First *Amburana cearensis* (Fabaceae) tree-ring chronology in Brazil in a dry forest shows great potential for climate reconstruction

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PIRE**CREATE**

INTRODUCTION

Tree-ring chronologies are excellent climate archives to explore past and future climate variation. However, in tropical regions there are vast yet unexplored areas of seasonally-dry forests that lack dendrochronological studies.

Here we built a tree-ring chronology of *Amburana cearensis* (Allemão) A.C. Sm., a species with known dendrochronological records but never explored in Eastern South America.
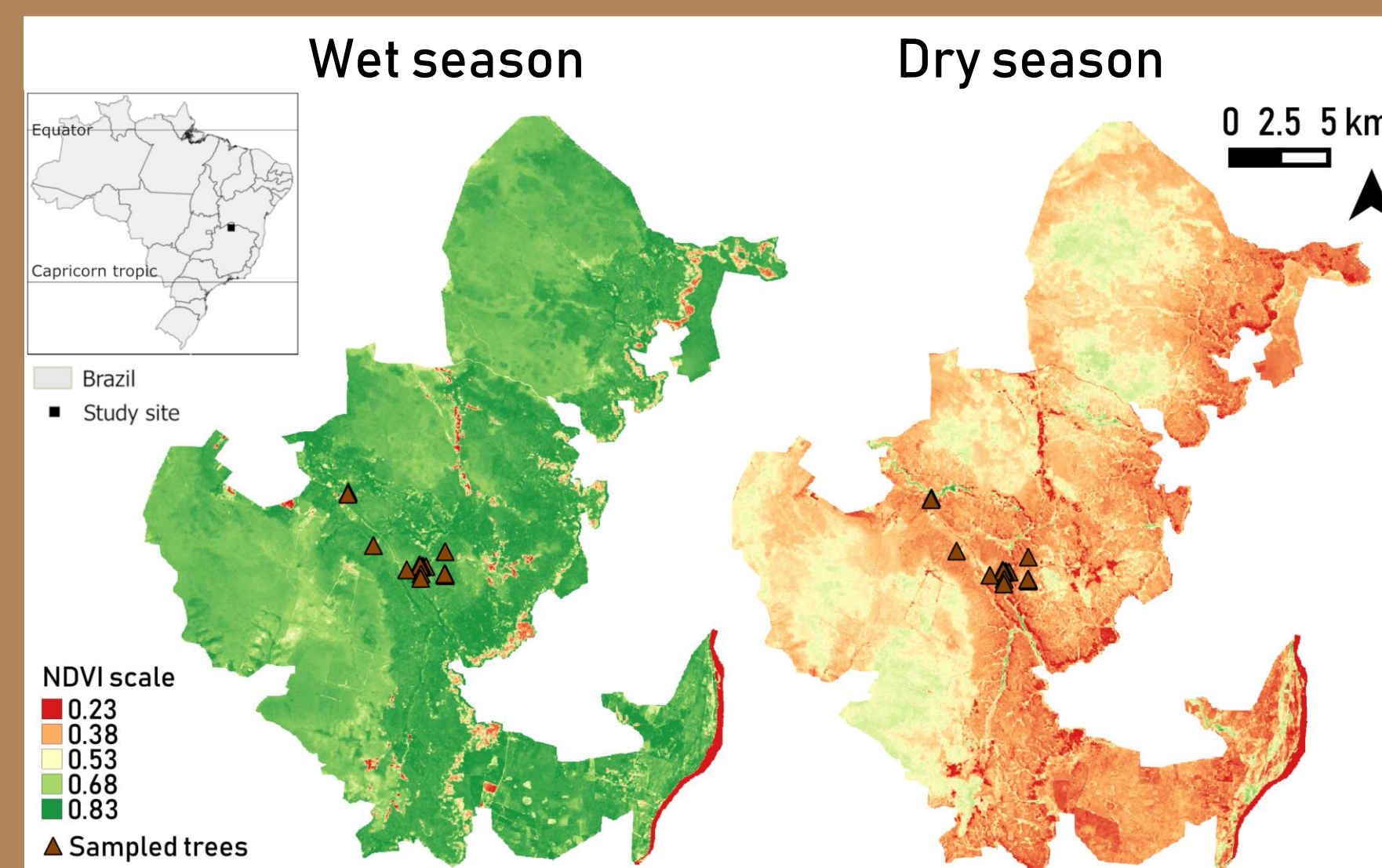
METHODS

Sampling took place in Central - Eastern Brazil, at a karstic area with a clear dry winter in which precipitation is lower than 50mm for 6 months.

We used standard procedures (SPEER, 2010) to build a chronology and explore the recorded climate signal.
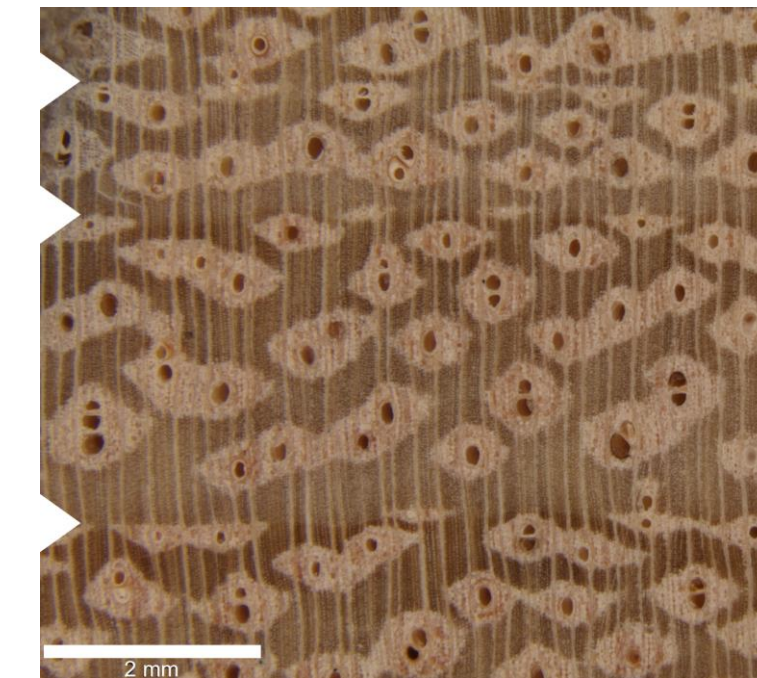

Courtesy of Francisco Cruz

We found subfossil trunks that were dragged from the forest in past flooding events and remained trapped and preserved inside caves. Scale ~30m.
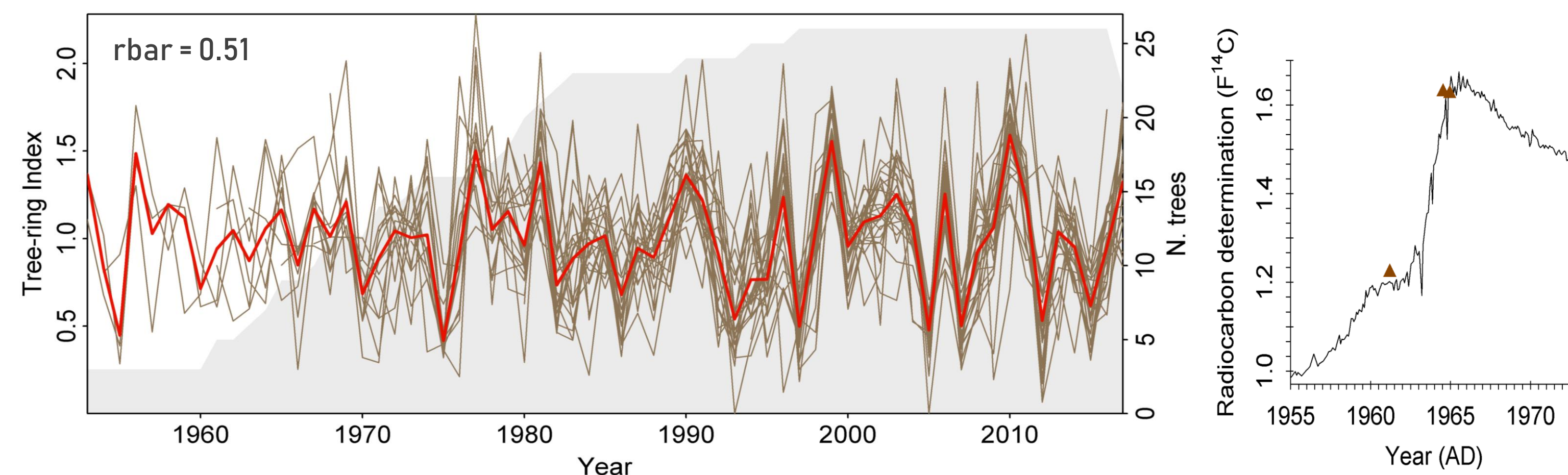

Sampled trees at the Cavernas do Peruaçu National Park and Vegetation Index based on LANDSAT8 images from the wet (20/XII/2018) and dry season (16/VII/2019).
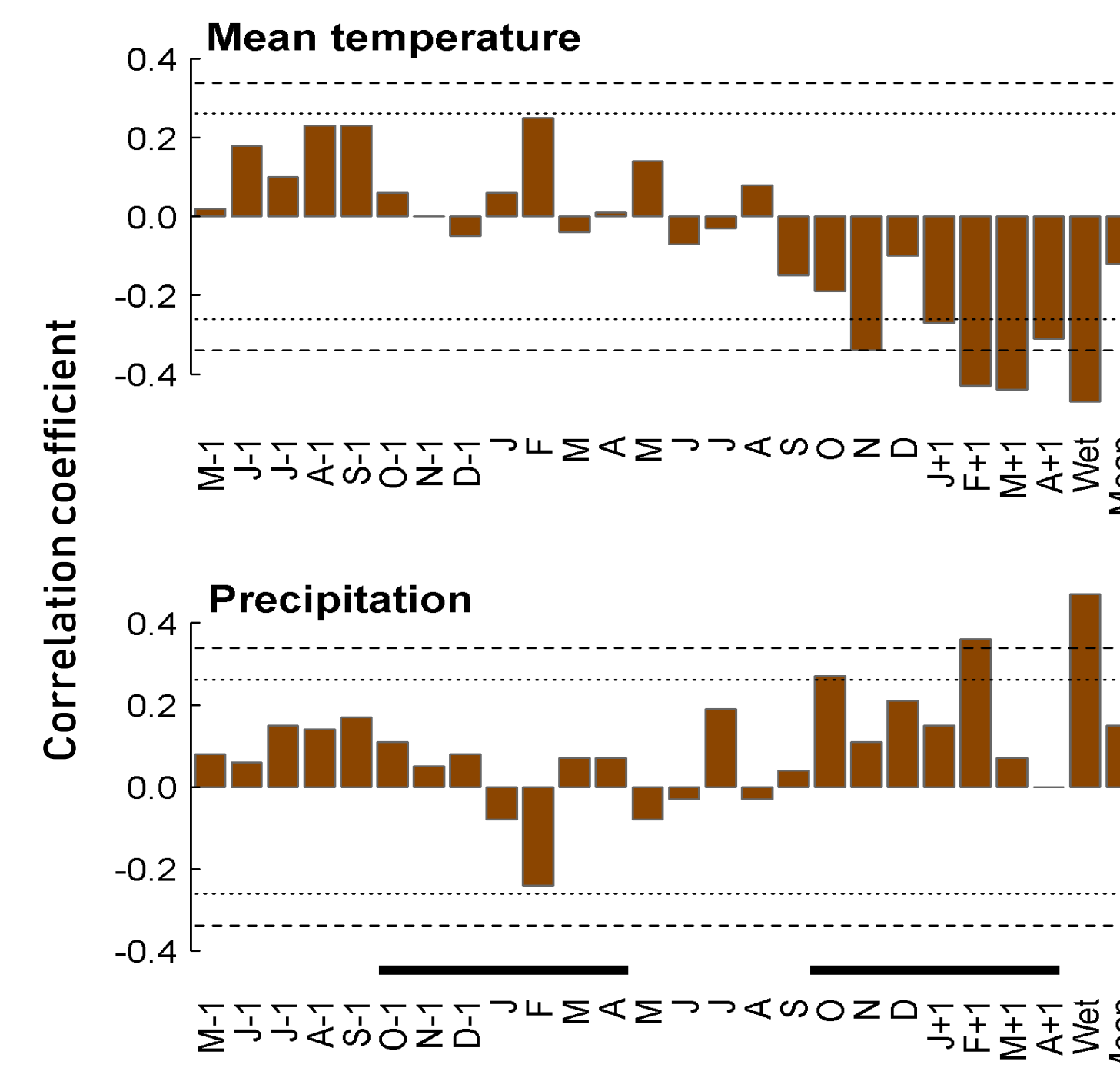
RESULTS AND DISCUSSION

Tree rings are delimited by half-flattened aliform parenchyma around small vessels. The white arrowheads highlight tree-ring boundaries.
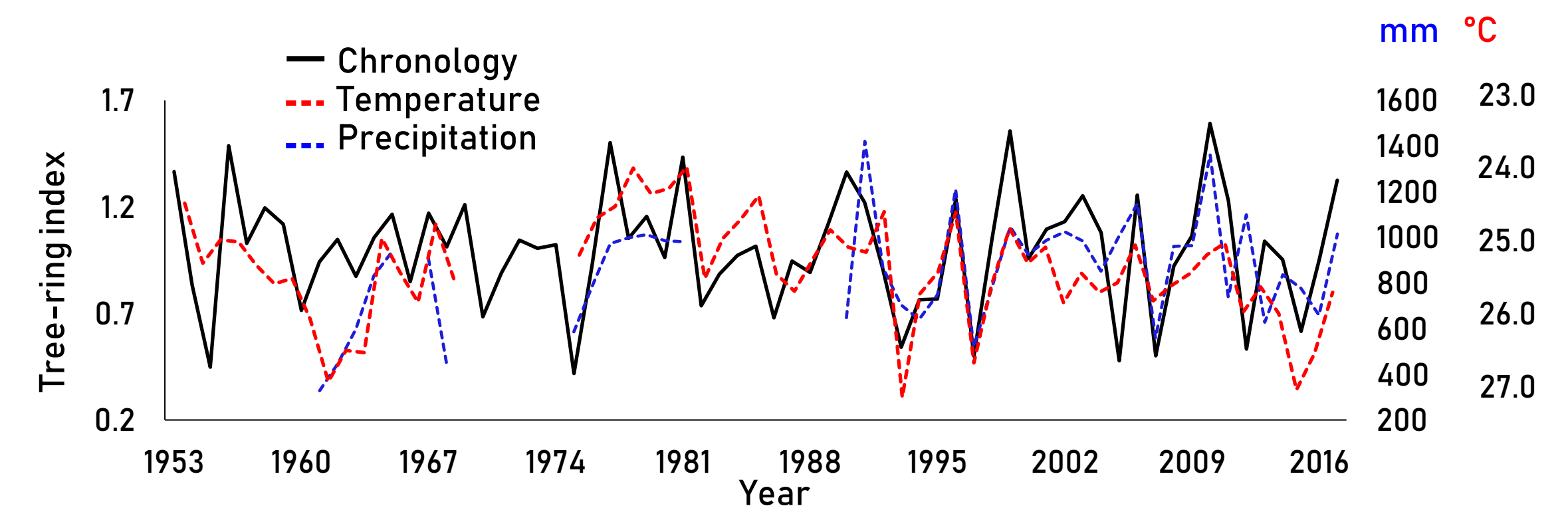
Tree-ring width chronology (red) based on 26 trees (brown) showing a strong common growth signal.

Standard tree-ring width chronology was sensitive to temperature (negatively) and precipitation (positively) during the wet season.

Monthly correlation with mean temperature and precipitation. Dotted line: $p < 0.05$; dashed line = $p < 0.01$; black thick line: wet season.

Historical series of the wet season (Oct-March) and mean chronology shows good fit (correlation coefficient for both 0.47).

CONCLUSIONS

• We established the first *Amburana cearensis* chronology in Brazil.
• There is a strong climate signal recorded.
• Further, *A. cearensis* will be used to explore how the recent global warming is affecting the region.
• The study site offers the rare possibility of using subfossil wood to extend the chronology to the past and connect to proxies retrieved from cave speleothems.

Calibrated age (right) of two tree rings - 1960 and early and latewood of 1965 (triangles). Southern hemisphere calibration curve, zones 1&2 (HUA *et al.*, 2013).

• One tree, although well correlated with the mean chronology had a 10-year offset. We are performing more analysis to understand the causes (e.g. carbon remobilization, absorption of old carbon).

HUA, Q., Barbetti, M., & Rakowski, A. (2013). Atmospheric Radiocarbon for the Period 1950-2010. Radiocarbon, 55(4), 2059 - 2072.

SPEER, J. H. (2010). Fundamentals of tree-ring research. University of Arizona Press.