CAWSES News

Climate And Weather of the Sun-Earth System

Volume 1, Number 1 March 2004

CAWSES is an international program sponsored by SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) established with an aim of significantly enhancing our understanding of the space environment and its impacts on life and society. The main functions of CAWSES are 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 at all levels.

CAWSES: An ambitious SCOSTEP program

It is a real pleasure for me, as SCOSTEP President, to write this short introduction to this, the first, CAWSES Newsletter. The actions leading to CAWSES were as follows. Anticipating the end of SCOSTEP's very successful 1998-2002 programs: S-RAMP, ISCS, PSMOS, and EPIC, SCOSTEP started a long-range planning process to plan its future program more than four years ago. That Long-Range Planning Committee recommended that during the period 2003-2007, SCOSTEP carry out a very ambitious program, CAWSES (Climate and Weather of the Sun-Earth System). It also made some recommendations about CAWSES, some of which were as follows:

1. There should be a CAWSES Science Steering Group to monitor the progress of CAWSES and make recommendations to the Bureau concerning CAWSES;
2. CAWSES should include a significant effort toward Capacity Building and Education;
3. Most importantly, CAWSES projects should be constituted to facilitate interdisciplinary solar-terrestrial research as much as possible.

These recommendations were adopted by the Bureau and by the SCOSTEP adherent countries. It was decided to postpone the CAWSES implementation period by one year to allow more organizational details to become clear and to give one year for SCOSTEP to build its finances up to the point where CAWSES could be implemented during the period from 2004-2008. *……(continued on page 2)*

Inside this Issue:

Message from the Chair

Dear Colleagues,

It is a great pleasure to be able to launch the first CAWSES Newsletter. The CAWSES office was established at the Center for Space Physics, Boston University on January 16, 2004 - the coldest day in 40 years when all local schools were closed to protect children from frostbite. Thus the climate for CAWSES can only get warmer! We are very fortunate that Dr. Pallamraju Duggirala, ("Raju" for short, an enthusiastic optical aeronomer) can spend some of his time to coordinate CAWSES activities with the able assistance of Ms. Lisa Vercauteren. They are eagerly awaiting inputs from you regarding news of importance to the CAWSES community: experimental and modeling campaigns, brief descriptions of national or regional CAWSES programs, and announcements on workshops and special CAWSES sessions at International meetings. We would also like to include thoughtful opinion pieces on policy issues that affect our community. Of course, we are always eager to publicize international recognition received by our CAWSES colleagues. Initially we hope to publish two equinoctial Newsletters. The CAWSES brain-trust resides in you the solar-terrestrial system scientist. The health and well being of our planet demands the vitality of our science. Our collective goal is to create within CAWSES a vibrant forum for bringing together interdisciplinary scientists from around the globe to generate exciting new research and ideas, which will attract the next generation of young scholars to our field.

CAWSES EXECUTIVE BODY

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Awards/Honors for SCOSTEP/CAWSES Scientists

Marvin Geller has been elected Fellow of the American Geophysical Union (AGU) in 2003.

Judith Lean has been elected a Member of the US National Academy of Sciences in 2003.

Joanna Haigh received the coveted Chree Medal and Prize for the year 2003 from the UK's Institute of Physics.

We also note that **Mike Lockwood** received the Chree Medal and Prize for the year 2002.

Yohsuke Kamide has been the recipient of the Price Medal of the Royal Astronomical Society for the year 2003.

Christopher T. Russell has been the recipient of the AGU's J. A. Fleming Medal for the year 2003.

Marvin Geller has been nominated as the Chair of the committee to rewrite the AGU position on "Human Impacts on Climate".

We congratulate all of them on their well-deserved recognition.

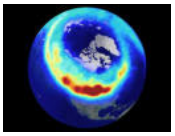
(continued from page 1) ……

The first step was to appoint a very distinguished CAWSES Science Steering Group, and after a small bit of arm-twisting, we were able to recruit Dr. Sunanda Basu to chair it. CAWSES Theme Leaders were appointed to attempt to provide continuity between the previous SCOSTEP programs and CAWSES, while also establishing the desired increased inter-disciplinary Sun-to-the-Earth aspects of CAWSES. Some CAWSES Working Groups have been formed. Others are being formed as this Newsletter goes to press. Plans for the CAWSES Capacity Building and Education programs are being formulated.

The publication of this first Newsletter is an important milestone marking the beginning of CAWSES operations. I hope the SCOSTEP science community will look for ways to participate in CAWSES and that national and international agencies will let us know how CAWSES efforts may complement their ongoing programs. I hope that CAWSES will help solar-terrestrial scientists achieve their science objectives, and I hope that solar-terrestrial scientists will help CAWSES in its efforts. We are all in this together.

CAWSES Campaign

The first CAWSES Space Weather campaign will be running in association with the campaign of CPEA (Coupling Processes in Equatorial Atmosphere) and the ISR World Days from **March 29 to April 3, 2004.** The focus of the ISR world days campaign will be the coupling between the high- and low-latitude ionospheres. The focus of the CPEA campaign is on the coupling from the troposphere up through the thermosphere in a strong convective region over Indonesia. The CAWSES campaign will draw together and expand these efforts by coordinating collaborating satellite and ground-based programs to produce a sun-to-Earth data set, which dips down into the lower atmosphere. This campaign will also serve as the first test bed for a collaborative CAWSES/GEM/IAGA effort to combine international magnetometer chains to produce global maps of ULF wave index and magnetospheric density. There has been overwhelming response to the CAWSES campaign announcements and several groups from satellite missions to ground instrumentation have indicated their interest in participating in this first campaign. You are all encouraged to participate and in case you have not already done so, please let D. Pallamraju (raju@cawses.bu.edu) know what instrumentation you will be planning to operate during this period to facilitate future coordination and establishment of databases. Updates and an evolving list of collaborating programs and individuals will be posted on the CAWSES website http://www.bu.edu/cawses.



Please send us highlights of your campaign results for publication in the next newsletter.

Theme 1: Solar Influence on Climate

Co-Chairs: Michael Lockwood and Lesley Gray

The aim of this project is to investigate the effects of solar variability on the climate of the lower and middle atmosphere. Variations in solar spectral irradiance, as well as solar energetic particles and galatic cosmic rays, will be considered along with their impacts on the thermodynamic, dynamical, chemical, and microphysical structure of the atmosphere. Emphasis will be placed on the physical processes involved, and the study of paleoclimates will provide a historical context within the broader domain of extreme environments pertinent to the Sun-Earth system. The project will include an ongoing assessment of the state of the science in this area as it evolves.

The establishment of working groups for focused investigation and their task leaders is in progress.

Theme2: Space Weather: Science and Applications

Co-Chairs: Janet Kozyra and Kazunari Shibata

The top-level goals of the Space Weather Theme are to foster collaborations between national space weather efforts worldwide where such joint efforts enable progress in our ability to: (1) identify critical inputs to specify the geospace environment at a level needed to minimize impacts on technology, human society and life, and (2) support the development worldwide of dependable, robust models that predict conditions in geospace based on quantitative understanding of the entire sun-Earth system and all of its interacting components.

To achieve these goals, Theme 2 will use two interwoven research strategies. It will provide a test bed for a series of new space weather data products based on international collaboration, called "One-Earth" maps or time-series. A "One-Earth" map integrates a key space weather observation from a worldwide distribution of ground-based sites into a single time-dependent global map of space weather quantities or brings together an uninterrupted time-series of solar observations. The first of these "One-Earth" maps will focus on the ULF wave index and mass-loaded magnetospheric density. Other maps might include: ground-induced currents (GICs), gravity waves, N_mF_2, H_mF_2, scintillations, cosmic ray ground events, GPS TEC observations, uninterrupted time-series of H-alpha images, etc. There is a natural synergism between CAWSES efforts and upcoming programs like, for example, the International Heliospheric Year (IHY), which also seeks to collect international data sets. Another key focus of CAWSES Space Weather Theme is the organization of international campaigns, where the investigations of key science issues are enhanced or enabled by the availability of "One-Earth" maps or time-series. Valuable outputs of these international space weather campaigns are expected to be: (1) comprehensive Sun-to-Earth geophysical data sets essential for investigating the physics and dynamics of the evolving geospace system, (2) coordinated analysis efforts to synthesize, test and utilize for understanding and prediction these comprehensive data sets, and (3) associated global modeling efforts that enable progressive improvements through the iterative confrontation between models and the comprehensive "campaign" data sets. International collaboration is the element that enables these powerful geospace investigations.

The advisory structure for Theme 2 will consist of a main Space Weather Theme panel, one or more rotating science and technology Working groups that change as new types of data are integrated into "One-Earth" data products, and a rotating information technology Working group. The Space Weather Theme Panel will identify and organize space weather campaigns, select the data types for new "One-Earth" maps, appoint and dissolve Working Groups. The science and technology Working Group will address issues associated with integrating observations into a common global map. The information technology Working Group will focus on tools to: (1) collect data from distributed sites and ground-based chains, (2) integrate this data into a common map or time-series on the fly, and (3) disseminate the global maps through a web-based interface. Additional Working Groups may be created to participate in and coordinate different aspects of the Sun-Earth data analysis or model development. At the present time, a Working Group for magnetometer observations has been formed. And a first space-weather campaign is set to run from 29 March – 3 April in conjunction with an ISR World Days interval and the Coupling Processes in the Equatorial Atmosphere (CPEA) campaign.

Theme 3: Atmospheric Coupling Processes

Co-Chairs: Franz-Josef Lüebken and Joan Alexander

For surface, or near-surface, inputs to affect the middle atmosphere and the upper atmosphere/ionosphere, they must propagate upward through the various atmospheric regions. In particular, wave motions propagate upward through the atmosphere, thunderstorms influence the Earth's electric circuit, and chemical inputs are transported upward, undergoing chemical transformations as they do so.

Solar energy inputs to the terrestrial system, both radiative and corpuscular, and magnetospheric inputs affect the atmosphere in many ways. They can initiate wave disturbances that propagate downward. They can alter the upper atmosphere's chemical composition, which can then influence lower regions, and they can influence the atmosphere's conductivity in various regions.

The CAWSES Theme, "Atmospheric Coupling Processes" seeks to further our understanding of how upward propagating effects might affect the upper atmosphere/ionosphere as well as how downward propagating effects influence regions at and below the levels of energy inputs. Toward this end, three Working Groups have been established. They are:

- **WG 3.1:** Dynamical coupling (planetary waves, gravity waves, tides, turbulence) and its role in the energy and momentum budget of the middle atmosphere,

- **WG 3.2:** Coupling via photochemical effects on particles and minor constituents in the upper atmosphere: solar/terrestrial influences and their role in climate, and

- **WG 3.3:** Coupling by electrodynamics including ionospheric/magnetospheric processes.

It is clear that these Working Groups will need to interact strongly with those in the other themes. For instance, many of the suggested mechanisms for *Solar Influences on Climate* involve many of these atmospheric coupling processes. Waves propagating from below influence the ionosphere and are relevant to *Space Weather*. Finally, the assessment of upper atmosphere/ionosphere trends clearly involves *Space Climatology*.

Theme 4: Space Climatology

Co-Chairs: Claus Fröehlich and Jan Sojka

Overarching as the title is, we hope to maintain connectivity between the four working groups so that CAWSES can do justice to this title. The four working groups are (with a summary of their tasks and products):

- **WG 4.1:** Solar Irradiance Variability**:** possible secular trend of observed total solar irradiance (TSI) and the short-term variability of TSI and the spectral solar irradiance (SSI), time-dependent spectra for SSI (IR to EUV) which can be used in climate models, time series for PSI and proxies such as MgII index for general use, extend proxies for irradiance variability for the last 1000 years, define a climatology of CMEs and solar wind as far as they influence the Earth's environment on time scales longer than the 27-day rotational period of the Sun.

- **WG 4.2:** Heliosphere Near Earth**:** geomagnetic field and interplanetary magnetic field and its variability during the last 1000 years, cosmic rays with their relation to solar activity and variability during the last 1000 years, historical aurora data as support for the long-term variation of solar activity.

- **WG 4.3:** Radiation Belt Climatology: evolution of radiation belts, radiation belts and geomagnetic field interrelationship (see also WG 4.2)

- **WG 4.4:** Ionosphereic and Upper-Atmosphere Variability (with established IAGA/ICMA liaison): ionospheric F-layer height and density variations, thermospheric density variations, mesospheric issues as noctilucent clouds, temperature minimum, composition, etc. (the geomagnetic record is essential and is provided by WG 4.2)

These divisions fall along classic discipline lines and to keep the theme as a single main focus the leaders of the four working groups, together with the two co-chairs, will be the overall Theme 4 committee responsible for direction and interdisciplinary interactions. At this time the working group leaders are being selected and more specific guidance on their direction or focus is being defined.

One of the main objectives of Theme 4 will be to create a CD of selected CAWSES climatology that can be used by everyone: from school children to senior researchers. The emphasis will be in having the working group of Theme 4 quality control any climatology data set to be put into the CD. Currently there are many on-going individual, national, and international efforts to identify these climatologies in the different disciplines. Our vision is that this CD will bring selected quality-controlled data sets together in one place. These data sets will not be "interpreted" in their most raw form on the CD. The scientific work of interpreting these climatologies is an on-going effort and one that many of the CAWSES working groups will be actively involved in.

The next issue will contain the names of WG members and information regarding CAWSES activities in SCOSTEP member nations.

Capacity Building and Education

Co-Chairs: Marvin Geller, S.-T. Wu, and Joe Allen

SCOSTEP, since its inception, has tried to involve scientists from less developed nations in its science programs through involving them on science working groups and helping pay for travel to scientific meetings. During CAWSES, SCOSTEP hopes to take advantage of the advances in computing and electronic communications that are reshaping so much of our world. During the formulation period for CAWSES, the SCOSTEP Bureau, National Adherents, and Scientific Discipline Representatives voted to devote a significant portion of SCOSTEP's financial support for CAWSES to Capacity Building and Education. SCOSTEP's financial resources alone will not be sufficient to realize its goals in this area. Therefore, a proposal is being made to ICSU for financial assistance in these areas. We also hope that national and international agencies can help in these areas.

Giving the uncertainties in funding for CAWSES Capacity Building and Education, there are similar uncertainties in the specifics of the SCOSTEP efforts in these areas. Our hope though is to be able to set up partnerships between scientists in Developing Countries (DC) and scientists in wealthier nations for a multi-year period. We hope to financially assist those DC scientists with computing and/or electronic communications and also to assist in funding their travel to CAWSES-related meetings. Exactly how this develops will depend on the amount of available funding for this activity, but SCOSTEP is committed to having these activities be a significant part of CAWSES.

In the Education arena, we hope to develop materials that can be made available to scientists and students in various nations to explain the various aspects of CAWSES science.

Unlike the CAWSES science programmatics, which is being guided by the CAWSES Science Steering Group, SCOSTEP's efforts in Capacity Building and Education will initially be supervised by the SCOSTEP Bureau, although some separate group may be established for this purpose at a later time.

!! IMPORTANT ANNOUNCEMENT!!

CAWSES meeting during COSPAR in Paris, July 04

The SCOSTEP Bureau will meet at the ICSU HQ in Paris, France on Thursday-Friday, 15-16 July 2004. On Friday there will be a presentation on CAWSES science activities, where the CAWSES Theme and Working Group leaders will be invited to report on their group's activities. On Saturday, 17 July, there will be an all-day CAWSES planning meeting at a site to be determined. There will also be an open meeting on the status and progress of CAWSES research in different countries during COSPAR week 18-25 July. The time and venue for this meeting are being finalized. Please stay tuned!

Upcoming Meetings in 2004

CONFERENCE	DATE	LOCATION	CONTACT INFORMATION
International Conference on Substorms (ICS-7)	March 21-27, 2004	Lapland, Finland	http://www.geo.fmi.fi/ics7/
LWS Science Workshop on Connecting our Dynamic Sun to the Heliosphere and Geosphere	March 23-26, 2004	Boulder, Colorado	http://lasp.colorado.edu/sdo/meetings/Workshop2004First.html
VII Latin American Conference on Space Geophysics	March 29-April 2, 2004	Village Eldorado Hotel in Atibaia, Brazil	http://www.cea.inpe.br/colage/
The 2004 Space Weather Week Conference	April 13-16, 2004	Boulder, Colorado	http://www.sec.noaa.gov/sww/
Winckler Symposium: Fast Temporal Variation in Auroral Particle Precipitation	April 21-23, 2004	University of Minnesota, Minneapoli	http://www.ftpi.umn.edu/index_winckler.html
European Geosciences Union (EGU) 1st Genera Assembly	April 25-30, 2004	Nice, France	http://www.copernicus.org/EGU/ga/egu04/
COSPAR Capacity Building Workshop on the "Analysis of Data from Multisatellite Magnetospheric Missions"	May 3-14, 2004	Beijing, China	http://www.faculty.iu-bremen.de/jvogt/cospar/cbw3/
2004 Joint Meeting: AGU and the Canadian Geophysical Union (CGU)	May 17-21, 2004	Montreal, Canada	http://www.agu.org/meetings/sm04/
XVIth Recontres de Blois: Challenges in the Climate Sciences	May 23-28, 2004	Chateau de Blois	http://opserv.obspm.fr/confs/climates.html
The IAU Symposium 223 "Multi-Wavelength Investigations of Solar Activity"	June 14-19, 2004	St. Petersburg, Russia	http://sun.stanford.edu/IAU223/
First International Symposium on Space Climate: Direct and Indirect Observations of Long-Term Solar Activity	June 20-23, 2004	Oulu, Finland	http://cosmicrays.oulu.fi/SpaceClimate1/
2004 GEM Summer Workshop	June 20-25, 2004	Snowmass, Colorado	http://spacibm.rice.edu/gem/gem2004/index.html

2004 CEDAR Workshop	June 27-July 2, 2004	Eldorado Hotel, Santa Fe, New Mexico	http://cedarweb.hao.ucar.edu/wkshp/
SHINE 2004 Workshop	June 27-July 2, 2004	Big Sky Montana	http://www.shinegroup.org/
The First Asia-Oceania Geosciences Society Annual Meeting	July 5-9, 2004	Suntec Singapore International Convention & Exhibition Centre	http://www.asiaoceania.org/confer.html
IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere System	July 12-15, 2004	Bath, UK	http://www.bath.ac.uk/elec-eng/IAGA2004.htm
35th COSPAR Scientific Assembly	July 18-25, 2004	Paris, France	http://www.cospar2004.org/
NATO Advanced Study Institute on Sprites, Elves and Intense Lighting Discharges	July 24-31 2004	Corte in Corsica	http://www.geophysik.uni-frankfurt.de/~fuellekr/SUMMER/
The XXVII SCAR Meeting	July 25-31, 2004	Bremen, Germany	http://www.scar28.org/SCAR/general.html
SPARC 3rd General Assembly	August 1-3, 2004	Victoria (BC), Canada	http://www.aero.jussieu.fr/~sparc/
Chapman Conference on Solar Energetic Plasmas and Particles	August 2-6, 2004	Turku, Finland	http://www.agu.org/meetings/cc04bcall.html
2004 Western Pacific Geophysics Meeting	August 16-20, 2004	Honolulu, Hawaii	http://www.agu.org/meetings/wp04/
3rd Alfven Conference-Alfven Waves in Space Plasmas	August 23-27, 2004	Steamboat Springs, Colorado	http://lasp.colorado.edu/alfconf3/
IAU Symposium: Coronal and Stellar Mass Ejections	September 13-17, 2004	Beijing, China	http://srg.bao.ac.cn/2004huiyi/2004-cme.htm
VLF Workshop on ELF/VLF Radio Phenomena Generation, Propogation and Consequences in Observations, Theory and Modeling	September 27-October 1 2004	SGO, Finland	http://www.sgo.fi/Aeronomy/VLF.html
2004 Huntsville Modeling Workshop on Challenges in Modeling the Sun-Earth System	October 18-22, 2004	Hilton Hotel, Huntsville, Alabama	http://www.science.nasa.gov/HSVWorkshop/
Sun-Earth Connection Physics: The GeoImpact of CMEs, CIRs, and Ordinary Solar Wind	November 8-12, 2004	Merida, Mexico	http://www.lanl.gov/csse/merida/
2004 Fall AGU Meeting	December 13-17, 2004	San Francisco, CA	http://www.agu.org

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