Volume 27 Issue 5

May 2013

The Observer

East Valley Astronomy Club

This is a contrast-enhanced image produced from the Hubble images of Comet C/2012 S1 (ISON) to reveal the subtle structure in the inner coma of the comet. (Credit: NASA, ESA, J.-Y. Li (Planetary Science Institute), and the Hubble Comet ISON Imaging Science Team)

Upcoming Events:

Local Star Party - May 4

Public Star Party - May 10

Deep Sky Observing Night - May 11

General Meeting - May 17

Check out all of the upcoming club events in the Calendars on page 8

Inside this Issue:

The Backyard Astronomer

A Binocular Primer (Part One)

by Bill Dellinges

After a telescope, binoculars are a stargazer's best friend. Yet I seldom see amateur astronomers using them.

Of course I can't be everywhere to check up on you people, so perhaps some of you indeed use them. I'm just saying their use doesn't seem to be ubiquitous. Allow me to discuss the virtues of the instrument.

In a nutshell, a binocular is two short-focus, low power telescopes. The advantage of being able to use both your eyes is immediately obvious. Nature intended it that way. Why would you want to look into an optical instrument with one eye when you have two eyes? There is no doubt the brain is happier and the view more pleasing with an image formed from both eyes.

Some amateurs see binoculars as a first step in learning their way around the night sky before purchasing an expensive telescope. Nothing wrong with that philosophy. However, once

Continued on page 2

The Backyard Astronomer

Continued from page 1 experience is gained and a telescope finally acquired, all too often the binocular is retired. Bad idea. Binoculars compliment the telescope in exploring and enjoying the night sky. How so?

The wide field of a binocular, usually 6 degrees or more (versus a telescope's 1 to 2 degree field at best) allows the observer to enjoy large objects a telescope can't fit into its narrow field. There are many large open star clusters such as M44 (Beehive Cluster), M45 (Pleiades), Hyades, and the Double Cluster in Perseus that are best seen in binoculars.

Binoculars are far superior to telescopes in panning the Milky Way and also come in handy when the occasional comet makes an appearance – only binoculars' wide field can accommodate the long tail of a comet. In using the typical straight-through viewing binocular the problem of observing objects overhead must be addressed.

First, a sidebar: I always recommend using binoculars on a tripod because it's almost impossible to hold them steady enough for objects to remain motionless (and the higher the power, the worse this condition becomes).

Viewing at the zenith can be solved by leaning back slightly and tilting the tripod back towards you. It may help to also raise the tripod's center post up at the same time in order to place your eyes under the eyepieces of the binocular. One can also simply remove the binocular from the tripod and hand hold it while standing or perhaps better, aim them up while in a lounge chair. Finally, it's just plain fun and interesting to survey the area around the tiny chunk of sky your telescope is revealing. Chances are you will be delightfully surprised by what you find. Why spend your entire astronomical hobby viewing tiny pieces of space, take a look at the big picture!

OK, perhaps I've talked you into buying a binocular. What do you look for in shopping for one? Not to scare you, but I see at least 18 criteria.

Let's look at the most important factors in choosing a binocular. The first thing to consider is size, type, and power. They basically come in small, medium, and large sizes, just like your coats!

The large or so-called "giant" size begin with the 10x70's class. The two basic types are porro-prism and roof prism. Generally we use the former in astronomy and the latter for birding or general daytime use. Let's keep things simple and recommend the old standby 7x50 (which I stand by!).

Some prefer a 10x50 but keep in mind, the higher the power, the tougher it is to hold them steady. The 7x50 represents a medium size, medium power general purpose astronomy binocular - seven power and objective lenses 50mm in diameter. The optics should be "Fully Multi-Coated" (FMC), not just "Coated", "Fully Coated" or "multicoated", although in a pinch you can get by with the latter ."FMC" here denotes every optical surface including prisms is multi-coated). This is important because there is about a 4% loss of light for each uncoated air to glass (ATG) surface in a binoculars' optical system, which can be composed of as many as a dozen optical elements in each barrel. A simple one layer coated system loses about 1.5% for every ATG surface. In a FMC system, less than 1% of the light is lost for each (ATG) surface. This translates into a FMC binocular passing about 95% of its light compared to only about 80% for the single coated binocular (i.e., of the 100% of light entering the FMC binocular, 95% reaches your eyes).

Some binoculars are nitrogen purged to prevent internal fogging. This is a nice amenity but not absolutely necessary, especially in dry climates. To be continued.

Editor's note: Bill's article will be continued in the June issue.

Hubble Sees Horsehead of a Different Color

Astronomers have used NASA's Hubble Space Telescope to photograph the iconic Horsehead Nebula in a new, infrared light to mark the 23rd anniversary of the famous observatory's launch aboard the space shuttle Discovery on April 24, 1990.

Looking like an apparition rising from whitecaps of interstellar foam, the iconic Horsehead Nebula has graced astronomy books ever since its discovery more than a century ago. The nebula is a favorite target for amateur and professional astronomers. It is shadowy in optical light. It appears transparent and ethereal when seen at infrared wavelengths. The rich tapestry of the Horsehead Nebula pops out against the backdrop of Milky Way stars and distant galaxies that easily are visible in infrared light.

Hubble has been producing ground-breaking science for two decades. During that time, it has benefited from a slew of upgrades from space shuttle missions, including the 2009 addition of a new imaging workhorse, the high-resolution Wide Field Camera 3 that took the new portrait of the Horsehead.

The nebula is part of the Orion Molecular Cloud, located about 1,500 light-years away in the constellation Orion. The cloud also contains other well-known objects such as the Great Orion Nebula (M42), the Flame Nebula, and Barnard's Loop. It is one of the nearest and most easily photographed regions in which massive stars are being formed.

In the Hubble image, the backlit wisps along the Horsehead's upper ridge are being illuminated by Sigma Orionis, a young five-star system just out of view. Along the nebula's top ridge, two fledgling stars peek out from their now-exposed nurseries.

Scientists know a harsh ultraviolet glare from one of these bright stars is slowly evaporating the nebula. Gas clouds surrounding the Horsehead already have dissipated, but the tip of the jutting pillar contains a slightly higher density of hydrogen and helium, laced with dust. This casts a shadow that protects material behind it from being stripped away by intense stellar radiation evaporating the hydrogen cloud, and a pillar structure forms.

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center in Greenbelt, Md., manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore, Md., conducts Hubble science operations. STScI is operated by the Association of Universities for Research in Astronomy Inc., in Washington.

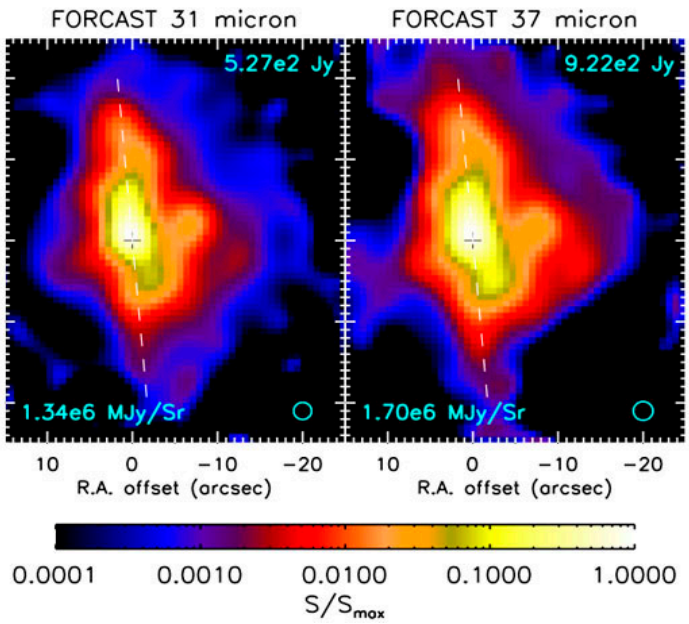
SOFIA Observations Reveal a Surprise in Massive Star Formation

Researchers using the airborne Stratospheric Observatory for Infrared Astronomy (SOFIA) have captured the most detailed mid-infrared images yet of a massive star condensing within a dense cocoon of dust and gas.

The star is G35.20-0.74, commonly known as G35. It is one of the most massive known protostars and is located relatively close to Earth at a distance of 8,000 light-years.

Until now, scientists expected the formation process of massive stars would be complicated by the turbulent, chaotic environments in the centers of new star clusters where they form. But observations of G35 suggest this giant star, more than 20 times the mass of our sun, is forming by the same orderly process as do stars with the same mass as the sun. Stars most like the sun are understood to form by simple, symmetric collapse of interstellar clouds.

"The focus of our study has been to determine how massive stars actually form," said Yichen Zhang of the University of Florida. Zhang is lead author of a paper about the discovery published April 10 in the Astrophysical Journal. "We thought the G35 protostar's structure would be quite complicated, but instead we found it is simple, like the cocoons of protostars with the sun's mass."



The observations of G35 were made in 2011 with a special camera aboard SOFIA, a modified Boeing 747SP aircraft that can carry a telescope with an effective diameter of 100 inches (2.5 meters) to altitudes as high as 45,000 feet (13,700 meters).

G35 was an ideal target for investigations because it is in an early stage of development. But infrared light coming from G35 is so strong it prevented infrared space telescopes from making detailed images. Also, the protostar is embedded so deeply in its natal cloud that it cannot be detected by optical telescopes observing from the ground at visible wavelengths.

Flying high above the light-blocking water vapor in Earth's atmosphere, the airplane-mounted Faint Object Infrared Camera for the SOFIA Telescope (FORCAST) enabled astronomers to see G35 where it hides -- inside a dark, dense, interstellar dust cloud -- by collecting infrared light escaping the cloud. Uniquely suited for this work, FORCAST detected faint details next to bright structures at wavelengths inaccessible to any other telescope on the ground or in space.

"Massive stars, although rare, are important because there is evidence they foster the formation of smaller stars like our sun, and because at the ends of their lives they create and distribute chemical elements that are the basic building blocks of Earth-like planets," said co-author James De Buizer, a SOFIA staff scientist with the Universities Space Research Association (USRA) at NASA's Ames Research Center in Moffett Field, Calif.

Figures 1a and 1b show FORCAST images of G35 at wavelengths of 31 and 37 microns. Figures 2a and 2b respectively present G35 images obtained by NASA's Spitzer Space Telescope and the Gemini-North telescope at Mauna Kea, Hawaii, also used in this study. Figure 3 shows computer model images intended to match characteristics of the central regions of the images in figures 1a and 1b.

The model images show greatly simplified versions of what is revealed especially in the SOFIA images: a luminous protostar heating a dense interstellar cloud from the inside while simultaneously expelling cone-shaped jets of gas toward the tops and bottoms of the frames. The top outflow cone appears brighter because it is directed toward us and there is less obscuring material along the line of sight.

The high resolution of the images showcases the capability of modern infrared detector arrays when used on an airborne platform and gives scientists hope that data gathered in this way substantially will advance their understanding of the Milky Way galaxy.

FORCAST was built by a team led by Terry Herter of Cornell University in Ithica, N.Y. Co-authors of the Astrophysics Journal paper include scientists from the University of Florida in Gainesville; University of Wisconsin in Madison; University of California at Berkeley; Louisiana State University in Baton Rouge; the Arcetri Observatory in Florence, Italy; and the USRA SOFIA science staff at Ames.

SOFIA is a joint project of NASA and the German Aerospace Center. SOFIA is based and managed at NASA's Dryden Aircraft Operations Facility in Palmdale, Calif. NASA's Ames Research Center in Moffett Field, Calif., manages the SOFIA science and mission operations in cooperation with the Universities Space Research Association (USRA) headquartered in Columbia, Md., and the German SOFIA Institute at the University of Stuttgart.

May Guest Speaker: Rogier Windhorst

Rogier Arnold Windhorst (born 1954) is an astronomer and a professor of physics and astronomy at Arizona State University.

He received his Ph.D in astronomy in 1984 from the University of Leiden and did post doctorate work at Mt.Wilson and Las Campanas Observatories.

He currently serves as associate chair at Arizona State and is among six Arizona state faculty who were awarded Regents Professor appointments in 2006; he presides over the School of Earth and Space Exploration at the university.

In 2008, he became Foundation Professor of Astrophysics at Arizona State University and Co-Director of the ASU Cosmology Initiative.

Windhorst has authored over 100 published scientific papers and has given over 125 lectures at seminars.

His research has led to new understandings of how the universe first began.

He also studies black holes.

His research focuses on Astrophysics and Space Science, and he is the principal investigator of the Hubble space telescope mid-UV bright galaxy survey.

He is one of the six Interdisciplinary Scientists worldwide for the James Webb Space Telescope, and member of the JWST Flight Science Working Group. Windhorst is involved in planning the JWST science performance, and in critical oversight of its entire design and construction phase.

◑ Last Quarter Moon on May 2 at 04:16

○ New Moon on May 9 at 17:30

◐ First Quarter Moon on May 17 at 21:35

● Full Moon on May 24 at 21:26

Upcoming Meetings

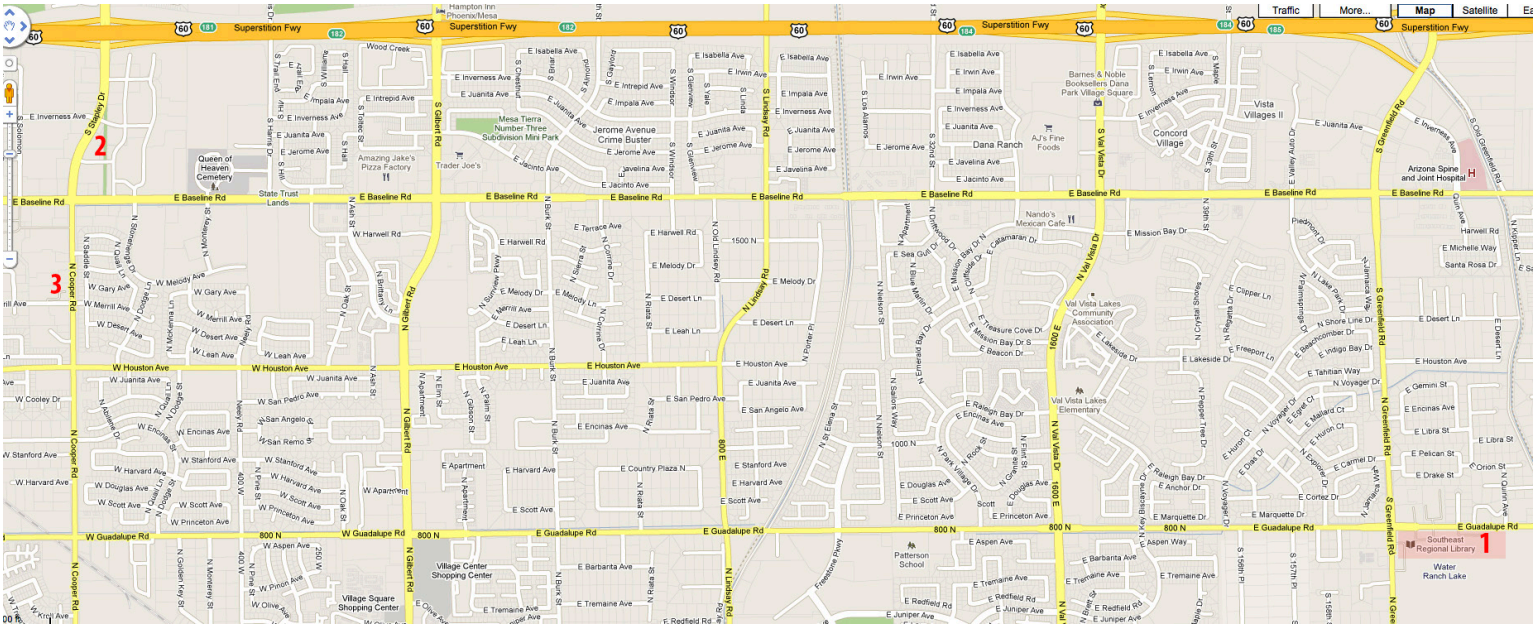
May 17
June 21
July 19
August 16
September 20
October 18

The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads. Meetings begin at 7:30 pm.

All are welcome to attend the pre-meeting dinner at 5:30 pm. We meet at Old Country Buffet, located at 1855 S. Stapley Drive in Mesa. The restaurant is in the plaza on the northeast corner of Stapley and Baseline Roads, just south of US60.

Visitors are always welcome!



2 Old Country Buffet
1855 S. Stapley Drive
Mesa, Az. 85204

1 Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234

May 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	**2**	3	**4**
5	6	7	8	9	**10**	**11**
12	13	14	15	16	**17**	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

May 2 - Queen Creek High School Star Party

May 4 - Local Star Party

May 10 - Public Star Party & SkyWatch at Riparian Preserve

May 11 - Deep Sky Observing Night

May 17 - General Meeting at SE Library

June 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	**8**
9	10	11	12	13	**14**	15
16	17	18	19	20	**21**	22
23	24	25	26	27	28	**29**
30						

June 1 - Local Star Party

June 8 - Deep Sky Observing Night

June 14 - Public Star Party & SkyWatch

June 21 - General Meeting at SE Library

June 29 - Local Star Party

East Valley Astronomy Club -- 2013 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:

☐ New Member ☐ Renewal ☐ Change of Address

New Member Dues (dues are prorated, select according to the month you are joining the club):

☐ **$30.00 Individual** January through March

☐ **$35.00 Family** January through March

☐ **$15.00 Individual** July through September

☐ **$17.50 Family** July through September

☐ **$22.50 Individual** April through June

☐ **$26.25 Family** April through June

☐ **$37.50 Individual** October through December

☐ **$43.75 Family** October through December

Includes dues for the following year

Renewal (current members only):

☐ **$30.00 Individual** ☐ **$35.00 Family**

Name Badges:

☐ **$10.00** Each (including postage) Quantity: _____

Name to imprint: _____

Total amount enclosed:

Please make check or money order payable to EVAC

☐ Payment was remitted separately using PayPal ☐ Payment was remitted separately using my financial institution's online bill payment feature

Name:

Phone:

Address:

Email:

☐ Publish email address on website

City, State, Zip:

URL:

How would you like to receive your monthly newsletter? (choose one option):

☐ Electronic delivery (PDF) *Included with membership* ☐ US Mail **Please add $10 to the total payment**

Areas of Interest (check all that apply):

☐ General Observing ☐ Cosmology

☐ Lunar Observing ☐ Telescope Making

☐ Planetary Observing ☐ Astrophotography

☐ Deep Sky Observing ☐ Other

Please describe your astronomy equipment:

Would you be interested in attending a beginner's workshop? ☐ Yes ☐ No

How did you discover East Valley Astronomy Club?

PO Box 2202
Mesa, AZ 85214-2202
www.evaconline.org

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

Liability Release Form

In consideration of attending any publicized Star Party hosted by the East Valley Astronomy Club (hereinafter referred to as "EVAC") I hereby affirm that I and my family agree to hold EVAC harmless from any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), which may directly or indirectly be connected to EVAC and/or my presence on the premises of any EVAC Star Party and related areas.

I further agree to indemnify any party indicated above should such party suffer any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), caused directly or indirectly by my negligent or intentional acts, or failure to act, or if such acts or failures to act are directly or indirectly caused by any person in my family or associates while participating in an EVAC Star Party.

My signature upon this form also indicates agreement and acceptance on behalf of all minor children (under 18 years of age) under my care in attendance.

EVAC only recognizes those who are members or invitees and who also have a signed Liability Release Form on file as participants at an EVAC Star Party.

Please print name here ***Date***

Please sign name here

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

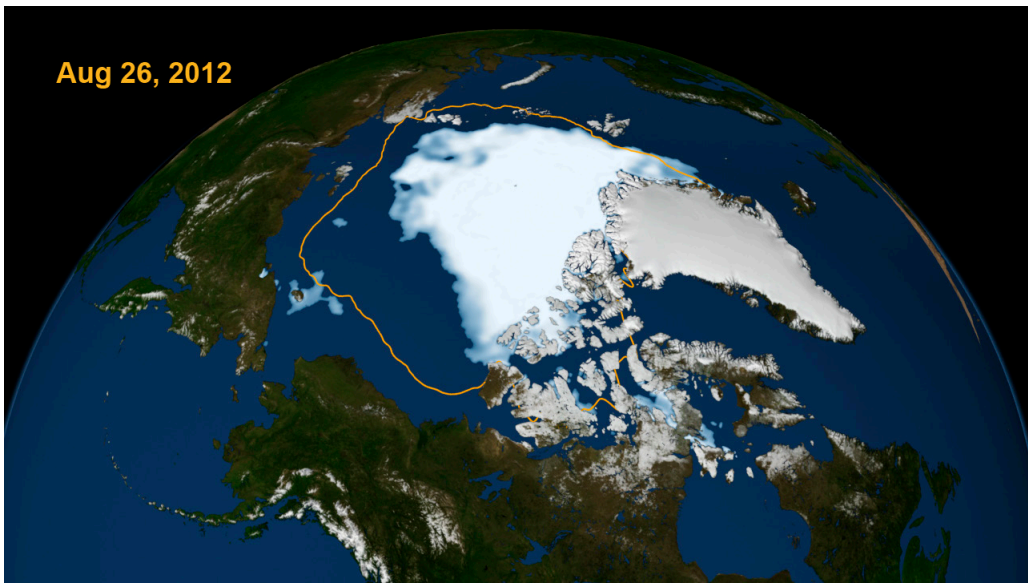
Exploring the Water World

by Diane K. Fisher

In some ways, we know more about Mars, Venus and the Moon than we know about Earth. That's because 70% of our solar system's watery blue planet is hidden under its ocean. The ocean contains about 98% of all the water on Earth. In total volume, it makes up more than 99% of the space inhabited by living creatures on the planet.

As dominant a feature as it is, the ocean—at least below a few tens of meters deep—is an alien world most of us seldom contemplate. But perhaps we should.

The ocean stores heat like a "fly wheel" for climate. Its huge capacity as a heat and water reservoir moderates the climate of Earth. Within this Earth system, both the physical and biological processes of the ocean play a key role in the water cycle, the carbon cycle, and climate variability.



This image from September 2012, shows that the Arctic sea is the smallest recorded since record keeping began in 1979. This image is from NASA's Scientific Visualization Studio at Goddard Space Flight Center.

This great reservoir continuously exchanges heat, moisture, and carbon with the atmosphere, driving our weather patterns and influencing the slow, subtle changes in our climate.

The study of Earth and its ocean is a big part of NASA's mission. Before satellites, the information we had about the ocean was pretty much "hit or miss," with the only data collectors being ships, buoys, and instruments set adrift on the waves.

Now ocean-observing satellites measure surface topography, currents, waves, and winds. They monitor the health of phytoplankton, which live in the surface layer of the ocean and supply half the oxygen in the atmosphere.

Satellites monitor the extent of Arctic sea ice so we can compare this important parameter with that of past years. Satellites also measure rainfall, the amount of sunlight reaching the sea, the temperature of the ocean's surface, and even its salinity!

Using remote sensing data and computer models, scientists can now investigate how the oceans affect the evolution of weather, hurricanes, and climate. In just a few months, one satellite can collect more information about the ocean than all the ships and buoys in the world have collected over the past 100 years!

NASA's Earth Science Division has launched many missions to planet Earth. These satellites and other studies all help us understand how the atmosphere, the ocean, the land and life—including humans—all interact together.

Find out more about NASA's ocean studies at http://science.nasa.gov/earth-science/oceanography. Kids will have fun exploring our planet at The Space Place, http://spaceplace.nasa.gov/earth.

This article was written by Diane K. Fisher and provided through the courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

If It's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

May 2013

Celestial events (from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find information) customized for Prescott, Arizona. Remember, the Moon is ½ degree or 30 arcminutes in diameter. All times are Mountain Standard Time.

On Wednesday, May 1, the Moon is at third quarter phase and rises at 12:26 AM (Thursday).

On Thursday, May 9, it is new Moon and you have all night to hunt for faint fuzzies. From 11:13 AM to 1:22 PM the Moon occults Mercury. Unfortunately, the Sun is only 2.5 degrees away, making this event completely unobservable. In a few hours the Moon will present the people of Australia and the Pacific Ocean with an annular solar eclipse.

On Saturday, May 11, from 9 AM to 7 PM, the planet Mercury (magnitude -1) is occulted by the Sun (magnitude -27). This event is also completely unobservable, but I thought you would like to know about all these alignments.

On Friday, May 17, the Moon is at first quarter phase and sets at 1:02 AM (Saturday).

On Wednesday, May 22, about 9:00 PM, you can see 3 of Saturn's satellites lined up south of the planet. Look for Enceladus (magnitude 12, nearest the planet), Rhea (magnitude 10), and Titan (magnitude 9). Dione (magnitude 11) is off to the east. Tethys (magnitude 10.5) is in close to the northwest. The hard one to see will be Mimas (magnitude 13) in close to the southwest. All these directions are celestial with north in a non-inverting telescope at 11 on the clock face and west at 2 on the clock face. Enceladus, Rhea, and Titan stay lined up pretty much all night. At about 1:20 AM (Thursday) Mimas joins the line. Observing all this will not be made easier by the nearly full Moon only 4 degrees away.

From Wednesday, May 22 through Thursday, May 30, you can see three planets dance around each other. Venus (magnitude -4), Jupiter (magnitude -2), and Mercury (magnitude -1) will be very low in the west-northwest about 8:00 or 8:15 PM. Binoculars will help find them.

On Friday, May 24, at 7:20 PM (13 minutes before sunset) the full Moon rises spoiling any chance of seeing faint fuzzies for the night. At about 9:25 PM the Moon is officially full and undergoes an extremely slight and completely unobservable penumbral eclipse. This is as close as the Moon gets to being opposite the sun (You won't see any shadows cast by craters.) without entering the Earth's shadow.

On Saturday, May 25, at 11:05 PM, you can see the Moon occult a double star. The star is Xi Ophiuchi. The components are magnitude 4.4 and 8.9, separated by 3.9 arc-seconds. The pair emerges from the dark limb of the Moon at 12:09 AM (Sunday).

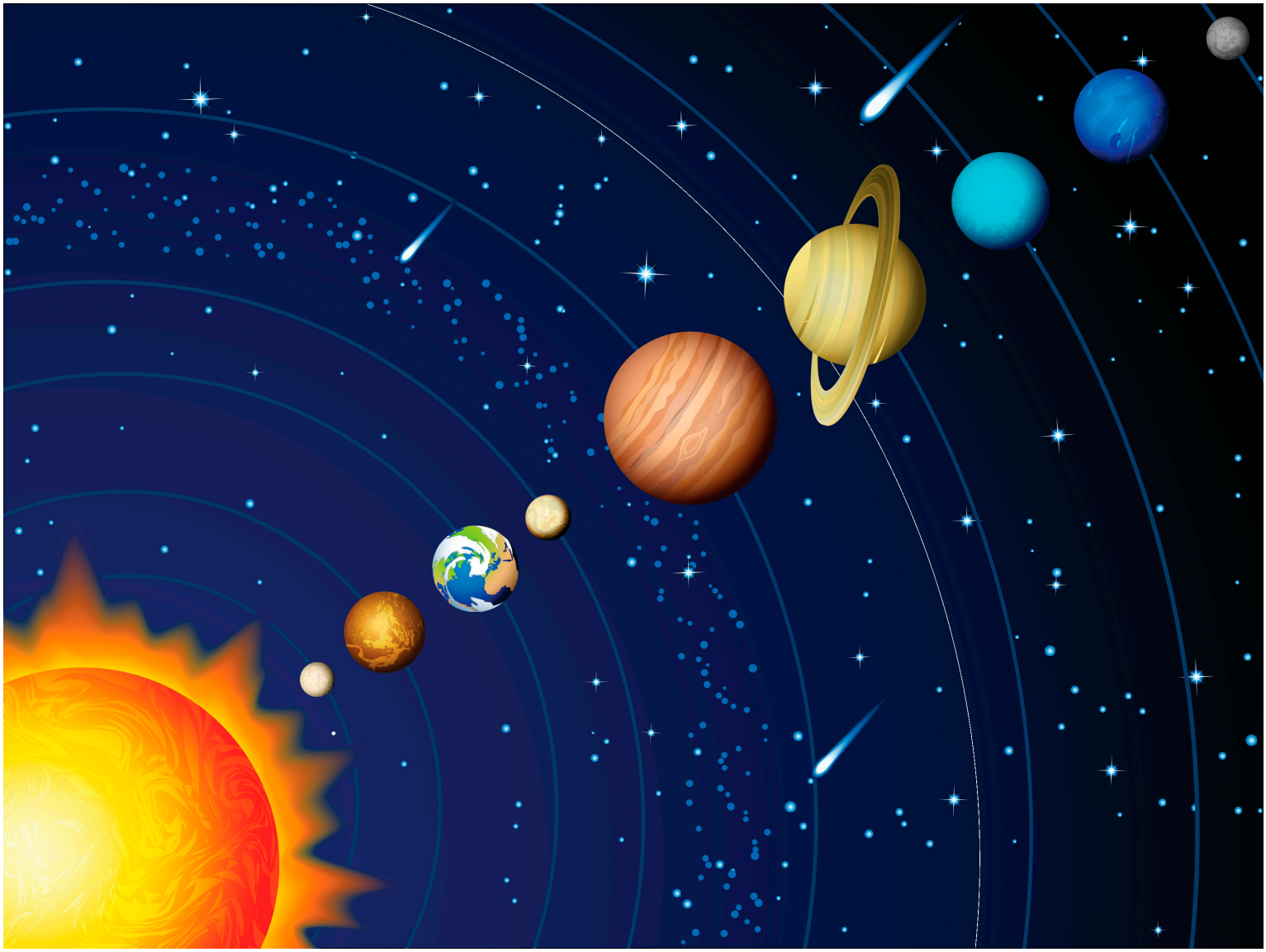
On Friday, May 31, at noon, the Moon is at last quarter phase and rises at 1:01 AM (Saturday).

Looking for that perfect weekend activity?

Why not resolve to getting involved?

Contact Dave Coshow to join the staff at GRCO

Email: grco@evaconline.org



All good things must one day end, and so it is with my tenure as Newsletter Editor for East Valley Astronomy Club.

I have served the club as Board Member, Vice President, President, and as Editor for the past seven years. It is time for someone new to take the reins.

Please contact one of the primary officers to volunteer for this fun and rewarding position.

I hope you have enjoyed the newsletter!

Feel free to contact me with any questions you may have at:

news@evaconline.org

The Deep Sky Object of the Month

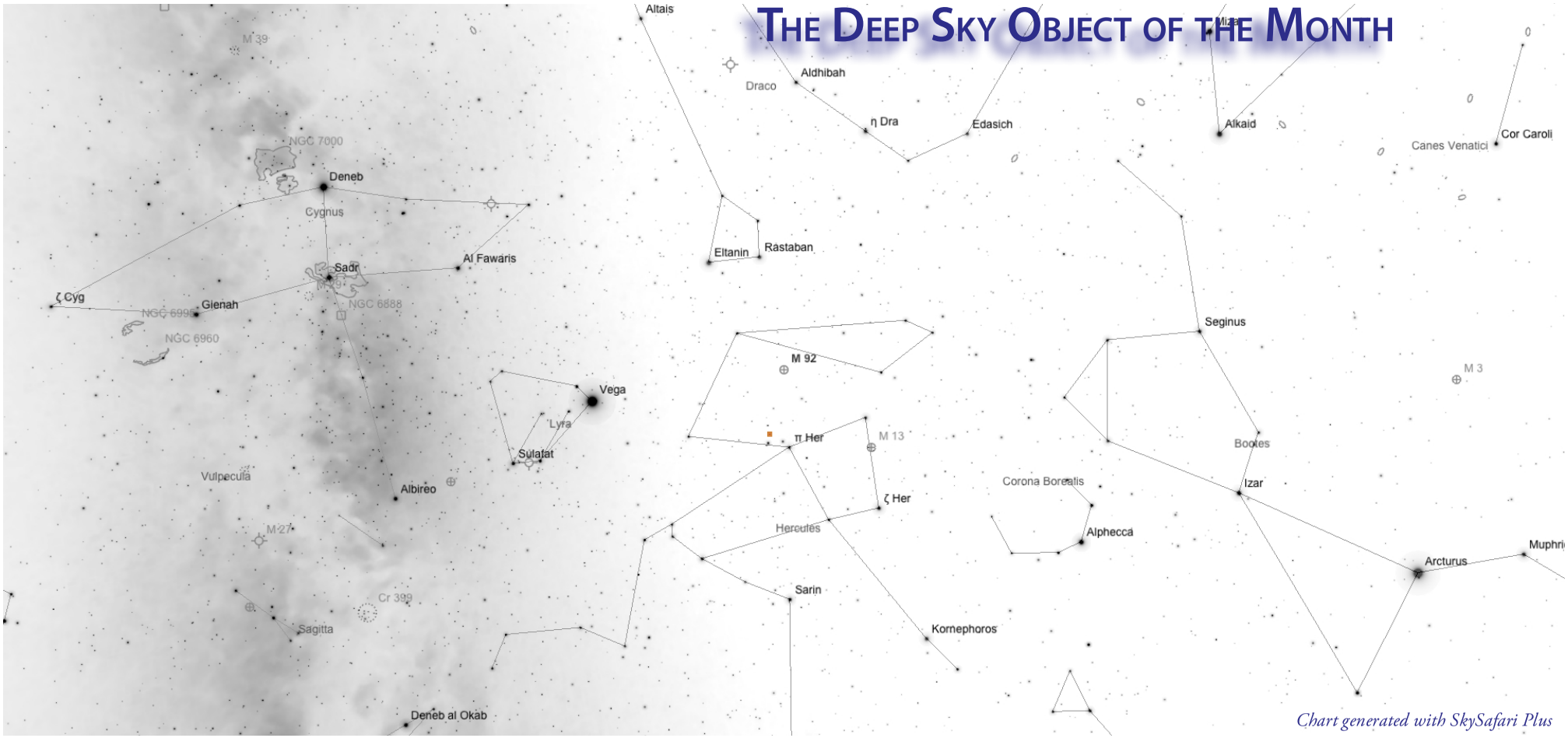


Chart generated with SkySafari Plus

Messier 92 (NGC 6341) is a globular cluster in the constellation Hercules. M 92 was discovered by Johann Elert Bode in 1777. Charles Messier independently rediscovered it and cataloged it in 1781, along with eight other objects (M84-M91) which are all Virgo Cluster galaxies. William Herschel first resolved it into stars in 1783.

M 92 is about 26,000 light years distant, only little farther away than its brighter apparent neighbor M 13; and it is intrinsically smaller and fainter. Its true diameter is about 100 light years; its absolute magnitude is -8.1, a luminosity of 150,000 Suns (60% that of M 13), and it may contain a mass of up to 330,000 Suns. M 92 is approaching us at 112 km/sec.

The stars of M 92 are exceptionally poor in iron and other elements heavier than hydrogen. This suggests that M 92 was formed before the gas and dust of our galaxy were enriched with heavy elements, and therefore that M 92 is exceptionally old, even for a globular cluster. M 92 may be a bit younger than M 13, or about 12 billion years old.

Only 16 variable stars have been discovered in this globular, 14 of which are of the RR Lyrae type. One is of the W Ursae Majoris type, and one of the very few eclipsing binaries found in a globular cluster. In these dense stellar agglomerates, close encounters occur frequently, so that binary systems will be disturbed, and eventually destroyed.

M92 (NGC 6341) Globular Cluster in Hercules

RA: 17h 17m 32.41s Dec: +43° 07′ 25.4″ Size: 2.0′ Magnitude: 6.44

As one of the many benefits to becoming an East Valley Astronomy Club member, we have the following telescopes available for monthly check-out to current EVAC members:

8 inch Orion manual Dobsonian
8 inch Orion Intelliscope Dobsonian
60mm Tasco Alt-Azimuth Refractor

For more information, or to check out one of these scopes, please talk to:

David Hatch
EVAC Properties Director
480.433.4217

The Observer is the official publication of the East Valley Astronomy Club. It is published monthly and made available electronically as an Adobe PDF document the first week of the month. Printed copies are available at the monthly meeting. Mailed copies are available to members for a slight surcharge to offset printing and mailing expenses.

Please send your contributions, tips, suggestions and comments to the Editor at: news@evaconline.org Contributions may be edited. The views and opinions expressed in this newsletter do not necessarily represent those of the East Valley Astronomy Club, the publisher or editor.

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www.evaconline.org

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