

The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)

Annual Report (January 1 – December 31, 2010)
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2010 ACTIVITIES

SCOSTEP is charged by the International Council for Science (ICSU) with the planning and execution of scientific programs of limited duration in the Sun-Earth environment. The current program is the Climate and Weather in the Sun-Earth System-II (CAWSES-II), which is focused on solar impacts during the rising phase of solar cycle 24. It follows on from CAWSES-I, which took place between 2004 and 2008 during the descending phase of cycle 23.

SCOSTEP Sponsored Scientific Meetings and Workshops

- 12th Solar Terrestrial Physics (STP) Conference, Berlin (July 12-16, 2010)

The twelfth symposium on Solar-Terrestrial Physics (STP) of SCOSTEP (Solar Committee On Solar Terrestrial Physics) was held in Berlin from 12 July to 16 July 2010. A total of 251 scientists (including 45 students) from 32 countries participated in this symposium. A total of 268 abstracts were received and practically all of them were accepted. The five morning sessions were organized for all participants (no sub sessions). Five tutorial lectures were given introducing all participants to the various aspects of solar-terrestrial physics. Also in the morning session, 15 keynote speakers familiarized all participants to research on various aspects of the solar-terrestrial system. In the afternoon parallel sessions took place where more specific research presentations were given in 32 invited papers, 78 contributed talks and 143 poster papers. Substantial funds were raised to support the symposium, and a total of 62 scientists from developing countries received financial support to attend the meeting. The STP-12 meeting was sponsored by the German Space Foundation, German Aerospace Centre, the German Research Center for Geosciences, IAGA, IAMAS, Leibnitz Institute of Atmospheric Physics, Kühlungsborn, Max Planck Institute for Solar System Research, Lindau, SCAR, SCOSTEP and URSI. SCOSTEP provided \$20,000 in support of young and early career scientists.



Figure 1: STP-12 Group Photo, Berlin, July 16, 2010

The scientific topics presented were organized around the CAWSES programs that started in 2004. STP12 comprehensively covered the four major scientific themes of the first phase of CAWSES, (2004-2008) namely: 1) Solar influences on climate, 2) Space weather: science and impacts 3) Atmospheric coupling processes and 4) Space climatology. Results from

the first phase were summarized during STP12 and are used as a basis for the second phase of CAWSES (2009-2013).

Some social events took place during the meeting, in particular an icebreaker party at the Berlin Botanical Garden (one of the oldest worldwide), a guided tour through Berlin and Potsdam, and the conference dinner, which was held on the Spree River, cruising through historical and governmental parts of the German capital.

The Program and Abstract Book for the STP-12 conference can be found at http://www.yorku.ca/scostep/?page_id=131.

- *First Regional CAWSES II MLT Radar Workshop, Singapore, March 8-9, 2010*

The workshop in Singapore was sponsored by SCOSTEP through CAWSES II (\$3,000), by the University of Adelaide, Kyoto University, the Japanese Ministry of Education, and others. It brought together scientists and their students working in research in the general area of the Magnetosphere Lower Thermosphere and Ionosphere (MLTI) region of the atmosphere. The main goal of the workshop was to discuss new results and to begin discussions on the creation of a radar network in the East Asia-Oceania region. One important goal was to integrate and assimilate data from ground-based networks of radars and other instruments to effectively form Virtual Observatories of the MLTI region. 37 scientists and students attended the meeting from Australia, China, India, Indonesia, Japan, Korea and the USA. A full report is available in the 2nd CAWSES-II, TG4 newsletter at http://www.cawses.org/wiki/images/3/35/TG4_newsletter_issue2.pdf

- *First Latin American FMT Workshop 2010, Ica, Peru, November 22- 26, 2010*
<http://esi.igp.gob.pe/FMTworkshop/>



the 1st FMT Workshop.

The FMT (Flare Monitoring Telescope) was constructed in 1992 to investigate the long-term variation of solar activity and explosive events. It has been part of the international coordinated observations program (STEP) since 1991. In March 2010, it was moved from Hida to Ica University in Peru as part of the CHAIN-project. The FMT consists of 6 small telescopes, five of which observe the Sun at different wavelengths or in different modes. The remaining one is equipped with a tracker for accurate tracking of the sun.

Figure 2: Group photo of the participants in

The Astronomy Division of the Geophysical Institute of Peru and the Faculty of Sciences of the Universidad Nacional San Luis Gonzaga de Ica organized the First Latin American FMT Workshop, held in Ica, Peru, November 22-26, 2010. Financial support for the workshop was provided by the Organization of Latin American States, National Assembly of Universities Presidents, National Academy of Sciences of

Peru, Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), National Astronomical Observatory of Japan (NAOJ), Hida Observatory of Kyoto University and the Congress of Peru. SCOSTEP provided support of the amount of \$4,000 US, from its Capacity Building funds.

The purpose of the workshop was to bring together potential users of the FMT telescope data and jointly develop research in solar physics, as well as imparting knowledge on data reduction of Hinode Solar Probe and data reduction of Solar Spectrograph of Solar Observatory of Ica University.

There were 7 invited speakers from Japan, Brazil, Peru, Ecuador and Algeria. The lectures were attended by more than 150 participants mostly students from the School of Physical Sciences and the Faculty of Environmental Engineering at the University of Ica. After the main core lectures specialized courses were organized at the Computer Center of the Solar Observatory of Ica, restricted to 30 people, as this was the capacity of the IDL licensed computer laboratory. The following courses were given: 1) Data Reduction of FMT Telescope of Solar Station of Ica, by Dr. Satoshi Morita; 2) Data Reduction of Hinode Solar Probe, by Dr. Yoshi Suematsu; 3) Data Reduction of Solar Heliograph Spectrum of Solar Observatory of Ica, by Dr. Yoichiro Hanaoka. 8 posters were presented mostly with preliminary results of observations made in the FMT.

The workshop has shown that the Solar Observatory of Ica can play an important role for research and education in solar physics and its effects on Earth. It was decided that the Second FMT Workshop will be held in Japan, in July, 2011 with the participation of students and researchers from the Solar Observatory of Ica. The National Astronomical Observatory of Japan has agreed to improve the Solar Spectrograph at Solar Observatory of Ica. National Astronomical Observatory of Japan and Kyoto University will also sign a Cooperation Agreement with the University of Ica.

The President of the University of Ica announced he would propose to the University Assembly: 1) The creation of the Research Institute of the Sun; 2) Naming the Research Institute as Dr. Mutsumi Ishitsuka in honor to Mutsumi Ishitsuka who spent more than 50 years in Peru for Solar Research activities; 3) University Foundation would subsidize travel and stay for 5 students that will participate in the Second FMT Workshop that will be held in Japan in July 2011.

The scientific programme of the workshop can be found at <http://esi.igp.gob.pe/FMTworkshop/program.html>. Photos from the event are available at: <http://esi.igp.gob.pe/FMTworkshop/photos.html>

- *International School on Atmosphere - Ionosphere Radars and Radio Sounding: Science and Applications, November 15-24, 2010*

Since 2006 the National Central University (NCU) in Jhong-Li (Chung-Li), Taiwan, had conducted International Schools on Atmospheric Radar (ISAR). Due to the great demand, proved by the large number of international applications (there were more than 80 students applying to attend the school in 2009) and the great success, proved by examinations and responses of students, the 5th International school ISAR-NCU-2010 was held from November 15 to 24, 2010 at the Graduate Institute of Space Science and National Central University, Jhong-Li, Taiwan. It was mainly open for students from South-East Asia and all costs for students and lecturers were carried by the NCU.

This school aimed at graduate and PhD students, young postdoctoral research scientists and engineers having background or work in the fields of atmospheric or ionospheric science, radar and radio system development and experimental applications. In particular methods applying different ground-based lower, middle and upper atmosphere and ionosphere radar and radio methods were addressed.

The ISAR-NCU-2010 was co-directed by Professors Chien-Ming Huang (Graduate Institute of Space Science, NCU, Taiwan) and Jürgen Röttger (Germany), supported by the university under President W.L.

Chiang through Prof. Y.H. Chu, Director of the Dept. of Research and Development of NCU, which was the predominant sponsor of this school. The lecturers and presentations were held in the Center for Space and Remote Sensing Research (CSRSR) of the NCU.



Figure 3: ISAC-NCU-2010 Students during one of the lecture presentations.

As at the earlier schools the ISAR-NCU-2010 was performed under the international heading of the SCOSTEP (Scientific Committee on Solar Terrestrial Physics) program CAWSES (Climate and Weather of the Sun-Earth System) and the URSI (International Union of Radio Science) Working Group GF on Middle Atmosphere, co-chaired by C.H. Liu and J. Röttger.

The lectures were given by four professors from Taiwan and four overseas scientists. They comprised the following topics: J. Röttger (Germany) on basics of radars for scientific research – an overview of atmosphere and ionosphere radars; radar technology, radar control, data acquisition and pre-processing, MST-VHF radars; coherent and incoherent scatter radars; atmosphere dynamics and ST radar meteorology. Y.C. Liou (NCU) on the introduction of Doppler weather radars and their applications. T.C. Chen Wang (NCU) on the introduction of the principle and the applications of dual-polarization weather radar systems. R.M. Kuong (NCU) on the NCU VHF radar

system. T.Y. Yu (USA) on atmospheric radar imaging using multi receivers and multi frequencies. K.K. Reddy (India) on wind profilers for atmospheric research, and natural disasters and implications on Asia. T. Bullett (USA) on HF radars and ionospheric sounding; and L.C. Tsai (NCU) on ionospheric electron density and total electron content measurements and modelling.



Figure 4: Group photo of the ISAR-NCU 2010 participants.

The 25 students, attending this international school, were from 7 countries: India, Indonesia, Malaysia, Mongolia, Philippines, Vietnam, including Taiwan. They visited the mobile and stationary Doppler dual-polarization radars and the VHF radar of the National Central University. Each student received a certificate for attending the ISAR-NCU 2010. At the end some students were invited to give short presentations on their own work, and in the final discussion session it was discussed how to continue and further improve future schools. The next ISAR-NCU is planned for November 2011.

- First International Space Weather Initiative (ISWI) Summer School, 28 October – 4 November, 2010

The First International Space Weather Initiative (ISWI) Summer School was held from 28 October to 4 November 2010, in Bahir Dar, Ethiopia and was hosted by Bahir Dar University, Ethiopia, in collaboration with Boston College, USA. The event was sponsored by National Aeronautics and Space Administration (NASA), USA; European Office of Aerospace Research and Development (EOARD), UK; Climate and Weather of the Sun-Earth System (CAWSES)/Scientific Committee on Solar-Terrestrial Physics (SCOSTEP); International Center for Theoretical Physics (ICTP), Italy; Bahir Dar University, Ethiopia; Boston College, USA; Air Force Research Laboratory (AFRL), USA; University of Michigan, USA; Kyushu University, Japan; University of Calgary, Canada; Massachusetts Institute of Technology (MIT), USA; German Aerospace Center, Germany. SCOSTEP provided support of \$6,000 US from its Capacity Building funds. SCOSTEP was represented by Dr Natchimuthuk Gopalswamy.

The IHY program has successfully deployed significant number of ground-based instrument in Africa to understand the physics behind the unique ionospheric irregularities in the equatorial African region that have been attracting a lot of attention. One of many objectives of the IHY program was to lay down new space weather research infrastructure within the developing nations, like Africa. However, even if the ground-based instruments are available in their back yards, many African young professors do not well understand what kind of science they can do with the data they are collecting. Therefore, to provide basic space science understanding, data analysis and data assimilation techniques to local, especially, young professors, post docs and post graduate students, the ISWI 2010 summer school was organized in Bahir Dar, Ethiopia during the period of 28 October – 4 November 2010. The summer school was a continuation of the very successful IHY-Africa 2009 summer school, which was held in Akure, Nigeria in February 2009. The International Space Weather Initiative (ISWI) is a continuation of the recently ended successful program called International Heliophysical Years (IHY). Additional goals of the summer school were to gather African and other international scientists under one roof; facilitate the deployment of new observational infrastructure to study space weather; spark interest in space science education and research, and encourage the next generation of African scientists to become interested in the space sciences. As has been shown from previous similar summer schools, it is believed that these young scientists and graduate students will contribute significantly to the future instrument operations (mostly provided by scientists from the US) in the African continent.



Figure5: Distribution (red dots) of ISWI

A total of 56 delegates attended the workshop in Ethiopia. Of these delegates, 42 represented 16 different African countries (see Figure 5 for the distribution of the participants) and 14 instructors travelled from 6 different countries (8 from USA, 1 from Canada, 1 from Germany, 1 from Japan, 1 from Nigeria, and 2 from Ethiopia). Young scientists from the following African countries participated in the Summer School: Algeria, Cameroon, D. R. Congo, Ethiopia, Ivory Cost, Kenya, Madagascar, Malawi, Nigeria, Rwanda, South Africa, Sudan, Tanzania, Uganda, and Zambia.



Figure 2: ISWI 2010 Summer School participants performing laboratory demonstrations. Dr. B. Damtie's computer laboratory.

Due to the generous sponsorship that the summer school received, 22 African delegates outside Ethiopia and 3 instructors received full financial support. Among these the airfare of 21 African participants and one instructor (from Nigeria) were sponsored by NASA. One African participant outside Ethiopia received airfare from Kyushu University. The accommodation and local expenses

of all African participants outside Ethiopia were also sponsored by CAWSES and EORD. Similarly, the remaining instructors were sponsored by different sponsors (three instructors by Boston College, two by AFRL, one by University of Michigan, one by NASA, one by ICTP, one by University of Calgary, one by Kyushu University, one by German Aerospace Center, and one (partially) by MIT). All participants from Ethiopia and all other local logistics were sponsored by EOARD, ICTP, COSPAR, and Bahir Dar University.

The scientific program of the summer school included the following main Heliophysics science sessions: 1) Introduction to space science; 2) Scientific instruments for space exploration; 3) Modern data analysis, interpretation methods, and programming in open source; 4) Space Weather (Sun-to-Earth Coupling); 5) Ground- and Space-based GPS TEC; 6) Equatorial electrodynamics; 6) Data Resource Pointer. These science sessions included more than 40 lectures with the main focus on what kind of science can be done with the data recorded by the instruments deployed in the African region and how can the data be utilized. In addition there was one laboratory demonstration session using open software available. There were also parallel instrument deployment process going on, in which participants had access to live demonstration at the site where VHF and GNSS receivers were deployed by AFRL (the German Aerospace Center. The panel discussion focused on: instruments and databases, possible barriers for the expansion of space science education and research in the continent. In the panel discussion all participants emphasized the need for such kind of additional training courses in space weather data analysis and interpretation is high priority for African young scientists. As Africa begins to employ and benefit from space weather applications, it is important to initiate programs in space science education and research at the university level for capacity building and sustainability. However, the main barrier in the region toward this effort is the lack of resources such as articles, books, suitable software for data analysis. The participants requested that AGU would allow free access to African scientist for its articles if possible. Prof Mark Moldwin has donated some of his books (*Introduction to Space Weather*) to some of the participants.

Such summer schools not only supports ISWI goals but also accelerate the basic science understanding to provide education in Space Weather studies in the African countries who have never had space weather program in any of their universities. Also along these lines, Boston College (BC) and the International Centre for Theoretical Physics (ICTP) already made partnership and organized series of workshops for university professors, young scientists and graduate students from Africa on GNSS hardware, applications and scientific exploration with GNSS. It was announced (Prof Patricia Doherty, Boston College, an instructor at the summer school) that the third of these series workshops is scheduled to be held in Abuja, Nigeria in October 2011.

On behalf of the ISWI international secretariat, Dr. Nat Gopalswamy confirmed that such ISWI summer schools will continue under the umbrella of ISWI. The overall rating (that includes, quality of lectures, organization, accommodation, food, accessibility, etc) of the summer school by the participants was 9.2 out of 10.

Bureau Meeting, July 17, 2010 (Berlin)

Following the STP-12 meeting in Berlin, the SCOSTEP Bureau held its meeting on July 17, 2010.

1. Updates on CAWSES-II

Susan Avery, CAWSES-II co-chair, informed the Bureau that the CAWSES-II Task Group (TG) leaders had a number of meetings during the STP-12 symposium in Berlin to discuss the strategic plans for each of the task groups. More detailed information on each TG can be found on the CAWSES wiki website at <http://www.cawses.org>. Avery noted that an important way to raise the visibility of the CAWSES program is through organizing science sessions at major international meetings, such as EGU, AGU, IUGG, etc. The CAWSES leadership also plans to hold a major meeting at the end of CAWSES-II to showcase the major scientific achievements by the program. Avery also told the Bureau that she and Co-chair Alan Rodger are developing guidelines for applying CAWSES funds, and are working together with the TG leaders to determine what type of funding applications should be supported. The comics books currently available on SCOSTEP website will soon be made available on the CAWSES website as well. In addition, information on national CAWSES programs should also be recognized on the CAWSES website. Avery and Rodger again strongly encourage more countries to be involved in CAWSES-II.

Avery and Rodger also requested the Bureau to provide funding in order to establish a part-time position to help with the CAWSES office. The request stems from the fact that both co-chairs (Avery and Rodger) have large responsibilities in their formal jobs as heads of large organizations and therefore are unable to devote as much time as they would like to in dealing with CAWSES related issues. At the time of this report Dr. Lynn Harvey, LASP, is assisting the CAWSES Co-chairs in the day-to-day management of the CAWSES-II administration.

Bureau members thanked Avery and Rodger for their leadership in the CAWSES-II program, and acknowledged that CAWSES-II, while with a slow-start, is now in full swing.

The Bureau suggested that the best effort should be made to promote CAWSES-II in international arenas. As part of that effort, Susan Avery and Alan Rodger organized a SCOSTEP/CAWSES session at the IUGG general assembly to be held in Melbourne, Australia, June 28-July 6, 2011, while Christian Hanuise has organized a CAWSES-II session for the URSI General Assembly in Istanbul in August 2011.

2. Outreach

As part of the Capacity Building effort, the SCOSTEP educational comic books have reached young people in many countries. Dr. Brigitte Schmieder suggested that SCOSTEP should continue to encourage more countries to translate the comics to their native languages. She also pointed out that because of her position as the SCOSTEP Vice-President she was able to persuade France to increase its subscription contributions to SCOSTEP. Dr. Schmieder has also been instrumental in the translation of all currently available comic books into French, the latest being on "What are Cosmic Rays?". The comic books in English, French, German and Italian are now available at http://www.yorku.ca/scostep/?page_id=366, and follow the link. More translations into French are available and will be uploaded to the respective site.

A new comic book on “Space Weather” is currently under development at Nagoya University in Japan, which will become the 10th book of a series of educational comics sponsored by SCOSTEP/CAWSES. Japan has also formed a new SCOSTEP subcommittee chaired by Prof. T. Ogino and has established its own Task Groups corresponding to each of the CAWSES-II themes, including Capacity Building and eSciences. The Japanese CAWSES-II kickoff meeting was held on June 16-17, 2010, with 78 participants.

3. *Transfer of SCOSTEP Secretariat from NCAR, Boulder, Colorado to York University, Toronto, Canada*

In May 2010 the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) Secretariat Office was re-located from Boulder, Colorado to the Centre for Research in Earth and Space Science (CRESS) at York University in Toronto, Canada. In Boulder it was hosted within NOAA from 1995 to 2006 and then at NCAR. CRESS is an Organized Research Unit within the Faculty of Science and Engineering. The Canadian Space Agency and York University are kindly acknowledged for their support of the SCOSTEP Secretariat Office.

The new SCOSTEP Secretariat began its operation on July 18, 2010. The financial and administrative transition has been smooth. For the needs of the SCOSTEP a new Website was designed and launched in October, 2010. All General Council members were contacted and the SCOSTEP data base corrected and updated. A contest for a new SCOSTEP Logo was launched and the results were available in April 2011. All GC members voted on the selection of the new logo and the results will be announced at the GC meeting in Melbourne, July 2011.

Support for various SCOSTEP and CAWSES/SCOSTEP workshops have been administered promptly and reports have been acquired following those workshops.

A three-member committee (Brigitte Schmieder, Christian Hanuise and Nat Gopalswamy) appointed by the SCOSTEP President Robert Vincent was given the task of updating the list of Science Discipline Representatives to the SCOSTEP General Council. The recommendations will be presented to the SCOSTEP Bureau on July 2, 2011 for discussion and approval.

In October 2010 all 78 General Council members were contacted for nominations for new SCOSTEP Executive officers, the Election of which will be held at the GC meeting on July 3, 2011 in Melbourne. In December 2010 all nominations were in and 5 nominees agreed to stand for Election. In February 2011 all GC members were sent election ballots. At the time of this report 66 members of the GC have voted, the remaining GC members have indicated that they will vote at the meeting.

Two new members of the Bureau have been appointed to represent COSPAR – Prof. Takuji Nakamura (Japan) replacing Prof. Ryoichi Fujii (Japan) and IUPAP - Prof. Mark Lester replacing Prof. Sandra Chapman.

CAWSES/SCOSTEP Supported Workshops – 2011

Detail reports on the results from these workshops will be presented in the CAWSES Report.

- 4th International Space Climate Symposium, Goa, India, 16-21 January, 2011

This symposium was the 4th in a series which has become a regular (since 2004) biennial forum for discussion of the sun-earth relations, with special emphasis upon long-term time scale – from the solar cycle variability to millennial time scales. The Symposium was focused in the research topics covering the entire sun-earth link from solar dynamo, through the heliosphere and magnetosphere to the earth's atmosphere, and finally climate.

The Symposium was organized by the Indian research community. CAWSES-II task group leaders I. Usoskin (SOC vice-chair) and D. Marsh (SOC member) were directly involved. Besides its scientific goals the Symposium as well aimed at promoting and facilitating the sun-earth studies in the Indian region and specifically the involvement of young Indian students/ researchers in active collaboration and tutorials with the leading scientists. The program consisted of five keynote lectures, a number of invited reviews and regular scientific sessions. The fraction of lecture and review talks was great compared to a typical scientific conference, emphasizing the tutorial and promotion goal of the Symposium. CAWSES/SCOSTEP provided financial support of the amount of \$5,000. Other sponsors included Indian Institute of Science Education and Research, Kolkata (Principal Organizing Institution), Asian Office of Aerospace Research and Development, Indian Institute of Astrophysics, Bangalore Indian Institute of Geomagnetism, Navi Mumbai Montana State University, Bozeman, USA, NASA Living With a Star Program, USA, National Center for Antarctic and Ocean Research, Goa, India, University of Oulu, Finland. 93 scientists participated in the workshop, with 52 talks and 38 posters.

- *4th IAGA/ICMA/CAWSES-II TG4 Workshop on Vertical Coupling in the Atmosphere/Ionosphere System, February 14 - 18, 2011*

The 4th IAGA/ICMA/CAWSES-II TG4 Workshop on “Vertical Coupling in the Atmosphere/Ionosphere System” was held in Prague, Czech Republic, February 14 - 18, 2011. The meeting was attended by a total of 75 senior and young scientists from 16 countries. During the 5 days of the workshop 79 scientific papers were presented, from which 16 were solicited presentations. Two public/educational lectures were also given as part of the Workshop’s outreach program. The lectures were attended mainly by students from Prague grammar schools and university. The SCOSTEP support for this CAWSES/TG4 initiative was of the amount of \$5,000 US.

- *Chapman Conference on Atmospheric Gravity Waves and Their Effects on General Circulation and Climate, Honolulu, Hawaii 28 February – 4 March 2011*
<http://www.agu.org/meetings/chapman/2011/ccall/>

SCOSTEP also supported the *Chapman Conference on Atmospheric Gravity Waves on General Circulation and Climate*, held in Honolulu, Feb 28-March 4, 2011. A total of 87 scientists attended the conference, of which 11 were graduate students. From those attending the conference 49 were US scientists, and 38 from other countries. In addition to SCOSTEP support for the conference was also provided by the NSF, WCRP, ICMA, and from Tokyo University to provide travel grants for students, early career scientists, and researchers from developing countries. SCOSTEP provided support of \$5,000 from its Contingency Funds and it was used to waive conference registration fees for 13 student participants, 7 participants from India and Argentina, and one recent PhD (2010) regular participant. The registration fee had a tiered structure to assist students and international participants who would otherwise have trouble affording the meeting. Two students from India cancelled their attendance, but after these registration fees were already processed. In addition to India and Argentina, mentioned above, other international participants include Canada, England, USA, Japan, Korea, Slovenia, France, Germany and The Netherlands.

The topics discussed at the conference concerned: UTLS dynamics and STE processes, Topics based on latitudinal and longitudinal couplings, Stratospheric Sudden Warming, Internal waves in ocean, gravity currents (e.g. sea breeze, thunderstorm outflows, katabatic winds, likely precipitation changes due to global warming, climate variability in the stratosphere, effects of the recent solar minimum, data assimilation, to mention a few.

Education/Training Activities/Outreach:

New SCOSTEP Website was designed and has been available since October 2010 at <http://www.yorku.ca/scostep/>.

New translations in French of Comic Books. All information available at the Web site.

Publications (available at http://www.yorku.ca/scostep/?page_id=34)

Gray, L. J., J. Beer, M. Geller, J. D. Haigh, M. Lockwood, K. Matthes, U. Cubasch, D. Fleitmann, G. Harrison, L. Hood, J. Luterbacher, G. A. Meehl, D. Shindell, B. van Geel, and W. White, 2010: Solar influences on climate, *Rev. Geophys.*, 48, RG4001, 53p., doi:10.1029/2009RG000282

SCOSTEP paid half the costs, \$5,400, incurred with making the *Rev. Geophys.* paper completely open.

De Jager C., and S. Duhau, 2011: The Variable Solar Dynamo and the Forecast of Solar Activity; Influence of Terrestrial Surface Temperature, Chapter 3, p. 77-106, in *Global Warming in the 21st Century*, Ed. J.M. Cossia, 2011 Nova Science Publishers, Inc.

Future plans:

The CAWSES-II program is now in full swing, and it will remain as the main scientific program of SCOSTEP until the end of 2013. The program consists of four task groups to address the four scientific questions: (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? Each task group has further identified and formed a number of projects. As in the past CAWSES program, these projects are truly grass roots, consisting of scientists around world. In addition to the four task groups, CAWSES II also establishes a Virtual Institute in order to most effectively coordinate international collaborations among scientists around the 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 software into facilitating 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. At the Bureau meeting in

Berlin a small subgroup was established to consider long-range planning for further STP science programs after the completion of CAWSES.