EMS Annual Meeting Abstracts
Vol. 15, EMS2018-702, 2018

The new iteration of the Multi-purpose Airborne Sensor Carrier MASC-3

Alexander Rautenberg, Martin Schön, Kjell zum Berge, Hasan Mashni, Claudio Crazzolara, Moritz Mauz, Andreas Platis, and Jens Bange

Universität Tübingen, Angewandte Geowissenschaften, Umweltphysik, Tübingen, Germany
(alexander.rautenberg@uni-tuebingen.de)

The Environmental Physics working group at the University of Tuebingen uses MASC, an RPAS (Remotely piloted aircraft system) for in-situ measurements of the atmospheric boundary layer since several years. MASC-3 is the newest iteration and has a wingspan of four meters and an electric motor in the tail of the fuselage to ensure an undisturbed measurement in the nose. The RPAS has an efficient design with adaptive flight characteristics and the endurance is increased significantly. The new autopilot system PixHawk 2.1 provides very stable flight characteristics and enables missions beyond line of sight. A custom ground station software was developed to perform swarm flights with multiple MASCs in order to capture e.g. the inflow condition and the wake of a wind turbine at the same time.
The data acquisition of the sensor system was revised and is able to measure the 3D wind vector and temperature at turbulent scales, as well as humidity and surface temperature. A high-end version of the wind measurement system with a fast-response probe (five-hole probe) and an INS with differential GPS is available to increase the temporal resolution of the 3D wind vector up to several hundred Hz.
The poster will show exemplary results from the ISOBAR (Innovative Strategies for Observations in the Arctic Atmospheric Boundary Layer) campaign over the frozen Baltic Sea in northern Finland in February 2018. The capabilities of MASC-3 will be presented and the quality of the wind and flux measurements will be evaluated and compared to the meteorological tower measurements in homogeneous terrain.