

ALPO COMET NEWS FOR JUNE 2021

A Publication of the Comets Section of the
Association of Lunar and Planetary Observers

By Carl Hergenrother
ALPO Comets Section Coordinator
comets@alpo-astronomy.org



C/2020 S3 (Erasmus), $m \sim 15$, tail $> 19'$ PA 258° , 2021May20 1012-1022UT, 2x300s, FOV $26.2' \times 14.9'$
11" SCT f/6.4 STF-8300M 1.24"/pixel Mike Olason, Tucson Arizona

C/2020 S3 (Erasmus) brightened to 6th magnitude last November and December before becoming lost in the glare of the Sun. While the comet was visible later in data taken by the Sun watching SOHO spacecraft, it passed perihelion invisible to ground-based observers. Mike Olason of Tucson, AZ observed a diminished Comet Erasmus on 2021 May 20 with a Celestron C-11 SCT at f/6.4 with a STF-8300M CCD.

The monthly ALPO Comet News PDF can be found on the ALPO Comets Section website (<http://www.alpo-astronomy.org/cometblog/>). A shorter version of this report is posted on a dedicated Cloudy Nights forum (<https://www.cloudynights.com/topic/774250-alpo-comet-news-for-june-2021/>). All are encouraged to join the discussion over at Cloudy Nights. The ALPO Comet Section welcomes all comet related articles, observations, images, drawings, magnitude estimates, or spectra. One does not have to be a member of ALPO to submit material, though membership is encouraged. To learn more about the ALPO, please visit us @ <http://www.alpo-astronomy.org>. We can also be reached at comets@alpo-astronomy.org.

In This Issue

Summary.....	3
Comets Section News.....	3
Bright Comets (magnitude < 10.0).....	3
Fainter Comets of Interest (generally between magnitude 10.0 and 13.0).....	4
C/2020 T2 (Palomar)	4
7P/Pons-Winnecke.....	5
4P/Faye	7
8P/Tuttle	8
10P/Tempel	9
15P/Finlay	10
C/2019 L3 (ATLAS).....	11
C/2020 R4 (ATLAS)	13
C/2021 A1 (Leonard)	14
New Discoveries, Recoveries and Other Comets in the News.....	15
Recent Magnitude Measurements Contributed to the ALPO Comets Section	17
Recent Select Images Contributed to the ALPO Comet Section	18

Summary

Comets C/2020 T2 (Palomar) and 7P/Pons-Winnecke should vie for the title of brightest comet of June though they should only reach magnitude 10.0. While June won't see any "bright" comets, there are a large number of fainter objects, in addition to the aforementioned comets, between magnitudes 10 and 13. These fainter objects include some low numbered periodic comets (4P/Faye, 8P/Tuttle, 10P/Tempel, and 15P/Finlay) and long period comets C/2019 L3 (ATLAS), C/2020 J1 (SONEAR), and C/2020 R4 (ATLAS). C/2021 A1 (Leonard) is still inbound and has the potential to be a notable object at the end of the year, though its lack of recent brightening is concerning.

Comets Section News

During the month of May 2021, the ALPO Comets Section received 32 images and/or sketches from Denis Buczynski, John Chumack, Carl Hergenrother, Martin, Mobberley, Mike Olason, Gregg Ruppel, John D. Sabia, and Chris Schur of the following comets: 4P/Faye, 6P/d'Arrest, 7P/Pons-Winnecke, 8P/Tuttle, 10P/Tempel, 15P/Finlay, 17P/Holmes, 28P/Neujmin, 57P/du Toit-Neujmin-Delporte, 67P/Churyumov-Gerasimenko, 117P/Helin-Roman-Alu, C/2017 K2 (PANSTARRS), C/2019 K7 (Smith), C/2020 H5 (Robinson), C/2020 S1 (SONEAR), C/2020 R4 (ATLAS), C/2020 S3 (Erasmus), C/2020 T2 (Palomar), C/2021 A1 (Leonard), C/2021 A9 (PANSTARRS), and C/2021 E3 (ZTF).

On the magnitude front, J. J. Gonzalez, Carl Hergenrother, and Chris Wyatt submitted 43 visual and CCD/CMOS brightness measurements of comets 7P/Pons-Winnecke, 117P/Helin-Roman-Alu, 246P/NEAT, C/2017 K2 (PANSTARRS), C/2018 U1 (Lemon), C/2019 F1 (ATLAS-Africano), C/2019 T4 (ATLAS), C/2020 F5 (MASTER), C/2020 J1 (SONEAR), C/2020 R4 (ATLAS), C/2020 T2 (Palomar), and C/2021 A1 (Leonard).

The Comets Section Image Gallery (<http://www.alpo-astronomy.org/gallery3/index.php/Comet-Images-and-Observations>) also reached a milestone in May when the number of images/sketches passed the 6000 mark. The next milestone is the total number of different comets represented in the Gallery. We are only 4 comets away from having images of 600 comets.

We plan on publishing our analysis of the bright comets of 2019 in an upcoming issue of the Journal of the ALPO. If you have any comet observations from 2019, especially for comets 260P/McNaught, C/2018 N2 (ASSASN), C/2018 W2 (Africano), and C/2018 Y1 (Iwamoto), please consider sending them to the Comets Section at comets@alpo-astronomy.org. We would like to thank Jef De Wit, Uwe Pilz, and Michael Rosolina who recently contributed sketches of 2019's brighter comets.

Bright Comets (magnitude < 10.0)

None, though there is a chance that C/2020 T2 (Palomar) and 7P/Pons-Winnecke may surprise us and become brighter than predicted. Those two comets are described in the following section.

Fainter Comets of Interest (generally between magnitude 10.0 and 13.0)

C/2020 T2 (Palomar) – While no comets are expected to be brighter than magnitude 10.0 this month, let’s kick off the “Fainter Comets of Interest” section with two comets that should come close to magnitude 10.0 and, with luck, could become brighter.

C/2020 T2 (Palomar) was discovered on 2020 October 7 at 19th magnitude and heliocentric distance of 4.4 au. The Zwicky Transient Facility (ZTF) used the 1.2-m Schmidt on Mount Palomar for the discovery. *C/2020 T2 (Palomar)* is a long-period comet with perihelion next month on July 11 at 2.05 au and an orbital period of ~5720 years.

Visual observations by J. J. Gonzalez, Carl Hergenrother, and Chris Wyatt placed Palomar between magnitude 9.8 and 11.1 with a coma diameter between 3.5’ and 7’ in May. CCD observations by Carl Hergenrother on May 31 found the comet at magnitude 9.7 with a large 14’ coma. This bright and large coma was confirmed by other CCD measurement submitted to the COBS site. For example, Thomas Lehmann (ICQ code LEHaa) measured a magnitude of 10.1 and coma diameter of 17’ on May 19.90 UT.

June should see *C/2020 T2* maintain a peak brightness between 10.0 and 10.5 as it moves through Boötes in the evening sky. Imagers should be on the lookout for any narrow dust tail/trail features as the Earth passes through Palomar’s orbital plane on June 14.



Image of C/2020 T2 (Palomar) (right) and globular cluster M3 (left) as imaged by Gregg Ruppel on May 17. The image is a LRGB composite with the equivalent of 100 minutes total exposure with a AstroSysteme Austria 10N f/3.6 Astrograph in a robotic observatory at Dark Sky New Mexico.

C/2020 T2 (Palomar)

T = 2021-Jul-11 q = 2.05 au

Long-period comet - ~5700-year orbital period

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	13 36	+23 09	2.110	1.443	117E	Boo	10.4	72	27
2021-Jun-06	13 37	+21 08	2.097	1.460	114E	Boo	10.4	69	29
2021-Jun-11	13 38	+19 02	2.086	1.479	112E	Boo	10.4	64	31
2021-Jun-16	13 41	+16 50	2.077	1.502	109E	Boo	10.4	60	33
2021-Jun-21	13 43	+14 36	2.069	1.529	107E	Boo	10.4	56	36
2021-Jun-26	13 47	+12 20	2.063	1.558	104E	Boo	10.4	51	38
2021-Jul-01	13 51	+10 02	2.058	1.591	102E	Boo	10.4	47	40
2021-Jul-06	13 55	+07 44	2.056	1.626	99E	Boo	10.4	43	42

Comet Magnitude Parameters --- H = 7.7, 2.5n = 8.0

7P/Pons-Winnecke – Comet Pons-Winnecke was discovered on 1819 June 12 by Jean-Luis Pons and independently re-discovered 39 years later on 1858 March 9 by Friedrich August Theodor Winnecke. Throughout the 19th and early 20th century, Pons-Winnecke routinely reached 6th magnitude during its better placed apparitions. In 1927 during an especially close approach to Earth (0.04 au), the comet peaked at magnitude 3.5. Unfortunately, it hasn't had a bright return since 1939 (6th magnitude) and nowadays usually gets no brighter than ~10-11th magnitude. The recent drought of bright 7P apparitions is due to an increase in perihelion distance from 0.76 au in 1841 to a maximum of 1.26 au in 1989. This year's perihelion occurred on 2021 May 27 at 1.23 au.

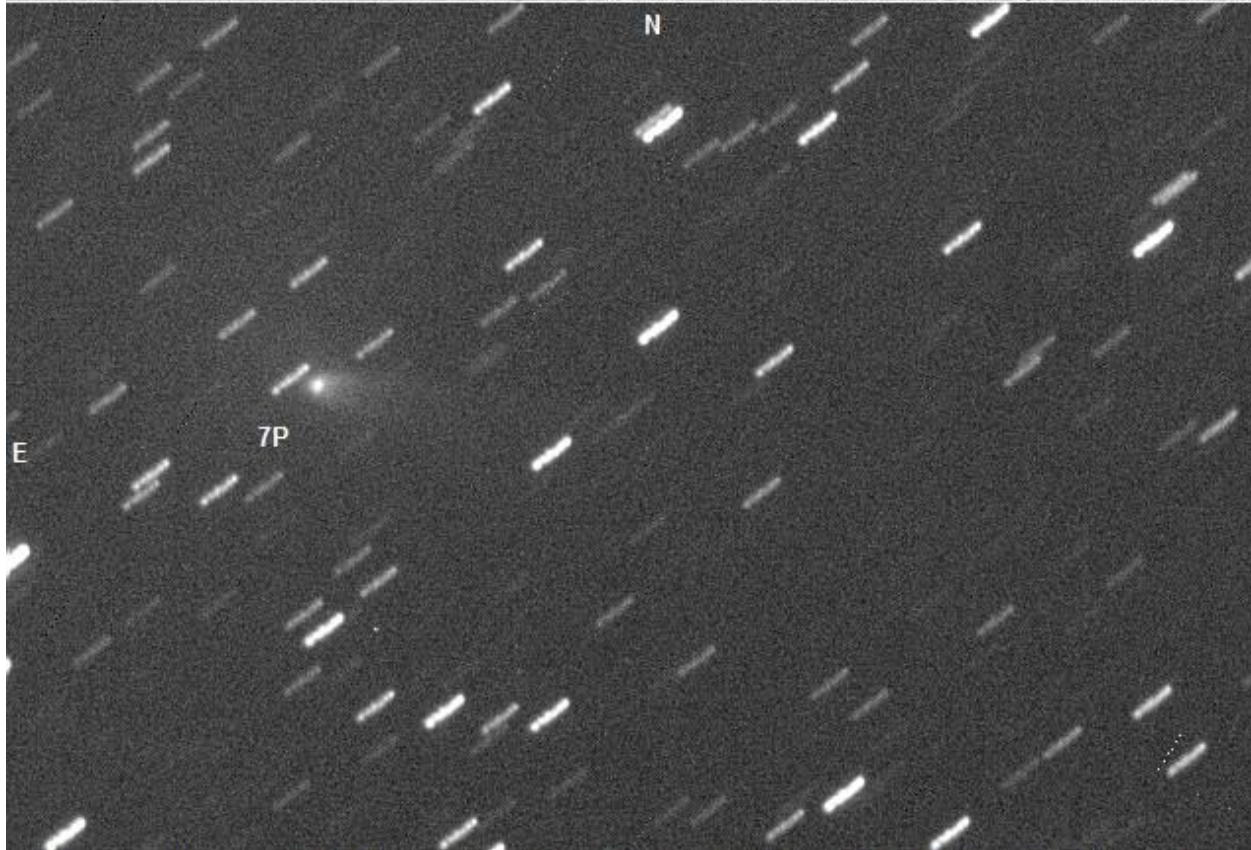
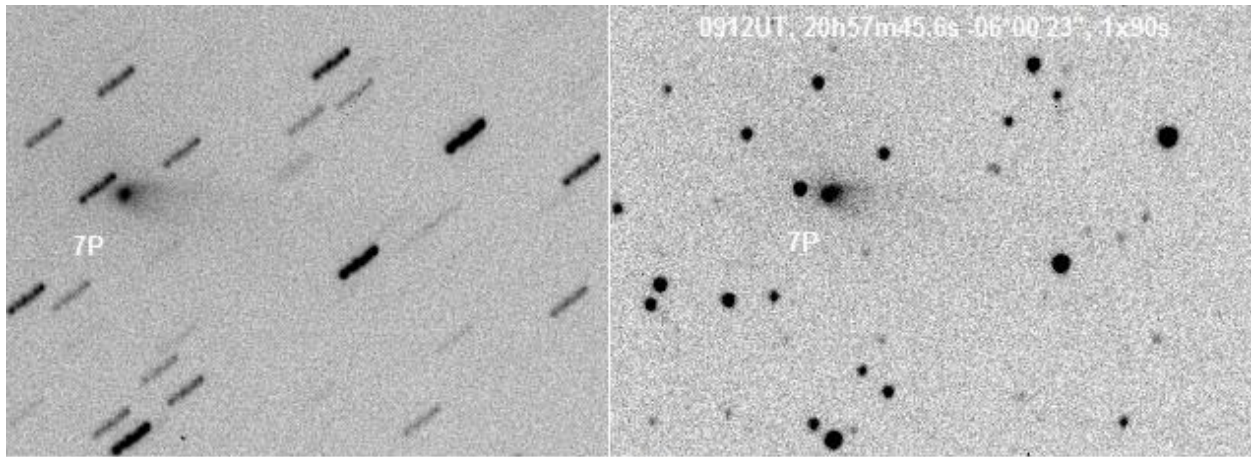
Three visual observations were submitted to the ALPO Comets Section. J. J. Gonzalez observed a very diffuse 2.5' coma at magnitude 11.3 on May 08.13 UT. 5 nights later (May 13.72 UT), Chris Wyatt reported a fainter comet at magnitude 14.4. He also saw a much smaller coma (0.3') suggesting the fainter magnitude estimate was due to not detecting all of 7P's coma. When Chris next observed the comet on May 19.62 UT, he saw a larger coma (2.0') and made a brighter magnitude estimate at 12.8. He also reported the comet was easier to see in a Swan band filter which enhances gas emissions. CCD/CMOS photometry submitted to the COBS site found the comet to be as bright as magnitude 10.8 in mid-May with coma diameters as large as 10'.

7P has a history of outbursts. In 2008, a ~3 magnitude outburst occurred a few months before perihelion. Just recently, Mike Kelley reported on [comets-ml](#) the detection of a ~0.7 magnitude outburst which started sometime between May 30 and June 2. As a result of this recent outburst, imagers have been detecting some interesting inner coma structure.

Barring further outbursts, Pons-Winnecke should reach peak brightness in mid-June at magnitude 10.5. This is a few weeks after perihelion and around the time of closest approach to Earth on June 12 at 0.44 au. The comet also sees it peak brightness skewed a few weeks after perihelion. 7P is observable from both hemispheres as it traverses the morning constellations of Capricornus (Jun 1-7), Aquarius (7-20), Pisces Austrinus (20-27) and Sculptor (27-30).



Photo Op Alert:
June 14/15 with the Helix Nebula (NGC 7293 / Caldwell 63)



**7P/Pons-Winnecke, m=12.7, tail 3' 18" PA 260°, 2021May23 0909-0918UT, 6x90s, FOV 13.1'x8.9'
11" SCT f/6.4 STF-8300M 1.24"/pixel Mike Olason, Tucson Arizona**

7P/Pons-Winnecke

T = 2021-May-27 $q = 1.23$ au

Jupiter-family comet - 6.31-yr orbital period

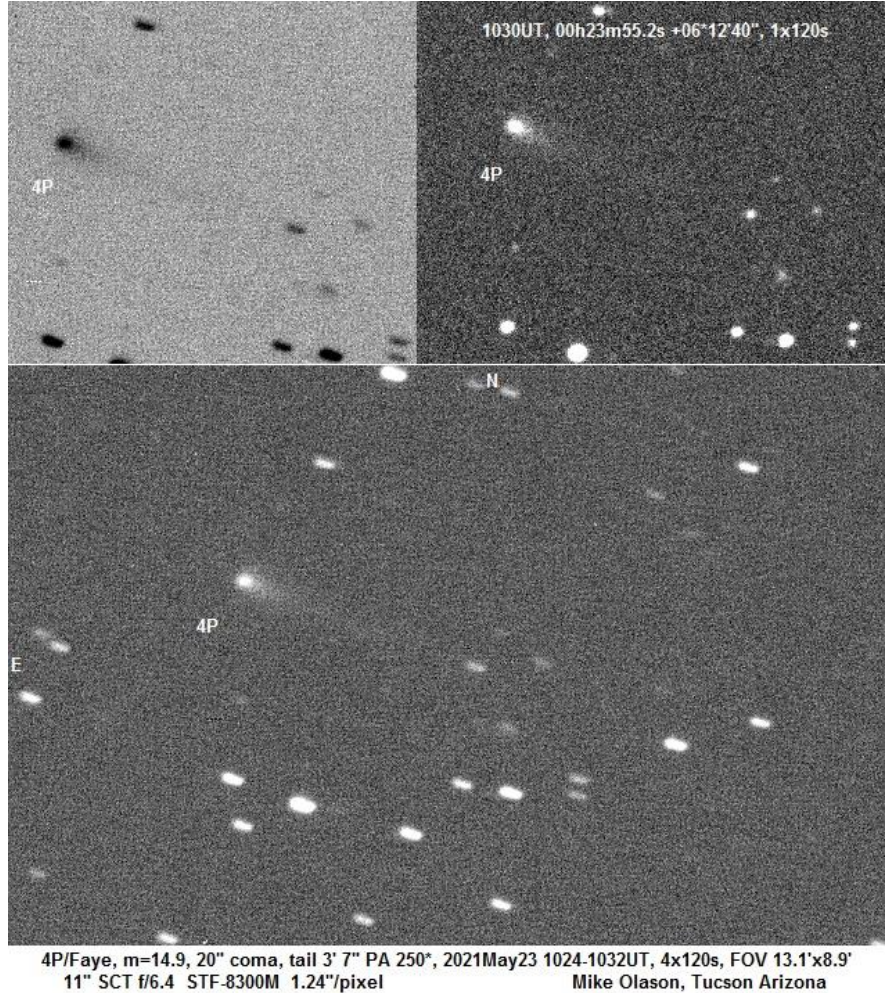
Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	21 32	-11 25	1.236	0.452	108M	Cap	10.9	29	62
2021-Jun-06	21 52	-14 49	1.240	0.445	110M	Cap	10.8	26	65
2021-Jun-11	22 11	-18 19	1.248	0.442	111M	Aqr	10.7	22	69
2021-Jun-16	22 30	-21 51	1.258	0.443	113M	Aqr	10.6	19	72
2021-Jun-21	22 47	-25 20	1.272	0.448	114M	PsA	10.6	17	76
2021-Jun-26	23 04	-28 43	1.288	0.456	116M	PsA	10.5	14	79
2021-Jul-01	23 18	-31 54	1.307	0.467	118M	Scl	10.6	12	82
2021-Jul-06	23 31	-34 55	1.328	0.482	120M	Scl	10.6	10	85

Comet Magnitude Parameters --- H = 11.7, $2.5n = 12.5$, offset = +50 days

4P/Faye – In March 1841, comet 4P/Faye passed within 0.64 au of Jupiter resulting in a decrease in perihelion distance from 1.80 to 1.69 au. Perhaps because of the smaller perihelion distance, the comet became bright enough to be discovered visually by Herve Faye on 1843 November 23 at 5th-6th magnitude. Or it is possible P/Faye experienced an outburst unrelated to the closer perihelion. Regardless, the discovery apparition proved to be anomalously bright. Most subsequent apparitions saw 4P max out at 9-10th magnitude at best. Since discovery, its perihelion distance has been stable ranging between 1.59 and 1.75 au.

This year marks the comet's 22nd observed return and is a moderately good return with perihelion on September 8 at 1.62 au and closest approach to Earth on December 5 at 0.94 au. In June, Faye is a morning object brightening from around magnitude 13.7 to 12.5 as its moves through the morning constellations of Pisces (Jun 1-26) and Aries (26-30). Peak brightness should occur at the end of September near magnitude 10.3.

The nucleus of Comet Faye has been directly observed by the Hubble Space Telescope at multiple apparitions and was measured to be 3.5 km in diameter.



4P/Faye

T = 2021-Sep-09 q = 1.62 au

Jupiter-family comet - 7.48-yr orbital period

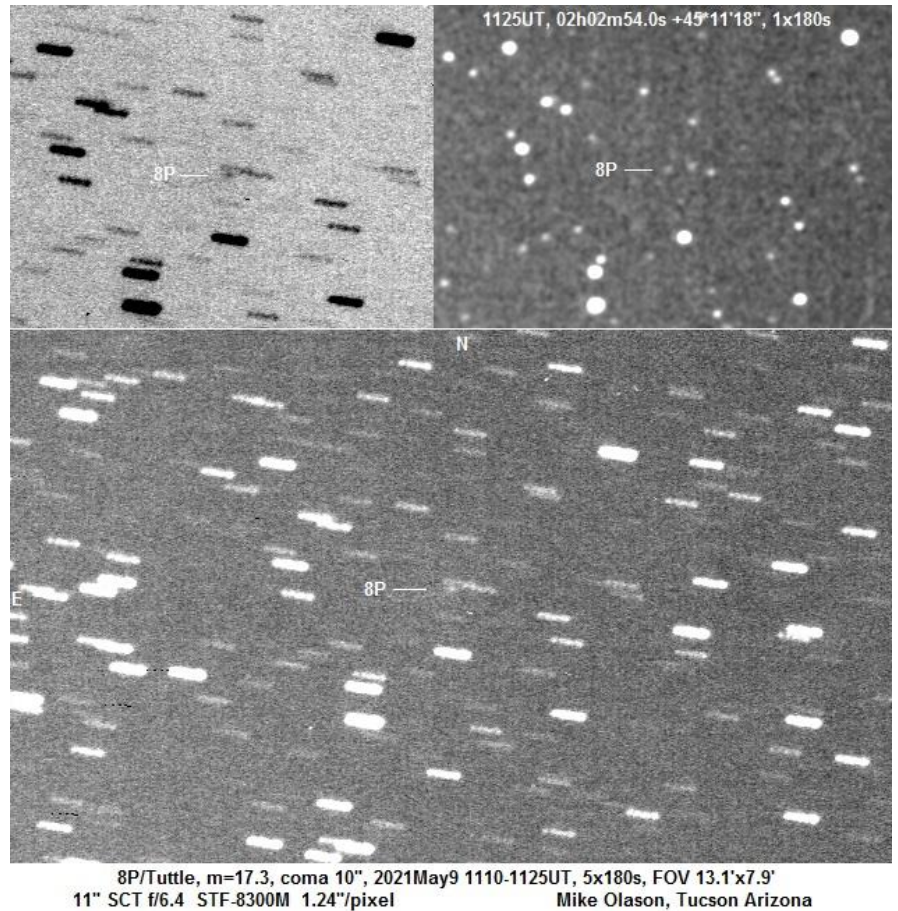
Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	00 43	+07 57	1.905	2.247	57M	Psc	13.7	11	31
2021-Jun-06	00 55	+08 59	1.880	2.186	59M	Psc	13.5	12	31
2021-Jun-11	01 07	+10 00	1.856	2.126	60M	Psc	13.3	14	32
2021-Jun-16	01 19	+11 00	1.833	2.068	62M	Psc	13.1	16	32
2021-Jun-21	01 32	+11 58	1.811	2.010	63M	Psc	12.9	18	32
2021-Jun-26	01 45	+12 53	1.790	1.954	65M	Psc	12.7	20	32
2021-Jul-01	01 58	+13 47	1.769	1.900	66M	Ari	12.5	23	32
2021-Jul-06	02 11	+14 37	1.750	1.846	68M	Ari	12.3	25	31

Comet Magnitude Parameters --- H = 3.9, 2.5n = 28.9

8P/Tuttle – Similar to the discovery story of 7P/Pons-Winnecke, 8P/Tuttle was discovered during two widely separated apparitions. Pierre François André Méchain was the first discoverer in January 1790. Sixty-eight years later, 8P was re-discovered by Horace Parnell Tuttle in January 1858. With a 13.6-year period, 8P/Tuttle is making its 13th observed return having been missed in 1953 and at the 4 perihelion passages between the 1790 and 1858 discoveries. Tuttle’s relatively large semi-major axis of 5.7 au and inclination of 54.9° makes it a Halley-type rather than a Jupiter-family comet. It is also the parent body of December’s Ursid meteor shower.

This year perihelion will be on August 27 at 1.03 au with a closest approach to Earth on September 12 at 1.81 au. Currently, 8P is a very difficult object to observe being invisible to southern hemisphere observers in June and located at very low elevations for northern observers. It will reappear for southern hemisphere observers in late August at 9th magnitude as it brightens to 8.5 in September.

Tuttle’s best return was in 2008 when it passed 0.25 au from Earth and brightened to 5th magnitude. That close approach allowed radar observations to resolve its 10 km (6 mile) in diameter contact binary nucleus. Two returns from now in 2048, it will have an excellent return with a an Earth close approach distance of only 0.17 au.



8P/Tuttle

T = 2021-Aug-27 $q = 1.03$ au

Halley-family comet - 13.6-yr orbital period

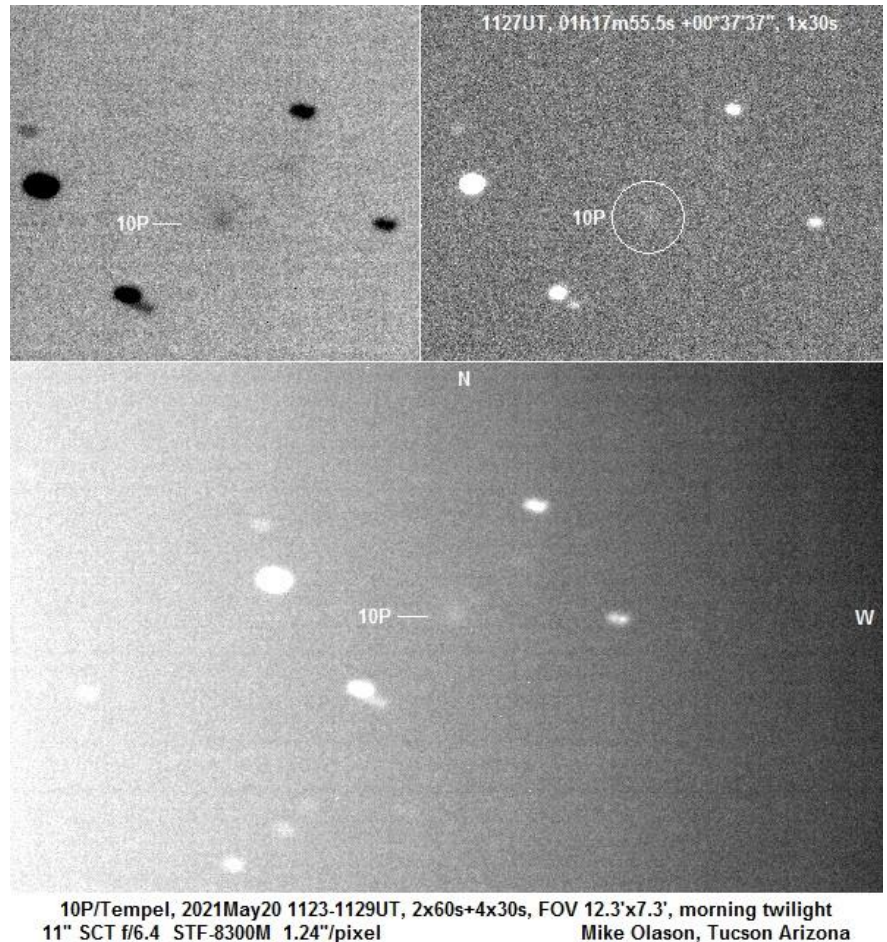
Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	03 28	+45 01	1.631	2.470	26	Per	14.5	9	0
2021-Jun-06	03 47	+44 32	1.580	2.428	26	Per	14.2	8	0
2021-Jun-11	04 07	+43 52	1.530	2.386	25	Per	13.9	7	0
2021-Jun-16	04 27	+43 00	1.481	2.344	24	Per	13.6	6	0
2021-Jun-21	04 46	+41 56	1.432	2.302	23	Per	13.3	6	0
2021-Jun-26	05 06	+40 39	1.385	2.261	23	Aur	13.0	5	0
2021-Jul-01	05 25	+39 08	1.339	2.220	22	Aur	12.7	4	0
2021-Jul-06	05 44	+37 24	1.295	2.180	22	Aur	12.4	3	0
Comet Magnitude Parameters --- H = 7.0, 2.5n = 20.0, offset = +25 days									

10P/Tempel – 10P/Tempel’s 2021 apparition has been a poorly placed one. Luckily, we won’t have to wait too long for a better 10P apparition as the 2026 return will be its best since 1967. In 2026, Tempel will pass within 0.41 au of Earth and peak at magnitude 7.5.

Jupiter-family comet 10P/Tempel (formally known as Tempel 2) is now two months past its March 24 perihelion at 1.41 au. The current poor observing circumstances are due to Tempel being located over 2 au from Earth and roughly on the other side of the Sun from our Earth-based vantage point.

No visual observations were submitted to the Comets Section in May. In fact, very few observations have been submitted anywhere with only a single night of May astrometry being published by the Minor Planet Center and no submissions to the COBS site. Mike Olason was able to image the comet from Tucson, Arizona which is quite the feat considering the comet didn’t rise till well after the start of astronomical twilight.

Now post perihelion, 10P should slowly fade in May from magnitude 11.2 to 11.5. Then again, the sparse recent observations suggest it may already be fainter than the prediction. While still predominately a southern object, 10P at least crawls above the horizon before the start of astronomical twilight for northern observers by the end of June.



10P/Tempel

T = 2021-Mar-24 $q = 1.41$ au

Jupiter-family comet - 5.4-yr orbital period

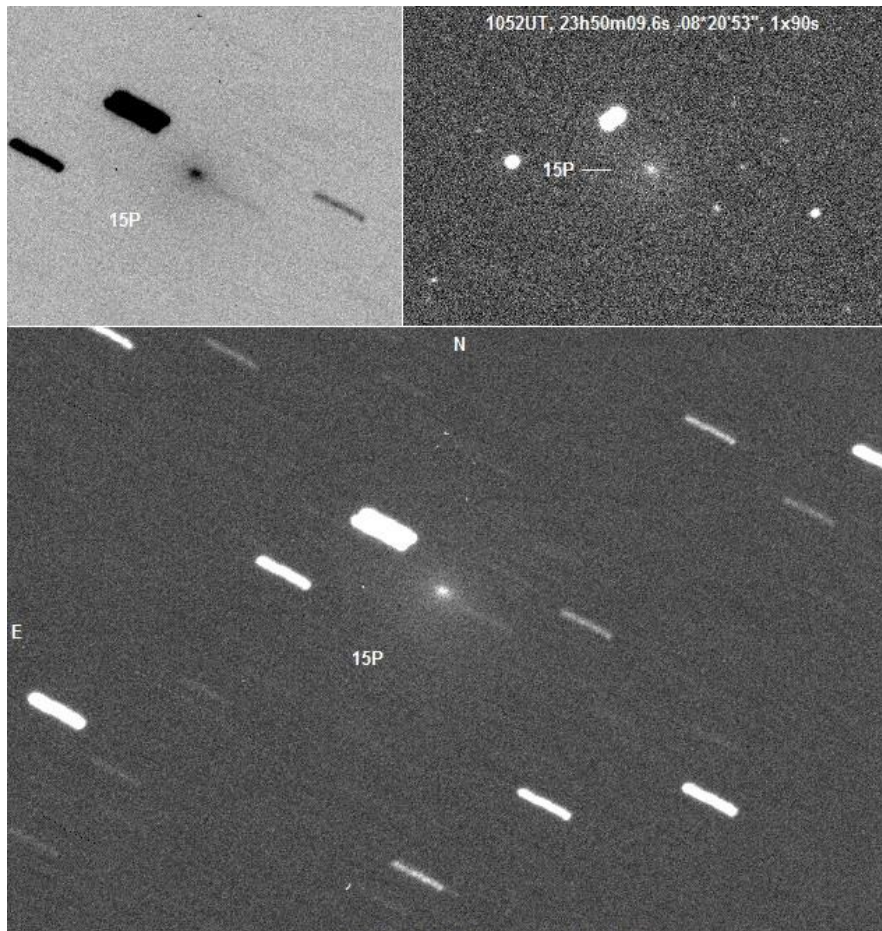
Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El (deg)	
								40N	40S
2021-Jun-01	01 48	+02 46	1.583	2.131	44M	Psc	11.5	0	25
2021-Jun-06	02 01	+03 36	1.607	2.129	46M	Psc	11.5	0	26
2021-Jun-11	02 13	+04 23	1.631	2.126	47M	Cet	11.6	0	27
2021-Jun-16	02 25	+05 06	1.656	2.121	49M	Cet	11.6	0	28
2021-Jun-21	02 37	+05 45	1.682	2.116	51M	Cet	11.7	2	29
2021-Jun-26	02 48	+06 21	1.709	2.109	53M	Cet	11.7	4	30
2021-Jul-01	02 59	+06 53	1.736	2.102	55M	Cet	11.8	6	31
2021-Jul-06	03 10	+07 22	1.764	2.092	57M	Cet	11.8	9	31

Comet Magnitude Parameters --- H = 7.7, 2.5n = 8.1

15P/Finlay – *15P/Finlay* was discovered in 1886 by William Henry Finlay at the Royal Observatory at Cape of Good Hope in South Africa. This apparition marks the 16th observed return of *15P*. Its best return was in 1906 when it passed 0.27 au from Earth and reached 6th magnitude. During its previous return in 2014/2015, *15P* experienced two outbursts of 2-3 mag outburst with the brightest reaching 7th magnitude.

Imaging photometry of *15P* reported to the COBS site in May found a comet that was as bright as magnitude 12.5 on May 18 (Michael Lehmann with a 0.2-m reflector). With perihelion on July 13 at 0.99 au, the comet should continue to brighten in June from around magnitude 11.8 (June 1) to 10.5 (July 1). The comet will be a difficult object for northern observers as it moves through the morning sky in Cetus (Jun 1-12), Pisces (12-22), Cetus again (22-26) and Aries (26-30). It will be better placed for southern observers.

Barring any future outbursts, *Finlay* should peak at magnitude 9.9 at the end of July.



15P/Finlay, m=14.9, coma 44", 2021May23 1039-1054UT, 10x90s, FOV 13.1°x9.3'
11" SCT f/6.4 STF-8300M 1.24"/pixel Mike Olason, Tucson Arizona

Photo Op Alerts:

June 8/9 with Local Group galaxy IC 1613

June 17 with galaxy NGC 676

15P/Finlay

T = 2021-Jul-13 q = 0.99 au

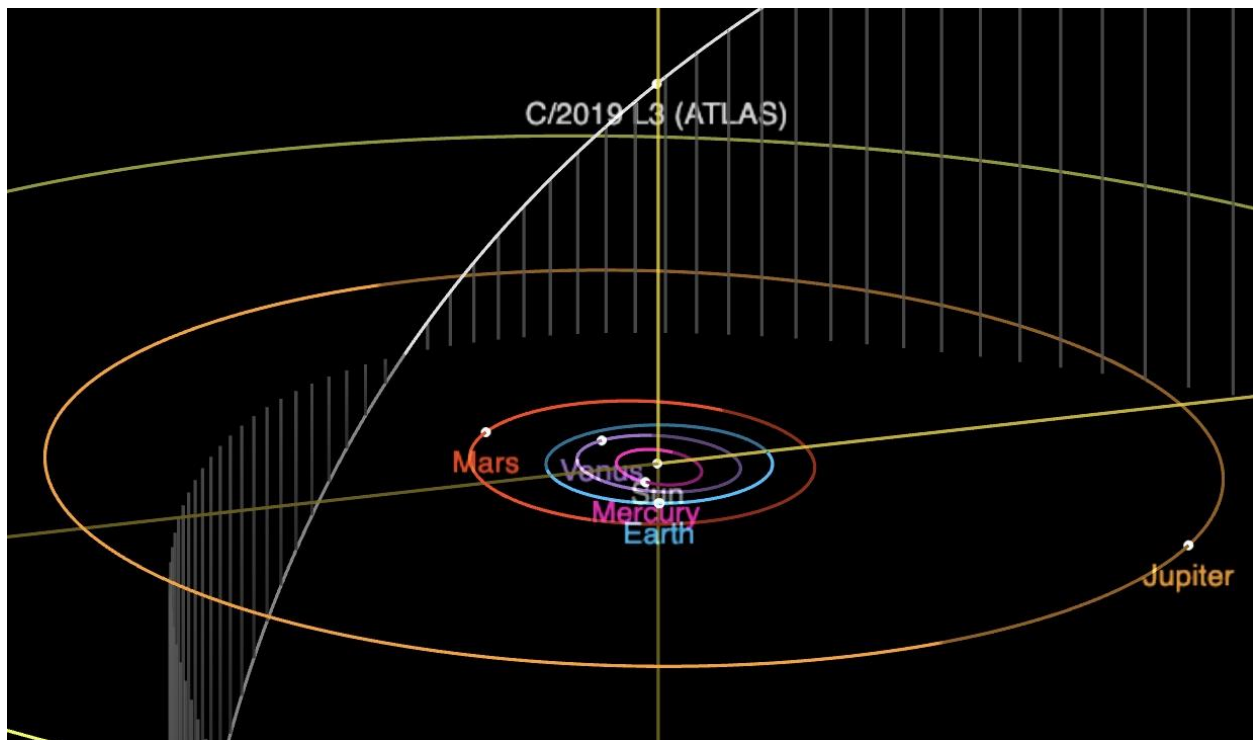
Jupiter-family comet - 6.56-yr orbital period

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	00 28	-03 48	1.164	1.123	65M	Cet	11.8	6	43
2021-Jun-06	00 50	-00 58	1.129	1.105	64M	Cet	11.5	7	40
2021-Jun-11	01 13	+01 55	1.098	1.093	62M	Cet	11.3	8	38
2021-Jun-16	01 36	+04 47	1.069	1.088	60M	Psc	11.0	9	35
2021-Jun-21	01 59	+07 36	1.045	1.089	59M	Psc	10.8	10	32
2021-Jun-26	02 22	+10 18	1.024	1.097	57M	Cet	10.6	11	30
2021-Jul-01	02 45	+12 51	1.009	1.109	56M	Ari	10.5	13	27
2021-Jul-06	03 08	+15 13	0.998	1.127	55M	Ari	10.3	15	25

Comet Magnitude Parameters --- H = 9.6, 2.5n = 15.7, offset = +20 days

C/2019 L3 (ATLAS) – *C/2019 L3* will be a difficult object to observe in June as it is near solar conjunction. Located in the northern constellations of Perseus (Jun 1-18) and Auriga (18-30), it is not visible from the southern hemisphere. Even northern observers will have difficulty as its elongation stays around 30 degrees. While no observations were reported to the Comets Section in May, a few CCD observations were submitted to the COBS site. The most recent by Thomas Lehmann (magnitude 12.5 on May 23.89 UT) and Steffen Fritsche (12.6 on May 14.87 UT).

C/2019 L3 doesn't arrive at perihelion till January when it will be 3.57 au from the Sun. The large perihelion distance means *C/2019 L3* could remain a visual object well into 2022 and possibly even 2023. If the comet brightens at a conservative $2.5^n = 8$ rate, it could reach magnitude 10.0 at the end of 2021.



C/2019 L3 on June 3rd is near solar conjunction as it passes north of the Sun. Orbit diagram produced at the JPL Small-Body Database Browser.

C/2019 L3 (ATLAS)
 T = 2022-Jan-09 $q = 3.55$ au Max El
 Long-period comet - Dynamically new (deg)

Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S
2021-Jun-01	04 17	+50 15	4.082	4.945	28M	Per	12.5	8	0
2021-Jun-06	04 27	+50 07	4.061	4.928	28M	Per	12.4	9	0
2021-Jun-11	04 36	+49 59	4.040	4.907	28M	Per	12.4	9	0
2021-Jun-16	04 46	+49 50	4.019	4.884	28M	Per	12.3	10	0
2021-Jun-21	04 56	+49 41	3.998	4.857	28M	Aur	12.3	11	0
2021-Jun-26	05 05	+49 30	3.978	4.828	29M	Aur	12.2	12	0
2021-Jul-01	05 15	+49 18	3.959	4.795	31M	Aur	12.1	13	0
2021-Jul-06	05 24	+49 05	3.939	4.759	32M	Aur	12.1	15	0

Comet Magnitude Parameters --- H = 3.2, $2.5^n = 8.0$

C/2020 J1 (SONEAR) – SONEAR was discovered on 2020 May 1 by the The Southern Observatory for Near Earth Research (SONEAR) survey which uses two telescopes, a Celestron 11” RASA and 0.45-m f/2.9, located in Oliveira, Brazil. The survey has found 9 comets though only two are named SONEAR, the rest being named after individual observers (Barros, Jacques, and Pimental).

Chris Wyatt visually observed C/2020 J1 on 4 nights between May 13 and 31. SONEAR was estimated by Chris between magnitude 12.6 to 13.0 with a small moderately condensed coma (1.0’-1.8’). Now past an April 18 perihelion (3.36 au), it should slowly fade from magnitude 12.7 to 13.1 as it moves through Libra (Jun 1-13) and Virgo (13-30) in the evening sky.



C/2020 J1 (SONEAR)

T = 2021-Apr-18 q = 3.36 au

Long-period comet - Dynamically new

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	14 46	-23 32	3.380	2.435	154E	Lib	12.7	26	74
2021-Jun-06	14 35	-21 38	3.386	2.486	147E	Lib	12.7	28	72
2021-Jun-11	14 26	-19 47	3.393	2.549	140E	Lib	12.7	30	70
2021-Jun-16	14 17	-18 02	3.400	2.624	133E	Vir	12.8	31	68
2021-Jun-21	14 10	-16 23	3.408	2.707	126E	Vir	12.8	31	66
2021-Jun-26	14 04	-14 52	3.416	2.799	119E	Vir	12.9	30	65
2021-Jul-01	13 58	-13 28	3.425	2.897	113E	Vir	13.0	29	64
2021-Jul-06	13 54	-12 13	3.435	3.000	106E	Vir	13.1	27	62

Comet Magnitude Parameters --- H = 6.7, 2.5n = 8.0

C/2020 R4 (ATLAS) – *C/2020 R4 (ATLAS)* is now outbound from a March 1 perihelion at 1.03 au and close approach to Earth on April 23 at 0.46 au. Due to a highly retrograde orbit (164 deg) the comet is rapidly moving away from the Earth (1.48 to 2.45 au over the course of June). As a result, the comet has quickly faded from around magnitude 8.4 on May 1.15 UT (Carl Hergenrother) and 8.3 on May 3.92 UT (J. J. Gonzalez) to magnitude 11.6 on May 13.42 UT and 12.4 on May 17.48 UT (later two estimates by Chris Wyatt). This June, it is observable from both hemispheres as an evening object in Leo as it fades from 12th to 14th magnitude.



C/2020 R4 (ATLAS)

T = 2021-Mar-01 $q = 1.03$ au

Long-period comet - ~961-year orbital period

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El	
								40N	40S
2021-Jun-01	11 05	+21 50	1.772	1.484	88E	Leo	12.2	49	28
2021-Jun-06	11 00	+20 41	1.831	1.651	83E	Leo	12.6	43	29
2021-Jun-11	10 57	+19 41	1.890	1.817	78E	Leo	13.0	37	30
2021-Jun-16	10 55	+18 47	1.950	1.981	73E	Leo	13.3	32	30
2021-Jun-21	10 54	+17 57	2.009	2.140	68E	Leo	13.6	28	29
2021-Jun-26	10 54	+17 12	2.069	2.297	64E	Leo	13.9	23	28
2021-Jul-01	10 54	+16 30	2.128	2.449	59E	Leo	14.1	19	27
2021-Jul-06	10 55	+15 50	2.187	2.596	55E	Leo	14.4	16	25

Comet Magnitude Parameters --- H = 8.9, 2.5n = 10.0

C/2021 A1 (Leonard) – *C/2021 A1 (Leonard)* was found on 2021 January 3 by Greg Leonard with the Mount Lemmon 1.5-m reflector. At discovery, it was around 19th magnitude and located 5.1 au from the Sun. According to the most recent published orbit by Syuichi Nakano (Nakano Note 4460, <http://www.oaa.gr.jp/~oaacs/nk/nk4460.htm>), Leonard has an “original” orbital period of ~90,000 years suggesting it is a dynamically old long-period comet.

As we mentioned in the previous few ALPO Comet News, *C/2021 A1* has the potential to become a nice object at the end of the year. It has a few things going for it including 1) a relatively small perihelion of 0.62 au on 2022 January 3, 2) a close approach to within 0.233 au (34.9 million km or 21.7 million miles) from Earth on December 12, and 3) a phase angle that reaches a maximum of 160 degrees at the time of close approach. The high phase angle may result in a few magnitudes of enhanced brightness due to forward scattering of light by cometary dust.

Now a few things working against it. High phase angles also mean small solar elongations. A minimum solar elongation of 15 degrees occurs at the time of highest phase angle and greatest forward scattering. 15 degrees solar elongation is similar to that of *C/2020 F3 (NEOWISE)* on 2020 July 5. While NEOWISE was definitely observable at that time and even naked eye from the clear skies of Tucson, it was just barely so and NEOWISE was around magnitude 1.5 to 2.0 at the time. If *C/2021 A1* is fainter, it would be a difficult object for many even with optical aid.

How bright *C/2021 A1* will get at that time is very uncertain. The increase in brightness due to forward scattering could be up to 2-3 magnitudes but that depends on how dusty the comet is. If it is gas-rich, meaning dust-poor, forward scattering could be much less. Also, while *C/2021 A1* brighten rapidly between April 2020 and March 2021, its rate of brightening has stalled since mid-March. A conservative $2.5^n = 8$ rate of brightening from now through perihelion results in a peak around magnitude 6.5 without any forward scattering. Even with significant forward scattering, that’s only a peak around magnitude 3.5. That would be a wonderful comet at 90, 60, or even 30 degrees from the Sun, but it would be a difficult sight at 15 degrees solar elongation. Hopefully the comet appeases us Earth-bound observers by kicking its brightening trend into high gear.

Like last month, the comet is still an evening object near 17-18th magnitude located up north in Ursa Major. Imagers are strongly encouraged to monitor *C/2021 A1* over the coming months.



C/2021 A1 (Leonard)

T = 2022-Jan-03 $q = 0.61$ au

Long-period comet - Dynamically old

Date	R.A.	Decl.	r	d	Elong	Const	Mag	40N	40S
2021-Jun-01	10 41	+57 10	3.455	3.623	72E	UMa	17.6	55	0
2021-Jun-06	10 37	+56 16	3.395	3.628	68E	UMa	17.5	51	0
2021-Jun-11	10 34	+55 20	3.335	3.631	65E	UMa	17.5	47	0
2021-Jun-16	10 31	+54 24	3.275	3.632	61E	UMa	17.4	43	0
2021-Jun-21	10 30	+53 28	3.214	3.630	58E	UMa	17.3	39	0
2021-Jun-26	10 28	+52 32	3.153	3.624	55E	UMa	17.3	36	0
2021-Jul-01	10 28	+51 36	3.091	3.614	51E	UMa	17.2	33	0
2021-Jul-06	10 28	+50 40	3.029	3.601	48E	UMa	17.1	30	0

Comet Magnitude Parameters --- $H = 10.5$, $2.5n = 8.0$

New Discoveries, Recoveries and Other Comets in the News

99P/Kowal – Michael Kelley reported a small ~ 0.7 -magnitude outburst of short period comet 99P/Kowal between May 12 and 14. The detection was made with the Oschin 1.2-m Schmidt on Mount Palomar and the GROWTH India Telescope (GIT) 0.7-m telescope. 99P/Kowal is a year out from a 2022 April 12 perihelion at 4.71 au and is currently around 17-18th magnitude. [Ref: [ATel 14628](#)]

C/2021 K1 (ATLAS) – A new 16th magnitude comet was detected in images taken on 2021 May 14 and 24 by the Asteroid Terrestrial-Impact Last Alert System (ATLAS) with their 0.5-m f/2 astrographs on Mauna Loa and Haleakala. Several PANSTARRS pre-discovery observations have been found back to April 2020 when the comet was 21st-22nd magnitude. C/2020 K1 is a periodic comet with an orbital period of 45.6 years. Perihelion was on 2021 May 4 at 2.50 au. Though post perihelion, minimum distance to the Earth occurs in mid-September at 1.87 au. The comet should peak at slightly brighter than 16th magnitude from June to September. Its next perihelion won't be till August 2065. [Ref: CBET 4968 & MPEC 2021-K89]

P/2021 J3 (ATLAS) – The ATLAS 0.5-m f/2 astrograph on Mauna Loa first detected this 18th magnitude comet on May 13. CBET 4974 reports that Syuichi Nakano has determined a short-period orbit for P/2021 J3 with an orbital period of 26 ± 1 year. Perihelion was almost two years ago on 2019 July 1 at 4.92 au. It is interesting that a 18th magnitude comet is found 2 years after perihelion. Last year at opposition, the comet was located in the dense star fields of Sagittarius perhaps explaining why it wasn't detected then. But go back another year to 2019 when the comet was at perihelion and should have been even brighter than 18th magnitude, and P/2021 J3 was well clear of the Milky Way and should have been easily detectable. It is very possible that the latest ATLAS comet is experiencing an outburst. [Ref: CBET 4974 & MPEC 2021-L26]

C/2021 J2 (PANSTARRS) – The Pan-STARRS1 telescope on Haleakala, Maui, discovered this 21st magnitude comet on May 10. This is a distant long-period comet with perihelion on 2021 September 21 at 4.71 au. CBET 4973 reports that Syuichi Nakano determined an osculating orbital period of ~ 1300 years. Though faint at 21st magnitude, the comet is past opposition and likely to become fainter with time. [Ref: CBET 4973 & MPEC 2021-L24]

C/2021 J1 (Maury-Attard) – This comet is the first discovery of the MAP project whose moniker is derived from the last names of its participants, Alain Maury, Georges Attard and Daniel Parrott. The MAP program used a Celestron RASA 11" located at San Pedro de Atacama in

Chile to find C/2021 J1 on May 9 at 19th magnitude. Alain Maury is no stranger to comet and asteroid discovery. He was part of the Second Palomar Sky Survey in the late 80s as well as the ODAS (OCA DLR Asteroid Survey) in the late 90s. During those surveys, Alain was part of the discovery of 3 comets: C/1988 C1 (Maury-Phinney), 115P/1985 Q1 (Maury), and 198P/1998 X1 (ODAS). Daniel Parrott is the author of the Tycho Tracker software that utilizes GPUs to “stack-and-shift” images at different possible motions to detect moving objects in a sequence of images, a technique also known as synthetic tracking. More on the MAP survey can be found at <https://www.spaceobs.com/en/Alain-Maury-s-Blog/MAP>.

C/2021 J1 is a Halley-type comet with an orbital period of 135 years and inclination of 92 degrees. Perihelion occurred back on 2021 February 19 at 1.74 au. As a result, the comet is fading from its current 19th magnitude. Its location at -56 degrees declination and southerly motion means observations will be limited to the southern hemisphere. [Ref: CBET 4972 & MPEC 2021-L11]

C/2021 G1 (Leonard) – Greg Leonard of the Catalina Sky Survey found this 21st magnitude comet on 2021 April 11 with the Mt. Lemmon 1.5-m reflector. A retrograde comet with an orbital period of ~650 years, Leonard comes to a rather distant perihelion on 2021 July 22 at 3.42 au. It likely has already peaked in brightness at around 20-21st magnitude. [Ref: CBET 4959 & MPEC 2021-J72]

C/2021 E3 (ZTF) – The Zwicky Transient Facility used the 1.2-m Oschin Schmidt to detect this object as an asteroid on 2021 March 9 at 19th magnitude. Follow-up observations detected cometary activity resulting in its announcement as comet C/2021 E3 (ZTF). Perihelion occurs next year on 2022 June 11 at 1.78 au. A conservative $2.5n = 8$ brightening coefficient results in a peak brightness of a little brighter than magnitude 12 in May and June of 2022. At that time the comet will reach a minimum distance to Earth of 1.21 au and located deep in the southern sky (passing within 10 degrees of the South Celestial Pole). If C/2021 E3 brightens faster than expected it could be a visual object for southern observers in mid 2022. [Ref: CBET 4960 & MPEC 2021-J71.

C/2020 PV6 (PANSTARRS) – Similar to the above object, C/2020 PV6 was originally reported and announced as an asteroid. The Pan-STARRS project discovered PV6 on 2020 August 13 at 21st magnitude. A number of imagers have detected cometary activity in May 2020. According to Syuichi Nakano, the comet is long-period object with a period of ~270 years. Perihelion occurs in a few months on 2021 September 25 at 2.30 au. Peak brightness should be around magnitude 15.0 in July. [Ref: CBET 4969 & MPEC 2021-K93]

As always, the Comet Section is happy to receive all comet observations, whether textual descriptions, images, drawings, magnitude estimates, or spectra. Please send your observations via email to the Comets Section < comets @ alpo-astronomy .org >, Comets Section Coordinator Carl Hergenrother < carl.hergenrother @ alpo-astronomy .org > and/or Comets Section Acting Assistant Coordinator Michel Deconinck < michel.deconinck @ alpo-astronomy .org >.

Thank you to everyone who contributed to the ALPO Comets Section!

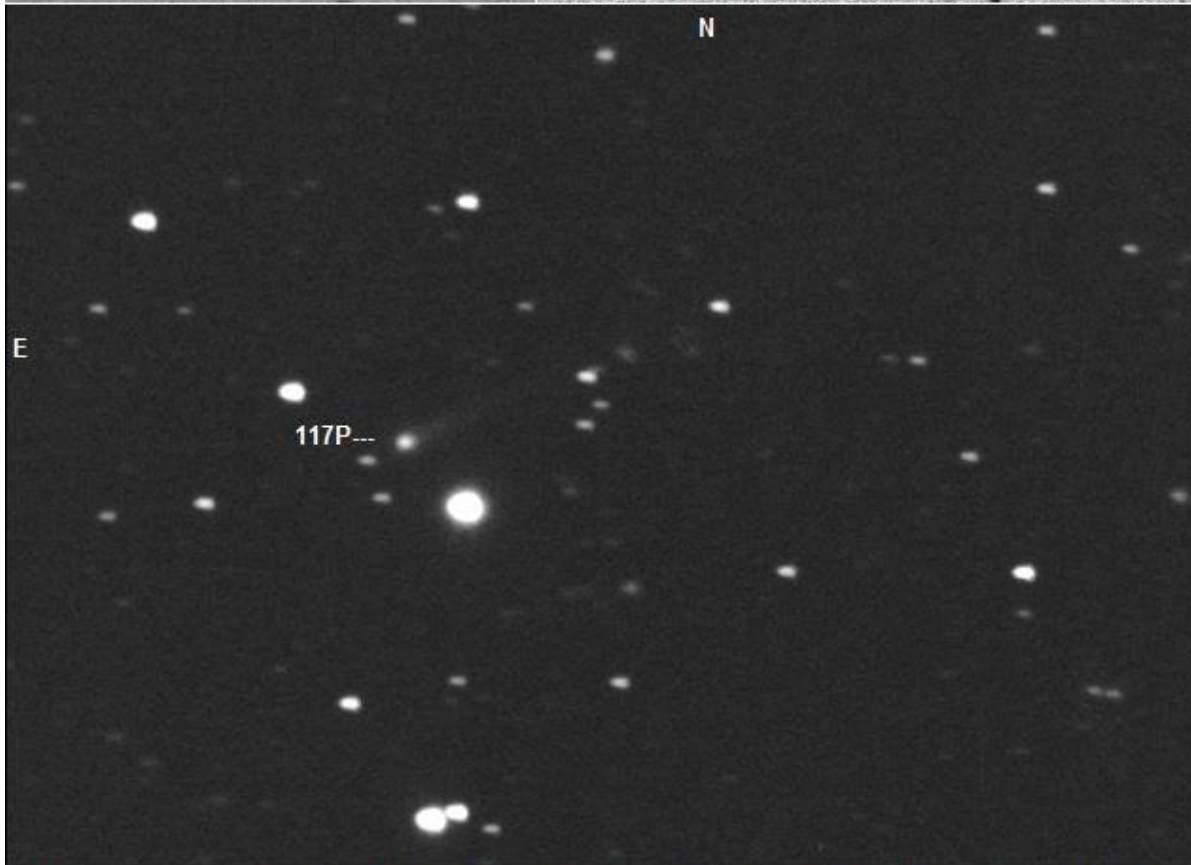
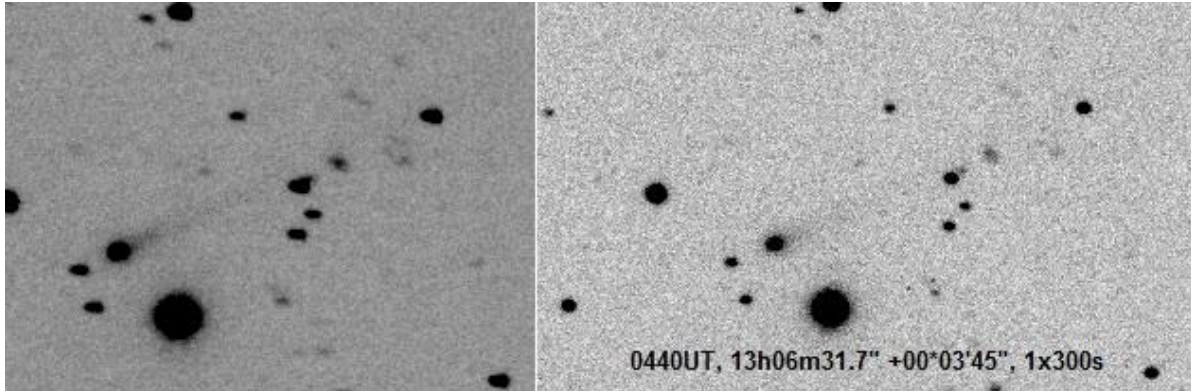
Stay safe and enjoy the sky!
- Carl Hergenrother

Recent Magnitude Measurements Contributed to the ALPO Comets Section

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
C/2021 A1	(Leonard)									
2021A1	2021 05 02.26	C 17.9	U4	50.7Y	7A320		0.4	0.8 m125	ICQ xx HER02	Carl Hergenrother
C/2020 T2	(Palomar)									
2020T2	2021 05 31.37	xM 10.5	AQ	40.0L	4 59		5.6 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 05 31.24	S 10.3	TK	12.5B	30		4 2		ICQ xx HER02	Carl Hergenrother
2020T2	2021 05 29.19	V 9.7	U4	10.6R	5a200		14.0		ICQ xx HER02	Carl Hergenrother
2020T2	2021 05 19.62	xM 11.1	AQ	40.0L	4 59		3.5 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 05 17.47	xM 10.9	AQ	40.0L	4 59		6 6		ICQ XX WYA	Christopher Wyatt
2020T2	2021 05 13.41	xM 10.7	AQ	40.0L	4 59		7 5/		ICQ XX WYA	Christopher Wyatt
2020T2	2021 05 12.43	xM 10.6	AQ	25.0L	5 40		3.5 5/		ICQ XX WYA	Christopher Wyatt
2020T2	2021 05 03.90	S 9.8	TK	20.3T10	77		7 2/		ICQ XX GON05	J J Gonzalez Suarez
C/2020 R4	(ATLAS)									
2020R4	2021 05 17.48	xM 12.4	AQ	40.0L	4 59		3.5 2		ICQ XX WYA	Christopher Wyatt
2020R4	2021 05 13.42	xS 11.6	AQ	40.0L	4 59		3.8 3		ICQ XX WYA	Christopher Wyatt
2020R4	2021 05 08.08	S 9.6	TK	20.3T10	77		8 3/		ICQ XX GON05	J J Gonzalez Suarez
2020R4	2021 05 05.26	V 9.3	U4	10.6R	5a300		21.0		ICQ xx HER02	Carl Hergenrother
2020R4	2021 05 03.92	S 8.3	TK	10.0B	25 10		3/		ICQ XX GON05	J J Gonzalez Suarez
2020R4	2021 05 03.89	S 9.4	TK	20.3T10	77		7 3/		ICQ XX GON05	J J Gonzalez Suarez
2020R4	2021 05 01.15	S 8.4	TK	12.5B	30		7 4		ICQ xx HER02	Carl Hergenrother
C/2020 J1	(SONEAR)									
2020J1	2021 05 31.40	xM 12.9	AQ	40.0L	4 108		1.1 6		ICQ XX WYA	Christopher Wyatt
2020J1	2021 05 19.58	xM 12.6	AQ	40.0L	4 59		1.8 5/		ICQ XX WYA	Christopher Wyatt
2020J1	2021 05 17.50	xM 13.0	AQ	40.0L	4 108		1.5 6		ICQ XX WYA	Christopher Wyatt
2020J1	2021 05 13.45	xM 12.9	AQ	40.0L	4 108		1 5/		ICQ XX WYA	Christopher Wyatt
C/2020 F5	(MASTER)									
2020F5	2021 05 19.64	xM 15.1	AQ	40.0L	4 182		0.6 3/		ICQ XX WYA	Christopher Wyatt
C/2019 T4	(ATLAS)									
2019T4	2021 05 31.38	xM 14.3	AQ	40.0L	4 182		0.5 5/		ICQ XX WYA	Christopher Wyatt
2019T4	2021 05 17.47	xM 13.5	AQ	40.0L	4 261		0.6 5		ICQ XX WYA	Christopher Wyatt
2019T4	2021 05 13.45	xM 14.4	AQ	40.0L	4 261		0.2 5		ICQ XX WYA	Christopher Wyatt
C/2019 F1	(ATLAS-Africano)									
2019F1	2021 05 31.41	xM 14.8	AQ	40.0L	4 261		0.3 5/		ICQ XX WYA	Christopher Wyatt
2019F1	2021 05 19.61	xM 14.9	AQ	40.0L	4 261		0.5 6		ICQ XX WYA	Christopher Wyatt
2019F1	2021 05 17.52	xM 14.5	AQ	40.0L	4 182		0.7 5/		ICQ XX WYA	Christopher Wyatt
2019F1	2021 05 13.73	xM 15.1	AQ	40.0L	4 261		0.5 6		ICQ XX WYA	Christopher Wyatt
C/2018 U1	(Lemmon)									
2018U1	2021 05 19.59	xM 15.1	AQ	40.0L	4 182		0.4 5/		ICQ XX WYA	Christopher Wyatt
2018U1	2021 05 17.51	xM 15.2	AQ	40.0L	4 261		0.3 4		ICQ XX WYA	Christopher Wyatt
2018U1	2021 05 13.70	xM 15.2	AQ	40.0L	4 261		0.4 5/		ICQ XX WYA	Christopher Wyatt
C/2017 K2	(PANSTARRS)									
2017K2	2021 05 19.63	xM 13.8	AQ	40.0L	4 182		0.8 5		ICQ XX WYA	Christopher Wyatt
2017K2	2021 05 13.70	xM 14.0	AQ	40.0L	4 182		0.5 4		ICQ XX WYA	Christopher Wyatt
246P/NEAT										
246	2021 05 19.60	xM 14.3	AQ	40.0L	4 182		0.8 4/		ICQ XX WYA	Christopher Wyatt
246	2021 05 17.53	xM 15.0	AQ	40.0L	4 261		0.5 4/		ICQ XX WYA	Christopher Wyatt
246	2021 05 13.72	xM 14.5	AQ	40.0L	4 182		0.7 4		ICQ XX WYA	Christopher Wyatt
117P/Helin-Roman-Alu										
117	2021 05 31.39	xM 15.2	AQ	40.0L	4 261		0.4 6		ICQ XX WYA	Christopher Wyatt
117	2021 05 19.57	xM 15.1	AQ	40.0L	4 261		0.3 3/		ICQ XX WYA	Christopher Wyatt
117	2021 05 17.49	xM 15.0	AQ	40.0L	4 261		0.4 4		ICQ XX WYA	Christopher Wyatt
117	2021 05 13.44	xM 15.2	AQ	40.0L	4 261		0.4 5/		ICQ XX WYA	Christopher Wyatt
7P/Pons-Winnecke										
7	2021 05 19.62	xM 12.8	AQ	40.0L	4 108		2.0 4/		ICQ XX WYA	Christopher Wyatt
7	2021 05 13.72	xM 14.4	AQ	40.0L	4 261		0.3 5/		ICQ XX WYA	Christopher Wyatt
7	2021 05 08.13	S 11.3	TK	20.3T10	100		2.5 1		ICQ XX GON05	J J Gonzalez Suarez

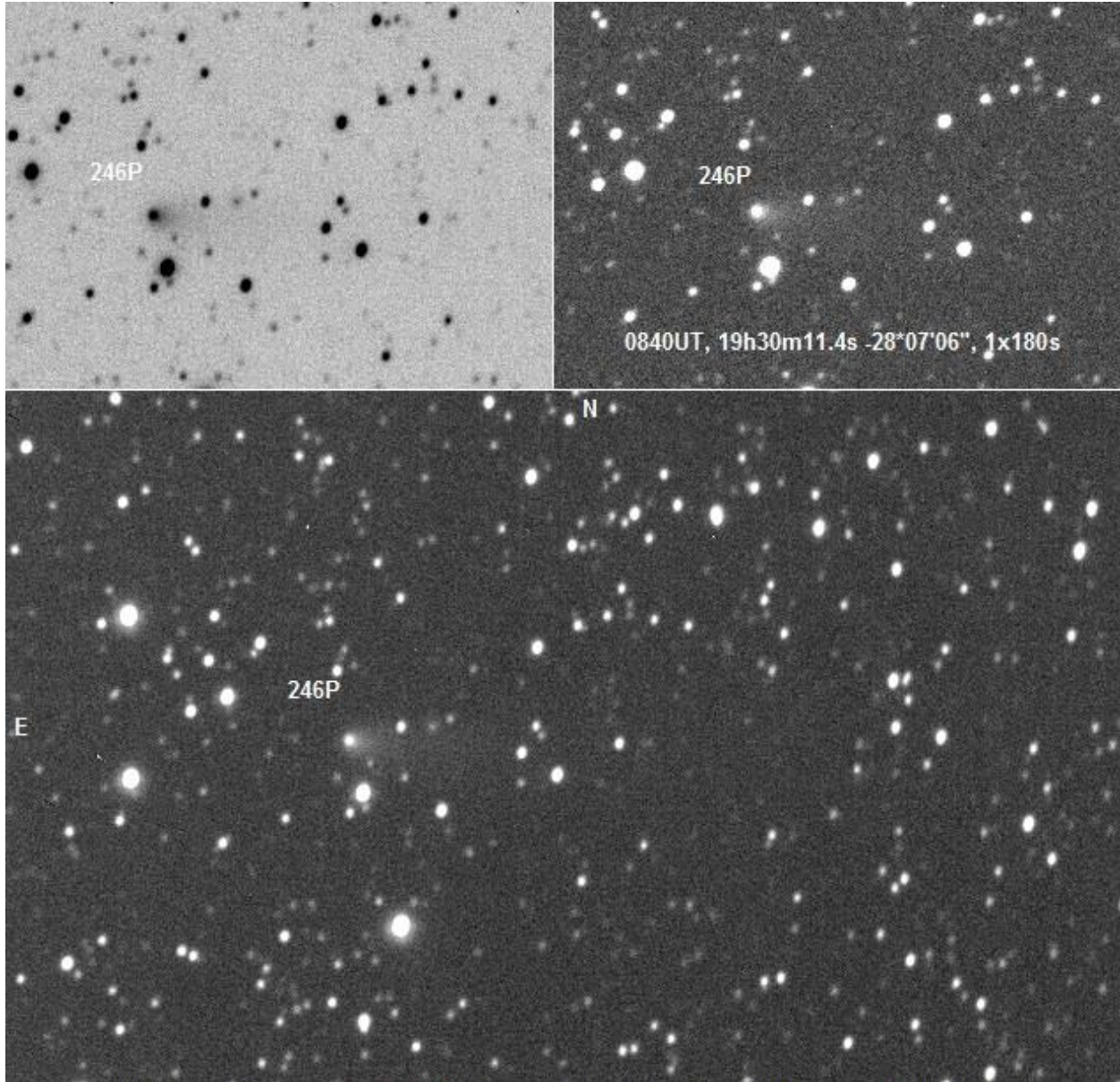
Recent Select Images Contributed to the ALPO Comet Section

117P/Helin-Roman-Alu



117P/Helin-Roman-Alu, m=15.4, tail 129" PA 294°, 2021May9 0420-0445UT, 5x300s, FOV 13.0'x9.3'
11" SCT f/6.4 STF-8300M 1.24"/pixel Mike Olason, Tucson Arizona

246P/NEAT



246P/NEAT, m=13.9, fan tail > 2' PA 265°, 2021May23 0840-0852UT, 4x180s, FOV 13.1'x8.4'
11" SCT f/6.4 STF-8300M 1.24"/pixel Mike Olason, Tucson Arizona

C/2017 K2 (PANSTARRS)



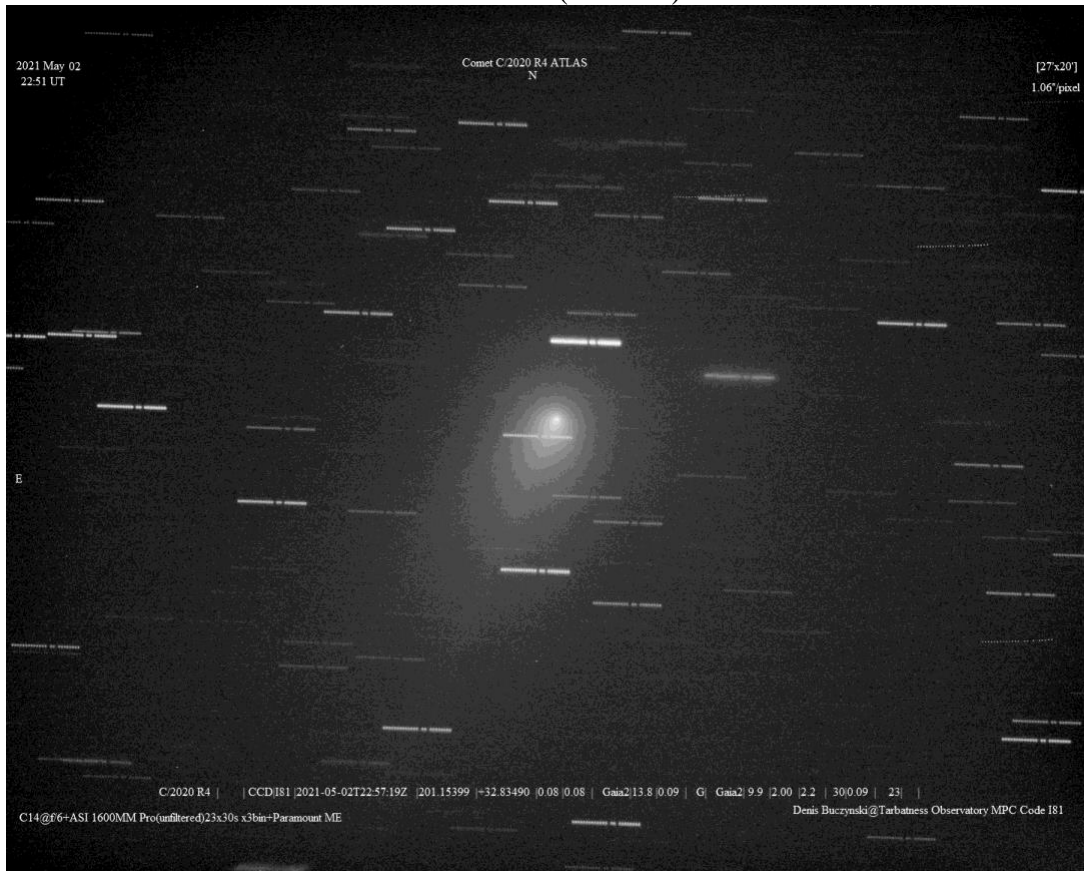
C/2018 N2 (ASASSN)



C/2019 K7 (Smith)



C/2020 R4 (ATLAS)



N (155' x 128')



C / 2020 R4 (ATLAS) + NGCs 46567 & 4631/4627 2021 May 6th 07:42:55 UT (mid) Tak FSQ 106 + STL-11000M LRGB 180:120:120:120s M.P. Moberley