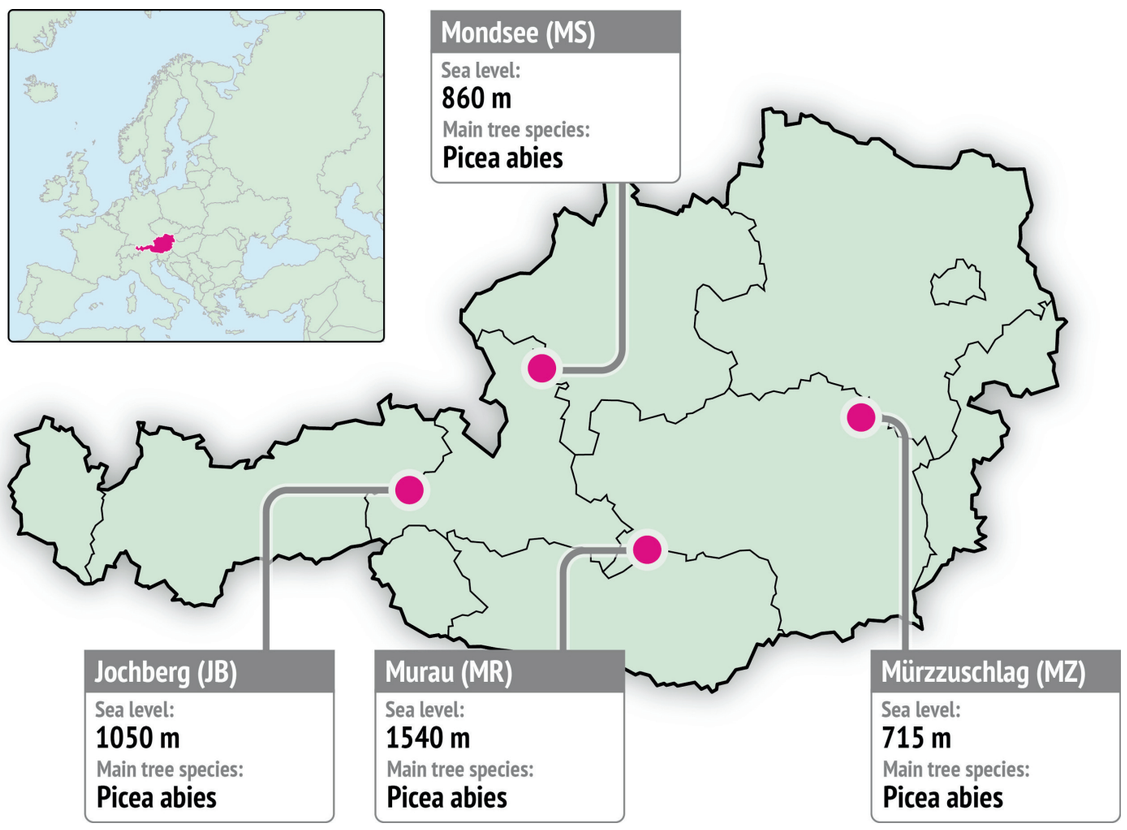
Analysis of the effects of soil parameters on radial stem growth for four spruce stands in Austria

Zolles Anita*, Vospernik Sonja, Schüler Silvio*, Karl Gartner***

***Austrian Research Centre for Forests, Austria **University of Natural Resources and Life Sciences, Austria**



Dendrometer

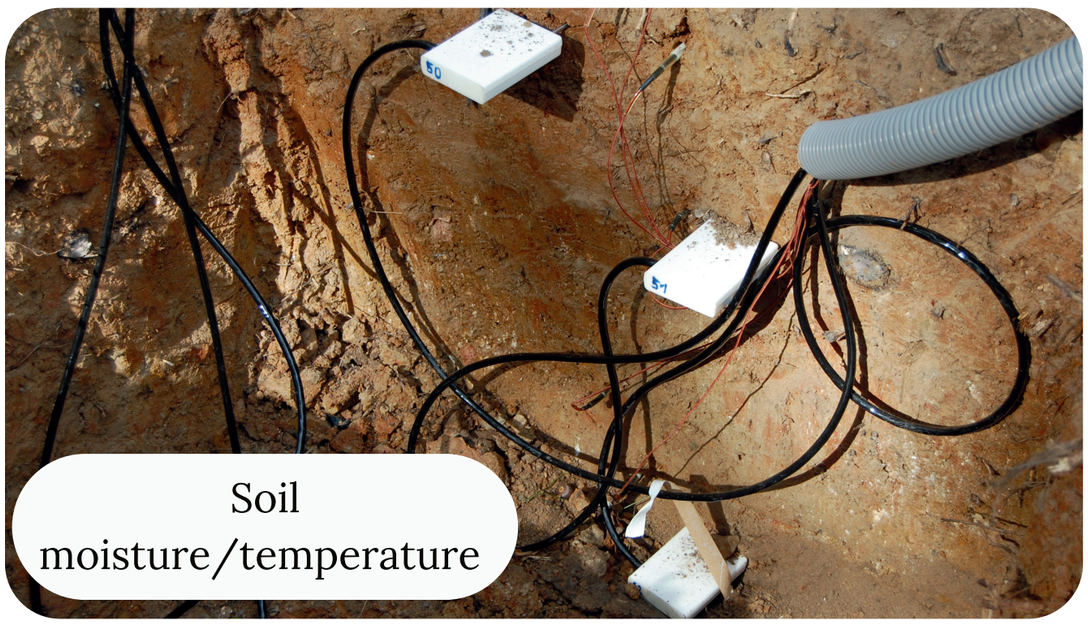
Setup

- Four ICP Forests sites
- Dendrometer measurements (10 trees/site)
- Tested climate variables: precipitation, temperature, radiation, soil moisture (SM) and soil temperature (ST)
- Day of the year (DOY)

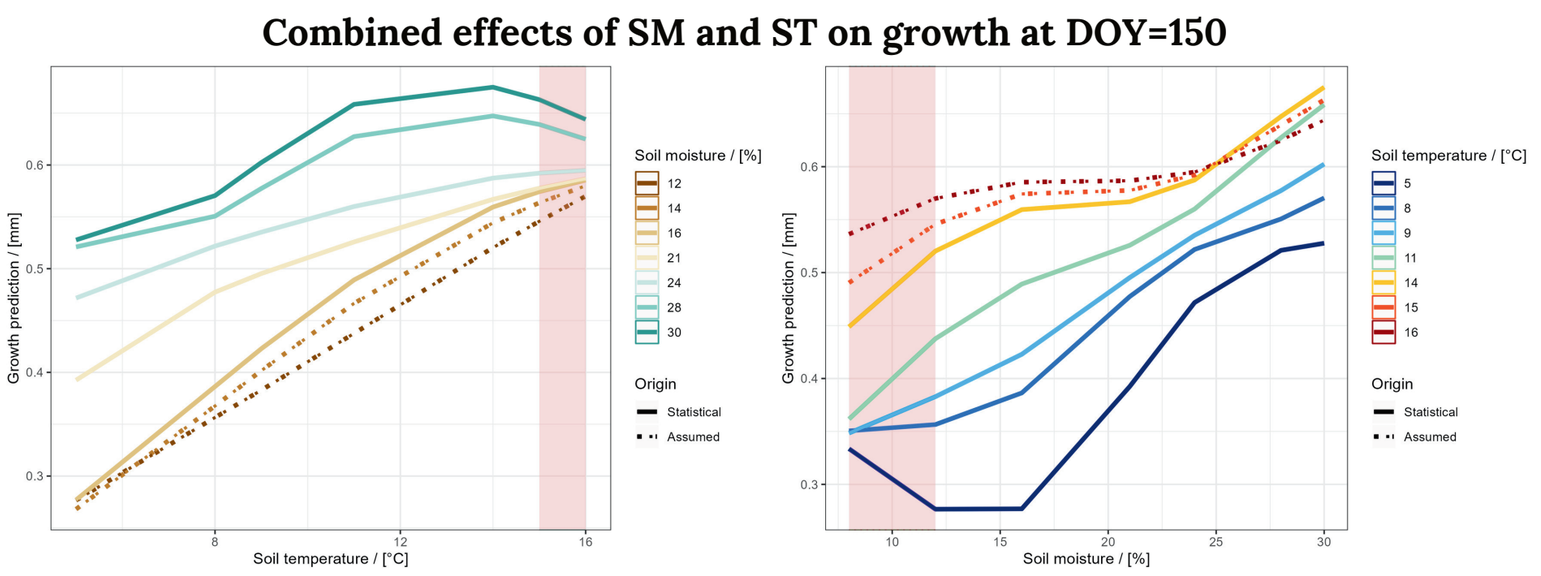
Modelling

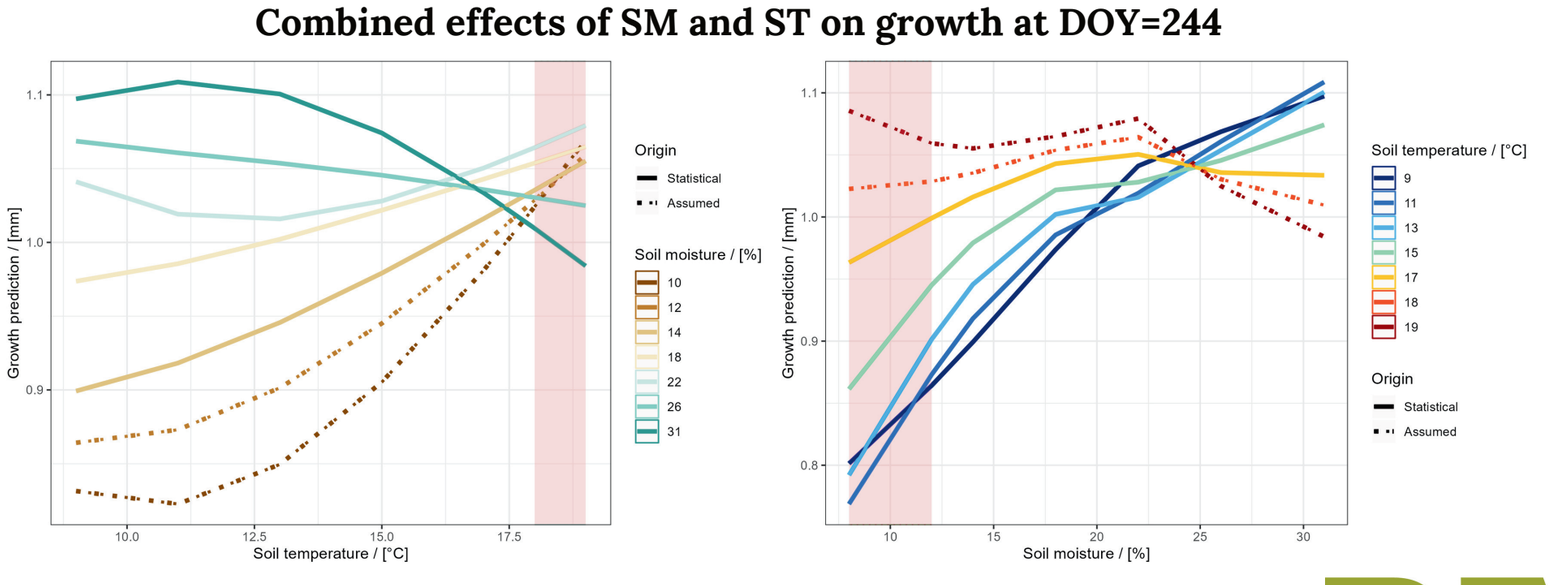
Generalized Additive Models (GAMs) were used with different moisture/temperature indicators, best model was selected based on AIC. The final model consisted of

- **Random effects**:
  s(TreeID,year)+s(TreeID,year,DOY)
- **Fixed effects:**
  s(DOY)+s(DOY,SM)+s(DOY,ST)
- **Tensor interaction:**
  ti(SM,ST)



Soil moisture/temperature





Results

Model using soil parameters outperformed all other model constellations

DOY=150

- Increase in ST/SM → increase in growth prediction
- Stronger increase when SM/ST is also higher

DOY=244

- Increase in ST/SM does not necessary increase growth prediction
- For low ST growth depends heavily on SM
- For low SM growth depends heavily on ST

Contact: anita.zolles@bfw.gv.at

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