

Measurements of Halogenated Greenhouse Gases at Jungfrauoch

Dr. S. Reimann¹,
Dr. J. Forrer¹,
Dr. D. Jeker¹,
Dr. A. Weiss¹,
M. Hill¹,
Dr. P. Hofer¹

¹EMPA, Ueberlandstr.129, 8600 Duebendorf, Switzerland

Tel:0041 1823 46 38; Fax:0041 1821 62 44; e-mail stefan.reimann@empa.ch

<http://www.empa.ch/deutsch/fachber/abt134/index.htm>

Introduction

HFCs (hydrofluorocarbons) and HCFCs (hydrofluorochlorocarbons) are widely used as replacement compounds for the CFCs (chlorofluorocarbons), which, due to their ozone-depleting properties, were forbidden in the Montreal Protocol. On the other hand, all of these compounds are also greenhouse active gases and are therefore included into the Kyoto-Protocol, in which the industrialised countries commit themselves to decline their emissions of these gases. Whereas the concentrations of the CFCs are more or less stable or have even begun to decline, HFCs and HCFCs are at present among the fastest growing pollutants in the global background atmosphere.

Measurements and modelling

For the detection of the anthropogenic input of these gases to the atmosphere, the Jungfrauoch station is an excellent platform. Because of its height and its position in the middle of Europe, as one of the biggest source regions for man-made emissions world-wide, it is not only possible to measure background concentrations but also to estimate the influence of the European emissions to this value. Measurements are performed by extracting the halogenated carbons from the air with the help of a specially built microtrap and subsequent analysis by gaschromatography-mass spectrometry (GC-MS). With the help of these quasi-continuous on-line measurements, which started in the beginning of 2000, together with sophisticated atmospheric models it should be possible to validate National and European emissions of these substances. The measurements are both a National Swiss project, supported by the Swiss Federal Office of Environment, Forests and Landscape (BUWAL) and a part of the EU-funded project SOGE (System for Observation of Greenhouse Gases in Europe). A further aim of the latter project will be to relate the long time series of column abundances of several of these halogenated greenhouse gases, which have been measured at Jungfrauoch by the University of Liège to in-situ concentrations.

Case study

As an example a concentration rise of different greenhouse gases is shown for the period of 30.-31. October 2000, when air masses originating from the Po-valley reached the site at Jungfrauoch (Fig. 1) In Fig. 2 the appropriate trajectories from the Swiss Model are shown, which are provided by the MeteoSwiss. The arrival height depends either on pressure (700 kPa) or equals to 100 m above the level of the Jungfrauoch represented in the model.

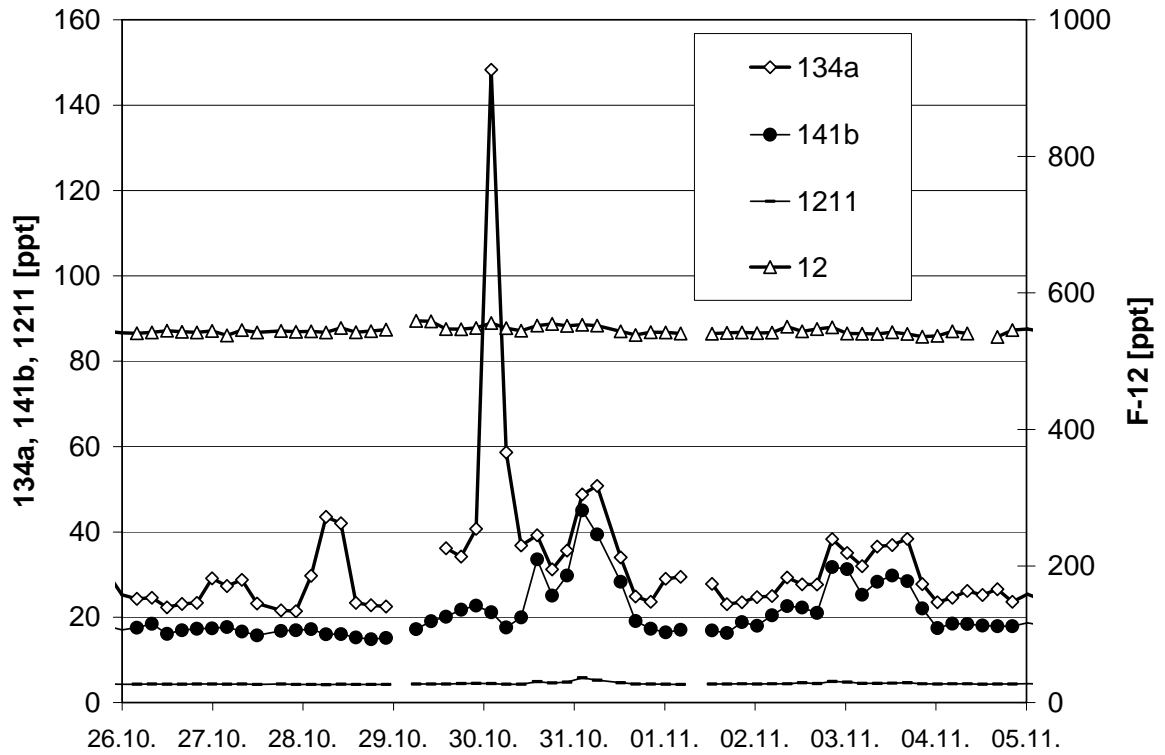


Fig. 1: Concentrations of different halogenated greenhouse gases at Jungfrauoch in autumn 2000. In the period of 30.-31.10 2000 air masses were influenced by emissions from the Po-valley (Fig. 2).

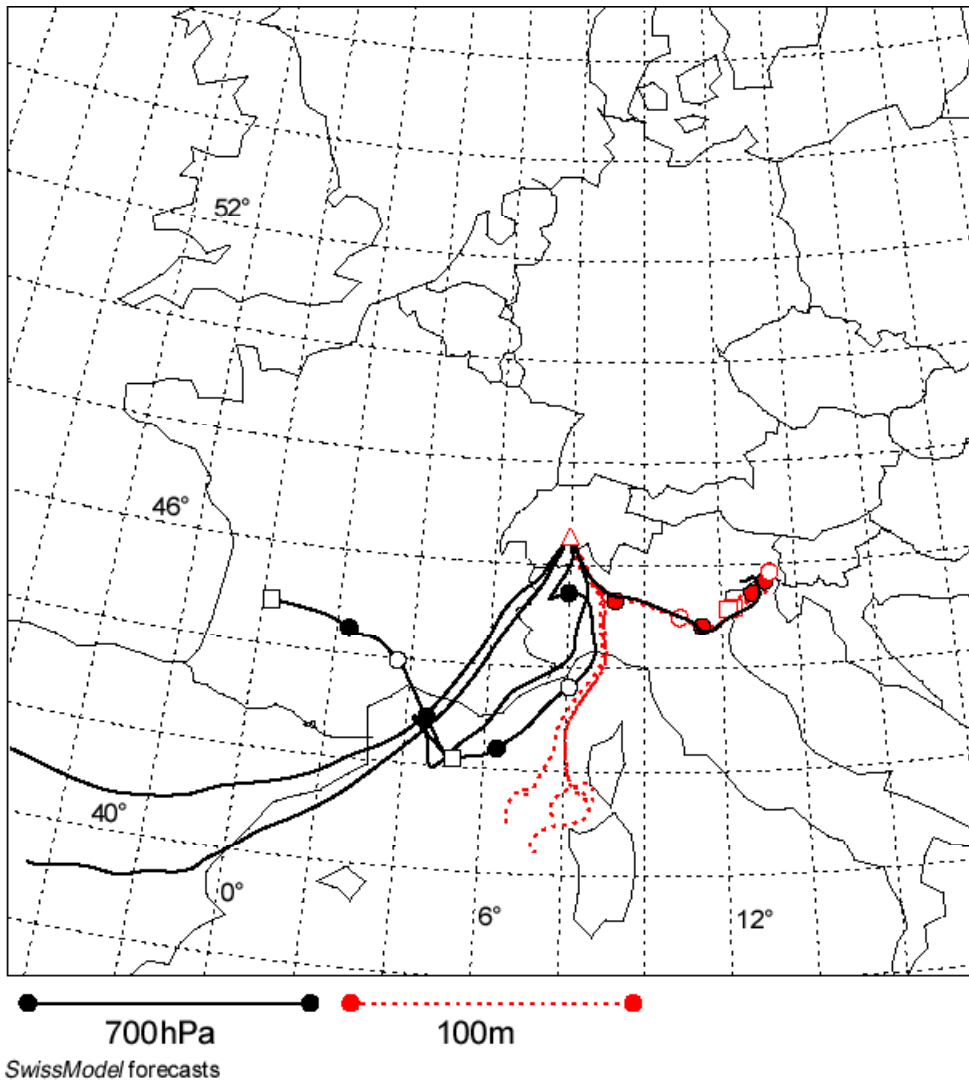


Fig. 2: Trajectories arriving at Jungfraujoch on the 30.10.00. The two traces are related to the pressure level of 700 hPa and to an arrival level 100 m above the height represented in the Swiss Model, respectively.

