



Università
degli Studi
di Ferrara

DIVULGAZIONE E FRUIZIONE DEL PATRIMONIO ANTROPOLOGICO

Lezione 2. Cronologia, variabilità climatica ed ecologica del Pliocene e del Quaternario

Marco Peresani

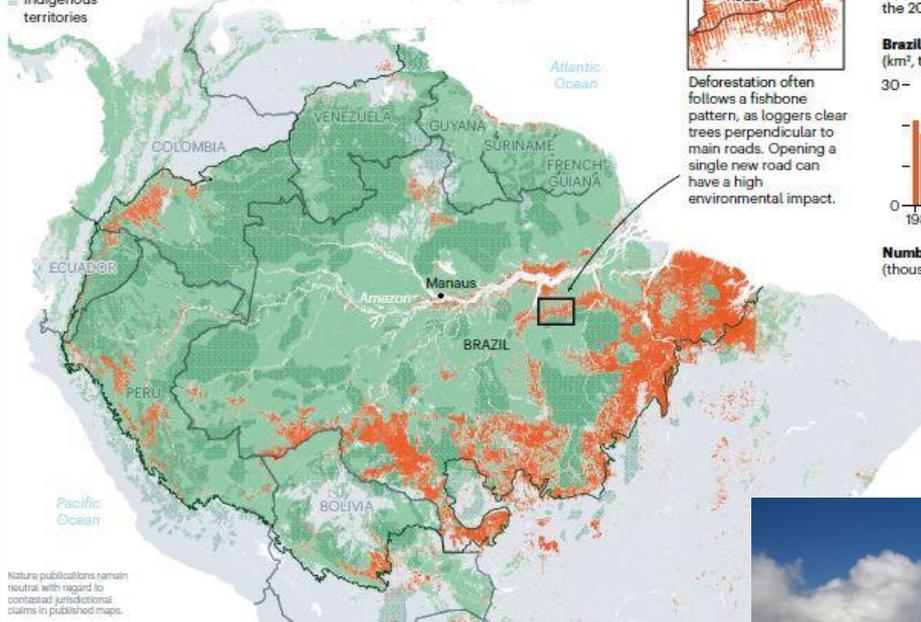
Dipartimento di Studi Umanistici

Sezione di Scienze Preistoriche e Antropologiche

FOREST LOSS

- Map key**
- Deforestation (since 1988)
 - Amazon rainforest biome
 - Forest cover
 - Indigenous territories

The Amazon rainforest covers some 5 million square kilometres of land across nine countries; more than half is in Brazil, where more than 19% of the forest has been cleared. Brazil reduced deforestation after 2004, but amid political turmoil tree clearing is rising again.



Nature publications remain neutral with regard to contested jurisdictional claims in published maps.

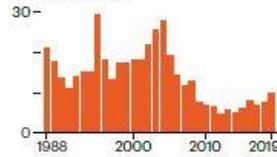


Deforestation often follows a fishbone pattern, as loggers clear trees perpendicular to main roads. Opening a single new road can have a high environmental impact.

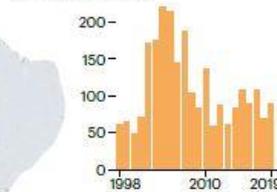
Deforestation and fires

Fires are often lit to clear deforested land. Data from the Brazilian Amazon show more fires in years of severe deforestation (such as 2004) or drought (2005, 2010 and 2015). Fires last August were the highest for any August since the 2010 drought.

Brazil deforested area (km², thousands)



Number of fires (thousands per year)



Ghiacciaio Monte Vioz – Ortles cevedale, luglio 2019

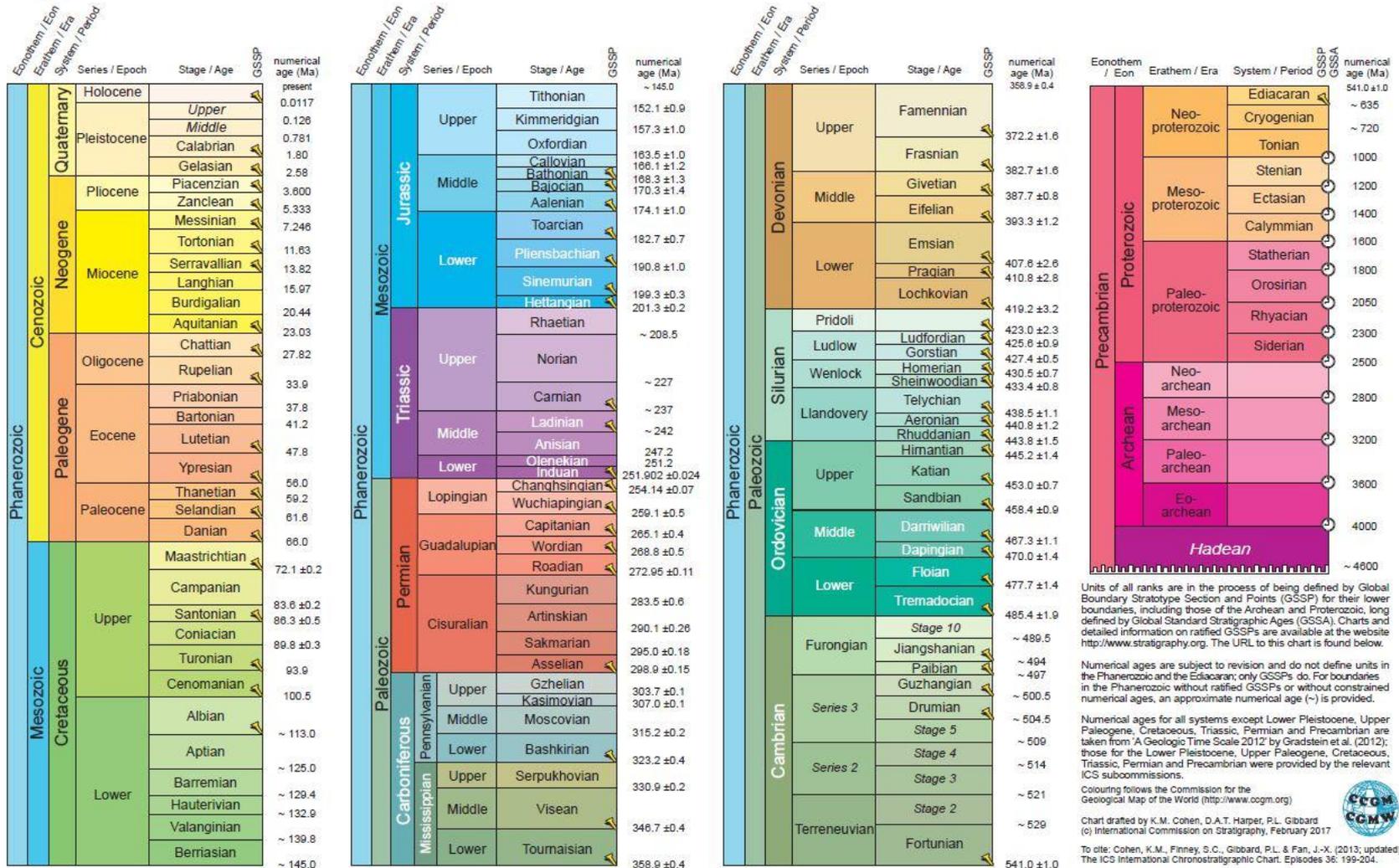


INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

www.stratigraphy.org

International Commission on Stratigraphy

v 2017/02



Units of all ranks are in the process of being defined by Global Boundary Stratotype Section and Points (GSSP) for their lower boundaries, including those of the Archean and Proterozoic, long defined by Global Standard Stratigraphic Ages (GSSA). Charts and detailed information on ratified GSSPs are available at the website <http://www.stratigraphy.org>. The URL to this chart is found below.

Numerical ages are subject to revision and do not define units in the Phanerozoic and the Ediacaran; only GSSPs do. For boundaries in the Phanerozoic without ratified GSSPs or without constrained numerical ages, an approximate numerical age (~) is provided.

Numerical ages for all systems except Lower Pleistocene, Upper Paleogene, Cretaceous, Triassic, Permian and Precambrian are taken from 'A Geologic Time Scale 2012' by Gradstein et al. (2012); those for the Lower Pleistocene, Upper Paleogene, Cretaceous, Triassic, Permian and Precambrian were provided by the relevant ICS subcommissions.

Colouring follows the Commission for the Geological Map of the World (<http://www.ccgim.org>)
 Chart drafted by K.M. Cohen, D.A.T. Harper, P.L. Gibbard
 (c) International Commission on Stratigraphy, February 2017

To cite: Cohen, K.M., Finney, S.C., Gibbard, P.L. & Fan, J.-X. (2013), updated! The ICS International Chronostratigraphic Chart. Episodes 36: 199-204.
 URL: <http://www.stratigraphy.org/ICSchart/ChronostratChart2017-02.pdf>



L'Olocene

JQS Journal of Quaternary Science 

Subdividing the Holocene Series/Epoch: formalization of stages/ages and subseries/subepochs, and designation of GSSPs and auxiliary stratotypes

MIKE WALKER,^{1,2*} MARTIN J. HEAD,³ JOHN LOWE,⁴ MAX BERKELHAMMER,⁵ SVANTE BJÖRCK,⁶ HAI CHENG,^{7,8} LES C. CWCYNAR,⁹ DAVID FISHER,¹⁰ VASILEIOS GKINIS,¹¹ ANTONY LONG,¹² REWI NEWNHAM,¹³ SUNE OLANDER RASMUSSEN¹¹ and HARVEY WEISS¹⁴

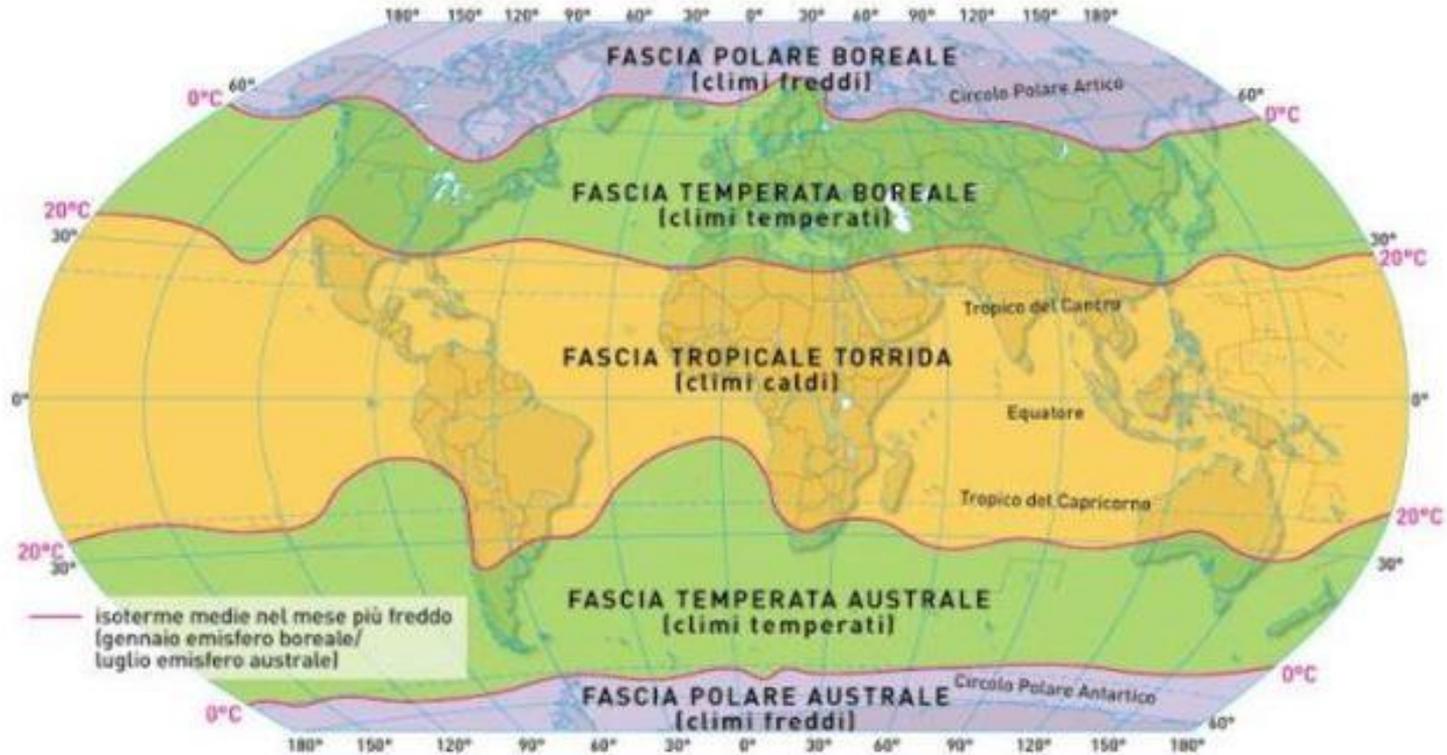
Eon	Era	Period	Epoch	Subepoch	Age	
Phanerozoic (pars)	Cenozoic (pars)	Quaternary (pars)	Holocene	Late	Meghalayan	present
				Middle	Northgrippian	4250 a b2k
				Early	Greenlandian	8236 a b2k
						11,700 a b2k

Clima

Per descrivere il clima di una regione, si ricorre ai suoi elementi, cioè la **temperatura**, la **pressione**, i **venti**, l'**umidità**, le **precipitazioni** e la **nuvolosità**.

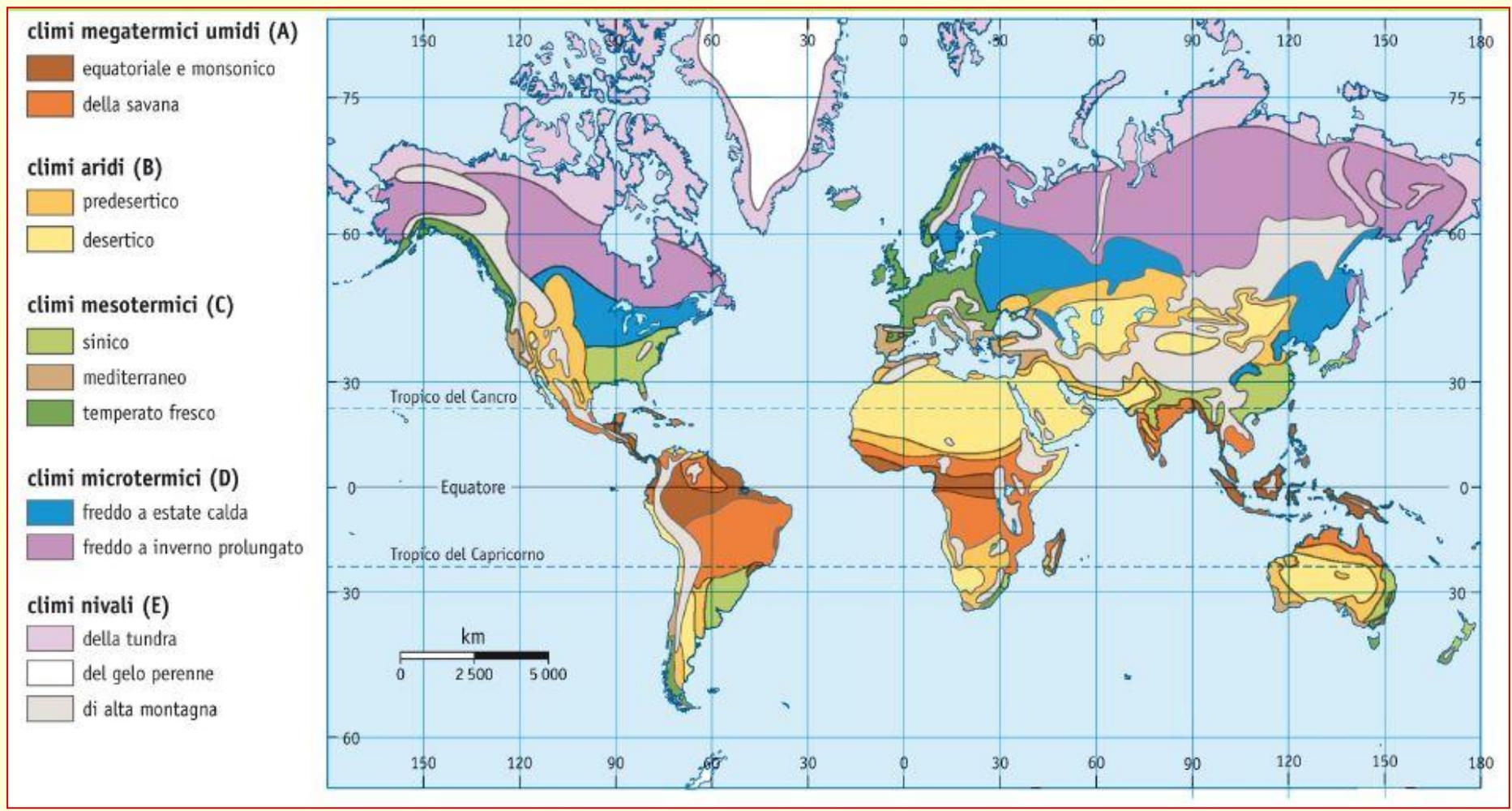
Questi vengono rilevati dalla rete di stazioni meteorologiche, estesa su tutta la superficie terrestre e attraverso i satelliti meteorologici, messi in orbita intorno alla Terra.

Fasce climatico-latitudinali



Luoghi che si trovano alla **stessa latitudine** e alla **stessa altitudine** hanno un clima simile.

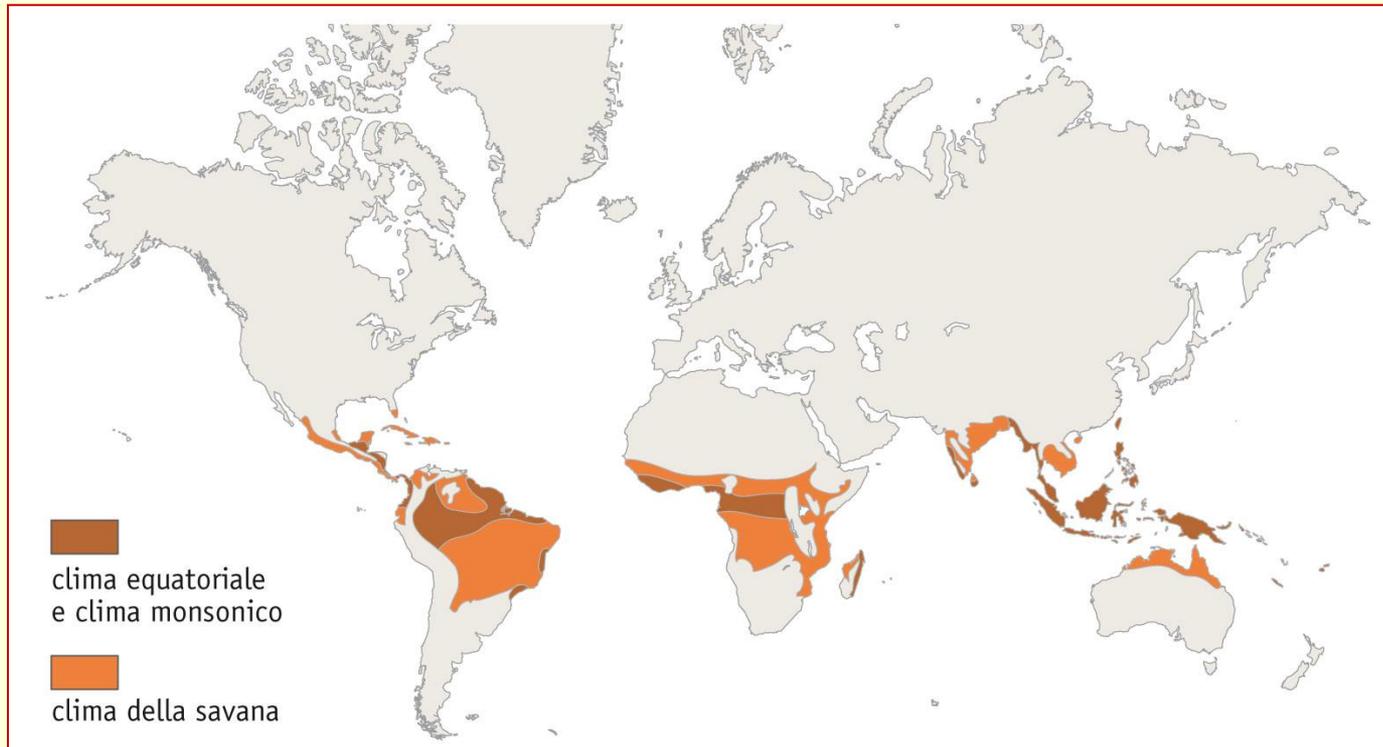
2.2. Variabilità climatica. Il clima



2.2. Variabilità climatica. Il clima

Climi megatermici umidi con una T media annua mai inferiore ai 15° e P medie annue intorno ai 2000-2500 mm. Le aree interessate da questi climi sono quelle intertropicali. In questo gruppo si distinguono tre tipi di climi (diversi per regime pluviometrico):

- a) Clima equatoriale (corrispondente al bioma della foresta equatoriale)
- b) Clima della savana (con il bioma omonimo)
- c) Clima monsonico (corrispondente alla giungla)



2.2. Variabilità climatica. Il clima

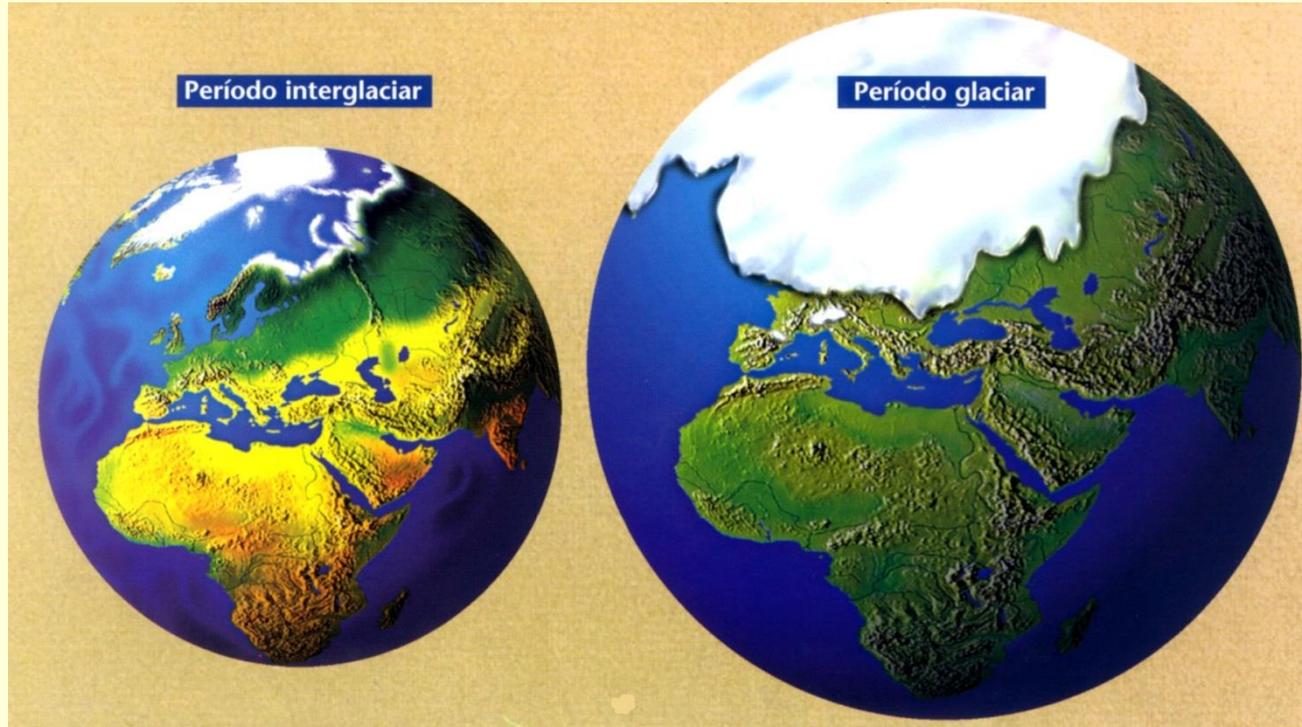
Climi nivali localizzati oltre i circoli polari.

La T media del mese più caldo è sempre inferiore ai 10° C e scende sotto lo zero nelle zone polari. Le precipitazioni sono scarse a causa delle pressioni permanenti. Si distinguono due principali tipi climatici:

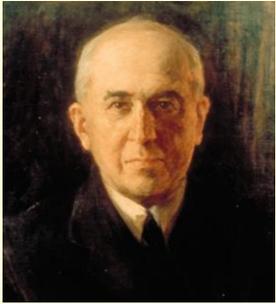
- Il clima della tundra, in prossimità del circolo polare artico (Islanda, Groenlandia, Canada polare).
- Il clima del gelo perenne che interessa le zone artiche costantemente coperte di ghiaccio e il Continente Antartico.



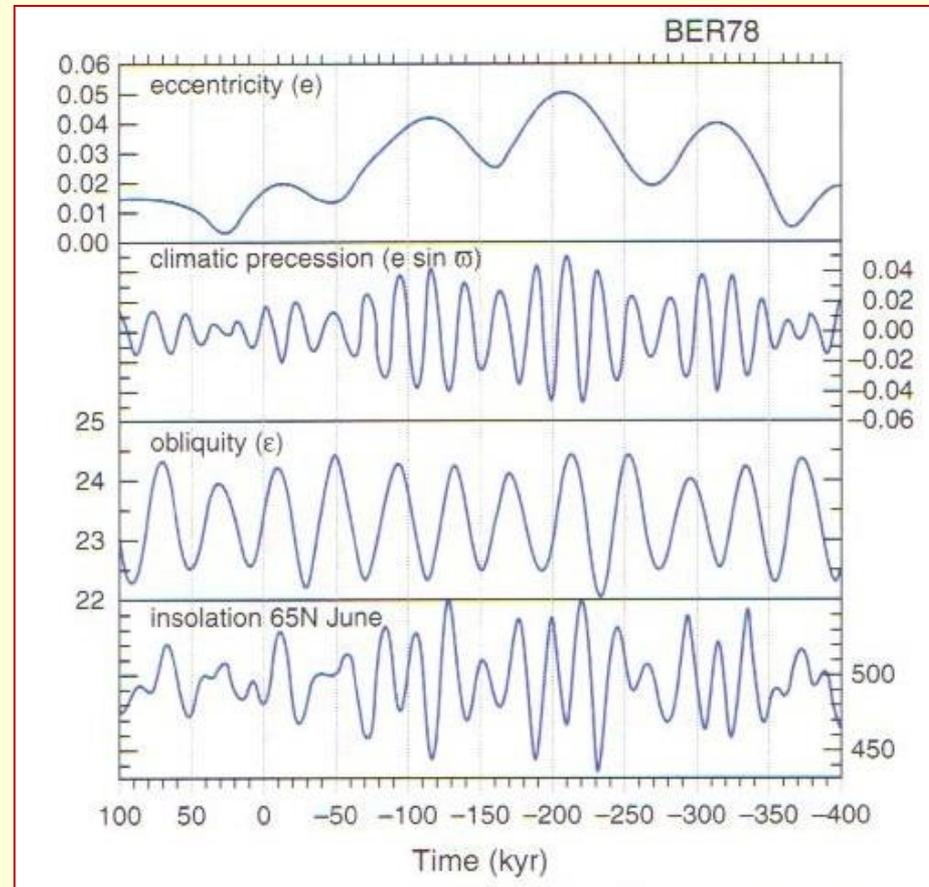
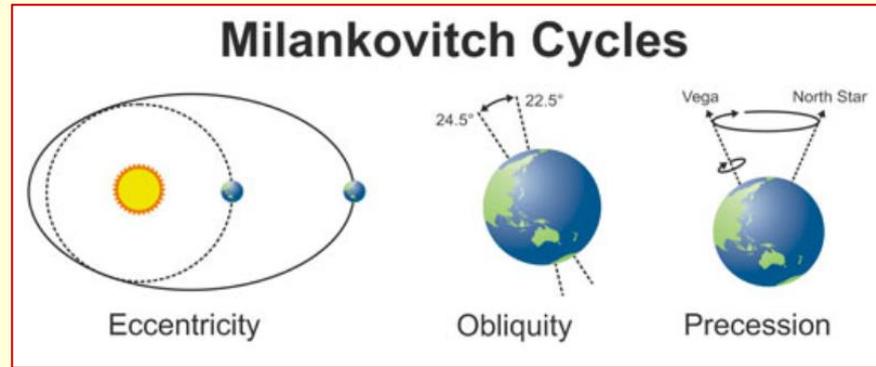
Cambiamento climatico e impatto geografico ed ecologico nel Pleistocene medio e superiore



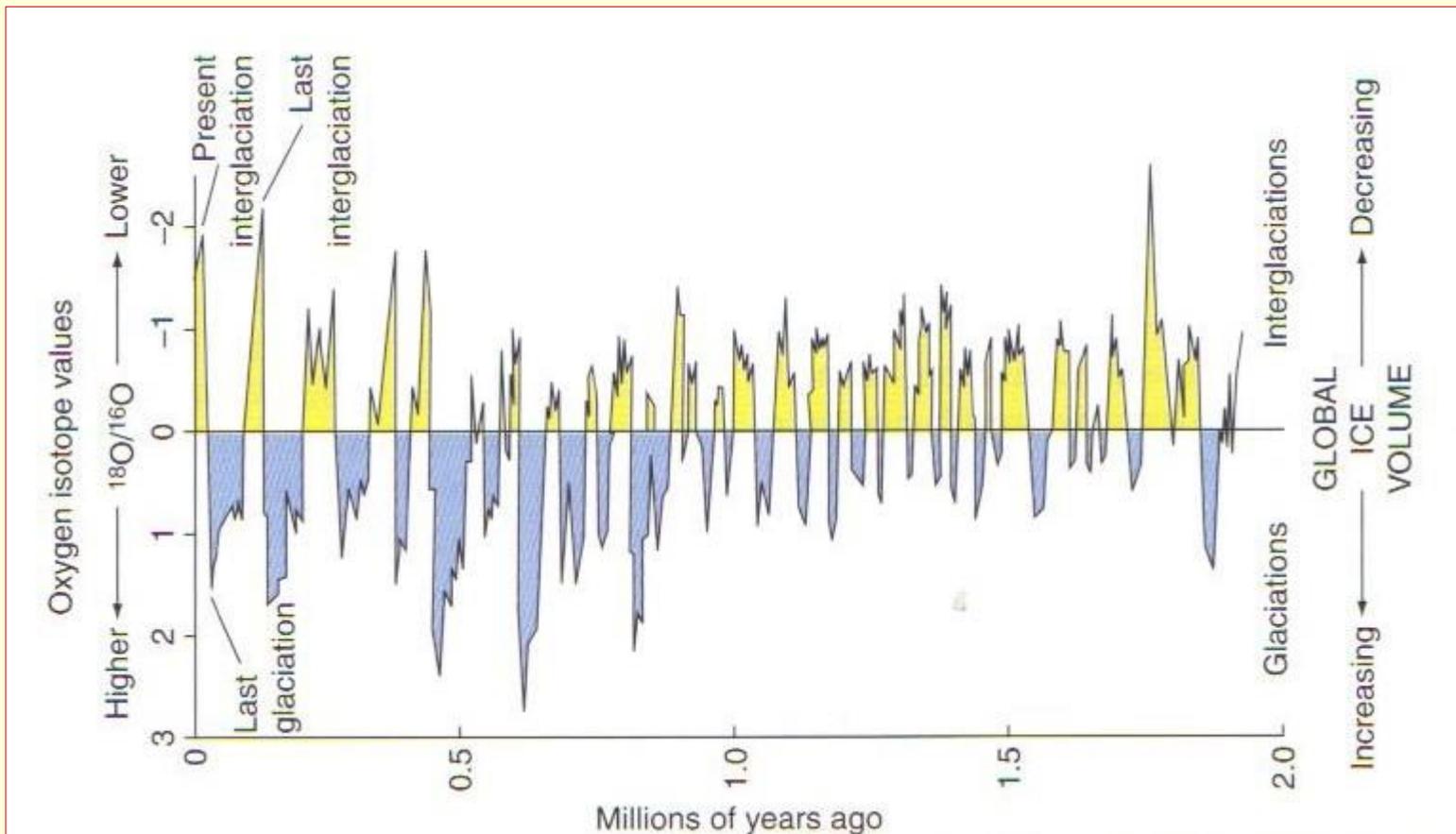
2.3. Variabilità climatica. Le glaciazioni



**Milutin Milankovitch
(1879- 1958)**



Variazioni nella magnitudine dei cicli glaciali dopo la rivoluzione climatica del Pleistocene medio (ca. 900ky BP)



2.4. Variabilità climatica. Curve isotopiche marine

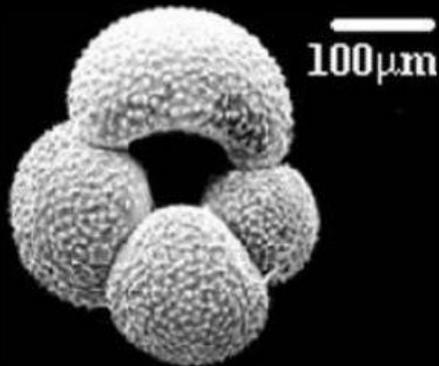


CURVE PALEOCLIMATICHE

Isotopi stabili dell'Ossigeno

I foraminiferi planctonici, oltre a numerose altre specie di organismi marini, costruiscono un guscio calcareo (CaCO_3) utilizzando l'ossigeno dell'acqua marina. La composizione isotopica dei gusci rispecchia così quella del mare in cui vivono questi animali.

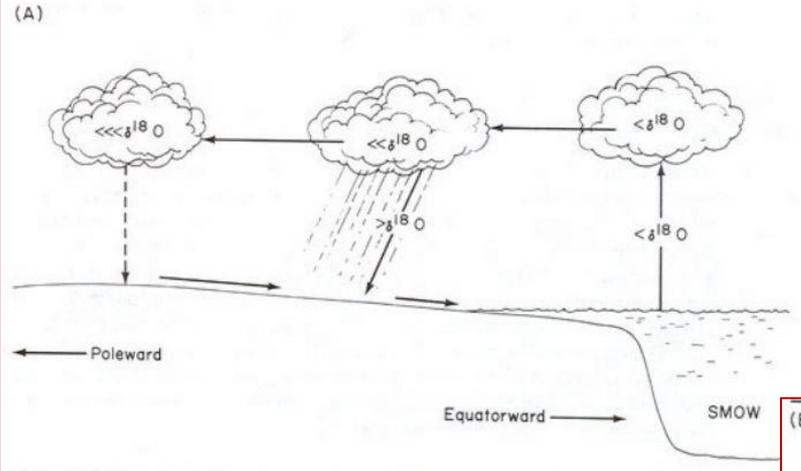
Alla loro morte i foraminiferi planctonici si depositano sul fondo degli oceani, formando sedimenti che si accumulano lentamente.



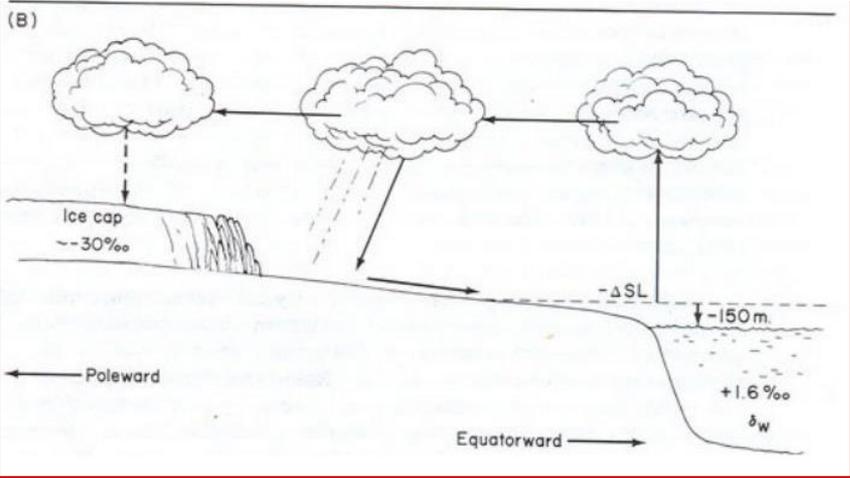
2.4. Variabilità climatica. Curve isotopiche marine

L'ossigeno ha tre isotopi stabili, con numero di massa 16, 17 e 18

ISOTOPO	MASSA	% in natura
16 O	15,99491	99,759
17 O	16,99913	0,037
18 O	17,99916	0,204



Frazionamento isotopico in periodo interglaciale

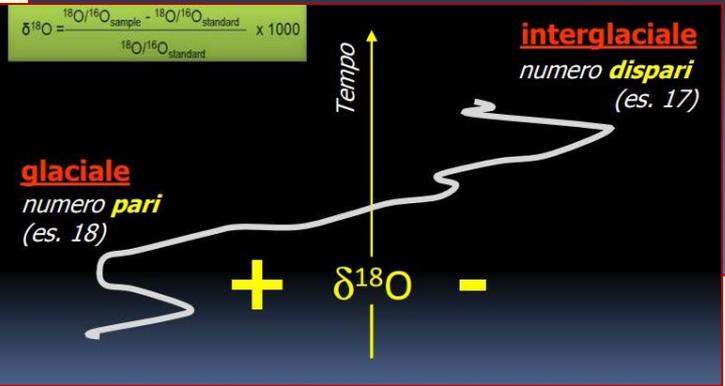
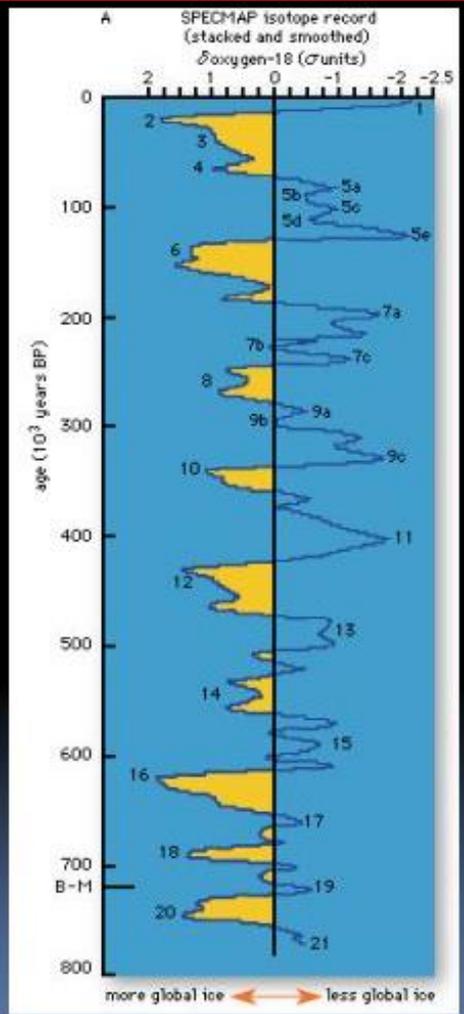


Frazionamento isotopico in periodo glaciale

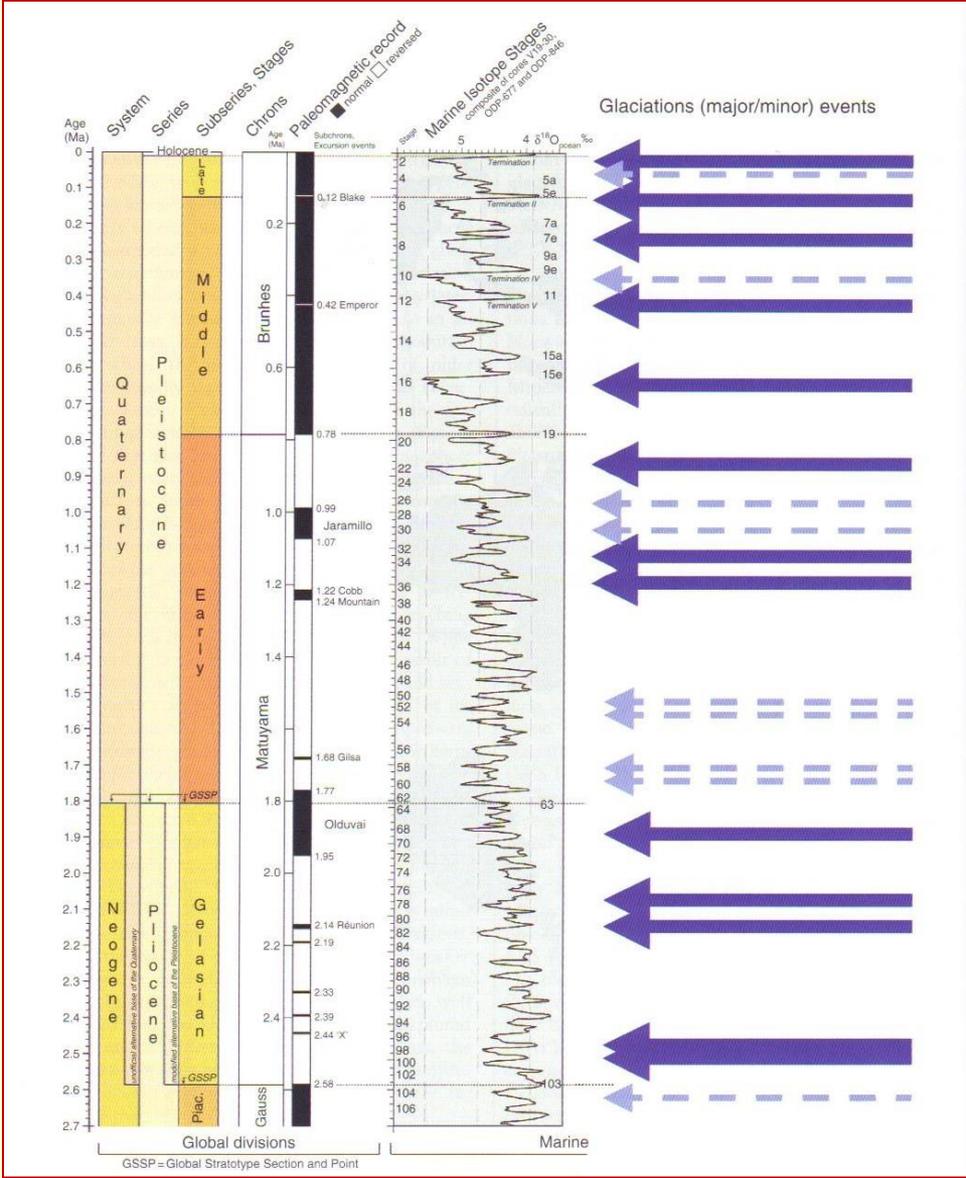
2.4. Variabilità climatica. Curve isotopiche marine

Si riconoscono **PICCHI GLACIALI** ed **INTERGLACIALI** (molto marcati negli ultimi 800 kyr) e oscillazioni minori. Questi picchi marcano intervalli denominati **MARINE ISOTOPE STAGE (MIS)**, che vengono numerati a ritroso partendo dall'interglaciale attuale (**MIS 1**).

Anche i picchi minori sono codificati numericamente e vengono chiamati **STADIALI** i periodi con temperature più fredde durante un interglaciale e **INTERSTADIALI** i periodi con temperature più calde all'interno di un glaciale.

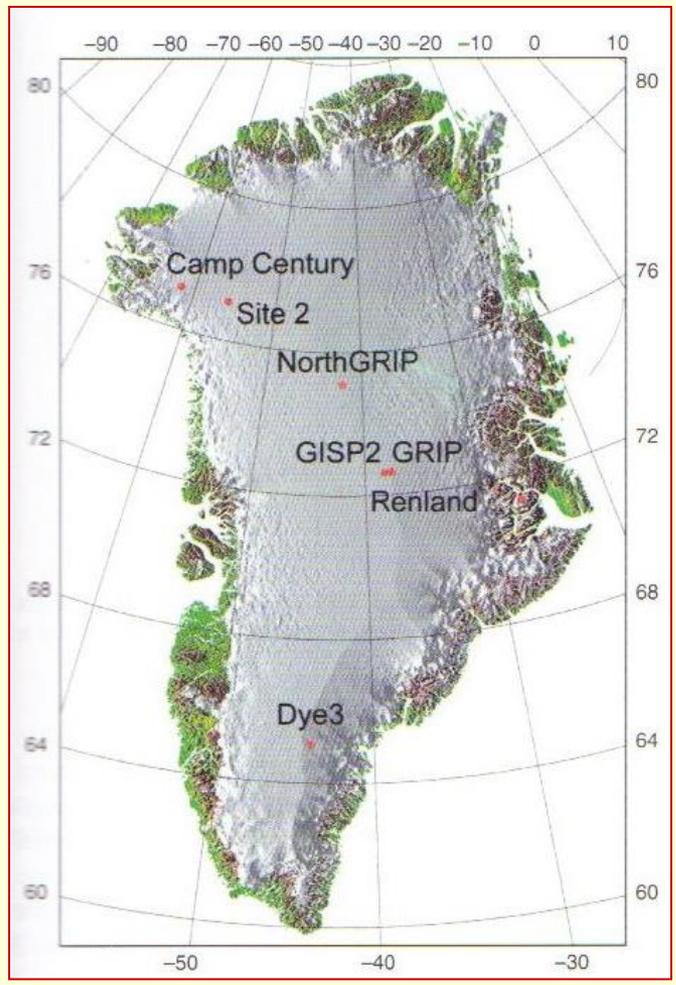
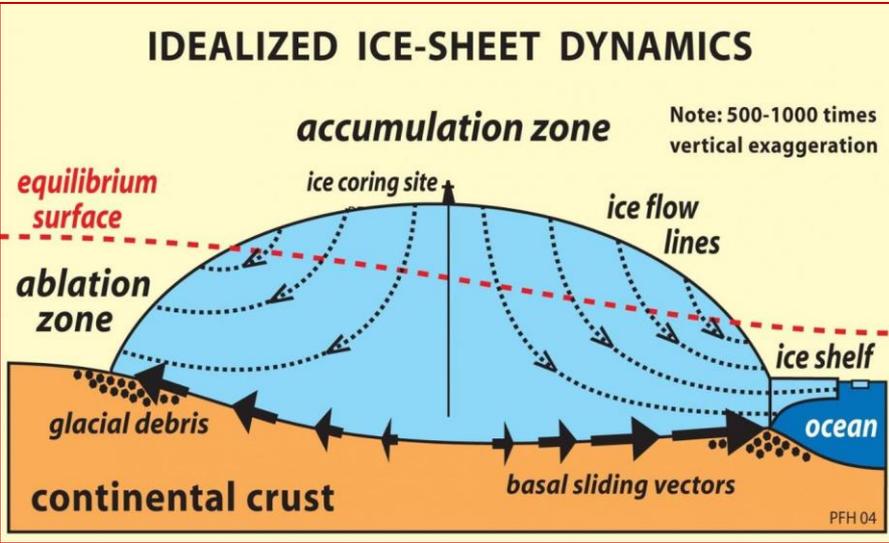


2.4. Variabilità climatica. Curve isotopiche marine

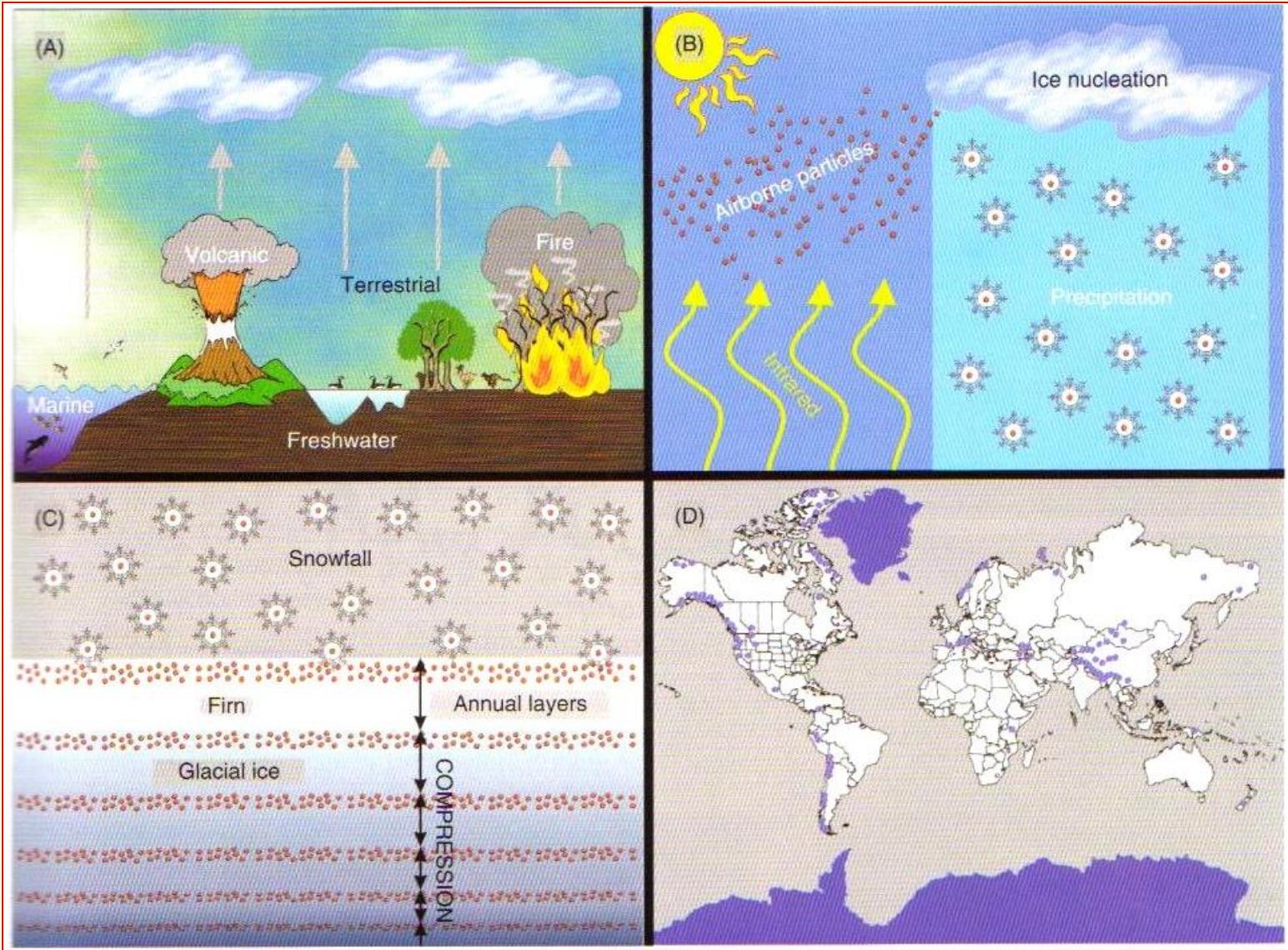


Principali eventi glaciali

Carote glaciali groenlandesi



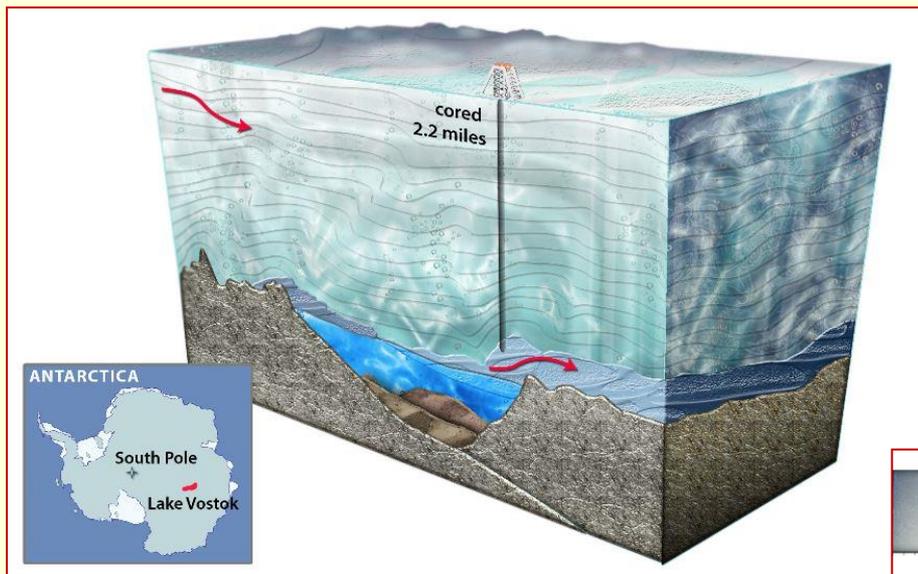
2.4. Variabilità climatica. Curve isotopiche glaciali



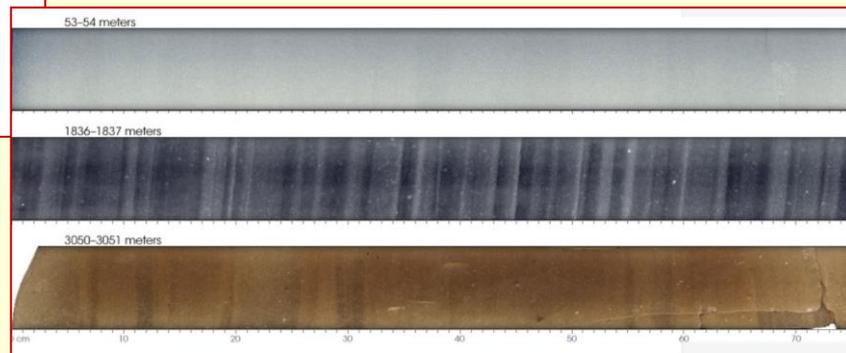
2.4. Variabilità climatica. Curve isotopiche glaciali



Vostok Ice Core

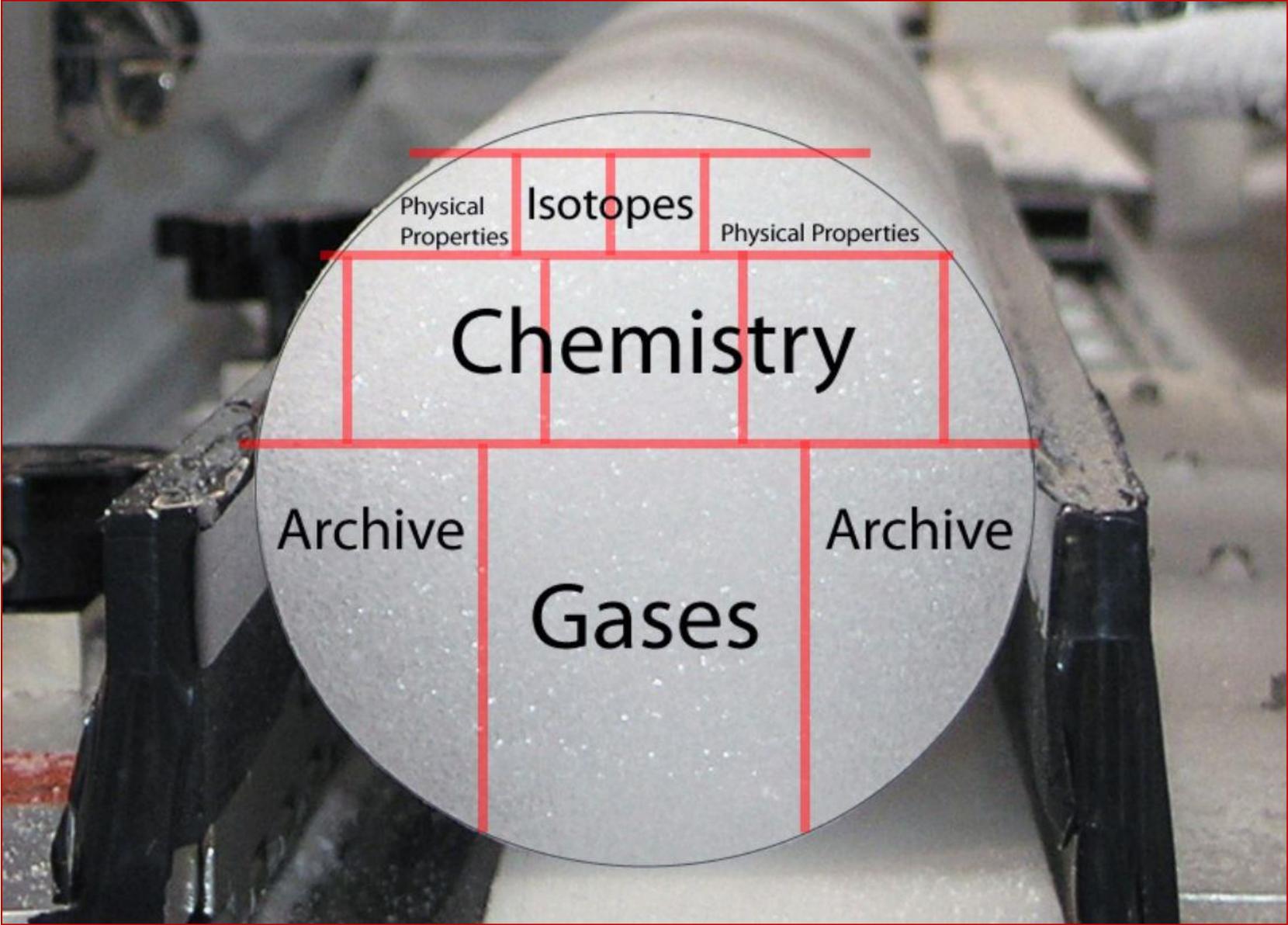


Vostok lake (1995)
Lunghezza=3.310 m.
Registra 422.766 anni di accumulo
di neve/ghiaccio.
Registra gli ultimi 4 cicli climatici
glaciale/interglaciale

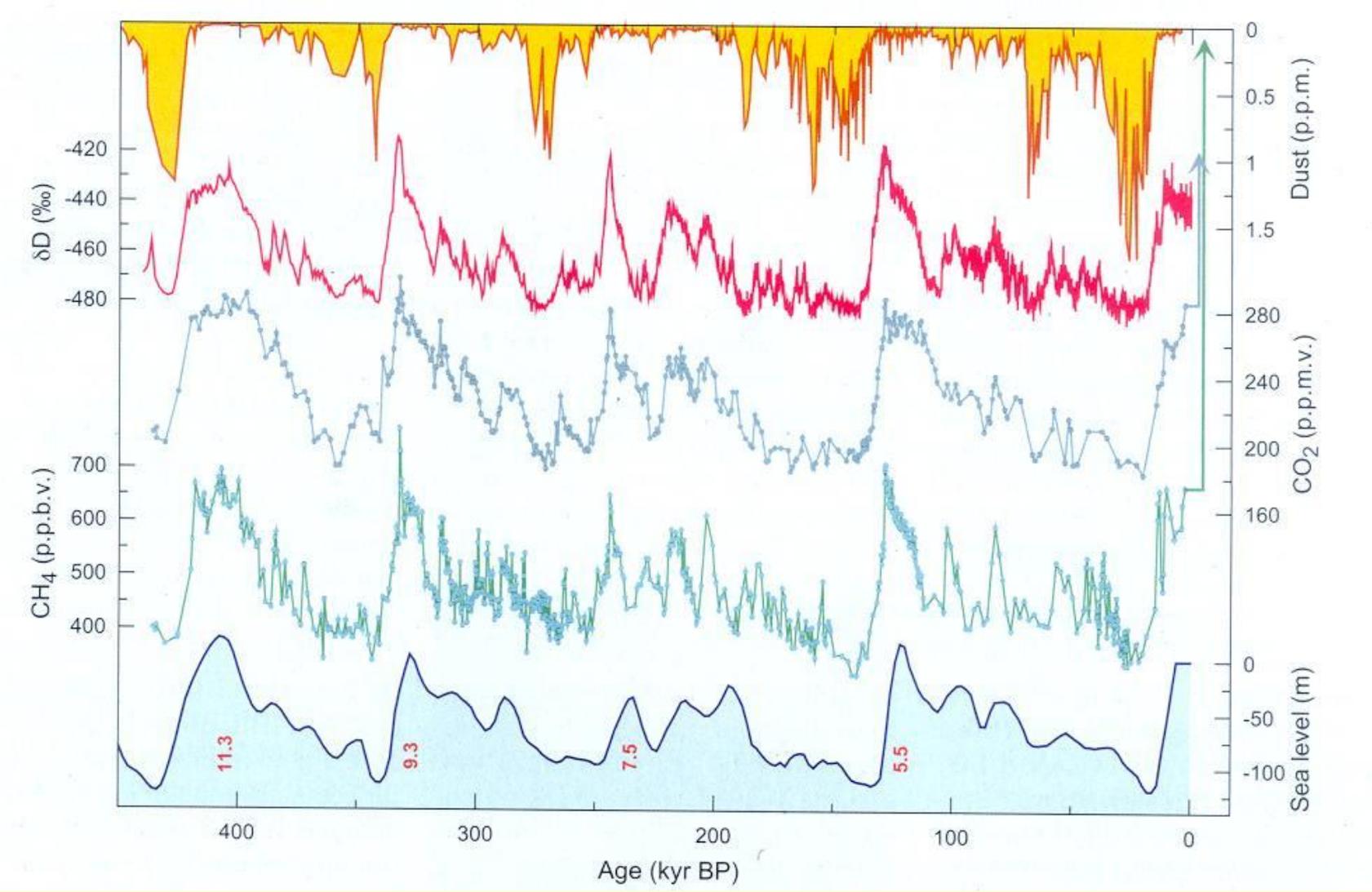


Stato di conservazione del ghiaccio e laminazioni

2.4. Variabilità climatica. Curve isotopiche glaciali

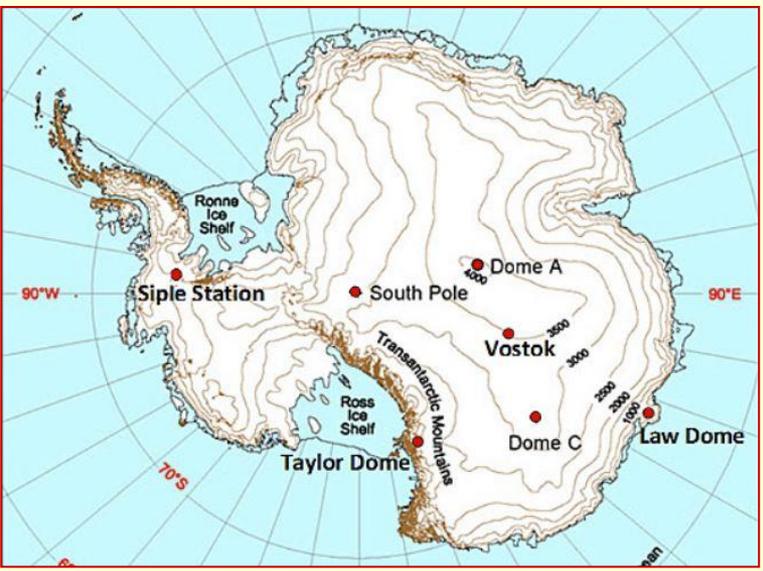
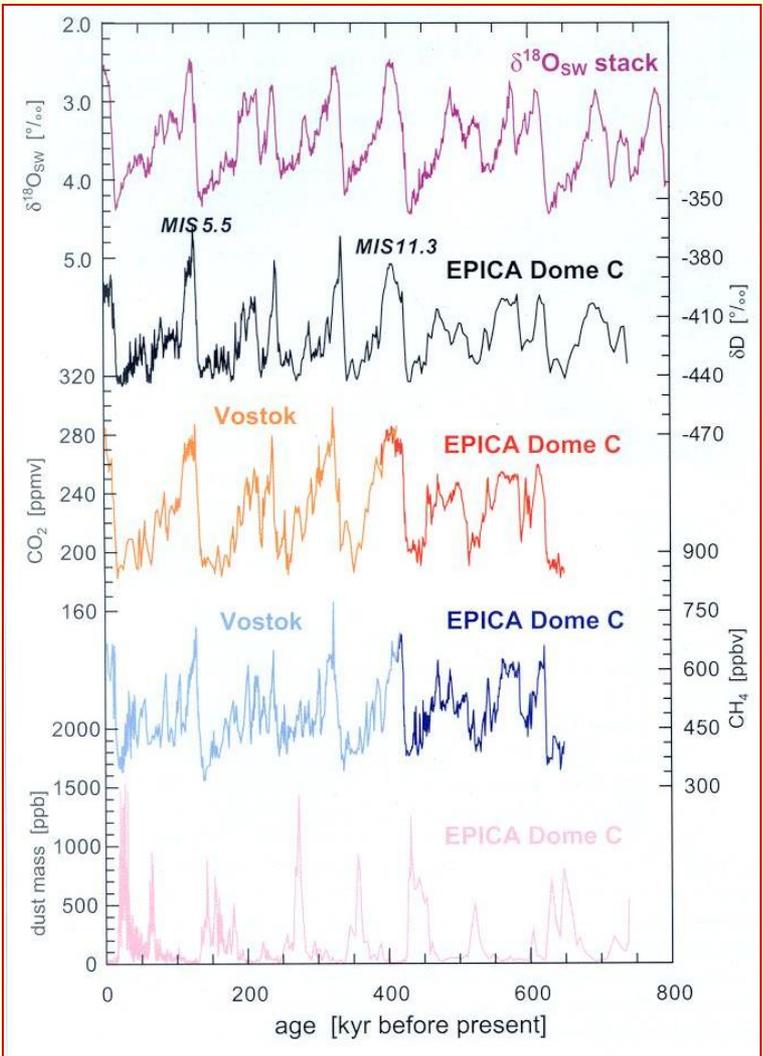


Vostok ice Core

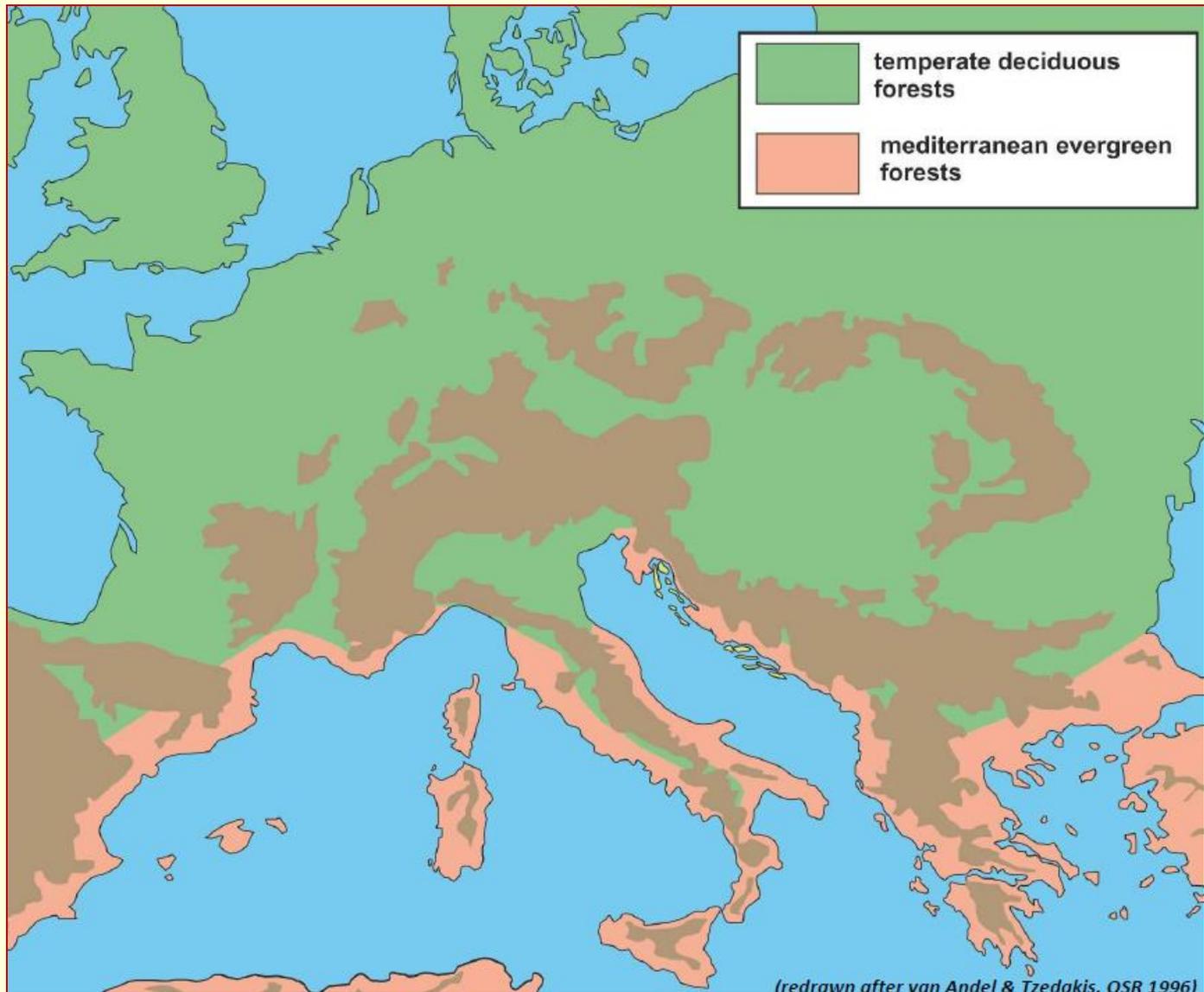


2.4. Variabilità climatica. Curve isotopiche glaciali

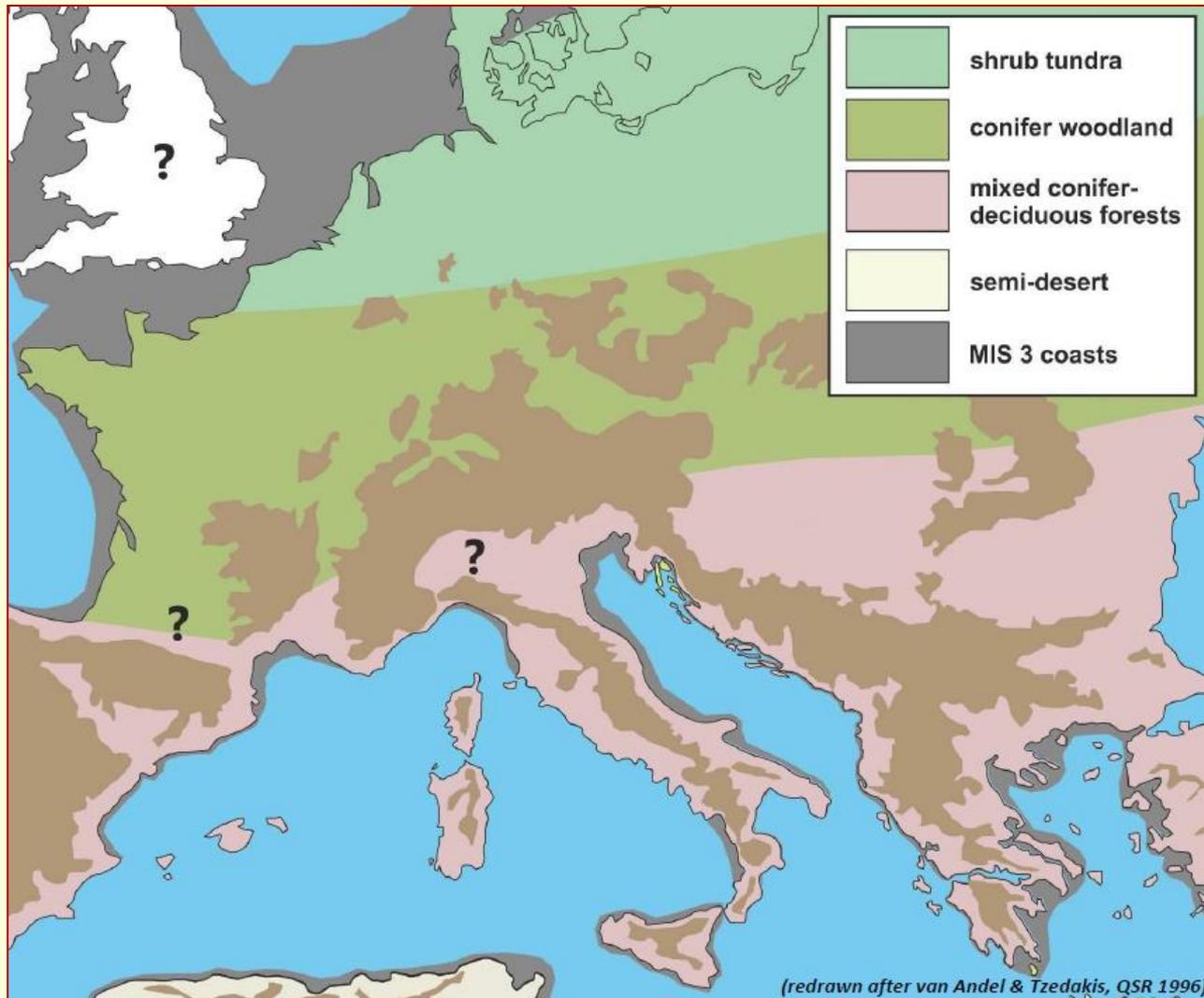
European Project for Ice Coring in Antarctica (EPICA)



Europa nell'ultimo Interglaciale (ca. 125ky BP)

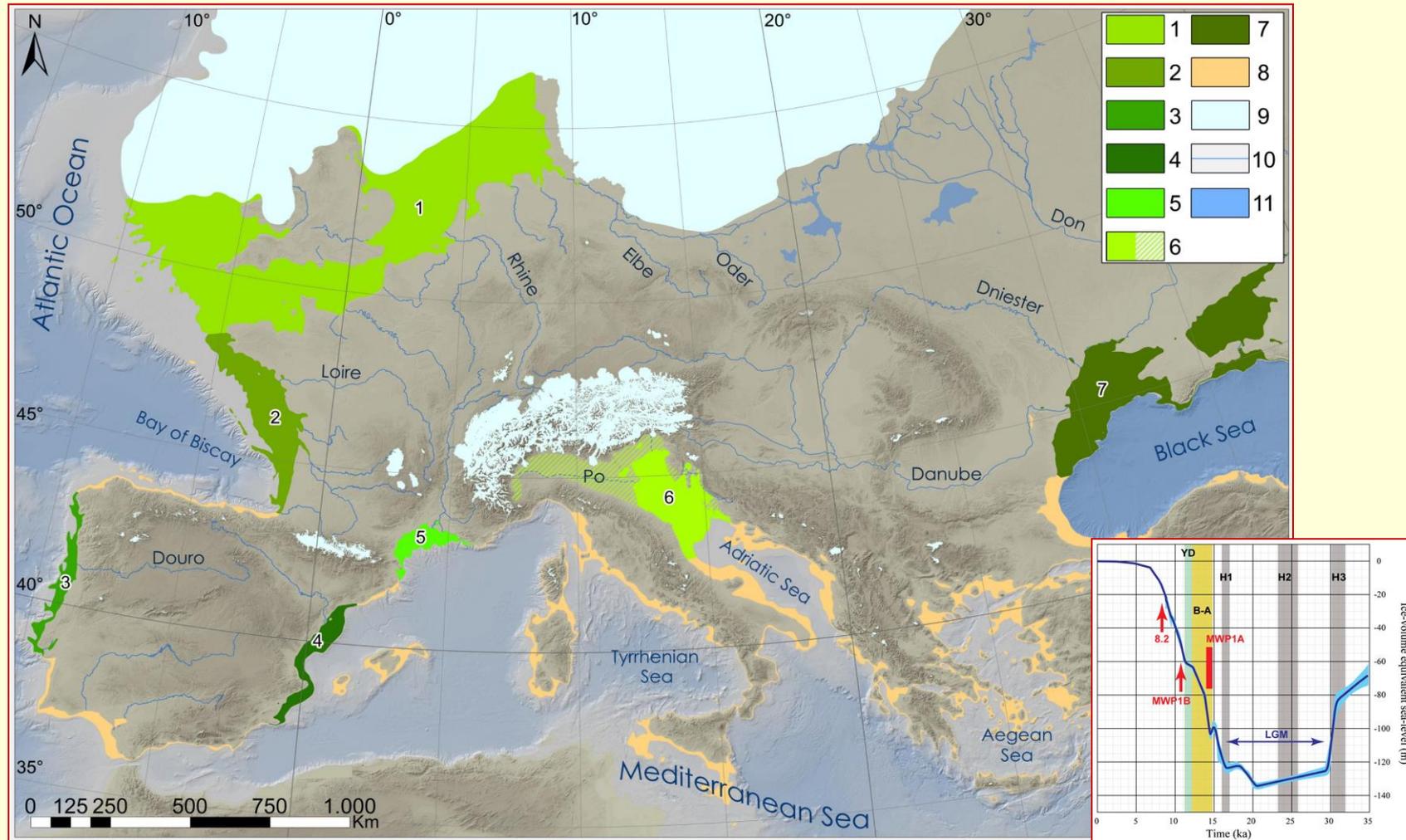


Europa nel MIS3 (46-32 ky BP)



2.5. Ecologia del Quaternario

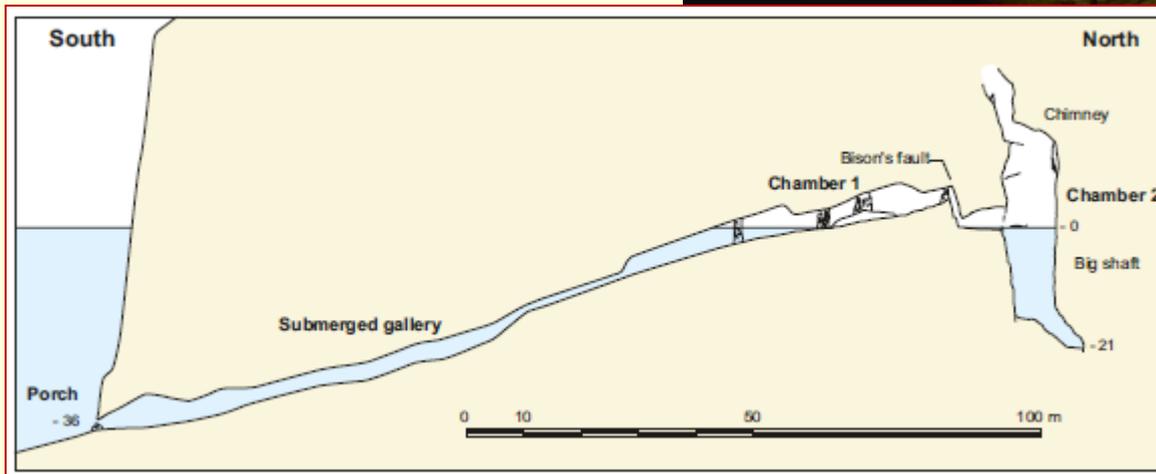
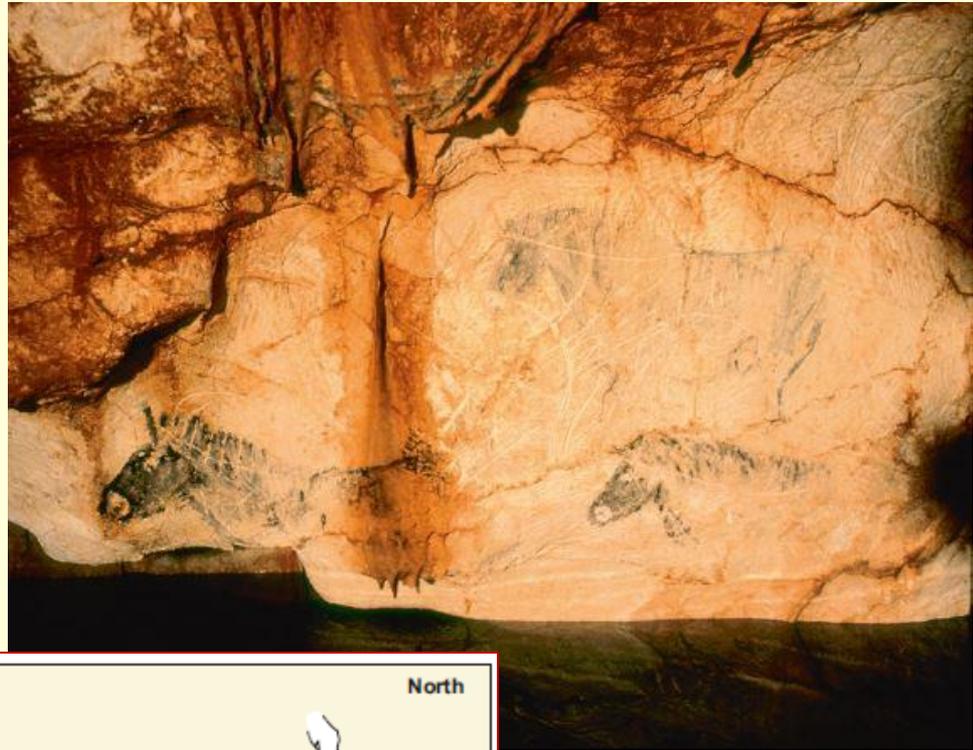
Europa durante l'ultimo massimo glaciale (LGM, 24-19 ky BP)

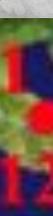


Major emerged continental shelves. 1. Doggerland/North Sea, English Channel and Bristol Channel; 2. Bay of Biscay and France Atlantic Coast; 3. North-central Portugal Atlantic Coast; 4. Catalunya and Valencia Coasts; 5. Gulf of Lion; 6. Great Po Plain; 7. Northern Black Sea Coast (Sea of Azov and Chorne Sea); 8. Other LGM emerged areas; 9. Scandinavian and British Islands ice sheets; 10. Mountain Glaciers; 11. Major rivers and lakes.

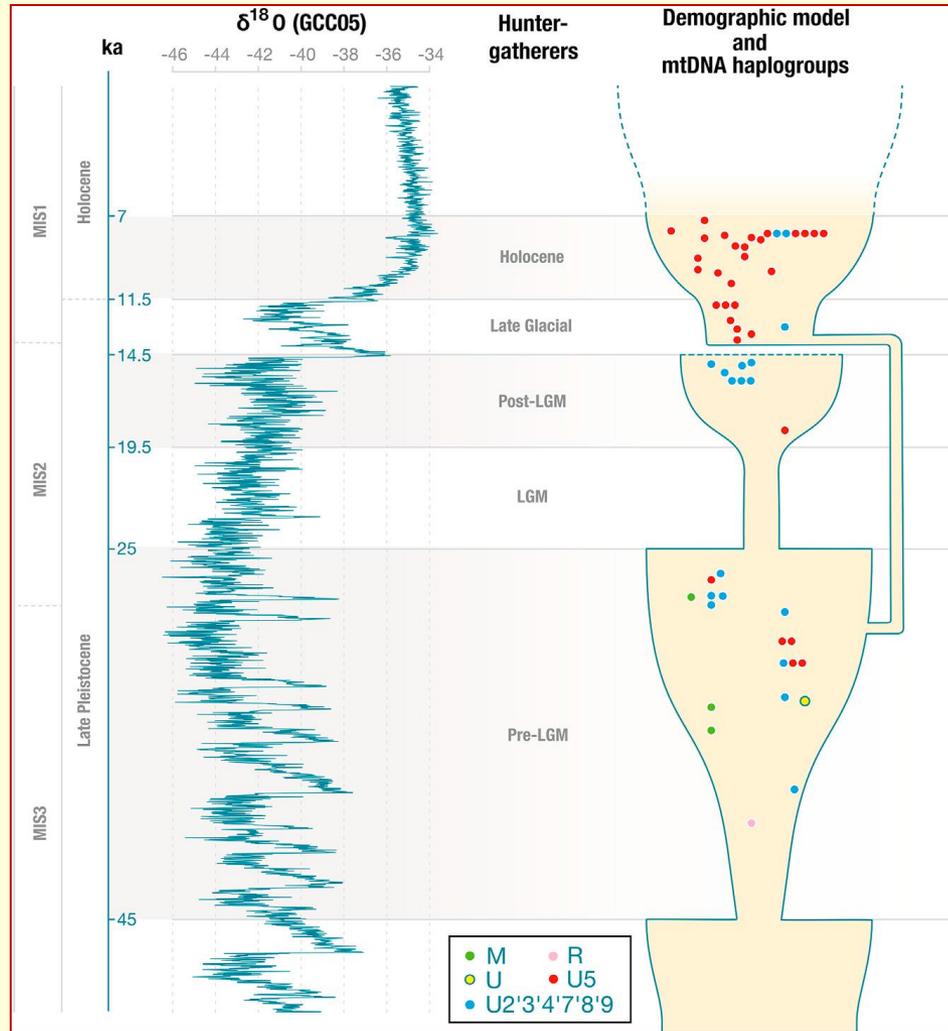
2.5. Ecologia del Quaternario

Effetti della regressione marina glaciale e della trasgressione postglaciale: **Grotte Cosquer** (Marsiglia)



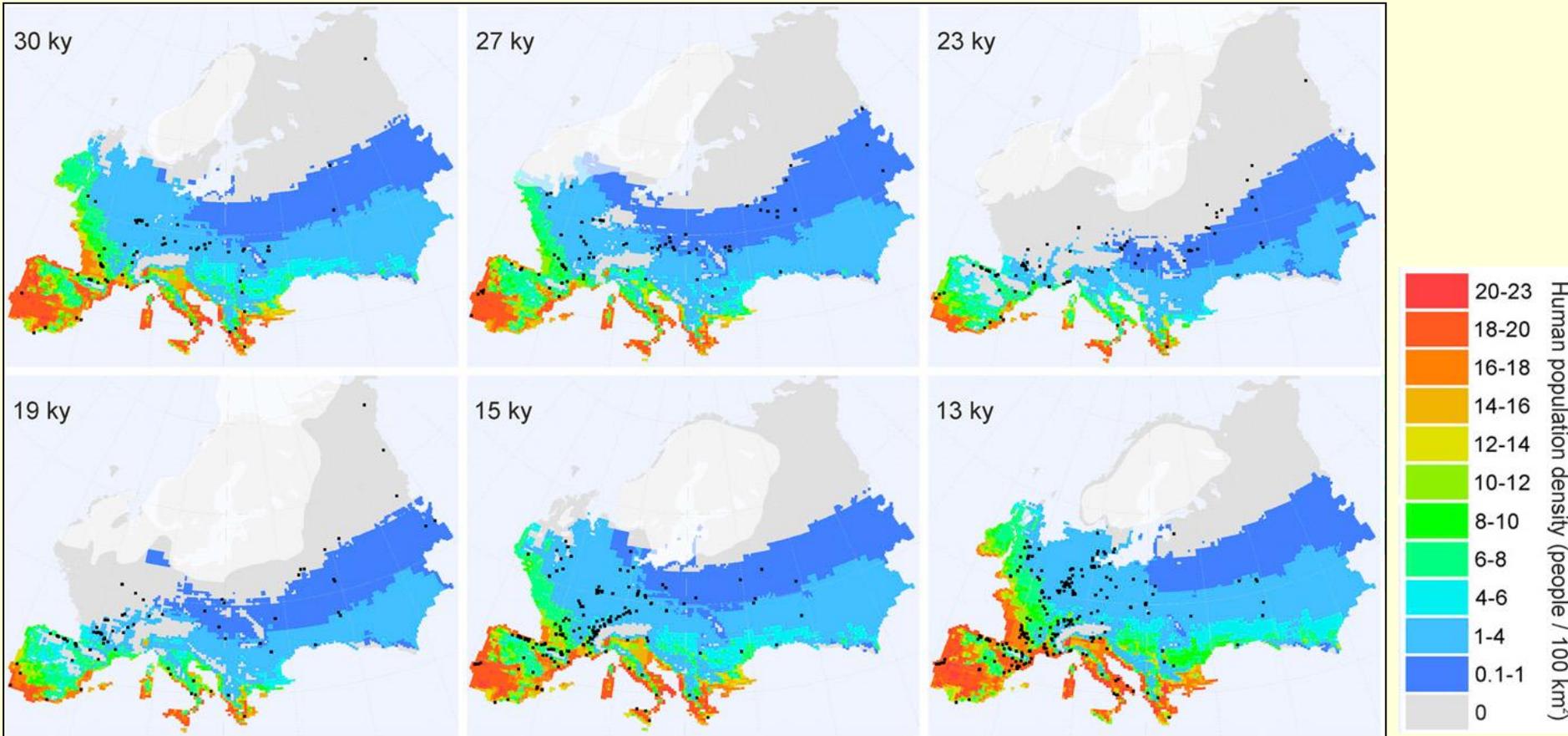


Popolazione europea nel Pleistocene superiore e nell'Olocene



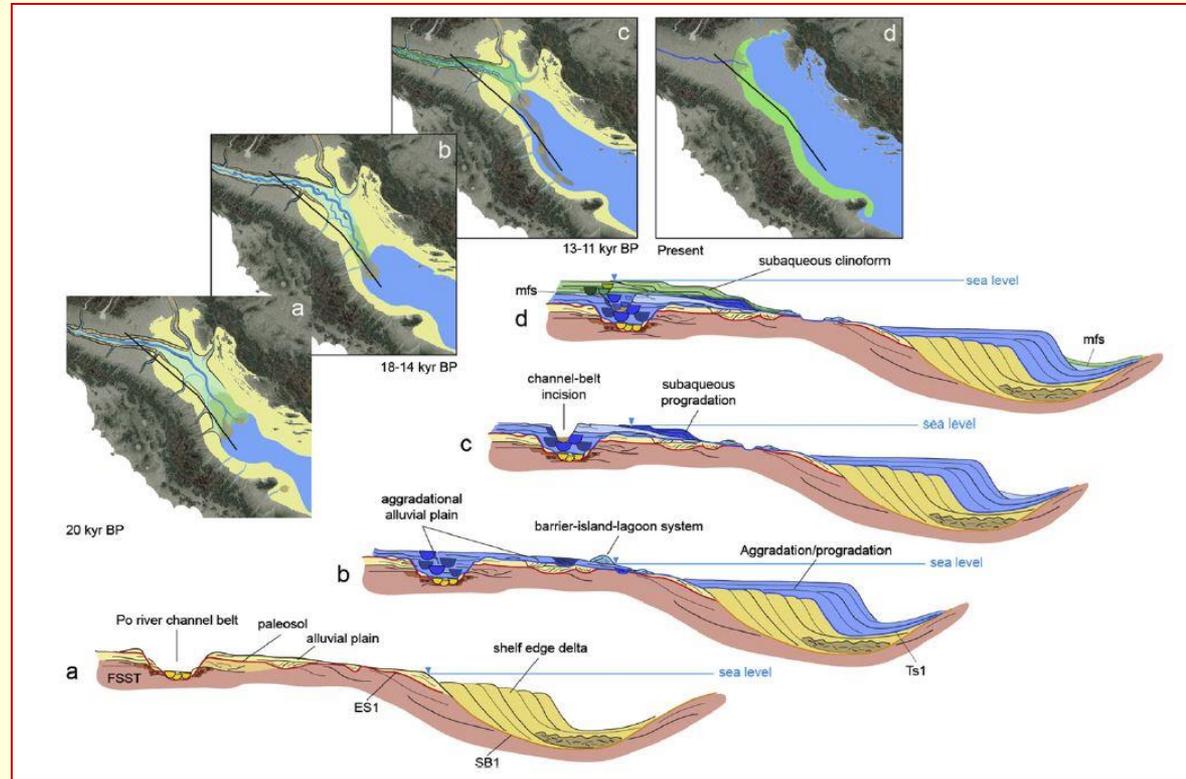
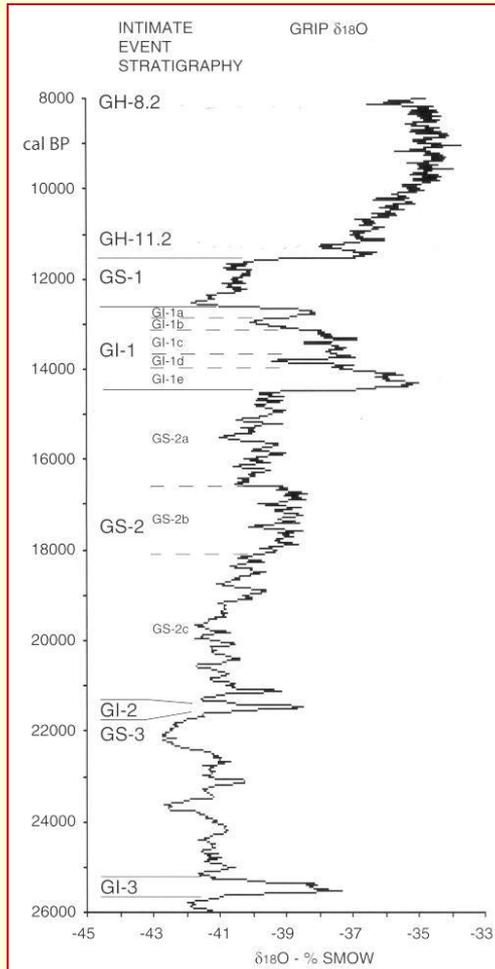
Posth et al. Current Biology, 2016

2.5. Ecologia del Quaternario



Simulazione dell'estensione geografica e della densità demografica della popolazione di cacciatori-raccoglitori europei modellizzate sulla base dei siti archeologici durante sei intervalli temporali da 30 a 13 ky fa. I siti archeologici sono indicate con punti neri.

Il tardoglaciale

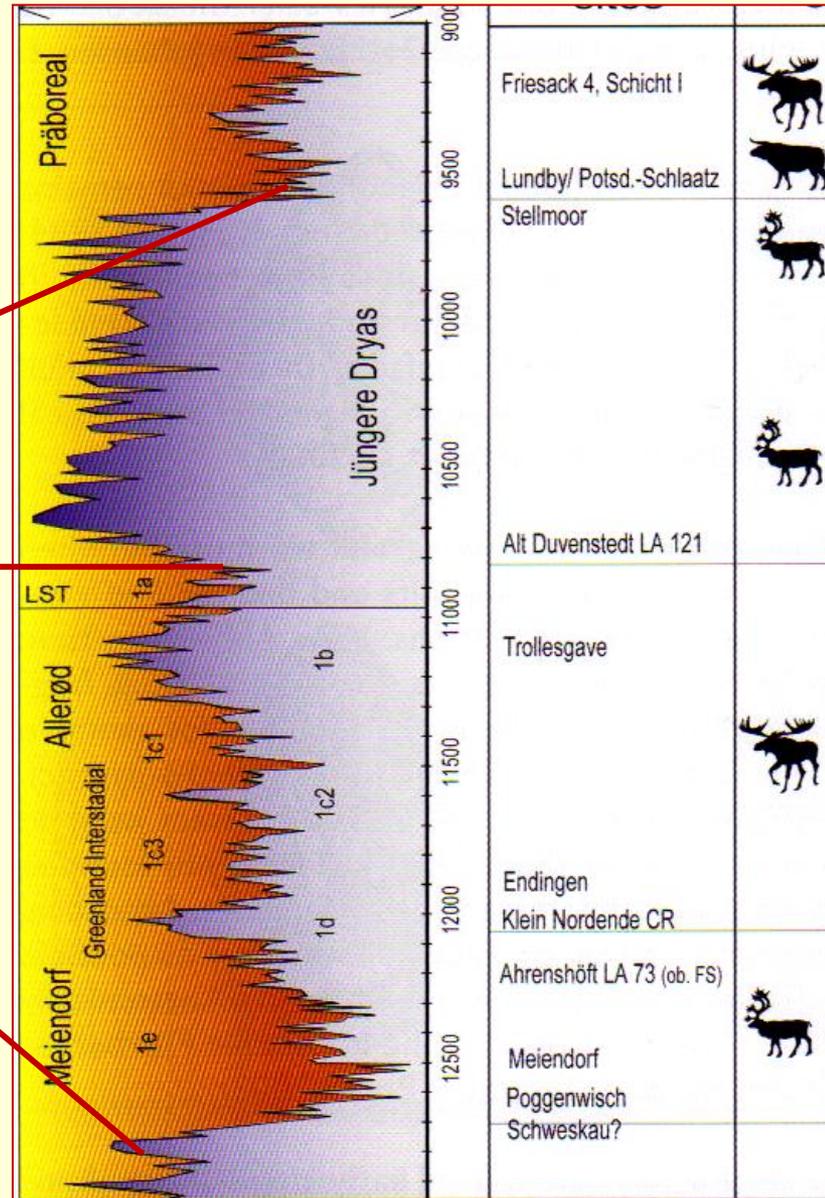
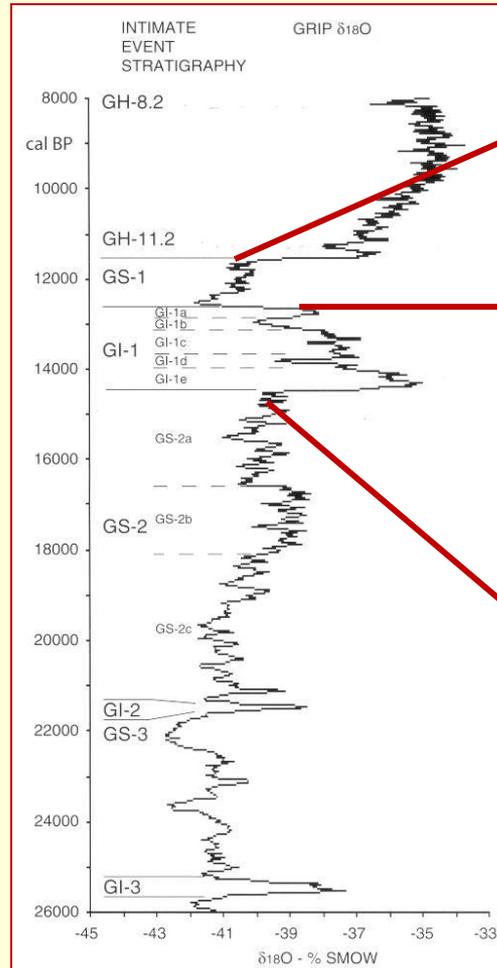


Evoluzione sedimentaria del bacino padano–Adriatic per gli ultimi 20 kyr: massima regressione (a), trasgressione iniziale (b), trasgressione intermedia (c), e attuale (d).

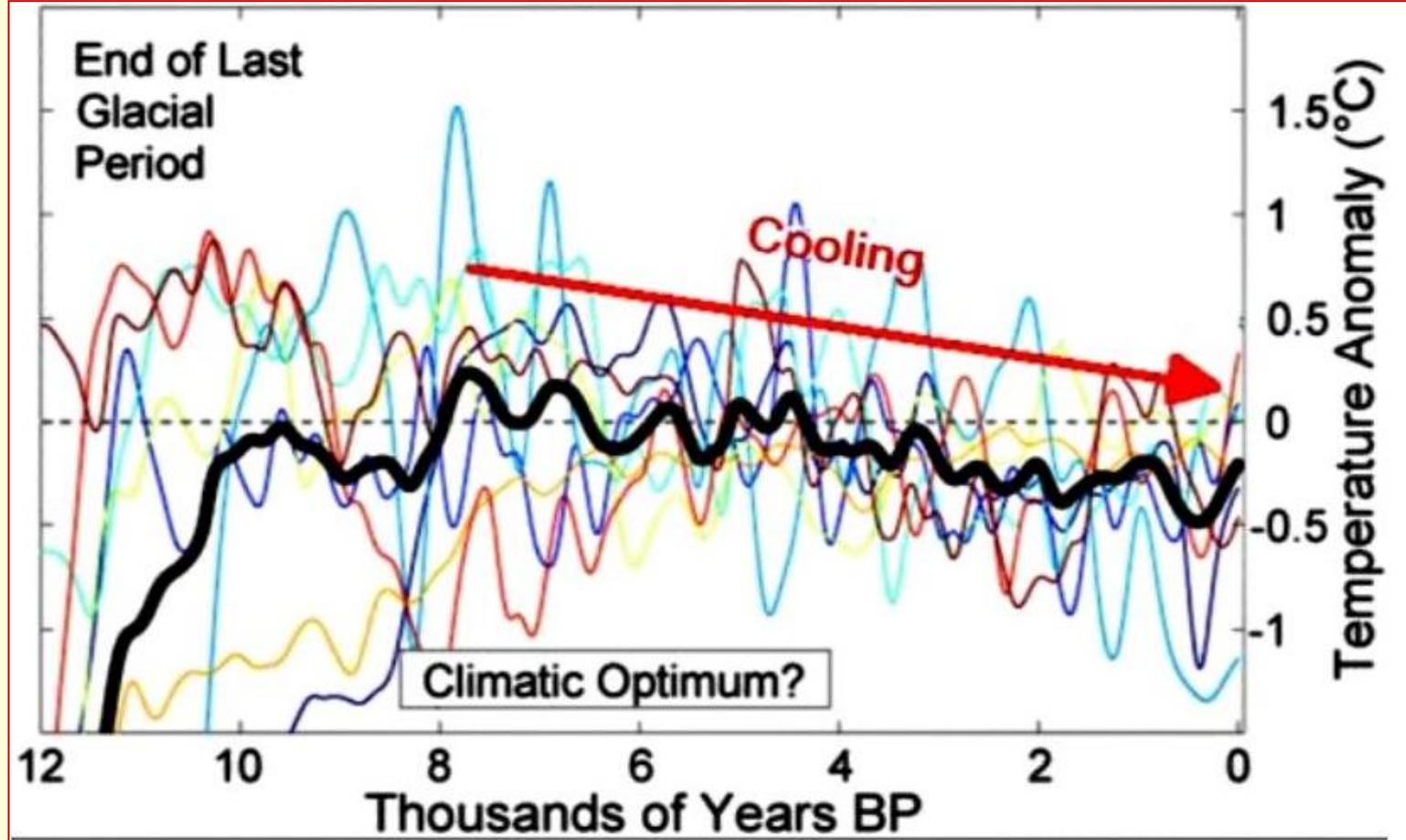
GRIP ice core

2.5. Ecologia del Quaternario

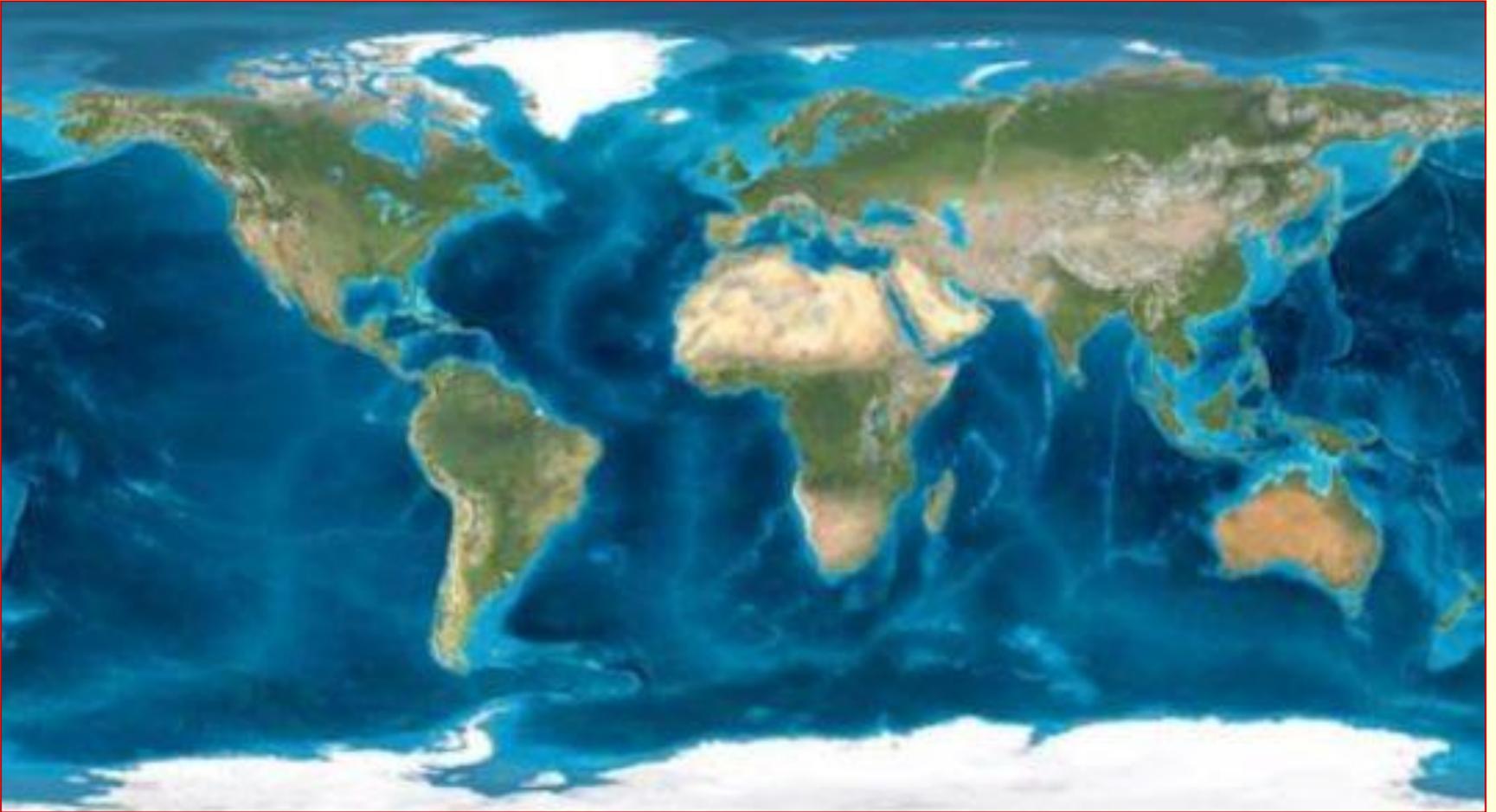
Faune tardoglaciali nordEuropa



Olocene: variazione delle temperature

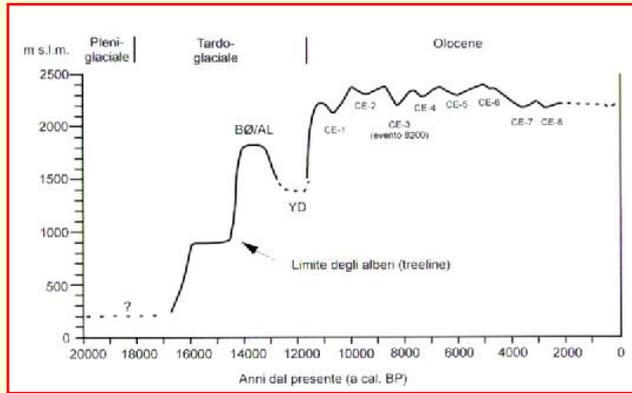


Olocene: quadro ecologico mondiale



Optimum Climatic Map of Italy

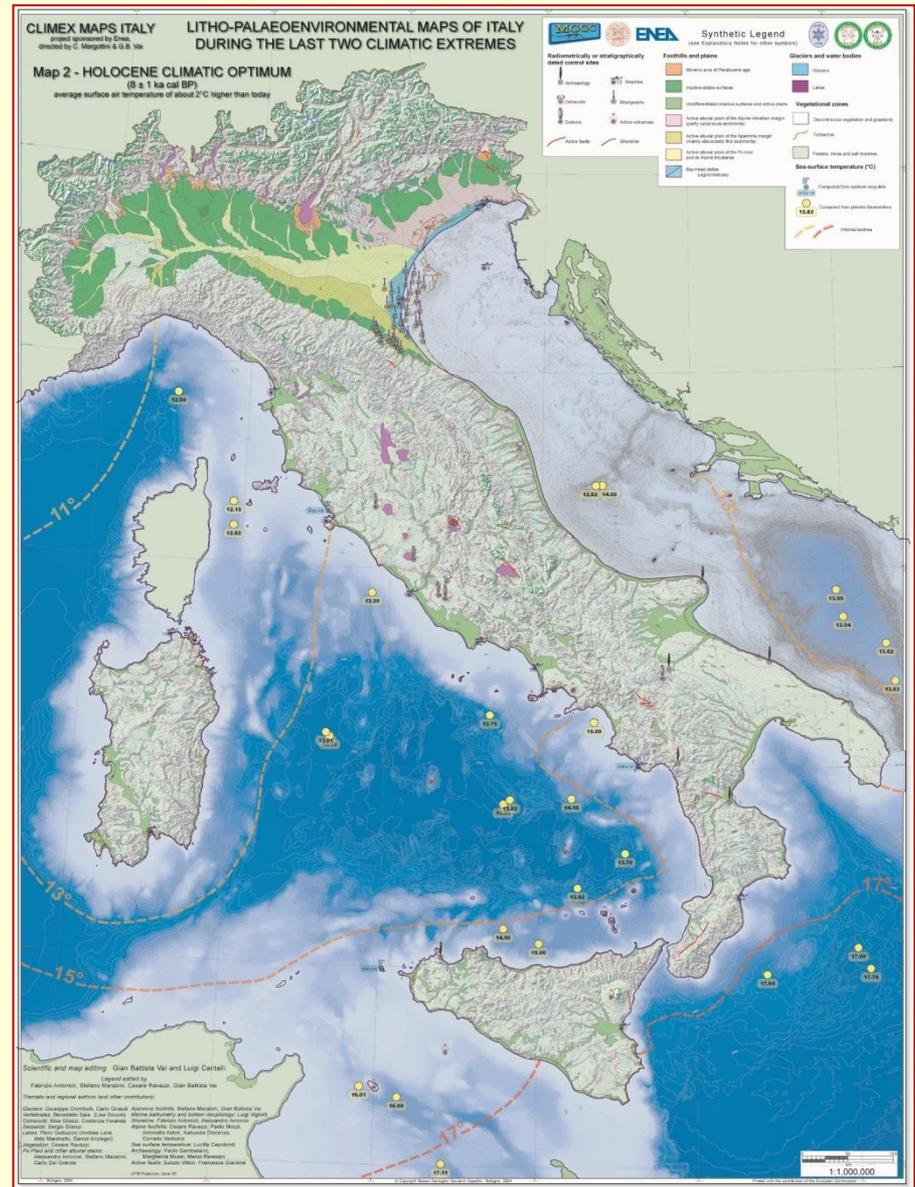
By Antonioli F. & Vai G.B. Eds.



Risalita limite superiore degli alberi



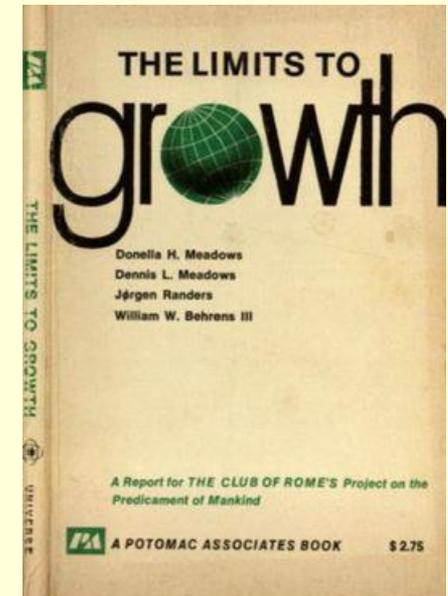
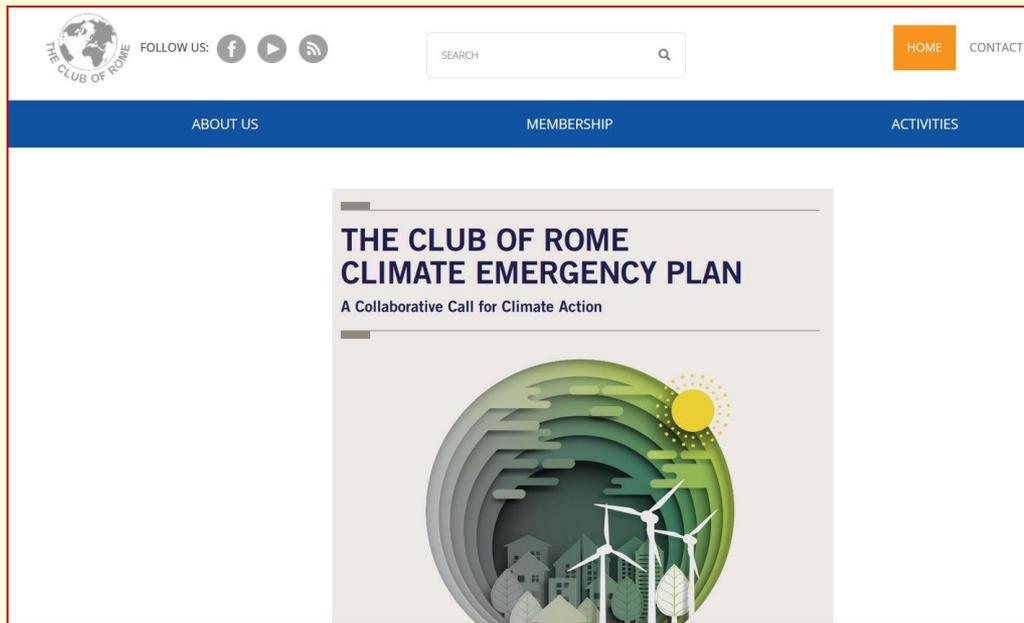
Faune e ambienti della foresta termofila



Antropocene: dall'Olocene a una nuova epoca



2.5. Ecologia del Quaternario. L'Antropocene



<https://www.clubofrome.org/>