http://www.icae.jp

Newsletter on Atmospheric Electricity

Vol. 22 • No 1 • May 2011

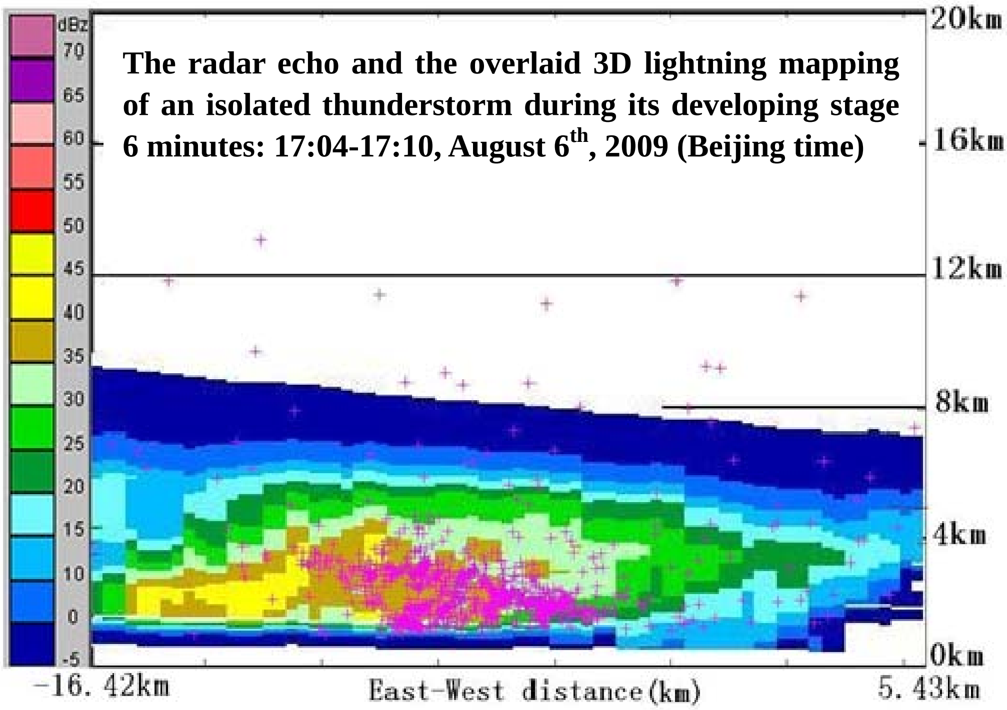
INTERNATIONAL COMMISSION ON ATMOSPHERIC ELECTRICITY (IAMAS/IUGG)

AMS COMMITTEE ON ATMOSPHERIC ELECTRICITY

AGU COMMITTEE ON ATMOSPHERIC AND SPACE ELECTRICITY

EUROPEAN GEOSCIENCES UNION

SOCIETY OF ATMOSPHERIC ELECTRICITY OF JAPAN



The radar echo and the overlaid 3D lightning mapping of an isolated thunderstorm during its developing stage 6 minutes: 17:04-17:10, August 6th, 2009 (Beijing time)

Comment on the photo above: **The electrical structure of the above isolated thunderstorm that occurred in Qinghai-Tibet plateau area and exhibited dominant positive electric field (this is a very USUAL phenomenon in THAT area!) has been revealed by Guangshu Zhang and his students (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences) using a 3D lightning mapping system. During the developing and the mature stages, the charge structure is an inverted dipole, while during the dissipating stage, it transforms into a four-layer structure of positive, negative, positive and negative charge with their heights of 5 km, 4 km, 3 km and 1.8 km from the ground, respectively.** ***For detail, please read their paper in the proceeding of the coming 14th ICAE.***

ANNOUNCEMENTS

YOUTUBE LIGHTNING ANIMATION

You can watch interesting youtube lightning animation by visiting the following sites.
http://www.youtube.com/watch?v=wd34RStIVPI
http://www.youtube.com/watch?v=vhnADxyncuI

The animations were generated by a MATLAB software called StormAnalysis. This software can be downloaded at the following web site: www.math.ufl.edu/~hager/papers/Lightning

The software can be used for free in research in accordance with the GNU software license. This software has four main modules:

1. PartitionStorm: Given an LMA file for a storm and optionally given an NLDN file, partition the storm into the flashes that occurred during the storm. Individual files are created containing the LMA pulses for a flash and any NLDN strikes associated with the flash.

2. ViewFlash: Generate XLMA type views of a flash. NLDN strikes are shown on the plots as well as additional information such as a balloon location.

3. AnimateFlash: A three dimension animation of a flash showing the development of the LMA pulses. NLDN strikes are shown as they occur during the animation.

4. PulseGraph: Generate a graph which approximates the lightning channel. Animations like those of the AnimateFlash code can also be produced.

This software is a byproduct of a National Science Foundation collaborative research project between the University of Florida (William Hager) and the New Mexico Institute of Mining and Technology (Richard Sonnenfeld). Please send any feedback concerning the software to hager@ufl.edu.

CONFERENCES

14th International Conference on Atmospheric Electricity (14th ICAE)

The coming 14th ICAE (Rio de Janeiro, Brazil, August 8-12, 2011) will have a record number of papers to be presented. Now early registration for the ICAE 2011 is open. The early registration must be done by July 15th. It can be paid by either VISA or Bank Transfer.

After that, it could be done only at the conference with an increase of 10%. Click in the link below for registration.

https://www.funcate.org.br/icae2011

After you have done the registration, you will receive a receipt by e-mail.

The registration fee includes Welcome Reception, four lunches and Conference Banquet at a Brazilian Barbecue - Porcão Rio's.

ANNOUNCEMENTS

3rd International Symposium on Winter Lightning (3rd ISWL)

Due to the terrible earthquake and Tsunami occurred in Japan on March 11, 2011, the 3rd ISWL has been postponed to be held on June 15-16, 2011 at Sapporo, Japan. For detail, please visit the conference website: http://www.iswl2011.jp/index.html.

7th Asia-Pacific International Conference on Lightning (APL 2011)

The 7th Asia-Pacific International Conference on Lightning will be held on Nov. 1-4, 2011, at Chengdu, China. For detail, please visit the conference website: http://www.apl2011.org/.

2011 AGU Fall Meeting

The fall meeting of AGU will be held on 5-9 December 2011, at the Moscone Center West, 800 Howard Street, San Francisco. There will be several sessions associated with atmospheric electricity. For detail, please visit http://www.agu.org/meetings/fm11/.

RESEARCH ACTIVITY BY INSTITUTIONS

Atmospheric Electricity Research Group, Institute of Geophysics, Pol. Acad. Sci. (Warsaw, Poland)

Ground-level electric measurements of the DC electric field and (sporadically) electric current density have been run at the polar station Hornsund, Spitsbergen (77.00 N, 35.55 E) since 1989. Recently, in collaboration with Radio and Space Plasma Physics Group from the University of Leicester, UK, we have investigated the relations of the DC electric field at Hornsund to the overhead ionospheric convection potential as obtained by SuperDual Auroral Radar Network, an international network of high-frequency radars monitoring plasma flow in the polar ionospheres. Initial results will be presented at the 14^{th} ICAE conference in Rio de Janeiro. We also continue, in collaboration with Russian (N.G. Kleimenova and O.V. Kozyreva) and Swedish colleagues (S. Israelsson), to study the behaviour of the measured electrical parameters due to the effects of sudden magnetospheric disturbances.

Department of Physics, University of Shkodra "Luigj Gurakuqi", Albania

Florian A. Mandija (f_mandiija@yahoo.com)

University of Tirana, University of Shkodra and the Albanian Centre of Nuclear Physics participate in a project which is focused on atmospheric/environmental monitoring. The principal goal of this project is continuous measurements of atmospheric ion concentrations, aerosol number and mass distributions and meteorological parameters. Monitoring campaigns have begun on July 2010 and will proceed till December 2012. During this period there are planed to monitor several areas in the territory of Albania. Principal monitoring areas are:

- Urban sites: cities of Shkodra and Tirana
- Rural sites: areas around Shkodra Lake
- Mountain sites:Razma and Dajti
- Seashore sites: Velipoja and Durres (Adriatic Sea)

These monitoring sites (amp and photos) are presented in the figure 1. Monitoring area coves almost all North-West part of Albania as well as the South-East part of Adriatic Sea. According to the plan of this project, the working group has to present overall results every year. This work can helps to a better understanding of atmospheric phenomena's occurring in this region.

Figure 1. Map and some photos of monitoring sites (Shkodra, Razma, Durres and Shkodra Lake)

Key Laboratory of Middle Atmosphere and Global Environment Observation (LAGEO), Institute of Atmospheric Physics, Chinese Academy of Sciences (CAS), Beijing

The current research works of LAGEO are focused on three aspects, analyses on the data from Shandong Artificially Triggering Lightning Experiment (SHATLE), lightning in severe convective weather systems, and TLEs and their parent thunderstorm. Considering the artificially triggering lightning, a rocket triggered flash, which includes 5 large M-components with unusual large peak current in a range of kilo-Amperes, 4 return strokes and 1 stroke/M-component (RM) event which exhibits both stroke and M-component features, was analyzed in detail. Results show that evident optical luminosity is found just prior to all the pulse events, even return strokes. Statistical distributions of channel base currents and close magnetic fields were also performed.

Lightning characteristics in convective severe weather system, including Typhoons and MCSs, were studied. Data from WWLLN was used to analyze the relationship between the maximum sustained winds and lightning rate in 69 typhoons, including 32 weak typhoons (category 1-3) and 37 super typhoons(category 4-5), over the Northwest Pacific Ocean from 2005 to 2009. The correlation coefficients between 6-h, 12-h, 24-h total lightning activity within 800km of the center and the maximum sustained winds of these two class typhoons were studied. The CG lightning in MCS mainly occurred in regions with high values of CAPE and surface equivalent potential temperature. The CG flashes are easier to happen in the stage that updraft reaches the maximum and downdraft appears.

TLEs observations have been continued since the summer of 2007. Characteristics of sprites-producing thunderstorm were analyzed by using TRMM, lightning location data and Doppler radar data. The results show that radar reflectivity, precipitation ice and cloud ice are in good agreement. Compared with precipitation ice and cloud ice, cloud water showed more complex vertical structure. A gigantic jet event was recorded in 2010.

Lightning Research Group of Gifu University (Gifu, Japan)

We have continued our long term observation experiments on the lightning that hit on a windmill and its lightning protection tower during the last winter. As a summary of our experiments, in the coming 14th ICAE, we are going to report the following characteristics of the upward lightning observed in Japanese winter thunderstorms and their implications: (1) The percentage of bipolar upward lightning is considerably high; (2) Self-initiated and other-triggered upward lightning tend to have biased percentages in terms of striking locations and thunderstorm types; (3) Wind shows significant effects in assisting the initiation of upward leaders; (4) Upward positive leaders initiated from structures with different effective heights have remarkably different initial speeds. Higher structures tend to initiate faster upward leaders.

We have also finished a paper on the characteristics of a downward positive stepped leader, which has been accepted by JGR. The positive leader, recorded by our high speed optical imaging system at a time resolution of 100 ns, radiated more than 20 optical pulses during its downward progression over the height from 297 m to 23 m above the ground like a negative stepped leader. The leader propagated at a speed of 0.8×10^6 m/s over the height from 270 m to 94 m and then accelerated to a speed of 2.3×10^6 m/s at the height of about 46 m. The positive leader optical pulses show a 10-90% rise time ranging from 1.2 to 3.8 μs with a geometric mean (GM) value of 2.0 μs, and a half-peak width ranging from 1.8 to 5.1 μs with a GM value of 3.4 μs. On average, the GM rise time and GM half peak width of these positive leader pulses are about 5 times (2.0 μs versus 0.4 μs) and 3 times (3.4 μs versus 1.1 μs) larger than those of negative leader pulses, respectively. The step luminosity pulses apparently originate in the leader tip region, which is unresolved with our limited spatial resolution of about 25 m, and propagate upward over distances from several tens of meters to more than 200 m (undetectable beyond that distance) with a speed close to 1.0×10^8 m/s. The pulses appear to attenuate significantly during their initial upward propagation of several tens of meters and then exhibit a tendency to be more or less constant in their luminosity.

Massachusetts Institute of Technology

The evidence for polarity asymmetry in lightning leader speeds from a number of different research areas (natural lightning strikes to towers, rocket-triggered lightning, outdoor high voltage generator studies, high-speed video recordings, and LMA analyses of leader progressions) have been organized for consideration in the context of Heckman's (1992) analysis of lightning channel current cutoff. The larger current flowing behind faster negative leaders is shown to lend stability (against current cutoff) to lightning ground flashes with positive polarity, thereby guaranteeing continuing current behavior The more slowly progressing positive leaders are found to promote current cutoff and the formation of multiple strokes for negative CGs. These results have been assembled for presentation at both the International Symposium on Winter Lightning in Sapporo in June, and for the ICAE in Rio de Janeiro in August. Discussions at the GROUND Lightning Conference in Salvador, Brazil in November 2010 planted important seeds for this work.

Vadim Mushtak continues work on the iterative inversion of multi-station observations of Schumann resonances toward characterizing the lightning activity in the three tropical 'chimneys'. In the latest calculations, five station (Belsk (Poland), Moshiri (Japan), Rhode Island (USA), Syowa (Australia) and Shilong (India)) observations of magnetic field in the ELF region (3 Hz -50 Hz) are used to locate the centroids of activity in South America, Africa and the Maritime Continent over 24 hours of UT on a single day (January 1, 2009).

MIT Lincoln Laboratory

Interest in convection hazardous to aviation and located beyond radar range from the East Coast of the United States has prompted an investigation of lightning detection over the Atlantic Ocean. All major regional and global networks are being examined for capabilities in an oceanic region extending from the Gulf of Mexico in the SW to Puerto Rico in the SE to New Foundland in the NE.

The UK Met Office, Observations R&D Group – VLF Arrival Time Difference lightning location network (ATDnet)

Alec Bennett alec.bennett@metoffice.gov.uk

The UK Met Office long range lightning location network (ATDnet) team have installed new sensors to increase the accuracy and detection efficiency of lightning stroke location in Europe and the North Atlantic, with a sensor installed in Croatia during August 2010 and another on Grand Cayman in the Caribbean during March 2011. Further deployments in the southern hemisphere are due by the end of 2011. A research paper co-authored by the ATDnet team and the Icelandic Meteorological Office analyzing lightning generated by the 2010 Eyjafjallajökull volcanic eruption was published at the end of 2010 (Bennett et al. 2010). The main finding was that the lightning rate was approximately proportional to the height of the volcanic ash plume above the crater, as identified using radar. The dominant charge separation mechanism responsible for lightning generation of sufficient strength to be detected by ATDnet was likely to be similar to that of conventional thunderstorms, as the strongest electrification appeared to coincide with plume top glaciation.

The ATDnet team continues to be actively involved with the Hydrological Cycle in Mediterranean Experiment (HyMeX), providing data and expertise on VLF lightning location in support of storm electrification investigations. We are also working with EUMETSAT to enable ATDnet data to be used to help generate thunderstorm observation products as part of the forthcoming Lightning Imager mission, to be flown on the Meteosat Third Generation geostationary satellite from 2018.

Two electric field mills, including one with an optical lightning detection sensor, have been installed at our headquarters in Exeter, UK. These instruments will be used in combination with our ATDnet network to investigate lightning peak current and polarity, with particular emphasis on improving our understanding of how our network performs with different types of lightning activity.

University of Florida (Gainesville, FL)

Lightning experiments and observations will continue in Summer 2011 at Camp Blanding, Florida (for the 18th year), as well as at the Lightning Observatory in Gainesville (LOG), located at a distance of about 45 km from Camp Blanding. The two facilities are linked by a dedicated phone line. A third field measuring station, 3 km from the Camp Blanding site, is currently being set up in Starke. A new ground launch facility for triggering lightning (in addition to our tower launcher) has been constructed at Camp Blanding as has a new optical viewing building 200 m away from the new ground-based launcher. New instrumentation for summer 2011 includes a local field mill network and upgraded dE/dt and x-ray TOA networks. A seven-station VHF time-of-arrival lightning locating system (Lightning Mapping Array) will be operated in the Camp Blanding area. Among the visiting researchers scheduled to perform experiments in the summer campaign from the new optical building are Dr. E.P. Krider and a grad student from the University of Arizona, Dr. Vince Idone and a grad student from SUNYA, Dr. Hugh Christian and a grad student from University of Alabama Huntsville, and Dr. Daohong Wang from Gifu University, Japan, in addition to UF faculty and students.

C.J. Biagi, M.A. Uman, J.D. Hill, D.M. Jordan, and V.A. Rakov, in collaboration with J. Dwyer of Florida Tech authored a paper titled "Observations of stepping mechanisms in a rocket-and-wire triggered lightning flash". They present 10 high-speed video images that depict the bottom 150 m of a downward negative, dart-stepped leader in a rocket-and-wire triggered flash, recorded at 240 kiloframes per second (4.17 us frame integration time), along with correlated measurements of the X-ray emission at 50 m, electric field derivative (dE/dt) at 80 m, and the rocket launch-tower current beneath the leader. They observed discrete segments of secondary channel that exhibited luminosity above that of the surrounding corona streamers and were distinctly separate and beneath the downward-extending leader channel. These segments appear similar to the space stems or space leaders that have been imaged in long negative laboratory sparks. Multiple simultaneous pulses in X-ray emission, dE/dt, and launch tower current were recorded during the time that the leader steps were imaged. The leader extended at an average downward speed between 2.7×10^6 and 3.4×10^6 m/s. The paper is published in the JGR - Atmospheres.

A. Nag and V.A. Rakov, in collaboration with J.A. Cramer of Vaisala authored a paper titled "Remote Measurements of Currents in Cloud Lightning Discharges". Using measured wideband electric field waveforms and the Hertzian dipole (HD) approximation, they estimated peak currents for 48 located compact intracloud lightning discharges (CIDs) in Florida. CIDs are apparently the most intense natural producers of HF-VHF (3 – 300 MHz) radiation on Earth. The HD approximation was used because (1) CID channel lengths are expected to range from about 100 to 1000 m and in many cases can be considered electrically short and (2) it allows one to considerably simplify the inverse source problem. Horizontal distances to the sources were reported by the U.S. National Lightning Detection Network (NLDN), and source heights were estimated from the ratio of electric and magnetic fields. The resultant CID peak currents ranged from 33 to 259 kA with a geometric mean of 74 kA. The majority of NLDN-reported peak currents for the same 48 CIDs are considerably smaller than those predicted by the HD approximation. The discrepancy is primarily because NLDN-reported peak currents are assumed to be proportional to peak fields, while for the HD approximation the peak of electric radiation field component is proportional to the peak of current derivative with respect to time. An additional factor is the limited (400 kHz) upper frequency response of the NLDN. The paper is published in the IEEE Transactions in EMC.

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.

Alemu Tadesse, Emmanouil N. Anagnostou. 2010. African convective system characteristics determined through tracking analysis, Atmospheric Research, Volume 98, Issues 2-4, 468-477.

Allen D., K. Pickering, B. Duncan, M. Damon. 2010. Impact of lightning NO emissions on North American photochemistry as determined using the Global Modeling Initiative (GMI) model, J. Geophys. Res., 115, D22301, doi:10.1029/2010JD014062.

Andreotti A., D. Assante, V.A. Rakov, L. Verolino. 2011. Electromagnetic coupling of lightning to power lines: Transmission line approximation versus full-wave solution, IEEE Trans. on EMC, 53(2).

Barthe C., W. Deierling, M. C. Barth. 2010. Estimation of total lightning from various storm parameters: A cloud-resolving model study, J. Geophys. Res., 115, D24202, doi:10.1029/2010JD014405.

Biagi C. J., M. A. Uman, J. D. Hill, D. M. Jordan, V. A. Rakov, J. Dwyer. 2010. Observations of stepping mechanisms in a rocket-and-wire triggered lightning flash, J. Geophys. Res., 115, D23215, doi:10.1029/2010JD014616.

Briggs M. S., et al. 2011. Electron-positron beams from terrestrial lightning observed with Fermi GBM, Geophys. Res. Lett., 38, L02808, doi:10.1029/2010GL046259.

Carlson B. E., N. G. Lehtinen, U. S. Inan. 2010. Terrestrial gamma ray flash production by active lightning leader channels, J. Geophys. Res., 115, A10324, doi:10.1029/2010JA015647.

Celestin S., V. P. Pasko. 2011. Energy and fluxes of thermal runaway electrons produced by exponential growth of streamers during the stepping of lightning leaders and in transient luminous events, J. Geophys. Res., 116, A03315, doi:10.1029/2010JA016260.

Collier A. B., J. Lichtenberger, M. A. Clilverd, C. J. Rodger, P. Steinbach. 2011. Source region for whistlers detected at Rothera, Antarctica, J. Geophys. Res., 116, A03219, doi:10.1029/2010JA016197.

Connaughton V., et al. 2010. Associations between Fermi Gamma-ray Burst Monitor terrestrial gamma ray flashes and sferics from the World Wide Lightning Location Network, J. Geophys. Res., 115, A12307, doi:10.1029/2010JA015681.

Cooray V., Rakov V. 2011. Engineering lightning return stroke models incorporating current reflection from ground and finitely conducting ground effects, IEEE Trans. on EMC, 53(2).

de Larquier S., V. P. Pasko. 2010. Mechanism of inverted-chirp infrasonic radiation from sprites, Geophys. Res. Lett., 37, L24803, doi:10.1029/2010GL045304.

Delfino F., R. Procopio, M. Rossi, A. Shoory, F. Rachidi. 2011. Lightning electromagnetic radiation over a stratified conducting ground: Formulation and numerical evaluation of the electromagnetic fields, J. Geophys. Res., 116, D04101, doi:10.1029/2010JD015077.

Enno S. E. 2011. A climatology of cloud-to-ground lightning over Estonia, 2005–2009, Atmospheric Research, Volume 100, Issue 4, 310-317.

Enrique V. Mattos, Luiz A.T. Machado. 2011.

Cloud-to-ground lightning and Mesoscale Convective Systems, Atmospheric Research, Volume 99, Issues 3-4, 377-390.

Gladich I., I. Gallai, D.B. Giaiotti, F. Stel. 2011. On the diurnal cycle of deep moist convection in the southern side of the Alps analysed through cloud-to-ground lightning activity, Atmospheric Research, Volume 100, Issue 4, 371-376.

Gurevich A.V., A.N. Karashtin. 2011. Radio emission structure of cloud-to-ground lightning discharge, Physics Letters A, Volume 375, Issue 7, 1128-1134.

Gurevich A.V., A.P. Chubenko, A.N. Karashtin, G.G. Mitko, et al. 2011. Gamma-ray emission from thunderstorm discharges, Physics Letters A, Volume 375, Issue 15, 1619-1625.

Han F., S. A. Cummer. 2010. Midlatitude daytime D region ionosphere variations measured from radio atmospherics, J. Geophys. Res., 115, A10314, doi:10.1029/2010JA015715.

Han F., S. A. Cummer. 2010. Midlatitude nighttime D region ionosphere variability on hourly to monthly time scales, J. Geophys. Res., 115, A09323, doi:10.1029/2010JA015437.

Helin Zhou, Nelson Theethayi, Gerhard Diendorfer, Rajeev Thottappillil, Vladimir A. Rakov. 2010. On estimation of the effective height of towers on mountaintops in lightning incidence studies, Journal of Electrostatics, Volume 68, Issue 5, 415-418.

Howard J., M.A. Uman, C. Biagi, D. Hill, V.A. Rakov, D.M. Jordan. 2011. Measured close lightning leader-step electric field-derivative waveforms, J. Geophys. Res., 116, D08201, doi:10.1029/2010JD015249.

Huang T.-Y., C. L. Kuo, C. Y. Chiang, A. B. Chen, H. T. Su, R. R. Hsu. 2010. Further investigations of lightning-induced transient emissions in the OH airglow layer, J. Geophys. Res., 115, A10326, doi:10.1029/2010JA015558.

Kulak A., Z. Nieckarz, S. Zieba. 2010. Analytical description of ELF transients produced by cloud-to-ground lightning discharges, J. Geophys. Res., 115, D19104, doi:10.1029/2009JD013033.

Kumar P. Ramesh, A.K. Kamra. 2010. Lightning activity variations over three islands in a tropical monsoon region, Atmospheric Research, Volume 98, Issues 2-4, 309-316.

Kuo C. L., et al. 2011. The 762 nm emissions of sprites, J. Geophys. Res., 116, A01310, doi:10.1029/2010JA015949.

Lal D.M., S.D. Pawar. 2011. Effect of urbanization on lightning over four metropolitan cities of India, Atmospheric Environment, Volume 45, Issue 1, 191-196.

Lay E. H., C. J. Rodger, R. H. Holzworth, M. Cho, J. N. Thomas. 2010. Temporal-spatial modeling of electron density enhancement due to successive lightning strokes, J. Geophys. Res., 115, A00E59, doi:10.1029/2009JA014756.

Li J., S. Cummer. 2011. Estimation of electric charge in sprites from optical and radio observations, J. Geophys. Res., 116, A01301, doi:10.1029/2010JA015391.

Liu D., Qie X., Xiong Y., et al. 2011. Evolution of the total lightning activity in a leading-line and trailing stratiform mesoscale convective system over Beijing, Advances in Atmospheric Sciences, doi:10.1007/s00376-010-0001-8.

Lu G., S. A. Cummer, J. Li, F. Han, D. M. Smith, B. W. Grefenstette. 2011. Characteristics of broadband lightning emissions associated with terrestrial gamma ray flashes, J. Geophys. Res., 116, A03316, doi:10.1029/2010JA016141.

Luque A., F. J. Gordillo-Vázquez. 2011. Modeling and analysis of N_2 ($B^3\Pi_g$) and N_2 ($C^3\Pi_u$) vibrational distributions in sprites, J. Geophys. Res., 116, A02306, doi:10.1029/2010JA015952.

Luque A., F. J. Gordillo-Vázquez. 2011. Sprite beads originating from inhomogeneities in the mesospheric electron density, Geophys. Res. Lett., 38, L04808, doi:10.1029/2010GL046403.

Mackay C., A. C. Fraser-Smith. 2010. Lightning location using the slow tails of sferics, Radio Sci., 45, RS5010, doi:10.1029/2010RS004405.

Mäkelä A., T. J. Tuomi, J. Haapalainen. 2010. A decade of high-latitude lightning location: Effects of the evolving location network in Finland, J. Geophys. Res., 115, D21124, doi:10.1029/2009JD012183.

Mandija F. 2011. Concentrations of atmospheric ions and aerosol particles near Adriatic Sea, Environmental Research Journal, 591-608.

Mandija F. 2011. Measurements on the principal electric parameters of the atmosphere. Book: Electrostatics; Theory and Applications, Novascience Publisher.

Mandija F., D. Ulqini, Sh. Ahmetaga, F. Vila. 2011. Radon concentration in the region of Shkodra Lake, Chemical Physics Research Journal, 63-74.

March V., J. Montanyà. 2010. Influence of the voltage-time derivative in X-ray emission from laboratory sparks, Geophys. Res. Lett., 37, L19801, doi:10.1029/2010GL044543.

March V., J. Montanyà. 2011. X-rays from laboratory sparks in air: The role of the cathode in the production of runaway electrons, Geophys. Res. Lett., 38, L04803, doi:10.1029/2010GL046540.

Martini M., D. J. Allen, K. E. Pickering, G. L. Stenchikov, A. Richter, E. J. Hyer, C. P. Loughner. 2011. The impact of North American anthropogenic emissions and lightning on long-range transport of trace gases and their export from the continent during summers 2002 and 2004, J. Geophys. Res., 116, D07305, doi:10.1029/2010JD014305.

Maslowski G., V.A. Rakov, M Miki. 2011. Some inferences from radial electric fields measured inside the lightning-channel corona sheath, IEEE Trans. on EMC, 53(2).

Milikh G., R. Roussel-Dupré. 2010. Runaway breakdown and electrical discharges in thunderstorms, J. Geophys. Res., 115, A00E60, doi:10.1029/2009JA014818.

Nag A., et al. 2011. Evaluation of U.S. National Lightning Detection Network performance characteristics using rocket-triggered lightning data acquired in 2004–2009, J. Geophys. Res., 116, D02123, doi:10.1029/2010JD014929.

Nag A., V. A. Rakov. 2010. Compact intracloud lightning discharges: 1. Mechanism of electromagnetic radiation and modeling, J. Geophys. Res., 115, D20102, doi:10.1029/2010JD014235.

Nag A., V. A. Rakov. 2010. Compact intracloud lightning discharges: 2. Estimation of electrical parameters, J. Geophys. Res., 115, D20103, doi:10.1029/2010JD014237.

Nag A., V.A. Rakov, J.A. Cramer. 2011. Remote measurements of currents in cloud lightning discharges, IEEE Trans. on EMC, 53(2).

RECENT PUBLICATIONS

Nicolau Pineda, Joan Bech, Tomeu Rigo, Joan Montanyà. 2011. A Mediterranean nocturnal heavy rainfall and tornadic event. Part II: Total lightning analysis, Atmospheric Research, Volume 100, Issue 4, 638-648.

Paiva G. S., C. C. Bastos, A. C. Pavão. 2011. Comment on comment by J. R. Dwyer and D. M. Smith on "'Seed' electrons from muon decay for runaway mechanism in the terrestrial gamma ray flash production", J. Geophys. Res., 116, D07205, doi:10.1029/2010JD015368.

Pan L., Qie X. 2010. Lightning Activity in Super Typhoon Sepat (0709), Chinese Journal of Atmospheric Sciences(in Chinese), 34(6):1088-1098.

Petr Novák, Hana Kyznarová. 2011. Climatology of lightning in the Czech Republic, Atmospheric Research, Volume 100, Issue 4, 318-333.

Qie, X., R. Jiang, C. Wang, et al. 2011. Simultaneously measured current, luminosity and electric field pulses in a rocket-triggered lightning flash, J. Geophys. Res., doi:10.1029/2010JD015331.

Reuveni Y., C. Price, E. Greenberg, A. Shuval. 2010. Natural atmospheric noise statistics from VLF measurements in the eastern Mediterranean, Radio Sci., 45, RS5015, doi:10.1029/2009RS004336.

Riousset J. A., V. P. Pasko, A. Bourdon. 2010. Air-density-dependent model for analysis of air heating associated with streamers, leaders, and transient luminous events, J. Geophys. Res., 115, A12321, doi:10.1029/2010JA015918.

Saba M. M. F., W. Schulz, T. A. Warner, L. Z. S. Campos, et al. 2010. High-speed video observations of positive lightning flashes to ground, J. Geophys. Res., 115, D24201, doi:10.1029/2010JD014330.

Said R. K., U. S. Inan, K. L. Cummins. 2010. Long-range lightning geolocation using a VLF radio atmospheric waveform bank, J. Geophys. Res., 115, D23108, doi:10.1029/2010JD013863.

Sharma S.R., V. Cooray, M. Fernando, F.J. Miranda. 2011. Temporal features of different lightning events revealed from wavelet transform, Journal of Atmospheric and Solar-Terrestrial Physics, Volume 73, Issue 4, 507-515.

Sharma S.R., V. Cooray, M. Fernando. 2011. Unique lightning activities pertinent to tropical and temperate thunderstorms, Journal of Atmospheric and Solar-Terrestrial Physics, Volume 73, Issue 4, 483-487.

Shoory A., A. Mimouni, F. Rachidi, V. Cooray, M. Rubinstein. 2011. On the accuracy of approximate techniques for the evaluation of lightning electromagnetic fields along a mixed propagation path, Radio Sci., 46, RS2001, doi:10.1029/2010RS004480.

Shvets A. V., Y. Hobara, M. Hayakawa. 2010. Variations of the global lightning distribution revealed from three-station Schumann resonance measurements, J. Geophys. Res., 115, A12316, doi:10.1029/2010JA015851.

Siefring C. L., J. S. Morrill, D. D. Sentman, M. J. Heavner. 2010. Simultaneous near-infrared and visible observations of sprites and acoustic-gravity waves during the EXL98 campaign, J. Geophys. Res., 115, A00E57, doi:10.1029/2009JA014862.

Stolzenburg M., T. C. Marshall, P. R. Krehbiel. 2010. Duration and extent of large electric fields in a thunderstorm anvil cloud after the last lightning, J. Geophys. Res., 115, D19202,

doi:10.1029/2010JD014057.
Suzuki T., Y. Matsudo, T. Asano, M. Hayakawa, K. Michimoto. 2011. Meteorological and electrical aspects of several winter thunderstorms with sprites in the Hokuriku area of Japan, J. Geophys. Res., 116, D06205, doi:10.1029/2009JD013358.
Tavakoli M.R. Bank, B. Vahidi. 2010. Statistical analysis of the lightning performance of high voltage OHLs using dynamic simulation of lightning leaders movements, International Journal of Electrical Power & Energy Systems, Volume 32, Issue 9, 1024-1030.
Thomas Farges, Elisabeth Blanc. 2011. Lightning and TLE electric fields and their impact on the ionosphere, Comptes Rendus Physique, Volume 12, Issue 2, 171-179.
Toledo-Redondo S., A. Salinas, J. Portí, J. A. Morente, et al. 2010. Study of Schumann resonances based on magnetotelluric records from the western Mediterranean and Antarctica, J. Geophys. Res., 115, D22114, doi:10.1029/2010JD014316.
van der Velde O. A., J. Bór, J. Li, S. A. Cummer, E. Arnone, et al. 2010. Multi-instrumental observations of a positive gigantic jet produced by a winter thunderstorm in Europe, J. Geophys. Res., 115, D24301, doi:10.1029/2010JD014442.
van der Velde O. A., J. Montanyà, S. Soula, N. Pineda, J. Bech. 2010. Spatial and temporal evolution of horizontally extensive lightning discharges associated with sprite-producing positive cloud-to-ground flashes in northeastern Spain, J. Geophys. Res., 115, A00E56, doi:10.1029/2009JA014773.
Vladislav Mazur, Lothar H. Ruhnke. 2011. Physical processes during development of upward leaders from tall structures, Journal of Electrostatics, Volume 69, Issue 2, 97-110.
Wang D., Xuan Y., Liu J., et al. 2011. Analyses on the characteristic of cloud-to-ground lightning flash in Da Hinggan Ling forest region, Chinese Journal of Atmospheric Sciences (in Chinese), 35(1):147-156.
Wu T., W. Dong, Y. Zhang, T. Wang. 2011. Comparison of positive and negative compact intracloud discharges, J. Geophys. Res., 116, D03111, doi:10.1029/2010JD015233.
Yamashita K., Y. Takahashi, M. Sato, H. Kase. 2011. Improvement in lightning geolocation by time-of-arrival method using global ELF network data, J. Geophys. Res., 116, A00E61, doi:10.1029/2009JA014792.
Yang J., X. Qie, G. Zhang, Q. Zhang, G. Feng, Y. Zhao, R. Jiang. 2010. Characteristics of channel base currents and close magnetic fields in triggered flashes in SHATLE, J. Geophys. Res., 115, D23102, doi:10.1029/2010JD014420.
Yuan T., L. A. Remer, K. E. Pickering, H. Yu. 2011. Observational evidence of aerosol enhancement of lightning activity and convective invigoration, Geophys. Res. Lett., 38, L04701, doi:10.1029/2010GL046052.
Zhang Q., X. Liu, J. Yang, R. Jiang, Z. Wang, J. Bian. 2011. The characteristics and simulation of close leader/return stroke field change waveforms, Radio Sci., 46, RS1017, doi:10.1029/2010RS004469.
Zhu B., H. Zhou, M. Ma, F. Lv, S. Tao. 2010. Estimation of channel characteristics of narrow bipolar events based on the transmission-line model, J. Geophys. Res., 115, D19105, doi:10.1029/2009JD012021.

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/.

ICAE

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 **2011 winter** issue of the newsletter is **Nov. 15, 2011**.

Editor:
Daohong Wang
Secretary of ICAE
E-mail:wang@gifu-u.ac.jp
Tel: 81-58-293-2702
Fax: 81-58-232-1894

Compiler:
Wenjuan Zhang
Laboratory of Lightning Physics and Protection Engineering
Beijing, China
zhangwj@cams.cma.gov.cn

Newsletters on Atmospheric Electricity are supported by International Commission on Atmospheric Electricity, IUGG/IAMAS.