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# MIRA

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NEWSLETTER



## Fire!

**The stars look down as the Indians Fire burns on the slopes of Pinyon Peak in this photo shot by Ivan Eberle from the Oliver Observing Station (see On the Cover, p.2).**

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**On the Cover**

As I write this, the Indians Fire is about nine miles south of the Oliver Observing Station and proceeding north towards us against the downslope above Tassajara and the wind that has been consistently out of the north. Our caretaker, Ivan Eberle, has been taking spectacular pictures of the fire over the last two weeks; our *Newsletter* reproductions in black and white hardly do them justice.

This fire is burning areas which, like our steep eastern slope, have not burned in at least 40 years. The rugged terrain of the Los Padres National Forest makes any attempt at containment, already a very difficult job, nearly impossible. I think this fire has the potential to be one of the largest in the history of the forest. In the wilderness, backfires and defensive lines near buildings are about the only tools available.

Over the last few years we've been cutting brush back as far as allowed by the Forest Service but the steepness and fuel load of the eastern slope will produce flames with heights of a couple of hundred feet. The radiant heat from flames that size plus glowing embers blown from the firestorm that will be coming up the mountain are the main threat.

By the time this *Newsletter* goes to press, volunteers prepare it for mailing, and the post office does its job, the issue will probably be decided. Let us all hope for a happy ending.

See more of Ivan's photography at [www.ivaneberle.com](http://www.ivaneberle.com).

--Bruce Weaver

**Membership Renewal**

A gentle reminder that the MIRA volunteers, docents, student interns, and astronomers at MIRA depend on your contributions to make all our educational and research activities possible. Please renew your membership in the MIRA adventure.

**Calendar of Events****MIRA Classes on Monterey's Sky**

In cooperation with the Regional Park District

**Saturday, 5 July, from 8:30pm until 10:30pm** Dr. Bruce Weaver will discuss "Light and Color in the Open Air" at the Garland Ranch Regional Park Center.

**Saturday, 1 August, 8:30pm-10:30** at Garland Ranch Regional Park, MIRA docent Dr. Jim Eagle will provide a "Guide to the Constellations."

**Saturday, 23 August, from 1pm until 5:30pm**, Dr. Arthur Babcock will lead a tour of the Oliver Observing Station on Chews Ridge. Vans will leave from and return to Garland Ranch Regional Park Center.

For a more complete description of the classes, see [www.mira.org/events.htm](http://www.mira.org/events.htm)

**Oliver Observing Station Tours**

**Sunday, July 20, 2:30-4:00pm.**

**Sunday, September 14, 2:30-4:00pm.**

Tours are free and open to the public, but reservations are required; call 883-1000.



*This feature is inspired by the questions we have received over the years from interested readers. If you have a question about an astronomical topic, please send it to us.*

Marty asks, via the Internet,

For binoculars & spotting scopes the field of view can be angular or linear.

If the angular field of view is known, one can obtain the linear field of view in feet at 1000 yards by multiplying the field of view in degrees by about 52.5

What formula can I use for this to convert feet at 1000 yards to meters at 1000 meters?

Dr. Bruce Weaver replies,

All optics deal with angular fields. Any angular field can be converted to some linear dimension at some distance. If you express the angle in radians, it is very nearly true that the linear dimension of a field is the angle (in radians) times the distance (in fathoms, light-years, meters, inches, or any other linear scale you want). A radian, which has no dimensions, is 57.3... degrees. Now you can use any scale (meters, feet, furlongs) that you please.

# The Roots of Life on Mars by Dr. David J. Des Marais

Reviewed by Rod Norden

Dr. David Des Marais of NASA Ames Astrobiology Institute presented a very entertaining and informative multimedia review of modern research into whether Mars may have had life in the past.

The central theme of NASA's overall Mars science strategy is to "follow the water." Unicellular life on Earth can exist in extreme environments, and it is possible on Mars that evidence of life may exist under the surface. The geologic record on Mars may be much older than on the geologically active Earth, possibly up to 4.5 billion years, the determined age of the Mars meteorite ALH84001. The surface of Mars has proved to be quite inhospitable with high radiation and such low atmospheric pressure that liquid water cannot exist there, so evidence must be found underground.

Dr. Des Marais began with a review of the space missions that have returned abundant data about Mars, beginning with the two Viking missions of 1976. They found many new and intriguing surface features and conducted chemical analyses of the soil for organic compounds. (None was detected.)



*Landing sites of the Mars missions. Courtesy NASA/JPL-Caltech.*

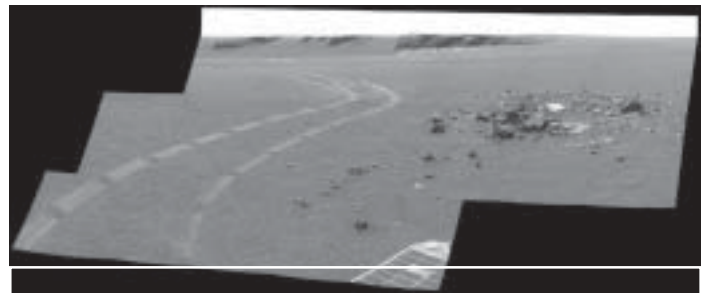
The Mars Global Surveyor mission of the 1990s has found evidence of flowing water in the past as well as numerous recent changes on the surface of Mars, such as boulders rolling downhill.

The Mars Exploration Rovers (Spirit and Opportunity) were the main subject of the talk. They landed in opposite hemispheres of Mars in 2004 and were equipped to look for evidence of water in the rocks and minerals. Mars Recon-

naissance Orbiter, which entered Mars orbit in 2006, carries a 20-inch telescope capable of resolving details as small as one foot on the surface. It has provided guidance data for both current rovers, and landing data for the very recent arrival of the Mars Phoenix Lander.

Dr. Des Marais showed a fantastic animation of the Rovers' launch, landing, and examples of their exploration. Surprisingly, the Mars Rovers were expected to run for three months, but four years later both are still operating!

Opportunity found small berry-sized hematite nodules. On earth, hematite generally forms in the presence of water. Significantly, Opportunity also found the mineral jarosite,



*Opportunity images its own tracks on the Martian surface. Courtesy NASA/JPL-Caltech.*

which forms exclusively in the presence of acidic water.

Of great importance, Opportunity discovered small rock layers overlapping and curving into each other, called festoon cross-beds. These layers indicated that water once flowed on the surface of Mars. It also found sulfate-rich evaporative deposits similar to those commonly seen in salt flats in desert regions on earth, as well as small cavities in the rock that were similar in shape and size to cavities in terrestrial rock left behind when some minerals are dissolved and dispersed by groundwater.

Meteorological findings included numerous dust devils documented by the rover Spirit during the Martian spring, well shown in an actual film clip from Mars, and clouds in the Martian sky seen by Opportunity.

The talk ended with a hilarious animation of a Mars rover whose rapidly spinning grinder became lodged in a rock and caused the entire rover to begin spinning and tearing itself apart!

# Refurbishing the Weaver Student Observatory

by Dr. Arthur Babcock



*The dedication of the Weaver Student Observatory 19 June 1998.*

The Weaver Student Observatory (WSO), MIRA's primary facility for education and public outreach, was dedicated on 19 June 1998. In the ten years since then, it has been used for scores of events hosting the general public, amateur astronomy clubs, scout groups, Lyceum of Monterey County classes, and students from elementary school to the Naval Postgraduate School. As many Friends of MIRA know, however, it has not been operational for the last year or so, the computer control system having suffered from some unknown hardware and/or software malfunction. Accordingly, funding was sought for a thorough refurbishing of the entire observatory. The Harden Foundation, the TABASGO Foundation, and the Friends of MIRA responded with generous contributions.

The first priority was to make the telescope usable again. It was decided to replace the existing mount and control system with an entirely new mount, and we selected the Paramount ME GEM (German equatorial mount) by Software Bisque. This is a top-of-the line mount with excellent pointing and tracking performance. It can be operated without computer control (if the astronomer is willing to locate celestial objects without assistance), but with computer control, the Paramount has a number of fascinating capabilities. It can be controlled locally, robotically (operated by a control script), and even remotely, over the Internet. Software enhances the pointing and

tracking accuracy, and the mount can even be programmed to track satellites! A long-term goal is to be able to operate the telescope over the Internet.

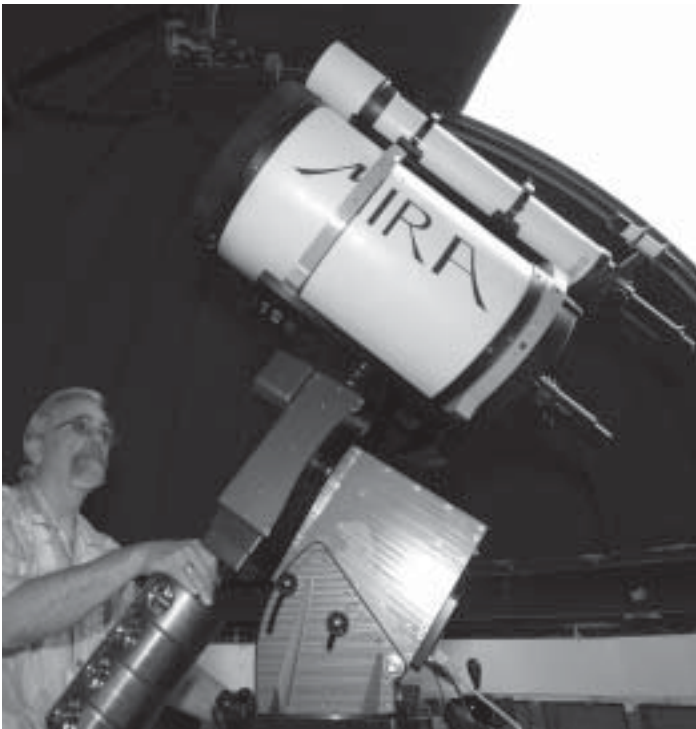


*Bruce Weaver and Bill Bishop (almost hidden behind the telescope pier) disassemble the old mount.*

As of this writing, the new mount has been installed

and the telescope is fully operational. Arthur Babcock, Bill Bishop, Kim Cohan, and Bruce Weaver completed the installation, removing the old (and incredibly heavy!) mount, performing various machining chores, and putting the new mount in place with the telescope (a Celestron C14) attached.

A new laptop computer has been acquired to run the control software. Our plan is to store this computer inside the (comparatively) warm and dry Hamming Astronomy Center, and to take it to the observatory when required. This plan may enhance reliability, as a humid observatory is not the best environment for computers.



*Arthur Babcock with the WSO telescope on its new Paramount ME. Photo by Robin Casady.*

Several other devices have been acquired that will not only restore, but enhance the operation of the WSO.

Observers who have used the WSO in the past will remember the two-piece shutter of the Ash dome. This arrangement required moving the shutter several times during the night, according to the part of the sky (zenith or horizon) one wanted to observe. When installed, a new kit from Ash Dome will make this operation unnecessary: the observer will open the shutter once, at the beginning of the session, and close it once, at the end.

Another problem WSO users will recall is low cloud, which is just a fact of life on much of the Central Coast.

While we have not yet discovered a means of chasing the clouds away, we have acquired a Boltwood Cloud Sensor, which at least will warn of their presence. If information from the cloud sensor is made accessible by Internet, as is the plan, both guests and docents can know in advance if an event must be cancelled due to cloud.

The equipment acquired earlier will still be available: a CCD camera with colored filters, two spectrographs, a MIRA-built digital-readout focuser, solar filters (both broadband and H-alpha), a video camera, and an assortment of eyepieces.

With all this new equipment (and with one more vital component, people—see “Call for Docents”), the WSO is poised to enter its second decade with more capabilities than ever. We thank the Harden and TABASGO Foundations, the Friends of MIRA, and all those who have taken—and will take—part in the process.

## Call for Docents

With the Weaver Student Observatory ready for a new period of productivity (see the companion article), MIRA is anxious to identify docents who can share their knowledge and interest with the wide range of people the WSO serves.

It is all very well to talk of robotically controlled telescopes, but educational events depend very heavily on *people*. With them, MIRA can interest students and the public in astronomy; without them, the telescope is just so much glass, aluminum, and silicon.

The equipment in the new WSO is sophisticated, but it has been designed for easy operation, and training will be provided. In any case, for all but the smallest groups, it is best to have at least two docents—one assisting people at the telescope, the other guiding them up the stairs and keeping them engaged while they wait their turn. So potential docents who do not feel their skills are up to managing a computer-controlled telescope should know that they can still make vital contributions.

Indeed, it is very valuable to have docents bring their own telescopes—even binoculars—to WSO events.

So don't be shy. If you'd like to contribute your time and enthusiasm to MIRA educational events, call Tami Huntley at 883-1000 or send e-mail to [mira@mira.org](mailto:mira@mira.org).

The Weaver Student Observatory is about to become better than ever. With your help, the events held there can be better than ever, too.

# The Summer Sky

by Rod Norden

The warm summer months are the best time to get out under the stars. The Milky Way extends all the way across the sky and the Summer Triangle stars are high overhead. It matters not whether one uses the naked eye, binoculars, or a telescope; there are spectacular objects too numerous to list available to the observer. July, August and September are wonderful months for those of us in the Northern Hemisphere.

## Fixed Stars

For naked eye observers, this is the season to observe the **Milky Way**. Please note the dark lanes and mottled appearance as it streams upward from Sagittarius up through Cygnus and beyond. This obscuration is due to dust in the plane of the galaxy blocking the light from the numerous stars beyond.

For observers under a dark sky with binoculars, **E.E. Barnard's 'E'**, a relatively obvious dark nebula among those he cataloged and is easily located in Aquila. It is located about 3 degrees north-west of Altair near Gamma Aquilae. A reference document to other dark nebulae cataloged by Barnard and location finder for them can be found at: <http://rasc.ca/im/observing/darknebula.pdf>

My favorite beginner's telescope object is **Messier 11** in Scutum. I will never forget how amazing it was with a 4" telescope in 1960, my first 'real' instrument. It is a very rich and compact galactic (open) cluster, reminding me of a cross between an open and a globular cluster. M11 contains an estimated 2900 stars, about 20% of which are bright enough to be seen in an 8" instrument. There is one 8<sup>th</sup> magnitude star on the 'leading' edge of the flock of its 'flight of wild ducks'.

My favorite advanced summer object is the **Veil**

**Nebula**, a very large supernova remnant in Cygnus. This object is so large (six times the diameter of the Full Moon or about 3 degrees) that to earlier observers its brighter parts appeared as a number of distinct diffuse nebulae, and were assigned separate NGC numbers: NGC 6960 (surrounding 52 Cygni), NGC 6979, NGC 6992, and NGC 6995. Fainter extensions have additional catalog identities.

The source supernova occurred less than 8,000 years ago, and the remnants have since expanded to its

current angular diameter. The distance to the nebula is not precisely known, with estimates averaging about 2,000 light years. It was discovered by William Herschel in 1784 using his 18-3/4" speculum mirror reflector.



*A small portion of the Veil Nebula imaged by MIRA interns with the 36-inch telescope.*

I have seen the brighter sections in 15x70 binoculars from Chews Ridge. The view with my 92.5mm f/4.8 Astro-Physics refractor can show the entire structure nicely with 22mm Nagler and OIII or UHC filter. A large Dobsonian with the same eyepiece and filter allow hours of study to find all wisps and structure around the remnant.

### Planets

**Mercury** is well placed for morning observation during early July, and is again visible extremely low in the west after sunset in early September.

**Venus** will reappear in the evening sky in late July, and gradually increase distance from the sun for the rest of the year.

**Earth** is at aphelion (farthest from the sun) on 4 July. The Autumnal Equinox occurs at 8:44am PDT (15:44 UT) on 22 September, as the sun crosses the equator on its way south.

**Mars**, in Leo, will approach within 0.7 degrees of Saturn on 10 July, and Venus passes within 0.3 degrees of the Red Planet on 11 September. It has several other conjunctions with planets, Regulus, and the moon during this period, but they all occur while the planets are extremely low in the west after sunset.

**Jupiter** reaches opposition on 9 July. It is great to watch the changing positions of the four Galilean moons, and their rare double shadow transits! The best timed for us occurs at 2:04am PDT on 5 August.

**Saturn** remains visible in Leo and has numerous conjunctions with other planets and the moon during the summer. Note the rings are becoming less visible through the rest of the year as we approach ring plane crossing in 2009.

**Uranus** comes to opposition on 13 September in Aquarius at magnitude 5.7, allowing it to be seen with the naked eye under very dark sky conditions. With a telescope, its greenish disk 3.7" in diameter can be seen. I have seen some of its largest moons in a 12-inch telescope with a good finder chart, but the brightest are only 14<sup>th</sup> magnitude.

**Neptune** comes to opposition on 15 August in Capricornus at 8<sup>th</sup> magnitude, rendering it visible in binoculars. Its largest moon, Triton, can just be seen in a 12-inch telescope varying from 8" to 17" from the 2.3" diameter planet.

**Pluto** (our dwarf planet) was in opposition on 20 June but is still only at 14<sup>th</sup> magnitude in Sagittarius, and will still be visible through the remainder of the summer by those

with a large telescope and good chart.

### Meteor Showers

The Southern Delta-Aquarids come to maximum 27-29 July with little moonlight to interfere. There would be about 20 meteors per hour if the radiant were at the zenith (called ZHR), but since the radiant is in the southern sky far from the zenith, fewer meteors may be visible. This shower is still quite interesting as about 5-10% of the meteors leave persistent trains (trails), and the nights are warm and comfortable to sit through. The dependable Perseid meteor shower comes to maximum on 11-12 August. The ZHR can be 60 to 100. The waxing gibbous moon will be setting between midnight and 1:30am PDT on August 10-13 leaving some dark skies to observe the rest of the night. The Perseid radiant is viably observable from about 10:30pm PDT onwards, and it gains altitude throughout the night, so chances of seeing numbers of meteors are good.

### Comets

There are only a few comets visible during the period brighter than 9<sup>th</sup> magnitude. Comet 6P/d'Arrest is well placed as it reaches perihelion on 15 August moving from Aquila to Capricornus. The typical behavior of this comet is to remain dim until perihelion and then brighten dramatically in the following couple of weeks which might allow it to rise to 7<sup>th</sup> magnitude if we are very lucky, though it is only expected to reach 9<sup>th</sup> magnitude. Comet C/2007 W1 (Boattini) returns to the northern hemisphere morning sky in mid-July in Cetus at approximately 8<sup>th</sup> magnitude, and it moves north and fades during the summer.

### Eclipses

There will be no eclipses visible from Central California this summer period, although there is a total eclipse of the sun on 1 August 2008 visible from the Arctic areas and the Far East. MIRA is planning a benefit trip to China to see the 22 July 2009 total solar eclipse, with optional extension to Tibet. Please contact Tami at MIRA at 883-1000 for more details.

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## Volunteers Needed

MIRA Administrator Tami Huntley needs volunteers to help with a variety of office duties. If you would like to work for MIRA (and enjoy the natural air conditioning of the Hamming Astronomy Center), call Tami at 883-1000.

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## Friends of MIRA Membership

I would like to become a Friend of MIRA and receive the quarterly MIRA Newsletter.

Enclosed is my membership donation of \$\_\_\_\_\_

In addition, I am making a special contribution of \_\_\_\_\_

\$2500 Associates Circle	\$100 Sponsor
\$1000 Associate	\$50 Family
\$500 Patron	\$35 Member
\$250 Sustaining	\$15 Student

*MIRA welcomes corporate and business members. Contributions are tax deductible as allowed by law.*

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### Welcome to our new Friends

Jay Johnson  
Tayna Johnson  
Eileen Murphy  
James Weinstein

**Thanks!**

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The Monterey Institute for Research in Astronomy owns and operates the Oliver Observing Station under permit from the U.S. Dept. of Agriculture-Forest Service.

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The Monterey Institute for Research in Astronomy owns and operates the Richard W. Hamming Astronomy Center and the Ralph Knox Shops through an arrangement with the U.S. Dept. of Education.

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