EVIDENCE REVIEW · EARTH'S INTERIOR

Earth's energy stores are big enough, but none could slide the crust 90° in a day

The disaster-cycle video says Earth turns over 90° in a day [1]. Several of Earth's internal energy stores hold more than such a slide would need, but none can release it within a day, and if its base resisted with 1 MPa or more, friction would cost several times more than the motion itself. We re-derived every value on the infographic that asks the question.

By Fact-Checked Science · Published October 19, 2026

OUR ANALYSIS marks our own reasoning and calculations, and the verdicts are our assessment. Everything else comes from the numbered sources.

Big enough on paper, impossible to release in a day

OUR ASSESSMENT

7×10^{26} J
to turn a 100-km-thick lithosphere 90° in 24 hours at a steady rate, our calculation [2]

10^{8} ×
Earth's whole heat flow, 47 TW, is what delivering even the infographic's smaller figure in a day would take [3]

4×10^{27} J
lost to friction for each megapascal of resistance at the base, five times the kinetic energy of a 100-km lithosphere's slide, our estimate

THE CLAIMS ABOUT EARTH'S ENERGY

TRUE

Earth has internal energy stores larger than 10^{27} J

The infographic's first takeaway

Earth's spin alone holds 2.1×10^{29} J [4], and the heat in the mantle and the latent heat of the liquid core are each of order 10^{30} J [2][5][6]. See section 1.

FALSE

"in one day during the magnetic pole shift, Earth turns over 90°"

The disaster-cycle video [1]

A 90° slide of the lithosphere in a day needs 4–7 × 10^{26} J of motion, all within the day, and more if its base resists: each megapascal of drag adds about 4 × 10^{27} J. No store can release energy that fast: heat leaves Earth at 47 TW, about 4×10^{18} J a day [3]. See sections 3 and 4.

OVERSTATED

Buoyancy plus pre-stress and weakening is the "most promising mechanistic direction"

The infographic's mechanism box and third takeaway

They are the only stores of roughly the right size, but buoyancy is released over millions of years, the stress needed exceeds the strength of rock, and no evidence points to a day-long instability combining them. See section 5.

MISLEADING

"global coherent stresses of the required size are unproven"

The infographic, on elastic pre-stress

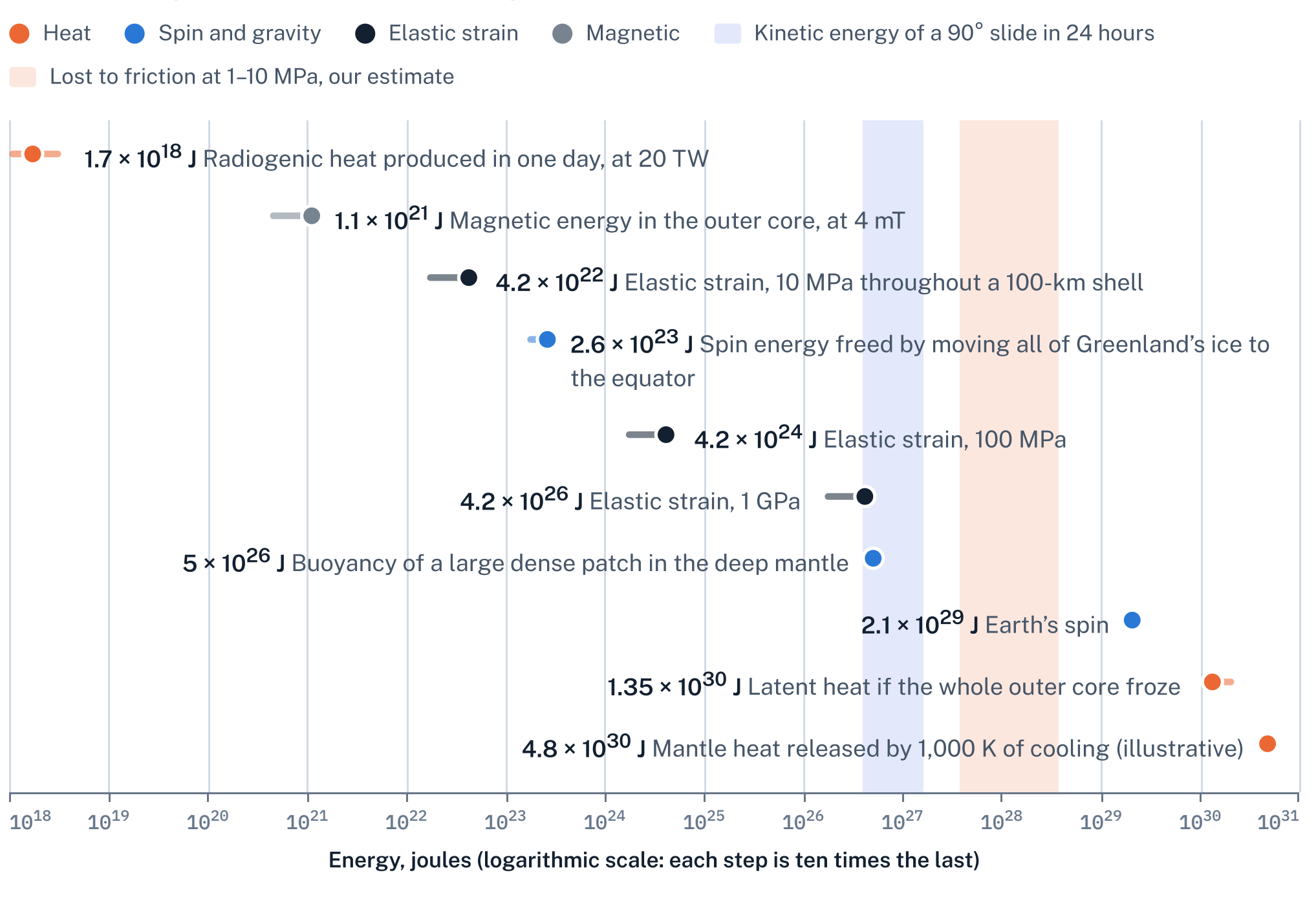
Storing that energy would take about 1 GPa throughout a 100-km lithosphere, more than the few hundred megapascals rock can hold [7]; earthquakes relieve a median of about 4 MPa of stress [8]. "Unproven" makes a physical limit sound like an open question. See section 3.

1 · THE STORES

All twelve values can be reproduced, and the chart is now drawn to scale

We re-derived every value on the infographic from published constants. Four follow directly; the other eight need inputs the infographic doesn't state, which we reconstructed (section 2). The original chart printed 10^{26} twice and placed five points 0.7 to 1.9 powers of ten from their values, so it is redrawn here.

Earth's energy stores beside the energy of a one-day slide



Dots: the infographic's values, all of which we reproduced. Bars: the range with other published inputs, for example the radiogenic heat of 11 to 38 TW across Earth models and geoneutrino measurements [9][10], a core field of 2.5 to 4 mT [11][12], or a latent heat of 600 to 1,200 kJ per kilogram [5]. The slide's kinetic energy runs from the infographic's 4.1×10^{26} J to 1.6×10^{27} J, the peak of a smooth start and stop for a 100-km lithosphere [2]. Redrawn by factchecked.science.

2 · THE INPUTS

Eight values rest on choices the infographic doesn't state

Each can be reproduced, but only by guessing a thickness, a stiffness or a distance. The most important is the slide's own energy, which implies a thinner shell than the usual 100-km lithosphere.

What reproduces each value, and what changes with standard inputs

ON THE INFOGRAPHIC	WHAT REPRODUCES IT	WITH STANDARD INPUTS
K0, the slide's minimum peak kinetic energy: 4.1×10^{26} J	A shell about 58 km thick turned 90° in 24 hours, or a 100-km shell turned 68°	A 100-km lithosphere turned 90°: 7.1×10^{26} J; turned 104°: 9.5×10^{26} J [2]
Smoothstep peak: 9.2×10^{26} J	2.25 times K0, exactly what the smoothstep curve gives	1.6×10^{27} J for a 100-km lithosphere
Elastic strain at 10 MPa, 100 MPa and 1 GPa: 4.2×10^{22}, 4.2×10^{24} and 4.2×10^{26} J	That stress everywhere in a global 100-km shell, with a stiffness of 60 GPa, the model's average shear modulus there	Using the Young's modulus instead gives 2.6 times less [2]
Greenland ice comparison: 2.6×10^{23} J	Spin energy freed if all of Greenland's ice, 7.42 m of sea level, moved from 72°N to the equator [14]	Melted into the ocean instead: 1.7×10^{23} J
Gravitational buoyancy: 5×10^{26} J	10^9 km³ of mantle 50 kg/m³ denser than its surroundings, moving 1,000 km	The two large dense-bottomed patches at the base of the mantle hold more mass, but they already rest on the core, so little of it can still sink [15][16]
Core latent heat: 1.35×10^{30} J	A latent heat of 733 kJ per kilogram for the outer core's 1.84×10^{24} kg [2]	Published range 600–1,200 kJ/kg: 1.1–2.2 × 10^{30} J, so three significant figures overstate it [5]
Mantle heat: 4.8×10^{30} J	A heat capacity of 1,200 J/kg/K for 4.0 × 10^{24} kg of mantle cooled by 1,000 K	1,265 J/kg/K gives 5.1×10^{30} J [6]

OUR ANALYSIS

Directly reproduced

Radiogenic heat in a day, 20 TW × 86,400 s = 1.7×10^{18} J; the magnetic energy of a 4 mT field filling the outer core, 1.1×10^{21} J; Earth's spin, ½Cω² = 2.1×10^{29} J; and the smoothstep peak, 2.25 × K0 [12][4]. The 20 TW is one estimate among several: Earth models and geoneutrino measurements run from about 11 to 38 TW, and Earth's total heat loss, radiogenic heat plus slow cooling, is 46–47 TW [9][10][3].

3 · HOW FAST

The stores large enough can't let go in a day

The infographic's table points the right way, but softly: "not demonstrated", "unproven" and "no known mechanism" describe limits that physics sets.

EARTH'S HEAT LOSS

4×10^{18} J a day

47 TW, all the heat leaving Earth, radiogenic and primordial; the slide needs 10^8 times that rate [3]

FROM EARTH'S SPIN

OUR ANALYSIS

0.19%

rise in Earth's moment of inertia needed to free 4 × 10^{26} J: 2.7 oceans' worth of mass moved from the poles to the equator [4]

STORED IN ROCK

OUR ANALYSIS

1 GPa

throughout a 100-km lithosphere to hold the slide's energy as strain, above what rock can bear [7]

What limits each store

STORE	THE INFOGRAPHIC	WHAT SETS THE LIMIT
Mantle heat	"Huge inventory, but heat must be transported and converted into mechanical work."	Heat leaves Earth at 46–47 TW, about 10^{-12} of this inventory a day, and only part of any heat flow can become work [3].
Core latent heat	"Very large long-term source, not demonstrated as a one-day releasable reservoir."	It is released only as the inner core grows: about 6.9×10^{28} J over some 670 million years, roughly 3 TW [17]. Freezing the outer core in a day would mean drawing 1.6×10^{25} W through the core's surface.
Earth's spin	"Large total energy, but only a small accessible fraction becomes available unless inertia changes along a real path."	Right. Without an outside pull such as the tides, only a change in the moment of inertia frees spin energy; moving all of Greenland's ice to the equator frees 2.6×10^{23} J, a sixteen-hundredth of the slide's kinetic energy [14].
Gravitational buoyancy	"Mechanically relevant and close to the target scale in large anomaly examples; requires a real mass redistribution and torque pathway."	The size is right, but buoyancy works against the viscosity of the lower mantle, about 10^{22} Pa s [18 p. 4]. A 10^9 km³ anomaly sinks about 13 cm a year and takes some 7 million years to release 5×10^{26} J.
Elastic pre-stress	"Can release quickly, but global coherent stresses of the required size are unproven."	It would take about 1 GPa throughout the lithosphere. Laboratory experiments put the strength of rock at "a few hundred megapascals for relatively dry rocks" [7]. Earthquake stress drops run from 0.3 to 50 MPa, with a median of about 4 [8]; the largest ever recorded, magnitude 9.5, released about 10^{19} J [19].
Magnetic energy	"Too small, in this inferred core-field model, to power the target motion."	Too small by a factor of about 400,000; a field several times stronger would change nothing [12].
Radiogenic heat	"Real long-term source, but no known mechanism releases it coherently in one day."	Radioactive decay sets the rate. A day's output is about four billionths of the slide's kinetic energy [9].

Rates and ratios without a reference are our calculations from the values above.

4 · FRICTION

Any resistance at the base would cost more than the motion

The infographic compares the stores only with the slide's kinetic energy. But a lithosphere turned 90° slides an average of about 7,700 km over the layer beneath it, and every metre against resistance turns energy into heat.

Energy lost sliding a 100-km lithosphere 90° in a day

RESISTANCE AT THE BASE	ENERGY LOST	TIMES THE INFOGRAPHIC'S K0	TIMES A 100-KM SLIDE'S	AVERAGE POWER
0.1 MPa	3.8×10^{26} J	0.9	0.5	4.4×10^{21} W
1 MPa	3.8×10^{27} J	9.3	5.4	4.4×10^{22} W
4 MPa (median earthquake stress drop)	1.5×10^{28} J	37	21	1.8×10^{23} W
10 MPa	3.8×10^{28} J	93	54	4.4×10^{23} W
100 MPa	3.8×10^{29} J	932	536	4.4×10^{24} W

Our estimate: resistance × base area × average slip. K0 is the infographic's 4.1×10^{26} J; a 100-km lithosphere's slide needs 7.1×10^{26} J [2].

OUR ANALYSIS

Resistance of a tenth of a megapascal is enough

Friction alone matches the slide's kinetic energy at a resistance of about 0.1 to 0.2 MPa, a twentieth to a fortieth of a typical earthquake's stress drop [8]. At 1–10 MPa the slide loses 4×10^{27} to 4×10^{28} J, more than every store on the infographic except Earth's spin, the core's latent heat and the mantle's heat, the three whose release in a day it already doubts. That heat would soon melt the slip zone, which may be the "weakening" in its mechanism box. Melt would lower the resistance, so friction is not a firm limit. Even with no friction, the motion alone needs about 5×10^{21} W, a hundred million times Earth's heat flow [3].

OUR ANALYSIS

The solid layer beneath doesn't help

The layer under the lithosphere flows with a viscosity of about 10^{17} to 10^{19} Pa s [18 p. 5]. Sheared that fast, it would resist with stresses of 10^{14} Pa or more, and over a single day it would behave as a solid and break rather than flow. Keeping the losses below the kinetic energy would need about 10^8 Pa s, a billion times lower than the lowest of those values. Just getting the shell moving within the day takes a push of a few megapascals across its whole base. Only a layer of melt could slide that easily.

5 · THE MECHANISM BOX

The "most promising" direction has only its size behind it

The infographic names "coupled buoyancy + pre-stress + weakening instability" as the "most promising mechanistic direction" and suggests a research path that would "calculate accessible energy as displacement proceeds, rather than assuming the motion in advance".

OUR ANALYSIS

Right size, wrong speed

Buoyancy and pre-stress are the only stores of roughly the right size, which is all the box shows. Buoyancy is released at the pace of mantle flow, millions of years for this much energy; pre-stress at that level exceeds the strength of rock; and weakening by melting is untested at this scale (section 4). We found no observations or models of a day-scale instability that combines them. The picture under the box shows two plates converging, not a whole shell sliding.

OUR ANALYSIS

A sound method, if it counts the losses

Calculating the energy that becomes available as the motion proceeds, instead of assuming the motion, is the right way to test the idea. Such a calculation would also have to include friction, the strength of rock and the rate at which each store can release energy, the three things that rule a one-day slide out here. The box's heading, "most promising", still suggests a one-day slide is a live option; these limits say it isn't.

6 · A FASTER FLIP

ECDO's flip in six to eight hours would need energy on the scale of Earth's spin

The ECDO hypothesis proposes a 104° turn of the mantle and crust together [20]. Its main article captions the turn "a violent 48 hours" [20]; another exhibit puts it at six to eight hours [21]. Our page on ECDO checks its other claims.

LITHOSPHERE, 104° IN 8 HOURS

OUR ANALYSIS

8.6×10^{27} J

of kinetic energy at a steady rate; in 6 hours, 1.5×10^{28} J [2]

MANTLE AND CRUST, 104° IN 6–8 HOURS

OUR ANALYSIS

1.4–2.5 × 10^{29} J

at a steady rate, about two-thirds of Earth's spin energy to more than all of it [2][4]

EARTH'S SPIN, FOR COMPARISON

2.1×10^{29} J

the whole energy of Earth's daily rotation [4]

OUR ANALYSIS Over 48 hours, the mantle and crust would need about 4×10^{27} J, a fiftieth of Earth's spin energy and ten times the infographic's one-day slide [2].

7 · READ WITH CARE

The limits of this check

Where our numbers rest on our own assumptions, and what we couldn't read.

The inputs are reconstructions

The research summary behind the infographic wasn't available, so the shell, stiffness, distance and latent heat behind eight values are our reconstructions. Each reproduces the printed value, but other combinations might too.

The friction estimate is a rough one

It treats the lithosphere as one rigid shell sliding over a uniform base, and doesn't model melting faults, real plate shapes or a lithosphere that bends. It shows the size of the problem, not a precise figure.

Inventories, outputs and examples

The infographic's footer rightly warns that some values are total inventories, one is a day's output and others are examples. Its chart marked some kinds in its labels but didn't sort them; ours names the kind in every label.

Some sources read in summary

Several papers were read as abstracts or summaries, including those on the core field, rock strength, stress drops and deep-mantle structures [12][11][7][8][15][16]. The reference Earth model was entered by hand and checked against published totals [2][4].

OUR ANALYSIS

Bottom line: Earth has the energy, but no way to spend it in a day.

The infographic's numbers hold up and its instinct is right: total energy isn't the problem. Release is. The stores big enough to matter give up their energy over millions to billions of years, and even 1 MPa of resistance at the base would cost several times the motion's energy. A 90° turn in a day is not an open research question but one these limits close.

Related checks

FALSE Einstein and the 90° flip The Disaster Cycle, Fact-Checked

UNVERIFIED Major White and Project Nanook The Disaster Cycle, Fact-Checked

Sources

Bracketed numbers refer to this list; p. gives a page of the published article. Values without a reference are our calculations from the cited inputs. Links checked October 19, 2026.

1 SpaceWeatherNews (S0) (2026). THE DISASTER CYCLE – The Evidence. YouTube video, quoted from the transcript behind our check of the video; the line is at 1:22:26.

2 Dziewonski, A. M., and Anderson, D. L. (1981). Preliminary reference Earth model. *Physics of the Earth and Planetary Interiors* 25(4), 297–356. Its density and elastic profiles give the masses, volumes, moments of inertia and moduli we use.

3 Davies, J. H., and Davies, D. R. (2010). Earth's surface heat flux. *Solid Earth* 1(1), 5–24. CC BY 3.0.

4 Petit, G., and Luzum, B. (eds.) (2010). IERS Conventions (2010), IERS Technical Note 36, chapter 1 (updated version): Earth's rotation rate, flattening and gravity field, from which its moment of inertia follows.

5 Deguen, R., Alboussière, T., and Cardin, P. (2013). Thermal convection in Earth's inner core with phase change at its boundary. *Geophysical Journal International* 194(3), 1310–1334. We read the version on arXiv.

6 Barnes, R., et al. (2020). VPLanet: the virtual planet simulator. *Publications of the Astronomical Society of the Pacific* 132(1008), 024502. We read the version on arXiv.

7 Kohlstedt, D. L., Evans, B., and Mackwell, S. J. (1995). Strength of the lithosphere: constraints imposed by laboratory experiments. *Journal of Geophysical Research* 100(B9), 17,587–17,602. We read the abstract.

8 Allmann, B. P., and Shearer, P. M. (2009). Global variations of stress drop for moderate to large earthquakes. *Journal of Geophysical Research* 114(B1), B01310. We read the abstract.

9 Borexino Collaboration (Agostini, M., et al.) (2020). Comprehensive geoneutrino analysis with Borexino. *Physical Review D* 101(1), 012009. CC BY 4.0.

10 KamLAND Collaboration (Abe, S., et al.) (2022). Abundances of uranium and thorium elements in Earth estimated by geoneutrino spectroscopy. *Geophysical Research Letters* 49(16), e2022GL099566. CC BY-NC-ND 4.0. We read the version on arXiv.

11 Buffett, B. A. (2010). Tidal dissipation and the strength of the Earth's internal magnetic field. *Nature* 468(7326), 952–954. We read the University of California, Berkeley's release about it.

12 Gillet, N., Jault, D., Canet, E., and Fournier, A. (2010). Fast torsional waves and strong magnetic field within the Earth's core. *Nature* 465(7294), 74–77. We read the abstract.

13 KamLAND Collaboration (2011). Partial radiogenic heat model for Earth revealed by geoneutrino measurements. *Nature Geoscience* 4(9), 647–651. We read the abstract.

14 Morlighem, M., et al. (2017). BedMachine v3: complete bed topography and ocean bathymetry mapping of Greenland from multibeam echo sounding combined with mass conservation. *Geophysical Research Letters* 44(21), 11,051–11,061. CC BY 3.0. We read the abstract.

15 Cottaar, S., and Lekic, V. (2016). Morphology of seismically slow lower-mantle structures. *Geophysical Journal International* 207(2), 1122–1136. We read the abstract.

16 Lau, H. C. P., Mitrovica, J. X., Davis, J. L., Tromp, J., Yang, H.-Y., and Al-Attar, D. (2017). Tidal tomography constrains Earth's deep-mantle buoyancy. *Nature* 551(7680), 321–326. We read the abstract.

17 Li, W.-J., Li, Z., Shi, Y.-B., He, X.-T., Wang, C., and Zhang, P. (2020). Ab initio determination on the thermal evolution of the Earth's core. arXiv:2010.05423, a preprint not peer reviewed.

18 Cathles, L., Fjeldskar, W., Lenardic, A., Romanowicz, B., Seales, J., and Richards, M. (2023). Influence of the asthenosphere on earth dynamics and evolution. *Scientific Reports* 13, 13367. CC BY 4.0.

19 Hanks, T. C., and Kanamori, H. (1979). A moment magnitude scale. *Journal of Geophysical Research* 84(B5), 2348–2350; and Kanamori, H. (1977). The energy release in great earthquakes. *Journal of Geophysical Research* 82(20), 2981–2987. The standard relations between magnitude, seismic moment and energy.

20 The Ethical Skeptic (pseudonym). Exothermic Core-Mantle Decoupling – Dzhanibekov Oscillation (ECDO) Theory. Blog article, May 12, 2024, as modified October 8, 2026; read October 19, 2026.

21 The Ethical Skeptic (pseudonym). Hidden in Plain Sight. Blog article, December 18, 2023, as modified July 3, 2026; read October 19, 2026 (Exhibit K4).

METHOD

How this was checked

On October 19, 2026, we checked every value and statement on the original infographic, 38 items, against published constants and studies: the reference Earth model, the IERS conventions, heat-flow and geoneutrino measurements, estimates of the core's field and latent heat, laboratory rock strength, earthquake stress drops and mantle viscosity. We re-derived all twelve values, measured the original chart against its axis and estimated the friction a sliding lithosphere would meet. The check corrected several statements; the change log lists them.

The verdicts and the items tagged "Our analysis" are our own assessment, built on the cited sources: the re-derivations, release rates and the friction estimate. The chart is redrawn by factchecked.science from the infographic's values, and the video is quoted from the transcript behind our check of it [1].

After the page was built, a second reviewer who hadn't seen the drafting recomputed every value with its own model of Earth's structure, all of which matched, checked the chart against its values and checked every quotation and reference. The changes that followed: the friction comparison is now conditional, about 4×10^{27} J lost per megapascal of resistance at the base, five times a 100-km lithosphere's kinetic energy, and melt in the slip zone could lower it; the release-rate limit, which rules out a one-day slide on its own, leads; ECDO's own "48 hours" is given beside its six to eight hours; the deep-mantle patches no longer count as buoyancy that could still be released; the K0 row says it reproduces only with a thin shell; the change log gives the right cause for the original chart's errors; and several sources and wordings 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

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.
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 19, 2026 Published on factchecked.science after a full check against the sources and a re-derivation of every value. Changes from the infographic: added our verdicts on four claims and sections on the inputs behind eight values, on friction and on ECDO's faster flip. The chart is redrawn: the original printed 10^{26} on two ticks, placed five points 0.7 to 1.9 powers of ten from their values, drew the 1 GPa point left of K0 although it is slightly larger, and drew the 24-hour band about 0.3 low, so that the buoyancy point sat on the 9.2×10^{26} J line although it is about half that. The chart now adds a band for friction at 1–10 MPa and extends the slide's band to 1.6×10^{27} J; the infographic's values were right, its drawing was not. The inputs behind eight values are now stated: K0 implies a shell about 58 km thick, and a 100-km lithosphere gives 7.1×10^{26} J; the Greenland value is the spin energy freed by moving all its ice to the equator; and the core's latent heat is shown with its range, 1.1–2.2 × 10^{30} J, beside the infographic's 1.35×10^{30} J. In the table, "not demonstrated", "unproven" and "no known mechanism" became the limits that apply (heat flow, the growth of the inner core, rock strength, mantle viscosity and decay rates), and the takeaway that thermal stores are "not obviously available" became not available. Friction, which the infographic left out, is estimated. "Most promising mechanistic direction" is rated Overstated, and its converging-plates picture is not reproduced.

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