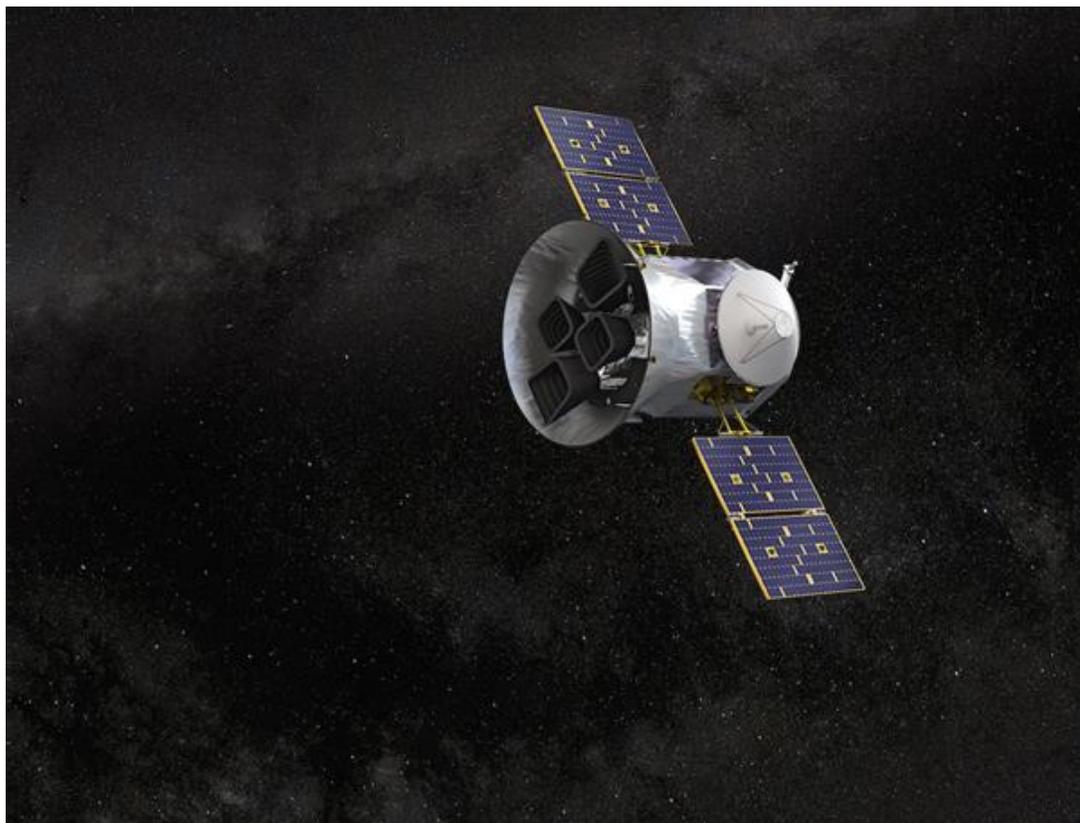


TESS: The Transiting Exoplanet Survey Satellite



The Transiting Exoplanet Survey Satellite (TESS) uses four identical CCD cameras to methodically search nearly the entire sky for exoplanets circling bright, nearby stars. Its data are released to the public with no proprietary period, opening up the field of exoplanet discovery to anyone with an internet connection..

Photo Courtesy: NASA's Goddard Space Flight Center

Inside this Issue...

- 2 – Koch Immersive Theater and Planetarium Update by Mitch Luman
- 3 – Local Events and information
- 4 – News around the Globe
- 5 – Clyde Tombaugh by Mitch Luman
- 6 – Calendar
- 7 – EAS Business

The EAS newsletter, Observer, is published monthly. Anyone wishing to contribute articles or photos may mail them to the club's PO Box: EAS, PO Box 3474, Evansville, IN 47733, or e-mail them to the editor at:

dasiceman@yahoo.com

Koch Immersive Theater and Planetarium Update by: Mitch Luman

The Koch Immersive Theater and Planetarium at the Evansville Museum is open and presenting programs Thursday-Sunday each week. Evansville and the surrounding area are fortunate to have a planetarium so close and within driving distance. Planetariums are theaters devoted to education and entertainment in astronomy and space science. The 40-foot hemispheric dome at the Evansville Museum specializes in programs depicting the stars, planets, and other celestial objects and the presentation of giant screen movie, all on the largest projection screen around. You would have to travel to Louisville, St. Louis, Muncie, or Land Between the Lakes in Kentucky for a similar experience. The specialized theater utilizes an advance ion air filtration system adheres of Cinema Safe guidelines of the American Theater Association.

In addition to its astronomy-oriented *Skies Over Evansville* program, which it presents on Saturdays at 2:00 PM and *Solar System Tour*, which is presented Sundays at 2:00 PM, the theater is offering two NEW films in September!

Touch the Stars

Showtimes: Thursday & Friday at 1 PM and Saturday and Sunday at 1 PM and 4 PM.

Touch the Stars centers on humankind's probes used in exploration of our solar system and the galaxy beyond. The film traces the path to space through the history of NASA's probes, orbiters, and landers, from the heart of our solar system to the surface of the other planets and moons, to the grand tour of the Voyager spacecraft through the outer planets and beyond. Created with the latest imagery and scientific data *Touch the Stars* uses inspiring real footage and threedimensional vistas of our solar system and interstellar space to transport audiences to planets and distant stars alongside these intrepid robot explorers. This is an uplifting program that you won't want to miss

Birth of Planet Earth

Showtimes: Thursday - Sunday at 3PM.

Scientists now believe that our galaxy is filled with solar systems, including up to a billion planets roughly the size of our own. The film employs advanced, data driven, cinematic-quality visualizations to explore some of the greatest questions in science today: How did Earth become a living planet in the wake of our solar system's violent birth? What does its history tell us about our chances of finding other worlds that are truly Earth-like? This program is narrated by Richard Dormer from the HBO television series *Game of Thrones*.

More information and tickets or on its website, emusuem.org

The **Evansville Astronomical Society (EAS)** is a non-profit organization fully incorporated in the state of Indiana. It has, as its primary goal, the advancement of amateur astronomy. Founded in 1952, the society seeks to:

- 1... maintain adequate facilities for its members and the public in order to extensively study the skies and
- 2... promote an educational program for those who wish to learn more about the science of Astronomy.

Meetings are held the third Friday of each month, except June, when the annual EAS picnic is held. The society also sponsors monthly Open House events during the warmer seasons that afford the public an opportunity to tour the observatory.

EAS 2021 Officers and Contacts

President – Tony Bryan
812.827.3234

evansvilleastro@gmail.com

Vice President – Scott Conner

Secretary – Dave Kube
740.223.6854

Treasurer – Amy Barrett

Counselors
Ken Harris (2019)
Mitch Luman (2020)
Michael Borman (2021)

Webmaster – Michael Borman

Program Director
Chuck Allen

Newsletter editor – Dave Kube
dasiceman@yahoo.com

For more information about the EAS or directions to the Observatory, please visit the club's web page:

www.evansvilleastro.org



Local Events and Information

EAS Update

Please Note: Currently, at the time of this printing, I have no information about the September 17th, 2021 meeting. Please view the Facebook Group Page and the EAS website for updates.

EAS Update

Please note that currently all public meetings have been canceled and therefore we are trying to meet via online Zoom Meeting until further notice.

EAS Update

EAS Update

EAS Update

EAS Update

EAS Update:

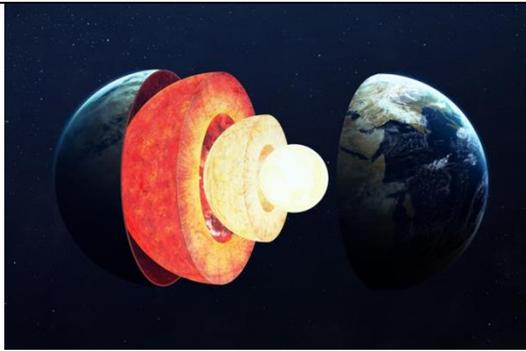
Please visit our website www.evansvilleastro.org and our Facebook Group page to keep yourself up to date for any changes.

FOR SALE:

Telescopes and accessories for sale...

As mentioned in last month's issue, Mike Borman still has some excellent telescope equipment and imaging accessories for sale. Some of the gear has already been sold. If interested, go to Mike's web page. Here is the link: <http://www.mborman.org/forsale.htm>

Earth's Inner Core is Growing Lopsided.



A geological mystery is unfolding far beneath our feet, and it may shed light on the life-sustaining magnetic field that extends far above our heads.

Credit: Vadim Sadovski/Shutterstock

Each year, the solid-iron inner core at the heart of our planet expands by about a millimeter as the Earth's nether regions cool and solidifies. According to a recent study, one side appears to be growing faster — but scientists don't know why.

This phenomenon likely dates back to the inner core's creation, between 1.5 billion and half a billion years ago. At this point, after billions of years of cooling, the Earth's fiery interior finally lost enough heat to begin an ongoing process of crystallization. Now, as the outer core's molten iron loses heat, it crystallizes to become the newest layer of the inner core .

The center of this hyperactive hemisphere lies 1,800 miles (2,896 kilometers) under Indonesia's Banda Sea: About 60 percent more iron crystals form at that point on the inner core than on the other side of the world.

Today, the inner core boasts a radius of about 750 miles (1,207 km) — not to mention a scorching temperature of more than 9,000 degrees Fahrenheit (4,982 degrees Celsius). Yet even after an eon of lopsided growth, it hasn't actually deformed. Gravity acts constantly to mold it, redistributing the excess in the east and maintaining a spherical shape. Besides posing a captivating puzzle, this asymmetrical growth may help power the Earth's magnetic field (and enable our survival).

Why Cosmic Radiation could Foil Plans for Farming on Mars.



New research suggests gamma rays stunt plant growth.

Credit: SergeyDV via Shutterstock.

What would it take for humans to live on Mars? The first step is to successfully get people to the red planet. Once there, the astronauts would face a task that could be even more difficult: figuring out how to survive in an environment that is vastly different from Earth's. Earth's plants don't grow as well, when exposed to the level of radiation expected on Mars .

Wieger Wamelink, an ecologist at Wageningen University in the Netherlands who describes himself as a space farmer, has been frustrated by sci-fi depictions of growing plants on Mars. "What you often see is that they do it in a greenhouse," he said, "but that doesn't block the cosmic radiation."

Wamelink and his team had to recreate the cosmic radiation. The team settled on using gamma rays generated by radioactive cobalt, even though the actual cosmic radiation that bombards Mars' surface consists of various types of radiation, including alpha and beta particles .

The team grew rye and garden cress in two groups: one with typical growing conditions and the other had similar conditions but added gamma radiation. Four weeks after germination, the scientists compared the two groups and saw that the leaves of the group exposed to gamma rays had abnormal shapes and colors. The weights of the plants also differed; the rye plants in the gamma-ray group weighed 48% less than the regular group, and the weight of the garden cress exposed to gamma rays was 32% lower than their unblasted counterparts.

Clyde Tombaugh- Famous Astronomer of the 20th Century by: Mitch Luman

Clyde Tombaugh--one of the greatest visual astronomers of all time--was the discoverer of the dwarf planet Pluto. This one and only discovery of a planet during the last century (dwarf or otherwise) took place on February 18th, 1930. The announcement was made from the Lowell Observatory located just outside Flagstaff, Arizona.

How Clyde Tombaugh became the discoverer of this famed object is the stuff of legend. Born on a Kansas farm, the young Tombaugh was already a skilled amateur astronomer prior to being hired by the Lowell Observatory to conduct a search for a suspected object beyond the orbit of Neptune. Using a telescope, a wide-angle camera and black and white photographic plates Tombaugh took hundreds of images near the path in the sky where a suspected planet might be found.

After producing identical sets of photographic plates of the sky taken days apart, Tombaugh used an optical-mechanical device called a Blink Comparator to visually compare each plate to tease out any candidates. When he shifted views between his two images, any moving object, such as a planet, would appear to jump from one position to another, while the more distant objects such as stars, would appear stationary. After searching through countless star fields and enduring many false alarms over a period of over a year, an object was finally discovered that had every indication of being a distant object beyond the orbit of Neptune. After careful confirmation by other astronomers, the 9th planet in the Solar System, which would be dubbed Pluto, was announced to the world.

Beginning in the 1990s, Pluto's status as a planet was beginning to be questioned following the discovery of other objects of similar size located in a region beyond the orbit of Neptune known as the Kuiper Belt. This led the International Astronomical Union (IAU) to formally define the term "planet"—excluding Pluto and reclassifying it as a dwarf planet (minor planet designation: 134340 Pluto) in 2006. Subsequent observations have shown that Pluto has five known moons: Charon , Styx, Nix, Kerberos, and Hydra. The New Horizons spacecraft performed a flyby of Pluto on July 14, 2015, becoming the first and, to date, only spacecraft to do so.

Clyde Tombaugh died in 1997. Tombaugh Region, the largest, bright surface feature on the surface of Pluto is named in his honor.



September 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Generated by FreeHTMLCalendar.com Copyright © 2011 John Dalbey.

Up and Coming Events 2021

EAS Meetings and Events are currently on hold or cancelled due to the current COVID-19 situation.

Please note I do not have any meeting info regarding September 17th, 2021 meeting.

Please visit our Web Page <http://www.evansvilleastro.org> for updates.

Please visit our Facebook Group Page for updates.

Moon Phases

New Moon	First Quarter	Full Moon	Third Quarter
October 6 th , 2021	October 12 th , 2021	October 20 th , 2021	October 28 th , 2021

[Moon Phases courtesy of Time and Date.com](https://www.timeanddate.com)

EAS Unofficial Meeting Notes for August – 2021

The EAS had no official meeting for the month of August 2021.

Instead of our regular zoom meeting, we were all invited to take part in the Astronomical League's three day event ALCon '21.

The event was accessed online via zoom and took place on Thursday August 19th, Friday August 20th and Saturday August 21st, 2021. There were 2 sessions each day and included many guest speakers from around the globe. There was something for everyone.

I was lucky enough to take part in some of all three days and enjoyed every minute.

Respectfully Submitted – Dave Kube – Secretary