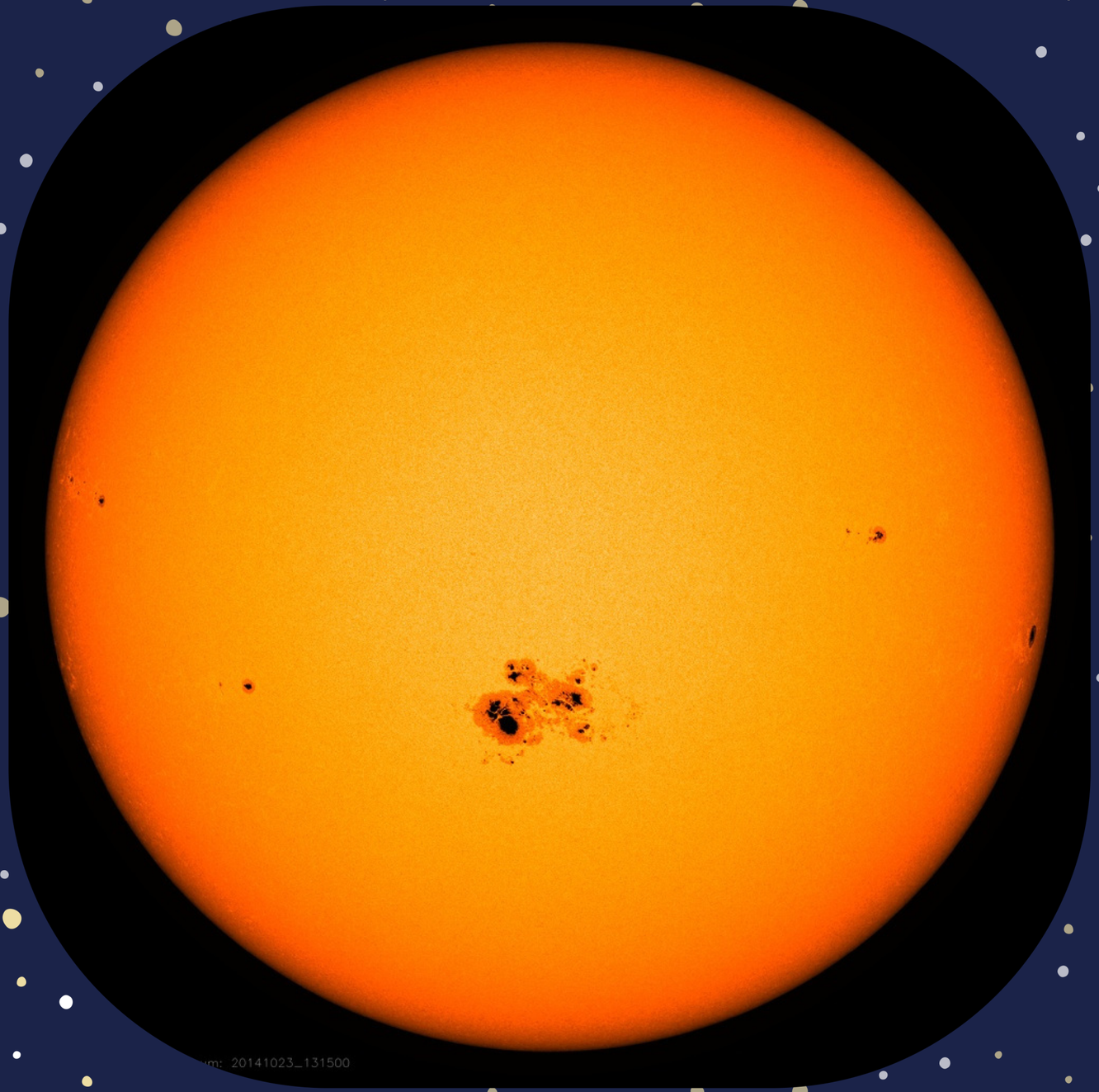
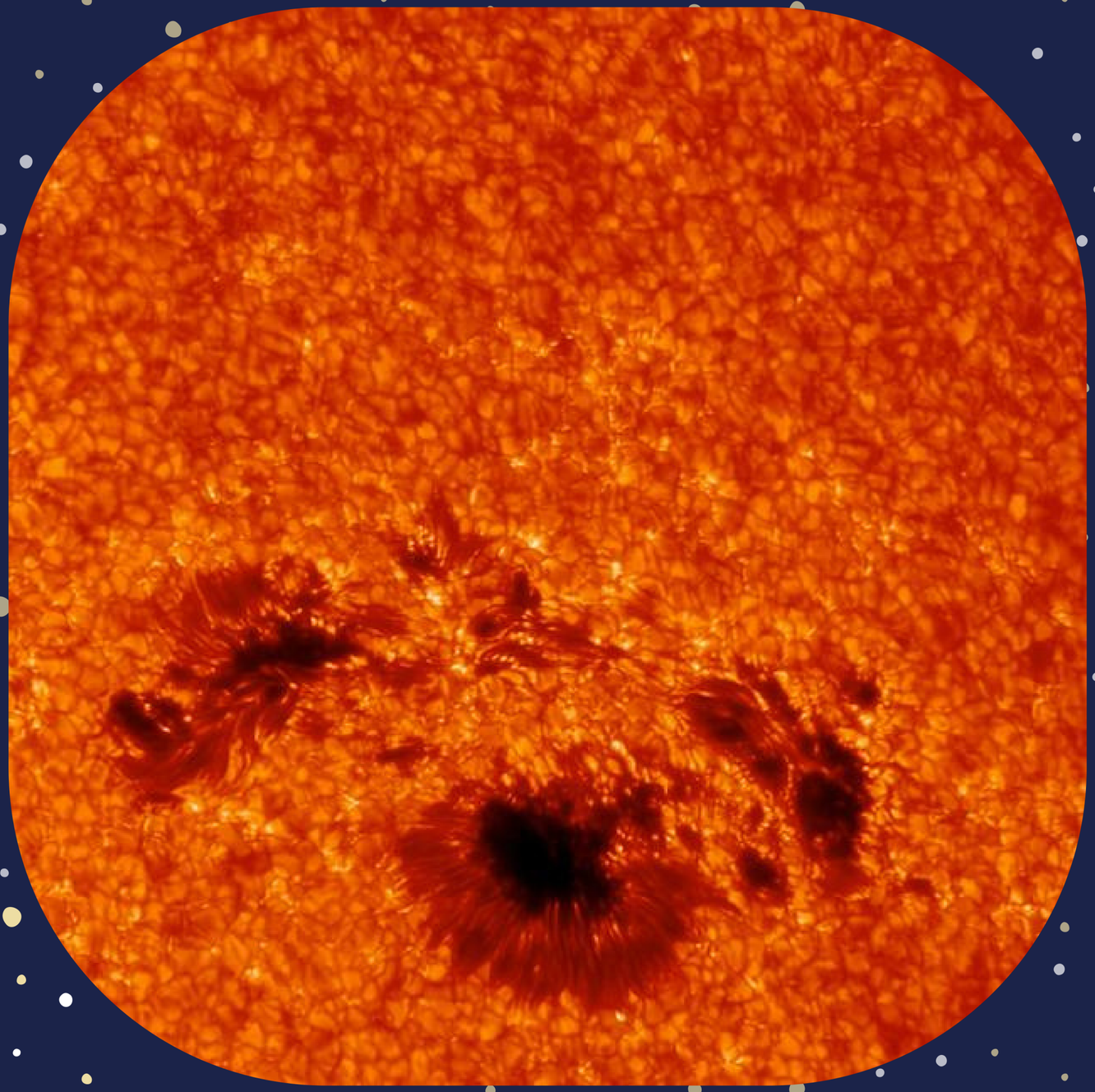


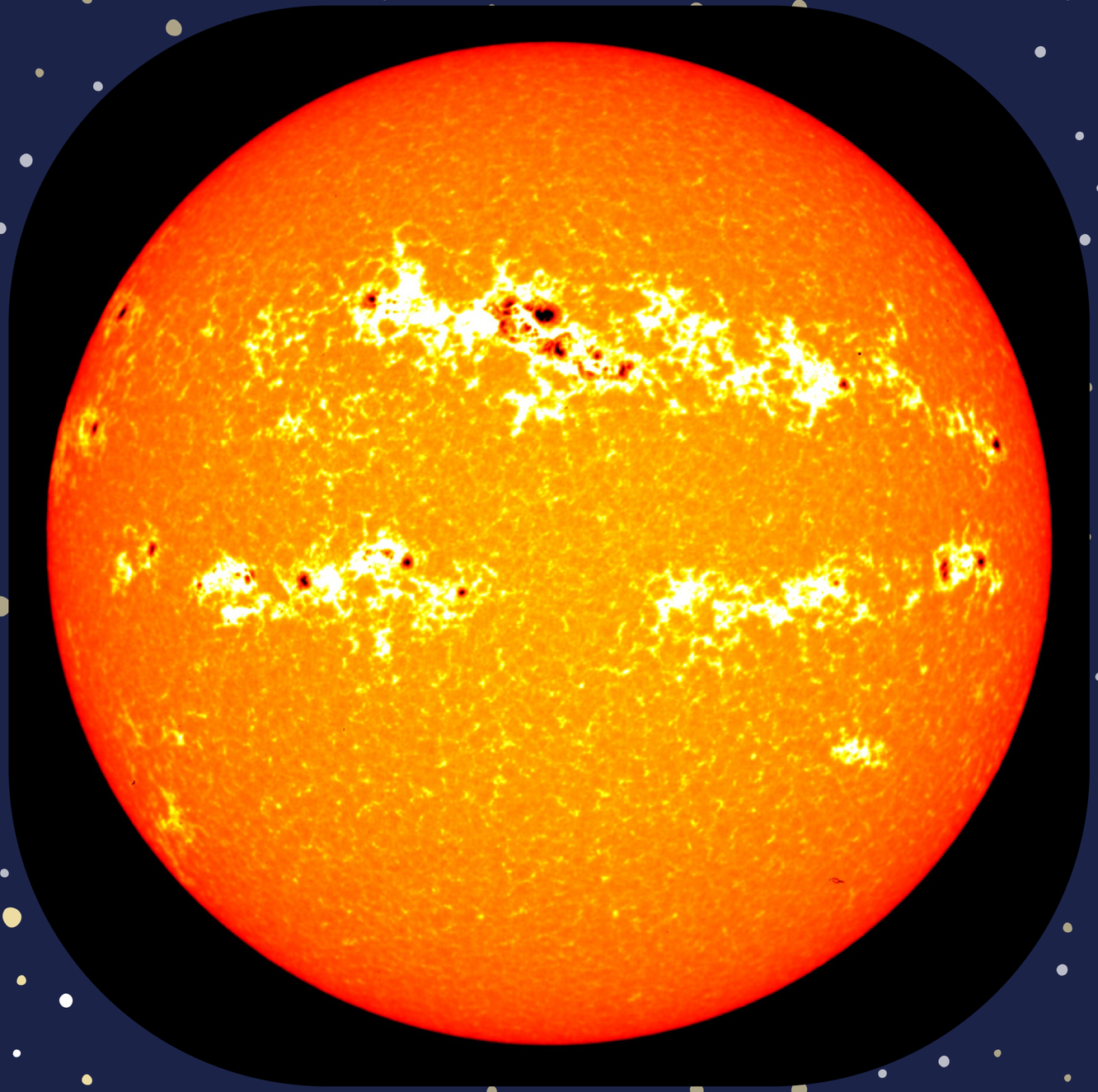
On Oct. 18, 2014, a sunspot rotated over the left side of the sun, and soon grew to be the largest active region seen in the current solar cycle, which began in 2008. Currently, the sunspot is almost 80,000 miles across -- ten Earth's could be laid across its diameter.

Sunspots point to relatively cooler areas on the sun with intense and complex magnetic fields poking out through the sun's surface. Such areas can be the source of solar eruptions such as flares or coronal mass ejections.

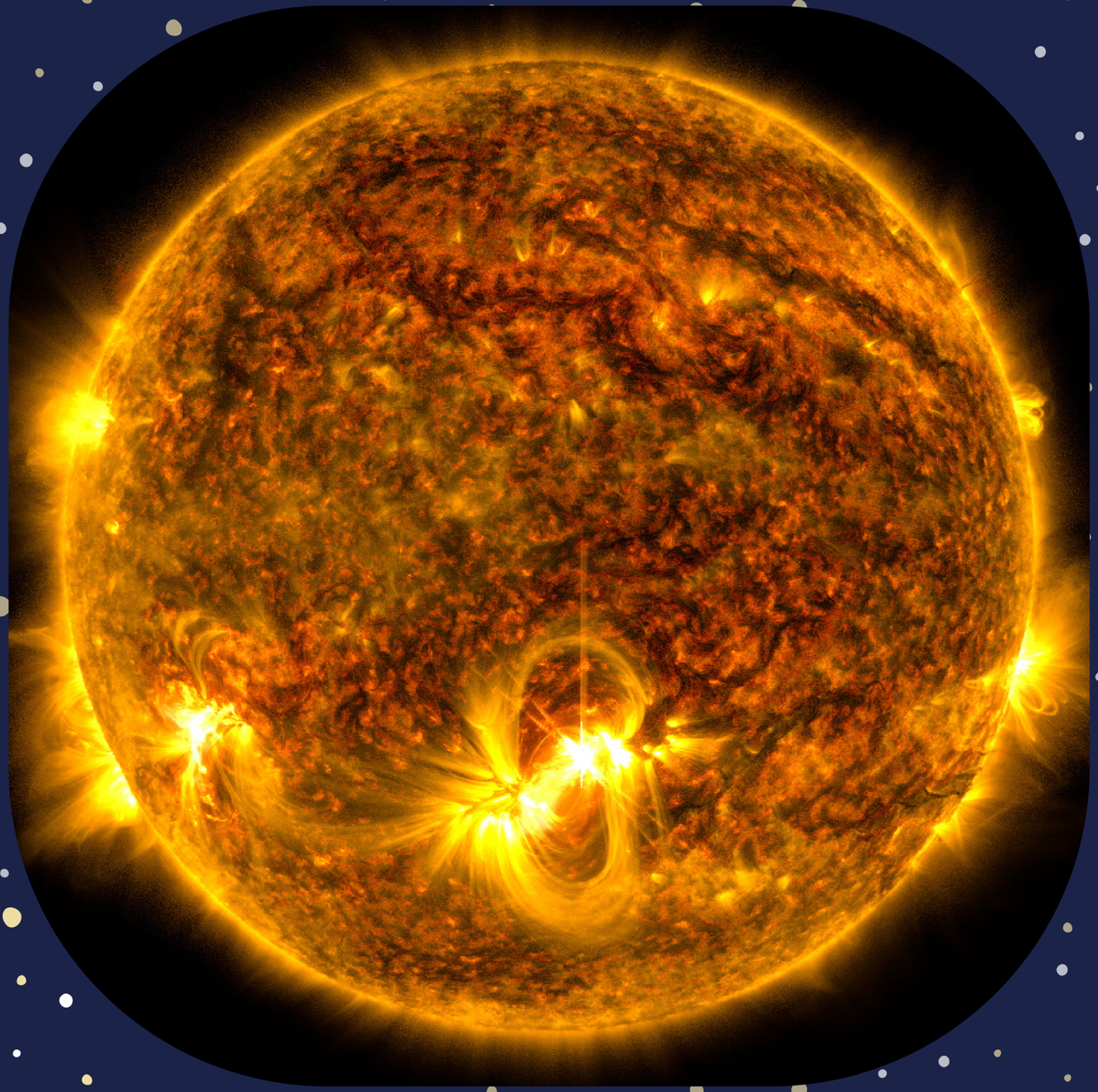


This close-up of the sunspot underneath the March 29, 2014, flare shows incredible detail. The image was captured by the G-band camera at Sacramento Peak in New Mexico. This instrument can focus on only a small area at once, but provide very high resolution.

Sunspots form in regions with stronger magnetic fields on the photosphere and appear dark against the hotter solar surface, even though they are still quite hot.



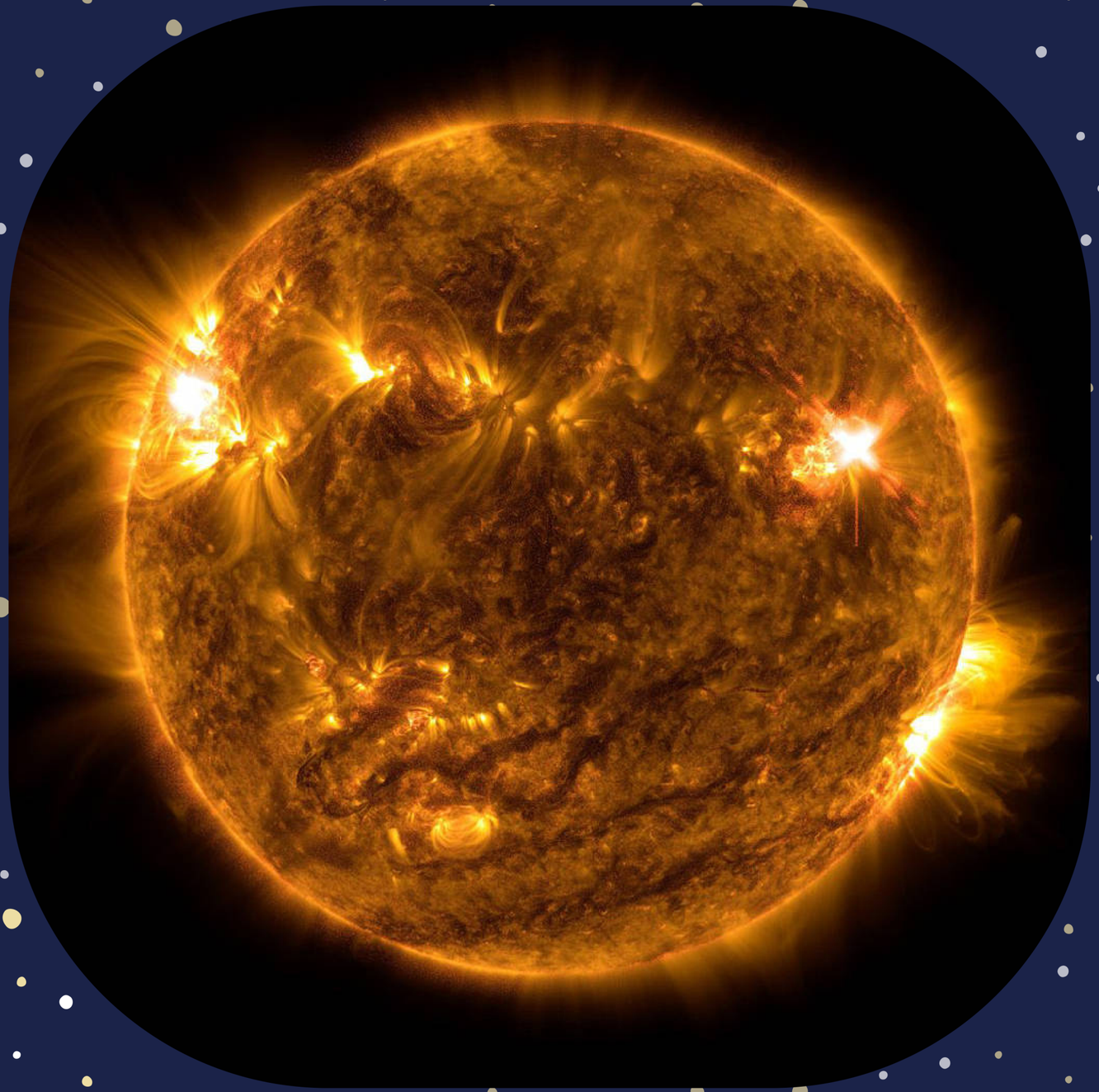
Sunspots form in regions with stronger magnetic fields on the photosphere and appear dark against the hotter solar surface, even though they are still quite hot. Faculae are extended regions that tend to form around sunspots and are hotter, and brighter, than the photosphere.



The Sun emitted a strong solar flare on Tuesday, May 10, 2022, peaking at 9:55 a.m. EDT. NASA’s Solar Dynamics Observatory, which watches the Sun constantly, captured an image of the event.

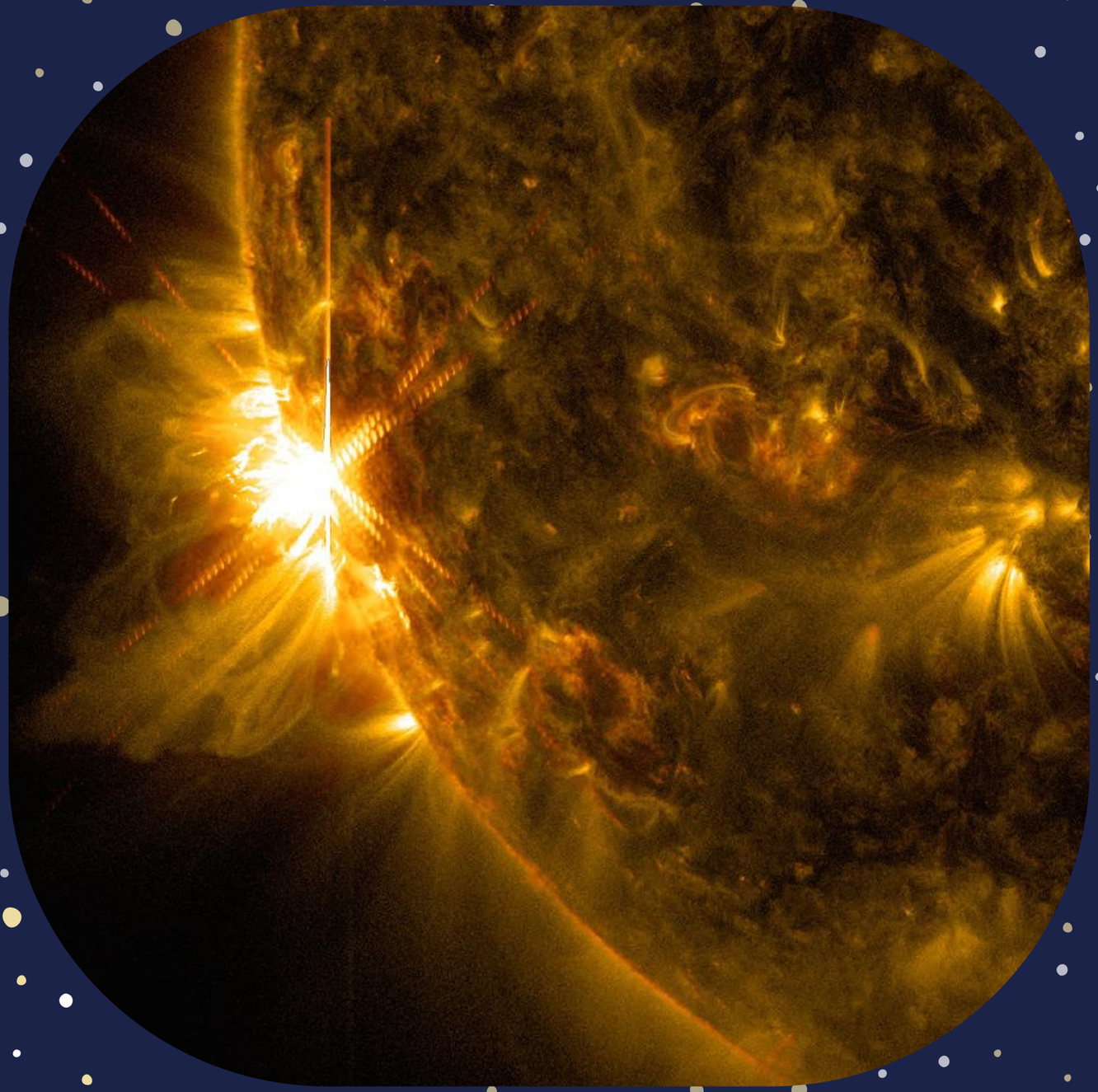
Solar flares are powerful bursts of energy. Flares and solar eruptions can impact radio communications, electric power grids, navigation signals, and pose risks to spacecraft and astronauts.

This flare is classified as an X-class flare. X-class denotes the most intense flares, while the number provides more information about its strength.

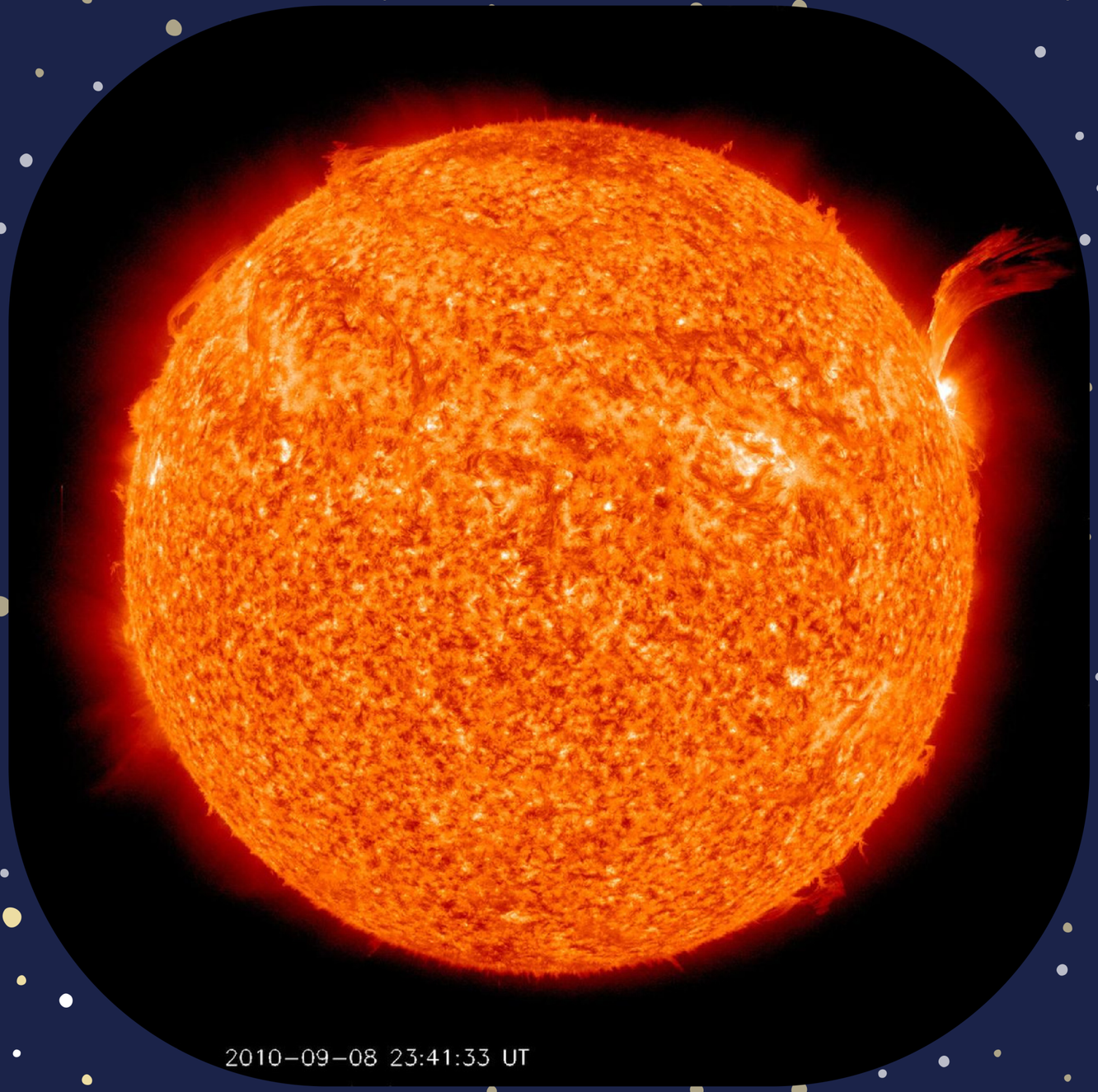


The Sun released an X1 solar flare, captured by our Solar Dynamics Observatory (SDO) on Oct. 2, 2022.

X-class are the most intense flares, while the number provides more information about its strength. For instance, an X1 flare is half as strong as an X2. While solar flares can affect radio communications, power grids, and navigation signals, harmful radiation from a solar flare cannot pass through Earth’s atmosphere to physically affect humans on the ground. By studying flares and how they affect our planet and nearby space, the SDO helps us to better prepare for and mitigate these potential disruptions.

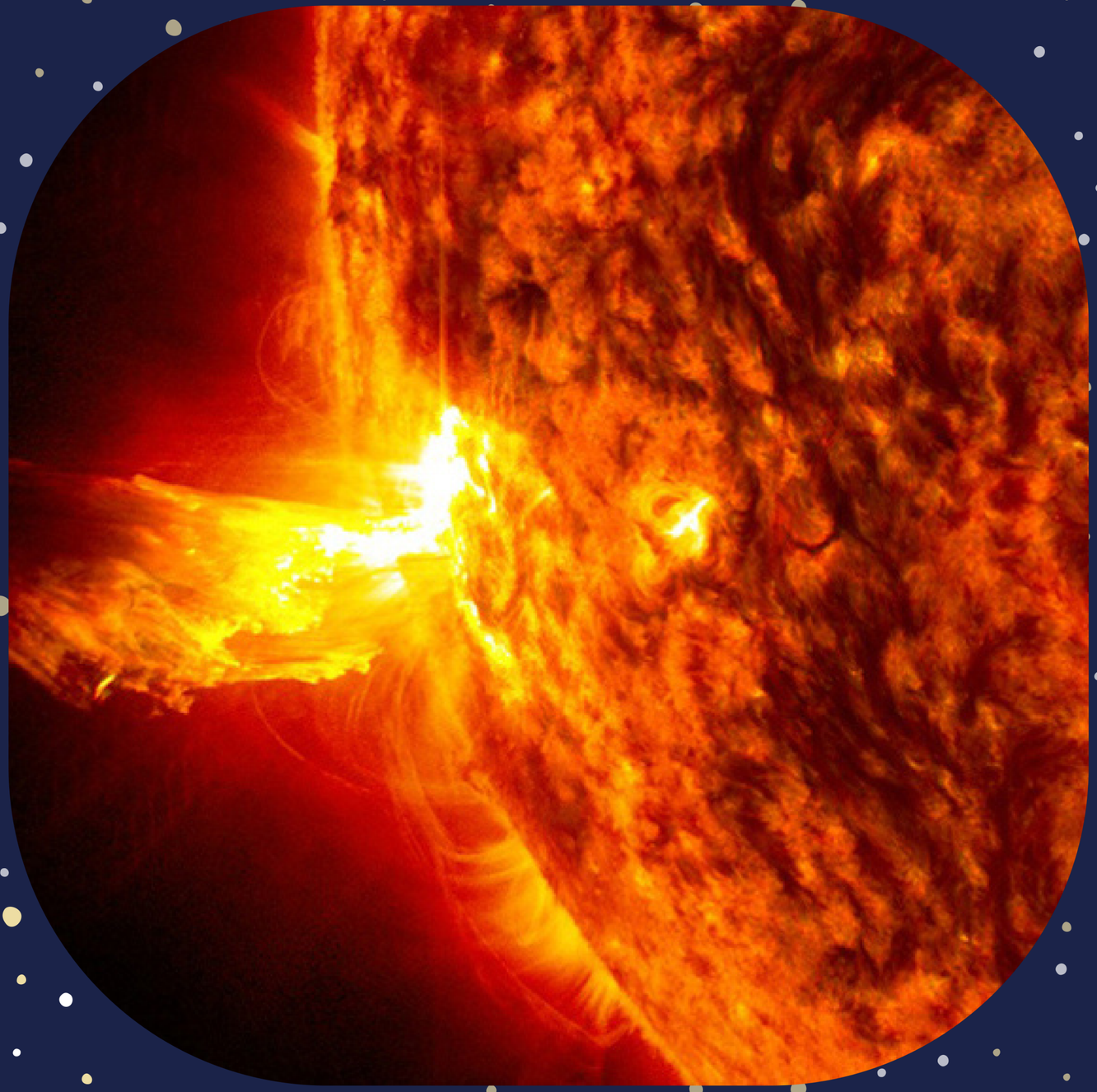


A solar flare bursts off the left limb of the sun in this image captured by NASA's Solar Dynamics Observatory on June 10, 2014, at 7:41 a.m. EDT. This is classified as an X2.2 flare.

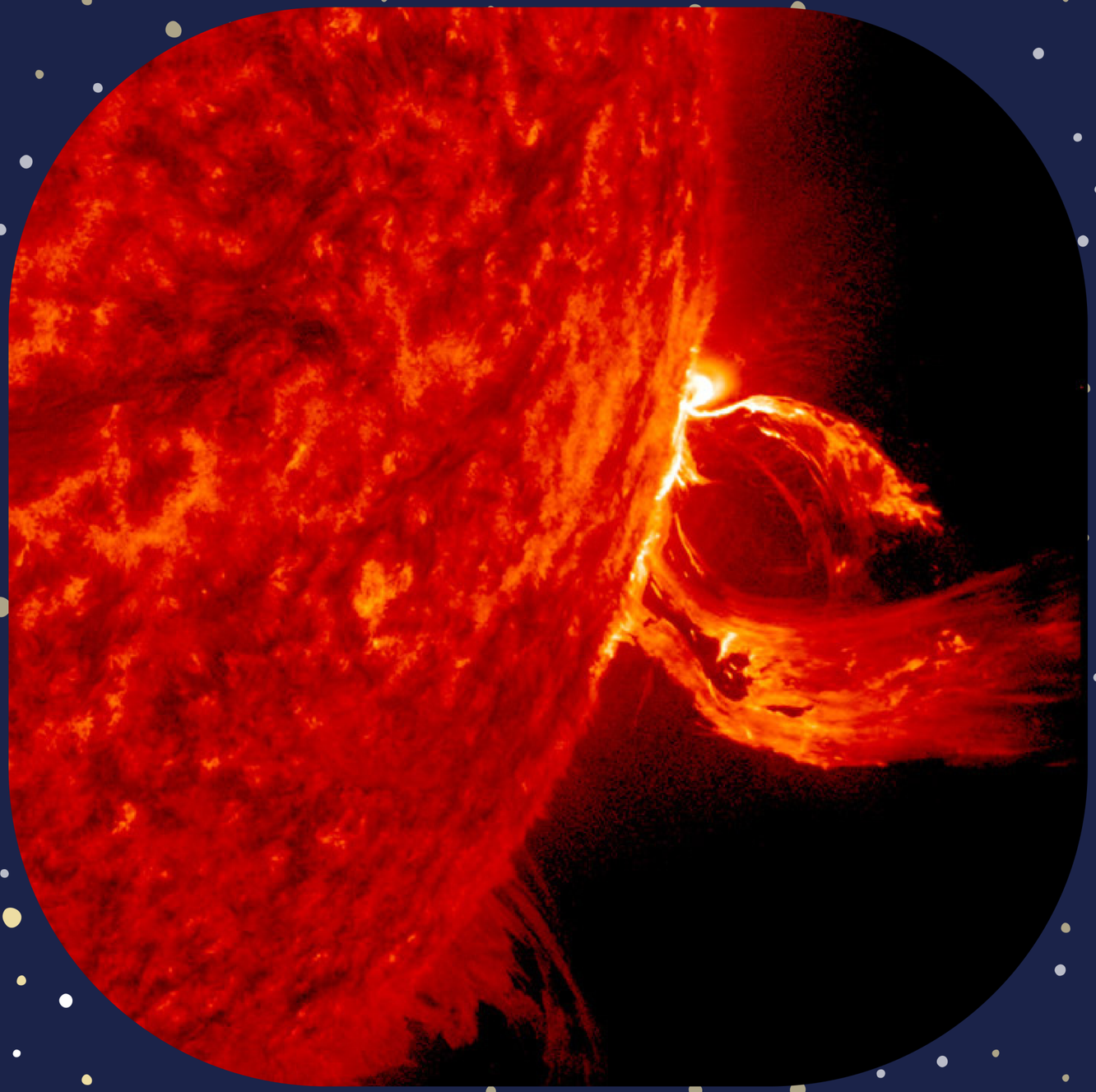


NASA image release Sept 9, 2010 Just as sunspot 1105 was turning away from Earth on Sept. 8, the active region erupted, producing a solar flare and a fantastic prominence. The eruption also hurled a bright coronal mass ejection into space. The eruption was not directed toward any planets.

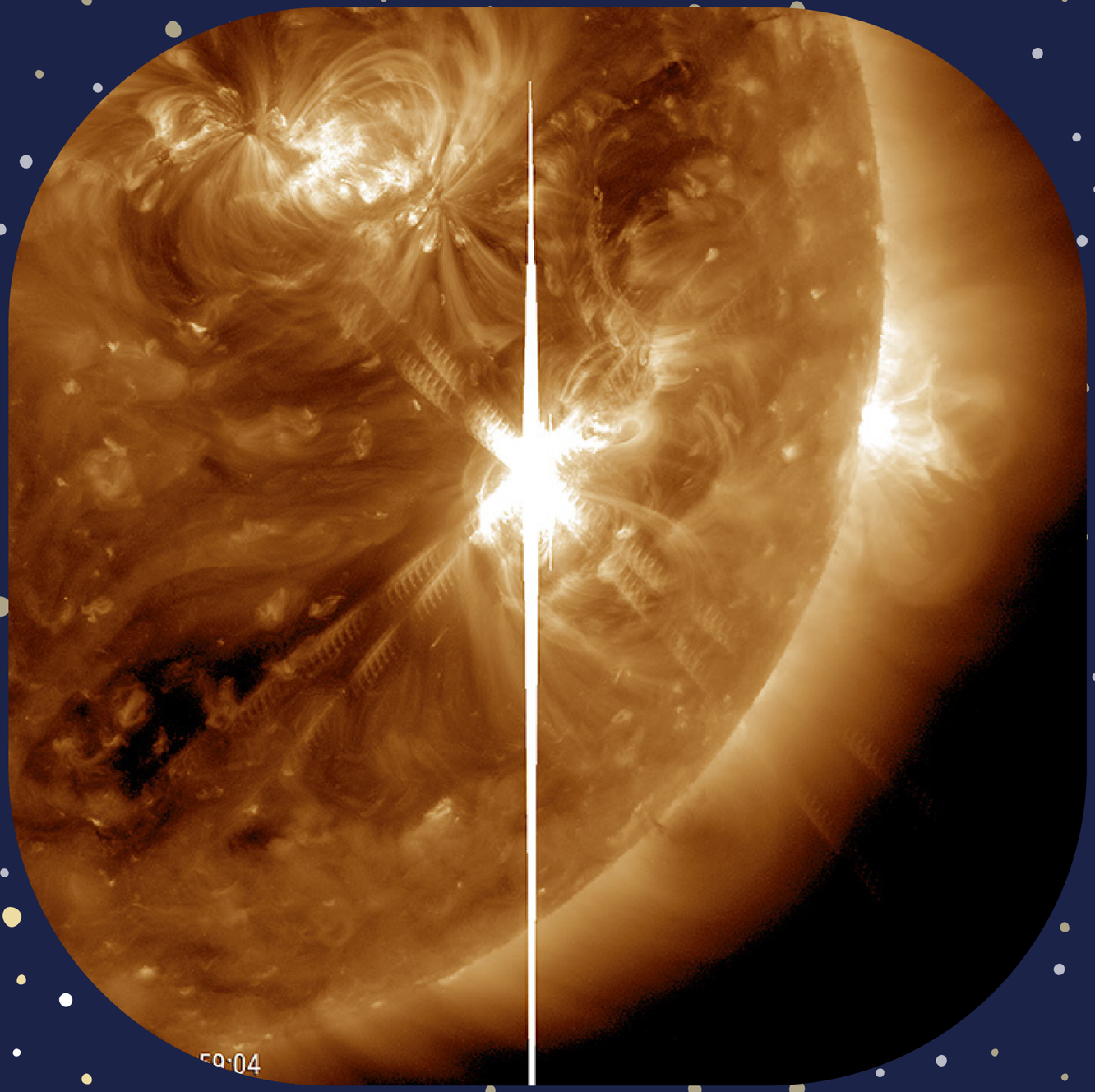
On August 31, 2012 a long filament of solar material that had been hovering in the sun's atmosphere, the corona, erupted out into space at 4:36 p.m. EDT. The coronal mass ejection, or CME, traveled at over 900 miles per second. The CME did not travel directly toward Earth, but did connect with Earth's magnetic environment, or magnetosphere, causing aurora to appear on the night of Monday, September 3.



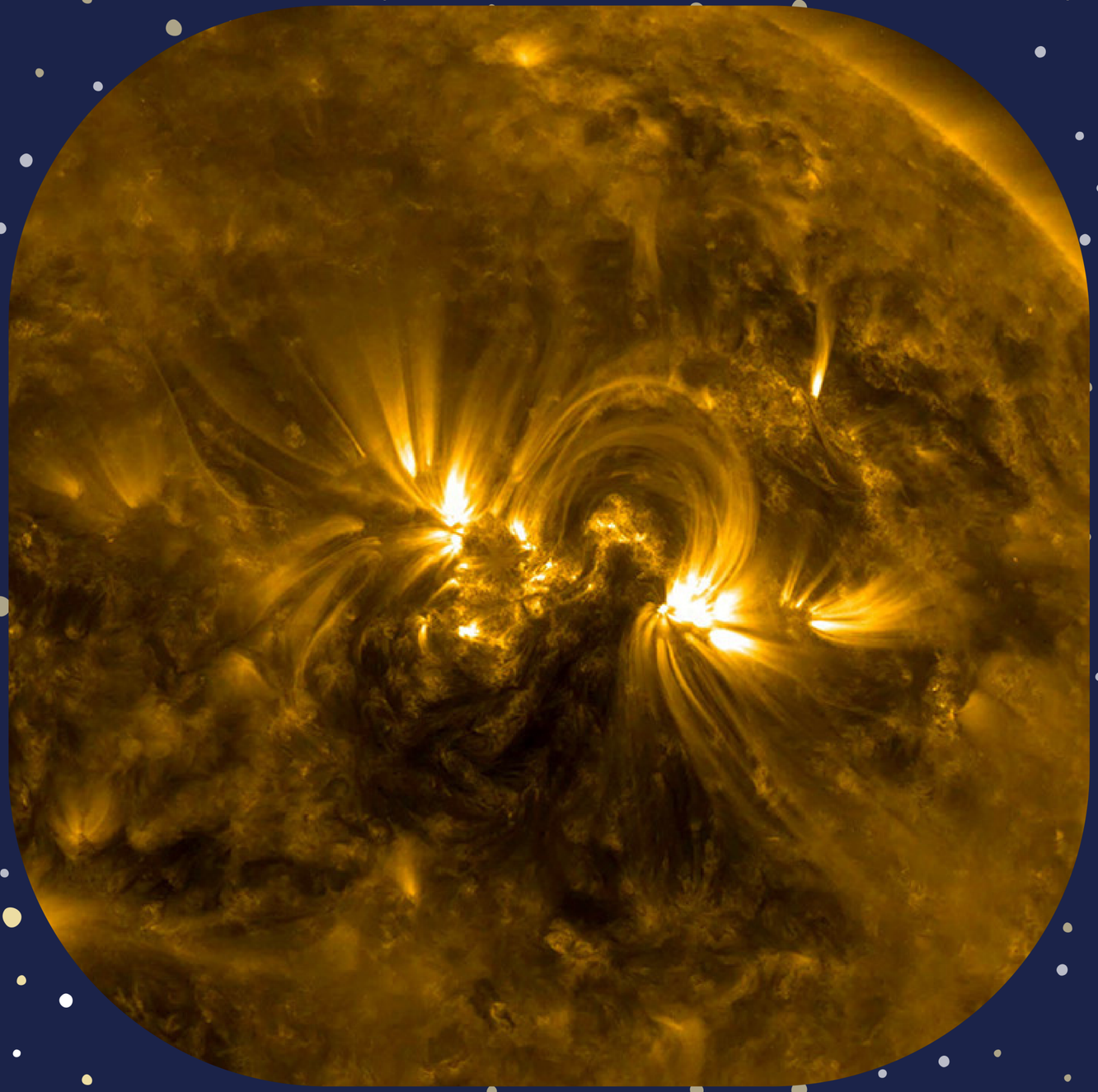
This image from June 20, 2013, at 11:15 p.m. EDT shows the bright light of a solar flare on the left side of the sun and an eruption of solar material shooting through the sun’s atmosphere, called a prominence eruption. Shortly thereafter, this same region of the sun sent a coronal mass ejection out into space



A substantial coronal mass ejection, or CME, blew out from side of the Sun, giving us a great view of the event in profile (June 17-18, 2015). NASA's Solar Dynamics Observatory caught the action



A large sunspot was the source of a powerful solar flare (an X 9.3) and a coronal mass ejection (Sept. 6, 2017). The flare was the largest solar flare of the last decade. For one thing, it created a strong shortwave radio blackout over Europe, Africa and the Atlantic Ocean.



The magnetic field lines between a pair of active regions formed a beautiful set of swaying arches rising up above them (Apr. 24-26, 2017). What we are really seeing are charged particles spinning along the magnetic field lines.

The photos in this presentation are from Solar Dynamics Observatory and Goddard Space Flight Center for NASA. View more NASA images on their website in the image gallery at https://www.nasa.gov/.