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Abstract book – Oral presentations
Regular sessions

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Previous year's climatic conditions drive foliation response of European beech (*Fagus sylvatica* L.)

Oral

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Abstract

In the wake of recent drought events such as 2018-2019 as well as the last known benchmark year 2003 a decline in crown vitality was observed across Central Europe for European beech (ICP Forests Technical Report 2020). Therefore, it becomes more and more important to investigate short-term impacts of the previous year's climate on the foliation responses, governing carbon fixation and indicating tree vitality. Here we apply a moving window analysis (dendroTools package in R) to detect the strongest correlations between daily climate data and foliation responses of European beech (*Fagus sylvatica* L.) on 30 Level II plots across Germany. A generalized linear model revealed foliation to be negatively influenced by the daily mean temperature and positively by the daily precipitation sum of previous year's summer across 30 plots. A positive significant effect at $p<0.1$ was found for temperature across a climatic water balance (CWB) gradient, indicating a stronger negative influence of temperature on drier sites. Across different soil types, the model also revealed significantly different responses on the effect of temperature on foliation. However, foliation recovery rates did not differ significantly between 2003 and 2018. Recovery in 2003 changed positively across CWB gradient, with some differences among soil types, but not in 2018. 2018 imposed more variations across plot-wise recovery responses, indicating that site climatic conditions or soil type alone may not influence the drought response. More information on soil properties such as available water capacity (AWC), as well as stand density information is needed to better quantify drought recovery of foliation. These will be included in the model to quantify the foliation recovery in European beech. A link between the legacy effects of foliation, and growth in future studies will be established to better understand responses of beech to exogenous influences. In the future, the investigation of lagged responses might reveal more accurate time estimates within a year triggering the physiological response. Moreover, buffering effects should be included in future analysis to quantify adaptive responses, especially under drought.