

## **Fixedwing UAV soundings of the boundary layer during the ScaleX 2015 summer campaign in southern Germany**

Andreas Philipp (1), Alexander Groos (1), Erik Petersen (1), Julian Bischoff (1), Sebastian Szogs (1), Christoph Beck (1), Jörg Hähner (2), and Jucundus Jacobeit (1)

(1) University of Augsburg, Institute for Geography, Physical Geography and Quantitative Methods, University of Augsburg, Germany (andreas.philipp@geo.uni-augsburg.de), (2) University of Augsburg, Institute for Informatics, Organic Computing, University of Augsburg, Germany

In order to examine the potential to close the local water cycle budget and to evaluate models on different scales (among other aims) a fleet of 6 fixed wing UAVs has been operated by the Institute for Geography and the Institute for Informatics of the University of Augsburg during the ScaleX measurement campaign of the KIT/IMK-IFU (Karlsruher Institut für Technologie/Institut für Meteorologie und Klimatologie, Garmisch Partenkirchen).

The site is located in southern Germany in a rural, hilly landscape at a small catchment tributing to the Ammersee and equipped with several ground based and remote sensing hydrological instruments. In order to complement these instruments by in situ measurements of the boundary layer, three intensive observation periods (IOPs) for taking temperature and humidity profiles took place, each with a different set up in order to evaluate optimal operation modes. The UAVs are all operated by the open hardware Apogee autopilot and sensor controller developed by ENAC (Ecole Nationale de l'Aviation Civile, Toulouse) operated by the PPRZ open source software package. The first IOP (30.06.-01.07.2015) was an experiment to cover a small site of 500 by 500 meters (well-appointed with hydrological instruments) in a 24 hours period as dense as possible. Thus three simultaneous helical profile flights (radius 70 m) have been run at each full hour around three different centres with heights ranging up to 1000 m above ground level (with special permissions).

During a second IOP (15.07.2015) it has been tried to increase the frequency of profile flights up to 2 flights per hours between 7:30 and 14:00 CEST. These soundings have been accompanied by flyovers of a manned ultra light aircraft of the IMK-IFU.

Finally a third experiment (06.08.2015) tried to evaluate longer flights (up to 55 minutes) of two UAVs at constant levels of 300 and 500 m above ground level between 6:00 and 14:00 CEST in order to cover the early diurnal cycle even more constantly by the in situ measurements. A midnight profile for measuring the starting conditions of the development has been measured up to a height of 1600 m, which was the permitted limit for this campaign.

Data analysis using a newly developed 3D software showed that these flight experiments are able to reveal several distinct meteorological processes developing during the diurnal cycle which are shortly discussed on the poster.