



Brace to Describe Venus' Ionosphere Studies



MR. BRACE

Mr. Larry H. Brace, Head of the Planetary Atmospheres Branch of the Laboratory for Atmospheres, NASA Goddard Space Flight Center, will address the January 7 National Capital Astronomers colloquium. The topic, "The Solar Wind Interactions With the Ionosphere of Venus," is particularly interesting during the present unusually rapid rise of the solar activity cycle.

Venus appears to be the only planet in the solar system that does not possess an intrinsic magnetic field strong enough to shield its atmosphere and ionosphere from the direct impact of the solar wind. As a result, Venus is comet-like in some respects, losing planetary ions to the solar wind, a process that probably has affected the evolution of its atmosphere and the loss of its oceans. The solar wind interactions also cause the Venus ionosphere to be highly dynamic as it responds to the large variations in the solar wind pressure. The measurements made by instruments on the Pioneer Venus Orbiter will be used to illustrate what we have learned about the Venus ionosphere in the past 10 years since the spacecraft was injected into orbit there. The implications of these results for stellar wind interactions at Mars, with its suspected larger intrinsic magnetic field, will also be discussed.

Mr. Brace has been a senior research scientist at Goddard Space Flight Center since 1963 when he left the University of Michigan, where he was the Director of the Space Physics Research Laboratory. He has been a Principal Investigator on many NASA satellite missions, with expertise in the area of *in situ* ionosphere measurements. Over the past 30 years he has authored more than 170 scientific papers, primarily on the ionospheres of Earth and Venus. His current efforts are focused on the study of solar-wind interactions with Venus, using data from the Pioneer Venus Orbiter, the only NASA spacecraft currently in orbit about another planet.

JANUARY CALENDAR — *The public is welcome.*

- Tuesday, January 3, 10, 17, 24, 31, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.
- Friday, January 6, 13, 20, 27, 7:30 pm — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.
- Saturday, January 7, 5:45 pm — Dinner with the speaker at the Smithsonian Restaurant, 6th and C Streets, SW., inside the Holiday Inn. Reservations unnecessary. Use the 7th Street and Maryland Avenue exit of the L'Enfant Plaza Metrorail station.
- Saturday, January 7, 7:30 pm — NCA monthly colloquium in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. Enter Independence Avenue side. Dr. Brace will speak.
- Friday, January 13, 20, 27, 8:30 pm — NCA 14-inch telescope open nights with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at 960-9126.
- Saturday, January 21, 7:30 pm — Discussion group on solar activity monitoring with Nancy Byrd. Room A06, Building 42, University of DC. See page 27.

For other organizational events of interest see elsewhere in this issue.

DECEMBER COLLOQUIUM

Dr. Carol Crannell, NASA Goddard Space Flight Center astrophysicist, described a new solar observation project at the December meeting with National Capital Astronomers at the National Air and Space Museum.

Crannell is Principal Investigator for the project, a balloon-borne Gamma-ray Imaging Device (GRID). The instrument is designed to study solar activity related to flares, in particular the physics of magnetic flux tubes by gamma-ray imaging of the arches.

She was given responsibility for the solar balloon series on 14 February 1980, the day of the Solar Maximum Mission launch. The first flight of the series carried a spectrometer, and was launched in Manitoba, Canada on Nov. 1, 1980. Some flights have been aloft for as long as 20 days.

Crannell likened the behavior of flares to that of earthquakes: Some of the highest-energy events occur late in the cycle. If no small events occur early, then enormous events are likely later. Microflares occur on timescales from milliseconds to seconds.

Gamma rays were first detected from balloon-borne detectors during the solar activity peak of 1958. The Orbiting Solar Observatory (OSO), launched in 1969, first detected nuclear gamma-ray line emission from solar flares, supporting theory.

At present, it is uncertain whether the gamma-ray source within the flux tube is at the magnetic foot points, or distributed throughout the loop. One possibility is that some isolated, very localized ionizing mechanism accelerates electrons along the magnetic arch to the foot points, where, upon encountering the nuclei of denser matter, they are decelerated to emit bremsstrahlung X-rays. Another possibility is that some bulk-excitation process ionizes the entire loop. Neither explains all.

Soft X-ray images show two spots. These may either be foot-point radiations, or be distributed emission from loops so tenuous that little is seen except looking longitudinally down the columns. There

may be undetected emissions, perhaps microwave synchrotron radiation, at and near the top of the loop. Composite images of the solar disk in H-alpha and VLA microwaves seem to show radiation from all parts of the loops. Microwaves, however, are strongly absorbed in the loop plasma, so can be seen only from the outer layer.

At present, there are no high-resolution hard X-ray or gamma-ray images of loops with which to identify and locate sources. What is needed is to resolve the radiation spectrum with separate, simultaneous, high-resolution images in both microwaves and gamma rays. The reactions can then be determined from the wavelengths, or energy levels, and distributions of the sources.

GRID will for first time image the gamma-ray sources with high resolution, thus to resolve the question of their location within magnetic loops. A six-meter tube with 10-cm detector fields at one end, sets of collimating grids of tungsten with slightly different periods at each end, will produce moire patterns at the detectors. These will reveal directions of arrival of photons, to yield gamma-ray images of 1.6 arcsec resolution. The thin plasma strands in the magnetic loops are of the order of 1 arcsec. Crannell showed prototype collimators of different periods, from 50-micron spaces with 100 micron period, to 2-mm spaces and 100 micron period, 1 cm.thick.

The 300-ft diameter, 28-million-cubic-foot balloon will carry a ton of instrumentation and an additional ton of ballast.

There is no plan to orbit any flare studies during the 1991 peak. However, two instruments have just been selected for long-duration balloon flights. One is optical, the other, a high-resolution Gamma-ray Spectrometer (HIREGS), to use cryogenic germanium detectors for nuclear line emission from flares.

Crannell hopes to be ready to launch in time for the 1991 peak of the present solar activity cycle. Robert H. McCracken

COMING NEXT MONTH

The February NCA colloquium will feature a panel of astronomers who will discuss their Australian and Chilean

observations of some recent, very interesting developments in Supernove 1987A.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. For further information call the NCA-IOTA

Information Line: (301) 474-4945
(Greenbelt, MD).

UT Date	Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
Grazing Lunar:						
01-03-89	10:48	Edgewood, MD	9.1	20	18S	20 cm
01-04-89	11:00	Essex, MD	3.0	13	18N	5 cm
01-10-89	23:24	New Galilee, MD	8.2	13	16S	8 cm
01-12-89	23:45	Virginia Beach, VA	7.7	32	14S	8 cm
01-24-89	02:22	Montreal, Que. or n. ME	1.3	95	-6N	5 cm
Asteroidal:			Star Mag	Delta Mag	Name	
01-12-89	06:42	Gaspe Pen., Que.	12.1	0.7	(423) Diotima	20 cm
01-25-89	11:01	e. Canada	8.0	5.0	(346) Hermentaria	5 cm
02-01-89	02:05	Labrador	11.5	1.1	(275) Sapiaentia	13 cm
02-02-89	07:19	w. PA, MD, DC, e.VA	10.8	0.21	(6) Hebe	25 cm
†Photometric						

NCA WELCOMES NEW MEMBERS

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DISCUSSION GROUP TO EXAMINE STATUS OF SOLAR ACTIVITY, RESEARCH

The January 21 NCA discussion group will consider various aspects of solar activity, solar research methods, findings and implications, and unanswered questions.

Everyone is encouraged to attend and feel free to participate, whether to contribute technically or simply to learn and enjoy!

NCA discussion groups are multipurposed. They serve not only to unite those who are technically involved in the subject, but also as an opportunity for any interested person to learn at any level. Working groups on support areas often are initiated by these discussions.

The group will meet at 7:30 pm at the

University of DC, in Building 42, Room A06, just behind Building 44, which is on the north side of Van Ness Street, just west of Connecticut Avenue, NW, near the Metrorail Red Line Van Ness-UDC station.

Park under Building 44. (Tell the attendant you are attending a meeting.) Walk out the back of the garage a few feet to building 42. Take the elevator one floor up.

From Metrorail, as you emerge to the sidewalk, go to the left between the columns to the stairway on the left, up four short flights to the elevated walk to building 42. A06 is on the same floor.

For further information, call National Capital Astronomers, 320-3621.

Calendars – The turn of the year is a reminder that the century changes in only 11 more years. How many calendar functions in pieces of software handle correctly the change from December 21, 1999 to January 1, 2000? Any that expect 2-digit years are suspect. I myself consider software that represents years past 1999 in the "100 +" format are not too practical. In this format, 2000 is 100, 2001 is 101, and so on.

This can work as a temporary measure, but it is too prone to error to be realistic for long term use. I think it would be better to use all four digits of the year, but many people would prefer a truncated form, where "0" is 2000, "1" is 2001, etc. Also, 2000 is a leap year, but 1900 was not. I am told that a number of calendar functions consider 1900 to have been a leap year.

While speculations about calendar functions may seem just a matter for amusement, they actually represent a very large expense. Calendar functions are found in many, if not most, computer operating systems, in clocks, watches, and virtually anything else that displays time, and in many calculators. Many of these will be replaced by 2000, but somebody will have to program their replacements. It is not too early to check the calendar functions we work with today to see if they will need updating tomorrow.

Computer Planetary Occultations with Newcomb – A friend, Rocky Harper of La Porte, Texas, has some comments on Newcomb and Gnewcomb software that Willmann-Bell sells to accompany Bretagnon and Simon Planetary Programs and Tables from -4000 to +2800. The software is in BASIC, and the source is provided, so purchasers can customize it to their needs. The program Newcomb has a subroutine to calculate an occultation of a star by a planet.

Rocky did some tests using the April 7, 1976 occultation of Epsilon Geminorum by Mars, noting that, if he does not preprocess the 2000-epoch star

coordinates to the occultation epoch of 1976.269, the occultation is not predicted. He modified the Newcomb source to work with QuickBASIC 4.0, and comments that compiling the Newcomb program makes the run much faster. He writes, "Playing with this program is a lot of fun and thought provoking."

Good, Cheap Word Processing Made Better – Most PC's, including mine, are used for word processing more than any other activity. There exist today an incredible variety of work-processing, text-editing, and text-formatting tools to use, some of which are very good, some of which are very inexpensive, and a few of which are both.

One of the best bargains in the field has been Quicksoft's PC-Write, which we use and like. It has been designed to be easy to use for those who just want a basic word processor, but it also has the advanced features for those who want them, as well as providing the means for users to configure the program as they wish. Now, with the release of PC-Write 3.0, it has been made better, it can handle bigger files, up to the limit of the computer memory. It has a better spelling checker. It can edit in columns. It has a "box mode," in which any rectangular block of text can be handled as a single unit, and moved, deleted, copied as a unit.

With all this, it still only costs \$89 (\$16 for just the diskettes without a manual). With these changes, this program is ahead of the pack of the lower-cost and shareware word processors. It will be interesting to see how the other software developers respond to this challenge.

We had been using PC-Write most of the time, and PC-Type+ for its box mode, and Q, PC-Type+, and Norton's Editor for really long files. Now we have little reason to use anything but PC-Write 3.0.

The address for Quicksoft is Quicksoft, Inc., 219 First Avenue N #224-PSIX. Seattle. WA 98109.

OPTICAL SOCIETY DINNER LECTURE

Tuesday, January 17, at 6:00 pm, The National Capital Section of the Optical Society of America monthly dinner meeting will be held at Hunter's Motel and Restaurant, near the Fort Belvoir exit on I-95. At 7:30 pm, the talk, "Photorefractive

Materials," will be presented by Edward Sharp, Center for Night Vision and Electrooptics. For further information and reservations, call Mary Tobin at (202) 394-2046, or Dick Bulova. (703) 664-6771.

EXCERPTS FROM THE IAU CIRCULARS

1. November 4 — Y. Ge and Q. Wang, Purple Mountain Observatory, discovered a comet (1988o) of 16th magnitude in Cetus. The orbital elements by Marsden indicate that Comet Ge-Wang has a period of 10 years.

2. November 25 — ALPO Mars Patrol Observers detected a major dust storm on Mars, originating west of Solus Lacus and spreading over

Robert N. Bolster

much of the southern hemisphere by the end of the month.

3. November — B. Hartkopf, Georgia State University, has determined a high-precision orbit for the binary star Alpha Coma Berenices from speckle interferometry data. The inclination of the orbit is close to 90°, and an eclipse may occur within two weeks of 1990 February 15.

AMERICAN ASTRONOMICAL SOCIETY TO MEET IN BOSTON

The 173rd meeting of the American Astronomical Society will be held in Boston, Massachusetts, January 8-12, 1989, hosted by the Massachusetts Institute of Technology. In addition to the many papers scheduled, there will also be award presentations, special interest and working group meetings including computer use, VLBI

users, imaging technology, employment practices and strategies, teaching in secondary schools, a job center for informal interviewing, an industrial tour, demonstrations, and many other features. To register, or for further information, call the Society's Administrative office: (202) 328-2010.

NCA TREASURER FREITAG ELECTED TO A.A.S. HISTORICAL COMMITTEE

Ruth S. Freitag, Treasurer of National Capital Astronomers, has been elected to the Historical Astronomy Division of the American Astronomical Society. NCA member Dr. David DeVorkin is Secretary-treasurer of the Division. Ruth has contributed articles to the Historical Division Newsletter for the past year.

During the January meeting of the American Astronomical Society in Boston, the Division will commemorate the sesquicentennial of Harvard College Observatory, and the centennial of the Smithsonian Astrophysical Observatory, in a two-day celebration.

U.S. NAVAL OBSERVATORY TOURS IN JANUARY

Monday night public tours of the Naval Observatory are scheduled for January 9, 23, 30, at 7:30 pm (EST). During January, however, Call 653-1543 for specific information and to confirm individual tours. Passes will be issued to the first 75 persons in line, not at the main gate as previously, but at the gate across from the British Embassy, at Massachusetts Avenue and the southeast side of Observatory Circle. Parking is not allowed on the grounds

for the tours except for the handicapped; ample parking is available near the gate.

Visitors will see various observatory facilities and, weather permitting, appropriately selected celestial objects, with the historic 26-inch Clark refractor with which the satellites of Mars were discovered more than a century ago.

For details, call the taped Observatory message: (202) 653-1543.

UNIVERSITY OF MARYLAND OPEN HOUSE SCHEDULED

The Astronomy Program, University of Maryland, holds open house on the 5th and 20th of each month at the University's Observatory on Metzert Road in College Park. Talks and slide shows are presented, followed by telescopic sky viewing, weather permitting.

Friday, January 20, 8:00 pm — "The Origin of the Solar System," Dr. Michael F. A'hearn.

The public is invited; there is no charge, and no reservations are necessary for individuals. Groups larger than ten should call (301) 454-3001 at least 5 days prior to the program.

Thursday, January 5, 8:00 pm — "Novae and Supernovae," Dr. W.K. Rose.

AIR AND SPACE MUSEUM OFFERS SKY LECTURE

On Saturday, January 7, at 9:30 am, the National Air and Space Museum will present the free, public Monthly Sky Lecture in the Einstein Planetarium: "Who is a Qualified Observer?" by Michael

Dennis, a Ph.D. candidate at Johns Hopkins University. Safe telescopic viewing of the Sun will follow the program, weather permitting.

NASA GODDARD COLLOQUIA, SEMINARS SCHEDULED FOR JANUARY

The following colloquia and seminars will be held at 3:30 pm at Goddard Space Flight Center, Greenbelt, Maryland. Coffee and tea will be served from 3:00. Enter the main gate and obtain a visitor's pass from the guard. Call Tracy Parlate, 286-8543, for further information.

Scientific Colloquia in Building 3 Auditorium:

Friday, January 13 — "Supernova

1987A: the High-energy Store," Bonnard Teegarden, Goddard Space Flight Center Friday, January 27 — "2Galaxies in the Early Universe," Patrick McCarthy, Mount Wilson and Las Campanas Observatories.

Laboratory for Atmospheres Seminar in Building 21, Conference Room 183:

Tuesday, January 24 — "Seven-month Solar Cycle," Walter Hoegy, NASA Goddard Space Flight Center.

ACADEMY ANNOUNCES SEMINAR

As a part of the Career Seminar Series, the Washington Academy of Sciences offers valuable insights for you, whether beginning, intermediate, or advanced in your career interests. The program will present overviews from the perspectives of speakers representing two changing professions. The speakers are:

1. Dr. Donald Gross, Professor and Chairman, Operations Research Department, George Washington University, and Program Director for Operations Research in the Systems Theory and Operations Research Program of the Electrical, Communications, and Systems Engineering Division of the National Science Foundation.

2. A speaker to be announced, from the American Nuclear Society.

The seminar will be held at the Mary Graydon Center, American University, on January 19, 1989. A 6:30 pm reception will offer an opportunity to meet and converse with the speakers and others. Dinner will follow at 7:00, the seminar at 8:00.

It is not necessary (but recommended!) to attend the reception and dinner in order to attend the seminar only. Please make dinner reservations (\$15) by Monday, January 16. Call Robert McCracken at National Capital Astronomers: 320-3621.

NCA if the astronomical affiliate of the Washington Academy of Sciences.

NCA T-SHIRTS

(Also make snugly pillow cases — illustrated.) Blue lpgo, red lettering (and flag stripes) on white 50-50 polyester-cotton. State size: (S,M,L,XL) \$10. ("Venus" and pillow not included!). Make checks to NCA, mail to Ruth S. Freitag, NCA Treasurer, 1300 Army-Navy Drive, Arlington, VA 22202. Information, NCA: (301) 320-3621.

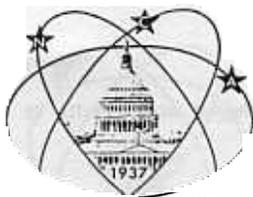
TELESCOPE FOR SALE

Celestron Super C 8+ with all coatings, wedge, and Meade adjustable tripod, all factory accessories, \$1,000.00. Richard Frankenberg, (202) 785-5545.

NCA OFFERS MEMBERS DISCOUNTS ON MANY PRODUCTS

Members of National Capital Astronomers can buy many books, charts, atlases, celestial catalogs, planispheres, and many other observing and scientific educational aids at discounts available only to members. For specifics, or to order, call or write Ruth Freitag, NCA Treasurer, 1300 Army-Navy Drive, Arlington, VA 22202. (703) 521-7831.





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SERVICES AND ACTIVITIES

A Forum for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA colloquia held at the National Air and Space Museum of the Smithsonian Institution. All interested persons are welcome; there is no charge.

Expeditions frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables, and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

Discussion Groups provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

Publications received by members include *Sky & Telescope* magazine and the NCA newsletter, *Star Dust*.

The **NCA Public Information Service** answers many astronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

The **Telescope Selection, Use, and Care Seminar**, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often lead to disappointment.

Working Groups support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

Telescope-Making Classes teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

NCA Travel offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

Discounts are available to members on many publications and other astronomical items.

Public programs are offered jointly with the National Park Service, the Smithsonian Institution, the U. S. Naval Observatory, and others.

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Make check payable to National Capital Astronomers, Inc., and send with this form to: Patricia B. Trueblood, Secretary, 10912 Broad Green Terrace, Potomac, MD 20854.

The following information is optional. If you would like to participate actively in NCA affairs, please indicate briefly any special interest, skills, vocation, education, experience, or other qualifications which you might contribute. Thank you, and welcome!

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