



Data-model comparisons of European forest dynamics

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Understanding the drivers and mechanisms of changes in past tree distribution and abundance will help assess the biological consequences of future climate change scenarios. Data-model comparisons involving bioclimatic models such as the dynamic vegetation model LPJ-GUESS, the equilibrium model STASH and the gap-phase model FORSKA allow comparison between pollen data and simulated vegetation in the absence of human impact. Factorial experiments can be carried out, where the relative roles of different drivers of vegetation dynamics may be assessed. We present Holocene examples from stand, regional and continental scales. We investigate whether modelled patterns of climate parameters 6000 years ago can account for the European distribution of *Fagus sylvatica* at that time. No single driving force could account for the observed distributional limits at 6000 BP, or the pattern of spread during the Holocene. Climatic factors, particularly drought during the growing season, are the likely major determinants of the potential range. Climatic factors are regionally moderated by competition, disturbance effects and the intrinsically slow rate of population increase of *F. sylvatica*. Dynamic vegetation modelling is needed to account for potentially important competitive interactions and their relationship with changing climate.