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PSF NEWS

Planetary Studies Foundation

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Lunar Topography to Scale: Let's Make It Real

By: Matt Harmston



As a child, I found a curious peace in the light of the moon. Whether streaming light in my bedroom window, casting shadows under the wise old oaks, or serving as a silent beacon in the darkness of night, the moon never seemed far from my thoughts. Through my reading, I knew that this serene light was reflected from a face contoured by unimaginable destruction and chaos, details that I longed to view for myself. As a cherub, my first views through a 'scope revealed bumps and bruises, pits and peaks, darkened maria and brilliant streaks. I imagined an entire world just beyond my little arm's reach. As with any child having plenty of time to daydream, that view of the moon kicked my imagination into high gear, pondering such questions as, "What would it look like if I could see these big 'things' [technical 6-year-old jargon] on Earth?" Four decades later, seeing Earth-bound craters firsthand is still on my bucket list. But, I have been able to gain a little insight into this question thanks to satellite imagery and the ability to image the moon. For this article, I superimposed images captured with my MallinCam HD-10 and 100mm Skywatcher refractor onto Cedar Rapids, Iowa-centered screenshots from Google Maps. To the best of my limited ability, overlaid images are to scale. The first crater of interest is probably my favorite: Copernicus (see first photo above). Being between 56 and 57 miles wide and 2.3 miles deep, it's conspicuous nearly 500-mile wide debris canopy (or, ejecta blanket), with the right lighting and image scale, takes on what I think is a feathered look. Some of these "feathers" start many miles away from the primary crater, due to secondary impacts from debris cast out in the initial impact. Being larger than Anaxagoras, centering Copernicus on Cedar Rapids would put Iowa City within its reaches. The central peaks alone span the width of Cedar Rapids. While we may not know the entirety of global disasters arising from such an impact on Earth (I'll leave that speculation to Hollywood), it is safe to say that, no matter where you are, this would ruin your day pretty quickly.

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PRESIDENT'S MESSAGE

2018 has certainly been a transitional year for your Planetary Studies Foundation. The year began with the anticipation of a series of planned celebrations leading up to our actual 30th Anniversary date on February 8th 2019. Unfortunately unanticipated circumstances that began in early February took precedence and required an immediate change in plans. The main issue dealt with our lease on our Earth and Space Science Museum in Elizabeth, Illinois. The owners' decision to sell the property put our tenancy in question and we had to prepare for the possibility of moving out before the expiration of our December 31, 2018 lease. The PSF has occupied this facility since November 2013 and we accumulated a great deal of exhibit material and furniture over those past five years. The immediate problem would be to make a decision to either completely close the museum or move our exhibits to an alternative location. With that in mind the PSF Executive Board authorized a search committee to look for and recommend an alternative site. A possible solution came rather quickly with the availability of a much smaller but less expensive location on the opposite side of Main Street in Elizabeth. The only problem was that the landlord wanted PSF to sign a two year lease and take immediate possession. Given the uncertainty with our current rental situation the PSF Executive Board decided to sign the lease, take possession and prepare for a gradual move to the new facility. Our facility at 115 N. Main Street remained in full operation through September. The exhibits and most of the furniture were moved over to the new facility by late October. I want to thank the following volunteers and staff for making this move as efficient and problem-free as possible: Julie and Mark Bryan, Tina Hollis, Michael Brixius, Gulnara Novbatova, Peggy Wakefield, Echo Taylor, Evelyn Larson, Kevin Sevey, Judith and Jeff Glenn. The new facility at 152 N. Main Street is coming together very nicely with new exhibits and will be open to the public early next year.



The move to the new location created many new challenges for the PSF staff. Still PSF conducted a very successful Children's Summer Science Program, provide numerous off-site lecture programs and night-time observing sessions, classified a record number of new meteorites, operated the Doug Firebaugh Astronomical Observatory, and keep both the 1876 Banwarth House and Earth and Space Science museums open on weekends. At the August Annual Members Meeting your PSF Executive Board passed the 2019 Budget (see page 6) that reflects a significant change in both expenditures and income. This reflects the need for PSF to review its mission goals, consolidate its resources, and develop a new strategy for fundraising. The immediate plan for 2019 is to operate from our new facility, hold more events at the 1876 Banwarth House and Museum, promote the observing sessions at the Doug Firebaugh Astronomical Observatory in Freeport, IL, and offer more off-site lecture programs. In addition our meteorite research team will continue to classify new meteorites as part of our association with and commitment to the Yale Peabody Museum of Natural History. As you can see 2019 will be a very interesting and challenging year. Over the past thirty years PSF has survived through many up and down periods and always came out on top. I'm sure the next five years will be no different and I look forward to the what the future holds for us.

I thank all our members, financial benefactors, scientists, associates and friends for their continued dedication and support. **HAPPY HOLIDAYS**

Paul P. Szipiera

DONORS' SPOTLIGHT

Year-end Fund Drive (as of December 8th)

General (Operations) Fund

Leo & Karen Baran
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Cecelia Cooper
Richard & Ellie Leary
Linda Virag

1876 Banwarth House & Museum

Connie Kahl

Summer Children's Science and Internship Programs

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Eugenia Krzyzanski
Martha & Max Purchis
Carol Wellman

Doug Firebaugh Astronomical Observatory

Doug Firebaugh
Tom Dunmore

Meteorite Research

Paul & Diane Sipiera

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Spike O'Dell
Karen Sabatini
Dave Smith
Paul Solarz

MEMBER'S SPOTLIGHT: MATT HARMSTON

Can you tell us about your background and education/professional accomplishments?

I am a senior research scientist for an educational testing company, living in a wonderful rural Iowa cornfield. Though my undergraduate and graduate work took place in Iowa, I'm originally from Stockton, Illinois. With educator parents and ample northern Illinois dark skies, my budding fascination with outer space couldn't help but be fueled. Having been inspired by my parents, I write articles for my local astronomy club's newsletter in hopes that I can share that inspiration with others.

You are one of PSF's newest members. How did you hear of us? You have been to our museum, what did you think of it?

I learned of PSF after stopping at the museum in Elizabeth. I had seen the museum while passing through town, and decided to stop in. I was impressed by the quality and uniqueness of exhibits. Yet, the passion with which the legacy of space exploration and science was shared really captured me.



Matt & Family

You like astrophotography, when and why did you get interested in it?

I do indeed enjoy snapping pictures of the heavens. But, I am not what purists might call an astrophotographer. Rather, I engage in video astronomy, and snap images from my computer screen captured live via CMOS video cameras. Though purchasing my first camera only a year ago, I've completely immersed myself in the pursuit. Even while being an avid telescopic observer for over 20 years using scopes large and small, I was unable to serve my child who had the greatest interests in astronomy due to her being of low vision. The discovery of video astronomy has been an absolute "game changer" for us, as the flexibility of quality video cameras has enabled me to engage all of my daughters...with low vision or not. Admittedly, video astronomy has opened up amazing new realms to me. But, there's nothing like the awakened awareness of fault lines on the moon, weather on Jupiter, and the grandeur of the Orion Nebula. That's the good stuff.

Do you have any other interest?

While I have a lot of other interests, biking and making music with my daughters are at the top of the list.

Where is the most memorable place(s) you have traveled to?

Doolin, a small community in Ireland situated near the base of the Cliffs of Moher, holds a special place in my heart. Sitting in sunlit silence, watching Atlantic swells roll onto shore with the song of seabirds drifting on the salty breeze brought an incredible sense of peace.

Do you have a favorite area of learning?

Hands down, I prefer to learn about astronomy. What I've learned to date fascinates me, and I could never run out of interesting new topics in a thousand lifetimes.

Do you have any advice for younger scientist or students?

Each day, choose to look for wonder and beauty. At the very least, you will smile. But, you may ultimately find yourself truly inspired.

REPRESENTING PSF AT CONFERENCES IN CHINA AND INDIA: JAMES C HAGEN

It has been my pleasure and privilege to be part of the Planetary Studies Foundation for several decades now, and to currently be an Executive Board Member of the organization. I will never forget several annual dinners with those incredible men who walked on the moon – what a thrill!! Although trained as a research microbiologist, I thrive not only on looking in, but in looking UP! I have been on a rather curious road that has led to me to work in the areas of bioterrorism, and disaster management for both natural and man-made disasters. Imagine my surprise when I found the worlds of disaster management and space exploration could actually intersect!

The United Nations Office for Outer Space Affairs (UNOOSA) works to "promote international cooperation in the peaceful use and exploration of space, and in the utilization of space science and technology for sustainable economic and social development." In 2006, UNOOSA established the United Nations Platform for Space-Based Information for Disaster Management and Emergency Response (UN-SPIDER) to use space technology and near Earth objects (satellites) to help with preparing for, and responding to disasters.

It has been my privilege and honor to represent the Planetary Studies Foundation at international UN-SPIDER meetings in China and India. At these meetings, I have served both as Session Moderator and Chair, and I have given presentations concerning the importance of this linkage in protection of our most vulnerable populations. Over 30 nations are in attendance at these meetings, and it is a wonderful opportunity to share what is being done by each of our organizations and countries. Attendees are always most interested in learning the activities of the Planetary Studies Foundation and our efforts to promote both knowledge and interest in space, especially in our youth. Our last meeting was in Beijing October 24 - 26, and specifically concerned Enhancing Disaster Preparedness for Effective Emergency Response.

Much of the work focuses on utilizing existing satellite networks, both private and government-based, to provide all nations (especially Third World countries) with information on potential disasters, and in saving lives and property after disasters occur. We are all too aware that natural disasters are becoming more prevalent, more severe, and more unpredictable! Our recent hurricane season, and California fires, are ample proof of that. Elsewhere in the world, there are abundant hurricanes, tsunamis, earthquakes, as well as drought and poverty. Much work needs to be done and space technology can help.

I wish to thank Paul and Diane and all those associated with PSF for their continued dedication, commitment, and perseverance. So many events here in the US and globally threaten to drown out the importance and wonder of space. PSF is needed more now than ever – keep up the incredible work!



UN-SPIDER Conference in Beijing, China

**PLANETARY STUDIES FOUNDATION
2019 BUDGET**

I. FACILITIES EXPENSES:

1876 Banwarth House & Museum House:

Property Tax =	3,200
Insurance (off-site locations included) =	3,200
Utilities =	3,400
Security =	800
Maintenance & Misc. =	2,400
	Sub-total = \$13,000

**Earth & Space Science Museum
(152 N. Main St., Elizabeth)**

Rent & Utilities =	\$8,400
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**Firebaugh Observatory
(Freeport, Illinois)**

Operating Expenses =	\$600
	Sub-total = \$9,000

II. GENERAL OPERATING EXPENSES:

Staff & Programs:	
Administration:	\$8,000
Educational Specialists:	
(Topical and summer programs) =	16,000
General Office:	
Internet Services =	500
Office Supplies =	500
Newsletter & Postage =	3,000
Marketing:	
Meteoritical Society student travel grant =	2,000
	Sub-Total = \$30,000

Meteorite Research (optional subject to specific funding):	
a) Analytical services - University of Washington =	\$3,000
b) Sample preparations (probe sections) =	1,000
c) Travel (professional meetings and presentations)	4,000
	Total = \$8,000

GRAND TOTAL = \$60,000

LUNAR CRATERS: MAKING THEIR SCALE REAL (CONTINUED FROM PAGE 1)



Our next crater of interest is quite sizeable: Clavius. Clavius is nearly 140 miles wide, also with an elliptical appearance. Here, foreshortening is due to its location in the moon's southern highlands. Being one of the largest craters on the moon, Clavius contains a distinct, curved chain of smaller craters within its confines. Centering Clavius on Cedar Rapids would place Davenport and regions well-beyond Waterloo within its limits. Such a crater would unleash unimaginable devastation [there's that phrase again] upon the Earth, given that its diameter exceeds many size estimates of Earth's Chicxulub crater, theoretically linked to the dinosaurs' extinction. Along with craters, the moon has at least 40 features identified as impact basins, a name given to impact sites with diameters exceeding 300km (183 miles). A hallmark of many impact basins is the long-ago backfilling and cooling of dark lavas, making them stand out against brighter lunar terrain. Recall the image of the full moon above: Large, roughly circular features backfilled with dark lava are impact basins referred to as maria (or, seas) due to long-since dismissed theories of their being water-filled. The largest impact basin on the near side of the moon is Mare Imbrium (Sea of Rains). This basin, located at upper left in our first image, is over 700 miles wide. It is hypothesized to be the result of a collision between the moon and a 150 mile-wide protoplanet some 3.8 billion years ago. Though the original impact is thought to have created a depression roughly 60 miles deep and perimeter mountain ranges upwards of 4.5 miles high, lava backfilled much of the original cavity. If centered on Cedar Rapids, nine US states would fall at least partially within Mare Imbrium's limits. The ejecta would carry far further, maybe even back into space. When you see evidence of impacts on this scale, the presence of lunar- and Mars-sourced meteorites on Earth makes a lot more sense. With the juxtaposition of lunar craters and terrestrial maps being so awe-inspiring, my amazement over impacts, meteorites, and mineralogic visitors from the moon and Mars is definitely enhanced. And yet, I am grateful that the impacts from which they came took place a long time ago, in places far, far away. Still, could you imagine...



PLANETARY STUDIES FOUNDATION

2018 YEAR-END DONATION FORM

Promoting Science Education, Meteorite Research and Encouraging Interest in the Physical, Astronomical, Environmental and Cultural Sciences

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Email: _____

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Operating Expense

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Banwarth House & Museum

Doug Firebaugh Observatory

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