

Recent Comets and the ALPO Comets Section

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ALPO Comets Section Coordinator

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The ALPO Comets Section

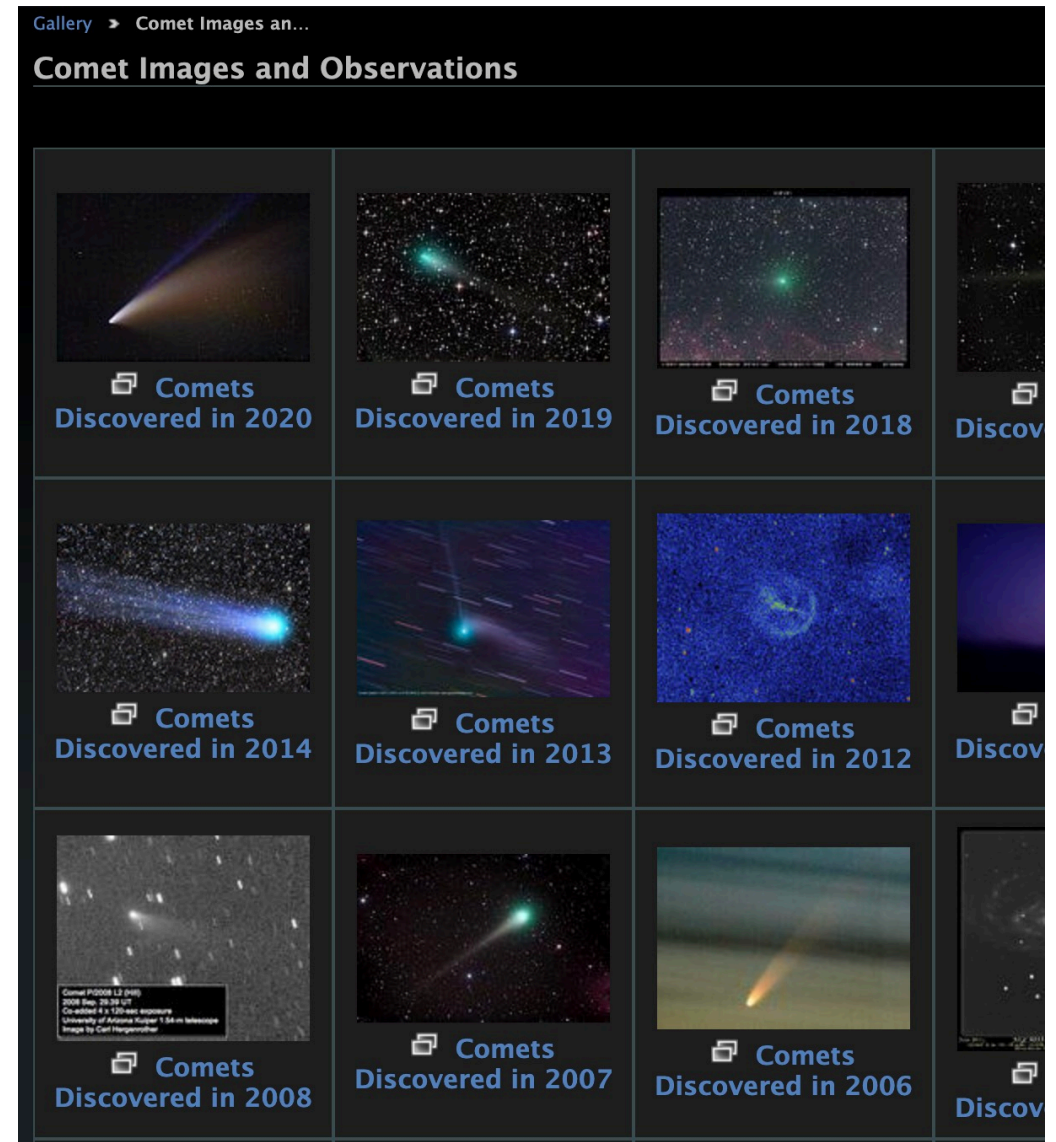
- The ALPO Comets Section has been going strong for over 60 years
- The Comets Section was founded in 1957 by High School student David Meisel in response to the appearance of bright comets C/1956 R1 (Arend-Roland) and C/1957 P1 (Mrkos)
- The Section was created to address the need for compiling visual and photographic observational data on comets
 - The Section continues this mission even as technology has moved many observers away from visual and photographic observing to digital observing
- The Section currently publishes a monthly guide to observable comets
 - Each “ALPO Comets News for [your favorite month here]” has its own Cloudy Nights forum page as well as being distributed via the ALPO-Member-Discussion mailing list



Figure 3. Comet Mrkos 1957d. 19 AUG 1957, 03:29 - 03:44 U.T. 7-in. F.L., f/2.5, 15-min. Exp. on Kodak Royal Pan, developed in DK-50. This was the first comet to be photographed in color, using "high-speed" Anscochrome 25 ASA Film, pushed to 200 ASA. Photograph by C. F. Capen.


ALPO Comets Section Image Gallery

- As of September 2020, the Section's image archive consisted of 5686 images and sketches of 532 comets
- During 2020, the Section has received 611 images, sketches, and spectra of 87 comets from 37 observers
 - A small number of these images were submitted in 2020 but taken prior to this year
- The Image Gallery on the ALPO web site contains the Section's image archive
 - Each comet has its own sub-folder within a folder organized by year of discovery (for long-period and newly discovered short-period comets) and number (for numbered short-period comets)



ALPO Comets Section Magnitude Database

- As of September 2020, the Section's Magnitude Database consisted of 9918 magnitude measurements of 362 comets
- During 2020, the Section has received 435 magnitude measurements of 22 comets from 8 observers
 - Nearly all magnitude estimates were submitted in the International Comet Quarterly (ICQ) format
 - Many of the magnitude estimates were also submitted to the ICQ and the Comet Observations Database (COBS) archives
- Links to the Section's Magnitude Database can be among the links on the right side of the Comets Section's web page

Comet Section 

Comet magnitudes can be submitted to the Comet Section in a number of different formats. A useful magnitude estimate must include the following: designation of comet, date and time of observation in UT, magnitude estimate, technique used, aperture of telescope, type of telescope (refractor, reflector, etc.), magnification used, your name. Other parameters such as coma size, DC, tail length, tail PA, naked eye visual limiting magnitude in the part of the sky containing the comet are desired but optional. The data listed below is in the International Comet Quarterly (ICQ) format. A full description on the ICQ format can be found at this [ICQ webpage](#).

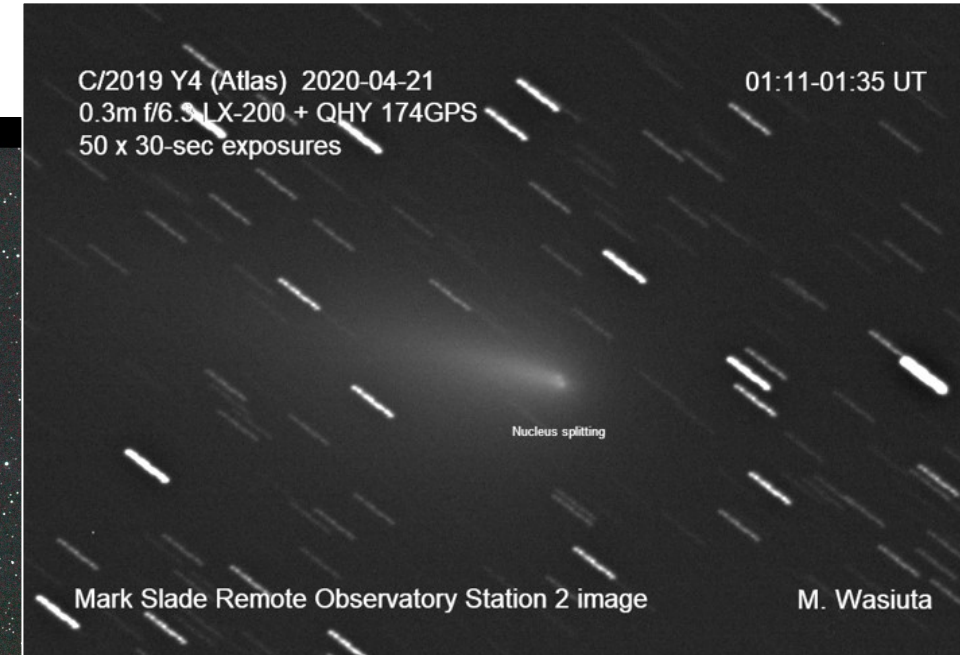
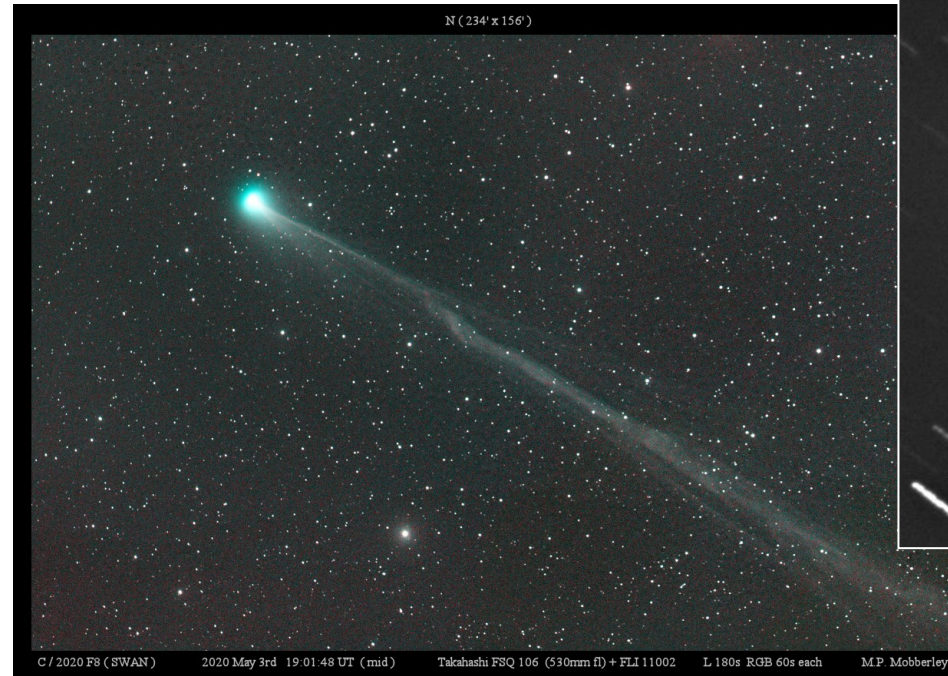
Comet Des	YYYY MM DD.DD (UT)	Mag	SC	APER	FL	POW	COMA Dia DC	TAIL LENG PA	ICQ CODE	Observer Name
C/2020 Q1 (Borisov)										
2020Q1	2020 08 25.14	S 11.6	TK	20.3	T10	160	2.5 2		ICQ XX GON05	Juan Jose Gonzalez Suarez
C/2020 K8 (Catalina-ATLAS)										
2020K8	2020 08 25.18	S 10.3	TK	20.3	T10	160	3 2		ICQ XX GON05	Juan Jose Gonzalez Suarez
2020K8	2020 07 17.10	C 15.8	U4	15.0	R	7a600	0.9		ICQ xx HER02	Carl Hergenrother
C/2020 H2 (Pruyne)										
2020H2	2020 04 28.78	xS 13.3	AQ	25.0	L	5 125	0.7 3		ICQ XX WYA	Christopher Wyatt
2020H2	2020 04 28.46	Z 12.5	U4	10.6	R	5a480	4.7		ICQ xx HER02	Carl Hergenrother
C/2020 G1 (Pimentel)										
2020G1	2020 04 24.40	xS 15.6	AQ	40.0	L	4 261	0.2 3		ICQ XX WYA	Christopher Wyatt
2020G1	2020 04 19.40	xS 15.0	AQ	40.0	L	4 261	0.4 2/		ICQ XX WYA	Christopher Wyatt
C/2020 F8 (SWAN)										
2020F8	2020 06 01.09	&B> 7.4	:TK	12.6	B	5 25			ICQ XX DECa	Michel Deconinck
2020F8	2020 05 26.12	S 6.8	TK	20.3	T10	77 4	3 0.2 350		ICQ XX GON05	Juan Jose Gonzalez Suarez
2020F8	2020 05 22.08	B 7.0	TK	12.6	B	5 25 > 6	1/		ICQ XX DECa	Michel Deconinck

2020 Comets Section Contributors

- **A big thank you to our 2020 contributors!**
- *Salvador Aguirre, Charles Bell, Sergio Babino, Andre Brossel, Denis Buczynski, Andres Chapman, John Chumack, Phillip Creed, Dan Crowson, Michael Deconinck, Hugo Espina, Diego Etchevers, Ken Fiscus, Christian Harder, Juan Jose Gonzalez, Gabriel Jaimes, Manos Kardasis, Laurent Lacote, Michel Lefevre, John Maikner, Gianluca Masi, Tyson McVicar, Jim Melka, Frank Melillo, Martin Mobberley, Mike Napper, Mike Olason, Nicolas Reyren, Efrain Morales Rivera, Tim Robertson, Michael Rosolina, Gregg Ruppel, John Sabia, Chris Schur, Mark Shapiro, Willian Souza, Tenho Tuomi, Roger Venable, Myron Wasiuta, Darryl Wilson, and Chris Wyatt*
- The above contributors have submitted comet magnitude measurements (both visual and CCD), sketches, CCD images, spectra, and textual descriptions of comets observed during the first 9 months of 2020.

The Comets of 2020 (so far...)

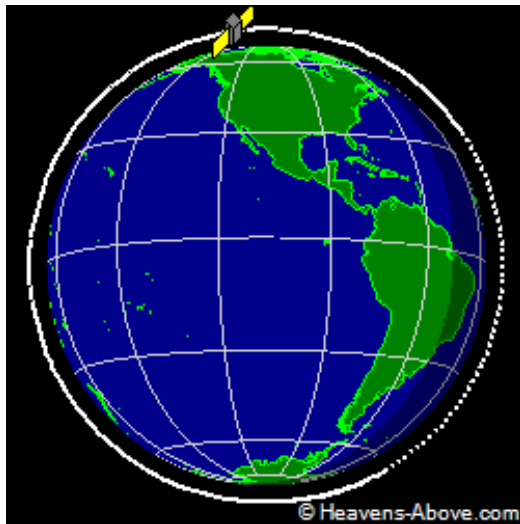
- 2020 has already seen 9 comets brighter than magnitude 10.0
 - 2P/Encke
 - 88P/Howell
 - C/2017 T2 (PANSTARRS)
 - C/2019 U6 (Lemmon)
 - C/2019 Y1 (ATLAS)
 - C/2019 Y4 (ATLAS)
 - C/2020 A2 (Iwamoto)
 - C/2020 F3 (NEOWISE)
 - C/2020 F8 (SWAN)



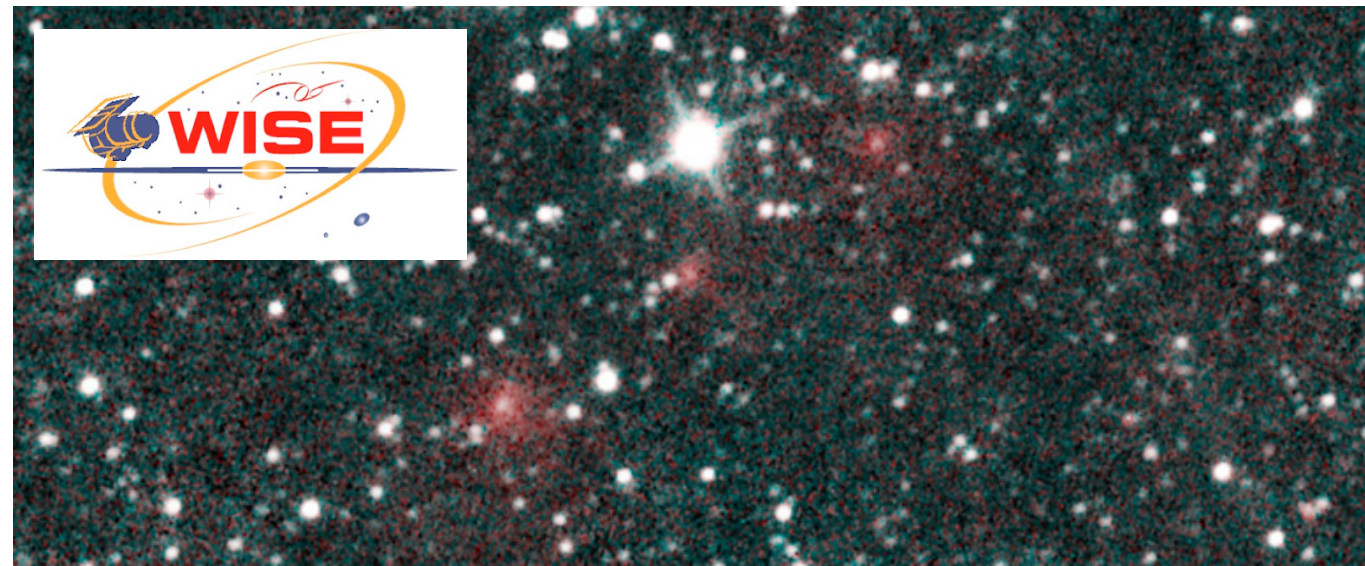
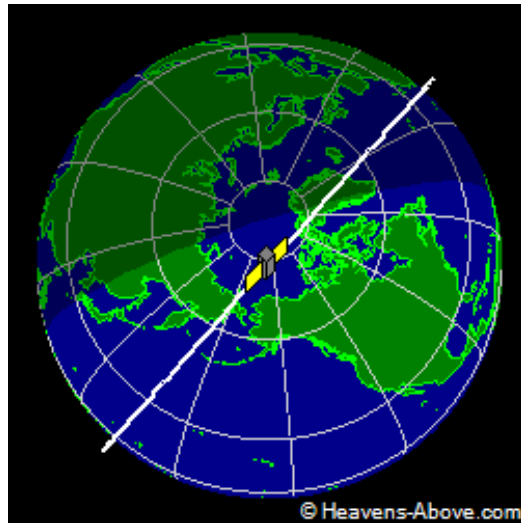
- C/2019 Y4 (ATLAS) & C/2020 F8 (SWAN) were predicted to become bright objects but fell apart as they approached perihelion
- Finally, C/2020 F3 (NEOWISE) surprised us by becoming the most impressive comet for northern hemisphere observers since C/2011 L4 (PANSTARRS) in 2013 and perhaps even C/1995 O1 (Hale-Bopp) in 1997

The Discovery of C/2020 F3 (NEOWISE)

- Comet NEOWISE was discovered by the Near-Earth Object Wide-field Infrared Satellite (NEOWISE) on Mar. 27, 2020
 - At discovery, the comet was in the constellation of Puppis at 2.08 au from the Sun and 1.70 au from Earth
 - Ground-based follow-up observations placed the comet as bright as 15.9
 - Faint at discovery, C/NEOWISE was not expected to become a bright object. There was even doubt as to whether it would survive perihelion.



Credit: Heavens Above



Credit: JPL/NEOWISE

The Orbit of Comet NEOWISE

C/2020 F3

Orbit from the Minor Planet Center

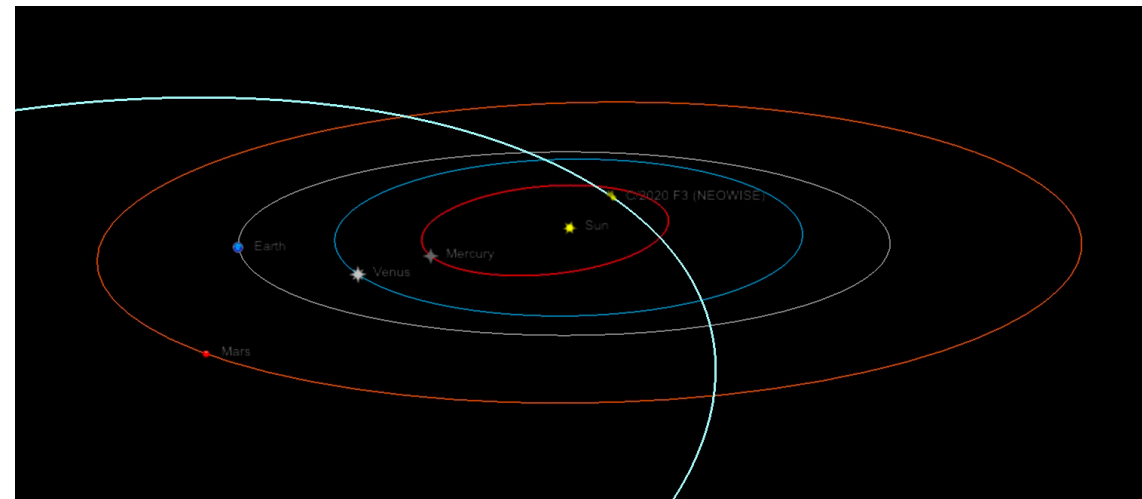
Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 July 3.6790 TT

q	0.294648	(2000.0)	P	Rudenko	Q	
z	+0.002759	Peri.	37.2790	+0.7186034	+0.1438651	T = 2459034.17905 JDT
	+/-0.0000016	Node	61.0104	+0.2818985	-0.9546416	q = 0.2946478
e	0.999187	Incl.	128.9374	+0.6357219	+0.2606959	Earth MOID = 0.36249 AU

$1/a(\text{orig}) = +0.003654 \text{ AU}^{-1}$, $1/a(\text{fut}) = +0.002758 \text{ AU}^{-1}$.

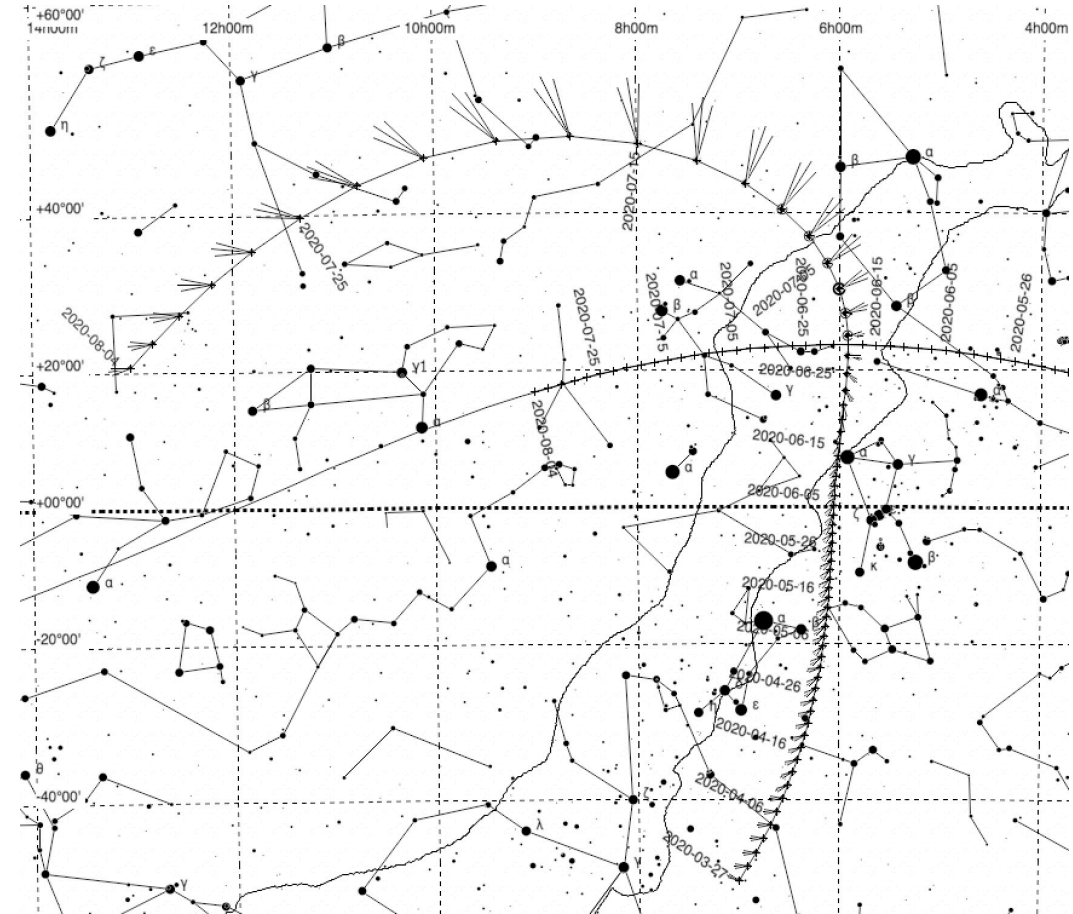
- NEOWISE is a dynamically old comet having made at least one previous close perihelion passage.
 - “Original” semi-major was ~ 270 AU with a previous perihelion occurring ~ 4400 years ago or around 2400 BC.
 - “Future” semi-major axis is ~ 350 au corresponding to the next perihelion happening in ~ 6700 years.



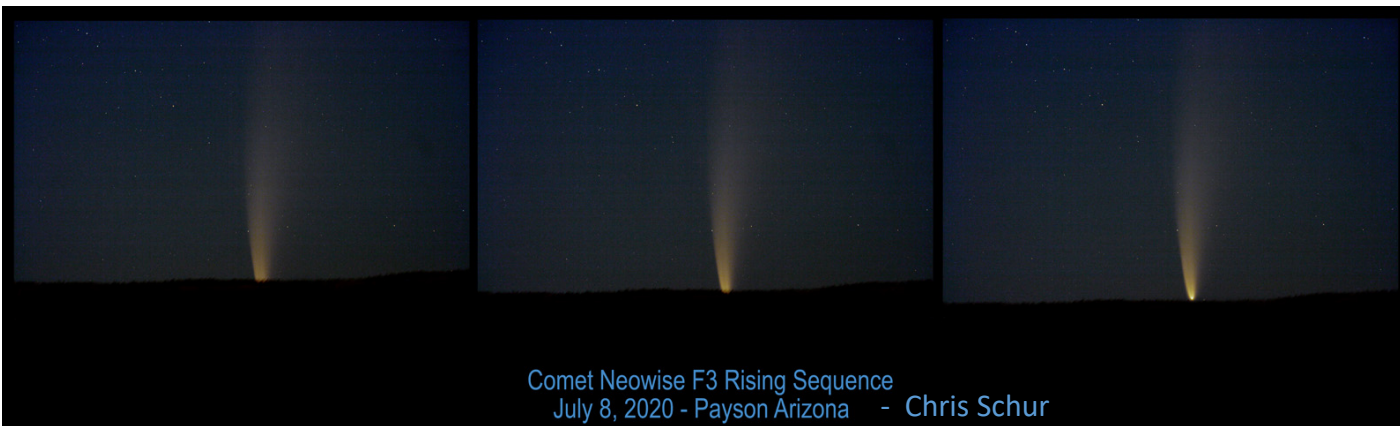
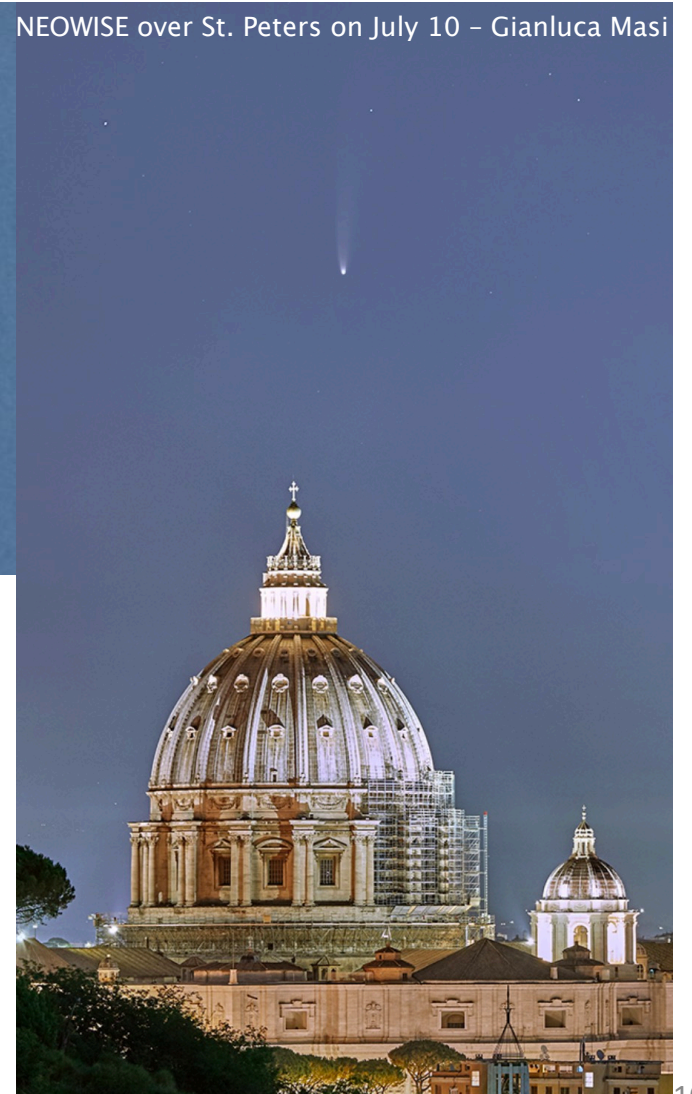
Orbit diagram from JPL Small Body Database Browser

Observing Circumstances

- The comet was only visible from the southern hemisphere during most of its inbound leg
- By early June, NEOWISE's elongation dropped below 20° .
- While out of view from Earth, a fleet of Sun-watching spacecraft (Solar and Heliospheric Observatory (SOHO), Solar and Terrestrial Relations Observatory (STEREO), and Parker Solar Probe) followed the comet
- Two days before perihelion on July 1, the comet was seen by Earth-based observers at a small elongation of 11°
- For the first half of July, NEOWISE was a morning object
- At mid-month, it passed north of the Sun into the evening sky and was circumpolar for mid to high northern latitudes
- As July progressed and the comet moved to the southeast, it again became visible to southern hemisphere observers
- Closest approach to Earth occurred on July 23 at 0.69 au



Assorted NEOWISE Images



Near-nucleus features

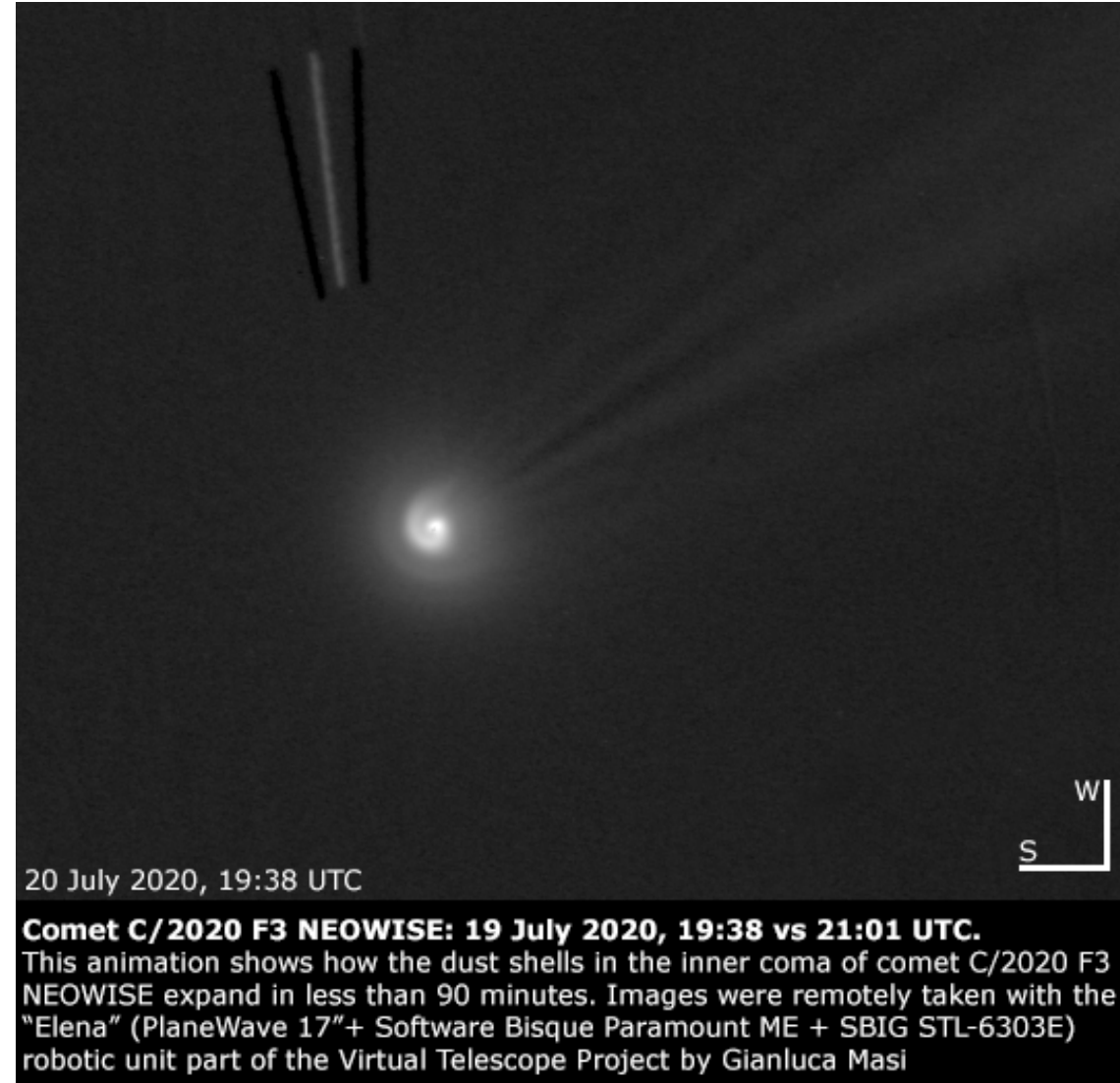
- Both visual and CCD observers noted a strong yellow color in early July due to Sodium D line emissions
- Observed in early July was a bifurcation of the dust tail, sometimes incorrectly called the “the shadow of the nucleus”
- Rotating jets and expanding shells and hoods were also seen
- Gianluca Masi also determined a rough rotation period of 7.5 ± 2.3 hours based on the expansion of the shells (IAUC 4816)



Sketch – 2020 July 12 – Christian Harder



Sketch – 2020 July 5 – Michel Deconinck

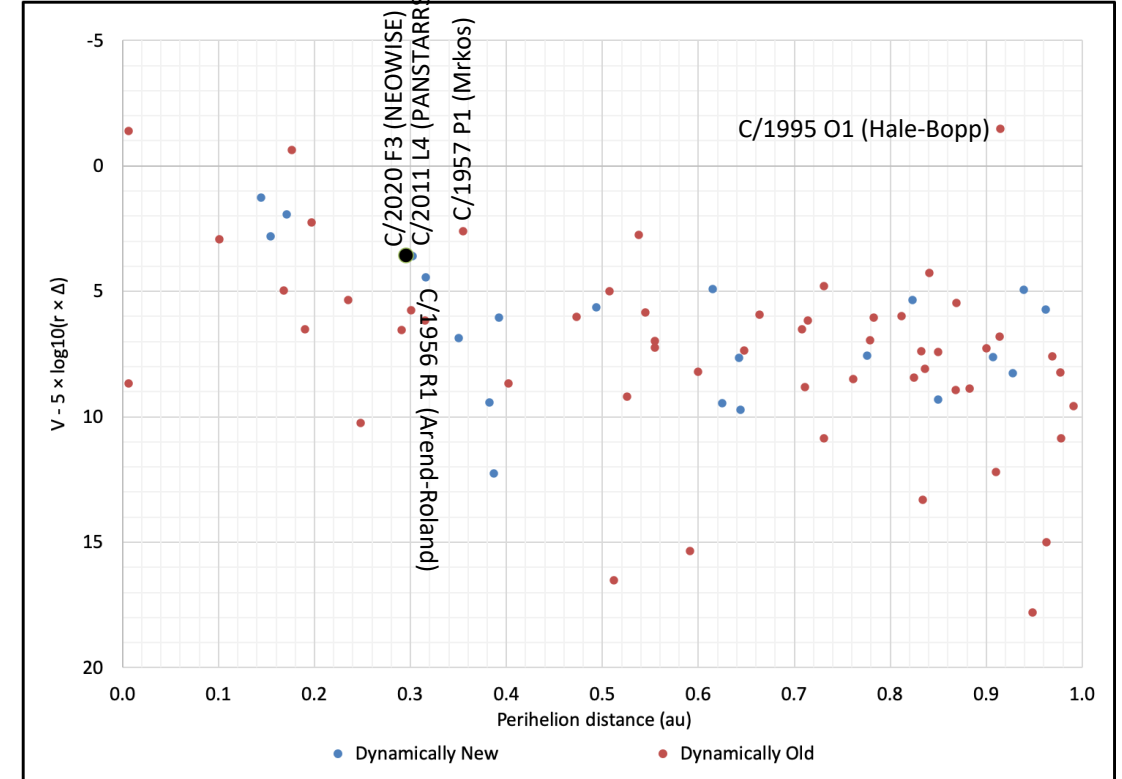
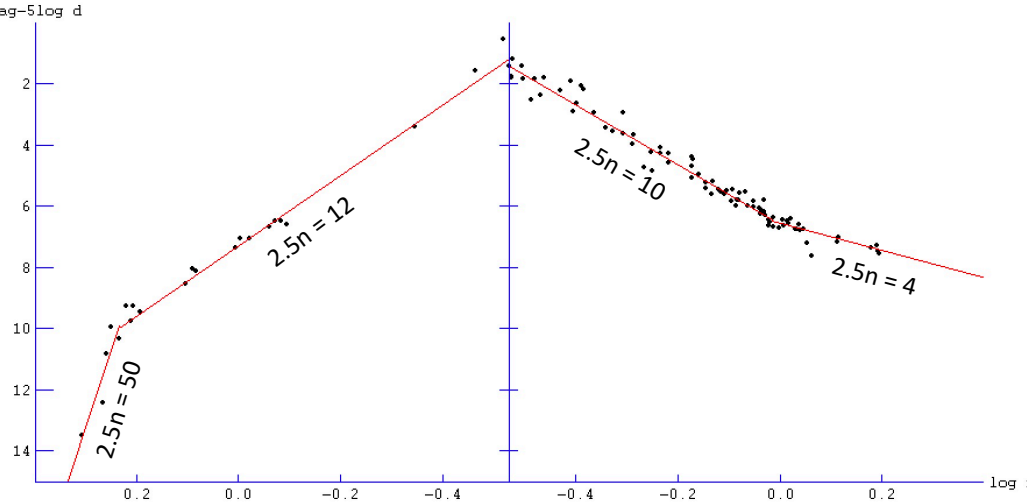
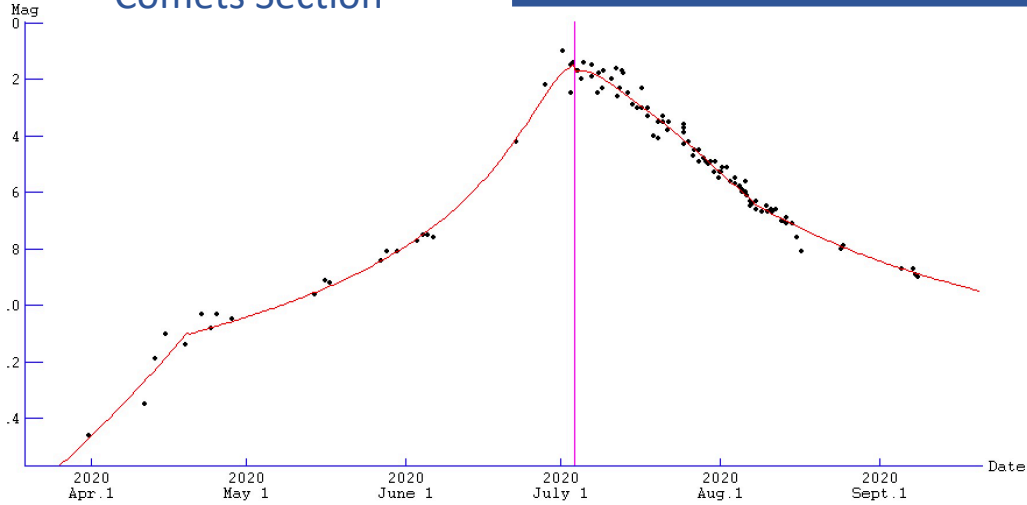


NEOWISE at its Best

- The full extent of both the ion and dust tails were evident around the time of closest approach to Earth on July 23.
- Though the comet had faded to 3rd magnitude by this time, a strongly curved dust tail was measured to a length of 10° and the ion tail out to nearly 30°



Apparent and Intrinsic Brightness



Comet Magnitude Formula

$$m_1 = H_0 + 5 \log \Delta + 2.5n \log r$$

where H_0 is absolute mag, Δ is Sun-Earth distance (au), n is an activity index & r is Sun-comet distance (au)

Next On Deck

- Upcoming comets for small aperture observers:
 - Rest of 2020
 - 88P/Howell - 8th mag
 - C/2020 M3 (ATLAS) – 8-9th mag
 - In 2021
 - 15P/Finlay -9-10th
 - 8P/Tuttle – 8th mag
 - 6P/d’Arrest – 9-10th mag
 - 67P/Churyumov-Gerasimenko – 8-9th mag
 - In 2022
 - 19P/Borrelly – 8th mag
 - C/2017 K2 (PANSTARRS) – 5th mag
 - In 2023
 - 2P/Encke – 7th mag
 - 103P/Hartley – 7th mag
 - In 2024
 - 12P/Pons-Brooks – 4th mag
 - 13P/Olbers – 7th mag
 - 62P/Tsuchinshan – 7th mag
 - 144P/Kushida – 8th mag
 - 333P/LINEAR – 9th mag
 - And any new discoveries!

