



## **In-situ Measurements of RH<sub>ice</sub> in Cirrus Clouds and their Environment**

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A fundamental parameter for the evolution of cirrus clouds during their life cycle is the relative humidity with respect to ice (RH<sub>ice</sub>). Simultaneous measurements of gas phase and total (gas + condensed) water provide a powerful instrument package to distinguish clear air from cloudy air and to get information on RH<sub>ice</sub> in both areas.

We will present total and gas phase water measurements from the airborne field experiments CIRRUS I and CIRRUS II which took place over Northern Europe in December 2003 and November 2004. The combined water measurements were performed by a high precision airborne system composed of the well established photofragment fluorescence hygrometer FISH (Fast In-situ Stratospheric Hygrometer) and the new diode laser absorption hygrometer OJSTER (Open-path Juelich Stratospheric Tdl ExpeRiment). Both instruments were successfully operated for the first time together during the two experiments.

Six flights above Scandinavia, covering latitudes from 52 deg to 64 deg northern latitudes and altitudes from 6 -13 km, were performed during the experiments. The temperature inside and around cirrus ranged between 203 to 240 K. For the individual flights we will show frequency distributions of RH<sub>ice</sub> in- and outside cirrus clouds and the dependence of RH<sub>ice</sub> on temperature. We then compare the results with measurements in colder cirrus down to 190 K (APE-THESEO, EUPLEX and EN-VISAT field experiments). We observe maxima of RH<sub>ice</sub> frequency up to 150 % inside and slightly lower values outside the clouds at all latitudes and temperatures less than 215 K. For warmer cirrus we find maxima at lower values (100 - 130 %) inside.