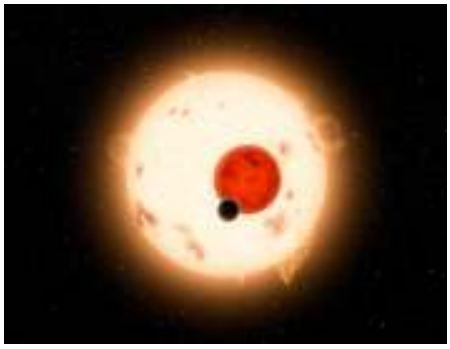
CONSTELLATION

Fall 2011, No. 3



Number of Extrasolar Planets:

688

(As of September, 2011. Source: Extrasolar Planets Encyclopedia)

"...let us cast our eyes up to the spangled canopy of heaven, where innumerable luminaries at such an immense distance from us cover the face of the skies. All suns as great as that which illumines us, surrounded with earths perhaps no way inferior to the ball which we inhabit and no part of the amazing whole unfilled! System running into system, and worlds bordering on worlds! Sun, earth, moon, stars be ye made, and they were made!"

- Edmund Burke (1744)

Solar System Size Surprise

by Dr. Tony Phillips

News flash: You may be closer to interstellar space than you previously thought.

A team of researchers led by Tom Krimigis of the Johns Hopkins University Applied Physics Laboratory announced the finding in the June 2011 issue of *Nature*. The complicated title of their article, "Zero outward flow velocity for plasma in a heliosheath transition layer," belies a simple conclusion: The solar system appears to be a billion or more kilometers smaller than earlier estimates.

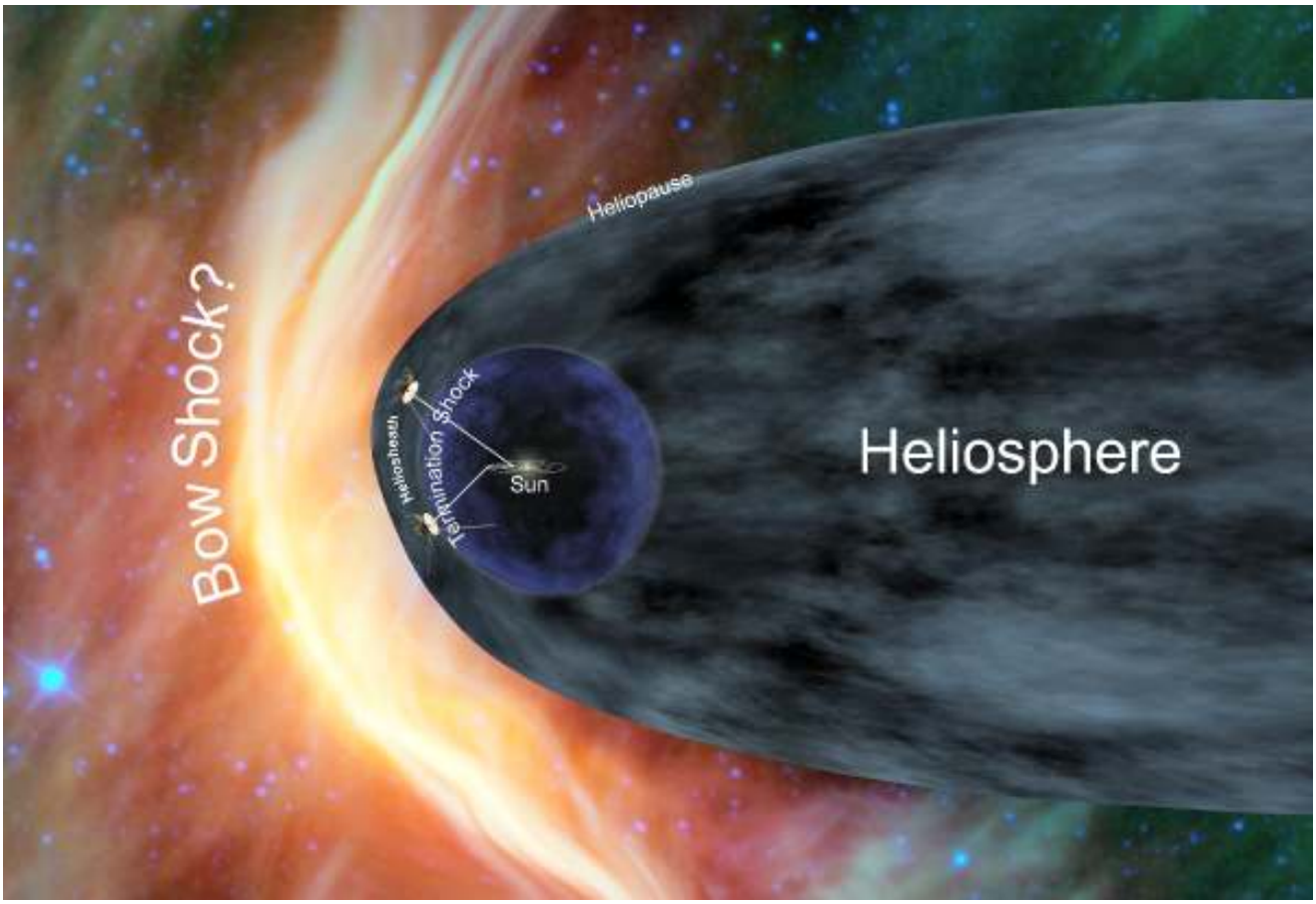
The recalculation is prompted by data from NASA's Voyager 1 probe, now 18 billion kilometers from Earth. Voyagers 1 and 2 were designed and built and are managed by NASA's Jet Propulsion Laboratory. Aging but active, the spacecraft have been traveling toward the stars since 1977 on a heroic mission to leave the solar system and find out what lies beyond.

To accomplish their task, the Voyagers must penetrate the outer walls of the heliosphere, a great bubble of plasma and magnetism blown in space by the solar wind. The heliosphere is so big, it contains all the planets, comets, and asteroids that orbit the sun. Indeed many astronomers hold that the heliosphere defines the boundaries of the solar system. Inside it is "home." Outside lies the Milky Way. For 30+ years, the spacecraft have been hurtling toward the transition zone. Voyager 1 is closing in.

Much of Voyager 1's long journey has been uneventful. Last year, however, things began to change. In June 2010, Voyager 1 beamed back a startling number: zero. That's the outward velocity of the solar wind where the probe is now.

"This is the first sign that the frontier is upon us," says Krimigis.

(Continued on page 2)



(Continued from page 1)

Previously, researchers thought the crossing was still years and billions of kilometers away, but a new analysis gave them second thoughts. Krimigis and colleagues combined Voyager data with previously unpublished measurements from the Cassini spacecraft. Cassini, on a mission to study Saturn, is nowhere near the edge of the solar system, but one of its instruments can detect atoms streaming into our solar system from the outside. Comparing data from the two locations, the team concluded that the edge of the heliosphere lies somewhere between16 to 23 billion kilometers from the sun, with a best estimate of approximately 18 billion kilometers.

Because Voyager 1 is already nearly 18 billion kilometers out, it could cross into interstellar space at any time—maybe even as you are reading this article.

"How close are we?" wonders Ed Stone, Caltech professor and principal investigator of the Voyager project since the beginning. "We don't know, but Voyager 1 speeds outward a billion miles every three years, so we may not have long to wait."

Stay tuned for the crossing.

For more about the missions of Voyager 1 and 2, see voyager.jpl.nasa.gov. Another Voyager project scientist, Merav Opher, is the guest on the newest Space Place Live cartoon interview show for kids at spaceplace.nasa.gov/space-place-live.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Election Committee

Hello, my name is Steve Innes. I have been appointed by Patty Seaton to be the chair of the Election Committee as a result of the retirement of Don Knapp, the previous chair. This year we are currently accepting nominations for the Board of Directors. Please send nominations to me at stardriv@maine.rr.com. Nominations and seconds must be returned to me no later than November the 1st, 2011. It is highly recommended that all nominated candidates send in a biography. I must have bios no later than November 30th, 2011. You may also send in a photograph of yourself as well.

The list of nominees will be included in the Winter Solstice edition of the Constellation and will be available for review online in December, prior to the mailing of the ballots.

Nominations and Elections are covered in Article V of the MAPS by-laws (see the "Constitution" section of the website: www.mapsplanetarium.org/category/constitution/).

Thank You.
Steve Innes
Elections chair
stardriv@maine.rr.com

2012 Elections

Nomination Deadline:
Nov. 1, 2011

Bio & Photo Deadline:
Nov. 30, 2011

Elections:
January 2012

MAPS Conference Sponsors

Due to an error, we did not properly thank our Third Magnitude conference sponsors **Evans & Sutherland**, and **GOTO Inc.** Thank you very much for your generous contributions!

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CONTACT!

MAPS Executive Committee

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Past President
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Mike Smith
North Planetarium, North Museum
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msmith@northmuseum.org

President's Message

Ah, the September Equinox. For many of us, classes are back in full swing in our theaters. For others, the school groups have started to pick up again. We continue to shape, plan, and mold our programs to suit the ever-changing Standards and Core Learning Goals while teaching good, fun astronomy! How we plan makes a big difference.

This summer, I got a chance to get an "inside" look into the design process of the new Adler Planetarium Grainger Sky Theater. On June 14, several of your planetarium colleagues were invited to see the theater and the Clark Family Welcome Gallery before it opened to the public. While the new program wasn't quite complete, the lessons shared I felt were important to all of us: this theater was designed with an end product in mind. The key goal was simple: to provide guests the overall experience of going into Deep Space. The Welcome Gallery and Sky Theater design evolved out of this goal. The equipment (dome, projection system, floor, chairs) was designed to meet the plan of the theater rather than the theater designed to work with a particular instrument. And while the program was not yet complete the day of our visit, I saw and heard enough to be captured by the process, and felt that the Adler had, indeed, met their goal.

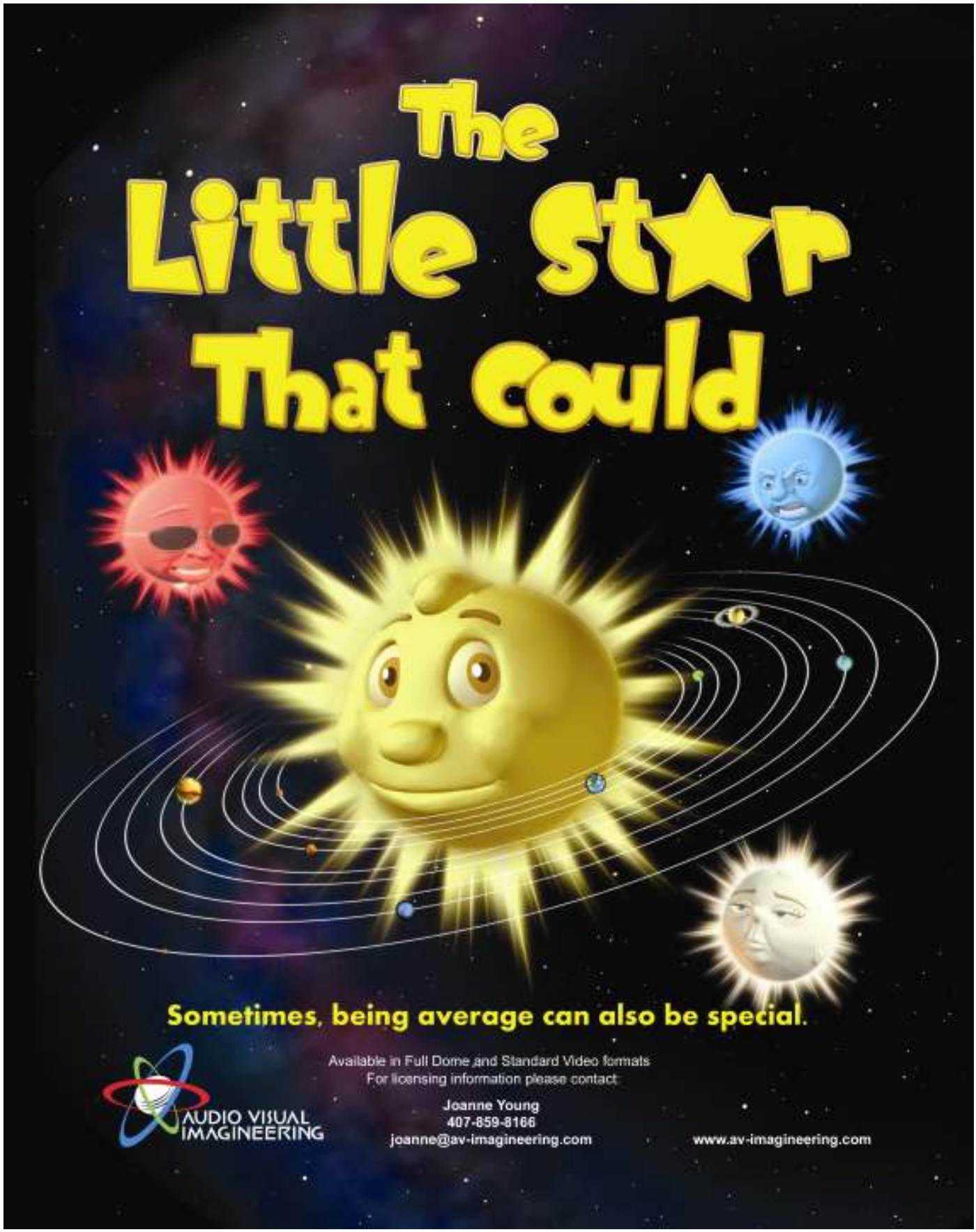
Now, I realize that this process also took time and money. Most of us don't have access to quite the same resources. But we all share the same dreams and excellent ability to design. Let's embrace that and continue to share our ideas with each other, evolving our field in such a way that everyone has that same wonderful experience of Deep Space. That's what our annual conferences are all about! Mark your calendars for May 16-19, 2012 at Toms River, New Jersey! Additional conference details will appear on our website (www.mapsplanetarium.org/) as they become available. Also, consider becoming more active in the organization! This year we are accepting nominations for Board Members, a two-year commitment to attend our two Executive Board meetings as well as communicate electronically through email for ongoing organization work. For now, send in your nominations to me (pxts13@yahoo.com). You can nominate yourself, although all nominations require a second. I look forward to working with all of you!

Enjoy the start of the new school year!!

Sincerely,

Patty

Patty Seaton,
President


The
Little Star
That Could
Sometimes, being average can also be special.
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EDUCATION COMMITTEE

Greetings from the Education Committee!

The MAPS region has just been ravaged by hurricane Irene. Here's hoping everyone 'weathered' the storm safely, and that your homes and facilities were undamaged. Here in the NY metro area a corner of the TV screen was constantly showing a Doppler satellite view of the storm as the reporters from each channel commented on Irene's current location and conditions. How easily we take for granted these technologies, including the satellite views from space of weather patterns, atmospheric moisture, wind direction and the rest. There are quite a few of us old enough to remember the words "live via satellite" being flashed across the bottom of the television screen in the 1960's when these technologies first became part of our everyday world. Today's TV commentators warned against the reliance on land lines for communication, should trees fall and lines snap. The precaution was to be sure to fully charge your cell phone in case power were to be lost, and even to text, as oppose to placing a call, should the storm bring down cell towers. These recent events can serve as a reminder that as we continue to celebrate 2011 as the 'Year of the Solar System' let us not forget to cast an eye towards the home world. When the Apollo astronauts headed out for the moon, many were more impressed and intrigued by the view of Earth, an oasis in the vast black loneliness of space. Here's to Mother Earth…by understanding her we can better understand the other planets, and by understanding the other planets, the better we can understand our own.

John Scala
jscala@lvhs.org

Images from Space
How do we get those pictures?

Distribute one blank grid (graph) paper to each student. Next distribute the coded master message sheet.

Explain to your students that robotic unmanned spacecraft have been sent throughout the Solar System. However, they do not send back packages of video or film. The images (pictures) are stored as a series of numbers in a computer and the numbers are radioed to the Earth.

They must now act as interpreters, taking the numbers and putting them back into picture form.

For the purpose of this activity the computer on the spacecraft could only use shades of black and white (Modern spacecraft can use colors).

Each lettered row (A, B, C, D…C) is divided into numbered columns (1-42).

(Continued on page 7)

Look at row A. Darken in the boxes listed by number - all others remain white. A dash between numbers means to darken all the boxes including the last listed.

Example: 3; 5; 8; 14 - 26

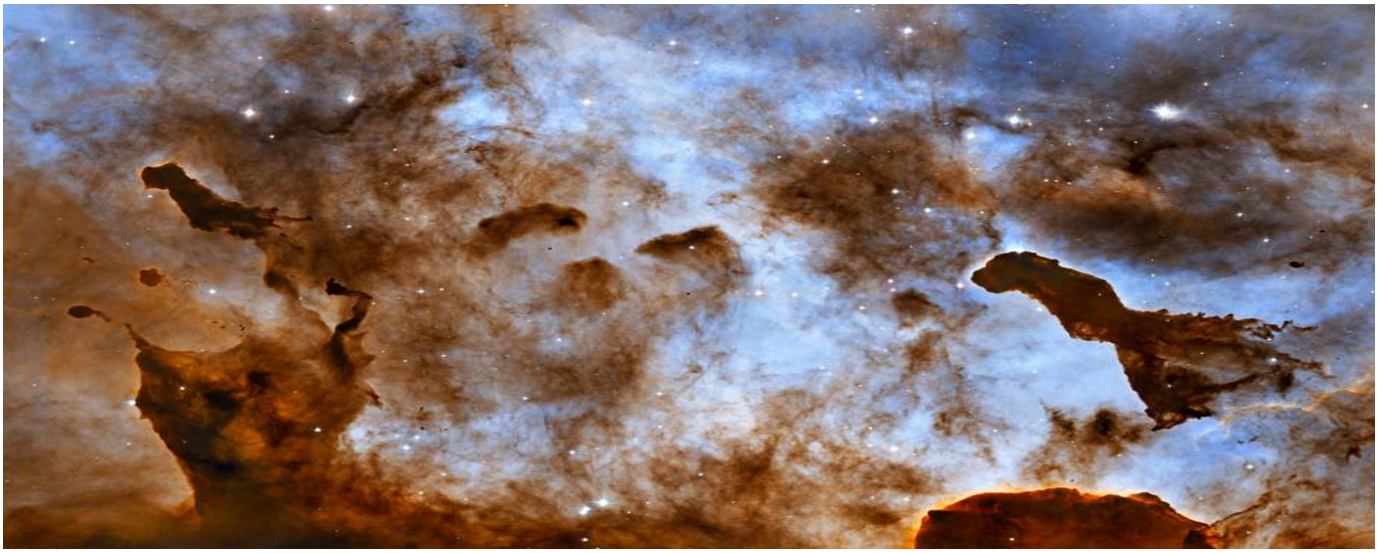
Darken in box 3. Leave 4 blank. Darken 5. Leave 6 & 7 blank. Darken 8. Leave 9, 10, 11,12 & 13 blank. Darken in 14 all the way through [including] box 26.

Use the column marked "CHECK" to keep track of where you've completed the task.

Background: Space probes cannot send hard copy (film or video) back to Earth. Areas of light color are measured by a very sensitive device, which assigns that area of lightness a number. Darker areas are assigned different numbers. The simplest system uses "1" for dark areas and "0" for lighter areas. A string of numbers, 110001001110110011110, is radioed from the probe and received by giant satellite radio receivers here on Earth. The numbers are sent to a computer, which then unscrambles them back into dark/light zones. This is very much like how a newspaper photo is printed. Look closely at a newspaper photo, and you'll see the dark & light "dots" which taken together form the picture. Older students may understand that compact disc players work the same way - audio (sound) is made into a string of numbers (digital); the computer in the CD player reads the numbers and changes it back into tones and sounds.

Worksheets for this activity appear on pages 9 & 11.

"Images From Space" by Linder Winter. The activity appears in "Project SPICA- a teacher resource to enhance astronomy education" sponsored by the Harvard-Smithsonian Center for Astrophysics published by Kendall/Hunt © 1994 ISBN 0-8403-9366-0



Student Worksheet

Name _____

Date _____

IMAGES FROM SPACE: Transmission Data Sheet

You are an Earth-based computer. A spacecraft has imaged an object in outer space and has just transmitted its observations to you. The image was recorded in only two shades (black and white). Your job is to change the data into a picture by drawing it onto the attached grid.

Look at the row lettered "A." You need to darken only the numbered squares listed for that row; the other squares stay white. Dashes separating numbers mean "through," so if a row lists "40-45," that means you need to darken squares 40 *through* 45.

Use the "Check" column to check off each row as you complete it.

Transmission Data

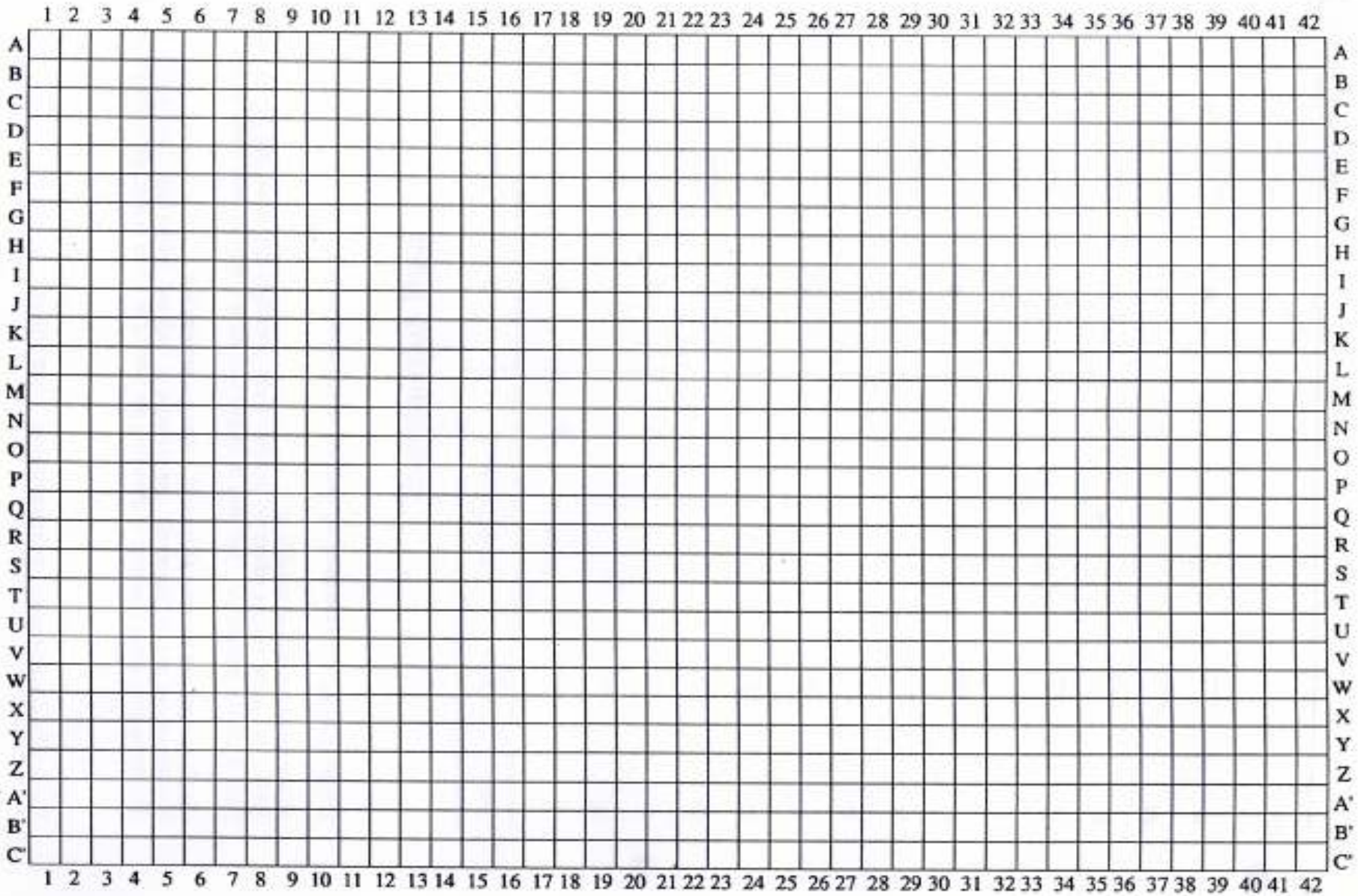
Row	Check	To Be Darkened	Row	Check	To Be Darkened
A	____	None	O	____	11-32
B	____	1	P	____	11-32
C	____	4	Q	____	11-32
D	____	2; 6; 19-24	R	____	11-32
E	____	8; 17-26	S	____	12-33
F	____	3; 10; 16-27	T	____	13-31; 34
G	____	4; 12; 15-28	U	____	13-31; 35-36
H	____	6; 14-29	V	____	14-30; 37
I	____	7; 13-30	W	____	14-30; 38
J	____	8; 13-30	X	____	15-29; 32; 39
K	____	10; 12-31	Y	____	17-27; 34
L	____	12-31	Z	____	19-25; 37; 41
M	____	11-32	A'	____	39-40
N	____	11-32	B'	____	42
			C'	____	None

Student Worksheet

Name _____

Date _____

IMAGES FROM SPACE



PLANETARIUM NEWS

SAVE THE DATE
MAPS 2012

Our conference next year will be in Toms River, New Jersey at the recently renovated Robert J. Novins Planetarium at Ocean County College. Our host Gloria Villalobos has secured the dates of May 16-19, 2012 for the conference.

Stay tuned for details on the MAPS website!

PUBLICATION REPORT

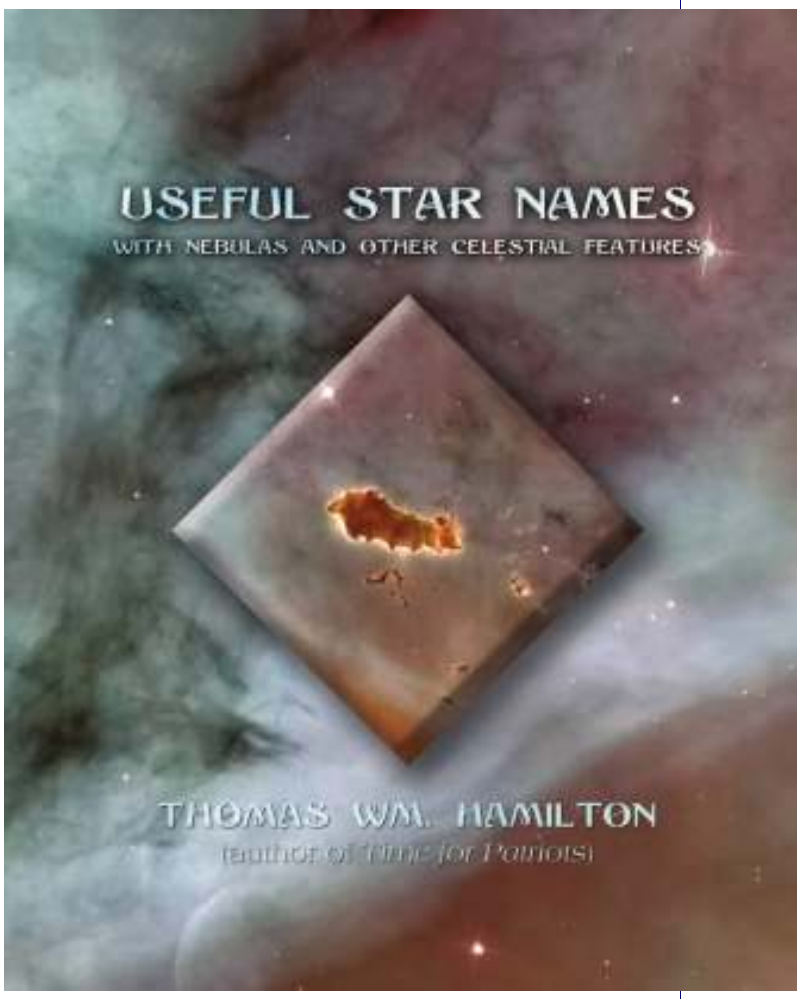
Mike Smith is working on the Proceedings from this year's conference in Pennsylvania. He hopes to have this completed by the end of the year.

If you have any additional materials or images to contribute please contact Mike:

Michael Smith
North Museum of Natural History & Science
400 College Avenue
Lancaster, PA 17603
cosmicmike@northmuseum.org

USEFUL STAR NAMES

You will be seeing stars when you read the breathtaking astronomy book ***Useful Star Names: With Nebulas and other Celestial Features***. If you've ever looked up in the sky with wonder and wanted to know more, this helpful guide is a must read.



Retired astronomy professor Thomas Wm. Hamilton invites you along as he presents a fascinating list of the 88 constellations. Learn the names of the stars, nebulas and galaxies within each, as well as how to find their location in the sky and their brightness.

Professor Hamilton says his students always prefer to learn a star by its name, rather than its catalog number. "Teegarden' s Star is so much nicer sounding than SO 0255790.5." Amaze your friends with your knowledge of the stars, because the sky's the limit!

Useful Star Names: With Nebulas and Other Celestial Features (ISBN: 978-1-61204- 614-3) is now available from Strategic Book Publishing and Rights Co: sbpra.com/ThomasWmHamilton or at amazon.com or barnesandnoble.com.

About the Author: Thomas Wm. Hamilton knew he wanted to be a writer since he was young. "When I was 11 years old and I didn't like the way Mark Twain ended Tom Sawyer Abroad, I decided to write my own ending." Born in San Francisco, the author grew up in New York and New Hampshire. He lives on Staten Island, New York, and is working on his next astronomy book.

CONSTELLATION DEADLINES

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

Cover Date	Deadline
December 2011	Friday, Dec. 2, 2011
March 2012	Friday, Mar. 2, 2012
June 2012	Friday, Jun. 1, 2012
September 2012	Friday, Sept. 7, 2012

Submissions should be sent to the editor:

Kevin Conod
43 Warren Trail
Denville, NJ 07834

Phone#: (973) 596-6609, Fax#: (973) 642-0459
E-mail: kdconod@yahoo.com

"Super Earths" Found

This artist's impression shows the planet orbiting the Sun-like star HD 85512 in the southern constellation of Vela (The Sail). This planet is one of sixteen super-Earths discovered by the HARPS instrument on the 3.6-metre telescope at ESO's La Silla Observatory. This planet is about 3.6 times as massive as the Earth lis at the edge of the habitable zone around the star, where liquid water, and perhaps even life, could potentially exist. Credit: ESO/M. Kornmesser

Constellation
c/o Kevin Conod
The Newark Museum's
Dreyfuss Planetarium
49 Washington Street
Newark, NJ 07102