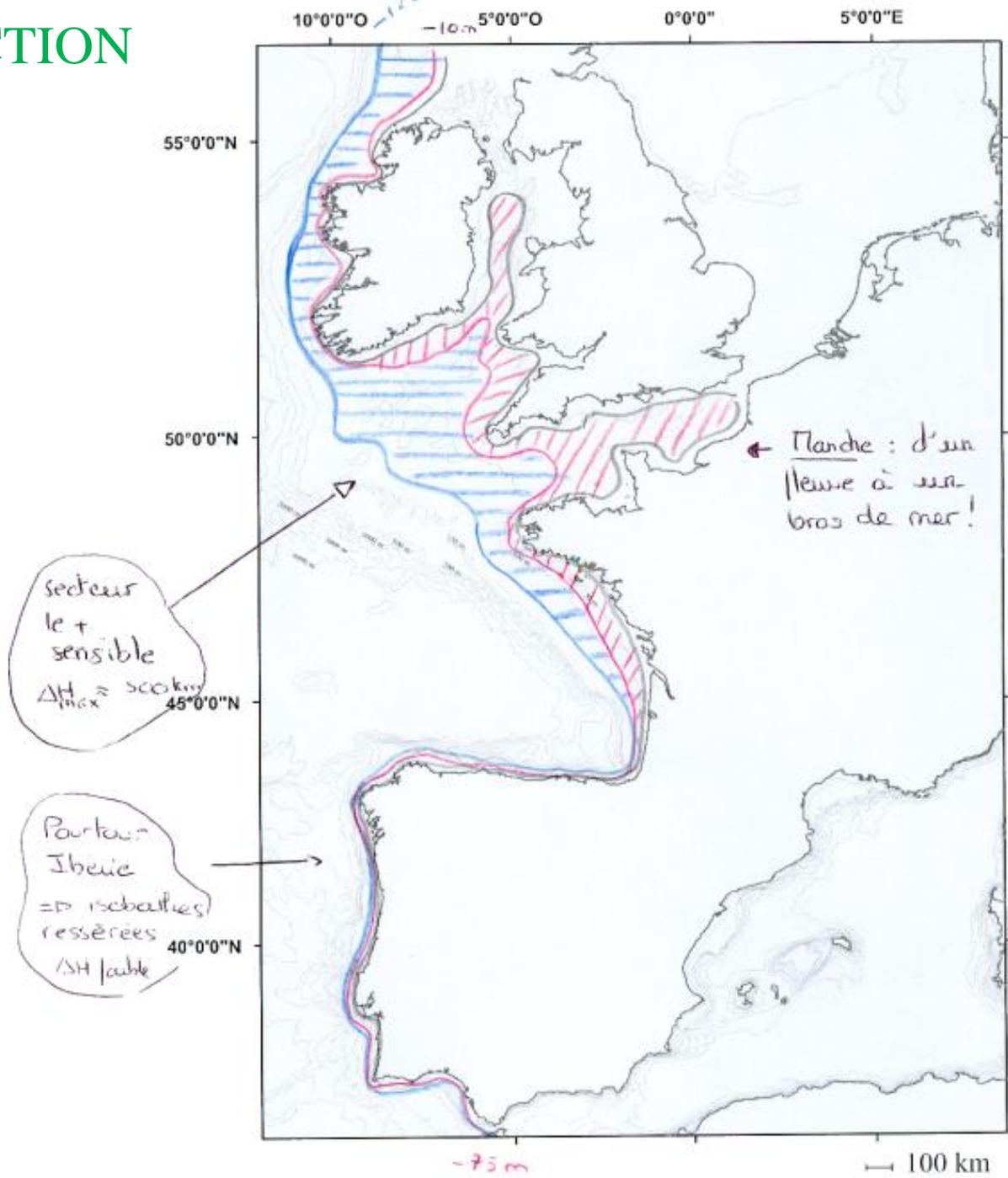
De combien de km bouge le rivage à chaque étape ? Quels sont les secteurs de la marge les plus affectés ? Pourquoi ?

⇒ Viser le secteur médocain

⇒ Viser le secteur du Pas-de-calais



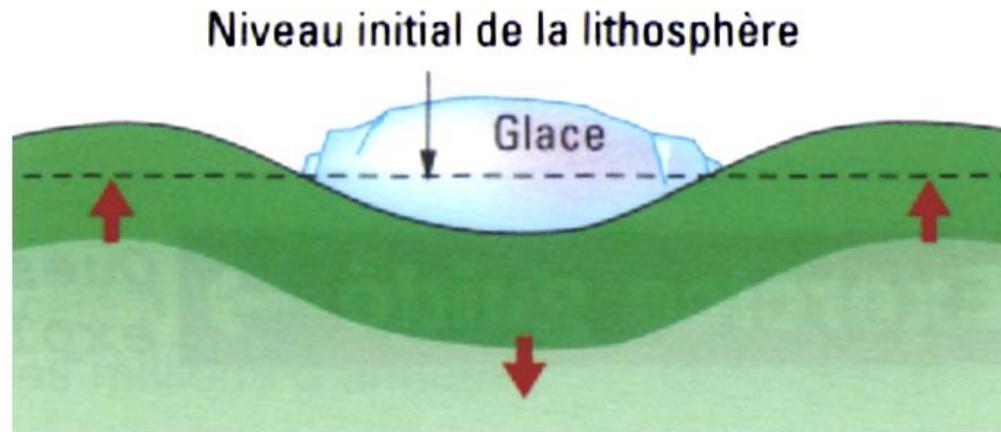
CORRECTION



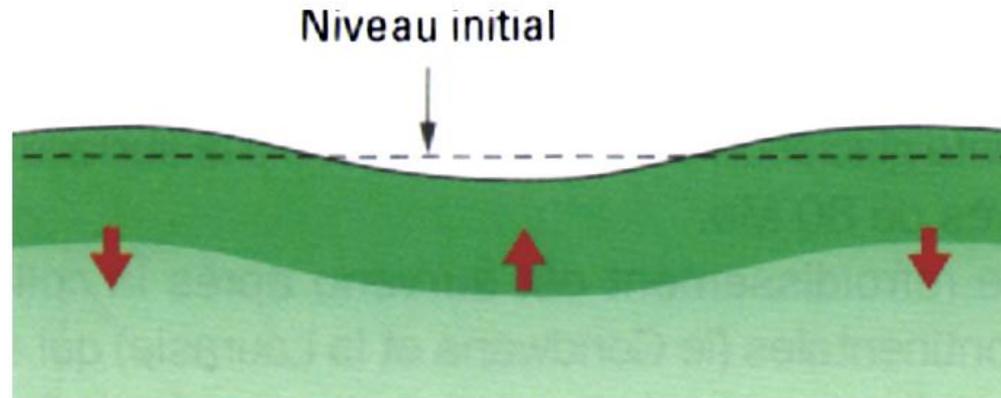
Attention cependant ! => approche un peu caricaturale car phénomène bien plus complexe

Le réajustement isostatique :

Pendant la phase de glaciation



Pendant la phase de réchauffement



« Le rebond isostatique »

 Lithosphère

 Asthénosphère

Love numbers, the “sea-level equation” and the glacial isostatic adjustment problem

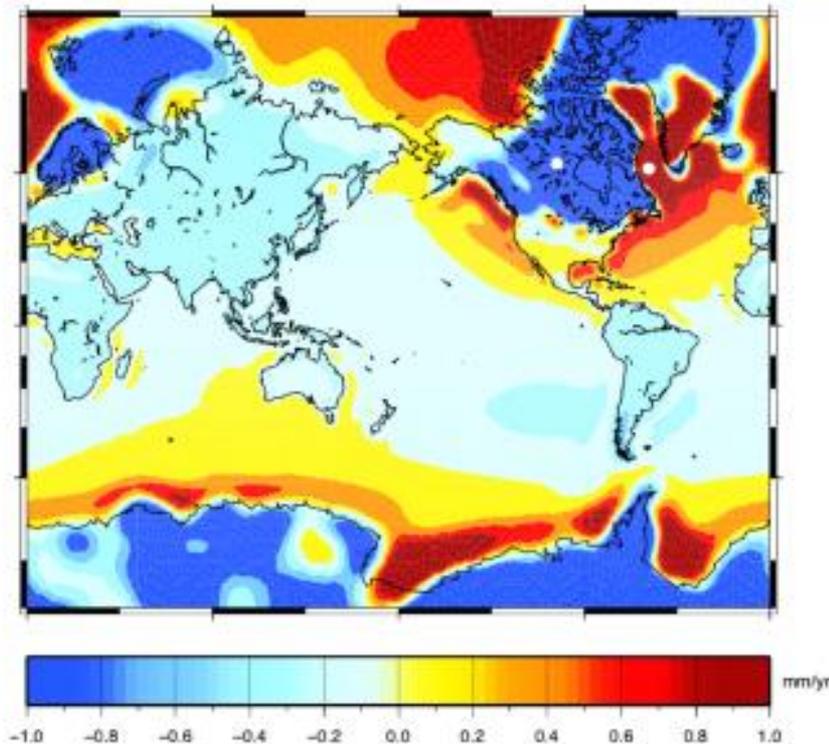
Giorgio Spada,

Dip. di Fisica e Astronomia (DIFA),

Settore Geofisica, Università di Bologna, Bologna, Italia.

Web Lecture on March 18, 2021 at 3:00 PM (Paris Time)

<https://us02web.zoom.us/j/85441508088?pwd=N2kzbnR5Nk5tZlQ1d1ZlQUlRbFmN2UT09>



Extrait du résumé du conférencier :

“ Since their introduction by AEH Love (1909), the “Love numbers” became a fundamental tool in the context of various problems in global geodynamics, involving the Earth’s response to various types of forcing (surface loading, -dal or seismic excita-on).

... Furthermore, in the second part, I shall discuss a very important application of the Love numbers technique, in the framework of the so-called “Sea Level Equation” which represents the fundamental non-linear integral equa-tin that governs the Glacial Isostatic Adjustment (GIA) process (Farrell & Clark, 1976).

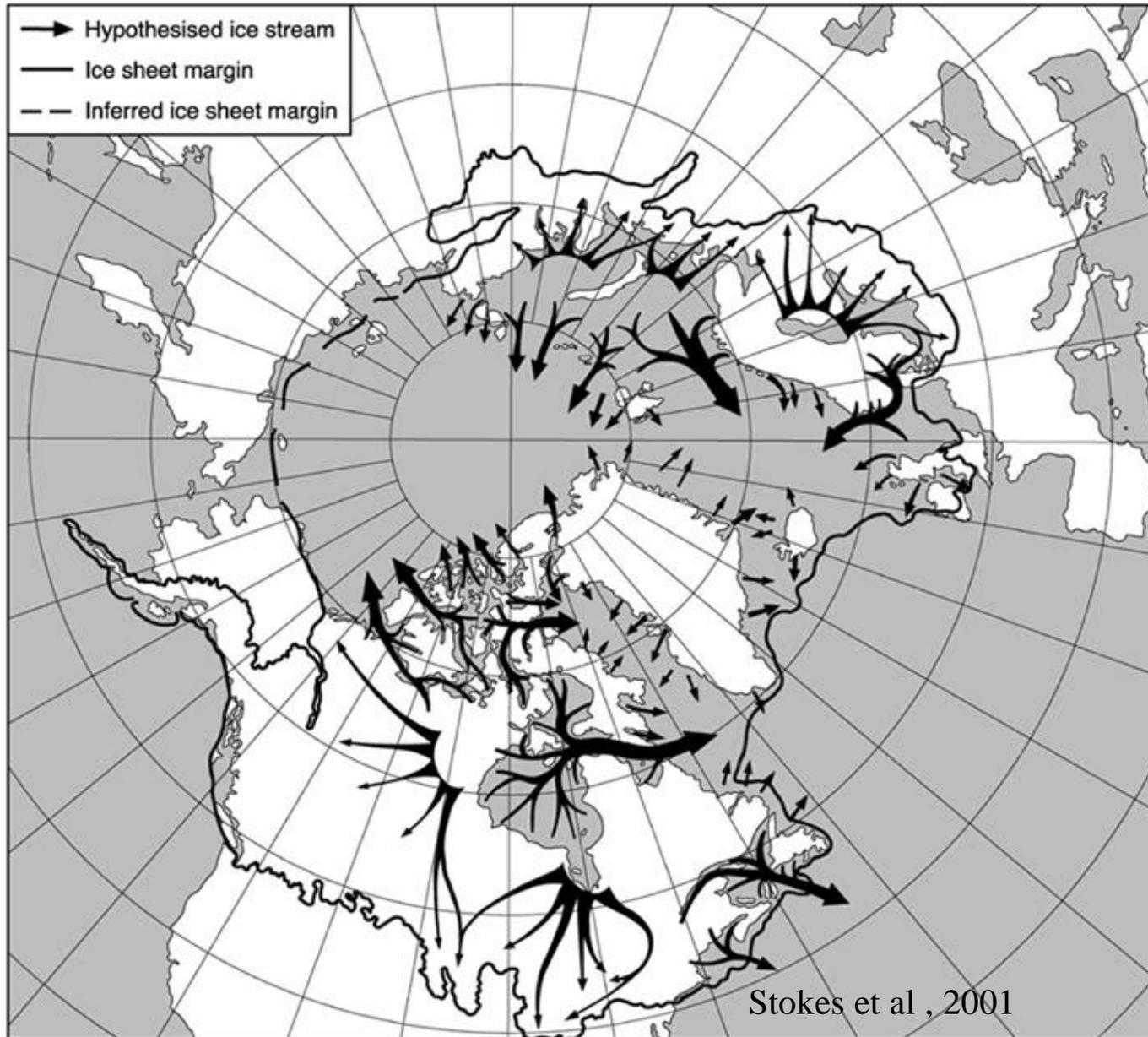
Spada, G., & Melini, D. (2019). SELEN 4 (SELEN version 4.0): a Fortran program for solving the gravita-onally and topographically self-consistent sea-level equa-on in glacial isosta-c adjustment modeling. *Geoscien-fic Model Development*, 12(12), 5,055-5,075.”

Les grands glaciers européens



Dernier maximum glaciaire, Svendsen et al., 2015

Les glaciers boréaux ?



Pour les côtes françaises (isostasie) :

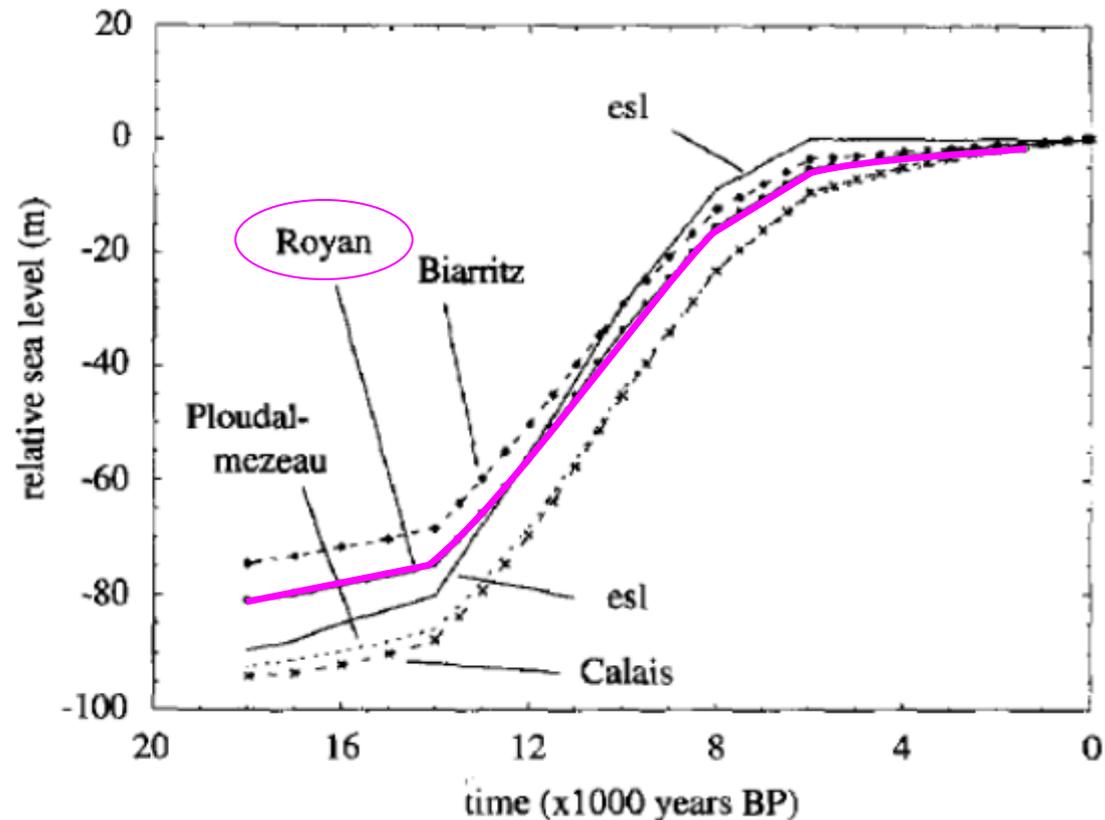
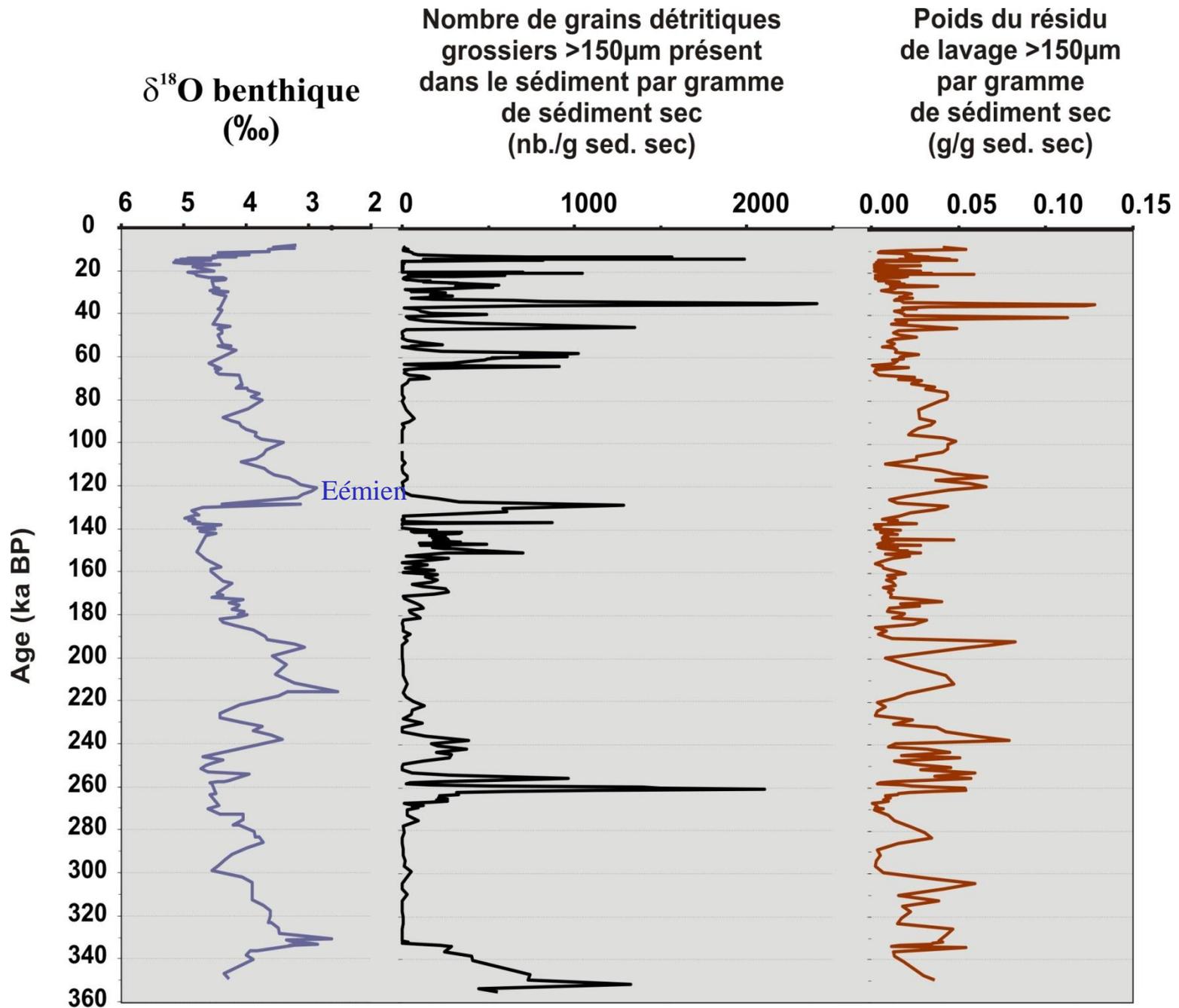


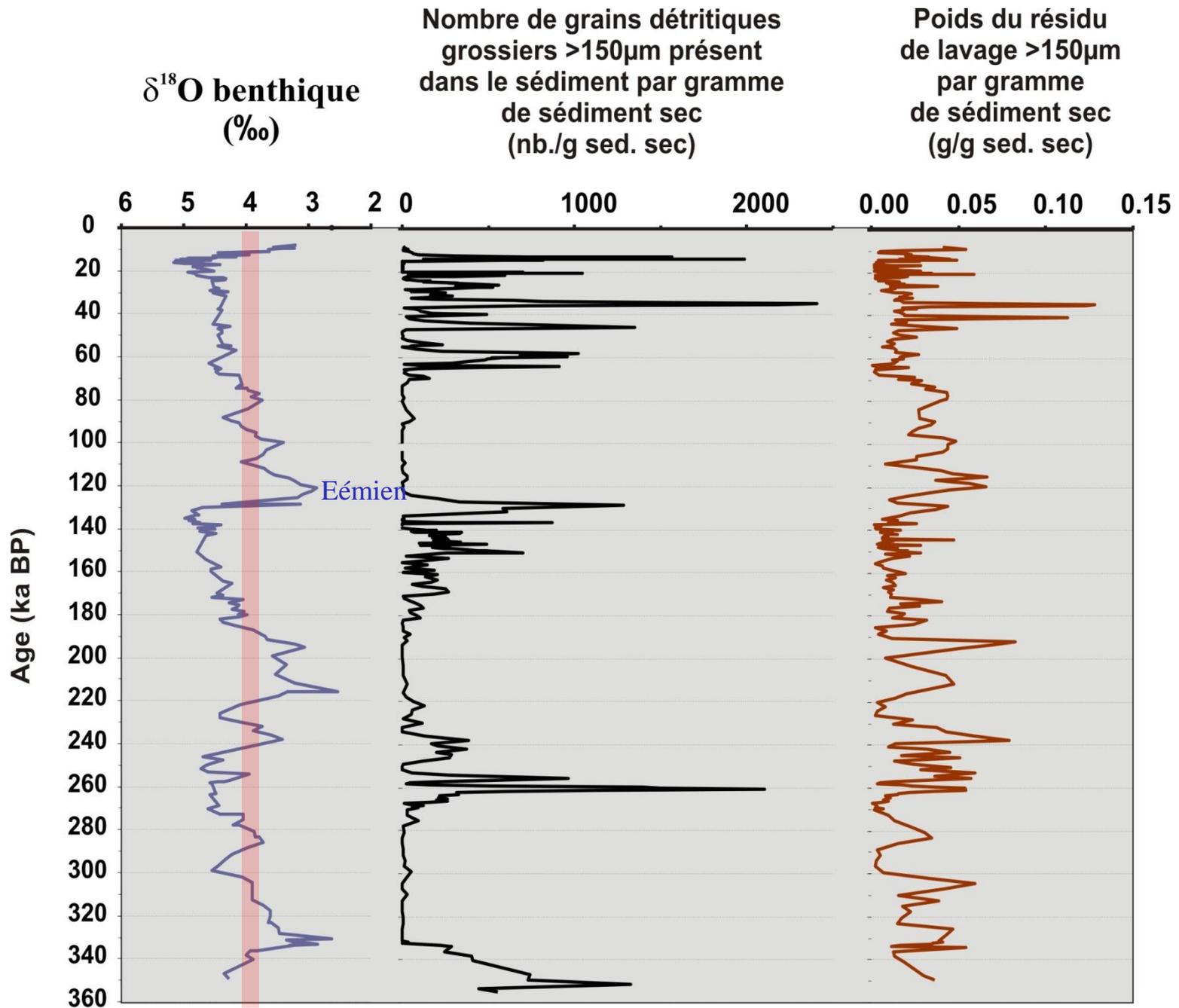
Fig. 4. Total relative sea-level curves at four sites based on the first iteration solution in which all melting ceased at 6000 yr B.P. and with no ice loading cycle before 18,000 yr B.P.. Also shown is the corresponding eustatic sea-level function (esl). Only the northern hemisphere ice sheets are considered.

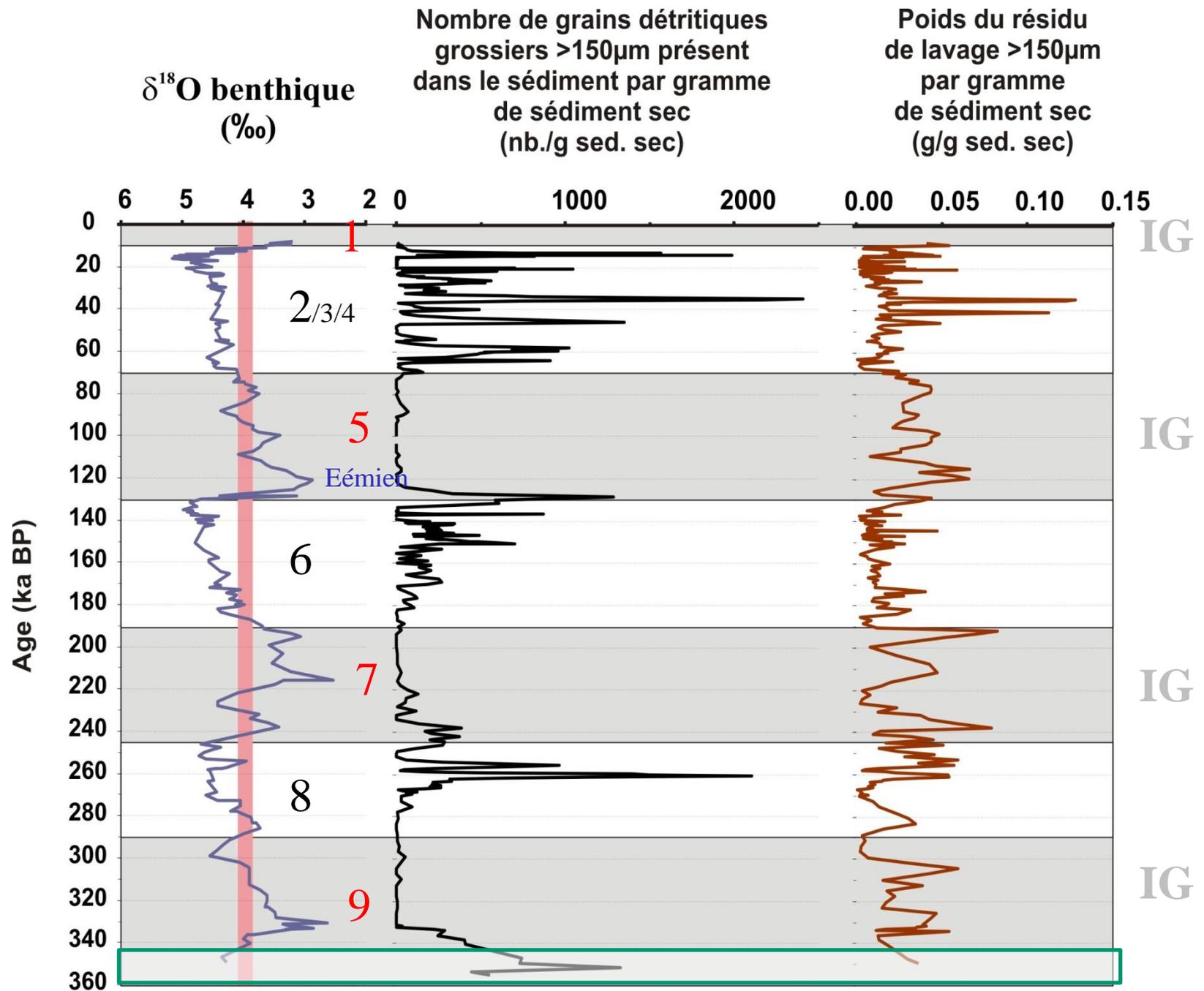
Question (4) ?

- a. Identifier à partir du $\delta^{18}\text{O}$ les périodes glaciaires et les périodes interglaciaires.
- b. Que notez-vous pour ces périodes respectives en termes de flux de grains grossiers à l'océan. Pourquoi les deux méthodes divergent pour leur quantification. Qu'est-il rigoureux de considérer pour appréhender au mieux ces flux ?
- c. Quels processus peuvent être à l'origine de ces apports détritiques grossiers ?

BUT : mieux comprendre le rôle des glaciers sur la sédimentation



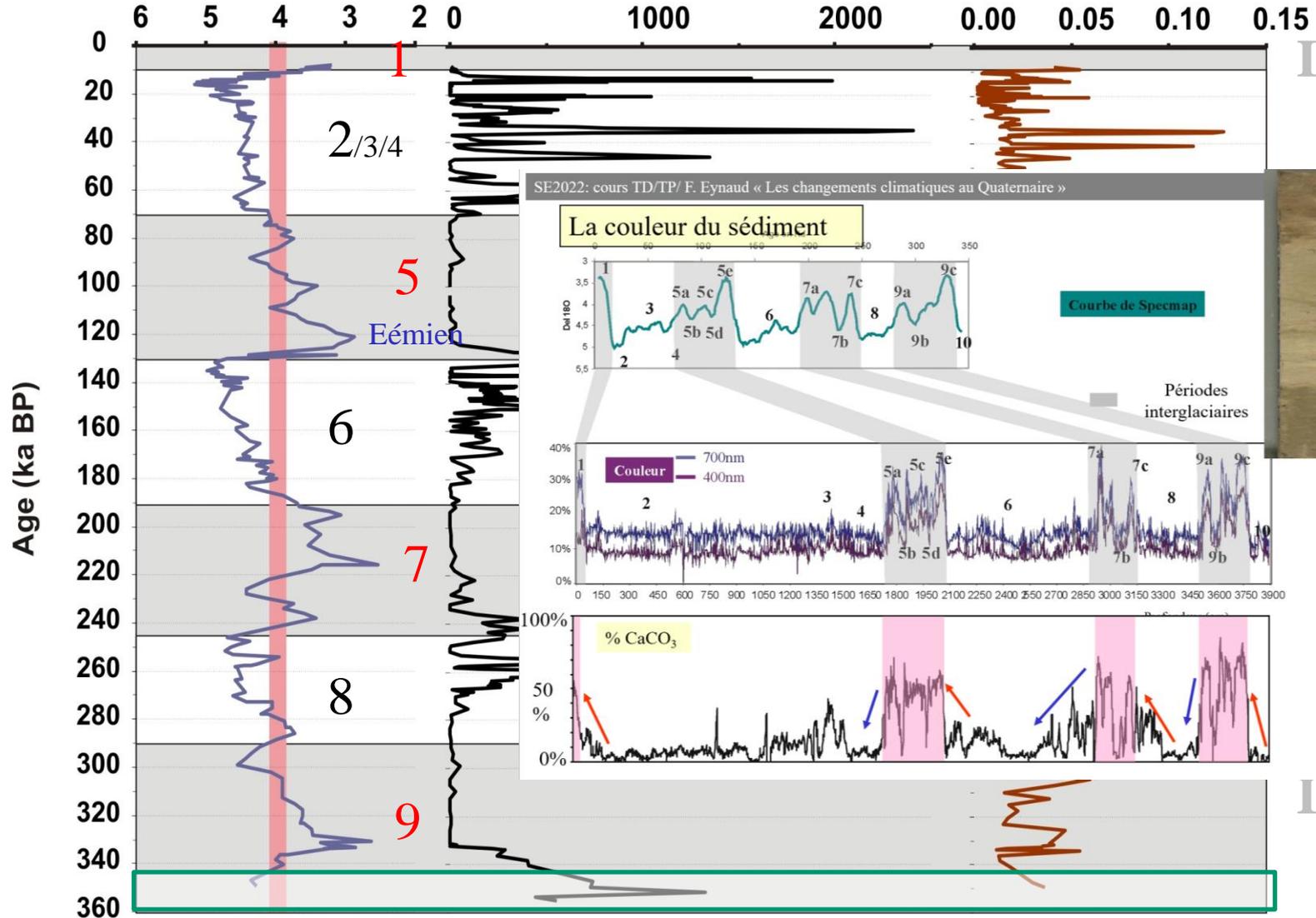


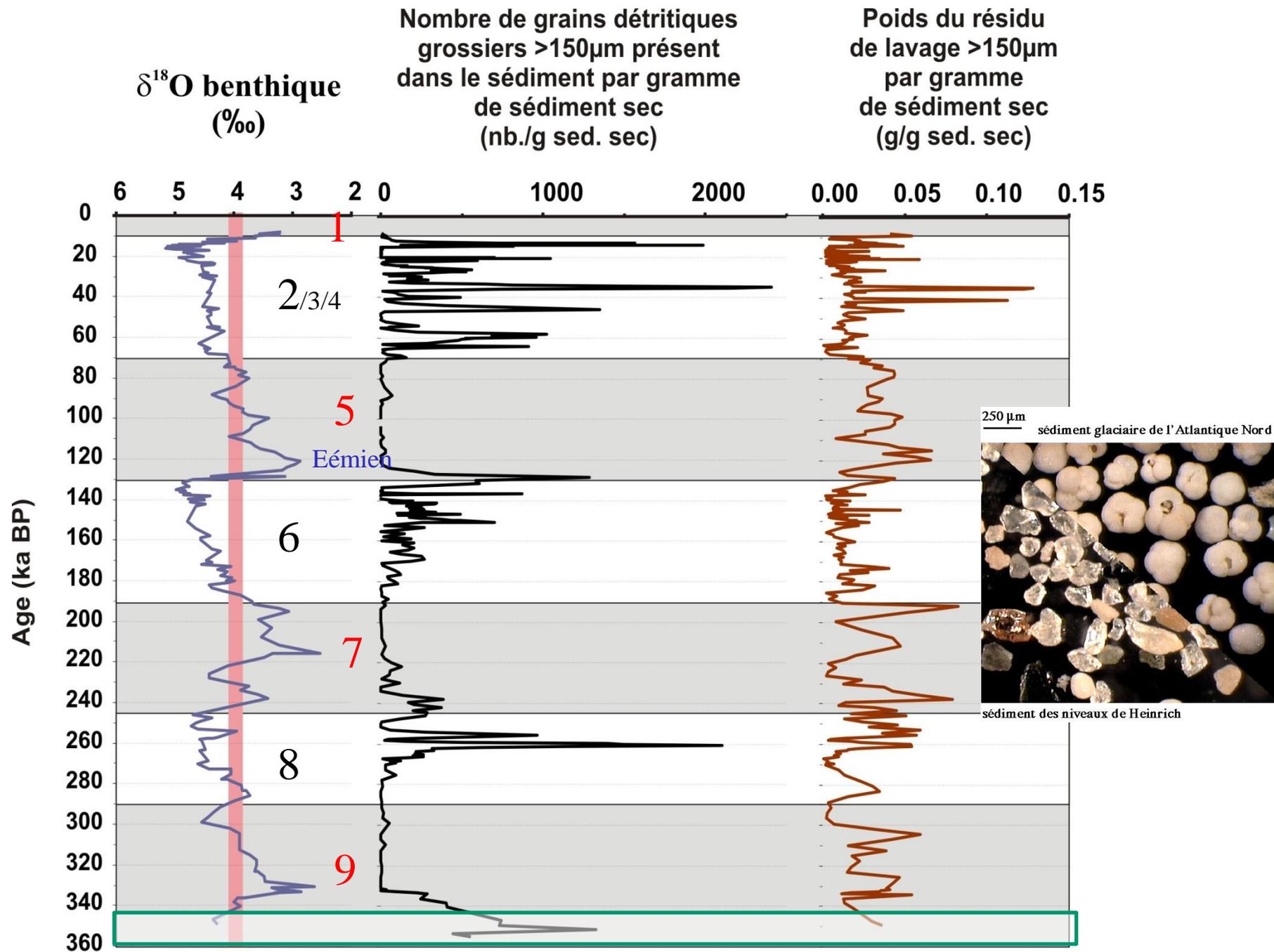


$\delta^{18}\text{O}$ benthique
(‰)

Nombre de grains détritiques
gros >150 μm présent
dans le sédiment par gramme
de sédiment sec
(nb./g sed. sec)

Poids du résidu
de lavage >150 μm
par gramme
de sédiment sec
(g/g sed. sec)





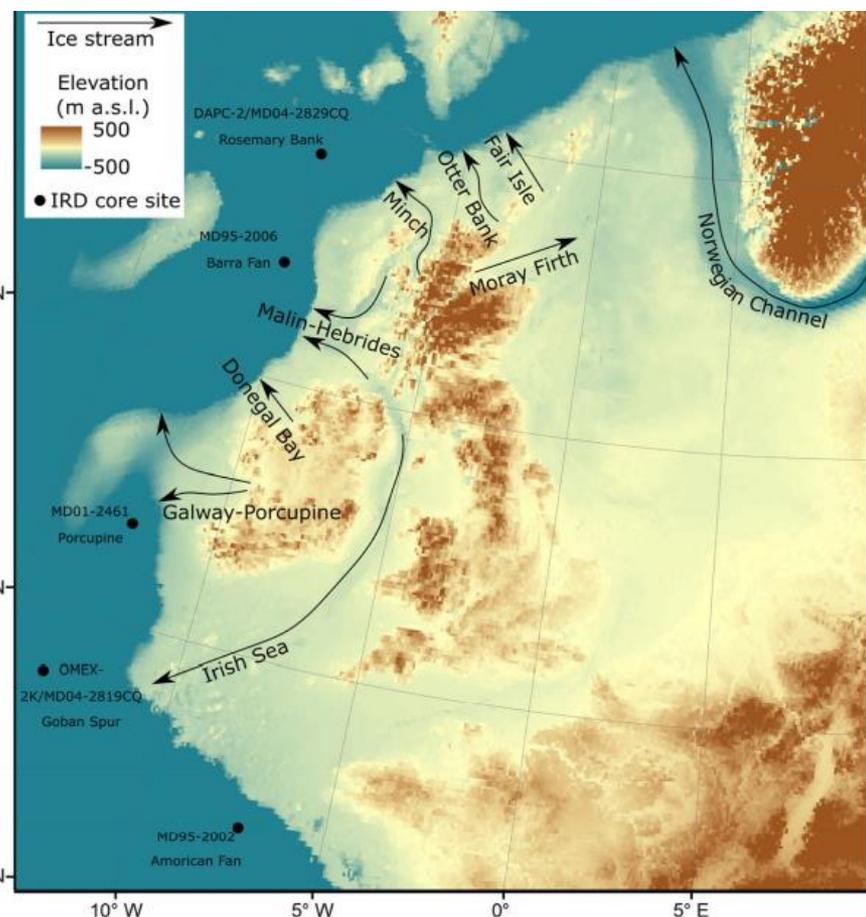
Exploring the extent to which fluctuations in ice-rafted debris reflect mass changes in the source ice sheet: a model–observation comparison using the last British–Irish Ice Sheet

DAVID J. WILTON,¹ GRANT R. BIGG,^{2*}  JAMES D. SCOURSE,¹  JEREMY C. ELY²  and CHRIS D. CLARK² 

¹Department of Geography, University of Exeter, Penryn, Cornwall, UK

²Department of Geography, University of Sheffield, Sheffield, UK

Received 24 June 2020; Revised 27 November 2020; Accepted 11 January 2021

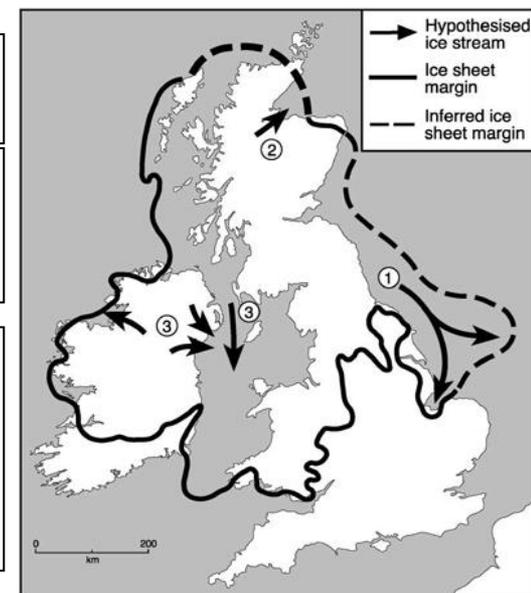


Stokes et al , 2001

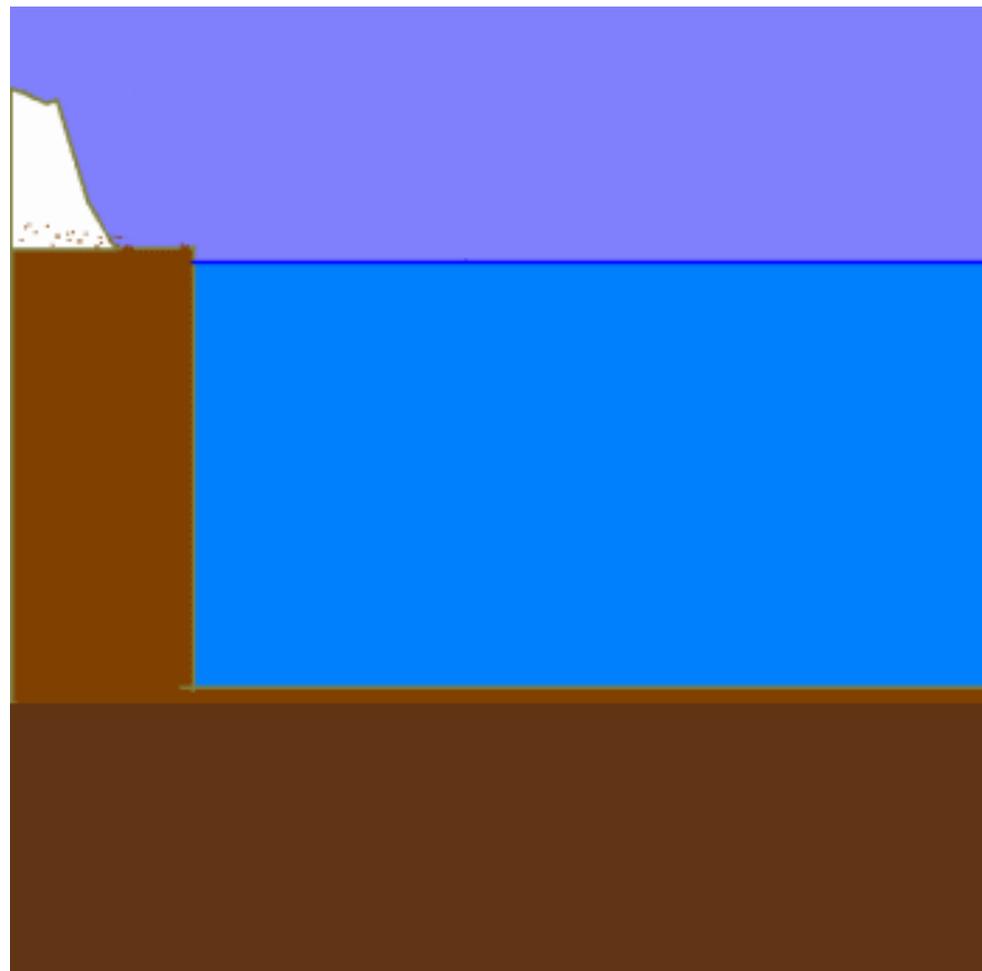
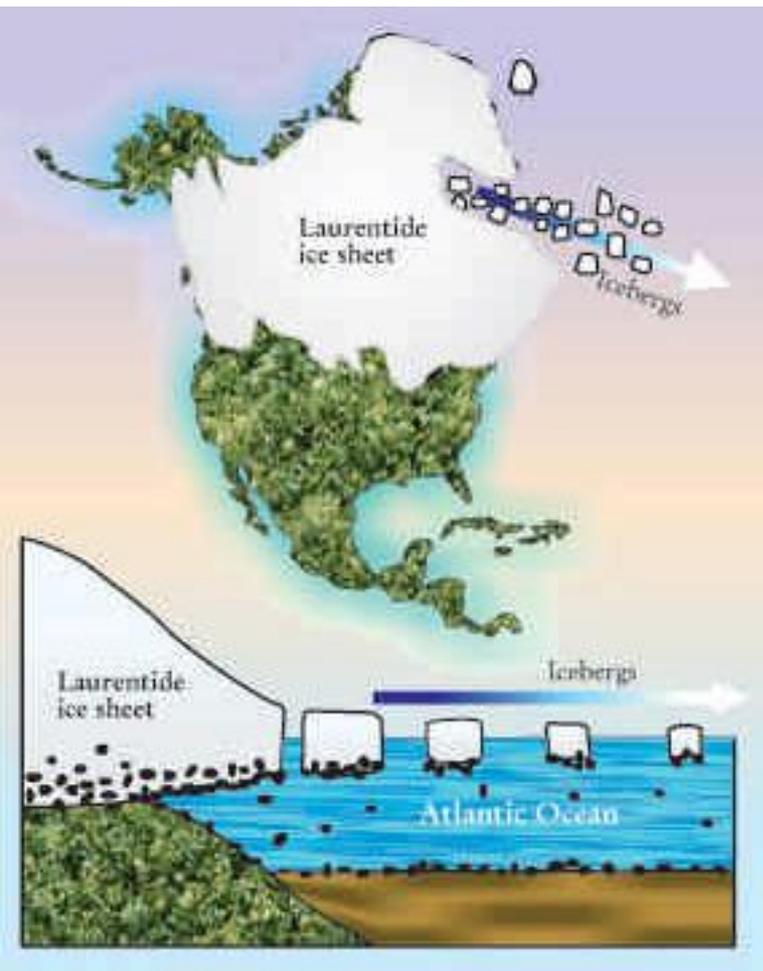
1 : « North Sea
Ice Stream »

2 : « Moray Firth
Ice Stream »
vers 13,000yr BP

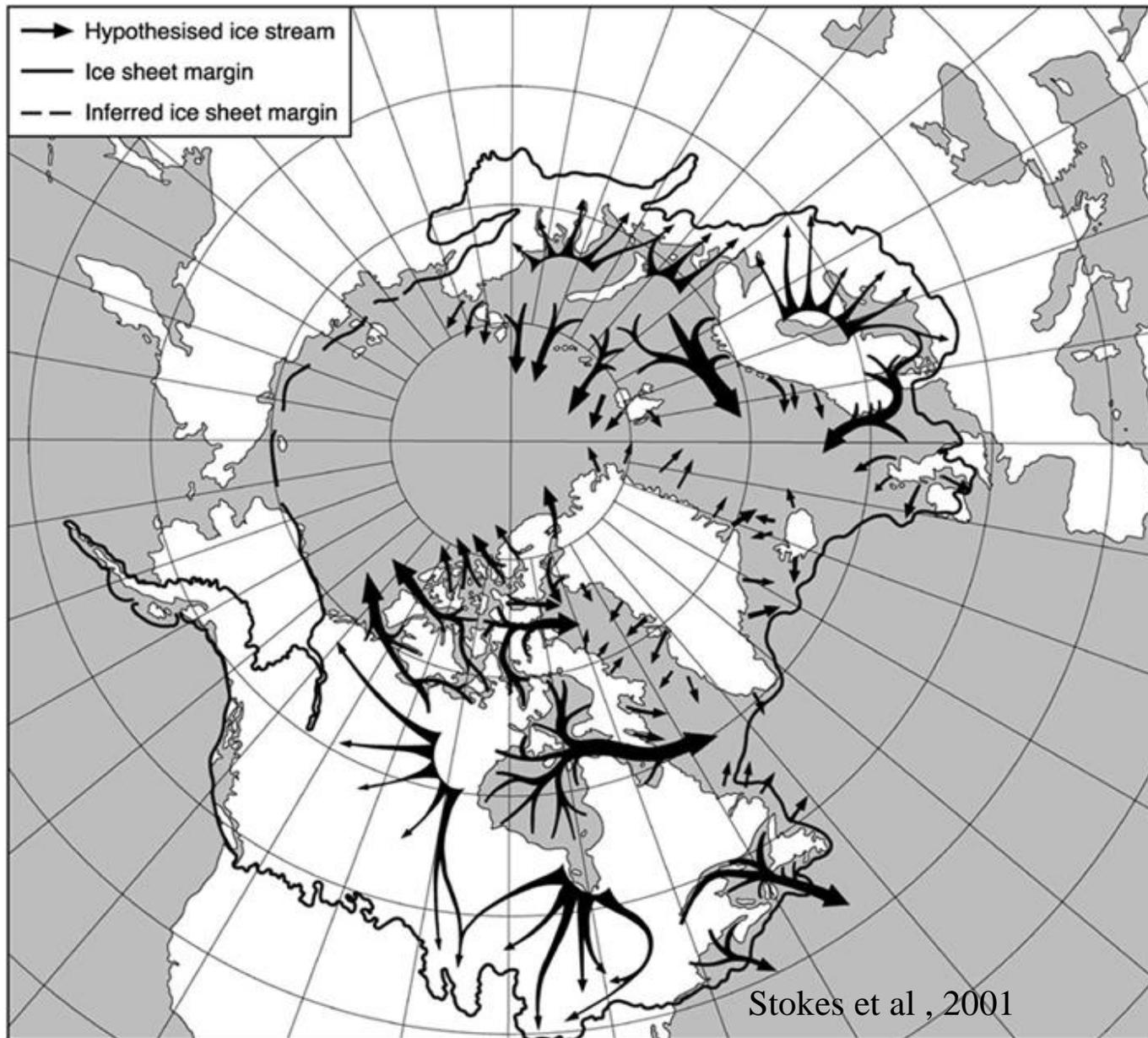
3 : « Irish Sea
Basin Ice
Stream » : entre
15,000 et
14,000yr BP



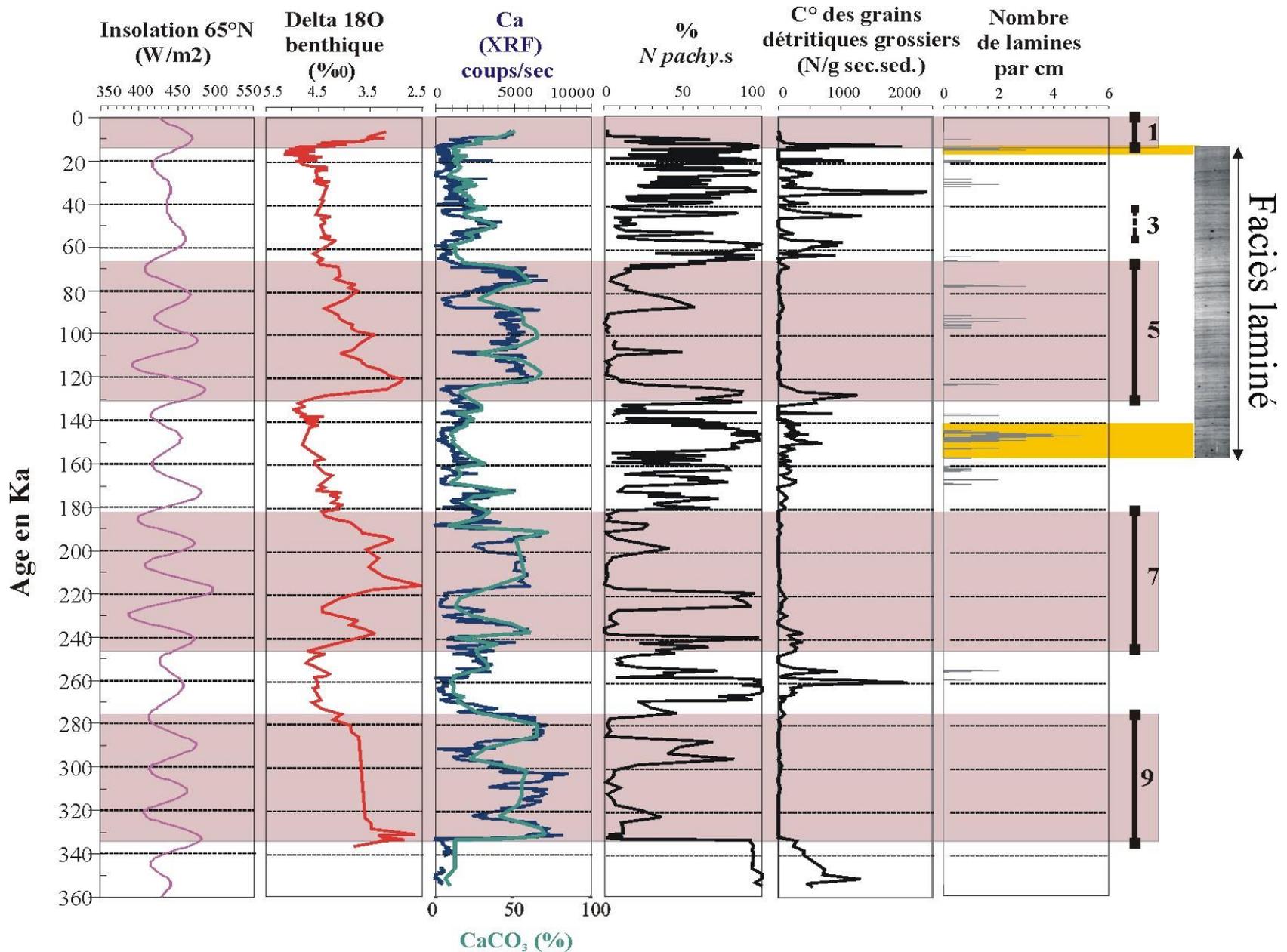
**Pour aller plus loin
(si le temps)**



Les couloirs distributaires ?



Analyses multiproxies sur la carotte MD03-2692



A 1.2 Ma record of glaciation and fluvial discharge from the West European Atlantic margin

S. Toucanne^{a,b,*}, S. Zaragosi^a, J.F. Bourillet^b, P.L. Gibbard^c, F. Eynaud^a, J. Giraudeau^a, J.L. Turon^a, M. Cremer^a, E. Cortijo^d, P. Martinez^a, L. Rossignol^a

⇒ Changements dans la géométrie des calottes? Qui correspond aussi à dérive MPT
 ⇒ Size Europe

