



## **The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)**

### **Annual Report (January 1 – December 31, 2013)**

Prepared by Marianna G. Shepherd, SCOSTEP Scientific Secretary

The report that follows covers the period from January 1 to December 31, 2013. It reflects the activities carried out by the organization and its scientific program, Climate and Weather of the Sun-Earth System (CAWSES). During the reported period SCOSTEP conducted a scientific forum with lead scientists from the solar-terrestrial scientific community to determine the future directions of research following the end of the CAWSES II program. The new scientific program, called VarSITI (Variability of the Sun and Its Terrestrial Impact) was created and scheduled to begin in January 2014. SCOSTEP participated in the 49<sup>th</sup> Scientific and Technical Subcommittee (STSC) of the UN COPUOS (Committee on the Peaceful Use of Outer Space) as a permanent observer, SCOSTEP&CAWSES supported 9 scientific conferences and workshops, developed closer collaboration with the ISWI (International Space Weather Initiative), through the support of ISWI meetings. These events were communicated to the SCOSTEP scientific community via 3 Newsletters.

#### ***SCOSTEP Sponsored Scientific Meetings and Workshops (in chronological order)***

- **Sun2climate school: Impact of solar variability on the Earth's climate, Thessaloniki, Greece, March 10-15, 2013**

COST (Cooperation in Science and Technology) Action TOSCA ("Towards a more complete assessment of the impact of solar variability on the Earth's climate") organized its first training school in Thessaloniki (Greece) based on the successful format of capacity building schools. The objective of this multidisciplinary event was to give young scientists a global understanding of the topical but also controversial role of solar variability in climate change. Students coming from 17 countries, with levels ranging from master to post-doc levels, participated in this school.

The main role of TOSCA is to foster interactions between different communities. TOSCA has 5 working groups

- WG1 impact of solar radiative forcing
- WG2 impact of interplanetary perturbations
- WG3 impact of energetic particles
- WG4 interfacing between upper and lower atmospheric layers and corresponding models
- WG5 outreach and dissemination (GHOST)

TOSCA is a pan-European action that brings together over 70 leading European scientists and aims at making progress on scientific understanding of the Sun-climate connection. This connection is a typical example wherein progress has been hampered by the lack of interaction between various

scientific communities. For that reason, the multidisciplinary programme of this school addressed various aspects of the Sun-Earth system, emphasizing the need for a global view of the system.



**Photo 1:** *The participants in the COST/TOSCA Science School, Thessaloniki.*

28 students attended the school, coming from: Armenia (1), Bulgaria (2), China (1), Cyprus (1), Czech Republic (3), Finland (1), France (1), Germany (4), Greece (3), Hungary (1), Israel (2), Italy (1), Norway (1), Romania (1), Russia (3), Sweden (1), and Switzerland (1).

Participants were selected based primarily on the likely benefit they would derive from participating in that school, rather than on the match between their curriculum and the programme of the school. This approach provided a very diverse sample of bright students with expertise in topics such as: lightning and atmospheric electricity, operational space weather, ocean dynamics, geomagnetism, neutron monitors, radiative transfer modeling, regional climate simulations, solar image analysis, and more. Most participants were second-year master students or PhD students. The five-day programme featured lectures, a computer class, a poster session, two movies and a debate, and a daily assessment. To improve the coordination between all lectures, speakers had been asked to share in advance their programme. One week before the school, slides had been made available to all, including the students.

Lectures addressed various aspects of the Sun-climate connection, with a blend of fundamental physical issues, key questions, and practical aspects such as existing sources of data.

The computer class was held at the University of Thessaloniki and was given by E. Tanskanen (Finnish Meteorological Institute, Helsinki, Finland). She introduced the students to the Substorm Zoo (<http://www.substormzoo.org>), an interactive web-based tool she used to teach the students how to handle solar-terrestrial data. That visit to the university was followed by an excursion through the old city of Thessaloniki and dinner downtown.

The poster session allowed the students to present their own work and thereby reverse the otherwise unidirectional flow of information. Incidentally, such activities, together with the grouping of all participants in the same hotel (with no other guests at that time of the year) greatly helped foster interactions between the students, and between the students and the lecturers.

Finally, each day ended with a 30-minute assessment session, during which students were asked to express what they had learned during the day. This break was appreciated for helping to better assimilate the main message of the lectures.

Participation in this school was entirely free of charge, but students were encouraged to contribute at least partly to their travel expenses. Eventually, 13 students out of 28 asked for (and obtained) full reimbursement of their travel expenses. This brought the total budget of the school to approximately 35 kEuro, out of which 5.5 kEuro were provided by SCOSTEP, IUGG (ICMA) and COSPAR. The funding of this school turned to be a major challenge because COST has strict rules regarding the countries that are eligible for participation. However, thanks to additional support from SCOSTEP, IUGG and COSPAR, all selected participants could be supported, regardless of their country of origin. For more information about the school, including the lectures and additional material see <http://sun2climate.sciencesconf.org>.

- **IAUS300 in Paris “Nature of solar prominences and their Role in Space Weather”- Paris, France, June 10- 14 2013**

The IAUS300 symposium was dedicated to Einar Tandberg Hanssen. Jean Claude Pecker (Académie des Sciences) , S.T. Wu, R. Moore (Hunstville) and B. Schmieder (LESIA Observatoire de Paris) presented reviews of his work throughout his long career as a specialist in Solar Prominences and Principal Investigator of the UV instrument aboard the SMM.

175 scientists coming from 30 countries attended the meeting, which took place at the Ecole de Chimie in Paris. These included 36 from France, 25 from US, 17 from Spain, 15 from UK, and 14 from China.

More than 6 scientists came from each of the following countries: Russia, South Korea, Germany, Belgium, India, and Japan. Between 1 and 2 participants came from : Iran, Poland, Argentina, Norway, Brazil, Czech Rep., Costa Rica, Tajikistan, Slovenia, Austria, Sweden, Romania, Slovakia, Mexico, Portugal, Serbia, Italy, Canada.

The meeting was sponsored by: IAU, KLSA/CAS from China, SCOSTEP, and ESA; From France: SF2A, CNES, Observatoire de Paris, LESIA, IAS, and PNST.

The meeting was divided into 4 Sessions: Prominences, Coronal Mass Ejections and Space Weather, Ejections from Stars, Instrumentation. There were 28 invited reviews, 48 contributions and 98 posters. The topics covered in the presentations included new observations coming from the Hinode and SDO satellites, which were summarized by Eric Priest.

The aim of this IAU Symposium was to present a review of the state-of-the-art of the theoretical, numerical modeling, as well as space-borne (Hinode, STEREO and SDO) and ground-based observational studies of prominences and their role in the dynamics of Sun-Earth relations. It also opened new scientific perspectives especially young scientists, working in the field. Prominences have an active role in the Space Weather. Magnetic clouds and the Inter-planetary Coronal Mass Ejections (ICME) associated with erupting prominences can produce severe perturbations in the Earth environment. Moreover, huge prominences and CME have been detected in solar-type stars (and others) and exoplanets. It was interesting to examine the properties of solar prominences in a broader perspective, on one hand, and to present the status of the sophisticated solar analysis to the concerned stellar community on the other hand. Eric Priest made a very lively summary.

- **International Study of Earth-Affecting Solar Transients (ISEST) workshop, Hvar, Croatia, June 17-20, 2013**

The International Study of Earth-Affecting Solar Transients (ISEST) workshop was held in Hvar, Croatia, June 17-20, 2013. The goal of the workshop was to improve the scientific understanding of the origin and propagation of solar transients, and develop the prediction capacity of these transients' arrival and potential impact on the Earth.

This international workshop was attended by 27 people from 11 countries, including Austria, Belgium, China, Croatia, France, Germany, India, Iraq, Poland, Russia, and United States. In addition to the 27 participants on site, there were another 25 individuals signed up to participate in the program through online platform. The online platform was achieved through a WIKI website located at [http://solar.gmu.edu/heliophysics/index.php/Main\\_Page](http://solar.gmu.edu/heliophysics/index.php/Main_Page) (The meeting website is kept at <http://spaceweather.gmu.edu/meetings/ISEST/>)



*Photo 2: Group Photo of ISEST Workshop, June 17-20, 2013, Hvar, Croatia*

The four-day workshop was divided into two parts. The first part was for contributed presentations. The second part was for group work and discussions led by working group leaders. Four working groups were established: (1) Data Group, (2) Theory Group, (3) Simulation Group, and (4) Campaign Event Group. Individual presentations and working group

summaries can be found at [http://solar.gmu.edu/heliophysics/index.php/ISEST\\_Presentations](http://solar.gmu.edu/heliophysics/index.php/ISEST_Presentations).

The workshop made significant progress toward understanding and predicting solar transients through unprecedented international collaboration. It brought together several international research groups actively working in solar transients. The workshop became it a unique platform for such collaboration. The workshop created a master event list for all Earth-affecting solar transients from 2007 to date. Simulation group will carry out three-dimensional MHD simulations of these events, while the Theoretical group will make in-depth analysis of these events. In particular, the workshop identified multiple campaign events for a comprehensive collaborative study in the future.

The workshop was sponsored by SCOSTEP, Hvar Observatory and George Mason University. For more information on the meeting please see: <http://spaceweather.gmu.edu/meetings/ISEST/>.

- **5<sup>th</sup> International Space Climate Symposium held 15-19 June 2013 in Oulu, Finland**

The Symposium included all aspects of the long-term change in the Sun and its effects in the heliosphere and in the near-Earth environment, including the Earth's atmosphere and climate. Special focus was on studies on the causes, consequences and implications of the present, unusually low solar activity, on long-term occurrence of solar extreme events, on possible planetary influence on solar activity and on solar wind effects on atmosphere and climate. Confirmed solicited speakers included, e.g., Jose Abreu, Rainer Arlt, Jürg Beer, Axel Brandenburg, Paul Charbonneau, Frédéric Clette, Ed Cliver, Ingrid Cnossen, Ana Elias, Walter Gonzalez, Bidya Karak, Gang Li, Fusa Miyake, Dario Passos, Indrani Roy, Eugene Rozanov, Alexander Ruzmaikin, Kiyoto Shibasaki, Karel Schrijver, Kazunari Shibata, Sami Solanki, Leif Svalgaard, José Vaquero, Dong Wu, Thomas von Clarmann, and Seiji Yashiro.

The Symposium was very successful, with more than 100 participants from about 20 countries; high level of scientific discussions and results was achieved leading to new effective collaborations. Abstracts have been published in an abstract book.

- **10<sup>th</sup> AOGS (Asia Oceania Geosciences Society) meeting, Brisbane, Australia, June 24-28, 2013 – CAWSES II Session ST29.**

<http://asiaoceania.org/aogs2013/public.asp?page=home.htm>

During the 10<sup>th</sup> AOGS meeting in Brisbane, Session ST29 "Understanding climate and weather of the Earth-Sun System" was dedicated to results from the SCOSTEP/CAWSES II program. The CAWSES II (Climate and Weather of the Sun-Earth System: Towards Solar Maximum) program has been a five-year

(2009-2013) international program supported by SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) established with the aim of addressing the complex characteristics of the Sun-Earth system, its variability and impacts on life and society. The Sun, heliosphere, magnetosphere, ionosphere and atmosphere act as a system of systems. The aim was to bring together worldwide resources, including space- and ground-based instruments, data archives, and the cyber infrastructure to understand the short-term (Space Weather) and long-term (Space Climate) processes throughout the Sun-Earth system under four major themes 1) What are the solar influences on the Earth's climate? 2) How will geospace respond to an altered climate? 3) How does short-term solar variability affect the geospace environment? What is the geospace response to variable inputs from the lower atmosphere?

The main objective of the ST29 was to highlight the coupling processes or coupled interactions in the Sun-Earth system, namely how the variability in one latitude /altitude/ region is coupled with the variability in other location(s)/region(s). These include coupling processes in the lower-upper atmosphere, magnetosphere-ionosphere, high-to-low latitude, Solar-wind / interplanetary medium to the magnetosphere, in addition to neutral – plasma coupling processes.

The main conveners of the ST29 session were Toshitaka Tsuda, (CAWSES Co-Chair, Kyoto University), Joseph M. Davila (CAWSES Co-Chair, NASA GSFC), with co-conveners: Nat Gopalswamy, (NASA GSFC), Franz-Josef Lübken (Leibniz Institute of Atmospheric Physics), and Marianna G. Shepherd (York University).

A total of 16 papers were included in ST29, held on June 27, 2013 with nine oral presentations. The session was started with a summary on recent CAWSES-II activities followed by national reports from India and Japan. Specific topics on coupling processes in the middle and upper atmosphere were presented from ground-based radar and optical measurements. A special focus was given on the atmospheric wave dynamics over Antarctica revealed with ST radar and lidars at the Davis station. The PANSY radar that has been recently installed at the Japanese Syowa base has shown its powerful capabilities in observing various phenomena in the Antarctic atmosphere. The PANSY radar is the largest atmospheric radar in the Antarctic. PANSY is a new plan to introduce the first MST (Mesosphere-Stratosphere-Troposphere)/IS (Incoherent Scatter) radar, which is a VHF monostatic pulse Doppler radar, in the Antarctic to Syowa Station as an important station observing the earth's environment with the aim to catch the climate change signals that the Antarctic atmosphere shows. The interaction of the neutral atmosphere with the ionosphere and magnetosphere as well as the global-scale atmospheric circulation including the low and middle latitude regions are also targets of PANSY.

- **IconSpace 2013: International Conference on Space Science and Communication, Jul. 1 -3, 2013, Malacca, Malaysia, <http://www.ukm.my/iconspace2013/>**

The 2013 IEEE International Conference on Space Science and Communication (IconSpace2013), organized by Universiti Kebangsaan Malaysia / IEEE Malaysia Section was held at the beautiful and historical city of Malacca, Malaysia from 1-3 July 2013. The IconSpace2013 with a theme "Facing the challenges of the solar maximum" is a premier forum for academicians, scientists, engineers and students to interact and disseminate information on the latest developments in space science, communication and technological advances. Conference presentations were submitted for publication in conference proceedings describing the state-of-the-art research and development. As practiced in the previous IconSpace conferences, the Proceedings of IconSpace-2013 with ISSN will be published in the IEEE Xplore database. Among the topics covered in the course of the conference were: Space weather, Upper atmosphere, Lower atmosphere, Pollution and climate change, Cosmology, Studies in the solar system, Space exploration and astronautics, Observational astronomy and instrumentation,

Computational or statistical methods, Remote sensing applications, Environmental sciences, Satellite networks and networking, Satellite navigation and positioning systems, Satellite, nano-satellite and payload design, Satellite development and manufacturing, Space education, Space science outreach. The conferences also featured **Solar Observation & Imaging Workshop, with Prof. Prof. Dato' Dr. Mohd Zambri Zainuddin (UM) as a key-note speaker**. A complete brochure that consisted of synopsis and tentative of the workshop can be downloaded at <http://www.ukm.my/iconspace2013/>.

- **Workshop on Whole Atmosphere Coupling during Solar Cycle 24 National Central University, Jhongli, Taiwan, July 14-17, 2013.** <http://www.ss.ncu.edu.tw/~watm24/>

Since the start of Solar Cycle 24 in 2008, there has been an explosion of scientific results highlighting the importance of vertical coupling between all layers of the atmosphere, as well as between the atmosphere as a whole and the Sun. From upper atmospheric and ionospheric variability driven by atmospheric waves and tides excited by tropical rainfall in the troposphere, to potential signatures of magnetosphere and solar sources in the lower atmosphere, it is apparent that a system-wide approach incorporating scientists from all atmospheric regions is necessary to tackle the new challenges of both space and atmospheric weather and climate.

To help build new lines of communication between these different communities in CAWSES-II activities, and review recent advances affecting TG4, the Workshop on Whole Atmospheric Coupling during Solar Cycle 24 (WATM24) was held at National Central University (NCU) in Jhongli, Taiwan during July 14 – 17, 2013. Financial support was kindly provided by the Taiwan National Science Council and SCOSTEP, while facilities and additional support were provided by NCU and the students and staff of NCU.

Attendance was strong with a total of 55 registered scientists and students, including 18 international attendees from institutions in the USA, Bulgaria, India, and Japan. 38 oral presentations were given, including both invited reports on new advances, as well as longer tutorial-style reviews of subjects pertaining to the CAWSES-II activities. Major themes covered throughout the four days of the workshop included tides in the thermosphere and ionosphere, ionosphere-thermo-sphere coupling, tropical rainfall variability responsible for tidal and wave excitation, downwards coupling between the stratosphere and troposphere, gravity wave-driven middle atmospheric oscillations, the global electric circuit, lithosphere-atmosphere coupling, severe space weather events driven by intense CMEs (coronal mass ejections), as well as middle and lower atmospheric changes driven by solar and anthropogenic sources. The talks were accompanied by enthusiastic discussions, as well as questions from students and scientists.



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*Photo 3: WATM24 participants who made it past Typhoon Soulik on day 1.*

Dedicated discussion sessions were also held over lunch, as well as on the final afternoon of the workshop, where participants discussed future prospects for CAWSES-II science. Topics and proposals discussed included encouraging

the development of constellations of small satellites as both educational and scientific platforms, prediction of severe space weather events, the need to engage with the tropospheric community, as well as questions concerning atmospheric coupling with the solid Earth and cryosphere.

The workshop then adjourned as planned, just in time for Typhoon Cimaron to sweep by. Overall, the workshop was a success with new connections being made, while laying the ground work for future collaborations. An archive of presentations is being compiled, and is available.

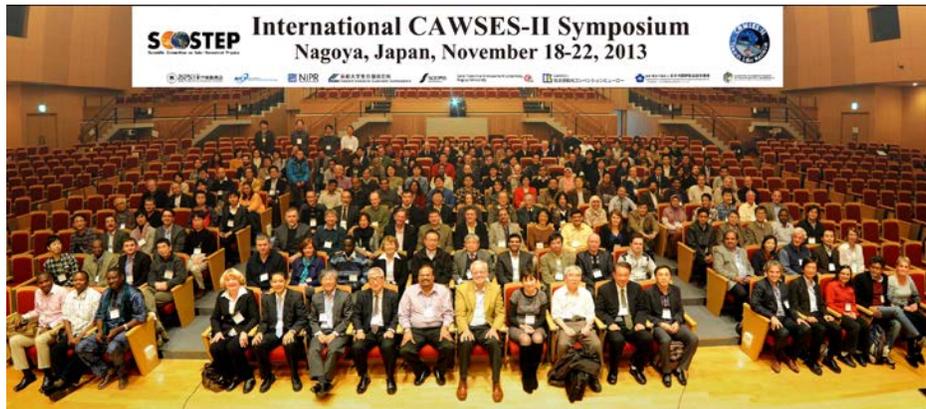
- **IAGA 2013, 12th Scientific Assembly, Mérida, Yucatán, México, August 26 -31, 2013**

During the XII th IAGA Assembly, held in Mérida Yucatán, Mexico from 26 to 31 August 2013, there was a session #2.4 “Long- and short-term solar influences in the middle and upper atmosphere“, which was devoted to all aspects of solar influence on the atmosphere, including coupling processes between atmospheric layers. Model development, modeling results, analyses of observations both of atmospheric and solar parameters, new instruments and methods may be presented during the session. The following sessions were within the scope of SCOSTEP where results from the CAWSES II program were presented: 1) “*Long-term changes and trends in the upper atmosphere-ionosphere system*” (Division II ICMA/CAWSES joint session) with conveners Gufran Beig (India), Jan Laštovička (Czech Republic) and Scott Bailey (USA); 2) “*Low Latitude Atmosphere-ionosphere Coupling Processes and Responses to Forcing from Lower Atmosphere and Magnetosphere*” (Div. II/III), with conveners: Mamoru Yamamoto (Japan) and Mangalathayil A. Abdu (Brazil); 3) “*Extreme Space Weather: Solar wind-magnetosphere-ionosphere upper atmosphere coupling*” (Div. II/III) with conveners Nanan Balan (UK), Tiger Liu (Taiwan) and Andrew Yau (Canada); 4) “*Coupling Processes in the Atmosphere-Ionosphere System*” (Div. II/ICMA), with conveners Dora Pancheva (Bulgaria), Ulrike Langematz (Germany) and Petra Knizova (Czech Republic), and 5) “*Long- and short-term solar influences in the middle and upper atmosphere*” (Div II/ICMA and CAWSES-II/SCOSTEP) with conveners Christoph Jacobi and Katja Matthes (Germany).

- **International CAWSES Symposium – November 18 - 22, 2013, Nagoya, Japan**

The International CAWSES-II Symposium was held at the Toyoda Auditorium of Nagoya University in Nagoya, Japan during November 18 - 22, 2013. There were 251 participants with 393 abstracts submitted from 32 countries: Argentina, Brazil, Bulgaria, Canada, China, Cote d’Ivoire, Czech Republic, Fiji Islands, Finland, France, Georgia, Germany, Greece, India, Indonesia, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Russia, Rwanda, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK, USA, and Vietnam. Six tutorial lectures were presented by T. Tsuda, L. Gray, J. Laštovička, H. Lühr /J. Park and P. Fox. Aspects of the research conducted during the CAWSES II program and the future research following the completion of the CAWSES program were addressed during 3 panel discussions, moderated by P. Martens, J. Oberheide and N. Goplaswamy. The Symposium provided an excellent opportunity to discuss the scientific accomplishments of the CAWSES-II program and a look forward to SCOSTEP’s future programs.

The symposium covered the major CAWSES-II tasks: 1) What are the solar influences on the Earth’s climate? 2) How will geospace respond to an altered climate? 3) How does short-term solar variability affect the geospace environment? 4) What is the geospace response to variable inputs from the lower atmosphere? 5) Capacity building, and 6) Informatics and eScience.



*Photo 4: Group photo of the CAWSES II Symposium participants (courtesy to Dr. Tsutsumi).*

The main functions of CAWSES-II have been to help coordinate international activities in observations, modeling, and applications crucial to achieving this understanding, to involve scientists in both developed and developing countries, and to provide educational opportunities for students of all levels. The symposium featured keynotes/lectures which were of interest to all participants in the mornings and more specific sessions held in the afternoons. The program book can be found at [http://www.stelab.nagoya-u.ac.jp/cawses2013/Program\\_Book\\_CAWSSESII\\_Symposium.pdf](http://www.stelab.nagoya-u.ac.jp/cawses2013/Program_Book_CAWSSESII_Symposium.pdf), while the book with abstracts is at <http://www.stelab.nagoya-u.ac.jp/cawses2013/>

The Science Organizing Committee consisted of J. Borovsky, P. Fox, S. Gurubaran, T. Hirooka, M. Hoshino, T. Iyemori, J. Kozyra, K. Kusano (vice-chair), J. Laštovička, D. Marsh, K. Matthes, H. Motoyama, Y. Murayama, T. Obara, J. Oberheide, Y. Omura, T. Sakao, A. Seppälä, K. Shibata, T. Shimizu, I. Shinohara, K. Shiokawa, Y. Takahashi, S. Ueno, I. Usoskin, M. Yamamoto (chair), K. Yumoto, T. Nakamura, K. Shiokawa, M. Yamamoto and N. Gopalswamy were the symposium's conveners.

### **SCOSTEP Bureau Meetings**

SCOSTEP organizes and conducts international solar-terrestrial physics (STP) programs of finite duration in cooperation with other International Council for Science (ICSU) bodies. Results from these programs are shared with the community of SCOSTEP scientists by joining in conducting meetings, conferences, and workshops and by publishing newsletters, handbooks and special journal issues.

The relevant ICSU bodies are represented in SCOSTEP by the Bureau members (IAU, IAGA, IAMAS, IUPAP, COSPAR, URSI, SCAR; IUGG has a liaison).

SCOSTEP is one of the 17 interdisciplinary bodies of ICSU, along with COSPAR and SCAR.

The general requirement for conducting a scientific program is that it be approved by at least two of the participating bodies. The current scientific programme supported by SCOSTEP is the Climate and Weather of the Sun-Earth System (CAWSES - Phase II) and ended in 2013. The work under CAWSES II will culminate with a scientific symposium to be held in Nagoya, in November 2013.

## **1. SCOSTEP Bureau Meeting - Bern, May 8, 2013**

### **1.1. SCOSTEP Bureau Meeting – May 6, 2013, Bern, Switzerland**

On May 6, 2013 the SCOSTEP Bureau held a meeting in Bern, Switzerland prior to the ISSI/SCOSTEP Forum on the future SCOSTEP scientific program(s). The meeting was also attended by the CAWSES II co-

chairs. The Bureau approved the SCOSTEP Annual Report for 2012 and the Minutes from the Bureau meeting in Vienna, Austria on April 22, 2012. Both documents can be found in the Archives at [http://www.yorku.ca/scostep/?page\\_id=40](http://www.yorku.ca/scostep/?page_id=40). Further information on the meetings in Bern will be made available on the SCOSTEP Website.

## 1.2. ISSI/SCOSTEP Forum on New Science Program(s) – May 7-8, 2013, Bern, Switzerland

The current SCOSTEP scientific program CAWSES (the Climate and Weather of the Sun-Earth System) started in 2005 and will complete 2 consecutive 4-year terms at the end of 2013. SCOSTEP began discussing potential scientific programs that are timely for the 2014-2018 period. In September 2012 a call for white papers on the future scientific program(s) was released by SCOSTEP's President soliciting input from scientific bodies engaged in solar terrestrial physics issues and from the scientific community in general. These white papers were required to define the scientific program including the scientific question to be addressed, an objective that can be achieved over a period of four years, data sets to be used, modeling collaborations, and a team of scientists (international steering committee) to coordinate the project.

Nine white papers were submitted covering a number of issues of solar physics, effect of space weather on climate and atmospheric coupling.

A Forum of 25 scientists was created to review the white papers submitted and make recommendations to the SCOSTEP Bureau for the new scientific program(s) to succeed CAWSES II. The Forum was organized and hosted by the International Space Science Institute (ISSI) in collaboration with SCOSTEP and met for a two-day discussion during May 7-8, 2013 at the ISSI headquarters in Bern, Switzerland.



*Photo 5: The participants in the ISSI/SCOSTEP Forum, Bern, May 7-8, 2013.*

The lead authors of the nine white papers gave presentations at the meeting. Four major topics emerged as possible segments of the New Science Program, to follow the current CAWSES II, starting in 2014, as follows (all acronyms are tentative):

1. Specification and Prediction of the Coupled Inner-Magnetospheric Environment (SPeCIMEN).
2. Solar Evolution & Extrema (SEE)
3. Role of the MA/LT and the Sun in climate (ROSMIC)
4. International Study of Earth-Affecting Solar Transients (ISEST)

It was also decided that a combination of the MiniMax24 campaign and the Earth-Affecting Solar Transients (ISEST) program approved by the Bureau last year will continue as part of the New Scientific Program. The New Science Program is tentatively named as "Variable Sun and Its Terrestrial Impact" or VarSITI. A summary of the VarSITI program can be found at [http://www.yorku.ca/scostep/?page\\_id=46](http://www.yorku.ca/scostep/?page_id=46).

Katya Georgieva (Bulgaria) and Kazuo Shiokawa (Japan) were nominated as VarSITI CO-Chairs. Over the period of the next few months the definition and the structure of the New Scientific Program was

further discussed and refined and an announcement was made at the General Council meeting on **November 23, 2013** in Nagoya, following the CAWSES II International Symposium.

### 1.3. New SCOSTEP Bureau members



**Dr. Annika Seppälä**, Finish Meteorological Institute is the newest member of the SCOSTEP Bureau, representing SCAR (Scientific Committee on Antarctic Research). Dr. Seppälä replaced Dr. Maurizio Candidi. In 2012 Annika Seppälä was selected for the EMS (European Meteorological Society) Young Scientist Award for her outstanding publication "Geomagnetic activity and polar surface air temperature variability".

Annika received her PhD in 2007. Her work treated the effects of solar storms and the associated solar charged particles on the neutral atmosphere. A major result of this research was the first confirmation from observational data that solar storms lead to significant amounts of NO<sub>x</sub> being produced in the polar mesosphere and stratosphere and that these amounts are maintained and transported downwards during the darkness of the polar night.

After finishing her PhD, Dr. A. Seppälä worked at the British Antarctic Survey in Cambridge, UK, for a number of years, including a two year Marie Curie Fellowship, before returning to the Finnish Meteorological Institute in 2011. She was recently awarded a Finnish Academy Fellowship to start her own research group looking into the potential climate connections from solar particle forcing. She has been also a co-leader of the SCOSTEP science program CAWSES-II (Climate And Weather of the Sun-Earth System) Task group 1 "What is the solar influence on climate?", and takes part in the COST-action "TOSCA" which is aiming to provide a complete assessment of the impact of solar variability on the Earth's climate.

### 2. SCOSTEP Bureau Meeting - Nagoya, November 18, 2013

The second SCOSTEP Bureau meeting for 2013 was held on November 18, 2013, in Nagoya, Japan. In the agenda were the results from the CAWSES II program, including the preparation of review papers for the CAWSES II Special Issue of the Progress in Earth and Planetary Science (PEPS) peer-review e-journal. The organization of the new SCOSTEP program, VarSITI (2014-2018) and the upcoming STP13 symposium in Xi'an, China, in October 2014 were also discussed.

### 3. SCOSTEP General Council Meeting - Nagoya, November 22, 2013

SCOSTEP General Council (GC) meeting was held on November 22, 2013, in Nagoya, Japan. The SCOSTEP President and the Scientific Secretary presented a report on SCOSTEP's activities and achievements since the last GC meeting in July 2011, in Melbourne, Australia. The GC unanimously approved the applications for a membership to SCOSTEP by Brazil, Nigeria, and Switzerland.

### 4. SCOSTEP Awards – Distinguished Service Medal

At a ceremony during the International CAWSES II Symposium in Nagoya, on November 20, 2013 the SCOSTEP *Distinguished Service Award* for 2013 was given to **Mr Joe Haskell Allen** for his outstanding service to the SCOSTEP community in particular and to the broader space science community in general.

Joe Allen's service to space research and to SCOSTEP began when he commenced his scientific career in 1963 after he joined what was to become the NOAA Geophysical Data Center. It coincides with the development of SCOSTEP, first as an ICSU Inter-Union Commission, then a Special Committee in 1972 and finally as a Scientific Committee in 1978. Joe Allen played a key role in the first SCOSTEP international science program, the International Magnetospheric Study (IMS) that commenced in 1976. He established and ran the Central Information Office (IMSCIE) that help coordinate the various activities and bodies that were involved in IMS, for which he was given SCOSTEP's Service award for outstanding services to the International Magnetosphere Study in directing the IMS Information Exchange Office. (For the full citation of *Mr. Joe H. Allen* please see [http://www.yorku.ca/scostep/?page\\_id=1356](http://www.yorku.ca/scostep/?page_id=1356))



**Photo 6:** SCOSTEP's President Nat Gopalswamy presents the SCOSTEP medal for Distinguished Service to Mr. Joe H. Allen.

Perhaps Joe's most significant service to SCOSTEP was as Scientific Secretary, a position that he held from 1994 to 2006, making him one of the longest serving members in this position. It is difficult to overstate the importance of the Scientific Secretary to the successful running of SCOSTEP; the responsibilities are many and varied.

Joe H. Allen is awarded the SCOSTEP Distinguished Service Medal for his selfless service in supporting SCOSTEP programs. This service covers virtually all aspects of SCOSTEP activities, including serving as Scientific Secretary for 12 years and for his outstanding contributions to the solar-terrestrial community over nearly four decades.

## 5. SCOSTEP's 13<sup>th</sup> Quadrennial Symposium on Solar-Terrestrial Physics STP13 – Xi'An, Shanxi, China

The STP 13 will be held in Xi'An, Shanxi, China during **October 13-17, 2014**. Information on the meeting can be found at <http://stp13.csp.escience.cn/>



**Photo 7:** The STP13 leaflet cover

## 6. SCOSTEP Town-Hall meeting on VarSITI – December 11, 2013

A town hall meeting on the new VarSITI program, organized by SCOSTEP, was held on December 11, 2013 in San Francisco, during the Fall meeting of the American Geophysical Union. Presentations were made by SCOSTEP's President, N. Gopalswamy, the VarSITI Co-chair, K. Shiokawa and the VarSITI theme leaders P. Martens and J. Bortnik. A review of the VarSITI program can be found at [http://www.yorku.ca/scostep/?page\\_id=1426](http://www.yorku.ca/scostep/?page_id=1426) and [http://scostep.apps01.yorku.ca/wp-content/uploads/2013/08/SCOSTEP-VarSITI\\_Brochure2013.pdf](http://scostep.apps01.yorku.ca/wp-content/uploads/2013/08/SCOSTEP-VarSITI_Brochure2013.pdf)

## 7. USA SCOSTEP Coordinating Group meeting – December 23, 2013

SCOSTEP's President N. Goplaswamy gave an update on SCOSTEP and its activities to the US SCOSTEP Coordinating Group. The presentation can be found at [http://scostep.apps01.yorku.ca/wp-content/uploads/2010/07/scostep\\_info\\_USCG.pdf](http://scostep.apps01.yorku.ca/wp-content/uploads/2010/07/scostep_info_USCG.pdf)

## 8. SCOSTEP at UN COPUOS

SCOSTEP first participation in the work of the COPUOS as a Permanent Observer was in the 50<sup>th</sup> session of the STSC (Scientific and Technical Subcommittee) held from February 11-22, 2013 in Vienna. SCOSTEP activities were featured by the display 9 posters on SCOSTEP – related activities in SCOSTEP National adherent members, namely Bulgaria, Canada, India, Japan, New Zealand, Norway, Russia, Slovakia, USA and SCOSTEP.

A SCOSTEP poster was also presented at the symposium dedicated to the 10<sup>th</sup> anniversary of the International Living With a Star (ILWS) program. All posters can be found on the SCOSTEP website.

On February 14 SCOSTEP's President Dr. Nat Gopalswamy made a technical presentation at the 50<sup>th</sup> STSC session and announced the MiniMax24 Campaign, which is SCOSTEPs' focus on the Weakness of the Current Solar Cycle. In his address N. Gopalswamy stated that SCOSTEP seeks focus on the peculiar state of the Sun by declaring the year 2013 as the year of "MiniMax24" to note that the even though the Sun is going through activity maximum conditions, the activity is rather low. SCOSTEP will conduct year-long scientific and outreach activities to understand and explain the current behavior of the Sun and its potential impact on human society and Earth's space environment. The scientific activity will include a comprehensive "MiniMax24 Campaign" to observe and record the subdued activity of the Sun and compare it with that of previous cycles. In particular, events on the Sun will be recorded and tracked all the way to Earth's atmosphere along paths of mass and electromagnetic flows from the Sun. Outreach activities explaining the implications of the weak solar activity on space weather and Earth's climate. SCOSTEP encourages year-long activities to be led by national SCOSTEP committees and by task group leaders of the current SCOSTEP scientific program CAWSES (Climate and Weather of the Sun-Earth System).

A wiki page has been established to record all the MiniMax24 campaign activities: [https://igam02ws.uni-graz.at/mediawiki/index.php?title=Main\\_Page](https://igam02ws.uni-graz.at/mediawiki/index.php?title=Main_Page). Members of the scientific community have been encouraged to participate in the MiniMax24 campaign by registering in the wiki page and edit the community portal in this wiki page to include information on daily variability in the solar terrestrial space. Dr. Manuela Temmer (University of Graz, Austria, [manuela.temmer@uni-graz.at](mailto:manuela.temmer@uni-graz.at)) is the coordinator for the MiniMax24 Campaign. Further information can also be obtained from the SCOSTEP secretariat ([www.yorku.ca/scostep](http://www.yorku.ca/scostep)).

On 18 December 2012, the UN General Assembly (GA), in its 67<sup>th</sup> plenary session granted SCOSTEP the status of a Permanent Observer to the UN Committee of the peaceful Uses of Outer Space (COPUOS).

SCOSTEP's first participation in the work of the COPUOS as a Permanent Observer was in the 50<sup>th</sup> session of the STSC (Scientific and Technical Subcommittee) held during February 11-15, 2013 in Vienna. SCOSTEP activities were featured by the display of 9 posters from SCOSTEP National adherent members, namely, Bulgaria, Canada, Germany, India, Japan, New Zealand, Norway, Russia, Slovakia, and USA. There was also a SCOSTEP poster highlighting current activities.



**Photo 8:** SCOSTEP's poster at the ILWS 10<sup>th</sup> anniversary symposium (Photo - courtesy of George Maeda, ICSWSE, Japan)



**Photo 9:** The poster featuring the SCOSTEP/CAWSES activities in Bulgaria (Photo - courtesy of George Maeda, ICSWSE, Japan)

SCOSTEP also participated in the 10<sup>th</sup> Anniversary Symposium of the International Living With a Star (ILWS) Program, (<http://ilwsonline.org/tenthanniversary/>). All posters can be found on the SCOSTEP website.



**Photo 10:** SCOSTEP's President Dr. Nat Gopalswamy at the 50<sup>th</sup> session of UN COPUOS announcing the MiniMax24 Campaign – February 14, 2013 (Photo - courtesy of George Maeda, ICSWSE, Japan)

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## 9. SCOSTEP New Members

During 2013 three new countries applied for membership in SCOSTEP, Brazil, Nigeria and Switzerland. At its meeting on November 22, 2013 in Nagoya the SCOSTEP General Council unanimously approved these applications and with that the number of SCOSTEP Adherent members became 30.

## 8. 2014 International Geophysical Calendar

The ISES 2014 International Geophysical Calendar available by ftp from [ftp://ftp.ngdc.noaa.gov/STP/publications/igc\\_calendars/2014/](ftp://ftp.ngdc.noaa.gov/STP/publications/igc_calendars/2014/). The website for the International Geophysical Calendar, including recent versions, can be found at <http://www.ises-spaceweather.org>.

### ***SCOSTEP Secretariat Activities***

The SCOSTEP Secretariat continued its work in coordinating and managing all SCOSTEP related activities, as well as providing logistic and technical support for the CAWSES program. The Scientific Secretary, Prof. M. Shepherd organized the annual SCOSTEP Bureau meetings in Bern and Nagoya, prepared posters featuring SCOSTEP and CAWSES II activities as well as helped with the preparation of the National SCOSTEP-related posters all displayed at the symposium dedicated to the 10<sup>th</sup> Anniversary of the International Living with a Star, held in February 2013 in Vienna. The posters were also displayed at the International CAWSES II Symposium in Nagoya, Nov 18 – 23, 2013. M. Shepherd also organized the VarSITI Town Hall on December 11, 2013 in San Francisco during the AGU Fall meeting, prepared a brochure on the VarSITI program for Public outreach. She also issued 3 SCOSTEP Newsletters, maintained the SCOSTEP Website, looked after the translation of the Comic books in foreign languages, administered the SCOSTEP finances and looked after general day-to-day SCOSTEP business.

### ***SCOSTEP Capacity Building Activities:***

#### **1. SCOSTEP/ISWI Science School Nairobi, Kenya - Oct 21-Nov 1, 2013**

The 2013 Space Science School was held from October 21 to November 1, 2013 in Nairobi, Kenya. It was organized by Nat Gopalswamy (SCOSTEP), and Paul Baki (Technical University of Kenya) (School directors) with the help of the Local Organizing Committee: Paul Baki (Technical University of Kenya); Andrew Oduor (Maseno University); Harrison Amwayi (Technical University of Kenya). This was the

second SCOSTEP Science School supported by ICSU (the 1<sup>st</sup> was held in 2012 in Indonesia). During the Science School a teacher workshop, led by Deborah Scherrer (Stanford University) was also held. The International Advisory Committee consisted of Dr. Sharafat Gadimova (UNOOSA); Prof. K. Yumoto (Japan); Dr. Madhulika Guhathakurta (NASA); Prof. Marius Potgieter (South Africa); Dr. Nicole Vilmer (France), and Prof. Vafi Doumbia (Cote D'Ivoire).



**Photo 11:** SCOSTEP/ISWI Science School in Nairobi, Kenya, October 21 – November 1, 2013.

Key-note lectures were presented on: Sun in the Universe (Legesse Kebede, Ethiopia); Solar Interior (Jesper Schou, Germany); Solar Dynamo (Mark Miesch, USA); Solar Atmosphere and Solar Wind (John Raymond, USA); Solar Flares and Coronal Mass ejections (Nat Gopalswamy, USA); Energetic

Particles from the Sun (Dalmiro Maia, Portugal); Cosmic Rays and climate (Nadir O. Hashim, Kenya); Space weather & Dynamos (Christine Amory Mazaudier, France); Solar wind-magnetosphere-ionosphere System (Nikolai Østgaard, Norway); Sudden Ionospheric Disturbance (Deborah Scherrer, USA); Basic Ionospheric Physics (Paul Baki, Kenya); Ionosphere and GNSS (Florence D'Ujanga, Uganda); Equatorial Ionosphere (Babatunde Rabiou, Nigeria); Data Processing in Ionospheric Studies (Andrew Akala, Nigeria); Atmospheric Physics (F.-J. Lübken, Germany); Data Analysis techniques (Farzad Kamalabadi, USA); Sun and Climate (Chris Oludhe, Kenya).



**Photo 12:** SCOSTEP/ISWI Science School in Nairobi, Kenya, October 21 – November 1, 2013 – lecturers and students.

There were 39 students from 7 countries (Ethiopia, Kenya, Uganda, Tanzania, Rwanda, Malawi and Nigeria) and 17 lecturers from 9 countries (Ethiopia, Germany, USA, Portugal, Kenya, France, Norway, Uganda, Nigeria).

High School students from Brookhouse School learned about Space Situational Awareness and Space Weather.

The teachers' workshop led by Deborah Scherrer had 20 participants from Kenya. Its goal to engage participants in hands-on activities so they could teach more effectively. The teacher workshop on solar terrestrial relationship was combined with the astronomy teaching conducted by NASE (Network for Astronomy School Education). This is an activity by IAU Commission 46 <http://www.iau.org/education/commission46/nase/>.

In addition an instrument workshop was also held led by D. Maia, C. Monstein, C. Amory – Mazaudier, N. Gopalswamy, B. Rabiou, and D. Scherrer, as well as a public lecture to high school students on Space Situational Awareness and Space Weather (D. Maia); All lectures were followed by hands-on exercises; Discussion on SCOSTEP's VarSITI program (N. Gopalswamy), and VarSITI's ROSMIC program (F.-J. Lübken) were conducted. The discussion also addressed the participation of African countries in international organizations such as SCOSTEP, ISWI, ILWS; Discussion on African Geophysical Society (B. Rabiou).