

DAS FOCUS

Vol. 62, No. 3, March 20
Special Viral Edition

**Next Board Meeting and General Meeting
Originally Scheduled for Tuesday, March 17 2020
Cancelled**

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Meeting agenda



**FOCUS editor:
Richard G. Spencer
Publications Chair, DAS**

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From the President *Rob Lancaster*

March 2020 President's Column

Dear DAS Members,

I hope this message finds you well. I am sorry that we had to cancel the March 2020 DAS Meeting, but I think it is a good idea with the virus COVID-19 going around and the advice from the state about large gatherings. I should also make you aware of the fact that NEAF has been cancelled for this year, but they are still planning some virtual events. Mt. Cuba has also cancelled all upcoming meetings and events until further notice.

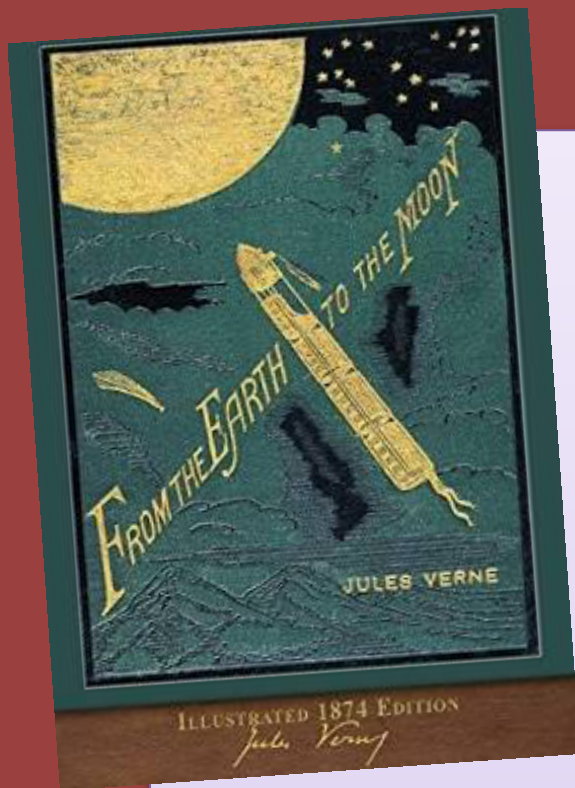
As for the upcoming events such as Astronomy Workshops, the April DAS Meeting, the Dinner Meeting, our outreach events, and the Intro to Astronomy Class, for the time being, they are all far enough in the future that we can take a "wait and see approach." We will monitor the situation and send further guidance as it becomes available. The DAS Book Club is having their meetings via Skype and they will not be affected by this.

I hope you get a chance during this brief hiatus of organized activities to get outside and do some observing from home. It is Galaxy Season and the springtime temperatures are getting warmer and warmer. Once the epidemic subsides, I hope to see you at our organized events again soon.

Thank you,

Rob Lancaster
DAS President





DAS Dinner Meeting Tuesday, May 19th

Hold the date!!!

***Go no-go decision will be announced
in the coming weeks***

Speaker: Local filmmaker Michael Oats will share his documentary "To the Moon, Delaware: Critical Contributions from Three Delaware Companies: W. L. Gore & Associates, Inc., DuPont, and ILC Dover".

<https://www.302stories.com/to-the-moon-delaware>

Schedule:

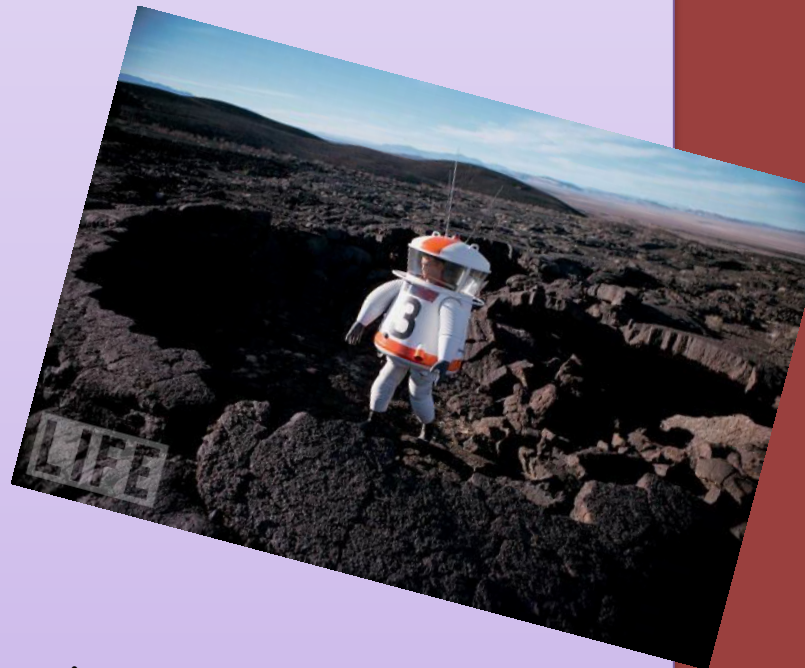
- 6:00pm - Social Hour
- 7:00pm - Dinner served
- 8:30pm - Awards and guest speaker

The Menu:

- Bread & butter
- Salad
- Meat or Vegan Lasagna
- Dessert
- Water & soda
- Beer & wine by free will donation

More details including registration will follow.

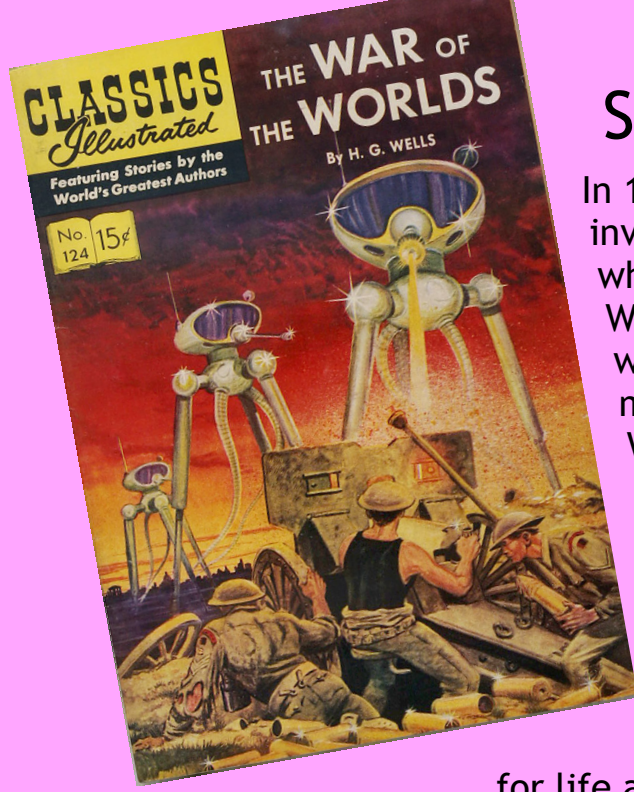
—Jeff Lawrence



Space Invaders and Microbes

In 1898, H.G. Wells wrote a (fictional) account of a Martian invasion of the Earth, entitled “The War of the Worlds” which featured Martians *almost* conquering Earth. Our Weapons of War were powerless against the invaders and it was looking bleak for our side, when, slowly at first, then more rapidly, the invaders keeled over and died.

What happened? The invaders were brought low by Earthly germs, against which they had no immunity. This highlights the complex relationship between Man and microbes; microbes are both necessary for life and a major cause of disease.



As a cultural aside, Orson Welles, later a famous filmmaker, was also a bit of a jokester. Before his movie fame, he stirred things up with a special 1938 Halloween episode of his weekly dramatic radio show, Mercury Theatre. This episode, presented like actual news, “reported” an invasion of Earth by Martians. It fooled many people and brought him instant notoriety.

—RGS

Fun Facts About Quarantine and Pestilence —RGS

GENERAL DECLARATION
(Outward-Inward)
AGRICULTURE, CUSTOMS, IMMIGRATION, AND PUBLIC HEALTH
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Owner or Operator: U.S.A. Flight: **APOLLO 11** Date: **JULY 24, 1969**
 Marks of Nationality and Registration: **HONOLULU, HAWAII, U.S.A.**
 Departure from: **MOORE** (Place and Country) Arrival at: **HONOLULU, HAWAII, U.S.A.** (Place and Country)

FLIGHT ROUTING
(*Flies* Column always to list origin, every en-route stop and destination)

PLACE	TOTAL NUMBER OF CREW / COMMANDER'S NAME	NUMBER OF PASSENGERS ON THIS STAGE	CARGO
CAPE KENNEDY	COLONEL EDWIN E. ALDRIN, JR.		
MOORE	COLONEL EDWIN E. ALDRIN, JR.		MOON ROCK AND MOON DUST SAMPLES - Care Must Be Observed
JULY 24, 1969 HONOLULU	LT. COLONEL MICHAEL COLLINS		

Declaration of Health
Persons on board known to be suffering from illness other than sicknesses of the effects of accidents, as well as those cases of illness disembarked during the flight: **NONE**

Any other condition on board which may lead to the spread of disease: **TO BE DETERMINED**

Details of such dispensing or medical treatment (system, date, time, method) during the flight. If no dispensing has been carried out during the flight give details of most recent dispensing:

Signature, if required: **Ernest J. Murray**
Customs Inspector

HONOLULU AIRPORT
Honolulu, Hawaii
ENTERED

The Apollo 11 astronauts were quarantined for 3 weeks after returning from the moon, “just in case” they might have been carrying unfamiliar infectious microbes. They were placed in a negative-pressure environment so that air flowed into the room, rather than being expelled from the room, which could have potentially spread disease. This use of negative-pressure rooms is ongoing in hospitals today, to avoid contagion from diseases such as tuberculosis and COVID-19. While this keeps disease from spreading, it holds the disease “in”, which isn’t what you always want. In fact, positive pressure is used to keep disease “out” of certain areas, such as surgical operating rooms.

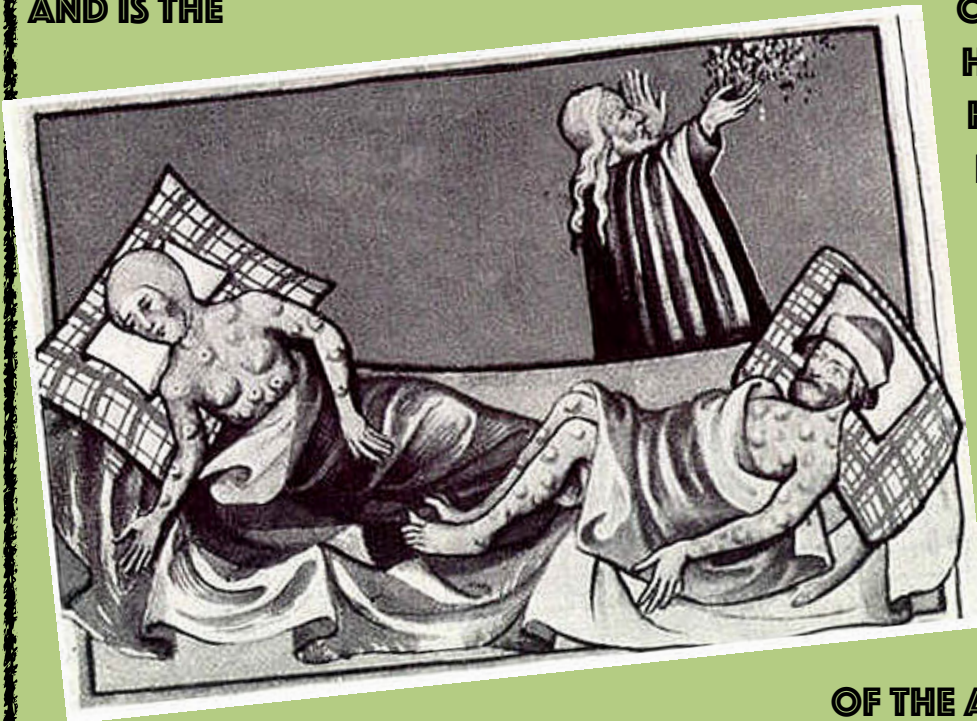
Celestial Cause of Plague

The bubonic plague, or Black Death, which devastated Europe in 1347 - 1350, was thought to have arisen, at least in part, from cosmic events which today we get all excited about and email each other.

From the report of the Paris Medical Faculty, 1348

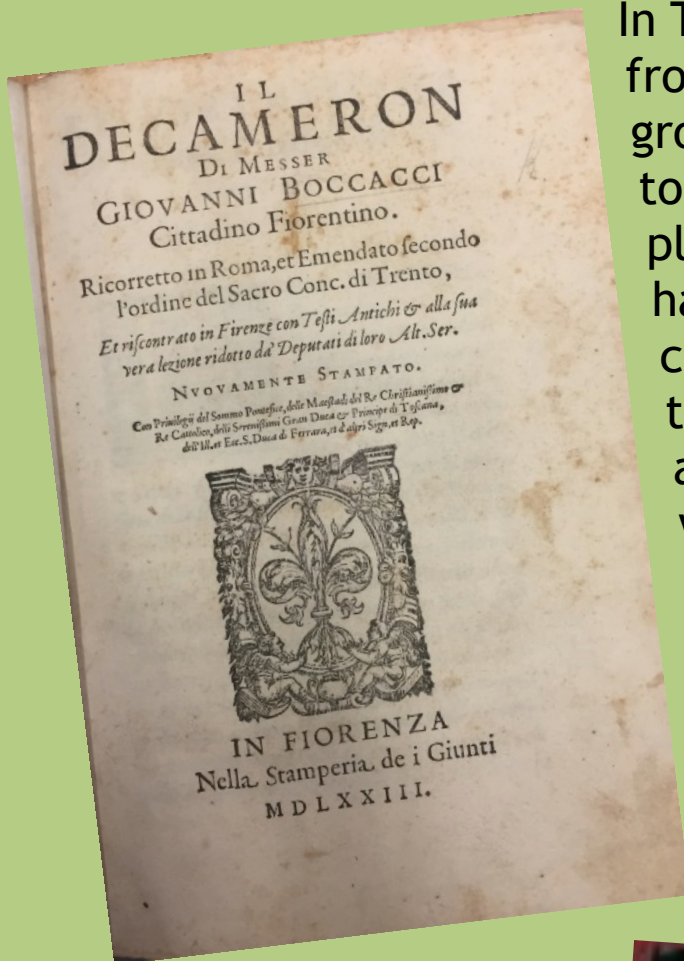
WE SAY THAT THE DISTANT AND FIRST CAUSE AND IS THE

OF THIS PESTILENCE WAS CONFIGURATION OF THE HEAVENS. IN 1345, AT ONE HOUR AFTER NOON ON 20 MARCH, THERE WAS A MAJOR CONJUNCTION OF THREE PLANETS [SATURN, JUPITER, AND MARS—RGS] IN AQUARIUS. THIS CONJUNCTION, ALONG WITH OTHER EARLIER CONJUNCTIONS AND ECLIPSES, BY CAUSING A DEADLY CORRUPTION OF THE AIR AROUND US, SIGNIFIES



MORTALITY AND FAMINE...

Quarantine in Literature



In The Decameron, by Boccaccio, from the early 1350's, a fictional group of 10 young nobles decamped to the countryside to avoid the plague, which hit urban areas much harder (so much for the planetary conjunction theory.) There, they told stories (many of which were astonishingly ribald) to each other while waiting for the danger to pass.

—RGS

Note: We can justify this snippet appearing in the FOCUS, given the conjectured link between the bubonic plague and the cosmos.



Issac Newton and the Plague

The Black Death in Europe in the mid-1300's was only one of the several epidemic plague outbreaks in earlier centuries. One outbreak in England occurred in the 1660's, when, like so many students nowadays, Newton was enjoying his college years at Cambridge University close to London. Newton headed off to his family's estate in the countryside to escape the pestilence, where, without the benefit of his instructors ("I can't teach this kid anything!"), he put the finishing touches on the mathematics we now know as calculus. Then, as an early application of these methods, he used



it to derive the law of universal gravitation at age 23 (not sure how old that is in people years).

—RGS



Dear All, please do not think for a moment that I am taking the COVID-19 pandemic lightly; on the contrary, as a physician, I have a great respect for viral pneumonia and respiratory failure. The above pages are meant to inform, not to downplay.

—RGS

Going Virial!

*What is the virial theorem?
Why should I care?*

Contributed by Richard G. Spencer



Globular Cluster M71



Cluster of Galaxies Abell 2744

The *Virial Theorem* states that for an equilibrium system (i.e., it will still be there when you look again in a few billion years, give or take) of mutually gravitating bodies, the total kinetic energy is one-half of the total potential energy (well, *negative* of the potential energy if you want to be technical, since the potential energy is always negative). The word “virial” comes from Latin roots, meaning “strength”, and is defined in terms of the forces and distances between the gravitating bodies.

Armed with this late-1800’s theorem from (ultimately) statistical mechanics, the mass of such systems can be estimated from modern spectroscopic measurements of the radial velocity (i.e. velocity along the line of sight) of a representative subset of the bodies within the system, i.e. a globular cluster, or cluster of galaxies.

This is called the “virial mass” to distinguish it from the mass derived in a number of other ways. None of the methods are perfect, and much can be learned by comparing them.

I hope to give a lecture on this at an upcoming DAS meeting!

Astrophotos by AP-SIG & DAS Members

The Pacman Nebula (NGC 281) in Narrowband

by Bill Hanagan

I described narrow-band imaging in some detail in the January and February 2020 issues of the FOCUS, so I won't cover it in detail here. My image of the Pacman Nebula was produced from narrow-band emission data acquired jointly with Rick Spencer.

Basic Narrowband Color Mappings

While creating my version of the Pacman Nebula that appears on the next page, I first tried a number of "basic" color mappings to see if any might be advantageous. There are

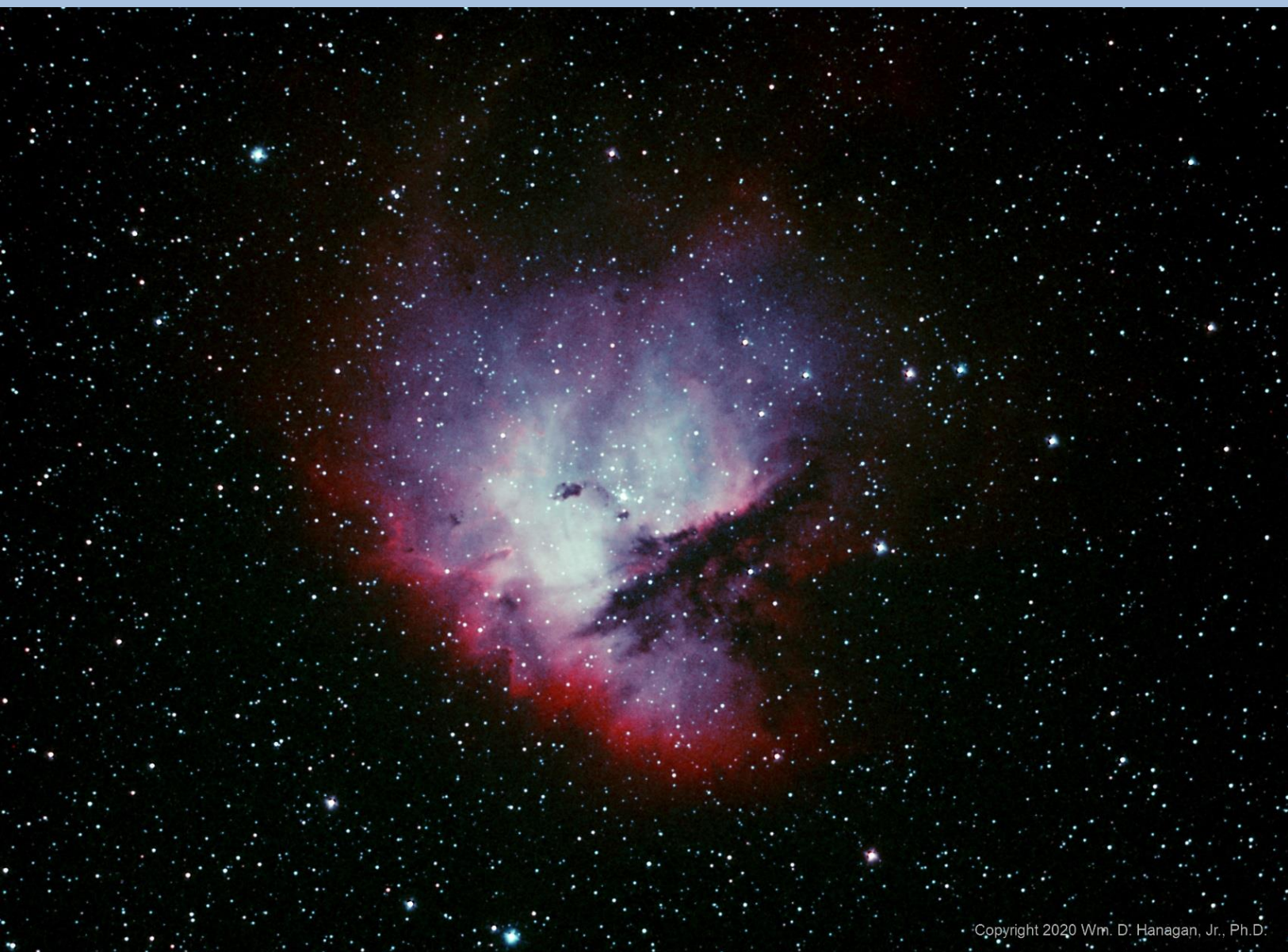
six basic ways to map the usual Hydrogen, Sulfur, and Oxygen image data into an RGB color image. These are shown to the right. Two of these are widely known. "HOS" is the CFH palette, named



after the Canada France Hawaii telescope, and SHO is the Hubble Palette. Let me know which you like or dislike and why.

The main difference between the underlying H-alpha, OIII, and SII image is seen at the lower-left edge of the nebula, which is rich in Hydrogen and Sulfur emission, as compared to the central region of the nebula, which is rich in Oxygen emission.

For the image below, I decided to go with the (H+S)OO palette, which I used on the Pelican Nebula image in the February FOCUS. This combines the Hydrogen and Sulfur images in the Red channel and places the Oxygen data in both the Green and Blue channels. This mapping happens to place the sources of the data into the color channels closest to the colors of the emission lines passed by their respective narrow-band filters, so it could be argued that this is as close to a “natural” appearance as can be expected in a narrowband image.



Copyright 2020 Wm. D. Hanagan, Jr., Ph.D.

However, since the center of the nebula is rich in OIII emission I adjusted the color in the center of the nebula slightly using CurvesTransformation, to get a light blue reminiscent of our own sky, for visual impact.

Data Acquisition Details for the Pacman Nebula

- Sub-exposures: 10 minutes each, dithered and guided
- Total exposure time contributing to the image: 3 hours 20 minutes (6x10 minute exposures each for H-alpha and OIII, and 8x10 minute exposures for SII).
- Date and Site: 12/16/19, Rick Spencer's Observatory
- The raw images were obtained when the moon was high and 72% illuminated! You don't have to wait for a moonless night to do astrophotography!
- Optics: 10" Takahashi CCA-250 with an 0.72 focal reducer, operating at 890 mm and f/3.6 (f/4.4 based on the amount of light blocked by the central obstruction)
- Telescope mount: Astro-Physics AP1100GTO with CP4
- Imaging Camera: QSI-683wsg8, with off-axis guider (OAG), operated at -10C
- Guiding camera: Starlight Xpress Ultrastar, mounted in the OAG
- Software: Windows 10, ASCOM, Astro-Physics Command Center (APCC), Cartes du Ciel (SkyChart), Nebulosity4, and PHD2

Image Processing Details for the Pacman Nebula

PixInsight 1.8 was used for all image processing. Combined words like "ImageCalibration" and "StarAlignment" are not typos—they denote specific PixInsight Processes and Scripts that were used.

ImageCalibration was used with master dark and bias frames, followed by CosmeticCorrection, which was used to correct a bright column and to remove hot pixels that survived calibration. Blink was used to qualify images (only one image was rejected out of 21). StarAlignment, Crop, and ImageIntegration were used in the usual way. DynamicBackgroundExtraction was applied separately to each of the three master frames to take advantage of the larger background areas in the SII and OIII images. MultiscaleLinearTransform was used for noise reduction. PixelMath was used for RGB color mapping according to the mappings described in the text. HistogramTransformation was used for an initial basic stretch and CurvesTransformation was to finish.

The Jellyfish Nebula (IC 443) in Narrow-Band by Bill Hanagan

Copyright 2020 Wm. D. Hanagan, Jr., Ph.D.



My bi-color image of the Jellyfish Nebula, above, was produced from narrowband data acquired jointly with Rick Spencer. This image was color mapped using the HOO palette, which is commonly used when only H-alpha and OIII data are acquired. Note the small teal area at the top right of the Jellyfish and scattered among the tendrils through the center and right edge of the Jellyfish. These are the areas where OIII emission is at its highest.

Data Acquisition Details for the Jellyfish Nebula

This image was produced from 8x10 minute H-alpha exposures and 4x10 minute OIII exposures, for a total of 2 hours of exposure time. The data was acquired on 12/7/2019 with the moon 83% illuminated. Otherwise, the data acquisition details are the same as for the Pacman Nebula above.

Image Processing Details for the Jellyfish Nebula

TGVDenoise was used in addition to MultiscaleLinearTransform for noise reduction. Otherwise, the image processing details were the same as for the Pacman Nebula above.

Images from Ron Worden

From the Snobie Observatory at the Lincoln Control Center in Bear, DE



Copyright Ron Worden

Caldwell 49 the Rosette Nebula is a large Ha region located near one end of a giant molecular cloud in the constellation Monoceros

Technical Information:

Date: 1/20/2020

Location: W75° 40' 43.04" N39° 34' 39.7"

Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm, Guide Scope 60mm Prime Luci Labs

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000XM + ZWO174 autoguider(+/-1 arcsec)

Temperature: 26°F cooled to -15°C

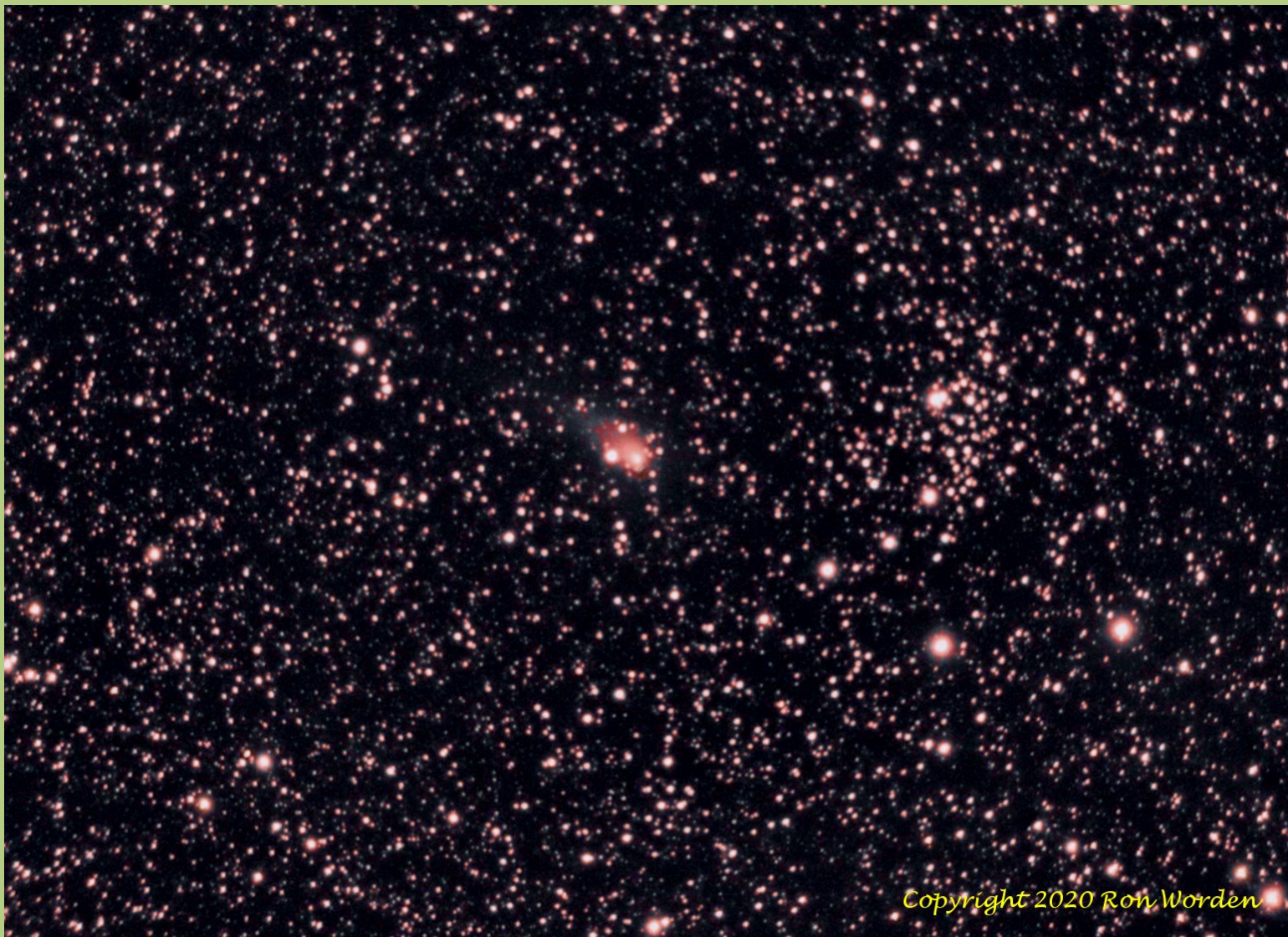
Filters: Sii,Ha,Oiii

Exposure: 18LF-300sec .sub frames (1.5hrs.)(6 Sii,6 Ha,6 Oiii) Sii in Red channel, Ha in Green channel, Oiii in Blue channel.

Software: PixInsight/PaintShopPro6

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark



Copyright 2020 Ron Worden

Comet C/2017 T2 & NGC957 is an open cluster in the constellation Perseus

Technical Information:

Date: 1/20/2020

Location: W75° 40' 43.04" N39° 34' 39.7"

Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm,

Guide Scope 60mm Prime Luci Labs

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000XM + ZWO174 autoguider(+1 arcsec)

Temperature: 26°F cooled to -15°C

Filters: L,Sii,Ha,Oiii,Hb

Exposure: 25LF-300sec .sub frames (2.08hrs.)(5L,5Sii,5Ha,4 Oiii,6Hb) L in L channel, (Sii&Ha) in Red channel, Oiii in Green channel, Hb in Blue channel.

Software: PixInsight/PaintShopPro6

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark from 10 dark frames



M45(Pleiades) Open star cluster in constellation of Taurus

Technical Information:

Date: 11/02/2019

Location: W75° 40' 43.04" N39° 34' 39.7"

Telescope: ED102CF Refractor + .8x Focal Reducer F/5.6 , FL 571mm,
Guide Scope 60mm Prime Luci Labs

Mount: Losmandy G11 Guided with Dithering

Cameras: SBIG ST2000XM + ZWO174 autoguider(+/-1 arcsec)

Temperature: 43°F cooled to -10°C

Filters: L,Sii,Ha,Oiii

Exposure: 23LF-300sec sub frames (1.92hrs.)(6L,3Sii,6Ha,8Oiii) L in
Luminescent channel, Combined Sii & Ha in Red channel, Oiii in Green
channel, Oiii in Blue channel.

Software: PixInsight

Frame: 54.4 x 71.2 arcmin

Calibration: Master Dark from 10 dark frames

Observer: Ron Worden

Mark Jacobini

Resources for Beginners

[Beginners Click This Link!](#)

Follow this to one of the most valuable posts that you will find on Cloudy Nights (CN). It's one post within a thread started by Dave Mitsky who is a very active moderator on the CN site. He also puts together the Celestial Happenings topic each month on CN.

Dave is the quintessential Astronomy Enthusiast who freely passes on his vast knowledge to our community. – MJ

*If this link doesn't redirect you, please cut and paste:

<https://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/?p=5184287>

Another Beginner's TIP

[Beginners Articles](#)

You will be rewarded with a collection of articles that cover astronomy from A(Albedo) to Y(Your Eyes:Key to Observing). Sorry, no Z yet.

The site has a few outdated links, but the Articles section is packed with good info. – MJ

*If this link doesn't redirect you, please cut and paste :

<https://www.lcas-astronomy.org/articles/index.php>

The 18th Anniversary AP-SIG Meeting Report by Bill Hanagan, AP-SIG Founder

Elephant Trunk detail by Mark Mitchell

The February 29 AP-SIG meeting was held on-site at Rob Lancaster's home in Wilmington, DE. In case you missed the title of this article, this meeting was the 18th Anniversary of the Founding Meeting of the Astro-Photography Special Interest Group!

Due to the cloudy and blustery weather, we started the meeting inside where Rob and Lindsay provided a buffet dinner of Capriotti's subs, followed by a delicious dessert of Dark Chocolate Mousse Cake! Thanks Rob and Lindsay!

After dinner, the meeting moved into the family room, where Rob demonstrated a new auto-focus routine that he has been working on and also described his recent effort to transplant Astrometry.net plate solver code into a native Windows library so it doesn't need to run in a troublesome virtual machine environment. I presented examples of all of the basic color mappings of three-wavelength narrowband data into RGB color images using the Pacman Nebula. Other photos that were displayed included Ron Worden's narrowband version of M31 and Dana Wright's narrowband version of the Tadpoles (IC 410). Some of the photos displayed appear elsewhere in this issue of the FOCUS.

We continued with the Q&A session and reviewed some easy ways for beginners to get started doing astrophotography.

I remembered to take the group shot below just as we were breaking up. From left to right are Bill Hanagan, Dana Wright, Rob Lancaster, Bob Trebilcock, and Ron Worden. Casey Przywara also attended the meeting but left ahead of the group photo.

The next AP-SIG meeting is tentatively scheduled for the weekend of March 20 / 21 at Rick Spencer's. HOWEVER, this will only go ahead if Rick Spencer and I can figure out how to make the meeting low-risk in terms of spreading COVID-19.



Woodside Creamery Outreach Schedule

We will once again host a series of Outreach events at Woodside Farm Creamery. Enjoy some delicious ice cream as we share views of the night sky with the public. This will offer many their first time to see the Moon or major planets through a telescope! Bring a basic scope, pair of binoculars, or just your (basic) knowledge of astronomy. The club even has some loaner telescopes you



can use for this event! Woodside Creamery is located at 378 North Star Road, Newark, DE. The dates are as follows, and I hope to see you there! —Jeff Lawrence

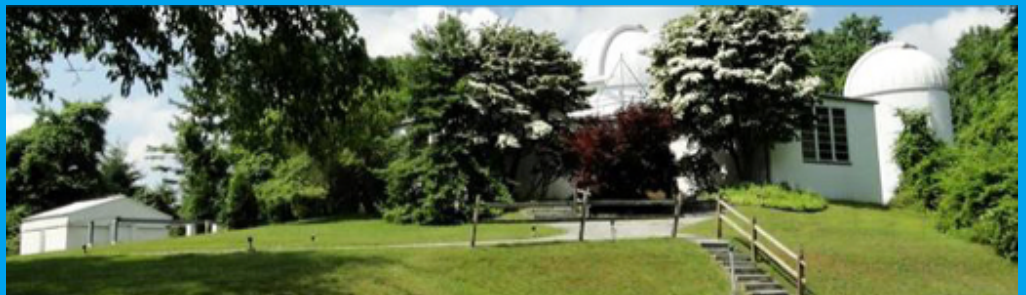
Friday, April 3:	6:30 - 8:00
Friday, May 1:	7:00- 8:00
Friday, May 29:	7:30 - 9:00
Friday, June 26:	7:30 - 9:00
Friday, July 24	7:30 - 9:00
Friday, August 28:	6:30 - 9:00
Friday, September 25:	6:00 - 8:00
Friday, October 23:	5:30 - 8:00

MCAO Volunteers Needed

My name is Kim Green and I am the secretary at the Mount Cuba Astronomical Observatory. This year we have increased our field trip activity, we have added many additional Public and Family Nights and we have added additional children's programs to our calendar. The community has requested these programs and we

are doing our best to accommodate. With that being said, we are looking for volunteers to help out.

We are in need of people who are available to help during the day time with our field trips and tours. But we would also love to have some



evening help as well. If you are interesting in helping out please contact me at 302-654-6407 or email me at KimGreenMCAO@gmail.com and I can add you to our volunteer email list so you know when we will need help.

Did you know?...*another way to contribute to the DAS*

The Delaware Astronomical Society is a registered charity under AmazonSmile. Amazon donates 0.5% of the price of eligible smile.amazon.com purchases to the charities selected by customers. If you are making Amazon purchases and want to see a portion of your purchase price donated to DAS please use the link below

Delaware Astronomical Society's unique AmazonSmile charity link: <https://smile.amazon.com/ch/23-7281900>

Do you believe 0.5% couldn't matter?
Think again!

From: Mary Poppins;
extolling the virtues of small
investments



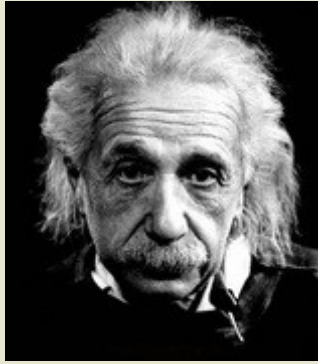
Fidelity Fiduciary Bank

If you invest your tuppence
Wisely in the bank
Safe and sound
Soon that tuppence safely invested in the bank
Will compound
And you'll achieve that sense of conquest
As your affluence expands
In the hands
Of the directors
Who invest as propriety demands

You see, Michael, you'll be part of...
Railways through Africa
Dams across the Nile
Fleets of ocean greyhounds
Majestic self-amortizing canals
Plantations of ripening tea

All from
Tuppence prudently, thriftily, frugally
Invested in the...
To be specific
In the Dawes, Tomes, Mousley, Grubbs
Fidelity Fiduciary Bank

DAS Loaner Equipment



“Be a loner. That gives you time to wonder, to search for the truth. Have holy curiosity. Make your life worth living.”

The DAS has several telescopes that are designated for loan to members. Our advice to new members is to take any of these telescopes out on loan so you can learn the advantages and disadvantages of the various designs.

- 80mm Celestron Refractor with a NexStar GOTO mount. (On loan from Bill McKibben)
- Meade ETX 90mm Special Edition
- Bushnell Voyager 4” tabletop scope (AstroScan clone)
- Three Dobsonian scopes: two with 6” aperture, one with 8” aperture. This style scope is very easy for beginners.
- Meade 8” LX-10 Telescope: This 8” Meade LX-10 Schmidt Cassegrain Telescope (SCT) is a good loaner if you have any thoughts about buying an SCT telescope on a GoTo fork mount.

Procedure for DAS Members to Sign Out Loaner Equipment

1. **Inform:** Please inform DAS Observatory Chair via e-mail -- this is currently how all loaner equipment is being logged/tracked. (email below)

2. Borrower email to include:

- a. Your name and contact information (cell #, email, home number, etc.)
- b. Date equipment borrowed
- c. Description of all equipment being borrowed
- d. Estimated return date for each component borrowed
- e. List any damaged/missing components (if applicable)

3. **Damage:** If the equipment is damaged while you are borrowing the equipment, please notify the DAS Observatory Chair in a timely manner.

4. **A sign out log** will be posted in the near term to compliment the email notification. **NOTE:** Currently DAS Loaner equipment is **only available for loan to current DAS members.** (Which is a great excuse to join DAS)

Thank you,
Chris Horrocks
DAS Observatory Chair

DAS AMATEUR TELESCOPE MAKING SPECIAL INTEREST GROUP

Bill Hanagan

The DAS Amateur Telescope Making (ATM) Special Interest Group (SIG) is made up of DAS members who get together to work on their own as well as club related telescope making projects. We get together at times and locations appropriate for whatever projects are currently underway.



The general range of activities of the ATM SIG includes all manner of telescope making including Newtonian mirror making, the testing of complete telescopes as well as individual optics, and the making of telescope accessories. In the past, we have made several Newtonian telescope mirrors from scratch and completed some mirrors that members brought in as works in progress, including one that was started in the mid-1960's! We've also made new telescope tubes, made secondary mirror holders, tested numerous telescope objectives, made wire spiders for Newtonian secondaries, and made many solar filters for telescopes and binoculars. We also completed the refiguring of the DAS 17.5" Newtonian mirror used in the Big Dob currently housed in the Sawin Observatory.

If you're interested in telescope making, feel free to email me and let me know what you're interested in doing at hanaganw@verizon.net and include your name, address, and phone number. I'm always glad to provide some guidance and information to other telescope makers.



Images taken before and after adjustment of the Hubble Space Telescope *using methods fully endorsed by the ATM SIG.*

From the Desk of: Robert Trebilcock, DAS Treasurer

It is time to renew Delaware Astronomical Society 2020 Annual Membership Dues

November 1 is past--time to renew DAS Dues!

Delaware Astronomical Society 2020 annual membership dues were due November 1.

Dues remain \$30 for the 2020 calendar year.

Dues remain \$30 for the 2020 calendar year.

There are several payment options:

- 1) You can bring cash, check or money order for \$30 made out to DAS to any meeting. I will be available at the meeting to collect any payments.
- 2) You can use your PayPal account to send payment to DASmtcuba@gmail.com
- 3) You can pay with PayPal using the link below; you don't need to have an account with PayPal, just a credit card.
https://www.paypal.com/cgi-bin/webscr?cmd=_s-xclick&hosted_button_id=NDGKG4CWCX8GU
- 4) You can mail payment to:

Robert Trebilcock
DAS Treasurer
3823 Rotherfield Lane
Chadds Ford, PA 19317

If you know that you don't want to rejoin, let me know, and I will stop sending reminders, but we *really, really* want you to continue with DAS!

If finances are a barrier to rejoining, let me know confidentially, and we will try

If finances are a barrier to rejoining, let me know confidentially, and we will find a solution.

If you believe that you have already paid your 2020 dues, send me an email at trebilcock@aol.com and we will try to figure out what happened.

Think of the many benefits of being a member of the Delaware Astronomical Society!

We have telescopes including eyepieces and collimating equipment for your use. You will have access to an array of telescopes for loan or for use in the Sawin Observatory at Mt. Cuba. The most recent purchases are a solar scope, and the Orion HDX110, which can be used for observing or for astrophotography, depending on your interests. If you know nothing about astrophotography, no problem, we have people eager to teach you how to do it. There is a special interest group in astrophotography that meets monthly.

If you want to build a telescope of your own, we have members who are expert and who are willing to show you how to do it. We have books in our library that explain the concepts.

If you are a beginner, you will have help in Greg Lee's "What's Up in the Sky", so that you will know where to look for interesting objects that month and we have added mini talks to the monthly meetings on basic astronomy concepts geared to beginner astronomers.

If you want help with finding objects in the sky, come to our star parties, formal and informal, to get some help with using your telescope. You can also borrow a club loaner scope or just come and enjoy the sharing of views through several scopes.

If you have a problem with your equipment, we meet informally every Tuesday night to share discoveries of new equipment, solve problems, chat and observe. Come out on Tuesday nights to find members who can help you problem solve. Let us know in advance what you would like to work on or which problems need solved, or what interesting things you would like to try.

If you want to be more involved, let one of the Board Members know!
We need people with diverse interests!

There is something for everyone in the DAS, so be sure to send in \$30 for dues soon to help improve the amenities of the club even more.



Medieval astronomers favored clubs—you should too!

New Members Form

Please make checks payable to DAS, print out the following form and mail to:

Robert Trebilcock, DAS Treasurer, 3823 Rotherfield Lane, Chadds Ford, PA 19317

DAS Membership costs \$30 per year, which renews November 1st. We pro-rate membership based on when you join, as follows:

Month Joined	Cost	Renewal Due
Jan-Feb	\$30	This November
March-May	\$20	This November
June-Aug	\$10	This November
Sept-Dec.	\$30	Next November

NEW MEMBERSHIP FORM

Item	Cost	Sub-total
Membership	\$30/20/1	
Astronomy Magazine	\$34	
	total:	



Name _____
Email Address _____
Street Address _____
Phone Number _____
City _____ State _____
Zip _____
How did you hear about
DAS? _____

For questions, contact Robert Trebilcock, DAS Treasurer at (610) 558-1637 (leave message) or by email New Members

Please see the [How to Join page](#) on our website for methods to become a dues-paying member. If you have any questions call any of the member representatives listed.

If you're just joining us for the first time, THANK YOU VERY MUCH, and WELCOME to the DAS! It's GREAT to have you with us!—Rob L.

to Trebilcock@aol.com

How to Join the DAS Groups.io Group

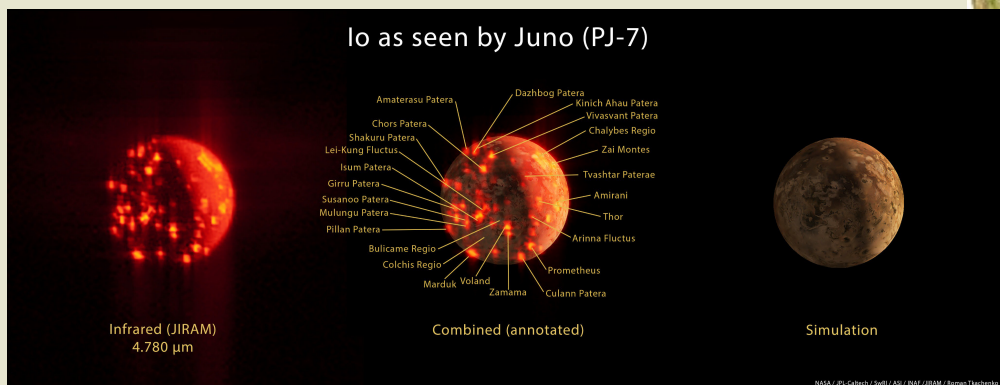
DAS FORUM / E-MAIL SITE ON GROUPS.IO

This is an e-mail service, online forum, and information sharing service for use by DAS members and our astronomy enthusiast friends. To Subscribe to the service, just send an email to: DAS+subscribe <at> groups.io. Then we will compare your name/ email to our lists to make sure that we know you, and if so, we will approve your subscription. If you are not currently a member of the DAS, we strongly encourage you to join.

That is all that you need to do to get into the system. You don't even need to setup an account. But if you want to have more control over how you receive messages from the group or if you want to use the more advanced features, then head over to the website <https://groups.io/login> after you are approved for the DAS Group and you can log in to make any changes you like.

For more information about our group click this link:

<https://groups.io/g/DAS>



**Io, the highly volcanic innermost moon of Jupiter, after which the .io groups were named (I presume)
—RGS**

DAS Contacts

Please call or email us with any questions or for more information!

Officers:

President: Rob Lancaster, rlancaste AT gmail DOT com

Vice-President: Jeff Lawrence, (302) 668-8277, jef.law76 AT gmail.com

Secretary: Bill McKibben, billmck21921 AT gmail DOT com

Treasurer: Bob Trebilcock, trebilcock AT aol DOT com

Board Members at Large:

Bill Hanagan, (302) 239-0949, hanaganw AT verizon DOT net

Tom Harding, hardintw AT aol DOT com

Dave Groski, groski AT udel DOT edu

Standing Committee Chairs:

Observatory: Chris Horrocks: bettysmithers AT verizon.net

Education: Vacant--*are you interested?*

Library: Maria Lavallo and Sue Bebon

Observing: Greg Lee, (302)252-7806, greglee288 AT gmail DOT com

Publications: Rick Spencer, rgspencer AT ymail DOT com

Other Positions:

Amateur Telescope Making Special Interest Group: Bill Hanagan, hanaganw AT verizon DOT net

Astronomical League Coordinator: K Lynn King, klynking AT verizon DOT net

Astro-Photography Special Interest Group (AP-SIG): Bill Hanagan, hanaganw AT verizon DOT net

Awards Chair: Amy Hornberger, aehornberger AT gmail DOT com

DAS Book Club Leader: Amy Hornberger, aehornberger AT gmail DOT com

Elections Chair: Sidney Ocampo, gegocampo AT yahoo DOT com

Programs Chair: Jeff Lawrence, jef.law76 AT gmail.com

Webmaster: Rob Lancaster, rlancaste AT gmail DOT com

