Does silviculture practice affect the climate-growth relationship in spruce stands?

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Objective

The presented project aims to find the most suitable silvicultural management (forest tending) for pure Norway spruce stands, fulfilling wood-producing and non-wood-producing functions based on dendrochronological analysis.

Hypothesis

H1: In the observed pure Norway spruce stands, thinning from above will primarily accelerate tree growth and strengthen the stands´ resilience against drought stress due to reducing competition in the crown canopy layer.

H2: Norway spruce resilience will depend on stand structures and site-specific conditions, especially the annual precipitation and mean annual air temperatures.

Methods

- Study sites: Teplá, Železná Ruda, Vimperk, Blaník, Nisa, Ostravice, Velké Karlovice
- Sampling Norway spruce from stands with different silviculture management
- Measuring tree rings in the laboratory using CooRecorder
- Cross-dating of all tree ring series and their averaging within each tree, detrending using Spline (70 years wavelength)
- Creation of indexed site standard chronology for all studied categories (R soft., package dplR)
- Calculation of Pearson's correlations between indexed tree-rings widths (RWI) and monthly climatic variables in R software, package Treeclim

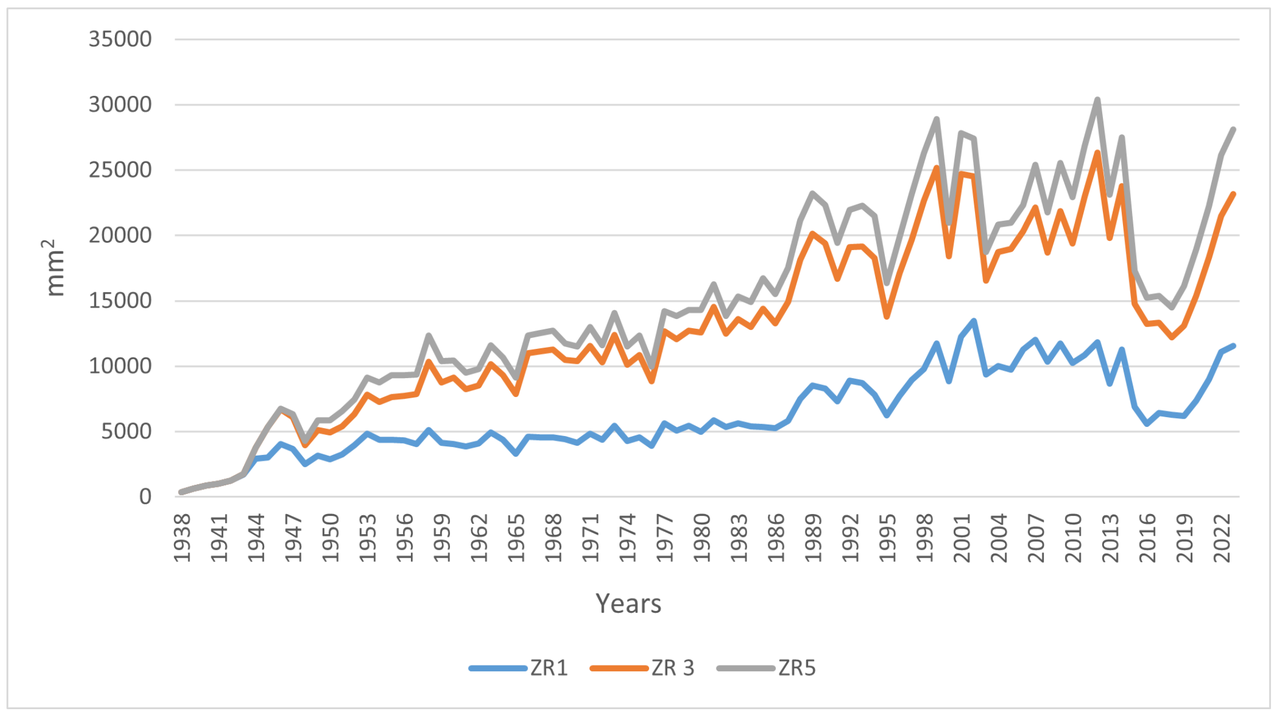

Figure 2 Basal area increment values (mm^2) for Železná Ruda site

Preliminary results and discussion

In Fig. 1. correlation with monthly climatic variables (monthly precipitation, mean monthly air temperatures, and drought index SPEI) in 20 years moving windows for "Železná Ruda" location for three different silvicultural regimes: control, heavy and moderate thinning from above. These results show the change of climate growth relationships over time. In Fig. 2, the average basal area increment is shown. Similar growth paterns were also observed by Rybníček et al. (2009) in spruce stands located in Orlické mountains area.

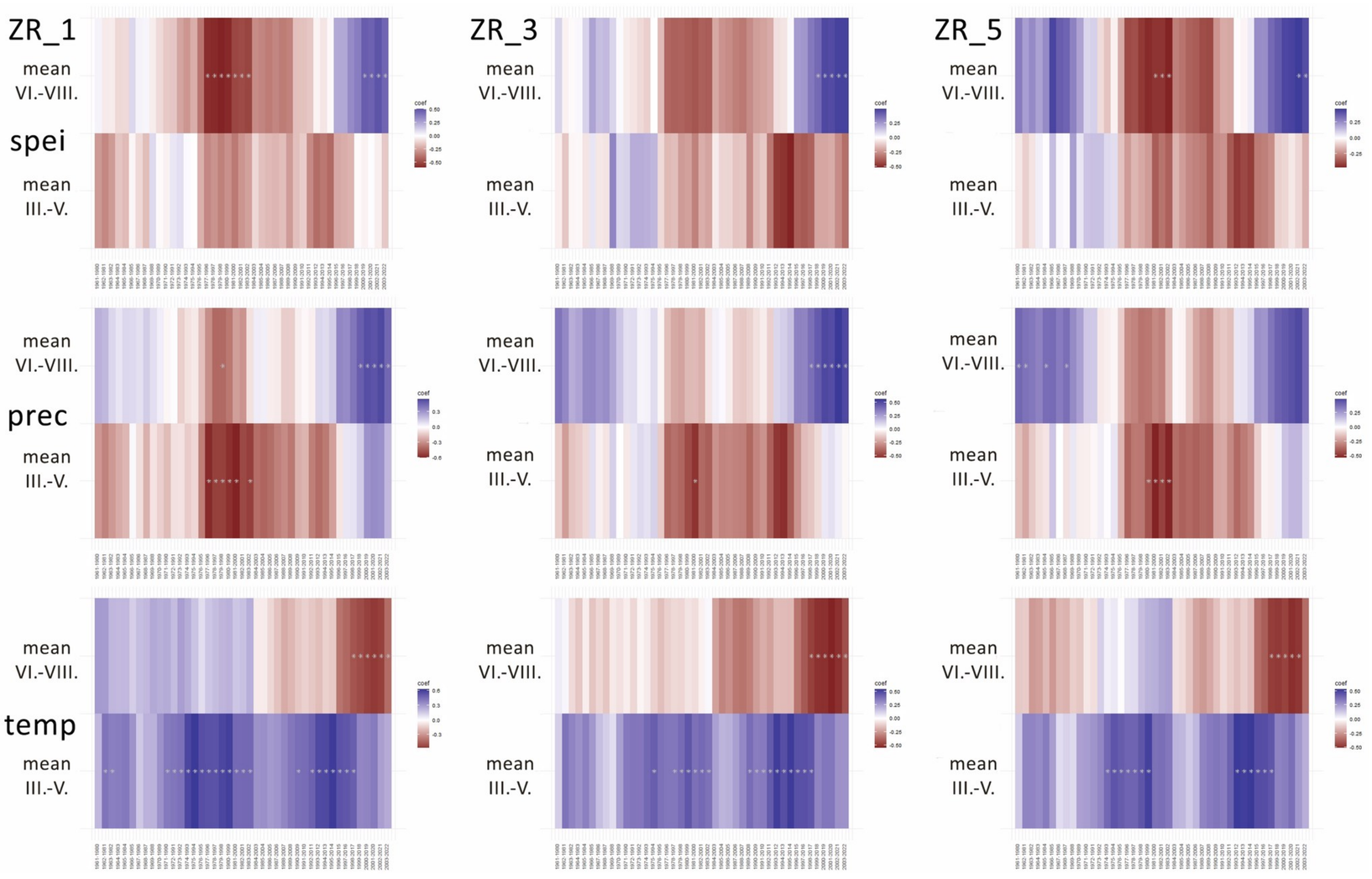

Figure 1 Moving correlation charts for Železná Ruda site

REFERENCES

Rybníček, M. et al. 2009. Influence of temperatures and precipitation on radial increment of Orlické hory Mts. spruce stands at altitudes over 800 m a.s.l. J. For. Sci., 55: 257-263.

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