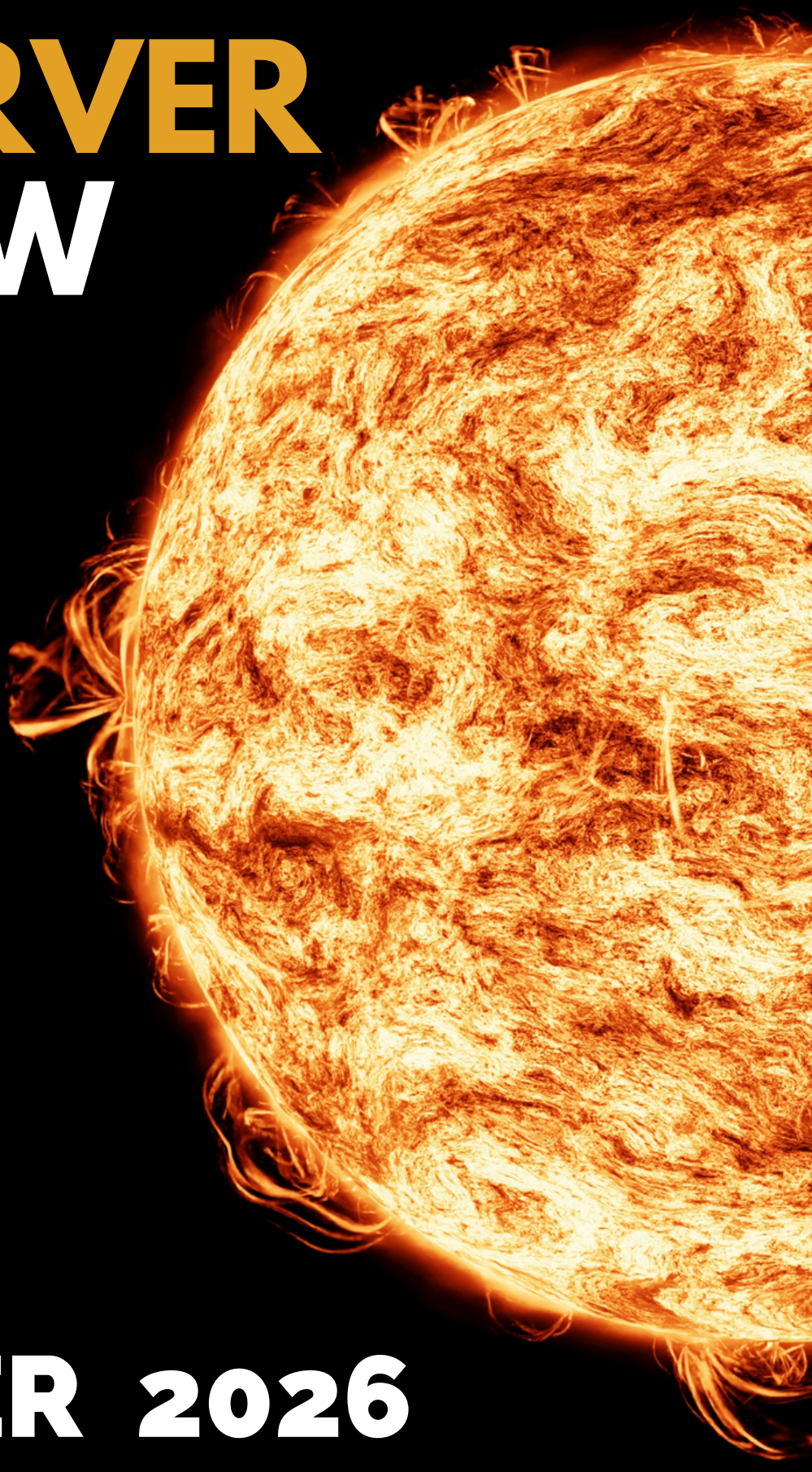
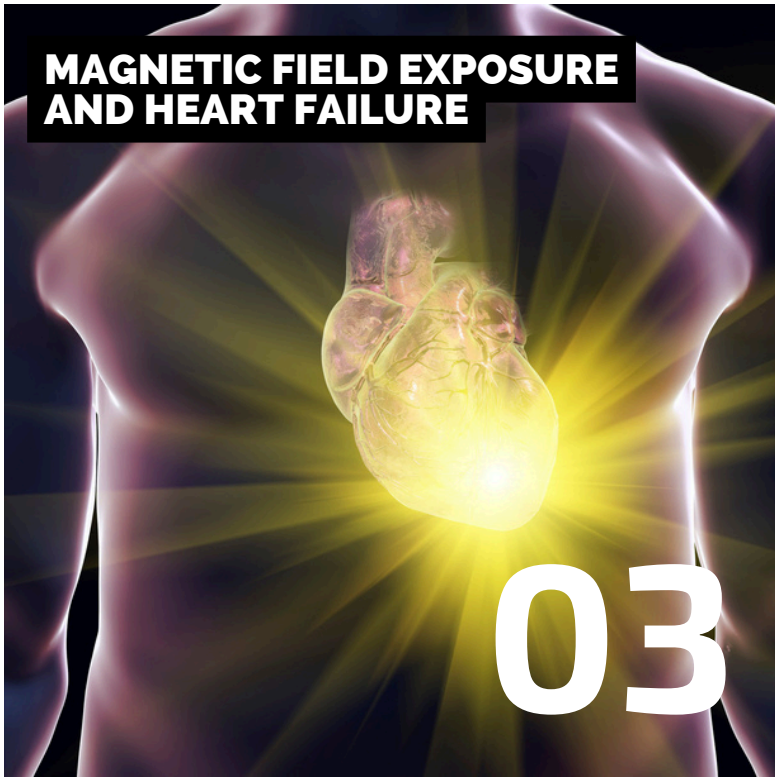
THE OBSERVER REVIEW



OCTOBER 2026

CONTENTS
OCTOBER





PHILIPPINE CAVE RECORD

As we know, The Laschamp excursion, is one of the most extensively studied geomagnetic events in Earth's history, occurred approximately 41,000 years ago when the planet's magnetic field weakened dramatically and temporarily departed from its normal polarity.

FEATURED ARTICLES

06 **COSMOGENIC RADIOCARBON PRODUCTION**

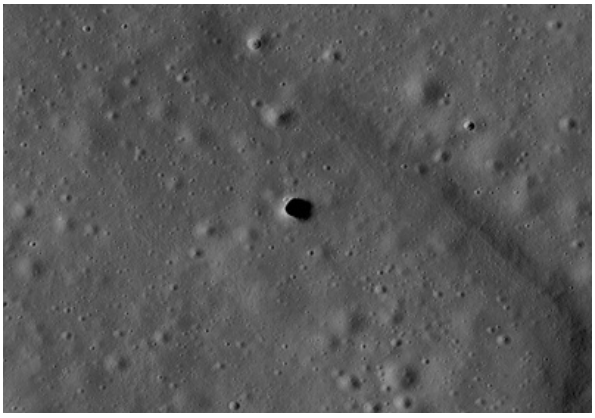
07 **EARTHQUAKES CAN SYNCHRONIZE**

09 **GEOMAGNETIC DISTURBANCES & TERRESTRIAL WEATHER**

A new study titled Exploring the Relationships Between Geomagnetic Activity and Terrestrial Weather provides additional evidence of a relationship between geomagnetic activity and surface weather conditions, particularly wind speed and temperature.

11 **ARCTIC LIGHTING AND THE SUN**

14 **DISCOVERING A LUNAR CAVE**



17 **OKLAHOMA METEOR IMPACT REWRITTEN BY 100 MILLION YEARS**

20 **ASTEROID APOPHIS**

21 **NEUROLOGICAL HEALTH**

22 **CARRINGTON EVENT & ENERGETIC PARTICLE EVENT**

MAGNETIC FIELD EXPOSURE AND HEART FAILURE

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
CARDIOVASCULAR EFFECTS OF MODERATE-INTENSITY STATIC MAGNETIC FIELD EXPOSURE IN EXPERIMENTAL HEART FAILURE USING A CHARACTERIZED EXPOSURE SYSTEM

A new study published September 7, 2026, in Electromagnetic Biology and Medicine suggests that prolonged exposure to moderate-intensity static magnetic fields may reduce structural damage to the heart, even when measurable improvements in cardiovascular function remain limited.

Researchers investigated the effects of static magnetic field exposure on 28 male rats divided into four groups: healthy controls, experimental heart failure, magnetic field exposure alone, and heart failure combined with magnetic field exposure. Heart failure was induced using isoproterenol, a compound that can produce cardiac stress and tissue injury when administered repeatedly.

The exposed animals received static magnetic field treatment for two hours per day, five days per week, over 21 days. Unlike alternating electromagnetic fields, static magnetic fields maintain a constant direction and intensity over time. Researchers carefully mapped the experimental field in two and three dimensions to characterize the exposure conditions.

The results revealed an important distinction between cardiovascular function and structural damage. Magnetic field exposure produced relatively little change in blood pressure, most electrocardiographic measurements, or circulating cardiac biomarkers. Although brain natriuretic peptide (BNP), a marker associated with cardiac stress, showed a downward trend in the heart failure group receiving magnetic field exposure

Microscopic examination of heart tissue revealed more substantial effects. Rats exposed to static magnetic fields exhibited significantly less inflammatory cell infiltration, vascular congestion, and myocardial fibrosis compared with animals experiencing experimental heart failure without magnetic field exposure. Fibrosis involves the accumulation of scar-like connective tissue that can impair the heart's ability to contract and relax normally.

These findings show that static magnetic fields may influence cellular or tissue-level responses to cardiac injury without necessarily producing immediate improvements in overall cardiovascular performance. The mechanisms responsible remain uncertain, and the study did not establish whether the observed structural benefits would translate into improved long-term heart function.

PHILIPPINE CAVE RECORD

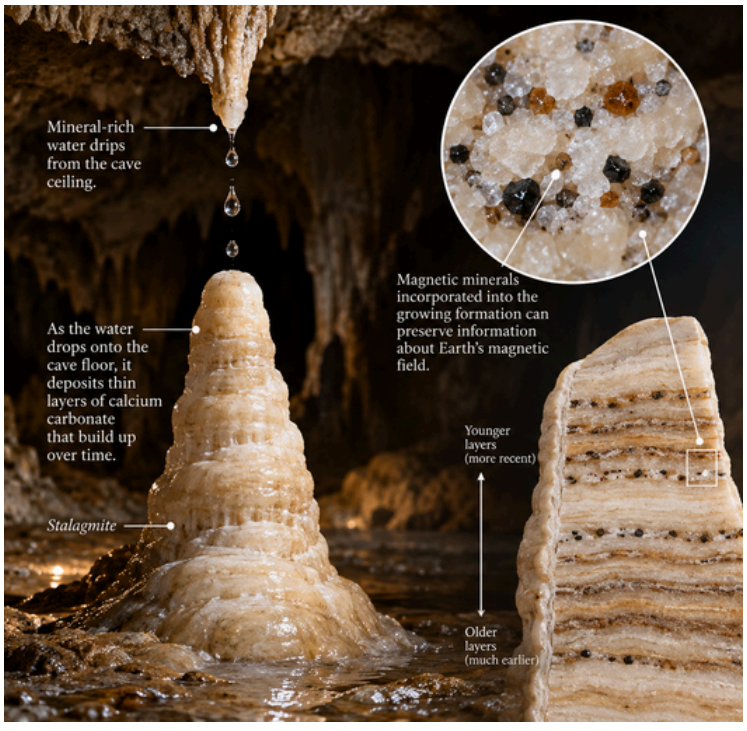
BY: BAILEY LAURISSA

ARTICLE REFERENCED:
GP23A-03 UNDERSTANDING THE LOCAL BEHAVIOR OF THE LASCHAMP EXCURSION THROUGH A STALAGMITE FROM THE PHILIPPINES

As we know, The Laschamp excursion, is one of the most extensively studied geomagnetic events in Earth's history, occurred approximately 41,000 years ago when the planet's magnetic field weakened dramatically and temporarily departed from its normal polarity.

A new study, Understanding the Local Behavior of the Laschamp Excursion Through a Stalagmite from the Philippines, presents paleomagnetic evidence suggesting that the magnetic disturbances associated with the Laschamp may not have appeared simultaneously in every region. Instead, some locations may have experienced continued instability thousands of years after the main event.

Researchers examined a stalagmite collected from Puerto Princesa Subterranean River National Park in the Philippines, providing a rare record of ancient geomagnetic behavior from Southeast Asia. The formation dates between approximately 49,000 and 35,000 years before present, encompassing the period of the Laschamp excursion and several millennia afterward.



Stalagmites form as mineral-rich water drips onto cave floors, gradually depositing layers of calcium carbonate.

As these deposits accumulate, magnetic minerals incorporated into the growing formation can preserve information about the direction and relative strength of Earth's magnetic field. This makes stalagmites valuable natural archives for reconstructing geomagnetic changes over thousands of years.

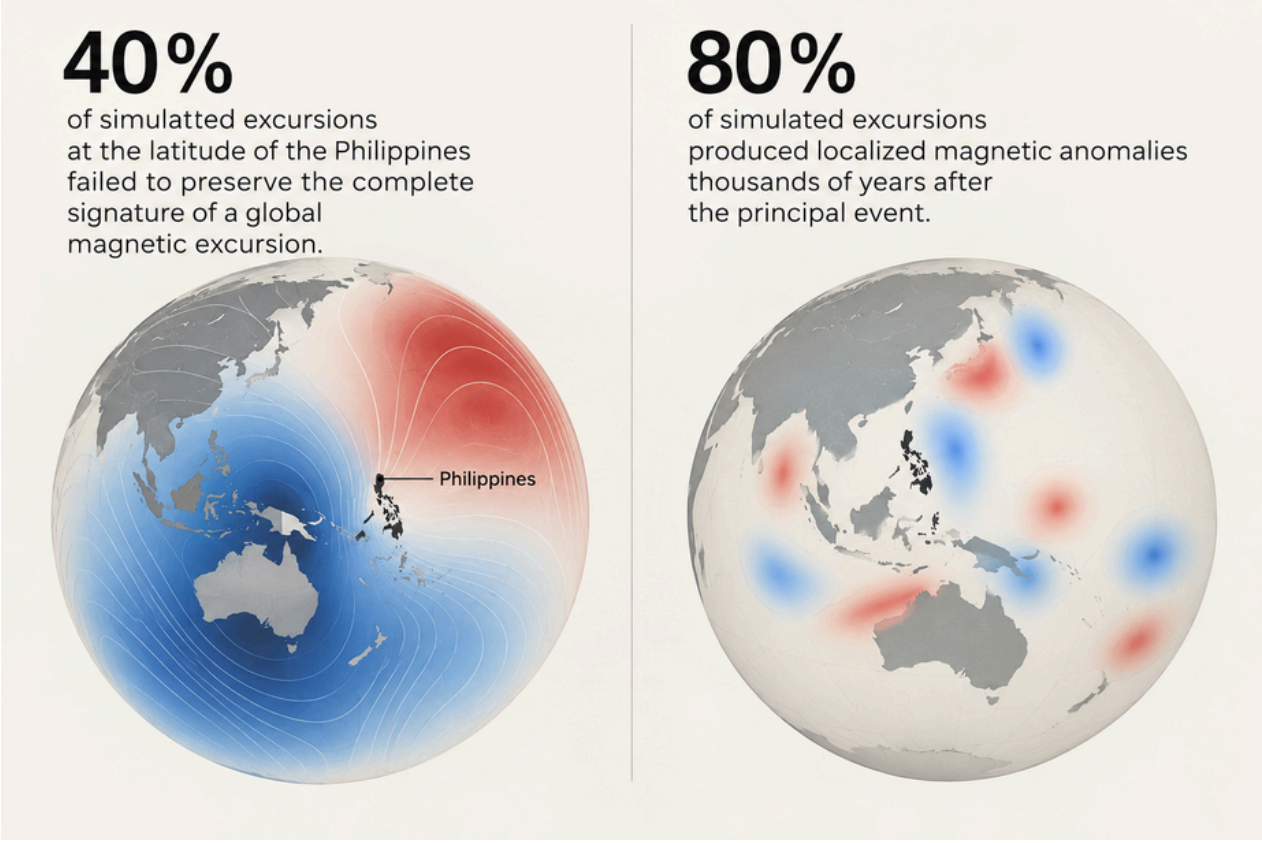
The research team analyzed 15 specimens from the stalagmite, measuring their natural remnant magnetization and using alternating magnetic fields to isolate different magnetic components. Additional mineralogical analyses identified goethite and partially oxidized magnetite, minerals capable of retaining evidence of ancient magnetic conditions.

The most significant finding was a magnetic disturbance dated to approximately 37,100 years ago, nearly 3,900 years later than the commonly accepted timing of the Laschamp excursion.

Changes in magnetic inclination, relative paleointensity, and deviations from the expected geocentric axial dipole field indicated an excursion-like signature in the Philippine record. Rather than documenting the primary event at approximately 41,000 years ago, the stalagmite appears to preserve evidence of a later period of regional magnetic instability.

To investigate this discrepancy, the researchers compared their observations with numerical simulations of Earth's geodynamo, the process by which fluid motion in the outer core generates the planetary magnetic field.

THE SIMULATIONS REVEALED THAT THE GEOGRAPHIC EXPRESSION OF A GEOMAGNETIC EXCURSION CAN VARY SUBSTANTIALLY. AT THE LATITUDE OF THE PHILIPPINES, APPROXIMATELY 40% OF SIMULATED EXCURSIONS FAILED TO PRESERVE THE COMPLETE SIGNATURE OF A GLOBAL MAGNETIC EXCURSION. FURTHERMORE, 80% OF SIMULATED EXCURSIONS PRODUCED LOCALIZED MAGNETIC ANOMALIES THOUSANDS OF YEARS AFTER THE PRINCIPAL EVENT.



COSMOGENIC RADIOCARBON PRODUCTION

BY: BAILEY LAURISSA

ARTICLE REFERENCED:

COSMOGENIC RADIOCARBON PRODUCTION AND GLACIAL CYCLES CONTROL MARINE RADIOCARBON ARCHIVE VARIATIONS

A new study published in Communications Earth & Environment, titled “Cosmogenic Radiocarbon Production and Glacial Cycles Control Marine Radiocarbon Archive Variations,” provides new insight into how Earth's magnetic field, cosmic radiation, and long-term climate cycles have influenced the global carbon system over the past 50,000 years.

Using an advanced Earth system model known as CLIMBER-X, researchers reconstructed changes in marine radiocarbon reservoir ages, which measure the apparent age difference between carbon in seawater and carbon in the atmosphere. Their findings suggest that these variations are governed by two distinct processes: relatively rapid changes in cosmogenic radiocarbon production and slower changes associated with glacial-interglacial climate cycles.

The study reinforces the significant influence of Earth's magnetic field on radiocarbon production. As magnetic field strength decreases, more cosmic radiation can penetrate the atmosphere, increasing the production of carbon-14. These changes are subsequently recorded in natural archives, including marine sediments and corals.

One of the clearest examples appears during the well-documented Laschamps geomagnetic excursion approximately 41,000 years ago. The researchers found that this period of extreme magnetic field weakening corresponded with a pronounced disturbance in the marine radiocarbon record, with simulated reservoir ages approaching 1,200 years.

Their simulations also suggest that the atmospheric radiocarbon gradient between the Northern and Southern Hemispheres during the excursion may have been nearly twice as large as previously estimated, reaching approximately 13‰.
This distinction is important because changes in the radiocarbon record have often been interpreted as evidence of shifts in ocean circulation. The new simulations demonstrate that some of these fluctuations may instead originate from changes in cosmic radiation reaching Earth's atmosphere. The study also identified substantial delays in the ocean's response to climatic transitions. During the last deglaciation, the modeled decline in marine reservoir ages lagged the rise in atmospheric carbon dioxide by approximately 4,000 years, partly because of changes in Atlantic overturning circulation.

EARTHQUAKES CAN SYNCHRONIZE

BY: BAILEY LAURISSA

ARTICLE REFERENCED:

RARE SYNCHRONIZATION AMONG RECURRING EARTHQUAKES

A new study published October 3, 2026, in Geophysical Research Letters provides evidence that neighboring faults can synchronize their earthquake cycles through repeated stress interactions. The findings offer new insight into how seismic activity can develop organized patterns over time, rather than occurring entirely independently.

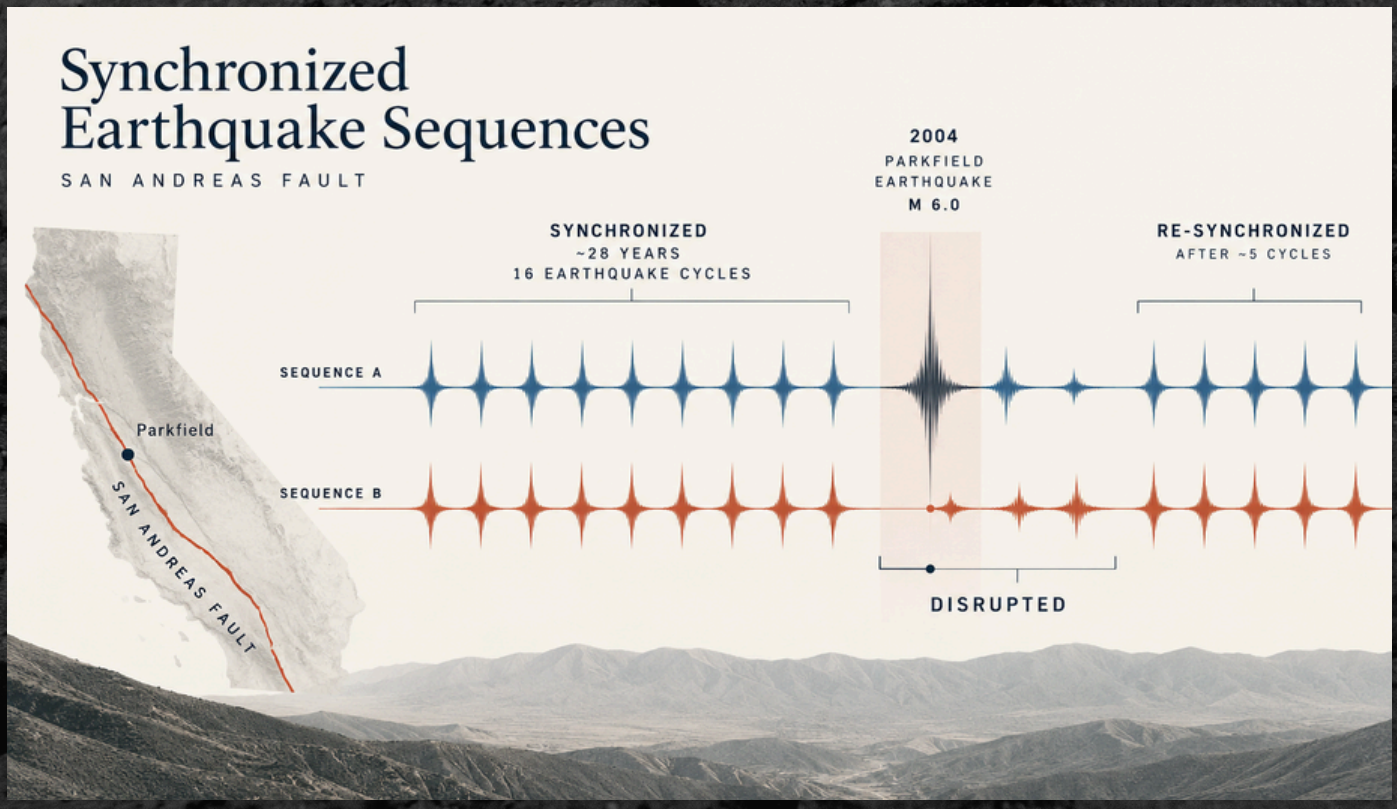
Researchers examined earthquake records from California's San Andreas Fault and more than 1,000 years of historical megathrust earthquakes in Japan. They found that neighboring faults can begin rupturing in recurring sequences when the stress transferred between them is strong enough to overcome differences in their natural earthquake recurrence intervals.

Using mathematical models inspired by synchronized oscillators, such as fireflies flashing together, the researchers identified specific conditions that allow earthquake cycles to become aligned.

ALONG THE CENTRAL SAN ANDREAS FAULT, SYNCHRONIZATION WAS MOST APPARENT AMONG REPEATING EARTHQUAKES SEPARATED BY LESS THAN APPROXIMATELY ONE KILOMETER.

IN JAPAN, THE RESEARCHERS IDENTIFIED NEIGHBORING FAULT SEGMENTS ALONG THE NANKAI TROUGH AND OFFSHORE HOKKAIDO THAT APPEAR PARTICULARLY SUSCEPTIBLE TO SYNCHRONIZED MAGNITUDE 8 OR GREATER EARTHQUAKES.

One important finding was that synchronization can persist through multiple earthquake cycles, even after disturbances temporarily disrupt the pattern. Along the San Andreas Fault, researchers documented a pair of repeating earthquake sequences that remained synchronized across approximately 28 years and 16 earthquake cycles. Following disruption by the magnitude 6.0 Parkfield earthquake in 2004, synchronization reemerged after approximately five cycles.



THE STUDY DEMONSTRATES THAT EARTHQUAKE TIMING IS INFLUENCED NOT ONLY BY THE GRADUAL ACCUMULATION OF TECTONIC STRESS BUT ALSO BY INTERACTIONS CAPABLE OF ADVANCING, DELAYING, OR REORGANIZING FAULT RUPTURE CYCLES.

THE RESEARCHERS EXPLICITLY RECOGNIZE EXTERNAL DISTURBANCES AS FACTORS THAT CAN ALTER SYNCHRONIZATION, INCLUDING DISTANT EARTHQUAKES, TIDAL FORCES, AND TRANSIENT FAULT SLIP.



GEOMAGNETIC DISTURBANCES & TERRESTRIAL WEATHER

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
EXPLORING THE RELATIONSHIPS BETWEEN GEOMAGNETIC ACTIVITY AND TERRESTRIAL WEATHER

A new study titled Exploring the Relationships Between Geomagnetic Activity and Terrestrial Weather provides additional evidence of a relationship between geomagnetic activity and surface weather conditions, particularly wind speed and temperature.

As Observer Review readers are already familiar with, solar activity extends far beyond the space environment, with potential influences on Earth's atmosphere, weather patterns, and broader climate system. The relationship between solar variability and terrestrial conditions has been a recurring focus of solar climate forcing research, and this latest study adds another piece to that investigation.

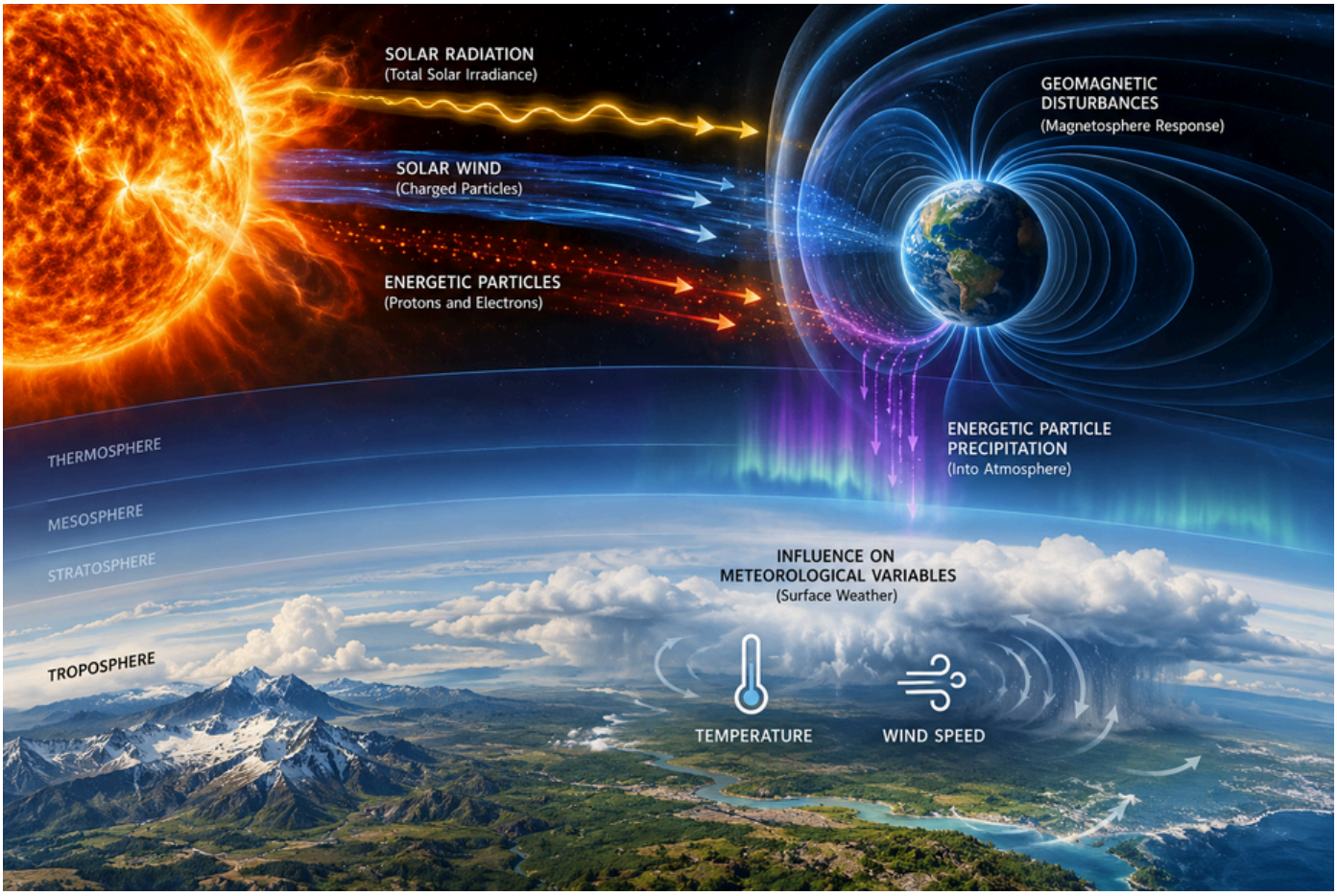
Researchers developed a mathematical model coupling geomagnetic disturbances with meteorological conditions, focusing on 500 kV transmission lines in Guangxi, China. Their analysis incorporated two major geomagnetic storm periods, March 16–19, 2015, and May 10–13, 2024, alongside extreme meteorological conditions representing once-in-50-year weather events.

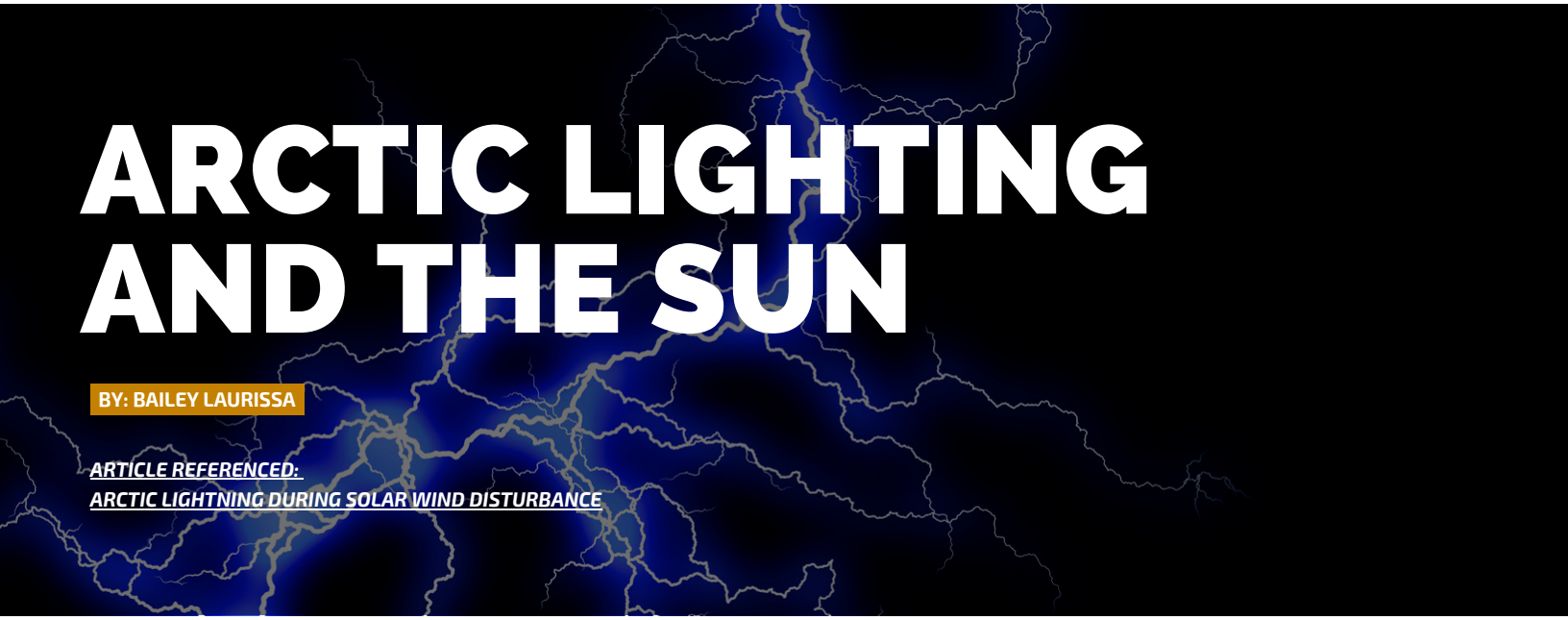
The results indicated a generally significant positive correlation between geomagnetic disturbance intensity and wind speed. Stronger geomagnetic disturbances were associated with higher wind speeds in the conditions examined. Researchers also identified a tendency toward negative correlations between geomagnetic disturbances and temperature in cold winter regions, suggesting that stronger disturbances may coincide with lower temperatures.

As we have discussed extensively, solar climate forcing is not limited to variations in total solar irradiance. Solar wind interactions, geomagnetic disturbances, energetic particle precipitation, and their potential atmospheric effects are all relevant to understanding the broader Sun-Earth relationship.

This study is particularly interesting because it examines meteorological variables at Earth's surface rather than focusing exclusively on the upper atmosphere or magnetosphere.

Wind speed and temperature are fundamental components of atmospheric circulation, which governs the redistribution of energy throughout Earth's climate system. The reported correlations raise the possibility that geomagnetic variability may be connected to atmospheric processes extending into the lower atmosphere.





ARCTIC LIGHTING AND THE SUN

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
ARCTIC LIGHTNING DURING SOLAR WIND DISTURBANCE

A new study published in Communications Earth & Environment, titled “Arctic lightning during solar wind disturbance,” identifies significant relationships between solar wind activity, energetic particle precipitation, and lightning occurrence across northern Europe. The findings add to the growing body of research examining how solar activity may influence atmospheric processes beyond the upper atmosphere.

Researchers examined approximately 9 million lightning flashes recorded across Fennoscandia, including northern Norway, Sweden, and Finland, between 1998 and 2019. By comparing lightning observations with solar wind conditions, geomagnetic activity, and energetic proton measurements across solar cycles 23 and 24, the team investigated whether changes in the near-Earth space environment corresponded with variations in atmospheric electrical activity.

One of the most significant findings involved energetic proton flux, particularly at latitudes between 62°N and 67°N.

During solar cycle 23, researchers identified a strong positive correlation between lightning occurrence and proton flux measured by polar-orbiting satellites. Across the broader 60°N to 71°N region, the correlation coefficient reached 0.80, while a particularly strong relationship of 0.93 was observed between 66°N and 67°N.

Importantly, this localized relationship remained nearly unchanged after researchers excluded 2003, an exceptionally active year for geomagnetic disturbances. The correlation at 66°N to 67°N remained 0.92, suggesting that the association was not solely the result of one unusually active solar year.

The study also identified significant relationships between lightning and high-speed solar wind streams, particularly within the auroral oval, where energetic particles can more readily interact with Earth's upper atmosphere.

These correlations were strongest at annual timescales during solar cycle 23. They were not consistently reproduced during solar cycle 24, and daily, weekly, and monthly analyses generally revealed much weaker relationships.

This distinction is important. The findings suggest that any solar influence on lightning is unlikely to operate as a simple, immediate response to every incoming solar wind disturbance.

Instead, the relationship appears to depend on geographic location, atmospheric conditions, and the broader state of solar and geomagnetic activity.
Across the study region, extreme-lightning days occurred on 19.5% of high-speed solar wind days, compared with 9.9% of days without high-speed streams.

This represented approximately twice the probability of extreme lightning activity during high-speed solar wind conditions.

The relationship became even more pronounced when researchers accounted for cloud conditions.

At latitudes between 65°N and 66°N, under moderate-to-high cloud coverage, the probability of an extreme-lightning day increased from 7.9% during non-high-speed-stream conditions to 20.5% during high-speed streams.

This corresponds to approximately three times the odds of an extreme-lightning day.

These findings are particularly relevant because they suggest that solar wind disturbances may influence atmospheric electrical activity when the necessary meteorological conditions are already present.

In other words, solar activity does not need to create a thunderstorm to potentially influence its electrical behavior.

High-speed solar wind streams carry plasma and magnetic structures outward from the Sun. When these disturbances interact with Earth's magnetosphere, they can produce geomagnetic activity and alter the movement of charged particles into the polar atmosphere.



Energetic particle precipitation increases atmospheric ionization, producing charged particles that can modify electrical conductivity.
The researchers identify several possible pathways connecting these processes to lightning activity.

One involves additional free electrons contributing to electrical breakdown within thunderclouds. Another involves particle-induced changes in atmospheric conductivity, potentially modifying the vertical currents that connect the ionosphere, atmosphere, and Earth's surface.

A third possibility involves changes in the interplanetary magnetic field, particularly its By component, which can influence polar ionospheric electric fields and potentially alter the global atmospheric electric circuit.

DISCOVERING A LUNAR CAVE

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
PSI-LED TEAM SELECTED FOR NASA PRISM PROGRAM TO EXPLORE POTENTIAL LUNAR CAVE

New geophysical investigation could reveal ancient lunar lava tubes, providing insight into the Moon's volcanic history and potential locations for future human exploration.

NASA has selected a proposal led by the Planetary Science Institute (PSI) to investigate a potentially extensive underground cave system beneath the lunar surface. The project, known as Geophysical Instruments for Marius Lunar Pit Investigation (GIMLI), will use seismic measurements, ground-penetrating radar, and gravity observations to determine whether an ancient lava tube extends beyond a large opening in one of the Moon's most volcanically diverse regions.

The investigation will focus on the Marius Hills Pit, a substantial opening in the lunar surface that scientists suspect may provide access to an underground cavity formed by ancient volcanic activity.

Orbital observations have already provided evidence that the Moon may contain extensive networks of subsurface lava tubes. However, the size, structure, and continuity of these potential underground systems remain largely unknown. GIMLI aims to move beyond orbital observations by conducting direct geophysical measurements from the lunar surface.

The Marius Hills region contains extensive evidence of past volcanic activity, including ancient lava flows and geological formations associated with basaltic volcanism.
On Earth, lava tubes form when the outer surface of a flowing lava stream cools and solidifies while molten material continues moving beneath it. Once the eruption subsides and the remaining lava drains away, a hollow passage can remain underground.

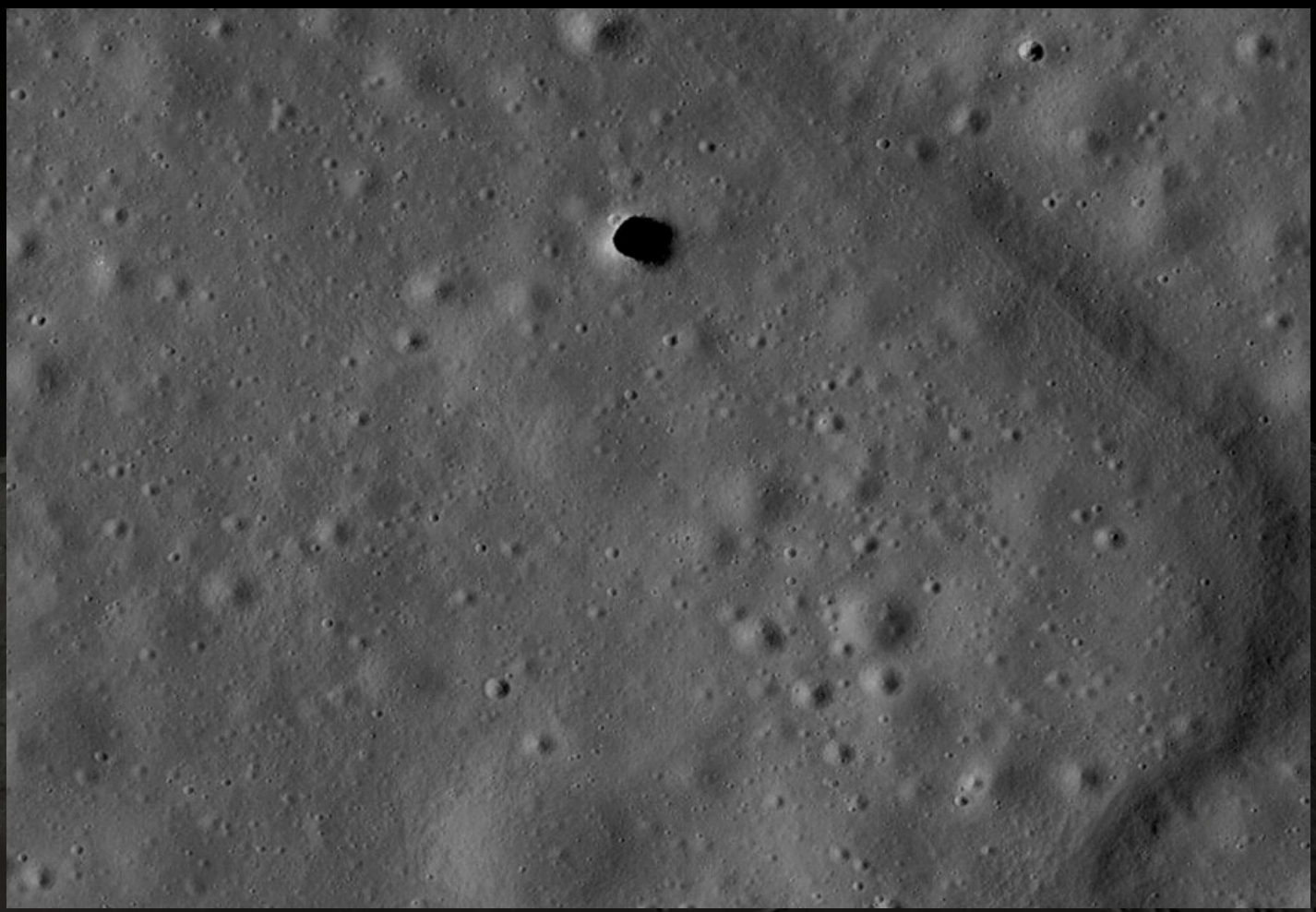
Similar processes may have occurred on the Moon during its volcanically active past.

The Marius Hills Pit could represent a collapsed section of one of these ancient underground passages, potentially exposing an entrance to a much larger system.

To investigate this possibility, the GIMLI mission will combine three complementary geophysical techniques.

Ground-penetrating radar will transmit electromagnetic signals into the lunar subsurface to identify buried geological boundaries and potential cavities.

Active-source seismic measurements will examine how artificially generated seismic waves travel through the surrounding rock, helping researchers identify changes in subsurface structure.



THE MARIUS HILLS PIT (MHP) ON THE SURFACE OF THE MOON. MHP WILL BE STUDIED BY PSI-LED GIMLI, THROUGH THE NASA PRISM PROGRAM, TO INVESTIGATE A POSSIBLE LAVA TUBE BENEATH THE SURFACE. CREDIT: NASA/GSFC/ARIZONA STATE UNIVERSITY

Gravity measurements will search for subtle variations in gravitational acceleration that could indicate missing rock mass associated with an underground void.

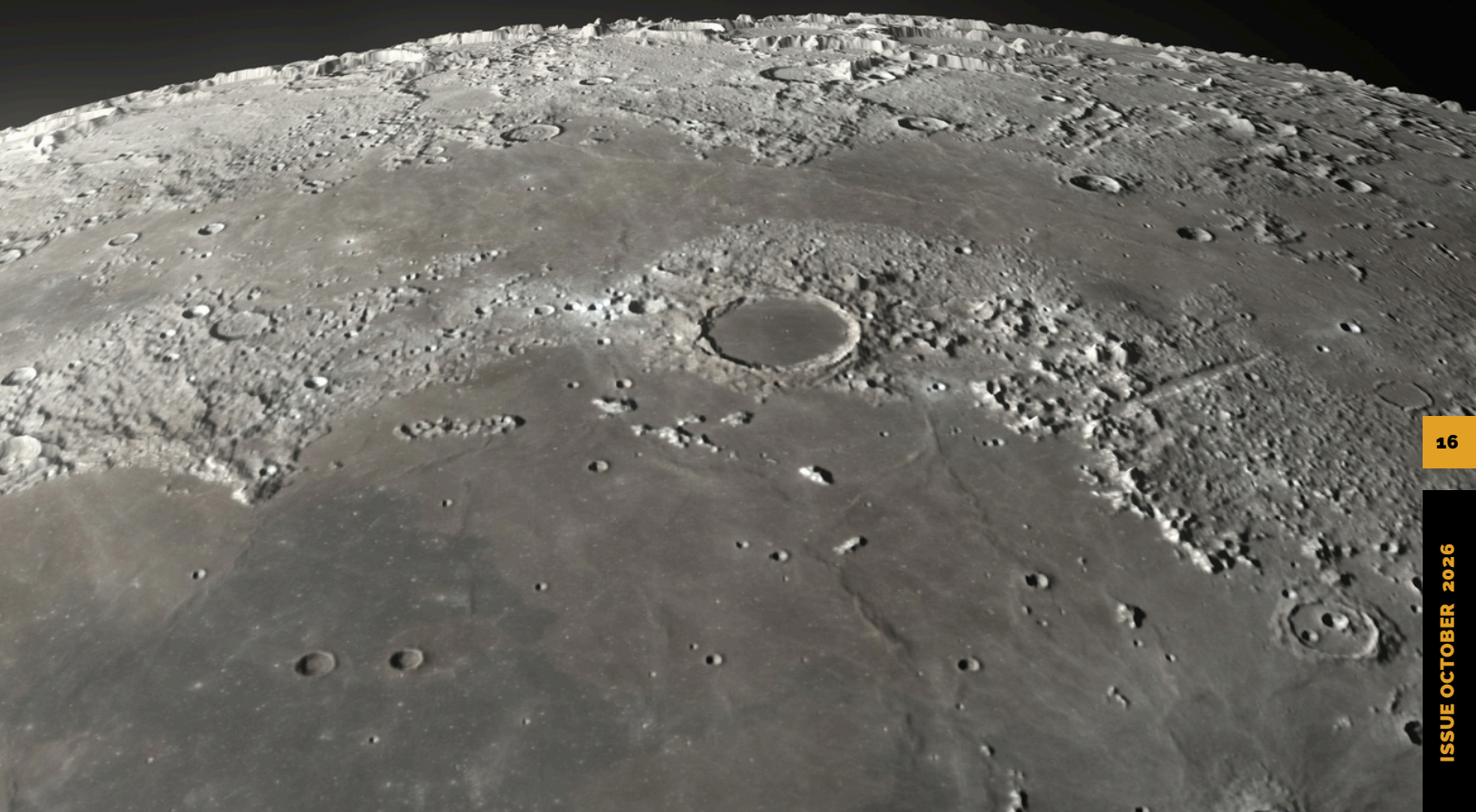
Cameras will also document the surrounding terrain and exposed geological layers within the pit walls.

These layers may preserve evidence of successive volcanic episodes, including changes in lava composition, flow behavior, and the intervals separating eruptions.

Understanding these sequences could help researchers reconstruct the timing and evolution of volcanic activity in the region.

The possible discovery of a lava tube would provide another important piece of that history.

Because similar formations occur in terrestrial volcanic environments, scientists could compare lunar structures with those found on Earth to better understand how differences in gravity, eruption conditions, and cooling processes influenced volcanic activity on the Moon.



OKLAHOMA METEOR IMPACT REWRITTEN BY 100 MILLION YEARS

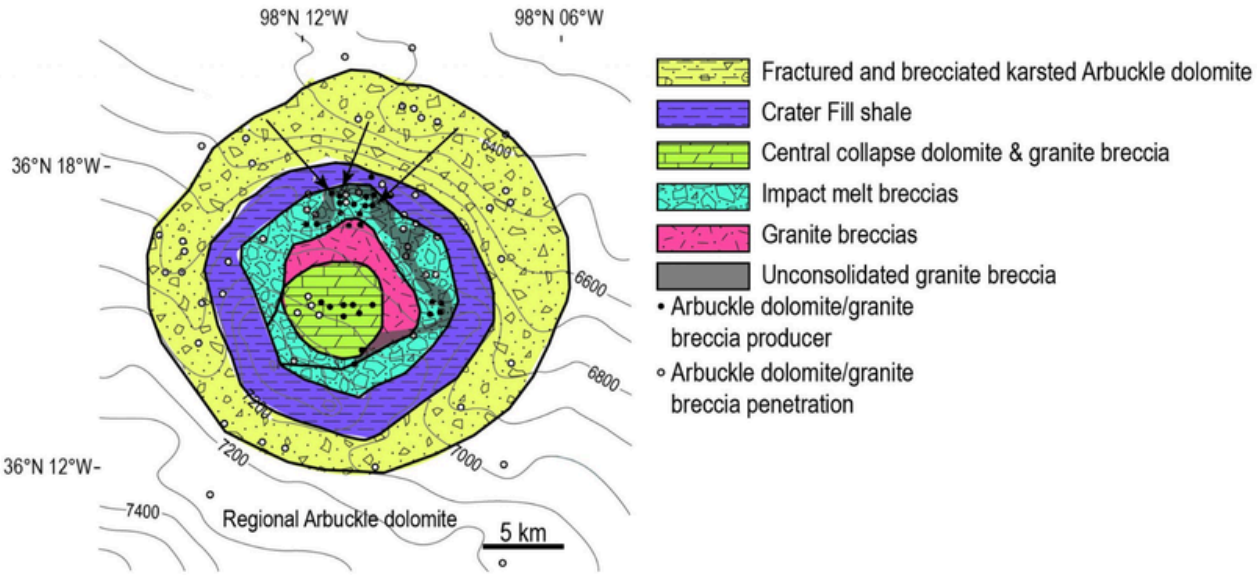
BY: BAILEY LAURISSA

ARTICLE REFERENCED:
METEOR HIT OKLAHOMA 100 MILLION YEARS LATER THAN PREVIOUSLY THOUGHT

A new geological investigation has dramatically revised the age of a major meteor impact structure in Oklahoma, placing the collision nearly 100 million years later than previously believed. The findings not only change the timeline of a significant impact event in North America but also introduce new questions about the possible relationship between extraterrestrial impacts and one of Earth's major biological crises.

Published in Meteoritics & Planetary Science, the study by researchers at the University of Texas at Austin determined that the Ames impact structure formed approximately 370 million years ago during the Late Devonian, rather than 467 million years ago during the Middle Ordovician.

The revised age removes the Ames crater from a proposed period of unusually frequent asteroid impacts and places it near the Frasnian-Famennian mass extinction, a major episode of marine biodiversity loss approximately 372 million years ago.



The Ames impact structure lies buried beneath sedimentary rock near Ames, Oklahoma. Although no longer visible at the surface, the crater extends for miles underground and has become an important site for both geological research and oil and gas production.

For decades, the impact was believed to have occurred during the Middle Ordovician, approximately 467 million years ago. This placed Ames among several North American impact structures associated with the Ordovician Meteor Event, a period characterized by an increased influx of extraterrestrial material.

The concentration of impacts during this interval has contributed to a provocative hypothesis: Earth may once have possessed a temporary ring of asteroid debris, similar in appearance to the rings surrounding Saturn.

According to this hypothesis, the breakup and gravitational capture of asteroid material could have produced a debris ring around Earth, gradually delivering meteorites to the surface over millions of years. Some researchers have also proposed that such a ring could have influenced Earth's climate by altering the distribution of incoming solar radiation.

However, the new dating of the Ames structure removes one important crater from the proposed Ordovician impact population, demonstrating the importance of establishing accurate ages before reconstructing large-scale episodes of extraterrestrial bombardment.

The researchers reached their conclusion by examining zircon crystals extracted from granitic rocks affected by the Ames impact.

Zircon is particularly valuable for reconstructing geological history because its crystal structure can preserve evidence of both radioactive decay and extreme physical disturbances. Using uranium-lead dating, the researchers identified an approximately 370-million-year-old signal associated with the impact.

To establish that the zircons had experienced an extraterrestrial collision rather than an unrelated geological process, the team collaborated with NASA to examine their internal structures using cathodoluminescence imaging and electron backscatter diffraction.
These techniques revealed characteristic changes in the crystals associated with shock deformation and recrystallization.

The results consistently indicated a Late Devonian impact age, regardless of the analytical approach used.

The previous Ordovician estimate had relied on biostratigraphic evidence, particularly fossilized remains of conodonts, ancient marine organisms whose tooth-like elements are widely used to date sedimentary rocks.

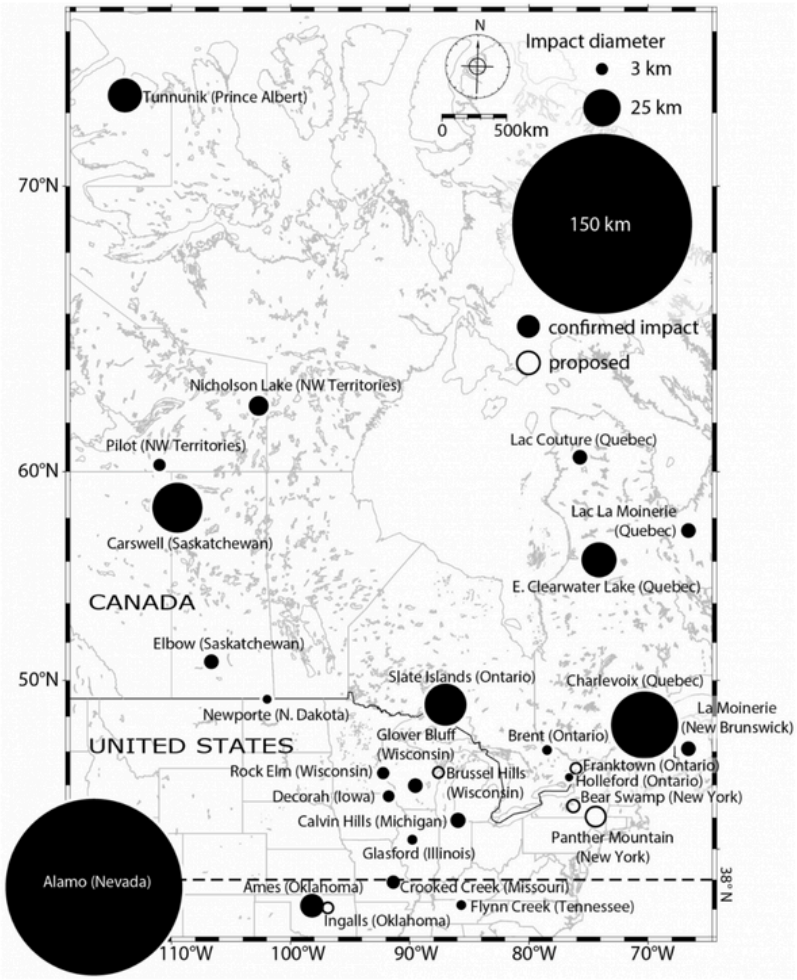
Perhaps the most significant implication of the revised timeline is its proximity to the Frasnian-Famennian mass extinction, which occurred approximately 372 million years ago.

This extinction event was one of the major biological disruptions of the Phanerozoic Eon, producing substantial losses among marine organisms, including reef-building communities, trilobites, and other groups that dominated Devonian ecosystems.

Its causes remain debated, with proposed contributing mechanisms including widespread ocean anoxia, climate change, major volcanic activity, and other environmental disturbances.

The newly established age of the Ames impact introduces another extraterrestrial event into the broader Late Devonian timeline.

Earth's impact record is incomplete. Many ancient craters have been erased by erosion, buried beneath sediment, or destroyed through tectonic activity. Even preserved structures can be difficult to date accurately.



CONSEQUENTLY, INTERPRETATIONS OF ANCIENT BOMBARDMENT EPISODES OFTEN DEPEND ON RELATIVELY SMALL COLLECTIONS OF KNOWN IMPACT SITES.

MOVING A SINGLE CRATER BY NEARLY 100 MILLION YEARS CAN THEREFORE ALTER THE APPARENT CONCENTRATION OF IMPACTS WITHIN A PARTICULAR GEOLOGICAL INTERVAL.

IN THE CASE OF AMES, THE REVISED AGE WEAKENS ITS PREVIOUS ASSOCIATION WITH THE ORDOVICIAN METEOR EVENT WHILE ADDING ANOTHER CONFIRMED IMPACT TO THE LATE DEVONIAN RECORD.



ASTEROID APOPHIS

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
ASTEROID APOPHIS 2029 EARTH FLYBY – ANIMATIONS

On April 13, 2029, asteroid Apophis will pass approximately 20,000 miles (32,000 kilometers) above Earth's surface, bringing the massive object closer to our planet than many satellites in orbit. The encounter will provide scientists with a rare opportunity to observe how Earth's gravitational field influences the physical structure and motion of a near-Earth asteroid.

NASA's OSIRIS-APEX mission is designed to investigate these changes, particularly whether the gravitational interaction triggers seismic disturbances, surface landslides, or changes in the asteroid's rotational behavior.

Apophis is an elongated asteroid measuring approximately 450 meters along its longest axis and 170 meters along its shortest. Its unusual shape, combined with its close approach to Earth, makes it an important natural laboratory for understanding how gravitational forces influence smaller bodies throughout the solar system.

During the encounter, Apophis will pass at approximately one-tenth of the average distance between Earth and the Moon. At this proximity, Earth's gravitational influence will be strong enough to significantly alter the asteroid's trajectory. However, changes to its orbit are only one aspect of the encounter. Researchers expect Earth's gravity to influence the asteroid's rotation, potentially changing both its spin rate and rotational orientation. These changes could redistribute stresses throughout the asteroid's interior and surface.

One possibility is that the encounter will generate asteroid quakes, seismic disturbances caused by gravitational stresses rather than the tectonic processes responsible for earthquakes on Earth. These disturbances could destabilize loose surface material, triggering landslides or exposing previously buried material. The magnitude of these effects remains uncertain and will depend on Apophis' internal structure, composition, and mechanical properties.



NEUROLOGICAL HEALTH

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
AURORA-ASSOCIATED GEOMAGNETIC ACTIVITY AND HEALTH: A REVIEW WITH FOCUS ON NEUROLOGICAL IMPLICATIONS

The review evaluated peer-reviewed research examining associations between geomagnetic activity and neurological, neuroendocrine, and autonomic nervous system responses.

One of the findings highlighted was a reported association between geomagnetic disturbances and increased seizure frequency among individuals with epilepsy. Previous studies suggest that fluctuations in geomagnetic conditions may coincide with changes in neurological excitability, although the biological mechanisms responsible remain uncertain.

Researchers also identified associations between geomagnetic activity and sleep disturbances, cognitive fluctuations, and changes in mood. These effects could have particular implications for patients undergoing neurological evaluations or recovering from neurosurgical procedures.

Sleep disruption is especially relevant because adequate sleep plays an important role in neurological recovery. Similarly, changes in cognitive performance, anxiety, and stress responses could complicate clinical assessments and patient management.

The review further discusses evidence linking geomagnetic variability to changes in autonomic and neuroendocrine activity, suggesting that the potential biological influence of geomagnetic disturbances may extend beyond the brain to systems responsible for regulating stress and physiological stability.

An important implication involves vulnerable populations, particularly elderly patients and individuals with existing neurological conditions. The authors suggest that greater awareness of geomagnetic conditions could eventually help inform patient monitoring and postoperative care if the reported relationships are confirmed through further research.

CARRINGTON EVENT & ENERGETIC PARTICLE EVENT

BY: BAILEY LAURISSA

ARTICLE REFERENCED:
$_{6}$CL CONCENTRATIONS FROM POLAR ICE CORES SET NEW CONSTRAINTS ON THE CARRINGTON EVENT

The Carrington Event of September 1859 remains one of the most powerful geomagnetic storms in recorded history. Its extraordinary auroral displays and widespread disruptions to telegraph systems have made it a benchmark for understanding the potential consequences of extreme solar activity. However, one of the most important questions surrounding the event has remained unresolved: Did the Carrington Event also produce an extreme solar energetic particle (SEP) event that reached Earth? A new study examining cosmogenic radionuclide concentrations in polar ice cores provides stronger evidence that the answer may be no. Researchers analyzed chlorine-36 (^{36}Cl) and beryllium-10 (^{10}Be) records preserved in Greenland and Antarctic ice to investigate whether the 1859 event produced a detectable increase in energetic particle radiation reaching Earth's atmosphere. Their findings suggest that, despite the Carrington Event's exceptional geomagnetic intensity, it was not accompanied by an extreme Earth-directed SEP event. The central finding was the absence of a statistically significant increase in ^{36}Cl concentrations around 1859 across all three ice core records.

This is particularly important because ^{36}Cl provides a useful constraint on the fluence of energetic solar particles, including particles with energies exceeding 30 megaelectronvolts (MeV).

If the Carrington Event had produced an extreme Earth-directed SEP event, researchers would expect a corresponding increase in cosmogenic radionuclide production that could potentially be preserved in polar ice.

Instead, the measurements showed no significant ^{36}Cl enhancement associated with the event.

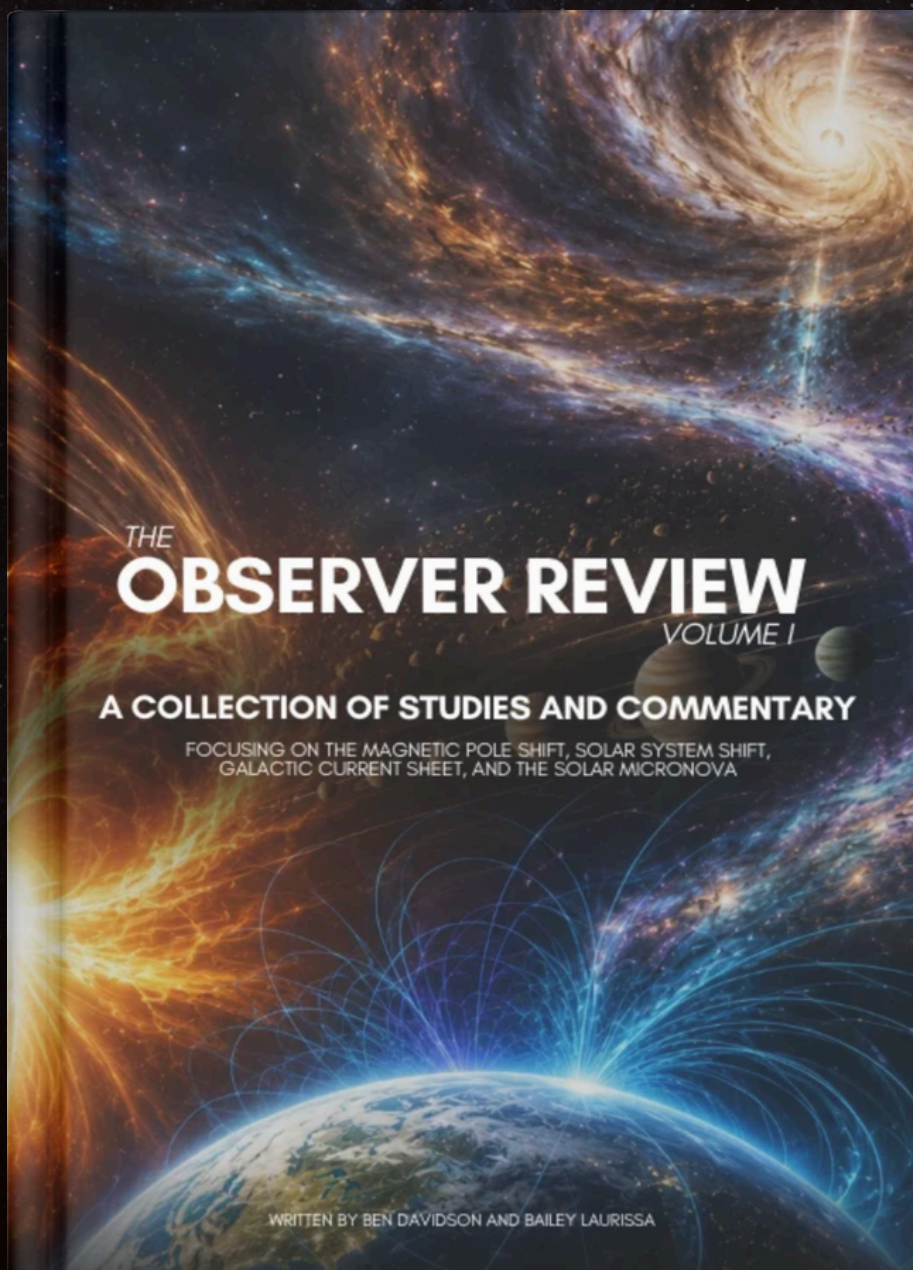
THE OBSERVER REVIEW VOLUME 1

THE OBSERVER REVIEW VOLUME 1 **IS NOW AVAILABLE TO ORDER IN PRINT.**

FOR OBSERVER REVIEW MEMBERS, THIS IS YOUR OPPORTUNITY TO TAKE THE REVIEW OFF THE SCREEN AND ONTO YOUR BOOKSHELF.

- Over 50 Scientific Studies
- Magnetic Pole Shift & Earth Changes
- Solar System Changes
- The Galactic Current Sheet
- The Solar Micronova

CLICK TO PURCHASE



THANK YOU!

WE HOPE YOU ENJOYED OUR OCTOBER ISSUE!
WE APPRECIATE YOUR QUEST AND LOVE FOR KNOWLEDGE ABOUT SPACE AND OUR GREATER COSMOS.

HAVE A TOPIC/DISCUSSION YOU WANT FEATURED?

Email observerreview@observerranch.com with a topic that you'd love to see an article written on!

