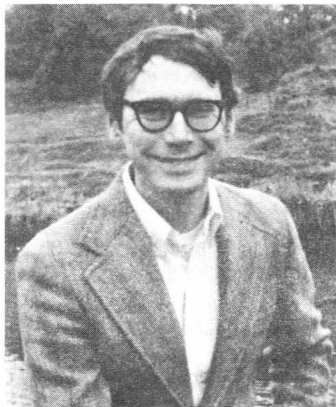




BERGSTRALH TO RELATE ENROUTE POLARIMETER FIX



DR. BERGSTRALH

Dr. Jay T. Bergstralh, NASA astronomer of Jet Propulsion Laboratory, Pasadena, will address the April 3 meeting of National Capital Astronomers. He will describe the remarkable salvage of the failed Voyager photopolarimeter, further damaged in the Jupiter encounter, in time for a spectacular success at Saturn.

Polarization, spectral filters, and field of the instrument are selected by three aperture wheels. Damage to the mechanism was compounded upon Jupiter encounter by permanent radiation damage to the control logic. The ingenious work between Jupiter and Saturn which resulted in successful performance, including detailed occultation tracing of the ring system, and the results, will be described.

Specializing in high-resolution spectroscopy of the outer planet atmospheres for the past ten years at JPL, Dr. Bergstralh serves as scientific liaison between the Principal Investigator at the University of Colorado and Voyager project management at JPL.

Dr. Bergstralh received his B. A. from Carlton College and his M. A. and Ph. D. (1972) from the University of Texas. He is a member of the American Astronomical Society and the International Astrophysical Union.

APRIL CALENDAR — *The public is welcome.*

Friday, April 2, 9, 16, 23, 30, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, April 2, 16, 23, 8:00 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, April 3, 8:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, April 3, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Bergstralh will speak.

Tuesday, April 6, 13, 20, 27, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Saturday, April 17, 8:00 PM — Discussion group with Larry White at the Department of Commerce. See page 31.

MARCH LECTURE

Dr. Rudolph A. Hanel, Goddard Space Flight Center, spoke at the March 7 meeting of National Capital Astronomers, on recent reductions of some of the Voyager 2 Saturn data. Experiments involved were imaging science, infrared spectroscopy, radio science, and photopolarimetry; others were not discussed.

Opening with a brief overview of the project, Hanel showed the trajectory and planned itinerary of Voyager 2. The probe is now on the way to Uranus encounter in January 1986. He reviewed the data and imagery obtained during the Saturn flyby.

The radio occultation experiment measured the atmospheric density; the refractive index of the atmosphere causes a phase delay. From the density and the hydrostatic equation relating pressure to altitude, the pressure profile was derived. The gas law relating density and pressure then yields temperature over molecular weight. From the known molecular weights of the atmospheric constituents the temperature was plotted.

Constitution of the atmosphere was determined spectroscopically. It is mostly hydrogen, about 11 percent helium, with very small amounts of methane and other gases.

Temperature profiles were also derived from infrared brightness-temperature measurements at various depths of penetration.

Temperatures have been determined for atmospheric pressures from about 1 millibar to 1 bar, for different latitudes. From these data north-south cross sections were plotted. The wind-shear pattern calculated from the temperature gradients is correlated with the imaged atmospheric features. The shear, however, is much less than that indicated by the wind velocities measured by the imaging science. If the wind velocities are indeed as high as indicated, a very great depth of atmosphere must participate in the formation of the observed features. Saturn seems to be just a gas ball. If it does have a small core, it may be dissolved in high-pressure hydrogen.

Hanel compared the heat balance of Saturn to that of Jupiter. It was previously known that Jupiter's rate of energy radiation exceeds that of its absorption from the Sun. The continuing escape of adiabatic heat from Jupiter's original collapse accounts for the excess. Saturn is a smaller and far less dense planet; the lesser adiabatic heat radiation should now be insignificant. At a radiation temperature of 94 K (cf 124 for Jupiter), however, Saturn shows a similar heat excess of about 1.7. Saturn's large excess is accounted for by a different mechanism:

Infrared spectroscopy shows by line-strength ratios that the atmospheric helium:hydrogen ratio is about one-half that of Jupiter's atmosphere. This supports theories proposing that helium virtually rains out of Saturn's upper atmosphere into the deep interior. Separation of the helium frees its potential energy which is converted to heat and accounts for the excess radiation, according to recent theories.

Turning to the satellites, Hanel reviewed polarimetry and imagery data. Particles in Titan's atmosphere are extremely efficient forward scatterers. Polarimetry versus illumination phase and wavelength indicates particle sizes, if spherical, of about 0.1 to 0.15 micron in the infrared, but only 0.05 micron in the ultraviolet; the particles obviously are not spherical, but probably are elongated.

A large number of hydrocarbons have been spectroscopically identified in Titan's atmosphere; generally these are the same molecules found in interstellar nebulae, e. g., the Orion Nebula. The energy necessary to form these molecules from atmospheric methane and nitrogen is supplied by ultraviolet irradiation, bombardment by electrons and protons, and perhaps by lightning. At the University of Maryland Ponnamperna et al have produced various combinations of such molecules by exposing nitrogen-methane mixtures to all of these energy sources.

The vertical temperature profile of Titan's atmosphere indicates that all of these molecules should exist only at high altitudes; they should condense out at

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations in April. For further information call Dave at 585-0989.

UT Date	Time	Place	Vis Mag	Pent Sunlit	Cusp Angle	Min Aper
04-13-82	08:42	Ladysmith, VA	6.8	78	12S	8 cm
04-27-82	01:54	Milton, NY	6.2	14	1S	5 cm
04-29-82	02:28	Potomac, MD	9.5	34	3N	20 cm
04-29-82	03:23	Owings Mills, MD	5.3	34	2S	5 cm

DISCUSSION GROUP ON ARCHAEOASTRONOMY

The Chaco Canyon noon solstice marker, Mayan astronomy, Venus observations and the Dresden Codex will be Larry White's topic on April 17.

NOMINATING COMMITTEE OFFERS FISCAL 1983 NCA OFFICER SLATE

The Nominating Committee, Benson Simon, Chairman; Michael Brabanski, Nancy Byrd, and William Pala, offer the following slate:

President:	Robert H. McCracken	Trustee: Daniel G. Lewis
Vice President:	Joan Bixby Dunham	Trustee: Wolfgang A. Schubert
Secretary:	Stanley G. Cawelti	(Two if McCracken elected, to
Treasurer:	Ruth S. Freitag (Incumbent)	fill 3 years unexpired term)
Sergeant at Arms:	Geoffrey Chester (Incumb.)	

Additional nominations may be made by written petition by ten full members in good standing, submitted to the secretary prior to the May 1 election.

NAVAL OBSERVATORY, NCA TO CELEBRATE ASTRONOMY DAY 1 MAY

The U. S. Naval Observatory will again hold open house with participation by NCA. Details later. Information: Bob McCracken, 229-8321.

NAVAL OBSERVATORY COLLOQUIA SCHEDULED

Thursday, 8 April, Dr. Victor Szebehely, University of Texas: "Stability and Capture of Asteroids." Thursday, 22 April, Dr. David DeVorkin, National Air and Space Museum: "Henry Norris Russell and the Atmosphere of the Sun." The colloquia are held in Building 52, room 300, at 2:00 PM. Coffee and tea will be served following the talks.

NCA members welcome. Enter at Massachusetts Avenue and 34th Street with some identification; directions will be provided. McCracken, 229-8321.

lower levels. Atmospheric mixing should result in a continuing condensation. It is not known whether the surface is heavily covered with this hydrocarbon rain.

At a meeting two days before the lecture, Hanel said, Brad Smith announced that 21 satellites of Saturn have now been discovered.

Hanel continued with images of other satellites, the ring system, the photopolarimeter occultation tracing of the rings, and concluded with some remarks on the questions and problems expected on the 1986 Uranus encounter.

At that time, Uranus' north pole will have been nearly facing the Sun, the south pole in darkness, for several years. The resulting atmospheric dynamics will be interesting. Atmospheric composition, particularly the helium:hydrogen ratio will also be of interest.

At the great distance from the Sun, the long exposure times required for imaging will reduce resolution. Compounding the problem is the low albedo.

The scan-platform azimuth-slewing drive, which was crippled during the Saturn encounter, is not useful; alternative methods are being developed. One inconvenient possibility is to use only the elevation drive with coordinated rotation of the entire craft.

EXCERPTS FROM THE IAU CIRCULARS

1. December — Wisniewski and Ferguson, Steward Observatory, observed a two-magnitude drop in the brightness of KR Aurigae to 15.6. Spectra obtained with the Multiple-Mirror Telescope now show much stronger H lines and new lines from He, C, N, and Fe.

2. February — L. Kohoutek, Hamburg Observatory, reported changes in the brightness of the nucleus of planetary nebula NGC 2346, which increased to magnitude 11.3 on February 2, then dropped to 13.3 on February 10.

3. February — S. Nakano, Sumoto, Japan, suggested that Comets Hartley (1982b and 1982c) were identical with periodic Comet du Toit 2 (1945 II). This was supported by orbital element calculations by Marsden, which indicate a period of 5.21 years.

4. April 15 — M. P. Candy, Perth Observatory, predicts that there may be an occultation by Pluto or its satellite of a 13th-magnitude star at UT 01:36.

FREE ASTRONOMICAL INDEX OFFERED

The Astronomical Society of the Pacific has compiled a 20-year index to NASA publications on astronomy. Many have received little publicity because of restrictions on government publishing.

To receive your copy, send two first-class stamps with your name and address to: NASA Index, A. S. P., 1290 24th Avenue, San Francisco, CA 94122.

FOR SALE — Aero Tessar lens, 4-inch diameter, 24-inch focal length. In original crate. \$100.00. John Mather, (301) 937-0061.

WANTED — Telescope. Must be easily portable, for both celestial and terrestrial use. Bill Prokopchek, (703) 754-8204. (Haymarket, VA)

HELP WANTED — Systems and Applied Sciences Corporation seeks part-time (20 hours per week) night assistant for 36-inch telescope at Goddard Space Flight Center. Call Arne Hendon, O: 344-7615, H: 522-1245.

STAR DUST may be reproduced with proper credit to National Capital Astronomers.

★ S T A R D U S T



WASHINGTON, D. C.

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, a non-profit public-service corporation for promotion of astronomy and related sciences. President, Daniel G. Lewis. Editor, Robert H. McCracken. Lecture reviews, James K. Crowley, John B. Lohman, Mark M. Trueblood. IAU Excerpts, Robert N. Bolster. Deadline 15th of each month. For information or to submit material for publication, Robert H. McCracken, 5120 Newport Avenue, Bethesda, Maryland 20816. (301) 229-8321

FIRST CLASS