



Humidity Measurements by E-AMDAR

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Apart from conventional measurements, meteorological data are also won by commercial aircraft during the routine flight climbing, cruising, and descending within an altitude range between ground and 12,000 m. This kind of network has the name AMDAR (Aircraft Meteorological Data Relay). The measurements are transmitted world-wide in near real-time via radio connection to the airline's data centres who forward them to the national meteorological services. The data consist of messages with

- identification number, date and time,
- position and flight altitude (here equivalent to the ambient air pressure),
- air temperature, wind velocity and wind direction.

The European consortium EAMDAR (EUMETNET AMDAR) under participation of the DWD among 13 further European weather services is processing

- more than 30,000 meteorological aircraft messages daily,
- of 530 activated airplanes
(Air France, British Airways, KLM, Lufthansa, and SAS)

Another measured variable being very crucial for the weather forecast still was missing so far: the humidity.

Until late 2006, the sensor system WVSSII (SpectraSensors Inc., USA) has been installed into three Lufthansa aircraft of the Airbus A320 family. The sensor's location is nearly 5 m behind the nose and on the 4 o'clock position on the body's circle section. The system's output of water vapour mass mixing ratio is integrated into the AMDAR data flow.

The sensor's physical principle is based on the Tunable-Diode Laser spectroscopy. The amount of airflow through the sensing chamber and the air pressure there is kept within limits by the system's UCAR air sampler being flush mounted on the fuselage. The actual WVSSII version is equipped with a heated inlet hose. This technical precaution prevents unwanted condensation processes in the upstream section between the air sampler unit and the sampling tube.

This modification of the AMDAR fleet contributes to a prospectively worldwide completion and partly replacement of the meteorological radiosondes.

First results of the flight operation show a reasonable congruence with adjacent radiosonde data. Laboratory test results as well as flight operational experiences in the USA and Germany lead to some ideas about the improvement of the operational principle.