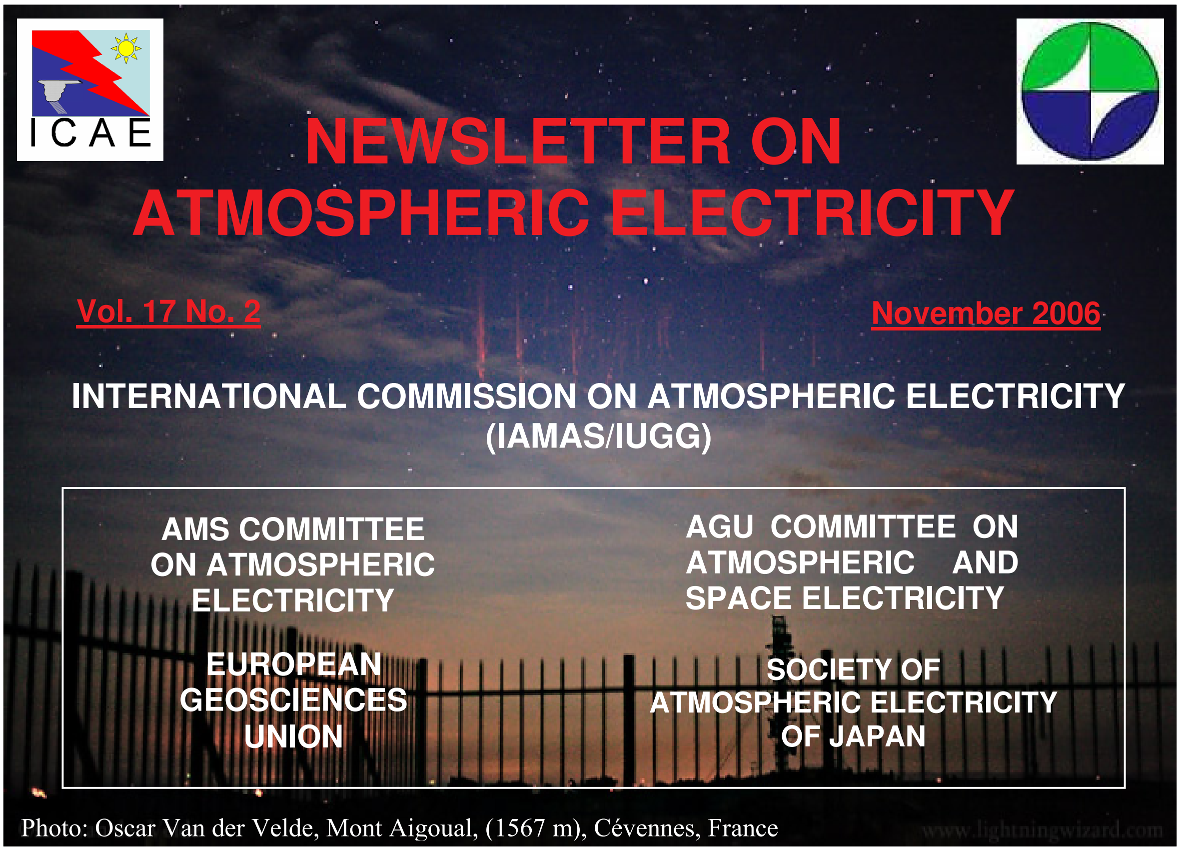

Photo: Oscar Van der Velde, Mont Aigoual, (1567 m), Cévennes, France

The Newsletter on Atmospheric Electricity is sent by e-mail, those colleagues who need a paper version should contact Serge Soula: (serge.soula@aero.obs-mip.fr) or Pierre Laroche: (Pierre.Laroche@onera.fr). They will receive the Newsletter by regular mail. Those who know anybody who needs a printed version are also welcome to contact us. On the other hand, the easiest way to communicate being electronic mail, we would be grateful to all of those who can help us complete the "atmospheric electricity" list of email addresses already available. All issues of this Newsletter are available on the website of the International Commission on Atmospheric Electricity:

http://www.atmospheric-electricity.org/

We remind all our colleagues that the Newsletter remains also available on the website:
http://ae.nsstc.uah.edu/
thanks to Monte Bateman's help.

Contributions to the next issue of this Newsletter (May 2007) will be welcome and should be submitted to Serge Soula or Pierre Laroche before May 15, 2007, preferably under word attached documents. A reminder will be sent to all colleagues whose e-mail addresses are presently listed.

Comment on the photo above: Oscar caught this spectacular sprite photo at Mont Aigoual on September 11th night, during the 2006 eurosprite campaign, by using his digital camera (Canon EOS 5D), a 50 mm lens at f/1.8, ISO 1600 and exposures of 4 seconds. The story behind thee photo is available on the blog: http://eurosprite.blogspot.com/2006/09/photo-of-red-sprite.html

ANNOUNCEMENTS

NSSL, Norman, OK

Atmospheric Electricians in Norman, Oklahoma, are now all collocated at:

The National Weather Center
120 David L. Boren Blvd.
Norman, OK USA 73072

Those included are Bill Beasley, Don MacGorman, Ted Mansell, Vlad Mazur, Dave Rust, Terry Schuur, and Conrad Ziegler
Individual organizational affiliations, telephone, etc. will be on the Atmospheric Electricity Addresses list.: http://ae.nsstc.uah.edu/AE/addresses.html

NEW BOOK

Christian Bouquegneau, Pro-recteur de la FPMs (christian.bouquegneau@fpms.ac.be)

published a new book written in French, in the Collection *Bulles de Sciences,* to the editions EDP Sciences - http://livres.edpsciences.org/ :

Doit-on craindre la foudre ?

Preface by Gérard Berger

CONFERENCES

2006 AGU FALL MEETING

The fall meeting of AGU will be held on **11-15 December 2006**, at the Moscone Center West, 800 Howard Street, San Francisco. (http://www.agu.org/meetings/fm06/)

All sessions for the 2006 Fall Meeting are listed first by Section/Discipline and then by date within each section at the address:
http://www.agu.org/meetings/fm06/?content=program&show=glance

To see directly the AE sessions program, go to this address :
http://www.agu.org/cgi-bin/sessions5?meeting=fm06&sec=AE

The different sessions sponsored by the section AE (Atmospheric and space Electricity) include 129 presentations in oral or poster forms. The list of these presentations is direcly visible at this address : http://www.agu.org/meetings/fm06/waisfm06.html

Meetings of the Focus Groups will be held on Tuesday, 12 December, 18h15 – 19h45 at the Marriott Hotel. For Atmospheric and Space Electricity : Golden Gate C1.

2007 EGU GENERAL ASSEMBLY

The General Assembly 2007 of the European Geosciences Union (EGU) will be held in **Vienna**, Austria, on **15 – 20 April 2007**

The website of the assembly: http://meetings.copernicus.org/egu2007/

Deadline for Receipt of Abstracts: 15 January 2007

The EGU General Assembly covers all disciplines of the Earth, Planetary and Space Sciences. Especially for young scientists the EGU appeals to provide a forum to present their work and discuss their ideas with experts in all fields of geosciences.

Two sessions are open to topics in atmospheric electricity:

NH1.06 - Lightning, listed in Natural Hasard (NH) and co-listed in Atmospheric Sciences (AS). This session is devoted to all aspects of experimental and theoretical topics related to lightning. Convener: Hans Betz Co-Convener: Colin Price, Serge Soula.

ST13 Solar - heliospheric and atmospheric coupling with near-Earth space, listed in Solar-Terrestrial Sciences (ST).
This session explores especially the pathways of energy flow through the Earth's atmosphere via the global atmospheric electric circuit and its relation to clouds, thunderstorms, lightning and sprites.
Convener: Martin Fullekrug Co-Convener: Norma Crosby.

All scientists are cordially invited to submit an abstract to one of the sessions. Further information about the abstract preparation and formatting can be found here.

Deadlines & Milestones

Date	
08 December 2006	Deadline for Support Applications
15 January 2007	Deadline for Receipt of Abstracts
28 February 2007	Deadline for Letters of Invitation for obtaining visas & receiving travel funds
31 March 2007	Deadline for Pre-Registration

13TH INTERNATIONAL CONFERENCE ON ATMOSPHERIC ELECTRICITY

The Conference will be held on August 13-17, 2007 in Beijing, China

The deadline of abstract submitting for ICAE2007 has been delayed from November 1st to November 30th, 2006.

For information about this Conference, visit the Web of ICAE2007: (http://www.casnw.net/icae2007/).

The important dates for this Conference are presented in the following table:

1 July, 2006	Abstract submitting start
30 November, 2006	Deadline for abstract submitting
1 February, 2007	Deadline for financial support application
1 May, 2007	Deadline for extended abstract
1 June, 2007	Deadline for early registration
1 July, 2007	Deadline for hotel reservation
13-17 August, 2007	Conference

Contact:

Chairperson of ICAE 2007:
Dr. & Prof. Xiushu Qie
Lab. of Middle Atmosphere and Global Environment Observation
Institute of Atmospheric Physics, Chinese Academy of Sciences,
Beijing 100029, P. R. China
Phone: +86-10-62005773(O) 13552636006
E-mail: qiex@mail.iap.ac.cn

Secretary of ICAE 2007:
Dr. Yang Zhao
Cold and Arid Regions Environmental and Engineering Research Institute,
Chinese Academy of Sciences
320 Donggang West Road,
Lanzhou 730000, Gansu, P.R. China
Tel: +86-931-4967690
Fax: +86-931-8274863
E-mail: icae2007@lzb.ac.cn

INTERNATIONAL CONFERENCE ON LIGHTNING AND STATIC ELECTRICITY 2007 - (ICOLSE 2007)

The **ICOLSE 2007** will be held at Université Pierre et Marie Curie in Paris, France, from **28-31 August 2007**.

This Conference will be concerned with all aspects of lightning interaction with ground, air and sea systems and human beings.
The website of the conference is: http://www.icolse.org/

Papers are invited concerning issues involving: Aircraft – Spacecraft - Marine Vehicles - Land Vehicles – Buildings - Storage depots – Windmills - Recreational Facilities

Key Dates:

Receipt of Abstracts by Technical Secretariat	31 January 2007
Notification of Acceptance to Authors	30 November 2006
First submission of papers	30 March 2007
Reviewing of Submitted papers	30 May 2007
Notification of Revisions	30 June 2007
Final Submission of revised papers	10 July 2007
Conference	28 –31 August 2007

The Chairman for ICOLSE 2007 will be Dr. Jean-Patrick Moreau. The conference will be hosted by Pierre and Marie Curie University, in association with EUROCAE and Dassault-Aviation.

To send an abstract use the address: tech@icolse.org

For booking and general information please contact Eurocae after January 20 2007

IX INTERNATIONAL SYMPOSIUM ON LIGHTNING PROTECTION (SIPDA)

Prof. Alexandre Piantini, Chairman of the IX SIPDA is very pleased to announce the **Call for Papers** of the IX International Symposium on Lightning Protection - IX SIPDA – which will be held in Foz do Iguaçu, Brazil, from 26th to 30th November, 2007.

The event is organized by the Institute of Electrotechnics and Energy of the University of São Paulo - IEE/USP - with the support of the Institute of Electrical and Electronics Engineers - South Brazil Section - IEEE.

The aim of the Symposium is to present and discuss recent developments concerning lightning modeling and measurement techniques, as well as grounding and lightning protection. The main topics of the Symposium are:

1) Lightning Physics, Characteristics and Measurements
2) Lightning Detection and Location Systems
3) Lightning Protection of Substations and Transmission Lines
4) Lightning Protection of Medium and Low Voltage Distribution Lines
5) Lightning Protection of Structures and Installations
6) Lightning Protection of Electronics and Telecommunication Systems
7) Grounding
8) Lightning Electromagnetic Fields and Electromagnetic Compatibility
9) Equipment
10) Testing and Standardisation
11) Lightning-caused Accidents and Injuries

Authors are invited to submit unpublished papers in the topics listed through the website (www.iee.usp.br/sipda), according to the following time schedule:

- **Abstract submission (min. 400 and max. 600 words): 1st March 2007**
- **Notification of provisional acceptance: 30th April 2007**
- **Full paper submission: 1st July 2007**
- **Notification of final acceptance: 1st September 2007**

For further information about the Symposium, please visit the web site at:
http://www.iee.usp.br/sipda or contact us through the e-mail: sipda@iee.usp.br.

ICLP 2008

From 23rd to 26th of June 2008, the 29th International Conference on Lightning Protection (ICLP) will be held in Uppsala, Sweden.
http://www-conference.slu.se/ICLP2008/index.html

The Conference will be located in Uppsala University : http://www.uu.se/

Several topics in the field of lightning physics and lightning protection will be investigated at this Conference:

- Lightning discharge
- Lightning occurrence characteristics
- Lightning electromagnetic pulse
- Lightning attachment
- Lightning down conductors and grounding
- Lightning protection of power systems
- Lightning protection of electronic systems
- Lightning deleterious effects
- Practical and specific lightning protection problems
- Lightning protection of windmills and other alternative power systems,
- Lightning testing standards.

RESEARCH ACTIVITY BY INSTITUTION

ATMOSPHERIC ELECTRICITY GROUP (ELAT) – BRAZILIAN INSTITUTE OF SPACE RESEARCH (Sao José dos Campos – Brazil)

The last recent activities of ELAT includes: the integration of all lightning sensors (52) installed in Brazil in one large network. The first data are already available in the ELAT site (www.cea.inpe.br/elat); the beginning of the 2007 campaign to observe lightning with high-speed cameras, now with two cameras; and, finally, the organization of the II International Conference on Lightning Physics and Effects and the V Brazilian Workshop on Atmospheric Electricity to be held in Maceió from 25 to 28 November, in collaboration with Dr. Silvério from University of Minas Gerais (for details about the events see www.groundconferences.com). The ELAT has also submitted more than 10 papers to next ICAE Conference in Beijing.

ATMOSPHERIC ELECTRICITY GROUP - PHYSICS DEPARTMENT AT THE UNIVERSITY OF MUNICH (Garching, Germany)

For more than 10 years the „Atmospheric Electricity Group" at the University of Munich studies electrical phenomena in the atmosphere and develops lightning detection sensors. In 2005, a new system for lightning location (LINET) was completed and intensively tested in Southern Germany. The system measures 'total lightning' in the VLF/LF range and implies a new technique for the discrimination between cloud discharges (IC) and ground strokes (CG), which is independent of waveforms. In co-operation with DLR (Atmospheric Physics Group, Deutsche Luft- und Raumfahrt, Oberpfaffenhofen, Germany) LINET was utilized in three scientific field campaigns, taking place in Brazil ("TROCCINOX"), Australia ("ICE") and Africa ("AMMA"). Since May 2006 the Munich group extended LINET to large parts of Europe by means of 60 sensors, covering Germany and all surrounding countries. Numerous additional sites will be equipped for the next storm season in 2007.

A first specific evaluation of network performance was carried out in Poland, comparing lightning data with results from the local Safir-PERUN system, as a contribution to the GROUND conference in Brazil (2006). Further tests and comparisons in various countries are under way. The high efficiency for low-amplitude lightning, reporting of IC events including emission heights, and an optimized locating accuracy for CG strokes – in Germany an average error of ~150 m is achieved – renders the data interesting for a number of research purposes. Among these we mention the determination of lightning-induced NOx production and a possible scaling to global production, using world-wide networks, test of numerical cloud models, and studies of severe weather conditions using the ratio between IC and CG signals.

One focus of our research concerns the basic understanding of the reported IC events which, though generally weaker as compared to CG strokes, represent relatively strong events; the distribution of IC and CG current amplitudes overlap so that despite fundamental differences in the production mechanism some similarities of the discharge processes must be present. Specific clarification is expected from comparisons between LINET and PROFEO planned for 2007. For this purpose, the number of LINET sensors in France will be increased in order to optimise detection of IC events in the area Ile de France around Paris. Co-operations for the study of lightning processes using extended networks are welcome.

Contacts: hans-dieter.betz@physik.uni-muenchen.de

ATMOSPHERIC ELECTRICITY RESEARCH GROUP AT THE INSTITUTE OF GEOPHYSICS, POL. ACAD. SCI. (Warsaw, Poland)

Warsaw atmospheric electricity group continues its activities in the field of thunderstorm electricity observations and lightning research (Piotr Baranski: baranski@igf.edu.pl). Some farther observations of electric field changes of the first and subsequent return strokes in CG flashes in summer thunderstorms in Poland were presented at the first COST P18 workshop which was hold 2-3 April 2006 in Vienna. Details are available on www pages (http://www.costp18-lightning.org/). In last thunderstorm season we collected additionally several cases of CG flash events with their electric field signatures containing the continuing current component. The observations are prepared to be examined and presented during the 13-th ICAE in Beijing, China. The previous recordings of the bipolar flashes during summer thunderstorms near Warsaw are published in *Acta Geophysica* (vol. 54, no.1, pp. 71-89, 2006) available through www.cesj.com.

In 2007 we will start our special research project entitled “Multiple cloud-to-ground lightning flashes - their development, parameters, hazard for people and risk of damages”. in the frame of the COST P18 program with the cooperation of Warsaw University of Technology, Institute of Meteorology and Water Management and Space Research Centre of Polish Academy of Sciences. The preliminary task is the design, construction and operation of the complementary local lightning detection system (LLDS) in the region of Warsaw as additional source of data on multiple CG lightning indicated by the SAFIR lightning detection system and eventually by the CELDN or the LINET data recorded from Warsaw region. The LLDS network will consist of six stations installed in Warsaw area and equipped with: electric field changes receiving antenna of frequency band up to 100 kHz, GPS time synchronization clock, pretriggered A/D converter, individual memory storage bank. The central analyzer with personal computer will be used for post processing of stored data from all simultaneously working antennas. The fast speed movie cameras (Redlake or similar type) will be applied for records of lightning development images in selected regions of horizon containing tall structures. The records are planned to be done in years 2007-2008. We intend to extend the range of the collected data on relations between CG discharges (including multiple strokes), and the SAFIR lightning and meteorological radar observations in different elevations of lightning channels in view to get better knowledge on multiple discharge origin and development. Comparative examinations of the LLDS and the SAFIR (and the CELDN/LINET) data are expected to verify the quality of lightning data available now over Warsaw from different location systems as well to enrich multiple lightning flash studies in the region of Warsaw.

The new data from the atmospheric electricity arctic station at Hornsund (77.0°, 15.5°) brought further examples of characteristic electric field, E_z, and air-earth current, J_z, regularities in correspondence to variations of the geomagnetic field components and ionosphere absorption simultaneously recorded (Stanislaw Michnowski: smichn@igf.edu.pl). This behavior observed previously at the ground during fair weather appear to be related to the magnetosphere-ionosphere configuration and the position of the station. The recently introduced Schumann resonance recordings in Hornsund as well as an extension of the available data from the Scandinavian IMAGE magnetic station network and from the satellite recordings provide presently more information concerning the indication of possible response of the lower atmosphere electricity elements to the solar wind changes. The spectral analyses of the E_z and J_z variations as well as of the geomagnetic field components and riometer absorption changes show simultaneous occurrence and similarity in wavelet structure of long period spectrum of variations of these elements during observed substorms induced by solar wind.

Atmosphere electricity recordings carried out in the Geophysical Observatory at Swider (Marek Kubicki: swider@igf.edu.pl) during more than fifty years (1927-1929; 1954-2006) were used for a preliminary examination of long term variations of the electric field in relation to the solar activity and anthropogenic influences. The changes in the long term trends were shown by the wavelet analysis of the E_z and recorded electrical conductivity variations, and compared with the variation of simultaneously measured at Swider: radioactive fallout, aerosol, dust, chemical pollutants, Be7 concentration and meteorological parameters. The daily courses of the average fair weather mean hourly values of E_z in winter season at Swider are similar in the shape to the Carnegie curves. The seasonal distribution of E_z exhibits maximum in winter and minimum in summer. The difference between the extremes varies within the range of 30% of the annual average value. A seemingly inconsistency of seasonal variations of E_z and of the corresponding global thunderstorm activity from the point of view of the global circuit was noticed and elucidated at the presentation of seasonal variations of the parameters observed at Swider.

Additional problems appear recently in the range of the atmospheric electric field anomalies as the eventual precursors of the earthquakes. The mentioned topics are being prepared with Russian coworkers and will be presented at the 13-th ICAE in Beijing, China.

ATMOSPHERIC ENVIRONEMENT RESEARCH GROUP – ONERA - The French Aerospace Lab (Chatillon, France)

Modeling of atmospheric Electricity

Alain Delannoy(Alain.Delannoy@onera.fr) continues the development of the electrification model initially set up by Bob Salomon and al. at Washington State University. THOR is a microphysic and dynamical deep convection cloud model providing the description of cloud electrification on the base of a detailed and explicit microphysical and a simplified dynamic. An advanced lightning parameterization is coupled to THOR in order to retrieve a realistic lightning flashes activity associated to the dynamical and microphysical activity of deep convective clouds. Alain Delannoy and Alain Broc (Alain.Broc@onera.fr) apply THOR model to several actual situations for which they were able to describe the general characteristic of the associated lightning activity.

Lightning arc interaction with materials

Laurent Chemartin (Laurent.Chemartin@onera.fr), Onera PhD student and Philippe Lalande develop a 3D physical modeling of the behavior of arc interaction with material. In collaboration with Clarisse Delalondre (Clarisse.Delalondre@edf.fr) EDF (French Electric Power Research Department), they work on the adaptation of Saturne^{TM} code to describe the behavior of an arc swept by airflow. In a first step they will organize the coupling of Saturne^{TM} with CFD codes. In the future the interaction of the arc with the material at the attachment sites will be considered.

Lightning channel sweeping process

On the base of the work done on 3D arc modeling, Philippe Lalande is preparing a project gathering the effort of several Onera Groups for the global modeling of the arc channel including the interaction with airflow, materials of aircraft fuselage and electromagnetic radiation of the arc.

Observation of lightning activity

Patrice Blanchet (Patrice.Blanchet@onera.fr) is achieving the final assembly of the research lightning mapper PROFEO. PROFEO is a VHF interferometer and DTOA associated with MW TOA measurements, designed to provide 3D detailed description of lightning activity over Paris district (typically 200 km x 200 km). PROFEO will be in operation during summer 2007 during which time several LINET stations will be added to the network in order to conduct collaborative analyses with Prof. Hans Betz of Physics Department at the University of Munich.

Collaboration with University of French Polynesia is going on with Pascal Ortega (Pascal.Ortega@upf.pf)who is setting up a MW lightning mapper network which will provide the opportunity to study lightning activity Characteristic at the transition between land and Ocean.

GEOELECTROMAGNETIC MONITORING LABORATORY OF BOROK GEOPHYSICAL OBSERVATORY IPE RAS (Yaroslavl, RF)

Current studies are directed to the study of Global electric circuit and Earth's atmospheric electricity. The members of the research team of GemM Laboratory are Dr. S.V. Anisimov (Head of GemM Laboratory), Dr. E.M. Dmitriev, Dr. N.M. Shikhova, Dr. S.S. Bakastov and. K.V. Aphinogenov. The researches are performed in collaboration with the Plasma Physics and Electronics Department of the Institute of Applied Physics, RAS (Dr. E.A. Mareev).

The relations of aeroelectric and temperature fields in the lower atmosphere were investigated for convective seasons of 2003-2006. We proposed the mechanisms of coupling of the aeroelectric field intensity and the atmospheric air temperature, which explain their positive correlation under conditions of unstable stratification (late morning-day) and negative correlation in the late evening and at night. The transference of space charges has been substantiated by means of the remote sensing of electric field variations during 2005-2006. The computer modeling of the atmosphere electrode effect dynamics was developed by algorithm of minimization of difference between the experiment data and the results of the numerical solution of the corresponding differential test.

A problem of distinguishing between the global, regional and local variations of the electric field and current in the global atmospheric electric circuit is a long-term fundamental problem of atmospheric electricity. Synchronous observations of the electric field have been organized at three stations, spaced at the distances from 100 to 370 km each from another: “Borok” ($58^0$04´ N and $38^0$14´ E), “Prozorovo” (58^0 23' N; 37^0 39' E) and “Gorodets” ($56^0$41´ N and $43^0$26´ E). Along with the electric field variations, the variations of the electric current and air polar conductivities were measured at the stations “Borok” and “Gorodets”. Observations were performed in summer periods of 2005 and 2006. A unique aeroelectric data base has been created. The results of cross-correlation, spectral and wavelet analyses of synchronous measurements showed the presence of characteristic common temporal scales for the variations of different intensity and close time intervals.

The GemM Laboratory Measurement Complex has been used for the routine continuous observations of atmosphere electric field and atmosphere electric current. The data of aeroelectrical observation are presented on the web-site of Borok Geophysical Observatory Database (http://geobrk.adm.yar.ru:1352/electric/index.html).

The results of recent researches were reported at the International Symposium “TOPICAL PROBLEMS OF NONLINEAR WAVE PHYSICS (NWP-2005)”, Nizhny Novgorod-2005 and Conferences “Composition of atmosphere and electrical processes” Borok-2005, Moscow-2006.

INDIAN INSTITUTE OF TROPICAL METEOROLOGY (Pune-411008, India)

Abstract of a study from satellite-based observations:

Satellite based observations of LIS and OTD: A comparative study of flash count during the overlapping period, by M.K. Kulkarni, M.I.R. Tinmaker and S.S. Kandalgaonkar :

Satellite represents an ideal platform for investigating lightning activity over large region. Also, in general, satellites provide detailed information on lightning characteristics i.e. spatial extent, temporal and discharge frequency up to hundreds of km. Characteristics of lightning flashes in different geographical regions are of great interest both in the engineering applications and in the analysis of interactions between lightning and earth’s atmosphere. Thundercloud being optically thick medium, strongly affects the temporal and spatial characteristics of the optical signals produced by lightning. This is observed by sensor of the satellite. The optical measurements of lightning activity recorded by both sensors (LIS and OTD) in the form of flash count, during overlapping period have been compared. For this purpose, daily lightning data recorded by LIS and OTD for two overlapping years, i.e. for 1998 and 99, has been analysed over the Indian landmass covering 8°-33° N and 73°- 86° E, at a spatial resolution of 0.5° X 0.5° grid (~55km x 55km) obtained from Global Hydrology and Climate Centre Lightning Research Team at NASA’s Marshal Space Flight Centre is used to compare the lightning flash counts recorded by two sensors. Also, their diurnal and annual variation is examined over the Indian land region. Even though LIS has recorded higher flash counts than OTD their variation is almost similar.

LABORATORY OF LIGHTNING AND SEVERE STORM, COLD AND ARID REGIONS ENVIRONMENTAL AND ENGINEERING RESEARCH INSTITUTE, CHINESE ACADEMY OF SCIENCES, (Lanzhou, Gansu 730000, P. R. China) & LABORATORY OF MIDDLE ATMOSPHERE AND GLOBAL ENVIRONMENT OBSERVATION(LAGEO), INSTITUTE OF ATMOSPHERIC PHYSICS, CHINESE ACADEMY OF SCIENCES, (Beijing 100029, China)

Shandong Artificially Triggering Lightning Experiment (SHATLE) has been carried out continuously in middle eastern China by the Laboratory of Lightning and Severe Storm in Lanzhou with collaboration with LAGEO in Beijing since 2005. The purpose of the experiment is to clarify the discharge intensity and its correlation to dynamic and microphysic processes in the Mesoscale Convective System that occurs quite often in the region from June to August. Seven negative flashes including 30 return strokes have been artificially triggered with the rocket-wire technique. One quite intense lightning discharge including 2 return strokes was triggered by using the classical triggering method in the summer of 2006 with the peak current of return stroke of about 42 kA. The impact of lightning rod on the waveform of current, the relationship between current and Electromagnetic field, the optical spectrum have been also interested.

The electrical characteristics of thunderstorm in the Chinese Inland Plateau and Tibetan Plateau have been continuously studied. The result proves that the positive CG lighting discharge tends to occur in the upper part of the storm during the late stage of middle-intensity thunderstorm when the lower extensive positive charge center is decreased. For the strong thunderstorm with much-larger-than-usual LPCC, the ratio of positive CG could be high and it occurs possibly in the lower LPCC. With the assistance of collogues in Laboratoire d'Aérologie in Toulouse, a measuring system of charged hydrometeor particles inside the cloud has been developed preliminarily. In situ soundings of charged particles together with Electric field are planed in the next summer to investigate the charge structure of thunderstorm in this special region.

The lightning and precipitation structure around the onset of Chinese South Sea monsoon season have been studied by using the standard orbit data of PR, TMI and LIS on TRMM satellite. A distinguish difference has been found before and during the monsoon seasons.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (Parsons Laboratory, Cambridge, Massachusetts 02139, USA)

The MIT C-band Doppler radar was upgraded and fielded in Niamey, Niger under NASA sponsorship for participation in the AMMA (African Monsoon Multidisciplinary Analysis). Round-the-clock operation of the radar and a suite of electrical/lightning measurements took place from late June to late September, 2006. Targets for investigation in atmospheric electricity were the stratiform regions of squall lines, the occurrence of sprites over Mesoscale Convective Systems (MCSs), and the behavior of gust-front generated dust storms. Further details are given below.

Numerous squall lines were documented with laterally extensive (>100 km) stratiform regions with radar bright band, and supporting spider lightning flashes with positive CGs. This behavior in baroclinic Africa contrasted with earlier observations of a similar nature in the more barotropic Amazon basin of Brazil, and helps explain the abundance of Schumann resonance Q-bursts for Africa in comparison with the other tropical 'chimneys'. Yasu Hobara, Bob Boldi and Earle Williams are studying events simultaneously observed in the African squall lines and in Schumann resonance observations in Rhode Island, for the upcoming AGU meeting.

Given the abundance of energetic positive lightning flashes in Niger MCSs, we expected the frequent presence of sprites overhead. But despite numerous attempts to detect them with low-light video equipment supplied by Walt Lyons and Tom Nelson, no sprites were documented. This failure is currently attributed to the large aerosol optical thickness in Africa and the abundance of upper tropospheric cirrus cloud from vigorous continental convection there. Even on 'clear' moonless nights, far from the city lights of Niamey, it was unusual to be able to see stars below 30 degrees elevation angle for the same reasons.

More riveting than lightning in Niger (despite its great abundance) were the gust-front producing haboobs, or dust storms. These advancing walls of red-brown dust extended to heights of thousands of meters, often extinguished the bright lights at the nearby international airport, and produced systematic strong perturbations in surface electric field, indicative of predominant negative charge overhead. This polarity is consistent with that of dust devils documented in the literature, but is still poorly understood. Rich enhancements in condensation nuclei were also observed in advance of the gust front temperature drops and opaque dust walls. Work is underway by colleagues from Guadeloupe (Nathalie Nathou, Elizabeth Hicks, and Constantin Pontikis) to understand the haboob contribution to the transport of African dust across the Atlantic Ocean to the Americas.

The MIT radar was left in place in Niger for additional work in Africa next summer. Those interested in either the MIT radar data set for 2006 or investigations there in 2007 should contact Earle Williams (earlew@ll.mit.edu).

SPACE SCIENCE AND TECHNOLOGY DEPARTMENT – RUTHERFORD APPLETON LABORATORY (Oxfordshire, UK)

The RAL group continues to work on both planetary and terrestrial atmospheric electricity. Karen Aplin, Nicholas Owen and Peter Stevens have predicted ion mobilities and developed methods to obtain the first Titan ion mobility spectra from the Huygens probe data. Karen Aplin is a member of the Huygens atmospheric electricity analysis working group and is contributing to the ongoing interpretation of the Huygens data and determination of possible Titan global circuit parameters. With the Reading University group, we have also been working on the atmospheric detection of infra-red absorption of cluster ions using dedicated filters at the infra-red absorption bands previously detected in our laboratory.

TEL AVIV UNIVERSITY (TAU), DEPARTMENT OF GEOPHYSICS AND PLANETARY SCIENCES - THE OPEN UNIVERSITY OF ISRAEL (OUI), DEPARTMENT OF LIFE AND NATURAL SCIENCES - (Tel Aviv, Israël)

Colin Price (Tel-Aviv University) together with **Yoav Yair** (Open University of Israel), **Alberto Mugnai** (National Research Center, Italy), **Kostas Lagouvardos** (National Observatory of Athens, Greece), **Carmen Llasat** (University of Barcelona), and **Sila Michaelides** (Cyprus Meteorological Service) have recently started a new European project called FLASH, that deals with flash floods in the Mediterranean region, using lightning data from the ZEUS VLF network to investigate past flash flood storms, while trying to better predict future flash floods. The project started in September 2006.

Colin Price, **Yoav Yair** and **Mustafa Asfur** have been using VLF data from Africa to study the connections with African Easterly Waves (AEWs) and hurricane cyclogenesis in the Atlantic Ocean. We have analysed the data from the active 2005 season and the weak 2006 season, with significant differences found in the lightning activity in these years. A new graduate student, Yuval Reuveni, has started to work on our old and new Stanford VLF receivers to investigate space weather effects on VLF propagation.

Colin Price, **Olga Pechony** and **Eran Greenberg** continue their theoretical and experimental analysis of Schumann resonance parameters. A few papers have been submitted to Radio Science dealing with ELF transients, and the day-night asymmetry of the earth-ionosphere waveguide.

Colin Price and **Adi Zomer** are continuing to study ultra low frequency (ULF) magnetic anomalies in southern Israel. We have recently started to collect simultaneously seismic data along side the magnetic ULF data, in order to try to differentiate between seismic related ULF anomalies, and other sources of noise. We are also building a new ULF station close to the Dead Sea, 200km north of the first station.

The ILAN team led by **Yoav Yair** and **Colin Price** is continuing into the 2006/7 winter-sprite campaign after successfully detecting winter sprites and ELVES near Israel during the 2005/6 campaign (Ganot et al., 2006, to be submitted). Optical observations are carried out either from the Tel-Aviv University campus or from the Wise Observatory near Mizpe-Ramon in southern Israel, and simultaneously ELF and VLF data are collected. Early October storms have already exhibited significant sprite activity. A continuing cooperation with **Jo'zsef Bór** and **Gabriella Sátori** from the Geodetic and Geophysical Research Institute, Sopron, Hungary, enables a comparison of the ELF signals of the parent lightning for the observed TLEs as recorded by the two stations. The results of the 2005/6 campaign show that for 87% of TLEs an intense ELF event that was observed both from MR (Israel) and NCK (Hungary) located some 500 km and 2100 km respectively from area of the TLEs. Charge moment change calculation showed values of 1400±600 C km (Greenberg et al, 2006, submitted). The ILAN team (Imaging of Lightning And Nocturnal flashes, open website URL: http://geophysics.tau.ac.il/personal/Ilan/) includes students **Michal Ganot, Yosef Shertz, Eran Greenberg** (TAU) and **Roy Yaniv** (OUI). This year a team from the Hebrew University of Jerusalem led by **Caryn Ehrlich** will join the sprite campaign, observing from the top of Mt. Scopus in Jerusalem, possibly enabling triangulation and 3D imaging of sprites.

Yoav Yair, **Reuven Aviv**, **Baruch Ziv**, **Roy Yaniv** (OUI), **Colin Price** (TAU) and **Gilad Ravid** (BGU) continue working on the network analysis of lightning activity in spatially distant thunderstorms. The initial results were lately published in JASTP (68, 1401-1415, 2006). New data-sets from previous space-shuttle missions will be re-analyzed, as well as data from ground-based lightning location system in Israel and Canada. An emerging cooperation with **Rajeev Thottappillil** from the University of Uppsala in Sweden will enable the comparison of network parameters in different types of storms.

THE UNIVERSITY OF READING (Reading, UK)

Giles Harrison, Alec Bennett, Keri Nicholl, Madhavi Latha
(r.g.harrison@reading.ac.uk)

Recent instrument work at Reading has led a reliable method for measuring the air-earth conduction current density in a range of atmospheric conditions, with a rigorous calibration (Alec Bennett). There are few direct measurements of this quantity on a long term basis, and these new measurements, alongside continuous monitoring of the Potential Gradient, provide a substantial new dataset in urban air. The techniques have been reported in the *Review of Scientific Instruments*.

Keri Nicholl is developing new techniques in ion measurements, both with the Reading PIMS instrument and through considering the use of spectroscopic techniques. Madhavi Latha is investigating methods to compensate for the effects of aerosol on PG measurements, with the ion-aerosol balance equation applied to co-located measurements.

Giles Harrison has been working with Sachida Tripathi (University of Kanpur) on theory for the removal of charged aerosol particles by water droplets. This has led to simplified methods for calculating charged aerosol removal, described in a paper in the *Quarterly Journal of Meteorology*. These methods are designed for inclusion in numerical cloud models. A simple calculator program for these evaluations can be downloaded from:
http://www.met.rdg.ac.uk/~swshargi/WebStuff/Pubs/Abstracts/Tripathi_etal06.htm

Work with Tamsin Mather (Earth Sciences, University of Oxford) has led to a new review paper on volcanic lightning, published in *Surveys in Geophysics*.

UNIVERSITY OF FLORIDA (Gainesville, Florida, USA)

At the UF/FIT International Center for Lightning Research and Testing, the combined network of electric and magnetic field (MSE) and x-ray (TERA) sensors was expanded and upgraded during Summer 2006. The network monitors the fields, x-rays, and optical output of natural and triggered lightning within its 1-km^2 area of coverage. The network now contains eight pairs of electric field derivative (upper frequency response 20 MHz) and x-ray (a few keV to 5 MeV) sensors, with a timing uncertainty between signals received at different sensors of a few nanoseconds. The total number of network stations is now 20. Each of these stations is equipped with a one- or two-channel x-ray sensor, 6 stations are equipped with electric field sensors, 8 stations with dE/dt sensors, and 2 with magnetic field sensors.

R.C. Olsen III, V.A. Rakov, D.M. Jordan, J. Jerauld, M.A. Uman, and K.J. Rambo authored a paper titled "Leader/return-stroke-like processes in the initial stage of rocket-triggered lightning". Linear streak film, video, current, and electric field records from nine triggered lightning flashes are analyzed to examine the process of cutoff and reestablishment of current during the initial stage of rocket-triggered lightning. All of the data were acquired at the International Center for Lightning Research and Testing at Camp Blanding, Florida, in 2002 and 2003. It is shown that in some rocket-triggered lightning events, the process of current cutoff and reestablishment during the initial stage is similar to a leader/return-stroke sequence, although the currents in this process are typically an order of magnitude smaller (1 kA or so) than those in a triggered or natural lightning subsequent stroke (10–15 kA). The events were separated into two groups based on observed characteristics, with the duration of the current cutoff interval being the primary differentiating characteristic. In some cases, two or three failed attempts at current reestablishment prior to the successful resumption of current flow in the channel were observed. Currents associated with the unsuccessful attempts were typically an order of magnitude smaller (100 A or so) than in the process which finally reestablished the current. The process of reestablishing current in rocket-triggered lightning is apparently similar to that observed in so-called altitude-triggered lightning and that inferred to occur in natural lightning when current is cut off close to the ground. The paper is published in the JGR.

G. Maslowski (visiting scholar; permanently at the Rzeszow University of Technology, Rzeszow, Poland) and V.A. Rakov authored a paper titled "A study of the lightning channel corona sheath". Dynamics of lightning channel corona sheath surrounding thin channel core is examined on the basis of three transmission-line-type models of the return stroke that specify different attenuation of longitudinal current with height. The corona sheath conductivity is estimated using measured radial electric field in the immediate vicinity of the lightning channel and measured channel base current. The corona sheath radius, velocity of corona sheath radial expansion, and corona current are examined using a multiexponential approximation of the lightning channel base current waveform. Additionally, energy dissipated in the corona sheath is estimated and compared to that dissipated in the channel core. The following properties of the radial corona sheath were found. (1) Electrical conductivity in the return stroke corona sheath is of the order of 10^{-6}–10^{-5} S/m, which is comparable to the conductivity of very poorly conducting soil. (2) The return stroke corona sheath expands, at a velocity that is between 10^4 m/s and 10^5 m/s (except for the first microsecond when this velocity briefly exceeds 10^6 m/s), to a radial distance of several meters (close to 10 m near ground for the MTLE model) in a millisecond or so. (3) Energy dissipated in the return stroke corona sheath can be comparable to that dissipated in the channel core, although the rate of energy deposition (power) per unit volume in the corona sheath is 4 orders of magnitude lower than in the core. The paper is published in the JGR.

UNIVERSITY OF LEICESTER - RADIO AND SPACE PLASMA PHYSICS GROUP (Leicester, U.K.)

As part of the CAL (Coupling of Atmospheric Layers) project, Anna Odzimek and Neil Arnold (University of Leicester, U.K.) have been working with Michael Rycroft, of CAESAR Consultancy, Cambridge, U.K. They have been investigating, theoretically: a) the global atmospheric electric circuit, including maps of topography and thunderstorm activity (following Makino and Ogawa, Journal of Atmospheric and Terrestrial Physics, 46, 431-445, 1984), modelled atmospheric electrical conductivity profiles, and a non-equipotential ionosphere at 80 km altitude, in order to generate “synthetic Carnegie curves”, b) how sprites may vary the potential of the ionosphere above an active thunderstorm producing +CG discharges, c) answers to some of the sixteen questions mentioned at the end of the paper by Michael Rycroft “Electrical processes coupling the atmosphere and ionosphere: An overview” (Journal of Atmospheric and Solar-Terrestrial Physics, 68, 445-456, 2006).

UNIVERSITY OF ULM, MATERIALS DIVISION, (Ulm, Germany)

New data obtained from the slow evaporation of water drops containing nanoparticles on hydrophobic substrates provided observational access to the precise mechanism by which sessile water drops evaporate. The results indicated the existence of a nanoscopic water layer separating the bulk water from the substrate beneath, an interlayer with an organization that is different from that of the bulk water. The experiments were carried out at room temperature. Previously we imaged nanoscopic water layers at room temperature in air (Sommer A.P. and Franke R.P., Modulating the Profile of Nanoscopic Water Films with Low Level Laser Light. Nano Letters, 3, 19-20, 2003). This is significant, because of additional studies, indicating a crystalline structure of water confined to surfaces – even at room temperature. Nanoscopically thin films of water coating ice crystals are discussed today as charge reservoirs, facilitating the exchange of charge during ice crystal / graupel collisions in thunderclouds. A new element involving nanoscopic water layers is their necessary presence on the surface of aerosols in the atmosphere. The thickness of the water layers masking them depends primarily on the polarity of the aerosol particles and the temperature and humidity of the particular milieu. Notably, measurements regarding the size and chemical composition of aerosol particles do not provide any information on the presence or absence of water layers. When measurements are carried out in vacuum a good piece of information is lost. It would be instructive to study the aerosols captured in the atmosphere by imaging methods allowing their examination at humidity and temperature levels mimicking the situation in the clouds. We hope, our results will motivate the atmosphere electricity community to implement into the laboratories more Atomic Force Microscopes and Environmental Scanning Electron Microscopes – two of the most powerful high-resolution imaging instruments operating at ambient conditions. Knowing more on the structure and thickness of the water layers masking aerosols in general, and nanoaerosols in particular, is essential for modeling the impacts of aerosols on climate, including absorption and scattering of solar irradiation and their probable impact on the intensity of hurricanes. The water layers coating nanoaerosols in the atmosphere on the one hand, and aerosol size-spectra determined in the laboratory on the other hand, could falsify calculations based on monitoring aerosols by satellites.

This is certainly true for nanoaerosols carrying substantial water layers, comparable to their own volume. A novel method to identify nanoaerosols in rain and hail has been recently introduced by us. (Andrei P. Sommer, samoan@gmx.net)

UNIVERSITE PAUL SABATIER - LABORATOIRE D'AEROLOGIE, (Toulouse, France)

Oscar Van der Velde and Serge Soula participated in the Eurosprite campaign during the summer of 2006 by using an observation system including a Watec 902H camera and the UFOCapture software. This system was used several nights at Mont Aigoual, France (44° 07' 17,02" N; 3° 34' 52,52" E) and one night in Toulouse directly from the laboratory. Several sprites were caught with this system (71 during 5 nights of observations). The last night of observation on 17th November provided 17 sprites observed from the roof of the laboratory in Toulouse.
The other camera managed by the Danish National Space Center (Torsten Neubert) for this campaign was mounted at Pic du Midi (42.93° N, 0.14° E). During one night of observation (27th of July) two sprites were simultaneously detected by the two cameras. The images of the sprites observed from the two sites are visible on the blog of the campaign: http://eurosprite.blogspot.com/
Aglika Savtchenko, Ph.D. student at the University of Sofia (Bulgaria), spent one month during the summer in our group and took part in these observations.
Michal Ganot, student at the Tel-Aviv University (TAU), Israel, who spent two weeks in our group could take part to the campaign. She brought a camera Watec 100N and this way we could cover a larger field of view from the Mont Aigoual site. During the night of September 11th – 12th a mesoscale convective system was active over land close to the Atlantic cost and South of Bordeaux, providing 28 sprites events observed by both or one of both cameras used at Mont Aigoual. The camera of Pic du Midi was in the cloud that night.
The final meeting of the CAL project (http://www.dsri.dk/cal/) which associates several European countries for the research on sprites was held at Danish National Space Center in Copenhagen (Denmark) on 24-25 August.

Modeling activity in atmospheric electricity:
After completing her thesis in september 2005 under the supervision of J-P Pinty, Christelle Barthe got a 1-year ASP grant at NCAR, Boulder, CO, where she moved on 15 Nov. of this year. Christelle's project is to work on some aspects (LNOx parameterization, aqueous phase chemistry) in the non-hydrostatic mesoscale model WRF with Dr Mary Barth . Christelle recently published a part of her thesis modeling work in 2 papers to appear soon in JGR. A first paper describes the results of the 5-hour simulation of the 10 July 1996 STERAO case which was performed with an explicit NOx production derived from the original lightning scheme of MesoNH. The second paper describes a detailed simulation of an electrified supercellular storm in our mesoscale model MesoNH. Other papers (a multistorm sensitivity study and results of an intercomparison workshop) are submitted or under consideration for submission in a journal.

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