The Mason-Dixon Astronomer

Westminster Astronomical Society Inc. of Maryland

June 2012 Vol. 29 No. 6

www.westminsterastro.org

Star Points for June 2012

"Venus to Transit Sun"

by Curtis Roelle

In This Issue:

Pages 1 & 3
Star Points

Pages 2 & 4
President's Message

Page 5
Upcoming Events

Pages 6-9
Message from Observing Chair/ Second VP

Pages 10-11
NASA's Space Place

June 5 will be your last chance for over a century to see a transit of Venus. Read on to find out where you can go and how to safely view this rare phenomenon.

The 20th century may have had two world wars and a cold war, but it didn't have any transits of Venus. The next Venus transit doesn't occur until the year 2117 — 105 years from now.

Transits of Venus occur in pairs with the most recent in 2004 — the earlier one in the pair that includes this year's. Yet prior to 2004, the last transit was in 1882 when Chester Arthur was our president. I think it is safe to assume that at the time of the 2004 event, there was not a living soul on Earth who had previously seen a transit of Venus.

Perhaps you're wondering what a transit of Venus is. It happens when the Sun, Venus, and Earth line up in such a way that we view the tiny dark shadowed disk of Venus crossing the larger and intensely bright disk of the Sun. I will give the starting and ending times for the event later. But first I want to tell you where you can go to see it with your own eyes, weather permitting.

When considering viewing the Sun extreme care must be taken. It is a dangerous proposition without proper precautions and safe reliable equipment. This is where members of Westminster's own astronomy club are ready to step in and help. The Westminster Astronomical Society will have telescopes equipped for safe solar viewing set up at several different locations.

On Tuesday, June 5, you can go to any of the following Carroll County Public Library branches: North Carroll, Finksburg, Taneytown, Eldersburg, Westminster, and Mt. Airy. The telescopes will be set up by 5 p.m., weather permitting.

(*continued on page 3)*

June Meeting: Wednesday, June 13, 2012, 7:30 p.m., at Bear Branch Nature Center

Speaker: Mark "Indy" Kochte of JHU APL will present the latest results from NASA's MESSENGER mission to Mercury. (More information is on page 4.) Please join our speaker for dinner before the meeting at 6 p.m. at Harry's in Westminster.

President's Message

by Jim Reynolds

Greetings all!

Three cheers for the warmer weather! No more frozen feet & numb fingers. While the winter sky is preferred by many, the summer nights have their own beauty to offer.

Since our last meeting the evenings I have been out viewing have been, for the most part, showing my friends and neighbors Saturn & other celestial jewels. It's great to see Antares at a reasonable time of the night this time of year. I've been teasing my Pittsburgh Steelers fans that the Ravens have their own constellation (Corvus), but the gods in their infinite wisdom did not favor the Steelers with recognition. Here's a fun game — try and match up as many constellations with NFL or other sports teams' names & logos.

"I think I finally spotted a star between the spy satellites."

I'm itching to go camping in an area that has better viewing conditions than what we have here in Carroll County. If anyone is interested in getting a weekend camping trip together, let me know. Perhaps someplace in eastern West Virginia or southern Pennsylvania? I'm open to suggestions.

I'm not sure if everyone's aware of it but our Webmaster and Planetarium Director, Brian Eney, is on his way out to California for his internship with the Stratospheric Observatory for Infrared Astronomy (SOFIA). I am sure that everyone wishes Brian the best of luck and lots of wonderful adventures on the other coast. If you are interested in learning more about SOFIA, you can read more about it here:

http://www.sofia.usra.edu/Sofia/telescope/sofia_tele.html
&
http://www.nasa.gov/mission_pages/SOFIA/index.html

(continued on page 4)

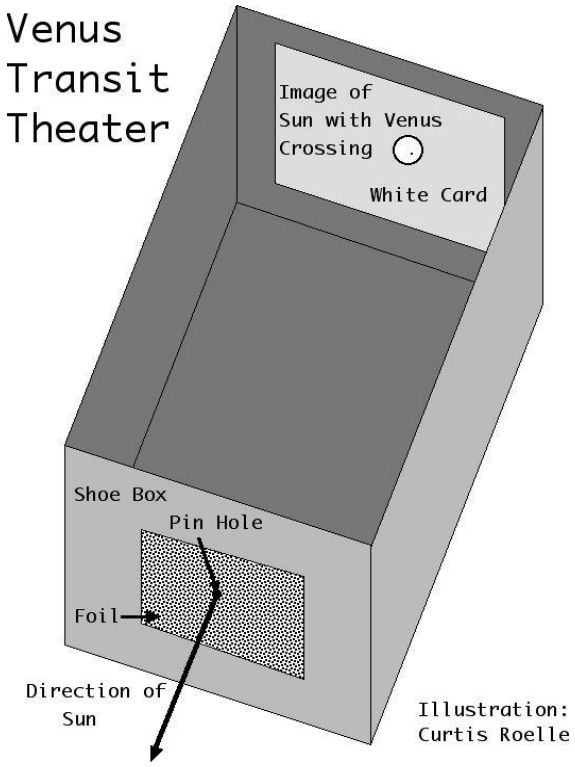
Star Points, *cont.*

As for the transit event, the show begins at 6:04 p.m. as the disks of Venus and the Sun appear to touch. A few minutes later a tiny black notch may be visible along the Sun's edge. By 6:21 p.m. Venus' dark disk will be entirely contained within the Sun's own disk. The Sun and Venus will not be actually touching each other. Venus will be about 67 million miles from the Sun, and Earth another 27 million miles from Venus. The circular black dot of Venus drifts slowly across the Sun, and the transit will still be in progress when the Sun sets at 8:32 p.m. EDT.

But what if you cannot make it to any of the library events? Can you watch from home or wherever you happen to be? Yes, you can. You can make a Venus transit theater like the one pictured in the illustration on the right.

Construction is very simple. All you need is 1) an old shoe box, 2) aluminum foil, 3) clear tape, 4) a white card or piece of paper, 5) scissors, and 6) a straight pin.

Cut a hole in one end of the box and cut a piece of aluminum foil big enough to cover the hole. Next, tape the aluminum foil on the inside of the box covering the hole. While you have the tape out, tape a white card or piece of paper inside the box at the opposite end from the foil. Now, with your straight pin carefully make a very small hole in the aluminum foil. Your theater is ready to use.



Here are directions for using it during the transit. 1) Turn your back toward the Sun. 2) Hold the box near your side at waist level with the Sun shining on the outside of the box where the foil is mounted. 3) Turn and tilt box until a pinhole-projected solar image appears on the white card. 4) Look for a tiny black dot on the Sun's projected image. That tiny dot is a planet about the size of Earth.

"Star Points" by Curtis Roelle appears in the Carroll County Times *on the first Sunday of each month. Visit the website at* http://www.starpoints.org or send email to StarPoints@gmail.com.

President's Message continued

As you know by now, the Venus Transit is taking place on June 5, 2012. Bob Clark, Skip Bird, and many other folks have really gone above and beyond the call of duty in their tireless efforts to spread the word. WASI will have a presence at several Carroll County libraries — Westminster, Taneytown, Eldersburg, Finksburg, Mt. Airy, and North Carroll.

The Towson University Project ASTRO workshop was held on May 25th, and WASI was well represented for a 5th year. Skip Bird, Christian Ready, and Jim Reynolds are all volunteering again this year. WASI has many opportunities for public outreach. Please let Wayne Bird or any of the other officers know if you have any spare time to lend a hand.

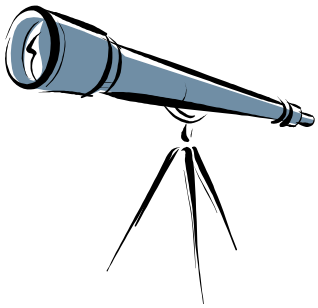
I've been taking advantage of the warmer weather and working on my observation logs. I hope everyone has the chance to get out and enjoy the wonderful summertime celestial wonders that the night sky has to offer (and the daytime for our solar-viewing friends).

Clear skies!
Jim Reynolds

JUNE MEETING'S SPEAKER

Born and raised in northeast Ohio, Mark "Indy" Kochte received a degree in astronomy from the Ohio State University in 1987. In 1988 he joined the Hubble Space Telescope project at the Space Telescope Science Institute in Baltimore, doing the acquisition, processing, and archiving of Hubble data. During his tenure on the mission he was afforded the opportunity to do some research in the studies of extrasolar planets and helped define the evidence of an atmosphere around the planet HD 209458b. He also was heavily involved in the grassroots project UMBRAS, a spacecraft design that would enable space telescopes to actually visually detect extrasolar planets the size of Jupiter or Saturn. After 17 years with Hubble he moved on to the Far Ultraviolet Spectroscopic Explorer project (FUSE) as a Mission Planner, taking on the immense challenges of how to deal with a satellite that has only one remaining reaction wheel. In the fall of 2006 he was offered the opportunity to join the MESSENGER team at the Johns Hopkins University Applied Physics Lab as a Payload Operations Specialist for the Mercury Atmospheric and Surface Composition Spectrometer instrument (MASCS). Here he supported two successful flybys of Venus and three exciting flybys of Mercury during the Cruise Operations of the spacecraft. In March 2011 he and the rest of the team transitioned to Mercury Orbital Operations when MESSENGER became the first ever spacecraft to orbit the planet Mercury. Since then he has been buried in the daily operations of monitoring the health and safety of MASCS, as well as scheduling several million spectra observations with it for the science team, observations designed to probe the tenuous exosphere around Mercury as well as divine the elements that make up the surface of this little planet. Throughout his tenure in space mission operations he has published a half a dozen papers on space mission design and mission operations, as well as co-authored a half a dozen additional papers on space mission design and science analysis results.

Upcoming WASI Observing and Events



Venus Transit June 5, 5:30 p.m., Westminster, Taneytown, Eldersburg, Finksburg, Mt. Airy, and North Carroll public libraries

Soldiers Delight Public Stargazing June 9, 8 p.m., at Soldiers Delight Natural Environment Area in Owings Mills

Monthly Meeting June 13, 7:30 p.m., at Bear Branch Nature Center (BBNC)

Cherry Springs Star Party June 14-17, at Cherry Springs State Park in Pennsylvania; for more information, visit http://www.cherrysprings.org/

Become a Pilot Family Day & Aviation Display June 16, 10 a.m. to 3 p.m. at National Air & Space Museum's Udvar-Hazy Center in Chantilly, Virginia; for more information ask Skip Bird or visit http://becomeapilot.si.edu/

Green Bank Star Quest IX June 20-23, in Green Bank, West Virginia; for more information, visit http://www.greenbankstarquest.org/

Planetarium Show June 23, 7:30 p.m., at BBNC

Message from Observing & Science Chair and 2nd VP, Tom Lipka

Fellow Astronomers,

While circumstances beyond my control have conspired to prevent me from communicating with you via last month's newsletter as well as from not being able to attend last month's meeting, I was not totally out of the loop. In fact, it was refreshing to see that the momentum that we started for club in-reach has borne fruit and only after a couple of meetings! We have created a positive feedback loop that with each iteration is bringing more and more members into the mix. More members are stepping up and taking active roles, contributing of their time, experiences, and expertise to the benefit and edification of all! Club in-reach is well on its way to reaching par with WASI's renowned outreach branch, creating a more vibrant and healthy astronomy club! My compliments and thanks to all have helped to make it so! Let us keep up the good work.

An exemplar of the aforementioned, active member **Tony Falletta**, following on the heels of a recent meeting that featured a visit by Dr. Michelle Thaller of Goddard, acted upon Dr. Thaller's offer of reciprocity and brokered a visit by a modest group of WASI members and their guests to tour the Goddard facility in May. As most by now are well aware, the Yahoo Groups (YG) list was abuzz with activity with chatter in both preparations leading up to as well as reports subsequent to their visit. I leave it to Tony and those who accompanied him to provide a more comprehensive presentation or two relating their experiences. Thanks Tony for setting the visit up! Tony is also taking on some the responsibility regarding the club's wares on ***Café Press's*** website. Please support Tony's efforts, and by extension WASI, by not only visiting often but also by purchasing something as often as possible!

Following on the heels of the Goddard tour came the annular eclipse of May 20. While we on the east coast were left out of the shadow, a few members sought other means with which to observe this rare event. Take for example, emeritus member and member of the Board of Directors (BOD) Curt Roelle, who had the fortunate happenstance of having to "work" out west during the period of the eclipse and who was able at least to be in an area where partiality was visible. That was the Yin of his experience. The Yang of the encounter came at an unanticipated price to him personally that Curt has already shared with the assembled mind on YG. No doubt Curt will give us the full story at an upcoming presentation. On a similar note, by the time this missive reaches you a lunar eclipse will also have occurred that once again precludes our being able to observe it here in the east!

Likewise another event that will have taken place by the time this installment of our newsletter reaches you is arguably the paramount event of 2012 and possibly of most of our lifetimes: the Transit of Venus (ToV)! So now, the focus of discussion subsequent to this once in every ~5- to 6-score event by now will have shifted to tales of successful as well as failed observation attempts along with stories of trips to "exotic lands" — many of which (I hope) will be fodder for future meeting talks! I also understand based on internet traffic on YG that another subset of the membership had planned to travel, mostly individually in this case, to distant locales in an attempt to trump the typically unfavorable and frustrating weather that often plagues the "Free State." If nothing else the individual exploits of those who try should provide for additional opportunities for both documenting this event for posterity as well as to regale the club.

On a similar note, a dedicated cadre of WASI members too are staying local and, led by outreach guru extraordinaire and club treasurer Skip Bird, will have dispersed to public venues throughout Carroll County in order to exemplify this once-in-a-multigenerational event to the public and to hopefully recruit new members in the process. Furthermore, it must be pointed out however that, regardless of outcome, this aspect of the ToV event would not have realized its full potential for the hoped-for putative successes and aforementioned benefits had it not been for dedicated efforts of another active WASI member and future emeritus himself, **Bob Clark!**

Together with his son who produced the posters and press releases advertising the event and WASI's involvement in same, this father-son duo is likewise responsible for much of the legwork in dispersing our message to the community. Thus, regardless of whether or not the weather has cooperated for "us locals" or for everyone for that matter, ***a hell of a lot of work and club energy*** was expended by Bob and son in the effort! Major kudos and commendations are due to these folks. On a side note, as of this writing, our friend Bob Clark has experienced a series of serious health issues that have sidelined this venerable seasoned citizen! The prayers of my family and I go out to Bob for a full and speedy recovery, and I dare say that I can speak for the entire membership in extending the prayers of the entire membership in this regard! Please also, drop Bob a note or call to wish him well!

Returning to science and observational astronomy.

An interesting occultation event of note takes place the evening before our June meeting. Late on the evening of the 12th and just after midnight of June 13th, the Minor Planet Center (MPC) "asteroid" number 134340, **a.k.a. Pluto,** currently at 14th magnitude, will have occulted a similarly dim star in Sagittarius, followed an hour or so later by another occultation by Pluto's moon Nix of the same star!

Aside from the fact that this is a small (~1"), dim, and difficult target for most of us, why is this important? Why should you care? As most already know by now, the New Horizons probe, currently between the orbits of Uranus and Neptune, is speeding out for a planned rendezvous with the Pluto system with the intention of reaching this world before the atmosphere freezes out. Nevertheless, with an average temperature of around ~50 K (or more than -360 F) freezing is a relative thing! Pluto, like all planets, has seasons, too, but seasons with much more extremes of temperature and atmospheric chemistry than anything on Earth. So seasonality does come into play, even over 3 billion miles from the Sun by virtue of the fact that even at these temperatures, there are compounds that can exist as a gas, solid, and liquid even at these extremely low temperatures!

Take for example the ethane lakes of Titan! On Titan, this hydrocarbon apparently exists near its triple point, much as water does here on Earth. Evidence for a hydrologic cycle on the giant moon abound and are indicated by vast drainage channels suggesting liquid ethane and similar hydrocarbon rains in sufficient levels to form these and delta-like structures, which empty into these vast lakes. Titan, too, has seasons as evidenced by the observed disappearance (evaporation) of one of these lakes during the time since the Cassini probe has been watching!

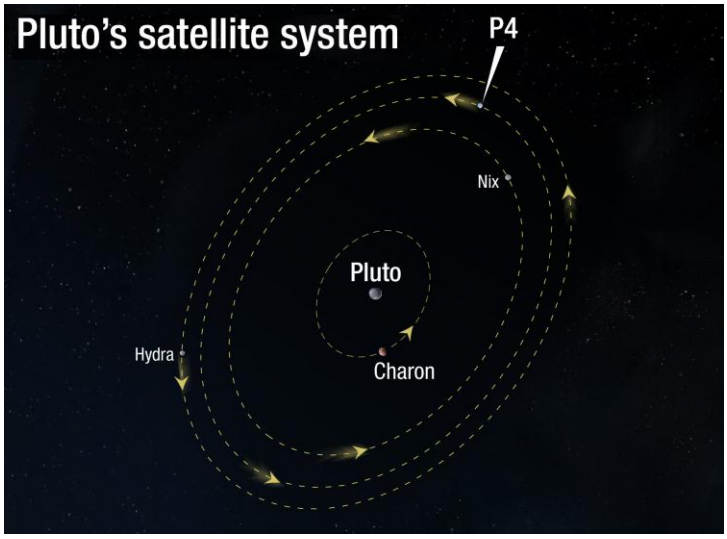
Message from Observing & Science Chair continued

Therefore elemental gases, such as nitrogen, and organic compounds, such as methane and carbon monoxide, that are known to exists on Pluto will behave similarly and differentially existing either as gases, sublimating from ices during summer months (actually years in Earth time) and depositing again as ices during winter. In the case of the former, gases are much more easily detected. In the latter case, when they "freeze" out, not only does it become more difficult to detect remotely, but depending on their relative abundances it is expected that these frozen gases will blanket most surface detail, thus obscuring any geologic information that this distant object may hold, much as any terrestrial glacier obscures the rock that lies beneath.

Moreover, adding to normal seasonality are the effects of Pluto's steeply inclined orbit. Inclined 17 degrees to the ecliptic plane that the rest of the planets roughly follow, Pluto's poles (actually the equatorial regions are at what we would call the poles along its spin axis), become preferentially exposed to the Sun when above and below the ecliptic during its 248-Earth-year year! Thus, the combined effects of a highly inclined and elliptical orbit, seasonal variations in hemispheric and "polar" insolation, coupled with a putative ~6-Earth-day *retrograde* rotation period (1 Plutonian day), implies that Pluto probably has a number of surprises in store for us, particularly while the planet is "warm." Pluto reached perihelion (summer) in 1989 and until 1999 was actually closer to Earth than giant Neptune, then making Neptune the ninth planet. During perihelion, the planet is near one of its extremes of 17 degrees above the ecliptic, exposing the southern pole to insolation. Pluto is now in a descending mode where the opposite pole becomes exposed near aphelion (Pluto's winter) in the 22nd century. Since perihelion the shifting orbital geometries resulting from its highly eccentric orbit and Pluto's 3:2 resonance with Neptune result in Pluto having crossed back over Neptune's orbit in recent years, thus resuming his classic role as the "9th planet" (or whatever it is!).

It's late summer on Pluto now so the clock is ticking to get there quickly since the next summer on this icy world will not happen for two centuries! While conditions on Pluto should still be relatively similar by arrival in 2015 as they are in 2012, every "year" counts, as the atmosphere no doubt is cooling down. More data are needed. Thus, these stellar occultations by Pluto will invariably become essential components to the final targeting of the probe's July 2015 rendezvous. Here is where observing occultations becomes important!

In July 2011 a fourth moon, currently designated P4, was discovered by the Hubble Telescope orbiting Pluto between Nix and Hydra (see attached diagram), which only heightens our interest in getting there. It has also raised new questions regarding the true affinities of this planetary object as well as what else lies in the local Plutonian neighborhood that could be a threat to New Horizons. Should Pluto be called a planet? Is it a dead comet? A large asteroid and TNO? Pluto's extreme distance and odd orbital properties support arguments for a cometary origin. I would speculate that the discovery of this 4th satellite, that this strange world may harbor some sort of faint ring or ring arcs shepherded by these smaller moons (exclusive of Charon) that are just too thin and faint for nearly all of our Earth-bound instruments to detect.



If New Horizons is to succeed in 2015, these questions need to be answered with as much certainty as humanly possible. Perhaps, just as the ring arcs of Neptune were fortuitously discovered during a "routine" occultation by that planet's passing in front of a star, maybe we will get lucky again. Here on Earth in 2012, Pluto will be at opposition on June 29, thus presenting a favorable apparition for the upcoming occultations. It is then is a prime opportunity that should not be missed! Coincidentally, in the June issue of *Sky&Telescope* p.52-53 features a large finder chart for Pluto for 2012. One salient feature making this dim planet easier to star hop to is its close proximity just south of open cluster M25.

Speaking of clusters, the window of opportunity is rapidly closing for us northerners to catch a glimpse of one of the southern hemisphere's premiere' objects, the famed globular cluster NGC 5139 — Omega Centauri! Cloudy weather has thwarted all of my few attempts thus far, but there is still time.

Good luck to all who try! Clear skies!

Tom Lipka

Thank Goodness for Magnetism

by Dr. Tony Phillips

Only 93 million miles from Earth, a certain G-type star is beginning to act up.

Every 11 years or so, the solar cycle brings a period of high solar activity. Giant islands of magnetism — "sunspots" — break through the stellar surface in increasing numbers. Sometimes they erupt like a billion atomic bombs going off at once, producing intense flares of X-rays and UV radiation, and hurling massive clouds of plasma toward Earth.

This is happening right now. Only a few years ago the Sun was in a state of deep quiet, but as 2012 unfolds, the pendulum is swinging. Strong flares are becoming commonplace as sunspots once again pepper the solar disk. Fortunately, Earth is defended from solar storms by a strong, global magnetic field.

In March 2012, those defenses were tested.

At the very beginning of the month, a remarkable sunspot appeared on the Sun's eastern limb. AR1429, as experts called it, was an angry-looking region almost as wide as the planet Jupiter. Almost as soon as it appeared, it began to erupt. During the period of March 2nd to 15th, it rotated across the solar disk and fired off more than 50 flares. Three of those eruptions were X-class flares, the most powerful kind.

As the eruptions continued almost non-stop, Earth's magnetic field was buffeted by coronal mass ejections or "CMEs." One of those clouds hit Earth's magnetosphere so hard our planet's magnetic field was sharply compressed, leaving geosynchronous satellites on the outside looking in. For a while, the spacecraft were directly exposed to solar wind plasma.

Charged particles propelled by the blasts swirled around Earth, producing the strongest radiation storm in almost 10 years. When those particles rained down on the upper atmosphere, they dumped enough energy in three days alone (March 7-10) to power every residence in New York City for two years. Bright auroras circled both poles, and Northern Lights spilled across the Canadian border into the lower 48 states. Luminous sheets of red and green were sighted as far south as Nebraska.

When all was said and done, the defenses held — no harm done.

(continued on next page)

This wasn't the strongest solar storm in recorded history — not by a long shot. That distinction goes to the Carrington Event of September 1859 when geomagnetic activity set telegraph offices on fire and sparked auroras over Mexico, Florida, and Tahiti. Even with that in mind, however, March 2012 was remarkable.

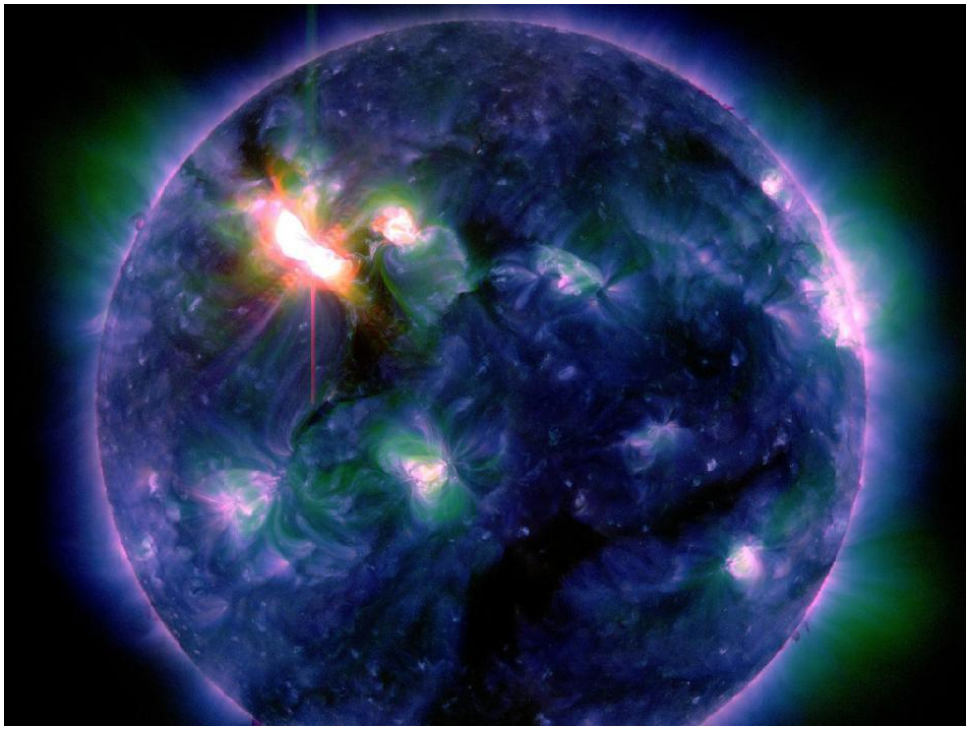
It makes you wonder, what if? What if Earth didn't have a magnetic field to fend off CMEs and deflect the most energetic particles from the Sun?

The answer might lie on Mars. The Red Planet has no global magnetic field, and as a result its atmosphere has been stripped away over time by CMEs and other gusts of solar wind. At least that's what many researchers believe. Today, Mars is a desiccated and apparently lifeless wasteland.

Only 93 million miles from Earth, a G-type star is acting up. Thank goodness for magnetism.

With your inner and outer children, read, watch, and listen in to "Super Star Meets the Plucky Planet," a rhyming and animated conversation between the Sun and Earth, at http://spaceplace.nasa.gov/story-superstar.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



This multiple-wavelength view of the X5.4 solar flare on March 6 was captured by the Solar Dynamics Observatory (SDO) in multiple wavelengths (94, 193, and 335 angstroms). Credit: NASA/SDO/AIA