

# ERCA 2013

European Research Course on Atmospheres

7 January to 8 February, 2013  
21<sup>st</sup> session  
Grenoble, France



**Final Report**

<http://erca-school.eu>



# ERCA 2013

## *European Research Course on Atmospheres*

### Scientific report of the 21<sup>st</sup> session ERCA 2013

- |                       |                       |
|-----------------------|-----------------------|
| 1. Organisation       | 6. Detailed programme |
| 2. Financial supports | 7. ERCA community     |
| 3. Course of events   | 8. Evaluation         |
| 4. Lecturers          | 9. Impacts & fallouts |
| 5. Participants       |                       |

#### 1. Organisation of the 21<sup>st</sup> session

This 21<sup>st</sup> session of the European Research Course on Atmospheres (ERCA) has been directed by Pr. **Paolo LAJ** of the Joseph-Fourier University in Grenoble. It followed the first 20 sessions directed by Pr. Claude BOUTRON of the Joseph-Fourier University.

The Director was assisted by a European schools office, a management committee and a scientific committee. The European schools office is mainly located at the 'Maison des magistères', a belonging of the Joseph-Fourier University located on the 'Scientific Polygon', in West Grenoble. Composition of the European schools office:

Anna BARANOVA-FRÜH (ERCA School, UJF)  
Youlia MAZET (financial and administrative management of the European schools, UJF)  
Clotilde EFFANTIN-BONHOURE (ESONN School, UJF)  
Isabelle GAUVIN (HERCULES school, UJF)  
Hania ESSEBBAR (financial assistant of the European schools, UJF)

The Management Committee is composed of:

Dr. Gilles DELAYGUE (deputy director, UJF)  
Dr. Pierre BRASSEUR (LGGE, CNRS Grenoble)  
Dr. Aurélien DOMMERGUE (LGGE, Joseph-Fourier University, Grenoble)  
Dr. Jean-Luc JAFFREZO (LGGE, CNRS Grenoble)  
Dr. Jean LILENSTEN (IPAG, CNRS Grenoble)  
Dr. Ghislain PICARD (LGGE, Joseph-Fourier University, Grenoble)  
Dr. Alain SARKISSIAN (LATMOS, CNRS Verrières)  
Dr. Didier VOISIN (LGGE, Joseph-Fourier University, Grenoble)

The Scientific Committee is composed of:

Pr. Carlo BARBANTE, University Ca'Foscari in Venezia, Italy  
Dr. Carl BRENNINKMEIJER, Max-Planck Institute of Chemistry, Mainz, Germany  
Pr. Peter BRIMBLECOMBE, University East Anglia, Norwich, UK  
Joëlle COLOSIO, Agence de l'environnement et de la maîtrise de l'énergie, Paris  
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Pr. Jonathan LUNINE, University of Arizona, USA  
Dr. Bruno MALAIZÉ, University of Bordeaux, France  
Pr. Jochem MAROTZKE, Max-Planck Institute of Meteorology, Hamburg, Germany  
Pr. Kevin NOONE, University of Stockholm, Sweden  
Pr. John PLANE, University of Leeds, UK  
Pr. Markus QUANTE, GKSS, Geesthacht, Germany  
Pr. Yinon RUDICH, Weizmann Institute, Israel  
Pr. Eric WOLFF, British Antarctic Survey, Cambridge, UK

# ERCA 2013

## *European Research Course on Atmospheres*

### 2. Financial supports

The Joseph-Fourier University and the local CNRS representative ('Delegation Alpes') are our main supports, without which ERCA could not exist. In addition to them, several other institutions trust ERCA and are important funders. These funds are either directly given to ERCA, or specifically attributed to students (to cover registration and travel/housing costs).

#### **Supports from international agencies**

- UK Natural Environment Research Council (NERC): UK's main agency for funding and managing research, training and knowledge exchange in the environmental sciences; fundings are managed by the National Centre for Atmospheric Science (NCAS).
- The Abdus Salam International Centre for Theoretical Physics (ICTP): Founded in 1964 by the late Nobel Laureate Abdus Salam, ICTP has been a driving force behind global efforts to advance scientific expertise in the developing world, under the auspices of the Italian government, UNESCO and IAEA.
- The International Geosphere-Biosphere Programme (IGBP): The goal of this internationally funded agency is to coordinate international research on global-scale and regional-scale interactions between Earth's biological, chemical and physical processes and their interactions with human systems.
- Max-Planck Institute for Chemistry (MPIC): The leading German agency for funding and managing research, training and knowledge exchange in chemistry.
- Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research (GKSS): As a member of the Helmholtz Association of German Research Centres, the largest scientific organization in Germany, the Helmholtz-Zentrum Geesthacht is engaged in long-term activities in the fields of materials and coastal research that are making a major contribution to resolving the large and pressing issues facing society and the scientific and business worlds.
- The European Geophysical Union (EGU) is Europe's premier geosciences union, dedicated to the pursuit of excellence in the geosciences and the planetary and space sciences for the benefit of humanity.

#### **Supports from national agencies**

- The French Ministère for Higher Education and Research supports participants from Eastern Europe, Asia, and Southern America with the ACCES and the 'Investissement d'Avenir' programs.
- The Institut de Recherche pour le Développement (IRD) has focused its research for over 65 years on the relationship between man and its environment, in Africa, Mediterranean, Latin America, Asia and the French tropical overseas territories. Its research, training and innovation activities are intended to contribute to the social, economic and cultural development of southern countries.
- The Centre National d'Etudes Spatiales (CNES, National Agency for Space Studies) is the government agency responsible for shaping and implementing France's space policy in Europe.
- The Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME, French Environment and Energy Management Agency) is a public agency which aims are to encourage, supervise, coordinate, facilitate and undertake operations with the aim of protecting the environment and managing energy.
- The Observatoire de Haute Provence (OHP) is an observatory site for astronomy, environment, and the study of atmosphere. As a national facility for astronomy it welcomes visiting astronomers.

#### **Supports from local agencies**

- The Observatoire des Sciences de l'Univers de Grenoble (OSUG) is a geosciences observatory within the University of Grenoble, grouping sixth laboratories. It supports ERCA with the LabEx OSUG@2020 programme.
- The Collège Doctoral (Doctoral school) of the University of Grenoble manages about 3500 PhD students (of them, 45% foreigners) and is especially responsible of their training.
- POLYTECH Grenoble is the University Joseph-Fourier of Grenoble engineering school. It provides ERCA a great support by hosting the school.
- Région Rhône-Alpes is France second region (6M inhabitants and 10% of national GDP) and one of the leading European ones, with a very active economy. It largely invests in the university and research area, with over 240,000 students.
- Grenoble Alpes Métropole operates the urban area around Grenoble. It supports its economy, scientific activities, and the universities.
- Ville de Grenoble invests in innovation especially through the 'pôles de compétitivité'.

# ERCA 2013

## *European Research Course on Atmospheres*

These supports have been acknowledged regularly, to the participants as well as in our communication means (web site <http://erca-school.eu>, posters, programme).

### **3. Course of events**

This 21<sup>st</sup> session took place from January 7th to February 8th, 2013. The first 4 weeks (7 January to 1st February) took place in Grenoble, at Polytech'Grenoble, a school of the Joseph-Fourier University. The last week (3 to 8 February) took place at the Observatoire de Haute-Provence, close to Forcalquier, in South France.

The training programme of the first 4 weeks in Grenoble comprised a very consistent package of lectures (about 100 hours), debates, and poster sessions during which participants presented their research work.

The training comprised six main thematic:

*Atmospheric chemistry & atmospheric composition changes*

*Earth climate system & the science of climate change*

*Earth Science system - Impact & society*

*Experimental techniques & research methodologies for the atmospheric sciences*

*Hydrology & precipitation: Water cycle in climate change*

*Planetary atmosphere, solar activity & space weather*

The participants have been confronted to very diverse thematic and lecturers, providing them both a global picture of the climatic system, as well as advanced views through specific seminars and practicals. Currently, no other school than ERCA provides a similar training, which explains the success of ERCA, especially with first year PhD students, as well as with young researchers willing to get to the field of environment. About 70 lectures have been provided by 38 lecturers. The presentations were available to participants on the ERCA web site. Lectures covered not only scientific problems, but also communication tools for young researchers: how to write a scientific paper and proposals.

The programme included as well visits to research facilities related to the school thematic: The European synchrotron in Grenoble (ESRF), the Laboratoire de Glaciologie et de Géophysique de l'Environnement (LGGE, UJF/CNRS), and the Planeterrella experiment at the Institut de Planétologie et d'Astrophysique de Grenoble (IPAG, UJF/CNRS).

Seven sessions were dedicated to the oral presentation by participants of their personal background and research work. These short presentations have been completed by informal discussions between participants with their posters, which were on display during a whole week.

Two scientific debates, open to public, have been organized at Café des Arts, downtown Grenoble: one dealing with research funding, the other one with ethics in science.

The last week dealt with the study of instruments installed on the site of the Observatoire de Haute-Provence (OHP), directed by Mr Auguste LE VAN SUU. This observatory is a service unit attached to the Observatoire des sciences de l'univers Pythéas (INSU/Aix-Marseille University/IRD/Collège de France), directed by Pr Bruno HAMELIN. OHP is a premium site for observing:

- atmosphere, with lidars and spectrometers run by the Laboratoire Atmosphères, Milieux et Observations Spatiales (LATMOS) of the University of Versailles-Saint-Quentin-en-Yveline (UVSQ);
- space, with the historical telescopes of the Observatory (0.8 to 2m), especially the one with which the first exoplanet was discovered in 1995;
- the Mediterranean forest, with the help of an instrumented platform run by the Pythéas OSU and by the research federation ECCOREV (directed by Joël GUIOT).

The principle of the various instruments, operating procedures and applications, have been first presented to the participants by specialists, especially by a group of scientists from LATMOS. Then, the participants have been divided into several groups in order to study the running instruments and to work on measurements.

During this last week, participants have also visited the Centre d'études nucléaires de Cadarache (CEA). They were given a lecture on the energy resources and current advances with fusion and fission. They also visited the construction site of the International Thermonuclear Experimental Reactor (ITER).

### **4. Lecturers**

There were 38 lecturers, from 10 countries: France (13), Germany (10), England (3), Italy (3), Israel (2), USA (2), Japan (1), Russia (1), Sweden (1), Switzerland (1), The Netherlands (1). Among them were 16 women. We have to come closer to gender parity in the future for lecturers.

The complete list of lecturers can be found in Annex 1.

Four lecturers from China and Brazil have cancelled their participation at the last minute.

EUROPEAN RESEARCH COURSE ON ATMOSPHERES - ERCA

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# ERCA 2013

## *European Research Course on Atmospheres*

Lecturers have been proposed by the scientific and management committees. They were selected for their renowned scientific expertise, as well as for their educational abilities.

### **5. Participants**

Fifty-five (55) participants have been selected from the 235 applications posted on the ERCA web site. Such elevated number of applications proves the great interest and the reputation of ERCA at an international level. Many researchers who participated to ERCA in the past now send their students train with ERCA. Among these 55 selected participants, 3 could eventually not come, either because they could not pay for the travel (Cuban and Argentinian participants) or because they could not get a visa in time (Nigerian participant). Because of their last minute cancellation, these 3 participants could not be replaced by candidates from the waiting list. ERCA 2013 had thus 52 participants, with an exact gender parity (26 females and 26 males), with 25 different nationalities:

Algeria (1), Belgium (1), Brazil (3), Chile (1), China (6), Cyprus (1), Ecuador (2), England (6), France (5), Germany (4), Greece (1), Hungary (1), India (2), Italy (1), Lithuania (1), Norway (1), Poland (2), Portugal (1), Romania (2), Russia (5), Slovenia (1), Sweden (1), Switzerland (1), Turkey (1), Ukraine (1);

and who work in 22 countries:

Belgium (1), Brazil (3), Chile (1), China (4), England (7), Finland (3), France (7), Germany (6), Hungary (1), India (2), Ireland (1), Japan (1), Norway (1), Poland (1), Portugal (1), Romania (1), Russia (5), Slovenia (1), Sweden (2), Switzerland (1), The Netherlands (1), Ukraine (1).

The list of participants can be found in Annex 2, which includes their position and research thematic.

The age of the participants ranges from 23 to 42 years, with a mean of 28 years.

More than 3/4 of the participants are PhD students; 2 are Master students; the others are researchers.

The selection of participants was multi-criteria: the research thematic, the laboratory, the country and the possibility to get a visa; the advisor support.

Grants have been allowed to 21 participants, to cover the whole registration cost. The origins of these grants are the following:

International Geosphere-Biosphere Programme – IGBP Brazil (3 grants)

Centre National d'Etudes Spatiales – CNES (1 grant)

LabEx OSUG@2020 (2 grants)

Abdus Salam International Center for Theoretical Physics – ICTP (2 grants)

ACCES Programme from the Ministère de l'enseignement supérieur et de la recherche (6 grants)

UK Natural Environment Research Council – NERC (5 grants)

Institut de Recherche pour le Développement- IRD (2 grants)

European projet ACTRIS (1 grant)

### **6. Detailed Programme**

The daily programme is given in Annex 3.

### **7. ERCA Community**

One of the ERCA strengths is to facilitate exchanges between lecturers and participants, and between participants themselves, in order to create a multidisciplinary scientific community dealing with the ERCA thematics. Selection of candidates has been made to have a very representative panel of participants from both well-established research institutions and fast-developing research institutions from emerging countries. A total of 26 participants (50% of participants) originate from countries with emerging economies as defined by the UN, representing all different continents. In addition, invitation to lecturers from developing economies completes the clear ERCA strategy to offer students a course that responds to actual needs in countries outside the OECD. . With lecturers from different background and a strong emphasis on issues related to impact of climate change, participants received information that is directly related to issues that are essential to these countries. It is important to notice that many students from emerging economies are involved into ERCA through their advisors, often themselves former ERCA participants. ERCA intends to continue being at the forefront of post-graduate education provided at international level and opened to all different countries. The organisation of ERCA was pro-active to create the conditions for exchange amongst participants: ensuring participants of balanced origin and gender and providing special opportunities to meet throughout the session: in addition to the regular coffee breaks, there were Mondays dinners following scientific debates. These dinners were also opportunities to exchange with lecturers. Day trips were also organized: a snowshoe trip took place on Sunday 13 January –although based on volunteering all participants were there–, and a touristic day trip to discover Provence by bus was offered.

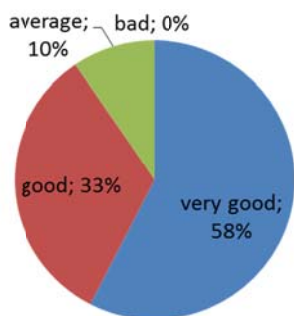
# ERCA 2013

## European Research Course on Atmospheres

### 8. Evaluation

Evaluating the lectures and the whole session is our major concern. Since this year, such an evaluation is done by the participants through the ERCA web site, which allows us to get digital results and to compute them quickly. Satisfaction of participants is one of the parameters accounted for when selecting lecturers and when modifying ERCA. A survey is proposed both on lectures and on the general organization of ERCA.

Concerning the quality of the lectures, participants have been asked to note each of them using one of the following grades: « *Very good* », « *good* », « *average* » or « *bad* ». The results for this session show a very high level of satisfaction (cf. Figure).



Satisfaction survey for all lectures of ERCA 2013

The majority of lectures has been graded « *very good* », and none of them has been graded « *bad* ». Only 10% of the lectures have been graded « *average* ». Note that even lectures considered as difficult (eg, radiative transfer in the atmosphere) have been quite well graded.

ERCA benefits from a long term process of selecting lecturers, which allows us to provide top quality lectures. A special feature of ERCA is also to keep, year after year, a core of highly motivated and active lecturers. A satisfaction survey covering the global organization and the living conditions is still open on the web site. One third of the participants have answered so far. The satisfaction level is consistently very high. In addition to evaluating ERCA, participants also gave comments and propositions for improvement, which will be of course accounted for when organizing the next session.

### 9. Impacts and fallouts

The overall objectives for the 2013 sessions of ERCA have been reached: offer high-quality training, both theoretical and practical, access to state-of-the-art equipment, favour multidisciplinary, and, finally, create and stimulate scientific exchange between European lecturers and students of different geographic and scientific origin. This can be measured by the satisfaction survey organized anonymously for participants, expressing a high degree of appreciation towards scientific level of lectures, and the overall organization.

ERCA is a recurrent yearly event. We are therefore presently preparing next year's session that will be held in January/February 2014. Several modifications will be implemented in the 2014 program based on the evaluation of the 2013 session. The main part of the program will be defined by the end of May 2013 and announced via electronic mailing lists in June 2013. The internet site of the school (<http://www.erca-school.eu>) is updated and will continue to be updated.

ERCA is the reference training in the atmospheric science and climate fields for part of the national scientific community. We hope that ERCA contributes to attract young scientists from all over the world and to train a large part of the national and international community in these fields. ERCA2014 is already planned in connection with the release of the new IPCC report.

# ERCA 2013

## *European Research Course on Atmospheres*

### **Annex 1: Detailed list of the lecturers in ERCA 2013**

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# ERCA 2013

## *European Research Course on Atmospheres*

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Ont annulé leur participation en dernière minute :

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LUYO Yong. Center for Earth System Science/Institute for Global Change Studies, Tsinghua University, Room 606, Weiqing Building, Tsinghua University Haidian, 100084, Beijing, China. Email: yongluo@tsinghua.edu.cn

NOBRE Carlos. Center for Earth System Science, National Institute for Space Research, Avenida dos Astronautas 1758, Jardim da Granja, SP 12227-010 São José dos Campos, Brazil. Email: carlos.nobre@inpe.br, leonardo.fontes@mct.gov.br

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## Annex 2: participants to ERCA 2013

Last name	First name	Gender	Nationality	Working place	Position	Research thematics	Institution/University
<b>ADAMS</b>	Thomas	H	UK	England	PhD	The study of anthropogenic and biogenic emissions and their affects on atmospheric composition, air quality and climate change.	University of Leicester, UK
<b>AÏT-MESBAH</b>	Sonia	F	Algérie	France	PhD	The strength of the coupling between the hydrological state of the soil and the atmosphere in new numerical simulations of present ans modified climate.	LMD, Universite Pierre et Marie Curie, Paris 5e
<b>ANDERSSON</b>	Monika	F	Pologne	Finland	PhD	Persistent currents in distorted mesoscopic rings and applications to flux qubits	Finnish Meteorological Institute, Helsinki, Finland
<b>ARELLANO</b>	Santiago	H	Equateur	Sweden	PhD	Ground-based optical remote sensing of volcanic emissions	Chalmers University of Technology, Campus Johanneberg, Sweden
<b>BASANTES</b>	Ruben	H	Equateur	France	PhD	Changes in glacier mass balance in the tropical Andes over the past 50 years. Challenge for the water availability	Joseph-Fourier University, Grenoble, France
<b>BEDAREVA</b>	Tatiana	F	Russie	Russia	PhD	Retrieval of aerosol optical and microphysical characteristics in the total atmospheric column from ground-based spectral measurements of direct and diffuse solar radiation	V.E. Zuev Institute of Atmospheric Optics, Tomsk, Russian Federation
<b>BENSEHIL</b>	Lyzia	F	France	France	PhD	Atmospheric Carbon Dioxide measurement from space. Preparatory of the MicroCarb mission and analysis of GOSAT measurements	LSCE, CEA Saclay / University Versailles Saint Quentin en Yvelines
<b>CAN</b>	Özge	F	Turquie	Germany	PhD	absorbing aerosols: parameterization and effect on atmospheric dynamics and cloud properties	Leibniz-Institut for Tropospheric Research, Leipzig Germany
<b>CESNULYTE</b>	Vaida	F	Lituanie	Finland	PhD	Atmospheric aerosols and UV radiation	Finnish Meteorological Institute, Kuopio, Finland
<b>CONDURACHE-BOTA</b>	Simona	F	Roumanie	Romania	Assistant Professor	Study of the relationship between cloud types and solar activity	Dunarea de Jos University, Galati, Romania

<b>DE MELLO MARQUES</b>	Magdalena	F	Brésil	Brazil	PhD	Analytical Chemistry of ice cores	Universidade Federal Fluminense, Centro de Estudos Gerais, Brasil
<b>DOMINGUES</b>	Ana Filipa	F	Portugal	Portugal	PhD	Development of new algorithms for air quality determination using a UV spectrometer	University of Évora, Evora- Portugal
<b>FARIAS</b>	Cecilia	F	Chili	Chile	PhD	Atmospheric chemistry, Atmospheric Dynamics	Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago of Chile.
<b>FREEMAN</b>	Sarah	F	UK	England	PhD	The effects of aviation on tropospheric chemistry	Manchester Metropolitan University, Centre for Aviation, Transport and the Environment, Manchester
<b>FROIDUROT</b>	Stéphane	F	France	France	PhD	Characterization and assessment of hydroclimatic extremes simulated by regional climate models ? a joint approach to tropical and temperate region	Joseph-Fourier University, Grenoble, France
<b>FURU</b>	Eniko	F	Hongrie	Hungary	PhD	Characterization of atmospheric aerosols using nuclear micro - analytical methods	University of Debrecen, Hungary
<b>GAUTIER</b>	Elsa	F	France	france	PhD	Reconstruction of volcanism history during the last 2000 years using sulfur isotopic composition	Joseph-Fourier University, Grenoble, France
<b>GOUVEIA</b>	Diego Alves	H	Brésil	Brasil	MSc	Characterization of cirrus clouds in central Amazon and its radiative effects	Institute of Physics, University of São Paulo, Brazil
<b>GRYTHER</b>	Henrik	H	Norvège	Norway	PhD	Short lived Climate forcers in the Arctic	Stockholm University, Stockholm Sweden
<b>HARIKISHAN</b>	Gandham	H	Inde	India	Senior Researcher	Study of cloud macro and microphysical parameters and their response to aerosol from insitu and remote sensing techniques	Indian Institute of Tropical Meteorology, Pune, Maharastra, India
<b>HINDLEY</b>	Neil	H	UK	England	PhD	Stratospheric Dynamics	University of Bath, United Kingdom
<b>HORN</b>	Sabrina	F	Germany	Germany	PhD	Investigations about the uptake of important trace gases in mineral dust by means of a Knudsen cell	Leibniz-Institut für Troposphärenforschung, Leipzig
<b>JEZEK</b>	Irena	F	Slovénie	Slovenia	PhD	Contributions of traffic and biomass burning to air pollution based on the Aethalometer black carbon measurements	University of Ljubljana, Slovenia

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<b>KONSTANTINOV</b>	Pavel	H	Russie	Russia	Assistant Professor	Simulation of climate of the Moscow Region in XXI century with simple urban canopy model	Faculty of Geography, Moscow, Russian Federation
<b>KORNEVA</b>	Irina	F	Russie	Russia	PhD	Current change of climate and thermal structure in Moscow	Moscow State University, Moscow, Russia
<b>KOZACHEK</b>	Anna	F	Russie	Russia	Researcher	Paleoreconstruction of climatic conditions in highlands of the Caucasus according to complex research of ice cores	Faculty of Geography, Moscow, Russian Federation
<b>KREMMLING</b>	Beke	F	Germany	Germany	PhD	Investigation of atmospheric radiative transport from O2 A-band measurements of the GOSAT satellite instrument	Max Planck Institute for Chemistry, Mainz
<b>LASLOV</b>	Elemyr	H	Ukraine	Ukraine	PhD	Impacts of some surface parameters on urban heat island development	Department of Meteorology, University of Debrecen, Hungary
<b>LI</b>	Ren	H	Chine	China	Researcher	Soil and surface characteristics on the Tibetan Plateau	Cold and Arid Regions Environmental and Engineering Research Insitute, CAS Lanzhou, Gansu, China
<b>LIU</b>	Wenjie	H	Chine	China	Post-doctorant	Observational study on soil environment in the upstream of Shule River Basin	Cold and Arid Regions Environmental and Engineering Research Insitute, CAS Lanzhou, Gansu, China
<b>LOUF</b>	Valentin	H	France	France	PhD	Study of the liquid water by the use of microwave radiometers	University Lille 1, Villeneuve d'Ascq
<b>LYULYUKIN</b>	Vasily	H	Russie	Russia	PhD	Wave motions in a stably stratified atmospheric boundary layer and their role in processes of mass-momentum-heat exchange	Obukhov Institute of Atmospheric Physics of the Russian Academy of Sciences, Moscow, Russia
<b>MAGNUS</b>	Joelsson	H	Suède	Sweden	PhD	MIF transfer and effects in gas phase reactions	Department of Chemistry, Copenhagen
<b>MEYERHOLT</b>	Johannes	H	Germany	Germany	PhD	Systematic Assessment of Uncertainty in Coupled Carbon-Nitrogen Cycle Models and their Climate Feedbacks	Max Planck Institute for Biogeochemistry, Jena, Germany
<b>MOSS</b>	Andrew	H	UK	UK	PhD	Wave dynamics of the stratosphere and mesosphere	University of Bath, UK
<b>NIKONOVAS</b>	Tadas	H	Grèce	UK	MSc	Black carbon atmospheric emission from boreal forest fires	Department of Geography, Swansea University, UK

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<b>PANCHAL</b>	Rikesh	H	UK	UK	PhD	Measurement of tropospheric OH reactivity	Department of Chemistry, University of Leicester, UK
<b>PRAGA</b>	Alexis	H	France	France	PhD	A large-scale chemistry-transport scheme for massively parallel architectures	CERFACS, University of Toulouse
<b>PRAKASH CHAUBEY</b>	Jai	H	Inde	India	PhD	Aerosol Characterization over Pristine Environments: Polar and Himalayan	Indian Space Research Organization, Trivandrum, Kerela, India
<b>PROKOPIOU</b>	Markella	F	Chypre	The Netherlands	PhD	Examining past variations of greenhouse gases (CH <sub>4</sub> and N <sub>2</sub> O) with isotope measurements on air trapped in polar ice cores	Institute for Marine and Atmospheric research Utrecht (IMAU), Utrecht University, The Netherlands
<b>RAZVAN COSMIN</b>	Radulescu	H	Roumanie	Ireland	PhD	Volcanic Ash Forecasting	National University of Ireland, Galway
<b>REITER</b>	Anja	F	Germany	Germany	PhD	Transport of pollution into the UTLS in Asiatic Monsoon	Ludwig-Maximilians University, Munich
<b>SAPONARO</b>	Giulia	F	Italy	Finland	PhD	Aerosol-cloud interaction from satellite data	Finnish Meteorological Institute, HELSINKI, FINLAND
<b>SCHIBIG</b>	Michael	H	Suisse	Switzerland	PhD	High precision CO <sub>2</sub> and O <sub>2</sub> measurements at Jungfraujoch	University of Bern, Switzerland
<b>SCHWANCK CARLOS</b>	Francielle	F	Brésil	Brazil	PhD	Study of trace elements in Antarctic ice cores using ICP-MS and other techniques	Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
<b>SULEJ</b>	Anna	F	Pologne	Poland	PhD	New analytical methodologies for determining various xenobiotics in runoff water.	Department of Analytical Chemistry, Gdansk University of Technology, Poland
<b>TACK</b>	Frederik	H	Belgique	Belgium	Scientist	UV-Vis (ground-based and spaceborne) absorption spectroscopy	Belgian Institute for Space Aeronomy, Brussels, Belgium
<b>WANG</b>	Puyu	F	Chine	China	Research scientist	Glaciers changes in arid regions	Cold and Arid Regions Environmental and Engineering Research Institute, CAS Lanzhou, Gansu, China
<b>WANG</b>	Wuke	H	Chine	Germany	PhD	Estimating and understanding upper troposphere/lower stratosphere processes and stratosphere-troposphere coupling	Freie Universität Berlin

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<b>WEBB</b>	Alex	H	UK	UK	Researcher	Remote sensing of greenhouse gases by satellites	Earth Observation Science, University of Leicester, UK
<b>ZHANG</b>	Naizhong	H	Chine	Japan	PhD	Variations of atmospheric <sup>13</sup> C <sup>16</sup> O <sup>18</sup> O and its behavior study	Tokyo Institute of Technology, Yokohama, JAPAN
<b>ZHANG</b>	Xiaoyu	F	Chine	China	PhD	The Snow-Infiltration Ice Evolution on Urumqi Glacier No.1	Cold and Arid Regions Environmental and Engineering Research Institute, CAS Lanzhou, Gansu, China

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### Annex 3: Detailed programme of ERCA 2013

#### Week 1 (Grenoble)

	Monday 7/01		Tuesday 8/01	Wednesday 9/01	Thursday 10/01	Friday 11/01
10:30-11:15	Official opening (room 101)	9 - 10:30	Manfred Mudelsee: Climate Time Series Analysis: Recent Climate Changes.	Carl Brenninkmeijer: Using stable isotope analysis in environmental sciences 1. Principles and techniques.	Eric Wolff: Past climate and atmospheric chemistry from ice cores - principles and examples.	Olga Zolina: Northern Hemisphere cyclone activity in present and future climate.
11:15-12	Frank Raes: About molecules and planets with humans in between (room 101)	10:30-11	Coffee break	Coffee break	Coffee break	Coffee break
12:15-14	Buffet at Polytech (room 144)	11 - 12:30	Frank Raes: Atmosphere-Climate feedbacks.	Manfred Mudelsee: Climate Time Series Analysis: Paleoclimate.	Carl Brenninkmeijer: The challenge of monitoring the changing composition of the Earth's atmosphere.	Eric Wolff: Ice-core records of climate and atmospheric chemistry from the last century to the last 800,000 years
		12:30-14	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)
14 - 15:30	Hans-Werner Jacobi: Introduction to the chemistry of the troposphere I (room 146)	14 - 15:30	Hans-Werner Jacobi: Introduction to the chemistry of the stratosphere	Carl Brenninkmeijer: Using stable isotope analysis in environmental sciences 2. Atmospheric applications.	Olga Zolina: European extreme precipitation and its climate variability	ESRF visit
15:30-16	Coffee break (r. 135)	15:30 - 16	Coffee break	Coffee break	Coffee break	
16 - 17:30	Hans-Werner Jacobi: Introduction to the chemistry of the troposphere II (room 146)	16 - 17:30		Student session 1	Student session 2	
		18:30 - 20:	Debate @café des Arts with Claude Boutron			

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### Annex 3: Detailed programme of ERCA 2013

#### Week 2 (Grenoble)

	Monday 14/01	Tuesday 15/01	Wednesday 16/01	Thursday 17/01	Friday 18/01
9:00- 10:30	Emily Schaller: Atmospheres of comets and dwarf planets in the Solar System.	Jaap Kwadijk: The use of climate scenarios in development of water management climate adaptation strategies.	Bruno Malaizé: Highs and falls of civilizations during the recent Holocene.	Martin Werner: Current status and limitations of Earth system models.	Yoav Yair: Lightning on earth and other planets: key discoveries and open questions.
10:30-11:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
11:00- 12:30	Yann Kerr: The several steps towards a scientific spatial mission observing Earth: SMOS.	Yann Kerr: SMOS applications in oceanography, hydrology and extreme events survey.	Christoph Völker: Feedbacks between ocean biogeochemistry and climate.	François Leblanc: The solar activity as a driver of atmospheric escape: what's possible.	Jean Lilensten: The space environments (thermosphere, ionosphere, magnetosphere).
12:30-14:00	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)
14:00- 15:30	Emily Schaller: Seasonal Changes in the Atmosphere of Saturn's moon Titan.	Bruno Malaizé: Major Quaternary climatic events recorded in the ocean.	Martin Werner: Basic concepts and approaches of global climate modelling.	Yoav Yair: The global electrical circuit, thunderstorms and transient luminous events: an introductory survey.	<a href="#">Planeterrella or LGGE visits</a>
15:30- 16:00	Coffee break	Coffee break	Coffee break	Coffee break	
16:00- 17:30	Jaap Kwadijk: Global projections of hydrological effects of climate change.	Christoph Völker: Large-scaled circulation dynamics of the ocean.	Student session 3	Student session 4	
18:30 - 20:	Debate @ Café des Arts with Yann Kerr & Alain Schuhl				

### Annex 3: Detailed programme of ERCA 2013

#### Week 3 (Grenoble)

	Monday 21/01	Tuesday 22/01	Wednesday 23/01	Thursday 24/01	Friday 25/01
9:00- 10:30	Peter Brimblecombe: Air pollutants and their health impact.	Kevin Noone: Planetary boundaries 2: scenarios for sustainability.	Eugene Clothiaux: Atmospheric radiation: basic physics and concepts.	Eugene Clothiaux: Radiation and Remote Sensing: A Few Current Applications.	Ralf Ebinghaus: Emission sources, regional and global distribution of persistent organic pollutants (POPs).
10:30-11:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
11:00- 12:30	Kevin Noone: Planetary boundaries 1: a safe operating space for humanity?	Peter Brimblecombe: Indoor air pollution.	François Forget: Climate evolution of Earth, Venus, Mars: is the Earth unique in the universe?	Ralf Ebinghaus: Emission sources, regional and global distribution of atmospheric mercury.	Markus Quante: The Role of Clouds in Climate and Environment.
12:30-14:00	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)
14:00- 15:30	Peter Brimblecombe: Preparing, writing and publishing a scientific paper.	Student session 6	Eugene Clothiaux: Radiation through clear and cloudy atmospheres.	Markus Quante: Cloud and precipitation physics an introduction.	Planeterrella or LGGE visit
15:30- 16:00	Coffee break	Coffee break	Coffee break	Coffee break	
16:00- 17:30	Student session 5	François Forget: Climate and Meteorology on Mars and Venus.			
18:30 - 20	Debate @ Café des Arts with Peter Brimblecombe & Kevin Noone 'Science & Society: What Does Decision Support for Global Sustainability Look Like?'				



### Annex 3: Detailed programme of ERCA 2013

#### Week 4 (Grenoble)

	Monday 28/01	Tuesday 29/01	Wednesday 30/01	Thursday 31/01	Friday 01/02/13
9:00- 10:30	Andreas Richter: Satellite measurements of troposphere composition - principles, results, and future developments.	Filippo Giorgi: Climate change and the hydrologic cycle.	Volker Bothmer: The dynamic solar corona.	Yinon Rudich: From deserts to reefs: global processes of mineral dust.	Lisa Kaltenegger: Super-Earths and life, what to be careful of and what to explore.
10:30-11:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
11:00- 12:30	Gerhard Krinner : IPCC structures and procedures: How an assessment report is written and what it can be used for.	Andreas Richter: Nitrogen oxides in the troposphere - sources, distributions, impacts, and trends.	Yinon Rudich: Optical properties of aerosols: theory and new measurement methods.	Joanna Haigh: How do variations in the Sun affect climate?	Laura Perez: Why and how to evaluate the public health benefits of reducing greenhouse gas emissions.
12:30-14:00	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)	Lunch (Barnave)
14:00- 15:30	Teruyuki Nakajima: Climate impacts of atmospheric aerosols and clouds.	Teruyuki Nakajima: What we learn from the Fukushima nuclear power plant accident.	Joanna Haigh: Evidence for a solar influence on climate.	Volker Bothmer: Space Weather – The Earth inside the turbulent heliosphere	Karine Sellegrì: Formation of new nanoparticles in the atmosphere and implications
15:30- 16:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
16:00- 17:30	Filippo Giorgi: Regional climate modeling; update and CORDEX developments.		Student session 7	Lisa Kaltenegger: Exploring other worlds, the newest results.	Laura Perez: Case study: transport policies and public health benefits in different geographical contexts.
18:30 - 20	Grazzia Giu Trio @ Café des Arts				

### Annex 3: Detailed programme of ERCA 2013

#### Week 5 (Observatoire de Haute-Provence)

Time	Sunday 3/02	Time	Monday 4/02
8.00	Departure from Grenoble/Marie Curie for OHP	9.00-10.30	
12.00	Arrival at "Maison Jean Perrin"/OHP	11.00 - 18.00	Visit of the Atomic Energy Center (CEA), Cadarache with Tokamak Tore Supra & ITER, presented by Jean-Marc Ané
12.30-14.30	<i>Lunch at Maison Jean Perrin (buffet)</i>	13.00	<i>Sandwiches</i>
14.30-16.00	Settling the participants in their rooms at MJP and Hotel Forcalquier		
16.00-17.00	Julie Patris: Astronomical observations at OHP and elsewhere		
17.00-17.30	Davide Dionisi: Lidar technique for atmosphere observations		
17.30-18.00	Alain Sarkissian: Presentation of the "Observatoire de Haute-Provence"		
18.30-20.00	<i>Dinner at Maison Jean Perrin</i>	18.30-20.00	<i>Dinner at "Maison Jean Perrin"</i>
20.00-00.00	<b>Introduction to observatorial astronomy. The participants will be splitted into 4 groups.</b> Group 1: Astronomy on open sky (Julie Patris) Group 2: 80 cm telescope (Alain Sarkissian) Group 3: Visit of Observatory (Davide Dionisi) Groupe 4 (pause) Group 4: Astronomy on open sky (Julie Patris)	20.00-00.00	<b>Lidars and Telescopes</b>
20.00-21.00	Group 1: 80 cm telescope (Alain Sarkissian) Group 2: Visit of Observatory (Davide Dionisi) Groupe 3: Pause Group 3: Astronomy on open sky (Julie Patris)	20.00 - 22.00	Group 1: 0.80 m optical telescope (Julie Patris) Group 2: Climate and Astronomical Data Bases (Alain Sarkissian) Group 3 Ozone Lidars (Davide Dionisi) Group 4 Temperature and wind lidars (Philippe Keckhut)
21.00-22.00	Group 1: 80 cm telescope (Alain Sarkissian) Group 2: Visit of Observatory (Davide Dionisi) Groupe 3: Pause Group 3: Astronomy on open sky (Julie Patris)		
22.00-23.00	Group 4: 80 cm telescope (Alain Sarkissian) Group 1: Visit of Observatory (Davide Dionisi) Group 2: Pause Group 2: Astronomy on open sky (Julie Patris)	22.00-00.00	Group 2: 0.80 m optical telescope (Julie Patris) Group 1: Climate and astronomical Data Bases (Alain Sarkissian) Group 4: Ozone lidars (Davide Dionisi) Group 3: Temperature and wind lidars (Philippe Keckhut)
23.00-00.00	Group 3: 80 cm telescope (Alain Sarkissian) Group 4: Visit of Observatory (Davide Dionisi) Group 1: Pause		
00.00	Departure of 25 participants to Forcalquier	00.00	Departure of 25 participants to Forcalquier

## Annex 3: Detailed programme of ERCA 2013

### Week 5 (Observatoire de Haute-Provence)

Time	Tuesday 5/02
9.00- 10.30	Irène Xueref-Remy: The global carbon cycle
10.30- 10.45	<i>Coffee break</i>
10.45-12.15	Irène Xueref-Remy: Observation of atmospheric greenhouse gases and emission tracers
12.30-14.30	<i>Lunch at Maison Jean Perrin (buffet)</i>
14.30-16.00	Philippe Keckhut: Lidar studies at OHP
16.00-16.15	<i>Coffee break</i>
16.15-17.45	Alian Sarkissian: Spectroscopic measurements of stratospheric constituents
18.30-20.00	<i>Dinner at Maison Jean Perrin</i>
20.00-00.00	<b>Visit to the lidars and observation with 0.80 m optical telescopes.</b>
20.00-22.00	Group 3: 0.80 m optical telescope (Julie Patris) Group 4: Climate and Astronomical Data Bases (Alain Sarkissian) Group 1: Ozone lidars (Davide Dionisi) Group 2: Temperature and wind lidars (Philippe Keckhut)
22.00-00.00	Group 4: 0.80 m optical telescope (Julie Patris) Group 3: Climate and astronomical Data Bases (Alain Sarkissian) Group 2: Ozone lidars (Davide Dionisi) Group 1: Temperature and wind lidars (Philippe Keckhut)
00.00	Departure of 25 participants to Forcalquier

## Annex 3: Detailed programme of ERCA 2013

### Week 5 (Observatoire de Haute-Provence)

Time	Wednesday 6/02
9.00-10.30	
10.30-17.00	<b>Visit to instruments and data analysis</b>
10.30-11.10	Group 1: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 2: Lidars (Philippe Keckhut) Group 3: Visit of the 120 and 152 cm telescopes (Julie Patris) Group 4: Preparation of Ozone sondes (Davide Dionisi)
11.10 - 11.40	Ozone balloon launch
11.40-12.20	Group 2: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 1: Lidars (Philippe Keckhut) Group 4: Visit of the 120 and 152 cm telescopes (Julie Patris) Group 3: Preparation of Ozone sondes (Davide Dionisi)
12.30-14.30	<i>Lunch at "Maison Jean Perrin" (buffet)</i>
14.30-15.10	Group 3: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 1: Lidars (Philippe Keckhut) Group 4: Visit of the 120 and 152 cm telescopes (Julie Patris) Group 2: Preparation of Ozone sondes (Davide Dionisi)
15.10-15.50	Group 4: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 2: Lidars (Philippe Keckhut) Group 3: Visit of the 120 and 152 cm telescopes (Julie Patris) Group 1: Preparation of Ozone sondes (Davide Dionisi)
16.00-16.30	Visit of the 193 cm telescope (Julie Patris)
19.30-00.00	<i>Dinner de Gala (Château de Sauvan)</i>

### Annex 3: Detailed programme of ERCA 2013

#### Week 5 (Observatoire de Haute-Provence)

Time	Thursday 7/02	Time	Friday 8/02
10.30	Departure from Maison Jean Perrin for sightseeing tour	11.30	Departure from Maison Jean Perrin for Grenoble
10.30-17.30	Sightseeing tour	13.00	<i>Sandwiches</i>
13.00	<i>Sandwiches</i>	16.00	Arrival in Grenoble. Railway station
18.30-20.30	<i>Dinner at "Maison Jean Perrin"</i>		
20.30	Departure of 25 participants to Forcalquier		