Newsletter of the Pomona Valley Amateur Astronomers

Blaise Pascal/ . Eloquence is a painting of the thoughts.

Volume 35 Number 6 ***nightwatch*** **June 2015**

President's Message

It's a good time for solar system science. On April 30, the Messenger spacecraft was deliberately crashed into Mercury at the end of its extremely successful career. Among other things, Messenger discovered evidence that Mercury has a liquid iron core, had active volcanoes in its past, and still has abundant water ice and organic materials in the shadowed craters at its poles. Messenger also gathered data on flybys of Earth and Venus en route to Mercury, so it performed close observations of all the terrestrial planets except Mars. It did photograph Mars remotely as part of a solar system "family portrait" in late 2010.

A bit farther out, the spacecraft Dawn is in orbit around the dwarf planet and largest asteroid Ceres. As I write this it is descending to a 2700 mile (4400 km) orbit to map the entire planet at medium range. After 22 days at that distance, Dawn will descend yet again, to a scant 233 miles (375 km) above the surface - the same distance between Claremont and Needles - and map Ceres yet again at high resolution.

MUCH farther out, New Horizons is currently swooping toward Pluto and its extensive system of moons at a blistering 8.5 miles per second (13.8 km/s). Starting on May 15, New Horizons could image the Plutonian system at higher resolution than the Hubble space telescope. The probe's closest approach to Pluto will be on July 14. After the Pluto flyby, New Horizons will fly by at least one Kuiper Belt object in early or mid-2019, at a distance of 43 or 44 astronomical units (Pluto is currently about 33 AU from the sun).

By the time you read this we'll probably know whether the Planetary Society's LightSail-A microsatellite has successfully deployed its solar sail or not. After a successful launch as a secondary payload on an Atlas V on May 20, the tiny satellite, about the same size as a loaf of bread, lost contact for 8 days. But it's talking again now, and the plan is to extend the booms this Wednesday (June 3) and the sails on Friday (June 5). Fingers firmly crossed!

Finally, I received a very nice letter from the IRS this week, addressed to the PVAA. It begins, "We're pleased to tell you we determined you're exempt from federal income tax under Internal Revenue Code Section 501(c)(3)." We're officially a tax-exempt charitable corporation!

Our speaker this month is Tim Thompson, who will talk about "Multiwavelength Astronomy: Freedom from the Tyranny of the Eye." The general meeting is this Friday, June 5, at 7:30, in room B460 in Shanahan Center (the 'new' building) at Harvey Mudd College. I hope to see you there.

Matt Wedel

PVAA Officers and Board

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Treasurer	Gary Thompson	909-935-5509
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Karl Rijkse (2016)	909-428-1884
Ron Hoekwater (2017).....	909-391-1943
Cori Charles (2017) …….	909-646-0275

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Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

PVAA Gen Meeting 5/01/15

The PVAA General meeting started with announcements. If you would like to spend a night using the historic 100" Hooker Telescope at Mount Wilson, contact Ron Hoekwater. The viewing date is Sunday night, September 13th.

PVAA annual dues is due. $30 for an individual, $40 for a family and $12 for a youth under 18. Please see Gary Thompson or Howard Maculsay during the meeting. You can also mail it

PVAA
P.O. Box 162
Upland, CA 91785.

Your membership also includes membership in the Astronomical League. (See https://www.astroleague.org/)

If you would like to buy solar eclipse glasses, we as a club, are getting a special deal from the Astronomical League. We will be ordering 250 at 45 cents each (Plus shipping.) The exact price won't be known until we place the order right after June's meeting on June 5th.

The speaker for the night was Dr. Eric Grosfils. Dr. Grosfils is with the Geology Department at Pomona College. His topic for the night was "A Few Fresh Looks At Our Old Familiar Moon."

First he went over a few theories of how the moon formed. The moon is "light" compared to Earth, meaning it has a lower density. It has more aluminum (element 13) and titanium (element 22), as a percentage of its total make-up, while the Earth has a lot more iron (element 26). Many believe that the moon was formed when a Mars-sized object hit the Earth. The resulting debris congealed to form the moon and much of the heavier elements fell back to Earth, making it denser, and the moon lighter.

The average meteor impact hits the moon at 15-20 km/sec. (A high speed rifle bullet travels 1 km/sec.) When you hit the moon that fast, not only do you leave a crater, the ejecta can leave 'rays' from the center of the impact.

While a lot of the craters are made by impact, a good percentage were also made by volcanic activity. Volcanic activity can also make 'Shield volcanoes.' They are called shield volcanoes due to their large size and low profile, which resembles a warrior's shield lying in the ground. Many of these shield volcanoes can't be seen with telescopes or even from the Apollo missions' images. While many of them are BIG, you need a low angle to see them. The recent reconnaissance lunar spacecraft – LRO -Lunar Reconnaissance Orbiter and Japan's SELENE (nicknamed Kaguya by the public) produced much higher resolution images than were available before. Using these images geologist have been able to find many volcanic domes that were 'hidden' before. So while the moon is a 'dead' chunk of rock, it will continue to keep geologist busy for generations to come.

For more information visit:

http://lroc.sese.asu.edu/ and
http://www.kaguya.jaxa.jp/index_e.htm

Gary Thompson

Club Events Calendar

June 5, 2015, General meeting
June 13, 2015, Star Party, Angeles Oaks and
June 12-14, 2015 Joint Star Party with RAS at Grandview Campground

July 17-19, 2015 Joint Star Party with RAS at GMARS
July 23, 2015, Board meeting, 6:15
July 31, 2015, General meeting

July 31st General Meeting reserved for Members
10 to15 minute "Show and Tell" presentations.

August 14-16, 2015, Joint Star Party with RAS at GMARS
August 20, 2015, Board meeting, 6:15
August 28, 2015, General meeting

September 13, 2015, Annual Mt. Wilson Telescope viewing
Sept 11-13, 2015, Joint Star Party with RAS at GMARS
September 17, 2015, Board meeting, 6:15
September 25, 2015, General meeting

Oct. 9-11, 2015, Joint Star Party with RAS at GMARS
October 22, 2015, Board meeting 6:15
October 30, 2015, General meeting

Nov. 5-8, 2015, Joint Star Party with RAS, Night Fall at Borrego Springs
November 12, 2015, Board meeting, 6:15
November 20, 2015, General meeting

December 3, 2015, Board meeting, 6:15
December 11, 2015, Holiday Party, Sizzlin' Skillets 7:00pm
No scheduled General meeting.
No scheduled Star Party.

What's Up? - Dwarf Planet Questions

Dwarf planet is a new astronomical designation adopted in 2006 when several minor planets beyond Pluto were discovered. Questions began when Mike Brown of Palomar Observatory discovered one that could be larger than Pluto. Pluto had been considered our ninth planet so the International Astronomical Union (IAU) had to decide whether to add a tenth planet (maybe more) to our solar system or not. Instead it chose to demote Pluto to a dwarf planet. A name game questions begun immediately. Pluto's newly discovered companion Charon could also be a dwarf planet since the two revolve around a common center. They're technically our only double planet system.

James Christy, discover of Charon in 1978, got in naming trouble when it was realized that his wife's name was Sharon. But as the boatman of the hellish river Styx it still seemed appropriate to be by Pluto (Lord of Hell). A name chosen because it's initials PL were those of Percival Lowell who started the trans-Neptunian search.

Pluto fans, ranging from lovers of Disney's dog (named after the planet) to those who had memorized a nine planet system, were angry. Next the IAU decided Ceres, largest object in the Asteroid Belt, would be promoted to dwarf planet status. Currently being studied by the Dawn probe, it's round and planetary compared to other oddly shaped asteroids.

The IAU set out a definition of what made a planet. It has to orbit the Sun. It has to have enough mass to form a rounded shape. It has to clear the neighborhood around its orbit. The dwarf planets hadn't cleared their orbital neighborhoods.

New questions rose over what to name the Pluto sized object Mike Brown astronomers had discovered way out there. Brown had already gotten in trouble by naming a plutonian Sedna (Inuit goddess of icy seas) before the IAU had approved it. Yet he started to call the larger object Xena. This was inspired by a popular TV show "Xena: The Warrior Princess" since it suggested a search for a "planet X" like Pluto. Actually the name is a variation on Xeno which means a foreign stranger in Greek. Once discovers could freely choose their own names. Brown also suggested Lila, the prize of a complex game played by the Hindu god Brahma. But it was pointed out that his daughter's name was Lilah.

After much argument it was decided to choose a classical Greek goddess, Eris (1,445 miles in diameter). Eris is the goddess of argument and discord. It has a far out orbital period of 558 years. It has a tiny moon to be named Disnomnia (Goddess of Lawlessness). Brown had originally suggested the name "Gabrielle" after Xena's television sidekick. He noted that Disnomnia could be a reference to Lucy Lawless the actress who played Xena.

Estimates are that there are over 200 more candidates for dwarf planet in the region known as the Kuiper Belt. There are already named planetoids which could become dwarf planets. They include Sedna, and Orcus (Etruscan god of the dead) which received a Roman name because it has a resonance with Neptune like Pluto. It also has a large moon, Vanth. There's Quaoar named after the Tongva creator god. The Tongva are the natives in the local Pomona, Claremont area familiar to discoverer Brown. It has a rogue trans-Neptunian orbital period as does Ixion (a rogue figure from Greek mythology). Others include Veruna named after a Hindu deity. It has a trans-Neptunian orbit like Quaoar, Ixion and Pluto. It's an spheroid elongated by its very rapid spin, rather the way water balloons elongate when spun. It has no known moon. This group also includes Salacia, named after Neptune's wife, the goddess of salt water.

Larger than these are the five that are officially recognized as dwarf planets. They are Ceres, Pluto, and Eris but not Charon which is a moon but not a moon. The two other dwarf planets are named after non Greco-Roman gods. There is Haumea named after the Hawaiian goddess of childbirth to honor the many observatories on Mauna Kea in Hawaii. It has two Hawaiian moons, Hi'iaka and Namaka. Like Veruna it's an elongated spheroid caused by rapid rotation. Also named for an island god of the Rapa Nui on Easter Island is Makemake. It was discovered at Easter time.

There are still many questions, but the New Horizon's probe due to arrive at Pluto on July 14 should provide new answers about these remote dwarf planets.

Lee Collins

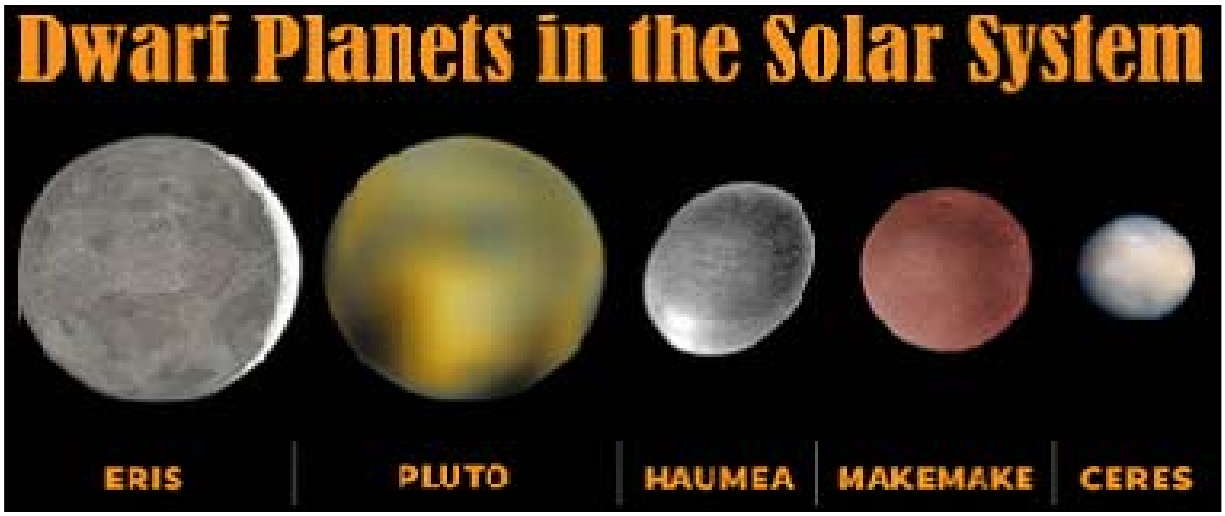

Image Source - NASA

The Space Place is a NASA educational website about space and Earth sciences and technologies. It targets upper-elementary-aged-children.

New on the Space Place Web Site: Airmoss Experiment

Space Place is pleased to announce a new way to spice up your classroom or after-school experience—the Space Place Experiment Center! Loaded with two classic bean-sprout experiments, this web app brings the excitement of the scientific method into the digital age with a framework for students to input observations and record daily changes—all online. How much water does a bean need to sprout? What happens if you try to grow a bean plant without light? Start your investigation today!

http://spaceplace.nasa.gov/experiment

PVAA POST-IT PAGE

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Welcome to new Board Member, Cori Charles and thanks to Lee Collins for his service to the Board.

Tim Thompson will speak to PVAA on June 5. The title of his talk is "Multiwavelength Astronomy: Freedom from the Tyranny of the Eye."

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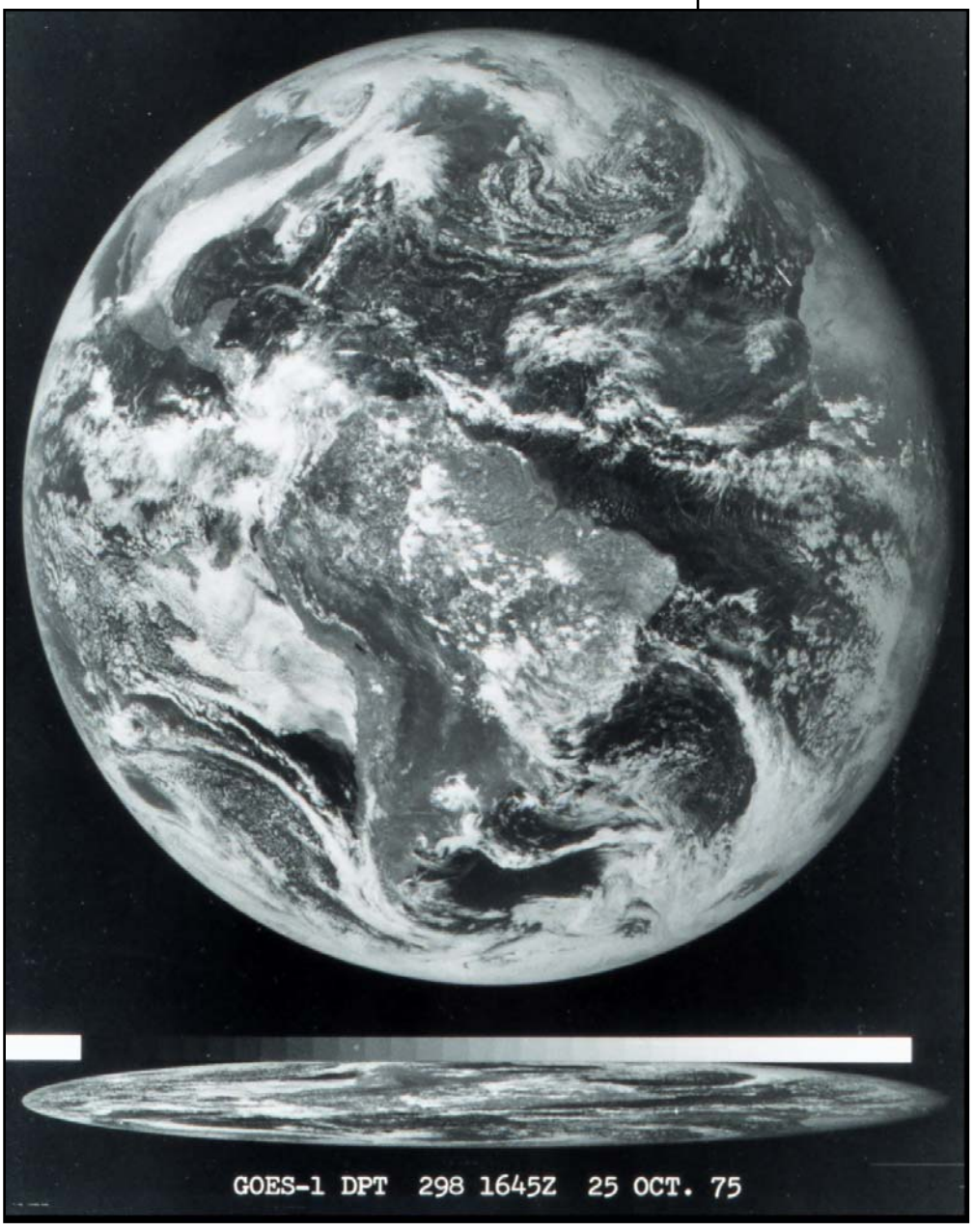
I wrote a followup to the talk I gave to your group in April. I tried autoguiding and a light pollution filter for the first time. The autoguider was mostly a success, the filter . . . well.
The article is at:
http://www.laas.org/joomlasite/index.php/dave-nakamoto-articles
I hope your will enjoy this.
Dave Nakamoto

The "G" in GOES Is What Makes It Go

Going up into space is the best way to view the universe, eliminating all the distortionary effects of weather, clouds, temperature variations and the atmosphere's airflow all in one swoop. It's also the best way, so long as you're up at high enough altitudes, to view an entire 50 percent of Earth all at once. And if you place your observatory at just the right location, you can observe the *same* hemisphere of Earth continuously, tracking the changes and behavior of our atmosphere for many years.

The trick, believe it or not, was worked out by Kepler some 400 years ago! The same scientist who discovered that planets orbit the sun in ellipses also figured out the relationship between how distant an object needs to be from a much more massive one in order to have a certain orbital period. All you need to know is the period and distance of one satellite for any given body, and you can figure out the necessary distance to have any desired period. Luckily for us, planet Earth has a natural satellite—the moon—and just from that information, we can figure out how distant an artificial satellite would need to be to have an orbital period that exactly matches the length of a day and the rotational speed of Earth. For our world, that means an orbital distance of 42,164 km (26,199 miles) from Earth's center, or 35,786 km (22,236 miles) above mean sea level.



We call that orbit *geosynchronous* or *geostationary*, meaning that a satellite at that distance always remains above the exact same location on our world. Other effects—like solar wind, radiation pressure and the moon—require onboard thrusters to maintain the satellite's precisely desired position above any given point on Earth's surface. While geostationary satellites have been in use since 1963, it was only in 1974 that the Synchronous Meteorological Satellite (SMS) program began to monitor Earth's weather with them, growing into the Geostationary Operational Environmental Satellite (GOES) program the next year. For 40 years now, GOES satellites have monitored the Earth's weather continuously, with a total of 16 satellites having been launched as part of the program. To the delight of NASA (and Ghostbusters) fans everywhere, GOES-R series will launch in 2016, with thrice the spectral information, four times the spatial resolution and five times the coverage speed of its predecessors, with many other improved capabilities. Yet it's the simplicity of gravity and the geostationary "G" in *GOES* that gives us the power to observe our hemisphere all at once, continuously, and for as long as we like!

Dr. Ethan Siegel

Image credit: National Oceanic and Atmospheric Administration, of the first image ever obtained from a GOES satellite. This image was taken from over 22,000 miles (35,000 km) above the Earth's surface on October 25, 1975.