Supplementary Material

Figure S1. Example of the WPS at contrasting sites.
Figure S2. Spatial distribution of the residuals.
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Table S1. Types of forests included in the tree cover.
Equation S1. Mixed model equation.

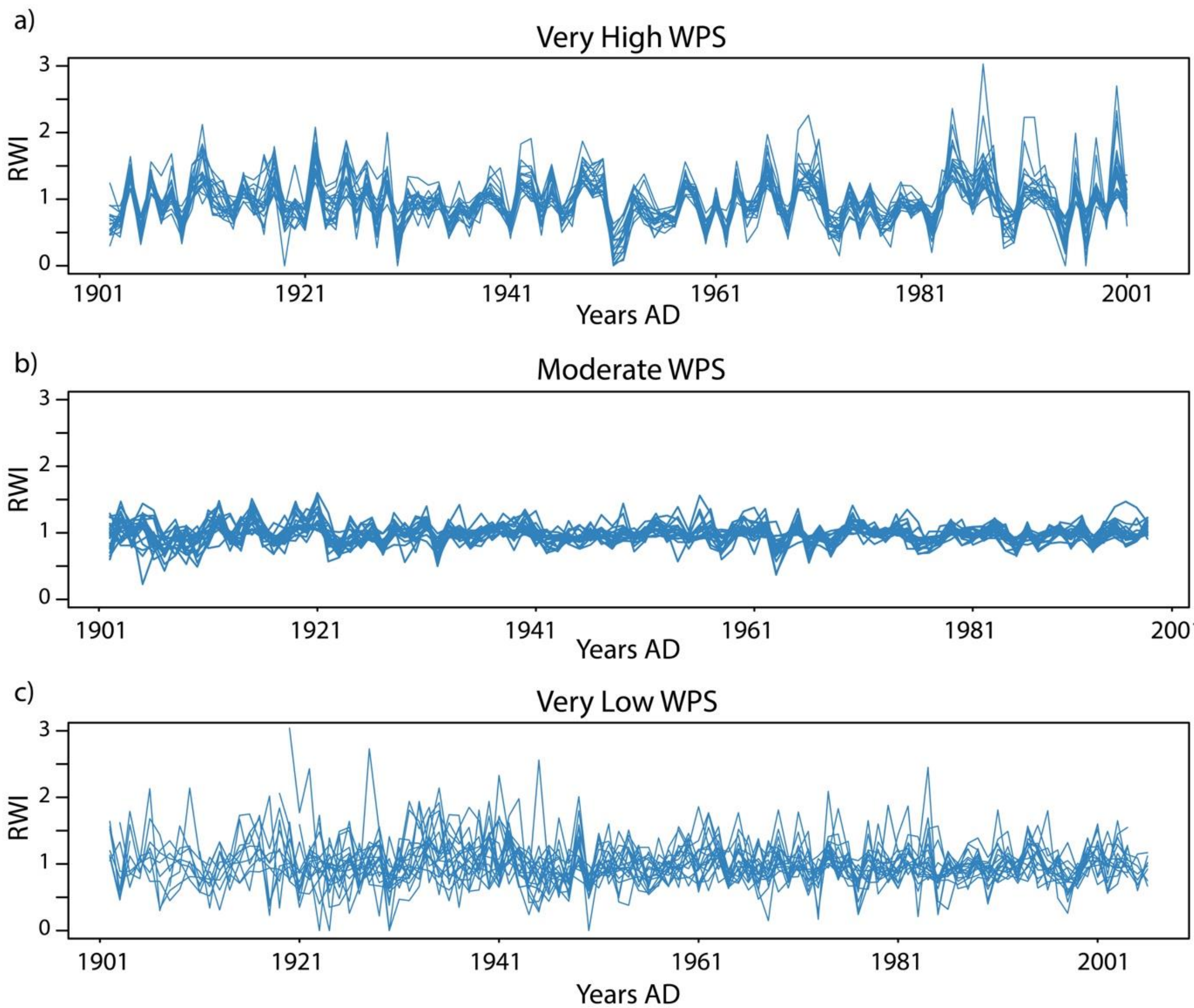

Figure S1. Example of the WPS at contrasting sites. 20 ring-width residual series of each site are randomly selected. a) represents the Very High WPS of *Pinus ponderosa* in Colorado State (US) with the ITRDB denomination ‘co593’. b) represents the Moderate WPS of *Pinus sylvestris* WPS in Spain with the ITRDB denomination ‘spai053’. c) represents the Very Low WPS of *Tectona grandis L. f*. in Thailand, with the ITRDB denomination ‘th001’.

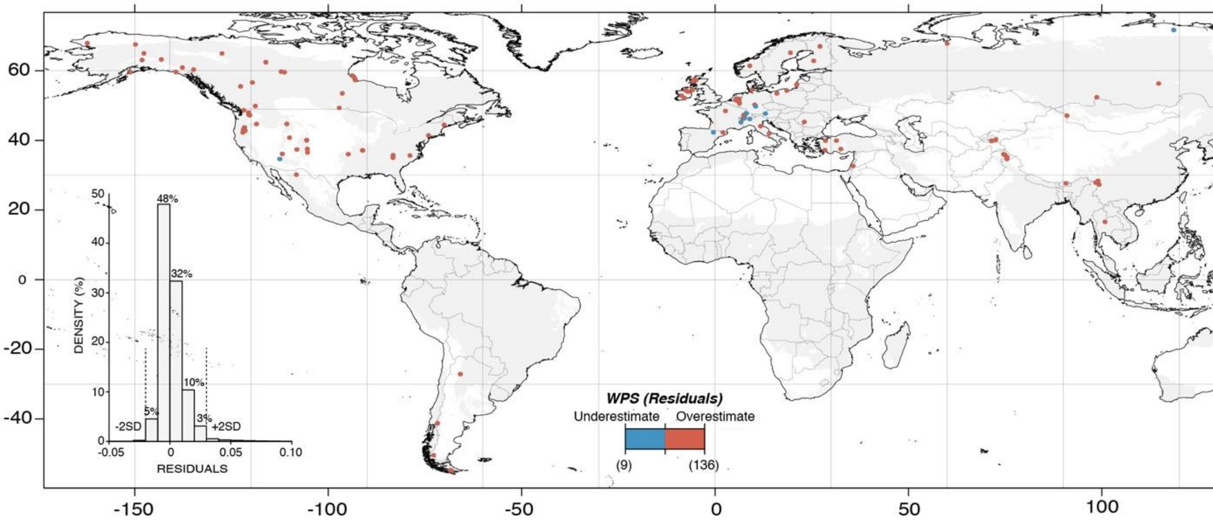

Figure S2. Spatial distribution of the residuals between the observed and the predicted within-population synchrony (WPS) model (only sites with ±2 SD are shown).

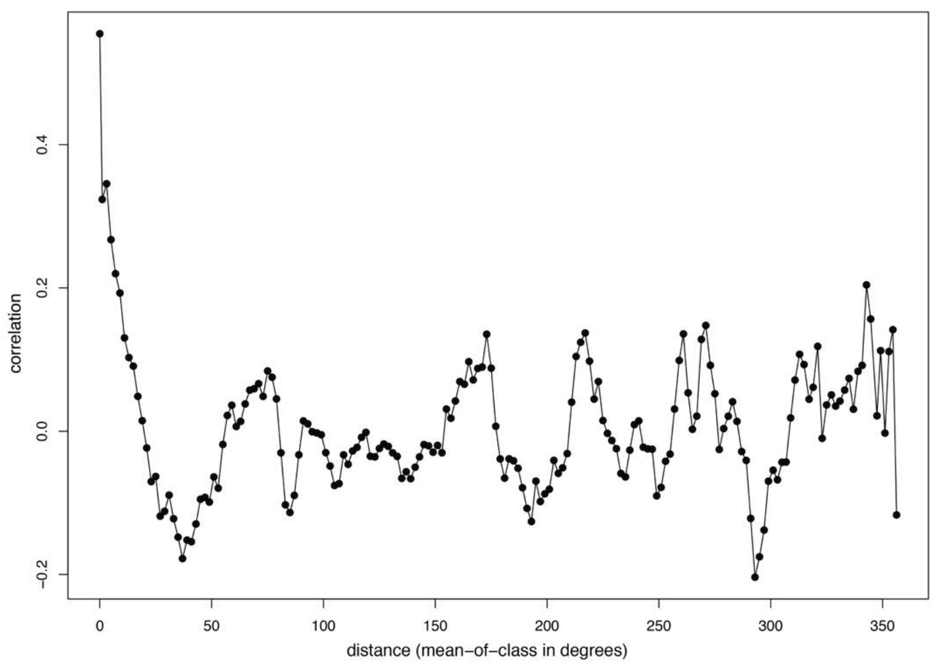

Figure S3. Spatial Correlogram of the mean of WPS. The correlogram is calculated using x, y, and z data where z was a univariate value. The correlation is the value for the Moran similarity. The interpretation of the correlation is that, except for very nearby points (i.e. < 5 km apart), values of WPS have very weak spatial autocorrelation across sites and therefore it is safe to assume that WPS observations are essentially independent observations and therefore we do not need to account for spatial autocorrelation in WPS when modeling WPS as a function of any predictor variables.

Type of forests included in the tree cover
Tropical and subtropical moist broadleaf forests
Tropical and subtropical dry broadleaf forests
Tropical and subtropical coniferous forests
Temperate broadleaf and mixed forests
Temperate coniferous forests
Boreal forests/Taiga
Tropical and subtropical grasslands
Savannas and shrublands
Temperate grasslands
Montane grasslands and shrublands
Mediterranean forests
Woodlands and scrubs

Table S1. Global tree cover was classified according to the World Wildlife Fund (WWF) definition of ecoregions (https://www.worldwildlife.org/biomes).

Equation S1. The model is represented as:

$$(\boldsymbol{y}|\boldsymbol{b}) \sim N(\boldsymbol{X\beta} + \boldsymbol{Zb}, \sigma^2)$$
$$\boldsymbol{b} \sim N(0, \boldsymbol{\Sigma})$$

where $\boldsymbol{y}$ is a vector-valued random response variable, whose observed value is y_{obs}, with mean $\boldsymbol{X\beta}$ and variance $\sigma 2$; $\boldsymbol{\beta}$ is an unknown vector of fixed effects; $\boldsymbol{b}$ is an unknown vector of random effects, with mean 0 and variance–covariance matrix, $\boldsymbol{\Sigma}$; and $\boldsymbol{X}$ and $\boldsymbol{Z}$ are known model matrices containing the values of the fixed and random variables for the observations $\boldsymbol{y}$. The models were fit by the maximum likelihood method using the R package lme4 (Bates, Mächler, Bolker, & Walker, 2015).

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software; Vol 1, Issue 1 (2015)* . https://doi.org/10.18637/jss.v067.i01