

POLARITY REVERSAL SIMULATION | SCIENCE NEWS

Magnetic field lines (top) result from convecting liquid iron (bottom)

OUR JOURNEY

How much do you really know about the pale blue dot?

EDITOR

Amanda Bell



CONTACT

Questions, comments, submissions, photos or just to say 'hello':

ObjView at [NoCoAstro dot org](http://NoCoAstro.org)

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NOCOASTRO MEETING

Join us for our monthly awesomely-nerdy astro talk:

Date: Thursday, May 5th, 6:15-7:45pm

Speaker: TBD

If you know someone who would like to dazzle the club with their astronomical knowledge, please contact Bob: VP at NoCoAstro dot org.

DID YOU KNOW...? All meetings are FREE & open to the public!

Just stop by the Fort Collins Museum of Discovery.

MAY

NOCOASTRO OUTREACH

11th, Wednesday

Poudre Learning Center, 8:30pm

13th, Friday

Fossil Creek Reservoir, 8:30pm

27th, Friday

Bobcat Ridge (pre-register), 8:45pm

28th, Saturday

Carter Lake (park fee req'd), 9pm



HOME, SWEET EARTH

ORIGIN OF NAME: *Our planetary home has been called Earth for at least 1000 years.* Did you know that Earth is the only planet that wasn't named after a Greek or Roman god or goddess?

ATMOSPHERE TYPE: As you probably remember from elementary school, our atmosphere is primarily oxygen (~20%) and nitrogen (~78%) by volume. Our atmosphere thins with increasing altitude and 3/4 of it is within 6.8 miles (11 km) of the surface. You may be saying to yourself, 'That's great but where does Earth end & space begin?' *Good question.*

MOONS: Surely we have one moon, right? Simply put, moons are just *natural satellites*. So, what about the *quasi-orbital satellite* called Cruithne (CREW-eeen-ya)? Maybe we have a *mini moon* or does Earth just have *temporary moons periodically*?

SIZE: If size matters, Earth is the winner! It isn't just the largest terrestrial planet in our solar system but also the most dense.

EQUATORIAL CIRCUMFERENCE: 24,873.6 miles [moon is 27% the size of Earth].

VOLUME: 260 billion cubic miles [moon is 2% Earth volume].

MASS: $5.97 * 10^{24}$ kg [moon is 1.2% the mass of Earth].

MEAN DENSITY: 5.513 g/cm cubed [most dense in the solar system].

UNCOMPRESSED DENSITY: 4.4 g/cm cubed. [By comparison, the moon has the weakest gravity and smallest mass, so is the least dense of the 5 terrestrial worlds, including Mercury, Venus, Earth and Mars.] This measurement is the average density if the planetary materials were at zero pressure. Higher uncompressed density indicates greater metal content. **Do you know why** densities decrease for the planets as we move outward from the sun?

MAGNETIC FIELD: Our geomagnetic field, which is constantly changing, extends from Earth's interior to the place where it meets the solar winds. A paleomagnetic study to find the earliest evidence of magnetic fields has shown it to be present since at least *3,450M years ago*. Is a magnetic field a *prerequisite for life*?

Fun Fact:
Lunar libration is why even though only 50% of the moon is visible at once, we actually see 59% of its surface from Earth

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SURFACE GRAVITY: 9.8 m/s squared, which is also the standard 'one g' used when measuring surface gravity of all planetary bodies. You may not be surprised to hear that Earth's surface gravity is the greatest of the terrestrial planets (just sneaking in above Venus' 8.87 m/s squared). However, did you know that our little planet has greater surface gravity than one of the gas giants in our solar system as well? That's right, we beat out Uranus, which came in at a very respectable 8.69 m/s squared. But wait, *how do we measure surface gravity of a gas giant?*

SURFACE AREA: 197M square miles [the moon is 7.4% of Earth SA & is actually smaller than the continent of Asia].

PLANETARY COMPOSITION: Terrestrial. *How do we characterize terrestrial versus Jovian planets?*

DISTANCE FROM SUN: About 93M miles, which is also equal to 1 A.U. or 'astronomical unit'. *How lucky is that?*

ORBIT: The *eccentricity* of our orbit is minimal, at 0.01671123. [the moon is our eccentric neighbor, at 3.315x Earth]. This number is derived from our closest orbit around sun of 147M kilometers and our farthest orbit of 152M kilometers. A value of zero ($x=0$) is circular, a fraction ($0 < x < 1$) is elliptical, one ($x=1$) is parabolic escape orbit and greater than one ($x > 1$) is a hyperbola. Because our orbit is just over 365 days long, we have leap years. *Let Phil Plait explain why.*

SPIN: Earth inhabitants take for granted the seemingly-endless, comfortable, life-sustaining spinning of the planet... but did you know that we are *slowing down*? We're on our way (like the slow & steady tortoise) to a 'double tidal lock' with the moon. Interestingly, double tidal locks are common in the universe: in pairs of close, relatively-large orbiting satellites and double star systems, the strong tidal forces *easily and favorably lead to a double tidal lock.*

EQUATORIAL INCLINATION: 23.4 degrees [the moon is tilted a mere 6.68 degrees]. The moon has a stabilizing effect on Earth. *Without the moon, we could be in real trouble.*

PLANETARY ALBEDO: Earth's albedo is *similar to the albedo of gas giants* in the solar system; planetary bodies with clouds tend to have a higher albedo. Seasonal changes that affect cloud cover affect Earth's albedo.

TEMPERATURE CHANGES: We have recorded *+159.3 deg in 2005* and *-136 deg in 2010* on Earth; that's 295.3 degrees! [moon has a 522 degree temperature variation from night to day].

Fun Fact:
*Ozone is blue
and smells like
geraniums*

MOON DRIVES MIGRATION OF ARCTIC ZOOPLANKTON:

Biological clock tied to the phases of the moon?

The daily rising and setting of the sun propels what is thought to be the world's largest migration: tiny zooplankton move from the near-surface waters down into deeper, darker waters during the day to avoid predators that rely on sight for finding a meal. It turns out that the region can be surprisingly active in the dark of the polar night.



SUPERNOVA IRON FOUND ON MOON:

A supernova two-million years in the past has left its mark on the moon.

Evidence of this supernova has been found on Earth in deep-sea sediment samples and now in samples gathered on the moon from 1969 to 1972.

Among other things this also makes it possible for the researchers to infer the distance to the supernova event!

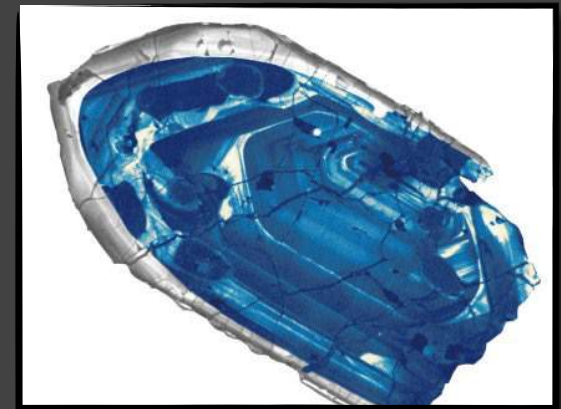


WHEN GEOLOGY AND ASTRONOMY COLLIDE:

New research has confirmed that Earth's crust first formed just 160 million years after formation of our solar system!

Why does this matter? New research is confirming the timeframe that Earth was a fiery ball covered in a magma ocean came earlier than previously thought, as did the Earth cooling to become habitable earlier than we thought as well!

The research may help scientists understand how other habitable planets may form.



WHO IS YOUR FAVORITE?



Carl Sagan: The Pale Blue Dot.



Brian Cox: Have you seen him on Qi yet? He talks about ewoks!



Neil deGrasse Tyson: Wants you to just be yourself.



Michio Kaku: Discusses 'The Future of the Mind' with Jon Stewart.



Maybe you prefer YouTube celebs: SciShow, Sixy Symbols, Veritasium, Numberphile or MinutePhysics?

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“ Before we invented civilization our
ancestors lived mainly in the open out under
the sky. Before we devised artificial lights and
atmospheric pollution and modern forms of
nocturnal entertainment
we watched the stars.”

— Carl Sagan, *Pale Blue Dot*

Pale Blue Dot: A Vision of the Human Future in Space (audio book)
By: Carl Sagan



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