Shoalhaven Astronomers Inc.
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Astro Flyer

JUNE 2023

Club News

Hi to all from the Vice President,

I write this report as the Vice President as unfortunately Mark has needed to resign as President, and on behalf of the Association would like to take this opportunity to thank Mark for his leadership of the Association for the last 4 years. During the last financial year, the Shoalhaven Astronomers Association saw a number of unprecedented challenges and changes, all of which Mark and the Committee has been able to successfully navigate to ensure the Association has been well placed to serve its membership.

Some of these challenges included the loss and unavailability of a number of valuable members, which created some difficulties in providing experience and presentations at meetings. This was coupled with the lurking Covid virus which saw a decline in attendances and presenters. Also, many set backs were experienced in the construction of our new observatory, including the approval processes and the burning down of the production factory. This has meant a lot more work for association members, and I would like to thank all those members who have worked tirelessly to bring the project to fruition. The work completed this year will put the Association in good stead for many years to come, and will be a great community asset. Well done to all those involved.

(read more from Vice President over page.)

Next Meeting June 16th 7 pm for 7.30 pm

Contents

Bob and Harry are unwell this month.

MOON PHASES

New Moon	First Quarter	Full Moon	Last Quarter
June 18th	June 26th	July 3rd	July 10th

Viewing Nights

We are aiming, once daylight saving is over, to make observing at Friday meetings a priority if the weather permits.

New and Last Quarter moon phases are good times for Dark Sky Observing.

… Message from the Vice President

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With these challenges now behind us, the Association is well placed to offer some amazing opportunities for members and the community, really only limited by our imagination, I could say the Universe is at our feet. I would expect that we will be able to undertake a lot more visual observing from our new "club house", will be able to provide interesting learning sessions for our members, and beam the astronomical images direct to a lecture theatre for members and the public to view in a comfortable and safe environment. The new observatory will also provide opportunities to increase membership and raise funds for the Association. We also envisage a strong working relationship with the University.

Also, the Association now has an impressive stable of telescopes which need to be housed in a safe environment. The Committee has considered the option of individual members who are without telescopes at home, being a host for a telescope, use it and maintain it at home, so it is in working order when required for community events. Please consider whether you would like to foster an Association telescope.

To assist in the strengthening of our Association we will need a good crew to steer the ship, and I would ask all members to seriously consider nominating for and Executive position or a Committee position at the AGM next month, as both Mark and I will not be standing. I will be nominating for a position on the Committee.

As we are now facing a new era, if any member has an idea as to where the Association should be going, or how we can improve member and community service, please don't hesitate to contact a Committee member.

Keep looking towards the stars.
John Gould
Vice President

Observation Report Andrew Wood

Observation Report June/July 2023

Moon Phases

New Moon	June 18
First Quarter	June 26
Full Moon	July 3
Last Quarter	July 10
New Moon	July 18

Planets

Venus is the star of the early evening in the west. It's disk is increasing inapparent size as it goes from half to crescent phase, maintaining a magnitude of -4.5.

Mars is also above Venus in the west, though at magnitude 1.7 and only 4" in diameter, it won't be much through a telescope. June 22 sees Mars, Venus and the crescent Moon close. From 9-12 July Mars is very close to Regulus, the brightest star in Leo.

Jupiter is currently an object for early risers in the dawn sky.

Saturn is rising earlier each night and will be above the horizon by 9pm in the first half of July.

There are five **comets** currently visible for those with dark skies and decent aperture. All at magnitude 10-11. See *Astronomy 2023* or an internet search will give details.

There are also three **Meteor Showers**

Southern delta-Aquarids from July 18-Aug 23
alpha-Capricornids from July 3-Aug 15
Piscis Austrinids from July 15-Aug 10

With Orion now out of sight Scorpius becomes more prominent through the winter. It has two easy bright Open Clusters, M6 and M7, and a swathe of Globular Clusters, as well as some nebulae. Scorpius and nearby constellations can keep any deep sky observer or imager busy on any clear moonless winter night. Just remember to dress like you're going on a ski trip!

Good Viewing

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The Tunguska event was the biggest asteroid impact in recorded history. How did it vanish without a trace?

By Hannah Osborne published May 31, 2023

During the Tunguska event, over 8 million trees covering an area of 830 square miles were flattened when an asteroid entered Earth's atmosphere.

The Tunguska event is considered to be the biggest asteroid strike in recorded history (Image credit: solarseven/Getty Images)

On June 30, 1908, an asteroid flattened an estimated 80 million trees in Siberia over 830 square miles (2,150 square kilometers). Dubbed the Tunguska event, it is considered the biggest asteroid impact in recorded history. Yet no one has ever found the asteroid fragments or an impact site.

The asteroid lit up the skies in a remote, sparsely inhabited region near the Podkamennaya Tunguska River. It unleashed a 10 to 15 megaton explosion — similar in size to the 1954 Castle Bravo nuclear bomb test, the fifth-largest nuclear detonation in history. "The sky was split in two, and high above the forest the whole northern part of the sky appeared covered with fire," an eyewitness reported.

One popular theory is that the asteroid formed Lake Cheko, a freshwater lake about 5 miles (8 kilometers) from the explosion epicenter. The lake is about 1,640 feet (500 meters) wide and 177 feet (54 m) deep.

Luca Gasperini, research director at the National Research Council of Italy, and colleagues said the lake's cone-like shape and depth resembled an impact crater.

In a study published 2012 in the journal Geochemistry, Geophysics, Geosystems, they estimated that the sediments at the bottom of the lake had been building for 100 years, while evidence of trees at the bottom of the lake indicate the waterhole covers an old forest.

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(Image credit: Universal Images Group/Getty Images)

But some experts were not convinced. In 2017, researchers led by Denis Rogozin, from the Institute of Biophysics at the Siberian Branch of the Russian Academy of Sciences, carried out their own analysis and concluded that lake sediments were at least 280 to 390 years old, "significantly older than the 1908 Tunguska Event." And in a new study published May 2 in the journal Doklady Earth Sciences, Rogozin and colleagues presented more evidence to refute the idea Lake Cheko is the Tunguska asteroid's impact site.

Previously, many researchers believed Lake Cheko's unusual cone shape was unique in the region, giving weight to the idea that an asteroid formed it. But Rogozin and colleagues analyzed two nearby lakes — Zapovednoye and Peyungda — that sit 31 miles (50 km) and 37 miles (60 km) from the suspected impact site. Both are also cone shaped, they found.

"The difference in the age of the lake sediments puts into question the impact origin of these lakes — this would require the arrival of three almost identical space bodies at different times, which is highly improbable given that the lakes are located in almost the same place on Earth," the researchers wrote.

Daniel Vondrák, who studies lake ecosystems at Charles University in Prague, told Live Science in an email that he is convinced by Rogozin's evidence.
However, the conical shape of the lakes isn't the only evidence that Cheko was formed by the Tunguska event, Gasperini said.

In a paper posted to the preprint server arxiv in 2018 (which still has not been peer reviewed), Gasperini and his team hypothesized that Tunguska was caused by a "rubble-pile" asteroid — a structurally weak mashup of fragments from a monolithic asteroid.. As a result, the asteroid split into two pieces — one around 197 feet (60 m) wide, the other around 20 to 33 feet (6 to 10 m) wide. The smaller of these two smashed into Earth, forming Lake Cheko, they wrote.

The team detected a 33-foot-wide (10 m) anomaly at the bottom of the lake that may be a leftover fragment of the asteroid. By drilling to the lake center, someone could test the composition of the anomaly to confirm that hypothesis. However, Gasperini's team can no longer access the site due to the war in Ukraine.

"The Russian scientists could easily do this test, instead of continuing to publish articles showing data similar to ours with very questionable interpretations," Gasperini told Live Science in an email.

Astro Events from Frank Gross

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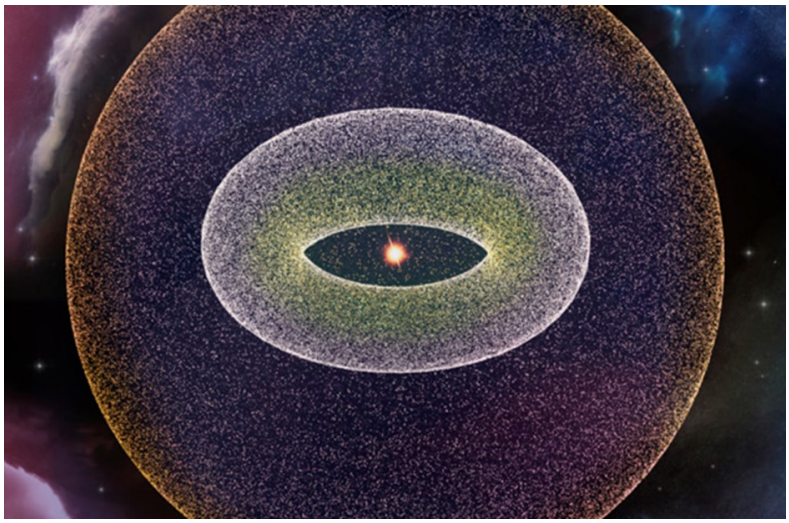
What could have happened to the asteroid?

If Cheko wasn't formed by the Tunguska impact crater, then what happened to the asteroid that set fire to the skies more than a century ago? A paper published in 2020 in the journal Monthly Notices of the Royal Astronomical Society suggested a large iron asteroid passed through Earth's atmosphere, then curved away from Earth without breaking up. This, the team said, would explain why no trace of the asteroid has ever been found.

Another paper posted to arxiv last month put forward yet another hypothesis — that the asteroid broke apart and scattered across the landscape. While many fragments would have burnt up in the atmosphere, the team said smaller chunks could have survived and hit Earth over a "strewn field.". This paper suggests rocks from the asteroid could be about 10 to 12 miles (16 to 19 km) northwest of the epicenter, "even if the mud and vegetation could have made any trace disappear."

Mysteries of the Oort cloud at the edge of our solar system: The entirely theoretical cloud of icy space debris marks the frontiers of our solar system.

By Joshua Rapp Learn Published: Thursday, August 5, 2021



The Oort cloud represents the very edges of our solar system. The thinly dispersed collection of icy material starts roughly 200 times farther away from the sun than Pluto and stretches halfway to our sun's nearest starry neighbour, Alpha Centauri. We know so little about it that its very existence is theoretical — the material that makes up this cloud has never been glimpsed by even our most powerful telescopes, except when some of it breaks free.

"For the foreseeable future, the bodies in the Oort cloud are too far away to be directly imaged," says a spokesperson from NASA. "They are small, faint, and moving slowly."

Aside from theoretical models, most of what we know about this mysterious area is told from the visitors that sometimes swing our way every 200 years or more — long period comets. "[The comets] have very important information about the origin of the solar system," says Jorge Correa Otto, a planetary scientist the Argentina National Scientific and Technical Research Council (CONICET).

A faint cloud, in theory the Oort cloud's inner edge is believed to begin roughly 1,000 to 2,000 astronomical units from our sun. Since an astronomical unit is measured as the distance between the Earth and the sun, this means it's at least a thousand times farther from the sun than we are. The outer edge is thought to go as far as 100,000 astronomical units away, which is halfway to Alpha Centauri. "Most of our knowledge about the structure of the Oort cloud comes from theoretical modeling of the formation and evolution of the solar system," the NASA spokesperson says.

While there are many theories about its formation and existence, many believe that the Oort cloud was created when many of the planets in our solar system were formed roughly 4.6 billion years ago. Similar to the way the Asteroid Belt between Mars and Jupiter sprung to life, the Oort cloud likely represents material left over from the formation of giant planets like Jupiter, Neptune, Uranus and Saturn. The movements of these planets as they came to occupy their current positions pushed that material past Neptune's orbit, Correa Otto says.

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Another recent study holds that some of the material in the Oort cloud may be gathered as our sun “steals comets” orbiting other stars. Basically, the theory is that comets with extremely long distances around our neighbouring stars get diverted when coming into closer range to our sun, at which point they stick around in the Oort cloud.

The composition of the icy objects that form the Oort cloud is thought to be similar to that of the Kuiper Belt, a flat, disk-shaped area beyond the orbit of Neptune we know more about. The Kuiper Belt also consists of icy objects leftover from planet formation in the early history of our solar system. Pluto is probably the most famous object in this area, though NASA’s New Horizons space probe flew by another double-lobed object in 2019 called Arrokoth — currently the most distant object in our solar system explored up close, according to NASA.

“Bodies in the Oort cloud, Kuiper belt, and the inner solar system are all believed to have formed together, and gravitational dynamics in the solar system kicked some of them out,” the NASA spokesperson says.
Visitors from the Edge of our Solar System

Estonian philosopher Ernst Öpik first theorized that long-period comets might come from an area at the edge of our solar system. Then, Dutch astronomer Jan Oort predicted the existence of his cloud in the 1950s to better understand the paradox of long-period comets.

Oort's theory was that comets would eventually strike the sun or a planet, or get ejected from the solar system when coming into closer contact with the strong orbit of one of those large bodies. Furthermore, the tails that we see on comets are made of gasses burned off from the sun’s radiation. If they made too many passes close to the sun, this material would have burned off. So they must not have spent all their existence in their current orbits. “Occasionally, Oort cloud bodies will get kicked out of their orbits, probably due to gravitational interactions with other Oort cloud bodies, and come visit the inner solar system as comets,” the NASA spokesperson says.

Correa Otto says that the direction of comets also supports the Oort cloud’s spherical shape. If it was shaped more like a disk, similar to the Kuiper Belt, comets would follow a more predictable direction. But the comets that pass by us come from random directions. As such, it seems the Oort cloud is more of a shell or bubble around our solar system than a disk like the Kuiper Belt. These long-period comets include C/2013 A1 Siding Spring, which passed close to Mars in 2014 and won’t be seen again for another 740,000 years.

“No object has been observed in the distant Oort cloud itself, leaving it a theoretical concept for the time being. But it remains the most widely-accepted explanation for the origin of long-period comets,” NASA says.

The Oort cloud, if it indeed exists, likely isn’t unique to our own solar system. Correa Otto says that some astronomers believe these clouds exist around many solar systems. The trouble is, we can’t even yet see our own, let alone those of our neighboring systems. The Voyager 1 spacecraft is headed in that direction — it’s projected to reach the inner edge of our Oort cloud in roughly 300 years. Unfortunately, Voyager will have long since stopped working.

“Even if it did [still work], the Sun’s light is so faint, and the distances so vast, that it would be unlikely to fly close enough to something to image it,” the NASA spokesperson says. In other words, it would be difficult to tell you’re in the Oort cloud even if you were right inside it.

Our Observatory Telescopes by Andrew Wood

With the ongoing work on the club Observatory nearing completion, it should be operational within the next couple of months. The mount, an iOPTRON CEM 120, is currently installed on the pier in the centre of the Observatory.

The telescopes purchased for this mount are:

1A Skywatcher EVOSTAR ED72 Guidescope
2A Skywatcher Espirit 100mm Super Apochromatic Refractor
3A GSO RC14-A Carbon Truss Ritchey- Chrétien telescope

While most of us will be familiar with telescopes such as refractors, Newtonian reflectors and Schmidt-Cassegrains; and possibly Maksutov Cassegrains, the Ritchey-Chrétien design may not be so well known.

You may have heard of ChatGTP: an Artificial Intelligence program now widely in use to generate quick information about, well, nearly anything. I used ChatGTP to generate information about the Ritchey-Chrétien telescope design.

[Start ChatGTP]
A Ritchey-Chrétien telescope is a type of reflector telescope that uses two hyperbolic mirrors to gather and focus light. It is named after its inventors, George Willis Ritchey and Henri Chrétien. The design of the Ritchey -Chrétien telescope is specifically optimized for a wide, flat field of view and minimal optical aberrations, making it popular for professional astronomical observations and astrophotography.

The primary mirror of a Ritchey-Chrétien telescope is hyperbolic in shape, and the secondary mirror is also hyperbolic but smaller in size. These mirrors work together to correct for optical aberrations such as coma and spherical aberration, resulting in a high-quality image across a larger field of view compared to other telescope designs. The hyperbolic mirrors also help to minimize off-axis astigmatism.

Ritchey-Chrétien telescopes are commonly used in many professional observatories around the world, as they offer excellent image quality over a wide field of view. Their design is particularly useful for capturing detailed images of faint deep-sky objects, such as galaxies and nebulae. They are also employed in various scientific applications outside of astronomy, including satellite tracking and laser ranging.

Overall, the Ritchey-Chrétien telescope design combines the advantages of a reflector telescope (light-gathering ability) with the benefits of corrected optics, making it a popular choice for advanced astronomical research and imaging.
[End ChatGTP]

Our Observatory Telescopes by Andrew Wood

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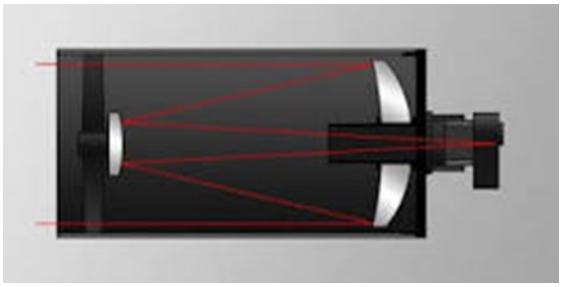
With the ZWO ASI183MC-P Cooled Colour CMOS Camera attached, we can look forward to images from the telescopes in the Observatory appearing on the screen in our meeting room.

The Ritchey- Chrétien telescope. Both the Primary and secondary mirrors are hyperbolic.

Ref: https://starizona.com/blogs/tutorials/ritchey-chretiens



Andrew Wood

More Club News

The AGM was held at the May 2022 monthly meeting. Elected officials for 2022- 2023
The 2021 AGM has been postponed due to Covid.

Executive
President: Mark Town
Vice President: John Gould
Secretary : Andrew Wood
Treasurer: Frank Gross
Public Officer; Frank Gross

Operation Positions
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Observation Officer: Robert Turnbull
Editor: Kaye Johnston
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Equipment Officer:Vacant

Committee General Members:
Freya Bates,
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Chris O'Hanlon,

Check out the Astro Flyer on the web site: www.shoalhavenastronomers.asn.au

Shoalhaven Astronomers PO BOX 1053 Nowra NSW 2541	**The deadline for Articles for the Astro Flyer is The First Friday of the Month.** **Editor Kaye Johnston**