Education & Training

EUFAR on-board training opportunities to advance airborne research

Ils Reusen

VITO

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TETRAD training course, 10-18 September 2010, Hyères, France

EUFAR - EUropean Facility for Airborne Research

EUFAR

Integrating Activity of the EC FP7

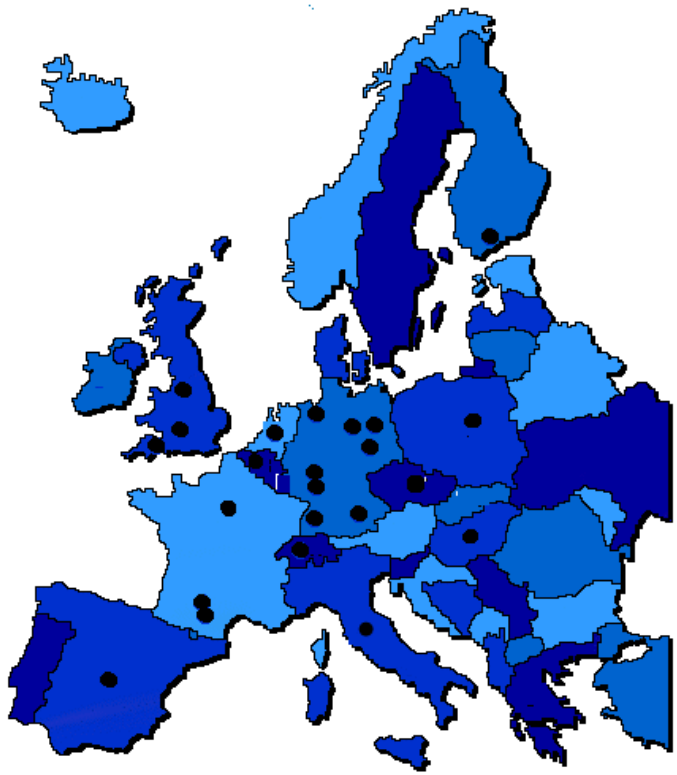
Budget 8 M€ ***Duration 4 years (2008-2012)*** ***33 Partners***

7 instruments and 19 aircraft open to Trans-national Access

www.eufar.net

EUFAR Consortium

- 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







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 ASK-16
FZK					Microlight
AWI			Polar 5		
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





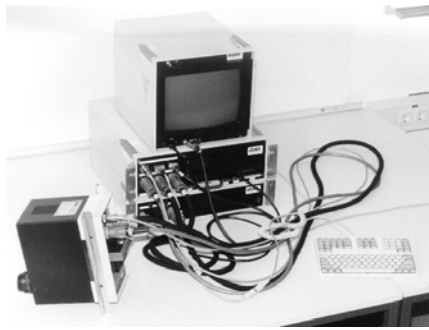







HyperSpectral Imaging sensors open to TA

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

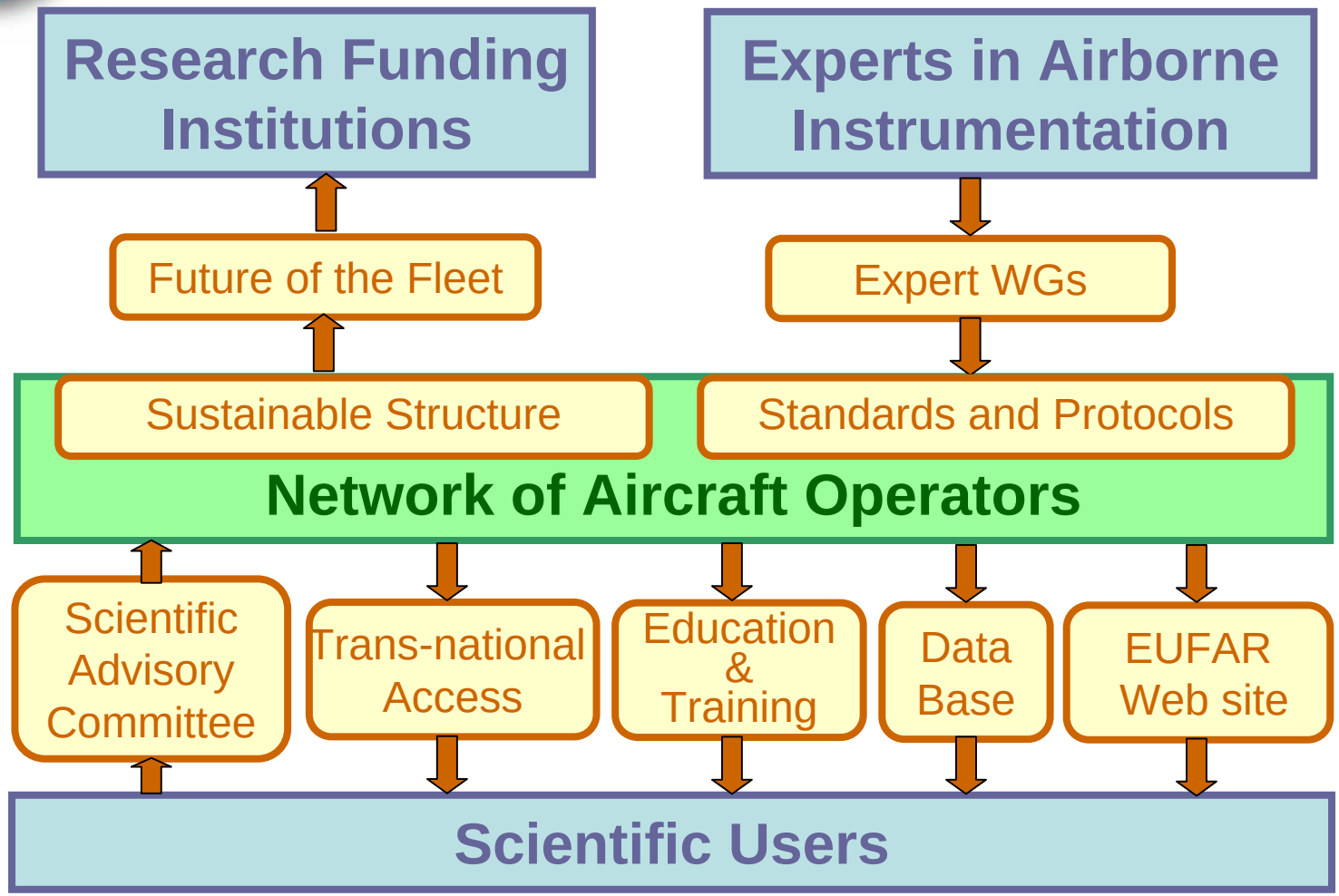


Long Term Objectives

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.

EUFAR Activities



EUFAR Activities

- **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

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

- 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

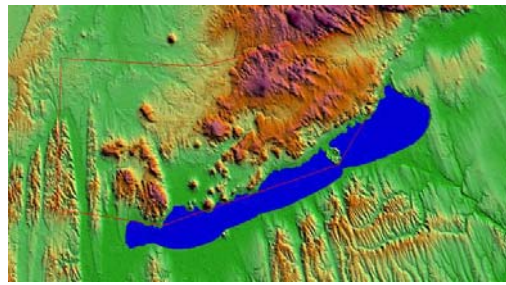
N5ET - Education and Training

- 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

Training Courses (1/5)

EUFAR Summer Schools

- **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 hysperspectral 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)

- 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

Training Courses (3/5)

EUFAR Summer Schools

- **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)

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

Training Courses (5 / 5)

EUFAR Summer Schools

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EUFAR EWG

TETRAD reporting

- **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 the 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

- 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**

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

- **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

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

EUFAR Activities

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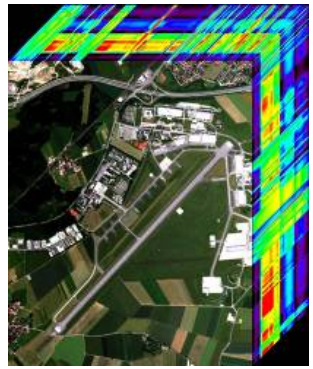
Transnational Access (TA)

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

- **EUFAR FP6 Achievements:**
  - 74 proposals received
  - Support allocated to 46 projects: 230 users and 412 flight hours



Transnational Access (TA) call is continuously open!

- EUFAR Transnational Access call to **get 100% funded flight hours** for your experiments is continously 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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EUFAR EWG

TETRAD reporting

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)

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

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

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TETRAD reporting

List of Expert Working Groups:

- **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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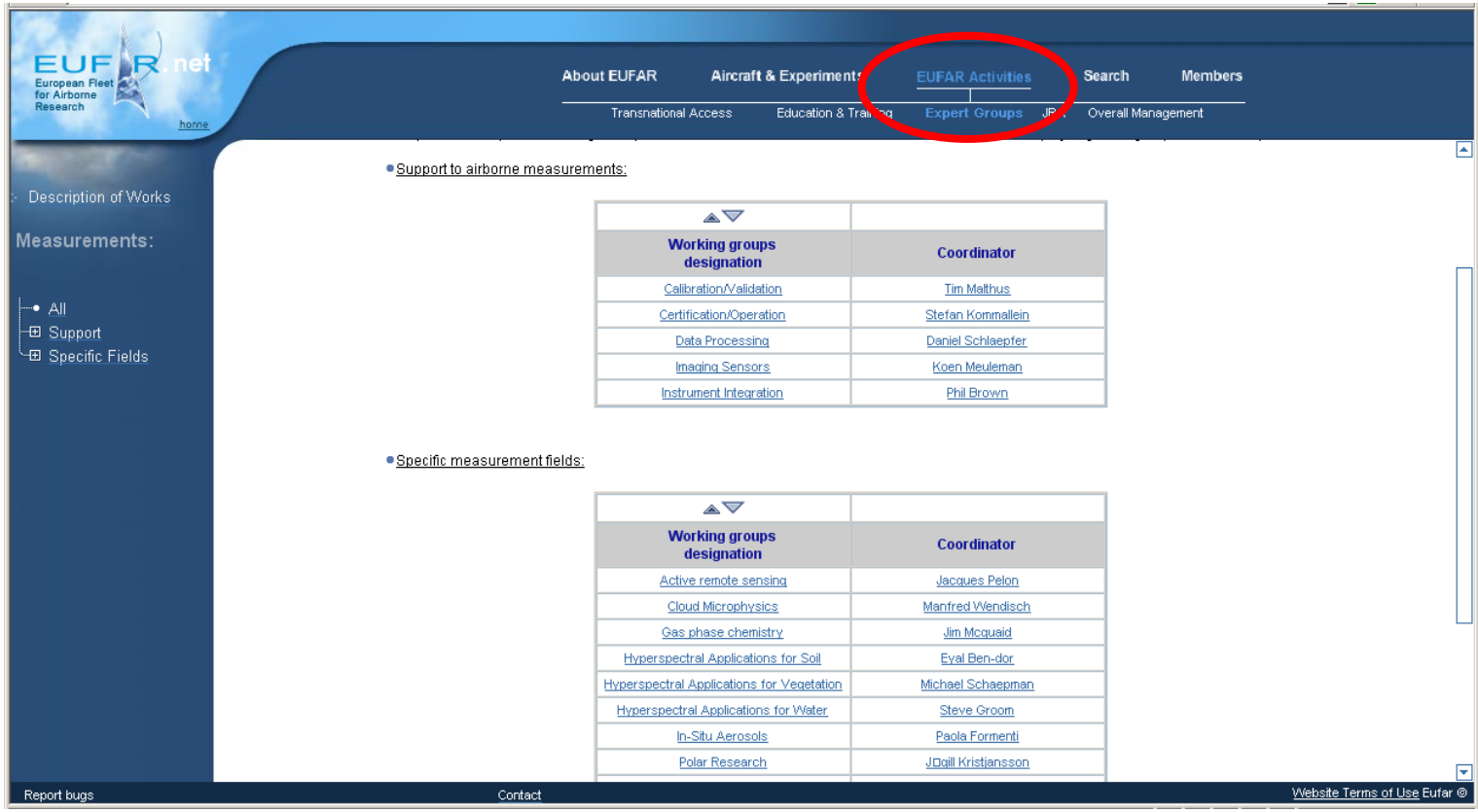
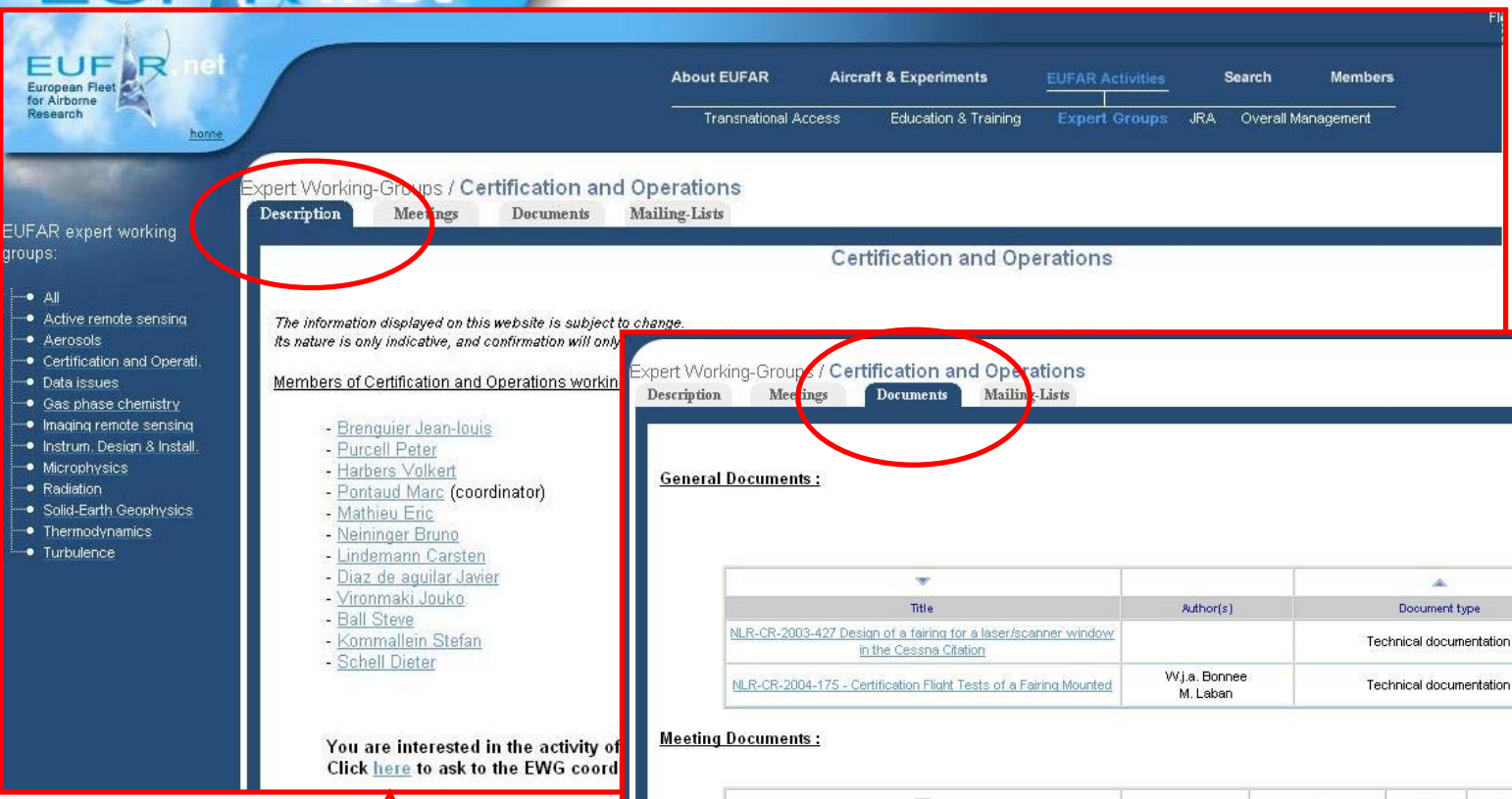
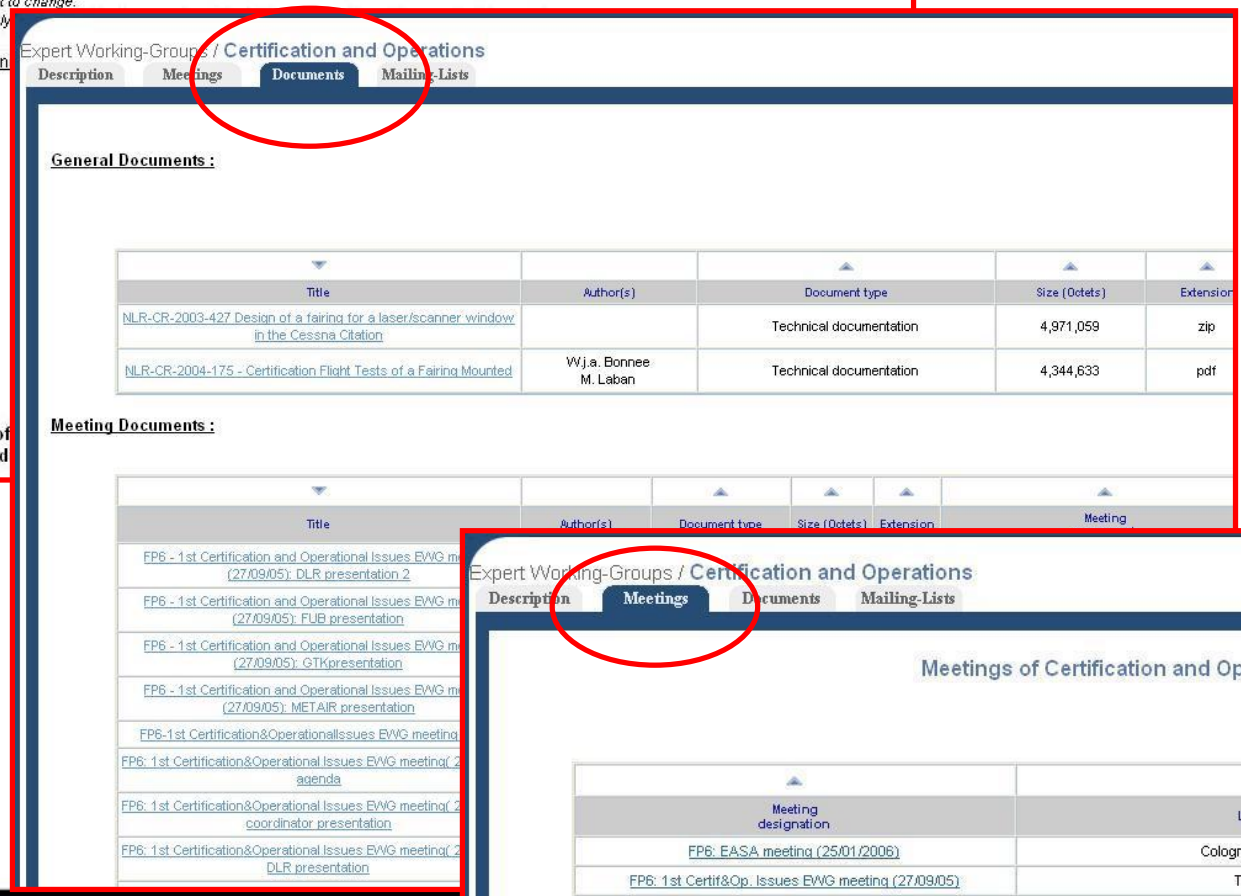
TETRAD reporting



www.eufar.net : expert working groups details





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

Contact person

For more info on
EUFAR Education and Training opportunities

Contact

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Boeretang 200
2400 Mol
Belgium
+32 14 33 68 62
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

Contact person

For more info on EUFAR Expert Working Groups

Contact

Manfred Wendish
m.wendisch@uni-leipzig.de

TETRAD reporting

Evaluation forms

- to be completed on last day of training course

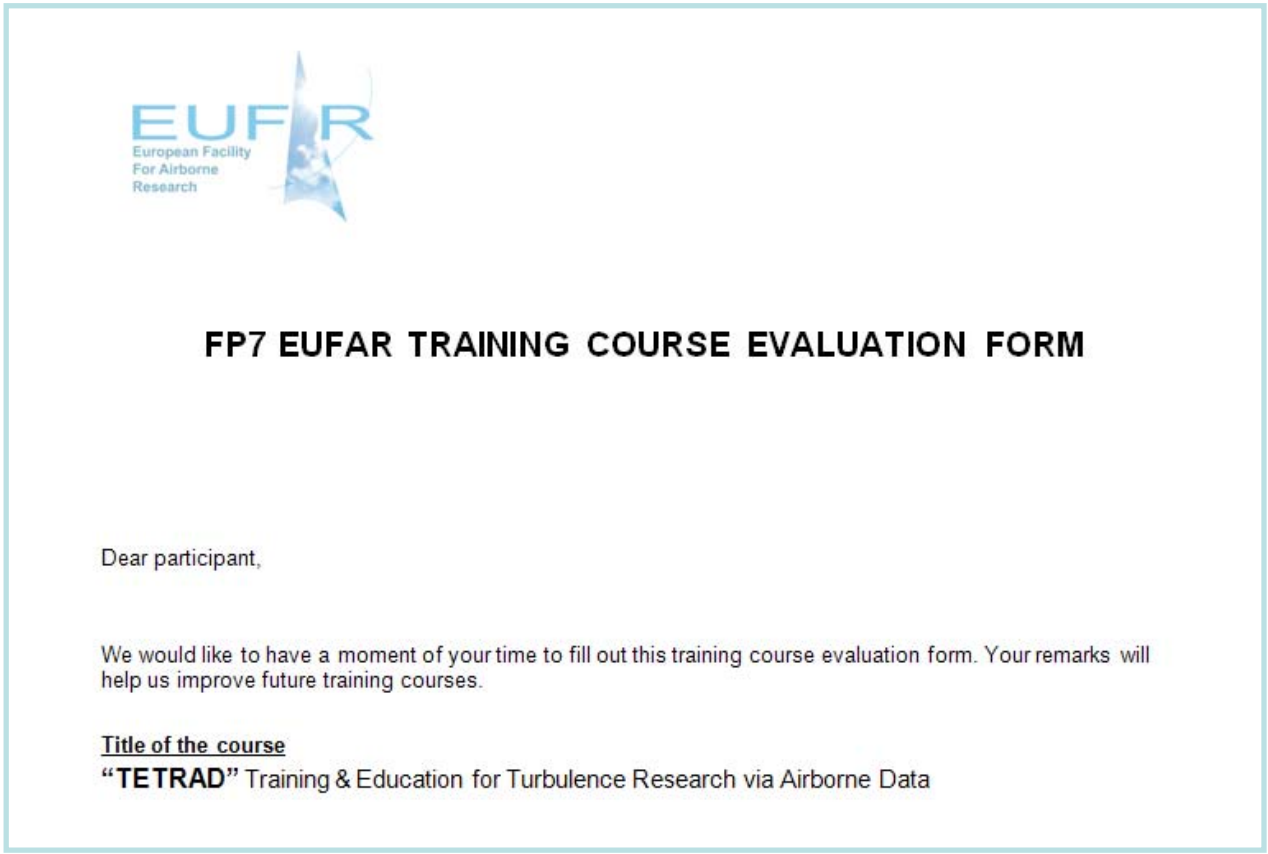
Student reports

- to be submitted on-line
- due **15/12/2010**

Working group scientific reports

- to be sent to bureau@eufar.net
- due **15/12/2010**

Evaluation form



EUFAR
European Facility For Airborne Research

FP7 EUFAR TRAINING COURSE EVALUATION FORM

Dear participant,

We would like to have a moment of your time to fill out this training course evaluation form. Your remarks will help us improve future training courses.

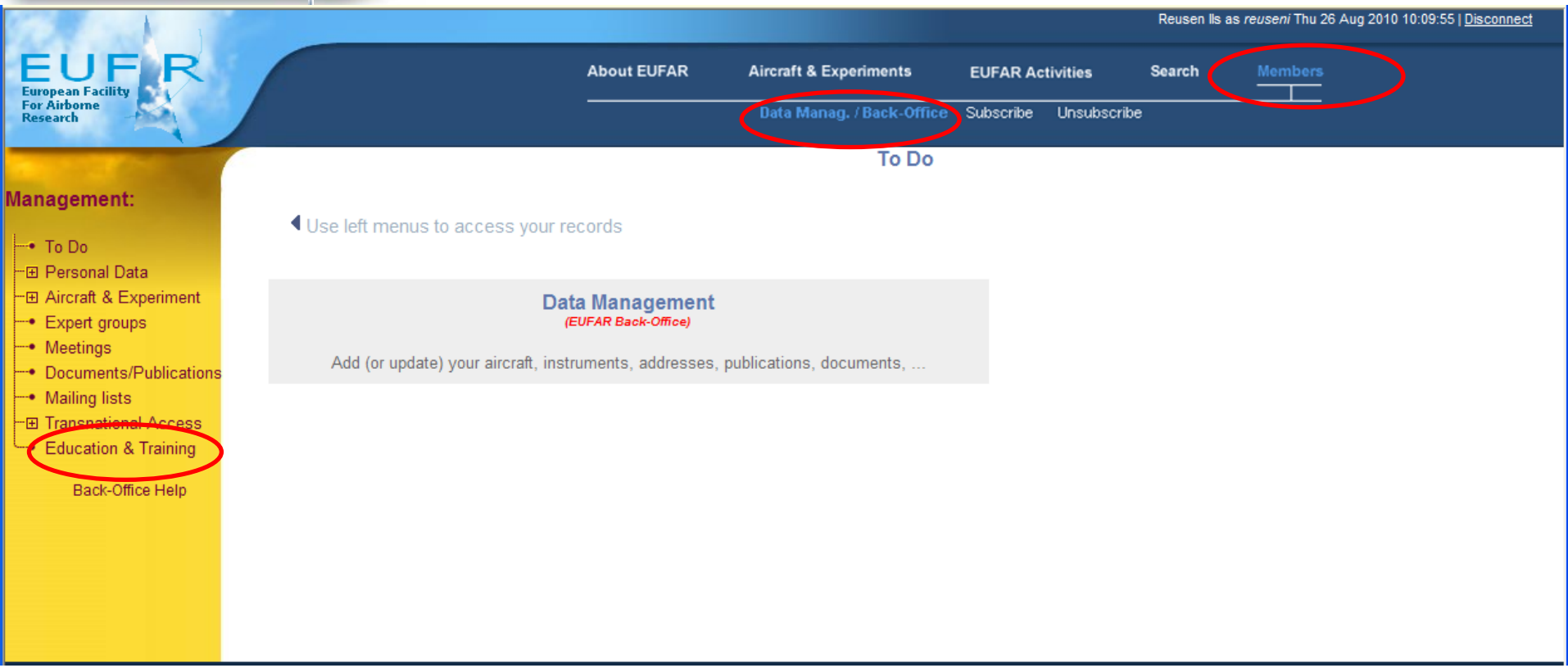
Title of the course

"TETRAD" Training & Education for Turbulence Research via Airborne Data

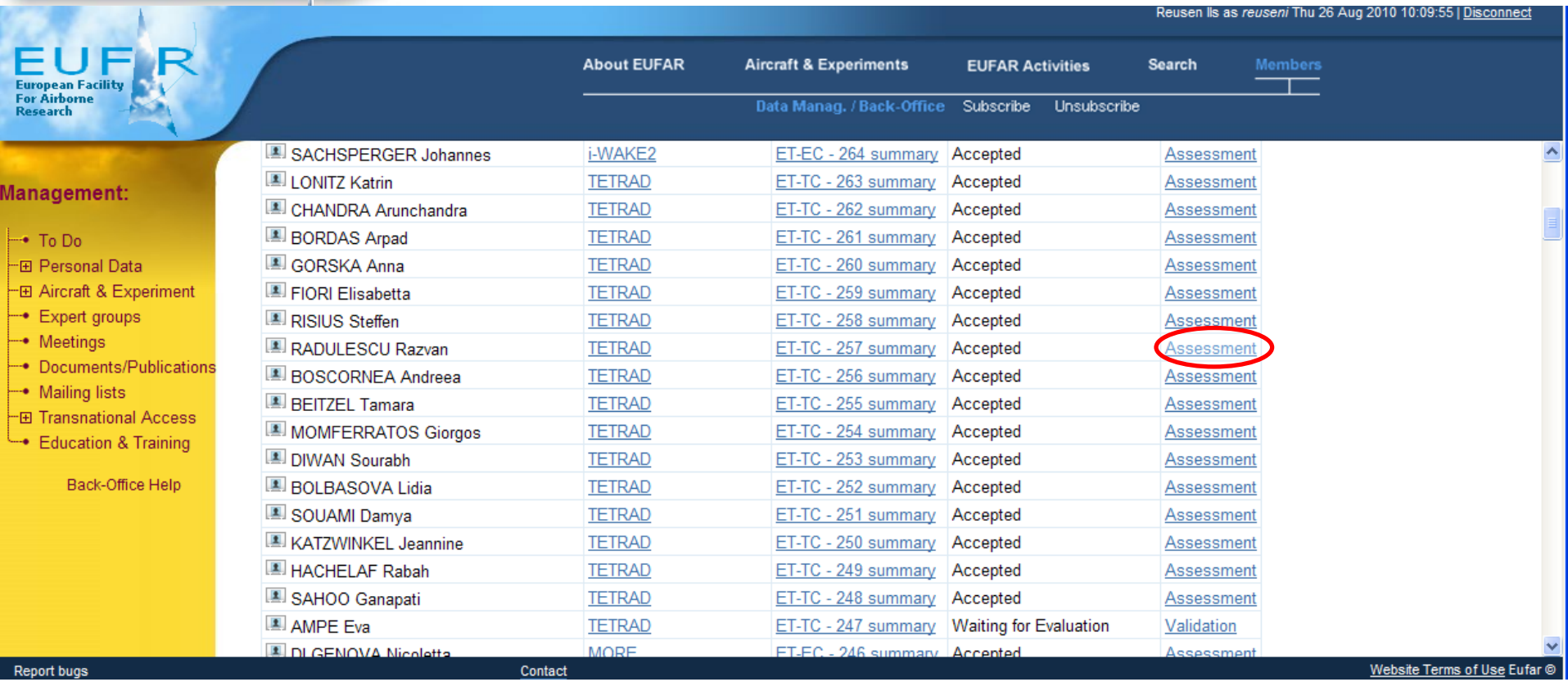
To be completed on the **last day of the training course**
Valentina will collect the completed forms

Your opinion is valuable for future training courses!

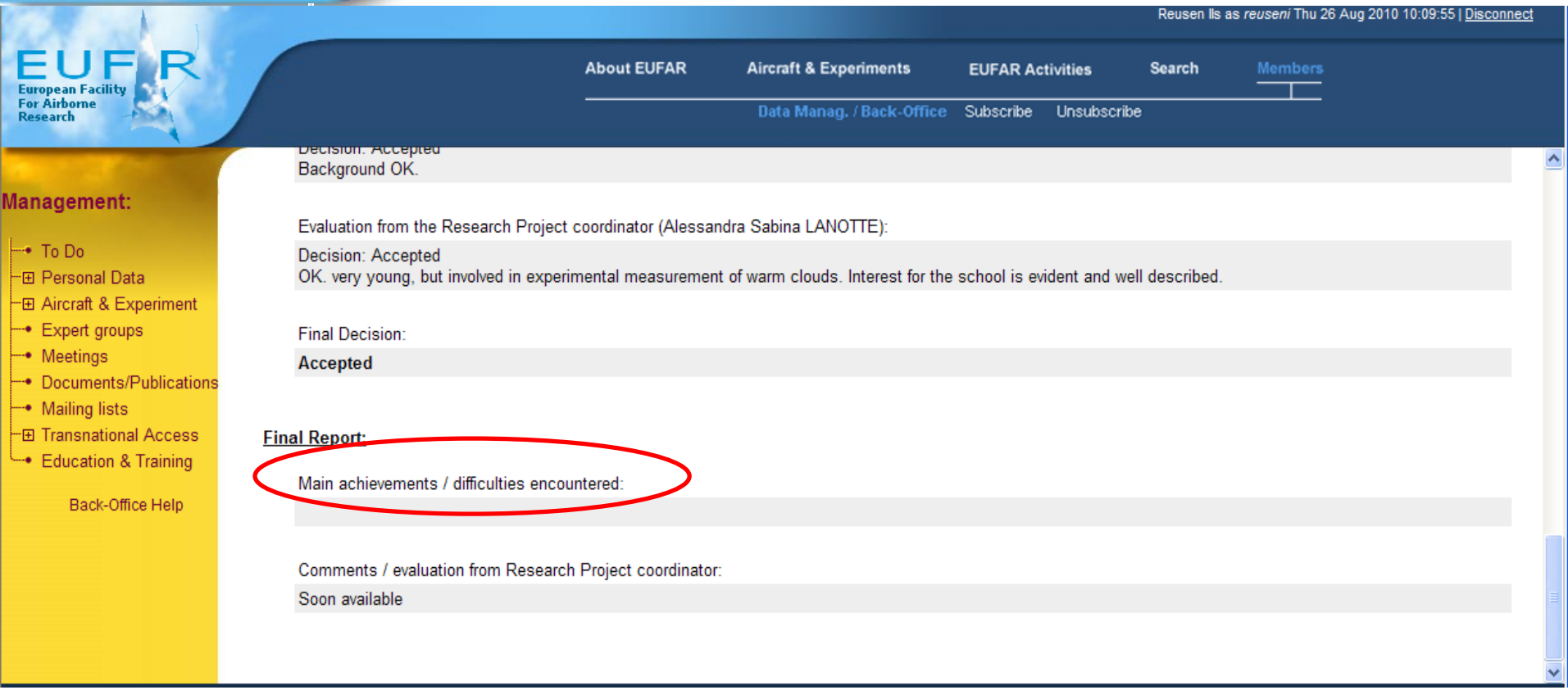
Student reports



Student reports

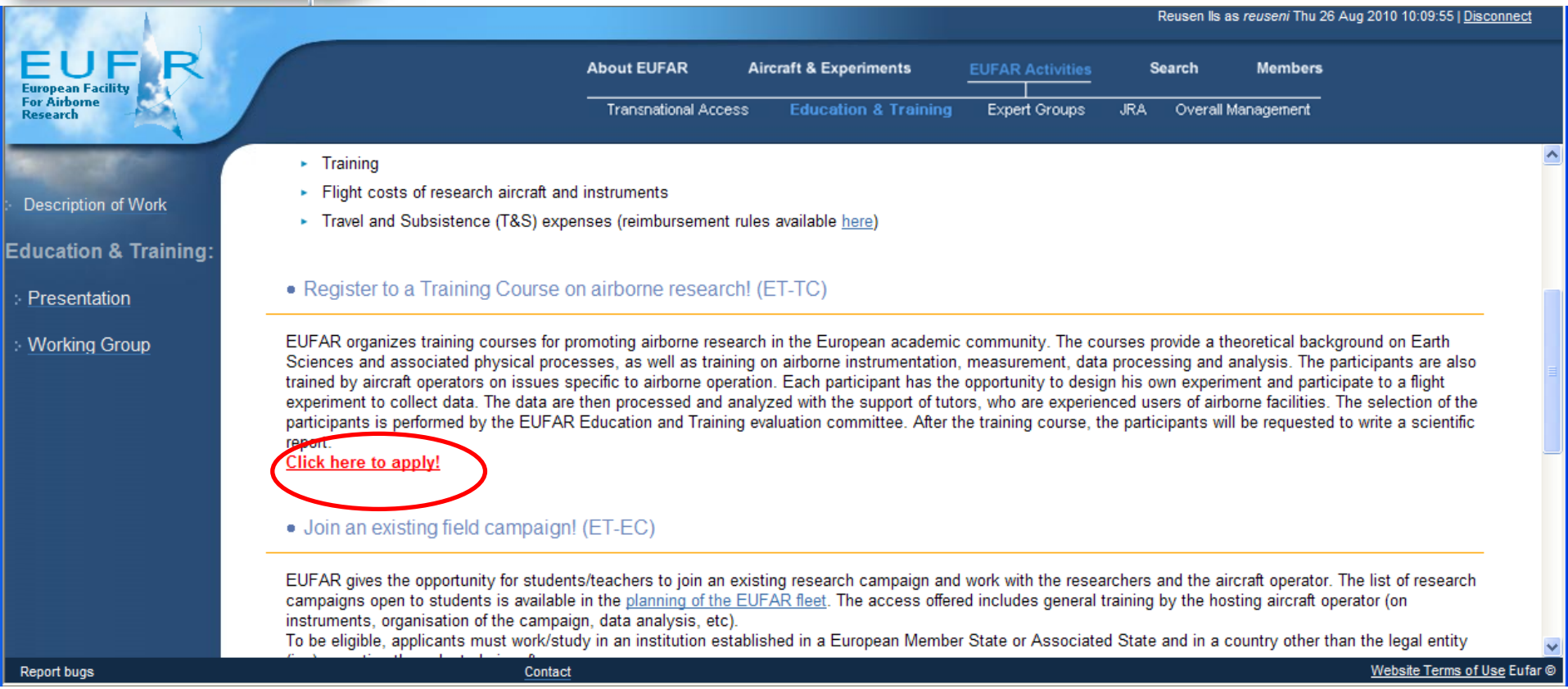


Student reports



Due 15/12/2010

Working group scientific report - example



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

- Description of Work

Education & Training:

- Presentation
- Working Group

- Training
- Flight costs of research aircraft and instruments
- Travel and Subsistence (T&S) expenses (reimbursement rules available here)

Register to a Training Course on airborne research! (ET-TC)

EUFAR organizes training courses for promoting airborne research in the European academic community. The courses provide a theoretical background on Earth Sciences and associated physical processes, as well as training on airborne instrumentation, measurement, data processing and analysis. The participants are also trained by aircraft operators on issues specific to airborne operation. Each participant has the opportunity to design his own experiment and participate to a flight experiment to collect data. The data are then processed and analyzed with the support of tutors, who are experienced users of airborne facilities. The selection of the participants is performed by the EUFAR Education and Training evaluation committee. After the training course, the participants will be requested to write a scientific report.

Click here to apply!

Join an existing field campaign! (ET-EC)

EUFAR gives the opportunity for students/teachers to join an existing research campaign and work with the researchers and the aircraft operator. The list of research campaigns open to students is available in the planning of the EUFAR fleet. The access offered includes general training by the hosting aircraft operator (on instruments, organisation of the campaign, data analysis, etc).
To be eligible, applicants must work/study in an institution established in a European Member State or Associated State and in a country other than the legal entity

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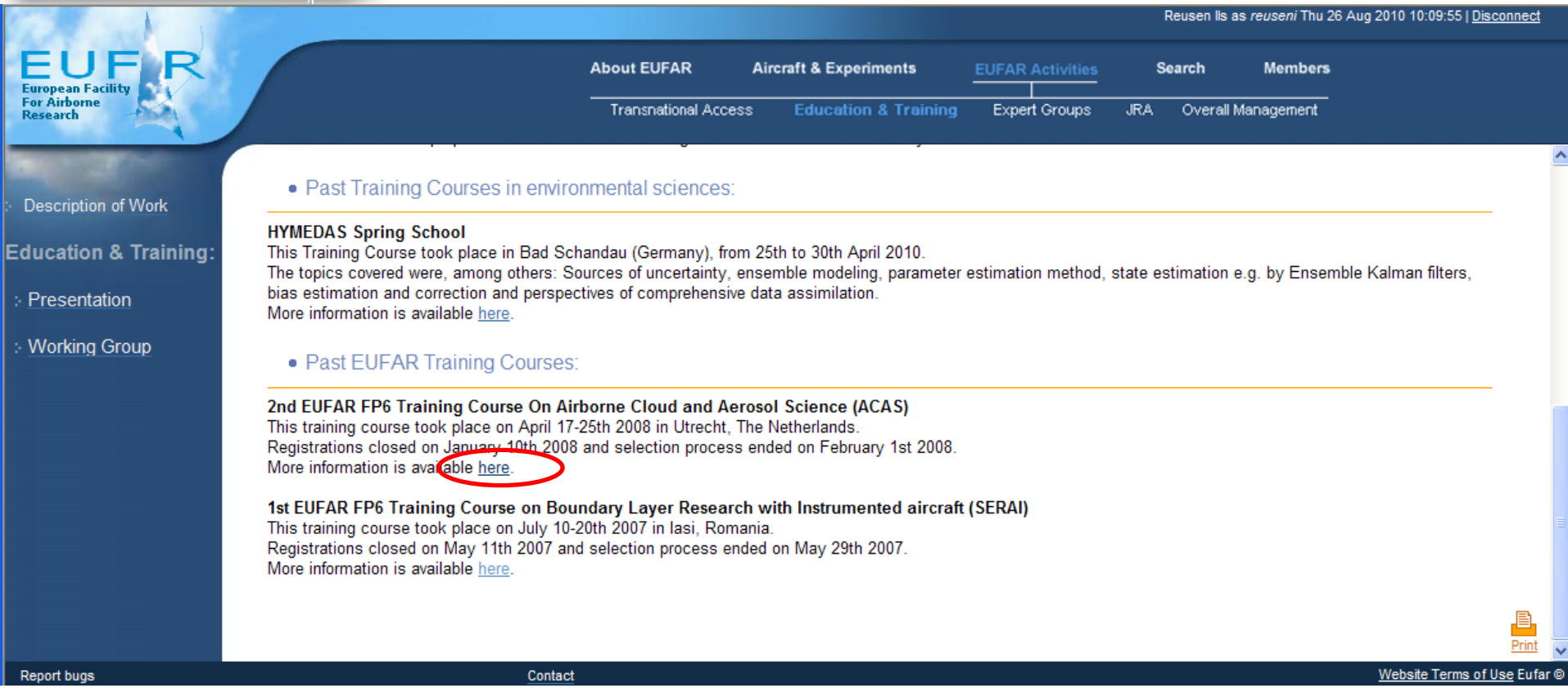
Working group scientific report - example



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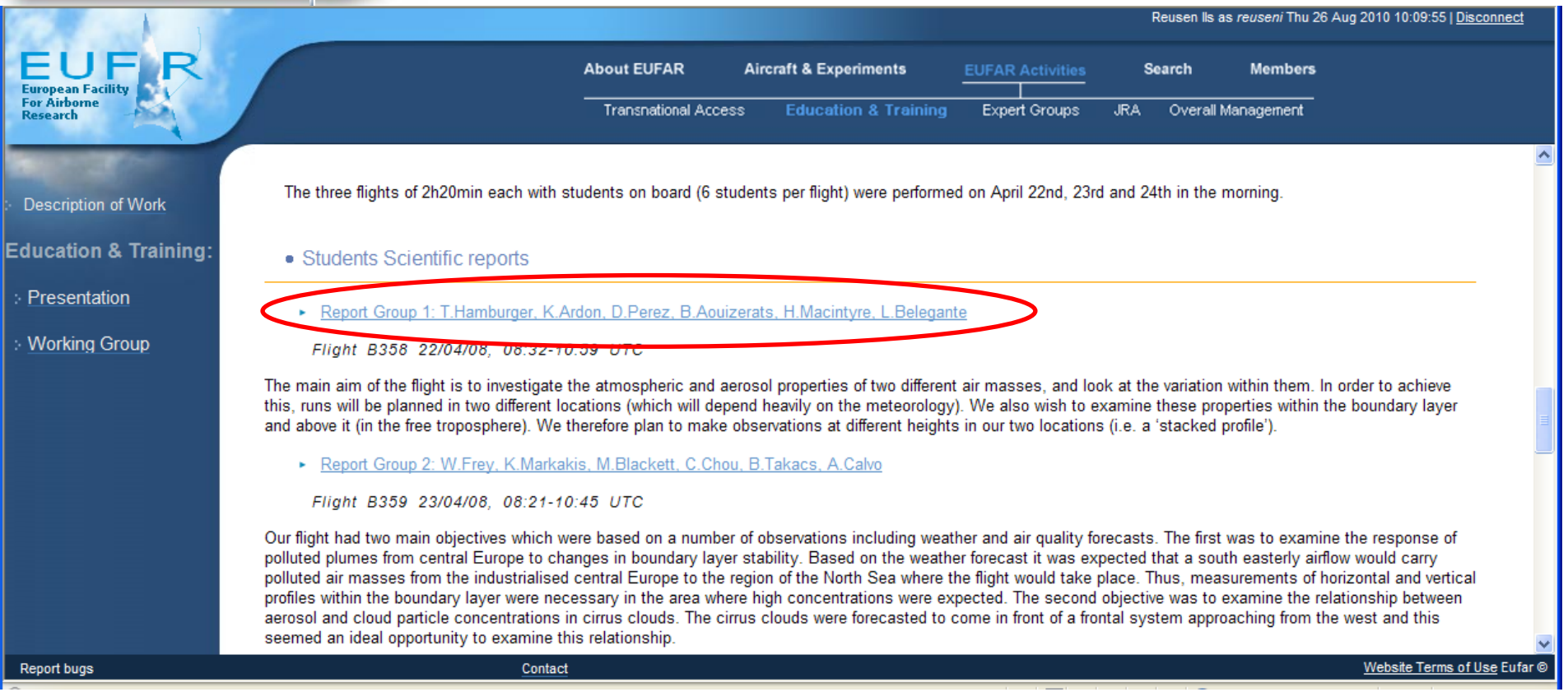

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- Description of Work

Education & Training:

- Presentation
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The three flights of 2h20min each with students on board (6 students per flight) were performed on April 22nd, 23rd and 24th in the morning.

- Students Scientific reports

- Report Group 1: T.Hamburger, K.Ardon, D.Perez, B.Aouizerats, H.Macintyre, L.Belegante

Flight B358 22/04/08, 08:32-10:59 UTC

The main aim of the flight is to investigate the atmospheric and aerosol properties of two different air masses, and look at the variation within them. In order to achieve this, runs will be planned in two different locations (which will depend heavily on the meteorology). We also wish to examine these properties within the boundary layer and above it (in the free troposphere). We therefore plan to make observations at different heights in our two locations (i.e. a 'stacked profile').

- Report Group 2: W.Frey, K.Markakis, M.Blackett, C.Chou, B.Takacs, A.Calvo

Flight B359 23/04/08, 08:21-10:45 UTC

Our flight had two main objectives which were based on a number of observations including weather and air quality forecasts. The first was to examine the response of polluted plumes from central Europe to changes in boundary layer stability. Based on the weather forecast it was expected that a south easterly airflow would carry polluted air masses from the industrialised central Europe to the region of the North Sea where the flight would take place. Thus, measurements of horizontal and vertical profiles within the boundary layer were necessary in the area where high concentrations were expected. The second objective was to examine the relationship between aerosol and cloud particle concentrations in cirrus clouds. The cirrus clouds were forecasted to come in front of a frontal system approaching from the west and this seemed an ideal opportunity to examine this relationship.

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To be sent to bureau@eufar.net due 15/12/2010

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European Facility For Airborne Research

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EUFAR TA

EUFAR EWG

TETRAD reporting

I wish you all an interesting TETRAD training course!

Spread the knowledge!

Thank you for your attention!

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