1993 CEDAR Workshop Schedule and Probable Room Assignments:

Monday (1:30-4:15) - NIST
1) PRIMO - NIST Rm 1007
2) High Lat Models - NIST Rm 1003-1005
3a,b) ISR Tech (1:30-3:00) / CCCP/FSU (3:00-4:15) - NIST Rm 4020
4) ATSB - NIST Auditorium
5) Rocket Radar Dip Equator Campaign in Brazil (3:00-4:15) - NIST Rm 4536, contact: Robert Pfaff (This is a meeting, not a workshop)

Tuesday (1:30-5:30) - Foothills (FL)
1) ATLAS - FL Auditorium
2a,b) Jan 93 10-day (1:30-4:30) / World Day Sched. (4:30-5:30) - FL 1001
3) HLPS - FL 1-2133 (Bldg 1)
4) NLC/PMC - FL 1003
5) Database - FL 1002 (sign-up for 1 hour each)

Wednesday (1:30-5:30) - Foothills (FL)
1) CAT - FL Auditorium
2) Joule Heating - FL 1001
3) ARIA II - FL 3-2072 (Bldg 3)
4) Arecibo Friends - FL 1003
5b) STS-53 Airglow (3:30-5:30) - FL 1-2133 (Bldg 1)
6) Database - FL 1002 (sign-up for 1 hour each)

Thursday (2:00-6:00) - Foothills (FL)
1) LTCS - FL Auditorium
2) Auroral Arcs - FL 1001
3) GISMOS - FL 1003
4a,b) MISETA (2:00-4:00) / Jicamarca (4:00-6:00) - FL 1-2133 (Bldg 1)
5) Resonance Lidar - FL 3107
6) Database - FL 1002 (sign-up for 1 hour each)

Friday (1:30-5:30) - Foothills (FL)
1) CADRE - FL Auditorium
2) CORN - FL 1001
3) Storms - FL 1-2133 (Bldg 1)
4) Turbopause - FL 1003
5) Database - FL 1002 (sign-up for 1 hour each)

NOTE: Some of the workshop rooms are not very large, and the attendance is expected to be about 325 per day. Hence, decisions will be made at the time of the morning break about rooms based on a show-of-hands. Some rooms may be switched at that time. More serious, if switching rooms does not help, then a workshop will be moved to another building, either to Foothills on Monday, or to NIST on Tuesday through Friday.

NIST Room Capacities:
- Auditorium: 510
- Room 1007: 70
- Room 1003-1005: 60
- Room 4020: 40
- Room 4536: 30

Foothills Room Capacities:
- Auditorium (FL2-1022): 141
- FL2-1001: 79
- FL2-1003: 70
- FL1-2133: 61 (In Building 1)
- FL3-2072: 40 (In Building 3)
- FL2-3107: 35
- FL2-1002: 15

CEDAR 1993 Workshops

Title	Organizer	Short Description
Monday:		
1. PRIMO	Dave Anderson	Ionospheric modelling efforts during LTCS-2 and -6
2. High Lat. Models	Mike Ruohoniemi	High latitude/global convection modeling
3. ISR Techniques	Frank Djuth	New ISR data acquisition/analysis methods
4. CCCP/FSU	John Foster	Opportunities: present/future Russian collaborations
5. ATSB	Michael Mendillo	Atmospheres of Terrestrial Size Bodies (ATSB)
Tuesday:		
6. ATLAS	Daniel Melendez	Shuttle ATLAS experiment results & coordination
7. Jan 93 10-Day Run	Mike Kelley	Preliminary "World Week 1/2" data analysis
8. World Day Scheduling	John Holt	Sceduling World Days of observations
9. HLPS	Jan Sojka	High latitude plasma structure exper. & modelling
10. NLC/PMC	Jerry Romick	Noctilucent & Polar Mesospheric Cloud experiments
11. Database	Barbara Emery	Hands-on NCAR Database operations
Wednesday:		
12. CAT	Maura Hagan	Thermospheric Signatures During LTCS-2 and LTCS-6
13. Joule Heating	Robert Sears	High latitude joule heating / MSX coordination
14. ARIA II	Miguel Larsen	Feb 94 Alaska rocket campaign planning
15. Arecibo Friends	Craig Tepley	Current status and future upgrade plans at Arecibo
16. STS-53 Airglow	Lyle Broadfoot	Shuttle airglow obs with AZ
11. Database	Barbara Emery	Hands-on NCAR Database operations
Thursday:		
17. LTCS	Jeff Forbes	MLT dynamics during LTCS-2 and LTCS-6
18. Auroral Arcs	Gary Swenson	Wintertime Sondrestrom campaigns & future planning
19. GISMOS	O. de la Beaujardiere	Global magnetic substorm studies Imager/Spect, Dec 1992
20. MISETA	John Meriwether	Equatorial experimental aeronomy
21. Jicamarca	Don Farley	Jicamarca activities
22. Resonance Lidar	Mike Kelley	New technology impact & future lidar coordination
11. Database	Barbara Emery	Hands-on NCAR Database operations
Friday:		
23. CADRE	Dave Fritts	Experimental/modelling of equatorial dynamics
24. CORN	Gary Swenson	Coordinated nightglow/lidar observations @ Illinois
25. Storms	Michael Buonsanto	Current analysis & future planning of storm studies
26. Turbopause	Miguel Larsen	Structure of molecular/eddy diffusion transitions
11. Database	Barbara Emery	Hands-on NCAR Database operations

1.

PROBLEMS RELATED TO IONOSPHERIC MODELLING AND OBSERVATIONS (PRIMO)

The purpose of the PRIMO workshop at CEDAR is to identify and try to resolve significant discrepancies which exist between theoretically-calculated ionospheric parameters such as F-region peak electron densities and altitudes, NMAX and HMAX, and global observations of these quantities. The first two PRIMO workshops (1991 and 1992) compared various model results with each other and with equinox and solstice, solar maximum observations at Wallops Island, Millstone Hill and Bermuda. As a result of these comparisons, a number of modifications to the theoretical models were made which brought about better agreement with the observations. The database for these comparisons is provided by a large network of digital ionospheric sounders as part of the Validation of Ionospheric Models (VIM) study being carried out by URSI Commission G, Working Group 3 on Informatics and Modelling. In addition, the NCAR incoherent scatter radar database is also being used in the validation of theoretical models. This year, in addition to its own agenda, the PRIMO workshop is collaborating with two other CEDAR workshops, Coordinated Analysis of the Thermosphere (CAT) and the Lower Thermosphere Coupling Study (LTCS) in identifying the important ionosphere/thermosphere coupling mechanisms for two specific LTCS campaign periods in December of '88 and '91. All interested participants and bystanders are welcome.

Dave Anderson, Jan Sojka, Tim Fuller-Rowell

2. 1993 Annual CEDAR Meeting

Workshop: The Derivation of Empirical Models of High Latitude Convection

Convenor: Michael Ruohoniemi (The Johns Hopkins University Applied Physics Laboratory, Johns Hopkins Road, Laurel MD 20723-6099, Ph: (301) 953-6000 X4572, Fax: (301) 953-6670, E-mail: APLSP::Ruohoniemi)

The large-scale circulation of magnetospheric plasma at high latitudes is an important factor in the modelling of geospace dynamics. It is also readily observed by ground- and satellite-based instruments. Databases collected over periods of many years are now available for extensive statistical studies of convection in support of CEDAR objectives.

In this workshop, we will discuss techniques for the reduction of observational data to two-dimensional maps of global convection. We will also examine the value of the various geophysical indices (e.g. IMF, Kp, etc.) that are often utilized as 'binning' parameters, that is, to identify characteristic states of the global convection. Another question to be addressed is the predictive value of statistical models, given the inherent variability of convection phenomena. Interested persons are invited to prepare short presentations on any of these topics. It is hoped that an informal format will encourage a more lively exchange of views.

To conclude, we will discuss the creation of an archive of basic convection measurements for the NCAR community. The package could include a compatible archive of geophysical indices and software for the reduction of the data to workable models.

3.

INCOHERENT SCATTER RADAR TECHNIQUES

Organizer: F. T. Djuth

This workshop is designed to highlight new techniques and procedures for the acquisition and analysis of incoherent scatter radar data. Recent improvements in data-taking and analyses systems have led to several different approaches aimed at optimizing the parameter profiles deduced from the "ion-line" lag-profile and/or range-averaged spectrum. Moreover, echoes from naturally produced "plasma lines" have been exploited in an effort to capture the full information content of the incoherent scatter process. Observatories with active involvement in this area include Millstone Hill, Arecibo, Sondre Stromfjord, and EISCAT. Because of differences in the capabilities of each observatory, a plurality of approaches have been adopted to optimize the data collection process at each facility. The objectives of this workshop are to establish a common ground for the various techniques, contrast their capabilities, and promote the exchange of ideas concerning their implementation. Particular attention will be given to problems associated with lag smearing of the ion line data in altitude, the functional form adopted for parameter fits, and constraints in the fitting process introduced by physical considerations. Moreover, with the advent of radar techniques capable of measuring the natural plasma line spectrum versus altitude, an important complement to the ion-line analyses now exists. The plasma line data yield very accurate measurements of the electron density profile, and can be used in conjunction with ion-line measurements to extract additional information from the incoherent scatter observations (e.g. ion composition in the F_1 region, ionospheric currents, and the energy distribution function of suprathermal electrons). As part of this workshop, difficulties and shortcomings of well-established techniques will also be addressed, and their potential impact on the CEDAR data base will be discussed. The objective in this area is to identify latent problems and to arrive at suitable remedies.

4.

CCCP/FSU Workshop
(CEDAR Collaboration and Cooperative Projects with the Former Soviet Union)

Convener: John Foster
3:00-4:15, Monday, June 21, 1993

Dramatic political changes in the countries of the Former Soviet Union have opened the door for increased scientific collaboration with groups in Eastern Europe and Central Asia working in fields compatible with the CEDAR program. The number of contacts between scientists in these countries and the CEDAR community is growing daily and the means and difficulties associated with these new international collaborations are being addressed by the individuals involved, often for the first time. The purpose of the CCCP/FSU Workshop is to introduce the CEDAR community to some of the projects currently envisioned or underway and to prodide a forum for the discussion of the logistics involved in setting up and maintaining such interactions. The experience gained in setting up existing projects will be shared in order to facilitate future collaboration between the CEDAR researchers and the FSU research community.

A number of radio-propagation facilities have been visited during the past year and initial discussions of programs of interest to CEDAR have been held. These include incoherent scatter radar, HF propagation, partial-reflection radar, and trans-ionospheric propagation techniques. These will be reported and it is hoped that attendees at the Workshop will be able to provide information on programs in the areas of optical diagnostics, theory, and modeling.

A CEDAR FSU Visiting Scientist program has been established and this will be described, along with means of providing financial support for such collaborations.

A CEDAR Workshop
21 June 1992
NIST (Main Lecture Hall: 1:30-4:15 pm)
Boulder, Colorado

5.

ATMOSPHERES OF TERRESTRIAL SIZE BODIES (ATSB)

Convenor:
Michael Mendillo
Boston University

We have in the solar system a set of on going "active experiments" in the origins and evolution, photochemistry and dynamics of atmospheres surrounding objects that are Earth-like in size. These not only include the traditional terrestrial planets (Mercury, Venus and Mars), but also satellites of Jovian planets (Io, Triton, Titan), as well as Pluto, our Moon and perhaps asteroids and comets. The focus of the ATSB Workshop at CEDAR will be on the theme: "How can studies of Earth-sized atmospheres using groundbased observations, theory and modeling yield important results on the coupling, energetics and dynamics of our own atmosphere?" The Workshop will be composed of several invited speakers, followed by a panel discussion.

Invited Speakers

Dr. Stephen Bougher University of Arizona	"Thermospheric Energetics and Dynamics on Venus and Mars"
Professor Jane Fox SUNY at Stony Brook	"Photo and Ion-Neutral Chemistry on Venus and Mars"
Professor Thomas Cravens University of Kansas	"The Thermosphere and Ionosphere of Titan"

Panel Discussion

Respondent:	Dr. Raymond Roble NCAR	Modeling: "Dynamics"
Respondent:	Professor Andrew Nagy University of Michigan	Modeling: "Aeronomy"
Views:	Dr. Sunanda Basu National Science Foundation	"ATSB: The Next Programmatic Step"
Views:	Professor Frederick Roesler University of Wisconsin	"Groundbased Optical Instrumentation for Terrestrial Aeronomy Applied to Other Planets"
Views:	Professor Robert Kerr Boston University	"Groundbased Radio Techniques Applied to Other Planets"

6.

ATLAS Workshop
Convener: Daniel J. Melendez-Alvira
1:30-5:30, Tuesday, June 22, 1993

The ATLAS-CEDAR workshop this year benefits from the success of the ATLAS-1 9 day mission during March 24 to April, 2, 1992, and the participation of many groundbased stations worldwide. Virtually all incoherent scatter radars observed during some or all periods of the mission as well as the SUNDIAL network of ionosondes, optical observatories and radars.

The objectives of the ATLAS-CEDAR workshop are:

1. Highlight scientific results from the mission and present samples of the measurement capabilities achieved with both space and groundbased instruments.

2. Provide an opportunity for other interested investigators to collaborate using the combined dataset.

3. Discuss the course of current and new investigations using the combined ATLAS-CEDAR measurements and modeling resources.

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Agenda: ATLAS Workshop

1. Overview of the ATLAS-CEDAR Campaign --- Doug Torr (UAH)/D.J. Melendez.

2. Results from AEPI: AEPI/SEPAC joint observations: The artificial aurora experiments --- Steve Mende (Lockheed).

3. Results from ENAP: Airglow and auroral observations with AEPI on ATLAS-1 --- Gary Swenson (Lockheed).

4. Results from ENAP: Twilight Observations from ATLAS-1 of resonant scattering on Ca+ and He --- Brian Tinsley (UTD).

5. Results from ISO: An Overview --- Doug Torr (UAH).

6. Results from ISO: Retrieval of Thermospheric Composition and Temperature --- Judy Fennelly (UAH).

7. Results from ISO: Retrieval of Mesospheric OH Concentrations --- Frank Morgan (UAH).

8. Results from ISO: Model Comparisons of the Geographic Variation of Thermospheric 6300 A Tangent Ray Height Profiles as Measured by ISO --- Daniel Melendez (NRL).

9. Model 630.0 nm --- Stan Solomon (U. Colorado).

10. An Overview of Ground-Based Observations in the ATLAS-SUNDIAL Investigation --- Ed Szczuszczewicz (SAIC).

11. ATLAS-BRAZIL: Ionospheric Conditions During the March 1992 ATLAS/SUNDIAL Campaign --- Jose H. Sobral (INPE Brazil).

12. SUNDIAL-FRANCE: French Station Results --- Rudi Hanbaba (CNET France).

13. SUNDIAL-RUSSIA: Russian Sundial Results --- Sergei Pulinets

14. SUNDIAL-EISCAT: EISCAT Radar Observations --- Mark Lester (U. Leicester).

15. ATLAS-SONDRESTROM: Odile de la Beaujardiere (SRI).

16. ATLAS-GOOSE BAY: Mike Ruohoniemi (JHU/APL).

17. RESULTS FROM AMIE: Electric Potential Patterns derived for March 28-29, 1992.

18. ATLAS-Millstone -- Michael Buonsanto/John Holt (Haystack).

19. Digisonde Data -- Bodo Reinisch (Lowell).

20. Arecibo Data -- Melendez or Zhou (Arecibo Staff).

21. Round-Table discussion: projects and collaborations.

7,

January 10-Day Run Workshop:
Conveners: Mike Kelley/Clark Miller
1:30-4:30, Tuesday, June 22, 1993

In January of 1993 a long World Day run was made to optimize the data collection for the year at Arecibo which will be operating at a reduced level for some time. A number of instruments were clustered at the observatory or on the island to enhance the scientific return. To imagers were fielded at the Optical Facility to investigate wave activity in the D, E, and F-regions. Both detected interesting airglow patterns with clear wave signatures. The portable CUPRI radar was installed in southern Puerto Rico for continuous observations of E and F region plasma instabilities and the large 430 MHz system was operated for nearly the entire period. Data were also obtained from the Ramey Digisonde and the nearly conjugate ionosonde in Argentina as well as numerous World Day sites around the globe. After a few brief reports on the data quality and unique events already identified, the Workshop will break into smaller units to address the most outstanding issues. At the end a brief discussion will be held concerning future plans for the sunspot minimum period when mid-latitude spread F maximizes.

8.

Workshop: World Day Scheduling

Organizer: John Holt

4:30-5:30, Tuesday, June 22, 1993

This will be an open forum for discussion of the 1994 Incoherent Scatter Coordinated Observation Day Schedule. In recent years, approximately 20 days have been scheduled. Highlights of this year's schedule included the January 10-day run, the longest ever attempted, and the participation of incoherent scatter radars in Ukraine and Russia.

The schedule must essentially be complete by the end of July. Therefore this will be the last opportunity for a large cross-section of the community to meet with representatives of the incoherent scatter radars to discuss next year's schedule. Ideas for new observation programs are especially welcome.

9.

High Latitude Plasma Structures (HLPS)

The high latitude ionosphere is almost always structured. These structures come in a variety of shapes and intensities. Some have even been successfully correlated with specific solar and geomagnetic conditions. However, *unraveling their source mechanisms is still in its infancy and is the objective of the HLPS working group.* To do this, both experiment (coordinated campaigns) and theory (physical models) are needed. Hence, the HLPS workshops emphasize the need for coordination in collecting adequate databases such that physical models can be adequately constrained.

To date, the HLPS workshops have focussed upon two forms of plasma structures: the sun-aligned polar arcs observed mainly under northward IMF conditions and the patches observed under southward IMF conditions. At this year's workshop, both of these structures will be discussed, but additional structures, such as those associated with twin vortices and the Harang discontinuity, will be discussed. As the basis of future HLPS campaigns and modeling effort.

-- Ed Weber, Jan Sojka

10.

NLC/PMC Workshop
Convener: G. Romick
1:30-5:30, Tuesday, June 22, 1993

There are a number of programs related to observations of mesospheric clouds being considered in the next few years that are in the development stages. A number of scientists thought that this was an appropriate time to review what we know, what we are doing and what people are planning to do and propose collaborative programs where possible. The workshop is divided into three basic parts covering: the current state of our understanding and basic questions still unanswered; the types of data bases and analyses that are currently being carried out and ; future observation programs and plans. Each part of the program has a session chairman and the afternoon will be divided in the following general manner:

1:30 Introduction -- Romick

1:35 Current understanding of Mesospheric Clouds - Session Ch. Thomas
Overview- Thomas & Olivero

2:00 Available data and ongoing Analyses - Session Ch. Sharp
Summer '92 - Sharp, Thomas, Yee, etc.
NLC '91 - Goldberg
WINDI - Shepherd
HARDI - Hays
others

3:15 Future Programs and Planning - Session Ch. Romick
ANLC '93 - Meriwether
NLC '93 - Goldberg
MSX - Summer ' 95 - Romick, Humphreys, ONeil
Summer ' 95 - Sharp
WINDI - Shepherd
HARDI - Hays
Others

One-Hour On-Hands CEDAR Data Base Workshop
Consultants on Duty: Roy Barnes (NCAR) and Steve Cariglia (MIT)
Organizer: Barbara Emery
Tuesday - Friday, June 22-25, 1993
Foothills Lab, Room 2-1002

This is a hand-on workshop. Five workstations will be set up during the week of CEDAR. There will be a sign-up sheet at the registration desk at NIST for those who want to take an hour to work with the CEDAR Data Base. Persons can either come with their own agenda of what they want to accomplish in an hour, or they will be able to choose from simple exercises. These will include moving data files from the mass store to the cedar machine, getting one-hour or one-minute geophysical indices, getting ascii tables of data, and running simple models.

Handout for 1993 Hands-on NCAR Database Operations (11th workshop)

CEDAR DATA BASE EXAMPLES

The following examples are generally non-trivial, but are often desired.
Some we have good answers and techniques for, and others we do not.

1) How to get the information files available via anonymous ftp
2) How to use or take the MSIS model
3) How to use or take the IRI model
4) How to use or take the IGRF model
5) How to get indices
   a) Anything but 1 min indices
   b) 1 min indices
6) How to get 1 location from the Forbes/Vial model tides
7) How to learn the experiment mode of an IS radar (i.e., azimuth and elevation scan sequence)

Execution scripts, output files, and this description are available on cedar in directory "~bozo/docs/examples".

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1) Anonymous ftp access
   Much of the database documentation is available to any user with internet access, via anonymous ftp. Those with cedar logins may also access these files. Due to security restrictions, it is a two step process to browse files , anonymous ftp access consists of

   a) Browse the general information file first. If logged into cedar, enter
      more ~ftp/README
      A copy of README has also been placed in ~ftp/pub, so it would also work to enter 'more ~ftp/pub/README'. If accessing via anonymous ftp, it is best to transfer a copy before browsing. From your home computer, enter:
      ftp cedar.hao.ucar.edu
      If not known by name, enter 'ftp 128.117.16.90'. Give your last name in response to a password prompt, then enter:
      cd pub
      get README
      quit
   b) README indicates the nature of the file, some are ASCII text which may be browsed with paging utilities such as 'more' or 'less'. Those files with a ".ps" suffix are postscript and are meant to be printed.

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2) MSIS model
   a) Puruse or take files from /sting/foster/msis90 - i.e., say
      cd ~foster/msis90 and examine files there.
      These are the 1990 MSIS composition and wind programs split into separate subroutines with a couple of Makefiles to run on a UNIX system. See User Guide p 6-12.

   b) On cedar MSIS 83 and 86 are accessed within a fortran program by calling "GMSIS", see "~bozo/pgms/is/src/gmsis.f" for an argument list description. Link to the subroutines library when compiling; e.g.:
      f77 -c yoursource.f
      f77 yourcource.o ~bozo/pgms/is/bin/lib.a -o yourexecutable

   c) Using MADRIGAL:
      - MSIS 86 parameters may be accessed interactively using isprint by adding the MSIS parameters to the data selection criteria.
      - MSIS 86 source (gts5.f) is in /usr/madrigal/lib/libdev/geolib.a

So, if you want to use it stand alone, just link it in with your programs; e.g.,

```
f77 -c yoursource.f
f77 yoursource.o /usr/madrigal/lib/libdev/geolib.a -o yourexecutable
```

If you want to use the madrigal library for everything, (opening files, accessing indices, etc.), copy ~madrigal/util/madmdl/madmodel.f and modify it to have the following call sequence:

```
exdcon(idbfil,dataset,...)
exdflt(idbfil,"GEOFILEON",1.0)
loop
   exdiob(idbfil,sec,3,..)
   exdget(idbfil,811...)
   exdget(idbfil,821...)
   exdget(idbfil,830...)
   exdget(idbfil,850...)
   exdget(idbfil,860...)
   exdget(idbfil,880...)
   exdget(idbfil,890...)
   exdget(idbfil,900...)
   exdget(idbfil,901...)
   print parameters, location, time
end loop
call exdcls(idbfil,..)
end
```

When compiling, link your program to the MADRIGAL libraries

```
f77 -c yoursource.f
f77 yoursource.o  ~madrigal/lib/madlib.a ~madrigal/lib/libdev/geolib.a
```

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3) IRI model

a) Puruse or take files from /sting/foster/iri or iri90. (Similar to MSIS)

b) Use subroutine "GIRI" (~bozo/pgms/is/giri.f), analogous to "GMSIS"

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4) IGRF model

a) Use program igrf.f. Obtain a copy by entering "gpgm igrf.run", It computes field components for a given location and time using DGRF 1965, 70, 75, 80, and 85 coefficients, and IGRF 1990.

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5) Indices

a) Anything but 1 min indices -- Use getndcs to generate tables and plots of multiple indices for intervals up to one month. See section 4.1.

b) 1-min indices IMF for most world days from Apr 83 through Jan 88 are available in a 13 MB file (/usr/madrigal/files/stage/imf830413a.cbf). If they are not on-line, they can be brought over with the command 'gmsfile imf830413a'; see User Guide, Section 2.2. (A much longer period of record is available for hourly values, see IMF631127A). This file was created by SRI for World Day analyses and has data from within the magnetosphere removed. If not working with a Radar World Day between April 1983 and January 1988, the 1-min indices must be obtained elsewhere; see "c) Other sources", below, or 1993 Catalogue, p 34.

- Run rdtp to find out what parameters are on this file. See the User Guide, Section 2.3. The example is actually from the file aei780101a.cbf, the file of hourly and 1 minute AE indices. Alternatively, one might guess what parameters are on the IMF file by looking at the list of parameter codes in ~bozo/docs/parcods.list or ~ftp/pub/parcods.list. IMF parameters are in the 2200's: GSM coordinates are 2204, 2206,

and 2208.

- Run 'gdat' to get the time period you want. See the User Guide, Section 4.2. The steps are:
  i) Obtain a copy of gdat.run. Enter 'gpgm gdat.run' from your home account (or from your /d/ directory you need more than space).
  ii) Edit gdat.run for your specific case. Use the vi, emacs or re editor. Basic changes should be:
  ```
  set lfn = "/usr/madrigal/files/stage/imf830413a.cbf"
  ...
  '$lfn' 0 99999 .FALSE. '$pcf'
  'gdat test of 1 min IMF' (or anything else you want in 80 characters)
  1984  919 1500    0 1984  919 1510    0
  2204 -99 -9999 0 2
  2206 2208
  ```
  iii) Execute gdat.run by entering 'gdat.run' or 'gdat.run &' (to put it in background). This produces files: 'gdat.out' and 'gdat.data', a list of diagnostics and the data. If a lot of output is expected it may be necessary to run gdat in your /d/ directory to avoid truncation.

c) Other sources: Two other sources of high resolution magnetometer data are NSSDC and UCLA; see 1993 Catalogue, p 34. NSSDC has 15-sec samples from IMP-8 for 3 Oct 73 to 21 Jul 91, and 1-min samples from ISEE3. UCLA has 5 minute averages, but the UCLA facility is basically a request facility until data capture is improved on their GUEST account. Hence, only the NSSDC access is described here:

- Obtain data availability and format information:
  i) mail archives@ndadsa.gsfc.nasa.gov
  ii) SUBJECT: holdings imp8 (or holdings isee3)
  iii) Leave message text blank. The description is emailed back, usually within about 5 minutes.

- Obtain data via anonymous ftp:
  i) mail archives@ndadsa.gsfc.nasa.gov
  ii) SUBJECT: request imp8 mag15 ascii (or request isee3 mag01)
  This requests ascii data only for imp8 (binary is available). ISEE3 is only ascii data, so 'ascii' need not be specified.
  iii) The message text should contain one line per date requested in the form YYMMDD (yr/mo/day); e.g.,
  ```
  900320
  900321
  ```
  requests satellite magnetometer data from March 20-21, 1990.
  iv) An email response will be issued naming the files (one per day) prepared for retrieval.
  v) Fetch the files via anonymous ftp:
    - enter 'ftp ndadsa.gsfc.nasa.gov'
    - Specify login id 'anonymous' and your name for a password.
    - Change to the directory containing the files (e.g. cd data_dist.imp8)
    - Confirm the file(s) presense by entering 'ls'. The suffix, '_ascii' has been appended to the name(s) in the email response received earlier.
    - Transfer a file by entering, for example, 'get imp8_90-320.mag_ascii'
    - Terminate ftp with 'quit'.

Beware that these data may come from within the magnetosphere.

d) 1-min Ae,Ao,Al,Au is available for 1978-1986 are available in an 81 MB file (/usr/madrigal/files/stage/aei780101a.cbf).

- Run rdtp to find out what parameters are in this file. See the User Guide, Section 2.3. The example is actually from the file aei780101a.cbf, so it is not neccessary to actually run the job. The 1-D parameters are

the hourly means, and the 1 or 2.5 min values are in the 2-D array. The 2-D parameter codes are: 10 (yr), 20 (month/day), 30 (hr/min), 31 (additional increment to hr/min in sec*100), 320 (AE), 321 (AL), 322 (AU), and 323 (AO).

- Run gdat to extract indices for a desired time interval.

i) Obtain a copy of gdat.run. Enter 'gpgm gdat.run' from your home account (or from your /d/ directory you need more than space).

ii) Edit gdat.run for your specific case. Use the vi, emacs or re editor. Suppose 1-min Ae, Al, Au, Ao are desired for 15:00-15:10 UT 19 Sep 1984 Then the lines in gdat.run should be:

```
set lfn = "/usr/madrigal/files/stage/aei780101a.cbf"
...
'$lfn' 6 99999 .FALSE. '$pcf'
'gdat test of 1 min AE'
1984  919 1500    0 1984  919 1510    0
320 -99 -9999 0 3
321 322 323
```

Note that the execution time is significantly reduced in this example by telling gdat to skip the first 6 files before starting to select data. Study of '~bozo/docs/akavsns', reveals AEI780101A contains one file per year, 9 files total; so file 7 contains indices for 1984. If unsure of file stratification within a data volume, it is safest to set the number of files to skip to 0. Note also that gdat automatically provides 4 date/time parameters (10, 20, 30, 31) plus the primary requested parameter (320), so it is not necessary to include the date/time in the extra parameters.

iii) Execute gdat.run by entering 'gdat.run' or 'gdat.run &' (to put it in background). This produces files: 'gdat.out' and 'gdat.data', diagnostics and the data. If a lot of output is expected it may be necessary to run gdat in your /d/ directory to avoid truncation. This example took about 15 minutes to execute, so running in background give the freedom to do other interactive tasks while gdat is executing.

---

6) Forbes/Vial model semi-diurnal solar tides

File is 3.7MB (150 altitudes between 0 and 105 km, 89 latititudes between +88 and -88 degrees, and 12 months). Each month of the year is represented by a set of logical records where each logical record contains 1 latitude and all heights. The year is arbitrary.

a) Stage "/ISRADAR/SDT880101A" to cedar using "gmsfile", examine the header record and data record layout using "rdtp", then use "gdat" to fetch the subset of interest. It is not necessary to copy the file from the mass store, because it has alreay been done; see User Guide, section 2.2.

b) Use isprint to limit latitude (see section 3.2). Madrigal file is: via880101g.001. First, establish various environment variables by entering

```
source ~madrigal/prep
```

Then invoke isprint:

```
isprint file=via880101g.001
gdlatf=37.,43.
show
```

This will "show" all the parameter codes; then ask for those desired by name or number; e.g.,

```
gdlat gdalt gdalti vneamp vnephs vnnamp vnnphs
z=85,86
header=f
date=15mar88 out=isprint.data
```

q
The last four lines establish a height interval of 85-86 km, turns off printing the "header" lines, selects the month, and before quitting, names an output file to save the amplitues and phases of the eastward neutral wind.

---

7) Experiment mode of an IS radar

a) Often catalogue (or header) records contain satisfactory experiment descriptions. Use rdtp to create a file containing these record types. If this is insufficient, use "pltcyc" to extract antenna pointing information from a dataset; see User Guide Section 5.1.

b) Use isprint to puruse the data. Default is to print the "header" which includes azimuth and elevation. Other spatial parameters may be requested even if they are not explicitly in the logical data record; See section 3.2.

c) Additional information is kept in akavsns. Any noted problems are recorded in ~bozo/docs/akavsns. For example, careful readers will discover that EISCAT experiments between Jan 87 and Mar 91 running modes CP-3-E and CP-3-F may have underestimated ion velocities and overestimated ion temperatures, both by about 10%.

12. **COORDINATED ANALYSIS of the THERMOSPHERE**

1993 Workshop Agenda
Wednesday, June 23
1:30-5:30 PM
NCAR Foothills Lab Auditorium

Initiative to Investigate LTCS-2 and LTCS-6 Periods

1• Identification/Presentation of Available Data

2• Model Simulations

3• Establishment of Working Groups

3:00-3:15 ****** BREAK ******

CAT Climatological Investigations -- New Results

Working Group Sessions

13.

High Latitude Atmospheric Joule Heating: Opportunities for Coordinated Ground-based and MSX Satellite Observations

1:30 - 5:30, Wednesday, June 23, 1993

WORKSHOP OBJECTIVE

Review state of knowledge of High Latitude Joule Heating physics and empirical database, and outline opportunities for coordinating ground-based experimental measurements with the MSX satellite. The MSX observational time frame is approximately 1994 through 1996.

AGENDA (Tentative)

INTRODUCTION AND OBJECTIVES	Robert D. Sears Jamieson S. & E.
High Latitude Joule Heating Review	Dr. V. Wickwar Utah State Univ.
Coordinated Incoherent Scatter Radar and Optical Measurements at Sondrestrom	Dr. O. de la Beaujardiere SRI International
Coordinated Optical and Magnetic Measurements at Poker Flat	Dr. T. Hallinan Geophysical Inst. University of Alaska
The MSX Joule Heating Experiment Concept and Planned Implementation	Robert D. Sears Jamieson S. & E.

Experimenters are invited to present an informal 10 minute summary of their interests and capabilities relating to measurement of High Latitude Atmospheric Joule Heating, including both the localized atmospheric temperature, density, and compositional changes and the propagation of energy to lower latitudes by means of winds and AG wave generation.

ORGANIZER:

Robert D. Sears
Jamieson Science and Engineering
10285 Dempster Ave.
Cupertino, CA. 95014
TEL/FAX: (408) 257-1302

14.

ARIA II WORKSHOP

CEDAR Summer Workshop (June 1993)
1:30-5:30, Wednesday, June 23

The ARIA I experiment was carried out at Poker Flat, Alaska, in March 1992 with the goal of determining the effect on the neutral atmosphere of the long-lived, broad spatial-scale Joule heating that characterizes the diffuse aurora in the postmidnight sector. Measurements were made with a combination of ground-based instrumentation, and instrumented and chemical release rockets. The first experiment showed large changes in the neutral composition over a scale of a few hundred kilometers. Large neutral winds were also measured in the lower E region around 115 km altitude. The preliminary analysis indicates an interesting and potentially important interaction between the upward propagating tides and the local electrodynamic parameters. There is also evidence that the mass and composition were significantly affected by the neutral circulation. The postmidnight sector appears to be a potentially interesting region as far as auroral physics is concerned, yet the region has received little attention so far.

The ARIA II workshop will focus on results from the first ARIA experiment and will begin planning for the ARIA-Vorticity experiment scheduled for February 1994 and the ARIA II experiment scheduled for February 1995. The ARIA-Vorticity experiment will focus on measurements of the neutral vorticity as a source of field-aligned currents near the poleward edge of the diffuse aurora, in addition to mass and composition effects. ARIA II will provide wind, composition, and mass measurements with better spatial and temporal coverage than ARIA I. The rocket measurements are clearly critical to the experiments, but the goal of the workshop will be to plan the ground-based measurements which can be used to achieve a number of the general science objectives of the experiments.

Contact: M. F. Larsen larsen@metradr.phys.clemson.edu

803-656-5309

15.

Arecibo Friends Workshop

Convenor: Craig Tepley
1:30-5:30, Wednesday, June 23

The workshop is a continuation of last year's meeting designed to promote a better user understanding of the Arecibo Observatory. It will be an informal meeting of those who have observed at Arecibo or are interested in doing so in the future. We will briefly discuss our overall organizational structure and changes that will be implemented for the submission of observing proposals. The Arecibo staff and interested users will address the current state and future developments planned for specific areas of radar and optical instrumentation used for studies of the atmosphere. The present status of the Gregorian Upgrade project and its impact on observing will be included, while a few planned post-Gregorian projects will be outlined.

16.

AIRGLOW OBSERVATIONS WITH THE ARIZONA IMAGER/SPECTROGRAPH FROM STS-53, DECEMBER 1992

Convener: Lyle Broadfoot
3:30-5:30, Wednesday, June 23, 1993

We will discuss some new observations which may shed some light on CEDAR questions.

1) An overview of new optical data sets from a facility-type instrument will be discussed, followed by:

2) What is a CEDAR facility instrument?

3) Should CEDAR have facility instruments?

The data to be used in our discussion were obtained during Shuttle Flight, STS-53. This will be a progress report of the analysis of that data set.

The Arizona Imager/Spectrograph collects a great many observational signatures, simultaneously from a common column of gas. We will discuss the significant signatures in constraining atmospheric models.

Although a flight experiment will be described, the requirement for this instrumental capability for ground-based programs is the real question to be considered by the community. All aspects of instrument preparation, observational planning, mission operations, real-time monitoring, data collection, data merging and distribution, are common to the requirements of a ground-based facility instrument.

17.

LTCS Workshop
Coordinator: Jeff Forbes
2:00-6:00, Thursday, June 24, 1993

The LTCS (Lower Thermosphere Coupling Study) Workshop will be devoted to an assessment of the state of the mesosphere/lower thermosphere during the LTCS-2/SUNDIAL (December 5-10, 1988) and LTCS-6/SUNDIAL (December 4-11, 1991) campaign periods. Note that the latter campaign is also recognized as MLTCS-2, named after the MLTCS project of the STEP Program.

At the workshop we will attempt to coalesce ideas and collaborations aimed at:

1. An understanding of the dynamics of the December solstice MLT (Mesosphere/Lower Thermosphere) region;

2. Contrasting/comparing LTCS-2 and LTCS-6 conditions

3. Identifying interesting dynamical phenomena representing coupling between atmospheric regions.

We will try as much as possible to avoid strictly "show and tell" presentations and try more to EVOKE DISCUSSION.

18,

Auroral Arcs Workshop
Convener: Gary Swenson
2:00-6:00, Thursday, June 24, 1993

Purpose: To discuss and plan scientific explorations of the aeronomy of Auroral Arcs.

Recent Background:

A campaign was conducted at Sondrestrom, Greenland and Godhavn, Greenland with the objective of employing multi-station observations of Auroral Arcs. The campaign occurred Jan 11-Feb 2, 1993. The Godhavn site, operated by the Danish Meteorological Institute (DMI), is located ~290 km to the magnetic north of the Sondrestrom. Participants in the experiment included an imaging spectrometer, (Lockheed, G. Swenson), All-sky imager at Godhavn (National Institute, K. Makita), and at Sondrestrom, the Backscatter Radar (SRI), Fabry Perot and Spectrometer Measurements (U. of Mich., R. Niciejewski), All-sky imaging, (Lockheed, R. Rairden). S. Solomon, U. of Col., and R. Rairden, Lockheed, provided experiment direction at Sondrestrom during the campaign including coordination of operating modes for the radar.

A number of arcs were observed where the arc position was near the magnetic zenith of Sondre.

The workshop is open to discuss general auroral arc aeronomy by the focus will be the presentation and discussion of results from this campaign as well as making plans for a follow up campaign planned for January, 1994.

Workshop

Discussion-Status of modeling activity (Open for all) - 20 minutes
Overview of Godhavn Campaign- Swenson - 20 min
Events Discussions-Swenson, Solomon, Niciejewski - 30 min
Modeling discussion - Solomon -20 min
Discussions - All - 30 min
Plans for 94 - All - 30 min

[**Note:** The structure of this workshop is not rigid. Persons wanting to make contributions should do so at the meeting, or let G. Swenson know before the workshop if you want scheduled time. This is to be a working workshop.]

19.

GISMOS WORKSHOP

Convenor: Odile de la Beaujardiere
2:00-6:00, Thursday, June 24,

The GISMOS campaigns are coordinated observations aimed at studying the coupling between the magnetosphere and the ionosphere.

During this workshop, we will analyze data from the following GISMOS periods:

Jan 12 to 16, 1988
Mar 23 to 24, 1990
Jan 27 to 29, 1992
Mar 17 to 27, 1993

We plan to start by concentrating on the following two March 93 intervals:
March 17 at 1200 UT to March 18 at 1500 UT (World Day run)
March 24 from 00 to 08 UT which was a "severe storm" period
(using the NOAA classification)

Part of the meeting will be devoted to discussions on H-Beta measurements, the rest will be concerned with substorms, auroral intensifications, and sun-aligned arcs. Finally, we will talk about future plans.

20, MISETA: multi-instrumented studies of equatorial thermosphere aeronomy

Convenor: John Meriwether

2:00-4:00, Thursday, June 24, 1993

The MISETA workshop marks the beginnings of a new thrust in CEDAR equatorial aeronomy research. The development of MISETA is intended to answer the need for improved instrumental diagnostics for observations of the equatorial ionosphere and neutral atmosphere over the magnetic equator near Jicamarca,Peru. Studies based upon these data would address a variety of topics among which are questions regarding the absence or presence of a trigger mechanism for the initiation and seeding of spread F activity in the equatorial ionosphere, the role of gravity waves and the thermospheric neutral wind in bubble and spread-F formations, the role of the midnight pressure bulge caused by atmospheric tidal forcing in the variability of the meridional F-region neutral wind, and the extent of the latitudinal variation of the neutral wind in the direction away from the magnetic equator. MISETA measurements in general would seek to provide a more complete phenomological description of the equatorial physical processes observed in the F-region through a diversified suite of instruments.

The MISETA concept is to add to the Arequipa Fabry-Perot interferometer three important instruments: the CEDAR imaging all-sky system (Boston University), an automated spaced beacon receiver scintillation detector (Boston College), and the Cornell digital ionosonde. All four of these instruments operate automatically at night. The BC scintilation and the Cornell digital ionosonde (constructed by Reinish, U. of Lowell) will observe plasma flow in the F-region. (the BC instrument will require scintillation activity for any drift measurements). The CEDAR all sky system observes the structure and morphology of the bottomside F-region in the horizontal distribution of several airglow emissions (630nm and 777.4nm).

Jicamarca Radar Observatory will serve a very important role in providing validation of zonal plasma drift measurements from these two radio science instruments, particularly when operated in the interferometer mode developed by Farley and Kudeki. JRO is an excellent tool for observing ionospheric parameters, but it cannot be operated continually to provide climatology measurements of zonal plasma drifts or scintillation activity. Other JRO parameters measured are electron density profiles, ion and electron temperature measurements, as well as vertical drifts.

In addition, modelling development (by Ray Roble and Cassandra Fesen) to understand the neutral dynamics and electrodynamics of the equatorial ionosphere would be supported to help interpret the new measurements in view of the variety of physical processes that enter into the complex dynamics of this region.

The plan of the workshop in the first hour is to present the current status of the three new MISETA instruments and to hear a report concerning the new developments of the general circulation modelling as applied to the MISETA mission. Then the second hour would feature the discussion of plans for the initiation of the MISETA observations in the September and October periods this fall. Once started, it is intended that an extended period of observations would take place. Within this period specific intervals would be singled out for special treatment with supporting measurements made by JRO.

Anyone interested in equatorial aeronomy is invited to attend.

21.

JICAMARCA WORKSHOP

D. T. Farley, Cornell University, Convener

PURPOSE. As was the case last year, the goals of this workshop are (1) to describe the Jicamarca Observatory and its capabilities to those who may be unfamiliar with it, especially students, and (2) to bring current and past users up to date on new developments at the Observatory. What follows is a preliminary outline of the Workshop organization. There may be changes made between the time of writing and the date of the Workshop.

GENERAL OVERVIEW (D.T. Farley and R.F. Woodman). General description of the Observatory and its various radars; new developments in the capabilities; other related facilities; the current political situation.

DATA ACQUISITION SYSTEM (W.E. Swartz). The present system and its capabilities, and upgrades that are in the works.

RECENT SCIENCE AT JICAMARCA

D. Hysell - Aspect sensitivity of bottomside ESF irregularities
E. Kudeki - 150 km echoes
E. Kudeki - N-S F region drifts
B. Fejer - F region dynamics: model/observation comparisons
A. Creamer - More model/observation comparisons
P. Erickson - High altitude incoherent scatter observations
J. Flaherty - Coordinated Jicamarca/OTH radar observations
R. Woodman - Observations of space debris

Others? (Above titles are approximate only - my best guess at this point - and assorted co-authors have been omitted). Because of time constraints these talks will obviously have to be *really brief*, just two or three viewgraphs that hit the highlights. The idea is to show the scope of the research at Jicamarca and point out implications for future work. The details of the work *cannot* be given here. We do not want a series of speeded up AGU talks!

CEDAR PROGRAMS AT JICAMARCA. Brief presentations on relevant programs (in addition to the usual IS world day runs). In some cases workshops on these programs will have already taken place before the Jicamarca Workshop. Quick summaries may suffice for these. For some programs we may wish to discuss scheduling, best operating modes, etc.

MISETA - J. Meriwether (covered in preceding workshop; omit or very brief)
CADRE - D. Fritts
IEEY - R. Woodman
Others?

GENERAL DISCUSSION. Suggestions for new programs, new experiments, equipment upgrades, etc.

22.

Resonance Scatter Lidar Workshop
Conveners: Mike Kelley/Chet Gardner
2:00 - 6:00, Thursday, June 24, 1993

A number of proposals have been written to the CEDAR Program concerning Resonance Doppler Lidar development for the future. The purpose of this Workshop is to educate the community at large on the state-of-the-art in such systems and to describe the technical requirements on them. Three formal talks will be given dealing with the latter topic including a description of the existing Dye Lidar systems. These will be followed by discussion of four solid state Lidar options which have been suggested for the future. A panel discussion will follow.

23.

CADRE Workshop
Convener: David Fritts
1:30-5:30, Friday, June 25, 1993

The ***CADRE*** workshop will provide an opportunity for investigators participating or interested in the ***CADRE*** observations and data analysis to have a first look at some of the data collected during the December 1992 and January 1993 campaigns. We anticipate having preliminary analyses of a few of the data sets performed prior to the workshop to facilitate discussion of the relevant science topics to be addressed and the possibilities for correlative studies using the various observational systems.

Included in the first ***CADRE*** campaigns were all of the Pacific ST, MF, and MEDAC radars, balloons in Indonesia, rockets in Hawaii, the Jicamarca MST radar, UARS/HRDI mesospheric wind measurements, and optical observations at several discrete sites. We thus have a diverse data set which will be very valuable for a variety of studies provided we can assimilate all of the various components effectively.

There will be opportunities for presentation of data and analyses by those who have performed these studies in advance. The majority of our time is likely to be spent, however, in considering the possibilities for analysis and correlative studies and in coordinating the next, more comprehensive series of observations.

Everyone with an interest in ***CADRE***, with data or not, is welcome.

24. **Coordinated Observations Regarding Nightglow (CORN)**
Co-Chairmen: G. Swenson (Lockheed) and Dan Senft (U of IL)
1:30-5:30, Friday, June 25, 1993

Background. A campaign was conducted at the U. of Illinois during Sept-Early Oct., 1992 to study atmospheric gravity waves in the upper mesosphere using remote sensing techniques. The instrumentation included the U. of Ill Na Density and Temperature LIDAR (C. Gardner), OH and O2 spectrometer measurements (U. of Michigan and Johns Hopkins, S. Yee), OH narrow band and O2 imaging and temperatures, (Aerospace, J. Hecht), O2 Fabry Perot Temperatures and O2, OI imaging, (York University, Bob Peterson and Rudy Wiens), and OH broadband imaging (Lockheed, G. Swenson). A one night test was performed August 29, 1992 which involved lidar and imaging data for a particularly active period. All experiments operated during the late Sept-early Oct period, and during several clear nights, good data was gathered. A MAJOR ASPECT OF THE CAMPAIGN WAS THE SIMULTANEOUS OPERATION OF THE Na "TEMPERATURE" LIDAR SIMULTANEOUSLY WITH REMOTE SENSING AIRGLOW OBSERVATIONS OF THE UPPER MESOSPHERE DURING ACTIVE GRAVITY WAVE PERIODS.

Workshop Intent: Present results from individual experiments and share results.

WORKSHOP PLAN:

PRESENT CAMPAIGN SUMMARY, REVIEW BACKGROUND AND GOALS.
G. Swenson (and other contributers)-20 Minutes
Review of Paper Plans-U. of Ill., 5 Minutes
Lidar Results-U. of Ill., -15 Minutes
OH Narrow Band-Aerospace, - 15 Minutes
OH,O2 Temperatures, Johns Hopkins, 15 Minutes
O2, Airglow Images, York University, 15 Minutes
OH Broadband Images, Lockheed, 15 Minutes

Discussion on Joint Results - 20 Minutes

Future Plans

25.

CEDAR STORM Workshop

NCAR Foothills Lab Room FL 3-2072
1.30 - 5.30 pm, Friday, June 25th, 1993

This year's workshop again emphasizes two storm periods around the times of the Incoherent Scatter Coordinated Observations Days of March 20-21, 1990, and June 11-12, 1991. These two storms were observed by incoherent scatter radars, coherent scatter radars, ionosondes, polarimeters, Fabry-Perot interferometers, magnetometers, satellites, all-sky imagers and other instruments. In addition, results of a number of sophisticated models have been compared with various data sets to assess our understanding of storm processes, both on a global scale and at individiual locations. Several successful workshops dealing with these two interval have already been held, and a special session at the Spring 1993 AGU Meeting emphasized these two storms. Some studies of the March, 1990 storm have already been published, and others are maturing rapidly. The June, 1991 interval was more severely disturbed, with Kp reaching 90 on June 5, 8- on June 10, and again 8- on June 13. A number of specific projects dealing with this latter interval have recently gotten underway.

Reports on many of the projects currently being carried out on these two storm periods will be given at this workshop. Individuals involved in the various projects will also have time to get together to discuss details of their collaborations.

Tentative Agenda

Introduction - M. Buonsanta (5 min)

G. Crowley - Patch study of March, 1990 storm (10 min)

M. Lester - The magnetospheric/ionospheric response to the magnetic disturbances of March, 1990 (10 min)

B. Emery/D. Knipp - Latest AMIE potential patterns for the March, 1990 storm (10 min)

M. Codrescu - Coupled Thermosphere Ionosphere Model results for the March, 1990 storm compared with Millstone Hill and Arecibe data (10 min)

P. Richards - Field Line Interhempispheric Plasma model electron density results for the March, 1990 storm compared with Millstone Hill and Arecibo data (10 min)

C. Fesen - TIGCM results for March, 1990 and June, 1991 (10 min)

P. Riley - Identifying penetration events in equatorial ionosphere (10 min)

B. Fejer - Penetration of disturbance winds and electric fields to low and middle latitudes (10 min)

R. Smith - Couple of thermospheric momentum and energy to midlatitudes during the June, 1991 storm (15 min)

M. Lester - The magnetospheric/ionospheric response to the magnetic disturbances of June, 1991 (10 min)

M. Buonsanto - Midlatitude magnetosphere/ionosphere coupling during the June, 1991 storm (10 min)

G. Crowley - Plans for a coordinated study of the November 8-9, 1991 storm (10 min)

M. Codrescu - Development of a storm alert system (15 min)

Discussion of future plans for the CEDAR Storm Study (15 min)

Discussion groups on specific projects (1 hour+)

26.

Turbopause Transition Study Workshop
(formerly MLT Structures)
CEDAR Summer Workshop (June 1993)
1:30-5:30, Friday, June 25

The turbopause transition was the focus of considerable interest in the 1960's and early 1970's, but the interest has waned somewhat since then. A possible reason is that there may be a feeling in the community that the dynamics associated with the transition from eddy to molecular viscosity is reasonably well understood. Even a cursory reconsideration of the literature in light of the developments over the last ten years shows that quite the contrary is true. In fact, the dynamical processes and their effects on the chemistry and electrodynamics in the turbopause transition height range are rather poorly understood.

The focus of the workshop is on the dynamics, chemistry, and electrodynamical interactions in the transition height range from approximately 80 to 120 km altitude. The height range encompasses the transition from isotropic to anisotropic turbulence, from eddy to molecular viscosity, from collision-dominated to free ionization, and includes the special chemistry of several minor constituents.

Our goal is to define the major scientific problems associated with the turbopause transition and to formulate a plan for attacking those problems with the available experimental and theoretical techniques.

A representative but not exhaustive list of the scientific issues that warrant discussion is as follows:

* How accurate are the available eddy and molecular diffusion coefficient values?

* How do the tides modulate the eddy diffusion coefficients?

* Is there evidence for eddy diffusion above the turbopause boundary?

* Are the gravity wave momentum fluxes dissipated differently above the turbopause than below?

* What is the effect of the increasing Hall and Pedersen drag coefficients on the dissipation of wave energy?

* How does the transition from eddy to molecular viscosity affect the chemistry?

* Are radar or optical measurements affected by the transition from eddy to molecular viscosity? If so, will the effects create biases or will they provide new information about the dynamics of the transition region?

The range of topics and the height ranges involved suggest that an investigation of the problems will require a combination of a broad range of instrumentation for both ground-based and in situ measurements. A proposal for a rocket campaign either in Hawaii or Puerto Rico is being considered to provide the in situ observations.

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