Project Database of ICP Forests
PROJECT DESCRIPTION

PROJECT INFORMATION

Project title: **The ecological and biogeochemical importance of snow cover for temperate forest ecosystems**
and
Phenotypic plasticity and local adaptation in beech provenances (*Fagus sylvatica*)

Project ID: 81

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PROJECT DESCRIPTION

The data will be used in the two PhD projects *The ecological and biogeochemical importance of snow cover for temperate forest ecosystems and Phenotypic plasticity and local adaptation in beech provenances* (*Fagus sylvatica*). Involved persons are Prof. Dr. Jürgen Kreyling (supervisor), Lena Muffler (PhD student), and Robert Weigel (PhD student) at the University of Greifswald, Professorship of Experimental Ecology. In the long run, both projects aim at investigating adaptive potential of beech individuals in general and beech provenances in face of climate change. The **main hypothesis** being relevant for the data request is that **there is local adaptation of beech provenances to the different climatic conditions throughout the distribution range of beech**. To test this hypothesis, ecological experiments will be set up along bioclimatic gradients. The gradients should cover the range of climatic parameters that are most important and restrictive for the distribution of beech. In a first step, distribution data of beech in general will be used to identify these most important climatic parameters (**statistical methods: species distribution modelling based on the Random Forest and Maxent algorithms**). The random forest model offers great possibilities to filter for important predictors and to implement stratified subsampling (compensate for different spatial resolution of data) in the modelling. Maxent will be further used, because it can compensate for the data containing many pseudoabsence points. For the modelling, especially distribution data covering the range margins is important but yet partially missing in our available data set (i.e. Poland, Belarus, Italy, …). Level I and level II data of the ICP forest inventory would help to fill the gaps of our currently available data set (already containing fine scaled information for Mid, Western, and Northern Europe).

Later in the project, the models should be refined to aim at a scientific publication. **Tested hypotheses will then be that (i) adaptational potential of beech is higher when local adaptation of beech provenances is considered (in modelling) and that (ii) different provenances will respond differently (some with declining, some with increasing range) to climate change**. Here, the species distribution models based on climate envelope modelling will then further be compared to species distribution modelling based on more mechanistic approaches (transfer functions of productivity derived from data gathered in the experiment of the two PhD-projects). The results are important not just to qualify but to quantify the amplitude of probable range shift in future.