

EGU21-3831

<https://doi.org/10.5194/egusphere-egu21-3831>

EGU General Assembly 2021

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Importance of drivers and processes for the predictive uncertainty in vegetation dynamics change across European forests

Johannes Oberpriller¹, Peter Anthoni², Almut Arneth², Christine Herschlein², Andreas Krause³, Anja Rammig³, and Florian Hartig¹

¹University of Regensburg, Botany, Theoretical Ecology, Regensburg, Germany (johannes.oberpriller@ur.de)

²Karlsruhe Institute of Technology, Garmisch-Partenkirchen, Department Atmospheric Environmental Research (IMK-IFU), Germany

³Technical University of Munich, Professorship for Land Surface-Atmosphere Interactions, Freising, Germany

Model predictions about future states of ecosystems under environmental change are uncertain. Understanding which factors drive these uncertainties is of immense value for directing research, but also for their interpretations. Here, we analyse sensitivities and uncertainties of a state-of-the-art dynamic vegetation model (LPJ-GUESS) across European forests. We found that predictions of carbon fluxes are most sensitive to structure-related and mortality-related parameters, but most uncertainty is induced by drivers, nitrogen-, water- and mortality-modules. The uncertainty induced by drivers increases with increasing temperature, decreasing precipitation and from north to south across Europe. Moreover, environmental conditions change the resulting uncertainties in other processes. In this context, we encounter that the stress-gradient hypothesis is implicitly displayed in the model processes. In conclusion, our study stresses the importance of environmental drivers for ecosystem predictions not only due to their uncertainty contributions but also because they determine the uncertainties of other processes.