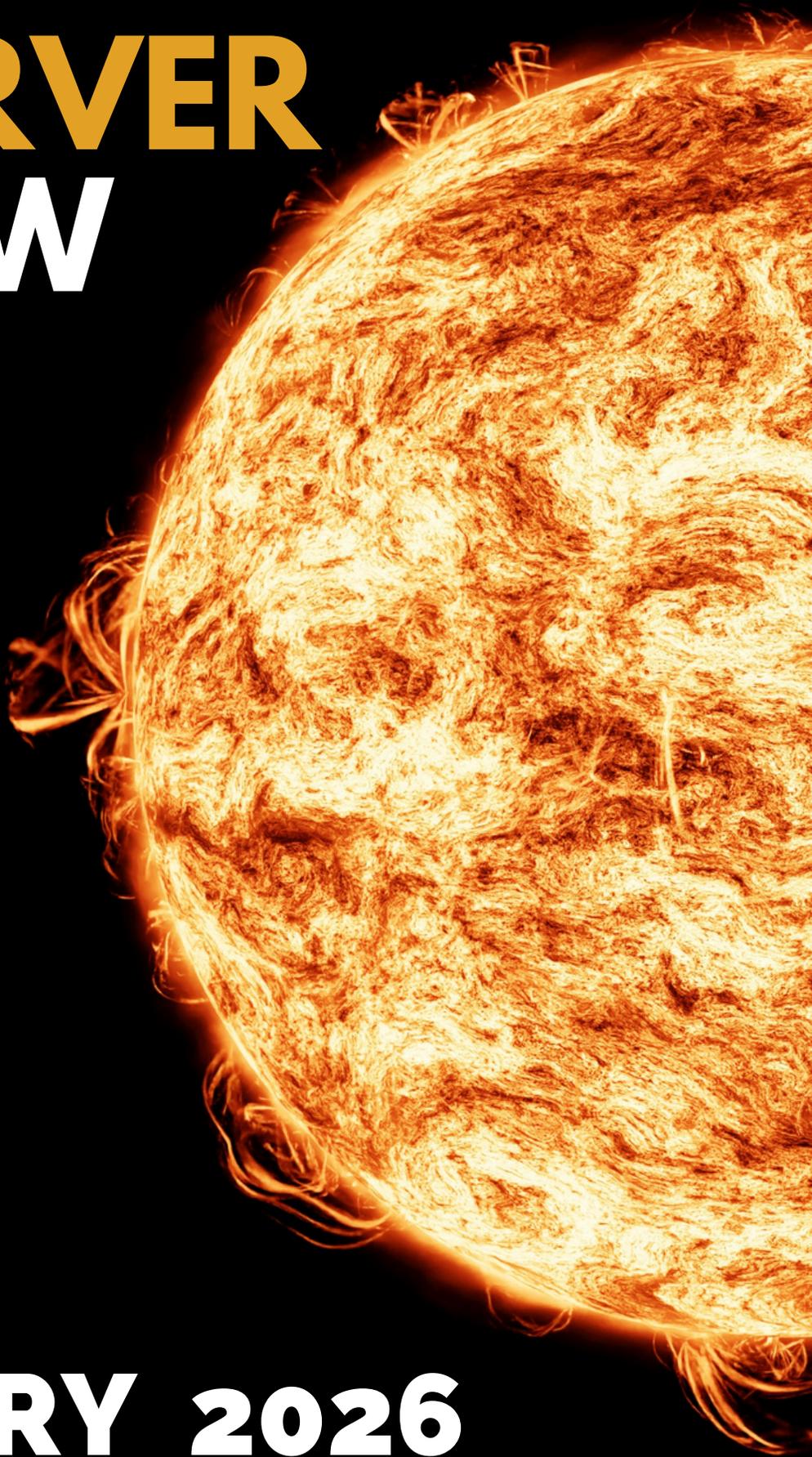


THE OBSERVER REVIEW



FEBRUARY 2026

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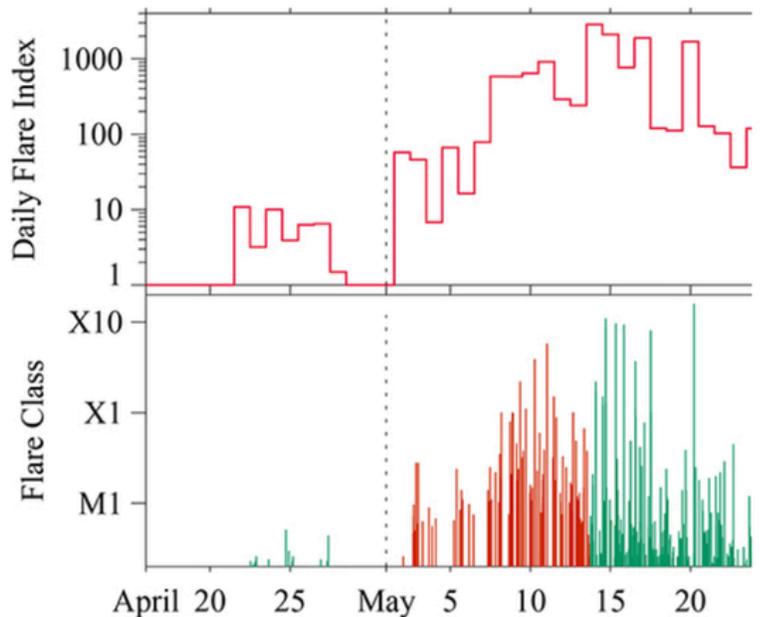
THE X16.5 THAT MISSED THE EARTH

BY: BEN DAVIDSON

ARTICLE REFERENCED:

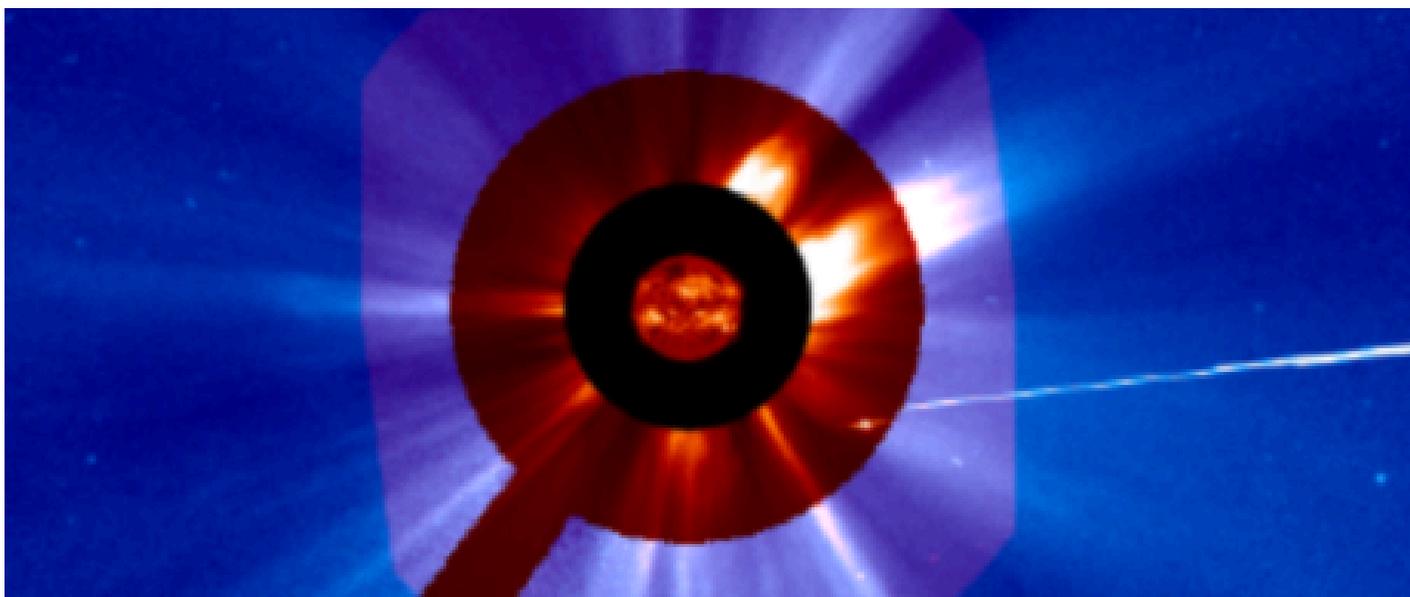
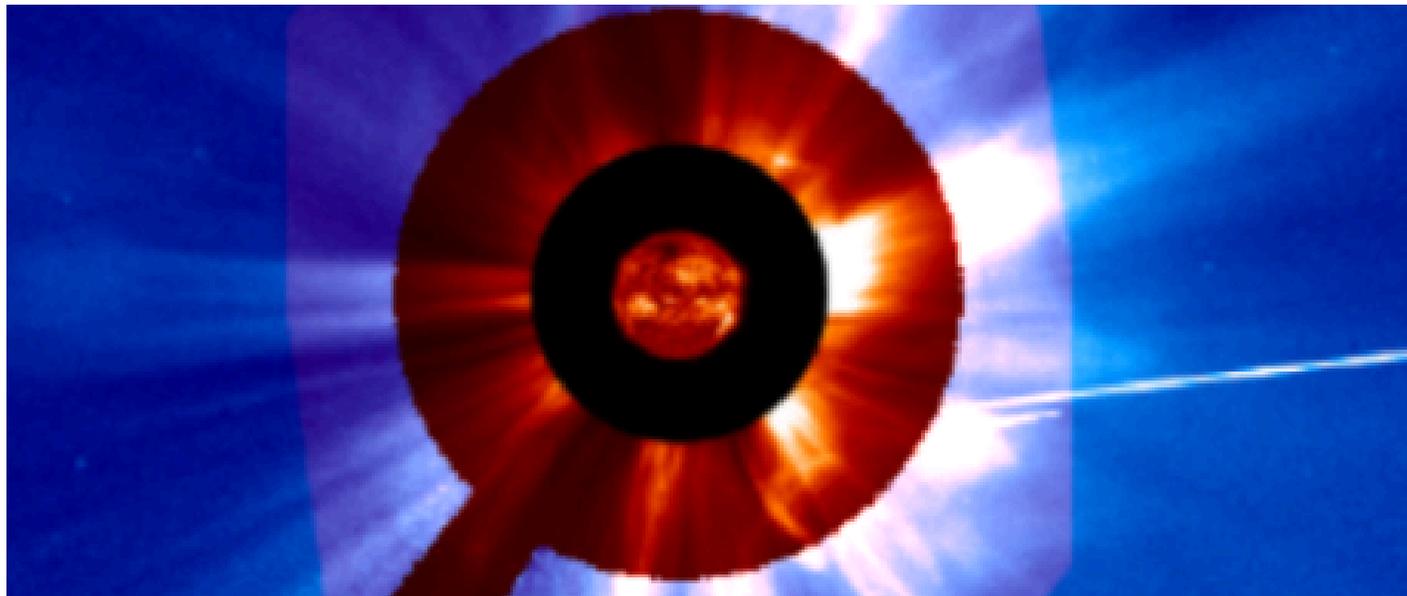
NEAR-CONTINUOUS TRACKING OF SOLAR ACTIVE REGION NOAA 13664 OVER THREE SOLAR ROTATIONS

One of the most-covered science stories of the last two years is the great solar superstorm of May 2024. A considerable fraction of our coverage has involved how the magnitude of the storm and the resulting auroral displays were far outsized based on what we would expect from the solar activity. This chart of flaring of that sunspot helps visualize that in a way we haven't seen before.



The solar flares that occurred on the half of the sun facing the earth are in red, and those that occurred after the sunspot rotated onto the farside of the sun are in green. The solar flares that were directed at earth took place on May 8th and 9th; even though some on the 10th through the 14th took place on the earth-facing half of the sun (red) they either did not produce coronal mass ejection plasma shockwaves, or they occurred near the side of the sun, facing 80 to 90 degrees away from earth, and those eruptions were not directed our way. The two largest peaks in red on May 10th did not strike earth. Those smaller red events produced a level 5 solar storm, with auroral displays that matched or exceeded the record event - the 1859 Carrington event superflare.

When you look at the green spikes it is obvious that we got very lucky. We're lucky that the biggest red spikes did not impact us, let alone the considerably larger events in green. Those green spikes mirror the 2003 Halloween solar storm, the last level 5 event, and yet what hit us in 2024 was much smaller, and produced an equivalent or stronger magnetic disruption, with equivalent or stronger auroral displays than the Carrington event, which was ~X100.



The side-by-side coronagraph images here show the near-solar space before and after the farside X16.5 solar flare that would have likely capped off a solar killshot sequence if it had faced earth.

Key Takeaways: The earth is considerably vulnerable to space weather compared to the past because of the ongoing geomagnetic excursion, and that sunspot produce killshot level events about 2 weeks too late to send us back to the stone age.

SOLAR FORCING OF POLITICS

ARTICLE REFERENCED:***THE SOLAR PENDULUM: WHAT IF THE SUN MODULATES OUR POLITICS?***

The Arab Spring unfolded across multiple nations in rapid succession. Latin America's "pink tide" saw left-leaning governments rise almost simultaneously across countries with distinct institutions and histories. European democracies oscillate between social democratic and conservative regimes in cyclical patterns that transcend borders.

These phenomena are typically attributed to globalization, economic contagion, or information diffusion. But an emerging question asks whether a deeper environmental driver exists in the background: solar forcing.

Three pathways are most relevant to political dynamics. The environmental pathway describes how solar variability influences climate oscillations, atmospheric circulation, and the probability of extreme weather, which in turn affects agriculture, food prices, migration patterns, and competition over resources. The neurobiological pathway reflects population-level correlations between geomagnetic disturbances and solar activity with shifts in melatonin regulation, circadian rhythms, cardiovascular stress, and mood disorders, shaping collective stress responses, social cohesion, risk tolerance, and aggression. The societal synchronization pathway captures how large-scale environmental and physiological changes occur simultaneously across continents, producing shared baseline conditions among populations that are otherwise culturally and politically distinct.

When agricultural systems destabilize, food prices rise. Food insecurity correlates strongly with civil unrest, protest frequency, and regime instability. The Arab Spring provides a modern example. Preceding the uprisings, global food prices reached record highs following droughts and grain shortages in multiple breadbasket regions. While the political triggers were local, the environmental stressors were globally synchronized. Solar-climate coupling offers one mechanism that could produce such synchronization.

Furthermore, one of the most puzzling features of political waves is their simultaneity. Countries with different media ecosystems, political institutions, and economic conditions often undergo similar ideological shifts at roughly the same time. Solar forcing provides a mechanism for synchronization that operates independently of national boundaries. Solar cycles and geomagnetic storms affect the entire planet simultaneously. If these forces influence climate variability, human physiology, and collective psychology, they create synchronized background conditions across populations.

SOLAR FORCING OF THE DOW

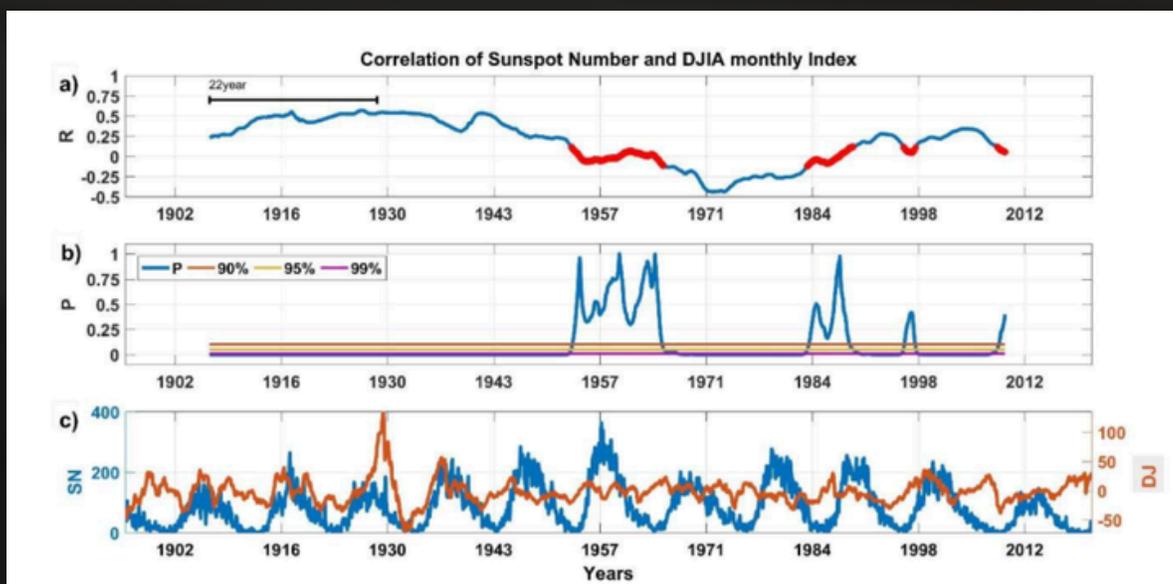
ARTICLE REFERENCED:

SOLAR ACTIVITY AND THE DOW JONES INDUSTRIAL AVERAGE

A 2026 study in *Georgian Scientists* revisits a long-standing but controversial question: does solar activity measurably influence financial markets, specifically the Dow Jones Industrial Average. Using more than a century of data and modern signal-analysis methods, the researchers identify recurring synchronizations between solar variability, cosmic rays, and market behavior that appear intermittently across time. The relationship is not stable or deterministic. It is episodic.

Sharp declines in the Dow often precede or accompany broader economic stress. If external geophysical drivers modulate human behavior, technological systems, or macroeconomic stability, the Dow is a logical signal to analyze.

The researchers examined monthly sunspot numbers, cosmic-ray measurements, and Dow Jones data spanning the late nineteenth century through 2021. To isolate cyclical patterns rather than long-term economic growth, they removed the upward trend in the market using an eleven-year moving average, matching the dominant solar cycle. From there, they applied sliding-window correlations, cross-correlation analyses, and wavelet coherence techniques designed to detect synchronization across time and frequency. These methods revealed that the relationship between solar activity and the market is not stable. Instead, it shifts in strength, timing, and even direction depending on the historical period. At times the correlation is weak, and at others it becomes statistically meaningful, particularly when examined at solar-cycle time scales.



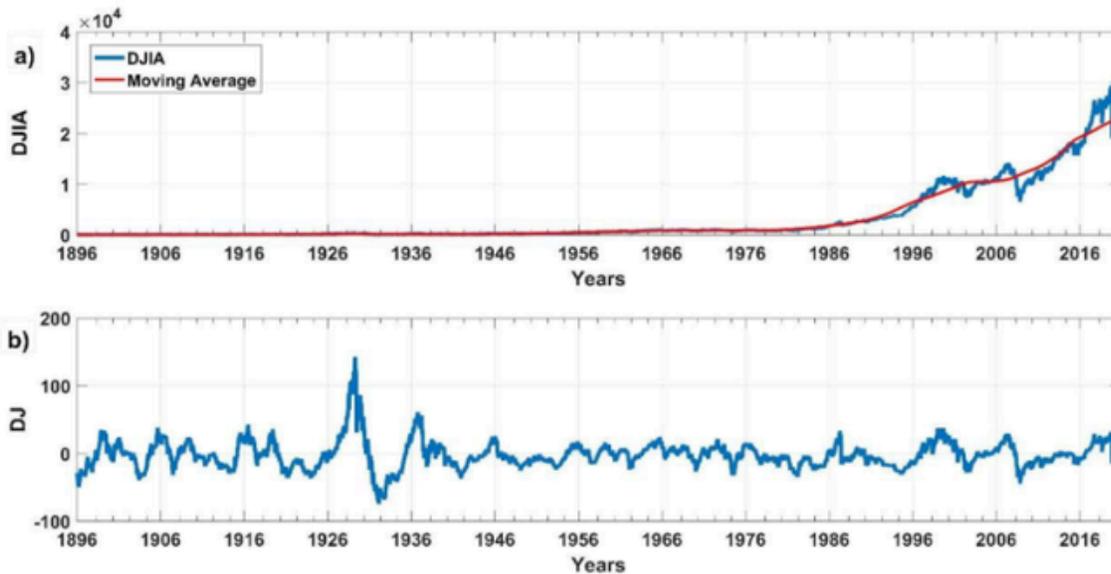


Fig. 1. DJIA data decomposition a) The DJIA (blue curve) and the moving average DJIA with an 11-year window (red curve); b) The detrended DJIA expressed as a percentage.

Across the full record, the statistical correlation between sunspots and market fluctuations was modest but highly significant, indicating that the relationship is unlikely to be random. More striking, however, were the time-localized periods when the connection strengthened.

IN THE EARLY TWENTIETH CENTURY AND AGAIN IN THE LATE TWENTIETH CENTURY, THE RESEARCHERS OBSERVED PRONOUNCED SYNCHRONIZATION BETWEEN SOLAR CYCLES AND MARKET FLUCTUATIONS, ESPECIALLY NEAR THE ELEVEN-YEAR PERIODICITY ASSOCIATED WITH SUNSPOT ACTIVITY.

During these intervals, coherence between the two signals exceeded thresholds typically considered meaningful in complex systems analysis. Outside those windows, the relationship weakened or reversed, underscoring its non-stationary nature. Multi-decadal patterns (around 30 years and 50–60 years) were also observed but require longer datasets to confirm.

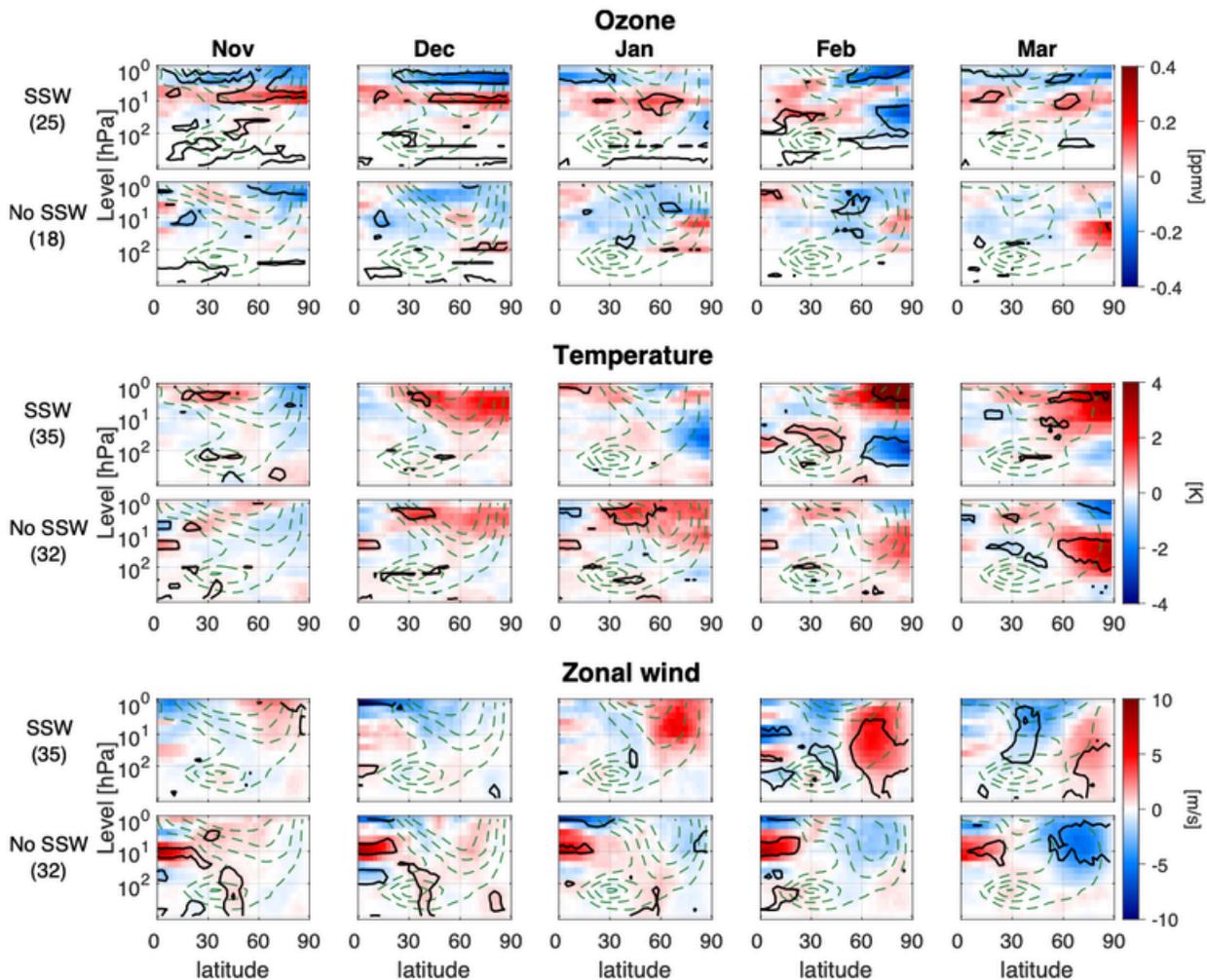
THE MOST IMPORTANT TAKEAWAY IS NOT THAT SOLAR ACTIVITY “DRIVES” THE MARKET, BUT THAT FINANCIAL SYSTEMS APPEAR INTERMITTENTLY SENSITIVE TO SOLAR-TERRESTRIAL CONDITIONS.

SOLAR FORCING OF THE POLAR VORTEX

ARTICLE REFERENCED:

[POLAR VORTEX EVOLUTION DURING SSWs INFLUENCED BY ENERGETIC ELECTRON PRECIPITATION](#)

Every winter, a massive ring of winds forms high above the Arctic. This system, known as the polar vortex, helps control the movement of cold air across the Northern Hemisphere. When it is strong, cold air stays locked near the pole. When it weakens or collapses, winter weather can spill south into North America, Europe, and Asia.



THE OBSERVER REVIEW

Using decades of atmospheric data and geomagnetic indicators, researchers tracked how particle precipitation, ozone, temperature, and wind patterns evolved before and after SSW events.

The study outlines a chain of atmospheric processes that begins with intensified solar wind driving higher geomagnetic activity. This enhances the precipitation of energetic electrons into the polar upper atmosphere, which increases reactive nitrogen species. Those compounds contribute to ozone depletion in the upper stratosphere and mesosphere, altering the region's temperature structure. As the thermal gradient shifts, wind balance and atmospheric wave propagation also change, ultimately influencing how the polar vortex recovers following a sudden stratospheric warming event.

And as we look more closely at Earth's constant interaction with particles from the Sun, some of these particles become trapped and guided by Earth's magnetic field toward the polar regions. When energetic electrons plunge into the upper atmosphere, they collide with atmospheric gases and trigger chemical reactions.

THOSE REACTIONS PRODUCE TWO FAMILIES OF REACTIVE COMPOUNDS:

ODD HYDROGEN (SHORT-LIVED, ACTS QUICKLY IN THE UPPER ATMOSPHERE)

ODD NITROGEN (CAN PERSIST FOR WEEKS DURING POLAR NIGHT)

The long-lived nitrogen compounds matter most here. During the dark Arctic winter, they can be transported downward into the upper stratosphere, Ozone is often discussed as "the ultraviolet shield," but in the winter polar stratosphere it also plays a major role in the heat balance.

When the researchers separated winters into two groups, a striking pattern emerged. The relationship between energetic electron precipitation and a stronger polar vortex showed up primarily in the winters that experienced sudden stratospheric warmings. In winters without these events, the relationship was weak or even reversed late in the season. This suggests that sudden stratospheric warmings are not just "noise" that hides the particle influence. Instead, they may be the moments when the atmosphere is most sensitive to it.

Furthermore, before a sudden stratospheric warming, higher energetic electron precipitation was linked to stronger wave convergence in the polar stratosphere.

Likewise, after the warming, higher energetic electron precipitation was linked to wave divergence that helps accelerate winds back toward the normal westerly state.

CLIMATE FORCING REALITY

ARTICLE REFERENCED:
LIVESTOCK, METHANE AND CLIMATE

AS WE KNOW, *ANNOYINGLY* METHANE EMISSIONS FROM CATTLE AND SHEEP ARE FREQUENTLY HIGHLIGHTED IN CONVERSATIONS ABOUT CLIMATE CHANGE.

A recent physics-based analysis set out to quantify this claim in concrete terms, asking a simple question: how much does methane from livestock actually change Earth's temperature?

Instead of relying on general assumptions, the researchers calculated atmospheric methane concentrations, how long methane remains in the atmosphere, and how this translates into radiative forcing and temperature change.

Ruminant animals such as cattle and sheep rely on a digestive process called enteric fermentation. Microorganisms in the rumen break down fibrous plant material and release methane as a byproduct. This methane is then emitted into the atmosphere.

AT THE MOLECULAR LEVEL, METHANE IS MORE EFFECTIVE AT TRAPPING HEAT THAN CARBON DIOXIDE. FOR EACH MOLECULE, METHANE PRODUCES SUBSTANTIALLY MORE RADIATIVE FORCING. HOWEVER, METHANE EXISTS IN FAR SMALLER CONCENTRATIONS THAN CO₂ AND PERSISTS IN THE ATMOSPHERE FOR A MUCH SHORTER TIME, TYPICALLY ABOUT A DECADE BEFORE IT BREAKS DOWN.

As the study concludes, "Absurdly small contributions to Earth's temperature are caused by the methane emissions of ruminant livestock." Methane contributes to this imbalance, but it is only one part of a much larger system that includes solar and geological influences as we know.

PRE-EARTHQUAKE ANOMALIES

ARTICLE REFERENCED:

PRE-SEISMIC IONOSPHERIC TOTAL ELECTRON CONTENT ANOMALIES ASSOCIATED WITH THE JUNE 28, 2023, EARTHQUAKE IN THAILAND

The research focused on the earthquake that occurred in Phitsanulok Province with a magnitude of 4.5. Scientists analyzed high-resolution satellite navigation data collected at one-second intervals over a fifteen-day period surrounding the event. Statistical analysis revealed abnormal behavior in ionospheric electron levels several days before the earthquake.

On June 23, five days prior to the rupture, a pronounced increase in electron concentration was observed. On the day of the earthquake, this increase was followed by a strong decrease. Both changes exceeded the normal statistical range of variation, indicating that the fluctuations were not part of typical background behavior.

These results align with a growing body of research showing that the ionosphere often responds to tectonic stress before earthquakes occur. As pressure builds along faults, microfractures form in the crust and gases can escape from underground.

Electrical properties of the ground begin to shift, and electric fields may develop near the surface. These changes can propagate upward through the lower atmosphere and influence the distribution of charged particles in the ionosphere. The result is a measurable alteration in electron density above regions preparing for seismic rupture.

Low-latitude regions such as Thailand may be especially sensitive to these processes. Atmospheric circulation, electrical currents, and ionospheric structure in these regions can amplify disturbances linked to tectonic stress. This makes continuous monitoring of ionospheric electron behavior particularly valuable in tropical seismic zones.

As we seen in past articles we've references, the pattern observed in Thailand follows a sequence seen in other pre-earthquake studies. In many cases, an increase in ionospheric electron levels appears days before the event, followed by a reduction as the system destabilizes near the moment of rupture.

THE SATURN SUPERSTORM

ARTICLE REFERENCED:

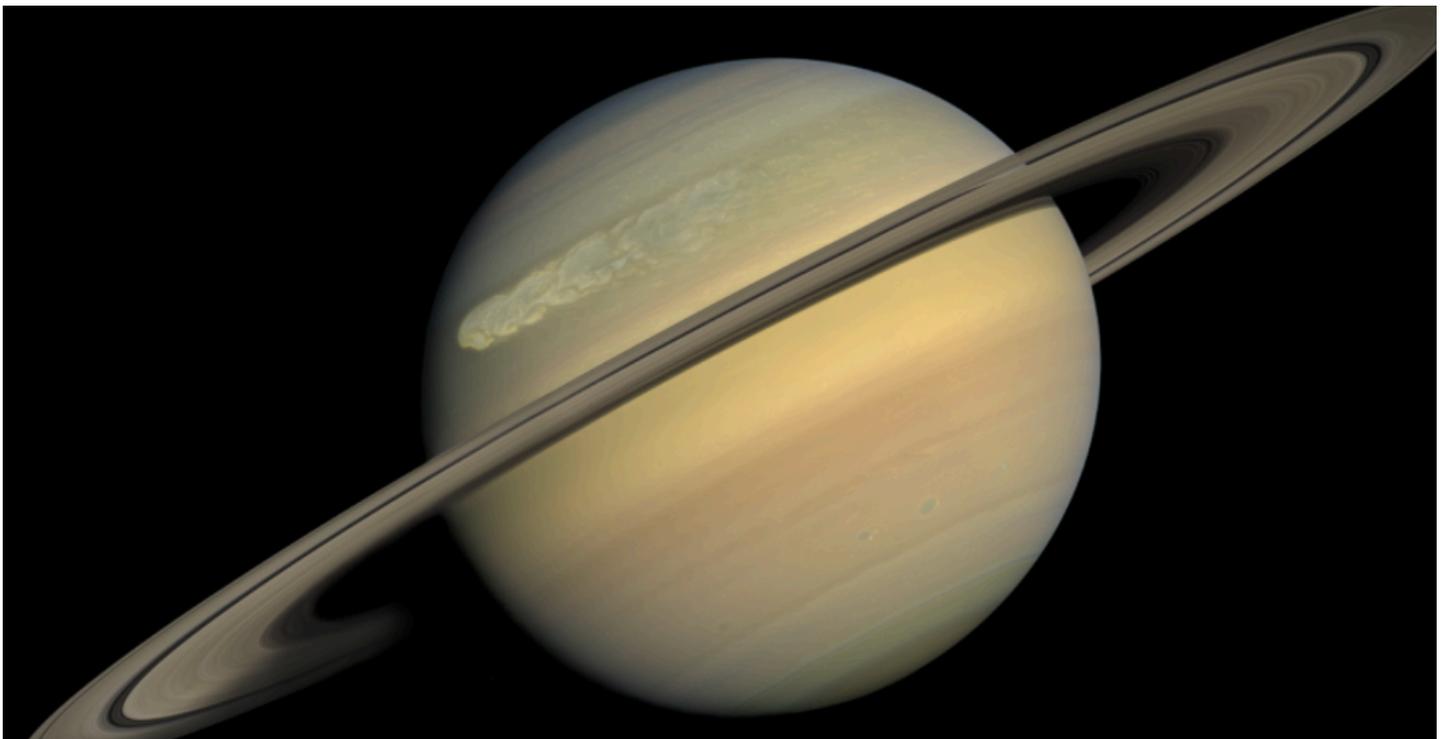
OBSERVATIONS OF THE TEMPORAL EVOLUTION OF SATURN'S STRATOSPHERE FOLLOWING THE GREAT STORM OF 2010-2011. II. LATITUDINAL DISTRIBUTION OF CO AND STRATOSPHERIC WINDS

BY: BEN DAVIDSON

The basics: The great Saturnian superstorm occurs ~ once every Saturnian year (29.5 years) at the perihelion point (closest orbital distance to the sun) when the solar energy is highest. The storms form ~every three decades since their discovery 150 years ago, with limited evidence for the existence of the ~30-year cycle going back at least to the 1810s.

The 2010 superstorm (pictured) arrived 10 years early, defying the physics expectation of every astronomer. A new study is also revealing that it was also the longest-lasting, had the strongest vortex, and had record lightning production.

Our explanation for this event is that it is part of the larger solar system shift. The early-arrival of the superstorm is resulting from a change in Saturn's magnetic field, which has allowed more solar energy to enter the system, triggering the storm early. This recent confirmation of the anomalous and powerful nature of the storm emboldens the growing mountain evidence for this magnetic shift throughout the solar system.



2025 WORLD MAGNETIC MODEL - EARLY DEGRADATION

ARTICLE REFERENCED:

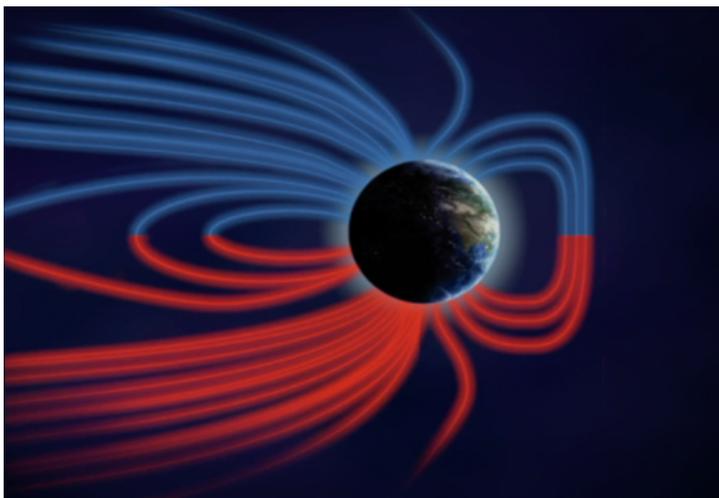
CANDIDATE GEOMAGNETIC FIELD MODELS FOR IGRF-14 AND SECULAR ACCELERATION SINCE 2020

BY: BEN DAVIDSON

The most important presentation at the AGU Fall Meeting 2026 has been officially published, the findings now confirmed, and the dramatic implications come back to mind. This study demonstrated that there was in fact a significant geomagnetic jerk and acceleration pulse across the 2022 to 2024 period, and that by the middle of 2026 the new 2026 world magnetic model had already sustained significant degradation.

This is the same type of degradation that caused the first-ever out-of-cycle update to the world magnetic model in 2019. It's never supposed to happen, and we are already well on track to see another one this cycle. The cause of the degradation is the magnetic pole shift moving faster than models accounted for. Not only have they predicted slow-downs the last several cycles, which haven't happened, but the accelerations are so dramatic that the models are exceeding acceptable error rates.

The 2015 model broke down a year early (2019) before the expected release in 2020, and the 2026 is entering that territory after just one year. The pole shift keeps accelerating.



THE NEXT GEOMAGNETIC JERK

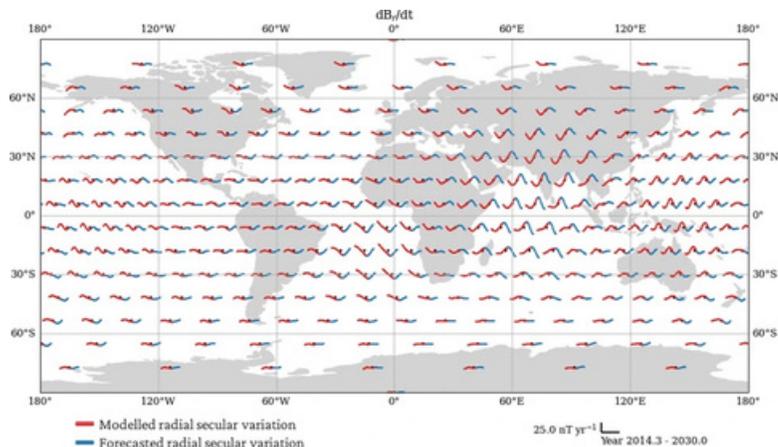
ARTICLE REFERENCED:

IGRF-14 SECULAR VARIATION PREDICTION FROM CORE SURFACE FLOW ACCELERATION

As we know, a geomagnetic jerk is a sudden change in the trend of Earth's secular variation, basically an inflection in how the core-driven magnetic field is changing from year to year. It usually shows up as a kink in the slope of geomagnetic secular variation records.

That is why the IGRF-14 secular variation problem is so interesting right now. The International Geomagnetic Reference Field has to provide a five-year forecast of IGRF-14 (2026–2030 for IGRF-14), even though IGRF-14 is not truly linear and is punctuated by these jerk-like inflections. The core issue is predictability: if the field were changing smoothly, a simple extrapolation would work. But the historical record shows forecast skill degrading within a few years, largely because it contains localized accelerations and abrupt inflections that linear methods cannot anticipate. The framing of the cited article represents a shift in how geomagnetic jerks are understood. For decades they were treated as anomalies that exposed the limits of linear forecasting. Now they are increasingly interpreted as surface signatures of hydromagnetic waves and oscillatory processes propagating along the core–mantle boundary. The candidate IGRF-14 model is built on that interpretation. By forecasting the oscillatory behavior of core flow acceleration, it attempts to capture the physical mechanism that produces jerks rather than smoothing those events away.

The forecast for 2024 through 2030 suggests that the coming years may provide a real-time test of whether the new approach captures the essential dynamics of secular variation. If the predicted inflections in the Pacific and central Africa emerge as observed jerk events, it would support the idea that the magnetic field's most abrupt changes are not random disruptions but expressions of underlying rhythmic processes in the core.



NORTH ATLANTIC ANOMALY

ARTICLE REFERENCED:

SPACE POLLUTION, NORTH ATLANTIC ANOMALY (NAA), ROCKET LAUNCHES, RE-ENTRIES MELTING POLAR ICE CAPS

BY: BEN DAVIDSON

There is now a North Atlantic Anomaly (NAA) in addition to the well-known South Atlantic Anomaly (SAA). The NAA consists primarily of an ozone hole in the northern Atlantic region, opposite of the equator to where the SAA is found. A new paper is discussing a potential cause and forecast for the anomaly, and I fear it is dramatically incorrect.

The study suggests that spacecraft and satellite particles that have burned up could be reducing the ozone in these areas, with a rather flimsy explanation for how it would be so concentrated in just one area. These explanations of causation and atmospheric gymnastics are both unconvincing.

The SAA weak spot in earth's field, where extra space particles are already coming into the atmosphere, shows reduced ozone during enhanced flux events, and the same should be true in the northern hemisphere, only with the opposite charge particles. Both electrons and protons destroy ozone, but their penetration dynamics are different in the northern vs southern fields.

The correct answer is that this is a relatively expected next-sign in the sky of the spread and deepening of the SAA as part of the larger weakening magnetic field and the ongoing magnetic pole shift.



SPACE RADIATION AND AIRLINES

ARTICLE REFERENCED:

ENHANCED RADIATION EXPOSURE OF AIRLINE CREW AND PASSENGERS DURING THE MAY 2024 GEOMAGNETIC STORM

BY: BEN DAVIDSON



Based on the usually ionospheric events taking place regularly now, and a recent study reporting enhanced radiation at airline altitudes during the May 2024 solar superstorm, we are officially releasing guidance on space weather flight safety.

Currently, there are only procedures in place to reroute flights from the polar region during SEP (proton) storms of level 3 and higher. We suggest that during a level 5 proton storm, it may not be safe to fly anywhere.

This same caution applies to the highest (level 5) geomagnetic storms as well (Kp9). Additionally, during Kp8 events it may not be safe to fly in the polar region, even if no re-routing is officially taking place due to proton counts.

These specific guidances are not endorsed by the FAA and no action is planned or even contemplated for these other events, in this nature or any other. When needing to get on an airplane, you need to be aware of space weather conditions.



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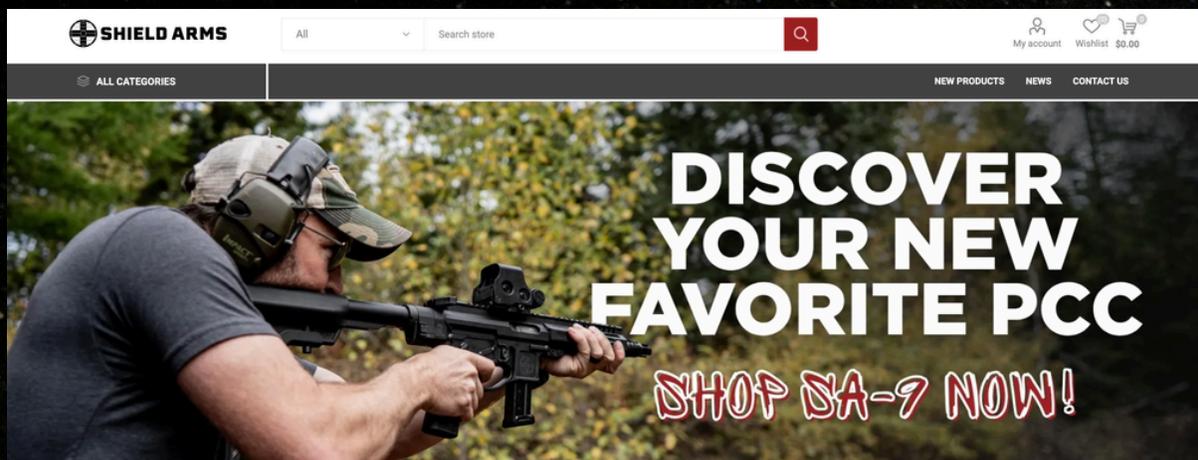
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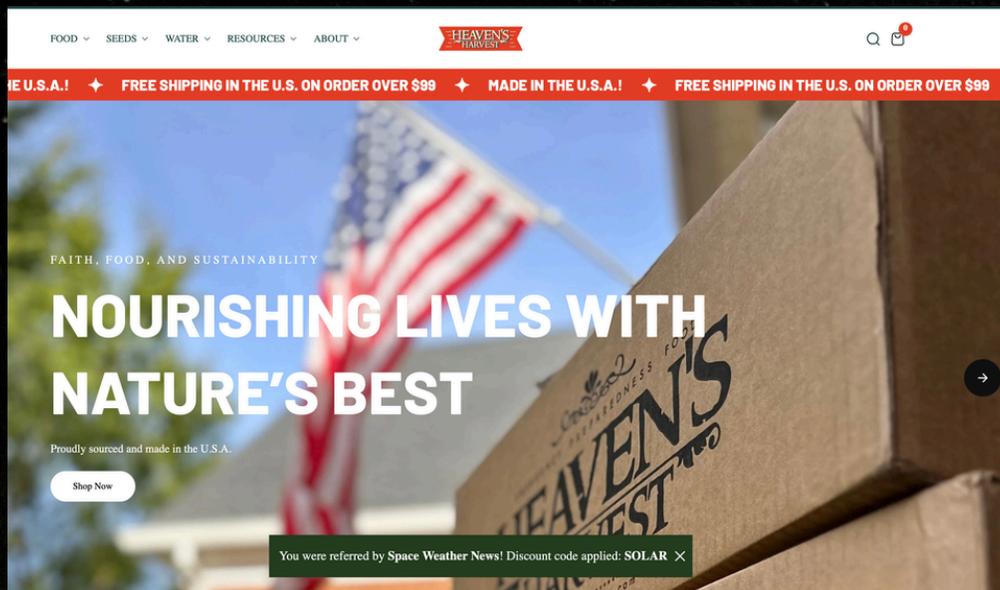
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ABOUT SPACE AND OUR GREATER COSMOS.**

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