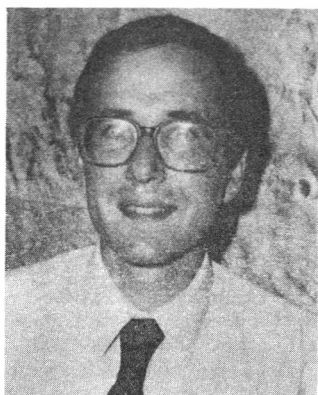




MAXWELL TO COMPARE LANDFORMS OF EARTH, MARS



DR. MAXWELL

Dr. Ted A. Maxwell, Chairman, Center for Earth and Planetary Studies, National Air and Space Museum, will speak at the April meeting of National Capital Astronomers. He will compare the desert landforms of Mars with those of the Earth.

Mariner and Viking missions to Mars have provided ample clues to the geologic history of the planet. Many features on Mars, such as large channel systems, eolian streams, sand dunes, and pitted rocks lying on the surface can also be found in terrestrial desert regions.

in the remote desert of southwestern Egypt, where virtually no rain has fallen for the past 5,000 years, there is abundant evidence for previous episodes of running water, but the terrain is now being shaped by wind and sand.

Water once flowed on Mars, too, but not in geologically recent time. Still, the surface is altered by processes similar to those in Egypt. Dr. Maxwell has studied the desert landforms on site, and will relate the implications for wind- and water-sculptured features on Mars.

Dr. Ted A. Maxwell received the A.B. in Geology from Franklin and Marshall College in 1971, the M.S. in Geology from the University of Utah in 1973, and his Ph.D., Geology, from Uta in 1977. He has a wide range of experience in geomorphology, both terrestrial and comparative planetary, as principal and coinvestigator on numerous spacecraft and terrestrial projects.

APRIL CALENDAR -- *The public is welcome.*

- Tuesday, April 3, 10, 17, 24, 7:30 pm -- Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.
- Friday, April 6, 13, 20, 27, 7:30 pm -- Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.
- Friday, April 6, 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, April 7, 6:15 pm -- Dinner with the speaker at Blossom's Restaurant, Pennsylvania Avenue and 12th Street, NW, in Old Post Office Pavillion. Reservations unnecessary.
- Saturday, April 7, 8:15 pm -- NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Maxwell will speak.
- Saturday, April 14, 8:00 pm -- Working Group on Photographic Materials, Techniques meets, Department of Commerce Conference Room D. See page 31.
- Saturday, April 21, 8:00 pm -- Discussion Group meets in Conference Room D, Department of Commerce: Astronomy Day plans. See page 31.
- Saturday, April 28, after 4:00 pm -- Open house for NCA at Hopewell Observatory. See page 31.

MARCH LECTURE

Dr. Mukul R. Kundu, Director of the Astronomy Program at the University of Maryland, addressed the March meeting of National Capital Astronomers on recent advances in solar radio physics derived from Very Large Array (VLA) observations.

The VLA in New Mexico and Maryland University's Clark Lake Radiotelescope array in California were originally designed for cosmic research. Dr. Kundu and others, however, foresaw the potential of these high-resolution instruments for research in solar physics. Their persuasion influenced alteration of the design parameters to facilitate solar research, albeit with some tolerable compromises. Now about four percent of the observing time of these instruments is devoted to solar work, resulting in substantial advances in solar physics.

The frequency at which the solar atmosphere becomes opaque, hence, the altitude limit of visibility, is proportional to the square root of the electron density. Electron density decreases with altitude; lower altitudes are observed at higher frequencies. Selection of appropriate frequencies allows radio exploration over a range of altitudes in which some parameters are very difficult to measure in other spectral domains. Magnetic field topology is mapped in high resolution by the VLA. It is this unique value of the VLA that is emphasized in solar magnetodynamic research.

Variations in electron density associated with active regions (spots, plages, filaments, flares, etc.) can be mapped at different frequencies. In the active regions the continuum radiation of the quiet Sun is overlain with plasma radiation from electrons gyrating around magnetic field lines -- gyroresonance -- at specific frequencies.

In an optically opaque region electron temperature, or kinetic temperature, equals the brightness temperature. In a partly transparent region the electron temperature equals the brightness temperature divided by the opacity. Gyroresonance absorption, which depends upon a magnetic field, increases optical opacity. Three parameters, then, can be measured in radioastronomy: electron density, temperature, and, particularly important, magnetic field.

A solar flare is the sudden release of energy, mainly magnetic, which had been stored in a metastable active region. It is in the lower solar atmosphere that the flare-producing metastable magnetic fields develop. The necessary frequency range for this region, up to several gigahertz, is within the capability of the VLA.

Kundu showed a film covering a 9-minute span at 10-second intervals during a flare. This was the first motion picture produced by the VLA. The active region was monitored at 15-minute intervals preceding the flare with a spatial resolution of 4 arcsecond at 10 GHz, corresponding to an altitude of 10,000 km. The I and V polarization components (Q and U were not generated) and changes in the magnetic field structure were seen. (Ed. note: The state of polarization of electromagnetic radiation can be completely characterized by the four Stokes parameters, I, Q, U, and V. I is the total intensity, Q is the linear 0-degree or horizontal component, U, the linear 45-degree component, and V, the right circular component. The resultant of these defines the polarization.

In the last frame before the flare a reversal of magnetic polarity was seen. These magnetic details could not have been recorded by optical or other means.

Two alternative explanations seem possible: 1, Newly emerging magnetic flux interacts with the preexisting flux to produce a current sheet which triggers the flare, or 2, A previously invisible loop of opposite polarity contains currents which increase the twist, thus increasing the magnetic field strength, in turn, the gyroresonance absorption, which makes the loop visible, and produces a current sheet which triggers the flare.

In either case, it appears that a current sheet triggers the flare, but exactly how remains uncertain.

In another interesting case, at a resolution of 0.7 arcsecond, two regions corresponding to two optical flare regions were seen with a neutral line between. A microwave flare appeared between the two oppositely polarized kernels, which

OCCULTATION EXPEDITIONS PLANNED

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

Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
04-06-84	01:27	Morristown, NJ	5.9	18	-8S	5 cm
04-08-84	04:40	Silver Spring, MD	8.3	38	4N	8 cm
04-11-84	01:34	Sandy Spring, MD	8.0	71	5N	10 cm
04-21-01:52		Fayetteville, NC	2.1	66	-13N	5 cm

DISCUSSION GROUP TO PLAN ASTRONOMY DAY PARTICIPATION

On 21 April at 8:00 pm in Conference Room D, U. S. Department of Commerce, plans will be discussed for NCA participation in observance of Astronomy Day with both the U.S. Naval Observatory and the National Air and Space Museum. We need several volunteers for each location to handle telescopes, exhibits, and public information. This is an important public service as well as a promotional activity. Your participation will be appreciated by thousands.

WORKING GROUP ON PHOTOGRAPHIC MATERIALS, TECHNIQUES TO MEET

All are welcome to a meeting at the Department of Commerce, Conference Room D, on 14 April at 8:00 pm, in response to the continuing broad interest in preparing for the 30 May solar eclipse. Joe Macrie, Chairman of the Working Group, will moderate.

NCA INVITED TO HOPEWELL OBSERVATORY

Hopewell Observatory will host National Capital Astronomers on Saturday 28 April from 4:00 pm until interrupted by the following sunrise. Bring prepared lunch; coffee, tea, cocoa, and soft drinks will be provided. If you wish you may bring your own telescope.

From the Beltway, go west on I-66 25 miles to the Haymarket exit. Left 0.25 mile to traffic light, right on Route 55 0.8 mile to County Road 681, right on 681 3 miles to end, left on County Road 601 (dirt) 1.2 mile to County 629, right on 629 1.0 mile to small paved road on right. (Easier to see is gate and stone facing on left.) Turn right to top of ridge, go around microwave station and continue on dirt road through woods a few hundred feet to site.

Parking has been somewhat improved, but carpooling is recommended. For further information call 320-3621.

NAVY MEMORIAL MUSEUM PRESENTS PROGRAM, DISPLAY

Those who missed the National Academy of Science's historic display of Jan K. Herman's Old Naval Observatory work have another chance. The Navy Memorial Museum now displays his work, and is offering a series of related talks. On Wednesday, 18 April at 12:00 noon, Richard E. Schmidt, Astronomer, U.S. Naval Observatory, will speak on the life of H. P. Tuttle, Comet Seeker.

The Museum is at the Washington Navy Yard, 9th and M Streets, SE. There is no charge. For information call 433-3519.

apparently were the foot points of a loop. The 10-gHz (2-cm) radiation originated near the top of the loop. This result supports the proposition that a single loop can explode to produce a flare.

When in a flare explosion energy is released at the top of a loop, electrons undergo scattering at energies of from a few to 100 keV. Within some energy range, electrons are trapped near the top of the loop. Other, higher-energy electrons go to the magnetic foot points where they interact with plasma to produce hard X-rays and H-alpha emission.

Kundu also described briefly the Clark Lake antenna array, with which the lower frequencies corresponding to higher altitudes are studied. rhm

EXCERPTS FROM THE IAU CIRCULARS

1. December 29 -- R. Chanal, St. Etienne, France, discovered a 14th-magnitude object near V 372 Ori in the Orion Nebula, believed to be identical with infrared variable NSV 2229. N. Scott, Altrincham, England, confirmed the object and discovered a similar one, both normally fainter than 17th magnitude.

2. February -- C. B. Cosmovici, DFVLR, and S. Ortolani, Asiago Astrophysical Observatory, reported that the spectra of Comet IRAS-Araki-Alcock taken in 1983 may with the 1.82-m telescope at Asiago, showed about 50 unknown lines. New molecules identified: HCO, H₂S⁺. Suspected: H₂CO, S₂, DCO, and NH₄.

3. February -- Lecacheux, Le Fevre, Baudrand, Lemonnier, and Mathez, Meudon Observatory, and Lelievre, Canada-France-Hawaii Telescope, obtained electronographic photometry of Comet Halley with the CFH Telescope. They reported it to be of about 23rd magnitude, with evidence of night-to-night variability and a change of 1 magnitude in less than an hour on February 4.

4. March -- Seward and Harnden, Harvard-Smithsonian Center for Astrophysics, and Helfand, Columbia Astrophysical Laboratory, reported that 1979 data from the Einstein Observatory showed an X-ray pulsar in a supernova remnant in the large Magellanic Cloud. They suggest that the object, which had a 50-ms period, should show radio and optical pulses. R. N. Bolster

CORRECTION

An editorial confusion in the lecture notes appeared in the review of the February lecture in the March issue, sixth paragraph. Flagstaff measures parallaxes to 3 mas for selected stars, and no proper motions. Positions are measured to 1 mas. The 100,000 stars referred to are expected to be measured to 2 mas by HIPPARCOS, not the 61-inch Flagstaff instrument.

This error occurred in my (R. H. McCracken) editing, and not in Peter Kammeyer's accurate review of the lecture.

We try very hard to keep *Star Dust* scientifically accurate and dependable, particularly as to substance. What you don't see is the errors we catch.

FOR SALE -- Edmund 8-inch Newtonian telescope with 8X50 finder, equatorial mount on wheels. \$250 or best offer. Earl Clay, (301) 596-3641.

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