



**THE CYPRUS
INSTITUTE**



**Workshop - “Expanding the Scope - Autonomous Flying Platforms for
Atmospheric and earth Surface Observations in the Mediterranean”**

Working Group (WG) and Management Committee (MC) Meeting

**COST Action ES0802
Unmanned Aerial Systems (UAS) in Atmospheric Research**

**Cyprus Hilton Hotel, Nicosia, Cyprus
28th March - 1st April 2011**

Monday 28th March 2011

08:30 - 9:30 **Registration - Atrium, Hilton Hotel**

Opening Session - Akamas Room

09:30 **L. Barrie, The Cyprus Institute, Cyprus (Vice President for Research)**
Welcome and opening remarks

09:40 **M.A. Lange, EEWRC, The Cyprus Institute, Cyprus**
A. Teller, S. Ioannou, C. Keleshis, J. Lelieveld, Z. Levin, P. Philimis
UAS research in the Mediterranean

10:05 **J. Reuder, University of Bergen, Norway**
Presentation of the COST Action ES0802 - Unmanned Aerial Systems in
Atmospheric Research

10:20 - 10:40 **Coffee break - Atrium**

UAS applications in atmospheric sciences (I)

10:40 **J. Cuxart, University of the Balearic Islands, Spain**
M. Lothon, J. Reuder
The UAS Intensive Sampling Period in the BLLAST Campaign

11:05 **A. Teller, EEWRC, The Cyprus Institute, Cyprus**
C. Keleshis, S. Ioannou, M.A. Lange
The UAS facility in Cyprus

Airborne Instrumentation for Atmospheric Research

- 11:30 **H. Bingemer, Goethe University, Frankfurt, Germany**
Measurements of Mineral Dust Properties over the eastern Mediterranean from Unmanned Aerial Vehicles using an Electrostatic Aerosol Collector
- 11:55 **Z. Levin, Tel Aviv University, Israel, and EEWRC, The Cyprus Institute, Cyprus**
K. Ardon, A. Teller
Ice Nuclei Measurements in the Eastern Mediterranean; The potential use of UAS for measuring their Vertical Distribution
- 12:20 **K.A. Nicoll, University of Reading, UK**
R.G. Harrison
Meteorological Sensors for Small Airborne Platforms
- 12:45 - 14:00 **Lunch - Fontana Restaurant**

Airborne Instrumentation for Atmospheric Research (Cont.)

- 14:00 **U. Platt, University of Heidelberg, Germany**
M. Horbanski, D. Pöhler
Measurement of Atmospheric Trace Species by Absorption Spectroscopy from Unmanned Aerial Systems
- 14:25 **T. Wagner, MPI for Chemistry, Mainz, Germany**
S. Beirle, R. Shaiganfar, M.P. de Vries
DOAS Observations of Atmospheric Trace Gases, Aerosols and Surface Properties from Unmanned Aerial Systems
- 14:50 **K. Kandler, Technische Universität Darmstadt, Germany**
Application of a Miniature Impactor System as Aerosol Sampler for Single Particle Analysis

Poster Presentations

- 15:15 **M. Horbanski, University of Heidelberg and MPI for Chemistry, Mainz, Germany**
K.P. Heue, D. Pöhler, D. Walter, U. Platt
Differential Optical Absorption Spectroscopy (DOAS) – An Applicable Trace Gas Measuring technique for Unmanned Aerial Systems
- 15:20 **H. Hesselbarth, Zurich University of Applied Sciences, Switzerland**
ZHAW – Sensor Package - Turbulence, Fast Temperature and Fast Humidity
- 15:25 **J. Born, Karlsruhe Institute of Technology, Germany**
Comparison of Atmospheric Sensors for Small UAV's
- 15:30 **C. Claussen, University of Heidelberg, Germany**
A Comprehensive and Modular UAS for earth Observations
- 15:35 - 16:30 **Coffee break and Poster Session - Atrium**

UAS technology

- 16:30 **S. Ioannou, EEWRC, The Cyprus Institute, Cyprus**
C. Keleshis, A. Teller, M.A. Lange
Power Quality Issues and Optimization of Energy and Power Sources of Mobile Systems
- 16:55 **C. Keleshis, EEWRC, The Cyprus Institute, Cyprus**
Data Acquisition (DAQ) System Design for unmanned Aerial Vehicles
- 17:20 **M. Müller, Martin Müller Engineering, Germany**
A. Drouin
Paparazzi - The Free Autopilot: Scientific Usage
- 18:00 - 20:00 **Icebreaker Reception - Kantara Room**

Tuesday 29th March 2011

UAS Applications in Atmospheric Sciences (II)

- 09:00 **J. Bange, University of Tübingen, Germany**
C. Behrens, N. Wildmann
Multi-Purpose Automatic Sensor Carrier MASC: Aircraft measurement technology and First Application
- 09:25 **S. Martin, University of Tübingen, Germany**
J. Bange
The Influence of Aircraft Speed variations on Sensible Heat Flux Measurements by Different Airborne Systems
- 09:50 **M. Delic, AT-One EEIG, Braunschweig, Germany**
H. Hesselink, F. Morlang, D.-R. Schmitt
Satellites Enabling the Integration in Non-Segregated Airspace of UAS in Europe
- 10:15 **L. Stefanutti, Environmental Research and Services, Italy**
M. Genisio, G. Di Donfrancesco, R. Weigel, A.R. MacKenzie, K.Kandler, M Hermann, W. Junkermann, R.L. Jones and the EFESTO Team
EFEST – Evaluating Flight Safety during Volcanic Eruptions: A System to Support Air Traffic Operations
- 10:40 - 11:00 **Coffee break – Atrium**

UAS Applications in Atmospheric Sciences (II) (Cont.)

- 11:00 **S. Amici, Istituto Nazionale Di Geofisica e Vulcanologia, Italy**
F. Giuliotti, L. De Angelis, M. Turci, M.F. Buongiorno
UAS Measurements in the Thermal Range

- 11:25 **B. Wrenger, University of Applied Sciences, Ostwestfalen-Lippe, Paderborn, Germany**
J. Dünnermann, D, J. Cuxart, F. Molinos, I. Roselló, N. Wildmann, J. Bange
Multicopter Based Ultra Low Altitude vertical profile Flights in the Eastern Ebro Basin (Spain): method Inter-comparison
- 11:50 **J. Cuxart, University of the Balearic Islands, Spain**
D. Martinez, J.L. Palau, L. Roselló, B. Wrenger, J. Dünnermann
Study of Low-Level Jets and Surface Inversions in the eastern Ebro Basin using UAS
- 12:15 **H. Hesselbarth, Zurich University of Applied Sciences, Switzerland**
Lightweight Design of UAVs for meteorological measurements
- 12:40 - 13:40 **Lunch - Fontana Restaurant**
- 13:40 **P. Tisler, Finnish Meteorological Institute, Finland**
S.R. Kouznetsov, T. Palo, T. Vihma
Field campaign in Antarctica Summer 2010-2011: Atmospheric profiling with the UAV SUMO
- 14:05 **J. Reuder, University of Bergen, Norway**
S. Mayer, J. Jonassen, M. Müller
Atmospheric Measurements with SUMO - Status and Outlook
- 14:30 - 17:00 **Working Groups**
WG1 (Akamas Room)- New Frontiers in UAS Instrumentation (Lead - Z. Levin)
WG2 (Aheras Room)- Future prospects and Potential of Utilizing UAS's in Atmospheric- and Geosciences (Lead - M.A. Lange)
- 15:00 - 16:00 **Coffee will be available in the Atrium**
- 17:00 - 18:00 **Summary of the Workshop**

Wednesday 30th March 2011

- 09:00 **Bus departure for Technical Visit**
Kotsiatis Airfield
Lunch bags will be provided during the visit
- 13:30 **Departure for Hilton Hotel**
- End of Workshop**
- COST Action ES0802 Meeting commencing after lunch***
- 19:30 **Bus departure for Workshop Dinner**
Venue: Ayia Anna Taverna, Ayia Anna

Wednesday 30th March 2011 (Cont.)

COST Action ES0802 Meeting

14:30 - 14:45 **Opening by J. Reuder - Akamas Room**

14:45 - 18:00 **Parallel Sessions for WG1 and WG3**

WG1 - Akamas Room

1. Welcome (C. Soutis)
2. A brief introduction of new members and approval of minutes
3. Progress on UAV specifications (operation conditions, payload, flying duration, autonomy-performing out-of-contact missions, avionics/instrumentation, usable by a non-expert, low cost)
4. Discuss review report in materials/structural design, power plant systems (IC/electric), avionics/microelectronics, communication technology and informatics that could lead to an improved and more reliable UAS (Progress report by B. Wrenger)
5. Short reports by group members on their UAV research activities
6. Discussion, Research funding opportunities, Publication of papers
7. Miscellaneous/ any other business
8. Place and date of next meeting
9. Closing

WG3 - Aheras Room

1. Welcome (J. Cuxart)
2. A brief introduction of new members and approval of minutes
3. report on the preparation of the COST week in BLLAST
4. Recent activities of the WG members related to the Action - including presentations
5. Discussion on further individual and joint activities in the final part of the Action (2011-12)
6. Open discussion
7. Miscellaneous/ any other business
8. Place and date of next meeting
9. Closing

19:30 **Departure for Workshop Dinner**
Venue: Ayia Anna Taverna, Ayia Anna

Thursday 31st March 2011

09:00 - 13:00 **Parallel Sessions for WG2 and WG4**

WG2 - Akamas Room

1. Welcome (Jens Bange)
2. Brief introduction of group members / new members
3. Conclusions of the last meeting in Cambridge (Jens Bange)
4. Status of the online sensor data base (Burkhard Wrenger)
5. Report on recently developed on-board measurement computer (Jens Dünnermann, 15 minutes)
6. Short reports (10 minutes each) on data base for operation and calibration routines for certain measurement quantities, including achievable temporal resolution and accuracy:
 - a. Temperature: Norman Wildmann
 - b. Humidity: Daniel Martinez
 - c. Pressure: Christian Behrens
 - d. GPS: Stefania Amici
 - e. Altitude: Bruno Neiningner
 - f. Euler angles: Marie Lothon
 - g. Flow angles: Aline van den Kroonenberg
 - h. True air speed: Marius Jonassen
 - i. Chemical sensors: Burkhard Wrenger
 - j. Aerosols: Leopoldo Stefanutti
7. Discussion: How should we proceed in WG2?
8. Definition of tasks assigned to individual WG2 members
9. Closing: Topics to be discussed on following meetings

WG4 - Aheras Room

1. Welcome (R. Storvold)
2. A brief introduction
3. Status on Project Deliverables
 - a. Legal study documentation
 - b. UAS safety report
 - c. Security procedures for the demonstrations
4. Regulatory status and current practices
 - a. Developments on status on regulation in the participating countries. All countries represented in WG will give updates
5. Progress in other ongoing international initiatives in the development of regulations
 - a. EUROCAE WG-73
 - b. AMAP UAS expert group (Brenda Mulac)
 - c. JARUS (TBD)
6. UAS operations among participants since last meeting
7. Planned UAS operation among participants (Rune Storvold, TBD)
8. Miscellaneous/any other business
9. Workshop on UAS Operations.
 - a. Campaign Planning
 - b. Obtaining Permits
 - c. Operational Procedures
 - Single UAS
 - Multi UAS operating simultaneously

10:45 - 11:15 **Coffee will be available in the Atrium**

13:00 - 14:00 **Lunch - Fontana Restaurant**

14:00 - 17:00 **Joint WG Meeting - Akamas Room**

Welcome to participants

1. Adoption of agenda
2. Matters arising
3. Talks (if any, to be decided):
4. Short summary of the individual WG meetings from the day before (5 min each)
5. WG interactions
6. Campaign planning for 2011
7. Web news
8. Funding opportunities:
9. Publications, dissemination and outreach activities
10. Next meetings
11. Request for new members
12. AOB
13. Closing

17:00 - 18:30 **Special Meeting - Akamas Room**

Preparation for the BLLAST Campaign (J. Cuxart)

Friday 1st April 2011-03-17

08:30 - 13:00 **MC Meeting - Akamas Room**

Welcome to participants (J. Reuder)

1. Adoption of agenda
2. Adoption of the minutes of the last meeting
3. Matters arising
4. Report from the COST office
5. Orientation by the Chair (Joachim Reuder)
6. Progress report by working group leaders (Costas Soutis, Jens Bange, Joan Cuxart, Rune Storvold)
7. Progress report of webmaster (Burkhard Wrenger)
8. Progress report about grant holding
9. STSM status, applications
10. Action planning
 - a. Annual Progress Conference (preparation and/or feedback from DC)
 - b. Action Budget Planning
 - c. Meeting Planning
 - Status and preparation of the next meeting in Switzerland
 - Long-term planning (including anticipated locations and dates of the 2011 autumn and 2012 spring/autumn meetings)
 - d. Planning of joint measurement campaign in 2011
 - e. Identification of future research application possibilities
11. Publications, dissemination and outreach activities
12. Miscellaneous
13. Closing

10:30 - 11:00 **Coffee will be available in the Atrium**

End of COST Action ES0802 Meeting

13:00 - 14:00 **Lunch - Fontana Restaurant**