

**Report of the
EUFAR FP6 - EWG meeting on
“Active Remote Sensing from Aircraft”**

September 4-5th 2008

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2. Participants

ARUNASALAM	Karunaharan
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BRUNEAU	Didier
CHAZETTE	Patrick
DABAS	Alain
DECHAMBRE	Monique
DELANOE	Julien
DIDONFRANCESCO	Guido
DREWS	Reinhardt
EDOUART	Dimitri
EHRET	GERHARD
FERRARE	Rich
FLAMANT	Pierre
FLAMANT	Cyrille
JOSSET	Damien
MAGLIULO	Enzo
NEMUC	Anca
NICOLAE	Doina
PELON	Jacques
STACHLEWSKA	Iwona
STEFAN	Sabina
STEFANUTTI	Leopoldo
VALI	Gabor

3. Overview of the meeting

The first meeting on Active Remote Sensing from Aircraft (ARSA) was held on September 4 and 5, 2008. It was hosted by Service d'Aéronomie, Institut Pierre Simon Laplace at University Pierre et Marie Curie in Paris. The objective was a presentation of the state of the art developments of airborne active instruments (lidar and radar) dedicated to Earth observation from aircraft.

Presentations were given by speakers from several European countries (Germany, Italy, Romania, United Kingdom and France). Introductions to both lidar and radar airborne instrumentations and observations were made by invited speakers from US institutions (NASA/Langley and U. Wyoming, respectively) having a long expertise in this field.

The agenda is given here below and presentations are available on the EUFAR site.

4. Developments

Developments presented have been made following several ways and can be summarized in four items.

1) compact automatized systems for observations to retrieve surface information (altimetry, vegetation cover, winds over ocean, ...) and atmospheric parameters (aerosol and cloud layer altitudes, boundary layer height, aerosol extinction, ...) to be implemented on aircraft and balloons, using small solid state laser sources (laser diodes or diode pumped lasers).

2) new/improved large systems (Differential absorption, Raman, Doppler, ...) using solid-state laser sources for retrieving aerosol and cloud microphysical properties, atmospheric gases, wind field in low turbidity media, ...

3) new high frequency Doppler radars for cloud physics (radiative properties and dynamics).

4) new analysis methods to exploit synergetic observations (multiple wavelengths in optical and/or microwave domains, both from active and passive sensors) and retrieve useful parameters.

5. Discussions

Discussion has been initiated from a list of questions (see presentations). A large number of possible observations were identified for climate and environmental issues, as well as for applications (pollution survey, risk analysis linked to emissions, forecast, air traffic, ...), as inputs to models.

A joint requirement was not identified, but new technologies are emerging which allow to open new fields and bring significant progress in compactness and reliability (operation at near IR wavelengths, for wind field and trace gases in clear air for example, new high frequency radars, ...). They need to be explored. Larger systems for new scientific exploration may also be implemented, aiming at synergetic use of various instruments. They could be further reduced in size, weight and power, as technology evolves. The development of new analysis methods has also been emphasized, to derive new parameters, accounting for new observational capabilities offered by scanning systems and instrumental synergism.

6. Advices

Advices to users, aircraft and instrument operators : compact lidar and radar systems (related to item 1) are now available from several companies which may be implemented onboard aircraft.

Advice to funding agencies : scientific projects related to the development and implementation of new instruments (or a combination of instruments, items 2, 3) and new analysis methods (4) should be supported to develop new approaches, open new application fields, and foster industry developments.

7. Agenda

Thursday 4 September, 2008

13 :30 -13 :45 Welcome and Introduction (J. PELON, IPSL/CNRS)

13 :45 – 14 :30 NASA invited presentation on High spectral resolution Lidar observations (R. FERRARE, NASA/LaRC, USA)

14 :30 – 15 :00 Results from field experiments and Lidar developments at DLR (G. EHRET, DLR, Germany)

15 :00 – 15 :30 LEANDRE New Generation (D. BRUNEAU, SA/IPSL/CNRS, France)

15 :30- 15 :45 Break

15 :45 -16 :15 New compact eye-safe backscatter lidar systems for balloon borne-and airborne operation (P. CHAZETTE, CEA and LMD/IPSL/CNRS, France)

16 :15 - 16 :45 Micro-lidar developments (G. DI DONFRANCESCO –ENEA- and E. MAGLIULO, CNR-ISAFOM, Italy)

16:45 -17:00 ERS activity (L. STEFANUTTI, CNR &ERS-srl)

17 : 00-17 :30 Discussion

Friday 5 September, 2008

9 :00 – 9:45 U. Wyoming invited presentation on Cloud radar observations (G. VALI, U.W., USA)

9:45 -10 :15 Airborne Radar developments at CETP/IPSL (M. DECAMBRE, CETP/IPSL/CNRS)

10 :15 - 10 :45 Radar-lidar-radiometry for cloud studies (J. DELANOE, U. Readings, UK)

10 :45 - 11 :00 Break

11 :00- 11 :30 Doppler wind Lidar measurements (A. DABAS, CNRM/Meteo-France)

11 :30 -12 :00 Developments at Enviroscopy (I. BALIN, Enviroscopy, Romania)

12 :00 – 12 :30 New Lidars for the analysis of greenhouse gases sources and sinks (P. FLAMANT , LMD/IPSL/CNRS)

12 :30 – 14 :00 Lunch

14:00 -14:30 Airborne lidar and radar development at AWI (R. DREWS, AWI, Germany).

14:30- 14:45 Lidar developments at INOE (D. NICOLAE, INOE, Romania)

14 :45-16 :00 Discussion

Topics for discussions :

- Analysis of surface parameters (ocean, land, ice) from airborne radar and lidar : status, needs and future projects
- How to better analyze the dynamics of the clear atmosphere (water vapour and wind; horizontal and vertical profiles)
- Better analyze the impact of aerosols and aerosol-cloud interaction, cloud parameters, greenhouse gases
- Joint efforts
- Recommendations, identification of critical parameters and possible system developments adapted to an implementation on most a/c

All presentations are available on the EUFAR website.