The PRETORIA CENTRE
of the
Astronomical Society of Southern Africa
www.pretoria-astronomy.co.za

NEWSLETTER JANUARY 2019

NEXT MEETING

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 23 January at 19h15.
Programme:

- **Beginner's Corner:** "Uses of 3D printing in astronomy" by Johan Smit.
- **What's Up?** by Michael Poll.

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

- **Main talk: "Plans with the Astrophotography Section of ASSA and techniques of astrophotography" by Martin Heigan. ***
- **Socializing over tea/coffee and biscuits.**

The chairperson at the meeting will be Bosman Olivier.
***** Martin Heigan is the newly appointed Director of the Astrophotography Section of ASSA.

NEXT OBSERVING EVENING

Friday 18 January 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.

TABLE OF CONTENTS

Astronomy-related articles on the Internet

Scientists are 99% sure there's a huge exoplanet very close to our solar system. A newly published paper combines 20 years of research to conclude with 99 percent confidence that Barnard's star - a small red dwarf only 6 light-years away - has a planet that's roughly three times the size of Earth. https://www.livescience.com/64089-new-super-earth-discovered-at-closest-star.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20181118-ls

Gaia spots enormous ghost galaxy on Milky Way's outskirts. Gaia satellite data has revealed a dwarf galaxy hidden behind the shroud of the Milky Way's disk. https://earthsky.org/space/gaia-spots-ghost-galaxy-near-milky-way?utm_source=EarthSky+News&utm_campaign=754e4fe70c-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-754e4fe70c-394671529

Scientists discovered an energetic "cosmic serpent" in our galaxy. This triple star system is made up of a binary star system and a single star – all Wolf-Rayet stars - which are rotating around each other, surrounded by serpentine dust swirls. One day, they will all end up with a bang and release a powerful gamma-ray burst. https://www.msn.com/en-za/news/techandscience/scientists-discovered-an-energetic-"cosmic-serpent"-in-our-galaxy/ar-BBPTNZR?ocid=spartandhp&pfr=1

Prehistoric cave art suggests ancient use of complex astronomy. https://earthsky.org/human-world/prehistoric-cave-art-suggests-ancient-use-complex-astronomy?utm_source=EarthSky+News&utm_campaign=229dcdbf28-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-229dcdbf28-394671529

Fireball that exploded over Greenland shook Earth, triggering seismic sensors. The meteorite disintegrated over a point on the Greenland ice sheet near the Humboldt glacier. https://www.livescience.com/64291-greenland-fireball-seismic-recordings.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20181213-ls

Newfound object is the farthest solar system body ever spotted. https://www.livescience.com/64335-farthest-solar-system-object-discovery.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20181220-ls

Timelapse of Beta Pictoris b. Sequence of images from ESO's SPHERE instrument, showing the passage of exoplanet Beta Pictoris b into the glare of its star and then, two years later, re-emerging.https://earthsky.org/space/timelapse-images-exoplanet-beta-pictoris-b?utm_source=EarthSky+News&utm_campaign=0fd44aac4e-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-0fd44aac4e-394671529

Large and Small Magellanic Clouds collided! The motions of stars in the Small Magellanic Cloud – as revealed by the Gaia space observatory – show that this small satellite galaxy of our Milky Way collided in the past with its larger neighbour, the Large Magellanic Cloud. https://earthsky.org/space/collision-confirmed-large-small-magellanic-clouds?utm_source=EarthSky+News&utm_campaign=31217129b4-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-31217129b4-394671529

TESS planet-hunter achieves 1st light. TESS is the successor of Kepler. TESS will observe a much larger part of the sky than Kepler. https://earthsky.org/space/tess-planet-hunter-achieves-1st-light?utm_source=EarthSky+News&utm_campaign=5a83fb793a-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-5a83fb793a-394671529

Astronomy-related images and video clips on the Internet

Huge meteorite crater discovered under Greenland ice. https://earthsky.org/earth/meteorite-crater-under-greenland-ice?utm_source=EarthSky+News&utm_campaign=c8e271469d-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-c8e271469d-394671529

Juno mission to Jupiter at halfway point. See images of Jupiter. https://earthsky.org/space/nasa-juno-mission-halfway-dec2018?utm_source=EarthSky+News&utm_campaign=04d60ec2ad-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-04d60ec2ad-394671529

Spacecraft spies ice-filled Mars crater. Korolev Crater is about 82 km across and 2 km deep. It is located in the northern lowlands of Mars. It is covered by water ice that persists year-round. The central part of the ice is 1.8 km thick. ESA's Mars Express orbiter acquired images of it. https://earthsky.org/space/mars-express-sees-ice-filled-korolev-crater-on-mars

Ultima Thule seen in detail. https://earthsky.org/space/new-horizons-encounter-ultima-thule-jan-1-2019?utm_source=EarthSky+News&utm_campaign=7aaa07436a-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-7aaa07436a-394671529

Spacecraft orbits tiny Bennu, breaks record. https://earthsky.org/space/osiris-rex-goes-into-orbit-bennu-breaks-record?utm_source=EarthSky+News&utm_campaign=7aaa07436a-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-7aaa07436a-394671529

Astronomy basics: Seven ages of starlight

Watch an excellent, 1½ hour long popular level educational documentary about seven stages in the evolution of stars. **Ω**

https://documentaryheaven.com/seven-ages-of-starlight/

Feature of the month:
Thousands of globular star clusters scattered between galaxies

Peering into the heart of the giant Coma cluster of galaxies, the Hubble Space Telescope captured a whopping 22 426 globular star clusters scattered among the Coma cluster's 1 000 galaxies.

https://earthsky.org/space/globular-star-clusters-coma-galaxy-cluster-hubble **Ω**

Observing: A remote globular cluster in Delphinus - by Magda Streicher

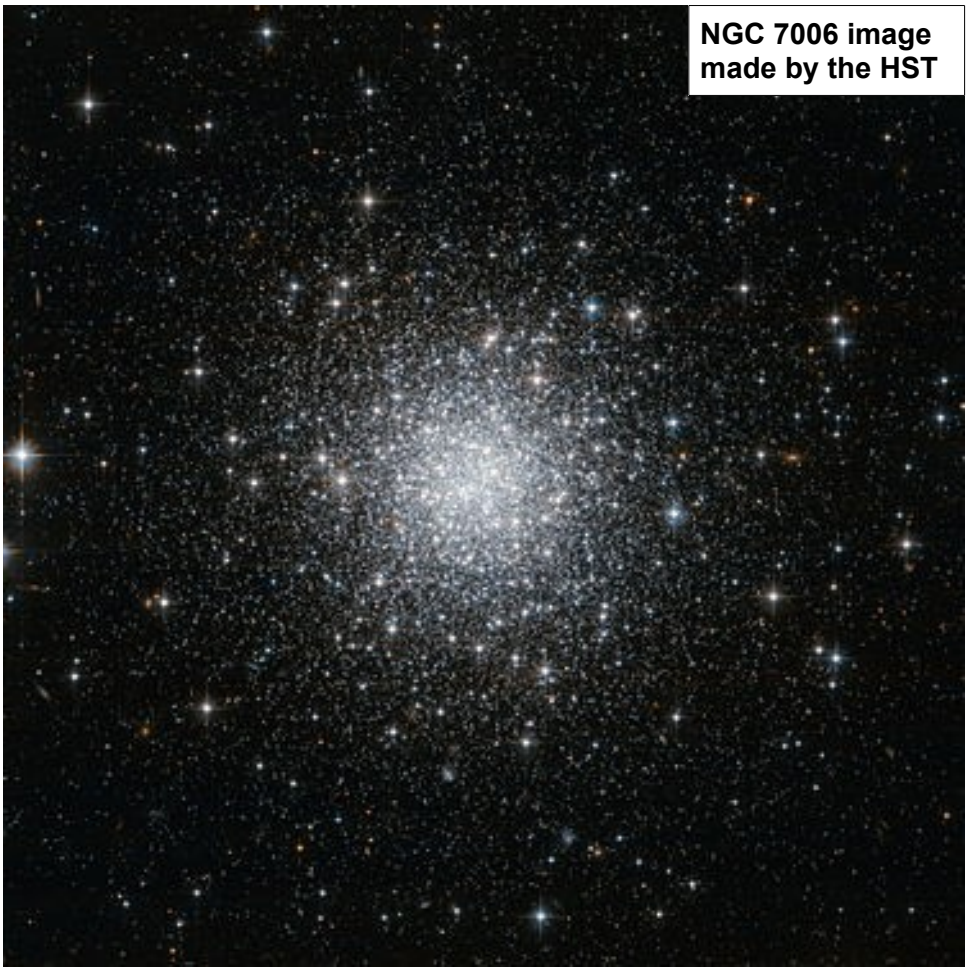
Delphinus, one of the smallest constellations, is an asterism-shaped constellation quite outstanding against the northern night sky. The Italians call it Delfino; the Germans call it their Delphin, which was regarded then as the most remarkable of marine creatures.

The globular cluster NGC 7006 in the constellation is regarded as one of the most distant and remote globular clusters, being situated approximately 120 000 light-years away from us, and about 180 000 light-years from the galactic centre of the Milky Way and was once thought to be drifting as a distant object on the outskirts of the galaxy. NGC 7006 was first picked up in 1784 by William Herschel, who noted it as a small, faint, object, difficult to spot.

To me the globular appears as a small, washed-out, fuzzy haze, growing slowly brighter towards a core that is itself not very bright. In a way it looks more like a planetary nebula rather than a globular cluster. The only stars resolved are twin magnitude 14 stars on the southern periphery of the globular, with a field of view filled with pin-point stars. Larger telescopes and higher power may reveal a clumpy appearance and mottling with some sort of structure, but I doubt whether any starlight can be resolved in amateur instruments. Just north of the globular cluster in the field of view a string of stars swings out towards the west, most of them yellow in colour. A few background galaxies are situated in the south-western field, but are far too faint even to glimpse.

Just the thought of an object of this magnitude sometimes leaves us totally astounded at how truly huge the universe with all its wonderful objects is. **Ω**

Name	Object	RA	Dec	Magnitude	Size
NGC 7006	Globular	21 h 01.5 m	+16° 11’ 02”	10.6	2.8’



NGC 7006 image made by the HST

November 23rd 2018 observing evening report
- by Michael Poll & Danie Barnardo

There was high cloud and full moon, so observing opportunities were limited. Nevertheless, we had an entertaining and enjoyable evening. Danie, Michael and Greg were there early on and then came a few visitors, so we were about a dozen in all, including Amy who there again with her toddler, Steve who is in South Africa from the UK, and Adila. Also Melody and her son, Caleb accompanied by a friend arrived a little later with a telescope she hsd bought for her son. Danie helped them assemble the scope and showed them the basics of use. Caleb seems to be very interested in the hobby and we hope to see them again. Another visitor, an electronics engineer from Rwanda, working at a local cell phone company, was also present. Danie had a very interesting talk with him and he promised to join the club. Sure enough, he came as a visitor at the meeting on 28 November.

Apart from the Moon, only Saturn and Mars, and four stars only were easily seen with the naked eye: the stars were Canopus, Achernar, Fomalhaut, and later on, Rigel. In between the clouds, all the visitors were impressed by the telescopic sight of Saturn, which some were seeing for the first time. It was mentioned to Steve that Saturn has been passing overhead at our latitude, but from the UK for the current apparition it only scrapes the southern horizon.

We were able to show the Moon through the hazy cloud – the clouds acting as a "Moon Filter". We were able to point out Grimaldi, (the darkest spot on the Moon) and, between Grimaldi and the limb, Riccioli – showing that this was a favourable libration to see these two craters. Other craters shown were Aristarchus, Copernicus, and Tycho, also we pointed out Mare Crisium.

Discussions we had were many and varied. We explained the use of the Skymap, did a bit of practical with finding Canopus and Achernar, and gave out the website address. There was talk about the angle of Saturn's spin axis, and the effect it had on the visibility of the rings. It was noted that the tilt of Saturn's spin axis is similar to that of the Earth – 26° and 23½° respectively. It was also explained that, at this time of year, there are not many bright stars in the sky, because the south pole of spin axis of the Milky Way passes almost exactly overhead at our latitude, so that the Milky Way itself, with its bright objects, runs around the horizon. Pluto is the subject of the main topic at our next formal meeting so we had a discussion about Trans Neptunian Objects, and Pluto in particular and explained why Pluto is no longer classified as a planet (it has not cleared its orbit as there are about 100 other objects in a similar orbit – the objects in this group are called Plutinos). **Ω**

Summary of coming presentation on 23 January under "What's Up?" - by Michael Poll

In the morning sky:

- The Moon will be near Venus and Jupiter on January 31st and February 1st
- The Moon will be near Saturn on February 2nd and near Jupiter again on February 27th.
- Venus will be close to Saturn on February 18th.

In the evening sky:

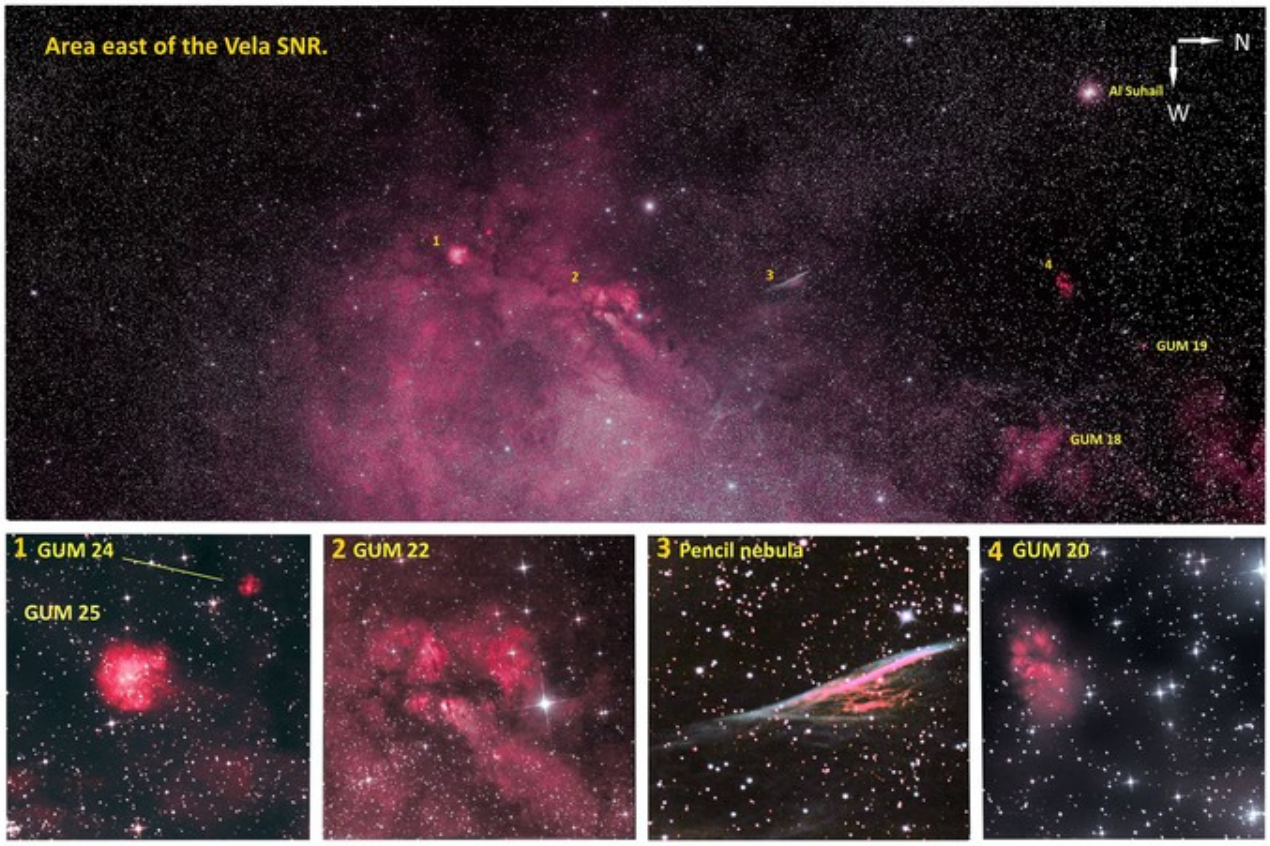
- The Moon will be close to Mars (and Uranus) on February 10th, and close to Aldebaran (in Taurus) on February 13th & 14th.
- Mars and Uranus will be close together on February 13th, when they will be 59 arc minutes (59') apart (i.e about two Moon diameters).
- On the night of February 16th – 17th the Moon will occult (i.e pass in front of) the star Delta Geminorum (magnitude 3.5). The times given for Johannesburg are: disappearance 23h44 on the 16th, reappearance 00h51 on the 17th.

Also to be discussed:

- The Moon's perigee and apogee. The full moon of February 19th is the closest full moon of 2019, one reference gives the distance from the Earth at the moment of full moon as 356 846 km, centre to centre. Minimum perigee and maximum apogee figures will be noted.
- The constellations of Aries and Triangulum will be highlighted.
- The sunspot cycle – the current cycle (Cycle 24) is winding down, and sunspots belonging to Cycle 25 have been seen. The prolonged minimum between Cycles 23 and 24 will be reviewed, as will the amount of activity in Cycle 24. **Ω**

NOTICE BOARD

- **Two new astronomy projects for citizen scientists:**
  1. **Local Group Cluster Search.** https://www.zooniverse.org/projects/lcjohnso/local-group-cluster-search?utm_source=Newsletter&utm_campaign=announce10jan2019
  2. **The COSMIC project** (**C**ontent-based **O**bject **S**ummarization to **M**onitor **I**nfrequent **C**hange) aims to identify and isolate surface features on Mars. https://www.zooniverse.org/projects/wkiri/cosmic?utm_source=Newsletter&utm_campaign=announce10jan2019
- **Beanies.** Beanies will be offered for sale @ R40.00 each at every monthly meeting, until they are sold out.
- **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.



Area east of the Vela supernova remnant. Photographs taken by Johan Moolman at the Karoo Star Party 2017. Tele Vue 127mm, Canon 6D. The target identification was done with the help of Auke Slotegraaf.

Chairman's report for meeting 28 November 2018 - by Pierre Lourens

Under "Beginner's Corner" Johan Smit spoke about the summer constellations. He started with Aries, followed by Centaurus, Eridanus, Gemini and Taurus. In each case, he told the story from Greek mythology from which the name comes. Then he spoke about Sculptor, which contains the Sculptor galaxy. Next was Orion, the name of a boy his father, Hyrieus, prayed to Zeus for. He elaborated on Orion's adventures according to Greek mythology. Canis Major, Canis Minor and Lepus were all placed in the sky by Zeus near Orion, according to Greek mythology. A local story of Orion is also found among the Bushmen. Early in the morning in November, the Milky Way runs all around the horizon.

Under "What's Up?" Johan Smit showed in calendar form the things that will be visible in the sky on different dates, as in his summary. He showed an image in the October newsletter. He discussed the mythology behind M44 (the Beehive Cluster). He did this first for December 2018 and then for January 2019. He challenged us to try and see Sirius B aka "The Pup".

Under "Main Talk" Michael Poll spoke about Pluto. It was discovered in 1930 by Clyde Tombaugh at Lowell Observatory. Its current position is in Sagittarius. The New Horizons spacecraft imaged about 60% of Pluto's surface during its flyby of Pluto on July 14th 2015.

No rocks were seen on the surface Pluto, only ices of H_2O, CH_4, CO and N_2. The freezing / melting points of points of these ices are as follows:
H_2O : 0º C. CH_4 : -182º C. CO : -205º C. N_2 : -210º C. The freezing / melting points of the last three substances are close enough to the surface temperature of Pluto (which is around -230°C) that they can still flow. Water ice is as hard as silicates on the surface of the Earth and acts as a bedrock.

Images of Tombaugh Regio were shown. The western part of this region is called Sputnik Planitia and is about as big as South Africa. It consists primarily of nitrogen ice and shows a pattern of polygonal convection cells. It has no impact craters and so this is a very young surface. Sputnik Planitia also shows large areas of sublimation pits which are hundreds of metres across and tens of metres deep. The eastern part of Tombaugh Regio consists of bright pitted uplands with a high density of pits, up to 25 km across, and smooth plains up to 50 km wide between the pits. The ice here is proportionally more methane than nitrogen, although glaciers of nitrogen ice can be seen flowing from the uplands into Sputnik Planitia.

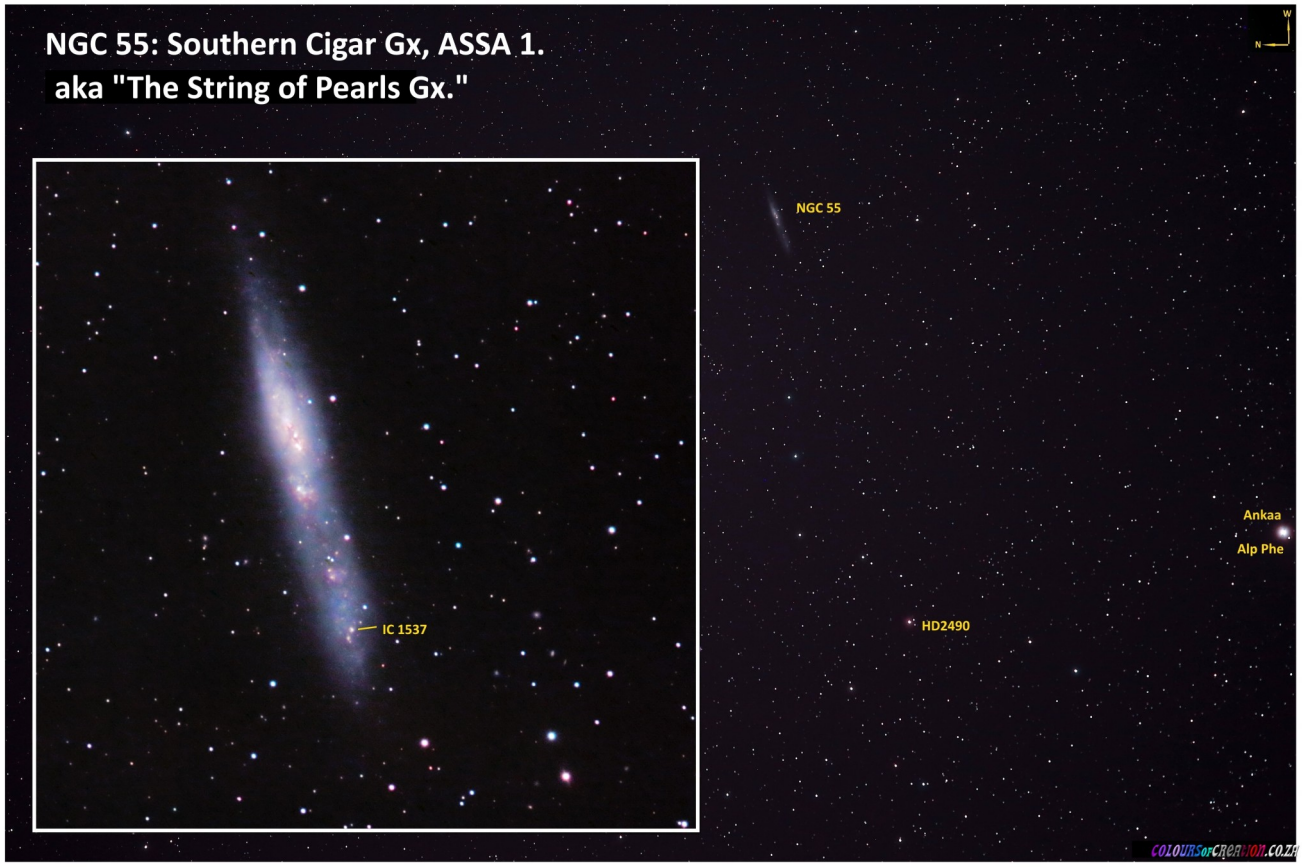
Eastwards of Tombaugh Region is an area of what is called bladed terrain in an area called Tartarus Dorsa. It has sharp spikes of methane ice several hundred metres high. Similar features, made of water ice and only a few metres high, are found in the Chilean Andes, and are called Penitentes. The 'spikes' form from sublimation of the ice under low atmospheric pressure.

There are mountains on Pluto up to 6000 metres high. Most of them are water ice, but there are one or two suspected cryovolcanoes. The Al Idrisi mountains to the north east of Sputnik Planitia look like jumbled blocks of water ice and are about 2 500 metres high. In the southern region of Sputnik Planum are Tenzing and Hillary Montes which rise to about 1 600 metres above the surrounding plains. Wright Mons (about 4 000 metres high) and Piccard Mons (about 6 000 metres high) are suspected cryovolcanoes. Piccard Mons has a central depression about 11 000 metres deep.

There are dark uplands on the surface of Pluto that stretch around the equator. The dark, brownish colouration is due to mantle of tholins which are substances formed when methane and nitrogen in the atmosphere interact with UV light and cosmic rays. The largest dark area, called Cthulhu Macula, is to the west of Sputnik Planum and to the east are five dark regions called informally "Brass Knuckles". The topography consists of a rough upland plateau interspersed with troughs and basins up to 20 km wide and 3 km deep.

Away from Sputnik Planitia, about 5000 impact craters have been identified on Pluto.

References include the October, November and December 2016 issues of "Sky and Telescope". **Ω**



The Southern Cigar aka the **String of Pearls Galaxy**. A Magellanic type barred spiral galaxy, lying about 7 million light years away in the constellation of Sculptor. Not to be confused with its northern counterpart, the **Cigar galaxy** aka **M82**, located in Ursa Major.

Wide field: Modified Canon 6D, Canon 200mm f2.0 lens, multiple exposures: 90 seconds, ISO 1600.

Inset: Modified Canon 6D, TeleVue 127 mm refractor with 2x t/c: 1320 mm f10.4; multiple 180 seconds exposures @ ISO 6400. Tracking: Celestron CGX mount and SBIG SG-4 auto-guider. Stacking in DeepSkyStacker. Pp adjustments to curves, levels, saturation and brightness as well as cropping, done in Paint.NET and Picasa.

Photographs and caption by Johan Moolman. **Ω**

Comet Wirtanen. Photographed by Barbara Cunow on 20 December 2018.

She writes: *"The image was obtained by taking 120 images with 5 s exposure time each. I used my DSLR on a tripod, a lens with 55 mm focal length with f/4 and 800 ISO. The Moon was very bright, I could not see the comet with binoculars because of the sky brightness, and I also could not see the comet on the individual images. It only became visible after I stacked the images."* **Ω**

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