>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

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Abstract

Climate change will impact forest demography, including forest regeneration. To project future changes in vegetation structure in situ as well as e.g. the upward migration of forest trees, dynamic models featuring a good representation of forest demography are needed. However, little is known on the structural complexity of the vegetation models that are in use today, nor on their behavior when benchmarked against empirical data along a broad environmental gradient. This presentation is addressing both aspects.

First, we conducted a meta-analysis of 28 models (from stand to global scales) in terms of the representation of tree demography, and found interesting historical developments since the earliest use of such models 50 years ago: model complexity has increased overall, and depending on the scope of the model the complexity of individual process formulations has increased as well. The goal, however, is not to develop "global everything models", but models that are targeted towards specific applications. I will show that particularly landscape models and to some extent stand models have a good degree of sophistication of regeneration processes while at the same time also providing a diversity of process representations, which allows for uncertainty assessments.

Second, in the context of the COST Action PROCLIAS we conducted a systematic benchmarking of multiple dynamic vegetation models against measured forest regeneration data from 800+ stands along a wide environmental gradient in Europe. At the time of writing this abstract, it is too early to speculate about results because these will be discussed at a workshop in June 2022 only. The latest results and insights will be shared at the IMC in Innsbruck.

Overall, the conclusion is that dynamic vegetation models need a larger focus on establishment (regeneration) as well as mortality processes, because with growth processes the sophistication is already high but tree demography has not received sufficient attention to date in most models, thus rendering future projections particularly uncertain.

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