CONSTELLATION

Summer 2014, No. 2

"The Cosmos is all that is or ever was or ever will be. Our feeblest contemplations of the Cosmos stir us – there is a tingling in the spine, a catch in the voice, a faint sensation as if a distant memory, of falling from a height. We know we are approaching the greatest of mysteries."

– Carl Sagan

CONTENTS

A Glorious Gravitational Lens

By Dr. Ethan Siegel

As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they *also* contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, *mass itself* is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a *gravitational* lens!

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Impact on children's conceptual constructs regarding observational features of the Moon: A look at elements of program and instruction design for early elementary-aged students

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With the increased impact of fulldome technology on the planetarium community, now seems like a reasonable time to pause and reflect on the educational impact and potential of the presentations and programs delivered in these unique learning environments. Similar to research within the planetarium and other informal science education (ISE) fields decades ago (Bishop, 1980; Freidman, Schatz, and Sneider, 1976), prior to the invention of fulldome projectors, several more recent studies have concluded that professionals in the planetarium field believe that the inclusion of active learning in planetarium presentations and programs is important for conceptual learning (Croft, 2008; Littman, 2009; Small and Plummer, 2010). This is consistent with educational research findings that indicate that active experiences for audiences are more effective in promoting the types of cognitive engagement that produce affective and cognitive changes (e.g., Bell et al., 2009; Brazell and Espinoza, 2009; Donovan and Bransford, 2005). Providing active learning experiences for younger audiences is especially important.

This study looks at how a modular designed (combination of live interaction and pre-recorded video segments) planetarium program combined with classroom instruction affected children's conceptual understanding of observational features of the Moon. It includes a discussion of how program elements and instructional design may have supported change in student understanding. Our research goals were to: a) investigate how to support young children in learning astronomy using a modular planetarium design and b) explore elements of program and instruction design that support children in learning astronomy in ways that integrate science practices, such as observation, and cross-cutting concepts, such as patterns.

Our second research goal may have implications for education beyond the planetarium field as it reflects the goals of the *Next Generation Science Standards* (NGSS Lead States, 2013) to engage children in a fusion of core ideas, science practices, and cross-cutting concepts.

To explore our research goals we worked with Audio Visual Imagineering in creating a modular designed planetarium program called *The Moon*. Practices of science, appropriate to early elementary school and this domain, were embedded in the program including: scientific observation and creating and using models and representations. Students in our study also participated in two classroom lessons (before and after the program) that engaged them with three observational astronomy constructs targeted by *The Moon* program: lunar surface features, the Moon's apparent motion, and the changing lunar phases. Our study was guided by the following research questions:

1. How do children's ideas about the Moon change as a result of this instructional intervention?
2. How did elements of program and instruction design impact student learning?

Students in four 1st grade classrooms from a suburban U.S. elementary school participated in this study. The first author taught each of the lessons over the span of three days: an introductory classroom lesson, the planetarium program, and the final classroom lesson. A sample of students from each classroom (N=36) was interviewed about a week before and after instruction. Each student was only asked questions relating to two of the three Moon topics:

1. The surface features of the Moon (n = 22)
2. The apparent motion of the Moon (n = 25)
3. The monthly cycle of lunar phases (n = 26)

Codes describing students' ideas were developed for each interview protocol. We began this process by considering prior research on children's conceptions about the Moon (e.g. Plummer, 2009; Trundle et al., 2007) and then developing additional codes based on the interviews. To determine whether or not codes could be used reliably, both authors coded a subset of the interviews (~20%). An inter-rater agreement of at least 80% was reached for each category; all disagreements were discussed leading to agreement.

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Analysis: Our findings show that students' conceptual understanding improved in all three categories. To address our first research question, we include the categories that most compellingly convey how students' conceptual understanding changed. To address our second research question, we discuss those elements of instruction that appear to have influenced the change observed in student understanding.

Surface features of the Moon – Students were asked to draw a picture of the Moon. Codes were developed to indicate the number of scientifically correct surface features (craters, Maria, highland) students included on their drawings. Table 1 shows the shift in the number of scientific features children included in their drawings with fifteen students (68 %) improving and no students regressing.

Table 1.	**Pre (n=22)**	**Post (n=22)**
Maria, Highlands, Craters	0	8 (36%)
Two scientific features	0	5 (23%)
One scientific feature	15 (68%)	6 (27%)
None or other	7 (32%)	3 (14%)

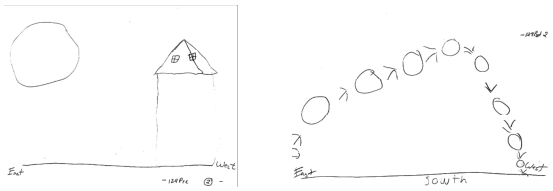
Example: *Before & after instruction*

The scientific process of sketching one's observations is illustrated within *The Moon* program as the main character draws an image of the Moon, labeling the craters, Maria and highland as part of his lunar observations. Further, the live components of *The Moon* program allowed students additional opportunities to be actively engaged; they discussed the Moon's surface features by comparing and contrasting the surface of the Moon and the Earth as well as the near side and far side of the Moon. These instructional elements may have provided students with a path to create conceptual constructs of the targeted knowledge by actively engaging students with visually representations of the concepts.

The apparent motion of the Moon - Students were given a piece of paper with a ground and the directions East and West labeled at the bottom. They were then asked to draw a picture of how the Moon would appear throughout the day/night. A set of codes were developed featuring levels of understanding with the scientific correct conception including that the Moon rises in the East, moves across the sky in a curved path, and sets in the West. Table 2 shows that approximately half of the students did not believe that the Moon moved prior to instruction with another 44% describing a motion that was not scientifically accurate (not rising E and setting W). After instruction, most students (80%) improved in how they described of the Moon's apparent motion.

Table 2.	**Pre (n=25)**	**Post (n=25)**
Moon rises E to W	2 (8%)	18 (72%)
Moon rises/sets on opposite sides of sky	0	1 (4%)
Moon appears to move	11 (44%)	5 (20%)
No motion described	12 (48%)	1 (4%)

Example: *Before and after instruction*



Again, this concept was modeled in the planetarium program as the main character drew the apparent motion of the Moon in his notebook. This motion was also kinesthetically presented to the students as they were asked several times throughout the program to point and follow the apparent motion of the Moon across the planetarium dome. Prior to viewing this portion of *The Moon* program, students addressed their personal constructs of the Moon's apparent motion as they were asked to predict by drawing with their finger how they thought the Moon would move across the sky in a single day. Classroom instruction after the planetarium visit also challenged students to demonstrate how the Moon appears to move through an activity where students had to put several images of the Moon throughout the day in the correct order. The combination of modeling in the program, the use of kinesthetic activities, the realization and confrontation of personal constructs through prediction and post-planetarium visit reinforcement all seem to have played a major role in changing students understanding of daily apparent motion of the Moon. This particular topic used a large amount and variety of active instruction and science practices as instructional elements, which may explain why the greatest improvement of student conceptual understanding was observed in this area.

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The monthly cycle of lunar phases – Students were given eight photographs of the Moon, representing each of the major phases, and were asked to put them in the correct order of how we would see them in the sky. Codes reflected the sophistication of how students arranged the eight cards; an arrangement of a waxing then waning cycle was considered the scientifically normative goal as displayed in Table 3. Half of the students improved in their understanding of the lunar cycle, 12 stayed at the same level of understanding, and 1 student regressed.

Table 3.	**Pre (N=26)**	**Post (N = 26)**
Repeating cycle waxing & waning	4 (15%)	9 (35%)
Repeating cycle but phases not all ori-	2 (8%)	6 (23%)
Waxes or wanes then repeats	4 (15%)	3 (12%)
Waxes or wanes, phases not oriented	10 (38%)	6 (23%)
Did not descript pattern as repeating	6 (23%)	2 (8%)

Students were provided with several opportunities to explore the lunar cycle throughout instruction and in the planetarium. As part of the live portions of *The Moon* program students were asked to state shapes that they have seen the Moon appear in the sky. As students responded that particular Moon phase was put on the dome for students to see. Within the pre-recorded portion of the program the main character (and the audience) predicts which Moon phase comes next in the lunar cycle. *The Moon* program also highlights a lunar phase calendar where the concepts of waxing and waning are presented. Post-visit instruction included an activity where students were asked to predict future Moon phases.

Although many students improved, few reached the target understanding that the Moon's phases increase and decrease over the course of a month. This suggests that students need more practice observing the lunar phases and then organizing images into the pattern of the lunar phases.

Conclusions – This study examined a modular designed planetarium program that includes live presentation embedded within short pre-recorded video segments. The instructional design elements of a modular planetarium program, supported by classroom instruction, showed significant impact on 1st grade students' conceptual understanding of the Moon. The combination of instruction in the planetarium and in the classroom provided students with multiple opportunities to reflect on their current concepts and actively engage with new ideas. Students were actively engaged by using science practices during the planetarium program as well as in the classroom. For example, in the planetarium program children compared and contrasted their observations, used their own bodies to mimic representation of the Moon's apparent motion, and made predictions about the phases of the Moon. These findings demonstrate an effective method of actively engaging children during a planetarium program towards improved understanding of astronomy. Planetarium professionals need to remain committed to using planetariums in ways that maximize their potential. They should also consider opportunities to provide teachers with ways to apply ideas learned in the planetarium during follow-up lessons in the classroom.

Acknowledgment: We would like to thank Joanne Young and Audio Visual Imagineering for the development of *The Moon* program. This work was partially funded by the MAPS Education Research Grant.

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Middle-Atlantic Planetarium Society Conference 2014
"Renew, Refresh, Revive!"
Baltimore, MD -- Wed-Sat, September 10-13, 2014

Join us at the Maryland Science Center (MSC) at Baltimore's Inner Harbor from Wednesday evening, September 10 through Saturday afternoon, September 13, 2014.

Conference Hosts at MSC's Davis Planetarium are working hard with the Conference Planning Committee to organize a conference designed to "Renew, Refresh and Revive" your enthusiasm and perspective toward providing engaging and inspiring astronomy education.

The preliminary schedule already includes a great line-up of workshops and speakers with expert knowledge of current and coming events, missions, technology and more. You are encouraged to submit your Proposal to Present and help round out a dynamic meeting!

Preliminary Conference Schedule:

Wednesday - September 10, 2014
- Afternoon - Check-In, Conference Registration
- Evening - Reception at MSC includes speaker Frank Summers and 'Hubble 3D' in IMAX along with Observatory and Planetarium shows
- Late evening - Taurus session

Thursday - September 11, 2014
- Morning - Breakfast at MSC, Vendor Hall open, workshops and presentations
- Afternoon - Lunch with speaker Fred Espenak, workshops and presentations
- Evening - Dinner with speaker Alan Stern, Planetarium Programs, Observatory
- Late evening - Taurus session

Friday - September 12, 2014
- Morning - Breakfast at MSC, Business meeting, Vendor Hall open, workshops and presentations
- Afternoon - Lunch with speaker Lisa May, workshops and presentations
- Evening - Banquet at hotel, Margaret Noble Address by Carter Emmart, AMNH
- Live music from The Real Geniuses to follow
- Late evening - Taurus session

Saturday - September 13, 2014
- Morning - Breakfast at MSC, workshops and presentations
- topics include New Horizons/Pluto, MAVEN/Mars
- Afternoon - Lunch, workshops and presentations evaluations, door-prizes, closing remarks
- Conference concludes at 4:00pm

IMPORTANT DEADLINES

Registration - August 1
Hotel Reservations - August 1
Paper Proposals - August 1
Poster Text & Handouts - September 10

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Out with the Old - In with the New

Nagasaki is a 400 year-old port city on the southern Japanese island of Kyushu. For centuries, it was one of the principal cities where Japanese culture interacted with European and other Asian cultures. As such, it has always been a city that is curious, and eager for learning and new ideas.

The Nagasaki Science Museum now continues that eagerness for education with a total renovation of its planetarium. In March of 2014 the planetarium re-opened after removing an older, larger system from another company, and installing a new, smaller, brighter, state of the art GOTO CHIRON II HYBRID Planetarium™ system. This new projector uses extremely bright LED's to produce more, and smaller stars than ever before. In fact, the CHIRON II projects a Milky Way that is made up of 140,000,000 micro-stars!

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Tech Tip: UPS Batteries

Kevin Conod, Newark Museum

I don't know if you use Uninterruptable Power Supplies (UPS) in your planetarium, but we've been using several in Newark. These come in really handy if the power goes out or if your area suffers from frequent brownouts. You can't run a whole show off of them but at least you can bring a program to a graceful stop and shut down computers, etc., without plunging an audience of little kids into darkness and silence!

The batteries in a UPS are generally rated for up to 5 years. In practice we've found that it is more like 3 to 4 years, but a battery's lifetime can be significantly shortened by heat. For every 15°F above 77°F, battery life can be reduced by 50%. We had a small UPS stored underneath a projector pedestal. We thought we had enough ventilation under there but recently the battery expired prematurely (we've now added a small fan for extra cooling).

I knew our other UPS batteries were 3 to 4 years old and wanted to be proactive about replacing them. But with OEM battery prices and shrinking budgets that's not easy.

We have units made by APC and they of course want you only to use their replacement batteries. In reality a lot of batteries are made by a small number of companies with different brand names and private labels slapped on them. I decided to go with a third party supplier so I could fit this into our budget.

I was able to get a set of Amstron batteries at almost half the cost of OEM from atbatt.com, though there are many other choices (i.e. we've also used refurbups.com in the past). The only problem I ran into is that APC recently changed their connectors so the battery seemed plugged in OK but we were getting a "no connection" error from the UPS. The solution was to unscrew the simple wiring harness from the old battery and put it on the new set (this was fairly easy, you just have to be careful not to short the terminals together and ruin your new battery. Put a piece of electrical tape on one terminal while you work on the other).

Another tip: when ordering make sure you know how many batteries you need. Many replacements are sold as a "cartridge" which contain multiple batteries. You don't want to order too many or too little and pay for extra shipping.

Keeping your power supplies fat and happy will protect your valuable planetarium equipment - especially when a custodian accidentally flips off the wrong breaker in the middle of a show!

(Continued from page 4)

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President's Message

As I leafed through the memorabilia sifting out of our transition to a new planetarium building, I realized this July 20th is another anniversary: 55 years since the first landing on the Moon. For me, that will always be Space Day. National pride was at fever pitch as Americans stepped onto its surface and captured the flag in the hotly fought battle we call the Cold War space race. At the time, I was enjoying the summer between high school graduation and college and wondering what matriculation was.

Times have changed. My hair is shorter and whiter. Star shows now come from producers around the world. We welcome many more international, worldly influences in our field with 35 countries represented in the International Planetarium Society. Now we talk about Russian space vehicles ferrying crews to the International Space Station, and several countries sail orbiters around our natural satellite to begin planning future lunar colonies. Some of our members are enjoying the sights of China right now at IPS 2014!

On the other hand, changing times bring surprisingly familiar themes. Battles still rage and competition continues in science education. Measured on some world scales, U.S. students' science aptitudes seem to be lacking and America appears to be losing ground. Similar to the education investments of the sixties, the battle cry for STEM education and new education standards like the Next Generation Science Standards calls for more formal and informal educational programs. That includes the entertaining programming we foster under our domes.

Other parallels arise. As the song says, everything old is new again, so a creative scientist and planetarian has offered new perspectives to the study of the universe by reprising Carl Sagan's tour de force, *Cosmos*. Echoing the past, a space race picks up speed, this time to capitalize on economic opportunities with private firms like SpaceX and Orbital moving forward in space transportation.

So the chords change but the song continues with impacts on our work. Some institutions see the expansion and upgrade of a planetarium to be beneficial on several levels and make their domes become something more than starry skies. Others redefine their planetaria more readily as "outreach". At long last they use them to provide support for multi-age STEM education, and build alliances between higher learning and K-12 programs. AND... even MAPS now has financial support for planetarium education research. (Our first grant recipient, Kim Small, reports on her progress on page 2 of this issue. Members can apply at any time.)

All of this brings new roles for planetariums and astronomy educators that can be both empowering and daunting. As you find your methods evolving in one direction or another, please take time to share your insights, advances and experiences with the rest of us. In MAPS you will always find students eager to hone their dome craft. Share your knowledge here in the Constellation, at conferences like our Baltimore meeting in September, or at the LIPS meeting (being held this August in the MAPS region at the Treworgy Planetarium at Mystic Seaport, Connecticut). Changing times require new tools and sharing your innovations with other planetarians will help make all of us grow stronger nationally, internationally, and in our own domes.

Happy Solstice! & Happy Space Day!

Alan Davenport
MAPS President

P.S. Regrettably, a few people who affected the lives of many will not see this anniversary. Most notably, the first man to step on the moon 55 years ago, Neil Armstrong, left us in 2012. Closer to home, Peter Connors from our MAPS ranks in 2013, and Alan Friedman of the Hall of Science in Flushing NY last month, passed on. They were stalwart teachers who touched lives and left a legacy of better science education for all.

Survey Report from the MAPS Education Committee

Thanks to all who participated in the Education Committee Survey, second try, in April 2014. We had 29 respondents to the survey and learned some interesting things based on those replies.

The Education Committee will be reporting on the results in more detail at the MAPS Conference in Baltimore this fall; however we would like to point out some preliminary trends that stood out in some of the questions.

Question 1:
What do you consider to be the most vital/important part of the conferences?

- The overwhelming response is that you value the conference time to network, collaborate, and share professional experiences with your colleagues.
- You are also concerned about not being able to attend conferences either because of the time of year that conferences are scheduled, or because the date of the conferences changes from year to year.

Question 4:
What is the most difficult aspect of your job?

- Financial and staffing issues topped the list for most planetarians.
- Justifying the existence of the planetarium and its role to administrators was also a common response.

Question 6:
Are you interested in the alignment of the Next Generation Science Standards (NGSS) with planetarium presentations?

- An overwhelming majority replied in the positive, even if there was some concern about the value or philosophy of the *Standards*.

Question 7:
What is the best way for us to share information with the membership? Please indicate how likely each of these modes will reach you:

- E-mail directly to MAPS members was the top choice among the methods that were listed.

Question 8:
Add any additional comments/ideas/suggestions you would like to share with the Education Committee:
There were some wonderful suggestions among the replies including the following:

- posting of workshops in a downloadable format
- archiving a database of lesson plans
- suggestions on how to bridge the technology gap
- funding opportunities/grants

These are just a few highlights of responses in the survey. We will endeavor to address some of your concerns and act on your suggestions for improving our services to the membership. As always, we welcome your input (don't wait for a survey to share your thoughts)!

Lee Ann A. Hennig
Chair, MAPS Education Committee
June 2014

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The Saga of the Overhead Projector – Keeping it Simple

By Patty Seaton, H. B. Owens Science Center, Prince George's County, MD

My boss and I have a long-standing joking disagreement about technology in the building. She rightly wants our science center to have cutting-edge technology to provide to the students/ teachers of Prince George's County Public Schools. We do have Promethian Boards in the classrooms, which work well for interactive PowerPoint presentations. She would like to see MORE! As a result, she also believes that the older technologies, such as the use of overhead projectors, should go away.

Here's where she and I disagree. First of all, there is no need of a Promethian Board in the planetarium. Secondly, I am glad we still have "old" technology, because I actively use 24-60 slide projectors on a regular basis (we don't have the money to upgrade and add fulldome digital capability to the theater). Finally, we can project PowerPoint onto the dome, and I found that in certain circumstances, it is (1) more awkward and (2) LESS functional to use than using an overhead projector!

Why would I need an overhead in the planetarium? We often train our students and/or the public to read star maps. I like to use the maps from Skymaps.com. I first project a copy of the map onto the dome using the overhead projector; teach the audience how to use it, being careful to demonstrate how you need to TURN THE MAP so that the direction you are facing is at the bottom. Then the audience can easily see how the orientation of the constellation changes. Looking for the asterism of the Big Dipper can be confusing if you don't have the map turned the right way! Well, I once tried to just scan the map into PowerPoint and teach it that way. Oops, I couldn't easily turn the map, so that demonstration was lost to that audience. So by the time I handed the groups their maps and target constellations to locate from their designated stations around the theater, I had more confused people than usual. They had forgotten to turn the map, so were looking for their constellations/asterisms in the wrong orientation. Amazing how important MODELING is to your group, whether students or the general public!

The most critical need I have for the simplicity of the overhead projector comes with my second grade class where we chart moon phases for two months so we can establish a pattern to the way the moon changes. I give each student a clipboard and an observation chart, and they are to draw what they see in the sky on each of the target dates we have pre-programmed (your standards: crescents, quarters, full moon; no gibbous for 7-year-olds). When I used PowerPoint with pre-drawn moon phases on it (I just clicked to make the sketch appear!), the students had trouble sketching what they saw in the sky. Even though we had just compared it to a list of phases pre-drawn for them. They could match the moon in the sky to the proper moon in the list, but were struggling to draw them. When I switched back to using the overhead projector, modeling how to draw each phase, they had much less difficulty completing their sketches.

I think we as educators have long known about the importance of modeling for our students. Yet this sometimes can too easily get lost in translation as we look to "wow" with "bigger and better" technologies. Sometimes it's okay to stay simple. Because after all, what is our goal? To wow our students with technology we own or teach them a life-long skill they can own?

I choose the latter. Give me my overhead projector, and trust me to use it appropriately!

(Disclaimer: My boss does trust me to use the overhead projector appropriately, but we still joke about it!)

A Glorious Gravitational Lens

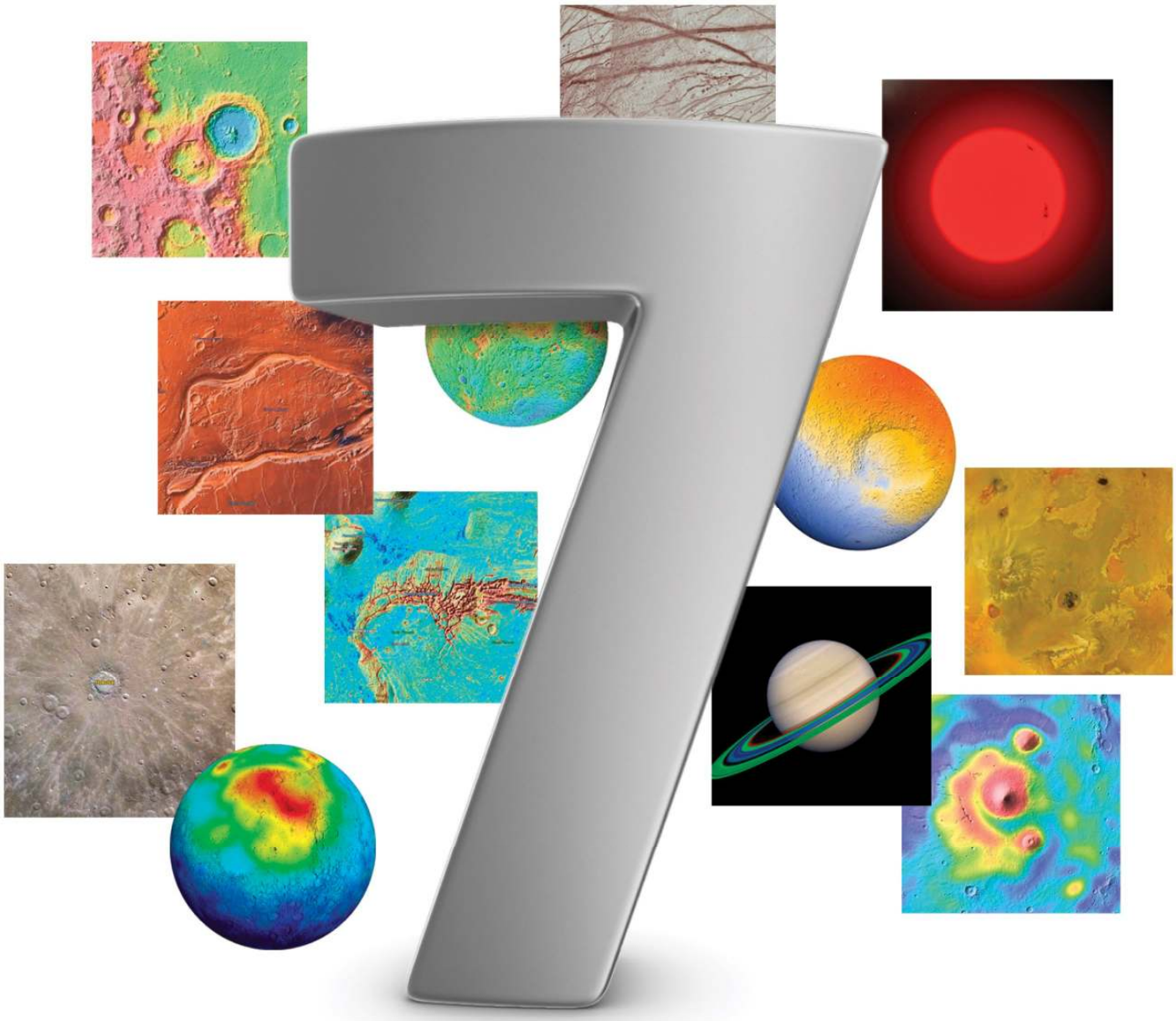
(Continued from page 1)

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster) in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Located in the Constellation of Draco (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's *also* located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between magnitudes 17 and 20, and include galaxies at a variety of redshifts ranging from z=0.7 all the way up to z=2.5, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Learn about current efforts to study gravitational lensing using NASA facilities:
http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens/

Kids can learn about gravity at NASA's Space Place: http://spaceplace.nasa.gov/what-is-gravity/



CONSTELLATION DEADLINES

The Constellation is published quarterly near the equinoxes and solstices. Please keep in mind the following deadlines:

Cover Date	Deadline
September 2014	Friday, September 5
December 2014	Friday, December 5
March 2015	Friday, March 6
June 2015	Friday, June 5

Submissions should be sent to the editor:

Kevin Conod
43 Warren Trail
Denville, NJ 07834

Phone #: (973) 596-6609
Fax #: (973) 642-0459
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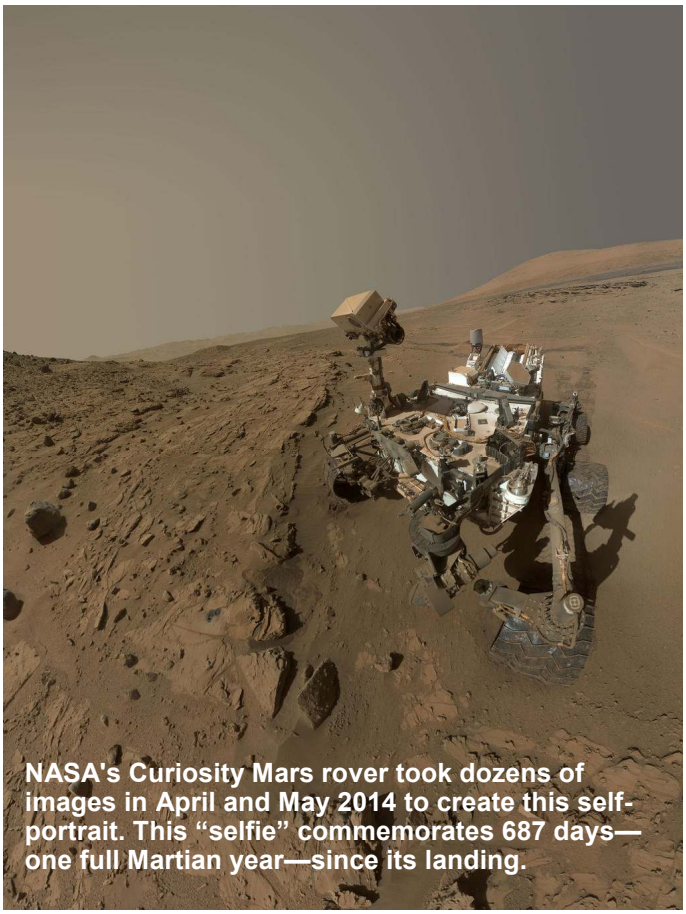
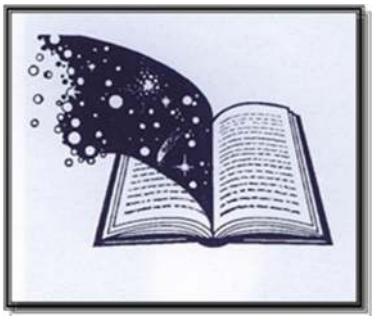


NASA's Curiosity Mars rover took dozens of images in April and May 2014 to create this self-portrait. This "selfie" commemorates 687 days—one full Martian year—since its landing.

A New Prize Proposal: PAGES OF STARS

"Pages of Stars" prize is a very simple proposal with the goal of building a collection of short audio recordings (maximum 3-5 minutes each) that can easily be shared among planetarians using mp3 files. The IPS Mobile Planetarium Committee will select the best audio recording(s) from the proposals of the applicants.

Planetarian colleagues from around the world are invited to prepare a short text, in English, that can be read under a planetarium dome. The text can be:



- an astronomical and scientific commentary, or
- a classical Greek (or another culture's) sky story, or
- an original story or poem (any kind of topic) with some astronomical details or with an event that happens under the night sky (including the name of some stars or constellations or other sky objects visible with the naked eye).

The author (or a collaborator of the author) must read the text aloud (in English) and record this story as an mp3 file (maximum 3 to 5 minutes in length).

A committee, elected by the IPS Portable Planetarium Committee in collaboration with the Astronomical Observatory Serafino Zani, will select the proposals presented to the secretary of the prize. The text of the best proposal will be published in the "Mobile News Network" column of the *Planetarian* magazine, while the three best works will be made available on the IPS Free Media Webpage. (www.ips-planetarium.org/?page=voice)

The winner will receive a award plaque on the occasion of the "Day of Planetaria" which occurs in March.

Participants must send, before December 31st, an application that includes:

1. The written text of the commentary, story or poem,
2. The audio recording as an mp3 file (without music) and
3. A participation form of the author (full name, complete address, year of birth and your short curriculum vitae) and the name(s) of any collaborator(s).

All entrants must agree to release their work under the Creative Commons Attribution 4.0 International License (To view a copy of this license, visit creativecommons.org/licenses/by/4.0/) or choose to make their work public domain (Information about what this means can be found at: creativecommons.org/publicdomain/).

Send this information by email to:

Susan Reynolds Button, sbuttonq2c@gmail.com, IPS Portable Planetarium Committee, 8793 Horseshoe Lane, Chittenango, NY 13037 or to Loris Ramponi, osservatorio@serafinozani.it or megrez58@gmail.com, Osservatorio Serafino Zani, Via Bosca 24, 25066 Lumezzane – Italy.

Q: When does something *FREE* have real value?

A: When it's Bowen Exhibit Expo 2014 Indianapolis

Architects...Exhibit Designers,Managers, Curators...Museums/Science Centers/Cultural Centers...Exhibit Fabricators...Planetariums, Giant Screen, and Immersive Theaters

What is Exhibit Expo?
Bowen Technovation, a worldwide designer and provider of exhibit technologies, has created Exhibit Expo 2014 to showcase products and methods they utilize in their designs and installation work around the globe. See the schedule at www.bowentechnovation.com/expo2014.

Workshop Sessions
A classroom setting will feature two full days of workshops focused on exhibit and presentation systems and design. These are intended as professional development workshops, not sales pitches. See the list of workshops below.

The Product Expo
Specialists from the top names in audio-video-lighting-control products meet our guests and explain new directions in exhibit-oriented equipment, software, and design.

Exhibit Fabricators Showcase
Want to know who can build it? This area will feature materials and samples from some of the most respected exhibit fabrication firms in the country.

Immersive Theaters Showcase
This area and workshops are where you can learn all the latest info about creating domed immersive theaters for space science, history, art, geology, biology, etc.

And did we mention it's surprisingly affordable...as in *FREE* to attend!

Register at www.bowentechnovation.com/expo2014

Oct. 29th & 30th

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Wednesday Sessions

(Free Registration Required)

- Digital Video Systems from Source to Viewer
- Digital Audio Systems from Source to Listener
- New Projector Technologies
- How to Select Touchscreens
- Inserting Live Video and Distance Learning into Exhibits and Immersive Theaters
- Saving Your Equipment: Power Protection and Conditioning
- Wireless Mic Selection
- How to Design a Modern Immersive Theater or Exhibit
- Assistive Listening, Alternate Languages and Audio Tours

Thursday Sessions

(Free Registration Required)

- New 2010 ADA Regs for Theaters and Exhibits
- Modern Lighting Control for Exhibits and Immersive Theaters, Artnet and DMX
- How to Design a Modern Immersive Theater or Exhibit
- Architectural Aspects and Requirements for Exhibits
- Exhibit Fabrication Panel Discussion
- New Projection Screen Technologies
- How To Select Flat Panel Displays
- Exhibit Control Systems
- Architectural, Theatrical, LED and Motorized Lighting for Exhibits

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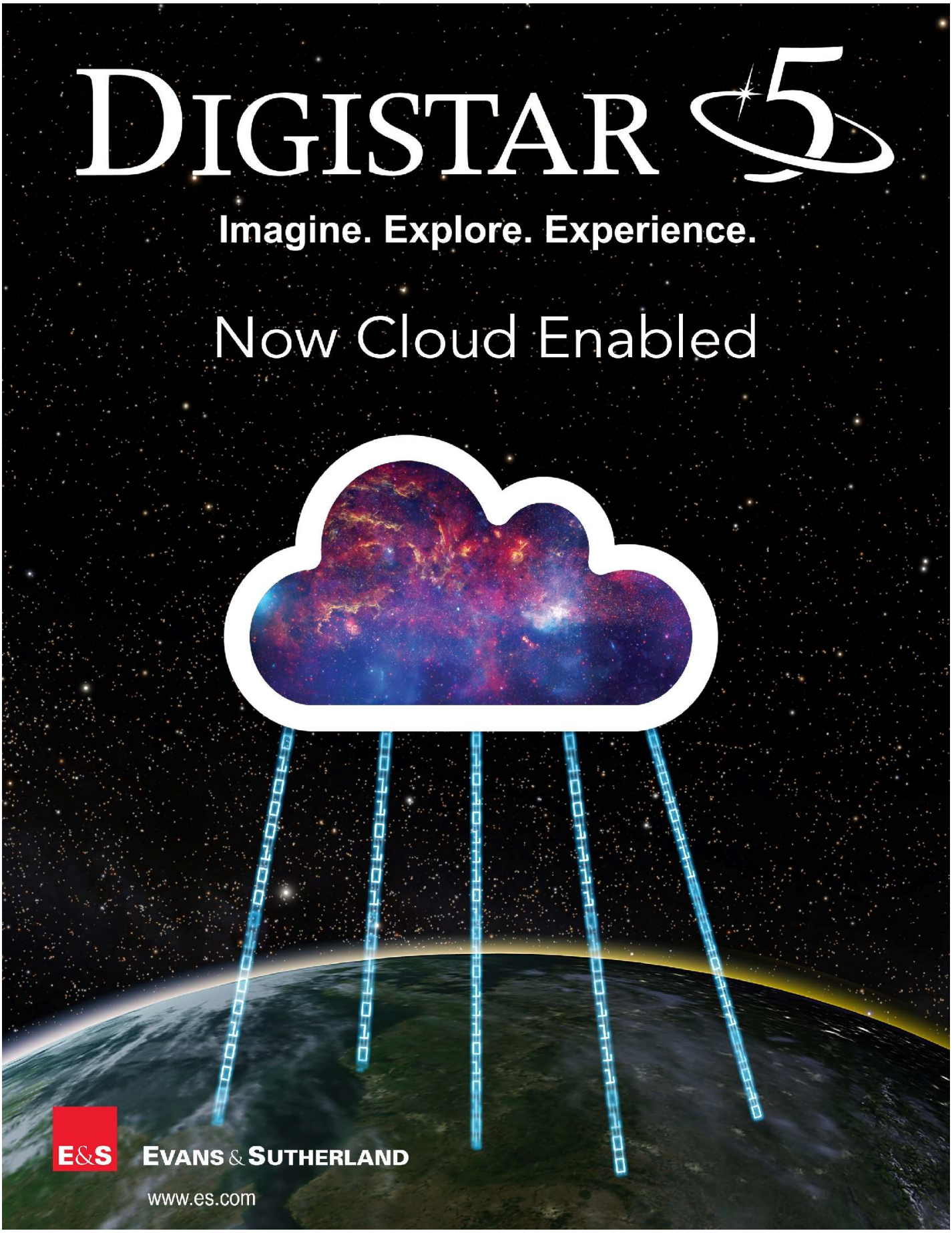
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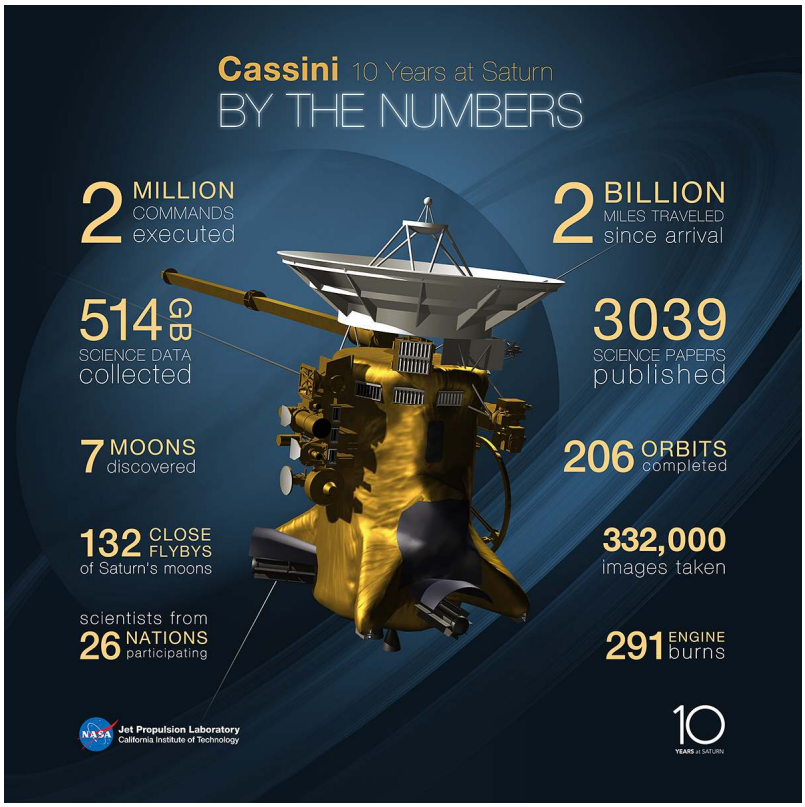
Astronomy Day

Almost 200 people showed up at the **East Kentucky Science Center and Planetarium** for Astronomy activities on May 10th. Attendees got a chance to see three different planetarium shows, receive free handouts from Astronomy Magazine and NASA Space Place, and take part in hands on Activities about the Constellations, the Sun, and weight on other planets. A dozen door prizes were also given away.

Cassini at 10

Kevin Conod, Newark Museum

It's hard to believe but NASA's Cassini spacecraft has been in orbit for a full decade! It celebrated its 10th anniversary on June 30th. Cassini is the largest and most complex interplanetary spacecraft ever built and the first to orbit the ringed planet.



The mission has been a great success. Cassini's Huygens probe landed on Saturn's largest moon Titan in 2005. The probe penetrated the thick methane and ethane cloud cover for the very first time, revealing a complex surface consisting of liquid hydrocarbon lakes and seas, as well as river beds, dunes, and mountains.

Cassini went on to discover seven new moons, ice plumes on Enceladus, giant storms, and hurricanes at Saturn's poles. It has also explored the planet's amazing ring system in unprecedented detail.

Cassini's penultimate mission will be 22 daring dives between Saturn and its rings. Its final act will be a spectacular plunge into the planet's atmosphere in 2017.

For the Cassini's top ten images see: http://tinyurl.com/lcca59d.

Hello to Planetarium gift shop buyers!!!!!

I am a wood & stone inlay artist who is also an amateur astronomer and a lover of the night sky. After 35 years in the business, my line includes many astronomical designs, in a variety of items. I use the most colorful woods, semi-precious stones (including turquoise), and sterling silver wire for the stars, to create this very high quality work.

The images in this ad are a sample grouping of my line. You can see the full line at www.skywestinc.com. The website lists retail pricing. Wholesale customers get a 50% discount. As a professional inlay artist, 90% of my work is sold through stores.

Since my work is handmade, the pieces vary making a nice variety of wood and stone colors in your display. My best sellers are the #300 series money clips, the #200 series key rings, 1 ¼ inch & 1 ½ inch wide belt buckles, large & small boxes, business card cases, and small & medium pill boxes. You can call me at 505-291-0024, so we can discuss your needs and provide the best items for your store.

Thank you

Charlie Fleckenstein at Sky West Inc.


Teach Astronomy with clear, dark skies.
When guests are seated and the lights dim, the night sky should look great, not gray.
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