

Peters, R.(1997): Beech Forests; Kluwer Academic Publishers; Dordrecht, Boston, London

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Abstract

Among the sampled beech forests, geographically and climatically determined differences in codominant overstory tree species and in forest structure may require different forest dynamics for maintenance of beech dominance. This chapter focused on forest-canopy dynamics which affect light climate for juvenile beeches in the understory and growing space for mature beeches in the forest canopy. Strong growth-rate increases in the stem diameter seem to reflect change in light climate and growing space. Therefore, tree-ring chronologies can be used to describe canopy dynamics.

An index for growth-rate increase (GI) was proposed to quantify canopy dynamics, and to compare these among the sampled beech forests. This index is little affected by dry or cool summers, but strongly by storm such as typhoons, hurricanes or tornados. Per sampled forest, the annual average GI showed peaks in one or two years after a major storm impacted the forest. This annual average GI could be used to reconstruct canopy dynamics over a long time interval, about 100 years. Cumulative distribution of the annual average GI could be used to distinguish between the more dynamic American and more stable Asian sampled forests. In Asia, the annual average GI showed that AS2 was more dynamic than AS1, and analysis of the wind climate showed that, on windy days, AS2 had higher wind speeds than AS1. This supports the use of GI to compare wind-related canopy dynamics.

GI parameters were calculated to show the level of canopy dynamics per stand, or heterogeneity in dynamics within a forest. In general, the parameters showed that the North American sampled forests were more dynamic than the European sampled forests, which were more dynamic than the Turkish and Asian sampled forests.

Canopy dynamics could be related to canopy dominance using the GI parameters.

In more dynamic sampled forests, like AM+, more light demanding overstory species could reach the forest canopy. In the more stable Asian sampled forests more light demanding overstory species, and often even beech could rarely establish themselves. The structure of the Asian sampled forests is unfavorable for beech regeneration (Chapter 6), and the events that can change this structure seem rare.

habitat: oak-hornbeam forests, beech forests

forest dynamic, gap dynamic, succession

stand structure

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