CAWSES News

Climate **A**nd **W**eather of the **S**un-**E**arth **S**ystem

Volume 2, Number 2 **September 2005**

CAWSES is an international program sponsored by SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) and has been established with the 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 theory crucial to achieving this understanding, to involve scientists in both developed and developing countries, and to provide educational opportunities for students at all levels.

Message from the Chair

Sunanda Basu
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CAWSES continues to have a very busy and productive second year. The NSF funding for the CAWSES Office at BU has been received, which allows us to keep publishing *CAWSES News*. Raju will give you more details about our Workshop in Taipei in May and our very successful second science planning meeting in Toulouse, France in July 2005. Our Theme Co-chairs have provided updates on the respective activities of their groups. You will note that progress is being made across-the-board within all Themes.

Our CAWSES Program has attracted considerable international attention. I feel honored to have been invited to deliver an Association Lecture on CAWSES science at the IAGA Meeting in Toulouse in July 2005. It was well received by the audience and the presentation (without the movie clips) can be found on the IAGA & CAWSES Webpages. I hope that through this talk I was able to convey the excitement of doing Sun-Earth system science. My job was made much easier by the wonderful material sent to me by an extensive list of colleagues. A General Lecture with a Space Weather theme will be delivered at the URSI General Assembly at New Delhi, India next month, in which I expect to concentrate on the variety of impacts on systems that are caused by space weather events.

As I write this, our Second CAWSES observational campaign is in full swing. There has been considerable solar flare activity and even halo CMEs observed by SOHO in the early part of this month. The joint space weather and atmospheric coupling campaigns in September-October 2005 should provide extremely interesting global measurements during both quiet and disturbed periods, thereby making available extensive inputs to data assimilation models. I do hope that the entire CAWSES community participates, in some way, in the ongoing second campaign and the results will, hopefully, provide much insight into the complex interactions within the Sun-Earth coupled domain.

Inside this issue:

"The opposite of a correct statement is a false statement. But the opposite of a profound truth may well be another profound truth".
– Neils Bohr (1885 – 1962)

Update on CAWSES activities since March 2005

D. Pallamraju
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We are nearing the end of the 2nd year of the CAWSES program. The program has matured well during this period due to grass-roots planning and the tireless efforts of many of our CAWSES colleagues across the globe. I am happy to share with you some of the developments within the CAWSES program.

CAWSES mini-workshops on Theme 2 and Theme 3 science were held in conjunction with the International Symposium on Equatorial Aeronomy (ISEA-11) in Taipei, Taiwan in May 2005. These workshops focused on the results from the observations carried out during April-May, 2004 on the first joint CAWSES campaign on Space Weather and Coupling Processes in the Equatorial Atmosphere. It was encouraging to see that over 80 scientists participated, even though these workshops were held on the Saturday following a very full week of ISEA sessions. Several of those results are currently in the process of refereeing and they will be published in a special issue of Annales Geophysicae along with other papers presented during the ISEA-11 meeting. Several presentations related to Theme 1 and Theme 4 science were made during the workshops on Solar Variability and Planetary Climates in Bern, Switzerland in June and at the Solar Variability and Climate Workshop held later that month in Rome. The proceedings of these meetings will be published in two separate volumes. During the CEDAR meeting in Santa Fe, NM, USA in June 2005, D. Pallamraju made a presentation on CAWSES science and described how the science planning and its organization could help all the I*Y programs. In addition, many CAWSES science presentations were made at major international meetings such as IAGA held in Toulouse, France and IAMAS held in Beijing, China. Furthermore, a paper on CAWSES science authored by Sunanda Basu and D. Pallamraju has been accepted for publication in Advances in Space Research, 2005

The 2nd CAWSES Science Planning meeting was held on July 23rd in Toulouse. Around 60 scientists from 15 countries participated. At least one of each Theme's Co-Chairs gave presentations on the progress of their respective Theme. They also mentioned the workshops/meetings that were held during the last six months and highlighted the preliminary findings. This meeting was also attended by all the CAWSES Science Steering Group (SSG) members except C.-H. Liu (who was represented by S.-Y Su). In their feedback they all expressed satisfaction on the progress made by the CAWSES program thus far. Most notably the SSG appreciated the fact that the program is: i) being built from the bottom up, ii) the range of activities and interaction among different Themes are being greatly fostered, and iii) the global participation is steadily increasing.

Sunanda Basu delivered one of the four IAGA Association Lectures given at Toulouse. Her talk was on CAWSES Science, in which she described the effects of the October, 2003 storm, popularly known as the Halloween storm, from the Sun to the Earth. Her talk can be viewed at http://www.bu.edu/cawses/intro.htm.

The second Space Weather and Atmospheric Coupling Campaign is presently underway during September – October of this year. It has been planned in such a way that the CAWSES community can take advantage of the

Discussions during coffee break at the CAWSES Workshop in Taipei, Taiwan, May 14, 2005

Sunanda Basu delivering the IAGA Association Lecture on CAWSES Science in Toulouse, France, July 27, 2005

month-long incoherent scatter radar operations during the month of September and the solar filament observations from September 7 – 21 (http://bass2000.bagn.obs-mip.fr/jop178/JOP178_2005.html). The data obtained during these two months will be useful to characterize tides and their influence from the Troposphere to the Thermosphere.

CAWSES-AOPR office will be organizing its first Capacity Building Workshop on Space Science for the benefit of Southeast Asian scientists in November of this year (see report by Shin-Yi Su below). Further, Theme 2 will be organizing a Virtual Poster Session during December. This will be a novel experiment in which people will upload their poster online to a pre-defined website. There will be message boards for submitting questions and the authors of the posters will provide answers online. More information will be provided in due course. I encourage everyone to participate in it and assess this way of having a "virtual international science meeting". While, obviously not a substitute for the advantage that a face-to-face meeting brings, we do hope that such Virtual Poster Sessions will provide an avenue for wider participation internationally, providing much needed respite from the increasing financial and time constraints that one has to endure in international travel. Theme 3 has defined several focused projects and this arrangement is yielding results. We look forward to a productive year with many new accomplishments emanating from all CAWSES Themes.

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Awards/Honors for SCOSTEP/CAWSES Scientists

Gufran Beig and 18 other scientists from around the world were presented the Norbert Gerbier-MUMM International Award for 2005 for their paper entitled "Review of mesospheric temperature trends", published in 2003 in Volume 4 of the *Reviews of Geophysics*.

Jan Sojka has been appointed as the Chair, CEDAR Science Steering Committee for a period of two years beginning July, 2005

We congratulate them on their well-deserved recognition.

Report on progress under CAWSES Themes

Theme 1: Solar Influence on Climate

Report by Lesley Gray (Co-Chair)
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It has been a very busy summer for Theme 1 activities! In June, there was a workshop on 'Solar Variability and Planetary Climates' hosted by the International Space Science Institute (ISSI) in Bern, Switzerland. Sessions included 'solar output variability', 'long-term observations and reconstructions', 'tropospheric aerosols', 'radiation budget and changes', 'theory and models', 'recent space data' and 'planetary science'.

Hot on its heels, there followed a meeting on 'Solar Variability and Earth Climate', held in Rome, Italy in July. The scientific sessions covered the status of solar radiations and climate records, mechanisms and physical models for irradiance variations and climate variations, the coupling of the middle and lower atmosphere and the future of sun-climate research. Both of these meetings will produce published proceedings, the preparation of which should be well underway by the time of publication of this *CAWSES News*.

At the other end of the spectrum from these relatively small, focussed workshops, there were two major conferences this summer. In July, the IAGA Scientific Assembly in Toulouse had a session on solar variability effects on the middle atmosphere and troposphere, and also

one on the vertical coupling of the atmosphere – ionosphere system and solar effects on it. In August, the IAMAS Conference in Beijing, China had a session on solar activity and its influence on the Earth's weather and climate. All the three conference sessions were well attended and successful.

As is always the case, these workshops and conferences have been extremely beneficial not only because of the formal meeting sessions, but also due to the discussion and exchanges during coffee breaks and the small 'satellite' meetings that are arranged around them. In particular, the inaugural meeting of the new WCRP SPARC* working group SOLARIS (Solar Influence for SPARC) also took place at the IAGA meeting. The objective of this group is 'modelling and understanding the solar influence on climate through stratospheric chemical and dynamical processes'. It is being led by Dr. Kuni Kodera (kodera@mri-jma.go.jp) and Dr. Katya Matthes (kmatthes@ucar.edu). Because this topic is so closely linked to the CAWSES Theme 1 activities, Lesley Gray has also been invited to co-chair the activity, to ensure close links between SOLARIS and CAWSES. More information on its activities will be reported in future newsletters.

*SPARC: Stratospheric Processes and their Relation to Climate

Theme 2: Space Weather: Science and Applications

Report by Janet Kozyra (Co-Chair)
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It has been an exciting year for Theme 2 science. Interactions between Themes 2 and 3 are increasing through the Theme 3 Projects 7a and 7b, which are: Electrodynamic coupling effects in the equatorial and low-latitude ionosphere (Coordinators: Archana Bhattacharyya, Art Richmond, and Hermann Luehr), and understanding atmospheric coupling processes through numerical modeling (Coordinators: Gang Lu, Maura Hagan, and Art Richmond). The participation of solar colleagues has increased with the inclusion of WG (2.4) "Continuous H-Alpha Imaging Network" (CHAIN), and widening the focus of WG 2.3 to address "Solar Sources of Geoeffective Disturbances". Also several magnetometer chains are now participating in CAWSES global studies. Names of the Theme 2 members are provided in this *CAWSES News*.

Furthermore, ICESTAR and CAWSES are joining together to analyze a series of long-duration X-class flares, CMEs, and associated magnetic activity in January 2005 which has elements of strong interest to both programs. One of the major scientific focus of the ICESTAR program is the study of high-latitude interhemispheric effects: including asymmetries and conjugate phenomena. CAWSES, on the other hand, focuses on the role of coupling and the interconnection between system elements.This includes the effects of high-latitude asymmetries and conjugacies, in producing the global geospace response to solar forcing. There have been several sessions at meetings already, including sessions at the June 2005 CEDAR meeting in Santa Fe, New Mexico and at the 2005 IAGA meeting in Toulouse, France. There is also an upcoming session at the 2005 Fall AGU Meeting in San Francisco dedicated to the January 2005 events. ICESTAR Contacts: Kirsti Kauristie (kristi.kauistie@fmi.fi) (Finnish Met. Inst.), Aaron Ridley (ridley@umich.edu) (U. Mich.), and Allan Weatherwax (aweatherwax@siena.edu) (Siena College). The ICESTAR webpage is at: http://www.siena.edu/physics/ICESTAR/.

UPDATE ON THE 2ND CAWSES SPACE WEATHER AND ATMOSPHERIC COUPLING CAMPAIGN: *Unusual Activity Leads Off the Campaign*

The 2nd CAWSES space weather and atmospheric coupling campaign in now in its 3rd week. A giant sunspot AR 10798/10808 began erupting on September 7, 2005, and before it had finished on September 15, geospace had been hit with a total of 8 powerful X-class flares and some 17 M-class flares. In the wake of these flares came a strong radiation storm filling the near-Earth space environment with high-energy solar protons and electrons. Also, there was a long interval (11-17 September 2005) of magnetic activity driven by high-speed streams and coronal mass ejections. This was the second transit of the solar disc by this long-lived active region. The history of the activity it produced raises some interesting questions. Figure 1 gives observations during two intervals of magnetic activity each associated with a different transit of AR 10798/10808 across the solar disc.

Some New Science Questions:

- What features of the solar wind disturbances produced by eruptions of this particular active region make them more effective at driving high-latitude/magnetotail activity as opposed to ring current build-up and magnetic storm activity?
- What, if anything, is unusual about the nature of the active region itself?
- When an active region produces multiple eruptions do the solar wind disturbances from these eruptions have common features? If so, do these characteristic features produce commonalities in all of the associated geospace responses, such as a tendency for high latitude as opposed to ring current activity?
- Do fluctuating and/or short duration intervals of IMF

B_z play an important role in driving more high-latitude activity compared to ring current build-up?

- Does the density of the solar wind play an important role in driving the geospace response during these recent events? During the 24 Aug 2005 storm, solar wind densities were quite low (1-2 cm^{-3}) during the strong southward B_z interval; even though they are high (up to probably 80 cm^{-3}) in the sheath region preceding the CME when IMF B_z was northward. Solar wind densities also dropped below 1 cm^{-3} during the 11 September 2005 magnetic activity. Since upstream solar wind densities are correlated with plasma sheet density, and thus the ring current source populations, low solar wind density may weaken the energy flow into the ring current relative to auroral activations. Of course, the effect of low solar wind densities on high-latitude activity is also unclear.

The Campaign Continues:

The campaign is already fulfilling its promise as an exciting vehicle for investigating the interconnected elements in the Sun-Earth system. The first data analysis workshop is being planned for mid-December 2005. It will have both virtual and face-to-face elements. More information along with updates on the activity during the campaign will soon be available on the CAWSES website. Please send information on unusual features, science focus areas, data sets, etc., to D. Pallamraju (raju@cawses.bu.edu), Janet Kozyra (jukozyra@engin.umich.edu), or Kazunari Shibata (shibata@kwasan.kyoto-u.ac.jp) and we will make sure the information gets integrated into the campaign web pages.

"I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me"
– Sir Isaac Newton (1643 – 1727).

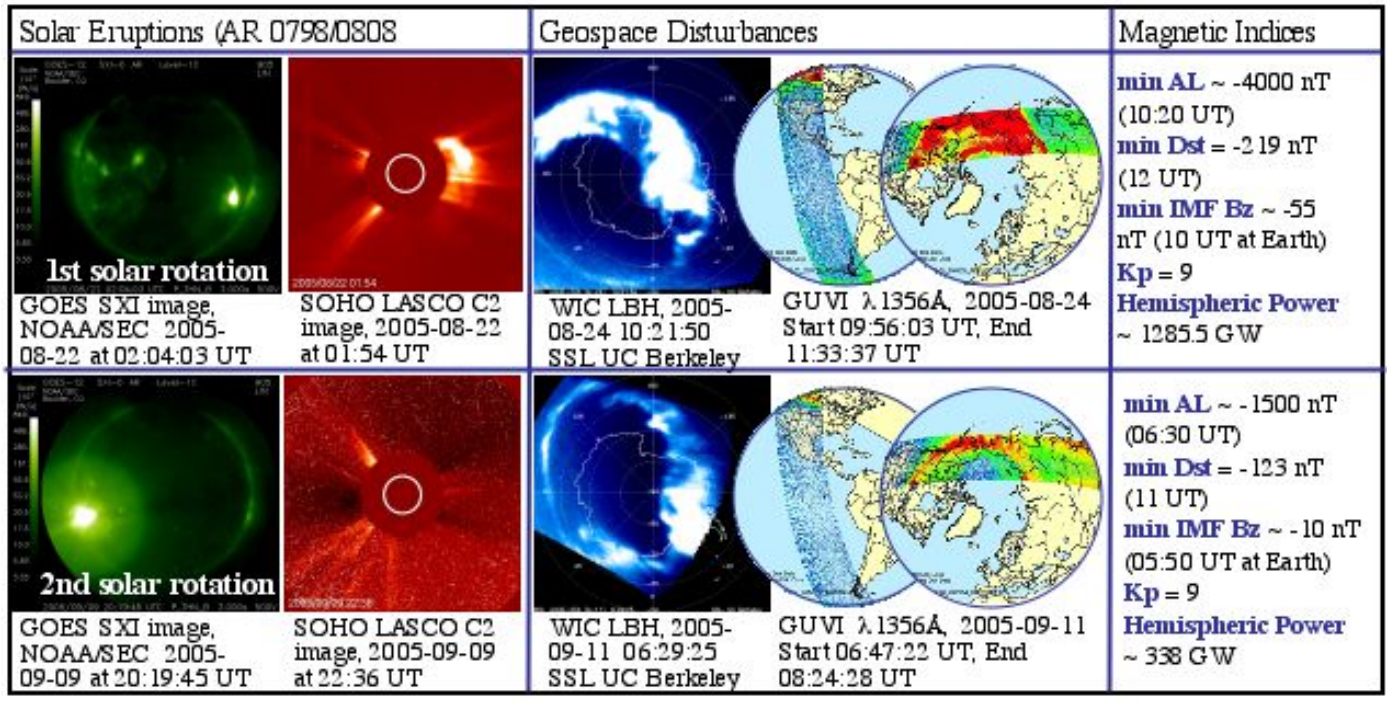

Figure 1: Top panels show elements of the magnetic activity as realtime AL dipped to a minimum value of ~ -4000 nT just prior to storm maximum on 24 August 2005 during the previous appearance (in August) of AR 10798/10808. Estimated hemispheric power reached a remarkable 1285.5 GW during this time. From left to right, images show the solar flare, coronal mass ejection, a frame of the auroral activity over the southern pole from IMAGE/WIC, TIMED GUVI observations of a possible ion/ENA aurora at equatorial to midlatitudes, and a TIMED GUVI view of the northern auroral oval. The bottom panels show similar data during the current transit (in September) of AR 10798/10808 across the solar disc when the realtime AL reached a minimum value of –1500 nT just prior to storm maximum. The last column gives information on the geospace response as indicated by various magnetic indices. In these events, it appears that major auroral activations are occurring even though there are indications that the magnetic storms themselves may be weaker than expected.

Theme 3: Atmospheric Coupling Processes

Report by Franz-Josef Luebken (Co-Chair)
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During the Theme 3 meeting in Toulouse on July 20, 2005, the list of projects was discussed and updated. The list is as follows:

1) Planetary and gravity wave influences upon the winter polar vortices (0-100 km)
Coordinator: Alan Manson
2) A global observing campaign to characterize tides and their influence from the troposphere to the thermosphere
Coordinator: William Ward
3) Gravity waves and turbulence
Coordinators: Dave Fritts, Nikolai Gavrilov
4) Solar influence on minor constituents and layers at the extra-tropical summer mesopause
Coordinators: Franz-Josef Luebken, Ulf-Peter Hoppe, and Scott Bailey
5) Ozone - How well do we really understand it?
Coordinator: Marty Mlynczak
6) Equatorial atmosphere coupling processes
Coordinators: Mamoru Yamamotu, Hisao Takahashi, and Subramanian Gurubaran.
7a) Electrodynamic coupling effects in the equatorial and low-latitude ionosphere
Coordinators: Archana Bhattacharyya, Art Richmond, and Hermann Luehr
7b) Understanding atmospheric coupling processes through numerical modeling
Coordinators: Gang Lu, Maura Hagan, and Art Richmond.

Some of the projects have installed a steering committee with several scientists participating in coordination. Several campaigns are active, or planned within the projects listed above. Please contact the coordinators for more details.

- Project 6 has increased its scope and now includes four activities, namely: a) CPEA (Coupling Processes in the Equatorial Atmospheres), b) Mesosphere-ionosphere coupling, formation of plasma bubbles, c) Low latitude radar network for investigation of dynamical processes in the mesosphere-lower thermosphere region, and d) INTAR (see below)
- INTAR (International Network on Tropical Atmosphere Radars) was proposed for Theme 3 prior to the meeting. This activity is considered an important input to our Theme. It was suggested that the speaker of INTAR contact the coordinators of the Theme 3 project 6 to incorporate INTAR within this project.

Theme 4: Space Climatology

Report by Jan J. Sojka (Co-Chair)
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The report of this Theme's activities was made on Saturday, 23 July 2005, to the CAWSES Science Steering Group in Toulouse, France by Jan J. Sojka. Common to all four working groups within Theme 4 is the collection, evaluation, calibration, and interpretation of long-term data sets. The availability and quality of these measurements differ considerably, leading to the four working groups proceeding somewhat differently.

WG 4.1 addresses the question of solar irradiance variability, a topic dependent upon observations of the Sun made from above the atmosphere and from measurements of wide scale relevance to Sun-Earth science. Hence, the primary data are available, but only span the recent four decades of satellite research. The working group has already organized three workshops: July 2004 COSPAR's 36th General Assembly in Paris, December 2004 Fall AGU in San Francisco, and June 2005 Solar Variability and Earth's Climate Workshop in Villa Mondragone, Italy. Their next special session will be in September 2005 at the SORCE Science Meeting in Durango, Colorado. Because the record of solar irradiance variability depends critically on the continuation of satellite missions that overlap one another, this working group has taken on the role of a "proactive voice" and is working closely to coordinate and set up collaborations between the different satellite missions, e.g., the future SDO (USA) and the PICARD (France) satellite teams.

The challenges facing WG 4.2 are considerably different and literally involve scientific archeology to locate and access the earliest magnetometer measurements. These are to be found in laboratories and government buildings in the form of log books and charts created well over 100 years ago. Unfortunately, these records are currently not on World Data Center lists of archived resources, but need to be. The recovery of these data are crucial to extending back the climatological record of the Heliospheric-Earth interactions in modern-day detail to perhaps 250 years ago. Going further back will depend on nature's own records, such as tree rings and ice core analysis, tasks not yet undertaken by this WG.

WG 4.3 has initiated a two-thread approach to understanding the radiation belt climatology of developing a unified measurement database, and development of the next generation radiation belt model. The measurements are from satellite observations from multiple nations whose

mission objectives were both technical and scientific. Bringing these together into a unified description of a 3-D time evolving structure of complex energy dependence is the challenge. Like WG 4.1, this database only goes back to about forty years. This effort will lead to the first comprehensive description of the radiation belt climatology, and hence, form the ground truth for the model development.

WG 4.4 deals with the variations in the upper atmosphere and ionosphere as its emphasis, specifically to access the current state of climatology and trend estimates. Of particular emphasis will be studies of the reliability of the estimates, which, in part, depend on a better understanding of the quality of the databases. This working group has formed strong ties with the IAGA/ICMA Working Group II-F, which has pioneered worldwide trend analysis in this field. The WG 4.4 is planning a joint workshop with the IAGA/ICMA II-F group. Specific studies of satellite data availability of the upper atmosphere, and determining upper atmospheric wave activity trends from 100-year long magnetic records have already been undertaken.

This *CAWSES News* contains the names of scientists who are group members of this Theme. I am pleased to report that the momentum gathered by the working groups, as they get up to speed is already impressive and shows international impact.

Report on Solar Irradiance Variability (WG 4.1)

Report by J. Pap, G. Thuillier, and P. Fox
(papj@marta.gsfc.nasa.gov)

WG 4.1 "Solar Variability" of Theme 4 was the main supporter of the Solar Variability and Climate Change meeting that took place in Monte Porzo de Catone, Italy, during June 27 - July 1, 2005. A special CAWSES session was held on the last day. The main goal of this session was to establish a collaborative effort between WG 4.1 and WG 1.1. The latter deals with assessment of evidence for the Solar Influence on Climate. During this session there was discussion on the solar data needed for Theme 4 for climate modeling, especially on long time scales over centuries - back to the Maunder Minimum and beyond. Discussions in this session highlighted the fact that there are constructions of irradiance time series and spectral irradiance variability which are obsolete, but still used in climate modeling. The importance of replacing these outdated "models" with more physics based models was emphasized. It was discussed in detail that various results for solar cycle 23 show the first clear breakdown between solar activity and solar variability. The irradiance representing variability is higher at maximum of cycle 23 than activity indices, like the sunspot number, the 10.7 cm radio flux, Be10 cosmogenic isotope, etc. While these activity indices were "reasonable" proxies for long-term irradiance variability before cycle 23, current results indicate that we cannot really say for which cycles (prior to cycle 21) that these indicators are reliable for climate studies.

It was concluded that for IPCC (Intergovernmental Panel on Climate Change) studies we need TSI (Total Solar Irradiance) reconstructions back to 1850. However, irradiance has been measured only from late 1978. Thus, any irradiance models which are developed back to 1850 should be accompanied with error bars. Extrapolating irradiance values back to the Maunder Minimum is considered as the first step in longer term backward modeling, and for this purpose first we need to understand irradiance-activity-variability relations at Maunder Minimum and then go back further in time. It was also concluded that the current correlation studies can provide guides for searching for links between solar variability and climate change, but they cannot or should not be used to replace physical mechanisms. Hence more detailed solar physics data are needed. Attending scientists compiled the list of ongoing projects on current image analysis efforts like the Arcetri, Mt. Wilson, and Kodaikonal images to refine models, which emphasize the quiet Sun. Changes in these solar features are the most probable solar contributors to long-term climate variations.

In addition to Sun-climate connections via irradiance variations, for the study of relationships between the 11-year solar cycle to atmospheric chemistry we also need solar energetic particle data besides that of irradiance. For this purpose coordination between Theme 4 and Theme 2 (Space Weather) efforts is being established.

An additional subject of discussion is how WG 4.1 can provide data either to Theme 1, Theme 2, or Theme 3. We concluded that in addition to the general CAWSES website, the Virtual Solar Observatory (VSO) could also be a "source" of data. This data "catalogue" will be a very useful "tool" for CAWSES participants working on solar physics to learn about the availability of solar data and of the important components of irradiance research within CAWSES Theme 4. It was agreed that as part of a coordinated effort with Theme 1, WG 4.1 could help Theme 1 with describing data qualities, use of data, for modeling the climate impact of solar variability. It was concluded that data documentation should be maintained on the CAWSES website - preferably to be linked to VSO.

Finally, collaborations with other projects, like the

electronic Geophysical Year (eGY) and International Heliophysical Year (IHY) were discussed. Importance of joint campaigns with these projects as well as with CAWSES Theme 2 were highly supported. Steve Walton (California State Univ., USA), was identified to be responsible for coordinating campaign observations. Future meetings were discussed and we recommend that CAWSES scientists send a one-page long proposal for meetings.

Call for proposals:

CAWSES Working Group 4.1 "Solar Irradiance Variability" calls for short proposals for CAWSES WG 4.1 meetings to be held in 2007 and 2008. These proposals should describe facilities, dates and financial resources available to the proposers. The proposed topics related to WG 4.1 activities should be briefly described in a 200-word abstract. WG 4.1 leaders in consultation with panel leaders will select the time and place of the CAWSES WG 4.1 meetings for 2007 and 2008. Proposals for the 2007 meeting are due by December 31, 2005 and by December 31, 2006 for meetings to be held in 2008.

Capacity Building and Education

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

Five graduate students from developing countries have been supported by CAWSES to participate in the International Symposium on Equatorial Aeronomy, held in Taipei, Taiwan during May 2005. Support was also extended to organizers of two CAWSES-related sessions so that they could choose students for attending the IAGA meeting in Toulouse, France in July 2005. In addition to meeting eminent scientists in their field, we hope attending international meetings such as these will provide the students with an understanding of how their own research fits into the 'bigger picture' of Sun-Earth system science.

Contributions from the CAWSES Community

Two new magnetometer stations in Antarctica to extend the SAMBA chain to auroral latitudes.

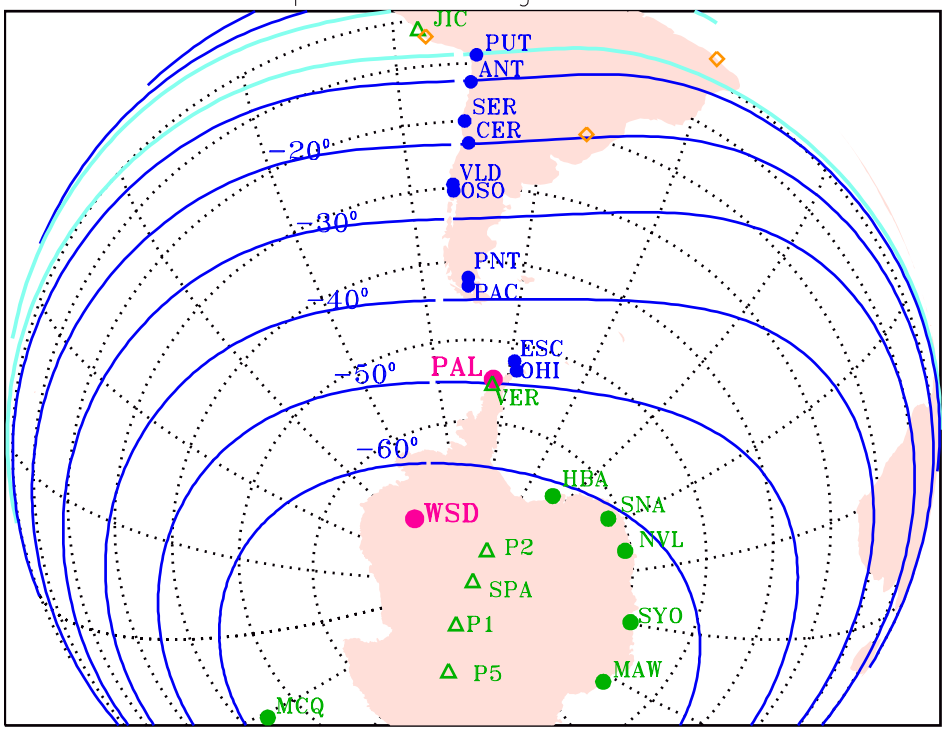
Report by Eftyhia Zesta,
(ezesta@atmos.ucla.edu)

The South American Meridional B-field Array (SAMBA) is a meridional magnetometer chain at low and mid-latitudes along the coast of Chile and in Antarctica. Installation of stations began in 2002. The first Antarctica installations were done in early 2004 in the Chilean bases of Escudero and O'Higgins.

The map below shows all the SAMBA stations along with other magnetometers in the area. Blue solid circles are the 10 SAMBA stations that were installed between 2002 and 2004. The two magenta circles are the two new SAMBA stations that are extending the chain. The black dotted lines are lines of geographic latitude and longitude and the blue lines are lines of constant geomagnetic latitude.

SAMBA is aimed primarily for the study of inner magnetosphere ULF waves and processes. The four lower latitude stations (PUT, ANT, SER, CER) are approximately equidistant and close to the dip equator. The other 6 stations are set in pairs (VLD-OSO, PNT-PAC, and ESC-OHI) for the study of field line resonances (FLRs), which can be inverted to give the equatorial mass density. These stations are particularly suited for the remote study of inner magnetospheric dynamics during storms. Furthermore, these stations are conjugate to the stations of the MEASURE chain in North America (Mark Moldwin, PI) so the conjugate study of ULF resonances is possible. Conjugate remote monitoring of the inner magnetospheric density can yield many interesting results about models and techniques used to determine the equatorial mass densities from ground magnetometers.

Map of SAMBA magnetometers



The SAMBA chain is about 12 hours of local time apart from the 210° Magnetic Meridian chain offering the unique opportunity of simultaneous dawn-dusk and noon-midnight observations during inner magnetospheric processes. Such observations have yielded new and interesting results about the asymmetry of the ring current and how it is enhanced by solar wind dynamic pressure enhancements during storm times.

The two new magnetometer stations in Antarctica (PAL and WSD) are extending the SAMBA chain to auroral latitudes bringing the total number of stations to twelve. The first one was recently installed, in April of 2005, in the Antarctica base Palmer (Mag. Lat. =-49.74°, Mag. Long. =9.2°, L=2.4). Palmer along with the ESC and OHI stations as well as the Ukranian VER station comprise a multitude of magnetometer pairs for extending the remote sensing of the inner magnetosphere.

The second new station, WSD, will be a fully automated magnetometer system that is scheduled for installation in the West Antarctica Divide site (WAIS-D) (Mag. Lat.=-67°, Mag. Long. =-4.57°, L=6.5) in November 2005. WSD is at auroral latitudes and is near-conjugate to the Canadian station PBQ, offering a unique opportunity for routine conjugate studies of substorms and other auroral processes. In addition, WSD along with the other auroral stations of the south hemisphere (indicated as green solid circles in the map above) will be used for the determination of a southern-hemisphere AE index that can be compared with the standard AE index for the purpose of conjugate studies.

This chain of magnetometers will be able to address the science issues described by the Theme 2 of CAWSES. The SAMBA magnetometers will be operating during the CAWSES campaigns. Data from these magnetometers is available at: http://samba.atmos.ucla.edu up to the year 2004. For data for later dates contact Eftyhia Zesta.

The Chapman Conference on Corotating Solar Wind Streams and Recurrent Geomagentic Activity

Report by Gang Lu, Bruce Tsurutani, Nat Gopalswamy, Walter Gonzalez, Robert McPherron, and Fernando Guarnieri
(ganglu@ucar.edu)

This Conference was held from 6-12 February 2005 in Manaus, Amazonas, Brazil and its goal was to discuss corotating high-speed solar wind streams and recurrent magnetic storms/substorms/convection bays, as well as the subsequent effects on the ionosphere and thermosphere. There were 83 attendees coming from Europe (Belgium, England, Germany, Holland, Italy, Norway, Slovakia, Sweden), the United States, Canada, Japan, South America (Brazil and Argentina), South Africa, Egypt, India, and Sri Lanka. Among them, 8 were PhD students. A total of 88 papers were presented at the conference, covering a wide range of topics of the Sun-Earth system from the Sun and the solar wind to the magnetosphere, ionosphere, and thermosphere. Some of the specific topics discussed at the Conference included: the dynamics and evolution of coronal holes, the formation of corotating interaction regions (CIRs), the role of Alfven and cyclotron waves in coronal heating, Alfven waves in solar wind heating, the similarity and difference between CIR-driven geomagnetic storms and those driven by coronal mass ejections (CMEs) as seen in the magnetospheric, ionospheric, and thermospheric responses, the characteristics of particle injection and ring current formation during CIR-driven geomagnetic storms, effects of the CIR-induced geomagnetic activity on the upper atmospheric dynamics and composition and the acceleration of relativistic "killer" electrons during high speed streams. Papers presented at this Conference will be published in the form of an AGU Monograph and also in a special issue of JGR space physics.

First Capacity Building Workshop on Space Science during November 7 to 15, 2005 at NCU, Taiwan

Report by Shin-Yi Su
(*sysu@jupiter.ss.ncu.edu.tw*)

The National Science Council (NSC) of the Republic of China at Taiwan has been promoting scientific exchange programs among countries in the Southeast Asia Region for many years. Responding to the 2004-2008 worldwide CAWSES program initiated by the ICSU scientific body of SCOSTEP, and the capacity building efforts coordinated by the CAWSES-AOPR Coordinating Office in Taiwan, NSC has teamed up with CAWSES-AOPR to organize a space science training workshop for young scientists in the region. The workshop will be held from November 7 to 15 at National Central University (NCU) in Chung-Li, Taiwan. NSC has set up funds, a maximum of NTD 40,000 (approximately USD1,250) per participant, to support the participants' travel and living expenses during the workshop period.

The first workshop is designed to study the "Space Weather Effect on Ionosphere." Specific topics to study during the workshop are:
1. Basics of the solar wind interaction with the Earth magnetosphere.

2. Current Systems in the Terrestrial Environment.
3. Shape and size of the Earth magnetosphere in relation to space weather effect. (Theory and predication with ACE and Wind data).
4. Ionosphere and space weather effect. (Theory and practical analyses with ionosonde, GPS, and FORMOSAT-1 data).
5. Space-borne ionospheric density and temperature measurements, and application with International Reference Ionosphere (IRI) model.

Instructors for the workshop will be Profs. R. A. Heelis (UTD, USA), K. I. Oyama (ISAS/JAXA, Japan), J. K. Chao (NCU, Taiwan), S.-Y. Su (NCU, Taiwan), J. Y. Liu (NCU, Taiwan), L. H. Lyu (NCU, Taiwan), and Dr. C. K. Chao (NCU, Taiwan). Courses are designed with classroom tutoring together with hands-on data analysis with latest observational data from ionosonde, GPS, and FORMOSAT-1. It is expected that the students will take these observational data back to their respective countries for continuing study of the newly observed ionospheric phenomena and to interact with their colleagues as well as instructors. For more information about the workshop, please contact Prof. S.-Y. Su at: sysu@jupiter.ss.ncu.edu.tw

Important Announcements from the CAWSES Office

D. Pallamraju

1) 2nd CAWSES Space Weather and Atmospheric Coupling Campaign in September - October 2005

The second CAWSES Space Weather Campaign is timed to coincide with the Incoherent Scatter Radar (ISR) Operations (on best effort basis) that are scheduled for the whole month of September 2005 (http://people.ece.cornell.edu/wes/URSI_ISWG/2005WDschedule.htm). The ISR world days campaign combines the efforts of an ongoing LTCS (Lower Thermosphere Coupling Studies) campaign led by L. Goncharenko at Millstone Hill Observatory and a MST (Mesosphere, Stratosphere, Troposphere) campaign. Combining these observations with other radio and optical measurements will provide much needed inputs to global data assimilation models. Furthermore, during this period a global observing campaign to characterize Tides and their influences from the Troposphere to the Thermosphere is being organized under CAWSES Atmospheric Coupling Processes. In addition, there are also plans to take advantage of the coordinated observations of solar filaments during September 7-21 (http://bass2000.bagn.obs-ip.fr/jop178/JOP178_2005.html) being organized by International Joint Observing Program. Contact person for this effort is Dr. Thierry Roudier (roudier@bagn.obs-mip.fr). Thus, the September-October 2005 campaign provides a unique opportunity to leverage these new observations of the ITM system and of the Sun to study the entire Sun-Earth system during both quiet and disturbed intervals. You are all encouraged to participate and please send an email to any of the organizers on what instrument(s) you are operating during this period to facilitate future coordination and interaction.

Organizers: Janet Kozyra (jukozyra@engin.umich.edu), K. Shibata (shibata@kwasan.kyoto-u.ac.jp), D. Pallamraju (raju@cawses.bu.edu) & William Ward (wward@umb.ca).

2) First Global Tidal Campaign in September – October 2005

The purpose of this campaign is to: 1) identify and stimulate observations which will contribute to our understanding of the migrating and the non-migrating atmospheric tides, their sources, their propagation characteristics and impacts throughout the atmosphere, and 2) stimulate interactions between scientists and analysis of these observations.

Observations from radar, lidar, optical photometers, spectrometers and interferometers, magnetometers and satellites are all important (in fact any parameter from which information on atmospheric tides can be determined). Observations are solicited which will allow the diagnosis of: (a) tidal modes throughout the atmosphere in temperature, wind, airglow, constituents, electron density, currents; (b) local time variations in the upward flux of gravity waves; (c) the global mean wind and temperature structure from the ground to the thermosphere; (d) large scale planetary waves; and (e) atmospheric heating throughout the atmosphere. In particular tropospheric heating (direct water vapour heating, latent heat release), stratospheric heating (absorption of solar radiation by ozone), chemical heating and CO_2 cooling near the mesopause, along with tidal modulation of atomic oxygen and CO_2. In addition to the observations, model simulations of conditions appropriate to the various observing campaigns are also solicited.

The timing of this campaign has been chosen to take advantage of the special opportunity to take measurements at the same time as the "World Month" campaign being undertaken by the Incoherent Scatter Radar community. Please contact William Ward (wward@unb.ca) to indicate your interest in participating in this campaign, and the type(s) of observations you will be taking. Please visit the CAWSES website http://www.bu.edu/cawses for updates.

3) URSI General Lecture on CAWSES in New Delhi in October, 2005

Sunanda Basu has been invited to deliver one of three URSI General Lectures on "Impacts of Extreme Solar Disturbances on the Earth's Near-Space Environment". Her talk will be presented on October 28, 2005. This is yet another recognition for the CAWSES community all over the globe, whose work she will be representing at this meeting.

4) STP-11 Meeting in Rio de Janeiro, March 6-10, 2006

Planning continues for STP-11 meeting to be held in Rio during March 6 – 10, 2006. Keynote speakers will include G. Brasseur, C. de Jager, T. Killeen and A. Nishida. A public lecture will be presented by J. G. Roederer. Several tutorial speakers have been invited and more information on this meeting will be available at: http://www.grahnoperator.com.br/events/scostep.

5) ICTP Advanced School on Space Weather in May 2 - 19, 2006 in Miramare - Trieste, Italy

Advanced ICTP school on Space Weather, co-sponsored by CAWSES, COST, ICTP and the US NSWP will be held in Trieste during May 2 – 19, 2006. The course Co-Directors are Profs. M. Messerotti (Italy) and J. M. Forbes (USA). Topical areas will be covered with a view towards balanced treatment of basic physics, phenomenology and data analysis. The CAWSES support will especially be earmarked for our CAWSES colleagues from Africa.

6) CAWSES Workshop on Ice Layers, May 15-17, 2006

CAWSES Workshop on Ice Layers in the summer mesosphere will be held in Kühlungsborn during May 15-17, 2006. Main scientific organizer: Franz-Josef Lübken Deputy scientific organizers: Ulf-Peter Hoppe and Scott Bailey. Contact F-J Lübken (luebken@iap-kborn.de)

7) IAGA/ICMA/CAWSES Workshop on Long Term trends September 4 – 8, 2006

The 4th IAGA/ICMA/CAWSES Workshop on Long-Term Changes and Trends in the Atmosphere will be held at Sodankylä Geophysical Observatory, Sodankylä, Finland, from September 4 – 8, 2006. Contact: Thomas Ulrich (thu@sgo.fi)

CAWSES News is also available on the web at: http://www.bu.edu/cawses

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