Temecula Valley Astronomer

The monthlv newsletter of the Temecula Valley Astronomers February 2022

Events: General Meeting, Monday, February 7, 2021, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- **IFI & Gallery by Clark Williams**
- **JWST Update**
- **How can a High Schooler deter a Near Earth Asteroid? by Aryan Gupta**
- **Refreshments by TBD- Volunteer?**

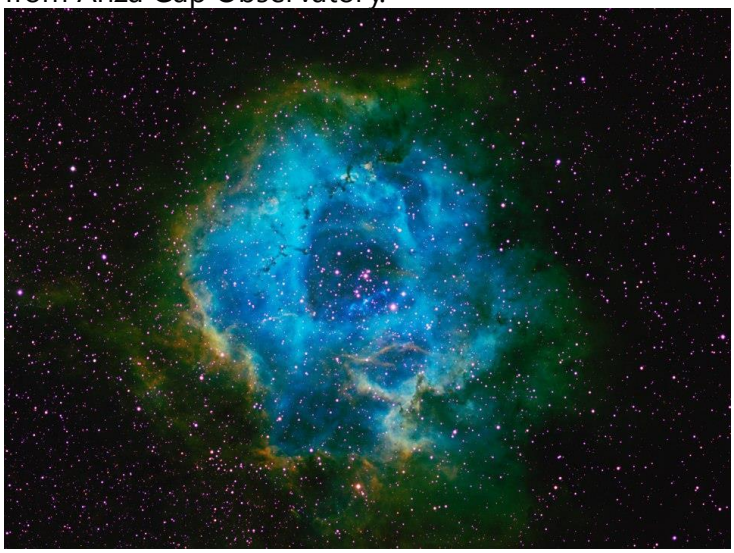
Star Parties at South Coast Winery every Friday evening in February.

For upcoming school Star Parties check the Calendar on the web page.

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Paul Kreitz <pkreitz@sbcglobal.net> by the 20th of the month for the next month's issue.

Rosette Nebula By TVA's own Curtis Croulet. This image was shot over three nights in Jan 2013 from Anza Gap Observatory.



General information:
Subscription to the TVA is included in the annual $25 membership (regular members) donation ($9 student; $35 family).

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Cosmic Comments – Feb 2022

By Mark Baker

“The Stars Are Calling, So We Must Go…!!!”

And the James Webb Space Telescope has the potential to getting us that much closer to going…seeing back to the “beginning” of time, as we know it, will teach us a cosmology that we didn’t even know we are trying to learn!!! Of course, I’m a little premature, as it hasn’t seen “first light” yet, but if it continues to perform at and above expectations we are in for quite a ride…

But for us Terrans of TVA, we get to do this very same thing for multitudes of both first time and experienced observers at every Star Party. Every WOW, OOOHH, OMG, AWESOME, and some comments more expletive in nature means we have helped shed light for people who probably didn’t even know they were in the dark – pun intended!!!

I am so glad we have the South Coast Winery Star Parties to provide that vicarious opportunity for many others, and I REALLY hope the school events resume in 2022… where we get to point a child’s eyes skyward and instill a desire for answers, often to questions not even asked yet!!!

So, TVA Abides… maybe not in the sense we were used to, but we continue to play a key role in our communities in helping people go to the beckoning stars… just like JWST!!! And for that, I thank you all…

Clear, Dark Skies my Friends…

Looking Up Redux – February 2022

Compiled by Clark Williams
from these sources:
SeaSky.org
Wikipedia.com
in-the-sky.org
The American Meteor Society, Ltd.
cometwatch.co.uk
NASA.gov
TVA App (2.0.1296)
FullAndNewMoon App (2.0)
Starry Night Pro Plus 8
SkySafari 6 Pro
Stellarium
timeanddate.com/astronomy
https://www.fourmilab.ch/earthview/pacalc.html

ALL TIMES ARE LOCAL PACIFIC TIME (PST / PDT) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)
hh:mm:ss or hhmmss
hhmm+ (time of the next day)
hhmm− (time of the previous day)
hhmm (seconds not shown)
yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by date:

Wednesday the 16th @ 0857 FULL in CANCER
Wednesday the 23rd @ 1433 THIRD QTR in VIRGO
No New Moon This Month
Tuesday the 8th @ 10551 First QTR in PISCES

Apogee comes on 2022-02-10 @ **1840 – 404,896 km (251,591 mi)**
Perigee comes on 2022-12-26 @ **1419 – 367,785 km (228,531 mi)**

2022 has: (13) new moons, (13) 1st Qtr moons, (12) Full moons, (12) 3rd Qtr moons
(0) Blue moon and (2) Black moons

Daylight Savings: Starts: 2022-Mar-13 : Ends: 2022-Nov-06

Luna: Luna is Waxing Crescent on the first of the month, headed for First Quarter on the 18th. Luna rises at rising at **0726**, transiting at **1246** and setting by **1805**. Luna by mid-month is 97% illuminated, Waxing gibbous. Rising at **1541** and transiting at **2303** and setting at **0619+**. By the-end-of-the-month Luna is Waning

Crescent, rising at **0517**- transiting at **1030** and setting by **1543**.

Highlights: (distilled from**: SeaSky.org** and **Clark's planetary Orrey** program[s]**)**

February 16 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at **0859**. This full moon was known by early Native American tribes as the Snow Moon because the heaviest snows usually fell during this time of the year. Since hunting is difficult, this moon has also been known by some tribes as the Hunger Moon, since the harsh weather made hunting difficult.

February 16 - Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 26.3 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look for the planet low in the eastern sky just before sunrise.

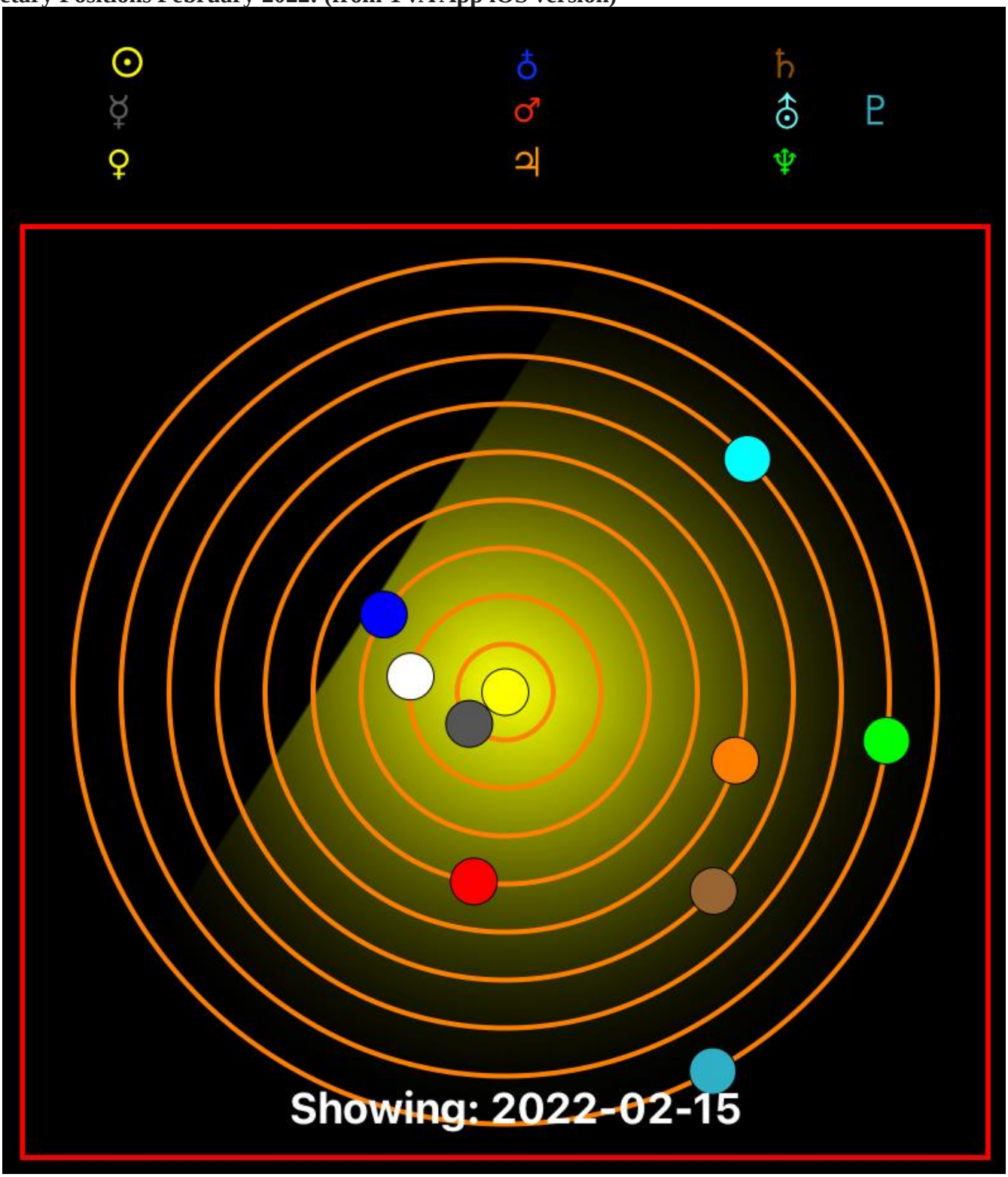
Algol minima: (All times Pacific Time)

02/03/2022	**0503**
02/06/2022	**0152**
02/08/2022	**2242**
02/11/2022	**0658**
02/14/2022	**1931**
02/17/2022	**1621**
02/20/2022	**1310**
02/23/2022	**0649**
02/26/2022	**0338**


01 WAX CRSNT
02 WAX CRSNT
03 WAX CRSNT
04 WAX CRSNT
05 WAX CRSNT
06 WAX CRSNT
07 WAX CRSNT
08 1st QTR
09 WAX GIB
10 WAX GIB
11 WAX GIB
12 WAX GIB
13 WAX GIB
14 WAX GIB
15 WAX GIB
16 FULL
17 WAN GIB
18 WAN GIB
19 WAN GIB
20 WAN GIB
21 WAN GIB
22 WAN GIB
23 3rd QTR
24 WAN GIB
25 WAN GIB
26 WAN GIB
27 WAN GIB
28 WAN GIB
2022 February

Planets:

Planetary Positions February 2022: (from TVA App iOS version)



- **Mercury:** Mercury is a morning object in the beginning of the month, rising by **0532** followed by sunrise at **0643**. Mercury by mid-month remains a morning object, rising at **0507** followed by sunrise at **0632**. By the 28th Mercury is rising by **0514** and sunrise is at **0616**.
- **Venus:** Is the Morning Star on the first of the month, rising by **0429**, followed by sunrise at **0643**. By mid-month Venus is rising at **0358** followed by sunrise at **0632**. By the 28th Venus is rising at **0343** followed by sunrise at **0616**.
- **Mars:** Mars is a morning object on the first, rising within a minute or so of Venus. Mars rises at **0431**, followed by sunrise at **0643**. By mid-month Mars is rising at **0419** preceding sunrise at **0632**. End-of-month finds the Warrior rising at **0404** with sunrise at **0616**.
- **Jupiter:** Jupiter is an evening object on the first of the month. Sunset is at **1721** and Jove follows at **1916**. By mid-month Jove is setting at **1839** following sunset at **1734**. Come the end of the month Jupiter is setting within about 15 minutes of the Sun. Sunset is at 1746 followed by Jupiter set at **1800**.
- **Saturn:** Saturn is very close to the Sun on the first of the month. Saturn is setting within 10-minutes of sunset. Saturn by mid-month is rising at **0611** followed by sunrise at **0632**. By the end-of-the-month Saturn is a morning object rising at **0521** followed closely by sunrise at **0616**.
- **Uranus:** On the first of the month Uranus is transiting at **1634**, just before sunset. So, look high in the sky near the highest arc of the ecliptic to find it. Uranus sets at **0018+**. By the ides Uranus will transit at **1644** about thirty-minutes before sunset. Uranus will set at **2328**. End-of-month finds Uranus transits at **1550**, nearly two hours before sunset. Uranus sets at **2235**.
- **Neptune:** Neptune is leading Uranus during February. Neptune will set at **2022** following sunset at **1721**. By the 14th Neptune does not set until **1933** almost two full hours after sunset. By the-end-of-the month Neptune is setting at **1840** again almost full hour after sunset.
- **Pluto:** Pluto is a morning object on the first of the month; Pluto rises at **0558,** but at magnitude 14.44 it is just going to be very difficult to find in the early morning sky. By mid-month Pluto is rising at **0509**, nearly an hour-and-a-half before sunrise. By the 28th you may have a decent chance of finding Pluto early in the morning. Pluto rises at **0415** and you may be able to find it by the time it rises above the clutter around **0500** in the morning. The Sun is rising fast so be quick.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2022 with a reasonable magnitude; say less than or equal to +10 in February there is nothing except the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software or try: **https://www.asteroidsnear.com/year?year=2022**

Meteors:

- **See *Highlights* (above).**

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believed to come from the Kuiper Belt and have periods in excess of 20-years.
  - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
  - Short period comets February have a near circular orbit or an elliptical orbit. The latter being far more common.
- 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.

The brightest comet this month is at Magnitude 7.9; comet ***19P/Borrelly***. On the 15th it will be at Mag +7.9. More difficult targets this month.

Deep Sky:
Notes:

L/Z abbreviation for ALT/AZ
R/D abbreviation for Right Ascension/Declination
α is right ascension
δ is declination

In each case, unless otherwise noted, you should look for the following on or about the 14th Day of February 2022 at 2100 PDT and you will have about 20 minutes of viewing time total.

- **Maffei 1:**

Illustration 1: By Atlas Image [or Atlas Image mosaic] obtained as part of the Two Micron All Sky Survey (2MASS), a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology, funded by the National Aeronautics and Space Administration and the National Science Foundation. - http://www.ipac.caltech.edu/2mass/gallery/images_galaxies.html, Public Domain,

Maffei 1 is a massive elliptical galaxy in the constellation Cassiopeia. Once believed to be a member of the Local Group of galaxies, it is now known to belong to a separate group, the IC 342/Maffei Group. It was named after Paolo Maffei, who discovered it and the neighboring Maffei 2 in 1967 via their infrared emissions.
Maffei 1 is a slightly flattened core type elliptical galaxy. It has a boxy shape and is made mainly of old metal-rich stars. It has a tiny blue nucleus in which stars continue to form. Like all large ellipticals it contains a significant population of globular clusters. Maffei 1 is situated at an estimated distance of 3–4 Mpc from the Milky Way. It may be the closest giant elliptical galaxy.

Maffei 1 lies in the Zone of Avoidance and is heavily obscured by the Milky Way's stars and dust. If it were not obscured, it would be one of the largest (about 3/4 the size of the full moon), brightest, and best-known galaxies in the sky. It can be observed visually, using a 30–35 cm or bigger telescope under a very dark sky.

(Wikipedia)

- **NGC 2419:**

Illustration 2: By NASA Hubble - https://www.flickr.com/photos/144614754@N02/49096538881/, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=87407313

NGC 2419 (also known as Caldwell 25) is a globular cluster in the constellation Lynx. It was discovered by William Herschel on December 31, 1788 NGC 2419 is at a distance of about 300,000 light years from the Solar System and at the same distance from the galactic center.
NGC 2419 bears the nickname "the Intergalactic Wanderer," which was bestowed when it was erroneously thought not to be in orbit around the Milky Way. Its orbit takes it further away from the galactic center than the Magellanic Clouds, but it can (with qualifications) be considered as part of the Milky Way. At this great distance it takes three billion years to make one trip around the galaxy.
The cluster is dim in comparison to more famous globular clusters such as M13. Nonetheless, NGC 2419 is a 9th magnitude object and is readily viewed, in good sky conditions, with good quality telescopes as small as 102mm (four inches) in aperture. Intrinsically it is one of the brightest and most massive globular clusters of our galaxy, having an absolute magnitude of -9.42 and being 900,000 times more massive than our Sun.
It was proposed that NGC 2419 could be, as Omega Centauri, the remnant of a dwarf spheroidal galaxy disrupted and accreted by the Milky Way. However, later research seems to have disproved this theory. Astronomer Leos Ondra has noted that NGC 2419 would be the "best and brightest" for any observers in the Andromeda Galaxy, looking for globular clusters in our galaxy since it lies outside the obscuring density of the main disk. This is analogous to the way the cluster G1 can be seen orbiting outside of the Andromeda Galaxy from Earth.
It was found to be composed of two different populations, one behind more helium-rich than the other, which does not fit the current model for globular cluster formation (which leads to a very homogeneous population in the cluster). This raises new questions on how this globular cluster was formed. (Wikipedia)

February is great for both viewing and imaging.
Spend some time outside with your scope. Winter is here.

For now – Keep looking up.

RANDOM THOUGHT
By Chuck Dyson

FIRST LIGHT

In 2017 the call went out for observing proposals for time on the James Webb Space Telescope (JWST) even though the launch date was uncertain. (In reality it was more than four years away.)

When you have a project that is at the 10-billion-dollar mark and may have a life span of 10 years, although NASA now thinks that the telescope may function for 15 years, you do not want to waste even one second of observing time. However, before Webb can take its first official image 344 separate deployment steps must be successfully completed, as I write this we are over half-way there, and then the real work begins. Once the telescope is in a stable orbit around the L2 point the Near Infrared Camera (NIRCam) will take images and analyze them to then determine what fine adjustments are needed for each individual mirror segment to bring that mirror segment into nearly perfect overall alignment. Aligning all 18 segments will take about two weeks and then, as the NASA spokesperson says “it will take a series of WOW shots” that will be made public. Personally, I hope one of those shots is a repeat of the Hubble’s Pillars Of Creation image that has become an astronomy icon.

A telescope’s first light is always a big deal, and historically first lights have gone both ways from “OH WOW, GREAT!” to “OH WOW, DISASTER!”. So, let us take a look at some historical first lights and see how they went. Our first telescope is the 60-inch reflector at Mt. Wilson and although it was not the largest telescope in the world (that honor goes to Lord Rossie’s, retired, 72 inch speculum mirror reflector), the 60 inch mirror was glass with a silver overcoating where the Rossie mirror was metal with the metal surface polished to create an optical surface. The problems with speculum (an alloy of copper and tin) were: First, it was heavy and 72 inches was as large as you could go before the mirror would sag and distort under its own weight. Second, speculum only, at its best, reflects 66% of the light that falls on it. Third, the speculum surface is only good for four to five years, it oxidizes, and then the mirror must be completely refigured as it cannot be recoated. The 60 inch glass mirror, in contrast, was a prototype for even larger glass mirrors, the silver coating on the glass was 90% reflective, and the mirror could be recoated when needed and did not need to be refigured. First light on December 24 1908 (Hale’s Christmas Present?) was a photograph of M42 and it was a GREAT image (If you go to the Mt. Wilson web site and click on the observing tab and then the 60 inch telescope group reservations you will see the best example of the first light photograph I have ever found).

First Light image of M42 by Mt. Wilson 60” telescope. https://www.mtwilson.edu/60-telescope/

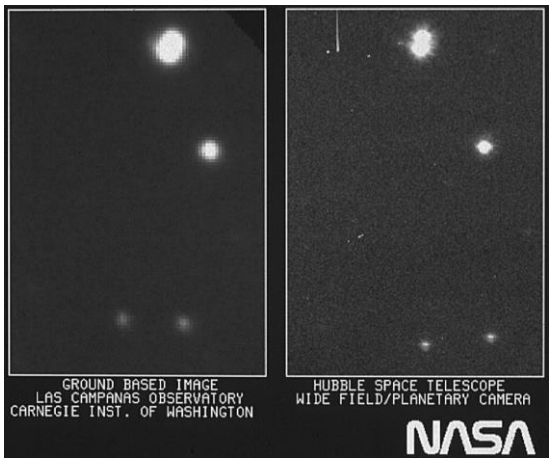
Considering that the 60 inch was a state-of-the-art test bed it is surprising that Hale embarked on his second great mirror project in 1906, the 100 inch Hooker telescope, two years before the 60 inch saw first light; but because Hooker, the donor, was throwing money at him as if it were going out of style Hale had to commit the monies to a project before Hooker could come to his senses. I am certain that you all had a teacher who said to you "Those who do not know history are doomed to repeat it." But I say, "Those who do know history will still repeat it anyway" and in the case of The James Webb there are striking similarities to the Hooker. The Webb has 6.25 times the light gathering capacity of the Hubble and the Hooker has 6.25 times the light gathering capacity of the 60 inch and in 1906 Hale thought the 100 inch would be operational in 1910; it saw first light in 1917 seven years later than predicted with commensurate cost overruns. JWST, conceived in 1996, was scheduled for launch in 2007, then 2011, then 2014, then 2018, then 2020, and finally in 2021; fourteen years later than predicted and with well-publicized cost overruns. After all of the time delays how did the Hooker first light go? DISASTER! Not able to wait for a photograph to be taken and developed Hale & Co. rigged an eyepiece to the telescope and what they saw were several jumping, fuzzy Jupiters. The problem was that the mirror was made from common glass and had a large coefficient of expansion and prodigious tube currents produced by the massive mirror. At about 2 am or 3 am Hale &Co. took another look, by this time the mirror had reached equilibrium, and not only could Hale see great detail on Jupiter he and others could see detail on the Jovian moons. This glass performance problem plagued the Hooker throughout its scientific life; however, the lessons learned from the Hooker I am certain helped prepare Hale for the long, arduous, and frustrating process that was to be an integral part of the 200 inch Palomar telescope project. One can also argue the Hooker telescope's greatest accomplishment was its ability to photograph, with just a little help from Milton Humason, individual Cepheid variable stars in other galaxies and start to establish the true size and nature of our universe.

As long as we have mentioned Palomar let's look at its first light experience and as Palomar's development story is generally well known we will just touch on the highlights. 1928 Hale receives a Rockefeller Foundation grant to pursue the Palomar project. In 1936 a mirror blank is finally delivered to the Caltech lab for grinding, after several failed attempts to actually produce one. The expected time to grind the mirror and build the observatory building was three years but a little thing called World War II got in the way. Finally, after work was again started in late 1945 the mirror and observatory were both finished in only one year more than expected so in January of 1949 the ever modest Edwin Hubble was given the honor of taking the first image with the telescope and he, of course, chose NGC2261, Hubble's Variable Nebula, because it does not get any better than taking a picture of an object named after you with the world's greatest telescope. And, yes, the first light image was spectacular. From 1949 to 1975 Palomar was the largest telescope in operation only to be

Hale 200-inch telescope first light image of NGC2261

exceeded by the 6 meter (234 inch) Bol'shoi Teleskop Azimultal'nyi (BTA-6 for short) a Russian telescope that has truly never worked very well. Today the largest single mirror scopes, and there are several, have 8.2 meter (320 inch) mirrors.

With all of Edwin Hubble's accomplishments it was only natural that NASA would name a large space telescope after him. The development of the 2.4-meter (100 inch) Hubble Space Telescope, even by people who are very much in favor of space exploration, is only described as expensive and in Congress, when another program is taking monies away from your favored programs there will be trouble. In May of 1990 the Hubble Space Telescopes first light image was of the open cluster NGC3532 in the constellation Carina and it compared to a photograph by a 2.4 meter telescope in Chili of the same cluster. The Hubble photo was clearer than the Chili telescope image, but not that much better and subsequent galaxy photos confirmed that one or both of the mirrors had configuration issues. Congresses response was immediate and for a clear understanding of how some members of Congress felt, especially a young, then Senator, Al Gore see Hubble Space Telescope Problems C-SPAN June 29 1990. Someone was really upset. Disgruntled members of Congress had made several attempts to cancel the program because of cost so the engineers, under pressure, cut some corners and minimized some questionable quality assurance test results and this combination resulted in Hubble's disastrous first light. In 1993 the first Hubble repair mission was carried out and new solar panels were installed, and an optical corrector lens was also installed with spectacular results. Finally in 1995 Hubble took what is considered its most important exposure, the Hubble deep field where it looked at a blank, by Earth telescopes, section of sky for more than 100 hours and when the data was processed there were thousands of galaxies that could not be seen from Earth. Before Edwin Hubble there was one galaxy, after Edwin Hubble there are 10 billion galaxies. After the Hubble deep field there were 200 billion galaxies, and today with further studies there are an estimated 2 trillion galaxies in our "little" universe.



The last first light telescope I want to look at is the W.M. Keck I as this was the first hexagonal design multiple mirror telescope, think of it as the prototype for the Webb telescope because it was realized early on in the design process that a large, single, very heavy mirror was not going to work, ever. All eyes were on the Keck in November 1990 when the first nine of the segments were mounted and test images were taken of NGC1232, a face on spiral. The reason for the nine segment test was to compare the quality of the Keck image to the quality of the same image from Palomar. The nine Keck segments had almost the same surface area as Palomar, and the Keck image was gooder than the Palomar one. In May of 1993 the Keck was again tested this time with all thirty-six segments in operation and the telescope did not disappoint, this was final verification of the Webb eighteen hexagonal segment mirror design. Boys and girls, we are good to go, with a launch date in 2007, and then in 2011, and then in 2014, and then in

2018, and then in 2020, finally and successfully in 2021 (although the actual day did bounce around a bit).
With the experience of the Mt. Wilson 100 inch and Hubble to learn from and the Webb program being so long in development and "only" nine billion five hundred million dollars over budget, you can understand why on or about April 24th there will be nothing but raw nerves at NASA and many university astronomy departments when the first fully calibrated Webb images come in. As one of my bosses would say "we can always do it wrong, we can never do it right"; so, if the first light images are spectacular Congress will say nothing, but if the images are poor the budget and program cutting knives will be out and sharp.

Being so bold as to assume the JWST first light will go perfectly, the next questions are who gets to observe and how will the operating committee make best of the telescope?
In 2017 when the call for proposals went out some were selected at that time along with the guaranteed viewing time of the teams who actually developed the telescope, the program director's personal time, and 13 programs that are titled "Large and Treasury" that will produce data for public access. This collection of users has been assigned time that uses the first five months of viewing time. The proposals from what is called the general observers had their proposals reviewed by one of 18 review committees each with ten people in a double blinded fashion, the papers had no names and the people submitting the papers did not know which of the 18 committees would be reviewing their proposal and, NO, committee members were not permitted to review their own proposals. Into this blind system went 1200 proposals from 41 countries and out of this came 266 selected proposals, a third of them went to female astronomers and a couple went to graduate students (How awkward would it be if the grad student's proposal was accepted and the professor's was rejected?). The total hours awarded for the first full year of observing was 10,000 hours. Those of you who are into math may say "Just one minute their fella, I know that there are only 8,760 hours in a year; so, what gives?" And you are right the telescope is deliberately over booked so if there is a problem and the viewers program must be delayed or severely interrupted then that viewer's program is not lost but is bumped into the next years viewing schedule and the next viewer's program is moved up. This approach to viewing management guarantees maximum viewing time with minimum disruption to the viewing schedule, a good use of our tax dollars.

Let's keep our eye on the James Webb for at least a decade of excitement.

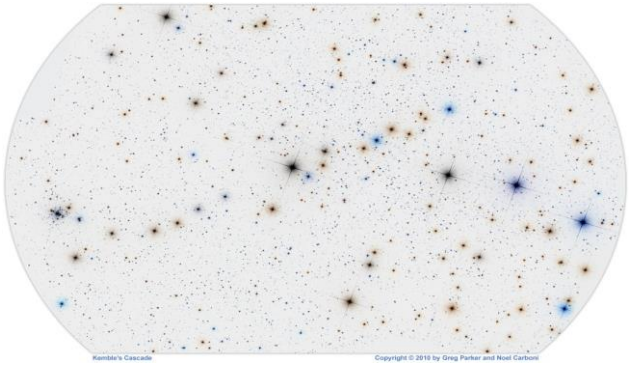
Cheers,
Chuck

Another Look

By Dave Phelps

New Moon January 31
New Moon March 2
Full Moon February 16 is the Snow Moon, in Cherokee: Kagali

In 1980, Walter Scott Houston, Scotty to his friends, wrote an article in Sky and Telescope about a Franciscan Friar, Father Lucien Kemble who wrote him about an asterism he found in Camelopardalis. Friar Kemble described it as "a beautiful cascade of faint stars tumbling from the northwest down to the open cluster NGC 1502". Friar Kemble used 8x35 binoculars. Scotty called it "Kemble's Cascade" in his column and Friar Kemble went on to find two more binocular asterisms and to have an asteroid named after him.



Thank you to APOD 2010 for Kemble's Cascade.

The area you'll be looking is pretty far north, +60 degrees and somewhat west of Cassiopeia.
There is nothing there to fix on to help star hop. The Greeks did not name this part of the sky and it wasn't until the 1600's that a camel was placed in that spot. By the 1800's a squirrel (Sciurus Volans), a young man harvesting (Custos Messium) and a reindeer (Tarandus) occupied that place in the sky. Eventually it became the
Giraffe whom all know and love today.

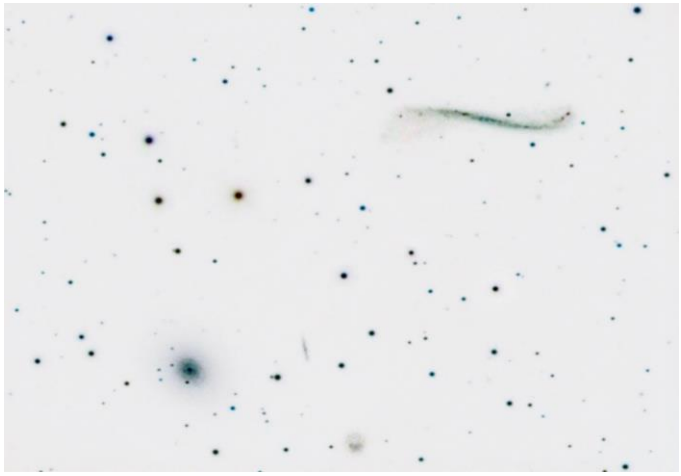
Image by Sidney Hall – Uranias Mirror

Scotty also wrote about Stock 23, near Kemble's Cascade. He named Stock 23 Pazmino's Cluster after John Pazmino, who wrote about it also in Sky and Telescope. At one end of the Cascade, the aforementioned NGC 1502 is an open cluster discovered by William Herschel. NGC 1502 has two rather nice multiple star systems that are easy to see: Σ (Struve) 484 and Σ 485. Σ 484's components are closely matched at 9th

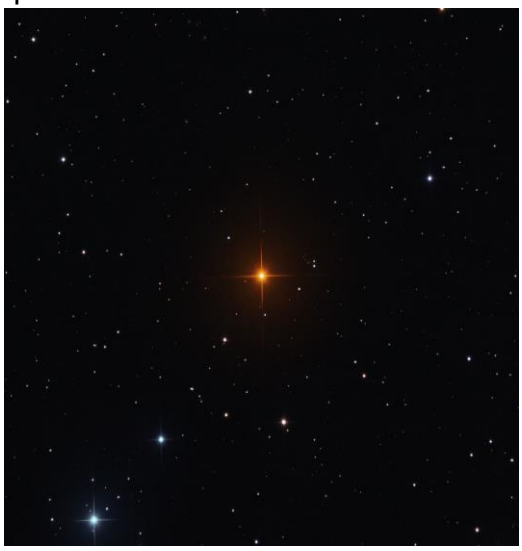
magnitude and quite close, 5.3 min, while Σ485 are brilliant in your field of view. 6th magnitude and 18 min in separation.

Close by Kemble's Cascade, as was mentioned, is Pazmino's cluster, Stock 23, described, per Pazmino, as "a very compact grouping of four stars, which on inspection become a neat cluster". Look for the orange outlier in the cluster.

Thank you to Roberto Mura for the image of NGC 1502 and the internet for the chart copy.



When you see UGC or a number preceded by a "U" in your atlas it is referring to the Uppsala General Catalog of Galaxies. It is a catalog of over 12,000 galaxies in the northern hemisphere taken from the Palomar Sky Survey blue plates. We can thank Swedish astronomer Peter Nilson for his hard work. The catalog essentially includes every galaxy mag 14.5 and brighter including particular characteristics like size, shape and degree of obliqueness. We can thank the UGC for galaxy number 3697. Once again, it seems that an object so interesting that it should be common knowledge has popped up on our radar lately. UGC 3697 is called the Integral Galaxy because of it flattened sine wave shape.



The image, from pbase.com shows UGC 3697 and a companion galaxy UGC 3714. The galaxies are pretty far up there, 71 degrees N. Not much between them and the pole. Magnitude is in the 12 and 13 range so a big scope is probably called for. APOD doesn't have an image of them but the National Radio Astronomy Observatory has an image worth archiving at **https://public.nrao.edu/gallery/warped-disk-of-galaxy-ugc-3697-2/.** UGC 3679 is definitely a bucket list item.

Back in the day of f15 Achromats, weight driven clock drives and filar micrometers, positional astronomy and double stars were all the rage. I know I am telescoping time right now, but think of the classic telescope makers like Fitz, Clark, Brashear and their telescopes figured like fine art. Those long focal lengths, clear light paths and instrumental magic allowed for black backgrounds and usable separation. Struve (Σ) would have used refractors like the GroBen Refraktor in Hamburg, Germany to search for and catalog double stars like the two in NGC 1502. Also important at that time and

continuing today is the search for and recording of Variable stars like R Leporus. R Leporis, sometimes called Hind's Crimson Star, is a well-known variable star in the constellation Lepus, near its border with Eridanus. It is designated "R" in the chart up top. It is a carbon star which appears distinctly red. It is named after famous British astronomer J. R. Hind, who observed it in 1845. Wikipedia
"R" has been the focus of some study. It has shown radical magnitude changes over the last one hundred and fifty years and appears to be on every serious AAVSO members' radar.

We all know about M42, the Flame, the Horsehead, the Belt Stars, all of these beautiful winter objects and asterisms. If you point your telescope at the Orion nebula you will see something almost all professional images lose… the Trapezium. We see it, they blow it out. I imagine one of your smallish APO telescopes with their unobstructed objective will show a spectacular image of the Trapezium. Add a little focal length and objective size and their separation just gets wider and wider.

At the top left of Orion is Betelgeuse, α Orionis. This orangish star has been getting a lot of print lately about its variability. It's designated a pulsating variable, has a magnitude differential of less than one magnitude, from 0.4 to 1.3 (Bright Star Atlas) and is expected to blow "any day now". It's a pretty star to look at, so if you have your binoculars on R Leporis, might as well look at another orange star in Orion.

Near Betelgeuse, between it and the belt is the only part of Barnard's Loop I have seen visually. You guys and girls with your fancy cameras and point on guiding can take 1200
micro-second images, stack them on your computer and come out with something the pros of thirty and forty years ago would salivate over, much like the image taken in 2004 by a Danish amateur in South Africa. Screw an anti-pollution filter into your Nagler and look through your eyepiece. Go ahead, try it.
We'll get to the Horsehead, the Flame and environs later.

https://galaxy.phy.cmich.edu/~axel/Astrophotography/images/Orion_HaHaRGB.html

The brightest star in the Pleiades is Alcyone, η Tauri, and the third brightest star in the constellation of Tauris. She is also a beautiful multiple star system with at least four members and a possible fifth companion one second of arc away. (From a recent article I just read, a small group used a masking technique to observe the Pup, Sirius B. Perhaps they'd be interested in a newer challenge?) Alcyone b,c,and d make up a small triangle only a minute of arc from their mother. Although they have not been named officially by the International Astronomical Union I believe we can name these stars Hyrieus, Hyperenor, and Aethusa, the names of Alcyone's three children by Poseidon. Alcyone is half Titan, father Atlas-27Tauri and half Sea-Nymph, mother Pleione-28 Tauri. To further mix their genealogy, Poseidon was god of the sea.

All of this was to further the goal that you go out with a telescope or binoculars and look at a very nice star.
To put Alcyone to rest, her name was derived from the Greek *αλκυων* (*alkyon*), meaning “kingfisher.”
https://www.star-facts.com/alcyone/
Alcyone (Eta Tau, mag. 2.87)

While we are looking at orange stars, lets slip back to the Hyades, on the way to the Pleiades and find Hind’s Variable Nebula. It’s difficult to give a lot of hard data on Hind’s, like magnitude and size because it is uh, well, variable. T Tauri, which illuminates the nebula is brightest at about 8ish and fades to about 13ish but was around 14th when Hind’s found it in 1852. My memory of the nebula was of a small, unassuming and unimpressive object too dim for anyone but a member of the **AAVSO** to spend much time on. Turns out I was wrong.

T Tauri is the prototype of the T Tauri variable describing a young, hot star still in formation, in fact they say-**AAVSO**, that T is less than a million years old. T Tauri is also a multiple star system one of whom is really young and really wild. By the way: Hind’s Variable Nebula (NGC 1555) is also designated Herbig-Haro Object (HH) 155.

I am guessing that Hind’s is formed at least in part from gas ejected from a very small star still in the act of construction throwing off gas as its forming cloud condenses. That is a poor description of an Herbig-Haro Object. Still, go ahead, how often do we see a star in the act of creation. An amazing image of Hind’s is found at **http://annesastronomynews.com/tag/hh-155/**
While there, be sure to look for NGC 1554, Struve’s Lost Nebula. Struve found it, Dreyer recorded it, no one has seen it since. Maybe you’ll be the first.

I think we’ll close-out this month with two last objects inside the horns of the Bull, one not too far from Aldebaran and one not too far from the Crab, both with some history. You will find NGC 1647 near Aldebaran, a niceish open cluster discovered by Herschel in 1784. The other object, NGC 1746 you may find in one atlas but not another. They say it was “described”, not discovered, by d’Arrest in 1863 and cataloged as another open cluster like NGC 1647. More recently, however, they are describing it as an asterism, not physically connected. When you look, maybe you can judge for yourself.

Dark Skies, Dave Phelps

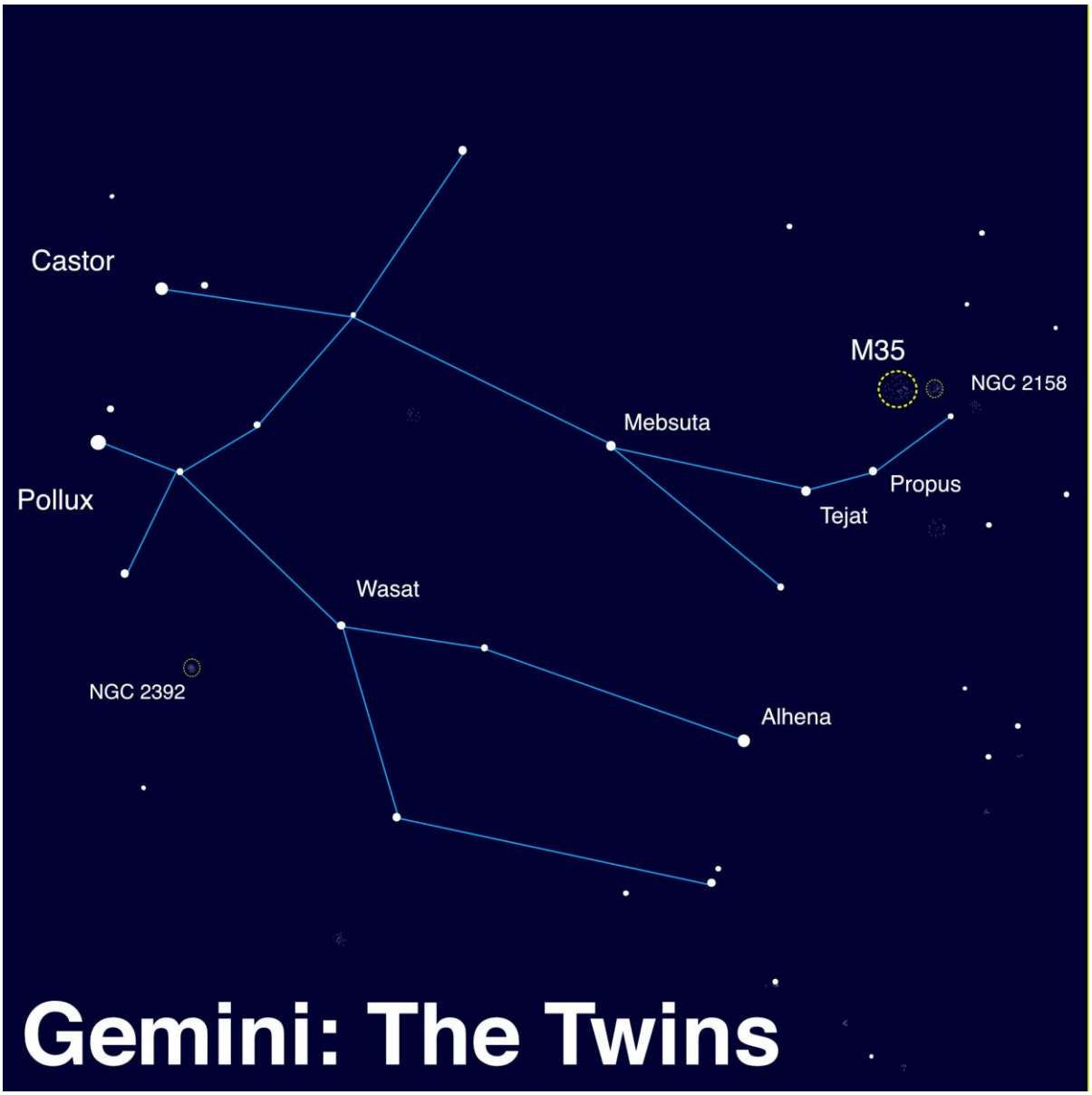
Hang Out with the Twins of Gemini
By David Prosper – NASA - JPL

The night skies of February are filled with beautiful star patterns, and so this month we take a closer look at another famous constellation, now rising high in the east after sunset: Gemini, the Twins!

If you're observing Orion, as discussed in last month's article, then Gemini is easy to find: just look above Orion's "head" to find Gemini's "feet." Or, make a line from brilliant blue-white Rigel in the foot of Orion, through its distinct "Belt," and then on through orange Betelgeuse. Keep going and you will end up in between the bright stars Castor and Pollux, the "heads" of the Gemini Twins. While not actually related – these stars aren't bound to each other, and are almost a magnitude apart in brightness – they do pair up nicely when compared to their surrounding stars. Take note: more than one stargazer has confused Gemini with its next-door neighbor constellation, Auriga. The stars of Auriga rise before Gemini's, and its brightest star, Capella, doesn't pair up as strikingly with its second most brilliant star as Castor and Pollux do. Star-hop to Gemini from Orion using the trick above if you aren't sure which constellation you're looking at.

Pollux is the brighter of Gemini's two "head" stars - imagine it as the head of the "left twin" - and located about 34 light-years away from our Solar System. Pollux even possesses a planet, Pollux b, over twice the mass of Jupiter. Castor - the head of the "right twin" - by contrast, lies about 51 light-years distant and is slightly dimmer. While no planets have been detected, there is still plenty of company as Castor is actually a six-star system! There are several great deep-sky objects to observe as well. You may be able to spot one with your unaided eyes, if you have dark skies and sharp eyes: M35, a large open cluster near the "right foot" of Gemini, about 3,870 light-years away. It's almost the size of a full Moon in our skies! Optical aid like binoculars or a telescope reveals the cluster's brilliant member stars. Once you spot M35, look around to see if you can spot another open cluster, NGC 2158, much smaller and more distant than M35 at 9,000 light-years away. Another notable object is NGC 2392, a planetary nebula created from the remains of a dying star, located about 6,500 light-years distant. You'll want to use a telescope to find this intriguing faint fuzzy, located near the "left hip" star Wasat.

> Gemini's stars are referenced quite often in cultures around the world, and even in the history of space exploration. NASA's famed Gemini program took its name from these stars, as do the appropriately named twin Gemini North and South Observatories in Hawaii and Chile. You can discover more about Gemini's namesakes along with the latest observations of its stars and related celestial objects at nasa.gov.



Castor and Pollux are Gemini's most prominent stars, and often referred to as the "heads" of the eponymous twins from Greek myth. In Chinese astronomy, these stars make up two separate patterns: the Vermillion Bird of the South and the White Tiger of the North. What do you see? The Night Sky Network's "Legends in the Sky" activity includes downloadable "Create Your Own Constellation" handouts so you can draw your own star stories: bit.ly/legendsinthesky

Image created with assistance from Stellarium.

Montage of Gemini North, located on Mauna Kea in Hawaii, and Gemini South, located on Cerro Pachón in Chile. These "twin" telescopes work together as the Gemini Observatory to observe the entire sky.

Image Credit: NOIRLab Source: https://www.gemini.edu/gallery/media/gemini-northsouth-montage

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