



TRANSNATIONAL ACCESS COORDINATION

Major project to deploy multiple aircraft to assess the impact of pollution over West Africa, July 2016

The **Dynamics-aerosol-chemistry-cloud interactions in West Africa** (DACCIWA) campaign seeks to investigate the influence of anthropogenic and natural emissions on the atmospheric composition over South West Africa and to assess their impact on human health, the ecosystem, and agricultural productivity.

Funded by the European Union, DACCIWA is a large project (~€10M) with partners in Germany, France, UK, Switzerland, Ghana and Nigeria.

The research campaign in the summer of 2016 undertook a range of activities ranging from flying research aircraft over West Africa, to running complex numerical models of the composition of the atmosphere, including airborne measurements using 3 European research aircraft (SAFIRE's ATR42, DLR's FA20 and NERC BAS Twin Otter).

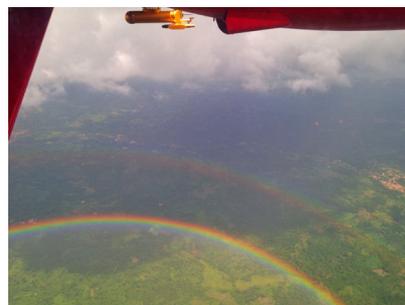
As part of EUFAR's transnational access activity, EUFAR funded flight hours, and provided travel and subsistence support to 3 research campaigns that were clustered with DACCIWA:

- **APSOWA**, with flight hours on board DLR's FA-20 aircraft, aims to characterise gaseous and particulate pollutants emitted by shipping and oil, and gas extraction platforms off the coast of West Africa. Pollution was therefore sampled west from Nigeria, along the coasts of Benin, Togo and Ghana.
- **MICWA** aims to investigate the mid-level inversions and genesis/lysis of altocumulus/altostratus fields. 3 flights were planned between Cotonou and Niamey, for a total of 10 EUFAR supported flight hours on board SAFIRE's ATR-42.
- **OLACTA-2** aims to obtain a definitive dataset on the low-level atmospheric circulation (LLAC) in the Gulf of Guinea, based on a suite of state-of-the-art in situ and remote sensing instruments intended to document the dynamics, thermodynamics and composition of the LLAC together with sea surface properties and near surface turbulent fluxes. 3 meridional flights between coastal SWA and 2°N took place with a total of 10 flight hours on board SAFIRE's ATR-42.

For more information on DACCIWA, the project team published an [overview paper](#) outlining the motivation for tackling this challenging science mission.

Contact Agnes.Borbon@lisa.u-pec.fr (CNRS, France) for information on the cross calibration checks during DACCIWA.

Visit the ULISSE/CNRS blog (only in French), by clicking [here](#).



Above: NERC's Twin Otter aircraft flying over Accra during DACCIWA 2016.

Left: Members of research teams in front of DLR's Falcon 20 aircraft

Photo credits - Sophie Haslett

Visit the website & apply for fully-funded flight hours

Open Calls for Proposals for Transnational Access to EUFAR aircraft are accessible via the website on the [TA Application page](#).

Calls for the use of small, low-cost aircraft, for earth-observation studies and for applications of airborne in-situ measurements are open until 31 May 2017. Proposals will be reviewed as soon as possible after submission, and accepted subject to their meeting overall standards through peer-review and whilst sufficient funding remains within the available budget.

We encourage applications that are linked to multi-disciplinary research activities supported through the Transnational Access programmes of other environmental research infrastructures such as **ACTRIS** and **ENVRIplus**. Applicants should describe such linkages clearly in their applications. Potential applicants are reminded that they can also submit a short Expression of Interest via the website at any time.

OLACTA-2 (Observing the Low-level Atmospheric Circulation in Tropical Atlantic)

EUFAR-supported flight campaign, July 2016

Clustered with the [DACCIWA campaign](#), the OLACTA-2 project is focused on the role of the air-sea interaction on the southern West-African climate dynamics, a scientific topic presently not covered by DACCIWA. This project thus aims at advancing knowledge on the low-level atmospheric circulation (LLAC) in the Eastern Equatorial Atlantic in connection with air-sea interactions in the presence of significant sea-surface temperature (SST) gradients and highly variable background wind conditions (wind bursts observed in response to the St Helena anticyclone synoptic variability).

Advancing knowledge on Tropical Atlantic Climate is also the primary goal of the ongoing EU-funded [PREFACE project](#). Indeed, in spite of significant improvements in the global models between the CMIP3 and CMIP5 exercises, strong biases are still found in the Eastern Tropical Atlantic region. PREFACE aims at understanding the origin of these flaws, such as the misrepresentation of low and mid-levels clouds (by conducting ship-borne campaigns among other things) in order to correct them. With 10 fully funded flight hours on board SAFIRE's ATR42 funded by EUFAR's transnational access activity, OLACTA-2 will therefore contribute to and enrich the findings of both the DACCIWA and PREFACE projects.

The overarching objectives of OLACTA-2 are to acquire a definitive dataset, against which the models simulations can be challenged, to advance knowledge of (i) sea-surface temperature (SST) gradients and (ii) background winds impact on the low-level atmospheric circulation (LLAC) vertical structure in the Gulf of Guinea, as well as (iii) the influence of the LLAC return flow on the transport of natural and anthropogenic aerosols over the Atlantic Ocean.

Given that the OLACTA-2 dedicated flights needed to be conducted once the equatorial cold tongue was well established and after the so-called monsoon onset, the proposed time frame for DACCIWA (27 June - 17 July 2016) was ideal. From a climatological point of view, the monsoon onset is determined to be around 24 June (plus or minus 8 days). As one of the objectives is to assess the impact of background winds on the LLAC structure, one of the proposed flights was scheduled during a large-scale wind burst event in the Gulf of Guinea, remotely driven by the Saint-Helena anticyclone fluctuations. These wind bursts are very frequent at this time of the year, and exhibit a robust bi-weekly periodicity that can be forecasted a few days to one week in advance. The planned flights also aimed to observe at the same time the tropospheric dry intrusions that suppress convection over the Guinean coast. These dry intrusions, linked to the Indian monsoon system, have been shown to play a major role in the West African monsoon onset.

During the OLACTA-2 field campaign three flights took place on 2, 7 and 14 of July on board SAFIRE's ATR 42 with roughly 10 hours of flying time in total.

The flights concentrated on measuring sea surface gradients north of 2°N as the cold tongue near the equator was too far to reach.

The development of the Atlantic Cold Tongue was unusually late this season compared to climatology. The regions measured included temperature changes of around 3 degrees as measured by satellites and the warm sea regions were often observed to be collocated with regions of offshore afternoon convection, with the SST gradients being a potential source of instability. Interestingly, the measurements from the aircraft indicated near constant SSTs over the region, however this may be a limitation of the accuracy of the raw data and fully processed data is expected to reveal more detail.

The field campaign allowed for airborne measurements of sea surface temperatures that can be compared with satellite observations and observations of boundary layer structure with lidar. These will be further analysed and compared to satellite observations to examine the role of SST in the boundary layer structure and convection initiation. As part of the DACCIWA project we also ran the Met Office Unified Model (UM) as a forecast tool at convective permitting 4km resolution. Further runs with the same domain will be possible and these will be used as a tool to understand the data.

The only major aircraft related difficulty was the lack of lidar for some part of the project as described above. This was dealt with as rapidly as possible and was missing for only one flight. This problem has therefore not unduly affected the ability to achieve the project aims.

The fact that the SST cold tongue was further south than predicted was also a difficulty. However, the SST gradients closest to shore were strong and their impact on the boundary layer structure was measured, hence the aims of OLACTA in measuring air sea interactions at temperature gradients should be largely unaffected. This data will allow us to tie into the DACCIWA dataset more closely and make use of model runs and other analyses. Part of this data can also be fed into DACCIWA sea breeze studies.

The research team was provided with the SST data from the CLIMAT instrument in real-time, but as a raw product during the flights, and are currently awaiting fully processed data from the SAFIRE team. So far, this fully processed data is only available for the flight and initial analysis shows that the temperature gradients were observed. The rest of the data is expected to be fine. The data from the other radiometers (CIMEL and Kipp & Zonen broadband radiometer) have been checked for the first flight and look as expected.

Unfortunately due to a technical fault, lidar data for the second flight will not be available. This was unavoidable and repairs were made after instrument parts were shipped out to the field, ensuring we had the instrument back online for the third flight. All other data is fine as far as we can tell at this early stage.

The flight data will be available in the [EUFAR/CEDA archive](#) as soon as possible.

EUFAR EXPERT WORKSHOPS

EUFAR ICCP Cloud Expert Workshop

Manchester, 23-24 July 2016

By Christiane Voigt, Darrel Baumgardner and Greg McFarquhar

The EUFAR ICCP Workshop on Data Processing, Analysis and Presentation Software of Cloud Probes took place at the University of Manchester from 23 to 24 July 2016. More than 40 cloud measurement experts and students from Europe, America, Asia and Australia participated in the workshop with the objectives to summarise current data processing algorithms for measurements made with cloud spectrometers operated on research aircraft, to discuss differences in the data processing methods, to assess optimum practices and to recommend a way forward in improving data quality from cloud probes.

After a welcome and introduction to the workshop by Darrel Baumgardner (Droplet Measurement Technologies), Christiane Voigt (leader of EUFAR's expert working group on In Situ Characterisation of Cloud and Precipitation Particles) presented an overview of EUFAR activities. Colin Gurganas (SPEC) showed a new study that addressed the oversizing of out-of-focus particles by the 2D-S. The session continued with a discussion of open issues related to cloud data processing.

Darrel Baumgardner presented a summary of results from a questionnaire on data processing issues that had been responded to by 15 participants. The summary included current practices on data corrections for airspeed, out of focus particles, shattering and ice crystal size/habit definition. Greg McFarquhar (University of Illinois) showed a study that underscored the uncertainties in deriving particle size distributions, using the same data set from optical array probes (OAP) but processed by three separate groups. Although the same algorithms were supposed to be implemented in the processing, there were significant differences that still remained due to different criteria for accepting particles.

The next session introduced eight different software packages to process and display measurements from cloud probes. These were developed and are maintained by the University of North Dakota (David Delene), University of Manchester (Jonathan Crosier), University of Illinois (Greg McFarquhar/Wu Wei), NCAR (Aaron Bansemer), previous standards & protocols engineer under EUFAR 2008-2013 (Matt Freer), SPEC (Colin Gurganas) and Environment Canada (Alexei Korolev). The day ended with an introduction and a tutorial to Python by Nick Guy and Matt Freer.

A discussion on the way forward in cloud data analysis was opened on day two. This included a dialogue on definitions of microphysical cloud parameters and corrections to be applied to cloud data analysis. The urgent need for a common international reference library that includes the individual processing algorithms was agreed upon by the 43 participants in attendance.

The reference database should be a living document with a quality control by referencing to existing literature or by an internal review process and an easy follow up of track changes. The possibility to assign a DOI for individual processing algorithms was emphasised. Simulated or experimentally derived data sets can serve as reference cases to test, evaluate or compare the processing algorithms.

EUFAR, who currently maintains EGADS (EUFAR Airborne Data-processing Software), was recommended as a possible first choice to host such a database. In addition, an intercomparison paper on cloud data processing algorithms is planned as one outcome of the workshop. These actions will be initiated by Darrel Baumgardner, David Delene and the international cloud community possibly in connection to the EUFAR expert working group on cloud instrumentation. The progress can be followed in workshops linked to the ICARE 2017 international conference on aviation research hosted by EUFAR in 2017 and the AMS/ICCP conferences in 2018 and 2020.

In summary, the workshop offered a unique opportunity to bring together leading experts and young scientists to exchange information in the challenging and fast evolving field of airborne cloud measurements. The action items that were identified in this workshop and that will be carried out in the near future will be an important step forward in the interaction within and outside of the cloud physics community to improve the quality and fidelity of cloud measurements.

For more information, contact Christiane Voigt (christiane.voigt@dlr.de) and Darrel Baumgardner (darrel.baumgardner@gmail.com).



Expert Workshop Group Photo (Manchester, July 2016)

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To publish airborne research related publications, job opportunities, events, etc., contact bureau@eufar.net.

Aircraft and Instruments (TA and non-TA)

All aircraft operators participating in EUFAR's transnational access scheme have been requested to check and, where necessary, update the information on their instruments and aircraft, as well as their aircraft planning information on the EUFAR website to make it easy to identify key opportunities for training and the clustering of TA proposals. Visit the [FAQ section on aircraft and instruments](#).

As EUFAR is a network reuniting all users and providers of airborne research all over Europe, new operators are invited to contact the EUFAR Office if they wish to have their aircraft and instruments published on the EUFAR website. For more information please contact olivier.henry@meteo.fr.



Photo of SAFIRE's ATR-42 taking off for Lomé, Togo, to join the DACCWA campaign July 2016.

Photo credit: SAFIRE

TECHNOLOGY TRANSFER

Transfer of innovative technologies developed within EUFAR

EUFAR's TTO activity seeks to support the transfer of technology between experts in airborne measurements and industry partners. Each year 2 to 3 promising technologies will be selected and studied for presentation to industry representatives, who will thereafter be invited to attend presentations by EUFAR experts on their most innovative research developments. These workshops will be an opportunity for experts and industry representatives to closely interact and develop partnerships for upgrading airborne research instruments, methodologies and software into innovative and useful products.

A guide on technology transfer prepared by Florin Paun - the TTO activity leader (ONERA) and has been made available on the EUFAR website. The guide specifically addresses the EUFAR scientist community, and showcases the operating existing markets and the long time to market (10 years+) specificity to successfully implement a new technology. Click [here](#), to access the guide (open to all EUFAR members).

Interested in transferring your technology? Download the technology sheet template by clicking [here](#) and send it to bureau@eufar.net or the TTO coordinator - florin.paun@onera.fr today!

EUFAR's achievements

Visit EUFAR's achievement page to see how EUFAR's current project has progressed so far, by clicking [here](#).

DATA ARCHIVE

Flight data from EUFAR supported flight campaigns

New data have recently been added into the [EUFAR data archive](#) from the AROMAPEX project (APEX instrument). So far 27 EUFAR2 funded research campaigns have been added for 12 projects from 4 aircraft operators plus additional data from earlier flights. The archive currently provides links to 162 flights (including auxiliary data) for 55 EUFAR funded research projects (~2TB) plus links to a further 9.3TB of ARSF and FAAM flights. Flight data from EUFAR supported research campaigns continue to arrive and be ingested as they become available.

The EUFAR Flight Finder (EFF)

The EUFAR Flight Finder tool (EFF) is a geospatial-temporal search interface to locate flight data within the EUFAR data archive at BADC and can be found at <http://flight-finder.ceda.ac.uk/> and via the [EUFAR tools page](#).

The aim of the EFF is to facilitate the location and identification of EUFAR flights, and to link to the appropriate data files in the archive. Users can search by geographical area on a map interface, by temporal constraints or using key words or parameter names. Results are displayed on the map; clicking on a flight will show further details and links to the data. Help sheets and a tutorial video are provided to get you started. Flights from FAAM, NERC-ARSF and SAFIRE aircraft are currently included - more will be added shortly. All comments and user feedback are welcome, email Wendy Garland (support@ceda.ac.uk).



Screenshot of the EUFAR Flight Finder tool

ENVRiplus Exchange of Personnel Programme

One of the objectives of ENVRiplus is to facilitate the exchange of knowledge among staff working in Research Infrastructures (RI) or related to the implementation of new RI's. ENVRiplus therefore has launched an Exchange of Personnel (EoP) programme to enhance cross-RI mobility of involved RI staff. This programme will help disseminating the know-how of RI specialists and provide practical hands-on experience on operational procedures.

More information about the call, application criteria and process can be found [here](#).

STANDARDS & PROTOCOLS

EUFAR software tools to create INSPIRE metadata and flight reports

The EUFAR Standards & Protocols team is proud to announce the end of beta phase for ASMM (Airborne Science Mission Metadata) and EMC (EUFAR Metadata Creator) tools. Brand new versions for both software have been made available in compliance with recent recommendations made by EUFAR's S&P and data archive teams, and to allow for deeper integration into the EUFAR website. At the same time, a second server has been added to the EUFAR constellation. This new server will be dedicated to the new versions of ASMM and EMC tools, accessible via the following links:

> asmm.eufar.net

> emc.eufar.net

What is the purpose of ASMM?

The Airborne Science Mission Metadata (ASMM) tool has been developed to create, modify and view XML files that will contain standardised metadata to describe the scientific objectives and other scientific descriptors of research flights.

Within airborne atmospheric science, mission reports and log sheets written by scientists on board the aircraft provide valuable supporting details about research flights that are not evident from the instrument data itself. These reports can include environmental details such as types of clouds encountered, surfaces overflown and synoptic features, or mission details such as overall scientific aims, flight manoeuvres undertaken and supporting surface based observations, among many other things.

Currently, mission reports take the form of handwritten or electronic notes, thus the quality and content varies greatly between authors, making the reports less useful for filtering or searching of specific flight details in the months and years after the flight.

This project - Airborne Science Mission Metadata (ASMM) - was motivated by the need to create a standard set of mission reports, aiding in the classification and searching of data sets and archives based on flight phenomena, mission parameters or other scientific criteria. To meet this goal, an XML format has been developed to store the mission report data in a standard manner, and an easy-to-use graphical user interface has been developed to facilitate creation and display of the standard XML files. This project contains the source code and executables for the ASMM creator as well as documentation describing the ASMM XML schema.

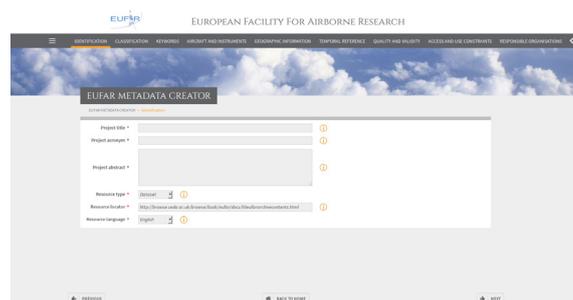
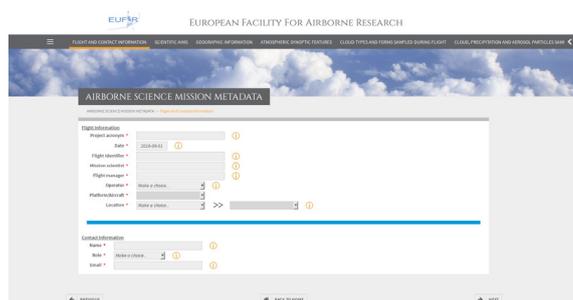
EUFAR Training Opportunities

Apply to participate in the design of a research campaign, join an existing campaign, or visit an aircraft/instrument operator by clicking [here](#).

What is the purpose of the EMC?

Metadata are critical for preparing a ready-for-use dataset after a field experiment. In the EUFAR database, available metadata will assist operators to store their datasets under good conditions, and thereafter will help users to search effectively for specific data. The goal of the EUFAR Metadata Creator is to produce global metadata dedicated to a particular dataset for Airborne Scientific Campaigns. As EUFAR is a European project and seeks to be compatible with other main European initiatives, the use of the EMC to generate xml files generated will ensure the files conform to the version 1.3 of the [INSPIRE metadata and XML Standard](#).

For more information on tools developed within EUFAR to facilitate airborne research measurements, click [here](#).



Website screenshots of the ASMM and EMC

JOINT RESEARCH ACTIVITY - HYLIGHT

Under EUFAR's [Joint Research Activity - HYLIGHT](#) dedicated to the integration of airborne hyperspectral imagery and laser scanning data to improve image processing and interpretation, 14 tools are being prototyped, tested and developed by the HYLIGHT working group.

The tools currently available together with their installation guide and user manual, can be accessed on the EUFAR website, by clicking [here](#). The remaining tools will be added progressively on the website.

Contact the activity leader – ils.reusen@vito.be, for more information.



Photos of METAIR's Dimona aircraft flying over the North Sea shore near Cuxhaven, during a campaign testing an Airborne Wind LIDAR. Contact Bruno Neiningner (nuno@zhaw.ch) for more information. Photo credits: Cyril Hertz

STRATEGY & EUROPEAN INTEGRATION

Establishing EUFAR as a legal sustainable entity

To ensure a future for EUFAR, consolidate the network of airborne research facilities and pursue European integration by introducing new stakeholders, part of EUFAR's strategy consists of establishing a legal sustainable structure that will support the network's core activities and develop a scheme of open access to research infrastructures.

After careful examination of different relevant legal models, EUFAR is working towards establishing itself as an international non-profit association under Belgian law (AISBL). Up to date, 9 partner institutions have signed the [AISBL MoU](#) related to the [AISBL Position Paper](#) (CNR, Czech Globe, DLR, VITO, Météo-France, Met Office, ONERA, the Polish Ministry of Science & Higher Education and CNRS) and 3 partner institutions (INTA, FUB and TAU) expressed their willingness to join the EUFAR AISBL.

The AISBL working group held 8 meetings since May 2015 for continued discussions on the EUFAR AISBL, particularly the Statutes and Internal regulations and the Activity and Financial Plans. The next AISBL working group meeting is set to take place on 7 October 2016 via web-conference.

If you wish to join the EUFAR AISBL or get more information, please contact bureau@eufar.net.

ICARE 2017 Conference

Oberpfaffenhofen, Germany, July 2017

In association with our airborne research colleagues in the USA, the EUFAR consortium is organising the second edition of the International Conference on Airborne Research for the Environment as a follow-up of ICARE 2010. We anticipate that this may involve around 150 delegates from both atmospheric science and earth observation disciplines. There will be key-note presentations from invited speakers.

The time period for ICARE2 is fixed now and will be held in the week of 10-14 July 2017 at DLR, Oberpfaffenhofen, Germany. The conference will involve plenary and poster sessions, expert workshops and a summer school prior to the conference on Airborne remote sensing for monitoring essential biodiversity variables in forest ecosystems-A. EUFAR operators have been invited to present their aircraft at the conference. Limited space will be available to present research aircraft from the European fleet, which can include any aircraft currently represented on the EUFAR website, not just those that are involved in EUFAR's Transnational Access scheme. It is expected that aircraft from the US may also be coming, although EUFAR2 will not be the forum for a big airshow.

The scientific programme is currently being drafted and will be made available on the EUFAR website later in 2016, together with information on how to register to participate in the conference.

For more information, contact bureau@eufar.net.



Photos from ICARE 2010, Toulouse. Photo credits: Météo-France

UPCOMING EVENTS

SAIL35 Symposium 'Eye on Foliage'

Enschede, The Netherlands, 27- 28 Sept. 2016

The SAIL 35 symposium will be celebrating the 35th anniversary of the widely used SAIL model. SAIL is a computer model used to calculate the bidirectional reflectance of vegetation canopies. In this symposium recent theories and applications of radiative transfer in vegetation remote sensing will be presented. For more information, visit <http://sail35.org> or e-mail SAIL35-ITC@utwente.nl.

EUFAR Expert Workshop on Soil Spectral Library

Potsdam (GFZ), Germany, 28 - 29 Sept. 2016

The workshop is organised by the [remote sensing Lab of the University of Tel Aviv](#) and [Section 1.4 Remote Sensing at GFZ](#) under the framework of EUFAR's [Expert Working Group activity](#).

This workshop seeks to gather both experts and young scientists in hyperspectral remote sensing of soil in order to present, discuss and find the ways on how to exploit the technology to support, in a credible manner, digital mapping and monitoring of soils. The emphasis will be placed on current hot topics related to the development of soil spectral libraries and standardisation of protocols, commercial applications, and space applications and tools for prediction of soil properties.

EUFAR Expert Workshop on Atmospheric Correction of Remote Sensing Data

Berlin, Germany, 26 - 28 Oct. 2016

An expert workshop on atmospheric correction of remote sensing data will be held in October at the [Harnack Haus](#) of the [Max Planck Society](#), in Berlin. Funded by EUFAR and [ESA](#), this workshop is organised by the [Institute for Space Sciences of the Freie Universität Berlin](#). The workshop aims to bring together both experts and young scientists working with remote sensing data in order to present, discuss and examine current methods of atmospheric corrections procedures.

EUFAR Expert Workshop on Hyperspectral Imaging from UAVs

Milan, Italy, 14 Dec. 2016

EUFAR is organising an expert workshop on hyperspectral imaging from UAVs with applications in precision farming. Hosted by the [University of Milano-Bicocca](#), this workshop will bring together experts in UAV hyperspectral image processing with the aim of presenting the state-of-the art in high spatial, high spectral remote sensing and in miniaturised hyperspectral sensors and technology. The workshop will also serve to identify gaps in bringing the knowledge to an operational system, i.e. bridge the gap between research and farmers/ industry. Application with abstract and CV must be emailed to bureau@eufar.net and stephanie.delalieux@vito.be before 21 October 2016.



THE C 207 FUB, A SMALL TROPOSPHERIC CESSNA T207A TYPE AIRCRAFT, OPERATED BY **FREIE UNIVERSITÄT BERLIN**, AVAILABLE FOR TRANSNATIONAL ACCESS TO FULLY FUNDED FLIGHT HOURS UNDER THE EUFAR2 FRAMEWORK.



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EUFAR Handbook

Reference: Manfred Wendisch & Jean-Louis Brenguier (Eds.) *Airborne Measurements for Environmental Research: Methods and Instruments*, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2013
ISBN: 978-3-527-40996-9, 655pp.

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