GEOCIÊNCIAS USP

PALEO TRACES

Quinta reunión científica del ORE-HYBAM – La Paz 07/10-11/10/2013

Multidecadal variability of the South America Monsoon System during the last 2000 years in central western Brazil based on speleothem records

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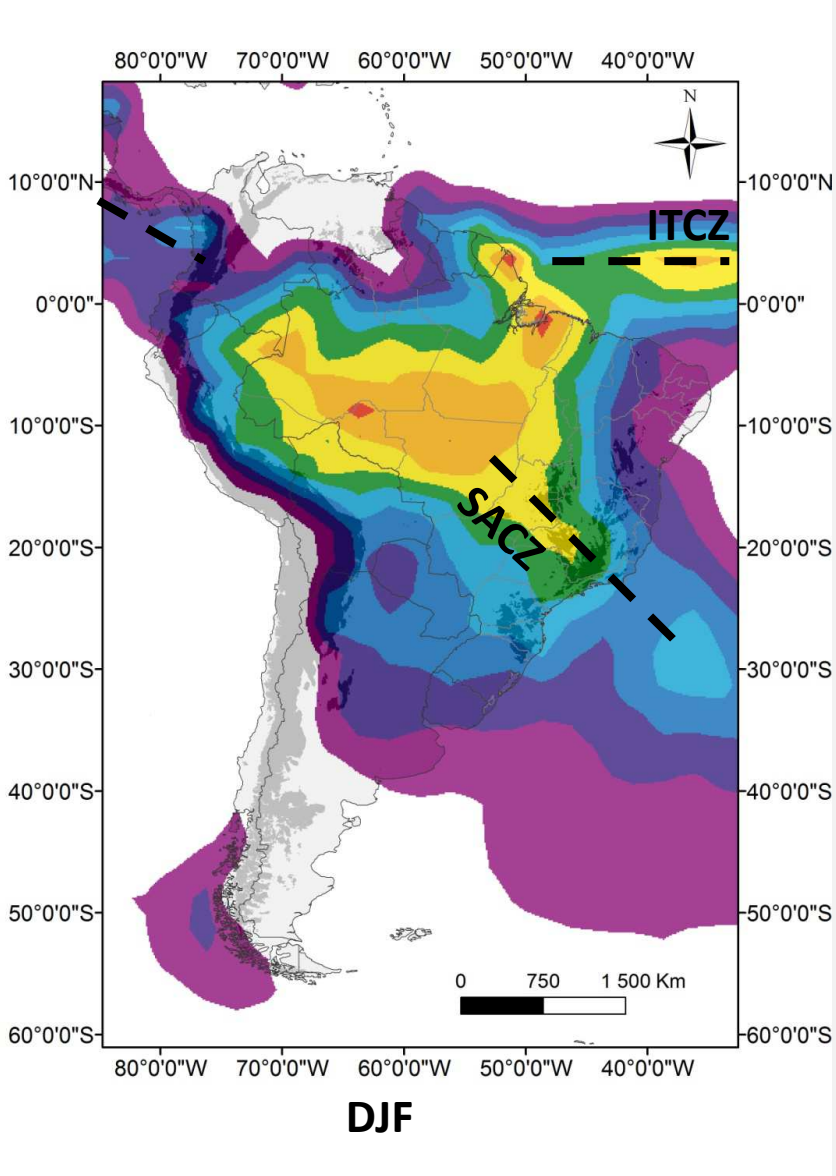
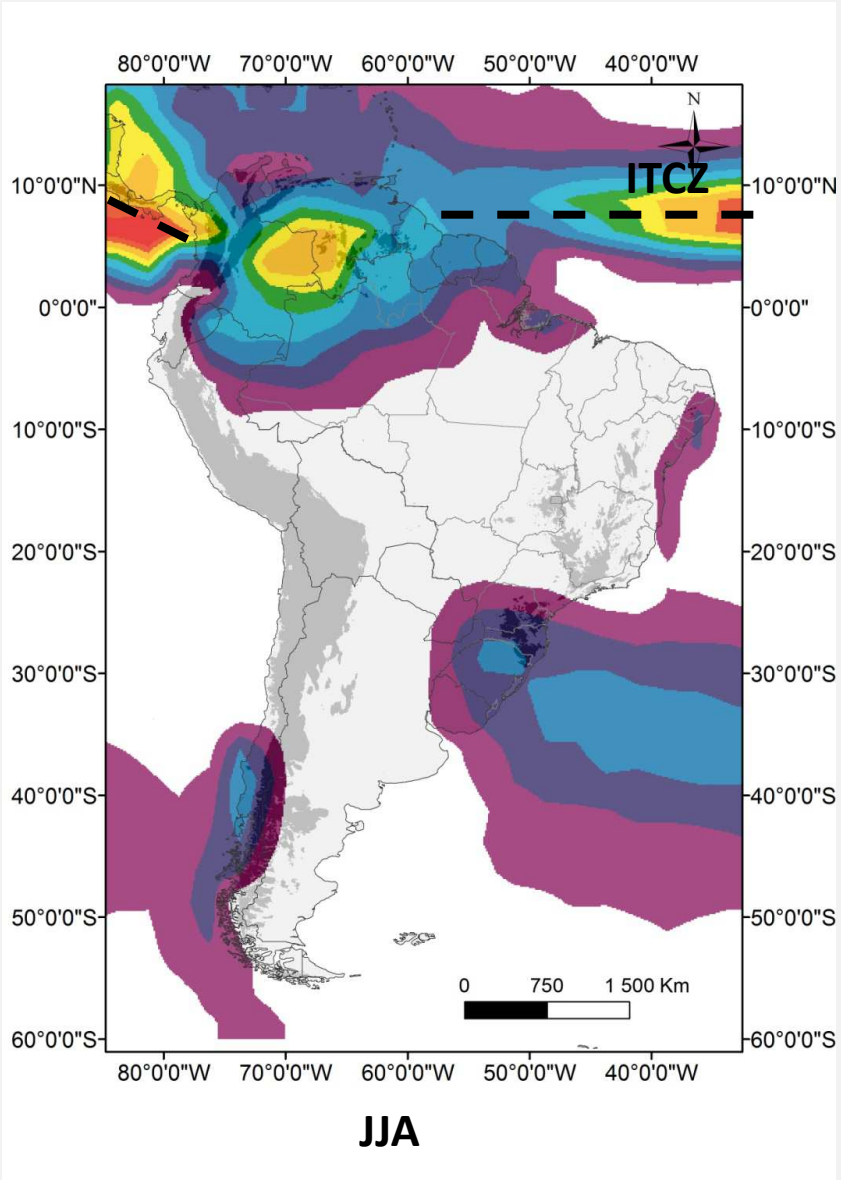
Sao Mateus Cave – Goias - Brasil

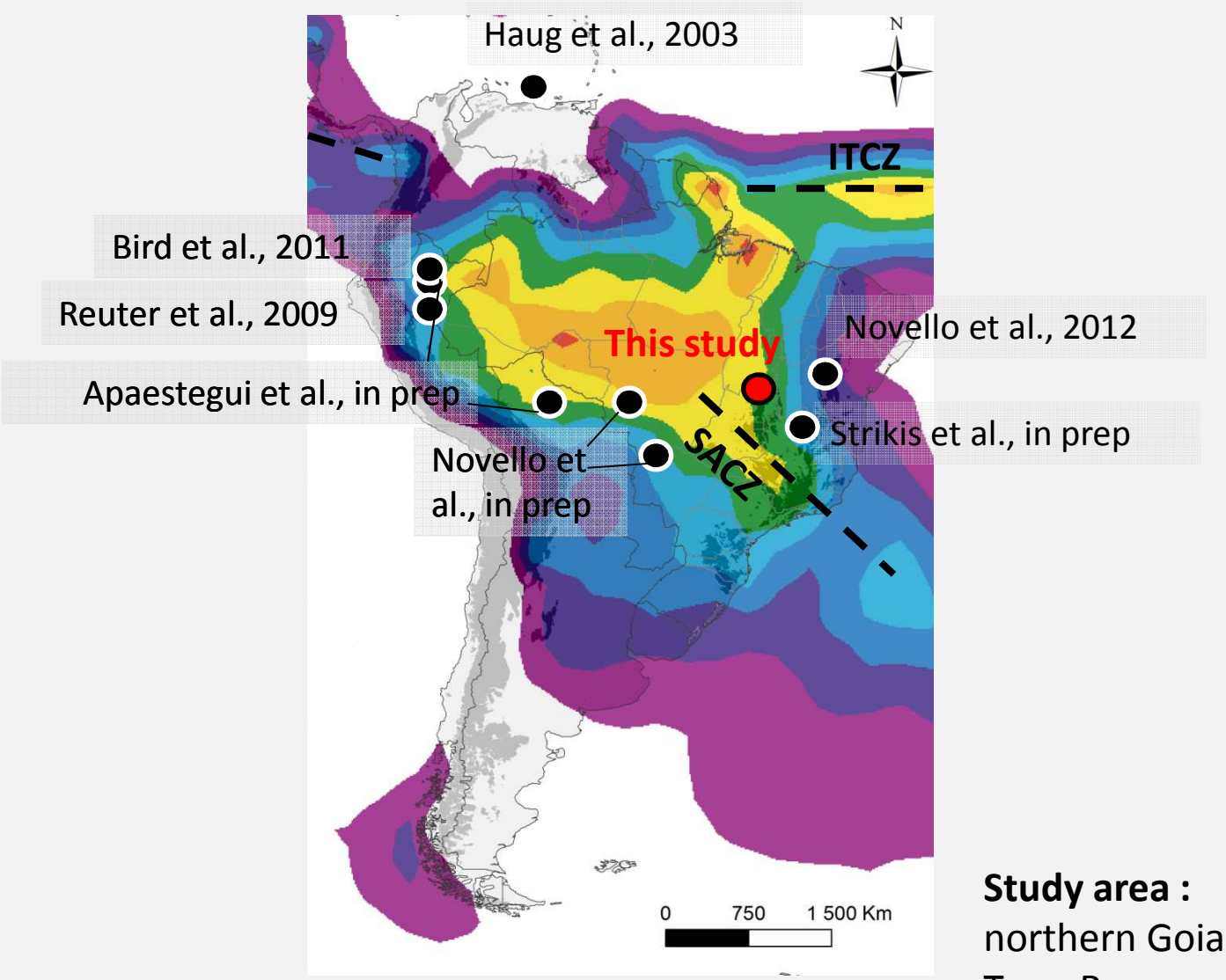
South America Monsoon system (SAMS)





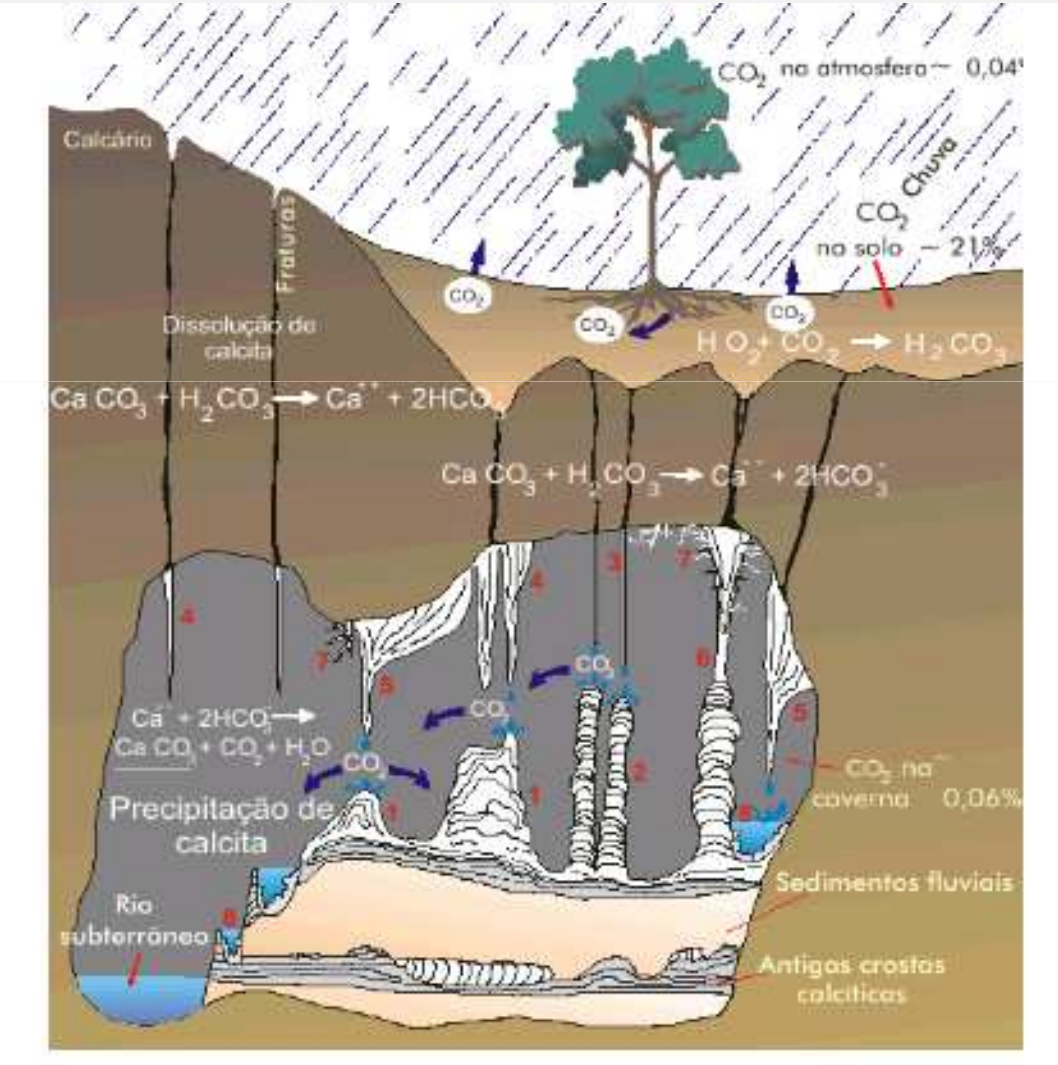
Long-term mean (A.D. 1979–2000) precipitation (in mm) for December–February (DJF) from the Climate Prediction Center Merged Analysis of Precipitation.

Some records of SAMS for the last 2000 years



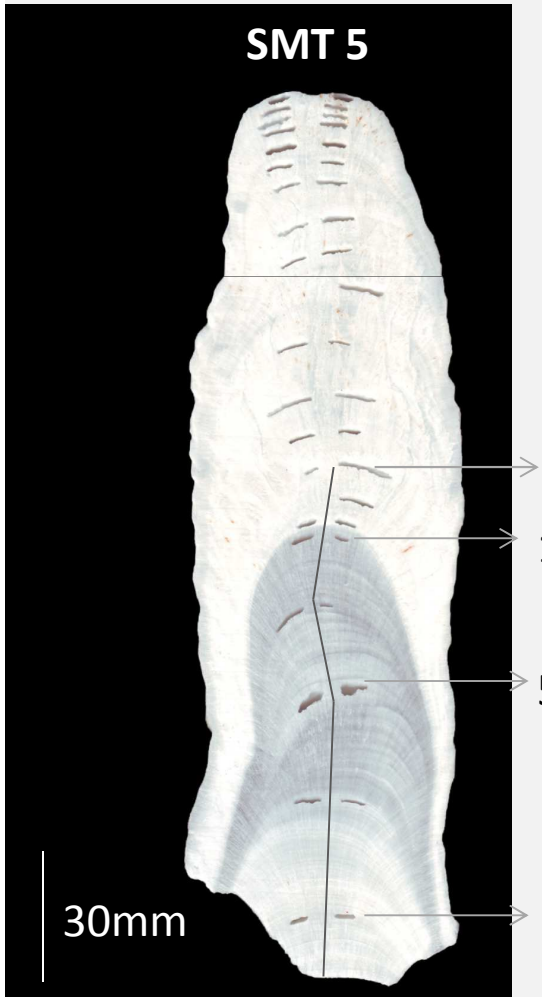
Study area :
northern Goias state
Terra Ronca park
Upper part of Tocantins basin

Espeleothems as indicador of paleoclimate and paleo-environment



3 stalagmits studied

17 U/Th dates
2430 $\delta^{18}O$ analysis

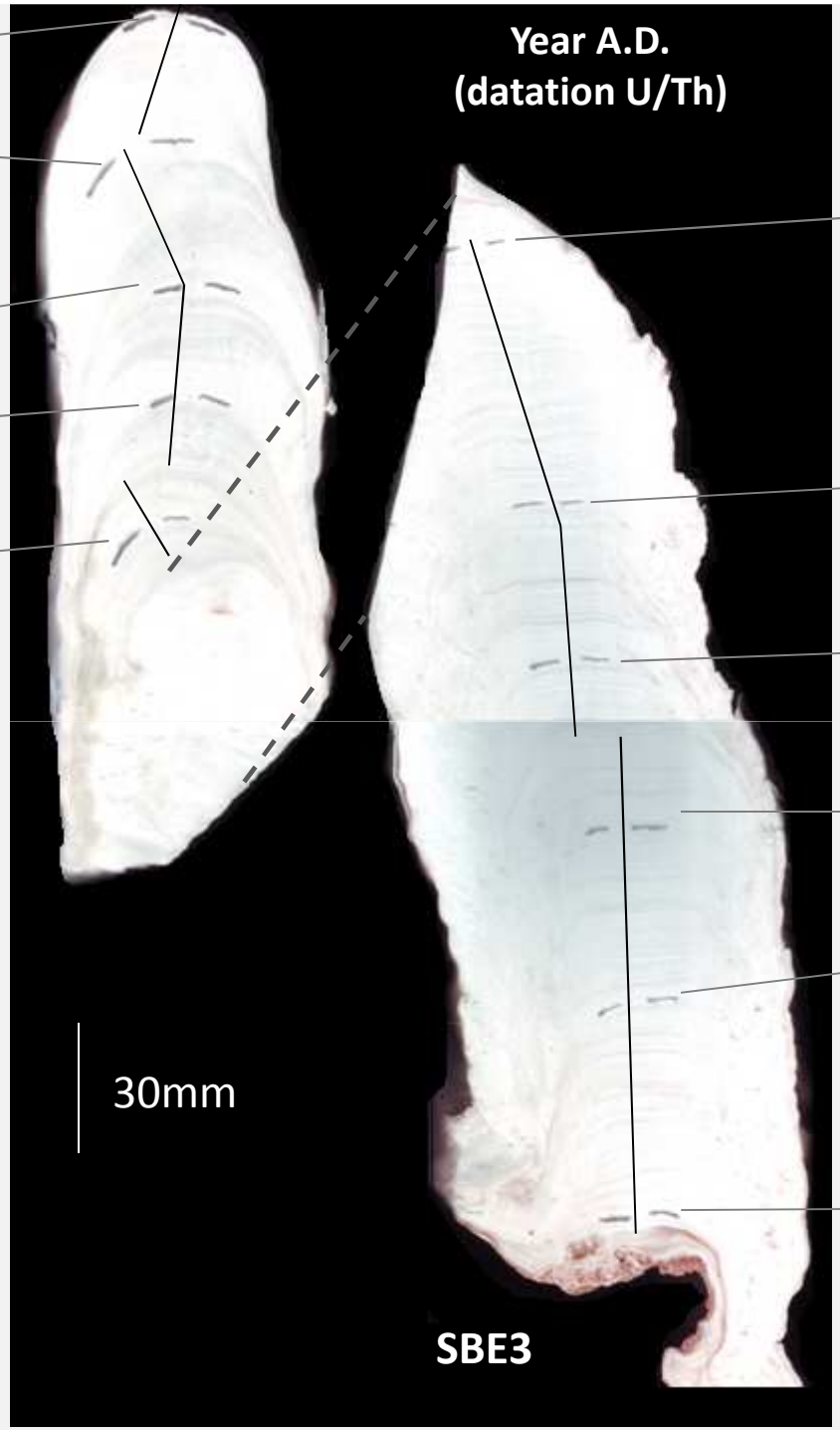


1181 ± 9

1048± 59

501± 15

343± 15



1997± 2.7

1956± 2.7

1876± 3.6

1818± 3.6

1704± 6.6

Years A.D.

1647± 3.4

1483± 4.6

1384± 3.3

1317± 3.8

1260± 4

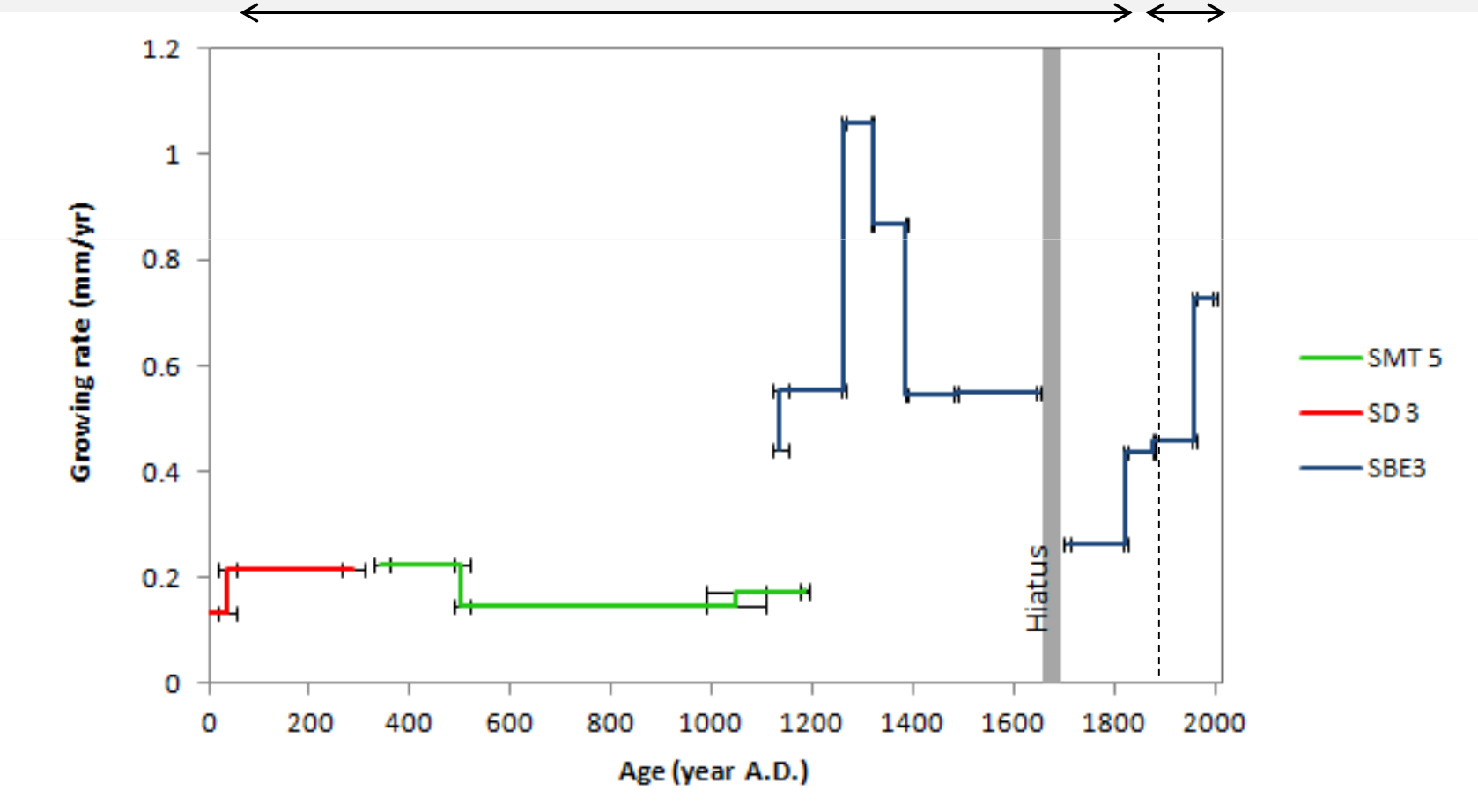
1134± 15

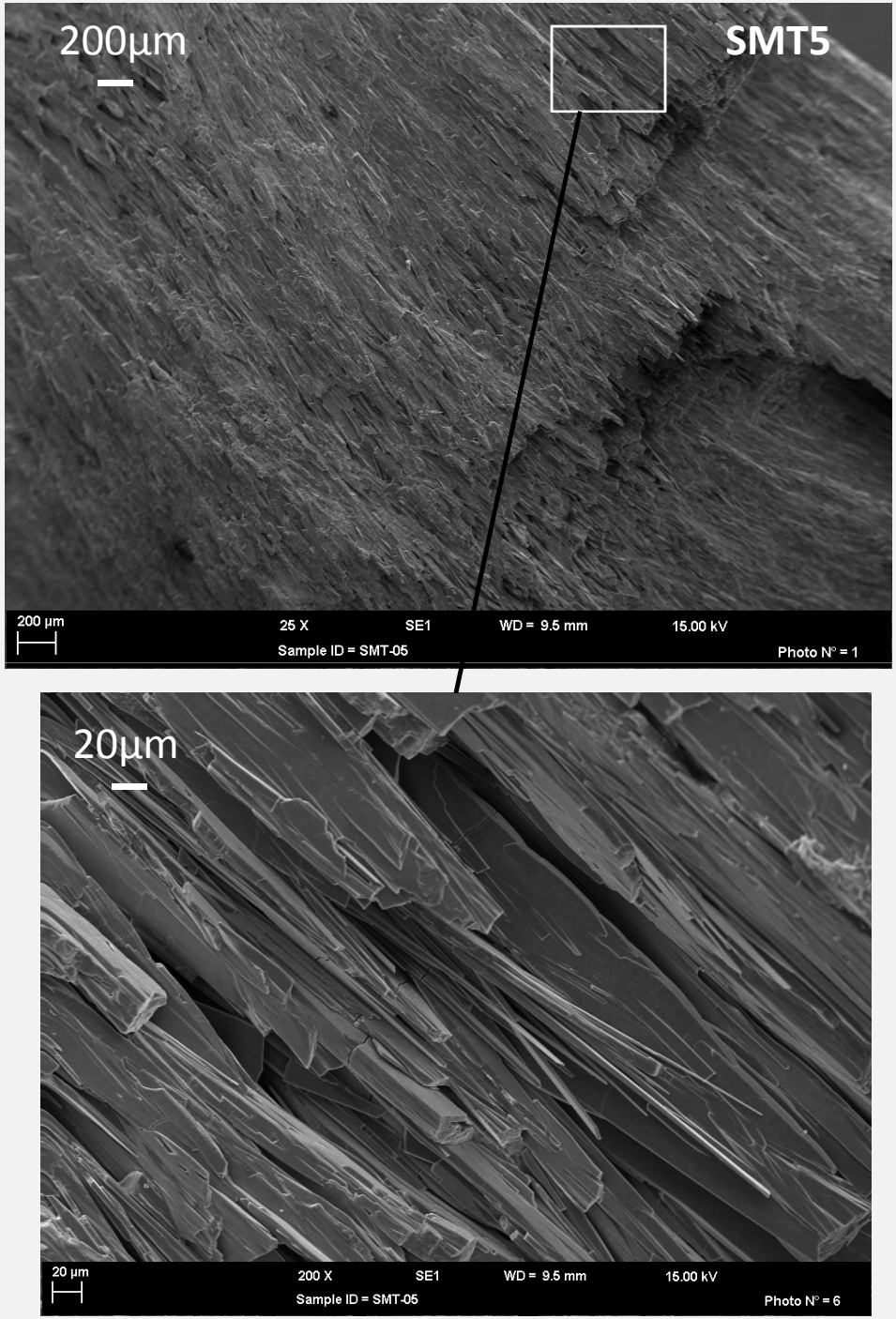
Growing rate and isotopic sampling characteristics

Isotopic sampling resolution

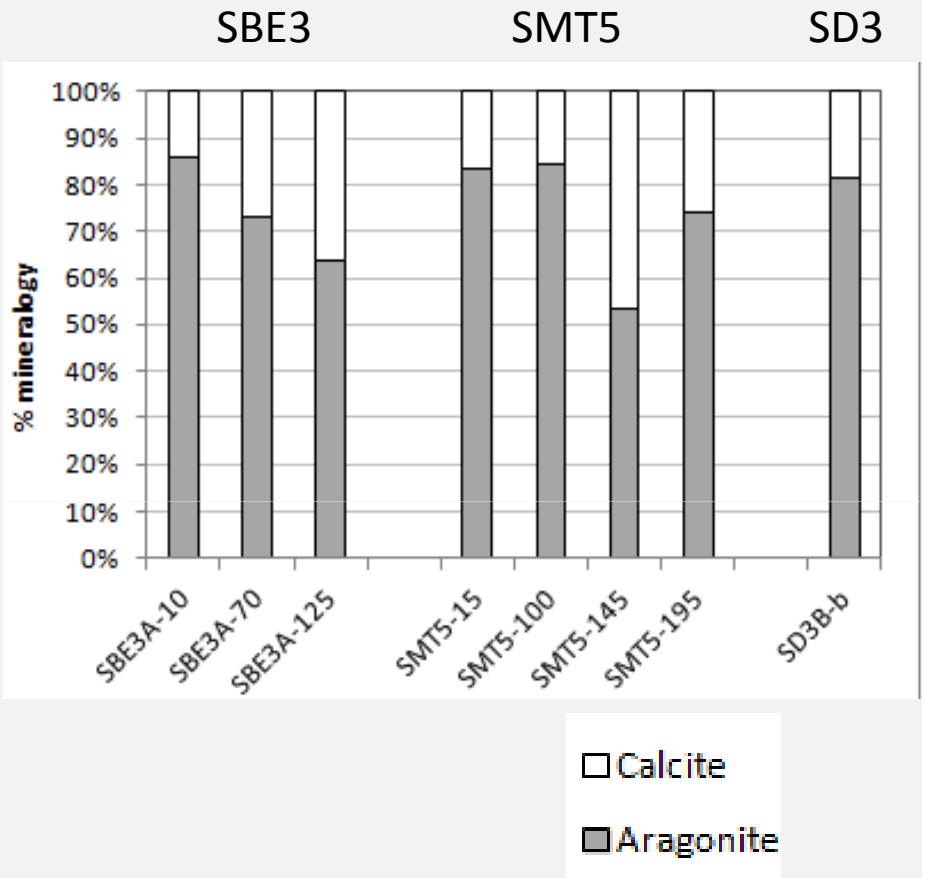
2-4 years/sample (1830 $\delta^{18}O$ analysis)

0.2-1 year/sample (600 $\delta^{18}O$ analysis)



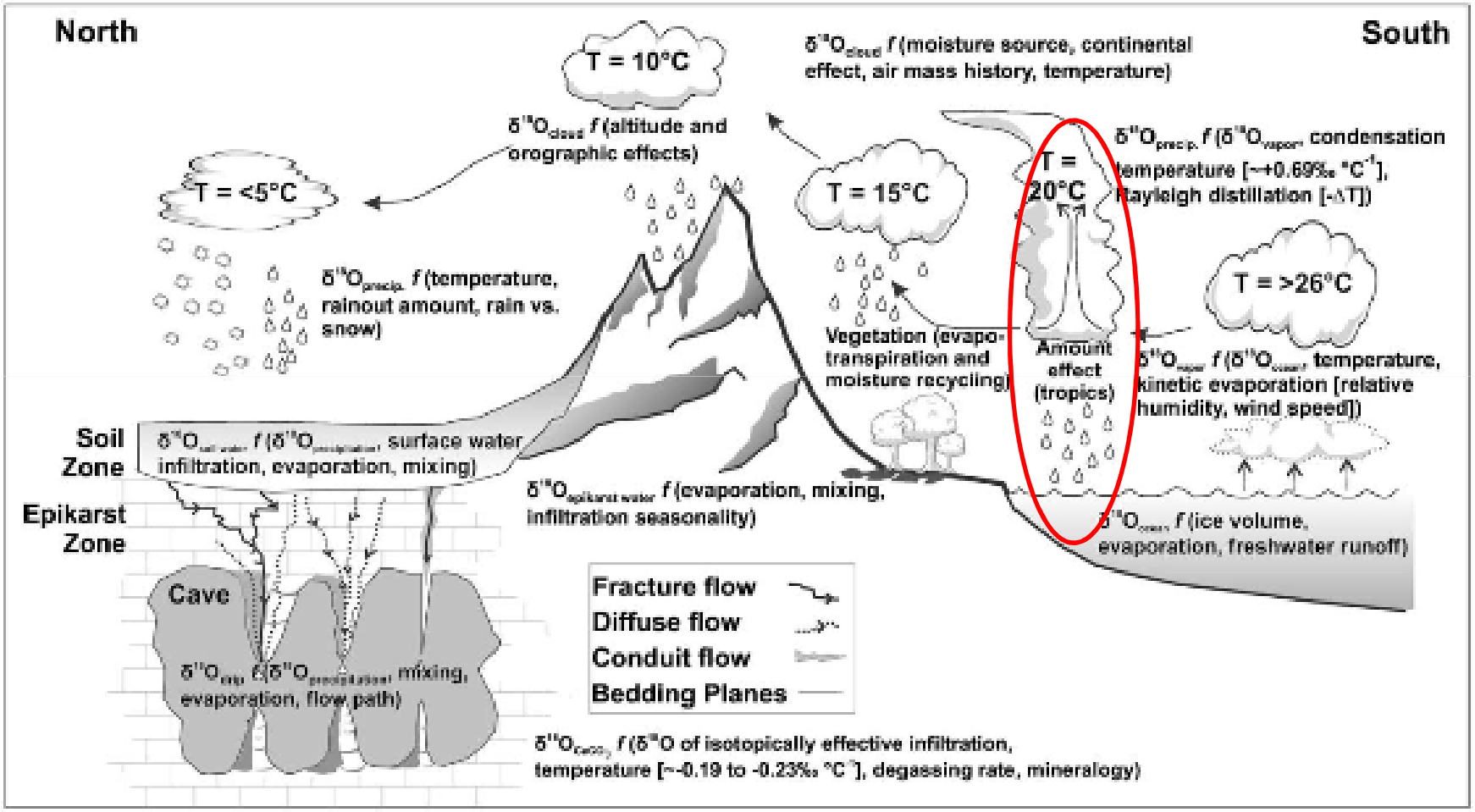


Mineralogy



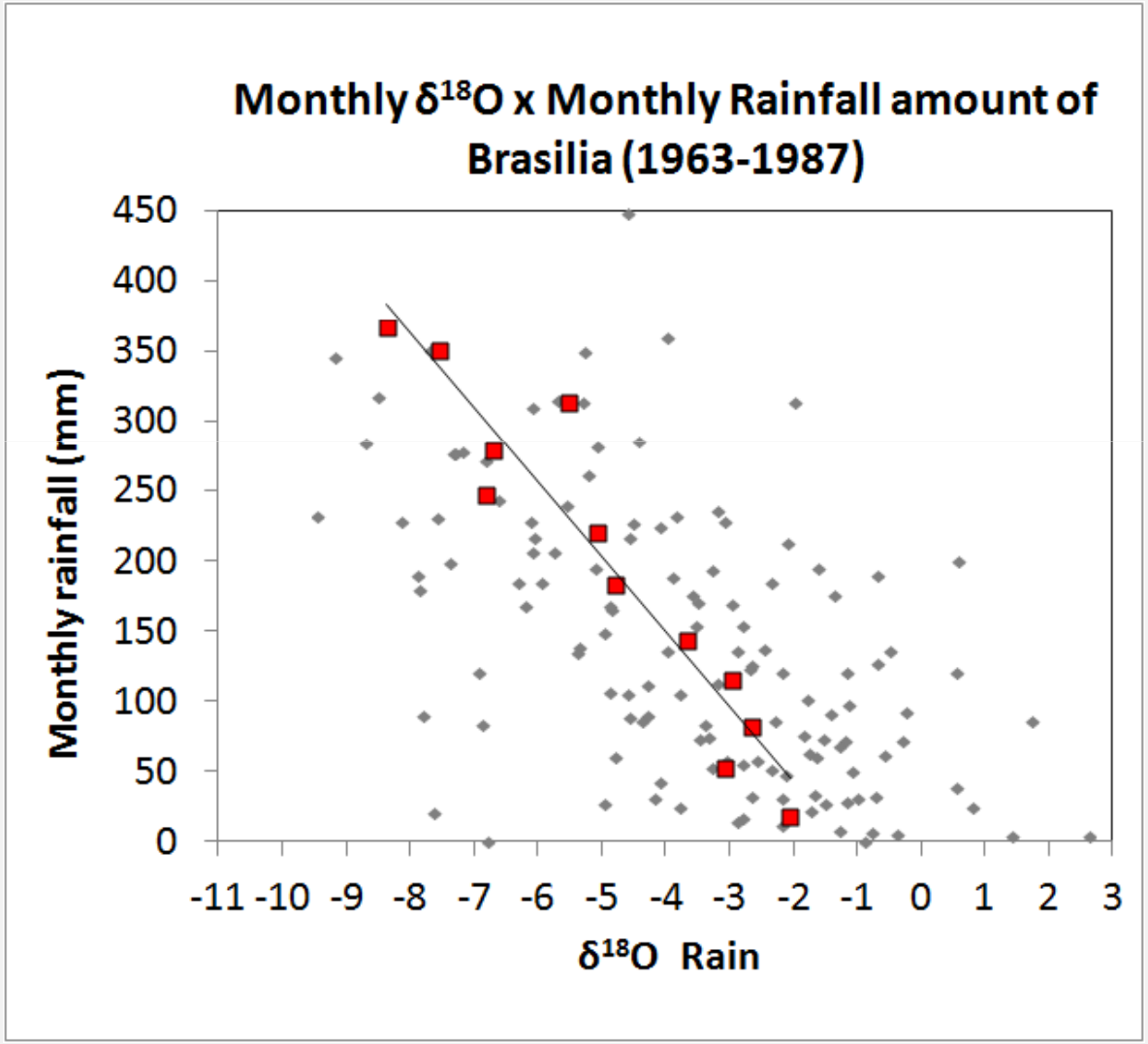
SEM images

Control of the $\delta^{18}O$ carbonate signature



Lachniet et al., 2009

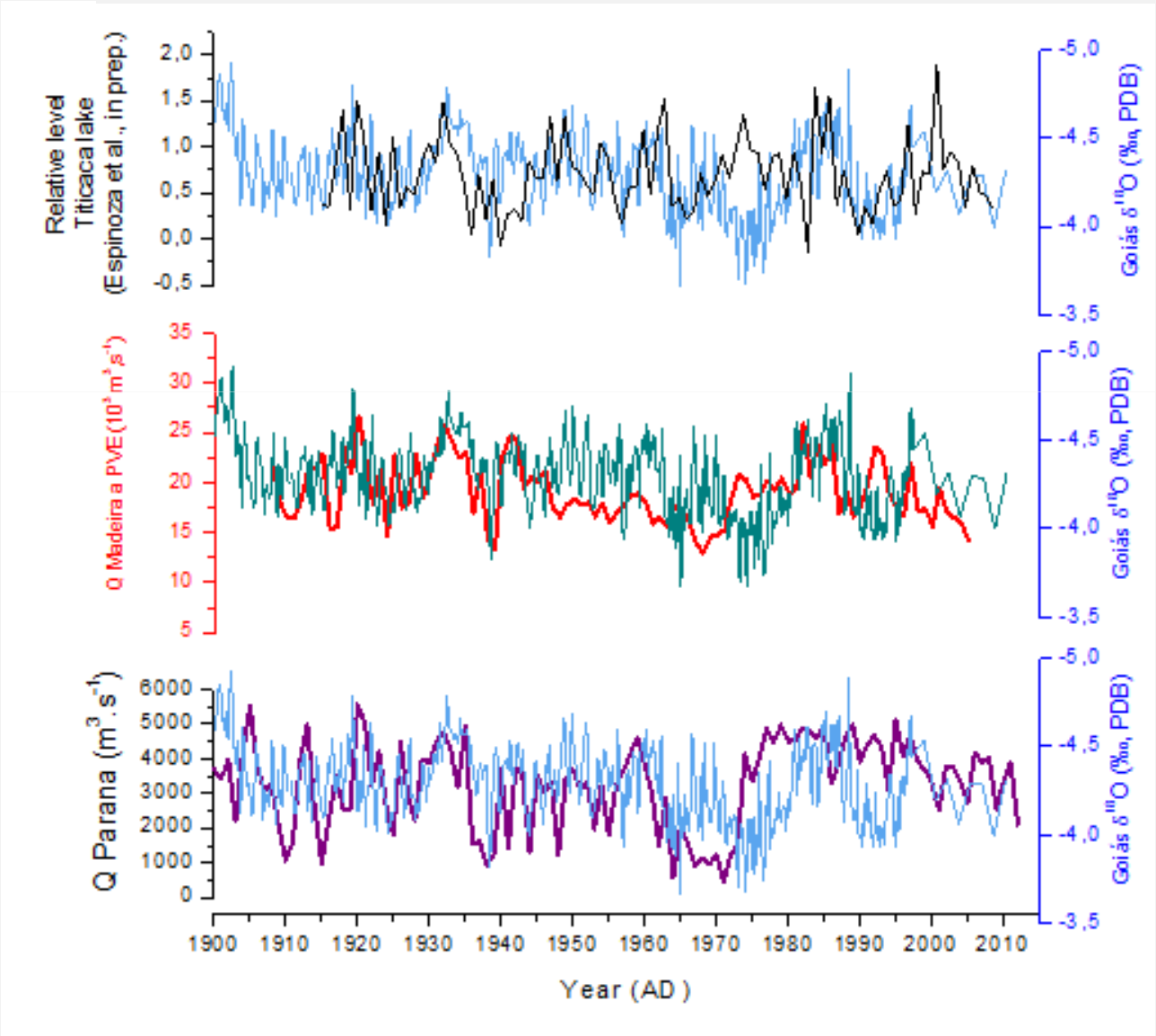
Rain $\delta^{18}O$ signature = amount effect

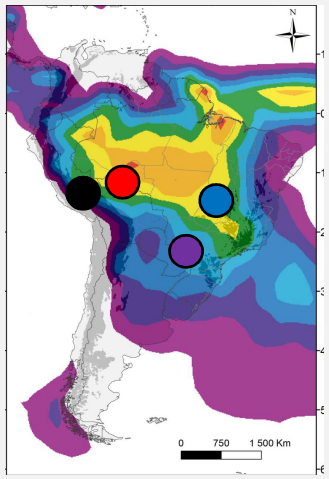


From IAEA database

Carbonate $\delta^{18}O$ signature = amount effect

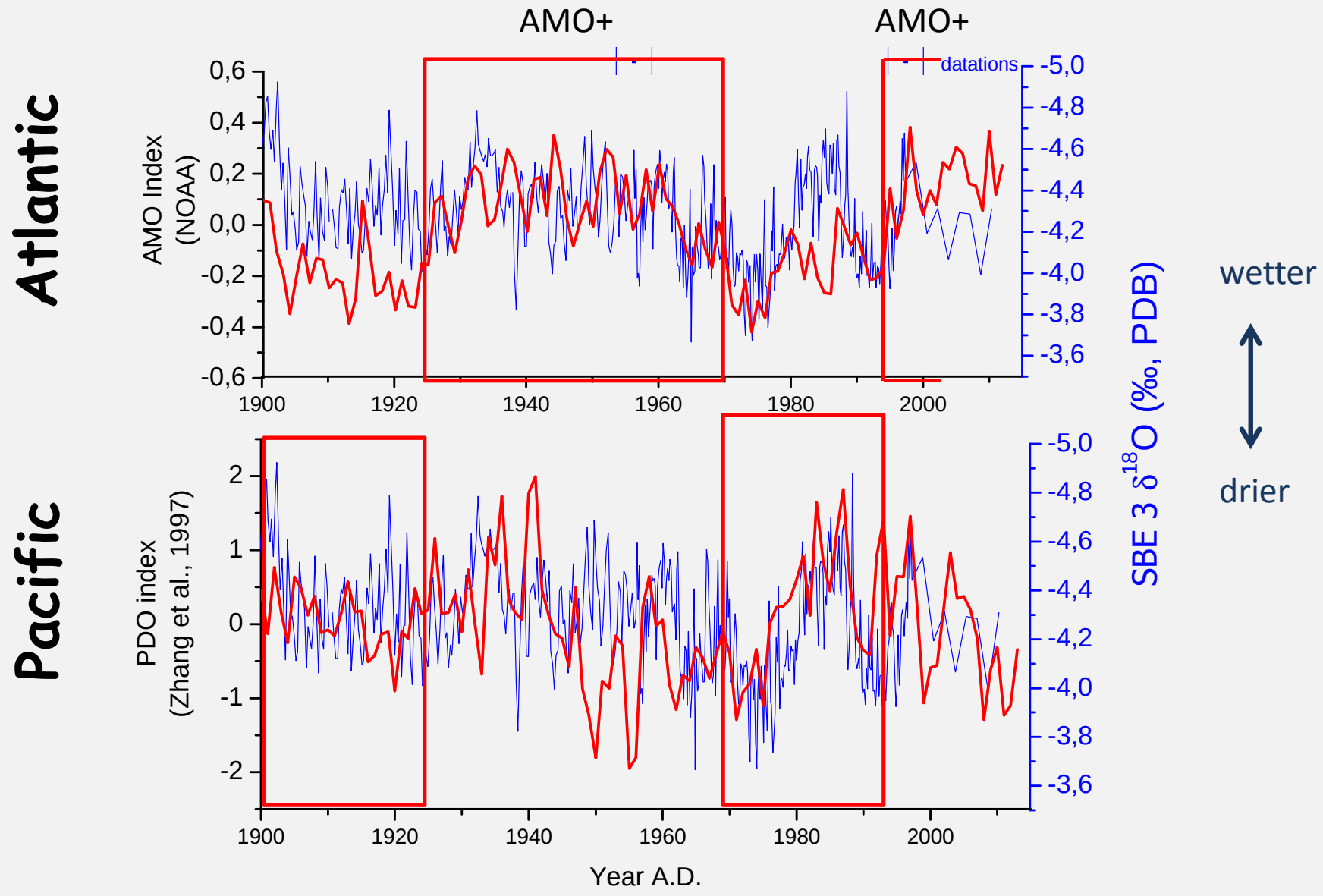
$\delta^{18}O$ espeleotem Goias vs historical hydroclimatical records



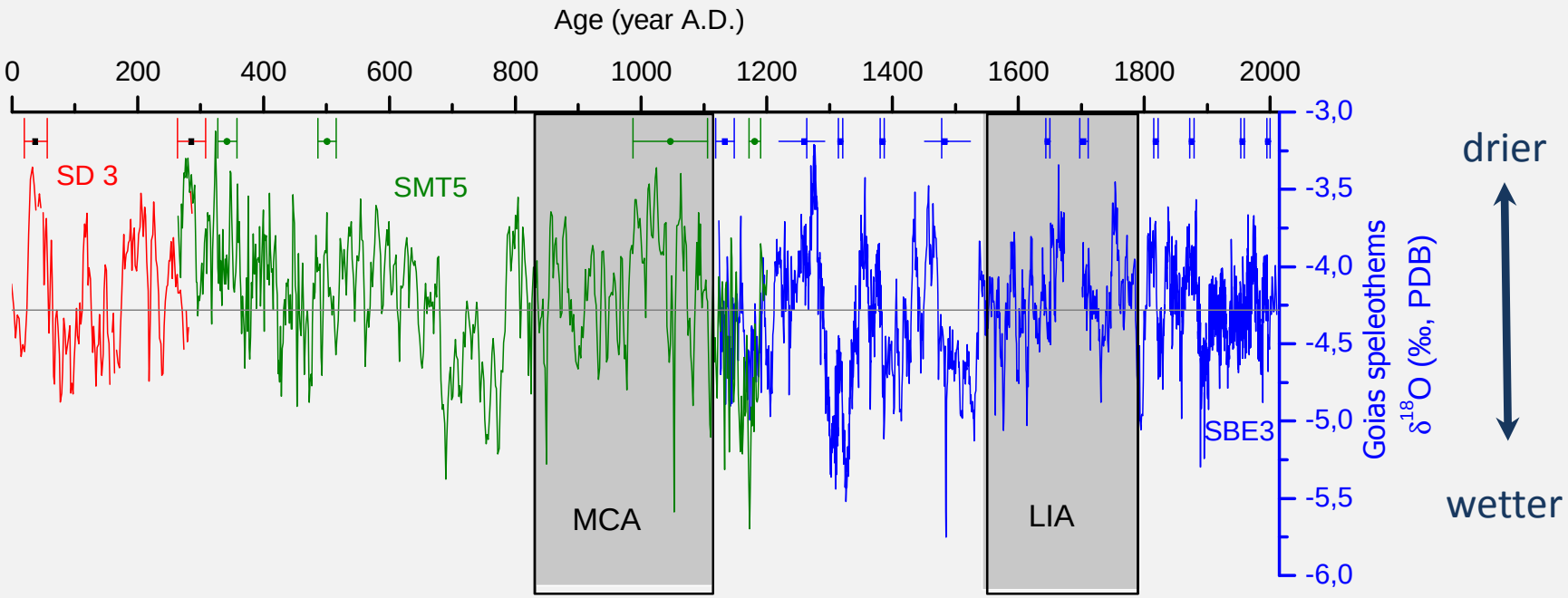


wetter

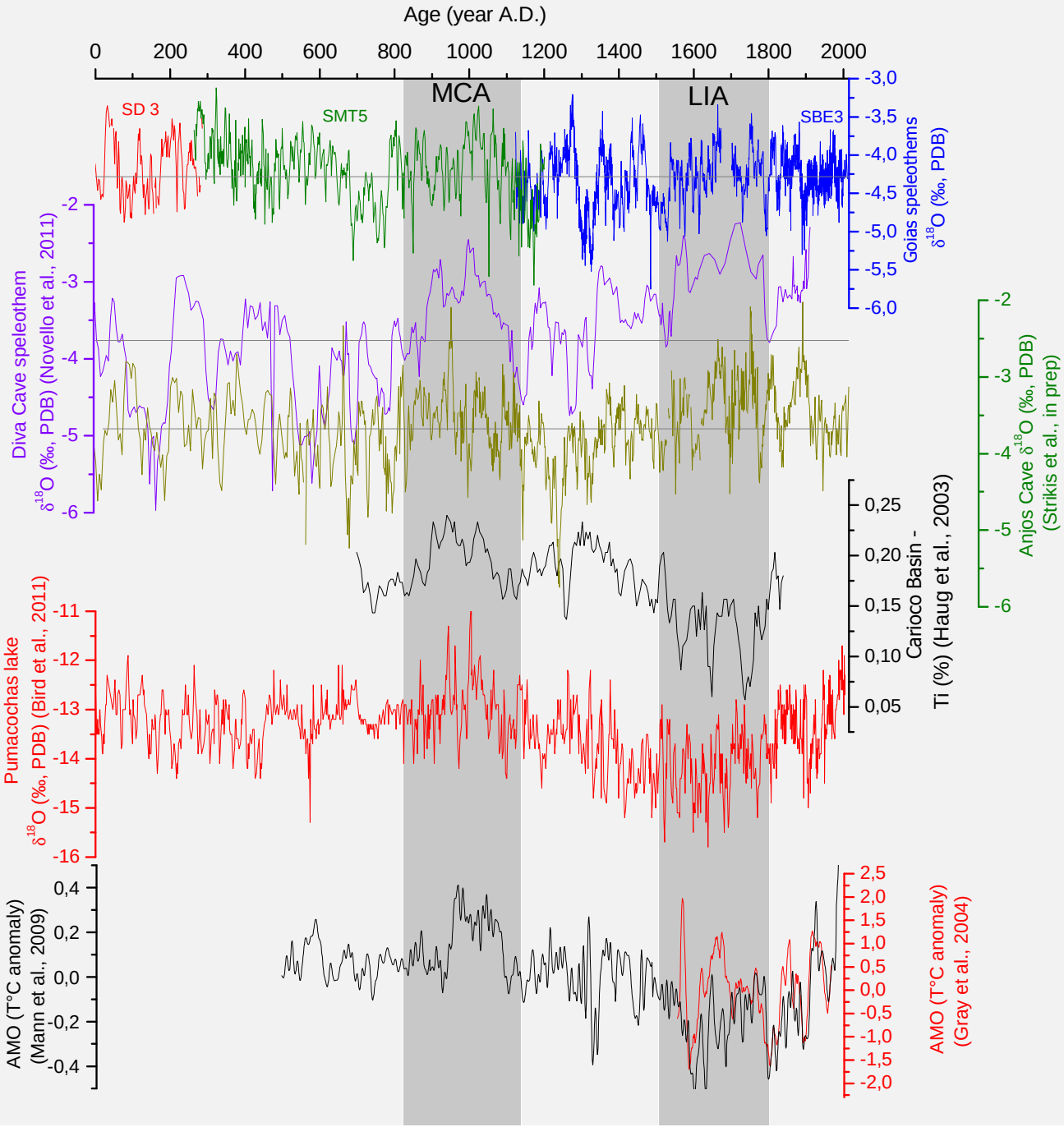
Multidecadal variation of Northern Goias Climate during the last century

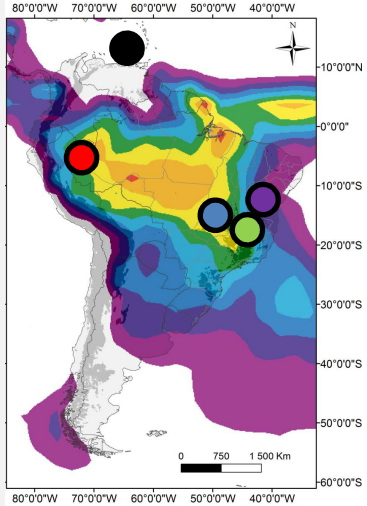


Results : Rainfall variability of central Brazil during the last 2000 years



Results : Comparision with some south-American records

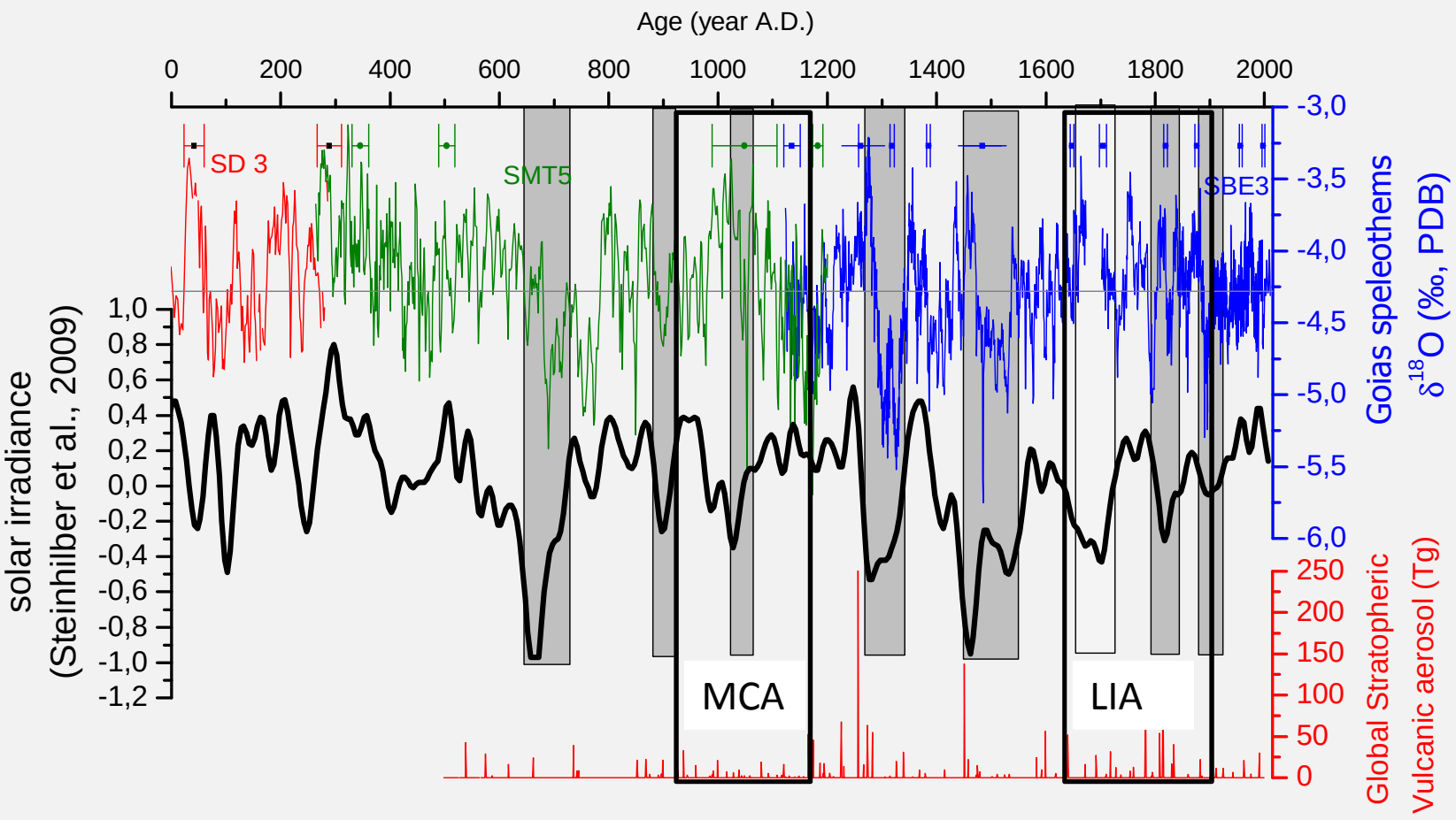




drier

wetter

The solar activity and the volcanics evnts a forcant for wetter events?



Conclusion

- Central Brazil climate depend on Atlantic and Pacific SST oscilations

- LIA : antiphase between central/eastern Brazil and the rest of the SAMS region on the last 2000 years
(East/West displacement of the SACZ?)

- Solar activity seems to play an important role on SAM modulation on secular timescale


Gracias
Obrigado
Merc
Thank you