JANUARY LECTURE

At the January meeting of National Capital Astronomers, Dr. Jacob I. Trombka, astrophysicist of NASA Goddard Space Flight Center, presented an overview of NASA's plans for solar system exploration through the 1990's.

Trombka opines that we are entering a new era in planetary exploration; he sees rising enthusiasm for plans for the 1990's. Two programs have already been approved: the Venus mapper, a radar mapping system, and a Mars orbiter.

A number of key questions will be addressed, e.g., the origin of the solar system, the appearance and evolutione of life, interactions between the planetary system and our own environment, and the potential for development and utilization of space resources, including establishment of lunar or space bases.

Approach to these questions, necessarily subjective, requires knowledge and theories derived not only from previous planetary studies, but also from stellar astronomy. The formation of stars and atomic nucleosynthesis within them, molecular development, formation of planetary systems, and the evolution of organic compounds into biological systems are among the many factors involved. Formulation of the appropriate questions and the design of each aspect of an exploratory program requires selection of those models which seem best to fit the observations.

To acquire a more detailed knowledge of these factors, NASA is initiating a two-phase program. In the first phase, a relatively low-cost series of *Planetary Observers* will be sent mainly into polar orbits around a number of solar-system bodies. Using remote-sensing techniques they will map global magnetic, mineral, and chemical properties of the body and its envionment.

The *Mars Geochemical Orbiter* to be launched in 1991 is to reach Mars orbit in 1992 and be monitored for 2 years. A *Lunar Observer* is to be launched in 1993, and an Earth-crossing asteroid rendezvous mission is planned for about 1995.

The second-phase missions are proposed to acquire further detailed data inaccessible through remote sensing. Examination by contact and return of samples to Earth will be emphasized. Included will be asteroid flybys and rendezvous with a comet near aphelion. A penetrator will be driven into the nucleus to examine its nature, and will be monitored until some time after the comet has passed perihelion.

Candidate comets must have a short period (aphelion must be accessible), a low inclination (high inclination requires far more energy to intercept), and a prograde orbit (a retrograde comet requires enormously more energy to intercept). All short-period comets are prograde, however. It should also be bright enough to be monitored from the ground. Several comets are under consideration depending upon scheduling.

Late second-phase plans include possible exploration of the outer planets and their major satellites, such as Titan and Jupiter's Galilean satellites. A joint mission with the European Space Agency is tentatively planned for a multiple-comet, multiple asteroid mission to be launched from the Space Shuttle. in the late 1990's.

The first mission of the series, the *Mars Geoscience-Climatology Orbiter*, has been approved and funded, and is now ahead of schedule. It will include three facilities to be made available to successful applicants for experiments. They are the visible-light cameras, the infrared spectrometer, and the X- and gamma-ray spectronmeters. An announcement of opportunity will be made by NASA in April 1985 for those who have viable research proposals.

Although the comet mission is not yet funded and may be delayed, an announcement of opportunity for that program will also be made in April 1985.

Design of the X- and gamma-ray spectrometers is Trombka's responsibility. The objective is to map the global distribution of elements on the planet. Spallation of elements by primary cosmic rays (high-energy protons) results in emission of neutrons. These interact with and excite atomic nuclei whose subsequent de-excitation results in emission of characteristic gamma-ray spectra by which the elements and their abundances are identified. Certain nuclides having very long halflives -- those of potassium, thorium, and uranium -- continuously emit characteristic gamma-ray spectra by which they too can be detected and measured. altogether, about twenty elements can be globally mapped in this way.

Surface elements under solar exposure fluoresce in the X-ray region, again with characteristic, identifiable spectra. The X-ray technique, however, is useful only on bodies having no atmosphere, such as the Moon. Gamma rays will penetrate the atmosphere; X-rays will not.

Relative elemental abundances indicate the degree of differentiation of the planet and tell much of its chemical and thermal history.

The comet rendezvous craft will approach to within about 3 to 5 km near aphelion, before a tail has formed. A penetrator will then be injected about 1 meter into the nucleus, where it is believed the primordial materials exist from which the solar system was formed. The surace has been differentiated; the volatile surface materials have been driven off by sunlight. The penetrator, which is capable of penetrating bedrock, will measure chemical, mechanical, and thermal properties of the internal material. R.H.McC.

We thank Dr. John Lohman, who was about to review the lecture when he was again hospitallized, making it impossible for him to continue. We are happy to report that he has been released, and that his heart problem now seems to be under control.

OCCULTATION EXPEDITIONS PLANNED

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

UT Date	Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
02-01-85	06:17	White Oak, Bowie, MD	8.5	78	2N	20 cm
02-01-85	23:29	Sunderland, MD	6.6	85	16S	8 cm
02-02-85	00:25	Bowie, MD,F'fax, VA	7.6	85	15S	15 cm
02-08-85	05:25	Thornburg, VA	6.7	90	16S	10 cm
02-08-85	11:33	Centreville, VA	6.9	89	14S	10 cm
02-09-85	05:20	Woodbridge, CT	2.9	82	14S	5 cm

NCA WELCOMES NEW MEMBERS

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FEBRUARY DISCUSSION GROUP TO FEATURE HALLEY PLANS

The Comet Halley Reception Committee will meet in Conference Room D of the Department in Commerce Building on February 16, 1985, at 8:00 pm. NCA's plans for Halley's Comet will be the topic. If you missed the last one, now is the time to get involved!

SOFTWARE WORKING GROUP TO ESTABLISH ASTRONOMY BULLETIN BOARD

The NCA Software Working Group will meet on Saturday, February 23 to plan the establishment of a computer bulletin board for current occultation data and other astronomical information. The service will be accessible by telephone line from any computer or terminal.

All those interested are invited to the meeting at the home of Drs. David and Joan Dunham, 9408 Ocala Street, Silver Spring, Maryland 20901. Call 585-0989 evenings if you plan to attend, or for more information.

Ocala Street intersects Franklin Street 4 blocks east of Colesville Road, about a half mile inside the beltway. From the Silver Spring Metro, take number 14 Ride-On bus to Franklin Street and Wire Avenue. Walk back one block to Ocala. Turn right. 9408 is the fourth house on the left.

EXCERPTS FROM THE IAU CIRCULARS

1.December -- Stella and White, European Space Agency, reported that EXOSAT observations of X-ray source VO332+53 on November 21, 22, and 26 showed it to be emitting double sinewave pulses with a period of 4.4 s. Parmer, Blissett, and Webster, U.K. Infrared Telescope Unit, Edinburgh University and Royal Observatory, Edinburgh, observed that the object's infrared radiance was greater on December 23 than it had been during the previous flaring a month earlier. Ilovaisky and Chevalier, Observatoire de Besancon, reported that high-speed optical photometry of the only star visible at that position with the 1.9-m Haute Province Observatory reflector during November 29 to December 8 showed no variation.

2. January 8 -- William A. Bradfield, Dernancourt, Australia, discovered a comet of 11th magnitude in Norma. R.N. Bolster

NASM SKY LECTURE, H-ALPHA SUN VIEWING

The Monthly Sky Lecture in the Planetarium of the National Air and Space Museum, at 10:00 a.m. on Saturday, February 2, will feature the history of timekeeping, presented by Jim Sharp, Planetarium Chief. Following the lecture , weather permitting, Stan Cawelti will offer safe, telescopic hydrogen-alpha viewing of the Sun on the deck east of the building.

On Wednesday, February 27, at 7:30 pm, in the planetarium, J. David Bohlin, Goddard Space Flight Center, will discuss the Sun. Following his talk, weather permitting, Stan Cawelti will offer telescopic viewing of the night sky.

FOR SALE

Celestron-8 telescope system. Oculars: 6- and 20-mm Erfles, 9- and 25-mm orthoscopics, 26-mm Plossl, 8.4-21-mm z00m orthoscopic. Complete accessories, including 2-X Barlow, RFA, LPR, filter set, Porro prism, star diagonal, cleaning kit, manual, and catalog. Cost over $2700, asking $1800, or best offer. Glen Robinson, (703) 594-2575.

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SOFFEN ON LIFE: AN ARGUMENT FOR SETI

DR. SOFFEN

Dr. Gerald A. Soffen, Associate Director of Space and Earth Science for Program Planning, Goddard Space Flight Center, will address the February 2 meeting of National Capital Astronomers. He will discuss the origins of life, NASA data, and the Search for Extra-Terrestrial Intelligence (SETI).

Biologists consider the origin of life one of the most exciting questions of our age. In the last few decades we have developed a general theory that is supported by laboratory work as well as astronomical observation. Our studies of extraterrestrial chemical evolution have shown possible paths toward the building blocks of living systems. Discovery of interstellar organic compounds has added support to the general concept.

The *Viking* mission to Mars was a bold attempt to to search for extraterrestrial life and its chemistry. The results were surprising and led to a lasting controversy concerning their interpretation. Dr. Soffen will review the data and current views of SETI.

Dr. Soffen was the Project Scientist for the *Viking* missions to Mars, launched in 1975, and was responsible for all of the scientific investigations of over 70 scientists. Prior to coming to Goddard, he was Director for Life Sciences at NASA Headquarters in Washington. Earlier, he was the Chief Environmental Scientist at NASA Langley Research Center.

FEBRUARY CALENDAR --*The public is welcome.*

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

Saturday, February 2, 6:00 pm -- Dinner with the speaker at the Ding-How Restaurant, 1221 E Street, NW. Reservations unnecessary.

Saturday, February 2, 8:15 pm -- NCA monthly meeting at the Department of Commerce Auditorium, 14th Street and Constitution Avenue, NW. Dr. Soffen will speak.

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

Saturday, February 6, 1:30 pm -- NCA Software Working Group meets at Dunham's home, 9408 Ocala Street, Silver Spring, MD, See page 23.

Friday, February 3, 10, 24, 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, February 16, 8:00 pm -- Discussion group at the Department of Commerce, Conference Room D: Comet Halley Reception Committee. (Page 23)