



## Supplement of

## **Prospects for dendroanatomy in paleoclimatology – a case study on** *Picea engelmannii* from the Canadian Rockies

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**Figure S1:** The MXBI percentile chronologies visualized against the original ring-width chronology. The percentile chronologies are obtained by sorting the high-pass filtered MXBI values into eight percentile intervals based on the corresponding measurements of absolute ring-width (e.g., the 0-30 percentile are the corresponding MXBI-values for the narrowest 30% of the rings). The titles provide the percentile interval used in each plot. The original ring-width chronology is developed from the full sample cohort (N = 182). The correlations between chronologies and its significances are provided in the bottom of each plot.



**Figure S2:** same as fig. 4, but instead of the CRU TS dataset using the Luckman and Wilson (2005) temperature data originally produced by the Meteorological Service of Canada.



**Figure S3:** same as fig. 6, but instead of the CRU TS dataset using the Luckman and Wilson (2005) temperature data originally produced by the Meteorological Service of Canada.



**Figure S4:** aMXD and Max. radial CWT mean (un-detrended) z-scored chronologies plotted over the 1586–2015 period, together with its sample depth over time.



**Figure S5:** Biplot of the first two principal components of the PCA performed 1901–1994 CE period on the MXBI percentile chronologies (depicted in fig. S1), together with the width, anatomy, and density parameters (shown by the grey lines). The colors of the MXBI vectors

correspond to the percentiles, where the blue-colored lines correspond to MXBI values measured on the narrow rings whereas the redder colors correspond to MXBI values from the wider rings.



**Figure S6:** Same as figure 4, but instead of CRU TS dataset using the Berkeley Earth gridded daily temperatures (grid 52.5°N 118.5°W, 1880–1994 period). The data have been converted into monthly resolution prior to analysis, by averaging the daily data for each calendar month. Correlations are performed on detrended data over the 1901–1994 CE period. Significant correlations (p<0.01) are marked with white circles.



**Figure S7:** Regional curves of selected anatomical datasets. The scatterplots represent individual, non-detrended and cambial-age aligned (first year in each series), anatomical measurements. The orange curves are the medians of the individual data points smoothed with a cubic smoothing spline. Note that no pith offset adjustments have been made on the time series. For comparison, we also add smoothed regional curves of the MXBI and X-ray derived MXD datasets. Linear regression equations for each RC are included in the plots. Probability density functions of the parameters are provided at the bottom of each panel, together with warm-season temperatures for comparison of distribution and prevalence of outliers in the proxy and in the temperature target.