☑ **Fact-Checked Science**

EVIDENCE REVIEW · S0 NEWS, 20 OCTOBER 2026

S0 News, October 20, 2026: Earth's field far above the lab's, no pole shift under way

On October 20, 2026, S0 News presented four papers on magnetic fields and living things as evidence that an "ongoing magnetic pole shift" is taking Earth toward the near-zero fields of the laboratory, with America "losing protection" fastest [1 00:00:17–00:03:02]. Our four paper checks cover the papers themselves. This page checks the frame around them: how weak the laboratory fields are beside today's field [3 Table 1], how fast the field is changing [2 §3][5], what the magnetic poles are doing [3 §1.6][4 p. 12], what animals do when a field changes, and the episode's Iceland and Masaya items.

By Fact-Checked Science · Published October 21, 2026 · Updated October 26, 2026

OUR ANALYSIS marks our own reasoning and calculations, and the verdicts are our assessment. Everything else comes from the numbered sources. For the episode [1], times are positions in the video; for the reports [3] and [4], p. gives a page and § or Table a section or table; for the papers, Abstract, Introduction, Methods, Results and Discussion name their sections.

Real papers, a frame the measurements don't support

OUR ASSESSMENT

5–13×
Our analysis: Earth's surface field, 23–67 μT, divided by the 5 μT below which the papers' authors call a field hypomagnetic [3 Table 1][17 Introduction]. The episode's three hypomagnetic experiments used 0.14 to 1 μT.

−128 nT/yr
The largest fall in field strength forecast for 2025–2030 is over North America, which our own calculation reproduces; at the cities we evaluated the field is still 43,000–55,000 nT [2 §3][5].

31 km/yr
The north magnetic pole's forecast speed in 2027, down from 56 km/yr in 2002: a drift that is slowing, not a pole flip [2 §3].

THE EPISODE'S CLAIMS

FALSE

Earth is entering lab-like low field strength

"Low field strength like we're entering as Earth's magnetic field is tanking" [1 00:02:15–00:02:19]

The episode's three hypomagnetic papers used 143 nT, 0.29 μT and below 1 μT, about 50 to 350 times less than the fields their subjects live in [15 p. 4][17 Results][14 Methods]; Earth's surface field is 23–67 μT [3 Table 1]. The axial dipole has lost about 9% since 1840 [9], the full dipole is forecast to lose 5.4% a century, and on a straight line it would take about 1,500 years to reach 5 μT. The field is "probably not reversing" [10], and our review of the forecasts found no excursion expected for centuries. See section 2 and section 3.

MISLEADING

America is losing protection from Earth's field the fastest

"America is losing protection from Earth's magnetic field the fastest in this ongoing pole shift" [1 00:02:49–00:02:55]

The rate part holds: IGRF-14 models the largest fall in field strength over North America, −128 nT a year, and our grid agrees [2 §3]. But that is 0.27% a year in a field of 43,000–55,000 nT, about twice the South Atlantic minimum, and in proportion the anomaly's eastern lobe falls faster, 0.40% a year; shielding from cosmic rays depends on the whole field and the atmosphere, not the strength over one country [12]; and no pole shift is under way. See section 4.

MISREAD

The bat study confirms forecast navigational failures

"this is confirmation of the widespread across up and down the animal kingdom navigational failures forecast during this magnetic pole shift" [1 00:02:02–00:02:13]

The preprint tests whether migrating bats need light to find their heading; it says nothing about pole shifts, reversals or failures [18 Abstract]. Bird compasses re-tune to 4 μT [21], bats orient at 10 μT and with reversed polarity [22], and the disruptions on record come from geomagnetic storms [30][31]. See section 6.

MISLEADING

A magnetic pole shift is under way

"the electromagnetic environment of Earth is changing in the ongoing magnetic pole shift" [1 00:00:24–00:00:27]

The north dip pole drifts toward Siberia and is slowing: 56 km/yr in 2002, 36 in 2025–2026, 31 forecast for 2027 [2 §3][4 p. 12]. The dipole loses about 5% a century [9]. That is ordinary secular variation; the field is "probably not reversing" [10], and no excursion is expected for centuries. See section 5.

MISLEADING

Masaya's magma is moving and warnings are flying

"significant magma movement beneath a Nicaraguan volcano … Warnings flying, scientists checking data" [1 00:01:16–00:01:31]

The study is a satellite record of ground motion from January 2018 to February 2024, with inflation from mid-2022 read as new magma supply [40 Abstract]. The university's release says the researchers did not identify immediate dangers to the 2 million people nearby [39]. See section 7.

OVERSTATED

Iceland's volcanoes often wake within a month of a magnitude-5 quake

"five pointers in Iceland get my attention. It's often less than a month before their volcanoes wake back up after quakes of this magnitude" [1 00:01:04–00:01:13]

One M 5.3 struck the Bárðarbunga caldera on October 19 [35][36][37]. The rule has a basis in Iceland's rifting episodes: M 5-class quakes came five days before the 2014 Holuhraun eruption and 23 days before the 2021 Fagradalsfjall eruption [43][44 Abstract][35]. But the Met Office says such quakes "occur regularly" in this caldera, the last on October 5 and July 28 [36]; the volcano last erupted in 2015, and swarms in January 2025 and June 2026 ended without eruptions [37]. "Often" claims much more than the record supports. See section 7.

1 · THE EPISODE

Four papers, one frame

The episode of October 20, 2026, ran three and a half minutes and linked five items: a Penn State release on Masaya volcano and four papers on magnetic fields and living things, three of them preprints and one a conference abstract [1]. The presenter introduced them under a premise he returned to three times: an ongoing magnetic pole shift [1 00:00:24–00:00:27].

In the episode's words

Quoted from the automatically generated transcript. "hippocample activity" and "the locus curerilius" are its renderings of hippocampal activity and the locus coeruleus.

> *"today we're going to hit the sun, earthquakes, volcanoes, and four papers that hit the electromagnetic interaction of living beings with the environment. All relevant as the electromagnetic environment of Earth is changing in the ongoing magnetic pole shift."*
>
> S0 News [1 00:00:17–00:00:29]

> *"Up next we've got a triple on hypomagnetic fields. Low field strength like we're entering as Earth's magnetic field is tanking. all hit the wild surge in reactive oxygen species and brain impact, neurogenesis, hippocample activity, and the locus curerilius."*
>
> S0 News [1 00:02:13–00:02:28]

> *"I'm sure it's just a coincidence that America is losing protection from Earth's magnetic field the fastest in this ongoing pole shift. And we appear to be losing our damn minds. But from San Antonio to Shanghai, there is no escaping this eventually."*
>
> S0 News [1 00:02:47–00:03:02]

The four papers, and what the episode made of them

Mole-rats in a near-zero field

WHAT IT IS

A bioRxiv preprint, not peer reviewed, from a Bonn-led team: a whole-brain screen of neural activity in Ansell's mole-rats, subterranean mammals with a well-studied magnetic sense, using a new imaging pipeline [14 Abstract].

WHAT IT MEASURED

Maps of neural activity (c-Fos) after 72 minutes in a changing field or in a near-zero field, below 1 μT, about 2% of the local field, and whether the animals would enter a near-zero zone [14 Methods][14 Results].

WHAT IT FOUND

The near-zero field, not the changing one, activated areas involved in stress and anxiety, among them the amygdala and the periaqueductal grey, and mole-rats avoided a near-zero zone [14 Abstract].

WHAT THE EPISODE SAID

One of "a triple on hypomagnetic fields" that "all showed that when you take away the magnetic field, the brain stops working right" [1 00:02:13–00:02:37].

In our check of Zhang et al. (2026), the stress-circuit result is partly supported and the avoidance result supported; the episode's "surge in reactive oxygen" is misread, "the brain stops working right" overstated, and effects that "compound" over time unsupported.

Six volunteers in a 350-fold weaker field

WHAT IT IS

A Research Square preprint, not peer reviewed, from Moscow's Institute of Biomedical Problems, part of the SIRIUS year-long isolation experiment [15 Abstract].

WHAT IT MEASURED

Heart-rate variability, blood pressure and skin blood flow (laser Doppler) in six healthy volunteers, two men and four women, under a field the "Arfa" coil system held at 143 ± 32 nT, 350 times below the local field [15 p. 4][15 Abstract].

WHAT IT FOUND

Lower parasympathetic and higher sympathetic activity, higher heart rate and blood pressure, and altered oscillations in skin microcirculation; the authors say the data "suggest a potential increase in oxidative stress" [15 Abstract].

WHAT THE EPISODE SAID

"The chemical army in your blood isn't working right" [1 00:02:41–00:02:43].

In our check of Popova et al. (2026), the reactive-oxygen "surge" and the blood-chemistry claim are misread, the compounding claim unsupported, and even the authors' own conclusion of sympathoadrenal activation overstated for six people.

Mice without a field: an abstract, and the papers behind it

WHAT IT IS

A conference abstract for the EGU General Assembly 2026, not peer reviewed, from the Beijing biogeomagnetism group, summarising its mouse studies; the main one was published in 2021 [16 Abstract][17].

WHAT IT MEASURED

New neurons in the hippocampus, memory tests and reactive oxygen species in male mice kept for eight weeks in 0.29 μT, 1/190 of Beijing's field [17 Results].

WHAT IT FOUND

Fewer new neurons and poorer memory, with less reactive oxygen in the neural stem cells and more across the hippocampus after eight weeks [17 Abstract][17 Results]. The abstract adds suppressed mitochondrial respiration and chronic neuroinflammation, for which our check found no published measurement [16 Abstract].

WHAT THE EPISODE SAID

"neurogenesis, hippocampe activity"; "The mitochondria aren't working right. The waste removal system isn't working right" [1 00:02:24–00:02:41].

In our check of Ren et al. (2026), the neurogenesis and memory result is true in mice, the reactive-oxygen "surge" misleading, "the brain stops working right" overstated, and the compounding claim partly true.

Bats steering in total darkness

WHAT IT IS

A bioRxiv preprint, not peer reviewed, from an Oldenburg-led team with the Bat Research Society of Latvia: wild Nathusius' pipistrelles caught on migration at a major flyway [18 Abstract].

WHAT IT MEASURED

Take-off direction in a circular arena after acclimation to starlight-level light or to verified total darkness, with take-off latency recorded as a control for the animals' state [18 Abstract].

WHAT IT FOUND

Bats took off south-west, their migratory direction, in starlight and in darkness after starlight acclimation, with mean headings 11° apart. The authors argue the magnetically sensitive molecule must form without light, unlike the light-dependent compass described in birds [18 Abstract].

WHAT THE EPISODE SAID

"the mammals do not use the same light activated magnetic compass birds do. But more importantly this is confirmation of the widespread across up and down the animal kingdom navigational failures forecast during this magnetic pole shift" [1 00:01:57–00:02:13].

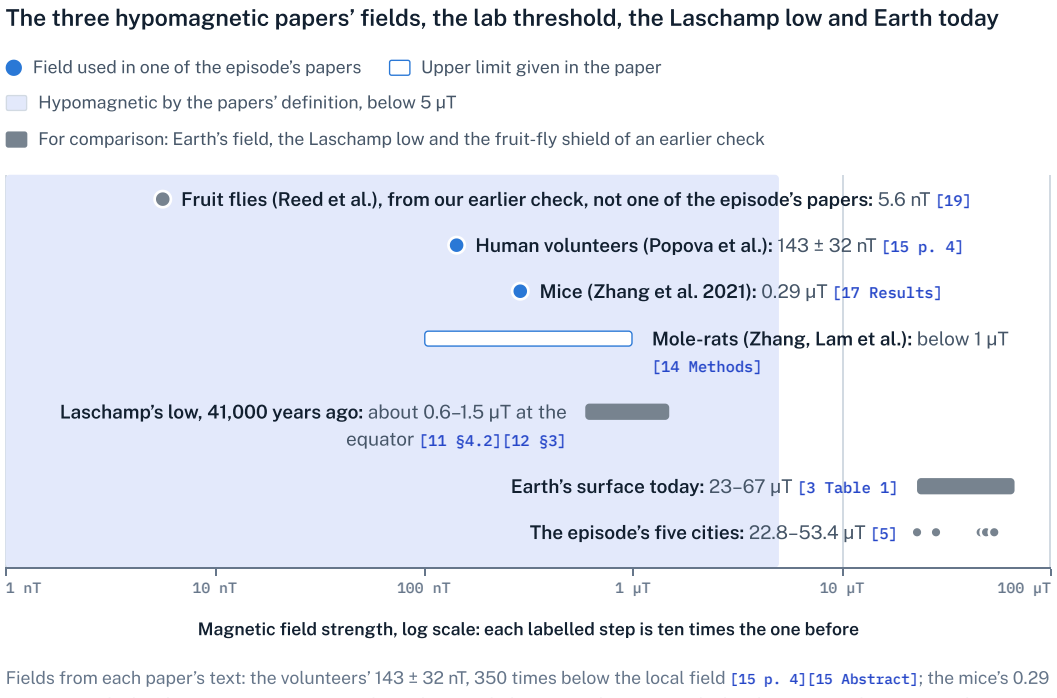
In our check of Cellarius et al. (2026), the darkness result is true and the "no bird-style light compass" claim partly true; the pole-shift "confirmation" is misread, and the episode's "eight different things in the plant life cycle" could not be verified.

2 · THE LABORATORY AND THE PLANET

The episode's laboratory fields are 50 to 350 times weaker than Earth's

A field counts as hypomagnetic below 5 μT in the papers' own definition [16 Abstract][17 Introduction]; the episode's three hypomagnetic experiments go far below that. Earth's field at the surface runs from about 23 μT near the equator to 67 μT near the magnetic poles [3 Table 1]. Nothing on Earth today is within a factor of four of the threshold.

The three hypomagnetic papers' fields, the lab threshold, the Laschamp low and Earth today



Fields from each paper's text: the volunteers' 143 ± 32 nT, 350 times below the local field [15 p. 4][15 Abstract]; the mice's 0.29 μT, 1/190 of the local 55.26 μT [17 Results]; the mole-rats' "below 1 μT", about 2% of the local 44.7 μT, with no exact value given [14 Methods]; and, for comparison only, the 5.6 nT shield of the fruit-fly study checked earlier on this site, which the episode did not show [19]. The hypomagnetic threshold is the Beijing group's definition [16 Abstract][17 Introduction]. Laschamp's low is the dipole at 2–5% of today's in global field models, converted by us to the field at the equator; the surface field then fell below 1 μT in places [11 §4.2][11 §4.6][12 §3]. Earth's surface range is from the World Magnetic Model report [3 Table 1]; the five cities, from IGRF-14 (our analysis), are São Paulo 22.8, Johannesburg 28.2, San Antonio 45.8, Shanghai 49.2 and Ottawa 53.4 μT [5].

EARTH'S FIELD AGAINST THE 5 μT THRESHOLD

OUR ANALYSIS

5–13×

23,000 nT ÷ 5,000 nT ≈ 4.6; 67,000 ÷ 5,000 ≈ 13 [3 Table 1][16 Abstract]. Even the weakest point on Earth, 22,071 nT in north-eastern Argentina, is 4.4 times the threshold [2 §3].

AGAINST THE MOUSE STUDIES' 0.29 μT

OUR ANALYSIS

80–230×

23,000 ÷ 290 ≈ 79; 67,000 ÷ 290 ≈ 231 [17 Results]. At the five cities the episode names, 79 to 184 times.

AGAINST THE VOLUNTEERS' 143 NT

OUR ANALYSIS

160–470×

23,000 ÷ 143 ≈ 160; 67,000 ÷ 143 ≈ 470 [15 p. 4]. The mole-rats' "below 1 μT" gives at least 23–67× [14 Methods]. The fruit-fly shield of our earlier check, 5.6 nT, would give 4,000–12,000× [19], but the episode did not show that study.

The episode's three papers remove 98% to 99.7% of the field their animals or volunteers live in. "Like we're entering" would need Earth's field to fall to a fiftieth of today's at the least; section 3 gives the arithmetic for how long that would take.

3 · THE DECLINE

At today's pace the dipole would take about 1,500 years to reach 5 μT

The axial dipole, the main part of Earth's field, is about 9% weaker than in 1840 [9]; the full dipole, which also counts the tilted part, is 7.6% weaker than in 1900 by our calculation from IGRF-14, and the axial part alone 7.0% [5]. The IGRF-14 paper forecasts that it will "continue to fall in strength over the next five years and weaken relative to the non-dipolar contributions" [2 §3]. Continued in a straight line, that pace reaches the laboratory in the fourth millennium.

LOST SINCE 1840

9%

the dipole's decline over 175 years, from 1840 to about 2015, roughly 5% a century, from Finlay and colleagues' analysis of the historical record [9]; ESA said in 2020 that over the last 200 years the field had "lost around 9% of its strength on a global average" [42].

FORECAST PACE, 2025–2030

OUR ANALYSIS

16 nT/yr

16.2 nT a year in the full dipole's equatorial field of 29,733 nT: 0.054% a year, 5.4% a century, from the IGRF-14 coefficients and their forecast rates [5]. For the axial dipole alone, the measure Finlay and colleagues use, the forecast is 12.6 nT a year against their 1840–2010 average of 16 [5][9].

DIPOLE MOMENT, 2025

OUR ANALYSIS

7.69×10^{22} A m^2

computed as the IGRF-14 paper defines it, from the three degree-1 coefficients; 8.32×10^{22} in 1900 and 7.67×10^{22} forecast for 2030 [2 §3][5].

OUR ANALYSIS

How long a straight line takes

Take the dipole's equatorial field in 2025, 29,733 nT, and continue the forecast fall of 16.2 nT a year without change. The 5 μT threshold (5,000 nT) is 24,733 nT away: 24,733 ÷ 16.2 ≈ 1,530 years, about AD 3550. The mole-rat study's 1 μT is 1,770 years away, about AD 3800; Laschamp's low, 5% of today's dipole, 1,740 years, about AD 3770; zero, 1,840 years, about AD 3860, which matches the "within 1,900 years" Finlay and colleagues give for the axial dipole at its average pace [9]. At the full dipole's fastest five-year pace since 1945, 27.8 nT a year in 1980–1985, the threshold is still about 890 years away [5].

Halving the dipole, the level at which past excursions began, takes about 920 years at the forecast pace, about AD 2940. Our review When is the next magnetic excursion due? runs five projections, including an exponential speed-up, and finds none that halves it before about AD 2280.

Years from 2025 to each level, on a straight line

PACE OF DECLINE	HALF OF TODAY	5 μT (LAB THRESHOLD)	1 μT (MOLE-RAT STUDY)	LASCHAMP'S 5%
16.2 nT a year, the full dipole's 2025–2030 forecast	918 (AD 2943)	1,527 (AD 3552)	1,774 (AD 3799)	1,744 (AD 3769)
16 nT a year, the axial dipole's 1840–2010 average	929 (AD 2954)	1,546 (AD 3571)	1,796 (AD 3821)	1,765 (AD 3790)
27.8 nT a year, the full dipole's fastest five-year pace since 1945 (1980–1985)	535 (AD 2560)	890 (AD 2915)	1,034 (AD 3059)	1,016 (AD 3041)

Our analysis from the IGRF-14 degree-1 coefficients and their 2025–2030 forecast rate [5]; the 16 nT a year is Finlay and colleagues' average for the axial dipole [9], applied here, like the other two paces, to the full dipole's 29,733 nT. A straight line is a device for scale, not a forecast: the full dipole's pace has swung between 8 and 31 nT a year since 1900, and nothing requires it to hold.

The one precedent: the Laschamp excursion

About 41,000 years ago the dipole fell to roughly 2–5% of today's in global field models, and the surface field was weak everywhere, below 1 μT in places [11 §4.2][11 §4.6][12 §3]. That is the only time in the geological record that resembles the laboratory, and the low lasted between a few centuries and a thousand years [11 §4.2]. Larsen and colleagues compute that the loss of shielding then would raise cosmic-ray doses on low-latitude flights while leaving some high-latitude routes better shielded [12 Abstract].

Our evidence review When Earth's magnetic field falters covers the excursion record and today's field.

What geomagnetists expect

Brown and colleagues compared today's field with the two best-recorded excursions and concluded that it is "probably not reversing" [10]. Our review of the forecasts, When is the next magnetic excursion due?, found no geomagnetist expecting an excursion within the next few centuries, and some who read today's field as a possible early stage of one much later.

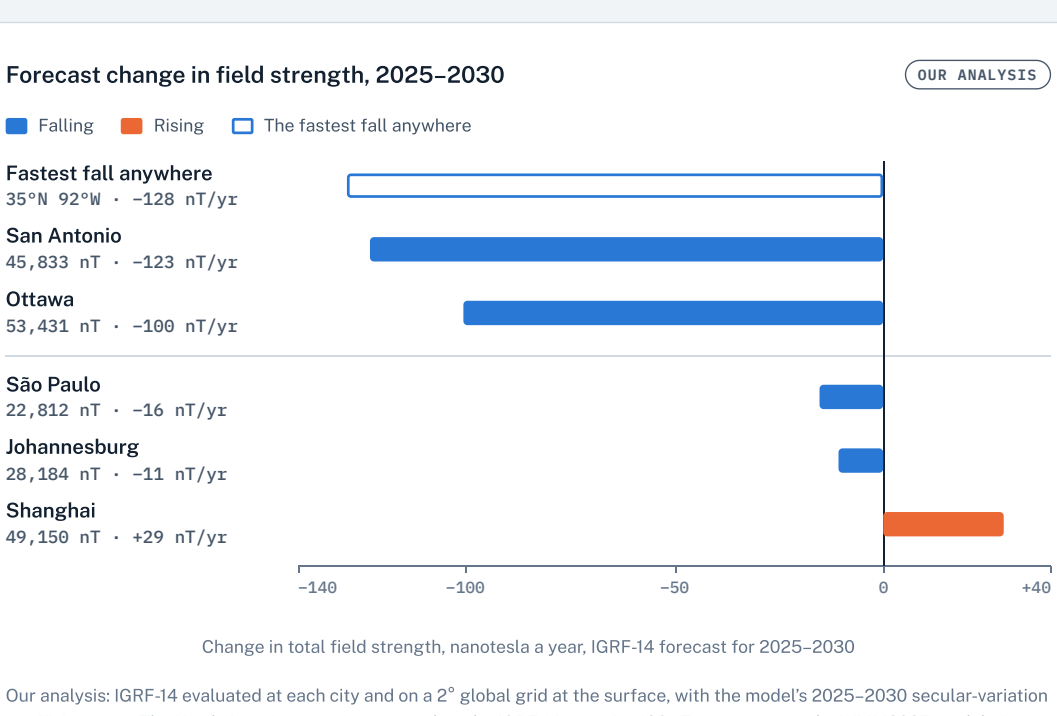
4 · WHERE THE FIELD IS FALLING FASTEST

The surface field is falling fastest over North America in nanotesla, 0.27% a year; in proportion, the South Atlantic lobe leads

Here the episode has a point. Describing its maps of predicted change for 2025–2030, the IGRF-14 paper says: "The largest changes in field strength (dF/dt) are modeled in North America (of -128 nT/yr) while the Indian Ocean also has a variation of 104 nT/yr" [2 §3]. Our own evaluation of the model reproduces both numbers. In proportion to the local field, though, the South Atlantic Anomaly's eastern lobe falls faster.

Forecast change in field strength, 2025–2030

OUR ANALYSIS



Our analysis: IGRF-14 evaluated at each city and on a 2° global grid at the surface, with the model's 2025–2030 secular-variation coefficients [5]. The North American maximum matches the IGRF-14 paper's −128 nT a year [2 §3]; the WMM2025 model gives −126 in the next grid cell [7]. Code and numbers in section 9.

OUR ANALYSIS

On the grid, the contiguous United States averages −115 nT a year, Canada −78, Central America and the Caribbean −99, South America −44 and the South Atlantic −47; Europe and East Asia are rising, by 43 and 30. Only 0.6% of Earth's surface is forecast to lose field strength faster than San Antonio.

In proportion to the field, the anomaly's eastern lobe leads: at 35°S 0°E, 95 nT a year from 23,931 nT is 0.40% a year, while North America's steepest relative fall is 0.28% at 25°N 84°W; Miami, at 0.28%, and Bogotá, at 0.27%, match or exceed San Antonio [5]. The fastest fall in nanotesla is not where the field is weakest: the anomaly's minimum, in north-eastern Argentina, deepened by about 30 nT in 2025 [4 p. 3][4 Table 4], and São Paulo changes by 16 nT a year [5].

What the model-makers report

The World Magnetic Model team, from Swarm satellite data at 450 km for 2019–2024, found "the most pronounced decrease occurring near the Caribbean region, amounting to approximately 406 nT over the five-year period", with the decrease in field strength "most pronounced in the NW and SW edges" of the South Atlantic Anomaly [3 §1.7 p. 21].

ESA's Swarm team reports that since 2014 "the magnetic field over Siberia has strengthened while it has weakened over Canada. The Canadian strong field region has shrunk by 0.65% of Earth's surface area, which is almost the size of India" [8], the change that has been pulling the magnetic pole toward Siberia [13].

OUR ANALYSIS

What "losing protection" would mean

The field over North America is among the strongest at the surface, 43,000–55,000 nT at the cities we evaluated, about twice the South Atlantic minimum [5]. A loss of 123 nT a year is 0.27% a year. The field over San Antonio has already fallen from 54,280 nT in 1900 to 45,833 nT in 2025, with today's pace about twice the century's average [5].

Protection is the wrong word for a local surface value. The field's shielding against cosmic rays is set by the field as a whole, through the cut-off rigidity that Larsen and colleagues compute for a global model [12 Abstract], and at ground level most of the shielding is the atmosphere. The South Atlantic Anomaly matters because it "affects how closely energetic charged particles can reach the Earth, which impacts satellite radiation damage and radio propagation" [4 p. 13]: a satellite's problem, not a Texan's. Nothing ties the local rate to "losing our damn minds" [1 00:02:55–00:02:58].

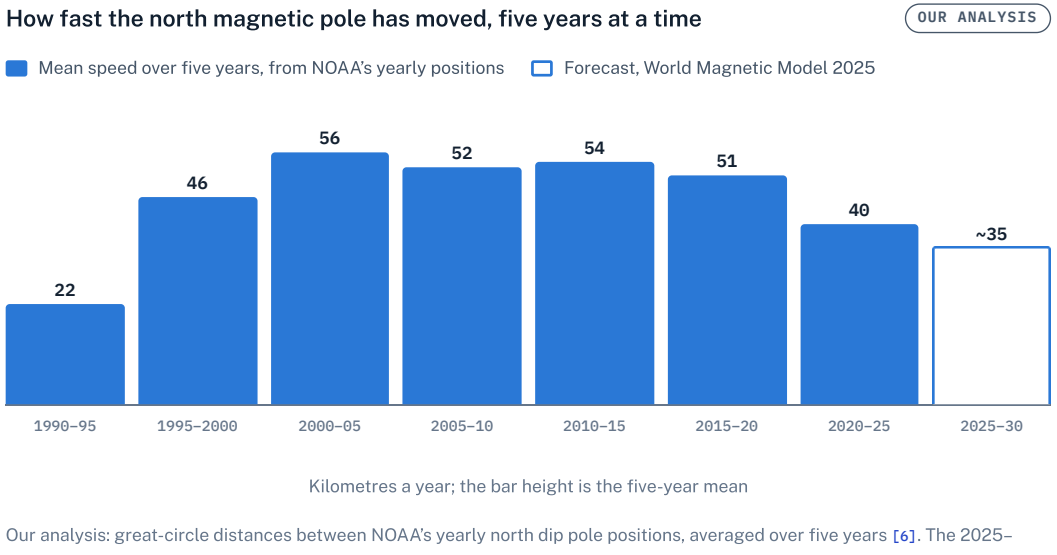
5 · THE POLES

The north magnetic pole is drifting toward Siberia, and slowing

For 2025–2030 the World Magnetic Model predicts "a very slow drift of the south dip pole, at about 9 km/year on average, and a faster (yet gradually decelerating) drift of the north dip pole, at about 35 km/year" [3 §1.6 p. 21]. The IGRF-14 paper: the north pole "experienced a strong acceleration from about 1960–2000, but has seen a modest deceleration over the past 25 years, peaking at 56 km/year in 2002.5 and slowing to 40 km/year in 2012.5. IGRF-14 forecasts continued deceleration with a speed of 31 km/year in 2027.5. This equates to a dip pole motion of about 100 m/day" [2 §3].

How fast the north magnetic pole has moved, five years at a time

OUR ANALYSIS



Our analysis: great-circle distances between NOAA's yearly north dip pole positions, averaged over five years [6]. The 2025–2030 column is the World Magnetic Model's forecast of about 35 km a year [3 §1.6 p. 21]; IGRF-14 forecasts 31 km a year in 2027 [2 §3]. The yearly positions are model values, not surveys.

LAST YEAR, 2025 TO 2026

36 km/yr

the north dip pole's average speed, against 9 km/yr for the south pole, "with no significant change in direction"; the model expects it to ease to "just above 30 km/year by the end of the decade" [4 p. 3][4 p. 12].

SINCE ROSS FOUND IT IN 1831

OUR ANALYSIS

2,470 km

the straight-line distance between the 1831 and 2025 positions in NOAA's record, from the Canadian Arctic to within 4.2° of the geographic pole [6].

THE DIPOLE'S TILT

9.21°

between the dipole axis and the rotation axis in 2025, with the geomagnetic north pole at 80.85°N, 72.76°W [3 §1.6 p. 20]. The dipole still holds 92.31% of the main field's power, down from 92.52% in 2020 [2 §3].

What is changing, in the models' own words

The South Atlantic Anomaly "has deepened by around 150 nT over the last five years and moved westward at around 20 km/year" [2 §3]; in 2025 alone it "continued to deepen by approximately 30 nanoteslas (nT) at Earth's surface and to migrate westward by about 20 km" [4 p. 3]. The anomaly's second low point, off southern Africa, "continues to grow" [2 §3].

None of the three reports describes a reversal, an excursion or a pole shift; all three describe secular variation, the slow change the models are rebuilt every five years to track [2][3][4].

OUR ANALYSIS

"Pole shift" is the episode's name for ordinary change

The pole does move, which is the true part of the premise. The false impression is that a reversal or an excursion is in progress and that "there is no escaping this eventually" [1 00:03:00–00:03:02]. The pole's speed peaked more than twenty years ago and has fallen by a third since; the dipole loses 5% a century; and the two excursion reviews on this site found no excursion likely for centuries, with the field "probably not reversing" [10].

6 · ANIMALS AND A CHANGING FIELD

Compasses adjust to weak fields; what disrupts migration is space weather

Birds, sea turtles, salmon and lobsters sense Earth's field [29][28], and so do bats and some rodents [22][23][24]. A compass reads its direction, either the inclination of the field lines, as birds do [20], or their polarity, as mole-rats and bats do [24][23]; the "map" sense of turtles, salmon and some birds reads intensity and inclination to judge position [28]. The episode read the bat paper as proof that this machinery is failing.

The claim, and what the paper asks

> *"Here though they found the mammals do not use the same light activated magnetic compass birds do. But more importantly this is confirmation of the widespread across up and down the animal kingdom navigational failures forecast during this magnetic pole shift."*
>
> S0 News [1 00:01:55–00:02:13]

> *"A central question is whether the compass depends on light … To our knowledge, this is the first demonstration that a migratory mammal expresses its seasonally appropriate migratory heading in total darkness."*
>
> Cellarius et al. (2026) [18 Abstract]

Weak fields: the compass re-tunes

Robins' compass "works in a fairly narrow functional window around the intensity of the local geomagnetic field, but adjusts to intensities outside this range when birds experience these new intensities for a certain time": in a 4 μT field, less than a tenth of the local 47 μT, they were disoriented after 8 hours but "able to orient in this field after a total exposure time of 17 h" [21 Abstract].

Chinese noctule bats "positioned themselves at the magnetic north at field strengths that were only 1/5th of the natural geomagnetic field, and did so even when the polarity of the artificial field was reversed"; the authors note that such strengths "occurred during geomagnetic excursions or polarity reversals" and that bats have lived through "tens to hundreds" of them [22 Abstract][22 Introduction].

A drifting field: animals track it

"Drift of the magnetic field (i.e. geomagnetic imprinting) uniquely accounted for 23.2% and 44.0% of the variation in migration routes for sockeye and pink salmon" returning to the Fraser River: the fish follow the field's secular change rather than failing [26 Abstract]. In loggerhead turtles, "spatial variation in Earth's magnetic field strongly predicts genetic differentiation between nesting beaches" [27 Abstract].

The imprinting hypothesis "appears to be compatible with present and recent rates of field change (secular variation); one implication, however, is that unusually rapid changes in the Earth's field, as occasionally occur during geomagnetic polarity reversals, may affect ecological processes by disrupting natal homing" [25 Abstract]. That conditional, about reversals, is the closest thing in the literature to the episode's "forecast".

What does disrupt migration: storms

In 22 years of North American radar data, severe space weather went with "a 9 to 17% decrease in migration intensity in both spring and fall", and in autumn with birds drifting more with the wind [30 Abstract]. Across 2 million bird captures, geomagnetic disturbance was associated with more vagrants, birds far off course, in autumn [31 Abstract]. Gray whales stranded more often on days of high solar radio noise, which the authors attribute to radio-frequency noise generated by solar storms [32]; a study of 348 mass strandings in New Zealand, Britain and Cape Cod found no significant link to storms in the 30 days before, "no causal relationship between the two phenomena" in Eos's summary [33][34].

These are disturbances of hours to days, from the Sun. Our check Storms, auroras and the brain covers what a storm does and does not do to a body.

OUR ANALYSIS

What a decline or an excursion would change

A slow decline changes intensity, which the map sense already copes with as the field drifts. An excursion changes direction, polarity and strength for centuries; that would matter most for polarity-compass users such as mole-rats and bats, and it is the case the bat and salmon authors have in mind. Neither is happening now (section 5), and the bat preprint tests none of it: its full text never mentions pole shifts, reversals, excursions or secular variation [18]. The episode took a result about light and made it a confirmation of failures that no source forecasts.

7 · ICELAND AND MASAYA

A routine quake, and a two-year-old satellite record

The episode's two volcano items rest on real events: a magnitude-5 earthquake under Bárðarbunga and a published study of Masaya. Neither supports the words around it.

Iceland: "five pointers" and a one-month rule

The USGS catalog lists one Icelandic earthquake of magnitude 4 or more in the four days of October 18–21: M 5.3, at 14:44 UTC on October 19, 10 km deep, 116 km west-north-west of Höfn, inside the Bárðarbunga caldera [35][37]. The day's largest quakes were off Vanuatu, M 6.0 on the 19th and M 6.3 on the 20th [35], so "wasn't the biggest quake of the day" holds.

The Icelandic Met Office's note at midday the next day: "A magnitude 5.2 earthquake was measured in Bárðarbunga at 14:44 on October 19th. The last earthquakes of this magnitude took place on October 5th and on July 28th. A few aftershocks have followed. Earthquakes of this size occur regularly within the Bárðarbunga caldera" [36].

The presenter's rule has precedents in Iceland's rifting episodes. Bárðarbunga's own 2014 swarm began on 16 August, brought quakes of M 4.7–5.7 from 22 August, and the Holuhraun fissure opened on 29 August, five days after the first M 5.3 in the USGS catalog [43][35]. At Fagradalsfjall, the dyke intrusion that began on 24 February 2021 with an M 5.6 ended in an eruption on 19 March, 23 days later [44 Abstract][35]. Those were intrusions on the move. The caldera quakes since the Holuhraun eruption ended in February 2015 are not: by early 2016 there had been 51 above M 3 with no eruption, a swarm with an M 4.8 in June 2026 briefly raised the aviation colour code to yellow before activity returned to background, the last comparable swarm having been in January 2025 [37], and the Met Office's own note on this one is that such quakes are routine [36]. We found no source for the one-month rule itself.

Masaya: "significant magma movement … warnings flying"

The study behind the Penn State release analysed Sentinel-1 radar interferometry "spanning January 2018–February 2024": about 3 cm of ground motion away from the satellite from 2018 to mid-2022, then motion toward it to 2024, "interpreted as inflation of the MCR due to new magma supply from depth", with a source about 3,200 m deep that gained about 4.5×10^5 m^3, and a second, shallower reservoir, about 200 m deep, that deflated throughout [40 Abstract].

The release says Masaya "sits within 13 miles of 2 million people" and that the researchers did not identify immediate dangers to the surrounding community; the goal, they say, is better monitoring and forecasting [39].

Masaya has been in a low-level eruptive period since October 2015, with a small lava lake, and ash plumes rose to 1.2–1.5 km above sea level on October 9, 2026 [38]. In March 2026 an unusual seismic swarm led the civil-protection system to step up monitoring [41]. None of that comes from the study, whose data end in February 2024.

OUR ANALYSIS

"More than 2 million people" is close to the release's 2 million [39]. Nicaragua's civil-protection system has been on heightened alert since the March 2026 swarm [41], and ash advisories went out on October 9 [38]; those, not the study, are the "warnings". "Significant magma movement" turns a modest inflation signal from 2022–2024, which the authors say poses no immediate danger, into a live alert; we rate the Masaya claim Misleading. The Iceland quake was real and routine. The five-month rule has some basis, in the rifting episodes before the 2014 and 2021 eruptions, but "often" claims much more than the record supports: at Bárðarbunga such quakes have recurred for a decade without an eruption. On the site's scale that is Overstated, not Unsupported.

8 · LIMITS

Where this check could be wrong

Models, not measurements, for 2025–2030

The rates in section 4 are a forecast. The IGRF's makers note that past forecasts "have often over-or underestimated the dip pole velocity" [2 §3]; the field's pace can change within a five-year cycle, as it did in the South Atlantic and south-east Asia in 2020–2025 [4 p. 7].

Straight lines are a device

The times in section 3 assume today's pace holds for a millennium and a half. The pace has varied by a factor of four since 1900 [5], and an excursion, when one comes, would not follow a straight line.

The Masaya paper in abstract only

The publisher's page sits behind a bot check we did not bypass; the paper's own population figure and hazard wording were not read [40].

Abstracts for most navigation papers

Of the animal-navigation sources, we read the bat paper and the noctule study in full [18][22]; the rest in abstract.

What would change these verdicts

01
A measured dipole decline many times faster than 16 nT a year, sustained over decades, or a global field model putting the surface field anywhere on Earth below 5 μT.

02
A peer-reviewed study tying failures of animal navigation to the field's secular change, rather than to storms, or a published forecast of such failures from a geomagnetic or biological source.

03
For Masaya, an INETER or SINAPRED alert tied to new magma supply, or an eruption; for Bárðarbunga, an eruption within the month the episode claims.

The one finding in the episode's favour, that the surface field is falling fastest over North America, would be unchanged by any of these; what it means is the question.

9 · CODE AND NUMBERS

Every geomagnetic number here comes from one script you can run

Our calculations, the code that makes them from NOAA's public files, and every number on this page, so you can check our work or add your own city.

The field and its rate

The script evaluates the IGRF-14 spherical-harmonic model (degree 13, with the degree-8 forecast of change for 2025–2030) at the surface, using Schmidt quasi-normalised Legendre functions and the WGS84 ellipsoid [5]. Before anything else it reproduces all twelve of NOAA's published WMM2025 test values, every component and rate to within 0.05 nT and 0.05 nT a year [7]. It then maps the field strength and its change on a 2° grid, evaluates the cities, and runs the WMM2025 model as a second opinion.

The dipole and the pole

The dipole moment follows the IGRF-14 paper's definition from the three degree-1 coefficients, for every epoch from 1900 to 2025 and the 2030 forecast, with the axial coefficient reported separately [2 §3][5]; the straight-line times divide the distance to each level by each pace, the fastest of which the script takes from its own series. The pole's speeds are great-circle distances between NOAA's yearly north dip pole positions [6].

Read it yourself

PY **geomag_sh.py**
The evaluator: validates itself against NOAA's WMM2025 test values, then gives the field and its rate on a global grid and at 21 cities, the dipole series, full and axial, and projections, and the pole's speeds · 32 KB [5][6][7]

JSON **s0-news-2026-10-20-numbers.json**
Every number on this page, with the validation result and the hashes of the input files · 24 KB

Run it

Needs only Python 3. Run `python3 geomag_sh.py`; the first time, it downloads the IGRF-14 coefficient file, the WMM2025 package and the pole positions from NOAA into a folder beside it, checks that the IGRF-14 file is the one we used, and writes its results, including this page's JSON, into another. It takes a few seconds. Add a city to the list near the top of the file to see its field and rate.

Related checks

- FALSE 15% gone, ten times faster? The Disaster Cycle, Fact-Checked
- FALSE The 2025 model already failing? The Disaster Cycle, Fact-Checked
- UNSUPPORTED A magnetic pole flip in the 2040s? The Disaster Cycle, Fact-Checked
- FALSE 55% of the field gone? The Disaster Cycle, Fact-Checked

Sources

Bracketed numbers refer to this list. For the episode [1], times are positions in the video (hours:minutes:seconds). For the papers, Abstract, Introduction, Methods, Results and Discussion name their sections and § a numbered section; for the reports [3] and [4], p. gives a page of the PDF and Table or § a table or section; Fig. names a figure. Links checked October 21, 2026.

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METHOD

How this was checked

On October 21, 2026, we checked every statement, number and quotation on this page against its source: the episode's automatically generated transcript, quoted verbatim with its timestamps [1]; the IGRF-14 paper and the December 2025 State of the Geomagnetic Field, read in full, and the relevant pages of the World Magnetic Model 2025 report [2][3][4]; the three hypomagnetic papers' texts for the field strengths they used, and the bat preprint, which changed no field [14][15][16][17][18]; and the abstracts or full texts of the navigation and volcano sources, about 110 items in all. DOIs were resolved through Crossref. The four papers themselves are checked on their own pages; nothing here re-rates them.

The verdicts and the items tagged "Our analysis" are our own assessment, built on the cited sources: the ratios between the laboratory fields and today's field; the dipole moment, its pace and the straight-line times to 5 μT, 1 μT and Laschamp's low; the map of where the field strength is falling fastest and the rates at the five cities; the pole's speeds from NOAA's yearly positions; and our reading of what each paper does and does not say about a changing field.

The geomagnetic numbers come from a spherical-harmonic script of our own (section 9) that reads the IGRF-14 coefficient file [5] and NOAA's pole positions [6]. Before we used it, it reproduced all twelve of NOAA's published WMM2025 test values to within 0.05 nT and 0.05 nT a year [7], and its North American maximum matches the IGRF-14 paper's own figure [2 §3]. Not read in full: the Masaya paper, whose publisher's page sits behind a bot check (we used its abstract and the university's release) [39][40]; and most of the animal-navigation papers, read in abstract.

A fresh reviewer then read the built page against the sources and re-ran the script from fresh NOAA downloads, which reproduced every number. That check corrected the page in several places: the laboratory range is now the episode's three hypomagnetic papers' 0.14–1 μT, with the 5.6 nT fruit-fly shield of our earlier check shown only as a labelled comparison; the volunteers' field is the preprint's measured 143 ± 32 nT, not a conversion of its 350-fold reduction [15 p. 4]; the fastest five-year pace of the dipole comes from our own series, 27.8 nT a year in 1980–1985, and the axial-dipole figures of Finlay and colleagues are kept apart from the full dipole [5][9]; ESA's 9% is cited to its 2020 release [42]; the rate of decline in proportion to the field, which the South Atlantic Anomaly's eastern lobe leads at 0.40% a year, stands beside the absolute one; the mice card no longer presents the abstract's unpublished mechanisms as measurements; the Masaya analysis names the 2026 alerts the episode may have meant; and the Iceland claim is rated Overstated rather than Unsupported, with the 2014 Bárðarbunga and 2021 Fagradalsfjall precedents [43][44]. The change log lists the rest.

This page was researched and written with Claude, an AI assistant made by Anthropic, and then re-checked against its sources in a separate verification pass.

The verdicts on this page

FALSE	The evidence contradicts the claim.
MISLEADING	Contains something true but leaves a false impression, usually by leaving out key context.
OVERSTATED	Has some basis but claims much more than the evidence supports.
MISREAD	Cites a real source but gets wrong what it says.

All ten verdicts, and how we check

CORRECTIONS

Corrections and changes

If we get something wrong, we fix it and record the change below with the date. If a correction changes a verdict, the log says what the old verdict was.

Change log

Oct 26, 2026	Corrected: the 9% decline of the axial dipole that Finlay and colleagues report is over 175 years, from 1840 to about 2015, not "about 185 years"; the 9% and the rate of roughly 5% a century are unchanged.
Oct 21, 2026	Published on factchecked.science after a full check against the sources. Built from the episode's transcript, the IGRF-14 paper and coefficient file, the World Magnetic Model 2025 technical report and the December 2025 State of the Geomagnetic Field, NOAA's pole positions, the four papers' own field strengths, fourteen peer-reviewed papers on animal navigation, and the USGS, Icelandic Met Office, Smithsonian and Penn State records for the Iceland and Masaya items. The geomagnetic calculations were made with our own script, validated against NOAA's test values. After a fresh review of the built page: the laboratory range is the episode's three hypomagnetic papers' 0.14–1 μT, with the 5.6 nT fruit-fly shield from our earlier check shown only as a labelled comparison, not as one of the episode's papers; the volunteers' field is the preprint's measured 143 ± 32 nT; the fastest five-year pace comes from our own dipole series (27.8 nT a year, 1980–1985) and the axial-dipole figures of Finlay and colleagues are kept apart from the full dipole; ESA's 9% is cited to its 2020 release; the relative rate of decline, led by the South Atlantic Anomaly's eastern lobe at 0.40% a year, stands beside the absolute one; the mice card no longer presents the abstract's unpublished mechanisms as measurements; the Masaya analysis names the 2026 alerts the episode may have meant; the Iceland claim is rated Overstated rather than Unsupported, with the 2014 Bárðarbunga and 2021 Fagradalsfjall precedents; the bat team is Oldenburg-led; the field over North America is given as 43,000–55,000 nT at the cities evaluated; and a dozen locator, author-initial and timestamp fixes.

Fact-Checked Science is independent. It isn't affiliated with the channels, presenters or authors whose claims it checks.

Last updated Oct 26, 2026