



ERICKSON TO DESCRIBE CLARK LAKE ARRAY



DR. ERICKSON

At the January 3 meeting of National Capital Astronomers, Dr. William C. Erickson, professor of astronomy at the University of Maryland and National Research Council Senior Research Associate, NASA Goddard Space Flight Center, will describe the newly completed Clark Lake, California, radio observatory of the University of Maryland, and some of the observational capabilities of the new 720-element T-array.

Fully steerable, the array comprises 480 log-spiral elements in an east-west arm 3 km in length, and 240 elements in a north-south arm 1.8 km long. Mechanically fixed in a vertical orientation, the elements are phased to steer the array over a zenith-angle range of $\pm 50^\circ$, the beamwidth of the individual elements. The phasing scheme involves rotation of the left-circular polarization of the elements, and main-

tains circular array polarization over zenith angles of greater than 50° .

The east-west arm of the array can be used in an Earth-rotation aperture synthesis mode (supersynthesis) in which the repositioning of the elements is done by the diurnal motion of the Earth. Operable from 15 to 130 MHz, the array is useful as both a radioheliograph and a sidereal telescope. It is used to observe dekametric non-thermal planetary radiations, the emission of pulsars, and other sources. Of course, aperture synthesis is not applicable to pulsar observations.

The rapid beam-positioning capability permits time-sharing operation among various observers on a 1-second time scale, making the facility available to simultaneous projects.

William C. Erickson was born in Chicago, received his B. A., M. A., and Ph. D. from the University of Minnesota, the latter in 1956. Before coming to the University of Maryland in 1962, he was a physics lecturer at the University of Minnesota and St. Thomas College, and served as Project Leader for the Benelux Cross Antenna Project at the University of Leiden. Dr. Erickson is a member of several major astronomical societies and has published widely.

JANUARY CALENDAR - *The public is welcome.*

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

Saturday, January 3, 6:15 PM — Dinner with the speaker at O'Donnell's Sea Grill, 1221 E Street, NW. Reservations not necessary.

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

Monday, January 4, 11, 18, 25, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnell, 362-8872.



Dr. John C. Brandt, Head of the Laboratory for Solar Physics and Astrophysics, Goddard Space Flight Center, examines petroglyphs near Zuni, New Mexico, believed to represent the Crab Nebula Supernova of 1054 AD. NASA photo.

DECEMBER LECTURE

Dr. John C. Brandt, Chief of the Solar Physics Branch of Goddard Space Flight Center, discussed records of the Crab Nebula Supernova in ancient rock art at the December 6 meeting of NCA.

The Gum Nebula, extending over 40° of the Southern Hemisphere sky, was discovered in 1952. It is one of the largest hot ionized regions in our galaxy, but shows no visible heat source. It is probable that the Gum Nebula is the remnant of a supernova explosion, as is the Crab Nebula (*Star Dust*, May 1971). Astrophysical reasoning gives 9000 BC as the approximate date of the Gum Supernova.

Because rock art petroglyphs (carvings) and pictographs (drawings) are as old as 40,000 years (French cave paintings), it occurred to Brandt that some Southern Hemisphere rock art might depict the occurrence of the Gum Supernova; he asked archaeologists for possible leads in the *Journal of Archaeology*. The result, thanks to a *Time Magazine* article (March 27, 1972) based on his paper, was leads, not on the Gum Nebula but on Crab Nebula rock art in the western and southwestern United States. The ultimate result was Brandt's book, *Archaeoastronomy in Pre-Columbian America*, University of Texas Press, the first book published on the subject.

It is believed, based upon Chinese dynastic records, that the Crab Nebula Supernova was first seen on July 5, 1054 AD. U. S. Naval Observatory calculations indicate that the supernova would have been seen in the southwest United States just 2° from the Moon at its crescent phase, and would have been at least as bright as Venus — perhaps five times as bright. Mrs. Kennedy, wife of the superintendent of Lava Beds National Monument, California, pointed out to Brandt two sites of rock art there showing bright objects near crescents. William Miller of Hale Observatories had previously located sites of three more in New Mexico. Ultimately, sixteen examples of rock art showing what are believed to be representations of the Crab Supernova were found.

Two facts support his belief that this rock art is contemporary depiction of the Crab Supernova, Brandt said. 1) Crescents are rare in rock art in the southwestern United States, although common in some other areas of the world; 2) These crescents virtually always occur with a representation of a bright object within about 2° .

We know from the Chinese dynastic journal, *Sung Chee*, together with the

GRAZING-OCCULTATION OBSERVATIONS PLANNED

At the December 20 NCA discussion group meeting, led by Walter Nissen, tentative plans were made to organize expeditions for the observation of three nearby occultations whose graze paths cross northern Maryland. An effort is being made to reestablish an effective NCA graze team for this valuable work. Those interested in participating should contact Walter at 528-6671.

PIONEER 6 COMPLETES A USEFUL DECADE IN SOLAR ORBIT

Designed in last six months, NASA's Pioneer 6 was launched into solar orbit December 16, 1965. Comprising more than 56,000 parts, it is still faithfully reporting valuable data from the Sun and the interplanetary medium, some spanning more than a half billion miles. It has measured the solar corona, solar wind, Earth-Sun distance (the astronomical unit), planetary orbits, high-energy particles of solar and galactic origin, relativistic relationships, the solar magnetic field (unfortunately, a key part in a solar magnetometer has finally worn out), and the tail of Comet Kohoutek. Except for the magnetometer, all of the experiments and other systems are working well, 24 hours a day.

Pioneers 6, 7, 8, and 9 constitute a network of solar weather stations whose data from all sides of the Sun are transmitted to space scientists and to the National Oceanic and Atmospheric Administration's Solar Disturbance Forecast Center at Boulder, Colorado. Approximately 1,000 primary users of these data include the Federal Aviation Administration, military organizations, power, communication, and other companies.

The craft is an 88-cm-long cylinder 92 cm in diameter with three booms 120° apart. Solar-powered by a covering of solar cells, it provides its own data handling, temperature control, communications, and power systems.

"Pioneer 6 is such a good spacecraft," comments Project Manager Charles F. Hall, "that we may get another 10 years out of it."

USNO calculations that only in the southwestern United States could the Crab Supernova have been seen in near conjunction with the Moon. Interestingly, the Chinese records gave the supernova position correctly in distance from the star ζ Tauri, but in the wrong direction by 180°; this was probably a transcribing error from astronomer to clerk. Some of the rock art crescents are reversed; tests with groups of non-astronomers drawing close conjunctions of the Moon with Venus also produced frequent reversed crescents.

The principal sites where fine rock-art depictions of the Crab Supernova are found are Fern Cave, Lava Beds National Monument, Choco Canyon, Zuni Indian Reservation, New Mexico, Cholly Canyon, Village of the Kivas, and in Baja California. Two sites at Lava Beds appear to show day-by-day motion of the supernova. The Choco Canyon site was probably a Sun-watching station and the painter left a handprint with his drawing. At the San Cristobal site the bright object has a ring around it. Could this represent a then-visible ring of expanding gases? The Baja California rock art was done by a culture noted for non-abstract drawings, lending credence to the reality of the event.

Tree-ring and carbon-14 dating in the areas of these sites have not produced a conclusive age of the rock art but eleventh-century dates fall inside the error limits.

Brandt noted that astroarchaeology holds clues to the origin of language because picture writing was an early step in man's development. If this proves valid, it will importantly aid astrophysical interpretation of ancient events in the Universe.

In response to questions, our speaker pointed out another example of a crescent and bright object — the Turkish Flag, origin unknown. Of the approximately 30 known crescents in the Southwest, only one is not associated with a bright object. Mayan art in the Yucatan may offer further astronomical rock art, but this art has resisted interpretation.

Brandt concluded with the warning that American rock art is rapidly being destroyed by construction, vandalism, and neglect.

William Winkler

EXCERPTS FROM THE IAU CIRCULARS

1. November 16 — The MIT SAS-3 group detected a transient X-ray source in Tucana during one scan by the satellite. Willmore, University of Birmingham, reported that Ariel 5 detected nothing from that source 2 minutes prior to and 34 minutes after the event.

2. December 5 — Y. Sato, Tochigi, Japan discovered a comet in Coma. Of 9th magnitude and with a 15-minute tail, Comet Sato (1975q) is moving rapidly southward.

3. December 5 — Visual magnitude estimates of θ^1 Orionis A indicate that the expected minimum did occur, but may have been shorter than expected.

This listing courtesy R. N. Bolster.

FOR SALE

Duplex Questar, 3.5-inch, 3 years old. Just out of warranty. Cer-Vit mirror, 7 filters, including Sun filter, adaptor for Canon F-1. Also Davis and Sanford tripod. All for \$1600 or best offer. Oakleigh Thorne, 872-0855.

WANTED

Telescope, prefer catadioptric, will consider others. Best offered for \$500 or less. Stu Lieberman, office: 282-2036, home: 384-7502.

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