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Long-term measurements of monoterpenes at the GAW station Hohenpeissenberg

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Monoterpene concentrations have been measured since the year 2000 at the Hohenpeissenberg Meteorological Observatory in southern Germany. The GAW global station Hohenpeissenberg is on top of a small mountain at 980 m elevation about 40 km north of the Alps. Pasture and mixed forests (mainly spruce) cover the slopes of the mountain and the surrounding countryside. Monoterpenes are measured by automated on-line GC-MS/FID routinely twice a day, at 1:00 and 13:00 (CET). The predominant terpene compounds are α-pinene, limonene, 3-carene, β-pinene and camphene, but also sabinene is quite abundant due to emissions from beeches. Although the ambient concentrations of monoterpenes are determined in a complex way by local emissions, mixing, transport, and atmospheric decay due to reactions with OH-radicals, ozone and NO_3 radicals, they may be described by an exponential fit to temperature with a correlation coefficient (R) of 0.7-0.8. Even better correlations are observed between the monoterpene turn-over rates and an exponential function of temperature when only reactions with OH and O_3 during noontime are considered. Inter annual variability and potential impacts on photochemistry and aerosol are discussed.