CONSTELLATION *addendum . . .*

supplement to the official publication of Bucks-Mont Astronomical Association, Inc

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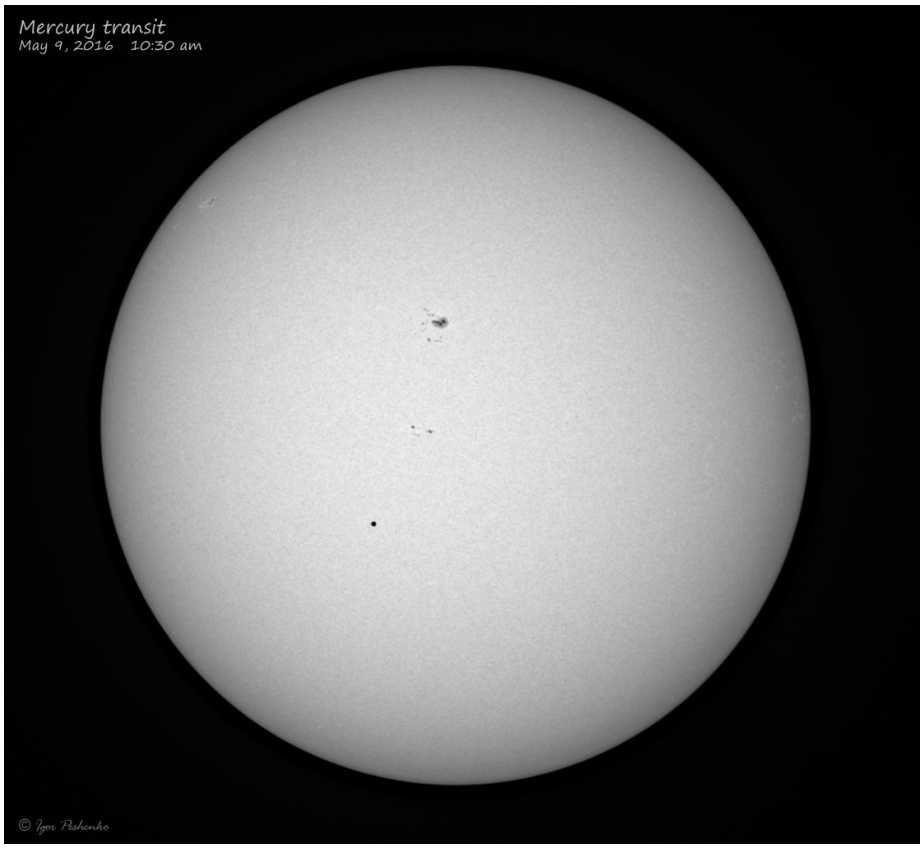
Observing Report

Mercury Transit of the Sun

- by Gary Sprague and Dwight Dulsky

BMAA had a public observing session at (Lower Nike) Park on Monday, May 9, to view the transit of Mercury across the Sun. Clouds and winds put an end to our observing around 12:30p. We had a nice group including Dan, Igor, Lee, Ed, Robert, Steve and Dwight. We also had some interesting visitors; even though there were not as many as we might have expected. Since it was nice and clear at the beginning of the transit, we should have quite a few photos to review at our next meeting. - *Gary*



Orion ED80T CF Triplet Apochromatic Refractor with Astro-Tech AT2FF field flattener
Baader solar film
Baader UV/IR cut filter
Celestron AVX mount
Canon EOS 1100D full spectrum, cooled
16 x 1/1500s, ISO 100
Processing: IRIS v5.59 and Photoshop CS2

- Mercury, mid-transit (lower left of center) image by BMAA member Igor Peshenko -

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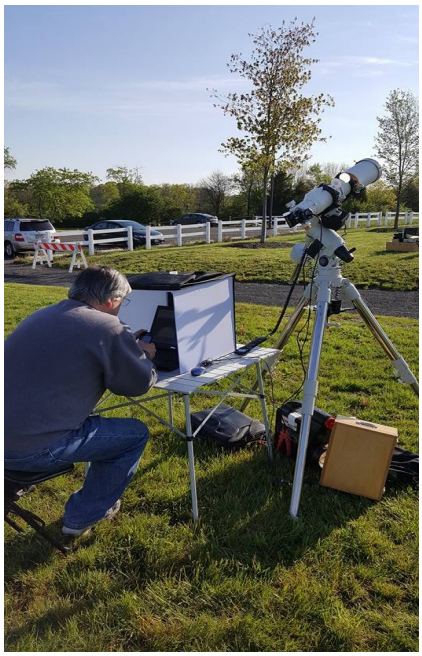
- Transit, continued -



upper left: Dan Acker setting up for transit astrophotograhy
upper right: some of the BMAA group at (Lower Nike) Park
lower left: Robert Mittel-Carey viewing the transit
lower right: the Baader Solar Filter mounted on Robert's scope

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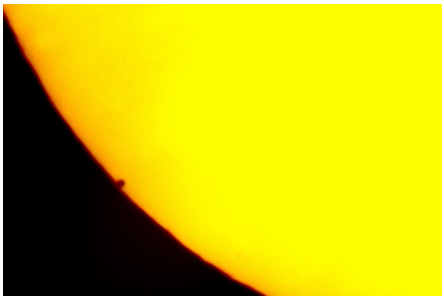
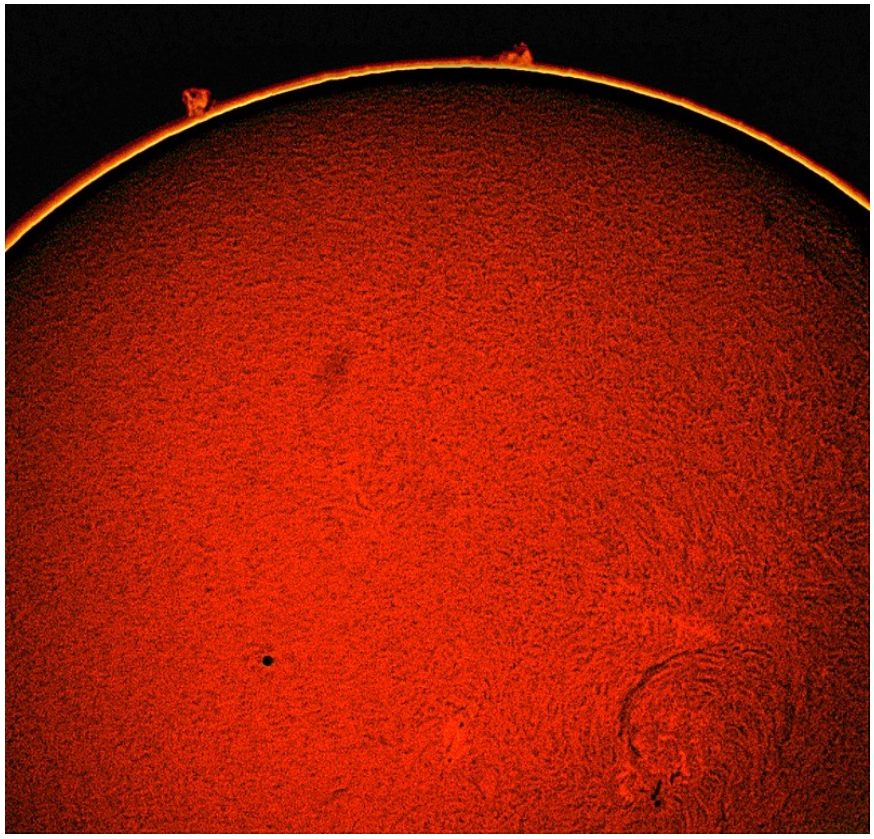
- Transit, continued -

Long-time BMAA member Brad Miller posted two awesome pics on his album in yahoo.groups:





- images by Brad Miller -

One is right there at second contact in white light *(above)*. His other outstanding pic is of mid-transit in Ha *(right)* with cool prominences along the top limb of the Sun. I showed these images during my presentation at Ambler Library - folks were very impressed by the astrophotography coming out of this group. - *Dwight*

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Bucks-Mont Astronomical Association, Inc

General Meeting Minutes
May 2016

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Meeting called to order by Gary Sprague at 7:30p. In attendance: 22 members and guests
Officers present: Gary Sprague and Dwight Dulsky (co-presidents), Lee Zager (vice-president), Ed Radomski (treasurer), Robert Mittel-Carey (secretary)

- Gary and Dwight reviewed scheduled events for May thru June.
- Member sharing: Bernie shared is May Observing Challenge. Also discussed the Mercury transit and viewing it.
- Lee shared additional tips and photos for solar/transit observing. Such as need equipment and how to safely do it.
- Silent Auction of an "Intro to DSLR Astrophotography" DVD.
- Raffle of a 32mm plossl eyepiece donated by Lee

➢ **Main topic: Baader Solar film filter workshop**

Dwight ran a great hands-on workshop making white light solar filters using Baader film. Several members made filters for a variety of telescopes including several off-axis style filters for larger aperture scopes.
Respectfully submitted,
Robert Mittel-Carey, secretary

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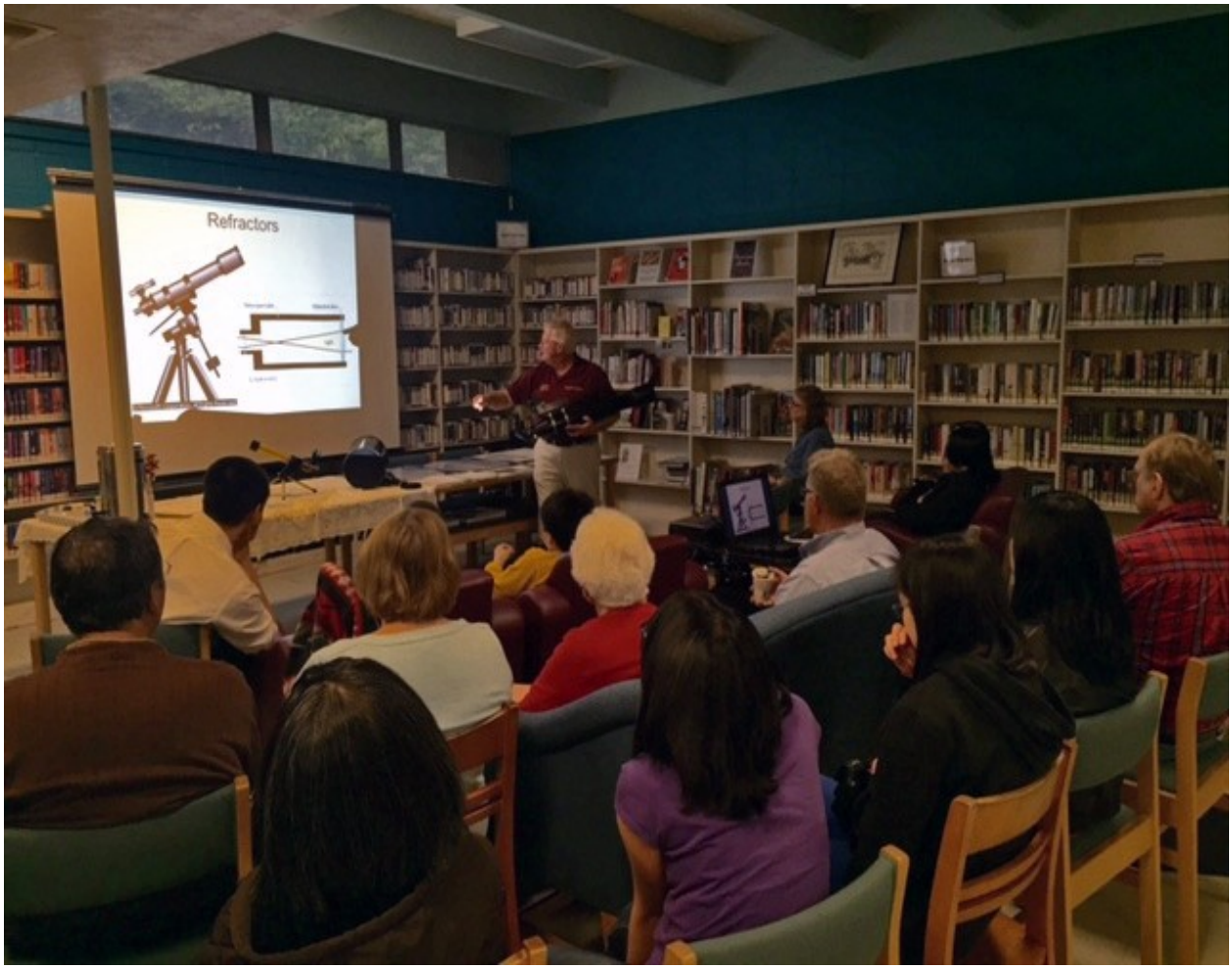
Outreach

Introduction to Astronomy

- by Dwight Dulsky

On May 10th 2016 BMAA held an "Intro to Astronomy Night" at the Ambler Branch of the Wissahickon Public Library. About 15 community members attended the workshop and were introduced to the fascinating activities of amateur astronomy and the Bucks-Mont Astronomical Association. We showed the three basic types of telescopes, refractors, reflectors and compound. In addition to equipment, the group was amazed at the talents of our astrophotographers and what they can image right here in the Delaware Valley. Another topic of the evening was showing how we navigate among the stars to find our elusive targets. It was demonstrated how to use the constellations as signposts in the sky and starhop to the intended target. The night ended with some fun 3-D images of Mars that popped out at us with the use of 3-D glasses.



- Dwight presents telescope basics to an attentive public group at Ambler Library -

BMAA has a very strong public outreach program which is a mix of community star watches and programs for libraries, school groups, scouts, retirement communities and other public events.

- Dwight Dulsky is BMAA co-president [-ed]

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NOAA's Joint Polar Satellite System (JPSS) to revolutionize Earth-watching

- by Ethan Siegel

If you want to collect data with a variety of instruments over an entire planet as quickly as possible, there are two trade-offs you have to consider: how far away you are from the world in question, and what orientation and direction you choose to orbit it. For a single satellite, the best of all worlds comes from a low-Earth polar orbit, which does all of the following:

- orbits the Earth very quickly: once every 101 minutes,
- is close enough at 824 km high to take incredibly high-resolution imagery,
- has five separate instruments each probing various weather and climate phenomena,
- and is capable of obtaining full-planet coverage every 12 hours.

The type of data this new satellite – the Joint Polar Satellite System-1 (JPSS-1) -- will take will be essential to extreme weather prediction and in early warning systems, which could have severely mitigated the impact of natural disasters like Hurricane Katrina. Each of the five instruments on board are fundamentally different and complementary to one another. They are:

1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.
2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.
3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.
4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates the atmosphere.
5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling.

The JPSS-1 satellite is a sophisticated weather monitoring tool, and paves the way for its' sister satellites JPSS-2, 3 and 4. It promises to not only provide early and detailed warnings for disasters like hurricanes, volcanoes and storms, but for longer-term effects like droughts and climate changes. Emergency responders, airline pilots, cargo ships, farmers and coastal residents all rely on NOAA and the National Weather Service for informative short-and-long-term data. The JPSS constellation of satellites will extend and enhance our monitoring capabilities far into the future.

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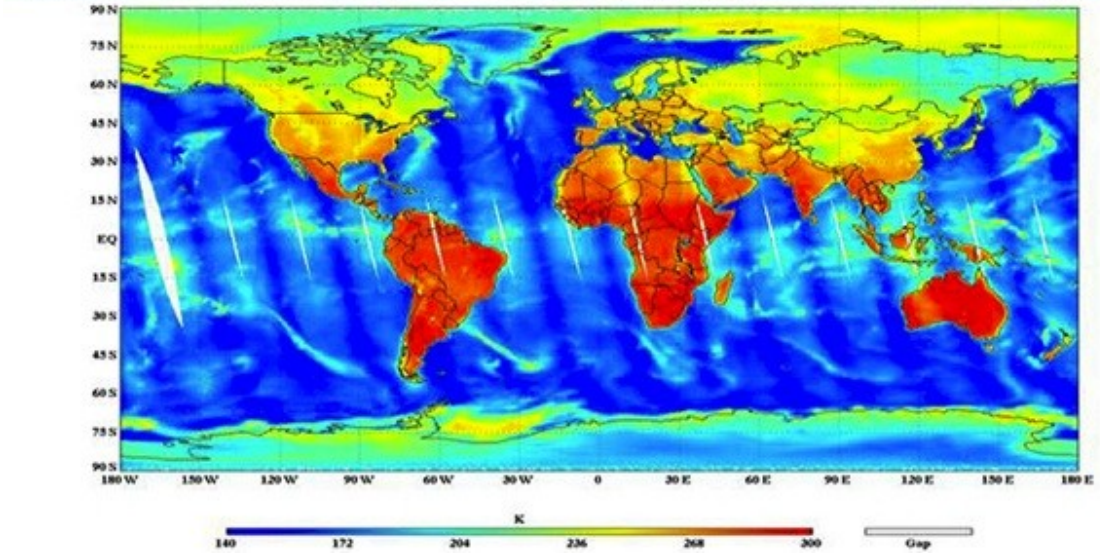

Images credit: an artist's concept of the JPSS-2 Satellite for NOAA and NASA by Orbital ATK (top); complete temperature map of the world from NOAA's National Weather Service (bottom).

– *SpacePlace is provided by NASA for local astronomy club publications [-ed]*

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Tips

Energizer LED Forehead Lamp

Recently, I purchased an Energizer LED forehead lamp from batteries.com on-sale for ~$13 with free shipping. It normally sells for around $22, and it is a very versatile tool: there are three levels of white light - high/low spot plus wide-angle for bench work. Also, there are red LEDs (shown) with a separate switch, which makes it a natural for night-time astronomy use.

The lamp is tilt-adjustable when worn so it can easily cover the viewing area. All-in-all, handy portable lighting that frees up your hands while working in small spaces. Other brands are available, too. *- Scott Petersen [-ed]*

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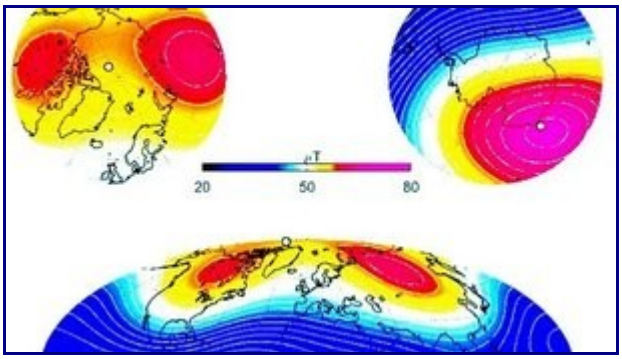
Earth’s Magnetic Heartbeat



Changes in strength of Earth’s magnetic field

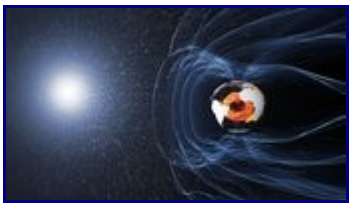
10 May 2016

With more than two years of measurements by ESA’s Swarm satellite trio, changes in the strength of Earth's magnetic field are being mapped in detail.

Launched at the end of 2013, Swarm is measuring and untangling the different magnetic signals from Earth’s core, mantle, crust, oceans, ionosphere and magnetosphere – an undertaking that will take several years to complete.

Although invisible, the magnetic field and electric currents in and around Earth generate complex forces that have immeasurable effects on our everyday lives.

The field can be thought of as a huge bubble, protecting us from cosmic radiation and electrically charged atomic particles that bombard Earth in solar winds. However, it is in a permanent state of flux.



The force that protects our planet

Presented at this week’s Living Planet Symposium, new results from the constellation of Swarm satellites show where our protective field is weakening and strengthening, and importantly how fast these changes are taking place.

The animation above shows the strength of Earth's magnetic field and how it changed between 1999 and May 2016.

Blue depicts where the field is weak and red shows regions where it is strong. As well as recent data from the Swarm constellation, information from the CHAMP and Ørsted satellites were also used to create the map.

It shows clearly that the field has weakened by about 3.5% at high latitudes over North America, while it has strengthened about 2% over Asia. The region where the field is at its weakest – the South Atlantic Anomaly – has moved steadily westward and weakened further by about 2%.

In addition, the magnetic north pole is wandering east, towards Asia.

The second animation shows the rate of change in Earth’s magnetic field between 2000 and 2015. Regions where changes in the field slowed are shown in blue and red shows where changes speeded up.

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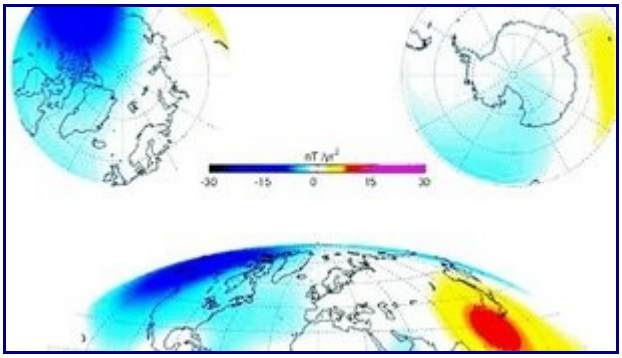
– Earth's Magnetic Heartbeat, continued -



Swarm shows rate of change

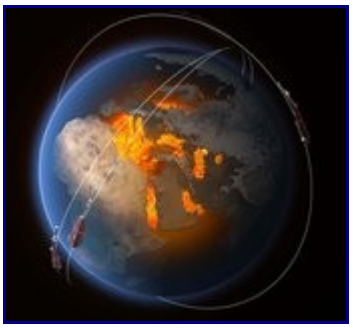
For example, changes in the field have slowed near South Africa, but have changed faster over Asia.

The magnetic field is thought to be produced largely by an ocean of molten, swirling liquid iron that makes up our planet's outer core, 3000 km under our feet. Acting like the spinning conductor in a dynamo, it generates electrical currents and thus the continuously changing electromagnetic field.

It is thought that accelerations in field strength are related to changes in how this liquid iron flows and oscillates in the outer core.

Chris Finlay, senior scientist at DTU Space in Denmark, said, "Swarm data are now enabling us to map detailed changes in Earth's magnetic field, not just at Earth's surface but also down at the edge of its source region in the core.

"Unexpectedly, we are finding rapid localized field changes that seem to be a result of accelerations of liquid metal flowing within the core."


Swarm constellation

Rune Floberghagen, ESA's Swarm mission manager, added, "Two and a half years after the mission was launched it is great to see that Swarm is mapping the magnetic field and its variations with phenomenal precision.

"The quality of the data is truly excellent, and this paves the way for a profusion of scientific applications as the data continue to be exploited."

It is clear that ESA's innovative Swarm mission is providing new insights into our changing magnetic field. Further results are expected to lead to new information on many natural processes, from those occurring deep inside the planet to weather in space caused by solar activity.

In turn, this information will certainly yield a better understanding of why the magnetic field is weakening in some places, and globally.

- this article provided by the European Space Agency, through NASA [-ed]

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