Dendroclimatological investigation of black pine (Pinus nigra Arnold) trees from hilly coastal area of Croatia

**Objectives**
- Develop tree-ring width and MXD proxy chronology
- Calculate climate signal for each of the tested climate factor: air temperature, precipitation and sunshine hours
- Investigate time stability of the signal

**Main results**
Developed site tree-ring width (TRW) and maximum latewood density (MXD) chronologies extend from 1869 till 2012. TRW chronology matches well with other black pine chronologies from surrounding regions, which makes it reliable for use in crossdating and dendrochronological network development.

**Climate signal in TRW**
- Width of the tree rings was positively affected by June-July precipitation (r=0.34) and negatively by summer season temperatures (r=-0.32), while sunshine hours of individual months had no significant influence.

**Climate signal in MXD**
- Above average number of moisture hours had a strong and positive effect on latewood density in months from April till the end of June (r=0.51). Even stronger was influence of temperature in period April-August (r=0.68). Precipitation had negative influence in June and July (r=-0.33) on latewood density.

**Climate signal stability**
- Tree-ring proxies reacted differently to climate factors through time. There were periods with strong response to climate factors and periods with insignificant response. The period with the least climatic influence was around 1930s and 1980s.

**Conclusions**
- TRW react equally strong to late spring/summer precipitation, air temperature and sunshine hours, suggesting a complex climate signal. In the future, investigation of drought indexes should be included for TRW climate signal analysis from this area.
- Higher correlation coefficients were calculated between climate factors and MXD data. The strongest influence was calculated between MXD and temperatures from April-August period, suggesting that for the wood density, this period is most important. Higher temperatures in this period could increase latewood density, but decrease widths of the tree-rings. Forest management strategies for this region need to take this facts into account.
- Climate-tree growth relationship results are calculated for the period, but detailed look with running correlation reveals instability of the tree-growth reaction to climate factors. Further climate–tree data relationship investigations are necessary to discover, why trees change reaction to climate factors.

**Research areas**
Department of forest yield and silviculture investigates tree physiology, cambium activity and climate-tree growth relationships in natural and urban forests. We use pinning method for annual growth investigations, needle trace method for needle shedding, Li-cor measurements for photosynthetic analysis and main parameters of tree-rings: tree-ring widths, density measurements, isotopic compositions.

Together with institutes and universities from Bosnia, Wales, USA, etc, we investigated needle shed process of two pine species, reconstructed temperatures, drought indexes and sunshine hours for regions on Balkan Peninsula, and studied oak die off and cambium activity of some tree species.