WP2- NA2: Remote sensing of the vertical aerosol distribution
Deliverable D2.4: Minutes of second workshop and presentations of the external experts

ACTRIS

WP2 – NA2: Remote sensing of the vertical aerosol distribution

WP20 – JRA1: Lidar and sunphotometer

2nd Joint Workshop

Università del Salento
Dipartimento di Matematica e Fisica "Ennio De Giorgi"
2 – 5 October, 2012

Agenda

2 October 2012
9:00 – 18:00
WP2 NA2: Remote sensing of vertical aerosol distribution
Introduction and progress review
- **Task 2.1 Exchange of expertise**
  - Integration and interaction with other WPs, programs and networks
  - Open discussion
- **Task 2.2 Quality assurance**
  - *Task 2.2.1 Intercomparison campaigns*
  - *Task 2.2.2 Internal quality check-ups*
- **Task 2.3 Improvement of lidar techniques and data analysis for aerosol characterization**
  - *Task 2.3.1 Definition of new aerosol parameters*
  - *Task 2.3.2 SCC web graphic interface*

3 October 2012
9:00-16:30
WP20 JRA1: Lidar and sunphotometer – Improved instruments, integrated observations and combined algorithms
Introduction and progress review
- **Task 20.1: Improved daytime capabilities of lidar instruments**
  - Status report on optical and mechanical design studies
  - Discussion of next steps
- **Task 20.3: Integrated retrieval schemes for aerosol microphysical properties**
  - Status of algorithm development
  - Test and application of algorithms
- **Task 20.2: Integrated observation strategies**
  - Status of combined observations at the core stations
  - Database
  - Discussion and next steps

4 October 2012
9:00 – 18:00
WP2 NA2: Remote sensing of vertical aerosol distribution
Task 2.1 Exchange of expertise (cont'd.)

WP2 / WP20
Scientific presentations
Technical discussions

5 October 2012
9:00 – 13:00
WP2 NA2: Remote sensing of vertical aerosol distribution
Task 2.1 Exchange of expertise (cont'd.)
Tutorial: Lidar data target classification; identifying aerosol and cloud layers using the STRAT software package

The 2nd Joint Workshop of ACTRIS WP2 (NA2: Remote sensing of vertical aerosol distribution) and WP20 (JRA1: Lidar and sunphotometer – Improved instruments, integrated observations and combined algorithms) was held in Lecce (Italy), from 2 to 5 November 2012 (see agenda), hosted by the Department of Mathematics and Physics "Ennio de Giorgi" of Università del Salento. The workshop was attended by 60 people (see list of attendees at the end of these minutes).

All the tasks were reviewed, with emphasis on task 2.3 (improvement of lidar techniques and data analysis for aerosol characterization) in the case of WP2, and on task 20.2 (integrated observation strategies) for WP20.

A hands-on tutorial on the utilization of the STRAT software package for automated layer detection and cloud masking on lidar profiles, organized by CNRS-SIRTA, was associated to the workshops and attended by 30 people.

All the presentations listed in the following are available on the ACTRIS intranet.

Note that you must be logged in to the ACTRIS intranet
first in order to use the interactive links below!

WP2 NA2: REMOTE SENSING OF VERTICAL AEROSOL DISTRIBUTION

A progress overview of WP2 is given in the presentation

- *WP2: Introduction and progress review* (Adolfo Comerón, UPC)

Task 2.1. Exchange of expertise

Interaction with other work packages, integration and outreach

The participation of WP2 (partial activation of EARLINET) on the EMEP / PEGASOS and ChArMEx campaigns of summer 2012 (EMEP / PEGASOS: 8 June – 17 July; ChArMEx: 25 June – 12 July) is outlined in the following presentations:

- *EARLINET and EMEP-PEGASOS campaign* (Lucia Mona, CNR-IMAA), presented by Adolfo Comerón (UPC)
- *July 2012 campaigns: ChArMEX pre-campaign / EARLINET potential operationality exercise / Assimilation of lidar profiles in an AQM* (Michaël Sicard, UPC)

In connection with the EARLINET potential operationality exercise associated to the ChArMEx Summer 2012 campaign, the assimilation of lidar observations on an air-quality model is presented in:

- *Assimilation of lidar observations for improving PM_{10} forecast* (Y. Wang, K.N. Sartelet, CEREA, et al.), presented by Karine Sartelet (CEREA).

The results of this preliminary work point towards the advisability of assimilating not only the lidar range-corrected profiles, but also extinction- and backscatter-coefficient profiles, as well as to the need of the availability of in-situ PM_{10} measurements close to the lidar stations for model evaluation purposes.

In the discussion of these outreach activities, the needs are stressed to get feedback on the use of the data provided, to get an official request to participate in future campaigns, and to have a say in their planning for contributing to the definition of scientific objectives and to the coordination with other parties.

With the goal of increasing the integration within ACTRIS, a presentation by WP22 (JRA3: A framework for cloud-aerosol interaction studies) leader, Herman Russchenberg, was invited:

- *Liquid water cloud retrievals: sensitivities and blind test* (Herman Russchenberg, Christine Brandau, TU Delft; Ulrich Loehnert, University of Cologne; Ewan O'Connor, University of Reading and FMI; Gianni Martucci, NUI Galway; Dave Donovan, KNMI; Kerstin Ebell, University of Cologne; Hanna Pawlowska, University of Warsaw).

In the discussion it is suggested that a document be written specifying the requirements for lidars aimed at studying the cloud base. Preliminary requirements for boundary-layer clouds would be extinction measurements with several-seconds time resolution and better than 15-m range resolution.

Technical presentations session

In this session, relevant practical problems and solutions for lidar-instrument settings, operation, and data interpretation were presented and discussed in a very interactive way. The session was structured around the following presentations:

- *Depolarisation calibration* (Juan Antonio Bravo Aranda et al., CEAMA-UGR)
- *The OPGC/LaMP lidar : automation and upgrades* (Patrick Fréville, OPGC/LaMP)
- *Fiber experiments* (Michael Gausa, ALOMAR)
- *Improving the alignment of outgoing beam and receiver field of view* (Jana Preißler and Frank Wagner, Universidade de Évora)
- *Intercomparison of a Leosphere Rman$_{510}$ with the EARLINET UPC lidar* (Philippe Royer and Laurent Sauvage, Leosphere; Michaël Sicard and Adolfo Comerón, UPC), presented by Michaël Sicard
- *Reducing the "smoothing induced" over-estimation of lidar ratio* (Ilya Serikov, MPI)

Scientific presentations session

In this session, elaborated results and tools arising from lidar data were presented:

- *Radar and lidar observations of ultragiant particles: a possible synergy for the study of aerosol* (Fabio Madonna et al., CNR-IMAA)
- *Atmospheric Boundary Layer determination from LIDAR, Microwave Radiometry and Radiosounding: an integrated approach* (Jesús Fernández Gálvez et al., CEAMA-UGR)
- *CLIMARENO: profiling of atmospheric aerosol optical and microphysical properties* (María José Granados-Muñoz et al., CEAMA-UGR; Javier Andrey, INTA; A. Chaikovsky, IPNASB; Ulla Wandinger, TROPOS)
- *Optical and microphysical characterization of volcanic sulphate particles during day and nighttime in the lower troposphere by lidar* (F. Navas-Guzmán et al., CEAMA-UGR; Detlef Müller et al., TROPOS; A. Chaikovsky, IPNASB)

- *On the benefit of ceilometers for aerosol remote sensing: absolute calibration of the Jenoptik CHM15kx* (Alexander Geiß and Matthias Wiegner, LMU)
- *35 Years of Stratospheric Aerosol Measurements at Garmisch-Partenkirchen (1976-2011)* (Thomas Trickl et al., KIT/IMK-IFU)
- *About the detection of the Nabro's eruption in summer 2011 in the framework of SPALINET-EARLINET-ACTRIS: ongoing activities* (Juan Luis Guerrero-Rascado et al., CEAMA-UGR; Carmen Córdoba-Jabonero et al., INTA; Frank Wagner et al., Universidade de Évora; Francisco Molero et al., CIEMAT; Diego Lange et al., UPC)
- *Vertical resolved separation of aerosol types using CALIPSO level-2 products* (Elina Giannakaki et al., AUTH, FMI, NOA)
- *LIVAS: a global aerosol and cloud climatology for lidar performance simulation studies* (Vassilis Amiridis et al., NOA; Ulla Wandinger, TROPOS; Panagiotis Kokkalis et al., NTUA; N. Papagiannopoulos et al.; CNR-IMAA)
- *Data preparation Overview for Aerosol Profile Retrieval Concept Development and Validation for Sentinel-4* (A. Apituley et al., KNMI; Ben Veihelman et al., ESA)

STRAT tutorial

A hands-on tutorial on the STRAT software for layering detection and cloud masking on lidar profiles was associated to the workshop and held just after it, organized by CNRS-SIRTA. Interested participants got directions for the preparation in advance of data obtained by their own systems to be used in the tutorial. Details and list of attendees are found in the annex to these minutes.

Task 2.2 Quality assurance

Details of deadlines, procedures, and examples concerning internal quality checkups are found in the presentation

- *WP2 Task 2.2 Quality Assurance Overview* (Volker Freudenthaler, LMU)

Volker Freundethaler reminds the deadlines for submitting the mandatory internal quality check-up results (see actions table at the end of this document). The new mandatory test on the depolarization calibration profile (for stations with depolarization channels) is also reminded. A short explanation about it is found in the above presentation, where links to full detailed explanations are also found. Concerning the format of depolarization calibration profiles, Ulla Wandinger points out that present requirements assume the use of a polarizing cube, which is not necessarily the case for all the systems; it is agreed that in those instances the formats will be discussed in a case-by-case basis.

The use of local radiosonde data (if available) for the Rayleigh-fit test is recommended. If not, use of GSF and FIM models is suggested, subject to accuracy validation (links found in above presentation).

The schedules of the intercomparison campaigns are also given in the above overview presentation. It is agreed that, after the first round of intercomparisons, ending in November 2012, the second round will be rescheduled. The intercomparison between L'Aquila station

system and LMU's POLIS system has already been carried out between 10 and 15 September 2012; a report is presented in:

- *LIDAR systems' intercomparison* (Vincenzo Rizi, CETEMPS – Univ. L'Aquila)

Task 2.3 Improvement of lidar techniques an data analysis for aerosol characterization

An overview of progress in the Single Calculus Chain (SCC) is given in the presentation

- *Improvement of lidar techniques and data analysis for aerosol characterization* (Giuseppe d'Amico, CNR-IMAA, et al. IFT, LMU, CNISM)

The EARLI09 campaign data[1] and the operationality exercise data (see Task 2.1 part in these minutes) have been used to test ELDA and the full SCC from raw data to the optical coefficients. The results of manual inversions of optical coefficients done by the different involved stations have been compared against those resulting from the unattended operation of the SCC in some selected cases (no clouds, homogeneous atmosphere and full lidar configuration available), with a very satisfactory outcome that points towards the potentiality of EARLINET as provider of near-real time aerosol optical profiles; a dedicated paper on this subject is planned.

Participants are reminded of the call for feedback already made in the previous workshop to provide information on particle linear depolarization measurements, specifications, calibration and error analysis used at each lidar station.

Status, progress and contributions to data processing and SCC web graphic interface were described and discussed through the following presentations:

- *ELDA– the optical module of the SCC* (Holger Baars, TROPOS[2])
- *Effective resolution in Savitzky-Golay and sliding average* (Fabio Madonna et al., CNR-IMAA)
- *EARLINET/ACTRIS WG on boundary layer (PBL – WG): work progress* (Fabio Madonna, CNR-IMAA; Holger Baars, TROPOS; Martial Haeffelin, IPSL; et al.) IPSL; et al.)
- *Polarisation sensitivity of lidars* (Volker Freudenthaler, LMU)
- *On the link between the wavelet covariance transform method and the gradient method* (Adolfo Comerón, Michaël Sicard, UPC)
- *Web interface for the Single Calculus Chain* (Ioannis Binietoglou, CNR-IMAA)
- *EARLINET reporting System* (Ioannis Binietoglou, CNR-IMAA, impworks; Stefanos Chatzimichelakis, Angelos Stamou, impworks)
- *EARLINET forum and collaboration site* (Ioannis Binietoglou, CNR-IMAA)

Concerning the SCC web graphic interface, two accounts will be sent to every station before the end of the month to grant access to it and start testing by the WP2 community at large.

With respect to the EARLINET reporting system, Ioannis Binietoglou calls for a small group of volunteers for testing and providing ideas.

[1] See minutes of Eight EARLINET-ASOS workshop, Bucharest, 28-30 September 2009 in intranet at http://www.earlinet.org.
[2] TROPOS: formerly IfT.

WP20 JRA1: LIDAR AND SUNPHOTOMETER – IMPROVED INSTRUMENTS, INTEGRATED OBSERVATIONS AND COMBINED ALGORITHMS

WP20 leader, Ulla Wandinger, reminds the work package objectives and reviews progress in the following presentation:

- *WP20 – JRA 1 Lidar and sunphotometer. Improved instruments, integrated observations and combined algorithms* (Ulla Wandinger, TROPOS)

Task 20.1. Improved daytime capabilities of lidar instruments

Fabio Madonna reviews the status and developments in this task, as described in the following presentation:

- *Task WP20.1: "Improved daytime capabilities of lidar instruments": work progress* (Fabio Madonna, CNR-IMAA)

Existing rotational-Raman-channel optical configurations, taken as reference starting points, are reviewed. Two of these configurations are being simulated using Zemax from the point of view of received signal, effect of background light and cross-talk. The simulations will be extended to other configurations whose parameters will be changed in search of optimal values. Ulla Wandinger shows preliminary examples of extinction coefficients measured through rotational Raman channels in both night- and day-time conditions (see slide No. 14 in WP20 introductory presentation above).

Task 20.2. Integrated observation strategies

Representatives of the core stations involved in the task (Athens/Thessaloniki, Granada, Leipzig, Minks, Potenza) report on the corresponding status: instrumentation, statistics of performed measurements, preliminary classifications, status of data analysis and planning. It is pointed out that the aim is not to gather big datasets, but rather to select representative cases. Details are available in slides 21 to 41 in WP20 introductory presentation above and, for Granada station, also in

- *Report on the status of combined observations at Granada core station* (Lucas Alados-Aboledas et al., CEAMA-UGR)

Vassilis Amiridis presntes the portal established to upload data to the database of integrated observations (http://lidar.space.noa.gr/lidar_db/, best viewed using Mozilla Firefox browser). Questions about format compatibility with GARRLIC will be addressed when GARRLIC is operative.

Task 20.3. Integrated retrieval schemes for aerosol microphysical properties

The current status and perspectives of algorithm development are discussed through the following presentations:

- *LIRIC: current status and* development (Anatoli Chaikovsky et al., IPNASB; Oleg Dubovik et al., LOA-Univ. de Lille)

The LIRIC (LIdar-Radiometer Inversion Code) software combines sunphotometer products and lidar data to retrieve aerosol microphysical properties in day-time conditions. A practical demonstration is shown on how LIRIC advanced users can analyze and correct the progress of

the optimization process underlying the software. Possibilities about the structure of the database and the automation of the processing are discussed. Although not formally part of LIRIC, a regularization algorithm and software module for ingesting Raman lidar data are also presented.

- *GARRLIC: Generalized Aerosol Retrieval from Radiometer and LIdar Combined data: Status and Perspectives* (Oleg Dubovik et al. LOA-Univ. de Lille; A. Chaikovsky et al., IPNASB)

The GARRLIC (Generalized Aerosol Retrieval from Radiometer and LIdar Combined data) software combines lidar- and sunphotometer-derived information at an earlier stage in the processing chain than LIRIC, using lidar information to act on the sunphotometer columnar information. Comparisons of GARRLIC and LIRIC inversions in the same scenario are shown. LIRIC provides new aerosol products, such as profiles of the particle fine and coarse modes and the capability of distinguishing between spherical and non-spherical particles in the coarse mode when depolarization data are available. The GARRLIC approach improves the accuracy of the LIRIC products and adds the capability of distinguishing the refractive indices of the fine and coarse modes. A sensitivity study has been completed for the case in which only intensity data are used, and is underway for the case in whcich depolarization information is also employed.

The following presentations show results of tests on the previous algorithms:

- *Comments on the potential of lidar, photometer, and combined lidar-photometer methods to retrieve microphysical properties of nonspherical particles* (Albert Ansmann et al., TROPOS; Rodanthi-Elisavet Mamouri, CUT)

A warning is made concerning the use of AERONET-derived lidar ratios, as lidar ratio is very sensitive to the scattering angle, and, unlike lidars, sunphotometers never reach a 180º scattering angle. Results of the application of POLIPHON software combining lidar and sunphotometer data to retrieve aerosol microphysical parameters are shown for some study cases. Comparisons with LIRIC results in cases with non-spherical particles are presented. The different approaches to the retrieval between, on one hand, POLIPHON– based on measured depolarization ratios – and, on the other, LIRIC and GARRLIC – based on particle spheroidal models – are outlined. A call is made to the community to become involved in the test and validation of the different proposed algorithms.

- *LIRIC evaluation using airborne measurements over Greece* (Panos Kokkalis et al., NTUA; Vassilis Amiridis, NOA; Rodanthi-Elisavet Mamouri, CUT; A. Chaikovsky, IPNASB)

Two case studies over Athens are presented, the first one corresponding to September 2011, within the ACEMED campaign, with support from EUFAR, which supplied a plane with on-board instrumentation (see presentation); the second one corresponds to 20 July 2011. Comparisons between aerosol mass concentrations derived from lidar and LIRIC and those forecasted by the DREAM model are presented.

- *Testing of LIRIC on the data of EARLI09 campaign* (Anatoli Chaikovsky, IPNASB, et al., LMU, CNR-IMAA, KNMI, MPI, INOE, TROPOS)

From the test of LIRIC on the data of this campaign it is concluded that there is a good agreement between the inversions obtained from data from different systems (see presentation), and that the profiles of the retrieved aerosol modes are stable against noise and distortion of lidar signals; differences between the retrievals from different systems are observed a close ranges because of differences of the incomplete overlap.

- *Application of combined algorithms to Granada data* (Lucas Alados-Arboledas et al., CEAMA-UGR)

Validation tasks of LIRIC are stressed through different approaches (use of a second nearby sunphotometer at a different altitude, comparison of day-time microphysical retrievals with close nigh-time lidar-only ones, comparison with in-situ airborne measurement and DREAM model). The insensitivity of the LIRIC underlying model to measured depolarization changes in some circumstances is pointed out.

- *Application of LIRIC to Potenza data: progress and problems* (Ioannis Bineitoglou, CNR-IMAA)

A critical assessment of convergence issues of LIRIC and a sensitivity analysis are presented. The problem of assigning weights to different parameters is brought up. Anatoli Chaikovsky and Oleg Dubovik warn against the possibility that by changing the weights the problem can become unconstrained. Care must be taken with weights assigned to parameters that do not have a big influence on the observables.

AGREEMENTS AND ACTIONS

No.	Agreement	Task	Work packages involved
1	Rescheduling of second round of lidar intercomparison campaigns after the end (November 2012) of the first one	2.2.1	WP2
2	Formats for the new mandatory internal check-up test on depolarization calibration profiles for systems not using a polarizing cube will be agreed upon on a case-by-case basis	2.2.1	WP2

Table 1. Agreements table

No.	Action	Task	Work packages involved	Deadline
1	Perform 2nd year mandatory quality check-up tests and forward results to Volker Freudenthaler (stations not having done so yet)	2.2.2	WP2	31 January 2013
2	Rescheduling of second round of lidar intercomparison campaigns	2.2.1	WP2	30 April 2013
3	Provide information to Giuseppe d'Amico on particle linear depolarization measurement technique, specifications, calibration and error analysis	2.3.1 2.3.3	WP2	31 December 2012

4	Usernames and passwords sent by Ioannis Binietoglou to stations to access the SCC web graphic interface	2.3.3	WP2	31 October 2012

Table 2. Actions table

List of participants

Participant	Partner	E Mail
Lucas Alados Arboledas	University of Granada - CEAMA, Granada, Spain	alados@ugr.es
Vassilis Amiridis	National Observatory of Athens, Greece	vamoir@noa.gr
Aldo Amodeo	CNR-IMAA, Potenza, Italy	aldo.amodeo@imaa.cnr.it
Albert Ansmann	TROPOS, Leipzig, Germany	albert@tropos.de
Arnoud Apituley	KNMI, De Bilt, The Netherlands	apituley@knmi.nl
Holger Baars	TROPOS, Leipzig, Germany	baars@tropos.de
Dimitris Balis	AUTH, Thessaloniki, Greece	balis@auth.gr
Livio Belegante	INOE 2000, Magurele, Romania	belegantelivio@inoe.inoe.ro
Ioannis Binietoglou	CNR-IMAA, Potenza, Italy	binietoglou@imaa.cnr.it
Juan Antonio Bravo Aranda	CEAMA - University of Granada, Spain	abravo@ugr.es
Anatoli Chaikovsky	Institute of Physics, NASB, Minsk	chaikov@dragon.bas-net.by
Adolfo Comerón	Univ. Politecnica de Catalunya, Barcelona, Spain	comeron@tsc.upc.edu
Giuseppe d´Amico	CNR-IMAA, Potenza, Italy	damico@imaa.cnr.it
Ferdinando De Tomasi	Università del Salento, Italy	ferdinando.DeTomasi@le.infn.it
Oleg Dubovik	University of Lille 1, France	oleg.dubovik@univ-lille1.fr
Jesús Fernández Gálvez	University of Granada, Spain	jesusfg@ugr.es
Volker Freudenthaler	MIM – LMU München, Germany	volker.freudenthaler@lmu.de
Patrick Fréville	OPGC-LaMP, Clermont-Ferrand, France	P.Freville@opgc.univ-bpclermont.fr
Michael Gausa	ALOMAR, Norway	michael@rocketrange.no
Aleksander Geiß	MIM – LMU München, Germany	alexander.geiss@physik.uni-muenchen.de
Elina Giannakaki	Finnish Meteorological Institute, Kuopio, Finland	eleni.giannakaki@fmi.fi
María José Granados Muñoz	CEAMA - University of Granada, Spain	mjgranados@ugr.es
Juan Luis Guerrero-Rascado	University of Granada - CEAMA, Granada, Spain	rascado@ugr.es
Ivan Grigorov	IE-BAS, Bulgaria	ivangr@ie.bas.bg
Martial Haeffelin	Institut Pierre Simon Laplace, Palaiseau, France	martial.haeffelin@ipsl.polytechnique.fr
Anne Hoffmann	Finnish Meteorological Institute, Kuopio, Finland	anne.hoffmann@fmi.fi
Marco Iarlori	CETEMPS – Univ. L'Aquila, Italy	marco.iarlori@aquila.infn.it
Thomas Kanitz	TROPOS, Leipzig, Germany	kanitz@tropos.de
Panos Kokkalis	NTUA, Greece	panko@central.ntua,gr
Mika Komppula	Finnish Meteorological Institute, Kuopio, Finland	mika.komppula@fmi.fi
Holger Linné	MPI Für Meteorologie, Hamburg, Germany	holger.linne@zmaw.de
Fabio Madonna	CNR-IMAA, Potenza, Italy	madonna@imaa.cnr.it
Rodanthi-Elisavet Mamouri	CUT – Limassol, Cyprus	rodanthi.mamouri@cut.ac.cy
Ina Mattis	DWD MOHP, Hohenpeißenderg, Germany	ina.mattis@dwd.de
Francisco Molero	CIEMAT, Madrid, Spain	f.molero@ciemat.es
Nadège Montoux	LaMP-OPGC, Clermont-Ferrand, France	n.montoux@opgc.univ-bpclermont.fr
Yohann Morille	LMD / IPSL, France	morille@lmd.polytechnique.fr
Francisco Navas Guzmán	CEAMA - University of Granada, Spain	fguzman@ugr.es
Doina Nicolae	INOE 2000, Magurele, Romania	nnicol@inoe.inoe.ro
Francisco José Olmo Reyes	University of Granada – CEAMA, Granada, Spain	fjolmo@ugr.es
Nikos Papagiannopoulos	CNR – IMAA, Potenza, Italy	nikolaos.papagiannopoulos@imaa.cnr.it
Gelsomina Pappalardo	CNR-IMAA, Potenza, Italy	pappalardo@imaa.cnr.it

Sérgio Pereira	Universidade de Evora, Portugal	sergiopereira@uevora.pt
Maria Rita Perrone	Università del Salento, Lecce	perrone@le.infn.it
Christophe Pietras	SIRTA/LMD/IPSL/École Polytechnique, France	pietras@lmd.polytechnique.fr
Aleksander Pietruczuk	Institute of Geophysics PAS, University of Warsaw	alek@igf.edu.pl
Gianluca Pisani	CNISM Napoli – Univ. di Napoli “Federico II”, Italy	pisani@na.infn.it
Manuel Pujadas	CIEMAT, Madrid, Spain	manuel.pujadas@ciemat.es
Vincenzo Rizi	CETEMPS – Univ. L’Aquila, Italy	vincenzo.rizi@aquila.infn.it
Herman Russchenberg	TU Delft, The Netherlands	H.W.J.Russchenberg@tudelft.nl
Andy Ruth	University College Cork, Ireland	a.ruth@ucc.ie
Karine Sartelet	CEREA, Marne-la-Vallée, France	sartelet@cerea.enpc.fr
Ilya Serikov	MPI Für Meteorologie, Hamburg, Germany	ilya.serikov@zmaw.de
Michael Sicard	UPC, Barcelona	msicard@tsc.upc.edu
Nikos Siomos	AUTH, Thessaloniki, Greece	nsiomos@physics.auth.gr
Iwona Stachlewska	University of Warsaw	iwona.stachlewska@igf.fuw.edu.pl
Dimitar Stoyanov	IE-BAS, Bulgaria	dvstoyan@ie.bas.bg
Thomas Trickl	KIT, IMK-IFU, Garmisch-Partenkirchen, Germany	thomas.trickl@kit.edu
Ulla Wandinger	TROPOS, Lepizig Germany	ulla@tropos.de
Matthias Wiegner	MIM – LMU München, Germany	m.wiegner@lmu.de

ANNEX

STRAT tutorial in WP2-WP20 workshop

Friday 5 October 2012
Lecce, Italy

ACTRIS: STRAT tutorial in WP2-WP20 workshop
Friday 5 October 2012 (9.00 to 13.00)
Lecce, Italy

Topic: Lidar data target classification; identifying aerosol and cloud layers using the STRAT software package

Organized by C. Pietras (Laboratoire de Météorologie Dynamique, CNRS), M. Haeffelin (Institut Pierre Simon Laplace, CNRS), Y. Morille (U. Angers, CNRS)

Participants : 30 participants from UPC Barcelona, U. Salento, U. Granada, U. Cork, LMU, INOE, I. Tropos, DWD, FMI, CGE Evora, KNMI, CNR-IMAA, CUT-TEPAK

Objectives : identify aerosol and cloud layers, molecular layers, and boundary layer top based on Lidar range-corrected non-calibrated attenuated backscatter profiles. This analysis is of particular interest to WP2 participants because it can help automate the identification of clear versus cloudy profiles and of portions of the profiles that are near particle free (molecular). This information can be used as input to the Single Calculus Chain. By participating in the tutorial the participants became familiar with using the STRAT software package (GPL licence). Hands-on demonstrations were performed using Lidar data from the participants.

The tutorial started by a 30-min introduction on the STRAT software, its goal, input/output files, and description of the five modules. The participants were then proposed to follow 2 sessions. 1/3 of the participants followed session (1) and 2/3 session (2):

(1) Session (1) focused on Reading and converting Level-1 Lidar data (range-corrected non-calibrated attenuated backscatter profiles) in NetCDF format (using the RAW2L1 software and web-based interface).
(2) Session (2) focused on applying STRAT to Lidar data: Creating or modifying a configuration file; Understanding the different modules of STRAT; Discussion about Lidar signal and noise profiles; Creating a STRAT output file from Lidar data. In this session, the groups of Leipzig, Granada, Barcelona, Potenza, Cabauw and Lecce were successful in applying STRAT to process their own Lidar data.

A discussion was then organized to get feedback on the use of STRAT:

- Being able to compute the Lidar noise profile is a key element for successful STRAT processing. In STRAT 3 methods are proposed, but this could be improved. Volker Freundentaler suggested he could help in proposing other methods.
- Limitations in cloud detection were found in some conditions: in particular for boundary layer broken clouds when the backscatter ratio between cloud base and cloud peak is not strong enough, STRAT is likely to identify clouds as aerosols. Several solutions are discussed: 2-D analysis (instead of 1-D), need to perform analysis at highest possible resolution to avoid smoothing, analyze peak-to-base slope in addition to ratio, …
- Solutions to common problems encountered when using STRAT should be shared with the group. This could be done using a FAQ on the STRAT website

or in the discussion forum of EARLINET. Similarly the EARLINET forum could be used to keep track of new developments.
- A small group of people should think about how to implement STRAT in SCC

STRAT news:
- STRAT is described and available for download on the following website: http://www.lmd.polytechnique.fr/~strat/
- A new version, STRAT v01.04, is available for download. STRAT v01.04 now includes an option where the user can provide his own Lidar noise profile.
- The documentation and website has been modified to include these changes.
- For question, contact strat@lmd.polytechnique.fr

STRAT tutorial – List of participants

Participant	Partner	E Mail
Lucas Alados Arboledas	University of Granada - CEAMA, Granada, Spain	alados@ugr.es
Arnoud Apituley	KNMI, De Bilt, The Netherlands	apituley@knmi.nl
Holger Baars	TROPOS, Leipzig, Germany	baars@tropos.de
Livio Belegante	INOE 2000, Magurele, Romania	belegantelivio@inoe.inoe.ro
Ioannis Binietoglou	CNR-IMAA, Potenza, Italy	binietoglou@imaa.cnr.it
Juan Antonio Bravo Aranda	CEAMA - University of Granada, Spain	abravo@ugr.es
Adolfo Comerón	Univ. Politecnica de Catalunya, Barcelona, Spain	comeron@tsc.upc.edu
Giuseppe d´Amico	CNR-IMAA, Potenza, Italy	damico@imaa.cnr.it
Jesús Fernández Gálvez	University of Granada, Spain	jesusfg@ugr.es
Volker Freudenthaler	MIM – LMU München, Germany	volker.freudenthaler@lmu.de
Elina Giannakaki	Finnish Meteorological Institute, Kuopio, Finland	eleni.giannakaki@fmi.fi
María José Granados-Muñoz	CEAMA - University of Granada, Spain	mjgranados@ugr.es
Juan Luis Guerrero-Rascado	University of Granada - CEAMA, Granada, Spain	rascado@ugr.es
Ivan Grigorov	IE-BAS, Bulgaria	ivangr@ie.bas.bg
Martial Haeffelin	Institut Pierre Simon Laplace, Palaiseau, France	martial.haeffelin@ipsl.polytechnique.fr
Anne Hoffmann	Finnish Meteorological Institute, Kuopio, Finland	anne.hoffmann@fmi.fi
Thomas Kanitz	TROPOS, Leipzig, Germany	kanitz@tropos.de
Mika Komppula	Finnish Meteorological Institute, Kuopio, Finland	mika.komppula@fmi.fi
Rodanthi-Elisavet Mamouri	CUT – Limassol, Cyprus	rodanthi.mamouri@cut.ac.cy
Ina Mattis	DWD MOHP, Hohenpeißenderg, Germany	ina.mattis@dwd.de
Yohann Morille	LMD / IPSL, France	morille@lmd.polytechnique.fr
Francisco Navas Guzmán	CEAMA - University of Granada, Spain	fguzman@ugr.es
Doina Nicolae	INOE 2000, Magurele, Romania	nnicol@inoe.inoe.ro
Francisco José Olmo Reyes	University of Granada – CEAMA, Granada, Spain	fjolmo@ugr.es
Fabio Paladini	Università del Salento, Italy	fabio.paladini@le.infn.it
Sérgio Pereira	Universidade de Evora, Portugal	sergiopereira@uevora.pt
Maria Rita Perrone	Università del Salento, Lecce	perrone@le.infn.it
Christophe Pietras	SIRTA/LMD/IPSL/École Polytechnique, France	pietras@lmd.polytechnique.fr
Andy Ruth	University College Cork, Ireland	a.ruth@ucc.ie
Michael Sicard	UPC, Barcelona	msicard@tsc.upc.edu