The Cedar Post

May 1994 No. 22

The NASA Program in Ionosphere-Thermosphere-Mesosphere Physics

The study of the Earth's ionosphere, thermosphere, and mesosphere (ITM) provides an important focus for activities within NASA's Space Physics Division (SPD). ITM science represents one of four primary areas within the SPD's newly reorganized Science Branch. The other areas are Solar Physics, Magnetospheric Physics, and Cosmic and Heliospheric Physics. The ITM component of the SPD addresses science objectives that are held in common with NSF's Aeronomy and Upper Atmosphere Facilities Programs. There is, therefore, an almost exact mapping between CEDAR and NASA's ITM Program.

NASA's ITM activities are funded by a Supporting Research and Technology (SR&T) Grants Program, a suborbital sounding rocket program and a space flight segment. In addition, a small number of ITM theory research groups (currently three) are funded from the Space Physics Theory Program. The annual NASA budget for ITM physics, excluding the flight segment and launch costs associated with sounding rockets and balloons, is approximately $8M per year, split almost equally between the SR&T (68 grants) and suborbital programs (17 investigations). Each year, NASA publishes a NASA Research Announcement, or NRA, that solicits proposals for participation in these programs. This announcement usually appears in the May-June time frame, with selections of successful proposals announced in January-February. Typically one third of the annual budget is available for competition in any given year. In recent years the success ratio has declined to about one in four or five, as the program has become more highly competitive and funding levels have remained flat.

The science effort within ITM is monitored by an advisory group--the ITM Management and Operations Working Group or ITM-MOWG--composed of active researchers in the field. The ITM-MOWG is currently chaired by Dr. R. A. Heelis of the University of Texas at Dallas and the working group interacts principally with Dr. Mary Mellott who is the NASA Headquarters lead scientist for the ITM area. The MOWG meets approximately three times a year to review the activities within ITM and reports to the Space Physics Subcommittee (SPS) which, in turn, is the advisory group for the SPD Director, Dr. George Withbroe.

The two near-term flight programs planned within ITM are the reflight of the space tether system (TSS-1), and the Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) mission, the anchor of the so-called "Solar Connections Program."

NASA is developing two tether systems: the Tethered Satellite System (TSS) exclusively for the space shuttle and the Small Expendable Deployment System (SEDS) which can be used on expendable launch vehicles, free-flyers, or the space shuttle. SEDS has had three successful flights, deploying tethered satellites up to 20 km distances (all were Delta-II secondary payloads). The first shuttle tether system, TSS-1, flew on STS-46 in late July and early August, 1992. While the deployment of the tether on the first flight of TSS-1 was not completely successful, the instrumentation worked flawlessly, giving confidence in the ultimate success of this mission. A reflight is currently manifested on STS-76 scheduled for launch in February, 1996. A community workshop to discuss the potential benefits of space tethers for ITM science will be held on July 6-8, 1994 at the Space Physics Research Laboratory, University of Michigan. Potentially interested participants should contact the convener, Dr. Brian Gilchrist, at 313-763-6230 (e-mail: gilchrist@eecs.umich.edu).

The TIMED mission is the major new initiative in ITM science and is currently planned for launch towards the end of the decade. The scientific objectives of the TIMED mission focus on a global investigation of the region of the atmosphere between ~80 and 160 km altitude. TIMED has passed several important milestones during the past year and continues to evolve as intense efforts are undertaken to define the best possible scientific mission consistent with the limited available budgetary resources. The TIMED Science Working Group (SWG),

comprising 15 Principal Investigators, was selected by NASA in July 1993. The SWG includes 9 instrument teams and 6 interdisciplinary scientists. A summary of the selected investigations was given at the Fall AGU Meeting and a brochure describing the full mission is included in this CEDAR mailing.

In December 1993, the TIMED SWG was charged by NASA to develop lower cost options for the mission that preserve the most important aspects of the TIMED science. This process has been completed and several alternative mission scenarios have been presented to NASA Headquarters for consideration. There now exists, therefore, a complete set of implementation options for TIMED, ranging from single Pegasus-class spacecraft with a subset of the selected TIMED instruments to the full-up two-spacecraft mission described in the brochure which accommodates all selected instruments. The available options incorporate many innovative approaches to the mission development (e.g. shortened development time lines, use of existing high-technology spacecraft buses, small co-located teams, testing at working subsystem rather than component levels, etc.), making TIMED truly one of the first of the "faster, better, cheaper" missions long espoused by NASA as required for the next era of space research. The choice of the actual version of TIMED for flight will be made later this year as NASA works through its budget planning exercises. In the meantime, there will be a Saturday TIMED workshop at the upcoming CEDAR meeting to define the collaborative CEDAR ground-based efforts and campaigns. This workshop is being convened by Dr. Jeff Forbes (University of Colorado) who is one of the TIMED interdisciplinary scientists. Participation is strongly encouraged, since the NSF and NASA aeronomy efforts are two sides of the same coin and need to be coordinated appropriately. In particular, CEDAR-style ground-based research will be absolutely essential to optimize the scientific return from the TIMED mission.

The NASA Research Program in ITM Physics is critical to the overall vitality of upper atmospheric science in the U.S. In the words of the late Stan Shawhan, past director of the SPD, the ITM Program "represents NASA's contribution to CEDAR." Further information on the NASA programs may be obtained from Dr. Mary Mellott at NASA Headquarters.

Tim Killeen, SPRL, University of Michigan

CEDAR in the Classroom

On May 5, 1994 the last lecture in Cornell University's Upper Atmospheric Physics course was accompanied by real time data from the Sondre Stromfjord Observatory. With a herculean effort by Cornell graduate student Steve Baker and the constant advice and guidance of Craig Rasmussen of the University of Michigan, the system was acquired and configured in less than a month's time from the start of the project.

The magnetosphere cooperated nicely in that the Observatory rotated through the throat of the dayside convection pattern, displaying a 360° rotation of the flow pattern while we watched. In addition, the local magnetic field measurements displayed the same pattern in the H component and had large fluctuations which correlated well with fluctuations in Ted Rosenberg's imaging riometer data channels.

All in all, it was a very satisfying experience for the instructor and the students. John Kelly and Craig Heinselman were very gracious in supporting this educational project. We look forward to further experimental use of the system as well as classroom and undergraduate involvement in geoscience.

Michael C. Kelley, Cornell University

CEDAR Post Editorial

I want to take this opportunity to thank Laurie Shelton for the excellent job she did in publishing the *CEDAR Post* during the past two years. She will be attending the workshop this year, passing the torch, so to speak, to Patti Gassaway of the University of Boulder, CO.

Barbara Emery was her usual stalwart self and always patient while reminding me for the nth time about this or that aspect of workshop proceedings.

I want to especially thank people who wrote lead articles, which for me made the publication more than a "call to the meeting." So, thanks is extended to Donald Farley, Mike Davis, Chet Gardner and Herb Carlson, Frank Djuth, Paul Castleberg, and Tim Killeen.

Michael C. Kelley, Editor, The CEDAR Post

CEDAR Ph.D. Survey Results (1988-1993)

Considerable attention has been given recently to the employment options for Ph.D. students in the U.S. Science program. A running dialogue exists, for example, in *Physics Today*, dealing with the topic. Our own John Sahr (CEDAR Steering Committee/Assistant Professor at the University of Washington) has publicized the problem and worked to develop a network to help prospective job seekers. Dr. Sahr, it turns out, was the one successful candidate for a tenure track position at U. Washington out of some 400 applicants. The CEDAR Steering Committee thought it worthwhile to check our own Ph.D. students to see where they have found employment and, if possible, what their long term prospects are.

The NSF provided lists of CEDAR awardees since 1988 and we canvassed them as to the whereabouts of their recent Ph.D. graduates (1988-93). For comparison purposes we used the same format as the article on page 33 of the December 1993 issue of *Physics Today* entitled "Initial Employment of Physics Doctorate Recipients: Class of 1992" by Susanne D. Ellis. (This is the issue with the beautiful cover photo of Arecibo, by the way.) Our numbers were much smaller (43 versus 804) so we did not separate U.S. from foreign-born students in our study.

The results are given in the table below, with job types divided into three categories labeled "Post Doctoral," "Potentially Permanent," and Temporary." Percentages were used, with CEDAR and *Physics Today* values listed under the headings "CEDAR" and PHYSICS," respectively. The first set of percentages involves employer classification and the second the type of work.

The most striking result is that 60% of our students have found potentially permanent positions in a short time versus 23% in Physics. This result may be a little deceiving, since if a student stayed at his or her home institution for a while as a postdoc and then took a permanent post, we included this case in the permanent column. Likewise, if a student went to a university as a postdoc and became an assistant professor we ruled this a "Potentially Permanent" case as well.

It seems at this point that our CEDAR graduates are doing well, but we must not become overconfident. More effort is needed to establish industrial connections. The CEDAR Steering Committee should again consider the addition of a Job Fair aspect to the yearly workshop. We might well be able to attract recruiters to Boulder for an afternoon workshop/ poster session. Perhaps there should be a third "co-Chair" for the Boulder meeting in charge of this aspect of the conference.

Michael C. Kelley, Cornell University

CEDAR Ph.D. Survey Results (1988-1993)

Total Ph.D. Names Submitted: 43

	Postdoctoral Positions		Potentially Permanent Positions		Temporary or Part-Time Positions	
	CEDAR	PHYSICS	CEDAR	PHYSICS	CEDAR	PHYSICS
Number of Contributors	15	517	26	190	2	97
Percent of Total	35	62	60	23	5	12
Employer						
University	53%	67%	27%	12%	0%	55%
College or High School	7%	0%	8%	14%	50%	27%
Industry	7%	5%	15%	52%	0%	10%
FFR&DC*	7%	16%	23%	7%	0%	0%
Government	25%	8%	27%	12%	0%	0%
Other	0%	4%	0%	3%	50%	8%
Type of Work						
Research	81%	93%	44%	14%	0%	33%
Teaching	6%	--	8%	10%	50%	40%
Teaching & Research	0%	--	24%	10%	0%	7%
R&D	13%	7%	24%	52%	0%	5%
Nonphysics Prof'l.	--	--	--	7%	0%	7%
Other	--	--	--	7%	50%	8%

*Federally funded research and development centers

1994 Annual CEDAR Meeting Agenda
Sponsored by NSF, HAO/NCAR, and the University of Colorado

The plenary sessions will be held in Math 100 at the University of Colorado every morning, Monday through Friday. Poster sessions will be held in the cafeteria atrium of Foothills Laboratory. Workshops will be held every afternoon, Monday through Friday, and Saturday at the NCAR Foothills and Mesa Laboratories.

Monday, June 20, 1994 - Math 100, University of Colorado

8:30 - 9:15 Welcome and Introductions - Michael Kelley, Cornell University:
- UCAR (Richard Anthes, President of UCAR)
- HAO (Tom Holzer, Director of HAO)
- New CEDAR Steering Committee Chairman (Jeff Forbes)

Introduction of Students and Postdocs

9:15 - 9:30 CEDAR Data Base - Barbara Emery, NCAR

9:30 - 10:00 CEDAR Prize Lecture - Raymond Roble, HAO/NCAR, Modelling the Circulation, Temperature and Compositional Structure of the Upper Atmosphere (30-500 km)

10:00 - 10:30 Break

10:30 - 11:30 Tutorial #1: Comparative Planetary Ionospheres - Andrew Nagy, University of Michigan

11:30 - 12:00 UARS Results - Charles Jackman, NASA/Goddard

12:00 - 12:30 Updates and Reports:
- National Space Weather Service - Ron Zwickl, SEL/NOAA
- Polar Cap Observatory - John Kelly, SRI International, and Mike Kelley, Cornell University

12:30 - 2:00 Lunch

2:00 - 5:30 Workshops at NCAR Mesa and Foothills

6:30 - 8:30 Reception/Tour Coors Brewery in Golden (or 6:00-9:00)

Tuesday, June 21, 1994 - Math 100, University of Colorado

8:30 - 9:00 NSF Issues - Rich Behnke
CEDAR Review - Bob Robinson

9:00 - 10:00 Tutorial #2: Coupled Energetics, Chemistry, and Dynamics in the Mesosphere - Marty Mlynczak, NASA/Langley

10:00 - 12:30 Break and Poster Session A at Foothills Lab

12:30 - 2:00 Lunch

2:00 - 5:30 Workshops at Foothills Lab only

Wednesday, June 22, 1994 - Math 100, University of Colorado

8:30 - 8:45 CEDAR Postdoc Status Report - Rick Doe, SRI International, Nightside Signatures of Magnetic Reconnection

8:45 - 9:45 Tutorial #3: Ionospheric Effects of Lightning Discharges - Umran Inan, Stanford University

9:45 - 12:30 Break and Poster Session B at Foothills Lab

12:30 - 2:00 Lunch

2:00 - 5:30 Workshops at NCAR Mesa and Foothills

6:00 - 8:30 Buffet at NCAR Mesa Lab Tree Plaza

Thursday, June 23, 1994 - Math 100, University of Colorado

8:30 - 9:30 Updates and Reports:
- ADS - Frank Marcos, Phillips Lab
- RAIDS, ARGOS, SSULI - Bob McCoy, Naval Research Lab
- MSX - Gerald Romick, Applied Physics Lab
- TIMED - Andy Christensen, Aerospace Corporation

9:30 - 10:00 Svalbard/EISCAT - Tony Van Eyken, EISCAT or substitute

10:00 - 10:15 Break

10:15 - 11:15 Tutorial #4: Computer Networking and Telescience - Yadunath Zambre, SRI International

11:15 - 11:30 UARC: Results and Observations - Tom Finholt, University of Michigan and Robert Clauer, University of Michigan

11:30 - 11:45 Telescience at Millstone Hill - John Holt, MIT-Millstone Hill

11:45 - 12:00 Title TBD
Brent Watkins, University of Alaska or substitute

12:00 - 12:20 EISCAT Perspectives on Telescience - Tony van Eyken, EISCAT or substitute

12:30 - 2:00 Lunch

2:00 - 5:30 Workshops at NCAR Mesa and Foothills

Friday, June 24, 1994 - Math 100, University of Colorado

8:30 - 9:00 Reports:
- HAARP Heating System in Alaska - Dennis Papadopoulos, University of Maryland

MU Radar and MST Upgrades - Robert Palmer, University of Nebraska

9:00 - 10:00 Tutorial #5: Auroral Acceleration Processes - Pat Reiff, Rice University

10:00 - 10:15 Break

10:15 - 11:30 Reports:
GEM status (TBD)
RISE status - Dick White, HAO/NCAR
Student Experience Workshop - Monica Coakley, University of Wisconsin and John Sahr, University of Washington

11:30 - 12:30 Poster Prize Awards, Future Plans for CEDAR, Concluding Remarks

12:30 - 2:00 Lunch

2:00 - 5:30 Workshops at NCAR Mesa and Foothills

Saturday, June 25, 1994 - Main Seminar Room, NCAR Mesa Laboratory

CEDAR/TIMED Collaborative Science (Convener: Jeff Forbes, University of Colorado)

9:00 - 12:00 General Workshop

12:00-2:00 Lunch Off-Site

2:00 - 5:00 Writing Assignments

1994 Annual CEDAR Meeting Plans
Monday, June 20 to Saturday, June 25
Boulder, CO

We anticipate approximately 300 persons at the 1994 CEDAR Workshop. So far, 146 students and 39 non-students have registered. This year, University buses will be employed to take participants from the plenary sessions to Foothills and the Mesa. We expect a lot of car pooling, so only one 44-passenger bus will be used. In addition, one bus will go from the Foothills Lab on Wednesday at 5:30 pm to the NCAR buffet at the Mesa Lab. The return will be at 8:30 pm from the Mesa to Hallett Hall. At least one bus, if not more, will be used to take participants from Foothills Lab and the Mesa to the reception/light buffet/tour/movies at Coors Brewery in Golden, leaving at 5:00 pm or later. The return time has not yet been set. Buses would stop at the Mesa and Foothills if necessary, but would definitely go to Hallett Hall. The Coors reception currently starts at 6:00 and goes to 9:00 pm. These times may change to 6:30-8:30 pm if only 300 are expected. We will have rotating tours, food rooms, and movies, so any arrival time is fine.

A list of the workshops is given, along with tentative room assignments. Workshops are held concurrently in the afternoons at both the NCAR Mesa and Foothills Laboratories due to a shortage of space experienced the past few years. There are regular shuttle runs between the two labs every 30 minutes, taking about 20 minutes in transit, to facilitate workshop attendance at the different locations. The NCAR shuttle schedule will be in the package of materials sent to each pre-registrant in early June along with useful maps containing directions to Coors and locations of meeting buildings in Boulder.

Due to the large number of students who signed up for poster space, we had to move the posters from the University Hallett Hall lounge to the Foothills Lab cafeteria atrium. This meant moving the poster session on Monday morning to Tuesday morning to allow people time to put their posters up Monday afternoon. Tuesday morning posters should be taken down before the afternoon break on Tuesday and Wednesday posters should be put up after the break. Wednesday posters should come down sometime Wednesday afternoon. On the poster session days (Tuesday and Wednesday), the bus will leave the University at 10:00 am and go to Foothills, the location of the morning break. On other days, the bus will leave the University at 12:30 and go to Foothills and the Mesa. Return buses to Hallett have not been planned, so plan on car pooling to dinner or further destinations.

Two students applied for fellowships to come to NCAR before the meeting and to stay for a week after the meeting to work on some CEDAR data base project. These students are: Judy Mirick of Clemson University (advisor John Meriweather) and David Machuga of Pennsylvania State University (advisors John Mathews and Tim Kane). Judy and David will be studying Jicamarca and Arecibo incoherent scatter data, respectively.

Barbara Emery, NCAR

Workshop Schedule
1994 CEDAR Summer Meeting

The rooms to be used are:

Foothills-2 Auditorium, room 1022	= 141 persons
Foothills-2, room 1001	= 61 persons
Foothills-2, room 1002	= ~10 persons and several workstations
Foothills-2, room 1003	= 48 persons
Foothills-2, room 3107	= 35 persons
Foothills-3, room 2072	= 40 persons
Mesa Main Seminar (MS)	= 122 persons

Final room assignments will be based on a show of hands at the plenary sessions each morning. Building assignments will probably NOT change. Workshops are split every day between the Mesa and Foothills Lab except for Tuesday. We estimate between 300 and 350 attendees, 145 being students.

MONDAY

1) 2:00-5:30 FL2-1022
Student Experience Panel Workshop (estimate 70)
Conveners: Monica Coakley and John Sahr

2) 2:00-5:30 FL2-1001
Puerto Rico 2 (Turbopause Transition) Workshop (estimate 30)
Convener: Miguel Larsen

3) 2:00-5:30 Mesa MS
CEDAR Storm Study (estimate 50)
Convener: Michael Buonsanto

4) 1:30-5:30 FL2-1002
Database (Roy Barnes, NCAR and Steve Cariglia, Millstone) (sign-up for 1 hour)

Note that the Coors reception starts at 6:00 and goes to 9:00 pm. These times may change to 6:30-8:30 pm if only 300 are expected. We will have rotating tours, food rooms, and movies, so any arrival time is fine. However, one or more buses will leave Foothills and the Mesa at 5:00 or 5:30 pm (depending on the start time), and will return to Hallett Hall.

TUESDAY

1) 2:00-5:30 FL2-1022
Arecibo Workshop (estimate 100)
Convener: Craig Tepley

2) 2:00-5:30 FL2-1001
CADRE Workshop (estimate 50)
Convener: Dave Fritts

3) 2:00-5:30 FL3-2072
Workshop on The Arizona Imager/Spectrograph Facility (estimate 30)
Convener: A. Lyle Broadfoot

4) 1:30-5:30 FL2-1002
Database (Roy Barnes, NCAR and Steve Cariglia, Millstone) (sign-up for 1 hour)

WEDNESDAY

1a) 2:00-5:00 Mesa MS
January 1993 10-Day World-Day Experiment (estimate 40)
Conveners: Clark Miller and Mike Kelley

1b) 5:00-6:00 Mesa MS
1995 Incoherent Scatter World Day Schedule (estimate 50)
Convener: John Holt

2) 2:00-5:30 FL2-1001
ISTP/GGS-CEDAR Collaborative Campaign Workshop (estimate 40)
Conveners: Glynn Germany and D. Torr

3) 1:30-5:30 FL2-1002
Database (Roy Barnes, NCAR and Steve Cariglia, Millstone) (sign-up for 1 hour)

Note that the buffet at the NCAR Mesa Lab starts at 6:00 pm, so the World Day Schedule is designed to meet right before this. A bus will leave Foothills Lab at 5:30 pm for the Mesa Lab buffet, and will leave the Mesa at 8:30 to return to Hallett Hall.

THURSDAY

1) 2:00-5:30 FL2-1022, FL3-2072, FL2-3107, FL2-1003 (<4:45)
CEDAR Coordinated Analysis of the Thermosphere (CAT) Workshop (estimate 50)
Convener: Maura Hagan

2) 2:00-5:30 FL2-1001
Jicamarca Workshop (estimate 30)
Convener: Don Farley

3a) 1:30-3:00 Mesa MS
Proton Aurora Workshop (estimate 50)
Conveners: Roger Smith, Hans Nielsen, Charles Deehr and Supriya Chakrabarti

3b) 3:00-4:30 Mesa MS
Auroral Arcs-AERONOMY Workshop, CEDAR-94 (estimate 50)
Conveners: Gary Swenson and Stan Solomon

3c) 4:30-6:00 Mesa MS
Auroral Airglow Structure and Tomography (estimate 50)
Convener: Robert Sears

4a) 2:00-5:00 FL2-1002 - sign-up for about 10 persons for 30 minutes each.
-University of Michigan UARC display and demo (Craig Rasmussen)

-Millstone Hill and EISCAT mosaic display and demo (Steve Cariglia and others. Since Steve is at the Database Workshop other days, those who sign up can see it at any other time.
-University of Alabama CEDAR Access Program (Srinivas Pasupuleti)

4b) 5:00-6:00 FL2-1003
Discussion of Data Formats
Conveners: Craig Rasmussen, John Holt, and Barbara Emery

FRIDAY

1) 2:00-5:30 FL2-1022
MISETA/Equatorial Dynamics Workshop (estimate 50)
Conveners: John Meriwether and Michael Mendillo

2) 2:00-5:30 FL2-1001
PRIMO: Problems Related to Ionospheric Modelling and Observations (estimate 30)
Conveners: Dave Anderson, Jan Sojka, and Tim Fuller-Rowell

3) 2:00-5:30 Mesa MS
Needs for Laboratory Aeronomy Data (estimate 40)
Convener: Ken Smith

4) 2:00-5:00 FL2-1002
Database (Roy Barnes, NCAR and Steve Cariglia, Millstone) (sign-up for 1 hour)
University of Michigan UARC display and demo (Craig Rasmussen) (sign-up for 30 minutes)

SATURDAY

9:00-12:00, 2:00-5:00 Mesa MS (Main Seminar Room)
CEDAR/TIMED Workshop (estimate 50)
Convener: Jeff Forbes

Miguel Larsen, Clemson University
Barbara Emery, NCAR

Workshop Announcement: CEDAR/TIMED Collaborative Science Saturday, June 25, 9 am ~ 5 pm

It is highly probable that the TIMED mission will proceed with a 1996 new start. However, this will be a "timed" not "TIMED", i.e. a significantly reduced version of the fully-instrumented, two-spacecraft mission originally conceived. Our ability to optimally address important science issues relating to the mesosphere and lower thermosphere and coupling to regions above and below will require, now more than ever, collaborations between ground-based and space-based observational capabilities. These collaborations, and any incremental funding needed to support them, must be planned well in advance.

The purpose of the workshop is to begin to develop a strategy for collaboration between the CEDAR program and the TIMED mission. The intention is to produce a document which clearly and demonstrably defines potential synergisms that would lead to significant advances in science that would otherwise not be possible. In particular, the parochial view that ground-based observations serve mainly to "validate" satellite-based measurements "in support of" space-based missions needs to be dispelled. This can only be done through substantive intellectual arguments and hard facts. The proposed document will serve as the medium and vehicle through which these arguments are articulated. Possible scope of the document includes justifying maintenance of key existing programs, acceleration of proposed programs and facilities (i.e. PCO, MARI, etc.), and any additional funding required for proposed collaborative activities; providing a basis for a U.S. interagency funding agreement; and demonstrating the necessity of international participation, thereby providing funding leverage for our foreign colleagues.

All interested scientists are welcome to attend. International participation is key, and these inputs will be solicited at the June 1994 Workshop, and for some period (perhaps a year) thereafter. Presentations relating to TIMED experiments and science are being planned for morning presentations during the week of June 20-24, thus providing some context for our deliberations. It is anticipated that we will initially hold an open forum in the morning wherein ideas are exchanged and splinter groups are defined. The splinter groups will meet for some period of time, prepare written drafts, and reconvene later in the day to interact and plan the next stage of work. We will plan a two-hour lunch break to allow adequate time for some leisure activity and lunch.

Substantive comments, both pro and con, and any questions can be directed to:

Jeff Forbes, Convener
Department of Aerospace Engineering Sciences
Campus Box 429, University of Colorado
Boulder, CO 80309-0429
phone: (303) 492-4359; fax: (303) 492-7881
e-mail: forbes@zeke.colorado.edu; jforbes@ncar.ucar.edu

First Announcement

Summer Workshop on Space Tethered Missions for ITM Science

This is an announcement of a summer 1994 workshop to assess the potential benefits of space tethers for the Ionospheric-Thermospheric-Mesospheric (ITM) science discipline. The results from this workshop will be provided to NASA's Space Physics Division.

Workshop Date:	July 6-8, 1994
Location:	Space Physics Research Laboratory University of Michigan Ann Arbor, MI

Identification of Potential Participants

We wish to identify those in the ITM science community who may have an interest in participating in the workshop or learning more about it. Please reply directly via e-mail to itmteth@eecs.umich.edu, via fax (313-764-5137, Attn: Brian Gilchrist) or via phone (313-763-6230).

The Potential Benefit to ITM Science

Possible capabilities offered by space tethers for ITM science include (1) multi-point, simultaneous in-situ measurements of the lower thermosphere, ionosphere, and auroral regions; (2) multiple look angle remote sensing measurements; (3) large scale electrodynamic measurements as well as cause-and-effect ionospheric currents experiments; and (4) large antenna structures for VLF/ELF generation/detection. Such measurements offer the possibility of conducting in-situ science of considerable synergy with the proposed TIMED mission.

Technology Tool for ITM Science

NASA is developing two tether systems: the Tethered Satellite System (TSS) exclusively for the space shuttle and the Small Expendable Deployment System (SEDS) which can be used on expendable launch vehicles, free-flyers, or the space shuttle. SEDS has had three successful flights, deploying tethered satellites up to 20 km distances (all were Delta-II secondary payloads). International collaboration also appears likely with both scientific mission interest and/or technology development on-going in Italy, Japan, Russia, and Canada as well as other ESA countries.

Workshop Questions

We propose to address questions such as the following in the workshop:

(1) Can ITM science benefit from the unique capabilities of space tethers? What is the scientific imperative?

(2) Can missions be defined to address important scientific questions with modest costs?

(3) Are there technology issues remaining to be resolved before ITM science can fully benefit from space tethers?

Preliminary Organizing Committee

Brian Gilchrist (UM, Chair)

Rod Heelis (UTD, Co-Chair)	W. John Raitt (USU, Co-Chair)
Carlo Bonifazi (ASI)	Larry Brace (UM)
George Carignan (UM)	Koh-Ichiro Oyama (ISAS)
Chris Rupp (NASA, MSFC)	George Wood (NASA, Langley)

Brian Gilchrist, University of Michigan

Call for Papers

International Symposium on Equatorial Aeronomy: ISEA

Including the Middle Atmosphere

The ISEA Symposium Outline

The 9th International Symposium on Equatorial Aeronomy will be held at the Bali Cliff Resort, Bali, Indonesia during March 20-24, 1995. The 9th ISEA is planned to discuss recent progress and future perspectives on a wide range of issues concerning equatorial and low latitude aeronomy, including the middle atmosphere. Authors are encouraged to submit papers on all topics of interest to the 9th ISEA.

Submission of Abstracts

For submission of papers, two kinds of abstracts are needed: one is a standard one-page abstract and the other is an extended abstract of no more than four pages. The standard abstracts must be received by the Secretary for ISEA by November 1, 1994. The deadline of extended abstracts will be February 28, 1995.

Registration and Hotel Accommodation

The registration fee is $180 US. A large number of rooms have been reserved for ISEA at a special discount rate ($80 US per night) at the Bali Cliff Resort only during the Symposium. Programs for spouses will be arranged. Further details will be provided in the Second Announcement which will be sent in June 1994 to intending participants with the Registration Form and the Application Form for Hotel Accommodation.

Travel Stipends

Limited funding will be available for partial support of travel expenses for students and participants from developing countries. To be eligible for consideration, the applicant must be the speaker for an accepted oral or poster paper. Written application for this support must accompany the standard abstract submission in order to be considered, and must be received by the Secretary for the ISEA by November 1, 1994.

Sponsors

The 9th ISEA will be co-sponsored by the International Union of Radio Science (URSI), the International Association of Geomagnetism and Aeronomy (IAGA), the International Association of Meteorology and Atmospheric Science (IAMAS), the Scientific Committee on Solar Terrestrial Physics (SCOSTEP), the Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS/Japan), and the U.S. Air Force.

Other Information

The 9th ISEA will be chaired by S. Fukao (Japan), co-chaired by B.G. Fejer (USA) and M.A. Abdu (Brazil), and local arrangements will be made by Harsono Wiryosumarto, Chairman of the National Institute of Aeronautics and Space (LAPAN/Indonesia). For further information, please contact the Secretary for the Conference:

Dr. T. Tsuda
Secretary for the 9th ISEA
Radio Atmospheric Science Center
Kyoto University
Uji, Kyoto 611, Japan

Tel: +81-774-32-3111
Fax: +81-774-31-8463
Telex: 5453665 RASCKU J
e-mail: tsuda@kurasc.kyoto-u.ac.jp

Shoichiro Fukao
Chairman of the 9th ISEA, Kyoto University

APL Postdoctoral Position

Geospace Remote Sensing Group
The Johns Hopkins University
Applied Physics Laboratory

One postdoctoral position is immediately available in the area of optical aeronomy. The position is for one year and is renewable for up to two additional years.

The postdoctoral position is in association with ongoing NSF, NASA and DoD programs being carried out at APL. Current interests within the group include analysis and modeling of the mesosphere HRDI/UARS data, high latitude daytime NIR spectroscopic rocket data, ground-based/airborne spectroscopic data from the NSF-sponsored CORN campaign, and spectroscopic aircraft data from the ALOHA campaigns. Participation in, and modeling and analysis of, polar stratosphere chemistry/radiation/dynamics data in association with the current ASHOE/MESA campaign, as well as analysis of data from previous arctic and SPADE campaigns, is also underway. In addition, there is a strong interest in modeling and analysis of data related to the mesosphere-thermosphere system. With the launch of the MSX spacecraft in November 1994, there will be direct access to a 6 Gbyte/day database comprising five spectrographs and four imagers covering the spectral range 110-900 nm viewing from the nadir to 200 km in the limb. There is also need for support in hardware design, development, construction and calibration, since the group has an active program in instrument development with participation by several members of the group as principal and co-investigators on the TIMED and MSX satellites as well as in rocket and airborne programs.

Annual salaries are in the range of $40,000.

For the initial interaction, interested individuals should submit a resume, a statement of research interests, background and thesis abstract to either Gerald Romick, Don Anderson, Larry Paxton, Geoff Crowley, Sam Yee or Danny Morrison. The address is:

JHU/APL
Johns Hopkins Road
Laurel, MD 20723
e-mail: first_last @jhuapl.edu

If there are any questions, phone (301) 953-5000 and ask to speak with one of the contacts listed above.

Members of the group will be at the 1994 Annual CEDAR Workshop (June 20-24) and will be available for detailed discussions. JHU/APL is an equal opportunity/affirmative action employer.

Research Assistantship in the Atmospheric Physics Laboratory

The Atmospheric Physics Laboratory is a part of the Department of Physics and Astronomy of University College London. It is situated about a ten minute walk from the main campus, at 67-73 Riding House Street. The group carries out research on the upper atmosphere and ionosphere using a variety of ground-based techniques (Fabry-Perot Interferometers, Incoherent Scatter Radar and others) and a numerical model of the ionosphere-thermosphere system. It has a world-wide reputation in this area.

A position is available within the group to work in EISCAT (European Incoherent Scatter Radar) data, and the comparison of that to the UCL-Sheffield-SEL numerical thermosphere-ionosphere model (TIM). It is for an RA, at the recent post-doctoral level. Experience in ionospheric and/or thermospheric physics would be preferred, but is not essential if enthusiasm is substituted.

Two main projects are to be worked on. On EISCAT, the analysis of top-side data is a complex task which pushes the capabilities of the radar (and our theoretical understanding) to the limit. It will be necessary to try out a number of different techniques to try to extract velocities and compositions of the different ion species from the data taken. A number of interesting new analysis techniques are being developed, and it is hoped UCL can make a significant contribution to that development. This world is in the forefront of incoherent scatter radar research, and will be enhanced when a new radar facility comes into operation on Svalbard in 1995-96 (ESR - the EISCAT Svalbard Radar).

The second project, the comparison of EISCAT data to the numerical mode, will entail the setting up and use of an empirical model of EISCAT data at UCL. This will be used to study long-term trends, seasonal and solar cycle variations, LT versus UT effects, and as "ground-truth" for comparison with the TIM. The latter aspect will require the researcher to become acquainted with the TIM and become involved in this development. The TIM runs on the Cray at Rutherford Appleton Laboratory, and on DEC AXP workstations at UCL. A number of interesting developments are planned on this model in the future.

Anyone interested in this position (or if you think you might be and would like to discuss it) should contact Alan Aylward in the APL (071-636-8333, ext. 3035, 82-3035 from UCL main building). Alternatively, call Karen Smart, secretary to the group (071-436-7614) and leave your details, and we will get back to you.

Kane Wins 1993 Allen Prize

The 1993 Allen Prize, which is given for graduate work in atmospheric remote sensing using electro-optical instrumentation, went to Timothy J. Kane. A research associate in the Electro-Optics Department of the Applied Research Laboratories at Pennsylvania State University, Kane was cited for "fundamental contributions to lidar studies of mesospheric iron and sporadic layering phenomena in the upper atmosphere." Two other awards presented at the OSA annual meeting were reported in the December issue of *Physics Today* (page 37): the Robert M. Burley Prize of the Joseph Fraunhofer Award, which went to Erwin G. Loewen, and the Esther Hoffman Beller Award, which went to Robert G. Greenler.

Chet Gardner, University of Illinois

The 21st Annual European Meeting on Studies of the Atmosphere by Optical Methods

September 12-16, 1994
London, England

This meeting will be held at University College London, in the Bloomsbury area near the British Museum and West End. Subject to availability, accommodation can be provided in inexpensive student quarters near to the conference centre. The meeting will be hosted by the Atmospheric Physics Laboratory of the Department of Physics and Astronomy at UCL. Each session of a widely varied program will be introduced by an invited paper, but contributed talks are also welcome. A special edition of the *Journal of Atmospheric Physics* will publish papers from the proceedings, subject to the usual refereeing procedures.

This is an exciting period for atmospheric and ionospheric science, with the imminent arrival of the EISCAT Svalbard Radar, Cutlass and the other DARN radars, the Cluster satellites and many other ground-based and space-based systems. Optical systems have a vital role to play in joint studies with these facilities, and developments in optical systems themselves are enabling measurements to be made where it was previously not possible. Keynote talks will put the arrival of the new systems into context, and show what developments are likely in the near future.

The areas covered will be wide, from stratosphere to the borders of the magnetosphere, from Fabry-Perot Interferometry to active experiments, and from ground-based to space-based instruments. The physics will include auroral substorm morphology, noctilucent clouds, middle atmosphere dynamics and much more.

A varied social program is also being prepared. Besides the usual Conference dinner, a boat trip along the Thames to historic Greenwich is planned. There is also a preliminary program for accompanying persons, although the centrality of the site in London almost makes such arrangements superfluous!

For more details of the planned program, and abstract and registration forms, contact:

Dr. David Rees
Atmospheric Physics Laboratory
Dept. of Physics and Astronomy, University College London
67-73 Riding House Street
LONDON W1P 7PP, UK
phone: +44 71 436 7614; fax: +44 71 436 7615
e-mail: dr@apg.ph.ucl.ac.uk (Internet)

Boulder Lodging and Local Transportation Information

1994 Ninth Summer CEDAR Workshop
June 20–25, 1994

The facilities listed below have blocked rooms for workshop participants between the nights of June 18-June 25, 1994. Reservations must be accompanied by a credit card charge number or a deposit for the first night's lodging; Visa, MasterCard, American Express, and Discover credit cards are accepted at most of the hotels. Cancellations must be made before 4:00 PM on the arrival day to avoid being charged for the first night's lodging. The blocks of rooms at special workshop rates are only being held until the dates indicated below and they may fill up early. **MAKE ALL RESERVATIONS AS SOON AS POSSIBLE AND SPECIFICALLY MENTION THE CEDAR WORKSHOP HOSTED BY NCAR.** (If using a Travel Agent, have them identify you in the same manner.) Participating hotels and rates for June 18-June 25, 1994 are:

Hotel	Single*	Double*	Deadline	No. of Rooms
Days Inn 5397 S. Boulder Road Boulder, CO 80303 (303) 499-4422; Fax: (303) 494-0269	$64	$69 (Up to 4 People)	May 18	65
Holiday Inn of Boulder 800 - 28th Street Boulder, CO 80303 (303) 443-3322	$69	$69	May 18	35
Courtyard by Marriott 4710 Pearl East Circle Boulder, CO 80301 (303) 440-4700 or 1-800-321-2211; Fax: (303) 440-8975	$75	$75	June 6	35
Homewood Suites Hotel 4950 Baseline Road Boulder, CO 80303 (303) 499-9922 or 1-800-225-5466; Fax: (303) 499-6706	$99 for a Suite w/Kitchen (will accommodate 3-4 people)		May 18	15

RESERVE ROOMS BEFORE DEADLINES TO ASSURE LOWER RATES

All hotels have comfortable accommodations and all of them, except the Courtyard, can provide shuttle service to local meetings if requested by individuals *in advance* (based on availability). The Days Inn and Homewood Suites provide free continental breakfasts with lodging. Homewood Suites also has a free social hour Monday through Thursday. Checkout times are 12:00 noon. All hotels have swimming pools. We were unable to book blocks of rooms at the Broker Inn or the Clarion again this year, but some individual rooms may be available.

*Hotel rates do not include 9.55% sales tax.

UNIVERSITY OF COLORADO DORMITORY ROOMS AND MEALS

	Single	Double	No. of Rooms
Main Campus Conference Housing Area 142 Cheyenne-Arapaho Hall Boulder, CO 80310 Fax: (303) 492-4646	$133.67	$109.02 (per person) [NOTE: FOR EMERGENCIES ONLY: (303) 492-6885 (Suzy Campbell or her secretary)] e-mail: campbell%eagle@vaxf.colorado.edu	70(S), 70(D)

NO PHONE-IN RESERVATIONS ACCEPTED. PLEASE SEND THE REGISTRATION FORM PROVIDED HEREIN TO THE MAIN CAMPUS CONFERENCE HOUSING AREA. Rates for the campus package include a dormitory room from 6/19 to 6/23 and breakfast every day from 6/20 to 6/24. Early arrivals (6/18) and late departures (6/25) will pay an extra $22.46/night (single) or $17.35/night (double, per person). Also, have only ONE individual in charge of each group from each university. Colorado University accepts VISA and MasterCard. The above prices include the 9.55% sales tax. Please check in at Hallett Hall. Parking permits for a week may be requested on the registration form for $7.50 (price at the meeting will be at least $15/vehicle).

GROUND TRANSPORTATION (Airport). The Rocky Mt. Supercoach (303/499-1951, ~$15.00) and the Boulder Airporter Limousine Service (303/321-3222, ~$12.00) will take reservations for direct transportation between Denver International Airport, the hotels, and the University. Their schedules are staggered so you may find one more convenient for your arrival/departure.

DAY CARE. For child care while you attend the Workshop, Children's World at 5377 Manhattan Circle in Boulder will accept children on a drop-in basis (based on space availability). Children's World also offers summer field-trip programs. If you're interested, please call Maribeth Scott at (303) 494-3694. Many other day care facilities are listed in the Boulder telephone directory under "Child Care."

Registration Form
1994 Ninth Summer NSF CEDAR Workshop
June 20–25, 1994

National Institute of Standards and Technology – NIST
National Center for Atmospheric Research – NCAR

1. **PLEASE PRINT**

Name: _____

Institution: _____

Address: _____

_____

Telephone: (_____)_____ Fax: (_____)_____

E-mail: _____ Citizenship: _____

Are you a: Student ( ) Tutorial Speaker ( ) Neither ( )

NOTE: Students registering after **May 31** will be charged a $5.00 late fee. Students wanting travel funds should register **before April 30**.

2. I plan to present a poster at the meeting _____. **NOTE**: Send title and author list to Dr. Jeffrey Thayer by **May 31** to be considered. (For address, please see *Call for Poster Papers*.) Also, please identify the first author as student or nonstudent, as students will be given preference if there are space limitations.

3. I plan to attend the reception / tour at Coors Brewery in Golden, CO on Monday, June 20 (additional $10.00; free for students and tutorial speakers) _____.

4. I plan to attend the buffet on the Tree Plaza at NCAR on Wednesday, June 22 (additional $15.00; free for students and tutorial speakers) _____.

5. **FEES:** The regular total fee for the CEDAR Workshop is $85. It could be more or less depending on parking needs and attendance at the reception and buffet. **ALL FEES, INCLUDING PARKING, RECEPTION, AND BUFFET ARE WAIVED FOR STUDENTS AND TUTORIAL SPEAKERS. However, parking permits not requested on this form must be purchased by the attendee. Fees for guests or late assessments are not waived. NOTE**: Foreign registrants are not assessed the $15.00 late fee provided they register by **May 31** and may delay payment until the meeting.

(a) Regular registration - $60.00 _____. (Registration by **May 31**.)

(b) Retiree Registration - $20.00 _____. (Registration by **May 31**.)

(c) Coors Brewery reception/tour - $10.00 _____.

(d) Guest(s) for Coors reception/tour - $10.00/ea or $5.00/child _____.

(e) NCAR buffet - $15.00 _____.

(f) Guest(s) for NCAR buffet - $15.00/ea or $7.50/child _____.

(g) University parking permit - $7.50 _____. (Request by **June 10**.)
(If purchased at the meeting, ≥$15.00)

(h) Late registration fee - $15.00 _____. (Registration **after May 31**.)

(i) Late **student** registration fee - $5.00 _____. (Registration **after May 31**.)

GRAND TOTAL, 1994 CEDAR WORKSHOP FEES (a-i) $ _____.

NOTE: If registration payment is not enclosed with this form, please be certain that checks sent separately identify you and the workshop. Checks for the workshop (including parking permits or guests for Coors or the buffet) should be made payable to NCAR. NCAR does not accept VISA or MasterCharge. Foreign registrants may pay on arrival provided their registration forms are mailed early. Please send correspondence to: Barbara Emery, HAO/NCAR, P.O. Box 3000, Boulder, CO 80307-3000; Phone: (303) 497-1596; Fax: (303) 497-1589; Internet: emery@ncar.ucar.edu; SPAN: 9580::"emery@ncar.ucar.edu".

University of Colorado Summer Conference Housing Application
Main Campus

PLEASE COMPLETE THE INFORMATION REQUESTED BELOW AND SEND TO THE ADDRESS INDICATED AT THE BOTTOM OF THIS FORM.

Name of Conference: *NSF CEDAR Meeting, Summer 1994*

Participant's Name: _____ Sex: _____
(last) (first)

First Night's Lodging: _____ Last Night's Lodging: _____
(date) (date)

Address: _____ City: _____ State: _____ Zip: _____

Telephone: (Home) _____ (Business) _____

Please request one of the following:

*Single Room _____ Double Room _____ (Roommate Preference if Any) _____

Special Requests (Smoker/Nonsmoker, etc.) _____

*There are a limited number of single rooms. If a single room is unavailable, you will share a double room with another conference participant.

Complete if Accompanied by Spouse and/or Family:

Spouse's Name _____ First Night's Lodging _____ Last Night's Lodging_____

Child's Name _____ Age ____ Sex____ Dbl ____ Sngl ____ 1st Night____ Last Night_____

" Name _____ Age ____ Sex____ Dbl ____ Sngl ____ 1st Night____ Last Night_____

" Name_____ Age ____ Sex____ Dbl ____ Sngl ____ 1st Night____ Last Night_____

Will a rollaway bed be needed? _____ Crib? _____ **Total Number in Party** _____

PAYMENT IS DUE AT CHECK-IN. Cash, traveler's checks, personal checks, VISA and MasterCard will be accepted. DO NOT SEND MONEY IN ADVANCE. PHONE-IN REGISTRATIONS ARE **NOT** BEING ACCEPTED, BUT IN CASE OF ANY QUESTIONS OR EMERGENCIES, THE AREA MANAGER'S TELEPHONE NUMBER IS (303) 492-6885.

MAIL TO: Main Campus Conference Housing Area
142 Cheyenne-Arapaho Hall
Boulder, CO 80310
or
Fax: (303) 492-4646
e-mail: campbell%eagle@vaxf.colorado.edu

The Cedar Post

Dr. Michael C. Kelley
School of Electrical Engineering
318 E & TC
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Ithaca, NY 14853

Address correction requested.

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L. Shelton, Production Manager.