The CEDAR Post

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Inside This Issue

TIMED is Launched!

TIMED was launched on December 7 from Vandenberg Air Force Base in California. Since that time, the instruments have been deployed and checked out. Data are arriving from the four instruments to feed research programs that have been keenly anticipating this moment. The TIMED instruments will soon be serving the needs of the CEDAR TIMED investigators along with the ground-based radar, optical and modeling facilities. Further information is available at the TIMED website www.timed.jhuapl.edu where you can register and browse TIMED data products. Information on the CEDAR contributions can be found at http://cedarweb.hao.ucar.edu/timed/timed.html. Excitement is rising now that this long-awaited project is entering its operational phase.

The Global Ultraviolet Imager (GUVI), TIMED Doppler Interferometer (TIDI), Solar Extreme Ultraviolet Experiment (SEE) and Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) are described on the TIMED website. Check in to see how they are doing.

"We're very excited that our science mission is underway," says Dr. Sam Yee, APL TIMED project scientist and the mission's science team leader. "TIMED's observations will provide us with the first-ever global picture of the critical mesosphere and lower thermosphere region of our atmosphere, allowing scientists to form a baseline for future studies of this area. TIMED will characterize the physical properties of this region, enabling the scientific community to make future 'space weather' predictions and determine how it affects things like communications, satellite tracking, spacecraft lifetimes and spacecraft reentering Earth's atmosphere."

News from the National Science Foundation

The CEDAR FY 02 funding competition had 22 proposals submitted, 13 of which were funded for a total of about $850,000 in first-year funding. Three proposals were submitted to the FY 02 CEDAR Postdoctoral Program and two awards were made. However, the third candidate was also highly qualified, so the Aeronomy and Atmospheric Chemistry Programs supported him jointly. Details will be provided in the next CEDAR Post.

CEDAR research awards are also continuing as part of several targeted initiatives: CEDAR/TIMED jointly with NASA, Maui-MALT jointly with AFOSR, and the CEDAR/GEM M-I Coupling Initiative.

The CEDAR FY 03 funding competition, which also includes the Postdoctoral competition, will be announced shortly through the NSF WebPages. A CEDAR email announcement will be sent out to alert the community regarding the release of that program solicitation, as well as other relevant news.

NSF's Geoscience Directorate has recently announced the Geoscience Education Initiative (Program Solicitation NSF 02-45 on the NSF WebPages). Approximately $2.5 M is available in joint GEO and EHR funds. The deadline for receipt of proposals is March 19, 2002. Questions and comments should be directed to Ms. Jewel Prendeville: jprendev@nsf.gov, tel 703 292 8521.

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Summary of Fall 2001 CSSC Meeting

The 2001 CEDAR Steering Committee meeting began with presentations by NSF leaders. Jarvis Moyers began with a summary of new directions being taken by the agency, including the fact that up to 7 percent of new funding in this current year will be applied to new initiatives in IT, biocomplexity and nanoscience. There will also be a new initiative in mathematical science with an engineering focus. This latter initiative provides opportunities for the GEO directorate in nonlinear analysis and modeling. We also heard that the agency wants to become more efficient through raising grant size and duration. As you would expect, with relatively constant resources, this is bound to reduce the success rate.

Richard Behnke and Sunanda Basu reminded us that the GPRA process in NSF requires reporting success. We are all invited to help with science highlights, which can be used to show that CEDAR is a success. We were also reminded that NASA is moving to produce mission definitions for the geospace monitors and the inclusion of the C/NOFS satellite in that context. Basu suggested that a collaboration between NSF and NASA might be useful, as has been between NASA and TIMED.

Bob Robinson mentioned the current study being carried out by CEDAR scientists to evaluate the costs and benefits of lidar facilities being used in the CEDAR program.

The committee decided that the theme/title for next year's workshop should be the Role of Coupling in Geospace. Tutorials will be arranged to illustrate that theme. John Foster, Jan Sojka, Erhan Kudeki and Tim Kane will be selecting tutorial speakers.

In keeping with the theme of coupling is the addition of the Whole Atmosphere Community Climate Model (WACCM) mini-workshop within the CEDAR workshop on Thursday and Friday. WACCM is a model developed by three divisions at NCAR that goes from the surface to 140 km (for now), coupling the troposphere, stratosphere, mesosphere and lower thermosphere.

Pamela Loughmiller presented her ideas for the next student workshop, which will be entitled "Collaborative Campaigns – Instrumentation, Science and Networking." She also has many other good ideas. Her new student section of this newsletter is one of them. Take a look on page 4.

Posters at the workshop will be in two sessions and will be organized by John Kelly and Sam Yee. It was decided to offer the winner of the student poster competition a 20-minute spot to present the research to a plenary session of the workshop in the following year (starting next year). Sixto Gonzales will coordinate the workshops.

The CEDAR Prize Lecturer program will be continued. A list of eligible people will be prepared as a combination of nominees in response to an email announcement, and high performers will be selected using data from the Science Citation Index. Art Richmond and Roger Smith will coordinate that activity.

A major focus of the two-day meeting was an examination of progress in CEDAR Phase 3 to discover whether our program is on course. The committee took each of the science topics listed in Phase 3 and discussed the thoroughness and success of our research to date. Grades of "research complete," "moderate progress" or "little progress" were assigned to each. The interim conclusion is that most topics have made moderate progress. It was decided that the most appropriate reaction to our present situation is to produce a midcourse report for the 2002 workshop. Assignments were made to committee members to carry out a more detailed evaluation of our work to date.

In the wrap-up session, each committee member was given the opportunity to raise a topic of his or her choice. Among the items discussed was the continued production (and cost) of CEDAR Post in hard copy rather than relying on the digital version. The committee decided that despite the cost, hard copies were of significant value to CEDAR people. We heard that Art Richmond was soon to assume the editorship of JGR blue. John Kelly mentioned the CEDAR-related articles that had recently appeared in "Witness the Arctic" and encouraged more CEDAR outreach publications. Jan Sojka pointed out that much of the data to be used by the Community Coordinated Modeling Center (CCMC) in order to evaluate the metrics required by the National Space Weather Program would be coming from CEDAR instruments. We need to ensure that CCMC folks are familiar with our CEDAR database.

Student CEDAR Post

Welcome to the latest addition to the CEDAR Post.

The intent in adding this new section is threefold. We hope to:

1) highlight information of interest to students;

2) increase student networking by sharing information student-to-student, and;

3) highlight to the CEDAR science community what students are up to and who's coming out of the pipeline.

In this Student CEDAR Post premier, you'll find:

• student workshop news, and an upcoming student list serve (cedarstudents@hao.ucar.edu);

• writeups by one student and two recent grads sharing their experiences with CEDAR and an explanation of what they are currently working on;

• a writeup highlighting one research campaign involving student collaboration, and;

• profiles of 10 students who either graduated this year or are just about to finish!

Please feel free to send any ideas/comments/feedback about this section's debut appearance to Pamela Loughmiller at Cornell U. (demi@ece.cornell.edu). Also, if you would like to submit input or recommend a student to be highlighted for the next Student CEDAR Post "Student Page" publication, please feel free to send that to me as well.

Many thanks to all those students and recent grads who took the time to submit information, and especially to Chris, April, Mick, and Rob for their willingness to participate in this trial run!

2002 CEDAR STUDENT WORKSHOP

This year's student workshop topic is: COLLABORATIVE CAMPAIGNS - Instrumentation, Science, Networking.

In addition to maintaining tried-and-true programs and bringing back old favorites, the workshop will feature a number of new items for students including student outings, trips to Boulder, alternatives to afternoon workshops, and special student sessions! Emphasis will be placed on facilitating student networking both with other students as well as with the CEDAR community as a whole. Stay tuned for more details, and we'll see you in June!

STUDENT COLLABORATION

Submitted by: April Hiscox, Penn State University

Starting with this issue, the CEDAR Post would like to highlight current student work in the CEDAR community. If you are a student working on a CEDAR-funded or related project, your input for this session is greatly appreciated and may be submitted to the CEDAR Student Representative: Pamela Loughmiller (demi@ece.cornell.edu).

This month the student work on the Maui-MALT project will be highlighted. Maui-MALT is a multi-university campaign to study the middle and upper atmosphere above Mt. Haleakala. Observing time has been granted on the AEOS telescope for two lidar systems, and concurrent observations will be made on airglow imagers and eventually a meteor radar located at the bottom of the mountain will enhance the scientific goals of the project. Currently there are a handful of students from Cornell University, The University of Illinois and Penn State University designing and installing equipment for a variety of experiments on the mountain. These students have been working with each other to enhance the educational experience with collaboration that allows for the overlap in data from the different instruments to be explored. The first observation period is scheduled for January, and updates on progress, data products, and links to the universities can be found at http://asll.ee.psu.edu/maui/.

STUDENT HIGHLIGHTS

The idea for this section is to let students know what other students (and recent grads) are working on by highlighting the work of some of our fellow students in the CEDAR community. The folks below were recommended and then asked to share with us what they are up to and how CEDAR participation has impacted their efforts.

If you'd like to recommend a student to highlight in the next issue, or if you are a student working on an interesting project that you'd like to share with the rest of us, please send your input to student representative Pamela Loughmiller (demi@ece.cornell.edu).

Student Highlight #1: Chris Wilford, University of Sheffield, UK: My general area of study has been the dynamics and chemistry of the top side ionosphere, in particular using the coupled thermosphere-ionosphere-plasmasphere (CTIP)

Student CEDAR Post *Continued*

model to help explain features seen in the data.

My first year was spent modifying the CTIP model to enable it to solve the equations of continuity, momentum and energy balance for a third major ion, He+. During the summer of 2001 I was fortunate enough to spend two weeks at the University of Texas at Dallas forming a DMSP satellite database for transfer back to the UK, under the supervision of Rod Heelis. This visit was linked to my visit to the CEDAR meeting where I was able to meet with Sixto Gonzalez to discuss the possiblity of future collaboration.

As a result of these meetings, my current focus of work is the occurrence of He+ layering above the Arecibo incoherent scatter radar. Results from the Arecibo radar show that the He+ layer can form up to 30% of the total ion concentration. Quiet time results from the Arecibo radar from October 1997 show that the He+ layer constitutes ~17% of the total ion concentration. Comparison of these results with the CTIP model show that it is capable of reproducing the layer very well.

Also on this day in October 1997, we were fortunate enough to have a fly-past of the DMSP-F13 satellite almost directly above Arecibo. The results from the DMSP-F13 satellite show an increase in the fractional content of He+ at latitudes close to Arecibo. This has been a successful multi-instrument study combining results from the Arecibo radar, the DMSP satellites and the CTIP model. Next we will look at times of greater solar activity, where there is expected to be layering of greater magnitude.

The CEDAR 2001 meeting gave me an excellent opportunity to meet potential collaborators and to discuss future work face-to-face, which is often much easier than by email. My hopes for the next CEDAR meeting are that I will get an opportunity to meet my collaborators on the above project to discuss future work and to get an opportunity to present my results to an international audience. I would definitely encourage more students from the UK/Europe to attend the CEDAR meeting.

Student Highlight #2: Michael H. Denton, University of Wales, UK: It is now three years and three months after commencing my PhD studies, and I have submitted the final version of my thesis to the University of Sheffield. One of the highlights of this period was the 1999 CEDAR workshop in Boulder, the friends, collaborators and contacts I made there, and the opportunity to present my work at the poster session.

I'd been able to acquire some extra funding for an extended stay in the US, and spent the three following weeks at the Center for Space Sciences at the University of Texas at Dallas. The DMSP data I analyzed during my stay formed the basis for two chapters of my thesis, which discussed the ion concentration changes that occur during stormtimes, and how He+ ions can become dominant in the topside ionosphere during such storms.

The trip "across the pond" is easier to make than ever. I hope the funds provided by CEDAR and other organizations allow even more international students the opportunity of presenting their work to colleagues in the US, something I'd strongly encourage. However, I'd also encourage more American students to make the return trip!

I'm currently enjoying working as a post-doc in the Radio and Space Physics Group, University of Wales, Aberystwyth, UK. Our group runs a chain of receivers in the high Arctic which record dual-frequency signals from the NIMS (Navy Ionospheric Monitoring System) satellites. These signals provide ground-to-satellite Total Electron Content (TEC) measurements, and inversion of this dataset gives a 2-D image of the electron density with respect to altitude and latitude. At present I'm working on an explanation of the structure and morphology of the dayside high-latitude trough, using tomographic data and a computer model.

Email: mick.denton@aber.ac.uk
Thesis: Thermal Balance of the Topside Ionosphere, University of Sheffield, UK, 2000 (http://www.aber.ac.uk/propag/).

Student Highlight #3: Rob Wilson, CEDAR Postdoc, Penn State University:

Well, here goes. I'll give you some background first. I started out in grad school working in condensed matter. Quite frankly, I found it to be a little boring sitting in a basement lab day after day doing the same thing. It was during a fishing expedition, after I created material after material, when I suddenly realized that most of it was useless. I also had a bad experience with that particular physics department, so in 1998 I decided to move to Clemson to try something different.

Student CEDAR Post *Continued*

My first exposure to atmospheric physics was when Miguel Larsen (my PhD advisor) invited me on a sounding rocket campaign in Alaska in the dead of winter just to see what it was he did. I believe it was ARIA 2. Experiencing the aurora, the natural beauty of Alaska and the launching of rockets was unforgettable. I also liked the idea of traveling to various locations to collect data and getting my hands dirty so to speak. It involved more than sitting around in a lab all day.

That spring I attended my first CEDAR meeting. I had attended an APS meeting in the past and I was impressed with the focus on students at CEDAR. I was also impressed with our community. It is small enough that you can get to know a significant percentage of people in the field. I was also excited about the science. There are so many open questions and so many different areas to work in.

The next spring I took part in the Wallops Island Sporadic E campaign. It was the data from this sounding rocket campaign that would form the basis for my dissertation. That Fall I was tasked with coordinating our involvement in the Leonids '99 campaign at Starfire in New Mexico. Again, a great location that I would normally never bother to visit. Finally, in the Fall of 2000 I took part in the TOMEX campaign at White Sands, New Mexico. Spring semester 2000 I worked harder than I thought possible and produced my dissertation, "Rocket and Radar Observations of Quasi-Periodic Structures Associated with Mid-Latitude Sporadic E Layers."

At last year's CEDAR meeting I was invited to give a talk on my research at the student workshop. This was my first opportunity to give a talk at a meeting. I was very impressed with the even greater emphasis on students at the 2000 meeting. The tutorials and various workshops during the week were excellent. I found countless opportunities to speak to colleagues about my research and discuss current issues. In this respect CEDAR has been invaluable. It has allowed me to network and put faces to the names with many of the papers I have read over the years. By the way, I think Rebecca Bishop did an outstanding job last year.

As I investigated options after grad school, the CEDAR post-doc was a very attractive prospect. I wanted to stay in the field and I liked the idea of pursuing my own interests. In addition, thinking about the science I wanted to do and writing the proposal was good experience for me. I was fortunate enough to have my proposal accepted and am now at Penn State working with Tim Kane. We have plans to conduct year-round lidar/radar studies at Arecibo but I am finding many other opportunities to collaborate. The bottom line is, in the next two years I am going to work on several different types of problems at various latitudes with several new types of instruments. It is a very exciting time for me and I can't wait to get to work each day. As a grad student I suffered what I think is typical anxiety about my abilities and my future in research. Now I look forward to the future. I just can't wait for the next experiment or the next opportunity to discuss ideas with my colleagues. I have a sense of community and confidence which is due in large part because of my experiences with CEDAR.

STUDENT PIPELINE

The students below are planning to graduate within the next year or have just recently graduated.

Rebecca Lynn Bishop:
rbishop@aurora.phys.clemson.edu; University of Texas at Dallas; August 2001; Ionospheric Physics; Thesis: Nighttime Intermediate Layers.

Tom Grydeland:
Tom.Grydeland@phys.uit.no; University of Tromsø; August 2002; Incoherent Scatter radar, signal processing, plasma lines; Involved with the MIDAS-W project at Millstone Hill, working mostly with the EISCAT Svalbard Radar. Some experience with software from device drivers to graphical user interfaces.

Craig Kruschwitz:
craigk@ece.cornell.edu; Cornell University; January 2002; Long-lived meteor trails, mesospheric temperatures/winds, turbulence; Thesis: A Study of Persistent Meteor Trains from the 1998 and 1999 Leonid Meteor Showers.

Tomoko Matsuo:
tmatsuo@hao.ucar.edu; State University of New York at Stony Brook & National Center for Atmospheric Research; Sep-Dec 2002; Upper Atmosphere; Thesis: Modeling of Responses of Thermosphere & Ionosphere to High-latitude Forcing Data Assimilation for High-latitude Ionospheric Electrodynamics.

Aimee Merkel:
merkela@rintintin.colorado.edu; University of Colorado; May 2002; Atmospheric Science/Aerospace Engineering; Thesis: Dynamical influences and seasonal characteristics of Polar Mesospheric Clouds (PMC) from measurements from the Student Nitric Oxide Explorer (SNOE) satellite.

Student Pipeline *Continued*

Clifton Minter:
Cliff.Minter@noaa.gov; University of Colorado at Boulder; May 2002; Aerospace Engineering; Thesis: Thermospheric Composition Forecasting Using Kalman Filtering Techniques.

Marco Olivieri:
molivier@uwo.ca; UWO (University of Western Ontario), Canada; Feb 2001 M.ESc Electrical Engineering; Thesis: LWIR Remote Sensing of Clouds.

Weilin Pan:
wpan@ews.uiuc.edu; University of Illinois at Urbana-Champaign; May 2002; Laser Remote Sensing; Thesis: Fe Boltzmann Temperature Lidar Measurements of Middle Atmosphere Temperatures and Fe Densities at Geographic South Pole; international student holding F-1 visa.

T. K. Ramkumar:
tkramkumar@eudoramail.com; Equatorial Geophysical Research Lab, Indian Institute of Geomagnetism; April 2002; equatorial aeronomy and ionosphere and geomagnetism; Thesis: Investigation of the equatorial ionosphere using ground-based magnetic field measurements and partial reflection radar.

Sundararajan Sridharan:
egrl@sancharnet.in; Equatorial Geophysical Research Lab, Indian Institute of Geomagnetism, Krishnapuram(B.O.) Maharajanagar (P.O.); April 2002; Equatorial Geomagnetism with special emphasis on 'Middle Atmospheric Dynamics'; Thesis: Investigation of middle atmospheric winds, waves and tides from low latitudes.

Chris Wilford:
c.wilford@sheffield.ac.uk; University of Sheffield, UK; Summer 2002 (fingers crossed!); dynamics and chemistry of the topside ionosphere.

2002 PARS Summer School

The 2002 Summer School in aeronomy and radio science will take place in Fairbanks and Gakona, Alaska from July 29 to August 9. The school director will be Bill Bristow. The School is designed for graduate students to participate with their faculty supervisors. Each participant will have a project to complete during the school. Access to many different types of ionospheric and atmospheric instrumentation will be available during the school. A summary of those which are anticipated is given in the table below.

Each student applicant should write a proposal for an aeronomic or ionospheric project using one the instruments listed below. Applications should include the name and address of the student and supervisor and be sent to Bill Bristow by email at Bill.Bristow@gi.alaska.edu by April 1, 2002. Successful student and faculty applicants will be funded for travel and subsistence to attend the school.

The program/course schedule is still tentative, but is expected to include lectures on the following topics:

1. Mesosphere and thermosphere.
2. Ionosphere.
3. Radio wave propagation
4. Ionosonde techniques
5. Radar theory
6. HF and VHF techniques
7. Incoherent-scatter theory
8. Incoherent-scatter techniques
9. Riometry
10. Tomography
11. Wind Profiling

The program will begin in Fairbanks on Monday, July 29 and move to Gakona on Friday afternoon, August 2.

Instrument	Description	Location
Ionosonde	Digital	Sheep Creek near Fairbanks
Ionosonde	Digital	Gakona
HR radar	SuperDARN	Kodiak, King Salmon
VHF radar	50 MHz HLMS	Anchorage
VHF radar	Frank Djuth 139 MHz radar	Gakona
VHF radar	HAARP transmitter and VHF receiver	Gakona
ISR	RAO test set from SRI	Gakona
ISR simulator	Ganguly type	Gakona
Tomography	TEC array	Alaska
Riometer imager	256 antenna array 7 antenna array	Poker Flat Gakona
Wind Profiler	450 MHz	Glenallen

CEDAR Meetings Calendar 2002-2004

CONFERENCE	DATE	LOCATION	ORGANI-ZATION	CONTACT INFO
Polar Conjugate Studies of Geospace and Space Weather Enviroment	February 4 - 8, 2002	Ithala Game Reserve (Kwazulu-Natal), South Africa	SCAR	http://www.nu.ac.za/physics/scar2002/scarhome.htm
Plasma Processes in Near-Earth Space: INTERBALL and Beyond	February 5 - 10, 2002	Sofia, Bulgaria	COSPAR	http://www.stil.acad.bg/STIL/ib2002/
International Conference on Women in Physics	March 7 - 9, 2002	Paris, France	IUPAP	N/A
International Symposium on Equatorial Processes Including Coupling (EPIC)	March 18 - 22, 2002	Kyoto, Japan	SCOSTEP	http://www.kurasc.kyoto-u.ac.jp/epic/
10th International Ionospheric Effects Symposium	7 - 9 May, 2002	Alexandria, Virginia	URSI	http://www.IES2002.com
Commission G International Symposium on the High Latitude Ionosphere	15 - 17 May, 2002	Fairbanks, Alaska	URSI	http://lyme.gi.alaska.edu/~radar/
AGU Spring Meeting	28 May - 1 June, 2002	Washington, DC	AGU	http://www.agu.org
10th International Conference on the Solar Wind	17 - 21 June, 2002	Pisa, Italy	N/A	http://www.arcetri.astro.it/~solwind
27th General Assembly	21 - 26 June, 2002	Nice, France	EGS	http://www.copernicus.org/EGS/egsga/nice02/nice02.htm
International Congress on Plasma Physics	15 - 19 July, 2002	Sydney, Australia	N/A	http://www.ise.canberra.edu/au/ICPP2002

CEDAR Meetings Calendar *continued*

CONFERENCE	DATE	LOCATION	ORGANIZ-ATION	CONTACT INFO
XXVII SCAR Assembly	15 - 26 July, 2002	Shanghai, China	ICSU/SCAR	http://www.scar.org
XXVII General Assembly of International Union of Radio Science	17 - 24 August, 2002	Maastricht, Netherlands	URSI	http://www.ursi-ga2002.nl
Innovative Telescopes and Instrumentation for Solar Astrophysics (AS20)	22 - 28 August, 2002	Waikoloa, Hawaii	IAGA/SPIE	http://spie.org/Conferences/calls/02/as/confs/AS20.html
General Assembly of International Council for Science (ICSU)	22 - 28 September, 2002	Rio de Janeiro, Brazil	ICSU	http://www.icsu.org
34th COSPAR Assembly (2nd World Space)	11 - 20 October, 2002	Houston, Texas	COSPAR	cospar@paris7.jussieu.fr
AGU Fall Meeting	6 - 10 December, 2002	San Francisco, California	AGU	http://agu.org
EGS XXVIII General Assembly	7 - 11 April, 2003	TBD	EGS	http://copernicus.org/EGS/
IUGG Assembly	30 June - 11 July, 2003	Sapporo, Japan	IUGG	http://iugg2003.ics-inc.co.ip
EGS XXIX General Assembly	26 - 30 April, 2004	TBD	EGS	http://www.copernicus.org/EGS/
XXVIII SCAR Assembly	July, 2004	Bremerhaven, Germany	ICSU/SCAR	http://www.scar.org

CEDAR-related REU Programs

Institution/Address	Contact Person	Notes
University of Alabama Department of Physics Huntsville, AL 35899	A. Gordon Emslie emlieg@email.uah.edu James A. Miller miller@mpingo.uah.edu (205) 895-6276 x273	"REU Site: Space Science and Instrumentation at University of Alabama, Huntsville" ATM-9820339 http://www.uah.edu/physics/reu/reu.html
University of Alaska Fairbanks, Geophysical Institute Fairbanks, AK 99775	Roger W. Smith bblw@gi.alaska.edu (907) 474-7416	Summer Internships in Space Physics ATM-9709085
National Center for Atmospheric Research Boulder, CO 80307	Cindy Worster cmw@ucar.edu (303) 497-1552	www.hao.ucar.edu/public/inside/summer.html Application deadline: January 16
Massachusetts Institute of Technology Haystack Observatory Westford, MA 01886	Joseph Salah lhp@wells.haystack.edu (508) 692-4764 fax (617) 981-0590	www.haystack.edu/haystack/haystack.html Application deadline: February 7
NASA Goddard Space Flight Center Greenbelt, MD 20771	Frederick Bruhweiler bruhweiler@cau.edu (202) 319-5333	Research Opportunities for Undergraduate Students in Laboratory and Space Physics at NASA Goddard Space Flight Center ATM-0003133
University of Michigan Department of Atmospheric, Oceanic, and Space Science Ann Arbor, MI 48109	Michael Combi mcombi@umich.edu (734) 647-7226 fax (734) 647-3083	REU Site: Undergraduate Research Participation at the Space Physics Research Laboratory, University of Michigan www.sprl.umich.edu/SPRL/REU Applications deadline: April 1 ATM-9987967
National Astronomy and Ionosphere Center Office of the Director NAIC, Space Sciences Cornell University Ithaca, NY 14852	Jill Morrison morrison@astronsun.tn.cornell.edu (607) 255-3735	Research at Arecibo Observatory, Puerto Rico www.naic.edu

2001 CEDAR Workshop Report: Magnetosphere-Ionosphere Coupling from the CEDAR Perspective

Conveners: Lie Zhu, Mike Ruohoniemi and Ray Greenwald

Magnetosphere-ionosphere coupling (M-I) is a major research area in the CEDAR program and the one in which the CEDAR and GEM scientists have their own unique research strengths. The goal of this workshop was to provide a forum for the CEDAR scientists to discuss the M-I coupling issues from a CEDAR perspective, demonstrate the CEDAR research progresses in the M-I coupling study, and discuss the CEDAR interests and long-term goals in this area.

The workshop took place at Raintree Plaza Hotel, Longmont, Colorado, from 1:15 pm to 3:30 pm on June 22, 2001. About 50 people attended the workshop. There were four items on the workshop agenda: scheduled presentations of duration eight minutes or less; informal discussion on the active role of the ionosphere/thermosphere in the M-I coupling; a briefing of the GEM M-I coupling sessions at Snowmass this year; and a discussion of CEDAR interests in M-I coupling study.

The scheduled presentations started with John Foster who addressed the question of ionospheric ion sources for the magnetosphere. He described the storm-enhanced density (SED) resulting from erosion of the plasmasphere by intense polarization fields, a process that can transport thermal plasma from the inner magnetosphere to the merging field lines at the dayside cusp.

Art Richmond then discussed the effect of the neutral wind on M-I coupling. Runs of the MTIEGCM code have shown how the wind can modulate the electrostatic potential distribution. Perturbations of 10-25 percent in the potential were noted.

Evgeny Mishin discussed the wave structure of the polarization electrojet that accompanies SAID events. It has been found that precipitating energetic ions coincide with intense electric field fluctuations. Alfvenic wave modulation of the polarization electrojet is inferred, possibly arising from an M-I coupling instability.

Hien Vo then reviewed the statistics of occurrence of the polarization electrojet as observed by the Millstone Hill IS radar. He pointed out the need to incorporate subauroral electric fields into depictions of the convection pattern and the difficulty of separating polarization and magnetospheric electric fields.

Dave Anderson discussed the prompt penetration of high latitude electric fields to low latitudes. He described a correlation between magnetic perturbation measurements and daytime vertical ExB drifts occuring in the South American sector.

Dirk Lummerzheim discussed the impact of spatial structure in aurora on M-I coupling. Such structure is observed at all scale sizes down to a few meters. He described a model of Alfven wave propagation and FACs that leads to density variations and converging and diverging currents. The model also predicts the Hall and Pedersen conductivities.

Slava Lyatsky continued the discussion of the role of FACs in M-I coupling. He described a mechanism for the development of the substorm current wedge and dipolarization that involves the rotation of the Region 2 current system.

Tim Fuller-Rowell reviewed the application of the CTIM model to the study of effects in M-I coupling. In these steady-state simulations the neutral winds drive about 10 percent of the FACs and change the total cross-polar potential drop by 1-2 percent.

Clark Groves described the use of the Utah State ionospheric model to map high-latitude ionization and structure. He discussed the sensitivity of the simulation results to variation in the inputs and the need for more realistic characterization of ionization production, loss, and transport.

Josh Semeter closed out the scheduled presentations with a discussion of time-dependent M-I coupling during auroral breakup. He pointed out the importance of correctly relating the structures in density and temperature distributions seen with radars to the brightness distributions obtained with optical instruments.

Lie Zhu from Utah State University chaired the informal discussion on the active roles played by the ionosphere/thermosphere. In his

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Workshop Report continued...

brief introduction, he listed several physical processes in which the ionosphere/thermosphere play significant active roles in the M-I coupling, including plasma outflow, effect of neutral wind dynamo, field-aligned currents and Alfven wave field of the ionospheric origin, upward Poynting flux, and conductivity effect. He then specifically discussed the M-I coupling treatment in the most recent coupled MHD/ionosphere/thermosphere model and provided suggestions for the improvement of the electrodynamic connection between the MHD model and the ionosphere/thermosphere model.

Ray Greenwald then gave a briefing of the GEM M-I coupling study sessions at Snowmass. He pointed out that there is an urgent need to further join the research strengths of CEDAR and GEM scientists in the M-I coupling study. The GEM steering committee suggested that a joint GEM-CEDAR M-I coupling mini-workshop be held at the 2001 Fall AGU Meeting. This suggestion was informally endorsed by the audience. We encourage CEDAR scientists to attend the mini-workshop, make presentations on current projects, and explore the possibilities for wider study of M-I coupling issues with our GEM colleagues.

Plans for the 2002 CEDAR Workshop

The 2002 CEDAR Workshop will be held June 16 - 21 at the Radisson (formerly Raintree Plaza) Hotel Conference Center in Longmont, Colorado, where the joint 2001 CEDAR-SCOSTEP Meeting took place. The web page for the workshop is at: http:/cedarweb.hao.ucar.edu/wkshp. It contains information on registration, abstracts, lodging, student funding, and a draft agenda. Student funding/biography forms, registration, and hotel forms are due by April 19. Late fees are imposed after May 24.

The workshop starts Sunday June 16 with the Student Worskhop. Poster sessions are Tuesday and Wednesday June 18 - 19. All posters (88 total) can go up during the break Tuesday morning, and can stay up until the end of the second poster/reception Wednesday at 9 PM, but only half will be presented each evening. Students can enter a poster competition, and winning student posters will be displayed in the hall on Thursday and Friday. Poster abstracts are due May 10. Abstracts are also welcome from invited plenary or workshop speakers. The extracurricular activity is a comedy at the Longmont Theatre at 7:30 pm on Thursday, June 20, with an opportunity to talk with the actors afterwards.

The Whole Atmosphere Community Climate Model (WACCM) community will hold a mini-workshop within the framework of the CEDAR Workshop on Thursday and Friday. WACCM is a model developed by the HAO, ACD and CGD divisions at NCAR and goes from the surface to 140 km (for now).

Rolando Garcia of ACD/NCAR will give the plenary tutorial on Thursday about the motivation, development and initial results from WACCM. The Thursday afternnon WACCM workshop emphasizes the middle atmosphere while the Friday WACCM workshop is on the stratosphere and below. The WACCM workshop within CEDAR is described at http://acd.ucar.edu/models/WACCM/workshop waccm_ws.html.

The 2002 GEM Workshop will be held in Telluride, Colorado the following week, June 23-28, starting Sunday, June 23 with their student workshop. The CCSM (Community Climate System Model) workshop is scheduled to be held in Breckenridge, Colorado the following week, June 25-27 (Tuesday through Thursday).

The tentative schedule for the CEDAR workshop is as follows:

Sunday, June 16, AM: Student Workshop (Front-Range Theatre);

Sunday, June 16, PM: Student Workshop (Front-Range Theatre) Chair: Pamela Loughmiller, (Cornell University);

Sunday, June 16, Evening: Student social at local park;

Monday, June 17, AM: Plenary session in Summit South

Monday, June 17, PM: Workshops in conference center;

Monday, June 17, Evening: CSSC dinner at Lucile's Creole Cafe;

Tuesday, June 18, AM: Plenary Session in Summit South;

Tuesday, June 18, PM: Workshops in conference center;

Tuesday, June 18, Evening: #1 Poster/reception/dinner in Summit North and conference center;

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Workshop Plans continued...

Wednesday, June 19, AM: Plenary session in Summit South;

Wednesday, June 19, PM: Workshops in conference center;

Wednesday, June 19, Evening: #2 Poster/reception/dinner in Summit North and conference center;

Thursday, June 20, AM: Plenary session in Summit South (WACCM tutorial by Rolando Garcia (Atmospheric Chemistry Division/NCAR);

Thursday, June 20, PM: Workshops in conference center (WACCM #1 Middle Atmosphere Workshop);

Thursday, June 20, Evening: Longmont Theatre comedy "All in the Timing" ($5.50 per person; http://www.longmonttheatre.org);

Friday, June 21, AM: Plenary session in Summit South;

Friday, June 21, PM: Workshops in the conference center (WACCM#2 Lower Atmosphere Workshop).

For further information (additions, changes etc.) see the 2002 CEDAR Workshop Web page at: http://cedarweb.hao.ucar.edu/wkshp/.

Longmont/Boulder Hotel Listings

The facilities listed below have blocked rooms for workshop participants between the nights of June 15-23, 2002. Reservations must be accompanied by a credit card charge number or a deposit for the first night of lodging; Visa, MasterCard, American Express, and Discover credit cards are accepted at most of the hotels. Cancellations must be made 24 hours in advance to avoid being charged for the first night of lodging. The blocks of rooms at special workshop rates are only being held until May 03-18, 2002. **Make reservations before May 15 (May 3 for The Broker Inn) and specifically mention the CEDAR Workshop**. If using a travel agent, have them identify you in the same manner. The government rates for 2002 in Boulder and Longmont are $93. All Longmont hotels are shuttle stops for the Shamrock Airport Express ($18) from the Denver International Airport. Passengers for the Radisson (formerly Raintree Plaza Hotel), Hawthorn Suites (formerly Raintree Plaza Suites), Hampton Inn, and Marriott need to exit the bus for a smaller shuttle to be delivered to their hotel doorway. Most hotels include breakfast, although it will also be available at the conference center.

Students and others who wish to be grouped two or three to a room in the Radisson must apply for roommate matching through the Conference Hotel Roommate Matching Form on the Web. Those who are paying for their own lodging, know who their roommate(s) is(are), and those roommates are also paying for their own lodging, can contact the hotel on their own instead of using this roommate matching form. Those who wish to can room in the Williams Village dormitory residence halls of the University of Colorado in Boulder.

Participating hotels and group rates for June 15-23, 2002, are:

Radisson Hotel
Formerly Raintree Plaza Hotel, east of Twin Peaks Mall
1900 Ken Pratt Blvd
Longmont, CO 80501
front desk: (303) 776-2000
reservations: (800) 843-8240
reservations fax: (303) 774-7272
email: reservations@prattprop.com
(reservations on web site don't secure $93 rate)
tax rate: 7.1%
single or double: $93
reservation deadline: May 17
No. of rooms: 50
pool, breakfast at conference center

Hawthorn Suites
Formerly Raintree Plaza Suites, east of Twin Peaks Mall
2000 Sunset Way
Longmont, CO 80501
front desk/res.: (303) 774-7100
front desk/res. fax: (303) 774-7102
email: hawthorn@prattprop.com
(reservations on web site don't secure $109 rate and must stay min. 7 nights)
tax rate: 7.1%
single or double: $109
reservations deadline: May 17
No. of suites: 30
pool, free breakfast and social hour

Courtyard by Marriott Hotel
NW corner of Hwy 119 and Hover; 3 min. drive; under construction - will be complete June 6, 2002
1410 Dry Creek Rd., Longmont, CO
reservations: (303) 682-1166
cylongmont@whitelodging.com
tax rate: 7.1% No. of rooms: 20
single/double: $93 deadline: June 3
pool/spa/fitness room/fast Internet

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2002 CEDAR Workshop
Boulder/Longmont Hotel listings *continued*

Hampton Inn
Corner of Ken Pratt Blvd (Hwy 119) and Hwy 287 (Main) - 5 min. drive
850 S. Main St.
Longmont, CO 80501
front desk: (303) 772-2554
reservations: (800) 426-7866
reservations fax: (303) 772-2698
tax rate: 7.1%
pool, spa, breakfast

Holiday Inn Express, Boulder
North Boulder - 15-20 min. drive
4777 North Broadway
Boulder, CO 80304
front desk: (303) 442-6600
reservations fax: (303) 415-1588
tax rate: 9.65%
No. of rooms: 10
pool, spa

The Broker Inn
Near university - 25 min. drive
555 30th St.
Boulder, CO 80303
front desk: (303) 444-3330
reservations: (800) 338-5407
reservations fax: (303) 444-6444
tax rate: 9.65%
single or double: $93
reservation deadline: May 16
No. of rooms: 30
pool, spa, breakfast

Ramada Inn, Boulder
Across from university, 25 min. drive
800 28th St.
Boulder, CO 80303
front desk: (303) 443-3322
reservations fax: (303) 443-0397
tax rate: 9.65%
single or double: $90
reservation deadline: May 15
No. of rooms: 18
pool, spa

For additional and/or updated information about the 2002 CEDAR Workshop agenda, area hotels, maps to and from hotels and airport, etc., go to the CEDAR Workshop Web page at: http://cedarweb.hao.ucar.edu/wkshp/.

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