

COST ES0802: Unmanned Aerial Systems (UAS) in Atmospheric Research

Report on the Activities during the 2 day scientific workshop and WG3 meeting in Lannemezan, France, 05.-06.07.2011

Venue:

Laboratoire d'Aérodynamique, Centre de Recherches Atmosphériques, Université Paul Sabatier /
Observatoire Midi-Pyrénées
8, route de Lannemezan
65300 Campistrous, France

Local Organizer: Marie Lothon

Background:

In the frame of the Boundary Layer Late Afternoon and Sunset Turbulence (BLLAST, <http://bllast.sedoo.fr/>) campaign, a WG3 meeting has been organized, hosted by the CRA (Centre de Recherches Atmosphériques) of the Laboratoire d'Aérodynamique (Université de Toulouse Paul Sabatier). The aim of the meeting has been to bring together a large number of UAS teams and participate during some days in the activities of BLLAST. Besides, some teams have contributed to the basic objective of BLLAST during the whole campaign. In total 6 UAS groups involved in the Action ES0802 participated with scientific flight missions. Table 1 gives an overview of the corresponding groups and their UAS operated during the campaign.

	institute	Contact PI	airframes	max. tow
1	University of Bergen Geophysical Institute	Joachim Reuder	3 SUMO	0.6 kg
2	Technische Universität Braunschweig Institute of Aerospace Systems	Sabrina Martin	2 M ² AV	6 kg
3	University of Tübingen Center for Applied Geosciences	Aline van den Kroonenberg	1 MASC	5 kg
4	University of Applied Sciences Ostwestfalen-Lippe Department of Environmental Engineering and Applied Computer Sciences	Burkhard Wrenger	1 Octocopter 1 Quadrotor 1 RedPit 1 HAI	2 kg 1 kg 0.8 kg 1.8 kg
5	University of Applied Sciences Bremen	Heinrich Warmers	2 Fun-Jet 1 BUSCA800 1 Mikrokopte r (quadrotor)	0.7 kg 0,6 kg 1,1 kg

6	University of Heidelberg Institute of Environmental Physics	Cornelius Claussen	1 Multiplex Mentor	<5kg
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In addition 6 Short Term Scientific Missions (STSM) have been performed in connection with the BLLAST field campaign, enabling the participation of the following Early Stage Researchers, both in the BLLAST campaign as well as in the WG3 meeting and workshop:

- Sabrina Martin, Technical University Braunschweig, Germany
- Norman Wildman, University of Tübingen, Germany
- Marius Jonassen, University of Bergen, Norway
- Filipe Molinos, University of the Balearic Islands, Spain
- Felix Beckmann, University of Applied Sciences Ostwestfalen-Lippe, Germany
- Christoph Niemann, University of Applied Sciences Bremen, Germany

One other intended and applied STSM (Oliver Ennslin, University of Applied Science Zürich) had to be withdrawn due to technical problems with the UAS intended for use within the project.

Meeting summary

The 2 day meeting and workshop was attended by 14 COST and 25 non-COST members (see attached participant list). Due to the embedding of the meeting in an ongoing campaign and the corresponding Intense Observational Periods (IOP) the tentative agenda (see attachment) had to be adapted accordingly.

After registration, day 1 started with a short presentation of the Laboratory for Atmospheric Research in Lannemezan, given by Fabienne Lohou, the head of the facility. After that Marie Lothon, lead scientist of the BLLAST campaign, shortly outlined the scientific goals, the measurement strategy and the instrumental and observational realization of the BLLAST campaign. After that the participants attended the daily morning briefing of the BLLAST campaign for the discussion of the overall measurement strategy for the following days. In the afternoon and evening of day 1 of the meeting, all meeting participants operated their systems at different sites within the experiment area, closely coordinated with the ongoing BLLAST measurements from ground based stations, manned aircrafts, tethered balloons and radiosoundings.

During day 2 all WG meeting participants again were involved in the morning briefing of the BLLAST campaign. In the afternoon a workshop on miniaturized temperature and humidity sensors was performed. Main topic was the validation and discussion of parallel measurements of different sensors mounted on one UAS. At the end of the day a short administrative meeting of WG3 finished the WG3 gathering at Lannemezan.

Scientific outcome of the meeting

The achievements of the Lannemezan gathering with respect to the COST action can be summarized as follows:

- 1) Supply of numerous atmospheric profiles and horizontal transects by the SUMO (small UAS, University of Bergen), Sirius (University of Tübingen), and the aircrafts of the University of Bremen, contributing to the detailed description of the temporal development of the ABL and the surface temperature.
- 2) Supply of turbulence measurements by the mid-size UAS (range of 1.5 to 3 m wing span and weight between 5 and 10 kg including payload) M2AV (TU Braunschweig) and MASC (University of Tübingen).
- 3) Supply of high resolution and geo-referenced ortho-photographies of the whole experiment area by the UAS Sirius from the University of Heidelberg.
- 4) The first successful operation of the octocopter of the University of Ost-Wesphalen Lippe for meteorological purposes, that made low-level soundings (0-150 m) and transects at heights near 10 m above ground.
- 5) The first time coordination between the operation of small manned instrument aircraft and the UAS during a meteorological field campaign was very successful and shows that both systems complement each other very well.
- 6) The meeting was extremely important with respect to the gained experience in the coordination between different UAS teams within one experiment.
- 7) The good complementation between balloon sampling and UAS
- 8) The testing of different instruments (some of them had never been on a flying platform before).
- 9) Test and validation of different temperature and humidity sensors (first results are presented in the attached STSM report of Norman Wildman)

At the end of the meeting, the participants joined and agreed that the experience was very good. The UAS contribution to BLLAST has been extremely valuable and this seems to prove that UASs can be a new necessary tool for future experimental campaigns in atmospheric boundary layer research.

List of participants

Lannemezan participants July 2011

Non-COST LASTNAME	FIRSTNAME	LAB	CITY	COUNTRY
Réchal	Régine	LA	Toulouse	FR
Lohou	Fabienne	LA	Toulouse	FR
Durand	Pierre	LA	Toulouse	FR
Saïd	Fredérique	LA	Toulouse	FR
Darbieu	Clara	LA	Toulouse	FR
Couvreux	Fleur	Météo-France/GAME	Toulouse	FR
Legain	Dominique	Météo-France/GAME	Toulouse	FR
Alexander	Daniel	University of Utah	Salt Lake City, UT	USA
Pardyjak	Eric	University of Utah	Salt Lake City, UT	USA
Steenefeld	Gert-Jan	MAQ, Wageningen Univ.	Wageningen	NE
Van de Boer	Anneke	MAQ, Wageningen Univ.	Wageningen	NE
Pietersen	Henk	MAQ, Wageningen Univ.	Wageningen	NE
Decoster	Olivier	MAQ, Wageningen Univ.	Wageningen	NE
Graf	Alex	Forschungszentrum Jülich		GE
Augustin	Patrick	LPCA	Dunkerque	FR
Flament	Pascal	LPCA	Dunkerque	FR
Deboudt	Karine	LPCA	Dunkerque	FR
Yagüe	Carlos	Universidad Complutense de Madrid		SP
Maqueda	Gregorio	Universidad Complutense de Madrid		SP
Román	Carlos	Universidad Complutense de Madrid		SP
Wacker	Stefan	PMOD-WRC	Davos Dorf	CH
Pino	David	Tech. Univ. of Catalonia	Barcelona	SP
Mione	Joël	ENSEEIH	Toulouse	FR
Dione	Cheikh	LA	Toulouse	FR
Hartogensis	Oscar	MAQ, Wageningen Univ.	Wageningen	NE

25

COST	
Born	J
Claussen	C
Duennermann	J
Martinez	D
Lothon	M
Reuder	J
Scholtz	A
Van Den Kroonenberg	A
Warmers	H
Wrenger	B

10

COST STSM	
Jonassen	M
Martin	S
Molinos	P
Wildmann	B

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39

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