

# Scientific Report

## 2<sup>nd</sup> TEA-IS Summer School 23-27 June, Collioure, FRANCE

### Summary

The discovery of TLEs and TGFs above thunderstorms demonstrates that our understanding of thunderstorms and of processes in the atmosphere above them is limited. TLEs and TGFs further underscore the point that thunderstorms affect not only the troposphere but all atmospheric layers and near-Earth space. Two European space missions are planned for the study of thunderstorms and atmospheric coupling. They are the Atmosphere-Space Interactions Monitor (ASIM) of the European Space Agency (ESA) and the French satellite “Tool for the Analysis of RADIations from lightnings and Sprites” (TARANIS) developed by the French space agency (CNES). To be launched in 2016, the missions will study electric discharges above thunderstorms, thunderstorm-generated atmospheric gravity waves, and thunderstorm cloud properties.

The ESF-Funded Research Network Programme “Thunderstorm Effects in the Atmosphere-Ionosphere System” (TEA-IS) was designed to coordinate the European research on fundamental thunderstorm processes and their impact and to provide a supporting framework for the two space missions mentioned above.

The 2<sup>nd</sup> TEA-IS Summer School was held at Collioure (France) from June 23<sup>rd</sup> to June 27<sup>th</sup>, 2014. The objectives were twofold: (1) to give students an overview of the history and present status of the research field of TEA-IS, and (2) to provide a venue where researchers can exchange new results and develop new collaborations. There were 95 registered participants, including 28 teachers and 43 participants registered as students. The program, the proceedings, and additional information are available at the website of the summer school: <http://tea-is-2014.cnrs-orleans.fr/>

In total, there were 89 scientific presentations (6 tutorial talks, 21 topical talks, 16 student talks and 46 posters) and 6 training lessons. Each day was dedicated to a main topic:

06/23: Physics of atmospheric electricity.

06/24: Lightning induced perturbations of the atmosphere-ionosphere.

06/25: High-Energy Atmospheric Electricity.

06/26: Perturbations of the atmosphere-ionosphere induced by thunderstorms.

06/27: Current and future space projects: objectives, instrumentation, and expected impacts.

The typical organization of each day was as follows:

09:00-10:00	One tutorial.
10:30-12:30	Four topical talks.
14:00-15:00	Four oral presentations by students.
15:00-16:00	Poster session.
16:30-18:30	Training lessons.

## Scientific content and discussion

To review the scientific content of the Summer School, we present each of the covered topics. Then, we briefly present the content of the training lessons and the poster sessions.

### Physics of atmospheric electricity (June 23<sup>rd</sup>)

This topic was introduced by a one-hour tutorial talk by S. Soula (LA, University of Toulouse/CNRS, France) who presented “**Meteorology of thunderstorms**”. It was followed by four topical talks dedicated to specific points related to the physics of lightning:

- “Cloud electrification processes” by E. Avila (FaMAF, University of Cordoba, Argentina).
- “Lightning physics” by P. Lalande (ONERA, Chatillon, France).
- “Generation, propagation, and detection of ELF/VLF waves” by M. Cohen (School of Electrical and Computer Engineering, Georgia Institute of Technology, USA).
- “Lightning space observations for nowcasting” by H. Christian (Earth System Science Center, University of Alabama in Huntsville, USA).

The last oral presentations of the day were four selected student talks related to the physics of atmospheric electricity and of TLEs:

- Thunderstorm geometry & morphology suggested from Cassini/RPWS Saturn lightning flashrate data and comparative terrestrial meteorology – J.A. Paganan (IWF, Space Research Institute, Austria).
- Lightning strokes frequency homogenization for climatological analysis: application to LINET data records over Europe – M. Petracca (Institute of Atmospheric and Climate, CNR, Italy).
- Streamer-to-leader transition in gigantic jets – C.L. da Silva (CSSL, Pennsylvania State University, USA).
- GRASSP Instrument: Status and First Results – M. Passas (IAA-CSIC Instituto de Astrofísica de Andalucía, Spain).

### Lightning-induced perturbations of the atmosphere/ionosphere (June 24<sup>th</sup>)

Two 45-minute tutorial talks were presented to introduce this topic: “**Imaging Sprites with high Time resolution**” by H. C. Stenbaek Nielsen (Geophysical Institute, University of Alaska, USA) and “**TLE modeling: an overview**” by A. Luque (IAA-CSIC, Instituto de Astrofísica de Andalucía, Spain). They were followed by four associated topical talks:

- “Jet observations and theories” by O. Van der Velde (Electrical Engineering, Technical University of Catalonia, Spain).
- “The chemistry of high altitude discharges” by H. Winkler (Institute of Environmental Physics, University of Bremen, Germany).
- “Ionization perturbations from lightning and TLEs in the lower ionosphere” by P.L. Blelly (IRAP, University of Toulouse/CNRS, France).
- “Transient discharges in technology: from electricity networks to plasma medicine” by U. Ebert (CWI, Eindhoven University of Technology, The Netherlands)

The four selected student talks related to the topic of the day were:

- Similarities in appearance between natural sprites and pilot systems in the lab by P. Kochkin (Electrical Engineering Department, Eindhoven University of Technology, The Netherlands).
- The plasma-chemical self-consistent model for halo/sprite formation in the mesosphere by A.A. Evtushenko (Institute of Applied Physics RAS, Russia).
- Gas heating and chemical impact of Sprite streamer channels in the Earth mesosphere by F.C. Parra-Rojas (IAA-CSIC Instituto de Astrofísica de Andalucía, Spain).
- High Altitude Balloon-Borne X-ray Detector Observations of Impulsive Electron Precipitation Events Associated with Lightning Activity During the 2013/2014 BARREL Campaigns by G.S. Bowers (Department of Physics, University of California Santa Cruz, USA).

### **High Energy Atmospheric Electricity (June 25<sup>th</sup>)**

The introducing tutorial talk “**High-Energy Atmospheric Electricity**” was presented by J. R. Dwyer (Department of Physics and Space Sciences, Florida Institute of Technology, USA). Wednesday afternoon was off and the last oral presentations of the day were four topical talks addressing specific points of high energy atmospheric electricity:

- “TGF observations” by N. Ostgaard (Birkeland Centre for Space Science, University of Bergen, Norway).
- “Theory and modeling of X- and gamma-ray emission from lightning” by S. Celestin (LPC2E, University of Orléans, CNRS, France).
- “Electron Acceleration above Thunderclouds” by M. Fullekrug (Centre for Space, Atmospheric and Oceanic Science, University of Bath, UK).
- “Modeling the radiation doses from terrestrial gamma-ray flashes” by J. R. Dwyer (Department of Physics and Space Sciences, Florida Institute of Technology, USA).

### **Perturbations of the atmosphere/ionosphere induced by thunderstorms (June 26<sup>th</sup>)**

The title of the tutorial talk was “Atmospheric disturbances related to thunderstorms and possible effects on weather and climate” by E. Blanc (CEA, DAM-DIF, France). It was followed by four topical talks:

- “Impact of thunderstorm activity on the middle atmosphere dynamics” by A. Hauchecorne (LATMOS/IPSL, University of Versailles St Quentin/ University Pierre et Marie Curie / CNRS, France).
- “VLF wave studies of lightning effects in the lower ionosphere” by C. Haldoupis (Physics Department, University of Crete, Greece).
- “Global Electric Circuit and climate” by C. Price (Department of Geophysical, Atmospheric and Planetary Science, Tel Aviv University, Israel).
- “Gravity wave from thunderstorms: impact on atmospheric and climate models” by P. Heinrich (CEA, DAM-DIF, France).

The four student talks on this topic and about High-Energy Atmospheric Electricity were:

- Numerical Modeling of the Global Electric Circuit by G.M. Lucas (Aerospace Engineering Sciences, University of Colorado, USA).

- Thunderstorm – lower ionosphere relationship as shown by ionograms recorded at Pruhonice in two summer campaigns of 2013 by V. Barta (Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences, Hungary).
- Modelling the runaway relativistic electron avalanche and the feedback mechanism with GEANT4 by A.B. Skeltved (Birkeland Centre for Space Science, University of Bergen, Norway).
- Effects of atmospheric electric fields on radio emission from air showers by T.N.G. Trinh (KVI, University of Groningen, The Netherlands).

The student talks were followed by an additional oral presentation of a research work supported and funded by the RTN TEA-IS: Laboratory streamers under TLE conditions: spectroscopic analysis with emphasis on the determination of the electric field strength by T. Hoder (Leibniz Institute for Plasma Science and Technology, INP, Germany).

### **Current and future space projects: objectives, instrumentation, and expected impacts (June 27<sup>th</sup>)**

The last day of the Summer School was dedicated to the current and space projects related to the observation of TLEs and TGFs. To introduce this topic, the tutorial talk **“Past and Future challenges of space observations”** was presented by Y. Yair (The Open University of Israel, Ra’anana, Israel). It was followed by five topical talks related to five different space projects:

- “Fermi TGF Observations” by M. Briggs (University of Alabama in Huntsville, USA).
- “AGILE” by M. Marisaldi (INAF-IASF, National Institute for Astrophysics, Italy).
- “GLIMS” by M.Sato (Hokkaido University, Japan).
- “TARANIS” by J.L. Pinçon (LPC2E, University of Orléans/CNRS, France).
- “ASIM” by T. Neubert (National Space Institute, Technical University of Denmark, Denmark).

The four selected student talks related to space projects were:

- New class of RHESSI TGFs - N. Kelley (SCIPP, University of California Santa Cruz, USA).
- Comparison of global RHESSI and AGILE TGFs distributions and analysis of all AGILE satellite passes over South America. 2009-2012 period. - F. Fabró (Polytechnical University of Catalonia, Spain).
- Automatic 0+ Whistler Detector Deployed on board the TARANIS Satellite - A.J. Compston (Department of Electrical Engineering, Stanford University, USA).
- Chibis-M observations of VHF and VLF/ELF emissions from lightning discharges - D.I. Vavilov (Space Research Institute of RAS, Russia).

### **Training lessons:**

The training sessions were dedicated to summer school participants registered as students. Due to the number of attending students, three groups had to be formed and two parallel training sessions were repeatedly organized on the afternoon of June 23<sup>rd</sup>, June 24<sup>th</sup> and June 26<sup>th</sup>.

- *Training lesson 1: Using space mission data (DEMETER) – M. Parrot (LPC2E, University of Orléans/CNRS, France).*

This training lesson was the opportunity for students to learn how to use space based observation (DEMETER data) recorded in the ionosphere and related to the thunderstorm activity. The training lesson started by a short presentation of the DEMETER satellite, its operations, its experiments and the corresponding data. Then students were asked to perform analysis of data recorded during interesting events at the time of thunderstorm activity.

- *Training lesson 2:* TLE ground based observations – O. Chanrion (National Space Institute, Technical University of Denmark, Denmark)

This training lesson was the opportunity for young scientist to learn how to use ground based systems to perform Transient Luminous Event observations assisted by lightning and satellite data. After a short introduction to TLEs and ground based systems used to perform observations, the students were asked to perform their own observations on real and artificial data.

### **Poster sessions:**

Two poster sessions (23 posters each) were organized during the summer school.

- *Poster session #1* (Monday, June 23<sup>rd</sup> and Tuesday, June 24<sup>th</sup>)

Distribution of the posters with respect to the main topics of the summer school:

- Physics of atmospheric electricity: 10 posters.
- Lightning-induced perturbations of the atmosphere/ionosphere: 12 posters.
- Perturbations of the atmosphere/ionosphere induced by thunderstorms: 1 poster.

- *Poster session # 2* (Thursday, June 26<sup>th</sup> and Friday, June 27<sup>th</sup>)

Distribution of the posters with respect to the main topics of the summer school:

- High Energy Atmospheric Electricity: 13 posters.
- Perturbations of the atmosphere/ionosphere induced by thunderstorms: 4 posters.
- Current and future space projects: 6 posters.

## **Assessment**

One important objective of this summer school was to introduce students to the main results and theories in the topics of the TEA-IS Research Networking Program. The structure of the scientific program (one day – one topic, one-hour tutorial plus four half-hours topical talks per topic). The quality of the selected teachers served that purpose extremely well. The main purpose of the topic “Current and future space projects” was to prepare the young scientists to the soon coming European space missions ASIM (ESA) and TARANIS (CNES). This purpose was nicely seconded by the training lessons where the student could learn how to combine ground-based and space-based systems for atmospheric electricity research work.

Networking among the participants was encouraged. The time allotted for these activities included the coffee breaks, the poster sessions, and the conference dinner. The summer school was very successful in that it brought together researchers from many different countries and working on different fields (meteorology, geophysics and plasma physics). The scientific field of TEA-IS is at the interface of different disciplines including Atmospheric Physics and Chemistry, Space Plasma Physics, Discharge Physics and Chemistry, Meteorology, and High-Energy Physics. These disciplines involve different tools and concepts that need to be put together in order to understand better the various couplings between the thunderstorms, the atmosphere, and the space environment. The summer school, owing to its pedagogy-based approach enabled key-point discussions and will hopefully result in significant scientific progress.

The summer school was also the opportunity for the Steering Committee of TEA-IS to encourage participants from TEA-IS supporting countries to apply for funding for short and exchange visits. The deadline of this call is August 15. We expect that the resulting collaborations will lead to significant scientific results that can also be partly attributed to the summer school.

As a conclusion, in our opinion and from the feedback we have already received from participants, we consider that the meeting was a very productive one, that it fulfilled its objectives, and enhanced Europe’s position in the scientific research of the covered topics.



2<sup>nd</sup> TEA-IS summer school

Collioure (France)

23-27 June 2014

# Scientific program



	June 23 Physics of atmospheric electricity	June 24 Lightning-induced perturbations of the atmosphere/ionosphere	June 25 High Energy Atmospheric Electricity	June 26 Perturbations of the atmosphere/ionosphere induced by thunderstorms	June 27 Current and future space projects: objectives, instrumentation and expected impacts
8 :45-9 :00	Opening	8:30 – 9:15 Sprite high speed observations and implications for models – H. Stenbaek Nielsen			
09 :00-10 :00	Meteorology of thunderstorms – S. Soula	9:15 – 10:00 TLE modeling: an overview – A. Luque	High-Energy Atmospheric Electricity – J. Dwyer	Atmospheric disturbances related to thunderstorms and possible effects on weather and climate – E. Blanc	9:00 – 9:30 Past and Future challenges of space observations – Y. Yair 9:30 – 10:00 Fermi TGF Observations – M. Briggs
10:00-10:30	<i>Coffee Break</i>				
10 :30-11 :00	Cloud electrification processes – E. Avila	Jet observations and theories – O. Van der Velde	TGF observations – N. Ostgaard	Impact of thunderstorm activity on the middle atmosphere dynamics – A. Hauchecorne	AGILE – M. Marisaldi
11 :00-11 :30	Lightning physics – P. Lalande	The chemistry of high altitude discharges – H. Winkler	Theory and modeling of X- and gamma-ray emission from lightning – S. Celestin	VLF wave studies of lightning effects in the lower ionosphere – C. Haldoupis	GLIMS – M.Sato
11 :30-12 :00	Lightning ELF/VLF emissions and lightning detection – M. Cohen	Ionization perturbations from lightning and TLEs in the lower ionosphere – P.L. Blelly	Electron Acceleration above Thunderclouds – M. Fullekrug	Global Electric Circuit and climate – C. Price	TARANIS – J.L. Pinçon
12 :00-12 :30	Lightning space observations for nowcasting – H. Christian	Transient discharges in technology: from electricity networks to plasma medicine – U. Ebert	Modeling the radiation doses from terrestrial gamma-ray flashes – J. Dwyer	Gravity wave from thunderstorms: impact on atmospheric and climate models – P. Heinrich	ASIM – T. Neubert
12:30-14:00	<i>Lunch at the summer school place</i>		<i>Afternoon off</i>	<i>Lunch at the summer school place</i>	
14 :00-15 :00	Student oral presentations	Student oral presentations		Student oral presentations	Student oral presentations
15 :00-16 :00	Posters (session #1)	Posters (session #1)		Posters (session #2)	Posters (session #2)
16 :00 - 16 :30	<i>Coffee break</i>			<i>Coffee break</i>	Closing
16 :00 - 18 :30	Training lessons (small groups): • Using space mission data (DEMETER) – M. Parrot • TLE ground based observations – O. Chanrion Open discussions	Training lessons (small groups): • Using space mission data (DEMETER) – M. Parrot • TLE ground based observations – O. Chanrion Open discussions			
19 :00-19 :30		<i>Welcome reception at the Château Royal</i>			
19:30-20:30					
20 :30-22 :00	<i>St Jean fire (from 22:00)</i>		<i>School Dinner</i>		



# Monday 23 June

## Physics of atmospheric electricity

8:45 – 9:00	<i>Summer school opening</i>
9:00 – 10:00	Meteorology of thunderstorms – S. Soula
10:00 – 10:30	<i>Coffee break</i>
10:30 – 11:00	Cloud electrification processes – E. Avila
11:00 – 11:30	Lightning physics – P. Lalande
11:30 – 12:00	Lightning ELF/VLF emissions and lightning detection – M. Cohen
12:00 – 12:30	Lightning space observations for nowcasting – H. Christian
12:30 – 14:00	<i>Lunch</i>
14:00 – 14:15	Thunderstorm geometry & morphology suggested from Cassini/RPWS Saturn lightning flashrate data and comparative terrestrial meteorology - J.A. Paganan
14:15 – 14:30	Lightning strokes frequency homogenization for climatological analysis: application to LINET data records over Europe - M. Petracca
14:30 – 14:45	Streamer-to-leader transition in gigantic jets - C.L. da Silva
14:45 – 15:00	GRASSP Instrument: Status and First Results - M. Passas
15:00 – 16:00	Poster session #1
16:00 – 16:30	<i>Coffee break</i>
16:30 – 18:30	Training lessons: <ul style="list-style-type: none"><li>• Group #1: Using space mission data (DEMETER) – M. Parrot</li><li>• Group #2: TLE ground based observations – O. Chanrion</li></ul> Open discussions

## Poster session #1

### Physics of atmospheric electricity

<b>1</b>	E. Adirosi	Analysis of a Convective Event Using Different Sensors
<b>2</b>		
<b>3</b>	L.-J Gallin	Acoustic characterization of lightning discharges
<b>4</b>	G. Hodosán	Detecting lightning signatures on extrasolar planets and brown dwarfs
<b>5</b>	I. Kolmasova	Correlation of pre-stroke magnetic-field pulses measured by a broad-band receiver with the sources of VHF radiation recorded by LMA
<b>6</b>	S. Kumar	AN OVERVIEW OF LF PERTURBATIONS AT LOW LATITUDE IN THE SOUTH PACIFIC REGION
<b>7</b>	J.C. McCormick	Effects of Solar Flux on VLF Lightning Sferic Propagation
<b>8</b>	H. Mkrtchyan	Lightning detection networks and Thunderstorm Ground Enhancements
<b>9</b>		
<b>10</b>	M.G. Nicora	Diurnal patterns in lightning activity over South America
<b>11</b>	O. Santolik	A two-point direction finding method for impulsive electromagnetic signals produced by lightning
<b>12</b>		

### Lightning-induced perturbations of the atmosphere/ionosphere

<b>13</b>		
<b>14</b>	J. Bór	Case studies of red sprite producing thunderstorms in Hungary
<b>15</b>		
<b>16</b>	G. Diniz Sousa	Study of Sprite Related Electric Fields using FEMM simulations
<b>17</b>	A. Dubinova	Positive streamer discharge inception from dielectrics
<b>18</b>	T. Hoder	Laboratory streamers under TLE conditions: spectroscopic analysis with emphasis on the determination of the electric field strength
<b>19</b>	M.A. Ihaddadene	Modeling of optical emissions produced by sprite streamers in preparation for the TARANIS space mission
<b>20</b>	M.A. Kaznacheeva	Research of transient events in the upper atmosphere measured by Universitetsky-Tatiana-2 satellite far from lightning activity
<b>21</b>	N.G. Lehtinen	On the spatial scale of streamers
<b>22</b>	Ajeet K Maurya	Observations of first TLE's events over Indian Sub-continent
<b>23</b>	J. Mlynarczyk	A sequence of sprites - an analysis of ELF signals and optical recordings
<b>24</b>	V.S. Morozenko	Transient UV flashes in the upper atmosphere as a background for the orbital detector TUS operation
<b>25</b>	F.T. São Sabbas	TLE and HEET Research in South America with the LEONA Collaborative Network
<b>26</b>	Y. Suzuki	Displacement between Position of Winter Sprites and Strike Point of Cloud-to-Ground Lightning
<b>27</b>	Y. Suzuki	Preliminary Reports of Summer Sprite Observation at The Top of Mt. Fuji, Japan

## Perturbations of the atmosphere/ionosphere induced by thunderstorms

<b>28</b>	E. Camporeale	Linear mode conversion between cold plasma waves mediated by a density inhomogeneity in the ionosphere
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## Tuesday 24 June

# Lightning-induced perturbations of the atmosphere/ionosphere

8:30 – 9:15	Sprite high speed observations and implications for models – H. Stenbaek Nielsen
9:15 – 10:00	TLE modeling: an overview – A. Luque
10:00 – 10:30	<i>Coffee break</i>
10:30 – 11:00	Jet observations and theories – O. Van der Velde
11:00 – 11:30	The chemistry of high altitude discharges – H. Winkler
11:30 – 12:00	Ionization perturbations from lightning and TLEs in the lower ionosphere – P.L. Blelly
12:00 – 12:30	Transient discharges in technology: from electricity networks to plasma medicine – U. Ebert
12:30 – 14:00	<i>Lunch</i>
14:00 – 14:15	Similarities in appearance between natural sprites and pilot systems in the lab - P. Kochkin
14:15 – 14:30	The plasma-chemical self-consistent model for halo/sprite formation in the mesosphere - A.A. Evtushenko
14:30 – 14:45	Gas heating and chemical impact of Sprite streamer channels in the Earth mesosphere - F.C. Parra-Rojas
14:45 – 15:00	High Altitude Balloon-Borne X-ray Detector Observations of Impulsive Electron Precipitation Events Associated with Lightning Activity During the 2013/2014 BARREL Campaigns - G.S. Bowers
15:00 – 16:00	Poster session #1 (Same posters as Monday)
16:00 – 16:30	<i>Coffee break</i>
16:30 – 18:30	<p>Training lessons:</p> <ul style="list-style-type: none"> <li>• Group #2: Using space mission data (DEMETER) – M. Parrot</li> <li>• Group #3: TLE ground based observations – O. Chanrion</li> </ul> <p>Open discussions</p>
19:00 – 19:30	<i>Welcome reception at the Château Royal</i>

Wednesday 25 June

## High Energy Atmospheric Electricity

9:00 – 10:00	High-Energy Atmospheric Electricity – J. Dwyer
10:00 – 10:30	<i>Coffee break</i>
10:30 – 11:00	TGF observations – N. Ostgaard
11:00 – 11:30	Theory and modeling of X- and gamma-ray emission from lightning – S. Celestin
11:30 – 12:00	Electron Acceleration above Thunderclouds – M. Fullekrug
12:00 – 12:30	Modeling the radiation doses from terrestrial gamma-ray flashes – J. Dwyer
12:30 – 19:30	
19:30 : 22:00	<i>School diner</i>

# Thursday 26 June

## Perturbations of the atmosphere/ionosphere induced by thunderstorms

9:00 – 10:00	Atmospheric disturbances related to thunderstorms and possible effects on weather and climate – E. Blanc
10:00 – 10:30	<i>Coffee break</i>
10:30 – 11:00	Impact of thunderstorm activity on the middle atmosphere dynamics – A. Hauchecorne
11:00 – 11:30	VLF wave studies of lightning effects in the lower ionosphere – C. Haldoupis
11:30 – 12:00	Global Electric Circuit and climate – C. Price
12:00 – 12:30	Gravity wave from thunderstorms: impact on atmospheric and climate models – P. Heinrich
12:30 – 14:00	<i>Lunch</i>
14:00 – 14:15	Numerical Modeling of the Global Electric Circuit - G.M. Lucas
14:15 – 14:30	Thunderstorm – lower ionosphere relationship as shown by ionograms recorded at Pruhonice in two summer campaigns of 2013 - V. Barta
14:30 – 14:45	Modelling the runaway relativistic electron avalanche and the feedback mechanism with GEANT4 - A.B. Skeltved
14:45 – 15:00	Effects of atmospheric electric fields on radio emission from air showers - T.N.G. Trinh
15:00 – 15:15	Laboratory streamers under TLE conditions: spectroscopic analysis with emphasis on the determination of the electric field strength - T. Hoder
15:15 – 16:15	Poster session #2
16:15 – 16:45	<i>Coffee break</i>
16:45 – 18:45	Training lessons: <ul style="list-style-type: none"><li>• Group #3: Using space mission data (DEMETER) – M. Parrot</li><li>• Group #1: TLE ground based observations – O. Chanrion</li></ul>

## Poster session #2

### High Energy Atmospheric Electricity

<b>1</b>	V. Aamodt	Search for Terrestrial Electron Beams (TEB) in SAMPEX data
<b>2</b>	K. Albrechtsen & S. Coyle	Do all lightning produce TGF's? Approaching this question from two angles using data from RHESSI, TRMM and WWLLN
<b>3</b>	Z. Bonaventura	Effect of fast electrons on streamer propagation simulated with a beam-bulk model for the production of TGFs
<b>4</b>		
<b>5</b>	H. Espinós-Morató	The journey of the Terrestrial Gamma Flashes: propagation through the atmosphere
<b>6</b>	T. Gjesteland	The second RHESSI TGF catalog
<b>7</b>	C. Köhn	Energy resolved positron and hadron spectrum produced by a negative stepped lightning leader
<b>8</b>	A. Luque	Saturation of Relativistic-Runaway Electron Avalanches into Uniformly Propagating Ionization Fronts
<b>9</b>	J. Navarro-González	Cooking TGFs with GEANT4
<b>10</b>	R.S. Nisi	An altitude and distance correction to the source fluence distribution of TGFs
<b>11</b>	D. Sarria	Terrestrial Gamma-Ray Flashes and associated electron emissions at satellite altitude: some properties and modelling using Monte-Carlo simulations.
<b>12</b>	L. Sorokin	High-Energetic Radiation from Lightning and Laboratory Spark Discharge
<b>13</b>	M. Stanbro	Classification of Terrestrial Electron Beams using Mirrored Pulses
<b>14</b>	A. van Deursen	In flight measurement of Terrestrial Gamma-Rays

### Perturbations of the atmosphere/ionosphere induced by thunderstorms

<b>15</b>		
<b>16</b>	C.L. da Silva	Air heating and infrasound radiation in sprites
<b>17</b>	C. Rutjes	Ionization due to extensive air showers in humid air
<b>18</b>	G. Sători	Possible relation between the tropical lightning chimneys and the wavenumber-4 structure in the thermosphere/ionosphere
<b>19</b>	R. Yaniv	Meteorological and diurnal variation of the vertical conduction current density and fair weather E-field in the Negev desert, Israel

## Current and future space projects: objectives, instrumentation and expected impacts

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<b>20</b>		
<b>21</b>		
<b>22</b>	T. Farges	MicroCameras and Photometers (MCP): the optical instrument on board TARANIS
<b>23</b>	I.A. Golovanov	RELEC Space Mission for Relativistic Electron Precipitation and TLE study
<b>24</b>	C. Muller	B.USOC role in the ASIM operations on the ISS
<b>25</b>	M. Offroy	Characterization of lightning with ISUAL data in order to identify the Transient Luminous Events of the TARANIS mission
<b>26</b>	A. Orr	ESA's Atmosphere-Space Interactions Monitor (ASIM) for the ISS
<b>27</b>	R. Singh	Ground based support for ASIM and TARANIS space missions over Indian region

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# Friday 27 June

## Current and future space projects: objectives, instrumentation and expected impacts

9:00 – 9:30	Past and Future challenges of space observations – Y. Yair
9:30 – 10:00	Fermi TGF Observations – M. Briggs
10:00 – 10:30	<i>Coffee break</i>
10:30 – 11:00	AGILE – M. Marisaldi
11:00 – 11:30	GLIMS – M.Sato
11:30 – 12:00	TARANIS – J.L. Pinçon
12:00 – 12:30	ASIM – T. Neubert
12:30 – 14:00	<i>Lunch</i>
14:00 – 14:15	New class of RHESSI TGFs - N. Kelley
14:15 – 14:30	Comparison of global RHESSI and AGILE TGFs distributions and analysis of all AGILE satellite passes over South America. 2009-2012 period. - F. Fabró
14:30 – 14:45	Automatic 0+ Whistler Detector Deployed on board the TARANIS Satellite - A.J. Compston
14:45 – 15:00	Chibis-M observations of VHF and VLF/ELF emissions from lightning discharges - D.I. Vavilov
15:00 – 16:00	Poster session # 2 (Same posters as Thursday)
16:00 – 16:30	<i>Summer school closing</i>
16:30 – 18:30	
18:30 – 19:30	<i>Conference open to the public</i>

## List of participants

Status	Firstname	Surname	Affiliation
Participant	Vegard	Aamodt	University of Bergen
Participant	Elisa	Adirosi	Institute of Atmospheric Sciences and Climate - CNR
Participant	Kjetil	Albrechtsen	University of Bergen
Speaker	Eldo	Ávila	FAMAF-Universidad Nacional de Córdoba, IFEG-CONICET
Participant	Veronika	Barta	Research Centre for Astronomy and Earth Sciences, HAS
Organiser	Elisabeth	Blanc	CEA
Speaker	Pierre-Louis	Blelly	IRAP, CNRS, Université Paul Sabatier
Participant	Vitaly	Bogomolov	Moscow State University
Participant	Zdenek	Bonaventura	Laboratoire E.M2.C / Department of Physical Electronics
Participant	József	Bór	Centre for Astronomy and Earth Sciences, Hung. Acad. Sci.
Participant	Gregory	Bowers	University of California at Santa Cruz
Speaker	Michael	Briggs	University of Alabama in Huntsville
Participant	Enrico	Camporeale	Centrum Wiskunde & Informatica
Organiser	Sebastien	Celestin	LPC2E, University of Orleans / CNRS
Speaker	Olivier	Chanrion	DTU Space / Technical University of Denmark
Speaker	Hugh	Christian	University of Alabama in Huntsville
Speaker	Morris	Cohen	Georgia Institute of Technology
Participant	Andrew	Compston	Stanford University
Participant	Stefan	Coyle	Birkeland Centre, University of Bergen
Participant	Caitano	da Silva	Penn State University
Participant	Anna	Dubinova	Centrum Wiskunde & Informatica
Speaker	Joseph	Dwyer	Florida Tech
Participant	Michal	Dyrda	Institute of Nuclear Physics Polish Academy of Sciences
Speaker	Ute	Ebert	Centrum Wiskunde & Informatica
Participant	Hector	Espinos Morato	University of Valencia-IPL
Participant	Andrey	Evtushenko	Institute of Applied Physics of the Russian Academy of Sciences
Participant	Chris	Eyles	University of Valencia

Participant	Ferran	Fabró Tapia	UPC-Polytechnical University of Catalonia
Organiser	Thomas	Farges	CEA, DAM, DIF
Speaker	Martin	Fullekrug	University of Bath
Participant	Thomas	Gjesteland	Birkeland Centre for Space Science, University of Bergen, Norway
Participant	Ilya	Golovanov	Moscow State University
Participant	Francisco J.	Gordillo-Vázquez	IAA-CSIC
Speaker	Christos	Haldoupis	Physics Department, University of Crete
Speaker	Alain	Hauchecorne	LATMOS/IPSL, UVSQ, CNRS
Speaker	Philippe	Heinrich	CEA
Participant	Tomas	Hoder	Leibniz-Institute for Plasma Science and Technology-INP Greifswald
Participant	Gabriella	Hodosán	University of St Andrews, UK
Participant	Mohand	Ihaddadene	LPC2E, Orléans University / CNRS
Participant	Margarita	Kaznacheeva	Moscow State University
Participant	Nicole	Kelley	University of California, Santa Cruz
Participant	Pavlo	Kochkin	Eindhoven University of Technology, Eindhoven, The Netherlands
Participant	Christoph	Köhn	Centrum Wiskunde en Informatica (CWI)
Participant	Ivana	Kolmasova	Institute of atmospheric physics AS CR
Participant	Sushil	Kumar	The University of the South Pacific
Speaker	Philippe	Lalande	ONERA
Participant	Nikolai	Lehtinen	University of Bergen, Norway
Participant	Greg	Lucas	University of Colorado - Boulder
Speaker	Alejandro	Luque	IAA-CSIC
Speaker	Martino	Marisaldi	INAF / IASF Bologna
Participant	Ajeet Kumar	Maurya	Indian Institute of Geomagnetism, Navi Mumbai, India
Participant	Jackson	McCormick	Georgia Tech
Participant	Hripsime	Mkrtchyan	A. Alikhanyan National Laboratory (Yerevan Physics Institute)
Participant	Janusz	Mlynarczyk	AGH University of Science and Technology
Participant	Joan	Montanya	Technical University of Catalonia
Participant	Didier	Moreau	B.USOC
Participant	Violetta	Morozenko	Moscow State University

Participant	Christian	Muller	B.USOC
Participant	Javier	Navarro Gonzalez	IPL Universitat de Valencia
Speaker	Torsten	Neubert	DTU Space
Participant	M. Gabriela	Nicora	CITEDEF
Participant	Ragnhild	Nisi	University of Bergen
Participant	Marc	Offroy	CEA, DAM, DIF
Participant	Astrid	Orr	ESA, Estec
Speaker	Nikolai	Østgaard	Birkeland Centre for Space Science, University of Bergen
Participant	Joseph Ambrose	Pagaran	Space Research Institute, Austrian Academy of Sciences
Participant	Praveen	Pandey	B.USOC, Belgian Institute for Space Aeronomy (BIRA-IASB)
Participant	Francisco Carlos	Parra-Rojas	Instituto de Astrofísica de Andalucía, IAA-CSIC
Speaker	Michel	Parrot	LPC2E, University of Orléans / CNRS
Participant	Maria	Passas Varo	Solar System Department, IAA-CSIC
Participant	Marco	Petracca	ISAC CNR
Organiser	Jean-Louis	Pinçon	LPC2E, University of Orleans / CNRS
Speaker	Colin	Price	Tel Aviv University
Participant	Victor	Reglero	University of Valencia-IPL
Participant	Casper	Rutjes	Centrum Wiskunde en Informatica (CWI)
Participant	Ondrej	Santolik	Institute of atmospheric physics AS CR
Participant	Fernanda	São Sabbas	Instituto Nacional de Pesquisas Espaciais - INPE
Participant	David	Sarria	IRAP, CNRS, Université Paul Sabatier
Speaker	Mitsuteru	Sato	Faculty of Science, Hokkaido University
Participant	Gabriella	Sátori	Research Centre for Astronomy and Earth Sciences, HAS
Participant	Rajesh	Singh	Indian Institute of Geomagnetism
Participant	Alexander Broberg	Skeltved	Birkeland Centre for Space Science, University of Bergen
Participant	Leonid	Sorokin	Peoples' Friendship University of Russia
Speaker	Serge	Soula	Laboratoire d'Aérodynamique, CNRS/UPS
Participant	Gabriel	Sousa Diniz	INPE
Participant	Matthew	Stanbro	University of Alabama in Huntsville
Speaker	Hans	Stenbaek-Nielsen	University of Alaska Fairbanks

Participant	Yuko	Suzuki	Department of physics, Tokyo Gakugei University
Participant	Gia	Trinh	KVI - CART, University of Groningen
Speaker	Oscar	van der Velde	Universitat Politècnica de Catalunya - BarcelonaTech
Participant	Alexander	Van Deursen	Eindhoven University of Technology, Eindhoven, The Netherlands
Participant	Dmitry	Vavilov	Space Research Institute
Speaker	Holger	Winkler	University of Bremen
Speaker	Yoav	Yair	The Open University of Israel
Participant	Roy	Yaniv	Tel Aviv University