Comet, Asteroid and Meteor Section

CAMnotes 2022 No.3 October-December

Diary of events

October-early November	Comet C/2017 K2 (PanSTARRS) in the evening sky
22 October	Orionids meteor shower at maximum
1-22 November	Taurids, Leonids, alpha-Monocerotids meteor showers active
22 November	Possibility of meteors from comet C/2022 R2 (ATLAS)
1 December	Occultation of TYC 1203-00957-1 by asteroid 543 Charlotte
13/14 December	Geminids meteor shower at maximum

Comet C/2017 K2 (PanSTARRS) in the early evening sky

I gave details about visibility of this comet, which was predicted to become the brightest of the year, in CAMnotes 2022 No. 2. The comet was expected to reach perhaps magnitude 6 and become visible in binoculars, but in the weeks since it brightened more slowly than expected. Magda Streicher and I observed the comet during late September, at which time we estimated the magnitude as 9.0, about two magnitudes fainter than originally predicted. The comet still has some time before it reaches perihelion on December 19.97, but is not expected to brighten much in that time, as although it moves closer to the sun, the distance from Earth increases.

At right is an image by Lafras Smit taken on 25 July 2022, and reproduced with his permission. The image shows how the comet appears in the eyepiece from a dark sky site and has changed little since then, displaying a bright central point in the coma, which is noticeably brighter on one side and leads into a short curved tail.

The comet will become too low to observe in the evening sky after early-November, so if you wish to see this comet observe as soon as possible before it gets too low and lost in evening twilight

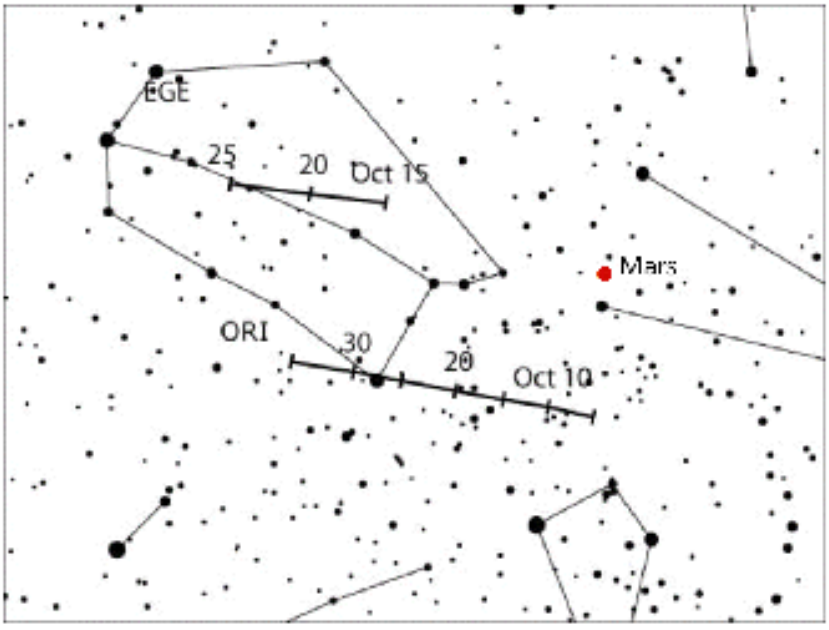
A nice opportunity for astro-imagers comes on 27 October when the comet is less than 2° from the open cluster NGC 6124 (Caldwell 75) and forms a diamond with that cluster, globular cluster NGC 6139 and a small W-shaped asterism. Auke Slotegraaf mentioned the asterism was catalogued by Bruno Alessi as HD 146954 Group, DSH J1620.8-3931. The star HD 146954 is a double star, first observed by Robert Innes in 1895, with component magnitudes 6.1 and 10.8, currently separated by about 20''.

Comet C/2017 K2 (PanSTARRS) on the evening of 27 October. Also in the field are NGC 6124, NGC 6139 and asterism DSH J1620.8-3931, which should provide an opportunity for astro-photographers.

Orionids meteor shower

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 appears 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). 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. There should be little interference from the moon, which is at last quarter on 17 October, and New Moon occurs on 25 October.

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, which radiate from nearby as shown in the map below. They are also fast-moving meteors, but the rate seldom exceeds 2-3 per hour even at their peak around 18 October.



The diagram at right, courtesy of the IMO Meteor Shower Calendar for 2022, shows the radiant drift for the Orionids (ORI) and nearby epsilon-Geminids (EGE) with date. Note also the presence of the planet Mars in Taurus, with its position shown for the night of maximum of the Orionids.

November meteor shower activity

There are several meteor showers active in November, which generally give low activity outside outburst years.

The **Southern and Northern Taurids** (STA, NTA) are the meteor stream left behind by comet 2P/Encke, and account for much of the antihelion (ANT) activity at this time of year. The Southern Taurids reach their maximum in October, but the Northern branch peaks in November, 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. This year is one such year, and enhanced rates of bright Taurid fireballs are possible in October and November 2022. 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.

The **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. But the comet is now almost as far away from the sun as it gets, and no significant Leonid activity is expected in 2022.

The **alpha-Monocerotids** is another meteor stream which shows occasional outbursts. Previous outbursts occurred in 1925, 1935, 1985 and 1995, which might imply a ten year periodicity, but then also in 2019. No outburst is expected this year, but nevertheless observations are useful to characterise the any baseline activity that might be present outside of outburst years. The radiant is at RA 07h48, Decl. +01°, peaks on November 21/22, and the meteors enter with speed 65 km/sec and are fast-moving.

Meteors from comet C/2022 R2 (ATLAS) ?

Comet C/2022 R2 (ATLAS) was discovered on 14 September 2022 and reaches perihelion on 25 October. The orbit passes within 0.05 AU of earth's orbit, and if there are particles left behind by the comet at the time of closest approach, there is a potential for a meteor shower to occur. While there is no guarantee that any meteor activity will occur, we need to observe in case a shower does materialise. Any meteors from the comet will appear to radiate from about RA 05h36, Decl. −20°, in the constellation of Lepus around the dates of 20-25 November, with a peak possibly centred on 19h UT on 22 November. The radiant rises about 7pm local time, and is high enough for serious observation from 9pm until dawn. The moon will not interfere.

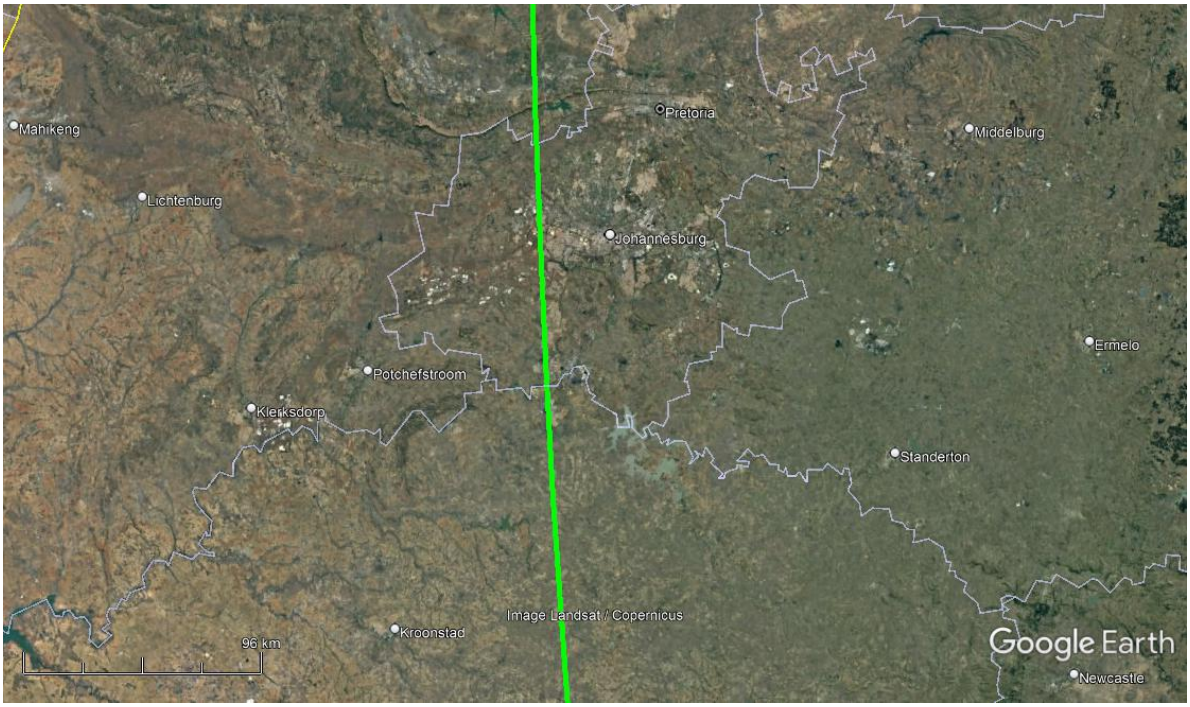
The entry speed will be 38 km/sec, and any meteors from the shower will appear to move with medium speed. (Ref: John Greaves, meteornews.net).

Occultation of TYC 1203-00957-1 by asteroid 543 Charlotte

On the evening of December 1, observers from Gauteng to Mthatha may see asteroid 543 Charlotte pass in front of a 10.2 magnitude star. Since Charlotte at the time will be magnitude 13.7, the star will essentially pop out of view for up to 9 seconds, depending on how close you are to the centre line of the occultation. Timing the moment of disappearance and subsequent reappearance of the star enables us to determine the size and shape of the asteroid, and the star is bright enough to make this a nice project for fairly small telescopes. The star occulted is TYC 1203-00957-1, coordinates RA = 01h 21m 00.542s, Decl. +21° 13′ 43.053″, and the low power field (courtesy ESO Deep Sky Survey) is shown in the image below, with the target star in the centre.

Low power field centred on TYC 1203-00957-1. Field is 30 arc minutes across.

The path is roughly north to south across the eastern side of the country. For Gauteng, the path crosses the towns of Brits, Krugersdorp, and Vanderbijlpark, and Sasolburg in the Free State. Those on the centre line may see the star disappear for up to 9 seconds; those up to 20-25 km from the centre line may see a disappearance of shorter duration. Predicted time of occultation for Gauteng is between 21h16 – 21h17 UT (23h16-23h17 local time), but observations should be conducted for 5 minutes either side of this time, due to any uncertainties in the predicted times, but more importantly to identify any secondary occultations that may occur due to possible moons of Charlotte.



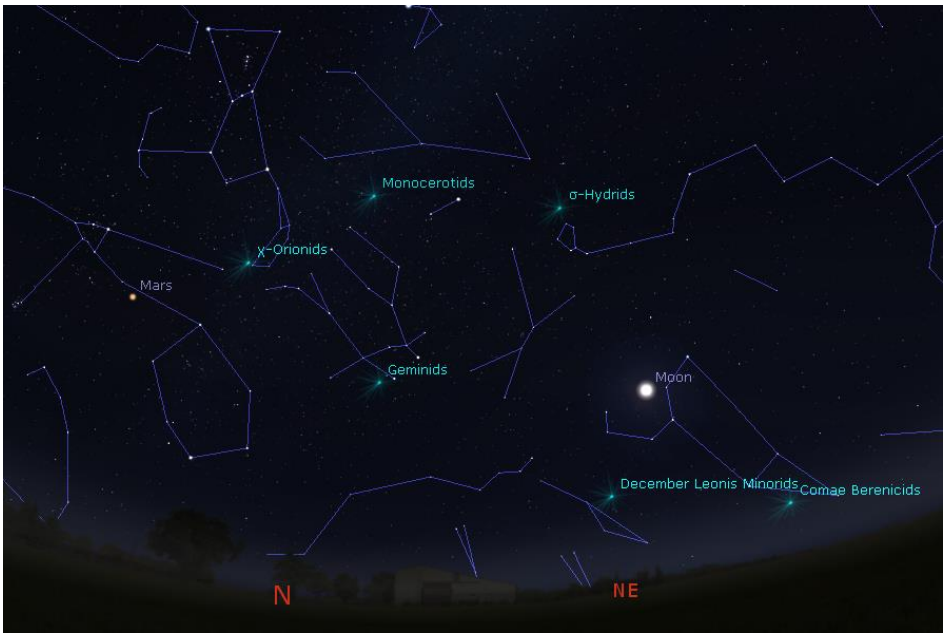
Predicted path of the occultation of TYC 1203-00957-1 by asteroid 543 Charlotte on December 1 for Gauteng and northern Free State. The width of the path is 45 km centred on the green line.

For occultation timings to be of value, we ideally need several observers across the path. If you are interested in participating in these observations, either for this or future events, please let me know.
Data courtesy Steve Preston, https://www.asteroidoccultation.com/

Geminids meteor shower at maximum

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, but unfortunately observing conditions this year are not ideal, with a bright gibbous moon interfering, and located just 38° from the radiant at its peak. 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 will be slightly brighter. Most of the known parent bodies of meteor showers are comets. However 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 are prepared to bear the influence of the nearby moon.



The scene looking north at around 1am on December 14, showing the position of the Geminid radiant near the bright star Castor in Gemini. Diagram credit Stellarium, ver 0.20.1.

Looking at the scene towards the north, the bright moon, 72% illuminated is to the right in Leo. Mars is to the upper left in Taurus. Several minor showers are also active, including the chi-Orionids, Monocerotids and sigma-Hydrids, and these may show slight, but perceptible activity.

Clear skies

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