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Long-term measurements of anthropogenic trace gases at the German GAW site Hohenpeissenberg

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Atmospheric trace gases show variability on various time scales, e.g. 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 90'. Thus, time series of 10 or more years are available now. This enables 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. 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 NOx, however, concentrations did not decline significantly which is in contrast to current emission inventories.