March 2023

ALPO Comet News

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

Two Comets Passing in the Night

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On the Front Cover:

C/2022 E3 (ZTF) and C/2022 U2 (ATLAS) photo bombed a number of nebula, star clusters, and in the case of C/2022 E3, even Mars during February. The two comets also passed close to each other.

In this image taken on 2023 February 6 at 17.4 hours UT, Michael Jäger caught the two comets near there closest. The image is a RGB composite with exposures of 150:150:150 seconds taken with a 0.3-m f/4 astrograph and QHY600 camera.

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/866561-alpo-comet-news-for-march-2023/) 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

After starting 2023 off with a bang, C/2022 E3 (ZTF) is still the brightest comet in the sky but fading fast this month from around magnitude 8 to 10. Southern observers will still be able to observe last summer's brightest comet, C/2017 K2 (PANSTARRS), which will fade from 8th to 9th magnitude. Up north, northerners have 9th magnitude comets C/2020 V2 (ZTF) and C/2022 A2 (PANSTARRS) to themselves.

Rounding out the comets with those expected to be between magnitude 10 and 12 are 81P/Wild, C/2019 L3 (ATLAS), and C/2019 U5 (PANSTARRS).

A recently announced new discovery, C/2023 A3 (Tsuchishan-ATLAS), looks like a promising comet for 2024. While we still have months to watch Tsuchishan-ATLAS develop, it may become a naked eye object in September and October of 2024 though it will be located close to the Sun at its best.

Last month the ALPO Comets Section received 112 magnitude estimates and 91 images/sketches of comets C/2022 U2 (ATLAS), C/2022 P1 (NEOWISE), C/2022 E3 (ZTF), C/2022 A2 (PANSTARRS), C/2021 Y1 (ATLAS), C/2021 S3 (PANSTARRS), C/2020 V2 (ZTF), C/2020 S4 (PANSTARRS), C/2019 U5 (PANSTARRS), C/2019 T4 (ATLAS), C/2019 L3 (ATLAS), C/2017 K2 (PANSTARRS), 452P/Sheppard-Jewitt, 364P/PANSTARRS, 362P/(457175) 2008 GO98, 272P/NEAT, 230P/LINEAR, 179P/Jedicke, 118P/Shoemaker-Levy, 113P/Spitaler, 96P/Machholz, 81P/Wild, 29P/Schwassmann-Wachmann, and 12P/Pons-Brooks. A big thanks to our recent contributors: Salvador Aguirre, Michael Amato, Dan Bartlett, Michel Besson, Todd Bossaller, Denis Buczynski, J. J. Gonzalez, Jose Guilherme de Souza Aguiar, Christian Harder, Scott Harrington, Carl Hergenrother, Eliot Herman, Rik Hill, Michael Jäger, John Maikner, Martin Mobberley, Charles Morris, Mike Olason, Phill Parslow, Ludovic Perbet, Clement Planchon, Olivier Planchon, Uwe Pilz, Allan Rahill, Efrain Morales Rivera, Michael Rosolina, Gregg Ruppel, Anaël Semiat, Richard Schmude, Jr., Chris Schur, Greg T. Shanos, Willian Souza, 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

Mar 07 - Full Moon
Mar 14 - Last Quarter Moon
Mar 21 - New Moon
Mar 28 - First Quarter Moon

Comets at Perihelion

Mar 03 - P/2022 V1 (WISE-Lemmon) [q = 2.28 au, 12.8-yr period, V ~ 18, discovered in November 2022, pre-discovery observations from 2010]
Mar 05 - C/2022 R3 (Leonard) [q = 5.13 au, V ~ 17-18]
Mar 08 - C/2022 W2 (ATLAS) [q = 3.12 au, V ~ 17]
Mar 10 - C/2023 B2 (ATLAS) [q = 1.74 au, V ~ 16-17]
Mar 12 - 256P/LINEAR [q = 2.70 au, 10.0-yr period, V ~ 18, discovered in 2003, 3rd observed return]
Mar 18 - C/2023 A1 (Leonard) [q = 1.83 au, V ~ 16-17]
Mar 22 - C/2022 Y2 (Lemmon) [q = 2.54 au, 86-yr period, V ~17-18]
Mar 29 - C/2019 U5 (PANSTARRS) [q = 3.62 au, V ~ 11-12]

Photo Opportunities

Mar 06 - C/2019 U5 (PANSTARRS) passes 6' from 11th magnitude galaxy NGC 4666, also passes very close to 13th mag galaxies NGC 4642,4653 & 4668, unfortunately bright Moon nearby
Mar 10 - C/2022 E3 (ZTF) passes 7' from 11th mag galaxy NGC 1637
Mar 11-13 - C/2020 V2 (ZTF) passes through outskirts of large open cluster NGC 752
Mar 14-15 - 81P/Wild passes within 30' of 7th mag globular M9 and 10th mag glob NGC 6342
Mar 25 - C/2022 E3 (ZTF) passes within 1' of 12th mag galaxy NGC 1666

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 U2 (ATLAS)					T								
2022U2	2023 02 24.98	M	11.1	AQ	30.0L	5	61	3	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022U2	2023 02 22.97	M	10.9	AQ	30.0L	5	61	3	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022U2	2023 02 16.93	S	10.8	TK	20.3T	10	77	5	2			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022U2	2023 02 16.44	xS	10.7	AQ	40.0L	4	59	4.9	3			ICQ XX	WYA Christopher Wyatt
2022U2	2023 02 14.81	S	10.2	TI	53.1L		111	3.5	1			ICQ XX	HAR11 Christian Harder
2022U2	2023 02 08.77	S	10.7	TI	29.8L	4	92	3	1			ICQ XX	HAR11 Christian Harder
2022U2	2023 02 07.75	S	10.9:	TI	25.2L	4	92	2.5	1/			ICQ XX	HAR11 Christian Harder
2022U2	2023 02 06.78	S	13.3	HS	32.0L	5	144					ICQ XX	PIL01 Uwe Pilz
C/2022 E3 (ZTF)													
2022E3	2023 02 26.75	S	8.6	TK	10.5R	6	26	2					PIL01 Uwe Pilz
2022E3	2023 02 26.16	M	7.6	TK	5.0B		10	7	2			ICQ xx	HER02 Carl Hergenrother
2022E3	2023 02 25.83	S	7.7	TI	10.0L	4	27	7.5	4			ICQ XX	HAR11 Christian Harder
2022E3	2023 02 24.96	M	7.8	TK	10.0B		25	4	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022E3	2023 02 22.95	M	7.2	TK	10.0B		25	4	3			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022E3	2023 02 21.44	xM	7.7	TK	7.0B		15	7.5	5/			ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 20.43	xM	7.6	TK	7.0B		15	10	5	20	m 43	ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 18.08		6.9		0.0E								HARaa Scott Harrington
2022E3	2023 02 16.94	M	6.9	TK	10.0B		25	4	3/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022E3	2023 02 16.92	S	6.2	TK	5.0B		10	15	5/	1.2	30	ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022E3	2023 02 16.79	I	7.2	TK	12.5B	5	25	3	4	8	m 80	ICQ XX	DECaa Michel Deconinck
2022E3	2023 02 16.78	E	7.2	TK	25.0C		62	12	4/	48	m 80	ICQ XX	DECaa Michel Deconinck
2022E3	2023 02 16.44	xM	6.9	TK	7.0B		15	10	5/	38	m 28	ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 15.75	S	6.6	TK	10.5R	6	22	5		0.33	59	ICQ XX	PIL01 Uwe Pilz
2022E3	2023 02 15.46	xM	6.8	TK	5.0R		10	9	5/			ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 15.10	S	6.6:	TK	5.0B		7 & 5		1/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 14.81	S	6.5	TI	4.4B		8	12	4	35	m 40	ICQ XX	HAR11 Christian Harder
2022E3	2023 02 14.76	S	6.1	TK	5.0B	4	7	10		0.33	61	ICQ XX	PIL01 Uwe Pilz
2022E3	2023 02 14.03		6.1		3.6B		12	15	4			ICQ XX	ROSxx Michael Rosolina
2022E3	2023 02 13.14	M	6.3	TK	5.0B		10	12	5			ICQ xx	HER02 Carl Hergenrother
2022E3	2023 02 12.12	S	6.5	TK	5.0B		7 & 8		1/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 11.76	E	6.4	TK	12.5B	5	25	8	4	20	m 80	ICQ XX	DECaa Michel Deconinck
2022E3	2023 02 11.22	Z	6.5	TK	5.0R	4a	180	10.6				ICQ XX	OLAaa Mike Olason
2022E3	2023 02 10.83	S	5.6	TK	5.0B		10	20	5/	1.2	20	ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022E3	2023 02 10.82	S	5.3	TK	E		1	22	6/			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022E3	2023 02 10.29	Z	6.6	TK	5.0R	4a	180	10.6				ICQ XX	OLAaa Mike Olason
2022E3	2023 02 10.08		6.0		0.0E								HARaa Scott Harrington
2022E3	2023 02 09.97	S	6.3	TK	8.0B		20	3	4			ICQ XX	SOU01 Willian Souza
2022E3	2023 02 09.93	M	6.2	TK	10.0B		25	5	4			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022E3	2023 02 09.31	Z	6.5	TK	5.0R	4a	180	10.6				ICQ XX	OLAaa Mike Olason
2022E3	2023 02 09.09	S	6.5	TK	5.0B		7 &10		1/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 08.98	S	6.2	TK	8.0B		20	3	3			ICQ XX	SOU01 Willian Souza
2022E3	2023 02 08.93	M	6.1	TK	10.0B		25	5	4/			ICQ XX	DES01 Jose Guilherme de Souza Aguiar
2022E3	2023 02 08.78	S	5.9	TI	4.4B		8	18	4	33	m 55	ICQ XX	HAR11 Christian Harder
2022E3	2023 02 08.73	S	5.8	TK	7.0B	6	16	12		0.42		ICQ XX	PIL01 Uwe Pilz
2022E3	2023 02 08.10	S	6.2	TK	5.0B		7 &10		2/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 07.78	O	6.0	TK	12.5B	5	25	20	5/	55	m 75	ICQ XX	DECaa Michel Deconinck
2022E3	2023 02 07.74	S	5.8	TI	4.4B		8	20	4			ICQ XX	HAR11 Christian Harder
2022E3	2023 02 07.42	xM	6.2	TK	7.0B		15	8	5/			ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 07.10	S	6.5	TK	5.0B		7 &10		2/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 06.99		6.0		3.6B		12	20	4			ICQ XX	ROSxx Michael Rosolina
2022E3	2023 02 06.82	S	5.6	TI	4.4B		8	18	4			ICQ XX	HAR11 Christian Harder
2022E3	2023 02 06.79	S	6.2	TK	5.0B	4	7					ICQ XX	PIL01 Uwe Pilz
2022E3	2023 02 06.45	xM	5.9	TK	7.0B		15	10	6			ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 06.12	I	6.2	TK	5.0B		7					ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 05.93	S	5.5:	TI	4.4B		8	15	3/			ICQ XX	HAR11 Christian Harder
2022E3	2023 02 05.14	S	6.2	TK	5.0B		7	12	7/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 04.75	S	5.7	TK	5.0B	4	7	7		0.25	100	ICQ XX	PIL01 Uwe Pilz
2022E3	2023 02 04.46	&M	6.8	TK	25.0L	5	40	2.8	6			ICQ XX	WYA Christopher Wyatt
2022E3	2023 02 04.18	S	5.5	TK	5.0B		7 &12		6			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 03.17	S	5.0	AC	5.0B		7 &15		5/			ICQ XX	AGU01 Salvador Aguirre
2022E3	2023 02 01.25	S	4.5	TK	0.0E		1	25	6			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022E3	2023 02 01.24	S	4.7	TK	5.0B		10	20	5			ICQ XX	GON05 Juan Jose Gonzalez Suarez
2022E3	2023 02 01.16	I	5.0:	TK	12.5B	5	25	30	6	1.2		ICQ XX	DECaa Michel Deconinck
C/2022 A2 (PANSTARRS)													
2022A2	2023 02 26.79	S	9.5	TI	35.3L		105	2.2	3			ICQ XX	HAR11 Christian Harder
2022A2	2023 02 25.82	S	9.2	TI	29.8L	4	79	3.2	3			ICQ XX	HAR11 Christian Harder

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   2022A2  2023 02 16.91  S  8.4 TK  7.0B    15   6    4            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 16.89  S  8.6 TK 20.3T10  77   5    4            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 14.79  S  9.2 TI 53.1L   111   3.5  3/           ICQ XX HAR11 Christian Harder
   2022A2  2023 02 10.87  S  8.5 TK  7.0B    15   7    4            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 08.75  S  9.6 TI 29.8L 4  92   2.4  3/           ICQ XX HAR11 Christian Harder
C/2021 Y1 (ATLAS)
   2021Y1  2023 02 16.43 xM 15.0 AQ 40.0L 4 182   0.6  5/           ICQ XX WYA   Christopher Wyatt
C/2021 S3 (PANSTARRS)
   2021S3  2023 02 16.47 xM 15.5 AQ 40.0L 4 182   0.5  6            ICQ XX WYA   Christopher Wyatt
C/2020 V2 (ZTF)
   2020V2  2023 02 26.80  S 10.2 TI 35.3L   105   2.2  3/           ICQ XX HAR11 Christian Harder
   2020V2  2023 02 25.81  S 10.1 TI 29.8L 4  79   2.1  3/           ICQ XX HAR11 Christian Harder
   2020V2  2023 02 16.95  S  9.0 TK  7.0B    15   7    4            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 16.94  S  9.4 TK 20.3T10  77   4    4/  0.1   30 ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 16.77  E  9.3 TK 25.0C10 192   6    3            ICQ XX DECaa Michel Deconinck
   2020V2  2023 02 14.80  S  9.9 TI 53.1L   111   2    4   5   m 35 ICQ XX HAR11 Christian Harder
   2020V2  2023 02 10.85  S  8.7 TK  7.0B    15   8    3            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 08.76  S  9.9 TI 29.8L 4  92   2.2  4   2   m 10 ICQ XX HAR11 Christian Harder
   2020V2  2023 02 07.76  S  9.9 TI 25.2L 4  78   2.2  4            ICQ XX HAR11 Christian Harder
C/2020 S4 (PANSTARRS)
   2020S4  2023 02 16.49 xM 15.0 AQ 40.0L 4 182   0.6  5            ICQ XX WYA   Christopher Wyatt
   2020S4  2023 02 14.87  S 14.9 TI 53.1L   298   0.3  3/           ICQ XX HAR11 Christian Harder
C/2019 U5 (PANSTARRS)
   2019U5  2023 02 25.27  M 11.4 AQ 30.0L 5 100   2    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019U5  2023 02 16.99  S 10.9 TK 20.3T10  77   6    2            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2019U5  2023 02 16.51 &M 13.0 AQ 40.0L 4 108   1.1  5/           ICQ XX WYA   Christopher Wyatt
   2019U5  2023 02 02.66 xM 12.7 AQ 25.0L 5 125   1    4/           ICQ XX WYA   Christopher Wyatt
C/2019 T4 (ATLAS)
   2019T4  2023 02 02.70 xM 13.6 AQ 25.0L 5 125   0.7  4/           ICQ XX WYA   Christopher Wyatt
C/2019 L3 (ATLAS)
   2019L3  2023 02 24.99  M 12.3 AQ 30.0L 5 100   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019L3  2023 02 16.98  S 11.5 TK 20.3T10 133   1    3            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2019L3  2023 02 16.48 xM 11.9 AQ 40.0L 4  59   2.4  5/           ICQ XX WYA   Christopher Wyatt
   2019L3  2023 02 08.96  M 11.8 AQ 30.0L 5 100   1    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019L3  2023 02 02.67 xM 11.7 AQ 25.0L 5  74   1.6  4            ICQ XX WYA   Christopher Wyatt
C/2017 K2 (PANSTARRS)
   2017K2  2023 02 21.43 xS  8.9 TK  7.0B    15   7    3/           ICQ XX WYA   Christopher Wyatt
   2017K2  2023 02 16.42 xM  8.8 TK 40.0L 4  59   2.6  6  33   m243 ICQ XX WYA   Christopher Wyatt
   2017K2  2023 02 02.72 xM  8.7 TK  7.0B    15   6    4            ICQ XX WYA   Christopher Wyatt
452P/Sheppard-Jewitt
452        2023 02 27.08  C 19.5 BG 30.5H 4E880           1   m    ICQ XX MAIab John Maikner
364P/PANSTARRS
364        2023 02 20.38  C 17.9 BG 30.5H 4C600                    ICQ XX MAIab John Maikner
362P/(457175) 2008 GO98
362        2023 02 16.18  C 19.9 BG 30.5H 4C000                    ICQ XX MAIab John Maikner
272P/NEAT
272        2023 02 14.35  C 21.1 BG 30.5H 4F600                    ICQ XX MAIab John Maikner
230P/LINEAR
230        2023 02 14.26  C 20.0 BG 30.5H 4C000                    ICQ XX MAIab John Maikner
179P/Jedicke
179        2023 02 16.02  C 18.5 BG 30.5H 4A320                    ICQ XX MAIab John Maikner
118P/Shoemaker-Levy
118        2023 02 16.46 xM 13.6 AQ 40.0L 4 108   1.4  3/           ICQ XX WYA   Christopher Wyatt
118        2023 02 14.83  S 13.5 TI 53.1L   215   0.8  2            ICQ XX HAR11 Christian Harder
113P/Spitaler
113        2023 02 27.09  C 18.3 BG 30.5H 4C600          10  s    ICQ XX MAIab John Maikner
96P/Machholz
 96        2023 02 27.43  C 13.8 BG 30.5H 4a135          10  m305 ICQ XX MAIab John Maikner
 96        2023 02 17.24  S  8.8 TK 20.3T10 100   1.7  3   0.15 290 ICQ XX GON05 Juan Jose Gonzalez Suarez
 96        2023 02 07.27  S  7.7 TK 20.3T10 100   2    3            ICQ XX GON05 Juan Jose Gonzalez Suarez
81P/Wild
 81        2023 02 25.29  M 13.1 AQ 30.0L 5 121   1    3/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 81        2023 02 09.28  M 12.9 AQ 30.0L 5 121   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
 81        2023 02 02.69 xM 12.8 AQ 25.0L 5 125   0.9  5            ICQ XX WYA   Christopher Wyatt
29P/Schwassmann-Wachmann
 29        2023 02 16.45 xM 14.2 AQ 40.0L 4 182   0.5  3/           ICQ XX WYA   Christopher Wyatt
12P/Pons-Brooks
 12        2023 02 27.41  C 18.8 BG 30.5H 4B160                    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 CBET 5227
456P/2021 L4   = P/2012 Q3 (PANSTARRS)
455P/2017 S9   = P/2011 Q5 = P/2022 R7 (PANSTARRS)
454P/2022 U5   = P/2013 W3 (PANSTARRS)
453P/2022 V1   = P/2010 BN109 (WISE-Lemmon)
452P/2003 CC22 = P/2022 B5 (Sheppard-Jewitt)
451P/2007 A2   = P/2006 WY182 = P/2022 S2 (Christensen)
450P/2004 A1   = P/2022 Q3 (LONEOS)
449P/2020 S6   = P/1987 A2 = P/2013 Y3 (Leonard)
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New Discoveries and Recoveries

P/2023 B3 (PANSTARRS) – Rob Weryk (University of Western Ontario) reported the discovery of a 21st magnitude comet on 2023 January 23 by the Pan-STARRS2 1.8-m telescope on Haleakala, Maui. The comet is of the short-period variety with an orbital period of 9.7 years. Surprisingly, it was last at perihelion on 2020 August 27, almost 3 years ago, at 3.96 au from the Sun. The lack of pre-discovery observations back to and before perihelion suggests the comet has experienced a recent outburst. This possibility is further bolstered by the comet brightening to 18-19th magnitude my mid-February.

The comet's orbit has experienced some recent changes due to two close approaches to Jupiter in August 1995 at 0.54 au and March 2005 at 0.13 au. In fact, the comet was within 1.0 au of Jupiter from May 1994 and June 1997 and again between October 2002 and November 2009. Prior to 1994, it was on a more distant orbit with a perihelion 5.3 au from the Sun and 17-year orbital period. [CBET 5222, MPEC 2023-D10]

C/2023 B2 (ATLAS) – The Asteroid Terrestrial-Impact Last Alert System, or ATLAS, found this 18th magnitude comet on 2023 January 21 with their 0.5-m f/2 Schmidt at Sutherland, South Africa. C/2023 B2 (ATLAS) arrives at perihelion this month on the 10th at 1.75 au from the Sun. It should be 16th magnitude at its brightest in early April when it passes 0.87 au from Earth. [CBET 5217, MPEC 2023-C44]

C/2023 A3 (Tsuchinshan-ATLAS) – This object may become a nice object in September and October of 2024. C/2023 A3 (Tsuchinshan-ATLAS) was first discovered at 19th magnitude at the Purple Mountain Observatory's XuYi Station in China on 2023 January 9. The IAU traditionally uses the anglicized name "Tsuchinshan" for the Purple Mountain Observatory. The Observatory is no stranger to comet discoveries with 60P/Tsuchinshan, 62P/Tsuchinshan, C/1977 V1 (Tsuchinshan), C/2017 E2 (Tsuchinshan), and C/2021 S4 (Tsuchinshan) having been discovered there. After discovery it was placed on the MPC NEOCP but was removed at the end of January due to a lack of follow-up. The ATLAS program independently discovered the comet on February 22 at 18th magnitude. Hence the name "Tsuchinshan-ATLAS".

Perihelion occurs on 2024 September 28 at a relatively small 0.39 au so we have plenty of time to watch C/2023 A3 develop. I'm going to make a very preliminary prediction of how bright C/2023 A3 will get with the usual disclaimer about the futility of predicting any comet's future behavior, especially one that is still 7 au from the Sun. We don't know if the comet is dynamically new or old, though an orbit published in CBET 5228 by Syuichi Nakano suggests it may be dynamically old which means it has made at least one previous close perihelion. Nakano's orbit suggesting the last perihelion was ~90,000 years ago. For now, we will assume the photometric parameters published by Dan Green in CBET 5228: H = 7.0 and 2.5n = 8.0.

The comet will be a distant object in 2023 with opposition on May 5 when the comet will be at 17th magnitude. Imagers should be able to follow it till September before losing it in the glare of the Sun. It'll reappear in the morning in November or December at 16th magnitude. Its next opposition will be on 2024 April 21 when it will be 2.9 au from the Sun and perhaps as bright as 12th magnitude. In the northern hemisphere, we lose sight again in July when it will be 10th magnitude. Southern hemisphere observers will be able to follow it till mid-August when it'll be around 8th magnitude.

Southern hemisphere observers will get another window of observation in late September with the comet located low in the morning eastern sky right before dawn. By this point, it may be brightening from 4th to 3rd magnitude. At northern mid-latitudes, we may also be able to see the comet at this time though astronomical twilight will have already begun when it rises. On the date of perihelion (Sept. 28), the comet will only be 22 degrees from the Sun and still drawing closer to the Sun on the sky.

On October 10, a minimum solar elongation of 3.1 deg will be reached with the comet being almost directly in between the Earth and Sun and observable in SOHO LASCO coronagraph images. Its phase angle will also reach a maximum of 173.9 deg possibly resulting in a few magnitudes of enhanced brightness due to the forward scattering of dust. Instead of being around a non-enhanced peak brightness of magnitude 3.0, it could be closer to magnitude 1 or even 0. Two or three days after that, northern observers with flat horizons and super clear skies may be able to pick up the comet low in the evening sky. By then the phase angle will have decreased so forward scattering is no longer a major player, but the comet may still be a 3rd magnitude object. Most of us in the north we'll get a reasonable chance to see the comet by mid-October when it'll be closer to 4th magnitude. Southern hemisphere observers will have to wait till late October though the comet should still be around 4th magnitude.

With C/2022 E3 (ZTF)'s orbit plane crossing and anti-tails fresh on our memories, C/2023 A3 will have its own orbit plane crossing on October 14.

This all assumes the comet doesn't disintegrate or brightens at something other than a conservative 2.5n = 8.0 rate. A slower rate means a fainter brightness, while a faster rate means brighter. It shouldn't be a surprise if its rate of brightness changes between now and perihelion, perhaps even multiple times. Regardless, we have a nice, interesting comet to look forward to in 2024. [CBET 5228, MPEC 2023-D77]

C/2023 A2 (SWAN) – Though discovered with spacecraft instruments, C/2023 A2 (SWAN) is an amateur discovery. On 2023 January 15, Vladimir Bezugly (Dnipro, Ukraine) reported a faint object seen on SOHO SWAN images taken between January 6 and 13. The object was followed in the SWAN data through January 24. After the comet was extensively discussed on comets-ml, Katsumi Yoshimoto was able to image the comet from Earth on January 30 at 12th magnitude. After that more ground-based observers were able to image the comet and it also became visible in STEREO-A HI-1A spacecraft images.

Perihelion was on 2023 January 20 at 0.95 au. The comet has probably already peaked in brightness at 12th magnitude. It is moving away from the Sun on the sky and becoming better placed for ground-based observations though these will be limited to the southern hemisphere. [CBET 5226, MPEC 2023-D49]

C/2022 T1 (Lemmon) – This object was found with the Mount Lemmon Survey 1.5-m near Tucson, Arizona on 2022 October 3. At the time it appeared as an inactive 20-21st magnitude object. Observations from 2023 January 18 by Pan-STARRS found the object to be cometary resulting in a change in designation from A/2022 T2 to C/2022 T1 (Lemmon). The comet's perihelion is a year from now on 2024 February 17 at 3.44 au when it should be a 16th magnitude object. [CBET 5218, MPEC 2023-C52]

P/2021 PE20 (ATLAS) – Like the comet above, P/2021 PE20 (ATLAS) was originally reported as an inactive asteroidal object. ATLAS discovered the object on 2021 August 12 at 18th magnitude. Though follow-up observations in the days following discovery found the object to be a comet, it was inadvertently given the asteroid designation 2021 PE20. Now too faint to be observed, P/2021 PE20 was at perihelion on 2021 June 7 at 1.23 au and peaked at 17th magnitude. It will next be at perihelion in September 2028 at 1.22 au. [CBET 5220, MPEC 2023-C66]

C/2018 S3 (TESS) – This object was originally detected in TESS (Transiting Exoplanet Survey Satellite) images taken in September and October 2018 as an 18th magnitude asteroidal object. Pre-discovery observations were found by Sam Deen in DECam data taken on the Cerro Tololo 4-m in Chile back to February 2014 as well as observations found in the 2 months after the TESS data. Sam reported that the object was cometary in the DECam data.

C/2018 T3 (TESS) is a large perihelion long-period comet with perihelion back on 2016 June 29 at 8.00 au. For the period that it was observed (2014-2018), it was located at declinations between -42 and -86 hence too far south for the major asteroid surveys that were all located in the northern hemisphere during those years. [CBET 5229, MPEC 2023-D54]

Comets Brighter Than Magnitude 6 and 10

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 2023-D72)

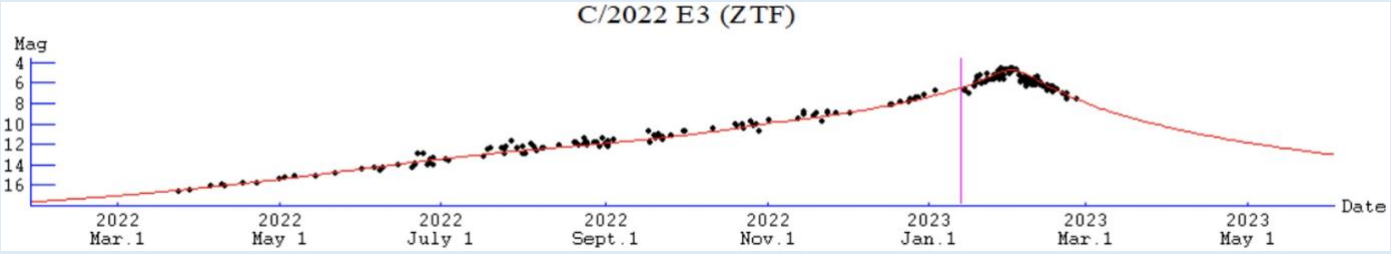
```
    C/2022 E3 (ZTF)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2023 Jan. 12.78524 TT                                  Rudenko
q   1.1122475           (2000.0)            P               Q
z  -0.0002899      Peri.  145.81576     -0.60064669     -0.07340467
 +/-0.0000003      Node   302.55568     +0.33753042     +0.87940722
e   1.0003224      Incl.  109.16851     +0.72477360     -0.47037718
From 6822 observations 2021 July 10-2023 Feb. 27, mean residual 0".6.
1/a(orig) = +0.000769 AU**-1, 1/a(fut) = -0.000021 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
2023-Mar-01  04 38  +01 22   1.345   0.938     88E    Tau   8.0     48   39
2023-Mar-06  04 39  -01 07   1.390   1.088     83E    Eri   8.4     43   40
2023-Mar-11  04 41  -03 00   1.437   1.236     79E    Eri   8.9     39   40
2023-Mar-16  04 43  -04 28   1.487   1.382     75E    Eri   9.3     35   40
2023-Mar-21  04 45  -05 39   1.537   1.524     71E    Eri   9.6     31   40
2023-Mar-26  04 48  -06 38   1.590   1.662     68E    Eri  10.0     26   39
2023-Mar-31  04 51  -07 29   1.643   1.796     64E    Eri  10.3     22   38
2023-Apr-05  04 55  -08 15   1.697   1.925     61E    Eri  10.6     18   37
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  5.8 + 5 log d + 12.3 log r [Through T-70 days]
m1 =  6.9 + 5 log d +  6.8 log r [T-70 to perihelion]
m1 =  6.8 + 5 log d + 10.2 log r [Since 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  2023 02 26.75   S  8.6 TK 10.5R 6  26   2                        PIL01 Uwe Pilz
   2022E3  2023 02 26.16   M  7.6 TK  5.0B    10   7    2           ICQ xx HER02 Carl Hergenrother
   2022E3  2023 02 25.83   S  7.7 TI 10.0L 4  27   7.5  4           ICQ XX HAR11 Christian Harder
   2022E3  2023 02 24.96   M  7.8 TK 10.0B    25   4    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022E3  2023 02 22.95   M  7.2 TK 10.0B    25   4    3           ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022E3  2023 02 21.44  xM  7.7 TK  7.0B    15   7.5  5/          ICQ XX WYA   Christopher Wyatt
   2022E3  2023 02 20.43  xM  7.6 TK  7.0B    15  10    5  20   m 43 ICQ XX WYA   Christopher Wyatt
   2022E3  2023 02 18.08      6.9     0.0E                          HARaa Scott Harrington
   2022E3  2023 02 16.94   M  6.9 TK 10.0B    25   4    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2022E3  2023 02 16.92   S  6.2 TK  5.0B    10  15    5/  1.2   30 ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022E3  2023 02 16.79   I  7.2 TK 12.5B 5  25   3    4   8   m 80 ICQ XX DECaa Michel Deconinck
   2022E3  2023 02 16.78   E  7.2 TK 25.0C    62  12    4/ 48   m 80 ICQ XX DECaa Michel Deconinck
   2022E3  2023 02 16.44  xM  6.9 TK  7.0B    15  10    5/ 38   m 28 ICQ XX WYA   Christopher Wyatt
   2022E3  2023 02 15.75   S  6.6 TK 10.5R 6  22   5        0.33  59 ICQ XX PIL01 Uwe Pilz
   2022E3  2023 02 15.46  xM  6.8 TK  5.0R    10   9    5/          ICQ XX WYA   Christopher Wyatt
   2022E3  2023 02 15.10   S  6.6:TK  5.0B     7 & 5    1/          ICQ XX AGU01 Salvador Aguirre
   2022E3  2023 02 14.81   S  6.5 TI  4.4B     8  12    4  35   m 40 ICQ XX HAR11 Christian Harder
   2022E3  2023 02 14.76   S  6.1 TK  5.0B 4   7  10        0.33  61 ICQ XX PIL01 Uwe Pilz
```

```
2022E3  2023 02 14.03     6.1     3.6B    12  15    4            ICQ XX ROSxx Michael Rosolina
2022E3  2023 02 13.14  M  6.3 TK  5.0B    10  12    5            ICQ xx HER02 Carl Hergenrother
2022E3  2023 02 12.12  S  6.5 TK  5.0B     7 & 8    1/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 11.76  E  6.4 TK 12.5B 5  25   8    4  20   m 80 ICQ XX DECaa Michel Deconinck
2022E3  2023 02 11.22  Z  6.5 TK  5.0R 4a180  10.6               ICQ XX OLAaa Mike Olason
2022E3  2023 02 10.83  S  5.6 TK  5.0B    10  20    5/  1.2   20 ICQ XX GON05 Juan Jose Gonzalez Suarez
2022E3  2023 02 10.82  S  5.3 TK     E     1  22    6/           ICQ XX GON05 Juan Jose Gonzalez Suarez
2022E3  2023 02 10.29  Z  6.6 TK  5.0R 4a180  10.6               ICQ XX OLAaa Mike Olason
2022E3  2023 02 10.08     6.0     0.0E                                  HARaa Scott Harrington
2022E3  2023 02 09.97  S  6.3 TK  8.0B    20   3    4            ICQ XX SOU01 Willian Souza
2022E3  2023 02 09.93  M  6.2 TK 10.0B    25   5    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
2022E3  2023 02 09.31  Z  6.5 TK  5.0R 4a180  10.6               ICQ XX OLAaa Mike Olason
2022E3  2023 02 09.09  S  6.5 TK  5.0B     7 &10    1/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 08.98  S  6.2 TK  8.0B    20   3    3            ICQ XX SOU01 Willian Souza
2022E3  2023 02 08.93  M  6.1 TK 10.0B    25   5    4/           ICQ XX DES01 Jose Guilherme de Souza Aguiar
2022E3  2023 02 08.78  S  5.9 TI  4.4B     8  18    4  33   m 55 ICQ XX HAR11 Christian Harder
2022E3  2023 02 08.73  S  5.8 TK  7.0B 6  16  12        0.42     ICQ XX PIL01 Uwe Pilz
2022E3  2023 02 08.10  S  6.2 TK  5.0B     7 &10    2/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 07.78  O  6.0 TK 12.5B 5  25  20    5/ 55   m 75 ICQ XX DECaa Michel Deconinck
2022E3  2023 02 07.74  S  5.8 TI  4.4B     8  20    4            ICQ XX HAR11 Christian Harder
2022E3  2023 02 07.42 xM  6.2 TK  7.0B    15   8    5/           ICQ XX WYA   Christopher Wyatt
2022E3  2023 02 07.10  S  6.5 TK  5.0B     7 &10    2/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 06.99     6.0     3.6B    12  20    4            ICQ XX ROSxx Michael Rosolina
2022E3  2023 02 06.82  S  5.6 TI  4.4B     8  18    4            ICQ XX HAR11 Christian Harder
2022E3  2023 02 06.79  S  6.2 TK  5.0B 4   7                    ICQ XX PIL01 Uwe Pilz
2022E3  2023 02 06.45 xM  5.9 TK  7.0B    15  10    6            ICQ XX WYA   Christopher Wyatt
2022E3  2023 02 06.12  I  6.2 TK  5.0B     7                    ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 05.93  S  5.5:TI  4.4B     8  15    3/           ICQ XX HAR11 Christian Harder
2022E3  2023 02 05.14  S  6.2 TK  5.0B     7  12    7/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 04.75  S  5.7 TK  5.0B 4   7   7        0.25 100 ICQ XX PIL01 Uwe Pilz
2022E3  2023 02 04.46 &M  6.8 TK 25.0L 5  40   2.8  6            ICQ XX WYA   Christopher Wyatt
2022E3  2023 02 04.18  S  5.5 TK  5.0B     7 &12    6            ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 03.17  S  5.0 AC  5.0B     7 &15    5/           ICQ XX AGU01 Salvador Aguirre
2022E3  2023 02 01.25  S  4.5 TK  0.0E     1  25    6            ICQ XX GON05 Juan Jose Gonzalez Suarez
2022E3  2023 02 01.24  S  4.7 TK  5.0B    10  20    5            ICQ XX GON05 Juan Jose Gonzalez Suarez
2022E3  2023 02 01.16  I  5.0:TK 12.5B 5  25  30    6   1.2      ICQ XX DECaa Michel Deconinck
```

Was it really only a month ago when C/2022 E3 (ZTF) was a faint naked eye comet? The problem with comets that get bright due to close proximity to Earth is that they rapidly fade as they speed away from Earth. On February 1, E3 was 0.29 au from Earth. That distance has already increased to 0.94 au on March 1 and to an even greater 1.65 au on April 1. As a result, the comet that was 4th magnitude a month ago starts March around magnitude 8.0 and is likely to finish the month around magnitude 10.0.

The most recent visual observations found the comet between magnitude 7.5 and 8.0 with a coma up to 7' and slightly to moderately condensed (DC from 2 to 5.5). Imagers are still seeing two tails, a long narrow gas tail and a shorter but broader dust tail. As the comet recedes from the Sun and Earth it will be moving south through Taurus (Mar 1-3) and Eridanus (3-31) in the evening sky.

C/2022 E3 (ZTF) was discovered on 2022 March 2 at 17th magnitude by the Zwicky Transient Facility (ZTF) with the 1.2-m f/2.4 Schmidt on Mount Palomar when it was 4.3 au from the Sun. ZTF is a dynamically old long-period comet which means this is not its first time approaching close to the Sun. Based on the latest orbit published by the Minor Planet Center, it was last at perihelion nearly 47,000 years ago. Perturbations by the major planets do result in this possibly being its last trip through the inner solar system. The negative 1/a(fut) value means it will recede back into the depth of deep space on a hyperbolic orbit and may ultimately leave our solar system forever.

Two teams have reported a rotation period for the nucleus of C/2022 E3. A team led by Matthew Knight (Lowell Observatory) used the Lowell Hall 0.42-m and the 4.3-m Discovery Channel Telescope to measure an 8.7 +/- 0.1 hr rotation period (ATel 15879). A second group using the 0.4-m Savonarola Cassegrain telescope of the Stazione Astronomica di Sozzago found an 8.49 +/- 0.12 hr rotation period (ATel 15909).

Figure 1 – Christian Harder may have caught an outburst of C/2022 E3 (ZTF) as two (maybe three?) jets were visually observable on February 12, 2023 UT. Christian used a 21" dobsonian at 155x for this sketch.

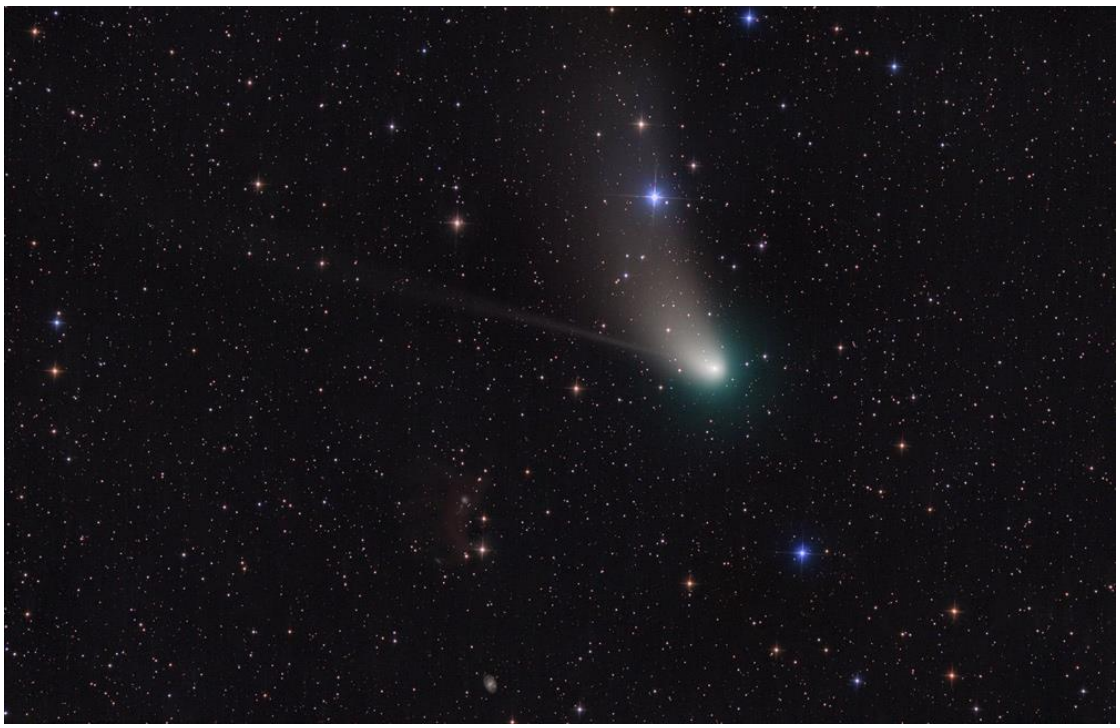


Figure 2 – A late February (Feb. 20 UT) image of C/2022 E3 (ZTF) by Chris Schur in Payson, Arizona. Chris used a 10" f/2.9 GSO astrograph Newtonian and ZWO ASI071MC Pro CMOS OSC camera. The exposure is a co-add of 55 minutes.

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 2023-D72)

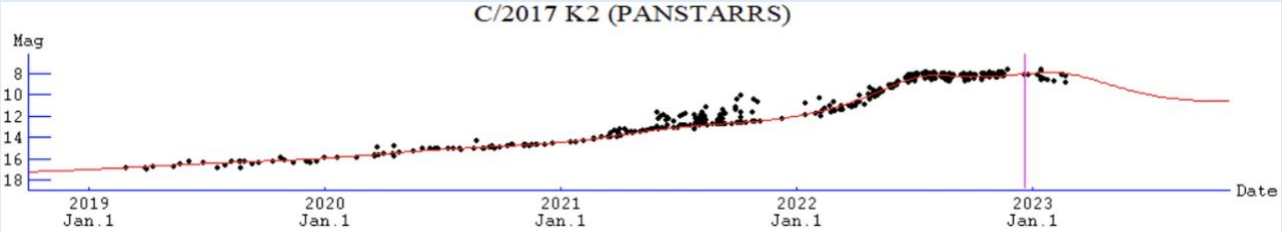
```
    C/2017 K2 (PANSTARRS)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2022 Dec. 19.68872 TT                                  Rudenko
q   1.7968936           (2000.0)            P               Q
z  -0.0004373      Peri.  236.20152     +0.01818934     +0.04921873
 +/-0.0000001      Node    88.23602     -0.18087332     +0.98247050
e   1.0007857      Incl.   87.56336     -0.98333819     -0.17980329
From 11224 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
2023-Mar-01  02 05  -58 01    2.012   2.257     63E    Hyi    8.6     0   43
2023-Mar-06  02 26  -54 57    2.041   2.282     63E    Hor    8.7     0   44
2023-Mar-11  02 45  -51 50    2.071   2.314     63E    Hor    8.8     0   44
2023-Mar-16  03 01  -48 44    2.103   2.353     63E    Hor    9.0     0   44
2023-Mar-21  03 16  -45 41    2.135   2.399     62E    Hor    9.1     0   44
2023-Mar-26  03 29  -42 43    2.169   2.450     62E    Eri    9.2     0   44
2023-Mar-31  03 41  -39 53    2.204   2.507     61E    Eri    9.4     0   43
2023-Apr-05  03 52  -37 10    2.239   2.569     59E    Eri    9.5     0   42
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  4.2 + 5 log d +  6.6 log r [Through T-150 days]
m1 =  4.8 + 5 log d +  5.0 log r [From T-150 days to perihelion]
m1 =  2.9 + 5 log d + 13.0 log r [Since 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  2023 02 21.43 xS  8.9 TK  7.0B    15   7    3/           ICQ XX WYA   Christopher Wyatt
   2017K2  2023 02 16.42 xM  8.8 TK 40.0L 4  59   2.6  6  33   m243 ICQ XX WYA   Christopher Wyatt
   2017K2  2023 02 02.72 xM  8.7 TK  7.0B    15   6    4            ICQ XX WYA   Christopher Wyatt
```

C/2017 K2 (PANSTARRS) is still a nice 8th magnitude object for southern observers. Now that the comet is moving away from the Sun and Earth, it should start to fade more rapidly. The comet was always slow to brighten with a weak 2.5n = 6.6 brightening rate over the past 2+ years. Starting about 5 months before perihelion, this rate slowed down even more. Now that it is past perihelion, it is fading more rapidly at a 2.5n ~ 13 rate. Chris Wyatt continues to follow C/2017 K2 visually, finding it fainter at magnitude 8.7 to 8.9 with a large, up to 7' moderately condensed coma.

As mentioned above, K2 is a southern hemisphere only object and is observable this month in the evening sky as it moves through Hydrus (Mar 1), Eridanus (1-2), Horologium (2-21), and Eridanus (21-31). This month, it should fade from around magnitude 8.6 to 9.4.

C/2020 V2 (ZTF)

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

Orbit (from Minor Planet Center, MPEC 2023-D72)

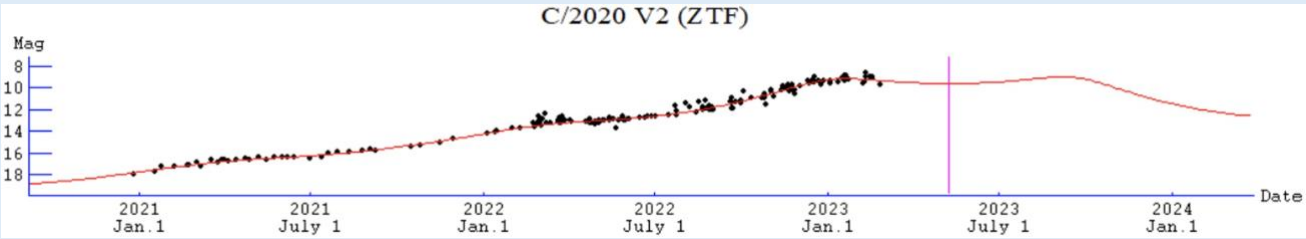
```
    C/2020 V2 (ZTF)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2023 May 8.56970 TT                                  Rudenko
q   2.2278381           (2000.0)            P              Q
z  -0.0004171      Peri.  162.43164     +0.69787326     +0.59390268
 +/-0.0000002      Node   212.37214     +0.53387562     -0.05877077
e   1.0009293      Incl.  131.61091     +0.47744082     -0.80238744
From 4097 observations 2020 Apr. 18-2023 Feb. 25, mean residual 0".4.
1/a(orig) = -0.000141 AU**-1, 1/a(fut) = -0.000379 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
2023-Mar-01  01 46  +41 52    2.363   2.611     64E    And    9.4    45    0
2023-Mar-06  01 49  +39 55    2.344   2.683     59E    And    9.4    41    0
2023-Mar-11  01 53  +38 09    2.327   2.754     54E    And    9.4    36    0
2023-Mar-16  01 57  +36 32    2.311   2.822     49E    And    9.5    31    0
2023-Mar-21  02 01  +35 04    2.297   2.886     45E    Tri    9.5    27    0
2023-Mar-26  02 05  +33 43    2.284   2.946     40E    Tri    9.5    23    0
2023-Mar-31  02 09  +32 28    2.272   3.001     36E    Tri    9.5    18    0
2023-Apr-05  02 13  +31 18    2.261   3.051     31E    Tri    9.6    14    0
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 = -1.4 + 5 log d + 15.9 log r [up to T-580 days
m1 =  3.2 + 5 log d + 10.1 log r [between T-580 and T-220 days]
m1 =  4.2 + 5 log d +  8.0 log r [T-220 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  2023 02 26.80  S 10.2 TI 35.3L   105   2.2  3/           ICQ XX HAR11 Christian Harder
   2020V2  2023 02 25.81  S 10.1 TI 29.8L 4  79   2.1  3/           ICQ XX HAR11 Christian Harder
   2020V2  2023 02 16.95  S  9.0 TK  7.0B    15   7    4            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 16.94  S  9.4 TK 20.3T10  77   4    4/  0.1   30 ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 16.77  E  9.3 TK 25.0C10 192   6    3            ICQ XX DECaa Michel Deconinck
   2020V2  2023 02 14.80  S  9.9 TI 53.1L   111   2    4   5   m 35 ICQ XX HAR11 Christian Harder
   2020V2  2023 02 10.85  S  8.7 TK  7.0B    15   8    3            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2020V2  2023 02 08.76  S  9.9 TI 29.8L 4  92   2.2  4   2   m 10 ICQ XX HAR11 Christian Harder
   2020V2  2023 02 07.76  S  9.9 TI 25.2L 4  78   2.2  4            ICQ XX HAR11 Christian Harder
```

C/2022 E3 (ZTF) isn't the only comet visible in reasonably sized telescopes in the northern sky. C/2020 V2 (ZTF) and C/2022 A2 (PANSTARRS) are also a nice northern comets.

C/2020 V2 is a dynamically new comet presumably making its first perihelion close to the Sun. Perihelion is still two months away on 2023 May 8 at 2.23 au from the Sun. The rather distant perihelion means C/2020 V2 will remain near its maximum brightness for months. As a result, the comet will stay brighter than magnitude 10

for most of 2023 with two likely peaks in brightness. The first peak occurred last month at around magnitude 9 when the comet reached the first of two minimum distances to the Earth (2023 January 6 at 2.06 au from the Earth while 2.63 au from the Sun). A second slightly brighter peak, also at magnitude 9, is predicted around the time of its second close approach (September 17 at 1.85 au from Earth and 2.68 au from the Sun). Though the comet should be intrinsically brightest around its May 8 perihelion at 2.23 au, it will be located 3.22 au from Earth and on the far side of the Sun at that time.

Visual observers (Michel Deconinck, Juan Jose Gonzalez Suarez, and Christian Harder) observed the other bright ZTF comet on 7 nights in February and found it between magnitude 8.7 and 10.2 (aperture corrected to 8.9 to 9.6) with a slightly to moderately condensed (DC = 3.0-4.5) up to 8'coma. A few visual observers including Juan Jose Gonzalez Suarez and Christian Harder observed a short tail.

This month, C/2022 V2 continues to be a far northern evening object in Andromeda (Mar 1-19) and Triangulum (19-31).

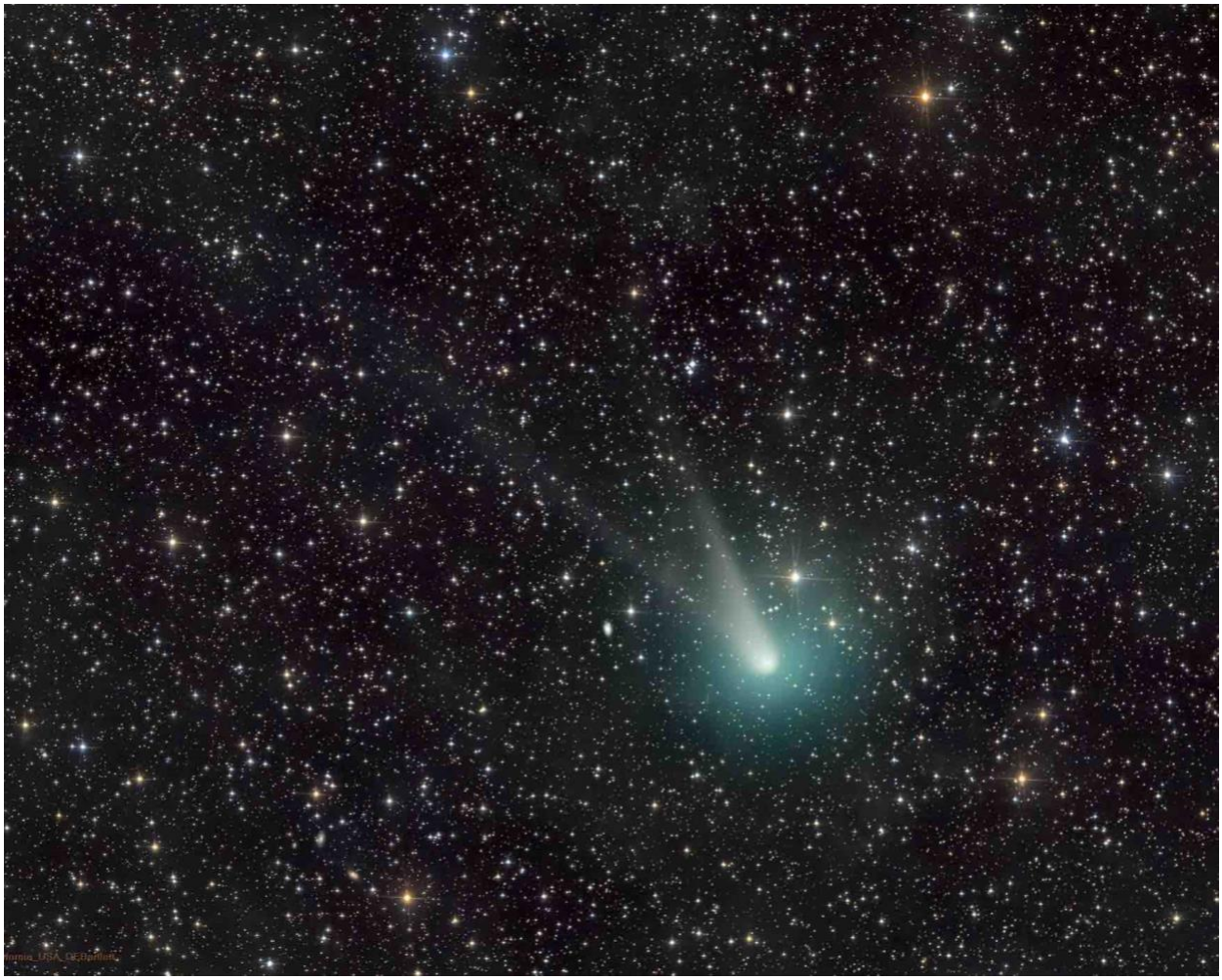


Figure 3 – Here's what C/2020 V2 (ZTF) looked like to Ludovic Prebet. Ludovic used a 18" dobsonian at 60 and 160 power on 2023 January 29.

C/2022 A2 (PANSTARRS)

Discovered 2022 January 10 by Pan-STARRS with the Pan-STARRS2 telescope at Haleakala
Dynamically new long-period comet

Orbit (from Minor Planet Center, MPEC 2022-D72)

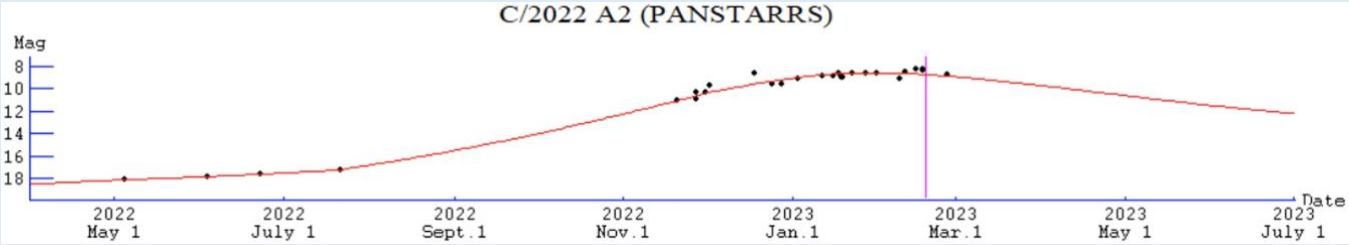
```
    C/2022 A2 (PANSTARRS)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2023 Feb. 18.26695 TT                                  Rudenko
q   1.7352899           (2000.0)            P               Q
z  -0.0001849      Peri.   88.36697     +0.01739964     +0.99011795
 +/-0.0000003      Node   171.57948     -0.09144928     -0.13701531
e   1.0003208      Incl.  108.14702     +0.99565771     -0.02988742
From 913 observations 2022 Jan. 9-2023 Feb. 16, mean residual 0".5.
1/a(orig) = -0.000050 AU**-1, 1/a(fut) = -0.000067 AU**-1.
```

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

```
C/2022 A2 (PANSTARRS)                                                Max El
                                                                      (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag   40N  40S
2023-Mar-01  22 26  +51 27    1.741   2.020     59M    Lac    9.0    24    0
2023-Mar-06  22 44  +49 59    1.747   2.094     56M    Lac    9.1    22    0
2023-Mar-11  23 00  +48 36    1.756   2.167     52M    And    9.2    21    0
2023-Mar-16  23 13  +47 18    1.767   2.239     49M    And    9.3    20    0
2023-Mar-21  23 26  +46 08    1.781   2.308     46M    And    9.5    19    0
2023-Mar-26  23 37  +45 03    1.797   2.374     44M    And    9.6    18    0
2023-Mar-31  23 47  +44 04    1.814   2.435     41M    And    9.7    18    0
2023-Apr-05  23 56  +43 10    1.834   2.492     39M    And    9.9    17    0
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  7.6 + 5 log d + 13.6 log r [Through T-220 days]
m1 = -0.2 + 5 log d + 29.4 log r [Between T-220 and T-80 days]
m1 =  2.7 + 5 log d + 19.7 log r [After T-80 days, 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
   2022A2  2023 02 26.79  S  9.5 TI 35.3L   105   2.2  3           ICQ XX HAR11 Christian Harder
   2022A2  2023 02 25.82  S  9.2 TI 29.8L 4  79   3.2  3           ICQ XX HAR11 Christian Harder
   2022A2  2023 02 16.91  S  8.4 TK  7.0B    15   6    4           ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 16.89  S  8.6 TK 20.3T10  77   5    4           ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 14.79  S  9.2 TI 53.1L   111   3.5  3/          ICQ XX HAR11 Christian Harder
   2022A2  2023 02 10.87  S  8.5 TK  7.0B    15   7    4           ICQ XX GON05 Juan Jose Gonzalez Suarez
   2022A2  2023 02 08.75  S  9.6 TI 29.8L 4  92   2.4  3/          ICQ XX HAR11 Christian Harder
```

C/2022 A2 (PANSTARRS) was discovered with the Pan-STARRS2 1.8-m Ritchey-Chretien reflector on Haleakala, Hawaii at 19-20th magnitude back on 2022 January 10. At discovery, the comet was 4.9 au from the Sun and 4.6 au from Earth. Though a dynamically new long-period comet, it rapidly brightened to around 8-9th magnitude in January.

February saw the comet maintain its January brightness as it arrived at perihelion on February 18 at 1.74 au. Visual observers Juan Jose Gonzalez Suarez and Christian Harder estimated a brightness between magnitude

8.5 and 9.6 (aperture and bias corrected to between 8.3 to 9.2). In small binoculars, it had a moderately condensed coma of diameter 6-7'.

March should see C/2022 A2 fade from around magnitude 9.0 to 10.0. This is a result of a slowly increasing distance to the Sun (1.74 to 1.82 au) and a more rapid increase in its distance to the Earth (2.02 to 2.45 au).

As been the case for the past few months, C/2022 A2 is a northern object limited to northern hemisphere observers. It is currently observable in the morning sky as it moves through Lacerta (Mar 1-10) and Andromeda (10-31).

Figure 4 – Eliot Herman (Tucson, Arizona) imaged C/2022 A2 (PANSTARRS) on 2023 February 20 with an iTelescopes Takahashi TOA-150 0.15-m refractor and . QHY268C One Shot Color CMOS camera. It is a composite of 5 60-s exposures.

Comets Between Magnitude 10 and 12

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-D72)

```
  29P/Schwassmann-Wachmann
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2019 Apr. 22.08466 TT                                  Rudenko
q   5.7776654            (2000.0)            P              Q
n   0.06626543     Peri.   51.08595     +0.99049649     -0.06693952
a   6.0479941      Node   312.39742     -0.00102388     +0.86995719
e   0.0446972      Incl.    9.36345     +0.13753420     +0.48856278
P  14.9
From 15716 observations 2018 June 18-2023 Feb. 26, 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
2023-Mar-01  06 16  +28 30   6.076   5.609   113E   Aur  11-14    79   21
2023-Mar-06  06 16  +28 23   6.077   5.685   108E   Aur  11-14    78   21
2023-Mar-11  06 17  +28 16   6.079   5.764   103E   Aur  11-14    77   21
2023-Mar-16  06 17  +28 09   6.081   5.844    99E   Aur  11-14    75   20
2023-Mar-21  06 18  +28 02   6.082   5.925    94E   Aur  11-14    71   20
2023-Mar-26  06 19  +27 55   6.084   6.007    89E   Aur  11-14    67   20
2023-Mar-31  06 21  +27 48   6.085   6.089    85E   Aur  11-14    62   19
2023-Apr-05  06 23  +27 40   6.087   6.170    80E   Aur  11-14    58   18
```

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 02 16.45 xM 14.2 AQ 40.0L 4 182   0.5  3/          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. The Schwassmann-Wachmann duo discovered 4 comets together, three short-period comets (29P/Schwassmann-Wachmann, 31P/Schwassmann-Wachmann, and 73P/Schwassmann-Wachmann) and a long-period comet shared with American visual observer extraordinaire Leslie Peltier [C/1930 D1 (Peltier-Schwassmann-Wachmann)].

29P is an enigmatic comet. Its nucleus is one of the largest known for an active comet with a recent study using Spitzer infrared data placing its size at 64.6 +/- 6.2 km. Combining the Spitzer diameter with an assumed cometary nucleus albedo of 0.04 yields an absolute magnitude of ~10.1. If 29P were to be completely inactive, its nucleus would still be currently observable at a magnitude of ~18.0. The large size of 29P's nucleus was recently confirmed during an occultation visible across the southwest USA on December 19 when two chords were observed consistent with a nuclear size of ~60 km.

29P experiences outbursts multiple times per year with the largest resulting in a peak brightness of 10th magnitude though the majority of outbursts are much fainter. The constant outbursts are especially odd since the comet's orbit lies just outside the orbit of Jupiter and is nearly circular (e=0.04), meaning the comet does not

experience large variations in solar heating like most comets. Richard Miles (Director of the British Astronomical Society's Asteroids and Remote Planets Section) has published a series of papers on 29P and its outbursts and found that as many as 6 active areas are producing outbursts on a nucleus with a rotation period of ~57-58 days.

Back in September, October, and November of 2021, a number of large outbursts were observed resulting in 29P reaching 10th magnitude, which is about as bright as it ever gets. Recently two large outbursts were detected on November 22 and 27 with additional small to moderate outbursts on December 26, January 12, 19, 29, February 14 and 21. Few visual observations were submitted to the ALPO or COBS in February and they found a faint 29P at 14th magnitude. A number of CCD/CMOS observations were submitted to COBS and they found the comet to be around 11th-12th magnitude with a rather large 6-11' coma. The lack of visual observations maybe due to the coma becoming a large low surface brightness feature. We may need another major outburst like the ones in November to make 29P easily visible in large aperture visual telescopes.

If you observe 29P, please consider contributing to two pro-am programs spearheading the effort to better understand this amazing object: 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).

81P/Wild

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

Orbit (from Minor Planet Center, MPEC 2023-D72)

```
  81P/Wild
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2022 Dec. 15.61293 TT                                  Rudenko
q   1.5984371            (2000.0)            P              Q
n   0.15350778     Peri.   41.62471     -0.99847594     -0.03890013
a   3.4544783      Node   136.09851     +0.02223195     -0.93275656
e   0.5372855      Incl.    3.23644     +0.05051270     -0.35840198
P   6.42
From 2147 observations 2014 Oct. 18-2023 Feb. 27, mean residual 0".6.
     Nongravitational parameters A1 = +0.48, A2 = +0.3420.
```

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
2023-Mar-01  16 54   -18 52    1.761   1.540    85M    Oph   10.8    28   54
2023-Mar-06  17 03   -18 59    1.782   1.513    88M    Oph   10.9    28   57
2023-Mar-11  17 12   -19 02    1.803   1.486    91M    Oph   11.0    29   60
2023-Mar-16  17 20   -19 03    1.825   1.459    94M    Oph   11.1    29   63
2023-Mar-21  17 27   -19 03    1.848   1.432    97M    Oph   11.1    29   65
2023-Mar-26  17 33   -19 00    1.872   1.405   101M    Oph   11.2    29   67
2023-Mar-31  17 38   -18 56    1.896   1.378   104M    Oph   11.3    30   68
2023-Apr-05  17 43   -18 51    1.921   1.353   108M    Oph   11.4    30   69
```

Comet Magnitude Formula (from ALPO and COBS data)

```
m1 =  4.5 + 5 log d + 22.0 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
 81        2023 02 25.29  M 13.1 AQ 30.0L 5 121   1    3/          ICQ XX DES01 Jose Guilherme de Souza Aguiar
 81        2023 02 09.28  M 12.9 AQ 30.0L 5 121   1    3           ICQ XX DES01 Jose Guilherme de Souza Aguiar
 81        2023 02 02.69 xM 12.8 AQ 25.0L 5 125   0.9  5           ICQ XX WYA   Christopher Wyatt
```

Paul Wild 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. Perihelion was on 2022 December 15 at 1.60 au when the comet was also a distant 1.94 au from Earth. 2023 will see the comet move towards a close approach to Earth on 2023 May 18 at 1.22 au.

81P is a morning object in Ophiuchus this March. It was observed visually in February by Jose Guilherme de Souza Aguiar and Christopher Wyatt at magnitude 12.8-13.1 (aperture and bias corrected mag of 11.7-12.4). The prediction above has 81P fading in March from around magnitude 10.8 to 11.3 though recent observations suggest it may be ~0.5-1.0 magnitudes fainter than the prediction.

C/2019 L3 (ATLAS)

Discovered 2019 June 10 by the ATLAS survey with one of their 0.5-m f/2 Schmidt
Dynamically old long-period comet

Orbit (from Minor Planet Center, MPEC 2023-D72)

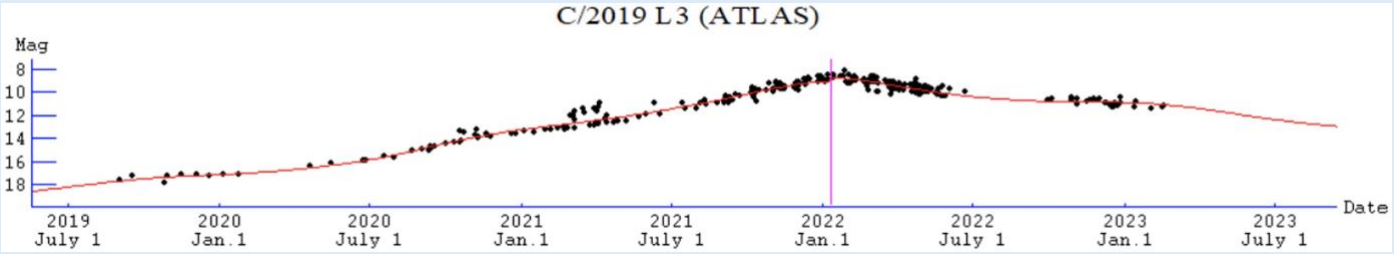
```
    C/2019 L3 (ATLAS)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2022 Jan.  9.64926 TT                                  Rudenko
q   3.5544196           (2000.0)            P              Q
z  -0.0005754      Peri.  171.61732     -0.26040741     -0.66641987
 +/-0.0000001      Node   290.77988     +0.83684012     +0.20510112
e   1.0020453      Incl.   48.35090     +0.48154604     -0.71681105
From 6012 observations 2019 June 10-2023 Feb. 24, mean residual 0".4.
1/a(orig) = +0.000108 AU**-1, 1/a(fut) = -0.000875 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
2023-Mar-01  09 17  -35 11   5.099   4.381   132E   Pyx  11.2    15   85
2023-Mar-06  09 14  -35 04   5.129   4.417   131E   Pyx  11.2    15   85
2023-Mar-11  09 11  -34 54   5.159   4.459   130E   Pyx  11.2    15   85
2023-Mar-16  09 09  -34 40   5.188   4.506   128E   Pyx  11.3    15   85
2023-Mar-21  09 06  -34 24   5.218   4.558   126E   Pyx  11.3    16   84
2023-Mar-26  09 05  -34 05   5.249   4.615   124E   Pyx  11.4    16   84
2023-Mar-31  09 03  -33 46   5.279   4.675   122E   Pyx  11.4    16   84
2023-Apr-05  09 02  -33 25   5.309   4.740   119E   Pyx  11.5    16   84
```

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

```
m1 =  2.5 + 5 log d + 12.1 log r [Until T-550 days]
m1 = -4.9 + 5 log d + 21.7 log r [Between T-550 and T+0 days]
m1 =  2.3 + 5 log d +  8.0 log r [Since T+0 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
   2019L3  2023 02 24.99  M 12.3 AQ 30.0L 5 100   1    3            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019L3  2023 02 16.98  S 11.5 TK 20.3T10 133   1    3            ICQ XX GON05 Juan Jose Gonzalez Suarez
   2019L3  2023 02 16.48 xM 11.9 AQ 40.0L 4  59   2.4  5/           ICQ XX WYA   Christopher Wyatt
   2019L3  2023 02 08.96  M 11.8 AQ 30.0L 5 100   1    4            ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019L3  2023 02 02.67 xM 11.7 AQ 25.0L 5  74   1.6  4            ICQ XX WYA   Christopher Wyatt
```

C/2019 L3 (ATLAS) keeps slowly fading. It is over a year after its 2022 January 9 perihelion at 3.55 au from the Sun. At that time the comet reached a peak magnitude of ~8.5 to 9.0. Before perihelion, L3 experienced a rapid rate of brightening. Since perihelion, it has faded at a slow though normal rate of 8.0 log r. That combined with the comet's large perihelion distance is the reason for its slow apparent fading. Visual observers found L3 at magnitude 11.5 to 12.3 (aperture and bias corrected to 11.2-11.9) with a small 1-2.4' moderately condensed (DC = 3 to 5.5) coma. This month, the comet is visible from both hemispheres though low in the south for northerners as it moves through the southern constellation of Pyxis in the southern evening sky.

C/2019 U5 (PANSTARRS)

Discovered 2019 October 22 with the Pan-STARRS1 1.8-m on Haleakala

Orbit (from Minor Planet Center, MPEC 2023-D72)

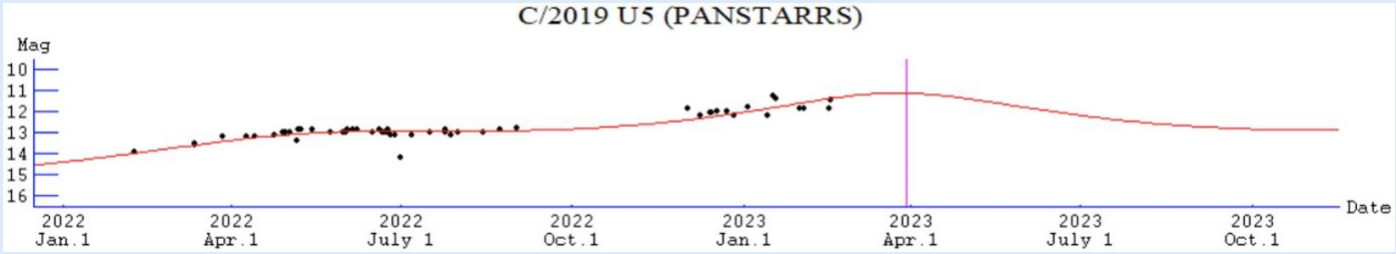
```
    C/2019 U5 (PANSTARRS)
Epoch 2023 Feb. 25.0 TT = JDT 2460000.5
T 2023 Mar. 29.85173 TT                                  Rudenko
q   3.6241923            (2000.0)            P              Q
z  -0.0004088      Peri.  181.49738     -0.99907955     +0.00774683
 +/-0.0000003      Node     2.63731     -0.02311353     +0.73134212
e   1.0014817      Incl.  113.52061     -0.03613607     -0.68196678
From 3250 observations 2019 Oct. 11-2023 Feb. 27, mean residual 0".4.
1/a(orig) = +0.000090 AU**-1, 1/a(fut) = -0.000091 AU**-1.
```

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

```
C/2019 U5 (PANSTARRS)                                                  Max El
                                                                        (deg)
    Date       R.A.    Decl.      r       d     Elong  Const  Mag    40N  40S
2023-Mar-01  12 55   -00 18    3.634   2.766    146M   Vir   11.3     50   50
2023-Mar-06  12 46   -00 33    3.631   2.715    153M   Vir   11.2     49   51
2023-Mar-11  12 36   -00 46    3.628   2.675    160M   Vir   11.2     49   51
2023-Mar-16  12 25   -00 59    3.626   2.647    168M   Vir   11.2     49   51
2023-Mar-21  12 14   -01 12    3.625   2.631    175M   Vir   11.1     49   51
2023-Mar-26  12 03   -01 24    3.624   2.628    176E   Vir   11.1     48   52
2023-Mar-31  11 52   -01 36    3.624   2.639    169E   Vir   11.2     48   52
2023-Apr-05  11 42   -01 48    3.625   2.661    161E   Vir   11.2     48   52
```

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

```
m1 =  3.9 + 5 log d +  9.2 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
   2019U5  2023 02 25.27  M 11.4 AQ 30.0L 5 100   2    4              ICQ XX DES01 Jose Guilherme de Souza Aguiar
   2019U5  2023 02 16.99  S 10.9 TK 20.3T10  77   6    2              ICQ XX GON05 Juan Jose Gonzalez Suarez
   2019U5  2023 02 16.51 &M 13.0 AQ 40.0L 4 108   1.1  5/             ICQ XX WYA   Christopher Wyatt
   2019U5  2023 02 02.66 xM 12.7 AQ 25.0L 5 125   1    4/             ICQ XX WYA   Christopher Wyatt
```

C/2019 U5 (PANSTARRS) was discovered by the Pan-STARRS survey on 2019 October 22. At that time the comet was 21st magnitude and 10.4 au from the Sun, or a little further than the orbit of Saturn. This month sees the comet arrive at perihelion at 3.62 au on the 29th. It is also at opposition in Virgo this month making March the best time to observe U5 as it peaks around magnitude 11.1.

In February, Juan Jose Gonzalez Suarez, Jose Guilherme de Souza Aguiar, and Christopher Wyatt observed U5. They found the comet between magnitude 10.9 and 13.0 (aperture & bias corrected to magnitude 10.6 to 11.9) with a coma between 1' and 6' in diameter and a moderate coma with a DC of 4-5.5.