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Simulating monoterpene emissions on regional to global scale

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In most large-scale emission models, monoterpene emission is simulated as a purely temperature-dependent process. However, on leaf or canopy level, monoterpene emissions for a range of plant species have been found to depend on both temperature and light, similar to what is common for isoprene. This light dependence can be accounted for when terpene production is simulated in a more process-based manner by linking it to photosynthesis. Such a process-based model can be combined with estimates of monoterpene storage (in those plant species that store monoterpenes) to account for observed short-term temperature-dependent emissions.

In this study, several ways to simulate monoterpene emissions are compared on a regional and global scale, and the effect of monoterpene storage on the annual cycle is investigated. Large uncertainties in emission estimates are caused by the upscaling to canopy level, the applied standard rates and the lack of important processes in the models, e.g. water stress or insect herbivory.