http://www.icae.jp

Newsletter on Atmospheric Electricity

Vol. 23 · No 2 · Nov 2012

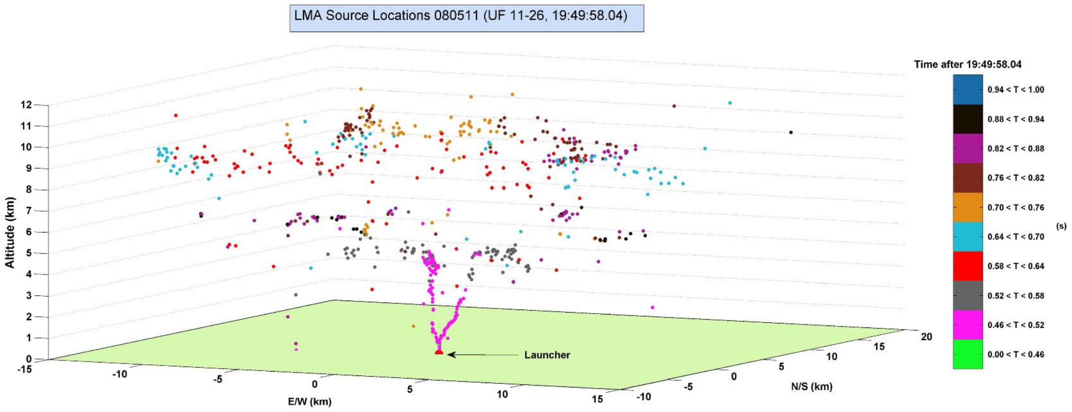
INTERNATIONAL COMMISSION ON ATMOSPHERIC ELECTRICITY (IAMAS/IUGG)

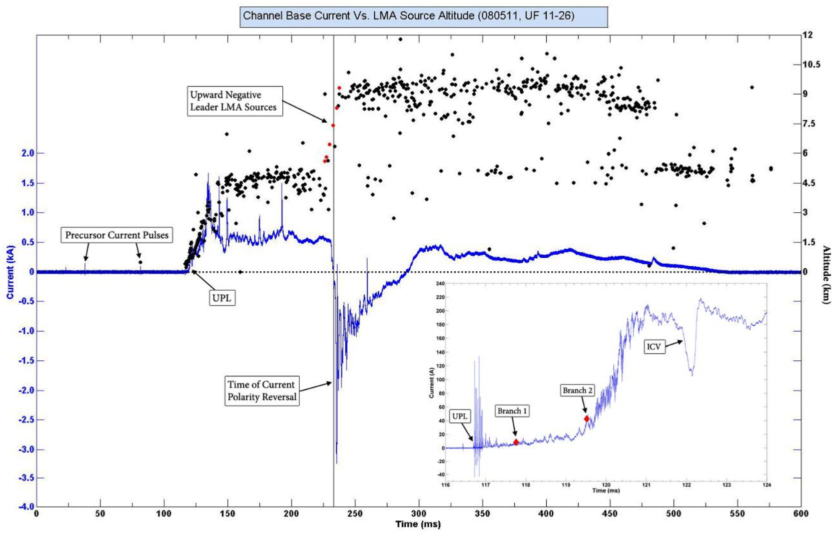
AMS COMMITTEE ON ATMOSPHERIC ELECTRICITY

AGU COMMITTEE ON ATMOSPHERIC AND SPACE ELECTRICITY

EUROPEAN GEOSCIENCES UNION

SOCIETY OF ATMOSPHERIC ELECTRICITY OF JAPAN





Comment on the photo above: **LMA source locations and channel base current for an unusual triggered lightning flash at the UF/FIT International Center for Lightning Research and Testing at Camp Blanding, FL. The triggering process with its upward positive leader curiously led to the initiation of an intracloud discharge from the top of the lower negative charge region into the upper positive charge region, with some of the charge from the upper positive center flowing to ground, reversing the normal direction of current flow at ground. The LMA sources of the negative upward leader which initiates the cloud discharge are shown on the bottom left figure in red dots just prior to the current reversal. Adapted from a paper to be submitted for publication by Hill, Pilkey, Uman, Jordan (UF), Rison, Krehbiel (New Mexico Tech), Biggerstaff, Highland (OU), and Blakeslee (NASA).**

ANNOUNCEMENTS

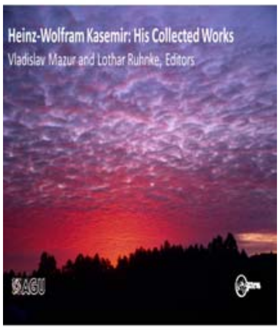
Awards

Vladimir A. Rakov has been elected a Fellow of the American Geophysical Union (AGU) “for his fundamental work on lightning modeling and his identification of mechanisms of a number of basic lightning processes”. AGU has more than 60,000 members from 148 countries. Only one in a thousand members is elected to Fellowship each year.

Vladimir A. Rakov and Vernon Cooray received Karl Berger Award from the scientific committee of the International Conference on Lightning Protection (ICLP) during the 31st ICLP for distinguished achievements in lightning research, developing new fields in theory and practice, modeling and measurements. Congratulations, Dr. Rakov and Dr.Cooray!

New Books

Coming Soon From AGU



Heinz-Wolfram Kasemir: His Collected Works

Vladislav Mazur and Lothar Ruhnke, Editors

Available this fall
http://www.agu.org/pubs/books

An open access publication presenting the collected works of Heinz-Wolfram Kasemir, with commentaries by the Editors.

Heinz-Wolfram Kasemir was a prolific researcher in many branches of atmospheric electricity. Several of his contributions stand out as most significant for the development of this science:

- Kasemir developed a physically-sound theory about the transfer of charges from thunderstorms to global fair-weather areas.
- Kasemir’s theory of atmospheric current flow influenced calculations of (1) the electric field and current pattern of cloud charges in the presence of conductivity increasing with altitude, (2) the time-function for a lightning electric field that changes from electrostatic to one driven by conductivity, and (3) the effect of conductivity changes at cloud boundaries on their screening charges, and consequently, on surface electric fields.
- Kasemir’s revolutionary idea that lightning develops as a bi-directional leader with a zero-net charge, proposed in 1950, had a major impact on the development of lightning physics.
- Kasemir’s analysis of influence charge on lightning channels in a potential field opened up the area of the physical modeling of lightning processes.

Because many of his papers were not reviewed by his peers, it is a rare opportunity to experience the real thinking of a prominent scientist in the field of atmospheric electricity. Kasemir's papers are not easy reading, but a persistent reader will find great pleasure to discover in them clear ideas expressed in very precise language.

CONFERENCES

The 8th Asia-Pacific Conference on Lightning

The 8th Asia-Pacific Conference on Lightning will be held on 26-28 June 2013 in Seoul, Korea. For detail, please visit http://apl2013.org/.

- Preliminary Paper Submissions   Feb 28th, 2013
- Acceptance Notification   Mar 31st, 2013
- Final Paper Submission   Apr 30th, 2013

EGU GA - Vienna, April 7-12th, 2013

Lightning: Physics, Detection and Atmospheric Effects
Deadline for Abstract submission: January 9th 2013
Convened by: Y. Yair   S. Soula, C. Price, H-D. Betz, Y. Takahashi

This session seeks contributions from research in atmospheric electricity on:

- Cloud microphysics, charge separation and lightning discharge physics
- Atmospheric Electricity in fair weather and the global circuit
- Atmospheric chemical effects of lightning and contribution of LtNOx
- Middle atmospheric TLEs, energetic radiation from lightning and TGFs
- Global lightning patterns in an era of climate change
- Thunderstorms in hurricanes and typhoons
- Urban effects on lightning distributions
- Modeling of thunderstorms, lightning
- Now-casting and forecasting of thunderstorms and severe weather
- Lightning detection networks and sensors from ground and space

http://meetings.copernicus.org/egu2013/

2nd Announcement and
Call for Papers

The **Finnish Meteorological Institute** and the **European Severe Storms Laboratory** have the pleasure to invite you to the jointly organized...

ECSS 2013
7th European Conference on Severe Storms

Helsinki, Finland
3 – 7 June 2013
Scandic Marina Congress Center

The scope of the conference covers all aspects of severe storms with a special focus on convective storms. Researchers, operational forecasters, and risk and emergency managers are invited to submit contributions. In the light of the global relevance of the conference themes, participants from all over the world are encouraged to attend.*

Abstract submission and **registration** for the conference are now possible through the ECSS website **www.ecss.eu/2013**. There, you will find further details. The deadline for abstract submission is **15 December 2012**.

Information on the venue, hotels, travel to Helsinki and Social events (including an Ice Breaker, Conference Dinner, tours to Helsinki and the Suomenlinna Fortress, and to Nuuksio National Park) can be found on the website of the Local Organizer: **www.ecss2013.fmi.fi**.

For general questions regarding the conference, please contact the ECSS team at ecss@essl.org.

*see overleaf

Topics of the Conference

- Impact of storms on society, impact mitigation
- Convective storm and tornado dynamics
- Numerical modelling of storms; storm-scale data assimilation
- Convective storms within extratropical, Mediterranean, and tropical cyclones
- Floods and flash floods
- Forecasting and nowcasting of severe weather
- Remote-sensing of storms (e.g. satellite, radar, lightning detection)
- Storm electrification; lightning; microphysics; hail
- Storm climatology, risk assessments, and climate change
- Collection of storm data; damage assessment

In addition, there will be an informal session during which videos and pictures of severe storms will be shown.

ECSS 2013 Scientific Programme Committee

Harold Brooks, *National Severe Storms Laboratory*, USA (chair)
Pieter Groenemeijer, *European Severe Storms Laboratory, Germany (vice-chair)*
Jenni Rauhala, *Finnish Meteorological Institute, Finland (vice-chair)*
Johannes Dahl, *North Carolina State University, USA*
Jean Dessens, *Anelfa, France*
Michael Kunz, *Karlsruhe Institute of Technology, Germany*
Climent Ramis, *Universitat de les Illes Balears, Spain*
Evelyne Richard, *Laboratoire d'Aérologie/CNRS, France*
Yvette Richardson, *Pennsylvania State University, USA*
Elena Saltikoff, *Finnish Meteorological Institute, Finland*
David Schultz, *University of Manchester, U.K.*
Martin Setvák, *Czech HydroMeteorological Institute, Czech Republic*

Please feel free to forward this Call for Papers to any interested persons. The organizers are looking forward to meet you in Helsinki.

The ECSS 2013 is supported by:

VAISALA
UNIVERSITY OF HELSINKI
EUMETSAT
World Meteorological Organization
EMS
Munich RE
FORECA

RESEARCH ACTIVITY BY INSTITUTIONS

CSIRO Materials Science and Engineering (Sydney, Australia)

An explanation of the birth of Ball Lightning as occurs inside of houses and also aircraft has been developed from solutions of conservation equations for the motion of electrons and ions. A stream of ions of density of ~ 10^6/cc impinging on the outside of an insulating glass window accumulates to produce an electric field on the inside of the glass window sufficient to sustain an electric discharge. Ions from the discharge of opposite sign to that on the outside of the window accumulate on the inside of the window leaving a sphere of electrons and ions with a net charge that constitutes the discharge of Ball Lightning and moves away from the glass inside of the room or aircraft cockpit. Lead author was John Lowke of CSIRO, together with retired US Air Force pilots Don Smith and Keith Nelson, and also Robert Crompton of Australian National University, and Tony Murphy of CSIRO. The stream of ions would usually originate from corona or stepped leaders of lightning that remain in the atmosphere after recombination processes, but may also originate from radio antennae. The theory gives a quantitative explanation of the energy source, structure, life-time and motion of Ball Lightning and its apparent transmission through closed glass windows. The theory is published in J. Geophys. Res., 117, D19107, doi: 10.1029/2012JD017921, (2012) and was also presented at the 2011 ICAE conference in Rio de Janeiro.

Indian Institute of Tropical Meteorology, Pune- India
Air Ion Spectrometer Laboratory, I & O T Division

Devendraa Siingh, devendraasiingh@tropmet.res.in

Continuously measurements of atmospheric ions in the mobility range of 3.16 - 0.00133 $cm^2v^{-1}s^{-1}$ (diameter range 0.46 – 50 nm) from Neutral Cluster and Air Ion Spectrometer (NAIS) at a tropical station, Pune (18° 31' N, 73° 55' E) from the January 2010, revealed that nucleation events for the formation of new particles. These events generally occurred between 0800 - 1000 LT and enhanced concentrations of Aitken particles continued to be observed up to 1700 - 1800 LT (Fig. 1).

Our group's working mainly on the scientific problem of solar activity, lightning and climate issues, Global electric circuit, Thunderstorm and lightning, sprites, Modki and ENSO effects on atmospheric electricity parameters, contribution of ion in the new particle formation etc.

We are participating in the various field experiments from time to time deepening on Institute interest for measures Ion and aerosol distribution from NAIS and SMPS respectively. Recently we have conducting the campaign from March 2012 to May 2012 with collaboration with Indian Institute of Technology; Kanpur measures the ions and aerosol distribution to understand the new particle formation at urban station. Results are very encouraging (for example Fig. 2).

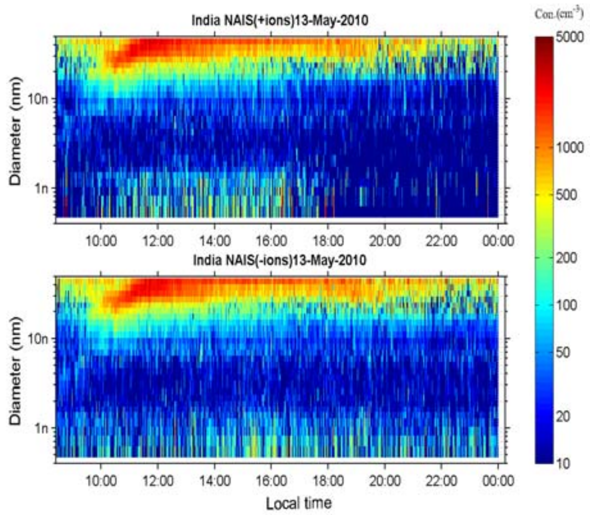


Fig. 1 Ion mobilty spectra of particle formation events on 13.05.2010.

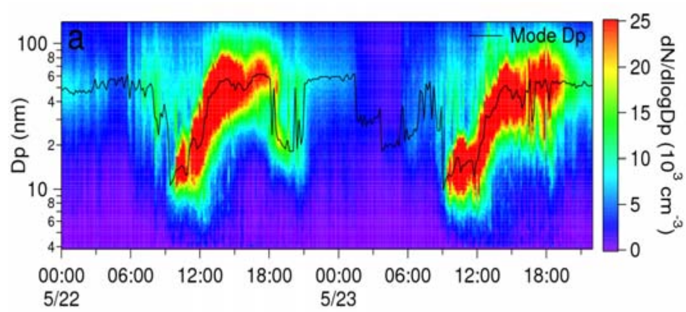


Fig.2 Contour plot of particle number-size distributions for typical NPF events observed on May 22–23, 2012 at IITM, Pune.

Key Laboratory of Land Surface Process and Climate Change in Cold and Arid Regions(LPCC), Cold and Arid Regions Environmental and Engineering Research Institute(CAREERI), Chinese Academy of Sciences(CAS), Lanzhou, China

Zhang Rong (zhangrong859@126.com)
Zhang Guangshu (zhanggs@lzb.ac.cn)

A system for locating the sources of lightning radiation in three spatial dimensions at a time resolution of 50μs has been developed. Using the system, a comprehensive observation on natural lightning discharge has been conducted in the northeastern region of Qinghai-Tibet Plateau every summer since 2009 and large amounts of data have been obtained. We have successfully documented the entire evolution images of a large number of CG and IC discharging channels and studied the amount of NO_x produced in the associated discharging processes.

Numerous statistics show that the radiation sources obtained by 3D locating system are somewhat dispersive in the initial and branching stages, so these sources will inevitably result in error when calculating the total length of a flash. A temporal and spatial grid approach is used in our study. Firstly, the time period between the first and the last sources are divided into a series of 10-ms segments. And those sources in each time segment are assigned into many 3D spatial grid cells. The dimensions of the grid cell we used is 500 m (West-East distance) ×500 m (North-South distance) ×200 m (vertical distance) according to the accuracy of the locating system (altitude error is larger than horizontal error). If there are 3 or more VHF sources in a grid cell, the average location of the sources in the cell is found; otherwise the sources contained in the cell are ignored. This step converts the raw VHF sources to a smaller set of averaged points and prevents overestimation of channel length by removing those outliers (either in temporal or in spatial scale).

The next step, which is the core of our approach, is to connect those averaged points with lines. After connecting, we get the total channel length by adding all the lengths of the lines connecting the averaged points. And then, we calculate the NO_x production produced in a flash through the total flash length multiplied by the production per unit flash-length (1.7×10^{-3} moles/m). One sample of our results for a CG flash is shown in Figure1. Figure1 shows the 3D view and north-southward vertical projection of the channel created with our algorithm, respectively. In the figure, the points represent the raw radiation sources getting from the locating system, the color scale presents the progression of time (blue being early in the flash and red being late), and the black lines represent the flash channel created with our proposed approach. The length and the NO_x production of this flash are 24k m and 41 mol, respectively. The detailed results will be reported in a scientific paper.

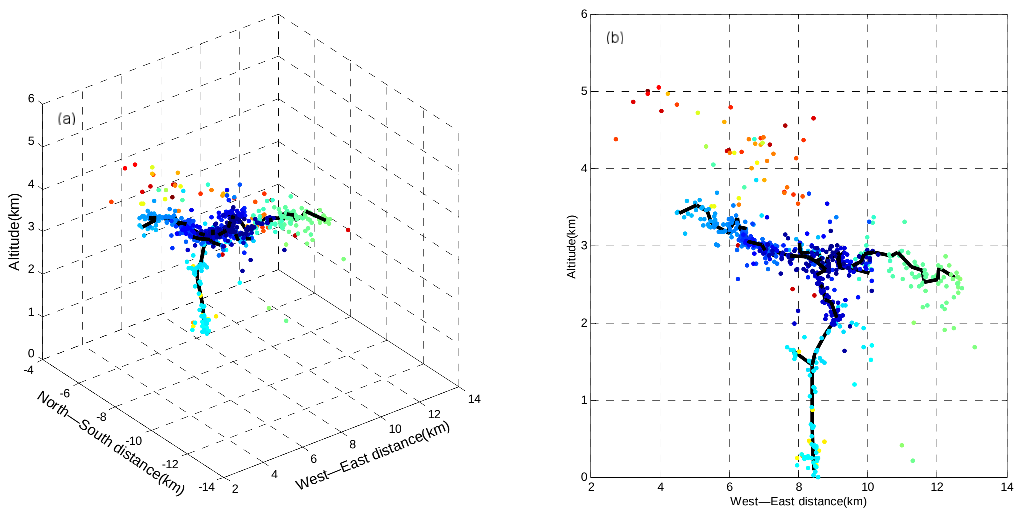


Fig.1 3D view (a) and north-southward vertical projection (b) of the channel created with our algorithm for a CG flash

Laboratory of Lightning Physics and Protection Engineering (LiP&P), Chinese Academy of Meteorological Sciences (CAMS), Beijing, China

Analysis of an Attachment Process with Junction Point below the Tip of Upward Connecting Leader

A field experiment, mainly focusing on the lightning flashes striking on tall structures, has been conducted since 2009 in Guangzhou, Guangdong Province, China. A downward negative lightning flash occurred at 15:13:32 (Beijing Local Time) on July 18 2011, which struck Guangzhou International Finance Center (GIFC, previously known as Guangzhou West Tower, 440 m high), is analyzed. This flash is numbered as F1111 in our database.

This flash consists of eight return strokes along a single path. Before the first return stroke, the downward leader exhibits multiple branches and leads to a long upward connecting leader (UCL) with length longer than 400 m and two unconnected upward leaders (UUL) with lengths of some tens of meters from the top of the structure.

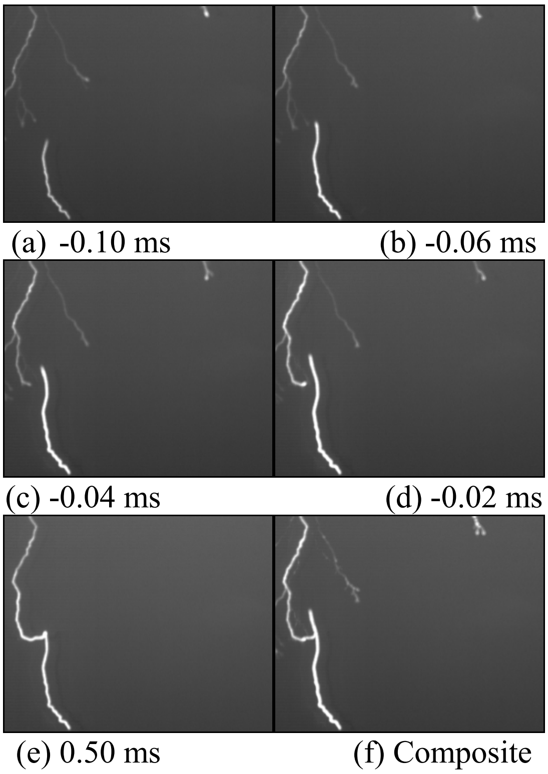


Fig.1 High-speed images of F1111 captured by the high-speed camera with a sampling of 50,000fps. Fig. 1f is the composite image of 75 images before the return stroke and the image 0.5 ms after the return stroke.

The propagation directions and velocities of the main channel of the downward leader (MCDL, which supports the return stroke) and the UCL, and the luminosities of leader tips, are analyzed. The results showed that:

(1) The UCL is initiated approximately 1.08 ms prior to the first return stroke when the MCDL is approximately 550 m far away and propagates upward continually without branch. The characteristics of the UCL are affected by the downward leader at an observable extent during its propagation process, especially during the last period of 0.3 ms prior to the first return stroke.

(2) While the characteristics of the downward leader, even those of the MCDL, are not affected by the UCL at an observable extent during their propagation processes, except in the last 80 us prior to the first return stroke. When the distance between the MCDL and the UCL decreases to only 60 m, the MCDL bends evidently toward the UCL, then propagates with obviously increasing velocity and luminosity, and finally, makes connection with the UCL. Other branches of the downward leader have no obvious propagation trend toward the UCL, even during the last stage.

(3) Both the MCDL and the UCL have velocities mainly of the order of 105 m s^{-1}. The high-speed images with a sampling rate of 50,000 fps show that the MCDL exhibits a propagation velocity ranging from 1.2 × 105 to 8.6 × 105 m s^{-1} (average: 3.0 × 105 m s^{-1}) between the heights of 700 and 1070 m above the ground, and the UCL from 0.9 × 105 to 18.6 × 105 m s^{-1} (average: 4.5 × 105 m s^{-1}) between 430 and 790 m. The velocity of the MCDL increases from 1.7 × 105 to 8.6 × 105 m s^{-1} during the last 80 us prior to the return stroke, and during the last 0.26 ms prior to the return stroke, the velocity of the UCL sharply increases from 1.2 × 105 to 18.6 × 105 m s^{-1}.

The presence of multiple branches of the downward leader near the top of GIFC in F1111 is considered as the essential reason, of the occurrence of multiple upward leaders from the top of GIFC, and of the almost linear propagation of the UCL without obvious bend toward the tip of the MCDL during the last stage, which results in the final connection between the tip of the MCDL and a point below the tip of the UCL. In F1111, the effect of the downward leader on the UCL is obvious, while that of the UCL on the downward leader is weak, even unobservable. The propagation direction, velocity and luminosity of the MCDL exhibit no obvious changes, till the distance between the MCDL and the UCL decreases to approximately 60 m at the time of 80 us prior to the first return stroke.

Three-dimensional Imaging of Chaotic Pulse Trains in Negative Cloud-to-Ground Lightning Using VHF Broadband Digital Interferometer

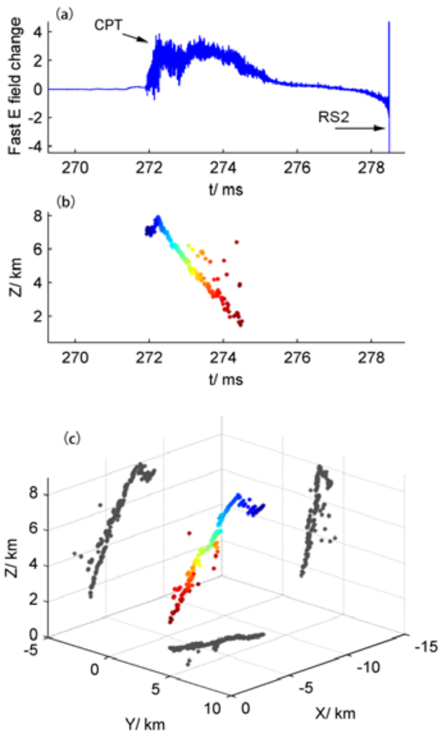


Fig.1 The 3D location of CPT occurred in –CG Case 6: (a) the fast E field change waveform, (b) the height of sources (Z) versus time, and (c) the 3D location and its projection on three coordinate planes (gray points).

In the summer of 2010, we performed a three-dimensional lightning locating experiment using synchronous observations of two VHF broadband interferometer systems near or at the Guangzhou Field Experiment Station for Lightning Research and Testing. During the experiments, a variety of lightning phenomenons were observed by our interferometer systems. CPTs (Chaotic Pulse Trains) event is one of them. We use the term "CPTs" rather than "Chaotic Leader" because, in several cases, the observed irregular sequences of pulse activity is not fairly close to subsequent return stroke. Lan et al. [2011] has presented a detailed study about the features of CPTs waveform and HF radiation intensity. They also gave a preliminary observation from two-station interferometer measurements. The propagation velocities of the downward leaders associated with CPTs were found to be about 2.0 $\times 10^7$ m/s.

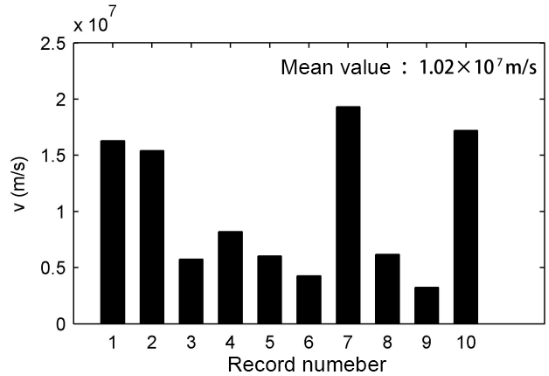


Fig.2 The velocities of 10 CPT events.

In this study, we selected 10 negative Cloud-to-Ground lightning records which contained CPTs event. The discharge processes associated with CPTs was imaged in three dimensions using VHF broadband digital interferometers. The spatial and temporal characteristic, power spectral density (PSD) in the 30 MHz to 290 MHz band and pulse train structure of 10 CPTs records were analyzed. We found that the breakdown process associated with CPTs is similar with attempt leader or dart leader. The statistical result shows the average progression speeds of these breakdown processes are about $10^6 \sim 10^7$ ms^{-1}. The average PSD of the CPT event's VHF emission is 1.8~11.6 dB or

2.4~12 dB larger than that of the step leader or dart leader in the same negative cloud to ground lightning. The mean value and standard deviation of the pulse separations in these chaotic pulse trains are 5.3 ~ 9.0 μs and 2.7 ~ 4.9 μs.

Experiments on Lightning Protection for Automatic Weather Stations Using Artificially Triggered Lightning

The development of artificially triggered lightning techniques has enabled various experiments on lightning hazards and protection, based on triggered lightning, and has led to researches on key techniques of lightning protection, with the results being applied to electric power systems, apartment buildings, lighting systems for airport runways, the testing of lightning protection devices, arsenals, and motor vehicles.

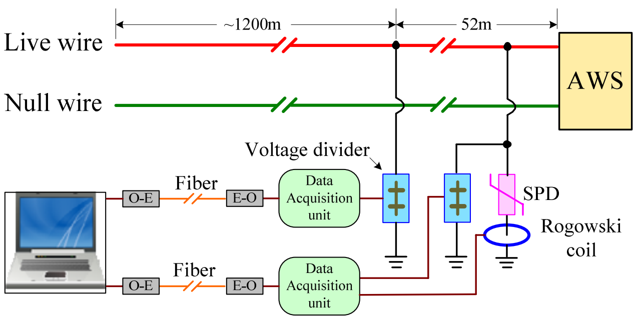


Fig.1 Schematic showing the measurement of induced voltage on the overhead power line.

The automatic weather station (AWS) is integrated with numerous electronic devices (sensors, data acquisition unit, digital communication device) that are vulnerable to the electromagnetic pulses generated by lightning. The present study examined the characteristics of voltage on an overhead power line with 220-V alternating voltage and on a 10-m vertical AWS signal line for wind speed, and the current and residual voltages in an SPD, and especially focused on the fast-changing signals which were electromagnetically induced by the return stroke processes of the triggered lightning T200804. This triggered lightning had eight return strokes with peak currents ranging from –6.67 to –26.47 kA. Because of the limitations in recording length of the data acquisition system, the voltage on the lines and current through the SPD were recorded only for the IS and the first seven return strokes.

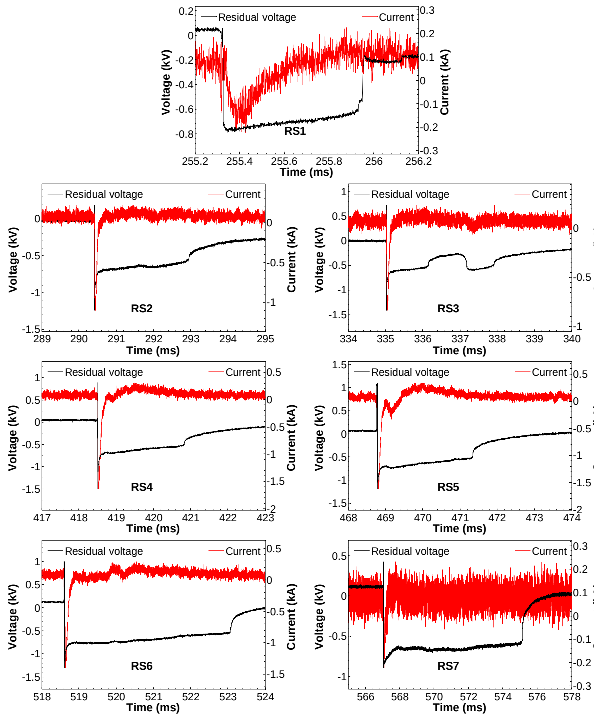


Fig.2 Waveforms of residual voltage and current through the SPD and corresponding to the first seven return strokes.

Several conclusions can be drawn from the present results. The pulse of induced voltage on the overhead power line corresponding to the return strokes is composed of a slowly changing section with a duration of several microseconds, a sharp opposite sub-peak, and a sharp main peak. The GMs of the peak values of the sub-peaks and main peaks were 2.49 and -7.66 kV, respectively. GM values were 0.97 ms for the 10%–90% risetime, and -6.46 kV ms^{-1} for the 10%–90% average gradient.

Voltage on the 10-m vertical signal line for wind speed showed two types of waveforms: a main peak followed by a opposite-sign sub-peak, and a main peak alone. All main peaks resembled a “V” shape, distinct from the shapes of the pulses of induced voltage on the overhead power line. The peak values of the main peaks and sub-peaks (GM of –1.20 kV and 412.43 V, respectively), half-peak widths (GM of 0.82 ms, only for main peaks, the same below), 10%–90% risetimes (GM of 0.59 ms), and 10%–90% average gradient (GM of –1.60kV ms^{-1}) were all less than those of the pulses of induced voltage on the overhead power line.

No clear relationship was found between the peak values of the base current in the lightning channel and the peak values of induced voltage on either the overhead power line or on the vertical signal line for wind speed. However, peak currents of the return strokes were shown to have a close relationship with the 10%–90% average gradients of the induced voltages.

In contrast to the base current of the return strokes, the backflow current pulses through the SPD and corresponding to the return strokes produced smaller peak values (from -0.22 kA to -1.64 kA) and 10-90% average gradients (from -48.44 A ms–1 to -101.26 A ms–1), bigger 10%–90% risetimes (from 12.08 ms to 14.41 ms), and similar-magnitude half-peak widths (from 52.23 ms to 80.17 ms). Cetrainly, the parameters of the backflow current was influenced by the poor performance of Rogowski coil in detecting the signals with frequecy lower than 150 Hz. However, the influence is not enough to reverese the foregoing comparison.

Relatively long-duration residual voltages larger than 600V (absolute value) generated across the SPD after the bipolar pulses of induced voltage produced by the fast-variation return stroke processes. The duration of the residual voltage ranged from 0.2 to 5.9 ms, the average value being 2.1 ms. Long duration and multiple residual voltages might be responsible for the damage of the SPD rated for a current of 20 kA.

With regard to the damage to the zinc-oxide arrester in the experiment, it may have overheated because of the long duration of residual voltage in the arrester, which was caused by the short distance between the lightning and the overhead power line. If possible, overhead power lines should be avoided for supplying power to AWS in the field. If the environment is harsh and an underground supply is not possible, the power line should be installed with multiple surge protectors. With consideration to nearby lightning flashes, the first surge protector should be an air-gap surge arrester. If a zinc-oxide arrester is used, it should have a high current rating. In addition, the vertical signal line should have an arrester added at the front of the AWS acquisition device.

Lightning Research Group of Gifu University (Gifu, Japan)

With the support from the lightning research group of University of Florida, We have being continued our high speed optical observation experiments at The International Center for Lightning Research and Testing (ICLRT) at Camp Blanding, Florida by using three LAPOSs (Lightning Attachment Process Observation System). From May until September, we have recorded more than 20 rocket triggered lightning as well as a few nearby natural lightning which are suitable for studying lightning attachment processes. The data analysis is underway.

In the last September at the 2012th ICLP, we presented a paper titled "High Speed Optical Observation on Initiation Process of Lightning Return Strokes" which reported the initiation process of 14 subsequent return strokes triggered at ICLRT last year. Of the 14 strokes, 9 occurred following dart leaders and 5 following dart-stepped leaders. The return strokes are found being initiated at a height ranging from 2.3 m to 26.0 m above the lightning termination point. A return stroke with a larger peak electric current tends to initiate higher. All the return strokes show initial bidirectional (upward and downward from their initiation height) propagation. We have been able to estimate the initial upward propagation speeds for all the return strokes. The resultant speeds range from 0.4×10^8 m/s to 2.5×10^8 m/s. For the downward propagation speeds, only two strokes among the 14 strokes allow us to perform a reasonable estimation. The resultant speeds are 0.6×10^8 m/s, 0.5×10^8 m/s, respectively. A negative correlation has been noted between their initial upward propagation speeds and their downward leaders' speeds.

Our observation on lightning that strike on a rotating windmill and its nearby lightning protection tower during winter seasons has being continued for 8 years. In the coming AGU fall meeting, we will give an invited talk presenting a review and an update of the observation results.

MIT (Cambridge, MA, USA)

Anirban Guha arrived at MIT from India in October to work for one year on a Fulbright Post-Doc Fellowship. He is currently exploring the 19-year record Schumann resonance record for climate variability in West Greenwich, Rhode Island. Following that effort, he will work with Vadim Mushtak on the inversion of multi-station Schumann resonance background observations. The receiver station in Tahiti, assembled in short order by Pascal Ortega, has been made possible by magnetometer equipment supplied by Anirban. Nice multi-modal spectra are now available on a continuous basis.

A paper has been submitted with Stan Heckman to a special compilation organized by Pierre Laroche on the topic "Lightning Hazards to Aircraft and Launchers". This study builds on the growing evidence for polarity asymmetry in lightning leader speeds to provide an explanation for the systematic initiation of recoil leaders in the positive end of the lightning 'tree'. The analysis is based on earlier instability analysis (Heckman, 1992) of an electrical circuit representation for lightning. The circuit consists of a current source in parallel with a channel capacitance, and a negative resistance element to represent the increasing voltage drop in arcs with decreasing current.

Earle Williams has been gathering material for the Franklin Lecture on "Lightning and Climate" at the upcoming AGU meeting. Part of that collection has been the further examination of trends in thunder days with temperature at stations in Alaska at high northern latitude where the signature of global warming is most pronounced.

RESEARCH ACTIVITY BY INSTITUTIONS

MIT Lincoln Laboratory (Lexington, MA, USA)

Work continues on the documentation of meteorological conditions supporting the presence of layers of pronounced enhancement in differential reflectivity (ZDR) above the 0C isotherm, called "+ZDR bright bands"), and attributable to gravity-oriented, anisotropic ice crystals. Common in winter snowstorms with warm frontal uplift, and in the trailing stratiform regions of weak, marginal-lightning-producing summer squall lines, this feature is absent when the squall line is intense and electrically active. This finding may be attributable to the presence of rimed ice debris in the stratiform region that lack the necessary anisotropy for the +ZDR enhancement.

Arrangements have been made with Mengistu Wolde at the National Research Council in Canada to continue with research flights into snowstorms this winter to explore the microphysics associated with icing conditions, and to provide 'truth' for ground-based MEXRAD polarimetric radars. These studies are supported by the Federal Aviation Administration.

Special Laboratory of Physics, University of Shkodra, Albania

Florian Mandija (f_mandija@yahoo.com)

During the last six months of this year, our working group has continued the monitoring process of the concentrations of both, cluster ions and atmospheric aerosols. The limit electrical mobility of measured air ions was 0.8 $V^{\cdot}s/cm^3$ (cluster ions). Meanwhile the size range of measured aerosol particles is 0.25-32 μm (accumulation and coarse modes).

Monitoring campaign were carried out in various locations; urban centers (city of Shkodra), rural areas surrounding the city, nearest mountain sites (up to 1500 m), in the bridge of Shkodra Lake and seashore sites (South-East side of Adriatic Sea).

The main purpose of these campaigns is the enrichment of our database which contains data on ion and aerosol concentrations, as well as the principal meteorological parameters in specific locations. This database helps on better understanding of atmospheric processes, diurnal and annual cycles of the concentrations of atmospheric ions and aerosols, their altitude profiles, and to estimate their interactions under specific conditions.

In experimental processes are evolved also students enrolled in of the Master and Doctoral programs in cooperation with University of Tirana. All these results are, and also will be published continuously in appropriate conferences and peer review journals.

University of Florida (Gainesville, FL, USA)

A total of 26 full-fledged lightning flashes and 24 attempted upward leaders (events with precursor pulses only) were triggered in 2012 at Camp Blanding (CB), Florida. Nineteen flashes contained leader/return stroke sequences (a total of 104) and seven were composed of the initial stage only. Fifteen triggered flashes with return strokes, besides being recorded at CB, were recorded at the Lightning Observatory in Gainesville (LOG) and two also in Starke, at distances of 45 and 3 km, respectively.

Dustin Hill defended his Ph.D. Dissertation titled “The mechanisms of lightning leader propagation and ground attachment”. He is presently working at the NASA Kennedy Space Center.

Hill J.D., J. Pilkey, M.A. Uman, and D.M. Jordan, in collaboration with W. Rison, and P.R. Krehbiel of New Mexico Tech, authored a paper titled “Geometrical and electrical characteristics of the initial stage in Florida triggered lightning”. They examined the geometrical and electrical characteristics of the initial stages of nine Florida triggered lightning discharges using a Lightning Mapping Array (LMA) and measured channel-base currents. They determined initial channel and subsequent branch lengths, average initial channel and branch propagation speeds, and channel-base current at the time of each branch initiation. The channel-base current is found to not change significantly when branching occurs, an unexpected result. The initial stage of Florida triggered lightning typically transitions from vertical to horizontal propagation at altitudes of 3–6 km, near the typical freezing level of 4 km and several kilometers below the expected center of the negative cloud-charge region at 7–8 km. The data presented potentially provide information on thunderstorm electrical and hydrometeor structure and discharge propagation physics. LMA source locations were obtained from VHF sources of positive impulsive currents as small as 10 A, in contrast to expectations found in the literature. The paper is published in the GRL.

Mallick S. and V.A. Rakov, in collaboration with J.R. Dwyer of Florida Tech, authored a paper titled “A Study of X-ray Emissions from Thunderstorms with Emphasis on Subsequent Strokes in Natural Lightning”. The authors examined X-ray emissions associated with leaders of natural cloud-to-ground lightning. For 23 (8 first and 15 subsequent) strokes within 2 km of the Lightning Observatory in Gainesville (LOG), Florida, the occurrence of detectable X-rays was 88% and 47% for the first and subsequent strokes, respectively. The occurrence of X-rays tended to increase with increasing return-stroke peak current and decreasing distance from the lightning channel. The majority (5 out of 7) of subsequent-stroke (dart or dart-stepped) leaders produced more X-ray pulses than their corresponding first-stroke leaders, in support of the theory [Cooray et al., 2009, 2010] according to which a warm, low-density channel traversed by subsequent-stroke leaders is more conducive to occurrence of the so-called cold runaway breakdown than the virgin air in which first-stroke leaders have to develop. This finding may have implications for production of TGFs, which may also preferentially occur via secondary breakdown retracing the remnants of a previously conditioned channel or cloud region. The energy of some photons was in the MeV range (in one case possibly in excess of 5 MeV); that is, in the gamma-ray range. There was a significant difference between first and subsequent leaders in terms of the distribution of estimated X-ray source heights. For first leaders, the maximum source height did not exceed 800 m, whereas for subsequent leaders the source height distribution appeared to extend to about 3.6 km. Not all leaders within a flash produced detectable X-rays. For the same leader near ground, some steps were accompanied by detectable X-ray emissions, while others were not. One possible explanation (in view of Saleh et al.' [2009] finding that the source electrons are probably emitted isotropically) is that electric field enhancements (>30 MV/m or so for the case of normal air density), needed for the cold runaway breakdown, are very brief and highly localized, so that in many cases a sufficiently energetic electron from the tail of the bulk distribution may be unavailable to start the runaway process. This implies that the cold runaway breakdown is not a necessary feature of lightning leaders, even if the required fields do occur. The paper is published in the JGR - Atmospheres.

RECENT PUBLICATIONS

This list of references is not exhaustive. It includes only papers published during the last six months provided by the authors or found from an on-line research in journal websites. Some references of papers very soon published have been provided by their authors and included in the list. The papers in review process, the papers from Proceedings of Conference are not included.

Almeida A C, B R P Rocha, J R S Souza, J A S Sá, J A P Filho. 2012. Cloud-to-ground lightning observations over the eastern Amazon Region. Atmospheric Research, 117, 86-90.

Andreotti A, C Petrarca, V A Rakov, L Verolino. 2012. Calculation of voltages induced on overhead conductors by non-vertical lightning channels. IEEE Trans. on EMC, 54(4), 860-870.

Aplin K L, T Goodman, K L Herpoldt, C J Davis. 2012. Laboratory analogues of Martian electrostatic discharges. Planetary and Space Science, 69(1), 100-104.

Arevalo L, V Cooray, D Wu, B Jacobson. 2012. A new static calculation of the streamer region for long spark gaps. Journal of Electrostatics, 70(1), 15-19.

Babich L P, E I Bochkov, J R Dwyer, I M Kutsyk. 2012. Numerical simulations of local thundercloud field enhancements caused by runaway avalanches seeded by cosmic rays and their role in lightning initiation. J. Geophys. Res., 117(A9), A0931610.1029/2012JA017799.

Baharudin Z A, M Fernando, N A Ahmad, J S Mäkelä, M Rahman, V Cooray. 2012. Electric field changes generated by the preliminary breakdown for the negative cloud-to-ground lightning flashes in Malaysia and Sweden. Journal of Atmospheric and Solar-Terrestrial Physics, Vol. 84–85, 15-24.

Baranski P, M Loboda, J Wiszniowski, M Morawski. 2012. Evaluation of multiple ground flash charge structure from electric field measurements using the local lightning detection network in the region of Warsaw. Atmospheric Research, 117, 99-110.

Battersby S. 2012. Strange skies: The enigma of impossible lightning. New Scientist, 213(2853), Pages 42.

Bech J, N Pineda, T Rigo, M Aran. 2012. Remote sensing analysis of a Mediterranean thundersnow and low-altitude heavy snowfall event. Atmospheric Research, In Press, Corrected Proof, Available online 26 June 2012.

Béghin C, O Randriamboarison, M Hamelin, E Karkoschka, C Sotin, R C Whitten, J-J Berthelier, R Grard, F Simões. 2012. Analytic theory of Titan's Schumann resonance: Constraints on ionospheric conductivity and buried water ocean. Icarus, 218(2), 1028-1042.

Berkopec A. 2012. Fast particles as initiators of stepped leaders in CG and IC lightning. Journal of Electrostatics, 70(5), 462-467.

Blakeslee R J, D M Mach, M G Bateman, J C Bailey. 2012. Seasonal variations in the lightning diurnal cycle and implications for the global electric circuit. Atmospheric Research, In Press, Corrected Proof, Available online 5 October 2012.

Boening C, J K Willis, F W Landerer, R S Nerem, J Fasullo. 2012. The 2011 La Niña: So strong, the oceans fell. Geophys. Res. Lett., 39(19), L1960210.1029/2012GL053055.

Bruning E C, S A Weiss, K M Calhoun. 2012. Continuous variability in thunderstorm primary electrification and an evaluation of inverted-polarity terminology. Atmospheric Research, In Press, Accepted Manuscript, Available online 1 November 2012.

RECENT PUBLICATIONS

Buechler D E, W J Koshak, H J Christian, S J Goodman. 2012. Assessing the performance of the Lightning Imaging Sensor (LIS) using deep convective clouds. Atmospheric Research, In Press, Corrected Proof, Available online 5 October 2012.

Bürgesser R E, M G Nicora, E E Ávila. 2012. Characterization of the lightning activity of “Relámpago del Catatumbo”. Journal of Atmospheric and Solar-Terrestrial Physics, 77, 241-247.

Cecil D J, D E Buechler, R J Blakeslee. 2012. Gridded lightning climatology from TRMM-LIS and OTD: Dataset description. Atmospheric Research, In Press, Corrected Proof, Available online 15 July 2012.

Celestin S, W Xu, V P Pasko. 2012. Terrestrial gamma ray flashes with energies up to 100 MeV produced by nonequilibrium acceleration of electrons in lightning. J. Geophys. Res., 117(A5), A0531510.1029/2012JA017535.

Chen M, T Lu, Y Du. 2012. Properties of “site error” of lightning direction-finder (DF) and its modeling. Atmospheric Research, In Press, Corrected Proof, Available online 23 September 2012.

Chen M, X Gou, Y Du. 2012. The effect of ground altitude on lightning striking distance based on a bi-directional leader model. Atmospheric Research, In Press, Corrected Proof, Available online 8 September 2012.

Chilingarian A, B Mailyan, L Vanyan. 2012. Recovering of the energy spectra of electrons and gamma rays coming from the thunderclouds. Atmospheric Research, Vol. 114–115, 1-16.

Cláudia R de M, R N Dias, S Visacro. 2012. Comparison of peak currents estimated by lightning location system and ground truth references obtained in Morro do Cachimbo station. Atmospheric Research, 117, 37-44.

Cohen M B, U S Inan. 2012. Terrestrial VLF transmitter injection into the magnetosphere. J. Geophys. Res., 117(A8), A0831010.1029/2012JA017992.

Collier A B, R E Bürgesser, E E Ávila. 2012. Suitable regions for assessing long term trends in lighting activity. Journal of Atmospheric and Solar-Terrestrial Physics, In Press, Accepted Manuscript, Available online 15 November 2012.

Cooray V, G Cooray. 2012. Electromagnetic radiation field of an electron avalanche. Atmospheric Research, 117, 18-27.

Cooray V, M Becerra. 2012. Attractive radii of vertical and horizontal conductors evaluated using a self-consistent leader inception and propagation model-SLIM. Atmospheric Research, 117, 64-70.

Cooray V, V Rakov. 2012. On the upper and lower limits of peak current of first return strokes in negative lightning flashes. Atmos. Res., 117, 12-77.

Coquillat S, M-P Boussaton, M Buguet, D Lambert, J-F Ribaud, A Berthelot. 2012. Lightning ground flash patterns over Paris area between 1992 and 2003: Influence of pollution? Atmospheric Research, In Press, Accepted Manuscript, Available online 15 November 2012.

Cvetic J, F Heidler, S Markovic, R Radosavljevic, P Osmokrovic. 2012. Dynamics of a lightning corona sheath-A constant field approach using the generalized traveling current source return stroke model. Atmospheric Research, 117, 122-131.

da Silva C L, Pasko V P. 2012. Simulation of leader speeds at gigantic jet altitudes. Geophys. Res. Lett., 39(13), L1380510.1029/2012GL052251.

Dwyer J R, M M Schaal, E Cramer, S Arabshahi, N Liu, H K Rassoul, J D Hill, D M Jordan, M A Uman. 2012. Observation of a gamma-ray flash at ground level in association with a cloud-to-ground lightning return stroke. J. Geophys. Res., 117(A10), A1030310.1029/2012JA017810.

Edens H E, K B Eack, E M Eastvedt, J J Trueblood, W P Winn, P R Krehbiel, G D Aulich, S J Hunyady, W C Murray, W Rison, S A Behnke, R J Thomas. 2012. VHF lightning mapping observations of a triggered lightning flash. Geophys. Res. Lett., 39(19), L1980710.1029/2012GL053666.

Farias W R G, O Pinto Jr., I R C A Pinto, K P Naccarato. 2012. The influence of urban effect on lightning activity: Evidence of weekly cycle. Atmospheric Research, In Press, Accepted Manuscript, Available online 3 October 2012.

Ferro M A da S, M M F Saba, O Pinto Jr. 2012. Time-intervals between negative lightning strokes and the creation of new ground terminations. Atmospheric Research, 116, 130-133.

Füllekrug M, D Diver, J-L Pinçon, A D R Phelps, A Bourdon, C Helling, E Blanc, F Honary, et al. 2012. Energetic charged particles above thunderclouds. Surv Geophys, DOI 10.1007/s10712-012-9205-z.

Gamerota W R, J O Elismé, M A Uman, V A Rakov. 2012. Current waveforms for lightning simulation. IEEE Trans. on EMC, 54(4), 880-888.

Ghodpage R N, D Siingh, R P Singh, G K Mukherjee, P Vohat, A K Singh. 2012. Tidal and gravity waves study from the airglow measurements at Kolhapur (India). Journal of Earth System Science, 121 (6).

Gordillo-Vázquez F J, Luque A, Simek M. 2012. Near infrared and ultraviolet spectra of TLEs. 2012. J. Geophys. Res., 117(A5), A0532910.1029/2012JA017516.

Grimm R E, A C Barr, K P Harrison, D E Stillman, K L Neal, M A Vincent, G T Delory. 2012. Aerial electromagnetic sounding of the lithosphere of Venus. Icarus, 217(2), 462-473.

Haddad M A, V A Rakov, S A Cummer. 2012. New measurements of lightning electric fields in Florida: Waveform characteristics, interaction with the ionosphere, and peak current estimates. J. Geophys. Res., 117(D10), D1010110.1029/2011JD017196.

Haldoupis C, M Cohen, B Cotts, E Arnone, U Inan. 2012. Long-lasting D-region ionospheric modifications, caused by intense lightning in association with elve and sprite pairs. Geophys. Res. Lett., 39(16), L1680110.1029/2012GL052765.

Hecht J. 2012. Bolts from the blue – lightning diverted for the first time. New Scientist, 213(2858), Pages 14.

Helling C, M Jardine, D Diver, S Witte. 2012. Dust cloud lightning in extraterrestrial atmospheres. Planetary and Space Science, In Press, Corrected Proof, Available online 13 July 2012.

Hill J D, J Pilkey, M A Uman, D M Jordan, W Rison, P R Krehbiel. 2012. Geometrical and electrical characteristics of the initial stage in Florida triggered lightning. Geophys. Res. Lett., 39(9), L0980710.1029/2012GL051932.

Huang S-M, R-R Hsu, L-J Lee, H-T Su, C-L Kuo, C-C Wu, J-K Chou, S-C Chang, Y-J Wu, A B Chen. 2012. Optical and radio signatures of negative gigantic jets: Cases from Typhoon Lionrock (2010). J. Geophys. Res., 117(A8), A0830710.1029/2012JA017600.

Hurley J, P G J Irwin, L N Fletcher, J I Moses, B Hesman, J Sinclair, C Merlet. 2012. Observations of upper tropospheric acetylene on Saturn: No apparent correlation with 2000 km-sized thunderstorms. Planetary and Space Science, 65(1), 21-37.

Jacobson A R, X-M Shao, E Lay. 2012. Time domain waveform and azimuth variation of ionospherically reflected VLF/LF radio emissions from lightning. Radio Sci., 47(4), RS400110.1029/2012RS004980.

Jenkins G S, M L Robjhon, J W Smith, J Clark, L Mendes. 2012. The influence of the SAL and lightning on tropospheric ozone variability over the Northern Tropical Atlantic: Results from Cape Verde during 2010. Geophys. Res. Lett., 39(20), L2081010.1029/2012GL053532.

Jiang R, X Qie, C Wang, J Yang. 2012. Propagating features of upward positive leaders in the initial stage of rocket-triggered lightning. Atmospheric Research, In Press, Corrected Proof, Available online 25 September 2012.

Kern A, C Schelthoff, M Mathieu 2012. Probability of lightning strikes to air-terminations of structures using the electro-geometrical model theory and the statistics of lightning current parameters. Atmospheric Research, 117, 2-11.

Konovalenko A A, N N Kalinichenko, H O Rucker, A Lecacheux, G Fischer, P Zarka, et al. 2012. Earliest recorded ground-based decameter wavelength observations of Saturn's lightning during the giant E-storm detected by Cassini spacecraft in early 2006. Icarus, In Press, Accepted Manuscript, Available online 3 September 2012.

Kosar B C, N Liu, H K Rassoul. 2012. Luminosity and propagation characteristics of sprite streamers initiated from small ionospheric disturbances at subbreakdown conditions. J. Geophys. Res., 117(A8), A0832810.1029/2012JA017632.

Kulak A, J Mlynarczyk, M Ostrowski, J Kubisz, A Michalec. 2012. Analysis of ELF electromagnetic field pulses recorded by the Hylaty station coinciding with terrestrial gamma-ray flashes. J. Geophys. Res., 117(D18), D1820310.1029/2012JD018205.

Kulkarni M N, and A K Kamra. 2012. Model for calculating the vertical distribution of the atmospheric electric potential in the exchange layer in a maritime clean atmosphere. Advances in Space Research, 50, 1231-1240.

Kumar P R, A K Kamra. 2012. Land–sea contrast in lightning activity over the sea and peninsular regions of South/Southeast Asia. Atmospheric Research, 118, 52-67.

Kumar P R, A K Kamra. 2012. Variability of lightning activity in South/Southeast Asia during 1997–98 and 2002–03 El Nino/La Nina events. Atmospheric Research, 118, 84-102.

Lee L-J, S-M Huang, J-K Chou, C-L Kuo, A B Chen, H-T Su, R-R Hsu, H U Frey, Y Takahashi, L-C Lee. 2012. Characteristics and generation of secondary jets and secondary gigantic jets. J. Geophys. Res., 117(A6), A0631710.1029/2011JA017443.

Li J, S Cummer, G Lu, L Zigoneanu. 2012. Charge moment change and lightning-driven electric fields associated with negative sprites and halos. J. Geophys. Res., 117(A9), A0931010.1029/2012JA017731.

RECENT PUBLICATIONS

López J, J Montanyà, M Maruri, D De la Vega, J A Aranda, S Gaztelumendi. 2012. Lightning initiation from a tall structure in the Basque Country. Atmospheric Research, 117, 28-36.

Lowke J J, D Smith, K E Nelson, R W Crompton, A B Murphy. 2012. Birth of ball lightning. J. Geophys. Res., 117(D19107), doi: 10.1029/2012JD017921.

Lu W, L Chen, Y Zhang, Y Ma, Y Gao, Q Yin, S Chen, Z Huang, Y Zhang. 2012. Characteristics of unconnected upward leaders initiated from tall structures observed in Guangzhou. J. Geophys. Res., 117(D19), D19211, doi:10.1029/2012JD018035.

Mahaney W C, D Krinsley. 2012. Extreme heating events and effects in the natural environment: Implications for environmental geomorphology. Geomorphology, Vol. 139–140, 348-359.

Mallick S, V A Rakov, D Tsalikis, A Nag, C Biagi, D Hill, D M Jordan, M A Uman, J A Cramer. 2012. On remote measurements of lightning return stroke peak currents. Atmospheric Research, In Press, Corrected Proof, Available online 29 August 2012.

Mallick S, V A Rakov, J R Dwyer. 2012. A study of X-ray emissions from thunderstorms with emphasis on subsequent strokes in natural lightning. J. Geophys. Res., 117(D16), D1610710.1029/2012JD017555.

Mallios S A, V P Pasko. 2012. Charge transfer to the ionosphere and to the ground during thunderstorms. J. Geophys. Res., 117(A8), A0830310.1029/2011JA017061.

Maurya A K, R Singh, B Veenadhari, K Sushil, M B Cohen, R Selvakumaran, et al. 2012. Morphological features of tweeks and nighttime D region ionosphere at tweek reflection height from the observations in the low-latitude Indian sector. J. Geophys. Res., 117, 1-12.

Maslowski G, S Wyderka, V A Rakov, B A DeCarlo, L Li, J Bajorek, R Ziemba. 2012. Experimental investigation and numerical modeling of surge currents in lightning protection system of a small residential structure. Journal of Lightning Research, 4, (Suppl 1: M4), 18-26.

Maslowski G, V A Rakov. 2012. Review of recent developments in lightning channel corona sheath research. Atmospheric Research, In Press, Corrected Proof, Available online 13 July 2012.

Mega T, M K Yamamoto, M Abo, Y Shibata, H Hashiguchi, N Nishi, T Shimomai, et al. 2012. First simultaneous measurement of vertical air velocity, particle fall velocity, and hydrometeor sphericity in stratiform precipitation: Results from 47 MHz wind-profiling radar and 532 nm polarization lidar observations. Radio Sci., 47(3), RS300210.1029/2011RS004823.

Meredith S L, S K Earles, C E Otero. 2012. Electric fields induced by a modified double exponential current waveform. Journal of Electrostatics, 70(1), 152-156.

Mikuš P, M T Prtenjak, N S Mahović. 2012. Analysis of the convective activity and its synoptic background over Croatia. Atmospheric Research, Vol. 104–105, 139-153.

Montanyà J, O A van der Velde, V March, D Romero, G Solà, N Pineda. 2012. High-speed video of lightning and x-ray pulses during the 2009–2010 observation campaigns in northeastern Spain. Atmospheric Research, 117, 91-98.

Moore L, G Fischer, I Müller-Wodarg, M Galand, M Mendillo. 2012. Diurnal variation of electron density in Saturn's ionosphere: Model comparisons with Saturn Electrostatic Discharge (SED) observations. Icarus, 221(2), 508-516.

Mora N, F Rachidi, M Rubinstein. 2012. Application of the time reversal of electromagnetic fields to locate lightning discharges. Atmospheric Research, 117, 78-85.

Murray L T, D J Jacob, J A Logan, R C Hudman, W J Koshak. 2012. Optimized regional and interannual variability of lightning in a global chemical transport model constrained by LIS/OTD satellite data. J. Geophys. Res., 117(D20), D2030710.1029/2012JD017934.

Nag A, V A Rakov, D Tsalikis, J Howard, C J Biagi, D Hill, M A Uman, D M Jordan. 2012. Characteristics of the initial rising portion of near and far lightning return stroke electric field waveforms. Atmos. Res., 117, 71-77.

Nayel M, J Zhao, J He. 2012. Analysis of shielding failure parameters of high voltage direct current transmission lines. Journal of Electrostatics, 70(6), 505-511.

Nicolau P, M Joan, A Oscar. van der Velde. Characteristics of lightning related to wildfire ignitions in Catalonia. Atmospheric Research, In Press, Corrected Proof, Available online 21 July 2012.

Nieto H, I Aguado, M García, E Chuvieco. 2012. Lightning-caused fires in Central Spain: Development of a probability model of occurrence for two Spanish regions. Agricultural and Forest Meteorology, Vol.162–163, 35-43.

Nishihashi M, K Shimose, K Kusunoki, S Hayashi, K Arai, H Inoue, W Mashiko, M Kusume, H Morishima. 2012. Three-dimensional VHF lightning mapping system for winter thunderstorms. J. Atmos. Oceanic Technol. doi:10.1175/JTECH-D-12-00084.1, in press.

Pawar S D, D M Lal, P Murugavel. 2012. Lightning characteristics over central India during Indian summer monsoon. Atmospheric Research, 106, 44-49.

Perera C, M Rahman, M Fernando, P Liyanage, V Cooray. 2012. The relationship between current and channel diameter of 30 cm long laboratory sparks. Journal of Electrostatics, 70(6), 512-516.

Petrova S, R Mitzeva, V Kotroni. 2012. Summer-time lightning activity and its relation with precipitation: Diurnal variation over Maritime, Coastal and Continental Areas. Atmospheric Research, In Press, Accepted Manuscript, Available online 1 November 2012.

Pinty J-P, C Barthe, E Defer, E Richard, M Chong. 2012. Explicit simulation of electrified clouds: From idealized to real case studies. Atmospheric Research, In Press, Corrected Proof, Available online 26 April 2012.

Plyasov A A, Surkov V V, Pilipenko V A, Fedorov E N, Ignatov V N. 2012. Spatial structure of the electromagnetic field inside the ionospheric Alfvén resonator excited by atmospheric lightning activity. J. Geophys. Res., 117(A9), A0930610.1029/2012JA017577.

Pohjola H, A Mäkelä. 2012. The Comparison of GLD360 and EUCLID Lightning Location Systems in Europe. Atmospheric Research, In Press, Accepted Manuscript, Available online 1 November 2012.

Qiu S, B-H Zhou, L-H Shi. 2012. Synchronized observations of cloud-to-ground lightning using VHF broadband interferometer and acoustic arrays. J. Geophys. Res., 117(D19), D1920410.1029/2012JD018542.

Rakov V A, F Heidler. 2012. Advances in lightning protection research (Editorial). Journal of Lightning Research, 4 (Suppl. 2: M0), 49.

Rakov V A. 2012. Lightning discharge and fundamentals of lightning protection. Journal of Lightning Research, 4, (Suppl 1: M2), 3-11.

Robledo-Martinez A, H Sobral, A Ruiz-Meza. 2012. Electrical discharges as a possible source of methane on Mars: Lab simulation. Geophys. Res. Lett., 39(17), L1720210.1029/2012GL053255.

Rubinstein M, J-L Bermúdez, V Rakov, F Rachidi, A Hussein. 2012. Compensation of the instrumental decay in measured lightning electric field waveforms. IEEE Trans. on EMC, 54(3), 685-688.

Rycroft M J, K A Nicoll, K L Aplin, R G Harrison. 2012. Recent advances in global electric circuit coupling between the space environment and the troposphere. Journal of Atmospheric and Solar-Terrestrial Physics, Vol. 90–91, 198-211.

Salut M M, M Abdullah, K L Graf, M B Cohen, B R T Cotts, K Sushil. 2012. Long recovery VLF perturbations associated with lightning discharges. J. Geophys. Res., 117(A8), A0831110.1029/2012JA017567.

Schaal M M, J R Dwyer, Z H Saleh, H K Rassoul, J D Hill, D M Jordan, M A Uman. 2012. Spatial and energy distributions of X-ray emissions from leaders in natural and rocket triggered lightning. J. Geophys. Res., 117(D15), D1520110.1029/2012JD017897.

Schumann C, M M F Saba, R B G da Silva, W Schulz. 2012. Electric fields changes produced by positives cloud-to-ground lightning flashes. Journal of Atmospheric and Solar-Terrestrial Physics, 92, 37-42.

Shoory A, F Rachidi, M Rubinstein. 2012. Correction to “Relativistic Doppler effect in an extending transmission line: Application to lightning”. J. Geophys. Res., 117(D13), D1310410.1029/2012JD017886.

Siingh D, P R Kumar, M N Kulkarni, R P Singh, A K Singh. 2012. Lightning, convective rain and solar activity — Over the South/Southeast Asia. Atmospheric Research, In Press, Corrected Proof, Available online 19 August 2012. DOI:10.1016/j.atmosres.2012.07.026, 1-13.

Siingh D, R P Singh, A K Singh, S Kumar, M N Kulkarni, A K Singh. 2012. Discharges in the stratosphere and mesosphere. Space Science Reviews, 169, DOI:10.1007/s11214-012-9906-0, 73-121.

Smorgonskiy A, F Rachidi, M Rubinstein, G Diendorfer, W Schulz. 2012. On the proportion of upward flashes to lightning research towers. Atmospheric Research, In Press, Corrected Proof, Available online 10 September 2012.

Sokol Z, P Pesice. 2012. Nowcasting of precipitation – Advective statistical forecast model (SAM) for the Czech Republic. Atmospheric Research, 103, 70-79.

Soula S, F Iacovella, O van der Velde, J Montanyà, M Füllekrug, T Farges, et al. 2012. Multi-instrumental analysis of large sprite events and their producing storm in southern France. Atmos. Res., 10.1016/j.atmosres.2012.10.004.

Stephan K D. 2012. Implications of the visual appearance of ball lightning for luminosity mechanisms. Journal of Atmospheric and

RECENT PUBLICATIONS

Solar-Terrestrial Physics, 89, 120-131.

Stolzenburg M, T C Marshall, S Karunarathne, N Karunarathna, T A Warner, R E Orville, H-D Betz. 2012. Strokes of upward illumination occurring within a few milliseconds after typical lightning return strokes. J. Geophys. Res., 117(D15), D1520310.1029/2012JD017654.

Sumitani H, T Takeshima, Y Baba, N Nagaoka, A Ametani, J Takami, S Okabe, V A Rakov. 2012. 3-D FDTD computation of lightning-induced voltages on an overhead two-wire distribution line. IEEE Trans. on EMC, 54(5), 1161-1168.

Suzuki T, M Hayakawa, Y Hobara, K Kusunoki. 2012. First detection of summer blue jets and starters over Northern Kanto area of Japan: Lightning activity. J. Geophys. Res., 117(A7), A0730710.1029/2011JA017366.

Takahashi T. 2012. Precipitation particle charge distribution and evolution of East Asian rainbands. Atmospheric Research, 118, 304-323.

Thang T H, Y Baba, N Nagaoka, A Ametani, J Takami, S Okabe, V A Rakov. 2012. A simplified model of corona discharge on overhead wire for FDTD computations. IEEE Trans. on EMC, 54(3), 585-593.

Visacro S, C R. Mesquita, A De Conti, F H. Silveira. 2012. Updated statistics of lightning currents measured at Morro do Cachimbo Station. Atmospheric Research, 117, 55-63.

Wakasa S A, S Nishimura, H Shimizu, Y Matsukura. 2012. Does lightning destroy rocks? Results from a laboratory lightning experiment using an impulse high-current generator. Geomorphology, Vol. 161–162, 110-114.

Wang C, R Jiang, J Yang, M Liu. 2012. Current subsidiary peak in triggered lightning strokes. Radio Sci., 47(4), RS400210.1029/2011RS004933.

Wang Y, G Zhang, X Qie, D Wang, T Zhang, Y Zhao, Y Li, T Zhang. 2012. Characteristics of compact intracloud discharges observed in a severe thunderstorm in northern part of China. Journal of Atmospheric and Solar-Terrestrial Physics, Vol. 84–85, 7-14.

Warner T A, K L Cummins, R E Orville. 2012. Upward lightning observations from towers in Rapid City, South Dakota and comparison with National Lightning Detection Network data, 2004–2010. J. Geophys. Res., 117(D19), D1910910.1029/2012JD018346.

Warner T A. 2012. Observations of simultaneous upward lightning leaders from multiple tall structures Atmospheric Research, 117, 45-54.

Winn W P, E M Eastvedt, J J Trueblood, K B Eack, H E Edens, G D Aulich, et al. 2012. Luminous pulses during triggered lightning. J. Geophys. Res., 117(D10), D1020410.1029/2011JD017105.

Yair Y. 2012. New results on planetary lightning. Advances in Space Research, 50(3), 293-310.

Yoshida S, C J Biagi, V A Rakov, J D Hill, M V Stapleton, D M Jor dan, M A Uman, et al. 2012. The initial stage processes of rocket-and-wire triggered lightning as observed by VHF interferometry. J. Geophys. Res., 117(D9), D0911910.1029/2012JD017657.

Yoshida S, M Akita, T Morimoto, T Ushio, Z Kawasaki. 2012. Propagation characteristics of lightning stepped leaders developing in charge regions and descending out of charge regions. Atmospheric Research, 106, 86-92.

Yuan T, L A Remer, H Bian, J R Ziemke, A Rachel, K E Pickering, L Oreopoulos, et al.

RECENT PUBLICATIONS

2012. Aerosol indirect effect on tropospheric ozone via lightning. J. Geophys. Res., 117(D18), D1821310.1029/2012JD017723.

Zakharenko V, C Mylostna, A Konovalenko, P Zarka, G Fischer, et al. 2012. Ground-based and spacecraft observations of lightning activity on Saturn. Planetary and Space Science, 61(1), 53-59.

Zeng Q, Z Wang, F Guo, M Feng, S Zhou, H Wang, D Xu. 2012. The application of lightning forecasting based on surface electrostatic field observations and radar data. Journal of Electrostatics, In Press, Uncorrected Proof, Available online 9 November 2012.

Zhang Q, D Li, Y Fan, Y Zhang, J Gao. 2012. Examination of the Cooray-Rubinstein (C-R) formula for a mixed propagation path by using FDTD. J. Geophys. Res., 117(D15), D1530910.1029/2011JD017331.

Zhang Q, J Yang, X Jing, D Li, Z Wang. 2012. Propagation effect of a fractal rough ground boundary on the lightning-radiated vertical electric field. Atmospheric Research, Vol. 104–105, 202-208.

Zhang Q, X Jing, J Yang, D Li, X Tang. 2012. Numerical simulation of the lightning electromagnetic fields along a rough and ocean-land mixed propagation path. J. Geophys. Res., 117(D20), D2030410.1029/2012JD017851.

Zhou E, W Lu, Y Zhang, B Zhu, D Zheng, Y Zhang. 201. Correlation analysis between the channel current and luminosity of initial continuous and continuing current processes in an artificially triggered lightning flash. Atmospheric Research, In Press, Accepted Manuscript, Available online 1 November 2012.

Reminder

Newsletter on Atmospheric Electricity presents twice a year (May and November) to the members of our community with the following information:

- ✧ announcements concerning people from atmospheric electricity community, especially awards, new books...,
- ✧ announcements about conferences, meetings, symposia, workshops in our field of interest,
- ✧ brief synthetic reports about the research activities conducted by the various organizations working in atmospheric electricity throughout the world, and presented by the groups where this research is performed, and
- ✧ a list of recent publications. In this last item will be listed the references of the papers published in our field of interest during the past six months by the research groups, or to be published very soon, that wish to release this information, but we do not include the contributions in the proceedings of the Conferences.

No publication of scientific paper is done in this Newsletter. We urge all the groups interested to submit a short text (one page maximum with photos eventually) on their research, their results or their projects, along with a list of references of their papers published during the past six months. This list will appear in the last item. Any information about meetings, conferences or others which we would not be aware of will be welcome.

Newsletter on Atmospheric Electricity is now routinely provided on the web site of ICAE (http://www.icae.jp), and on the web site maintained by Monte Bateman http://ae.nsstc.uah.edu/.

In order to make our news letter more attractive and informative, it will be appreciated if you could include up to two photos or figures in your contribution!

Call for contributions to the newsletter

All issues of this newsletter are open for general contributions. If you would like to contribute any science highlight or workshop report, please contact Daohong Wang (wang@gifu-u.ac.jp) preferably by e-mail as an attached word document. The deadline for **2013 spring** issue of the newsletter is **May 15, 2013**.

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