CASH-AIC

C ompact
A irborne
S ampling of
H umidity with
A utomatic
I n-flight
C alibration

In atmospheric research there is an urgent need for reliable measurement of the humidity distribution in the middle and upper troposphere with global coverage. In this altitude region only few representative measurements of sufficient accuracy do exist. The CASHAIC-project as part of the German atmospheric research program AFO-2000 (Atmophärenforschung 2000) should fill an important gap. Main goal is to develop a compact, automatic, and reliable water vapor measuring device to be flown as stand alone instrument on board of long-distance passenger aircraft during regular flight operation. An important aim is to achieve on-line access of the measured data for weather services to support meteorological synoptic and weather forecasting. Further, in a feasibility study the measuring capabilities of a compact, light weighted carbon dioxide sensor as part of the water vapor measuring system will be tested and eventual a prototype will be developed and tested aboard a research aircraft.

Based on the water vapor sensing device deployed in the MOZAIC (Measurement of Ozone and Water Vapor by Airbus In-Service Aircraft) program the water vapor unit has to be developed into a compact, light weight stand alone instrument with automatic in-flight calibration to record the measured humidity data and to include aircraft parameters such as position, pressure, temperature, wind etc. To guarantee the on-line availability of reliable water vapor data, a method for automatic in-flight calibration of the sensors will also be developed. The employed method will be tested and validated by in-flight comparison with a reference hygrometer during research aircraft missions of the SPURT Spurengastransport in der Tropopausenregion)-project dedicated to trace gas transport in the tropopause region which is also part of the AFO-2000 program.

It is planned to achieve on-line data availability through the use of an already existing international data network , e.g. AMDAR (=Aircraft Meteorological DAta Reporting). The integration of measured humidity data into the AMDAR system from numerous measuring platforms will then provide a sound statistical basis for various atmospheric research fields (atmospheric dynamics, weather forecasting and climate).

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