Volume 124 No. 10
October 2015

The Bulletin

Monthly newsletter of the Astronomical Society of South Australia Inc

In this issue:

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- Will comet Catalina 2013 US10 reach naked eye this month?
- Lyon Group of Galaxies #455 in Grus

Registered by Australia Post
Print Post Approved PP 100000605

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ASTRONOMICAL SOCIETY of SOUTH AUSTRALIA Inc

GPO Box 199, Adelaide SA 5001

The Society (ASSA) can be contacted by post to the address above, or by e-mail to *info@assa.org.au.* Membership of the Society is open to all, with the only prerequisite being an interest in Astronomy.

Membership fees are:

Full Member	$75
Concessional Member	$60
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Concession information and membership brochures can be obtained from the ASSA web site at:
http://www.assa.org.au
or by contacting The Secretary (see contacts page).

Member Submissions
Submissions for inclusion in The Bulletin are welcome from all members; submissions may be held over for later editions.

Wherever possible, text submissions should be sent via e-mail or posted on CD-ROM in almost any word processing format and may still be submitted handwritten or typed. Your name may be withheld only if requested at the time of submitting. Images should be high resolution and uncompressed, e.g. TIFF file formats, although high resolution JPEGs are acceptable. Your full name and object designation must be provided with each image and will be published. Equipment/exposure etc details are welcome but optional.

Advertising & Classifieds
Small adverts and classifieds are free for members (space permitting). Commercial advertising is available at a cost of $50.00 per quarter page per issue.

All enquiries and submissions should be addressed to The Editor and preferably sent by e-mail to:
editor@assa.org.au

For large files (e.g. on CD) or hardcopy items, post to:
Joe Grida
Editor, The Bulletin
PO Box 682,
Mylor SA 5153

Contributions should reach the Editor no later than the 7th of each month, for publication in the following month's issue of The Bulletin

In this issue:

Sister Society relationships with:

Orange County Astronomers
www.ocastronomers.org

Colorado Springs Astronomical Society
www.csastro.org

Central Arkansas Astronomical Society
www.caasastro.org

There's still time to book for the
VicSouth Desert Spring Star Party

Little Desert Nature Lodge, Nhill, Vic
November 6-9, 2015

http://vicsouth.info/2015.htm

A great weekend of fabulous talks, including comet discover Terry Lovejoy, commercial displays, prizes, and of course fantastic dark sky observing!

Cover photo: The Trifid Nebula, M20, imaged in narrowband by **Paul Haese** at Clayton Bay, SA. Equipment - GSO RC12 telescope and SBIG STXL11002 CCD. Guiding – AOX, Software - MaximDL, Focusmax, Pinpoint, CCD Autopilot 5. Total exposure of 9.5 hours Lum Ha OIII. Darks, flats and biases applied. Processed in CCD stack and Photoshop CS6.

Activities

October 2015 - the month at a glance

General Meeting

Wednesday, 7 October, 2015
@ 8:00pm
Kerr Grant Lecture Theatre
2nd Floor, Physics Blg
University of Adelaide
North Terrace, Adelaide

Guest Speaker:

Colin Hill
Astronomical Society of SA

(See speaker bios on page 4)

Black Holes & Stellar Remnants

When stars reach then end of their long lives they lose the battle with gravity as their fuel runs out.

After an often violent demise, their cores collapse into an incredibly dense compact remnant. Tonight we explore White Dwarfs, Neutron Stars and Black Holes. What do these objects consist of? How big are they and what stops them collapsing further?

These and other questions will be answered.#

Planning on going observing?

Save yourself unnecessary travel and time. If the weather looks doubtful where you are, check with the following people to see if the event is still on (or see www.assa.org.au after 5pm).

Stockport Observatory (DO 3-13)

Observatory 8528 2284

Lyn Grida 8388 5980

Tony Beresford 8338 1231

Heights Observatory (DO 3-34)

Robert Bronca 8266 7504

Whyalla

Peter Mayfield 0408 410 895

Tooperang

Jeff Lowrey 0429 690 610

Northern Yorke Peninsula

Tony Henderson 0429 352 382

Riverland

Tim Vivian 0407 800 225

October 2015 Calendar

Day		Time	Activity
Wed	7	8:00pm	General Meeting
Thu	8	7:30pm	Members' Meeting, Whyalla
Sat	10	8:00pm	Members' Viewing Night – Stockport
Sat	10	8.00pm	Member's Viewing Night - Riverland
Sat	10	3:30pm	Telescope Clinic, Tooperang
Sat	10	8:00pm	Members' Viewing Night – Tooperang
Fri	16	8:00pm	Public & Members' Viewing – NYP
Sat	17	8:00pm	Members' Viewing Night – Stockport
Fri	23	8:00pm	Public Viewing Night – The Heights
Wed	28	7:30pm	ASSA Council Meeting
Fri	30	7:30pm	Deep Sky Imaging Group

Note: Times shown above and throughout this document are:
5 Oct 2014 to 5 Apr 2015 : South Australia Summer Time (UTC+10:30)
6 Apr 2015 to 3 Oct 2015 : South Australia Standard Time (UTC+ 9:30)
4 Oct 2015 to 3 Apr 2016 : South Australia Summer Time (UTC+10:30)

Astronomy Education - Beginners' Talks

Wednesday, 7 October , 2015 @ 8:00pm
Kerr Grant Lecture Theatre

Great Discoveries in Astronomy

We journey back to ancient times and take a look at the visionaries who developed our basic understandings of the universe. More recently we look at the discoveries made by Copernicus, Galileo, Sir Isaac Newton and many more.

Have you got your National Police Check?

- New legislation applies from 11 April 2015
- Impacts on all ASSA members who volunteer at ASSA sanctioned **public** events
- i.e. public viewing nights, school visits, National Science Week, private booked nights

From the 11th April 2015, all members who attend ASSA sanctioned public events MUST have a current NPC clearance certificate, or equivalent clearance letter from their employer, and MUST have provided ASSA with these details.

Non-compliance is a $10,000 fine to ASSA.

Full details available here:

https://www.assa.org.au/media/58017/Police-Checks-Process-for-Applicants-ASSA-version.pdf

Guest Speaker Biography

October 2015 General Meeting

Colin Hill
Astronomical Society of SA

"I am a biomedical technician working at St. Andrew's Hospital with past experience in defence electronics.

I have been a member of ASSA since 1997 and have been on council for most of that time and have held the position of Beginner's Councillor for the past 7 years.

I am interested in all aspects of astronomy as well as particle physics and electronics. I have my own Sirius observatory housing a 12" LX850 telescope which I mainly use for deep sky astrophotography. I am also a member of the Deep Sky Imaging group within ASSA".

Telescope clinic

Got a telescope for Father's Day? Or has your telescope languished in the garage or shed because you didn't know how to set it up?

Is something not quite right with your telescope? Out of collimation?

Get answers to all these questions, and many more.

Tooperang Observing Site
Saturday, 10 October 2015
from 3:30pm

Stay for the BBQ (BYO food & drink), and enjoy some dark sky observing later.

It's almost ASSA Awards time .. Calling for nominations

As many of you are aware, the Society delivers a number of awards each year, and now is the time for you to start thinking about who to nominate.

Awards include:

- *Bill Bradfield Astronomy Award*
- *Craig Richardson Memorial Image Award*
- *Astrophotography Award*
- *Annual Service Award*

Full details:
https://www.assa.org.au/membership/awards/

Astro-gadgets

Jeff Lusher reports on the inexhaustible supply of astro-gadgets

DIY USB Camera Shutter Controller

Digital SLR cameras are a popular imaging tool for amateur astronomers to capture images of faint objects in the night sky. Most of the new model DSLR cameras have the ability to be connected to a mobile device, tablet or phone, through Wi-Fi or Bluetooth or directly connected to a PC/Laptop via the USB Port.

This allows the use of software to remotely control the DSLR camera which can help with astro-imaging. Backyard EOS, DSLR Focus and MaxDSLR are some of the more popular software titles.

Some of us may be a little reluctant to use our new DSLR camera for imaging as it may be left outdoors for many hours exposed to the elements and may choose to use an older model DSLR camera, but these remote functions on the older models may not allow us to control the shutter for longer than a 30 second exposure, which is essential to astro -imaging. One solution that has been around for some time now was to build an interface from the PC/Laptop to the camera's remote trigger connection. This was traditionally done through computer's RS232 serial data port's 9 pin connector.

These days the RS232 has been replaced by the Universal Serial Bus (USB) connection, which on its own can't drive the camera's remote trigger. One option that I have used is a USB to 9 Pin Serial adapter, which works well, but due to a lack of technical standard between different manufacturers, it took me several different units to find one that would work reliably.

Fortunately with the growth in popularity in the PIC and Arduino microcontroller market, several electronics manufacturers now make a USB cable with the required electronics integrated into the cable, which will not only allow us to make a basic interface to control the camera's remote shutter trigger, but as will be detailed in a future article, some leads can be configured to directly drive the Skywatcher series EQ5-Pro and EQ6-Pro telescope mounts from a PC.

Camera remote exposure triggers generally work using 3 electrical contacts. One contact is the Common or Ground circuit, another initiates the Camera Focus while the third circuit operates the Shutter. The basic manual remote just uses a mechanical switch to close an electrical contact between the Shutter circuit and the Ground circuit. If the camera is set to the Bulb setting, the shutter will remain open while this remote switch is closed.

This can be replicated electronically by a PC/Laptop through the RS232 Serial or USB port by having the imaging software turn on one of the ports control signals for the period of the required exposure time and electrically closing a circuit between the Ground and Shutter contacts on the camera. As the camera and PC/Laptop are electrically independent from each other, the best way to do this is with a simple electronic component called an opto-isolator which internally contains an LED and a phototransistor. The control signal from the PC/Laptop turns on the opto-isolators internal LED, switching on the phototransistor. This method keeps the electronics between the computer and camera isolated from each other.

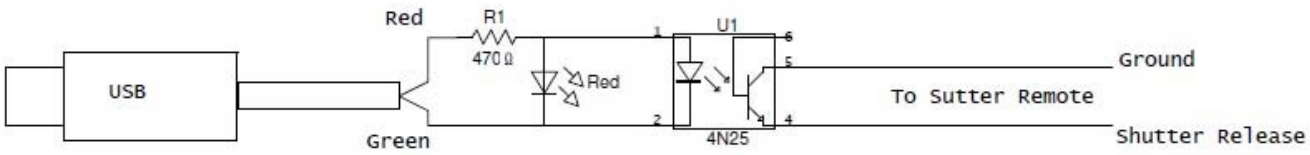
Although a commercial unit can be bought from various Australian telescope retailers for about $150, those who would like to build their own USB DSLR shutter release can do so for about $25 worth of parts and some basic soldering skills.

The resistor is a carbon 470 ohm 5% ¼W, the opto-isolator is a 4N25 and the LED, which is optional, is a generic red LED. The USB cable which I bought online from dontronics.com is the FTDI USB To Serial (TTL Level 5V) Converter Cable. A small box can be used to house and protect the assembly.

The connection to your camera will depend on the make and model of the camera. My Canon 400D uses a 2.5mm phono-plug with the Ground attached to the sleeve and the Shutter Release to the tip. A good source of camera remote plugs can be found on ebay by salvaging them from cheap manual camera remote cables.

Alternatively, if you already have a reliable USB to DB9 serial adapter for your laptop you might like to look at Paul Beskeen's project at http://www.beskeen.com/projects/dslr_serial/dslr_serial.shtml

Happy astro-imaging.



Planetary Occultations

Govert Schilling reports on the flight of a lifetime

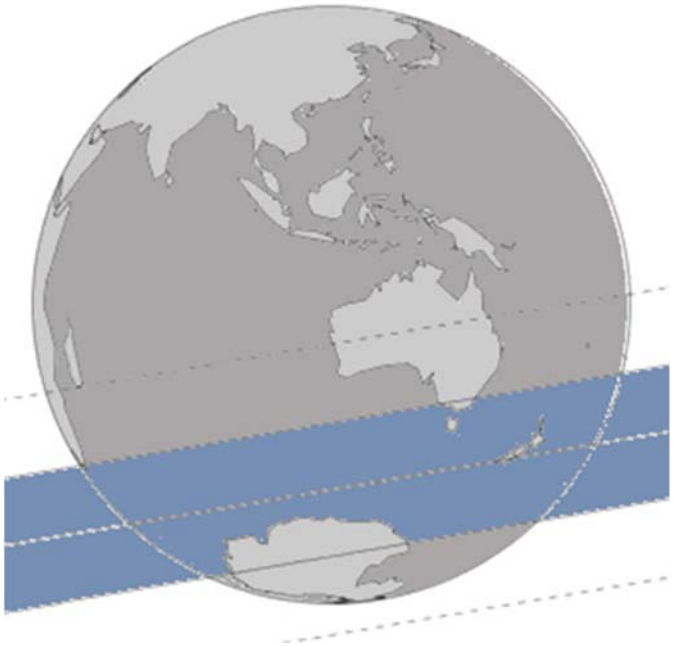
SOFIA Dashes into Pluto's Shadow

By: **Govert Schilling**, July 3, 2015 Sky & Telescope Magazine

Despite an 11th-hour scramble due to an unexpected shift in predictions, NASA's flying observatory was in the right place at the right time on June 29th as distant Pluto briefly covered a 12th-magnitude star.

If you thought scientific data taking is a slow, boring process, you've never been on board SOFIA, the Stratospheric Observatory For Infrared Astronomy. On June 29th, SOFIA observed a stellar occultation by Pluto, and I was aboard to watch. It was the most exciting flight I've ever experienced.

Above: NASA's Stratospheric Observatory for Infrared Astronomy on the runway in Christchurch, New Zealand. Photo: Govert Schilling



Above: Pluto's-eye view of the path (shown in blue) cast during its occultation of a 12th-magnitude star on June 29, 2015.

As many S&T.com readers know, SOFIA is basically an old Boeing 747-SP airliner that NASA bought and transformed into a flying infrared observatory. A German-built 2.5-meter telescope peers out into space through a large rectangular opening in the plane's fuselage.

From the plane's typical cruising altitude (near 40,000 feet or 12 km), high above the clouds and most of the atmosphere's infrared-absorbing water vapor, the telescope can make unique infrared observations.

Mobility can also play a role. SOFIA's home base is Palmdale, California, but this summer, it's been deployed to Christchurch, New Zealand, to observe objects in the southern sky for six weeks. Not coincidentally, Pluto's predicted cover-up of a 12th-magnitude star in Sagittarius would be observable from a broad zone that passed over part of Antarctica, the southern Indian Ocean, southeast Australia, and New Zealand.

"It's a very special occasion," says SOFIA's chief science advisor Eric Becklin (University of California at Los Angeles), who's one of the 30+ people on board. Now 75, Becklin is a pioneer of infrared astronomy and served as SOFIA's chief scientist during much of its development. "Everything has to go just right — there's no second chance. I wouldn't want to miss this opportunity."

The pressurized cabin of the aircraft has been transformed into a science lab. Nothing looks familiar. Although the telescope itself is hidden behind a big circular bulkhead, its attached science instruments jut far into the rear of the cabin and are an eye-catching sight.

Tonight, two instruments will be used: FLITECAM (First-Light Infrared Test Camera) and HIPO (High-speed Imaging Photometer for Occultations). Since they can work in tandem, the combination has been christened FLIPO. A flying hippo — a plush toy outfitted with wings — serves as a mascot. They'll record the star's changing brightness as it disappears behind Pluto's disk and reappears about 90 seconds later.

From these readings, scientists expect to learn more about the pressure and temperature profile of Pluto's extremely tenuous atmosphere and about the presence of particle hazes that might indicate cryovolcanic activity.

It seems like a simple task: fly through Pluto's "shadow," measure the light of a relatively bright star for a while, and then do some analysis. But in fact, it's a complicated endeavor. As Becklin said, everything has to work perfectly the first time — you can't ask Pluto to pass in front of the star again because a technical hiccup ruined your data. Moreover, SOFIA has to be in the right place at the right

Planetary Occultations

Govert Schilling reports on the flight of a lifetime

Two "Uh-Oh" Moments

We take off from Christchurch uneventfully at 10:09 p.m. local time and start heading toward our target point. The centerline's exact location has been calculated by Amanda Bosh at the Massachusetts Institute of Technology (MIT) in Cambridge, based on astrometry of Pluto carried out that same night by telescopes at Lowell Observatory, the Naval Observatory's Flagstaff Station, and the SARA 24-inch telescope at Cerro Tololo in Chile.

But 2 hours after takeoff, Bosh sends a final set of coordinates — the predicted centerline has shifted 225 km farther north than expected. With the plane already heading to the wrong location and the occultation just a few hours

Above: Flight planners aboard SOFIA scramble to revise the plane's route after last-minute predictions showed a sizable shift in the planned intercept point. Photo: Govert Schilling

away, mission managers scramble to work up a revised flight plan.

Later, instrument scientist Jeffrey Van Cleve tells me that the flight plan actually needed revising a second time. "I checked the shifted central line with the set of MIT coordinates, and they didn't match," he says. "We hadn't taken Earth's curvature into account." Pluto's shadow was indeed 225 km farther north, but because the shadow doesn't hit Earth's surface perpendicularly, the offset was really 332 km. "It's a much bigger correction than we had expected," fretted HIPO scientist Ted Dunham (Lowell Observatory).

And there was no time to double-check the new numbers. "We have to trust the new observations," he tells me. "We have no choice."

During the occultation Pluto casts a stellar shadow as wide as its diameter, about 2,300 km (1,430 miles). Observations from anywhere in the path would be scientifically useful, but everyone on board is very keen to hit the shadow path's centerline.

When a distant star is exactly behind the center of a planet, a ring of refracted starlight produces a brief brightening in the light curve — a central flash. "We've learned what central-flash observations can tell you about atmospheric hazes," Dunham explains. Little wonder he's worried about whether SOFIA's new path will take his instrument to the right spot.

The computer monitor at the console where I'm seated shows 14th-magnitude Pluto and the occultation star (which is five times brighter) as seen through the telescope's guiding camera. As the hours pass, I can see Pluto closing in on the star at a rate of just under 1 arcsecond every 15 minutes. (Incidentally, this slow-motion merging has little to do with Pluto's inexorably slow orbital motion. Instead, it's almost completely a parallax effect due to *Earth's* orbital motion around the Sun.)

Just under 7 hours into the flight, the magic moment finally occurs. We're over the eastern shore of New Zealand's South Island at an altitude of 11.9 km (39,100 feet), flying south-to-north at 986 km per hour; Pluto's shadow is racing across Earth's surface from east to west at almost 90,000 km per hour — a hundred times faster. At 16:53 Universal Time (4:53 a.m. on 30 June New Zealand time), SOFIA intercepts the shadow for just 90 seconds. Everyone around me cheers as they see the star fade, in exact agreement with those last -minute predictions.

The brightness recording from the guiding camera is available almost instantly, and the star's light curve shows a very pronounced central flash. The plot also shows two very narrow dips: a shallower one some 2 minutes before the start of the occultation and a deeper one about a half minute after the event's end. "I don't think they are real,"

Left: After SOFIA departed Christchurch, New Zealand, for its encounter with Pluto's shadow, a late change to the event's predicted track forced revisions to the flight plan while en route — resulting in convoluted course changes during the 8½-hour-long flight. Image: FlightAware.com

says Dunham, who's been chasing Pluto's shadow for three decades. "They're probably due to some instrumental effect. On the other hand: they could indicate that Pluto is surrounded by partial rings, just like Neptune." When the FLITECAM data become available, his intuition proves to be correct: the two dips don't show up. If Pluto has a ring system, it must be incredibly thin.

All this scientific drama has added significance, given that NASA's New Horizons spacecraft will fly past Pluto at close range on July 14th. Its ultraviolet imaging spectrometer, called Alice, will record sunlight streaming through Pluto's thin atmosphere as the Sun sets behind the dwarf planet as seen from the spacecraft. Meanwhile, tracking antennas on Earth will measure how New Horizons' radio signal changes as the spacecraft ducks behind Pluto and reappears a short time later.

"The radio occultation samples the lowest parts of the atmosphere, and the UV occultation samples the very highest parts," explains MIT scientist Michael Person, who's the principal investigator for tonight's SOFIA sortie. "Measurements at visible and near-infrared wavelengths fill in the gap. Together, these observations will provide us with a comprehensive view of the structure of Pluto's atmosphere."

"We're very lucky that this occultation of a relatively bright star happens so close to the New Horizons encounter," says Dunham. Pluto's atmosphere has varied over the years, and given that Pluto is moving farther from the Sun in its orbit, there's been concern that those wisps of gas would have frozen completely and collapsed onto the surface by the time New Horizons arrived. Fortunately, Person says, the light curve clearly shows that "the atmosphere is still there."

SOFIA finally touches down at Christchurch International Airport at 6:33 a.m., nearly 8½ hours after it left. I see exhausted but relieved faces all around me. Becklin — a big smile on his face — shakes hands with scientists, telescope operators, mission managers, and flight engineers. Someone collects signatures and farewell messages on a plot of the much-debated flight plan, as a present for telescope operator Karen West, who had just made her last SOFIA flight. It was certainly a memorable one.

(**Note:** *ASSA members Blair Lade, David Jenke, and Joe & Lyn Grida were all set to also backup the SOFIA observations with timings of the occultation from The Heights Observatory, Stockport Observatory, and David's observatory at Eudunda. However, once the new path of the shadow was announced, we found ourselves too far north of the predictions to be very useful. The weather was also not very co-operative). Ed.*

Above: Happy researchers, including former SOFIA chief scientist Eric Becklin (upper left), react to their successful observation of a star's occultation by Pluto on June 29, 2015.NASA / SOFIA / Carla Thomas

Earth's extremes point the way to extraterrestrial life

Bizarre creatures that go years without water. Others that can survive the vacuum of open space. Some of the most unusual organisms found on Earth provide insights for Washington State University planetary scientist Dirk Schulze-Makuch to predict what life could be like elsewhere in the universe.

NASA's discovery last month of 500 new planets near the constellations Lyra and Cygnus, in the Milky Way Galaxy, touched off a storm of speculation about alien life. In a recent article in the journal *Life*, Schulze-Makuch draws upon what is known about Earth's most extreme lifeforms and the environments of Mars and Titan, Saturn's moon, to paint a clearer picture of what life on other planets could be like. His work was supported by the European Research Council.

"If you don't explore the various options of what life may be like in the universe, you won't know what to look for when you go out to find it," said Schulze-Makuch, a professor in the WSU School of the Environment.

"We do not propose that these organisms exist but like to point out that their existence would be consistent with physical and chemical laws, as well as biology," he said.

For example, on Earth, a species of beetle called bombardier excretes an explosive mix of hydrogen peroxide and other chemicals to ward off predators.

"On other planets, under gravity conditions similar to those present on Mars, a bombardier beetle-like alien could excrete a similar reaction to propel itself as much as 300 meters into the air," Schulze-Makuch said.

While explorers to Mars might find creatures similar to those on Earth, life on a Titan-like planet would require a completely novel biochemistry. Such a discovery would be a landmark scientific achievement with profound implications.

Life on Mars

Earth life, with its unique biochemical toolset, could feasibly survive on a Mars-like planet with a few novel adaptations.

First, organisms would need a way to get water in an environment that is akin to a drier and much colder version of Chile's Atacama Desert. A possible adaptation would be to use a water-hydrogen peroxide mixture rather than water as an intracellular liquid, Schulze-Makuch said.

Hydrogen peroxide is a natural antifreeze that would help microorganisms survive frigid Martian winters. It is also hygroscopic, meaning it naturally attracts water molecules from the atmosphere.

During the daytime, plant-like microorganisms on a Martian-like surface could photosynthesize hydrogen peroxide. At night, when the atmosphere is relatively humid, they could use their stored hydrogen peroxide to scavenge water from the atmosphere, similar to how microbial communities in the Atacama use the moisture that salt brine extracts from the air to stay alive.

Schulze-Makuch speculates that a larger, more complex alien creature, maybe resembling Earth's bombardier beetle, could use these microorganisms as a source of food and water. To move from one isolated patch of life-sustaining microorganisms to another, it could use rocket propulsion.

Life on Titan

Due to its greater distance from the Sun, Titan is much colder than Earth. Its surface temperature is on average -290 degrees F. Additionally, there is no liquid water on the surface nor carbon dioxide in the atmosphere. The two chemical components are essential for life as we know it.

If life does exist on Titan or a Titan-like planet elsewhere in the universe, it uses something other than water as an intracellular liquid. One possibility is a liquid hydrocarbon like methane or ethane. Non-water based lifeforms could feasibly live in the liquid methane and ethane lakes and seas that make up a large portion of Titan's surface, just as organisms on Earth live in water, Schulze-Makuch said.

Such hypothetical creatures would take in hydrogen in place of oxygen and react it with high energy acetylene in the atmosphere to produce methane instead of carbon dioxide.

Due to their frigid environment, these organisms would have huge (by Earth standards) and very slowly metabolizing cells. The slow rate of metabolism would mean evolution and aging would occur much slower than on Earth, possibly raising the life span of individual organisms significantly.

"On Earth, we have only scratched the surface of the physiological options various organisms have. But what we do know is astounding," Schulze-Makuch said. "The possibilities of life elsewhere in the universe are even more staggering.

"Only the discovery of extraterrestrial life and a second biosphere will allow us to test these hypotheses," he said, "which would be one of the grandest achievements of our species."

Story Source:
Washington State University. "Earth's extremes point the way to extraterrestrial life: Exploring the limits of life in the universe." ScienceDaily, 26 August 2015.
sciencedaily.com/releases/2015/08/150826101656.htm

Background: A giant of a moon appears before a giant of a planet undergoing seasonal changes in this natural color view of Titan and Saturn from NASA's Cassini spacecraft. Credit: NASA Jet Propulsion Laboratory

Solar System Highlights

The major planets during October 2015

by Joe Grida

Whilst we enjoyed some beautiful conjunctions in the evening sky earlier this year, we now must rise before the Sun to catch the spectacular show in the morning sky.

Having passed through inferior conjunction on September 30, we should be able to view **Mercury** in the dawn sky by mid-October. It attains its greatest elongation of only 18° from the Sun on October 16.

Venus puts in a great show this month, having close approaches with Jupiter and Mars. However, it's the occultation by the Moon on the morning of October 9 that will draw the most interest.

Venus will disappear behind the bright limb of the waning crescent Moon at 4:55am ACSST, and reappear from behind the dark limb at 6:08am ACSST.

It achieves greatest elongation from the Sun of 46° on October 26. At that time only 50% of the planet will be illuminated. At a distance of 103 million kilometres, it still shines at mag -4.5.

Mars is now visible in the eastern dawn sky, found loitering in Leo. It begins the month at a distance of 359 million kms from Earth, reducing that to 331 million kms by the end of the month. Apparent size remains relatively steady at an average of 4.1 arc-seconds. Really too small for any useful observation.

It does, however, play a major part in the conjunctions visible this month, with Venus, Jupiter and the Moon.

The first is on October 10. About 40 minutes before sunrise, you'll see the thin waning crescent Moon, Jupiter 2° below it, and Mars 3.5° to the north-east of the Moon.

Then on the morning of October 19, Jupiter and Mars get really chummy, closing the distance between them to just 0.5°.

The dance of the planets then continues on October 26, when all three planets fit inside a 3.5° circle. It will be a lovely sight in binoculars and will make a very photogenic scene for our photographers.

As already mentioned, giant **Jupiter** is now visible in the morning sky, albeit not really placed for easy observation yet. It is still too close to the horizon by sunrise. It does however, lend its brightness to the conjunctions this month.

Saturn is the only naked planet visible in the evening sky this month; and you should make sure you get your last glimpse of the ringed planet this month, and it heads towards conjunction with the Sun next month.

Uranus, in Pisces, is well placed for evening observation, reaching opposition of the 12th. This blue-green world shines at magnitude 5.7, making just visible to the naked eye from a dark sky site. Apparent diameter is 3.7 arc-seconds.

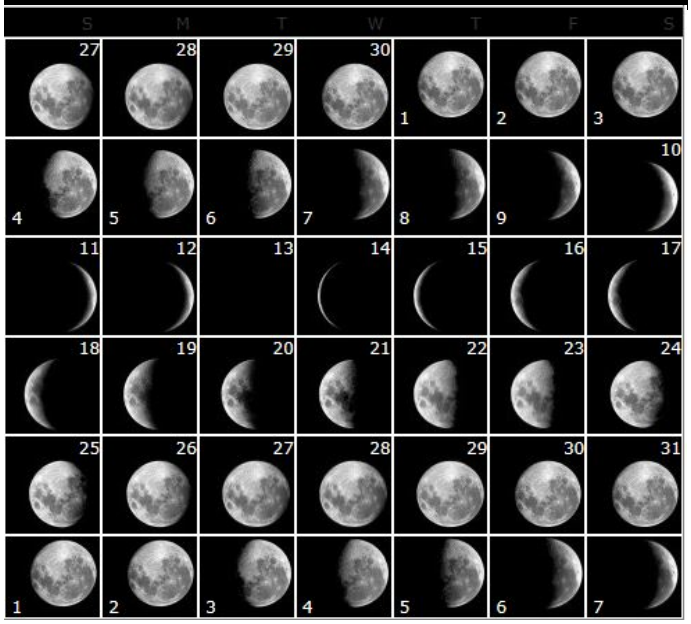
Neptune, in Aquarius, at magnitude 7.8 definitely requires a telescope to see it.

Dairy of phenomena

October 2015

d	h(UT)		
2	13	Aldebaran 0.6°S of Moon	
4	0	Moon furthest North (18.1°)	
4	21	LAST QUARTER	
8	18	Venus 2.5°S of Regulus	
8	20	Venus 0.7°N of Moon	**Occn**
8	21	Mercury stationary	
9	14	Mars 3.3°N of Moon	
9	21	Jupiter 2.6°N of Moon	
11	11	Mercury 0.9°N of Moon	
11	13	Moon at apogee	
12	3	Uranus at opposition	
13	0	NEW MOON	
16	10	Mercury greatest elong W(18°)	
16	14	Saturn 2.9°S of Moon	
17	22	Mars 0.4°N of Jupiter	
18	18	Moon furthest South (-18.2°)	
20	20	FIRST QUARTER	
25	19	Venus 1.0°S of Jupiter	
26	8	Venus greatest elong W(46°)	
26	10	Uranus 0.9°N of Moon	
26	13	Moon at perigee	
27	12	FULL MOON	
29	23	Aldebaran 0.6°S of Moon	
31	9	Moon furthest North (18.3°)	

Moon Phases - October 2015



Southern Hemisphere Comets

by Michael Mattiazzo

A roundup of bright and telescopic comets visible for southern hemisphere observers

Bright binocular comet Catalina 2013 US10 may be visible to the unaided eye this month!

C/2013 US10 Catalina

This object was discovered as an asteroid in late October 2013 by the Catalina sky survey, hence the asteroid designation, It was later shown to be travelling in a retrograde direction opposite to the planets (inclined 149 degrees to the ecliptic) as well as in a parabolic orbit (eccentricity =1) more typical of a comet.

Sure enough, cometary activity was eventually detected.

Catalina is dynamically new, its first visit to the inner solar system. We know this via the eccentricity.

It is also intrinsically bright (larger than 1P Halley) with a calculated absolute magnitude of 4.

This means that the comet would appear 4th magnitude if situated both 1AU from Sun and Earth.

Catalina has the potential to reach faint naked eye visibility for a considerable period between Oct 2015 to Jan 2016 peaking at magnitude 4 when it arrives at perihelion on 2015 November 15 at a distance of 0.82AU from the Sun.

Most unfortunately, this occurs when the comet is on the opposite side of the Sun, much like the comet Halley apparition in 1986!

It is not all bad news however. A retrograde orbit improves the odds for a close Earth passage, twice in this instance.

On August 14, 2015 the inbound comet passed 1.08AU from the Earth when it was situated in south circumpolar skies.

Post perihelion and outbound, a more favourable encounter at 0.72AU occurs on January 17, 2016 when it will be better situated for northern observers.

Dynamically new comets in general tend to disappoint.

They show initial promise at a large distance from the Sun, but then undergo intrinsic fading as they approach perihelion.

A classic example was the "fizzer of the century" comet ISON in 2013.

However, comet Catalina seems to be bucking the trend and may live up to its initial promise!

Above: *Image of C/2013 US10 Catalina, taken by **Michael Mattiazzo**, on 2015 September 5 using I-Telescope T8. 0.10-m f/5 Astrograph + FLI Microline 16803 CCD Camera, 5 min Luminance, 1 min RGB.*

Southern Hemisphere Comets

by Michael Mattiazzo

A roundup of bright and telescopic comets visible for southern hemisphere observers

As October begins, the comet is situated 4 degrees to the North of Eta Centauri, in the southwestern sky after dusk.

You may be able to glimpse the magnitude 6.0 comet with the unaided eye from a dark site.

The first 2 weeks of October offer the best viewing opportunity as the comet approaches evening twilight later in the month.

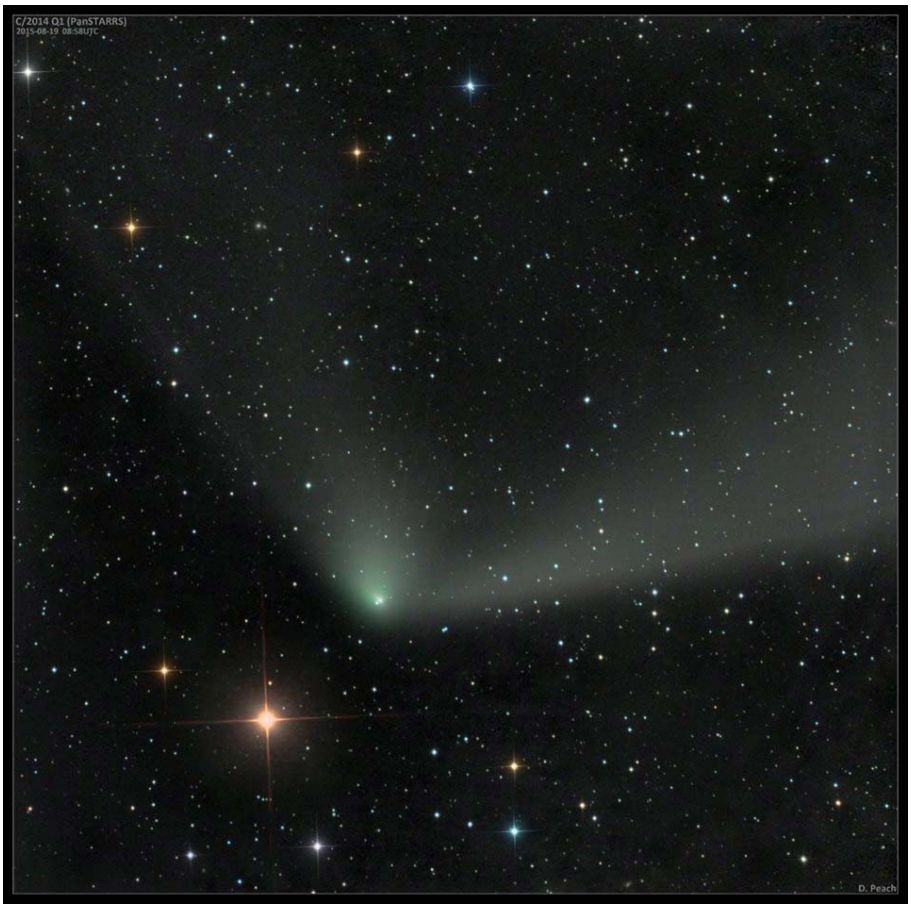
Moonlight will also start to interfere from October 16.

The comet will remain unobservable during November as it passes 8 degrees from the Sun on November 7.

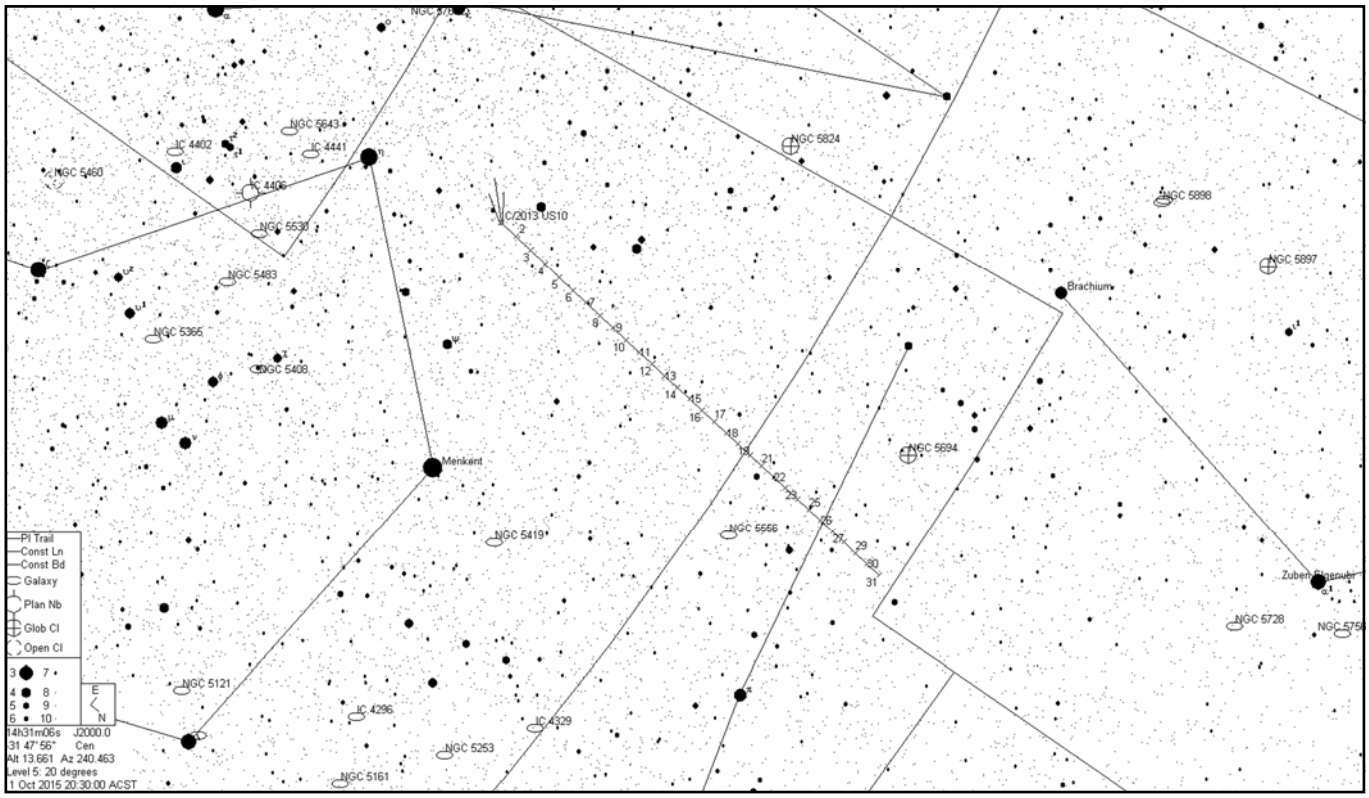
It then reappears in December morning skies at magnitude 4, well situated for northern hemisphere observers.

Check my Southern Comets website for latest updates:

http://members.westnet.com.au/mmatti/sc.htm



Above: *Comet C/2014 Q1 (PanSTARRS) imaged by **Damian Peach** on August 19, 2015 using a 20"CDK with FLI camera. LRGB. 18/2/2/2mins. Currently located in Centaurus, the comet has faded considerably since this image was taken.*



Variable Vagaries

by David Benn

This regular column will cover happenings in the ever-changing world of variable stars.

I posted to the ASSA Variable Stars forum on August 3rd about a request from Peter Williams (Variable Stars South) for observations of the long period eclipsing binary BL Telescopii, well-positioned high in the evening sky. At the time of writing BL Tel is past mid-eclipse.

Around 15 amateurs have made observations of the current event. I've only submitted two DSLR photometry observations so far, both near minimum; see the cross-hairs, corresponding to August 25th. I'm processing another set of images and hope to take some more this weekend (September 12th or 13th). While I was writing this, Michael Doherty replied to the forum post saying that he is processing DSLR images also.

The AAVSO international database light curve shows observations in different bands including visual, Johnson V, Johnson B, and infrared. The primary eclipse takes around two months to complete.

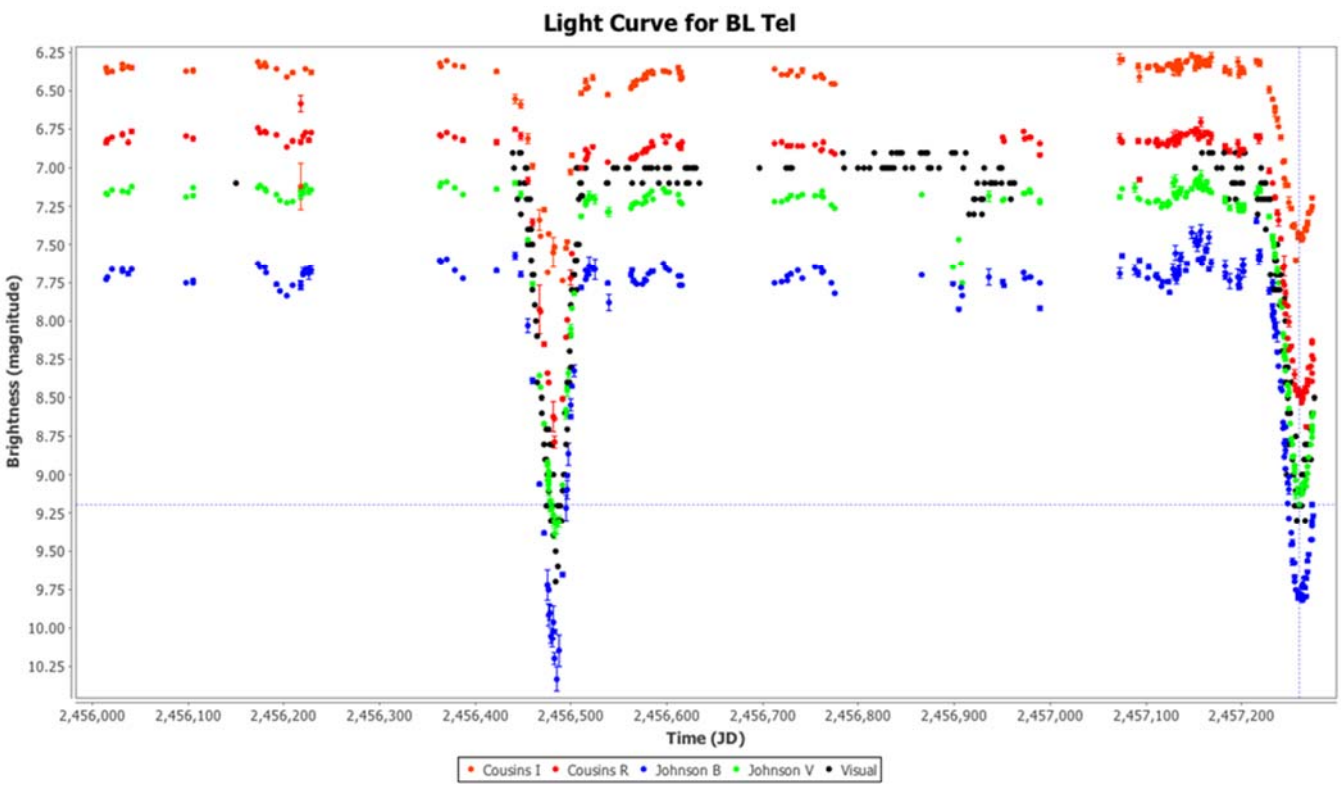
The BL Tel pair has an orbital period of around 778 days and has a visual magnitude range of around 7.1 to 9.1 although both vary, especially the magnitude range as is evident from the light curve even from the last two eclipses (the last being in 2013).

The binary consists of a luminous F-type supergiant primary and a less luminous M type secondary. All bands show out of eclipse variations due to pulsations of the F-type supergiant. In Zoldos (1994) and Genderen (1982) those pulsations were said to have a period of around 65 days.

Preliminary period analysis of observations from 2013 to 2015 make me wonder whether this has changed, but the number of out of eclipse data points is not huge, making such analysis less than reliable.

See the following for more details, especially regarding the variations mentioned above:

- ASSA variable star forum posts: BL Tel Variable Star Index page: https://www.aavso.org/vsx/index.php?view=detail.top&oid=36332
- E. Zoldos, 1994, *The pulsations of yellow semi-regular variables*, http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?1994A%26A...286..870Z&data_type=PDF_HIGH&whole_paper=YES&type=PRINTER&filetype=.pdf
- A.M. van Genderen, 1982, *VBLUW photometry of the high-latitude, eclipsing system BL Tel*, http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?1983A%26A...119..265V&data_type=PDF_HIGH&whole_paper=YES&type=PRINTER&filetype=.pdf



Alone in the dark

A guide to observing faint fuzzies in our night sky ***by Joe Grida***

Lyon Group of Galaxies #455 in Grus

Lyon Groups of Galaxies (or **LGG**) is an astronomical catalogue of nearby groups of galaxies complete to a limiting apparent magnitude B0=14.0 with a recession velocity smaller than 5,500 km/s. The LGG catalogue includes 485 groups and 3,933 member galaxies.

The image below shows an interacting trio of galaxies known as the Lyon Group of Galaxies #455 (LGG 455). It is made up of the galaxies NGC 7232 (upper right), NGC 7233 (lower right), and NGC 7232B (left). The group lies about 90 million light years away.

The two brightest objects near the centre of the image are foreground stars in our Milky Way. HD211111 is an 8.6 mag star of spectral class K5 and lies 1550 light years away. The other is HD211121, a 8.9 mag star, also of spectral class K5. I couldn't find a distance for this star in any of the catalogues I searched online.

Dark lanes of dusty material can be seen in NGC 7232 and NGC 7233, while NGC 7232B shows bright spots of young, blue stars along its weak spiral arms. LGG 455 has not been studied in great detail, but it is thought to host a 'dark galaxy', a rare object that contains the raw ingredients for making stars but which hasn't been able to form any.

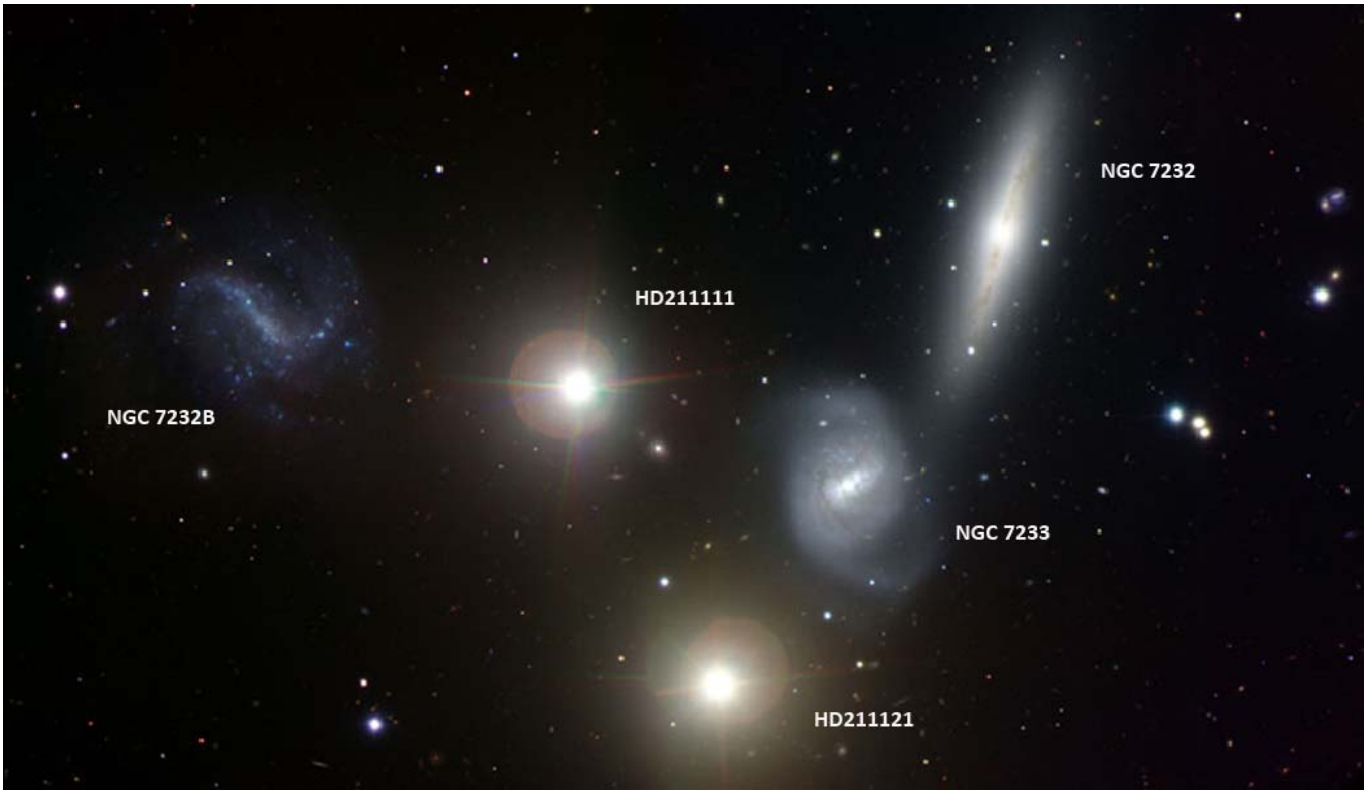
Even though the dark galaxy in LGG 455 contains enough gas to make more than 400 million Suns, the deep image by Gemini is not able to find any significant population of stars (just to the left of the lower foreground star in this image). Most likely, that huge amount of gas was flung out of NGC 7233 when it had a close encounter with one of its two companions.

The 2 foreground stars certainly interfere with the view through the telescope. **NGC 7232,** at magnitude 12.0, is the brightest of the trio of galaxies, located at RA 22:15:38.0, Dec -45:51:00. This S0a edge-on spiral is 2.6x0.9 arc-minutes in size, and with that size comes a low surface brightness of 12.7. In the eyepiece, it appears well concentrated with a bright 30" core.

Located 5 arc-minutes to the north, at RA 22:15:52.0, Dec -45:46:51, **NGC 7232B,** is a spiral, classified as SBc/Irr. At a visual magnitude of 13.5, a size of 1.5 x 1.2 arc-minutes, and a surface brightness of 14.2, this is the most difficult to observe. The central bar was glimpsed, but none of the arms were visible.

NGC 7233 is located immediately to the east of NGC 7232. This 12.5 mag round haze is 1.7x1.3 arc-minutes in size. Brightness increase gradually to the centre. The halo increases a bit with averted vision to 0.6' diameter.

The whole group and the foreground stars make quite a striking sight in the telescope.



Above: *Lyon Group of Galaxies #455 in the southern constellation of Grus. Image credit: Gemini Observatory (South) Cerro Pachon, Chile. North is at left, East is down.*

Contact information

Here's how to contact various members of Council, Regional Co-ordinators and SIG's

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Note: To address all members of the ASSA Council, send email to: council@assa.org.au

REGIONAL GROUPS

Whyalla

The group meets on the first Thursday of the month.

Coordinator: Peter Mayfield
Ph: 0408 410 895
Email: whyalla@assa.org.au

Northern Yorke Peninsula

The NYP'pers hold combined members' and public viewing nights monthly.

Coordinator: Tony Henderson
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Riverland

The Riverland group hold combined members' and public viewing nights monthly.

Co-ordinator: Tim Vivian
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Email: riverland@assa.org.au

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Variable Stars	David Benn	0407 261163
Radio Astronomy	Peter Gray	0418 829 632
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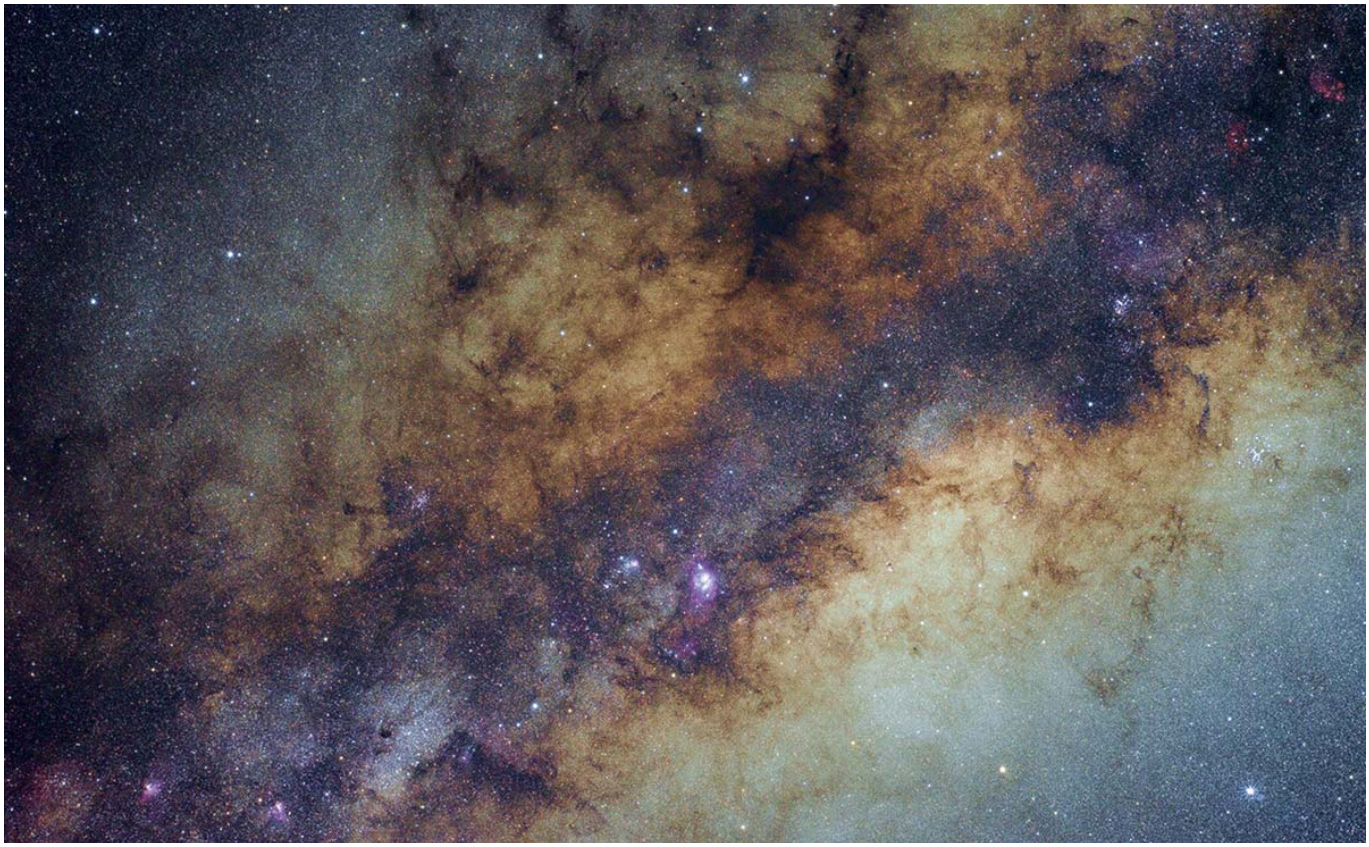
South Australia Telescope (36")	*sat@assa.org.au*	
National Police Check Coordinator	Paul Rogers *ozymandias@senet.com.au*	08 8263 7666

Members' Gallery

Highlighting members' astrophotos



Above: The centre of the galaxy, imaged by **Bob Ferrige**, at the August 2015 Alpana Astrocamp. It's a stack of 12 images, each of 7 minutes, using a Nikon D7000 DSLR, Nikkor 50mm F1.8 lens at F8, on a Skywatcher NEQ6 mount.
Below: The Lagoon Nebula (M8) imaged by **Colin Hill** from Gawler SA. This image is a stack of 8 x 15 minute exposures and processed with Pixinsight software. Equipment used was a Meade 12" LX850 SCT telescope with QHY8L CCD camera.