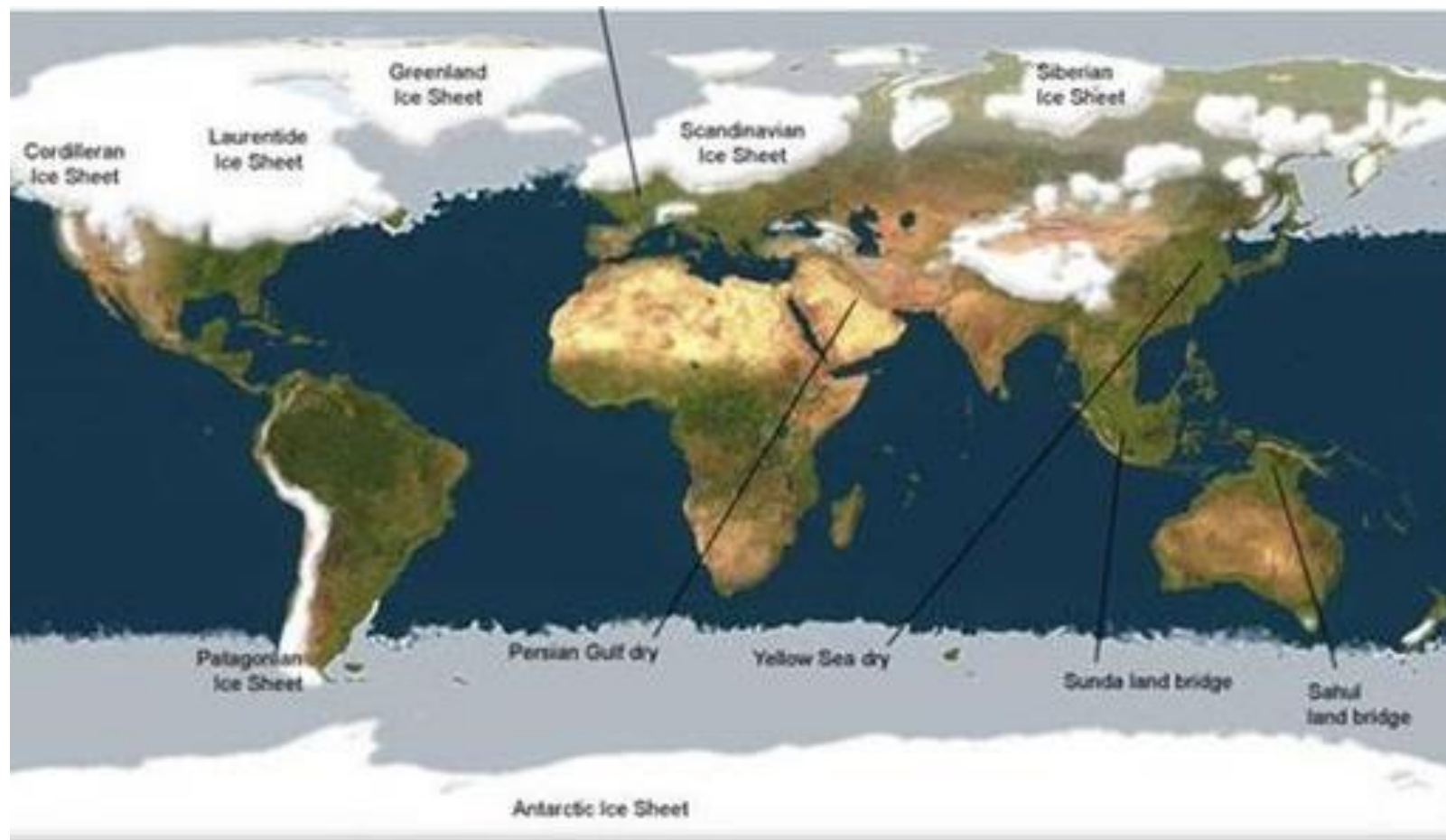




UFOP

Universidade Federal  
de Ouro Preto

# Eventos climáticos dos últimos 20 mil anos impactos nos biomas brasileiros



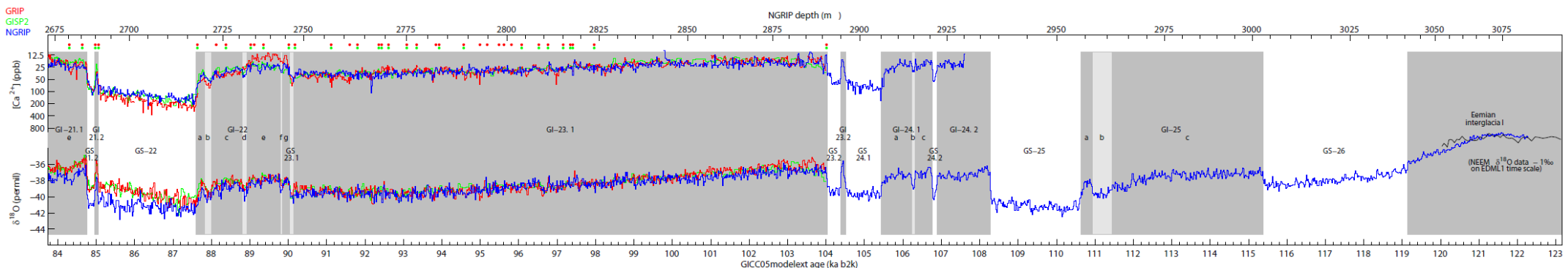
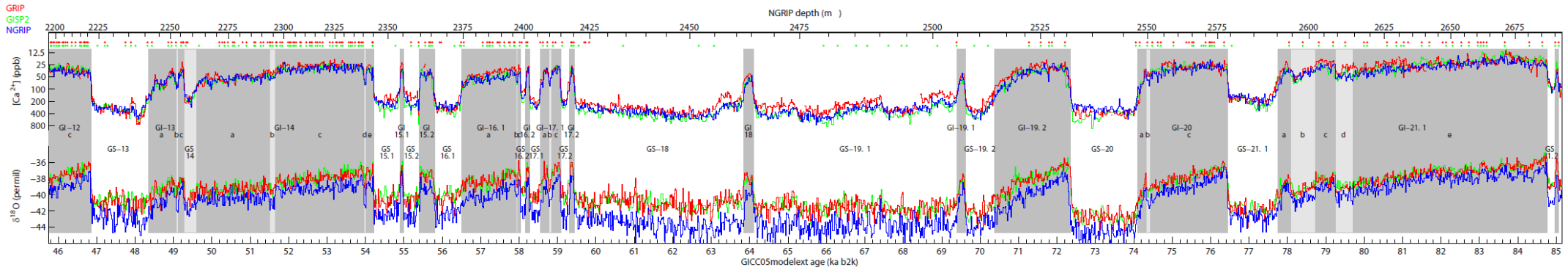
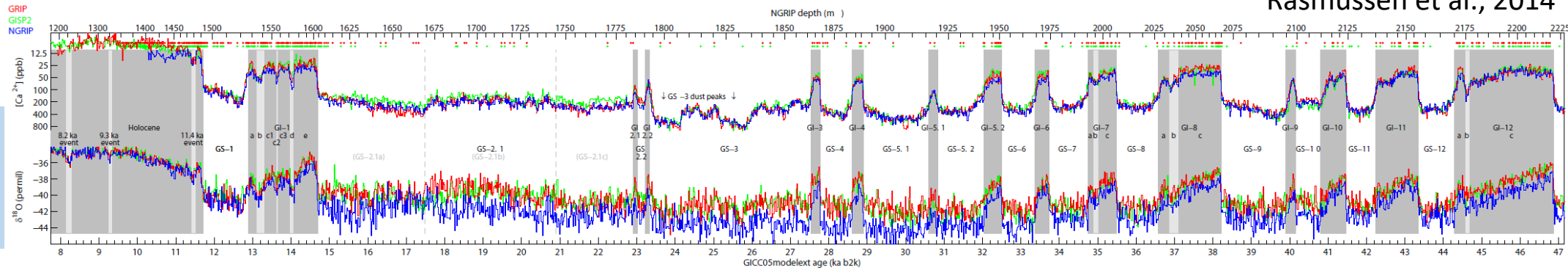
**Prof<sup>a</sup>. Raquel Cassino**  
**Departamento de Geologia / Escola de Minas**  
**Universidade Federal de Ouro Preto**

# Eventos climáticos de escala milenar

- Eventos Dansgaard-Oeschger (D-O)
- Eventos estadiais (*Greenland Stadials - GS*) / interestadiais (*Greenland Interstadials - GI*)

Rasmussen et al., 2014

25 transições abruptas durante a última glaciação

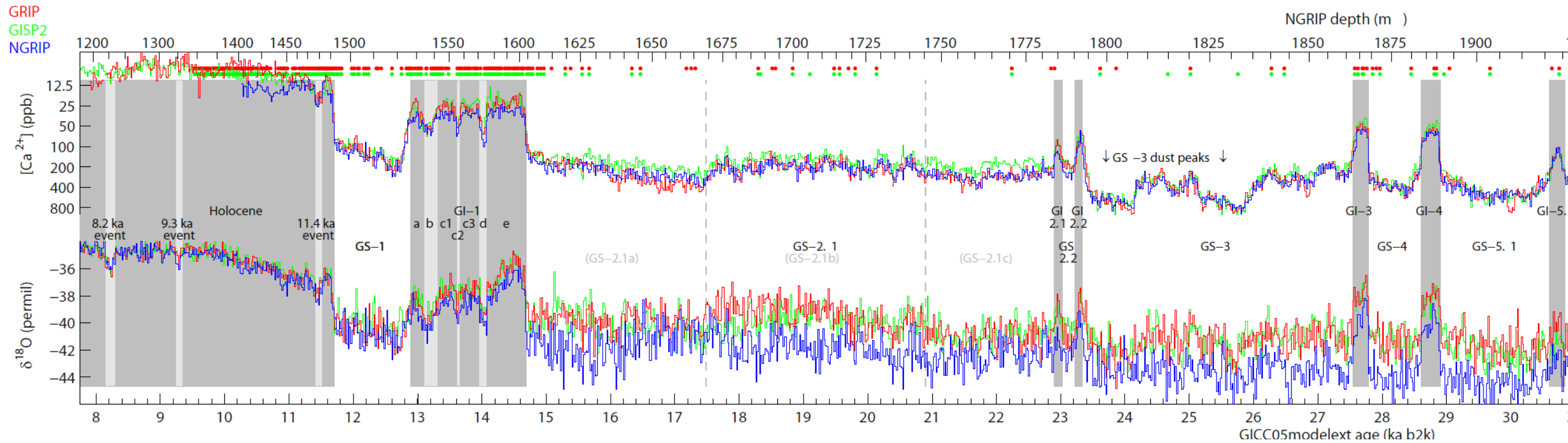


Steffensen et al., 2008

# Eventos climáticos de escala milenar

- Interestaduais (GI) – clima ameno
- Aquecimento abrupto, seguido de resfriamento gradual com fim abrupto

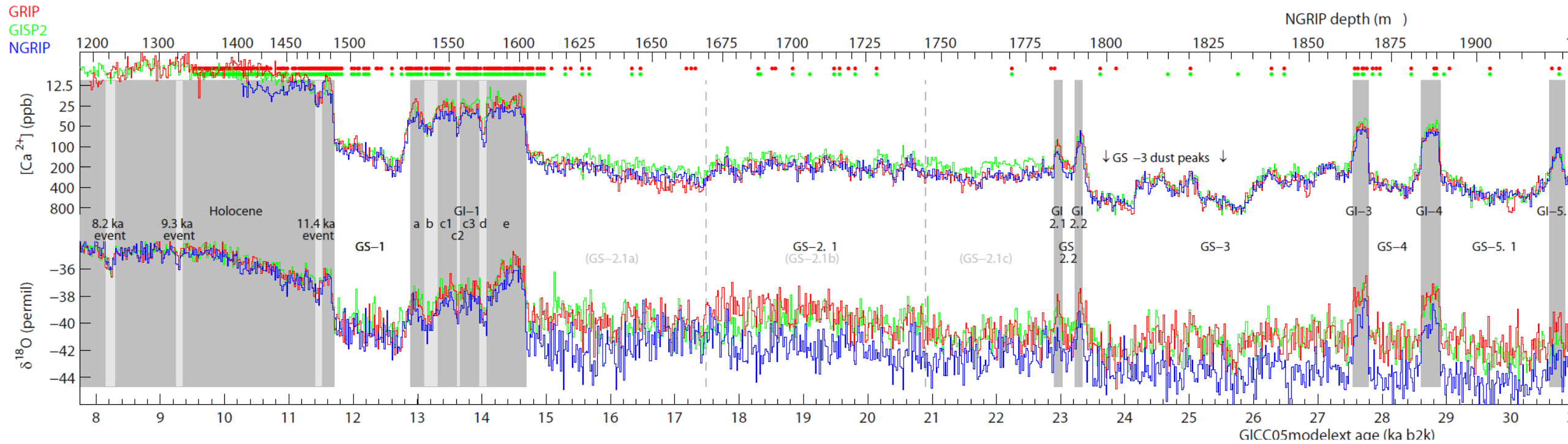
Rasmussen et al., 2014



# Eventos climáticos de escala milenar

- Estadiais (GS) – full glacial
- Temperaturas mais estáveis

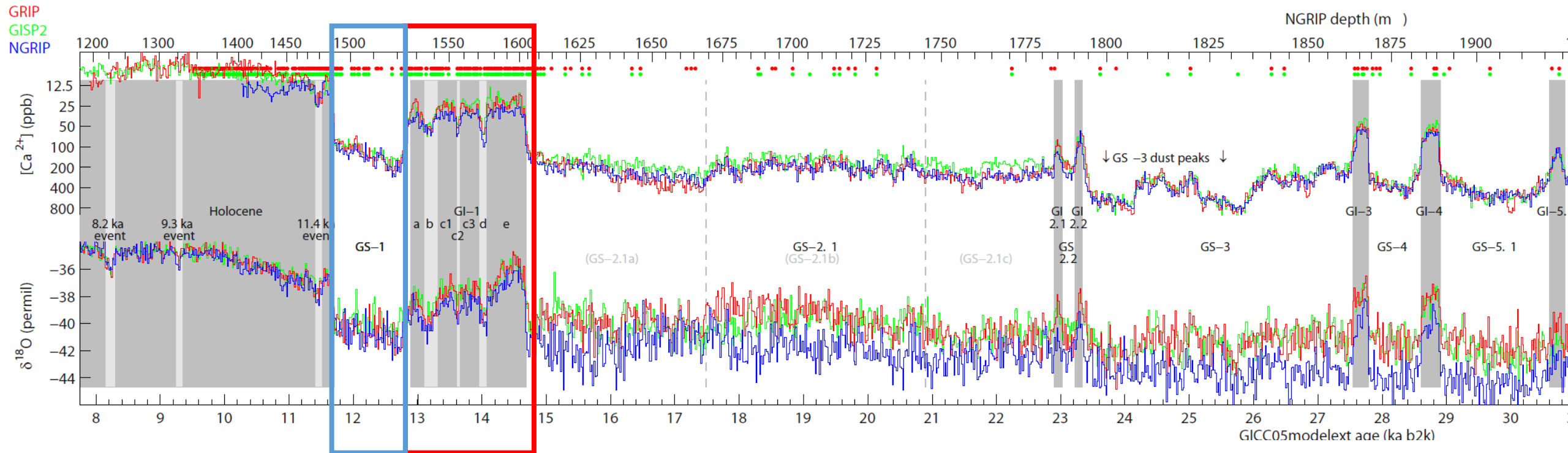
Rasmussen et al., 2014



# Eventos climáticos de escala milenar

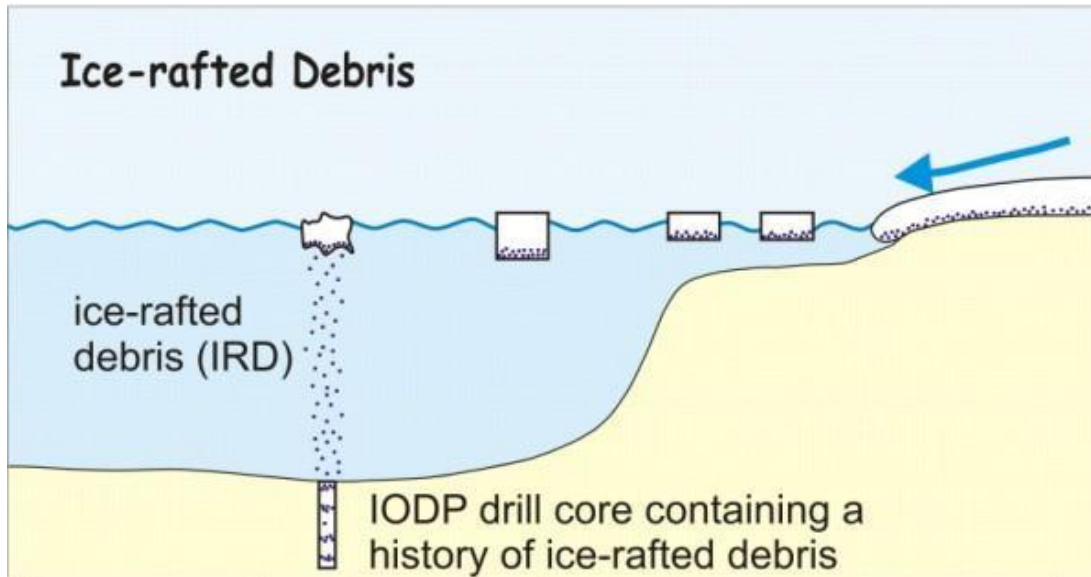
- Bolling-Allerod ~ GI-1
- Younger Dryas ~ GS-1

Rasmussen et al., 2014



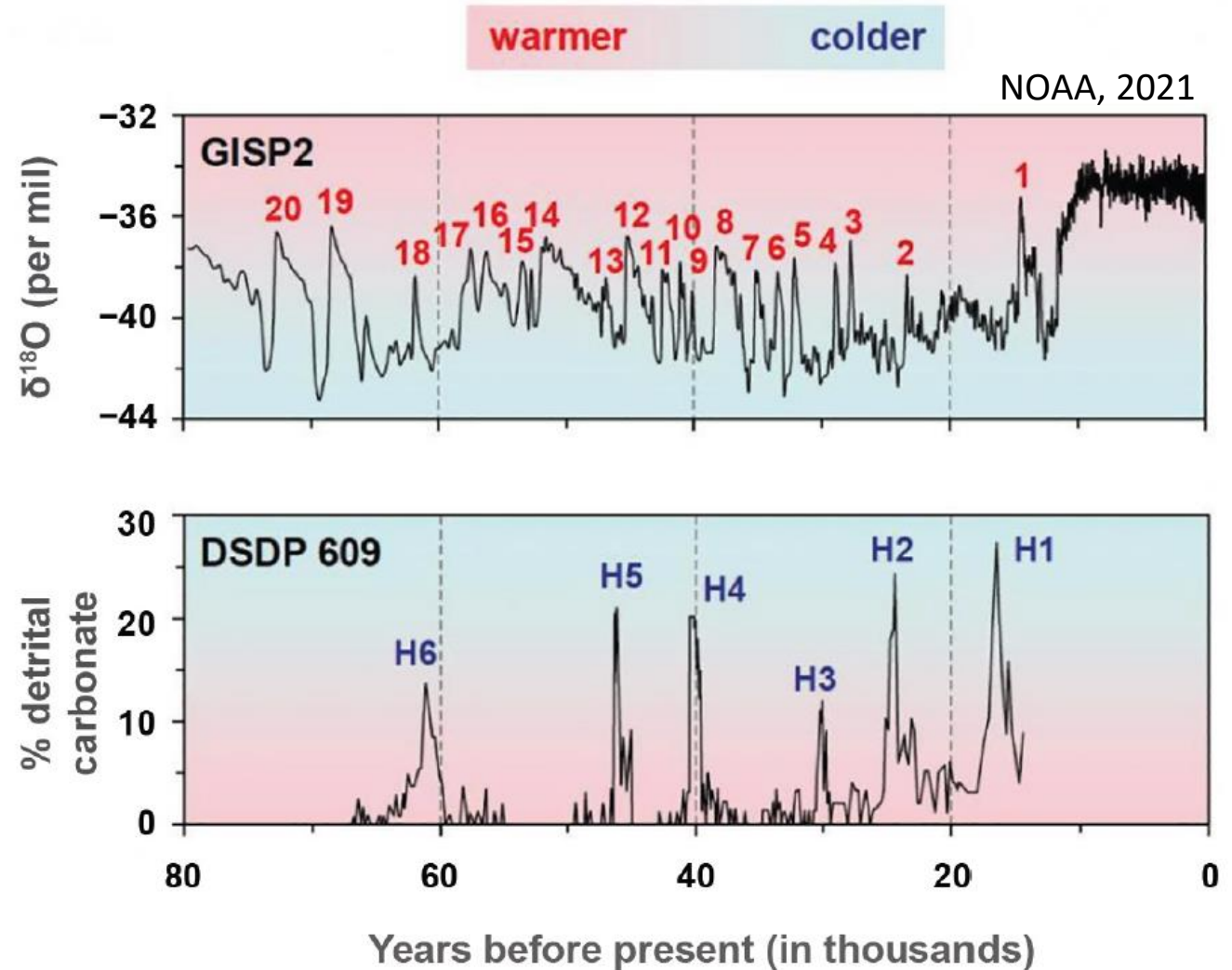
# Eventos climáticos de escala milenar

- Eventos Heinrich (HS)
- Deposição de detritos transportados pelo gelo no Atlântico Norte



Peter Hollinger, Greenland 2003

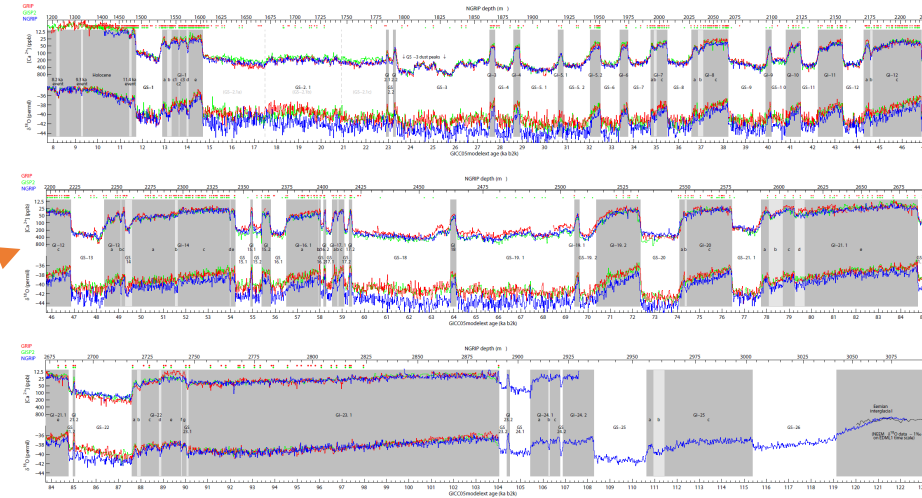
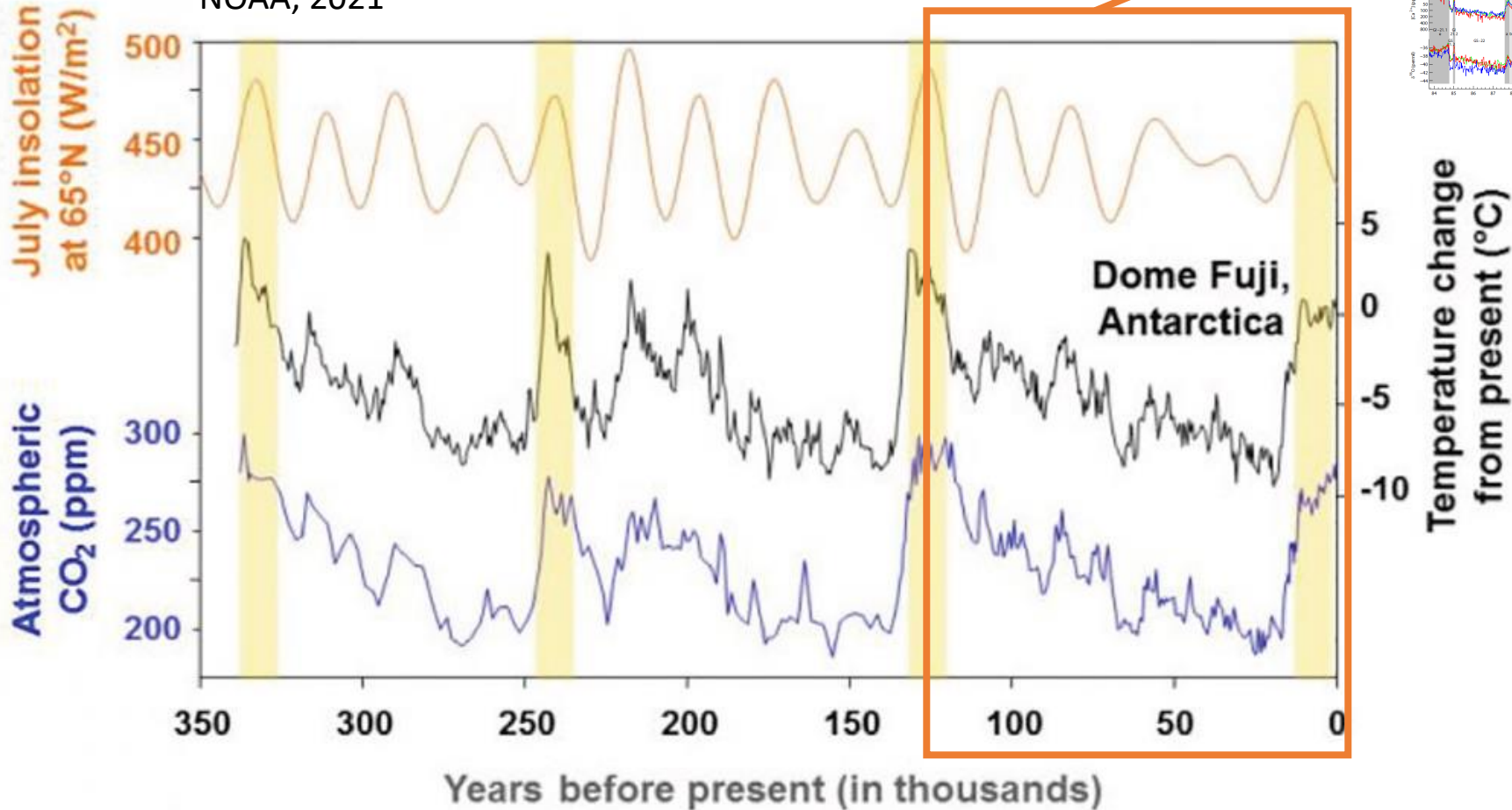
Blog Imperial College



# Eventos climáticos de escala milenar

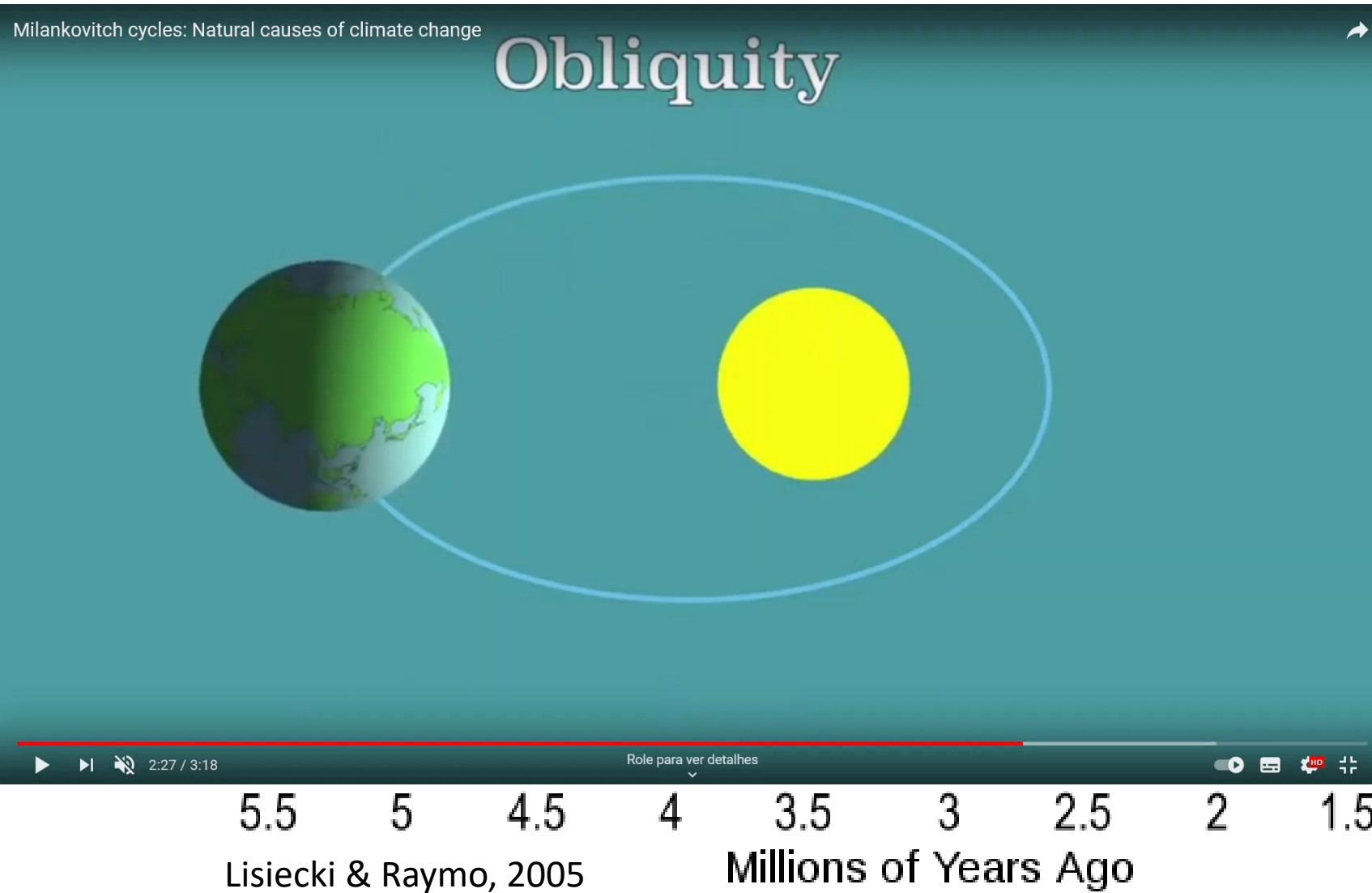
- Ciclos de escala orbital

NOAA, 2021

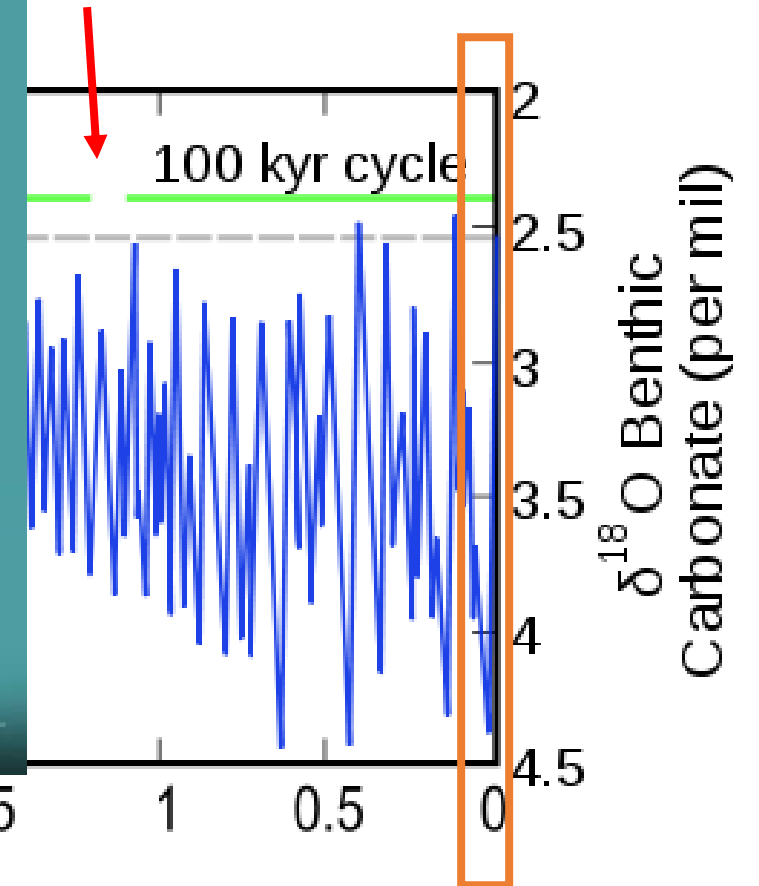


# Eventos climáticos de escala milenar

- Ciclos de escala orbital



“Eocene transition”

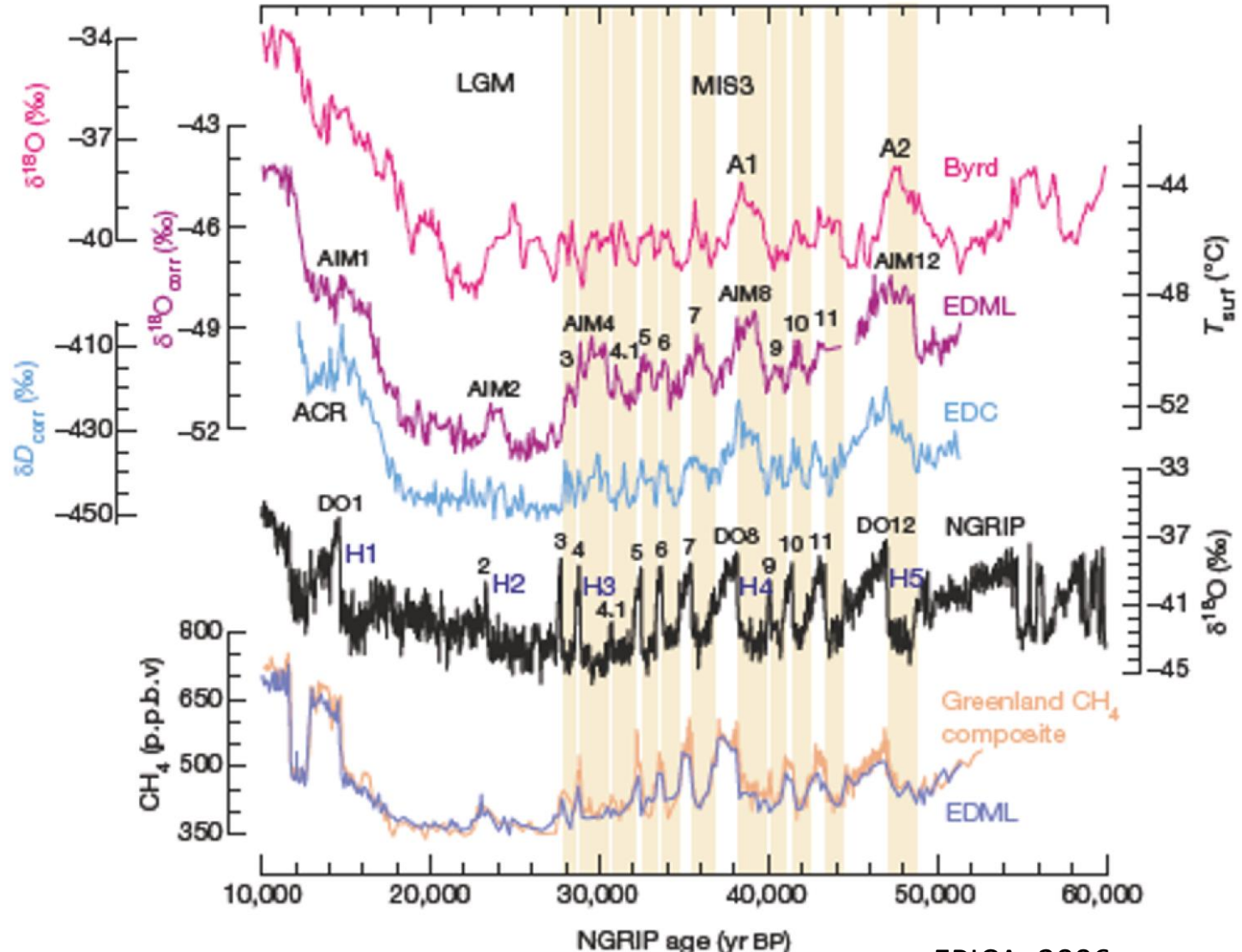
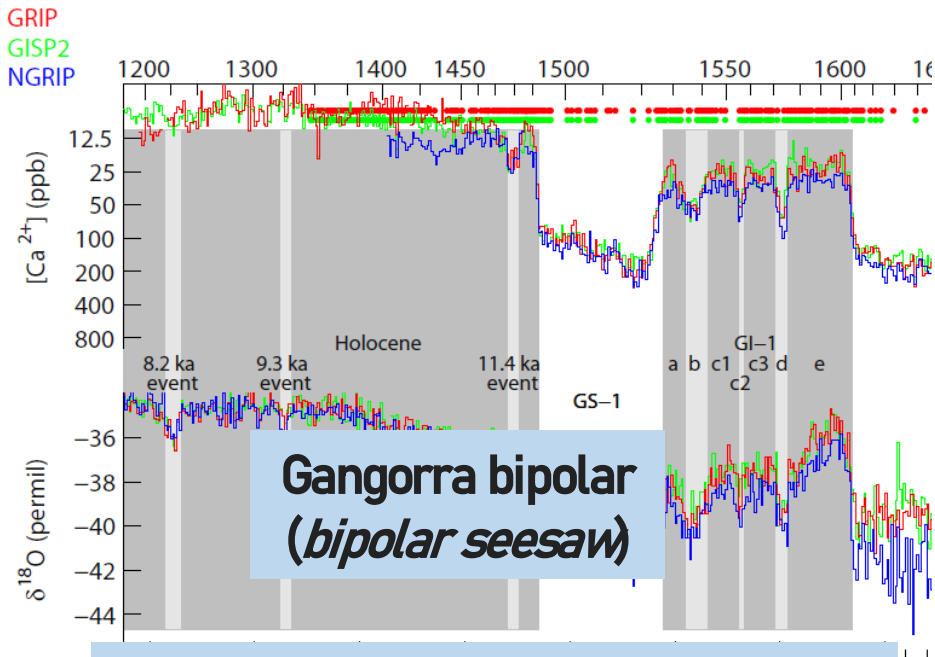




# Eventos climáticos de escala milenar

Rasmussen et al., 2014

- Causas dos eventos de escala milenar



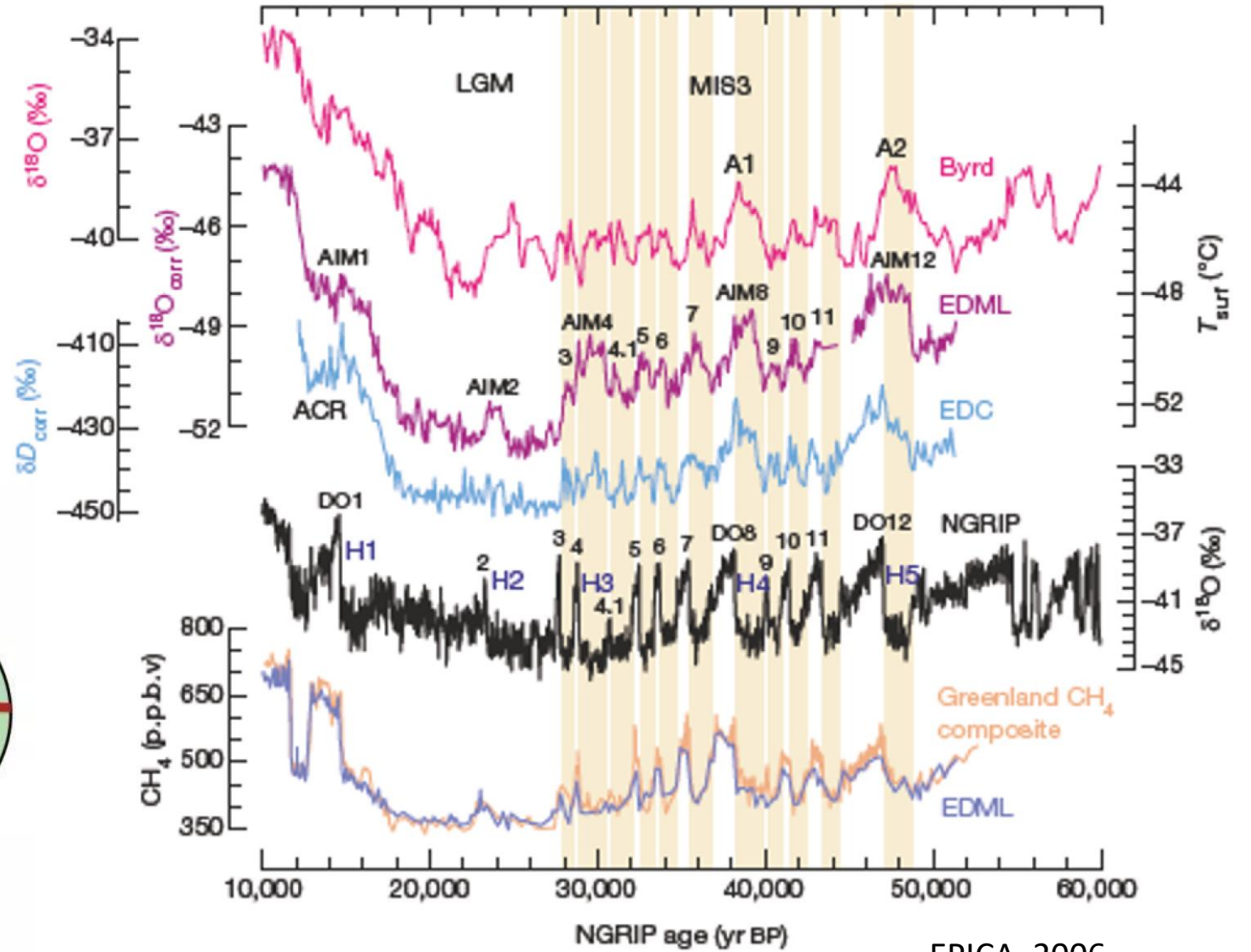
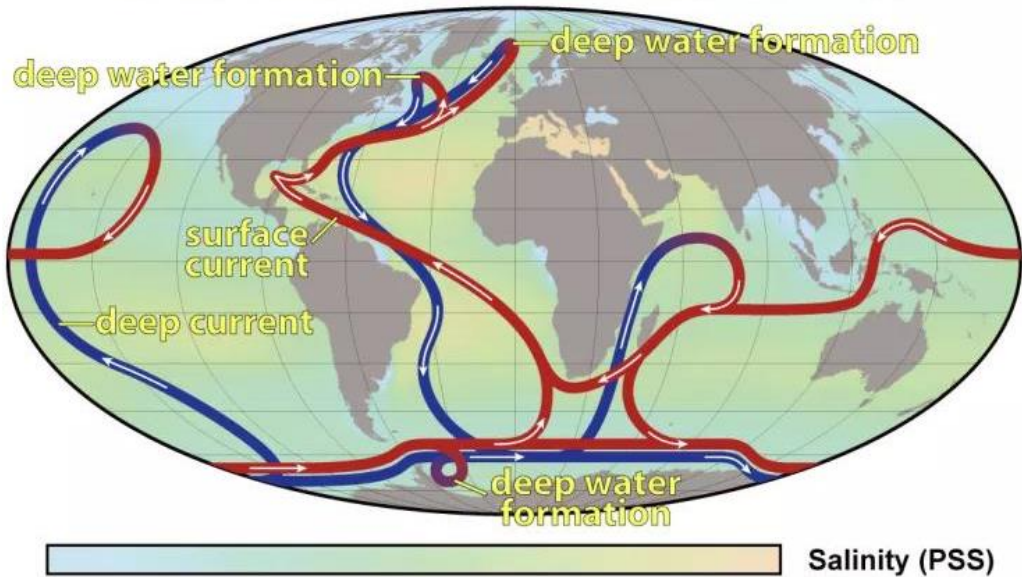
EPICA, 2006

O aquecimento abrupto na Groelândia é concomitante com o início do resfriamento na Antártida

# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar

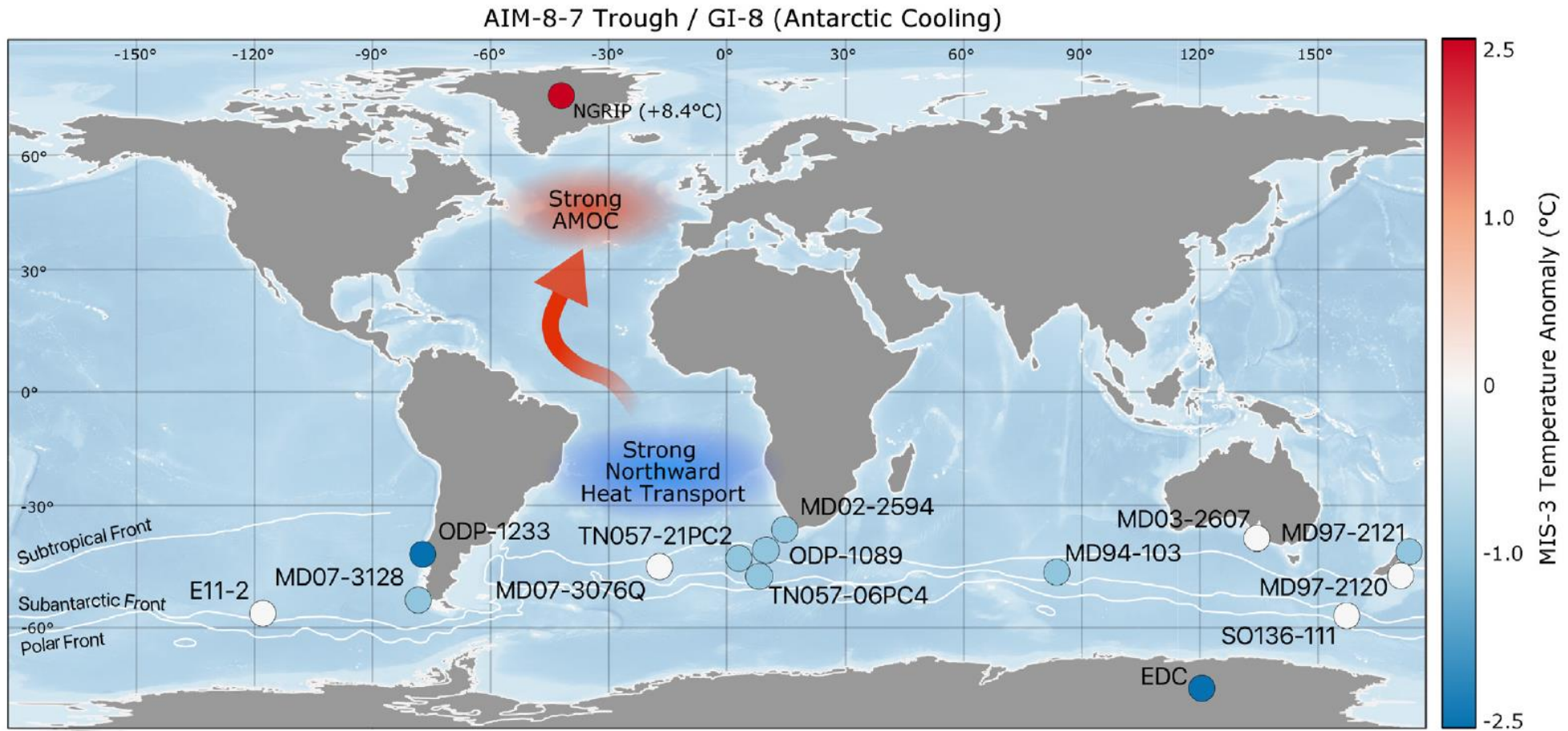
## AMOC – Atlantic Meridional Overturning Circulation



# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar

AMOC – Atlantic Meridional Overturning Circulation

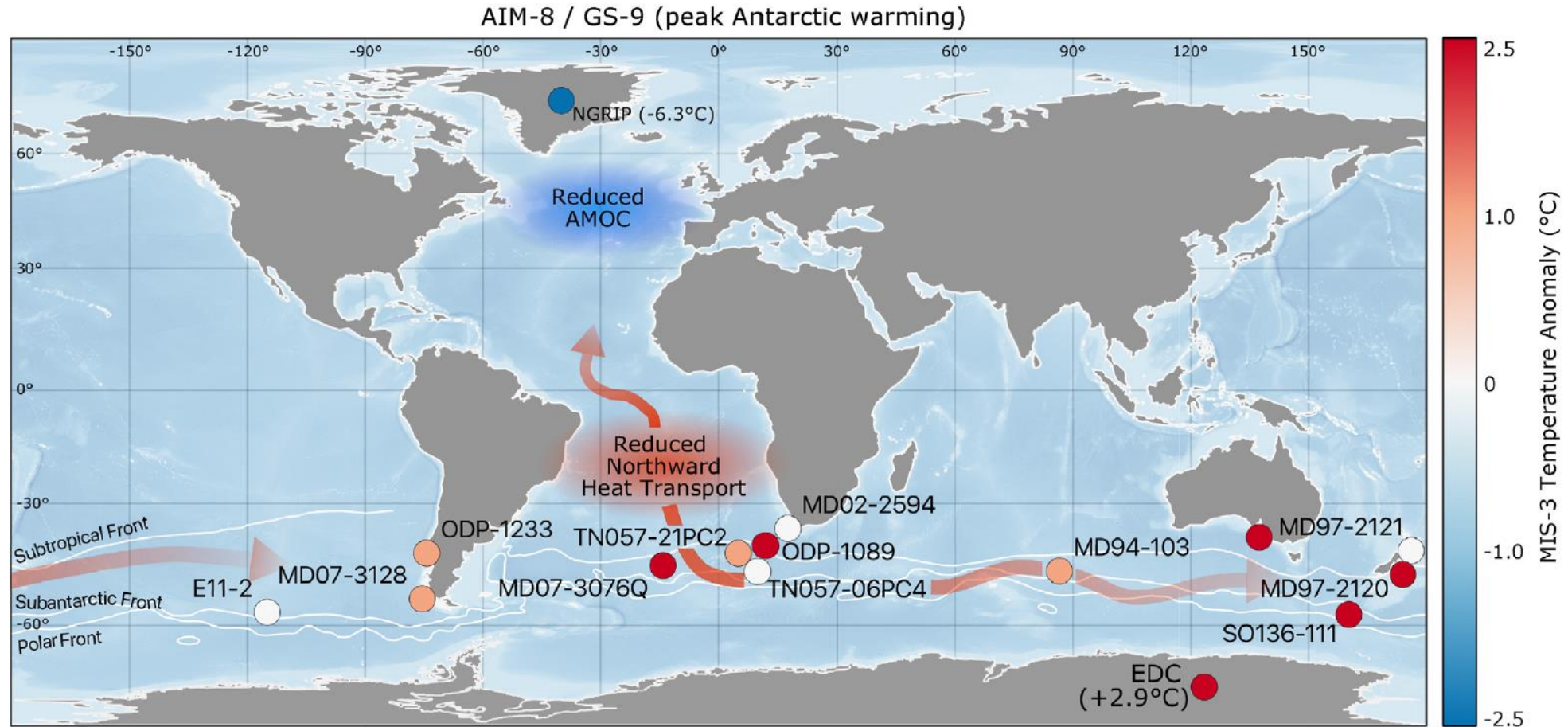


Anderson et al., 2021

# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar

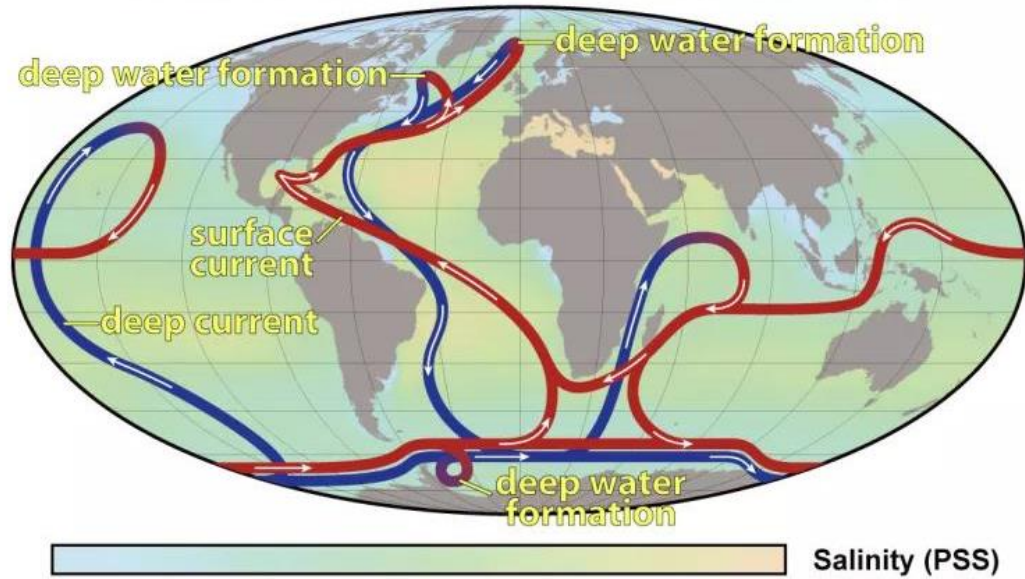
AMOC – Atlantic Meridional Overturning Circulation



Anderson et al., 2021

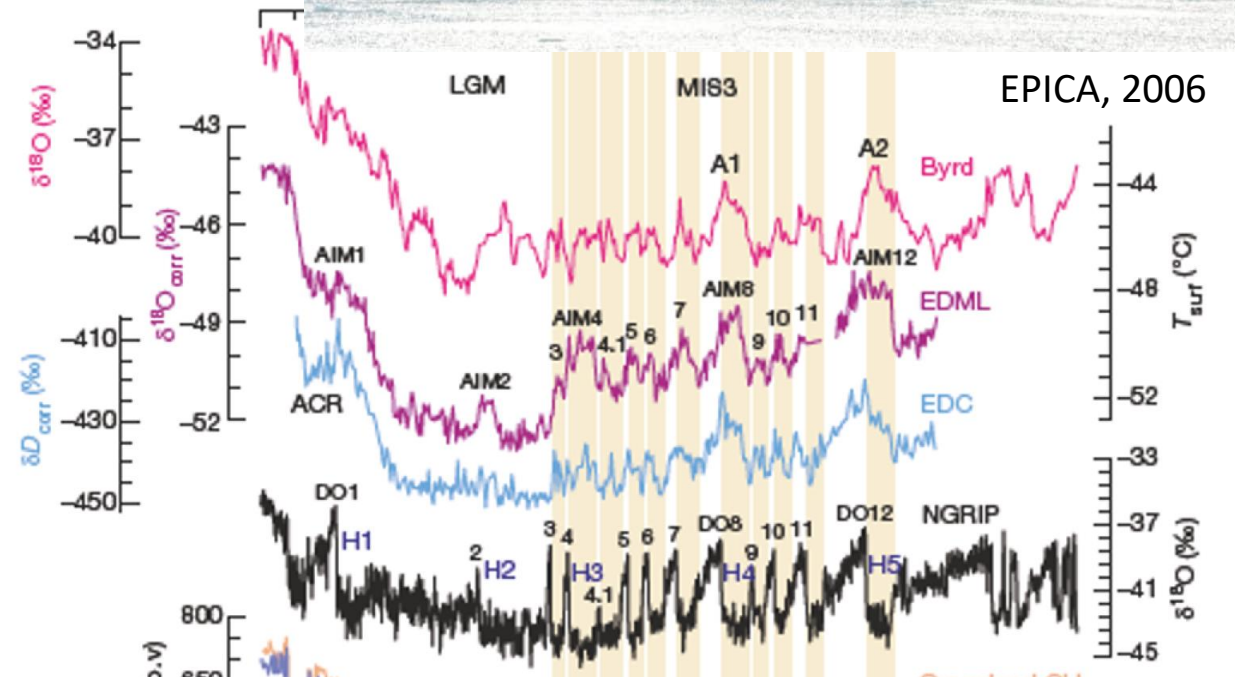
# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar



## Padrão de gangorra bipolar

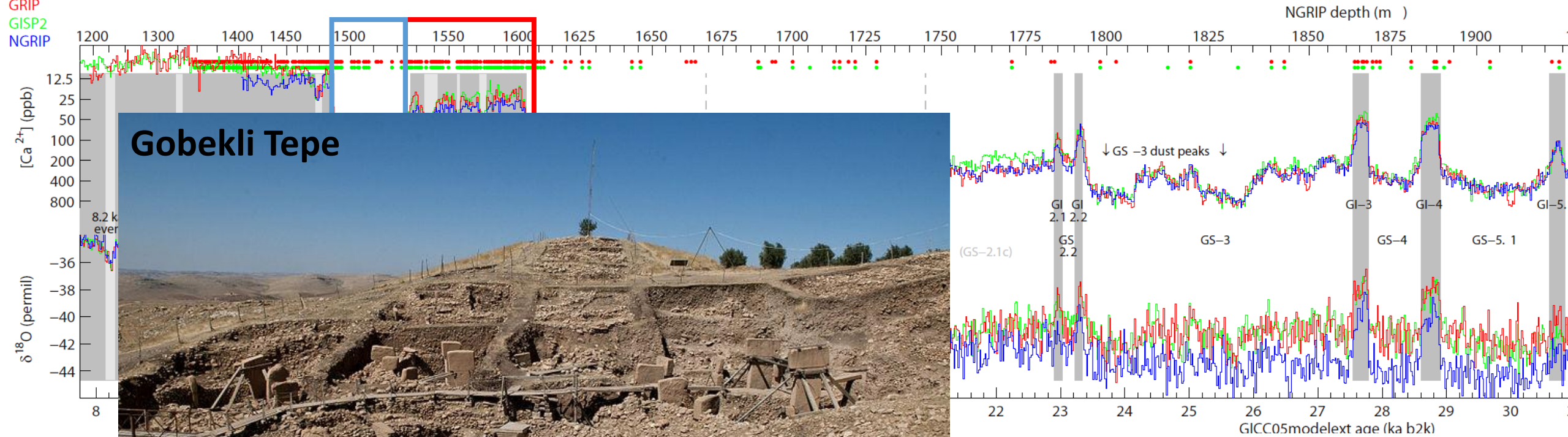
Resposta climática ao enfraquecimento da AMOC com o **Atlântico Sul** se aquecendo sistematicamente em resposta a uma descarga de água-doce aplicada no **Atlântico Norte**



# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar
- Younger Dryas

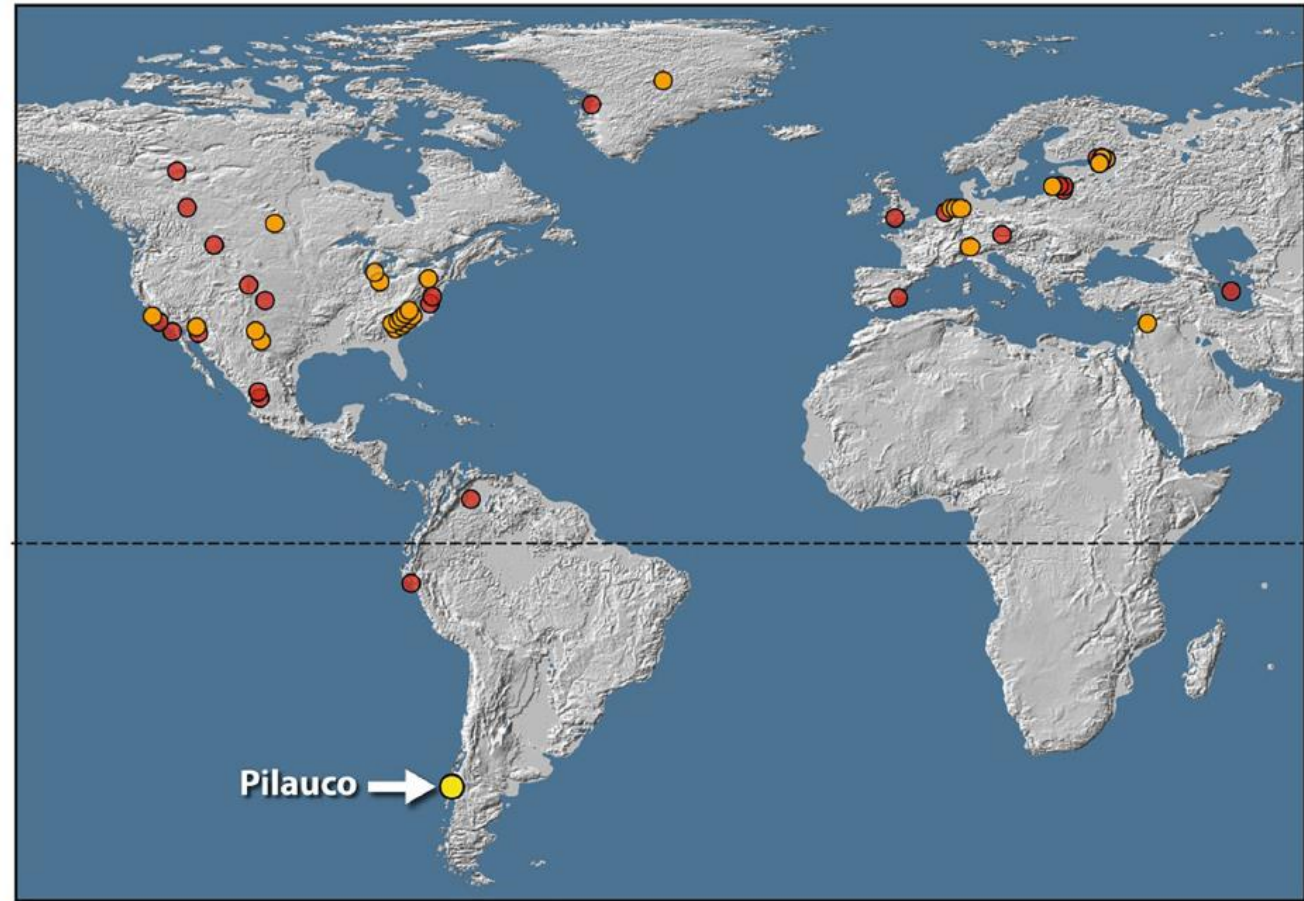
GRIP  
GISP2  
NGRIP



**Hipótese do impacto – YDIH**  
Firestone et al., 2007

# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar
- Younger Dryas



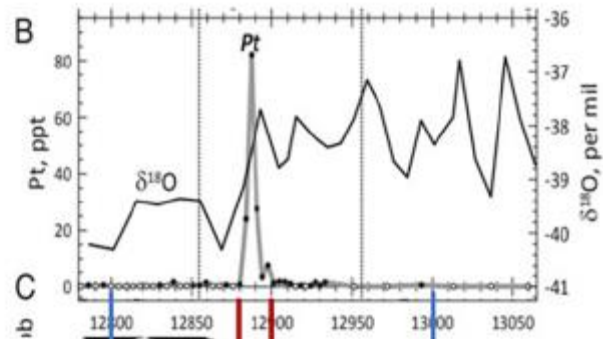
Sweatman, 2021

**Sítios com limite YD com picos de platina e/ou esférulas de impacto de alta temperatura**

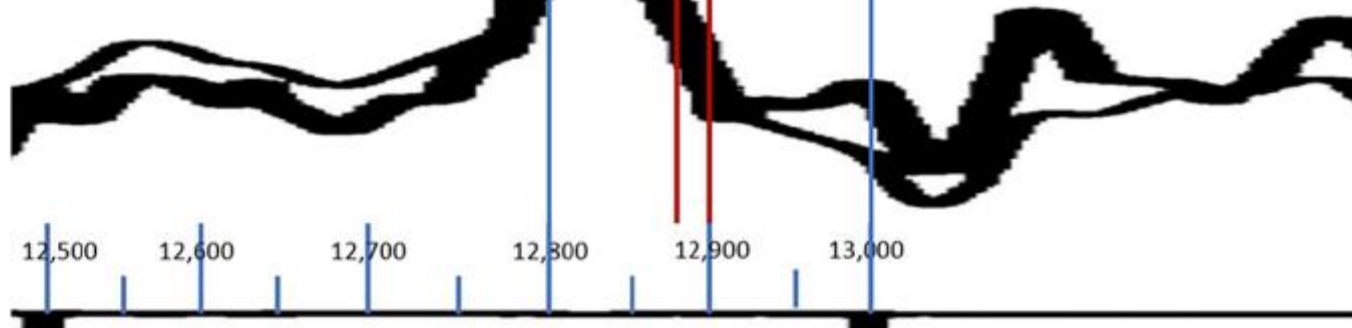
# Eventos climáticos de escala milenar

- Causas dos eventos de escala milenar
- Younger Dryas

Platina



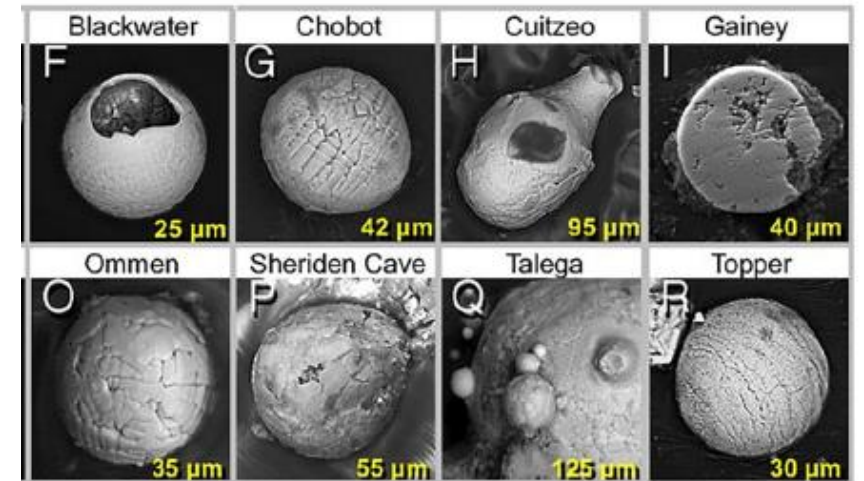
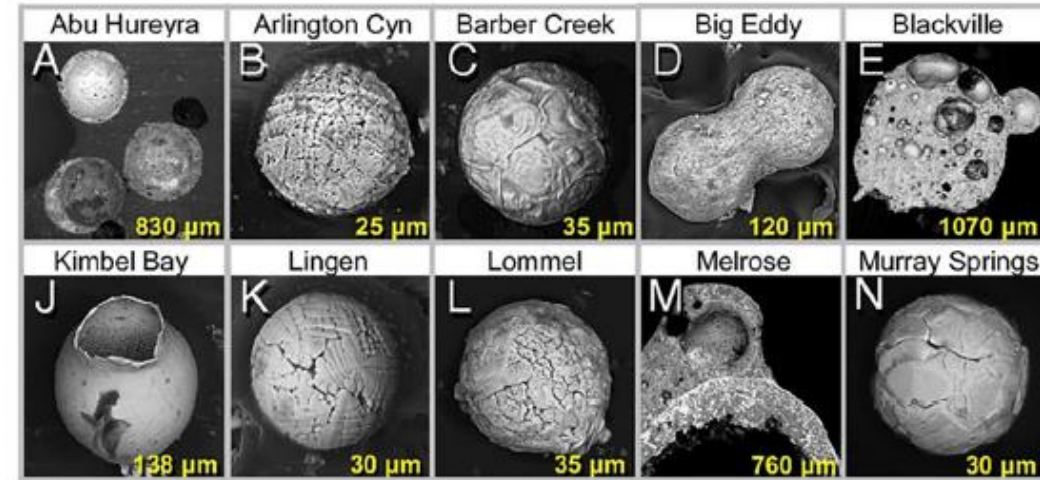
Amônio



12,500

13,000

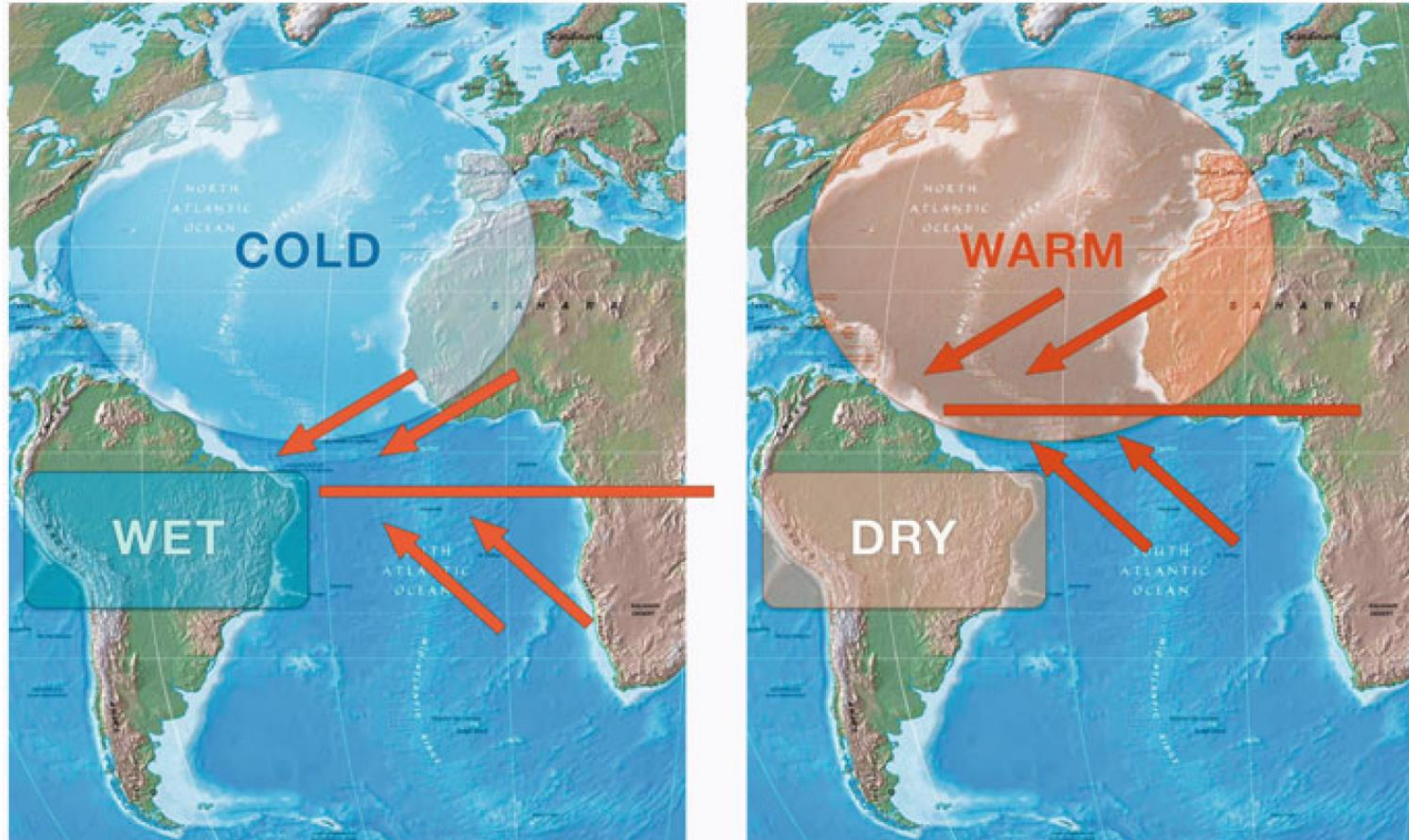
Sweatman, 2021





# Eventos climáticos de escala milenar

- Efeitos nas regiões tropicais



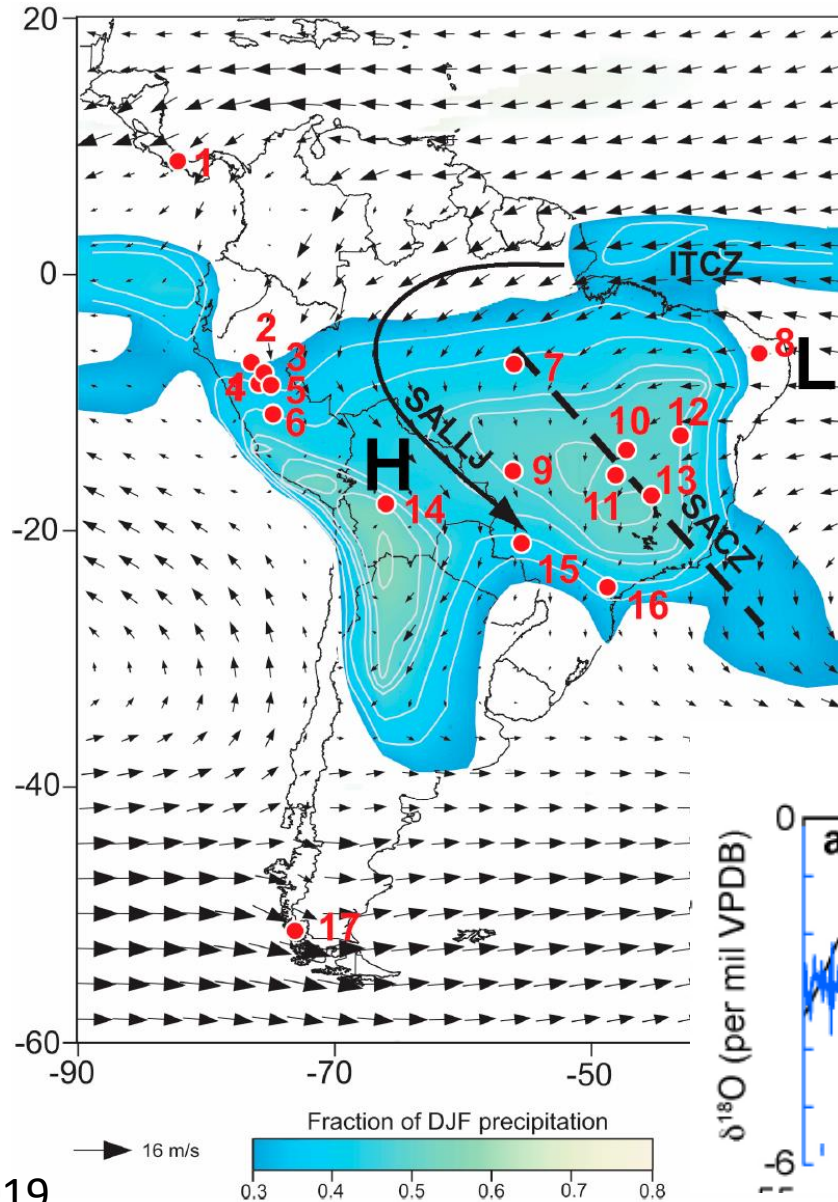
# Eventos climáticos de escala milenar

- Efeitos nas regiões tropicais

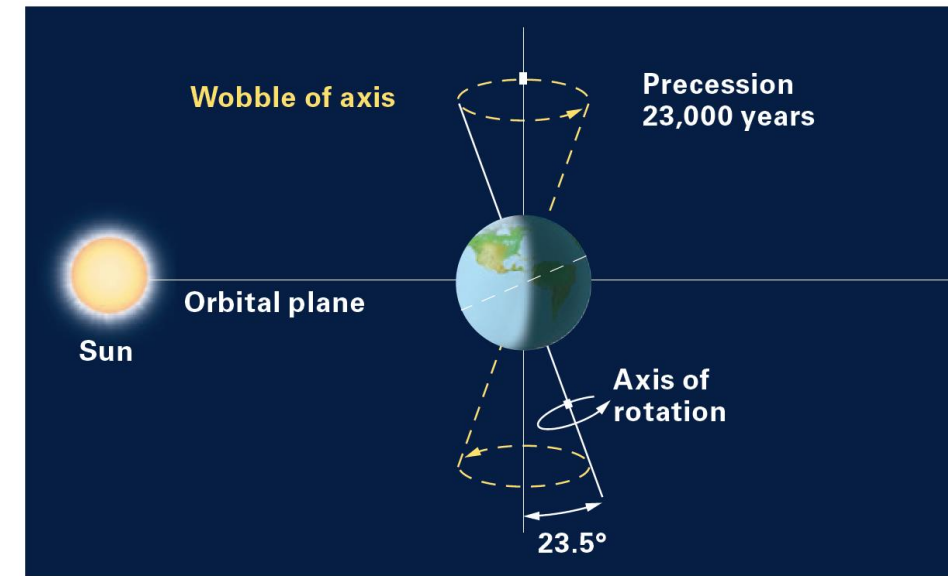
Espeleotemas

Volume de precipitação

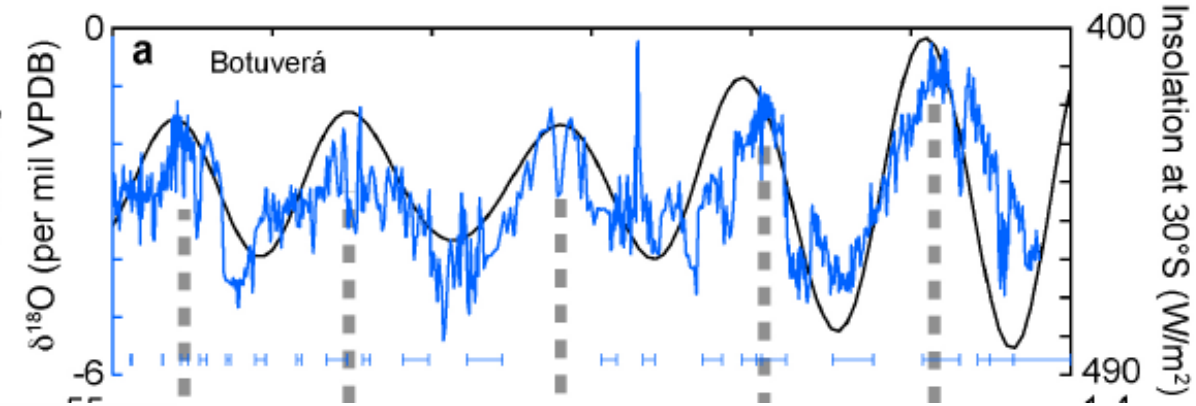
ITCZ e SAMS



Deininger et al., 2019

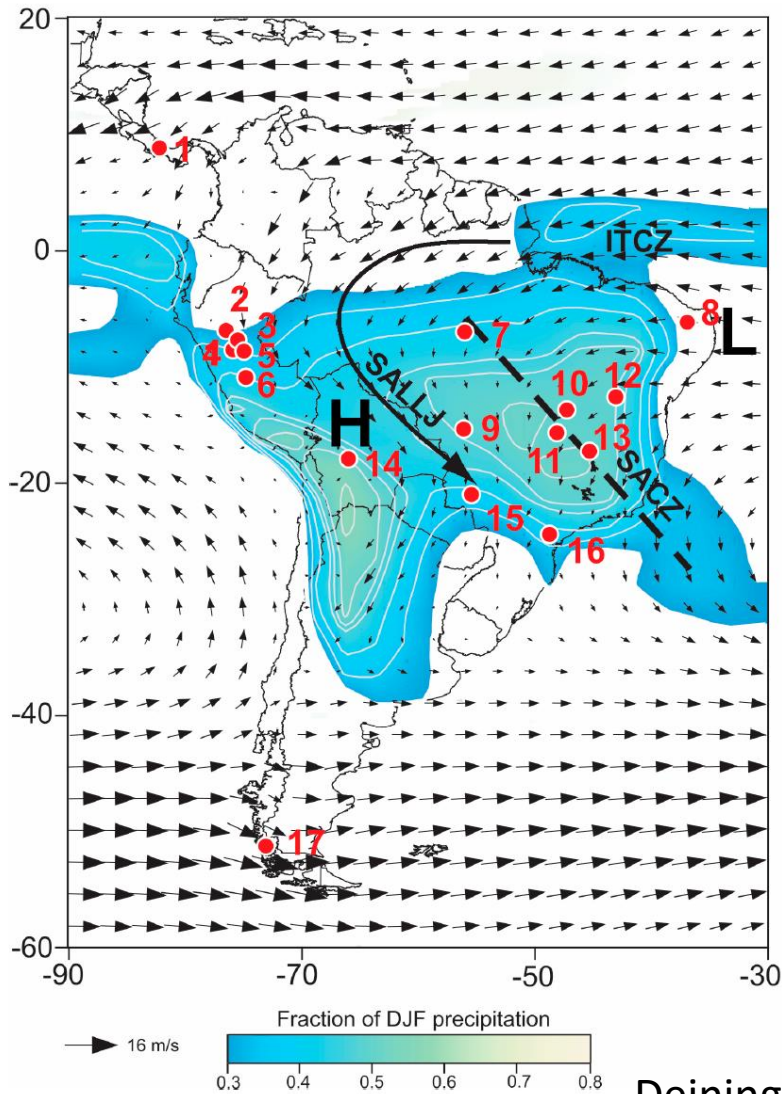


Deininger et al., 2019; Cruz et al., 2006



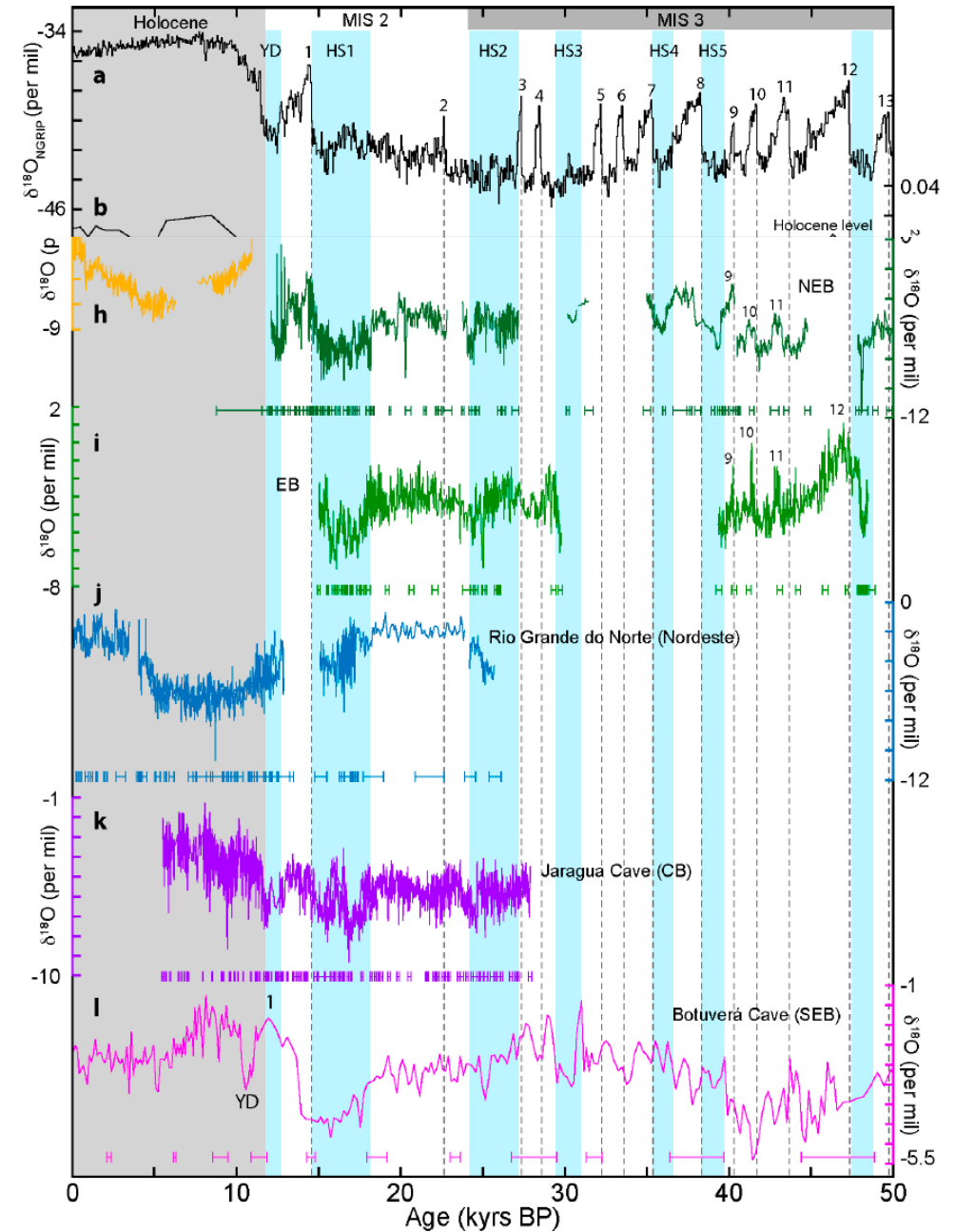
# Eventos climáticos de escala milenar

## Efeitos nas regiões tropicais



Deininger et al., 2019

HS1  
Mega-SACZ



# Eventos climáticos de escala milenar

- Efeitos nas regiões tropicais

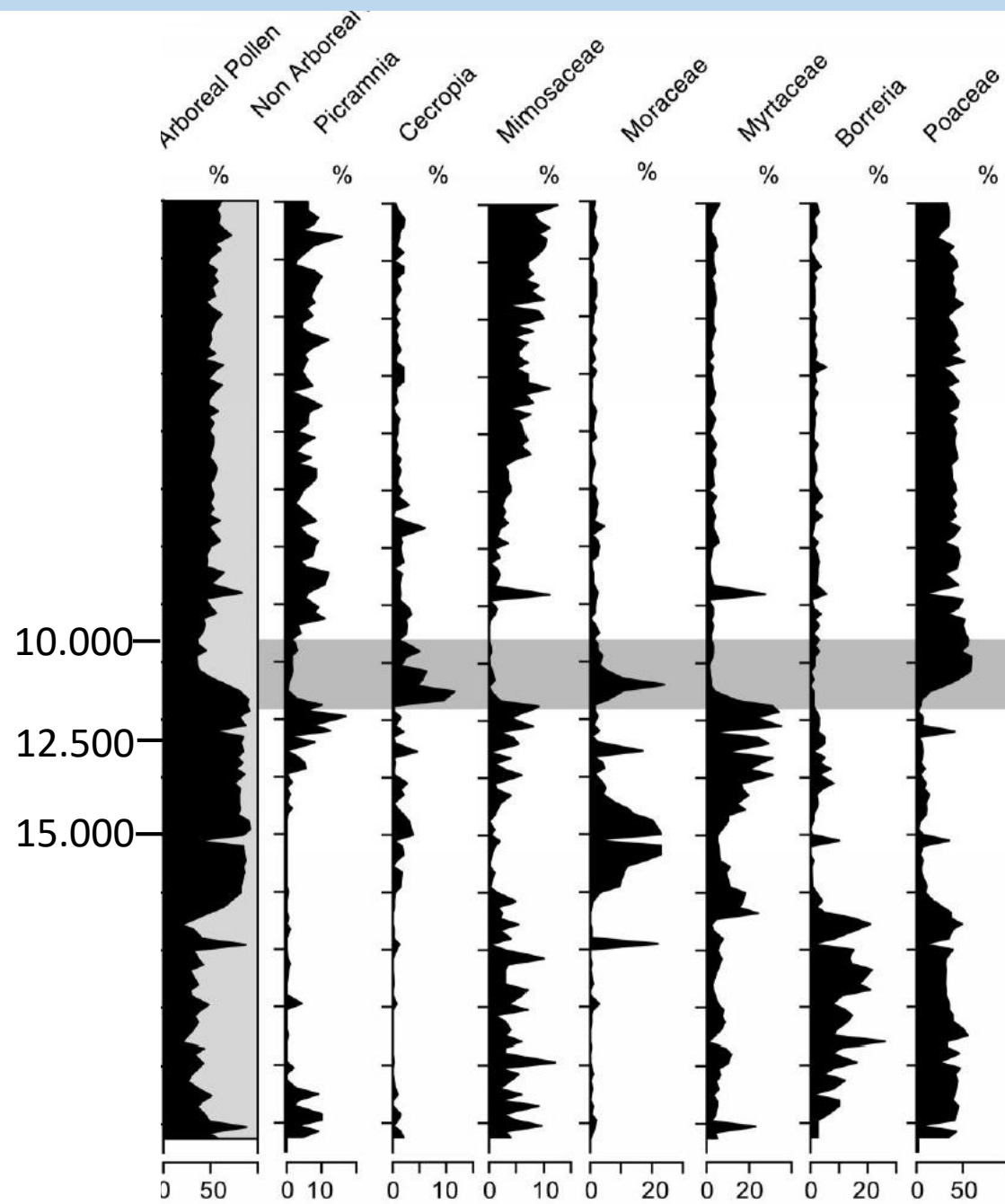
- Ciclos glaciais / interglaciais (40 e 100mil anos)
- Insolação associada à precessão (20 mil anos)
- Eventos HS e DO (escalar secular/milenar)



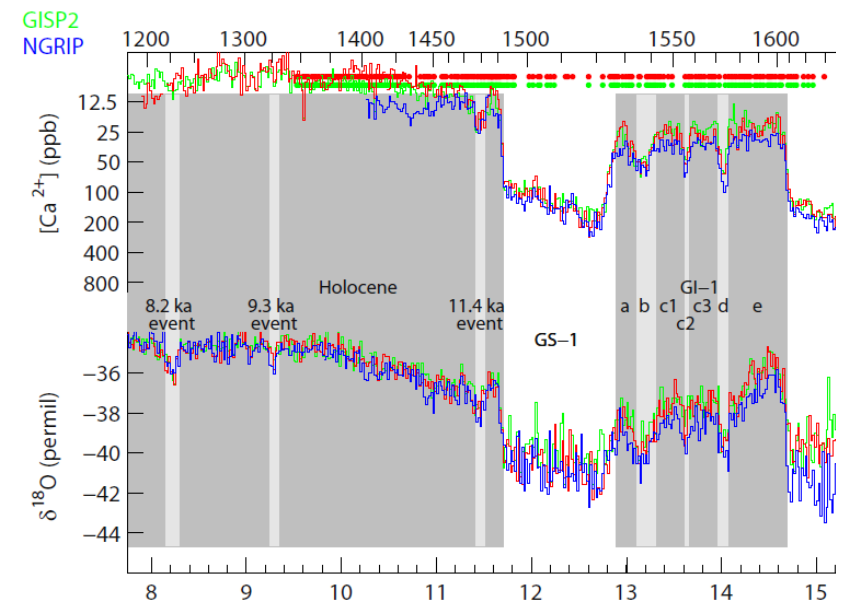
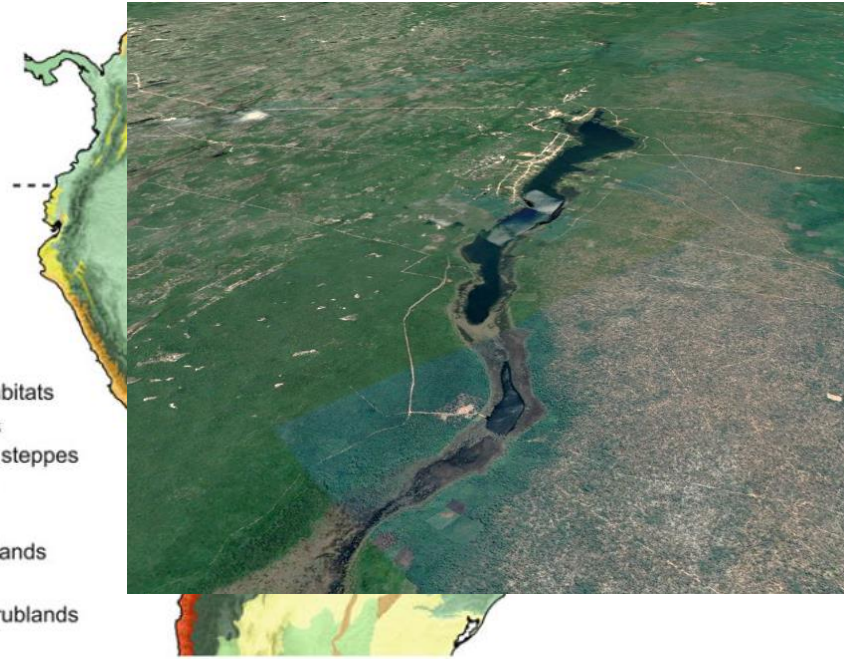
Baker et al., 2020



# Eventos climáticos de escala milenar

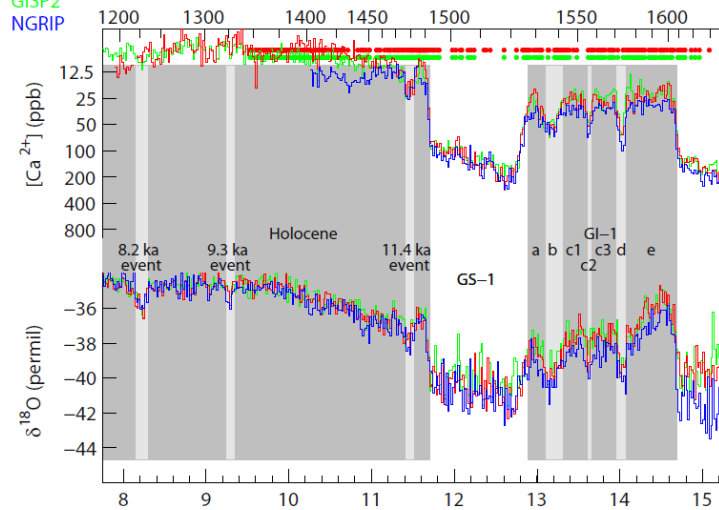


Ledru et al., 2002/2006

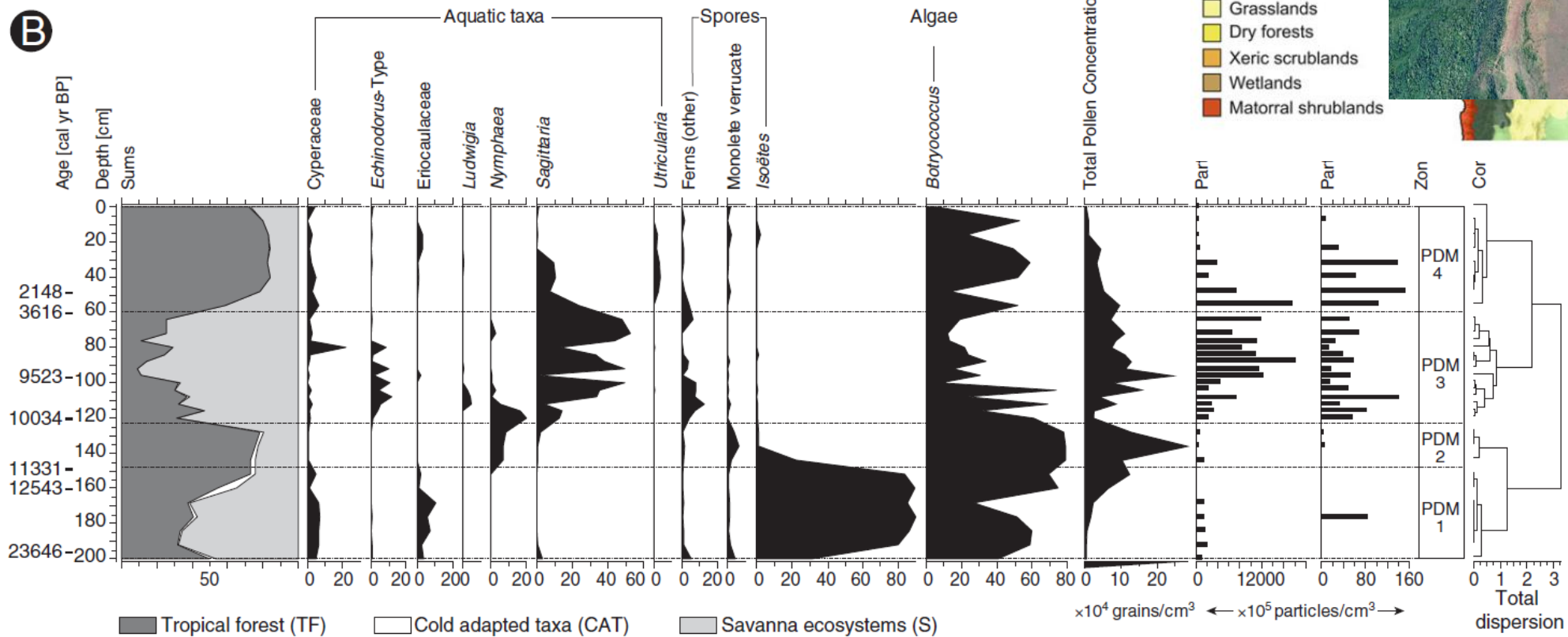


GRIP  
GISP2  
NGRIP

# Eventos climáticos de escala milenar

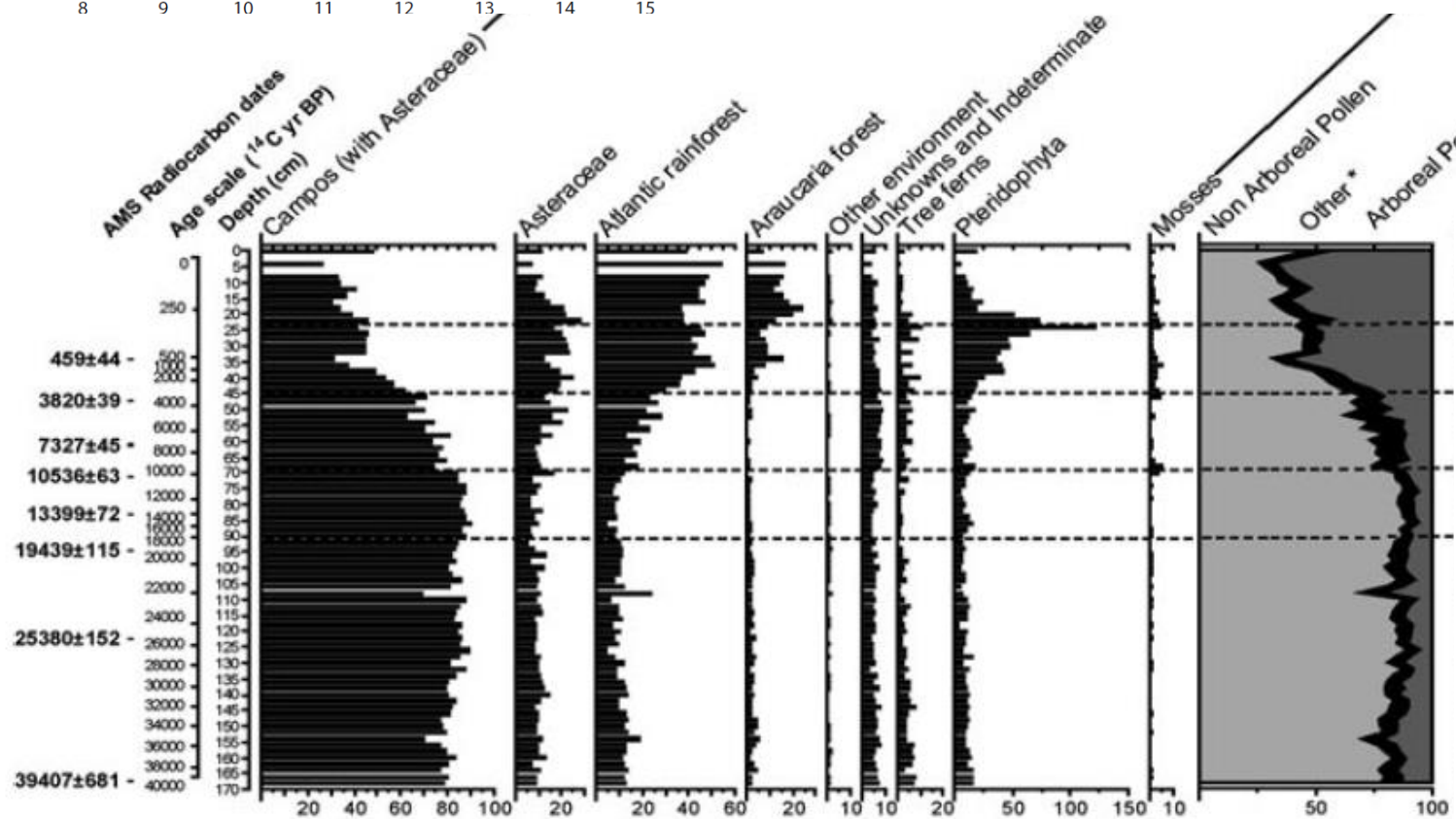
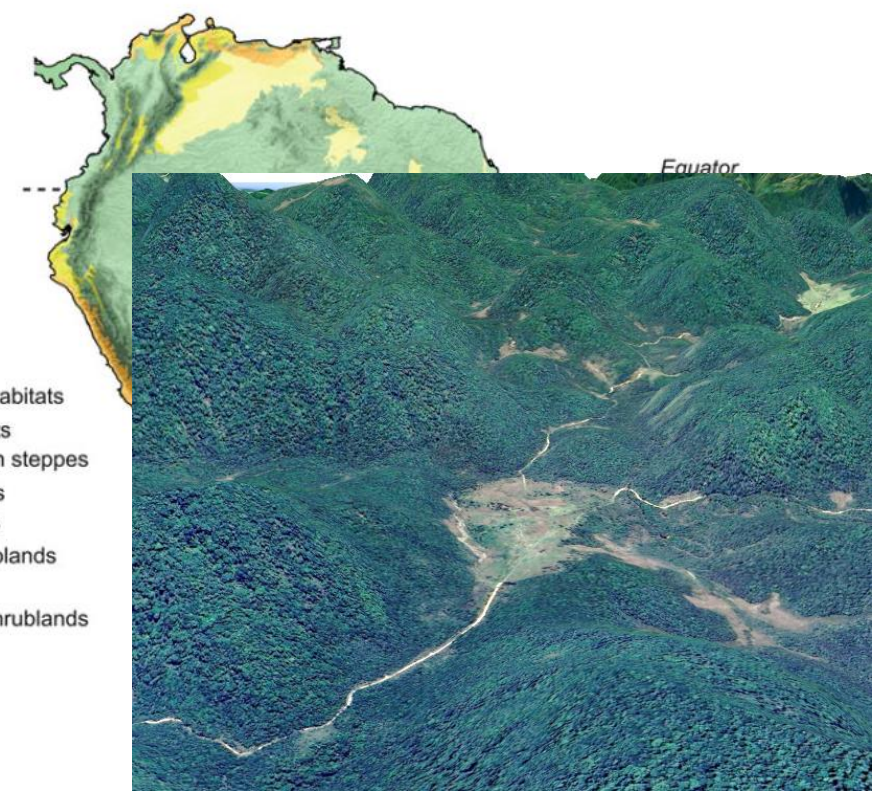
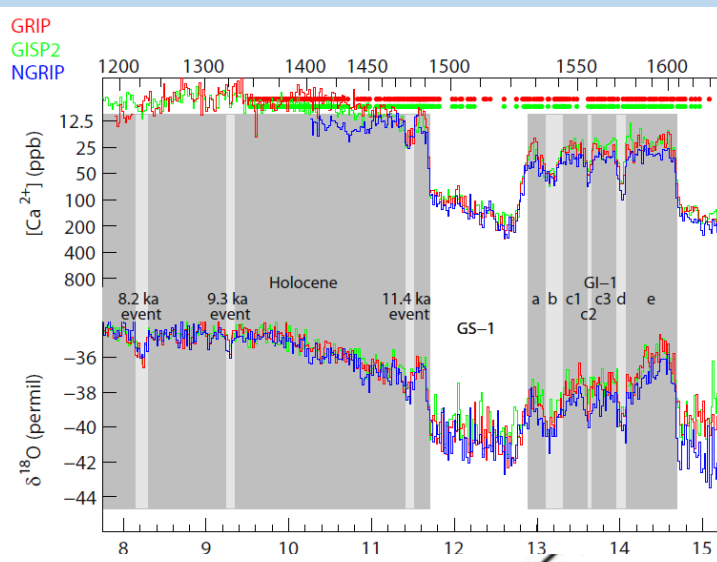


**B**



Hermanowski et al., 2012

# Eventos climáticos de escala milenar



**11.200 AP**  
**desenvolvimento inicial**  
**da Mata Atlântica**



# Eventos climáticos de escala milenar

- Efeitos nas regiões tropicais

- Ciclos glaciais / interglaciais (40 e 100mil anos)
- Insolação associada à precessão (20 mil anos)
- Eventos HS e DO (escalar secular/milenar)



Baker et al., 2020

**Obrigada pela atenção!**