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Geophysical Research Letters

Supporting Information for

Bristlecone Pine Maximum Latewood Density as a Superior Proxy for Millennium-length Temperature Reconstructions

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Contents of this file

Figures S1 to S4, Table S1, Data Set S1

Introduction

This Supporting Information file contains Figures that support the main results of the manuscript, as well as a table with the reconstruction statistics. The Data Set file contains the raw MXD measurements, the chronology, as well as the temperature reconstruction, and the files used to generate the Figures 2a,b,c, 3 and 4.

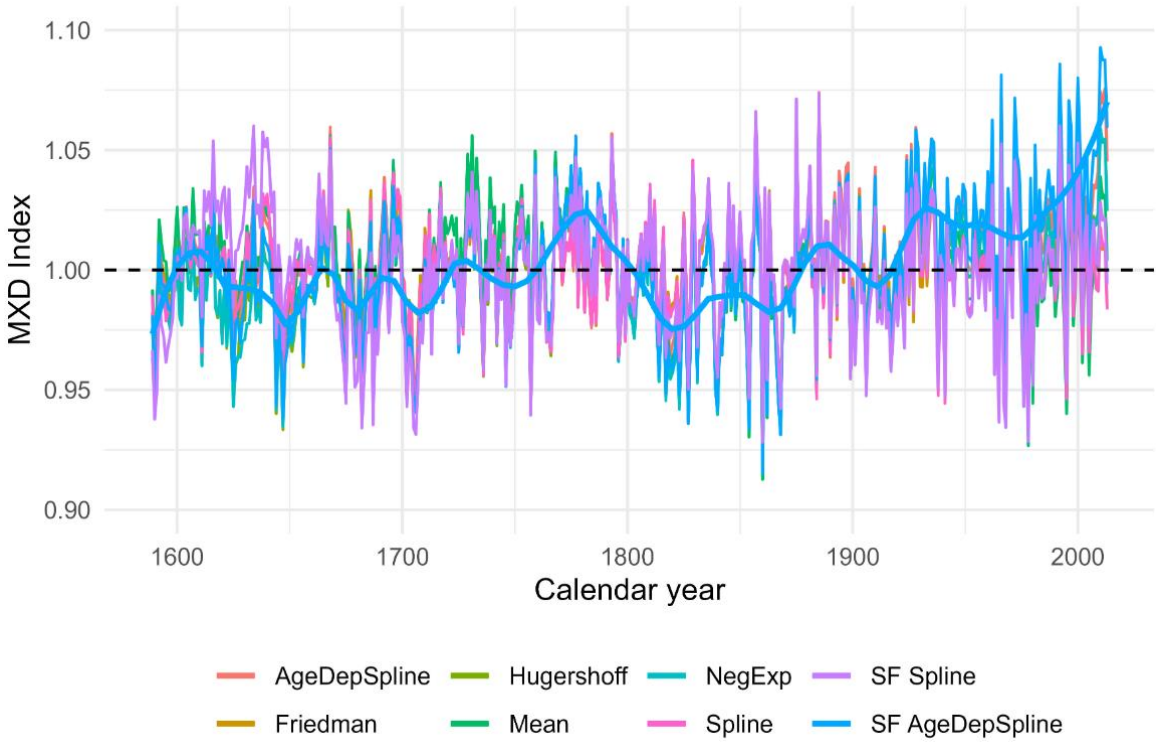

Figure S1. Different detrending options for the MXD data were explored, such as the age-dependent spline (red), Hugershoff (light green), Negative exponential (cyan), signal-free (SF) spline (purple), Friedman smoothing (brown), horizontal curve through the mean (green), regular spline (pink) and SF age-dependent spline (blue). The SF Age

Dependent detrending method was finally selected as it yielded the highest and the most robust correlation with climate..

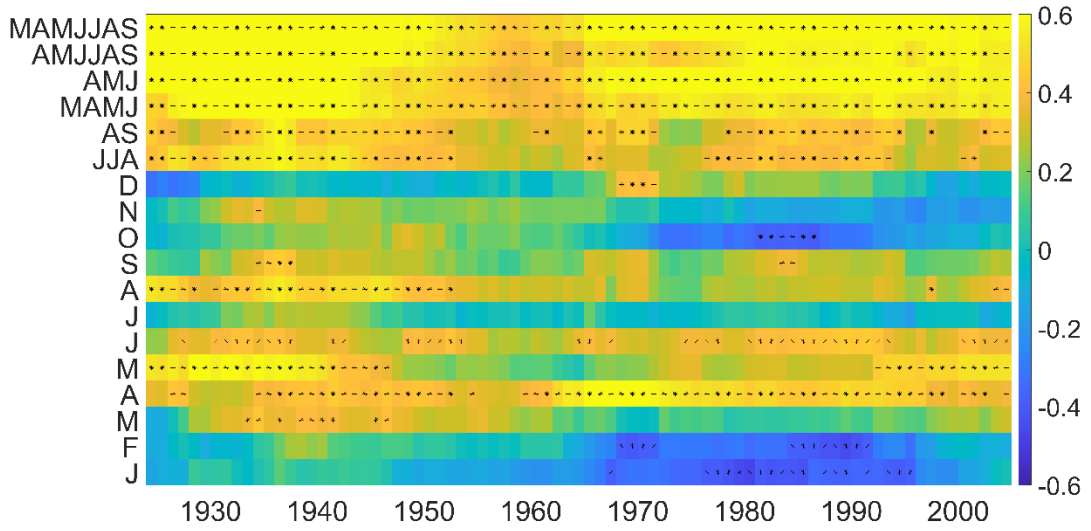

Figure S2. Correlation in a 30-yrs moving window between monthly and seasonal PRISM mean temperature and the X-ray CT MXD chronology. Significant correlations are highlighted with asterisks.

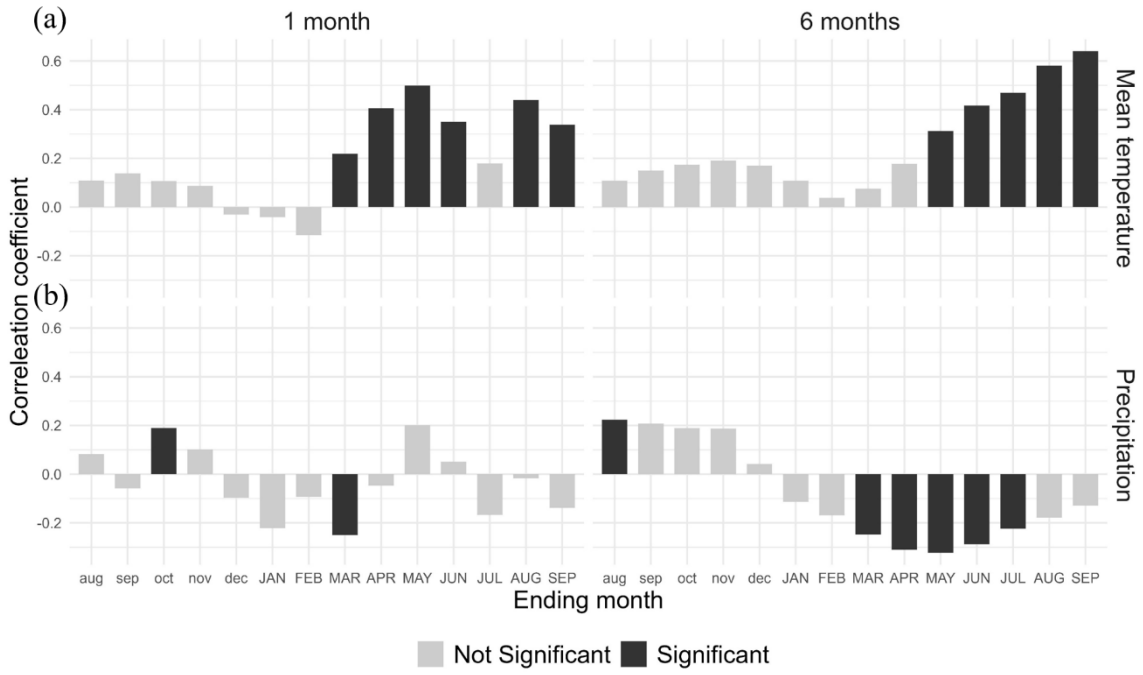

Figure S3. Monthly and seasonal correlations of our MXD chronology (a) with temperature and (b) partial correlations with precipitation (extracted from PRISM for the grid surrounding (37.54° N, 118.20°W)), calculated with SEASCORR (Meko et al., 2011)

programmed in R via the treeclim package (Zang & Biondi, 2015). Temperature was taken as the primary variable, precipitation – as the secondary variable.

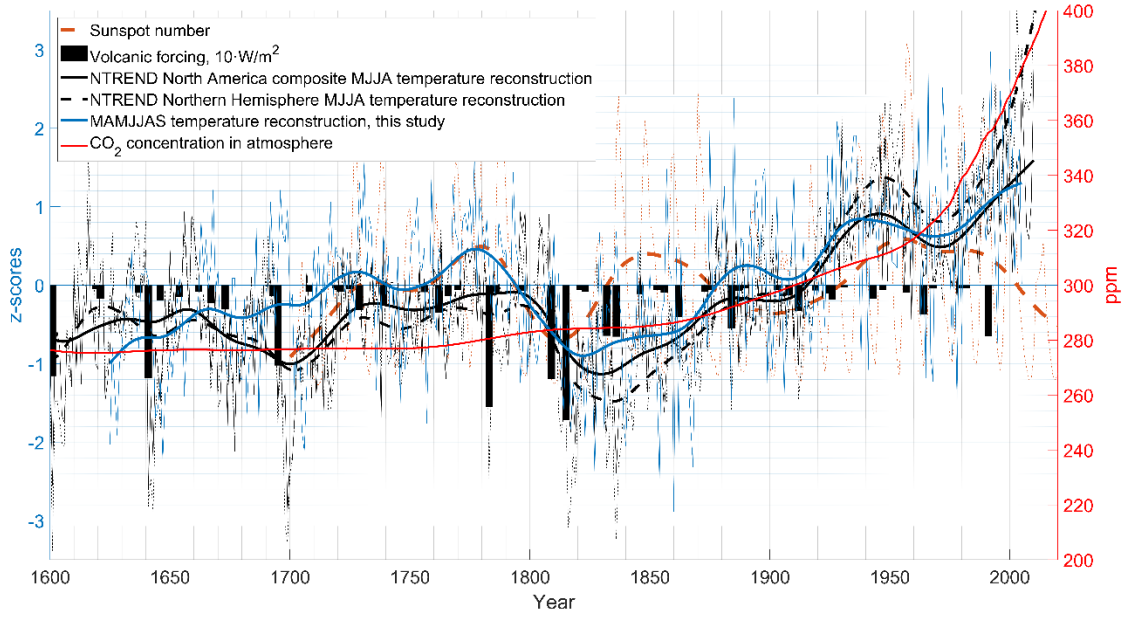

Figure S4. Our X-ray CT based reconstruction (blue) compared to non-anthropogenic and anthropogenic climate forcings. Volcanic forcing is shown as black bars (Sigl et al., 2015), the sunspot number is in orange (SILSO World Data Center, n.d.), and the global CO2 concentration in red (Lan et al. 2024, Etheridge et al. 1998)). There is a good coherence between sunspot number and our temperature reconstruction around 1710-1800 CE.

Table S1. Reconstruction statistics of the PRISM mean March-September (MAMJJAS) surface temperature using PILO MXD series. r_c : correlation in the calibration period, r_v : correlation in the validation period, R^2_c : coefficient of determination in the calibration period, RE : Reduction of Error, CE : Coefficient of Efficiency

Calibration	Validation	r_c	r_v	R^2_c	RE	CE
1895-1949	1950-2005	0.683	0.607	0.467	0.449	0.268
1950-2005	1895-1949	0.607	0.683	0.368	0.511	0.318
1895-2005		0.659	-	0.434	-	-

Data Set S1. The Data Set file contains the raw MXD measurements, the chronology, as well as the temperature reconstruction, and the files used to generate the Figures 2a,b,c, 3 and 4. Figshare link **https://doi.org/10.6084/m9.figshare.25562499.v1**