Comet, Asteroid and Meteor Section

CAMNotes 2024 No.3 July-September

The following observations are requested. Prospective observers who need more information or assistance are welcome to contact the Director.

COMETS – the following comets should be visible during Q3:

Comet 12P/Pons-Brooks was well observed in Q2. It emerged from evening twilight in the second week of April, becoming an easy object in binoculars and was visible to the naked eye from dark sky sites during early May. The comet displayed prominent gas and dust tails, as well as an anti-tail during early June due to dust particles lagging behind the comet's position and seen in perspective around the time of Earth's crossing the orbital plane of the comet on 6 June.

Image of comet 12P/Pons-Brooks taken by Kos Coronaios on 7 June.

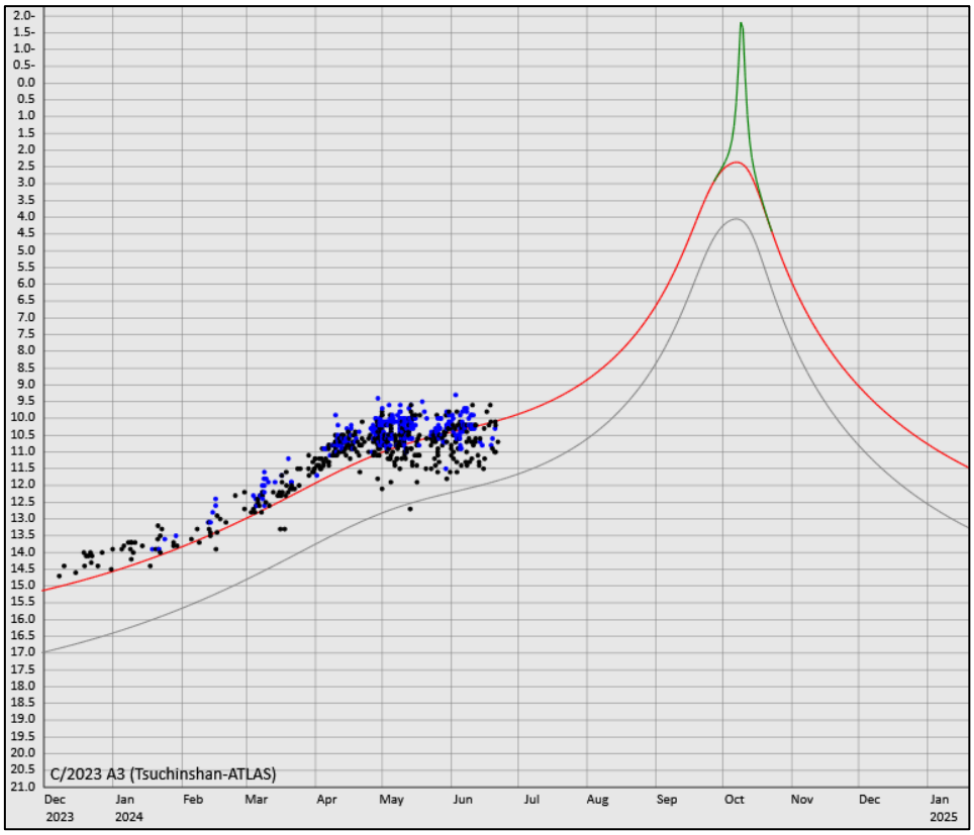
At the time of writing the comet has faded to around 8th magnitude and is expected to continue to fade unless it undergoes any further major outbursts. During July the comet crosses the constellations of Puppis and Vela and will likely fade to magnitude 9 by month end. It remains conveniently placed in the evening sky just after sunset. For those able to take images using a telescope, an interesting challenge will occur when the comet passes the globular cluster omega Centauri. On the evening of 22 September comet 12P passes within 0.3° of the centre of the cluster, which has a diameter of 55 arc-minutes, and should make for some interesting images. The comet will then likely be an 11-12th magnitude object.

Comet 13P/Olbers was at perihelion on 30 June and reached magnitude 6.5 or perhaps slightly brighter around that time. During July it remains poorly placed for observation from southern Africa, located in Ursa Major, but crosses into Coma Berenices in the second week of August, fading all the while. During the evenings of 16 to 18 August the comet passes through the interesting region known as the Coma Star Cluster (Melotte 111), providing some interesting imaging opportunities. The comet will likely be 8th magnitude at the time. On 25 August the comet will be 0.5° from the Black Eye Galaxy, Messier 64, and both objects should be of similar brightness. Note the Moon is full on 19 August and will interfere with observations.

C/2023 A3 (Tsuchinshan-ATLAS) may still become the brightest comet of the year. The comet was observed visually by Magda Streicher and myself during May, when it was a very pretty object, at magnitude 11 with a 4 arc-minute tail, slightly curved towards the north (see also image by Kos Coronaios).

Image of comet C/2023 A3 (Tsuchinshan-ATLAS) taken by Kos Coronaios on 15 June. South is towards the top, north towards the bottom of the image.

Initial estimates indicated the comet might become naked eye brightness. However, based on observations reported to the Comet OBServation database (COBS), and reproduced by Gideon van Buitenen in the figure below, the comet ceased to brighten from May onwards, and ultimately whether the comet does reach naked eye brightness depends on when and to what degree the brightness resumes its upward trend.



Light curve for comet C/2023 A3, credit Gideon van Buitenen, http://astro.vanbuitenen.nl/comet/2023A3.

The brightness behaviour of a comet can be expressed by the equation:

$$m1 = H0 + 5 \log(\Delta) + 2.5n \log(r)$$

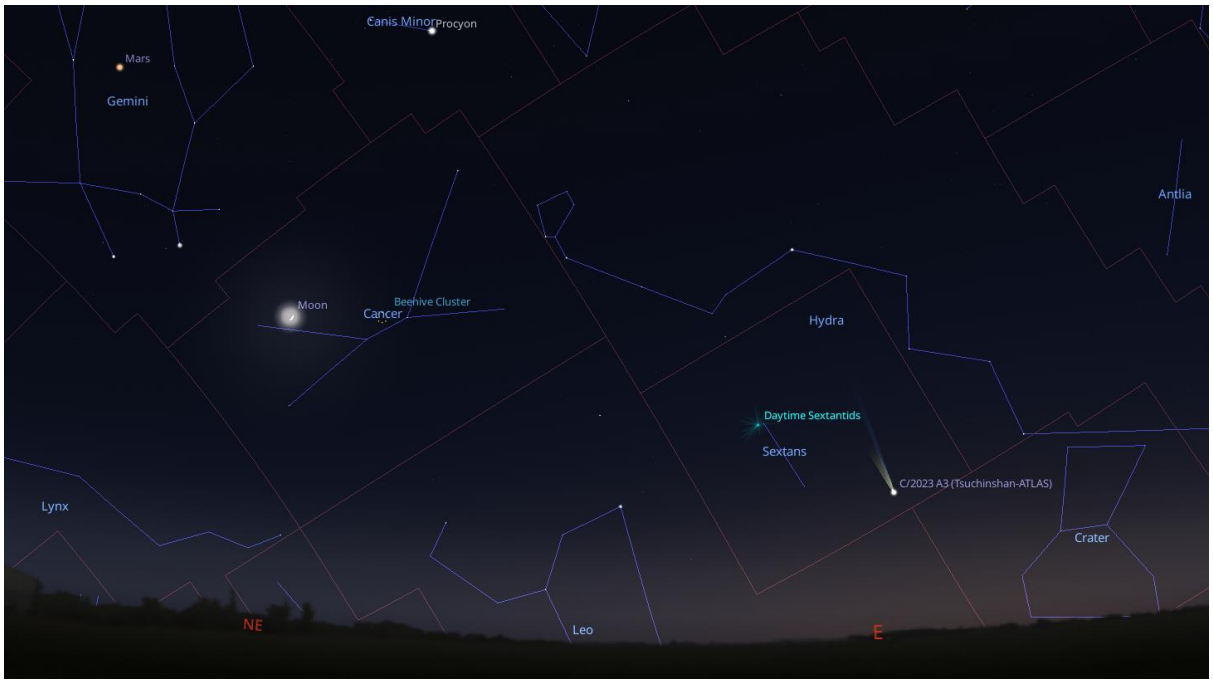
where m1 is the total magnitude of the coma, H0 is the absolute magnitude of the comet at Δ=r=1 AU, Δ is the geocentric distance of the comet from Earth in AU, and r is the distance of the comet from the Sun in AU. The value of n is a factor which defines the rate at which the comet brightens or fades relative to its distance from the Sun. In the light curve above the red curve is based on actual observations, where H0 = 6.26 and n = 3.14. The grey curve is based on the initial values from the Minor Planet Centre with H0 = 8.0 and n = 3.2. Finally, the green curve shows the possible enhancement in the brightness due to forward scattering of sunlight by dust particles at large phase angles, when the angle between the Earth and Sun as seen from the comet approaches 180°.

The ephemeris based on the Minor Planet Centre solution is shown below:

Date	UT	R.A. (J2000)	Decl.	Delta	r	El.	Ph.	m1
	h m s							
2024 09 25	000000	10 39 31.3	-06 06 36	1.027	0.399	22.6	75.3	4.9
2024 09 26	000000	10 41 39.1	-06 06 39	0.984	0.394	22.9	81.2	4.7
2024 09 27	000000	10 44 24.1	-06 05 24	0.940	0.392	23.0	87.4	4.6
2024 09 28	000000	10 47 52.7	-06 02 42	0.897	0.391	22.9	93.8	4.5
2024 09 29	000000	10 52 11.5	-05 58 28	0.853	0.393	22.7	100.5	4.4
2024 09 30	000000	10 57 27.9	-05 52 32	0.810	0.396	22.2	107.3	4.3
2024 10 01	000000	11 03 49.7	-05 44 46	0.767	0.401	21.5	114.2	4.3
2024 10 02	000000	11 11 24.8	-05 35 01	0.726	0.408	20.4	121.3	4.2
2024 10 03	000000	11 20 21.7	-05 23 03	0.686	0.417	19.0	128.5	4.1
2024 10 04	000000	11 30 48.3	-05 08 38	0.649	0.427	17.3	135.8	4.1
2024 10 05	000000	11 42 52.4	-04 51 31	0.614	0.438	15.2	143.3	4.1
2024 10 06	000000	11 56 39.8	-04 31 27	0.581	0.451	12.7	150.9	4.1
2024 10 07	000000	12 12 14.3	-04 08 13	0.552	0.465	9.8	158.6	4.0
2024 10 08	000000	12 29 35.2	-03 41 40	0.527	0.479	6.6	166.1	4.1
2024 10 09	000000	12 48 36.4	-03 11 52	0.506	0.495	3.9	172.1	4.1
2024 10 10	000000	13 09 04.9	-02 39 09	0.490	0.511	4.3	171.5	4.1
2024 10 11	000000	13 30 40.3	-02 04 10	0.479	0.528	7.9	164.9	4.2
2024 10 12	000000	13 52 55.7	-01 27 49	0.473	0.545	12.3	157.0	4.3
2024 10 13	000000	14 15 20.6	-00 51 17	0.473	0.563	17.0	148.9	4.4
2024 10 14	000000	14 37 24.2	-00 15 44	0.477	0.581	21.5	140.9	4.5
2024 10 15	000000	14 58 39.1	+00 17 48	0.486	0.599	26.0	133.2	4.7
2024 10 16	000000	15 18 44.5	+00 48 34	0.500	0.618	30.1	126.0	4.8
2024 10 17	000000	15 37 26.4	+01 16 07	0.517	0.637	33.9	119.2	5.0
2024 10 18	000000	15 54 38.3	+01 40 19	0.537	0.656	37.3	112.9	5.2
2024 10 19	000000	16 10 18.9	+02 01 15	0.561	0.675	40.3	107.1	5.4
2024 10 20	000000	16 24 31.6	+02 19 10	0.586	0.694	43.0	101.8	5.6
2024 10 21	000000	16 37 21.8	+02 34 22	0.614	0.713	45.3	96.9	5.8
2024 10 22	000000	16 48 56.6	+02 47 13	0.643	0.733	47.3	92.4	6.0
2024 10 23	000000	16 59 23.4	+02 58 02	0.674	0.752	49.1	88.3	6.2
2024 10 24	000000	17 08 49.5	+03 07 07	0.706	0.771	50.5	84.5	6.3

Ephemeris for comet C/2023 A3, prepared from Minor Planet Centre Ephemeris Service, downloaded on 23 June 2024, for Johannesburg at 00h UT on the given dates. Delta is the distance of the comet from the Earth in AU, r is the distance from the Sun in AU, El is the elongation the comet from the Sun in degrees, Ph is the phase angle of the Earth-Comet-Sun, and m1 is the total magnitude of the coma.

The comet reaches perihelion on 27 September, when it might become a naked eye object, low in the eastern sky just before dawn. The figure overpage shows the comet's location for the morning of 28 September, when it will be 46° to the right and slightly below the crescent Moon. The comet's elongation from the Sun will then be at its greatest around 23°, but after that date it heads rapidly into the solar glare, probably becoming unobservable until mid-October when it reappears low in the evening sky.



Comet C/2023 A3 located 10° above the horizon at 5am local time on the morning of 28 September.

The comet re-emerges from the solar glare from about 15 October, and might perhaps be 3rd magnitude, low above the western horizon. Whether the comet is observable earlier than this date depends on the degree to which the brightness is enhanced by forward scattering, if at all. Maximum phase angle of 172° occurs on 9 October, but the comet will then be located only 4° from the Sun. In the following days the comet gains altitude and increases in elongation from the Sun rapidly, although it is expected to fade quickly. Depending on how the comet performs, more observing details will appear in the next issue of CAMNotes.

METEOR SHOWERS – conditions are good to observe the Southern delta-Aquariids in late July/early August, and observations are required of the newly-listed eta-Eridanids.

The Southern delta Aquariids (SDA) are one of the more active meteor showers visible from the southern hemisphere, and generally produce good rates (ZHR~25) peaking around 31 July. Rates are also at decent levels a couple of days before and after maximum. During 2003, the shower peaked at ZHR ~40, but two days earlier than the traditional maximum date. The radiant on 31 July is at RA 23h36, Decl. -16°, and the meteors are medium speed at 42 km/sec. The radiant is fairly close to those of the Anthelion showers at this time of year, and some Anthelion meteors may be observed at the same time. They can be distinguished from the SDAs however by their slower average speed. The radiant is high enough to observe from 22h00 local time, culminates just after 2am and observations can continue until dawn. The Moon is at last quarter on 28 July, and on 31 July rises shortly before 3:30 am.

The radiants of the Southern delta-Aquariids and Anthelion meteors. The view is for Johannesburg at 22h00 local time on 31 July looking east. The radiants of the alpha-Capricornids and Piscis Austrinids are also shown. Saturn rises about an hour after the Southern delta-Aquariids.

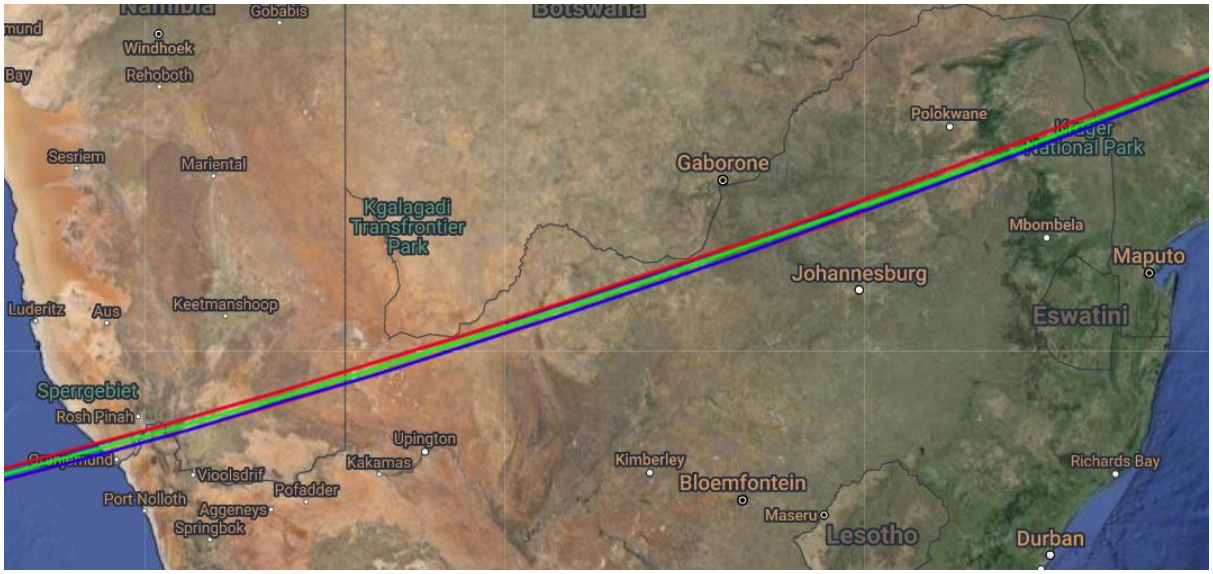
At the same time, meteors may be observed from two other nearby showers. The **alpha Capricornids (CAP)** reach their maximum on the same night as the Southern delta-Aquariids, though the rate is lower at ZHR ~5. The alpha-Capricornids are slow meteors, speed 25 km/sec, and have a tendency to produce bright yellow meteors, with fireballs common. The CAPs showed enhanced rates last in 1995 when the rate reached ZHR 10. Since then, nothing untoward was observed. During watches on the SDA and CAP showers, the occasional meteor from the **Piscis Austrinids (PAU)** might be observed. The radiant is close by and to the south of the SDAs, and peaks a couple of days earlier. The shower appears to be rich in faint meteors, and so probably only the occasional brighter members are observed visually. Nevertheless, care needs to be taken not to include these in counts of the other showers observed. At 44 km/sec, their speed is very similar to the Southern delta-Aquariids.

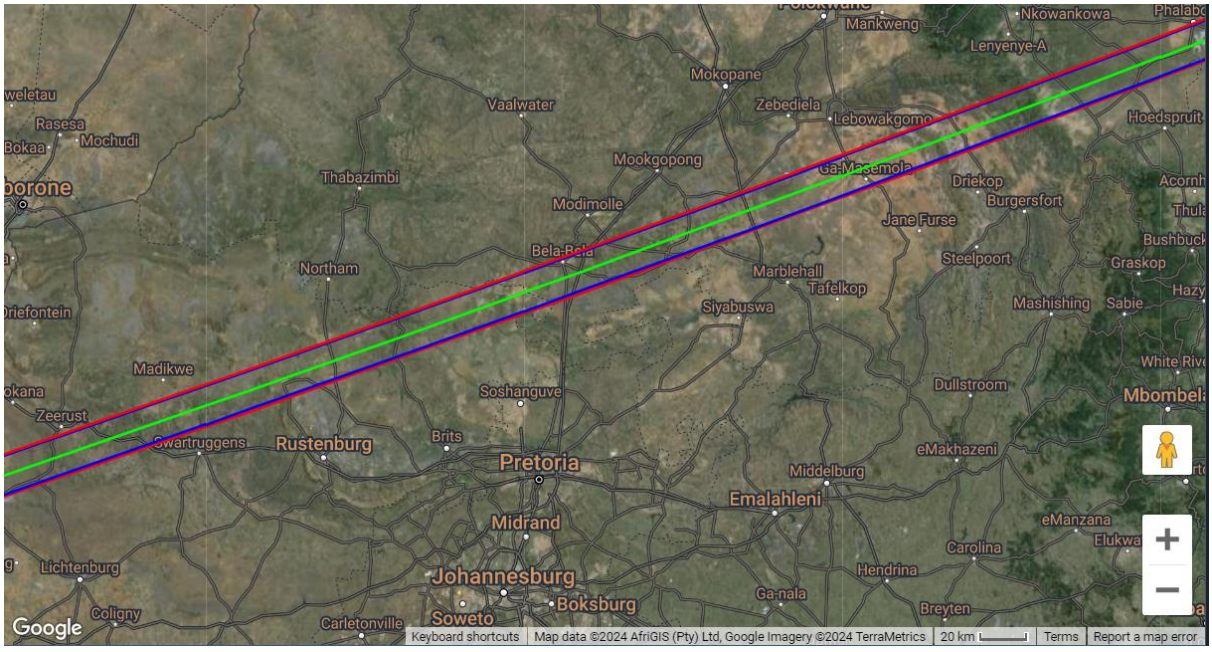
The **eta-Eridanids** were only recently added to the IMO working list, even though activity from the region has been detected visually for many years. Recent video detections show activity from a broad radiant active for much of August but peaking around 8 August with low ZHR. The activity however continues well beyond this date. Visual observations are required to help understand the nature of this southern hemisphere shower. The radiant is centred around RA 41.4° (02h46m), Decl. -13.3° and produces fast meteors which enter the atmosphere at 64 km/sec. The radiant rises around 23h30 local time, is high enough to observe from 2am and is highest as

early morning twilight intervenes. The Moon is at first quarter on 12 August, and so the predicted maximum and a few days after are suitable for observation without interference.

ASTEROIDS – there is an occultation of a magnitude 8.5 star on the early morning of 12 July.

Asteroid 7859 (Lhasa) occults TYC 6883-00040-1 on 12 July 2024 at 00:12- 00:15 UT. The path crosses from near Phalaborwa in the east, just south of Bela-Bela, Sun City, Mahikeng, through southern Namibia to just north of Oranjemund.





The star is magnitude 8.5, bright enough to observe the event with small apertures, and even photographically with a telephoto lens using an unguided time exposure to bracket the predicted disappearance time. Any disappearance will show up as a break in the star trails. The star is TYC 6883-00040-1 in the constellation of Sagittarius and is located at 19h 23m 31s, Decl. -27° 46' 32". The asteroid is 7859 Lhasa, which at magnitude 17.5 will not be visible. Observers in the path will see the star disappear for up to 1.3 seconds assuming the diameter of the asteroid is 16.2 km.

Persons interested in participating in this important program on asteroid occultations are welcome to contact the Director for more information on how to observe.

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

Clear skies,

Tim Cooper

Director, Comet, Asteroid and Meteor Section.

Acknowledgements
Star maps were drawn using Stellarium 0.20.1, Copyright © 2000-2020 Stellarium Developers. Data on meteor showers is courtesy of the International Meteor Organization's Meteor Shower Calendar 2024. Asteroid occultation predictions are from Occult Watcher 5.0.4.1 with additional information from Steve Preston's site at asteroidoccultation.com. Maps for asteroid occultations are from Google Earth, copyright Google, INEGI Imaging, © NASA 2024, Terrametrics.