Geophysical Research Abstracts
Vol. 21, EGU2019-8155, 2019
EGU General Assembly 2019

Longterm-measurements of halocarbons at Taunus Observatory, Germany

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Since the mid-20th century, halocarbons have influenced the atmosphere significantly. Depending on the lifetime and the structure of the halocarbons, as well as which halogens they are bearing, halocarbons can change the composition and the radiative budget of the atmosphere. Several halocarbons are able to destroy the stratospheric ozone layer and thus can have a high ozone depleting potential. Furthermore, some are acting as strong greenhouse gases, having a high global warming potential.

Halocarbons have been measured weekly by flask-sampling at the Taunus Observatory (TO) since the end of 2013. Since May 2018, a new continuous automated in-situ measurement-system has been established at TO. The TO is located rurally at 825 m ASL on the mountain top of the *Kleiner Feldberg*, the second largest mountain in the Hessian mountain range *Taunus*. The *Kleiner Feldberg* is situated near the Rhein-Main area, located about 20 km northwest of Frankfurt am Main in the centre of Europe. The TO can complement the three other measurement-sites of halocarbons in Central Europe located at Mace Head in Ireland, Jungfraujoch in Switzerland, and Monte Cimone in Italy. With the observation site TO, we are able to detect background-records of halogenated tracegases in the atmosphere, as well as local and regional pollution events. Subsequently, the results of the measurements at the TO can be used to identify and quantify the sources of emissions using (inverse) atmospheric transport models.

The flask-sampled air is analysed using a gaschromatograph (GC) coupled to a time-of-flight-mass spectrometer (TOF-MS). Due to the ability of the TOF-MS to detect not only preselected substances, but the whole range of mass-to-charge-ranges, it is possible to analyse samples for not yet identified or unknown substances retrospectively. Thus, we are able to achieve a digital air archive. Here we present several timeseries of the weekly flask-sampling of a selected range of halocarbons. We focus especially on the results of the first retrospective analysis of fourth generation halocarbons, the so called hydrofluoroolefines (HFOs).

Using the continuous automated in-situ measurement-system, air is sampled every two hours, allowing the detection of small variabilities of the substances in the atmosphere. This is also done using a TOF-MS. We present the first results of the newly established measurement-system.