The Blue Moon Observer

September, 2018 Volume 20, Number 9

Door Peninsula Astronomical Society

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www.doorastronomy.org

The September general meeting will be held at 7 PM on Tuesday, September 4, at the Ray & Ruthie Stonecipher Astronomy Center. The program, from the *Great Courses Series "Dark Matter, Dark Energy: The Dark Side of the Universe"*, will be the topic "Cosmology in Einstein's Universe", introduced by John J. Beck. Gary Henkelmann will present the monthly "Learning the Night Sky" feature and will focus on the Starry Night software.

Meeting Notes from August 7

After initial announcements, Steve Ransom-Jones presented the main program on the source of weather and the source of atmospheres on Earth, Venus, and Mars. The presentation will also be submitted to the Peninsula Pulse and is also printed here by permission of the Peninsula Pulse and doorcountypulse.com.

Around four and a half billion years ago, the planets in our part of the solar system, now known as the terrestrial planets, were formed and they looked remarkably similar. Earth, Mars, Venus and Mercury all have rocky compositions, contain a variety of metals and have solid surfaces. Three of these planets, Earth, Venus and Mars followed an extremely similar path until around four billion years ago, including massive volcanic activity and the development of almost identical atmospheres deriving from the gases of these eruptions. Each still has an atmosphere circulates, and contains clouds and is energized by energy from the sun. Four billion years ago, these atmospheres were comprised almost exclusively of carbon dioxide with a little oxygen and mere traces of water vapor, ammonia, methane.

How did three similar planets with almost identical atmospheres end up so different? Let us look at some of the driving forces on our atmospheres:

1. Each body in the universe radiates heat at a wavelength that is a characteristic of its temperature. The fusion reaction in the sun causes it to radiate at a wavelength (based on its temperature) in the visible part of the spectrum. Planets will absorb some of the energy from the sun and reflect the remainder. This absorption warms a planet, causing it to radiate in the infrared part of the spectrum.
2. Certain gasses are transparent to visible light but will absorb infrared radiation. These gases, including water vapor and carbon dioxide, will absorb infrared radiation and become warmer.
3. Where the sun is directly overhead (at the equator), you can imagine a cylinder of rays warming a circle on a planet's surface. Where the cylinder of rays hit the sloped surface of the poles, the energy is spread out over a much larger area, so that there is less heating.
4. The warmer surface of the equator, combined with the heat-absorbing gasses will heat the atmosphere above the surface and

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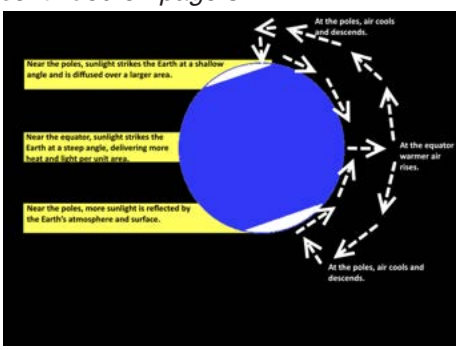

Who We Are

DPAS is a local club and chapter of the Astronomical League. We are also a club member of the International Dark-Sky Association and the Night Sky Network, teaching arm of the Astronomical Society of the Pacific. We meet on the first Tuesday of every month, with rare exception. Meetings are held at the Ray & Ruthie Stonecipher Astronomy Center unless otherwise announced. We operate and maintain the Leif Everson Observatory which houses a 14" Celestron Schmidt-Cassegrain telescope on a sophisticated tracking mount controlled by computer, and a weather station housed in the observatory. Current weather readings are shown on our web site: www.dooraastronomy.org

The StarGarden near the observatory is used for viewing the sky with unaided vision, binoculars and members' telescopes. There are also binocular mounts set in concrete which allow viewers of different heights to view the same object through the same binocular.

The Ray & Ruthie Stonecipher Astronomy Center provides for storage, projects, meetings, warm-up and toilet facilities. It also houses a StarLab, an inflatable planetarium with a sophisticated projection system. The planetarium is used for group presentations.

An Analemmatic Sundial was dedicated on October 20, 2012.

The "astronomy campus" as described here is reached by taking Utah Street east to the stop sign and turning left through the gate onto Stargazer Way. Or you can set your GPS to 2200 Utah.

Notes from Five Nights Under Dark Skies at Newport State Park, August 10-14, 2018.

Description of Viewing area at Newport State Park: Newport State Park is an International Dark Sky site. Drive to parking lot 3. A paved path goes straight down to the sand beach and another goes around the picnic area to the right. The viewing area is between the paths above the beach and is about 100 meters wide. Several flat concrete pads and picnic tables are spread about. Trees block the horizon 3/4 around but it is visible over Lake Michigan to the East.

Friday: Looked cloudy early in the evening so Tom Minahan gave a presentation "Planetary Rings" at the Nature Center to an audience of 3. It was our first night and not well advertised. Luckily the skies cleared and good viewing and dark skies ensued. Our President Gary Henkelmann and his wife Barbara changed their sailing plans to moor in Sister Bay so they could attend Friday and Saturday nights. Thanks to them for setting up at the viewing area. Thanks Claire Minahan for taxiing them over to Newport and back. Hard to tell just how many people attend these things in the dark, but there were several groups laying about on blankets. We had out mounted binoculars and a laser pointer and people just stopped by as they wandered around. Northern Door amateur astronomer James K. set up a 12-inch Dobsonian that belongs to Newport. We saw good views of nebula and clusters. Jupiter and Saturn looked great but Mars is just a bright orange ball because of a planet-wide dust storm.

Saturday: Gary H. and a new acquaintance helped Tom M. carry in and set up his new 150 mm refractor on an equatorial mount. After targeting Jupiter, Saturn and Mars as it got dark, a human "nebula finder" (didn't get his name) got the 150 aimed at several nebula. Not as good a view through a larger aperture Dobsoniam, but excellent for a smaller instrument. Several groups of blanket stargazers about, and a steady but not overwhelming flow of wanderers seeking telescopic views. Some meteors were seen. Tom handed out two dozen plus red glowsticks - to children only! Adults, get your own.

Sunday: A group of 220+ from Madison came up to Newport to view the Perseid meteor shower. Titled "Universe in the Park and Perseid Metoer Shower", a guest astronomer from UW-Madison gave an astronomy presentation at the shelter next to the viewing area. After, the group dispersed and mingled with other astronomers. Tom M. set up binoculars on a parallel mount, but found later after dark they were dripping with dew! No heater so no binocular viewing. Not a big problem - there were other, better protected instruments to look through. People stayed till near midnight.

Monday: Our culture-bridging poster "*La Luna y Las Estrellas Salen de Noche*" caught the attention of a couple from Spain and they spent an hour with us talking and looking through the 150 mm refractor. People just show up and they could be from anywhere. We used the 150 mm to bag (the core of) M51, the Spiral galaxy in Ursa Major, and the North American nebula in Cygnus. Under the dark skies here one can easily see star clusters and asterisms not normally seen with the naked eye.

Tuesday: Looked cloudy so Tom M. presented "Planetary Rings" again to a crowd that filled the Nature Center. Better advertised and we had several kids in the audience. Quick fact: the Earth at times in the past has had rings, say, after an asteroid or comet impact. They don't last long because of the gravitational disturbance of the Moon. It cleared off later but we decided to just relax at our nearby campsite. The Milky Way is brilliant there too or pretty much anywhere in the

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DPAS BOARD

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Ray Stonecipher, in spirit

Barbara Henkelmann serves as the DPAS Archivist.

The business of the DPAS is largely conducted at the Board meetings to leave the general meetings open for programs. The Board meetings are held at the Astronomy Center at 7 PM on Monday, 8 days prior to the following general meeting. Members of DPAS are invited to attend Board meetings.

Meeting Notes from page 1
cause the air to rise.

5. The cooler surface at the poles will cause the warm air to descend and cool. As a result, we have air circulation, driven by solar energy, properties of atmospheric gases and different surface temperatures.

6. Where gases condense to form ice at the cooler poles, this will cause further temperature differences as the ice will reflect more of the visible light, resulting in less heating of the surface and the formation of polar caps, reinforcing both the temperature differences and the air circulation.

7. Heating an atmosphere will cause the gas particles to move faster. Not all gas molecules will move at the same (average speed) at a given temperature but there will be a distribution around that average with some significantly faster or slower.

Now, can we use this knowledge to unravel the mystery of how three almost identical atmospheres changed so radically.

Earth and Venus have similar sizes (within 10%) and orbit the sun at comparable distances (93 million miles for the Earth and 67 million for Venus). Mars is a little more distant at 142 million miles and has about a half of Earth's diameter.

Earth

The Earth's atmosphere comprises of 78% nitrogen, 21% oxygen with some carbon dioxide, water vapor and traces of other gases. Around 4 billion years ago the Earth cooled to a point where the water vapor started to condense and it started to rain (and I mean REALLY rain!!). This deluge formed the oceans and allowed basic organic carbon chemistry and simple life to flourish. Photosynthesis increased the amount of oxygen in the atmosphere as plants converted carbon dioxide into carbon for growth and released oxygen.

As these plants died and became buried, the carbon was removed from the atmosphere (for a few billion years, at least) and converted into fossil fuels. Carbon dioxide was also locked into sedimentary rocks such as limestone absorbed by the oceans. The emergence of life actually stabilized the atmosphere into something that can sustain life.

Venus

Venus, being slightly closer to the sun than Earth, enjoyed a little more solar radiation. This differences was just enough to prevent water vapor from condensing. Water vapor, like carbon dioxide, absorbs the infrared radiation from the planet's surface, causing the temperature in the atmosphere to rise even further until a point is reached where the carbon in the rocks on the planet's surface is 'baked' out, releasing yet more carbon dioxide and accelerating the temperature rise. This 'positive feedback' has resulted in an extremely inhospitable atmosphere:

- It remains unbreathable with a composition of 96% carbon dioxide and 4% nitrogen.
- The pressure is incredibly high; on the surface a person would endure a crushing pressure 92 times what we feel when standing on the Earth (or the equivalent of diving in the ocean to a depth of 3,000 feet)

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Astronomy Quiz

1. Is Ceres a dwarf planet or an asteroid?

2. Mark each true or false.
The Higgs boson:
a) has non-zero mass
b) has spin
c) is necessary if the Standard Model of Particle Physics is valid
d) can decay into 2 bottom quarks
e) was predicted in 1964

3. Name the eight constellations bordering the constellation Draco.

Newport from page 2
Northern Door.

Big Thanks to naturalist Beth Bartoli and the staff at Newport State Park for all they do to accommodate dark-sky enthusiasts and astronomers.

Parking lot 3 and picnic and sky-viewing areas at Newport State Park.

Poetry

Pluto
BY MAGGIE DIETZ
Don't feel small. We all have
been demoted. Go on being

moon or rock or orb, buoyant
and distant, smallest craft ball

at Vanevenhoven's Hardware
spray-painted purple or day-
glow

orange for a child's elliptical vi-
sion
of fish line, cardboard and
foam.

No spacecraft has touched you,
no flesh met the luster of your

heavenly body. Little cold one,
blow
your horn. No matter what you
are

planet, and something other
than
planet, ancient but not "classi-
cal,"

the controversy over what to
call you
light-hours from your ears. On
Earth

we tend to nurture the diminu-
tive,
root for the diminished. None

of your neighbors knows your
name.
Nothing has changed. If
Charon's

not your moon, who cares? She
remains unmoved, your com-
panion.

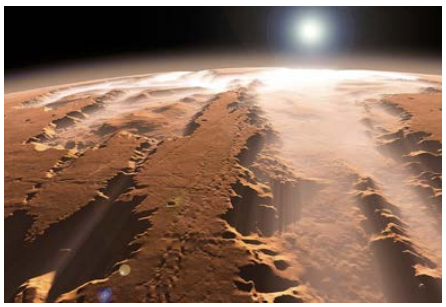
Maggie Dietz, "Pluto" from That Kind of Happy. Copyright © 2016 by The University of Chicago.

Meeting notes from page 3

- The temperature is a fairly constant 864°F, hotter than the surface of Mercury and high enough to melt lead.
- Venus does enjoy clouds, but these are made of sulphur dioxide or sulphuric acid as water does not exist on this planet.
- The winds are also pretty strong, at 185mph, encircling the planet every 4 days.

Mars

Mars has a much lower surface gravity (38% of the Earth) and enjoys only a quarter of the solar radiation. The lower gravity (lower escape velocity) has allowed, over a period of billions of years, much more of the atmosphere to escape into space (see observation 7 above).
While we see evidence of oceans covering almost a third of the surface, most of the water has condensed into the planet. We have now discovered that subterranean caches of brine probably exist under the poles. Some of the carbon dioxide has bound into rocks. With the removal of water vapour and carbon dioxide, the atmosphere absorbs much less infrared radiation, accelerating the cooling process (almost opposite to what we see on Venus).



The Martian poles comprise of solid carbon dioxide and a little water-ice. Each Martian year, as spring arrives, the polar caps evaporate, exposing the dust of the Martian surface under them. With an atmospheric pressure 1% of the Earth, the heating effect on the atmosphere is amplified (less radiation heating much, much, much less atmosphere, but with more carbon dioxide released from the poles) and strong winds result. These winds lift the exposed dust into the atmosphere, allowing the dust to absorb more solar radiation, accelerating the winds. The result is huge dust storms; the storm that started in June this year covered a quarter of the planet's surface. In the autumn, cooling causes the carbon dioxide to return to the polar caps in solid form and for a much calmer winter.
Our experience on Mars would be of a thin, cold (-195°F - +70°F range), dusty, carbon dioxide-based environment.

Conclusion

What we experience in our solar system is a form of the "Golilocks" effect with conditions on Earth allowing life to appear and that life sustaining those conditions. On Mars and Venus, positive feedback has caused the same original atmospheres to evolve in very different ways.
The lessons that we have learned from our own solar system allow us to understand, for a given stellar radiation, what types (size and orbits) of planets may be able to sustain life as we know it. This will help us to understand which of the newly discovered exoplanets may be of most interest to study.

As a footnote, unfortunately, Mercury, being significantly closer to the sun and having a much lower mass, did not evolve a significant atmosphere.

After refreshments provided by John J. Beck consisting of stuffed jalapeño chilis. taquitos and beverages, Steve once again had the floor for his presentation for Learning the Night Sky monthly series:

As we look to the north in the summer evenings, towards the horizon from the (by now) familiar "W" of Cassiopeia, we see the shape of Perseus, legendary slayer of the
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Astronomy Quiz Answers

1. Ceres is listed both as a dwarf planet and as an asteroid. It is the largest asteroid in the asteroid belt and its mass constitutes about 1/4 the mass of the entire asteroid belt.

2. a) True. The Higgs boson, has non-zero mass.
b) False. The Higgs boson has zero spin.
c) Essentially true. The standard model predicts the Higgs boson and the Higgs field.
d) Standard theory predicts that the Higgs boson decays into two bottom quarks or b quarks 60% of the time, the rest decay into pairs photons, tau leptons, W and Z bosons.
e) True. Higgs and others developed the theory of the mechanism and particle by 1964.

3. Draco is bordered by Boötes, Hercules, Lyra, Cygnus, Cepheus, Ursa Minor, Camelopardalus, and Ursa Major.

Viewing Nights 2018

September 8
October 6
November 10
December 8

New Members

Welcome:
David and Christina Ott

Meeting notes from page 5

Gorgon Medusa.
Perseus is the origin point of the summer Perseid meteor shower that has been witnessed for over 2,000 years, lasting from mid-July until late August with peak activity between the 9th and 14th of August.

To an observer, Perseus contains some deep sky objects as well as some colourful bright stars. M38 is a relatively bright open star cluster, just to the East of the main asterism and M76, the "Little Dumbbell Nebula" is a planetary nebula a little to the East of Perseus' head. With a telescope Perseus has a number of bright giant and supergiant stars that include yellow orange, red and blue-white. It also contains three binary and four systems that contain three or more stars.
Moving to the east of Cassiopeia look for a distinctive pattern of four stars that for the "Great Square of Pegasus". From this square, it is possible to imagine the shape of a horse formed by trails of stars leading upwards from the top right corner (the head), from the top left corner (the front legs) and from the bottom left corner (the rear legs).
As our eyes follow the rear legs back towards Cassiopeia we may be lucky enough to see, quite possibly with the aid of some binoculars, a faint smear. This is Andromeda, our nearest neighboring galaxy and one that is heading towards us 68 miles per second. The collision with our galaxy will take place in 4 billion years' time. Even with a small telescope, the shape of Andromeda may be discerned. Patient photographers have been able to take pictures that show the shape of the galaxy, the spiral arms and even its companions with a telephoto lens combined with good tracking and (or) stacking multiple exposures.

Andromeda has a halo of gas and stars as well as a companion galaxy, M32. M32 was considered a bit of an anomaly, as it appeared to have an elliptical shape, indicating it was an old galaxy, yet had significant star formation activity, something that we associate with much newer galaxies. In the last month, the University of Michigan published research that supports the ideas that the predecessor of M32 (designated M32P) collided with Andromeda causing the formation of the halo and the unusual properties of this collision remnant.