nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Be glad of life because
it gives you the chance to look up at the stars.
Henry Van Dyke

Volume 37 Number 10 ***nightwatch*** **October 2017**

Speaker Announcement

This month's speaker is Tim Thompson of JPL, who will speak to us about cosmology as the Cosmic Microwave Background (CMB). The general meeting is at 7:30 in Shanahan B460 on the Harvey Mudd campus. I hope to see you there.

Matt Wedel

Club Events Calendar

October 6 General Meeting
October 21 Star Party - Nightfall, Anza Borrego

October 25 Board Meeting
November 3 General Meeting
November 18 Star Party - Landers GMARS

November 29 Board Meeting
December 9 Holiday Party

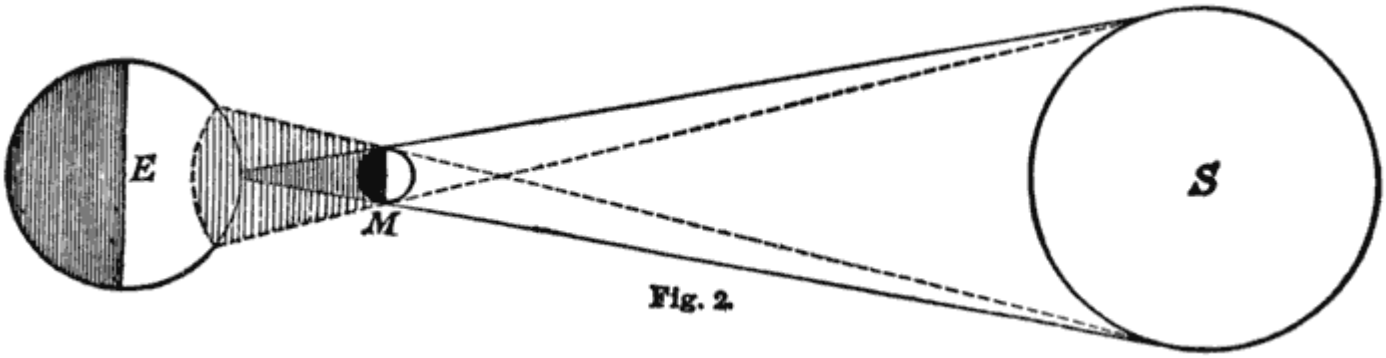


Fig. 2.

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	Howard Maculsay	909-624-1667
Treasurer	Gary Thompson	909-935-5509
VP Facilities	Jeff Felton	909-622-6726

Board

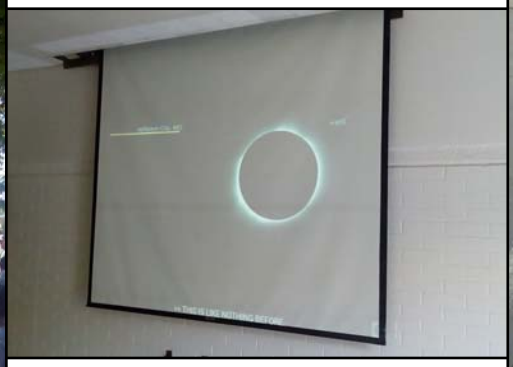
Jim Bridgewater (2018).....	909-599-7123
Richard Wismer(2018)	
Ron Hoekwater (2019).....	909-706-7453
Cori Charles (2019) …….	909-646-0275

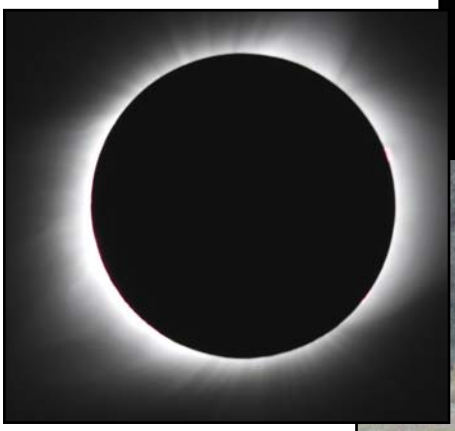
Directors

Membership / Publicity	Gary Thompson ..	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943
Nightwatch	John Stover ….....	

PVAA General Meeting 09/08/17

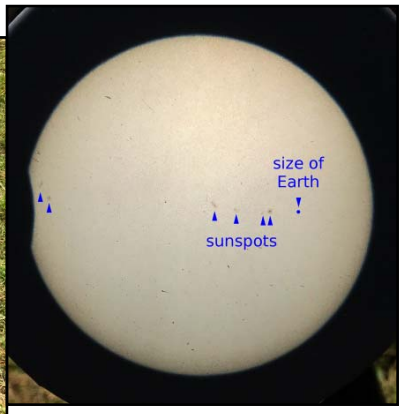
Alex McConahay's computer crashed and he could not do his presentation. Here are some pictures people shared.

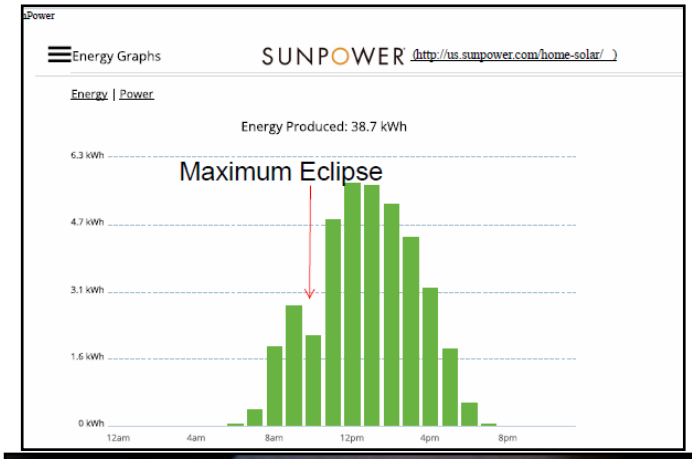



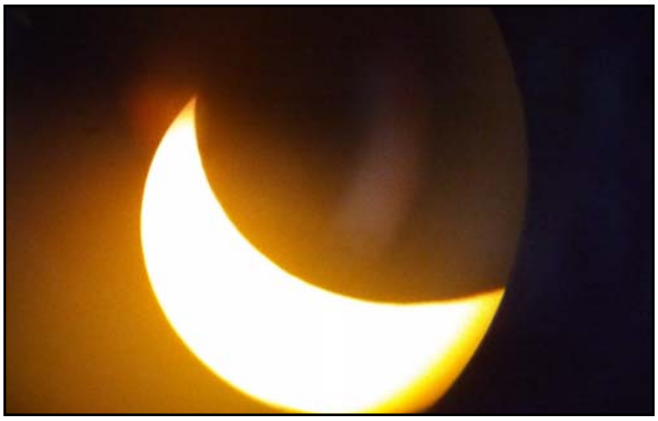



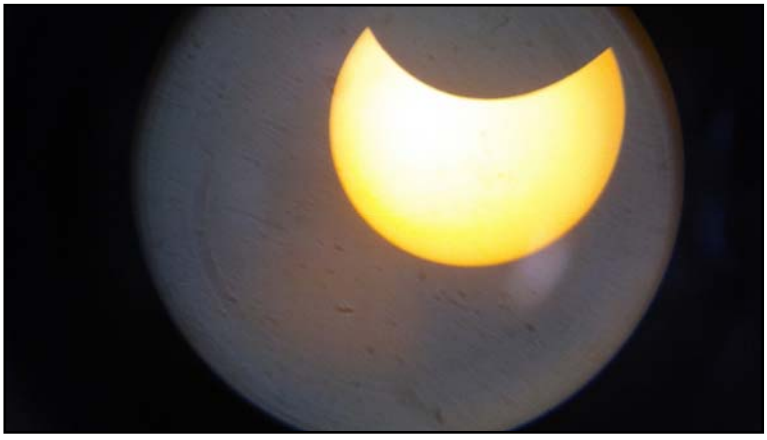





size of
Earth
sunspots


Energy Graphs
SUNPOWER
Energy | Power
Energy Produced: 38.7 kWh
Maximum Eclipse
6.3 kWh
4.7 kWh
3.1 kWh
1.6 kWh
0 kWh
12am
4am
8am
12pm
4pm
8pm





What's Up? - Cassini's Success

Lasting 20 years, the joint NASA-ESA space probe Cassini has completed a very successful outer solar system mission. Named after the 17th century Italian astronomer Jean Dominique Cassini, it carried with it a module named Huygens which landed and photographed the cloud shrouded surface of Saturn's large moon Titan. Christiaan Huygens discovered Titan in 1655. The NASA-ERA probe was launched in 1997 and made many wonderful observations until being crashed into Saturn's atmosphere this September as it ran out of fuel.

Back in the 1600's Cassini discovered Saturn's moons Rhea, Tethys, Dione, and Iapetus. He correctly commented that one half of Iapetus was white while the other half was dark. The result of surface deposits from outside sources. Cassini's Division in the ring system was first seen by him. Huygens first realized that Saturn had rings (he thought they were solid). The Cassini-Huygens probe discovered seven new moons, including small ones inside the rings which caused ripples in their orbital openings. And there were tiny moonlets that pulled icy ring particles around themselves to form propeller shaped objects. Gravity waves formed by many gaps in the rings bring forth waves and spokes in the thin ring structure. In addition there is a "ring rain" in which icy water falls down into Saturn's upper atmosphere.

Although Cassini was only the size of a school bus, the plutonium-powered probe accomplished a list of impressive discoveries in the Saturn system. Explorers had gotten a fresh look at the giant ringed planet in the 1980's as Voyager I and Voyager II rushed past. Cassini was designed to stay in planetary orbit and uncover Saturn's secrets. Saturn has always been considered secretive and beautiful ever since Galileo first looked at it with a primitive scope. He was puzzled by the blurry rings and thought Saturn either had ears or was a three planet system. Galileo had to stop looking at something he couldn't understand.

Before reaching Saturn the spacecraft flew by Jupiter and made a valuable analysis of its mysterious multicolored clouds and Great Red Spot.

But Cassini would reveal the enormous super thin rings as being many and very complex. But first it flew by and photographed an asteroid sized moon Phoebe. Here craters revealed white ice beneath the dusty surface. Next it was discovered that Saturn's cloud covered surface rotates at different speeds depending on the latitude. Also it was revealed the inner rings rotate faster than the outer rings in the system. Saturn is a fluid gas giant. Cassini was now the first spacecraft to orbit Saturn. It orbited Saturn 294 times and took 450,000 images.

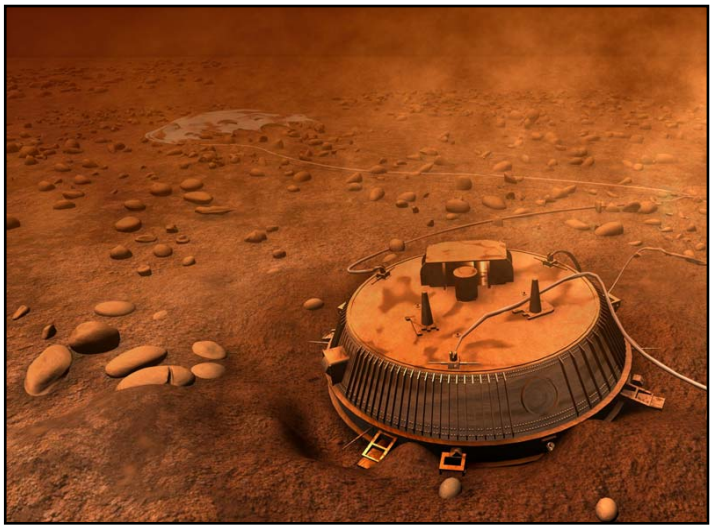
Next it flew by the large moon Titan to radar photograph its interesting Earth like surface. Titan was revealed to have volcanoes that replenish its cloudy methane atmosphere that makes liquid rains which fill its large shallow lakes. The rain is methane rather than water which would freeze at Titan's 1% of Earth's surface temperature. Huygens landed in 2005 and photographed a rocky streambed on Titan's smoggy surface before freezing up; the first landing in the outer solar system.

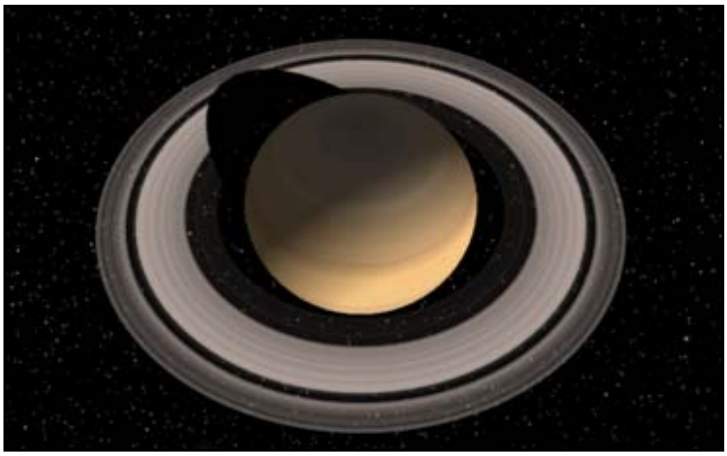
Cassini proceeded to photograph several of Saturn's moons. While passing the small icy moon Enceladus it saw that it had giant geyser plumes of ice crystals spewing out from its south pole. This material coming from a more liquid source of water beneath Enceladus' frozen surface was supplying Saturn's thin outer E ring with constant material. There are no significant craters on the moon's surface which means the surface could be constantly reformed by a thin icy atmosphere.

This discovery of this subsurface sea changed the mission into a longer period of exploration. In a close flyby Cassini analyzed Enceladus plumes to detect water, carbon dioxide, and other hydrocarbons. Enceladus seemed more likely to have microbial life than Titan.

Other mysterious moons and atmospheric storms were also looked at. There's a great polar cloud hexagon that changes color with the seasons. A small moon Hyperion looks like an odd fractured ice crystal. A moderately sized inner moon Mimas has a giant crater that makes it look like the Death Star artificial weapon from Star Wars; a meeting of fantasy and reality in an alien system that could be explored and studied for endless years.

Lee Collins





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Cassini Says Goodbye

On September 15th, the Cassini spacecraft will have its final mission. It will dive into the planet Saturn, gathering information and sending it back to Earth for as long as possible. As it dives, it will burn up in the atmosphere, much like a meteor. Cassini's original mission was supposed to last four years, but it has now been orbiting Saturn for more than 13 years!

The spacecraft has seen and discovered so many things in that time. In 2010, Cassini saw a massive storm in Saturn's northern hemisphere. During this storm, scientists learned that Saturn's atmosphere has water vapor, which rose to the surface. Cassini also looked at the giant storm at Saturn's north pole. This storm is shaped like a hexagon. NASA used pictures and other data from Cassini to learn how the storm got its six-sided shape.

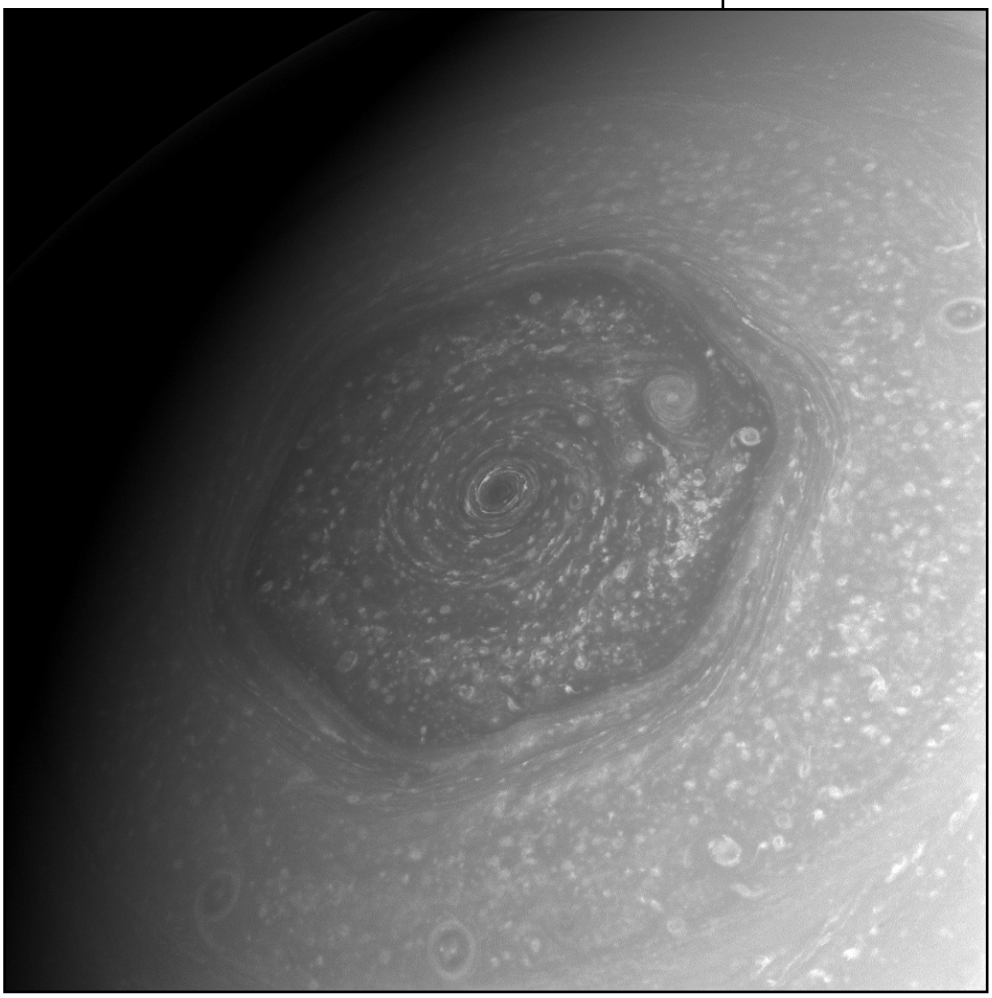
Cassini also looked at some of Saturn's moons, such as Titan and Enceladus. Titan is Saturn's largest moon. Cassini carried a lander to Titan. The lander, called Huygens, parachuted from Cassini down to the surface of the moon. It turns out, Titan is quite an exciting place! It has seas, rivers, lakes and rain. This means that in some ways, Titan's landscape looks a bit like Earth. However, its seas and rivers aren't made of water—they're made of a chemical called methane.

Cassini also helped us learn that Saturn's moon Enceladus is covered in ice. Underneath the ice is a giant liquid ocean that covers the whole moon. Tall geysers from this ocean spray out of cracks in the ice and into space, like a giant sneeze. Cassini flew through one of these geysers. We learned that the ocean is made of very salty water, along with some of the chemicals that living things need.

If there is life on Enceladus, NASA scientists don't want life from Earth getting mixed in. Tiny living things may have hitched a ride on Cassini when it left Earth. If these germs are still alive, and they land on Enceladus, they could grow and spread. We want to protect Enceladus, so that if we find life, we can be sure it didn't come from Earth. This idea is called planetary protection.

Scientists worry that when Cassini runs out of fuel, it could crash into Titan or Enceladus. So years ago, they came up with a plan to prevent that from happening. Cassini will complete its exploration by diving into Saturn—on purpose. The spacecraft will burn up and become part of the planet it explored. During its final plunge, Cassini will tell us more about Saturn's atmosphere, and protect the moons at the same time. What an exciting way to say goodbye!

Teagan Wall



Caption: This image of the hexagonal storm on Saturn's north pole was taken by Cassini in 2013. Image credit: NASA/JPL-Caltech/Space Science Institute

To learn more about Saturn, check out NASA Space Place:
https://spaceplace.nasa.gov/all-about-saturn