

**THE SCIENTIFIC COMMITTEE ON SOLAR-TERRESTRIAL PHYSICS (SCOSTEP)**  
**Annual Report (01/01/2008 – 12/31/2008)**  
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**2008 ACTIVITIES**

**SCOSTEP Sponsored Scientific Meetings and Workshops:**

- The 12th International Symposium on Equatorial Aeronomy (ISEA-12)

ISEA-12 was hosted by the Ionospheric Physics Lab, at the Department of Physics, University of Crete. It was held from 18 to 24, May 2008 at the Royal Knossos Conference Hotel to the east of Heraklion on the island of Crete, Greece. 170 participants, both senior and young scientists, from 25 countries, attended the symposium. A total of 250 papers (about 150 oral and 100 posters) were presented by invited and contributing authors during 11 scientific sessions distributed over a period of a week. The topics covered a wide range of research areas, reflecting the need to study the Earth's ionosphere-atmosphere system in a coupled sense. ISEA-12 comprised sessions on the dynamics of the middle atmosphere, mesosphere and thermosphere, E- and F-region plasma physics and ionospheric electrodynamics, including large scale ionospheric modeling and simulation, atmosphere-ionosphere coupling processes and phenomena, magnetic storm and space weather effects, and a session on new experimental techniques and instruments. In addition, and for the first time in its long history, ISEA-12 started with a full day of tutorials on key topics given by leading members of the aeronomic community, and ended with a session of invited expert talks on future research trends and unresolved problems. SCOSTEP/CAWSES provided \$2,000 in financial support to the workshop.

- International Workshop on Solar Variability, Earth's Climate and the Space Environment

The workshop was hosted by Montana State University in Bozeman, on June 1–6, 2008. Its main goal was to bring together researchers working in Sun-Earth system science towards assessing the current state of knowledge and addressing cross-disciplinary topics that are not normally possible in either a completely solar, or climate oriented meeting. The workshop program was designed with particular emphasis on understanding the physical processes that link a cause in the Sun to an effect on Earth – spanning timescales relevant from space weather to space climate effects. There were eighty-five registered participants, with scientists from Asia, Europe, North America and South America present at the meeting. Among them eighteen were graduate students and young scientists. Thirteen international participants received financial support through funding from SCOSTEP/CAWSES (\$5,000) and the International Heliophysics Year (IHY) program.

- CAWSES Tidal workshop

The Third CAWSES Global Tidal Campaign Workshop took place at the University of New Brunswick (Fredericton, NB, Canada) from Monday, August 18, 2008 to Friday, August 22, 2008. Over 20 people participated in the workshop, the majority in person and

the rest remotely via the internet. Financial support of \$1,500 from SCOSTEP was used to partially support the meeting travel costs of post doctoral scientists and graduate students, and room rental.

The workshop focused on modeling and observations of tidal signatures in the upper atmosphere. Workshop participants also reviewed the current status of the CAWSES tidal campaign project as well as ideas for future activities. It was recognized that the project has made significant contributions to the CAWSES program by bringing together people with expertise in various aspects of tidal studies and the resulting cross fertilization of scientific activities. The workshop ended with a discussion on potential future activities for this project. It was concluded that further observing campaigns should be held and in particular variability associated with the quasi-biennial oscillation (QBO) and El Niño-Southern Oscillation (ENSO) should be investigated. This would be accomplished by supporting campaigns which would allow different phases of these global phenomena to be observed.

- 5<sup>th</sup> IAGA/ICMA/CAWSES workshop “Long Term Changes and Trends in the Atmosphere:

The workshop was held in the Arctic and Antarctic Research Institute in St. Petersburg, Russian Federation, on 9-12 September 2008. It was attended by 45 scientists (including a few doctoral students) from four continents, Europe, Asia, Northern America and Southern America. The workshop was focused on long-term changes trends in the mesosphere, thermosphere and ionosphere. Papers on trends in the stratosphere (including ozone), stratosphere/troposphere and stratosphere/upper layers interactions, on tropospheric trends, and on long-term changes in solar wind/geomagnetic activity were presented as well at the workshop. SCOSTEP/CAWSES provided \$1,500 to support scientists from developing countries to attend the workshop.

- The IHY School in Nigeria

The fifth and last IHY School was held on 10-22 November 2008 at the Roban Hotel in Enugu, Nigeria. A total of 89 applications were received, and 40 were selected from 14 different African countries (out of the 54 countries in Africa). Fifteen instructors gave lectures on topics involving all IHY disciplines. Each lecture was of 2 hours in duration, which included hands on laboratory exercises. Many of the lecturers are involved in IHY observatory deployment program and capacity building activity in African countries.

The School was supported by the following agencies: IHY Secretariat (NASA), The Center for Basic Space Sciences (CBSS), Abdus Salam International Center for Theoretical Physics, Northwestern university of South Africa, University of Bergen (Norway), The space environment research Center, Kyushu University (Japan) and SCOSTEP/CAWSES. The school was convened by Professor. P. N. Okeke of CBSS, Nigeria and directed by Drs. Nat Gopalswamy (IHY & SCOSTEP) and B. Rabi (Federal Technical Institute, Nigeria). All the presentations made at the school will be distributed to the school participants before the end of 2008. The lectures will be written up and will form the chapters of a book to be published by Longmans. The funds of \$5,000 from SCOSTEP/CAWSES were used to support the travel costs of four African students to attend the school.

- **International School on Atmosphere-Ionosphere Remote Sounding and Modelling**

The school was the third one held at the National Central University (NCU) in Chung-Li, Taiwan, following the first two in October 2006 and October 2007, respectively. The structure and content of ISAR-NCU-2008 was somewhat changed as compared to the earlier schools to widen the scope on active and passive methods for studies of the atmosphere and ionosphere with radio waves. All the school and related activities were held 6-17 October 2008 at the Center for Space and Remote Sensing Research (CSRSR) on the campus of NCU. The school offered a series tutorials and lectures on basic radio sciences and applications, along Questions and Answers sessions. The school gave the participants and in particular the students a very important introduction and overview of radio science used for remote sounding by satellites and radar.

The students attending the school were mostly from the developing countries in the South-East Asian region. Out of almost 93 applications 34 students could be selected, and they were from India (7), Indonesia (8), Japan (1), Malaysia (2), Nigeria (2), Philippines (6), Vietnam (1), and Taiwan (7).

### **Bureau Meeting:**

The SCOSTEP Bureau meeting was held in Vienna, Austria, on 13 April 2008, in junction with the annual EGU meeting. Some of the main issues on the meeting agenda are summarized below:

#### **1. CAWSES II and Its implementation Plan**

Susan Avery (Chair of the CAWSES program) presented to the bureau the outline of the CAWSES II program, which includes four identified scientific topics: (1) What are the solar influences on Earth's climate; (2) How will geospace respond to an altered climate; (3) How does short-term solar variability affect the geospace environment; and (4) What is the geospace response to variable waves from the lower atmosphere. In addition, as Avery emphasized, a major undertake of CAWSES II is to establish a Virtual International Institute. The Virtual Institute will serve as a hub with direct connections to other international program offices. It will develop softwares needed to facilitate virtual conferences, digital libraries, and data/resource management. More importantly, it will take the lead in STP sciences in terms of cyber infrastructure and international collaboration across multiple disciplinary sciences.

Bureau members attending the meeting approved the scientific topics for CAWSES II, and made suggestions of potential candidates to lead the task groups addressing these topics. The establishment of the CAWSES II virtual institute was also well received by the bureau. Other suggestions from bureau members were on cooperation with international programs such as IHY and International Polar Year (IPY). To facilitate such cooperation, the bureau appointed Maurizio Candidi, bureau member representing Scientific Committee on Antarctic Research (SCAR), and Natchimuthuk Gopalswamy, bureau member representing International Astronomical Union (IAU) as the contract persons to IPY and IHY, respectively.

A draft brochure of the CAWSES II program was distributed to the bureau members for their comments and inputs. After collecting feedback from the bureau, the brochure will be updated and finalized, along with the graphic design of a new logo for CAWSES II. The brochure will then be printed and distributed to all SCOSTEP and CAWSES member countries, SCOSTEP Scientific Discipline Representatives, and other international organizations.

To formally launch the CAWSES II program, the bureau strongly endorsed Avery's idea of having a kick-off workshop in spring 2009. Bureau members suggested a number of possible locations for the kick-off workshop, including Paris, Washington D. C., and Boulder. After some discussion, the bureau decided to have the workshop in Boulder in April of 2009. Gang Lu (SCOSTEP Scientific secretary) will make the proper arrangements for the meeting at the National Center for Atmospheric Research (NCAR) in Boulder.

## **2. Preparation of STP-12**

Franz-Josef Lübken, who is Chair of the local organization committee (LOC) for STP-12 and unfortunately was not able to attend the bureau meeting in person, presented a written report to the bureau a rough estimate of costs for STP-12. After carefully examining each line item on the report, bureau members raised some questions on several of them. These questions was forwarded to Lübken for further clarification. In addition, bureau members made a number of suggestions to further reduce the meeting costs, and these suggestions had also been forwarded to Lübken. All issues raised by the bureau was addressed at the LOC meeting in September in Berlin and was reported back to the Bureau by Lübken in November along with an updated cost estimate.

Bureau members also urged to form the scientific organization committee (SOC) for STP-12 as soon as possible, and suggested a list of potential SOC candidates. Bob Vincent (SCOSTEP President) would make the final decision on the SOC membership with inputs from the bureau. The final decision on the SOC membership was made in September 2008, and all members accepted the position.

## **3. Letter of Support for UK STP Sciences**

Sandra Chapman, bureau member representing International Union of Pure and Applied Physics (IUPAP), reported the drastic funding cut in solar-terrestrial physics (STP) programs in UK. This action has led to an outcry by the international STP community. The bureau was also extremely concerned about the situation in UK. The bureau suggested Bob Vincent, on behalf of SCOSTEP, to send a letter to the Science and Technology Facilities Council (STFC) of the United Kingdom to lend support to the UK STP community. The letter was sent to STFC in May.

### **Education/training activities:**

As a continued collaboration with the Solar-Terrestrial Environment Laboratory at Nagoya University in Japan, along with supervision and guidance under Prof. Y. Kamide and the technical support by Ms. Y. Noda, three more educational comic books were published in 2008. These new comic books are entitled “What is the Upper Atmosphere?!” , “What are the Polar Regions?!”, and “What is the Sun-Climate Relationship?”. Together with the six books published during past 3 year (namely, “What is the Aurora?!”, “What is the Geomagnetic Field?!”, “What is the Solar Wind?”, “What is the Ozone Hole?”, “What are the Cosmic Rays?”, and “What is Global Warming?”), we now have nine comic books available online at the SCOSTEP website <http://www.scostep.ucar.edu> and can be freely downloaded. The subjects of these comic books are representative of the SCOSTEP scientific topics. Although the books are designed specifically for K-12 education, they are informative to research scientists and general public alike.

The comic books are published in English and Japanese. In addition, a blank “balloon” version of these books is available for translation into other languages. We have received requests to translate

comic books into 20 languages besides English and Japanese: Chinese, Czech, Danish, Greenlandic, French, Finnish, Hebrew, Italian, Korean, Russian, Spanish, Swedish, Thai, Turkish, 2 Indian languages (Hindi and Marathi), and 4 Nigeria (Hausa, Igbo, Yorba, and Pidgin). So far selected comic books have been translated into Hindi, French, Italian, Spanish, and Korean. Selected comic books in Italian are also available on SCOSTEP [website](#).

### **Publications:**

SCOSTEP distributes its programs and current STP events through electronic newsletters and on Internet. Minutes from official meetings, national reports, and other related information are made available on SCOSTEP [website](#). Educational materials such as the comic books mentioned above are also publicly available online at <http://www.scostep.ucar.edu>.

### **Future Plan:**

The original CAWSES program (2004-2008) has officially ended now. Building on the success during the past 5 years, the SCOSTEP Bureau in 2006 strongly endorsed the expanded CAWSES-II program as its new scientific program for the period of 2009-2013. Since then a number of planning meetings had taken place. The first CAWSES-II planning workshop was held in July 2007 to develop the framework for the follow-on to the CAWSES program. Another town hall meeting was held during the International CAWSES Symposium in October 2007 to solicit community input on scientific topics for CAWSES-II. Based on the community input from these meetings, four scientific topics have emerged that focus on some of the forefront scientific challenges facing the international STP community. Another major undertake of CAWSES II is to establish a Virtual Institute in order to most effectively coordinate international collaborations among scientists around world, particularly those from developing countries as well as early career scientists and students. The Virtual Institute will take advantage of cyber-infrastructure technology and develop necessary softwares into facilitate cross-disciplinary research, and data and resource management. It will establish digital libraries and host virtual scientific conferences, which will benefit greatly young scientists. Public education and capacity building will continue to be a core part of CAWSES II. In addition to developing new educational comic books, the CAWSES Virtual Institute will provide easier access to data and research tools by scientists from developing nations and will build an international network of graduate students and early-career scientists.

SCOSTEP is dedicated to fulfill its long-term responsibility to promote international interdisciplinary programs in solar-terrestrial physics. SCOSTEP will continue to work within the ICSU framework to encourage cross-disciplinary conferences and to facilitate cross-project cooperation and multi-national research collaboration. SCOSTEP will continue conducting programs with the scientific goal of advancing quantitative understanding of coupling mechanisms responsible for the transfer of mass and energy throughout the solar-terrestrial system. The practical goal is to improve predictability of the effects of the variable components of solar energy and disturbance on the terrestrial environment. These disturbances range from interference with satellite and aircraft communications systems, to blackouts of electric power grids.