



TROMBKA TO DETAIL REMOTE-SENSING TECHNIQUES



DR. TROMBKA

Dr. Jacob I. Trombka of NASA's Goddard Space Flight Center will discuss the techniques and uses of remote sensing at the February 2 meeting of National Capital Astronomers.

The use of remote X-ray and gamma-ray sensing of the Moon, Mars, and Venus to determine surface elemental composition has been successfully demonstrated during the United States Apollo and Viking missions and the Soviet Luna, Mars, and Venus missions. These data have significantly influenced our understanding of the nature of the origin and history of the evolution of the Solar System. These techniques are now being considered by the United States, European, Soviet, and Japanese space programs for use on future missions to the Moon, Mars, Mercury, comets, and asteroids.

During the Apollo mission, detailed measurements of the diffuse gamma-ray background were made. The data indicated that the origin may be cosmological.

One of the most detailed measurements of a gamma-ray burst was made during the Apollo 16 mission; this phenomenon is not yet understood. Future spaceflight missions are now being planned to determine the spectral, temporal, and spatial distributions of such bursts.

A native of Detroit, Michigan, Dr. Trombka received his M. S. in 1954 from Wayne State University and his Ph. D. in 1961 from the University of Michigan. Before coming to NASA, he was a research physicist at the Oak Ridge Institute of Nuclear Studies, a scientist at the Oak Ridge National Laboratories, and a senior scientist at the Jet Propulsion Laboratory. He is at present a space scientist at GSFC, an adjunct professor of law at Georgetown Law School, and a visiting professor of chemistry at the University of Maryland.

Dr. Trombka is a member of the American Physical Society, the American Nuclear Society, and Sigma Xi.

FEBRUARY CALENDAR — *The public is welcome.*

Friday, February 1, 8, 15, 22, 29, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, February 8, 15, 22, 8:00 PM — Observing with the NCA 14-inch telescope with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. 960-9126.

Saturday, February 2, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, February 2, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Trombka will speak.

Tuesday, February 5, 12, 19, 26, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

JANUARY LECTURE

National Capital Astronomers started a new decade with a talk by Dr. Rudolph Hanel of Goddard Space Flight Center on the infrared experiment on board the Voyager spacecraft.

The Voyager infrared experiment consists of a visible-spectrum radiometer and an infrared-spectrum Michelson interferometer which share the same 0.5-m Cassegrain telescope. The beryllium primary is coated with gold to enhance its infrared reflectivity. Thermopile detectors were used, since the mission duration of several years precluded the use of more modern cryogenically cooled detectors.

In his slides of Jupiter's surface, Dr. Hanel noted the existence of plumes, white ovals near the red spot, hot spots, and barges. Dr. Hanel then showed a time-lapse motion picture of Jupiter's clouds made at one frame per (10-hour) revolution. The red spot swirled in one direction while cloud streams and white ovals moved around the edge of the red spot. The film showed in striking detail the dynamics of the Jovian atmosphere, and Dr. Hanel demonstrated that much of this dynamic behavior could be explained by the data from the Voyager infrared experiment.

At 5 au from the Sun, Jupiter receives only 4 percent of the amount of radiation received by the Earth. Because of Jupiter's large mass, density, and consequent internal heating, however, it emits twice as much energy as it receives. The total reflected and emitted energy is measured by the Voyager infrared experiment.

By driving one arm of the Michelson interferometer a detailed infrared spectrum was obtained. The angular field of the interferometer is small; Jupiter's surface was mapped in the infrared with fairly high resolution. The resulting spectra show ammonia and two lines indicating pressure-induced absorption by hydrogen. Approximately 11 percent by volume of helium is also shown, and smaller amounts of acetylene, ethane, phosphine, and methane.

From the infrared spectrum was derived not only the chemical composition of the atmosphere, but also its temperature profile. Where the atmosphere is opaque, the brightness temperature derived from the infrared spectrum corresponds to the temperature of the upper layer. Observations from Palomar Mountain before Voyager reached Jupiter showed no 5- μ m radiation from the red spot, but a great deal of 5- μ m radiation just north of it. From these observations, the positions of the sources were successfully predicted and their infrared spectra were obtained as Voyager approached Jupiter. Spectral features in the 5- μ m region show the presence of ammonia, water vapor, germane (GeH_4), deuterated methane, and phosphine. These hot spots have a brightness temperature of 260 K, compared to the coldest reading of 100 K directly over the red spot.

By comparing the temperatures at different latitudes, a complete climatological north-south cross section was derived. When this was combined with pressure-temperature curves, it was found that the Jovian troposphere is unexpectedly uniform, while the stratosphere is not stratified. Rather, there are waves indicating a great deal of activity.

Plots of the temperature difference between a feature and its surroundings indicate the white ovals and red spot are cooler, and the hot spots and dark barges are warmer. A set of ten spectra were obtained across the east-west diameter of the red spot. Using the thermal-wind equation, the wind field was derived from the temperature profile. Winds up to 50 m per second were thus measured inside the red spot.

Dr. Hanel turned next to the satellites of Jupiter. He reviewed details of the Galilean satellites already presented to NCA by previous speakers, and discussed for the first time infrared results from Io.

One feature of interest on Io is a dark horseshoe near a volcano. From the

TRUEBLOOD NEW SERGEANT AT ARMS

The trustees of National Capital Astronomers announce the appointment of Mark Trueblood to serve as sergeant at arms for the unexpired term vacated by Charles Edmonds who has moved from the Washington, DC area.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations in February. For further information call Dave by February 7 at 585-0989.

Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
02-06-80	10:36	Yonkers & L. I., NY	6.1		(46) Virginis	Mag 11
02-16-80	10:10	Hyderabad, India	-27		Total solar eclipse	
02-19-80	23:16	Beltsville, MD	8.7	18	6S	20 cm
02-25-80	07:24	Boring, MD	6.2	73	6N	10 cm
02-26-80	06:01	Largo, MD	7.2	81	7N	20 cm

NAVAL OBSERVATORY COLLOQUIUM SERIES ANNOUNCED

During February, the U. S. Naval Observatory will hold colloquia in Building 52, Room 300, at 15:30 EST. Coffee and tea will be served in the foyer at 15:10.

Thursday, February 7

"Atomic Clocks and General Relativity"
Professor Carroll Alley
University of Maryland

Thursday, February 21

"Astrophysics of Sirius B"
Professor Malcolm P. Savedoff
University of Rochester

Enter the Observatory grounds through the gate at 34th Street and Massachusetts Avenue, where the guard will require identification and direct you. You may park behind Building 52. For further information, call 254-4540.

NCA WELCOMES NEW MEMBERS

Terence Andrews
36 Simeon Lane
Sterling, VA 22170

David R. Beam
5603 Harding Avenue
Alexandria, VA 22311

Jane Ellis
1204 Bicksler Court
Herndon, VA 22070

Marion Parker
4635 North 20th Road, Apt. 3
Arlington, VA 22207

Richard J. Taibi
7002 Coolridge Drive
Camp Springs, MD 20031

brightness temperature it was estimated that 10 percent of the feature was at 290 K while 90 percent of it was at 130 K. The spectrum showed sulphur dioxide, but not other gases normally associated with volcanism. Most notable in its absence is hydrogen sulphide. Thus Io appears to be depleted of hydrogen, nitrogen, and carbon, which may have been present previously but were lost due to Io's weak gravitational field.

The Voyager results from Jupiter, when properly interpreted, yielded a great deal of new information from a few relatively simple experiments. The results from Saturn to be obtained later this year could yield as much. mt

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

EXCERPTS FROM THE IAU CURCULARS

1. October 17 — The institute of Astrophysics, Dushanbe, reported the observation of the occultation of AGK 3 +19° 59' by (65) Cybele from three stations. The greatest chord was 245 km long. At Ura-Tyube, Rakhimov, and Najmov visually observed the occultation and a 2-s secondary event attributed to a satellite 11 km in diameter 917 km from Cybele.

2. November 11 — Dupree and Baliunas, Center for Astrophysics, observed changes in the spectrum of α Aquarii with the IUE spacecraft. Supported by spectral data from Mount Hopkins Observatory, these are the first quantitative evidence of chromospheric variability in such a supergiant's atmosphere.

3. December 11 — P. Maley and W. Nissen observed a 27-s occultation of SAO 80950 by (9) Metis. No secondary events were seen.

4. December 24 — W. A. Bradfield, Dernancourt, Australia, discovered a comet (1979 I) of fifth magnitude in Scorpius. He reported it to be diffuse with condensation, and a tail 1 degree. The ephemeris indicates that the comet is past perihelion and moving far south, but may still be of fifth magnitude when it becomes visible from mid-northern latitudes at the end of January. rnb

FOR SALE

Celestron 8-inch telescope (sand cast) with tripod, wedge, carrying case, five eyepieces, star diagonal, Porro prism erector, large finderscope, Barlow lens, wide-angle 32-mm Erfle with giant star diagonal and adapter. James LaFollette, (301) 986-1695.

Questar 3.5-inch telescope. Like new — about 1 year old. Pyrex mirror, Sanford and Davis tripod, Nikon adapter. Negotiable price. Don Shepherd, O: 763-1583; H: (Prince Frederick, MD) (301) 535-3474.

Two homemade telescopes: 8-inch Newtonian reflector, 4.25-inch Newtonian reflector and wooden tripod with telescoping legs, setting circles, eyepiece. Price negotiable. Dan Blum, (301) 949-2236.

WANTED

Telescope, easily portable, economical. T. M. Moore, (301) 587-7715.

* STAR DUST



Published eleven times yearly for NATIONAL CAPITAL ASTRONOMERS, INCORPORATED, a non-profit, public-service organization promoting interest and education in astronomy and related sciences. President, Mary Ellen Simon. STAR DUST: Robert H. McCracken, 5120 Newport Avenue, Washington, DC 20016. Deadline: 15th of preceding month.

FIRST CLASS MAIL

SCHNALL, JEROME,
2801 QUEBEC ST NW,
WASHINGTON, DC 20008

Postmark: WASHINGTON, DC 20013 JAN 29 1980 7:18 PM. Postage stamp: 15c. Postage meter: 15c. Postage meter stamp: 15c. Postage meter stamp: 15c.