★ STAR DUST

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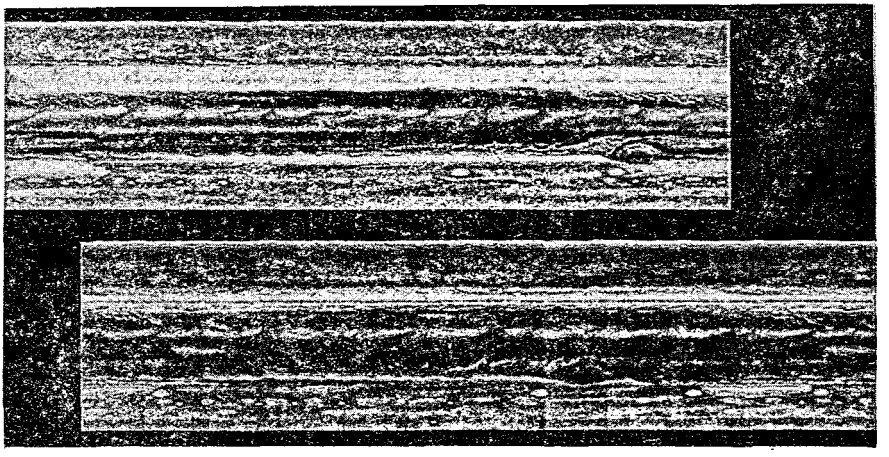
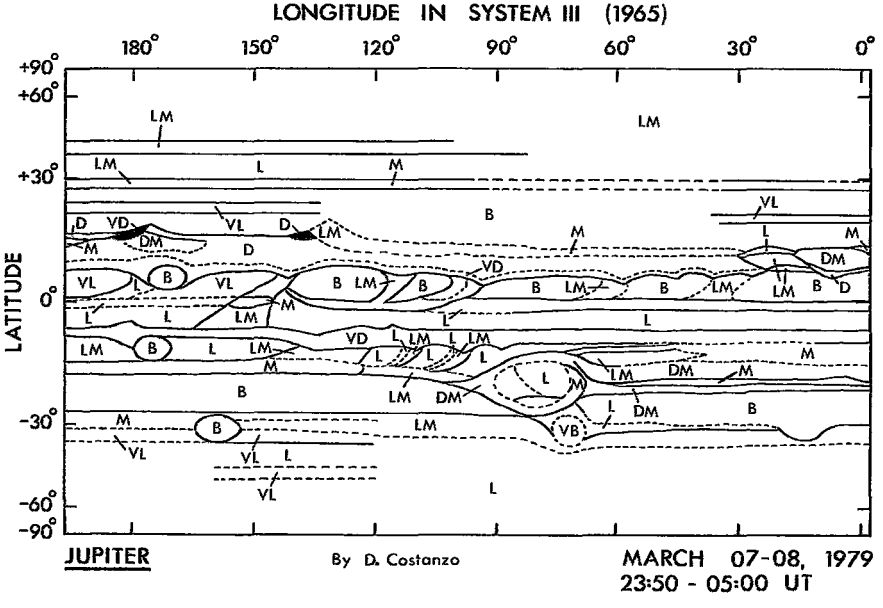


NASA VOYAGERS OUTSTANDING SUCCESS; IJVTOP ACTIVE

These two remarkable NASA mosaics from Jupiter Voyagers 1 (above) and 2 show widespread changes in the planet's features between observations. The upper photo extends 400 degrees in longitude, with zero at its right edge; the lower photo is aligned accordingly. North is up.

The drawn cylindrical projection of Jupiter (below) is one of 22 such maps made by Daniel Costanzo for the International Jupiter Voyager Telescope Observations Program (IJVTOP). The program was organized by the Labora-



AUGUST CALENDAR — *The public is welcome.*

Friday, August 3, 10, 17, 24, 31, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

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

Saturday, August 18, 9:00 PM — *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW. near Rock Creek Nature Center. Planetarium if cloudy. Information: Bob McCracken, 229-8321.

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tory for Planetary Atmospheres, University College London, and the Meudon Observatory Planetary Group, Paris.

Costanzo's key to the various symbols is as follows: VB, very bright; B, bright; VL, very light; L, light; LM, light medium; M, medium; DM, dark medium; D, dark; VD, very dark.

A keen observer, artist, and cartographer, Costanzo thanks William Pala, William Winkler, and Charles Edmonds for providing a variety of instruments and observational assistance.

Tracing the use of these inputs, *Star Dust* discussed the program with a number of NASA officials. Chief Planetary Astronomer Dr. William Brunk explained NASA's International Planetary Photographic Patrol, established in the 1960's. This worldwide network of NASA cameras monitors the planets on a long-term, continuing basis.

Dr. Gary Hunt, Head of the London laboratory, is a member of the Jupiter Voyager Imaging Team at NASA's Jet Propulsion Laboratory at Pasadena. Dr. Hunt says that while many observers are involved, many more are needed throughout the world, to record observable details, particularly transits of the central meridian, not only during the Voyager program, but for a much longer time. These observations, coordinated at Meudon, will provide a wider data base against which to interpret the exquisite short-term details obtained by "our myopic (Voyager) view." A better understanding of the meaning of the long-term behavior of observable features should result.

Dr. Hunt urges those of our readers who can make such observational contributions to request full details of the IJVTOP program.

Write to: IJVTOP, in care of Peter Muller, Laboratory for Planetary Atmospheres, University College London, London, England WC1E 6BT

Locally, Daniel Costanzo, (703) 842-0051, can also provide information.

JUNE LECTURE

Dr. Janet Rountree Lesh, of Goddard Space Flight Center, spoke at the June 2 meeting of National Capital Astronomers. She discussed the history and status of stellar spectral classification, with emphasis on the MK system. (Morgan, Keenan, and Kellman, Yerkes, 1943)

Dr. Lesh began by stating the goal and the purpose of stellar spectral classification.

The goal of stellar classification, Dr. Lesh said, is to arrange the spectra into meaningful and self-consistent groups. The purpose of classification is to allow understanding of the members of each group by detailed study of the prototype, and to facilitate recognition of unusual individuals by comparison with a framework of usual ones.

Spectral classification began with Newton's experiments toward achromatization which he published in 1706. He did not, however, resolve absorption lines in the solar spectrum; they were first reported observed, but not interpreted, by Wollaston in 1820. Joseph von Fraunhofer mapped hundreds of lines in 1814-1815, designating the more prominent ones with letters. Bunsen associated

RENEWAL TIME APPROACHING; TELESCOPE CONTRIBUTIONS NEEDED

The NCA Treasurer's membership renewal notices will soon be arriving. When you send your renewal check, it will help the treasurer if you will enclose the reminder card you receive from *Sky and Telescope*. One more thing: Some who have pledged for the telescope fund have not yet sent their contributions. These and others, you← are urged to enclose a tax-deductible donation with your renewal. If you are in the 50-percent bracket, your contribution will cost you only one-half its value to NCA!

GRAZING OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations in early September; no August expeditions are planned. For further information call Dave at 585-0989.

Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
09-03-79	01:50	Bowie, MD	6.1	84	2S	10 cm
09-06-79	09:21	Norfolk, VA	3.8	Occurs during partial phase of total lunar eclipse, near edge of umbra.		

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individual lines with elements and ions. Kirchhoff later enumerated his laws of emission and absorption which explained the lines.

In the first detailed spectral classification, published in 1872, A. Secchi grouped several thousand stars into four classes: I, those showing only the lines of hydrogen, such as Sirius; II, those showing many lines, later learned to be metallic, e.g., the Sun; III, those few showing (molecular) bands shaded toward the red, now known to be titanium oxide, as in Alpha Leonis; IV, those very few showing bands shaded toward the violet, now called carbon stars.

Early workers classified stellar spectra in various ways, some in few groups, some in many, and some involving other characteristics such as color. The resulting confusion is still occasionally evident in the tendency among some "to confuse information obtained by photometry with information obtained from examining the spectrum," our speaker said. For example, O- or B-type stars could be misclassified because of interstellar reddening. The phenomenon was not known at the time of publication of the Henry Draper Catalog shortly before 1920, which contains a number of such misclassifications.

The catalog was funded as a memorial to Draper (1837-1882) by his widow, through a large grant to Pickering at Harvard. In this work, Wilhelmina Fleming arranged the spectra alphabetically in order of increasing complexity. A series of successive workers added subclasses and further complications.

From 1914 to 1918 Annie Cannon personally classified more than 225,000 stars for the HD Catalog, then over 100, 000 more for the HD extension. Using only a hand lens and natural light, she visually examined the spectra at a rate of about three per minute.

Cannon rearranged Fleming's order to reflect the order of decreasing temperature: O, B, A, F, G, K, M, R, N, S — the designations used (with subclasses) today.

The Henry Draper Catalog was dominant for the next two decades, although a need was seen for a luminosity dimension.

In the early 1940's William W. Morgan at Yerkes proposed a system in which luminosities were represented by subclasses expressed in order of decreasing luminosity by Roman numerals I through V. The important difference between Morgan's system and similar efforts of some earlier workers is that the luminosities are to be determined only from spectral characteristics, and are not to be influenced by the results of other types of measurements, e.g., photometry. A more stable classification thus results.

The original MK Atlas was published in 1941. In the latest version, pub-

lished late in 1978, each spectral type and luminosity class is uniquely represented by a single standard star. An individual is classified by comparison of its spectrum with that of the standard, not by direct spectral criteria. Dr. Lesh noted abuses of the system, seen even today, by confusion of photometric data with spectral data in the classification process.

Our speaker showed numerous examples of the proper use of the system, then examples of its use in recognizing unusual types which may be candidates for further study.

She envisions future extensions of the system to include spectral features in vacuum ultraviolet and far infrared, and showed a number of such features from satellite observations, but made with inappropriate spectral resolutions — both too high and too low — for classification purposes. When instruments of intermediate resolution are flown, the principles of the MK system can be extended to include the additional classes. rhm

EXCERPTS FROM THE IAU CIRCULARS

1. April — Middleditch, Mason, and Nelson, University of California at Berkeley, and White, Goddard Space Flight Center, detected pulsed optical emission from the pulsar 4U 1626-67 with the 400-cm telescope at Cerro Tololo. The fundamental period of 7$676 and the first harmonic were observed, as well as flickering with a period on the order of a minute.

2. June 16 — Kenneth Russell, U.K. Schmidt Telescope Unit, discovered a 17th-magnitude comet (1979d) in Virgo on an exposure made by P.R. Standen with the 122-cm Schmidt telescope at Siding Spring.

3. June 24 — W.A. Bradford, Dernancourt, Australia, discovered a 10th-magnitude comet (1979c) in Hydra.

4. June 26 — Carlos Torres, National Observatory, University of Chile, discovered an 18th-magnitude comet (1979e) in Aquila. rnb

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