



Hydrogen Mixing Ratio Measurements In Finland

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Hydrogen gas is present at all times by measurable quantities in the background troposphere. Chemical processes of molecular hydrogen affect the mixing ratios of other gases in the atmosphere, mainly methane. Molecular hydrogen has also decreasing impact to the hydroxyl levels in the atmosphere. Industrial and traffic emissions produce high amounts of hydrogen and carbon monoxide. Hydrogen gas measurements are being conducted at background stations as well as at urban stations. Continuous atmospheric studies are important to better understanding of the effects of hydrogen mixing ratio changes and the impacts to other atmospheric gases in rural and urban environments.

Hydrogen mixing ratios have been continuously monitored at a global background station Pallas in Northern Finland since 2006. The results show the background level of around 500 ppb hydrogen with a distinct seasonal variation. Weekly flask samples from Pallas have also been analyzed since 2002 by NOAA/ESRL providing an independent method for evaluation of the results. They show the inter-annual variation in the hydrogen mixing ratios.

In June 2007 continuous measurements of hydrogen were started at urban site Kumpula, Helsinki in Southern Finland. The hydrogen mixing ratios at Kumpula show the relatively constant background level with occasional high episodes during favourable meteorological (inversion and low wind) conditions and high anthropogenic activity. Usually less than ten hydrogen events exceeding 600 ppb have been recorded per month. Carbon monoxide mixing ratios are also measured to obtain information about the relative amounts of these species in emission plumes. Pallas and Kumpula hydrogen results will be compared and combined with carbon monoxide for

individual episodes.