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Unified phenology model with Bayesian calibration for several European species in Belgium

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Plant phenology is a good bio-indicator for climate change, and this has brought a significant increase of interest. Many kinds of phenology models have been developed to analyze and predict the phenological response to climate change, and those models have been summarized into one kind of unified model, which could be applied to different species and environments.

In our study, we selected seven European woody plant species (Betula verrucosa, Quercus robur pedunculata, Fagus sylvatica, Fraxinus excelsior, Symphoricarpus racemosus, Aesculus hippocastanum, Robinia pseudoacacia) occurring in five sites distributed across Belgium. For those sites and tree species, phenological observations such as bud burst were available for the period 1956 – 2002. We also obtained regional downscaled climatic data for each of these sites, and combined both data sets to test the unified model. We used a Bayesian approach to generate distributions of model parameters from the observation data. In this poster presentation, we compare parameter distributions between different species and between different sites for individual species.

The results of the unified model show a good agreement with the observations, except for Fagus sylvatica. The failure to reproduce the bud burst data for Fagus sylvatica suggest that the other factors not included in the unified model affect the phenology of this species. The parameter series show differences among species as we expected. However, they also differed strongly for the same species among sites.Further work should elucidate the mechanism that explains why model parameters differ among species and sites.