



The CEDAR Post

May 2001

<http://cedarweb.hao.ucar.edu/commun/cedarcom.html>

Volume 42

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MAGNETOSPHERIC-IONOSPHERIC-ATMOSPHERIC SCIENCE

A DECADAL STUDY IN PROGRESS

Our community has embarked on a self-study with the goal of guiding government agencies over the ten-year time span of 2002-2012. Such studies were pioneered very successfully by the astronomy community and have come to be called Decadal Studies. The organization of the Decadal Survey is given at <http://www4.nationalacademies.org/cpsma/SSBDisc.nsf> and involves several levels of oversight as well as five panels with focused charges. The panel most closely related to the CEDAR and GEM communities is the Magnetosphere-Ionosphere-Atmosphere Panel, the membership of which is given on the next page.

Key to the success of the astronomy process is community input and, eventually, community agreement on such key elements as NASA and DOD missions, ground-based NSF facilities, and outreach and modeling emphases. To this end, two major efforts to obtain formal community input are planned. On Wednesday evening, May 30, 2001, at the AGU meeting in Boston, the Survey Panel will make a presentation to the entire community. Opportunities will then exist to meet with individual panel members. In addition, a two-hour workshop is planned at CEDAR on Wednesday, June 19, for the Magnetosphere-Ionosphere-Atmosphere Panel to present and discuss a draft of their report. A similar community forum will meet Monday night, June 18, at the GEM/SHINE meetings in Snowmass, CO. The rapid pace of this effort is determined by the coupled scheduling requirements of the National Academy of Science review process and NASA planning pressures. A final draft is due by mid July.

Such a truncated process is not very satisfying. To make it more inclusive the CEDAR community has created a web-based mechanism to begin an immediate interactive process of information exchange. The relevant url is <http://cedarweb.hao.ucar.edu/decadal.html> which also has links to the GEM and SHINE community web sites.

A working outline is being prepared by the panel and will be made available as soon as possible on the aforementioned web site.

- Continued on page 3

CSSP DECADAL SURVEY

MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE PANEL

MEMBER	AFFILIATION	RESEARCH INTERESTS	EMAIL ADDRESS
Michael C. Kelley	Cornell U.	Ionosphere/thermosphere ground-based radar, lidar, and rockets	mck13@cornell.edu
Mary Hudson	Dartmouth College	Ring current and radiation belt particles, ULF waves, geomagnetic storms; theory and modeling	mary.hudson@dartmouth.edu
Dan Baker	U. of Colorado	Energetic particles, storms and substorms; satellite measurements	baker@lynx.colorado.edu
Tom Cravens	U. of Kansas	Ionosphere/thermosphere theory including planetary	cravens@kupas.phsx.ukans.edu
Tim Fuller-Rowell	NOAA/SEC	Ionosphere/thermosphere models	tjfr@sec.noaa.gov
Maura Hagan	NCAR	Dynamical coupling between atmospheric regions	hagan@ucar.edu
Umran Inan	Stanford U.	Ground-based and satellite VLF wave measurements; auroral ionosphere and magnetosphere; wave particle interactions	inan@nova.stanford.edu
Tim Killeen	NCAR coupling models	Ionosphere/thermosphere	killeen@ucar.edu
Craig Kletzing	U. of Iowa	Auroral rocket measurements; theory of auroral particle acceleration	craig-kletzing@uiowa.edu
Janet Kozyra	U. of Michigan	Modeling stormtime ring current evolution	jukozyra@engin.umich.edu
Robert Lysak	U. of Minnesota	Magnetosphere-ionosphere coupling; auroral particle acceleration; ULF waves and reconnection; theory	bob@aurora.spa.umn.edu
Howard Singer	NOAA/SEC	Satellite magnetometer measurements, ULF waves, geomagnetic storms and space weather	howard.singer@sec.noaa.gov
Roger Smith	U. of Alaska	Ionosphere/thermosphere measurements	roger.smith@gi.alaska.edu

The panel urges discussion of the outline as well as its fleshed out report, the sooner the better, of course.

Our goal is to make the case for our discipline based on fundamentally sound science. At the same time it is important to recognize the twin pillars of support that society demands. First, we need to inspire in the general public the same sort of fascination we all feel with the complexities and beauty of the earth system and geospace science. Second, we must show the societal need for improved space weather forecasting as it becomes much more dependent on space-based systems in the civilian and military realms.

Certain areas of our field are more inspiring to the general public than others. Clearly, the aurora as viewed both from space and from ground-based systems offers awe-inspiring glimpses of the complex dynamic system we study. Upward propagating lightning and its manifestation in sprites and elves also inspire public interest, as do noctilucent clouds, aurora on other planets, and long-lasting meteor trails. Properly presented dynamic models of the magnetosphere and their coupling to CME observations on the input side and auroral oval changes at the output could also be powerful tools. We encourage anyone with exciting video clips to make them available to panel members.

The National Space Weather Program affords a natural template for explaining the role our discipline plays in a societal context. The health and well being of our astronauts and, eventually, space pioneers requires a deep understanding of hazardous radiation in the heliosphere and magnetosphere. Threats exist to nonliving space assets as well as to extensive power grids on the surface of the earth. Ionospheric weather creates many problems for both the civilian and military sectors in the areas of communications and navigation. In some areas of ionospheric science we are on the brink of creating data assimilative models mirroring those of the meteorological community. By the end of this decade we anticipate data products rivaling those driving the weather forecasting industry and we need to be ready with validated tools capable of ingesting these data sets.

Our hope is to meld together the communities' science objectives, a celebration of our triumphs, and our hopes for the future with a realistic assessment of the highest priority tools we feel are necessary for the task we face. Our recommendations will include suggestions for NASA, NSF, NOAA, and the DOD, but most notably to the Air Force and the Navy. We need your help!

- *Michael C. Kelley, Cornell U., and Mary K. Hudson, Dartmouth College, Chair and Co-chair of the MIA Panel*

WORKSHOP SUMMARY: RELOCATABLE OPTICAL AND RADIOWAVE MEASUREMENTS

The Relocatable Optical and Radiowave Measurement Techniques Workshop was held at Penn State on 1-2 March 2001. This workshop, which attracted more than 40 participants from the CEDAR community and beyond, focused on various components of the Relocatable Atmospheric Observatory (RAO). The RAO will include both passive and active optics as well as radiowave instruments, in addition to the core ISR. This Class I instrumentation will reflect current technological development and, of course, have portable capabilities.

Different geographical regions experience a variety of physical influences that need to be fully explored in order to understand the global response of the upper atmospheric system. The concept of the RAO has thus been based upon its relocatability to various locations of interest to aeronomy and space weather. In addition, it has been well established that the clustering of unique and complementary ground-based instrumentation has enabled new discoveries in middle and upper atmospheric physics. This ability to delve deep into atmospheric processes has led to a community demand for clustering capability

along with an emphasis on portability.

The outcome of the workshop activity will be a report to the NSF (currently in preparation) summarizing the important science goals that can be achieved utilizing the mobile aspect of this suite of instruments. The report will also address the key issues of such instrument development. It will discuss core components (specifically Lidars, Radars, Spectrometers, Interferometers, and Imagers) in terms of portability, capability, operational concerns, and potential innovations. Issues such as data systems and management, remote control/access, calibration and validation, and the use of an oversight committee will also be included. For further information about the workshop (including several of the talks presented) please consult: <http://asll.ee.psu.edu/rw/> (updated often !!)

- *Tim Kane, The Pennsylvania State University*

TIMED UPDATE

The launch of NASA's Thermosphere Ionosphere Mesosphere Energetic and Dynamics (TIMED) spacecraft has been delayed to August 10, 2001. The likelihood of this latest launch date is very high. Information regarding the TIMED Program can be found at the TIMED website <http://www.timed.jhuapl.edu>.

- *Jeng-Hwa Yee, Applied Physics Lab, Johns Hopkins U.*

NEWS NOTES FROM THE NSF

The Relocatable Atmospheric Observatory OR will Charlie Brown ever actually kick the football?

The recent Relocatable Optical and Radiowave Measurement Techniques Workshop held at Penn State on March 1-2, 2001 demonstrated again the enormous scientific potential of the RAO, as well as the community interest in this facility. I would like to thank Dr. Tim Kane and colleagues at Penn State for their splendid job in organizing this workshop. Tim's excellent report on the workshop is the article preceding this one, on page 3. NSF's plans for moving ahead with the construction of the RAO remain "soft". However, I believe we have switched questions from "if" to "when." A firm NSF commitment with an approved construction timeline is quite possible in FY2002. I certainly know that this facility, including both the ISR and the optical instruments, is well regarded within our Division and Directorate.

In addition to enabling cutting edge science, the RAO will add true excitement to our field. I am sure it will become a major training ground for the next generation of aeronomers. We (NSF) have never built a major aeronomy facility (Arecibo, Millstone Hill and Sondrestrom were all built by other agencies) and it is NSF's turn! So, once again, I ask for your patience.

- *Rich Benke, NSF*

NSWP COMPETITION HEADS UP

The next NSWP competition will be announced in early June with a September 1, 2001 deadline. We expect to have more than \$1M available for awards. Although the exact wording of the announcement is still being developed, the major thrusts will be quite similar to last year's.

- *Rich Behnke, NSF*

CEDAR AND THE COMMUNITY COORDINATED MODELING CENTER

The Community Coordinated Modeling Center (CCMC) is a multi-agency facility to aid in the development of models for specifying and forecasting conditions in the space environment. The CCMC fills a long-standing gap between the space weather research community and the operational arms of NOAA and the Department of Defense (DoD) who are responsible for providing space weather services to a large customer base. The CCMC provides computer assets sufficient for the development and test of the largest and most sophisticated space weather models. A particularly exciting aspect of the CCMC is the ability to provide runs-on-demand to members of the scientific community wishing to use

the output of these models in research related to specific space weather events.

The CCMC concept was initiated in 1998 as a result of DoD efforts to provide a means of more effective transitioning of research models to operations. Subsequent multi-agency efforts have led to a conceptual design and management plan for the center. Participating agencies have all offered support for the CCMC including the purchase of computational assets, physical infrastructure for the center, scientific and technical support, and post-doctoral research support. A more detailed description of the CCMC is provided on the web site at <http://ccmc.gsfc.nasa.gov>.

The CCMC is managed by a Steering Committee with members from participating agencies. At a recent meeting of the Steering Committee, representatives from the GEM, CEDAR, and SHINE communities were invited to participate in a discussion of the process for selection of models for the CCMC. The representatives were Chuck Goodrich from the University of Maryland, Cassandra Fesen from U. Texas at Dallas, and Spiro Antiochos from NRL. The Steering Committee sought advice on how to ensure a process for model selection that is equitable to all model developers, while at the same time is responsive to the needs of the operational space

weather community. The Committee will form a Science Working Group and an Operations Working Group that will meet on a regular basis and review the status of CCMC model development and make recommendations about additional models to be implemented at the CCMC.

Interested members of the CEDAR Community should visit the CCMC web site for updates on the model selection process. Comments and suggestions about model development and the CCMC should be forwarded to Cassandra Fesen (fesen@tides.utdallas.edu) or any of the Steering Committee Members listed on the web site.

- *Bob Robinson, NSF*

FY 2001 CEDAR POSTDOCTORAL AWARDS

Two CEDAR Postdoctoral awards were made for FY 2001, to Dr. Diego Janches and Dr. Tai-Yin Huang.

Dr. Tai-Yin Huang received her Ph.D. degree in 1997 from the University of Cincinnati with advisor Professor Tai-Fu Tuan. She then worked for a two-year period under an International Postdoctoral Fellowship with Dr. William Ward at York University in Canada. In December 1999 she moved to

Clemson University to work with Dr. Michael Hickey. She will continue to work with Dr. Hickey on her CEDAR Postdoctoral project entitled "A numerical study on time-dependent effects of ducting".

Dr. Diego Janches received his Ph.D. from Penn State University in December 2000 for research on radar meteor observations from Arecibo. His post-doctoral award to Penn State, under the guidance of John

Mathews, is entitled "An Arecibo/EISCAT Observational Investigation of the Effects of the Meteor Mass Flux on the 80-120 km Atmosphere/Ionosphere." He will conduct research at both EISCAT and Arecibo. He has been in residence at the Swedish Institute of Space Physics (IRF-Kiruna) since early January and will move to Arecibo in September.

FY 2001 CEDAR AWARDS

The CEDAR FY01 funding competition had 21 proposals submitted; 12 were funded (with some help from the Aeronomy Core program) for a total of about \$840K in first year funding. The awards are as follows:

PI	INSTITUTION	TITLE
Akmaev	U. Colorado	A CEDAR modeling study of global change in the mesosphere and lower thermosphere
Chakrabarti	Boston U.	Ionospheric auroral disturbances in proton aurora
Conde	U. Alaska	Mapping the variance of thermospheric vertical winds using Dynamics Explorer-2 WATS data
Fuller-Rowell	U. Colorado	Evaluating the source of electrodynamic variability at low latitudes
Hickey	Clemson U.	Studies of the numerical simulation of gravity wave packets: Effects on chemical exothermic heating
Larsen	Clemson U.	Investigations of sporadic E layers and quasiperiodic echo structure in Puerto Rico using Arecibo and a coherent scatter radar
Link	Southwest Research Inst.	Ionospheric effects of rapid solar XUV variations
Milikh	U. Maryland	Electron energization by strong turbulent electric fields in the auroral E-region
Roesler	U. Wisconsin	Determination of geocoronal Balmer-alpha intensities and upper atmospheric hydrogen densities from WHAM Fabry-Perot observations
She	Colorado State U.	Geophysical study of mesopause region: Completion of one solar cycle of lidar observation at Fort Collins
Tsunoda	SRI International	The electric field profile of the equatorial electrojet

MAUI MALT AWARDS

The MAUI-MALT funding totaled \$1.3M, with AFOSR providing about 55% of the funds and CEDAR about 45%. Five two-year awards were made from the seven proposals submitted; these are listed below.

PI	INSTITUTION	TITLE
Franke	U. Illinois	A meteor radar for collaborative investigations of waves, tides, winds, and temperature in the mesosphere above Haleakala
Gardner	U. Illinois	Lidar studies of middle atmosphere composition, structure and dynamics
Kane	Penn State U.	Rayleigh lidar measurements of middle atmospheric temperatures and dynamics
Swenson	U. Illinois	Studies of high frequency atmospheric gravity waves in mesospheric airglow
Taylor	Utah State U.	Coordinated seasonal investigations of gravity wave characteristics and mesospheric temperature variability

SOUSY RADAR MOVES TO JICAMARCA

At the last CEDAR meeting an offer by the Max Planck Institute for Aeronomy in Germany to donate its VHF SOUSY radar to the Jicamarca Radio Observatory was briefly discussed. We are happy to report that it looks as though the move will happen in the next few months, with support from the NSF and the Air Force covering the cost (roughly \$50K) of the move.

The SOUSY radar is a 600 kW (peak power) radar, operating at 53.5 MHz with a computer-controlled steerable phased-array antenna consisting of 196 Yagis. The transmitter and the receiving/operations room are mounted in four 8-meter shipping containers, permitting some degree of mobility. Two characteristics that differentiate this radar from the Jicamarca radar are its bandwidth, permitting an altitude resolution of 50 meters, and the wide and agile steerability of its antenna ($\pm 15^\circ$).

This addition to the Jicamarca facilities will make possible a number

of new studies, such as

1. Measurements of north-south winds at ionospheric heights, taking advantage of the larger zenith angles that the SOUSY radar can access.

The north-south wind is the only ionospheric parameter of importance that cannot be measured reliably at Jicamarca now.

2. Concurrent observations, with radar and in situ probes, of the same mesospheric scattering volume probed by rockets launched from the Punta Lobos rocket range. Neutral turbulence in a stratified atmosphere is now being numerically modeled with success. Equatorial mesospheric turbulence is the best testing ground for these simulations since the Reynolds numbers are low and comparable to those of the models. What we learn at equatorial latitudes should benefit our understanding of the more complicated Polar Mesospheric Summer Echoes.

3. Concurrent rocket and radar observations of E- and F-region irregularities. Common volume observations have not been done in the past because of the distance

between Jicamarca and the Punta Lobos rocket range, but moving the SOUSY radar will solve that problem. A major new equatorial rocket campaign is now being discussed at NASA.

4. High-power wide-angle meteor radar interferometric studies. The behavior of meteor trails at the equator is different than at other latitudes.

5. Measurements of the E-region irregularities at the foot of the field lines passing through the "150 km echoes" region above Jicamarca. Such observations might give us a clue about the physical mechanisms responsible for these irregularities, for which there is as yet no accepted theory. For such measurements we would have to move the radar to a location about 300 km north of Jicamarca, a location which also happens to be the edge of the equatorial electrojet.

6. Bistatic radar observations of the vertical drift of the ionospheric plasma at 3200 km altitude, close to the field lines that go through the F region at Arecibo latitudes. At this altitude the magnetic field lines have their radius of curvature centered on the surface of the earth a few tens of kilometers south of Jicamarca. Because of the geometry we expect very narrow spectral widths, which may improve our sensitivity enough to make such observations feasible.

7. High range resolution Mesospheric, Stratospheric and Tropospheric (MST) measurements, taking advantage of the broader bandwidth of the SOUSY radar and the possibility of a wider frequency allocation in Peru.



Aerial view of SOUSY radar in the Harz Mountains in Germany. It will be moved to the Jicamarca Radio Observatory in Peru in the near future.

8. Wide angle radar imaging of turbulent structures, using the wider SOUSY antenna beams. This imaging is of particular interest in the MST region, where the images made with the Jicamarca radar don't show much structure because of the narrowness of its widest possible beam.

- Don Farley, Cornell U., and Ron Woodman, Instituto Geofisico del Peru

MORE CSU SODIUM LIDAR DATA IN THE CEDAR DATA BASE

Up to this point, data from the Colorado State narrowband Sodium Lidar that are in the CEDAR Database include hourly mean nocturnal temperatures for 1993 and

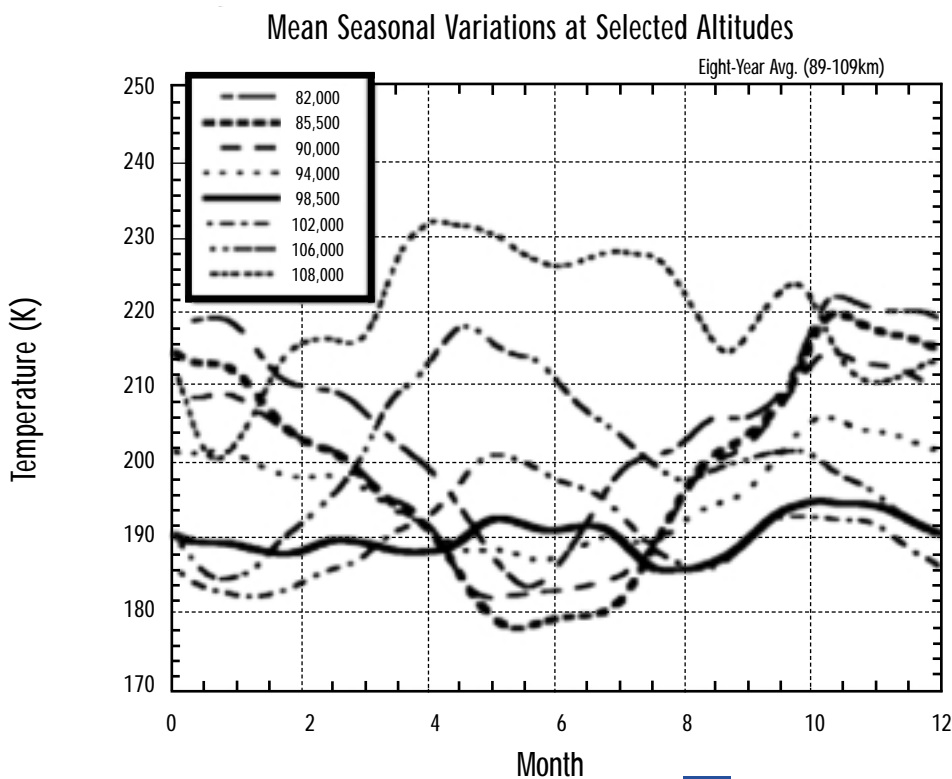
a list of durations and nights with data up to March 1999. The web page for the CSU lidar on the CEDAR Database is located at <http://cedarweb.hao.ucar.edu/instr/csl.html>. We are adding the following information to the CEDAR Database to update our contribution.

(1). The list of durations and nights we have sodium density and temperature data will be extended to the end of year 2000. The list of nights of CSU lidar data between 1990 and 2000 is available at http://cedarweb.hao.ucar.edu/instr/cslsdates90_00.html. We are looking forward to potential collaboration and encourage colleagues who consider selected data in temperature and Na density useful for their research to contact us. Depending on

science requirements, it is possible to re-analyze these data in a format to suit a specific study.

(2). Nocturnal mean temperatures at 87 km between 1990 and 1999 over Fort Collins, CO (41°N, 105°W) have been deduced with a FWHM of 3.7 km, and will be available as plots and data values from the CEDAR Database. Under normal conditions, nocturnal mean temperature of OH imagers may be used as proxy for temperatures at 87 km with FWHM of ~ 4 km [She and Lowe, 1998]. We entered the time series of 417 nights of nocturnal Na mean temperatures at 87 km into the CEDAR Database, hoping that colleagues with OH imagers and/or interested in OH observations will find this decade-long data set useful for comparison and imaginative correlative studies.

(3). Climatology and variability of Na densities and temperatures over Fort Collins, CO (41°N, 105°W) in the mesopause region (80 to 105 km) have been tabulated. This is based on a recently published eight-year climatology of nocturnal temperature and sodium density, which was derived from 417 nights of narrowband Na lidar observation between 1990 and 1999. A temperature and a Na density profile are computed for each night from the photocount profiles. They are vertically smoothed using a Hanning window with a FWHM of 3.7 km, giving a typical measurement precision of ~0.6 K and ~5 K near the peak (92 km) and edges (81 km and 107 km) of the Na layer respectively. To compute monthly



mean and eight-year composite climatology, the 417 nightly profiles were sorted by day number, compiled in a one-year duration irrespective of year, and subsequently filtered with a 61-day full-width Hanning window. The climatological temperatures between 81 and 109 km and Na densities between 70 and 119 km and their variability with one entry per day of the year at 0.5 km intervals will be available as plots and data values at <http://cedarweb.hao.ucar.edu/instr/csl.html>. Much like a model atmosphere, the climatology may be used to serve as a representative midlatitude temperature and Na density in the mesopause region. They may also be used to initiate the best-guess temperatures for Rayleigh lidar temperature retrieval in the midlatitudes.

To gain a bird's eye view of the thermal structure of a midlatitude mesopause region and as an example of using the Database, we show, in the adjoining figure, climatological seasonal variation in temperatures at selected altitudes, including the altitudes of maximum and minimum annual variation, at 85.5 km (bold, solid) and 98.5 km (bold, dashed), respectively. A two-level mesopause picture with high winter and low summer mesopause altitudes clearly emerges from these plots. The global validity of a two-level mesopause thermal structure has been discussed in an earlier paper [She and von Zahn, JGR, 1998].

- Chiao-Yao She and David A. Krueger,
Colorado State University

THE ODIN SATELLITE IS LAUNCHED

The Odin satellite is a Swedish small satellite built in co-operation with Canada, Finland, and France. Odin, weighing 242 kg, was successfully launched onboard a Russian START-1 vehicle on Feb. 20, 2001 into a 620 km polar, sun-synchronous 18:00 h ascending node orbit. Odin carries two instruments, a sub-mm/mm radiometer built in Sweden and Finland and the Optical Spectrometer and Infra Red Imaging System (OSIRIS) built in Canada. The radiometer has three spectrometers: an acousto-optic spectrometer built in France and two autocorrelator spectrometers built in Sweden. Both instruments will operate in limb scanning mode.

Odin is unique in that it will be used for both astrophysical and atmospheric measurements, the two disciplines being united in the use of sub-mm spectroscopy to observe emissions from common (H_2O , CO and O_2) as well as discipline-specific

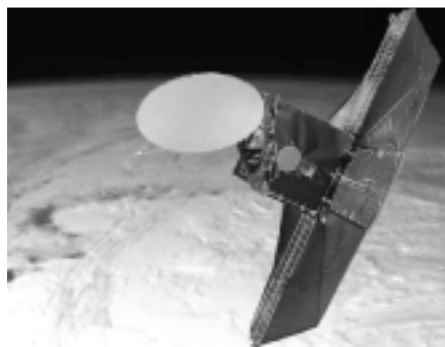


Illustration showing the 1.1 m radiotelescope on Odin. The OSIRIS instrument's apertures can be seen on the side of the main body. Picture courtesy SSC.

molecules. The OSIRIS instrument will be used only for atmospheric studies.

The atmospheric mission is primarily aimed at the study of ozone related processes in the stratosphere and mesosphere. The water vapour budget and the dynamics of the noctilucent cloud formation region in the summer mesosphere is another interest.

The sub-mm instrument covers 4 bands in the 486-580 GHz region each tuneable over 17 GHz and observable with any of the three spectrometers. The main operating mode has ClO, HNO_3 , N_2O and O_3 as target species but other modes allow measurements of water vapour (up to 90 km at 557 GHz), CO, H_2O_2 , HO_2 and NO.

OSIRIS will operate by observing the scattered light at the earth's limb and will measure O_3 , NO_2 , ClO and BrO as well as registering scattering by particles. The 1.27 μm imager will allow tomographic reconstruction of the ozone field from the $\text{O}_2(^1\text{D})$ emission.

Odin is now in its commissioning phase with regular measurements expected to begin in May. A more detailed report will be presented in a later issue of the CEDAR Post. Further information can be obtained at the homepage of the Swedish Space Corporation (<http://www.ssc.se/ssd/>) and at <http://www.misu.su.se>. A poster describing the possible synergies with the TIMED mission will be presented at the CEDAR workshop by Jörg Gumbel.

- Donal Murtagh, Chalmers University of Technology, Göteborg, Sweden, on behalf of the Odin team

PRELIMINARY ANNOUNCEMENT:

PSMOS 2001 WORKSHOP

MESA LABORATORY
BOULDER, COLORADO
SATURDAY, JUNE 23 2001

A PSMOS Workshop will be held at the NCAR Mesa Laboratory in Boulder on Saturday, June 23 following the joint 10th Quadrennial STP Symposium and 2001 CEDAR Workshop. The PSMOS 2001 Workshop agenda will focus on established PSMOS projects and include progress reports, concurrent discussion of ongoing activities led by project leaders, and follow-on plenary session updates. We will conclude the day with a discussion of proposed PSMOS activities in 2002 and beyond. The CEDAR community is invited to attend.

Additional details including logistics will be posted on the PSMOS web site <http://www.hao.ucar.edu/psmos/home.html> and announced at a later date.

- Maura Hagan, NCAR, and
Gordon Shepherd, York University

CEDAR WORKSHOP AND
SCOSTEP STP-10 SYMPOSIUM

RAINTREE PLAZA HOTEL, LONGMONT,
COLORADO
17-22 JUNE 2001

The CEDAR (Coupling, Energetics and Dynamics of Atmospheric Regions) Workshop for 2001 will be held in conjunction with the SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) 10th Quadrennial Solar Terrestrial Physics Symposium (STP-10) in the Raintree Plaza Hotel Conference Center in Longmont, Colorado, about 12 miles NW of Boulder along Hwy 119 (the Diagonal Highway). The joint website is at <http://cedarweb.hao.ucar.edu/wkshp/>. The website shows the most recent agenda, with links to workshop descriptions and abstracts for talks. It also has links to abstracts in the two poster sessions, student biographies, maps, registration and lodging forms, and other information. Registration late fees are imposed after May 1. Hotel blocks are open until May 18.

The schedule is full from Sunday June 16 with the SCOSTEP General meeting in Boulder and the CEDAR Student Workshop in Longmont to Friday June 22 with talks and workshops lasting until 6 p.m. We hope to have a good meeting with lots of interaction between our two groups.

- Barbara Emery, HAO/NCAR

2001 CEDAR STUDENT
WORKSHOP

The topic of the 2001 student workshop is "Exploring the Mesosphere, Lower Thermosphere, and Ionosphere (MLTI)". The MLTI is a fascinating and dynamic part of our terrestrial atmosphere. Throughout the day we will examine the coupling between the regions as well as several of the intriguing phenomena present in this altitude range.

The student workshop begins at 10:00 a.m. Sunday June 17. During the two hour morning session students will have an opportunity to meet and interact with one another as they learn about the CEDAR program. Morning presentations include an introduction to the MLTI region and an overview of instrumentation and models used by CEDAR scientists. These presentations are useful for students new to CEDAR but should also provide a review for senior graduate students.

The afternoon workshop focuses on specific topics relevant to the MLTI region. It begins with an overview of the TIMED satellite mission that is set to launch later this summer. Presentations range from airglow imaging of gravity waves to polar dynamics of the MLTI region. The variety of presentations will provide something interesting for everyone.

The student social will follow immediately after the workshop for students and invited guests. It is located in the nearby Roger's Grove park. Dinner and soft drinks will be provided. Alcohol is not allowed at this year's social.

- Rebecca Bishop, U. Texas at Dallas

DRAFT AGENDA FOR
2001 CEDAR-SCOSTEP MEETING

RAINTREE PLAZA HOTEL, LONGMONT, COLORADO

Note: the following agenda is tentative.
Please see <http://cedarweb.hao.ucar.edu/wkshp/agenda01.html> for the latest version.

SCOSTEP Saturday, June 16, 2001

SCOSTEP Bureau Meeting

Chair: Marvin Geller

08:15 Van from Raintree to NCAR Mesa Lab
09:00-12:00 Agenda
12:00-13:00 Lunch at NCAR
13:00-17:00 Agenda
17:00-17:45 Van from NCAR Mesa Lab to Raintree

SCOSTEP Sunday, June 17, 2001

SCOSTEP General Meeting

Chair: Marvin Geller

08:00-08:30 Bus from Raintree (8:00)
and dorm (~8:30) to NCAR Mesa Lab
09:00-12:00 Agenda
12:00-13:00 Lunch at NCAR
13:00-17:00 Agenda
17:00-17:45 Bus from NCAR Mesa Lab to dorm
and to Raintree

CEDAR Sunday, June 17, 2001

CEDAR Student Workshop

Chair: R. Bishop

(CEDAR student rep)

Exploring the Mesosphere, Lower Thermosphere and
Ionosphere (MLTI) Region
(non-students welcome)

10:00-10:20 Introductions - Rebecca Bishop (UTD)
10:20-10:40 Break
10:40-11:20 Overview of MLTI region -
Dan Marsh (NCAR)
11:20-12:00 Middle atmosphere remote sensing -
Tim Kane (PSU)
12:00-13:15 Lunch at nearby restaurants
or Twin Peaks Mall
13:15-14:00 The TIMED Mission - Sam Yee
14:00-14:25 Airglow imaging of gravity waves -
Feng Li (U. Il.)
14:25-14:45 Break
14:45-15:10 Sporadic E and Qp -
Rob Wilson (Clemson U.)
15:10-15:35 Modeling of meteor trails -
Lars Dyrud (BU)
15:35-15:55 Break
15:55-16:20 Meteoric dust in the MLT -
Lynette Gelinas (Cornell)
16:20-17:30 Panel discussion
17:30-18:00 Travel to student social at Rogers Grove
18:00-21:00 Social for students, recent graduates, and
invited guests. Picnic dinner provided.
21:00-21:30 Return to Raintree and Williams Village

Monday, June 18, 2001
Official opening of STP-10
and CEDAR-2001

2001: A Space Science Odyssey

**Co-Chairs: R. Vincent (Australia), D. Baker (USA),
 C. Fesen (USA)**

- 08:00-08:30 Welcomes and Introductions
- 08:30-09:30 Keynote lecture: What we need to know about solar variability - Eugene Parker (USA)
- 09:30-10:00 Programmatic: Preliminary report on the Decadal Study Survey of Solar and Space Physics - Lou Lanzerotti (USA)
- 10:00-10:25 Break
- 10:30-18:00 Separate CEDAR and SCOSTEP sessions - see below
- 20:00-21:00 **Evening Poster Session #1 and Reception**

10:30-12:00 **CEDAR Session - Chair: C. Fesen**

- 10:30-11:10 CEDAR Prize Lecture: TBD
- 11:10-11:20 Report on Student Workshop - Rebecca Bishop (UTD)
- 11:20-11:30 Report on TIMED - Jeng-Hwa Yee (JHU/APL)
- 11:30-11:40 Report on CEDAR DB - Peter Fox (HAO/NCAR)
- 11:40-12:00 Report from NSF
- 12:00-01:15 Lunch

13:15-18:00 **CEDAR workshops**

- 13:15-15:15 Arecibo Friends (Farley)
Equinox transition in MLT region (Liu/Taylor)
- 15:15-16:00 Break
- 16:00-18:00 LTCS - (Johnson/Azeem)
Topside (Noto/Kerr)

10:30-17:30 **SCOSTEP session**
Solar Variability for the Rising Phase of Cycle 23

- Chair: S.-T. Wu**
- 10:30-11:00 J.-L. Bougeret (France)
Solar activity affecting the space environment

- 11:00-11:30 Variability of solar luminosity - C. Frohlich (Switzerland)
- 11:30-12:00 Contributed papers
- 12:00-13:30 Lunch
Solar Variability for the Rising Phase of Cycle 23, continued - Chair: Judith Pap (USA)
- 13:30-14:30 Tutorial 1: A unified view of solar flares and coronal mass ejections - K. Shibata (Japan)
- 14:30-15:00 Triumphs and shortcomings in observations of the solar corona - D. Michels (USA)
- 15:00-15:30 Contributed paper(s)
- 15:30-16:00 Break
- 16:00-18:00 SCOSTEP Long-Range Plan (CAWSES) - Chair: M. Geller (USA)
Speaker(s): TBD

Tuesday, June 19, 2001

Long-Term Variability of Earth's Climate, Including Solar Influences
Chair: E. Friis-Christensen (Denmark)

- 08:30-09:30 Tutorial 2: Influence of 11-year solar variation on atmospheric circulation - K. Labitzke (Germany)
- 09:30-10:00 Long-term trends in exospheric H and global change - R. Kerr (USA)
- 10:00-10:25 Break
- 10:30-11:00 Solar-atmospheric coupling by electrons: observational and computational evidence for effects on the climate of the middle atmosphere - L. Callis (USA)
- 11:00-11:30 Involvement of solar activity in longterm changes of the stratosphere - Murry Salby (USA)
- 11:30-12:00 Contributed papers - TBD

Lunch

13:15-18:00 **CEDAR workshops**

- 13:15-15:15 Jicamarca Amigos (Farley)
Transient Optical Emissions (Pasko/Heavner/Taylor)
- 15:15-16:00 Break
- 16:00-18:00 Problems in modeling the ionosphere at low latitudes (PRIMAL) (Fesen/Hysell/Anderson)

- Airglow and the dynamics responsible for periodic signatures (Meyer/Marsh)
- 12:00-18:00 **SCOSTEP afternoon session**
Long-Term Variability of Earth's Climate, Including Solar Influences
Chair: K Labitzke (Germany)
- 13:30-14:30 Tutorial 3: Solar influences on global climate change and the IPCC Report - Joanna Haigh (UK)
- 14:30-15:00 Detecting change in the lower middle atmosphere - W. Randel (USA)
- 15:00-15:30 Modeling effects on ozone variability - M. Takahashi (Japan)
- 15:30-16:00 Break
- 16:00-16:30 Cosmic rays and cloud formation - H. Svensmark (Denmark)
- 16:30-17:00 Modeling upper atmosphere response to increasing greenhouse gases - R. Roble (USA)
- 16:00-18:00 World Climate Research Program/Stratospheric Processes and their Role in Climate
- 18:30-21:30 CSSC Meeting
 SCOSTEP Bureau Meeting

Wednesday, June 20, 2001

Equatorial Processes in the Ionosphere-Thermosphere System

Chairs: J. Forbes (USA) and E. Kudeki (USA)

- 08:30-09:30 Tutorial 4: The physics of electrodynamic coupling in the equatorial ionosphere - R. Heelis (USA)
- 09:30-09:55 Equatorial ionosphere-thermosphere system - B. Fejer (USA)
- 09:55-10:20 Break
- 10:20-10:45 Dynamics and electrodynamics over Africa: Results from the Ivory Coast - A. Koba (Ivory Coast)
- 10:45-11:05 Equatorial ionospheric studies using ROCSAT - C. H. Liu (Taiwan)
- 11:05-11:30 Radio imaging of soft radar targets - R. Woodman (Peru)

- 11:30-11:55 Equatorial Irregularities - M. Mendillo (USA)
- Lunch
- 13:15-18:00 **CEDAR afternoon Workshops**
- 13:15-15:15 New polar science/RAO (Conde) GIFT (Global Ionosphere Forecasting Techniques) (Anderson/Fuller-Rowell/Sojka)
- 15:15-16:00 Break
- 16:00-18:00 Input for decadal study: Magnetosphere, Ionosphere and Atmosphere - (Kelley/Fuller-Rowell/Foster)
- 13:30-18:00 **SCOSTEP afternoon session**
Equatorial Processes in Middle Atmosphere Dynamics -
Chair: J. Forbes (USA)
- 13:30-14:30 Tutorial 5: Dynamics of the equatorial middle atmosphere - R. Garcia (USA)
- 14:30-15:00 Equatorial waves observed in airglow - H. Takahashi (Brazil)
- 15:00-15:30 Equatorial waves in the MLT - S. Gurubaran (India)
- 15:30-16:00 Break
- 16:00-18:00 Contributed presentations
- 18:00-21:00 **Evening Poster Session #2 and Reception**

Thursday, June 21, 2001

Large-Scale Variability of the Middle and Upper Atmosphere

Chairs: M. Hagan (USA) and T. Tsuda (Japan)

- 08:30-09:30 Tutorial 6: Physics and chemistry of the mesopause region - A. Smith (USA)
- 09:30-10:00 Equinox transition: Observations and interpretations - G. Shepherd (Canada)
- 10:00-10:10 Student Poster Prize Winners - A. Richmond
- CSSC announcements
- 10:10-10:25 Break
- 10:30-11:00 Global scale tidal variability and the coupling of tides and planetary waves - N. Mitchell
- 11:00-11:30 Gravity wave coupling into the middle atmosphere - S. Eckermann (Australia/USA)
- 11:30-12:00 Science of ALOMAR - E. Thrane (Norway)
- Lunch

13:15-18:00 **CEDAR afternoon workshops**
 13:15-15:15 Meteors (Mathews/Zhou)
 HLPS (Valladares/Sojka)
 15:15-16:00 Break
 16:00-18:00 PSAT (plasma structures and turbulence)
 (Mishin)
 Polar mesosphere dynamics (Duck)
 Tomography (Kamalabadi)
 S-RAMP Space Weather Month
 (Burns/Kozyra/Valladares)

12:00-18:00 **SCOSTEP afternoon session**
Large-Scale Variability of the Middle and Upper Atmosphere -
Chair: M. Hagan (USA)

13:30-14:30 Migrating and non-migrating tides in the
 MLT: origins and effects -
 S. Miyahara (Japan)
 14:30-15:00 Antarctic Mesopause Region - TBD
 15:00-15:30 Overview of Achievements by PSMOS
 in Asia and the Pacific - T. Tsuda (Japan)
 15:30-16:00 Break
 16:00-16:30 New Arctic Instrumentation: A Longitudinal
 Radar Chain - Y. Portnyagin (Russia)
 16:30-17:00 Optical Methods contribution
 17:00-18:00 Contributed papers

18:00-19:00 Bus and carpools to Anheuser Busch Brewery
 19:00-21:00 Tours of Busch
 21:00-22:00 Return

Friday, June 22, 2001
Space Weather as a Composite
of Solar-Terrestrial Physics
Chairs: H. Koskinen (Finland)
and Roger Smith (USA)

08:30-09:30 Tutorial 8: Solar origins of space weather -
 R. Schwenn (Germany)
 09:30-10:00 New techniques and facilities for Space
 Weather Research -
 R. Behnke (USA)

10:15-10:25 Break
 10:30-11:00 Magnetosphere-ionosphere coupling -
 R. McPherron (USA)
 11:00-11:30 Storm effects in the ionosphere -
 J. Foster (USA)
 11:30-12:00 Polar aeronomers: The energetics of
 polar aeronomy -
 J. Thayer (USA)

Lunch

13:15-18:00 **CEDAR afternoon workshops**
 13:15-15:15 TIMED (Yee/Solomon)
 M-I Coupling (Zhu/Ruohoniemi/Greenwald)
 15:15-16:00 Break
 16:00-18:00 TIMED ground-based support
 (Fox/Yee/Emery)
 High latitude electrodynamics
 (Richmond/Ruohoniemi)
 Input for the Decadal Study: Theory,
 Computation and Data Exploration
 (Schunk)

13:30-18:00 **SCOSTEP afternoon session**
Space Weather as a composite of
solar-terrestrial physics -
Chair: Y. Kamide (Japan)

13:30-14:30 Tutorial 10: Space Weather effects -
 H. Koskinen (Finland)
 14:30-15:00 Creation of trapped energetic particle
 collections in the magnetosphere and their
 effects on satellites and spacecraft -
 D. Baker (USA)
 15:00-15:30 Contributed papers
 15:30-16:00 Break
 16:00-16:30 Magnetosphere-Ionosphere interactions
 16:30-17:00 Predicting solar activity from NOAA/SEC -
 T. Detman (USA)
 17:00-17:30 Space Weather effects on the power system
 in N. Europe - R. Pirjola (Finland)
 17:30-18:00 Contributed presentations

TBD= 'To Be Determined'

2001 CEDAR AFTERNOON WORKSHOP SCHEDULE

see the schedule at: http://www.naic.edu/~sixto/cedar_workshop-2001.PDF

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
June 18	June 19	June 20	June 21	June 22
Arecibo Friends Farley	Jicamarca Amigos Farley	New polar science/RAO Conde	Meteors Matthews/Zhou	TIMED Yee/Solomon
Equinox transition in MLT Region Liu/Taylor	Transient Optical Emissions Heavner/Pasko/ Taylor	GIFT Anderson/Fuller- Rowell/Sojka	HLPS Valladares/Sojka	M-I Coupling Zhu/Ruohoniemi/ Greenwald
break	break	break	break	break
LTCS Johnson/Azeem	Problems in modeling the ionosphere at low latitudes(PRIMAL) Fesen/Hysell/ Anderson	Input for decadal study: Magnetosphere, Ionosphere, and Atmosphere Kelley/Fuller- Rowell/Foster	PSAT (plasma structures and turbulence) Mishin	TIMED ground based support Fox/Yee/Emery
Topside Noto/Kerr	Airglow and the dynamics responsible for periodic signatures Meyer/Marsh		Polar Mesosphere Dynamics Duck	High latitude E fields and Joule heating Richmond/ Ruohoniemi
			Tomography Kamalabadi	Input for decadal study: Theory, Computation, and Data Exploration Schunk

Reminder: Each workshop convener must provide a written summary of the workshop for publication in the August 2001 CEDAR Post. The summary should be sent to Roger Smith (roger.smith@gi.alaska.edu) within two weeks after the CEDAR Workshop.

TRANSPORTATION FROM THE DENVER INTERNATIONAL AIRPORT TO LONGMONT OR BOULDER

<http://cedarweb.hao.ucar.edu/wkshp/maps01.html>

TO LONGMONT: The Airport Express [303-772-5466] provides direct transportation between Denver International Airport (DIA) and the Longmont Raintree Plaza Hotel where the 2001 CEDAR-SCOSTEP Workshop will be held. All other Longmont hotels are also served by this shuttle. Fares are \$13 one way, cash only. Reservations are recommended, but note that there is no counter area at the airport to make reservations. Travel time from the Raintree to DIA is about 80 minutes. The buses are labeled either "Airport Express" or "Express Charter". To take the bus from the airport, go out the West Door #504 in the baggage area or the East Door #505 and proceed to the 4th traffic lane/island. The bus leaves the West Door #504 at 5 minutes before the hour from 5:55 AM to 7:55 PM and the East Door #505 5 minutes past the hour from 6:05 AM to 8:05 PM. The last bus leaves the West Door at 9:30 PM and the East Door at 9:45 PM.

The bus will stop in Longmont to discharge those passengers going to Longmont hotels. The stop/transfer point is at Exit 240 on I-25 at a Conoco station; transfer to vans for the Raintree, Hampton Inn, or Super 8 hotels. The other Longmont hotels near this exit are within easy walking distance.

Reservations are also recommended when leaving the hotels to go to DIA. Airport Express leaves every hour from 5:45 AM to 7:45 PM from the drop off point at I-25 and Hwy 119. Vans pick up at the hotels every hour from about 6:20 AM to 6:20 PM. (From Main St Super-8, 20 minutes after the hour; from the Raintree, 25 minutes after the hour; and from the Hampton 30 minutes after the hour.) Again, cash only is accepted for payment.

TO BOULDER: The SuperShuttle Boulder [303 444 0808], formerly the Boulder Airporter, provides direct transportation between Denver International Airport (DIA) and Boulder hotels. The fare is \$18 one way; major credit cards are accepted. Check in at the SuperShuttle counter in the baggage claim area, level 5 of the main terminal, across from the Hertz counter. A regular hotel stop is The Broker Inn, just across the street from the Williams Village dormitories. Other hotels and dormitories can be requested or are regular stops. The SuperShuttle leaves from The Broker Inn on the hour between 5 AM and 9 PM, arriving at DIA in 65 min.

The RTD AB bus is another alternative to getting to Boulder. Board the AB bus in Lane 3 outside the East Terminal Door #511 at 20 minutes past the hour from 6:20 AM to 11:20 PM. Fares are \$8.00 one way. The bus stops in front of NIST on Broadway and at other sites farther north on Broadway near the campus of the University of Colorado in Boulder.

LODGING FOR CEDAR/SCOSTEP 2001

<http://cedarweb.hao.ucar.edu/wkshp/hotels.html> or [dorm.html](http://cedarweb.hao.ucar.edu/wkshp/dorm.html)

The hotels listed below have blocked rooms for workshop participants between the nights of June 16-24, 2001. The blocks of rooms at special workshop rates are only being held until May 18, 2001. Specifically mention the CEDAR-SCOSTEP Workshop to obtain listed rates. 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 government rate for 2001 in Boulder and Longmont is \$90.) Most hotels include breakfast as part of their rates, but it will also be available in the conference center as part of the registration fee.

The web form must be used for all dormitory reservations. The University of Colorado at Boulder dormitory rooms are in Williams Village which is air conditioned. The dorm package is for 5 nights between Sunday June 17 to Thursday June 22. Additional nights are possible. The package core rates are in effect even if the stay is for a shorter period of time. The University of Colorado accepts VISA and MasterCard. Parking permits can be purchased at the dorm. CEDAR students are eligible for free lodging in a double at the dorm, a triple at the Raintree Plaza hotel, or about \$30/night elsewhere.

All Longmont hotels have shuttle stops for the Airport Express from the Denver International Airport (DIA). Boulder hotels and dorms are stops for the SuperShuttle Boulder. See the meeting website for detailed instructions on how to reach a particular hotel.

- Barbara Emery, HAO/NCAR

Raintree Plaza Hotel

1900 Ken Pratt Blvd
 Longmont, CO 80501
 1-800-843-8240 or (303) 776-2000;
 FAX: (303) 682-2190
 Single/Double \$90; 90 rooms; 6.95% tax;
 pool/breakfast at conference

Hampton Inn (Corner of Ken Pratt Blvd (Hwy 119) and Main (Hwy 287) - 5 min drive)

850 S. Main Street
 Longmont, CO 80501
 (303) 772-2554;
 FAX: (303) 772-2698
 Single \$90, Double \$96; 15 rooms; 6.95% tax;
 pool/spa/breakfast

Comfort Inn

(At Hwy 119 and I-25, exit 240 - 15 min drive)
 10811 Turner Blvd
 Longmont, CO 80504
 (303) 684-6779;
 FAX: (303) 684-6779
 Single/Double \$80; 30 rooms; 3.0% tax;
 pool/spa/breakfast

Super 8 Twin Peaks

(At Hwy 66 and Main/Hwy 287 - 10 min drive)
 2446 N. Main Street
 Longmont, CO 80501
 (303) 772-0888;
 FAX: (303) 772-3717
 Single/Double \$80; 45 rooms; 6.95% tax;
 Longmont Athletic Club/breakfast

Days Inn

(At Hwy 119 and I-25, exit 240 - 15 min drive)
 3820 Hwy 119
 Longmont, CO 80504
 (303) 651-6999;
 FAX: (303) 651-1708
 Single \$77, Double \$84; 15 rooms; 3.0% tax;
 pool/spa/breakfast

Niwot Inn

(Off Hwy 119 on 2nd Ave near Niwot Road - 10 min drive)
 342 2nd Ave
 Niwot, CO 80544
 (303) 652-8452;
 FAX: (303) 652-4289
 Single/Double \$129; 6 rooms; 4.7% tax; breakfast

The Broker Inn

(near U of CO - 25 min drive)
 555 30th Street
 Boulder, CO 80303
 (800) 338-5407 or (303) 444-3330;
 FAX: (303) 444-6444
 Single/Double \$90; 40 rooms; 9.7% tax;
 pool/spa/breakfast

Days Inn

(at Hwy 36 and Foothills Parkway - 25 min drive)
 5397 South Boulder Road
 Boulder, CO 80303
 (303) 499-4422;
 FAX: (303) 494-0269
 Single \$84, Double \$89; 20 rooms; 9.7% tax;
 pool/breakfast

Ramada Inn, Boulder (formerly the Holiday Inn)

(across from U of CO - 25 min drive)
 800 - 28th Street
 Boulder, CO 80303
 (303) 443-3322;
 FAX: (303) 443-0397
 Single/Double \$83; 30 rooms; 9.7% tax; pool/spa

University of Colorado Williams Village Dorms

(25 min drive)
 Register via web only
 60 Singles: ~\$258/person (June 17-21) + ~\$50/person
 each extra night + 9.7% tax
 40 Doubles: ~\$137/person (June 17-21) + \$25/person
 each extra night + 9.7% tax

2000 CEDAR WORKSHOP TUTORIALS AND VIDEOS AVAILABLE

The videos and hard copy tutorials for the 2000 CEDAR Workshop are complete. There were four tutorials, and a panel, as well as the CEDAR Prize Lecture. Except for the Panel Discussion on Planetary Atmospheres, all are available in hard-copy form free from Barbara Emery (emery@ucar.edu, HAO/NCAR, P. O. Box 3000, Boulder, CO 80307). The video tapes are on two 160 min tapes in NTSC (\$40) or PAL (\$55) format as:

Tape 1 of 2:

1) Tutorial #2:

F.-J. Luebken, University of Rostock, Germany - 57 min
 "The Thermal Structure of the Upper Mesosphere and its Relationship to Layered Phenomena"

Tutorial #1:

S. Bougher, University of Arizona - 60 min

"Comparative Terrestrial Planet Thermospheres: Venus, Earth and Mars"

Panel: Panel Discussion on Planetary Atmospheres - 28 min

M. Mendillo (moderator)

T. Slanger (Venus 557.7 nm)

M. Sulzer (Venus ISR obs?)

M. Hagan (Mars atmospheric waves)

M. Galand (solar system airglow/aurora workshop)

S. Bougher (tutorial speaker)

Tape 2 of 2:

2) CEDAR Prize Lecture: J. Semeter, SRI International - 48 min
 "The Information Content of the Aurora"

Tutorial #4: H. Singer, NOAA/SEC - 50 min

"The Magnetosphere and Space Weather"

Tutorial #3: J. Salah/J. Foster, MIT - 51 min

"Ionospheric Effects and Storm Studies: A Tribute to Michael Buonsanto"

Single tapes run \$25 each for NTSC format and only come in the above order. Please contact Barbara Emery with credit card information or checks made out to Garkie Audio/Visual Services to order video tapes. Tutorials and CEDAR Prize Lectures available in video, hard-copy, or other forms for previous years listed at <http://cedarweb.hao.ucar.edu/wkshp/videolist.html>

- Barbara Emery, HAO/NCAR

This is my last issue as editor of the CEDAR Post. Thanks to everyone who has helped make this newsletter worthwhile, beginning with the previous CSSC chair and editor, Joe Salah, and his very capable editorial assistant Heidi Johnson. They were invaluable in guiding me through the process.

Several colleagues were particularly generous with their time

and writing ability: Barbara Emery, Peter Fox, Nancy Crooker, Don Farley, Ray Greenwald, Tim Kane, John Meriwether, Chiao-Yao (Joe) She, Jeff Thayer, and Jeng-Hwa (Sam) Yee.

Other contributors to whom I am very grateful are Tom Duck, Jeff Forbes, Jonathan Freidman, Maura Hagan, Rod Heelis, Mary Hudson, Dave Hysell, Mike Kelley, Janet Kozyra, Miguel Larsen,

Dirk Lummerzheim, Bob Meier, Donal Murtagh, Kazem Omidvar, Jim Russell, Bob Schunk, Abas Sivjee, Roger Smith, Tony van Eyken, and Dick Wolf.

Last, biggest thanks to our NSF colleagues Rich Behnke, Sunanda Basu, and Bob Robinson, without whom none of this would be possible!

- C. G. Fesen, U. of Texas at Dallas





The CEDAR Post

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75961

The CEDAR Post is published
three times a year and is mailed to
more than 1200 scientists worldwide.

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