



NEWSLETTER MARCH 2018

NEXT MEETING

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 28 March at 19h15.

Programme:

- **Beginner’s Corner:** “The Sun” by Johan Moolman.
- **What’s Up?** by Percy Jacobs.

----- 10-minute break — library will be open. -----

- **Main talk:** “Blue moons” by Michael Poll. *
- **Socializing over tea/coffee and biscuits.**

The chairperson at the meeting will be Fred Oosthuizen.

* See page 5 for a summary of his talk.

NEXT OBSERVING EVENING

Friday 23 March from sunset onwards at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road.

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Astronomy- related articles on the Internet

- **Wandering rogue moons may be as common as stars.** Rogue moons, torn from their planets and flung outward to drift through space, may be as common as stars in the Universe, a new study finds. <https://www.space.com/40016-rogue-exomoons-may-be-common.html>
- **Jupiter storm blooms in rosy photo by NASA probe.** Citizen scientists processed this color-enhanced image of a Jupiter storm using data captured by the JunoCam imager aboard NASA's Juno spacecraft. <https://www.space.com/40010-jupiter-rose-photo-juno-citizen-scientists.html>
- **Meet 'Steve,' the aurora-like mystery scientists are beginning to unravel.** "Steve," is an aurora-like phenomenon documented by citizen scientists as it streaked across the sky in western Canada. <https://www.space.com/39968-steve-aurora-mystery-explained.html>
- **Books and black holes: Stephen Hawking's language helps us grasp the cosmos.** His popular book titled "A brief history of time" was a hit. <https://www.space.com/40005-stephen-hawking-black-holes-books.html>
- **Stephen Hawking's final paper proposes way to detect the 'Multiverse'.** His final research paper before his recent death could help astronomers find evidence that our Universe is just one among almost infinitely many other, different Universes in a larger "Multiverse" of Universes. It is a mind-boggling idea. <https://www.space.com/40025-stephen-hawking-final-paper-multiverse.html>
- **Stephen Hawking: Martin Rees looks back on colleague's spectacular success against all odds.** <https://www.space.com/39986-stephen-hawking-martin-rees-look-back.html>
- **Stephen Hawking never answered his 'most interesting' scientific question.** Robert McNees, a physicist at Loyola University in Chicago, said: "The black hole information paradox has been one of the defining questions for people working on quantum gravity. And, as it remains unanswered, I think it remains the most interesting question that Hawking raised." <https://www.space.com/39989-hawking-death-paradox-question-science.html>
- **How Stephen Hawking transformed our understanding of black holes.** <https://www.space.com/39988-black-hole-mysteries-stephen-hawking.html>
- **Stephen Hawking's most intriguing quotes on the future of humanity, aliens and women.** <https://www.space.com/39974-stephen-hawking-quotes.html>
- **A brief history of Hawking's scientific legacy.** https://pursuit.unimelb.edu.au/articles/a-brief-history-of-hawking-s-scientific-legacy?utm_source=newscientist&utm_medium=edm&utm_content=hawking_march20_topstory&

Astronomy-related images and video clips on the Internet

- **See video clips about Oumuamua, our 1st known interstellar visitor.** <https://www.space.com/40020-oumuamua-interstellar-object-binary-star.html>
- **Declassified military video shows 'UFO' off east coast.** <https://www.space.com/39961-pentagon-aliens-investigation.html>
- **Earth from space: the amazing photos by the GOES-16 satellite.** <https://www.space.com/35422-amazing-earth-from-space-photos-by-goes-16.html>

Chairman's report for meeting 28 February 2018 - by Danie Barnardo

The meeting was opened at 19:15 and after members were welcomed, the two upcoming events were advertised:

- Viewing at the Diocesan School for Girls (DSG) on Friday 9 March (contact Michael Poll)
- The Deelfontein Northern Star Party in the Vredefort Dome from 13 to 15 April (details on the ASSA Pretoria Centre website).

The speakers were introduced:

- Michael Poll will talk to us about Nebulae (Beginners Corner)
- Bosman Olivier will present What's Up
- Johan Smit will tell us about telescopes (Main Talk).

Michael gave a very good overview on Nebulae. He started with an overview of the Catalogues which list the most important nebulae. He then dwelt on the main classes of nebulae, giving examples of each:

- Those that can be resolved into stars (Open Clusters and Globular Clusters)
- Those that cannot be resolved into stars (Reflection Nebulae, Emission Nebulae, Supernova Remnants and Dark Nebulae).

Bosman outlined the main objects that are visible during March 2018, subdividing the objects into Naked Eye objects, Binocular objects and Telescopic objects.

After an interval of about 15 minutes, Johan was introduced as the main speaker. His subject was: Basis Optics applied in telescopes. He started off by explaining the purpose of a telescope: The prime function of all telescopes is to collect light from a distant object and to focus an image of that object on the retina, a photographic plate or a CCD camera with as little distortion as possible. He next dwelt on the three main types of telescopes: Reflecting, Refracting and Catadioptric and then described the principles of these three types. He also dwelt on spherical and chromatic aberration and their various problems in telescopes and on different types of glass used in telescopes.

He then followed this with a description of resolving power, pointing out that the human eye is the perfect optical system, and how to get the most out of your telescope. He explained the subject of magnification and how to determine the magnification according to the focal length of a lens/mirror, pointing out that magnification is not the end all and be-all of a telescope, but rather its light-gathering ability. He also described the issue of the Airy disc and how this affects focus as well as the principles behind field of view, resolution, contrast and definition. He also dwelt on binoculars and the problems associated with the different types of prisms and on how to select the best pair of binoculars.

After an excellent talk, the meeting was adjourned at about 21:45 and the members were invited to continue discussions over tea/coffee and biscuits.

Issuing from this talk two items are available on the ASSA Pretoria Centre website:

- Guidelines to practical magnification for various purposes and
- An Excel spreadsheet which can be used to determine the magnification obtainable for a specific telescope and eyepiece combination and which are the best and most useful combinations of telescope and eyepiece. Ω

Observing: Two close companions, NGC 6520 and Barnard 86 - by Magda Streicher

The dense Sagittarius Milky Way, what we call the Sagittarius Star Cloud, is home to two striking, diverse objects situated quite tightly together in astronomical terms. In combination these two objects display the proverbial pitch black and snow white.

NGC 6520, an open star cluster, and the nearby dark nebula Barnard 86 exhibit an unusual contrast that can truly be classified as one of the Milky Way jewels. The cluster is well defined and stands out very well against the dense starry field, with approximately 25 stars that vary between magnitude 10 and 13. The young cluster displays the blue-white stars of its youthfulness a mere 8,5 arc-minutes east of the dark nebula B 86, which in all likelihood formed part of the cluster's development process.

Through an ordinary telescope with high power the dark nebula displays softer, rounder edges with a flimsy part stretching out to mingle with the southern part of the cluster. The nebula spans about 5' in size, with the prominent magnitude 6,6 (HD 164562) on the nebula's north-western side. The dark nebula is composed of cold gas and a small amount of dust. Pictures taken with the Gemini Multi-object spectrograph show the dark nebula in the shape of a gecko, so to speak. In some ways B 86 resembles a top hat, almost box-shaped, with its brim cut off towards the north-west against the background star field. This dark nebula is believed to contain enough material to create a few thousand suns like our own, and the cluster could both be approximately 5 000 light years distant, with the galactic centre 5 times further away.

Working at Mount Wilson Observatory California, Edward Emerson Barnard (1857–1923) used wide-field lenses and the 24-inch Bruce telescope to take superb photographs of the Milky Way. They showed dark cloud structures, rifts and holes where there were only few stars visible. Barnard compiled a catalogue of the more prominent dark clouds, called *Atlas of Selected Regions of the Milky Way*, which was published in 1927.

In search of a bit of contrast in your life? Search out this pair of exceptional objects – they promise not to disappoint. Ω

Object Name	Type	RA	Dec	Magnitude	Size
NGC 6520	Open Cluster	18h03m.4	-27°54'	7.6	6'
B 86	Dark Nebula	18h03m.0	-27°53'	5.0	5'



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NOTICE BOARD

- ◆ **Free download.** *The Annual Space Transportation Compendium 2018.*
https://drive.google.com/file/d/1qIDSpq4d7JEtg-xYKOP2_wlVNjg9wXOU/view
- ◆ **Old newsletters:** All old newsletters from January 2004 onward are on our website. They contain a record of our Centre's activities as well as astronomical information.
- ◆ **Database:** Members are reminded that a database of the books in our library is to be found on our website.

Feature of the month: Planets far beyond our galaxy discovered

This is an incredible discovery. The newly discovered planets range from the size of the moon to the size of Jupiter, and their galaxy is 3.8 billion light years away from our own. The late Carl Sagan would have been ecstatic. Read more and see a video clip at:

<https://www.msn.com/en-za/news/techandscience/planets-far-beyond-our-galaxy-discovered-for-the-first-time-by-astrophysicists/ar-BBI8KI?ocid=spartandhp>

Summary of Main Topic for March 28th 2018: "Blue Moons"

In each of the months of January 2018 and March 2018 there were to be two Full Moons. Since the 1980s, the second Full Moon in a month has been popularly called a Blue Moon, but the "Blue Moon" expression, with different meanings, has actually been around since the 1520s when it was written in a religious pamphlet at the time of the Protestant Reformation. The presentation will look at the circumstances that led to its first being used and then will describe a number of other meanings that have evolved over the centuries.

There will be an in-depth look at an error in the March 1946 issue of Sky and Telescope which led to the rise of the current "two-full-moons-in-a-month" meaning.

The pattern of Full Moons in 2018 will repeat in 2037, a period of 19 years known as the Metonic Cycle. This Cycle will be explained and compared with the Saros Cycle.

This presentation was made several years ago as a Beginner's Corner item, but it has been revised and updated with the incorporation of additional material. Ω

Astronomy basics: Ocean's tides explained

<https://www.youtube.com/watch?v=3RdkXs8BibE>

February 23rd 2018 observing evening report - by Michael Poll

On July 18th 1783 the naturalist Gilbert White wrote “The country people began to look with a superstitious awe at the red luring aspect of the Sun... and indeed there was reason for the most enlightened person to be apprehensive”. White wrote about “a sickly opalescent fog”, and frosts at night. He said that these “horrible phenomena” had been going on for a month.

Benjamin Franklin, US Ambassador in Paris, wrote: “During the summer months of 1783..... there existed a constant fog over all Europe. This fog was of a permanent nature; it was dry, and the rays of the sun seemed to have little effect towards dissipating it, as they easily do a moist fog, arising from water. [The sun’s rays] were rendered so faint in passing through [the fog] that when collected in the focus of a burning glass, they would scarce kindle brown paper”. In Europe the following winter temperatures plummeted.

In Iceland the fog was blue and acrid, and devastated that year’s crops. Famine killed 25% of Iceland’s population, and 75% of the livestock died.

The fog was the result of one of Iceland’s volcanoes, Laki, erupting 14 km³ of lava. The ground hugging blue fog was probably an aerosol of sulphuric acid, formed when sulphur dioxide reacted with moisture in the air. During the eruption, fluid basalt filled the valleys, and quietly pumped volatiles into the atmosphere. Stephen Drury describes the fog as “Fumes from the Engine Room”. Because the lava and gas issued quietly, the natural pollution entered only the lower atmosphere, and the resulting aerosol reflected the sun’s rays.

Among the many amazed observers of these phenomena was 10-year old Luke Howard. Howard’s biographer, Richard Hamblyn wrote “He had experienced nothing like it before, an entire summer filled with inexplicable skies ... [which] gave definition to his early ideas”. For it was Howard who went on to classify and identify clouds and give them names. In 1803 he proposed a simple scheme of classification.

Howard was not the first to try and classify the clouds, but his breakthrough was to name them in Latin, the language of science. He used four terms: “cirrus”, “cumulus” “stratus” and “nimbus”. By using the first three in various combinations, he defined seven key cloud forms – he called them “modifications”. Some of his terms are still in use today. [In Latin, Cirrus is a “curl” Cumulus a “heap”, Stratus is “strewn”, and Nimbus is a “cloud”]

The point of this essay is that, at our observing evening of February 23rd, there was only Michael and Rudolph there to admire some of Luke Howard’s stratus clouds.

References:

“Stepping Stones” by Stephen Drury (1999).

Oxford University Press

“The wrong kind of snow” by Antony Woodward & Robert Penn (2007) *Hodder & Staughton*. Ω

Some feedback from the symposium at SAAO Headquarters in Cape Town 9 to 11 March 2018 – by Pierre Lourens

The theme – **Amateur Astronomy in the Digital Data Age** – has been chosen to promote the link between professional and amateur astronomers. The advance of astronomical technology with large surveys has largely robbed the amateur community of many of the niche areas where it used to uniquely contribute to science: variable and double star work, comet discovery, supernova discovery, etc. However, the advantage of these large scale surveys means that there are many more opportunities for amateurs to monitor identified sources for extended periods of time.

Several ASSA members are collaborating with professionals and it is hoped that the ASSA Symposium 2018 will make for new links and understanding by bringing together prominent experts and amateurs.

I present some topics and web links below to introduce you to the world of astronomical data, so that you can do your own data mining. Most topics were presented at the symposium, but some are ones I happened to stumble upon. You should take it from there yourself. “You can lead a horse to water, but you cannot make it drink.”

One message at the symposium was that ever more astronomical data will be put on the Internet in future, with ever more opportunities for citizen science.

- **Astronomy & Data Science Toolkit.** The focus of the toolkit is to provide high quality teaching materials. It is aimed at specifically connecting the fields of astronomy and data science. <https://datascience.astro4dev.org/>
- **The 64-dish MeerKAT radio telescope**, which will eventually be incorporated into the SKA, will start on 18 projects this year. There are exciting times ahead! Masses of data will be gathered and put on the Internet for access by amateurs. Watch their website at:
<http://www.ska.ac.za/gallery/meerkat/>
- **The Galaxy Zoo.** Amateurs can help professionals to explore galaxies. <https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/>
- **Finding supernovas.** Catalogues of galaxies on the Internet can be searched. See <http://vizier.u-strasbg.fr/viz-bin/VizieR-2>
https://archive.stsci.edu/cgi-bin/dss_form
<http://simbad.u-strasbg.fr/simbad/>
- **CosmoQuest.** NASA offers several citizen science projects involving the use of their large data archives about the solar system. <https://cosmoquest.org/x/>
- **SETI@Home.** You can participate by running a free program that downloads and analyzes radio telescope data, searching for extraterrestrial intelligence.
<http://setiathome.ssl.berkeley.edu/>
- **BOINC - compute for science.** BOINC is a free program that lets you donate your idle computer time to many science projects, not only astronomy.
<http://boinc.berkeley.edu/>
- **Planet Hunters.** They are enlisting the public's help to inspect the light curves recorded by spacecraft Kepler and find the planets missed by automated detection algorithms. <https://www.planethunters.org/>
- **Citizen science on Hubblesite.** Get involved in the research and participate with the teams analyzing space data. http://hubblesite.org/get_involved/citizen_science/
- **Data gathered by the Pan-STARRS observatory and others.**
http://hubblesite.org/news_release/news/2016-41
http://hubblesite.org/news_release/news/2016-44

Other opportunities for amateurs

Apart from data mining, there are other opportunities for amateurs to contribute to astronomical knowledge.

- **Variable star observing** still presents a lot of opportunities for amateurs. There are literally millions of stars to observe, far too many for professional astronomers. On the website of the AAVSO are tutorials and observing manuals, data analysis software and more. The AAVSO also publishes a journal. See <https://www.aavso.org/>
- **Exoplanet observing by amateurs.** You can download a free e-book on the topic from http://www.brucegary.net/book_EOA/EOA.pdf Jose da Silva, a member of the Pretoria Centre, gave a presentation on this topic. You can contact him at dasilva.jose@rocketmail.com
- **Tracking sky-glow.** See the attachments sent with this newsletter.
- **The Global Jet Watch Project.** Amateurs can contribute to knowledge of black holes by observing the optical spectra of black holes. <https://www.globaljetwatch.net/>
- **Astronomical spectroscopy.** Percy Jacobs of the Pretoria Centre spoke about this. If you are interested, you can contact him at percymj@iafrica.com
- **JUPOS.** JUPOS is an amateur astronomical project. The aim of JUPOS is to collect precise positions of jovian cloud features, to analyse them in drift charts, and to examine if and how their movements change in time. You can also download a software tool named WinJUPOS. <http://jupos.privat.t-online.de/index.htm>
- **Meteors, meteor streams and comets.** Tim Cooper spoke about these. He has cameras set up at different places over the Witwatersrand to study them. If you would like to participate, you can contact him at tpcoope@mweb.co.za

Have you any ideas?

- **Converting photographic plates and written notes into digital form.** At SAAO Headquarters in Cape Town are 10 000 photographic plates of the night sky and accompanying written notes in 1 000 books, all stored in an archive. The problem is how to convert all this data into modern digital form. Auke Slotegraaf spoke about this. Volunteers are needed to do the work. We can't be volunteers, because we don't live there. But if you have any ideas, you can contact him at auke@psychohistorian.org
- **The bicentenary of the Royal Observatory at the Cape of Good Hope.** This observatory was established in 1820. A large public event is planned at SAAO Headquarters in Cape Town in October 2020. Plans are: repair and maintenance of the old facilities on the site; tours of the site by visitors; the establishment of a dedicated visitors centre; an international conference coinciding with the event. However, all plans are funding dependent. Dr Daniel Cunnama is spearheading this venture. He will try and obtain funding from the NRF (National Research Foundation), whose offices are situated immediately south of the CSIR recreation centre in Pretoria. But he has to be a diplomat. If the venture looks too much like a white colonial enterprise to the managers at the NRF, funding will not be forthcoming. He also made a call for volunteers to help. If you have any ideas about the matter, you can contact him at daniel@saao.ac.za

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