

**Education &
Training**



EUFR on-board training opportunities to advance airborne research

Ils Reusen

VITO

ils.reusen @vito.be

ADDRESS training course, 19-28 August 2010, Balaton Limnological Research Institute, Hungary

EUFAR - EUropean Facility for Airborne Research



EUFAR

Integrating Activity of the EC FP7



Budget 8 M€

Duration 4 years (2008-2012)

33 Partners

7 instruments and 19 aircraft open to Trans-national Access

www.eufar.net



EUFAR Consortium

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Aircraft open to TA
HEX sensors open to
TA
Objectives
Activities

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ET-VO

EUFAR TA

EUFAR EWE

▲ **Météo-France (FR) Coordinator**

▲ **MetOffice (UK)**

▲ **DLR (DE)**

▲ **NLR (NL)**

▲ **Enviscope (DE)**

▲ **CNRS (FR)**

▲ **NERC (UK)**

▲ **INTA (ES)**

▲ **GTK (FI)**

▲ **FUB (DE)**

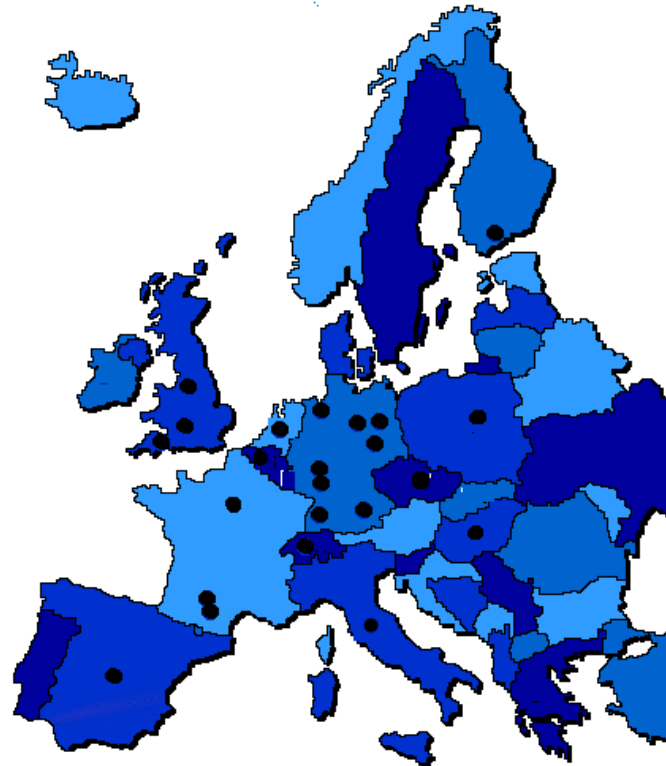
▲ **FZK (DE)**

▲ **AWI (DE)**

▲ **CNR-IBIMET (IT)**

▲ **UNIMAN (UK)**

▲ **VITO (BE)**



▲ **Jülich (DE)**

▲ **JOGU (DE)**

▲ **STFC (UK)**

▲ **USZ (HU)**

▲ **UCAM-DCHEM (UK)**

▲ **UHEI (DE)**

▲ **UWAR (PL)**

▲ **COSINE (NL)**

▲ **IRSN (FR)**

▲ **COMAT (FR)**

▲ **VKI (BE)**

▲ **UZH-RSL (CH)**

▲ **WU (NL)**

▲ **USBE (CZ)**

▲ **TAU (IL)**

▲ **GFZ (DE)**

▲ **PML (UK)**

▲ **ONERA (FR)**

15 aircraft or instruments operators
18 experts in airborne measurements
Of which 12 hyperspectral instrument providers
and/or hyperspectral remote sensing experts

Instrumented aircraft open to TA

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OPERATORS	CATEGORIES				
	1. Stratospheric aircraft	2. High level jets	3. Large aircraft	4. Medium aircraft	5. Small tropospheric aircraft
MetOffice			BAe146		
DLR		HALO		Do-228	
NLR		Citation		Metro	
ENVISCOPE		Learjet			Partenavia
SAFIRE		Falcon 20	ATR42		Piper-Aztec
NERC				Do-228	
INTA				CASA-212	
GTK				Twin-Otter	
FUB					Cessna 207
FZK					ASK-16
AWI			Polar 5		Microlight
ISAFoM					ERA Sky-Arrow
UNIMAN					Cessna 182J
TOTAL AIRCRAFT: 19	0	4	3	5	7
k€ / Flight hour	none	7 to 28	4 to 13	4 to 5	0.9 to 4

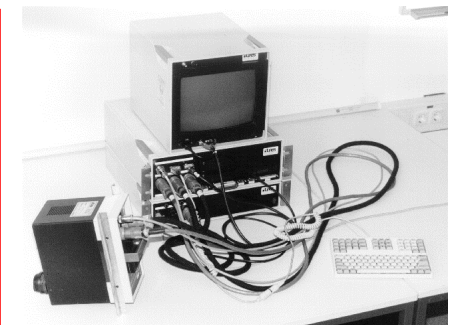
HyperSpectral Imaging sensors open to TA

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Operator	Instrument
VITO	APEX
DLR	ARES
NERC	Eagle/Hawk
INTA	AHS
FUB	CASI



Long Term Objectives

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To lay the groundwork of a European distributed infrastructure for airborne research in environmental and geo-sciences ...

... for each European scientist to get access at "equal terms" to the airborne facility the most suited to his scientific objectives, irrespective of his origin and of where the facility is operated.

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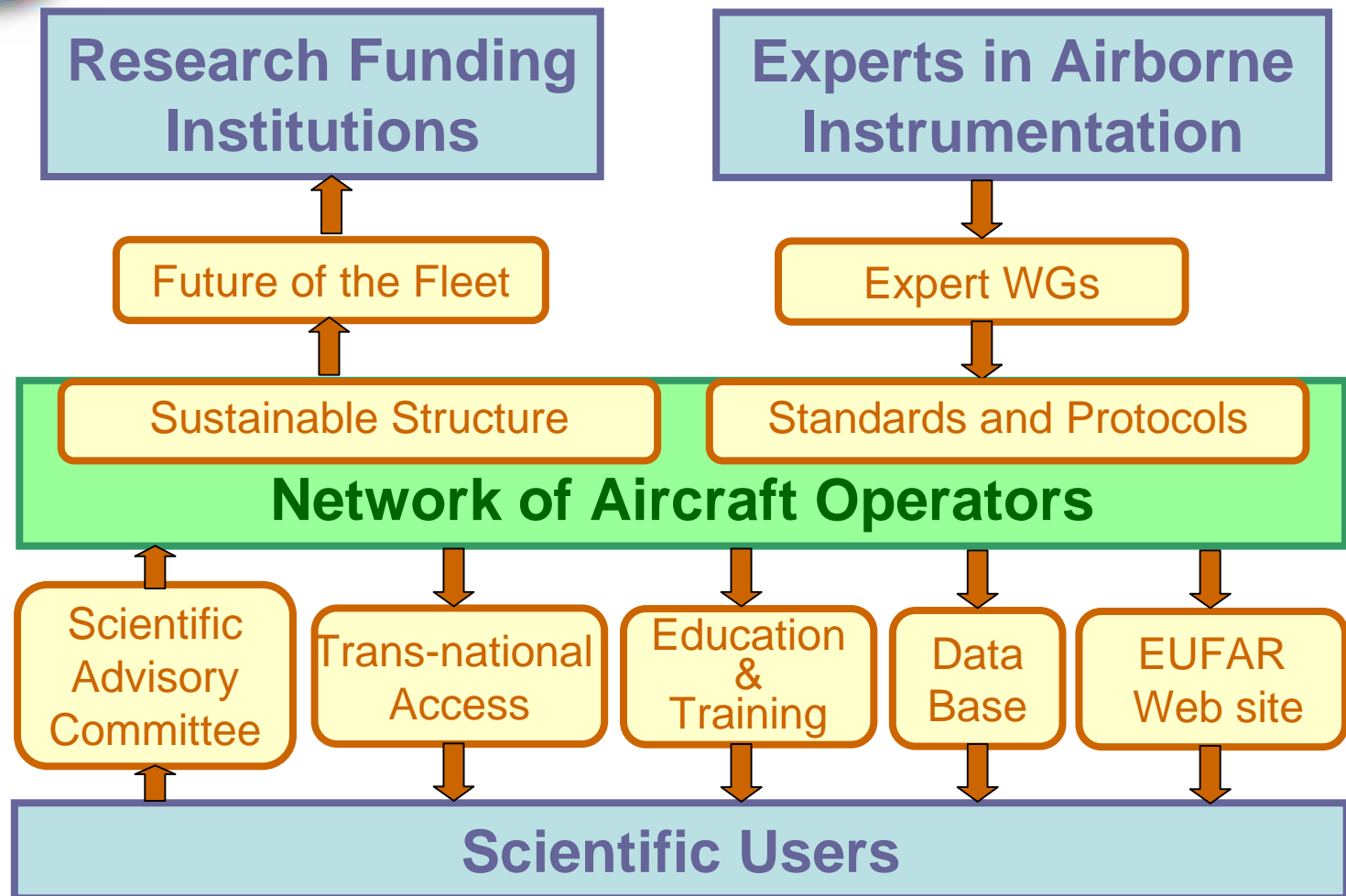
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• **Networking Activities – 2 M€**

- N1.** Scientific Advisory Committee (N1SAC-CNRM)
- N2.** TA coordination (N2TAC-MetOffice)
- N3.** Future of the Fleet (N3FF-Jülich)
- N4.** Expert Working Groups (N4EWG-JOGU)
- N5.** Education and Training (N5ET-VITO)
- N6.** Standards and Protocols (N6SP-DLR)
- N7.** Airborne Data Base (N7DB-STFC)
- N8.** E-Communication (N8EC-CNRM)
- N9.** Sustainable structure (N9SST-CNRM)

• **Transnational Activities (TA) – 3 M€**

• **Joint Research Activities (JRA) – 2,4 M€**

- JRA1.** Development and evaluation of new and improved hygrometers for airborne research (DENCHAR-Jülich)
- JRA2.** Quality layers for airborne hyperspectral imagery and data products (HYQUAPRO-VITO)
- JRA3.** Airborne Laser Interferometric Drop Sizer (ALIDS-IRSN)

N5ET - Education and Training

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Objectives

- ❖ To attract new early-stage researchers to airborne research
- ❖ To educate and train (theoretically and practically) new early-stage researchers in airborne atmospheric research and airborne hyperspectral remote sensing
- ❖ To train trainers (e.g. university lecturers) in airborne atmospheric research and airborne hyperspectral remote sensing

N5ET - Education and Training

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- ▶ EUFAR offers four **training opportunities**:
 - ❖ Training Courses on airborne research (ET-TC)
 - ❖ Join an Existing Campaign (ET-EC)
 - ❖ Participation in the design of a new field campaign, in the frame of Transnational Access (TA). Tutoring by experienced scientists (ET-TA)
 - ❖ Visit to aircraft/instrument operator for exchange of knowledge and know-how (ET-VO)
- ▶ EUFAR provides **100% support** for:
 - ❖ Training
 - ❖ Flight costs of research aircraft and instruments (through TA)
 - ❖ Travel and Subsistence (T&S) expenses (reimbursement rules available at the EUFAR website) for the participants

N5ET - Education and Training



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❖ EUFAR offers 4 training courses (ET-TC)

- For early-stage researchers
- For trainers/university lecturers (= NEW in FP7)
- Total number of participants to the training courses (60 students and 20 trainers/university lecturers)
- During 1 week to 10 days
- Equal emphasis on **theory** and **practical training/demonstration + flight experiment** (i.e. demo, hands-on exercises, design an experiment, definition of sampling strategy, flight plan, flight, ...)
- Top-class scientists cover **complete chain** from acquisition to interpretation of airborne data
 - Upstream topics (e.g. sensor development)
 - Downstream topics (e.g. corrections, analysis, interpretation)
 - With special attention to « common definitions and standard approach » (EUFAR N6-SP)
- Hand-outs (or syllabi) + airborne data provided
- Evaluation by participants
- Scientific reports from the participants published at the EUFAR website

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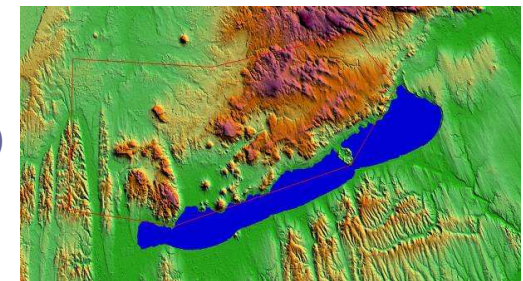
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- ❖ **ADDRESSS** training course, 19-28 August 2010, Tihany, Hungary (**Registration closed 20th May 2010; 72 registrations received, 20(+10) selected for EUFAR funding**)

Topic: Ecology and Earth sciences
Aircraft: DO228 D-CALM
operated by NERC ARSF (UK)
Sensor: AISA Eagle/Hawk
hyperspectral sensor
LEICA ALS50-II LIDAR
LEICA RCD 105 digital camera
operated by NERC ARSF (UK)

Host: Balaton Limnological Research Institute
Working area: Including lakes and wetlands, drainage basins, plains, hill and mountain regions, grasslands, forests, cultivated areas, conservation sanctuary sites and areas under high anthropogenic impact



Training Courses (2/5)

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❖ ADDRESSS programme

- Theory (LIDAR measurement principle, hyperspectral remote sensing, water quality, vegetation, ...)
- Hands-on (LIDAR data quality analysis, atmospheric correction, vegetation classification, ...)
- Field measurements (field spectroscopy)
- Flight planning design
- Excursion to airport/aircraft
- 3 student flights (if weather and time allow)
- Presentation of results

- ❖ Detailed time table (incl. keynote lecturers) available at the <http://www.eufar.net>

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❖ TETRAD (Training & Education for Turbulence Research via Airborne Data) training course, 10-18 September 2010, Hyeres, France (**Registration closed 20th June 2010 6pm**)

Topic: Turbulence research

Aircraft: ATR42

operated by SAFIRE (FR)

Sensor: Wind vector, turbulence probes, scattering spectrometer, imaging spectrometer for cloud droplet spectra, ...

operated by SAFIRE (FR)

Host: CNR ISAC Institute for Atmospheric Sciences and Climate

Working area: Flights, within external constraints, will consist of over-sea patterns, as well as patterns towards French Alps (Provence-Alpes- Cote d'Azur Region)

Training Courses (4/5)

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❖ TETRAD programme

- Theory (measurement of turbulence and clouds interaction with an aircraft, ...)
- Hands-on (exercises with cloud data, data analysis, ...)
- Flight planning design
- 4 student flights (with each 5 students on-board)
- Presentation of results



Picture EUFR ACAS summer school, 17-25 April 2008, Utrecht (the Netherlands)

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- ❖ **QAD (Quality on Airborne Data)** training course, 26 October-5 November 2010, Toulouse, France
(Registration will close 31st August 2010 6pm)

Topic: Inter-comparison experiments (meteorological parameters, aerosols, clouds, trace gases and radiation)

Aircraft: various from EUFAR fleet

Sensor: various from EUFAR fleet

Host: University of Stockholm

Working area: South of Toulouse airport

During **ICARE International Conference on Airborne Research for Environment**, 25-31 October 2010, Toulouse, France

To celebrate the 10th anniversary of EUFAR

Check www.eufar.net for more **information** and **registration**

ET-EC Join an existing field campaign

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- ▶ The list of research campaigns open to students is available in the **planning of the EUFAR fleet** at the EUFAR website

- ▶ **On-line application at the EUFAR website**



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ET-TA Participate in the design of a new field campaign

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In the frame of Transnational Access (TA), EUFAR offers the opportunity to join a host research group to design a field campaign (flight experiment) including

- ❖ scientific content
- ❖ organisation of the campaign
- ❖ data analysis

Selected applicants will be able to actively participate in the

- ❖ research flights
- ❖ data analysis
- ❖ publications

On-line application at the EUFAR website

ET-VO Visit an aircraft/instrument operator

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EUFAR offers the opportunity for instrument/aircraft operators to exchange personnel

- ❖ typically one week visit
- ❖ to share knowledge and know-how about instrument calibration, data acquisition, etc. during field campaigns or test at a ground facility

Eligibility criteria

- ❖ applicants should be instrument/aircraft operator from EU member state or associated state (from list available at the EUFAR website)
- ❖ must work in an institution established in a country other than the legal entity(ies) operating the selected aircraft/instrument
- ❖ after the visit, the participants will be requested to write a report

On-line application at the EUFAR website

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Transnational Access (TA)

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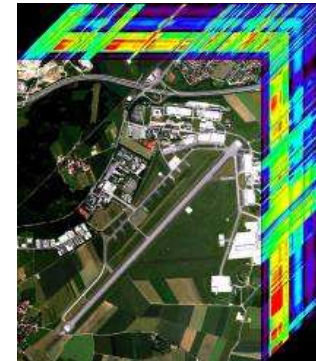
EUFR TA

EUFR EWE

- ▶ **7 instruments and 22 aircraft open to TA**
- ▶ **Support planned for 64 projects:
201 users and 538 flight hours**

▶ EUFR FP6 Achievements:

- ❖ 74 proposals received
- ❖ Support allocated to 46 projects: 230 users and 412 flight hours



Transnational Access (TA) call is continuously open!

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EUFAR Transnational Access call to **get 100% funded flight hours** for your experiments is continuously open!

NEW: Expression of Interest

Pre-review and evaluation process

Eligibility criteria available at www.eufar.net

The competition is open until 2011 but with potential flying opportunities until August 2012.

Transnational Access (TA) call is continuously open!

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Three types of TA proposals can be submitted

❖ Science projects

Proposals for **scientific projects** (primary acceptance criterion is the quality and impact of the science)

❖ Instrument development

Proposals that involve the **testing or development of novel instrumentation** in any area of airborne atmospheric or geo-science research

❖ Training courses

Proposals to **host** a 1 week to 10 days **training course including flight experiment** can be submitted on any topic for which the measurement capabilities of the EUFAR fleet+instruments are relevant.
(primary acceptance criterion is the quality of the teaching)

On-line application at the EUFAR website

Transnational Access (TA)

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TA Eligibility criteria

- ❖ The applicants (leader and the majority of the group) must work in a institution established in a European Member State or Associated State;
- ❖ The applicants (leader and the majority of the group) must work in a country other than the country(ies) where the legal entity(ies) operating the selected aircraft and/or instrument is(are) established;
- ❖ Only groups that are entitled to disseminate the foreground that they have generated under the project are eligible to benefit from access.

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N4EWG – Expert Working Groups

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EUFAR EWG

Objectives:

- ❖ To compile the knowledge in a high-level handbook on **“Airborne Physical Measurements – Methods and Instruments”** (state-of-the-art in airborne physical measurement principles and techniques)
- ❖ To improve the expertise among the specialized scientists in 18 fields of airborne research by organizing experts workshops
- ❖ To facilitate the transfer of expert knowledge to users, operators, and funding agencies

EUFAR FP6 Achievements:

- ❖ 12 Expert Working Groups
- ❖ 13 Expert Workshops organized

N4EWG – Expert Working Groups

List of Expert Working Groups:

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❖ **Support to airborne measurements:**

- Certification/Operation
- Instrument Integration
- Data Processing (Leader: Daniel Schlaepfer)
- Imaging sensors (Leader: Koen Meuleman)
- Cal/Val (Leader: Tim Malthus)
- Unmanned Aerial Systems

❖ **Specific measurement fields:**

- In-Situ Aerosols
- Gas Phase Chemistry
- Cloud Microphysics
- Radiation
- Solid-Earth Geophysics
- Thermodynamics
- Turbulence
- Stratospheric Research
- Polar Research
- Active Remote Sensing
- Hyperspectral Applications for Soil (Leader: Eyal Ben-Dor)
- Hyperspectral Applications for Vegetation (Leader: Michael Schaepman)
- Hyperspectral Applications for Water (Leader: Steve Groom)



www.eufar.net : list of expert working groups

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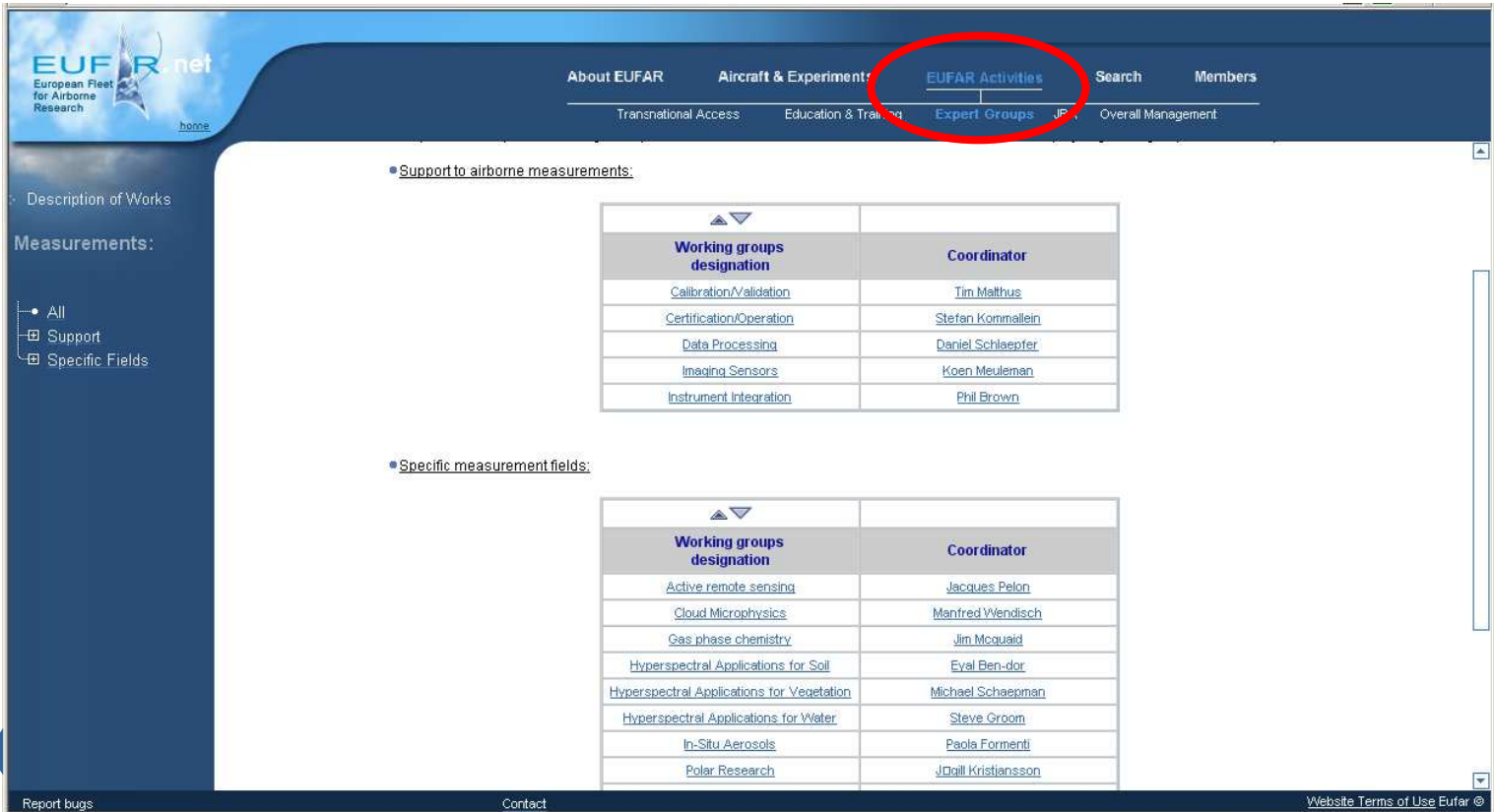
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EUFAR EWG



The screenshot shows the EUFAR.net website with the 'EUFAR Activities' menu item circled in red. The 'Expert Groups' section is active, displaying two tables of working groups and their coordinators.

Support to airborne measurements:

Working groups designation	Coordinator
Calibration/Validation	Tim Malthus
Certification/Operation	Stefan Kimmallein
Data Processing	Daniel Schlaepfer
Imaging Sensors	Koen Meuleman
Instrument Integration	Phil Brown

Specific measurement fields:

Working groups designation	Coordinator
Active remote sensing	Jacques Pelon
Cloud Microphysics	Manfred Wendisch
Gas phase chemistry	Jim McQuaid
Hyperspectral Applications for Soil	Eval Ben-dor
Hyperspectral Applications for Vegetation	Michael Schaepman
Hyperspectral Applications for Water	Steve Groom
In-Situ Aerosols	Paola Formenti
Polar Research	Joull Kristjansson

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European Fleet for Airborne Research

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About EUFAR Aircraft & Experiments **EUFAR Activities** Search Members

Transnational Access Education & Training **Expert Groups** JRA Overall Management

Expert Working-Groups / Certification and Operations

Description **Meetings** Documents Mailing-Lists

EUFAR expert working groups:

- All
- Active remote sensing
- Aerosols
- Certification and Operati
- Data issues
- Gas phase chemistry
- Imaging remote sensing
- Instrum. Design & Install.
- Microphysics
- Radiation
- Solid-Earth Geophysics
- Thermodynamics
- Turbulence

The information displayed on this website is subject to change.
Its nature is only indicative, and confirmation will only

Members of Certification and Operations working

- [Brenquier Jean-louis](#)
- [Purcell Peter](#)
- [Harbers Volker](#)
- [Pontaud Marc](#) (coordinator)
- [Mathieu Eric](#)
- [Neininger Bruno](#)
- [Lindemann Carsten](#)
- [Diaz de aguilar Javier](#)
- [Vironmaki Jouko](#)
- [Ball Steve](#)
- [Kommallein Stefan](#)
- [Schell Dieter](#)

You are interested in the activity of
Click [here](#) to ask to the EWG coord

Interested in joining an Expert Working Group, click here to ask the EWG leader

Expert Working-Groups / Certification and Operations

Description **Meetings** **Documents** Mailing-Lists

General Documents :

Title	Author(s)	Document type	Size (Octets)	Extension
NLR-CR-2003-427 Design of a fairing for a laser/scanner window in the Cessna Citation		Technical documentation	4,971,059	zip
NLR-CR-2004-175 - Certification Flight Tests of a Fairing Mounted	W.J.a. Bonnee M. Laban	Technical documentation	4,344,633	pdf

Meeting Documents :

Title	Author(s)	Document type	Size (Octets)	Extension	Meeting
FP6 - 1st Certification and Operational Issues EWG meeting (27/09/05): DLR presentation 2					
FP6 - 1st Certification and Operational Issues EWG meeting (27/09/05): FUB presentation					
FP6 - 1st Certification and Operational Issues EWG meeting (27/09/05): GIK presentation					
FP6 - 1st Certification and Operational Issues EWG meeting (27/09/05): METAIR presentation					
FP6-1st Certification&OperationalIssues EWG meeting (27/09/05): agenda					
FP6: 1st Certification&OperationalIssues EWG meeting (27/09/05): coordinator presentation					
FP6: 1st Certification&OperationalIssues EWG meeting (27/09/05): DLR presentation					

Expert Working-Groups / Certification and Operations

Description **Meetings** Documents Mailing-Lists

Meetings of Certification and Operations

Meeting designation	Location
FP6: EASA meeting (25/01/2006)	Cologne (Germany)
FP6: 1st Certif&Op. Issues EWG meeting (27/09/05)	Toulouse

Contact person

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For more info on EUFR Education and Training opportunities

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ils.reusen@vito.be

Contact person

For more info on
call for Transnational Access proposals

Contact

bureau@eufar.net

or

Phil Brown

phil.brown@metoffice.gov.uk

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HSI sensors open to
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Objectives
Activities

EUFAR N5ET

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Training
opportunities
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ET-EC
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For more info on EUFAR Expert Working Groups

Contact

Manfred Wendish

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Thank you for your attention!

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**Looking forward to meeting you at
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▶ **Evaluation forms** to be completed at the last day of the training course; Imelda will collect the evaluation forms.

▶ **Student reports** to be submitted on-line due **15/12/2010.**

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I wish you all an interesting ADDRESS training course!

Spread the knowledge!

(Almost) open VITO PhD position

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▲ **Title: "Development of an error budget model for the preprocessing of multi- and hyperspectral imaging sensors"**

▲ **Promotor:**

❖ Prof. Dr. Alfred Stein (ITC, Twente University)

▲ **Co-Promotors:**

❖ Prof. Dr. Gerard Heuvelink (Wageningen University)

❖ Dr. Ils Reusen (VITO)

▲ **Register soon at**

<http://www.vito.be/VITO/EN/HomepageAdmin/Home/Vacatures/doctoraten/>

▲ **Contact ils.reusen@vito.be**