January 2024

ALPO Comet News

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

C/2020 V2 (ZTF) meets the Grus Quartet

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On the Front Cover:

C/2020 V2 (ZTF) was a nice 9th magnitude object for most of 2023. While now a 12th magnitude object, it is still very photogenic. On the night of 2023 December 13, Dan Bartlett caught C/2020 V2 as it moved through the field of the Grus Quartet of galaxies in the constellation of… you guessed it, Grus. The Grus Quartet is comprised of the galaxies HGC 7552, 7582, 7590, 7599, and are located ~60-70 million light years from Earth. Dan's image consists of 37 x 15-sec exposures with a Hyperstar-equipped C14 at f/2 and ZWO ASI2600MC-Pro camera.

The monthly ALPO Comet News PDF can be found on the ALPO Comets Section website (http://www.alpo-astronomy.org/cometblog/ and in the Comets Section Image Gallery). A shorter version of this report is posted on a dedicated Cloudy Nights forum (https://www.cloudynights.com/topic/905381-alpo-comet-news-for-january-2024/). 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

Happy New Year! The start of 2024 sees the action dominated by returning comets. The brightest comet of the month should be the Halley-family comet 12P/Pons-Brooks, which is returning for the first time since 1954 and will brighten to 7th magnitude by the end of January. 12P has experienced a number of major outbursts, which recently seem to be occurring at a two-week cadence. Sharing the evening sky with 12P is short-period comet 144P/Kushida brightening to 8th magnitude. Also around 8th magnitude, but in the morning sky, is short-period comet 62P/Tsuchinshan. The only relatively bright long-period comet is C/2021 S3 (PANSTARRS), which may reach 9th magnitude and is in the morning sky before dawn.

Last month, the ALPO Comets Section received 131 images and 105 magnitude estimates of 33 comets: C/2023 X2 (Lemmon), C/2023 X1 (Leonard), C/2023 T3 (Fuls), C/2023 S3 (Lemmon), C/2023 P1 (Nishimura), C/2023 H2 (Lemmon), C/2023 A3 (Tsuchinshan-ATLAS), C/2022 QE78 (ATLAS), C/2022 JK5 (PANSTARRS), C/2022 E2 (ATLAS), C/2021 X1 (Maury-Attard), C/2021 S3 (PANSTARRS), C/2021 G2 (ATLAS), C/2021 A9 (PANSTARRS), C/2020 V2 (ZTF), C/2020 K1 (PANSTARRS), C/2019 U5 (PANSTARRS), C/2017 K2 (PANSTARRS), 471P, 470P/PANSTARRS, 378P/McNaught, 226P/Pigott-LINEAR-Kowalski, 207P/NEAT, 170P/Christensen, 144P/Kushida, 126P/IRAS, 103P/Hartley, 62P/Tsuchinshan, 32P/Comas Sola, 30P/Reinmuth, 29P/Schwassmann-Wachmann, 13P/Olbers, and 12P/Pons-Brooks.

A big thanks to our recent contributors: Dan Bartlett, Todd Bossaller, Denis Buczynski, Dan Crowson, Michel Deconinck, J. J. Gonzalez Suarez, Christian Harder, Carl Hergenrother, Eliot Herman, Michael Jäger, Manos Kardasis, Martin Mobberley, Mike Olason, Uwe Pilz, Greg Ruppel, Chris Schur, Gregory T. Shanos, Willian Souza, 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 include lightcurves for the comets discussed in these reports and apply aperture and personal corrections to the visual observations and only personal corrections to digital observations. Though we try to keep these lightcurves up to date, observations submitted a few days before publication may not be included. 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 reflectors and 0.066 magnitudes per centimeter for refractors. 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 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.

Acknowledgments

In addition to observations submitted directly to the ALPO, we occasionally use data from other sources to augment our analysis. Therefore, we acknowledge with thanks observations submitted directly to the ALPO and those submitted initially 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 analysis and would like to thank Thomas for his COBS observations. We would also like to thank the Jet Propulsion Laboratory for making their Small-Body Browser and Orbit Visualizer available and Seiichi Yoshida for his Comets for Windows programs that produced the lightcurves and orbit diagrams in these pages. 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 add to our knowledge of these fantastic objects.

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

Clear skies!
- Carl Hergenrother

Comets Calendar

Lunar Phases (UTC)

Jan 04 - Last Quarter Moon
Jan 11 - New Moon
Jan 18 - First Quarter Moon
Jan 25 - Full Moon

Comets at Perihelion

Jan 02 - C/2021 S4 (Tsuchinshan) [q = 6.69 au, V ~ 16]
Jan 06 - 216P/LINEAR [q = 2.13 au, 7.6-yr period, V ~ 17, discovered in 2001, this is the 4th observed return]
Jan 17 - C/2022 H1 (PANSTARRS) [q = 7.70 au, V~ 18-19]
Jan 19 - C/2023 S3 (Lemmon) [q = 0.83 au, 153-yr period, V ~ 15-16]
Jan 25 - 144P/Kushida [q = 1.40 au, 7.5=yr period, V ~ 8, discovered in 1994, 5th observed return, more below]
Jan 31 - 207P/NEAT [q = 0.94 au, 7.7-yr period, V ~ 12-13, discovered in 2001, 3rd observed return, missed in 2016]

Photo Opportunities

Jan 12-13 - 12P/Pons-Brooks passes ~0.5 deg of the Crescent Nebula (NGC 6888) and OC IC 4996
Jan 15-16 - 12P/Pons-Brooks passes ~0.5 deg of OC M29 (NGC 6913)
Jan 28-31 - C/2021 S3 (PANSTARRS) passes through the southern extent of nebulosity in the Antares area

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/2023 S3 (Lemmon)						T						
2023S3	2023 12 05.45	xS 14.6	AQ	40.0L	4	182	0.6	3/			ICQ XX WYA	Christopher Wyatt
C/2023 P1 (Nishimura)												
2023P1	2023 12 14.30	M 13.0	AQ	30.0L	5	100	1	5/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023P1	2023 12 11.67	xS 12.8	AQ	40.0L	4	182	1.5	2			ICQ XX WYA	Christopher Wyatt
C/2023 H2 (Lemmon)												
2023H2	2023 12 28.92	M 11.4	AQ	27.0L	5	90	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 27.92	M 11.3	AQ	27.0L	5	90	2	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 19.91	M 10.6	AQ	30.0L	5	65	2	4			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 18.07	Z 11.4		5.0R	4		4				ICQ XX OLAaa	Mike Olason
2023H2	2023 12 17.91	M 10.4	TK	30.0L	5	65	2	4/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 14.91	M 10.0	TK	30.0L	5	65	3	3			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 14.80	S 9.0	TK	20.3T10		77	4	2/			ICQ XX GON05	Juan Jose Gonzalez Suarez
2023H2	2023 12 13.92	M 10.0	TK	30.0L	5	65	3	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 12.92	M 9.9	TK	30.0L	5	65	3	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 11.92	M 9.8	TK	30.0L	5	65	3	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 07.07	Z 9.7		5.0R	4		6				ICQ XX OLAaa	Mike Olason
2023H2	2023 12 05.44	xM 9.4	TK	40.0L	4	59	5.5	4/			ICQ XX WYA	Christopher Wyatt
2023H2	2023 12 03.93	M 9.6	TK	27.0L	5	55	3	3			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 02.92	M 9.4	TK	27.0L	5	55	4	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2023H2	2023 12 02.79	S 8.9	TK	20.3T10		77	7	3			ICQ XX GON05	Juan Jose Gonzalez Suarez
2023H2	2023 12 01.92	M 9.4	TK	27.0L	5	55	4	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
C/2023 A3 (Tsuchinshan-ATLAS)												
2023A3	2023 12 25.22	V 14.4	U4	50.0Y	7a540		0.3				ICQ xx	HER02 Carl Hergenrother
C/2022 JK5 (PANSTARRS)												
2022JK5	2023 12 06.21	Z 15.1		5.0R	4A200		1.4				ICQ XX OLAaa	Mike Olason
2022JK5	2023 12 05.47	xS 15.0	AQ	40.0L	4	261	0.4	3			ICQ XX WYA	Christopher Wyatt
C/2022 E2 (ATLAS)												
2022E2	2023 12 11.64	xM 13.7	AQ	40.0L	4	182	0.7	4/			ICQ XX WYA	Christopher Wyatt
2022E2	2023 12 06.37	Z 13.6		5.0R	4a600		1.4				ICQ XX OLAaa	Mike Olason
C/2021 S3 (PANSTARRS)												
2021S3	2023 12 14.28	M 10.7	AQ	30.0L	5	65	2	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2021S3	2023 12 12.29	M 10.7	AQ	30.0L	5	65	2	3			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2021S3	2023 12 11.68	xM 11.6	AQ	40.0L	4	108	0.9	6	6	m251	ICQ XX WYA	Christopher Wyatt
2021S3	2023 12 03.31	M 10.9	AQ	30.0L	5	88	2	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2021S3	2023 12 02.30	M 11.0	AQ	30.0L	5	88	2	4			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2021S3	2023 12 01.31	M 11.0	AQ	30.0L	5	88	2	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
C/2021 G2 (ATLAS)												
2021G2	2023 12 11.66	xM 14.7	AQ	40.0L	4	182	0.5	3/			ICQ XX WYA	Christopher Wyatt
C/2020 V2 (ZTF)												
2020V2	2023 12 27.93	M 13.0	AQ	27.0L	5	100	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 18.10	Z 12.4		5.0R	4		2				ICQ XX OLAaa	Mike Olason
2020V2	2023 12 17.93	M 12.6	AQ	30.0L	5	121	1	4			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 14.92	M 12.5	AQ	30.0L	5	121	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 13.93	M 12.5	AQ	30.0L	5	121	1	4			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 12.93	M 12.4	AQ	30.0L	5	100	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 11.93	M 12.4	AQ	30.0L	5	100	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 07.10	Z 11.4		5.0R	4		4				ICQ XX OLAaa	Mike Olason
2020V2	2023 12 05.48	xM 11.8	AQ	40.0L	4	59	2.5	6	3.8	m 46	ICQ XX WYA	Christopher Wyatt
2020V2	2023 12 03.94	M 12.1	AQ	27.0L	5	90	1	3			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 02.93	M 11.9	AQ	27.0L	5	90	1	3			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2020V2	2023 12 01.94	M 11.8	AQ	27.0L	5	90	1	3/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
C/2020 K1 (PANSTARRS)												
2020K1	2023 12 11.61	xM 14.8	AQ	40.0L	4	182	0.7	5			ICQ XX WYA	Christopher Wyatt
2020K1	2023 12 05.46	xM 14.4	AQ	40.0L	4	182	0.7	4			ICQ XX WYA	Christopher Wyatt
C/2019 U5 (PANSTARRS)												
2019U5	2023 12 11.63	xM 13.8	AQ	40.0L	4	182	0.6	6			ICQ XX WYA	Christopher Wyatt
C/2017 K2 (PANSTARRS)												
2017K2	2023 12 15.04	M 12.5	AQ	30.0L	5	100	1	4/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2017K2	2023 12 14.03	M 12.5	AQ	30.0L	5	100	1	4			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2017K2	2023 12 13.02	M 12.4	AQ	30.0L	5	100	1	4/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2017K2	2023 12 12.02	M 12.4	AQ	30.0L	5	100	1	4/			ICQ XX DES01	Jose Guilherme de Souza Aguiar
2017K2	2023 12 11.61	xM 12.1	AQ	40.0L	4	59	2.3	6			ICQ XX WYA	Christopher Wyatt
2017K2	2023 12 05.50	xM 12.2	AQ	40.0L	4	59	2	5			ICQ XX WYA	Christopher Wyatt
226P/Pigott-LINEAR-Kowalski												
226	2023 12 18.16	Z 14.4		5.0R	4A080		1.7				ICQ XX OLAaa	Mike Olason
226	2023 12 06.19	Z 14.3		5.0R	4A080		1.7				ICQ XX OLAaa	Mike Olason

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144P/Kushida
144        2023 12 18.15  Z 13.4     5.0R 4       2.5               ICQ XX OLAaa Mike Olason
144        2023 12 06.15  Z 13.9     5.0R 4       2                 ICQ XX OLAaa Mike Olason
144        2023 12 05.49 xM 14.9 AQ 40.0L 4 261   0.5  4            ICQ XX WYA   Christopher Wyatt
103P/Hartley
103        2023 12 21.18  I&12.5 S  25.0C15  94 & 1                 ICQ XX DEC   Michel Deconinck
103        2023 12 18.29  Z 12.0     5.0R 4       3                 ICQ XX OLAaa Mike Olason
103        2023 12 15.22  M 12.0 AQ 30.0L 5  88   1    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 14.22  M 11.8 AQ 30.0L 5  88   1    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 13.21  M 11.8 AQ 30.0L 5  88   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 12.21  M 11.7 AQ 30.0L 5  88   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 11.62 xS 11.2 AQ 40.0L 4  59   3.7  3            ICQ XX WYA   Christopher Wyatt
103        2023 12 06.35  Z 11.3     5.0R 4       3                 ICQ XX OLAaa Mike Olason
62P/Tsuchinshan
 62        2023 12 28.25  S  8.0 TK 15.0L 5  37   5    4            ICQ XX SOU01 Willian Souza
 62        2023 12 27.18  M  8.2 TK 10.0B    25   4    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 21.14  O  8.5 S  25.0C15  94   3    4/& 5   m290 ICQ XX DEC   Michel Deconinck
 62        2023 12 19.21  M  8.7 TK 10.0B    25   6    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 18.30  Z  7.8     5.0R 4       8                 ICQ XX OLAaa Mike Olason
 62        2023 12 18.22  M  8.7 TK 10.0B    25   6    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 15.22  M  8.8 TK 10.0B    25   8    4/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 15.05  S  8.8 TK 20.3T10  77   6    3   0.3  290 ICQ XX GON05 Juan Jose Gonzalez Suarez
 62        2023 12 15.04  S  8.2 TK  5.0B    10   8    3/           ICQ XX GON05 Juan Jose Gonzalez Suarez
 62        2023 12 14.21  M  9.0 TK 10.0B    25   8    5            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 14.20  M  9.0 TK 30.0L 5  65   5    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 13.41  S  8.4 TK 12.5B    30   7    4/           ICQ xx HER02 Carl Hergenrother
 62        2023 12 13.20  M  9.0 TK 30.0L 5  65   5    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 12.20  M  9.2 TK 30.0L 5  65   4    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 11.67 xM  8.9 TK 40.0L 4  59   5.3  4/           ICQ XX WYA   Christopher Wyatt
 62        2023 12 06.33  Z  9.0     5.0R 4       8                 ICQ XX OLAaa Mike Olason
32P/Comas Sola
 32        2023 12 18.13  Z 13.6     5.0R 4A200   1.7               ICQ XX OLAaa Mike Olason
 32        2023 12 17.74  S 12.5 TI 53.1L   162   1.2  3            ICQ XX HAR11 Christian Harder
 32        2023 12 13.99  M 13.8 TK 30.0L 5 121   1    6            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 32        2023 12 12.99  M 13.8 TK 30.0L 5 121   1    5/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 32        2023 12 11.99  M 13.7 TK 30.0L 5 121   1    5/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 32        2023 12 06.17  Z 13.6     5.0R 4A200   1.7               ICQ XX OLAaa Mike Olason
 32        2023 12 05.50 xM 13.5 AQ 40.0L 4 108   1    5/           ICQ XX WYA   Christopher Wyatt
29P/Schwassmann-Wachmann
 29        2023 12 18.27  Z 12.1     5.0R 4       2                 ICQ XX OLAaa Mike Olason
 29        2023 12 15.01  S 13.2 AQ 20.3T10 167   0.7  7            ICQ XX GON05 Juan Jose Gonzalez Suarez
 29        2023 12 14.19  M 13.1 AQ 30.0L 5 121   1    7            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 29        2023 12 11.64 xM 13.0 AQ 40.0L 4 108   0.5  7            ICQ XX WYA   Christopher Wyatt
12P/Pons-Brooks
 12        2023 12 30.75  I 10.1 S  12.5B 5  25                     ICQ XX DEC   Michel Deconinck
 12        2023 12 29.08  M  8.8 TK 12.5B    30   5    1            ICQ xx HER02 Carl Hergenrother
 12        2023 12 18.69  S  8.4 TK 10.5R 6  53   1.5               PIL01 Uwe Pilz
 12        2023 12 18.11  Z  8.2     5.0R 4       8                 ICQ XX OLAaa Mike Olason
 12        2023 12 17.72  S  9.7 TI 53.1L   113   3.2  3/           ICQ XX HAR11 Christian Harder
 12        2023 12 14.81  S  9.5 TK 20.3T10  77   5    2/           ICQ XX GON05 Juan Jose Gonzalez Suarez
 12        2023 12 14.07  M  9.3 TK 12.5B    30   4    2            ICQ xx HER02 Carl Hergenrother
 12        2023 12 11.05  S  9.0 AC 20.0T10  50   2.3  4/           ICQ XX AGU01 Salvador Aguirre
 12        2023 12 08.08  M  9.0 TK 12.5B    30   3    5            ICQ xx HER02 Carl Hergenrother
 12        2023 12 07.79  S  8.8 TK 10.5R 6  53   2    2/               PIL01 Uwe Pilz
 12        2023 12 07.12  Z  8.6     5.0R 4       8                 ICQ XX OLAaa Mike Olason
 12        2023 12 06.12  Z  8.8     5.0R 4       5                 ICQ XX OLAaa Mike Olason
 12        2023 12 02.81  S  8.5 TK 20.3T10  77   6    2/           ICQ XX GON05 Juan Jose Gonzalez Suarez
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Comets News

Recap of 2023

2023 was another nice year for comet observers. While there were no "Great" comets, we did get one faint naked-eye comet in C/2022 E3 (ZTF) and another that became even brighter but never obtained naked-eye visibility (for most of us) due to being located against a very bright sky, C/2023 P1 (Nishimura).

To quickly recap 2023, here are a few Top 10 lists based on submissions to the ALPO Comets Section.

Top 10 Brightest Comets of 2023 (not counting comets only seen from space)

1. C/2023 P1 (Nishimura) (mag 2.3)
2. C/2022 E3 (ZTF) (mag 4.6)
3. C/2023 H2 (Lemmon) (mag 6.1)
4. 96P/Machholz (mag 7.7)
5. C/2017 K2 (PANSTARRS) (mag 8.2)
6. 2P/Encke (mag 8.2)
7. 62P/Tsuchinshan (mag 8.4)
8. C/2023 E1 (ATLAS) (mag 8.5)
9. C/2022 A2 (PANSTARRS) (mag 8.6)
10. 103P/Hartley (mag 8.7)

Top 10 Most Imaged Comets of 2023 (in total, 1,100 images were submitted for 75 comets)

1. C/2022 E3 (ZTF) 236 images
2. 12P/Pons-Brooks 175 images
3. C/2023 P1 (Nishimura) 136 images
4. C/2023 H2 (Lemmon) 60 images
5. C/2023 E1 (ATLAS) 60 images
6. 103P/Hartley 2 56 images
7. C/2020 V2 (ZTF) 44 images
8. 62P/Tsuchinshan 36 images
9. 2P/Encke 33 images
10. 29P/Schwassmann-Wachmann 18 images

Top 10 Most Magnitude Estimates in 2023 (in total, 1,267 estimates were submitted for 75 comets)

1. C/2022 E3 (ZTF) 128 estimates
2. C/2020 V2 (ZTF) 108 estimates
3. 12P/Pons-Brooks 92 estimates
4. 103P/Hartley 80 estimates
5. C/2023 P1 (Nishimura) 79 estimates
6. C/2023 E1 (ATLAS) 75 estimates
7. C/2022 A2 (PANSTARRS) 69 estimates
8. C/2023 H2 (Lemmon) 63 estimates
9. C/2019 U5 (PANSTARRS) 54 estimates
10. C/2021 T4 (Lemmon) 49 estimates

Looking Ahead to 2024

The chart below shows those comets expected to become brighter than magnitude 10.0 in 2024. The number in each date bin is the expected brightness for that date. Magnitudes are only shown for dates when the comet is above the horizon during the dark of night (between the end of astronomical twilight in the evening and the start of astronomical twilight in the morning). The only exceptions are the dates bolded in red for C/2023 A3 (Tsuchinshan-ATLAS) when the comet will only be above the horizon in twilight but still may be bright enough to be observed.

All brightness predictions are just that, predictions, and may be off by many magnitudes. Additionally, C/2023 A3 may be 1 or more magnitudes brighter than shown in early October due to forward scattering by dust.

Northern Hemisphere	01/01/24	01/11/24	01/21/24	01/31/24	02/10/24	02/20/24	03/01/24	03/11/24	03/21/24	03/31/24	04/10/24	04/20/24	04/30/24	05/10/24	05/20/24	05/30/24	06/09/24	06/19/24	06/29/24	07/09/24	07/19/24	07/29/24	08/08/24	08/18/24	08/28/24	09/07/24	09/17/24	09/27/24	10/07/24	10/17/24	10/27/24	11/06/24	11/16/24	11/26/24	12/06/24	12/16/24	12/26/24
C/2021 S3 (PANSTARRS)	9	9	9	9	9	8	8	8	8	9	9	9	9																							
62P/Tsuchinshan	8	8	8	8	9	9																														
12P/Pons-Brooks	8	8	8	7	7	6	6	5	5	4	4																									
144P/Kushida		9	8	8	7	8	8	9																												
13P/Olbers												9	9	8	8	8	7	7	7	7	7	8	8	9	9											
C/2023 A3 (Tsuchinshan-ATLAS)																		9	9	9	9	8	8	7	6	5	4	2	1	2	4	6	7	8	9	9
333P/LINEAR																																			9	
Southern Hemisphere																																				
C/2021 S3 (PANSTARRS)	8	7	7	7	7	7	7	7	7	7	7	8	8	8	9	9																				
62P/Tsuchinshan	9	9	9	9								4	4	4	5	6	6	7	8	8	9	9														
12P/Pons-Brooks													5	5	6	7	7	8	8	9	9															
144P/Kushida		9	8	8	7	8	8	9																												
13P/Olbers												9										8	8	9	9											
C/2023 A3 (Tsuchinshan-ATLAS)																				9	8	8	7	6	5	4	2	1	2	4	6	7				
333P/LINEAR																																		9		

Figure 1 - Observability and brightness of comets expected to become brighter than magnitude 10.0 in 2024.

Latest Periodic Comet Numberings

```
472P/2002 T6 = P/2023 RL75 (NEAT-LINEAR)          MPC 167069
471P/2023 KF3 = P/2010 YK3                        MPC 164694
470P/2014 W1 = P/2023 O2 (PANSTARRS)              MPC 164694
469P/2015 XG422 (PANSTARRS)                       MPC 164694
468P/2004 V3 = P/2023 O1 (Siding Spring)          MPC 164694
```

New Discoveries and Recoveries

P/2023 Y1 (Gibbs) – The 32nd comet to bear the name "Gibbs" was found by Alex Gibbs of the Catalina Sky Survey at the University of Arizona on 2023 December 17 at 20th magnitude with the Mount Lemmon 1.5-m. Pre-discovery observations by the Pan-STARRS2 1.8-m were found from 2023 November 24. P/2023 Y1 (Gibbs) is a short-period comet with a 6.7-year orbital period and perihelion on 2023 November 29 at 2.07 au. It should peak in brightness around magnitude 19.9 when at opposition in early March 2023. [CBET 5328, MPEC 2023-Y60]

C/2023 X4 (Hogan) – Joshua K. Hogan of the Catalina Sky Survey discovered this comet at 19th magnitude on 2023 December 13 with the Mount Lemmon 1.5-m. C/2023 X4 (Hogan) is an intermediate-period comet with an orbital period of 31 years. Perihelion occurs on 2024 May 24 at 3.66 au. It is likely the comet is already at its brightest. This is the 2nd comet after C/2022 Y1 to be named after Hogan. [CBET 5327, MPEC 2023-X272].

P/2023 X3 (PANSTARRS) – On 2023 December 7, both the Pan-STARRS1 and Pan-STARRS2 1.8-m telescopes imaged this comet at 21st magnitude. P/2023 X3 (PANSTARRS) is a short-period comet with a period of 8.8 years and perihelion on 2024 April 22 at 3.03 au. With opposition in December, the comet is currently at its brightest. [CBET 5326, MPEC 2023-X269]

C/2023 X2 (Lemmon) – Both Pan-STARRS and the Mount Lemmon Survey discovered this 19-20th magnitude comet on 2023 December 4. Due to the Mount Lemmon observations being posted on the NEOCP first, it is named "Lemmon." Pre-discovery observations were found back to August 2023. Though still over 7 au from the Sun, it won't get too much closer when it arrives at perihelion on 2025 December 28, at 5.09 au, though it will have brightened to 17th magnitude. [CBET 5323, MPEC 2023-X226]

C/2023 X1 (Leonard) – Greg Leonard of the Catalina Sky Survey found the 20th comet to bear his name on 2023 December 4 at 14th magnitude. C/2023 X1 (Leonard) was found a few weeks after its 2023 October 18 perihelion at 0.96 au. Unfortunately, it should be fading now. [CBET 5322, MPEC 2023-X225]

P/2023 W1 = P/2001 Q6 (NEAT) – Hidetaka Sato of Tokyo, Japan, recovered P/2001 Q6 (NEAT) on 2023 November 29, 30 and December 1 at17-18th magnitude. P/2001 Q6 was discovered on 2001 August 28 and reached 10th magnitude at its November 2001 perihelion. The current return is not as well placed, resulting in a peak at a fainter 12th magnitude at perihelion on 2024 February 26 at 1.41 au. [CBET 5325, MPEC 2023-X258]

C/2023 RN3 (ATLAS) – Back in September 2023, the ATLAS program found an 18th magnitude stellar object with their 0.5-m telescope on Haleakala. Several observers found cometary activity in October and November. C/2023 RN3 is an intermediate-period object with a 32-year orbital period. Perihelion occurred on 2023 January 16 at 5.17 au. [CBET 5321, MPEC 2023-X85]

Comets Between Magnitude 6 and 10

12P/Pons-Brooks

Discovered visually on 1812 July 12 by Jean-Louis Pons and rediscovered visually on 1883 September 2 by William R. Brooks
Halley-type comet

Orbit (from Minor Planet Center, MPEC 2023-Y97)

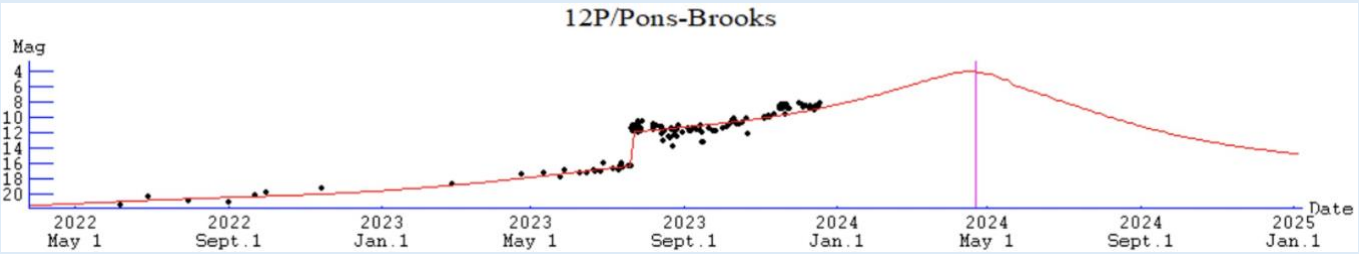
```
  12P/Pons-Brooks
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2024 Apr. 21.13060 TT                                  Rudenko
q   0.7808714            (2000.0)            P              Q
n   0.01383110     Peri.  198.98731     +0.14512983     -0.32931068
a  17.1882460      Node   255.85495     +0.98565687     +0.13020641
e   0.9545695      Incl.   74.19084     +0.08612699     -0.93520092
P  71.3
From 5919 observations 2023 Feb. 27-Dec. 28, mean residual 0".6.
```

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

```
12P/Pons-Brooks                                                    Max El
                                                                    (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag  40N  40S
2024-Jan-01  19 36  +37 44    1.999    2.259     62E    Cyg    8.9   30    0
2024-Jan-06  19 51  +37 47    1.935    2.202     61E    Cyg    8.8   28    0
2024-Jan-11  20 06  +37 52    1.870    2.145     60E    Cyg    8.6   27    0
2024-Jan-16  20 22  +37 59    1.804    2.088     59E    Cyg    8.4   26    0
2024-Jan-21  20 40  +38 06    1.739    2.033     58E    Cyg    8.2   24    0
2024-Jan-26  20 58  +38 12    1.672    1.979     57E    Cyg    7.9   23    0
2024-Jan-31  21 18  +38 15    1.606    1.928     56E    Cyg    7.7   23    0
2024-Feb-05  21 39  +38 14    1.540    1.879     54E    Cyg    7.5   22    0
```

Comet Magnitude Formula (from ALPO and COBS data for the 1954 and 2023 returns)

```
m1 =  6.8 + 5 log d + 11.6 log r [between T-684 and T-275 days]
m1 =  4.4 + 5 log d +  7.2 log r [between T-275 days and perihelion]
m1 =  5.2 + 5 log d + 15.5 log r [between perihelion and T+30 days]
m1 =  5.1 + 5 log d + 11.4 log r [after T+30 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
 12        2023 12 30.75  I 10.1 S  12.5B 5  25                    ICQ XX DEC   Michel Deconinck
 12        2023 12 29.08  M  8.8 TK 12.5B    30   5    1           ICQ xx HER02 Carl Hergenrother
 12        2023 12 18.69  S  8.4 TK 10.5R 6  53   1.5                      PIL01 Uwe Pilz
 12        2023 12 18.11  Z  8.2     5.0R 4       8                ICQ XX OLAaa Mike Olason
 12        2023 12 17.72  S  9.7 TI 53.1L   113   3.2  3/          ICQ XX HAR11 Christian Harder
 12        2023 12 14.81  S  9.5 TK 20.3T10  77   5    2/          ICQ XX GON05 Juan Jose Gonzalez Suarez
 12        2023 12 14.07  M  9.3 TK 12.5B    30   4    2           ICQ xx HER02 Carl Hergenrother
 12        2023 12 11.05  S  9.0 AC 20.0T10  50   2.3  4/          ICQ XX AGU01 Salvador Aguirre
 12        2023 12 08.08  M  9.0 TK 12.5B    30   3    5           ICQ xx HER02 Carl Hergenrother
 12        2023 12 07.79  S  8.8 TK 10.5R 6  53   2    2/                   PIL01 Uwe Pilz
 12        2023 12 07.12  Z  8.6     5.0R 4       8                ICQ XX OLAaa Mike Olason
 12        2023 12 06.12  Z  8.8     5.0R 4       5                ICQ XX OLAaa Mike Olason
 12        2023 12 02.81  S  8.5 TK 20.3T10  77   6    2/          ICQ XX GON05 Juan Jose Gonzalez Suarez
```

The focus of most comet watchers during the first half of 2024 will be returning Halley-family comet 12P/Pons-Brooks. The comet is making its first return since 1954, and the 6th or 7th observed return in total after being discovered in 1812, re-discovered in 1883, and seen back in 1457 and 1385, possibly in 245 AD.

The 2024 return isn't particularly good, with the comet never getting closer to Earth than 1.55 au. That, combined with perihelion at 0.78 au (T = 2024 April 21), means it will be located at very low solar elongations when at its brightest (peak at 4-5th magnitude). Still, 12P will be an interesting object to observe, with many large outbursts and a coma with lots of dynamic features (shells, jets, etc.).

December witnessed additional major outbursts by 12P. Recently on the BAA Comets Section mailing list (https://www.simplelists.com/baa-comet/msg/23992047/), Nick James called attention to a 15-day cadence in the outbursts of 12P going back to late October. If true, this may be a sign that 12P's nucleus rotates with a period of ~15 days. It also suggests that the next outburst should occur at the very end of December or early January. Time will tell.

The table below lists the some of the significant outbursts of 12P during the current apparition. It updates the list of outbursts published in the last ALPO Comets News based on messages and news items from the BAA and comets-ml (https://groups.io/g/comets-ml/message/31802 and https://britastro.org/section_news_item/comet-12p-pons-brooks-outburst-continue). Note that the outburst amplitude is for a small aperture centered on the nucleus and not for the entire coma (not the total magnitude), which is why some of the outbursts aren't obvious in the above lightcurve.

```
2023 07 20     Amplitude = 5.1 mag
2023 09 04     Amplitude = 0.4 mag
2023 09 23     Amplitude = 0.9 mag
2023 10 05     Amplitude = 3.9 mag
2023 10 22     Amplitude = 0.4 mag
2023 10 31     Amplitude = 3.7 mag
2023 11 01     Amplitude = 2.5 mag
2023 11 14     Amplitude = 5.1 mag
2023 11 30     Amplitude = 4.0 mag
2023 12 14     Amplitude = 3.0 mag
```

As has been the case for most of this apparition, 12P isn't visible from southern mid-latitudes. Northerners can spot the comet low in the northwestern sky at the end of evening twilight in Cygnus. It is difficult to predict exactly how bright the comet will be in January since its visual brightness is sensitive to outburst activity (in particular, sensitive to the size and degree of condensation of the coma). Digital photometry submitted to the COBS archive finds 12P around magnitude ~9. Visual photometry submitted to the ALPO and COBS finds the comet closer to magnitude 10 to 11. The difference may be due to the comet displaying a "two-tiered" coma, a bright inner coma, and a faint outer coma. It is possible many visual observers only see the inner coma while digital observers see both comae.

The brightness predictions used for this month are based on the 1954 return. If the comet is still following that brightening trend, then it will brighten from around magnitude 8.9 on the 1st to 7.7 at the end of the month.

December Photo Ops:
Jan 12-13 - 12P/Pons-Brooks passes ~0.5 deg of the Crescent Nebula (NGC 6888) and OC IC 4996
Jan 15-16 - 12P/Pons-Brooks passes ~0.5 deg of OC M29 (NGC 6913)

Figure 2- Dan Bartlett imaged 12P/Pons-Brooks on December 4 as it moved past the bright star Vega. The image was made with a Hyperstar-equipped C14 at f/2. The composite consists of 126 x 30-sec exposures.

Figure 3 – Gregory T. Shanos used a new ZWO SeeStar S50 smart telescope to capture 12P/Pons-Brooks in a 8-minute exposure taken on December 10. The SeeStar S50 consists of a 50mm f/5 apo triplet and the equivalent of a color ASI462 camera.

62P/Tsuchinshan

Discovered photographically on 1965 January 1 at the Purple Mountain (Tsuchinshan) Observatory
Short-period comet

Orbit (from Minor Planet Center, MPEC 2023-Y97)

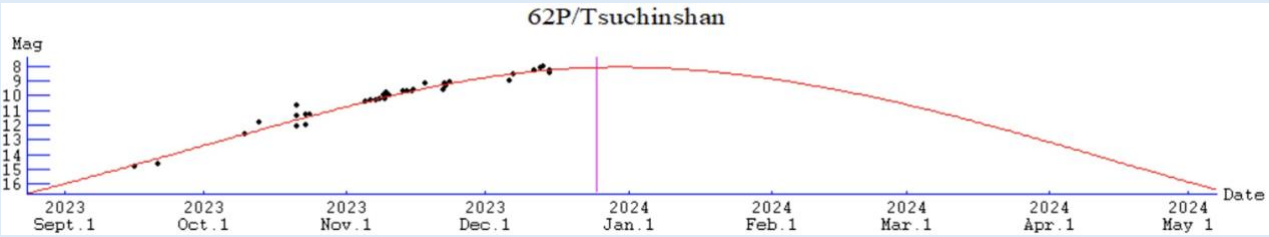
```
  62P/Tsuchinshan
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2023 Dec. 25.09687 TT                                  Rudenko
q   1.2650168           (2000.0)            P              Q
n   0.15924166     Peri.   47.28483     -0.43533738     -0.89697354
a   3.3710478      Node    68.67086     +0.79996023     -0.42462113
e   0.6247408      Incl.    4.73790     +0.41297094     -0.12302584
P   6.19
From 654 observations 2023 Aug. 29-Dec. 28, mean residual 0".5.
     Nongravitational parameters A1 = -1.45, A2 = +0.1132.
```

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

```
62P/Tsuchinshan                                                    Max El
                                                                    (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag  40N  40S
2024-Jan-01  11 31  +13 09    1.268    0.521    111M   Leo    8.1   63   28
2024-Jan-06  11 45  +12 24    1.273    0.514    112M   Leo    8.1   62   30
2024-Jan-11  11 58  +11 44    1.281    0.509    114M   Leo    8.2   62   32
2024-Jan-16  12 09  +11 10    1.292    0.505    116M   Vir    8.3   61   34
2024-Jan-21  12 18  +10 43    1.306    0.502    119M   Vir    8.4   61   36
2024-Jan-26  12 26  +10 22    1.322    0.500    122M   Vir    8.6   60   38
2024-Jan-31  12 32  +10 07    1.340    0.500    125M   Vir    8.8   60   39
2024-Feb-05  12 37  +09 59    1.361    0.501    129M   Vir    9.1   60   40
```

Comet Magnitude Formula (from 2023 ALPO observations)

```
m1 = 5.9 + 5 log d + 34.9 log r
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
 62        2023 12 28.25  S  8.0 TK 15.0L 5  37   5    4            ICQ XX SOU01 Willian Souza
 62        2023 12 27.18  M  8.2 TK 10.0B    25   4    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 21.14  O  8.5 S  25.0C15  94   3    4/& 5   m290 ICQ XX DEC   Michel Deconinck
 62        2023 12 19.21  M  8.7 TK 10.0B    25   6    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 18.30  Z  7.8     5.0R 4       8                 ICQ XX OLAaa Mike Olason
 62        2023 12 18.22  M  8.7 TK 10.0B    25   6    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 15.22  M  8.8 TK 10.0B    25   8    4/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 15.05  S  8.8 TK 20.3T10  77   6    3   0.3  290 ICQ XX GON05 Juan Jose Gonzalez Suarez
 62        2023 12 15.04  S  8.2 TK  5.0B    10   8    3/           ICQ XX GON05 Juan Jose Gonzalez Suarez
 62        2023 12 14.21  M  9.0 TK 10.0B    25   8    5            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 14.20  M  9.0 TK 30.0L 5  65   5    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 13.41  S  8.4 TK 12.5B    30   7    4/           ICQ xx HER02 Carl Hergenrother
 62        2023 12 13.20  M  9.0 TK 30.0L 5  65   5    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 12.20  M  9.2 TK 30.0L 5  65   4    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 62        2023 12 11.67 xM  8.9 TK 40.0L 4  59   5.3  4/           ICQ XX WYA   Christopher Wyatt
 62        2023 12 06.33  Z  9.0     5.0R 4       8                 ICQ XX OLAaa Mike Olason
```

Short-period comet 62P/Tsuchinshan is having its best return between 1900 and 2100. A close approach to 0.15 au of Jupiter in 1960 dropped 62P's perihelion from around 2.0 au to 1.5 au. The discovery apparition of 1965 was the first after the close approach with the comet brightening to 15th magnitude. Surprisingly, during its 1985 return, which was very similar to the one in 1965, 62P reached a brighter 10th magnitude. Additional close

approaches to Jupiter in 2009 and 2020 dropped perihelion to 1.38 and 1.26 au, respectively. At its most recent return in 2017, the comet reached 10th magnitude even though it came no closer than 1.02 au from Earth. This year, the comet will arrive at perihelion on 2023 December 25, at 1.26 au, and have its closest approach to Earth on 2024 January 29, at 0.50 au.

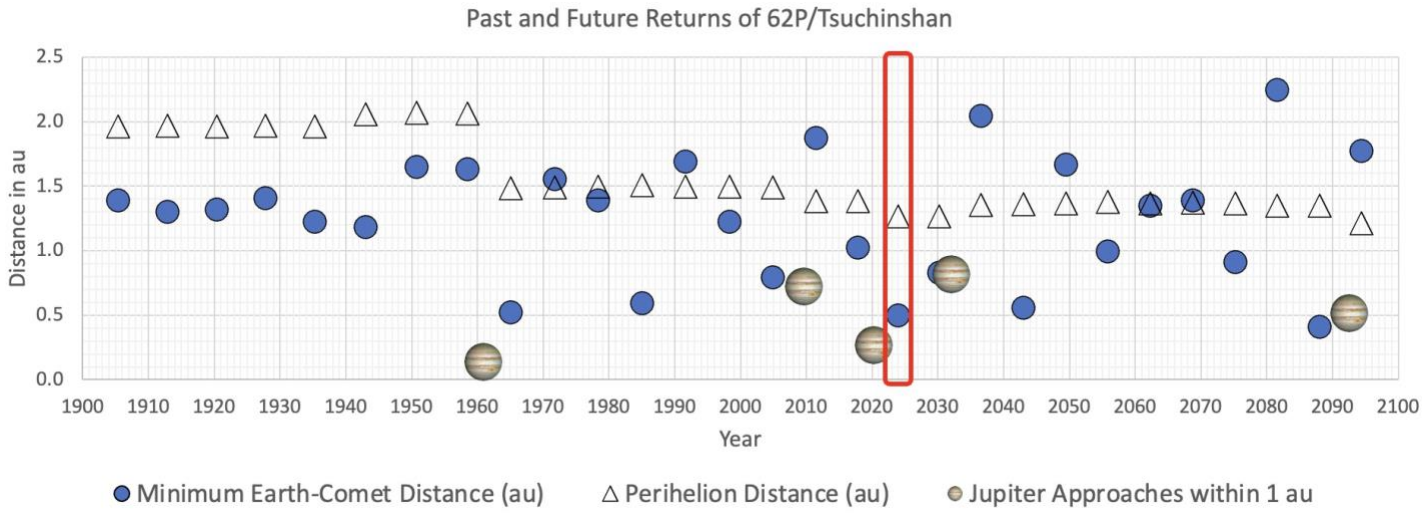


Figure 4 - Orbital evolution of 62P/Tsuchinshan from JPL Horizons data. The current apparition is highlighted in red.

The comet brightened to around magnitude 8.0 at the end of December with a large 7-8' visual moderately condensed coma. January sees the comet still near its peak brightness (~mag 8.0), though it the comet should slowly fade by almost a magnitude by the end of the month. The comet is a morning object observable from both hemispheres in Leo (Jan 1-11) and Virgo (11-31).

Figure 5 – For a short period on 2023 December 23, the Leo Trio of galaxies became a quartet as 62P/Tsuchinshan drifted by. Chris Schur captured this image in spite of a Full Moon with a 10" f/2.8 Astrograph and Atik 16200 camera from Payson, AZ.

144P/Kushida

Discovered photographically on 1994 January 8 by Yoshio Kushida (Yatsugatake South Base Observatory, Japan)
Short-period comet

Orbit (from Minor Planet Center, MPEC 2023-Y97)

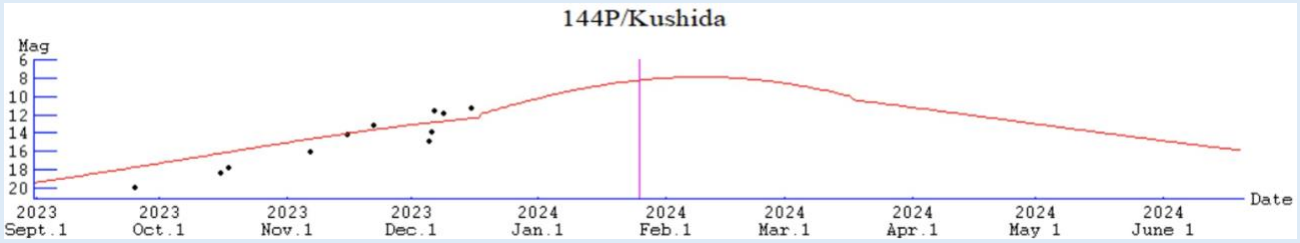
```
144P/Kushida
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2024 Jan. 25.76806 TT                                  Rudenko
q   1.3987800           (2000.0)            P              Q
n   0.13135582     Peri.  216.32082     -0.15948801     -0.98531032
a   3.8326855      Node   242.92840     +0.92112512     -0.12628396
e   0.6350392      Incl.    3.93140     +0.35509447     -0.11496054
P   7.50
From 1209 observations 2016 July 31-2023 Dec. 28, mean residual 0".5.
     Nongravitational parameters A1 = +0.68, A2 = -0.0257.
```

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

```
144P/Kushida                                                        Max El
                                                                     (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag  40N  40S
2024-Jan-01  03 03  +14 17   1.413   0.578    127E   Ari  10.2   64   33
2024-Jan-06  03 11  +14 17   1.403   0.589    124E   Ari   9.7   64   33
2024-Jan-11  03 20  +14 23   1.394   0.601    121E   Ari   9.3   64   32
2024-Jan-16  03 30  +14 34   1.389   0.615    118E   Tau   8.9   65   31
2024-Jan-21  03 41  +14 50   1.385   0.631    116E   Tau   8.5   65   31
2024-Jan-26  03 53  +15 08   1.384   0.650    114E   Tau   8.3   65   31
2024-Jan-31  04 06  +15 29   1.386   0.670    112E   Tau   8.1   66   30
2024-Feb-05  04 20  +15 51   1.390   0.692    110E   Tau   8.0   66   30
```

Comet Magnitude Formula (from Seiichi Yoshida)

```
m1 =  7.5 + 5 log d +  30.0 log r [until T-39 days]
m1 = -5.5 + 5 log d + 100.0 log r [between T-20 and T+52 days]
m1 =  6.0 + 5 log d +  25.0 log r [after T+52 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

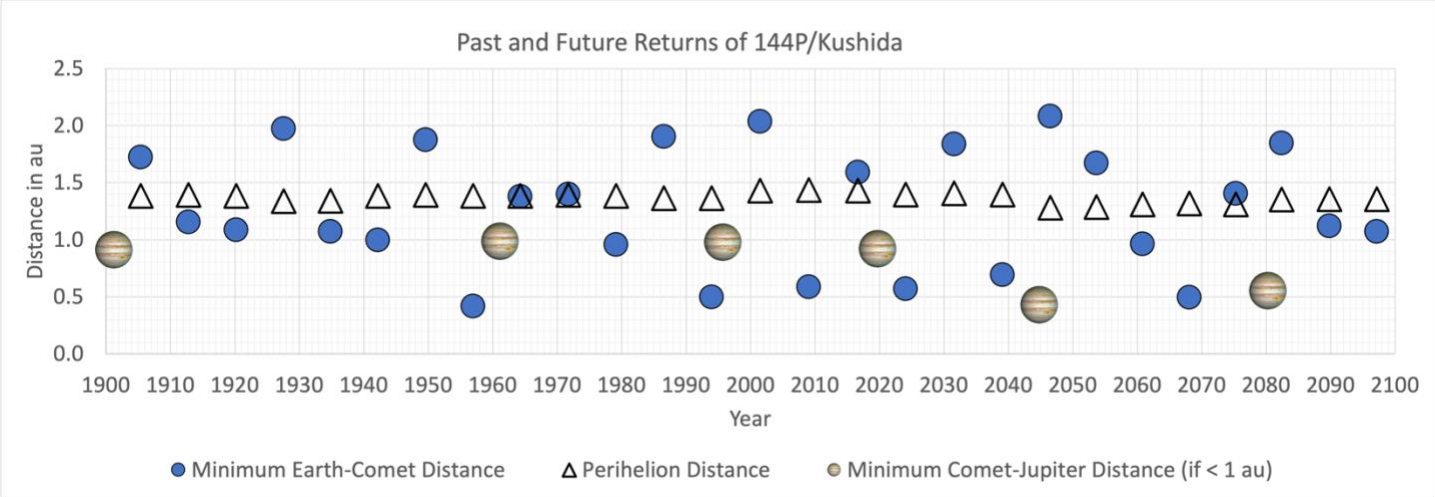
```
Recent Magnitude Measurements in ICQ format:
Comet Des  YYYY MM DD.DD     Mag SC APER FL POW    COMA     TAIL    ICQ CODE Observer Name
                (UT)                    T         Dia  DC  LENG  PA
144        2023 12 18.15  Z 13.4     5.0R 4       2.5                ICQ XX OLAaa Mike Olason
144        2023 12 06.15  Z 13.9     5.0R 4       2                  ICQ XX OLAaa Mike Olason
144        2023 12 05.49 xM 14.9 AQ 40.0L 4 261   0.5  4             ICQ XX WYA   Christopher Wyatt
```

The Jupiter family comet 144P/Kushida is currently in an orbit with a 7.5-year orbital period. The 2024 return is its 5th observed return, with the comet being seen at every return since its discovery in 1994 by Japanese seismologist and amateur astronomer Yoshio Kushida. 144P is one of two comets that Kushida discovered. Both comets were photographic discoveries, and both were discovered only a month apart, in December 1994 and January 1994. The other discovery is also a short-period comet, 147P/Kushida-Muramatsu. 144P was the second of Kushida's finds, having been discovered on the night of 1994 January 8 with a 0.10-m f/4 patrol telescope.

The discovery apparition in 1994 saw the comet brighten to 9th magnitude. The return in 2009 was also a good one, with a peak brightness of 8th magnitude.

Kushida has its best returns when its perihelion is in December or January. This year's perihelion is on January 25, which makes this a good return with a perihelion distance of 1.40 au and closest approach to Earth a few weeks earlier at 0.57 au. Like many short-period comets, 144P brightens rapidly and usually has peaks in brightness after perihelion.

There is a bit of a mystery surrounding 144P/Kushida. The comet never gets very close to Jupiter, and as a result, its orbit is fairly stable over a 200-year period between 1900 and 2100. Since 1900, its perihelion has only ranged between 1.34 and 1.44 au. So, if this comet routinely gets up to 8th, 9th, or 10th magnitude, why wasn't it discovered prior to 1994? Even at relatively poor returns like the previous one in 2016, the comet still reached 10-11th magnitude. How was the comet not seen before since it could have been bright enough to be a visual discovery multiple times since 1900 and should have been an 8th-magnitude object near opposition in late 1956 and early 1957. Perhaps Kushida was a less active comet pre-1994.



144P passed its closest approach to Earth on December 12 and will arrive at perihelion on January 25 at 1.40 AU. The month should see a rapid brightening from around magnitude 10.2 to 8.1. It will continue to brighten by another few tenths of a magnitude into February thanks to its post-perihelion peak in activity, even though it will be moving away from the Earth and Sun by then. This month, the comet is an evening object in Aries (Jan 1-12) and Taurus (12-31).

C/2021 S3 (PANSTARRS)

Discovered 2021 September 24 by PANSTARRS with the Pan-STARRS2 1.8-m Ritchey-Chretien reflector at Haleakala
Long-period comet

Orbit (from Minor Planet Center, MPEC 2023-Y97)

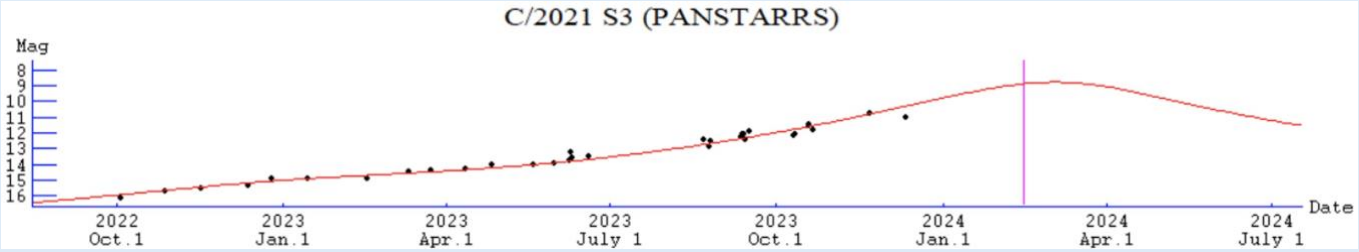
```
    C/2021 S3 (PANSTARRS)
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2024 Feb. 14.71937 TT                                  Rudenko
q   1.3201327           (2000.0)            P              Q
z  -0.0001408      Peri.    6.86253     -0.77074095     +0.39897399
 +/-0.0000023      Node   215.62059     -0.61758545     -0.65952899
e   1.0001858      Incl.   58.53338     -0.15667352     +0.63705673
From 1032 observations 2020 Dec. 6-2023 Dec. 26, mean residual 0".5.
1/a(orig) = +0.000146 AU**-1, 1/a(fut) = +0.000061 AU**-1.
```

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

```
C/2021 S3 (PANSTARRS)                                                Max El
                                                                      (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag  40N  40S
2024-Jan-01  14 50  -37 40    1.477    1.878     51M    Cen    9.8    5   27
2024-Jan-06  15 08  -36 34    1.446    1.821     52M    Lup    9.7    7   27
2024-Jan-11  15 26  -35 12    1.418    1.763     53M    Lup    9.6    8   28
2024-Jan-16  15 44  -33 34    1.393    1.707     54M    Lup    9.4   10   29
2024-Jan-21  16 02  -31 39    1.371    1.652     56M    Lup    9.3   11   30
2024-Jan-26  16 19  -29 26    1.353    1.598     57M    Sco    9.2   13   31
2024-Jan-31  16 36  -26 55    1.338    1.547     58M    Sco    9.1   16   32
2024-Feb-05  16 53  -24 06    1.328    1.499     60M    Oph    9.0   18   32
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  7.4 + 5 log d + 6.1 log r
Where "t" is the date of perihelion, "d" is Comet-Earth distance in au, and "r" is Comet-Sun distance in au.
```



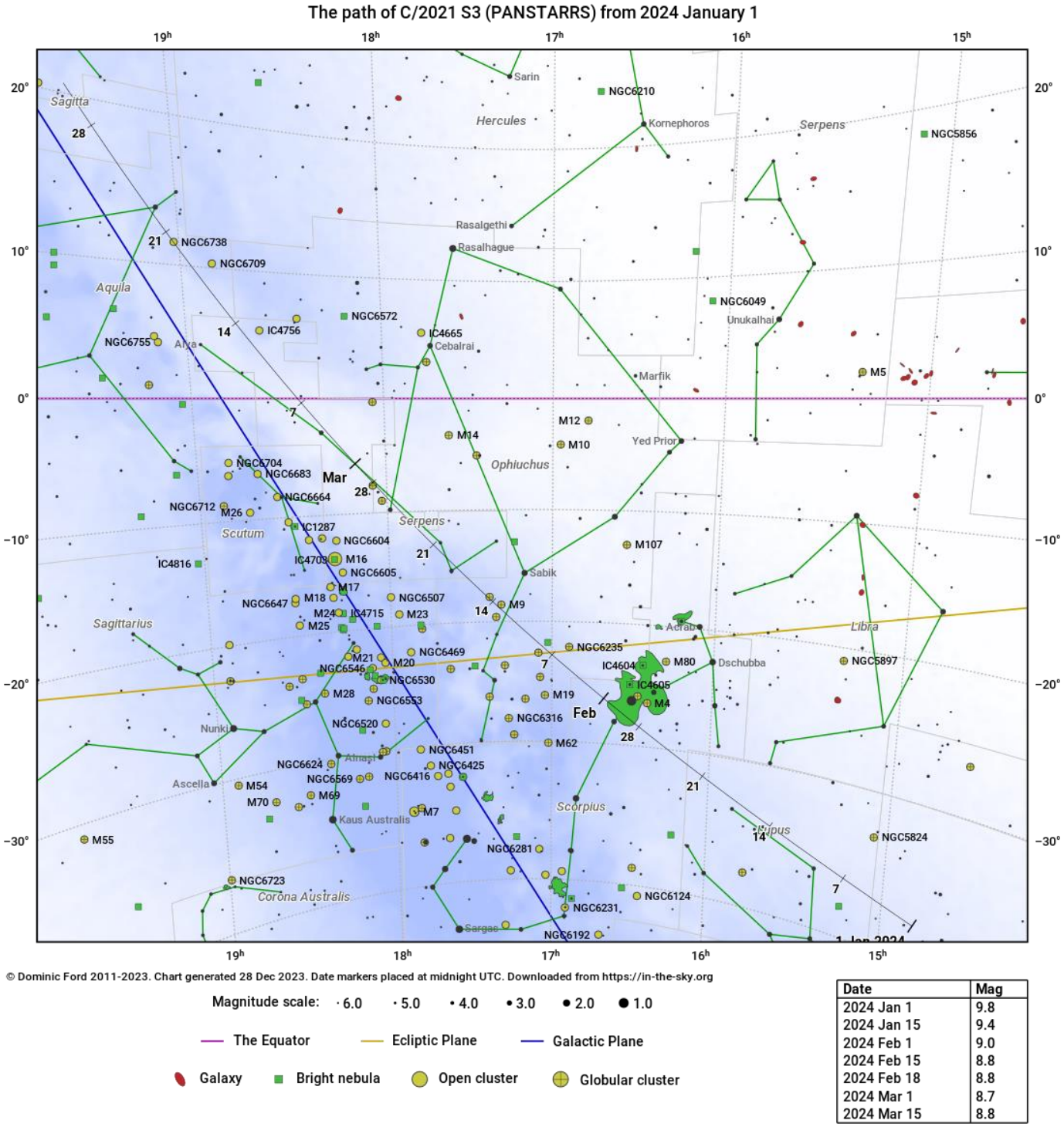
Recent Magnitude Measurements Contributed to the ALPO Comets Section

```
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
   2021S3  2023 12 14.28  M 10.7 AQ 30.0L 5  65   2    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2021S3  2023 12 12.29  M 10.7 AQ 30.0L 5  65   2    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2021S3  2023 12 11.68 xM 11.6 AQ 40.0L 4 108   0.9  6   6   m251 ICQ XX WYA   Christopher Wyatt
   2021S3  2023 12 03.31  M 10.9 AQ 30.0L 5  88   2    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2021S3  2023 12 02.30  M 11.0 AQ 30.0L 5  88   2    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2021S3  2023 12 01.31  M 11.0 AQ 30.0L 5  88   2    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
```

C/2021 S3 (PANSTARRS) is only weeks from a 2024 February 14 perihelion, at 1.32 au, and its closest distance to Earth on March 14, at 1.30 au. S3's lightcurve has been consistent and slowly brightening for over a year at a rate of ~6 log r (where r is the comet's distance from the Sun in au). Over the past few months, S3 has been located close to the Sun and not visible at all from the mid-northern latitudes. That should change this month as S3 travels northward through the morning constellations of Centaurus (Jan 1-4), Lupus (4-22), and Scorpius (22-31).

C/2021 S3 should reach a peak brightness of around magnitude 8.8 in early March. The next three months will see it moving northeastward along the summer Milky Way, providing a number of photo opportunities with deep sky objects.

January Photo Op:
Jan 28-31 - C/2021 S3 (PANSTARRS) passes through the southern extent of nebulosity in the Antares area



Date	Mag
2024 Jan 1	9.8
2024 Jan 15	9.4
2024 Feb 1	9.0
2024 Feb 15	8.8
2024 Feb 18	8.8
2024 Mar 1	8.7
2024 Mar 15	8.8

Figure 6 - Star chart for C/2021 S3 (PANSTARRS) covering the months of January through March. Chart made at in-the-sky.org.

Comets Between Magnitude 10 and 12

103P/Hartley

Discovered photographically on 1986 March 15 by Malcolm Hartley at Siding Spring Observatory in Australia
Jupiter-family comet

Orbit (from Minor Planet Center, MPEC 2023-Y97)

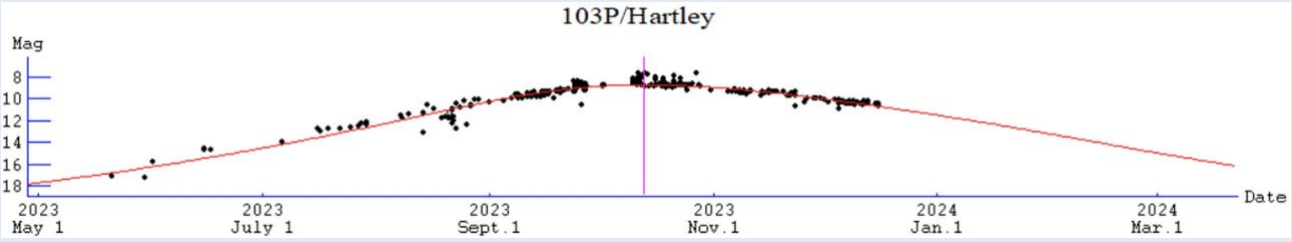
```
103P/Hartley
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2023 Oct. 12.51263 TT                                  Rudenko
q   1.0640924            (2000.0)            P              Q
n   0.15210774     Peri.  181.30149     +0.75452727     -0.63878528
a   3.4756431      Node   219.75002     +0.60422086     +0.76566775
e   0.6938430      Incl.   13.61045     +0.25613619     +0.07553984
P   6.48
From 8537 observations 2004 Sept. 20-2023 Dec. 28, mean residual 0".7.
     Nongravitational parameters A1 = +0.14, A2 = +0.0240.
```

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

```
103P/Hartley                                                          Max El
                                                                       (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag  40N   40S
2024-Jan-01  08 43   -14 31    1.499    0.650    132M    Hya   11.5   35    65
2024-Jan-06  08 37   -14 23    1.541    0.672    136M    Hya   11.8   36    64
2024-Jan-11  08 31   -13 57    1.585    0.696    140M    Hya   12.0   36    64
2024-Jan-16  08 24   -13 18    1.628    0.725    144M    Hya   12.3   37    63
2024-Jan-21  08 18   -12 25    1.672    0.757    147M    Pup   12.6   38    62
2024-Jan-26  08 13   -11 23    1.716    0.794    149E    Pup   12.9   39    61
2024-Jan-31  08 08   -10 13    1.761    0.836    150E    Hya   13.2   40    60
2024-Feb-05  08 04   -08 59    1.805    0.884    149E    Mon   13.5   41    59
```

Comet Magnitude Formula (from 2023 ALPO data)

```
m1 = 10.2 + 5 log d + 15.5 log r (T – 15)
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
103        2023 12 21.18  I&12.5 S  25.0C15  94 & 1                 ICQ XX DEC   Michel Deconinck
103        2023 12 18.29  Z 12.0     5.0R 4       3                 ICQ XX OLAaa Mike Olason
103        2023 12 15.22  M 12.0 AQ 30.0L 5  88   1    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 14.22  M 11.8 AQ 30.0L 5  88   1    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 13.21  M 11.8 AQ 30.0L 5  88   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 12.21  M 11.7 AQ 30.0L 5  88   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
103        2023 12 11.62 xS 11.2 AQ 40.0L 4  59   3.7  3            ICQ XX WYA   Christopher Wyatt
103        2023 12 06.35  Z 11.3     5.0R 4       3                 ICQ XX OLAaa Mike Olason
```

103P was at perihelion on October 12 at 1.06 au from the Sun, with the closest approach to Earth occurring back on September 26 at 0.38 au. The comet peaked at 8th magnitude in October, which was fainter than expected based on its behavior at past returns. This month, 103P should fade from around magnitude 11.5 to 13.2. Opposition is on January 23, with the comet being well well-placed for observers in both hemispheres in Hydra (Jan 1-17), Puppis (17-26), and back into Hydra (26-31). 103P's next perihelion is in April 2030, but it will be poorly placed on the other side of the Sun. Its 2036 return will be further from the Earth than in 2023 but still relatively good at 0.63 au from Earth.

Fainter Comets of Interest

29P/Schwassmann-Wachmann

Discovered 1927 November 15 by Arnold Schwassmann and Arno Arthur Wachmann at the Hamburg Observatory in Bergedorf, Germany
Centaur comet with orbital period of ~14.9 years

Orbit (from Minor Planet Center, MPEC 2023-Y97)

```
  29P/Schwassmann-Wachmann
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2019 Apr. 28.44476 TT                                  Rudenko
q   5.7814790            (2000.0)            P              Q
n   0.06622391     Peri.   51.58044     +0.98987924     -0.07557799
a   6.0505221      Node   312.40292     +0.00658512     +0.86993784
e   0.0444661      Incl.    9.36142     +0.14175943     +0.48733574
P  14.9
From 17588 observations 2018 June 18-2023 Dec. 28, mean residual 0".6.
```

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

```
29P/Schwassmann-Wachmann                                              Max El
                                                                       (deg)
    Date       R.A.    Decl.      r        d     Elong  Const  Mag    40N  40S
2024-Jan-01  08 35  +20 46    6.166    5.269    153M    Cnc  11-13   71   29
2024-Jan-06  08 32  +20 50    6.168    5.238    159M    Cnc  11-13   71   29
2024-Jan-11  08 30  +20 55    6.169    5.214    164M    Cnc  11-13   71   29
2024-Jan-16  08 28  +21 00    6.170    5.198    170M    Cnc  11-13   71   29
2024-Jan-21  08 25  +21 05    6.172    5.190    175M    Cnc  11-13   71   29
2024-Jan-26  08 23  +21 10    6.173    5.190    177E    Cnc  11-13   71   29
2024-Jan-31  08 20  +21 15    6.174    5.197    172E    Cnc  11-13   71   29
2024-Feb-05  08 18  +21 19    6.176    5.213    166E    Cnc  11-13   71   29
```

Comet Magnitude Formula

None, due to frequent outbursts.

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
 29        2023 12 18.27  Z 12.1     5.0R 4       2                ICQ XX OLAaa Mike Olason
 29        2023 12 15.01  S 13.2 AQ 20.3T10 167   0.7  7           ICQ XX GON05 Juan Jose Gonzalez Suarez
 29        2023 12 14.19  M 13.1 AQ 30.0L 5 121   1    7           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 29        2023 12 11.64 xM 13.0 AQ 40.0L 4 108   0.5  7           ICQ XX WYA   Christopher Wyatt
```

29P/Schwassmann-Wachmann (formerly S-W 1) was discovered photographically on 1927 November 15 by the German observing team of Arnold Schwassmann and Arno Arthur Wachmann.

29P experiences outbursts multiple times yearly, with the largest resulting in a peak brightness of 10th magnitude, though the majority are fainter. Four strong outbursts were seen in December: 2 on December 8 and 9 with a combined amplitude of 4 magnitudes, a 2-magnitude outburst on December 14, and another 2-magnitude outburst on December 23. As a result, visual and digital observers have been estimating a brightness between magnitude 11 and 13 throughout December. It is possible the comet will remain in the 11-13th magnitude range in January. It is well placed near the Beehive Cluster (M44) in Cancer with opposition on January 24.

If you image 29P, please consider contributing to two pro-am programs spearheading the effort to understand this amazing object better: the British Astronomical Society's (BAA) Mission 29P monitoring program coordinated by Richard Miles. (https://britastro.org/node/18562 & https://britastro.org/node/25120) and the University of Maryland's 29P Observation campaign (https://wirtanen.astro.umd.edu/29P/29P_obs.shtml).

C/2023 A3 (Tsuchinshan-ATLAS)

Discovered on 2023 January 9 at the Purple Mountain Observatory's XuYi Station and on February 22 by ATLAS
Dynamically new long-period comet

Orbit (from Minor Planet Center, MPEC 2022-Y97)

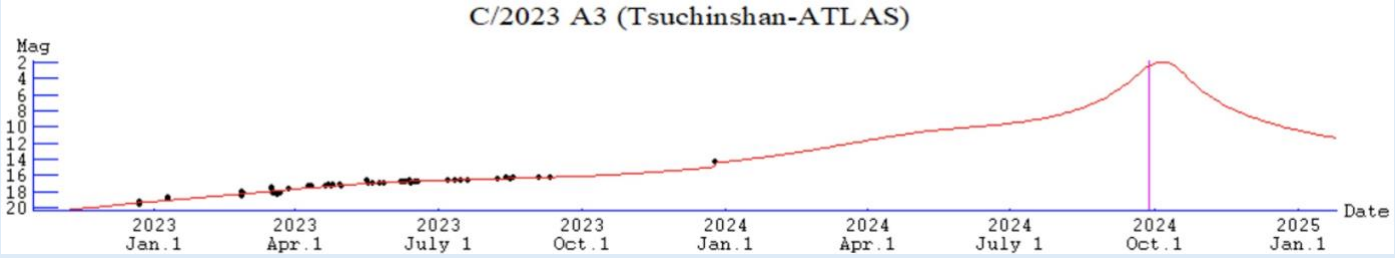
```
    C/2023 A3 (Tsuchinshan-ATLAS)
Epoch 2023 Sept. 13.0 TT = JDT 2460200.5
T 2024 Sept. 27.72458 TT                                  Rudenko
q   0.3914497           (2000.0)            P               Q
z  -0.0003843      Peri.  308.48374     +0.36131144     +0.90090462
 +/-0.0000108      Node    21.55648     +0.91859140     -0.29961354
e   1.0001504      Incl.  139.11971     -0.16013709     +0.31401050
From 2194 observations 2022 Apr. 9-2023 Dec. 28, mean residual 0".3.
1/a(orig) = -0.000209 AU**-1, 1/a(fut) = -0.000181 AU**-1.
```

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

```
C/2023 A3 (Tsuchinshan-ATLAS)                                          Max El
                                                                        (deg)
    Date      R.A.    Decl.     r       d     Elong  Const  Mag  40N  40S
2024-Jan-01  15 01  -07 18   4.249   4.732    55M   Lib  14.3   31    7
2024-Jan-06  15 03  -07 28   4.192   4.601    59M   Lib  14.2   33   12
2024-Jan-11  15 05  -07 36   4.136   4.467    64M   Lib  14.1   35   17
2024-Jan-16  15 06  -07 43   4.079   4.330    68M   Lib  14.0   37   22
2024-Jan-21  15 08  -07 48   4.021   4.189    73M   Lib  13.8   38   27
2024-Jan-26  15 09  -07 51   3.963   4.046    78M   Lib  13.7   39   32
2024-Jan-31  15 10  -07 53   3.905   3.901    82M   Lib  13.6   40   37
2024-Feb-05  15 10  -07 53   3.846   3.755    87M   Lib  13.5   41   42
```

Comet Magnitude Formula (from ALPO, COBS, and MPC data)

```
m1 = -16.6 + 5 log d + 35.0 log r [Through T-650 days]
m1 =  -2.3 + 5 log d + 19.0 log r [Between T-650 and T-490 days]
m1 =   4.1 + 5 log d + 11.2 log r [Between T-490 and T-405 days]
m1 =   6.4 + 5 log d +  8.0 log r [Between T-405 and T-277 days]
m1 =   5.9 + 5 log d +  8.0 log r [After T-277 days, assumed]
where "t" is the 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
   2023A3  2023 12 25.22  V 14.4 U4 50.0Y 7a540   0.3              ICQ xx HER02 Carl Hergenrother
```

C/2023 A3 (Tsuchinshan-ATLAS) is easily visible once again in the morning sky after solar conjunction in early November. Observation from December found A3 about 0,5 magnitude brighter than expected, or at least brighter than an 8-log r fit to the last few months of photometry (it is possible that it is brightening at a faster than an 8-log r rate). I imaged A3 with a Skygems Observatory 0.5-m in Spain on December 25 UT. The comet was V = 14.4 with a condensed 0.3' coma. We are closing in on C/2023 A3 (Tsuchinshan-ATLAS)'s September 27 perihelion at 0.39 au from the Sun. This month, C/2023 A3 is in Libra and should brighten from around magnitude 14.3 to 13.6 assuming an 8-log r rate.