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Cover caption

"Clyde's Spot", a newly emerged feature on Jupiter discovered by Clyde Foster (ASSA). See article page 37.

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Vol 79 Nos 5 - 6 **June 2020**

News Note: “Clyde’s Spot” – A rare outburst on Jupiter

By MissionJuno.com on 2020-06-30 UT

Fig 1: This image from NASA’s Juno spacecraft captures several storms in Jupiter’s southern hemisphere. Some of these storms, including the Great Red Spot at upper left, have been churning in the planet’s atmosphere for many years but, when Juno obtained this view of Jupiter, the smaller, oval-shaped feature at the centre of the image was brand new. Image credit: Image data: NASA/JPL-Caltech/SwRI/MSSS Image processing by Kevin M. Gill ©

The new feature was discovered by amateur astronomer Clyde Foster of Centurion, South Africa. Early on the morning of May 31, 2020, while imaging Jupiter with his telescope, Foster noticed a new spot, which appeared bright as seen through a filter sensitive to wavelengths of light where methane gas in Jupiter's atmosphere has strong absorption. The spot was not visible in images captured just hours earlier by astronomers in Australia.

On June 2, 2020, just two days after Clyde Foster’s observations, Juno performed its 27th close flyby of Jupiter. The spacecraft can only image a relatively thin slice of Jupiter's cloud tops during each pass. Although Juno would not be travelling directly over the outbreak, the track was close enough that the mission team determined the spacecraft would obtain a detailed view of the new feature, which has been informally dubbed “Clyde’s Spot.”

Another citizen scientist, Kevin M. Gill, created Fig 1 using data from Juno’s JunoCam instrument. This view is a map projection that combines five JunoCam images taken on June 2, 2020, between 3:56 a.m. PDT (6:56 a.m. EDT) and 4:25 a.m. PDT (7:25 a.m.

EDT). At the time the images were taken, Juno was between about 28,000 miles (45,000 kilometers) and 59,000 miles (95,000 kilometers) from the planet's cloud tops at latitudes of between about 48 degrees and 67 degrees south.

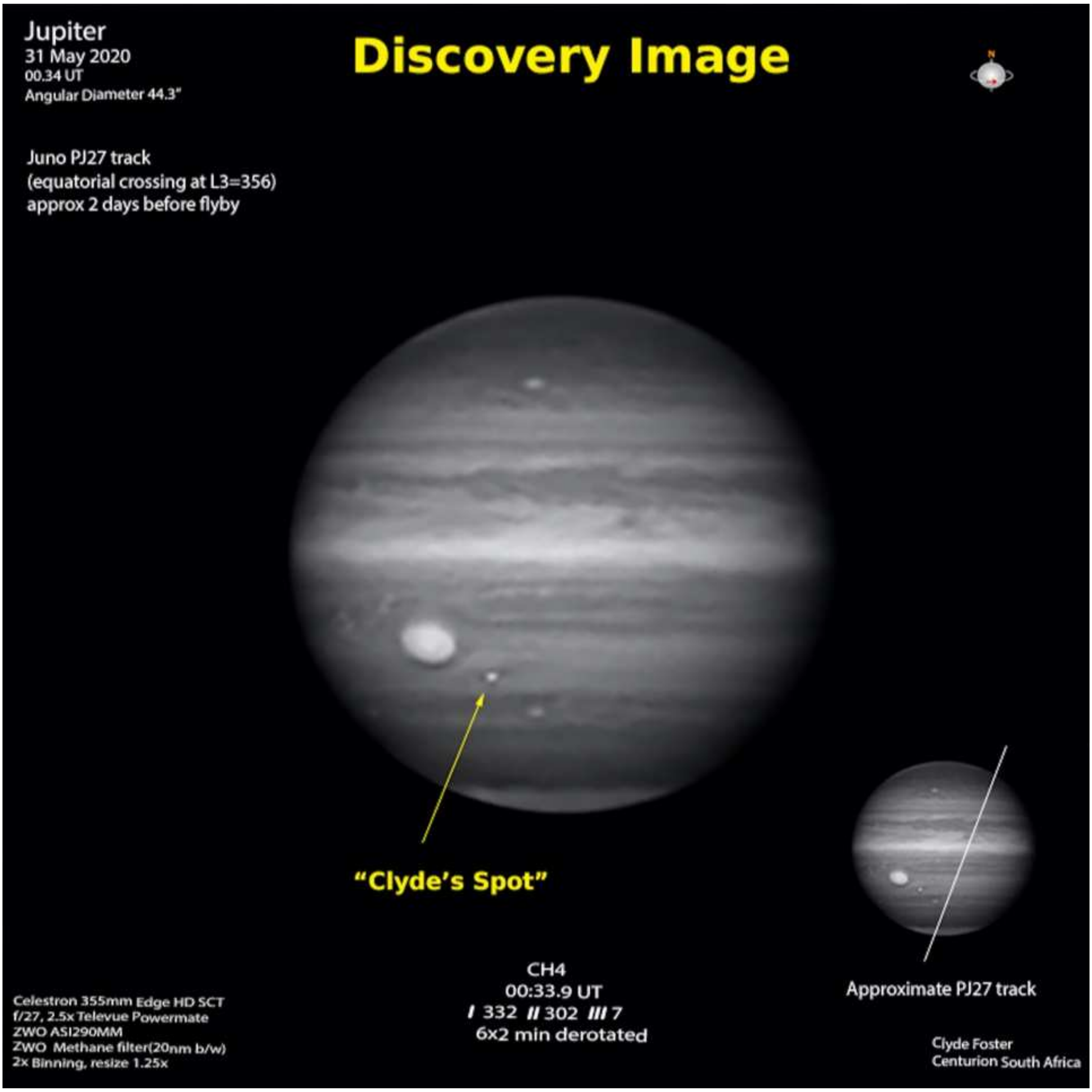

Fig 2: This image shows Jupiter as captured by Foster's telescope, and the Juno spacecraft's approximate trajectory as it zoomed close by the planet, travelling from north to south. (Credit C. Foster).

The feature is a plume of cloud material erupting above the upper cloud layers of the Jovian atmosphere. These powerful convective "outbreaks" occasionally erupt in this latitude band, known as the South Temperate Belt (JunoCam observed another outbreak at this latitude back on Feb. 7, 2018).

JunoCam's raw images are available for the public to peruse and process into image products at https://missionjuno.swri.edu/junocam/processing. More information about Juno is at https://www.nasa.gov/juno and https://missionjuno.swri.edu.

Clyde's Spot[1]

Clyde Foster - Shallow Sky Section Director, ASSA

Early on the morning of Sunday 31 May, whilst imaging Jupiter, the author noted a new spot, bright in Methane wavelengths, close to the Great Red Spot. The spot was not visible in images captured 10hrs earlier from Australia by Andy Casely. This would be identified as a vigorous plume of gaseous material erupting above the "normal" upper cloud layers of the Jovian atmosphere. These "outbreaks" are a regular occurrence in Jupiter's North and South Equatorial belts, but substantially rarer in this location, the South Temperate region, hence generating quite a bit of interest in the Pro-Am planetary community.

The term "Clyde's Spot" was initially coined by amateur planetary imager Paul Maxson from Arizona, and has been widely accepted and utilised in the Pro-Am planetary community as the current, albeit semi-formal designation (depending on developments, a more "formal" designation may be allocated in time).

However, what increased the level of excitement tremendously was that 2 days after this "discovery", the NASA Juno spacecraft was due to execute another of its 53-day close orbital flybys ("Perijoves", in this instance Perijove 27/PJ27). The spacecraft is only able to image a relatively thin slice of Jupiter's "surface", which varies on each flyby, and this cannot be changed. Remarkably, although Juno would not be travelling directly over the outbreak, the track was close enough that the mission team, by optimising the timing of the imaging, were able to capture the region and obtain incredible views of the new feature.

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My sincere thanks to the NASA Juno mission team for the wonderful and positive interaction over this period, in particular Glenn Orton, Candy Hansen and Tom Momary, to John Rogers of the BAA, Ricardo Hueso and Agustin Sanchez-Lavega at Bilbao University in Spain, and to my fellow planetary imagers that have committed time and effort to monitoring the development of the outbreak (and continue to do so) since its discovery. My thanks also to Kevin M Gill for his processing of the Juno data to produce a totally stunning final image.

[1] This article was written before we received the Junocam press release in the previous News Note and was kept because it includes extra background information.

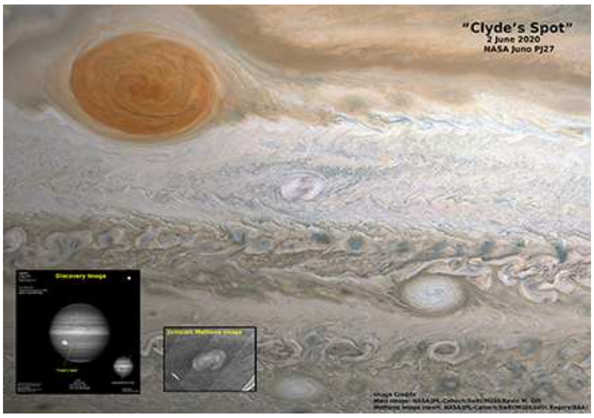


Fig 1. The main image in this mosaic is credited to Kevin M. Gill, who utilised 5 of the Juno images (it's moving fast - very fast!) to generate this stunning equirectangular map of the region. The Great Red Spot is beautifully captured at upper left, and the long lived anticyclonic oval S2-AWO A7 is at lower right. "Clyde's Spot", only 2 days old, shows fascinating structure directly in the centre of the image. The Juno mission team was also able to capture images in Methane wavelength (insert at lower centre), which, although containing some imaging/processing artefacts, also shows amazing structure. There is a copy of the original "discovery" image at lower left.

The author has submitted an abstract for an oral presentation on this subject at the upcoming EPSC 2020 conference that had been scheduled later this year in Granada, Spain, but will now be held as a virtual conference.

Editor: The next edition on MNASSA will carry fuller report on this remarkable achievement

News Note: Accreting pulsar caught 'powering up'

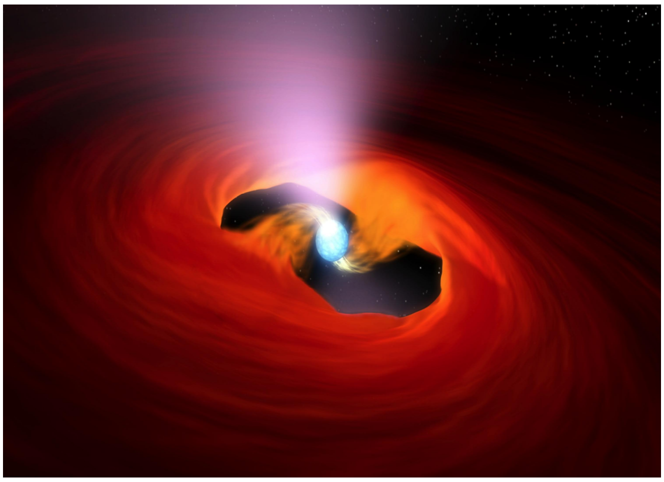


Fig 1. An artist's depiction of an accreting pulsar. Image: NASA

Observations across a range of wavelengths (optical, ultraviolet and X-rays) made in 2019, including those from the Southern African Large Telescope (SALT) have captured - for the first time - the powering up of the outburst from an accreting neutron star. It took 12-days for the accreted material to spiral onto the neutron star, triggering an X-ray outburst thousands of times brighter than our Sun.

The scientists observed an 'accreting' neutron star as it entered an outburst phase in an international collaborative effort involving five groups of researchers, seven telescopes (five on the ground, two in space), and 15 collaborators.

The telescopes involved include two space observatories: the Neil Gehrels Swift X-ray Observatory, and the Neutron Star Interior Composition Explorer (NICER) on the International Space Station; as well as the ground-based Las Cumbres Observatory network of telescopes and the Southern African Large Telescope (SALT).

Optical spectra obtained with SALT were crucial in demonstrating the powering-up observed on 6 occasions during August 2019. The first two observations showed it was very faint, while by the time of the third observation, on 6 August, is was clearly in outburst. This demonstrates the importance of flexible telescope scheduling that can quickly react to changing circumstances. SALT has made many advances in the study of compact objects, like neutron stars and black holes, including studies of the most energetic events in the Universe, like gamma-ray bursts and gravitational wave events.

It is the first time such an event has been observed in this detail - in multiple frequencies, including high-sensitivity measurements in both optical and X-ray. The physics behind this 'switching on' process has eluded physicists for decades, partly because there are very few comprehensive observations of the phenomenon.

The researchers caught one of these accreting neutron star systems in the act of entering outburst. They witnessed the onset of the outburst, from the first sign of optical activity to the beginning of X-ray emission, all the way to the end of the outburst.

The observations revealed that it took 12 days for material to swirl inwards and collide with the neutron star, substantially longer than previously thought.
These observations allow astronomers to study the structure of the accretion disk and determine how quickly and easily material can move inwards to the neutron star.

Using multiple telescopes that are sensitive to light in different energies we were able to trace that the initial activity happened near the companion star, in the outer edges of the accretion disk, and it took 12 days for the disk to be brought into the hot state and for material to spiral inward to the neutron star, and X-rays to be produced.

In an 'accreting' neutron star system a pulsar, which is a dense remnant of an old star, strips material away from a nearby star, forming an accretion disk of material spiralling in towards the pulsar, where it releases extraordinary amounts of energy - about the total energy output of the sun in 10 years, over the period of a few short weeks. This is so energetic that most of the radiation is released in the highest energy portion of the electromagnetic spectrum: in X-rays.

Some accreting neutron stars are not always active and can spend years in a quiet state, known as quiescence, where they emit barely any light at all and accrete at a very low rate. They can suddenly go into outburst and become extremely bright in X-rays for around a month.

The pulsar in a binary system is named SAX J1808.4−3658, and spins at a staggering rate of 400 times per second.

What the researchers saw was unexpected: it took 12 days from the first sign of increased optical activity before any high energy X-ray emission was observed. This is longer than anyone thought it would take, with most theories suggesting there should be only a two- to three-day delay. This work enables astronomers to shed some light on the physics of accreting neutron star systems, and to understand how these explosive outbursts are triggered in the first place, which has been a puzzle for a long time.

Accretion disks are usually made of hydrogen, but this particular object has a disk that is made up of 50% helium, more helium than most disks. It is thought that this excess helium may be slowing down the heating of the disk because helium "burns" at a higher temperature, causing the "powering up" to take 12 days.

The research team was led by PhD candidate Adelle Goodwin from the Monash School of Physics and Astronomy in Melbourne, Australia. Other members of the team are: Associate Professor Duncan Galloway Monash University, Dr David Russell from New York University Abu Dhabi and Dr David Buckley from the South African Astronomical Observatory.

News Note: Science budget slashed, less money for SKA

Sarah Wild

Fig 1. The 64 dishes of MeerKAT will eventually be folded into the Square Kilometre Array.

South Africa, struggling to contain economic fallout from the COVID-19 pandemic, has cut $20 million from its budget for the Square Kilometre Array (SKA). The cut was part of a 24 June budget announcement in which the country, anticipating severely reduced revenues and an increased need for health and social spending, slashed its science budget for the year by 16%. The country's major research funding agency, the National Research Foundation, also lost 10% of its government allocation, about $5.6 million (96.6 million rand).

South Africa and Australia are hosting the SKA, which when completed in the 2030s will have a total collecting area of 1 square kilometre. In a $1 billion first phase, the project aims to build some 130 000 small antennas in Australia, designed to collect low-frequency signals, while South Africa will host nearly 200 large, midfrequency dishes. Data from the linked arrays will be used to map the flows of hydrogen that fuel star formation and to study where and when the universe's first stars fired up.

Construction—meant to begin at the end of this year—has now been delayed "well into 2021" because of the pandemic, says SKA Director of Communications William Garnier. Before construction begins, the seven countries intending to join the international treaty organization have to ratify a convention to make their commitments legally binding. So far, only three nations—Italy, the Netherlands, and South Africa—have ratified the treaty, with South Africa signing on 2 June. As a co-host, South Africa expects to pay about 14% of construction and operating costs, says Rob Adam, head of the South African Radio Astronomy Observatory.

Further, the already planned extension of the country's MeerKAT radio telescope is more likely to be delayed by international travel restrictions than the budget cuts, Adam says. MeerKAT, a 64-dish telescope array designed and built by South Africa, will ultimately become part of the SKA. The extension referred to will see another 20 dishes added to the telescope beginning in May 2021, in association with the Max Planck Society of Germany *(Science, 25 June 2020).*

Annular Eclipse 2020

Oleg Toumilovitch (ASSA)

On 2020 June 21 a partial annular Solar eclipse was observed and photographed from sunrise at 06h57 until it ended at 07h12. Having photographed various astronomical events from Delta Park in Randburg since 2003 this site was again chosen. This enables the inclusion in the images of the eye-catching and ever-changing eastern skyline - Sandton, Rosebank, Braamfontein and its latest addition, Leonardo, the tallest building in Africa.

So, the tripod was set up in the westernmost and highest corner of the park. The distance from the observing site to the Leonardo skyscraper is 5.6 km, whose height from the ground is 234 m.

Depending on atmospheric conditions, it is possible to photograph the rising Sun during very first few minutes without a solar filter when the most of the dangerous radiation from the Sun is being cut-off by a thick layer of atmosphere and/or thin layer of clouds. Conditions were favourable, so it was decided to image the event without solar filter in the beginning.

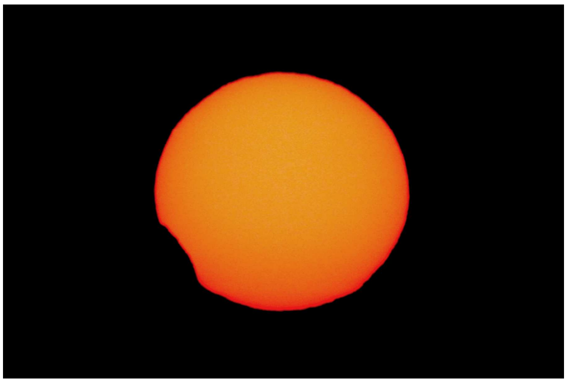


Fig 1. Using a modified Sigma 400 mm lens at 06h58

Later a solar filter was installed on lens just before the maximum phase.

Fig 2. Using a modified Sigma 400 mm lens with solar filter installed near maximum at 07h05; image has been cropped.

Both images were acquired with Canon EOS-550D camera in various optical configurations

News Note: MASTER observes Gamma-Ray burst afterglow

The MASTER-SAAO Telescope is part of the Russian Mobile Astronomical System of Telescope-Robots. It consists of two paired 0.4-m telescopes; one in the Canary Islands and the other in Sutherland

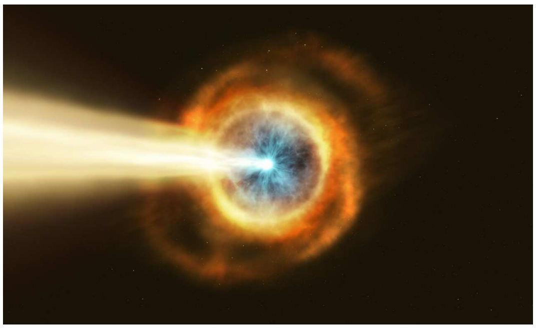


Fig 1: Artist's impression of the GRB source.

The MASTER-SAAO Robotic telescopes have contributed to the observation of an unusually energetic gamma-ray burst (GRB) which has prompted astrophysicists to rethink the role of magnetic fields in these enormous stellar explosions. Observations made in the burst's immediate aftermath show that key features of its associated magnetic field mysteriously vanished – a phenomenon that cannot be explained by current theories of how such fields form and evolve.

An unusually energetic gamma-ray burst has prompted astrophysicists to rethink the role of magnetic fields in these enormous stellar explosions. Observations made in the burst's immediate aftermath show that key features of its associated magnetic field mysteriously vanished – a phenomenon that cannot be explained by current theories of how such fields form and evolve.

On 14 January 2019, NASA's early-warning Swift satellite spotted a flash of gamma rays from an exploding massive star in a galaxy 4.5 billion light years away. Such flashes occur when a star's iron core collapses into a stellar-mass black hole, producing two relativistic beams of strongly-magnetized particles. These beams generate gamma rays through synchrotron radiation, and as they shoot outwards from the collapsing core, the particles in them collide with circumstellar material shed by the star in the run-up to its explosion. The resulting shock creates an optical afterglow that can linger for months.

As soon as Swift detected the burst, which was designated as GRB 190114C, it automatically alerted a host of telescopes on the ground. Within 32 seconds, the MASTER telescopes in the Canary Islands and South Africa were in position and recording the burst's afterglow.

This fast response has become standard within GRB astronomy, but the data proved anything but. Based on previous observations, astrophysicists expected the afterglow light to be polarized — perhaps by as much as 30 per cent, although the exact figure depends on the strength and structure of the GRB's magnetic field. The polarimeters on the MASTER telescopes, however, initially measured a polarization of only 7.7 percent. A minute later, when the Liverpool Telescope in the Canary Islands began taking data on the burst, the polarization had dropped to just two percent, and it remained at this marginal level for the remainder of the observations. That wasn't the only odd feature of GRB 190114C. When another facility in the Canary Islands, the MAGIC telescopes, began taking data on the afterglow, it measured incredibly energetic emissions – in the tera-electron-volt (TeV) range – from inverse Compton scattering, which occurs when photons collide with electrons in the circumstellar material. This is the first time such emissions have been detected at such high energies in a GRB.

Shock physics

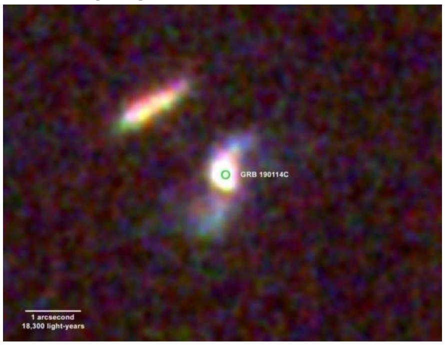


Fig 2. Unusual neighbourhood: A Hubble Space Telescope image of the afterglow of GRB 190114C, located in an interacting galaxy 4.5 billion light years away (Courtesy NASA/ESA/V Acciari et al/ICAR).

In a paper published in the *The Astrophysical Journal*, researchers led by Nuria Jordana of the University of Bath, UK, propose a partial solution to the mystery surrounding GRB 190114C. It is speculated that the low polarization is caused by the catastrophic dissipation of magnetic energy, which destroys the order of the magnetic fields and powers the afterglow. The picture she and her colleagues paint is one of shockwaves bouncing around the circumstellar material. At some point in the 31 seconds before observations began, the blast wave from the stellar explosion struck this material. Pure kinetic energy allowed the jet and much of the forward shock to pummel through, but part of the wave was reflected, forming a so-called reverse shock. Since localized disturbances scramble the forward shock's magnetic field in random orientations, the forward shock is never polarized. The reverse shock, however, should still carry the magnetic field ejected by the newly-formed black hole. In the case of GRB 190114C, something seems to have caused that magnetic field to catastrophically dissipate and dump its energy into the emission from the afterglow – which would explain the unusually high TeV energies. Jordana and colleagues infer that the weak polarization measured between 52 seconds and 109 seconds after the burst was the remnant of the large-scale magnetic field ejected from the black hole.

Looking for causes

The exact cause of the magnetic field collapse remains uncertain. According to Jordana, though the findings hint at a "universal role" for magnetic fields in GRBs, "the survival of the jet's magnetic field must depend on additional, as yet unknown, physical factors". She also points out that the polarization of the early optical afterglow has so far been measured in only a handful of GRBs. A larger sample will be needed to better understand the mechanisms that drive it.

Andrew Levan, an astrophysicist at Radboud University in the Netherlands who co-authored an earlier paper describing the TeV emission, says that the apparent lack of polarization is "a little surprising", especially given what he describes as the "very early and sensitive observations" of the GRB's afterglow. Levan's group found that GRB 190114C occurred in the central region of a galaxy that is interacting with another galaxy – an unusual location, since GRBs tend to be caused by the destruction of massive stars with low abundances of heavy elements, and these are usually only found in less chemically-evolved galaxies. Levan says it's "plausible" that GRB 190114C's environment and unusual characteristics could somehow be linked. However, he adds, "it's a very difficult problem to explain exactly how the field may have collapsed in this case".

Comet Swan C/2020 F8 (image & spectra)

Percy Jacobs (ASSA Member)

A difficult target that led to a reasonably good quality blue spectrum, covering 400nm to 535nm, and a relatively poor-quality red spectrum from 540nm to 640nm. Based on this, what could be seen in the spectra, in particular the 400nm to 535nm range, were the so-called Swan Bands, typically seen in comets. Swan bands are generated from burning hydrocarbons.

The challenges faced in this observation were

(a) Waiting for the comet to rise high enough above the horizon, out of the natural light-polluted part of the sky, the area below the 15^o altitude mark, and beating the start of the pre-dawn twilight, which started at 05h15

(b) Contending with a target that had an estimated total surface area magnitude of approx. 8. In comparison to the surrounding stars, using my finder scope, I could see up to 8 magnitude stars, but not the comet. So, the comet was not visible in my finder scope which is my primary finder for targets.

A comment on this specific point, positioning a target on the slit in the spectroscope, is controlled via the camera on my spectroscope, specific for this purpose, which in this case, was not possible. The actual auto-guiding, through the PHD Guide Software, is done through another camera connected to an 80 mm, F800, guide scope. It is through this camera that the target was seen. Time was taken to position a virtual slit in the guide scope camera, to the same position as the slit in the spectroscope's camera. Once on this virtual slit, the target was then exactly on the slit in the spectroscope. This took some time to verify and setup and match through the two different cameras as viewed on my PC screen.

Due to the faint magnitude, the exposure time was set at 4 mins x 5 for each side of the spectrum, i.e. 10 images. The challenge here was simply the time available. Through all this, guiding had to be checked and corrected every so often, and the task had to be completed before the twilight time of 05h15.

Fig 1. Image of Comet Swan: (Percy Jacobs)

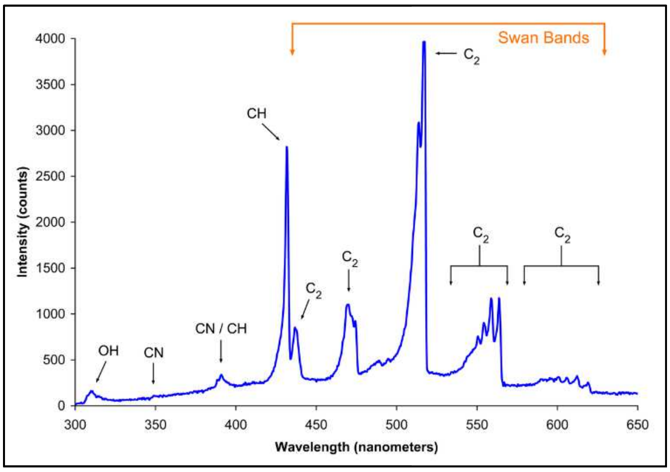
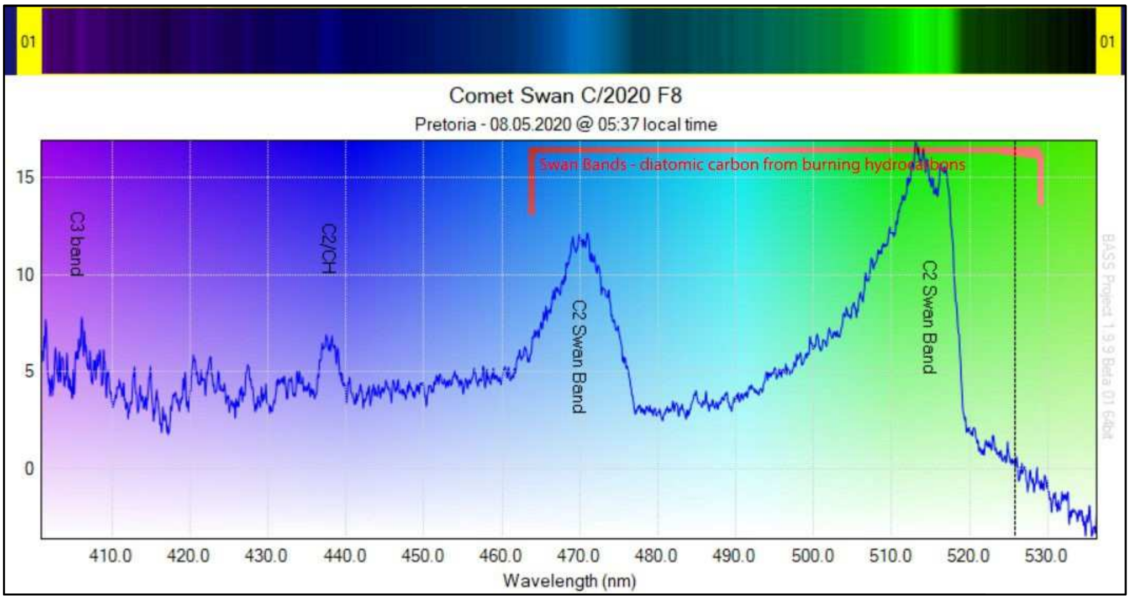
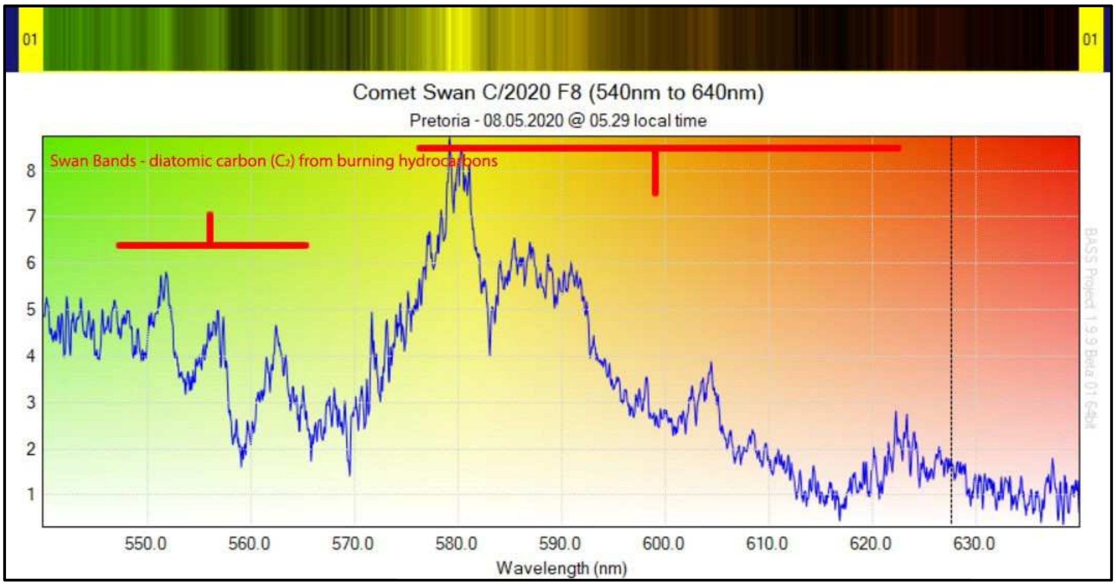


Fig 2. Example of the Swan Bands – diatomic carbon (C2) from burning hydrocarbons





Figs 3 and 4: Blue and red spectra of Comet Swan

Comments:

The red part of the spectrum is unfortunately of very low quality and therefore has low resolution, due to the faintness of the comet in the red. However, at least the Swan Bands are seen.

Recent Southern African Fireballs: Events # 335-349

Tim Cooper, Comet, Asteroid and Meteor Specialist, Shallow Sky Section

This article continues the sequential numbering of reported fireball sightings from southern Africa. By definition, a fireball is any meteor event with brightness equal to or greater than visual magnitude (m_v) –4. The following events were reported to the author and details are reproduced as given by the observer [any comments by the author are given in brackets]. All times were converted to UT unless stated, and all coordinates are for epoch J2000.0.

Event 335 – 2019 December 4 – Observatory, Cape Town, Western Cape

Observed by Estian Pienaar at 19h15, duration 5 seconds, brighter than the moon [visible at the time 55% illuminated, magnitude –11, altitude 51° in azimuth 303°], very bright orange and red colour, descending at a steep angle and slightly to the right. The fireball was initially bright and as it descended it broke into several fragments before some faded and others disappeared below the level of a neighbouring roof. From a sketch provided the starting point was approximately az/alt 64°, 30°, corresponding to RA/Dec 04h48, +03° which is between Aldebaran and Rigel, descending at an angle of 10° to the right and passing just to the left of Betelgeuse.

Event 336 – 2020 March 3 – Pretoria and Roodepoort, Gauteng

Observed by Dave Volschenk at around 17h20, he was facing north, looking at the moon which was in az/alt 354°, 41°, 59% illuminated and magnitude –11. The fireball with a long tail moved from right to left, low down and horizontal to the horizon. Colour was said to be silver, and around the edges copper coloured, duration 5 seconds, and Dave said ‘I could even see flames on it. Several small fragments broke off’. Through Dave’s wife Beverley they sent images of the scene indicating the path of the fireball. From this I determined the path approximately from az/alt 58°, 25° to 348°, 25°, which corresponds to RA/Dec 09h18, +13.6° to 04h55, +37.6°, and giving a path starting between Cancer and Leo, passing below Castor and Pollux and ending in Auriga, path length 70° and angular velocity 14°/sec. The fireball burnt out about 15° below and to the left of the moon.

Observed by Stuart McKenna from Roodepoort at around 17h30, travelling from east to west. 'It was extremely bright, as bright as a full moon, maybe brighter'. Duration roughly 4 seconds and was moving very fast, horizontally at low altitude above the horizon. From diagrams Stuart provided I determine he first saw the fireball in azimuth 33°, somewhat later than Dave Volschenk, and ended in azimuth 345°. There is good agreement between the two observers on the direction the fireball burned out.

Event 337 – 2020 March 15 – Camps Bay, Cape Town, Western Cape

Observed by Kari Goldin at around 18h40, bright white light with white tail, duration 3-4 seconds. As bright as or perhaps slightly brighter than Venus (so m_v ~ –4), which set slightly earlier in the evening. From a sketch provided I determine the path approximately from RA/Dec 03h52, 28° to 03h40, 26°, short path of 3.0° starting below right of the Pleiades and ending directly below the cluster. No sound heard.

Event 338 – 2020 March 18 – Near Villiers, Free State, Mokopane and Mookgophong, Limpopo

Observed by Donna Bingham at around 21h40, travelling northbound on the N3 highway about 9km south east of Villiers, and headed in direction of 330°, saw 'what appeared to be a shooting star travelling at speed and grew larger into a fireball'. Duration about 8 seconds, white at first, tail becoming blue around the edges and orange head. Donna provided a sketch of how the fireball descended which enabled determination of the start and end points as approximately az/alt 18°, 20° to 357°, 5°, corresponding to RA/Dec. 12h51, +41° to 11h00, +59°. The path was from the direction of Arcturus in Boötes, crossing Ursa Major which was then near culmination above the horizon.

A report in maroelamedia.co.za reported the bolide was seen at around 21h40 by three persons, including a police officer, near the town of Mookgophong. Attempts to obtain further details met with little response, but from the original media report 'suddenly the landscape lit up and when we looked up we saw an object with a tail, it was like a ball of smoke and flames that moved high above at rapid speed'. One of the three observers gave the azimuth of the endpoint about 24°. The sighting was followed by sounds 'like an explosion', and several residents in the town said their houses shook.

Anton Pieterse provided security camera footage from two sites, one in Mokopane and the second near Mookgophong, both showing an intense burst of light at the moment the bolide exploded. Two screen grabs from the Mookgophong footage are reproduced in Figure 1, showing the scene before the passage of the fireball, and at maximum light from the explosion, which floods the camera and is clearly brighter than the full moon would normally appear. The duration of the flash is about 1 second or less. The time stamp is 23h41m14s (SAST) but the accuracy of the time could not be verified. Unfortunately, the footage was received just before local restrictions on travel were imposed as a result of the Covid-19 pandemic, preventing any attempts by the writer to search for more videos or to calibrate the footage received in order to refine the time and direction of the bolide and the fall location of any potential meteorites.

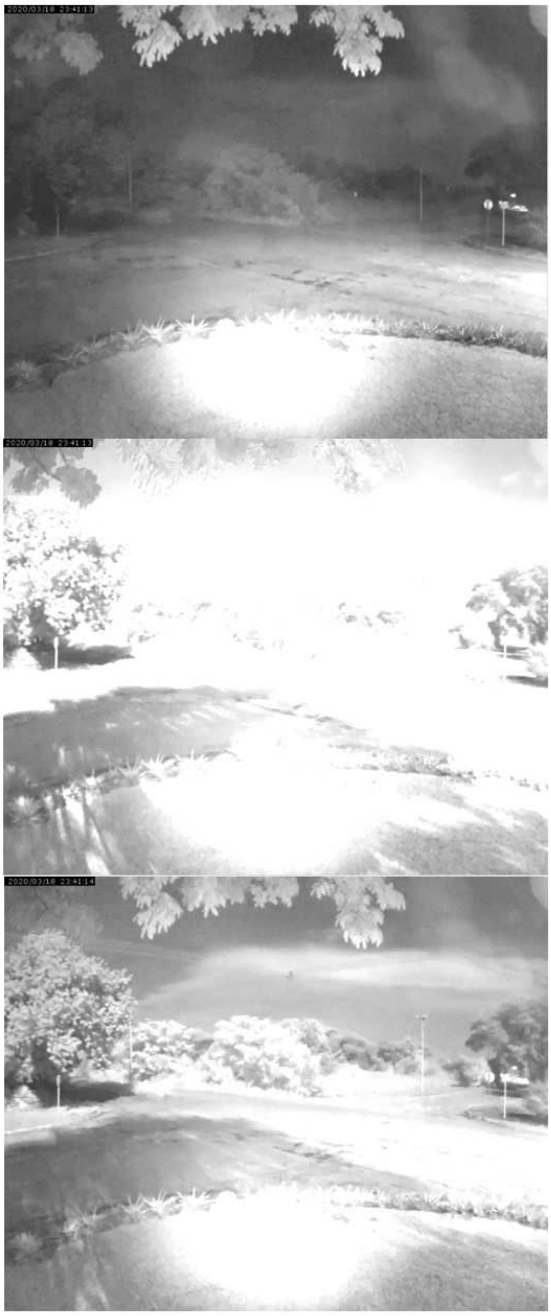


Fig 1. Event 338 – 2020 March 18 at 21h44, brightness of surrounds near Mookgophong as seen in security camera footage, top before appearance of bolide, middle at maximum light, bottom immediately after maximum light.

The same media report carried security camera footage in which the sound from the bolide can be heard, but not the flash. The clip runs for 23 seconds and the sound, which is of short duration, like a canon-shot, occurs 15 seconds into the clip. The time stamp on the video is 23h44m35s (SAST), but the accuracy of the time could not be determined due to the aforementioned reasons.

Event 339 – 2020 March 31 – Vredekloof Heights, Cape Town, Western Cape

Observed by Taneille Roach at around 19h55, said it was as bright, if not brighter, than the moon. Red/orange colour. No sounds heard. From a sketch provided I determine the start point in az/alt 27°, 30°, that is RA/Dec 11h26, +21°, descending towards the left at a shallow angle of 20°, duration about 4 seconds before disappearing behind a neighbouring building. The path when plotted backwards shows a good coincidence with the source of the Anthelion meteors, which radiate at this time of the year from the constellation of Virgo.

Event 340 – 2020 April 3 – Somerset West, Western Cape

Observed by Barry Wasdell at 23h49, he gave the azimuth and altitude of start and end points as 280.44°, 28° to 292.53°, 21°, which is RA/Dec 09h48.5', -7° 19.1' to 09h52.3', +5° 36.9'. Path length 13.66°, duration 3.5s, giving angular velocity of 3.9°/s. The object appeared to reduce in speed for the final 1-2 seconds and broke into several bright fragments. No sounds heard, but the observer was inside a building and saw the fireball through a window. Barry said the fireball was 'somewhat brighter than the full moon'.

Event 341 – 2020 April 4 – Robertson, Paarl, Worcester, Western Cape

Jodi Allemeier observed the fireball from Paarl at about 19h00, bright orange, duration a few seconds, and seemed quite low. Facing east, she produced a sketch from which I determined the azimuths of first and last visibility as 104° to 136°, descending at a shallow angle of about 15°.

Dediree Green also observed the fireball from Worcester and was able to provide a sketch showing the fireball moving from azimuth 123° and headed south. She agreed the fireball was descending at a very shallow angle.

Reported by Jaco Swart who said his wife and daughter observed the fireball from Robertson at about 19h00, looking south from the centre of town, saw a bright light with a red tail moving from north to south and downwards. They said, 'the siting must have been quite some distance from us in southerly direction'.

These reports give the path of the fireball headed roughly south, terminating off the Southern Cape coast.

Event 342 – 2020 April 20 – Bredell, Gauteng

Observed by Tim Cooper at 01h20, after completing a meteor watch for the night, was sitting in the lounge and saw the end of the path through a north facing window. Duration 1.5 seconds, bright white, $m_v = -4$. No fragmentation. The author checked his meteor cameras later and found the start of the visible meteor on a frame captured with CAMS@SA camera 6003 at 01h20m15s, which enabled determination of the start point at RA 15h07, Dec +24° 39’. The end point was established as approximately 16h00, +47°. When plotted backwards, the path gives a good agreement with the Anthelion sources in the vicinity of Virgo and Libra.

Event 343 – 2020 April 23 – Pretoria, Gauteng

Observed by Angela de Sousa from Rietfontein, between 16h50 and 16h58, as she stepped outside she saw the fireball moving from left to right below Crux, duration 3 seconds or perhaps longer, colour orange/white, and brightness about that of Venus [then visible in the opposite direction, $m_v = -4.2$]. She said it appeared large and close, and had a tail, and produced a sketch of the path with the fireball descending at a very shallow angle from just to the right of alpha and beta Centauri (Pointers), coordinates of start and end point from RA/Dec 14h15, –63.0° to 15h52, –87.6°.

Observed by Tanya Coetzee, from Moreleta Park, while facing south the fireball moved from left to right. She estimated the brightness about equal to Venus, duration 3-5 seconds, and colour was white or slightly orange.

The fireball was also captured on one frame from CAMS@SA camera 6005, time of start of the exposure was 16h54m24s. The path from the descriptions and image is consistent with an Anthelion fireball.

Event 344 – 2020 April 30 – Bredell, Gauteng

Observed by Tim Cooper at 18h55 during a watch on the h Virginid meteor stream, $m_v = -8$, duration 1.5 seconds, yellow core surrounded by white, the fireball had a sparkling appearance but no persistent train. Path from 15h56.0m, –59.5° to 16h41.7m, –64.9°, path length 7.4°, angular velocity 5°/sec. The fireball was logged as a possible h Virginid. It should be noted that during four days of observing this stream, several meteors were also plotted coincident with a possible radiant at about RA/Dec 14h23, –39.5°, and the path of the fireball was coincident with that radiant also.

Event 345 – 2020 May 1 – Sea Point, Western Cape

Observed by Keith Gaston at 19h10, brighter than the moon which was visible to the left, 60% illuminated, magnitude –11.4. Duration 2-3 seconds, bright white with green tail. Path derived from a sketch was from RA/Dec 13h40, +18° to 13h06, +36°, path length 19°. The fireball was most probably an Anthelion meteor which radiate from the head of Scorpius around this date.

Event 346 – 2020 May 7 – Donkerhoek, Pretoria, Gauteng

Observed by Leon Joubert at about 07h15, during full daylight, was outside looking in direction south-south-east when his eye caught a flash in the sky, appearing as a thin streak of light moving downwards towards the south west. Two or three pieces broke away from the main body, followed by a bright flash which then quickly dissipated. Duration was one second, there was no persistent train and no sounds heard. He said it looked so close he was expecting a sonic boom. Leon measured the az/alt of start and end points himself as 150°, 30° and 160°, 21°, which correspond to RA/Dec from 05h10, –64° to 06h51, –71° and is consistent with a Helion meteor which appear to radiate from the direction of the sun.

Event 347 – 2020 May 8 – Krugersrus, Springs, Gauteng

Observed by Natasha van der Walt at about 18h05, slightly brighter than Venus, which set earlier in the evening and magnitude –4.6, so m_v = –5, yellow colour and duration about 1.5 seconds. She said it appeared as a bright ball with a tail, much brighter and closer than a normal 'shooting star'. No sounds heard. Natasha supplied images of the view showing the path relative to trees and buildings, from which the derived path was from az/alt 172°, 40° to 192°, 30°, that is from RA/Dec 12h40, –74° to 06h40, –78.5°, starting just below gamma Muscae and descending to the right at an angle of 20°, path length 20.0° at 13.3°/sec. Given the approximate direction of the path, the fireball was probably an Anthelion meteor with radiant in the vicinity of Libra/Scorpius.

Event 348 – 2020 May 10 – Polokwane, Limpopo

Observed by Magda Streicher at 16h10, brightness a little fainter than Venus, which was then visible to the lower right and magnitude –4.6, so m_v = ~ –4. Duration 2-3 seconds. Coordinates of start and end point were from 06h15, –1.4° to 05h42, +1.5°, path length 8.6°, with four distinct 'puffs' of light spread over 1.5° followed by a burst of light and then disappearing with no persistent train. Colour was white, the terminal flash bright white.

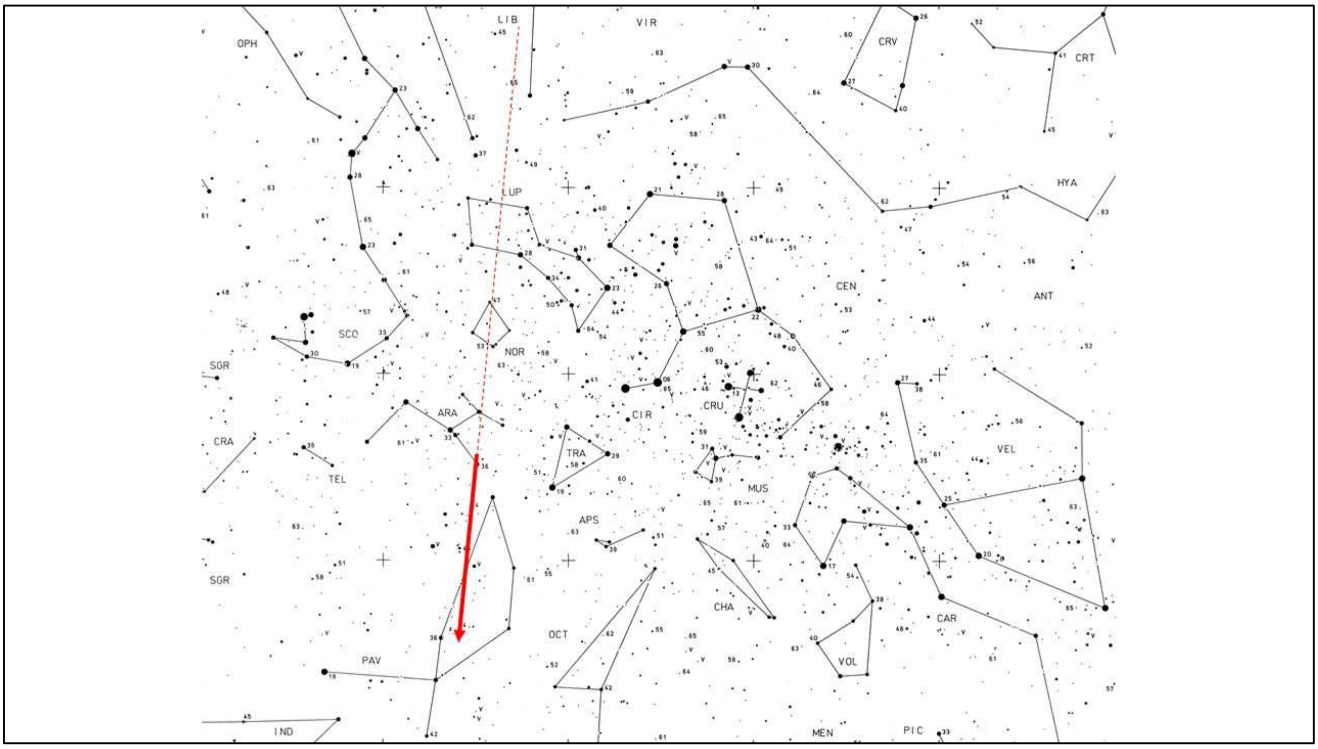
Event 349 – 2020 May 31 – Durban, KwaZulu Natal

Observed by Warren Patterson and daughter Neve at 18h26, green-white ball with short tail, duration 4-5 seconds. They were gazing at the stars when Neve drew her father's attention to the brightening fireball 'very bright, almost like a flare'. Warren's wife Suzannah immediately realised that one of their CCTV cameras faced in the direction of the fireball, and on checking had indeed recorded the last three seconds of the passage. Analysis of the footage shows the fireball entering at the top of the frame already in the process of ablation and is visible for 3.0 seconds before burning out. The duration of the visible passage from first visibility to fading from view was estimated as 4-5 seconds, so the first 1-2 seconds of the path were outside the field of view of the camera. The footage was calibrated from images taken by Warren after the event. Exposures were made using a Canon DSLR camera, positioned in front of and aligned with the direction of view of the CCTV camera, and with an exposure time sufficient to capture stars in the image. Seeing that the positions of the stars were known accurately at the time of the exposure, the positions of the fireball could be determined after overlaying the calibration images on screen grabs from the footage and aligning features visible in the two images. Results of the calibration are given in Table 1.

	Azimuth/altitude	Right Ascension/Declination
Start of visible fireball*	144.8°, 38.5°	17h22.2’, –59° 42.4’
First position in CCTV	149.7°, 31.7°	18h19.0’, –64° 04.5’
End of visible passage	156.7°, 21.5°	20h13.8’, –67° 27.5’

*Table 1 Path of the fireball as derived from calibration of CCTV footage. *start point assuming the fireball was visible 2 seconds prior to entering field of view of the CCTV camera.*

Fig. 2 Event 349 – 2020 May 31 at 18h26, path of fireball shown in gnomonic projection on Atlas Brno chart 11.



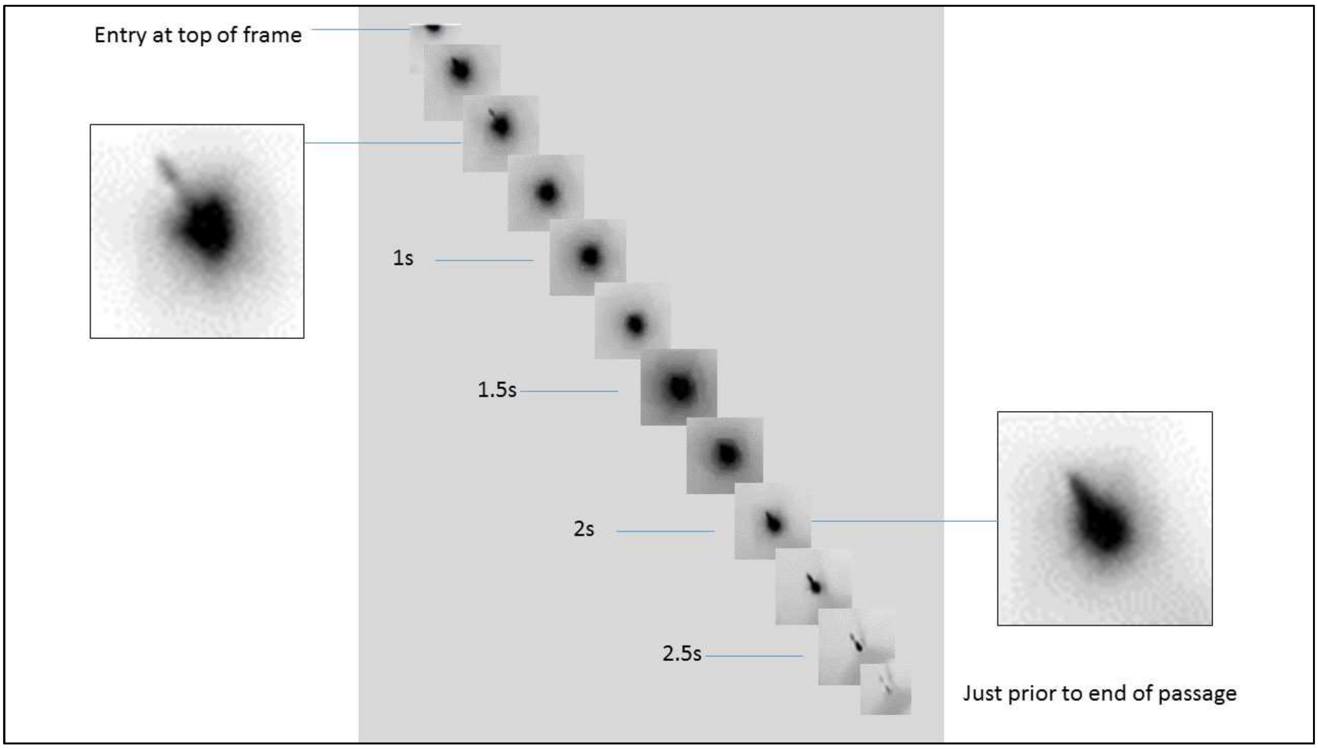


Fig 3. Event 349 – 2020 May 31 at 18h26, appearance of fireball in intervals of 0.25 seconds in CCTV footage. Fireball is already bright as it enters the frame at top left. Peak brightness occurs at 1.5 seconds into the clip. Enlargements show differences in appearance before and after peak brightness.

The path from these coordinates was plotted on Atlas Brno chart 11 as shown in Figure 2, and starts near to delta Arae and ends just to the right of delta Pavonis. From the CCTV coordinates the length of path travelled was 11.87° in a time interval of 3.0 seconds, giving a mean angular velocity of 3.96°/s.

The changing appearance during the period the fireball was in the CCTV field is shown in Figure 3. Screen grabs were taken at intervals of 0.25 seconds, converted to negative images and then montaged along the original descent angle to give an idea of how the shape and brightness developed. Peak brightness occurs 1.5 seconds after appearing at the top of the field of view, when the fireball flares to perhaps $m_v = -12$ or brighter.

After peak brightness the fireball faded rapidly without fragmentation. No sounds were heard.

The fireball was also seen by Blaze Haselau from Forest Hills. He reported seeing 'a large burning object falling from the sky with an orange tail. Way bigger than a shooting star and very bright. It was in my line of sight for at least 3 seconds before moving out of view. It looked like it fell to the east into the Indian Ocean off Durban'.

Acknowledgements

Thanks to Kos Coronaios (ASSA Observing Director) for forwarding various reports from the public. Thanks to Warren Patterson for his kind cooperation in calibrating the images for Event 349. Figure 2 is reproduced from Gnomonic Atlas Brno 2000.0, published by the Nicholas Copernicus Observatory and Planetarium, Brno, Czech Republic in conjunction with the Czech Academy of Sciences.

The Elusive Sirius B

Magda Streicher (ASSA Member)

Looking back over my many years of observing, there was one object that I never managed to see: Sirius B. In spite of many attempts, using a wide range of eyepieces, filters, magnifications and being under the remotest, darkest skies of South Africa, I never succeeded in observing the companion of Sirius, the faint white dwarf star Sirius B. My only achievement was teary eyes! The best thing would be to observe Sirius and the WD companion just after dark, or perhaps just before sunrise. I had heard from amateur comments that that would be the best way to achieve a sighting, and of course the sky had to be suitably dark. Another suggestion was to use a square piece of cardboard with a hexagonal hole cut in it, to match your telescope aperture, in front of the telescope. This wasn't tried!

Seeing Sirius B was probably in the same category as the "Horse Head nebula", so was going to be hard, really hard. It was decided practice on Rigel, which is also a double star with a separation almost the same as Sirius and Sirius B.

Well it took pristine clear skies with no stellar flickering, very little pollution and a tiny little virus, to bag this star called Sirius B! Shortly after 18h00 on the evening of the 10 May, 2020, Sirius was centred in the 16-inch telescope, its glare was, to put it mildly, overwhelming. Try and try again, nearly giving up hope, using different eyepieces from low resolution at 290X to the highest at 460X in a starfield from 22' to just 10' in size.

After 20 minutes of painstaking observation Sirius was left to drift to the edge of the eyepiece field of view and suddenly, a tiny pinprick of light was spotted unmistakably between the glaring spikes of the primary companion on Sirius's eastern side. I let it drift dozens of times through the visible field in the eyepiece and concentrated like never before. Not that it was easy, not at all, Sirius B, was just a speck of light playing peekaboo and was coming in and out of focus several times. This was a true "wow" moment; a rare reality moment in an observer's life.

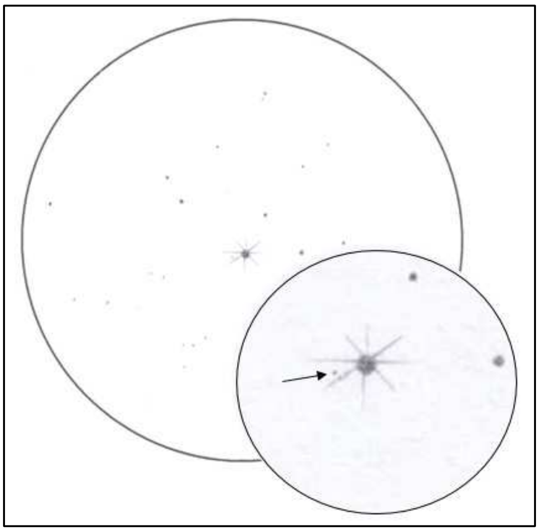


Fig 1: Sirius with inset showing Sirius B more clearly.

Using cross hairs, a 14mm eyepiece, at 290X in a 17’ field of view was the best way to go. Map work was done afterwards and a sketch drawn to confirm the observation with Sirius B. It was now at a PA of about 66 degrees and almost at its widest - 11’ from Sirius. This WD companion takes 50 years to orbit. Moments like this is what makes astronomy one of the most awarding things for us lucky ones who care to go out and “bag” the one deep sky object after another. In more or less 5 years it will be at its largest separation. The best time to see Sirius B is to start right away, do not waste time is my advice; it is possible to do!

This was more difficult than the illusive Horse Head nebula (a tiny dark gap with a beta-H filter) to observe and confirm. Not at all for the faint hearted, I was exhausted but so utterly happy. Even now, when I close my eyes I still see this shiny very, very, very small pinprick in the glary spikes of Sirius.

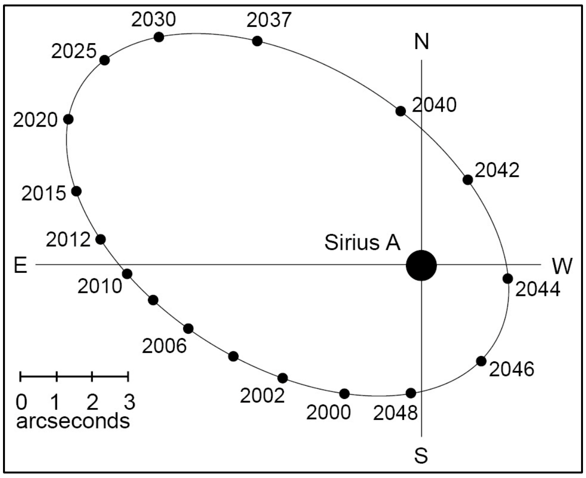


Fig 2: The orbit of Sirius B around Sirius A.

Observer:	MAGDA STREICHER
Object Nr:	
Object Name:	Sirius and Sirius B
Constellation:	Canis Major
RA:	06h45'
DEC:	16o44'
Magnitude:	
Size:	14mm wide angle 290X
Tel:	16-inch S/C
Fov:	17.4'
Date:	10th May 2020
Time:	18h25 - 18h50
Site:	Polokwane Limpopo
Visibility:	Clear, stable, 5+

Fig 3: Record of the observation!

Amateur Spectroscopy

Percy Jacobs (ASSA Member)

After learning the basics of taking spectra and processing of spectra, in a format that is of acceptable quality for submission to a scientific database, of which there are various, I found myself wanting to find a purpose for what I do. The main purpose, of course, is the enjoyment of making telescopes and the accessories, and then going outside to use them in a way that is purposeful to a specific objective and contributes towards the professional community. Not to mention the enjoyment of the night sky and the outdoors and the continuous learning that goes along with such a process.

As an amateur, the hobby must be about enjoyment and not become a "job". For example, submitting data to a database in a robotic, routine way, just trying to make up "numbers" of submitted data, is not enjoyment. If a person submits this data and then tries to analyse what has been submitted, and then compares to previous submissions, that person then starts to learn and improve skills, with regard to understanding and the interpretation of the spectra. This then creates the opportunity to discover something unusual. As I was told by one of my mentors in the hobby of observational astronomy, if one does not go outside and observe, and find and note what you are observing, one does not stand a chance of discovering current events or changes in the night sky.

So, I joined AAVSO, and I take part in submitting spectra to the Spectroscopy Data Base, created in 1st Quarter 2019. Currently, there are 30 members submitting data to this database from around the globe. At the time of writing this article, the database boasts approximately 2500 spectra submitted. The data focuses on variable stars in all their formats, such as Mira Variables, Cataclysmic Variables, Be stars, Chromospherically active stars, Pulsating stars, Cepheids, Binary systems, etc. I have submitted just on 237 spectra, and have had 750 downloads from outside interested parties, which are unknown to me. Through the AAVSO, additionally, we get "Alerts", which are sent out when help is needed by professionals regarding certain events. Through the AAVSO's Spectroscopy Discussion Group, one gets to interact and ask questions to the more experienced Amateur Spectroscopists. Questions may be regarding equipment or regarding profiles of submitted spectra.

In doing this work, my quality of submitted spectra has improved dramatically over time. Like anything in life, "practice-makes-perfect". In submitting these spectra, I have also gained knowledge of taking quality spectra and the interpretation of spectra using real-life examples. I have a regular set of stars that I monitor, 25 or so stars, and therefore get the chance to see the changes in the various stars over time by comparing to previous submissions. One can now see the changes that take place, in the various types of stars, and understand the reason why.

Observers equipment setup

- Celestron Tracking mount
- 8" Bosma Maksutov– F2400
- ZWO 178 Colour Camera (CMOS)
- DIY – 3D Printed Spectroscope – LOWSPEC (600L/mm grating)
  Resolving Power ~1 000 // Resolution ~0.6nm

Examples of spectroscope resolutions

- No Slit - Star analyser – 100L/mm – Resolving Power ~100 // Resolution ~5nm
- Slit - Alpy 600 – 200L/mm – Resolving Power ~600 // Resolution ~1nm
- Slit – Dados - 1200L/mm – Resolving Power ~5 000 // Resolution ~0.06nm
- Slit - Lhires III - 2400L/mm – Resolving Power ~17 000 // Resolution ~0.03nm
- Slit - LOWSPEC - 600L/mm - Resolving Power ~1 000 // Resolution ~0.6nm

- The LOWSPEC splits the NaI double, which is 0.6nm separation, as shown below

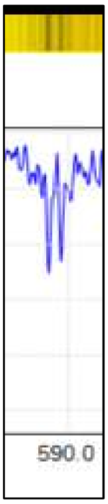


Fig 1: At a resolution of ~0.6nm, I can resolve spectra up to ~0.6nm – anything less than this is seen as a single line – anything above this becomes a double line. My smallest resolvable wavelength. As demonstrated here by splitting the NaI double which is about 0.6nm apart

Resolving Power – general rule

- 100 to 2 000 – low-resolution spectroscopy
- 2 000 to 9 000 – medium-resolution spectroscopy
- 10 000 and above – high-resolution spectroscopy

Resolving Power is referred to as "R". A formula is applied which takes into account all the various components of your spectroscope. Or, a simpler way, is to divide the number of lines in the grating, which in my case is 600L/mm, by the resolvable wavelength value, in my case, 0.6nm, R=600/0.6 = ~1000

Details of some processed spectra

My spectrum processing software is from the BASS Project (Basic Astronomical Spectroscopy Software)

All spectra are processed as per BeSS Requirements (The Be Star Spectra database format), within the BASS Project Software, and as per AAVSO requirements

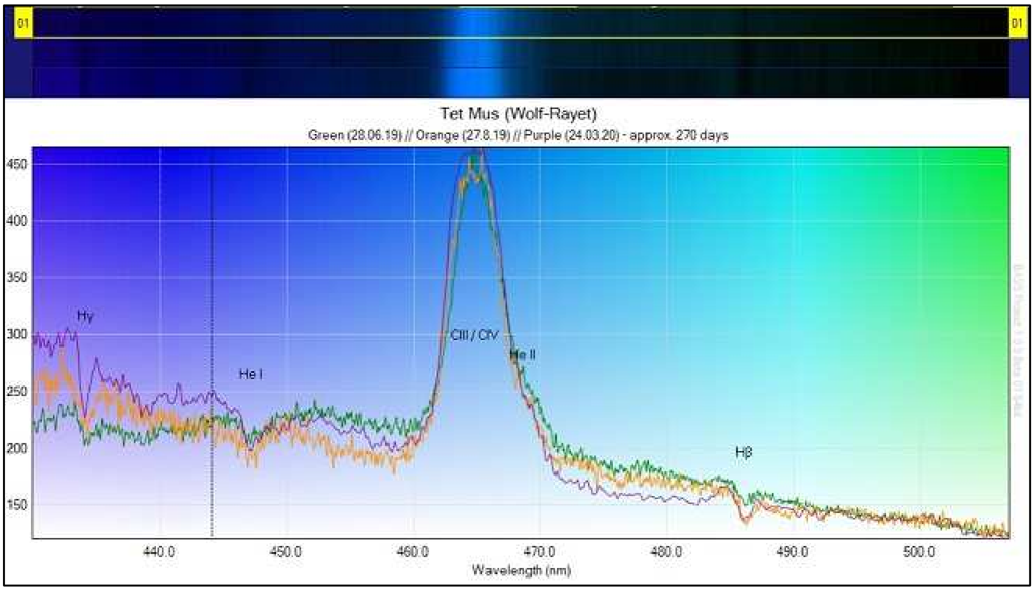
Table: Current List of Stars observed regularly by the author. Observing cadence is determined by available time and weather conditions.

AP Psc, α Ori (Betelgeuse), δ Cen, δ Sco, DO Eri , ε Eri, Nova V3890 Sgr, R Car, S Car, R Cen, T Cen, R Hor, T Hor, R Lep, R Scl, S Scl, S Pav, SS Lep, T Col, θ Mus, U Sco, WY Vel, η Car, γ Velorum.

Examples of spectra submitted

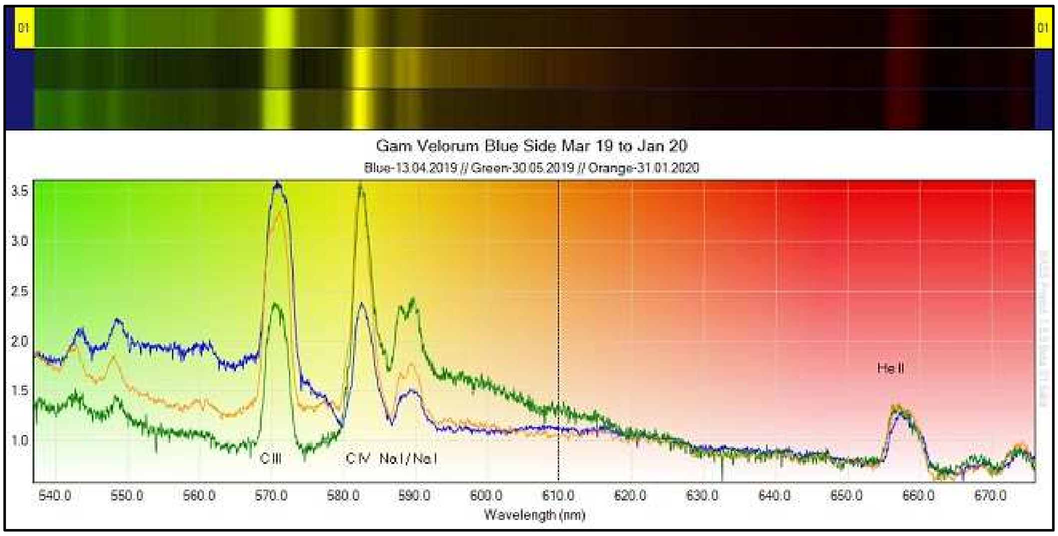
Wolf-Rayet (WR) Stars

Spectra stand out by massively broadened, intense helium or nitrogen or carbon or oxygen emission lines, and the almost complete absence of hydrogen. The star blasts away its entire outer hydrogen shell by a huge stellar wind. The broad emissions lines indicate very high pressures.

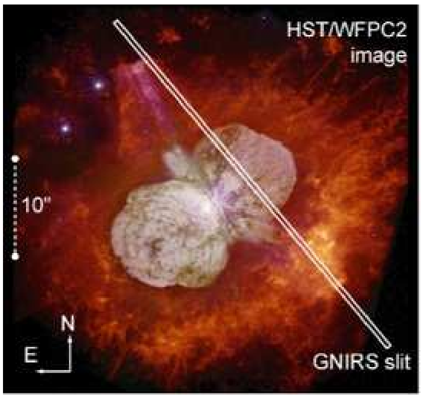


Figs 2 (above) and 3 (next page): Examples of Wolf-Rayet spectra.

The broad C III / CIV line at 465.0nm indicates a very high-pressure system.
The strong emission line of C III / C IV indicates a very hot excited gas.
The estimated & approximate gas expansion rate is in the region of 2 400km/s. See Note at end of article.
Also typical of a WR system are the He I (447.1nm) & He II (468.6nm) lines.
The strong He II emission at λ 6560 poses a risk of being misinterpreted as the Hα line at λ 6562.



Eta Car



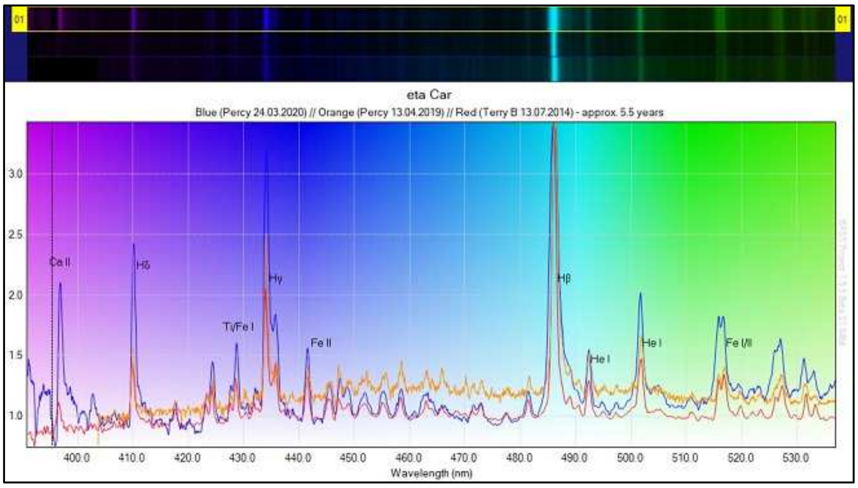
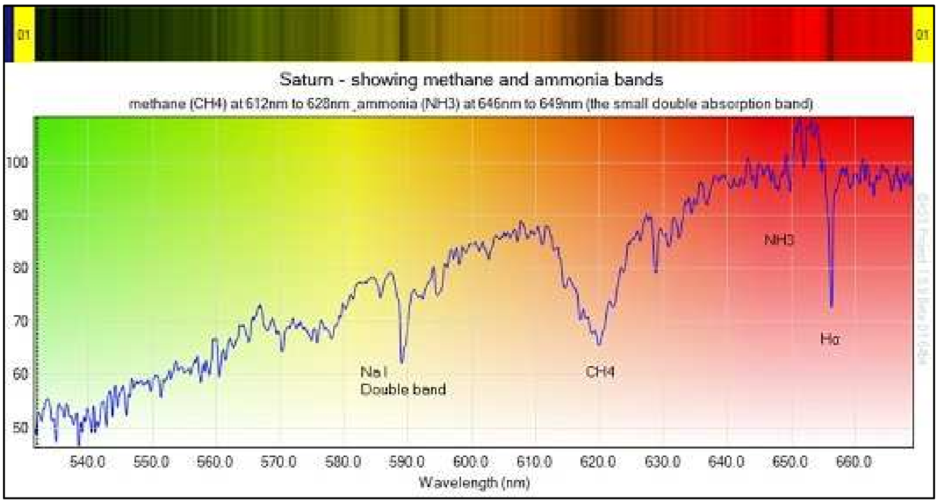


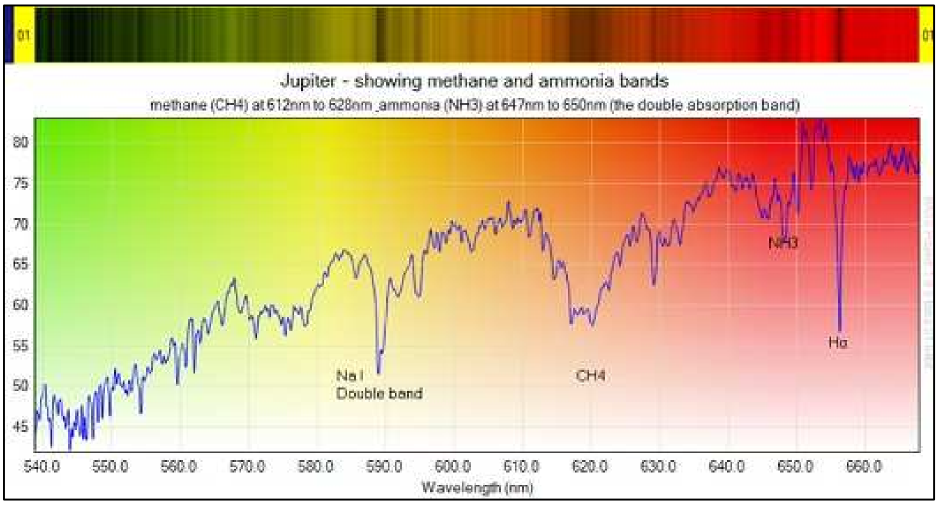
Fig 4 (left) Image of η Car from HST (WFPC2).

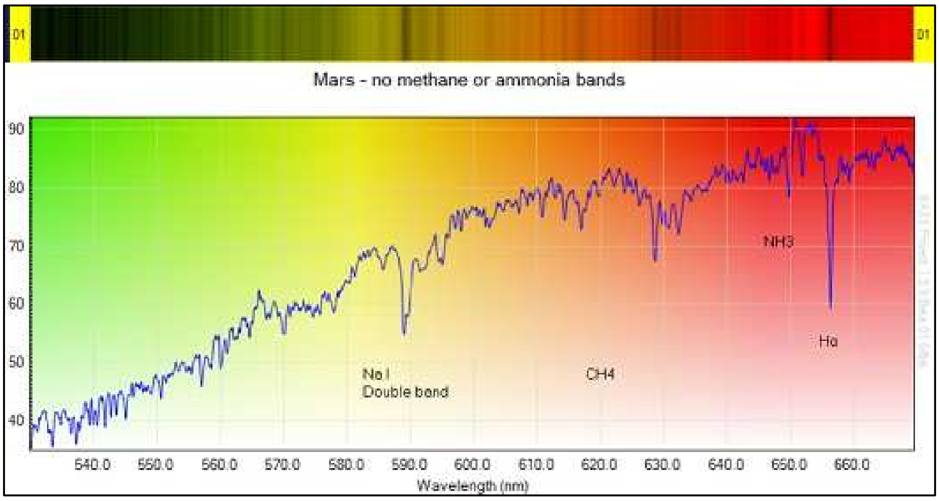
Fig 5 (right) Spectrum of η Car.

Noticeable differences over time:
- line intensities have increased over the years
- however, the line intensity for Hβ has remained the same
- either due to actual activity, or "maybe" differences in spectra processing?
- it is said that these H Blamer Emission lines reverse into absorption lines on a 4-year cycle. I shall monitor and observe

The outer planets, Jupiter, Saturn, Mars: Looking for methane (CH_4) & ammonia bands (NH_3)







Figs 6 – 8: (top to bottom) Jupiter & Saturn show a strong band of Methane and a week band of ammonia. Mars shows no methane or ammonia

SS Lep – cataclysmic variable

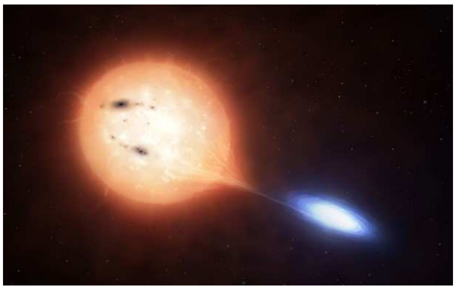
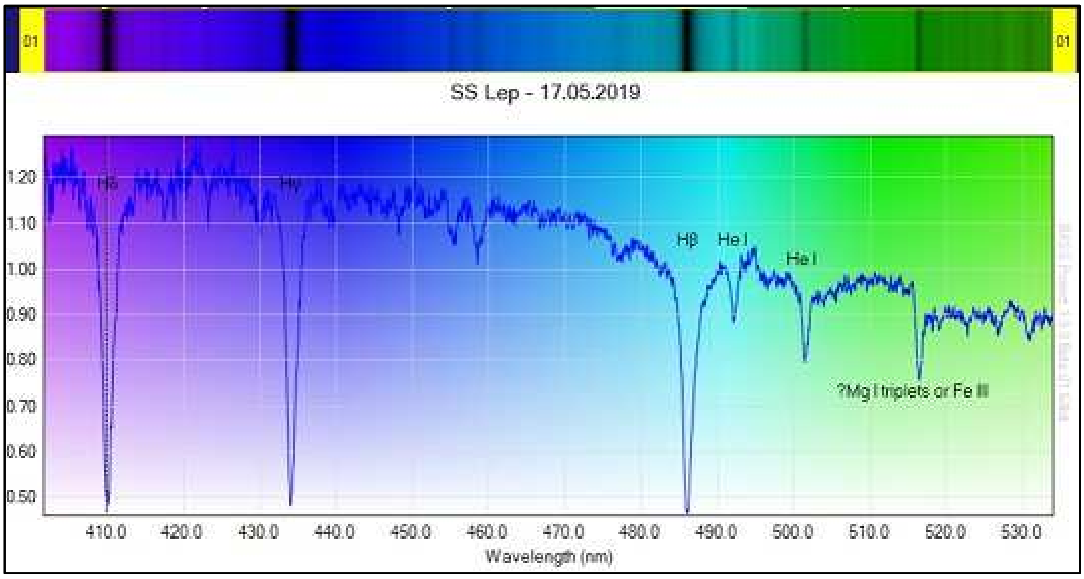
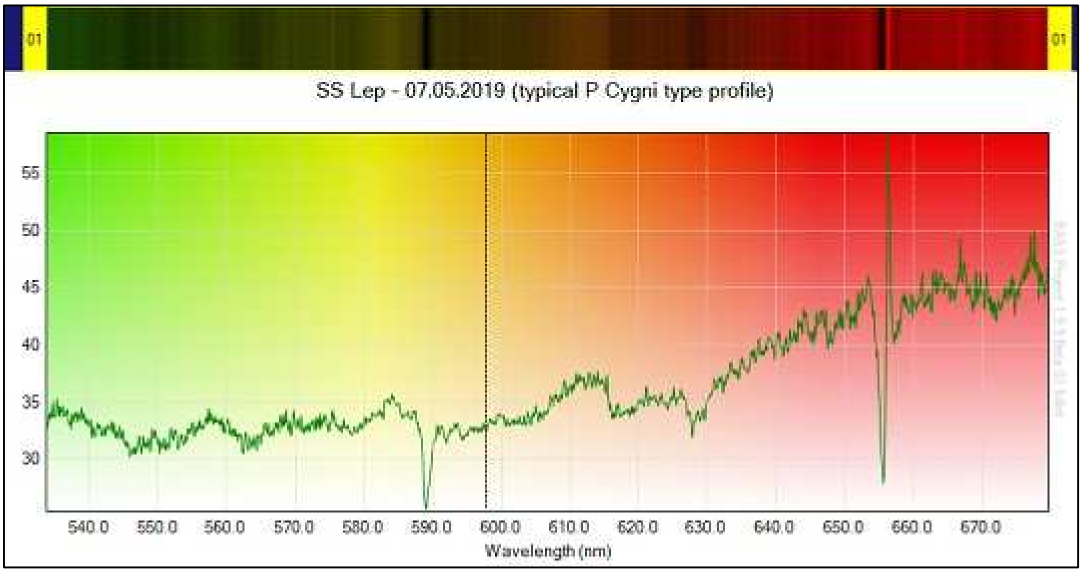


Fig 9. Artist's impression of SS Lep

Spectra should be similar to novae with typical "P Cygni" type profiles.

The spectra of cataclysmic variables (novae & novae like variables) during their quiescent phases consist of a continuum upon which are usually superposed emission lines of H I, He I, He II and Ca II. This varies of course. Some will show a typical continuous spectrum during outbursts with weak emission lines. The He II at λ 468.6 shows the largest variation





Figs 10 and 11. Spectra of SS Lep. Note the strong absorption and emission line at 656nm.

NOVA V3890 Sgr – eruption on 28.08.2019

(A symbiotic recurrent nova)

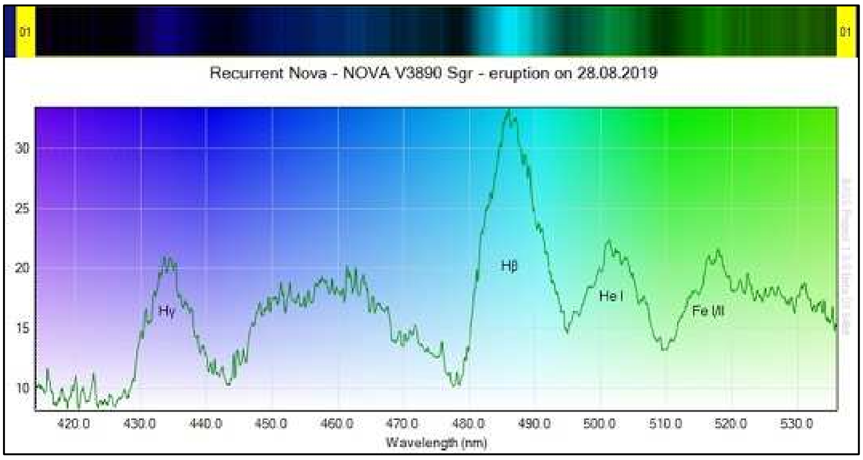


Fig 12: 1st-time mag.~7.5 – eruption 28.08.2019

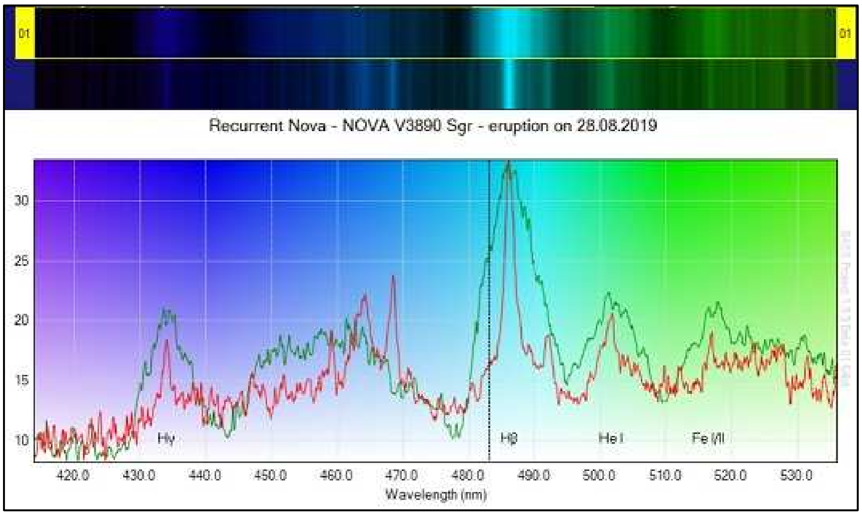


Fig 13: 2nd-time mag.~>8.5 – 03.09.2019

Please note that the earlier spectrum is superimposed in red.

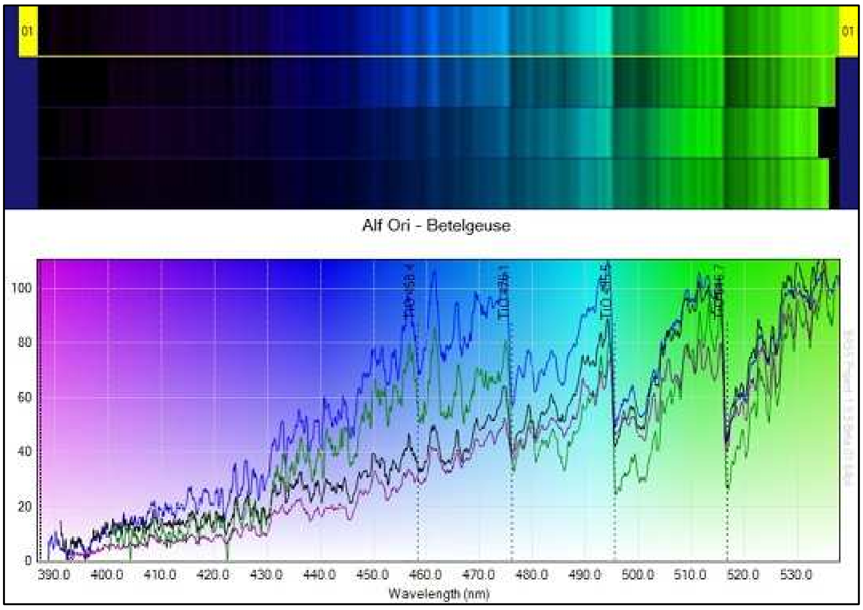
Of most interest are the Balmer hydrogen lines. We are looking for variations in the emission line shapes as the ejecta move outwards from the white dwarf and interact with the wind of the object.

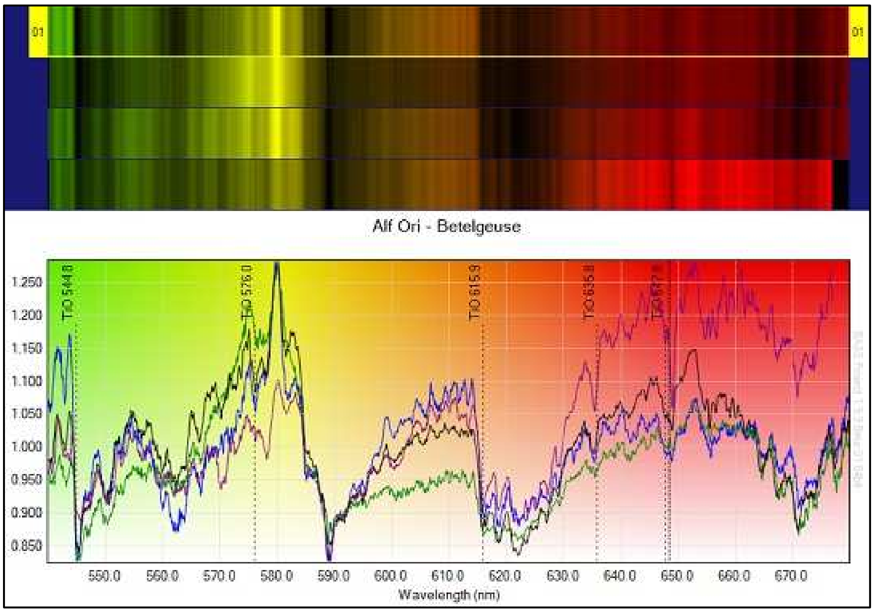
α Ori (Betelgeuse)

Here spectra are compared when the star went through a "dimming" phase just recently – Dec 19 to Mar 20.

1st top profile- 18.01.2020 – blue curve
2nd profile – 16.02.2020 – green curve
3rd profile – 19.03.2020 – black curve
4th profile – 15.04.2020 – purple curve

- The intensity of the TiO bands change. TiO bands are typical in M-giant stars.
- Note the change in peak intensity at 580nm. It could be the C IV line.
- Note the absorption peak at 649nm. Much thinner and sharper than previous. Could it be part of the ZrO bands? The author has not identified this strong absorption peak at the time of this article.
- Note the difference between the blue curve, 18.01.2020, vs the others. Note the change
- Note the strong absorption peak at the 589nm mark which could be the NaI bands - present in all spectra





Figs 14 & 15. α Ori in two wavelength regions at 4 epochs relevant to its recent changes.

R Car (M4e-M8e) – Mira – Long Period Variable Star

The TiO molecular bands are prominent in M-Type stars. The stronger the bands, the cooler the stars. Errors can be found if the classification of absolute band strength is applied indiscriminately to all bands.
Similar curves and changes are seen in other M-Type variable stars such as S Car & T Cen. S Car & T Cen are on the author's observational list.

AAVSO Visual Magnitude Light Curve – 2018 to 2020 – from ~4.6 to as low as 10.0
Note that when the magnitude reaches the 4.0 to 5.0 region, Hδ & Hγ & Hβ & Hα emission lines intensify and TiO bands are "stronger"

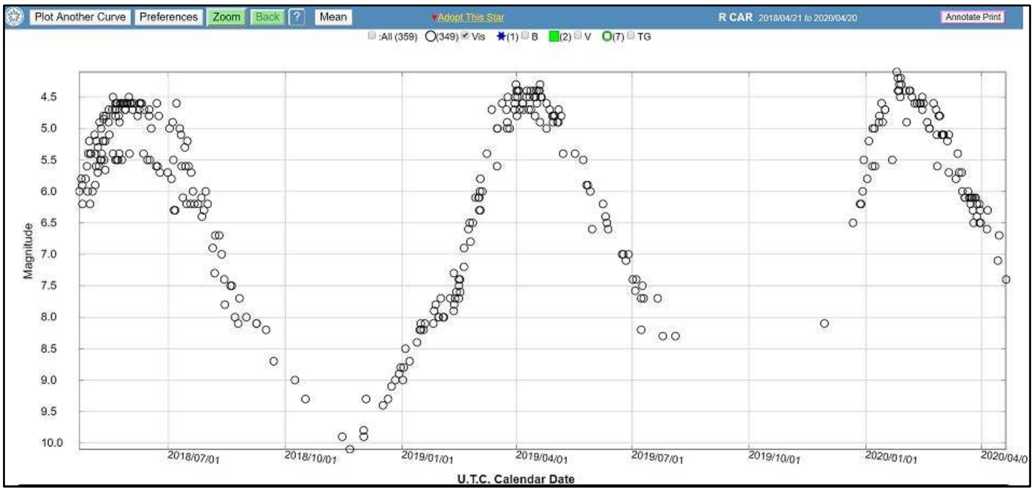


Fig 16: Light curve of R Car (AAVSO)

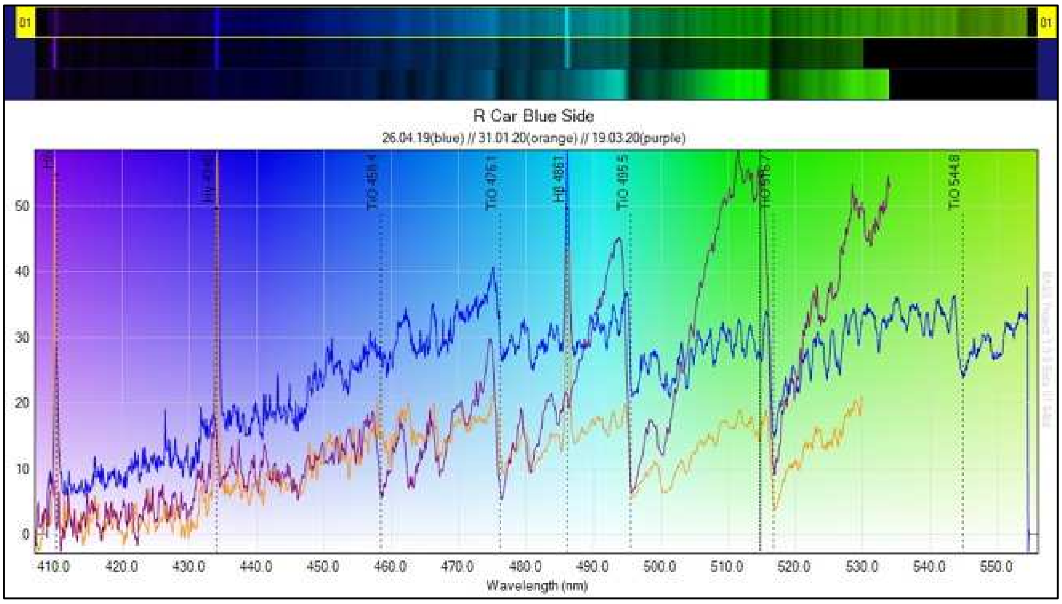


Fig 17: R Car in blue spectral region at two epochs.

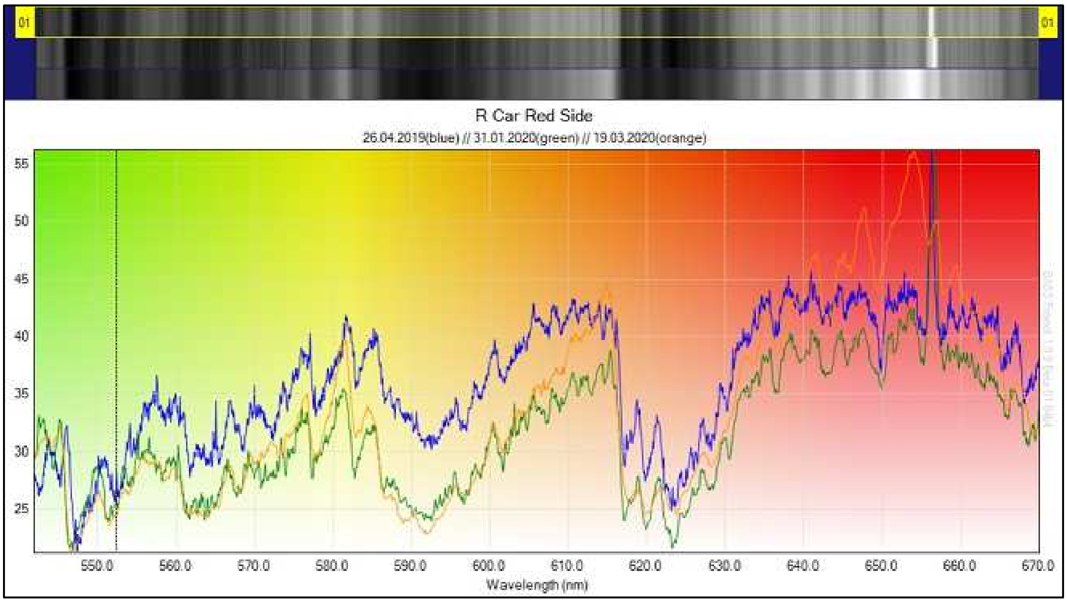


Fig 18: R Car in red spectral region

θ Mus (WC6+O9.5I) – Wolf-Rayet Star

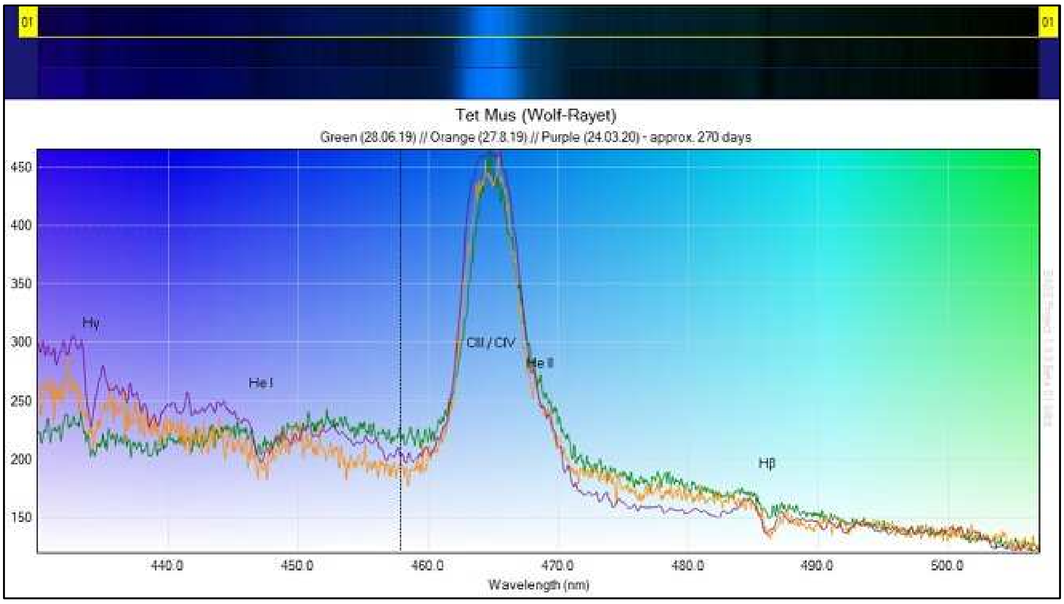
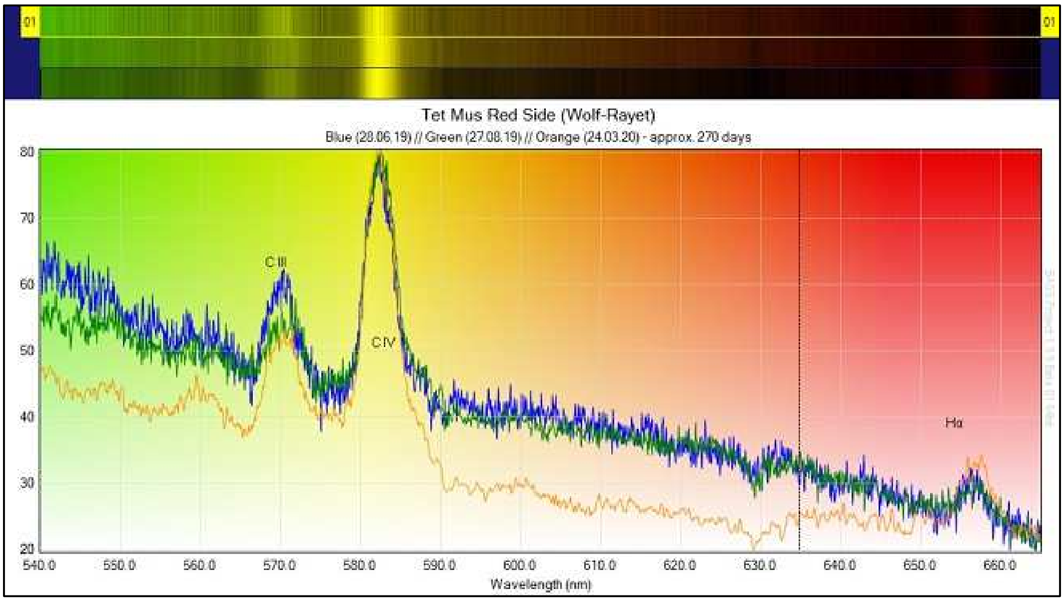


Fig 19: Blue spectra of ϑ Mus at three epochs.

Green curve - 28.06.19
Orange curve - 27.8.19
Purple - 24.03.20
approx. 270 days

Broad C III / CIV line at 465.0nm indicates a very high-pressure system
The strong emission line of C III / C IV indicates a very hot excited gas

The estimated & approximate gas expansion rate is about 2400km/s. See Note at end of article.
Also typical of a WR system are the He I (447.1nm) & He II (468.6nm) lines



Figs 19 & 20 ϑ Mus on three dates in two spectral regions.

Notes

1 Calculating expansion rate.

Full Width at Half Maximum (FWHM) is the width measured at half level between the continuum and the peak of the line. The FWHM is expressed either in wavelength unit or in speed unit when the objective is to measure expansion or disk speeds.
Therefore, if we apply this formula, V = c x (W /λ), where:
V = the expansion velocity
c = speed of light in km/s = 3×10^5 km/s
λ = wavelength of light in nm (10^{-9} m)
Substituting in the numbers we get we get an expansion rate of

$$V = 3 \times 10^5 \text{ km/s } (10.92\text{nm} / 656.3\text{nm}) \approx 5\,000 \text{ km/s}$$

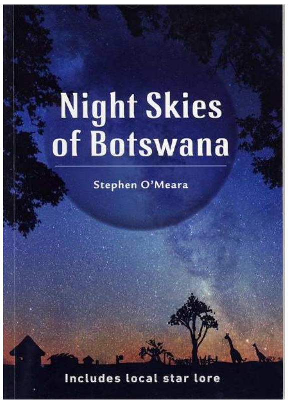
These are velocity-broadened lines, because of the expansion.

2 Looking at the spectra images

Wavelengths used run from ~400nm to ~660nm of displayed in two separate frames, and sometimes use a different "Y" axis scale.

Book Review

Etienne Gouws



An entry level astronomy book has recently appeared locally. "Night Skies of Botswana" by well-known astronomy author Stephen O'Meara [1] follows the same path as publications by Anthony Fairall[2] and Peter Mack[3], starting with a section explaining the night skies as seen from the Okavango Delta, then a set of monthly star charts, and ending with a description of the Solar system.

Interspersed with the astronomical text, star lore of various indigenous peoples appears, as well as figures depicting the constellations. Numerous star charts are shown, many of which concentrate on a small section of the sky to show particular stars and other deep sky objects visible with the naked eye or binoculars. For each month 4-star charts are shown, depicting the most important objects visible in the 4 compass directions from horizon to the zenith. The charts show the heavens as seen from a latitude of 20° S, which means that some of the Northernmost constellations will not be visible from a location further South .

Good use is made of colour in the figures, so that the names of constellations, stars and other objects can be easily distinguished. Unfortunately, many of the illustrations of the traditional constellation figures are printed as black on a dark blue background, which makes them hard to see. Apart from this niggle the book makes an attractive impression. Armed with a red light torch the star charts could be put to good use at night to learn the salient facts of the dark sky features. All in all, a good introductory book.

All three books mentioned are still available.

1 O'Meara, Stephen (2000). *Night Skies of Botswana.* Struik Nature publication.
2 Fairall, Anthony (2006). *Stargazing from Game Reserves in Southern Africa.* Struik.
3 Mack, Peter (2012). *Guide to Night Skies of Southern Africa*. Struik Nature publication.

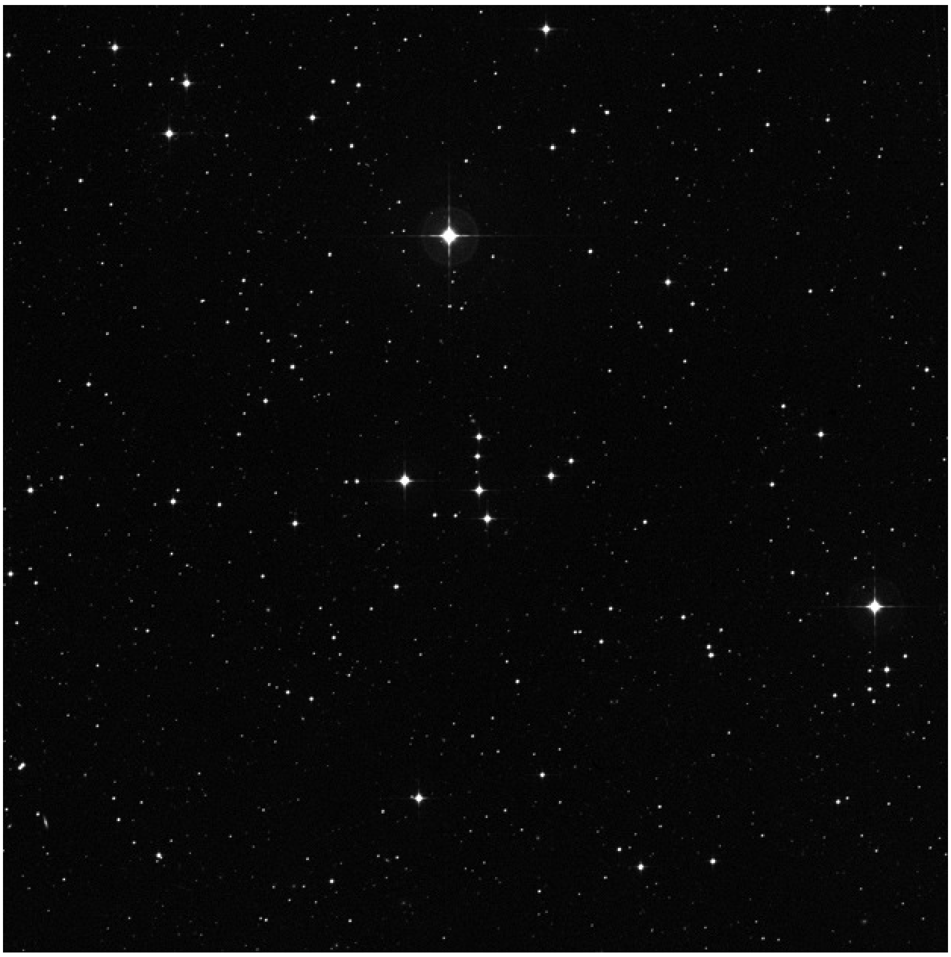
Streicher Asterisms 26-30

Magda Streicher

STREICHER 26
Hydrus

This grouping of stars is unique in regard to various others that I have looked at. Four brighter stars forms a loose semi-circle with a single 9-magnitude star placed towards the eastern bulge, with another pair to the west of the grouping. Sharing the circle are also a few very faint stars to complete this unique half-moon impression. This grouping stands out clearly and attracts immediate attention in this relatively scarce star field. A bright magnitude 8 shiny white star indicate the way to the south of the grouping.

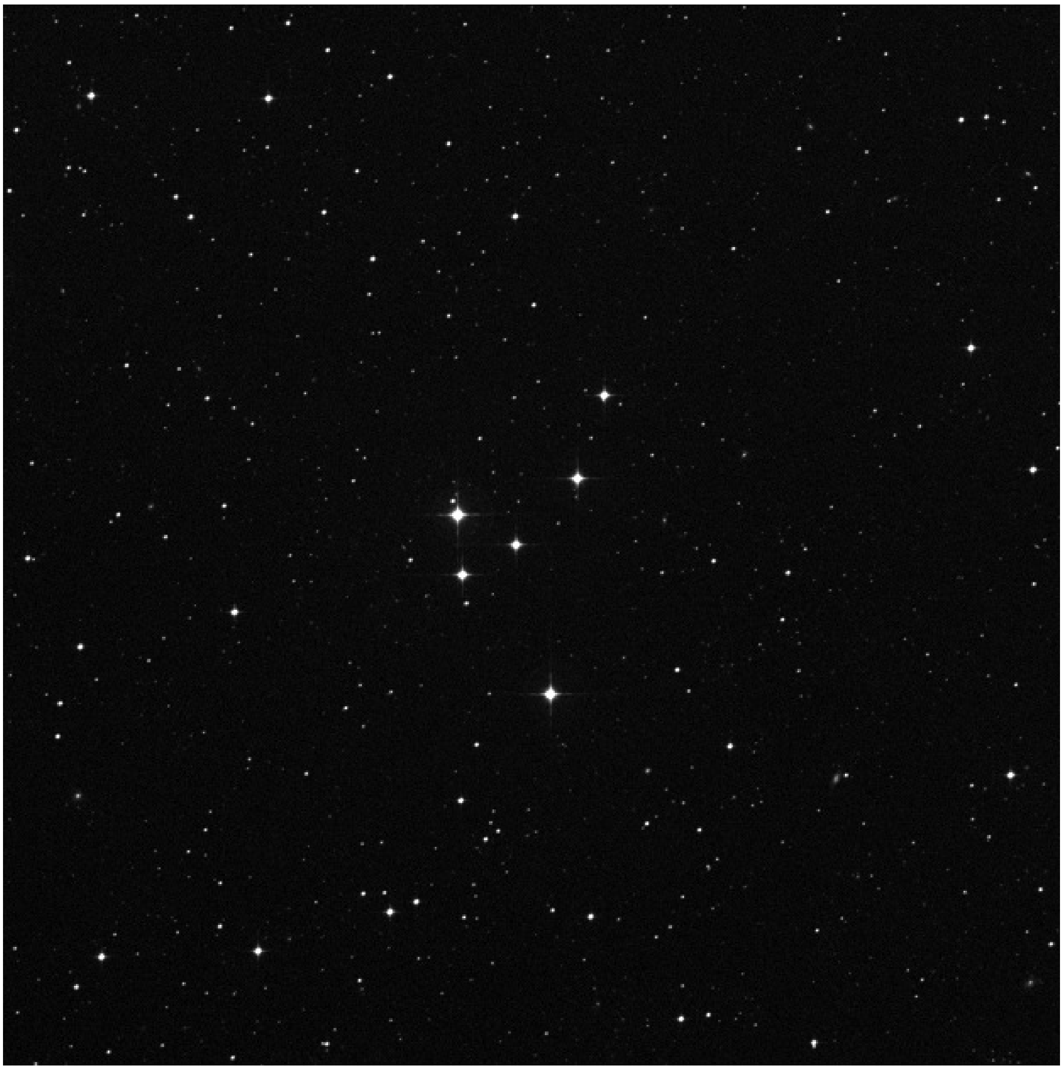
OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER 26 DSH J0240.3-7002	Asterism	02h40m.18	-70°02'.48"	8	5'



STREICHER 27
Hydrus

The same type of grouping as some of the others already referred too. Four relatively bright stars in a semi-circle that forms a curved combination from north to south-east. A lovely yellowish 9 magnitude star rounds off the string very prominent north on the south-eastern edge. This grouping is clearly visible against the background star field and reflects a true asterism impression. The very faint galaxy Leda 127475 is situated 8' south-west, which can barely be seen in the picture, very close to the left of a faint star.

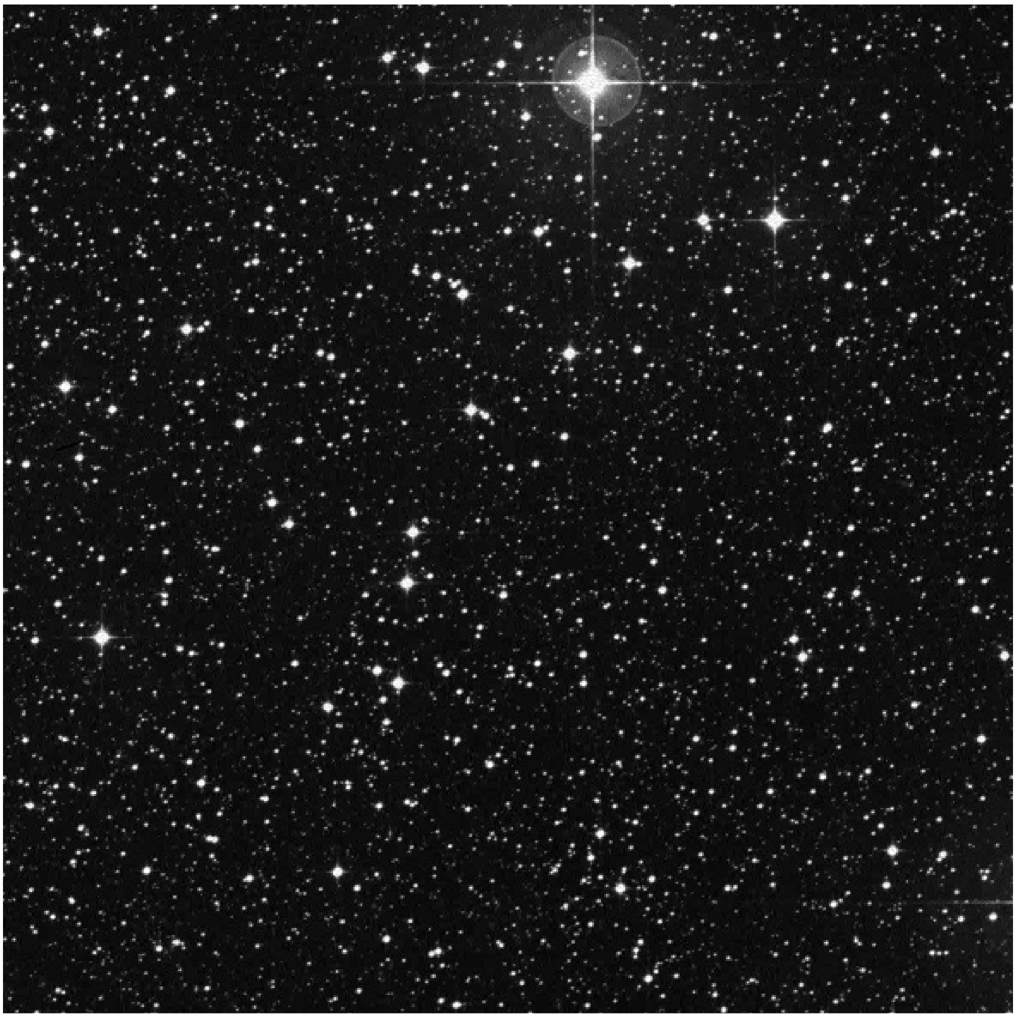
OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER 27 DSH J0146.4-6447	Asterism	01h46m.29	-64°47'.48	9	7'



STREICHER 28 – DSH J1519.0-4055
Lupus

Well-known to the northern hemisphere amateurs and situated in the constellation Camelopardalis, is the asterism Kemble Cascade. In the central region of the starry Wolf constellation, I came across a similar group impression, although not as outstanding. The asterism also resembles a cascade but on a much smaller and fainter scale and is situated 30' south-west of delta Lupi. The brightest star in this group is magnitude 8.6, with fainter stars in a downward string running for almost 10' in a north-west to south-east direction in a busy star field.

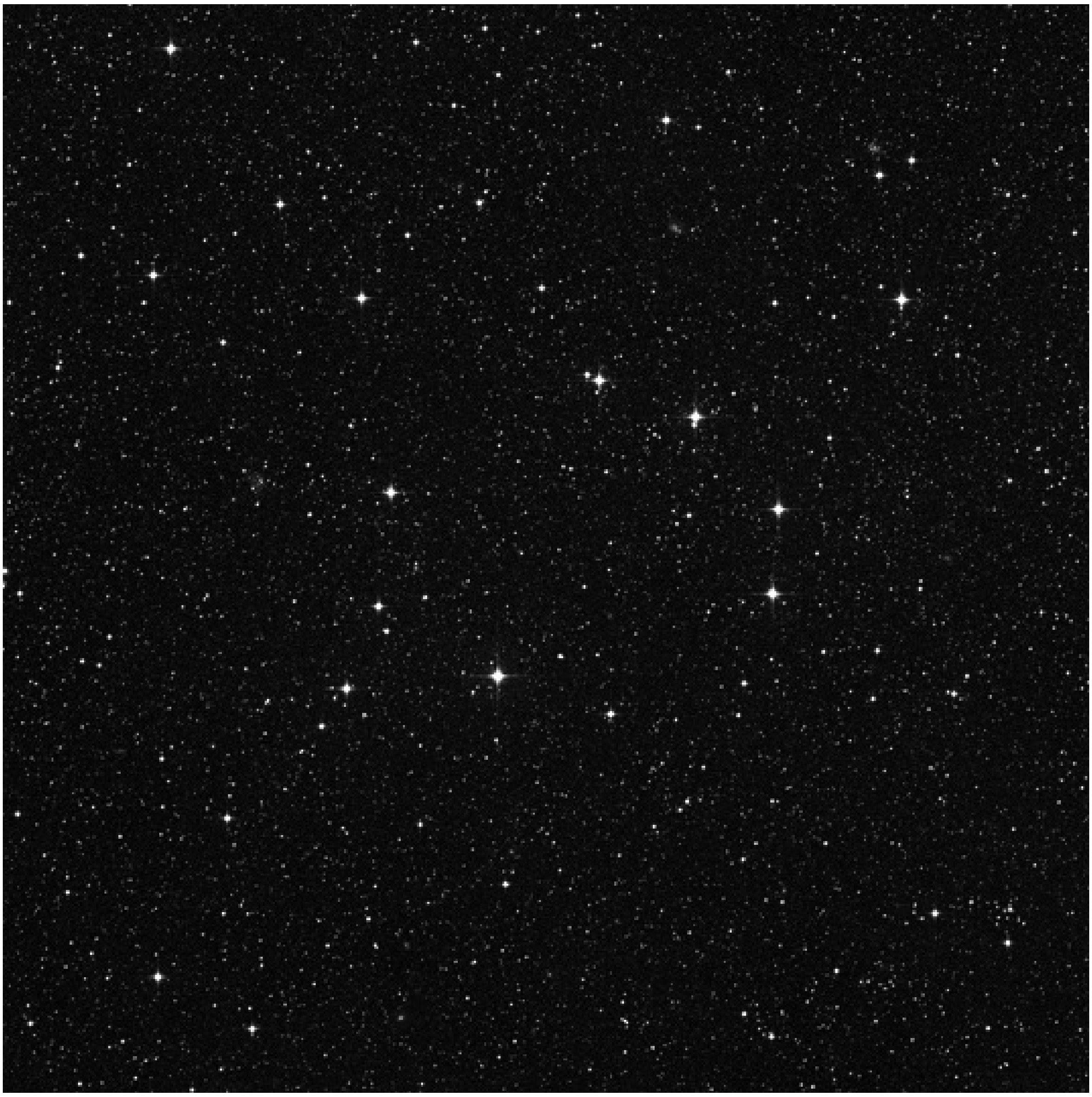
OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER 28 DSH J1519.0-4055	Asterism	15h19m.05	-40°55'.54	10	16'



STREICHER 29
Mensa

A rather faint group of stars that displays the letter G in a realistic representation. Most of the stars are of a similar magnitude in the midst of a busy star field. It can, however, be clearly discerned when the grouping has been identified. The globular cluster IC 2134 is situated towards the southern end of the group.

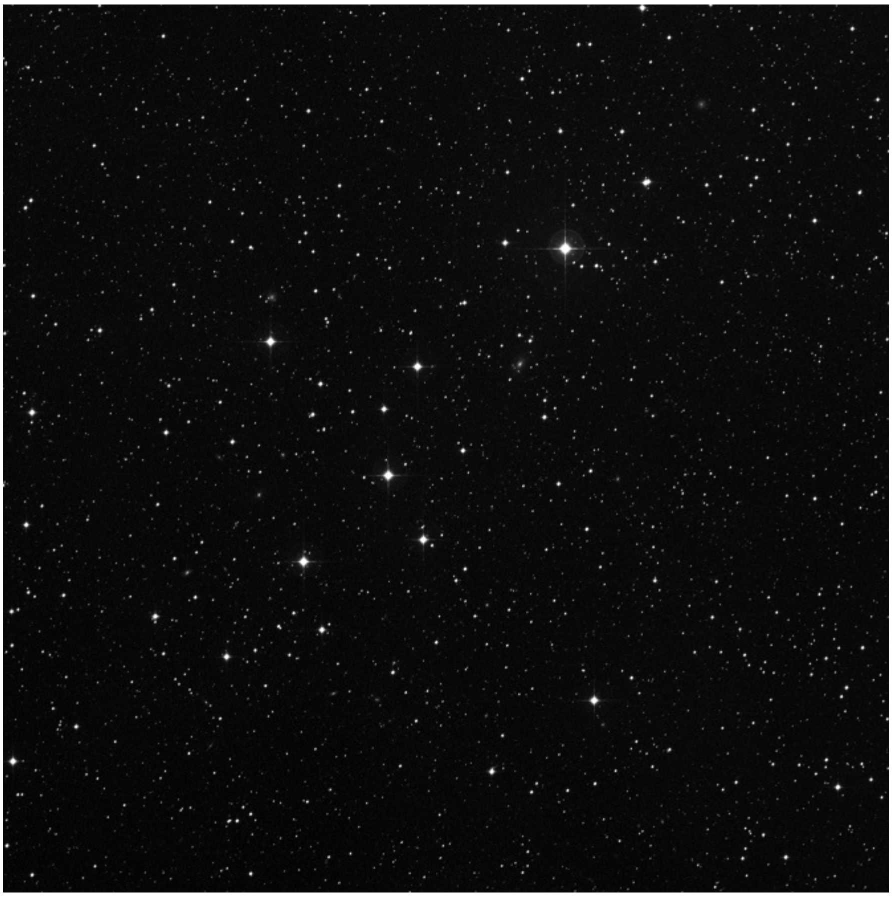
OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER 29 DSH J0517.5-7507	Asterism	05h17m.30	-75°07'.36	8	14'



STREICHER 30
Mensa

The shape of this asterism reminds me of a radio telescope in a way but to others it could be a completely different impression. The semi-circle of stars could be seen as the disk, that appears to point its ear toward the southwest. I named this asterism 'Prof Derck's scope' a treasured professional radio astronomer and friend Professor Derck Smits who is Associate Professor at the University of South Africa.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER 30 DSH J2034.9-8614	Asterism	20h34m.56	-86°14'.12	10	34'



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Publications: The Society publishes its electronic journal, the *Monthly Notes of the Astronomical Society of Southern Africa (MNASSA)* bi-monthly as well as the annual *Sky Guide Africa South.*

Membership: Membership of the Society is open to all. Potential members should consult the Society's web page assa.saao.org.za for details. Joining is possible via one of the local Centres or as a Country Member.

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