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Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 64, Number 2 Spring 2022
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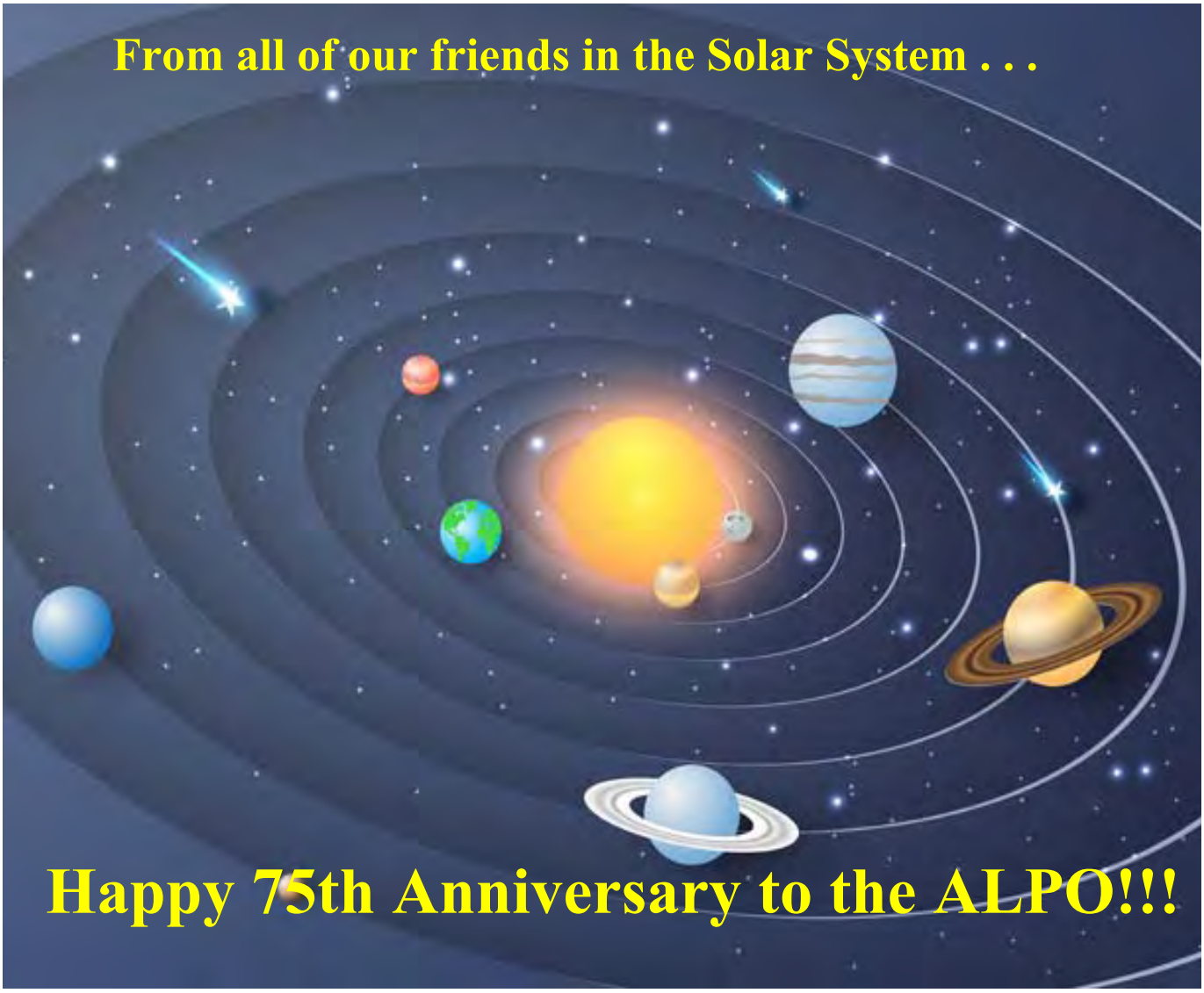
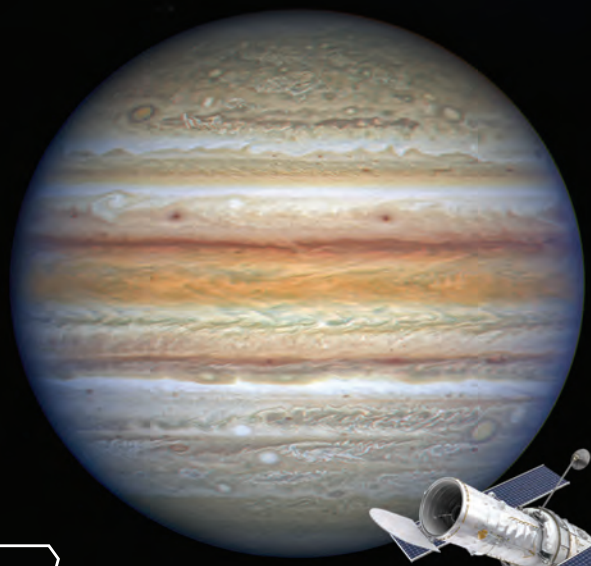


CELESTRON

THE THRILLA IN CEBU CITY, PHILIPPINES



CHRISTOPHER GO'S **C14** *VS.* **HUBBLE** SPACE TELESCOPE

Since the early 2000s, master astroimager and Team Celestron member Christopher Go has had a love affair with Jupiter. After working all day at his furniture business, he spends most nights pointing his 14" Celestron Schmidt-Cassegrain telescope towards the gas giant. His work has paid off, not just for him, but for the entire scientific community. On February 24, 2006, Go captured an image of Jupiter and noted that a white spot, Oval BA, had turned red. The spot is now known as "Red Spot Junior." Later, in June 2010, he and co-discoverer Anthony Wesley captured a video of a fireball exploding on Jupiter. It was the first-ever recording of an asteroid impacting a planet.

THE SECRETS TO CHRISTOPHER GO'S STUNNING IMAGES

- **The right equipment** – Go has used his trusty C14 since he started imaging seriously more than a decade ago.
- **Impeccable seeing conditions** – Despite being an urban area, his hometown of Cebu City, Philippines, enjoys excellent seeing conditions.
- **Years of passion and hard work**

	CHRISTOPHER GO'S C14	HUBBLE SPACE TELESCOPE
Aperture	14 inches	2.4 meters (7.9 feet)
Has contributed new scientific knowledge about Jupiter	✓	✓
Has required major repairs	No	✓
Cost	**$ Under 10k**	>$1.5 billion in 1990 dollars

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Astronomics – 800.422.7876 – astronomics.com
OPT Telescopes – 800.483.6287 – optcorp.com
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Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Shawn Dilles, Editor

Volume 64, No.2, Spring 2022
This issue published in March 2022 for distribution in both portable document format (pdf) and hardcopy format. Hard copy printing and distribution by Sheridan Press.

This publication is the official Journal of the Association of Lunar & Planetary Observers (the ALPO).

The purpose of this journal is to share observation reports, opinions and other news from ALPO members with other members and the professional astronomical community.

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Visit the ALPO online at:
http://www.alpo-astronomy.org

Founded in 1947

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ALPO Resources

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Association of Lunar & Planetary Observers (ALPO)

Founded by Walter H. Haas, 1947

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Member of the Board: Timothy J. Robertson
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(See full listing in *ALPO Resources*)
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Lunar Transient Phenomena: Anthony Cook
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Saturn Section: Julius L. Benton, Jr.
Remote Planets Section: Richard W. Schmude, Jr.
Exoplanets Section: Jerry Hubbell

Point of View:

The ALPO at 75: Accomplished, Impactful and Growing

By Shawn Dilles, editor, The Strolling Astronomer

It is a pleasure to introduce this issue of JALPO during our 75th Anniversary year. This is a special issue that reflects on some of our achievements. To show how far we have come, see the reprint of the first issue of *The Strolling Astronomer*. Founder Walter Haas typed the original by hand and mailed the issue as a newsletter.

We start our "Inside the ALPO" section by marking the passing of Harry Jamieson on page 32. A long-time ALPO Board member, executive director and editor of this Journal (July 2000 - April 2001), Harry was an avid lunar observer. He supported training for novice and intermediate observers and also advanced cooperation with the BAA.

At our core, ALPO is an organization of observers who contribute to our knowledge of the Solar System. It is therefore a pleasure to be able to share stories we have received about how members entered into astronomy and grew along with ALPO. We include tributes to mark our anniversary from observers in sister organizations including the BAA, the AMS, the Royal Astronomical Association of New Zealand, Analemma Society and AAVSO.

We then look at two anecdotal measures of the contributions and impact that ALPO members have made over the years: the List of Asteroids Named for ALPO Members, and List of Books written by ALPO members. Please take a moment to consider the time, effort, expertise and dedication of ALL of our observers - whether mentioned on these lists or not. Read them with a pen (or keyboard) in hand and send in any names that should have been on the lists.

Carl Hergenrother looks back to see what was going on in the JALPO 75, 50 and 25 years ago. The format is inspired by a similar feature in *Sky & Telescope* magazine. S&T is a decades-long partner that supports us through advertising and by the occasional mention in their publication.

After our reprint of Issue 1, No. 1, Beth Westfall reflects on how this Journal was produced over the years. Beth is in a unique position by virtue of having assisted her husband, John Westfall, through his many years as editor.

Our Journal would not be complete without articles containing information to support observers, and to present their observations, observational data, and images. This issue features articles Bob Lunsford on upcoming meteor showers, a report by Carl Hergenrother on comets, and a report on the upcoming Mars apparition by Roger Venable. Thanks to these authors and the many, many ALPO members who contributed observations to make them possible.

Kudos to all of our authors and observers - past and present - for their contributions, and best wishes to ALPO for another successful 75 years!

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News of General Interest

Our Cover: Best Wishes from Our Solar System 'Friends'

Usually, our cover features a photo of a Solar System object detailed within the pages of this Journal. This time, however, our cover features all of the Solar System as we celebrate the ALPO's 75th anniversary of its founding by the late Walter Haas in March 1947. Journal Editor Shawn Dilles covers the contents of this issue in his "Point of View Column on page 2.

We are also proud to display a special ALPO logo commemorating that fact. The new logo, produced by Rachel Good, daughter of our own Jerry Hubbell, will grace the front cover of all ALPO Journals through the remainder of Volume 64.

From its very first issue, when Walter announced a very dark streak just north of the South Temperate Belt (complete with his own sketches), along with a possible dark band across the globe of Saturn ("adjacent to the north edge of the ring-ellipse and parallel to that edge") and included short acknowledgements of others, through today where we include news of a possible meteor "outburst" in May, a wrap-up of the brightest comets in 2019 and a very detailed report about the 2022-23 "transitional apparition" of Mars (currently in progress), we've always done our best for you, the serious Solar System observer.

We hope you enjoy this issue of the Journal and ask that you pass the word on to any others that you know who are likewise into this kind of enjoyment.

Five Named to Newly Created ALPO Endowment Trust Board

The Association of Lunar & Planetary Observers (ALPO) is pleased to announce the appointment of five trustees to its newly created Endowment Trust Fund Board of Trustees.

The Endowment Trust Fund Board was established in early 2021 to provide management oversight and to generate and effectively utilize funds ensuring that both short- and long-term financial goals of the Association, a 501(c)(3) organization now celebrating its seventy-fifth anniversary, are met.

Retired business executive Ronald May was named chairman of the Endowment Trust Board. Mr. May brings with him over 40 years of experience in corporate marketing and communications and also served as a member of the Board of Trustees of the San Jose Museum of Art in the early 2000s. He earned his BA in U.S. History at California State University, Northridge, and an MBA in Business Administration at Golden Gate University in San Francisco.

The remaining Endowment Trust Fund Board members are:

- John Bedsole, a Certified Public Accountant, business valuation analyst, and tax professional with the firm Kalifeh Bedsole Adams in Mobile, AL. Mr. Bedsole earned his BS in Commerce and Business Administration in 2002 and an MA in Economics in 2003 from The University of Alabama; and, a Masters of Accounting in 2006 from The University of North Carolina at Chapel Hill. He has been a member of the ALPO for fourteen years.

Ron May, chairman of the ALPO Endowment Trust Board.

- Matthew Benton, CEO of Mentora Education Group, based in Washington, DC, and Istanbul, Turkey; and, Director of Foreign Languages at Bahcesehir College in Turkey. Mr. Benton earned his BA in History in 2004 from Armstrong Atlantic State University and his MA in Applied Linguistics from Georgia State University in 2009, and has been involved with the ALPO since the early 1990s.
- Jacqueline "Jackie" Beucher, who serves as treasurer for the Trust Fund of the Astronomical League, an umbrella organization comprising over two hundred and forty local amateur astronomical societies across the United States, and as vice chair of the Missouri chapter of the International Dark Sky Association. Ms. Beucher holds a BS degree in Business Administration from Avila University.
- Larry Hardy, chairman of the board for the Prairie Education Research

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Co-operative, the clinical trial division of Prairie Cardiovascular, and a member of the Board of Directors for Prairie Cardiovascular Consultants. Mr. Hardy earned a BS degree in molecular biology from the University of Illinois. Additionally, he is a vice president with Morgan Stanley in Springfield, Illinois.

"For decades, the ALPO has been recognized around the world for its outstanding contributions to both amateur and professional astronomical observing," said executive director Carl Hergenrother. "Each of these appointees brings a unique skillset and talent to the Association, and as we prepare to celebrate our seventy-fifth anniversary, the establishment of this Board and the naming of these five Trustees allows us to ensure that the Association is judiciously and wisely managed well into the future."

The Board will examine and oversee a wide range of issues, including digital archiving of over a half-century of technical bulletins, observing reports, and studies; examining the viability of a new headquarters location; and, establishing a long-term administration process for funds entering and leaving the Association. "It'll be a pleasure to work with my distinguished colleagues as we guide the ALPO towards a bright future," said Jackie Beucher, one of the newly appointed Trustees. "I am a longtime admirer of the ALPO, and my involvement will allow me to help grow this critical resource for both amateur and professional astronomers alike for generations to come."

ALPO 2022Conference: Call for Papers

By Tim Robertson & Ken Poshedly, ALPO Conference coordinators

Overview

Due to the continuing nearly worldwide quarantining caused by the Covid-19 pandemic, the 2022 Conference of the ALPO will be held online on Friday and Saturday, July 22 and 23.

The ALPO conference times will be:

- Friday from 1 p.m. to 5 p.m. Eastern Time (10 a.m. to 2 p.m. Pacific Time)
- Saturday from 1 p.m. to 6 p.m. Eastern Time (10 a.m. to 3 p.m. Pacific Time).

The ALPO Conference is free and open to all via two different streaming methods:

- The free online conferencing software application, Zoom.
- On the ALPO YouTube channel at *https://www.youtube.com/channel/UCEmixiL-d5k2Fx27Ijfk41A*

Those who plan to present astronomy papers or presentations must (1) already be members of the ALPO, (2) use Zoom, and (3) have it already installed on their computer prior to the conference dates. Zoom is free and available at *https://zoom.us/*

Those who have not yet joined the ALPO may do so online, so as to qualify to present their work at this conference. Digital ALPO memberships start at only $18 a year. To join online, go to *http://www.astroleague.org/store/index.php?main_page=product_info&cPath=10&products_id=39*, then scroll to the bottom of that page, select your membership type, click on "Add to Cart" and proceed from there.

There will be different Zoom meeting hyperlinks to access the conference each of the two days of the conference. Both links will be posted on social media and e-mailed to those who wish to receive it that way on Thursday, July 22. The Zoom virtual (online) "meeting room" will open 15 minutes prior to the beginning of each day's activities.

Those individuals wishing to attend via Zoom should contact Tim Robertson at *cometman@cometman.net* as soon as possible.

Conference Agenda

The conference will consist of initial welcoming remarks and general announcements at the beginning each day, followed by papers and research findings on astronomy-related topics presented by ALPO members.

Following a break after the last astronomy talk on Saturday will be presentations of the Walter Haas Observing Award and the Peggy Haas Service Award

A keynote speaker will then follow the awards presentations on Saturday. The selection of a keynote speaker is in progress and the final decision will be announced in the summer issue of this Journal (JALPO64-3).

Presentation Guidelines

All presentations should be no more than 15 minutes in length; the preferred method is 12 minutes for the presentation itself plus 3 minutes for follow-up questions. The preferred format is Microsoft PowerPoint.

Send all PowerPoint files of the presentations to Tim Robertson at *cometman@cometman.net* .

Suggested Topics

Participants are encouraged to present research papers and experience reports concerning various aspects of Earth-

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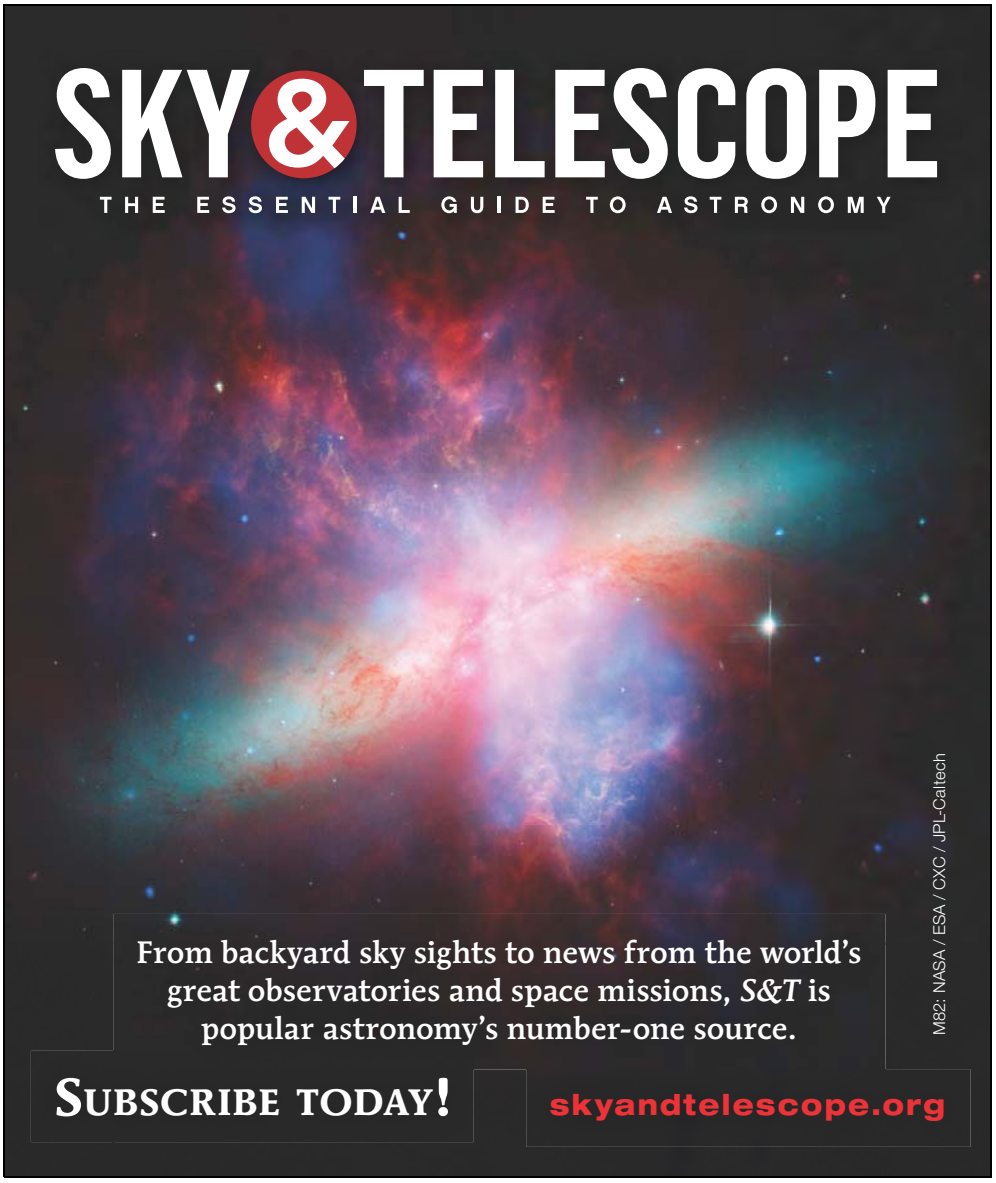
based observational astronomy including the following.

- New or ongoing observing programs and studies, specifically, how those programs were designed, implemented and continue to function.
- Results of personal or group studies of solar system or extra-solar system bodies.
- New or ongoing activities involving astronomical instrumentation, construction or improvement.
- Challenges faced by Earth-based observers such as changing interest levels, deteriorating observing conditions brought about by possible global warming, etc.

Information about paper presentations, the keynote speaker and other conference data will be published in this Journal and online as details are learned.



Bill Dembowski Retirement

While we may be a bit late with this announcement, it is with mixed feelings that we are sorry to see William Dembowski, longtime lead coordinator and then assistant coordinator of the ALPO Lunar Topographical Studies Program, retire from the program after so many years due to health reasons. But with the addition of a second scope to his home inventory, Bill is not giving up on either the ALPO or his lunar interests,

His history with the ALPO Lunar Section is extensive:

- Lunar Section - General Programs Coordinator, June 1996 to October 1998.
- Lunar Topographic Studies Program Coordinator, October 1998 to December 2008.
- Lunar Topographic Studies Program Assistant Coordinator, December 2008 - February 2020.

Bill can be reached at 219 Old Bedford Pike, Windber, PA 15963; e-mail to *zone-vx@comcast.net*

ALPO Contact Changes

General

E-mail addresses come and go, phone numbers get dropped and people move from one location to another, but without informing us at the ALPO of these changes, the result is a "failure to communicate". So no more contact from the ALPO.

Please inform Membership Secretary, Matt Will at *matt.will@alpo-astronomy.org* of changes in your contact information as soon as they

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occur. It takes only a few minutes via e-mail to do so.

Regular members who do not inform the ALPO membership secretary about e-mail address changes means missing out on announcements concerning the release of the next *Journal* and other important, time-sensitive news about your ALPO. Also, hard copy issues of our *Journal* may not necessarily be forwarded to you through your vacated, formal postal address.

Volunteer staff, should note that up-to-date contact information such as a current e-mail and postal addresses are crucial for members and observers seeking out staff for the first time for guidance in their programs. Secondary contact information such as phone numbers (which are NOT posted on the website or *Journal*) helps our managing staff in ensuring contact when e-mail won't suffice.

Please take the time to review your current contact information and check to see that the "ALPO Resources" pages in this *Journal* are correct, as well as on the ALPO website.

Hardcopy JALPO Issues Still Available

Please note that for those who still wish to add to their library of hardcopy ALPO Journals, we still have a healthy number of various issues left, some dating back to 1962. One oft overlooked thing about these early Journals is that they pre-date the age of satellite exploration of the Moon, the Sun, the planets and comets. Thus, the observing reports are full of the enthusiasm that comes with knowing that we were not competing with high tech gadgets already orbiting these celestial bodies.

And while the photos in those pages are crude when compared to the CCD and webcam images of today, the text captions that accompany them express how much work went into trying to squeeze out every little detail, no matter how grainy.

Please check the list of available issues in the back of this Journal to see what might suit your own interests.

Book Review Ideas Needed

Bob Garfinkle, our book review editor, states that it's been quite awhile that since he's received suggestions for an astronomy book review.

Surely there have been such books published over the past year or so. And it is Bob himself, who authored the highly prized three-volume "Luna Cognita" (available from Amazon at *https://www.amazon.com/Luna-Cognita-Comprehensive-Observers-Handbook/dp/1493916637*).

Bob can be reached via e-mail at *ragarf@earthlink.net*

Call for JALPO Papers

The ALPO encourages its members to submit written works (with images, if possible) for publication in this Journal.

As with other peer-reviewed publications, all papers will be forwarded to the appropriate observing section or interest section coordinator.

Thus, the best method is to send them directly to the coordinator of the ALPO section which handles your topic.

A complete list of ALPO section coordinators and their contact information can be found in the *ALPO Resources* section of this Journal.

ALPO Interest Section Reports

ALPO Online Section

Report by Jim Tomney, acting assistant section coordinator
alpo@tomney.com

The ALPO website (*http://alpo-astronomy.org*) was up and available for the fourth quarter of 2021 (Oct-Dec) with no reported issues (although anecdotally I have personally seen some pages failing to load while accessing the site). During that time, approximately 40,000 visits were made to the website, up slightly from the prior quarter.

As we wrap up the year let's take a look back at the number of images and sketches that we received for the ALPO Solar Section and the major planets. Observers of our home star were far and away the most active group, accounting for 69% of the total 6,667 items we received last year. Of course, the Sun does offer advantages, such as never being unavailable due to Solar conjunction and presenting a large surface suitable for multiple images during a session. All that being said, hats off to the dedicated observers who contributed to the ALPO Solar Section gallery in 2021.

We encourage everyone to continue to submit their observations for inclusion in the ALPO gallery by sending them to the appropriate e-mail address listed on the website's Gallery Submission Guidelines page (*http://www.alpo-astronomy.org/alpo/?page_id=952*). A crucial aspect of the guideline is for the file name to

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contain the UT date and time of the observation, since it is cumbersome and error-prone to locate that value by examining the image.

Work on the new version of the ALPO website is continuing. The committee will be collaborating with the various Section coordinators as their areas of the site are developed. If you are interested in helping test, code or create content for the website, please reach out to me at *alpo@tomney.com* so that we can put your skills to work in completing this effort.

As always, Section coordinators should let us know of any corrections or changes needed for their portion of the current website. If any section coordinator needs an ID for your section's blog, contact Larry Owens at *Larry.Owens@alpo-astronomy.org*

If you'd like to offer any comments or feedback about the site please reach out to the ALPO Online Section coordinators using the contact information found at *http://www.alpo-astronomy.org/alpo/?page_id=179*.

Follow us on Twitter, "friend" us on FaceBook or join us on MySpace.

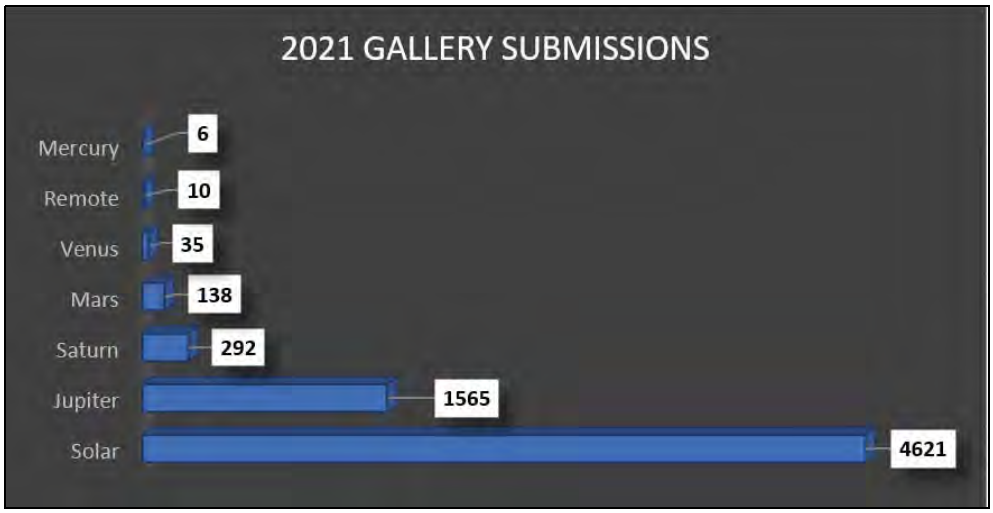
Outreach Section

Lunar & Planetary Training Program

Report by Tim Robertson, program coordinator
cometman@cometman.net

NO CHANGE -- The ALPO Training Program currently has four active students at various stages of the program.

The ALPO Lunar & Planetary Training Program is a two-step program, and



there is no time requirement for completing the steps. I have seen that those students who are motivated usually complete the steps in a short amount of time. The motivation comes from the desire to improve their observing skills and contribute to the pages of the Journal of the ALPO.

This program is open to all members of the ALPO, beginner as well as the expert observer. The goal is to help make members proficient observers. The ALPO revolves around the submission of astronomical observations of members for the purposes of scientific research. Therefore, it is the responsibility of our organization to guide prospective contributors toward a productive and meaningful scientific observation.

The course of instruction for the Training Program is two-tiered:

- The first tier is the "Basic Level" and includes reading the *ALPO Novice Observers Handbook* and mastering the fundamentals of observing. These fundamentals include performing simple calculations and understanding observing techniques.
- When the student has successfully demonstrated these skills, he or she can advance to the "Novice Level" for further training where one can specialize in one or more areas of study. This includes obtaining and reading handbooks for specific lunar and planetary subjects. The novice then continues to learn and refine upon observing techniques specific to his or her area of study and is assigned to a tutor to monitor the novice's progress in the Novice Level of the program.

When the novice has mastered this final phase of the program, that person can then be certified to "Observer Status" for that particular field.

For more information on the ALPO Training Program, contact Tim Robertson at 195 Tierra Rejada Rd #148, Simi Valley CA, 93065; e-mail to *cometman@cometman.net*

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YouTube & 'Observer's Notebook' Podcasts

Report by Tim Robertson, program coordinator
cometman@cometman.net

The *Observer's Notebook* podcast continues to go strong with over 150 podcasts recorded with various members of the ALPO, mostly section coordinators to highlight the programs within each section. The length of a typical podcast averages around 30 minutes. The longest podcast thus far is over 1 hour and 30 minutes. We can record longer, since there is no time limit – our hosting service has unlimited space available for podcasts.

It takes a great amount of time and money to make and produce the podcast, and thus far, it has been done with the help of service called "Patreon." We currently have 12 supporters – two of whom are NOT even members of the ALPO!

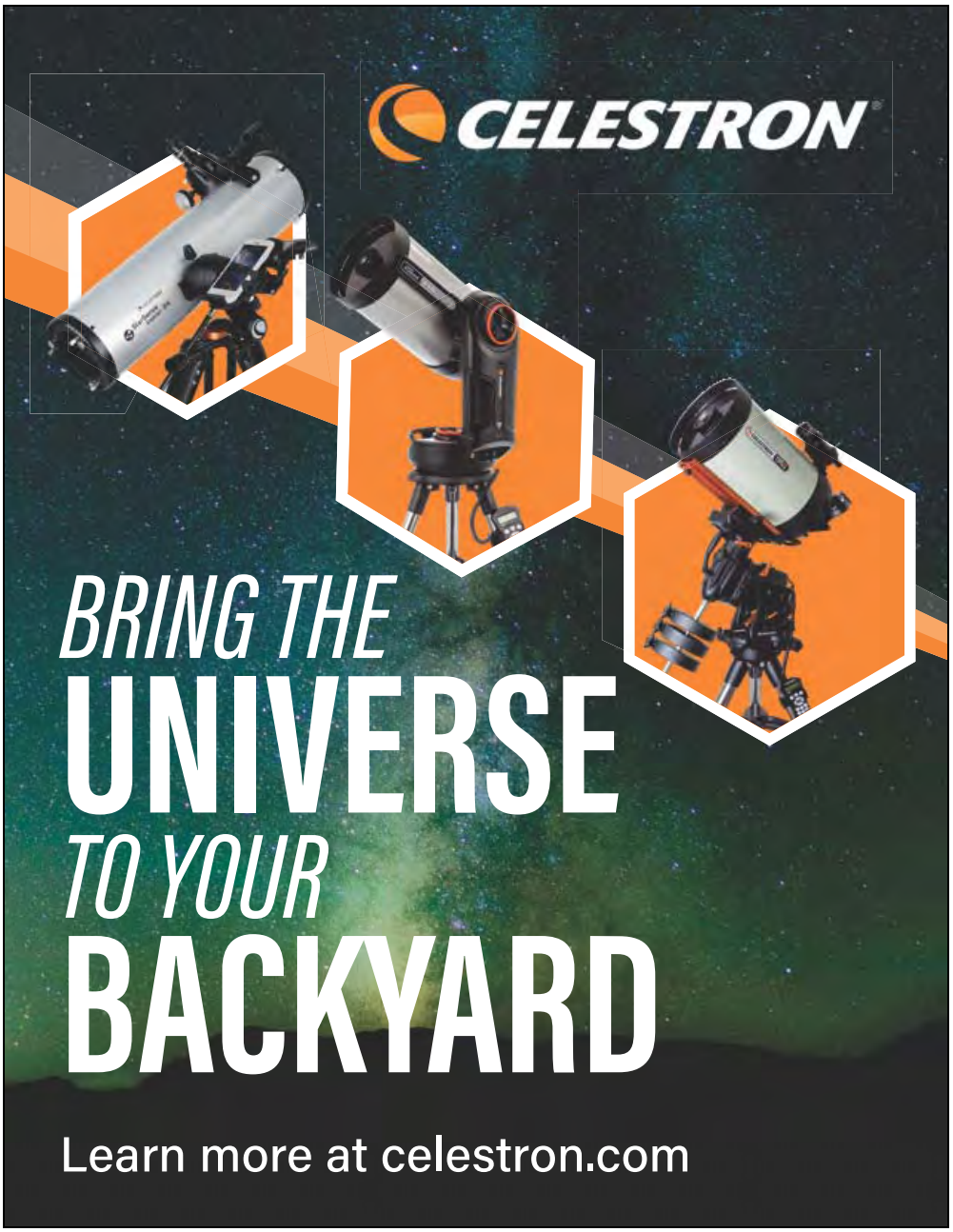
We have two generous Patreon supporters who each donate $35 a month to the podcast, and are, thus, producers of the podcast and who also receive one-year membership to the ALPO! Thanks to Steve Siedentop and Michael Moyer for their generous support of the *Observer's Notebook* podcasts.

You, too, can support the podcast by giving as little as $1 a month; for $5 you receive early access to the podcast before it goes public, for a monthly donation $10, you receive a copy of the *Novice Observer's Handbook*, and for $35 a month, you receive producer credits on the podcast plus a year's membership to the ALPO. You can help us out by going to the link below:

https://www.patreon.com/ObserversNotebook

Podcasts are released around the 1st and 15th of every month, and if you subscribe to it via iTunes, it will automatically be downloaded to your device.

Our podcasts are also used to get the word out on any breaking astronomy news or events happening in the night sky. Therefore, let me know if you have any breaking news that you want out announced.



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If you have a topic that you want covered in the podcast, please drop me a note; I am also looking for member profile pieces where we get to know the members of the ALPO.

Here are a few *Observer's Notebook* statistics you might be interested in:

- Number of downloads as of January 15, 2022: 580,000+
- Number of subscribers (all formats): 320+
- Average of number daily downloads (last month): 100
- iTunes rating: 5 Stars!
- Locations of most downloads: USA, UK, Canada, and Australia.

Check out some of our latest podcasts:

- Tim Robertson talks to the Christophe Pellier where we discuss his new book "Planetary Astronomy."
- Josh Urban discusses teaching astronomy to the visually impaired.
- Steve Tzakis is doing a two part series on amateur astronomers doing radio astronomy.
- Kevin Marvel, executive officer of the American Astronomical Society, tells us all about the AAS. Note that the AAS is the new owner of *Sky & Telescope* magazine which has been a solid advertiser in this publication since 1960.

You can hear the *Observer's Notebook* podcast on iTunes, Stitcher, iHeart Radio, Amazon Echo, and Google Play. Just search for Observers Notebook, or you can listen to it at the link below:

https://soundcloud.com/observersnotebook

The *Observer's Notebook* is also on Facebook:

https://www.facebook.com/groups/ObserversNotebook/

Remember that the ALPO also has a *YouTube* channel and continues to include instructional videos, lectures. We used it to livestream the ALPO 2020 Conference held last fall. Check it out and subscribe to the channel!

https://www.youtube.com/channel/UCEmixiL-d5k2Fx27Ijfk41A?

Thanks for listening! For more information about the ALPO Lunar & Planetary Training Program or the *Observer's Notebook* podcasts, contact Tim Robertson at 195 Tierra Rejada Rd #148, Simi Valley CA, 93065; e-mail to *cometman@cometman.net*

Youth Activities Program

Report by Pamela Shivak, program coordinator
pamelashivak@yahoo.com

The ALPO Youth Activities Program Mission Statement:

"The goal of ALPO's Youth Activities Program is to encourage children and young adults to take an interest in astronomy, space, stem and outreach. We plan to achieve this goal by forming an alliance with astronomy clubs and other STEM (science, technology, engineering, math) and educational entities. It is our hope that with an ardent and ongoing effort with these organizations, we can come up with fun and creative ways to get youths involved with any or all aspects of space and science while educating them in the process. With your help and contributions, I feel we can achieve this goal as the ALPO Youth Activities Program continues to grow with the support, cooperation and commitment of others."

I'm excited to report that the ALPO Youth Activities Program Facebook page now has 531 contributors from all over the world who post and share amazing astronomy, science, space and STEM resources and opportunities! Join us at the link below!

https://www.facebook.com/groups/ALPOYOUTHPROGRAM/

I've shared exciting online resources with the ALPO Youth Activities Program Facebook group about the launch of the James Webb Space Telescope and NASA's Artemis Program!

I encourage you to research, follow and share these and all exciting space exploration programs with your astronomy members and your young people.

We're super excited about the launch of the James Webb Space Telescope! This is a perfect opportunity to introduce your young person and astronomy club members to this amazing space telescope and its capabilities. Learn more at these links:

https://webb.nasa.gov/

https://www.jwst.nasa.gov/content/about/launch.html

- On December 25, 2021 at 7:20 a.m. ET (12:20 UT), the James Webb Space Telescope was launched by an ArianeSpace Ariane 5 rocket from Europe's spaceport in French Guiana, South America. The rocket and launch site were part of the

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European Space Agency's contribution to the mission.

- What is Artemis? With Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface and then learn what we need to know in order to take the next giant leap: sending the first astronauts to Mars! Learn what the "Lunar Gateway" is.
- Learn more about the Artemis Program's progress. Introduce your young people and astronomy club members to the Artemis project and follow the mission at the link: *https://www.nasa.gov/what-is-artemis*
- NASA invites the media to the launch of new Mega Moon Rocket and Spacecraft Artemis 1 mission. Artemis 1 will be an uncrewed flight test that will provide a foundation for human deep space exploration, and demonstrate our commitment and capability to extend human existence to the Moon and beyond!

As always, I welcome everyone to join, contribute, and take ideas you find on the group back to your local organizations.

The goal of ALPO's Youth Activities Program is to encourage children and young adults alike to take an interest in astronomy, space, STEM and outreach. We plan to achieve this goal by forming an alliance with astronomy clubs, and other STEM and educational entities. It is our hope that with an ardent and ongoing effort formed with these organizations we can come up with fun and creative ways to get youths involved with any or all aspects of space and science while educating them in the process.

With your help and contributions, I feel we can achieve this goal as the ALPO Youth Program continues to grow with the support, cooperation and commitment of others.

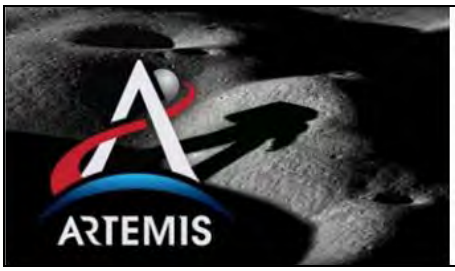
Visit us at *https://www.facebook.com/groups/ALPOYOUTHPROGRAM/*

Publications Section

Report by Ken Poshedly, section coordinator
ken.poshedly@alpo-astronomy.org

All are reminded that the entire library (except for the most recent year) of *The Strolling Astronomer* is available online at the ALPO web site.

Go to alpo-astronomy.org, then click on the "ALPO Section Galleries" link near the top-right corner of the screen. Next,



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click on "Publications Section", then "ALPO Journals", then click on the desired JALPO volume and issue within that volume.

Note that the most recent issues of the Journal are distributed to only dues-paying ALPO members and are not included on the ALPO web site.

ALPO Observing Section Reports

Eclipse Section

Report by Keith Spring, section coordinator
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For the 75th anniversary of the ALPO Journal, the Eclipse Section is proud to present two great eclipses! The first one we will look at occurred on December 4, 2021, where a total solar eclipse was visible from Antarctica. Let's be honest, Antarctica is extremely difficult to get to normally, let alone attempt an intercept with an eclipse. Against all expectations, observer Patrick Poitevin managed to reach this nearly inaccessible eclipse and share his experience.

Patrick related the following lightly edited comments about his endeavor to visit the December 4th 2021 total solar eclipse:

"For the 04 December 2021 total solar eclipse, there was not much choice where and how to observe the total solar eclipse. On Antarctica, from Union Base Glacier Camp, which would be about a $50,000 ticket; from a cruise, where you must conquer the bad weather forecasts … as well as the trip costs. Finally, last but not least, from a plane.

"There were two planes scheduled to go and observe totality at sunrise. Due to the fact that the Falklands Island airport cannot accommodate emergency landings for so many people (the two planes together had 90 eclipse observers

Total solar eclipse of December 4, 2021 as imaged by Patrick Poitevin at 41,000 feet above Antarctica.

Partial lunar eclipse of November 19, 2021 as imaged by Anthony and Michael Amato. Says Michael, "My brother Anthony took this photo while the moon was 97% covered. While he was photographing, I (Michael) used my binoculars to rate the eclipse's brightness as L=2 on the Danjon Scale. The eclipse was dark red here in West Haven, Connecticut."

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in total), we had to change plans and use a Dreamliner airplane. In fact, this aircraft is both more comfy and also faster, so a total gain all around.

"From the plane, at least if you go high enough and are in the path of totality, you always have clear sky. The Dreamliner I was in flew to 41,000 feet, while the other aircraft parallel to ours, was at 40,000 feet.

"The intercept occurred earlier than it would have if we had used the smaller planes. The plane turned into the right Sun position direction when partial phase was already in progress. Totality was earlier as well. A beautiful, but rather symmetric corona, with a big streamer at 12 o'clock and one at about 3 o'clock was observed. Mercury, close to the right, was easily visible.

"I am starting to prepare my next and 50th solar eclipse event for next year April — a partial solar eclipse… all depending on the pandemic challenge of course.

"My 25th total solar eclipse is planned for 2023 where I would like to observe "totality" just outside the path and look out for the F-Corona. I like to do some different things at solar eclipses. I still prefer to observe solar eclipses from land."

The "Almost Total Lunar Eclipse" of November 19, 2021 (two weeks before Patrick's solar eclipse), was much easier for observers to reach and more historically significant. This eclipse was visible from all of North America and parts of Asia as well as South America. The interesting thing about this lunar eclipse was that it was the closest — but not quite total — lunar eclipse since the 15th century! As always, the ALPO Eclipse Section is grateful for the continued efforts of all the Observers that contribute to the historical documentation of eclipses.

In 2022, there will be two total lunar eclipses that have a bit over 84 minutes of totality.

- The first occurs on May 16, 2022. It will be visible from North America and South America as well as western Europe and Africa. Totality of this eclipse will last 1 hour 24 minutes 53 seconds. The greatest eclipse will occur at 12:12:41 am Eastern Time with an umbral magnitude of 1.41.
- The second total lunar eclipse of the year will happen on November 8, 2022. Totality will have a duration of 1 hour 24 minutes 58 seconds and an umbral magnitude of 1.35. It will be visible from North America and western South America as well as eastern Asia and Australia.

Other Upcoming Eclipses

- April 30, 2022; Partial Solar Eclipse, 20:41:20 UT. Visible from southeast Pacific and southern South America.
- October 25, 2022; Partial Solar Eclipse, 11:00:00 UT. Visible from Europe, northeastern Africa, western Asia.

For consideration of publication in the next ALPO Eclipse Section report in this Journal, be sure to send your observation reports as soon as possible via e-mail to *eclipse@alpo-astronomy.org* or via regular mail to Keith Spring, 2173 John Hart Circle, Orange Park, FL 32073.

Visit the ALPO Eclipse Section online at *www.alpo-astronomy.org/eclipseblog*

Mercury / Venus Transit Section

Report by Keith Spring, section coordinator
star.man13@hotmail.com

Past Transits

This section is still accepting reports for the November 11, 2019 Mercury Transit for archival. Please send your reports to *eclipse@alpo-astronomy.org* or regular mail to the contact information in the *ALPO Resources* section of this Journal.

Future Mercury Transits

- November 12-13, 2032 - Visible from Europe, much of Asia, Australia, Africa, South/some coastal areas of East North America, South America, Pacific, Atlantic, Indian Ocean and Antarctica.
- November 6-7, 2039 - Europe, much of Asia, Australia, Africa, much of South America, Pacific, Atlantic, Indian Ocean and Antarctica.
- May 7-8, 2049 - Europe, Asia, Africa, North America, South America, Pacific, Atlantic, Indian Ocean, Arctic, Antarctica.

Future Venus Transits

- December 10-11, 2117
- December 8, 2125

Please send your reports via e-mail to *eclipse@alpo-astronomy.org* or regular mail to Keith Spring, 2173 John Hart Circle, Orange Park, FL 32073.

Visit the ALPO Mercury/Venus Transit Section online at *www.alpo-astronomy.org/transit*

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Meteors Section

Report by Robert Lunsford, section coordinator
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A report on a possible meteors outburst in May appears later in this Journal.

The springtime is normally slow for meteor watchers in the Northern Hemisphere with the highlight being usually the long duration Eta Aquarids best seen in early May. Other than the short-lived Lyrids of April, that is about all we have to look forward to each spring.

However, this year may be different though, as the possibility exists that the Earth may plow through the debris field of Comet 73P/Schwassmann-Wachmann 3 and an asteroid known as 2006GY2. After the disappointing Quadrantid display of early January, we could use a little excitement.

See the detailed article on these possibilities later in this Journal!

Visit the ALPO Meteors Section online at *www.alpo-astronomy.org/meteorblog/* Be sure to click on the link to viewing meteors, meteor shower calendar and references.

Meteorites Section

Report by Dolores H. Hill, section coordinator
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This report of the ALPO Meteorites Section summarizes new meteorite approvals and revisions from the Meteoritical Society's Nomenclature Committee for the period October 26, 2021 - January 23, 2022.

As of January 23, 2022, the Society's *Meteoritical Bulletin* recognizes a total of 69,163 officially named meteorites. Among the 3,007 newly approved or updated meteorites are four meteorite falls:

- H5, Sidi El Habib 001 (Algeria)
- L5, Glendale (Arizona, USA)
- L6, Kindberg (Austria)
- L6, Qiquanhu (China) eucrite

One interesting find was Grapevine Mesa, a rare Bencubbinite (CBa), the second from Arizona. The largest meteorite is Mount Yirtkuq Bulak 006, a 400kg H5 chondrite from China. At the other extreme were many 0.1 g meteorites recovered from Antarctica.

Newly approved meteorites include 2,705 ordinary chondrites (957 H, 1678 L, 2 L-melt, 68 LL), 1 EH5, 6 EL, 6 achondrites-ungrouped; 2 aubrites; 105 carbonaceous chondrites (1 C2-ungr,1 C3-ungr, 1 CBa, 1 CH3, 13 CK, 51 CM2, 12 CO, 15 CV, 2 CR2, 8 R); 7 mesosiderites; 34 irons (I7 IAB, 2 IIAB, 1 IIE, 7 IIIAB, 1 IVA, 6 ungrouped), 6 pallasites 88 HEDs (9 Howardites, 57 Eucrites, 22 Diogenites); 15 ureilites; 3 Winonaites; 20 Lunar; 9 Martian.

More information and official details on particular meteorites can be found at: *https://www.lpi.usra.edu/meteor/metbull.php*

Visit the ALPO Meteorites Section online at *www.alpo-astronomy.org/meteorite/* for a very detailed explanation of all facets of meteorite studies.

Comets Section

Report by Carl Hergenrother, section coordinator
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A report on the comets of 2019 appears later in this Journal.

In the previous ALPO Comets Section Report, we expressed hope that comet C/2021 A1 (Leonard) would put on a nice display in December and January. We are happy to report that the comet did not disappoint. While a formal analysis of Leonard's apparition will be published in a future JALPO, here are some recent Leonard highlights:

- Through late January, the ALPO Comets Section has received 139 magnitude measurements and observations and 170 images and sketches of Leonard.
- The comet reached magnitude 8 in mid-November and its prospects were looking good for a bright object around the time of close approach to Earth on December 12. But…
- Leonard had other plans, as its rate of intrinsic brightening not only ground to a halt but went into reverse. Still, Leonard was easily observable as it was well placed in the evening sky for northern observers. By December 11, it had brightened to 5th magnitude, in spite of its intrinsic fading. The apparent brightening was due to decreasing distances from the Earth and Sun which more than compensating for the decrease in intrinsic activity. With the comet moving too close to the Sun to be seen from Earth after the 11th, it looked like we had seen the best of Leonard.

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- After Leonard's close approach to Earth on December 12 at 0.233 au (34.9 million km, 21.7 million miles), its solar elongation increased once again. Leonard surprised observers by reappearing on December 14/15 at a much brighter than expected magnitude 2.5 to 3.5. Radio and spacecraft data confirmed that an outburst had occurred on December 13.
- With the comet now visible in the evening sky, it experienced a series of further outbursts on December 17, 20, 24, 30 and January 7/8 causing the comet's brightness to rise and fall between 2nd and 5th magnitude during that period.
- Perhaps even more surprising than the outbursts was the development of a long dynamic gas tail. Jan Hattenbach imaged the gas tail extending up to 36 degrees in length on December 26 from the dark skies of La Palma, Spain. Chris Wyatt visually observed a 9-degrees long tail in 15x70 binoculars on December 29.
- As of late January, the comet is only visible from the southern hemisphere. With the comet past its January 3 perihelion and over 6 times further from the Earth than at close approach in December, it has faded to 7th magnitude.

Looking forward to the April-May-June timeframe, Leonard should be fainter than 12th magnitude at the start of April. And while Leonard may be too faint, six other comets are expected to reach magnitude 12 or brighter.

- 19P/Borrelly and 22P/Kopff - These two short-period comets expected to be brighter than magnitude 12 are both outbound. 19P/Borrelly was reported to be

Table of Ephemerides for Comets 19P/Borrelly, 22P/Kopff, C/2017 K2 (PANSTARRS), C/2019 L3 (ATLAS), C/2019 T43 (ATLAS) and C/2021 O3 (PANSTARRS)

Date	R.A.	Decl.	r (au)	d (au)	Elong (deg)	Mag	Const	Max El 40N	Max El 40S
19P/Borrelly									
2022-Apr-01	04 23.7	+36 48.3	1.476	1.686	60E	Per	10.2	43	0
2022-Apr-11	05 00.8	+39 38.6	1.532	1.787	58E	Aur	11.4	41	0
2022-Apr-21	05 39.0	+41 36.3	1.593	1.894	57E	Aur	11.8	39	0
2022-May-01	06 17.5	+42 43.6	1.659	2.007	55E	Aur	12.2	37	0
2022-May-11	06 55.4	+43 04.9	1.727	2.124	53E	Aur	12.6	35	0
2022-May-21	07 31.7	+42 46.3	1.798	2.245	51E	Lyn	13.0	32	0
2022-May-31	08 06.1	+41 54.6	1.870	2.370	49E	Lyn	13.4	28	0
2022-Jun-10	08 38.2	+40 36.9	1.944	2.496	46E	Lyn	13.7	25	1
2022-Jun-20	09 08.0	+38 59.8	2.018	2.623	43E	Lyn	14.1	21	1
2022-Jun-30	09 35.5	+37 08.9	2.093	2.750	41E	LMi	14.4	18	1
22P/Kopff									
2022-Apr-01	21 35.6	-13 46.7	1.559	2.016	49M	Cap	10.9	5	29
2022-Apr-11	22 04.2	-11 43.0	1.572	1.980	51M	Aqr	10.9	5	32
2022-Apr-21	22 31.4	-09 35.1	1.591	1.946	54M	Aqr	11.0	5	34
2022-May-01	22 57.2	-07 26.9	1.616	1.913	57M	Aqr	11.1	6	37
2022-May-11	23 21.6	-05 22.2	1.646	1.880	60M	Aqr	11.2	7	39
2022-May-21	23 44.4	-03 24.1	1.682	1.846	64M	Aqr	11.4	9	41
2022-May-31	00 05.7	-01 35.2	1.722	1.810	68M	Psc	11.5	11	43
2022-Jun-10	00 25.3	+00 02.0	1.766	1.771	73M	Psc	11.7	15	45
2022-Jun-20	00 43.2	+01 25.8	1.813	1.730	77M	Cet	11.9	19	46
2022-Jun-30	00 59.1	+02 34.7	1.863	1.684	83M	Cet	12.1	25	46
C/2017 K2 (PANSTARRS)									
2022-Apr-01	18 54.1	+11 36.7	3.584	3.517	85M	Aql	9.5	50	34
2022-Apr-11	18 55.2	+11 44.2	3.493	3.284	93M	Aql	9.2	53	37
2022-Apr-21	18 54.4	+11 47.6	3.402	3.052	101M	Aql	9.0	56	38
2022-May-01	18 51.1	+11 43.0	3.312	2.823	110M	Aql	8.7	59	38
2022-May-11	18 45.1	+11 24.7	3.222	2.602	119M	Oph	8.5	61	39
2022-May-21	18 36.0	+10 45.8	3.132	2.397	128M	Oph	8.2	61	39
2022-May-31	18 23.5	+09 38.3	3.042	2.212	138M	Oph	8.0	60	40
2022-Jun-10	18 07.6	+07 53.9	2.953	2.055	146M	Oph	7.7	58	42
2022-Jun-20	17 48.9	+05 26.7	2.865	1.933	151E	Oph	7.5	55	45
2022-Jun-30	17 28.3	+02 16.3	2.778	1.851	149E	Oph	7.3	52	48

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Table of Ephemerides for Comets 19P/Borrelly, 22P/Kopff, C/2017 K2 (PANSTARRS), C/2019 L3 (ATLAS), C/2019 T43 (ATLAS) and C/2021 O3 (PANSTARRS) (Continued)

C/2019 L3 (ATLAS)									
2022-Apr-01	06 42.5	+16 38.4	3.630	3.502	89E	Gem	9.5	57	31
2022-Apr-11	06 48.4	+15 19.0	3.650	3.669	81E	Gem	9.6	49	31
2022-Apr-21	06 55.5	+14 03.1	3.672	3.833	73E	Gem	9.8	40	30
2022-May-01	07 03.5	+12 49.2	3.695	3.993	65E	Gem	9.9	30	29
2022-May-11	07 12.3	+11 35.8	3.721	4.145	58E	CMi	10.0	21	28
2022-May-21	07 21.7	+10 21.8	3.749	4.289	51E	CMi	10.1	11	26
2022-May-31	07 31.6	+09 06.2	3.778	4.422	45E	CMi	10.2	2	23
2022-Jun-10	07 41.7	+07 48.2	3.810	4.543	39E	CMi	10.3	0	20
2022-Jun-20	07 52.1	+06 27.2	3.843	4.651	33E	CMi	10.4	0	15
2022-Jun-30	08 02.6	+05 02.7	3.878	4.746	27E	CMi	10.5	0	11
C/2019 T4 (ATLAS)									
2022-Apr-01	11 51.4	-21 27.5	4.281	3.333	159E	Crt	11.7	28	72
2022-Apr-11	11 48.0	-19 12.5	4.271	3.337	155E	Crt	11.7	31	69
2022-Apr-21	11 45.5	-16 54.1	4.262	3.373	148E	Crt	11.7	33	67
2022-May-01	11 44.1	-14 38.2	4.255	3.437	139E	Crt	11.8	35	65
2022-May-11	11 44.1	-12 30.1	4.249	3.528	130E	Crt	11.8	37	63
2022-May-21	11 45.5	-10 33.7	4.245	3.639	120E	Crt	11.9	37	61
2022-May-31	11 48.2	-08 51.2	4.243	3.768	111E	Crt	11.9	34	59
2022-Jun-10	11 52.1	-07 23.8	4.242	3.910	102E	Crt	12.0	29	58
2022-Jun-20	11 57.2	-06 11.1	4.243	4.059	93E	Vir	12.1	24	56
2022-Jun-30	12 03.4	-05 12.5	4.246	4.213	84E	Vir	12.2	19	54
C/2021 O3 (PANSTARRS)									
2022-Apr-01	01 08.3	-01 05.3	0.647	1.615	8E	Cet	11.2	0	0
2022-Apr-11	01 54.2	-01 00.9	0.423	1.333	13E	Cet	9.3	0	0
2022-Apr-21	02 51.9	+03 21.0	0.287	0.964	16E	Cet	7.3	0	0
2022-May-01	03 33.2	+23 46.7	0.420	0.663	17E	Tau	7.8	0	0
2022-May-11	04 08.9	+53 20.0	0.644	0.605	37E	Cam	9.1	18	0
2022-May-21	05 41.2	+75 25.6	0.864	0.698	57E	Cam	10.4	34	0
2022-May-31	10 56.4	+80 53.0	1.072	0.852	69E	Cam	11.6	47	0
2022-Jun-10	13 24.8	+73 29.4	1.267	1.027	76E	UMi	12.6	56	0
2022-Jun-20	14 08.4	+66 16.1	1.452	1.211	80E	UMi	13.4	62	0
2022-Jun-30	14 31.3	+60 09.8	1.629	1.399	83E	Dra	14.1	65	0

around magnitude 9 at the time of this writing (mid-January). With perihelion on 2022 February 1 at 1.31 au, Borrelly starts April around magnitude 10 and fades to 12 by early May, and 14 by mid-June. Observations will be limited to northern hemisphere observers who can catch Borrelly as an evening object.

- 22P/Kopff was at perihelion on 2022 March 18 at 1.55 au. This return is relatively poor, with the comet getting no brighter than magnitude 11 at perihelion. It should still be around magnitude 11 in early April and slowly fade to around magnitude 12 by the end of June. Observers in both hemispheres should be able to follow Kopff in the morning sky.
- C/2017 K2 (PANSTARRS) - C/2017 K2 (PANSTARRS) was discovered on 2017 May 21 by the Pan-STARRS1 survey when the comet was a distant 16.1 au from the Sun. Pre-discovery observations were found back to May of 2013 when the comet was at an even more distant 23.7 au from the Sun. Even though perihelion won't occur until the end of the year (December 19 at 1.80 au), C/2017 K2 may be the brightest comet of the April-June period. On April 1, the comet will still be 3.6 au from the Sun and 3.5 au from Earth but should still be as bright as magnitude 9.5 in the morning sky. By the end of June, it will be located at 2.8 au from the Sun and 1.9 au from Earth and around magnitude 7.3 near opposition. PANSTARRS should reach a peak brightness at 6-7th magnitude by the end of the year though after September it will only be visible from the southern hemisphere.

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- C/2019 L3 (ATLAS) and C/2019 T4 (ATLAS) - Both of these long-period comets were discovered in 2019 by the ATLAS survey and have large perihelion distances. C/2019 L3 arrived at perihelion on 2022 January 9 at 3.57 au. Observations made in mid-January placed the comet around magnitude 9 or perhaps even a little brighter. Due to its large perihelion, the comet will slowly move away from the Sun resulting in a modest fading trend from around magnitude 9.5 on April 1 to magnitude 10.5 at the end of June. Northern observers will lose sight of the comet as it sets before the end of dusk by June 1. Southern observers will be able to follow C/2019 L3 into July.
- C/2019 T4 was discovered on 2019 June 9 at 19th magnitude. Perihelion is on 2022 June 9 at 4.24 au. The comet will be observable from both hemispheres in the evening sky. It should be near its peak brightness around magnitude 11.7 as April starts. It may be only 0.5 magnitudes fainter by the end of June.
- C/2021 O3 (PANSTARRS) - With the exception of a surprise discovery or outburst of a bright comet, the only object that may vie with C/2017 K2 for the title of brightest comet during the April-June quarter is C/2021 O3. This comet comes to perihelion on 2022 April 21 at a small perihelion distance of 0.29 au. Unfortunately, it has been brightening at an extremely slow rate since its discovery on 2021 July 26. The rate of brightening really calls into question how bright this comet will get. Assuming a conservative, but more typical, brightening rate brings the comet to 6-8th magnitude at perihelion. Again, unfortunately

Figure 1 (top). This image by Chris Schur gives a good impression of Comet Leonard's visual appearance in binoculars after it reappeared in the evening sky. The image was taken on 2021 December 20, approximately 0:130 UT from Payson, Arizona, USA. It is a stack of 5-second RGB images taken with a Sigma 150mm, f/2.8 Pro Macro lens.

Figure 2 (right). C/2021 A1 (Leonard) displaying almost 40 degrees of tail in this mosaic taken on 2021 December 26 at 20:25 UT by Jan Hattenbach. The image consists of two 180-second exposures taken with a 50mm, f/4 lens from the island of La Palma.

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for us, it will be located too close to the Sun for most observers at that time. Observers in the northern hemisphere should pick up the comet in early May as it rapidly moves away from the Sun in the evening sky. In fact, it will become a northern circumpolar object by mid-May. How bright it'll be by then is a good question as it should be rapidly fading. There is also the question of whether the comet will still exist by then? Since C/2021 O3 is a dynamically new comet, presumably making its first close perihelion passage to the Sun, there is a high likelihood it will disintegrate before or around the time of perihelion.

As always, the ALPO Comets Section is happy to receive all comet observations, whether images, drawings, magnitude estimates, and even spectra. Please send your observations via e-mail to *carl.hergenrother@alpo-astronomy.org*

Drawings and images of current and past comets are being archived in the ALPO Comets Section image gallery at *http://www.alpo-astronomy.org/gallery/main.php?g2_itemId=4491*

Visit the ALPO Comets Section online at *www.alpo-astronomy.org/comet*

Solar Section

Report by Rik Hill, section coordinator & scientific advisor
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Solar activity continues to increase with hopeful signs that we will be headed into a solar cycle at least as active as Cycle 24 rather than the bleak predictions of some astronomers that we would slip into another Maunder-type minimum with no sunspots for some years! (See SILSO-WDC plot that accompanies this report.) However, there is nothing yet to make us think the National Center for Atmospheric Research's prediction of "one of the strongest since record keeping began" will happen. Sunspot groups are starting to attain areas that make them just visible to the naked eye though we have no reports of this so far.

The increased activity has resulted in more observers contributing more observations to the ALPO Solar Section.

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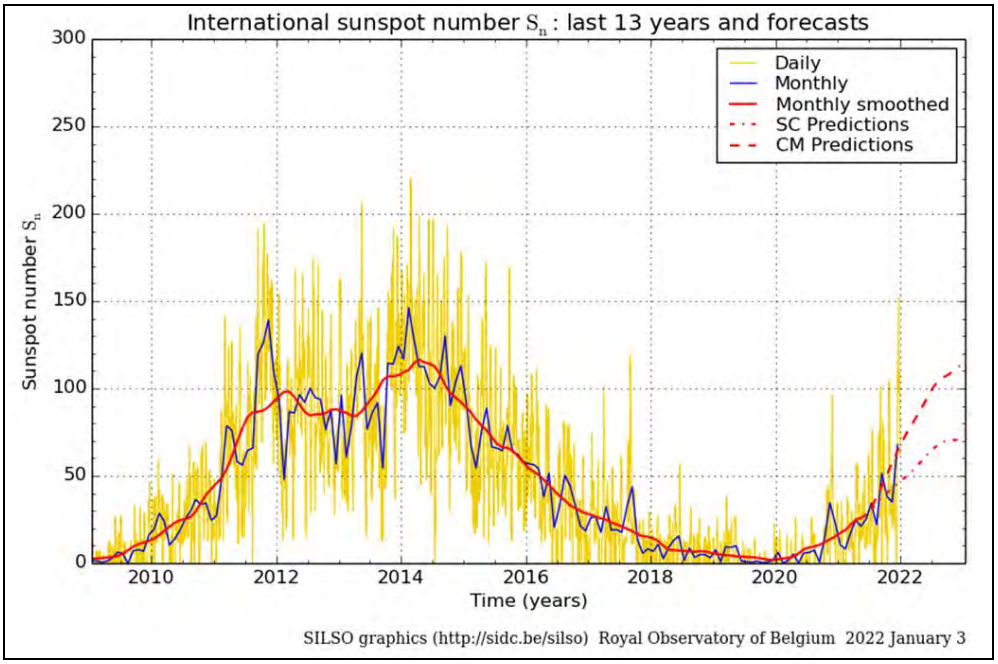
Typically we are now getting 300 to just over 400 submissions per rotation from over two dozen observers around the world. If you're not already one of these observers, you should be. Our requirements are minimal - any telescope will do with proper procedures. In the past, we have even had observers that made naked-eye observations every day (using eclipse glasses) and reported if there were any "naked-eye" sunspots seen and in any particular solar quadrant. Observing can't get more simple than that!

The staffing of this Section remains stable. We have Richard "Rik" Hill as coordinator, Kim Hay as assistant coordinator and Pamela Shivak also as an assistant coordinator. Kim has many solar hats writing our rotational summaries on the webpage and handling what little management is needed for the email list on "Groups.io". On the email list, members share tips on processing solar images along with reviews of various solar equipment. Kim also writes the annual solar observing article in the RASC's Observer's Handbook. Pamela, while busy running the ALPO Youth Activities Program also is the administrator for the SOLARACTIVITY page on FaceBook which hosts solar imagers from all over the world. Unfortunately, not all of them submit their work to the ALPO Solar Section but we're working on that. They also have a SOLARACTIVITY Picture of the Day. Photographs selected to be SAPOD are archived and featured in a yearly album. If you have not seen this, you should visit this page.

Things are getting better on the Sun, so get your filters and enjoy the view. Just send your images to solar@alpo-astronomy.org using the WinJUPOS-Convention described at *http://www.alpo-astronomy.org/alpo/?page_id=952*



SILSO-WDC plot of international sunspot numbers for the past 13 years with predictions. See text of report for details.

As my old friend Jack Horkheimer used to say, "Keep looking up!"

For information on solar observing – including the various observing forms and information on completing them – go to *www.alpo-astronomy.org/solar*

Mercury Section

Report by Frank J. Melillo, section coordinator
frankj12@aol.com

By the time you read this, spring weather will (hopefully) be at your doorstep. This means it is time to get out and do some observing! You will find Mercury entering the evening sky after its Superior Conjunction with the Sun on April 2. Mercury's position is quite favorable this time, making it easy to spot from mid-April to early May.

Starting the third week of April, it will set about an hour and 15 minutes after sundown. Mercury will shine brilliantly at -1 magnitude and will stand alone in the evening twilight. On April 28th, it will reach the Greatest Elongation at 21 degrees east of the Sun and will set even later, about an hour and 45 minutes after sunset. Telescopically, it will show a half-phase at 7.8 arc-seconds disk diameter. If you wait until the evenings of May 1 and May 2, you'll find a nearby thin crescent Moon. By mid-May, Mercury will lose its visibility and will head towards Inferior Conjunction with the Sun on May 21.

This can be a great opportunity for those who have a sodium filter and who might want to try imaging Mercury's sodium tail. I received some reports last spring and hopefully will get more this year. A paper is planned about this new, exciting role of imaging the sodium tail.

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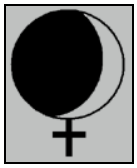
If you are interested in observing Mercury don't hesitate to contact me. For current observers, please send in your observations to the Mercury Section.

Visit the ALPO Mercury Section online at *www.alpo-astronomy.org/mercury*

Venus Section

Report by Julius Benton, section coordinator
jlbaina@msn.com



Venus entered Inferior Conjunction with the Sun on January 9, 2022, thereby ending the 2021-22 Eastern (Evening) apparition.

The geocentric phenomena for the 2022 Western (Morning) Apparition are presented in the table that accompanies this report.

Throughout the 2022 Western (Morning) Apparition now about to begin, Venus will be passing through its waxing phases as it shrinks in angular diameter, slowly changing from a thin crescent to a gibbous and ultimately a fully illuminated disk as it progresses toward Superior Conjunction on October 22, 2022.

As of the date of this report, observers had submitted over 400 drawings in integrated light (no filter) and using different color filters, as well as digital images taken at UV, visual, and near IR wavelengths of Venus for the previous 2021-22 Eastern (Evening). Observers have not begun sending in images and drawings for the new 2022 Western (Morning) apparition, although observations are expected to be received by the time that this Venus report is published.

Venus Pro-Am Activities

Regular readers of this Journal should be familiar with our continuing collaboration with professional astronomers as exemplified by our sharing of visual observations and digital images at various wavelengths during ESA's previous Venus Express (VEX) mission that ran for about nine years, from 2006 until the mission ended in 2015. It remains as one of the most successful Pro-Am efforts to date, involving ALPO Venus observers around the globe. Such observations will remain important for further study and will continue to be analyzed for several years to come as a result of this endeavor.

For reference, the VEX website is *http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38833&fbodylongid=1856.*

Our follow-on collaborative Pro-Am effort already remained underway during the current 2021-22 Eastern (Evening) apparition in continuing support of Japan's (JAXA) *Akatsuki* mission that began full-scale observations starting back in April of 2016. Latest information concerning the mission is that the spacecraft instrumentation is performing well, and our participation in the program is continuing at least for the remainder of 2022. For those interested, the website for the *Akatsuki* mission remains active, so adequately equipped ALPO observers can still register and start submitting images if they have not already done so. As always, more information will continue to be provided on the progress of the mission in forthcoming reports in this Journal. It is extremely important that all observers participating in the programs of the ALPO Venus Section always first contribute their observations to the ALPO Venus Section at the same time submittals are sent to the *Akatsuki* mission.

Gregory T. Shanos of Sarasota, FL submitted a digital image captured at 659 nm IR wavelength on December 18, 2021 at 22:01 UT using a 25.4 cm (10.0 in.) SCT under average seeing conditions. His image shows the narrow crescent of Venus and terminator shading. The apparent diameter of Venus is 52.3", phase k=0.128 (12.8% illuminated), and visual magnitude -4.6. South is at the top of image.

Already noted in fairly recent news alerts from the Akatsuki mission is the discovery of some intriguing atmospheric phenomena on Venus in the form of a giant discontinuity and disruption rapidly propagating along the middle and lower clouds of Venus that is not readily visible

Table 1. Geocentric Phenomena of the 2022 Western (Morning) Apparition of Venus in Universal Time (UT)

Superior Conjunction	2022 January 09^d 00^h UT (angular diameter = 63.3″)
Greatest Illuminated Extent	2022 February 09^d 00^h UT ($-4.7m_V$)
Greatest Elongation West	2022 March 20^d 00^h UT (46.0°)
Theoretical Dichotomy	2022 March 20.25^d UT (Venus is predicted to be exactly half-phase)
Inferior Conjunction	2022 October 22^d 00^h UT (angular diameter = 9.8″)

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in the upper clouds of the planet. This atmospheric phenomenon is comparable with other planetary patterns spotted at the super-rotating upper cloud levels like the horizontal V, Y, or ψ (psi)-shaped dusky clouds that are roughly aligned along the planet's terminator typically seen in images captured UV wavelengths. A study of past observations with ground-based telescopes and data from the earlier Venus Express mission shows evidence that this is a quasi-permanent feature of the atmosphere of Venus that presumably has been missed since at least the year 1984.

While this phenomenon is very challenging to observe on the dayside upper clouds with usual UV imaging techniques, it may be that the dayside middle clouds could be marginally noticeable on images taken at visible and near-IR wavelengths). In fact, wavelengths longer than 700 nm seem to be better suited for Earth-based observers participating in our pro-Am efforts to see what they can accomplish with perhaps detecting the middle cloud phenomena reported by Akatsuki scientists. More on these developments will be forthcoming in a subsequent update.

We are continuing our full coordination and strong teamwork with the *Akatsuki* mission team in collection and analysis of all observations. If anyone has questions about our Pro-Am efforts, please do not hesitate to contact the ALPO Venus Section for guidance and assistance. Those still wishing to register to participate in the coordinated observing effort between the ALPO and Japan's (JAXA) *Akatsuki* mission should utilize the following link:

https://akatsuki.matsue-ct.jp/

The observation programs of the ALPO Venus Section are listed on the Venus page of the ALPO website at http://www.alpo-astronomy.org/ as well as in considerable detail in the author's *ALPO Venus Handbook* available free as ALPO Monograph 15 on the ALPO website. Go to *www.alpo-astronomy.org*, click on the ALPO home page, click on the *ALPO Section Galleries* link near the top-right corner of the page, click on Publication Section, click on ALPO Monographs, then click on "ALPO Monograph 15 - Venus Handbook (Revised Edition 2016)".

Observers are urged to attempt to make simultaneous observations by performing digital imaging of Venus at the same time and date that others are imaging or making drawings of the planet at visual wavelengths. Regular imaging of Venus in both UV, near-IR and other wavelengths is important, as are visual numerical relative intensity estimates and reports of features seen or suspected in the atmosphere of the planet (e.g., dusky atmospheric markings, visibility of cusp caps and cusp bands, measurement of cusp extensions, monitoring the Schröter phase effect near the date of predicted dichotomy, and looking for terminator irregularities). Routine use of the standard ALPO Venus observing forms will help observers know what should be reported in addition to supporting information such as telescope aperture and type, UT date and time, magnifications and filters used, seeing and transparency conditions, etc.

Under favorable circumstances during future apparitions, Venus observers should monitor the dark side of Venus visually for the Ashen Light and use digital imagers to capture any illumination that may be present on the planet as a cooperative simultaneous observing endeavor with visual observers.

Also, observers should undertake imaging of the planet at near-IR wavelengths (for instance, 1000 nm) around the dates on either side of inferior conjunction, whereby the hot surface of the planet becomes apparent and occasionally mottling shows up in such images attributable to cooler dark higher-elevation terrain and warmer bright lower surface areas in the near-IR.

The ALPO Venus Section encourages readers worldwide to join us in our projects and the many challenges ahead.

Routine use of the standard ALPO Venus observing form will help observers know what should be reported in addition to supporting information such as telescope aperture and type, UT date and time, magnifications and filters used, seeing and transparency conditions, etc. The ALPO Venus observing form is located online at:

http://alpo-astronomy.org/gallery3/var/albums/Publications-Section/Observing-Section-Publications/Venus/VenusReportForm.pdf?m=1521162039

Individuals interested in participating in the programs of the ALPO Venus Section are encouraged to visit the ALPO Venus Section online *http://www.alpo-astronomy.org/venusblog/*

Lunar Section

Lunar Topographical Studies / Selected Areas Program

Report by David Teske, program coordinator
drteske@yahoo.com

The ALPO Lunar Topographic Studies Section (ALPO LTSS) received a total of 304 observations from 42 observers in 14 countries during the

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October-December 2021 quarter. The countries represented by observers were Argentina (14), USA (10), Italy (2), Columbia (2), Uruguay (3), France (2), Bolivia (1), Guatemala (1), Venezuela (1), China (1), Canada (1), Spain (1), New Zealand (1) and the Dominican Republic (1). It is most impressive to have so many high-quality lunar observations submitted from so many observers throughout the world, particularly Latin America.

Twenty-one articles were published in addition to numerous commentaries on images in our monthly newsletter *The Lunar Observer*. The "TLO" had an average page count of 78 pages per issue during this past quarter. Each issue contained a section, "By the Numbers", which looked at observer's locations and telescopes used for Moon-gazing. In all three months, Schmidt-Cassegrain telescopes, followed by Maksutov-Cassegrain telescopes, were the most common telescope for lunar observations. This trend in telescope type use has been consistent for many months. *The Lunar Observer* was placed on the *Cloudy Nights* website and viewed an average of 222 times in each month of the quarter.

The *Focus-On* series continued under Jerry Hubbell with the continuation of the "Lunar 100" objects during this quarter. These are based on the Lunar 100 items compiled by Charles Wood. Starting in May 2020, we explored 10 of the Lunar 100 targets every other month with the final installment in November 2021. This article featured challenging lunar targets such as the Ina and Mare Marginis Swirls, along with targets that were visible in plain sight, such as the Procellarum Basin and Gyldén Valley. The program generated an incredible response from observers across the globe and allowed us to feature many images and drawings of these lunar subjects as well as associated articles.

We remind all readers here that Jerry Hubbell is now heading the provisional ALPO Exoplanets Section and that Acting Assistant Coordinator Alberto Anunziato has succeeded Jerry. Alberto's January 2022 *Focus-On* column featured Mare Crisium and the craters Stevinus and Furnerius in March 2022. Mare Frigoris will be the *Focus-On* subject for May 2022. Submit all articles and images of the lunar targets to David Teske or Alberto Anunziato by the 20th of the month prior to publication (April 20 for Mare Frigoris). Contact information can be found in the "ALPO Resources" portion of this Journal, under the Lunar Section.

The Lunar Observer also featured articles concerning lunar topographic studies including familiar and not-so-familiar lunar targets. These articles ranged in sizes from one to four pages in length. Besides these, there have also been more articles about lunar imaging techniques. As of December 2021, Darryl Wilson began a monthly series about imaging the Moon in color.

An index of articles, authors and topics was compiled and placed on the ALPO website in the lunar gallery section for reference use of readers.

Each month, *The Lunar Observer* also features an in-depth article by Dr. Anthony Cook on the British Astronomical Society's "Lunar Geologic Change Detection Program," which is that organization's name for what the ALPO still calls the "Lunar Transient Phenomena Program." Other articles are about lunar features, lunar domes and images of recent lunar topographic studies.

Electronic submissions can now be made by emailing to the coordinator. See the most recent issue of *The Lunar Observer* on the ALPO website (*http://www.alpo-astronomy.org/gallery3/index.php/Lunar*) for instructions. Hard copy submissions should continue to be mailed to the coordinator at the address listed in the ALPO Resources Section of the Journal.

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The lunar image gallery/archive is also now active. Assistant Coordinator Wayne Bailey continues to submit archived images to the Lunar Gallery. This coordinator is now adding current lunar image submissions to the Lunar Gallery. Also, all issues of *The Lunar Observer*, including those from its beginning in 1997 as an American Lunar Society publication to June 2004 when it became the newsletter of this ALPO program, are now available on the ALPO website at *http://www.alpo-astronomy.org/gallery3/index.php/Lunar* due to hard work by Theo Ramakers. Also in the ALPO Lunar Gallery, images and reports can be found in the *Lunar Dome* section.

Lunar Meteoritic Impact Search Program

Report by Brian Cudnik,program coordinator
cudnik@sbcglobal.net

The ALPO LMIS program continues to coordinate observations and activity related to the documentation of lunar meteors and the confirmation of the same. One report was submitted recently of a possible impact event, but after reviewing the sequence of still-images that were provided, it became evident that the impact candidate was an artifact of the imaging system.

Another report, a visual one, was received since the last program report was published here. During the November 19, 2021 near-total lunar eclipse, Russ Stolling of Fresno, California, USA, reported seeing "a very short (quick!) white flash/spark at the upper right of the dark edge of the Moon." It only flashed once and was observed visually with a 40 mm, f/5 telescope and 15 mm eyepiece. The flash occurred between 8:52 and 8:53 UT on 19 November, near the NNE (celestial) limb of the Moon, likely between Harpalus crater and the lunar limb.

As of the date of this section report, no other reports of lunar eclipse lunar meteor candidates have been received. Please check your images/videos that were obtained around the same time as Mr. Stolling's observation to try to verify this impact event which may have been a Leonid. Unfortunately, there was a gap in my own images between 8:47 UT and 9:02 UT so I did not record this.

(Please note that the report for this event on the ALPO / LMIS program web page at *http://alpo-astronomy.org/lunarupload/lunimpacts.htm* is in error. That page states that the meteor was likely a Geminid, but SHOULD communicate that it was likely a Leonid.)

We will continue to encourage the monitoring of the Moon during our monthly observing campaigns as well as during special events when the Moon is favorably placed, such as major meteor showers and total lunar eclipses. Some special events coming up this year include the following:

- April 21, Lyrids meteor shower
- May 6, Eta Aquarids meteor shower
- May 16, total lunar eclipse
- Oct 21, Orionids meteor shower
- Nov 8, total lunar eclipse
- Dec 14, Geminids meteor shower

See Keith Spring's ALPO Eclipse Section report earlier in this Journal for details about the upcoming May 16 and November 8 total lunar eclipses.

See also Robert Lunsford's report later in this Journal on the upcoming Eta Aquarids meteor shower.

I have also been considering a program to monitor Jupiter for meteors, as these have been reported and confirmed fairly frequently (the 11th confirmed event so far was recently recorded in Asia). More details on such a program will be provided in a future program report here.

Please visit the ALPO Lunar Meteoritic Impact Search program web page at *http://alpo-astronomy.org/lunarupload/lunimpacts.htm*

Lunar Transient Phenomena

Report by Dr. Anthony Cook, program coordinator
tony.cook@alpo-astronomy.org

While no new LTP events have been observed since the last program report here, we do continue to receive excellent repeat illumination observations that can be used to disprove some past LTP reports.

One example is an LTP report submitted to the ALPO back in 1998, concerning an intermittent "whitish misty effect seen bordering the shadows of the SE rim" of the crater Plato. This effect was not seen on other craters and so was rightly reported as an LTP at the time.

Using a recent repeat illumination observation by Walter Elias (AEA), other images submitted to our archive (Maurice Collins (ALPO), Leandro Sid (AEA) and Franco Taccogna (Unione Astrofili Italiani)), it has been shown that the most likely explanation was seeing blurred inner part of the crater's SE inner rim terrace. See accompaying image on this page.

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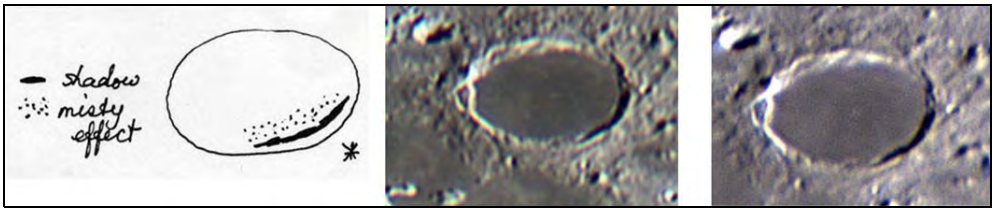

Lunar crater Plato, oriented with north towards the top. (Left) A sketch by Sally Beaumont (ALPO) made on 1998 Mar 08 UT 19:30-20:10. (Center) A color image taken by Maurice Collins (ALPO) on 2018 Sep 20 UT 07:33. (Right) A image taken by Walter Elias (AEA) on 2021Nov 15 UT 00:58.

Thus, we have removed the 1998 report from the ALPO/BAA LTP database.

General Information:

For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: *http://users.aber.ac.uk/atc/lunar_schedule.htm*

By re-observing and submitting your observations, only in this way can we fully resolve past observational puzzles. To keep yourself busy on cloudy nights, why not try "Spot the Difference" between spacecraft imagery taken on different dates? This can be found on: *http://users.aber.ac.uk/atc/tlp/spot_the_difference.htm* . If in the unlikely event you do ever see a LTP, firstly read the LTP checklist on *http://users.aber.ac.uk/atc/alpo/ltp.htm* , and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter LTP alerts can be accessed on *https://twitter.com/lunarnaut* .

Dr Anthony Cook, Department of Physics, Aberystwyth University, Penglais, Aberystwyth, Ceredigion, SY23 3BZ, Wales, United Kingdom. E-mail to *atc@aber.ac.uk*

Monthly summaries of the observations received as well as the best observation from each observer that can provide useful science on re-evaluation past LTP reports are published in the ALPO Lunar Section newsletter *The Lunar Observer* (*http://moon.scopesandscapes.com/tlo.pdf*) – often 10 or more pages per month.

We welcome observations from visual observers, and also astronomers with color imaging capability, who are able to record subtle natural colors on the lunar surface.

We also welcome new participants, whether they are experienced visual observers or high-resolution lunar imagers.

LTP observational alerts are given on the Twitter page: *https://twitter.com/lunarnaut*

Please visit the ALPO Lunar Transient Phenomena site online at *http://users.aber.ac.uk/atc/alpo/ltp.htm*

Lunar Domes Studies

Report by Raffaello Lena, program coordinator
raffaello.lena@alpo-astronomy.org

We have received 96 images including some by Rafael Benavides, Robert Cazilhac, Maurice Collins, Ryan Cornell, Guy Heinen, Richard Hill, Luigi Morrone, KC Pau, Frank Schenck, Maximilian Teodorescu, Andrea Vanoni and Christian Viladrich. Many images are of high resolution and of great interest for our program.

- Benavides has imaged the region in Wallace where some domes are detected. He also imaged Tobías Mayer, Milichius and Hortensius domes field.
- Morrone has imaged Gassendi 1 dome, Gruithuisen highland domes, domes L5 and L6 located in Sinus Iridum.
- Cazilhac has imaged an interesting horseshoe feature in Mare Crisium, which is a breached cinder cone and is its unofficial designation, Grimaldi dome, Cavalerius1 dome, Messier domes, Petavius1 dome and Yerkes 1 dome.
- Teodorescu has imaged the Arago domes, including the low domes named A4-A5 (see Figure 1), Rima Hyginus volcanic region, Yerkes 1 dome and the inflation of lava previously described to the north of Mare Crisium. This complex bulge may have formed when magma, or volcanic gases, rose under a lava flow near the surface and inflated it.
- Schenck and Heinen have imaged the dome in Mare Spumans, recently identified by Lena, which is under investigation for future report. It is located at 66.2°E and 0.08° S, with a base diameter of 8.5 km and lies at about 26 km south west of the crater Pomortsev.
- I encourage observers to acquire high-resolution imagery of this area using telescopic images, which I will correct for the inevitable foreshortening effect, so we can have more data of this dome. Further

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investigation is currently ongoing. Please also check your older images and send them to us for the ongoing study at *lunar-domes@alpo-astronomy.org* .

- Collins has imaged the domes Arago α and β located in Mare Tranquillitatis.
- Pau has imaged the lunar cone west of Lassell J, the Apennine bench formation.
- Hill has imaged the domes in Wallace region,
- Vanoni has imaged the Apennine bench formation and has submitted several images of craters such as Copernicus, Eratosthenes, Stadius and Mare Crisium in color for different mineral composition.
- Cornell has submitted many images of 3D reconstructions of several lunar craters.
- Viladrich has imaged the Fracastorius dome, the dome Luther 1, Petavius1 dome, the domes near Messier crater, the Birt bisected domes, the dome Teneriffe 1 a small swell, the dome Archimedes 1, the Apennine bench volcanic complex and two Archytas domes. He has imaged a lunar dome to the north-east of the crater Schröter. Named Sc1, it has a base diameter of 35 km. Its height, determined using the GLD100 dataset, measures 200 m and the average slope angle is 0.65°. It exhibits evidence of dark material, likely pyroclastic volcanic deposits, on its surface. The dome has been described in a previous ALPO article and in an abstract presented at the 46th Lunar and Planetary Science Conference (2015):

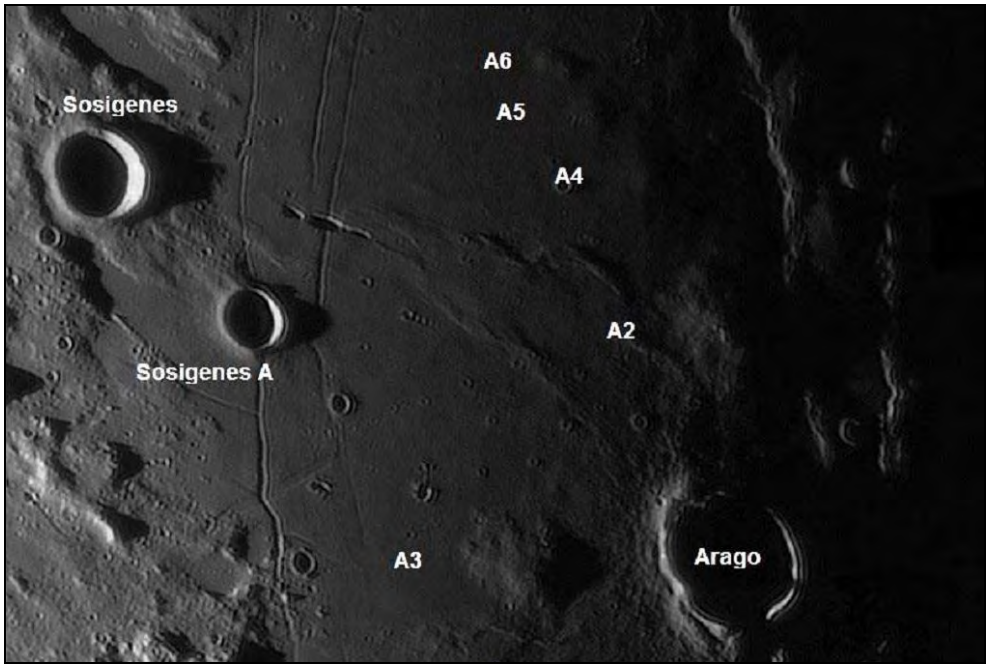

Figure 1: Telescopic image made by Teodorescu on November, 25 2021 03:49 UT using a 355 mm Newtonian telescope.

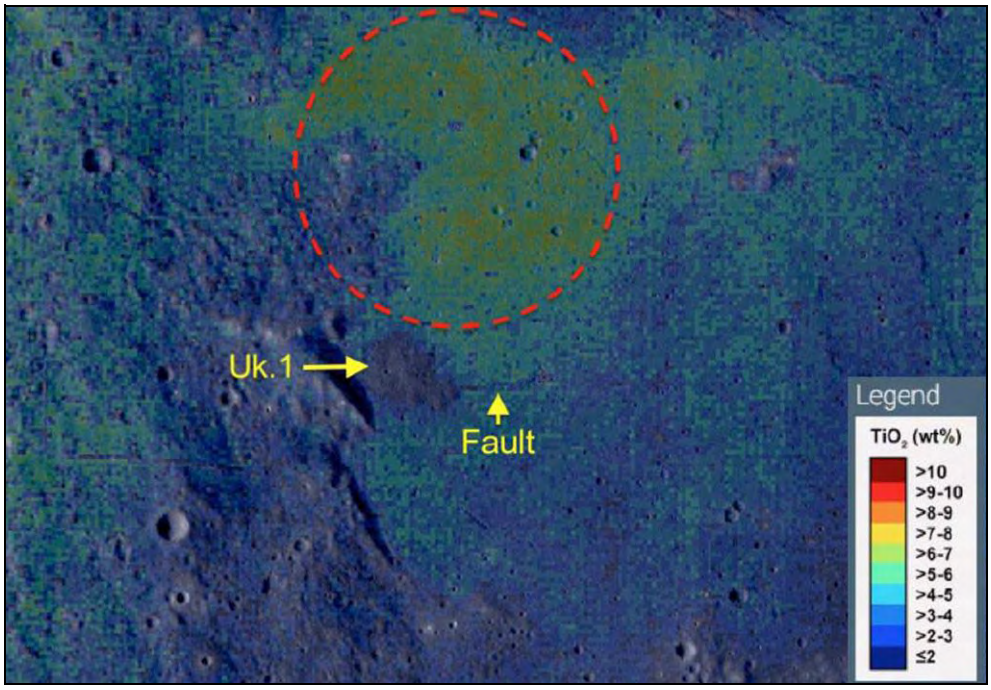

Figure 2: TiO_2 abundance in wt% overlay from *Quickmap* draped over the area of Uk1 showing the high TiO_2 content of the high ground to the north, and lower TiO_2 content of the surrounding, younger mare. Note the much lower abundance value on Uk1.

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https://www.hou.usra.edu/meetings/lpsc2015/pdf/1002.pdf

- Fitzgerald and this coordinator have examined a suspected volcanic structure located at about 25 km to the NE of Ukert in Mare Vaporum, using LROC WAC and NAC images, Clementine multispectral data, the Chandrayaan-1's Moon Mineralogy Mapper (M^3), LROC WAC-based GLD100 DTM, Mineral Mapper reflectance data acquired by the JAXA SELENE/Kaguya and Diviner data sets (see Figure 2). Albedo and age estimation, described above, would indicate that the feature under study - named Uk1- is not an old hill partially embayed by lavas.

A possibility is that Uk1 has been formed by silicic materials and then was covered by basaltic ejecta of pyroclastic material. However, the absorption bands of volcanic glasses are broader and shallower, and the 1,000 and 2,000 nm band centers are generally shifted to longer and shorter wavelength, respectively. In our spectral analyses these specific signatures are not detected. Therefore, volcanic glasses deposits likely are not present or are thoroughly intermixed with large amounts of basaltic material.

Alternatively, the feature may have been formed by subsequent erupting lavas, likely of different composition, producing the mixing of highland and basaltic material as detected using the Diviner data. The highland component of Uk1 had lower plagioclase content and thus lower SiO_2 component, which would explain lower associated morphometric parameters such as lower height and slope if compared with highland domes the so called Red Spots. Compositionally it differs from the basaltic mare lavas in being lower in iron, titanium, and orthopyroxene, but slightly enriched in silica, possibly in the form of plagioclase feldspar. The clinopyroxene signature indicates a composition not totally unrelated to mare basalts. The apparent mineralogical gradient as one ascends the structure from the level of the mare to the summit, as well as the morphological distinction between the lower and upper platforms suggests a two phased formation, with a lower viscosity effusive phase with a slightly higher iron content lava being followed by a late higher viscosity phase composed of lavas of progressively lower iron but higher silica content. One possible scenario is the draining of a differentiated magma chamber where the initial eruption of large amounts of basic basaltic magma left behind a residue with a relatively enriched silica content and higher viscosity. The location of Uk1 on top of the fractures that cross the mare lavas indicate that it is probably one of the younger geological features in Mare Vaporum; therefore an origin from a late stage magma chamber may be a plausible if highly speculative origin. A study of this feature is ongoing.

Interested observers can publish their own newly acquired images using the e-mail *lunar-domes@alpo-astronomy.org*. Preference for the filename would be to start with the date as YYYY-MM-DD-HHMM with leading zeros where appropriate. This than could follow with the observer's ID, followed with the name(s) of the features shown.

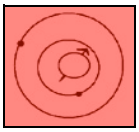
Images received are also shared in our Facebook group Lunar Dome Atlas Project: *https://www.facebook.com/groups/814815478531774/*.

Interested observers can also participate in the lunar domes program by contacting and e-mailing their observations to both Raffaello Lena, Lunar Dome Studies Program coordinator, at (*raffaello.lena@alpo-astronomy.org*) and Jim Phillips, assistant coordinator, at (*thefamily90@gmail.com*).

Mars Section

Report by Roger Venable, section coordinator
rjvmd@hughes.net

A pre-apparition report on the Mars 2022-23 apparition appears later in this Journal.



The new apparition of Mars has begun, and a few dedicated observers have already made observations of the Red Planet. See the preview of this apparition in this issue of the Journal. To share your observations and see what other observers are accomplishing, join us online in the marsobservers group of groups.io at https://groups.io/g/marsobservers . Also, take a look at the Mars gallery on the ALPO website at *https://www.alpo-astronomy.org/gallery3/index.php/Mars-Images-and-Observations* .

Also, we'd be happy to "see" you on the ALPO Mars message list at *https://groups.io/g/marsobservers*, where there are more than a thousand members.

Please send your drawings and images to this Mars coordinator at *rjvmd@hughes.net*, and also to Theo Ramakers at *mars@alpo-astronomy.org* for inclusion in the online Mars archive.

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Minor Planets Section

Report by Frederick Pilcher, section coordinator
pilcher35@gmail.com

The Minor Planets Section is pleased to announce the appointment of Robert Stephens as Associate Coordinator, a position that has been vacant for several years. Robert brings to the section 23 years of active research in asteroid CCD photometry and lightcurve analysis. His duties will be to assist and advise the section coordinator.

Presented here are highlights published in *The Minor Planet Bulletin*, Volume 49, No. 1, 2022 January-March, which represent the recent achievements of the ALPO Minor Planets Section.

Brian Warner and Robert Stephens report evidence that asteroids 5175, 7087, 68063, 143649, 159857, and 326732 have satellites. This evidence consists of dips in the rotational lightcurve caused when the satellite transits or is eclipsed or occultated by the larger body. The interval between the dips establishes the period of revolution around the main body. Of these six objects, the existence of the satellite is secure only for 326732, and very weak for the other five.

David Gault, Peter Nosworthy and Dave Herald of the Trans-Tasman Occultation Alliance, and Richard Nolthenius and Kirk Bender of the Intl Occultation Timing Assn (IOTA) report that asteroid 4337 has a satellite. Secondary dips were observed in the occultation profile from two separate occultations, on 2021 May 19 from Australia and 2021 June 9 from California.

Vladimir Bahyl and Emilia Balazova performed CCD photometry on Comet C/2017 T2 (PanSTARRS) and found a rotation period of the nucleus of 5.676 hours.

Lorenzo Franco and colleagues observed 790 Pretoria alternately with V and R filters and found a color index V-R=0.39.

In addition to asteroids specifically identified above, lightcurves with derived rotation periods are published for 96 other asteroids as listed below:

57, 58, 128, 224, 236, 329, 428, 536, 624, 663, 666, 878, 894, 903, 904, 1021, 1026, 1034, 1046, 1129, 1143, 1322, 1660, 1667, 1671, 1713, 1727, 1749, 1868, 1938, 1943, 1949, 1990, 2044, 2229, 2232, 2260, 2431, 2456, 2495, 2704, 2728, 2824, 2920, 2926, 3376, 3648, 3699, 3709, 3760, 3807, 3919, 3932, 4101, 4232, 4826, 4832, 4921, 5235, 5283, 5402, 5638, 5682, 5968, 5972, 6021, 6307, 6751, 6787, 7173, 7328, 7330, 7341, 7784, 7822, 7939, 8416, 11452, 14427, 15317, 15964, 15989, 16960, 19912, 32906, 138404, 140158, 152664, 283460, 285571, 353938, 2005 EC224, 2011 YQ10, 2019 UD4, 2021 JH2, 2021 LN15.

Secure periods have been found for some of these asteroids, and for others only tentative or ambiguous periods. Some are of asteroids with no previous lightcurve photometry, others are of asteroids with previously published periods that may or may not be consistent with the newly determined values. Newly found periods that are consistent with periods previously reported are of more value than the uninitiated may realize. Observations of asteroids at multiple oppositions widely spaced around the sky are necessary to find axes of rotation and highly accurate sidereal periods.

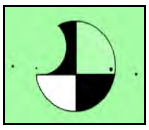
The authors of all of these papers are to be congratulated for the excellent writing of the technical details of all of these projects. Their competent explanations will reward careful reading of their ALPO *Minor Planet Bulletin* papers. Interested readers interested are invited to download *The Minor Planet Bulletin*.

The *Minor Planet Bulletin* is a refereed publication and that it is available without charge online at *"https://mpbulletin.org*

Please visit the ALPO Minor Planets Section online at *http://www.alpo-astronomy.org/minor*

Jupiter Section

Report by Richard Schmude, section coordinator, and Craig MacDougal, assistant section coordinator



Jupiter will be visible in the early morning sky in early April of 2022. It will be in the constellation of Aquarius and will shine at magnitude -2.1 which is about a factor of two dimmer from its peak in August of 2021.

This coordinator has started working on the 2021-2022 Jupiter apparition report for publication in this Journal. Please be sure to send any observations or other reports as soon as possible so that they may be included in that report.

During 2021, Oval BA and the Great Red Spot showed internal detail with the detail in the Great Red Spot in methane band images being especially interesting. Please continue to image Jupiter in methane band light.

Since the last report here, a topic of discussion has been the detection of more impacts on Jupiter. Using Marc Delcroix's *DeTeCt* software, imagers are

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able to find possible impact flashes in their raw video. Several confirmed impacts happened in October 2021. Another was found in a September video, but has not been confirmed. This subset of Jupiter observation is of great importance to researchers in solar system dynamics since it provides indirect but objective data to better understand the number and sizes of small bodies orbiting the Sun.

Craig MacDougal continues to monitor the ALPO-JUPITER io online discussion group, which has 57 members as of January 1, 2022. This is a worthwhile to group to join. Members submit and share images with over 100 having now been shared of the current apparition. One may also ask questions to fellow members about imaging and other techniques. Craig also reports that images may be shared with the group.

To subscribe to this group send a blank e-mail (with a blank subject line) to:

ALPO-JUPITER+subscribe@groups.io

A continuing request from the ALPO Jupiter Section staff: The NASA Juno mission is currently enthusiastically accepting images of Jupiter from amateur observers. And because Juno is not primarily an imaging mission, the mission coordinators are especially interested in our (ALPO member) contributions. Please check this article for general background: *https://skyandtelescope.org/astronomy-news/observing-news/juno-pro-am-workshop-05252016/* . After sending your images to us, you're invited to also send your Jupiter images to the JunoCam homepage at: *https://www.missionjuno.swri.edu/junocam* . The JPL hopes the Juno mission will be extended for another three years past July of 2021.

Finally, this is to remind all that the updated Jupiter manual, *Observing Jupiter in the 21st Century* is still available from the Astronomical League. Because there are several important updates in this revised version, all who observe or image Jupiter are strongly urged to obtain a copy. Go to:

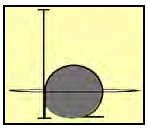
t *https://store.astroleague.org/index.php?main_page=index&cPath=1*

Another reminder, all contributors are advised to send all images ONLY to *Jupiter@alpo-astronomy.org* where they will be scanned for viruses before being forwarded on to me. Those received images will also be posted in the ALPO Jupiter Images and Observations gallery.

Visit the ALPO Jupiter Section online at *http://www.alpo-astronomy.org/jupiter*

Saturn Section

Report by Julius Benton, section coordinator
jlbaina@msn.com



The 2021-22 apparition of Saturn ended when the planet reached conjunction with the Sun on February 4, 2022.

The geocentric phenomena for the 2022-2023 apparition are presented in the table that accompanies this report.

As of this update, the ALPO Saturn Section had received more than 1,100 individual visual observations and multi-wavelength images for the previous 2021-22 observing season. During 2021-22, observers repeatedly captured images, that included small white spots in the EZn (northern half of the Equatorial Zone) interacting with the adjacent EB (Equatorial Band), plus recurring discrete sporadic small white spots in the EZs (southern half of the Equatorial Zone), as well as a curious persistent white ripple or streak midway within the EB (Equatorial Belt) as well as a lingering narrow white streak within the NEBs (North Equatorial Belt, southern component) and a similar feature within the NEBn (North Equatorial Belt, northern component).

During that observing season, observers reported white and dark spots in the NNNTeB (North North North Temperate Belt) as well as small white spots within the NNNTeZ (North North North Temperate Zone) as well as similar white spot activity situated near the southern edge of the NPR (North Polar Region). The aforementioned atmospheric phenomena reported in 2021-22 were frequently depicted in images using RGB, red, and 685nm IR filters. It is very important for observers to continue to image Saturn with the same multi-wavelength filters to determine if the same or similar features will persist and perhaps change morphologically with time as the 2022-23 apparition continues throughout the forthcoming months.

With the rings tilted by about +18° toward our line of sight from Earth in 2021-22, observers have experienced reasonably favorable opportunities to view, draw or image the northern hemisphere of the globe and north face of the rings even though the inclination of the rings toward Earth is diminishing progressively as the next edgewise presentation of the ring system approaches during the future 2024-25 apparition. With Saturn's southerly declination of about -15.4° for northern hemisphere observers, observers can expect to see and capture on images more of the features of the southern hemisphere of Saturn now that they are becoming visible south of where the rings

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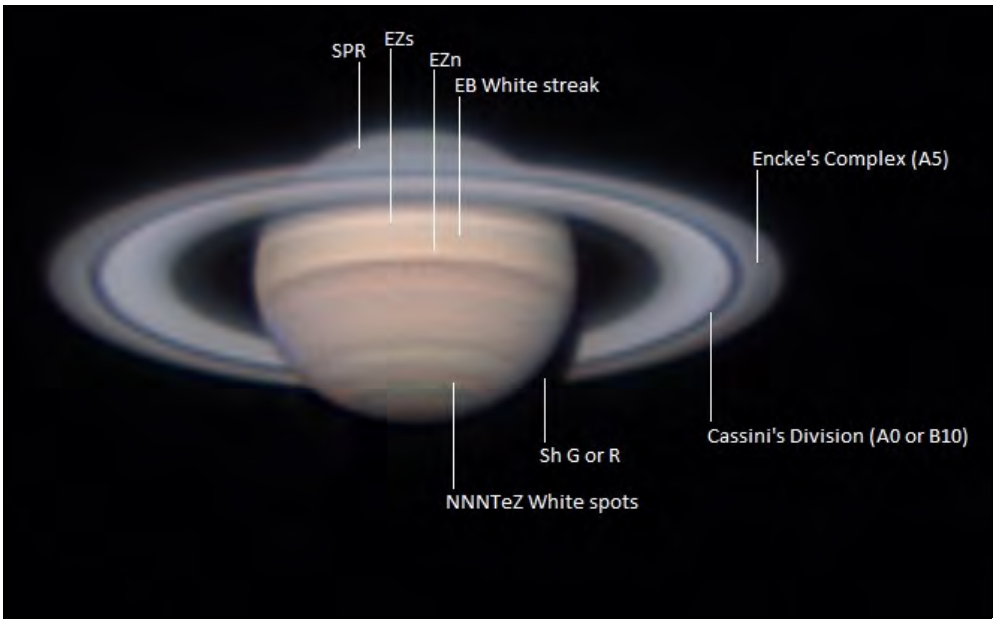
cross the globe, in particular the SPR (South Polar Region).

Pro-Am cooperation that occurred actively during the immediately preceding 2021-22 apparition of Saturn will continue as our team of observers will be routinely monitoring Saturn throughout the 2022-23 observing season for many of the previous and possibly any new recurring atmospheric phenomena on the planet. We always attempt to actively share our results and images with the professional community. This is an extension of our collaborative historical efforts with the Cassini mission that started its amazing odyssey back on April 1, 2004 until the spacecraft plunged into Saturn's atmosphere on September 15, 2017.

For years to come, planetary scientists will be carefully studying the vast database of images and data gleaned from the Cassini mission, including images provided during the mission by ALPO observers. Thus, interested readers of this journal worldwide who wish to join us in our observational pursuits are highly encouraged to submit systematic observations and digital images of the planet at various wavelengths throughout the current observing season.

Observers are also reminded that visual numerical relative intensity estimates (also known as visual photometry) remain a vital part of our visual observing program and are badly needed to ascertain recurring brightness variations in the belts and zones on Saturn as well as the major ring components.

ALPO Saturn observing programs are listed on the Saturn page of the ALPO website at *http://www.alpo-astronomy.org/saturn* as well as in more detail in the author's book, *Saturn and How to Observe It*, available from Springer, Amazon.com, etc., or by writing to the ALPO Saturn Section for further information.



Superb RGB image of Saturn taken by Trevor Barry of Broken Hill, Australia, on December 6, 2021 at 10:14 UT with RGB filters with a 40.8 cm (16.0 in.) Newtonian in good seeing conditions. Numerous belts and zones of the northern hemisphere of Saturn are visible in this image, with a curious white ripple or streak midway within the EB (Equatorial Belt) as well as a possible small white spot is suspected in the NPR (North Polar Region). The Sh G on R (Shadow of the Globe on the Rings is visible in this image as well as Cassini's Division (A0 or B10) and Encke's Complex (A5). The southern hemisphere is visible just south of where the rings cross Saturn's globe. The apparent diameter of Saturn's globe in this image is 15.8" with a ring tilt of +18.4°. and CMI = 354.1°, CMII = 353.0°, CMIII = 346.4°. Saturn's apparent visual magnitude = +0.7. South is at the top of the image.

Table of Geocentric Phenomena for the 2022-23 Apparition of Saturn in Universal Time (UT)

2022-23 Saturn Apparition	
Conjunction	2022 Feb 04^d 00^h UT
Opposition	2022 Aug 14^d 17^h UT
Conjunction	2023 Feb 16^d 00^h UT
Opposition Data for August 14, 2022:	
Equatorial Diameter Globe	18.76″
Polar Diameter Globe	17.04″
Major Axis of Rings	42.4″
Minor Axis of Rings	10.4″
Visual Magnitude (m_V)	+0.3
B = Declination Constellation	+13.7° -15.4° Capricornus

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Also consult "ALPO Monograph 14 - Theory and Methods for Visual Observations of Saturn" available online at *http://alpo-astronomy.org/gallery3/index.php/Publications-Section/ALPO-Monographs/ALPO-Monograph-14-Theory-and-Methods-for-Visual-Observations-of-Saturn*

Observers are urged to pursue digital imaging of Saturn at the same time that others are imaging or visually monitoring the planet (i.e., simultaneous observations).

The ALPO Saturn Section thanks all observers for their dedication and perseverance in regularly submitting so many excellent reports and images in recent years. The professional community continues to solicit drawings, digital images, and supporting data from amateur observers around the world in our active ALPO Pro-Am cooperative effortS.

All are invited to also subscribe to the Saturn e-mail discussion group at *Saturn-ALPO@yahoogroups.com*

Remote Planets Section

Report by Richard W. Schmude, Jr., section coordinator
schmude@gordonstate.edu

In early April, Neptune will be visible in the early morning sky in Aquarius, shining at magnitude 7.8. Unfortunately, the planet Uranus will be a very difficult object to observe in Aries because it is close to the Sun.

Several individuals have submitted images of Uranus and Neptune to this coordinator. In addition to this, the Hubble Space Telescope has imaged that planet. There is still a large bright area over the north polar region of that planet. At least one observer may have imaged a bright belt near that planet's equator. The best way to get detail is to use either a red or near-infrared filter. Hopefully we will get to see the first images of Uranus and Neptune through the James Webb Space Telescope in the not-too-distant future.

This coordinator plans to start writing the 2021-2022 Remote Planets Apparition Report in the summer of 2022. Please be sure to submit any relevant images or other observations to the coordinator as soon as possible.

To find any of the remote planets for telescopic observations, it is suggested that you first use a star chart which shows the position of the target, then use binoculars to find the target. Note that Sky & Telescope magazine (*http://skyandtelescope.org*) is a great source to find specific locations of sky objects.

Next, locate the target in the finder scope of your telescope. Finally, center your target in the field of view using a low-power eyepiece. You may need a dark site to locate Neptune both in binoculars and in your finder scope.

Both Uranus and Neptune have albedo features which can be imaged with a near-infrared filter. Uranus has a bright North Polar Region while Neptune may have irregular bright spots.

Finally, my usual reminder that the book *Uranus, Neptune and Pluto and How to Observe Them* is available from Springer at *www.springer.com/astronomy/popular+astronomy/book/978-0-387-76601-0* or elsewhere (such as *www.amazon.ca/Uranus-Neptune-Pluto-Observe-Them/dp/0387766014*).

Visit the ALPO Remote Planets Section online at *www.alpoastronomy.org/remote*

Exoplanets Section

Report by Jerry Hubbell
acting section coordinator
jerry.hubbell@alpo-astronomy.org

One of the most exciting things about amateur astronomy in this new golden age is the opportunity to pursue astronomical discovery with the software tools and instruments available today. Not only are these instruments on par with the basic tools that professionals use, but some are actually the same! These tools and instruments are either freely available, or very affordable for the interested amateur astronomer and citizen scientist.

The other huge enabler for this hobby is the Internet. The Internet has allowed the diverse amateur astronomy community to come together in an unprecedented way to share experiences and knowledge. One aspect of this sharing is that there are hundreds - if not thousands - of amateurs developing software, tools, and instruments through their love of the hobby. This includes information shared through hundreds of websites.

I want to share some information we have produced at the Mark Slade Remote Observatory (MSRO) to help train our astronomers to observe exoplanets. Here are two excerpts of training materials that will give you a flavor of what is involved in observing exoplanets. My goal is to use the material we have

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already produced at the MSRO as a source to develop the ALPO Exoplanet Section training materials.

In the next few months, I will be posting on the ALPO website the documents produced as the ALPO Exoplanet Training Program. This material will be freely available to ALPO members.

Here is an excerpt from the introduction to the Mark Slade Remote Observatory (MSRO) Exoplanet Follow-up Observing Program (XOFOP):

3.0 Introduction to the MSRO-XOFOP

3.1 MSRO-XOFOP

The Mark Slade Remote Observatory (MSRO) Exoplanet Follow-up Observing Program (XOFOP) is based on the goals of the NASA Transiting Exoplanet Survey Satellite (TESS) Follow-up Observing Program (FOP), known as TFOP. The MSRO-XOFOP was created to implement the TFOP Working Group (TFOP WG) Sub-Group One (SG1) requirements, and specific MSRO system requirements to meet the goals of the program. An additional goal is to prove out the use of the Diffuser Method in providing validated observations and develop specific reporting criteria for submission to, and acceptance by the TFOP WG SG1.

3.5 The MSRO-XOFOP Mission

The mission of the MSRO-XOFOP Team is to obtain high-quality observations in accordance with the requirements of the TFOP WG SG1 and as outlined in this document. These observation data will be obtained using the instruments available at the Mark Slade Remote Observatory (Station 1 and Station 2) and will be processed and analyzed using the standards provided by the TFOP WG SG1.

The MSRO-XOFOP astronomers are focused on seeing-limited imaging and primarily provides time-series photometric follow-up of TESS Objects of Interest (TOIs). Targets from Kepler's follow-on mission, K2, are also available for follow-up when no TOIs are available for a specific time and observatory location. TESS targets are identified with a TIC number; K2 targets are identified with an EPIC number. TFOP SG1 observation planning, coordination, and data submission web tools are available and are discussed elsewhere in this document.

Here is another excerpt from the MSRO-XOFOP procedure, sharing some links that are available on the TESS websites. These links provide some valuable resources that we use at the MSRO.

3.4.2 TESS Data Provided by the TFOP WG SG1

There are several datasets and other documentation provided by the TFOP WG SG1 that we will use to provide directions and plan our observations. Karen Collins forwards completed observation reports to the MSRO Assistant Director, and he will review them for relevance to the observations being performed and forward them on to the MSRO-XOFOP team.

There are three web-based tools available. The MSRO Assistant Director is the primary user for these accounts. He will use these tools to plan observations for the MSRO-XOFOP team but as a member of the team, you are welcome to log in and use these accounts.

a) The ExoFOP-TESS for the TESS TOI and KELT-FP observations:
https://exofop.ipac.caltech.edu/tess

NOTE: You must apply for your own ExoFOP-TESS account.
https://exofop.ipac.caltech.edu/account.html

b) The TESS Transit Finder (TTF) is used to find events for the MSRO on the night(s) of interest. You can select the Mark Slade Remote Observatory from the list:
http://astro.swarthmore.edu/telescope/tess/find_tess_transits.cgi

c) TESS Observations Coordinator (TOC) to list your planned observations to let other SG1 team members know what you are planning to observe.
http://www.astro.louisville.edu/tessplanner

These excerpts should give you a feel for the level and attention to detail used in developing the procedures. The procedures and other documents we develop for the ALPO Exoplanet Section will be at a level where it will be very easy to adapt and make the necessary changes needed for individual members to use at their observatories. I hope to be able to develop program training videos that will help members to understand and

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adapt the procedures to their specific needs. Additional videos will be produced to demonstrate the performance of these procedures also. If you are interested in working on these types of documents and training materials, please let me know that you would like to join the Training group in the Exoplanet Section.

If you already observe variable stars or minor planets and record their light-curve data, then here is one more exciting field to apply your skills and knowledge. If you are new to aperture photometry and want to learn the techniques involved in taking photometric data on any object and creating a light-curve, then the Exoplanet Section is your ticket to learning how to do that also.

Please contact me via e-mail if you are interested in learning these new tools, or if you are an experienced observer and citizen scientist doing photometric work, I especially want to talk to you about possibly becoming an assistant coordinator. My plans include the creation of the following groups in the Exoplanet Section:

- Instrumentation
- Observing Program
- Analysis & Modeling
- Data Reporting
- Observation Training

When you do contact me, indicate which groups you are interested in.

Thanks to all, and I look forward to hearing from you soon!.

Notable Deaths

Harry Jamieson, May 18, 1945 - February 11, 2022

(Editor's Note: The following account is from the official obituary with additional information supplied by ALPO Membership Secretary Matthew Will.)

Harry David Jamieson, Sr, 76, of Cheyenne, Wyoming, battled cancer courageously until he was welcomed home to be with Jesus on Friday, February 11, 2022 in Cheyenne, Wyoming. He was born May 18, 1945 in San Francisco to Marcella Collis and David Jamieson.

Harry was a computer programmer prior to his retirement in 2010, but his true passion was for astronomy. He spent his life studying the heavens and contributed much of his spare time to the Association of Lunar & Planetary Observers, serving various leadership roles within the group from roughly 1960-2000. Harry wrote the *Lunar Observer's Toolkit* software that allows astronomers to predict lunar features on any given date in time.

Below is a list of Harry's ALPO career positions:

- Lunar Selected Areas Program - November 1971 to June 1972
- Lunar Domes Survey (founding recorder) - three terms, February 1964 to February 1966, June 1972
- to December 1974, March 1992 to October 1998
- Lunar Section, general recorder - March 1970 to December 1974

- Membership Secretary - August 1987 to July 2001
- Journal Publisher - November 2000 to July 2001
- Board Director - August 1990 to July 2001
- Executive Director - January 1996 to July 1998
- Associate Executive Director - August 1995 to January 1996 and July 2000 to July 2001
- Treasurer - August 1990 to January 1996 and July 1998 to July 2001

Harry was so well respected in his field and offered such great contributions that a minor planet was named for him by the International Astronomical Union.

He is survived by his loving and devoted wife of more than 40 years, Delaina Jamieson; his son, Harry "David" Jamieson, II (Dana) and his children Presley and Scarlett; his daughter, Kellie Jamieson (Kevin) and her children Dylan and Elijah; his daughter, Wendy Jamieson Kolb along with her daughter, Amanda Kolb and granddaughter, Kennedy. Harry also had another

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grandchild on the way. He is also survived by his brothers Robert, Patrick and Michael as well as his sister, Laura, along with many nieces, nephews and cousins who will all miss him greatly.

Harry was preceded in death by his mother and father, his sister Anne Jamieson Funamura, brother Mark Jamieson, as well as his son, Richard Wayne Jamieson. His memorial service was held on Friday, February 18 at his church of many years, Calvary Chapel in Cheyenne, Wyoming.

Personal condolences may be sent by e-mail to

del.jamieson@gmail.com

and by regular mail to:

Delania Jamieson
3878 K2 Ranch Rd.
Cheyenne, WY 82007-9676

75 Years of the ALPO
Members and Others Share Their Memories

By Shawn Dilles, editor *The Strolling Astronomer*, shawn.dilles@alpo-astronomy.org

We have invited all ALPO members to send in memories of their association with ALPO since the organization's founding in 1947 and have so far received the following responses from those in the U.S. and elsewhere. We hereby present those personal accounts in the various authors' own words. Please send your ALPO story to this editor for inclusion in an upcoming issue.

Michael Amato, ALPO member, West Haven, Connecticut, USA

Over the years, the ALPO taught me what to look for when I observe the five naked-eye planets. I have learned how to tease out albedo features thanks to my reading The Strolling Astronomer.

****

Dr David Arditti, president, British Astronomical Association

Please allow me, as President of the British Astronomical Association, to send warmest greetings and congratulations on ALPO attaining its 75th anniversary. We have some members in common, and of course some historical links.

The ALPO is still a relative youngster, compared with the BAA's 132 year existence. I look forward to both organisations continuing to advance the amateur study of the solar system bodies far into the future.

****

Jeff Beish, ALPO member, Lake Placid, Florida, USA

A "short write-up" will certainly not express the appreciation I have for this fine organization, especially after nearly 50 years as a member of the Association of Lunar & Planetary Observers (ALPO). My association with all the many friends in the ALPO is the most important benefit that comes to mind. Unfortunately, most of my past Solar System observing friends are now gone and only fond memories of their fellowship and friendship remains within me. I had the privilege of knowing Dr. Don Parker and then a short time later the ALPO Mars Recorder, Charles F. ("Chick") Capen. How lucky could one be in the company of such people and to participate in learning of our Solar System under their guidance. A great deal of appreciation by all of us goes to Walter Haas for creating the ALPO. He was a true friend and mentor for many of us.

Over the years, the ALPO has grown from a small group of various age groups of very active members to an older and retiring band of dedicated observers. It seems as though younger people have lost interest in our observing choices. The ALPO Journal has certainly improved over the years; however, the nostalgia of collecting and keeping the earlier booklet form of *The Strolling Astronomer* makes one feel like a real member. If the online method saves time, effort and money, then that is a good thing.

During the years following my first encounters with Don Parker and Chick Capen, we attained considerable international attention and our research work on Mars is recognized the world over. In just one decade, the three of us – Chick, Don and I – published a considerable number of papers and lectured all over the world. Don and I were fortunate to have worked with many well-known and knowledgeable astronomers that could only have been realized because of our association with such a unique organization such as the ALPO.

****

Julius Benton, board member and coordinator, Venus and Saturn sections, Savannah, Georgia, USA

My deep interest in lunar and planetary astronomy followed me from my childhood well into my college years. By the time I completed my undergraduate studies, my interest in lunar and planetary astronomy had become a virtual obsession, partially ushered in by the unprecedented events of July 20, 1969, when Apollo 11 touched down on the Moon in the Sea of Tranquility. The following year I attended my first astronomical convention, where for the first time I met Walter Haas, the founder of the Association of Lunar & Planetary Observers (ALPO). His enthusiasm, encouragement and guidance helped stimulate my involvement in many ALPO activities. For a few more years, however, the rigors of graduate school occupied most of my available time as I pursued advanced degrees, but I always managed to set aside a few hours a week to spend time at my telescopes recording observations systematically.

The congenial, informal atmosphere of the ALPO helped me develop an appreciation for the great diversity of backgrounds and experience of the people I met and corresponded with. In 1971, I was appointed coordinator of the ALPO Saturn and Venus Sections, positions that I've held continuously for the last 51 years. Any small contribution that I have been able to make to what we know about the planets Saturn and Venus from the standpoint of

observational astronomy has come as a labor of love, something I have never grown tired of even after many years of recording, analyzing, and publishing detailed apparition reports. But whatever success the ALPO Saturn and Venus Sections might have achieved, none of it would have been possible without the of many dedicated observers too numerous to mention here. I look forward to the years ahead as I continue my role in charge of both ALPO sections.

****

Tony Broxton, ALPO member, Beechlea, Coads Green, near Launceston, Cornwall, England

I retired as a consultant engineer with British Aerospace and retrained as an astronomer. Astronomy groups I attended focused mainly on astrophotography, and the outcome ranged from images of Mars (which were merely featureless muddy blobs) to stunning pictures of objects such as Andromeda and the "Pillars of Hercules." I am completely hopeless at astrophotography, but I can get any Hubble image, or likewise, from the web.

I would ask "how do you use this information… how do you use these images to push back the boundaries of our knowledge?"

With this in mind and being retired and at home during the day, I took up solar work. The idea of sitting up all night in the freezing cold lacked appeal when I could bathe in sunshine.

I joined national/international teams of solar observers. I was an assistant director at the British Astronomical Association (BAA) and am a contributor to the Solar Influences Data Analysis Center, Brussels. In addition, I joined the ALPO since it, too, was an organization that published data on the web, enabling it to be used by universities, schools and researchers alike.

There was an obvious void where some amateur observers would be interested in contributing at a professional level, but how could they do this? So, with permission, help and data from the ALPO and the BAA, I wrote and published a book detailing how any interested party could do this.

Astronomers will know that solar weather has a direct influence on everyday life here on Earth. It can, and has, disrupted GPS and communications satellites, been responsible for power outages and much more. Any amateur astronomer who can contribute information does so to the benefit of all mankind, and the ALPO is a platform that enables this.

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Maurice Collins, member, the ALPO, the Royal Astronomical Society of New Zealand

On behalf of the Royal Astronomical Society of New Zealand, we would like to extend to all members of the ALPO a warm congratulations on your 75th Anniversary.

Here in New Zealand in the southern hemisphere, we have views of the sky that complements the northern hemisphere for observations of the Moon and planets to contribute to world-wide observations of objects. The support that the ALPO gives for observers to send in our images, and that they then get posted in the section galleries, newsletters, and the Journal of the ALPO really helps encourage amateurs to do useful work in astronomy.

At the RASNZ, we do not have a lunar and planetary section, but we do have a Comet and Meteor section that covers that part of the solar system. I personally have found the ALPO to be immensely helpful to my observing of the Moon, Venus, Jupiter and Saturn.

May you have continued support, and once again, congratulations on your 75th!

****

David Cowall, president, Board of Directors, American Association of Variable Star Observers

On behalf of the American Association of Variable Star Observers, I would like to congratulate the Association of Lunar and Planetary Observers on their 75th Anniversary.

Your continued, citizen-scientist contributions to astronomy continues to enhance our knowledge of the cosmos.

Best wishes for continued success.

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Brian Cudnik, coordinator, Lunar Meteoritic Impact Studies Program (ALPO Lunar Section) Houston, Texas, USA

From the 1970's, I have been interested in solar system astronomy. I began making telescopic observations of the planets in the early 1980's on an infrequent basis; but by late 1984 I was observing them regularly. I have been observing and sketching the planets on a regular basis from then to the present time.

Although I heard of ALPO in the 1980's, it was not until the late 1990's that I got involved with the organization. Accomplished visual astronomer, the late Barbara Wilson, encouraged me in 1998 to share my observations with ALPO rather than keep them to myself and that began my involvement with the organization. I regularly submitted sketches of all the major planets for quite a while, but I have tapered off (with the increased capability and proliferation of planetary imaging being the main reason) in recent years. Work and other

commitments ended my sketching submissions a little over a year ago.

A special event in November 1999 sparked a new level of involvement with ALPO. I participated in a campaign to look for lunar meteors during the Leonid storm event. I watched visually and witnessed an impact flash, later confirmed by video. The events of that night sparked interest in ALPO to revive a program that had existed in the 1950's and 1960's but saw little success. This was a program to watch the moon for meteor impact flashes. The revived program, the Lunar Meteoritic Impact Search program, was a new section in ALPO formed in early 2000 and has been in operation since, with me serving as its long-time coordinator. Thus, my main involvement with ALPO has been to coordinate this section, which has documented some 80 impact events over its 22-year history.

ALPO has also taught me the value of professional-amateur collaboration. Having earned a M.Sc. degree in astronomy, I have had some experience with the professional side of astronomy, but visual amateur astronomy remains my favorite aspect of the science. Currently most of my visual work is done with variable stars, but I still keep a record of planetary sketches in my variable star observing logbooks.

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Shawn Dilles, editor, ALPO journal "The Strolling Astronomer", Vienna, Virginia, USA

I have always been interested in astronomy and have been reading about it from the time I could read. My first astronomy book was the Dr. Seuss beginner book "You Will Go to the Moon", followed by "The Stars - A New Way to See Them" by H. A. Rey, which is still in print. I was surprised to learn decades later that the H.A. Rey also wrote the "Curious George" books. Others soon followed: Golden Nature Guide books, rockets and satellites, and a shelf of non-fiction books by Isaac Asimov and others. My own picture of the solar system was shaped by Chelsea Bonestell, who illustrated many of these books. If you have not heard the name do a google image search with his name.

At about age 12, I received a telescope along with a subscription to *Sky & Telescope* magazine as a gift and can still vividly remember observing on many cold winter nights with my dad. The telescope was good enough to allow me to see crisp features on the Moon, sunspots, and the rings of Saturn.

Fast-forward about 50 years to 2017. With retirement looming ahead, I started investigating ways to spend more time with activities I loved, and that included astronomy. I joined two local observing groups (Northern Virginia Astronomy Club and The Analemma Society) and investigated national groups like the American Meteor Society, the ALPO, and AAVSO. The ALPO seized my interest because of the fascinating articles in the JALPO.

The ALPO website hosts back issues of its Journal (the JALPO), and while working my way through them I saw several decades were not online. The ALPO board of directors was supportive and allowed me to scan the back issues, put them on-line and enter them into the NASA - Smithsonian Astrophysical Observatory Database for use by astronomers worldwide. I also worked with Michael Mattei to complete the indexes for each JALPO issue to Volume 60 and put them online. Ken Poshedly then enlisted me to officially become the Journal editor with him remaining to handle layout and other duties as coordinator of the ALPO Publications Section.

Most importantly, ALPO has introduced me to a group of new colleagues who are dedicated, talented and interested in learning more about the solar system. It was an honor working with John Westfall – and later Beth – on the scanning project. I have come to appreciate and respect all of the section coordinators who regularly turn observer reports into published articles. I greatly enjoy working with other JALPO contributors as well - especially when their articles cover new finds or new approaches to observing. I have been fortunate to get to work with and know Ken, who has been tirelessly editing and formatting the JALPO since 2001. I have learned so much from Ken and it is a privilege to work with him.

The ALPO is a very special organization, and I am grateful to be part of it.

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Lawrence Garrett, ALPO member, Fairfax, Vermont, USA

Since I first began reading the JALPO as a teenager in the 1970's, I knew right away this level of astronomy was for me. It met and exceeded my observing goals, with help from [ALPO] observers second to none.

My current projects are the lunar dome studies, and meteoric lunar impact detection when clouds allow.

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Carl Hergenrother, ALPO executive director; coordinator, ALPO Comets Section, Tuscon, Arizona, USA

I'd like to thank all of the members, contributors, and supporters (I'm looking at you family members) who helped make the ALPO one of astronomy's premier amateur-professional organizations over the past 75 years. The ALPO is in a strong and growing position and I'm certain future members will be celebrating another 75 years during the ALPO's 150th anniversary.

We all have our own stories on our journey to the ALPO and part of my story was published in these pages not

Phil Plante, ALPO member, Youngstown, Ohio, USA

The ALPO has become an integral part of my life experience. Starting off in grade school in the early 1960's, I learned the constellations, changing planet positions and Lunar phases. Using library books, if I could get them, I traced/copied constellations and copied object positions and double star data into a spiral notebook, to make my personal atlas. This saved my mom from making many trips to the library. But I had also learned about Halley's Comet and wondered if I would be alive to see it in 1986. It seemed like a long time away to me, back then. By 1967, my brother and I got a 60mm Tasco refractor for Christmas. I began crude sketching of Mars, Saturn and some deep sky objects. But I needed a bigger scope. But as it always had been, the high cost of books or equipment was an issue. I graduated High School in 1971 and by 1973 I had a full-time job at a new, local factory. (I retired from there after 41 years). By 1975, I had enough money saved to purchase a C-8. The telescope collection started. Reading the magazines, I was reminded of my quest to see Halley. But when at it's brightest, it would be below our horizon, so I booked a trip to Hawaii to see it in April 1986. No one else wanted to go, so I went alone. It was my first flight ever.

Halley was a nice sight, but the trip experience and all the friendly people, caught my interest. By August of that year, I finally joined the local astronomy club (MVAS). For the 1991 solar eclipse my brother and I took a cruise to Mexico for the "Big One" eclipse. Travel would soon become a way of life for me. In 1992, I put together an observing program for the MVAS. In doing research, I contacted all of the amateur organizations for samples of their report forms, so that serious members would be trained in what to observe and report to the organization.

This led me to contacting the ALPO. Harry Jamieson was then the ALPO Secretary. I learned he had been a member of my club in the early 1980's. At his invitation, I joined ALPO and went to the 1993 ALPO conference in Las Cruces. I meet Harry and many other notable ALPO members, including Walter Haas. Turns out he grew up in a town about 20 miles south of me. I am thus inspired by all of the connections between my life's journeys and to many of the members in ALPO, and in the AAVSO and IOTA. Having many members attend the 2003 ALPO convention held here in Boardman, OH seemed to be a fitting tribute for Walter, on his trip back home. I've since traveled to all seven continents to see solar eclipses, several with ALPO colleagues along. And I have traveled to many cities in the USA for ALPO/Astronomical League meetings. All of this has helped make the entire world seem like a neighborhood to me.

The two images here are from the 1993 Las Cruces ALPO meeting. The upper one includes Mike Mattei (on the left) and the late Don Parker, while the bottom image is of the late Harry Jamieson (on the left) and myself.

too long ago in a recent "Point of View" column. It was in 1990 when a teenage me first joined the ALPO. Like many members I discovered the ALPO through other organizations; in my case the pages of *Sky & Telescope* magazine. I still have fond memories of receiving the small format JALPO of that time and pouring over the apparition reports on the planets and comets. While *Sky & Telescope* was great for telling me what could be observed every month, the JALPO allowed me to see what others had observed and compare notes with my own experiences at the eyepiece.

As coordinator of the ALPO Comets Section, I have greatly enjoyed interacting with other observers and sharing in their observations. Involvement in the ALPO and sharing my observations with the membership has only increased my enthusiasm for observing.

Here's to another 75 years!

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Sanjay Limaye, ALPO board member, Madison, Wisconsin, USA

My path to ALPO has been unusual. I first learned observational astronomy through spacecraft cameras, starting with Mariner 10 television images of Venus and then used professional telescopes, starting with the 15-inch Washburn Telescope (Alan Clark) in Madison, Wisconsin.

Although I had used lenses to build a small telescope in middle school, when I found out I needed glasses, it turned out the place to get my spectacles also made their own lenses. Naturally I used my recently learned optical knowledge to build a small telescope to look at the Moon.

Living in New Delhi, India, at that time, the night skies were not great and there were no astronomy groups to join. Years later, when I returned to the University of Wisconsin in Madison after a two-year stint at NASA/GISS in New York where Carl Sagan, Steve Schneider (Climate Scientist) and Therese Encrenaz had preceded me as NRC Resident Research Associate (with Jim Hansen and Robert Jastrow), I found myself working with Voyager Data, since my mentor (Prof. Verner Suomi) was a member of the Imaging Team.

After the Uranus and Neptune encounters (1986 and 1989 respectively), I gave a few talks to the Madison Astronomical Society. During the ALPO meeting in Madison in 1992, some local MAS members brought Don Parker to meet me so that I could show him some of my planetary work with Voyager data.

When the Shoemaker Levy-9 impacts with Jupiter were predicted about a year later, I was keen on observing Jupiter and participating in astronomy gatherings in Chicago (Illinois), Key West (Florida), Ventura (California), Rockford (Illinois), which led to nurturing PRO-AM collaborations culminating in a packed meeting during the Division for Planetary Sciences annual meeting in Madison that I hosted in 1998. At some time, Don suggested that I should join ALPO to look after Jupiter observations and later suggested I join the board. It has been a wonderful experience for me, even after I returned to investigating Venus professionally. I've been lucky to have great ALPO members and learned a lot from them.

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Don Machholz, ALPO member, Wikieup, Arizona, USA

I first heard about ALPO and joined in the 1970s. By then I had been interested in astronomy for about ten years, had acquired a couple of telescopes, and had observed the Sun, Moon, planets and Messier objects. On January 1, 1975, I began a program of visual comet hunting which continues to this day.

Walter Haas was the face of ALPO in my opinion and it was his letters of encouragement that helped me along my own path. He was delighted that I recorded the number and magnitudes of the telescopic meteors I saw while comet hunting. He also asked a couple of times if it would be possible for me to also record the position and direction of each meteor, but I was unable to do that. So far, I have recorded over 14,000 telescopic meteors and I am grateful that Walter Haas encouraged me to continue those counts.

At an astronomy convention in 1988, David Levy who, at that time was the Comets Section Recorder and the Meteors Section Recorder, asked if I would be willing to assume the duties of the ALPO Comets Section Recorder. He said that he would be working on a new project. I agreed to accept the responsibility. I had been writing "Comet Comments" since 1978, a monthly column for astronomy club newsletters and comet enthusiasts, so I had a fairly good idea of what was required for the ALPO membership. By the way, the new project David was talking about was working with the Shoemakers at Mt Palomar.

At that time, the Journal was being published regularly four times a year. My quarterly articles were called "Comet Corner", and each discussed the comets recently discovered and recovered along with ephemerides for the bright comets for the next few months. John Westfall was an excellent editor, providing guidance and encouragement.

This worked well for several years but as we moved through the mid-1990s, two events occurred which changed the trajectory of these articles. First, the Journal started to run a bit behind and was not being published on a regular basis. Articles that I had written giving ephemerides for the next few months had to be rewritten with an extended ephemerides due to delays in publication.

And secondly, by the mid-1990s, the Internet became a growing source of comet information and most "cometeers" were using it rather than the Journal to acquire their comet data, especially the ephemerides.

Scattered throughout those 12 years were special reports I wrote on the apparition of a dozen comets. Each report had the discovery circumstances, the comet's orbit, magnitude estimates from our dedicated ALPO comet observers, a light curve based upon those observations, photographs and sketches.

And these were not the first reports of apparitions of comets to appear in the ALPO Journal. They had been reported before and since by both the ALPO Comet Section Recorders and others popular in the field of observing comets.

One of the most interesting comets that I covered was Periodic Comet de Vico (1846 IV). It appeared in the ALPO Journal, Volume 38, #1, pages 11-18. This research paper was written by me in the spring of 1994 and published that October. This comet had not been seen for 148 years and there was some speculation that it was due back soon.

Comet hunters are keen about lost and overdue periodic comets. The path which "sungrazer" comets take each year is known to many comet hunters, and each August through October they search the morning eastern sky hoping to find a sungrazing comet coming in. And Periodic Comet Swift-Tuttle, responsible for the Perseid meteor shower and with a period of about 130 years, traces a path through the sky that I would occasionally check. It was picked up visually in September 1992 by Japanese comet hunter Tsuruhiko Kiuchi. Later, beginning around the year 2000, I made special efforts to find the lost comet Pons-Gambart, but missed it. However, it was recovered on November 7, 2012, by Rob Matson on SWAN images from the SOHO spacecraft.

But back to Periodic Comet de Vico. It was believed that it has an orbital period of about 75 years so it would have been missed in the early 1920s. I did a thorough study of the comet hunters of that era with the question: why did they miss this comet? I then discussed orbits and predicted return times put forth by seven different individuals. Not appearing in the article is that I talked to a couple of well-versed comet experts, and both said the comet is still many ("at least 5") years away from coming back. Despite that, I pressed on with the article. In the final portion of the article, I printed search ephemerides for finding this comet upon its return. The article was published in the October 1994 issue of the ALPO Journal.

Eleven months pass. On September 18, 1995 I am sweeping the eastern sky from my observatory in Colfax, California with my 5" homemade binoculars and pick up a sixth magnitude comet. I reported it to the Central Bureau for Astronomical Telegrams. It turns out that three Japanese comet hunters had visually picked it up 17 hours prior. *All of us on those mornings were looking for sungrazing comets, not particularly for Comet de Vico.* By the end of that day, and it took a day of computing, the Central Bureau of Astronomical Telegrams reported that this was the return of Periodic Comet de Vico. It is now known as Periodic Comet 122P/de Vico.

As we approached the year 2000, I was finding myself completely fatigued at times and this made it difficult to continue both Comet Comments and my role as Comet Recorder. I later learned that this was due in part to bi-polar symptoms. It took several years before my physiology became more balanced and the symptoms disappeared. Comet expert and author Gary Kronk graciously took over as the ALPO Comet Recorder.

In the ALPO Journal, Volume 35, #4, Pages 145 to 152, there is a history of the first 25 years of the ALPO Comet Section. It is written by Daniel Green, David Meisel and Dennis Milon. In this article, it is noted that the ALPO "Comets Section played an important role during the 1960s and 1970s in that it introduced standardized procedures to improve the quality of data obtained by observers, and that it led to the development of the computerized archive of data begun in the late 1970s under direction of co-author Green at the SAO".

The article credits Comet Recorders Meisel and Milon for "developing observing procedures that enabled the section to collect what is perhaps the world most comprehensive archive of visual and photographic data on comets that were visible during the two decades following the Section's founding in 1957".

Recent ALPO Comet Recorders have extended the number of comet observations available to researchers. They can be found at *http://alpo-astronomy.org/index.htm*

And images of the comets can be found at *http://www.alpo-astronomy.org/gallery3/index.php/Comet-Images-and-Observations*

ALPO has had several comet recorders through the years:

- David Meisel - 1957 to 1964
- Dennis Milon - 1964 to 1984
- David Levy - August 1984 to August 1988
- Don Machholz - August 1988 to November 2000
- Gary Kronk - August 2000 to December 2012
- Ted Stryk - Vol. 47, No. 1 to Vol. 49, No.1; December 2004 to January 2007

- Carl Hergenrother - January 2013 to present

The amazing thing about this list is that four of the Comet Section Recorders (Milon, Levy, Machholz and Hergenrother) have themselves discovered comets.

ALPO has had a successful 75 years, pioneering the way in the collection and analysis of comet data. It is a history rich in the discovery, observation and analysis of comets.

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Dr. Richard J. McKim, member of both the ALPO & the BAA, Upper Benefield, Northamptonshire, England

In response to the announcement of the 75th anniversary of ALPO I send you warm greetings from the UK, and maybe some personal reminiscences of the ALPO Journal and some of the figures associated with its history will be of interest to readers.

I joined the ALPO in 1980 as the Mars Recorder for the BAA (though we refer to such positions as Section Directors) and I write this little note now, four decades on, still occupying that position. Thus, I have cooperated with many of the Mars recorders of the ALPO. I still have handwritten letters from Chick Capen, whom I never met, and we exchanged observations. He was a skilled observer and artist, as well as a great photographer, succeeding in recording fine details on Mars, in comet tails, and of Venus at inferior conjunction nearly as a ring of light. His Mars reports were exciting to read and were a great way to attract observers. Don Parker was his successor, and we did have the pleasure of meeting at a conference in Tucson, Arizona, USA. Thousands of his Mars images must have passed through my hands and many ended up in the pages of our own Journal. Don was perturbed by the massive seasonal hurricane [Andrew] in 1993, which removed the roof from his house in Coral Gables, near Miami, Florida, USA. In the absence of air conditioning, the family were obliged to sleep out of doors and, if I recall correctly, Don kept a revolver under his pillow. His first priority, however, when disaster struck was to make sure all the Mars records were adequately protected!

Another American friend was Tom Cave, whom I stayed with in 1994, and with whom I drove to the Lowell Observatory in Arizona, USA, to do some research and observation. Running out of gasoline in the middle of the desert is an incident fresh in my mind. Another is observing the comet impact scars upon Jupiter with the Clark refractor in the presence of Gene and Carolyn Shoemaker. Tom was once the Venus Recorder for the ALPO, and a stalwart from its early days. He used to attend all the conventions.

I have always liked to see the ALPO Journal because it contained unusual and unexpected items, which could be thought provoking. The modern journal is, if I may say so, a little less interesting to me in comparison because it lacks a lively correspondence, and I hope this can be addressed. Of course any duplicated typescript, as the early issues were, had the lively spontaneity that a beautifully printed modern Journal cannot. For many years, of course, its founder, Walter Haas, held the whole thing together, as well as serving as the first Lunar and Mars Recorder, and his editorial notes were always of great interest. It is clear from these and from the sometimes irregular publication dates that it was nearly a full time job. He also kept up a massive worldwide correspondence and, apart from the odd bit of typescript, everything was handwritten. His early searches for lunar meteors were legendary, and he was incredibly effective in getting transit timings for Jupiter and Saturn.

Not long after the 2004 solar transit of Venus, Walter came to the UK and it was my great pleasure to welcome him to my home for an afternoon. We had already corresponded for over two decades. He was still able to handle the stairs easily as we ascended to my study. We had long conversations about famous observers of the past and I could show him original drawings from our archives by Antoniadi, T. E. R. Phillips, F. J. Hargreaves, as well as his own contributions to our Mars Section from 1939.

Years ago, I was able to read the early numbers of the ALPO Journal at the RAS in London, but in the 1980s they gave them to the British Library. I purchased a long run from Richard Baum dating from his own membership in 1951 and was able to photocopy the first four volumes to complete the set. The original format was a success, slowly adding a page or two of illustrations, then it had a strange and short lived small format with more pictures, at last properly printed, but too small to be a long-term success, and then a sensibly larger size which has remained more or less the same size till today. Like in the BAA, the rise and fall of various groups has been interesting to see. I take the digital version now.

It was a melancholy experience to eventually have to write obituaries in the BAA Journal for Walter, Tom and Don. But I hope I did them justice. It is great that the work of such great observers lives on in the modern organization. I wish the ALPO and its Journal all success in the future and I recommend modern readers to get hold of some of the early issues to appreciate its rich historical tradition.

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Ken Poshedly, coordinator, ALPO Publications Section, Atlanta, GeorgiaA

My journey with the ALPO began not long after my interest in astronomy took hold, around 1959 or 1960 when I was in fourth or fifth grade. It was then that I

watched totally mesmerized as my teacher hand-copied a map of the Moon onto a blackboard (remember those?) using a paper clipping she was holding in her other hand. That chalkboard Moon-map stayed there for possibly a week and I gazed at it over and over before she took it down.

Perhaps a year or two later, I remember my parents taking me to what we now call a "sidewalk astronomy event" in suburban Cleveland, Ohio, where one of the two local astronomy clubs had set up their scopes at a high school parking lot and I viewed Saturn for the first time. Yep, I was bit by the "space bug" and wanted to be a professional astronomer!

In 1962, I remember seeing a listing of additional resources in the back of an astronomy book for children (possibly "The Sky Observer's Guide") that I found at my local public library. One was the ALPO and the other was the AAVSO. I wrote to Walter Haas and, like all the others here have noted, he answered me with a hand-written letter. I somehow scrounged up the measly dues and joined up for a few years, totally amazed by the great drawings by Clark Chapman in *The Strolling Astronomer*. But, alas, math was not my strong suite and I dropped out in 1965 or so because those math equations also in *The Strolling Astronomer* were just too intimidating to me.

I then rediscovered the ALPO 25 years later — in 1990 — after rediscovering astronomy a year earlier; I had given up on a career in astronomy in the mid-1960s for a career in journalism and later, technical writing. I rejoined the ALPO, attended my first conference in 1994 in Greenville, South Carolina, USA, and continued to grow in my knowledge of observational solar system astronomy.

I am proud to have been chosen as editor of the ALPO Journal in 2001 to succeed the late John Westfall and have done my best to keep our flagship publication relevant to both amateurs and professionals. As an aside, I think it's so appropriate that my editorship began in 2001, since the movie *2001: A Space Odyssey* is perhaps my all-time favorite flick. (Boring, yep, but still so cool!)

Surely, there are other kids out there who started in astronomy and in the ALPO just like I did. If so, welcome to you all!

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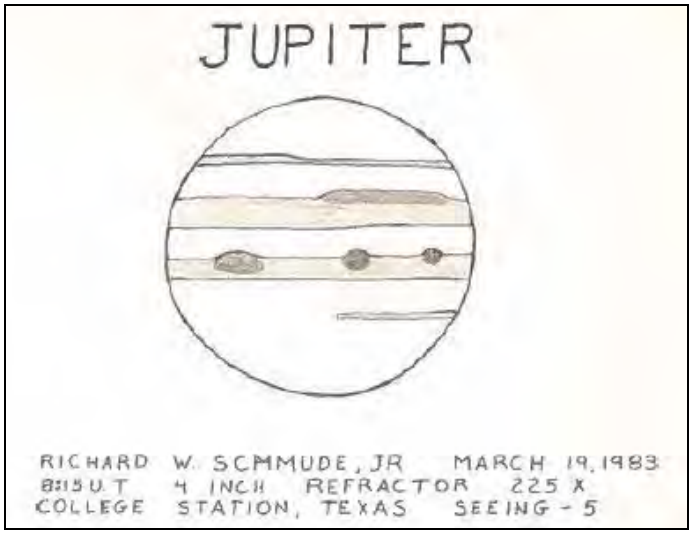
Tim Robertson, board member and coordinator, ALPO Training Program and Online Section, Simi Valley, California, USA

I joined the ALPO in the early 1970's, I was in high school and had been looking through my 60 mm refractor at the Moon and planets for a few years. One day, I was reading through *Sky & Telescope* magazine and they had an article about the ALPO. After reading it, I sent a letter off to Walter Hass to inquire about joining.

A few days later, I received a handwritten letter back from Walter, welcoming me and encouraging me to join the ALPO.

Richard Schmude, board member and coordinator, ALPO Jupiter and Remote Planets sections, Barnesville, Georgia, USA



Back in 1981, I would oftentimes go to the library and read the latest Mars articles in Sky & Telescope and Astronomy magazines. One day I noticed an article that I believe was written by Jeff Beish. In this article, he described recent Mars observations and also gave information on how to join the Association of Lunar & Planetary observers. I then joined shortly afterwards and I received my first issue of The Strolling Astronomer (Volume 29, No. 3-4).

This issue had a hand-drawn image of Saturn on the front cover, which undoubtedly sparked my curiosity to read more. In this issue, I noticed a Mars article written by C. F. Capen and D. C. Parker, along with reports on Comet Bradfield, Comet West and asteroids named after amateur astronomers. This issue showed me what amateur astronomers were doing in the 1970s and undoubtedly influenced me to make my own observations.

About a year later I purchased the parts for a four-inch refractor telescope. With this instrument, I was able to make drawings of Jupiter and Mars. An early Jupiter drawing, made with this telescope, accompanies my ALPO account here. My interest in the planets has continued.

After joining the ALPO, I started in the ALPO Training Program to perfect my observing skills. I spent the next three years making hundreds of observations of various lunar features. The observing skills I learned during that time have made me today a much better visual observer.

One of my early interests in astronomy was comets. At the time, Dennis Milon was the ALPO Comets Section Recorder. During the apparition of Comet Kohoutek-1973F, I made a series of visual observations and magnitude estimates. A few months later, Dennis had the report of Comet Kohoutek in the JALPO, and as I scanned the report, I saw my name in print as a contributing observer. Well, as a teenage kid, using nothing more than a pair of 7x50 binoculars to have his observations used in a scientific report…. I was beside myself. That alone motivated me to stay involved with the ALPO.

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David Teske, coordinator, Lunar Topographical Studies Program (ALPO Lunar Section), Louisville, Mississippi, USA

I have been a member of ALPO since 1994. It was at that time that I acquired a 3-inch Unitron refractor telescope and did more solar system observing. But the journey to the ALPO was longer. I have always been interested in solar and lunar observations. Starting in 1979, I began daily solar observations and solar drawings that continue to this day. As I write this, I have made more than 9,400 such observations!

Over the years, the telescopes have changed, but the technique has been much the same. In the past few years, I have added imaging of the Sun — particularly hydrogen alpha imaging — to my routine. I find the Sun so interesting, as it is constantly changing and presenting a wealth of information. At the same time as this daytime affliction with the Sun, I have been interested in lunar observations. This includes many years of observing, getting acquainted with lunar features, and now, lunar imaging. In 2019, I became the coordinator of the ALPO Lunar Topographical Studies Program under the organization's Lunar Section. It has been a tremendous honor to be entrusted with such a position. It has been a pleasure to interact with lunar observers from around the world and to put together the monthly newsletter, *The Lunar Observer*.

Congratulations to the ALPO on your first 75 years! I look forward to the wonders that the next 75 years bring!

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Peter Tyson, editor-in-chief, "Sky & Telescope" magazine, Cambridge, Massachusetts, USA

All of us at *Sky & Telescope* wish the ALPO and all its members the very best on its 75th anniversary. Over the decades, we've taken this journey of promoting amateur astronomy together, and may it ever be so. We cherish our long-running association with the ALPO. As Dennis di Cicco notes, "Our coverage of favorable planetary oppositions wouldn't have been the same without great material supplied by ALPO members. From the days of yore, people like Tom Cave and Don Parker, not to mention Tom Dobbins and Chuck Wood these days, have been and are keeping our readers entertained and informed about the Moon and planets."

Roger Sinnott stresses how valuable a resource the ALPO Journal has been for S&T, and in very specific ways. "For example," he notes, "as *The Strolling Astronomer* in the early 1950s, it was the first magazine this side of the Atlantic to report the work of German opticians on neo-brachyt (Schiefspiegler) telescopes for exquisite imaging of the Moon and planets. Enthusiasm for these tilted-component designs soon caught on with our own telescope-making readers." Roger also mentions how S&T has made good use of the Journal's reports of lunar transient phenomena and how he and S&T editor-in-chief Joseph Ashbrook mined its pages for crater timings to add to their huge database and to help in studying the size of the Earth's shadow at lunar eclipses.

So, congratulations on your diamond anniversary, and here's to keeping our relationship just as tight for the next 75 years!

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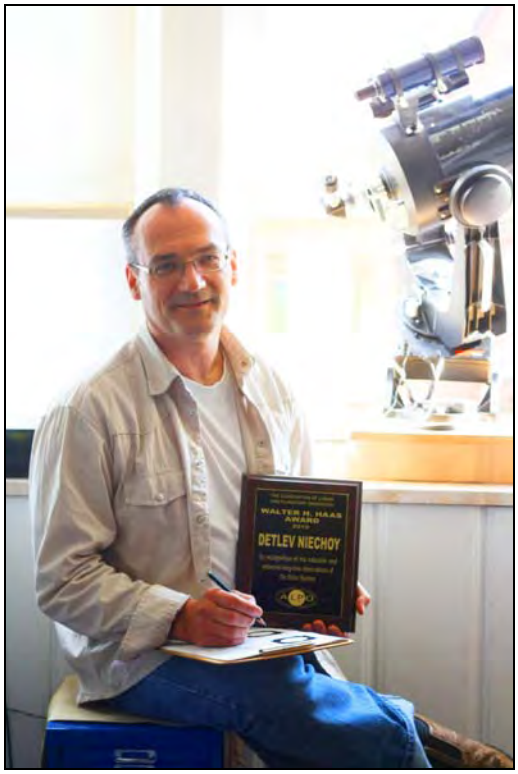
Matthew L. Will, ALPO board member and Secretary and Treasurer, Springfield, Illinois, USA

I had become acquainted with the ALPO through my brother Chris' membership in the mid to late 1960s. Having been a member myself since 1973, I have seen the ALPO change and grow through different eras of observational study, volunteer staff, and methods of communication. The personal attention to detail and wonderment of solar system astronomy through the Journal and in personal correspondence with ALPO staff has been what has kept me an ALPO member all these years, through these different eras. Indeed, it has been the reason for my deeper involvement with the ALPO today, to preserve these values and build a stronger organization. I would encourage members of the next generation to get more involved with YOUR ALPO, whether at the membership and observer level, volunteer staff level, or beyond. This is truly a great organization with wonderfully dedicated individuals, that can continue to make Solar System astronomy relevant in the present and evermore dynamic in amateur circles, for future generations.

Detlev Niechoy, ALPO member & recipient of the 2010 Walter H.Haas Observer Award, Göttigen, Germany



I became interested in astronomy back in 1972 when I read the book *Living Astronomy.* Because of my newfound fascination with celestial bodies, I began to observe the sky with binoculars in order to be able to recognize the constellations. Six years later I got my first telescope, which improved my observing capabilities. This enabled me to study more closely the "course of life of sunspots", the changing bands and zones of the planets Jupiter and Saturn, the albedo structure of Mars or the changes of Venus.

During the first visit of a planetary meeting of the "Vereinigung der Sternfreunde e.V.", I met the groups "Sun" and "Planets". The exchange with other amateur astronomers directed my interest to the large planets and the terrestrial planets. Then in 1985, I got hold of an ALPO journal for the first time. The reports and evaluations in the ALPO journal about the planets aroused in me the enthusiasm for the visual drawing observation of these planets and influenced my cooperation in the specialized group "planets".

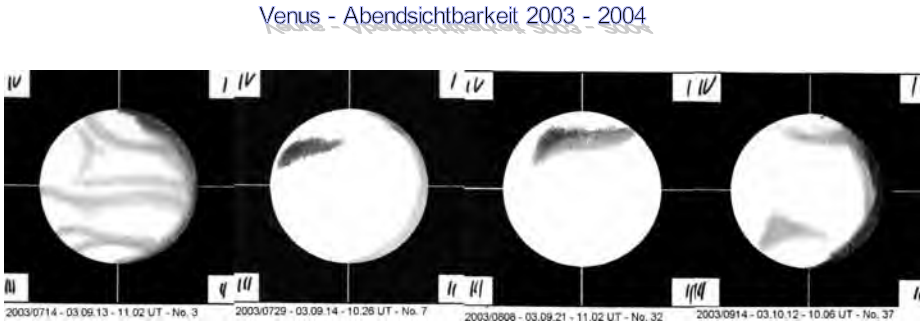
Distracted by the many planets, it took me some time to realize that the planet Venus had the greatest fascination for me, and this was fueled by the ALPO reporting. I became interested in the history, old observations, expeditions and reports of the planets Saturn and Venus.

I tried to understand how different observers perceived the planets and recorded their observations. During my research I discovered Johann Hieronymus Schröter (JHS), who got to know with astronomy in the years 1764-1767 in my hometown, Göttigen, and then continued his research in Lilienthal and recorded it for posterity.

The newly gained knowledge about Venus caused me to take a closer look at the existing observations and I concluded that hardly any series of observations were available which were performed by one observer on the same type of telescope with different magnifications and filters.
To change this condition, I dedicated myself to the visual drawing observation under almost similar conditions as JHS, predominantly drawing observation, until today.

I have been inspired by ALPO and many other amateur astronomers I met during my work with Venus.

The top image is of me with my ALPO 2010 award and the bottom image is page 1 of 14 from my paper where I described faint features (raised in contrast) that can be perceived on the planet Venus.



Venus- Abendsichtbarkeit 2003 - 2004

Abendsichtbarkeit bedeutet, dass der Planet nach der Sonne im Westen untergeht.

Der Planet steht also östlich der Sonne.

Eine Abendsichtbarkeit beginnr mit der oberen Konjunktion, das heißt die Planeten Erde und Venus stehen sich in der Konstellation Erde - Sonne - Venus gegenüber. Der Planet Venus seht sozusagen hinter der Sonne und hat einen kleinen Scheichendurchmesser.

Die Daten den Abbildungen:

Nr. 2003/0714, 13.09.2003, 11.02 UT(UT = Universal Time = Weltzeit), Nr. 3, Seeing (Luftruhe) = 2-3, Transparency(Durchsicht) = 2-3, Vergrößerung = 225x, Himmel = grau; die Schatten sind kontrastverstärkt.

2003/0729, 14.09.2003, 10.26 UT, S = 2, T = 2, 51x, Himmel = grau - weißgrau (leichter Dunst)

2003/0808, 21.09.2003, 11.02 UT, S = 2, T = 2, 51x, Himmel = weiß (Dunst)

2003/0914, 12.10.2003, 10.08 UT, S = 2, T = 2, 51x, Himmel = graublau

Bild links: Aufnahme mit Webcam Typ Viewquest M318, 14.09.2003, 11.36 UT, Okularprojektion, Celeston 8 (C(), Zenitprisma, 3xBarlowlinse, Infrarotfilter(IR), Vergrößerung = 677x.

Analemma Society

P.O. Box 196
Great Falls, VA
22066

11 January 2022

Shawn Dilles
sjdilles@gmail.com
Editor,
Journal of the Assn. of Lunar and Planetary Observers

Dear Shawn:

The Analemma Society congratulates the Association of Lunar and Planetary Observers on the commemoration of its 75th Anniversary. We see you as allies in our quest to teach the public science through Astronomy. We have found the moon and planets to be one of largest draws, and over the years some of the youngsters who have been exposed to our volunteer led programs have gone on to become astronomers themselves, both professional and amateur. We look forward to the next 75 years.

Regards,

Charles H Olin
Founding President
Analemma Society

The American Meteor Society, Ltd.
Geneseo, New York

Congratulations to the Association of Lunar and Planetary Observers on their 75th Anniversary

It is with great pleasure that we as staff members of the American Meteor Society who are also presently (Robert) or were past staff members (David) of the ALPO, relay our heartiest joint greetings on the occasion of the organization's 75 years of providing a most unique world-wide venue for hosting projects involving both amateur and professional observers of solar system objects. Not many years ago, the AMS and the AASVO celebrated our shared centennial and so we in the AMS hope that in 2047 your younger members will be around to celebrate 100 years of innovation and leadership in observational planetary astronomy.

Some 64 years ago, David started the ALPO Comets Section for which he was awarded the ALPO Award in 1960. After attending a number of joint WAA and ALPO conventions in the late 1950's and early 1960's and enjoying collaboration with Walter Haas and many of the earliest ALPO members he got his Ph.D. in astronomy from Ohio State University in 1967. In 1970, upon becoming an assistant professor (now Distinguished Professor Emeritus) at the State University of New York - Geneseo, he also became director of the American Meteor Society, a post he still holds after formal retirement.

Sincerely,

David D. Meisel

Executive Director of the American Meteor Society

Robert joined both the AMS and ALPO in the early 1980's. Later in that decade he replaced David H. Levy when he vacated the position of ALPO Meteors Section Coordinator. He has been running this section ever since. I was very happy to find a group that focused on solar system objects as it has been a prime interest in my life. Through my work with both ALPO and the AMS, I have been able to make it easier for ALPO members to become more involved in viewing meteor activity. My membership in ALPO the last 40 years has helped me keep on top of solar system phenomena and has provided many lasting friendships and comradery throughout the years.

Robert D. Lunsford
Fireball Program Coordinator
American Meteor Society

75 Years of the ALPO
ALPO Members With Asteroids

By Frederick Pilcher (*fpilcher35@gmail.com*) and Richard (Rik) Hill (*rhill@arizona.edu)*

On the occasion of the 75th anniversary of the founding of the Association of Lunar & Planetary Observers, we honor the many members whose contributions to astronomy have been so meritorious that asteroids have been named for them. The following list of citations has been obtained from the website of the Minor Planet Center, https://minorplanetcenter.net//iau/MPEph/MPEph.html

Note that some of the citations were written many years ago for people who have subsequently made significant contributions to astronomy and the ALPO. We have added their more recent contributions with brackets. The specific Minor Planet Circular (MPC) which announced the honorary designation is provided in parentheses.

Editor's Note: This is one of several articles that highlight the contributions of ALPO members over the decades. It is an incomplete list of asteroids named for ALPO observers. The list cites only one asteroid for each observer even though some are honored with several names. If any ALPO members have been omitted please send a note to the editor.

(1575) Winifred = 1950 HH (MPC 844)

This planet is named in honor of Miss Winifred Sawtelle, a staff member of the U.S. Naval Observatory, at the request of Mr. R. C. Cameron, whose discovery and observations of this planet in 1950 led to its being numbered.

(1990) Pilcher = 1956 EE (MPC683)

Named in honor of Frederick Pilcher, associate professor of physics at Illinois College, Jacksonville, who has done much to promote interest in minor planets among amateur astronomers. He has himself made visual observations of almost 1100 different minor planets, an all-time record [since superseded]. Name proposed by J. U. Gunter and J. Meeus, endorsed by C. M. Bardwell and B. G. Marsden. [Invited by Richard Hodgson at the founding of the Minor Planets Section to become a charter member, he has served as its Coordinator since 1982 and has been a prolific observer of asteroid rotational lightcurves since 2007.]

(2929) Harris = 1982 BK1 (MPC 8406)

Named in honor of Alan W. Harris, planetary scientist at the Jet Propulsion Laboratory, whose research has included studies of the origin of the solar system and the dynamics of planetary satellites and ring systems. In recent years he has become the most prolific observer of minor-planet rotational lightcurves. [Currently he serves as Scientific Advisor to the Minor Planets Section of the ALPO.]

(3099) Hergenrother = 1940 GF (MPC 27124)

Named in honor of Carl William Hergenrother (b. 1973) of the Bigelow Sky Survey. This photographic survey has been very successful in discovering new high-inclination minor planets. Name proposed by B. G. Marsden, G. V. Williams and S. M. Larson.

(3673) Levy = 1985 QS (MPC 12974)

Named in honor of David H. Levy, comet discoverer and observer, recognized for his perseverance in observing comets using both the oldest visual and the newest electronic techniques. Author of several books and articles, he is known for his biographies of astronomers. As an educator Levy has concentrated on bringing observational astronomy to both amateur astronomers and to children, and he has initiated school and camp programs for this purpose. Citation prepared by S. J. Edberg at the request of the discoverer.

(3685) Derdenye = 1981 EH14 (MPC 27125)

Named in honor of Derald and Denise Nye, dedicated amateur astronomers and observatory builders in Tucson. For the past thirteen years, Derald, with the assistance of Denise, has served as distributor for the Minor Planet Bulletin, the publication of the Minor Planets Section of the Association for Lunar and Planetary Observers. Through this work they have served as a contact point for hundreds of amateur astronomers around the world seeking to contribute to minor planet research. Name suggested and citation prepared by R. P. Binzel.

(3853) Haas = 1981 WG1 (MPC 14633)

Named in honor of Walter H. Haas of Las Cruces, New Mexico, founder and director, from 1947 until 1985, of the Association of Lunar and Planetary Observers. His leadership resulted in the evolution of A.L.P.O. into a respected organization dedicated to observing solar-system objects. Through the example set by his meticulous observations and his correspondence with members around the world he is responsible for launching the careers of many solar-system students. Name suggested and citation provided by D. Levy.

(4790) Petrpravec = 1988 PP (MPC 30095)

Named in honor of Petr Pravec (b. 1967), an astronomer at the Ondrejov Observatory well known for both

astrometric and photometric work on minor planets and comets. He specializes in near-earth objects and has often been the first person to observe objects found in the course of the discoverer's NEAT program following their tentative announcement in the Minor Planet Center's "NEO Confirmation Page". In his Ph.D. dissertation Pravec pointed out that the lightcurve of 1994 AW1, an NEO found by the discoverer, strongly suggests that the object is binary. This minor planet is being named on the occasion of the marriage of Petr Pravec and Katerina Machacova, 1997 June 21. [Currently he serves as Scientific Advisor to the Minor Planets Section of the ALPO.]

(5392) Parker = 1986 AK (MPC 23138)

This Mars-crossing Phocaea is named in honor of the American amateur astronomer Don Parker, who specializes in high-resolution photography and CCD imaging of Mars and Jupiter. Through his precise imaging, new features have been recognized on Mars. His investigations of planetary atmospheres have improved the understanding of weather phenomena there. Name proposed and citation written by P. L. Dombrowski, endorsed by D. H. Levy.

The following citation is from the IAU WGSBN Bulletin 1, #3, 7

(6651) Rogervenable = 1990 HL4 = 1991 RV9

Roger Venable (b. 1950) is a physician specializing in primary care and emergency medicine. He is Coordinator of Mars Section of Association of Lunar and Planetary Observers, and Vice President of International Occultation Timing Association. Roger has published articles on the atmosphere of Mars.

(8377) Elmerreese = 1992 SD1 (MPC 39651)

Elmer J. Reese (b. 1919), American amateur astronomer, was an important contributing observer in the early years of the Association of Lunar and Planetary Observers, serving on its volunteer staff. His hypothesis of subsurface sources to explain the South Equatorial belt disturbances at the cloud deck on Jupiter is well known.

(8734) Warner = 1997 AA (MPC 34348)

Named in honor of Brian D. Warner (b. 1952). For more than eight years he has published the Minor Planet Observer, a monthly newsletter with minor-planet finder charts and other news of interest to minor planet observers. In recent years he has taken up CCD imaging and contributed hundreds of astrometric observations. [He has written the programs MPO Connections for telescope/CCD operation and MPO Canopus for measuring and analyzing asteroid lightcurves, has since 2000 been a prolific observer of asteroid rotational lightcurves, and graciously offers assistance to many asteroid lightcurve observers.]

(11696) Capen = 1998 FD74 = 1985 GG1 = 1988 BS1 (MPC 41938)

Charles ("Chick") Franklin Capen (1926-1986) was best known for his observations of the planets, particularly Mars. He worked at the Lowell Observatory for many years as an observer and tour guide.

(17219) Gianninoto = 2000 CV (MPC 95804)

Joe Gianninoto (b. 1947) is an avid amateur astronomer originally from New York, now living in Tucson, Arizona. He specializes in white light and H-alpha solar observing with the Association of Lunar and Planetary Observers.

(21065) Jamesmelka = 1991 NM (MPC 84673)

James Melka (b. 1942) is an amateur astronomer who has observed and imaged Mars during nine apparitions from 1971 through 2012. He recorded the initial clouds of the 1971 and 2007 planet-wide dust storms and used Mars Global Surveyor images to identify three craters containing massive black sand dunes.

(28475) Garrett = 2000 CU (MPC 108697)

Lawrence Garrett (b. 1959) has been the Assistant Coordinator for the Minor Planets Section of the Association of Lunar and Planetary Observers since 1999. He also has several asteroid discoveries to his credit.

(28519) Sweetman = 2000 DP15 (MPC 110133)

Michael Sweetman (b. 1952) has been an amateur astronomer since the early 1960s, becoming an accomplished artist with his lunar and planetary observations. In recent years he has also been engaged in high-quality imaging of the moon.

(28601) Benton = 2000 EK147 (MPC 98711)

Julius Benton (b. 1949) has been a key member of the Association of Lunar and Planetary Observers (ALPO) serving as Saturn & Venus Coordinators since 1971. He has been an ALPO Board member since 1996 serving twice as Executive Director, twice as Associate Director and received the Peggy Haas Service Award in 2011.

(28602) Westfall = 2000 EL147 (MPC 98711)

John Westfall (b. 1938) is Professor Emeritus at San Francisco State University and the former Executive Director of the Association of Lunar & Planetary Observers (1985 - 1995), as well as a recipient of the ALPO Walter Haas Observing Award in 1988 and the ALPO Peggy Haas Service Award in 1998.

(28603) Jenkins = 2000 EW148 (MPC 98711)

Jamey Jenkins (b. 1955) is an American amateur astronomer who served as Assistant Coordinator-Archivist for the Association of Lunar and Planetary Observers from 2003 to 2014 and is author of The Sun and How to Observe It.

(29701) Peggyhaas = 1998 TY6 (MPC 118219)

Peggy Haas (nee Beryl Godfrey) (1912-1997) was an assistant to William H. Pickering in Jamaica. There she met and later married Walter Haas who in 1947, started the Association of Lunar and Planetary Observers (ALPO). She was indispensable to the ALPO in work on the Journal, as librarian from 1966 to 1985.

(30042) Schmude = 2000 EY3 (MPC 98711)

Richard Schmude (b. 1958) is Professor of Astronomy at Gordon State College. He has served as Coordinator for five observing Sections in the Association of Lunar and Planetary Observers (ALPO), as Executive Director and Associate Director. He has also received the ALPO Walter Haas and the Peggy Haas awards.

(30068) Frankmelillo = 2000 EZ70 (MPC 100314)

Frank Melillo (b. 1958) has been the Coordinator for the Mercury Section of the Association of Lunar and Planetary Observers (ALPO) since 2001. Also in that year he received the ALPO Walter Haas Observing Award.

(30100) Christophergo = 2000 EL157 (MPC 91791)

Christopher Go (b. 1970) is a Philippine astrophotographer who has taken superb images of the moon and planets since 1990. His detailed images of eclipses of the Galilean moons of Jupiter attest to the excellent quality of his work with a 0.28-m telescope. In 2006 he discovered the "Red Spot Jr." on Jupiter.

(31836) Poshedly = 2000 BU34 (MPC 111798)

Kenneth T. Poshedly (b. 1949) is the tireless Publisher and Editor-in-Chief of the Journal of the Association of Lunar and Planetary Observers. In 2010, he won the Peggy Haas Service Award for his work with that organization.

(31844) Mattwill = 2000 DQ15 (MPC 109631)

Matthew L. Will (b. 1957) is an amateur astronomer and long time Secretary and Treasurer of the Association of the Lunar and Planetary Observers. In 2003 he was presented with the Peggy Haas Service Award for his work with that organization.

(31848) Mikemattei = 2000 EM21 = 1990 SJ25 (MPC 106501)

Michael Mattei (b. 1940) worked at Harvard College Observatory Agassiz Station as a young man moving to optics with various institutions and companies culminating in his work with M.I.T. Lincoln Labs working on projects from microscope optics to space telescopes.

(31862) Garfinkle = 2000 EY70 (MPC 110133)

Robert A. Garfinkle (b. 1947) is a Fellow of the Royal Astronomical Society and author of best-selling observational astronomy books and many articles. He is also the British Astronomical Association Lunar Section Historian and the Association of Lunar and Planetary Observers Book Review Editor [and author of the definitive three volume "Luna Cognita"].

(38540) Stevens = 1999 VG2 (MPC 53471)

Berton L. Stevens (b. 1951) is an amateur astronomer at the Desert Moon Observatory. Las Cruces, New Mexico. His dedicated work in follow-up and confirmation astrometry of comets and NEAs has made Desert Moon an amateur observatory of significance; his efforts and contribution are commendable.

(44473) Randytatum = 1998 WB (MPC 106502)

Randy Tatum (b. 1956) is an avid observer with the Association of Lunar and Planetary Observers (ALPO) and has served as Assistant Coordinator for the Jupiter and Solar Sections of the ALPO as well as full Solar Coordinator from 1993-96. He is the 2016 recipient of the ALPO Haas Award for his prolific and expert observing.

The following citation is from the IAU WSGN Bulletin, Volume 1, #1

(45699) Maryalba = 2000 EO199

Mary Alba (b. 1957) is the daughter of Walter and Peggy Haas, founders of the Association of Lunar and Planetary Observers (ALPO). On her own she has been a strong supporter of the organization, encouraging observers and taking her displays of ALPO history to national astronomical meetings.

The following citation is from the IAU WSGN Bulletin, Volume 1, #1

(47707) Jamieson = 2000 DB15

Harry D. Jamieson (b. 1945) was one of the leading lights of the Association of Lunar and Planetary Observers in the 1960ñ2000 period, alternately serving as a Lunar Recorder, Board Member, Membership Secretary and then Director (1998ñ2000). During this time he organized their Lunar Dome program.

(47843) Maxson = 2000 EC123 (MPC 114954)

Paul Maxson (b. 1951) served as Association of Lunar and Planetary Observers (ALPO) Solar Section Assistant Coordinator and later Coordinator in the 1980s and 1990s. In 2014 he received the Walter Haas Observer's Award from the ALPO for his high quality solar and planetary astrophotography.

(47851) Budine = 2000 EW139 (MPC 118220)

Phillip Budine (b. 1937) has been an avid lunar and planetary observer for decades. He has served in the Association of Lunar and Planetary Observers (ALPO), including being Recorder for the Jupiter Section. In 1992 he received the ALPO's Walter Haas Observer's Award for his years of excellent observational work.

(48300) Kronk = 2002 LG35 (MPC 50465)

Gary W. Kronk (b. 1956) is an amateur astronomer, programer-analyst and writer who was so inspired by comet C/1973 E1 (Kohoutek) as a teenager that he began a quest to catalogue every comet recorded in human history. Volume One (Ancient Comets to 1799) of his four-part Cometography was published in 1999.

(50718) Timrobertson = 2000 ED139 (MPC 111800)

Tim Robertson (b. 1956) is a Quality Engineer at NASA's Goddard Space Flight Center, with the GOES and JPSS weather satellite programs. On staff with the Association of Lunar and Planetary Observers (ALPO), he is Coordinator for the ALPO Training Program as well as Producer of the "Observer's Notebook" podcasts.

(50721) Waynebailey = 2000 EU141 (MPC 114954)

Wayne Bailey (b. 1942) worked in the aerospace industry supporting the Space Shuttle Spacelab program. He became the Association of Lunar and Planetary Observers (ALPO) Lunar Coordinator in 2008 and in 2017 was the recipient of the ALPO Peggy Haas Service Award.

(55561) Madenberg = 2002 AF9

Janet A. Stevens (nee Madenberg, b. 1950) is an amateur astronomer who started a loaner telescope program in 1984 to introduce novices to telescopic observing. She co-edited Northern Lights from 1990 to 1998 and was executive secretary of the Astronomical League from 1995 to 2001.

(71615) Ramakers = 2000 EM20 (MPC 118220)

Theo Ramakers (b. 1943) is Assistant Coordinator for the Association of Lunar and Planetary Observers (ALPO) Solar Section. He has been instrumental in organizing the large database of tens of thousands of images and observations from amateur astronomers around the world, making them available on the ALPO website.

The following citation is from the IAU WSGN Bulletin, Volume 1, #1

(75972) Huddleston = 2000 CM112

Marvin Huddleston (b. 1955) is an amateur astronomer living in Mesquite, Texas. He is a member of the Association of Lunar and Planetary Observers, Royal Astronomical Society of London, and a storm spotter with the meteorological group "Texas CoCoRaHS."

(95928) Tonycook = 2003 JO13 (MPC 100316)

Tony Cook (b. 1962) is the British Astronomical Association and Association of Lunar and Planetary Observers Coordinator for Transient Lunar Phenomena. He also worked on the Mariner 10 imagery and the Clementine digital topographic map that was used during the planning of the impact of ESA's SMART-1.

(95982) Beish = 2004 MH6 (MPC 101206)

Jeff Beish (b. 1940) has been an avid amateur astronomer since the 1970s, serving in the Mars Section of the Association of Lunar and Planetary Observers (ALPO) from 1981 - 2005. He maintains the WIMP planetary ephemerides software and an excellent Mars website. In 1989 he received the ALPO Walter Haas observing award.

(118945) Rikhill = 2000 WS68 (MPC 58597)

"Amateur turned Pro" best describes Rik Hill (b. 1949). Well-known among amateur astronomers for his outreach activities, Rik currently works with the Catalina Sky Survey on Arizona's Mt. Lemmon searching for potentially hazardous asteroids. He has seven comet discoveries to his credit.

(164215) Doloreshill = 2004 MF6 (MPC 61270)

Dolores H. Hill (b. 1956) is a meteoriticist with the University of Arizona's Lunar and Planetary Laboratory, where she has, since 1981, classified meteorites using microprobe analysis, neutron activation methods and inductively coupled plasma mass spectrometry.

The following citation is from the Minor Planet Center Database: (*https://minorplanetcenter.net/db_search/show_object?utf8=?&object_id=Danjoyce*)

(203602) Danjoyce = 2002 ED

Daniel P. Joyce (b. 1948) is a precision mirror maker and astronomy enthusiast, who is always willing to share his vast knowledge of the night sky with the public. He has been president of the Chicago Astronomical Society seven times.

(205698) Troiani = 2002 AO3 (MPC 70410)

Daniel M. Troiani (b. 1952) is an avid amateur astronomer dedicated to planetary observing, especially of Mars, on which he rediscovered the Rima Tenuis in 1979. He has contributed greatly to the Mars Section of the Association of Lunar and Planetary Observers and has made 15,000 observations for the AAVSO.

(298877) Michaelreynolds = 2004 SY26 (MPC 80329)

Michael D. Reynolds (b. 1954) has spent many years inspiring students in astronomy in his role as Dean of mathematics and sciences and professor of astronomy at Florida State College in Jacksonville, Florida. He was director of the Chabot Science Center in California from 1991 to 2002

75 Years of the ALPO
Books Authored by ALPO Members

By Shawn Dilles, editor, *The Strolling Astronomer* (shawn.dilles@alpo-astronomy.org)

On this 75th anniversary of the ALPO, we believe it is fitting to reflect on some of the many books authored by ALPO members over the years. The list below is a sampling of titles that touch on Solar System observing or that may be of general interest to ALPO members. This list is not intended to be a comprehensive bibliography. Please contact this editor with any titles of books by ALPO authors you believe should have been included.

Ashbrook, Joseph (1984). *The Astronomical Scrapbook: Skywatchers, Pioneers, and Seekers in Astronomy*.

Baum, Richard (2007). *The Haunted Observatory: Curiosities from the Astronomer's Cabinet.*

Baum, Richard P. and Sheehan, William (1997). *In Search of Planet Vulcan: The Ghost in Newton's Clockwork Universe.*

Benton, Julius (2007). *Saturn and How to Observe It.*

Broxton, Tony (2010). *Solar Observer's Handbook*.

Cooke, Anthony (2003). *Visual Astronomy in the Suburbs.*

Cooke, Anthony (2005). *Visual Astronomy Under Dark Skies.*

Cooke, Anthony (2009). *Make Time for the Stars: Fitting Astronomy into Your Busy Life.*

Cruikshank, Dale P. (1995). *Neptune and Triton.*

Cruikshank, Dale P. and Sheehan, William (2018). *Discovering Pluto: Exploration at the Edge of the Solar System.*

Cudnik, Brian (2009). *Lunar Meteoroid Impacts and How to Observe Them.*

Cudnik, Brian (2012). *Faint Objects and How to Observe Them.*

Dobins, Thomas A.; Parker, Donald C.; and Capen, Charles F. (1988). *Introduction to Observing and Photographing the Solar System.*

Garfinkle, Robert A. (1994). *Star Hopping: Your Visa to the Universe.*

Garfinkle, Robert A. (2020). *Lunar Cognita.*

Jenkins, Jamey L. (2009). *The Sun and How to Observe It.*

Jenkins, Jamey L. (2013). *Observing the Sun: A Pocket Field Guide.*

David H. Levy (2003). *Guide to Observing and Discovering Comets.*

David H. Levy (2007). *Guide to Meteor Showers.*

David H. Levy (2010). *Guide to Transits, Eclipses and Occultations.*

Lunsford, R. (2009). *Meteors and How to Observe Them.*

McAnally, John W. (2007). *Jupiter and How to Observe It.*

Rix, Erica; Hay, Kim; Russell, Sally; Handy, Richard (2015). *Solar Sketching: A Comprehensive Guide to Drawing the Sun.*

Rukl, Antonin (2007). *Atlas of the Moon: Revised, Updated Edition.*

Schmude, Richard (2009). *Uranus, Neptune, and Pluto and How to Observe Them*.

Schmude, Richard (2010). *Comets and How to Observe Them*.

Schmude, Richard (2012). *Artificial Satellites and How to Observe Them*.

Sheehan, William (1988). *Planets and Perception: Telescopic Views and Interpretations, 1609 -1909*.

Sheehan, William P. and Dobbins, Thomas (2001). *Epic Moon: A History of Lunar Exploration in the Age of the Telescope.*

Sheehan, William and Westfall, John (2004). *The Transits of Venus*.

Westfall, John (2000). *Atlas of the Lunar Terminator*.

Westfall, John and Sheehan, William (2015). *Celestial Shadows: Eclipses, Transits, and Occultations*.

Wilkins, Hugh Percy (2019). *Map of the Moon*.

Wood, Charles A. (2012). *Atlas of the Moon*.

75 Years of the ALPO
A Look Back at The Strolling Astronomer

By Carl Hergenrother, coordinator, ALPO Comets Section, carl.hergenrother@alpo-astronomy.org

As part of our celebration of this 75th anniversary of the founding of the Assn of Lunar & Planetary Observers, we present here what was new back then for you, our readers, to compare with how far amateur astronomy has progressed.

Be sure to also see the reprint of "The Strolling Astronomer" issue No. 1 later in this Journal.

75 Years Ago

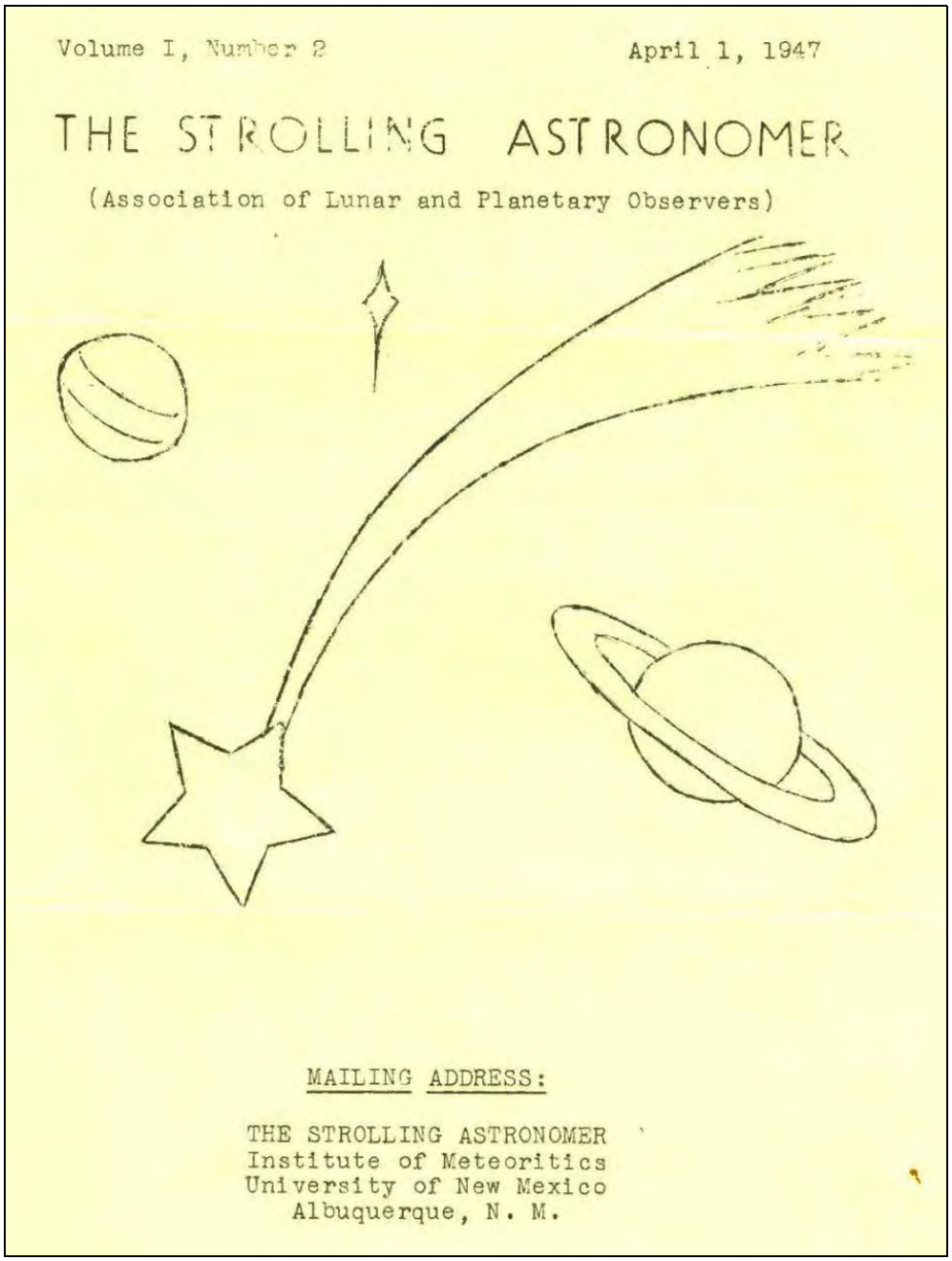
From its founding through 1953, *The Strolling Astronomer* was published monthly with the second issue dated April 1, 1947.

Only a month after the publication of that first issue, the membership of the ALPO reached 21.

In an article titled "Valuable Contributions to Astronomy by Owners of Small Telescopes", contributor Frank R. Vaughn pondered about the "many telescopes of amateur-size lying idle in garages, basements, storerooms, and attics…"

One of reasons given for so many idle telescopes is one still heard today, that is, that "amateur-sized" telescopes are too small or are incapable of contributing to science – especially compared to giant professional observatories and advanced observing techniques.

The subsequent history of the ALPO showed that "amateurs" equipped with "modest" telescopes are more than capable of making cutting-edge planetary observations.



Volume I, Number 2 April 1, 1947

THE STROLLING ASTRONOMER

(Association of Lunar and Planetary Observers)

MAILING ADDRESS:

THE STROLLING ASTRONOMER
Institute of Meteoritics
University of New Mexico
Albuquerque, N. M.

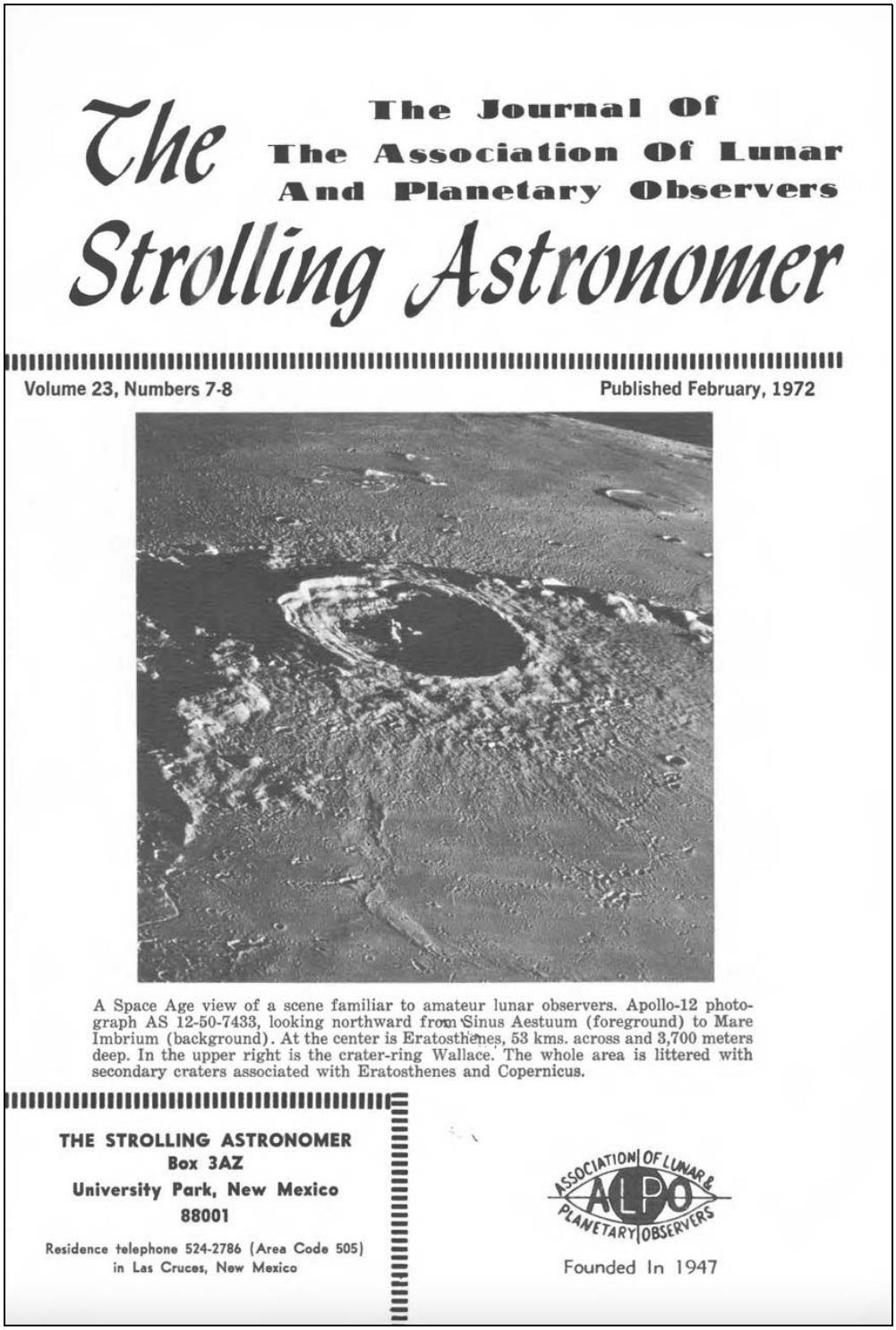
50 Years Ago

The February 1972 issue of *The Strolling Astronomer* (JALPO23:7-8) contained a call by then Lunar Recorder John E. Westfall for the creation of a new project to map regions of the Moon poorly or not observed by the Apollo program and other missions in support of Apollo. In "Luna Incognita: The Last Frontier", John argued that the imaging produced by the Lunar Orbiter spacecraft and the Apollo astronauts had not made earthbound lunar observations obsolete. Though only 0.7 percent of the lunar surface lacked space-based imagery, this area still covered 270,000 square kilometers near the lunar south pole, an area comparable in size to the state of Colorado.

The Luna Incognito Project proved highly active and successful with 18 additional reports published in the JALPO. The final report published in 1990 (JALPO34:4) presented the results of 384 drawings and 1,509 photographs contributed by 58 observers as well as observatory photographs from the ALPO collection. The data allowed the production of 1:2,500,000 scale maps of the south polar region.

Ten previously unknown or poorly known craters were mapped and named, including two commemorating the polar explorers Nobile and Shackleton. Fast-forward to the present and these two craters are now considered prime real estate for future human lunar habitats. Being located near the lunar south pole, portions of each crater's floor are permanently shadowed and may contain a significant amount of water ice. The western edge of Nobile crater is the destination of NASA's "Volatiles Investigating Polar Exploration Rover" (VIPER) scheduled to launch in late 2023. The mission will prospect for water ice and other resources in both regions of constant shadow and constant sunlight.

The 1971 ALPO Convention and Business Meeting met in Memphis, Tennessee on 1971 August 19. At the time of the meeting, the number of members totaled about 820.



The Journal Of The Association Of Lunar And Planetary Observers

The Strolling Astronomer

Volume 23, Numbers 7-8 Published February, 1972

A Space Age view of a scene familiar to amateur lunar observers. Apollo-12 photograph AS 12-50-7433, looking northward from Sinus Aestuum (foreground) to Mare Imbrium (background). At the center is Eratosthenes, 53 kms. across and 3,700 meters deep. In the upper right is the crater-ring Wallace. The whole area is littered with secondary craters associated with Eratosthenes and Copernicus.

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Association of Lunar & Planetary Observers ALPO

Founded In 1947

LUNA INCOGNITA: THE LAST FRONTIER?

By: John E. Westfall, A.L.P.O. Lunar Recorder

(Paper read at the A.L.P.O. Convention at Memphis, Tennessee, on August 18-22, 1971.)

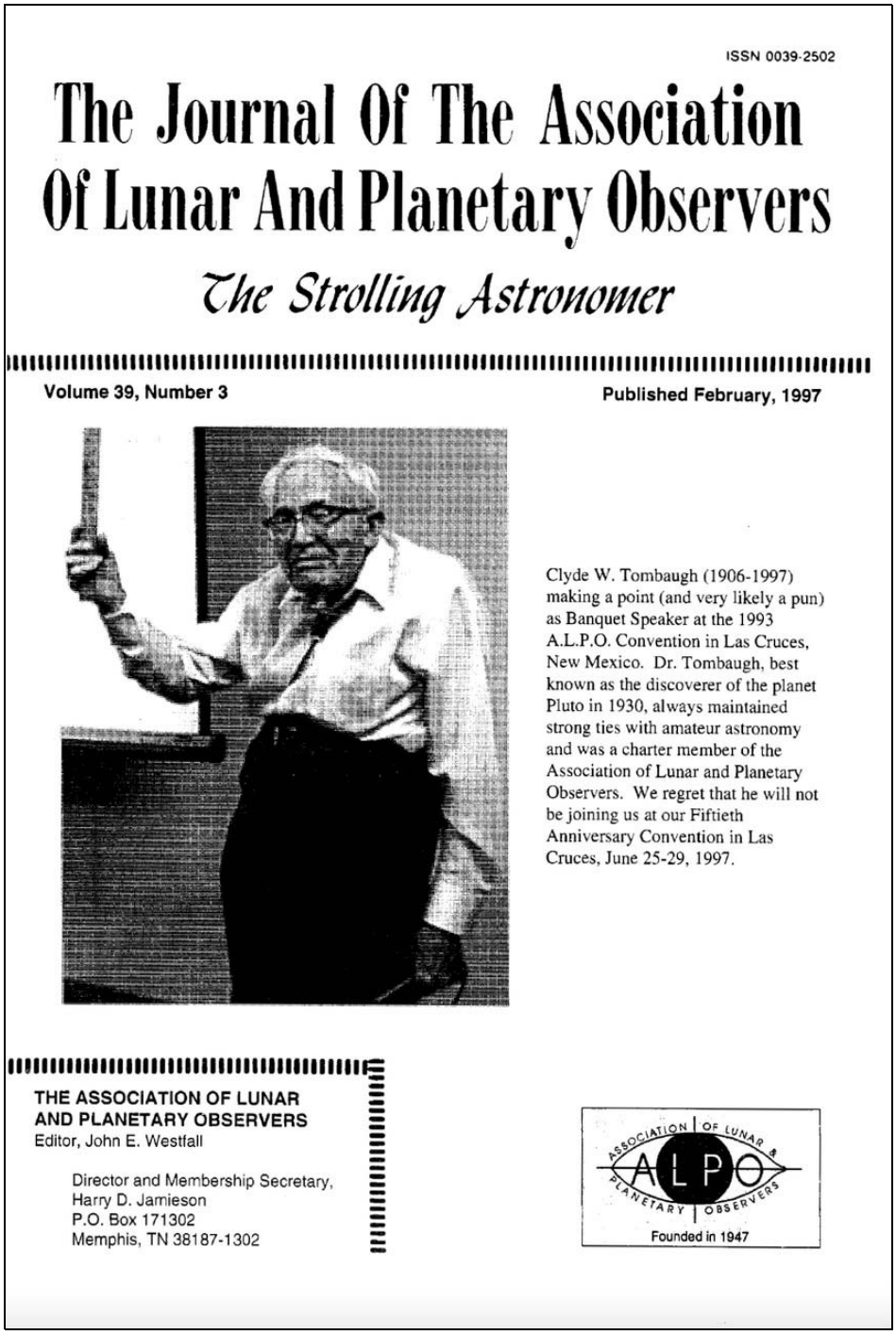
25 Years Ago

The lead article of the February 1997 issue of the JALPO39:3 focused on observations made of the July 1994 collision of shattered comet D/1993 E1 (Shoemaker-Levy 9) with Jupiter. Carlos E. Hernandez, Phillip W. Budine, Donald C. Parker and Jeffrey D. Beish reported that 84 observers submitted observations of the impact events.

They presented a wonderful account of planning and anticipating the observation of such an unprecedented event. How Jeff observed the dark spot created by the impact of fragment A but didn't immediately recognize it for what it was since the impact spots were predicted to be white and not dark. How the entire observing group, including family members, reacted to seeing the impact spots for the first time. And after reporting their observations to Brian Marsden at the Central Bureau of Astronomical Telegrams, their surprise at hearing that they were the first observers in the world to report a sighting of fragment A's impact spot.

Wow, does time fly! Has it really been 25 years since comet C/1995 O1 (Hale-Bopp) was at its best during March and April of 1997? While C/2006 P1 (McNaught) was a great comet for southern hemisphere observers and was visible at northern latitudes during the day and in bright twilight, Hale-Bopp remains the last great comet observable in a dark sky from the Northern Hemisphere.

A report on ALPO observations would be published in 1999 (JALPO41:3). Though Hale-Bopp is over 45 au from the Sun, there are plans to observe it once again with the recently launched James Webb Space Telescope.



ISSN 0039-2502

The Journal Of The Association Of Lunar And Planetary Observers

The Strolling Astronomer

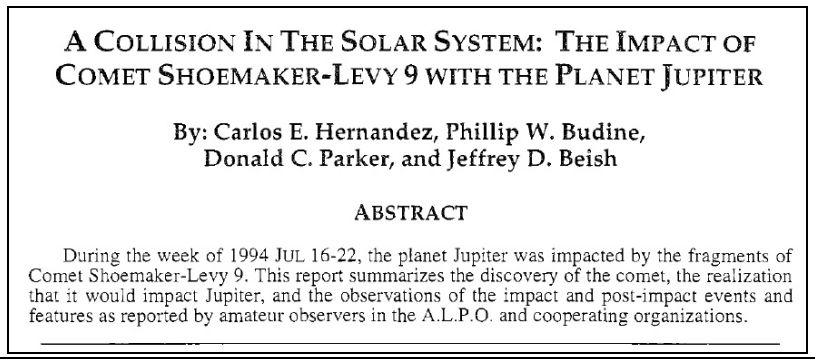
Volume 39, Number 3 — Published February, 1997

Clyde W. Tombaugh (1906-1997) making a point (and very likely a pun) as Banquet Speaker at the 1993 A.L.P.O. Convention in Las Cruces, New Mexico. Dr. Tombaugh, best known as the discoverer of the planet Pluto in 1930, always maintained strong ties with amateur astronomy and was a charter member of the Association of Lunar and Planetary Observers. We regret that he will not be joining us at our Fiftieth Anniversary Convention in Las Cruces, June 25-29, 1997.

THE ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS
Editor, John E. Westfall

Director and Membership Secretary,
Harry D. Jamieson
P.O. Box 171302
Memphis, TN 38187-1302

Founded in 1947



A COLLISION IN THE SOLAR SYSTEM: THE IMPACT OF COMET SHOEMAKER-LEVY 9 WITH THE PLANET JUPITER

By: Carlos E. Hernandez, Phillip W. Budine, Donald C. Parker, and Jeffrey D. Beish

ABSTRACT

During the week of 1994 JUL 16-22, the planet Jupiter was impacted by the fragments of Comet Shoemaker-Levy 9. This report summarizes the discovery of the comet, the realization that it would impact Jupiter, and the observations of the impact and post-impact events and features as reported by amateur observers in the A.L.P.O. and cooperating organizations.

75 Years of the ALPO
The Strolling Astronomer, Volume 1, No. 1

With this issue of your Journal, we celebrate the 75th anniversary of the founding of the Association of Lunar & Planetary Observers by the late (and great!) Walter H. Haas by reprinting Issue 1 of The Strolling Astronomer just as it appeared on March 1, 1947 when times (and scopes) were much simpler. We once more extend our thanks to Robert Garfinkle and the late John Westfall for their assistance in providing the required source file to accomplish this. If this looks familiar, we originally published these pages in JALPO59-3 (Summer, 2017).

COMPLIMENTARY COPY

Volume I, Number 1 March 1, 1947

THE STROLLING ASTRONOMER

(Association of Lunar and Planetary Observers)

MAILING ADDRESS:

THE STROLLING ASTRONOMER
Institute of Meteoritics
University of New Mexico
Albuquerque, N. M.

D E D I C A T I O N

Astronomy is one of the sublimest fields of human investigation. The mind that grasps its facts and principles receives something of the enlargement and grandeur belonging to the science itself. -- It is a quickener of devotion. --

H. MANN.

AN APPEAL

There exist amateur astronomers; there exist the telescopes they have built; there exist the moon and the planets. This leaflet is an attempt to persuade the party of the first part to use the party of the second part to increase knowledge of the party of the third part.

We hope to show herein some ways in which John Q. Amateur can profitably study our sister-worlds (perhaps literally neighbor-worlds in an impending age of space travel) and to give him some instructions on how to do so. It is our hope also to call his attention to current happenings of special interest. We urge John Q. Amateur to submit to us the lunar and planetary observations which he makes and shall undertake to study them and to report our findings through published papers in astronomical magazines. And if he wishes to write an article for this leaflet about "The Voracious Mosquito Compared to the Companionable Skunk as a Telescopic Accessory" or even some other subject - we shall be glad to receive his manuscript. We think that we can introduce John Q. to some interesting people and can show him a pleasant and fascinating hobby.

And now, friends, our fate is in your hands. Whether this embryonic leaflet is to be permitted to develop into a lusty infant depends entirely on your response. We propose to send you six future monthly mailings for one dollar. If our plan appears worthy of your support to that degree, we thank you as friends of lunar and planetary science. How about it?

Walter H. Haas

2

A DARK SOUTH TROPICAL STREAK ON JUPITER

It is risky to tell our readers what to look for on Jupiter; for the changes on this fascinating planet are so unpredictable that one is usually talking of what was, not of what is.

We shall venture, though, to direct attention to a very dark streak just north of the south temperate belt, the second most conspicuous Jovian belt which lies about midway between the center of the disc and the south limb. The center of the streak is now (February 23) near λ_2 340°. The streak should be well-placed for study near these A.M., C.S.T. times: March 6 at 3:00, March 8 at 5:00, March 13 at 4:00, March 18 at 3:00, March 20 at 4:30, March 25 at 4:00, and March 27 at 5:30.

Suitable intermediate times may be approximated by using the rotation-period of 9 hours, 50 minutes.

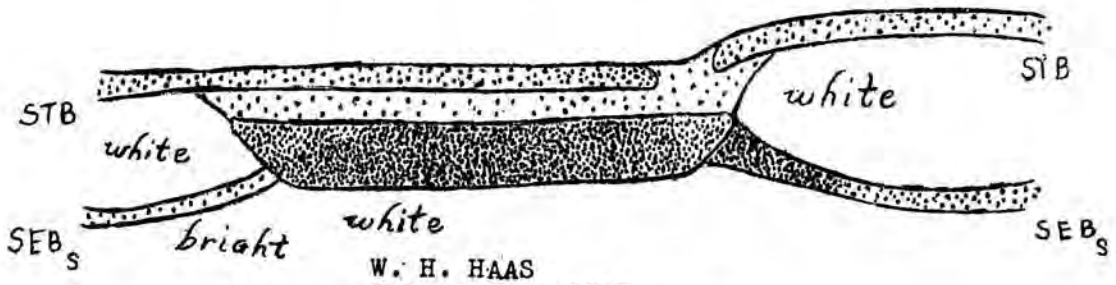
This streak in the planet's south tropical zone bears a striking resemblance to an object seen there in 1941 and 1942. It is probably identical with another object of the same general aspect observed during much of 1946. Jovian phenomena, in fact, show a curious tendency to repeat themselves.

The south component of the south equatorial belt is deflected into the streak at its preceding (left in inverting telescope) end and then bends northward to its usual latitude from the streak's following end. The streak of 1941 and 1942 had an analogous effect on this belt. Again, this same belt for a number of years now has usually been notably dark following (right of , in telescope) the Red Spot. What do these things tell us about the physical nature of the surface of Jupiter?

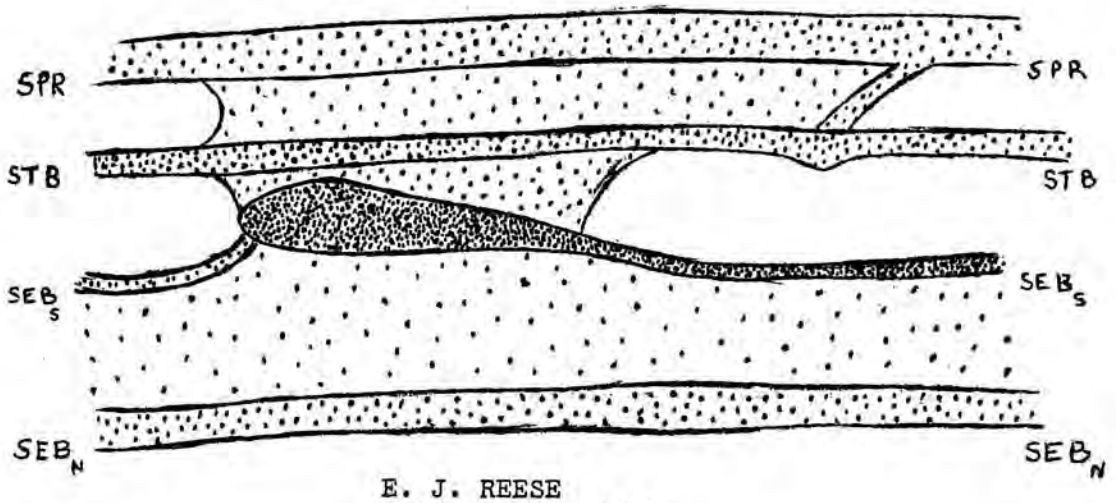
Observers are urged to sketch the streak and its vicinity, to note its color, and to time (to the nearest minute) the passage of its preceding and following ends, or other readily recognized points in it, across the central meridian of Jupiter.

3

SOUTH TROPICAL STREAK ON JUPITER



W. H. HAAS
February 7, 1947
4:50 - 5:05 A.M., M.S.T.
6-inch reflector
141X
Seeing poor
Sky slightly hazy to clear



E. J. REESE
February 12, 1947
5:40 - 6:50 A.M., E.S.T.
6-inch reflector
240X
Seeing poor
Sky slightly hazy

4

CELESTIAL HASH

We request observations of a possible dark band across the ball of Saturn adjacent to the north edge of the ring-ellipse and parallel to that edge. Is the feature an illusion? Or a Saturnian belt in high northern latitudes? Or perhaps the projection of a sometimes-reported dusky ring outside of Ring A? The band, if there, is not the shadow of the rings.

Try your luck with the spots, streaks, and shadings in the lunar crater Plato; and send us your drawings. We warn you: This detail is delicate; but good work has been done with only 6-inch apertures.

Twinkle, twinkle, little star,
Ever twinkling, there afar.
Awful seeing all the night!
Darn your scintillating light!

R. Barker, "Brendon", Crossbrook Street, Cheshunt, Herts., England, has sent a drawing of a difficult cleft connecting the lunar crater Manners to the famous Ariadaeus cleft. He desires a confirmation.

We suggest to amateurs having telescopes of the usual focal lengths of, say, 50 to 70 inches, that it is worthwhile to obtain an eyepiece of equivalent focal length 1/3". Such an eyepiece will often be more useful than either 1/2" or 1/4" eyepieces. O. E. Monning, 1010 Morningside Drive, Fort Worth, Texas, has supplied us with an eyepiece of e.f.l. 1/3", which has been very helpful in recent lunar and planetary observations.

ACKNOWLEDGMENTS

ELMER J. REESE, 241 South Mount Vernon Avenue, Uniontown, Pennsylvania, for excellent observations of Venue, Jupiter, Saturn, Plato, and Aristarchus, which he has submitted to us. Mr. Reese's telescope is a 6-inch reflector and demonstrates what energetic users can do with good small instruments.

H. PERCY WILKINS, 127 Eversley Avenue, Barnehurst, Kent, England, for what is unquestionably the best map of the Moon yet published. Any serious lunar student must get a copy. Mr. Wilkins is Acting Lunar Director of the British Astronomical Association and will welcome American contributions to lunar studies.

A. F. O'D ALEXANDER, the Saturn Director of the British Astronomical Association, 1 Athelstan Road, Dorchester, Dorset, England, for working out a laudable and extensive program of Saturn observations outlined in several Section Circulars. Dr. Alexander, too, will welcome American observers.

DAVID P. BARCROFT, Madera, California, for the loan of a book on Saturn. Mr. Barcroft's personal lunar and planetary library is perhaps the best private one in the country. He is very generous with his splendid collection.

E. K. WHITE, Chapman Camp, B.C., Canada; F. R. VAUGHN, 1368 East 53rd Street, Chicago, Illinois; H. M. JOHNSON, 1118 West 26th Street, Des Moines, Iowa; C. F. GRAMM, 398 Beresford Road, Rochester, New York; A. W. MOUNT, 4326 Birchman Street, Fort Worth, Texas; and E. J. REESE, all of whom have submitted to us observations of Saturn for the years 1943-6.

There are many others who merit mention for excellent contributions. These will receive space in future publications.

- -

Editor: WALTER H. HAAS, Instructor of Mathematics, University of New Mexico. Astronomer, Institute of Meteoritics, University of New Mexico, Albuquerque, New Mexico.

Counsellor: Dr. L. LA PAZ, Head of Mathematics Dept., University of New Mexico. Director, Institute of Meteoritics, University of New Mexico, Albuquerque, New Mexico.

6

A T T E N T I O N

This publication is for the purpose of coordinating the activities of amateur astronomers. It is a non-profit project; however, to cover the cost of publication and mailing of future issues, the minimum cost of one dollar for six copies is requested.

If you would like to join in the activities of the Association of Lunar and Planetary Observers, please fill in the coupon below, clip, and mail.

- -

Please send six (6) monthly issues of THE STROLLING ASTRONOMER to:_____

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75 Years of the ALPO

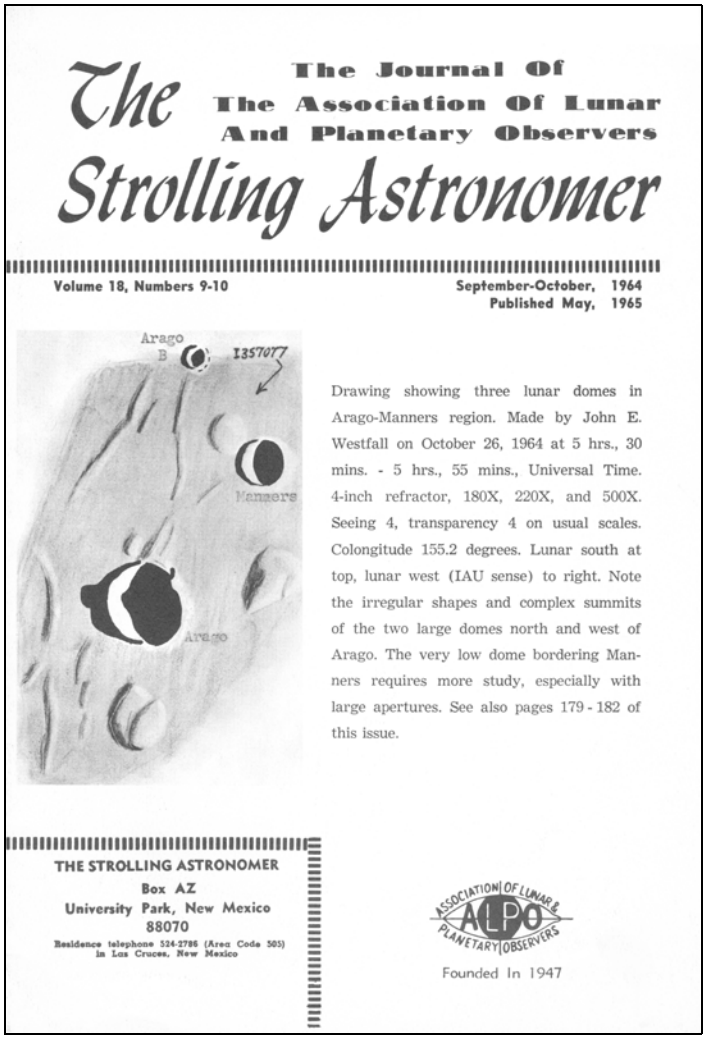
The Strolling Astronomer: The Early Years

By Elizabeth Westfall, *ewestfall5@comcast.net*

The production of *The Strolling Astronomer*, or *Journal of the Association of Lunar & Planetary Observers*, as it is now known, is a "stroll" through decades of technological change. I regret that I cannot remember the names of technologies, or dates of process change, but I hope I can give a picture into those developments. I am one of the few remaining persons who was present through these changes.

You may know that Walter Haas began *The Strolling Astronomer* in 1947 as a small newsletter, typed by his wife Peggy, mimeographed, and mailed by them from Las Cruces, New Mexico. Articles and observations were solicited from members. Walter edited the articles through letter correspondence with the author, and they were published. Membership grew and Walter based the ALPO organizational structure on that of the British Astronomical Association (BAA). Introduced were "Recorders," persons responsible for each subject area: the Moon, individual planets and comets. Likewise, *The Strolling Astronomer* was based on the appearance and structure of the BAA journal. The recorders were tasked with channeling articles and reports to Walter after reviewing them. Recorders are now called coordinators, but the process remains.

I became involved with ALPO and JALPO production in 1965 when John and I were married. John was named Lunar Section Recorder about that time and began collecting reports and images (all in hard copy), analyzing them and writing reports. All this work was done with a typewriter. I don't know how these typed submissions were converted into the Journal in the years before John became assistant editor. The issues may have been photographed by the printer and put into page columns. I believe that it was during the 1970s that the printer did the work of converting the typed materials and photos and drawings into the printed issues. There were extensive tables, such as for the Jovian moon timings, that could be prone to typographical errors. I helped John proof these tables, as well as articles and full issues from those first years until a new editor was selected.



The Journal Of The Association Of Lunar And Planetary Observers

The Strolling Astronomer

Volume 18, Numbers 9-10 — September-October, 1964 — Published May, 1965

Drawing showing three lunar domes in Arago-Manners region. Made by John E. Westfall on October 26, 1964 at 5 hrs., 30 mins. - 5 hrs., 55 mins., Universal Time. 4-inch refractor, 180X, 220X, and 500X. Seeing 4, transparency 4 on usual scales. Colongitude 155.2 degrees. Lunar south at top, lunar west (IAU sense) to right. Note the irregular shapes and complex summits of the two large domes north and west of Arago. The very low dome bordering Manners requires more study, especially with large apertures. See also pages 179 - 182 of this issue.

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Founded In 1947

The mentoring process is very important to me because it helps young or new members to develop skills and confidence. When John became editor of the Journal, the production process changed, and took longer. Walter's review of the Journal was valuable. Walter had been a demanding editor, yet a mentor for all who wrote for him. He required clear writing, correct style and accuracy of data, methods and analysis. He would mark corrections or ask questions about a method or analysis. That high standard of quality is one reason the Journal receives respect from professional astronomers. And John and other authors would learn from Walter's questions. He was mentoring them, challenging them. It was a collegial process. Therefore, John would receive articles usually reviewed or written by an ALPO section recorder. John would list questions and make his corrections, sometimes sending it back to the submitter. The issue would then be prepared in draft form and mailed to Walter for his review. He always had comments. Walter would return the draft to John who would then make his own changes or discuss them with Walter by phone.

John would then prepare the printer's copy, with graphics placed by hand. At

first, the paper photographs were placed on the typed copy, which was printed on legal size paper; upon reduction the printing was cleaner. The printer's copy was sent to the printer in Las Cruces, New Mexico, USA, sometimes by mail but frequently by FedEx. The printing and distribution were done in Las Cruces, by Walter and probably Peggy.

The personal computer revolution, however, changed everything.

John had worked with DOS-based time-share computers at San Francisco State University and established the Social Sciences Computer Lab there, but wanted the freedom of a personal computer. I gave John an Apple Macintosh II in 1984. He was elated. The production story of JALPO can be seen through the list of Apple computers he used. Each one added connectivity: floppy disks, hard disks, phone connections, Ethernet connections, thumb-drives, e-mail, and web access. He used a Macintosh (1984), Mac Plus (1986), Mac SE (1987), Mac LE II (1990), Mac Quadro tower (1991), iMac 1998 (1998), Mac G4 (2002), and an iMac Intel (2006). For those interested here is a link to photos of Apple Macs from the Computer History Museum, showing visually how they have evolved:

https://www.cnet.com/pictures/apples-mac-through-the-years-pictures/ .

In 1984, these computers had WYSIWYG (What You See Is What You Get) technology. You could type text, select a type font, format columns, change font size, and the results on the screen looked like what you wanted the printed page to look like. There was no longer the need to enter command codes to accomplish those tasks. You could see your letter, newsletter, or Journal article exactly as you wrote and designed the page, both on-screen and printed. You could easily make changes to your document. The early Macs used floppy disks or hard disks, so you could mail your documents (article, photo, complete article) to another person who also had a Mac.

By 1991, Macs began to have internet connections so you could send documents via the phone lines; the mail delays were eliminated. You could have a "live" discussion of questions or the research; and you could be notified of upcoming astronomical events. You could also transfer materials between Apple and PC (non-Apple) systems.

Other storage and portable technologies were introduced: floppy drive, hard drive, CD, DVD, USB thumb or flash drives, introduced in about 2005. During these years we also used fax machines.

John tried new word processing software as it appeared. The first one he liked was FullWrite, introduced about 1988. Some others were Aldus/Adobe PageMaker, and Adobe Illustrator for graphics.

Early images that were used were usually line drawings, so these were not too difficult to reproduce. But when photographs were used more often, printing problems were encountered. It was difficult to print high contrast photos and get the full range of values. It was also difficult to print photos that have small, faint objects on a black background. I think this problem was managed by the printer and the type of equipment used. As I recall, continued problems with this issue was one reason that the printer was changed from one in Las Cruces to a printer in Atlanta, Georgia, USA. The welcome transition was managed by Julius Benton's son Trey.

The editing process itself never changed but the advances in technology shortened the timelines. Photos, illustrations and tables began being submitted in electronic form, giving clearer images and reducing "assembly" of the issue. Proofing between John and Walter began to be done electronically. When printing was changed to the printer in Atlanta, I believe that the journal was sent electronically, or perhaps by a portable media form. The new printer was also able to wrap and mail the journal.

As editor, John began the important process of putting the Journal into online astronomy search databases. I don't have dates for these actions. He first contacted one of them and, through destructive methods, they were able to scan many years of issues – duplicates that John provided them. They were not able to continue the project, I forget why.

It was Ken Poshedly as the new editor in 2001, who began to publish the Journal electronically, and it was then entered directly into the database. I believe Ken had to resolve some interface problems.

The next set of important changes were when Ken became editor. Newsletters and publishing are his profession, so he brought much knowledge to the Journal. He modified the responsibilities so that the section coordinators (formerly recorders) take more responsibility for the review and editing of articles submitted through them, taking that burden from the editor. I believe that all articles are submitted electronically, as well as images. He changed the format to 8 ½ x 11, a more standard format. The content has been rearranged to be more readable and we now have color covers.

Best of all, the Journal is now available on-line with the inside illustrations in color if that was their original format.

And it was only a few years ago that Ken found a trusted and knowledgeable ALPO member, Shawn Dilles, who volunteered to personally scan the oldest issues from John's collection, for which we did not have duplicates. The back issues are now completely on-line, and current issues are added as published.

I enjoy the refreshed and updated *Strolling Astronomer* and I know that John admired the updated version, and I think Walter Haas would too.

Papers & Presentations

Possible Meteor Outbursts in May 2022?

By Robert Lunsford, coordinator, ALPO Meteors Section, *lunro.imo.usa@cox.net*

Discussion

Each year meteor activity during the month of May is normally dominated by the debris from Halley's comet known as the "eta Aquariids." They again will be the highlight of the month but may be joined by three other possible short-lived meteor outbursts.

The first of these is predicted to occur on the night of May 14/15 when the Earth may encounter debris shed from the Earth-crossing asteroid known as 2006GY2. Studies made since its discovery in 2006 indicate that the stream of material produced by this object could be dense and may produce a short but substantial meteor display. If a display was to occur, it is predicted to peak near 10:30 Universal Time on May 15 (3:30 am Pacific Daylight Time, May 15). Southern areas in the Mountain Time Zone of the U.S. may also be dark enough to witness any activity. Locations further east will observe morning twilight and dawn at this time so any display will not be visible.

Any meteors from this source would radiate from a celestial position of 16:24 +46. This area of the sky is located in northwestern Hercules, just east of the 4th magnitude star known as tau Herculis (see **Figure 1**). The entry velocity is estimated to be 36km/sec., which would produce meteors of medium velocity. Note that these meteors are NOT related to the meteor shower known as the "tau Herculids," which peak in late May. Unfortunately, this possible display coincides with the Full Moon and only brighter members of this display, if it occurs at all, will be visible.

The second and least likely meteor display is predicted to occur near 8:00 Universal Time on May 25, 2022, when the Earth is predicted to encounter sparse debris from comet 209P/Linear.

This timing is favorable for all of the U.S. and Central America. At this time and date, the Moon will be a waning crescent and will not be a factor as long as the potential observer faces northward. The potential radiant is located at 7:56 +77, which is situated in the constellation of Camelopardalis. During the morning hours, this position is situated below Polaris (see **Figure 2**). With an entry velocity of 16km/sec., these meteors would be extremely slow. I have observed this display with a closer encounter predicted, yet I saw only one meteor

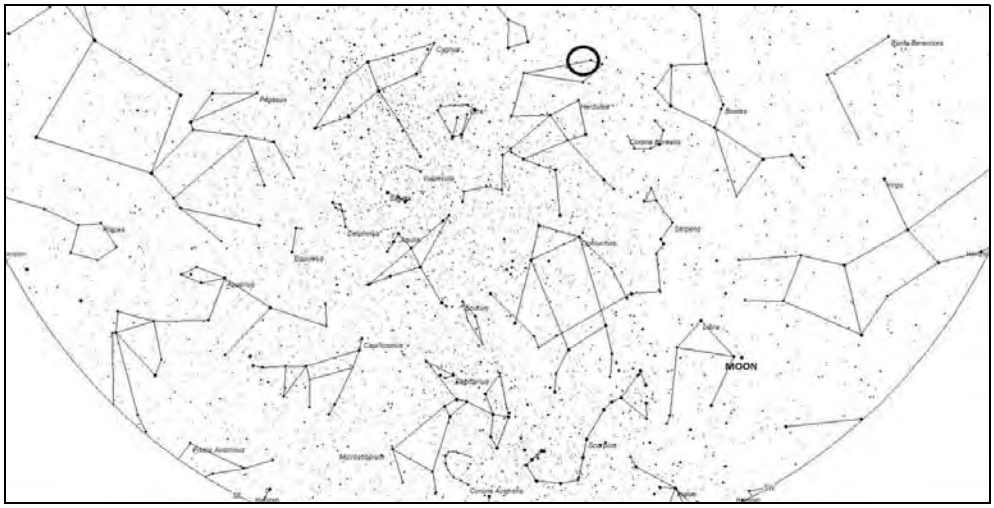

Figure 1. Position of the Full Moon and the 2006GY2 radiant on the morning of May 15, 2022.

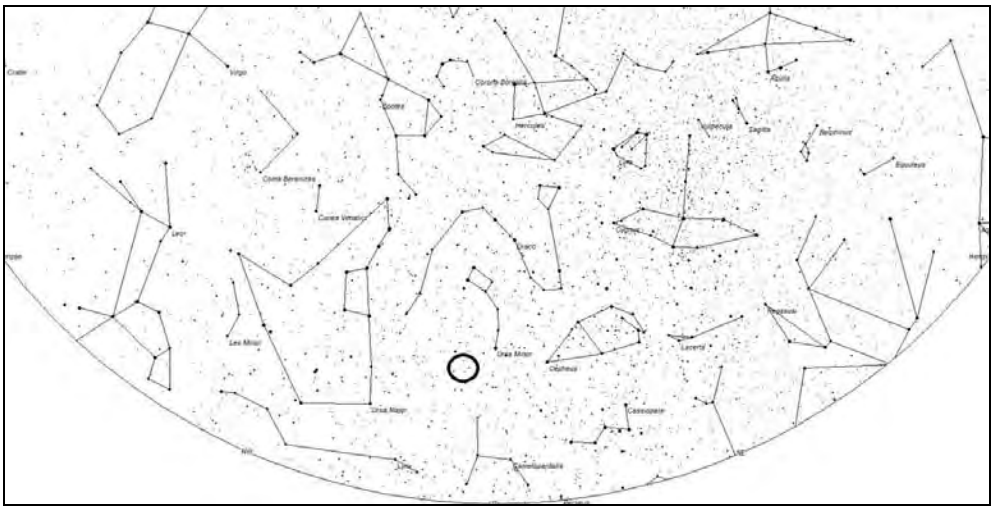

Figure 2. Position of the radiant for meteors from comet 209P/Linear on the morning of May 25, 2022.

during three hours of observation. Therefore, I expect this encounter to be a non-event.

The last and most interesting of these possible outbursts is the encounter of the Earth with debris from comet 73P/ Schwassmann-Wachmann 3. In 1995, this comet experienced a massive breakup with many dozens of individual fragments of the comet being discovered in subsequent returns. Due to the increased brightness of the comet in 1995, copious amounts of dust particles were also released from the comet.

It is these particles that may encounter the Earth this year. In order for this to occur though, a large amount of these particles must have been scattered in a forward direction, opposite the motion of the comet. Normally, most of the dust ends up behind the comet due to the pressure from solar radiation. This is especially true for the smallest particles which make up a majority of the debris. Any larger particles situated forward of the comet must also be large enough to be seen from the surface of the Earth. Due to the slow velocity at which these particles encounter the atmosphere (16km/sec.), meteors that are normally bright during showers of higher velocity will be considerably fainter during any display from this source. Therefore, it is possible that a strong meteor shower may occur but will be too faint to witness!

The only factor certain for this event is the timing. If anything occurs, it is expected near 5:05 UT on May 31. Note that that this timing is during the evening hours over western North America on May 30. Note that 5:05 UT corresponds to 10:05 pm PDT, 11:05 pm MDT, 12:05 am CDT and 1:05 am EDT. This timing favors the U.S. and Central America, but portions of Ontario, Canada, and northern South America may also be able to witness this display. Fortunately, the Moon will be at its new phase so moonlight will not be a factor at all.

These meteors are often called the "tau Herculids," which was derived from calculations of a radiant position back in 1930. This name is misleading as

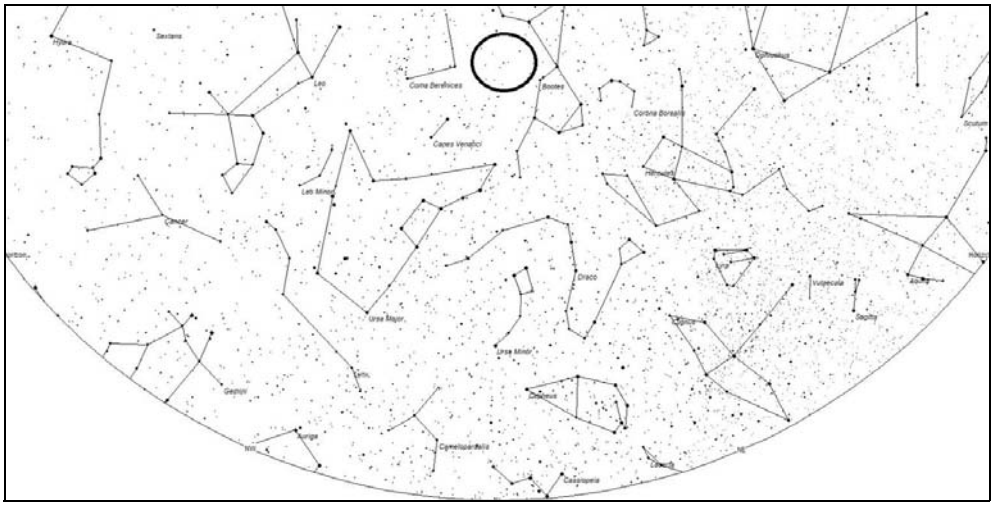

Figure 3. The large circle displays the expected radiant of SW3 meteors on May 30/31, 2022.

modern calculations indicate that meteors from this source are expected to radiate from western portion of the constellation Boötes. The predicted position is near 13:56 +28, which is close to the magnitude 5.02 star 9 Boötis (see **Figure 3**).

For slower meteors such as this, a zenith attraction also come into play which causes the radiant to appear further toward the zenith than the predicted position. Therefore, the actual radiant area could be very large, encompassing a large portion of both Boötes and Canes Venatici. The normal meteor rates at this time of year is very low so any meteor seen near this time has a good chance of belonging to this display.

Your best strategy for seeing this possible display is to find the darkest location possible, as a majority of the activity is bound to be faint. I would start observing an hour prior to the predicted time so that your eyes are well adapted to the night sky by the time the maximum occurs. If you see nothing at the predicted time of maximum, keep on watching for at least an hour just in case the timing is off. These meteors will appear in any portion of the sky, but I would suggest looking half-way up in your darkest direction. If you happen to witness intense activity, try to estimate the number of meteors visible per minute or 5-minute bins, depending on the activity. You might try to record your observations on your smart phone. I will be recording time, magnitude, and any other notable information on a dedicated recorder with WWV shortwave signals in the background. This will allow me to keep my eyes on the sky at all times.

Those with digital SLR cameras may wish to try and capture any meteors by taking time exposures of 30 to 60 seconds, depending on your sky conditions.

Whatever you see and record, we are interested in your data and your overall experience. Be sure to share them with the ALPO Meteors Section at *lunro.imo.usa@cox.net*

Astronomers have received many a black eye for predicting grandiose events that never happened. These three events may likely fall into this category. But I would suggest using the following mindset: "I don't expect anything to happen, but I don't want to miss it if it does".

My wishes for clear skies to all!

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Rao, Joe (2021) "Will Comet 73P/ Schwassman-Wachmann 3 produce a meteor outburst in 2022?", WGN (*Journal of the International Meteor Organization*); 49 (1): pp. 3-14.

Papers & Presentations

The Comets of 2019

By Carl Hergenrother, coordinator, ALPO Comets Section, *carl.hergenrother@alpo-astronomy.org*

Abstract

During 2019, the ALPO Comets Section received 466 magnitude measurements of 31 comets and 220 images and sketches of 28 comets. Of those comets at perihelion in 2019, five comets were well-observed with sufficient photometric data to model an accurate lightcurve. The five well-observed comets include the short period comet 260P/McNaught and 4 long-period comets, C/2018 R3 (Lemmon), C/2018 N2 (ASASSN), C/2018 W2 (Africano) and C/2018 Y1 (Iwamoto). Each of the comets reached 11th magnitude or brighter with 260P/McNaught peaking at magnitude 10.6, C/2018 R3 (Lemmon) at 9.6, C/2018 N2 (ASASSN) at 10.4, C/2018 W2 (Africano) at 7.9 and C/2018 Y1 (Iwamoto) being the brightest comet of 2019 and a borderline naked-eye object at magnitude 5.7.

The Discoveries of 2019

A total of 64 comets were discovered during calendar year 2019. Additionally, 7 apparently inactive objects on long-period comet-like orbits were discovered. The most newsworthy discovery of 2019 was interstellar comet 2I/2019 Q4 (Borisov). The second recognized interstellar object after 1I/2017U1 "Oumuamua" and the first active cometary interstellar object, 2I/Borisov was the focus of an extensive professional observational campaign. Eighteen images of 2I/Borisov were submitted to the Comets Section (**Figure 1**). A single visual observation was submitted by Chris Wyatt who observed 2I on 2019 December 6 with a 0.4-m f/4 reflector at 261x. He measured a brightness of magnitude 15.7 and a weakly diffuse 0.3 arc-minute coma.

Interesting Comet Events of 2019

In addition to the discovery of 2I/Borisov, several other comets of interest were discovered or returned in 2019. Long-period comet C/2019 J2 (Palomar) was found in May 2019 at a heliocentric distance of 1.96 au. As the comet approached a 2019 July 19 perihelion at 1.73 au, it was observed to disintegrate in early July (Ye, 2019a). An orbit by the Minor Planet Center found Comet Palomar to be a dynamically old, long-period comet with an orbital period of ~2000 years.

Short-period comet 168P/Hergenrother was expected at perihelion on 2019 August 5 at a distance of 1.36 au from the Sun. Discovered by this writer (ALPO Comets Section Coordinator Carl Hergenrother) in 1998, 168P was observed at returns in 2005 and 2012. During the 2012 return, the comet experienced a splitting event, resulting in the identification of several faint fragments and an outburst from 13th to

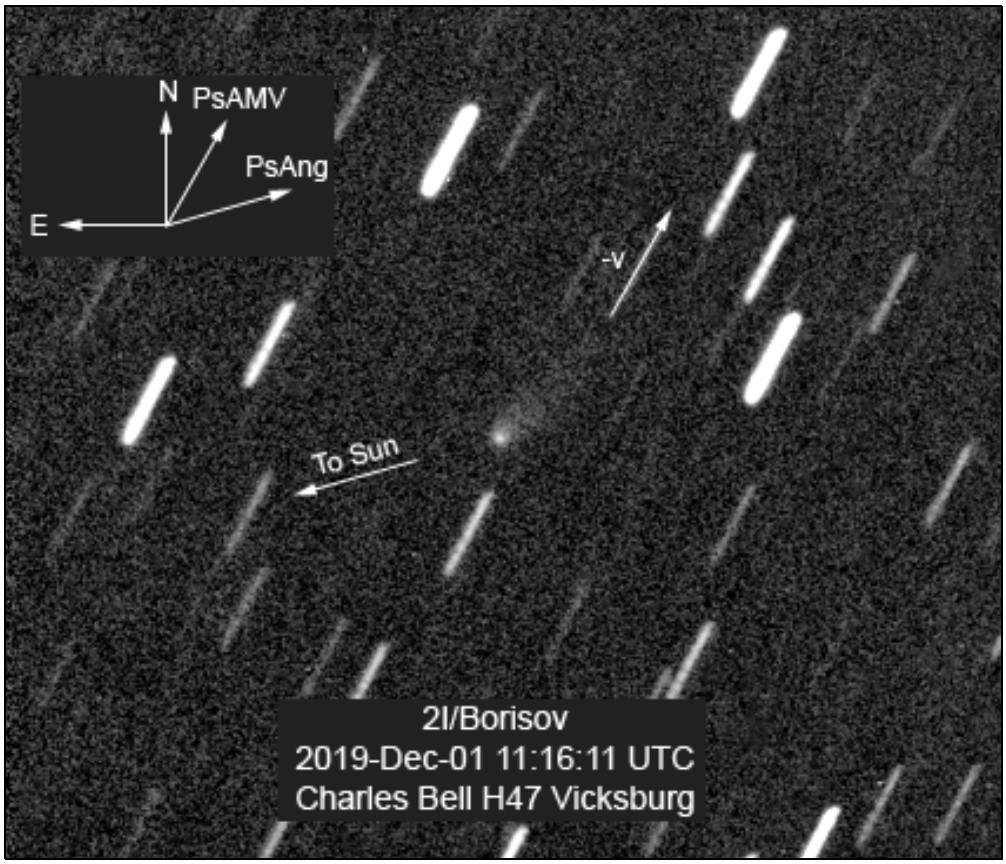

Figure 1. Interstellar comet 2I/Borisov as imaged on 2019 December 1 by Charles Bell from Vicksburg, MS, USA.

9th magnitude (Sekanina 2014). Though the comet appeared healthy as it receded from the Earth and Sun in 2013, no observations were made during the 2019 apparition. The Zwicky Transient Facility reported the non-detection of 168P by their Oschin 1.2-m Schmidt telescope in late July (Ye, 2019b).

168P is not the only short-period comet observed at multiple returns that subsequently disappeared. Other past no-shows include 3D/Biela which split in two in 1846 but hasn't been seen since 1852, 5D/Brorsen (not seen since 1879) 18D/Perrine-Mrkos (1968), 25D/Neujmin (1927), 34D/Gale (1938), 75D/Kohoutek (1987), 83D/Russell (1985) and 85D/Boethin (1986).

Table 1. Comets with the Most Images Submitted to the ALPO in 2019

Rank	Comet Name	# of Images
1.	C/2018 Y1 (Iwamoto)	49
2.	C/2018 W2 (Africano)	38
3.	C/2017 T2 (PANSTARRS)	24
4.	C/2018 N2 (ASASSN)	20
5.	260P/McNaught	20
6.	2I/2019 Q4 (Borisov)	18
7.	(6478) Gault	8
8.	C/2019 D1 (Flewelling)	4
9.	114P/Wiseman-Skiff	4
10.	384P/Kowalski	3

Table 2. Comets with the Most Magnitude Measurements Submitted to the ALPO in 2019

Rank	Comet Name	# of Magnitude Measurements
1.	C/2018 Y1 (Iwamoto)	64
2.	C/2018 N2 (ASASSN)	58
3.	C/2018 W2 (Africano)	58
4.	46P/Wirtanen	39
5.	38P/Stephan-Oterma	30
6.	C/2017 T2 (PANSTARRS)	30
7.	29P/Schwassmann-Wachmann	24
8.	260P/McNaught	23
9.	64P/Swift-Gehrels	22
10.	C/2018 A6 (Gibbs)	21

Observations Received in 2019

In 2019, the ALPO Comets Section received 466 magnitude measurements of 31 comets and 220 images and sketches of 28 comets. Lists of the 10 best observed comets based on submission of images and sketches and magnitude measurements are shown in **Table 1** and **Table 2**. This report will focus on five well-observed comets with perihelia in 2019. We define "well-observed" as those comets with sufficient observations to produce well-determined lightcurves. Though some comets such as C/2017 T2 (PANSTARRS), 38P/Stephan-Oterma, 46P/Wirtanen and 64P/Swift-Gehrels were well-observed in 2019, their perihelia occurred outside of 2019. Analyses of these comets will be presented in future JALPO articles. This will also be the case for comets that were discovered in 2019 but arrived at perihelion in 2020 such as C/2019 Y1 (ATLAS) and C2019 Y4 (ATLAS).

Observational data for the five well-observed 2019 comets, including geographic location, number of images, sketches, magnitude measurements for each comet, and size and type of telescope used are contained in **Table 3**. In order to augment the data submitted to the ALPO Comets Section, we also include CCD magnitude measurements submitted by Michael Lehmann to the Comet Observation Database (COBS) site (*https://cobs.si*) in our analysis (Zakrajsek & Mikuz, 2018).

Photometric Analysis

The total magnitude, or brightness of a comet's coma, can be represented by the following equation:

$$m_1 = H_0 + 5 \log \Delta + 2.5n \log r - 2.5 \log \psi(\alpha)$$

where:

- m_1 is the apparent total magnitude,
- H_0 is absolute total magnitude,

Table 3. Observer Information for Observations of Comets 260P/McNaught, C/2018 N2 (ASASSN), C/2018 R3 (Lemmon), C/2018 W2 (Africano), and C/2018 Y1 (Iwamoto)

Observer	Location	260P	C/2018 N2	C/2018 R3	C/2018 W2	C/2018 Y1	All Obs. from 2019	Instruments Used
Submitted to the ALPO								
Salvador Aguirre	Hermosillo, Mexico		1V		1V	1V+1C	4V+1C	0.15-m SCT
Dan Bartlett	June Lake, CA, USA						1C	0.28-m SCH
Charles Bell	Vicksburg, MS, USA						10C	0.30-m SCT
Nicholas Biver	Boulonville, France	1C	1C		3C		5C	0.41-m RFN
Denis Buczynski	Portmahomack, Scotland, UK		3C					0.28-m SCT
Jean-Luc Colas	Valdrome, France				3C		3C	0.11-m RFR
Dan Crowson	New Florence, MO, USA	1C	3C		2C		11C	0.09-m RFR 0.30-m RCT
Michel Deconinck	Artignosc sur Verdon, Provence, France	5S	6S		5S	11S	1V+35C	0.25-m SCT 30x125 B
Juan Jose Gonzalez	Various sites in Leon & Asturias, Spain	9V	10V	4V	11V	20V	116V	0.2-m SCT 25x100 B,10x50 B,0.045-m RFR Naked Eye
Christian Harder	Bult, Jeersdorf, Kirchheim, Syke & Westerholz, Germany / Ustrine, Croatia	26V	59V	5V	30V	21V	131V	0.75-m RFN 0.53-m RFN 0.3-m RFN 0.2-m RFN 8x44 B
Carl Hergenrother	Tucson, AZ, USA, iTelescopes (various remote sites)				3V+2C	1V	15V+4C	30x125 B
John Maikner	New Ringgold, PA, USA						6C	0.16-m RFR
Gianluca Masi	Ceccano, Italy					3C	22C	0.43-m CDK
Martin Mobberley	Cockfield, Suffolk, UK, iTelescopes (various remote sites)	1C				20C	27C	0.43-m CDK, 0.51-m CDK
Michael Olason	Denver, CO, USA		4C			5C	7C	0.28-m SCT
Uwe Pilz	Leipzig, Germany	4V	4V	1V	4V+2S	5V+2S	9V+4S	0.32-m RFN 0.11-m RFR 6x70 B 7x50 B
Raymond Ramlow	iTelescopes (various remote sites)	4C	6C		4C	3C	52V	0.28-m DK 0.11-m RFR

Table 3. Observer Information for Observations of Comets 260P/McNaught, C/2018 N2 (ASASSN), C/2018 R3 (Lemmon), C/2018 W2 (Africano), and C/2018 Y1 (Iwamoto) (Continued)

Observer	Location	260P	C/2018 N2	C/2018 R3	C/2018 W2	C/2018 Y1	All Obs. from 2019	Instruments Used
Efrain Morales Rivera	Aguadilla, PR, USA	5C	4C		12C		21C	0.30-m SCT
Michael Rosolina	Greenbrier, WV, USA				1V+1S	1V+1S	2V+3S	0.12-m RFR, 0.35-m SCT
Gregg Ruppel	Tucson, AZ, USA	4C	2C		1C	3C	19C	0.25-m RFN
John D Sabia	Scranton, PA, USA	1C	3C		5C	1C	16C	0.08-m RFR
Chris Schur	Payson, AZ, USA				1C	2C	5C	0.25-m RFN
Willian Souza	Sao Paulo, Brazil				1V	5V	6V	0.15-m RFN
Tenho Tuomi	Lucky Lake, SK, Canada	2C	2C	1C	1C	1C	13C	0.30-m RFN
Christopher Wyatt	Walcha, NSW, Australia	10V	18V		8V	9V	149V	0.4-m RFL 0.25-m RFL 11x70 B 7x50 B
Corine Yahia	Saucats, France					2C	2C	0.07-m RFR, 0.10-m RFR
Obtained from Comet Observation Database (COBS) website								
Michael Lehmann	Weimar, Germany and iTelescopes (var. remote sites)	33C	82C	8C	39C	29C	191C	0.11-m RFR, 0.20-m RFN, 0.30-m CDK, 0.51-m CDK

Observation Type: Images (C), Sketches (S), and Visual observations (V).
Telescope types: Binoculars (B), Classical Dall-Kirkham (CDK), Newtonian Reflector (RFN), Refractor (RFR), Schmidt (SCH), and Schmidt-Cassegrain (SCT)

Table 4 - Offsets in Magnitude for Individual Observers for Each Well-Observed Comet.
(A positive value means the reported magnitudes were increased (made fainter) with the inverse for negative values.)

Observer	260P	C/2018 N2	C/2018 R3	C/2018 W2	C/2018 Y1
Salvador Aguirre	0.0	0.0		0.0	0.0
Juan Jose Gonzalez	0.0	0.0	+0.6	0.0	+0.4
Christian Harder	-0.6	+0.4	0.0	+0.4	+0.4
Carl Hergenrother					0.0
Michael Lehmann	-1.0	-1.4	-0.7	-0.7	-0.7
Raymond Ramlow	-1.0	-1.2		-1.2	-1.2
Uwe Pilz		0.0	0.0	0.0	0.0
Willian Souza				0.0	0.0
Christopher Wyatt	-1.0	0.0		0.0	0.0

- Δ is the geocentric or comet-Earth distance in au,
- n is the activity index or measure of the rate of change in comet brightness relative to heliocentric distance,
- r is the heliocentric distance or comet-Sun distance in au,
- ψ is the phase function,

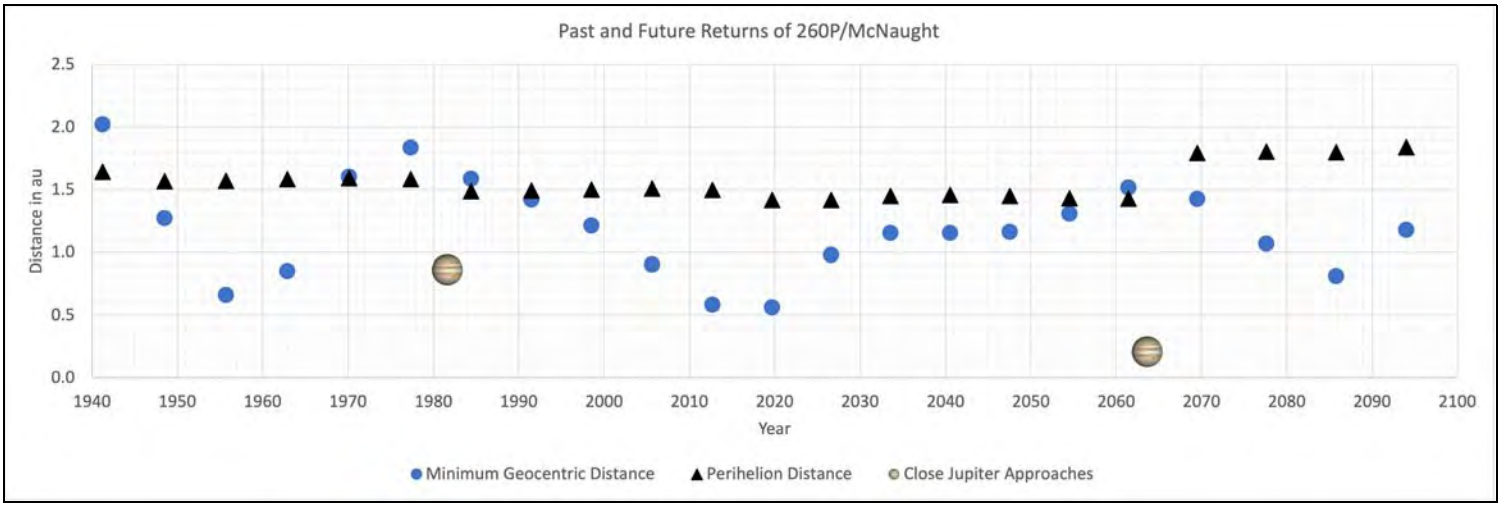

Figure 2. The evolution of the orbit of 260P/McNaught between 1940 and 2100. Black triangles denote date and distance of perihelion in au. Blue circles denote minimum comet-Earth distance (in au). Little Jupiter icons denote the date and distance for comet-Jupiter approaches of less than 1.0 au.

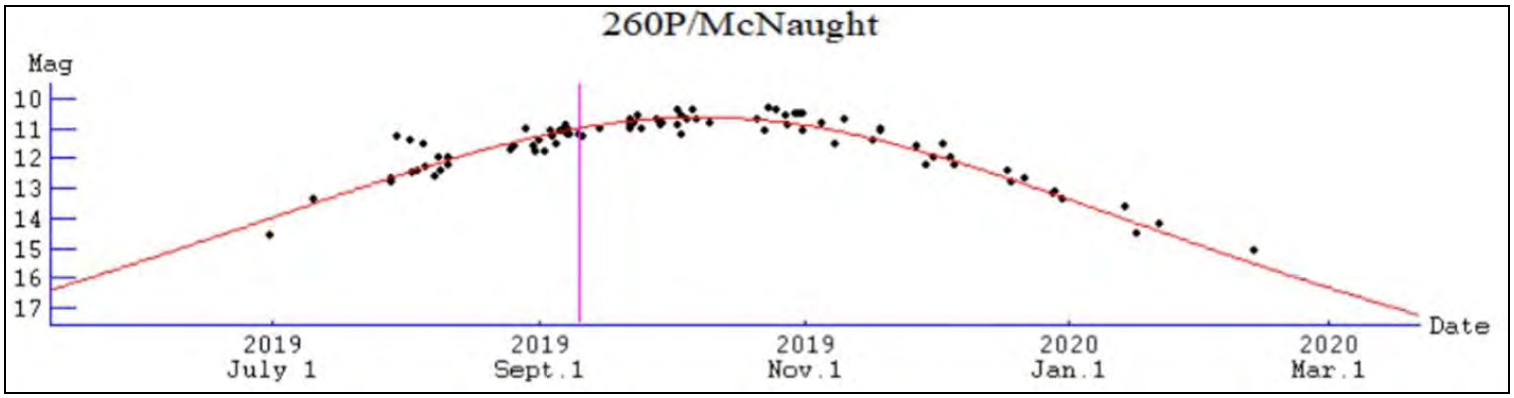

Figure 3. Apparent magnitude lightcurve of comet 260P/McNaught during its 2019 return. Apparent magnitudes were corrected for aperture and personal offsets. This figure and others like it were created using Seiichi Yoshida's "Comets for Windows" program.

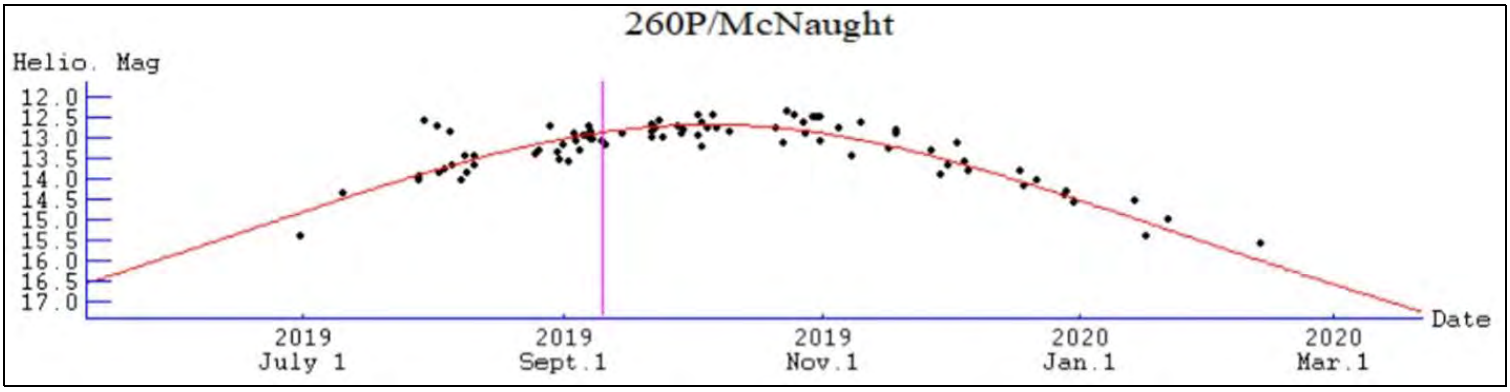

Figure 4. Heliocentric magnitude lightcurve of comet 260P/McNaught. Heliocentric magnitudes are produced by normalizing apparent magnitudes to heliocentric (comet-Sun) and geocentric (comet-Earth) distances of 1 au.

- *a* is the phase, or Sun-comet-Earth, angle in degrees (Meisel and Morris, 1982).

All photometry is corrected for the phase function published in Marcus (2007a, 2007b).

Brightness measurements are affected by a combination of factors including instrumental (aperture, focal length, magnification, type of optics), environmental (sky brightness due to moonlight, light pollution, twilight, aurora activity, zodiacal light), cometary (degree of condensation, coma color, strength and type of gas emission lines, coma-tail interface) and personal factors (sensitivity to different wavelengths, technique, observational biases). An aperture correction is applied to all visual observations by correcting to a standard aperture of 6.78 cm with a correction of 0.019 magnitudes per centimeter for refractors and 0.066 magnitudes per centimeter for reflectors (Morris, 1973). In addition to the aperture correction, all data is inspected and personal offsets per comet per observer are determined to minimize observer and observational biases beyond the standard aperture correction. **Table 4** contains magnitude offsets for each observer per comet. A value of "0.0" means no correction was necessary while a blank value means the observer did not report a magnitude estimate for that particular comet. Digital photometry derived from images are not corrected for aperture but may be corrected with personal offsets.

The Well-Observed Comets of 2019

260P/McNaught

Robert McNaught discovered 260P/McNaught on 2005 May 20 with the 0.5-m Uppsala Schmidt at Siding Spring Observatory in Australia during the course of the Siding Spring Survey. At discovery, the comet was magnitude 17.3 and received the designation P/2005 K3 (McNaught). With an orbital period of ~7 years, it returned to perihelion in 2012 and 2019. Following its recovery in 2012, the comet was officially numbered as 260P/McNaught. A peak brightness around magnitude 14-15 was reached in 2005. It became even brighter in 2012 at magnitude 11-12.

The 2019 return was very similar to the 2012 return but with a slightly smaller minimum Earth-comet distance (0.56 vs 0.58 au), smaller perihelion distance (1.42 vs 1.50 au) and early September perihelion date (September 9 vs September 12). The JPL Horizons ephemeris service (*https://ssd.jpl.nasa.gov/horizons/*) was used to conduct an analysis of the changing orbit of 260P (**Figure 2**). The 2012 and 2019 returns were the most favorable returns between 1940 and 2100. Future returns will see larger Earth-comet distances with a close approach to Jupiter in ~1.8 au in 2063 precluding approaches to Earth as close as in 2012 and 2019.

(See **Table 5**. Orbital elements published by Syuichi Nakano)

- **Epoch** is the date the orbital elements are valid for.
- **T** is the date of perihelion
- **q** is the perihelion distance
- ***e*** is eccentricity
- **a** is semi-major axis
- **Peri** is the argument of perihelion
- **Node** is the longitude of ascending node
- **Inc** is inclination
- **P** is the orbital period.

Photometry submitted to the ALPO with the addition of Michael Lehmann

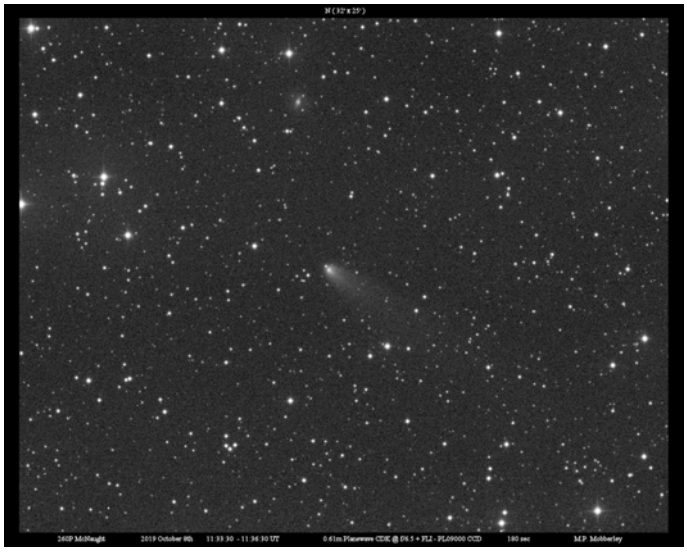

Figure 5. (above left) 260P/McNaught as imaged by Tenho Tuomi from Lucky Lake, Saskatchewan, Canada on 2019 September 22 with a 0.3-m f/5 reflector. The image was produced by co-adding 19 x 60-s exposures.

Figure 6. (above right) On 2019 October 8, Martin Mobberley caught 260P and its tail with an iTelescopes 0.61-m f/6.5 CDK and FLI PL09000 CCD in a 180-s exposure.

Table 5. Orbital elements published by Syuichi Nakano on Nakano Note 3870 (*http://www.oaa.gr.jp/~oaacs/nk/nk3870.htm*)

Epoch	=	2019 Aug. 25.0 TT
T	=	2019 Sept. 9.9566
q	=	1.41672 au
e	=	0.60878
a	=	3.62125 au
Peri.	=	18.38899 deg
Node	=	349.35550 deg
Inc.	=	15.05222 deg
P	=	6.891 years

contributions to the COBS website covered an observational arc of 228 days (2019 June 30 through 2020 February 13). Images submitted to the Comets Section covered a shorter arc of 65 days (2019 August 30 to November 3).

260P was recovered on 2019 March 2 at the Pierre Auger Observatory in Malargue, Argentina. On that date, the comet was 1.99 au from the Sun, 1.93 au from Earth, and a morning object at a solar elongation of 78°. The first observation submitted to the ALPO Comets Section was made on June 30 by Raymond Ramlow when the comet was magnitude 14.6 and located at 1.62 au from the Sun, 1.12 au from the Earth and a solar elongation of 99° in the morning sky.

The last ALPO observation was made on 2019 December 28 by Chris Wyatt who observed the comet visually at magnitude 13.2 when it was an evening object at a solar elongation of 130°, 1.84 au from the Sun and 1.05 au from Earth. Michael Lehman's set of observations submitted to the COBS site extended the range of observations until 2020 February 13 when he observed the comet at magnitude 15.1.

The last published observation by the Minor Planet Center was made on 2020 March 10 by Denis Buczynski at the Tarbatness Observatory in Portmahomack, Scotland.

Perihelion occurred on 2019 September 9 at 1.42 au with closest approach to Earth on 2019 October 3 at 0.56 au. Over the course of the ALPO observation period, 260P traveled primarily to the northeast through the constellations of Cetus (2019 June 30 - July 30), Pisces (July 30 - August 14), Aries (August 14 - September 17), Triangulum (September 17 - September 22), Perseus (September 22 - October 31), Andromeda (October 31 - December 25), opposition on November 4, maximum solar elongation of 146° on November 14 and back into Perseus (December 25 - 2020 February 13). It was a morning object from June through early November before moving into the evening sky.

An analysis of the comet's lightcurve found 260P's apparent brightness peaked 32 days after perihelion at around magnitude 10.6 during the first half of October (**Figure 3**). The best fit photometric equation is:

$$m_1 = 9.1 + 5 \log \Delta + 18.2 \log r \, (T - 32)$$

where (T - 32) means the comet's peak intrinsic brightness occurred 32 days after the perihelion date (T) (**Figure 4**).

Most observers consistently reported 260P to be a moderately condensed object with a coma that reached a visual maximum around 2.5 arc-minutes. Imagers observed a larger coma up to 6.7 arc-minutes in diameter. Almost all observers reported a tail. The longest visual measurements were on the order of ~5 arc-minutes in length while imagers were able to detect a tail up to 0.7° in length (**figures 5 and 6**). Chris Wyatt used a Lumicon Swan band filter

Figure 7. (above left) C/2018 N2 was still visible in 2021 as seen in this image by Denis Buczynski taken on 2021 May 3 with a C11 SCT at f/6 and ASI 1600MM Pro camera.

Figure 8. (above right) C/2018 N2 (ASASSN) displaying a long dust tail on 2019 October 19 in an image taken by Gregg Ruppel with an ASA 10N 0.25-m f/3.7 astrograph located in Animas, NM. The image is a LRGB composite with exposures of 10:10:10:10 minutes.

during his visual observations. (The Swan band filter is a narrow band filter that isolates the OIII and C2) emissions lines. Gas-rich comets will appear brighter when viewed through a Swan band filter. Wyatt reported that the filter dimmed 260P, which suggests that most of the observed signal from the comet was due to dust and not gas.

C/2018 N2 (ASASSN)

Comet C/2018 N2 (ASASSN) was discovered on 2018 July 7 by the "All-Sky Automated Survey for Supernovae" (ASAS-SN) program with their 14-cm "Cassius" telescope hosted at the Cerro Tololo Observatory in Chile. At discovery, the comet was a 16th magnitude object located in southern Eridanus at -40° declination. It is a dynamically old long-period comet that was last at perihelion ~160,000 years.

(See **Table 6**. Orbital elements published by Syuichi Nakano)

Since C/2018 N2 is a long-period comet, its orbital elements contain a few additional parameters that weren't included above in the orbital elements of 260P/McNaught.

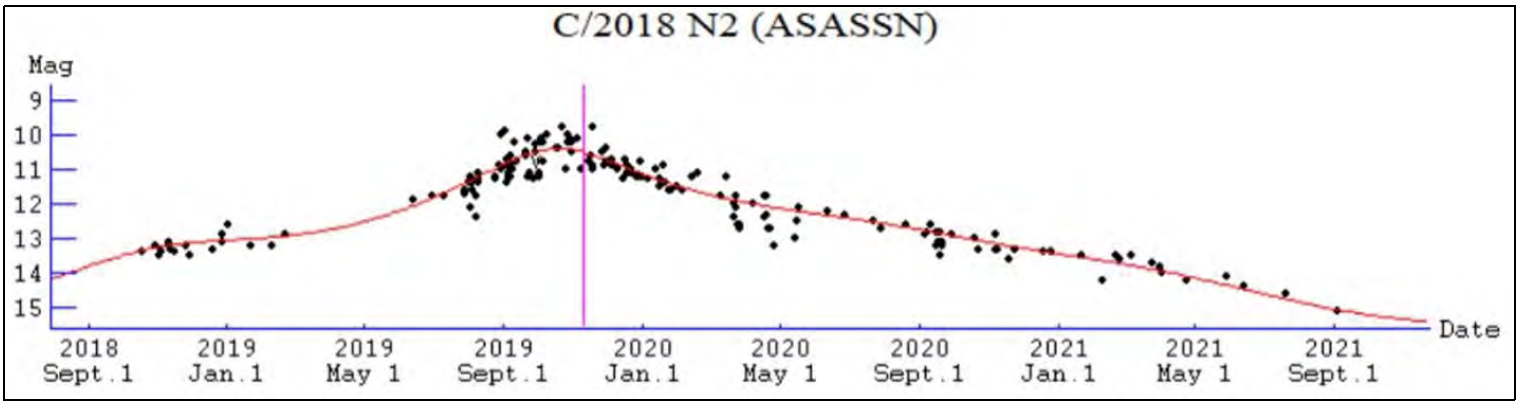

Figure 9. Apparent magnitude lightcurve of comet C/2018 N2 (ASASSN). The single 'v' point is a limiting magnitude for an observation that did not detect the comet.

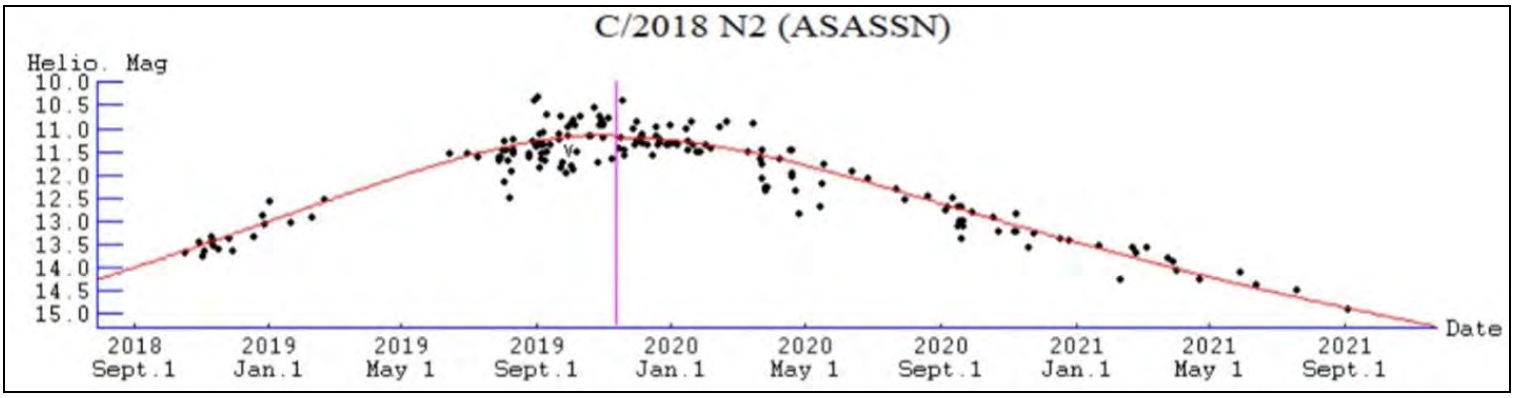

Figure 10. Heliocentric magnitude lightcurve of C/2018 N2 (ASSASN). The single 'v' point is a limiting magnitude for an observation that did not detect the comet.

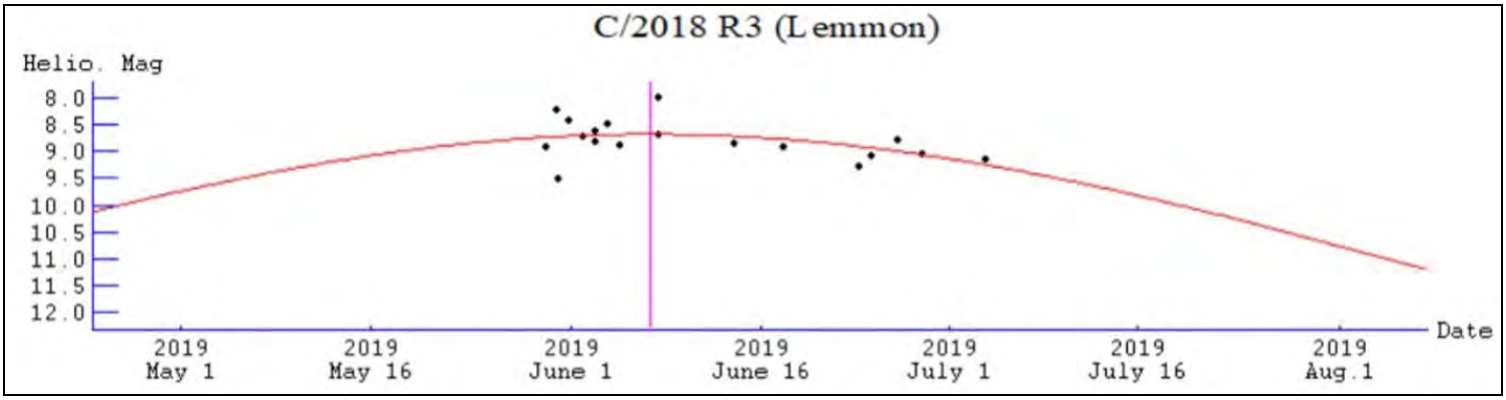

Figure 11. Apparent magnitude lightcurve of comet C/2018 R3 (Lemmon).

Table 6. Orbital elements published by Syuichi Nakano on Nakano Note 4334 (*http://www.oaa.gr.jp/~oaacs/nk/nk4334.htm*)

Epoch	=	2019 Nov. 13.0 TT
T	=	2019 Nov. 10.9599
q	=	3.12464 au
e	=	1.00016
Peri.	=	24.39559 deg
Node	=	25.25926 deg
Inc.	=	77.53196 deg
1/a	=	-0.00005 au^{-1}
Origin	=	+0.00034 au^{-1}
Future	=	-0.00026 au^{-1}

- **1/a** is the inverse of the semi-major axis.

- **Origin** is the original 1/a value which is the 1/a value prior to experiencing any gravitational perturbations by the major planets and gives an indication of the comet's inbound semi-major axis and orbital period, i.e., when the comet was last at perihelion. Values greater than +0.0001 au^{-1} are an indication that the comet is dynamically old and has passed close to the Sun at least once in the past (Levison 1996). Smaller or negative values of 1/a indicate a dynamically new object making its first passage close to the Sun.

- **Future** is the comet's outbound 1/a value and indicate when or even if a comet will experience another close perihelion passage.

Unlike the other four well-observed comets in this analysis, C/2018 N2 has a large perihelion distance at 3.12 au. To put this in perspective, Mars' average distance from the Sun is 1.52 au and Jupiter's is 5.20 au, so C/2018 N2 passed the Sun at a distance comparable to the middle of the Main Asteroid Belt. With an inclination of 77°, the comet traveled roughly perpendicular to the Earth's orbital plane in a south-to-north direction.

ALPO Comets Section observations spanned a large observational arc of 1,087 days between 2018 October 18 and 2021 October 9. During that time, C/2018 N2 moved through the constellations of Phoenix (2018 October 18 - December 11), Sculptor (December 11 - 2019 February 4), Cetus (February 4 - July 11), Solar Conjunction on April 19, Aries (July 11 - September 15), Triangulum (September 15 - October 11), Andromeda (October 11 - 2020 March 10), Opposition on October 15, Cassiopeia (March 10 - June 18), Solar Conjunction on March 26, Minimum Solar Elongation at 48° on April 14, Cepheus (June 18 - July 24), Camelopardalis (July 24 - August 30), Ursa Minor (August 30 - October 15), Draco (October 15 - 2021 April 5), back into Ursa Minor (April 5 - May 23), Draco again (May 23 - June 17), Ursa Major (June 17 - September 4) and Canes Venatici (September 4 - October 9).

The first observation submitted was by Raymond Ramlow who used an *iTelescopes* 0.106-m (4-in.), f/5 refractor to image on 2018 October 18. The comet was magnitude 13.4 with a 1 arc-minute coma. That date was 388 days before perihelion with the comet 4.78 and 4.17 au from the Sun and Earth, respectively.

The first visual observation was made only a few nights later, on October 30, when Chris Wyatt estimated the comet at magnitude 13.2. Subsequent observations followed a steady brightening as C/2018 N2 reached magnitude 12.0 by mid-June 2019, 11.0 in late August and a peak brightness of magnitude 10.4 in October. The comet's large perihelion distance resulted in a gradual brightness change. By the end of 2019, the comet was still within a

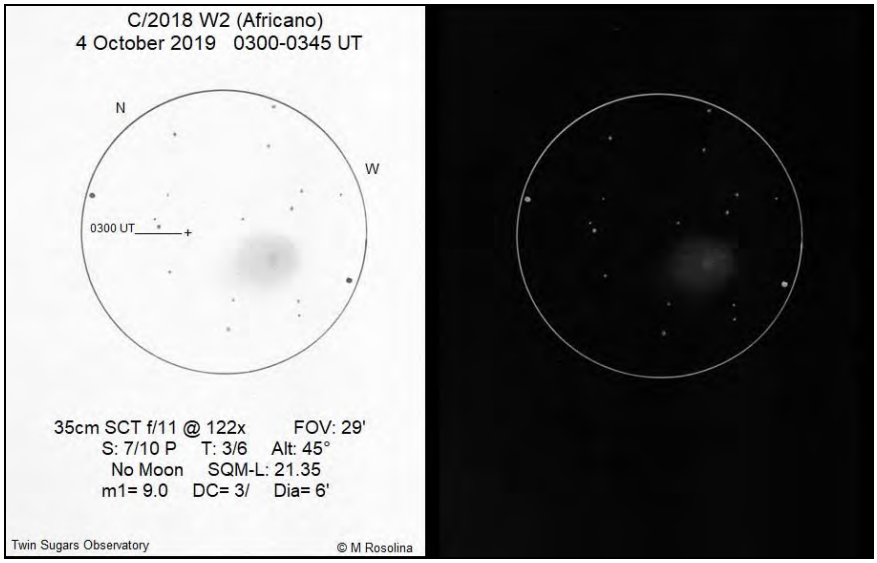

Figure 12. (above left) Visual sketch of C/2018 W2 by Michael Rosolina with a 0.35-m f/11 SCT at 122 magnification on 2019 October 4.

Figure 13. (above right) image of C/2018 W2 (Africano) as seen by John D. Sabia on 2019 September 28 in a co-added 20 x 42 second image taken with a Borg 77mm refractor.

magnitude of its peak brightness at magnitude 11.1.

Though the last observation in our analysis was made by Michael Lehmann on 2021 September 3 when the comet was magnitude 15.1, 662 days after its perihelion and 6.64 au from the Sun, observations continue to be reported by the Minor Planet Center (**Figure 7**). As of February 2022, the comet was still being observed around magnitude 18-19.

Many imaging and visual observations reported a tail. Visual observers detected a tail up to 5 arc-minutes long while imagers could follow the tail out to ~0.25° (**Figure 8**).

Figure 14. A color image of C/2018 W2 (Africano) showing its blue-green gas coma. This image was taken on 2019 September 21 by Chris Schur from Payson, Arizona with a 0.2-m f/4 Orion Astrograph. It is a combination of 62-min worth of images.

An analysis of the comet's brightness found its apparent brightness to have peaked around opposition in October 2019 (**Figure 9**) while its intrinsic brightness peaked roughly around the time of perihelion (**Figure 10**). Two different photometric parameter equations were fit to the data. They show that the comet faded after perihelion at a slower rate than it brightened prior to perihelion.

$m_1 = 4.4 + 5 \log \Delta + 8.6 \log r$ *[pre-perihelion]*

$m_1 = 5.6 + 5 \log \Delta + 6.3 \log r$ *[post-perihelion]*

Like 260P, Wyatt used a Swan band filter to observe C/2018 N2. Also similar to 260P, C/2018 N2 looked fainter in the Swan band filter, suggesting most of the observed light was due to dust and not gas.

C/2018 R3 (Lemmon)

Brian Africano discovered C/2018 R3 (Lemmon) on 2018 September 7 at 19th

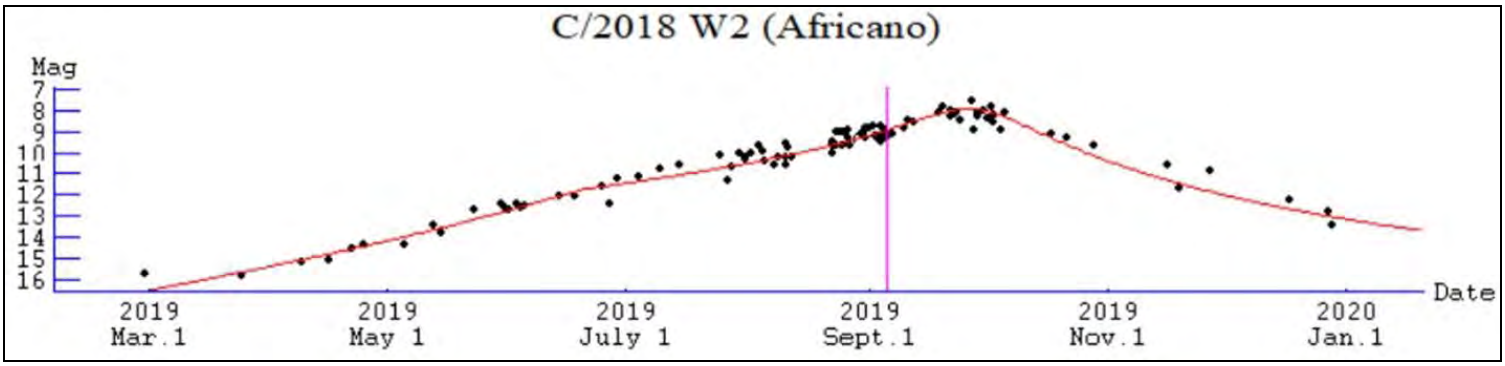

Figure 15. Apparent magnitude lightcurve of C/2018 W2 (Africano).

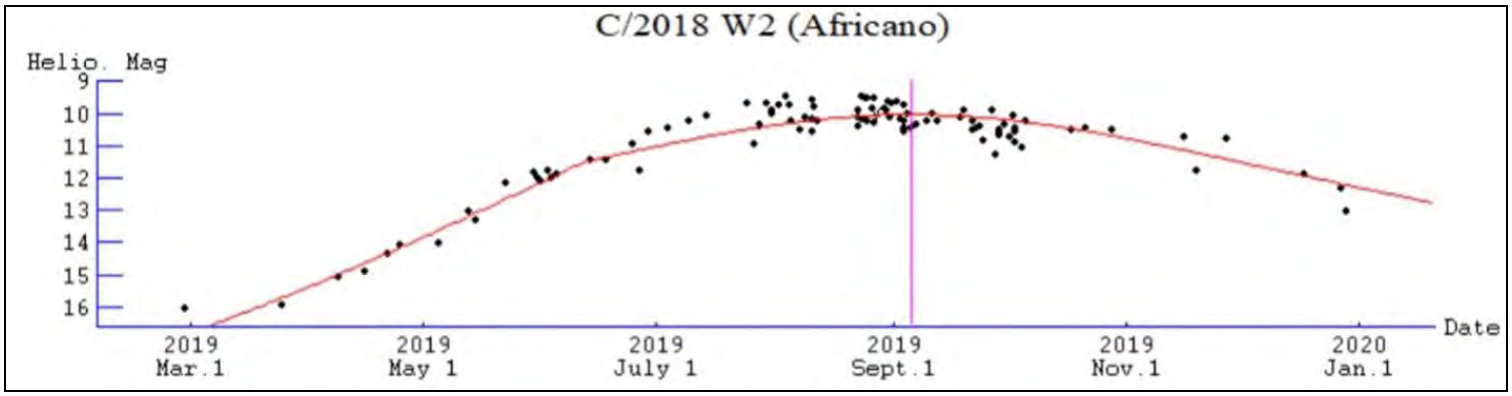

Figure 16. Heliocentric lightcurve of C/2018 W2 (Africano). The heliocentric magnitude is derived by corrected the observed apparent magnitude for distance to the Earth.

magnitude with the Mount Lemmon Survey 1.5-m telescope. The object was reported as an inactive asteroid at the time of discovery. As a result, it was named after the discovery telescope rather than the individual discoverer. At discovery, the comet was located 3.76 au from the Sun and 2.82 au from the Earth.

C/2018 R3 is a dynamically old, long-period comet with an original 1/a value of +0.00059 au^{-1} that corresponds to a previous perihelion passage ~70,000 years ago. With a future 1/a value of +0.00066 au^{-1}, its future orbital period will be shorter, though it still is not expected back for another ~59,000 years.

(See **Table 7**. Orbital elements published by Syuichi Nakano)

The ALPO received 10 visual magnitude measurements and a single image of C/2018 R3. In combination with CCD magnitude measurements submitted to the COBS site by Michael Lehmann, a lightcurve was determined for data taken between 2019 May 29 and July 3 (**Figure 11**):

$$m_1 = 5.5 + 5 \log \Delta + 23.5 \log r$$

On May 29, the comet was eight days before perihelion at 1.30 au from the Sun and 1.93 au from Earth. The lack of data prior to 2019 May 29 suggests the comet was too faint for visual observations. This would mean that the photometric index of 23.5 was even greater before May 29. This is confirmed by observations published by the Minor Planet Center and COBS, which show the comet around 13-14th magnitude in early May.

On the date of the last observations (July 3), C/2018 R3 was 26 days after perihelion, 1.35 au from the Sun and 2.19 au from Earth. The lack of observations after July 3 was due to a decreasing solar elongation that made further observations difficult. The Minor Planet Center archives do contain photometry produced after solar conjunction between November 2019 and March 2020. The last observation of C/2018 R3 published by the Minor Planet Center was from the Mount John Observatory in New Zealand. On 2020 March 3, Mount John observers measured the comet at magnitude 21.0 to 21.2. The comet was almost nine months after its perihelion and located 3.73 and 3.00 au from the Sun and Earth, respectively.

Table 7. Orbital elements published by Syuichi Nakano on Nakano Note 4053
(*http://www.oaa.gr.jp/~oaacs/nk/nk4053.htm*)

Epoch	=	2019 June 6.0 TT
T	=	2019 June 7.1975
q	=	1.29060 au
e	=	0.99937
Peri.	=	112.87572 deg
Node	=	324.62524 deg
Inc.	=	69.71502 deg
1/a	=	+0.00049 au^{-1}
Origin	=	+0.00059 au^{-1}
Future	=	+0.00066 au^{-1}

The comet above lightcurve shows the comet peaking around magnitude 9.6 in early June. Visual observations at that time reported a wide range of coma diameters (between 2.5 and 10 arc-minutes), a consistently diffuse coma (degree of condensation between 2 and 3.5 on a 0-9 scale) and no evidence of a tail.

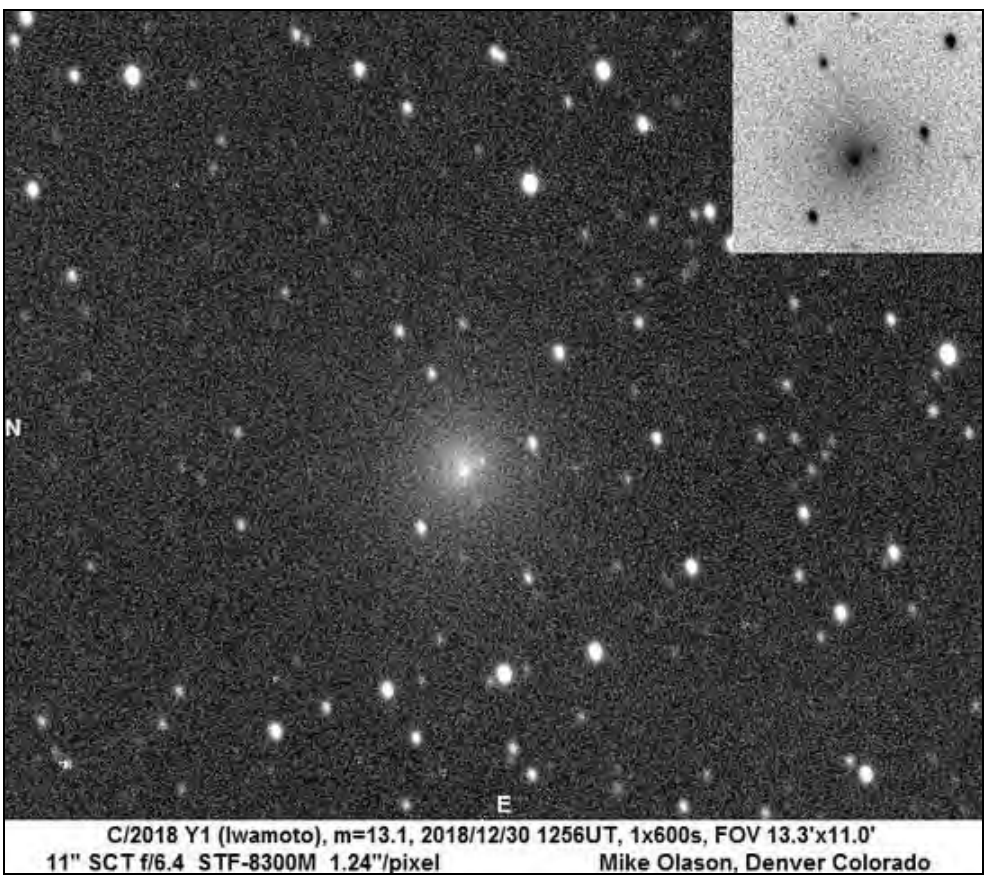

Figure 17. Michael Olason caught C/2018 Y1 (Iwamoto) only a few weeks after its discovery with a C11 SCT @ f/6.4 and STF-8300M camera in this 600-s exposure.

C/2018 W2 (Africano)

C/2018 W2 (Africano) was discovered nearly simultaneously on 2018 November 27 by Hannes Gröller with the Catalina Sky Survey 0.68-m Schmidt and Brian Africano with the Mount Lemmon 1.5-m reflector. Both telescopes are part of the Catalina Sky Survey and situated in the Santa Catalina Mountain range north of Tucson, AZ, USA. Though Gröller obtained the earlier observations, Africano was the first to submit his discovery to the Minor Planet Center and received discovery credit. At discovery, C/2018 W2 was 18th magnitude and located 3.81 and 3.88 au from the Sun and Earth, respectively.

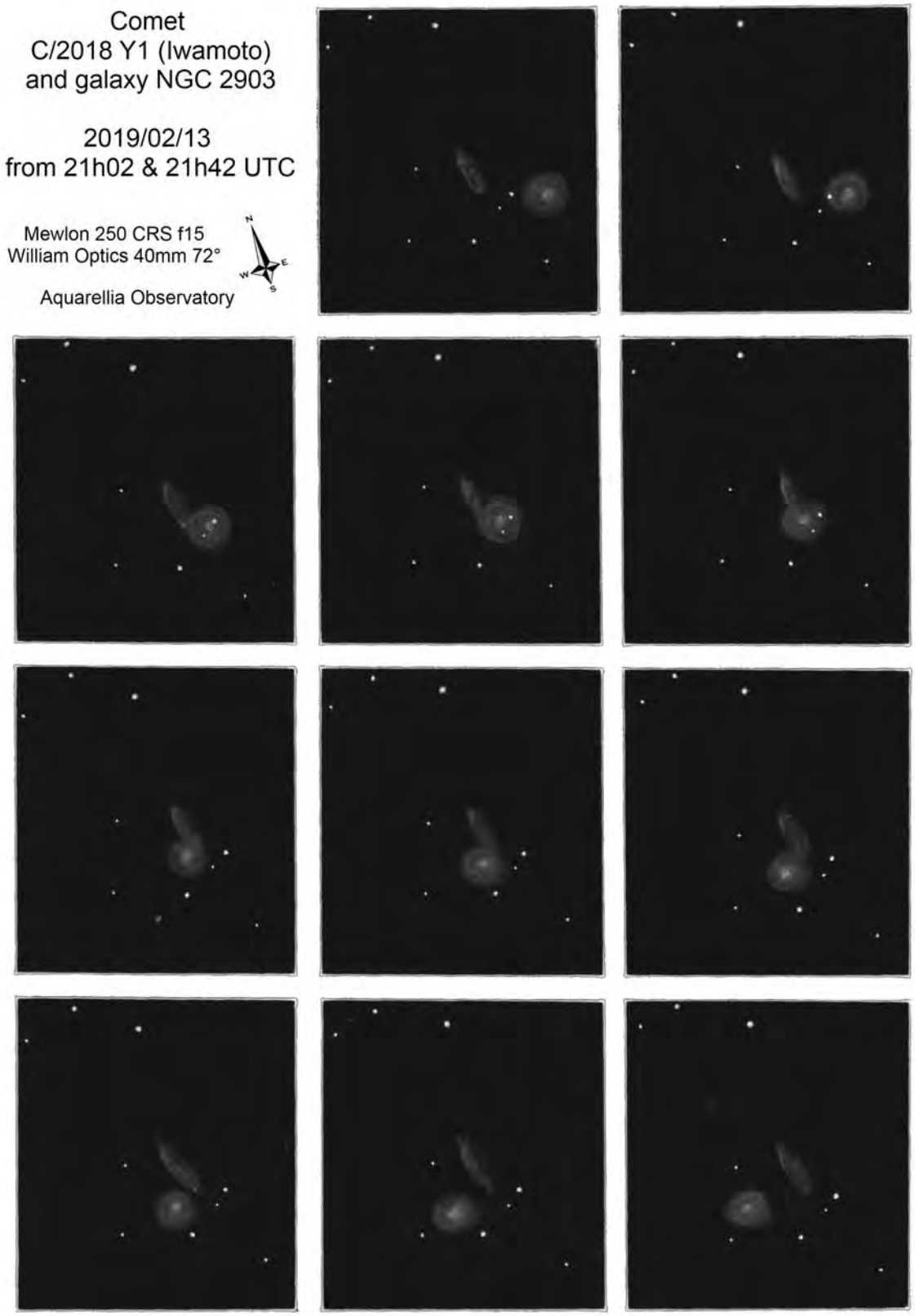

Figure 18. Michel Deconinck made a sequence of sketches on 2019 February 13 as C/2018 Y1 (Iwamoto) passed over the bright 9th magnitude galaxy NGC 2903 in Leo. The entire sequence spans 40 minutes and highlights the comet's rapid motion at close .

C/2018 Y1 is a dynamically old, long-period comet. An original 1/a value of +0.00049 au^{-1} corresponds to a previous perihelion passage ~90,000 years ago. Due to gravitational perturbations by the planets, C/2018 Y1 is now on a hyperbolic orbit and destined to escape our Solar System. With an inclination of 116°, its orbit is 26° from perpendicular to the Earth's orbital plane with the comet moving from the north to south during the time surrounding perihelion on 2019 September 5 at 1.45 au from the Sun. Closest approach to Earth occurred a few weeks after perihelion on 2019 September 27 at 0.49 au from Earth.

(See **Table 8**. Orbital elements published by Syuichi Nakano)

Between the dates covered by Comets Section observations, the comet moved southwestward through the constellations of Ursa Minor (2019 February 27 - March 12), Cepheus (March 12 - April 8), Cassiopeia (April 8 - May 2),

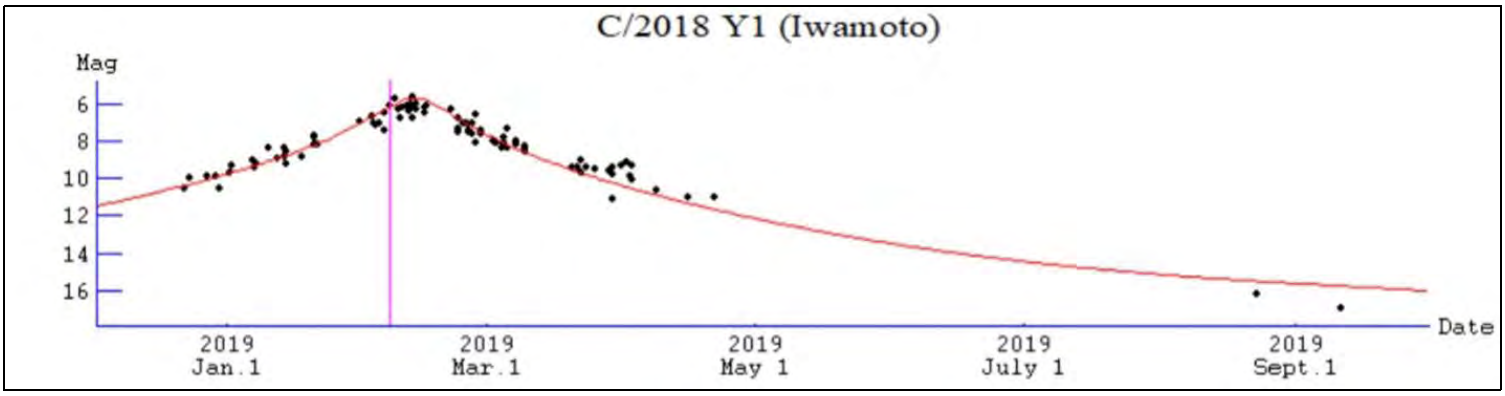

Figure 19. Apparent magnitude lightcurve of C/2018 Y1 (Iwamoto).

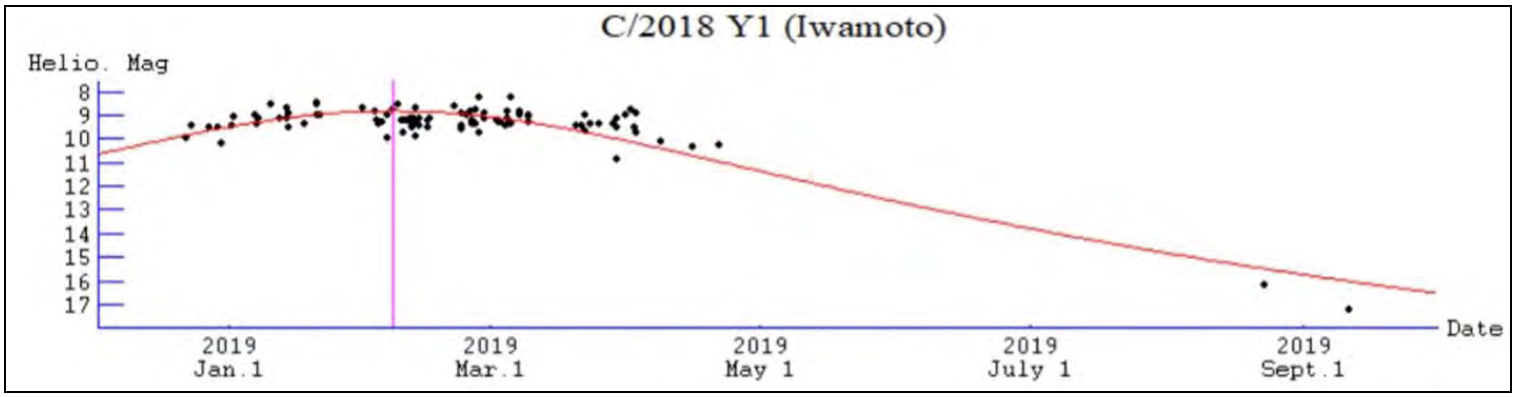

Figure 20. Heliocentric lightcurve of C/2018 Y1 (Iwamoto). The heliocentric magnitude is derived by corrected the observed apparent magnitude for distance to the Earth.

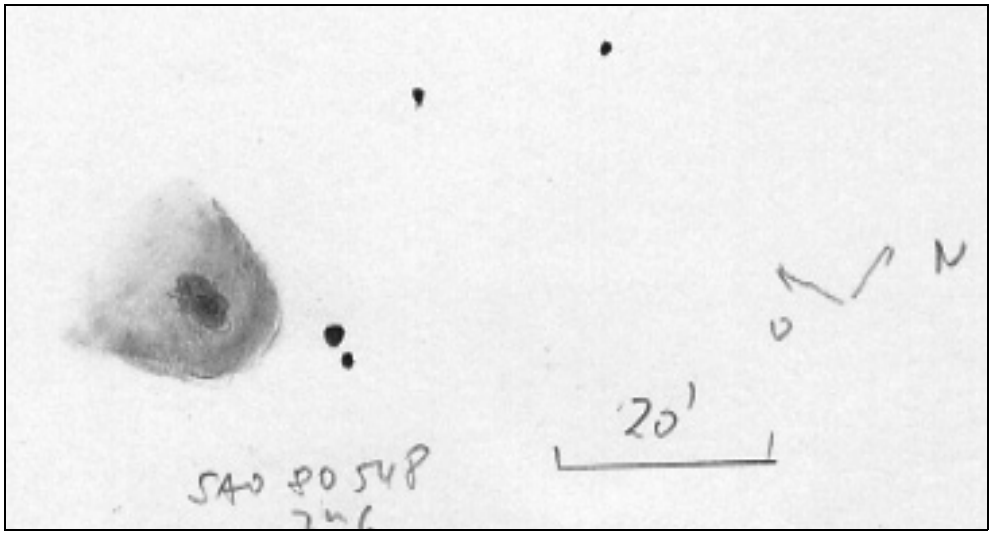

Figure 21. Visual sketch of C/2018 Y1 (Iwamoto) by Uwe Pilz of Leipzig, Germany on 2019 February 15 with a 0.07-m refractor.

Table 8. Orbital elements published by Syuichi Nakano on Nakano Note 3918 (*http://www.oaa.gr.jp/~oaacs/nk/nk3918.htm*)

Epoch	=	2019 Aug. 25.0 TT
T	=	2019 Sept. 5.7295
q	=	1.45467 au
e	=	1.00076
Peri.	=	157.97319 deg
Node	=	181.84961 deg
Inc.	=	116.61563 deg
1/a	=	-0.00052 au^{-1}
Origin	=	+0.00049 au^{-1}
Future	=	-0.00033 au^{-1}

Camelopardalis (May 2 - August 31), solar conjunction on May 23, minimum solar elongation of 41° on June 14, back and forth between Perseus and Andromeda (August 31 - September 25), opposition on September 25, Pegasus (September 25 - 29), maximum solar elongation of 168° on September 29, Pisces (September 29 - October 3), Aquarius (October 3 - 14), Pisces Austrinus (October 14 - 27) and Grus (October 27 - December 28).

At discovery, the comet was a morning object with a solar elongation of 79°. The first imaging observation reported to the COBS site by Michael Lehmann was made on 2019 February 27 when the comet was 2.88 au from the Sun, 2.54 au from Earth, and 189 days before perihelion. Lehmann measured the comet at magnitude 15.8 with a 0.7 arc-minutes coma and short, 0.01°, tail.

The first imaging observation reported to the ALPO was made on 2019 April 25 by Raymond Ramlow with an *iTelescopes* 0.106-m (4-in.) f/5 refractor. Ramlow reported a 0.8 arc-minute coma at magnitude 14.4. The earliest visual observation sent to the ALPO was by Christian Harder on 2019 May 30 when the comet was 1.99 au from the Sun, 2.61 au from Earth and 97 days prior to perihelion. Harder estimated the comet to be a diffuse object at magnitude 13.1 with a 0.5 arc-minute diameter coma.

The comet rapidly brightened as it approached both perihelion and the Earth reaching magnitude 12 in mid-June, 11 in mid-July, 10 in mid-August, 9 in early September and peaking around magnitude 8 at the time of closest approach to Earth in late September. At closest approach, the coma was visually reported to be as large as 13 arc-minutes in diameter (Chris Wyatt on September 24 in 7x50 binoculars). As a visual object, the comet was generally described as diffuse with a small condensed inner coma (**Figure 12**). On September 28, a maximum sky motion of 3.7° per day was reached.

An even larger coma was detected in images up to 31 arc-minutes in diameter (Lehmann on September 27). Only Juan Jose Gonzalez reported a tail visually. On September 28, he measured a 0.3° long tail in 25x100 binoculars. A tail was often visible in images with the longest report being by Lehmann at 0.7° on September 27. John D. Sabia was able to image the coma and inner extent of C/2018 W2's tail on September 28 with a Borg 0.077-m (3-in.) f/6.6 refractor (**Figure 13**). Wyatt observed C/2018 W2 with a Swan band filter and found the comet to be visually enhanced in the filter, suggesting a gas-rich coma, something confirmed by the strong blue-green coma visible in color images (**Figure 14**).

Following peak brightness, the last reported observation was made by Wyatt on 2019 December 28. By that date, the comet was 113 days after its perihelion, had faded to magnitude 13.5 and receded to distances of 2.13 and 2.66 au from the Sun and Earth.

An analysis of the comet's heliocentric brightness found its apparent brightness to have peaked around the time of closest approach to Earth (**Figure 15**) while its intrinsic brightness peaked a few weeks prior to perihelion (**Figure 16**). The best fit photometric equation for the data submitted to the ALPO and Lehmann's observations is:

$$m_1 = 7.9 + 5 \log \Delta + 8.2 \log r \; [inf, -80]$$

$$m_1 = 7.8 + 5 \log \Delta + 8.7 \log r \; (T+16) \; [inf, -80]$$

where:

- [XX, XX] is date range valid for the photometric equation in days from perihelion.
- A '-' denotes days before perihelion and a '+' denotes days after perihelion.
- *inf* is infinity.
- (T + 16) means the comet's activity was greatest 16 days *before* perihelion.

The two equations show a change in the rate of intrinsic brightening around 80 days prior to perihelion.

C/2018 Y1 (Iwamoto)

Masayuki Iwamoto of Awa, Tokushima, Japan, discovered C/2018 Y1 (Iwamoto) at 11th magnitude on 2018 December 18 on images obtained with a 10-cm (4 in.), f/4.0 Pentax SDUF II telephoto lens and Canon EOS 6D camera. This was Iwamoto's third comet discovery and second of 2018 after C/2018 V1 (Machholz-Fujikawa-Iwamoto), a discovery he shared with former ALPO Comets Section Recorder Don Machholz.

C/2018 Y1 is a dynamically old, long-period comet with an original 1/a value of +0.00697 au^{-1} corresponding to a previous perihelion passage around the year 300 AD. Its future 1/a value of +0.00779 au^{-1} means its next perihelion will be sometime around the year 3470.

(See **Table 9**. Orbital elements published by Syuichi Nakano)

At discovery, the comet was located 1.49 au from the Sun and 1.97 au from Earth at a low solar elongation of 47° in the morning sky. A retrograde inclination of 160° resulted in the comet rapidly approaching Earth. Perihelion occurred on 2019 February 7 at 1.29 au when the comet was 0.38 au from Earth. This was followed a few days later by a close approach to Earth on February 12 at 0.30 au and opposition on February 13 after which it became an evening object.

Between the dates covered by Comets Section observations, the comet rapidly moved westward through the

Table 9. Orbital elements published by Syuichi Nakano on Nakano Note 3919
(*http://www.oaa.gr.jp/~oaacs/nk/nk3919.htm*)

Epoch	=	2019 Feb. 6.0 TT
T	=	2019 Feb. 7.0295
q	=	1.28699 au
e	=	0.99107
Peri.	=	358.05611 deg
Node	=	147.48353 deg
Inc.	=	160.40345 deg
1/a	=	+0.00694 au^{-1}
Origin	=	+0.00697 au^{-1}
Future	=	+0.00779 au^{-1}

constellations of Hydra (2018 December 22 - 2019 January 12), Virgo (January 12 - February 8), Leo (February 8 - 14), opposition (February 13), Cancer (February 14 - 17), Gemini (February 17 - 21), Auriga (February 21 - March 16), Perseus (March 16 - April 21), solar conjunction (June 1), Auriga (June 5 - 24) and Perseus again (June 24 - September 11).

C/2018 Y1 was already bright enough for visual observations at discovery. The first Lehmann observation was made on 2018 December 22 when the comet was measured at magnitude 10.5. The first visual observation submitted to the Comets Section was made by Chris Wyatt on December 30 also at magnitude 10.5 (see **Figure 17** for an image taken by Michael Olason on the same date). Due to the comet's rapidly decreasing range to Earth, it quickly brightened to magnitude 9 in mid-January, 8 in late January, 7 by February 1, and reached a peak around between magnitude 5.5 and 6.0 at the time of closest approach to Earth. Juan Jose Gonzalez was able to make a naked eye detection on the nights of February 12 and 13 when he estimated a brightness of magnitude 6.0. During closest approach, the comet was moving at a rapid rate of over 7° per day. The rapid motion is evident in sketches made by Michel Deconinck over the course of 40 minutes on February 13 when the comet was passing near the bright 9th magnitude galaxy NGC 2903 in Leo (**Figure 18**).

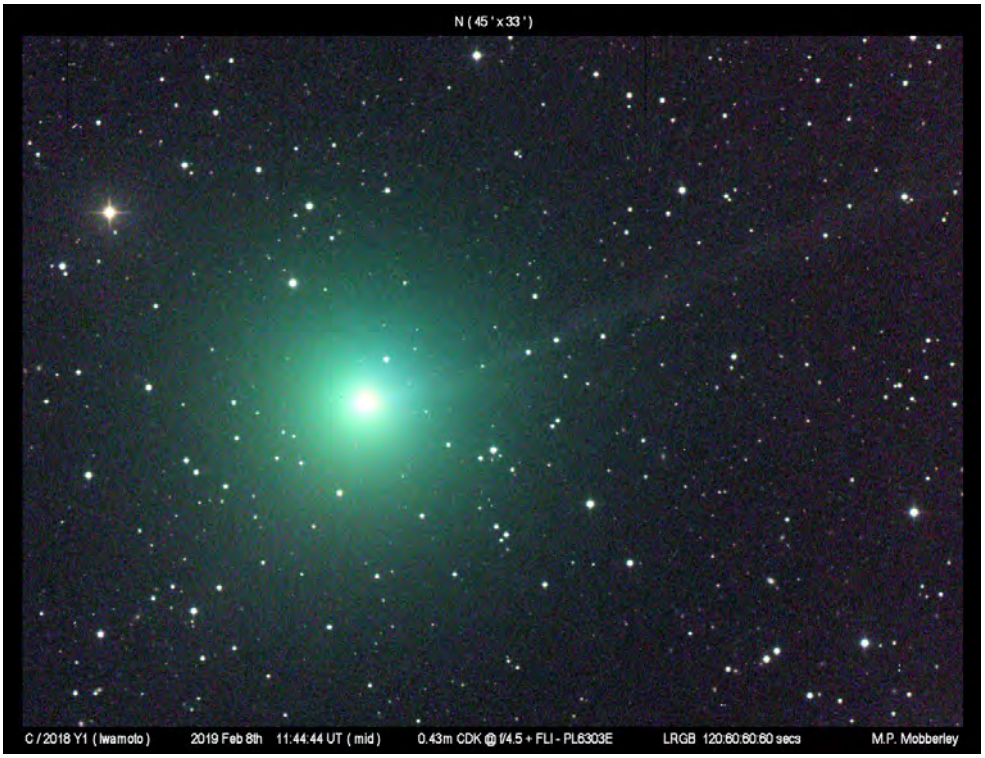

Figure 22. The blue-green gas coma of C/2018 Y1 (Iwamoto) is evident in this image taken by Martin Mobberley on 2019 February 8. A faint narrow tail is visible extending to the upper right of the coma.

An analysis of the comet's heliocentric brightness found a peak apparent brightness around the time of closest approach to Earth (**Figure 19**) while its intrinsic brightness peaked around the time of perihelion (**Figure 20**). The best fit photometric equation is valid for the entirety of the observation range.

$$m_1 = 6.8 + 5 \log \Delta + 13.5 \log r$$

Around the time of closest approach to Earth, visual observers measured a coma as large as 35 arc-minutes in diameter. The diffuse nature of the coma is evident in the sketch by Uwe Pilz on February 15 in **Figure 21**. Imagers measured an even larger coma with diameters of nearly a degree. A thin gas tail was also observed. The largest imaging tail measurement was by Lehmann on February 8 at 1.2° while Juan Jose Gonzalez measured a 3.5° tail on February 3. As was the case with C/2018 W2, C/2018 Y1 was enhanced in visual observations by Wyatt through a Swan band filter. The comet's gas-rich nature was confirmed by images showing a heavily blue-green coma as seen in the image in **Figure 22** taken by Martin Mobberley on February 8.

Comparative Analysis

Directly comparing the aperture and bias corrected apparent magnitudes of each of the five well-observed comets in this study finds that C/2018 Y1 (Iwamoto) was the brightest comet as seen from Earth with a peak at magnitude 5.7. In order of decreasing brightness are:

- C/2018 W2 (Africano) at magnitude 7.9
- C/2018 R3 (Lemmon) at 9.6
- C/2018 N2 (ASASSN) at 10.4
- 260P/McNaught peaking at magnitude 10.6 (**Figure 23**)

After normalizing the brightness of each comet to a standard distance of 1 au from the Sun and Earth, C/2018 Y1 (Iwamoto) was also the intrinsically brightest comet, though C/2018 R3 (Lemmon) was only slightly fainter (Figure 24). Though C/2018 R3 was 3.9 magnitudes fainter than C/2018 Y1 at

their respective peaks in brightness, this difference in apparent brightness was the result of C/2018 R3 being located at a much larger distance from the Earth.

Acknowledgments

We acknowledge with thanks the comet observations from the COBS Comet Observation Database (https://www.cobs.si), Minor Planet Center (https://minorplanetcenter.net/iau/Ephemerides/Comets/index.html), and International Comet Quarterly (http://www.icq.eps.harvard.edu) contributed by observers worldwide and used in this research.

We would also like to thank the Jet Propulsion Laboratory for their Small-Body Browser (https://ssd.jpl.nasa.gov/tools/sbdb_query.html) and Orbit Visualizer (https://ssd.jpl.nasa.gov/tools/orbit_diagram.html) and Seiichi Yoshida for his "Comets for Windows" programs (http://www.aerith.net/project/comet.html) that contributed to the production of many of our plots.

Lastly, we'd like to thank Syuichi Nakano for his orbital elements (http://www.oaa.gr.jp/~oaacs/nk.htm), the Minor Planet Center for their astrometric and photometric database (https://www.minorplanetcenter.net/data), the asteroid surveys and dedicated comet hunters for their discoveries, and all of the observers who volunteer their time increasing our knowledge of these amazing objects.

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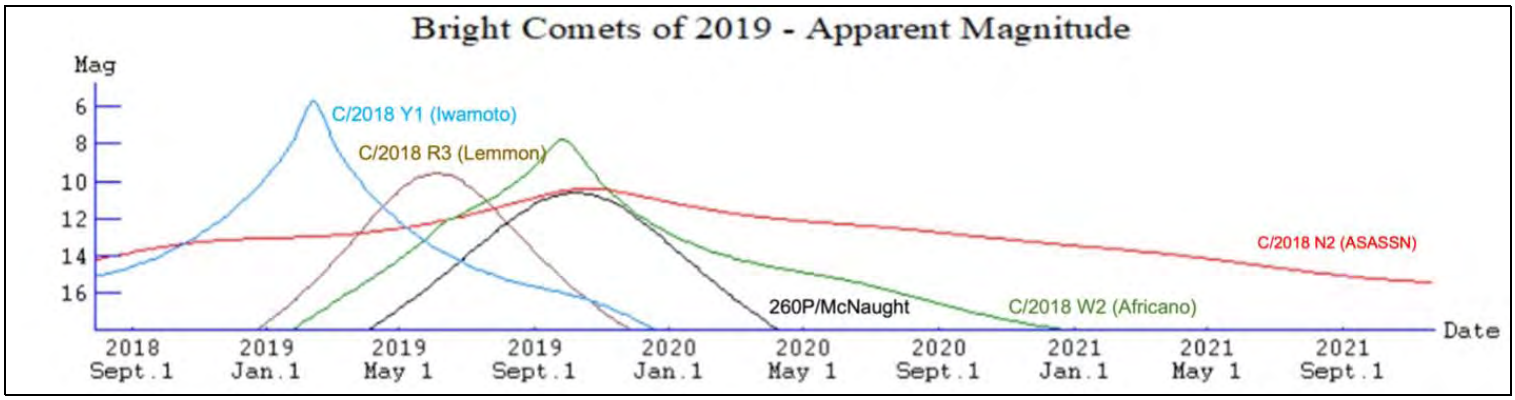

Figure 23. Comparison between the lightcurves fit to the observed apparent magnitude for the 5 comets studied in this analysis.

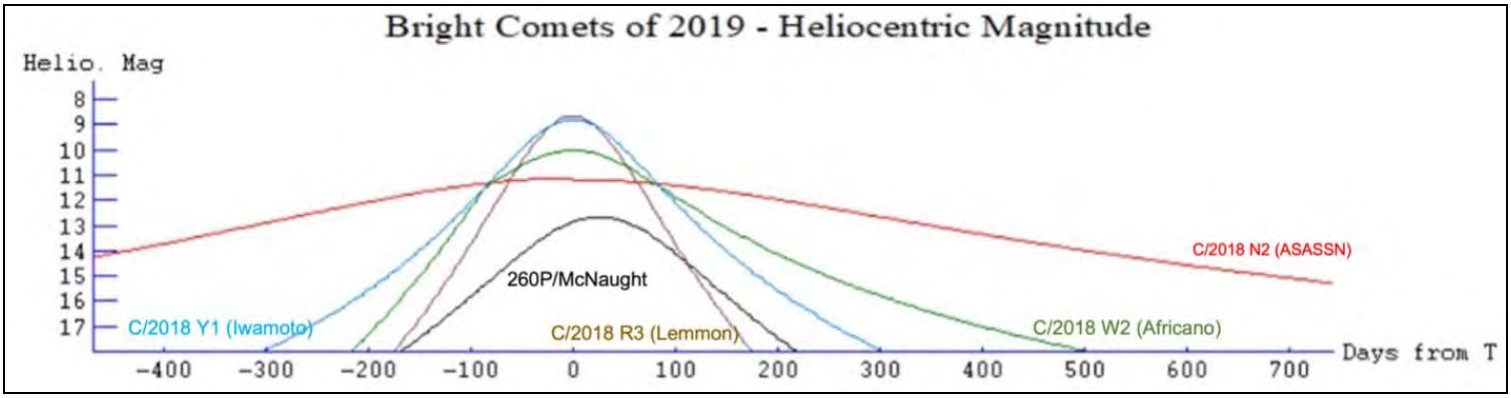

Figure 24. Heliocentric magnitude lightcurves for the 5 comets studied in this analysis. Since the heliocentric magnitudes are corrected for distance from the Sun and Earth, they allow a direct comparison between the absolute brightnesses of each object. Unlike the other figures where the calendar date is along the x-axis, this plot has days from perihelion along the x-axis.

Papers & Presentations

A Preview of the 2022-2023 Transitional Apparition of Mars

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Abstract

The nascent 2022-2023 apparition of Mars is described. It is a transitional apparition and it will favor observers in Earth's Northern Hemisphere. Observers are needed to monitor long-term changes in albedo features, the size of the polar caps, clouds that are expected to be prominent during this apparition, and the local and regional dust storms that are seen in every apparition.

This paper includes a number of color images of Mars, all of which can be viewed in full color in the pdf version of this Journal available to all ALPO members. To gain access to the pdf version of this publication, contact Matt Will, the ALPO membership secretary, at *matt.will@alpo-astronomy.org* for more information.

Overview of the Apparition

The new apparition of Mars is underway, having begun when Mars passed conjunction with the Sun on October 8th of 2021. The period between two solar conjunctions is called an *apparition*, and Mars apparitions are about 2.2 Earth years in duration. These apparitions have a repeating cycle so that the appearance of Mars -- its apparent size, brightness, and the Martian seasons that we observe -- will be much as they appeared 15.8 years earlier. This cycle is not exact, but the inaccuracy of repetition is ironed out to within 4 or 5 days in a longer cycle of about 79 Earth years. The apparitions are considered to be mostly *aphelic* (that is, far from the Sun) versus *perihelic* (that is, near the Sun) based on the location of Mars along its elliptical orbit at the time of opposition. However, this 2022-2023 apparition is considered *transitional* because on the date of opposition, Mars will be close to the halfway point between its aphelion and its perihelion.

Table 1. Important Dates of the 2022 – 2023 Mars Apparition

yyyy-mm-dd*	Event	Mag[X]	Diam†
2021-10-08	Opening conjunction	1.53	3.56
2022-05-13	Observing season begins	0.77	6.00
2022-08-27	Western quadrature	-0.04	9.50
2022-10-30	Retrograde motion begins	-1.18	14.94
2022-12-01	Closest approach	-1.90	17.20
2022-12-08	Opposition	-1.96	17.04
2023-01-12	Retrograde motion ends	-0.85	13.06
2023-03-16	Eastern quadrature	0.70	7.19
2023-04-12	Observing season ends	1.09	6.00
2023-11-18	Ending conjunction	1.36	3.71

* Dates are in universal time.
[X] Mean magnitude for the Martian sol.
† Diam is apparent subtended diameter in arc seconds.
Source: JPL Horizons ephemeris

Table 1 lists the salient dates of this apparition, along with the magnitude and apparent diameter of the planet on each of those dates. The dates, magnitudes, apparent diameters, and all other values used in this table and in the graphs of this article are taken from the *Horizons* ephemeris generator of the Jet Propulsion Laboratory (Solar System Dynamics Group, 2022). The classical visual observing season begins when the Earth draws sufficiently close to Mars that the latter will subtend about 6 arc seconds of the celestial sphere, and it ends when Earth has sped past Mars so that the Red Planet's apparent size has decreased to 6 arc seconds. However, with the improvements that have been made in amateur astronomical imaging in the last few decades, many observers

Online Features

Left-click your mouse on:

- The authors' e-mail addresses in blue text to contact them.
- The hyperlinks and source material references also in blue text to jump to source material or information about that source material (internet connection must be ON).

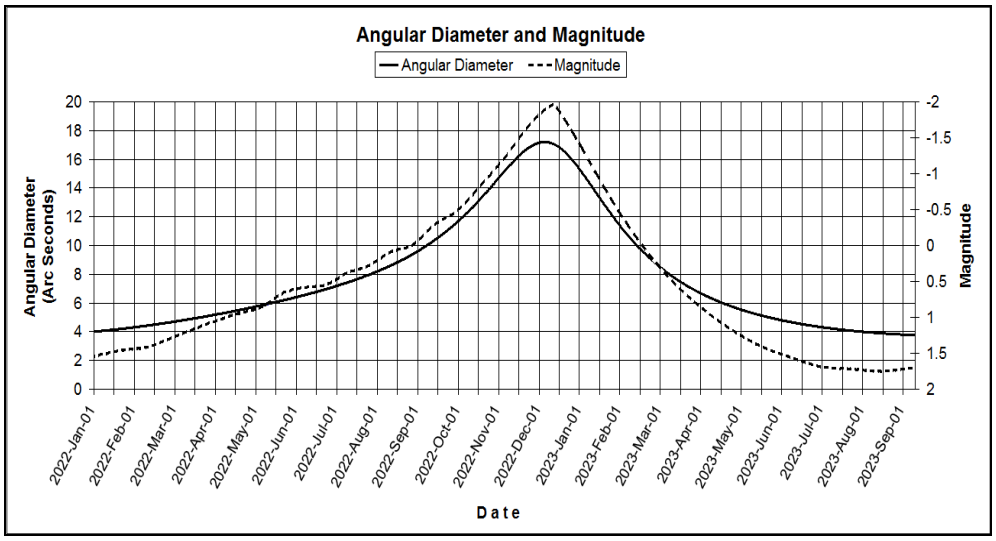

Figure 1. Expected apparent angular diameter in arc seconds (left ordinate and solid line) and brightness as represented by stellar magnitude (right ordinate and dashed line) as seen from Earth during the present apparition.

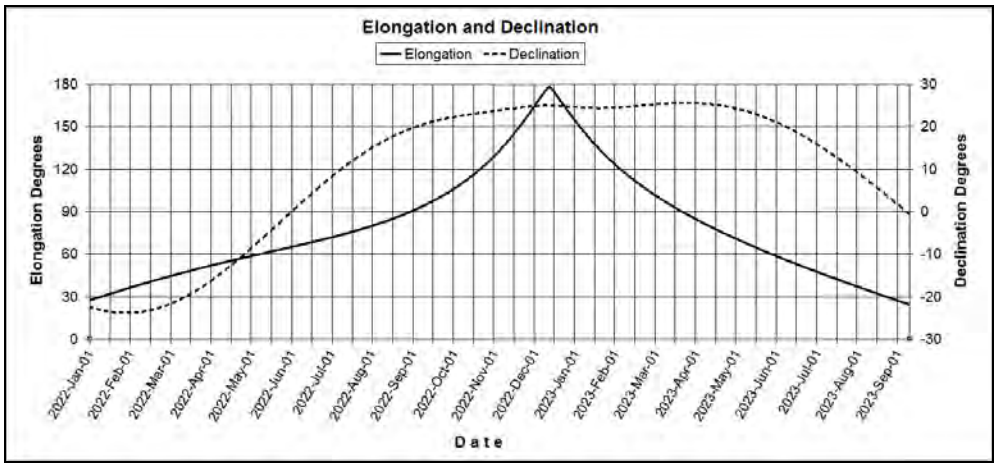

Figure 2. Expected solar elongation (solid line) and declination (dashed line) in degrees of arc as seen from Earth during the present apparition.

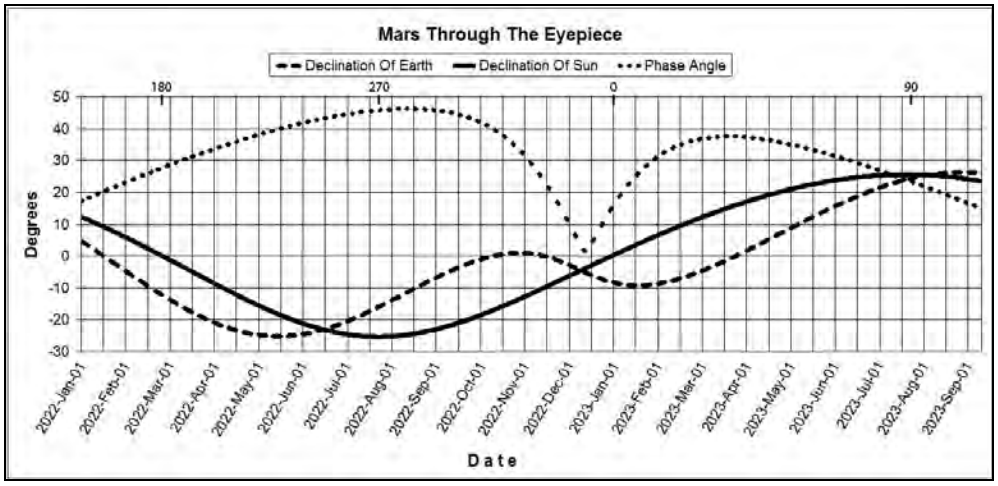

Figure 3. Expected declination of the Sun (solid line) and declination of the Earth (dashed line) in the sky of Mars, and the Earth-Sun-Mars phase angle (dotted line) in degrees of arc during the present apparition.

have been able to document albedo and atmospheric features when the planet is as small as 4 arc seconds. See, for example, the excellent image by Simon Kidd, showing Mars at a subtended diameter of 3.8 arc seconds, published in the ALPO Mars Section Report last year (Venable, 2021).

In the present apparition, Mars will subtend an apparent angular diameter greater than 6.0 arc seconds for 334 days, as compared to 357 during the last apparition, which was a perihelic one.

In **Table 1**, quadrature is the condition in which Mars is 90 degrees from the Sun in the sky. Specifically, western quadrature is when the planet is west of the Sun -- that is, in the morning sky, rising at about midnight. Eastern quadrature is when the planet is east of the Sun in the evening sky, setting at about midnight. At quadrature, the planet's telescopic disk is at its greatest gibbous appearance, with the widest unilluminated fraction. This is diagrammed in **Figure 3** as the phase angle, which is the Earth-Mars-Sun angle formed in space. (Although quadrature occurs with all outer planets and also the Moon and inner planets, the telescopic appearance at quadrature of Mars and the other outer planets is different from that of the Moon and inner planets.)

Mars in the Sky

Figure 1 diagrams the subtended diameter of Mars and its visual magnitude during the apparition. Note that the brightness at opposition will be about magnitude -2.0, and the diameter greater than 17 arc seconds. The dates of greatest brightness and greatest apparent diameter do not precisely match one another. The diameter is related strictly to the planet's distance from Earth, while the brightness is mainly a function of the planet's distance to both the Earth and the Sun, but also relates to the phase angle and the sizes of the polar caps and the planet's axial tilt toward us.

Figure 2 diagrams the solar elongation and the declination of Mars in Earth's

Figure 4. Simulated views of Mars as seen from Earth, developed by Jeff Beish. South is up and planetary east (sky west) is to the left. Planetary east is also called "preceding" and is indicated by the letter "P" on the left side of the figure, while planetary west is also called "following" and is indicated by the letter "F" on the right side of the figure. Notice that the simulated views are at intervals of 2 arc seconds in size, except for the largest one in the center. "Ls" is defined in the text on this page. "De" means areocentric declination of the Earth, "Ds" means areocentric declination of the Sun, "Dec" is the geocentric declination of Mars, and "A.U." is the Earth-to-Mars distance in astronomical units. These simulated views correspond to the interpretations of the data presented in figures 1, 2 and 3.

sky. Mars will cross the celestial equator into the northern sky on May 27, 2022, which is only two weeks after the beginning of the classical observing season. The declination at opposition will be about 25 degrees north, and will remain at approximately that value for the remainder of the classical observing season -- until May 2023. This will strongly favor observers in Earth's Northern Hemisphere.

Mars in the Eyepiece

The expected appearance of Mars in the telescope depends primarily on four factors that are diagrammed in **Figure 3**. These make **Figure 3** complex:

- The declination of Earth in the Martian sky. This is the dashed line in **Figure 3**.
- The declination of the Sun in the Martian sky. This is the solid line.
- The phase angle of Mars. This is the dotted line.
- The longitude of the Sun in the Martian sky measured from the point in Mars's orbit at which its northern spring equinox occurs. This parameter is usually called, simply, "L_S" for "longitude of the Sun", and it designates the Martian season. This is denoted in **Figure 3** by the numbers 180, 270, 0 and 90 at the top of the graph.

The L_S corresponds perfectly with the areocentric declination of the Sun. In the diagram, one can see that L_S 180 is the point where the Sun crosses Mars's equator to enter Mars's southern sky -- the start of southern spring and northern autumn. Also, L_S 270 is the point where the Sun's southward progression in declination stops -- the southern summer solstice -- and then reverses.

The visibility of the polar caps is related in part to their being illuminated by the Sun. Consequently, when the classical observing season begins on May 13, 2022, the North Polar Cap will be moderately large but it will not be visible, because the southern declination of the Sun will not allow it to be illuminated. We describe this by saying that the illumination defect includes the North Polar Region.

The other factor affecting the visibility of the polar caps is the areocentric declination of the Earth. For example, on October 16, 2022, in the middle of southern summer, the residual South Polar Cap will be small (due to the season) and illuminated by the Sun (due to the Sun's areocentric declination) but seen from Earth with difficulty, as our perspective will be from areocentric declination zero. The residual South Polar Cap is only 6 degrees of latitude across, and its center is offset from the South Pole by 3 degrees. The offset is toward meridian ~45° west, so that we'll be able to see it only when Mars is rotated so that 45° west is facing us -- the longitude of Mare Erythraeum. During previous apparitions, observers have demonstrated this intermittent visibility of the South Polar Cap when Earth is near areocentric declination zero (Venable, 2018).

Similar reasoning can be applied to the visibility of the broad North Polar Cap on March 1, 2023. Though it will be illuminated, due to the northern declination of the Sun, it will be impossible to accurately measure its diameter from Earth, as our vantage point will be from a southern areocentric declination that will not allow us to see the true width of the northern cap. All of this information can be gleaned by studying **Figure 3**, and its effects are diagrammed in the simulated views in **Figure 4.**

Although the illumination defect affects the polar caps, it affects middle latitudes more prominently, causing the planet to appear gibbous. The extent of the gibbous appearance is defined by the phase angle graphed in **Figure 3**. Prior to opposition, the sunset terminator is visible at the illumination defect, while after opposition, it is the sunrise terminator that is visible. This effects the times of visibility of terminator clouds.

Special Phenomena

Dust Storms

Years ago, these were thought to be uncommon, but now amateur observers document a number of them during every apparition. Many of them originate at or near the edge of one of the polar caps from the start of spring to the middle of summer in that hemisphere. Spacecraft images have revealed that about 1,000 local dust storms occur each Martian year, most of them too small to be

detectable from Earth. The largest usually originate in or near Hellas or Noachis, presumably due to the patterns of movement of strong, cold winds blowing off the South Polar Cap. The largest can spread to cover the entire planet, but this happens only about once every seven years on average. The last planet-encircling storm was in 2018.

Many an observer has looked right at a dust storm without recognizing it. There are three main features of dust storms that enable us to identify them:

- They obscure the usual albedo features.
- They are bright in red light, brighter than the ochre "desert" regions of the planet. Always image or scrutinize the planet through a red filter or you may miss them.
- They move from night to night, thereby obscuring different albedo features and changing shape and size.

It is enthralling to make a series of observations of the course of any dust storm.

Clouds

Clouds are bright in blue light, and the use of a blue filter will assist in their detection. The Tharsis volcanos are frequently the focus of clouds that form on the windward slopes early in the afternoons and spread downwind (usually westward, sometimes eastward) past the peaks during the late afternoons. Other topographic features often cause clouds, such the Elysium volcano areas, the Syrtis Major and Isidis area, and scattered in spots without distinguishing albedo features in Arcadia and Tempe. Almost any spot in the temperate and equatorial zones can have an occasional cloud.

The afternoon clouds of Tharsis are especially prominent in northern spring (L_S 0° to 90°) while the NPC is sublimating, and can still be seen in northern summer. They usually recur during southern spring as the SPC sublimates. When a number of clouds form across the bright northern and equatorial areas from Elysium to Tharsis, they often form a "W" pattern of bright, blue-white spots. These may coalesce into a single W-shaped cloud in the late afternoon.

Blue-white fogs appear over much of Tharsis in the late northern spring and early summer. The Tharsis Montes protrude above these fogs, appearing as dark spots amid the bright fog. The fogs usually dissipate by mid-morning but occasionally will persist in Tharsis and Xanthe into the afternoon.

A particularly interesting cloud is the Syrtis Blue Cloud that is often visible over Syrtis Major during northern summer when that area is positioned near the planet's limb. It can be strikingly bright blue.

High Terminator Clouds

These clouds are mesospheric, and due to this height, they are seen beyond the terminator. They may create an apparent extension of the terminator at their latitude. Like other clouds, they are probably brightest in blue light. Some

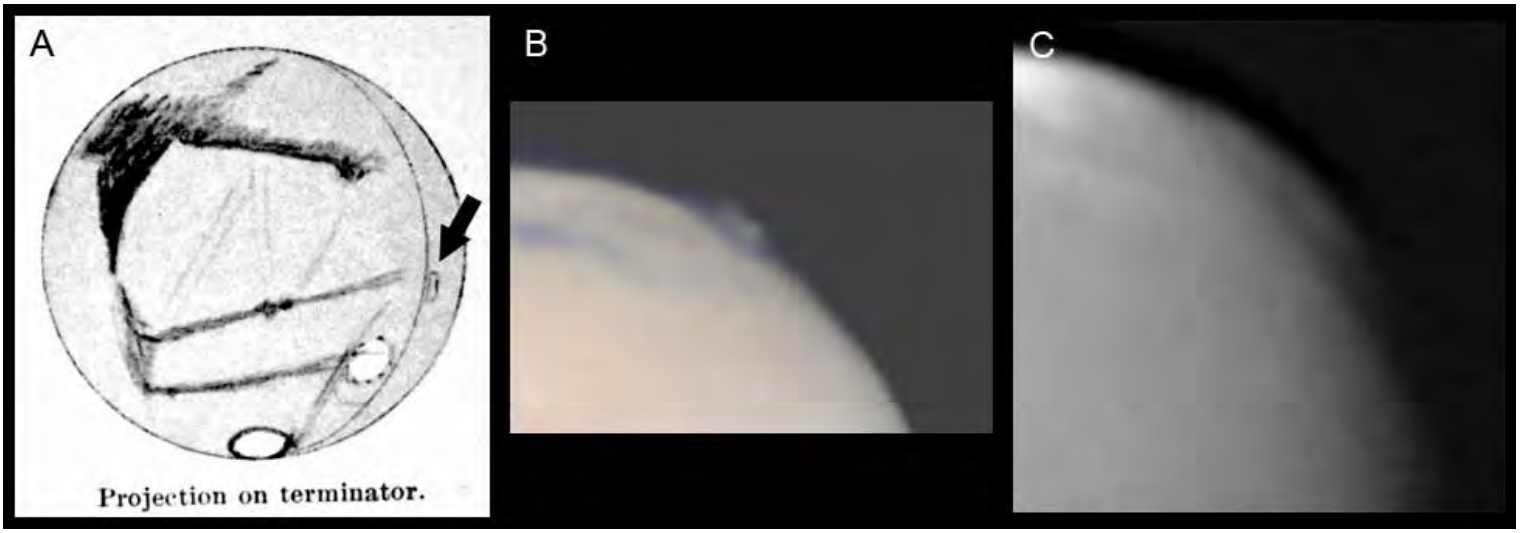

Figure 5. Three documentations of high altitude clouds beyond the sunrise terminator, detected before opposition.
A. Percival Lowell's terminator projection of May 25 and 26, 1903, with L_S of about 155°. Observed with a 24-inch refractor in Arizona, USA. Drawing by Lowell, arrow added here for clarity. Adapted from Lowell, 1906, p101.
B. A partial-disc cropping from one of Wayne Jaeschke's 9 images of March 20, 2012, that showed this high sunrise terminator cloud from 02:02 to 02:52 UT; this image was at 02:34 UT, with central meridian 144° west and L_S 86°. Schmidt-Cassegrain telescope of 14 inches (356 mm) aperture and Flea3 camera, using an Astrodon green filter. Imaged at Pennsylvania, USA.
C. A partial-disc cropping from one of Gary Walker's 6 images of August 8, 2020, that showed this high sunrise terminator cloud from 09:32 to 10:29 UT; this image was at 09:50 UT, with central meridian 205° west and L_S = 254°. Apochromatic refractor of 10 inches aperture and ZWO ASI290MM camera, using an Astronomic Type 2c blue filter. Imaged at Georgia, USA.

examples of high terminator clouds are shown in **Figure 5**. We wish to continue to monitor the planet for such clouds, to ascertain whether there is a particular Martian season and a particular latitude which they are most likely to occur, as well as their incidence and duration.

In addition, bright clouds near the terminator on its sunlit side can sometimes appear to cause terminator extensions when the processing of the image makes the illuminated area near the true terminator appear dark. Consequently, clouds near or beyond the terminator are not only phenomena of great interest but also phenomena of possible misinterpretation. The geometric location of the true terminator can be ascertained by making a line graph of the planet's brightness across the terminator, which is a function available in the *Registax 5.1* software application (Berrevoets, 2010). The true terminator is the location along the line at which the brightness is approximately 1/4 of the full brightness of the planet near that terminator. This is a diffraction effect. This exercise usually shows the actual terminator to lie beyond the planet's visible edge in images that are processed by usual methods.

Polar Fronts

As either the North or South Polar Hood dissipates, a ring of clouds is usually seen around the polar region, making the polar region's edge appear brighter than the Polar Cap closer to the pole. In this bright ring of clouds, one frequently sees knots or condensations that are thicker or brighter than the rest of the ring. These are cyclonic storms in the Polar Front along the edge of the Polar Cap. They often spawn dust storms as the cyclone moves away from the pole. At other times, they carry clouds without evident dust, causing the bright spots to extend farther from the pole. Often, especially along the edge of the NPC, one will see long cloud streaks that are the edges of cold air masses moving away from the cap. The Polar Front itself may deviate from its usual latitude, arcing toward temperate latitudes. These phenomena are homologous to the fronts and cyclones that occur on Earth. Figure 6 shows examples of some of these phenomena on Mars.

Craters and the Canyon

Earth-based images with the best resolution do show craters on Mars, but they do not show the walls and shadowing that would enable one to identify them as craters - they appear as round, dark or light spots, such as dark Huygens crater and bright Schiaparelli crater. The Valles Marineris canyon is often a site of clouds and fogs, especially in its western part (Noctis Lacus), and it was filled with bright airborne dust during the planet encircling dust storm of the summer of 2018 and the regional dust storm of November 2020.

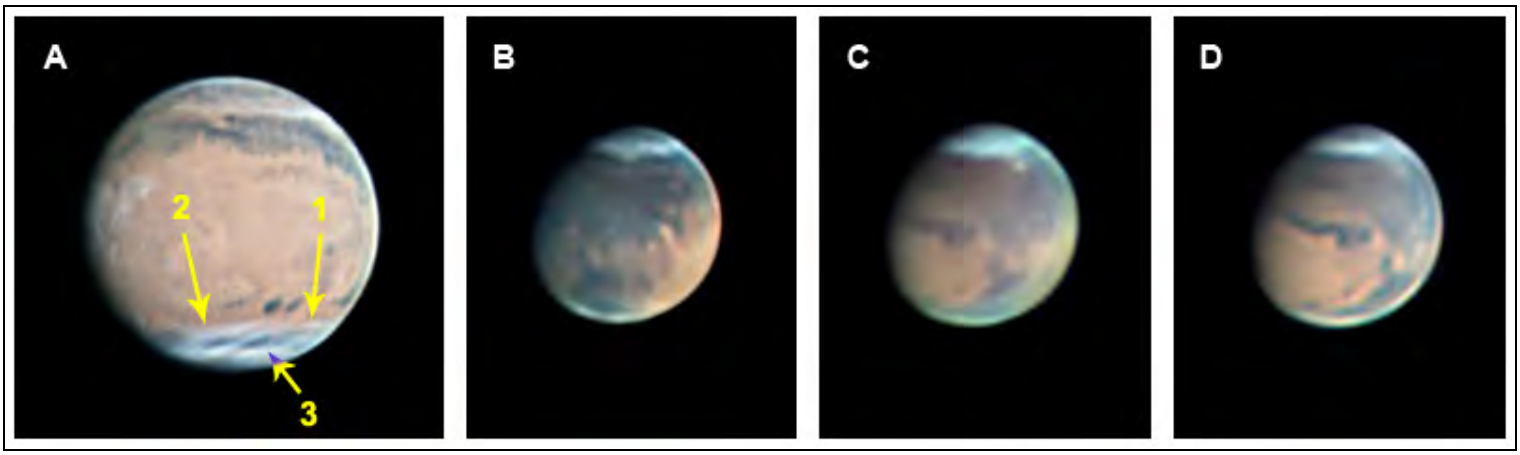

Figure 6. Some examples of polar front phenomena. South is up and planetary east is to the left in these images.
Image A. Fronts extending southward over Scandia and Panchasia. Front number 1 is the North Polar Front, which is the southern edge of the North Polar Hood. Front number 2 is a cold front moving southward from the Polar region. The white streak labelled 3 is not a front, but rather the edge of the North Polar Cap seen through the thinned North Polar Hood. Image by Don Parker and Paulo Lazzarotti on December 3, 2007, at 07:04 UT, using a Newtonian telescope of 16 inches (40 cm) aperture at f/47, a Skynyx 2-0 camera, and Astrodon RGB filters and an RG-610 filter for luminance. Seeing 5/11, transparency 5. Imaged from Florida. Apparent diameter 15.3 arc seconds.
Images B, C and D. An evolving South Polar Front storm image sequence by Clyde Foster. The apparent diameter of the planet was only 6.2 arc seconds. The South Polar Front is the bright, optically dense edge of the South Polar Hood. In image B, there is a thickening and southward protrusion along the South Polar Front near the central meridian - a Polar Front cyclone. In image C, imaged four days later, the planet is rotated about 30 degrees to the right. The dense spot in the South Polar Front persists and a bright local dust storm has formed just north of it, due to cold winds blowing from the cyclone. In image D, imaged one day after image C, the planet is rotated further to the right. The dust storm has increased in size and it has become blurred with the cyclone in the South Polar Front. The dust storm and the Polar Front storm are really a single, large cyclone that is entraining a dense dust storm as it moves northward. These three images were made with a Schmidt Cassegrain “HD” telescope of 14 inches (355 mm) aperture at f/27, a ZWO ASI290MM camera, and Baader RGB and IR filters. Image B was imaged on March 21, 2020, at 03:23 UT with CM = 39°; C was imaged on March 25, 2020, with CM = 5°; and D was imaged on March 26, 2020, with CM = 348°. All imaged from South Africa.

Moons

Phobos and Deimos are very difficult to spy visually when Mars is not near a perihelic opposition, and we received only one report of a visual sighting of Deimos and none of Phobos during the last apparition. Several imagers make images of them each apparition, appearing as star-like points next to a severely overexposed planet. If you want to look for them, use the *Horizons* ephemeris generator (Solar System Dynamics Group, 2022) to find out when they will be at their greatest elongations from Mars. Let us know if you see them!

Blue Clearing

This is a loss of contrast in albedo features, sometimes a complete disappearance of them so that the planet appears blank, when viewed or imaged in blue light. After years of noticing it, Antoniadi eventually concluded that it was due to poor astronomical seeing – that is, turbulence in Earth's atmosphere (Dobbins, 2021). In the 2003 apparition, ALPO observers compiled the recent observations of the phenomenon and concluded that it was due to the phase angle of the planet (Schmude, Troiani, Beish, et al., 2004, p. 39). A review of blue clearing was recently made by Thomas Dobbins in *Sky & Telescope* magazine (Dobbins, 2021). The ALPO Mars Section is interested in receiving your reports and ideas about this phenomenon. To help, send your blue images after stacking but without any of the contrast enhancement, wavelets, or other processing that you normally apply to your images. Of course, there is nothing wrong with enhancing your blue-filtered images, but please also send us your blue images before enhancement so that we can study blue clearing. Be sure that you effectively exclude infrared light from your blue-filtered images (Venable, 2019).

Occultations by Moon & by Mars

Some observers have made beautiful pictures of the two orbs when Mars is at or near the lunar limb. See, for example, the *Astronomy Picture of the Day* of September 11, 2020, by Duarte and Caldas (*https://apod.nasa.gov/apod/ap200911.html*). There are four occultations of Mars by the Moon during this apparition that are visible at night from land. **Figure 7** shows the maps of their paths, and the explanation of the maps. Other occultations occur in daytime, or with paths that are completely oceanic or arctic, or when Mars is too close to the Sun to be observed. Of the four occultations in **Figure 7**, three are on successive lunations: 2022 December 8, 2023 January 3, and 2023 January 31.

Notice that one of the occultations by the Moon is particularly favorable, occurring on the date of Mars's opposition - December 8, 2022. For this event, Beish has listed major cities of North America and Europe and the times of disappearance and reappearance at those cities (Beish, 2022). If your site is near but not in one of those cities, the times of disappearance and reappearance will be slightly different from that of the city near you.

For a prediction for your precise observing location, showing the exact times of disappearance and reappearance and the positions of these events along the lunar limb, you can enter into a planetarium program the coordinates of your location, together with the date and time of the midpoint of the event given underneath each path map in **Figure 7**, and manipulate the time to discover the exact details. One of the present authors (Venable) uses the accurate, inexpensive *Guide 9.1* software program (Project Pluto, 2017) for such individual local predictions. The software that generates the predictions of these events, including the maps used in **Figure 7** and the list of event times for cities, is *Occult 4.12.16.0* (Herald, 2021).

Mars will not occult any stars brighter than seventh magnitude during this apparition.

The Mars Observing Program of the Astronomical League

For an observer who has incomplete familiarity with Mars or with the methods to use in order to make a useful observation, the Mars Observing Program is a worthwhile project. The observer must be a member of the Astronomical League to participate. Like other observing programs managed by the Astronomical League, a sustained period of observation is needed to complete it, and it is best to plan observations early so that the requirements can be completed during a single apparition. The observations can be visual or by imaging or mixed. Information is online at *https://www.astroleague.org/content/mars-observing-program*. The observing requirements were laid out by the current ALPO Mars Section coordinator, who has agreed to review observations and correspond with participants if needed.

For those participants who will be observing visually, the use of the ALPO's Mars Observing Form is a good way to remind the observer to write down, not only what he or she sees on the planet, but all the relevant details about the central meridian, filters used, other equipment, seeing and transparency, etc. The form incorporates two circular templates for drawing. It is included in this article after the Beish Calendar of Mars Events.

To find the observing form online, follow these directions:

1. Go to www.alpo-astronomy.org.
2. Click on “ALPO Section Galleries” near the top of the right sidebar.
3. Click on “Publications Section”.
4. Click on “Observing Sections Forms”.
5. Click on “MarsReportForm”.
6. Download the file.

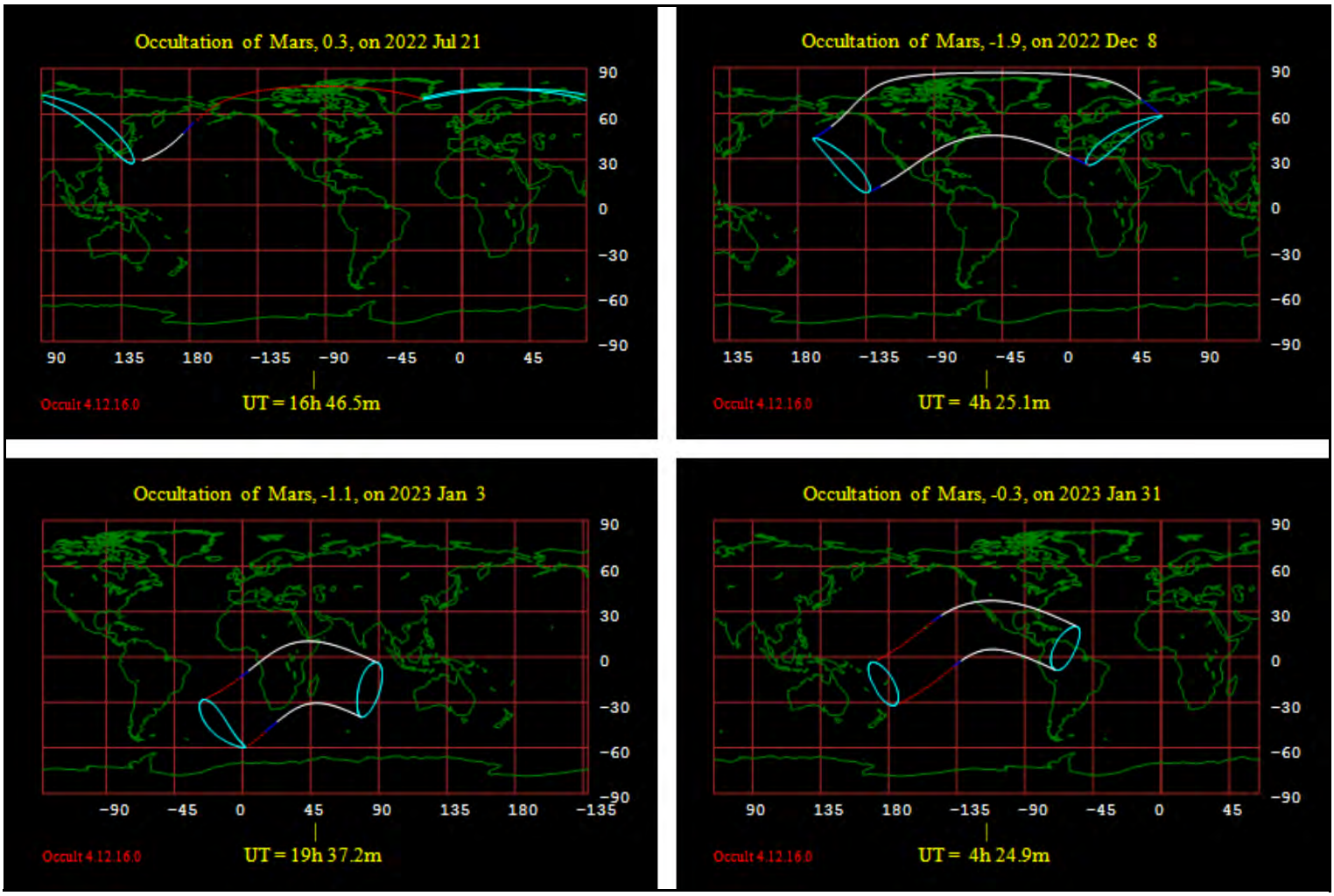

Figure 7. Four maps showing the visibility of the four occultations of Mars by the Moon during the current apparition. The dates are in Universal Time. In the heading above each event, the number to the left of the date is the magnitude of Mars. The hour and minute shown below each map is the time of the middle of the event. The center of each map is the longitude at which the middle time of the event's occurrence is located. As always when dealing with Universal Time, the event at your location is sometimes on a day different from the UT date, so be careful in converting the UT date and time to your local date and time.

As with a solar or lunar eclipse, the event progresses across the surface of the Earth from west to east at a speed that is related to the local altitude of the Moon in the sky. Consequently, the rate at which the event moves across the Earth is not constant, and the time of the middle of the event given below the map does not correspond to the middle of the geographic path. It is best to use a planetarium program to find the exact times of disappearance and reappearance at your location.

White lines define the path edges for that part of a path that is during night. Red lines define the path edges for that part of a path that is in daylight. Dark blue lines define the path edges for that part of a path that is in twilight. The light blue ovals at the ends of a path indicate the visibility of disappearance of the right side of the oval and the visibility of reappearance on the left side of the oval, as limited by the rising or setting of Mars.

Top left. 2022-07-21: Visible from Hokkaido (Japan) and parts of eastern Siberia. The arctic parts of the path are in daylight.
Top right. 2022-12-08: On the day of opposition. Visible from most of North America and most of Europe.
Bottom left. 2022-01-03: Visible from much of southern and eastern Africa and from islands in the Indian Ocean.
Bottom right. 2022-01-31: Visible from the southwestern USA, all of Mexico and Central America, northwestern South America, and most of the islands of the Caribbean Sea

With your report, be sure to include your name, location, the universal time of your observation (not your local time), brief descriptions of your instrument(s), filters used, and estimates of the quality of seeing and transparency. Your interpretations of your findings are also welcome.

Reporting Your Observations

The ALPO Mars Section is eager to receive your reports of your observations, whether you make images, drawings, or written descriptions. It is easiest for us if you send them directly to coordinator Roger Venable at *rjvmd@hughes.net* , We also encourage you to post them in the ALPO online image gallery by sending them to *mars@alpo-astronomy.org*

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Table 2. Calendar of Mars Events 2022-2023 (Jeff Beish)

DATE	PHYSICAL	REMARKS
2021 Oct 08	Ls 109.7°	**Conjunction.** Mars is behind the Sun ~2.629 AU.
2022 Feb 24	Ls 180° De -11.8° Ds 0.1° RA 19:37 Dec -22.3° A. Dia 4.6''	**Equinox - Northern Autumn/Southern Spring.** South Polar Cap (SPC) maximum width. Is the North Polar Hood present? Does SPH or frost cover Hellas? Hellas should begin to clear and darken. Are W-clouds present? South cap emerges from darkness of Winter. SPH thinning and forms "Life Saver Effect?"
2022 May 11	Ls 225.0° De -24.6° Ds -17.2° RA 23:24 Dec -5.6° A.Dia 6''	**Apparition begins** for observers using 4-inch to 8-inch apertures telescopes and up. Begin low-resolution CCD imaging. Views of surface details not well defined. Bright SPC projection Novissima Thyle (300°W - 330°W) areographic longitude. Dark rift Rima Augusta connected from 60° to 270° longitude. Rima Australis visible in SPC (290°-350°W)? W-clouds possible. SPC bright projection Argenteus Mons (10° W - 20° W). SPC Dust clouds in the south of Acidalium Mare, Chryse, Erythraeum Mare, Ophir and northeast Solis Lacus? SPC ~38° ±8°

Table 2. Calendar of Mars Events 2022-2023 (Jeff Beish) (Continued)

2022 Jun 19	Ls 250° De -22.2° Ds -23.5° RA 01:10 Dec 5.9° A.Dia 6.9''	**Mars at Perihelion.** SPC in rapid retreat. Novus Mons smaller. Dust clouds expected over Serpentis-Hellaspontus (Ls 250° - 270). Syrtis Major beginning to narrow. Frost in bright deserts? Orographic clouds (W-clouds) possible. Elysium and Arsia Mons bright? Note: Several "planet-encircling dust storms have been reported during this season. High probability for dust clouds at 255° Ls. SPC ~ 24° ±4°
2022 Jul 21	Ls 270° De -15.7° Ds -24.8° RA 02:35 Dec 13.4° A.Dia 7.9''	**Solstice - Northern Winter/Southern Summer.** W-clouds present? NPH extends 50° N? Decreased number of White clouds. "Syrtis Blue Cloud"? White areas in deserts? Dust clouds in south until 270° Ls? Watch for planetary system clouds bands. Orographic cloud over Arsia Mons? Syrtis Major is narrow. SPC ~17° ±2°
2022 Jul 24	Ls 271.8° De -15.0° Ds -24.8° RA 02:43 Dec 14.0° A.Dia 8''	W-clouds present? NPH extends 50° N? Decreased number of White clouds. "Syrtis Blue Cloud"? White areas in deserts? Dust clouds in south until 270° Ls? Watch for planetary system clouds bands. Orographic cloud over Arsia Mons? Syrtis Major is narrow. SPC ~17° ±2°
2022 Aug 27	Ls 292.8° De -7.2° Ds -22.7° RA 04:08 Dec 19.6° A. Dia 9.5''	**Mars at quadrature.** Look for orographic clouds over the Tharsis volcanoes. Orographic cloud over Arsia Mons? W-Cloud? SPC small (SPC ~ 10° ±2°).
2022 Sep 05	Ls 298.3° De -5.2° Ds -21.7° RA 04:28 Dec 20.5° A.Dia 10''	White areas? Orographic clouds over the Tharsis volcanoes. W-Cloud? Orographic cloud over Arsia Mons? SPC very small, difficult to see. SPC ~11° ±1°
2022 Oct 02	Ls 314.2° De – 0.6° Ds -17.5° RA 05:18 Dec 22.5° A.Dia 12''	Edom bright? Is SPC remnant visible in mid-summer? Orographic cloud over Arsia Mons? Topographic cloud over Libya? High probability of dusty storm at 315° Ls. Planet encircling dust storm in November 2020 (308° - 323° Ls)

Table 2. Calendar of Mars Events 2022-2023 (Jeff Beish) (Continued)

2022 Oct 30	Ls 330° De 0.8° Ds -12.1° RA 05:41 Dec 23.8° A.Dia 14.9''	**Retrogression Begins.** Hellas Ice-fog activity? Topographic cloud over Libya? Topographic cloud over Edom?
2022 Dec 01	Ls 347.1° De -3.6° Ds -5.4° RA 05:11 Dec 25.9° A.Dia 17.2''	**Mars at Closest Approach.** NPC large hood present. W-Cloud? Orographic cloud over Arsia Mons? Topographic cloud over Libya? Topographic cloud over Edom? Discrete (white) clouds and white areas should be seen. Syrtis Major begins to expand to its east. Topographic cloud over Libya?
2022 Dec 08	Ls 350.7° De -5.1° Ds -3.9° RA 04:59 Dec 25.0° A.Dia 17.1''	**Mars at Opposition.** NPC large hood present. W-Cloud? Orographic cloud over Arsia Mons? Topographic cloud over Libya? Topographic cloud over Edom? Discrete (white) clouds and white areas should be seen. Syrtis Major begins to expand to its east. Topographic cloud over Libya?
2022 Dec 26	Ls 359.8° De -8.2° Ds -0.1° RA 04:32 Dec 24.9° A.Dia 15.4''	**Equinox - Northern Spring / Southern Autumn.** North Polar Hood (NPH) breaking up, North Polar Cap (NPC) should be exposed.
2023 Jan 12	Ls 8.2° De -9.3° Ds 3.5° RA 04:23 Dec 24.5° A.Dia 13.2''	**Retrogression Ends.** North Polar Hood (NPH) breaking up and North Polar Cap (NPC) should be exposed. Hellas and Argyre bright? NPC~60° - 65°
2023 Jan 21	Ls 12.6° De -8.9° Ds 5.2° RA 04:25 Dec 24.5° A.Dia 12"	North Polar Hood (NPH) breaking up and North Polar Cap (NPC) should be exposed. Hellas and Argyre bright? NPC~60° - 65°

Table 2. Calendar of Mars Events 2022-2023 (Jeff Beish) (Continued)

2023 Feb 08	Ls 21.1° De -7.3° Ds 8.7° RA 04:40 Dec 24.8° A.Dia 10"	NPC nearly static or entering erratic retreat, hood dissipating? Orographic cloud over Apollinaris Petera? NPC~60° - 65°
2023 Mar 03	Ls 31.7 ° De -3.6° Ds 12.7° RA 05:15 Dec 25.4° A.Dia 8”	Limb clouds and hazes should start to increase. Dust clouds in NPR? NPC~60° - 65°
2023 Apr 11	Ls 49.3° De 4.9° Ds 18.5° RA 06:36 Dec 25.1° A.Dia 6’’	Continue NPC measurements. Is North Cap shrinking? South polar regions becoming difficult to observe. Any signs of South Polar Hood (SPH)? NPC ~68° ±3°
2023 May 28	Ls 70° De 15.5° Ds 13.3° RA 08:27 Dec 20.7° A.Dia 4.8’’	**Mars at Aphelion.** Is North Cap in rapid retreat phase? Antarctic hazes, hood. South polar regions becoming difficult to observe. Any signs of SPH? Cloud activity increases. Are limb arcs increasing in frequency, intensity? NPC ~74° ±1°
2023 Nov 18	Ls 150.2°	**Conjunction.** Mars is behind the Sun ~2.526AU.

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- **Monograph No. 2**. *Proceedings of the 44th Convention of the Association of Lunar and Planetary Observers. Greenville, South Carolina, June 15-18, 1994. 52* pages. File size approx. 6.0 mb.
- **Monograph No. 3**. *H.P. Wilkins 300-inch Moon Map.* 3rd Edition (1951). Available as one comprehensive file (approx. 48 megabytes) or five section files (Part 1, 11.6 megabytes; Part 2, 11.7 megabytes; Part 3, 10.2 megabytes; Part 4, 7.8 megabytes; Part 5, 6.5 mb)
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- **Monograph No. 5.** *Astronomical and Physical Observations of the Axis of Rotation and the Topography of the Planet Mars. First Memoir; 1877-1878.* By Giovanni Virginio Schiaparelli, translated by William Sheehan. 59 pages. File size approx. 2.6 mb.

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- **Monograph No. 13.** *A Manual for Observing the Moon: The ALPO Lunar Selected Areas Program* by Dr. Julius Benton. Second update to original 1994 edition. Intended for serious enthusiasts who want to seriously contribute to lunar science through participation in the specialized efforts of the ALPO Lunar Selected Areas Program (which now includes the Dark Haloed Craters Program (DHCP) and the Bright and Banded Craters Program (BBCP). The handbook includes fundamental methods and techniques for conducting systematic observations of specific types of lunar features, including remarks on the lasting value of current lunar visual observations by amateur astronomers with Earth-based telescopes.

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- **Lunar & Planetary Training Section:** *The Novice Observers Handbook* $15. An introductory text to the training program. Includes directions for recording lunar and planetary observations, useful exercises for determining observational parameters, and observing forms. Available as pdf file via e-mail or send check or money order payable to Timothy J. Robertson, 195 Tierra Rejada Rd., #148, Simi Valley, CA 93065; e-mail *cometman@cometman.net*.

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- **Venus:** Introductory information for observing Venus, the comprehensive *ALPO Venus Handbook*, as well as all observing forms and ephemerides, can be conveniently downloaded as pdf files at no cost to ALPO members and individuals interested in observing Venus as part of our regular programs at *http://www.alpo-astronomy.org/venus*.

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- **Minor Planets:** *The Minor Planet Bulletin*. Published quarterly and freely available at *http://www.mpbulletin.org*, this publication is **the** journal for almost all amateurs and even some professionals for publishing asteroid photometry results, including lightcurves, H-G parameters, color indexes, and shape/spin axis models. It is considered a refereed journal by the SAO/NASA ADS. All MPB papers are indexed in the ADS. While hard copy subscriptions are no longer available to individuals, institutions (e.g., college libraries) can still obtain them via a special subscription. See details in MPB 37-4 or contact the editor, Richard Binzel. Annual voluntary contributions of $5 or more in support of the publication are welcome.

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- **Saturn:** Introductory information for observing Saturn, including all observing forms and ephemerides, can be conveniently downloaded as pdf files at no cost to ALPO members and individuals interested in observing Saturn as part of our regular programs at *http://www.alpo-astronomy.org/saturn*. The former *ALPO Saturn Handbook* was replaced in 2006 by *Saturn and How to Observe It* (authored by Julius L. Benton) and it can be obtained from Springer, *Amazon.com*, etc.

- **Meteors:** (1) *The ALPO Guide to Watching Meteors* (pamphlet). $3 per copy (postage & handling); check/money order to Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759); e-mail *leaguesales@astroleague.org*. (2) *The ALPO Meteors Section Newsletter*, free (except postage), published quarterly (March, June, September and December). Send stamps, check or money order for first class postage to cover desired number of issues to Robert D. Lunsford, 14884 Quail Valley Way, El Cajon, CA 92021-2227.

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The Association of Lunar & Planetary Observers (ALPO) was founded by Walter H. Haas in 1947 and incorporated in 1990 as a medium for advancing and conducting astronomical work by both professional and amateur astronomers who share an interest in Solar System observations. We welcome and provide services for all individuals interested in lunar and planetary astronomy. For the novice observer, the ALPO is a place to learn and to enhance observational techniques. For the advanced amateur astronomer, it is a place where one's work will count and be used for future research purposes. For the professional astronomer, it is a resource where group studies or systematic observing patrols add to the advancement of astronomy.

Our Association is an international group of students that study the Sun, Moon, planets, asteroids, meteors, meteorites and comets. Our goals are to stimulate, coordinate, and generally promote the study of these bodies using methods and instruments that are available within the communities of both amateur and professional astronomers. We hold a conference each summer, usually in conjunction with other astronomical groups.

We have "sections" for the observation of all the types of bodies found in our Solar System. Section coordinators collect and study submitted observations, correspond with observers, encourage beginners, and contribute reports to our quarterly Journal at appropriate intervals. Each section coordinator can supply observing forms and other instructional material to assist in your telescopic work. You are encouraged to correspond with the coordinators in whose projects you are interested. Coordinators can be contacted either via e-mail (available on our website) or at their postal mail addresses listed in our Journal. Members and all interested persons are encouraged to visit our website at *http://www.alpo-astronomy.org*. Our activities are on a volunteer basis, and each member can do as much or as little as he or she wishes. Of course, the ALPO gains in stature and in importance in proportion to how much and also how well each member contributes through his or her participation.

Our work is coordinated by means of our quarterly periodical, the *Journal of the Assn. of Lunar & Planetary Observers* (known also as *The Strolling Astronomer*). Membership dues include a subscription to our Journal. Two versions of our Journal are distributed — a hardcopy (paper) version and an online (digital) version in portable document format (pdf) at considerably reduced cost.

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