

Reactive, Anthropogenic Trace Gases at the German GAW Site Hohenpeissenberg: Trends and Variability on Various Time Scales

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Atmospheric trace gases show variability on daily, weekly, seasonal and longer time scales due to natural and anthropogenic factors. At Hohenpeissenberg, a global station of the GAW program situated in rural southern Germany, a broad range of different atmospheric trace gases, e.g. VOC, CO, NO, NO₂, SO₂, O₃, OH, has been measured continuously since the mid or end 1990s. Thus, time series of 10 or more years are available now (Figure 1). This enables us to describe the variability and trends and start to analyse the factors of impact. Weekday – weekend comparisons allow a direct estimation of relative changes in anthropogenic emissions (Figure 2). Such differences are significant and increase with shorter life-times of the respective compounds, e.g. xylene concentrations on Sundays are factor 2 lower than during working days. Winter-summer ratios of directly-emitted, anthropogenic compounds generally depend on a combination of changing sources, sinks and transport. Observed winter-summer ratios are mostly between 2 and 6 which are smaller than the summer-winter ratios of OH – radicals of about 8. Trends of the anthropogenic trace gases indicate declining concentrations for most VOC and CO. For NO_x, however, concentrations did not decline significantly which is in contrast to current emission inventories.

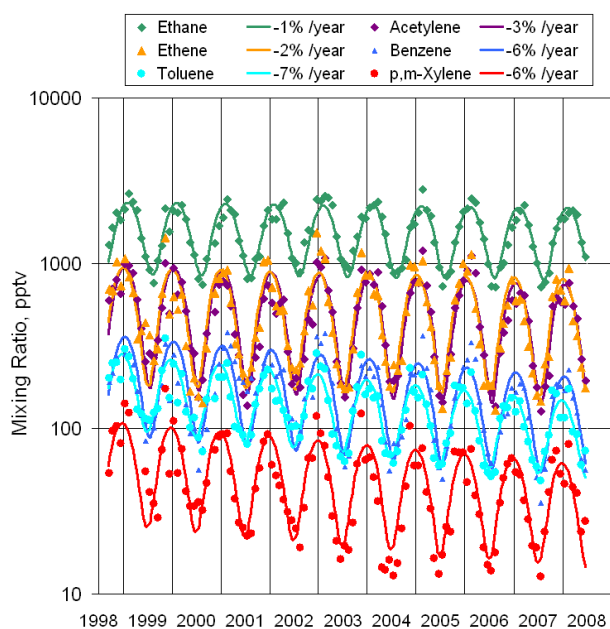


Figure 1. Time series of selected NMHC and trends obtained from a sine-fit to the monthly mean mixing ratios.

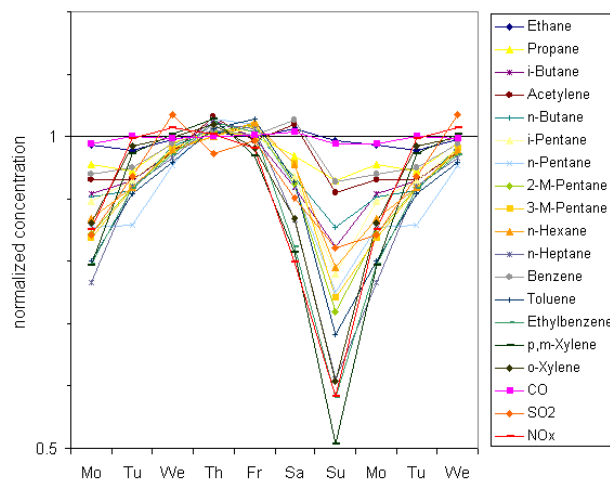


Figure 2. Weekly variation of anthropogenic trace gases at Hohenpeissenberg (daily averages of all data).