Fact-Checked Science

PAPER CHECK · EARTHQUAKES

Planet dates that matched 2010–2012 quakes are a math quirk; the match fades in new years

In Theodoros Nikitopoulos's preprint, 17 of 48 "planetary configuration dates" in 2010–2012 fell on days with an earthquake above magnitude 6.5, against 4.9 expected by chance (p = 0.0009) `[1 Table 2]`. S0 News called it "statistical proof of seismic upticks during periods where the planets gather on a line" `[2 00:00:54–00:00:58]`. Our rebuild from NASA's and the USGS's public data reproduces every number, with the threshold rule of the author's own code, but each date marks a sign flip in a matrix routine, not an alignment. In the 23 years the preprint didn't use, the match falls to a fraction of its strength: no significant excess by the rules we fixed in advance, and about 1.4 times chance by the author's code.

By Fact-Checked Science · Published October 28, 2026

`OUR ANALYSIS` marks our own reasoning and calculations, including our rebuild of the preprint's method, our test on years it didn't use, fixed in advance, the further test with the rule of the author's own code, and our tide arithmetic; the verdicts are our assessment. Everything else comes from the numbered sources. For the preprint `[1]`, p. gives a page by its own numbering (1 to 19, after Research Square's cover page), § a section, Table a table, Fig. a figure and Abstract its abstract; for the episode `[2]`, times are positions in the video.

An overlap we could reproduce, from dates that are a quirk of the math, far weaker in new years

`OUR ASSESSMENT`

55 of 55

minutes behind the preprint's 48 dates in which the method's matrix routine flipped the sign of one or two axes: the same arrangement of planets, mirrored or turned over, with every distance unchanged, by our analysis `[1 §2.2][4]`

21 vs 17.7

dates on earthquake days in 2013–2025 against the number chance predicts, with the rules and code fixed before we looked (p = 0.23); with the threshold rule of the author's own code, 25 against 18.6 (p = 0.079). The preprint's rate would have given about 73, by our analysis `[4][5]`

6×10^{-5}

the tide Venus raises on Earth at its closest, the largest of any planet's, as a share of the Moon's; Mercury, Venus, Mars and Jupiter together, each at its closest, come to at most 7×10^{-5}, by our analysis `[4][6]`

THE CLAIMS

`MISREAD`

Quake upticks when planets align

The presenter: "showing statistical proof of seismic upticks during periods where the planets gather on a line." `[2 00:00:53–00:00:58]`

The preprint reports a statistical excess of earthquake days on single dates, not proof, and its dates are not line-ups: each marks a minute when the routine that redraws the planets' arrangement flips the sign of an axis, and on those dates the four inner planets are no closer to a line through the Sun than on other days of the year. It calls the result "an observational finding rather than evidence of causation" `[1 §4]` and never mentions a line or a proof. In 23 years it didn't use, the excess falls to a fraction of its size. See sections 3 and 5.

`TRUE`

Magnitude 6.5 and larger quakes

The presenter: "Look was at magnitude 6.5 and larger earthquakes." `[2 00:00:58–00:01:01]`

The preprint takes the earthquakes of 2010–2012 in the USGS catalogue with a "reported moment magnitude" above 6.5 and counts days, not earthquakes: a day with at least one event above 6.5 counts once, however many struck `[1 §2.1]`. Our rebuild and the author's own lists confirm the cut is strictly above 6.5: only that gives its 39, 38 and 34 earthquake days `[1 Figs. 5–7][5]`. Three of the events, aftershocks on Tōhoku's own day, carry other kinds of magnitude and add no day. See section 2.

`MISLEADING`

Dates come from planet geometry

The preprint: "Planetary reference dates are generated using a predefined geometric filtering procedure applied independently to planetary ephemerides, without reference to geophysical observations." `[1 Abstract]`

The procedure does use only NASA's planetary positions. But every one of its dates marks a minute when the singular value decomposition at its core flips the sign of one or two axes, which leaves every distance unchanged; the preprint mentions this in passing `[1 §2.2]`. List the same bodies in another order and most of the dates move, so they are not a property of the planets' arrangement. Nor is the procedure quite the one the text states: the author's code measures the jump on Earth's coordinates alone `[3]`. That it was "predefined" can't be checked: 2011 was chosen first for its earthquakes, and an unexplained factor of 0.35 decides which bodies enter that year `[1 §2.1][1 §2.2]`. See section 3.

`TRUE`

Overlaps beat chance, 2010–2012

The preprint: "Observed same-day overlaps exceeded surrogate expectations in all three years, and the combined three-year analysis also showed a significant excess (p = 0.0009)." `[1 Abstract]`

Our rebuild from public data reproduces every number in the preprint's tables once the jump is measured on Earth's coordinates alone, as the author's code does `[3]`. With NASA's positions `[4]` and the USGS catalogue `[5]`, the same steps give the same 48 dates, and 17 of them fall on earthquake days against 4.86 expected by chance, as in the preprint `[1 Table 2]`. The exact p-value is 1 in 1,096: of the 1,096 ways to slide the dates along the three years, the real one gives the most overlaps. The excess holds for the preprint's own arbitrary choices; with the same planets listed in another order, it is gone. See sections 2 and 3.

`OVERSTATED`

Dates and quakes correspond

The preprint: "The present study therefore identifies an empirical temporal correspondence under the adopted null model" `[1 §4]`

The correspondence is real in 2010–2012 but not at that strength in other years. With rules and code we fixed before fetching any other year, the same procedure found 21 dates on earthquake days in 2013–2025 against 17.7 expected by chance (p = 0.23), and 17 against 12.8 in 2000–2009 (p = 0.14); rough 95% intervals reach 1.8 and 2.1 times chance. With the threshold rule of the author's own code, read afterwards, the new years show a weak excess, 25 against 18.6 (p = 0.079) and 23 against 14.6 (p = 0.019): about 1.4 times chance over the 23 years, against the 3.5 times the preprint reports. That weak excess is unconfirmed: it misses the decision rule we fixed in advance, and it is not significant once other arbitrary choices change. See section 5.

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1 · THE PAPER

Three years of large earthquakes, and dates found in the planets' positions

Theodoros Nikitopoulos, an independent researcher in Athens, posted the preprint on Research Square on October 20, 2026, under CC BY 4.0; it has not been peer reviewed `[1]`. Its aim, he writes, is "to establish whether such a statistical relationship exists while leaving the investigation of possible physical mechanisms beyond the scope of the present study" `[1 §1]`. It declares no external funding and no competing interests `[1 p. 17]`.

STEP 1

Earthquake days

Every earthquake of 2010–2012 in the USGS catalogue with a moment magnitude above 6.5, turned into a list of days: several earthquakes on one day count once, so the Tōhoku mainshock and its aftershocks of March 11, 2011, make one day `[1 §2.1]`. 2011 came first, "because it provides a global earthquake catalog containing substantial natural seismic clustering", and 2010 and 2012 were added to see whether the result persists

STEP 2

The planets, every minute

NASA's Horizons system gives the positions of the planets around the Sun at 1-minute steps. At each minute the method turns the distances between the bodies into a Gram matrix and takes its singular value decomposition, which redraws the arrangement on its own principal axes, a picture meant to ignore where the bodies sit and which way they face `[1 §2.2]`.

[1 §2.1].

STEP 3

Candidate minutes

A minute is a “candidate associated with a geometric degeneracy” when any coordinate of that picture jumps by at least 0.35×10^{-4} AU, about 5,200 km, from the minute before [1 §2.2]. The author’s code applies the test to Earth’s coordinates only, and never to a year’s first minute [3]. If a year has more than 100 candidates, the Moon joins the Sun and the four inner planets, then Jupiter [1 §2.3]. The days with candidates are the “planetary configuration dates”: 18 in 2010, 17 in 2011 and 13 in 2012 [1 §3.2].

STEP 4

The test

Slide the dates along the year by a random number of days, wrapping round at the end, and count the overlaps again; 200,000 slides give the spread expected by chance. The slides keep the dates’ spacing and leave the earthquakes’ clustering alone [1 §2.4].

The preprint’s results

YEAR	BODIES BESIDES THE SUN	CANDIDATE MINUTES	DATES	ON EARTHQUAKE DAYS	EXPECTED	P
2010	Mercury, Venus, Earth, Mars	20	18	6	1.92	0.0081
2011	the same, then with the Moon, then with Jupiter too	3,354, then 8,834, then 20	17	7	1.77	0.0085
2012	Mercury, Venus, Earth, Mars	15	13	4	1.21	0.0190
2010–2012	—	—	**48**	**17**	**4.87**	**0.0009**

From the preprint’s Tables 1 and 2 [1 Table 1][1 Table 2]. The p-values are the share of the 200,000 random slides that gave at least as many overlaps [1 §2.4].

In the author’s words

X*(t) is the redrawn arrangement and U(t) the matrix of its axes, from the decomposition.

> *“Although the congruence invariance of X*(t) was preserved, the detected degeneracy was associated with a sign reversal in the column vectors of the orthogonal matrix U(t).”*
>
> Nikitopoulos (2026) [1 §2.2]

> *“The present study therefore identifies an empirical temporal correspondence under the adopted null model but does not establish a physical coupling mechanism between planetary configurations and earthquake occurrence.”*
>
> Nikitopoulos (2026) [1 §4]

> *“The results should be interpreted as an observational finding rather than evidence of causation.”*
>
> Nikitopoulos (2026) [1 §4]

The author’s code

The preprint’s MATLAB code and data are on Zenodo: version 1.1 of August 1, 2026, under the MIT licence, which added the combined 2010–2012 test to version 1.0 of June 17 [3][1 p. 17]. Zenodo refused every request from our machine (“unusual traffic”), so we rebuilt the method from the preprint’s text. The site’s owner later supplied the deposit, and we read its code and data as text and data, without running the code. It does what the preprint describes, with the same bodies in the same order, the same Gram matrix, decomposition and threshold, and the same test, with one difference that matters: it measures each minute’s jump on Earth’s coordinates alone. Its earthquake lists are the USGS’s, event for event, and its positions are Horizons’, as ours are.

2 · OUR REBUILD

From NASA’s and the USGS’s data, the same 48 dates and the same p-values

We rebuilt each step from the preprint’s description, with the planets’ positions from JPL Horizons and the earthquakes from the USGS, and got every number it reports. One intermediate count matches only with the rule of the author’s code, which we read afterwards [4][5].

The rebuild beside the preprint, 2010–2012

QUANTITY	PREPRINT	OUR REBUILD
Candidate minutes, 2010 and 2012	20 and 15	20 and 15
Candidate minutes, 2011: inner planets; with the Moon; with Jupiter too	3,354; 8,834; 20	3,354; **12,891**, or 8,834 on Earth’s coordinates alone; 20
Dates, 2010 / 2011 / 2012	18 / 17 / 13	18 / 17 / 13
Earthquake days	39 / 38 / 34	39 / 38 / 34
Dates on earthquake days	6 / 7 / 4, 17 in all	6 / 7 / 4, 17 in all
Expected by chance	1.92 / 1.77 / 1.21, 4.87 in all	1.92 / 1.77 / 1.21, 4.86 in all
p	**0.0081 / 0.0085 / 0.0190; 0.0009**	**0.0082 / 0.0082 / 0.019; 0.0009**

The preprint’s numbers are from its Tables 1 and 2 [1 Table 1][1 Table 2], and its earthquake days from the counts on its Figs. 5–7 [1 Figs. 5–7]. Ours are exact p-values, every slide counted once; the preprint’s come from 200,000 random slides, and ours with the same method are 0.0085, 0.0081, 0.019 and 0.0009. The one count that differs, with the Moon in 2011, comes from the threshold rule: measured on Earth’s coordinates alone, as the author’s code does, the jump gives the preprint’s 8,834, and every other number is unchanged [3].

OUR ANALYSIS

What the p-values are

A year allows only 365 slides of the dates, so a p-value is a whole number of slides out of 365 that do at least as well as the real dates. In 2010 and 2011, 3 slides of 365 do (0.0082); in 2012, 7 of 366 (0.019). For the three years together, 1 of 1,096: no other slide of the 48 dates matches as many earthquake days as their real positions, and 0.0009 is the smallest value the test can give. Seventeen overlaps where 4.86 were expected is a large excess for a single test of fixed dates. What the dates are is the question of the next section.

OUR ANALYSIS

The choices the preprint leaves open

The exact match confirms them, and so does the author’s deposit [3]. Earth is Earth itself, not the centre of mass it forms with the Moon; the Sun’s row comes first, then Mercury, Venus, Earth, the Moon when needed, Mars and Jupiter; times are Horizons’ default, Barycentric Dynamical Time (TDB), about a minute off UTC; and the earthquake cut is strictly above 6.5, which with 6.5 included would give 49, 45 and 37 days [4][5]. We interpolated Horizons’ hourly positions to every minute; on four test days they agree with its own 1-minute output to within 3×10^{-13} AU, about 4 cm, and give the same candidate minutes.

3 · WHAT THE DATES ARE

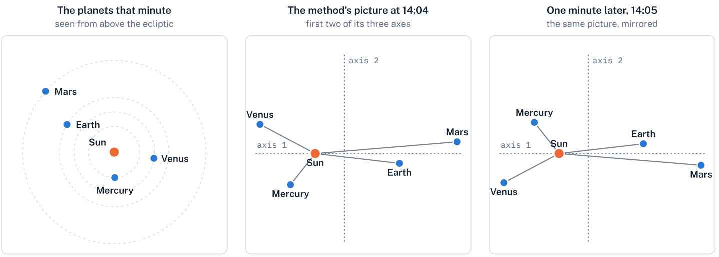
Each date marks a sign flip in a matrix routine, not an alignment

A singular value decomposition fixes each axis of its picture only up to its sign: an axis and its reverse describe the arrangement equally well, and the routine picks one by an internal rule. When that pick changes from one minute to the next, every coordinate on the axis changes sign, and the preprint’s test sees a jump, though the planets have only moved on by a minute.

One planetary configuration date: February 18, 2010, at 14:05 TDB

● The Sun ● Planets — Distance from the Sun

Scroll sideways to see all three panels →


The planets that minute
seen from above the ecliptic

The method’s picture at 14:04
first two of its three axes

One minute later, 14:05
the same picture, mirrored

Distances unchanged to within 7×10^{-6} AU · the method’s test sees a jump of 0.73 AU

OUR ANALYSIS From JPL Horizons positions [4]. Left: the Sun and the four inner planets at 14:04 TDB, seen from above the plane of Earth’s orbit, with circles at their distances from the Sun. Middle: the same five bodies as the preprint’s method draws them, centred on their mean position and turned to their principal axes; the third axis, nearly flat, isn’t shown. Right: one minute later, the routine returns the second and third axes with their signs reversed, so the picture is mirrored across the first axis. The method reads this as a jump of 0.73 AU, more than 20,000 times its threshold, and records the day [1 §2.2].

SIGN FLIPS, 2010–2012

OUR ANALYSIS

55 of 55

candidate minutes behind the preprint's dates that are a sign flip of one or two axes (34 and 21); undoing the flip leaves a real one-minute change of 0.7–3.1 × 10^{-5} AU, below the threshold. In the new years, 434 of 434.

HOW CLOSE TO A LINE

OUR ANALYSIS

0.50

the dates' average rank, among all days of their year, for how close the four inner planets lie to one line through the Sun; 0.5 is what unrelated dates would give. In the new years, 0.53 and 0.53.

SAME PLANETS, ANOTHER ORDER

OUR ANALYSIS

6 of 55

dates made for 2010–2012 with the Sun's row listed last instead of first that are also among the preprint's 48; with the bodies after the Sun in reverse order, 11 of 35 are.

OUR ANALYSIS

Why the method sees mirrors, and what made 2011 different

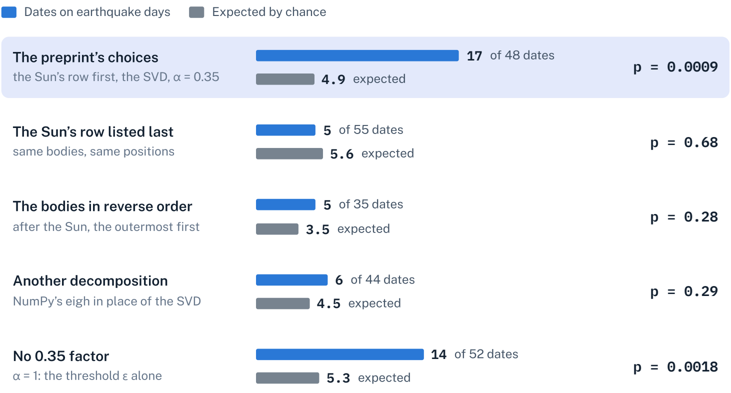
The method was built to ignore where the planets sit and which way their arrangement faces [1 §2.2]. A flipped axis is exactly such a change of facing: flipping one axis turns the arrangement into its mirror image, flipping two turns it over, half a turn about the third axis, and every distance stays the same. So what the test detects is not a geometric event but the moment the routine's sign convention changes, which depends on its internal arithmetic and on the order in which the bodies are listed. We measured alignment in the plane of Earth's orbit, from each planet's direction seen from the Sun: on a line through the Sun the four directions pair up, whichever side each planet is on. By that measure the dates are ordinary days, and so they are for planets on the same side of the Sun (average ranks 0.54, 0.51 and 0.52).

The one geometric effect in the method is what made 2011 different. With the four inner planets, 2011 has 3,354 candidate minutes, and all but 23 come in one unbroken run of 3,331 minutes from September 16, 19:45 TDB. On that day the five bodies were spread almost evenly in the plane: the ratio of the second principal variance to the first, 0.74, was higher than on 99.7% of the year's days, against a median of 0.17. With so even a spread the axes are barely defined and swing round faster than the threshold allows. That run, the opposite of a line-up, is what made the rule add the Moon and then Jupiter. Without the factor of 0.35 the year has 26 candidates and keeps the inner planets.

Change one arbitrary choice, and the excess goes

We reran the whole procedure for 2010–2012, the 100-candidate rule included, with one arbitrary choice changed at a time. The planets and their positions are the same in all five rows. These were among the checks we fixed before testing new years (section 4), though on the preprint's own years, so not blind.

Dates on earthquake days, 2010–2012, under the preprint's choices and four others



OUR ANALYSIS From JPL Horizons positions and the USGS catalogue, with exact p-values [4][5]. Without the factor of 0.35, the dates of 2010 and 2012 are the preprint's own; only 2011 changes, keeping the inner planets, and its p-value rises to 0.17.

The same holds for the threshold rule of the author's code (section 5): in 2010–2012 the three changed choices give 5, 5 and 6 dates on earthquake days, with p = 0.64, 0.28 and 0.29.

Only the preprint's own choices give the excess. A real link to the planets could not depend on the order in which their names are listed.

4 · THE TEST, FIXED IN ADVANCE

We wrote down the rules and froze the code before looking at any other year

Following the site's rules for testing a claimed pattern, set out in our test of the Sun's polar fields and great earthquakes, we fixed every rule of the out-of-sample test, and the SHA-256 checksum of the code that runs it, before fetching a single planetary position or earthquake outside 2010–2012.

16:20 UTC

Rules written

On October 28, 2026, at 16:20:40 UTC by the record of our working session, with only the 2010–2012 data and four test days of 1-minute positions in hand.

16:21 UTC

Code frozen

The last change to the seven scripts that fetch the data and make, score and diagnose the dates was saved at 16:21:53 UTC. Their checksums are below.

16:22 UTC

New data

The first download outside 2010–2012: the USGS list for 2013–2025 at 16:22:22 UTC, the first Horizons table at 16:22:26.

THEN

Scored

The frozen code ran on 2013–2025 and on 2000–2009. Nothing in it was changed afterwards.

The rules

Years	Primary: 2013–2025, 13 years. Second block: 2000–2009, 10 years. Each tested on its own, never pooled with 2010–2012.
Dates	The procedure that reproduced the preprint's final numbers, with the jump measured on every coordinate, as its §2.2 states [1 §2.2]. The author's code, read afterwards, measures Earth's coordinates alone: see section 5. If a year needed a body beyond Jupiter, Saturn, Uranus and Neptune in turn: our assumption, since the preprint stops at Jupiter. No year needed one.
Earthquakes	Days, in UTC, with a USGS event of magnitude above 6.5.
Test	Same-day overlaps against every slide of the dates along the whole block, each counted once: the exact form of the preprint's 200,000 random slides. One-sided.
Decision	**Replicated if 2013–2025 gives p below 0.05. Whatever the result, report the ratio to chance and the test's power.**
Also reported	The p-value of each year; the 2000–2009 block; the four variants of section 3; how close the planets are to a line on the dates.

5 · NEW YEARS

In 23 years the preprint didn't use, the match falls to a fraction of its strength

The frozen procedure made 206 dates for 2013–2025 and 148 for 2000–2009. None of those years needed a body beyond Jupiter, and every one of the 434 candidate minutes was again a sign flip [4][5].

2013–2025, THE PRIMARY TEST

OUR ANALYSIS

21 vs 17.7

dates on earthquake days against the number expected by chance; 1,096 of the 4,748 slides do as well (p = 0.23). Not replicated.

2000–2009

OUR ANALYSIS

17 vs 12.8

against the number expected by chance; 506 of the 3,653 slides do as well (p = 0.14).

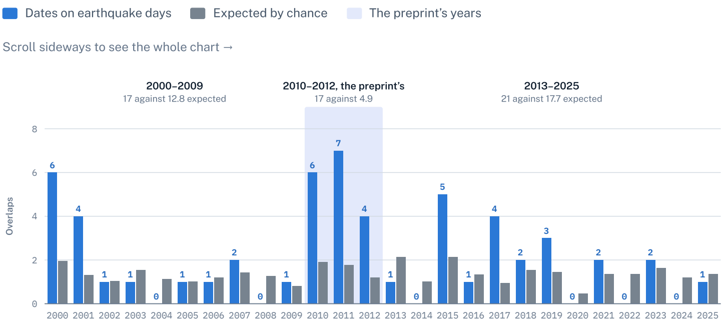
AT THE PREPRINT'S RATE

OUR ANALYSIS

about 73

overlaps in 2013–2025 had 17 of every 48 dates kept falling on earthquake days, as in 2010–2012; the test would have caught that rate almost certainly, and one 1.5 times chance two times in three.

Planetary dates on earthquake days, year by year



OUR ANALYSIS Our rebuild of the preprint's procedure as its text describes it, frozen, on JPL Horizons positions and the USGS catalogue [4][5]. The expected counts are exact averages over every slide of each year's dates. 2010–2012 are the preprint's years, reproduced; the others are new.

OUR ANALYSIS

Single years beat chance now and then, as chance predicts

Of the 13 years in 2013–2025, one has p below 0.05: 2017, with 4 dates on earthquake days against 0.96 expected ($p = 0.014$); 2015 came close ($p = 0.052$). Of the 10 years in 2000–2009, two do: 2000, with 6 against 1.95 ($p = 0.008$), and 2001 ($p = 0.044$). By chance alone one would expect about 0.65 and 0.5 such years. A year like 2000, taken alone, looks just like the preprint's.

OUR ANALYSIS

How big a link is still possible

The ratio of overlaps to chance was 1.19 in 2013–2025 and 1.33 in 2000–2009. Rough 95% intervals, from the overlap counts alone, run from 0.73 to 1.81 and from 0.77 to 2.13, so a weak link can't be excluded. The excess of 2010–2012 can: had 17 dates in 48 kept falling on earthquake days, 21 or fewer overlaps in 2013–2025 would have a chance of about 1 in 10^{16}. These intervals were not part of the rules fixed in advance.

The author's own rule, tested afterwards

After this test was run, the site's owner supplied the author's code [3]. It measures each minute's jump on Earth's coordinates alone, where the preprint's text compares every coordinate [1 §2.2]. On 2010–2012 the two rules give the same 48 dates. In new years the code's rule lets fewer bodies in for 6 of the 23 years, 2002, 2005, 2008, 2009, 2014 and 2020, and so gives 217 dates for 2013–2025 instead of 206, and 169 for 2000–2009 instead of 148. The rule is the author's, fixed in his deposit by August 1, 2026, long before any of our out-of-sample data; only our scoring of it came after the pre-registered test, so it is exploratory.

The two threshold rules on the years the preprint didn't use

YEARS	THRESHOLD RULE	DATES	ON EARTHQUAKE DAYS	EXPECTED	RATIO TO CHANCE (ROUGH 95%)	P
2013–2025	**As the text states (pre-registered)**	**206**	**21**	**17.70**	**1.19 (0.73–1.81)**	**0.23**
2013–2025	As the author's code does	217	25	18.65	1.34 (0.87–1.98)	0.079
2000–2009	As the text states (pre-registered)	148	17	12.80	1.33 (0.77–2.13)	0.14
2000–2009	As the author's code does	169	23	14.62	1.57 (1.00–2.36)	0.019
Both blocks	As the text states	354	38	30.50	1.25 (0.88–1.71)	0.091
Both blocks	As the author's code does	386	48	33.27	1.44 (1.06–1.91)	0.006
2010–2012	Either rule: the same dates	48	17	4.86	3.50	0.0009

Exact p-values. For both blocks together, the two blocks' exact null distributions are combined; the intervals are exact Poisson intervals on the counts. Only the rows marked as pre-registered follow the rules of section 4; the others are exploratory.

OUR ANALYSIS

What the author's rule shows

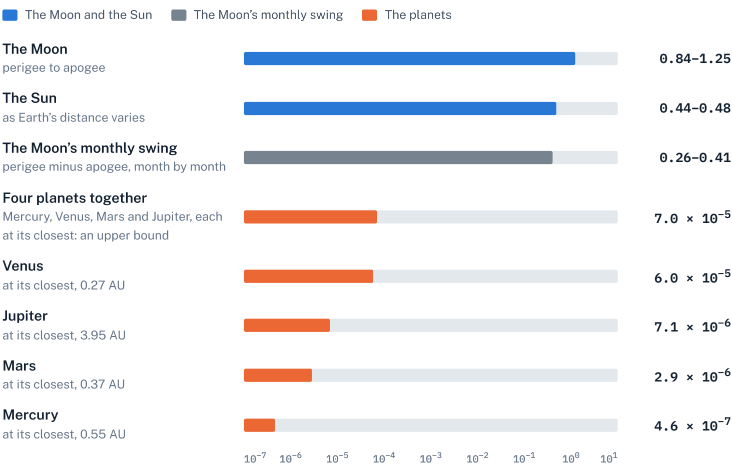
By the decision rule we fixed in advance, a p-value below 0.05 for 2013–2025, even the author's rule does not replicate: it gives 25 overlaps where 26 were needed. Over the 23 years together it leaves a weak excess, 1.44 times chance ($p = 0.006$), where the preprint found 3.5. Every one of its 539 candidate minutes is again a sign flip: in 537 nothing else changed beyond the threshold, and in the other two, both in the autumn of 2009, the axes were also swinging fast. On its dates the planets are no closer to a line than on other days, or barely (average ranks 0.54 and 0.53). And the excess goes with the author's arbitrary choices: with the Sun's row listed last, the bodies in reverse order or NumPy's eigh, the same rule gives ratios of 0.82 to 1.41 in the new years, none of them significant ($p = 0.10$ to 0.80).

6 · PLANETS AND TIDES

The planets' pull on Earth is tiny beside the Moon's, whose own effect on earthquakes is modest

The preprint proposes no mechanism [1 §4]. The one physical way a planet could reach a fault is its tide, the difference in its pull across the Earth, which falls off with the cube of distance. We worked it out for each body from NASA's masses and our Horizons distances over 2000–2025 [6][4].

Tidal pull on Earth, as a share of the Moon's at its average distance (log scale)



OUR ANALYSIS Peak tidal acceleration across Earth's radius, $2GMR/d^3$, with GM from NASA's DE440 ephemeris and Earth's mean radius [6], and the closest and farthest distances in our hourly Horizons positions for 2000–2025 [4]. The Moon's at its average distance, 384,400 km, is 1.1×10^{-6} m/s².

OUR ANALYSIS

Thousands of times too small

Venus raises the largest planetary tide, and at its closest, 0.27 AU, it is 6×10^{-5} of the Moon's. Mercury, Venus, Mars and Jupiter together, each at its closest at the same moment, would come to at most 7×10^{-5}. Every month, between perigee and apogee, the Moon's own tide changes by 0.26 to 0.41 of its average, 3,700 to 5,800 times that combined maximum. Tidal stress on a fault scales the same way, so whatever the planets do, the Moon's monthly swing does thousands of times more.

What studies of tides and earthquakes find

For the Moon and the Sun, an effect is detectable in some settings and modest overall. Shallow thrust earthquakes have been found to correlate with the strongest tides, their rate varying by up to a factor of 3 with the tidal stress [8 Abstract]; in 13,042 California earthquakes the rate was 2% higher when the tide favoured failure, a difference that was not significant [9 Abstract]; and a global study concluded that "large earthquakes are more probable during periods of high tidal stress" [7 Abstract]. Whether great earthquakes favour particular days of the year or of the lunar cycle, Hough's abstract answers in one word: no [10 Abstract].

Planetary line-ups, tested directly

Romanet tested the claim that planet–Sun alignments predict large earthquakes on 813 earthquakes of moment magnitude 7 or more from 1950 to 2018. Some three bodies lay within 3° of a line on 77.63% of days, and 78.72% of the earthquakes fell on such days ($p = 0.23$); new or full moon took 6.92% of days and 7.13% of the earthquakes ($p = 0.40$) [11 Table 1]. He notes there is no mechanism for planet–Sun alignments, because the fields of bodies other than the Sun and Moon are "usually extremely small when they reach the Earth" [11 p. 2]. A 2025 study cited by the preprint finds cycles of 1 to about 60 years in global seismicity that it relates to the planets and the tides, by a different method that we did not check [12 Abstract][1 §1].

7 · THE EPISODE

S0 News called it statistical proof of seismic upticks when the planets line up

The episode of October 28, 2026, listed the preprint under its own label, “Planetary Alignments and Earthquakes”, and summed it up in three sentences [2 00:00:44–00:01:01]. Its other links have their own pages: the radiation measured on flights during GLE 77, a 2018 Russian paper on geomagnetic activity and temperature and our review of the whole episode.

In the presenter’s words

From the automatically generated transcript.

> *“it’s been a while since the scapetta run of planetary geometry and earthquake papers. Proteé finally taking up the reigns here,”*
>
> S0 News, October 28, 2026
> [2 00:00:46–00:00:53]

> *“showing statistical proof of seismic upticks during periods where the planets gather on a line.”*
>
> S0 News, October 28, 2026
> [2 00:00:53–00:00:58]

> *“Look was at magnitude 6.5 and larger earthquakes.”*
>
> S0 News, October 28, 2026
> [2 00:00:58–00:01:01]

Two words we can’t read

“the scapetta run” and “Proteé” are the automatic transcript’s renderings, perhaps of names; they are unclear, and we don’t guess what was said. The preprint has a single author, Theodoros Nikitopoulos [1].

OUR ANALYSIS

Proof and a line: neither is in the preprint

The preprint offers a p-value from three years and calls it “an observational finding rather than evidence of causation” [1 §4]; that is not proof, and in new years the excess fell to a fraction of its size. It counts dates that fall on earthquake days, about one date in three in 2010–2012 against one in ten by chance, on single days, not over periods. And its dates are not periods when the planets gather on a line: they are single days when a matrix routine flips a sign, and on them the planets are no closer to a line than on other days. The line-up’s “planetary alignments and earthquakes” [2 00:00:21–00:00:23] frames the preprint the same way.

8 · LIMITS

What this page can and can’t settle

A rebuild, checked against the author’s code

We rebuilt the method from the preprint’s text before we could read the author’s code [3]. Read afterwards, the code differs from the text in one respect that matters: it measures the jump on Earth’s coordinates alone. That explains the one count our rebuild missed, 12,891 candidate minutes against the preprint’s 8,834 for 2011 with the Moon [1 Table 1], and it changes the dates of some new years (section 5).

Software can change the dates

Our dates for new years, under either rule, come from NumPy’s decomposition (LAPACK), which reproduced the preprint’s counts of candidate minutes and all 48 of its dates in 2010–2012. MATLAB’s could flip signs at other moments in other years. If it did, that would show again that the dates depend on software rather than on the planets.

A weak link isn’t ruled out

The new years rule out the excess of 2010–2012, but not a weak link: by our rough intervals, up to about 1.8 times chance in 2013–2025 and 2.1 times in 2000–2009, and with the author’s rule the 23 years together come to 1.44 times (1.06–1.91).

Our own assumptions

The bodies after Jupiter are our assumption, though no year needed them. The dates are in TDB and the earthquake days in UTC, but no candidate minute fell within two minutes of midnight. The USGS revises magnitudes, so a later list can differ slightly from ours of October 28, 2026 [5].

Studies read in abstract

The studies of tides and earthquakes by Ide [7] and Cochran [8] and their colleagues, by Vidale and colleagues [9] and by Hough [10], and the 2025 study of planetary cycles [12], were read in abstract only; Romanet’s was read in full [11].

What would change these verdicts

01
Dates defined by the planets’ geometry alone, so that relabelling the bodies leaves them unchanged, fixed in advance and beating chance in years not used to choose them.

02
The preprint’s procedure beating chance on future years, scored as here: at the rates of 2013–2025, about 25 or more overlaps over 13 years with the threshold as §2.2 states it, or 26 or more with the author’s rule, which fell one short.

03
A mechanism by which planets could stress faults with something near the force of the Moon’s monthly tidal swing.

9 · CODE AND NUMBERS

Repeat our analysis

Seventeen scripts produce every number of ours on this page. They fetch NASA’s and the USGS’s public data by URL and treat it as data. Seven of them are the code frozen before the test (section 4), byte for byte.

PY **run_all.py**
Runs everything below in order and compares the result with planet-dates-results.json · 7 KB

JSON **planet-dates-results.json**
The numbers on this page: every year’s dates, bodies, counts and p-values under both threshold rules, the variants, the sign flips, the alignment ranks, the tides, and the checksums of the code and of the Horizons tables’ ephemeris lines · 63 KB [4][5]

ZIP **usgs-m6.5-2000-2025.zip**
The three USGS lists of magnitude 6.5 and above as we fetched them on October 28, 2026, unchanged, with their URLs and checksums · 67 KB [5]

PY **config_dates.py · select_dates.py**
The preprint’s method, minute by minute, and its rule for adding bodies; frozen · 5 KB and 3 KB [1 §2.2][1 §2.3]

PY **overlap_test.py · outsample_test.py**
The earthquake days, the circular-shift test, and the test of each new block with its power; frozen · 3 KB and 5 KB [1 §2.4]

PY **diagnose_dates.py**
What happens at each candidate minute, and how close to a line the planets are on each date; frozen · 4 KB

PY **fetch_horizons.py · fetch_usgs.py**
Download the positions and the earthquake lists and log each URL with its checksum; frozen · 3 KB and 1 KB [4][5]

PY **check_interpolation.py · why_2011.py · explore.py · mirror_coords.py**
The test of our minute-by-minute positions against Horizons’ own; the 2011 run; the lunar phase and same-side alignment on the dates; the coordinates of the mirror diagram · 2, 2, 4 and 2 KB

PY **author_rule.py · combine_blocks.py**
The threshold rule of the author’s code, with its variants, scored by the scripts above; the two blocks taken together · 4 and 2 KB [3]

PY **intervals.py · tides.py · summarize.py**
The rough intervals on the ratio to chance; the tides of section 6; the collected results · 3, 6 and 11 KB [6]

Run it

Put the scripts in one folder and run `python3 -I run_all.py work`. It needs Python 3 with NumPy for the eight scripts that take the decomposition (config_dates.py, select_dates.py, diagnose_dates.py, check_interpolation.py, explore.py, why_2011.py, mirror_coords.py and author_rule.py); the others need only Python 3. It downloads about 280 MB from JPL Horizons, 156 hourly tables for 2000–2025 and 24 one-minute test tables, plus the USGS lists unless you add `--usgs` and the folder of the unzipped snapshot, and takes about half an hour, mostly downloading. Horizons’ replies carry the time of the request, so it checks the ephemeris lines rather than whole files.

Related checks

FALSE Olivine and earthquakes The Disaster Cycle, Fact-Checked

Sources

Bracketed numbers refer to this list. For the preprint [1], p. gives a page by its own numbering (1 to 19, after Research Square’s cover page), § a section, Table a table, Fig. a figure and Abstract its abstract. For the episode [2], times are positions in the video (hours:minutes:seconds), from the first to the last transcript line of each quotation. For the other sources, p. gives a page, Table a table and Abstract the abstract of the cited work; where only an abstract or a record was read, the entry says so. Links checked October 28, 2026.

1 Nikitopoulos, T. (2026). Temporal Overlap Between Global Seismicity and Planetary Configuration Dates. Research Square preprint, version 1, posted October 20, 2026; not peer reviewed. CC BY 4.0. We read the full text, Research Square's PDF of a cover page and 19 pages.

2 SpaceWeatherNews (S0) (October 28, 2026). They Should Have Warned the Airline | S0 News Oct.28.2026. YouTube video, https://www.youtube.com/watch?v=OPyP2JW3y6g. Quoted from the automatically generated transcript; times are positions in the video. The label "Planetary Alignments and Earthquakes" is the episode's own, on its link to the preprint.

3 Nikitopoulos, T. (2026). Temporal Overlap Between Global Seismicity and Planetary Configuration Dates: MATLAB code and data. Zenodo, version 1.1, August 1, 2026 (version 1.0, June 17, 2026), MIT licence. Zenodo refused our downloads (HTTP 403); the site's owner supplied the deposit, a zip of 392,617,938 bytes, the size Zenodo's record gives. We read its code and data in full, as text and data, and did not run the code.

4 Solar System Dynamics Group, NASA Jet Propulsion Laboratory. Horizons On-Line Ephemeris System, queried through its API on October 28, 2026: heliocentric ecliptic (ICRF) positions and velocities of the Moon and the planets from the DE441 ephemeris, hourly for 2000–2025 and every minute on four test days. Each query is in our scripts.

5 U.S. Geological Survey. ANSS Comprehensive Earthquake Catalog (ComCat): earthquakes of magnitude 6.5 and above, 2000–2025, from its FDSN event service, fetched as three lists on October 28, 2026 and hosted as a snapshot under Code and numbers.

6 Solar System Dynamics Group, NASA Jet Propulsion Laboratory. Astrodynamic parameters (GM of the Sun, the Moon and the planets, from the DE440 ephemeris) and Planetary physical parameters (Earth's mean radius). Retrieved October 28, 2026.

7 Ide, S., Yabe, S., and Tanaka, Y. (2016). Earthquake potential revealed by tidal influence on earthquake size–frequency statistics. *Nature Geoscience* 9(11), 834–837. Abstract only, from the publisher's page.

8 Cochran, E. S., Vidale, J. E., and Tanaka, S. (2004). Earth tides can trigger shallow thrust fault earthquakes. *Science* 306(5699), 1164–1166. Abstract only.

9 Vidale, J. E., Agnew, D. C., Johnston, M. J. S., and Oppenheimer, D. H. (1998). Absence of earthquake correlation with Earth tides: an indication of high preseismic fault stress rate. *Journal of Geophysical Research: Solid Earth* 103(B10), 24567–24572. Abstract only.

10 Hough, S. E. (2018). Do large (magnitude ≥8) global earthquakes occur on preferred days of the calendar year or lunar cycle? *Seismological Research Letters* 89(2A), 577–581. Abstract only, from the USGS's record of the paper.

11 Romanet, P. (2023). Could planet/sun conjunctions be used to predict large (moment magnitude ≥ 7) earthquakes? *Seismica* 2(1). Published May 1, 2023, CC BY 4.0. Full text read.

12 Dumont, S., de Bremond d'Ars, J., Boulé, J.-B., Courtillot, V., Gèze, M., Gibert, D., Kossobokov, V., Le Mouël, J.-L., et al. (2025). On a planetary forcing of global seismicity. *Frontiers in Earth Science* 13, 1587650. CC BY 4.0. Abstract only.

METHOD

How this was checked

On October 28, 2026, we checked every statement, number, quotation and citation on this page against its source: the preprint's full text, read as Research Square's PDF, which the site's owner also supplied, byte for byte the same, with its Crossref record [1]; the records of the author's code at Zenodo and DataCite [3]; the S0 News episode's transcript [2]; NASA's Horizons positions for 2000–2025 and NASA's masses of the Sun, the Moon and the planets [4] [6]; the USGS catalogue of earthquakes of magnitude 6.5 and above for 2000–2025 [5]; and six studies of tides, planetary line-ups and earthquakes, resolved through Crossref. Of the 12 sources listed, six were read in abstract or as a record only, as the list says. Zenodo refused our downloads of the author's code (HTTP 403, "unusual traffic"), and we did not try to get round it; the site's owner then supplied the deposit, and we read its code and data as text and data, without running the code [3].

The verdicts and the items tagged "Our analysis" are our own assessment, built on the cited sources. They include the rebuild of the preprint's method from its text; the diagnosis of what happens at each of its candidate minutes; the measure of how close the planets are to a line on its dates; the reruns with the bodies listed in other orders, another decomposition and no factor of 0.35; the test on 2013–2025 and 2000–2009, with its rules and code fixed in advance, and the further test with the threshold rule of the author's code; the rough intervals on the ratio to chance; the account of the 2011 run; and the tide arithmetic.

Our scripts, hosted under Code and numbers, reproduce every number of ours on this page from NASA's and the USGS's public data; run end to end on our downloads and the hosted snapshot of the USGS lists, they regenerate the hosted results file byte for byte. The rebuild matches every number in the preprint once the jump is measured, as the author's code measures it, on Earth's coordinates alone; with the rule as the preprint's text states it, every final number matches and one intermediate count, for 2011 with the Moon, does not. The four charts are our own, drawn from those data; no figure of the preprint is reproduced.

After the page was built, a second reviewer who hadn't seen the drafting re-ran our scripts end to end, which regenerated the results file byte for byte, rebuilt the method independently, read the author's deposit and checked every number, quotation and reference: 3 must-fix, 7 should-fix and 9 minor findings. We applied all but one, on how the episode's page spaces a p-value, which is not this page's to change, and two of them in part: we kept the fifth claim's quotation, and we could compare the deposit's size, not its checksum, with Zenodo's record. The main changes: the author's code measures the threshold on Earth's coordinates only, which explains the one count our rebuild missed, and with that rule the new years show a weak excess of about 1.4 times chance, which the page now reports as a further, exploratory test beside the pre-registered one; the verdict on "Dates and quakes correspond" moved from False to Overstated; the title, the description and the summary say the match fades rather than vanishes; the Moon's and the Sun's tidal effect is given with its factor of 3 for shallow thrust faults; flips of two axes are called turns, not mirrors; and two transcript locators and a dozen smaller points were corrected.

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

`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.
`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 28, 2026` Published on factchecked.science after a full check against the sources. Built from the preprint's full text (CC BY 4.0), the S0 News episode of October 28, 2026, our rebuild of the preprint's method from NASA's and the USGS's public data, and our test of it on 23 years it didn't use, with rules and code fixed in advance: five claims rated on the site's scale, two of them the episode's and three the preprint's own. The four charts are our own analysis; no figure of the preprint is reproduced. The scripts and a file of the numbers are hosted on the page. The fresh review changed one verdict before publication: "Dates and quakes correspond" went from False to Overstated after the author's own code was read, because its threshold rule leaves a weak excess of about 1.4 times chance in the new years, far below the preprint's 3.5; that rule is now reported as a further, exploratory test beside the pre-registered one.

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Last updated Oct 28, 2026