



Comet, Asteroid and Meteor Section

CAMnotes 2023 No.4 October to December

The last quarter of the year should provide some interesting opportunities to observe comets, asteroids and meteors. Details on favourable events are given in this issue of CAMNotes.

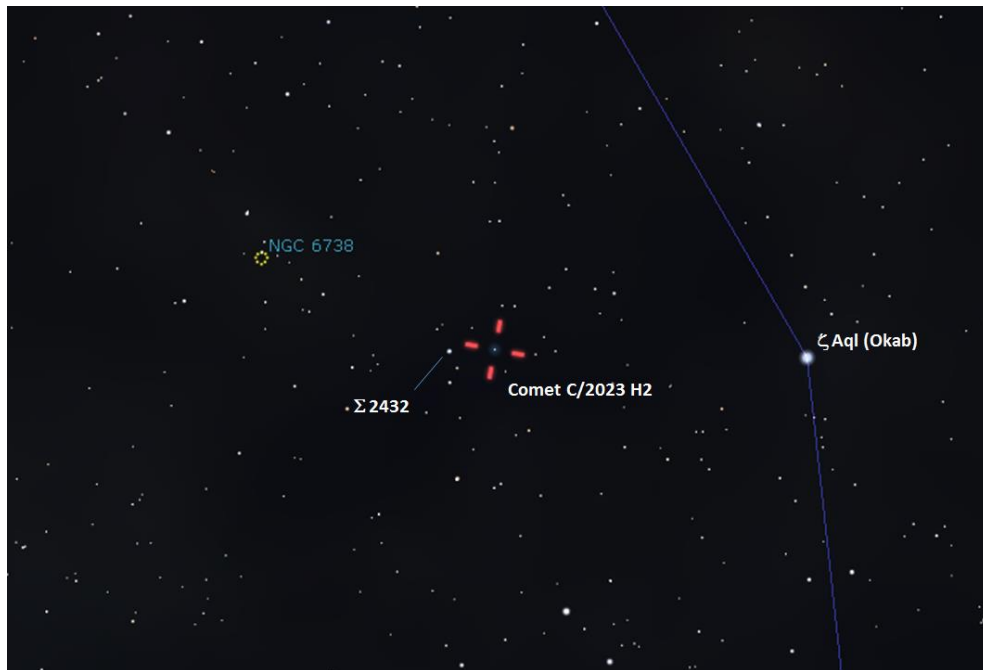
COMETS – there are a few comets which should be within reach of small telescopes. Note diagrams below are prepared courtesy of Stellarium.

Comet 103P/Hartley might be visible telescopically from dark locations. It was predicted to reach perhaps magnitude 8 around perihelion on 12 October, but the coma is diffuse which will make observation difficult from urban locations. The comet will be less than 1° from the bright star delta Geminorum (Wasat) on the morning of 11 October, and nearby to the Eskimo Nebula (NGC 2392, magnitude 9.7) on the following two mornings. The Moon will not interfere. Wasat is a nice close double star, consisting of yellow magnitude 3.5 primary and pale-blue magnitude 8.2 secondary components separated by $5.8''$. Be sure to check it out on your way to locating the comet using the chart below.



Location of comet 103P/Hartley for 11-13 October. Positions are for 05h00 SAST each morning.

Comet C/2023 H2 (Lemmon) is at perihelion on 29 October, and makes its closest approach to Earth a few days later on 10 November, when it might be 8th magnitude, low down in the Western sky just after dark. However it gains altitude quickly thereafter, and on the following night passes within 0.2° of the double star Struve 2432 (mags 6.7, 9.2, separation 14.8") which can be found between the bright star Okab (zeta Aquilae) and the open cluster NGC 6738. Thereafter the comet will become higher in the sky each evening, but will fade rapidly, and the Moon will hinder observations during the second half of the month.



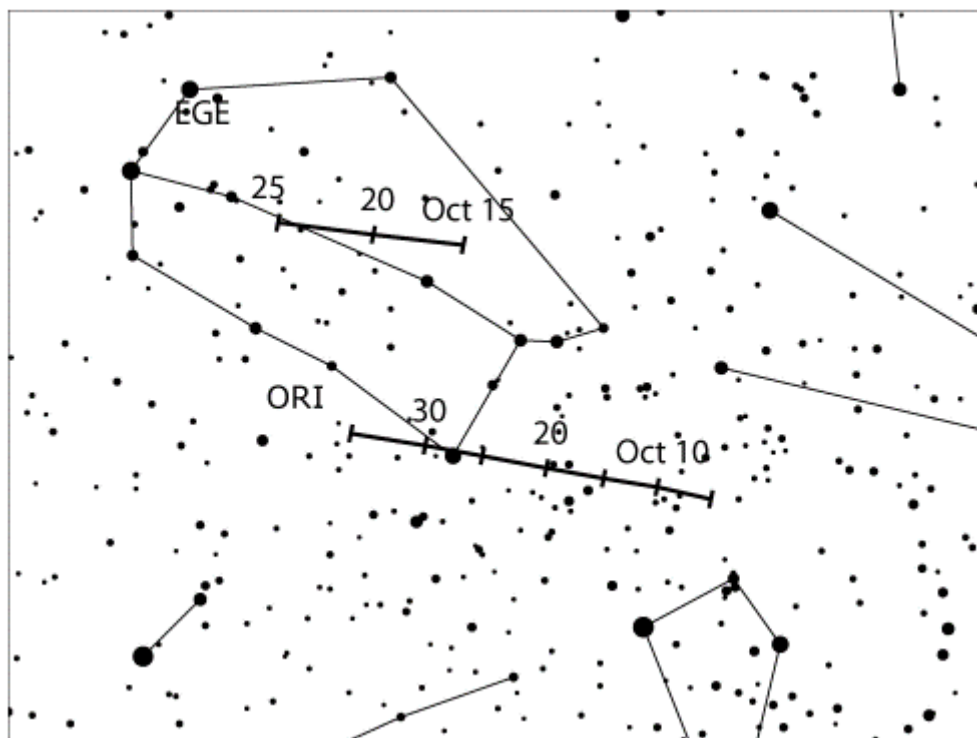
Location of comet C/2023 H2 (Lemmon) for the evening of 11 November 2023.

Comet 62P/Tsuchinshan 1 is at perihelion on 25 December, at which time it might reach magnitude 8-9 and located in Leo. On the morning of 28 December it will be very close to the trio of galaxies M65, M66 and NGC 3628. For visual observers the near full moon will interfere, but the scene should make a nice challenge for astro-imagers. A finder chart can be found in the Sky Guide Southern Africa, page 85.

Comet C/2021 S3 (PanSTARRS) only reaches perihelion in February 2024, but might be visible in mid-December as a magnitude 9 object in Centaurus. On the morning of 8 December it lies on a straight line formed by omega Centauri (NGC5139), Centaurus A (NGC 5128) and the comet, spanning just 7.5° and should provide for an interesting imaging opportunity for astro-photographers. But the best is yet to come for this comet, and I will say more about it in the next issue of CAMNotes.

METEOR SHOWERS - The fourth quarter of the year brings a number of good opportunities to observe meteors, and I will cover these in detail.

Orionids – Each year the Earth crosses the debris left behind by comet 1P/Halley on two occasions, the first in May resulting in the eta Aquariids, and then again in October resulting in the Orionids. The latter usually provides a reliable shower of fast meteors with zenithal hourly rate (ZHR) about 20 per hour and peaking about October 21/22. However this date can vary by as much as a couple of days either side, and the maximum is quite broad, often showing several sub-maxima. Therefore observation for several mornings centred on the predicted peak is recommended. The Orionids appear to radiate from about RA 06h20, Decl. +16° on the night of maximum. However the radiant will appear to drift eastwards by about one degree each day, due to the motion of the Earth in its orbit by about the same amount (see the diagram below).



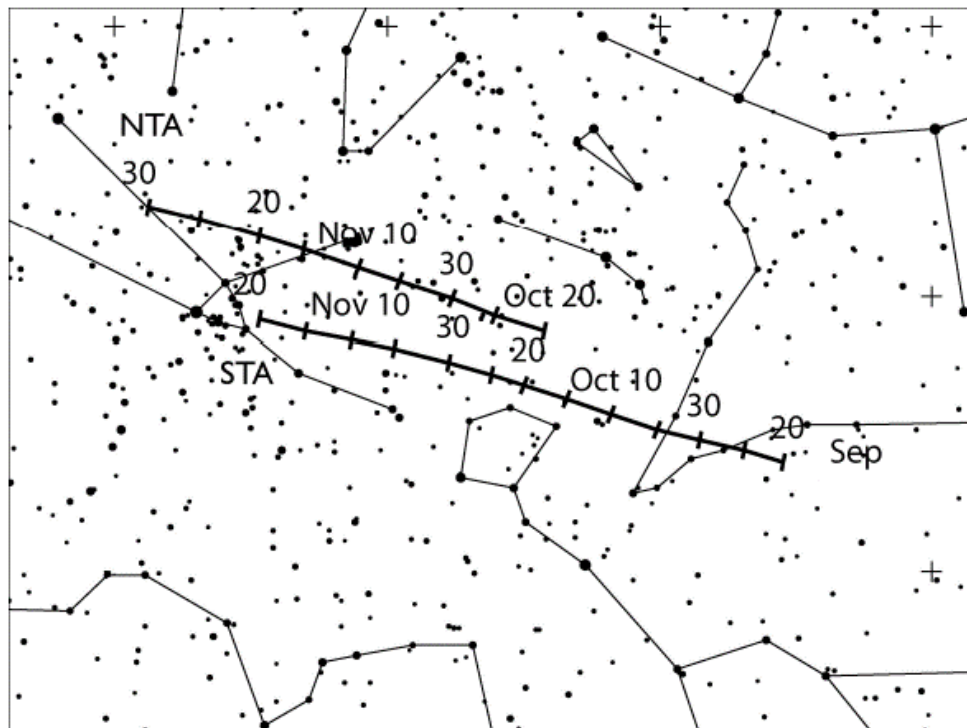
Position of the Orionid radiant, credit IMO Meteor Shower Calendar 2023

The radiant rises around 11pm local time, but needs to rise to an altitude of about 25° or more for observations to be of value. Observations are recommended from 1am until dawn, when the radiant will be highest in the sky, about 48° up. The Moon will not interfere on the night of predicted maximum, and sets around 1am local time, allowing at least a couple of hours observing under favourable conditions.

Orionid meteors enter the atmosphere at 66 km/sec, and so appear fast-moving. Like their sister shower the eta Aquariids, brighter Orionids have a tendency to leave persistent trains. Observations should ideally be carried out for one-hour sessions, noting the start and end times, faintest star visible to the naked eye at start and end of watch, and recording the number of Orionids, and sporadics (meteors not associated with any known shower) separately. Note also that there might be activity from the epsilon-Geminids (EGE), which radiate from nearby. They are also fast-moving

meteors, but the rate seldom exceeds 2-3 per hour even at their peak around 18 October.

Taurids – The Southern and Northern Taurids (STA, NTA) are the meteor stream left behind by comet 2P/Encke, and account for much of the anthelion (ANT) activity at this time of year. The Southern Taurids reach their maximum around 5 November, the Northern branch peaks one week later, leading to an annual Taurid activity which is very broad, but seldom with rates higher than 5 per hour. There is a tendency however to produce bright fireballs, with periodic outbursts in fireball activity coinciding with the ‘Taurid Swarm’ when Earth encounters larger particles in the stream. Although 2023 is not expected to produce enhanced rates of bright Taurid fireballs, it’s worth keeping a lookout for the occasional fireball anyway. Since Taurids are medium speed meteors (29 km/sec), capturing the occasional graceful bright Taurid on camera makes for an interesting project for astro-imagers.



Radiant drift during October and November of the Southern Taurids (STA) and Northern Taurids (NTA). Credit International Meteor Organisation.

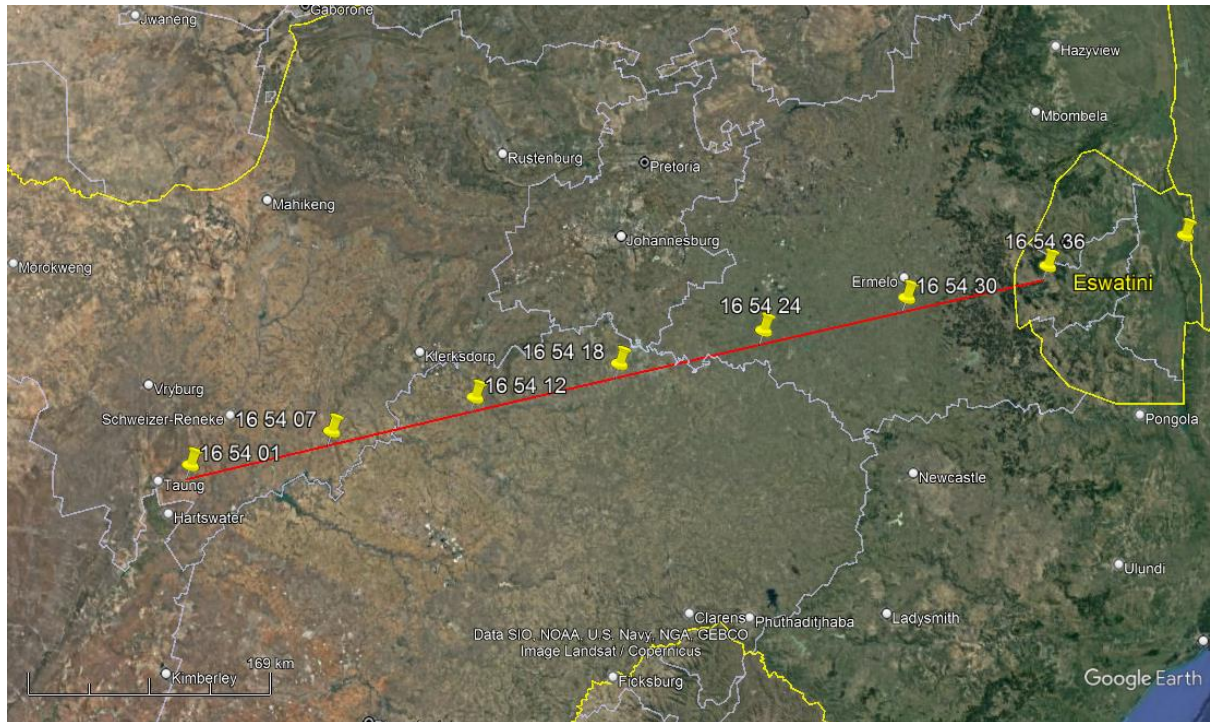
Leonids - reach their peak on the morning of November 17 or 18. Debris left behind by comet 55P/Tempel-Tuttle, they are well known for their outbursts coinciding with the return of the comet to perihelion every 33 years. The comet was last at that point in its orbit in 1998 and was accompanied by several years of storm activity from the Leonids. No significant Leonid activity is expected in 2023, but nevertheless, the shower should be observed to help model the particle flux ahead of the comet towards its next perihelion in May 2031. Observations can be conducted in the hour or so before dawn on the morning of 18 November.

Geminids - Despite the fact they are a northern hemisphere shower, the Geminids remain the most active shower annually also from our locations. The activity generally peaks during the night of December 13/14, and conditions this year are very favourable with maximum around the time of New Moon. Observations can begin from about 11pm local time and can continue until dawn, when the radiant is at its highest. Therefore best rates should be in the hour or so before dawn on December 14. The meteor stream is mass-sorted, so the Earth encounters larger particles as the shower progresses, so while rates on the morning of December 15 are likely to be lower, the average Geminid may be slightly brighter. Most of the known parent bodies of meteor showers are comets, but the parent body of the Geminids is an asteroid, 3200 Phaethon. The asteroid maybe a dormant comet, and the shower laid down before it became dormant, or it may be that dust continues to be left behind, lifted off the loose surface of the asteroid, as has been observed with another asteroid, 101955 Bennu. The Geminids are medium speed, 35 km/s, mainly white, but to me often display a sparkling appearance with yellowish core. They show little tendency to leave persistent trains, but the sight of very bright, graceful, sparkling Geminids is a sight to behold and will reward those who put in the effort to observe after midnight. Note that at the same time as the Geminids, there may be minor activity from the Monocerotids and sigma Hydrids. Take care not to include these in your Geminid counts. The Geminid radiant is close to the bright star Castor in Gemini, and any meteors which cannot be traced back to that point should not be counted as Geminids.

ASTEROIDS – There are a couple of close approaches and occultations by asteroids in the last months of 2023. Prospective observers are welcome to contact me for more details.

Asteroid 1998 HH49 – will approach to within 3.0 lunar distance (LD) on 17 October. At the time of closest approach 02h33 SAST the asteroid will be below the horizon, but the approach can still be observed later the same day after dark, when the asteroid will be as bright as magnitude 13.0, and travelling at about 1'/min across the sky. Using a large telescope you can observe the star visually as a faint speck travelling slowly across the field of view, or a series of stacked images will show the trail against the background stars.

Asteroid 103 Hera – will occult the magnitude 8.3 star HIP 99016 just after dark on 21 October. The asteroid has a diameter of 86km, and an observer on the central line of the occultation can expect a light drop of just over 4 magnitudes to that of the 12.5 magnitude asteroid, and with duration up to 4.9 seconds. The star has coordinates: RA: 20°06'07.70", Decl. -21°00'00.43", and is at the centre of the DSS image over-page, which will aid in identification. The 45% illuminated Moon will be just 9° from the star. Any occultation will take place between 16h53 to 16h55 UT, depending on how far east you are located within the path. Observers with larger telescopes should be able to see the asteroid before and after appulse. I recommend observing for 5 minutes before and after the predicted time, in case any secondary occultations occur due to previously unknown satellites of Hera.



Central path of occultation by 103 Hera on 21 October. Times are given in UT for the predicted time of disappearance for each pin.



HIP 99016 is at the centre of the field of view which has dimensions 30' x 30'. North is up, East is to the left.
Image credit ESO Online Digitized Sky Survey.

Observers anywhere within 43 km either side of the path can expect to see the star disappear for up to 4.9 seconds. The towns of Viljoenskroon, Oranjeville, Amersfoort and Morgenstern are all close to the centre line.

I hope the foregoing gives visual observers and astro-photographers plenty of opportunities for the remainder of the year. If you do observe any of these events I will be pleased to receive any reports or images for analysis.

Clear skies *Tim*