

1st Imaging Remote Sensing Expert Working Group Meeting

6–7 / 09 / 2005, Vietri sul mare, Italy

MEETING REPORT

(Prepared by José-Antonio Gómez, coordinator of EUFAR IRS EWG)

1. Background.

The first workshop of the EUFAR Expert Working Group in Imaging Remote Sensing was held in Vietri sul Mare (Naples-Italy) on 6th and 7th September 2005.

The meeting had place just before the Second EUFAR Management Committee Meeting and was hosted by Istituto per i Sistemi Agricoli e Forestali del Mediterraneo of Centro Nazionale de Ricerca.

The meeting covered following subjects

- i) General overview of EWG's activity in EUFAR, and in particular of Imaging Remote Sensing EWG.
- ii) European scenario in IRS
- iii) European-wide initiatives in IRS
- iv) Revision of EUFAR website and docs.
- v) Discussions
- vi) Conclusions and recommendations

2. Participants.

- Phil Brown, coordinator of Expert Working Group activity at EUFAR
- José-Antonio Gómez coordinator of Imaging Remote Sensing EWG.
- Andreas Müller, from DLR (Germany)
- Ils Reusen, from VITO-TAP (Belgium)
- Javier Díaz-de-Aguilar, from INTA (Spain)
- Koen Meuleman, from VITO-TAP (Belgium)
- Matti Möttus, from University of Tartu (Estonia)
- Paolo Donnarumma, from CNR ISAFoM (Italy)
- Paolo Gamba, from University of Pavia (Italy)
- Thomas Ruhtz, from Free University of Berlin (Germany)

Peter Purcell, from NERC (UK), present at TA meeting in Naples, expressed his willing to participate in the IRS EWG meeting, and was invited to submit his contribution to it.

3. The meeting.

The meeting was open with a presentation by Phil Brown, coordinator of N4EWG activity in EUFAR. Phil provided a general overview of the EWG activity in EUFAR framework. Rationale, objectives and expected outcomes of the EWG networking activity were detailed. He emphasized the role within EUFAR of Expert Working Groups activity as a tool to foster the exchanging of knowledge and to promote best practice and investments in airborne instrumentation.

Later on, Imaging Remote Sensing EWG activity was presented by Jose-Antonio Gomez-Sanchez. Specific aim and expected outcome of the activity of the group were pointed out. First of all, he proposed a review of the field of expertise covered by the Imaging Remote Sensing EWG, as that one dealing with the design, operation and calibration of passive electro-optical airborne instruments conceived to gather imagery from the surface of the Earth, in order to quantify its physical properties. Active sensors, even collecting imagery of the Earth surface, are excluded because they are covered by a specific EUFAR EWG in Active Remote Sensing. Dissemination of the knowledge through the EUFAR Front-Office was identified as the priority aim of the experts, by providing information about the whole set of instruments available for every type of airborne measurement, about existing instruments in Europe and their specific improvements, the ownership and the access procedures, scientific references, technical references, technical issues and regulations specific to airborne research operation.

In particular, main objectives of Imaging Remote Sensing EWG belonging to the category of Instrument/Measurement should be:

- to improve expertise amongst the scientists using and operating the airborne imaging remote sensing facilities and to ensure its continuity,
- to facilitate the transfer of expert knowledge to users and vice versa,
- to avoid unnecessary duplication of airborne imaging remote sensing instruments or other associated facilities

In order to achieve an updated picture of the European scenery in Imaging Remote Sensing field, participants were invited to describe their present activities and the ongoing programs in which they were involved, related to the subject of the EWG.

- Andreas Müller, presented the status of optical remote sensing capabilities at DLR (Deutsches Zentrum für Luft- und Raumfahrt). He focused his presentation in the capabilities new and innovative hyperspectral sensor ARES (Airborne Reflective Emissive Spectrometer) that is actually in the final stage of implementation. Andreas described as well, the new calibration infrastructure set up at DLR to support the new generation of optical imaging sensors.
- Koen Meuleman, from VITO (Flemish Institute for Technological Research) presented current status of APEX Program that will set up a challenging airborne imaging

spectrometer APEX (Airborne Prism Experiment) with hundreds of narrow bands along the optical spectrum.

- José-Antonio Gómez presented the airborne remote sensing facility of INTA (Instituto Nacional de Técnica Aeroespacial). He described main technical characteristics of AHS (Airborne Hyperspectral System), the new airborne hyperspectral sensor recently set up by INTA.
- Thomas Ruutz from FUB (Free University Berlin) and Peter Purcell from NERC, were invited to contribute to complete the European scene in IRS, providing electronic presentations of the respective airborne facilities to put them in the EUFAR website.

Imaging hyperspectral techniques with airborne sensors were acknowledged as the “state of the art” ones, in operational airborne remote sensing, and monopolized the discussions of the group during the two-days meeting.

Some remarks were made about the negative connotations quite often attributed to “duplication of facilities” concept.

It was agreed that “duplication” of facilities is not always a “negative” fact.

It happens that most of last-generation existing (already or in the short-term) imaging systems in Europe are unique and their operation and availability are limited and/or critical. A reasonable level of duplication of available facilities by different operators can help to set up a more consistent network of instruments, providing some level of backup in researching projects. Furthermore, duplication of facilities could allow to carry-out inter-comparison of measurements and inter-calibration of instruments. In addition, Further more, as the facilities are spread out in different locations in Europe, it can help to construct a distributed network of facilities and operators that should guarantee a more cost and effort-efficient way to attend the potential demand coming from the European users, essentially distributed along the whole European space.

A preliminary discussion started about the rationale and approach adopted by each institute/country to upgrade their capabilities.

Collaboration between operators of remote sensing instruments and platforms in areas such as: installation of new sensors, data collection issues, common procedures of operation, calibration of instruments, data process and data validation, metadata generation, development of new algorithms, etc; could be helpful to improve the network itself and could add value to the pool of available data collection systems, simplifying and making more attractive the access to the community of potential users, transmitting the image of a coherent and consistent network of platforms and instruments operated by institutions with common interests and co-ordinated making decisions processes.

It could be implemented through agreements among the operators to standardize protocols and procedures.

Temporal interchanges and stayings of researchers and technical staff could help to reach such objectives.

EUFAR could act as forum to discuss and agree common solutions and should catalyse such changes.

Once more, “good practice” between operators and involved scientists becomes essential and will benefit the whole network and each individual partner.

Later on, two more joined initiatives in the European framework were presented.

- Paolo Gamba, from University of Pavia, presented “HYPER-I-NET”(*), that stands for Hyperspectral Imaging Network, a proposal of a research training network (RTN) presented as a “Marie Curie Action” to the FP6 . HYPER-I-NET addresses challenges and new perspectives of hyperspectral imaging in the fields of sensor calibration, sensor operation, product processing, computing, etc.
- Ils Reusen, from VITO, coordinator of HYRESSA program (Hyperspectral Remote Sensing in Europe – specific Support Action), presented the purpose and objectives of HYRESSA initiative (), as an FP6 Accompanying Measures selected proposal that aims to build an European-wide network of hyperspectral sensors.

A side-effect of the meeting was to facilitate direct contacts between the participants, representatives of leading European institutions in the field of imaging remote sensing. Furthermore, the workshop was useful to advertise the ongoing and in-preparation proposals, and to provide feedback to the leaders of such initiatives.

EUFAR actions to advertise E&T opportunities were presented and reviewed. It was pointed out the lack of explicit references to EUFAR remote sensing activities.

EUFAR website contents were reviewed.

EUFAR website was acknowledged as a essential tool for the users to set up an experiment, and should its design should follow an user-driven structure.

It was agreed to propose a re-design of the instrument categorization, in order to get one more consistent and that allow a more straightforward access to the sensors.

Technical characteristics of the sensors should be completed.

It was proposed to set up links to the person of contact of each sensor, and to the related EWG.

It was proposed to add details that allow the traceability of the data provided by the sensors: level of process, algorithms applied, etc.

It was proposed and agreed to go on dealing some of these fine-tuning actions of the website contents through e-tools such as e-mail or web-conferencing.

4. Conclusions and recommendations

Airborne hyperspectral sensors were acknowledged as the most outstanding tool to image the Earth surface and the processes happening in it.

A relevant outcome of the meeting has been to gather a set of presentations and documents, now accessible through the EUFAR website, provided or presented by the direct responsables of the instruments in the most of the cases, that include a description of the existing Imaging Remote Sensing capabilities available at the moment or in the near future in Europe.

Complementary information of some interesting ongoing initiatives: HYRESSA and HYPER-I-NET, that foster collaboration in the hyperspectral field, were presented and is available at the EUFAR website to look up.

It was stated that availability of ground support facilities to calibrate the new generation of airborne imaging systems has become essential.

It was proposed to develop new techniques for hyperspectral image and data analysis, considering specific characteristics of hyperspectral data sets (this is one of the objectives addressed by HYPER-I-NET initiative).

Outcome recommendations to the IRS instrumented aircraft operators could be:

- Complete and tune actual information presented in the website, and add documents that could help to the users to build an experiment (the EWG's pages could be the right place).
- Set up or get access to supporting calibration facilities.
- Collaborate to compare calibration results.
- Standardize some tasks, procedures and documentation related to the data acquisition flight campaigns.
- Standardize products by the level of process applied.
- Pay more attention and keep critic with the advertising documents generated in EUFAR framework, very often biased in favor to atmospheric applications.

Recommendations to the IRS users

- Look up the available documents in the EUFAR website as a first step when setting up a new experiment/project. For further details, contact to the instrument responsible, to the operator or to the competent Expert Working Group.

- Demand for traceability details of the process applied to the image data.
- Report website content inconsistencies and feedback possible improvements that could facilitate to gather the information needed to set up a new experiment.

Recommendations to the funding agencies

- Encourage projects that require horizontal collaboration between different operators of IRS instrumented aircrafts, and help to create links between them, that will drive to build a better coordinated network of instruments and platforms.
- When deciding to fund a new IRS facility, consider its contribution to achieve a more equilibrated geographical distribution of the pool of sensor and platforms, in order to get a better and more cost-efficient access to the researching facilities.
- Consider and positively value backup and inter-comparison potential provided by new instruments proposed, that could provide some degree of favorable duplicity to the whole network.
- Foster standardization initiatives conducting to facilitate the access, to extend the applicability and to allow comparison of IRS data sets coming from different instruments/operators
- Promote mobility and interchange of researchers between the IRS operators.
- Support initiatives to develop new algorithms to process high-dimensional data provided by the outstanding generation of hyperspectral IRS instruments.

Note. Digital edition of the contributions to the workshop made by the participants have been placed in the Imaging Remote Sensing EWG web-page.