The

Volume 124 No. 12
December 2015

Bulletin

Monthly newsletter of the
Astronomical Society of South Australia Inc

Consider nominating for a Council position at the AGM this month!

In this issue:

- The astronomical adventures of Barite Rock
- More observing pads at Stockport Observatory
- Amazing flare from a black hole in a distant galaxy
- NGC 1721 galaxy group in Eridanus

Registered by Australia Post
Print Post Approved PP 100000605

Visit us on the web:
www.assa.org.au

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
Subscribe e-Bulletin only; discount	$20

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:

ASSA Activities *Details of general meetings, viewing nights etc*	3-4
The astronomical adventures of Barite Rock *The story as told to Fraser Farrell*	5-7
National Australian Convention of Amateur Astronomers *To be held in Sydney, Easter 2016*	7
Stockport Observatory site works *Additional observing pads and a new dome*	8
Astro News *Latest astronomical discoveries and reports*	9
The Sky this month *Solar System, Comets, Variable Stars, Deep Sky*	10-14
ASSA Contact Information	15
Members' Image Gallery *A gallery of members' astrophotos*	16

Sister Society relationships with:

Orange County Astronomers
www.ocastronomers.org

Colorado Springs Astronomical Society
www.csastro.org

Central Arkansas Astronomical Society
www.caasastro.org

Cover photo: NGC253, edge-on galaxy in Sculptor, imaged by **Paul Haese**, at Clayton Bay, SA. Telescope: GSO RC12 Ritchey-Cretien. Camera: SBIG STXL11002 CCD. Guiding – AOX. Software - MaximDL, Focusmax, Pinpoint, CCDautopilot 5. LRGB 15 hours. Darks, flats and biases applied. Processed in CCD stack and Photoshop CS6

Activities

December 2015 - the month at a glance

Annual General Meeting

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

Guest Speaker:

Steven Raine
Astronomical Society of SA

(See speaker bio on page 4)

Astronomical Anniversaries 2015

What do Saturn's massive and wonderful Titan, the Leviathan of Parsonstown, the first British Astronomer Royal, the red dwarf formerly known as Inne's Star, and the Hayabusa at Itokawa have in common?

Yes, they are among the many things and people commemorating "skymark" decadal anniversaries this year. Come along as Stevo Raine will discuss these and more showing how we've progressed and learnt through the ages and through some remarkable work by some fascinating people. #

What will you do for your society in 2016? Nominate or have somone nominate you for a Council position

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 8391 5377

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

December 2015 Calendar

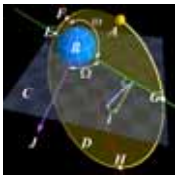
Day		Time	Activity
Wed	2	8:00pm	Annual General Meeting
Thu	3	7:30pm	Members' Meeting, Whyalla
Sat	12	8:00pm	Members' Viewing Night – Stockport
Sat	12	8.00pm	Member's Viewing Night - Riverland
Sat	12	8:00pm	Members' Viewing Night – Tooperang
Fri	18	8:00pm	Public & Members' Viewing – NYP
Fri	18	8:00pm	Public Viewing Night – The Heights
Sat	19	8:00pm	Members' Viewing Night – Stockport
Wed	16	7:30pm	ASSA Council Meeting

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, 2 December , 2015 @ 7:00pm
Kerr Grant Lecture Theatre

Astrophysics



You don't need a degree in Astrophysics to attend this one. Find out how the planets stay in orbit around the Sun. Discover the mysteries of General Relativity and the inner workings of the Universe.

Reports and Notices

Reports on recent ASSA activities, and notices of upcoming events

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

Steven Raine

Inspired by the 1989 'Voyager-II' fly past of Neptune, Steven "Stevo" Raine has been an ASSA and Supernovas member since 1992.

He has written for 'Sky & Space' magazine, having three items published there and also writes Science Fiction, a little of which has been published, as well as being a contestant on the ABC-TV quiz show ''The Einstein Factor' in 2009.

Steven is owned by a cat called 'Zosma' after the star Delta Leonis and a Jack Russell-cross-Fox terrier named (but not by him) Harry.

Remembering....

Earle Laurence

A long-standing and much revered member, Earle Laurence passed away a couple of months ago. Did you know.....

Earle was one of those quiet " I'll just get on and do it " type of members. Earle was the Beginner's Councillor for quite a few years, and people may recall his unique pronunciation of certain astronomical objects. I especially liked his referral to Saturn, or as Earle would say ... Sa - turn.

But did you know Earle was also a member of several sub committees in the Society, and offered his home as a meeting place for members on a number of occasions. He had a lovely home in the leafy eastern suburbs, and always made you feel very welcome.

For a while, the Council of ASSA used to meet and hold their monthly meetings at the Hackney Hotel (before they converted their meeting rooms to pokey rooms), and Earle, myself and a few others would arrive early and have a meal and friendly conversations prior to the meetings. Earle would always have some interesting news or conversations about many things.

And did you know that Earle became involved with the group of members who conducted the live radio broadcasts of "Eye in the Sky" on a weekly basis from the 5PBA FM studio at Salisbury. He was an on-air regular until the program ceased.

And did you know that Earle conducted regular lunch time solar observing sessions and training for students at The Heights school observatory for several years. He was also a regular presenter at Probus and other similar clubs at Burnside and other regions.

Earle helped out at public nights and working bees. He would often be dressed in shorts - regardless of the weather - *(yes Fraser, you aren't the only one),* and rather than drive back to Adelaide from Stockport, he would set up a minimalist camp in the Stockport caravan park overnight. Earle was used to camping from the many times he was in the Flinders Ranges.

I'm sure many members will have their own fond memories and anecdotes about Earle. I know I do.

Paul Rogers, Hon Life Member

The astronomical adventures of Barite Rock

The story as told to Fraser Farrell at the August 2015 Alpana AstroCamp

Last year my life was changed forever. After millions of years of contemplative silence I was suddenly torn from my home vein, taken out of the earth by machines, and dumped onto a pile of thousands of glittering white rocks. On this pile there was wind, which was too feeble to move me; sunlight, which sparkled from my newly revealed crystal faces; and at night, a comforting darkness which was faintly illuminated by thousands of unfamiliar sparkling lights.

"Who are you? And what is this place?" I asked the nearby rocks.
"We are Barite, like you, and this is the Oraparinna Barite Mine" they chorused in reply, "but to some we are also known as Barytes or Heavy-Spar. We have been mined..."

"Mined? What's that? What's happening to us?" I interrupted.

Their replies were many, whispered, and confusing:
"We stop natural gases exploding from drill holes."
"We're used to make special concretes. Radiation proof..."
"Brake pads. Instead of using that nasty old asbestos stuff."
"...and good for breakwaters and dams too, 'cos it's also heavier than regular concrete."
"Fire resistant plastics."
"Sound proofing..."
"I'm going into --medicine--" declared one small rock, "a syringe of me in the right spot can be really revealing on an X-ray."

Suddenly there was a roar from one of the machines. It charged at the pile, its great bucket gaping to engulf us. CRASH! I was trapped, we were trapped, all helpless, carried towards another machine already part filled with hundreds of pieces of barite just like us. Then I was tipped onto them. There was another more prolonged roar -- we were moving, leaving the mine. There were many crackings and groans and whispers as we settled into place. The journey was bumpy at first, and I was able to wriggle to the top. Where were we going?

I must have thought out loud, for the whispers suddenly became insistent. "This is the Final Journey from which none have ever returned, save one tiny bit of gravel. She was able to cling to this machine at Journey's End when all of her companion rocks were consigned to the Quorn Crushing Plant..."

"Crushing? That doesn't sound good".

"It is our death as rocks, but some say it is our destiny to become useful barite mineral products..."

"No way" I said "I'm --not-- going to be --crushed--! I want to die peacefully from erosion like the rocks around my home vein." How did I get off this machine before it reached the awful Crusher? The journey was still bumpy, and there were sudden changes in direction. Desperately, now I began working my way to the edge of the machine.

Above: *Barite Rock (foreground) poses with camp participants at Sunset Hill.*

The astronomical adventures of Barite Rock

The story as told to Fraser Farrell at the August 2015 Alpana AstroCamp

"Ouch!"
"Sorry, I'm trying to escape."
"Ow!" "Aaarghh!" "No!! That was my --best-- crystal face you..."
"Okay okay...I weigh about eighty kilos and it was all on one spot on you, sorry".
The litany of complaints continued as I moved, then suddenly my movements became more difficult. The bumps and swerving had ceased, the machine had moved onto a smoother surface and was gaining speed. I was still a short distance from the edge and freedom. Was I still doomed despite my efforts?

Suddenly there was a bouncing blur in front of the machine, followed by sudden jolts that rolled me to the very edge -- and then over. I fell away from the machine, there was a stunning impact, and then I was alone, except for the swarm of fragments broken from me in the impact, and the corpse of my mysterious bouncing saviour. I was free! But now what?

Many, many days passed. The sun sparkled from my crystal faces. The occasional rain tried in vain to dissolve me. The nights were still illuminated by thousands of faint lights whose patterns moved slowly across the sky. What were those things? Were they sparkling little barites lost in the night sky? I wished for someone to explain them to me. And there was another larger light, that slowly grew and then slowly shrank as the nights passed. It did this many times. Was it another rock, far from home like me?

Sometimes other moving machines paused beside me, and their occupants took my broken fragments away. Occasionally they tried to take me away too. Hah....I'm almost twice as dense as granite. Sorry about your squashed extremities! And what are "hernia" and "slipped disc"?

And then one day, after another cool clear night, yet another machine stopped by me. Its occupant unloaded some timber blocks. Hmm, I thought, maybe this one has moved big rocks before? I was soon rolled onto the timber blocks, then rolled from there onto higher timber blocks, and then suddenly I was being lifted into the back of the machine. No! Not the Crusher! I struggled to escape again but I was quickly wedged into place. The machine began moving; but away from the Crusher. Was I being taken home at last?

The moving machine didn't take me home. I was taken through mountains full of flowers and then across plains to a picnic place within more mountains full of flowers. Among them I saw groups of elongated red & black flowers, who told me their home was known to some as Wadna Yaldha and to others as Mt Chambers Gorge. The rocks there spoke of ancient tales of droughts and floods and changing landscapes. After a while the machine moved on, eventually coming to a different place within mountains, containing other machines that stared upwards. Did they know about the faint lights in the night sky?

At night the other machines came to life and stared at the night sky. And there were voices, many voices in the darkness, talking about the faint lights. The lights had names! Many names: NGC1761, Albiero, 47 Tuc, Nu Scorpii, Neptune & Triton, ESO142-19, Barnard 86, Ring Nebula....the roll call went on for hours. The machines moved frequently, some silent, some whirring. The voices talked about the many lights visible that night, and the many lights seen the previous night. They weren't lost little barites after all; they were things much bigger and far away. And even the smallest of these machines could see myriads of these things from this dark place.

I couldn't see much at all, wedged inside this moving machine whose exterior was getting rapidly opaqued by dew. This was frustrating.... By dawn the other machines were still. A few had fought off the dew to be active all night. All had seen many fascinating things. I spent the day contemplating what I had heard.

And then suddenly, late in the day, I was moving again. The machine was carrying me up a rough track to the summit of a hill. It stopped, and I saw stones being arranged on the ground before I was lifted out and placed carefully upon them. Nearby I saw a large rock resting upon two pillars of smaller stones. And supporting food & drinks brought here by other moving machines. This rock probably knows everything that happens around here, I thought.

"Where are those machines that looked at the night sky? And why are they here?" I asked the large rock.

"They stay in the valley behind me, with their attendants. They come here to seek the dark and clear skies at night and the mountain scenery around us during the day." the large rock responded.

"Oh...". I was momentarily at a loss. These machines and their attendants seemed harmless, but why had one of them just put me here?

The large rock continued, "Many years ago I was just another anonymous block of stone among millions in these mountains. But then I was brought here one day by a machine and placed upon these pillars. Since then I have

The astronomical adventures of Barite Rock

The story as told to Fraser Farrell at the August 2015 Alpana AstroCamp

received thousands of visitors from all over the earth and learned much from overhearing their conversations. This group and many others are regular visitors to this place."

"So if I stay here with you I will get lots of interesting visitors? Including this group of night sky machine attendants?"

"Yes" replied the large rock. "And isn't that a better life than being turned into a sack of drilling mud additive? I imagine every other barite you ever knew has already been turned into paste and put down an oil well or a geothermal hole; into the heat & pressure & total darkness. Or squirted into someone's fat-clogged arteries to be X-rayed, which may be worse. At least here when it's dark you can usually see stars."

"Stars?" I asked.

"Stars. Thousands of them from this hill top. Millions of them with the night sky machines you listened to last night. And it's going to be another splendidly clear night tonight. If the night breeze comes from the east again you will faintly hear this group talking about stars, and about the many other things they see out there."

"Well unless I roll off this hill it seems I'm here for keeps. I'm too heavy to blow away" I said. The setting sun was gleaming from my crystal faces. My shadow reached out to touch one of the big rock's stone pillars as the sun fell behind a nearby hill. The deep blue of the earth's shadow sprang into the sky behind the large rock.

"It's a great sight, the earth shadow behind these mountains" the large rock said. "Although not quite as dramatic as watching the summer thunderstorms from here. Sorry for blocking your view."

"I'll get used to it. Look, you can already see Saturn up there...."

Stockport Observatory site works

Building the new turret hasn't been the only activity at Stockport

In an effort to provide more observing space for members at Stockport Observatory, a number of new concrete pads have been recently poured.

The largest, 6m x 6m, is between the existing pads and the 20" observatory building. See photo below. This pad was made possible due to a generous donation from Peter McEough and David Bennett.

The pad that houses the 15" telescope and the roll-off shed has also been expanded to accommodate the soon to be relocated 16"Meade Lighbridge dobsonian, which until recently was used by students at The Heights School. See photo below bottom left.

A further pad will house the 3.5m observatory (below top left) that Joe & Lyn Grida donated to the Society. See photo below right. It is planned that once the observatory is in place, the 12" Meade LX200 currently in the 5m dome will be installed in the smaller dome, and the 18" dobsonian telescope currently in storage will return to its original home.

All photos by Peter McEough.

Amazing flare from a black hole in a distant galaxy

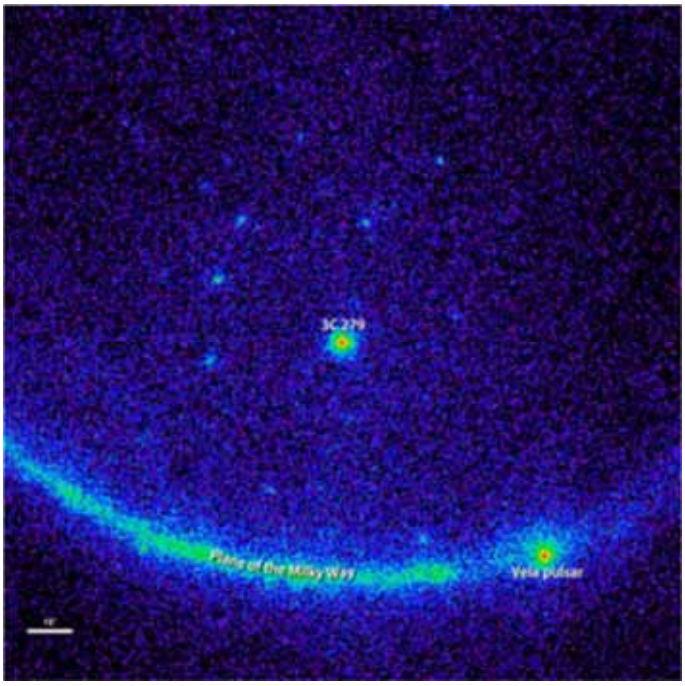
Five billion years ago, a great disturbance rocked a region near the monster black hole at the center of galaxy 3C 279. On June 14, the pulse of high-energy light produced by this event finally arrived at Earth, setting off detectors aboard NASA's Fermi Gamma-ray Space Telescope and other satellites.

Astronomers around the world turned instruments toward the galaxy to observe this brief but record-setting flare in greater detail.

"One day 3C 279 was just one of many active galaxies we see, and the next day it was the brightest thing in the gamma-ray sky," said Sara Cutini, a Fermi Large Area Telescope scientist at the Italian Space Agency's Science Data Center in Rome.

3C 279 is a famous blazar, a galaxy whose high-energy activity is powered by a central supermassive black hole weighing up to a billion times the sun's mass and roughly the size of our planetary system. As matter falls toward the black hole, some particles race away at nearly the speed of light along a pair of jets pointed in opposite directions. What makes a blazar so bright is that one of these particle jets happens to be aimed almost straight at us.

"This flare is the most dynamic outburst Fermi has seen in its seven years of operation, becoming 10 times brighter overnight," said Elizabeth Hays, a Fermi deputy project scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Astronomers think some change within the jet is likely responsible for the flare, but they don't know what it is.



Above: *Blazar 3C 279's historic gamma-ray flare can be seen in this image from the Large Area Telescope (LAT) on NASA's Fermi satellite. Both images show gamma rays with energies from 100 million to 100 billion electron volts (eV). Credit: NASA/DOE/Fermi LAT Collaboration*

The brightest persistent source in the gamma-ray sky is the Vela pulsar, which is about 1,000 light-years away. 3C 279 is millions of times farther off, but during this flare it became four times brighter than Vela. This corresponds to a tremendous energy release, and one that cannot be sustained for long. The galaxy dimmed to normal gamma-ray levels by June 18.

The rapid fading is why astronomers rush to collect data as soon as they detect a blazar flare. "Our priority is to make observations while the object is still bright," said Masaaki Hayashida, a Fermi team member at the University of Tokyo's Institute for Cosmic Ray Research. "Once it's over, we can start trying to understand the mechanisms powering it."

The Italian Space Agency's AGILE gamma-ray satellite first reported the flare, followed by Fermi. Rapid follow-up observations were made by NASA's Swift satellite and the European Space Agency's INTEGRAL spacecraft, which just happened to be looking in the right direction, along with optical and radio telescopes on the ground.

3C 279 holds a special place in the history of gamma-ray astronomy. During a flare in 1991 detected by the EGRET instrument on NASA's then recently launched Compton Gamma Ray Observatory (CGRO), which operated until 2000, the galaxy set the record for the most distant and luminous gamma-ray source known at the time. "Although we didn't expect to find the galaxy so bright, we soon had a much greater surprise," recalled Robert Hartman, who led the first gamma-ray study of 3C 279 with CGRO and is now a member of the Fermi team at Goddard. "Its brightness varied substantially, becoming four times brighter within 10 days."

The June 14 outburst rapidly brightened in less than a day and peaked on June 16, producing a gamma-ray flare 10 times brighter than the 1991 event. These rapid variations convey information about the size of the emitting region, which cannot be larger than the distance light can travel during the flare.

Mid-June proved to be an intense period for the Fermi team. As the satellite's Large Area Telescope studied 3C 279, its Gamma-ray Burst Monitor became the busiest it has ever been since the start of the mission. The instrument picked up a series of eruptions on the sun, which is unusual in itself, as well as multiple outbursts from V404 Cygni, a binary system containing a black hole that erupts every few decades.

Story Source: *NASA/Goddard Space Flight Center. "Amazing flare from a black hole in a distant galaxy." 10 July 2015. www.sciencedaily.com/releases/2015/07/150710161002.htm*

Solar System Highlights

by Joe Grida

The major planets during December 2015

Planetary observers will still need to be content by rising early in the morning to catch some bright planets.

Mercury, having passed conjunction last month, is gradually climbing into the western evening twilight sky, however it sets way too soon after the Sun in the early part of the month. The best time will be on December 14th, when the diminutive planet grazes the tip of the Teapot in Sagittarius. You'll need a clear western horizon.

Venus, at magnitude -4.2 at the start of December, still dominates the morning eastern sky, even though it has already started its slide towards the Sun. It dims to mag -4.0 by the end of the month, its globe shrinks from 17.5" to 14.5" in diameter, while its gibbous phase increases from about 65% to 75% illumination. A great photo opportunity presents itself on the morning of December 8th, when the thin waning crescent Moon sits just below Venus, and then 3° below the Moon we find Comet c/2013 US10 Catalina. See diagram below right.

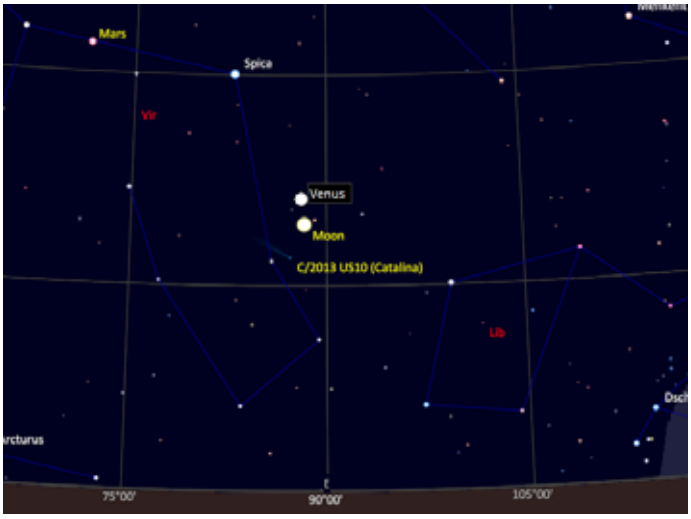
Mars, also a morning object, spends the entire month in Virgo. You can find him at the start of the month near Porrima, (Gamma Virginis). It brightens slightly from mag +1.5 to +1.3 during the month. A telescope still shows only a featureless tiny disk of only 5". We can look forward to opposition in May next year, when the planet displays a dimeter of almost 19"!

Jupiter, to be found in Leo, starts the month with a diameter of 36", and grows to 39" by the end of December. Brightness rises from mag -2.0 to -2.2. It rises around midnight mid-month, so it won't be long before it rules the evening skies.

Saturn, having just passed conjunction with the Sun at the end of November, reappears in the morning sky; albeit unsuitable for observation during December.

Uranus, in Pisces, shines at mag +5.8, with a diameter of 3.6". I observed the blue-green featureless planet at the recent VicSouth Star Party.

Neptune, in Aquarius, is still high in the west at the end of twilight, setting before midnight mid-month.

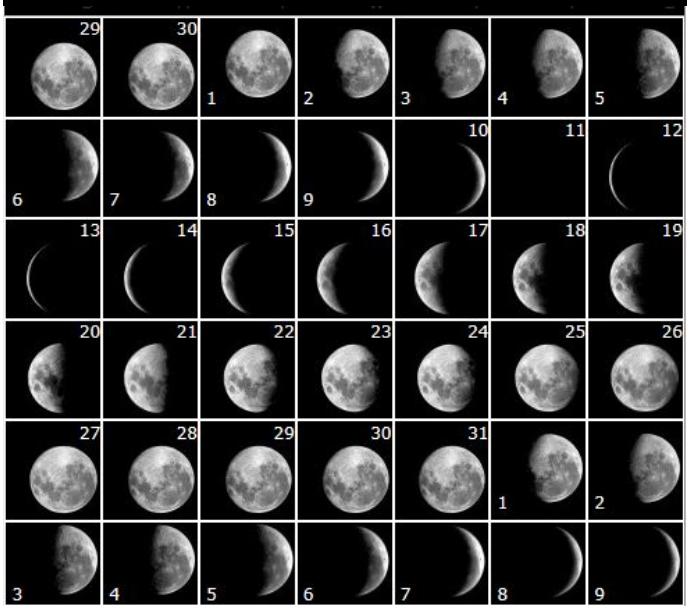


Dairy of phenomena

December 2015

d	h(UT)	
3	**7**	**LAST QUARTER**
4	5	Jupiter 1.7°N of Moon
5	15	Moon at apogee
6	2	Mars 0.1°N of Moon
7	17	Venus 0.6°S of Moon
10	14	Saturn 3.1°S of Moon
11	**10**	**NEW MOON**
12	7	Moon furthest South (-18.4°)
13	9	Pluto 3.1°S of Moon
17	6	Neptune 2.4°S of Moon
18	**15**	**FIRST QUARTER**
19	19	Mercury 3.8°S of Pluto
20	1	Uranus 1.1°N of Moon
21	8	Moon at perigee
22	4	Solstice
23	19	Aldebaran 0.7°S of Moon
23	23	Mars 3.5°N of Spica
25	7	Moon furthest North (18.5°)
25	**11**	**FULL MOON**
26	11	Uranus stationary
29	0	Mercury greatest elong E(20°)
29	19	Regulus 2.6°N of Moon
31	16	Jupiter 1.4°N of Moon

Moon Phases - December 2015



Southern Hemisphere Comets

by Michael Mattiazzo

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

Comet Catalina returns to morning skies, but is not well situated for southerners.

C/2013 US10 Catalina

Comet Catalina arrived at perihelion on 2015 November 15 at a distance of 0.82AU from the Sun, but remained unobservable as it went through solar conjunction.

It should make a reappearance in December morning skies, shining at magnitude 6. Last September to October, its rate of brightening stalled quite markedly.

It was predicted to reach 4th magnitude but it is lucky to even reach magnitude 6 at best! Dynamically new comets in general tend to disappoint, showing initial promise at large distance from the Sun, then undergo intrinsic fading as they approach perihelion.

Comet Catalina was still expected to survive its solar encounter however and hopefully atone for its poor showing. On December 9, the comet can be located in Virgo, a few degrees to the north of Venus, very low in the Eastern morning sky at 4:30am.

Since the comet is heading directly northwards, conditions improve only gradually as the month progresses. On December 23, the comet is at 7 degrees altitude in the Northeastern sky, still situated in Virgo, at 0430am. Moonlight starts to interfere after this date.

The comet is heading for an Earth approach of 0.72AU on January 17th, but will lie deep in northern skies by then.

10P Tempel

Was discovered in 1873 when it reached magnitude 9. It was determined to be of short period (5.5 years).

The apparition in 2015 is an average one, with the comet closest to Earth on May 24 at 1.31AU, then arriving at perihelion on November 14 at 1.41AU. Its light curve is asymmetric and generally brighter post perihelion.

During December, it will be trekking through the constellations of Sagittarius and Capricornus, during evening hours, shining at magnitude 10.5-11.0 This comet has displayed a fine dust "trail" on previous apparitions, detectable in deep CCD images, so attempts are encouraged.

C/2013 X1 PANSTARRS

Another dynamically new comet is heading sunward with the potential to reach 6th magnitude in June 2016.

It will be closest to the Sun on 2016 April 20 at a distance of 1.31AU. This is not particularly close so the comet may in fact reach its expected peak!

If you want to get an early look during December, the magnitude 10 comet can be seen traversing the constellation of Andromeda, low in the northern evening sky. On the evening of Dec 7, the comet is 1 degree E of Beta And.

On the 16th, it is 1 degree NE of Delta And.

Above: *Comet c/2013 US10 Catalina meets the Lagoon Nebula (M8) in Sagittarius on November 1, 2015. Imaged by* ***Justin Tilbrook****, Penwortham, SA with an 8" F/4 astrograph HEQpro 5 mount. Orion mini guider. Un-modded Canon 1100D DSLR, Baader Type III coma corrector. The comet is the green object immediately to the left of the nebula.*

Southern Hemisphere Comets

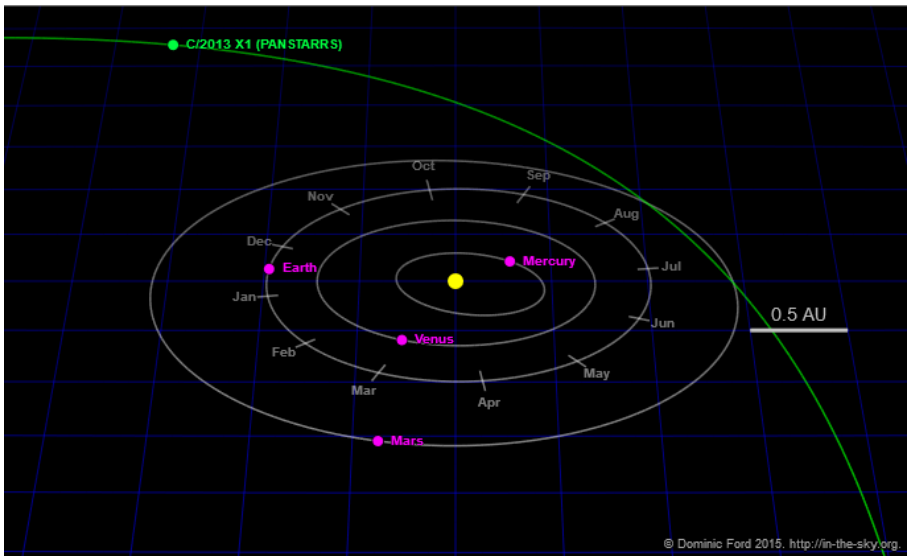
by Michael Mattiazzo

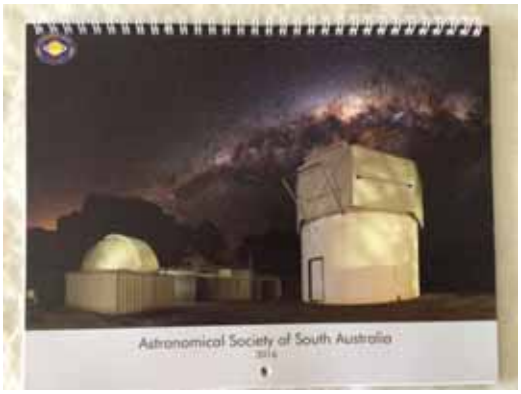
A roundup of bright and telescopic comets visible for southern hemisphere observers

Moonlight starts to interfere from this date.

See the orbit diagram at right, showing the comet's location as at 15 December 2015.

Check my Southern Comets website for latest updates: http://members.westnet.com.au/mmatti/sc.htm





Have you got your copy of the ASSA 2016 Calendar yet?

Full of beautiful sky photos taken by ASSA members, as well as details of meetings, observing nights, and other special events in the 2016 calendar.

Get your copy at meetings, or email secretary@assa.org.au
$20 + $4 postage/handling

Variable Vagaries

by David Benn

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

This month I want to start exploring the question: what are the causes of stellar variability?

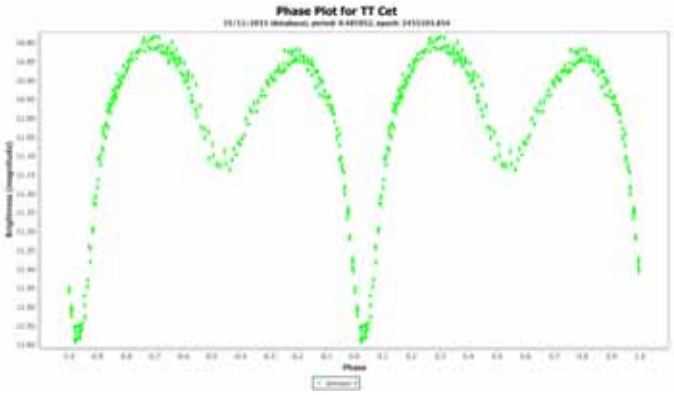
The simple answer is that variability in the brightness of a star's magnitude comes in two forms: extrinsic and intrinsic. In other words, variability can be caused by factors directly related to a star's internal physical stellar processes or independently of them.

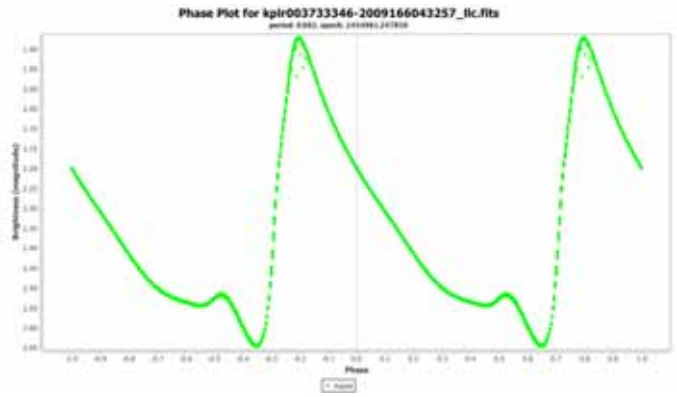
The most obvious example of extrinsic variability is eclipsing binary stars, such as BL Tel, mentioned in recent instalments. Another eclipsing variable is shown at right, TT Cet, the data for which was submitted to AAVSO by Robert Jenkins.

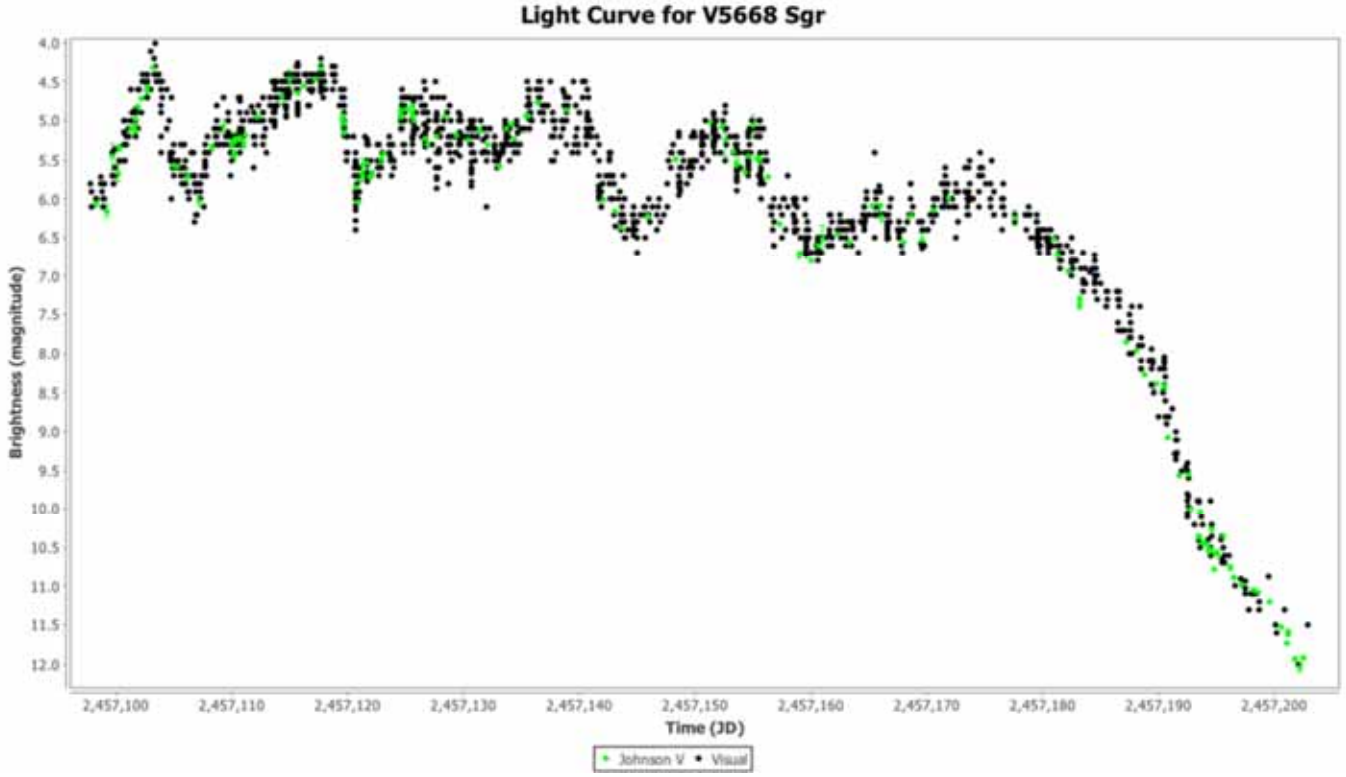
Other extrinsic causes are rotation (e.g. star-spots) and micro-lensing.

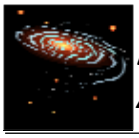
The intrinsic class includes pulsating, eruptive, cataclysmic and X-Ray stars. The remaining light curves show two pulsating variables and a cataclysmic variable (the nova V5668 Sgr) - see the plot at bottom.

In future instalments we'll look in detail at members of the different categories and what such light curves as those shown here tell us about the physical nature of the corresponding systems.









Alone in the dark

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

NGC 1721 galaxy group in Eridanus

The Spring and early Summer evening skies are replete with galaxies. Constellations such as Pisces, Cetus, Grus and Pavo readily come to mind, and provide a veritable smorgasbord of extragalactic eye candy. Make sure you also add Eridanus to your list. There are 170+ galaxies within reach of my 16" telescope in this constellation, and 10 Hickson Compact Groups as well!

So, I am really spoilt for choice. This month, we'll visit a group of galaxies centred on the spiral NGC 1721, located on the Eridanus-Lepus border, not far from Rigel in Orion, 4.6° to the north-east.

This group of 4 galaxies, made up of NGC 1721, 1723, 1725, 1728, all lie about 170 million light years away. The whole group fit in nicely at 142x magnification and 42 arc-minute field in the 16" telescope. I'd suggest that once you have seen the group as a whole, that you switch to higher magnification, say 200x+, to bring out more detail in the individual galaxies. I would also strongly recommend that you put a hoodie over your head to keep out any stray light.

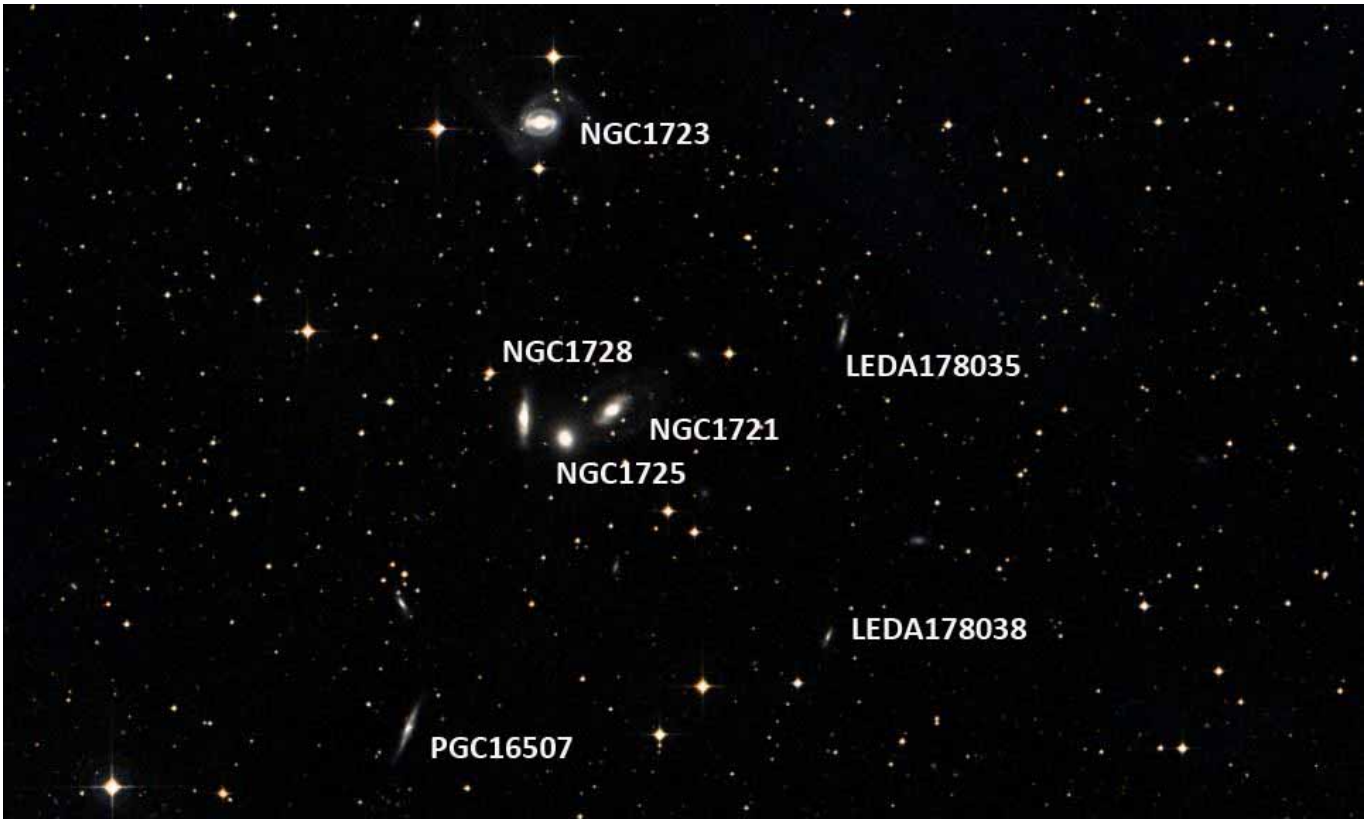
We'll start the exploration of the group with **NGC 1721**, centred on RA: 04 59 17.4, Dec -11 07 08. This type S0 spiral has a mag of 12.3, and is 2.5x1.4 arc-minutes in size. In the eyepiece, it looks small and slightly elongated, with quite a concentrated core.

NGC 1725 is located only 2 arc-minutes to the south-east. This elliptical galaxy shines at mag 12.58, and displays a size of 1.0x0.8 arc-minutes. Shows a bright stellar core in the eyepiece.

The edge-on Sa spiral **NGC 1728** lies a further arc-minute to the East. This mag 12.9 galaxy appears very elongated, with a small bright core. It displays a size of 1.8x0.9 arc-minutes.

The brightest member of the group, **NGC 1723** lies 8.5 arc-minutes to the north of NGC 1721. This type SB spiral shines at magnitude 11.7. It's also the largest of the group at 3.2x2.2 arc-minutes. It appears slightly elongated with a bright core. The faint arms visible in the photo below, were not visible in the eyepiece. It is sandwiched between a mag 10 star to the north, and a mag 11 star to the south. There's a mag 9.8 spec K5 star 2.9 arc-minutes to the east.

Your challenge objects are the edge-on 14.7 mag galaxy **PGC16507**, 11.6 arc-minutes to the south-east of NGC 1721. As it lies at the same distance as the rest of the group, it's probably a member of the family. Also look for the 16.2 mag **LEDA178038**, 8.9 arc minutes to the south-west, and 15.8 mag **LEDA178035**, 7.1 arc-minutes west-north-west!



Above: *Image of the NGC 1721 group from the Aladin Sky Atlas using data from the Digitised Sky Survey DSS2. Field is 30 arc-minutes high. North is at the top, East to the left.*

Contact information

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

2015 COUNCIL

President & Public Officer	Joe Grida	(08) 8391 5377	president@assa.org.au
Vice President	David Bennett	0419 419 552	vice-president@assa.org.au
Secretary	Peter McKeough	0418 688 654	secretary@assa.org.au
Assistant Secretary	Phil Stephen	(08) 8356 6936	assistant-secretary@assa.org.au
Treasurer	Philip Pudney	0408 818 839	treasurer@assa.org.au
Editor	Joe Grida	(08) 8391 5377	editor@assa.org.au
Publicity Officer	Paul Curnow	0402 079 578	publicity@assa.org.au
Observatories Director	Lyn Grida	(08) 8391 5377	observatories@assa.org.au
Technical Information Officer	Dr Tony Beresford	(08) 8338 1231	technical@assa.org.au
Instrument Officer	Paul Haese	0408 808 390	instruments@assa.org.au
Librarian	Susan Baker	0415 655 378	librarian@assa.org.au
Beginners' Councillor	Colin Hill	(08) 8523 0211	beginners@assa.org.au
Councillors	Greg Weaver	(08) 8293 2341	greg.weaver@assa.org.au
	Robert Bronca	(08) 8266 7504	robert.bronca@assa.org.au
	Steven Saffi	0431 585 014	steven.saffi@assa.org.au
	Lina Raslan	0434 580 212	lina.raslan@assa.org.au
	Stephen Scheer	0423 702 975	stephen.scheer@assa.org.au

Honorary Life Members: Ian Anderson, Ian Bedford, Dr Tony Beresford, Trish Ellin, Joe Grida, Lyn Grida, Colin Hill, Blair Lade, Paul Rogers, Michael Williams, Mick Wolf.

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
Ph: 0429 352 382
Email: nyp@assa.org.au

Riverland

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

Co-ordinator: Tim Vivian
Ph: 0417 800 225
Email: riverland@assa.org.au

SPECIAL INTEREST GROUPS

Deep Sky Imaging	Neil Walter	0418 805 182
Variable Stars	David Benn	0407 261163
Radio Astronomy	Peter Gray	0418 829 632
Light Pollution	Martin Lewicki	0413 494 366

OTHER CONTACTS

Aboriginal & Ethno Astronomy	Paul Curnow	0402 079 578
Comets & Meteors	Michael Mattiazzo	0420 959 664
Planetarium	Paul Curnow	0402 079 578
Society Historian	Terry Wardle *historian@assa.org.au*	
Schools Viewing Nights Coordinator	TBA	
Webmaster	Phillip Pudney *webmaster@assa.org.au*	0408 818 839
Awards Committee	*awards@assa.org.au*	
Project Manager, Stockport Dome Replacement Project	Dean Davidson *stockport-dome@assa.org.au*	0413 039 477
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: Aurora over Clayton Bay, SA @ 9:17pm ACDT on November 7, 2015. Photo by **Paul Haese,** with 14mm F2.8 lens, ISO: 3200, Exposure: 10 seconds.

Below: Venus emerges from behind the Moon @ 6:35am ACDT on October 9. Photo by **Martin Lewicki** with a 300mm lens on a Pentax Kx DSLR camera.