The Cedar Post

Quarterly (or as needed) Newsletter for the CEDAR AERONOMY COMMUNITY

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Editor
G. J. Romick

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Assistant Editor
Sheila Finch

NEWSLETTER CIRCULATION:

Our mailing list now includes over 450 scientists in the U.S. and abroad.

DISTRIBUTION:

Everyone on the distribution list will receive a copy of the new Volume I. New Volume II, which includes the radar sub-committee contributions will be mailed to those requesting a complete Volume II and all those who previously received Volume II will receive a copy of the radar reports as a supplement. All those requesting copies of the various CEDAR reports at the annual meeting should be getting them soon.

The CEDAR annual workshop was a huge success with 160 in attendance.

Each morning there was a tutorial lecture followed by a science session. We have videotapes of the whole meeting. We are putting together a composite tape of the tutorials only. They were:

George Sisco - Magnetosphere-Ionosphere Coupling
Colin Hines - Gravity waves
Gordon Shepherd - Modern Optical Techniques
Robert Vincent - Coherent Radars
Richard Behnke - Incoherent Scatter Radar

Each lecture is about one hour long. The composite VHS tape will last about 5 hours and you can duplicate it for your future use. Please send G. J. Romick your name and address if you want to add your name to the list. Do not anticipate receipt before October or November because the number of loaner copies is limited.

The following brief reports are from some of the workshops that took place during the week. Others will be described in the next CEDAR POST.

GLOBAL THERMOSPHERIC DYNAMICS

The workshop considered the quiet world period January 14-17, 1986. Data was available in some detail from the radars at EISCAT, Millstone, Sondrestrøm and Arecibo, and from the optical interferometers at Svalbard, Kiruna, Thule and Fairbanks. Summary plots were circulated in a pre-meeting package and also at the beginning of the session. Additional supporting data, other than the easily scaled magnetic and solar indices, were available for the energy deposition rate due to particle precipitation (Dave Evans kindly supplied this from his data base) and the AE Index (specially computed at the Geophysical Institute, University of Alaska). There was an on-line data base facility available for the use of participants who needed extra data or different presentations during the meeting, this provision was experimental and thanks are due to Roy Barnes and Barbara Emery for their assistance.

The meeting was designed to dispense with an extensive symposium session by distributing data beforehand so that the maximum time could be spent in discussion and work on the data at hand. The workshop commenced with short introductory presentations by the organizer and others with special information to contribute, the goal being to review the data set in a form which enabled the participants to get a comprehensive grasp of the period in terms of the thermospheric dynamics and related ionospheric behavior. In this review, geographic plots of thermospheric wind and ion drift were presented showing the data from several radars and interferometer stations in one diagram. The wind pattern over the high latitude region of the northern hemisphere was sampled at a maximum of four points (corresponding to the four interferometer stations with data) for each hour of U.T. Overlaid with this were the ion drift vectors from Sondrestrøm and a representative neutral wind model (VHS low solar activity, winter solstice provided by Dr. T. L. Killeen). Thus, we were able to note the agreement and disparity between the measurements and the simulation. This perspective on the measured winds is essential to the proper understanding of the data. Exospheric temperature and meridional wind data were presented by Dr. Maura Hagan from the meridional chain of radars, Sondrestrøm-Millstone-Arecibo giving a more global view of the study period at 75W. Dr. G. Crowley provided wind data from the EISCAT radar. Contact the organizers for the major points of discussion and future plans.

There is to be a merger of this thermospheric dynamics workshop and the GITCAD analysis activity. The responsible persons will be Drs. J. W. Meriwether, K. Miller, R. W. Smith and V. Wickwar with John Meriwether assigned to lead the analysis of the first GITCAD period, January, 1987. The next workshop is to be arranged outside the CEDAR general meeting.

HIGH LATITUDE PLASMA STRUCTURE (HLPS)

This working group was convened to advance our understanding of the source, evolution and ultimate fate of high latitude plasma structure covering the scale length ranging from hundreds of km to m. Since the scale length range is so large, different techniques are necessary to probe the irregularities and sense the background neutral and plasma parameters associated with irregularity generation and decay. With this objective in view, specialists involved in incoherent scatter and coherent scatter radar studies, in-situ measurements, gravity wave, optical imaging, neutral wind, plasma convection, scintillation and total electron content (TEC) studies were present as were theorists and modelers.

A consensus quickly developed that it is important to follow the evolution of large (several hundred km) "patches" in the polar cap seen under IMF B_z south conditions, follow their trajectories under different B_y conditions, study their smaller scale structuring in the combined neutral wind/plasma convection field, track their possible entry into the nightside oval and identify their conversion into auroral "blobs". In the auroral oval, it is important to study the effect of structured velocity fields usually seen on the edges of auroral arcs as an independent source of km and smaller scale irregularities, distinct from those related to the blob-associated gradients. The importance of performing the above studies in both the dark and sunlit polar caps was emphasized as was the need for performing convection studies in conjugate hemispheres. A three-year study during the rising phase of solar cycle is envisaged to sort out the complex morphology and physics. In particular, the current low-level of the sunspot cycle makes it difficult to perform studies on patches/blobs.

A campaign is being planned in mid-February, 1988 during the evening to post-midnight local time frame, involving the Sondrestrøm Fjord and Millstone Hill radars. The Goose Bay and Halley Bay conjugate HF radars, the all-sky imaging photometers and Fabry-Perot interferometers at Sonde and Qanaq, scintillation/TEC measurements from Sonde, Thule and Goose Bay using quasi-stationary and GPS satellites, as well as in situ measurements using the DMSP F-7 and F-8 and the Hilat and Polar Bear satellites. The emphasis for this campaign will be on velocity shears as sources of irregularities and convection patterns and M-scale irregularities in conjugate hemispheres rather than on patches and blobs for the reason mentioned above.

A campaign planning meeting will be held during the Fall AGU meeting at San Francisco in December 1987. For further details and meeting participation in the campaign, contact: Sunanda Basu, Emmanual College, Boston, MA 02115, Phone (617) 377-2017; SPAN Mail Box AFGL::MACKENZIE.

LOWER THERMOSPHERE COUPLING STUDY

The purpose of the CEDAR Lower Thermosphere Coupling Study LTCS Workshop was to coordinate the observational campaign scheduled for 15 September - 15 October, 1987, with a 5-day core period during 21-25 September, and to modify the LTCS Preliminary Planning Document as needed. The workshop was informal with no prearranged agenda, and open to all CEDAR participants. J. Forbes (Chairman, LTCS Coordinating Committee) presented a brief overview of the LTCS and reported on status of lower thermosphere radar participation in the LTCS (on behalf of A. Manson, Chairman, Lower Thermosphere Radar Committee) and J. Salah (Chairman, Incoherent Scatter Radar Committee) and T. Killeen and P. Espy (Co-Chairman, Optical Measurements and Committee).

Lengthy discussions ensued regarding the appropriateness of various E-region operating modes for the incoherent scatter radars, the problems involved in the removal of F-region and auroral contaminating effects from 5577Å Fabry-Perot determinations of lower thermosphere winds and temperatures, and the need for comparing Fabry-Perot and radar determinations of winds. It was the consensus of the workshop that all experimental data be provided in a format acceptale to the NCAR data base, and that the committee chairman, J. Salah, T. Killeen, P. Espy, and A. Manson serve as focal points for the deposition of these data into the data base for their respective areas.

GITCAD

The GITCAD (Global Ionosphere-Thermosphere Coupling and Dynamics) Workshop involved a one-afternoon meeting to provide a report of the coverage achieved during the initial GITCAD I (January 27-30, 1987) coordinated observations period and to set up a structure to facilitate:

1) timely analysis of the data by the various investigators and forwarding to a central collection point,
2) intercomparison of the results from the various instruments at a given site,
3) a search for correlations among the globally distributed sites to determine propagation time- and space-scales,
4) extraction of the underlying physical processes responsible for the observed phenomena,
5) construction and/or refinement of global models of the F-region plasma and the neutral upper thermosphere, including appropriate coupling between them, and testing them against the global, coordinated observations.

Many of the instruments distributed around the globe, e.g., the Fabry-Perot interferometers (thermospheric neutral winds and temperatures), the incoherent scatter radars and others (plasma drifts, electron and ion temperatures and densities), ionosondes (electron density distributions), reported successful measurements during the GITCAD I observing period, and some preliminary reduced data have been collected.

A coordinating group has been set up to achieve the objectives stated in the previous paragraph; its members are:

Dr. J. Meriwether, Jr., U. Michigan
Dr. K. Miller, Utah State U.
Dr. R. Smith, U. Alaska
Dr. V. Wickwar, SRI, Int'l

Responsiblity for the GITCAD I program has been assumed by Dr. Meriwether, whose full address is: Space Physics Research Lab, U. Michigan, 2455 Hayward, Ann Arbor, MI 48109-2143; (313) 763-6246. SPAN (SPRLC::MERIWETHER)

The GITCAD observation periods have been chosen to build a data base which documents seasonal and, in the longer term, solar-cycle changes. They have been scheduled quarterly insofar as possible, centered on the equinoxes and solstices, a pattern which is expected to continue.

GISMOS

Unifying theme: The transition of the Magnetosphere-Ionosphere system from one level of activity to another. This program was divided into four sub-groups.

Sub-Group 1: (Evans)

Addresses the spatial relationships between features in electric current, convection, and precipitation patterns.

We have defined an approach which involves individuals identifying, using objective criteria, features in their respective data sets. These feature identifications will form the data base for further study. The format and the mechanics of assembling the data were determined. While the entire set of GISMOS periods will be used, the January, 1984 interval was selected for the initial testing of our approach.

Sub-Group 2: (Rostoker and Lyons)

Addresses the spatial and temporal variations in convection and precipitation at the expansive phase of sub-storms and the relation between those ionospheric features and magnetospheric processes.

A well documented sub-storm expansion over Greenland during the April, 1986 GISMOS interval was selected for detailed study using the Sondre radar, the Greenland magnetometer chain, and imagery from VIKING and DE. The scientific issues were defined and the collection and analysis of the data began during the workshop.

Sub-Group 3: (Rasmussen)

Addresses the comparison of various global ionospheric and thermospheric models with both observations and with each other when using the same geophysical input specifications.

Among the models eligible for this exercise are:

The UCL coupled ionospheric-thermospheric model
The Utah ionospheric model
The NCAR thermospheric global circulation model

The Richmond approach to specifying the instantaneous convection, conductivity, and Joule heating patterns is the candidate to supply the common input specification for the model inter-comparisons. The GISMOS period of January, 1984 will probably be selected as the test period.

Sub-Group 4: (Fejer)

Addresses the coupled problems of the shielding of the high latitude convection electric field from low latitude during periods of geophysical stability and the penetration of that electric field to low latitude during substorms.

The discrepancy that existed between the predictions of the Rice convection model and the observations at Jicamarca appears to have been solved by including wind dynamic effects, the winds propagating from the disturbed region at high latitude to low latitude as described by the NCAR GCM. Observations of electric field penetration to low latitude from other sites are being examined in search of longitudinal effects.

For details and future plans, contact the various sub-group leaders or Odile de la Beaujardiere. It is anticipated that collaborative proposals will be submitted for the reduction and analysis of the available GISMOS interval observations. Plan for a possible January, 1988 GISMOS campaign to take advantage of DE imaging in the northern hemisphere prior to possible termination of that program due to shortage of funding.

COMPOSITION WORKSHOP

This workshop dealt primarily with the Sondrestrøm 1986 and 1987 optical/radar measurement programs. The meeting was held on the afternoon of July 1, 1987. There were approximately 12 people in attendance.

The measurement problems for weak OII and NII lines was the first item of discussion. This was stimulated by work described by Fred Rees and Dirk Lummerzheim. It was decided that an effort will be made in the next campaign to measure the OII (4416Å) line (Bill Sharp) and OII (7320Å) line (Abas Sivjee) in addition to the usual measurement set. Pat Espy also agreed to check into the deployment of a 1/2 m spectrometer at Sondre for this winter.

The next campaign is tentatively scheduled for January, 1987 during new moon conditions. It is anticipated that a radar upgrade to provide better altitude resolution in the E-region will be completed by that time.

People interested in this program should contact Andrew B. Christensen, Mail Station M2-255, The Aerospace Corporation, P.O. Box 92957, Los Angeles, CA 90009, or SPAN mail address: DIRAC2::CHRISTENSEN.

MAPSTAR

The Middle Atmospheric Periodic STructured Atmospheric Radiance workshop was focused upon planned participation in the MAC-EPSILON coordinated measurements campaign to be conducted in northern Scandinavia in October and November of 1987. The MAPSTAR participants include Air Force Geophysics Laboratory, Utah State University, University of Southampton, University of Western Ontario, University of Alaska, Brigham Young University, and University of Cincinnati.

During the MAC-EPSILON campaign, optical instruments will be operated from ground sites in Norway, Sweden and Finland. These sensors include near IR interferometer-spectrometers in three sites (Skibotn, Kiruna, and Andoya), 2-D NIR video photometers at three sites, (Skibotn, Pittiovaara and Tankavaara), NIR all-sky cameras at two sites, (Kiruna and Skibotn), NIR meridian scanner, (Andoya), plus auroral monitors at each site.

The emphasis of the coordinated MAPSTAR measurements, sponsored by AFOSR, is on the structure and dynamics of upper atmospheric near infrared emissions at high latitudes. Of particular interest are the spatial distributions of mesospheric OH radiation intensities and rotational temperatures, wave structures in the OH airglow can be observed to assist in characterizing and modeling atmospheric internal buoyancy, (gravity), waves. Auroral energy deposition appears to be a major source of large scale buoyancy waves at high latitudes.

The MAC-EPSILON campaign to study atmospheric dynamics is directed to the investigation of middle atmosphere turbulence by means of ground based observations and instrumented sounding rockets. The MAC-EPSILON team, with whom the MAPSTAR investigators will collaborate, plan three salvoes of instrumented upper atmospheric rockets, supporting meteorological sounding rockets, and ground based instruments. In Scandinavia, the latter include lidars on Andenes, Longyearbyen, Skibotn and shipboard; all-sky camera at Andenes and all-sky OH imager at Kiruna; Fabry-Perot etalons at Kiruna, Kilpisjarvi; spectrometers at Kiruna and Andenes; photometers at Andenes; radars at Ramfjordmoen and Bleik; ionosondes at Andenes and Ramfjordmoen; riometers at Andenes, Finland, Kiruna and Ramfjordmoen; and magnetometers at Andenes, Finland, Kiruna and Ramfjordmoen.

The MAPSTAR participation in the MAC-EPSILON campaign will complement the international investigation of the middle atmospheric turbulence at an apparent source. The MAPSTAR measurements will also be enhanced through MAC-EPSILON participation.

Theoretical papers directed to the MAPSTAR program included scientific uses of MAPSTAR data by E. Dewan, temperature estimates from OH radiation by J. Pike, et al., wave-driven airglow by J. Weinstock, super-saturated "gravity" waves by T. Van Zandt, new OH transition probabilities by D. Turnbull, and dynamics of OH emission "waves" by H. Yoshimoto. An interesting and informative discussion of buoyancy wave modeling was held involving Colin Hines, Ti Fu Tuan, Jerry Weinstock and Dave Fritts. Contact E. Dewan or D. Baker for more details.

OH CLIMATOLOGY

Data for four stations for the 1985-86 season have been received and the suggestion of processing these data into comparative plots on the same hourly or daily averages was suggested and will be acted on by G. J. Romick. Interest seemed present to continue this effort, but to merge it with the LCTS or MAPSTAR studies as part of the Climatological program and to combine data from other optical emissions, as well as Lidar and Radar programs. Discussion with these coordinating teams is planned. Additional interest in this area was expressed by Espy and others and their plans will be distributed to all those expressing interest in this area soon. Contact G. J. Romick for more details or to be put on the interest list if you are not already involved.

CEDAR DATA BASE WORKING GROUP

Approximately 50 people attended the CEDAR data base working group meeting. The group was in nearly unanimous agreement on several points.

1) The data base must contain only high "quality" measurements, i.e., measurements that are processed by accepted techniques published in the open, refereed literature.

2) These measurements must be easy to access and obtain from the data base. Most people favored interactive systems for transmission of small amounts of data. Magnetic tape could be used for larger segments of data, while in the future gigabytes of data could be accessed remotely using low-cost, high-density media such as optical disks.

3) The third point concerned the concept of what might be called "CEDARNET". Many people present at the meeting wanted a networked system to allow not only interactive communication with the data base, but peer-to-peer communication with colleagues at other institutions for the purpose of exchanging data and mail. A separate CEDAR network may be desirable, which would allow the use of a variety of micro and minicomputers and could include users who may not qualify as a SPAN node. The concept of autonomous use of the data base by un-networked individual users on personal computers (for instance at remote observing sites) was also discussed.

To investigate these point and begin to implement the data base, the CEDAR Steering Committee formed the data base committee. The committee, chaired by R. Sica, Utah State University, would consist of two sub-committees. The first sub-committee (input) is charged with deciding what parameters from each CEDAR instrument (and model) should be included in the data base, particularly at the summary level. The sub-committee would also address the question of deciding what constitutes sufficiently high quality measurements. The sub-committee will be linked to the Steering Committee through W. Sharp, University of Michigan. The members of the input group include:

M. Mendillo - Imaging
C. Gardner - Lidar
D. Torr - Modelling
J. Forbes - MS Radar
A. Richmond - NCAR Data Base
A. Sivjee - Spectroscopy
C. Tepley - Fabry-Perot Interferometry
V. Wickwar - Incoherent Scatter Radar

The input group will meet sometime in October to address these topics.

The second sub-committee (output) is charged with defining the user interface with the data base and to implement state-of-the-art methods for use of the data. T. Killeen, University of Michigan, will be the contact with the Steering Committee for the output group. The first gathering of this sub-committee will be in August at the IAGA meeting. Data base experts from NASA will meet with interested members of the community and demonstrate the current data management systems in use, and being planned, for NASA projects.

LOGO CONTEST

The Logo Contest has been extended until December 1st. Please send your offerings to Chairman, Steering Committee, G. J. Romick, Geophysical Institute, University of Alaska, Fairbanks, AK 99775-0800 prior to that date. Decisions will be made at the Fall AGU.

CEDAR POSTDOCTORAL VISITING SCIENTIST POSITION
High Altitude Observatory of NCAR*

The Terrestrial Interactions Section of the High Altitude Observatory (HAO) at the National Center for Atmospheric Research (NCAR)* has a Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR) visiting scientist position available starting on or after September 15, 1987 for a scientist recently receiving the Ph.D. The purpose of this position is to promote scientific research within the CEDAR program and establish a link between the magnetospheric, thermospheric, ionospheric, mesospheric, and electrodynamic modeling and data analysis efforts at HAO with the experimental and theoretical efforts at other institutions. This appointment is for a one-year period. The CEDAR postdoctoral visitor can reapply for the position, but a two-year maximum term will be imposed. This position will include the following scientific tasks.

1) Collaborate with members of the HAO staff and CEDAR community in supporting various CEDAR measurement campaigns and modeling projects.

2) Perform research using data obtained from various CEDAR projects, such as the Lower Thermosphere Coupling Study (LTCS), Global Ionospheric Simultaneous Measurements of Substorms (GISMOS), and others.

3) Utilize results from CEDAR modeling efforts and data from CEDAR projects for scientific research, evaluation of models performance and the identification of gaps in our knowledge that require additional measurements and model improvements.

4) Work with scientists, programmers and associate scientists involved with the NCAR Incoherent-Scatter Radar Data Base to determine the type and availability of data needed to support CEDAR projects.

The following will comprise a complete application:

1) A statement from the applicant regarding his or her interest in the position.

2) A vita (summarizing education and work experience).

3) A list of all scientific publications.

4) Letters of recommendation from three scientists familiar with the applicant's work and, please note, that it is the applicant's responsibility to request that the letters be sent.

5) A transcript of graduate school grades and an abstract of the Ph.D. thesis.

Applications are due by August 31, 1987 and should be sent to: HAO Visitors and Graduate Students Committee, HAO/NCAR, P.O. Box 3000, Boulder, Colorado 80307-3000, U.S.A. Questions about the position should be directed to Dr. Raymond Roble at (303) 497-1562.

*NCAR is an equal opportunity/affirmative action employer.

CEDAR STEERING COMMITTEE MEMBERSHIP

Gerald J. Romick (907) 474-7381 (work)
Chairman (907) 479-2721 (home)
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99775-0800
SPAN FRED::ROMICK

Dr. Joseph E. Salah
MIT Haystack Observatory
Westford, MA 10886

Dr Michael Mendillo
Boston University
725 Commonwealth Ave.
Boston, MA 02215

Dr. Tim Killeen (313) 747-3430
Department of Atmospheric and
Oceanic Sciences
University of Michigan
Ann Arbor, MI 48109
SPAN SPRLC::KILLEEN

Dr. Brian Tinsley (202) 357-7619
Aeronomy Program Manager
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

Dr. Chet Gardner
Dept. of Electrical and Computer
Engineering
University of Illinois
1406 W. Green St.
Urbana, IL 61801

Dr. David Fritts (907) 474-7845
Geophysical Institute
University of Alaska
Fairbanks, AK 99775-0800
SPAN FRED::DCF

Dr. Andy Christensen (213) 336-7084
Space Science Building
The Aerospace Corporation
P.O. Box 92957
Mail Stop M2-255
Los Angeles, CA 90009
DIRAC2::CHRISTENSEN

Dr. Richard Behnke (202) 357-7390
National Science Foundation
Room 644
1800 G Street, N.W.
Washington, D.C. 20550

Dr. William Sharp (313) 763-6200
University of Michigan
Space Physics Research Lab
Ann Arbor, MI 48109
SPAN SPRLC::SHARP

CEDAR Steering Committee Chairman - The CEDAR Steering Committee elected Tim Killeen as Chairman-elect and William Sharp as Vice-Chairman-elect, both to take office at the 1988 CEDAR annual meeting.