

# IO - September 2008

Issue 2008-09  
Eugene Astronomical Society

Eugene Astronomical Society  
Annual Club Dues \$25  
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Secretary: Jerry Oltion - 343-4758  
Additional Board members:  
Jacob Strandlien, Tony Dandurand,  
Tommy Lightning Bolt.

[www.eugeneastro.org](http://www.eugeneastro.org)

EAS is a proud member of:

**The Astronomical League**  
The World's Largest Federation of Amateur Astronomers



## NEXT MEETING: SEPTEMBER 30TH (Note that this is a *Tuesday*)

### A Tour of the Solar System by Jerry Oltion

Not all that long ago astronomers thought that Venus was a jungle planet, Mars had canals, and Pluto marked the outer boundary of our solar system. New telescopes and space probes have given us a better view of what's out there, and Jerry Oltion will present a survey of what we know to date.

This survey is a visual delight of spectacular images, starting with the Sun and working outward to the farthest reaches of the Sun's influence. Come see all the strange and beautiful things we've discovered in our own back yard since the invention of the telescope.

We'll also have our usual information sharing between members. We always encourage audience participation during our meetings. EAS meetings are traditionally times when we learn about astronomy and share experiences and knowledge of astronomy and the night sky. If you have something to share with the group, please do so.

Come and enjoy the wonders of the night sky with the Eugene Astronomical Society. After the meeting we can gather at The North Bank for dinner and conversation.

## September Events

Remember our "First Quarter Friday" on September 5th at the College Hill Reservoir, 24th and Lawrence, starting at 7:30. This is a little early, but it will give us a chance to catch Mars, Venus, and Mercury low in the west right after sunset. First Quarter Fridays are meant to be informal, fun gatherings for EAS members and the general public. Bring a telescope and have fun observing and sharing the view with whoever shows up.

We're also hosting a star party on September 19th at Mt Pisgah, starting at 8:15. We'll be setting up on the roadway above the parking lot just as we did last time.

# REMEMBER THAT WE NOW MEET AT EWEB

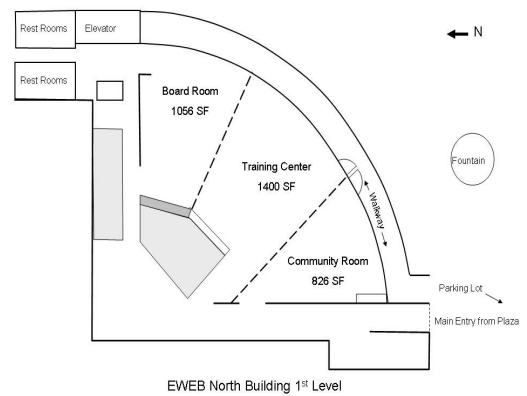
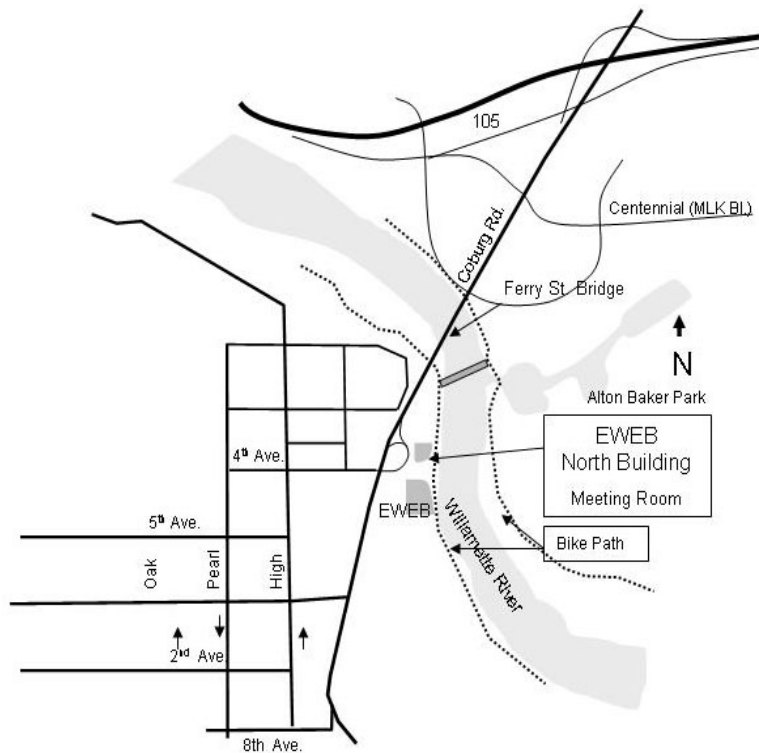
## 500 E. 4th Avenue in Eugene.

OUR NEXT MEETING WILL BE ON TUESDAY, SEPTEMBER 30th AT 7:00 IN THE NORTH BUILDING'S COMMUNITY ROOM. This is the first of the three wedge-shaped rooms in the semicircular building to the north of the fountain at EWEB's main campus on the east end of 4th Avenue.

### Meeting dates and times for the rest of the year:

- September 30 (**Tuesday**) in Community Room
- October 23 (Thursday) in Community Room
- November 10 (**Monday**) in Community Room
- December 18 (Thursday) in Community Room

Join the EAS mail list at <http://eugeneastro.org/mailman/listinfo/org.eugeneastro.general>



EWEB is located at 500 E. 4th Avenue. Our meetings will be in the first room in the semicircular building to the north of the fountain.

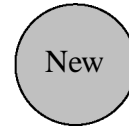
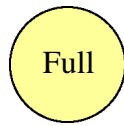
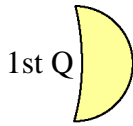


### Thank You Castle Storage

Board member Tommy Lightning Bolt was instrumental in getting a storage unit from the owners of Castle Storage for EAS to store its telescopes and equipment. EAS would like to thank Castle Storage for their generosity and support for our group. Please give them a call if you need a storage space, and tell your friends. They are great people and offer secure and quality units.



# Observing in September



September 7	September 15	September 21	September 29
Mercury set 8:21 PM	Mercury set 8:00 PM	Mercury set 7:40 PM	Mercury set 7:05 PM
Venus set 8:32 PM	Venus set 8:20 PM	Venus Set: 8:12 PM	Venus Set: 8:02 PM
Mars set 8:35 PM	Mars set 8:14 PM	Mars set 7:59 PM	Mars set 7:40 PM
Jupiter Set: 1:25 AM	Jupiter Set: 12:50 AM	Jupiter Set: 12:28 AM	Jupiter Set: 11:59 PM
Saturn Rise: 6:25 AM	Saturn Rise: 5:59 AM	Saturn Rise: 5:39 AM	Saturn Rise: 5:13 AM
Uranus Rise: 7:43 PM	Uranus Set: 6:45 AM	Uranus Set: 6:20 AM	Uranus Set: 5:47 AM
Neptune Set: 4:49 AM	Neptune Set: 4:16 AM	Neptune Set: 3:52 AM	Neptune Set: 3:20 AM
Pluto Set: 12:47 AM	Pluto Set: 12:16 AM	Pluto Set: 11:52 PM	Pluto Set: 11:21 PM

All times: Pacific Standard Time (Nov 4, 2007-March 9, 2008) = UT-8 or U.S. Pacific Daylight Time (March 9-November 2, 2008) = UT - 7 hours.

Date	Moonrise	Moonset	Sunrise	Sunset	Twilight Begin	Twilight End
9/1/2008	08:47	20:22	06:36	19:47	04:53	21:30
9/2/2008	09:56	20:43	06:37	19:46	04:54	21:28
9/3/2008	11:04	21:06	06:38	19:44	04:56	21:26
9/4/2008	12:11	21:32	06:39	19:42	04:58	21:24
9/5/2008	13:17	22:04	06:41	19:40	04:59	21:22
9/6/2008	14:19	22:42	06:42	19:39	05:01	21:19
<b>9/7/2008</b>	<b>15:17</b>	<b>23:30</b>	<b>06:43</b>	<b>19:37</b>	<b>05:02</b>	<b>21:17</b>
9/8/2008	16:07	—	06:44	19:35	05:04	21:15
9/9/2008	16:48	00:25	06:45	19:33	05:05	21:13
9/10/2008	17:23	01:28	06:46	19:31	05:06	21:11
9/11/2008	17:52	02:34	06:47	19:29	05:08	21:09
9/12/2008	18:15	03:43	06:49	19:27	05:09	21:06
9/13/2008	18:37	04:53	06:50	19:26	05:11	21:04
9/14/2008	18:58	06:04	06:51	19:24	05:12	21:02
<b>9/15/2008</b>	<b>19:19</b>	<b>07:16</b>	<b>06:52</b>	<b>19:22</b>	<b>05:14</b>	<b>21:00</b>
9/16/2008	19:41	08:30	06:53	19:20	05:15	20:58
9/17/2008	20:06	09:46	06:54	19:18	05:16	20:56
9/18/2008	20:37	11:05	06:56	19:16	05:18	20:54
9/19/2008	21:16	12:24	06:57	19:14	05:19	20:52
9/20/2008	22:06	13:40	06:58	19:13	05:20	20:50
<b>9/21/2008</b>	<b>23:09</b>	<b>14:46</b>	<b>06:59</b>	<b>19:11</b>	<b>05:22</b>	<b>20:48</b>
9/22/2008	—	15:41	07:00	19:09	05:23	20:46
9/23/2008	00:20	16:23	07:01	19:07	05:24	20:44
9/24/2008	01:37	16:57	07:03	19:05	05:26	20:42
9/25/2008	02:53	17:24	07:04	19:03	05:27	20:40
9/26/2008	04:08	17:46	07:05	19:01	05:28	20:38
9/27/2008	05:20	18:07	07:06	18:59	05:30	20:36
9/28/2008	06:30	18:26	07:07	18:58	05:31	20:34
<b>9/29/2008</b>	<b>07:39</b>	<b>18:46</b>	<b>07:08</b>	<b>18:56</b>	<b>05:32</b>	<b>21:32</b>
9/30/2008	08:47	19:08	07:10	18:54	05:33	20:30

Courtesy Sam Pitts

## Other Items of Interest This Month

- Jupiter prominent all month
- 9/1-9/19 Moon, Mercury, Venus, Mars bunch at dusk, remain close
- 9/5 First Quarter Friday star party**
- 9/6 Moon near Antares
- 9/10 Mercury at greatest eastern elongation (27°)
- 9/11 Mercury, Venus and Mars very close at dusk
- 9/12 and 9/19 Mercury and Mars close at dusk
- 9/12 Uranus at opposition
- 9/19 Mt. Pisgah Star Party** – Waning gibbous Moon near Pleiades
- 9/22 Autumnal equinox 8:44 a.m. PDT

## For Current Occultation Information

Visit **Derek C. Breit's** web site  
**“BREIT IDEAS Observatory”**

<http://www.poyntsource.com/New/Regions/EAS.htm>

Go to Regional Events and click on the Eugene, Oregon section. This will take you to a current list of Lunar & asteroid events for the Eugene area. Breit continues to update and add to his site weekly if not daily. This is a site to place in your favorites list and visit often.

All times are for Eugene, Oregon Latitude 44° 3' 8" Longitude 123° 5' 8" for listed date

## EAS Buys Frank Szczepanski's 18" Telescope

Since Rob Adams and Mel Bartels built the Rob Adams telescope in 1986, the EAS has had a big light-bucket for public star parties. The club has gotten a lot of good observing hours out of that scope over the years, and it has been the centerpiece of many star parties, but in recent years we haven't been able to use it because we don't have anybody who can cart it around. It's just too big and heavy to load into a pickup, and we can't get it up the steps to the College Hill Reservoir, where we host most of our star parties anymore, even if we could get it into a trailer. So the board of directors started looking for a more portable large-aperture scope that we could use for the centerpiece at parties.

On August 19th, Frank Szczepanski advertized his 18" dobsonian for sale. On August 20th, the board wrote him a check for \$1000, a bargain for such a magnificent telescope. Here's the history of this scope in Frank's own words:

"In about 1985 John Wally, who was teaching telescope mirror making at LCC, mentioned he had the remains of a broken bank door that was 3/4 inch plate glass. We cut a rough 17 inch circle out of it with a rock saw and I used a homemade wet grinding wheel to make it more round and then ground and polished it by hand. I remember John saying "Your troubles are just beginning" when we cut out the mirror. He was right. The grinding and polishing was not too bad but it kept looking astigmatized when I tested it and after at least 150 hours and 2 years I gave up and threw it up in the attic and ordered an 18 inch f5.5 mirror and secondary from Enterprize Optics. They promised it in 4 months. They delivered it in almost exactly 2 years. First light was in July of 1989. Boy was I frustrated.

"I quickly built a telescope around it and found it was very difficult to get in and out of my VW van so I cut down the rear box and then used it that way for many years. It is a wonderful telescope and I took it to the last Oregon Star Party in the Steens Mountains and most of them in the Ochicos as well as several Table Mountain Star Parties. In 2007 I decided to try to lighten it up and make it even smaller. I cut down the secondary cage and shortened the rear box again and extended the sticks. It went from 260 pounds down to about 195 and is now considerably easier to load and unload but got a little more shakey. I am still working to improve it. I was telling this story to Dave Davis at the Oregon Star Party several years ago and he asked me if I wanted to sell the unfinished 17 inch mirror. I told him I would not sell it but gave it to him. I understand it is now finished and belongs to a guy in Corvallis named Carl. I would like to look thru it someday."

– Frank Szcz



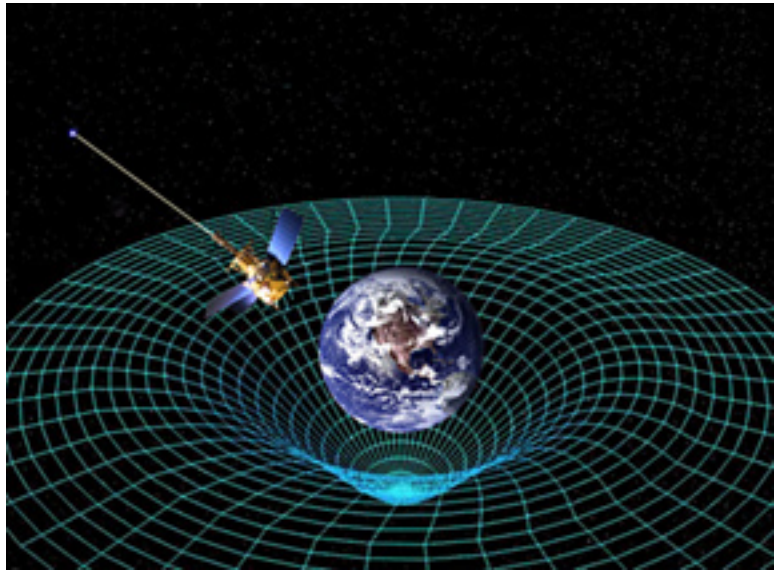
# Something's Not Right with Newtonian Gravity

By Amir Alexander of The Planetary Society

Submitted by Sam Pitts

A new study by researchers from the Jet Propulsion Laboratory shows that spacecraft that swing by the Earth are subject to a small but unexplained increase in their velocity. Is an unknown physical force at work, or something far more mundane? This anomaly is in some ways similar to another cosmic enigma: the Pioneer Anomaly, which seems to be affecting Pioneer 10 and 11 as they speed out of the solar system. All investigators know so far is that a great deal more research is needed. But they have already given this new mysterious phenomenon a name: “the flyby anomaly.”

The first indication that something unusual was going on came on December 8, 1990, as the spacecraft Galileo swung by Earth on its meandering road to Jupiter. As the spacecraft flew by, engineers at the Jet Propulsion Laboratory (JPL) in Pasadena



carefully tracked its Doppler signal to determine its speed and trajectory. But something didn't fit: as the spacecraft moved away from Earth, it was traveling ever so slightly faster than calculations said it should be. The deviation was only about one millionth the velocity of the spacecraft, but it was clearly detectable. It was as if a mysterious force had given Galileo a miniscule push as it was swinging by its home planet.

What was going on? Did the JPL engineers misinterpret the data they received from the spacecraft? Was Galileo affected by a mysterious cosmic force unknown to science? Or was it something else entirely? As of now no one knows the answer.

Skeptical by nature and training, space engineers initially doubted whether this apparent inconsistency in the Galileo data was real. It is far more likely, they reasoned, that the anomaly was an artifact of their own tracking instruments rather than a shift in the spacecraft's actual velocity. Over the next several years, John D. Anderson, along with James K. Campbell and James F. Jordan of JPL looked hard at the tracking procedures and equipment, searching for a possible cause that could explain away the speed discrepancy. They found nothing: the Galileo flyby anomaly remained stubbornly apparent in the tracking data.

Two years after its first visit, Galileo flew by Earth one more time for a gravity assist on its way to Jupiter, and Anderson and his colleagues were eager to see whether the mysterious effect repeated itself. This time, however, Galileo passed much closer to Earth, a mere 300 kilometers above the Earth's surface. In such a close flyby, the astrophysicists found the significant effects of atmospheric drag on the spacecraft drown out any possibility of detecting the miniscule velocity shift of the flyby anomaly.

But in the following years four other spacecraft swung by Earth on their way to their celestial destinations, giving engineers a chance to see if the so-called “flyby effect” reappeared. First came NEAR, which visited Earth in January 1998, and then Cassini in August of 1999. Rosetta, the European asteroid chaser visited in March 2005, followed by MESSENGER in August of the same year.

Surveying the information Anderson and his colleagues found that the Cassini data was useless,

because the spacecraft was using its navigational thrusters at the time of its closest approach to Earth, and the MESSENGER data showed no unexpected change in velocity during the flyby. But the Rosetta data did indicate an anomaly similar to the one detected 15 years earlier in Galileo, and the spacecraft's European controllers confirmed that they too were seeing the effect. The data from NEAR was most striking of all, providing the engineers with the clearest example of the anomaly. In addition to the Doppler measurements, the spacecraft's velocity change was confirmed by independent "ranging" data, which measure the time it takes for a signal from Earth to be transmitted back from the spacecraft.

All this led Anderson and his colleagues to conclude that the flyby anomaly was not a fluke related to the unique conditions of the Galileo spacecraft and its trajectory, but a consistent effect influencing the speed of spacecraft flying by our planet. Suggestions that it was caused by General Relativity's "frame dragging" (known as the "Lense-Thirring effect") led nowhere, when Anderson's calculations showed that the actual velocity change was too large to be explained by this phenomenon. But if the flyby anomaly was real, as data suggested, and if General Relativity had nothing to do with it, then what? What is the cause of the flyby anomaly?

Nobody knew, and it was at this point that Anderson and his colleagues decided to go public with an article. Talk about the flyby anomaly, Anderson recounted, "had been floating around JPL for years, and no one was able to explain it." Now, with the accumulation of data from several different spacecraft, Anderson said, the anomaly could no longer be dismissed. "It was time," he said, "to tell people that there was a problem with earth flybys." If the engineers at JPL couldn't explain the effect, perhaps the broader scientific community could come up with an explanation.

With this goal in mind, Anderson, Campbell, and Jordan, along with John E. Ekelund and Jordan Ellis, spent 18 months closely analyzing the data from all Earth flybys. They finally came up with a formula that accurately predicted the size of the anomaly based on the spacecraft's flight path. The extent to which the velocity of a spacecraft deviates from its expected value during a flyby, they found, depends of the difference in latitude (or "declination") between the spacecraft's incoming and outgoing trajectories. The greater the difference in latitude, the greater the anomalous velocity shift after the flyby.

The spacecraft NEAR, for example, approached Earth from a near-equatorial latitude, but left close to a polar latitude. According to the formula, this large difference between the two should result in a substantial flyby anomaly, and this was indeed the case. The NEAR flyby became the most clear-cut case study for the mysterious effect. MESSENGER, in contrast, approached and departed along nearly the same latitude, which according to the formula should result in a miniscule effect. And indeed, no flyby effect was detected in the MESSENGER data.

But as Anderson points out, coming up with a mathematical formula that can predict an effect is very different from having a physical explanation for it. Could it be some as yet undiscovered physical force, or something known as "dark energy" at work? Such revolutions in physics, Anderson mused, don't happen very often, but in the absence of a better explanation such radical hypotheses cannot be ruled out. "The formula doesn't suggest anything to us" he readily admitted, but perhaps some physicists will be able to come up with an explanation.

As more food for thought, Anderson points out that the flyby anomaly is in some ways similar to that other cosmic enigma — the Pioneer anomaly, which seems to be affecting Pioneer 10 and 11 as they speed out of the solar system. There is, he said an important difference between the two, because the flyby anomaly affects spacecraft's velocity, whereas in the Pioneers' case it is their acceleration that is being affected, slowing them down on their escape path from the solar system. But there is also an important similarity: "The Pioneers," Anderson said, "like all spacecraft swinging by Earth, are on a hyperbolic trajectory." This is a very unusual path, seeing that the vast majority of spacecraft are on parabolic or ellipsoid trajectories. Is there something then about a hyperbolic path that produces such anomalies? As of now, that too is a mystery...

# Strange Clouds at the Edge of Space

from Science@NASA.com

Last month, astronauts on board the International Space Station (ISS) witnessed a beautiful display of noctilucent or “night-shining” clouds. The station was located about 340 km over western Mongolia on July 22nd when the crew snapped this picture:

Atmospheric scientist Gary Thomas of the University of Colorado has seen thousands of noctilucent cloud (NLC) photos, and he ranks this one among the best. “It’s lovely,” he says. “And it shows just how high these clouds really are — at the very edge of space.”

He estimates the electric-blue band was 83 km above Earth’s surface, higher than 99.999% of our planet’s atmosphere. The sky at that altitude is space-black. It is the realm of meteors, high-energy auroras and decaying satellites.

What are clouds doing up there? “That’s what we’re trying to find out,” says Thomas.

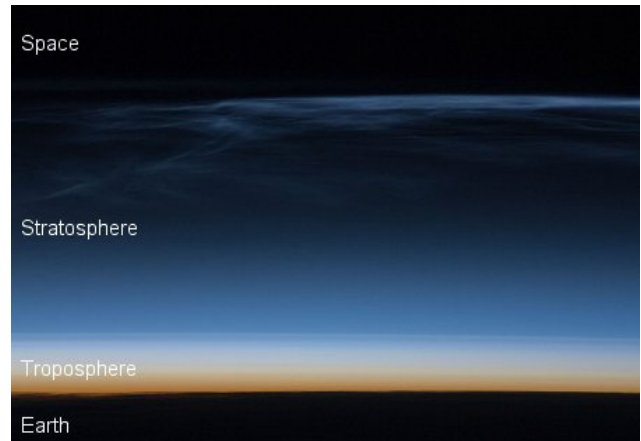
People first noticed NLCs at the end of the 19th century after the 1883 eruption of Krakatoa. The Indonesian supervolcano hurled plumes of ash more than 50 km high in Earth's atmosphere. This produced spectacular sunsets and, for a while, turned twilight sky watching into a worldwide pastime. One evening in July 1885, Robert Leslie of Southampton, England, saw wispy blue filaments in the darkening sky. He published his observations in the journal *Nature* and is now credited with the discovery of noctilucent clouds.

Scientists of the 19th century figured the clouds were some curious manifestation of volcanic ash. Yet long after Krakatoa’s ash settled, NLCs remained.

“It’s a puzzle,” says Thomas. “Noctilucent clouds have not only persisted, but also spread.” In the beginning, the clouds were confined to latitudes above 50°; you had to go to places like Scandinavia, Siberia and Scotland to see them. In recent years, however, they have been sighted from mid-latitudes such as Washington, Oregon, Turkey and Iran.

“This year’s apparition over Iran (at left) was splendid,” says Thomas. The Persian clouds appeared on July 19th, just a few days before the ISS display, and were photographed from latitude 38° N. “That’s pretty far south,” he says.

The genesis and spread of these clouds is an ongoing mystery. Could they be signs of climate change? “The first sightings do coincide with the Industrial Revolu-



Noctilucent clouds photographed by the crew of the ISS



Noctilucent clouds over Mt. Sabalan, a 15,784 ft extinct volcano in northwestern Iran. Photo credit: Siamak Sabet.

tion,” notes Thomas. “But the connection is controversial.”

NASA is investigating. The AIM satellite, launched in April 2007, is now in polar orbit where it can monitor the size, shape and icy make-up of NLCs. The mission is still in its early stages, but already some things have been learned. Thomas, an AIM co-investigator, offers these highlights:

1. Noctilucent clouds appear throughout the polar summer, are widespread, and are highly variable on hourly to daily time scales. A movie made from daily AIM snapshots shows the 2007 NLC season unfolding over the north pole.

2. There is a substantial population of *invisible* noctilucent clouds. Thomas explains: “NLCs are made of tiny ice crystals 40 to 100 nanometers wide — just the right size to scatter blue wavelengths of sunlight. This was known before AIM. The spacecraft has detected another population of much smaller ice crystals (< 30 nm) that don’t scatter much sunlight.” Clouds made of these smaller crystals are stealthy and hard to see, but a key part of the overall picture.

3. Some of the shapes in noctilucent clouds, resolved for the first time by AIM’s cameras, resemble shapes in tropospheric clouds near Earth’s surface. AIM science team members have described the similarities as “startling.” The dynamics of weather at the edge of space may not be as unEarthly as previously supposed.

These findings are new and important, but they don’t yet unravel the central mysteries:

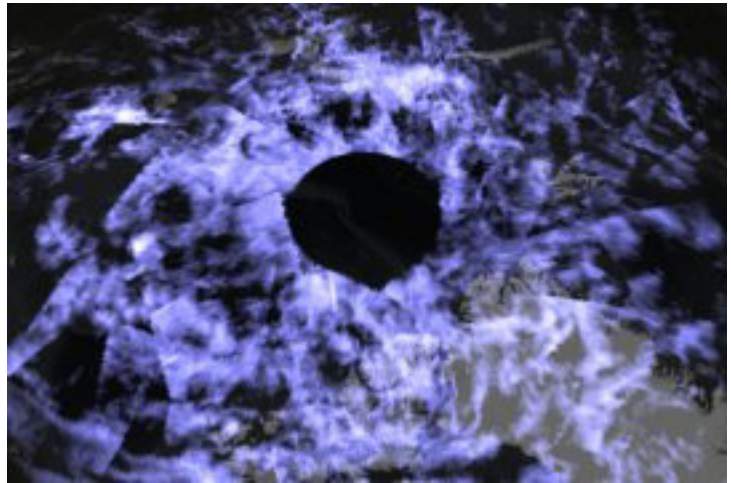
Why did NLCs first appear in the 19th century?

Why are they spreading?

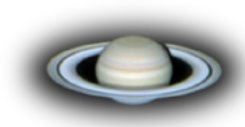
What is ice doing in a rarefied layer of Earth’s upper atmosphere that is one hundred million times dryer than air from the Sahara desert?

AIM has just received a 3-year extension (from 2009 to 2012) to continue its studies. “We believe that more time in orbit and more data are going to help us answer these questions,” says Thomas.

Meanwhile, it’s a beautiful mystery. Just ask anyone at the edge of space.



A daily snapshot of noctilucent cloud activity over the North Pole in 2007. Credit: AIM/Goddard Space Flight Center Scientific Visualization Studio.



## Announcements from Rick Kang:

- September is the last month this year that Pine Mountain Observatory east of Bend is open for Fri/Sat night drop-in programs. Usually the weather during September is drier, so if smoke stays away, skies can be very good, and darkness falls sooner.

- To supply current readily update-able info about outreach for students and teachers, I’ve put together a new website, [oregonsky.org](http://oregonsky.org) (no www). Check it out. If you’re a teacher, note Workshop/Field Trip Friday, October 10th, in Bend, to Pine Mountain!