

SFB 754

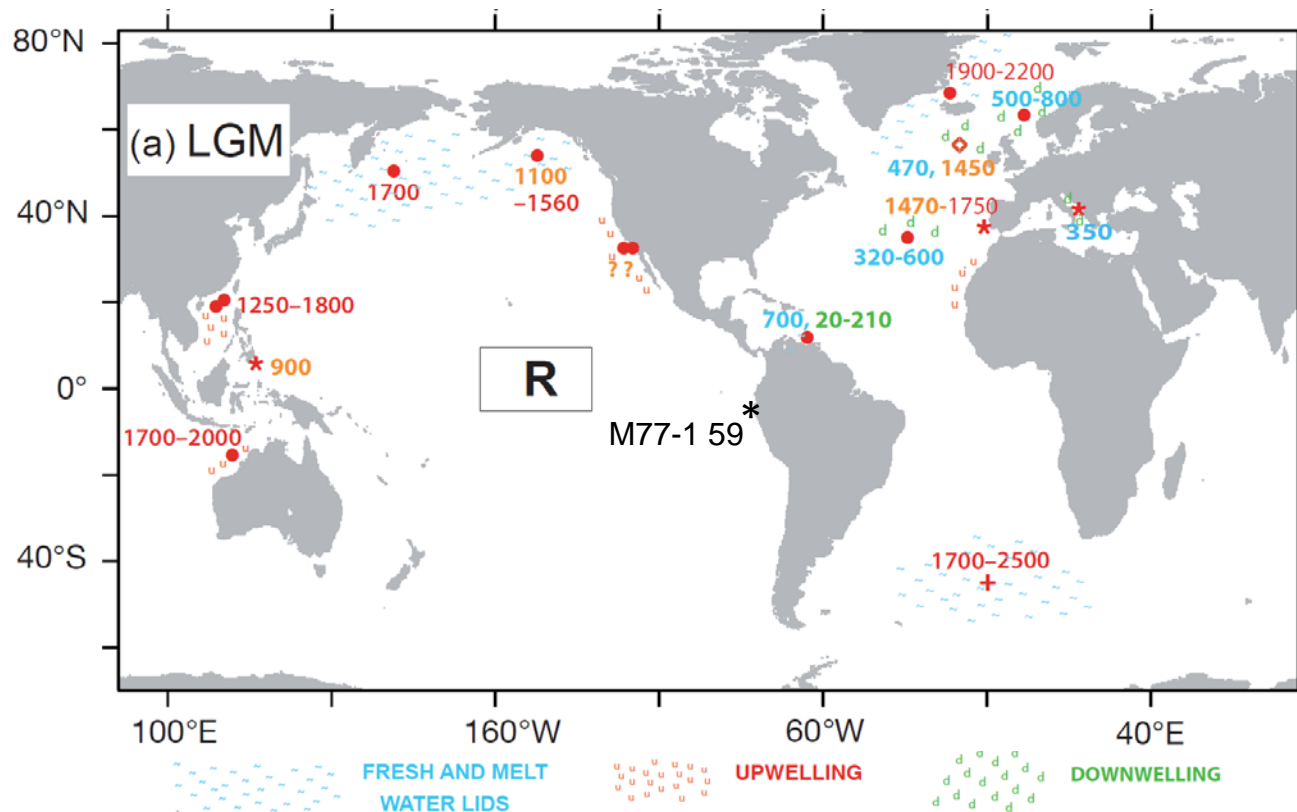
Deglacial ^{14}C reservoir ages of surface waters at the northern boundary of Peruvian coastal upwelling

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Presentation in EGU2020 session CL5.3

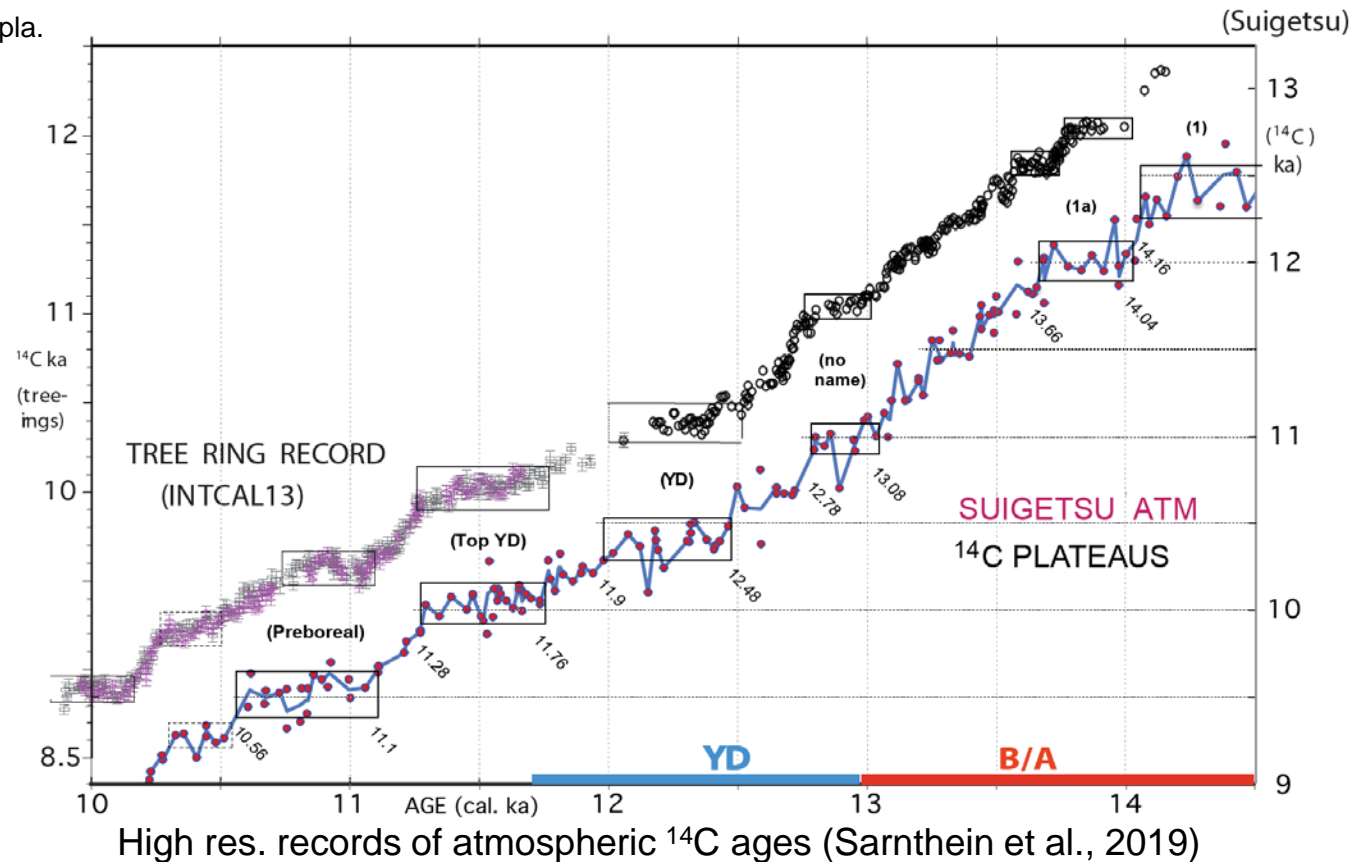
(Friday 08 May 2020; 16:45-18:00)

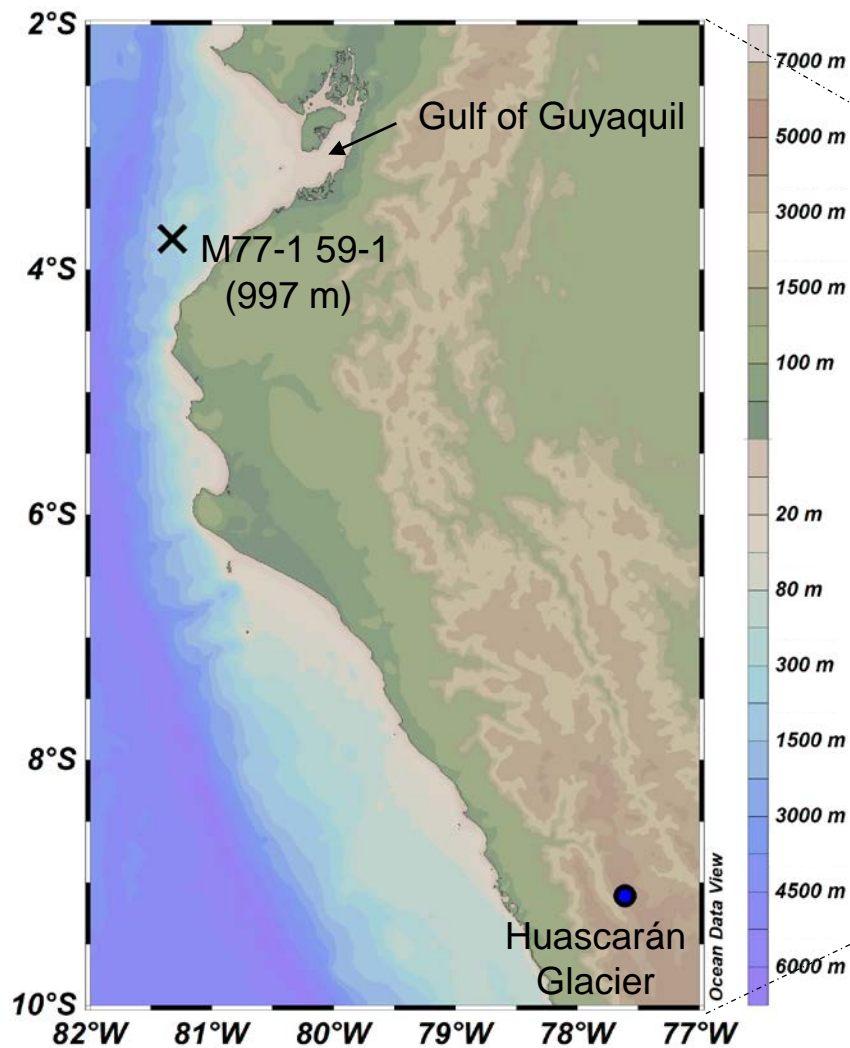
- Surface water ^{14}C ages are not in equilibrium with atmospheric ^{14}C .
- For accurate dating, planktonic ^{14}C ages need to be corrected for changes in the reservoir age (R_{pla}) of surface waters



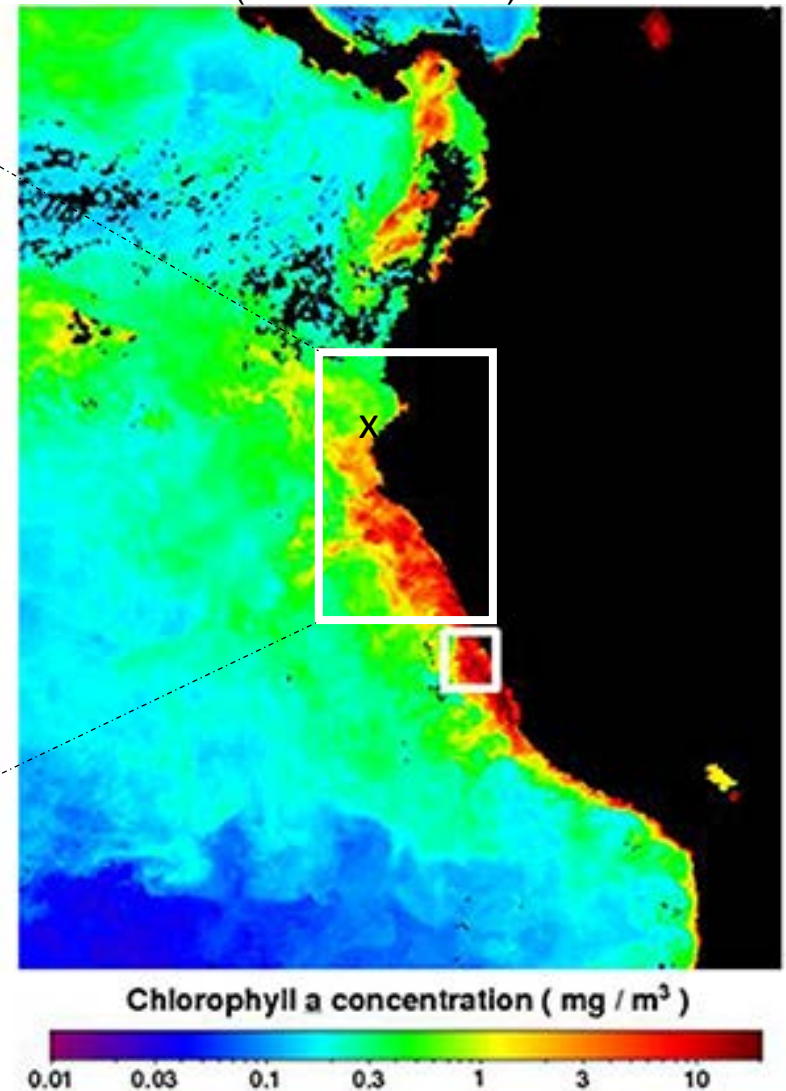
Distribution of R_{pla} during the Last Glacial Maximum (Sarnthein et al., 2015)

- The U/Th age-calibrated suite of atm. ^{14}C plateau boundaries serve as stratigraphic tie points for absolute age control.
- The difference between atm. and pla. ^{14}C ages of each individual plateau provides an estimate of local R_{pla} .



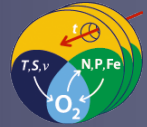


Upwelling intensity traced by Chlorophyll a
(Dale et al. 2017)

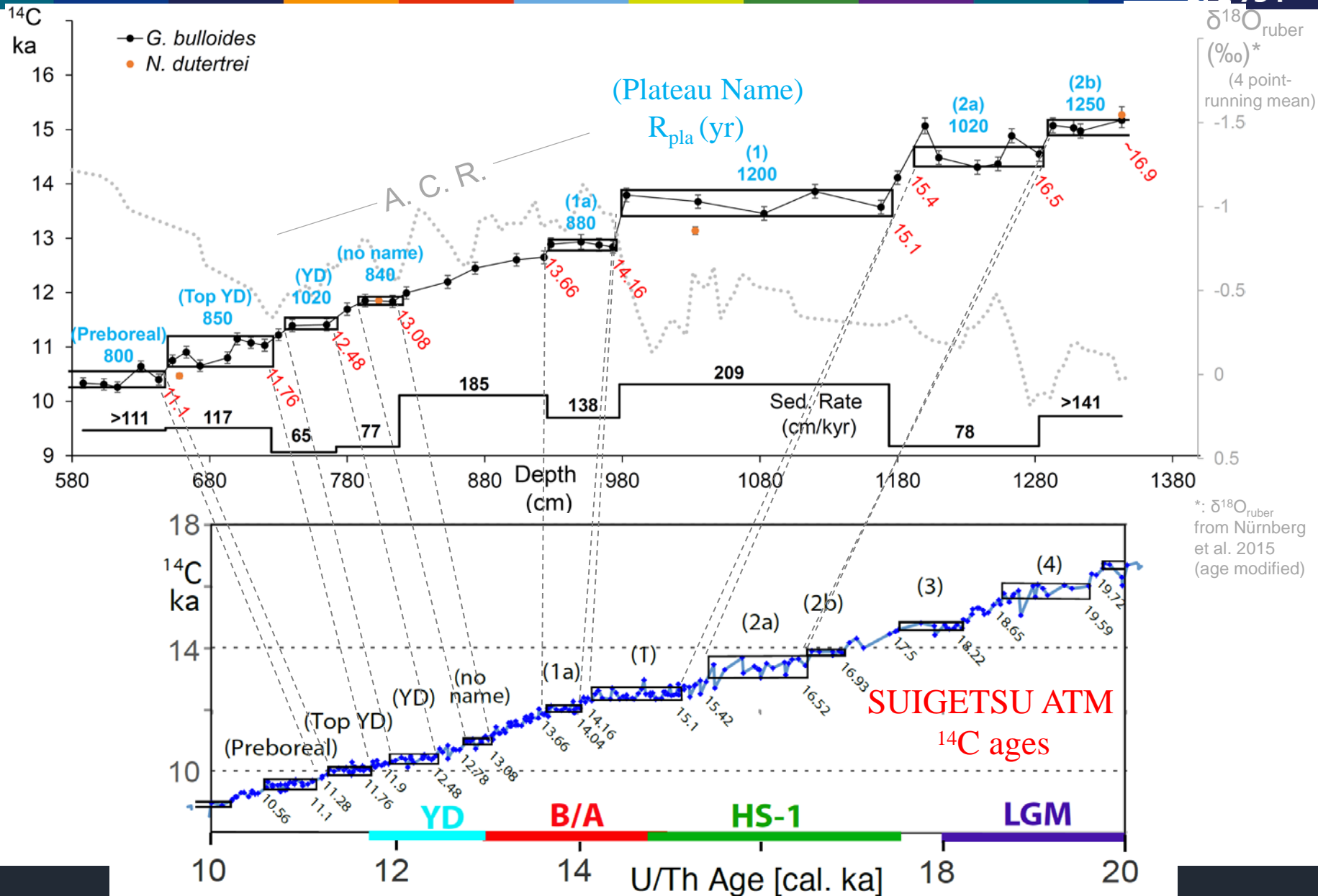


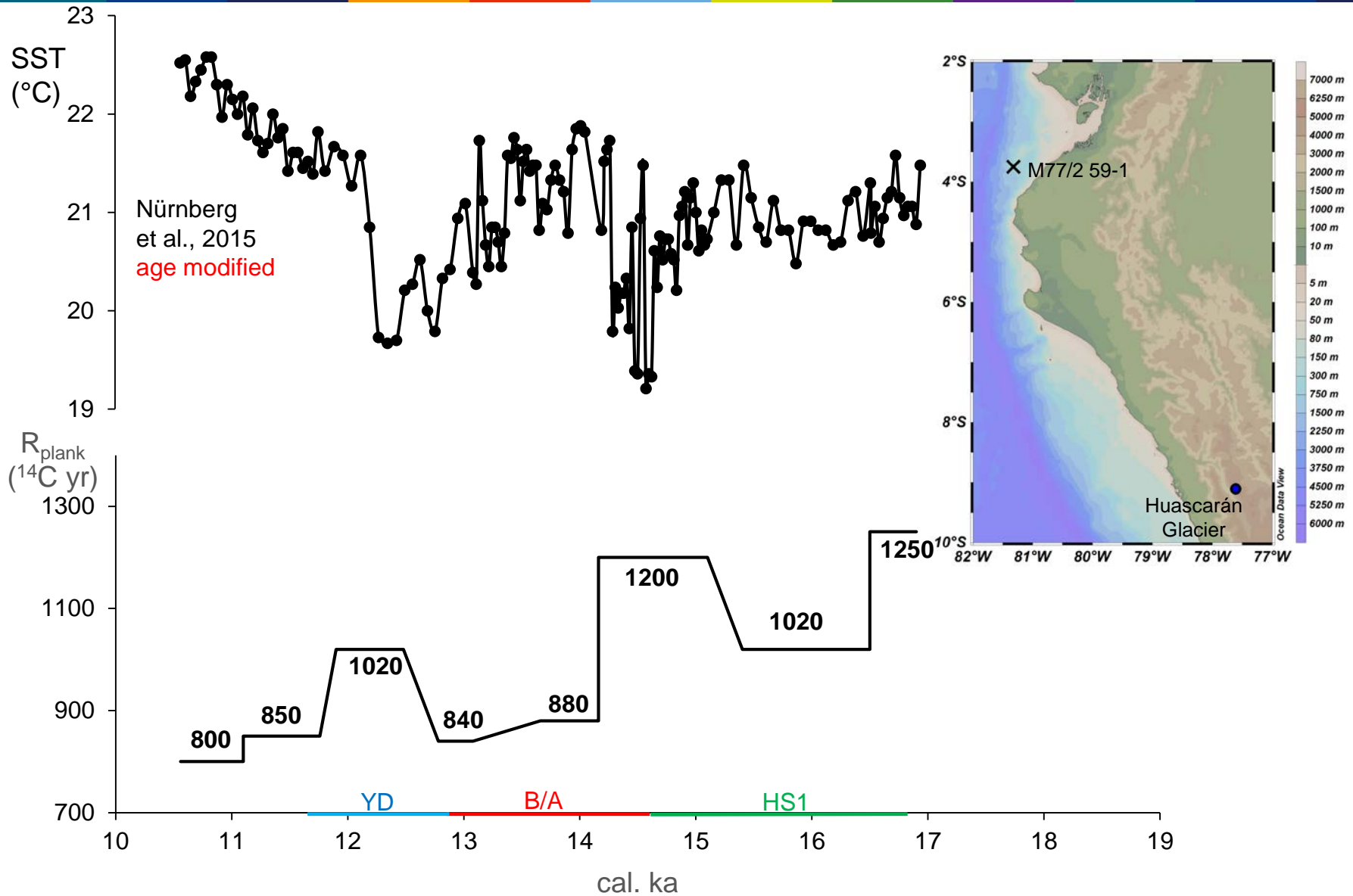
Deglacial ^{14}C reservoir ages of surface waters off Peru

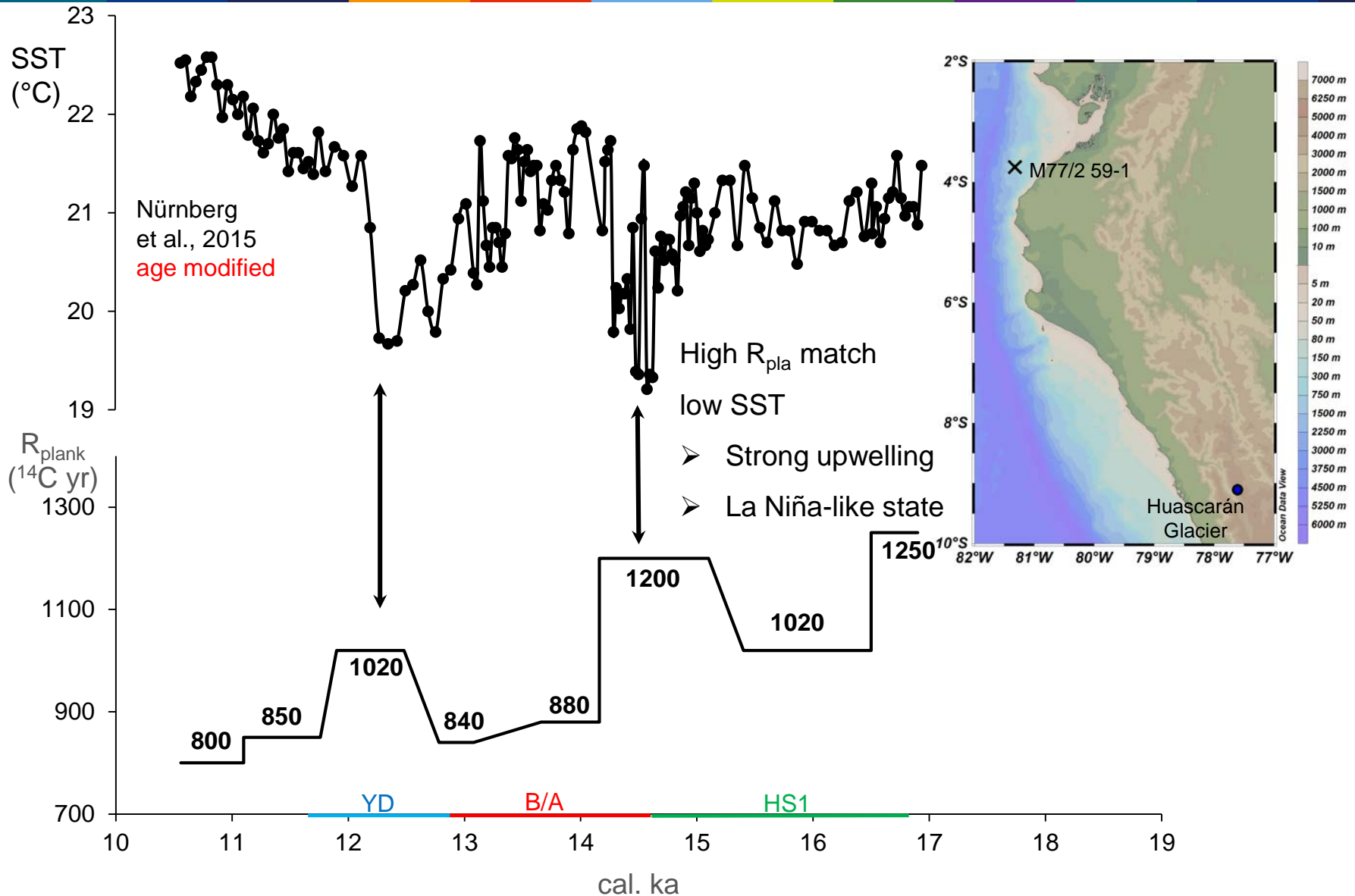
Results: High res. ^{14}C ka record from core M77-1 59-1

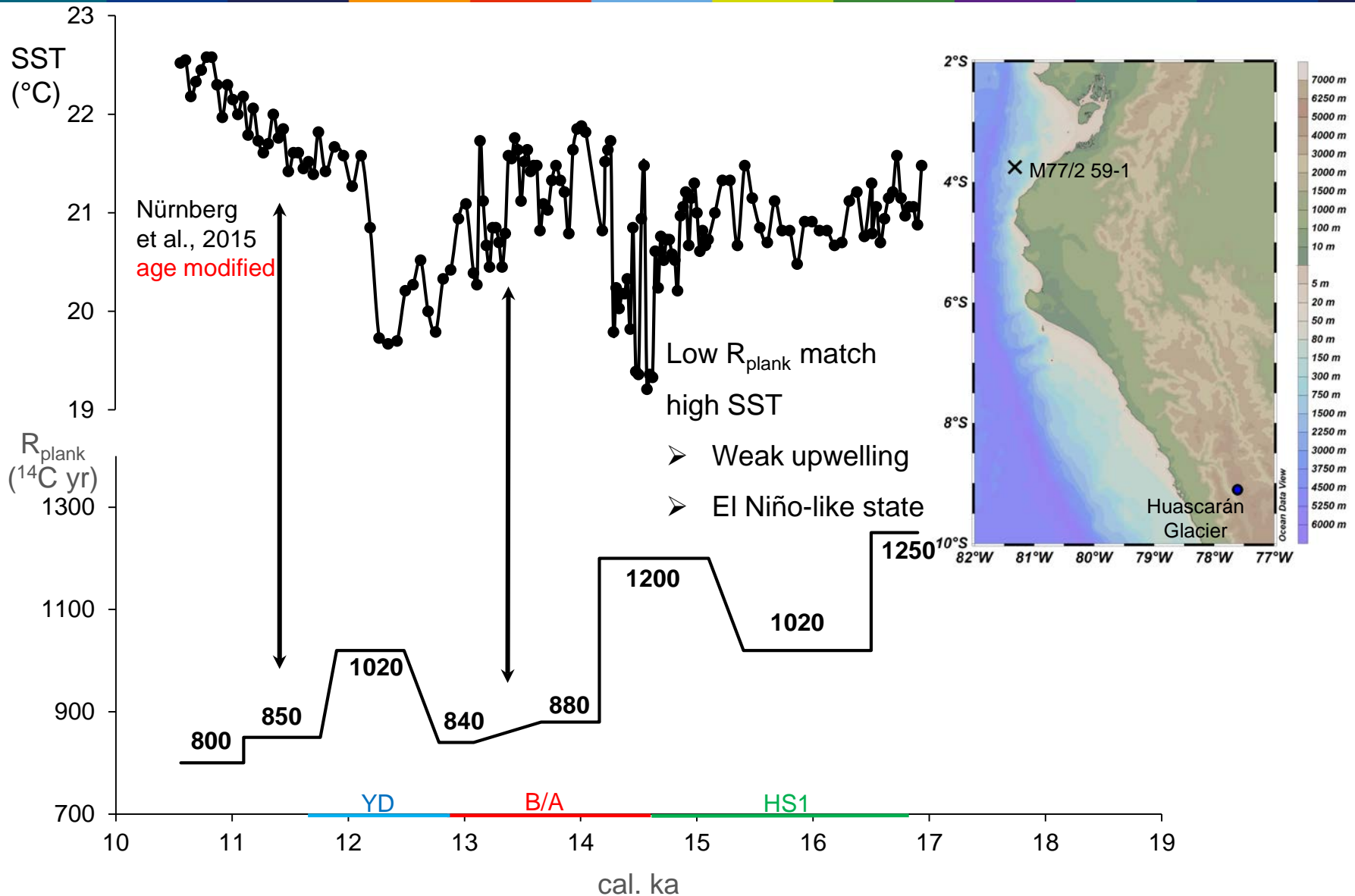


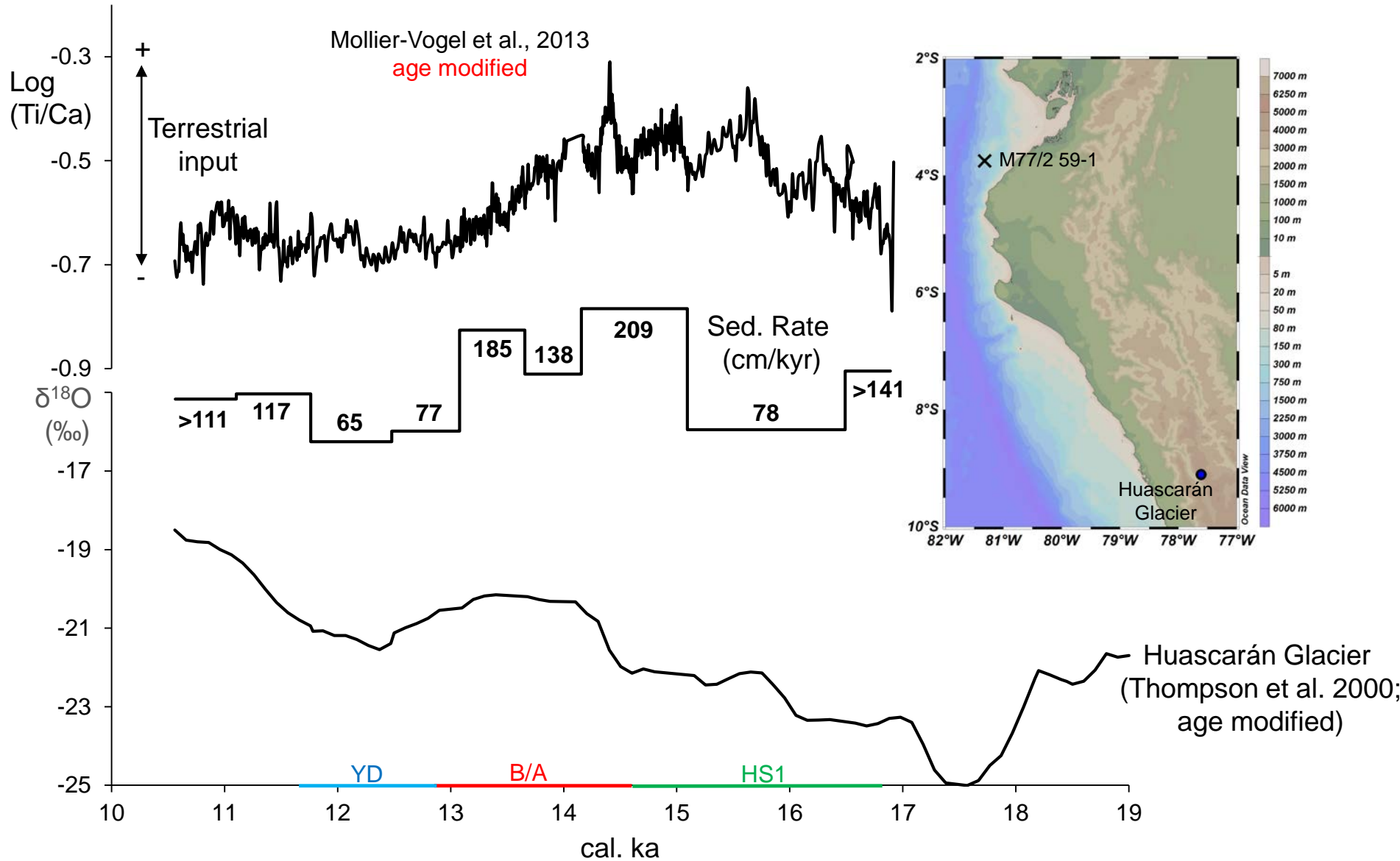
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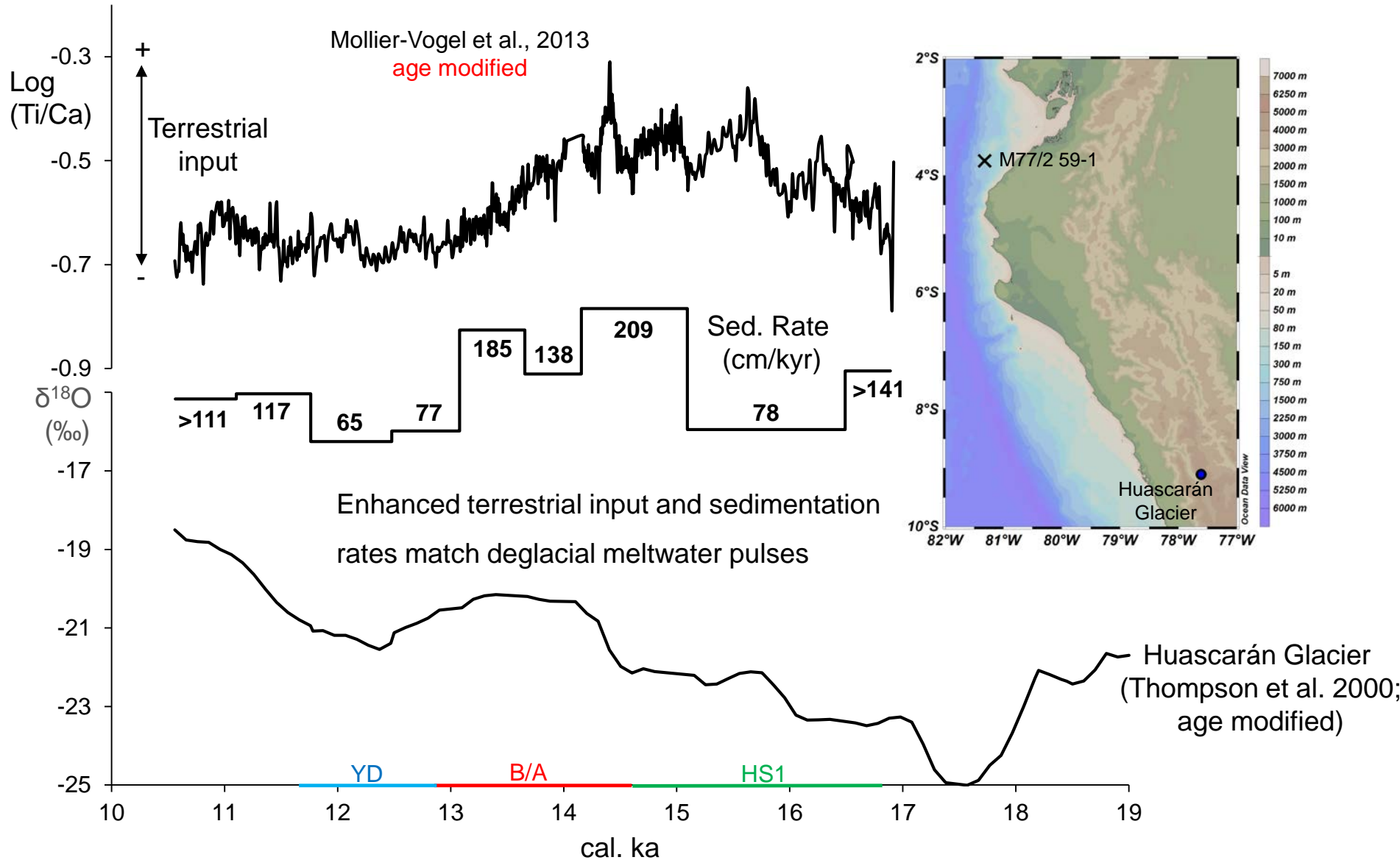


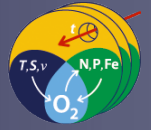












CONCLUSIONS

- ^{14}C plateau tuning established accurate centennial-scale age control
 - Deglacial reservoir ages (R_{pla}) off North-Peru are high (800-1250 ^{14}C yr) due to nearby coastal upwelling
 - Enhanced upwelling and cold SST match high R_{pla} = La Niña regime
- Weak upwelling and warm SST match reduced R_{pla} = El Niño regime
- Changes in sedimentation rates are governed by deglacial meltwater input (via the Gulf of Guyaquil)

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References:

- M. Sarnthein, S. Balmer, P. M. Grootes, M. Mudelsee, *Radiocarbon*. **57**, 129–151 (2015).
- M. Sarnthein *et al.*, *Clim. Past Discuss.* **2019**, 1–63 (2019).
- A. W. Dale, M. Graco, K. Wallmann, *Front. Mar. Sci.* . **4** (2017), p. 29.
- D. Nürnberg *et al.*, *Paleoceanography*. **30**, 984–999 (2015).
- E. Mollier-Vogel, G. Leduc, T. Böschén, P. Martinez, R. R. Schneider, *Quat. Sci. Rev.* **76**, 29–38 (2013).
- L. G. Thompson, E. Mosley-Thompson, K. A. Henderson, *J. Quat. Sci.* **15**, 377–394 (2000).