



Minutes of the 1<sup>st</sup> COST ES0802 Core Group Meeting - Bergen, 2009/06/02-03

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COST Action ES0802  
Core Group

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**History:**

2009/06/05: Burkhard Wrenger, first draft

2009/01/01: Additions and corrections by Joan Cuxart and Joachim Reuder

**List of abbreviations**

DC: Domain Committee

EoC: Expression of commitment

MC: Managing Committee

MoU: Memorandum of Understanding

STSM: Short Time Scientific Mission

SWG: Small Working Groups

UAS: Unmanned Aerial System

WG: Working Group



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## Welcome

Joachim Reuder, Chair of ESSEM COST Action 0802, opened the 1<sup>st</sup> Meeting of the Core Group (CG) at 13:30 and welcomed the participants. For a list of participants, see Annex 1.

## Adoption of the agenda

The agenda as given in Annex 2 was adopted without amendment.

CGM01D01: The agenda was adopted unanimously.

## Orientation by the Chair

The Chair of COST Action ES0802 gave a short overview on activities related to COST Action ES0802, see file Orientation\_COST\_ES0802\_UAS\_Bergen\_20090602.pdf.

Two **Short Time Scientific Missions (STSMs)** of COST Action ES0802 have been finished in the meantime,

- Sabrina Martin from TU Braunschweig, Germany (2009/03) participated in a SUMO campaign at Svalbard (2009/03/20 – 2009/04/02).
- Sigurdur Jonsson Iceland had a training on the SUMO system in Bergen (2009/05/11 - 22). The training was meant as a preparation of his future PhD work.

The Chair of COST Action ES0802, Jochim Reuder, will ask Sabrina Martin and Sigurdur Jonsson to provide the reports and photos for the website.

The **33<sup>rd</sup> IRSE conference** was held in Stresa, Italy on 4-8 May 2009. Relevant to COST Action ES0802 were

- ISRSE workshop: “UAS for Earth Remote Sensing”
- EUFAR-ICCAGRA (Interagency Coordinating Committee for Airborne Geoscience Research and Applications) meeting

Joachim Reuder also reported on his **own involvements in international UAS efforts**, e.g.

- Leading a working group “Unmanned aerial systems” in the European Research Infrastructure Project EUFAR (European fleet for Airborne Research)
- Co-leading the TOR group 8 (together with Brenda Mulac from NASA) under Working Group WG I/1 in the ISPRS commission I (WG I/1). See <http://www.commission1.isprs.org/>
- Regular visiting member in the German UAV-DACH workshop

**NASA** has shown interest in COST Action ES0802. According to Stephanie

Beauloye from the COST Office, the COST action can either invite the NASA as experts from case to case (costs to be payed by the Action's budget) or NASA officially joins the COST Action. After a short discussion, the CG members voted for the second option. Integration NASA into the COST Action will show the relevance of COST Action ES0802 and might open new projects and project possibilities. The CG members do not expect problems for involved scientists and companies. The Chair will start to work toward an official participation of NASA as non-cost participant.

CGM01D02: NASA shall be invited as an external participant.

Joachim Reuder informed on a **call for papers for ISPRS**, especially "The future of remote sensing" (unmanned vehicle systems and instruments for remote sensing) and on the **UAS 2009 Conference** in Paris; 2009/06/09 – 12. The CG members expressed their intentions to organise a side meeting to attract more interest on COST Action ES0802. Manfred Lange from the Cyprus Institute (Energy, Environment and Water Research Center) announces a **workshop on Autonomous flying platforms for atmospheric and earth surface observations in the Mediterranean**. It might be held side to side with a meeting of COST Action ES0802.

Belgium has signed the MoU of COST Action ES0802 but not named MC members yet.

There are informal contacts on the participation of further contries in the Action, namely Italy, Portugal, Netherlands and Sweden.

## Progress Report by Working Group Leaders

### **WG 1 (Chair: Costas Soutis)**

Costas Soutis started with a short motivation and gave some application examples, e.g. the Cryogenic Project or the Heliball 323. Furthermore, he re-introduced the main objectives of WG 1 based on the outcomes of the WG 1 meeting in Braunschweig in February. The discussion within the CG clearly revealed the application requirements of simple operation including autonomous take off and landing. Partly those requirements can be fulfilled from the technical point of view, but not from the legal point of view. Actually, a safety pilot is required. Joachim Reuder informed about some experienced UAV pilots in Germany, e.g. Martin Müller, Christian Lindenberg and Michael Kislat.

The goal from the scientific point of view are systems that are easy to operate. They are required even if experienced safety pilots are available. Rune Storvold pointed out that the responsibility for an UAV usually changes during the flight (take off phase, autonomous flight, landing). There is a minimal data set required as downstream information: position, altitude, direction of movement. The discussion within the CG members revealed that robust avionics and microelectronics should include some kind of self-monitoring of the UAV.

WG 1 should provide some ideas about what is technically possible for different

kind of application scenarios. One idea might be to develop a modular and flexible system with an option to take modules from a construction kit, e.g. different wings or wing modules, several sensors based on a modular payload system, depending on the mission demands.

The identifying research funding opportunities should be a task for all Working Groups as it will be easier to get funding. There are better chances to get funding if the application of a specific development is also clear.

### **WG 2 (Chair: Jens Bange)**

Unfortunately the leader of WG 2, Jens Bange was not able to participate in the meeting in Bergen due to an important short-term appointment. He contributed via telephone conference call and reported shortly on the actual state of WG 2. The main work focus in this group is set to the collection information on sensors applicable for UAS measurements. A corresponding deadline for input from all Action members was set to June 15, 2009.

### **WG 3 Chair: (Joan Cuxart)**

Joan Cuxart reported on the actual work of WG 3 based on the ideas given in the Braunschweig meeting, e.g. existing UAVs, known campaigns and limitations. The common understanding is that most users want the meteorological data for a reasonable price. It is not required to own an UAV system. Therefore a service including experienced operators might be preferred by some scientists.

From the point of view of Costas Soutis, one advantage of COST Action ES0802 is the combination of scientific requests – e.g. from WG 2 and 3 – and the application. Therefore students can benefit by working on actual requirements. It turned out that other advantages include applications that are not possible with manned aircrafts or radio sondes or are too expensive if carried out based on this. UAVs may serve as providers of data for initializing and/or validating numerical models and for improving the knowledge on processes . There are some transversal issues, e.g. combined use of modelling and UAV, heterogeneity and validating the UAV measurements.

Starting with the WG 3 meeting in Braunschweig, Small Working Groups (SWG) were identified. Joan Cuxart evaluated the SWGs files with respect to objectives and UAV, sensor or application specifications. He identified several application clusters with specific requirements:

- 1) Atmospheric chemistry at local, regional and larger scales, including complex terrain
- 2) Stable ABL in mid-latitude (including evening transition and complex terrain) and polar regions (including ice shelf and sea-ice)
- 3) Convective ABL including morning transition and in-cloud flights
- 4) Heterogeneous surfaces, such as coastal areas or non-uniform sea-ice
- 5) Specific applications, such as turbulence related to wind energy

These application clusters make up a good basis for the requirements

analysis within WG 1.

#### **WG 4 (Chair: Rune Storvold)**

Rune Storvold, Chair of WG 4, reported on the group members, on rules and regulation work and on education, see file WG\_4\_progress\_report\_20090603.pdf.

There is a new member, Tony Dodd from the UK and Thomas Spieß had to leave WG 4 due to a change of his job.

WG 4 is preparing input to **EUROCAE WG 73 group 4**. Per Osen is the contact for WG 4. The input is about "Operations matrix for scientific needs".

Furthermore, **UAS Norway** has become official stakeholder in regard to the development of the Norwegian regulation. Newly elected Board President of UAS Norway, Ole-Vidar Homleid, is also member of the COST Action ES 0802. On request from the Norwegian CAA, UAS Norway is taking initiative to establish of a **basic UAS operator course** in cooperation with a Norwegian Flight Academy. Jochen Reuder proposed to offer a similar course in the context of COST Action ES 0802.

Rune Storvold furthermore reported on UAS operation, future plans and actions by WG 4:

- Providing a web site info on Civilian operations requirements in COST Action countries for mini UAS (<150 kg) and procedures for obtaining permits.
- Inform national CAAs on the CA
- Present COST ES 0802 activity on UAS 2009 in Paris
- Follow EUROCAE 73 and other rulemaking initiatives and ensure that CA needs are made known.
- Follow up on member recruitment of new CA countries

He described the state of the regulations and the Core Group members discussed differences in local law. The regulation situation is unclear in some aspects and regions (Arctic, Antarctic, Svalbard). Joan Cuxart reported that in Spain it is possible to fly below 1000 ft without any permission.

In Norway there is the possibility of taking a course and CAA assessment for UAV pilots.

#### **Progress Report of Webmaster**

The Web- and Database-Master of COST Action ES0802, Burkhard Wrenger, reported about recent work on the website and the database. Since the WG and MC meeting in Braunschweig in February, additional contents has been published and the WG member lists have been updated. Furthermore, a login area restricted to the COST Action's members has been introduced. It shall act as a collaboration tool, e.g. for exchanging non-public information.

Due to a security issue of the underlying content management system (CMS),

the CMS was upgraded.

The focus of the actual work is the development of the database for UAVs, sensors and campaigns. The development of the structure of the database has been finished. Burkhard Wrenger presented some screenshots from the online forms for displaying and editing data. The next steps include the integration of the online forms and database into the website and the collection and loading of the data which requires feedback of the WG members. The WG members have been asked to provide data about known UAVs, sensors and campaigns.

The CG members decided to open the database for public read access after a phase of testing and consolidation.

CGM01D03: The database of COST Action ES 0802 shall be open for public read access after a phase of testing and consolidation.

After a short discussion, the CG members decided that a Wiki should be integrated into the website for news about UAVs and UAV related items.

CGM01D04: The CG decided to integrate a Wiki into the restricted area of the website of COST Action ES 0802.

## **Progress Report about Grant Holding**

Phil Anderson gave a short overview on the recent steps towards a negotiation between COST and the NERF administration. Problems have arisen due to the UK currency and a lack of a practical handbook of how to carry out the finance administration. The British Antarctic Survey (BAS) is not able to hold the money. The CG members discussed the efforts and number of transactions to be expected will the end of COST Action ES 0802. Phil Anders, Vice Chair, proposed to talk directly to the COST Office to discuss those issues.

CGM01D05: The CG decided to send Phil Anderson to the COST Office in order to discuss the Grant Holder issues directly.

## **Action planning**

### ***Annual Progress Conference***

The Chair of COST Action ES 0802, Joachim Reuder presented the actual state and the ongoing activities. He asked the CG members to create a list of work done during the following year in order to support the next Annual Progress Report.

### ***Action Budget Planning***

The money from the last year's Actions budget could not be transferred to the actual budget. Joachim Reuder, Chair of COST Action ES 0802 expressed his hope of receiving a comparable amount for the new budget. Further budget

planning will be done during the next MC meeting in September.

### ***Meeting Planning***

Based on the experiences from the WG meetings in Braunschweig, it was proposed to reduce the overlap between the Working Groups. Details will be planned and published for the next WG meeting in Andenes (early September).

There shall be two WG meetings per year, the next one at the Andoya Rocket Range (Andenes, NO) organised by MC member Michael Gausa. The Chair of COST Action ES 0802, Joachim Reuder will ask the group of Michael Gausa to provide informations about connecting flights (to Andenes or Evenes) as soon as possible.

Further meetings:

Phil Anderson offered to organise a meeting in Cambridge, preferable during summer (early June). He will check the conditions.

Joan Cuxart offered to organise a meeting on Mallorca.

Manfred Lange has offered to organise a meeting on Cyprus.

### **Location and Date of Next Meeting**

September 2<sup>nd</sup> – 4<sup>th</sup> 2009 side to side to the Andenes WG Meeting

### **Long-term planning (including anticipated locations and dates of future meetings)**

Phil Anderson proposed a joined scientific mission on the Antarctic Ice Shelf in the 2011/12 season (January 2011). There is no funding, but a good opportunity for real science. Costs will be about 5 k € for transport. Phil Anderson proposed to have the SUMO and the Braunschweig Carolo UAS there to perform profiling and turbulence measurements.

### ***Further Scientific Strategy of the Action***

The further scientific strategy is based on the proposal of COST Action ES 0802 and the deliverables described therein.

The work of the former WG 5 is integrated into WGs 1, 2 and 3.

The discussion revealed some major items, e.g.

- Calibration standards and field calibration units,
- new flight strategies, e.g. with two SUMO UAS (measuring profiles) and one Carolo UAS (measuring diffusion) flying between the SUMOs,
- assessment and recommendations for high speed data links for telemetry, mission management and measurement data . Martin Müller and Hogskole in Narvik (NO) work on that and should be integrated.

- Coordination of the SWGs of WG 3 by Joan Cuxart.
- Combining air chemistry and digital imaging, e.g. in order to investigate frost flowers (proposed by Phil Anderson) on a 20 m level. This requires low altitude flying and requires reliable altitude sensors.

### ***Identification of future research application possibilities***

These were discussed within the other items.

### **STSM Status and Applications**

See Orientation by Joachim Reuder above.

### **Publications, Disseminations and Outreach Activities**

The CG members proposed to have the COST Action's database and some review articles as the main publications. Furthermore, a publication in the Bulletin of the American Meteorological Society seems to be feasible. It will be checked if there is a chance to publish within a special issue of a journal. Review articles should be preferred on the European level, each WG topic might provide a separate .

It was proposed to start internal site workshop presentations on scientific work done with UAVs. This could be started on the Andenes meeting, e.g. "Application of the UAVs in the Arctic"

### **Miscellaneous**

Joachim Reuder, Chair of COST Action ES0802 will put a copy of the attendance lists to the restricted area of the COST Action's website.

According to Phil Anderson the Welsh government has put money into a center for UAV research and UAV industries. An exhibition will be held in June, he sent the UVE 2009 brochure by email.

Jocahim Reuder announced tests of damage created by UAVs with the SUMO UAV.

### **Closing**

The participants thanked Joachim Reuder, for the well organised meeting. The Chair of COST Action ES0802 thanked the CG members for active work and closed the meeting.

Bergen, 2009/06/03



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## **List of Annexes**

Annex 1: Participants of the 2<sup>nd</sup> MC-Meeting

Annex 2: Agenda of the 2<sup>nd</sup> MC-Meeting

## **Annex 1: Attendance List**

- Phil Anderson (UK)
- Joan Cuxart (ES)
- Joachim Reuder (NO)
- Constantinos Soutis (UK)
- Rune Storvold (NO)
- Burkhard Wrenger (DE)

## Annex 2: Agenda

### Agenda Core Group Meeting

#### COST Action ES0802 UAS in atmospheric research Bergen, Norway, the 02./03.06.2009

0. Welcome to participants
1. Adoption of agenda
2. Orientation by the Chair (Joachim Reuder)
3. Progress report by working group leaders (Costas Soutis, Jens Bange, Joan Cuxart, Rune Storvold)
4. Progress report of webmaster (Burkhard Wrenger)
5. Progress report about grant holding (Phil Anderson)
6. Action planning
  - 6.1 Annual Progress Conference (preparation and/or feedback from DC)
  - 6.2 Action Budget Planning
  - 6.3 Meeting Planning (including meetings)
    - 6.3.1 Location and date of next meeting
    - 6.3.2 Long-term planning (including anticipated locations and dates of future meetings)
  - 6.4 Further scientific strategy of the Action
  - 6.5 Identification of future research application possibilities
7. STSM status, applications
8. Publications, dissemination and outreach activities
9. Miscellaneous
10. Closing