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A novel modular multi-sensor dropsonde system for high resolution measurements

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Vertical profiles of in situ measurements are of great value for the analysis of meteorological processes, model initialization and validation and for the calibration of remote sensing instruments. Apart from dolphin type flight pattern only dropsondes can provide such measurements especially in remote areas or above large water surfaces. Currently two systems are used – the Vaisala RD93 dropsonde which was developed based on a GPS radiosonde in a joint project of DLR, NCAR and NOAA and the Karlsruhe dropsonde system which uses high precision sensors and offers the possibility to operate up to 30 sondes in small areas. The Karlsruhe sonde can only be dropped from low speed aircraft and need to be recovered to get access to the data.

The outstanding technical capabilities of the new High Altitude and LOng Range Research Aircraft HALO enables the operation of a new multi–sensor dropsonde system allowing significant higher vertical and horizontal resolution.
This new modular dropsonde system combines the advantages of the NCAR/DLR/Vaisala and the Karlsruhe systems. It can be used for targeted observations in remote locations and over water bodies worldwide, making data available for process studies and model assimilation purposes as well as for mission coordination in near real time, using a direct Iridium satellite network connection. Additionally for very detailed investigations, e.g. within a convective cloud, measurements with up to 30 simultaneously active sondes using a 400 MHz telemetry link to the launching aircraft are possible.
Several small sized sondes can be dropped at the same time using a release container compatible to common aircraft launching systems. This offers the great advantage to use the new system in a variety of research aircraft without cabin modifications. The release container concept will allow other leading edge applications with different sensor types in the future.
The dropsonde system consist of a release container which carries the sondes, a new meteorological sonde with integrated 400 MHz telemetry, a plug-in satellite communication module, cabin installations for the preparation and test of the sondes prior to dropping as well as a multi channel data receiver, real-time decoding, and visualization of up to 30 active sondes.

The new dropsonde system will be presented including photos from low approach launches showing the mode of operation of the release container, climate chamber reference measurements as well as intercomparisons with state of the art radiosondes and airborne in situ measurements made with the Dornier 128 research aircraft D-IBUF of the Technical University of Braunschweig.