

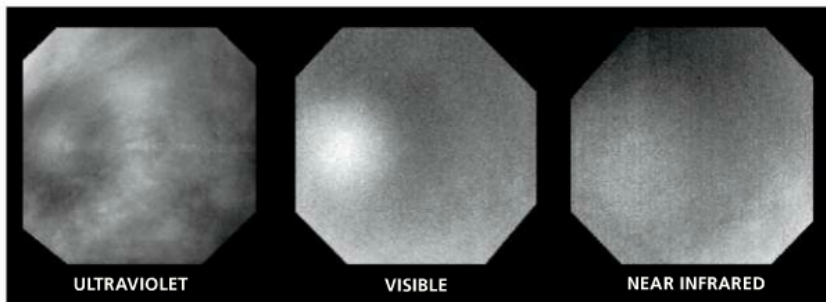


In March, the Venus Express probe released this false-color image of a glory in Venus' atmosphere, measuring about 750 miles across.

Venus Glory Reveals Cloud Qualities

➔ That rainbow circle of light you might glimpse in the sky out an airplane window is known as a glory. For the first time, astronomers have fully imaged one on another planet.

Glories occur at a point in the sky opposite the sun when light scatters off tiny liquid particles, usually water in our clouds, refracting into rings. After analyzing this view of a glory on Venus — combining three wavelengths into a false-color image — astronomers were surprised to learn that the planet's clouds aren't pure sulfuric acid after all, but may include iron chloride and pure sulfur. — KARRI FERRON



The color image of the glory (top) is a composite of these three photos, which were taken at different wavelengths of light during the phenomenon.

The Nose Knows More Than We Thought

➔ From roses to rainstorms to rotten eggs, our noses pick up thousands of scents every day. But just how many smells can we discern? Try a trillion — far more than once thought.

For decades, the number of scents the average person could distinguish was said to be about 10,000, an unverified estimate that smelled fishy to some researchers.

“We decided to do some experiments to replace the number with a more realistic one,” says neurobiologist Andreas Keller of Rockefeller University.

Keller's team, which published the findings in March, had 26 volunteers sniff 520 odor “cocktails.” Each was a different blend drawn from 128 distinct odor molecules. Participants were able to distinguish between even highly similar mixtures. Extrapolating from these findings, Keller estimates the average person can detect at least 1 trillion different smells, and probably far more. — APRIL REESE

Meet the Exoplanet Class of 2014

→ Another year, another amazing haul of exoplanets — worlds around other stars. The known total doubled to over 1,800, and headlines trumpeted several exciting, groundbreaking firsts. The numerous alien-world oddities that cropped up expanded our limited, solar system-centric perspective on nature's creativity. Just have a look at some of the "stars" of the Exoplanet High Class of '14!

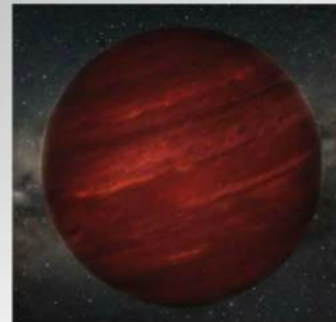
— ADAM HADHAZY



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Biggest trendsetter

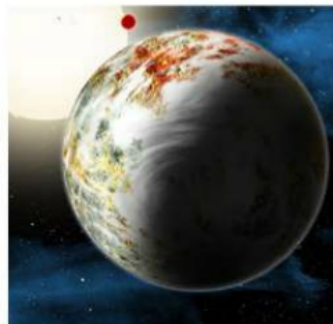
This mouthful of an exoplanet stands as the first approximately Earth-size world, with an Earth-like orbit, in a double-star system. Before, astronomers had no clue if Earthly worlds could form in such systems. Given that at least half of all stars are binaries, the finding greatly expands the odds for life in the universe.



GU Psc b

Most hipster

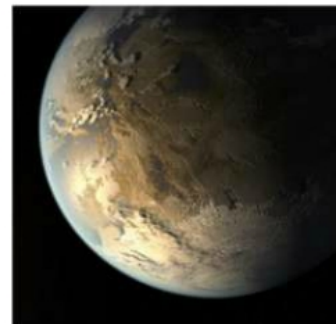
Talk about outside the mainstream. GU Psc b set the record this year for the greatest distance from its star. This rebel planet hangs out in an orbit about 200 billion miles from its host star — about 2,000 times the average Earth-sun distance. As big as about a dozen Jupiters, GU Psc b's outsider status challenges leading planet formation theories.



Kepler-10c

Biggest beefcake

This burly world is the first-ever "mega-Earth." Scientists knew that Kepler-10c was a "super-Earth" — a planet a few times Earth's size — since discovering it in 2011. But these planets could range from gaseous mini-Neptunes to rocky Earth-like worlds. A new measurement of Kepler-10c's mass, however, confirmed the world is solid, having 17 times Earth's mass. It's the "Godzilla of Earths," one researcher quipped.

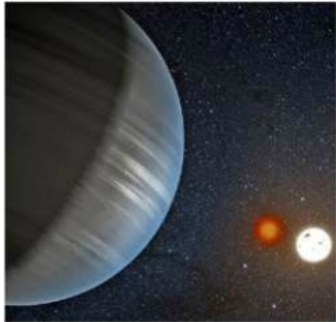


Kepler-186f

Most likely to succeed

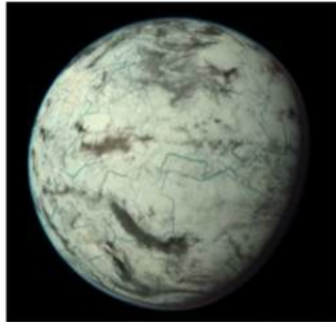
Hopes that alien life might exist got a huge boost in 2014 with the discovery of Kepler-186f. It's the first Earth-size planet discovered in another star's not-too-hot, not-too-cold "Goldilocks" zone, where liquid water can persist on a planetary surface. Potentially the friendliest-to-life exoplanet yet found, Kepler-186f will be studied for years to come.

EXOPLANET HIGH CLASS OF 2014



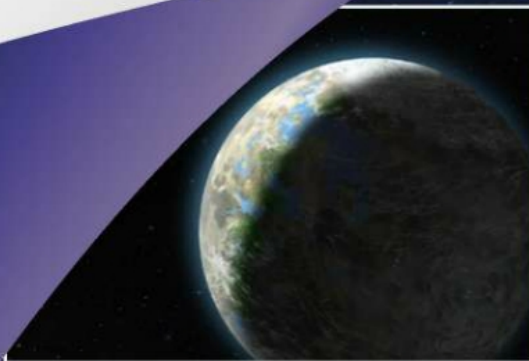
Kepler-413b Biggest drama queen

There's always a moody one. Kepler-413b has a very wobbly orbit, research this year showed. As it orbits a pair of stars, the exoplanet dips above and below the plane of the stars' orbit in an 11-year cycle. Earth takes 112,000 years to complete such a wobble cycle. Unlike most "transiting" exoplanets — which, from our perspective, cross the faces of their stars like clockwork — Kepler-413b goes long periods without a transit because of its wild orbital swings. It won't transit again until 2020.



Kapteyn b Most dependable

A loyal buddy, that Kapteyn b. This newfound exoplanet is 11.5 billion years old, more than twice our planet's age. But here's the kicker: Kapteyn b might well have been — or even may still be — habitable, as it, too, has an orbit that could allow liquid water. Life would have had many extra billions of years to develop here under the stalwart planet's dim, red sun.



Gliese 581 d and Gliese 581 g The dropouts

Exoplanet High had a few big dropouts this year. Gliese 581 d and Gliese 581 g, touted as the first potentially habitable exoplanet back in 2010, both failed to make the grade. Closer scrutiny of the Gliese 581 system reveals that the dips in starlight thought to arise from these planets crossing in front are more likely just due to sunspots.

CLOCKWISE FROM TOP: LEFT: NASA/JPL-CALTECH/T. PYLE; PHUUPR ARECIBO/LADIN SKY ATLAS; LYNETTE COOK/NASA; BACKGROUND: MEHMET CAVITINKSTOCK

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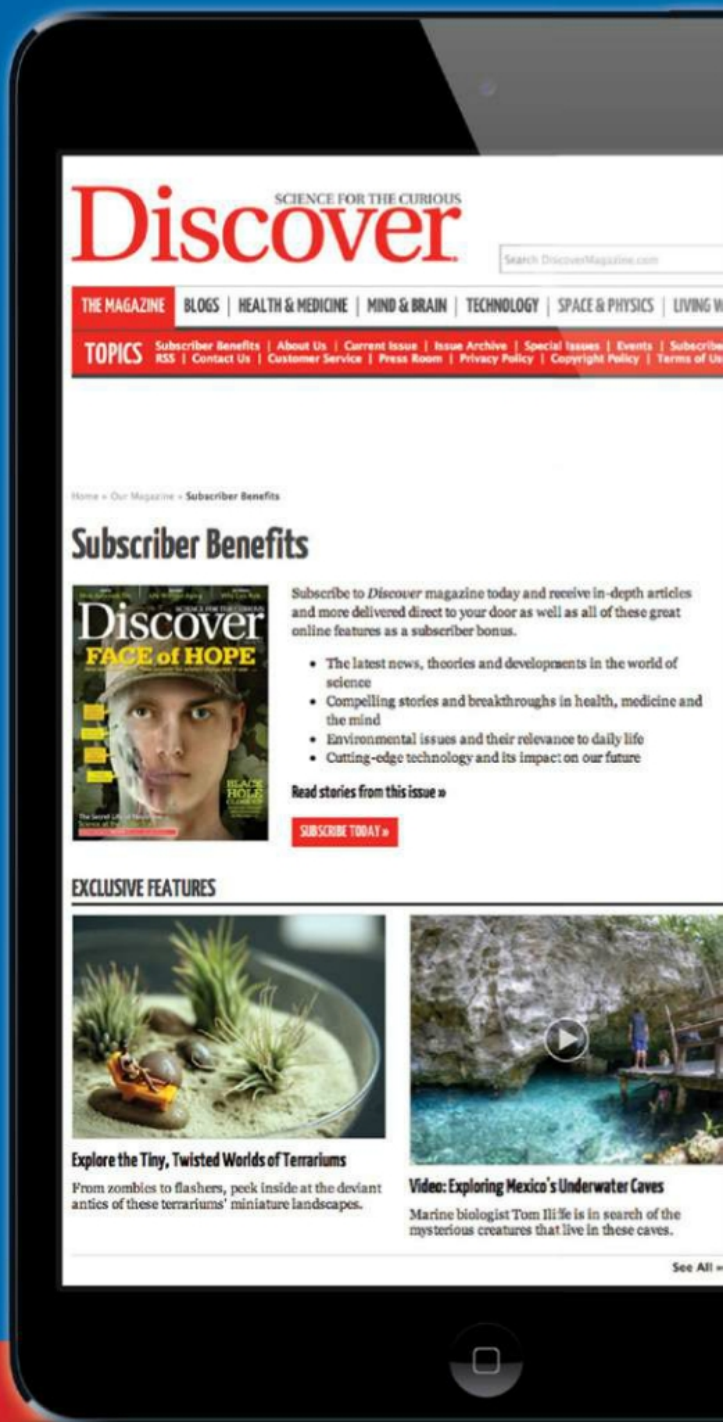
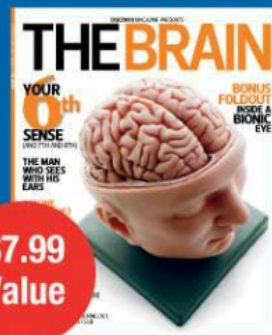
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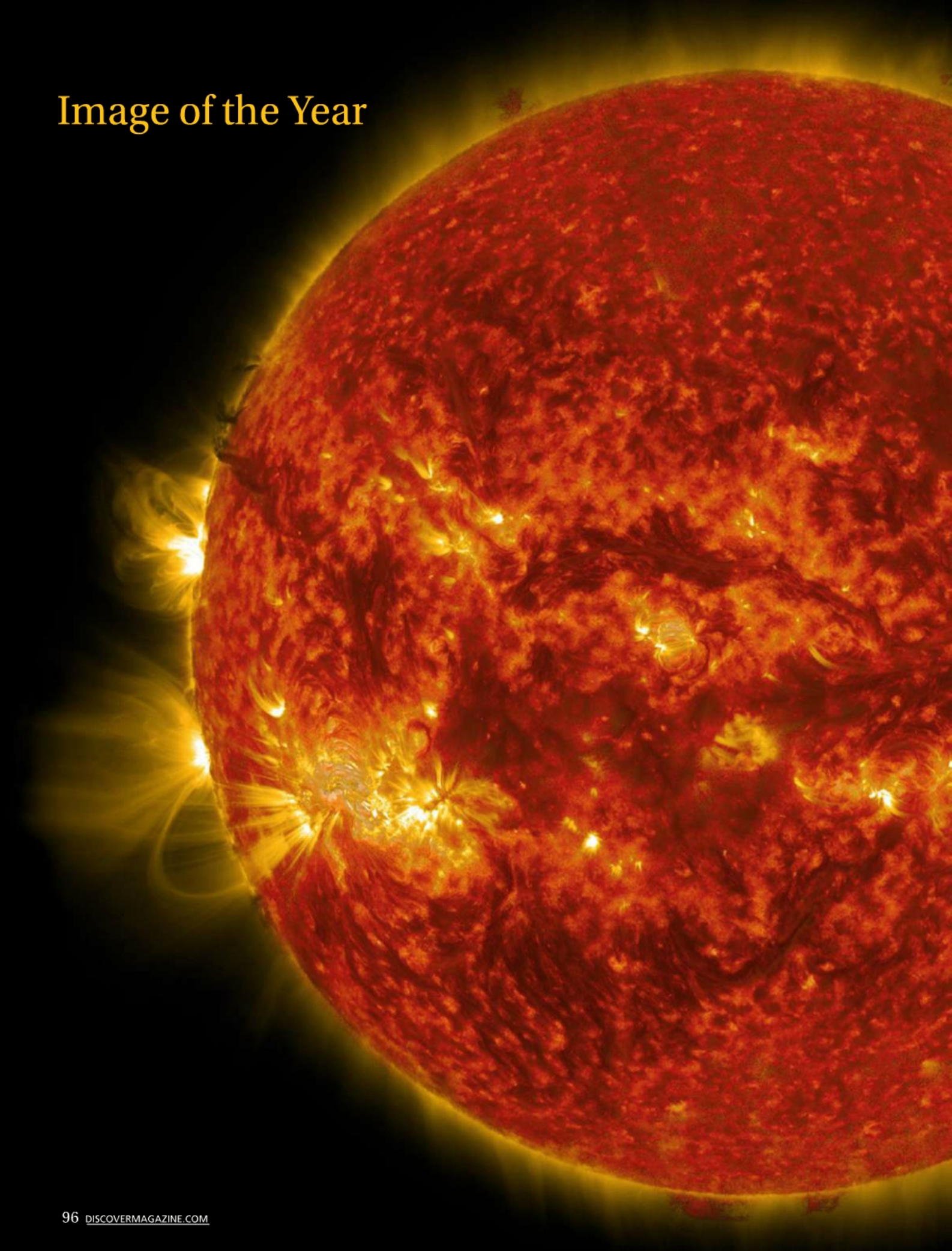
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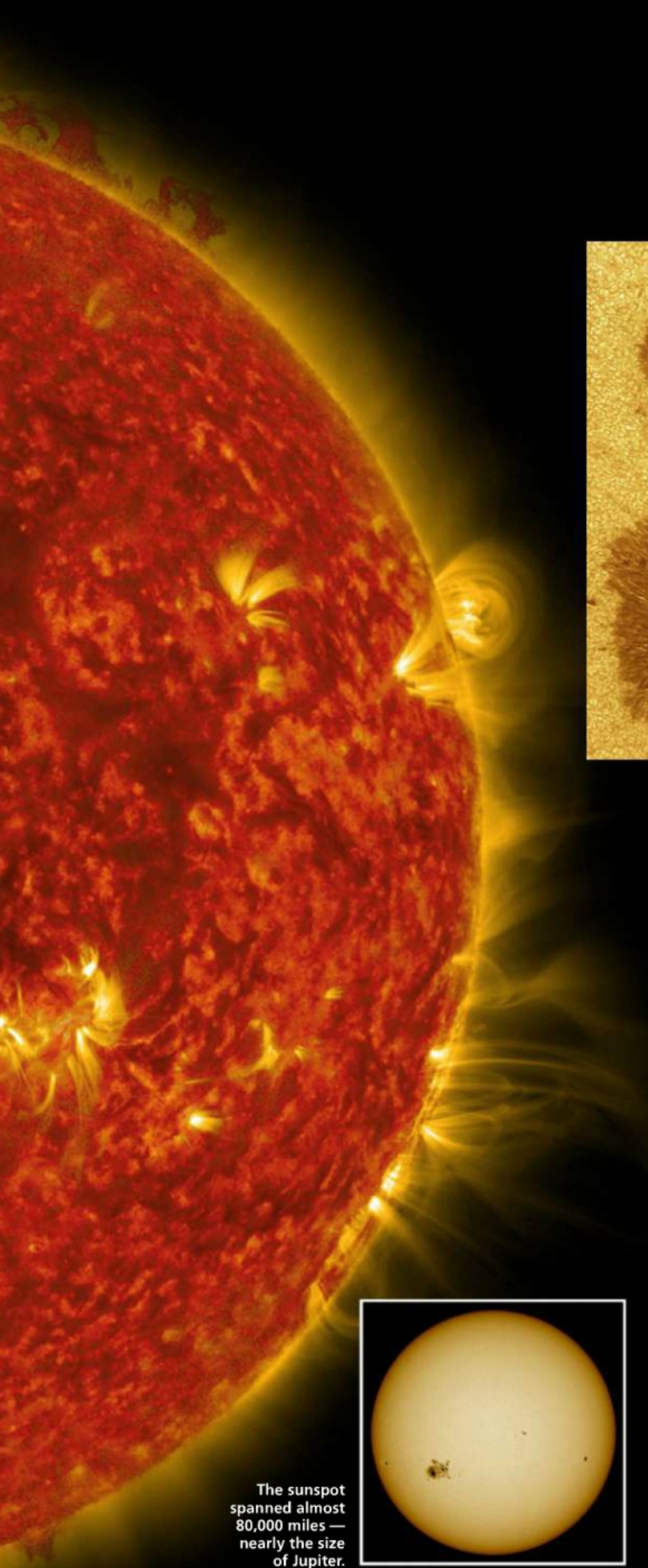
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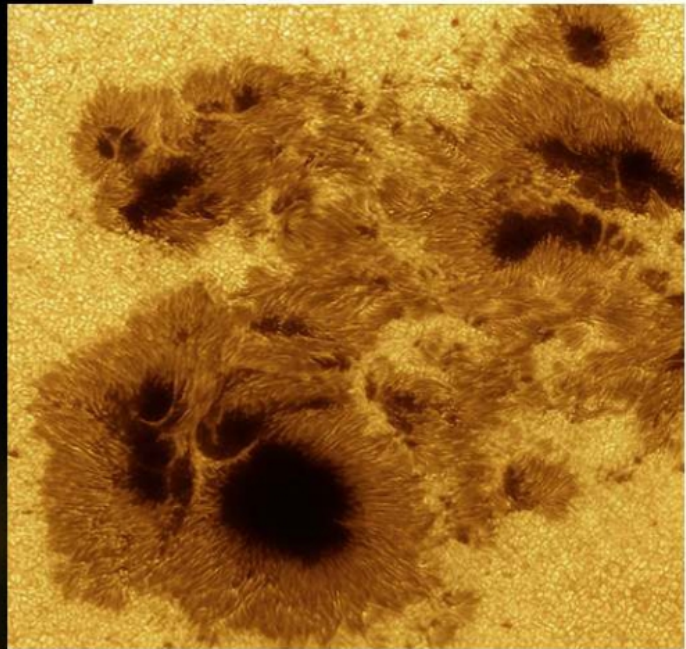
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Image of the Year





The sunspot spanned almost 80,000 miles — nearly the size of Jupiter.



This telescopic view reveals the sunspot group to be much darker in visible wavelengths. It could even be observed at sunset with the naked eye.

FROM LEFT: NASA/GODDARD SPACE FLIGHT CENTER/SDO/JIM FORBES/SDO/SDO; RANDALL SHIVAK AND ALAN FRIEDMAN/INVERTED IMAGINATION

Our Sun Lets Out a Roar

Although the sun's current 11-year cycle of activity is one of the quietest ever recorded, this Oct. 20 image (left) is anything but calm. The composite combines different views of extreme ultraviolet light captured by NASA's space-based Solar Dynamics Observatory. The coronal loops — massive magnetic arches of hot gas — sizzle at 1.8 million degrees Fahrenheit (yellow), while plumes of plasma (red) simmer at a relatively cool 90,000 F.

In October, the area known as active region 12192 (the bright patch on the left side of the main image) spawned the largest sunspot group in 24 years. According to NASA solar scientist C. Alex Young, the region is unusual because it produced fairly large solar flares but not the huge coronal mass ejections that typically occur at the same time, sometimes damaging satellites. — ERNIE MASTROIANNI

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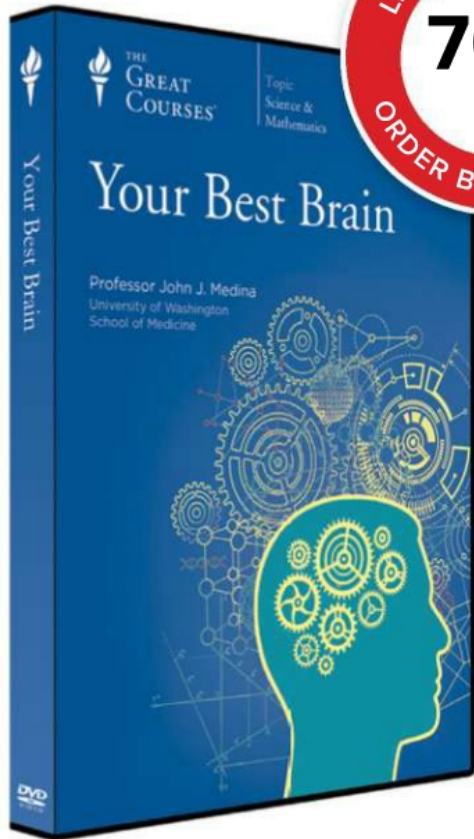
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