☑ Fact-Checked Science

PAPER CHECK · PALAEOMAGNETISM

The Permian reversal burst came eight million years before the Great Dying

A team led by the Chinese Academy of Sciences measured the magnetic polarity of 876 limestone samples from one section in South China and found 29 magnetozones between 262.5 and 258.75 million years ago, with a burst of about 11 reversals per million years before the end-Guadalupian extinction [1 l. 91][1 Abstract]. The authors call the link to that crisis a correlation whose "causation remains unproven" [1 Abstract]. S0 News said the paper confirms that magnetic reversals "were largely responsible for the great dying" [2 3:20]. The Great Dying began 251.94 million years ago, almost seven million years after the paper's record ends [3].

By Fact-Checked Science · Published October 22, 2026

OUR ANALYSIS marks our own reasoning and calculations, and the verdicts are our assessment. Everything else comes from the numbered sources; for the paper [1], l. gives a line number of the accepted manuscript, Fig. a figure or panel and Supp. p. a page of its supplement.

A real burst of reversals, eight million years before the Great Dying

OUR ASSESSMENT

262.5–258.75
million years ago: the span of the paper's record, across the Guadalupian–Lopingian boundary [1 Abstract]

6.8 million
years from the end of that record to the start of the Great Dying, by our arithmetic from the sources' dates [1 l. 124–125][3]

~11 → ~5
reversals per million years: the paper's peak before the end-Guadalupian extinction, and its compiled rate across the Permian–Triassic boundary [1 l. 131–134][1 l. 147–148]

THE CLAIMS

MISREAD

Reversals drove the Great Dying

The presenter: "The magnetic reversals, the magnetic pole shifts were largely responsible for the great dying." [2 3:20]

The paper's record runs from 262.5 to 258.75 million years ago and concerns the end-Guadalupian crisis [1 Abstract]. The Great Dying began 251.941 million years ago, 6.8 million years after the record ends [3], and the paper calls its own link to the earlier crisis a correlation whose "causation remains unproven" [1 Abstract]. See section 2.

PARTLY TRUE

Reversal peak at the Great Dying

The presenter: "a period of psychotically high magnetic pole shift frequency during the Great Dying" [2 3:33]

A Permian burst of about 11 reversals per million years is real, but it came in the 1.73 million years before the end-Guadalupian extinction [1 l. 131–134]. The paper's own compilation gives about 5 per million years across the Permian–Triassic boundary [1 l. 147–148], the average rate of the last 25 million years [12]. See section 3.

OVERSTATED

Confirms earlier studies

The presenter: "the paper is confirming what we've seen suggested in several other studies" [2 3:16]

Earlier papers did propose links between field reversals and extinctions, the Permian's among them [14][15][17][18][19]. This one cites them as hypotheses needing "further investigation," adds a correlation for a different crisis and withholds any causal claim [1 l. 194–195][1 l. 201–204]. See section 5.

UNSUPPORTED

Just like modern excursions

The presenter: "All the same stuff that happens with modern-day excursions happened back then, too. Major climate shift, super volcano upticks" [2 3:24]

The paper never mentions excursions or today's field. It attributes the Permian warming, acidification and sea-level fall to volcanism and plate tectonics, and proposes that mantle plumes and sinking slabs drove the reversals, not the reverse [1 l. 157–183]. The Great Dying's volcanism is dated to Siberian Traps sills to within a few tens of thousands of years [5]. See section 4.

TRUE

11 reversals per million years

The paper: "an unprecedented reversal frequency of 11 reversals/Myr –one of the highest records in Earth's history" [1 Abstract]

Its counts support the number: 22 magnetozones in 1.73 million years, in a 1-million-year sliding window [1 l. 131–134][1 Supp. p. 6]. It rests on one section, a 35% sample yield and an interpolated interval, and it overturns the previous timescale's 4.3-million-year chron for this interval [1 l. 91–94][11]. See section 6.

UNCONFIRMED

Reversals worsened the crisis

The paper: geomagnetic instability "might have played an additional forcing role in the Permian environmental and biotic crises" [1 l. 182–183]

A hypothesis the authors label a correlation: the causation "remains unproven," the ozone and ultraviolet evidence for the end-Guadalupian interval "remains limited," and volcanic halogens are an alternative driver [1 Abstract][1 l. 188–195]. See section 4.

1 · THE PAPER

One limestone section, 29 magnetozones and a burst of reversals before the end-Guadalupian crisis

A team led by the Institute of Geology and Geophysics of the Chinese Academy of Sciences, with co-authors in Nanjing, Xuzhou, Utrecht and Vienna, measured the magnetic polarity preserved in limestone at the Fengshan section near Liuzhou, South China, the auxiliary reference section for the boundary between the Guadalupian and Lopingian series of the Permian [1 l. 80–82]. The paper is a peer-reviewed research article in *National Science Review*, published on October 15, 2026 as an accepted manuscript, open access under CC BY 4.0 [1]. It is about the Permian's earlier crisis: the paper itself distinguishes "the end-Guadalupian (~261 Ma) and end-Permian (~252 Ma) events" [1 l. 49–50].

STEP 1

Sampling

876 oriented samples at 5–15 cm spacing in two profiles 0.5–2 m apart, taken in November 2020 and November 2024, through about 70 m of limestone [1 Supp. p. 2].

STEP 2

Measuring

Stepwise heating to 690 °C in a low-field demagnetizer, with the remanence read on cryogenic magnetometers in a shielded room. 309 specimens (35.3%) gave a stable direction; the other 567 "displayed chaotic trajectories and were excluded from further analysis" [1 l. 91–94][1 l. 226–231].

STEP 3

Testing

The directions pass a fold test against the Penglaitan reference section 93 km away and give a palaeopole matching South China's 265-million-year pole, so the authors take them as recorded at or soon after deposition [1 l. 98–104][1 Supp. pp. 3–4].

STEP 4

Counting and dating

A magnetozone needs at least three consecutive specimens of one polarity; the composite has 29 [1 l. 109–117]. Ages come from conodont zones, a uranium–lead date for the boundary (259.857 ± 0.084 million years) and interpolation at a constant sedimentation rate [1 l. 119–127].

SAMPLES THAT GAVE A DIRECTION

309 of 876

35.3%; the rest showed "chaotic trajectories" in demagnetization and were excluded [1 l. 91–94]

MAGNETOZONES

29

in about 3.75 million years, 262.5–258.75 million years ago: 4, then 22, then 3 [1 l. 117–135]

PEAK REVERSAL RATE

~11 per Myr

22 magnetozones in the 1.73 million years before the end-Guadalupian extinction, in a 1-million-year sliding window [1 l. 131–134]

In the authors' words Myr is a million years; Ma is million years ago.

> *"It yields extreme geomagnetic instability, characterized by 29 magnetozones and an unprecedented reversal frequency of 11 reversals/Myr – one of the highest records in Earth's history."*
>
> Zhang et al. (2026) [1 Abstract]

> *"These features are temporally correlated with the end-Guadalupian extinction (~261 Ma), suggesting a potential deep-Earth force contributing to surface ecosystem collapse, though the causation remains unproven."*
>
> Zhang et al. (2026) [1 Abstract]

> *"Up to now, the geomagnetic field behavior during this critical biocrisis has been poorly documented."*
>
> Zhang et al. (2026) [1 l. 78–79]

What "geomagnetic instability" means in the paper

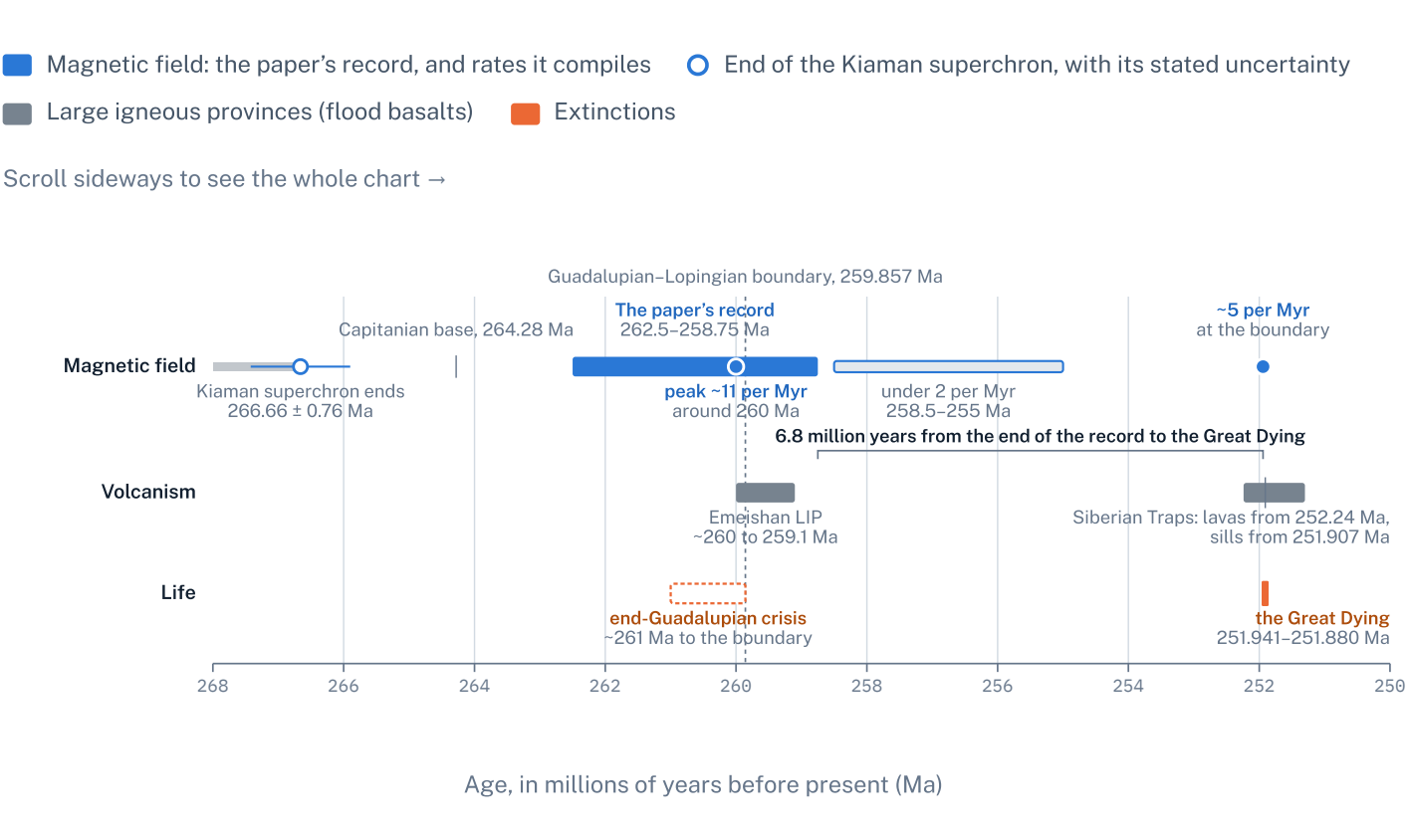
Reversal frequency. The paper measures polarity, not field strength: its only intensity figures are published values compiled from a database and two 2025 studies, averaged in age clusters because their ages carry uncertainties of up to about a million years [1 l. 141–142][1 Supp. p. 6]. The authors note that these "vary considerably in quality and age resolution, therefore, new paleointensity data are desired" [1 l. 151–152], and describe the weak field only as "the possible weakened field" [1 l. 182].

2 · TWO CRISES

Two Permian crises, about eight million years apart

The Permian ended with the worst extinction of the last half-billion years, 251.9 million years ago [3]. A smaller crisis came about eight million years earlier, around the Guadalupian–Lopingian boundary, alongside the Emeishan flood basalts of South China [8]. The paper's record covers the earlier one [1 Abstract].

The paper's record, the reversal peak and the two crises on one timeline



Scroll sideways to see the whole chart →

Our timeline from the sources' dated ages: the start of the Illawarra reversal, which ends the Kiaman superchron [10]; the Capitanian base, the boundary and the paper's record [1 l. 119–127]; the Emeishan province's onset and end [8][9]; the Siberian Traps' lavas and sills and the extinction interval [3][5]. The paper dates the end-Guadalupian crisis "~261 Ma" in its text and puts its hyperactive interval "immediately preceding" the extinction, ending at the boundary [1 l. 37][1 l. 131–132], so the crisis is drawn as a span. The Siberian Traps bar shows the roughly 300,000 years of lava before and during the extinction and the sills that began with it; lavas and sills continued for at least 500,000 years more [4].

OUR ANALYSIS

The gap is simple arithmetic from the sources. The paper's record ends at the top of the *Clarkina dukouensis* conodont zone, 258.75 ± 0.37 million years ago [1 l. 124–125]; the end-Permian extinction began 251.941 ± 0.037 million years ago [3]. That is 6.8 million years. The reversal peak, which the paper places "around 260 Ma" [1 l. 146], is about 8 million years before the Great Dying, and the two crises are 8–9 million years apart.

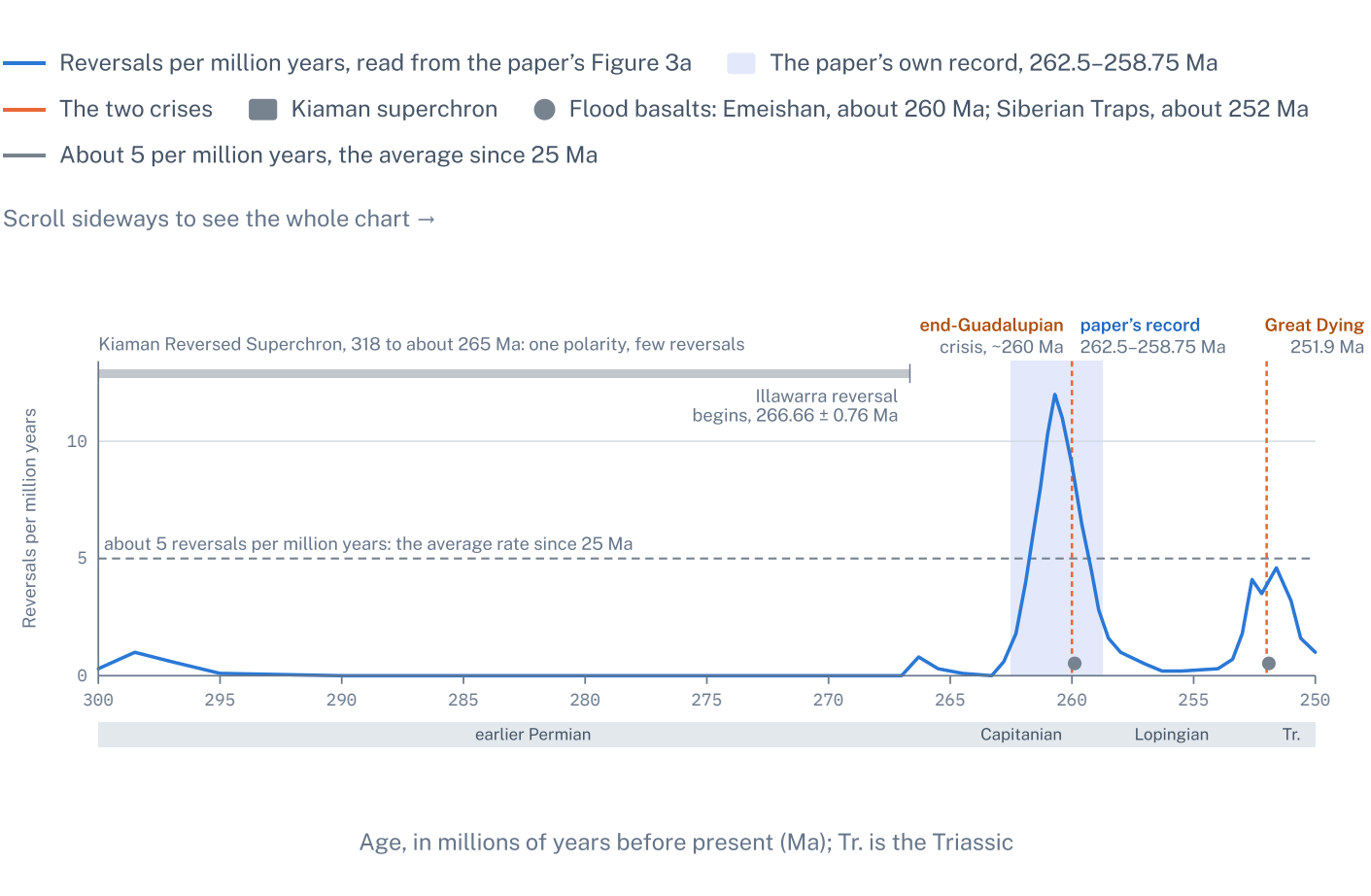
Nothing in the record reaches the Great Dying. What the paper says about the latest Permian comes from its compilation of other studies: "a phase of heightened reversal frequency and weakened field intensity during the latest Permian that coincided with Siberian LIP volcanism and the end-Permian mass extinction" [1 l. 69–71], which its Figure 3a draws as about 5 reversals per million years [1 l. 147–148].

3 · HOW FAST?

How fast is "psychotically" fast?

The presenter described "a period of psychotically high magnetic pole shift frequency during the Great Dying" [2 3:33]. The paper's compilation of the Permian field, redrawn below, puts the burst eight million years earlier and the rate at the Great Dying at about five reversals per million years [1 Fig. 3a].

Reversal frequency through the Permian, 300 to 250 million years ago



Scroll sideways to see the whole chart →

~11
reversals per million years "around 260 Ma," the paper's peak; about 12 on its curve [1 l. 145–146][1 Fig. 3a]

<2
per million years from 258.5 to 255 Ma, when "the field stabilized briefly" [1 l. 146–148]

~5
per million years across the Permian–Triassic boundary, the Great Dying's interval [1 l. 147–148]

~5
per million years today: the 5-million-year average "has fluctuated about ~5 events per million years since about 25 Ma" [12]

Adapted from Fig. 3a of [1], CC BY 4.0. The curve, a 1-million-year sliding window, is read from the figure by eye, since the paper tabulates no values: it stays at or below about 1 reversal per million years from the Illawarra reversal until about 263 million years ago, climbs steeply to a peak that reads about 12 around 260.7 million years ago, where the text says "~11 reversals/Myr around 260 Ma," falls to near zero by about 257, and shows a double bump of about 4 to 4.6 across the Permian–Triassic boundary, which the text rounds to "~5" [1 l. 144–148]. The three rates in the tiles are the paper's own words. The superchron's dates are the paper's [1 l. 68], the Illawarra reversal's start is from the Permian polarity timescale [10], and the gray dashed line is the average rate of the last 25 million years [12]. The two crises and the flood basalts are placed as in section 2; the stage bands use the paper's Capitanian base, its boundary age and the Permian–Triassic boundary at 251.902 million years ago [1 l. 119–122][3 Table 1].

OUR ANALYSIS

The number checks out against the paper's counts. Twenty-two magnetozones in 1.73 million years hold 21 reversals, about 12 per million years; a 1-million-year sliding window smooths that to the stated 11 (the curve in its Figure 3a reads about 12 at the peak). The whole record, 28 reversals in 3.75 million years, averages 7.5. The hyperactive interval ends 0.75 + 1.73 million years after the record's base, at 260.0 million years ago, which is the Guadalupian–Lopingian boundary; the paper's text dates the crisis "~261 Ma" and calls its interval the one "immediately preceding" the extinction [1 l. 37][1 l. 128–134].

"Unprecedented" in the abstract is stronger than "among the highest rates yet documented" in the text [1 Abstract][1 l. 133–134]. Comparable bursts are reported elsewhere: the Jurassic had "periods of rapid polarity reversals" before the long stability of the Cretaceous superchron [13], Olson and Amit's "hyper-reversing periods in the Jurassic" [12], and Precambrian records show rates "possibly larger than 5–10 reversals per Myr" [20]. The ranking rests on a 2018 study of reversal-rate cycles that we could not obtain [1 l. 133–134].

What the paper overturns is the previous Permian timescale, in which this interval was one long chron: "The Permian chron GU3n is a long chron (~4.3 Myr duration) like the Cretaceous C33r (3.7 Myr) and C33n (5.6 Myr), making these three chrons the longest known in the Phanerozoic (apart from the superchrons)" [11]. That timescale's author called the Capitanian and Wordian magnetostratigraphy "less well defined" and gave the chron ages older than about 259 million years two to three times larger uncertainties than the latest Permian's [11]. That is why a new section matters, and why it needs a second one.

4 · THE MECHANISM

What the paper proposes, and what it doesn't

The paper's chain runs from the mantle down to the core and from the core up to the ozone layer, with every link hedged. It does not propose that reversals cause volcanism or climate shifts, and it keeps what it calls the "Traditional view" of the Permian's drivers [1 l. 178–183].

Mantle to core

Numerical simulations, the paper says, "indicate that LIP-related superplumes growth in lower-mantle increase core-mantle boundary (CMB) heat-flux and promote geomagnetic reversals, whereas superplume collapse decreases CMB heat flux and thereby suppresses geomagnetic reversals" [1 l. 157–159], while "all current simulations run in parameter regimes far from Earth-like conditions and are sensitive to modelling choices" [1 l. 161–162]. For the burst around 260 million years ago it offers "A possible scenario": cold slabs from the assembly of Pangea reaching the lowermost mantle and "locally increasing heat extraction from the core," destabilizing the geodynamo [1 l. 169–173].

Core to surface

Tectonics and volcanism come first: "Pangea assembly drove eustatic regression and habitat loss, while LIP volcanism triggered warming, acidification, and carbon-cycle perturbations" [1 l. 179–181]. "Superimposed on these processes," the field "might have played an additional forcing role … mainly through decreasing the magnetospheric shielding effects," letting in more cosmic rays and solar particles that could thin the ozone layer and raise ultraviolet radiation at the surface [1 l. 182–187]. The ultraviolet evidence it cites, malformed pollen and protective compounds, is from the end-Permian; for the end-Guadalupian, "direct evidence for the latter interval remains limited," and volcanic halogens are "an alternative or complementary driver" [1 l. 188–194]. The ozone step rests on a model study of an extreme solar particle event under weaker fields by one of the co-authors [1 l. 187][23].

OUR ANALYSIS

The direction of the arrows matters for the episode's claim. In the paper, plumes and slabs drive the reversals; volcanism is a sibling symptom of the same mantle events and the established driver of the crises. The paper's own compilation shows the Emeishan basalts erupting during the reversal burst and the Siberian Traps during the modest rates of the latest Permian [1 Fig. 3], and it nowhere suggests that a reversing field causes eruptions. Nor does it claim a climate effect of the reversals: the warming and acidification it lists are volcanic [1 l. 179–181].

How the authors hedge it The three sentences that carry the causal question.

> *"… suggesting a potential deep-Earth force contributing to surface ecosystem collapse, though the causation remains unproven."*
>
> Zhang et al. (2026) [1 Abstract]

> *"While a geomagnetic contribution remains plausible and testable in principle, its role requires further investigation"*
>
> Zhang et al. (2026) [1 l. 194–195]

> *"The temporal association of deep Earth processes, geomagnetic instability with major environmental and biotic changes is intriguing. The correlation merits further investigations through measurements and modeling on chronology, paleointensity, geochemistry, and atmospheric studies."*
>
> Zhang et al. (2026) [1 l. 201–204]

The group's EGU 2026 conference abstract on the same record went further, saying that environmental stress beyond "tolerance thresholds drives the biodiversity declines and potential extinction events" [22]. The peer-reviewed paper dropped that sentence.

5 · THE EPISODE

What the episode said, beside the paper

S0 News of October 22, 2026 billed the paper as "a magnetic finish on the Great Dying" [2 0:28] and introduced it this way: "It was a very not cool thing that happened to life on Earth more than 250 million years ago. It was way worse than what took out the dinosaurs. It was the worst ever." [2 3:04] That much is right: the extinction is dated to 251.941–251.880 million years ago [3], and it removed more than 90% of marine species by the long-standing estimate [4], or about 81% by a 2016 reassessment that still ranks it the worst of the last half-billion years [7 Fig. 4]. The rest is below.

The episode's statements beside the paper

THE EPISODE SAID	THE PAPER, AND THE DATED RECORD	OUR VERDICT
"the paper is confirming what we've seen suggested in several other studies" [2 3:16]	It cites the earlier proposals as hypotheses whose role "requires further investigation" [1 l. 194–195] and reports a correlation for the end-Guadalupian crisis, "though the causation remains unproven" [1 Abstract].	**Overstated**
"The magnetic reversals, the magnetic pole shifts were largely responsible for the great dying." [2 3:20]	The record ends 6.8 million years before the Great Dying [1 l. 124–125][3]. The paper names tectonics and volcanism as the traditional drivers and the field as a possible "additional" one [1 l. 178–183].	**Misread**
"All the same stuff that happens with modern-day excursions happened back then, too. Major climate shift, super volcano upticks" [2 3:24]	No mention of excursions or of today's field. The climate effects are attributed to volcanism and to Pangea's assembly, and plumes and slabs drive the reversals, not the reverse [1 l. 157–183].	**Unsupported**
"a period of psychotically high magnetic pole shift frequency during the Great Dying" [2 3:33]	About 11 per million years around 260 million years ago, before the end-Guadalupian extinction; about 5 across the Permian–Triassic boundary [1 l. 144–148].	**Partly true**
"life on Earth more than 250 million years ago. It was way worse than what took out the dinosaurs. It was the worst ever." [2 3:07]	251.941–251.880 million years ago [3]; "more than 90% of marine and 75% of terrestrial species" [4], or "~81% of marine species" by the 2016 reassessment [7].	**True**

Quotations from the episode are from its automatically generated transcript, with the time at which each begins [2].

What the "several other studies" suggested

Courtillot and Olson (2007)

Proposed that "Three magnetic superchrons precede the four largest Phanerozoic extinctions," with "a 10–20 Myr delay," linked by mantle plumes that end a superchron and then rise to produce "continental flood basalt (trap) eruptions, rapid climatic change, and massive faunal depletions" [14]. In this scheme the reversals are a symptom of the mantle event; the volcanism does the killing.

Isozaki (2009)

Argued that the Illawarra Reversal reflects a superplume at the core–mantle boundary that "makes the geodynamo's dipole of the outer core unstable, and lowers the geomagnetic intensity," letting in cosmic rays that seed clouds and cool the planet, as a cause of the end-Guadalupian crisis, not the end-Permian one [15][16].

Wei et al. (2014) and Zhang et al. (2025)

A 2014 model proposed oxygen escaping to space during reversals as a route to mass extinction, "if this causal relation indeed exists" [17]. A 2025 study measured the field recorded in Emeishan lavas at "approximately one-sixth of the modern field intensity" and said the alignment of weak field, eruptions and extinctions "may reflect associations" [19].

The senior author's own perspective

In 2023, Yongxin Pan and Jinhua Li argued for "an evolutionary effect of geomagnetic field reversals on life," noting that understanding of the mechanisms is "incomplete due to the complexity of the linkages and shortage of data" [18]. The same group's record across the end-Permian extinction at Meishan reported five normal and five reverse magnetozones and made no causal claim [21].

What dated the Great Dying

Uranium–lead dates on volcanic ash put the extinction at Meishan between 251.941 ± 0.037 and 251.880 ± 0.031 million years ago, "an interval of 60 ± 48 ka" [3]. The Siberian Traps erupted about two-thirds of their lava in the roughly 300,000 years before and during it, and their sills began "concomitant with the mass extinction" [4]; the first sills, at 251.907 ± 0.067 million years ago, are identified as "the critical deadly interval" [5]. At Penglaitan the extinction was sudden, at 251.939 ± 0.031 million years ago, with "no evidence of a decline of biotic diversity prior to the extinction interval" [6]. None of these studies invokes the magnetic field as a cause.

6 · READ WITH CARE

A strong record from one section, and a hypothesis its authors don't claim to have tested

The measurements are careful and the writing is cautious. The limits below are our reading; the first two the paper states itself.

No field strength of its own

The paper measures polarity. Its intensity curve is compiled from published values of uneven quality, and the authors ask for new data [1 l. 149–152].

Interpolated ages

The base of the record and the base of the *Jinogondolella xuanhanensis* zone are interpolated from a cycle count and an assumed constant sedimentation rate [1 l. 119–124]. The peak rate scales inversely with the 1.73-million-year duration those ages set.

One section, a third of the samples

Two profiles half a metre to two metres apart in one section; 567 of 876 specimens were unusable [1 l. 91–94]. The nearest reference section, 93 km away, kept "only partially primary magnetic signals" [1 l. 77–78], so no second section has yet reproduced the 22 reversals.

It replaces a long chron

The previous Permian timescale filled this interval with a 4.3-million-year chron, with few dates to constrain it [11]. A record that overturns that is important, and needs confirming.

The crisis's own age

The paper gives "~261 Ma" and, in effect, the boundary [1 l. 37][1 l. 131–132]. The Emeishan eruptions began about 260 million years ago and ended by 259.1 ± 0.5 [8][9], and the high-precision study the paper cites for its boundary age is titled "Why the end-Guadalupian biotic crisis differs from mass extinctions" [25]. This page says "about 260 million years ago."

An accepted manuscript

The wording may change in the version of record; our line numbers refer to the manuscript published on October 15, 2026 [1].

What would change these verdicts

01
A second section reproducing the 22 reversals, with palaeointensity from the same beds, would turn the paper's number from one record into part of the timescale.

02
Ozone or ultraviolet proxies for the end-Guadalupian, as exist for the end-Permian [1 l. 188–192], together with a test that separates the field's contribution from volcanic halogens, would make the paper's hypothesis testable rather than plausible.

03
For the episode's version: a dated record placing a reversal burst at 252 million years ago rather than 260, and evidence that reversals cause eruptions or climate shifts. Neither is in this paper.

7 · TODAY'S FIELD

Nothing in the paper is about today's field

The episode went on: "Luckily, the excursion that we're in now isn't that bad, but it still takes out a large chunk of life every time it happens. We're less than 25 years away, by the way." [2 3:37] The paper contains nothing of the kind.

OUR ANALYSIS

The words "excursion," "Laschamp," "modern," "present-day," "today" and "pole shift" do not occur in the manuscript. "Present intensity" is a reference line in its Figure 3a, and "current simulations" refers to geodynamo models [1 Fig. 3a][1 l. 161]. Its only links to the recent past are two citations: the 2021 paper proposing a global crisis at the Laschamp excursion [24], cited for "further investigation" [1 l. 195], and the 2024 model of an extreme solar particle event under weaker fields [23].

Whether an excursion is under way, and when the next might come, are checked on our page When is the next magnetic excursion due? and on When Earth's magnetic field falters. Whether past excursions took out "a large chunk of life" is checked on Magnetic excursions, floods and extinctions, on one timeline, where the claim that Laschamp caused the extinctions of 42,000 years ago is rated Overstated and the claim that excursions line up with catastrophes is rated False.

Related checks

- FALSE A "clean sweep" of scientists? The Disaster Cycle, Fact-Checked
- OVERSTATED Ozone loss as the "extinction" mechanism The Disaster Cycle, Fact-Checked
- UNSUPPORTED A magnetic pole flip in the 2040s? The Disaster Cycle, Fact-Checked

Sources

Bracketed numbers refer to this list. For the paper [1], l. gives a line number of the accepted manuscript (its lines are numbered 1–400), Fig. a figure or panel, Supp. p. a page of its supplementary PDF, and Abstract its abstract. For the episode [2], the time is a position in the video. For the other sources, Table and Fig. name the part used; where only an abstract was read, the entry says so. Links checked October 22, 2026.

1 Zhang, M., Qin, H., Krijgsman, W., Arsenović, P., Wei, B., Shi, P., Hou, Y., Zhang, H., Qi, K., Deng, C., Zhang, Y.-c., Yuan, D.-x., Zhu, R., Shen, S.-z., and Pan, Y. (2026). Geomagnetic instability as a potential deep-Earth forcing factor in the Permian environmental and biotic crisis. *National Science Review*, nwag647. Accepted manuscript published October 15, 2026. Open access, CC BY 4.0. We read the publisher's PDF of the accepted manuscript (17 pages, lines numbered 1–400) and its supplementary PDF (35 pages: Figs. S1–S15, Tables S1–S2 and the specimen table Data S1).

2 SpaceWeatherNews (S0) (October 22, 2026). Magnetic Pole Shift & The Largest Extinction Ever | S0 News Oct.22.2026. YouTube video. Quoted from the automatically generated transcript; times are positions in the video. The label "Pole Shift & The Great Dying" is the episode's own, on its link to the paper in the video's description.

3 Burgess, S. D., Bowring, S., and Shen, S.-z. (2014). High-precision timeline for Earth's most severe extinction. *Proceedings of the National Academy of Sciences* 111(9), 3316–3321. We read the full text (PubMed Central, PMC3948271); Table 1 is its table of dates.

4 Burgess, S. D., and Bowring, S. A. (2015). High-precision geochronology confirms voluminous magmatism before, during, and after Earth's most severe extinction. *Science Advances* 1(7), e1500470. CC BY-NC 4.0. We read the abstract.

5 Burgess, S. D., Muirhead, J. D., and Bowring, S. A. (2017). Initial pulse of Siberian Traps sills as the trigger of the end-Permian mass extinction. *Nature Communications* 8, 164. CC BY 4.0.

6 Shen, S.-Z., Ramezani, J., Chen, J., Cao, C.-Q., Erwin, D. H., Zhang, H., Xiang, L., Schoepfer, S. D., Henderson, C. M., Zheng, Q.-F., Bowring, S. A., Wang, Y., Li, X.-H., Wang, X.-D., et al. (2019). A sudden end-Permian mass extinction in South China. *GSA Bulletin* 131(1–2), 205–223. We read the abstract.

7 Stanley, S. M. (2016). Estimates of the magnitudes of major marine mass extinctions in earth history. *Proceedings of the National Academy of Sciences* 113(42), E6325–E6334. We read the full text (PubMed Central, PMC5081622); Fig. 4 is its chart of extinction magnitudes.

8 Wignall, P. B., Sun, Y., Bond, D. P. G., et al. (2009). Volcanism, mass extinction, and carbon isotope fluctuations in the Middle Permian of China. *Science* 324(5931), 1179–1182. We read the abstract.

9 Zhong, Y.-T., He, B., Mundil, R., and Xu, Y.-G. (2014). CA-TIMS zircon U–Pb dating of felsic ignimbrite from the Binchuan section: Implications for the termination age of Emeishan large igneous province. *Lithos* 204, 14–19. We read the abstract.

10 Hounslow, M. W., and Balabanov, Y. P. (2018). A geomagnetic polarity timescale for the Permian, calibrated to stage boundaries. *Geological Society, London, Special Publications* 450, 61–103 (online 2016). We read the abstract.

11 Hounslow, M. W. (2016). Geomagnetic reversal rates following Palaeozoic superchrons have a fast restart mechanism. *Nature Communications* 7, 12507. CC BY 4.0.

12 Olson, P., and Amit, H. (2015). Mantle superplumes induce geomagnetic superchrons. *Frontiers in Earth Science* 3, 38. CC BY 4.0.

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23 Arsenović, P., Rozanov, E., Usoskin, I., Turney, C., Sukhodolov, T., McCracken, K., Friedel, M., Anet, J., Simić, S., Maliniemi, V., Egorova, T., Korte, M., Rieder, H., Cooper, A., et al. (2024). Global impacts of an extreme solar particle event under different geomagnetic field strengths. *Proceedings of the National Academy of Sciences* 121(28), e2321770121. CC BY-NC-ND 4.0. We read the abstract.

24 Cooper, A., Turney, C. S. M., Palmer, J., et al. (2021). A global environmental crisis 42,000 years ago. *Science* 371(6531), 811–818. Checked, with its formal comments and the authors' reply, on our excursions timeline.

25 Wu, Q., Hou, Z.-s., Ramezani, J., Yuan, D.-x., Zhang, H., Wang, W.-q., Zheng, Q.-f., Zhang, Y.-c., Zhang, F.-f., Wei, G.-y., Zhang, S.-h., Wang, Y., Erwin, D. H., Xu, Y.-g., and Shen, S.-z. (2026). Why the end-Guadalupian biotic crisis differs from mass extinctions: Insights from high-precision geochronology and carbon cycle modeling. *Earth and Planetary Science Letters* 679, 119898. The paper's source for the boundary age; its page showed a bot check to our tools, so we read only its title and record.

METHOD

How this was checked

On October 22, 2026, we checked every statement, number, quotation and citation on this page against its source: the paper's accepted manuscript, with its three figures read from the PDF, and its 35-page supplement; its Crossref, OpenAlex and Semantic Scholar records; the authors' EGU 2026 abstract; and 23 other sources, 22 of them resolved through Crossref, read in full where they are open access and otherwise as abstracts, about 95 items in all. The episode is quoted from its automatically generated transcript [2]. Four publisher pages showed bot checks to our tools (the paper's own article page, and the journal pages of Isozaki 2009, Courtillot and Olson 2007 and Wu et al. 2026); we did not bypass them, and used the publisher's PDF link, a repository record and the authors' conference abstracts instead. A fresh reviewer then read the built page against the sources, re-resolving every DOI and reading the paper's pages as images. That check redrew the curve of our Figure 3a redraw, which had the field reversing two to three times per million years for three million years before the paper's record begins where the paper's curve stays near zero until about 263 million years ago, and lowered its latest-Permian bump; corrected our reading of Biggin et al. (the rapid reversals are Jurassic, the Middle Cretaceous is the superchron); softened "ten-thousand-year precision" for the Siberian Traps dates to tens of thousands of years; had us read Burgess et al. (2014) and Stanley (2016) in full, where the boundary age and the ranking we cite come from; and fixed seven locators and several small wording slips.

The verdicts and the items tagged "Our analysis" are our own assessment, built on the cited sources. They include the time gaps between the paper's record, its reversal peak and the Great Dying; the reversal rates re-done from the paper's magnetozone counts; the comparison with the previous Permian polarity timescale; our reading of the paper's Figure 3a, whose curve values are not tabulated; and the timeline of the two crises, drawn from the sources' dated ages.

No measurement was repeated. From the paper's own counts we recomputed its reversal rates (22 magnetozones in 1.73 million years hold 21 reversals, about 12 per million years, consistent with its 1-million-year sliding-window peak of about 11; 29 magnetozones in 3.75 million years average 7.5) and the end of its hyperactive interval (262.5 − 0.75 − 1.73 ≈ 260.0 million years ago, the Guadalupian–Lopingian boundary). We did not recompute the polarity sequence from the supplement's specimen table, the two interpolated ages of the age model, or the ranking of the rate against other periods, which the paper takes from a 2018 study we could not obtain.

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

OVERSTATED	Has some basis but claims much more than the evidence supports.
MISREAD	Cites a real source but gets wrong what it says.
UNSUPPORTED	No evidence we could find backs it up, though it hasn't been strictly disproven.
UNCONFIRMED	Rests on a preliminary result that hasn't been confirmed.
PARTLY TRUE	Part of the claim holds up and part doesn't.
TRUE	The evidence supports the claim.

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 22, 2026	Published on factchecked.science after a full check against the sources. Built from our verification of the paper and of the S0 News episode of October 22, 2026: six claims rated on the site's scale, four of them the episode's and two the paper's own; the reversal-frequency chart is adapted from the paper's Figure 3a (CC BY 4.0, values read from the figure), and the timeline of the two Permian crises is our own, from the sources' dated ages.

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