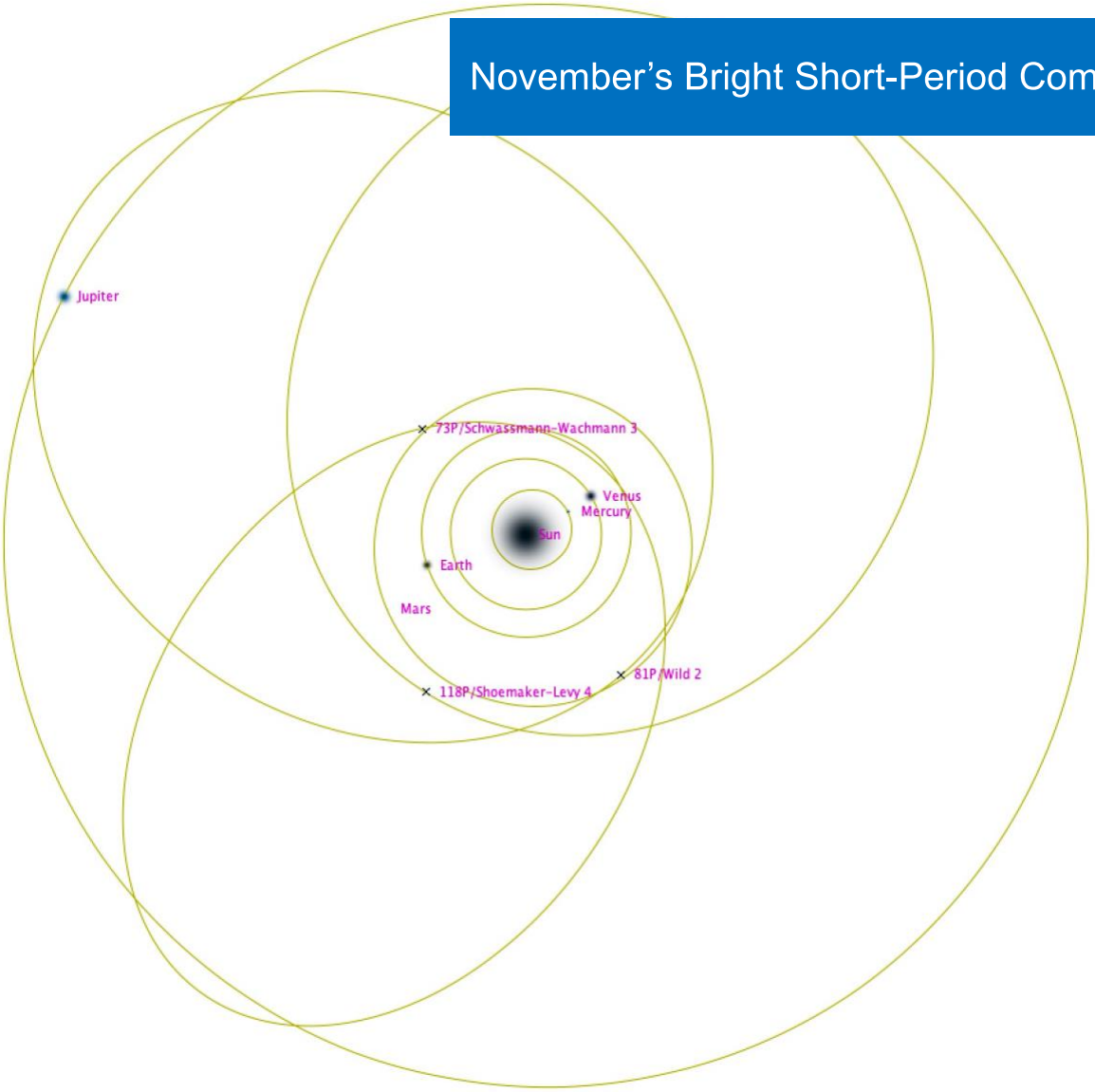
November 2022

ALPO Comet News

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



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On the Front Cover:

Three short-period comets are highlighted in this month's ALPO Comet News. The AstroGrav software (http://www.astrograv.co.uk/) was used to plot the orbits of comets 73P/Schwassmann-Wachmann, 81P/Wildm and 118P/Shoemaker-Levy. Comet and planet positions are valid for 2022 November 15.0 UT.

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/848824-alpo-comet-news-for-november-2022/) All are encouraged to join the discussion over at Cloudy Nights. The ALPO Comets 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 appreciated.

Please send your observations to the Comets Section at < comets@alpo-astronomy.org >, Coordinator Carl Hergenrother < carl.hergenrother@alpo-astronomy.org > and/or Acting Assistant Coordinator Michel Deconinck < michel.deconinck@alpo-astronomy.org >.

To learn more about the ALPO, please visit us @ http://www.alpo-astronomy.org.

Summary

November is sort of a transition month. For northern observers, we lost C/2017 K2 (PANSTARRS) and C/2022 P1 (NEOWISE). Even down south, K2 is becoming a more difficult object to observe as it approaches conjunction. And we await next year's bright comets, C/2020 V2 (ZTF) and C/2022 E3 (ZTF), which are just on the verge of being bright enough for most small aperture observers.

November sees the return of two comets that dropped out of last month's focus. 73P/Schwassmann-Wachmann was supposed to be faint at 14-15th magnitude but a recent outburst has it back at 10-11th magnitude. C/2019 L3 (ATLAS) has recently been re-observed and is still a 10th magnitude object.

Rounding out the comets expected to be brighter than 12th magnitude this month are two short-period comets, 81P/Wild and 118P/Shoemaker-Levy. Both will be around 11th magnitude.

Last month the ALPO Comets Section received 76 magnitude estimates and 33 images/sketches of comets C/2022 R2 (ATLAS), C/2022 P1 (NEOWISE), P/2022 L3 (ATLAS), C/2022 E3 (ZTF), C/2021 Y1 (ATLAS), C/2021 X1 (Maury-Attard), C/2021 T4 (Lemmon), C/2021 QM45 (PANSTARRS), C/2021 E3 (ZTF), C/2020 Y2 (ATLAS), C/2020 V2 (ZTF), C/2020 S4 (PANSTARRS), C/2020 K1 (PANSTARRS), C/2019 O3 (Palomar), C/2019 L3 (ATLAS), C/2017 K2 (PANSTARRS), 404P/Bressi, 327P/Van Ness, 244P/Scotti, 150P/LONEOS, 117P/Helin-Roman-Alu, 81P/Wild, 73P/Schwassmann-Wachmann, 29P/Schwassmann-Wachmann, 22P/Kopff, 12P/Pons-Brooks, and 2P/Encke. A big thanks to our recent contributors: Dan Bartlett, Denis Buczynski, J. J. Gonzalez, Jose Guilherme de Souza Aguiar, Christian Harder, Carl Hergenrother, Eliot Herman, John Maikner, Martin Mobberley, Uwe Pilz, Tenho Tuomi, and Chris Wyatt.

Request for Observations

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 >.

Photometric Corrections to Magnitude Measurements

We try to include up-to-date lightcurves for the comets discussed in these reports as well as applying aperture and personal corrections to the visual observations and personal just corrections to digital observations. All magnitude estimates are affected by many factors including instrumental (aperture, focal length, magnification, type of optics), environmental (sky brightness due to moonlight, light pollution, twilight, aurora activity, zodiacal light, etc.), cometary (degree of condensation, coma color, strength and type of gas emission lines, coma-tail interface) and personal (sensitivity to different wavelengths, personal technique, observational biases). The first correction used here corrects for differences in aperture [Charles S. Morris, On Aperture Corrections for Comet Magnitude Estimates. Publ Astron Soc Pac 85, 470, 1973]. Visual observations are corrected to a standard aperture of 6.78 cm by 0.019 magnitudes per centimeter for refractors and 0.066 magnitudes per centimeter for reflectors. After applying the aperture correction and if a sufficient number of visual observations are submitted for a particular comet, we also determine personal corrections for each observer for each individual comet. For digital observations only a personal correction is applied. A single observer submitting both visual and digital magnitude measurements may also have separate corrections for each observing method. If the magnitudes shown in the text don't match those plotted in the lightcurves, it is because of the application of these corrections.

Acknowledgements

In addition to observations submitted directly to the ALPO, we occasionally use data from other sources to augment our analysis. We would like to acknowledge with thanks observations submitted directly to the ALPO as well as those originally submitted to the International Comet Quarterly, Minor Planet Center, and COBS Comet Observation Database. In particular we have been using observations submitted to the COBS site by Thomas Lehmann for our analyzes so we would like to thank Thomas for his COBS observations. We would also like to thank the Jet Propulsion Laboratory for making available their Small-Body Browser and Orbit Visualizer and Seiichi Yoshida for his Comets for Windows programs that are used to produce the lightcurves and orbit diagrams in these pages. And last but not least, we'd like to thank Syuichi Nakano and the Minor Planet Center for their comet orbit elements, the asteroid surveys and dedicated comet hunters for their discoveries, and all of the observers who volunteer their time to adding to our knowledge of these amazing objects.

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

Clear skies!
- Carl Hergenrother

Comets Calendar

Lunar Phases

Nov 08 - Full Moon
Nov 16 - Last Quarter Moon
Nov 23 - New Moon
Nov 30 - First Quarter Moon

Comets at Perihelion

Nov 16 - 204P/LINEAR-NEAT at perihelion (q = 1.83 au, 6.8-yr period, V ~ 17, discovered in 2001, observed at 4 returns, 2-3 mag outburst in 2002)
Nov 17 - 244P/Scotti at perihelion (q = 3.92 au, V ~ 17, 10.8-yr period, discovered in 2000, 2022 is 3rd observed return)
Nov 24 - 118P/Shoemaker-Levy at perihelion (q = 1.83 au, 6.1-yr period, V ~ 12, discovered in 1990, 2022 is its 6th observed return, ~2 magnitude outburst in 2004, more below)
Nov 27 - P/2022 S2 (Christensen) at perihelion (q = 2.80 au, 15.9-yr period, V ~ 19-20, discovered on 2022 September 27 at 21st magnitude)
Nov 28 - C/2022 P1 (NEOWISE) at perihelion (q = 1.60 au, Halley-type comet, 79.4-yr period, more details below)
Nov 29 - P/2010 TO20 (LINEAR-Grauer) at perihelion (q = 5.51 au, 26.9-yr period, V ~ ???, discovered in 2010, 2022 is the next return after discovery, during the discovery return it didn't reach its brightest till 2-3 years after perihelion so it may not be very active at perihelion)
Nov 30 - 129P/Shoemaker-Levy at perihelion (q = 3.92 au, 8.9-yr period, V ~ 19, discovered in 1991, 2022 is its 5th observed return, Perihelion distance increased from 2.81 au in 2005 to 3.91 au in 2914, major 5+ mag outburst at aphelion in 2018)

Photo Opportunities

Nov 02/03 - C/2019 L3 (ATLAS) passes <30' from 13th mag galaxies NGC 3045 & 3052
Nov 15/16 - C/2017 K2 (PANSTARRS) passes through region of nebulosity (NGC 6188 – Dragons of Ara)
Nov 17 - 81P/Wild passes close to 11th mag galaxy NGC 4454
Nov 21/22 - C/2019 L3 (ATLAS) passes <10' from 13th mag galaxy NGC 3081
Nov 30 - 81P/Wild passes 10' from 12th mag galaxy NGC 4941

Recent Magnitudes Contributed to the ALPO Comets Section

Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia	COMA DC	TAIL LENG	TAIL PA	ICQ CODE	Observer Name
C/2022 P1 (NEOWISE)												
2022P1	2022 10 27.82	S 10.6	TI	25.2	L	4 145	2.6	1			ICQ XX	HAR11 Christian Harder
2022P1	2022 10 26.82	S 10.6	TI	25.2	L	4 145	2.8	1			ICQ XX	HAR11 Christian Harder
2022P1	2022 10 26.94	M 9.9	TK	30	L	5 109	5	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 25.92	M 9.9	TK	30	L	5 109	4	4/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 24.94	M 9.8	TK	30	L	5 89	5	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 23.93	M 9.9	TK	30	L	5 89	6	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 23.82	S 12.5	TI	25.2	L	4 145	0.8	4			ICQ XX	HAR11 Christian Harder
2022P1	2022 10 22.94	M 9.9	TK	30	L	5 89	5	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 20.91	M 9.8	TK	30	L	5 89	5	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 19.99	M 9.7	TK	30	L	5 89	5	3			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 15.42	xM 9.9	AQ	40.0	L	4 59	7.3	3			ICQ XX	WYA Christopher Wyatt
2022P1	2022 10 14.84	S 9.3	TK	20.3	T	10 77	8	2/			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022P1	2022 10 14.46	xM 10.2	AQ	40.0	L	4 59	8	3/			ICQ XX	WYA Christopher Wyatt
2022P1	2022 10 04.00	S 8.8	TK	20.3	T	10 100	5	2/			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022P1	2022 10 02.02	M 10.2	TK	30	L	5 89	4	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022P1	2022 10 01.04	M 10.3	TK	30	L	5 89	5	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
C/2022 E3 (ZTF)												
2022E3	2022 10 28.81	S 11.0	TI	25.2	L	4 145	0.8	4	2.5	m 65	ICQ XX	HAR11 Christian Harder
2022E3	2022 10 27.82	S 10.4	TI	25.2	L	4 145	1.2	s4	4.5	m 70	ICQ XX	HAR11 Christian Harder
2022E3	2022 10 26.83	S 10.5	TI	25.2	L	4 145	1.3	4	5	m 70	ICQ XX	HAR11 Christian Harder
2022E3	2022 10 23.00	S 10.8	TI	25.2	L	4 113	1	4/	2.5	m 70	ICQ XX	HAR11 Christian Harder
2022E3	2022 10 22.73	S 10.6	TK	32.0	L	5 80	0.6	5/	0.07	74	ICQ XX	PIL01 Uwe Pilz
2022E3	2022 10 20.83	S 10.5	TI	25.2	L	4 113	1.3	4/	1.9	m 70	ICQ XX	HAR11 Christian Harder
2022E3	2022 10 19.82	S 10.3	TI	25.2	L	4 113	1.35	4/	1.8	m 70	ICQ XX	HAR11 Christian Harder
C/2021 X1 (Maury-Attard)												
2021X1	2022 10 29.64	xM 14.5	AQ	40.0	L	4 261	0.4	3/			ICQ XX	WYA Christopher Wyatt
C/2021 T4 (Lemmon)												
2021T4	2022 10 29.66	xM 15.3	AQ	40.0	L	4 261	0.5	4/			ICQ XX	WYA Christopher Wyatt
C/2021 E3 (ZTF)												
2021E3	2022 10 29.70	xM 14.6	AQ	40.0	L	4 182	0.5	4/			ICQ XX	WYA Christopher Wyatt
2021E3	2022 10 28.69	xM 14.4	AQ	40.0	L	4 261	0.6	3/			ICQ XX	WYA Christopher Wyatt
C/2020 Y2 (ATLAS)												
2020Y2	2022 10 29.69	xM 14.8	AQ	40.0	L	4 261	0.7	4/			ICQ XX	WYA Christopher Wyatt
2020Y2	2022 10 28.67	xM 14.8	AQ	40.0	L	4 261	0.6	6			ICQ XX	WYA Christopher Wyatt
C/2020 V2 (ZTF)												
2020V2	2022 11 01.91	S 10.7	TI	29.8	L	4 132	1.6	4/	2	m140	ICQ XX	HAR11 Christian Harder
2020V2	2022 10 27.77	S 12.1	HS	32.0	L	5 144					ICQ XX	PIL01 Uwe Pilz
2020V2	2022 10 26.21	S 11.2	TI	25.2	L	4 113	1.8	s4			ICQ XX	HAR11 Christian Harder
2020V2	2022 10 22.74	S 11.4	TK	32.0	L	5 80	1	1/			ICQ XX	PIL01 Uwe Pilz
2020V2	2022 10 04.17	S 10.6	TK	20.3	T	10 77	6	3/			ICQ XX	GON05 Juan Jose Gonzalez Suarez
C/2020 K1 (PANSTARRS)												
2020K1	2022 10 15.39	xM 13.8	AQ	40.0	L	4 182	0.8	5/			ICQ XX	WYA Christopher Wyatt
2020K1	2022 10 14.82	S 11.8	TK	20.3	T	10 100	2.5	2/			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2020K1	2022 10 14.42	xM 13.5	AQ	40.0	L	4 182	0.8	5/			ICQ XX	WYA Christopher Wyatt
C/2019 L3 (ATLAS)												
2019L3	2022 10 29.71	xM 11.3	AQ	40.0	L	4 59	2	6			ICQ XX	WYA Christopher Wyatt
2019L3	2022 10 28.70	xM 11.1	AQ	40.0	L	4 59	2.5	6			ICQ XX	WYA Christopher Wyatt
C/2017 K2 (PANSTARRS)												
2017K2	2022 10 26.90	M 8.8	TK	10	B	25	3	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 25.89	M 8.7	TK	10	B	25	2	3			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 24.90	M 8.7	TK	10	B	25	2	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 23.89	M 8.7	TK	10	B	25	2	3			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 22.90	M 8.7	TK	10	B	25	3	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 20.90	M 8.6	TK	10	B	25	3	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 19.89	M 8.7	TK	10	B	25	3	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 15.39	xM 8.6	TK	40.0	L	4 59	3	6	10.5	m 36	ICQ XX	WYA Christopher Wyatt
2017K2	2022 10 14.90	M 8.8	TK	10	B	25	2	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 14.42	xM 9.2	TK	40.0	L	4 59	3.9	6	13.5	m 49	ICQ XX	WYA Christopher Wyatt
2017K2	2022 10 04.89	M 8.7	TK	10	B	25	3	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 02.90	M 8.6	TK	10	B	25	3	3			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2017K2	2022 10 01.89	M 8.6	TK	10	B	25	3	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
404P/Bressi												
404	2022 10 19.05	C 19.4	BG	155.0	R	7 B400					ICQ XX	MAIab John Maikner
327P/Van Ness												
327	2022 10 14.49	xM 15.4	AQ	40.0	L	4 261	0.4	5/			ICQ XX	WYA Christopher Wyatt
150P/LONEOS												

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150        2022 10 19.13  C 20.7 BG155.0R 7C960                    ICQ XX MAIab John Maikner
117P/Helin-Roman-Alu
117        2022 10 14.45 xM 14.7 AQ 40.0L 4 261   0.4  5/          ICQ XX WYA   Christopher Wyatt
81P/Wild
 81        2022 10 20.17  S 11.3 TK 32.0L 5 144        6   0.03 295        PIL01 Uwe Pilz
73P/Schwassmann-Wachmann
 73        2022 10 27.81  S 10.9 TI 25.2L 4 145   1.6  4   1.5 m 70 ICQ XX HAR11 Christian Harder
 73        2022 10 26.93  M 11.0 TK 30  L 5 109   1    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 25.90  M 11.0 TK 30  L 5 109   1    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 25.81  S 11.5 TI 25.2L 4 145   1.4  3           ICQ XX HAR11 Christian Harder
 73        2022 10 24.92  M 10.9 TK 30  L 5  89   1    4/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 23.92  M 10.7 TK 30  L 5  89   2    5           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 23.81  S 10.3 TI 25.2L 4 145   1.8  3/  1.8 m 80 ICQ XX HAR11 Christian Harder
 73        2022 10 22.91  M 10.6 TK 30  L 5  89   3    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 20.92  M 10.5 TK 30  L 5  89   3    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 19.95  M 10.4 TK 27  L 5  55   2    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 19.83  S 10.9 TI 25.2L 4 145   1    2/          ICQ XX HAR11 Christian Harder
 73        2022 10 15.40 xM 10.4 AQ 40.0L 4  59   1.2  5/  4   m 93 ICQ XX WYA   Christopher Wyatt
 73        2022 10 14.80  S 10.7 TK 20.3T10  77   2    3/          ICQ XX GON05 Juan Jose Gonzalez Suarez
 73        2022 10 14.43 xM 10.9 AQ 40.0L 4  59   1.6  5   4   m 92 ICQ XX WYA   Christopher Wyatt
29P/Schwassmann-Wachmann
 29        2022 10 29.72 xI 15.9 AQ 40.0L 4 261                    ICQ XX WYA   Christopher Wyatt
 29        2022 10 28.68 xI 16.0 AQ 40.0L 4 261                    ICQ XX WYA   Christopher Wyatt
22P/Kopff
 22        2022 10 14.48 xS 14.5 AQ 40.0L 4 108   1.7  2/          ICQ XX WYA   Christopher Wyatt
12P/Pons-Brooks
 12        2022 09 01.19  C 21.1 BG 30.5H 4C600                   ICQ XX MAIab John Maikner
2P/Encke
  2        2022 10 19.04  C 19.8 BG155.0R 7A800                   ICQ XX MAIab John Maikner
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New Discoveries, Recoveries and Other Comets News

Recent Periodic Comet Numberings

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From WGSBN Bulletin 2, #11 & 13
448P/2015 X1  = P/2022 Q1   = P/2008 T13 (PANSTARRS)
447P/2021 R9  = P/2008 T14 (Sheppard-Tholen)
446P/2012 O3  = P/2022 G2 (McNaught)
445P/2014 R5  = P/1998 W9   = P/2006 S14 = P/2022 L5 (Lemmon-PANSTARRS)
444P/2016 PM1 = P/2010 LK36 = P/2016 MD  = P/2022 C4 (WISE-PANSTARRS)
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New Discoveries and Recoveries

C/2022 U2 (ATLAS) - – The "Asteroid Terrestrial-Impact Last Alert System" (ATLAS) search program found this object at 19th magnitude on 2022 October 25 at a far northern declination of +69 deg. C/2022 U2 (ATLAS) is a long-period comet and possible dynamically old with a ~1000-year orbital period. With perihelion on 2023 January 14 at 1.33 au and closest approach to Earth on January 28 at 0.56 au, a conservative brightening rate only brings the comet up to 15th magnitude. But since it is dynamically old, it may brighten at a much faster rate so this is one to keep an eye on over the next month or two. [CBET 5187, MPEC 2022-V66]

C/2022 U1 (Leonard) – Greg Leonard of the Catalina Sky Survey found C/2022 U1 at 19-20th magnitude in images taken on 2022 October 20 with the Mount Lemmon 1.5-m reflector. U1 is a distant comet located around 6 au from the Sun at discovery. Perihelion will be a little closer at 4.20 au on 2024 March 25. It should peak at 17th magnitude in late 2023 and again in mid-2024. [CBET 5183, MPEC 2022-U343 and 2022-U349]

C/2022 S5 (PANSTARRS) – C/2022 S5 is a Halley-type comet with an orbital period of 92 years. It was discovered on 2022 September 24 at 19th magnitude with the Panoramic Survey Telescope and Rapid Response System Pan-STARRS2 1.8-m Ritchey-Chretien reflector at Haleakala, Hawaii. Pre-discovery observations from 2022 August 12 by Pan-STARRS and September 18 by Catalina have also been identified. With perihelion this month on November 27 at 2.18 au, C/2022 S5 has likely peaked in brightness. [CBET 5185, MPEC 2022-V02]

C/2022 S4 (Lemmon) – The Catalina Sky Survey used the Mount Lemmon 1.5-m to find this new 20th magnitude comet on 2022 September 19. C/2022 S4 is almost 2 years out from a 2024 July 18 perihelion at 2.77 au. [CBET 5181, MPEC 2022-U170]

C/2022 S3 (PANSTARRS) – On 2022 September 19 and 25, Pan-STARRS spotted a new 20-21st magnitude comet. C/2022 S3 has a perihelion close to the Sun at 0.84 au on 2023 January 21 and will pass 0.60 au from Earth on 2023 March 8. At the time of discovery, the comet appeared to be intrinsically faint. But there is some good news. One, the most recent orbit suggests it is a dynamically old long-period comet which are known to brighten at a faster than normal rate. Two, observations are confirming a rapid brightening trend with the comet already around 17th magnitude as of late October.

How bright will C/2022 S3 get? As of this writing, that is a big question mark. Being intrinsically faint, it may disintegrate as it nears perihelion, though this is less likely for dynamically old comets. As a rapidly brightening comet, it could become a visual object. So, time will tell. What we do know is it will primarily be a southern hemisphere object. Observers at northern mid-latitudes will lose sight of it by mid-December when it may still

be too faint for visual observers though it will reappear by March. Observers at southern mid-latitudes will have an uninterrupted view of the comet through perihelion and beyond. [CBET 5179, MPEC 2022-U122]

P/2022 S2 = P/2007 A2 (Christensen) - Erwin Schwab recovered comet P/2007 A2 on CCD images taken on 2022 September 27 and October 1 remotely with the 0.8-m f/3 Schmidt reflector at Calar Alto, Spain. The comet was 20th magnitude at recovery. P/2022 S2 was discovered by Catalina Sky Survey PI Eric Christensen on 2007 January 10 with the 1.5-m reflector on Mount Lemmon. During the discovery apparition, it peaked at 18-19th magnitude. With a 15.9-year orbital period, the comet is making its first predicted return since discovery with perihelion on 2022 November 27 at 2.80 au. It is expected to brighten to 19th magnitude. [CBET 5177]

P/2022 S1 (PANSTARRS) – Pan-STARRS discovered this 20th magnitude short-period comet on 2022 September 14 and 23 with their 1.8-m on Haleakala, Maui. P/2022 S1 has a 16.2-year orbital period and was at perihelion on 2022 August 19 at 3.15 au. It is likely near its peak brightness. [CBET 5176, MPEC 2022-T89]

C/2022 R6 (PANSTARRS) – Like the previous comet, C/2022 R6 (PANSTARRS) was also found at 20th magnitude, on September 14, and with the 1.8-m on Haleakala. Unlike P/2022 S1, R6 is a long-period comet with a large perihelion distance of 6.58 au on 2025 August 26. It should reach 17th magnitude in 2025. [CBET 5184, MPEC 2022-V1]

P/2022 R5 (PANSTARRS) – Continuing the theme of new PANSTARRS comets is P/2022 R5. The Pan-STARRS2 1.8-m telescope on Haleakala, Maui first spotted R5 on 2022 September 8 at 21st magnitude. With a perihelion of 2.47 au (on 2022 May 28) and aphelion of only 3.67 au, this appears to be an example of a Main-Belt Comet or Activated Asteroid. Hopefully future observations will establish if its activity is cometary in nature or due to a recent impact or rotational disruption. [CBET 5175, MPEC 2022-T88].

P/2022 R4 (PANSTARRS) – And one more… The Pan-STARRS2 1.8-m telescope on Haleakala, Maui was also used to find this comet on 2022 September 2 at 21st magnitude. R4 has an orbital period of 7.5 years and perihelion on 2022 July 10 at 1.96 au. It is likely near its peak brightness. [CBET 5174, MPEC 2022-T87]

C/2022 QE78 (ATLAS) –ATLAS found this object at 19th magnitude on 2022 August 27. Though originally announced as an asteroid, C/2022 QE78 was quickly identified as a comet with coma and tail. The comet is currently around 9 au from the Sun and won't arrive at perihelion until 2025 September 11 at 5.47 au. [CBET 5182, MPEC 2022-U218]

P/2022 Q3 = P/2004 A1 (LONEOS) = Charles Schambeau used the 8.1-m Gemini North Telescope on Mauna Kea to recover P/LONEOS at a faint 24th magnitude. This comet straddles the border between Jupiter-family comet and Centaur. Discovered in 2004, it was a 17-18th magnitude object for much of 2004 through 2006. With a perihelion of 5.31 au and small eccentricity of 0.22, LONEOS was well observed over the course of 4 years. Now returning to its next perihelion on 2027 July 24, it should peak at around 17-18th magnitude for a few years around 2027. With an orbit that keeps it in the vicinity of Jupiter, its orbit has rapidly evolved from a solid Centaur orbit with perihelion at 9.8 au and orbital period of 43 years in 1951 to a 22.2-year period and perihelion of 5.46 au in 2004, to a 17.6-year period and perihelion of 5.31 au this year, and a 16.1-year period and perihelion of 5.30 au in 2043. [CBET 5178, MPEC 2022-T106]

P/2022 B5 = P/2003 CC22 (Sheppard-Jewitt) – Mike S. P. Kelley, James Bauer, Quanzhi Ye, and Dennis Bodewits reported that asteroid 2003 CC22 appeared cometary in images taken on behalf of the Zwicky Transient Facility (ZTF) partnership with the 1.2-m Samuel Oschin Schmidt telescope at Palomar Observatory on 2022 Sept. 17 through 27 UT. The object was originally discovered at 21-22nd magnitude by Scott Sheppard and David Jewitt on images taken on 2003 Mar. 2 with the 3.6-m Canada-France-Hawaii Telescope at Mauna Kea in a search for new Jupiter satellites and, according to CBET 5186, was originally thought to be a satellite

of Jupiter. P/Sheppard-Jewitt is on a 19.7-year orbit with a perihelion on 2023 April 25 at 4.18 au. The 2022 observations placed it at 18th magnitude. It may peak a little brighter at 17th magnitude at opposition in February 2023. [CBET 5186, MPEC 2022-V36]

P/2020 S6 = P/1987 A2 = P/2013 Y3 (Leonard) – Maik Meyer suggested that P/2020 S6 (Leonard) has been observed on 1987 January 5 at 17th magnitude by Malcolm Hartley as a trailed object on a single photographic plate taken with the 1.2-m Schmidt at Siding Spring in Australia. The object was unconfirmed by officially announced as X/1987 A2. Sam Deen used the linkage with the 1987 observation to find additional observations taken as part of Brett Gladman's "Outer Solar System Origins Survey" with the 3.6-m Canada-France-Hawaii Telescope at Mauna Kea on 2013 December 29 and 2014 January 3. The comet was 22nd magnitude on both dates. The comet will next be at perihelion on 2027 September 25. [IAUC 4355, CBET 4868, 5173]

Comets Brighter Than Magnitude 10

C/2017 K2 (PANSTARRS)

Discovered 2017 May 21 by the Pan-STARRS survey with the Pan-STARRS1 1.8-m on Haleakala
Dynamically ??? long-period comet

Orbit (from Minor Planet Center, MPEC 2022-U349)

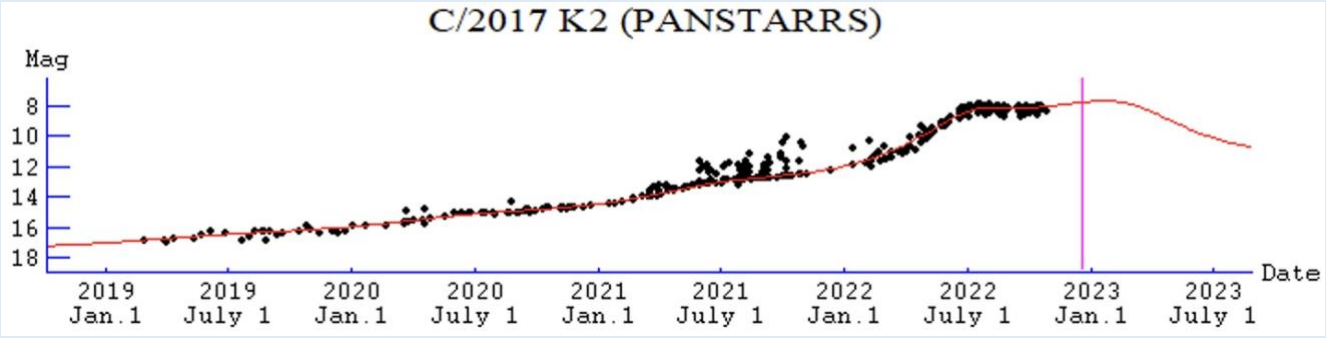
```
    C/2017 K2 (PANSTARRS)
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Dec. 19.68354 TT                                  Rudenko
q   1.7969118           (2000.0)            P               Q
z  -0.0004417      Peri.  236.19771     +0.01819614     +0.04924663
 +/-0.0000001      Node    88.23507     -0.18093987     +0.98245713
e   1.0007937      Incl.   87.56203     -0.98332582     -0.17986873
From 10980 observations 2015 Nov. 23-2022 Sept. 27, mean residual 0".5.
1/a(orig) = +0.000059 AU**-1, 1/a(fut) = +0.001150 AU**-1.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
C/2017 K2 (PANSTARRS)                                                  Max El
                                                                       (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag    40N  40S
2022-Nov-01  16 21   -42 45    1.902    2.581     38E    Nor    8.0      0   21
2022-Nov-06  16 27   -44 25    1.882    2.590     36E    Nor    8.0      0   18
2022-Nov-11  16 33   -46 06    1.864    2.595     34E    Nor    8.0      0   17
2022-Nov-16  16 40   -47 50    1.848    2.594     33E    Ara    8.0      0   15
2022-Nov-21  16 48   -49 35    1.834    2.589     32E    Ara    7.9      0   14
2022-Nov-26  16 57   -51 23    1.822    2.580     32E    Ara    7.9      0   13
2022-Dec-01  17 07   -53 13    1.813    2.566     32E    Ara    7.9      0   13
2022-Dec-06  17 19   -55 06    1.805    2.548     33E    Ara    7.9      0   13
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  4.1 + 5 log d + 6.7 log r [to T-425 days, where T = date of perihelion]
where "t" is date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au
```



Recent Magnitude Estimates submitted to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
              (UT)                      T         Dia  DC  LENG  PA
   2017K2  2022 10 26.90  M  8.8 TK 10  B    25   3    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 25.89  M  8.7 TK 10  B    25   2    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 24.90  M  8.7 TK 10  B    25   2    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 23.89  M  8.7 TK 10  B    25   2    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 22.90  M  8.7 TK 10  B    25   3    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 20.90  M  8.6 TK 10  B    25   3    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 19.89  M  8.7 TK 10  B    25   3    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 15.39 xM  8.6 TK 40.0L 4   59   3    6  10.5 m 36 ICQ XX WYA   Christopher Wyatt
   2017K2  2022 10 14.90  M  8.8 TK 10  B    25   2    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 14.42 xM  9.2 TK 40.0L 4   59   3.9  6  13.5 m 49 ICQ XX WYA   Christopher Wyatt
   2017K2  2022 10 04.89  M  8.7 TK 10  B    25   3    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 02.90  M  8.6 TK 10  B    25   3    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2017K2  2022 10 01.89  M  8.6 TK 10  B    25   3    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
```

C/2017 K2 (PANSTARRS) is no longer a northern hemisphere object. Even from the southern hemisphere it is slowly sinking in the evening sky as it approaches solar conjunction. Luckily it is far enough south that it will remain visible even at conjunction.

Jose Guilherme de Souza Aguiar and Chris Wyatt visually observed C/2017 K2 on 12 different nights in October. On most nights they found the comet around magnitude 8.6 to 8.8 in 25x100 binoculars and a 0.4-m f/4 reflector. Correcting for personal biases and aperture brought their estimates up to between magnitude 8.0 to 8.4. While the visual coma was measured between 2’ and 4’, Thomas Lehmann reported a much larger coma to COBS in the range of 12’ to 16’. Thomas also measured a tail that was routinely up to 0.5 to 0.77 deg in length. The visual tail was shorter at 10’ to 13’.

As mentioned before, C/2017 K2 is only visible from the southern hemisphere this month. It should start to slowly brighten again from around magnitude 8.0 to 7.9 as its moves through the evening constellations of Norma and Ara. The brightening is due to next month’s perihelion (T = 2022 December 19 @ 1.80 au) and the fact that the comet is once again moving closer to Earth.

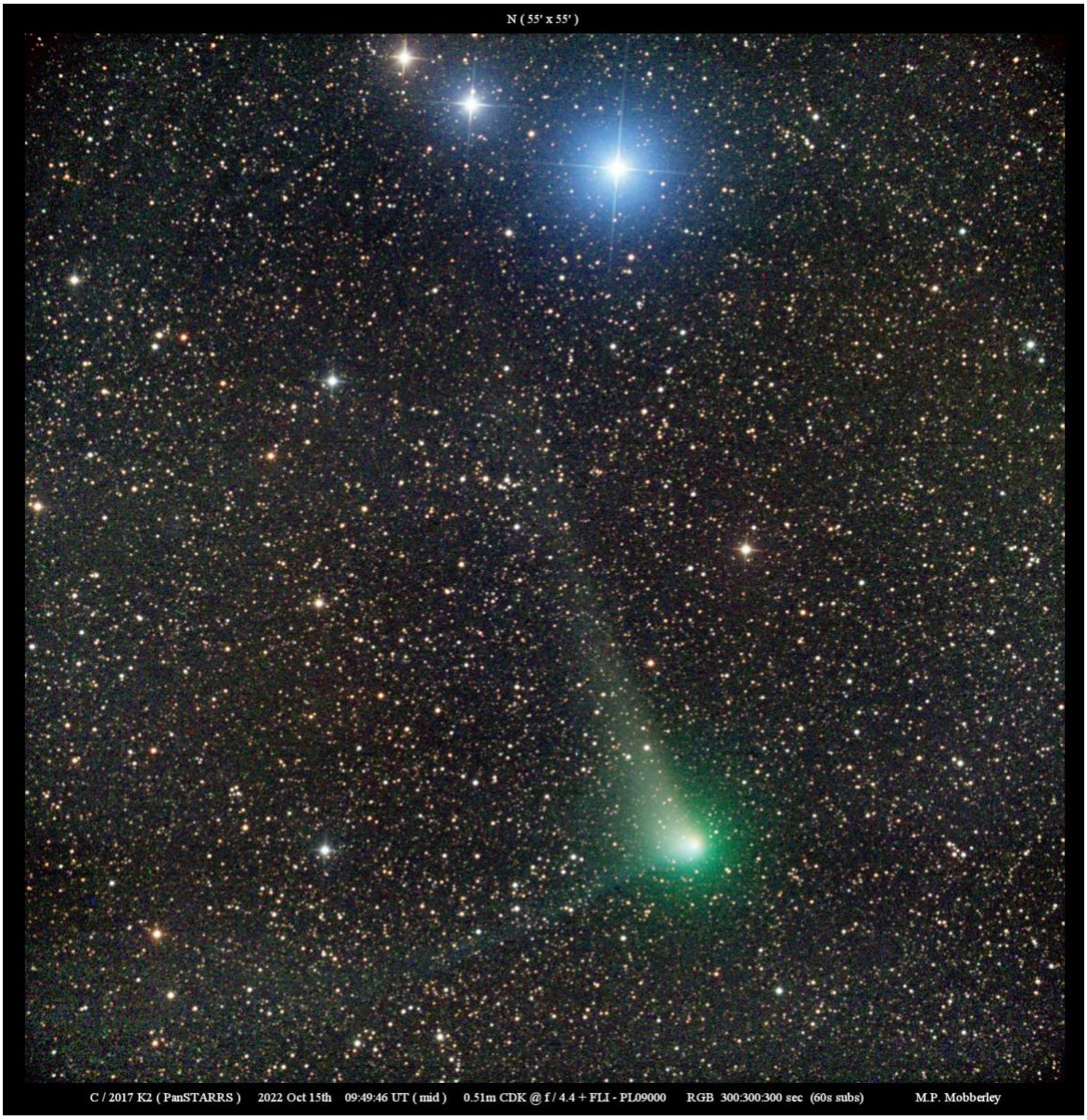


Figure 1 – Martin Mobberley imaged C/2017 K2 (PANSTARRS) with an 0.51-m CDK and FLI PL09000 camera on 2022 October 15. The image is a RGB composite of 5 60-s exposures in each filter.

C/2020 V2 (ZTF)

Discovered 2020 November 2 by the ZTF survey
Dynamically new long-period comet

Orbit (from Minor Planet Center, MPEC 2022-U349)

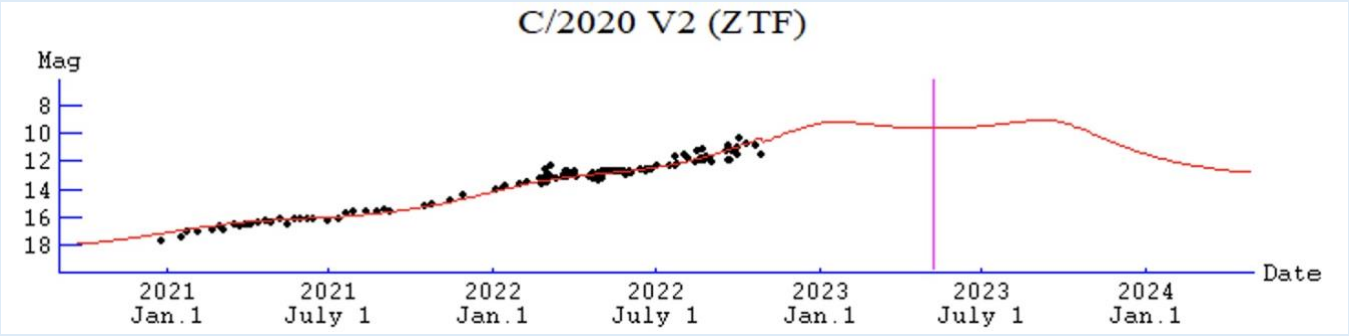
```
    C/2020 V2 (ZTF)
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2023 May 8.53927 TT                                    Rudenko
q   2.2280115           (2000.0)            P              Q
z  -0.0004426      Peri.  162.41945     +0.69777045     +0.59403874
 +/-0.0000005      Node   212.37014     +0.53386618     -0.05867762
e   1.0009861      Incl.  131.61100     +0.47760160     -0.80229354
From 2948 observations 2020 Apr. 18-2022 Oct. 28, mean residual 0".4.
1/a(orig) = -0.000142 AU**-1, 1/a(fut) = -0.000380 AU**-1.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
C/2020 V2 (ZTF)                                                      Max El
                                                                      (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag    40N  40S
2022-Nov-01  11 06  +60 36    3.066   2.998     84M    UMa   10.6     52    0
2022-Nov-06  11 09  +62 12    3.030   2.889     88M    UMa   10.5     55    0
2022-Nov-11  11 11  +64 02    2.994   2.781     92M    UMa   10.3     56    0
2022-Nov-16  11 12  +66 06    2.958   2.676     96M    UMa   10.2     57    0
2022-Nov-21  11 12  +68 25    2.923   2.575    100M    UMa   10.1     58    0
2022-Nov-26  11 11  +70 59    2.889   2.480    104M    UMa   10.0     57    0
2022-Dec-01  11 07  +73 49    2.855   2.391    108M    Dra    9.8     55    0
2022-Dec-06  10 57  +76 53    2.821   2.310    111M    Dra    9.7     53    0
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  2.4 + 5 log d + 11.1 log r [through T-190 days]
m1 =  4.3 + 5 log d +  8.0 log r [T-190 days and onward, assumed]
```



Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ    CODE  Observer Name
              (UT)                    T          Dia  DC  LENG  PA
   2020V2  2022 11 01.91  S 10.7 TI 29.8L 4 132   1.6  4/  2   m140 ICQ XX HAR11 Christian Harder
   2020V2  2022 10 27.77  S 12.1 HS 32.0L 5 144                    ICQ XX PIL01 Uwe Pilz
   2020V2  2022 10 26.21  S 11.2 TI 25.2L 4 113   1.8 s4           ICQ XX HAR11 Christian Harder
   2020V2  2022 10 22.74  S 11.4 TK 32.0L 5  80   1    1/          ICQ XX PIL01 Uwe Pilz
   2020V2  2022 10 04.17  S 10.6 TK 20.3T10  77   6    3/          ICQ XX GON05 Juan Jose Gonzalez Suarez
```

Of the four comets expected to around magnitude 10 or brighter in November, only C/2020 V2 (ZTF) is one of two easily observable for northern hemisphere observers. Riding high in Ursa Major (Nov 1-29) and Draco (29-30), V2 is circumpolar and well placed for morning observers.

C/2020 V2 is a dynamically new comet presumably making its first perihelion close to the Sun. Dynamically new comets usually brighten slowly. For example, look back at C/2017 K2's brightening rate of 2.5n ~ 6.7. But in the case of V2, it has been brightening at a rapid 2.5n ~ 11 rate since early 2021. As a result, it may brighten from around magnitude 10.6 on Nov 1 to 9.8 at the end of the month.

How bright V2 will get depends on whether it can keep up its rapid brightening. Assuming a more sedate 2.5n ~ 8 rate would result in a peak brightness of 9.2 in January and another, brighter peak at magnitude 9.0 in September. If its rapid brightening continues, it could be 0.5-0.6 magnitude brighter. Not super bright, but comparable to the display put on by C/2017 K2 over recent months.

For our friends down under, V2 will become visible from southern mid-latitudes in June.

Figure 2 – C/2020 V2 (ZTF) was imaged by Gregg Ruppel on 2022 October 28. The image is LRGB composite with a total exposure of 40 minutes.

C/2022 E3 (ZTF)

Discovered 2022 March 2 by the Zwicky Transient Facility (ZTF)
Dynamically old long-period comet

Orbit (from Minor Planet Center, MPEC 2022-U349)

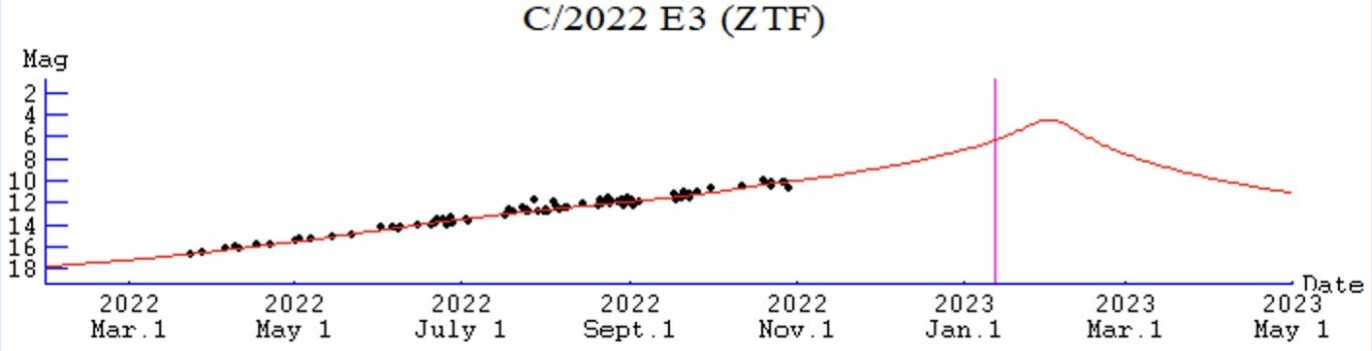
```
    C/2022 E3 (ZTF)
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2023 Jan. 12.78726 TT                                  Rudenko
q   1.1122563           (2000.0)            P               Q
z  -0.0002448      Peri.  145.81473     -0.60062700     -0.07339519
 +/-0.0000011      Node   302.55387     +0.33753174     +0.87941575
e   1.0002723      Incl.  109.16857     +0.72478930     -0.47036271
From 4359 observations 2021 July 10-2022 Oct. 28, mean residual 0".5.
1/a(orig) = +0.000762 AU**-1, 1/a(fut) = -0.000027 AU**-1.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
C/2022 E3 (ZTF)                                                      Max El
                                                                      (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag   40N  40S
2022-Nov-01  15 49  +24 49    1.596   2.147     44E    Ser   10.0    24    0
2022-Nov-06  15 49  +24 35    1.544   2.103     43E    Ser    9.8    21    0
2022-Nov-11  15 49  +24 26    1.492   2.051     43E    Ser    9.7    18    0
2022-Nov-16  15 50  +24 23    1.443   1.990     43E    Ser    9.5    15    0
2022-Nov-21  15 50  +24 25    1.396   1.921     44E    Ser    9.3    12    0
2022-Nov-26  15 51  +24 34    1.350   1.843     45M    Ser    9.1    14    0
2022-Dec-01  15 52  +24 51    1.308   1.757     47M    Ser    8.9    18    0
2022-Dec-06  15 52  +25 15    1.268   1.662     49M    Ser    8.6    23    0
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  5.6 + 5 log d + 12.8 log r [Through 80 days before perihelion]
m1 =  6.7 + 5 log d +  8.0 log r [After 80 days after perihelion, assumed]
```



Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ    CODE  Observer Name
               (UT)                    T         Dia  DC  LENG  PA
   2022E3  2022 10 28.81  S 11.0 TI 25.2L 4 145   0.8  4   2.5 m 65 ICQ XX HAR11 Christian Harder
   2022E3  2022 10 27.82  S 10.4 TI 25.2L 4 145   1.2 s4   4.5 m 70 ICQ XX HAR11 Christian Harder
   2022E3  2022 10 26.83  S 10.5 TI 25.2L 4 145   1.3  4   5   m 70 ICQ XX HAR11 Christian Harder
   2022E3  2022 10 23.00  S 10.8 TI 25.2L 4 113   1    4/  2.5 m 70 ICQ XX HAR11 Christian Harder
   2022E3  2022 10 22.73  S 10.6 TK 32.0L 5  80   0.6  5/  0.07  74 ICQ XX PIL01 Uwe Pilz
   2022E3  2022 10 20.83  S 10.5 TI 25.2L 4 113   1.3  4/  1.9 m 70 ICQ XX HAR11 Christian Harder
   2022E3  2022 10 19.82  S 10.3 TI 25.2L 4 113   1.35 4/  1.8 m 70 ICQ XX HAR11 Christian Harder
```

As of November 1, we are little over 10 weeks from C/2022 E3's perihelion on 2023 January 13 and 13 weeks from closest approach to Earth of 0.29 au on February 1. Since its discovery last March at 17th magnitude, ZTF has been brightening at a rapid 2.5n = 12.8 rate. Even a slowdown in brightening to a more conservative 2.5n = 8 rate results in a magnitude 4 to 5 comet in late January/early February. At that time, C/2022 E3 will be a northern circumpolar object.

Christian Harder and Uwe Pilz visual observed C/2022 E3 last month. They found the comet between magnitude 10.3 and 11.0 with a small 0.6’ to 1.4’ coma and 1.8’ to 5’ long tail. On images taken on October 11, Thomas Lehmann found a larger (mainly gas) coma (6.7’) and longer (mainly dust) tail (9’).

As has been the case in recent months, observing C/2022 E3 is limited to northern observers. Being located at a declination of ~+24 deg and well north of the Sun in Serpens, the comet will be continuously observable as it transitions from the evening to the morning sky on November 22. It should start the month around magnitude 10.0 and end the month closer to 9.0.

Though it will spend the period between October 2022 and early February 2023 invisible from the southern hemisphere, southern observers will be able to see the comet again a week or so after closest approach to Earth when it should still be within 0.5-1.0 magnitude of peak brightness.

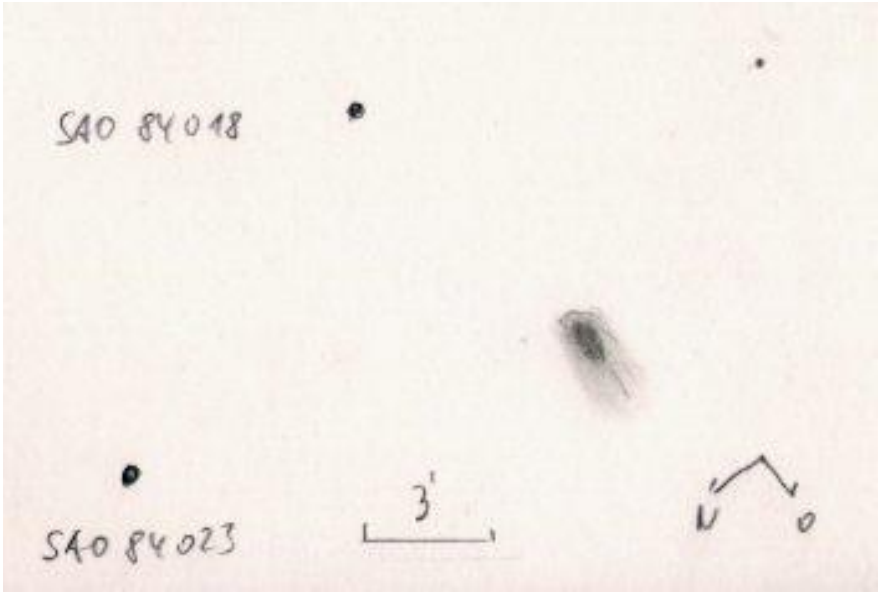


Figure 3 – C/2022 E3 (ZTF) as drawn by Uwe Pilz who used a 12” dobsonian to see the comet on 2022 October 23.

Figure 4 – Dan Bartlett used his Celestron RASA11 Schmidt & ZWO ASI 2600mcP camera to image C/2022 E3 (ZTF) on 2022 October 16. The image is a composite of 50 x 120-sec subframes.

C/2022 P1 (NEOWISE)

Discovered 2022 August 8 by the NEOWISE spacecraft
Halley-family comet

Orbit (from Minor Planet Center, MPEC 2022-U349)

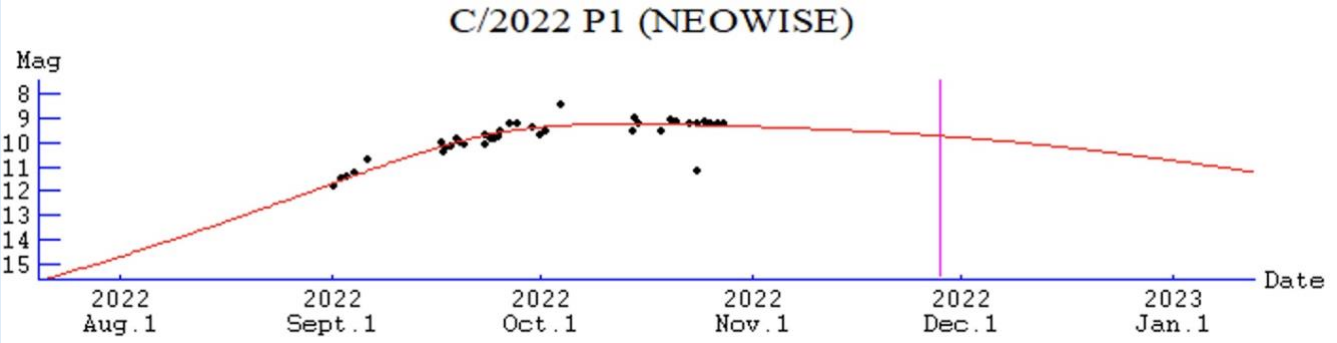
```
    C/2022 P1 (NEOWISE)
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Nov. 28.47679 TT                                  Rudenko
q   1.5951230           (2000.0)            P              Q
n   0.01242618      Peri.  249.93753     +0.67039971     -0.71938707
a  18.4605334       Node   205.08079     -0.41147966     -0.56431575
e   0.9135928       Incl.  154.60552     -0.61745342     -0.40500615
P  79.3
From 559 observations 2022 Aug. 8-Oct. 28, mean residual 0".5.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
C/2022 P1 (NEOWISE)
                                                                    (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag   40N  40S
2022-Nov-01  20 18   -41 54    1.636   1.491     79E    Sgr   9.4     7   60
2022-Nov-06  20 05   -41 27    1.623   1.613     72E    Sgr   9.5     7   53
2022-Nov-11  19 56   -40 59    1.613   1.732     66E    Sgr   9.6     6   46
2022-Nov-16  19 48   -40 32    1.605   1.848     60E    Sgr   9.8     5   39
2022-Nov-21  19 42   -40 07    1.600   1.958     54E    Sgr  10.1     3   33
2022-Nov-26  19 38   -39 44    1.597   2.062     48E    Sgr  10.4     2   28
2022-Dec-01  19 35   -39 24    1.598   2.159     43E    Sgr  10.7     0   22
2022-Dec-06  19 32   -39 06    1.600   2.248     38E    Sgr  11.1     0   18
```

Comet Magnitude Formula

```
m1 =  0.9 + 5 log d + 35.5 log r
```



Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ    CODE  Observer Name
             (UT)                      T         Dia  DC  LENG  PA
   2022P1  2022 10 27.82  S 10.6 TI 25.2L 4 145   2.6  1           ICQ XX HAR11 Christian Harder
   2022P1  2022 10 26.82  S 10.6 TI 25.2L 4 145   2.8  1           ICQ XX HAR11 Christian Harder
   2022P1  2022 10 26.94  M  9.9 TK 30  L 5 109   5    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 25.92  M  9.9 TK 30  L 5 109   4    4/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 24.94  M  9.8 TK 30  L 5  89   5    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 23.93  M  9.9 TK 30  L 5  89   6    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 23.82  S 12.5 TI 25.2L 4 145   0.8  4           ICQ XX HAR11 Christian Harder
   2022P1  2022 10 22.94  M  9.9 TK 30  L 5  89   5    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 20.91  M  9.8 TK 30  L 5  89   5    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 19.99  M  9.7 TK 30  L 5  89   5    3           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 15.42 xM  9.9 AQ 40.0L 4  59   7.3  3           ICQ XX WYA   Christopher Wyatt
   2022P1  2022 10 14.84  S  9.3 TK 20.3T10  77   8    2/          ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022P1  2022 10 14.46 xM 10.2 AQ 40.0L 4  59   8    3/          ICQ XX WYA   Christopher Wyatt
   2022P1  2022 10 04.00  S  8.8 TK 20.3T10 100   5    2/          ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022P1  2022 10 02.02  M 10.2 TK 30  L 5  89   4    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022P1  2022 10 01.04  M 10.3 TK 30  L 5  89   5    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
```

C/2022 P1 is a Halley type comet with an orbital period of 79.3 years. Since discovery in August, it has rapidly brightened at a steady rate. Its lightcurve can be well modeled with a 35 log r brightening rate. Though the comet is still a few weeks from its November 28 perihelion at 1.60 au and it continues to brighten in an absolute sense, here on Earth it has already reached a peak brightness and will slowly fade in November as it moves away from Earth (1.49 au on Nov 1 to 2.16 au on Dec 1) after its closest approach on September 25 at 0.85 au.

Visual observers Juan Jose Gonzalez Suarez, Jose Guilherme de Souza Aguiar, Christian Harder, and Chris Wyatt observed C/2022 P1 on 13 different nights in October. Their brightness measurements mainly fell in the 9.7 to 10.6 range with Juan Jose coming in a bit brighter at magnitude 8.8 to 9.3. Photometry based on imaging by Carl Hergenrother and Thomas Lehmann split the difference between the bright and faint visual observers.

Visually the comet had a slight to moderately condensed coma (DC between 2 and 4.5) between 4’ and 8’ in diameter. None of the observers detected a tail. Thomas Lehmann imaged a larger coma of 13’. Dan Bartlett caught a hint of both a dust and gas tail on deep images taken on September 23. The alignment of both tails was an excellent match to predictions from the JPL Horizons service.

P1 is an evening object in Sagittarius and should fade from around magnitude 9.4 to 9.9 this month. C/2022 P1 (NEOWISE) may still be seen from northern mid-latitudes but it is a difficult object very low in the sky.

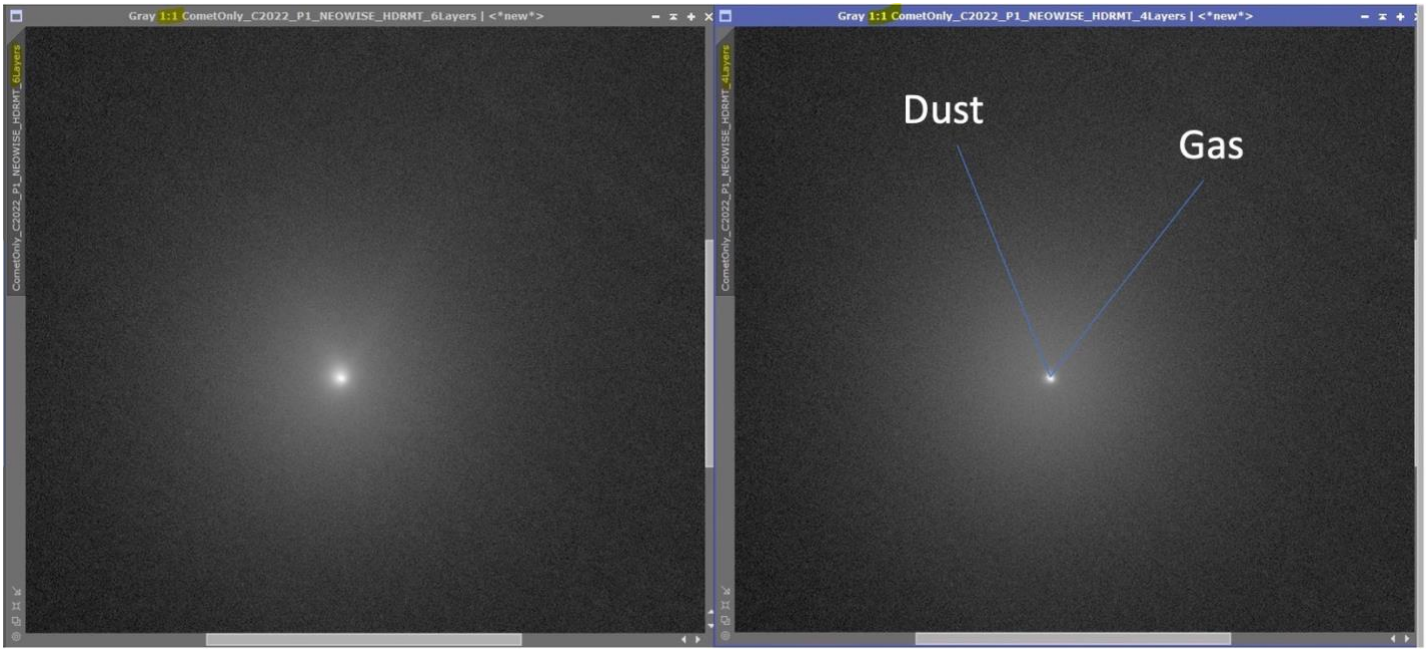


Figure 5 - Dan Bartlett imaged C/2022 P1 (NEOWISE) back on 2022 September 23 with a Celestron RASA11 schmidt telescope. The annotated image on the right shows the predicted alignment of the dust and gas tails from the JPL Horizons service. The predictions are an excellent match to what was seen in the left image.

Comets Between Magnitude 10 and 12

73P/Schwassmann-Wachmann

Discovered photographically on 1930 May 30 by Arnold Schwassmann and Arno Arthur Wachmann at Hamburg Observatory in Bergedorf, Germany

Orbit (from Minor Planet Center MPEC 2022-U349)

```
  73P/Schwassmann-Wachmann
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Aug. 25.78867 TT                                  Rudenko
q   0.9729601           (2000.0)            P              Q
n   0.18127604     Peri.  199.48848     -0.02171170     +0.98296420
a   3.0920210      Node    69.61041     -0.88948855     +0.06435225
e   0.6853320      Incl.   11.22777     -0.45644136     -0.17216321
P   5.44
From 2680 observations 2016 Feb. 13-2022 Oct. 26, mean residual 0".9.
```

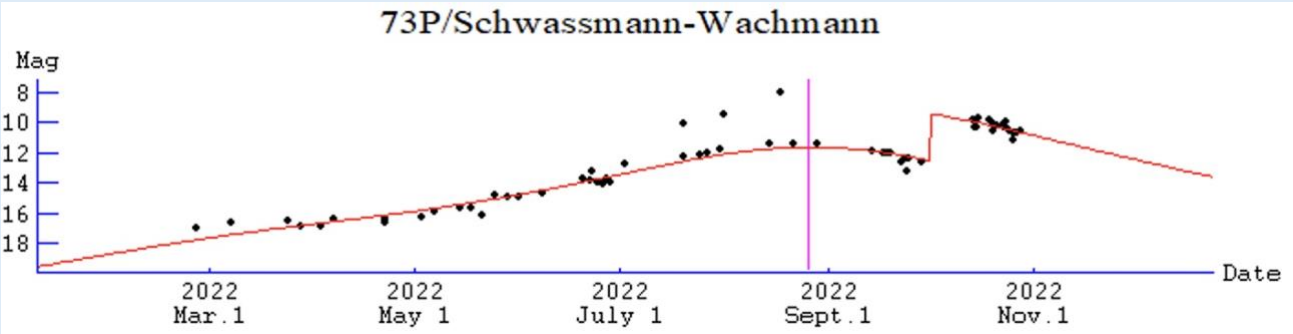
Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

73P/Schwassmann-Wachmann

Date	R.A.	Decl.	r	d	Elong	Const	Mag	Max El (deg) 40N	40S
2022-Nov-01	19 51	-33 56	1.342	1.184	75E	Sgr	10.9	14	53
2022-Nov-06	20 15	-32 39	1.386	1.240	75E	Sgr	11.4	16	52
2022-Nov-11	20 37	-31 10	1.431	1.301	75E	Mic	12.0	18	50
2022-Nov-16	20 58	-29 35	1.476	1.367	75E	Mic	12.5	19	48
2022-Nov-21	21 17	-27 56	1.521	1.438	75E	Mic	13.0	21	45
2022-Nov-26	21 34	-26 14	1.567	1.512	74E	PsA	13.5	23	42
2022-Dec-01	21 50	-24 32	1.613	1.589	73E	Cap	13.9	24	39
2022-Dec-06	22 05	-22 51	1.659	1.670	72E	Aqr	14.3	26	36

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 = 11.7 + 5 log d + 14.7 log r(T + 7) [Through perihelion + 36 days]
m1 =  9.0 + 5 log d + 11.9 log r        [Since perihelion + 36 days]
where "t" is date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au
```



Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
               (UT)                    T         Dia  DC  LENG  PA
 73        2022 10 27.81  S 10.9 TI 25.2L 4 145   1.6  4   1.5 m 70 ICQ XX HAR11 Christian Harder
 73        2022 10 26.93  M 11.0 TK 30  L 5 109   1    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 25.90  M 11.0 TK 30  L 5 109   1    4           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 25.81  S 11.5 TI 25.2L 4 145   1.4  3           ICQ XX HAR11 Christian Harder
 73        2022 10 24.92  M 10.9 TK 30  L 5  89   1    4/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 23.92  M 10.7 TK 30  L 5  89   2    5           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 23.81  S 10.3 TI 25.2L 4 145   1.8  3/  1.8 m 80 ICQ XX HAR11 Christian Harder
 73        2022 10 22.91  M 10.6 TK 30  L 5  89   3    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 20.92  M 10.5 TK 30  L 5  89   3    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 19.95  M 10.4 TK 27  L 5  55   2    6           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 73        2022 10 19.83  S 10.9 TI 25.2L 4 145   1    2/          ICQ XX HAR11 Christian Harder
 73        2022 10 15.40 xM 10.4 AQ 40.0L 4  59   1.2  5/  4   m 93 ICQ XX WYA   Christopher Wyatt
 73        2022 10 14.80  S 10.7 TK 20.3T10  77   2    3/          ICQ XX GON05 Juan Jose Gonzalez Suarez
 73        2022 10 14.43 xM 10.9 AQ 40.0L 4  59   1.6  5   4   m 92 ICQ XX WYA   Christopher Wyatt
```

Last month's ALPO Comet News didn't include 73P since it was receding from the Sun and Earth and expected to be fainter than magnitude 12. The comet had other ideas, and experienced an outburst between September 30 and October 5 that brought it back up to 10th magnitude.

73P has a history of outbursts and splitting events. The 1995 return saw a series of outbursts resulted in a jump in brightness from 12th to 6th magnitude. Those outbursts were the result of a splitting event that released multiple secondary components. The next return in 2000 was poor. Even then, two nuclei were observed. 2006 saw the comet's best return since 1930 with a close approach to Earth of 0.07 au. Visual observers were treated to a bright double comet with components B and C reaching 4-5th magnitude. Imagers detected dozens of fainter components with some components like B and G shedding hundreds of short-lived smaller components during the course of the apparition. While only a single component, the primary C, was seen in 2011, 2017 saw the C component return as well as a new secondary, designated BT. 2017 also saw 73P experience a ~2 magnitude brightening many months after perihelion.

Too bad we haven't visited 73P with a spacecraft, it's frequent outbursts and splitting events would be wonderful to watch up close. The NASA Comet Nucleus Tour (CONTOUR) mission which launched in 2002 was scheduled to fly by three comets including a planned 2006 encounter with component C of 73P. Alas the spacecraft experienced an explosion as it was conducting a burn to leave Earth orbit. It was also planned to fly by 2P/Encke, 6P/d'Arrest, and possibly a newly discovered long-period comet.

During the current return, Michael Jäger identified two secondaries on July 23 (now designated BU and BV). Both were around 19th magnitude at discovery but faded from view during August. On comets-ml, Michael Jäger also reported that he, Gerald Rhemann and Lukas Demetz found three more new fragments at distances of 75" to 50'. All were around 18th magnitude. It will be interesting to see if the most recent outburst released any new secondaries.

Since 73P's current brightness is related to an outburst, the above prediction is uncertain. Not only could another outburst occur, but the recent rate of fading after the outburst is uncertain. Still, 73P should start the month around magnitude 11.0 but may fade quickly.

For most of this apparition, it was a difficult object low on the horizon for northern observers. It is now becoming better placed as the part of the ecliptic it is traveling on is moving north of the northern winter Sun. It is still much better placed for observers south of the equator as it moves through Sagittarius (Nov 1-8), Microscopium (8-22), Capricornus (21-24), and Scorpius (24-30) in the evening sky.

81P/Wild

Discovered photographically on 1978 January 6 by Paul Wild at Zimmerwald, Switzerland

Orbit (from Minor Planet Center, MPEC 2022-U349)

```
  81P/Wild
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Dec. 15.63642 TT                                  Rudenko
q   1.5984036            (2000.0)            P              Q
n   0.15355951     Peri.   41.63839     -0.99848532     -0.03865735
a   3.4537023      Node   136.09875     +0.02200475     -0.93276259
e   0.5371913      Incl.    3.23656     +0.05042677     -0.35841256
P   6.42
From 1835 observations 2014 Oct. 18-2022 Oct. 28, mean residual 0".6.
     Nongravitational parameters A1 = -0.04, A2 = -0.1009.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
81P/Wild                                                              Max El
                                                                       (deg)
    Date      R.A.   Decl.     r       d    Elong  Const  Mag    40N  40S
2022-Nov-01  11 44  +02 24   1.659   2.243    42M   Vir  11.3    23    0
2022-Nov-06  11 57  +01 04   1.646   2.205    44M   Vir  11.2    24    0
2022-Nov-11  12 11  -00 16   1.635   2.167    45M   Vir  11.2    25    0
2022-Nov-16  12 24  -01 36   1.625   2.131    46M   Vir  11.1    26    1
2022-Nov-21  12 38  -02 56   1.617   2.096    48M   Vir  11.1    27    2
2022-Nov-26  12 52  -04 15   1.610   2.063    49M   Vir  11.0    28    3
2022-Dec-01  13 06  -05 33   1.605   2.030    51E   Vir  11.0    28    4
2022-Dec-06  13 20  -06 49   1.601   1.998    52E   Vir  11.0    29    5
```

Comet Magnitude Formula

```
m1 =  6.3 + 5 log d + 18.0 log r (t + 20) [Through 95 days after perihelion]
m1 =  8.2 + 5 log d + 12.5 log r [95 days after perihelion and afterwards]
where "t" is date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au
```

Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
               (UT)                        T         Dia  DC  LENG  PA
 81        2022 10 20.17  S 11.3 TK 32.0L 5 144        6   0.03 295        PIL01 Uwe Pilz
```

Paul Wild of the Astronomical Institute at Berne University in Switzerland discovered 81P/Wild (formerly Wild 2) on photographic plates obtained on 1978 January 6 taken with the 0.4-m Schmidt telescope at Zimmerwald, Switzerland. 81P is best known as the target of the Stardust mission which not only obtained close-up imaging (in 2004) but also collected a sample of cometary particles and returned them to Earth (in 2006).

One of the main reasons for the selection of 81P as the target of Stardust was its orbital evolution. Currently the comet is on a short-period orbit with an orbital period of 6.4 years and perihelion of 1.60 au. Prior to a very close approach to Jupiter of 0.0063 au on 1974 September 9, 81P had a much larger orbit with a period of ~47 years ranging between 5.0 and 21.2 au (from around the orbit of Jupiter to just beyond Uranus). The discovery apparition of 1978 marked the comet's first close perihelion to the Sun after the 1974 Jupiter encounter. The goal of the Stardust mission was to collect material from a comet new to the inner solar system.

Since the 1974, Wild has been on a fairly stable orbit with perihelion ranging between 1.49 and 1.60 au. Its best returns were in 1997 with a close approach to Earth of 0.85 au and 2010 at 0.67 au from Earth. During both of those returns the comet reached 8-9th magnitude. During its last return in 2016 when it passed a more distant 1.47 au from Earth, the comet reached 11th magnitude.

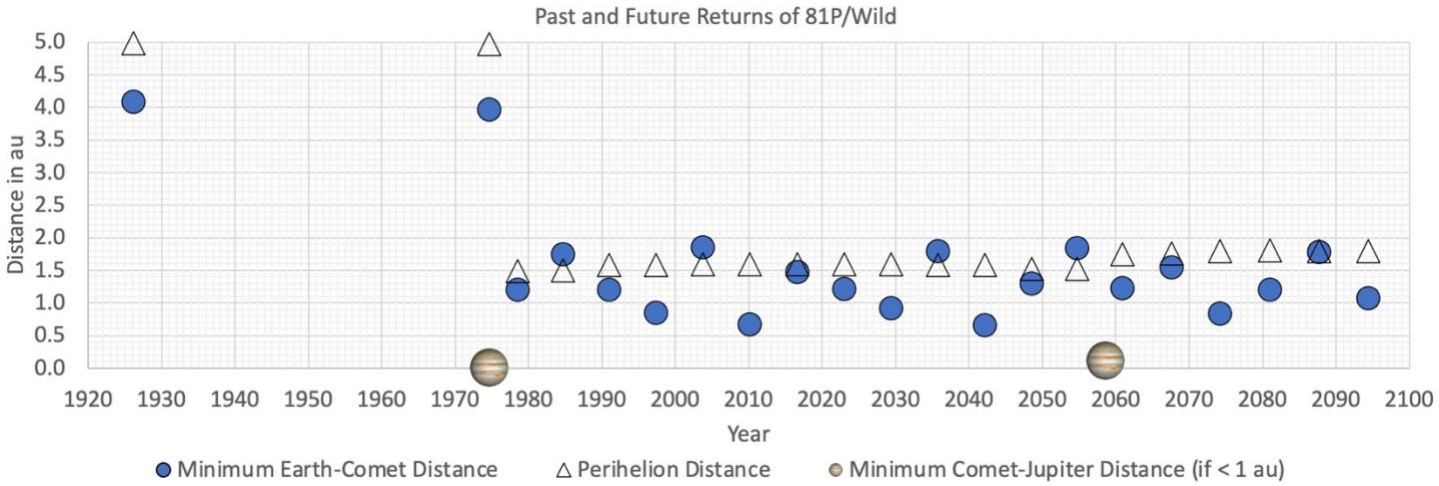


Figure 6 - Orbital evolution of 81P/Wild.

This year's return is better than 2016's but worse than in 1997 and 2010. Perihelion will be on 2022 December 15 at 1.60 au when the comet will be 1.94 au from Earth. The first half of 2023 will see the comet move towards a close approach to Earth on 2023 May 18 at 1.22 au.

81P is a low evening object for northern observers, starting at elevations between 23 and 28 deg at the end of astronomical twilight. Southern hemisphere observers will have even more trouble as it will be scrapping the horizon at the end of astronomical twilight.

Looking into the relatively near future, 81P will have two better returns in 2029 (close approach to Earth of 0.92 au) and 2042 (on par with the 2010 return with an approach to 0.65 au of Earth).

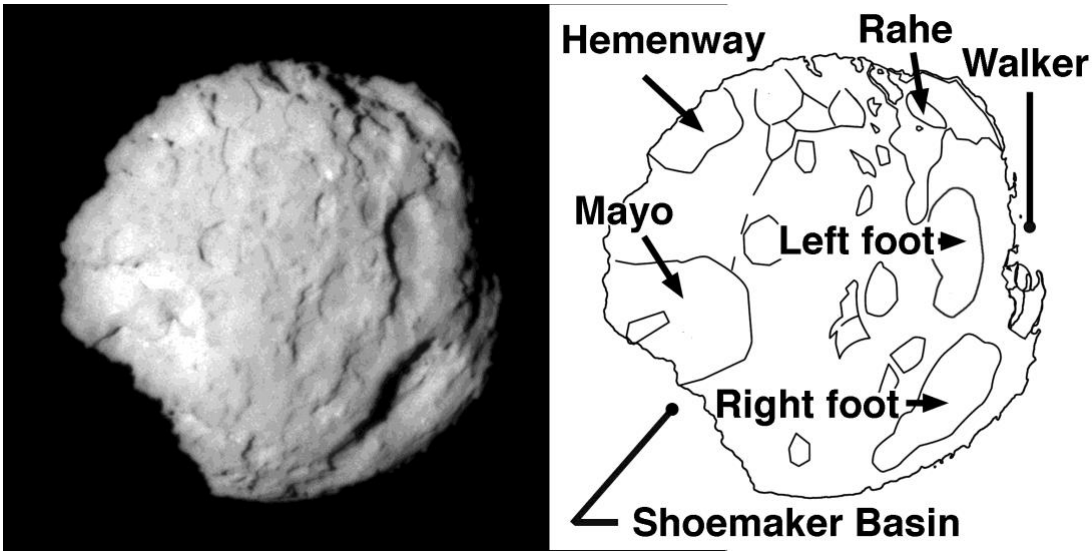


Figure 7 This image and diagram show comet Wild 2, which NASA's Stardust spacecraft flew by on Jan. 2, 2004. The picture on the left is the closest short exposure of the comet's nucleus. The listed names on the right were used by the Stardust team to identify features. Credit: NASA JPL. -

118P/Shoemaker-Levy

Discovered photographically on 1990 February 9 by Gene and Caroline Shoemaker and David Levy at Palomar Observatory

Orbit (from Minor Planet Center MPEC 2022-U349)

```
118P/Shoemaker-Levy
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Nov. 24.31340 TT                                  Rudenko
q   1.8290296            (2000.0)            P              Q
n   0.16099241     Peri.  314.82567     -0.12727838     -0.98600849
a   3.3465638      Node   142.09743     +0.95228415     -0.15183057
e   0.4534604      Incl.   10.09183     +0.27740784     +0.06880947
P   6.12
From 691 observations 2015 Sept. 15-2022 Oct. 27, mean residual 0".6.
     Nongravitational parameters A1 = -0.23, A2 = -0.0278.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
118P/Shoemaker-Levy
                                                                  Max El
                                                                   (deg)
    Date      R.A.   Decl.     r       d    Elong  Const  Mag   40N  40S
2022-Nov-01  07 54  +09 33   1.840   1.396    99M   CMi  12.1    59   32
2022-Nov-06  08 02  +09 07   1.836   1.349   102M   CMi  12.0    59   33
2022-Nov-11  08 09  +08 42   1.833   1.303   105M   Cnc  11.9    59   34
2022-Nov-16  08 16  +08 20   1.830   1.258   108M   Cnc  11.8    58   35
2022-Nov-21  08 22  +08 00   1.829   1.215   111M   Cnc  11.7    58   36
2022-Nov-26  08 28  +07 44   1.829   1.173   115M   Cnc  11.6    58   37
2022-Dec-01  08 32  +07 33   1.830   1.134   119M   Cnc  11.5    57   39
2022-Dec-06  08 37  +07 27   1.832   1.097   123M   Cnc  11.5    57   40
```

Comet Magnitude Formula (from Seiichi Yoshida)

```
m1 = -4.5 + 5 log d + 60.0 log r [-100 to ~100 days from perihelion]
m1 =  8.2 + 5 log d + 18.0 log r [+100 to 435 days from perihelion]
where "t" is date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au
```

Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
               (UT)                    T         Dia  DC  LENG  PA
None
```

118P was a photographic discovery by the prolific comet discovery team of Caroline and Gene Shoemaker and formal ALPO Comets Section Recorder David Levy. As with all of the team's finds, 118P was found with the 0.46-m Schmidt on Mount Palomar in southern California. Caroline and Gene made 32 comet discoveries while David made 23 (22 with the Levy name and 1 named after his Jarnac Observatory). 13 comets were co-discovered by the three of them and named Shoemaker-Levy, the brightest being the Jupiter impacting D/1993 F2 (Shoemaker-Levy 9).

118P/Shoemaker-Levy (formerly Shoemaker-Levy 4) was discovered on 1991 February 9 at 17th magnitude. Having been discovered 7 months after perihelion it faded rapidly after discovery. Its next return in 1997 saw the comet reach 12th magnitude. Nine months after perihelion and peaking at 14th magnitude in 2003, 118P experienced a ~2 magnitude outburst. 2010 was another good return with a peak brightness of 11-12th magnitude.

Looking at the comet's orbital evolution, each return alternated between good returns (1997, 2010, 2022) and poor returns (1990, 2003, 2016). This alternating pattern extended back to a return in 1958. If 118P was reaching 11-12th magnitude every ~13 years since the late 1950s, we have to wonder why it wasn't discovered previously.

Perhaps it was just a matter of being a little too faint for visual hunters and missed by photographic surveys which were still very limited in sky coverage. Or perhaps the comet was less active in those years.

In July 2020, a close encounter with Jupiter at 0.66 au resulted in a decrease in perihelion distance from 1.98 to 1.83 au. Due to the change in perihelion distance and orbital period, the 2022 and 2029 returns should be the best in the 20th-21st centuries.

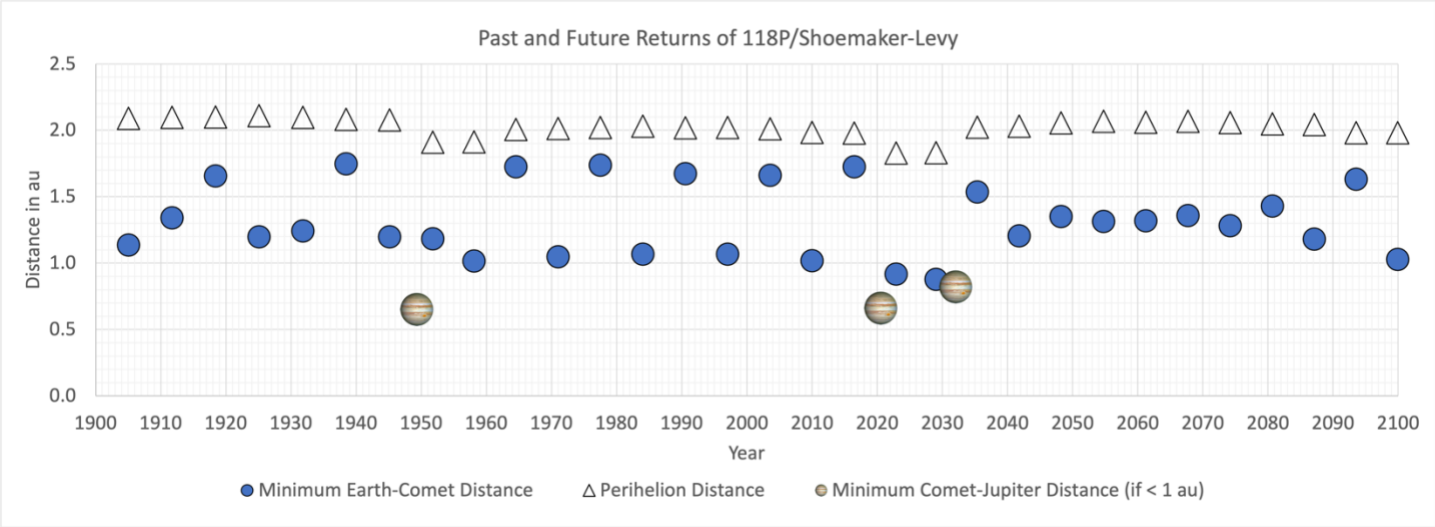


Figure 8 - Orbital evolution of 118P/Shoemaker-Levy.

Perihelion occurs on 2022 November 24 at 1.83 au and closest approach to Earth on 2023 January 18 at 0.92 au. The comet begins November around magnitude 12.1 and brightens to 11.5 by the end of the month which is very close to the brightest it should reach this return. A morning object, 118P will be moving through Canis Minor (Nov 1-6) and Cancer (6-30).

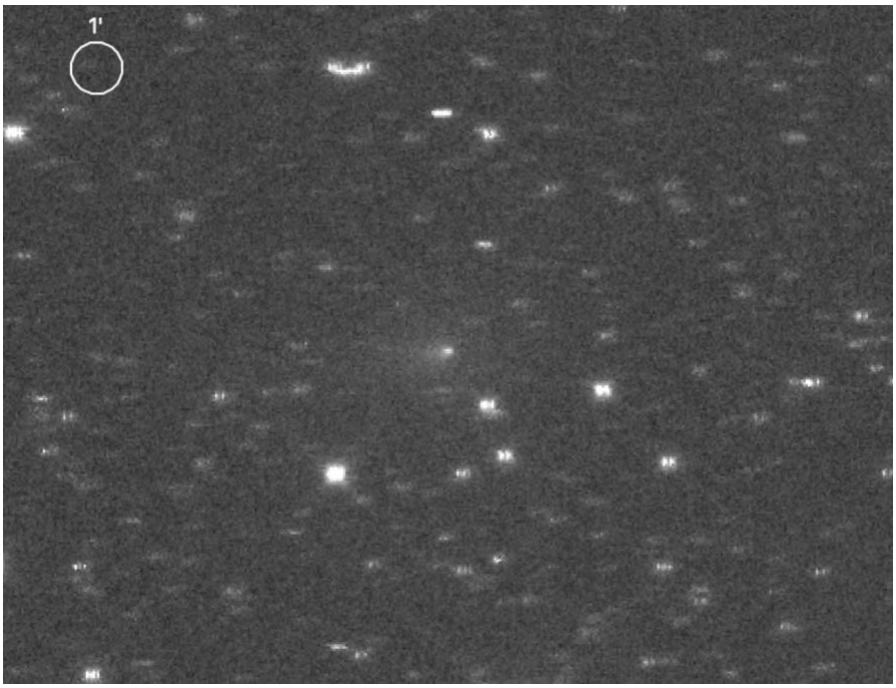


Figure 9 – 118P on 2022 October 28 in a 1200-s V-band image with a FSQ-106 refractor from Hakos, Namibia. Image taken by Carl Hergenrother.

C/2019 L3 (ATLAS)

Discovered 2019 June 10 by the ATLAS survey with one of their 0.5-m f/2 Schmidt

Orbit (from Minor Planet Center, MPEC 2022-Q33)

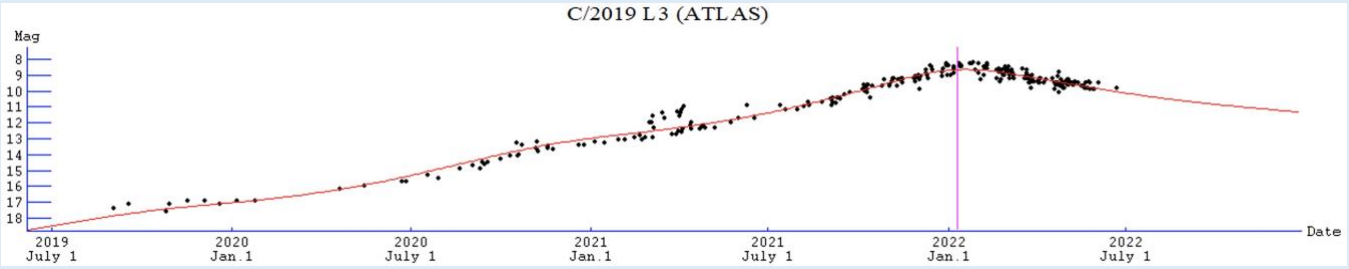
```
    C/2019 L3 (ATLAS)
Epoch 2022 Aug. 9.0 TT = JDT 2459800.5
T 2022 Jan.  9.61852 TT                                  Rudenko
q   3.5544248           (2000.0)            P               Q
z  -0.0005067      Peri.  171.61011     -0.26046920     -0.66637163
 +/-0.0000003      Node   290.78799     +0.83677329     +0.20516883
e   1.0018010      Incl.   48.35648     +0.48162876     -0.71683652
From 5327 observations 2019 June 10-2022 June 8, mean residual 0".4.
1/a(orig) = +0.000113 AU**-1, 1/a(fut) = -0.000870 AU**-1.
```

Ephemerides (produced with Seiichi Yoshida's Comets for Windows program)

```
C/2019 L3 (ATLAS)                                                    Max El
                                                                      (deg)
    Date       R.A.    Decl.     r       d     Elong  Const  Mag    40N  40S
2022-Nov-01  09 51   -18 07   4.429   4.755     65M    Hya   10.8     24   34
2022-Nov-06  09 53   -19 13   4.455   4.720     68M    Hya   10.9     25   36
2022-Nov-11  09 55   -20 20   4.481   4.684     72M    Hya   10.9     26   39
2022-Nov-16  09 57   -21 26   4.507   4.647     75M    Hya   10.9     27   41
2022-Nov-21  09 58   -22 31   4.533   4.610     79M    Hya   10.9     27   44
2022-Nov-26  09 59   -23 37   4.560   4.573     83M    Hya   11.0     26   48
2022-Dec-01  10 00   -24 41   4.587   4.536     86M    Hya   11.0     25   51
2022-Dec-06  10 00   -25 44   4.614   4.500     90M    Hya   11.0     24   55
```

Comet Magnitude Formula and Lightcurve (from ALPO and COBS data)

```
m1 = -3.9 + 5 log d + 18.8 log r(t - 89)
where "t" is date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au
```



Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
Recent Magnitude Measurements in ICQ format:
Comet Des YYYY MM DD.DD    Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
               (UT)                    T        Dia  DC  LENG  PA
   2019L3  2022 10 29.71 xM 11.3 AQ 40.0L 4  59   2    6           ICQ XX WYA   Christopher Wyatt
   2019L3  2022 10 28.70 xM 11.1 AQ 40.0L 4  59   2.5  6           ICQ XX WYA   Christopher Wyatt
```

Turns out C/2019 L3 (ATLAS) is still doing fine and actually running a bit brighter than expected. Chris Wyatt made two visual observations at the end of October and found a brightness of 11.1-11.3 (personal bias and aperture corrected to 10.1 to 10.3). Thomas Lehmann reported two observations to COBS on Sep. 30 and Oct. 5 at magnitude 10.9-11.0 (corrected to 10.4-10.5). Thomas' images found a 3.7-5.1' coma with up to a 0.13 deg long tail. Chris' visual observations found a 2-2.5' coma.

C/2019 L3 is now 10 months past its 2022 January 9 perihelion at 3.55 au. Its lightcurve is reasonably fit by a steep 2.5n ~ 19 brightening trend but offset with maximum intrinsic brightness occurring ~3 month after perihelion. This month, the comet is visible from both hemispheres as a morning object in Hydra. Since it is well past perihelion and closest approach to Earth, it should continue to slowly fade from around magnitude 10.8 to 11.0 though recent observations suggest it may be closer to magnitude 10.0 in brightness.