COLUMBUS ASTRONOMICAL SOCIETY

Prime Focus

Volume 58 Number 3 March 2009

The Columbus Astronomical Society Newsletter

Contents

Wired for Astronomy

What are other amateur astronomers doing nowadays? A great way to find out is to follow the blogs, and there are many.

For starters, go to http://www.astronomyblogs.com/. As the name implies, it is a web site dedicated to astronomy blogs. You will need to join if you want to start your own blog, but otherwise you can spend hours reading and exploring.

http://space.about.com/od/computerresources/tp/blogsastrospace.htm has a list of their choice of twn top astronomy and space blogs. Niumber one in the list is Phil Plaitt's well-known Bad Astronomy blog (http://blogs.discovermagazine.com/badastronomy/). And I personally agree with the choice—I even have his blog in my Google start page!

http://cs.astronomy.com/asycs/blogs/astronomy/default.aspx is associated with Astronomy Magazine and serves as an outlet for last-minute press releases and information.

Yahoo keeps a list of blogs here:http://dir.yahoo.com/Science/Astronomy/News_and_Media/Blogs/. You will notice some overlap, which is to be expected.

Now you have something to do on those familiar Ohio cloudy nights. Have a good read!

From the President

Editor's note:

I failed to receive an announcement from the president. I am sure he will make some announcement in the CAS Yahoo group.

The CAS meeting will be held Saturday March 14. As of this time, the program has not been announced.

Ron Ravneberg at Starfest ,taken by Terrance Dickinson

What's Up
Brad Hoehne

As I write this it is well below freezing outside, and windy enough to bring tears to the eyes of a north facing face. It's hard to believe that in a few short weeks, spring will begin.

The **Spring Equinox** occurs on March 20th at 6:44 a.m. EST, when the sun crosses the celestial equator from south to north. People standing on the equator that day will see the sun pass almost directly overhead. The bottoms of equatorial wells will be illuminated and many fortuitously situated flagpoles holding up flags of countries like Equador, Columbia, Brazil, The Republic of the Congo, Gabon, Somalia, Kenya or Indonesia will, at one moment of that day, cast no shadow.

The *evening star*, **Venus**, is at its closest and brightest this month, and will *reach inferior conjunction*, that is, it will pass between us and the sun, on March 28th. Less than a fortnight later it will become visible again at the *morning star*. Telescopic observers will see it wane over the course of March into a long thin crescent not quite an arcminute across.

As of this writing, **Comet Lulin** is still quite bright, though it is now fading as it drifts further from earth. Excellent finder charts for this interloper can be found at: http://www.astrodrayer.com/lulin

After taking its bow in January, **Jupiter** returns as a morning object. By late March, it should be visible in the morning twilight hugging southeastern horizon.

March is the ideal time for fans of **Saturn** (and aren't we all) to make evening visits to that planet. Opposition occurs on March 8th, which puts it due south, but high up, at around 1:36 a.m. local Columbus time.

Telescopic observers of Saturn will note that the rings are appearing thinner and thinner as the weeks progress. At the time of this writing, the system is beginning to look, at low power, a bit like a plump apricot speared on a toothpick. Just a few short years ago, the rings presented a wide-open view to us, and the planet was a bit brighter to the naked eye.

Galileo first observed Saturn in July of 1610. After all of his momentous discoveries of the previous months- craters on the moon, satellites around Jupiter, the existence of countless stars invisible to the unaided eye- he was apparently primed to see extraordinary things. And, with Saturn, he did. Excited, he secretly wrote to one his patrons:

. . . the star of Saturn is not a single star, but is a composite of three, which almost touch each other, never change or move relative to each other, and are arranged in a row along the zodiac, the middle one being three times larger than the lateral ones, and they are situated in this form: oOo.

Much like his later discovery of "the horns of Venus" Galileo was hesitant to widely publish this news too soon, but he wanted to ensure that he got credit for making his discovery first should someone else publish while he waited. Here, too, he employed an anagram. This one, unscrambled, revealed the message: Altissimum planetam tergeminum observavi, or "I have observed the highest planet triform." (Strangely, Galileo refers to Saturn in the same manner as his contemporaries who, despite Galileo's earlier discoveries, still largely maintained that the Earth was at the center of the universe and that the planets revolved in ever-higher spheres about it.) In the end, Galileo was probably smart not to announce his discovery right way. While he did, eventually, publish the solution to his coded message, it wasn't until he released his work The Asayer in 1623. This occurred after he had made a number of other, more puzzling, observations of 'The Highest Planet".

The first of these was made in 1612. In that year, Galileo noticed that the two companions of Saturn had apparently disappeared. While Galileo was not the sort to doubt himself, this change undoubtedly gave him pause- a pause that lasted until 1623, apparently. While he almost certainly did not doubt his own eyes (for he was supremely confident in himself), he likely felt that if he could not come up with a compelling physical explanation for Saturn's capricious nature the observer himself might be accused of caprice. He made a strategic wait. (We now know, of course, that this observation had been made at a time when Saturn's rings were being seen edge-on.)

Adding to the mystery of Saturn were further observations made in 1616 when, we now know, Saturn's rings were much more open to us. In that year Galileo described the world as possessing two ansae- or "handles." By this time, thoroughly confused, and with corroborating observations in hand from a smattering other observers of the time, Galileo uncharacteristically gave up attempting to interpret what he saw and simply published drawings of what he believed he had seen without any commentary.

It wasn't until 1656 that Christian Huygens finally put all the pieces together- using observations from previous observers- and made splendid guess about the true nature of the Saturnian system. (Again, claiming priority for his discovery in an anagram before publication. Folks in the Renaissance just loved anagrams.) A few years later, when better optics were developed, Huygens's model was shown to be largely correct.

Now that the rings of Saturn are becoming coy, the moons of Saturn are coming more clearly into view. With the overall brightness of the planet dropping by a half magnitude from a few years ago, some of its companion worlds have less glare to battle.

As of this February of this year, there are 61 known moons in the Saturn system. (This is not, of course, counting the trillions of dusty snowballs that make up the rings.) The sixty-first, dubbed S61 pending official naming, was plucked from a series of Cassini spacecraft images taken last August of the faint, dusty, G-Ring. So far, not much is known about this world, other than it seems to be a source for material in its home ring.

Dedicated observers can see as many as 8 of Saturn's moons in medium-to-large amateur telescopes. The easiest of these is **Titan**, the second largest moon in the Solar system. Titan is easily distinguished in large scopes by its slight peach color. Observers using large binoculars might be able to make out Titan as well, though, to see color, requires a telescope. In a very large scope, with exceptional seeing, a 1 arcsecond disc can be discerned.

Like the Galilean moons of Jupiter, Titan can sometimes be seen to cast shadows on its parent world. In March, there two opportunities for early risers to catch one of these events. The first of these begins on March 12th at 4:34 a.m. local time. At that time Saturn will be seen 25 degrees off the Western horizon. For the next hour or so, given good seeing, the shadow of Titan should be visible through most amateur telescopes. 16 days later (Titan's orbit about Saturn takes just a hair less than 16 days), the event will be repeated almost exactly. Beginning at 3:25 a. m., on the 28th, when Saturn is 26 degrees of the Western horizon, Titan's shadow will be seen. How low can Saturn get before you no longer can see the shadow?

Also fairly easy to spot are- from Saturn outward- **Tethys, Dione and Rhea.** They are, respectively, roughly two, three, and four times as far from the planet as the outermost visible edge of the rings are. More difficult is **Enceladus**- the bright snowball world thought to have liquid water in its interior. Enceladus is slightly closer to the rings than Tethys. At magnitude 12, however, the glare of the nearby rings usually makes viewing this tiny world quite difficult. Since the rings of Saturn are becoming less bright, from our perspective, now is the time to try seeing it.

Observers wishing to parse out where each of these five, easiest-to-spot, moons are can use the online applet found at:
http://www.skyandtelescope.com/observing/objects/planets/3308506.html

Another bright moon of Saturn is the strange **Iapetus.** The Discoverer of this world Giovanni Domenico Cassini (after whom the famous division is named), noted that with his scope it could only be seen when it appeared on the eastern side of Saturn. When on the western side, it vanished completely from view. Later observers with better telescopes saw that the world did not actually disappear, it merely varied from magnitude 10.2 to 11.9- a five-fold change in brightness. For a long time this variation in brightness was puzzling.

Voyager 2 photographs of Iapetus showed it to be covered by a giant stain of dark material on one entire hemisphere, and a bright icy patch on the other. Scientists dubbed the dark half Cassini Reggio. The light half was called Roncevaux Terra- after a muddy battlefield where forces under French king Charlemagne and Moorish Armies clashed. What would stain one side of Iapetus, and not the other? An impact? Some strange "sweeping up" of ring material? The most favored explanation today is somewhat complex. It goes something like this (deep breath):

Iapetus is an icy, and dusty, world. Sunlight falling on its surface warms it and causes some ice to sublimate. Some of the resulting vapor migrates around to the night side forms snow and falls back down again. (Since Iapetus has a 78 day long orbit, there is plenty of time for this movement from day-side to night-side to take place.) At one point in the history of this world, due to some unknown quirk of geology, there came to be a very slight difference between the rate of sublimation on one side of the planet over the other. This meant that one side of the planet would gather up snow more quickly than the other- it being the recipient of the slightly more rapid sublimation from over the horizon. Snow is bright and reflects heat back into space. A bright region is, therefore cooler and undergoes less sublimation. So, as a given region gets brighter, it tends to get brighter still- in a positive feedback loop. On the other side of the world, the no-so-bright region absorbs more heat and undergoes more rapid sublimation. Dust in the gets left behind when it sublimates and makes the terrain even darker. This, too, accelerates as time passes. Given this process, over time, even the tiniest difference can become more and more pronounced. As long as no great impact disturbs the cycle, it is likely that Roncevaux will continue to darken, and Cassini will continue to brighten until the former is as dark as the pure dark material it is made of the latter is as pure white as fresh Aspen powder.

Never dimmer than magnitude 12, Iapetus can be spotted by diligent observers in scopes as small as four or five inches. However, being quite far from Saturn- 27 visible-ring radii away, it is easy to confuse for a background star if one doesn't know where to look. Good star charts are needed. Many star-charting programs generate ready-made charts of Saturn's Moons. My personal favorite is called, simply, Guide.

More difficult to see, but much easier to find, is **Mimas**- which, with its giant crater Hershel, looks uncannily like the Death Star in space probe photographs. Hugging the visible rings inside the orbit of Enceladus, the magnitude 13 Mimas is often lost in the glare of its home world. A large telescope, good seeing and very clean optics are extremely helpful when attempting to spot this world as a tiny speck.

Finally, there's the strange, spongy **Hyperion**. Orbiting at a bit less than half the distance from Saturn as Iapetus, this potato shaped world is just barely visible to owners of large telescopes. A faint, magnitude 14, blip, you'll need to have an excellent finder charts to help distinguish this world from background stars. It also helps to wait until the moon is at its greatest eastern or western elongation- that is, it is as far to the side of Saturn as possible, before searching for it. Then, using high power, with put Saturn out of the field of view. If you're persistent, and have large enough optics to spot a magnitude 14 star, you might add yet another world to your collection.

Happy collecting!

Column 6 of 6 on Studying the Moon
Observing the Age of the Moon and Its Craters
Michael Packer

Amateur astronomers like to know the basic facts of deep sky objects they observe - distance, age, size, a property that makes the object noteworthy. The same thing goes for the Moon and its features. But age, one of the most important data points for understanding lunar terrain (and the major impact events in the inner solar system for that mater), is hard to recall both because there are a lot of lunar features to note and no good method presented on recollecting them. This last article on studying the Moon tries to solve this dating puzzle by reviewing the lunar age story and presenting the age markers that date important features.

The Lunar Age Story: A cataclysmic collision between a Mars sized body scientists have come to call Theia and a proto-Earth is the best model that fits the conditions of our 12,700km planet having a relatively large 3500km moon. The impact theory was first proposed in the 1940's and gained new life after rock samples were brought back to Earth.

The collision with Theia likely marked the final stages of planetary accretion across the solar system and contributed roughly to the last 10% of Earth's mass. Ancient lunar rocks are dated to 4.56–4.29 Ga (Ga: Gigaannum = 1 billion years ago). But the exact age of the Moon is unknown.

Both the rock samples and computer impact scenarios, that meet the high angular momentum conditions of the Earth-Moon system, suggest that the Moon formed mostly from the mantles surrounding the iron cores of Earth and Theia. What was left was a molten Earth, rich in heavy and light elements, and a molten Moon, iron deficient and gravitationally unable to hold on to the many gaseous volatiles (nitrogen, water, carbon dioxide, ammonia, hydrogen, methane) that persisted before it cooled. The Moon was a globular magma ocean. It became Earth's remote continent but it was destined to be a gray volcanic badlands.

Not too gray of a place for geologic time lords however. As the Moon cooled, the fraction of heavy elements that remained crystallized into iron and magnesium silicates and sank. Less dense material then crystallized, floated and formed an anorthositic crust about 50 km in thickness. For what it's worth, this anorthositic rock is composed of more than 90% calcic plagioclase feldspar which means "calcium-rich oblique fracture shaped crystalline minerals" an example of which is $CaAl_2Si_2O_8$. But the point is that this chalk looking rock represents the original crust of the moon and, after billions of years of horrendous impacts, it can still be recognized all over the lunar surface. It has a high albedo and makes up the bright white terrae or lunar highlands (Example: southern highlands around Tycho). It contrasts markedly with the dark iron-rich basaltic maria - the lava seas or extrusive magma that found its way to the surface a billion years later by erupting through the floors of the impact basins.

Six Lunar Epochs: Mentioning maria moves this age story to the epochs of cratering. And once again to the delight of geologic time lords, a badly cauterized moon would suitably record the major impact episodes right up to the present day. This enduring impact record continues to aid planetary geologists' understanding of how solar system bodies were formed, or transformed, into their present state.

Significant Craters and Basins that Formed Under Each Lunar Epoch

Pre-Nectarian	Nectarian	Lower Imbrian	Upper Imbrium	Eratosthenian	Copernican
4.53 to 3.92 Ga	3.92 to 3.85 Ga	3.85 - 3.75 Ga	3.75 - 3.2 Ga	3.2 - 1.1 Ga	1.1 - Present Ga
Manzinus	Cleomedes	Petavius	Archimedes	Eratosthenes	Copernicus
Grimaldi	Clavius	Arzachel	Plato	Pythagoras	Tycho
Ptolemaeus	Humorum Basin	Cassini	Posidonius	Bullialdus	Aristillus
Fecunditatis Basin	Crisium Basin	Macrobius	Piccolomini	Theophilus	Aristarchus
Procellarum Basin	Nectaris Basin	Vitello	Sinus Iridum	Langrenus	Kepler
Tranquillitatis B.	Serenitatis Basin	Schrodinger	Orientale Basin	Picard	Eudoxus

Pre-Nectarian: 4.53 to 3.92 Ga
The Pre-Nectarian period is defined from the point at which the lunar crust formed to the time of the Nectaris impact event. The Pre-Nectarian period started within an intense cratering period associated with the accretion of the Moon. Fragments of ruined craters on the Moon are the oldest and most difficult to recognize. The impact basins Procellarum, Tranquillitatis, and Fecunditatis likely formed in this epoch. Their basin walls are respectively demolished.

Nectarian: 3.92 to 3.85 Ga
The Nectarian period is named for the impact basin that contains the relatively small Mare Nectaris, which is one of about 12 multi-ring basins that formed in this brief interval. This epoch likely corresponds to the Late Heavy Bombardment period of the inner solar system. These old basins are all heavily degraded by subsequent impacts.

Lower Imbrian: 3.85 to 3.75 Ga
The short interval beginning with the Imbrium impact and ending with the Orientale impact is called the Lower Imbrian period. The formation of the Imbrium and Orientale basins provides the most important and widespread stratigraphic boundary between the ancient, heavily cratered Moon and the more recent Moon dominated by lava flows and a great reduction in impact cratering.

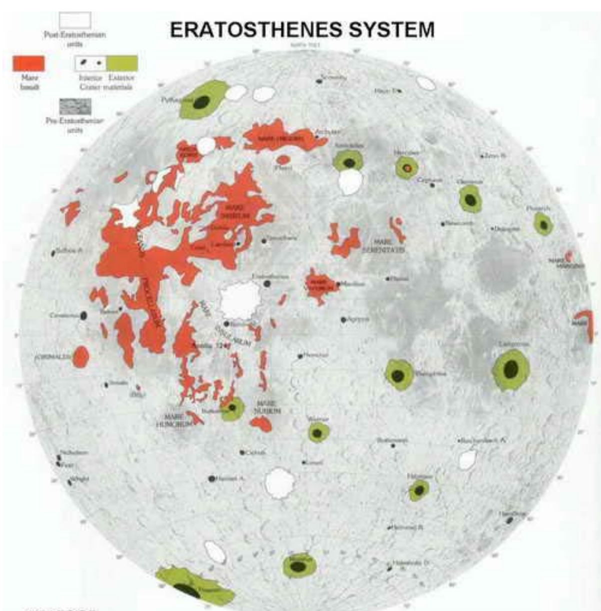
Upper Imbrian: 3.75 to 3.2 Ga
2/3's of the Moon's mare basalts erupted within the Upper Imbrian with many of these lavas flows filling the impact basins.

(Continued on page 5)

What did not crystallize and sink or crystallize and rise in the formation of the moon remained in a magma state. This material called KREEP is rich in rare-earth elements including uranium and thorium. Consequently radioactive heating was believed to be intense during this time and is attributed to the formation of most of the lunar maria particularly around Imbrium and Procellarum. It should be noted however that an interesting flooding theory, aside from the above, postulates that a major far-side impact sent shockwaves through the moon and instigated massive magma flooding on the near side - much in the same way that a rock striking an outside car windshield transfers energy and blows off a cone shaped piece of glass on the inside of the car.

Eratosthenian 3.2 to 1.1 Ga

After the core formation of lunar seas, the Eratosthenian period is demarked by fresh looking craters with no impact blemishes but with no rays structure either. Eratosthenes crater is a reference example. This was the longest period in Lunar history. During this era, late-stage volcanism still filled low-lying regions in and around Mare Imbrium and Oceanus Procellarum. Consequently secondary craters from some Eratosthenian impact craters are flooded or embayed by mare lavas. Bright ray systems would have undergone space weathering and faded away over this long 2 billion year time scale. Maps of the 6 epoch impacts like the Eratosthenian System shown in this article make a great observing plan for an evening. See lnk.nu/members.csolutions.net/t44.html.



Each of the 6 epochs has a map showing known events. Above is an Eratosthenian era nearside map.

Copernican 1.1 to Present Ga

Copernican period is demarked by fresh craters with rays. The Copernicus impact (.800 Ga) itself is a large impact with well defined walls, central peaks, secondary impacts, extensive ejecta and a well defined ray system. It has all the fresh detail of a relatively new impact. We are currently in the Copernican period of lunar history. There are no definite mare lava flows in this era but small numbers of superposed impact craters suggest that a few lava deposits in northern Oceanus Procellarum few lava deposits in northern Oceanus Procellarum are of Copernican age. The most significant geologic activity on the Moon during the Copernician period has been the continuing (but infrequent) impact cratering. The Copernican craters Tyco (.108 Ga) and Chicxulub (.065 Ga) on Earth are believed to be formed form a group of asteroids called Baptistina which itself was created from a collision within the Asteroid Belt about 160 million years ago (.160 Ga). The Chicxulub crater has been strongly linked to the extinction of the dinosaurs 65 million years ago. Hence Tycho is known as the Dinosaur crater by its association with Chicxulub.

Crater Classification

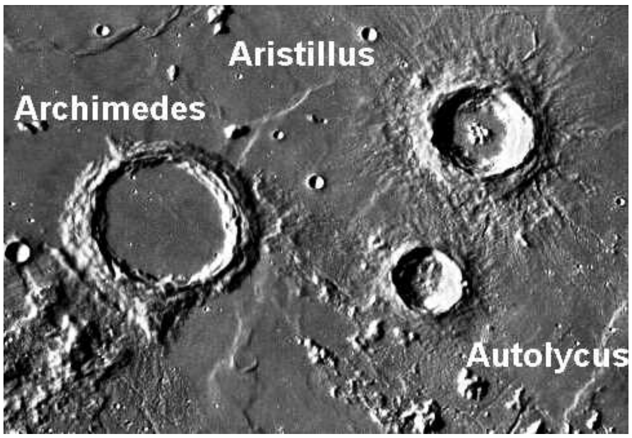
ALC:	**Simple bowl-shaped craters with smooth rims, diameters up to 20km; prototype Albategnius C.**
BIO:	**Simple like ALC, diameters up to 20km, but with a small flat floor; prototype Biot.**
SOS:	**Shallow craters with broad flat floors, narrow walls/no terraces, 20-35km; prototype Sosigenes**
TRI:	**Scalloped-walled craters, 15-50km with concentric slump masses in wall. Flat floor or small peak with material; prototype Triesnecker**
TYC:	**Multiple tiers of terraces, crenulated rim crest, large flat floor with peak 30-175km; prototype Tycho**

Crater Morphology and Size: Before you may take another look at Copernicus, Tycho et. al. and before I introduce a trio of lunar craters worth age study, this is probably a good time to remind yourself of natural crater erosion associated with crater size such as terraced or slumped walls, crater floors with material, and dilapidated central peaks (Column 2/6 on studying the moon). These features should not be confused with the erosional effects of later direct impacts or secondary impact material draping over the earlier crater. Without a doubt differentiating between these erosional processes lies at the crux of correctly reading the events that took place over the lunar terrain. And of course it needs to be stated somewhere that multiple impacts over the same terrain can make reading the sequence of events more challenging or impossible.

Archimedes, Autolycus and Aristillus: Observing the age sequence of lunar terrain. Grouped together in the northeastern sea of Mare Imbrian lie the craters Aristillus (northwest), Autolycus (middle) and Archimedes (southwest). With a diameter of 55 km, Aristillus is a TYC or Tycho class crater. It has terraced walls, a crenulated rim, a large flat floor and a massive clump of central peaks. It is also fairly easy to see that Aristillus is a fresh crater with a well defined wall, central peak system and bright rays of ejecta. It therefore is a Copernician period crater, under 1.1 billion years old.

The middle crater Autolycus is a little more tricky to pin down. Sitting on the bench of the nearby Apennine Mountains, 39 km Autolycus is likely too small to be a TYC crater. It does not have a discernable central peak but does have a floor filled with lava material and collapsed wall debris. So Autolycus pretty easily fits into a Triesnecker TRI class impact. Separate from this class detail, Autolycus shows distinct signs of erosion around its wall particularly to the north. Inspection with a telescope at or near the terminator shows radiating debris from Aristillis draping over Autolycus's outer structure. On the other hand, high angled light observations show that Autolycus has a faint ray structure itself - part of which lies over Archimedes. Hence Autolycus is likely a Copernician period crater but is older than Aristillis.

83 km Archimedes (flat floored only 1.6 km deep) seemingly does not fit within the crater scale. Its floor should be more like 4 km deep and have a peak system 2 km high. It was recognized early on that it, and Plato 600km north, must be partially filled with mare lavas from the Imbrium basin. And in fact, shadows cast from Archimedes rim on its floor and surrounding mare show the lava inside is about the same level as the lava outside. There are no breaches around Archimedes rim so the lava must have has rose up through fractures in the floor of the crater. Since Archimedes-sized craters are 4 km deep (not 1.6 km) these means that 2.4 km of lava filled the crater and buried its 2 km peak system. That's why



it's not there!

Pulling these observations together in context with the 6 epochs, a chronology of this area can be projected. 3.85 billion years ago the Imbrium basin formed creating the Apennine Mountains. A billion years later, basaltic lava filled the basin. But sometime between these two events the Archimedes crater formed and its floor was subsequently flooded along with the Imbrium basin. At least two billion years go by before this area sees the Autolycus impact and then, sometime later, the Aristillus impact crater is formed.

These kind of observations taken in context of the epochs, that were in turn estimated with the aid of lunar rock samples, can allow amateur astronomers to better recount the age of the terrain they're seeing and sharing at the scope. It takes some practice but after a while the entire Moon's surface forever looses its confusion and is replaced by a profound since of time, inner solar system development, and a connection with a remote earthly continent, once active, but always intimately associated with our planet. Thanks for sharing my interest in studying the Moon! (Sources: Chuck Wood's LPOD and book, various articles on the net, and the Virtual Lunar Atlas)

M57, the Ring Nebula
Stuart Little
September 18, 2005

Moon
Vic Stover
June 11, 2004

North America Nebula
Tom Beck
NGC7000 shot with Canon 10d and Borg 101
August 8, 2008

Where did all these gadgets come from?!

Ion propulsion. Artificial intelligence. Hyper-spectral imagers. It sounds like science fiction, but all these technologies are now flying around the solar system on real-life NASA missions.

How did they get there? Answer: the New Millennium Program (NMP). NMP is a special NASA program that flight tests wild and far-out technologies. And if they pass the test, they can be used on real space missions.

The list of probes that have benefited from technologies incubated by NMP reads like the Who's Who of cutting-edge space exploration: Spirit and Opportunity (the phenomenally successful rovers exploring Mars), the Spitzer Space Telescope, the New Horizons mission to Pluto, the Dawn asteroid-exploration mission, the comet-smashing probe Deep Impact, and others. Some missions were merely enhanced by NMP technologies; others would have been impossible without them.

"In order to assess the impact of NMP technologies, NASA has developed a scorecard to keep track of all the places our technologies are being used," says New Millennium Program manager Christopher Stevens of the Jet Propulsion Laboratory. For example, ion propulsion technology flight-tested on the NMP mission Deep Space 1, launched in October 1998, is now flying aboard the Dawn mission. Dawn will be the first probe to orbit an asteroid (Vesta) and then travel to and orbit a dwarf planet (Ceres). The highly efficient ion engine is vital to the success of the 3 billion mile, 8 year journey. The mission could not have been flown using conventional chemical propulsion; launching the enormous amount of fuel required would have broken the project's budget. "Ion propulsion was the only practical way," says Stevens.

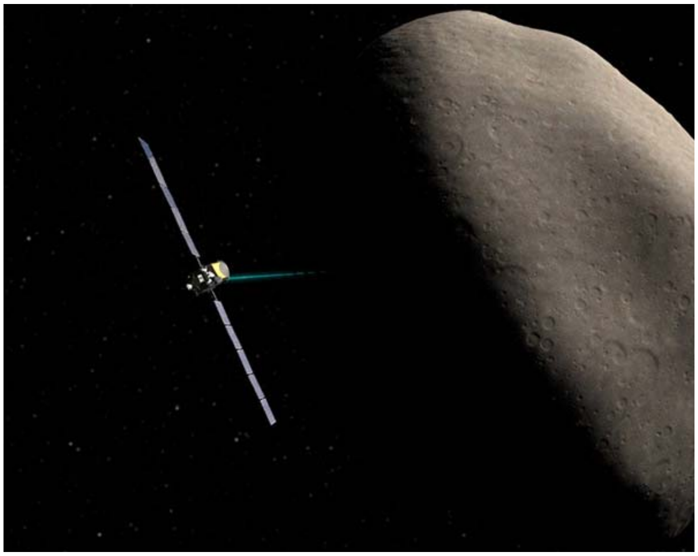
In total, 10 technologies tested by Deep Space 1 have been adopted by more than 20 robotic probes. One, the Small Deep Space Transponder, has become the standard system for Earth communications for all deep-space missions.

And Deep Space 1 is just one of NMP's missions. About a half-dozen others have flown or will fly, and their advanced technologies are only beginning to be adopted. That's because it takes years to design probes that use these technologies, but Stevens says experience shows that "if you validate experimental technologies in space, and reduce the risk of using them, missions will pick them up."

Stevens knew many of these technologies when they were just a glimmer in an engineer's eye. Now they're "all grown up" and flying around the solar system. It's enough to make a program manager proud!

The results of all NMP's technology validations are online and the list is impressive: nmp.nasa.gov/TECHNOLOGY/scorecard/scorecard_results.cfm. For kids, the rhyming *Space Place Partners' Column February 2009* storybook, "Professor Starr's Dream Trip: Or, How a Little Technology Goes a Long Way" at spaceplace.nasa.gov/en/kids/nmp/starr gives a scientist's perspective on the technology that makes possible the Dawn mission.

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



Dawn will be the first spacecraft to establish orbits around two separate target bodies during its mission—thanks to ion propulsion validated by Deep Space 1.

March 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7 Moon at perigee
8 Daylight Savings Time Saturn at opposition	9	10	11	12	13 Uranus at conjunction	14 CAS Meeting 8 PM
15	16	17	18	19 Moon at apogee Perkins New Vistas	20 Vernal equinox	21
22	23	24	25 PF Articles deadline	26	27 Venus at inferior conjunction	28
29	30	31 Mercury at superior conjunction				

April 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Please volunteer for Perkins Observatory programs. As the weather warms up, more people attend these events.			1	2 Moon at perigee	3	4
5	6	7	8	9	10	11 CAS Meeting 8 PM Mercury at perihelion
12 Easter	13	14	15	16 Moon at apogee	17	18
19	20	21 Asteroid Irene (8.9 mag) at opposition Mars at perihelion	22 Lyrids meteor shower	23	24	25
26 Moon at perigee	27	28	29 PF Articles deadline	30		

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The Prime Focus is the monthly newsletter of the Columbus Astronomical Society, a not for profit group of amateur astronomers interested in the night sky. Information can be obtained by writing to the address below. Society members build telescopes, observe the splendors of the universe, contribute to scientific research and educate the public at public programs around the city and at Perkins Observatory.
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[ ] Annual Student Membership Fee: (under 18) $10 ________
[ ] Annual Family Membership Fee: $25 ________
[ ] Annual Patron Membership Fee: $50 ________
[ ] Annual Corporate Membership Fee: $150 ________
[ ] Astronomy Magazine: $34.00/1 year * ________
[ ] Sky & Telescope: $32.95/1 year * ________
[ ] Trial - 3 issues of PRIME FOCUS while I decide: $2 ________
[ ] Tax Deductible Donation: ________
[ ] Send the Newsletter via USPS instead of e-mail ($5.00) ________
Total: ________

Please Print
Name____
Address____
City ______________________State _______ Zip ______________
Phone _____________________ (E-Mail) ____________________
Today's Date ____________________

NIGHT TIMES

The Newsletter of Perkins Observatory Mar. 2009

Saturn at its Peak

Now is the time to schedule a trip to the "O" before the Great Nebula in Orion sinks below the horizon in the evening until next year.

Saturn has finally migrated to the evening sky, and it is a fine sight indeed. Every 15 years or so, we get the opportunity to see the rings nearly "edge on." Right now, they look razor thin as they seem to cut the planet in half. You'll never forget the view.

So come on up to one of our Friday-night public programs and have a look. Members of the Friends of Perkins are especially and most cordially invited to take advantage of your season-pass badges to explore the wonders of the sky (and the wonders of our 85-year-old observatory, as well).

Even if it's cloudy, we promise to keep you entertained and educated by providing tours of the Observatory and a bit of instruction about some of the things you can see in binoculars or a small telescope from your own back yard.

International Year of Astronomy Celebration

Four hundred years ago, Galileo Galilei pointed his telescope at a clear night sky and made some significant discoveries about space – forever changing the human perspective of the universe.

In celebration of his accomplishments and as part of the International Year of Astronomy, Ohio Wesleyan University's Perkins Observatory will host special programs as part of the International Year of Astronomy's "100 Hours of Astronomy" program on April 3 and 4 at the observatory. This public event is co-sponsored by the Columbus Astronomical Society.

Tickets for each evening are $6 for adults, $4 for children (17 and under), and $4 for senior citizens (62 and over). Space is limited and reservations are required. To reserve tickets, call (740) 363-1257.

the rare opportunity to see the rings on edge through mid-April," he said.

Perkins Observatory's "100 Hours of Astronomy" will feature our usual Friday night Guest Night beginning at 8 P.M..

In addition, we'll run a marathon program on Saturday beginning at 4 P.M..

Those attending Saturday's event are asked to arrive anytime between 4 and 8 P.M.. Weather permitting, attendees will be invited to take part in daytime viewings of the sun using special telescopes and a plethora of nighttime objects using the Schottland Reflector and several smaller telescopes on the front lawn.

If skies are cloudy, we'll feature tours of the observatory, complete with ghost story.

Clear or cloudy, at 8 P.M. Tom Burns, Observatory Director, will discuss how even beginning stargazers can repeat Galileo's accomplishments with binoculars and telescopes telescope from their own backyards.

We expect this one to fill up fast, so please call soon and reserve your tickets.

Ron Ravneberg, In Memoriam

We are both saddened and honored to express our appreciation to the very long list of people who contributed to the Observatory's endowment fund this month in memory of the distinguished life of the late Ron Ravneberg. He will be missed as a volunteer, a mentor, and the best of friends.

Mr. and Mrs. Robert Kriss of Columbus
Brad Hoehne of the CAS
The staff at the United Way of Central Ohio Employment Fund
Bill Herbert of the CAS
Carol Korda of Northfield, MN
Denny & Kathy Johnson and family
John Ventre of Cincinnati

(over please)

Taurus, the Bulletin Board

Note to CAS members: Please bring your telescopes to clear, weekend programs!
Note to teachers: Now is the time to schedule spring field trips and visits by Perkins to your schools.

★March 6 (Friday) 8 P.M. Guest Night. Some tickets available.
★March 7 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★March 13 (Friday) 8 P.M. Guest Night. Cub scouts and plenty of them. Sold out!
★March 14 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★March 14 (Saturday) 8 P.M. Regular meeting of the Columbus Astronomical Society.
★March 19 (Thursday) 8 P.M. New Vistas in Astronomy, featuring OSU's Gregory Mack presenting "A History of Dark Matter and its Present Properties."
★March 20 (Friday) 8 P.M. Guest Night. Sold out!
★March 21 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★March 25 (Wednesday) 9 P.M. Todd Kraus's OWU astronomy class.
★March 27 (Friday) 8 P.M. Guest Night. Sold out!
★March 28 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★March 28 (Saturday) 8 P.M. Special dark-sky program for Central-Ohio Backpackers at a remote dark-sky location, tba. Call for details.
★March 31 (Tuesday) 8 P.M. Mount Vernon Nazarene college students.
★April 3 (Friday) 8 P.M. Guest Night/ "100 Hours of Astronomy" Tickets available.
★April 4 (Saturday) 4 P.M. International Year of Astronomy's "100 Hours of Astronomy" celebration, Perkins style. See the article at left for more details.
★April 10 (Friday) 8 P.M. Guest Night. Tickets available.
★April 11 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★April 12 (Saturday) 8 P.M. Regular meeting of the Columbus Astronomical Society.
★April 14 (Tuesday) 9:30 A.M. Blacklick Elementary 5th graders.
★April 16 (Thursday) 9:30 A.M. More Blacklick Elementary 5th graders.
★April 17 (Friday) 8 P.M. Guest Night. Tickets available.
★April 18 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
★April 21 (Tuesday) 9 P.M. Todd Kraus's OWU astronomy class.
★April 24 (Friday) 8 P.M. Guest Night. Some tickets available.

Ralph Antolino, Jr., of Columbus
Debbie & Mac Crawford of Columbus
Bob and Julie Slater of Columbus
Mary Ann & Gerald Trostle
The staff at the Columbus Speech and Hearing Center
The staff at the Ohio Department of Mental Health
James E. Healy of Canton
S. Missler of Columbus
Douglas Bailey of Columbus
Carol Carstens of Columbus
Stepan E. Ruben of Needham, MA
Kristie T. Koenig of Dublin
Willkie Cirker & Sharon Hamersley of the CAS
Joanne & James Konst of the CAS
L. M. Sasaki of Columbus
David & Janet Pierson of Columbus
Gary & Marilyn McCool of the CAS and Perkins
Steve & Sue Rismiller of Milford, OH
Frank & Sally Reindl of Columbus
Victoria & Jeff Daniels of Lewis Center
Ann & Ron Pizzuti of Columbus
Meg & Michael Flack of Columbus
Marilyn W. Pritchett of Columbus
Doug Askew of the CAS
Bill Hurley of the CAS

Observatory Angels

The following folks contributed to Perkins last month:

Patricia Furst of New Albany, $50 to the Perkins Operating Fund.

Jim Pace of the CAS, $40 to the Perkins Endowment and $40 to the Perkins Operating Fund.

Additionally, Jim Pace adopted the constellation Telescopium on our downstairs star map and asked that it be renamed "Alice" in honor of Ron Ravneberg.

Join Friends of Perkins Observatory

Or renew your membership!

Members of the Friends of Perkins receive a badge that entitles them to free admission to all our Friday and Saturday night Guest Nights, a free subscription to this newsletter, and occasional special programs for members.

This month, Steve Wolfe and family of Upper Arlington and the CAS renewed their family membership to the Friends of Perkins Observatory, $90.

We Need Computers!

Our public computers, most of them gifts from you, are getting a bit long in the tooth. On any given night, at least a few of them won't run at all.

If you have a relatively late-model PC or Mac you're planning on replacing, we can surely use it to entertain and delight the attendees at our public programs. Macs should be able to run OS X..

Lots of Ways to Reach Us

Phone: (740) 363-1257
Mail: P. O. Box 449
Delaware, OH 43015
Email: tlburns@owu.edu
Web site: www.perkins-observatory.org/
Fax: (740) 363-1258

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1. ___ Yes, I want to make a donation to the Perkins Endowment. Amount enclosed: ____________________
2. ___ Yes, I want to be a member of the Friends of Perkins Observatory. Enroll me at the level of sponsorship checked below:

___ Individual ($50) ___ Sponsor ($100) ___ Family ($90) ___ Family Sponsor ($200) ___ Corporate ($300)

Name ____

Names of family members (for family memberships only) ______________________________

Address ______________________________ Phone ______________________

City ______________________ State ________________ Zip Code ________________

_____ **Please check here if you are currently a member of the Friends of Perkins Observatory.**

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks available to "Perkins Observatory.")

2,000 Points of Light

On any given night of the year from a dark, rural location, 2,000 stars light up the sky. If 2,000 people, 2,000 Points of Light, will contribute $200 each, we can continue our mission unimpaired.

Half of your gift will go into the Perkins Endowment, the interest on which will keep us open for decades to come. The other $100 will be used to make building repairs build new exhibits and displays, and help with ongoing costs.

To show our gratitude, we will associate your name (or the name of any honoree you pick) with one of the over 2,000 stars on our large publicly-displayed star map. (Sorry, we get to pick the star).

___ Yes, I want to be a Point of Light (@ $200 per "Point"). Amount enclosed: ________________

Name ____

Honoree(s) for "2,000 Points of Light" ______________________________

Address ____

City ______________________ State ____________ Zip Code ___________ Phone: ________________

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks payable to "Perkins Memorial Observatory.")