PROJECT FINAL REPORT

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Table of Contents

1. Final publishable summary report

1.1 Executive summary

The issue of climate change has moved to the top of the global political agenda because changes in the climate system ultimately result in changes in social and economic systems. As it matures, the Global Earth Observation System of Systems (GEOSS) will represent a quantum leap in the speed, resolution, accuracy and sophistication of weather and climate modelling and forecasting. In this framework, the need for top-level research in atmospheric remote sensing becomes a critical issue for EU and in the same time an important opportunity for centres like ROLICE (ROmanian LIdar CEntre). Being one of the most advanced centres for atmospheric research in Romania, and the only one involved in laser remote sensing at that moment, ROLICE has recognized its weaknesses related both to its scientific activity at European level, and to its collaboration with public authorities and stakeholders at national level.

Three important actions were identified as to be crucial for the future development of the centre and consolidation of its position, and addressed within DELICE project:

- ***Improving the R&D infrastructure***, by purchasing new equipments and upgrading the existing ones;
- ***Mobilizing human resources*** by attracting young brilliant researchers and managers, train them in an international environment, and by collaborating with Diaspora;
- ***Increasing the visibility of the centre*** and ***strengthening international partnerships*** with EARLINET, AERONET and other relevant networks.

DELICE was a 948460 EUR grant, covering all categories of expenses. 45% of the budget was used to purchase new equipments (microwave radiometer, aerosol mass spectrometer, sodar) and upgrade the lidars, 40% to reinforce human resources and 15% to improve mobility and promote the centre. Based on the redesigned state-of-the-art laboratories, trained personnel, strengthen collaborations at national, regional and European level, ROLICE is today one the most advanced and complex remote sensing centres in Europe.

At the end of the project, all the instruments are operational (new equipments purchased, existing equipments upgraded). Market-liaison office is functional, with 2 specialists employed. Three new researchers are working now at INOE. Their research is focused on instruments optimization, satellite imagery, database and programming. The training at counterparts laboratories and at ROLICE were done, including participation to validation campaigns (9 people trained). ROLICE proved its potential (infrastructure and human resources) to external partners, and as consequence it was accepted to provide transnational access to the infrastructure inside ACTRIS (FP7-INFRASTRUCTURES-2010-1, 262254), is leading the planning and recruitment board of the Marie Curie ITN project ITARS (FP7-PEOPLE-2011-ITN, 289923) and is representing Romania to EG-CLIMET COST action.

Team members proved their ability as scientists and also leaders in this part of Europe. The result was the election of DELICE's coordinator as ICLAS (International Coordination-group on Laser Atmospheric Studies) member, starting July 2010, but more important, new consortia were formed, new proposals were submitted to various funding agencies, new collaboration with private sector and national public agencies (Ministry of Environment, National Authority for Scientific Research, ROMATSA, National Administration for Meteorology) were initiated. Collaboration with 6 Romanian experts from Diaspora was reinforced, and the number of communications to international conferences and papers published in peer-review journals has increased significantly.

The web site and web portal was launched and updated regularly, while promotional materials were designed, executed and distributed. Several promotional actions were organized, both scientific (OTEM 2009, 2010 and 2011 workshop, final conference, communications at international conferences and papers published), and for the public (official opening of the Romanian Atmospheric Observatory, based on a synergy of funds, stand at ROMENVIROTEC 2010, 2011, brochures, leaflets and presentations, mass-media interviews).

Coming to the end of DELICE project, we acknowledge the impact of this 948460 EUR grant, but also of the involvement of people from EARLINET, AERONET and other expert groups in Europe who helped us, motivated us and urged us to become better, more present on scientific level, and more responsible.

Detailed information on the project results, the team and all public reports are available on the DELICE website http://inoe.inoe.ro/DELICE.

1.2 Description of project context and objectives

The impact of climate change on ecosystems is projected to be significant and have strong direct implications for human well-being. The effects of climate change vary by region within Europe, depending not only on the exposure of a region to climate change (character, magnitude and rate of climate), but also on the sensitivity of the system impacted by climate change (impacts on socio-economic systems can result directly from climate impacts or indirectly through effects of climate impacts on ecosystems).

However, many aspects of the global climate system are still not fully understood. Key uncertainties involve clouds, sea-level rise, the carbon cycle and the impact of aerosols. Solving these uncertainties will assist governments to adopt more effective policies for mitigating, and adapting to, climate change. Understanding the underlying physical-chemical processes and the links and feedback mechanisms between climate change and air pollution forms the basis for any decisions on emission and air-pollution control, environmental regulations and the implementation of adaptation strategies with respect to climate change.

GEOSS[2] aims to achieve global coordinated multi-sensor observation of the Earth, therefore making use of all available capacities, significant at global/continental scale, which can contribute on the long-term. As it matures, GEOSS will represent a quantum leap in the speed, resolution, accuracy and sophistication of weather and climate modelling and forecasting. In this framework, the need for top-level research centres in atmosphere remote sensing becomes a critical issue for EU and in the same time an important opportunity for research groups like ours.

Being one of the most advanced centres for atmospheric research in Romania, and the only one involved in laser remote sensing at that moment, ROLICE[3] has recognize its weaknesses related both to its scientific activity at European level, and to its collaboration with public authorities and stakeholders at national level. Before the implementation of the DELICE project, the centre had 7 employees, several lidar systems (needing upgrades), and several small complementary instruments. The existing infrastructure was built on national grants, not enough to cope with the real need. At that time, the centre was not able to get information about meteorological parameters (radiosoundings in Romania are sparse and not accurate enough) and aerosols composition, therefore we were unable to perform complex analysis or even ground-calibration.

Contacts with several important European and global networks for atmospheric science (EARLINET[4], AERONET[5], EUSAAR[6]) were active also, but since the infrastructure was not proper, we could not provide them high accuracy results. The personnel also were not properly trained as to satisfy the standards of top-level research teams in Europe. Overall, at the moment when DELICE was submitted to FP7-REGPOT, the enthusiasm of "important players" on the market of atmospheric science towards our products was limited, although it was clear for everybody that data from this part of Europe is urgently needed.

To overcome these weaknesses, DELICE proposed as main objective to increase the research capacities of the National Institute of R&D for Optoelectronics (INOE 2000) by developing the remote sensing activities to stimulate its full research potential contributing to the realisation of European Research Area as a ”common market for research”.

The specific objectives of DELICE were:

O.1. Unlocking the ROmanian LIdar CEntre (ROLICE) potential for better integration in specific research networks such EARLINET (European Aerosol Research Lidar NETwork, http://www.earlinet.org) and AERONET (AErosol RObotic NETwork, http://aeronet.gsfc.nasa.gov);

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[2] Global Earth Observation System of Systems
[3] ROmanian LIdar CEnter
[4] European Aerosol Research LIdar NETwork
[5] AErosol RObotic NETwork
[6] European Supersites for Atmospheric Aerosol Research

O.2. Increasing quantitatively and qualitatively the regional capacity to contribute to GEOSS (Global Earth Observation System of Systems), an initiatives of GEO (Group on Earth Observation, http://www.earthobservations.org/index.html);

O.3. Extending strategic partnerships with other research groups working in the domain of laser remote sensing and complementary.

Several important actions were identified as to be crucial for the future development of the centre and consolidation of its position, and addressed within DELICE project:

O.1.a. Improving the R&D infrastructure, by purchasing new equipments and upgrading the existing ones.

Using around 45% of DELICE's budget, we purchased state-of-the-art instruments (microwave radiometer, sodar, aerosol mass spectrometer)(Deliverables D3 and D11) and upgraded the existing ones (multiwavelength Raman lidar, scanning eye-safe lidar)(Deliverable D7 update), so that our laboratory is today one the most advanced and complex remote sensing centres in Europe.

Recent events such as the eruption of Eyjafjallajökull in 2010 and Grímsvötn in 2011 have determined public authorities to look for available data and information not only in operative sectors, but also in research. As consequence, an increased pressure for more automatic measurements and more rapid data flow was put on research groups working with remote sensing techniques. This pressure had been propagated to our station both via European and global networks to which we are committed, and directly from national authorities: ROMATSA, Ministry of Environment, National Meteorological Administration. An important effort was done (and still undergoing) in 2 directions: a) automation of data collection and delivery; b) development of algorithms and technical solutions to shorten the time between measurements and delivery of the products without affecting data quality. Part of these are already integrated in data collection and processing chain at ROLICE.

O.1.b. Mobilizing human resources to achieve a critical mass in terms of man power and expertise. We had in view to achieve this goal by 3 means:

➲ ***Employment of supplementary personnel*** (Deliverable D6; Deliverable D16) - Employment was done in order to strengthen INOE's research capacity to face new challenges by making use of experts (including from Diaspora), young researchers (MSc and PhD St.) and strengthening the non-research activities. Two experienced researchers and 1 engineer were hired for the duration of the project, and 2 young researchers, 1 research manager and 1 marketing specialist received permanent positions.

➲ ***Develop the expertise of the team members*** - Training of our personnel was a continuous process at ROLICE. Apart from regular training via seminars organized in our Institute or in other Romanian research institutions, and complementary to individual training inside PhD programmes at University of Bucharest and "Politechnica" University of Bucharest, a major component was specialized training with the help of our counterparts. The need arise from the fact that, up to DELICE, no other laboratory in the country had access to such modern instruments, and therefore nor the knowledge or the expertise was available at local institutions. Both existing and newly employed personnel were trained via secondments to counterparts laboratories, in their specific area of expertise.

Trainings at Counterparts laboratories (Deliverable D5)

- 1PhD and 1Msc were trained at National Technical University of Athens, Laser Remote Sensing Unit - part of EARLINET(aerosol and ozone lidar and air mass trajectories analysis);
- 1 PhD was trained at Université Lille in Villeneuve d'Asc, France Research at Laboratoire d'Optique Atmosphérique - part of AERONET(radiative forcing);
- 1 PhD St. was trained at Ecole des Mines de Douai, Département Chimie et Environnement (aerosol mass spectrometry);
- 2 PhDs were trained at Leipzig Institute of Tropospheric Physics - part of EARLINET(microphysical retrieval). Together with this training was also organized an intercomparison campaign.(Deliverable 4)

Following the installation of new equipments (Aerosol Mass Spectrometer, Sodar, Microwave radiometer) and upgrades of the lidar systems (depolarization module, eye pieces, new detection modules), the second part of the training was organized for each of the topics before, at ROLICE. The purpose was to learn how to properly use the instruments and to handle the data, this time at our location and based on our instruments, which are not exactly the same as the ones in counterparts laboratories. Since all the sessions were organized at our location, more scientists could attend.

Trainings at ROLICE laboratories (Deliverable 18)

- 1 Training on ozone lidar and new configuration of the aerosol multiwavelength lidar with invited professors Prof. Dr. Alexandros Papayannis and Giorgos Georgousis, from National Technical University of Athens, Greece.
- 1 Training on the retrieval of aerosol microphysical properties, using own optical data with invited professor Dr. Detlef Müller from Leibniz Institute for Tropospheric Research, Germany.
- 1 Training on sunphotometry, multispectral data inversion and radiative forcing with invited professors Dr. Philippe Goloub and Eng. Thierry Podvin from University of Lille, France.

➲ ***Strength the collaboration with Romanian experts working aboard (***Deliverable D17) **-** One of the main objectives of the project was to strengthen INOE 2000's research capacity to face new challenges by making use of the expertise already gained by brilliant young Romanian specialists working abroad.

Three agreements for collaboration have been signed with Dr. Mihaela-Anca Marian (PhD at École polytechnique fédérale de Lausanne EPFL in the Microvision and Microdiagnostics Group and now work in Canada), Raluca Mihaela Andrei (Student at Scuola Normale Superiore Pisa, Prato Area, Italy) and Dr. Ioana Dima-West (PhD at University of Washington, Department of Atmospheric Sciences, Seattle, USA and now works in United States). Beside the contracts signed there are more people with whom we collaborate in fact in various forms: common research projects (Dr. Ioan Balin), joint scientific papers and communications (Dr. Ioan Balin and Dr. Mariana Adam), organization and participation to scientific events around the world (Dr. Ioan Balin - Switzerland, Dr. Mariana Adam - Italy and Prof. Dr. Cristian Focsa- France), advices on instrumentation and new technologies (Gheorghe Ilie - USA).

O.2.a. Increasing visibility

Research is our main interest. Nevertheless, research is paid by the society and therefore we have the obligation to communicate and to transfer our results to the society, at national or international scale. Increasing the visibility of the research centre was achieved by promotional activities designed for the scientific community (organizing the annual International workshop "Optoelectronic Techniques for Environmental Monitoring" and of an international scientific conference "Environmental Remote Sensing" (Deliverable D23), participation to most important conferences in the field of remote sensing in Europe, as well as publishing a significant number of scientific papers in peer-review journals (Deliverable D24) and opening of new channels to communicate with the public (meetings with stakeholders)(Deliverables D1; Deliverables D2; Deliverable D10; Deliverable D12; Deliverable D13; Deliverable D20; Deliverable D21; Deliverable D22), distribution of promotional materials (Deliverable D9 update), participation to exhibitions and science fairs (Deliverable D14; Deliverable D19), organization of specific events for children and students.

For a good external visibility, one of the deliverables in the DELICE project was the implementation of a multipurpose website. The structure of the site was designed to facilitate the promotion and dissemination of the project and to help the transfer of information between different entities in the project (e.g. counterparts, stakeholders, advisory board).(Deliverable D8).

O.2.b. Establishing new scientific collaboration in South East Europe

SE Europe is affected by multiple environmental risks. Some of them are endemic (e.g. earthquakes, droughts, floods and forest fires), others are imposed or accelerated by human activities (e.g. contamination, landslides, erosion) and others are inflicted by global factors such as the climate change. This region is not

contributing, although, to global environmental knowledge with coherent data and mitigation measures. Therefore, ROLICE started a series of actions to activate links with various groups relevant for atmospheric research, such as:

- Hungarian Meteorological Service, HUNGARY
- CETEMS, Physics Department, University of L´Aquila, ITALY
- University of SALENTO, ITALY
- Institute of the Environment and Spatial Planning, SLOVENIA
- Central Institute of Meteorology and Geodynamics, National Weather Service of Austria, AUSTRIA
- National Technical University of Athens, GREECE
- Meteorological and Hydrological Service, CROATIA
- Institute of Physics, Belgrade, SERBIA

The result of this collaboration was the submission of an Expression of Interest under the South-East European Cooperation Programme entitled "East European LIdar-based Transnational structure for Environmental and Climate change risk prevention-ELITE" and of an Expression of Interest under the South-East European Cooperation Programme entitled "South East European Network for Climate Change Adaptation - SEENA", which unfortunately were rejected. The most important gain of these proposals was that they created links not only with research institutions (listed above) from this part of Europe, but with national, regional agencies, and non-governmental agencies activating in climate change.

Another result was the participation of several experts from Hungary, Bulgaria, Turkey, Poland and Serbia to OTEM 2011. We took this opportunity to strength the links between our research groups, to show them our capacity and make exchange of expertise. Visiting our laboratories was also a good opportunity for them to realize they could use the trans-national access to start complex projects together with our group.

As full partner in ACTRIS project, we are offering trans-national access to infrastructure. Groups from South-East Europe which intend to develop remote sensing capabilities already expressed their interest to use this opportunity in order to benefit from hands-on training at our facility. One of these groups is part of the Institute of Physics, Belgrade, Serbia. Their application was already positively assessed by the TNA selection panel and was accepted.

O.3.a. Improving cooperation with EARLINET and AERONET groups **-** ROLICE continued its work under the agreements with EARLINET and AERONET. Moreover, part of the human resources professional development actions were carried out under the umbrella of these strategic partners. What is really important and proves that we fulfilled our objective in DELICE, is that our group was invited as partner to the 2 most significant projects at the moment dealing with atmospheric remote sensing: ACTRIS - FP7-INFRASTRUCTURES-2010-1, 262254 (coordinates an European ground-based network of stations equipped with advanced atmospheric probing instrumentation for aerosols, clouds and short-lived trace gases), and ITARS - FP7-PEOPLE-2011-ITN, 289923 (setting up a common school for young researchers, focus on remote sensing techniques, but also take into consideration synergistic use of various methods and techniques, in line with ACTRIS objectives).

O.3.b. Extending cooperation with research groups from complementary fields **-** After 2 years of practically no calls for proposals open by the national research programme, in September 2011 a call for “Partnerships” was launched. Primary goal of the programme was to bridge a stronger link between research and private sector, emphasizing the innovative aspect. Laser remote sensing is not as much involved in new products, but new data. As consequence, we formalized our previous collaboration with important stakeholders in our country (ROMATSA, National Administration for Meteorology). Several new applications of laser remote sensing data were identified and tailored on users needs in order to build up new proposals on a national volcanic ash alerting system, advice on weather modification or improvement of day and night vision devices' performances. All these projects have 2 common points: multidisciplinarity and immediate impact on society. Therefore, consortia were designed to cover not only laser remote sensing, but complementary fields too: aviation safety, meteorology, weather modification, security, etc. Beside these 3 examples, a lot more research projects were submitted to the same competition.

1.3 **Main S&T results/foregrounds**

In order to achieve its objectives, DELICE project has been organized into six Work Packages shown in the figure below:

1.3.1 WP1 Management

The objective of this work package was to ensure the overall coordination of the project.

Although DELICE was a single partner project, several EU partners have been supporting INOE to strengthen its research capacity building. By consequence, the Management structure of the project was based on the Project Management Team (Project Coordinator + Work Packages Leaders), but working in close cooperation with the Advisory Board (external experts on atmospheric remote sensing and complementary fields).

Task 1.1 – Managing and monitoring the project against the proposed milestones

Each WPL was given by the PC a list of milestones and deliverables to be fulfilled, the corresponding schedule and budget. Consultative meetings at each 3 months were organized by the PC with WPL in order to:

- report on each WP's activities: results obtained, problems occurred, solutions foreseen;
- discuss on administrative and financial issues such as: increasing of costs due to world economical crisis, tender / delivery delays, reallocations of resources (human and materials) between activities
- discuss on the following milestones and deliverables, agree on actions and schedule;

As soon as a deliverable was achieved, PC had immediate access to it, in order to check it against the project objectives and estimated results. After the final screening of the PC, each deliverable was prepared to be included in the project web site, and the EC officer was informed to check it online.

It was the responsibility of the PC to establish and distribute to the WPL all necessary procedures and tools, in order to ensure homogeneous reports.

Task 1.2 – Knowledge and information management

Knowledge and information flow was organized as follows:

- *within WP members* – there were no restriction of communication between people working within the same WP. Data and information was sent and received without any restriction;
- *between WPs* – was done mainly via WP leaders. However, there were no restrictions of communication between people working in different WPs as long as there was a need to exchange vital data and information that are necessary to fulfill project's objectives or to carry on a certain task;

- *with PC* – WPL sent their inputs to PC as many time as it was necessary. They also contributed for drafting reports to be sent either to the European Commission, to AB or SG. WPL coordinated their efforts to ensure proper achievements of WP objectives.
- *with AB and SG* – PC was the focal point for communication with AB and SG. PC participated to AB and SG meetings and gave presentation on project implementation status, and asked advice on related issues

Tools for knowledge and information exchange:

- direct dialog - during short meetings of PMT (each 3 months), Kick-off meeting, PMT-AB meetings, PMT-SG meetings;
- electronic messages - PC was at least in CC for all messages exchanged between group members or between WPL and external partners (AB, SG); PC was the only person in contact with EC officer;
- shared directories - a special (password protected) space on the server is dedicated to the hosting of project's documents; PC and WPL have non-restricted access to this space and use it to share technical and financial documents;
- web portal - the "Intranet" section (password protected) of the project's web site is used to exchange information between PMT and external partners: AB, SG and EC officer. Non-public deliverables, as well as technical reports, meetings briefings, presentations etc. are available within this portal, while only public deliverables are visible under the public web site.

Task 1.3 – Organizing and coordination of consultative meetings

Consultative meetings were organized every 3 months. All PMT members (PC + WPL) were present to report on activities inside the WP, and to suggest further actions.

Kick-off-Meeting was organized in Bucharest on March 10, 2009. Representatives of Diaspora and people in charge for different activities in the framework of the project were present, including project officer, Mr. Ciaran Dearle.

The kick of meeting agenda included the following items:

- Opening of the meeting
- Presentation of National Plan for Research, Development and Innovation - Human Resources and Ideas Programs
- REGPOT-1 presentation
- General Aspects of research in Romania
- DELICE project
- International cooperation
- Previous and future international cooperation
- Collaboration with the Diaspora

1st PMT-AB consultative meeting was organized in Bucharest on September 30th, 2009. Scientists from Europe and USA involved in the DELICE's Advisory board were present at this meeting to discuss the achievements during the project, new research directions and future FP7 projects involving European Lidar community.

2nd PMT-AB consultative meeting took place on September 30th, 2011 in Magurele, following the final DELICE Conference - Environmental Remote Sensing. It was organized by INOE and hosted at the new INOE's facility-Romanian Atmospheric Research 3D Observatory. This meeting was organized to discuss the achievements during the project, new research directions and future FP7 projects involving European Lidar community.

1st PMT-SG consultative meeting was organized in Magurele, Ilfov, on January 26th, 2010 representatives of the Ministry of Environment, Romanian Space Agency, National Authority for Scientific Research, National Administration for Meteorology, DARTCOM (United Kingdom), FALCON (Belarus), RAYMETRICS (Greece) and also people in charge for different domains in the framework of the project were present at the meeting. The purpose of the meeting was two-fold: to present DELICE's project and its impact on the development of ROLICE, and to get some information about the "market" needs and wishes.

2nd PMT-SG consultative meeting took place on January 25th, 2012 in Magurele at the location of National Institute of Research and Development for Optoelectronics INOE 2000 - Romanian Atmospheric Observatory. At the meeting participated representatives of the Ministry of Environment, National Authority for Scientific Research, Enviroscopy (Switzerland), ROMATSA (Romania) and also people in charge for different domains in the framework of the project.

Task 1.4 – Preparing reports (scientific and financial)

- Scientific (technical) reports

Each WPL was responsible to provide deliverables corresponding to the working plan. Most of the deliverables are reports on specific tasks and results obtained, which are used by the PC (after a final screening) to build up the overall project report. A short description of deliverables is included in this report. Detailed descriptions are available on the web site / web portal, depending on the dissemination level.

- Financial reports

Specific tools were implemented to ease the financial monitoring of the project, e.g. Excel sheets with automatic calculations of costs at the time when they occur, taking into account official exchange rates published on ECB. The PC is responsible for budget's (resources and costs) update once per week, including personnel costs, based on reports from WPL. This procedure allows PC to have real time control on project's budget. All financial reports (internal and external) are supervised by a financial officer employed at INOE. Certificates on the financial statements signed by an external audit were provided together with the reports. The audit had access to all financial documents and reports of the project.

- Financial aspects

During the implementation of DELICE project, we were facing the necessity of transferring partially the budget from one activity to another, as well as between different categories of expenses. This is due to differences between estimated necessities and costs and actually incurred and arises of supplementary needs for the benefit of the project. All transfers were made in the best interest of the project and for the complete achievement of project's objectives. Total costs charged to the project is with just 3.1kEUR lower than initially estimated.

1.3.2 WP2 Twinning and exchange of expertise

This work package had as objective to reinforce INOE's human potential, in order to be able to reach the necessary EU level of expertise.

Task 2.1 Training of Romanian specialists in counterparts laboratories

The goal of this project was to "learn by doing" under the supervision of the best experts in Europe, as part of their team and having direct access to state-of-the-art equipments in counterparts laboratories

In order to develop the expertise of the team members was organized specialized trainings with the help of our counterparts. This need arised from the fact that, up to DELICE, no other laboratory in the country had access to such modern instruments, and therefore nor the knowledge or the expertise was available at local institutions.

At the first training participated Jeni Vasilescu and Anca Nemuc and was held at University of Lille, France by Dr.Christa Fittschen and Dr. Philippe Goloub. The training took place on May 3-10, 2010.

The first part of this training was performed at Département Chimie et Environnement, Ecole des Mines de Douai (France) under supervision of Christa Fittschen and Véronique Riffault, specialist in composition of particulate organic matter, and principal investigator of a project involving monitoring of atmospheric aerosol. The chemistry department has an Aerosol Mass Spectrometer (AMS) similar to the one we purchased for INOE's laboratory in the frame of DELICE project. Also a calibration chain with several options was available and it was used for several calibration procedures performed during visit.

Second part of this training session took place at Université Lille in Villeneuve d'Asc, France Research at Laboratoire d'Optique Atmosphérique (LOA Lille France). Professor Philippe Goloub is coordinating PHOTONS (http://www-loa.univ-lille1.fr/photons/), the European part of AERONET (Aerosol Robotic Network). He and his team, an advanced and experienced group, are directly involved both in the calibration of sunphotometers, development of new instruments and algorithm for retrieval of aerosol's properties. A presentation of our activities and especially of activities involved in DELICE was a good start for our discussions, concentrated on calibration procedures and full involvement of INOE's team in future projects.

At the second training participated Belegante Livio and Radulescu Razvan and was held at National Technical University of Athens, Greece by professor Alexandros Papayannis. The training took place on May 31-June 12, 2010.

The two trainees spent 13 days (31th May - 12th June 2010) in Greece for a training period at counterparts laboratories. The training was performed at the NTUA's (National Technical University of Athens) department of laser remote sensing (LRSU – Laser Remote Sensing Unit) under the supervision of Alexandros Papayannis who is an Associate Professor in Environmental Physics and the Head/Leader of LRSU. This department has a similar Ozone LiDAR with the one used at the INOE laboratory. The difference in them is that the LRSU Ozone LiDAR is mounted on an optical table and has only one Raman cell, contrary to the INOE one which is an entirely separate system with two Raman cells, but the principle is the same.

In the first part of the training they participated at a discussion involving the user safety and how the laser is set-up for lasing. It has a fine alignment depending on the temperature of the crystal, and this set-up is performed every time the laser is started. Afterwards the discussion was deviated towards information retrieval using this system.

The second part of the training was dedicated to utilizing the shipped software for processing the signals retrieved with the Ozone LiDAR and thus giving information regarding the concentration of Ozone in the atmosphere.

And finally the last part of the training period was dedicated to HYSPLIT software and how this software can be used with clusters (not only give one trajectory, but set-up the program so that it gives a multitude of possible trajectories).

At the third training participated Doina Nicolae and Camelia Talianu and was held at Leibniz Institute for Tropospheric Research (IFT), Germany by professor Detlef Müller. The training took place on July 19 - 23, 2010.

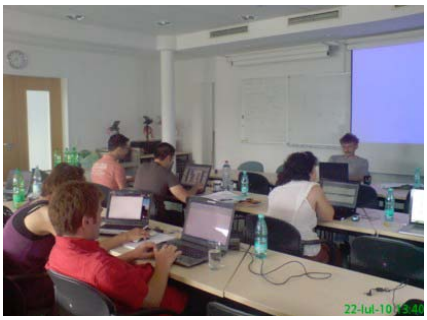
The two trainees spent 5 days (19th June - 23th June 2010) in Leipzig, Germany at Leibniz Institute for Tropospheric Research (IFT) for a training period at counterparts laboratories under supervision of Dr. Detlef Müller. The Institute for Tropospheric Research is an important centre with background in analyzing the microphysical and optical properties of atmospheric aerosols and algorithm development for retrieval of aerosol's properties. In addition, IFT has air quality monitoring systems similar to the Remote Sensing Department of INOE .

The training covered the following topics:

O.1. Theoretical background:
O.2. General aspects on Atmospheric Optics
O.3. Optical parameters of aerosols
O.4. Lidar inversion to extract aerosols' optical parameters
O.5. Regularization technique for microphysical
O.6. Introduction to microphysical retrieval

Applications:

- Simulations based on microphysical retrieval code
- Practical application of the microphysical retrieval code on "3+2" (3 elastic channels and 2 Raman channels) experimental lidar data.



Trainings - At Counterparts laboratories, Outside Romania

Task 2.2 Training by counterparts experts at Romanian lidar facility

The goal of this task was to apply and extend inside INOE's laboratories the knowledge acquired during previous training at counterparts.

The first training organized at Romanian lidar facility was held by Dr. Alexandros Papayannis and Giorgos Georgousis from National Technical University of Athens on December 10-12, 2010. At this training participated Mr. Livio Belegante and Mr. Emil Carstea.

During this training the focus was on several topics regarding the dial system:

- Hardware configuration:

The DIAL system is based on the differential absorption of light. Basically the DIAL transmits two wavelengths: an "on-line" wavelength that is absorbed by the gas of interest (in our case ozone) and an off-

line wavelength that is not absorbed. The differential absorption between the two wavelengths is a measure of the concentration of the gas as a function of range. DIALs are essentially dual-wavelength elastic backscatter lidars that transmits a pair, or several pairs of wavelengths (on and off) for the retrieval of concentration for a certain gas of interest.

Also, a special opto-mechanic module was developed for the alignment and monitoring of the laser emission energy. Methods for using this module were discussed and established.

- Software development

The training in Bucharest was an occasion for upgrading the acquisition and processing software for DIAL lidar system. This new software was tested during this training and a short tutorial regarding ways of using this software was also presented. The algorithms used in the software were presented and discussed.

Trainings - National Institute of R&D for Optoelectronics, Romania

The second training organized at Romanian lidar facility was held by Dr. Detlef Müller from Leibniz Institute for Tropospheric Research on January 10-15, 2011. At this training participated Mrs. Anca Nemuc, Mrs. Camelia Talianu, Mrs. Doina Nicolae, Mr. Livio Belegante, Mr. Emil Carstea.

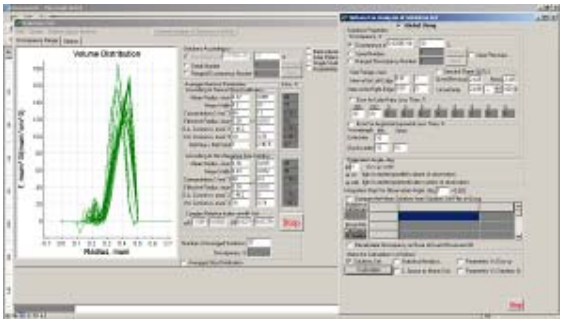
The main focus of the training was the retrieval algorithm of the aerosol microphysical properties from lidar measurements, algorithm developed by Dr. Detlef Muller and his colleagues from Leibniz Institute for Tropospheric Research.

The lectures provided by Dr. Detlef Müller, involved:

- Technical aspects of ground-based Raman Lidar;
- Data analysis and modeling tools - hands-on training using INOE's equipments;
- Retrieval algorithm of the aerosol microphysical properties from lidar measurements;
- Close interaction with each participant to ensure that the newly gained knowledge can be integrated in scientific work.

During the first two days of the course INOE’s employees attended the theoretical lectures about aerosols and their optical proprieties. Case studies, examples and results from INOE’s data base were discussed. Special attention was given to the results of SAMUM (EARLINET campaign for aerosol characterization) and other networks (eg AERONET). Comparisons between aerosols microphysical data obtained by different networks were debated.

The main issues discussed concerned the choices, assumptions and constrains to be set in the retrieval of aerosols microphysical properties.



Aerosol Parameters Retrieval, Software snapshot - Training, National Institute of R&D for Optoelectronics, Romania

The third training organized at Romanian lidar facility was held by Dr. Philippe Goloub and Eng. Thierry Podvin from University of Lille, France on September 26-30, 2011. At this training participated Mrs. Anca Nemuc, Mrs. Camelia Talianu, Mrs. Doina Nicolae, Mr. Livio Belegante, Mr. Emil Carstea, Mr. Razvan Radulescu, Mrs. Luminita Marmureanu, Mrs. Florica Toanca and Mrs Jeni Vasilescu.

Professor **Philippe Goloub** is the coordinator of PHOTONS (http://www-loa.univ-lille1.fr/photons/), the European part of AERONET (Aerosol Robotic Network). He presented his work and his team, an advanced and experienced group. Detailed presentation of calibration procedure of sunphotometers, development of new instruments and algorithm for retrieval of aerosol's properties are issues covered by Dr. Goloub during the morning sessions. He focused one of the discussion on the new sun tracking photometer named PLASMA (« Photomètre Léger Aéroporté pour la Surveillance des Masses d'Air ») developed by LOA (Laboratoire d'Optique Atmosphérique); CNRS-University of Lille; France). This instrument has been designed to fly onboard an aircraft to measure spectral optical thickness as a function of the altitude, which provides the vertical profile of the aerosol extinction coefficient as well as information of the aerosol size distribution. Data handling and data processing have been discussed and analysed.

The second part of this training took place on the terrace of the last floor and Mr. Podvin was the leader during this technical and practical session. The equipments have been set up for these specific sessions. During the hand-on training the calibration procedure, installation of the sunphotometer, possible errors and technical difficulties had been discussed and performed by the participants.

Task 2.3 Validation of instruments and instruction of the technical staff with the support of envisaged networks

The goal of this task was to quality assure the main instruments (lidar and sunphotometer) working as part of global and European networks, and instruct the technical staff on proper measurement procedures.

ROmanian LIdar CEntre together with European research partners had participated to lidar systems intercomparison campaign – EARLI09 (EArlinet Reference LIdars campaign 2009) -organized by Leibniz Institute for Tropospheric Research (IFT), from May 4th to May 29th, 2009, Leipzig, Germany.

During the EARLI09 campaign, there have been two stages:

- The setup and optimization of the instruments - for daytime and night-time measurements in near range (Planetary Boundary Layer) and far range (Troposphere and free troposphere) respectively.
- Direct comparison-the measurements with all lidar systems for three hours per sessions whenever the weather permitted, with a 1-minute time resolution. Mandatory procedure for evaluation of the behaviour of the instruments: the raw lidar data and configuration files obtained by each group converted to Net CDF were uploaded on a dedicated server. The Net CDF files were pre-processed with the SCC and the output file were compared and discussed after each session.

Intercomparison Campaign - Validation of instruments, Romanian Lidar Centre Autolaboratory

Leipzig, Germany

Significant results in WP2:

- 6 people trained in counterparts laboratories;
- 9 people trained at ROLICE by counterparts' experts;
- 2 instruments optimized, calibrated and quality assured;
- 3 people participating to technical workshops and field campaign.

1.3.3 WP3 Developing research facilities

The objective of this work package was to improve the existing research infrastructure by purchasing new up-to-date scientific equipments, install and test them and upgrading the most important existing ones.

Task 3.1 Identifying best technical solutions for the improvement of centre's infrastructure to fit applications and networks requirements

The goal of this task was to improve the existing research infrastructure by purchasing new up-to-date scientific equipments, install and test them and upgrading the most important existing ones.

The main objective of the work package 3 is to purchase the newest research equipments to extend the area of applications. Before starting open tenders for acquisition of the instruments we needed to make a report on the available instruments on the market and choose from them the best and suitable products. Therefore we have been searching the market and asking several research groups about their experience and expertise related to the instruments specified in DELICE work plan.

During the kick-off meeting Dr. Ioan Balin, WP 3 leader presented some of the instruments available on the market like being chosen to be bought:

- **Microwave profiler** for temperature and humidity profiles in the troposphere up to 2 km, continuous and unattended monitoring;
- **Wind profiler** for the determination of vertical fluxes which requires the measurement of the vertical wind component with high accuracy and high temporal resolution;
- **Aerosol Mass Spectrometer** for analysis of chemical composition of atmospheric components as a function of particle size.

Microwave profiler

Wind profiler

Aerosol Mass Spectrometer

Task 3.2 Upgrading existing R&D equipments to fulfill networks requirements (EARLINET, AERONET)

The goal of this task was to upgrade existing equipments to fulfil requirements of stability and accuracy.

- **Upgrade elastic backscatter lidar system (LiSA)**

The upgrade of the backscatter lidar system was realized to improve the performance of the system (higher signal to noise ratio and higher sounding distance). This upgrade consist in the replacement of the two receiving modules (PMT – 83 and PMT – 100) with two PRM-03 modules.

- **Upgrade UV backscatter scanning mini lidar (MILI)**

Another important upgrade was the improvement of the UV backscatter scanning mini lidar (MILI) by cleaning the alignment of optical components inside the laser head. This upgrade meant to improve the output energy of the emitting module and to optimize the laser beam profile. The upgrade had improved the quality of the lidar signal and increased the sounding distance of the system.

- **Upgrade Raman Lidar system (RALI)**

Several modifications were also realized to the Raman Lidar system (RALI) in order to improve the signal to noise ratio, to lower the overlap and to increase the quality of the signal. First step was to change the field of view (FOV) of the telescope by means of changing the aperture of the telescope from 5 mm to 7 mm. By increasing the aperture, the dynamic range of the system had also increased, improving the performances in the lower part of the atmosphere (the PBL). Another upgrade of the system was aiming improvement of the emitting optics. This upgrade consisted in changing one of the beam expanders at 1064 and 532 nm. The new and optimized beam expander had an important role in the emission of radiation by optimizing the beam profile on both wavelengths. The third and most important upgrade of the system was the insertion of a special mechanical device for the calibration of depolarization channels (to ensure quantitative retrieval of optical parameters).

Supplementary upgrade of the multiwavelength lidar was done at software level. It included development of several algorithms for automatic data processing and services for software engineering, to integrate these algorithms in professional, optimized software. Automation of data collection and data handling procedures was requested by EARLINET and national stakeholders, in order to optimize the use of data for operational monitoring in special cases (e.g. volcanic eruptions, extreme meteorological phenomena).

- **Upgrade of the tropospheric ozone lidar (OLI)**

Upgrade of the tropospheric ozone lidar (OLI) was also necessary for the improvement of the water supply mechanism (to ensure proper cooling of the laser for long-time operation). This upgrade consisted in the incensement of the water flow by inserting a special pomp in front of the laser water inlet. This leads to a better cooling of the laser in long-time operation. Implementation of two water filters was also necessary in this type of cooling (secondary cooling system with opened loop water supply). A second upgrade of OLI was

aiming a software upgrade (to optimize quantitative retrieval of ozone concentration on real time basis). This new software had an improved algorithm for ozone concentration retrieval (the new algorithm is taking into account also the effect of aerosol extinction of that specific wavelength).

- **Upgrade of the Aeronet Sunphotometer**

The sunphotometer is part of a large international monitoring network that requires good and reliable data - AERONET (Aerosol Robotic Network). To fulfill the requirements of this network, an upgrade was necessary. Part of the electronic box had to be modified to meet the demands. The upgrade required changes in the controlling electronics and modifications to the robotic arm that was controlling the azimuth level.

Task 3.3 Purchasing up to date R&D equipments to extend the area of applications

The goal of this task was to purchase new equipments in order to complement atmospheric parameters derived and provide ground-truth for lidars.

To fulfil the objectives of WP3, improvement of the existing research infrastructure we have purchased new up-to-date scientific equipments. A sodar, an Aerosol Mass Spectrometer and a Microwave Radiometer have been purchased, the tender procedures depending on the value of each instrument.

Significant results in WP3:

- 5 equipments upgraded and ready to use
  - Elastic backscatter lidar system (LiSA)
  - UV backscatter scanning mini lidar (MILI)
  - Raman Lidar system (RALI)
  - Tropospheric ozone lidar (OLI)
  - Aeronet Sunphotometer
- 3 new equipments purchased, installed and tested
  - 1 Aerosol Mass Spectrometer purchased, installed and tested (operational since May 30, 2010)
  - 1 Microwave Radiometer purchased, installed and tested (operational since December 10, 2009)
  - 1 Sodar purchased, installed and tested (operational since June 30, 2010)
- fully equipped and functional laser remote sensing laboratory;

1.3.4 WP4 Recruitment of highly qualified staff (including brain-gain)

The objective of this work package was to strengthen INOE's research capacity to face new challenges by making use of experts (including from Diaspora), young researchers (MSc and PhD St.) and strengthening the non-research activities.

Task 4.1 Setting up a dedicated "market liaison office" within ROLICE

The goal of this task was to create a small embedded entity in charge with client-customer relation, identification of funding opportunities and management support (needs and opportunities of ROLICE).

Scientists, industrialists and society are hardly finding common ways of communication. Furthermore, R&D funding organizations are promoting joint actions among them. In order to facilitate communication and exchanges between them and attract funding, a marketing liaison office (MLO) within Remote Sensing Department of INOE has been created.

Results:

- 16 new proposals submitted to various programmes (new consortia): FP7-INFRASTRUCTURE (1), FP7-PEOPLE-2010 (1), Norway Grants (1), FP7-PEOPLE-2011 (2), Romania-Swiss Research Programme (1), South East Cooperation Programme (2), National Programme for Research, Development and Innovation (8);
- 2 new grants obtained: RADO -"Romanian Atmospheric 3D research Observatory" - contract no. STVES 115266 Norway Grants - started May 1st, 2009; ACTRIS -"Aerosols, Clouds, and Trace gases Research Infrastructure Network" - FP7-INFRASTRUCTURES-2010-1, 262254 – started April 1st 2011;
- 1 proposal accepted, under negotiation (ITARS, FP7-PEOPLE-2011-ITN, 289923);
- 3 proposals rejected (ELITE & SEENA, South East Cooperation Programme; FP7-PEOPLE-2010);
- 10 proposals under evaluation (1 at FP7-PEOPLE; 1 at Romania-Swiss Research Programme, 8 at National Programme for Research, Development and Innovation);
- Representation of Romania to EG-CLIMET COST action by INOE.

Task 4.2 Recruiting research managers

The goal of this task was to populate the market-liaison office (MLO) with marketing specialists able to bridge the gaps with business environment and promote technology transfer, but also to promote ROLICE and advice on funding opportunities in the future.

In order to fulfill this goal **were** hired marketing and publicity specialists:

- 1 research manager, in charge with setting up the market-liaison office (Viorel Vulturescu, PhD. in Management in Science and technology)
- 1 marketing specialist, in charge with promotional and marketing activities inside ROLICE (Florica Toanca, graduate of Faculty of International Economic Relations, "Dimitrie Cantemir" University of Bucharest, and MSc. St. at Marketing and Business Negotiation Dept., "Dimitrie Cantemir" University of Bucharest).

Task 4.3 Recruiting highly qualified research personnel

The goal of this task was to strength the human potential of ROLICE by hiring highly qualified personnel and young researchers.

In order to fulfill this goal were hired both young and experienced researchers:

- 2 international experts: 1 expert in lidar and applications (Dr. Ioan Balin, PhD.) and 1 expert in atmospheric physics (prof. Dr. Sabina Stefan, PhD)
- 2 young researchers: 1 MSc Student (Razvan Radulescu, graduate of Faculty of Physics) and 1 PhD student (Luminita Marmureanu, graduate of Faculty of Biology)
- 1 engineer (Nicolae Nicolae, graduate of Technical University of Bucharest).

Task 4.4 Setting up cooperation with Romanian specialists from diasporas and start of "brain gain" process

The goal of this task was to set up a framework of cooperation with Romanian specialists working in remote sensing field abroad (exchange of experience, transfer of knowledge, lectures at conferences, etc.).

One of the main objectives of the project was to strengthen INOE 2000's research capacity to face new challenges by making use of the expertise already gained by brilliant young Romanian specialists working abroad. We have tried to achieve this by a convergent series of actions as: attracting young brilliant researchers but also cooperate with colleagues from diaspora.

We are collaborating now with a lot of Romanian experts working abroad by exchanging regularly information regarding our plans, future projects, campaigns and articles. Three agreements for collaboration have been signed with Dr. Mihaela-Anca Marian, Raluca Mihaela Andrei and Dr. Ioana Dima-West.

Significant results in WP4:

- 1 market-liaison office created;
- 2 marketing specialists hired;
- 2 experts and 3 young researchers hired;
- 16 new proposals submitted, out of which 3 proposals approved and 10 under evaluation;
- 3 collaborations with Romanian experts from Diaspora formalized;
- Representation of Romania to EG-CLIMET COST action by INOE.

1.3.5 WP5 Strengthening cooperation and improve networking

The objective of this work package was to "expose" INOE 2000's staff to an international environment, in order to facilitate knowledge transfer and contacts at national, European and international level.

Task 5.1 Organizing annual meetings with EU counterparts

The goal of this task was to discuss with representatives of the lidar community (but not exclusively) the achievements during collaboration, new research directions and common FP7 projects.

1st counterparts meeting was organized in Bucharest on March 11, 2009. The main topics of this meeting were "Cooperation with Diaspora and " Previous and future international collaboration".

2nd counterparts meeting took place at the end of September 2009 in Bucharest during 8th EARLINET workshop and Optoelectronic Techniques for Environmental Monitoring Conferences. It was organized by INOE and hosted by the University of Bucharest - Faculty of Biology (Centre for Research, Training and Consultancy in Microbiology, Genetics and Biotechnology). At this meeting assisted scientists from all over Europe, most of them principal investigators and representatives of all European Aerosol Lidar Network stations and people in charge with different activities in the framework of the common European projects. Important discussions were about EARLINET instruments validation campaign, which took place in Leipzig-Germany, 2009. The official internal checkups performed for all Lidar stations, data regarding the functioning state of the systems, telecover test and backscattering/ extinction data submitted to the EARLINET common database were presented.

3rd counterparts meeting took place on September 30th 2011 in Magurele**.** During this meeting were discussed „Projects generated by DELICE and Sustainability actions after DELICE". It was a good time to share information, generate ideas, explore best practices and lessons learned, and network with colleagues. The meeting proved to be an important platform for dialogue and exchange of views. It also provided a confidence building atmosphere between the participants and was very useful in expanding dialogue beyond the frontiers of Romania.

Task 5.2 Organizing an international conference on "Environmental Remote Sensing" in Romania

The goal of this task was to organize a prominent scientific event in Romania, with large national and international participation.

DELICE's final conference, entitled "Environmental Remote Sensing", was organized in Magurele, together with the workshop OTEM 2011 and the opening of the Romanian Atmospheric Observatory. The synergy of funds permitted us to give an important dimension to this event: 27 key speakers out of 69 participants, with more than 42 papers presented and included in the Conference proceedings.

The impact of the event was extraordinary, considering all collaboration opportunities which have been open to us since then (new proposals, direct contracts, transfer of expertise to research groups from South East Europe via trans-national access to infrastructure, etc.). Moreover, this event contributed to the improvement of our collaboration with various national authorities (Ministry of Environment, National Authority for Scientific Research, ROMATSA, National Administration for Meteorology, etc.), which attended to the conference and learned about the capacity we have not only to perform high quality research, but

also to contribute to their immediate needs (e.g. volcanic ash alerts, climate change particularities for Romania).

Task 5.3 Participation of Romanian specialists to important international conferences

The goal of this task was to increase the involvement of ROLICE's researchers in scientific community.

Participation to international conferences, scientific communications and publishing scientific papers was an important activity during DELICE. Following the recommendations of the Advisory Board and taking advantage of the improved capacities, collaboration with Romanian experts from Diaspora and with counterparts, the number of communications and of the papers increased from Reporting 1 to Reporting 2.

Significant results in WP5:

- 3 counterparts meeting organized (total of 87 participants, out of which 19 from abroad);
- 1 international conference organized (total of 69 participants, out of which 16 from abroad);
- 40 communications to international conferences;
- 28 papers published in peer review journals (out of which 25 papers in ISI journals);
- Nomination of Doina Nicolae, coordinator of DELICE, as Romanian representative at EG-CLIMET COST action;
- Election of Doina Nicolae, coordinator of DELICE, as ICLAS (International Coordination-group on Laser Atmospheric Studies, http://iclas.hamptonu.edu/index.html) member, starting July 2010.

1.3.6 WP6 Promotion and dissemination for "Life after the project"

The objective of this work package to promote laser remote sensing and networking in Romania.

Task 6.1 Setting up a web site dedicated to project's achievements and promotion of environmental research, including a web portal to promote collaborative work in laser remote sensing

The goal of this task was to set up a web-based tool for dissemination of project results, promotion of ROLICE and communication within and outside the consortium.

For a good external visibility and better transfer of data between partners was implemented a multipurpose website. The structure of the site was designed to facilitate the promotion and dissemination of the project and to help the transfer of information between different entities in the project (e.g. partners, stakeholders, advisory board).

DELICE website design has two main sections:

- Public section - a short description of the project is presented, aiming to promote results and show the capabilities and infrastructure of the DELICE group. This section is designed to increase the opportunities for further collaborations and projects.
- Internal - this section was created with the aim of improving collaboration and data transfer between different groups in the project, to show the structure and timeline of the DELICE project and to promote scientific results between the partners.

Task 6.2 Edit and distribute printed and electronic advertising materials: brochures, leaflets, e-bulletins

The goal of this task was to promote by classical (printed materials) and modern (electronic tools) means the activity of ROLICE and DELICE project.

Throughout the project have been created the following advertising materials:

- 2 Brochures

First brochure describes "Romanian Lidar Centre" and is splitted into twelve pages using pictures to enforce the message. The main information presented inside the brochure is: new equipments purchased by the laser remote sensing department, new projects and all kind of information that could concern the public or the scientific comunity.

Second brochure presents the Laser Remote Sensing Department starting with staff description, activities and objectives and going to equipments, laboratories and projects. The brochure has eight pages and information and pictures on each page is divided in 2 columns

- 5 Leaflets

  There were created leaflets for the next equipments: Aerosol Mass Spectrometer, Eye Safe Mini Lidar, Radiometer, Raman Lidar System and Sodar System. All the leflets have a common point: "the information" presented for each of them. The information is a short presentation of the equipment, applications and technical specifications.

- 2 ebulletins

  First ebulletin was created as an interface between the Romanian Lidar Centre and the public. The first number of the ***e***bulletin was created in order to present all new information regarding the Romanian Lidar Centre. This number was divided into ***New Projects, Volcanic Ash and Forthcoming Events.*** The design was created with *Corel Draw* software, the information being arranged and written so that could be read and understand by every type of reader. The ***e***bulletin was sent to the list of recipients that was created in the frame of DELICE project.

  There was also created a *second* ***e****bulletin* issued on October 2011. This edition was splitted into: ***Opening of the Romanian Atmospheric Research 3D Observatory, Scientific Events, Advertising Events and Forthcoming Events.***

Task 6.3 Participation to annual editions of ROMENVIROTEC

The goal of this task was to promote by direct interaction with stakeholders, the potential of laser remote sensing techniques.

ROMENVIROTEC is the perfect meeting place for environment protection agencies and institutions from Romania, willing to implement the requirements of the European Union related to this field. This exhibition was a good place to initiate and develop relationships between public authorities, environment agencies, companies, research institutes, experts (engineers and consultants). The unfolding of ROMCONTROLA, dedicated to measuring and control equipment and technologies and that of ExpoRenewEnergy dedicated to renewable energy sources was a good opportunity to bring together people interested on environment and renewable energy. Laser Remote Sensing participated to this event both in 2010 and 2011 so the task has been achieved. In a 15 m^2 exhibition booth, INOE 2000 proactively promoted its international projects. During each participation of ROMENVIROTEC more than **1000** people visited INOE ' s booth. Beside posters, flyers, brochures there were also presented some of our equipments. There were displayed some Power Point presentations with our department, equipments, projects and the workshop organized by us since 2006 - ***" Optoelectronic Techniques for Environmental Monitoring" - OTEM.*** Throughout these events, the representatives of INOE 2000 tried to establish contacts that could be used for the development of laser remote sensing in Romania.

Significant results in WP6:

- 1 web site and 1 web portal;
- 2 brochures;
- 5 leaflets;
- 2 e-bulletins;
- 2 stands at ROMENVIROTEC (INVENTIKA) 2010-2011;
- posters, flyers and PowerPoint presentations on environmental issues and optical monitoring techniques;
- radio, TV and press interviews.

PROJECT'S MAIN RESULTS

- All the instruments are operational (new equipments purchased, existing equipments upgraded);
- Market-liaison office is functional, with 2 specialists employed;
- 3 new researchers are working now at INOE; their research is focused on instruments optimization, satellite imagery, database and programming;
- Both parts of the training (at counterparts laboratories and at ROLICE) for team members are done, including by participation to validation campaigns (9 people trained);
- ROLICE proved its potential (infrastructure and human resources) to external partners, and as consequence it was accepted to provide transnational access to the infrastructure inside ACTRIS project, is leading the planning and recruitment board of the Marie Curie ITN project ITARS and is representing Romania to EG-CLIMET COST action;
- The election of DELICE's coordinator as ICLAS (International Coordination-group on Laser Atmospheric Studies, http://iclas.hamptonu.edu/index.html) member, starting July 2010;
- New consortia formed, new proposals submitted to various funding agencies, new collaboration with private sector and national public agencies (Ministry of Environment, National Authority for Scientific Research, ROMATSA, National Administration for Meteorology) started;
- Collaboration with 6 Romanian experts from Diaspora started, in different ways, and the number of communications to international conferences, and papers published in peer-review journals has increased significantly;
- The web site and web portal are launched and updated regularly, while promotional materials were designed, executed and distributed
- Several promotional actions were organized, both scientific (OTEM 2009, 2010 and 2011 workshop, final conference, communications at international conferences and papers published), and for the public (official opening of a new centre (synergy of funds), stand at ROMENVIROTEC 2010, 2011, brochures, leaflets and presentations, mass-media interviews).

1.4 Potential impact and the main dissemination activities

1.4.1 Potential Impact

DELICE was indeed a boost for atmospheric remote sensing in this part of Europe from many points of view. First, it proved is possible to get support and become a high-tech facility if the motivation is strong enough. Second, it demonstrated to "old players" in atmospheric research they can count on state-of-the-art laboratories and well-trained staff in Eastern-Europe too, and by consequence our centre was invited to participate in several large-consortiums and networks.

DELICE also provided funds for meetings face-to-face with potential partners, including organizing several scientific events at our place. This was a good opportunity to show scientists from Europe what we have and what we can do, therefore a good reason to set up new collaborations. DELICE open a door for Romanian researchers from Diaspora to reconnect to their country and transfer part of their expertise, erasing by this a moral debt towards the society which contributed to their formation as professionals. It imposed a centre from a very new EU country as one of the most advanced in the entire continent. Although our facility is too new to have a history of "success stories" behind, we are optimistic in considering users from Romania and abroad will express their interest to perform research here.

DELICE is not only about us. DELICE has deep implications in 4 other research centers in Romania, since we already started the transfer of expertise towards the newly set up Romanian Lidar Network. This involves a long-term commitment to provide data at national scale and to contribute to main European databases (http://inoe.inoe.ro/RADO). Moreover, DELICE created the frame to extend the activity in other East-European countries such as Croatia, Serbia and Slovenia. New projects were developed together with partners from within and outside Romania, to support them building laboratories and/or train the personnel in view of participating directly to GEOSS.

We acknowledge the impact of this 948460 EUR grant, but also of the involvement of people from EARLINET, AERONET and other expert groups in Europe who helped us, motivated us and urged us to become better, more present on scientific level, and more responsible.

1.4.2 Dissemination activities

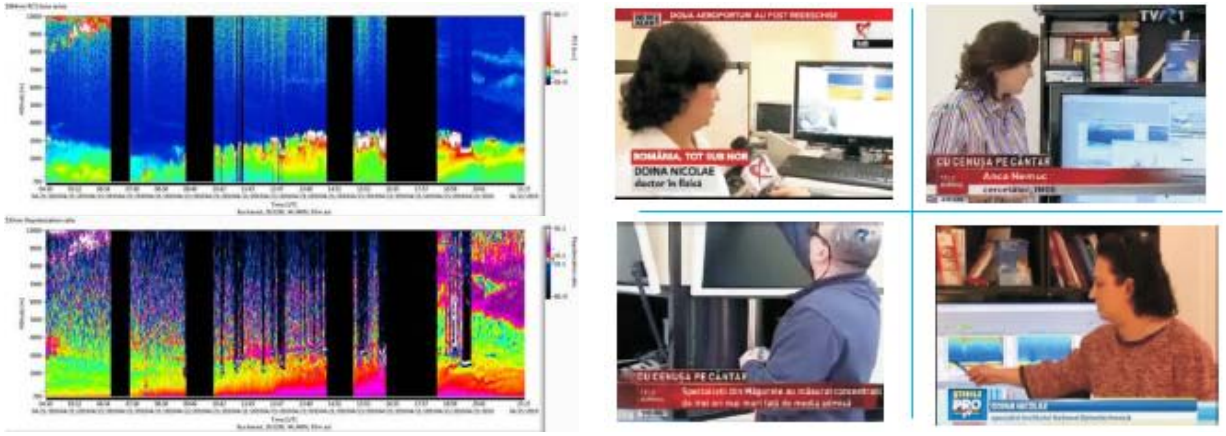
The web site and web portal are launched and updated regularly, while promotional materials were designed, executed and distributed. Several promotional actions were organized, both scientific (OTEM 2009, 2010 and 2011 workshop, final conference, communications at international conferences and papers published), and for the public (official opening of a new centre (synergy of funds), stand at ROMENVIROTEC 2010, 2011, brochures, leaflets and presentations, mass-media interviews).

Award at the 18th ROMENVIROTEC Science Fair

Science event organized for children at ROLICE

DELICE's final conference "Environmental Remote Sensing", ROLICE, September 2011

Volcanic ash over Europe was for ROLICE an opportunity to increase its visibility especially at national level. With our 3 aerosol lidar systems and ground-based instruments, we provided daily reports to EARLINET and various national authorities (civil aviation, weather service, environmental agencies) to advise them about plume trajectory, height and density. Team members participated in numerous mass-media interviews and debates regarding the impact of volcanic ash and Saharan dust on human's life, short and long term effects and risks.



Mass Media Interviews regarding the volcanic ash

DELICE had and will have a considerable impact not only on our centre, not only in Romania, but also in the entire region.

Promotional actions		***Impact***
Scientific level	***Public level***	
• organization of OTEM 2009, 2010, 2011; workshops (no costs charged to the project); • hosting the 8th EARLINET-ASOS meeting (no cost charged to the project); • organization of 3 counterparts meetings, and 3 consultative meetings with AB and SG; • participating with 40 communications at 12 international conferences/workshops; • publishing 25 papers in 8 ISI journals; • organization of the DELICE's final conference.	• design and administration of project web site and web portal; • design of promotional materials: brochure, leaflets, e-bulletin, presentations; • participation to ROMENVIROTEC 2010 and 2011 exhibitions; • mass-media interviews related to volcanic ash and Saharan dust in Romania; • set-up of a small Science Centre and organization of several events for children and public at large (no costs charged to the project);	• 16 new proposals submitted to various programmes (new consortia): FP7-INFRASTRUCTURE (1), FP7-PEOPLE-2010 (1), Norway Grants (1), FP7-PEOPLE-2011 (2), Romania-Swiss Research Programme (1), South East Cooperation Programme (2), National Programme for Research, Development and Innovation (8); • 2 new grants obtained: RADO - "Romanian Atmospheric 3D research Observatory" - contract no. STVES 115266 Norway Grants - started May 1st, 2009; ACTRIS -"Aerosols, Clouds, and Trace gases Research Infrastructure Network" - FP7-INFRASTRUCTURES-2010-1, 262254 – started April 1st 2011; • 1 proposal accepted, under negotiation (ITARS, FP7-PEOPLE-2011-ITN, 289923); • 10 proposals under evaluation (1 at FP7-PEOPLE; 1 at Romania-Swiss Research Programme, 8 at National Programme for Research, Development and Innovation); • Representation of Romania to EG-CLIMET COST action by INOE. • election of DELICE's coordinator as ICLAS (International Coordination-group on Laser Atmospheric Studies, http://iclas.hamptonu.edu/index.html) member, starting July 2010.

1.5 **Project website and relevant contact details**

http://inoe.inoe.ro/DELICE; http://environment.inoe.ro