The Cedar Post

May 1991 No. 13

Plans for the 1991 Annual CEDAR Meeting

The 6th Annual CEDAR Meeting will be held at the National Institute of Standards and Technology and at the National Center for Atmospheric Research in Boulder, Colorado, from Monday, June 17, through Friday, June 21, 1991. While many of the popular features of previous meetings such as tutorial papers, workshops and poster sessions are included in the agenda, the 1991 meeting will also include several important new features. Student attendance has increased steadily since the first CEDAR Meeting in 1986, and last year more than 100 students from 27 different institutions participated in the meeting. During the past several years we have received numerous requests from students and senior scientists to hold a series of short courses at the CEDAR Meeting to review the fundamentals of the instrument technologies important for observing both the neutral and ionized atmospheres. This year two 3-hour short courses are being offered on optical instrumentation. On Monday afternoon, June 17, in the NIST Auditorium, Russ Philbrick from Penn State University will conduct a short course on middle atmosphere lidar. On Tuesday afternoon, also in the NIST Auditorium, Roger Smith from the University of Alaska will conduct a short course on airglow instrumentation. Both courses are being taught at a level compatible with the technical expertise of beginning physics and engineering graduate students and are open to anyone who attends the CEDAR Meeting. The courses will be video-taped and there is no charge to participate. We expect to continue the short course program during the next several years with new courses on radars, satellite instrumentation, data processing and perhaps supercomputer modeling techniques.

The CEDAR Program has now reached an important crossroads in its evolution. While significant progress has been made in developing collaborative programs and improving instrument capabilities that are already yielding important new scientific results, we have not yet reached the goal of developing the "Class I facilities" that will be required to address the key research problems into the next century. Today, few disciplines can make significant progress without some big science projects. It is becoming increasingly clear that major new observational facilities are essential to address many of the most pressing problems in the atmospheric sciences. The relatively high cost of these new facilities will require community-supported initiatives to obtain the necessary funding. The Polar Cap Observatory is an important initiative that began several years ago under the leadership of Mike Kelly from Cornell University. The centerpiece of this extra-high latitude observatory is a large radar facility designed to study processes in the troposphere up into the magnetosphere. An intensive workshop on the Polar Cap Observatory was held at Cornell in the Fall of 1989, and recently, a summary report was published describing the scientific rationale for the observatory and the technical challenges involved in building it. The report has been formally submitted to NSF. At the CEDAR Meeting on Thursday morning, June 20, Mike will moderate a 3-hour workshop on the Polar Cap Observatory. The workshop will include discussions of the scientific goals of the project, the planned instrument configurations for the observatory, and the steps now being taken to secure funding.

Another important initiative featured at this year's meeting is the development of a giant optical observatory for atmospheric studies. Although this project is still in the early conceptual phase and the complete instrument complement has not yet been defined, the centerpiece of the observatory is envisioned to be a 10-meter class fully steerable telescope designed for lidar measurements of the atmosphere from the ground up into the thermosphere. The observatory is also expected to include a wide variety of radar, optical and *in situ* instruments. One and a half days of the CEDAR Meeting, starting on Tuesday morning, June 18, are devoted to this initiative. The optical observatory workshop has been organized by Chet Gardner and is described in more detail in the accompanying article.

A tentative agenda for the 1991 CEDAR Meeting, housing information and registration forms are included in this issue. Bela Fejer, Barbara Emery, Odile de la Beaujardiere and Roger Smith have done a fine job of organizing an interesting agenda, and they have attracted some superb tutorial speakers. We hope you will be able to attend. Perhaps we will see you on the Georgetown narrow gauge train trip just prior to the meeting on Sunday afternoon!

Development of a Giant Optical Observatory for Atmospheric Studies

The development and refinement of sophisticated remote sensing technologies during the past three decades have contributed enormously to our knowledge of the atmosphere. The construction of major radar facilities, such as EISCAT, Millstone Hill, Arecibo, Jicamarca and the MU radar, has permitted researchers to study both the neutral and ionized atmosphere with unprecedented accuracy and resolution. At the time these facilities were built, each represented a major step forward in observational capabilities, and today these radars continue to play central roles in many atmospheric studies. Lidar technology has enjoyed a similar renaissance since the invention of the laser in 1961. The first lidars were built in the 1930s and 40s using mechanically modulated searchlights. Today, modern laser-based systems are used to probe composition and structure throughout the atmosphere from the troposphere into the lower thermosphere. The last five years have been a period of substantial growth in lidar capabilities and applications, principally because of advances in certain critical areas of laser technology. Perhaps the most important of these has been the development of high-power, ultrastable narrowband lasers, which are now being used in Doppler/temperature lidars for middle and upper atmosphere applications. The development of tunable solid-state lasers, which are rugged and reliable and can be used for ground-based, airborne and even satellite observations, has also been important. While the recent advances have been impressive, the accuracy, resolution and sensitivity of many lidar systems are still limited by signal levels.

The performance capabilities of most atmospheric radars and lidars are dictated by one simple parameter, the power aperture product of the system (PA = average transmitter power x effective area of receiving antenna). The largest radars have power aperture products on the order of 10^6 Wm^2. The largest lidars are quite modest by comparison, with values on the order of 10-30 Wm^2. Lidars can make useful measurements, even with small PA products, because the optical backscatter cross sections are usually very large. Even so, the performance and sensitivity of most lidar systems can be improved substantially if the PA product is increased.

A 1 1/2 day workshop has been organized for Tuesday, June 18 and Wednesday, June 19 at the 1991 CEDAR Meeting to assess the scientific rationale and technical feasibility of developing a giant optical observatory for atmospheric studies. The centerpiece of the observatory is a 10-meter class telescope and several advanced laser systems designed to study the structure, composition, dynamics and chemistry of the earth's atmosphere from the troposphere up into the thermosphere. The observatory would also include an appropriate complement of other important instruments such as radars, imagers, spectrometers, and perhaps *in situ* measurement capabilities using balloon and rocket probes. The large telescope, in combination with advanced high-power laser systems, would permit lidar measurements of winds, density, temperature and chemical composition with a sensitivity and resolution more than 1000 times better than those which can be achieved with the most powerful systems in operation today. Depending on the application, it would be possible to develop lidars with PA products ranging from 150 to more than 10^4 Wm^2. This capability would permit researchers to study atmospheric processes with unprecedented accuracy and precision. Because the telescope will be designed specifically for lidar applications and will be fully steerable, active experiments involving laser modification and chemical releases from satellites and rockets would open entirely new research areas and may even permit observations well into the thermosphere.

The facility would be located at a geophysically interesting site that has superb viewing conditions. Potential sites include (but are not limited to) Mt. Hopkins, AZ, Haleakala Crater, Maui, and Cerro Tololo, Chile. The facility would be operated much like the large astronomical observatories and atmospheric radars. Researchers would conduct observations either using the equipment at the facility or perhaps bringing their own lasers or detectors to the site and using the large telescope. A fraction of the observing time would be devoted to measurements directly related to global change, e.g., developing long-term data bases of important atmospheric constituents such as water vapor, ozone, carbon dioxide and methane.

The optical observatory workshop begins on Tuesday morning with the tutorial session **21st Century Research Challenges in Observational Atmospheric Science**. The first speaker, Dave Fritts from the University of Alaska, will discuss his perceptions of the key research issues facing the atmospheric dynamics discipline during the next 20 years. Guy Brasseur, Director of the Atmospheric Chemistry Division at NCAR, will discuss the important research problems in atmospheric chemistry. These two talks will help workshop participants identify some of the major scientific issues that can be investigated at the proposed observatory. Chet Gardner will end the session with a discussion of the potential measurement capabilities of the facility.

The main workshop activities will take place on Tuesday and Wednesday afternoons in nine separate sessions that will run serially. The sessions are designed to address specific issues related to various scientific and technical aspects of the observatory. The session titles and their leaders are listed in the meeting agenda on page 4.

The portability and moderate cost of many lidars are distinct advantages for exploring the geographic variability of the atmosphere from remote sites or aircraft. However, researchers should have access to at least one major facility where sophisticated new technologies can be developed and tested and where mature techniques can be used to study atmospheric processes in exquisite detail. Presently, the giant optical observatory is only an idea. It can become a reality if we, as a community, are able to articulate compelling scientific and technical arguments for its construction. To do this requires your help. The workshop leaders and I are very interested in your views and ideas about the optical observatory concept. We hope you will be able either to attend the workshop at the CEDAR Meeting or to communicate your ideas directly to one of us. We look forward to hearing from you.

Chet Gardner, University of Illinois

Preliminary Workshop/Class Schedule for the 1991 Annual Meeting

We now have rooms available at both NIST and NCAR for the workshops and classes. At NCAR, the main seminar room seats 122, the Damon room seats 50, and the Fleishmann Building holds 35. Where possible, we tried to schedule the workshops at NCAR. We also tried to keep rooms 103-105 at NIST relatively free so that posters could be put up earlier and stay up longer. Note also that the workshops and classes do not always start at the same time.

Monday PM June 17

1) **Lidar Short Course** – R. Philbrick
   NIST auditorium, 2:00 – 5:00
2) Lower Thermosphere Coupling Study (LTCS) – J. Forbes
   NCAR main seminar room, 2:00 – 5:30
3) Accessing the CEDAR Data Base – B. Emery
   NCAR Damon room, 2:00 – 4:00
   Will have time at the end to practice on 10 terminals. Repeats Friday AM.

Tuesday PM June 18

1) **Airglow Instruments Short Course** – R. Smith
   NIST auditorium, 2:00 – 5:00
2) Development of a Giant Optical Observatory for Atmospheric Studies I – C. Gardner
   NCAR main seminar room, 1:30 – 5:30
3) Equatorial Dynamics I – Preliminary results from the Equis / CRRES 1990 campaign – M. Mendillo
   NIST room 107, 2:00 – 5:30
4) Coordinated Analysis of the Thermosphere (CAT) – M. Hagan
   NCAR Damon rooms, 1:30 – 5:30

Wednesday PM June 19

1) Development of a Giant Optical Observatory for Atmospheric Studies II – C. Gardner
   NCAR main seminar room, 1:15 – 5:30

2-3) March 1990 Storm – M. Buonsanto
   NCAR Damon rooms, 1:30 – 3:30
   Modelling of Global Convection – M. Ruohoniemi
   NCAR Damon room, 3:45 – 5:45

4) Global Scale Measurements and Modelling Approaches to Intermediate Layers – E. Szuszczewicz
   NCAR Fleischmann Building, 2:00 – 4:00

Thursday PM June 20

1) Equatorial Dynamics II – Future campaign plans – M. Mendillo
   NCAR main seminar room, 2:00 – 5:30
2) Problems Related to Ionospheric Modelling and Observations (PRIMO) – D. Anderson, T. Fuller-Rowell, J. Sojka
   NCAR Damon room, 2:00 – 5:30
3) Auroral Arcs – G. Swenson
   NCAR Fleischmann Building, 1:45 – 3:30
4) Atmospheric Laboratory for Applications and Science (ATLAS 1) – D. Torr and D. Melendez-Alvira
   NCAR Chapman room, 3:45 – 5:15

Friday AM June 21

1) Coupling and Dynamics of Equatorial Regions (CADRE) – D. Fritts
   NCAR main seminar room, 8:30 – 12:30
2) Accessing the CEDAR Data Base – B. Emery
   NCAR Directors' Conference room, 8:30 – 10:30
   Will have time at the end to practice on 10 terminals.
3) Global Ionospheric Simultaneous Measurements of Substorms (GISMOS) – Multi-instrument operations with improved spatial and temporal resolution – O. de la Beaujardiere
   NIST rooms 103-105, 8:30 – 10:30
4) Coupling and Dynamics of the Ionosphere/ Thermosphere System (CADITS) – V. Wickwar and H. Carlson
   NIST rooms 103-105, 10:30 – 12:30

Barbara Emery
NCAR/HAO

Georgetown Narrow Gauge Railroad

Arrangements have been made for up to 60 persons to ride the Colorado narrow gauge Georgetown Loop Railroad on Sunday afternoon, June 16. The train will leave Silverplume at 2:40 PM. Silverplume is on I-70 west of Denver and is about 1 1/2 hours by car from Boulder. Car pools will provide transportation. The train travels between Silverplume and Georgetown and will stop for approximately 1 hour during the trip for a guided mine tour. Only 60 people can be accommodated on the mine tour. However, 250 people can ride the train. The train ride alone is 1 hour and 10 minutes, while the train ride and mine tour are 2 hours and 20 minutes. Group rate costs for adults are $9.90 for the train alone, or $10.60 for the train and mine. Group rates for children (ages 4-15) are $4.25 for the train alone, or $5.50 for the train and mine tour. Children 3 and under ride free on the train if they sit on the lap of an adult, but are not encouraged to go into the mine because everyone is required to wear a hard hat. Sign up on the registration form if interested and make your checks payable to: Barbara Emery, HAO/NCAR, P. O. Box 3000, Boulder, CO 80307. Phone: (303) 497-1596. FAX: (303) 497-1137. e-mail: INTERNET emery @hao.ucar.edu or SPAN 9580::"emery@hao. ucar.edu".

1991 Annual CEDAR Meeting Agenda
Sponsored by NSF, HAO/NCAR, and U of CO

Monday, June 17, 1991 – NIST Auditorium

8:30–8:45	Welcome Chet Gardner, CEDAR Peter Gilman, NCAR Ray Roble, HAO
8:45–10:00	Introductions CEDAR post doc(s) Students
10:00–10:15	BREAK
10:15–10:45	CEDAR Prize Lecture
10:45–11:15	The International Solar Terrestrial Physics Program (ISTP) Stephen Curtis
11:15–12:00	CEDAR Issues (budget, awards, etc.) Behnke/Roesler/Gardner
12:00–12:30	CEDAR Data Base Update Emery/Holt
12:30–2:00	LUNCH
2:00–5:00	Lidar Short Course (NIST Auditorium) Russ Philbrick, Penn State
2:00–5:30	Workshops at NCAR and NIST
3:30–3:45	BREAK

Tuesday, June 18, 1991 – NIST Auditorium

8:30–9:00	CEDAR Related Work in the USSR V. Telegin, IZMIRAN, Moscow

21st Century Research Challenges in Observational Atmospheric Sciences

9:00–9:10	Introduction Chet Gardner, Univ. Illinois
9:10–10:10	Atmospheric Dynamics David Fritts, Univ. Alaska
10:10–10:30	BREAK
10:30–11:30	Atmospheric Chemistry Guy Brasseur, NCAR
11:30–12:15	Observational Capabilities of a Giant Optical Observatory Chet Gardner, Univ. Illinois
12:15–1:30	LUNCH
2:00–5:00	Airglow Instruments Short Course (NIST Auditorium) Roger Smith, Univ. Alaska

Development of a Giant Optical Observatory for Atmospheric Studies (NCAR Auditorium)

1:30	Lower Atmosphere Lidar Requirements Ed Browell, NASA Langley
2:30	Middle and Upper Atmosphere Lidar Requirements John Meriwether, Geophysics Laboratory
3:30	Correlative Radar Instrumentation Miguel Larson, Clemson Univ.
4:30	Correlative Optical Instrumentation Abas Sivjee, Embry-Riddle Univ. Tim Killeen, Univ. Michigan
6:00–8:00	RECEPTION/BUFFET at NCAR

Wednesday, June 19, 1991 – NIST Auditorium

8:30–9:30	Physics of Auroral Arcs Gerhard Haerendel, Max Planck-Garching
9:30–10:30	Poster previews (2 min/2 figs)
10:30–10:45	BREAK
10:45–12:30	Poster session at NIST
12:30	LUNCH

Development of a Giant Optical Observatory (cont.) (NCAR Auditorium)

1:15	*In situ* Balloon and Rocket Experiments Bill Sharp, Univ. Michigan
2:15	Atmospheric Modification and Tracer Experiments Mike Mendillo, Boston Univ.
3:15	Telescope Performance Requirements Russ Philbrick, Penn State
4:15	Observatory Site Requirements Craig Tepley, Arecibo Observatory
5:00	Planning the Next Step Chet Gardner, Univ. Illinois

Thursday, June 20, 1991 – NIST Auditorium

8:30–9:30	High Latitude Convection Rod Heelis, Univ. Texas-Dallas
9:30–10:00	The Solar Terrestrial Energy Program (STEP) Vince Wickwar, Utah State
10:00-10:30	BREAK

The Polar Cap Observatory

10:30–12:30	Mike Kelley, Cornell
12:30–2:00	LUNCH
2:00–5:30	Workshops at NCAR and NIST
3:30–4:00	BREAK

Friday, June 21, 1991 – NIST/NCAR

8:30–12:30	Workshops at NCAR and NIST
10:00–10:30	BREAK
12:30	Adjourn

Registration Form
1991 Sixth Annual NSF CEDAR Workshop
June 17–21, 1991

National Institute of Standards and Technology
National Center for Atmospheric Research

1. Name: _____

   Institution: _____

   Address: _____

   _____

   Telephone: (___) _____ FAX: (___) _____

   E-mail: _____ Citizenship: _____

   Are you a student: ( ) Tutorial Speaker: ( )

   NOTE: Students should have applied for travel funds by APRIL 30 in order to be considered for funding.

2. I plan to present a poster at the meeting Wednesday, June 19._____
   NOTE: Students will be given preference if there are space limitations.

3. (a) Enclosed is my registration fee of $55.00:_____
   (Fee includes reception/buffet. Due May 31 to receive $15.00 discount.)
   NOTE: FEE WAIVED FOR STUDENTS AND TUTORIAL SPEAKERS

   (b) Enclosed is my late registration fee of $70.00 :_____(Due after May 31)

4. (a) I plan to attend the reception/buffet at NCAR on Tuesday, June 18._____

   (b) I am bringing _____ guest(s) to the reception/buffet at NCAR Tuesday, June 18, and enclose $15.00/guest (indicate amount enclosed):_____

5. I am interested in the train ride (1 hr 10 min) _____ or train ride and mine tour (2 hr 20 min) _____ for _____ person(s) on Sunday, June 16 at 2:40 PM from Silverplume. Please check article in CEDAR Post for prices and give the ages of any children. _____

NOTE: If registration payment is not enclosed with this form, please be certain that checks sent separately identify you and the workshop. Checks for workshop (and guests for the reception/buffet) should be made payable to NCAR and checks for the train ride should be made payable to Barbara Emery (emery @ncar.ucar.edu, 9580::"emery@ncar.ucar.edu", 303-497-1596). Please send correspondence to:

Louise Beierle
HAO/NCAR
P. O. Box 3000
Boulder, CO 80307-3000
(303) 497-1599
FAX Number: (303) 497-1137

University of Colorado Summer Conference Housing Application
Main Campus

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

Name of Conference: NSF CEDAR Meeting, Summer 1991

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

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(s) _____ 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

Boulder Lodging and Local Transportation Information

1991 Sixth Summer CEDAR Workshop
June 17-21, 1991

The facilities listed below have blocked rooms for workshop participants for the nights of June 16-June 21 (with arrival on June 15-16 and checkout on June 21-23), 1991. Reservations must be accompanied by a credit card charge number or a deposit for the first night's lodging; Visa, Mastercharge, American Express, and Discover credit cards are accepted at all the hotels. Cancellations must be made before 4:00 p.m. 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 16-June 21, 1991, are:

Hotel	Single*	Double*	Deadline
Broker Inn 555 Thirtieth Street Boulder, CO 80303 (303) 444-3330 or 1-800-338-5407	$57	$67	June 1
Days Inn 5397 S. Boulder Road Boulder, CO 80303 (303) 499-4422	$39	$39 (Up to 4 People)	June 1
Holiday Inn of Boulder 800 - 28th Street Boulder, CO 80303 (303) 443-3322 or 1-800-465-4329	$55	$55	May 23
Residence Inn 3030 Center Green Drive Boulder, CO 80303 (303) 449-5545 or 1-800-331-3131	$65 for a Studio w/ Kitchen (will accommodate 2-4 people) (*Hotel rates do not include 9.4% sales tax.)		June 1

RESERVE ROOMS BEFORE DEADLINES TO ASSURE LOWER RATES

All hotels have comfortable accommodations and all of them, with the exception of the Broker Inn, can provide shuttle service to local meetings if requested by individuals *in advance* (based on availability). The Days Inn and Residence Inn both provide free continental breakfasts with lodging. Checkout times are 12:00 noon. The Residence Inn has fully equipped kitchens and can accommodate up to 4 people if a studio with a hideaway bed is requested. All hotels have swimming pools.

University of Colorado Dormitory Rooms & Meals	Single	Double
	$126.50	$104.00 (per person rates)

Main Campus Conf. Housing Area
142 Cheyenne-Arapaho Hall
Boulder, CO 80310

(303) 492-6885 (ask for Elise Grainger or her secretary)
NOTE: FOR EMERGENCIES OR QUESTIONS ONLY

Rates include a Dorm Room from 6/16 through 6/20 and breakfast and dinner every day from breakfast on 6/17 through breakfast on 6/21. Dinner on 6/18 is **not** included due to the Reception/Buffet. It is possible to extend your stay on either end for $18 per person for a double and $27 per person for a single plus tax per night. For those who plan to come early to stay over Saturday night, please say on the campus housing form that your start day is 6/15, not 6/16. NO PHONE-IN RESERVATIONS ACCEPTED THIS YEAR. PLEASE SEND REGISTRATION FORM PROVIDED HEREIN. Also, have only ONE individual in charge of each group from each university. CU accepts VISA and Mastercard. Make reservations as early as possible (Reminder: NO PHONE-INS). Check in at Cheyenne-Arapaho Hall.

GROUND TRANSPORTATION (Airport)

The Boulder Airporter Limousine Service (303/321-3222) and the Stapleton Supercoach (303/499-1951) will take reservations for direct transportation between the hotels, University and Denver's Stapleton Airport. Their travel schedules are different so you may want to check with both companies to determine the service that is most compatible with for your arrival and departure times.

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 availability). Children's World also offers summer field-trip programs. If you're interested, please call Shaun Barnes at (303) 494-3694. Many other day-care facilities are listed in the Boulder telephone directory under "Child Care."

FIRST CLASS

CHAMPAIGN IL MAY 31 '91 PB METER 6817429 US POSTAGE 0.39

The Cedar Post

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Address correction requested.

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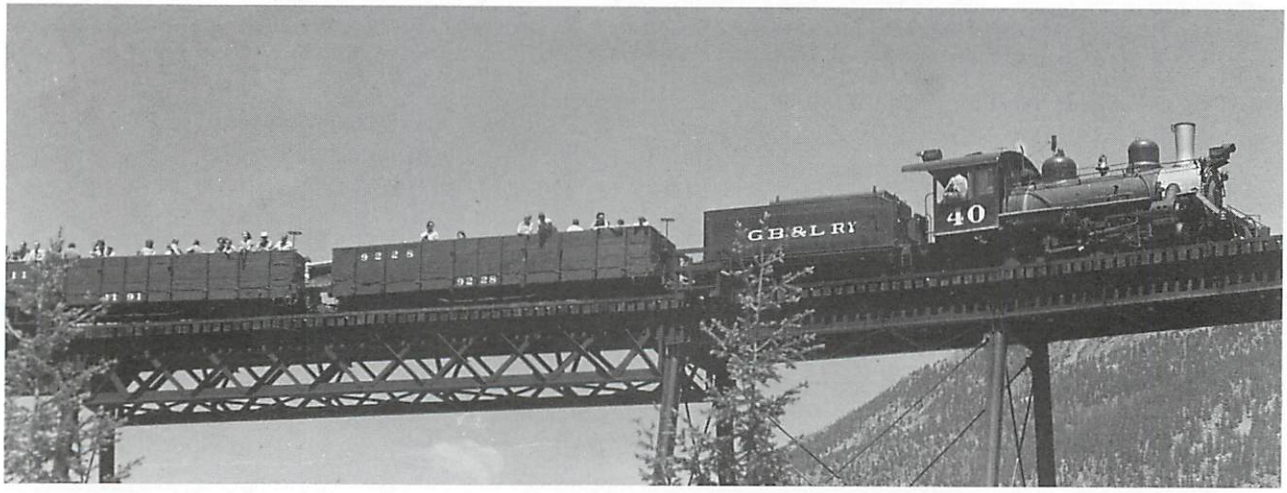
The Cedar Post is published quarterly and mailed to more than 800 scientists worldwide.
C. S. Gardner, Editor.



CEDAR Meeting Participants can ride the Georgetown Loop Narrow Gauge Railroad on Sunday afternoon, June 16, by making reservations with Barbara Emery (see page 3).