

Publication

The process-based SIM-BIM model : towards more realistic prediction of isoprene emissions from adult Quercus petraea forest trees

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The seasonal isoprene synthase model-biochemical isoprenoid biosynthesis model (SIM-BIM) is a recently developed process-based model to simulate isoprene emissions from vegetation. This model was validated using isoprene emission measurements from adult Quercus petraea (Mattuschka) Liebl. trees growing in a natural forest. Temperature and photosynthetic photon flux density (PPFD) data from a 120-year-old forest stand at Hofstetten in NW Switzerland were used to run SIM-BIM. Experimental isoprene synthase activity and isoprene emission rates from adult Q. petraea trees were compared to the model outputs for the years 2000 and 2001. High correlation (16.5 deviation for isoprene synthase activity and 28 isoprene emission factors) was observed between modelled and experimental data. In addition, a comparison was performed of the modelled values of SIM-BIM to values calculated using the algorithm ISOG97 of Guenther (Ecol. Appl. 7 (1997) 34). On the basis of the temperature and PPFD data from Hofstetten, this comparison clearly displayed the capability of SIM-BIM to simulate dynamic isoprene emission capacities during warm and sunny periods, and thus to model isoprene emission rates in a realistic manner for these conditions. (C) 2003 Elsevier Science Ltd. All rights reserved.

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