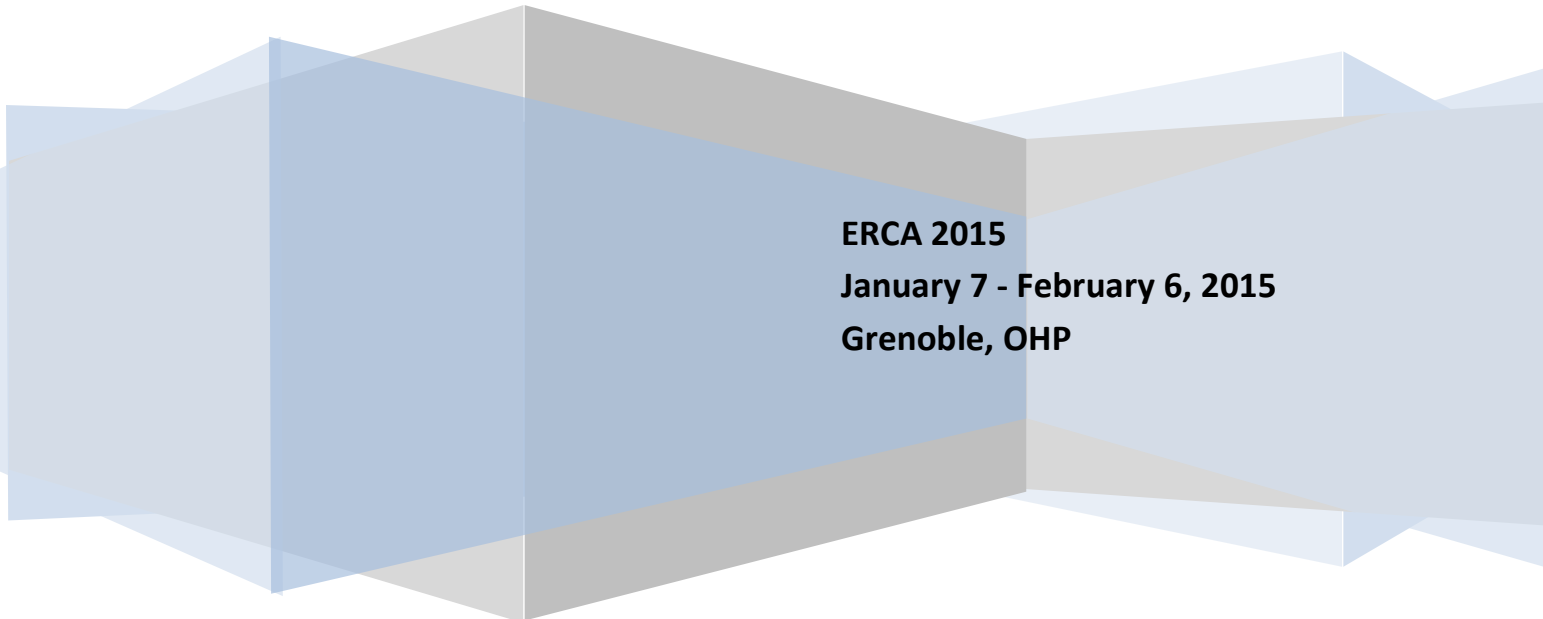




University Joseph-Fourier of Grenoble (UJF)
Centre National de la Recherche Scientifique (CNRS)

European Research Course on Atmospheres – ERCA 2015



ERCA 2015
January 7 - February 6, 2015
Grenoble, OHP

Scientific report for the 23rd session of ERCA2015

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1. Organization of the session

This 23rd session of the European Research Course on Atmospheres (ERCA) has been the first session directed by Pr. **Didier VOISIN** of the Joseph-Fourier University in Grenoble. These sessions followed the first 20 sessions directed by Pr. Claude BOUTRON, and two other sessions directed by Dr. Paolo LAJ, both at the Joseph-Fourier University.

The Director was assisted by the Office of the Grenoble European schools, a management committee and a scientific committee.

The Office of the Grenoble European schools is located at the 'Maison des magistères', a belonging of the Joseph-Fourier University located on the 'Scientific Polygon', in West Grenoble.

The Office of the European schools comprises:

- 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)
- Joseph GERMIANO (financial assistant of the European schools, UJF)

The Management Committee is composed of:

- Dr. Mathieu BARTHELEMY (IPAG, Joseph-Fourier University)
- Dr. Gilles DELAYGUE (deputy director, LGGE, Joseph-Fourier University)
- Dr. Stéphane LA BRANCHE (EDDEN, University Pierre-Mendès-France)
- Dr. Samuel MORIN (CEN Grenoble, Météo France)
- Dr. Julie PATRIS (Université Aix-Marseille)
- Dr. Alain SARKISSIAN (LATMOS, CNRS Verrières)
- Pr. Didier VOISIN (LGGE, Joseph-Fourier University)

The Scientific Committee is composed of:

- Pr. Carlo Barbante, University Ca'Foscaru of Venice, Italy
- Dr. Carl Brenninkmeijer, Max-Planck Institute for Chemistry, Mainz, Germany
- Pr. Peter Brimblecombe, University of East Anglia, Norwich, UK
- Joëlle Colosio, French Environment and Energy Management Agency (ADEME), Paris, France
- Pr. Ralf Ebinghaus, Helmholtz-Zentrum Geesthacht, Germany
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- Pr. Kevin Noone, Royal Swedish Academy of Sciences, Stockholm University, Sweden
- Pr. Markus Quante, Helmholtz-Zentrum Geesthacht, Germany
- Pr. Yinon Rudich, Weizmann Institute, Israel

1. 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

- **The World Meteorological Organization (WMO)** is a specialized agency of the United Nations. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.
- **The Global Atmosphere Watch (GAW)** programme of WMO is a partnership involving the Members of WMO, contributing networks and collaborating organizations and bodies, which provides reliable scientific data and information on the chemical composition of the atmosphere, its natural and anthropogenic change, and helps to improve the understanding of interactions between the atmosphere, the oceans and the biosphere. GAW focal areas are aerosols, greenhouse gases, selected reactive gases, ozone, UV radiation and precipitation chemistry (or atmospheric deposition).
- **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
- **Max-Planck Institute for Chemistry (MPIC)**. The leading German agency for funding and managing research, training and knowledge exchange in chemistry. It carries out investigations of the earth system and chemical processes in the atmosphere as well as the interactions between air, water, earth and mankind.
- **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 Geosciences Union (EGU) is Europe's premier geosciences union, dedicated to the pursuit of excellence in the Earth, planetary, and space sciences for the benefit of humanity, worldwide. It is a non-profit international union of scientists with over 12,500 members from all over the world. EGU has a current portfolio of 15 scientific journals, which use an innovative open access format, and organises a number of topical meetings, and education and outreach activities. Its annual General Assembly is the largest and most prominent European geosciences event, attracting over 11,000 scientists from all over the world.

Supports from national agencies

- **The French Ministry for Higher Education and Research (MESR)** supports participants from Eastern Europe, Asia, and Southern America with the ACCES and the '*Investissement d'Avenir*' programs.
- **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.
- **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.
- **Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME)** 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.
- **Observatoire de Haute-Provence (OHP)** is a premier observatory site for astronomy, environment, and the study of atmosphere. As a national facility for astronomy it welcomes visiting astronomers.
- **IRSTEA** is a research organization which, since more than 30 years, boasts a dual culture of researchers and engineers who tackle environmental matters from three angles: research, innovation and expertise. By studying ecosystems on a countrywide basis, they provide indispensable theoretic knowledge to help understand

ecosystems, and work to create solutions to reduce the impacts of human activity on the environment whilst providing expertise on public policies at the request of decision-makers.

- **Météo-France** is France national service of meteorology and climatology. Its main mission is to provide vigilance meteorological information to secure people and goods. *Centre d'Etudes de la Neige* (CEN) in Grenoble is Météo-France centre dedicated to snow and avalanches.

Supports from local agencies

- **Observatoire des Sciences de l'Univers de Grenoble (OSUG)** is a geosciences observatory within the University of Grenoble, grouping six laboratories. It supports ERCA with the Labex2020 program.
- **The Physics, Engineering, Mechanics, and geosciences department (PhITEM)** of the University of Grenoble
- **The Collège Doctoral (Doctoral school) of the University of Grenoble** manages about 3700 PhD students (of them, 45% foreigners) and is especially responsible for their training. ERCA is a part of this training.
- **POLYTECH Grenoble is the University Joseph-Fourier of Grenoble engineering school.** It provides ERCA a great support by hosting the school. (more information p.10).
- **L'Ecole doctorale des sciences de l'environnement d'Ile de France (ED129)** manages PhD students in the Paris area, especially their training. It supports the ERCA program at OHP as a training.
- **Grenoble Alpes Métropole** operates the metropolitan area around Grenoble. It supports its economy, scientific activities, and the universities.

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 23rd ERCA session took place from January 7th to February 6th, 2015. The first 4 weeks (7 to 30th January) took place in Grenoble, at Polytech Grenoble, a school of the Joseph-Fourier University. The last week (1st to 7 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 session 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 tutorials. 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 43 lecturers (Annex 1). 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 a proposal.

Four 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.

A debate on the mitigation of global warming impacts has been conducted by a specialist of political negotiations.

Three more informal debates have been organized at Café des Arts, downtown Grenoble, dealing with sustainable development and space weather impacts.

The last week dealt with the study of facilities and instruments installed on the site of the Observatoire de Haute-Provence (OHP), directed by Dr Auguste LE VAN SUU.

Visits to research facilities and laboratories

During the session the participants visited:

The European Synchrotron Radiation Facility (ESRF), an international institute funded by 19 countries;

The Laboratoire de Glaciologie et de Géophysique de l'Environnement (LGGE), an Institute of the French National Center for Scientific Research (CNRS) and the University Joseph-Fourier of Grenoble. Its scientific reputation is based on outstanding research achievements related to the reconstruction of past changes of climate and atmospheric composition during the last climatic cycles from polar ice cores.

The Planeterrella, experiment created by Jean Lilensten and his colleagues at the Institute of Planetology and Astrophysics of Grenoble (IPAG). See the description below.

Tutorials

Four tutorials were organized for the participants during the ERCA 2015 session, during a half day. A tutorial was designed as a very special occasion to exchange with specialists around an experimental setup. Each participant had to choose one of the following 4 tutorials:

Planeterrella, proposed by IPAG

The Planeterrella is an experiment inspired from the Terrella developed by Kristian Birkeland from 1896 to 1917, and is basically an aurora demonstrator for the Earth. Yet, its exceptional flexibility enables us now to simulate all kinds of planetary systems (Uranus and Neptune with their inclined rotation axis, Ganymeda - Jupiter interactions).

Rayleigh-Benard instability, proposed by IPAG

Rayleigh-Benard instability is one of the "archetypal" model of systems that can lead to chaotic behaviors. It consists of contra rotationnal rolls driven by a temperature difference between the bottom and the top of a box. In atmospheric physics, the phenomenon is of strong importance to understand vertical mixing of the atmosphere.

Snow monitoring at the Col-de-Porte station, proposed by CEN/MétéoFrance

A wide range of automated and manual snow and meteorological observations are co-located at the Col-de-Porte station (1325m elevation, ~ 30km away from Grenoble) and serve as: testbed for new instrumentation, establishment of driving/evaluation data for snowpack model development and build-up of climatologically relevant dataset. The practical at Col-de-Porte consisted of an illustration of key snow-related processes (surface energy and mass balance) together with existing and novel instrumentation to probe them (challenges for radiation, precipitation, wind measurements).

Scintillometry and flux measurements, proposed by LTHE

Scintillometry is a method which links the scintillation of an electromagnetic signal propagating through the atmosphere to turbulent properties. Turbulent exchanges between surface and atmosphere, namely sensible or latent heat fluxes, can then be derived from the observed scintillation. These estimates are representative of km² landscape units, which corresponds to the scale of satellite observations or model forecasts.

Last week of the session in Observatoire de Haute Provence

The last week dealt with the study of instruments installed on the site of the Observatoire de Haute-Provence (OHP), directed by Dr 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, has 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.

4. Lecturers

There were 44 lecturers, of them 10 women, from 14 countries: France (22), Germany (4), United Kingdom (2), Italy (2), USA (4), Israel (2), Canada (1), Switzerland (2), Finland (2), China (2), Sweden (1).

The detailed list of the lecturers with their affiliation is given in Annex 1.

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

Thirty seven (37) participants have been selected from the 100 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 37 selected participants, 1 eventually arrived late by few days because of problem with a visa.

ERCA 2015 had 24 females and 13 males (i.e. 65% of women), with 21 different nationalities:

Armenia (1), Bolivia (1), Brazil (1), China (3), Denmark (1), Estonia (1), France (3), Germany (7), Iceland (1), India (2), Italy (3), Japan (1), Morocco (1), Nigeria (1), Poland (1), Portugal (1), Russia (3), Syria (1), Turkey (1), UK (2), Ukraine (1).

They are working in 21 different countries:

Armenia (1), Australia (1), Bolivia (1), Brazil (1), China (3), Denmark (1), Estonia (1), France (3), Germany (8), Iceland (1), India (2), Italy (3), Nigeria (1), Poland (1), Portugal (1), Russia (3), Switzerland (1), Turkey (1), UK (2), Ukraine (1), USA (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 21 to 33 years, with a median value of 26 years.

28 participants are undergrad or PhD students, 9 are early career researchers.

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

Grants have been allowed to 10 participants, to cover the whole registration cost. The origins of these grants are the following:

Global Atmosphere Watch (GAW) / World Meteorological Organization (WMO): 1 grant

LabEx OSUG@2020: 2 grants

Abdus Salam International Center for Theoretical Physics: 2 grants

The French Ministry for Higher Education and Research with the ACCES Programme: 5 grants

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. Half of participants originate from countries with emerging economies as defined by UNO representing all different continents. In addition, invitation to lecturers from developing countries completes the clear ERCA strategy to offer students a course that responds to actual needs in countries outside the OECD, in particular the very strong problem of air pollution.

It is important to note 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 organization of ERCA has been pro-active to create the conditions for exchange amongst participants, by ensuring participants of balanced origin and gender and providing special opportunities to meet throughout the session.

In addition to the regular coffee breaks, the Monday scientific debates were followed by dinners which were opportunities to exchange with lecturers. Free day trips were also organized: a snowshoe trip took place on the first Saturday –although based on volunteering all participants were there, and a sightseeing day trip to discover Provence by bus was offered.

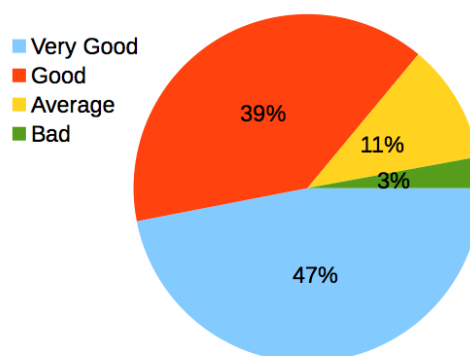
8. Evaluation

Evaluating the lectures and the whole session organization is our major concern. For two years now, 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 the programme of 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 grade 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 below)

Figure: The results of evaluation of the ERCA lectures (based on 1525 answers).

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. 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 2015 sessions of ERCA have been reached: to offer high-quality training, both theoretical and practical, to offer access to state-of-the-art equipment, to favor multidisciplinary, and finally create and stimulate scientific exchange between lecturers and students of different geographic and scientific origins. This can be measured by the satisfaction survey organized anonymously for participants, expressing a high degree of satisfaction with the scientific level of lectures, and the overall organization.



ERCA international visibility probably contributes to the very high international ranking of the University Joseph-Fourier of Grenoble (UJF) in the Earth and environmental sciences. For instance, the 2014 QS World University Rankings places UJF at the 50-100 level for Earth sciences and at the 100-150 level for environmental sciences.

ERCA is a recurrent yearly event. Next year session will be held in January/February 2016. Some modifications will be implemented in the 2016 program, based on the evaluation of the 2015 session. The main part of the program will be defined by the end of May 2015 and announced via electronic mailing lists in June 2015. The internet site of the school (<http://erca-school.eu>) will be used for announcements and for registration.

ERCA is one of the reference training in the atmospheric science and climate fields for the international scientific community. We hope that ERCA contributes to gather and train young scientists from all over the world.

Acknowledgements

We have to acknowledge all the personal contributions which made ERCA 2015 another great session. We are especially grateful to the very kind staff of Café des Arts.

Annex 1: ERCA 2015 Lecturers

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Participations which have been canceled

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Annex 2 : ERCA 2015 participants

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ALIAGA	Diego	Bolivia	28	Radiative transfer	Cotacota, calle 27, Campus UMSA, Facultad de Física, La Paz, Bolivia
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AN	Wenling	China	29	Isotope geochemistry and Climate change	School of Geographic and Oceanographic Sciences, Nanjing University, Hankou Road 22, Nanjing, China
BERTÒ	Michele	Italy	27	Paleo-climatology	Ca'Foscari University of Venice, Dorsoduro 2137, 30123 Venezia, Italy
BROWNLOW	Rebecca	United Kingdom	24	Tropical methane	Earth Sciences, Royal Holloway, University of London, Egham, Surrey, UK
CHERVYAKOV	Maksim	Russia	26	Radiation balance, Radiosonde observations	Saratov State University, 59 Universitetskaya Street, Saratov 410012, Russia
DAL FARRA	Anna	Italy	27	Enviromental Chemistry	University of Bern, Hochschulstrasse 4, 3012 Bern, Switzerland



Family name	First name	Nationality	Age	Research field	Affiliation
DAVE	Prashant	India	31	Study of Aerosol-Precipitation interaction using statistical and data mining approaches	Indian Institute of Technology Bombay, Powai, Mumbai, India-400076
DESSERTAZ	Maximilien	France	24	Atmospheric Chemistry	University of Wollongong, Northfield Avenue, 2522, Wollongong, NSW, Australia
GIRACH	Imran Asatar	India	30	Atmospheric Trace gases	Cochin university of science and technology, Cochin-682022, Kerala, India
GUDLAUGSDOTTIR	Hera	Iceland	33	Atmospheric sciences, role of volcanoes in atmospheric circulation	Institute of Earth Sciences, University of Iceland, Sturlugotu 7, 101 Reykjavik, Iceland
GUENTHER	Annika	Germany	27	Sulphur in the Upper Troposphere/Lower Stratosphere, Satellite Data, Chemical Transport Model	KIT, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany
JAIDAN	Nizar Abdelbare	Morocco	25	Data assimilation	Université Paul-Sabatier, 118 route de Narbonne, 31062 Toulouse, France
KORNHUBER	Kai	Germany	30	Climate Physics	Potsdam Institute for Climate Impact Research, Telegraphenberg A 31, D-14412 Potsdam, Germany
KRETSCHMER	Marlene	Germany	26	atmosphere science	Potsdam Institute for Climate Impact Research, Telegraphenberg A 31, D-14412 Potsdam, Germany



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LI	Qinyi	China	26	Atmospheric Environment	ZS953, Block Z, The Hong Kong Polytechnic University, Hung Hom, Hong Kong, China.
MIMEAU	Louise	France	23	Mountain hydrology	LTHE, Université Joseph-Fourier, 38402 Grenoble, France
MKRTCHYAN	Hripsime	Armenia	24	Atmospheric physics	Yerevan Physics Institute, Alikhanyan Brother street 2, Yerevan, Armenia
MOLNOS	Sonja	Germany	26	Climate Physics	Potsdam Institute for Climate Impact Research, Telegraphenberg A 31, D-14412 Potsdam, Germany
NASSE	Jan-Marcus	Germany	27	Atmospheric Physics and Chemistry	Institute of Environmental Physics, Im Neuenheimer Feld 229 D-69120 Heidelberg, Germany
ØSTERSTRØM	Freja From	Denmark	25	Atmospheric chemistry, gas phase kinetics	Department of Chemistry, University of Copenhagen, Universitetsparken 5, 2100 Copenhagen, Denmark
PAVLOVA	Hanna	Ukraine	21	Atmospheric modelling	Lvovskaya str. 15, Odessa, Ukraine
RIEGER	Vanessa	Germany	26	Climate impact of traffic emissions	German Aerospace Center (DLR), Münchener Str. 20, D-82234 Weßling, Germany
SALGUEIRO	Vanda	Portugal	28	Remote sensing	Rua Romão Ramalho nº59, 7000-671 Évora, Portugal
SANNINO	Alessia	Italy	29	Atmospheric physics	Complesso Universitario di Monte Sant'Angelo, via Cinthia, I-80126, Napoli, Italy



Family name	First name	Nationality	Age	Research field	Affiliation
SOBANSKI	Nicolas	France	26	Atmospheric chemistry	Max-Planck-Institut für Chemie, Hahn-Meitner-Weg 1, 55128 Mainz, Germany
STRUCKMEIER	Caroline	Germany	28	Atmospheric aerosols	Max-Planck-Institut für Chemie, Hahn-Meitner-Weg 1, 55128 Mainz, Germany
SZOPINSKA	Malgorzata	Poland	25	Anthropogenic contaminants in polar regions	Gdansk University of Technology, G. Narutowicza 11/12 Str. 80-233 Gdansk, Poland
TAKEISHI	Azusa	Japan	25	Aerosol-cloud interaction	Department of Geology and Geophysics, Yale University, 210 Whitney Avenue, New Haven, CT 06511, U.S.A.
TIMKINA	Ekaterina	Russia	25	recycle of fluorinated waste of aluminum production	NR ISTU, Lermontov street, D. 83, Irkutsk, Russia
VIEIRA DA SILVA FILHO	Marcelo	Brazil	27	Atmospheric Chemistry	Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Rua do Matão, 1226 - Cidade Universitária, São Paulo-SP - Brasil
VLADIMIROVA	Diana	Russia	22	paleoclimate, isotopic composition, Antarctica	38, Beringa st., 199178 St. Petersburg, Russia
WANG	Chaomin	China	25	ice core	No. 163, Xianlin Road, Qixia District, 210023 Nanjing, Jiangsu Province, China
WHITE	Emily	UK	23	Atmospheric Chemistry	University of Bristol, Senate House, Tyndall Avenue, Bristol, BS8 1TH, UK



Family name	First name	Nationality	Age	Research field	Affiliation
YILMAZ	Yeliz	Turkey	28	The land surface-atmosphere interaction	Istanbul Technical University Eurasia Institute of Earth Sciences, Istanbul, Turkey

Annex 3: Detailed programme in Grenoble (4 weeks) and at OHP (Observatoire de Haute-Provence) (1 week)

WEEK 1: GRENOBLE

Wednesday 7 January 2015	
10.30-11.15	Official opening (room 101)
11.15-12.00	Keynote lecture Michel Colombier The road to Paris 2015: designing a new, efficient international climate regime
12.15-14.00	<i>Buffet at Polytech (room 144)</i>
14.00-15:30	Dominique Serça Introduction to atmospheric chemistry 1
15.30-16.00	<i>Coffee break (room 135)</i>
16.00-17.30	Eugene Clothiaux Atmospheric radiation: basic physics and concepts
18.30	<i>Ice-breaking party at Café des Arts downtown (36, rue Saint Laurent, Grenoble),</i>

	Thursday 8/01	Friday 9/01	Saturday 10/01
9.00-10.30	Dominique Serça Introduction to atmospheric chemistry 2	Eugene Clothiaux Radiation and Remote Sensing: A Few Current Applications	Snowshoes day trip organized by ERCA
10.30-11.00	<i>Coffee break</i>	<i>Coffee break</i>	
11.00-12:30	Eugene Clothiaux Radiation through clear and cloudy atmospheres	Florent Dominé Some new snow-climate feedbacks	
12.30-14.00	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	
14.00-15.30	Dominique Serça Hydroelectricity, dams, and atmospheric emissions	ESRF VISIT - departure by special bus at 13.45 from the cafeteria Barnave.	
15.30-16.00	<i>Coffee break</i>		
16.00-17.30	Samuel Morin Snow and climate at the global scale		

WEEK 2: GRENOBLE

	Monday 12/01	Tuesday 13/01	Wednesday 14/01	Thursday 15/01	Friday 16/01
9.00-10.30	Richard Horne Planetary space weather	Yann Kerr SMOS applications in oceanography, hydrology and extreme events survey	Ralf Ebinghaus Emission sources, regional and global distribution of persistent organic pollutants (POPs)	Jed Kaplan The co-evolution of the Earth System and human civilizations over the pre-industrial Holocene	Carlo Barbante Ice-core records of climate and atmospheric chemistry
10.30-11.00	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>
11.00-12:30	Markus Quante The Role of Clouds in Climate and Environment	Markus Quante Cloud and precipitation physics an introduction	Tao Wang Air pollution in China: a review of control efforts, their effectiveness, and challenges	Tao Wang Photochemical ozone and smog in China: insights learned from several large research projects	Irène Xueref-Rémy The carbon cycle
12.30-14.00	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>
14.00-15.30	Yann Kerr The several steps towards a scientific spatial mission observing Earth: SMOS	Ralf Ebinghaus Emission sources, regional and global distribution of atmospheric mercury	Jed Kaplan The role of land surface processes in the climate system: Global modeling of biogeophysical and biogeo-chemical feedbacks	Carlo Barbante Ice core records as archives of past climate and atmospheric composition	LGGE visit
15.30-16.00	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	
16.00-17.30	Students presentation 1	Students presentation 2	Stéphane La Branche Climate debate preparation	Stéphane La Branche Climate debate preparation	LGGE visit
18.30	Debate @ Café des Arts with Markus Quante Should we change our transport systems and mobility for a better climate and environment?				

WEEK 3: GRENOBLE

	Monday 19/01	Tuesday 20/01	Wednesday 21/01	Thursday 22/01	Friday 23/01
9.00-10.30	Peter Brimblecombe Air pollutants and their health impact	Peter Brimblecombe Climate change and cultural heritage	Yinon Rudich Biological aerosols - role in climate and health	Gabrielle Petron New energy sources and air quality	Julien Le Sommer Role of the oceans in the climate system: processes and time-scales
10.30-11.00	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>
11.00-12:30	Peter Brimblecombe Indoor air pollution	Mike Bergin Aerosols and climate: Haze, clouds and the radiation balance	Gabrielle Petron Global observations, models and source tracking	Isabella Zin Water cycle and mountains	Jean Liliensten The space environments (thermosphere, ionosphere, magnetosphere)
12.30-14.00	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>
14.00-15.30	Caroline Brimblecombe Developing focus and productivity in academic and technical writing, <i>Room 144</i>	Yinon Rudich From deserts to reefs: global processes of mineral dust	Mike Bergin Black Carbon and Climate: Soot, Monsoons and Glaciers	Augustin Colette Projections of Air Quality for the 21st century: focus on the impact of climate change	Stéphane La Branche Climate debate
15.30-16.00	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	
16.00-17.30	Caroline Brimblecombe Developing focus and productivity in academic and technical writing, <i>Room 144</i>	Yinon Rudich Optical properties of aerosols: theory and new measurement methods	Students presentation 3	Students presentation 4	
18.30	Debate @ Café des Arts with Peter Brimblecombe: Environmental regulation or personal freedom?				

WEEK 4: GRENOBLE

	Monday 26/01	Tuesday 27/01	Wednesday 28/01	Thursday 29/01	Friday 30/01
9:00-10:30	Yoav Yair The global electrical circuit, thunderstorms and transient luminous events: an introductory survey	Casey Brown Floods, risk estimation and management	Carl Brenninkmeijer The challenge of monitoring the changing composition of the Earth atmosphere	Filippo Giorgi Climate change and the hydrologic cycle	Andreas Richter Nitrogen oxides in the troposphere - sources, distributions, impacts, and trends
<i>10:30-11:00</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>
11:00- 12:30	Ilya Usoskin Effect of the cosmic rays in the atmosphere	Carl Brenninkmeijer Using stable isotope analysis in environmental sciences 2. Atmospheric applications	Margit Haberreiter Impact of the solar activity on the climate	Anne Monod Secondary Organic Aerosol Part II	Barbara Nozière Aerosols and warm cloud formation
<i>12:30-14:00</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>	<i>Lunch (Barnave)</i>
14:00- 15:30	Eija Tanskanen Ionospheric space weather	Eija Tanskanen Hands on data with substorm zoo. <i>Room 144</i>	Anne Monod Secondary Organic Aerosol Part I	Andreas Richter Satellite measurements of troposphere composition - principles, results, and future developpments	Practicals: Barthelemy Vialatte Morin Cohard
<i>15:30- 16:00</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>	
16:00- 17:30	Carl Brenninkmeijer Using stable isotope analysis in environmental sciences 1. Principles and techniques	Eija Tanskanen Hands on data with substorm zoo. <i>Room 144</i>	Filippo Giorgi Regional climate modeling; update and CORDEX developments	Casey Brown Droughts, risk estimation and management	
18:30	Debate @Café des Arts with Eija Tanskanen and Ilya Usoskin Could an extreme solar event destroy our civilization and can it happen tomorrow?				



ERCA
European Research Course on Atmospheres
Organized by Université Joseph Fourier of Grenoble & CNRS

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GRENOBLE

WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 1

Time	Sunday 1 February 2015
8.00	<i>Departure from Grenoble/residence Marie-Curie to OHP</i>
12.00	<i>Arrival at OHP "Maison Jean Perrin"</i>
12.30-14.00	<i>Lunch at Maison Jean Perrin (buffet)</i>
14.00-15.00	<i>Settling the participants in their rooms at Maison Jean Perrin</i>
15.00-15.45	Alain Sarkissian Presentation of the "Observatoire de Haute-Provence" (movie theatre)
15.45-16.00	coffee break
16.00-17.00	Sergey Khaykin Lidar technique for Atmosphere observations (movie theatre)
17.00-18.00	Julie Patris Astronomical observations at OHP and elsewhere
18.00-20.00	Diner at Maison Jean Perrin
	Introduction to observational astronomy. The participants will split into 4 groups.
20.00-21.00	Group 1: Astronomy on open sky (Julie Patris) Group 2: 80 cm telescope (Alain Sarkissian) Group 3: Visit of Observatory (Sergey Khaykin) Group 4: (pause)
21.00-22.00	Group 4: Astronomy on open sky (Julie Patris) Group 1: 80 cm telescope (Alain Sarkissian) Group 2: Visit of Observatory (Sergey Khaykin) Group 3: (pause)
22.00-23.00	Group 3: Astronomy on open sky (Julie Patris) Group 4: 80 cm telescope (Alain Sarkissian) Group 1: Visit of Observatory (Sergey Khaykin) Group 2: (pause)
23.00-00.00	Group 2: Astronomy on open sky (Julie Patris) Group 3: 80 cm telescope (Alain Sarkissian) Group 4: Visit of Observatory (Sergey Khaykin)

WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 2

Title	Monday 2/02
9.00-10.30	Henrik Lundstedt The Solar Magnetic Atmosphere and Cycles (<i>movie theatre</i>)
10.30-10.45	<i>coffee break</i>
10.45-12.15	Henrik Lundstedt The Solar Wind, Storms and Forecasts (<i>movie theatre</i>)
12.15-13.30	<i>Lunch at "Maison Jean Perrin"</i>
13.30-15.00	Irène Xueref-Rémy Observing atmospheric gases (<i>movie theatre</i>)
15.00-15.15	<i>coffee break</i>
	The participants will split into 4 groups for one practical on CO ₂ measurements with Irène Xueref-Rémy , and one on lidar profile inversion with Sergey Khaykin .
15.15-16.00	Group 1: Practical on CO ₂ measurements Group 2: Practical on Lidar inversion
16.00-16.45	Group 2: Practical on CO ₂ measurements Group 3: Practical on Lidar inversion
16.45-17.30	Group 3: Practical on CO ₂ measurements Group 4: Practical on Lidar inversion
17.30-18.15	Group 4: Practical on CO ₂ measurements Group 1: Practical on Lidar inversion
18.30-20.00	<i>Dinner at "Maison Jean Perrin"</i>
	Visit to the lidars and observations with the 0.80m optical telescope
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 (Sergey Khaykin) Group 4: Temperature and wind lidars (Philippe Keckhut)
22.00-00.00	Group 4: 0.80 m optical telescope (Julie Patris) Group 1: Climate and Astronomical Data Bases (Alain Sarkissian) Group 2: Ozone Lidars (Sergey Khaykin) Group 3: Temperature and wind lidars (Philippe Keckhut)



WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 3

Time	Tuesday 3/02
10.00-11.00	Jean-Marc Ané Is nuclear energy sustainable (<i>movie theatre</i>)
11.00-11.15	<i>Coffee break</i>
11.15-12.15	Jean-Marc Ané Is nuclear energy sustainable (continued)
12.30-14.00	<i>Lunch at Maison Jean Perrin (buffet)</i>
14.00-16.00	Philippe Keckhut Observation of climate changes with NDACC instruments (<i>movie theater</i>)
16.00-16.30	<i>Coffee break</i>
16.30-18.00	Alain Sarkissian Spectroscopic measurements of stratospheric constituents (<i>movie theater</i>)
18.30-20.00	<i>Dinner at Maison Jean Perrin</i>
	Visit to the lidars and observations with the 0.80m optical telescope
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 (Sergey Khaykin)
22.00-00.00	Group 2: 0.80 m optical telescope (Julie Patris) Group 3: Climate and astronomical Data Bases (Alain Sarkissian) Group 4: Ozone lidars (Sergey Khaykin) Group 1: Temperature and wind lidars (Philippe Keckhut)



WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 4

Time	Wednesday 4/02
10.00-10.40	Ozone balloon launch+coffee break
	Visit to instruments and data analysis
10.40-11.20	Group 1: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 2: Lidars ((Sergey Khaykin) Group 3: Oak Observatory at OHP (O3HP) (Jean Philippe Orts) Group 4: Preparation of ozone sondes (Sergey Khaykin)
11.20-12.00	Group 2: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 3: Lidars (Sergey Khaykin) Group 4: Oak Observatory at OHP (O3HP) (Jean Philippe Orts) Group 1: Preparation of ozone sondes (Sergey Khaykin)
12.00-14.00	Lunch at "Maison Jean-Perrin"
14.00-14.40	Group 3: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 4: Lidars (Sergey Khaykin) Group 1: Oak Observatory at OHP (O3HP) (Jean Philippe Orts) Group 2: Preparation of ozone sondes (Sergey Khaykin)
14.40-15.20	Group 4: Dobson and SAOZ spectrometers (Alain Sarkissian) Group 1: Lidars (Sergey Khaykin) Group 2: Oak Observatory at OHP (O3HP) (Jean Philippe Orts) Group 3: Preparation of ozone sondes (Sergey Khaykin)
15.20-15.40	Coffee-break
15.40-16.40	Visit of the 193 cm telescope (Julie Patris)
18.00	Departure by bus to Chateau Sauvan
18.30-00.00	Guided visit of Château Sauvan by the family, and Gala dinner



WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 5

Time	Thursday 5/02
9.00	Departure from Maison Jean-Perrin for a sightseeing tour
10.30-18.00	Sightseeing tour in Provence
12.00-14.00	Lunch at a local restaurant
14.00-18.00	Tour in Provence, Fontaine de Vaucluse (Mathieu Barthelemy)
18.00-20.00	Diner at Maison Jean-Perrin

WEEK 5: OBSERVATOIRE DE HAUTE PROVENCE (OHP) – day 6

Time	Friday 6/02
8.00	Departure from OHP / Maison Jean-Perrin to Grenoble
14.00	Arrival in Grenoble at the railway station



2015

23rd session from
**JANUARY 7TH to
FEBRUARY 6TH**
Grenoble, FRANCE

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European
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ERCA is a course for PhD students, scientists and engineers from universities, public research institutes and private research or industrial organizations. It is a high level international course on the Physics and Chemistry of the atmosphere of planets, the climate system and climate change, atmospheric pollution at different scales and the human dimensions of environmental changes.



PROGRAM 2015

January 7th > 30th
GRENOBLE

LECTURES (about 130 hours)

- › Atmospheric chemistry and atmospheric composition changes
- › Earth climate system and the science of Climate change
- › Earth Science system - Impact and society
- › Experimental techniques and research methodologies for the Atmospheric Sciences
- › Hydrology and Precipitation: water cycle in climate change
- › Planetary atmospheres and space weather

PRESENTATIONS given by the participants.

VISITS:

- › The European Synchrotron Radiation Facility
- › The Laboratory of Glaciology and Geophysics of the Environment
- › The Planeterra experiment (Institute of Planetology and Astrophysics).

February 1st > 6th
**OBSERVATOIRE DE HAUTE
PROVENCE (OHP)**

- › Temperature, wind and ozone lidars
- › SAOZ and Dobson spectrometers
- › Balloon sounding
- › Optical telescopes
- › Mediterranean forest platform

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