



# CONSTELLATION

June 2006, No. 2



*“I often think the night is more alive and more richly colored than the day.”*

*-- Vincent Van Gogh*

## From Thunderstorms to Solar Storms...

by Patrick L. Barry



*The new GOES-N satellite launches, carrying an imaging radiometer, an atmospheric sounder, and a collection of other space environment monitoring instruments.*

When severe weather occurs, there's a world of difference for people on the ground between a storm that's overhead and one that's several kilometers away. Yet current geostationary weather satellites can be as much as 3 km off in pinpointing the true locations of storms.

A new generation of weather satellites will boost this accuracy by 2 to 4 times. The first in this new installment of NOAA's Geostationary Operational Environmental Satellites series, called GOES-N, was launched May 24 by NASA and Boeing for NOAA (National Oceanic and Atmospheric Administration). (A new polar-orbiting weather satellite, NOAA-18, was launched May 2005.)

Along with better accuracy at pinpointing storms, GOES-N sports a raft of  
*(Continued on page 8)*

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## CONTACT!

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Patty Seaton  
H. B. Owens Science Center  
Prince George's County Public  
Schools, MD  
pxts13@yahoo.com

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Novins Planetarium  
Ocean County College  
Toms River, NJ  
gvillalobos@ocean.edu

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Mobile Dome Planetarium  
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mobiledome1993@earthlink.net

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kconod@newarkmuseum.org

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Thomas Jefferson High School  
for Science and Technology  
Alexandria, VA  
lahennig@earthlink.net

Ted Williams  
Mallon Planetarium  
Arcola Intermediate School  
Norristown, PA  
twilliams@methacton.org



## A Note from the President

### Conference Reflections

Wow! I am always energized after meeting with my fellow colleagues at a conference! I hope you feel the same way! My thanks again go out to Gloria and her staff at the Novins Planetarium for a wonderful conference, much of which was planned for under a shroud of threatened closure! What a great testimony to the value of her planetarium in particular, and to the planetarium field in general, that someone would step up and save the planetarium with a generous donation! That should speak volumes to all of us.

And what a conference that was planned! To meet Story Musgrave; to see wonderful presentations in the theater; to participate in workshops; to listen to a variety of papers; all these gave me ideas that I have already implemented. Just yesterday I presented Frank Summer's "Not Your Parent's Solar System" to about 150 teachers in the county. Needless to say, it was a huge hit! Most of all, just being able to talk to those of you that I only see once a year, made the whole trip worthwhile. Thanks for participating, all who were able to attend.

For those who were not able to attend, please keep your eyes on the MAPS website ([www.maps-planetarium.org](http://www.maps-planetarium.org))! Our newest addition to the Board, Ted Williams, is already hard at work with Don Knapp to make the website more dynamic. Our education committee has asked you to submit your pre/post visit educational materials to Kristin Chon, so we can start a bank of resources readily available to you from the web. We are always looking for new ideas, so please email us and let us know what else we can do for you between conferences.

Speaking of conferences, keep in mind that MAPS 2007 is in conjunction with SEPA and GLPA, and therefore, will not be held until October 2007. We strongly encourage each smaller region (state/metropolitan areas/ etc.) to hold a mini-conference in the Spring. Maybe that will help "hold you over" until we meet again.

And consider ways you may want to serve. We have several committees that provide you with different opportunities to serve, and you can always run for office. We are accepting nominations NOW for Treasurer, Secretary, and President-Elect. Please send your nominations (you may nominate yourself!) to our Elections Chair, Jerry Vinski ([jvinski@rارانval.edu](mailto:jvinski@rارانval.edu)).

Thanks for helping to make our organization thrive! Happy Solstice!!!

*Patty*

Patty Seaton,  
President



## MAPS 2006

Members attended the 2006 Conference at Ocean County College's Novins Planetarium in Toms River, NJ.

*Group photo by Phil Zollner  
Additional photos by Steve Russo  
and Kathy Michaels.*

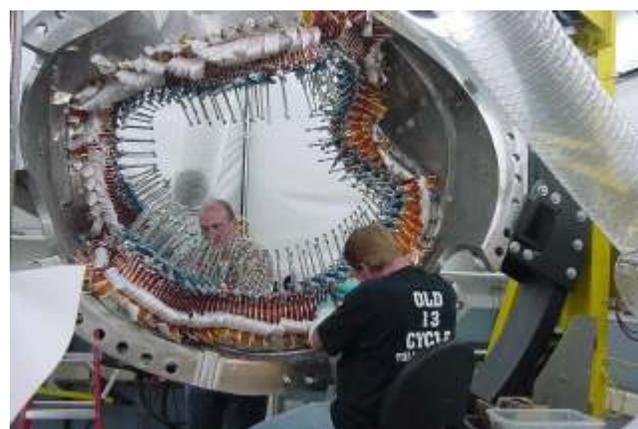
Group photo of the delegates gathered in front of the Novins Planetarium



Astronaut Dr. Story Musgrave gave an inspiring presentation.



Gene Russo instructs members in the fine arts of slide projector repair. (You did get that projector back together, right Gene?!)



The conference also featured a tour of the Princeton Plasma Physics Laboratory.

## A Simple, Inexpensive and Effective Aurora Projector for the Planetarium

Russell D. Sampson, Wickware Planetarium  
Eastern Connecticut State University, Willimantic, CT 06226  
sampsonR@easternCT.edu

I lived in Canada for forty three years. For more than twenty of those years I was in Edmonton, Alberta which is around 54-degrees north latitude. About every third night the northern lights would grace our skies. Some of these displays were bright enough to see from the middle of the city. I've been fortunate to observe and photograph dozens of spectacular auroral displays. However, when I was working at the Margaret Zeidler planetarium at the Edmonton Space Sciences Centre (now the Telus World of Science) I was always a little disappointed with our classic 'Pepsi Bottle' aurora projector. It never really matched what I saw in the real sky.

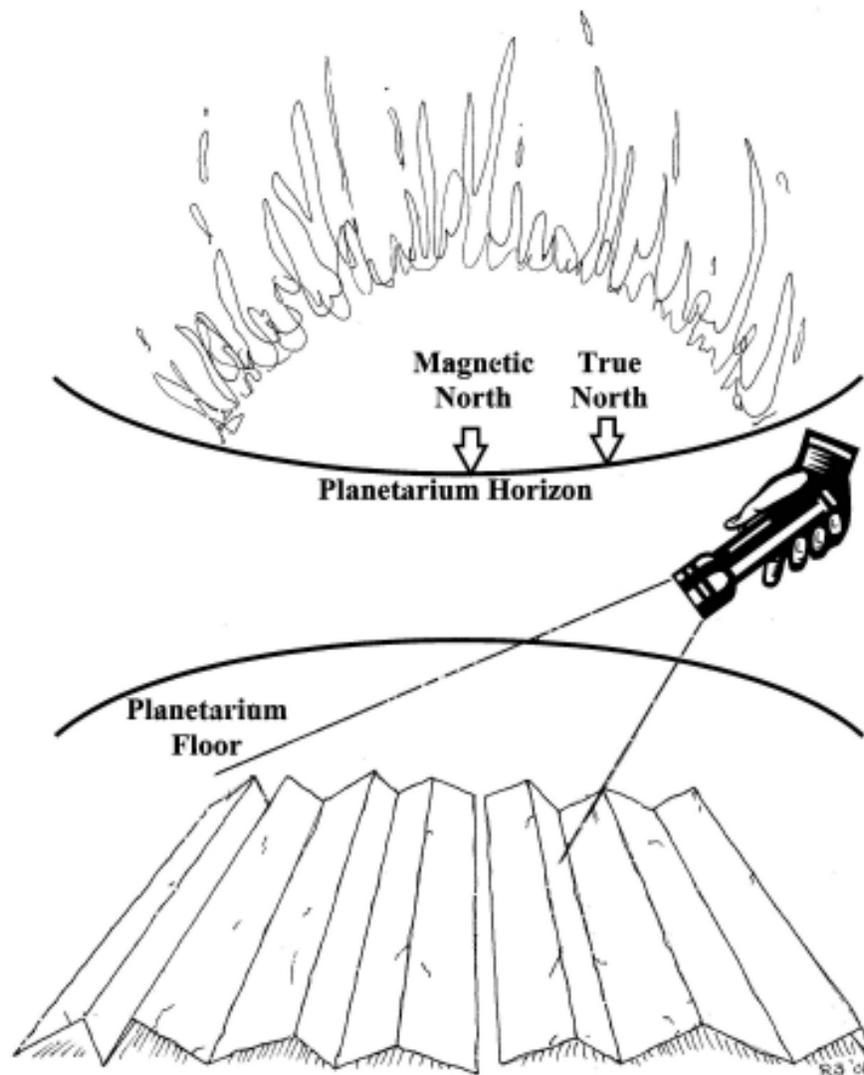
Now I live and work in Connecticut where I teach at a liberal arts university and co-direct our 55-seat planetarium. Last year while preparing a live show I needed to produce some sort of aurora simulation. Our planetarium has no full-time technical support and the classic Pepsi bottles are hard to find, so I started to experiment with what was close at hand. After some trial and error I stumbled upon a surprisingly simple, cheap and realistic aurora projector. Here is my recipe.

Take a sheet of overhead projector transparency film, crease it three or four times like an accordion. It appears that the higher quality overhead transparency film is better than the cheaper brands which are more brittle. Make a few of these and place them on the floor on the north side of your star projector with the creases aligned north-south. Now take an ordinary flashlight and cover the lens with green and red colored gels. I used sample gels from theatrical lighting companies. I covered most of the lens with green since this is the most common color of the aurora (a wavelength of 558 nm produced by atomic oxygen). Now simply shine the flashlight onto the overhead transparencies (see figure on the next page).

Slowly move the flashlight across the transparencies and you will see the light cast onto the dome shift and change much like the real aurora. It is important not to move the flashlight too quickly. Great auroral displays shift and move about as fast as a curtain in a gentle but slightly gusty breeze. Make sure the floor beneath the transparencies is not too reflective. You may have to put a large sheet of black paper or carpeting under the transparencies to cut down on the stray light reflected from the floor.

For more realism you can adjust the alignment of the transparencies on the planetarium floor until the arc of the aurora is centered on the direction of the magnetic pole - just like they appear in the real sky. This offset is roughly equal to the magnetic declination – the difference between true north and where a compass needle points. From our part of New England this is about 14-degrees west of true north (<http://www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp>).

Most of the dramatic auroral displays I've had the privilege to witness start out as a faint and low dome of greenish light centered on magnetic north. This part of the display is often mistaken for the glow of far away city (an Emerald city?). As the auroral intensity grows in brightness the display climbs higher into the northern sky. At this point it transitions into moving curtains, rays and arcs. During my demonstration the low auroral glow at the beginning of the display was simulated by simply shining the flashlight onto the floor next to the transparencies. A relatively faint green glow was cast upward onto the northern part of the dome. To transition into the more dramatic phase of the auroral display I slowly



moved the flashlight beam over the creased transparencies. The auroral glow then transformed into majestic rays, curtains and arcs. A good summary of the cause and appearance of the aurora can be found in the Solar Activity section of the Royal Astronomical Society of Canada's Observer's Handbook.

I'm still not perfectly satisfied with the projector. For one thing, my colors are not saturated enough. In the future I will be experimenting with gels of more saturated greens and reds.\* The additive effect of the green and red light may also produce a more muted yellow coloration. Finally, the aurora-like shapes produced by the creases of the transparency film are rather random and depend on subtle differences in the creases. As time permits, I will continue to tinker.

I would be happy to hear from any of the members who would like to try this out.

*\*Editor's note: one might try experimenting with LED flashlights. Inexpensive ones are available in different colors in many discount stores.*

## Pluto's Two Small Moons Christened Nix and Hydra

By Michael Buckley, The Johns Hopkins University Applied Physics Laboratory & Maria Martinez, Southwest Research Institute

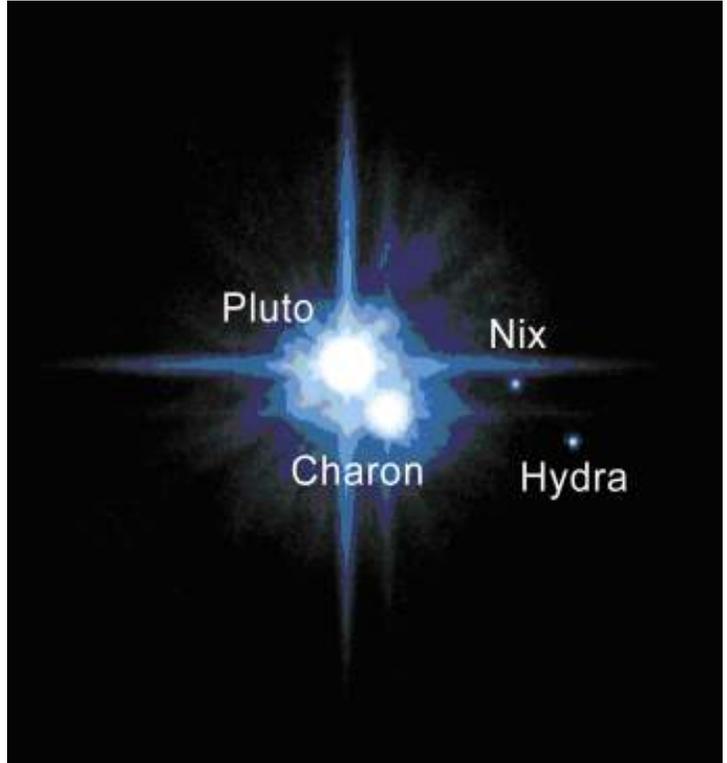
The names Nix and Hydra have been approved for the two small satellites of Pluto discovered in May 2005. The International Astronomical Union (IAU), the internationally recognized authority for assigning designations to celestial bodies, recently approved the names.

A team of researchers from Southwest Research Institute (SwRI) in Boulder, Colo., the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Md., the Space Telescope Science Institute in Baltimore and Lowell Observatory in Flagstaff, Ariz., used Hubble Space Telescope images to make the discovery in support of NASA's New Horizons mission to Pluto and the Kuiper Belt beyond.

"We're very pleased with the decision of the IAU," says co-leader of the discovery team, Dr. Alan Stern, executive director of the SwRI Space Science and Engineering Division and principal investigator of the New Horizons mission. "You're going to be hearing a lot more about Nix and Hydra in coming years — astronomers are already applying for telescope time to study their orbits and physical properties. And when New Horizons flies by Pluto in the summer of 2015, each will be mapped in detail."

"Pluto doesn't reveal its moons easily," adds discovery team co-leader and New Horizons Project Scientist Dr. Hal Weaver, of APL. "It took 48 years after the discovery of Pluto to find Charon and another 27 years to find Nix and Hydra. Perhaps we won't have to wait as long for the next discovery because the New Horizons spacecraft will be making a rendezvous with Pluto in nine years and will be searching for other small satellites."

Nix and Hydra, roughly 5,000 times fainter than Pluto itself, are about two to three times as far from Pluto as its large moon, Charon, which was discovered in 1978. The nine-member discovery team selected the name Nyx for S/2005 P 2, the inner small satellite, and the name Hydra for S/2005 P 1, the outer small satellite. Because asteroid 3908 already bears the Greek name Nyx, the IAU changed Nyx to its Egyptian equivalent, Nix.



In mythology, Nix is the goddess of darkness and night, befitting a satellite orbiting distant Pluto, the god of the underworld. Nix is also the mother of Charon, relevant to the giant impact believed to have created Pluto's three satellites, indicating Charon was borne of the material from which Nix formed. Hydra is the terrifying monster with the body of a serpent and nine heads, befitting the outermost moon of Pluto, the ninth planet in the solar system.

In addition, just as Pluto's name begins with the letters "P" and "L" to honor Percival Lowell, who motivated the search that led to its discovery, Nix and Hydra honor the search for new satellites and the New Horizons mission to Pluto by starting with the letters "N" and "H." The first letter of Hydra also honors the Hubble Space Telescope that was used to detect the satellites.



## The Digistar Users Group Is Coming to Utah

The Digistar Users Group recently voted to hold their annual meeting in Salt Lake City, Utah. Evans & Sutherland will host the three-day meeting during which Digistar users will share and demonstrate new programs, discuss upcoming features, and review customer service and support.

Along with DUG activities, E&S will be providing free hardware and software training seminars for all Digistar owners and introductory seminars on the Digistar product line.

Please plan to join us in Salt Lake City on September 27-29. We invite you to stay and take advantage of all that Utah has to offer, including a wide variety of outdoor activities and scenic adventures.

Space is limited, so visit the DUG website today to register for the meeting and reserve your spot in our training classes.

<http://www.digistardomes.org>



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## From Thunderstorms to Solar Storms...

*(Continued from page 1)*

improvements that will enhance our ability to monitor the weather—both normal, atmospheric weather and “space weather.”

“Satellites eventually wear out or get low on fuel, so we've got to launch new weather satellites every few years if we want to keep up the continuous eye on weather that NOAA has maintained for more than 30 years now,” says Thomas Wrublewski, liaison officer for NOAA at NASA's Goddard Space Flight Center.

Currently, GOES-N is in a “parking” orbit at 90° west longitude over the equator. For the next 6 months it will remain there while NASA thoroughly tests all its systems. If all goes well, it will someday replace one of the two active GOES satellites—either the eastern satellite (75°W) or the western one (135°W), depending on the condition of those satellites at the time.

Unlike all previous GOES satellites, GOES-N carries star trackers aboard to precisely determine its orientation in space. Also for the first time, the storm-tracking instruments have been mounted to an “optical bench,” which is a very stable platform that resists thermal warping. These two improvements will let scientists say with 2 to 4 times greater accuracy exactly where storms are located.

Also, X-ray images of the Sun taken by GOES-N will be about twice as sharp as before. The new Solar X-ray Imager (SXI) will also automatically identify solar flares as they happen, instead of waiting for a scientist on the ground to analyze the images. Flares affect space weather, triggering geomagnetic storms that can damage communications satellites and even knock out city power grids. The improved imaging and detection of solar flares by GOES-N will allow for earlier warnings.

So for thunderstorms and solar storms alike, GOES-N will be an even sharper eye in the sky.

Find out more about GOES-N at [goespoes.gsfc.nasa.gov/goes](http://goespoes.gsfc.nasa.gov/goes) . Also, for young people, the SciJinks Weather Laboratory at [scijinks.nasa.gov](http://scijinks.nasa.gov) now includes a printable booklet titled “How Do You Make a Weather Satellite?” Just click on Technology.

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

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## Flashlight & Laser Pointer Follies



I'm always on the prowl for good flashlights. Whether its for a workshop or teacher training, a nice flashlight is invaluable under the dome.

Cheap ones are easy to find in dollar stores, but often these are too large or so poorly made they don't last. Recently, I found a Rayovac flashlight. It's called a “Value Bright” and it takes AA size batteries. It seems durable, though I haven't tried it out yet under the dome. The best part is that its available in Wal-Mart stores for \$0.84—and batteries are included!! (Can you tell I get excited over bargain flashlights?) They don't seem to be available online, so you'll have to visit a local store. I was able to pick up a large number of them by raiding two stores in my area. (Avast! Flashlight Pirates off the starboard bow!)

For a couple of years we've been buying laser pointers for our planetarium from Target stores. They were pretty durable, but more than a year ago, they changed the “on” switch to a cheaper one which wore out quickly. A few months ago I found that many office supply stores, such as Staples, carry Apollo brand “Classic Comfort” laser pointers. It has a nice rubber grip and the switches haven't broken so far. You can find them in office stores and online for about \$25. It uses AAA batteries rather than more expensive and hard-to-change-in-the-dark button cells.

—Kevin Conod



## NEW MEMBERS

The following have joined our merry band of planetarians. Please extend a warm welcome to the following new and returning members.

Link Planetarium	Roberson Museum
Richard Brady	Novins Planetarium
Norman P. Angiuoli	Novins Planetarium
Ken Garrison	Novins Planetarium
Richard Gamba	Novins Planetarium
Debbie Daley	Novins Planetarium
Richard H. Mackiewicz	Novins Planetarium
Teresa St. Angelo	Novins Planetarium
Richard R. Fink	Novins Planetarium
John Bauer	Novins Planetarium
Becky Nelson	Lunar & Planetary Institute
Johan Gijsenbergs	Sky-Skan, Inc.
Marcus Weddle	Sky-Skan, Inc.
Stephen C. Dubois	Ferguson Planetarium
Stephen Shipley	Ancient Eyes Productions
Jason Statham	ASH Enterprises
Mark Perkins	MS Services
Lucy Albert	Space Telescope Institute
Steven Sauter	Bassett Planetarium
Kenichi Otani	Konica Minolta
Nozomu Shiotsu	Konica Minolta
Kerry Handron	Immersive Earth
Wilfried Lang	Carl Zeiss GMBH
Nico Schaeffer	Carl Zeiss GMBH
Richard Zobel	Visual Acuity
Katharine Perrow	Center for Educational
Technologies	
Frank Mancuso	Buhl Planetarium
Staffan Klashed	SCISS
Linda Krouse	Noble Planetarium
Tony Scott	SEOS, LTD
Eric P. Seiler	Seiler Instrument
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Constellation  
c/o Kevin Conod  
The Newark Museum's  
Dreyfuss Planetarium  
49 Washington Street  
Newark, NJ 07102