

EGU2020-18012

<https://doi.org/10.5194/egusphere-egu2020-18012>

EGU General Assembly 2020

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Exploring the control of phenological patterns of leaf function and tree growth in European tree species

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Trees in temperate climates show distinct seasonality of leaf photosynthetic function and tree growth, which has strong influence on the annual cycle of terrestrial carbon sequestration. Thus, there are intense efforts to explore phenological pattern of leaf photosynthetic function and tree growth in temperate tree species and understand their internal and external regulation. In this presentation, we summarize our past research in this field, combining results from different experimental studies and field observations on a large number of European tree species. We show not only the well-known dependency of the onset of spring bud burst and leaf development on temperature and photoperiod and their large inter- and intra-specific variability, but also refer to further, fairly unknown, environmental factors. We give examples how varying soil properties and drought stress may interact with temperature on the seasonal timing of bud burst, photosynthesis, shoot growth and autumnal leaf senescence. Finally, we give information on the temporal coordination of bud burst, canopy greening and tree growth, showing strong differences among European tree species. With the collected information, we identify potential sources of uncertainty in approaches predicting the seasonal timing of leaf photosynthetic activity and tree growth with climate warming.