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# Technical aspects of the development of a dual channel airborne hygrometer

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Application oriented photoacoustic (PA) spectroscopy related research and measuring system development was started at the University of Szeged at the middle of the 1990's. Since that time, numerous measurement systems have been developed and commercialized by Hilase Ltd, the spin-off company of the University of Szeged. These analyzers include great variety of natural gas analyzers, aerosol monitoring systems and airborne hygrometers [1]. This latter types of systems already have been used in various measurement campaigns (DENCHAR-IFCC, AIR-TOSS I-II), but the most important is the fact that a dual channel airborne hygrometer is a basic instrument applied within the CARICIC project, where it measures water vapor concentration and cloud water content simultaneously.

Though the measurement system has the most important capabilities for airborne applications its size, weight should be reduced and the long term reliability should be improved to be able to be used more widely, like in the IAGOS project. The most recent developments will be introduced.
A new data acquisition and control system has been developed to be the core of the system. This one gives the possibility for measurements in a wider dynamic range, while in size and weight approximately 15 % of the previously used controlling electronics.

A new constant pressure operation mode has been developed which brings more robust performance with much simpler calibration and data evaluation process.

Beside our standard stainless steel cell, aluminium and PTFE cells were investigated, even on elevated temperatures to decrease the effect of $H_2O$ absorption and desorption on the walls of the cell. Reference response time measurement were made using CH4, which does not have similar absorption effect the walls. Response time was determined as time required for 67% change between two different concentration changes, input change was always step change. Results show that aluminium cells can be used without restrictions which leads to significant weight reduction.

New coatings to reduce absorption of water vapor in the measuring cell, and a new integrated noise reduction system have been tested, results also will be introduced.

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