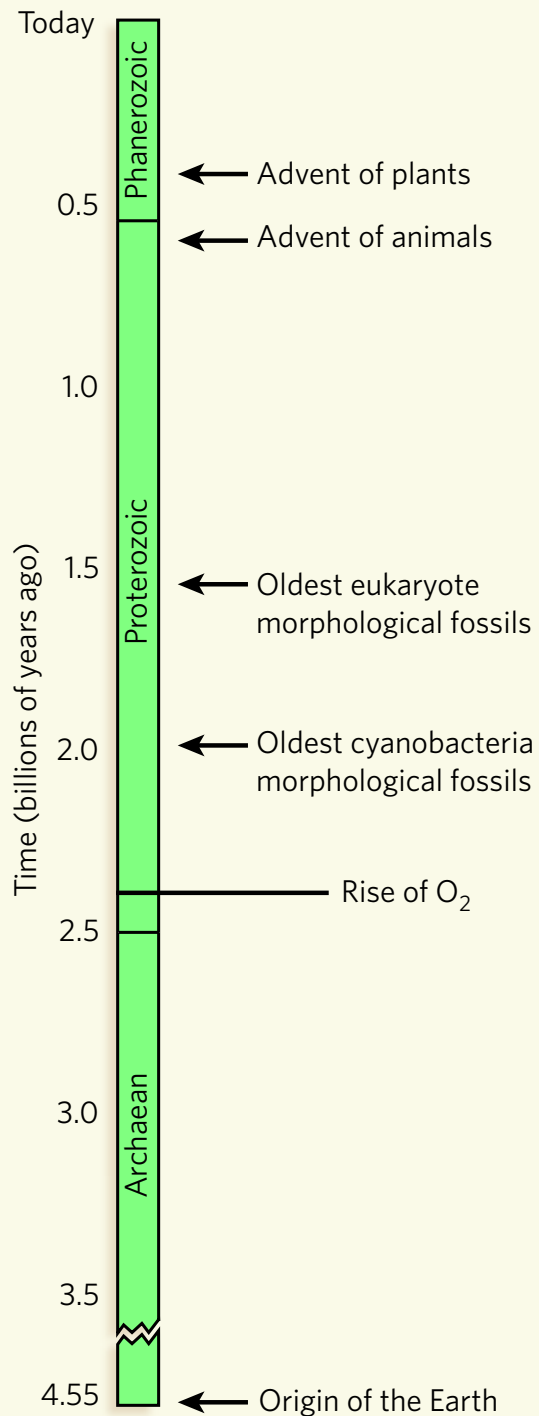




**Les premiers pas
du climat de la
Terre:**

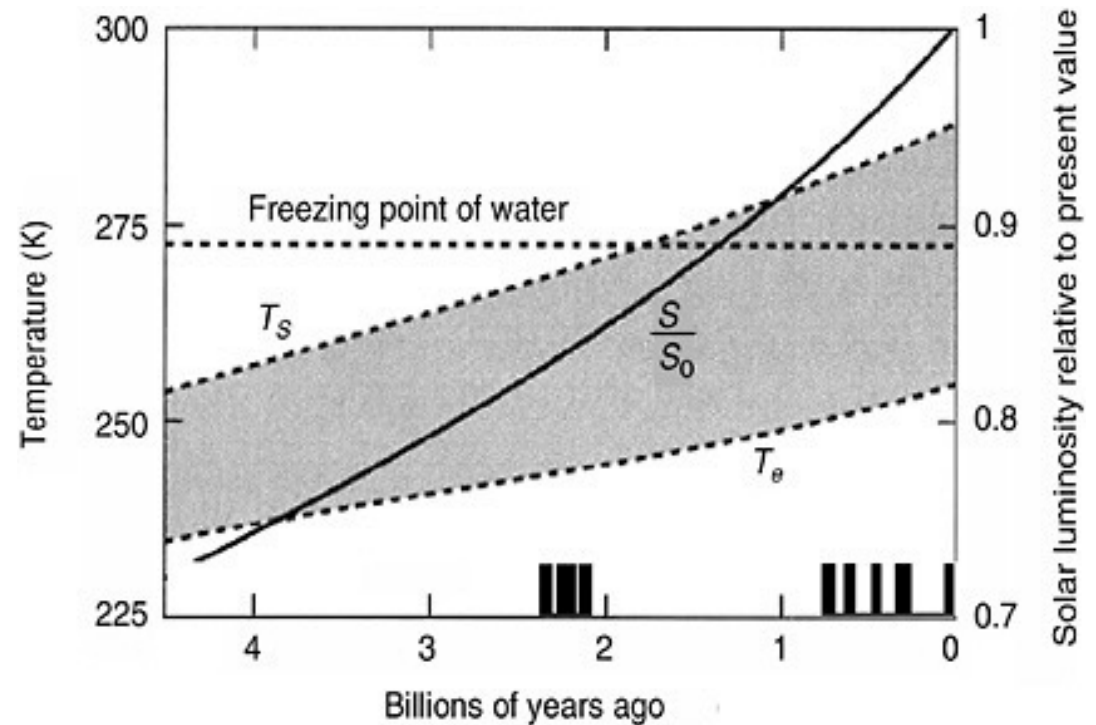
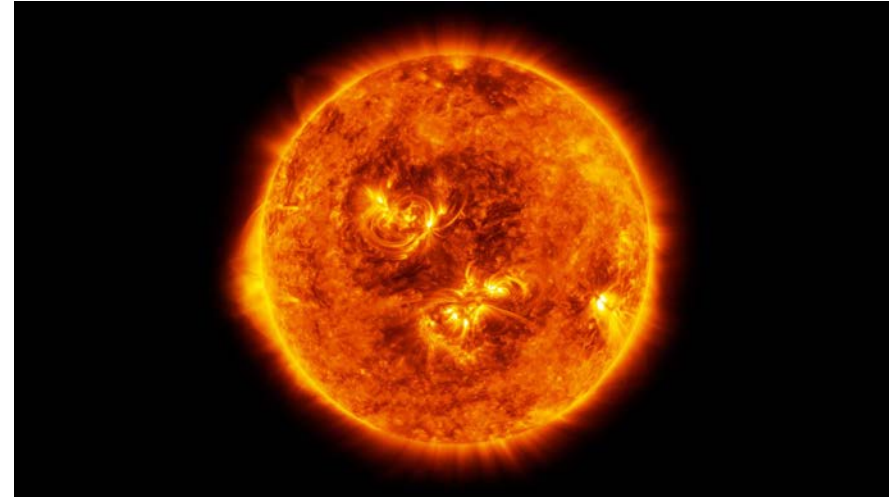
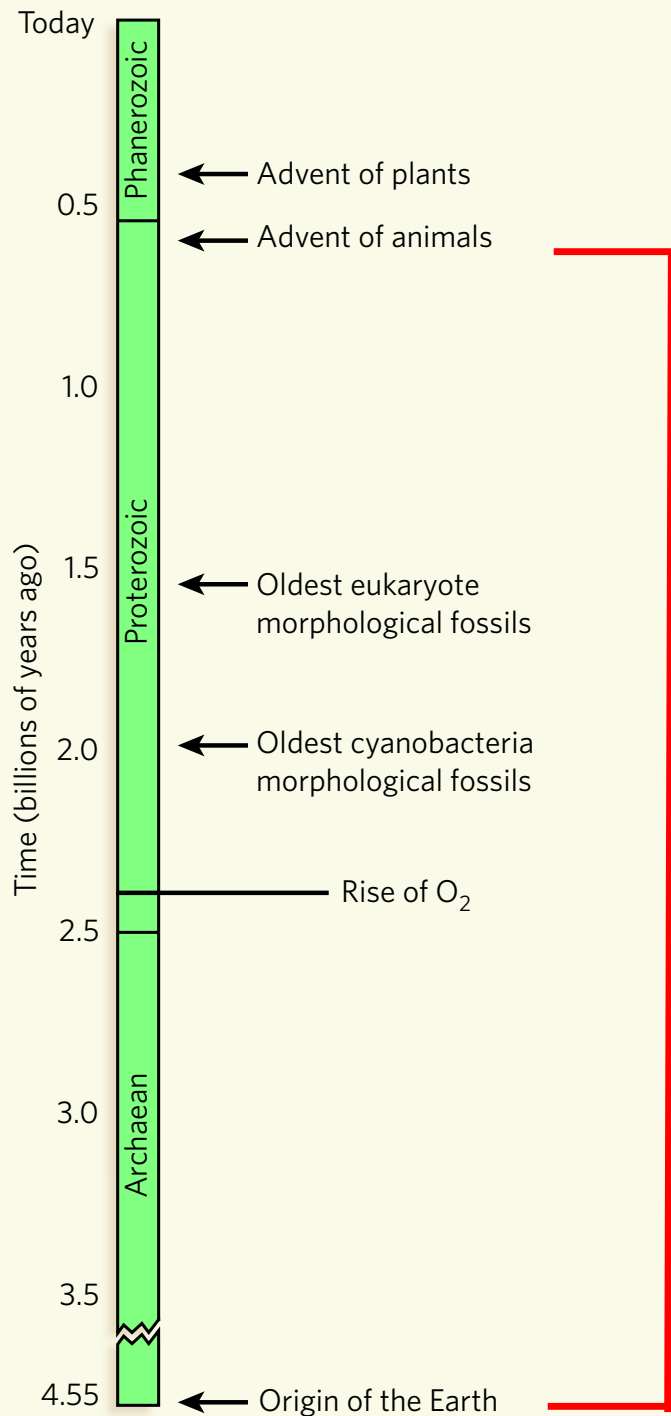
Le Précambrien

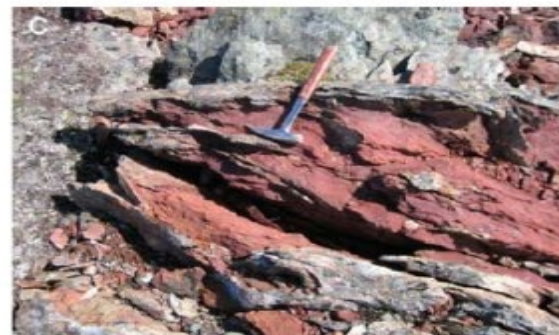
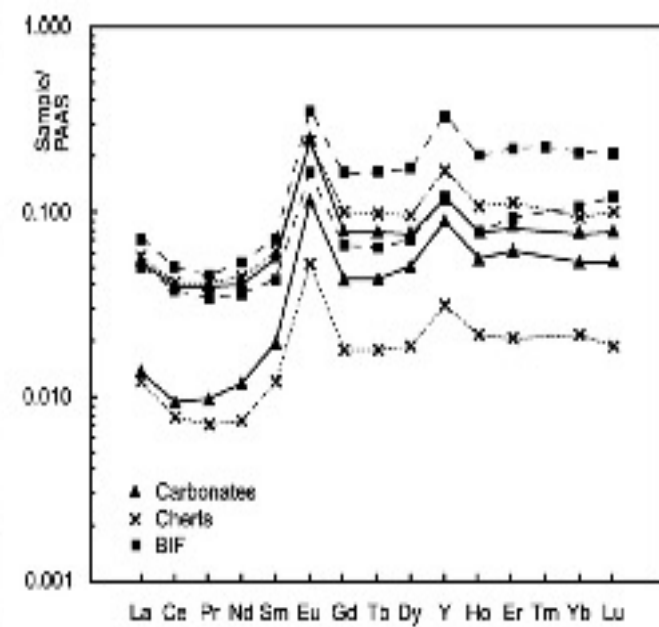
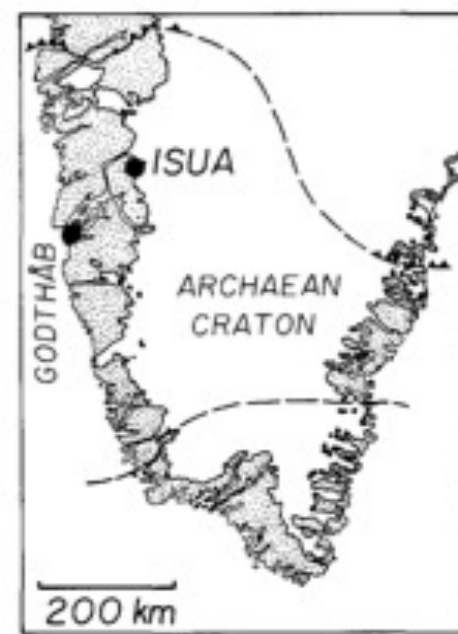
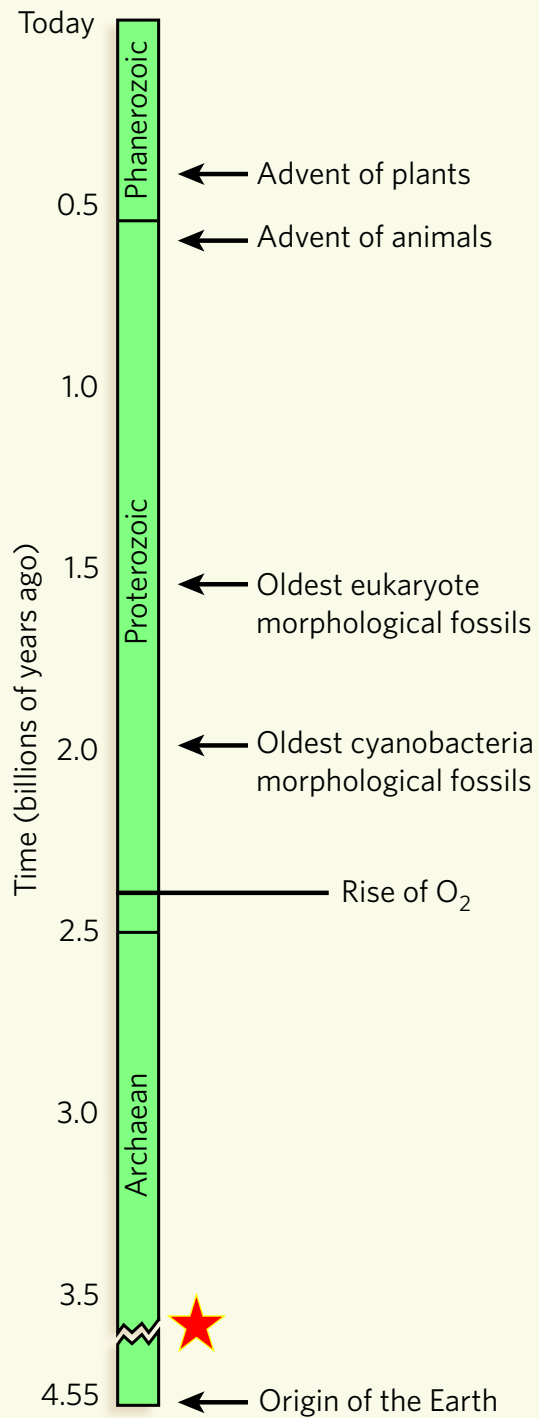


Les premiers pas du climat de la Terre: Le Précambrien

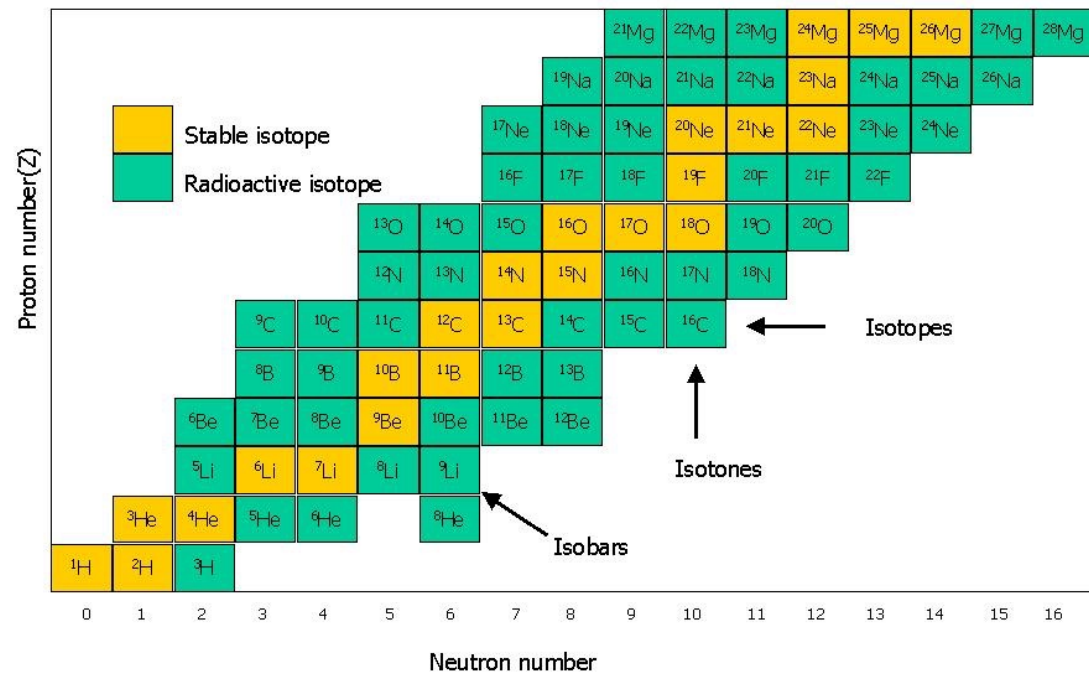


Le paradoxe du jeune soleil faible

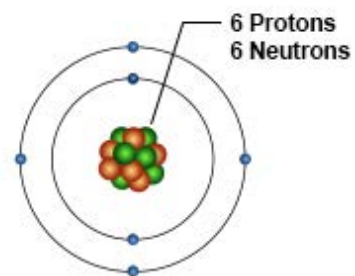




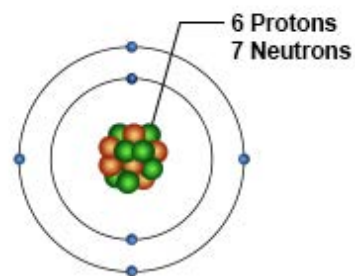
Nutman et al. (2009)



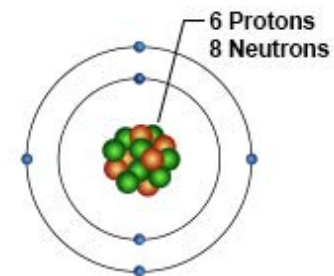
NATURAL ISOTOPES OF CARBON



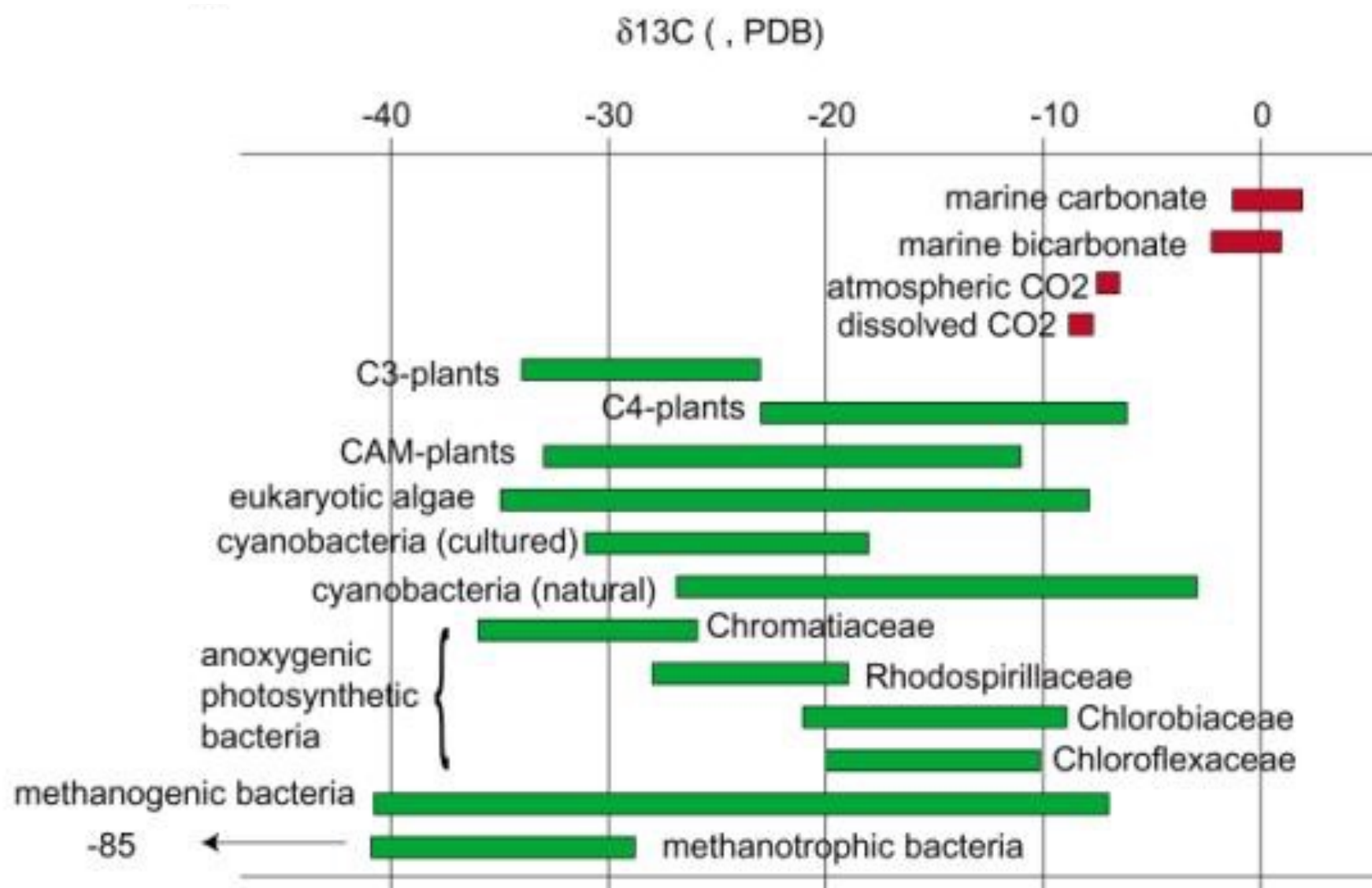
Carbon-12
(6P + 6N)
Atomic Weight = 12
Isotope Mass: 12 u
Abundance: 98.89%

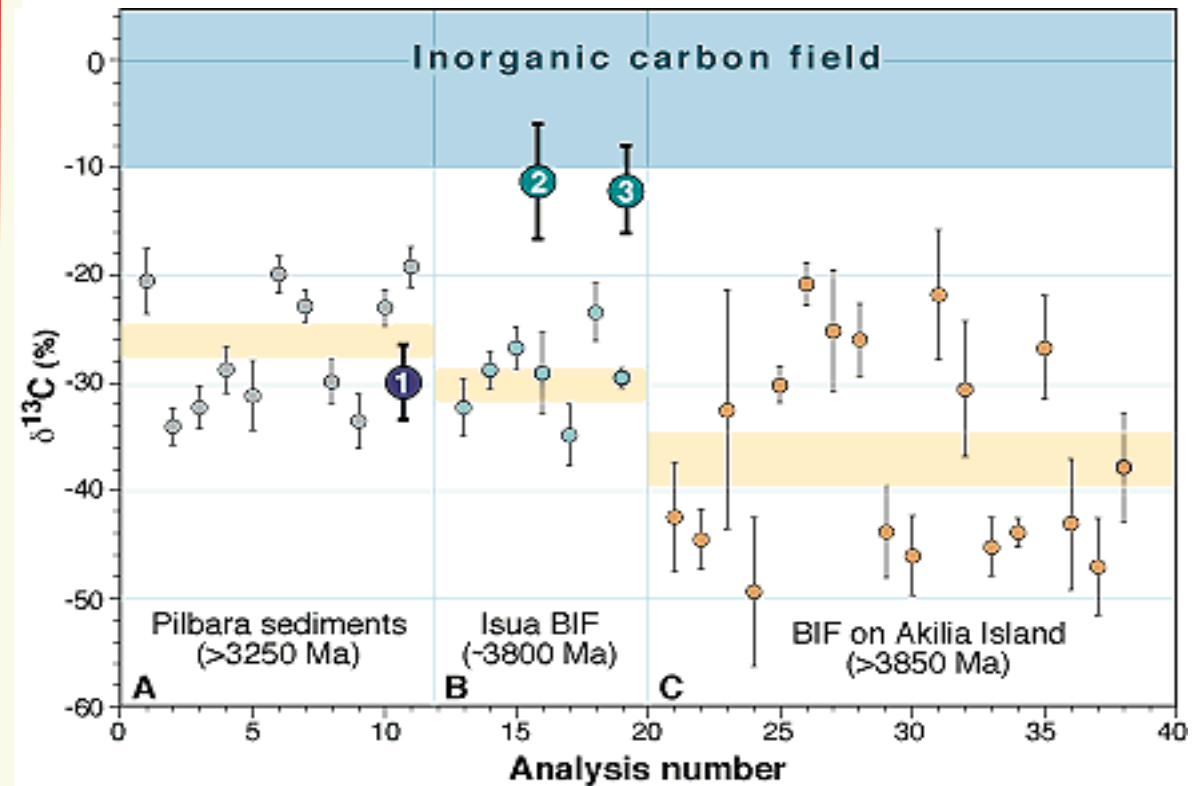
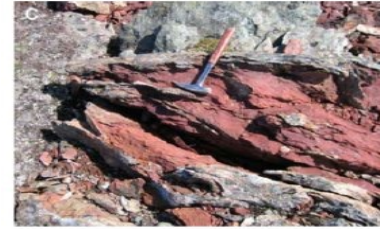
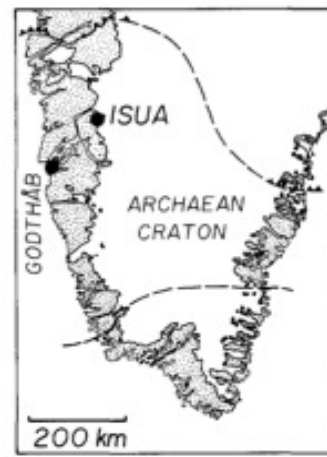
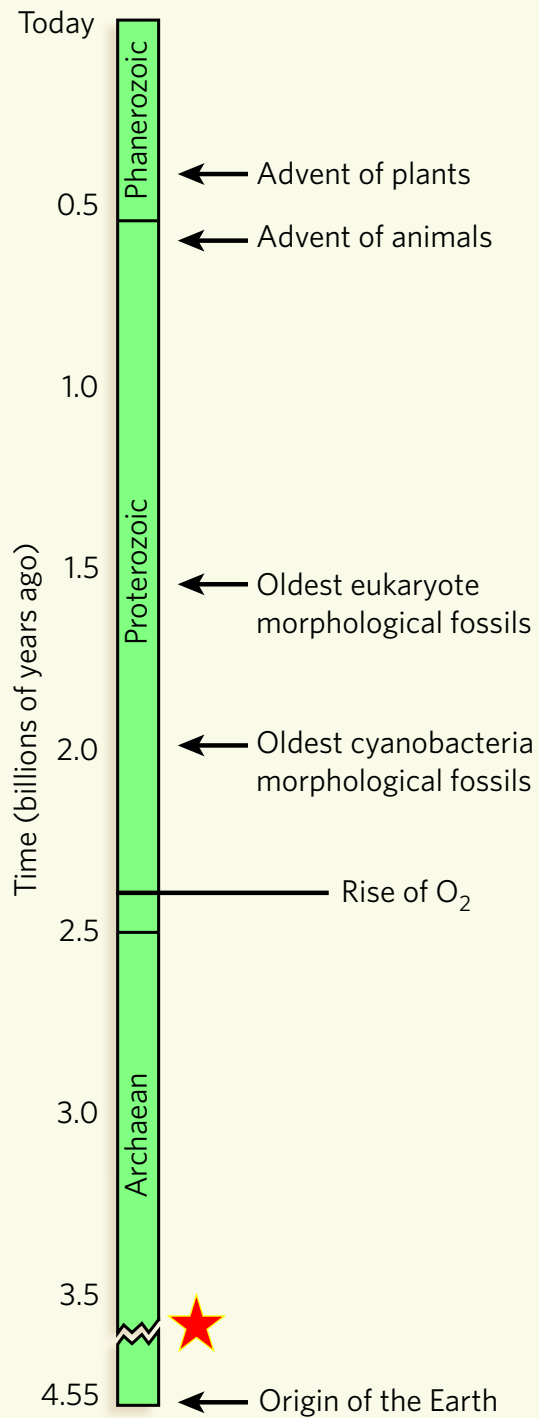


Carbon-13
(6P + 7N)
Atomic Weight = 13
Atomic Mass = 13.00335 u
Abundance: 1.109%

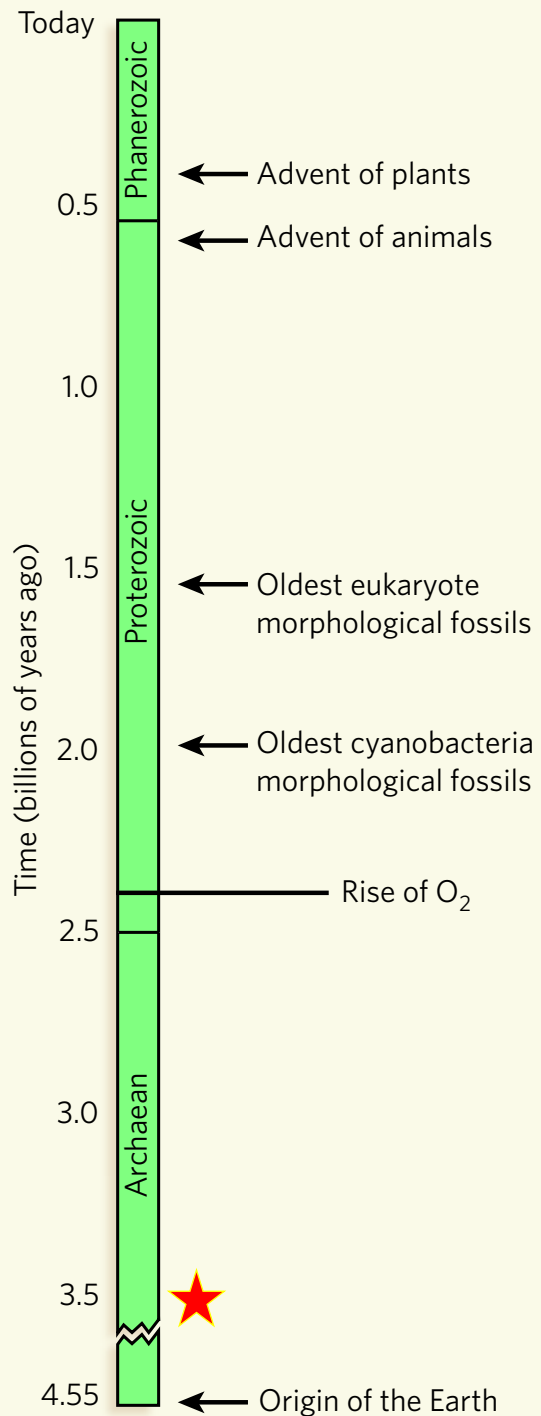


Carbon-14
(6P + 8N)
Atomic Weight = 14
Isotope Mass: 14.003241 u
Abundance: 1 Part Per Trillion
Half-life: $5,730 \pm 40$ Years





Holland (1997)

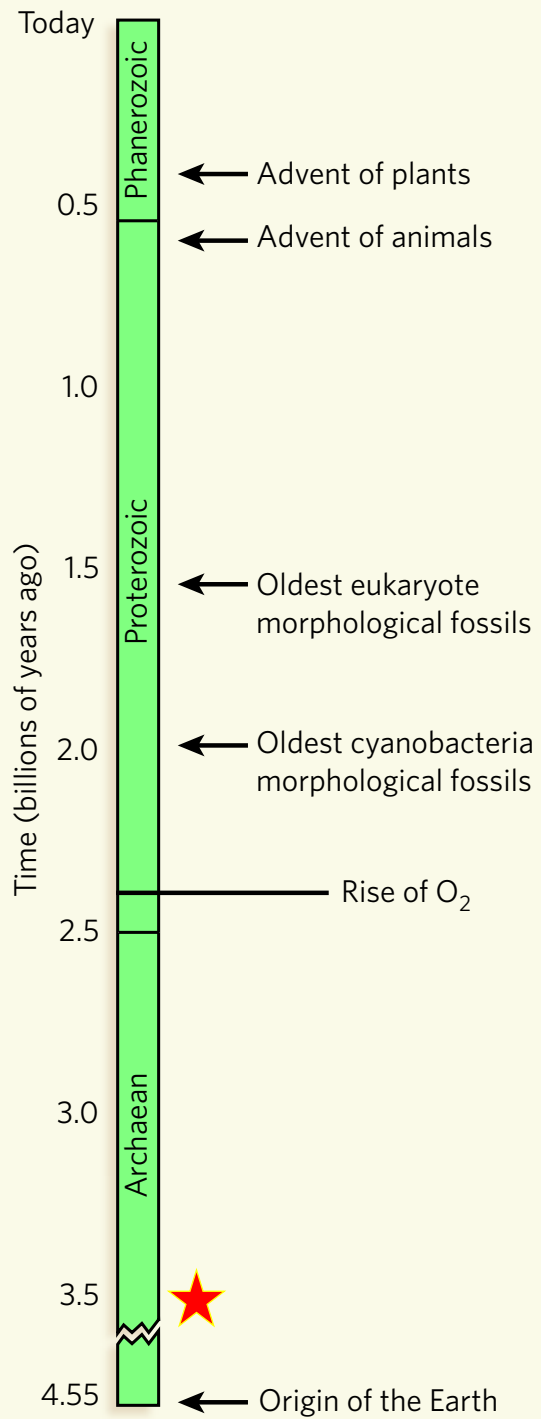


ARTICLES

Stromatolite reef from the Early Archaean era of Australia

Abigail C. Allwood^{1,2}, Malcolm R. Walter^{1,2}, Balz S. Kamber¹, Craig P. Marshall^{1,4} & Ian W. Burch²







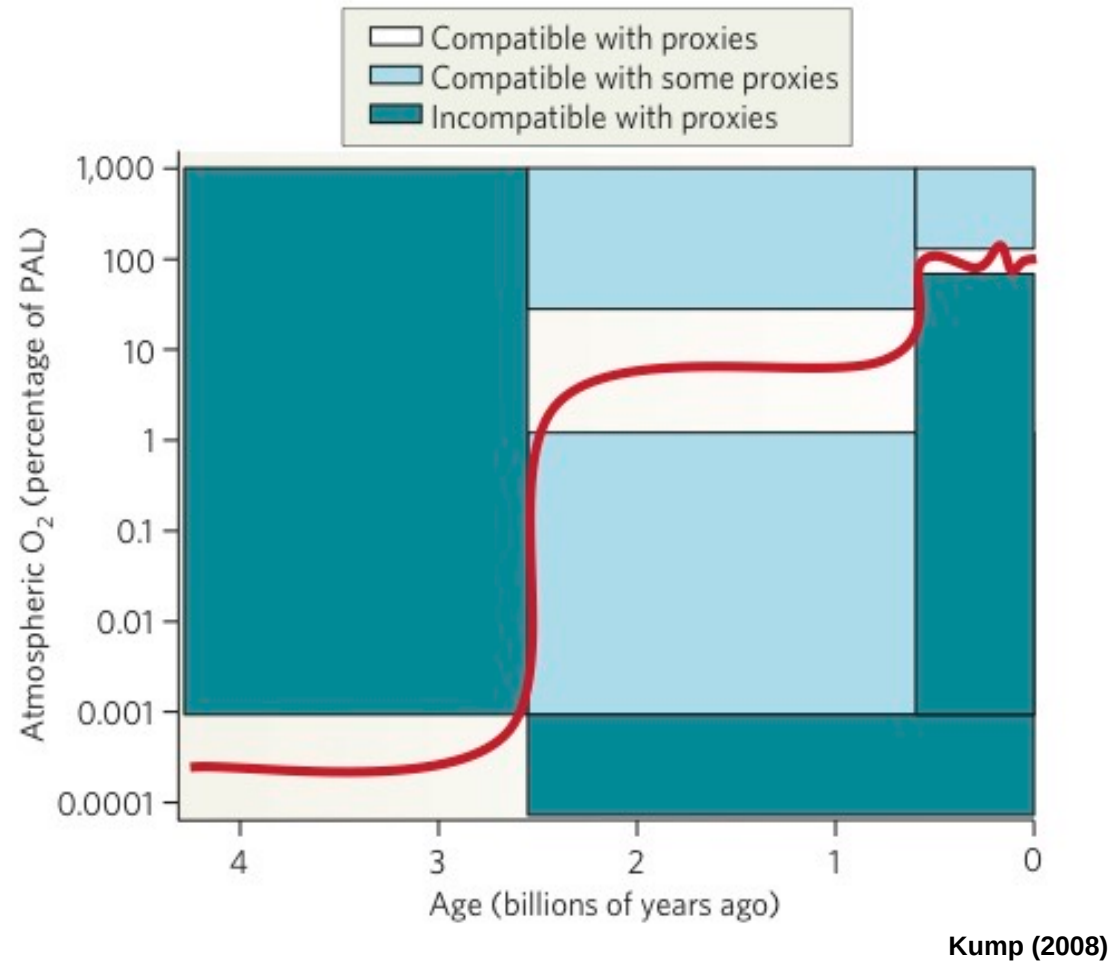
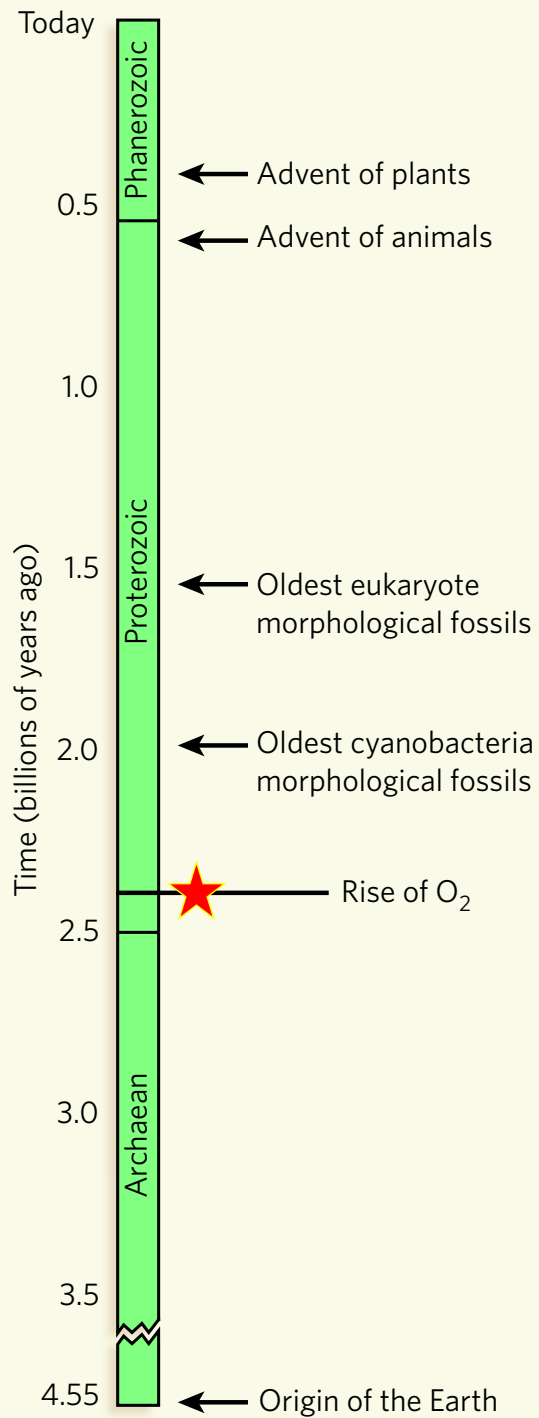












Precambrian Iron Formations

Riche en Fer (20 - 40 wt. %)

Riche en silice (40 - 60 wt. %)

Sédiments hydrogènes

Plus important source de Fe sur Terre

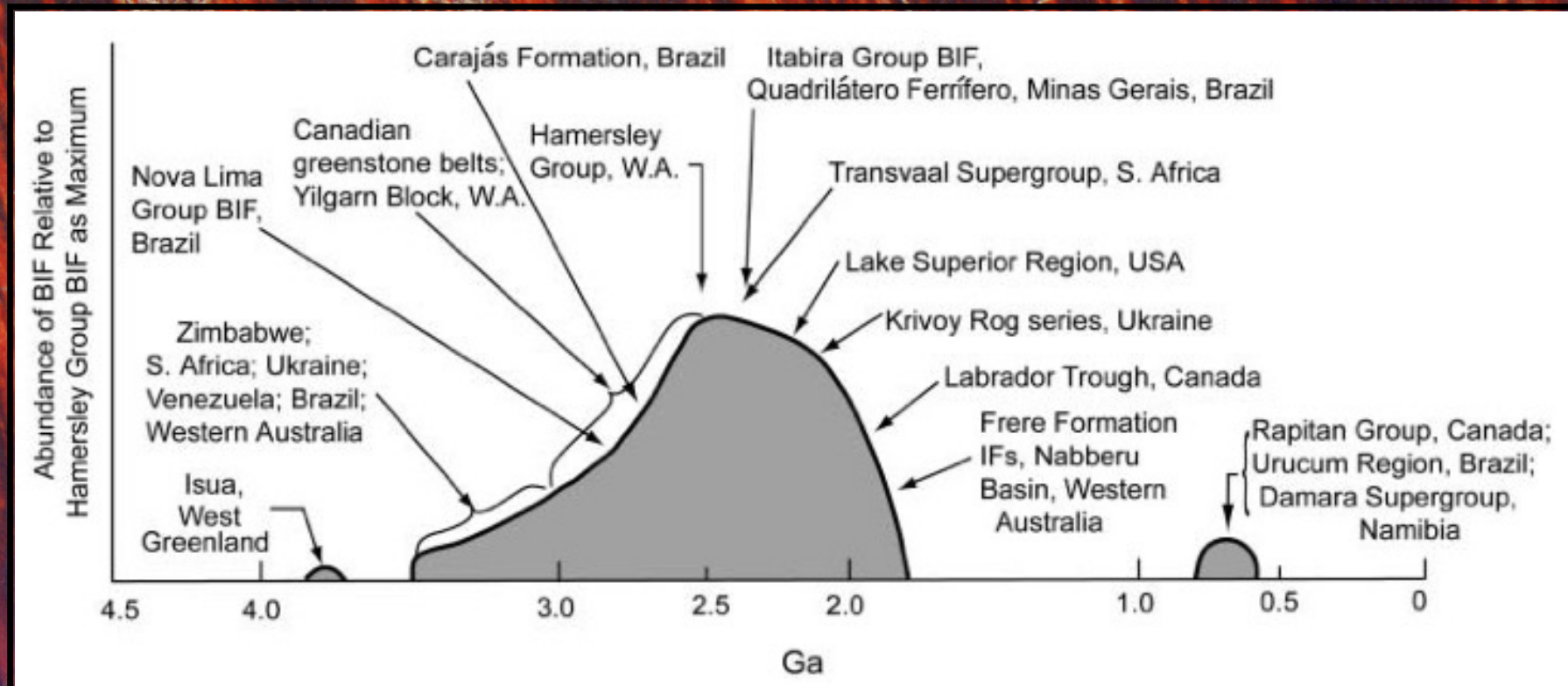
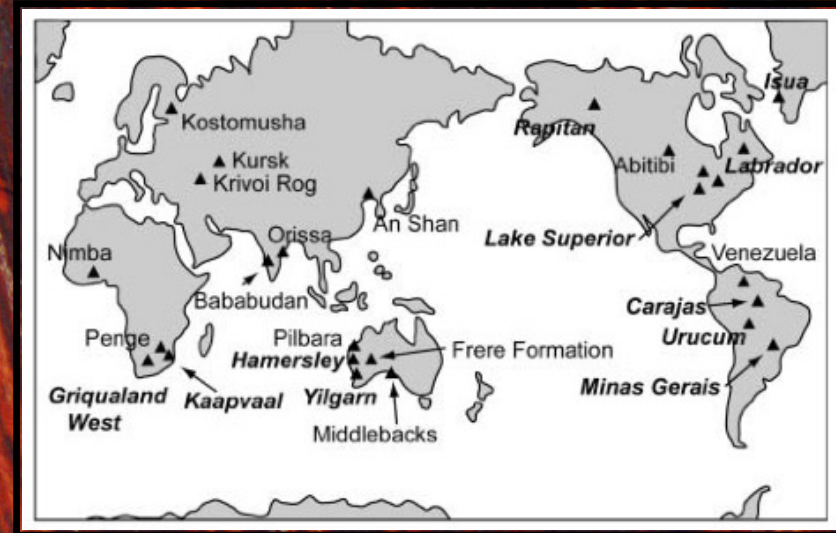






Distribution globale

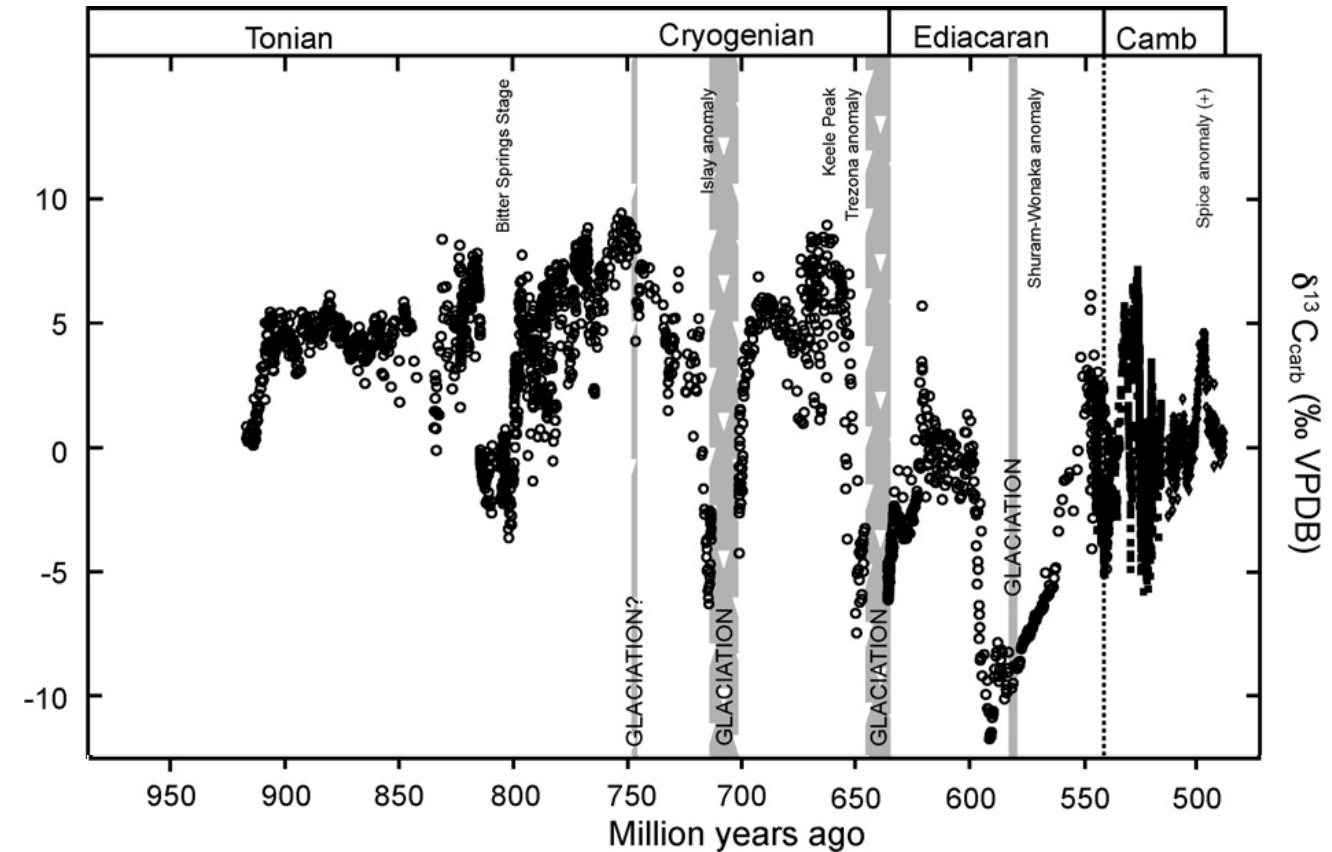
Exclusivement Précambrien



Climats extrêmes du passé: exemple de la Terre “Boule de Neige”

La Terre “Boule de Neige”

Snowball Earth



Climats extrêmes du passé: exemple de la Terre “Boule de Neige”

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Climats extrêmes du passé: exemple de la Terre "Boule de Neige"

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Climats extrêmes du passé: exemple de la Terre "Boule de Neige"

La Terre "Boule de Neige"

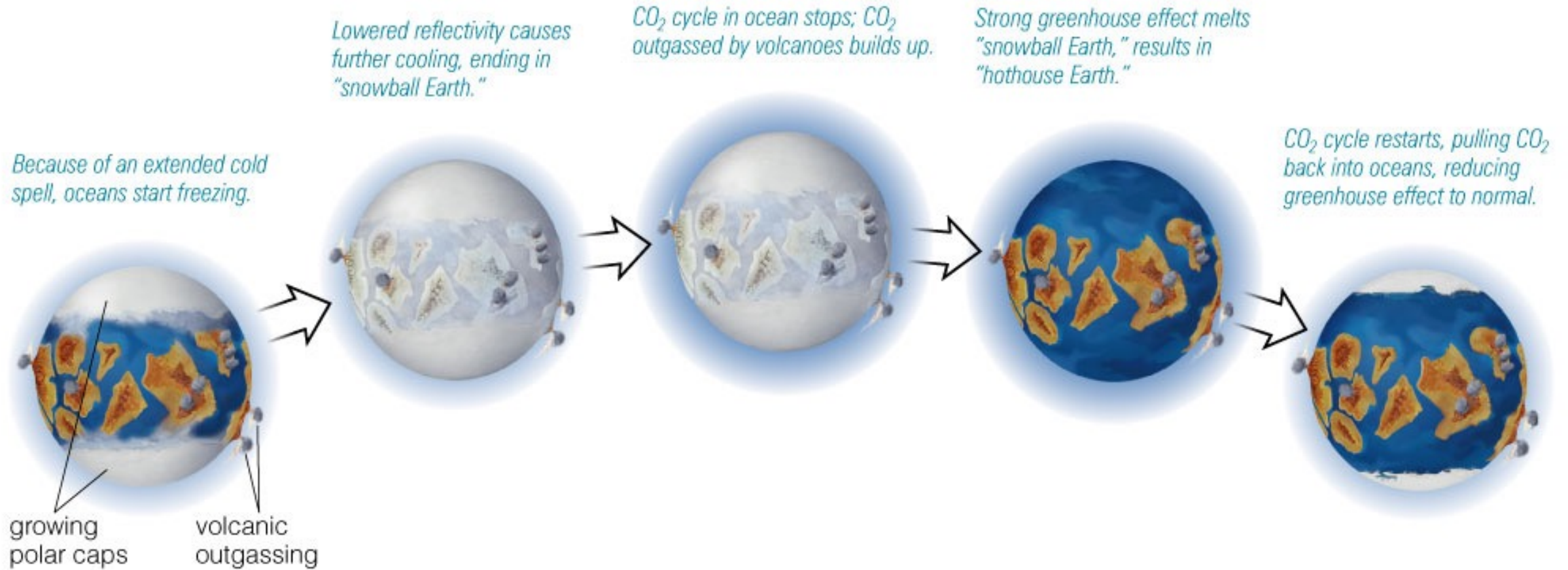
Snowball Earth



Climats extrêmes du passé: exemple de la Terre "Boule de Neige"

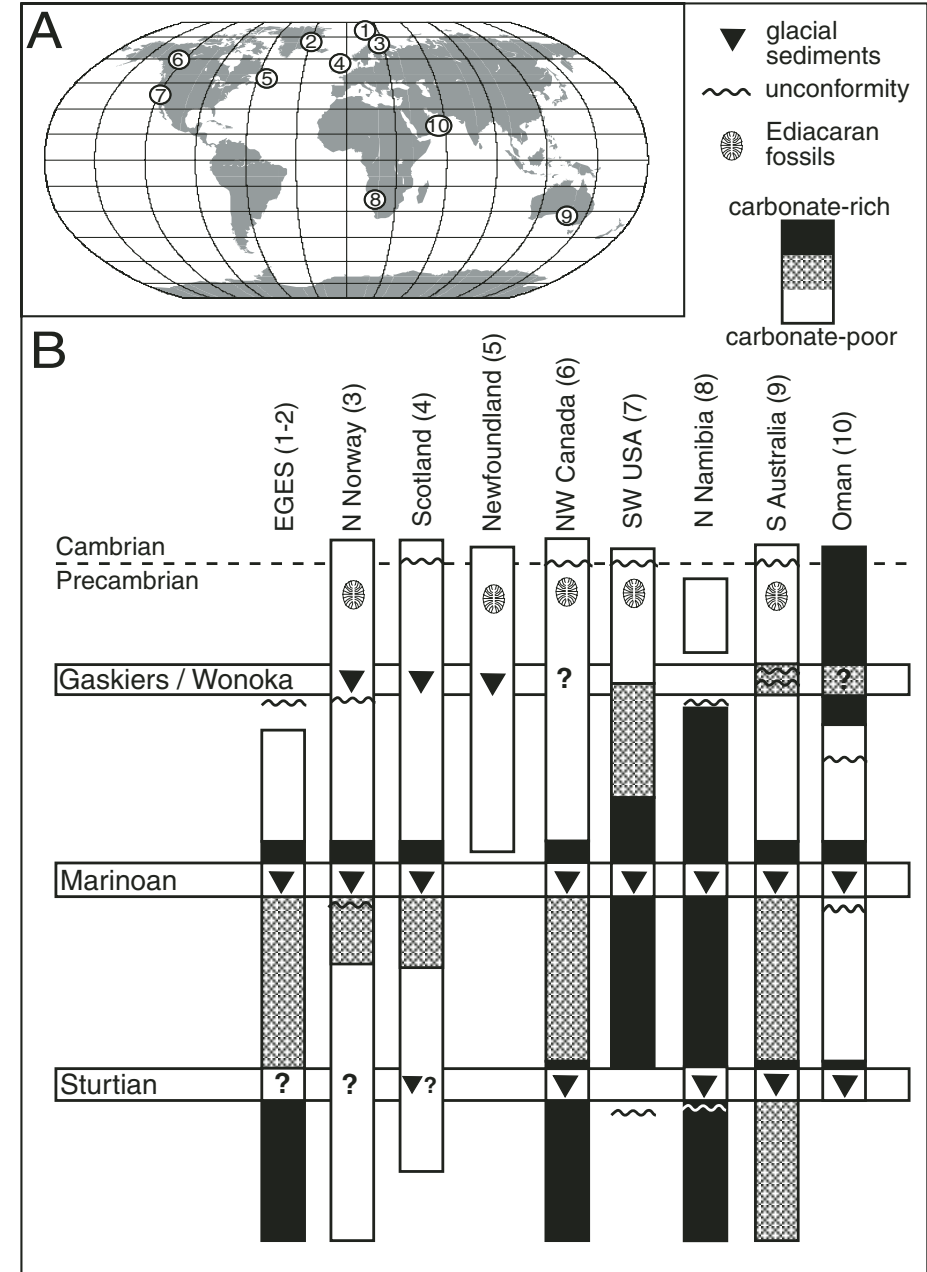
La Terre "Boule de Neige"

Snowball Earth



Climats extrêmes du passé: exemple de la Terre “Boule de Neige”

La Terre "Boule de Neige" Snowball Earth



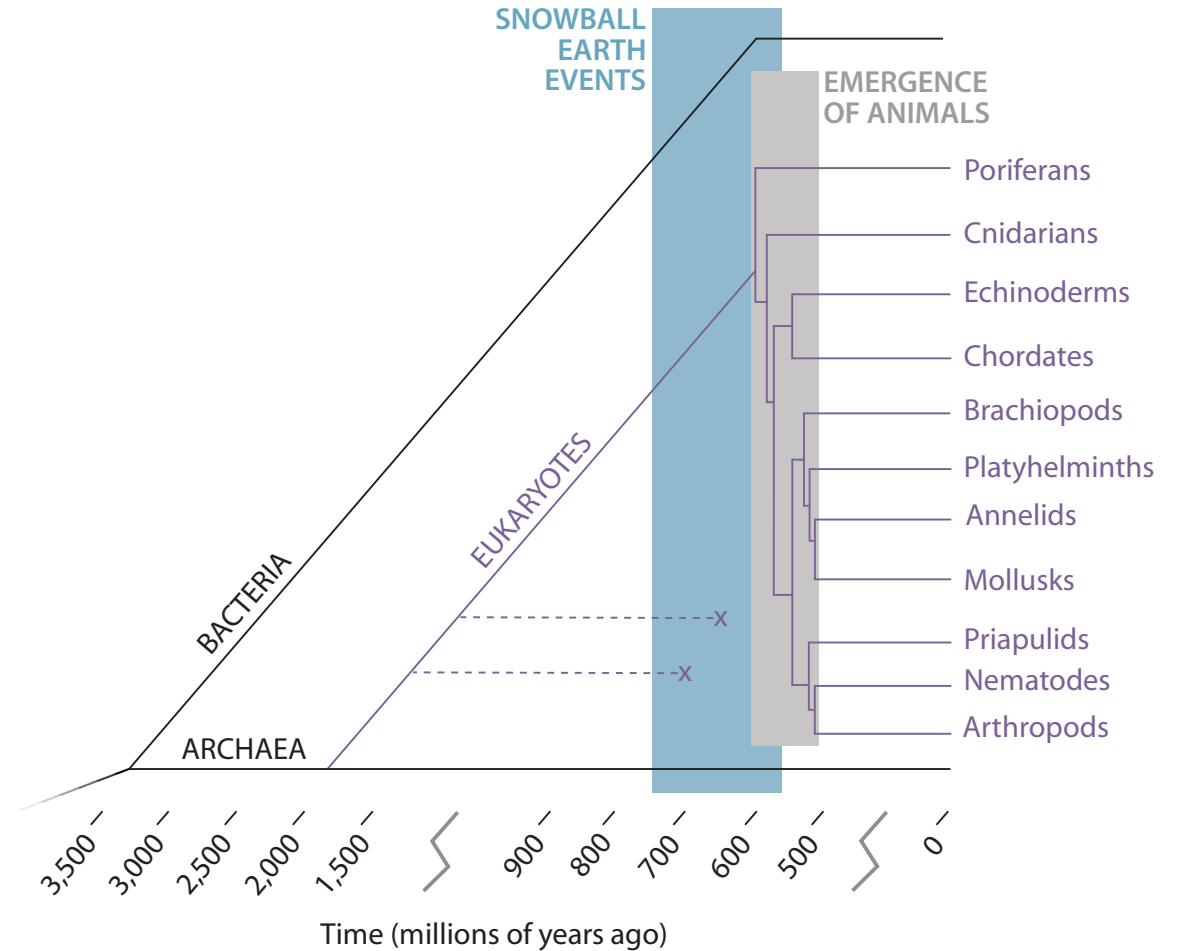
 glacial
sediments
 unconformity
 Ediacaran
fossils
 carbonate-rich

 carbonate-poor

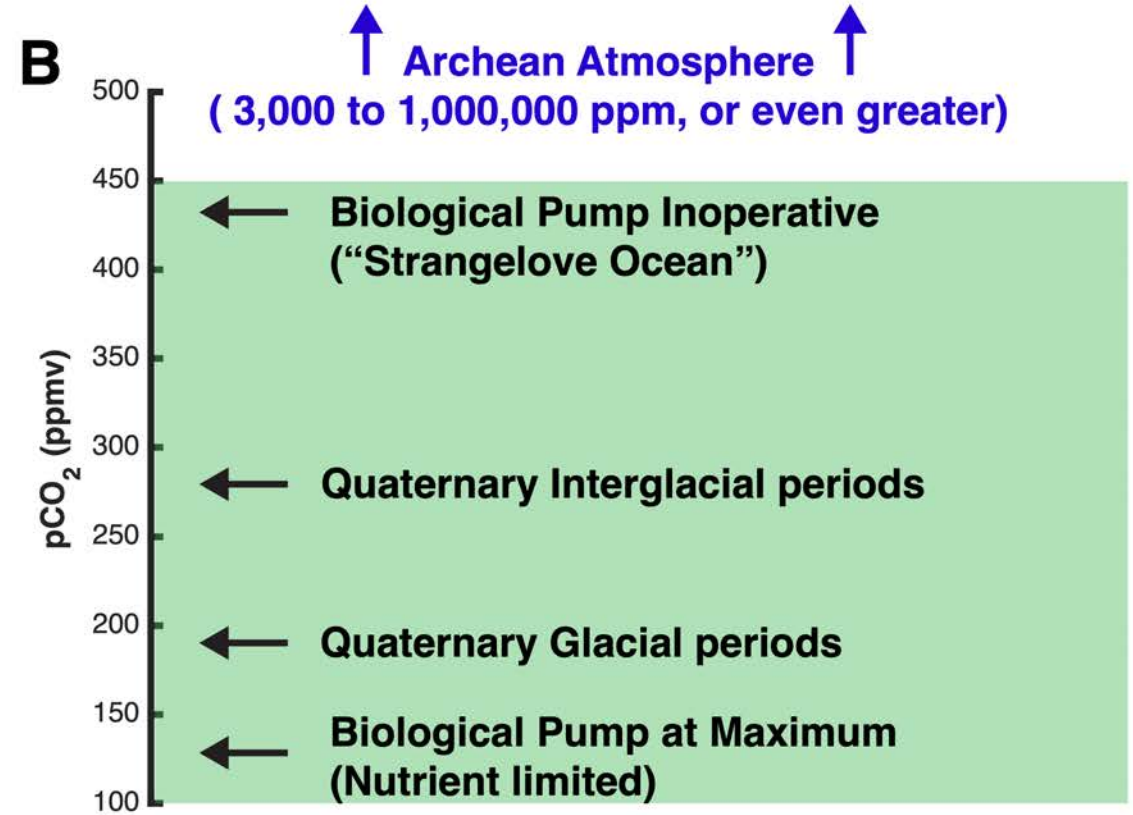
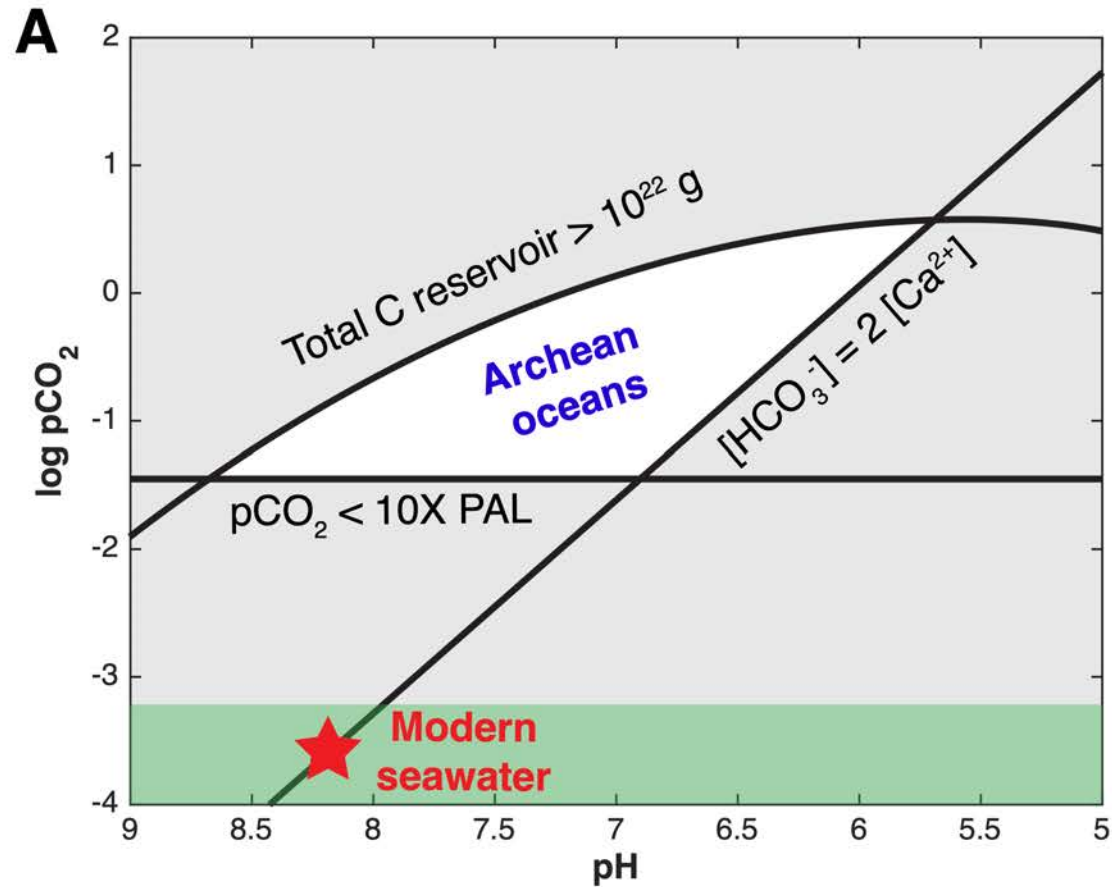
Climats extrêmes du passé: exemple de la Terre “Boule de Neige”

La Terre “Boule de Neige”

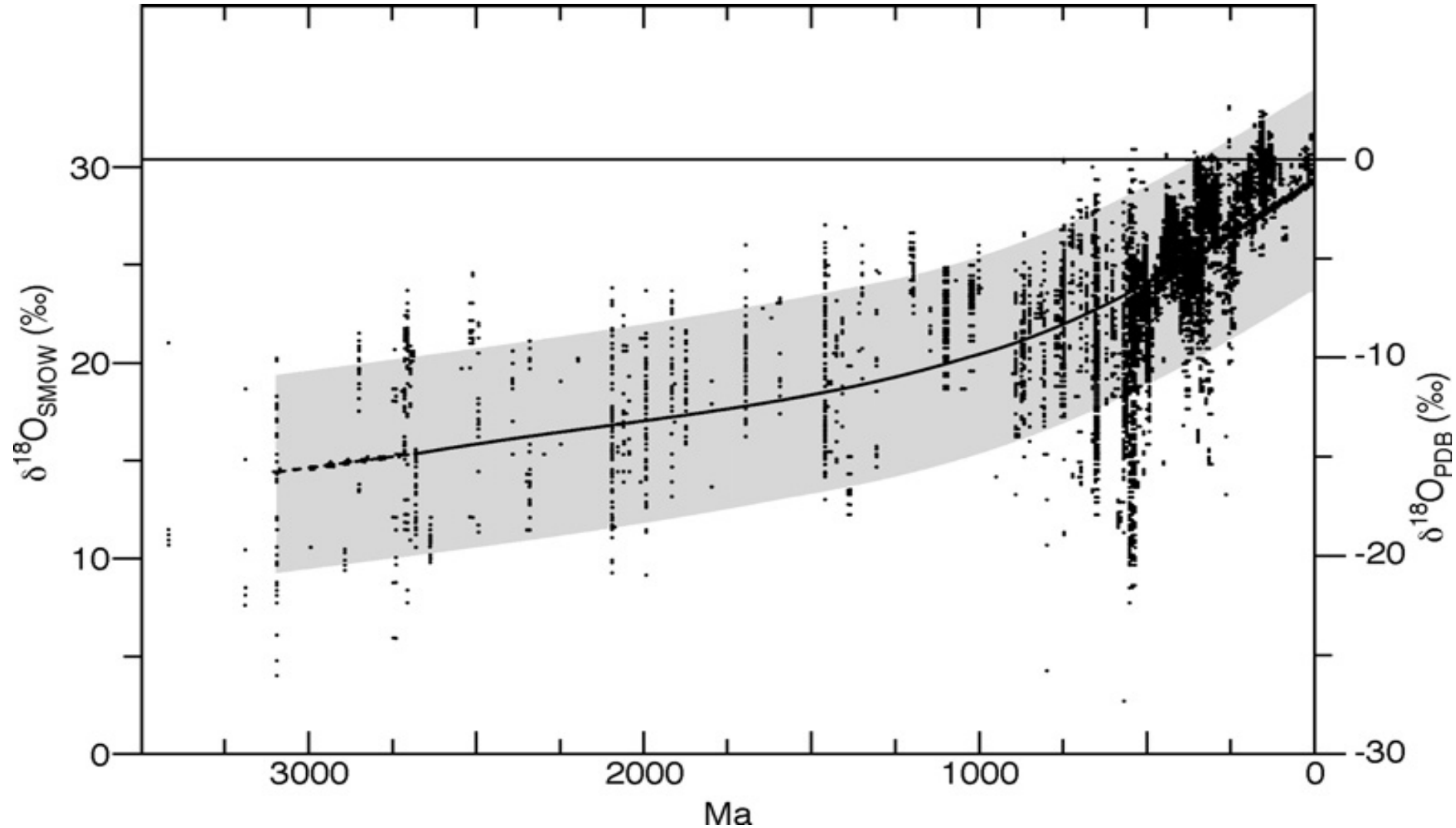
Snowball Earth



Remontons encore plus loin... il était comment le climat sur Terre à l'Archéen, il y a 3 milliards d'années?

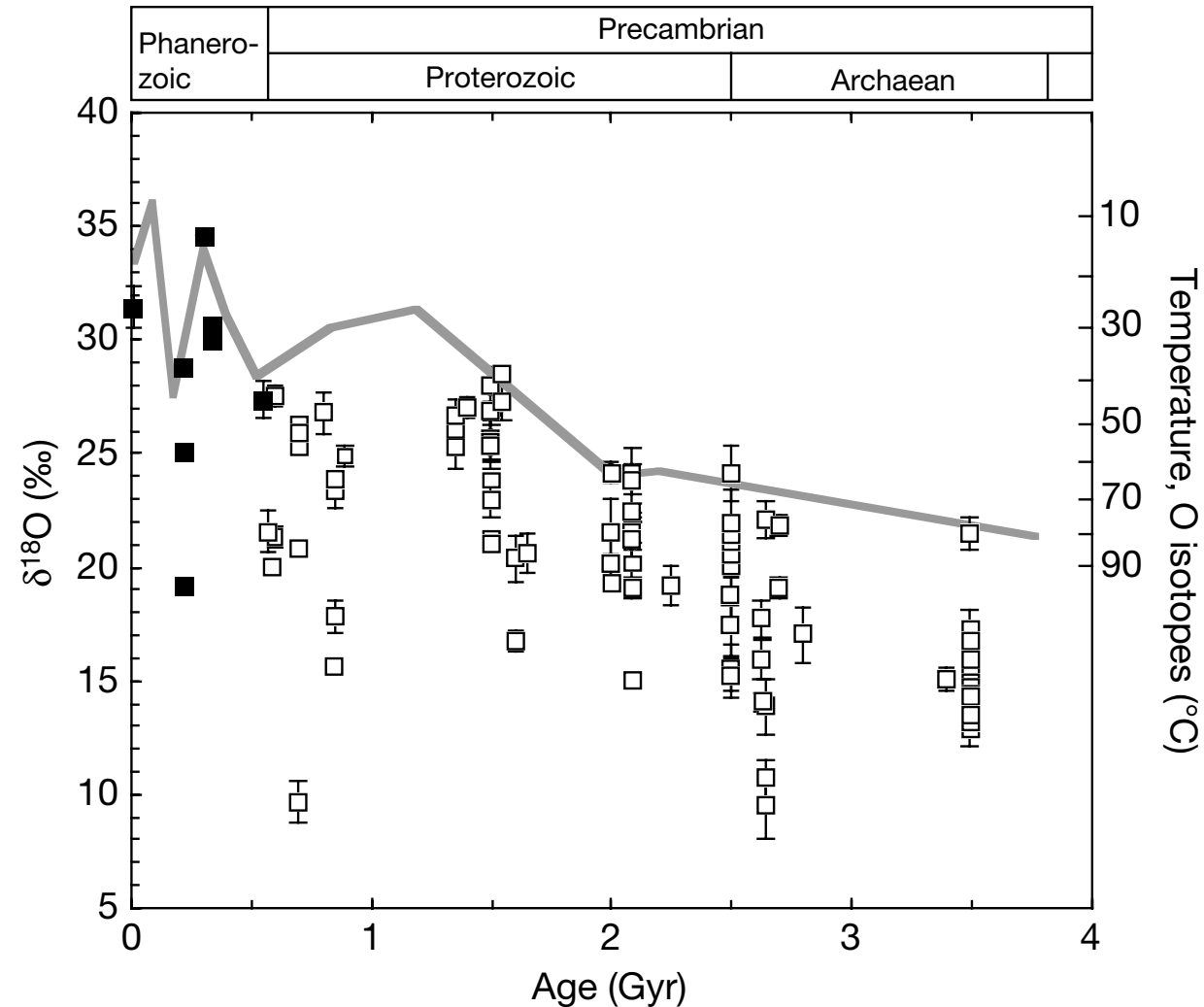


Remontons encore plus loin... il était comment le climat sur Terre à l'Archéen, il y a 3 milliards d'années?



Compilation selon Kasting et al. (2006) *EPSL*

Remontons encore plus loin... il était comment le climat sur Terre à l'Archéen, il y a 3 milliards d'années?

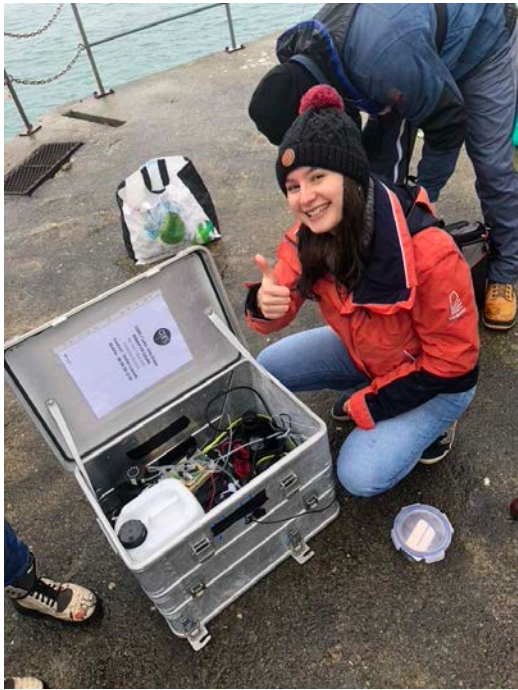


Le besoin d'échanger l'expertise... et de repousser les frontières analytiques

Exemple: Le Pôle Spectrométrie Océan



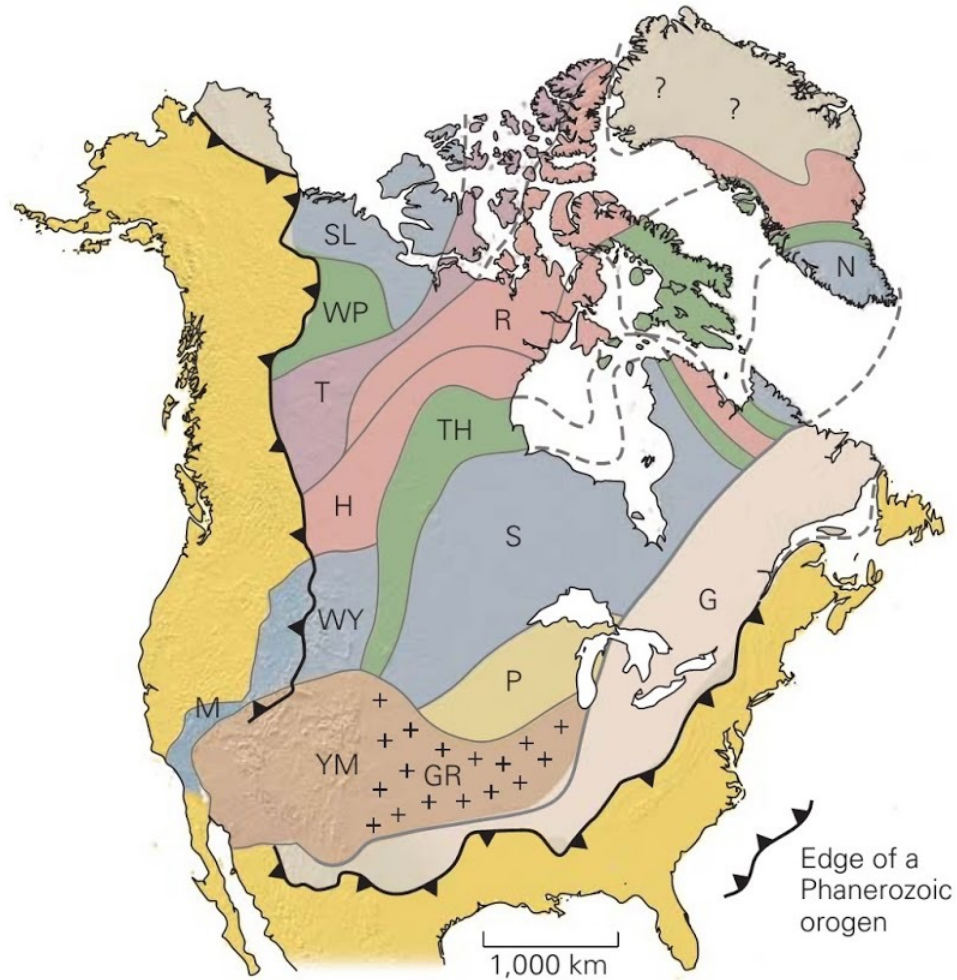
Et de former le future génération de géologues et géochimistes....



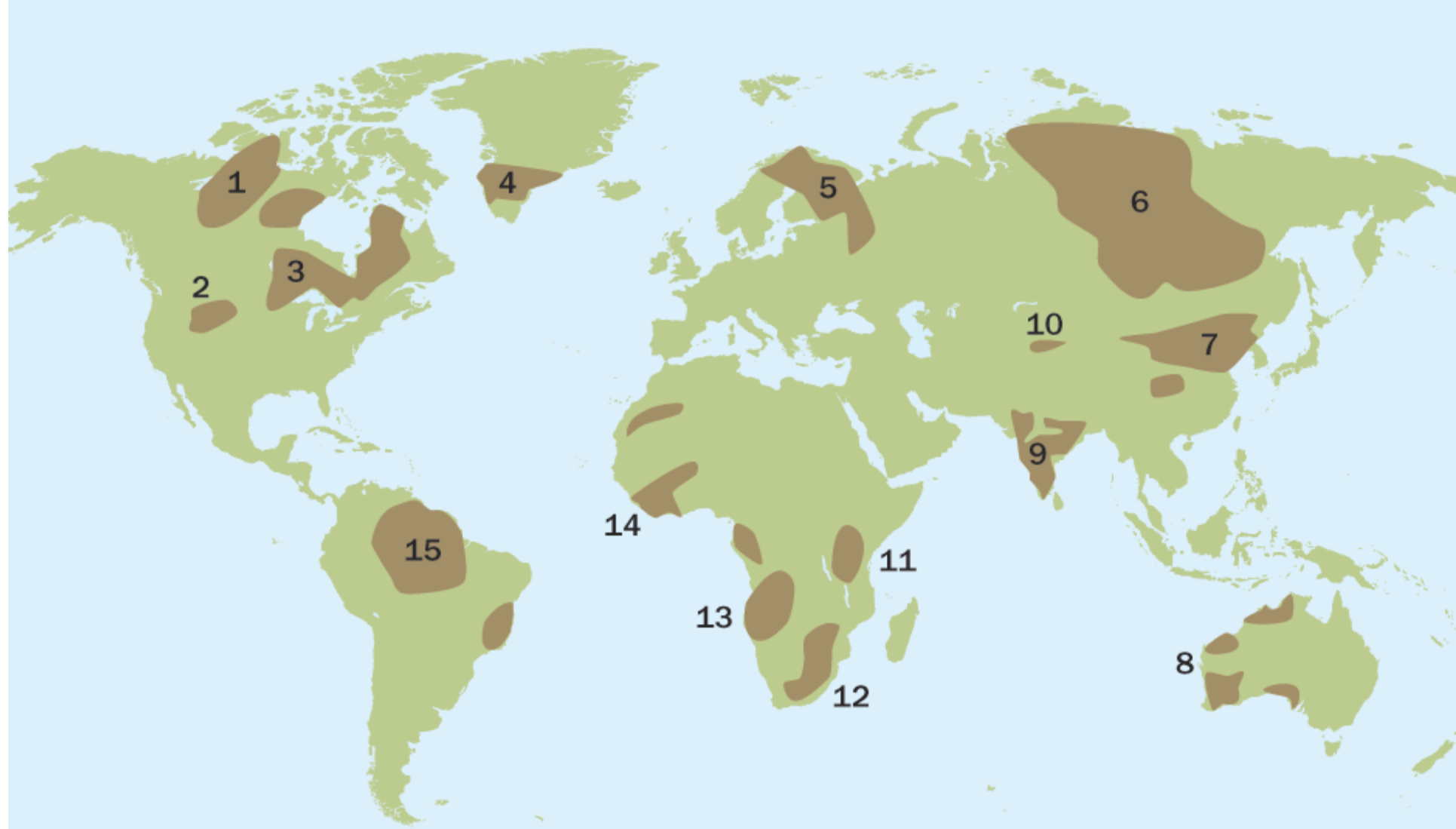
Merci pour votre attention
stefan.lalonde@univ-brest.fr



The North American craton consists of a collage of different belts and blocks stitched together during collisional and accretionary orogenies of Precambrian time.



- Phanerozoic orogen
- 1.1-Ga collisional orogen (G = Grenville)
- 1.6- to 1.7-Ga accreted crust covered by granite and rhyolite, where patterned (GR = granite-rhyolite province)
- 1.6- to 1.7-Ga accreted crust (YM = Yavapai and Mazatzal)
- 1.8-Ga accreted crust (P = Penokean)
- 1.8-Ga collisional orogen (TH = Trans-Hudson; WP = Wopmay)
- 1.9-Ga collisional orogen (T = Thelon)
- Archean rocks, later deformed and metamorphosed in the Proterozoic (H = Hearn; R = Rae)
- Relicts of Archean crust (WY = Wyoming; M = Mojave; S = Superior; N = Nain; SL = Slave)



1: Slave
2: Wyoming
3: Superior
4: Greenland

5: Fennoscandian
6: Siberian
7: North China
8: West Australian

9: Indian
10: Tarim
11: Tanzanian
12: South African (Kaapvaal)

13: Congo
14: West African
15: Amazonia