

ALPO COMET NEWS FOR DECEMBER 2020

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

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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/743144-alpo-comet-news-for-december-2020/>). All are encouraged to join the discussion over at Cloudy Nights. The ALPO Comet Section welcomes all comet related observations, whether textual descriptions, images, drawings, magnitude estimates, or spectra. You do 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>.

November turned out to be a great month for comet observers with 101 magnitude estimates of 9 comets and 44 images of 10 comets being submitted to the Comets Section. C/2020 S3 (Erasmus) led the pack as it brightened to 6th magnitude. C/2020 M3 (ATLAS), 156P/Russell-LINEAR and 88P/Howell were also visible between 7th and 10th magnitude. This month, Erasmus will be too close to the Sun for ground-based observers. As is fitting for 2020, we will be able to follow Erasmus virtually in images taken by the SOHO and STEREO spacecraft. C/2020 M3, 156P, and 88P will be fading but still bright enough for small aperture observers. For those willing to try fainter objects, 11P/Tempel-Swift-LINEAR, 29P/Schwassmann-Wachmann, 141P/Machholz, 398P/Boattini, and disintegrating C/2020 P1 (NEOWISE) will be between 10th and 14th magnitude.

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Bright Comets (magnitude < 10.0)

C/2020 S3 (Erasmus) – Comet C/2020 S3 (Erasmus) is a dynamically old long-period comet with an orbital period on the order of ~2600 years. Though a faint 17th magnitude object at discovery back on 2020 September 17 with the ATLAS 0.5-m f/2 Schmidt at Mauna Loa, the comet rapidly brightened to around magnitude 10.0 by the end of October.

On November 2, Chris Wyatt found the comet to be at magnitude 10.2. For the next week, the Moon was a problem and there were few observations. Finally, on the morning of November 11, I attempted to reobserve Erasmus. Imagine my surprise when I swept up a bright condensed 7th magnitude object instead of the 8-9th magnitude diffuse fuzzball that I was expecting. With Erasmus as bright as magnitude 7.4 on the 11th, there was some excitement as it should have brightened even more as it rapidly moved closer to the Sun. Unfortunately, the comet seemed to be stuck in neutral and stayed between magnitude 7.0 and 7.5 till the end of November when it finally started to brighten again with Willian Souza placing it at magnitude 6.6-6.7 on the 29th.

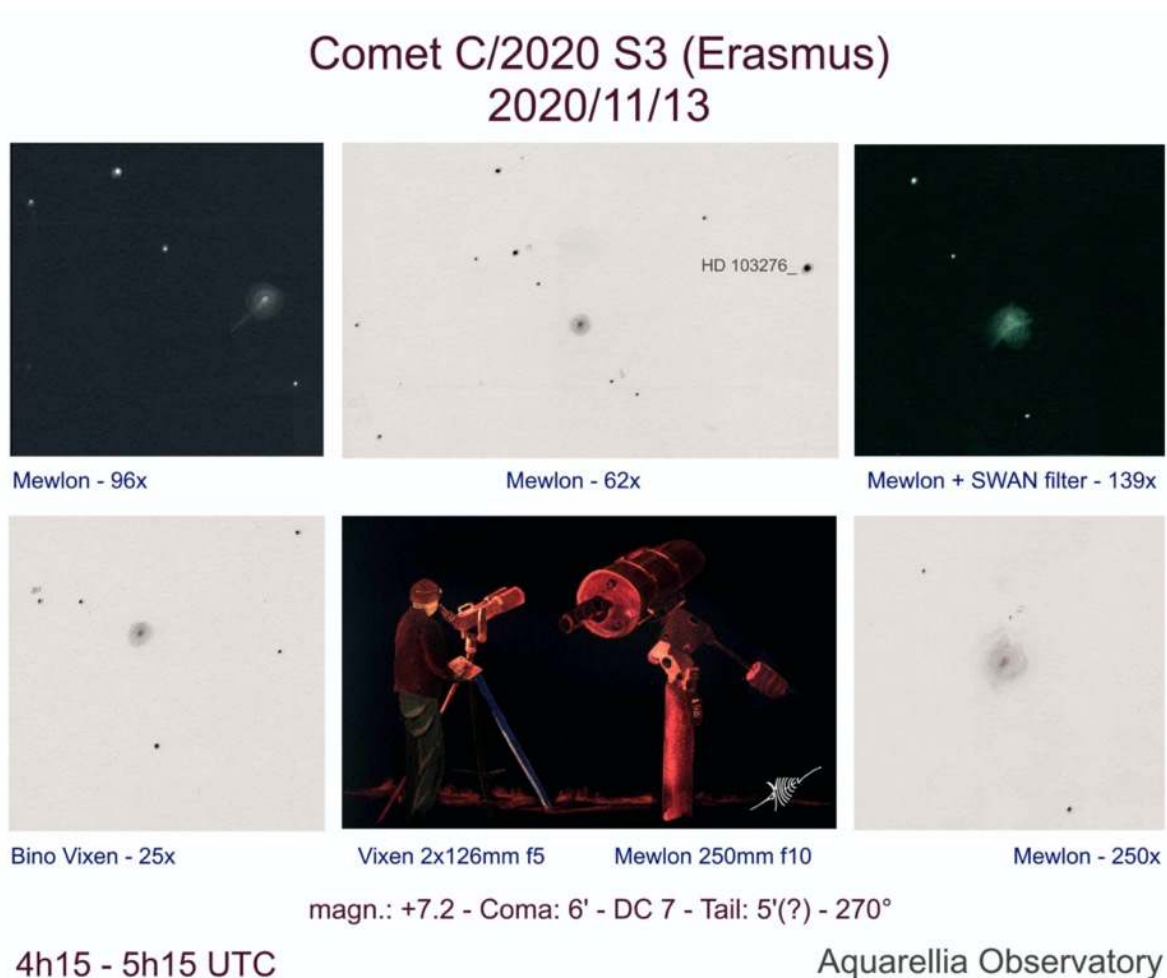


Figure 1 - Visual sketches of C/2020 S3 by Michel Deconinck showing the comet's appearance with different equipment.

Erasmus was very well observed with the Comets Section receiving 39 magnitude estimates and 14 images/sketches from Michel Deconinck, J. J. Gonzalez, Carl Hergenrother, Martin Mobberley, Ludovic Perbet, Michael Rosolina, Gregg Ruppel, Willian Souza, Chris Schur, Richard Tyson, Kacper Wierzchos, and Chris Wyatt. All observers reported the comet as small (3'-5' coma) and strongly condensed (DC = 5-7.5). A tail up to 1.4 degrees in length in the anti-solar direction was observed as well.

So now the bad news, if you haven't seen Erasmus you are probably out of luck. The comet starts December at an elongation of only 26 degrees and only rises after the start of astronomical twilight in the morning sky. Conditions only get worse as the comet approaches a minimum elongation of 5.2 degrees on December 24 as it passes on the far side of the Sun. Even though the comet could be a 5th magnitude object around the time of perihelion on December 12 ($q = 0.40$ au), it will be invisible to ground-based observers. Luckily the comet will be visible in data taken with the SOHO and STEREO-A spacecraft. Erasmus has been visible in the STEREO-A HI-1 FOV since November 13 (see below figure). On November 29 it displayed a 1.3-degree long tail. It should become visible in the SOHO C3 coronagraph FOV for about 2 weeks centered on December 24. Unfortunately, ground-based observers won't be able to see Erasmus again till April 2021 when it should be too faint for visual observation.

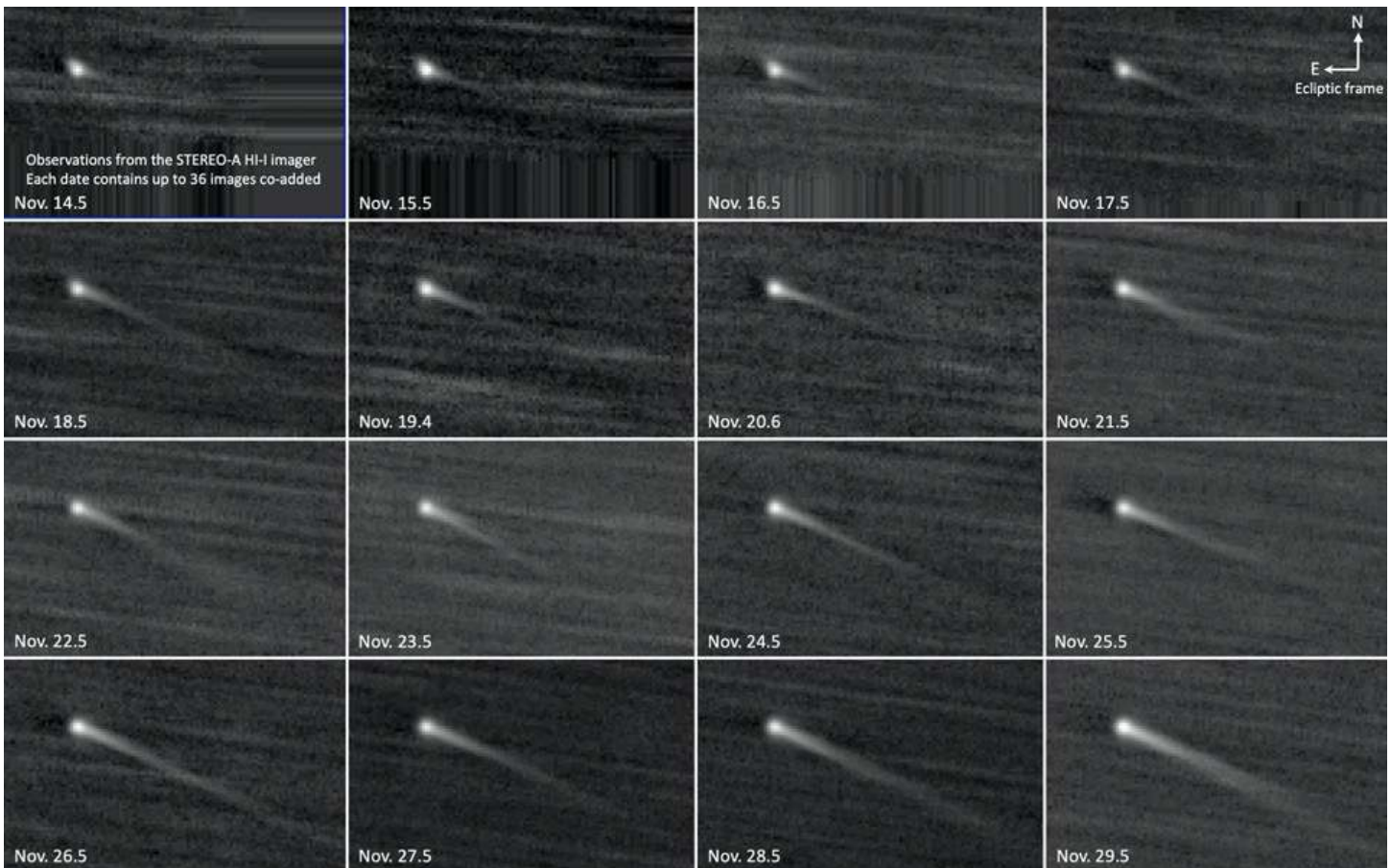


Figure 2 - Each date contains up to 36 co-added images of C/2020 S3 (Erasmus) taken with the HI-1 imager on the STEREO-A spacecraft. The tail on Nov 29 was ~1.3 degrees long. STEREO-A is currently located 0.96 au from the Sun and trails the Earth in its orbit by 58 degrees. From its location, the STEREO-comet distance (1.41 au on 11/29) is larger than the Earth-comet distance (1.09 au on 11/29). Images processed by Carl Hergenrother.

C/2020 S3 (Erasmus)

T = 2020-Dec-12 $q = 0.40$ au

Long-Period comet – dynamically old

Date	Mag	R.A.		Decl.		r	d	Elong	Const	Max El	
										40N	40S
2020-12-01	6.5	14	34	-23	25	0.497	1.114	26	Lib	1	0
2020-12-06	6.0	15	22	-23	35	0.430	1.183	20	Lib	0	0
2020-12-11	5.8	16	10	-22	54	0.395	1.264	14	Sco	0	0
2020-12-16	6.0	16	56	-21	35	0.406	1.347	9	Oph	0	0
2020-12-21	6.7	17	39	-19	50	0.458	1.427	5	Oph	0	0
2020-12-26	7.5	18	17	-17	54	0.536	1.506	5	Sgr	0	0
2020-12-31	8.3	18	51	-15	55	0.626	1.587	7	Sgr	0	0
2021-01-05	9.0	19	20	-13	56	0.721	1.672	9	Sct	0	0

Comet Magnitude Parameters --- $H = 9.3$, $2.5n = 10.0$

C/2020 M3 (ATLAS) – *C/2020 M3 (ATLAS)* provided quite the visual contrast to *C/2020 S3 (Erasmus)*. While Erasmus was small and strongly condensed, ATLAS was larger and more diffuse. Even though both comets were 7th magnitude objects in November, ATLAS was significantly more difficult to observe.



Figure 3 – Image of *C/2020 M3* taken on November 10 by Chris Schur with a 10" f/3.9 Orion Astrograph Newtonian + Baader MPCC and ZWO ASI071MC Pro Color CMOS camera in Payson, Arizona. Both a dust and ion tail are faintly visible.

Like Erasmus, ATLAS is a dynamically old object though with an even shorter orbital period of 139 years. Also like Erasmus, ATLAS was faint at discovery (19th magnitude on 2020 June 27) and rapidly brightened to within visual range. The ALPO received 31 magnitude estimates and 15 images/sketches from Denis Buczynski, Michel Deconinck, J. J. Gonzalez, Carl Hergenrother, Gabriel Jaimes, Martin Mobberley, Ludovic Perbet, Olivier Planchon, Michael Rosolina, Chris Schur, Willian Souza, Kacper Wierzchos, and Chris Wyatt. Though past

perihelion, the comet seemed to hold its brightness (between magnitude 7.5 and 8.0) for most of the month. Its coma was measured between 1' and 15'. The large range in coma diameters highlights how sensitive the observability of a large diffuse coma (DC = 2-4) is to sky conditions, aperture, and magnification.

This month C/2020 M3 is better placed for northern observers in the evening sky in Taurus (Dec 1-4), Auriga (4-31). Now over a month past its October 27 perihelion at 1.27 au and closest approach to Earth at 0.36 au on November 14, the comet is in full retreat from both the Sun and Earth. Starting the month slightly fainter than magnitude 8, the comet could be around magnitude 10 by the end of the year depending on its rate of fading.

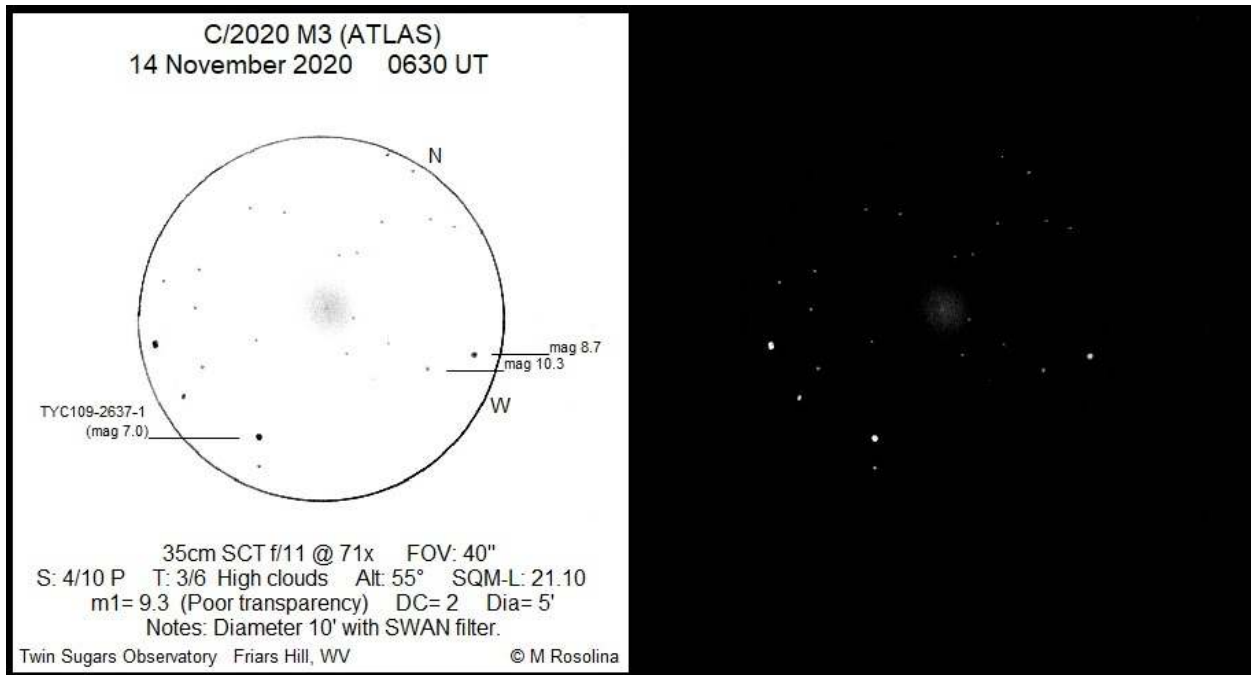


Figure 4 – Visual sketch of C/2020 M3 by Michael Rosolina taken on November 14.

C/2020 M3 (ATLAS)

T = 2020-Oct-25 $q = 1.27$ au

Halley-type comet – 139-year period

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El	
								40N	40S
2020-12-01	8.2	05 25	+25 25	1.378	0.399	166	Tau	76	24
2020-12-06	8.4	05 23	+30 33	1.408	0.428	169	Aur	81	19
2020-12-11	8.7	05 20	+34 53	1.441	0.463	167	Aur	85	15
2020-12-16	9.0	05 18	+38 26	1.476	0.504	164	Aur	89	11
2020-12-21	9.3	05 16	+41 17	1.514	0.551	160	Aur	89	9
2020-12-26	9.6	05 14	+43 29	1.553	0.603	155	Aur	86	6
2020-12-31	9.9	05 14	+45 11	1.595	0.660	151	Aur	85	5
2021-01-05	10.2	05 14	+46 27	1.638	0.721	147	Aur	83	3

Comet Magnitude Parameters --- H = 8.8, 2.5n = 10.0

88P/Howell – Jupiter-family comet 88P/Howell is now outbound after a September 28 perihelion at 1.35 au. Visual observations by J. J. Gonzalez, Carl Hergenrother and Chris Wyatt found 88P between magnitude 8.9 and 9.4 in November. The comet should fade from around magnitude 9.6 to 10.4 this month as it moves through Capricornus (Dec 1-26) and Aquarius (26-31) in the evening sky. Comet Howell is next at perihelion in March 2026 when it may peak at ~9.5.

88P/Howell

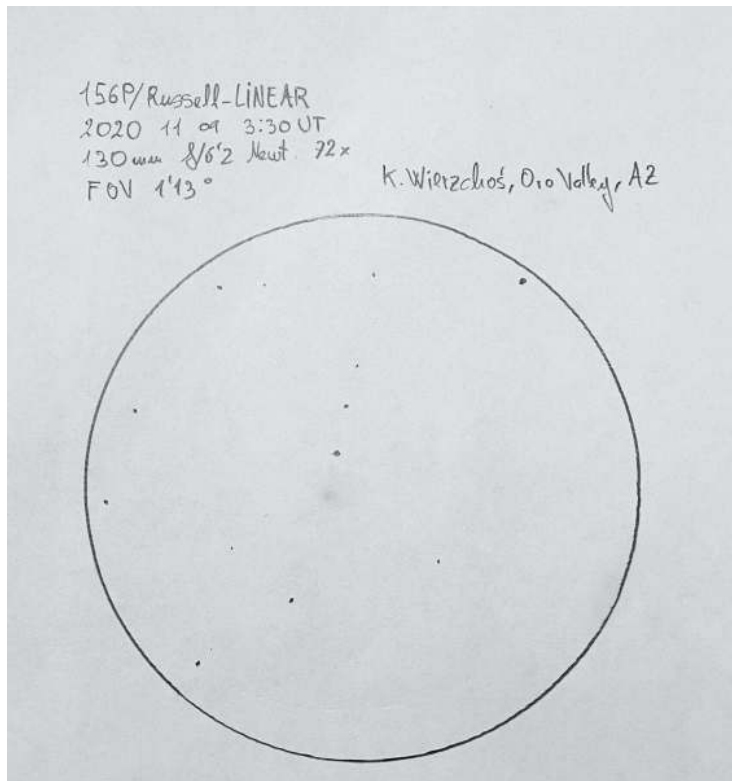
T = 2020-Sep-28 q = 1.35 au

Jupiter-family comet

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El	
								40N	40S
2020-12-01	9.6	20 40	-22 07	1.529	1.809	57	Cap	21	24
2020-12-06	9.8	20 57	-20 57	1.554	1.859	56	Cap	22	21
2020-12-11	9.9	21 13	-19 43	1.580	1.911	55	Cap	23	19
2020-12-16	10.0	21 28	-18 25	1.607	1.966	54	Cap	23	16
2020-12-21	10.2	21 43	-17 06	1.635	2.023	53	Cap	23	14
2020-12-26	10.3	21 58	-15 44	1.664	2.082	51	Cap	24	12
2020-12-31	10.4	22 12	-14 21	1.694	2.142	50	Aqr	24	10
2021-01-05	10.6	22 26	-12 58	1.724	2.203	48	Aqr	23	8

Comet Magnitude Parameters --- H = 6.5, 2.5n = 10.0

156P/Russell-LINEAR – 156P was first observed by Kenneth Russell on a single 90-min photographic plate taken by F. G. Watson with the U.K. Schmidt Telescope at Siding Spring Observatory on 1986 September 3. Further attempts to image the comet in 1986 were unsuccessful at that time. Fast forwarding to 2000, asteroidal LINEAR discovery 2000 QD181



was linked with another LINEAR discovery, 2000 XV43, and photographic Shoemaker discovery 1993 WU. With the updated orbit, an additional photographic image from one of the 1986 follow-up plates was identified. In addition to being seen in 1986, 1993, and 2000, 156P was also seen in 2007 and 2014. Though observed as cometary in the 1986 discovery image, most observations reported no cometary activity.

For an object that rarely shows cometary activity, it has been quite a surprise to observe this comet in small apertures as a 9-10th magnitude object. Michel Delconinck, J. J. Gonzalez, Carl Hergenrother, Kacper Wierzchos, and Chris Wyatt observed 156P between magnitude 9.6 and 11.0 in November. The perceived brightness of the comet has proven to be very sensitive to the equipment

Figure 5 - The visual appearance of 156P/Russell-LINEAR from Kacper Wierzchos made on November 9.

used. This is also obvious from the large scatter in DC values (3-6) and coma diameters (3'-8'). CCD images hint at the problem. 156P has a small condensed dusty inner coma within a much large diffuse gas coma.

156P is now a few weeks passed its 2020 November 17 perihelion at 1.33 au and over a month from its 0.48 au close approach with Earth. The comet should start to fade as it moves through evening constellations of Pisces (Dec 1-22), Andromeda (22-26), and back into Pisces (26-31).



Figure 6 - CCD image of 156P taken on November 15 by Martin Mobbetley showing an condensed inner dust coma and tail within a much larger gas coma.

156P/Russell-LINEAR

T = 2020-Nov-17 $q = 1.33$ au

Jupiter-family comet - 6.43-year period

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El (deg)	
								40N	40S
2020-12-01	9.9	00 03	+08 34	1.342	0.584	115	Psc	59	36
2020-12-06	10.0	00 12	+12 00	1.350	0.612	113	Psc	62	31
2020-12-11	10.2	00 22	+15 14	1.360	0.644	111	Psc	65	26
2020-12-16	10.4	00 33	+18 15	1.373	0.678	110	Psc	68	22
2020-12-21	10.5	00 44	+21 03	1.388	0.715	108	Psc	71	18
2020-12-26	10.7	00 56	+23 37	1.405	0.755	107	And	74	15
2020-12-31	10.8	01 09	+25 59	1.424	0.797	105	Psc	76	12
2021-01-05	11.0	01 22	+28 08	1.444	0.842	104	Psc	78	9

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

Fainter Comets of Interest (generally fainter than magnitude 10.0)

11P/Tempel-Swift-LINEAR – I have to admit, that I really enjoy researching the back stories of comets like *11P/Tempel-Swift-LINEAR* which was discovered, then lost, then rediscovered, then lost, then re-discovered yet again. As a former comet hunter, I'm a bit envious of those who re-discovered these long-lost comets and now get to have their name share a comet with some of the illustrious hunters of the past. Though as you'll see below, I did get to play a small part in *11P*'s saga.

Ernst Wilhelm Leberecht Tempel of Marseilles, France visually swept up *11P* for the first time on 1869 November 27. Tempel discovered or co-discovered 21 comets including *9P/Tempel*, the target of both the Deep Impact and Stardust-NEXT spacecraft missions, and *55P/Tempel-Tuttle*, the parent of the Leonid meteor shower. During the 1869 apparition, the comet passed within 0.25 au of Earth and peaked at 8th magnitude.

After passing unseen in 1875, *11P* was re-discovered on 1880 October 11 by Lewis Swift of Rochester, New York. Swift was also a prolific visual comet hunter with 13 discoveries including *109P/Swift-Tuttle*, the parent of the Perseids. The comet passed even closer to the Earth during this return (0.13 au) and brightened to 7th magnitude. The comet was seen in 1891 (when it passed 0.24 au from Earth and reached 10th magnitude) and 1908 (passed 0.63 au from Earth and peaked at 12th magnitude), but missed at poorly placed apparitions in 1886, 1897, and 1903.

After going unseen for 93 years, the *P/Tempel-Swift* was re-discovered for the third time on December 2001 by the LINEAR survey at 19th magnitude. This is where my small part of *11P*'s story comes in as I was one of the two people to initially suggest the new LINEAR comet was a return of Tempel-Swift. Though *11P* brightened to 17th magnitude in 2001, it was much fainter than at its returns in the 1800s. The intrinsic fading could be a result of a large increase in perihelion distance from 1.06 au in 1869, 1.09 au 1891, and 1.15 au in 1908 to 1.58 au in 2001.

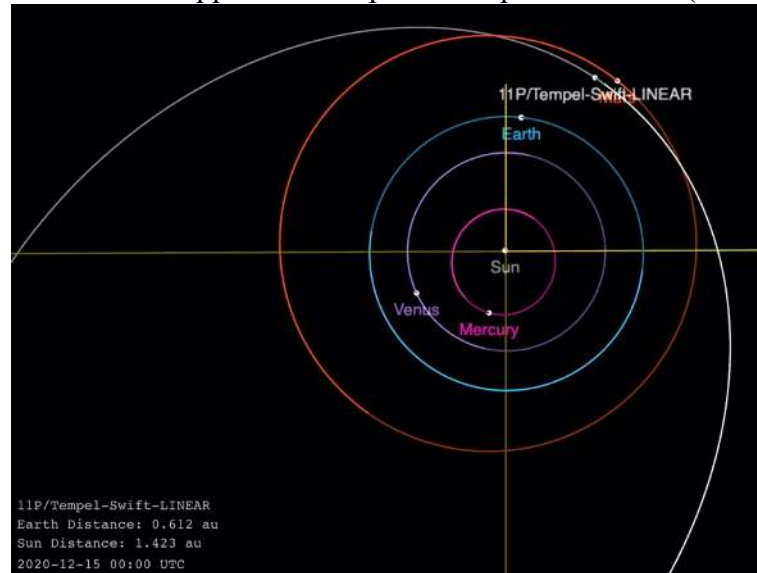


Figure 7 - Orbit of *11P* and the inner planets. Positions are valid for 2020 Dec 15. Diagram made with the JPL Small-Body Database Browser.

After a close approach to Jupiter in September 2018 (0.60 au), *11P*'s perihelion has dropped back down to 1.39 au. The lower perihelion on 2020 November 26 and minimum comet-Earth distance of 0.49 au on November 3 have resulted in *11P* reaching its brightest observed magnitude in over a century.

CCD imagers have been watching this comet rapidly brighten from magnitude 17 in mid-September to around 13.5 in November. Interestingly, both J. J. Gonzalez and Michel Deconinck have visually estimated the comet to be even brighter at around magnitude 11.3 to 11.6. These observations were made

on November 22 and 23. The brightness forecast below is very uncertain as the rate of brightening is extreme and also does not do a good job of modeling the actual brightness data. This month, 11P is an evening object moving through Pisces (Dec 1-28) and Cetus (28-31) and should fade as it is now past perihelion and closest approach to Earth.

11P/Tempel-Swift-LINEAR

T = 2020-Nov-22 $q = 1.39$ au

Jupiter-family comet - 5.95-year period

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El	
								40N	40S
2020-12-01	13.3	00 52	+11 22	1.390	0.550	127	Psc	61	37
2020-12-06	13.4	01 05	+10 02	1.393	0.572	124	Psc	60	37
2020-12-11	13.8	01 19	+08 55	1.398	0.597	122	Psc	59	38
2020-12-16	14.0	01 32	+08 00	1.406	0.625	120	Psc	58	37
2020-12-21	14.3	01 46	+07 17	1.416	0.656	117	Psc	57	37
2020-12-26	14.7	02 00	+06 46	1.427	0.691	115	Psc	57	37
2020-12-31	15.1	02 14	+06 24	1.441	0.729	113	Cet	56	37
2021-01-05	15.5	02 28	+06 12	1.456	0.769	111	Cet	56	36

Comet Magnitude Parameters --- H = 5.1, 2.5n = 67.1

29P/Schwassmann-Wachmann - 29P/Schwassmann-Wachmann was discovered photographically in 1927 by German astronomer team Arnold Schwassmann and Arno Arthur Wachmann. The duo discovered 4 comets together, three short-period comets (29P, 31P and 73P) and a long-period comet shared with Leslie Peltier (C/1930 D1).



Figure 8 - 29P as imaged by Martin Moberley 5 nights after the start of its most recent outburst.

On November 19, 29P underwent another of its frequent outbursts and is currently around 12th magnitude in the evening sky in Aries. If you image 29P, please consider contributing to the British Astronomical Society's (BAA) 29P monitoring program coordinated by Richard Miles. You can find more information at the BAA's "Observing the outbursting comet 29P/Schwassmann-Wachmann" page (<https://britastro.org/node/18562>).

29P/Schwassmann-Wachmann

T = 2019-Mar-07 $q = 5.77$ au

Centaur comet - 14.8-yr orbital period

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El (deg)	
								40N	40S
2020-12-01	12-13	02 21	+25 42	5.840	4.962	150	Ari	76	24
2020-12-06	12-13	02 19	+25 27	5.841	5.004	145	Ari	76	24
2020-12-11	12-13	02 18	+25 14	5.842	5.052	140	Ari	75	24
2020-12-16	12-13	02 16	+25 00	5.844	5.106	134	Ari	75	24
2020-12-21	12-13	02 15	+24 48	5.845	5.166	129	Ari	75	23
2020-12-26	12-13	02 15	+24 36	5.846	5.230	124	Ari	75	22
2020-12-31	12-13	02 15	+24 26	5.847	5.298	119	Ari	75	20
2021-01-05	12-13	02 15	+24 17	5.848	5.370	114	Ari	74	19

141P/Machholz - Former ALPO Comet Section Coordinator Don Machholz discovered this Jupiter-family comet in 1994. With a 5.34-year period, 141P is making its 5th observed perihelion passage. During 1994 the comet was actually a multiple comet with 5 components (component D was even observed to split during the apparition). The two brightest components (the primary A and secondary D) made a visually striking double comet in small telescopes. Components A and D were re-observed in 1999 but by 2005 only component A was visible. Due to poor observing conditions, no components were seen in 2010. During the last return in 2015, the primary (A) has been seen as well as another component (H) which could have been a new sighting of components B or C observed back in 1994.

141P's split personalities didn't begin in 1994. Research by Zdenek Sekanina found that components B through E split from the primary during the period of 1987 to 1991. Other research suggests 141P (or its progenitor) may have been breaking up for some time as it is related to both the Alpha Capricornid meteor shower and comet 169P/NEAT (a weakly active comet on an orbit with a 4.2-year period).

So far, the only observations of this comet were made back August when it was still a very faint 21st magnitude. Since then, I have seen no published observations of 141P even though the comet should be rapidly brightening as it approaches perihelion on December 16 at 0.81 au and close approach to Earth on January 19 at 0.53 au. It will be interesting to see how bright this comet gets and whether any additional components are observed. 141P is an evening object moving through Aquileia (Dec 1), Capricornus (1-9), Aquarius (9-19), Capricornus (19-24), and Aquarius (24-31).

141P/Machholz

T = 2020-Dec-16 q = 0.81 au

Max El

Jupiter-family comet – 5.34-year period

(deg)

Date	Mag	R.A.	Decl.	r	d	Elong	Const	40N	40S
2020-12-01	12.9	20 04	-10 01	0.841	0.901	52	Aql	27	10
2020-12-06	12.4	20 25	-09 48	0.822	0.847	52	Cap	28	8
2020-12-11	12.0	20 48	-09 35	0.811	0.792	52	Aqr	28	8
2020-12-16	11.6	21 12	-09 21	0.808	0.738	53	Aqr	29	8
2020-12-21	11.4	21 39	-09 08	0.813	0.686	54	Cap	30	8
2020-12-26	11.2	22 09	-08 53	0.826	0.638	56	Aqr	31	9
2020-12-31	11.1	22 41	-08 35	0.847	0.596	58	Aqr	32	12
2021-01-05	11.1	23 16	-08 12	0.875	0.562	62	Aqr	34	15

Comet Magnitude Parameters --- H = 14.0, 2.5n = 20.0, Offset = 10 days

[ref. S. Yoshida]

398P/Boattini - Comet Boattini was discovered on 2009 August 26 as a 18-19th magnitude object by Andrea Boattini with the 0.7-m Catalina Schmidt. During its 2009 return, the comet was a reasonably bright object reaching 12-13th magnitude. It was missed at its next return in 2015 but was recently recovered on 2020 August 11 at 19th magnitude by the ATLAS survey. Observing circumstances are near optimal for its current orbit with perihelion occurring on 2020 December 17 at 1.31 au and closest approach to Earth a few days later on December 22 at 0.38 au. Chris Wyatt and J. J. Gonzalez both observed the comet in November to be at magnitude 13.2 to 13.9. 398P should brighten further to 12th magnitude this month as it moves through Eridanus (Dec 1-31) in the evening sky.

398P/Boattini

T = 2020-Dec-26 q = 1.31 au

Max El

Jupiter-family comet – 5.53-year period

(deg)

Date	Mag	R.A.	Decl.	r	d	Elong	Const	40N	40S
2020-12-01	12.9	04 24	-12 30	1.339	0.403	145	Eri	38	62
2020-12-06	12.7	04 26	-11 32	1.327	0.392	145	Eri	39	61
2020-12-11	12.6	04 29	-10 08	1.318	0.384	145	Eri	40	60
2020-12-16	12.5	04 31	-08 19	1.311	0.378	144	Eri	42	58
2020-12-21	12.5	04 35	-06 07	1.307	0.376	144	Eri	44	56
2020-12-26	12.5	04 39	-03 34	1.306	0.376	143	Eri	47	53
2020-12-31	12.5	04 45	-00 45	1.307	0.380	142	Eri	49	51
2021-01-05	12.6	04 51	+02 15	1.310	0.387	141	Eri	52	48

Comet Magnitude Parameters --- H = 12.3, 2.5n = 20.0

C/2020 P1 (NEOWISE) – Not to be confused with this summer’s bright *C/2020 F3 (NEOWISE)*, *C/2020 P1* is an intrinsically faint, dynamically new long-period comet first seen by the NEOWISE spacecraft on August 2. Though a faint 19th magnitude at discovery, it brightened to around magnitude 10 before being lost in the Sun’s glare. Last month we speculated that P1 had started to disintegrate which is not uncommon for intrinsically faint, dynamically new comets. Recent imaging confirms that *C/2020 P1* has disintegrated and show a remnant dust trail. Still the comet is visually visible to large aperture observers with estimates placing it between 11th and 13th magnitude. The comet is slowly climbing higher in the eastern sky at dawn as it moves through Boötes (Dec 1), Virgo (1-11), and Serpens (11-31).

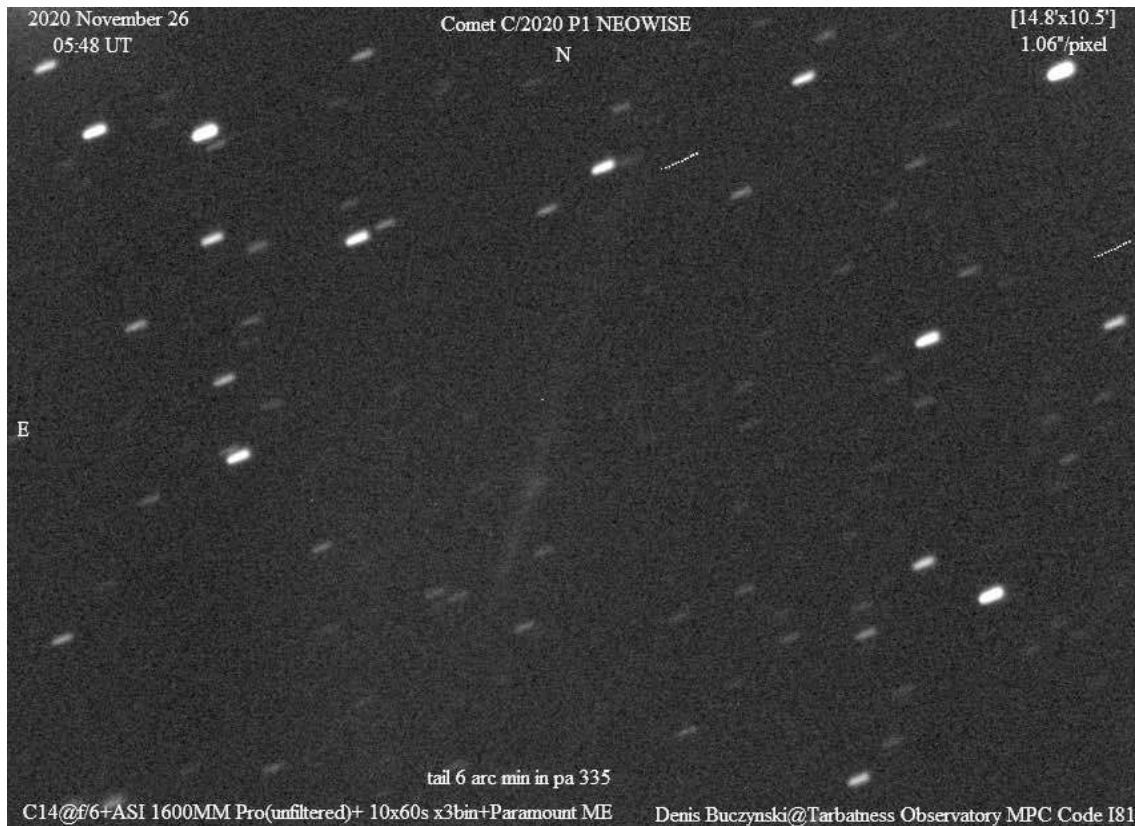


Figure 9 - All that is left of C/2020 P1 is a thin dust trail in this image taken on November 26 by Denis Buczynski.

C/2020 P1 (NEOWISE)

T = 2020-Oct-20 $q = 0.34$ au

Long-Period comet – dynamically new

Date	Mag	R.A.	Decl.	r	d	Elong	Const	Max El (deg)	
								40N	40S
2020 12 01	???	14 54	+07 30	1.085	1.689	37	Boo	19	0
2020 12 06	???	15 03	+07 01	1.181	1.759	39	Vir	21	0
2020 12 11	???	15 11	+06 37	1.274	1.822	42	Vir	24	0
2020 12 16	???	15 18	+06 18	1.365	1.877	44	Ser	27	0
2020 12 21	???	15 24	+06 03	1.454	1.925	47	Ser	30	0
2020 12 26	???	15 30	+05 53	1.542	1.966	50	Ser	33	0
2020 12 31	???	15 35	+05 47	1.627	2.001	53	Ser	35	0
2021 01 05	???	15 40	+05 47	1.711	2.029	57	Ser	38	0

New Discoveries, Recoveries and Other Comets in the News

New Discoveries and Recoveries

P/2020 V4 (Rankin) – David Rankin discovered P/2020 V4 with the Mount Lemmon 1.5-m on November 15 at 19th magnitude. This is the 6th comet named after David, all of which were found this year. P/2020 V4 is a borderline Centaur object with a perihelion of 5.15 au and orbital period of 28.5 years. Perihelion occurs next year on July 18, but the comet will be at its brightest around opposition this month and in early 2022. Even then it will only be a 19th magnitude object.

P/2020 V3 (PANSTARRS) – While P/2020 V4 is a borderline Centaur, P/2020 V3 (PANSTARRS) is a bona fide Centaur with a perihelion at 6.23 au and orbital period of 24.2 years. The object was

discovered with the Pan-STARRS1 telescope on November 10 at 20th magnitude. Perihelion occurs on 2021 January 20 when the comet will be at its brightest at 19th magnitude.

C/2020 V2 (ZTF) – The Zwicky Transient Facility (ZTF) uses the 1.2-m Schmidt on Mount Palomar to search for all sorts of transient astronomical phenomenon including comets and asteroids. *C/2020 V2* was found on November 2 at 19th magnitude and is a long-period comet with a 2.23 au perihelion on 2023 May 8. At discovery the comet was over 8 au from the Sun. The comet could brighten to 11th magnitude at that time, so this is one to watch in case it brightens more rapidly and becomes a visual object. This appears to be the first ZTF discovery to be named ‘ZTF’. Past ZTF finds were named “Palomar” or after the individual observer.

P/2020 V1 = P/2005 XA54 (LONEOS-Hill) – In addition to discovering two comets last month, David Rankin also used the Mount Lemmon 1.5-m to recover P2005 XA54 (LONEOS-Hill) on November 16 at 18th magnitude. The ZTF survey also imaged the comet on November 3 and 5. P/2005 XA54 was discovered on 2005 December 4 by the LONEOS (Lowell Observatory Near Earth Object Search) 0.6-m Schmidt as an asteroidal object and on 2006 January 6 by ALPO Solar Section Coordinator Rik Hill with the 0.7-m Catalina Schmidt as a comet. During its 2006 return, the comet was observed to peak at 13th magnitude. This time the comet will come to perihelion on 2021 January 28 at 1.75 au when it should peak at 16th magnitude or brighter.

P/2020 W1 (Rankin) – The 5th comet to bear David Rankin’s name was actually found a day after P/2020 V4. It was 20th magnitude when spotted with the Mount Lemmon 1.5-m. Like P/2020 V4, P/2020 W1 is a borderline Centaur with a perihelion at 5.29 au back on 2020 April 3 and an orbital period of 19.3 years. The comet has likely already peaked in brightness.

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 < carl.hergenrother @ alpo-astronomy.org >.

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

Stay safe and enjoy the sky!

- Carl Hergenrother (ALPO Comets Section Coordinator)

Recent Magnitude Measurements Contributed to the ALPO Comet Section

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA		TAIL		ICQ	CODE	Observer Name
						T	Dia	DC	LENG	PA			
C/2020 S3 (Erasmus)													
2020S3	2020 11 29.30	M 6.7	TK	15.0L	5	38	5	7			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 29.30	M 6.6	TK	7.0B		15	5	7/			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 28.25	S 6.8	TK	10.0B		25	3	7/	0.4	270	ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 26.53	wS 7.1	TK	5.0B		10	5	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 26.30	S 7.1	TK	7.0B		15	4	5			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 25.30	S 7.1	TK	7.0B		15	5	6			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 24.53	wS 7.2	TK	5.0B		10	4	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 24.53	wM 7.1	TK	12.5B		30	4	7	0.3	280	ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 23.29	S 7.2	TK	15.0L	5	42	5	6			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 23.29	S 7.2	TK	7.0B		15	5	6			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 23.28	S 7.1	TK	5.0B		10	5	7			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 22.24	S 7.0	TK	10.0B		25	4	7	1.4	280	ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 20.53	S 7.1	TK	5.0B		10	4	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 20.53	M 7.1	TK	12.5B		30	4	7	0.2	280	ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 20.30	S 7.4	TK	7.0B		15	3	4			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 20.29	S 7.5	TK	15.0L	5	42	3	5			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 20.26	S 7.7	TK	15.0L	5	38	3	5			ICQ XX	SOU01	Willian Souza
2020S3	2020 11 19.53	M 7.2	TK	5.0B		10	3	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 18.24	S 6.8	TK	5.0B		10	8	7			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 18.23	S 7.1	TK	10.0B		25	6	6/	0.6	280	ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 18.20	S 8.0:TK	12.6B	5	25	10	6				ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 17.52	M 7.3	TK	5.0B		10	4	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 17.52	M 7.5	TK	12.5B		30	3	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 17.22	S< 8.0	TK	25.0C10	190	> 4	7	>	5.0m	270	ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 17.21	S 8.1	TK	25.0C10	62	4	7		6.0m	270	ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 17.19	S 7.1	TK	12.6B	5	25	4.25	7			ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 15.70	xM 7.7	TK	7.0B		15	3.8	6/			ICQ XX	WYA	Christopher Wyatt
2020S3	2020 11 15.53	M 7.1	TK	5.0B		10	4	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 14.52	M 7.4	TK	5.0B		10	5	7/			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 14.23	S 6.9	TK	5.0B		10	8	6/			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 14.22	S 7.3	TK	10.0B		25	6	6	0.8	280	ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020S3	2020 11 13.22	B 7.2	TK	25.0C10	96	6	7	&	5.0m	270	ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 13.21	B 7.2	TK	25.0C10	250	6	6				ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 13.20	B 7.3	TK	25.0C10	62	6	7				ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 13.19	B 7.3	TK	12.6B	5	25	7	5/			ICQ XX	DECa	Michel Deconinck
2020S3	2020 11 12.52	S 7.2	TK	5.0B		10	6	6			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 11.52	S 7.3	TK	5.0B		10	5	7/			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 11.52	M 7.4	TK	12.5B		30	4	7			ICQ xx	HER02	Carl Hergenrother
2020S3	2020 11 02.69	xM 10.1	TK	25.0L	5	74	2.0	3/			ICQ XX	WYA	Christopher Wyatt
C/2020 P1 (NEOWISE)													
2020P1	2020 11 28.24	S 11.5	TK	20.3T10		100		1/	0.3	330	ICQ XX	GON05	Juan Jose Gonzalez Suarez
C/2020 M3 (ATLAS)													
2020M3	2020 11 29.17	S 10.0:TK	25.0C10	62	& 4	3					ICQ XX	DECa	Michel Deconinck
2020M3	2020 11 28.23	S 7.8	TK	10.0B		25	12	2/			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 26.52	S 8.0	TK	5.0B		10	10	2			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 24.52	S 7.9	TK	5.0B		10	6	2			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 24.52	S 8.3	TK	12.5B		30	9	3			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 22.21	S 7.6	TK	10.0B		25	15	3			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 22.20	S 7.3	TK	5.0B		10	15	3			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 21.19	S 8.9	TK	12.6B	5	25	7	2			ICQ XX	DECa	Michel Deconinck
2020M3	2020 11 20.52	S 7.7	TK	5.0B		10	6	2			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 20.52	S 8.0	TK	12.5B		30	9	3			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 19.52	M 7.8	TK	5.0B		10	5	2			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 18.22	S 7.4	TK	10.0B		25	15	3			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 18.17	S 10.5:TK	12.6B	5	25	5.5	2				ICQ XX	DECa	Michel Deconinck
2020M3	2020 11 18.00	S 7.2	TK	5.0B		10	15	3			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 17.18	S 9.5	TK	25.0C10	190	2	3				ICQ XX	DECa	Michel Deconinck
2020M3	2020 11 17.18	S 9.5	TK	25.0C10	190	2	3				ICQ XX	DECa	Michel Deconinck
2020M3	2020 11 17.08	S 8.4	TK	15.0L	5	24	3	2			ICQ XX	SOU01	Willian Souza
2020M3	2020 11 17.05	S 8.5	TK	15.0L	5	42	3	2			ICQ XX	SOU01	Willian Souza
2020M3	2020 11 15.93	Z 8.2	AA	5.0A	5	2	1				JAIaa	JAIaa	Gabriel Jaimes
2020M3	2020 11 15.50	xM 7.7	TK	5.0R		10	9.3	3/			ICQ XX	WYA	Christopher Wyatt
2020M3	2020 11 15.53	S 7.7	TK	5.0B		10	7	3			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 14.53	S 7.7	TK	5.0B		10	10	2			ICQ xx	HER02	Carl Hergenrother
2020M3	2020 11 14.52	xS 7.6	TK	5.0R		10	12.5	3			ICQ XX	WYA	Christopher Wyatt
2020M3	2020 11 14.24	S 7.7	TK	10.0B		25	13	3			ICQ XX	GON05	Juan Jose Gonzalez Suarez
2020M3	2020 11 13.18	B 8.6	TK	25.0C10	62	2.75	3/				ICQ XX	DECa	Michel Deconinck

2020M3	2020	11	11.51	S	7.6	TK	12.5B	30	6	3	ICQ	xx	HER02	Carl Hergenrother		
2020M3	2020	11	10.47	&M	8.1	TK	25.0L	5	40	8.0	5	ICQ	XX	WYA	Christopher Wyatt	
2020M3	2020	11	09.11	S	7.9	TK	15.0L	5	38	5	2	ICQ	XX	SOU01	Willian Souza	
2020M3	2020	11	08.13	S	7.7	TK	7.0B	15	5	4	ICQ	XX	SOU01	Willian Souza		
2020M3	2020	11	08.12	S	7.8	TK	15.0L	5	38	5	3	ICQ	XX	SOU01	Willian Souza	
2020M3	2020	11	02.70	xM	9.1	TK	25.0L	5	40	6.5	4	ICQ	XX	WYA	Christopher Wyatt	
C/2020 F5 (MASTER)																
2020F5	2020	11	15.45	xM	15.0	AQ	40.0L	4	261	0.3	5/	ICQ	XX	WYA	Christopher Wyatt	
2020F5	2020	11	14.44	xM	14.8	AQ	40.0L	4	261	0.3	3/	ICQ	XX	WYA	Christopher Wyatt	
398P/Boattini																
398	2020	11	17.96	S	13.2	AQ	20.3T10	133	1.5	5	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
398	2020	11	15.68	xM	13.9	AQ	40.0L	4	182	0.7	5/	ICQ	XX	WYA	Christopher Wyatt	
398	2020	11	14.48	xM	13.9	AQ	40.0L	4	182	1.0	5/	ICQ	XX	WYA	Christopher Wyatt	
156P/Russell-LINEAR																
156	2020	11	22.02	S	9.6	TK	20.3T10	77	6	3	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
156	2020	11	17.94	S	9.6	TK	20.3T10	77	8	3	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
156	2020	11	17.08	S	10.5	TK	12.5B	30	3	3	ICQ	xx	HER02	Carl Hergenrother		
156	2020	11	16.08	S	10.5	TK	12.5B	30	3	3	ICQ	xx	HER02	Carl Hergenrother		
156	2020	11	15.46	xM	9.7	TK	40.0L	4	59	6.0	6	ICQ	XX	WYA	Christopher Wyatt	
156	2020	11	15.07	S	10.5	TK	12.5B	30	3	4	ICQ	xx	HER02	Carl Hergenrother		
156	2020	11	14.45	xM	9.7	TK	40.0L	4	59	5.6	6	3.5m049	ICQ	XX	WYA	Christopher Wyatt
156	2020	11	10.44	xM	10.3	TK	25.0L	5	40	5.2	6	ICQ	XX	WYA	Christopher Wyatt	
156	2020	11	08.41	xM	10.6	AQ	25.0L	5	40	4.5	6	ICQ	XX	WYA	Christopher Wyatt	
156	2020	11	05.78	B	11.0	TK	25.0C10	62	3	4	ICQ	XX	DECaa	Michel Deconinck		
156	2020	11	03.41	xM	10.6	AQ	25.0L	5	40	4.0	6	ICQ	XX	WYA	Christopher Wyatt	
88P/Howell																
88	2020	11	17.80	S	8.9	TK	20.3T10	77	7	2/	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
88	2020	11	16.08	S	9.1	TK	12.5B	30	3	4	ICQ	xx	HER02	Carl Hergenrother		
88	2020	11	15.44	xM	9.4	TK	40.0L	4	59	4.7	4	ICQ	XX	WYA	Christopher Wyatt	
88	2020	11	15.07	S	9.3	TK	12.5B	30	4	3	ICQ	xx	HER02	Carl Hergenrother		
88	2020	11	14.42	xM	9.2	TK	40.0L	4	59	4.0	4	ICQ	XX	WYA	Christopher Wyatt	
88	2020	11	10.42	xM	9.4	TK	25.0L	5	40	4.8	3/	ICQ	XX	WYA	Christopher Wyatt	
88	2020	11	08.40	xM	9.3	TK	25.0L	5	40	4.5	3/	ICQ	XX	WYA	Christopher Wyatt	
88	2020	11	03.40	xM	8.9	TK	25.0L	5	40	3.4	3/	ICQ	XX	WYA	Christopher Wyatt	
29P/Schwassmann-Wachmann																
29	2020	11	22.04	S	11.0	TK	20.3T10	100	6	2	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
29	2020	11	18.20	S	10.8	TK	20.3T10	77	6	2	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		
29	2020	11	14.47	xI	15.4	AQ	40.0L	4	182	ICQ	XX	WYA	Christopher Wyatt			
29	2020	11	10.45	xI	14.7	AQ	25.0L	5	179	ICQ	XX	WYA	Christopher Wyatt			
11P/Tempel-Swift-LINEAR																
11	2020	11	23.78	S	11.6	:TK	25.0C10	190	6	3	ICQ	XX	DECaa	Michel Deconinck		
11	2020	11	22.00	S	11.3	TK	20.3T10	100	5	1/	ICQ	XX	GON05	Juan Jose Gonzalez Suarez		

Images Contributed to the ALPO Comet Section from the Previous Month
C/2020 S3 (Erasmus)



Figure 10 - Chris Schur imaged C/Erasmus at an elevation of only 5 degrees on November 28. The image is a 15-min exposure with a Stellarvue SV80s at f/4.4 and Canon Xti at ISO 400 from Payson, Arizona.



Figure 11 - Gregg Ruppel used a Takahashi FSQ106 and ZWO ASI294MC camera on November 20 to capture this 6 x 30 second exposure.



Figure 12 – A tail is visible in this sketch by Michel Deconinck made on November 21 with a Vixen 126 mm binoculars at 40x.

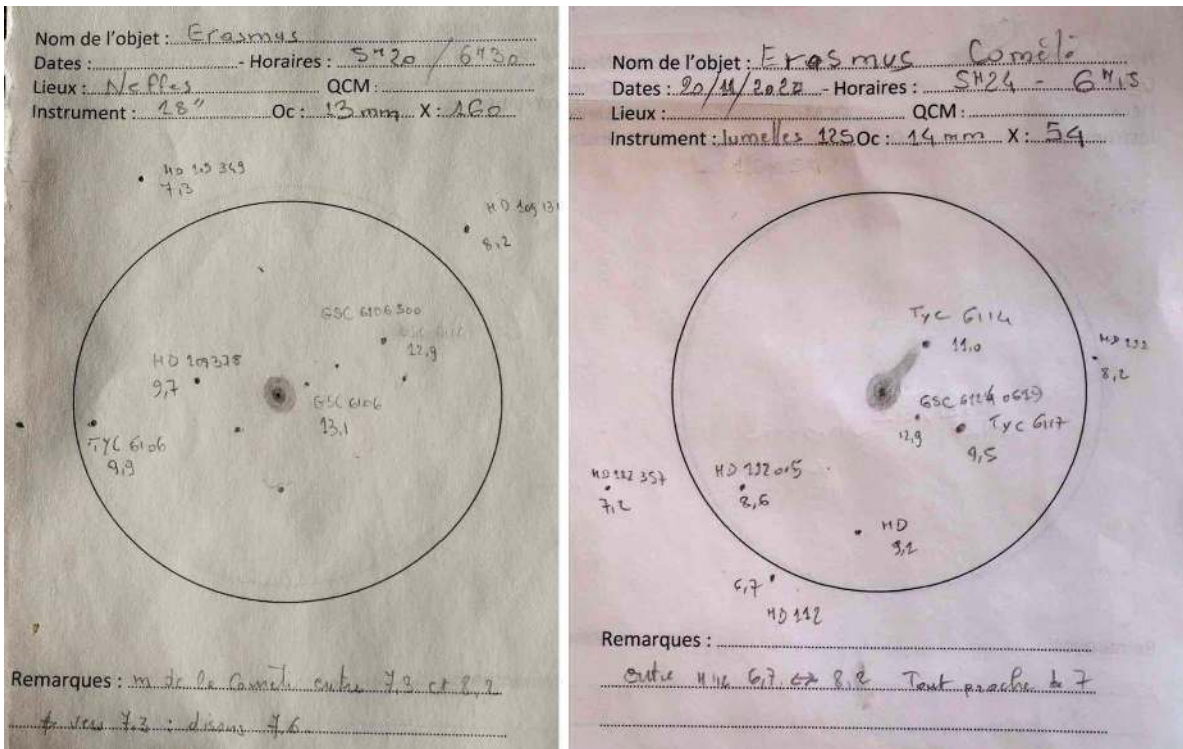


Figure 13 - Two sketches of Erasmus by Ludovic Perbet on November 18 (left) and 20 (right).

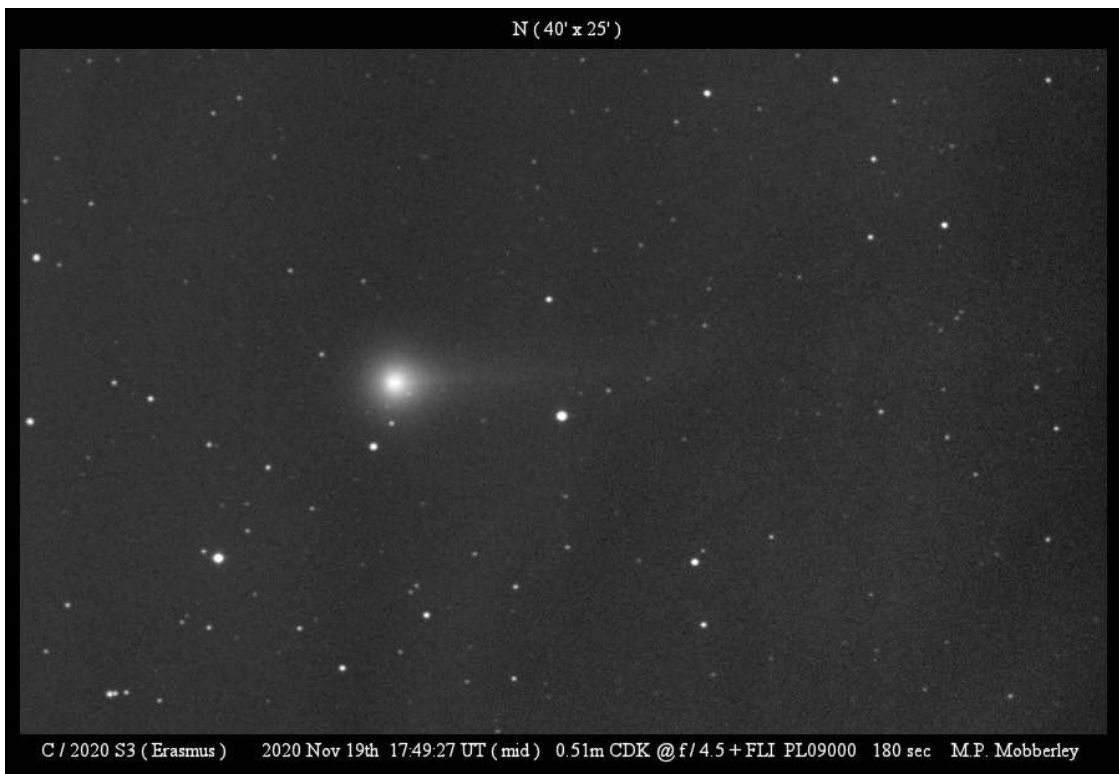


Figure 14 - Image of Erasmus taken on November 19 by Martin Mobberley with an iTelescopes 0.51-m CDK and FLI PL09000 camera (exposure time 180 seconds, Luminance filter)

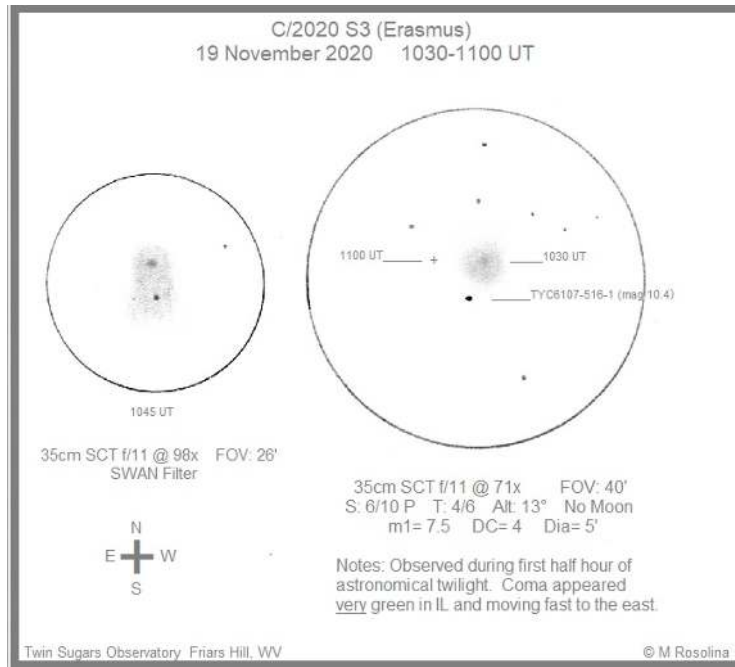


Figure 14 –Michael Rosolina also detected Erasmus' tail in a sketch made on November 19.



Figure 15 – Richard Tyson used a SLOOH telescope on November 5 to capture this color image of C/2020 S3 (Erasmus).

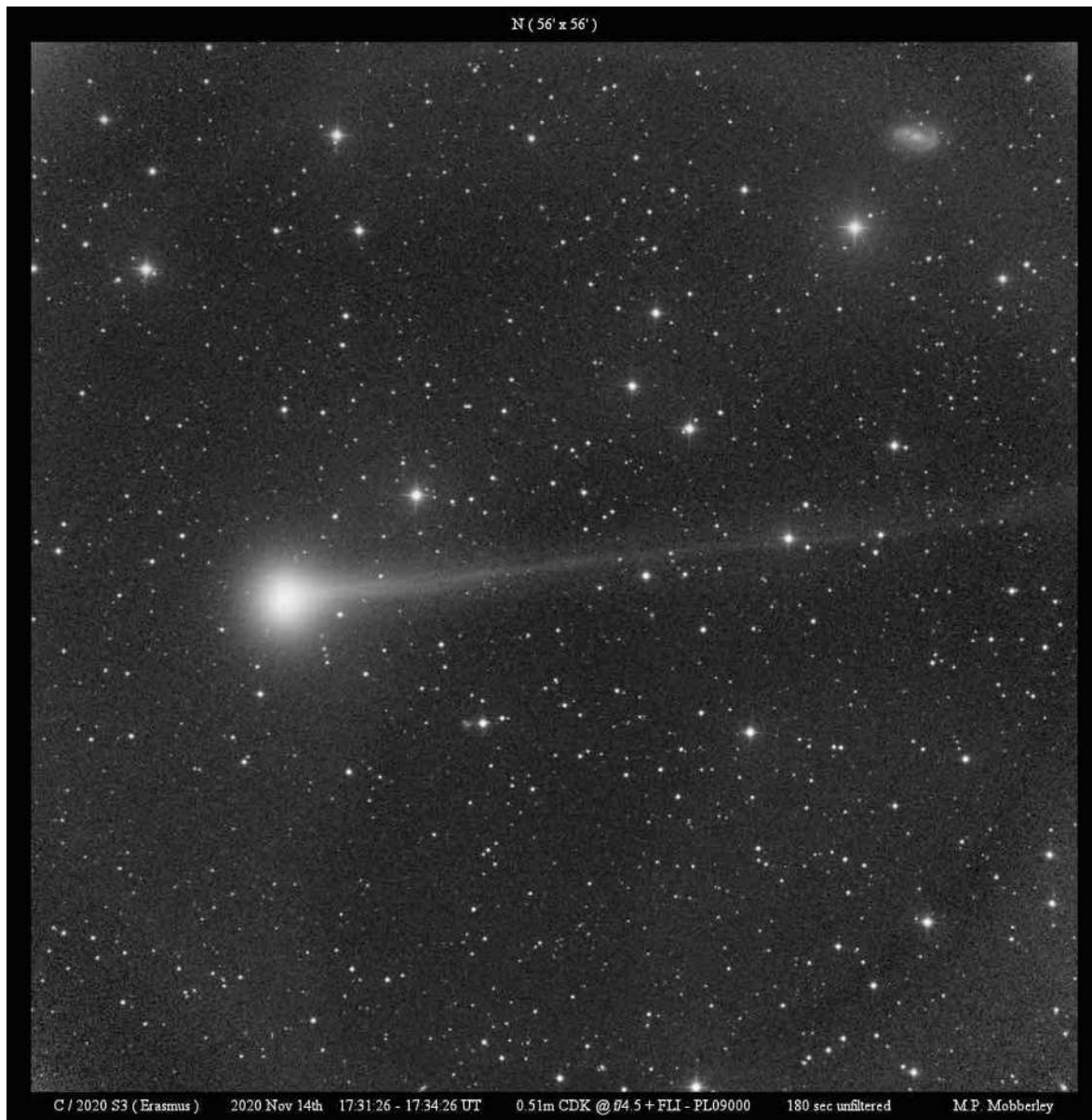


Figure 16 - Image of Erasmus taken on November 14 by Martin Mobberley with an iTelescopes 0.51-m CDK and FLI PL09000 camera (exposure time 180 seconds, Luminance filter). Nice galaxy in the upper right corner.

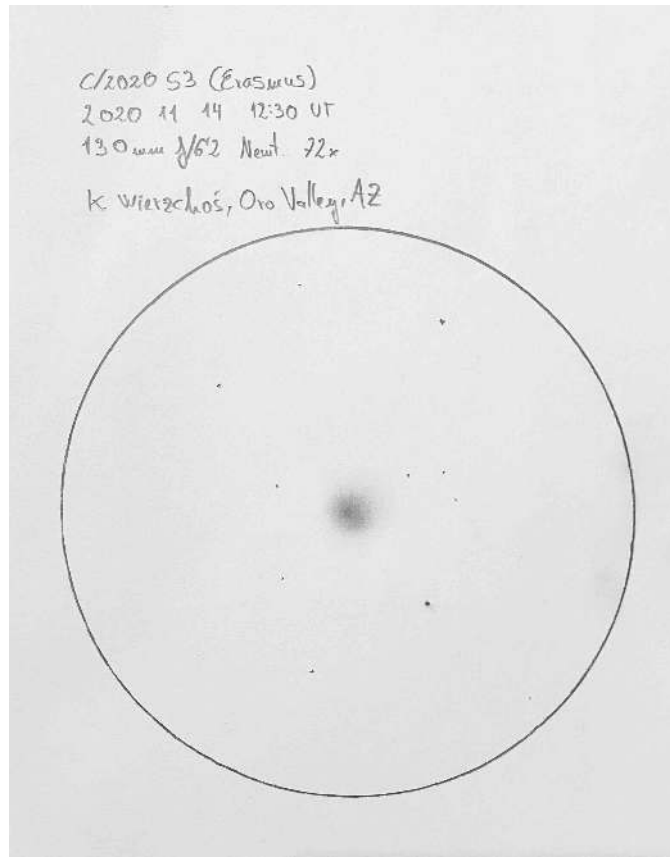


Figure 17 – Sketch of C/2020 S3 by Kacper Wierzchos on November 14.

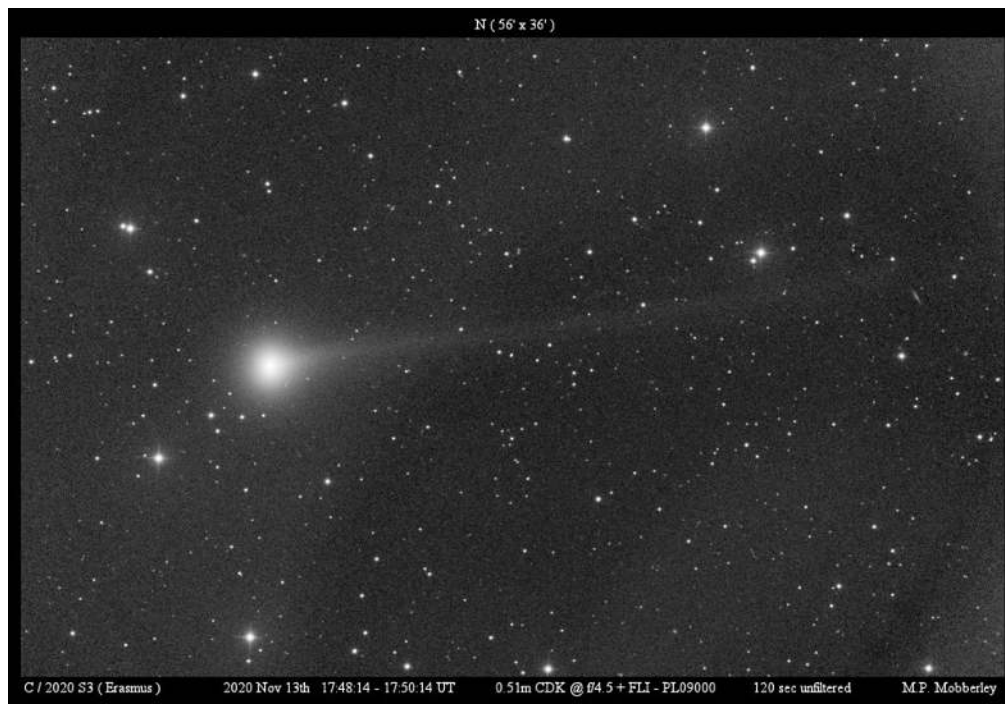


Figure 18 - Image of Erasmus taken on November 13 by Martin Moberley with an iTelescopes 0.51-m CDK and FLI PL09000 camera (exposure time 180 seconds, Luminance filter).

C/2020 M3 (ATLAS)

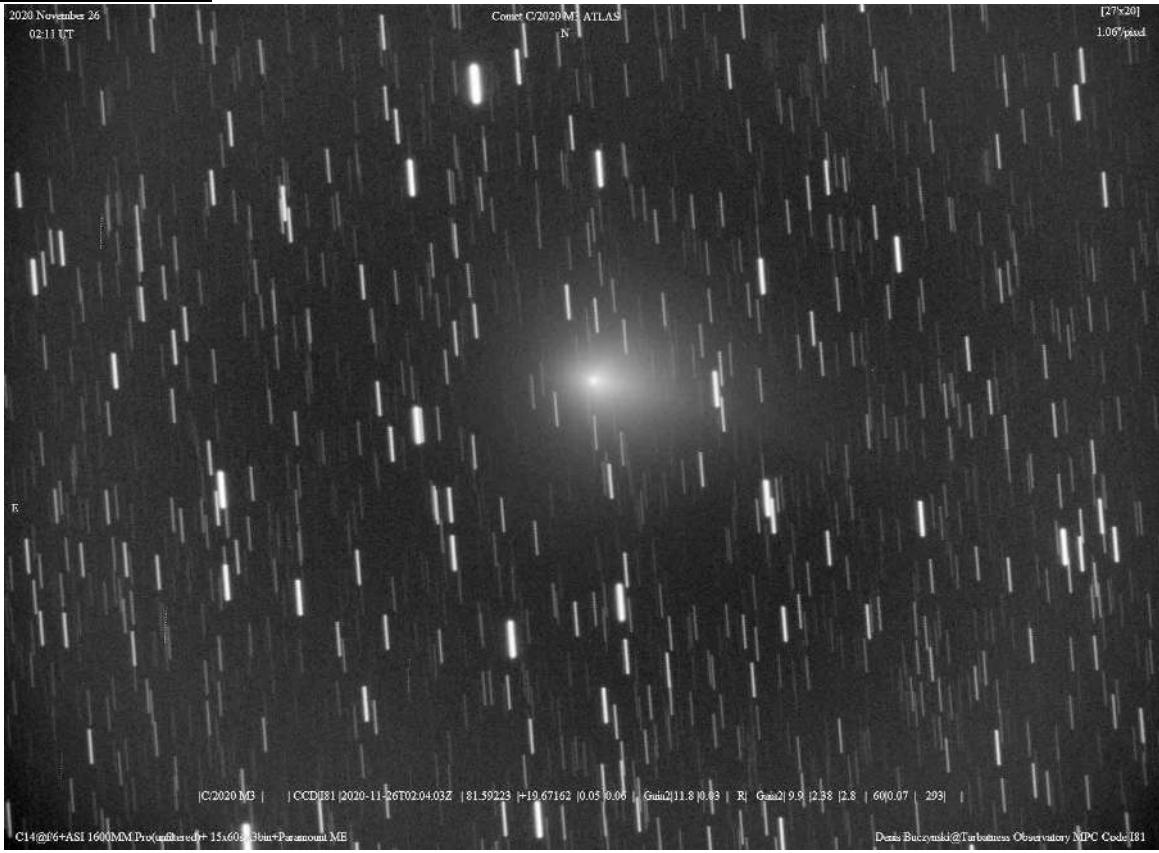
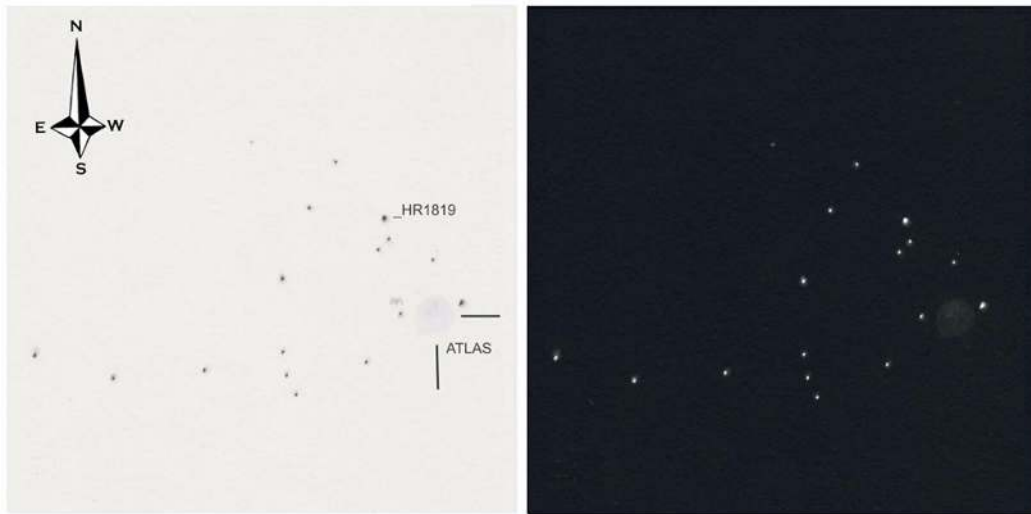


Figure 19 – Denis Buczynski used his C-14 + ZWO ASI 1600MM Pro to image C/2020 M3 on November 26.



C/2020 - M3 (ATLAS)
Bino Vixen 126 - 25x

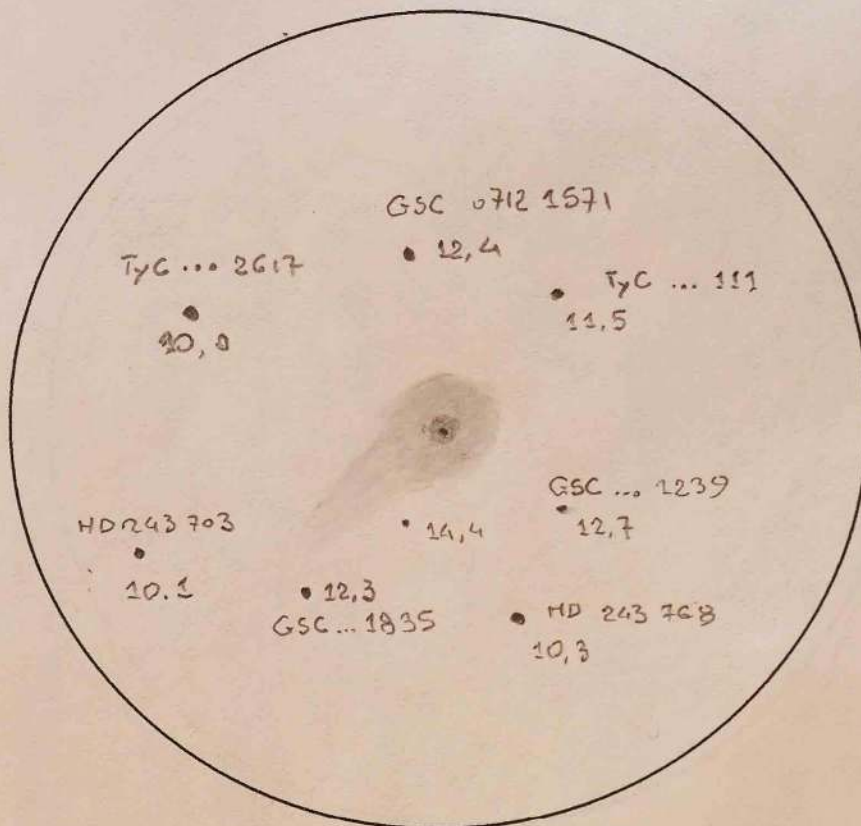
2020/11/21 - 4h30UTC
F.O.S.: 1.5°

Magn.: +8.9 - Tail : N/A - Coma: 7' - DC: 2

Aquarellia.com

Figure 20 – On November 21, Michel Deconinck made a sketch of C/2020 M3 that really highlighted its diffuse, poorly condensed appearance.

Nom de l'objet : C/ 2020 M3 (ATLAS)
 Dates : 21/11/2020 - Horaires : 22^h00 - 23^h00
 Lieux : NEFFES QCM :
 Instrument : 18" Oc : 13 mm X : 160
 7 mm X 300



Remarques : Mieux définie sans filtre "Comète"
 3 niveau de brillance. Ext. CD3 = 3 à 4 x le noyau
 Estimation : < TyC 0712 111 m = 11,5
 > GSC ... 1239 m = 12,7
 = à GSC ... 1571 m = 12,4

Figure 21 - Ludovic Perbet detected a tail in this sketch of C/2020 M3 made on November 21.



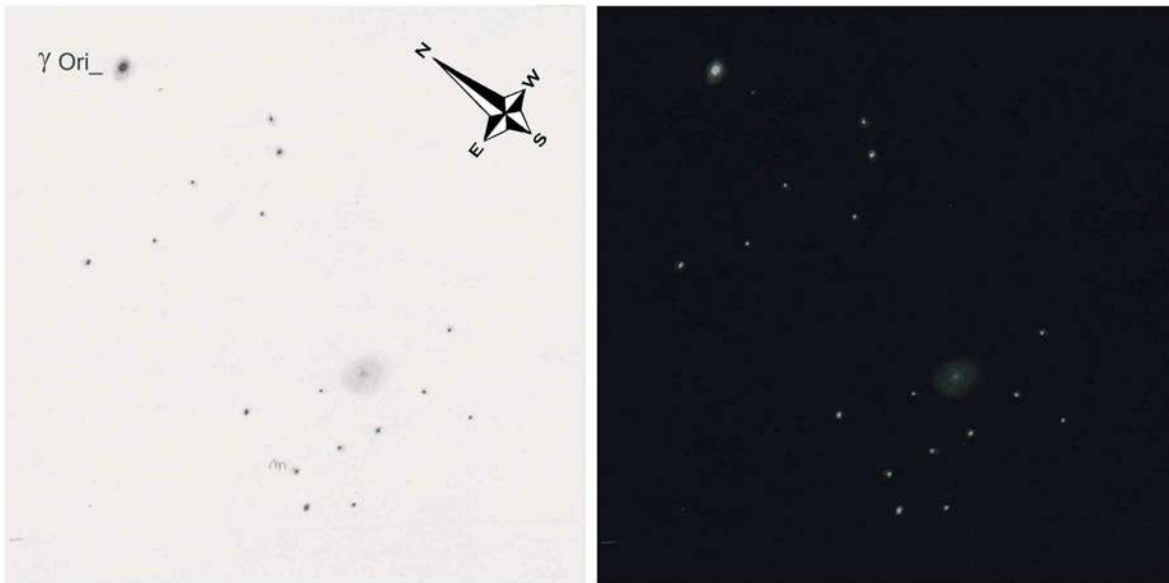
Figure 22 - Olivier Planchon (Bauduen Astronomical Observatory) imaged C/2020 M3 with a 24"/f/3.3 reflector on November 19. The image is consists of 18 x 15-second frames.



Figure 23 - Martin Mobberley also used the iTelescopes 0.51-m to make a color composite of C/2020 M3 on November 18.



Figure 24 - C/2020 M3 is almost swamped by the glow of the star Bellatrix on November 15.



C/2020 - M3 (ATLAS)
Mewlon 250 CRS - EP : 62x

2020/11/13 - 4h15 UTC
F.O.S.: 45'

Magn.: +8.6 - Tail : N/A - Coma : 2.75' - DC: 3/

Aquarellia.com

Figure 25 - Michel Deconinck used a Takahashi Mewlon 250 CRS at 62x to observe C/2020 M3 on November 13.

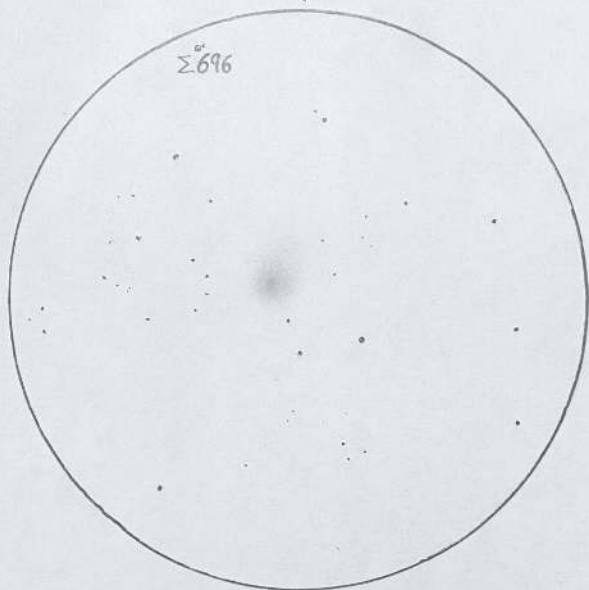


Figure 26 - This 20 minute exposure by Chris Schur with a 10" Orion f/3.9 astrograph captured C/2020 M3 and Bellatrix on November 14.



Figure 27 – A wide-angle southern hemisphere view of C/2020 M3 and a large fraction of Orion on November 11.

C/2020 H3 (ATLAS)
2020 11 13 6:20 UT
125mm f/7.8 APO 40x
K. Wierzbński, Oro Valley, AZ



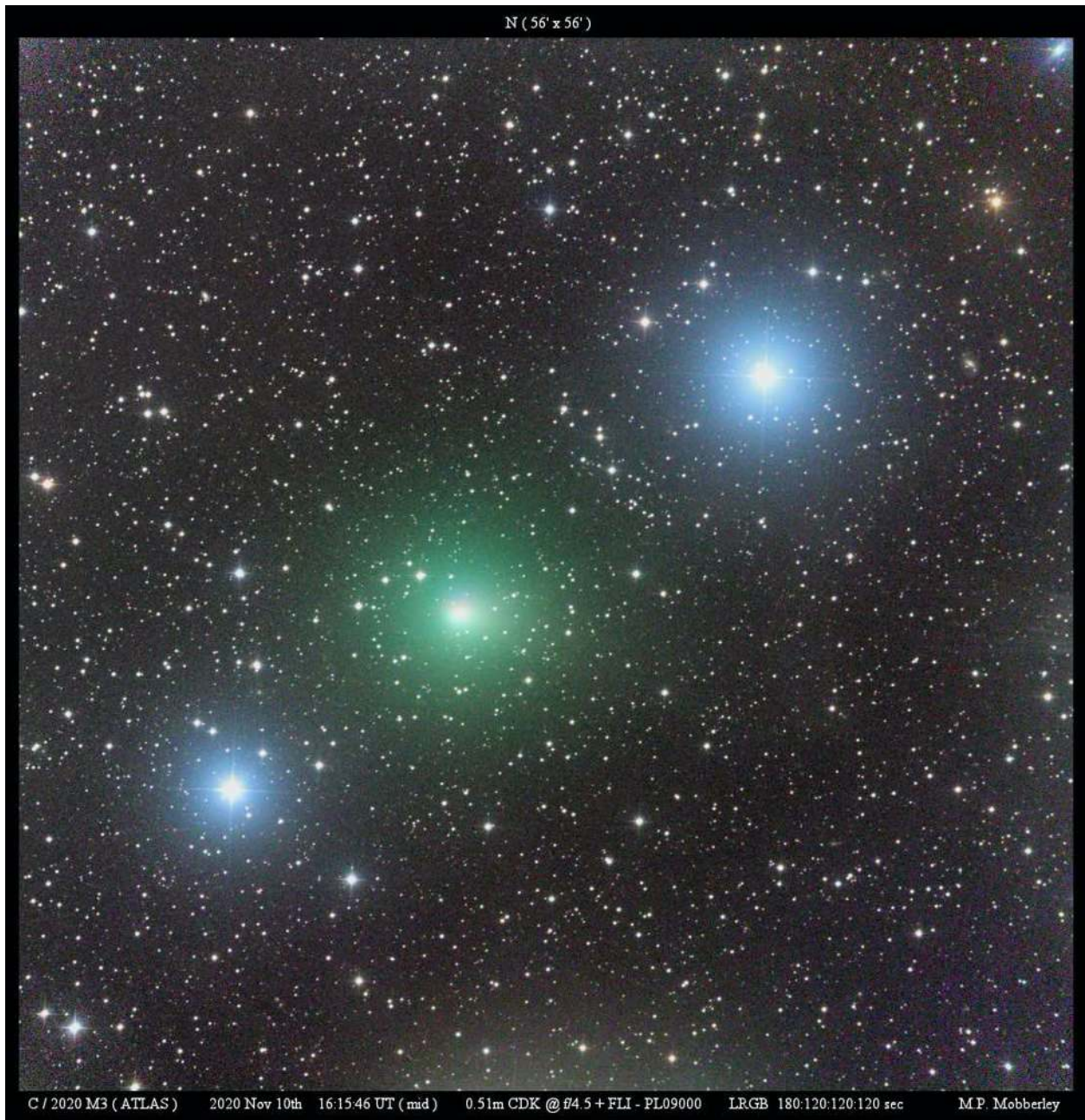


Figure 28 - C/2020 M3 threads the needle between magnitude 5.7 star HD 35299 and magnitude 6.9 double star HD 35548 in this image by Martin Mobberley.

C/2018 N2 (ASASSN)

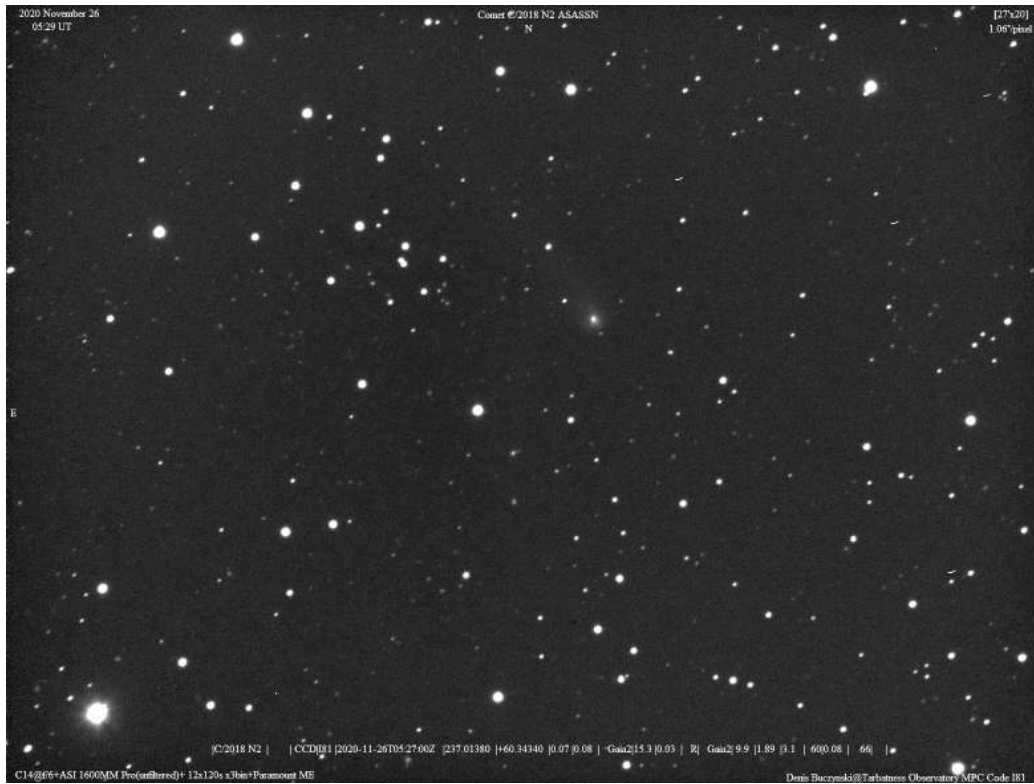


Figure 29 - C/2018 N2 (ASASSN) is now a year removed from its 2019 November 10 perihelion at 3.12 au. A 11th magnitude object at its brightest, Deniz Buczynski caught N2 at around 14th magnitude on November 26.

397P/Lemmon

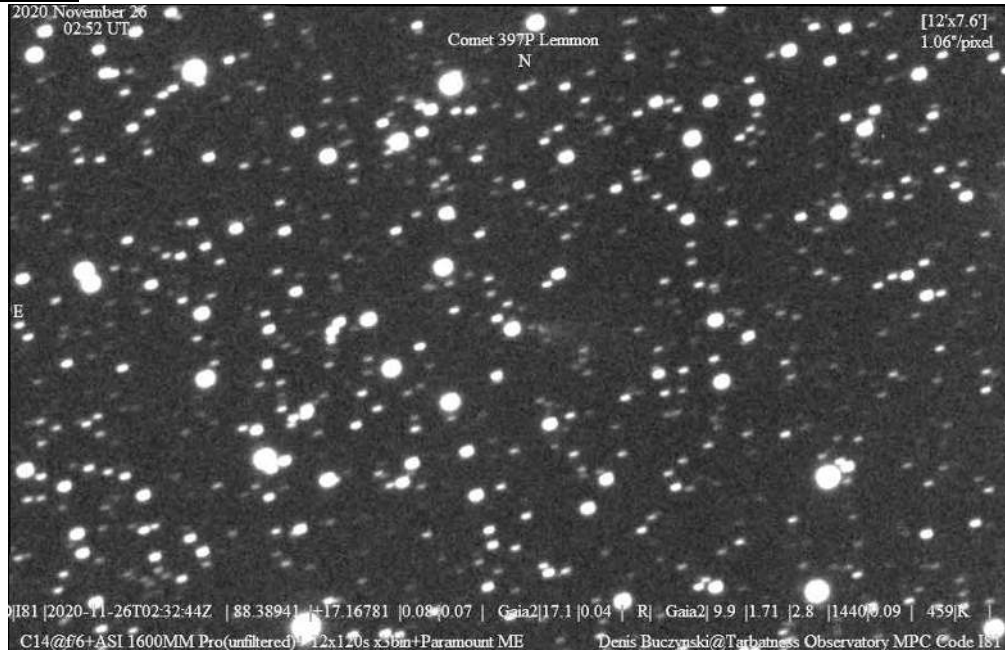


Figure 30 - Comet 397P/2013 TL117 (Lemmon) is making its 2nd observed return. Perihelion occurred back on 2020 June 19 at 2.28 au. The comet was around 19th magnitude when imaged by Deniz Buczynski on November 26 with a C-14 and ZWO ASI 1600MM Pro camera.

173P/Mueller

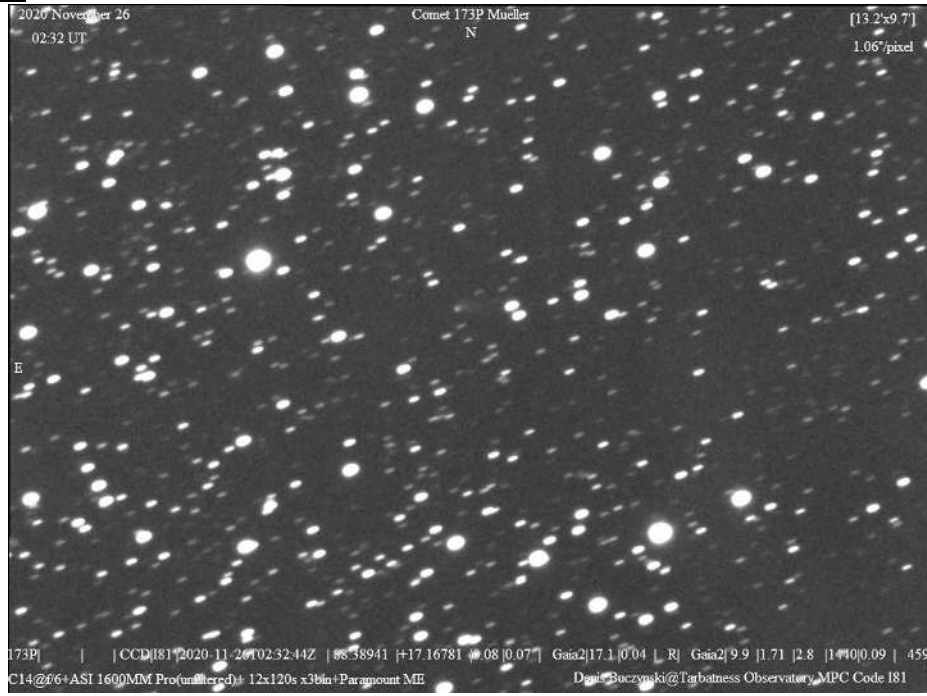
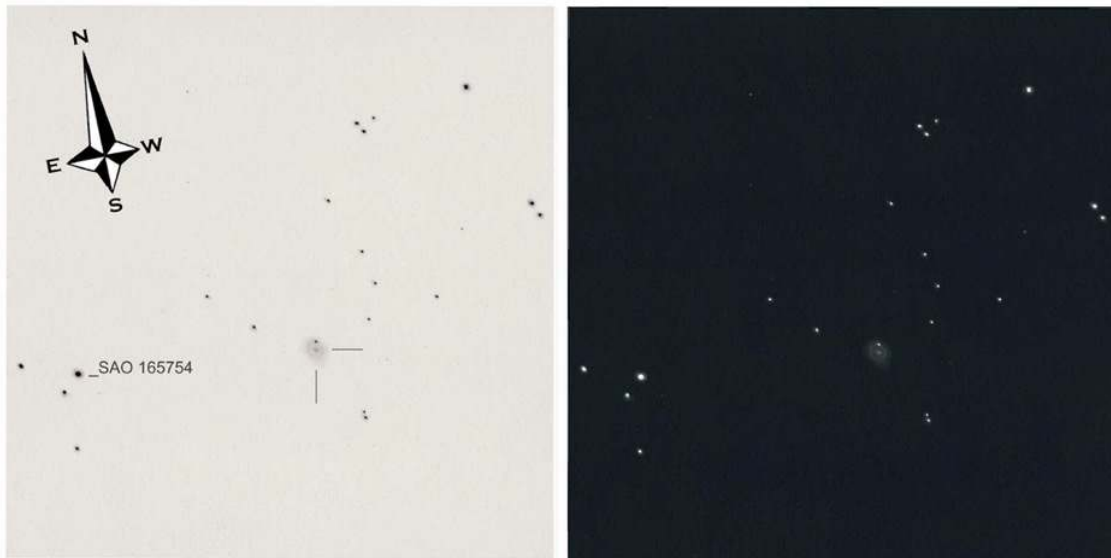


Figure 31 - Denis Buczynski caught an image of 173P/Mueller on November 26 with a C-14 SCT and ZWO ASI 1600MM Pro camera. 173P was discovered photographically by Jean Muller with the Palomar 1.2-m schmidt in 1994. This is 173P's 3rd observed apparition with perihelion on 2021 December 16 at 4.22 au. 173P was around 18th magnitude in this image. 173P has a very asymmetric lightcurve and peaks in brightness 1-2 years prior to perihelion.

156P/Russell-LINEAR



156P (Russell-LINEAR)
Mewlon 250mm f10 - 40mm EP:62x

2020/11/05 18h40 UTC
F.O.S.: 90'

Magn.: +11.0 - Tail : N/A - Coma : 3' - DC: 4

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Figure 32 - Michel Deconinck was able to detect 156P's small central condensation within its larger diffuse outer coma in this sketch from November 5.



Figure 33 – 156P photobombs the ARP 295 interacting galaxies in this Martin Moberley image from November 14.

84P/Giclas

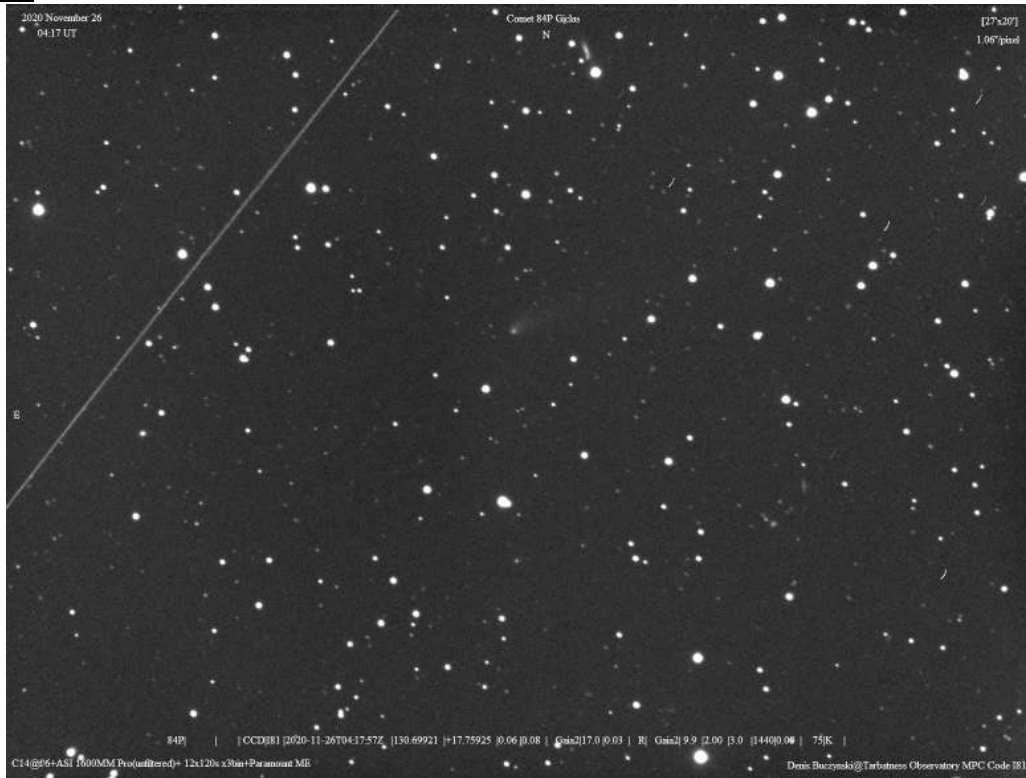


Figure 34 - Comet 84P/Giclas is a Jupiter-family comet on a 6.7-year orbit. Henry Giclas (Lowell Obs) discovered 84P on photographs taken in 1978. The comet was at perihelion on 2020 June 3 at 1.72 au. The comet was 16th magnitude last month.

29P/Schwassmann-Wachmann

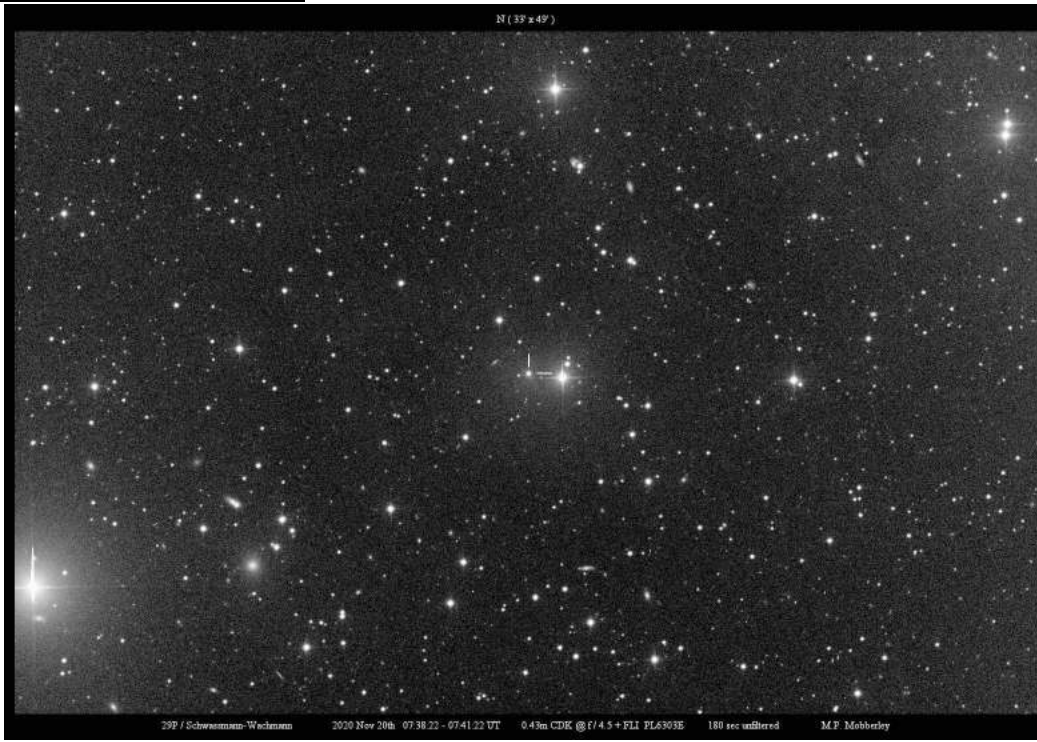


Figure 35 - This image of 29P by Martin Mobberley shows the comet only hours after the start of its most recent outburst. Note the larger diffuse coma, a remnant of an earlier outburst, surrounding the rapidly brightening inner coma.



Figure 36 - Sequence of images taken on November 21, 22 and 23 by Gianluca Masi of the expanding coma of 29P.