



The Cedar Post

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Workshop Announcement - The January 1993 Campaign January 8-10, 1994 in Boulder, Colorado

A 10-day World Day Run, the first experiment of this duration, was carried out in January 1993. Sites reporting observations include Christmas Island, Jicamarca, Arecibo, Shigaraki, Millstone Hill, Saskatoon, and EISCAT. In order to maximize collaborative science and to facilitate the interpretation of the data in a global context, a workshop will be convened in Boulder, CO on January 8, 9, and 10, 1995. The workshop has several goals: to identify particular science studies and the datasets, model results, etc., necessary to conduct the studies; to provide an environment enabling these studies; and to facilitate participation in them.

Some potential areas for investigation include: evaluating the benefits (if any) of 10-day observing runs; the spectral content of the winds and temperatures from 80 to 300 km; multi-day waves; gravity waves; the transition from quiescent to disturbed conditions in the thermosphere/ionosphere system; electrodynamics; lower atmosphere/upper atmosphere coupling; and analysis of multi-instrument observations at Arecibo. Suggestions are most welcome and should be sent to the conveners listed below.

The aim is for the workshop to be highly interactive and "hands-on," i.e., a true WORK-shop. To this end, most of the sessions will be held at the NCAR Foothills Laboratory with access to workstations, terminals, printers, and a library. At least some of the datasets and model results will be placed in a computer database before the workshop for perusal by the group. Participants are encouraged to come prepared to work, discuss, argue, and collaborate extensively and intensively for three days. Any suggestions on how to achieve these goals would be much appreciated by the conveners.

We welcome input, and are currently exploring the possibility of partial travel support for workshop participants. To be placed on the mailing list, to receive further information, or to make suggestions, please send email to fesen@tides.dartmouth.edu (FAX: 603-646-1446).

Conveners: Cassandra Fesen and Roberta Johnson

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The NSF program CEDAR (Coupling, Energetics and Dynamics of Atmospheric Regions) held their ninth summer workshop in Boulder, Colorado, June 20-25, 1994. A total of 348 persons came from 37 universities and 34 research installations, with 13 institutions in 8 countries outside the US. They attended plenary meetings and workshops on topics related to ground-based studies of the atmosphere between the stratosphere and the magnetosphere. NSF supports students every year, and this year 155 participated, including 2 from Canada, 1 from Australia, and 1 from Japan. Last year there were 397 participants, including 174 students. (The greater participation last year can be attributed at least partly to the Data Analysis School, which was taught all day on the final Saturday.)

Hosted by HAO, the CEDAR Workshop also drew support from the University of Colorado. Monday through Friday, the plenary sessions were held in Math 100 on campus, with afternoon workshops at the Mesa and Foothills Labs. Raymond Roble of the High Altitude Observatory (HAO) at NCAR gave the CEDAR Prize Lecture on *Modelling the Circulation, Temperature and Compositional Structure of the Upper Atmosphere (30-500 km)*. The tutorial topics this year were: (1) Planetary Ionospheres by Andrew Nagy of the University of Michigan, (2) Coupled Energetics, Chemistry and Dynamics in the Terrestrial Mesosphere and Lower Thermosphere by Martin Mlynczak of NASA/Langley, (3) Ionospheric Effects of Lightning Discharges by Umran Inan of Stanford University, and (4) Auroral Acceleration Processes by Patricia Reiff of Rice University. A fifth, less traditional tutorial was a series of talks on Computer Networking and Telescience. These lectures were videotaped, and videos and hard copies of the lectures will be available for students and researchers. Ninety-five participants have already signed up for free copies of the lecture notes, which will be sent out in early September. [For copies of the videos and/or notes, please contact Barbara Emery (address at end).]

Telescience

This year, there was a great deal of interest in telescience, which can be termed "doing science at a distance." Since telescience is very dependent on computer networking, the session started with Yadunath Zambre of SRI International and an *Introduction to Computer Networking*. Telescience includes changing the operating mode of instruments at a distance, real-time display of data, and text windows for distant researchers to communicate in.

Robert Clauer of the University of Michigan wrote an article on the Upper Atmospheric Research Collaboratory (UARC) attempting telescience with the Sondrestrom Upper Atmospheric Research Facility in Kangerlussuaq, Greenland [see the June 28, 1994 issue of the American Geophysical Union (AGU) publication, *EOS*]. His psychologist colleague, Thomas Finholt, gave a short talk on *Virtual Science: Lessons from the UARC Experience* during the CEDAR workshop, which revealed that UARC can be very valuable for retrospective, collaborative data analysis, and not just real-time data analysis.

Other facilities are doing a great deal with the World Wide Web or mosaic servers. John Holt of Millstone Hill and Tony Van Eyken of the EISCAT Scientific Association in Norway gave talks on this application. Finally, Brenton Watkins of the University of Alaska described their telescience activities with Alaskan instrumentation, and links to Sondrestrom and to Japan, using mosaic and collage, among other software tools. Demonstrations of UARC and mosaic were shown in the afternoon Data Base Workshop following the telescience tutorial.

Posters

About 75 participants (57 students), showed their posters in the cafeteria atrium at Foothills. The first poster session was on **RF Techniques and Ionospheric/Plasma Studies**, with the prize for best student poster going to Abhijit Bhattacharyya of the University of Nebraska for his "High-resolution measurements using frequency domain interferometry." Honorable mention was given to posters by Meers Oppenheim of Cornell, and Scott Palo and Todd Valentic, both of the University of Colorado. The second session was on **LIDAR/Optical and Neutral Studies**. John Noto of Boston University won the student prize for his poster on "Near infrared observations of thermospheric helium from Millstone Hill." Honorable mentions went to Helen Xiangqun He of Boston University, Thomas Immel of the University of Alaska, and Jacqueline Schoendorf of the University of Massachusetts in Lowell. (Jackie is finishing her thesis work as a student in HAO, working with Raymond Roble.) Winners were awarded copies of Michael Kelley's book, *The Earth's Ionosphere*.

Workshops

Among the twenty workshops this year (including the demonstrations of telescience and mosaic), several new ones were offered: Student Experience Panel, ISTEP/GGS (International Solar Terrestrial Physics/Global Geospace Science) - CEDAR Campaign, Formats, Proton Aurora, Auroral and Airglow Structure Tomography, Needs for Laboratory Aeronomy Data, and CEDAR/TIMED (Thermosphere, Ionosphere, Mesosphere: Energetics and Dynamics) Collaborative Science. For the first time since the initial meetings defined the CEDAR Data Base binary format, **formats** were discussed at a CEDAR Workshop, and it was decided that the netCDF (Network Common Data Form) software developed by Unidata, an NSF-sponsored program in Boulder, would be a secondary standard for the CEDAR community, along with the present CEDAR Data Base Format.

Student Experience Panel

A new idea headed by Monica Coakley of the University of Wisconsin (student rep on the CEDAR Steering Committee), and John Sahr of the University of Washington, the student experience panel proved highly beneficial for the 80 students who attended. In the first half (for students and recent graduates only), younger students asked a panel of older students such questions as, "What is a Lidar?" The second half featured a panel of recent graduates who described their experiences in finding a job, and shared tips on available fellowships and other subjects. Due to strong interest expressed in industry, the 1995 CEDAR Workshop should involve industry people. Students also requested another "basic question" session just before the regular CEDAR Workshop in 1995. Clark Miller of Cornell University is the new CEDAR Steering Committee student representative.

Still to Come

The International Union of Geodesy and Geophysics (IUGG) will meet on campus in Boulder from July 3 - July 14, 1995. To take advantage of the timing and allow for increased foreign participation, the 1995 CEDAR Workshop will be held in Boulder at NIST (National Institute for Standards and Technology), and both NCARs between Sunday, June 25 and Friday, June 30. Rooms for the 1996 CEDAR Workshop have been reserved at the University of Colorado in Boulder for June 15-22, 1996. For more information, please contact Barbara Emery [HAO/NCAR, P. O. Box 3000, Boulder, CO 80307, (303) 497-1596, Fax (303) 497-1589, e-mail emery@ncar.ucar.edu].

Barbara Emery, HAO/NCAR

OPPORTUNITIES FOR NSF FUNDING

The CEDAR community should take note of the following two additional opportunities for funding from NSF divisions other than atmospheric sciences.

The Academic Research Infrastructure Program is designed to improve the condition of research equipment and facilities in academic and independent nonprofit research institutions. The program assists in the acquisition or development and maintenance and technical support of major research instrumentation that is not usually available through other NSF programs. Awards range from \$100,000 to \$2 million for one year.

Substantial cost-sharing is required. The total funds available in FY95 are not yet known, but an increase over the FY94 allocation is expected. The closing date for the last competition was March 15, 1994. We will advise the CEDAR community either via e-mail or the CEDAR Post when the information pamphlet for next year's competition is available.

The Computer and Information Science and Engineering (CISE) Directorate of NSF plans a limited number of grants for support of postdoctoral research associateships in two areas; (1) to increase expertise in the development of innovative methods and software for applying high performance, scalable parallel computing systems in solving large scale computational science and engineering problems, and (2) to increase expertise in CISE experimental science by providing opportunities for associates to work in established laboratories performing experimental research in one or more of the research areas supported by the CISE Directorate. The **deadline for submission is November 1, 1994**. Information is currently available on STIS, the NSF on-line directory of documents. Access information is provided in the Grant Proposal Guide.

Bob Robinson, Sunanda Basu

Coordination of New CEDAR Science Steering Committee (CSSC)

At the conclusion of this year's workshop, Ray Roble, Jim Hecht, Craig Tepley, Mike Kelley, and Monica Coakley completed their terms on the committee. We are indebted to them for their leadership, service, and commitment during the past three years.

For the next two years, Jeff Forbes will serve as CSSC Chair, replacing Mike Kelley. Monica Coakley, student representative, is being replaced by Mr. Clark Miller for a one-year term. We are fortunate to have John Holt, Bob Kerr, and Cassandra Fesen as replacements for Jim, Craig, and Ray, each for three-year terms.

Listed below are the names and addresses of the current CSSC members for 1994-95. You are invited to contact any of these individuals as a means of bringing matters to the attention of the CSSC committee.

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Student Experience Workshop

The Student Experience Workshop was held on Monday, June 25, 1994, at the annual CEDAR meeting. The workshop had two main purposes: to help students learn about important experimental techniques in the CEDAR community; and to provide information about the job market. A series of panels addressed each topic during a three-hour period.

Before the break, four successive panels were convened on the topics of Passive Optical Instruments, Active Optical Instruments, Radio Instruments, and Modelling. The Passive Optical Instruments Panel included Brooke Hatfield (U. of AZ), Susan Nossal (U. of WI, Arecibo), John Noto (Boston U.), and Doug Drob (U. of MI). The Active Optical Instruments Panel consisted of Ian Monson (UT State), Richard Collins (U. of AL), Jonathan Friedman (Arecibo), and Jun Quian (U. of IL). The Radio Instruments Panel members were Helen He (Boston U.), Denise Thorsen (U. of IL), Peter Sultan (Boston U., AFGL), Phillip Erickson (Cornell). The Modelling Panelists participants were Jackie Schoendorf (U. of MA) and Pete Carter (Boston U.). These two hours of the workshop provided all the participants with an opportunity to learn from other students. This was done in order to reduce both the anxiety in asking fundamental questions and the number of unfamiliar terms in an explanation. Each panel thoughtfully answered audience questions and lent their insight and experience to a discussion of the advantages and disadvantages of various instruments and techniques. Questions were often along the line of "What exactly is a ...?" and "What quantity does it directly measure?" Although these may be considered basic questions, it is important that students have an opportunity such as this to expand their knowledge in the name of better future research.

Panelists' comments were helpful both to students attending the CEDAR meeting for the first time and to the more senior students. Students were excited about obtaining pertinent details that are often left out of papers, talks, workshops, and even tutorials. It is important to realize that all the students attending CEDAR do not have the same background course-work, and that the more senior students have spent the majority of their graduate school careers becoming expert on a fairly narrow range of topics. Possible ramifications of sessions such as these include more collaboration with the advent of on-line data bases, as well as a broader education for future peer reviewers. The ex-

change of information with the panelists went so well that great interest was generated in holding a similar workshop next year with an expanded time slot (such as the "school" time slot of the previous Sunday or workshops during several afternoons) on a variety of topics. A bibliography of review articles, and the possibility of Principle Investigators serving on a panel were two good suggestions put forth.

After the break, an additional panel of recently employed new PhD's discussed their experience in finding jobs. The panelists were Richard Collins (U. of AL), Jonathan Friedman (Arecibo), Judy Cumnock (U. of TX), Peter Sultan (AFGL), Susan Nossal (Arecibo), Jeff Johnson (APL), Scott Palo (U. of CO, HAO), and John Sahr (U. of WA). Several of the panelists felt that they were fortunate to have been in the right place at the right time in obtaining their positions. This stresses the importance of making contacts for networking, especially at the annual CEDAR meeting. Other factors considered important in finding employment were advisor assistance, prior teaching experience, and persistence. A hotly debated topic was whether industry is interested in PhD's, or actually prefers applicants with Master's degrees. The extent to which a graduate student is expected to proceed into an academic setting vs. an industrial setting was also discussed. Many participants felt that industry could not be effectively addressed, as only a few attendees had direct industry experience. Employment options can be explored more extensively through industry representation, which John Sahr will coordinate for the 1995 CEDAR meeting. Please send suggestions for possible speakers to him via email at jdsahr@zoyd.ee.washington.edu.

The CEDAR community frequently stresses student involvement. For the first decade of CEDAR, that has meant, principally, an exposure to the science and the science organization behind experimental campaigns and model development. With the changing political and economic situation, it is appropriate that CEDAR assist students in the complicated task of finding employment in or out of aeronomy.

To that end, we hope to begin an online resumé service and a regional listing of interested employers. We also wish to explore special topics for John Sahr and Clark Miller to develop for next year's student specialty workshop. Please send them your suggestions.

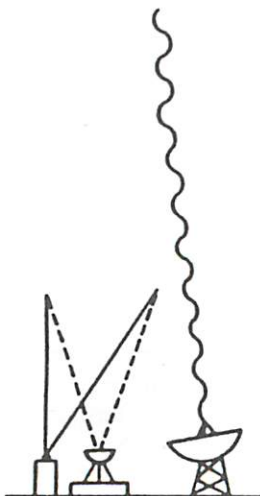
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Summary and Conclusions

The purpose of this workshop was to start developing a strategy for collaboration between the CEDAR program and the TIMED mission. On a conceptual level, the synergy between ground-based and space-based observations is obvious. However, the need exists to articulate in quantitative terms the key areas of synergism, and in particular to identify the level and type of support needed to realize these possibilities. The workshop is the beginning of a year-long grass-roots process expected to culminate in the documentation of ideas and initiatives which have received extensive inputs and review throughout the community. This documentation could also be used as the basis of a NASA AO addressing a TIMED Mission ground-based component, should such an opportunity materialize.

Approximately 60 people attended the morning session, 25 continuing through a lunch kindly hosted by Stan and Sharon Solomon, with a proactive subgroup of about 10 continuing in the afternoon.

Convenor J. Forbes initiated the workshop by outlining objectives and presenting an overview of the measurement capabilities of the various TIMED instruments. This was followed by a series of brief, impromptu presentations: C. Hines warning of possible shortcomings of MF radar wind data; G. Swenson, describing the synergism between ground-based, aircraft-based, and satellite-based observations of atmospheric waves; E. Szuszczewicz, on global ionosonde contributions; J. She, on capabilities of lidars. Much debate and discussion ensued. A brief summary of the important points and conclusions follows.



One conclusion of the morning session was the need to construct an "instrument template" upon which the capabilities (observables, height range, resolution, etc.) of various generic CEDAR instruments (i.e., Fabry-Perot interferometers, incoherent scatter radars, etc.) would be "mapped." These templates would then serve as a common set of building blocks for construction of "integrated system" capabilities, i.e., for a given instrument cluster. For example, a bar-graph representation of the height and local time capabilities for determining neutral winds could be constructed for the Millstone Hill Observatory. This construction then forms the basis for evaluating synergism with TIMED measurements of winds in relevant observing volumes. (Obviously, such a representation will prove invaluable for a number of other purposes, such as illustrating the relative contributions of different instruments or the need for additional instrumentation to fill key data gaps).

Dr. Bela Fejer has agreed to serve as the coordinator for definition of the template, and to collect completed templates from various instrument P.I.'s. This is a formidable task, for which Bela will be seeking CEDAR Community assistance.

Much discussion revolved around identifying areas of potential synergism between CEDAR and TIMED. The following initial list was drawn up, and some of the area coordinators assigned as follows:

Instrument Template (*Bela Fejer*)
Energy Deposition and Loss (*Stan Solomon*)
Large-Scale Dynamics (*Jeff Forbes and Roberta Johnson*)
Gravity Waves (*Michael Taylor*)
**State of the Global Ionosphere/
Electrodynamics** (*Ed Szuszczewicz*)
Polar/Auroral Processes (*Roger Smith*)

The tasks of the area coordinators are to work with the community to identify those scientific problems which are best addressed by coordinated space-based / ground-based observational programs, and to articulate ways in which these synergistic capabilities can be exploited with a realistic deployment of resources. The above individuals will be seeking assistance from the CEDAR Community. You are encouraged to initiate contact with any of the above individuals, or with overall coordinator Jeff Forbes, to express your views and offer assistance.

Jeffrey M. Forbes, Workshop Convenor

HLPS/GAPS Workshop Held at Peaceful Valley, Colorado

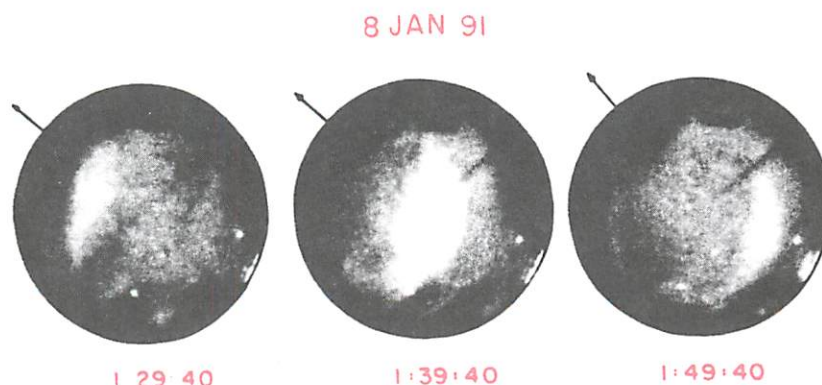
The HLPS (High Latitude Plasma Structures) Group of CEDAR, with its Solar Terrestrial Energy Program (STEP) Working Group 3 counterpart GAPS (Global Aspects of Plasma Structures), held a joint, three-day workshop June 27-29, 1994, at the Peaceful Valley Lodge and Conference Center in Lyons, Colorado, located about 30 miles north of Boulder in a pleasant mountain environment. The beautiful location, together with the meeting format which provided free afternoons, maximized interactions between participants, a feature that graduate students, in particular, found to be very productive. Forty-seven participants attended the workshop which was funded primarily by the CEDAR Program of the National Science Foundation, with a small grant from the International Science Foundation. The STEP international participation was achieved through the attendance of fourteen scientists representing the following countries: Russia, Canada, Australia, Brazil, Japan, and China. This was the second HLPS/GAPS Workshop held at Peaceful Valley, with two years elapsing between visits. Eighteen of the papers presented at the Workshop were selected for publication in a special section of the January/February 1994 issue of *Radio Science*, Sunanda Basu as guest editor.

The HLPS/GAPS working groups' first research objective is to understand the physics of macro-scale ionospheric structure, including the growth, transport, and decay of these structures. The first three sessions, entitled "Patches," "Future Topics and Campaigns," and "Sun Aligned Arcs," chaired by Ed Weber, Rod Heelis, and Jan Sojka, respectively, addressed these macro (10's to 100's of km) structures. Significant advances have been made since the first workshop in bringing together observations from multiple instruments at multiple locations and analyzing them to test the predictions of both patch and sun-aligned arc models. One argumentative highlight was the realization that with at least three different observation techniques in operation (low light level 630 nm observations; ground-based radio soundings [ISR (Incoherent Scatter Radar), CADI (Canadian Automated Digital Ionosonde), DISS (Digital Ionosonde Sounding System)]; and satellite *in situ* plasma measurements), a patch has quite a different meaning to different researchers. Hence, the group took the first steps toward reconciling these definitions, and a new set of observational campaigns have been planned.

The second and more long-range objective of the group is to understand the role of macroscale structures in the generation of plasma irregularities. This aspect is particularly relevant to all forms of radio wave propagation through, or reflection from, the ionosphere. However, the problems of understanding the coupling of these phenomena on both dramatically different spatial and temporal scales will be a long-term problem. In sessions four and five, entitled "Irregularities Part I" and "Irregularities Part II," chaired respectively by Mike Keskinen and Jim Vickrey, this macro-to-microscale problem was addressed and debated. These presentations did show some success in approaching the problem and most certainly defined the application communities need for realistic ionospheric irregularity models. The open workshop environment allowed extended discussions on the next step in this coupling that focused on the need for observational campaigns to monitor more information on irregularities, i.e., TEC, coherent scatter, as well as driving irregularity models from macroscale models and observations.

A selection of papers from this Workshop will be published in a special section of *Radio Science* with Ed Weber acting as the guest editor. In addition, a more detailed meeting report is to appear in the AGU *EOS* magazine. The CEDAR HLPS Working Group is co-chaired by Jan Sojka (Utah State University) and Ed Weber (Phillips Laboratory), while the STEP GAPS Working Group is chaired by Sunanda Basu (NSF Aeronomy Program Director).

Jan J. Sojka, Utah State University



Sequence of images displaying polar cap patches. The bright bands of luminosity are airglow associated with the enhanced density seen inside the patches. These polar cap patches were observed by the imager at Qaanaaq (77.5°N, 69.2°W) using the 630 nm filter. The arrow denotes the direction of the sun and the bright patch can be seen to move antisunward in the three images. (Courtesy of C. Valladares)



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The Cedar Post is published quarterly and mailed to more than 1000 scientists worldwide.
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CEDAR Chips

The editor invites submissions to the CEDAR Chips section of the Post. The purpose is to provide an informal forum for anyone to briefly address issues, controversial topics, etc. Replies to such commentaries are also welcome. We will initially experiment with a 250-word limit. Any comments?

