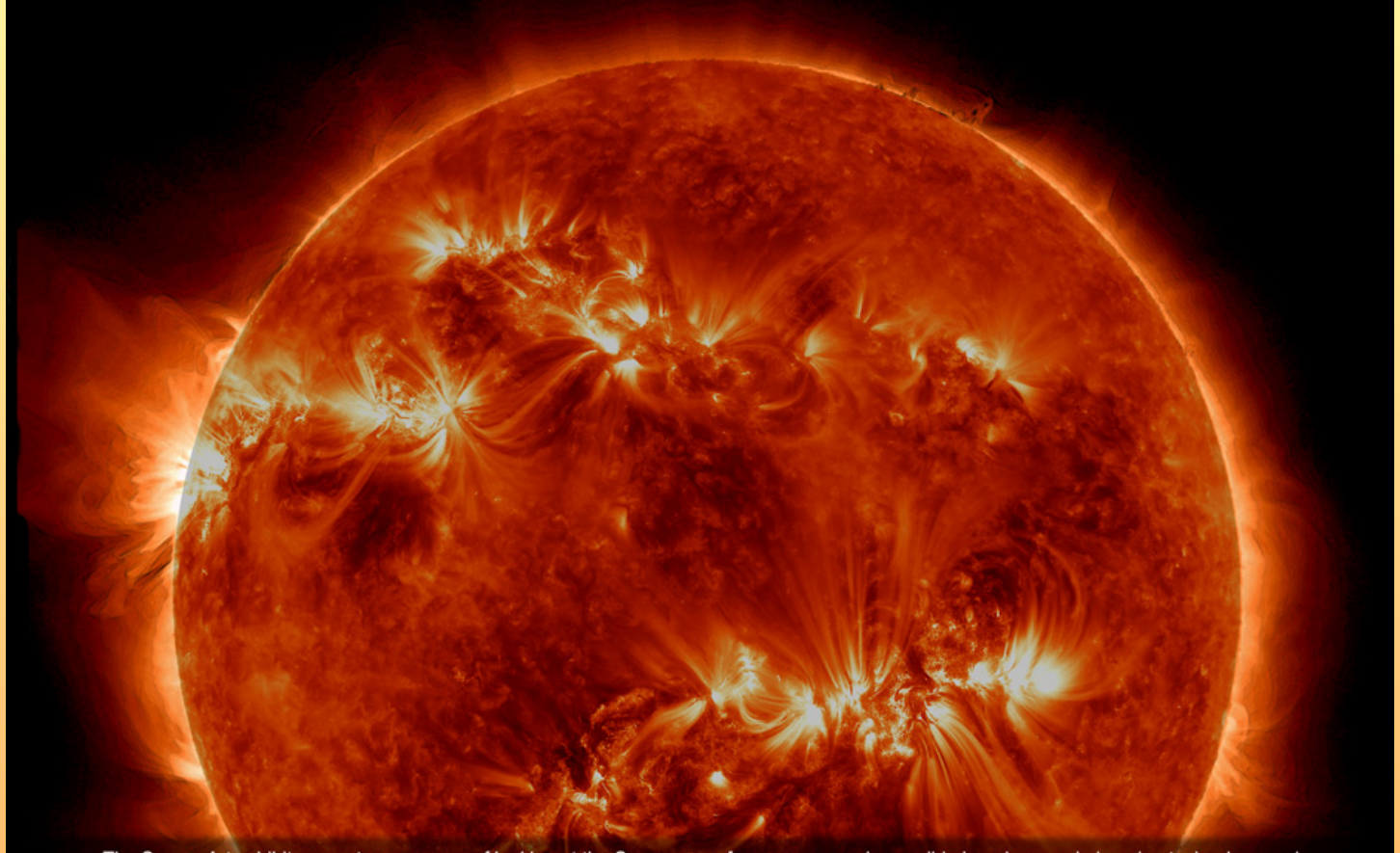
The Sun as Art

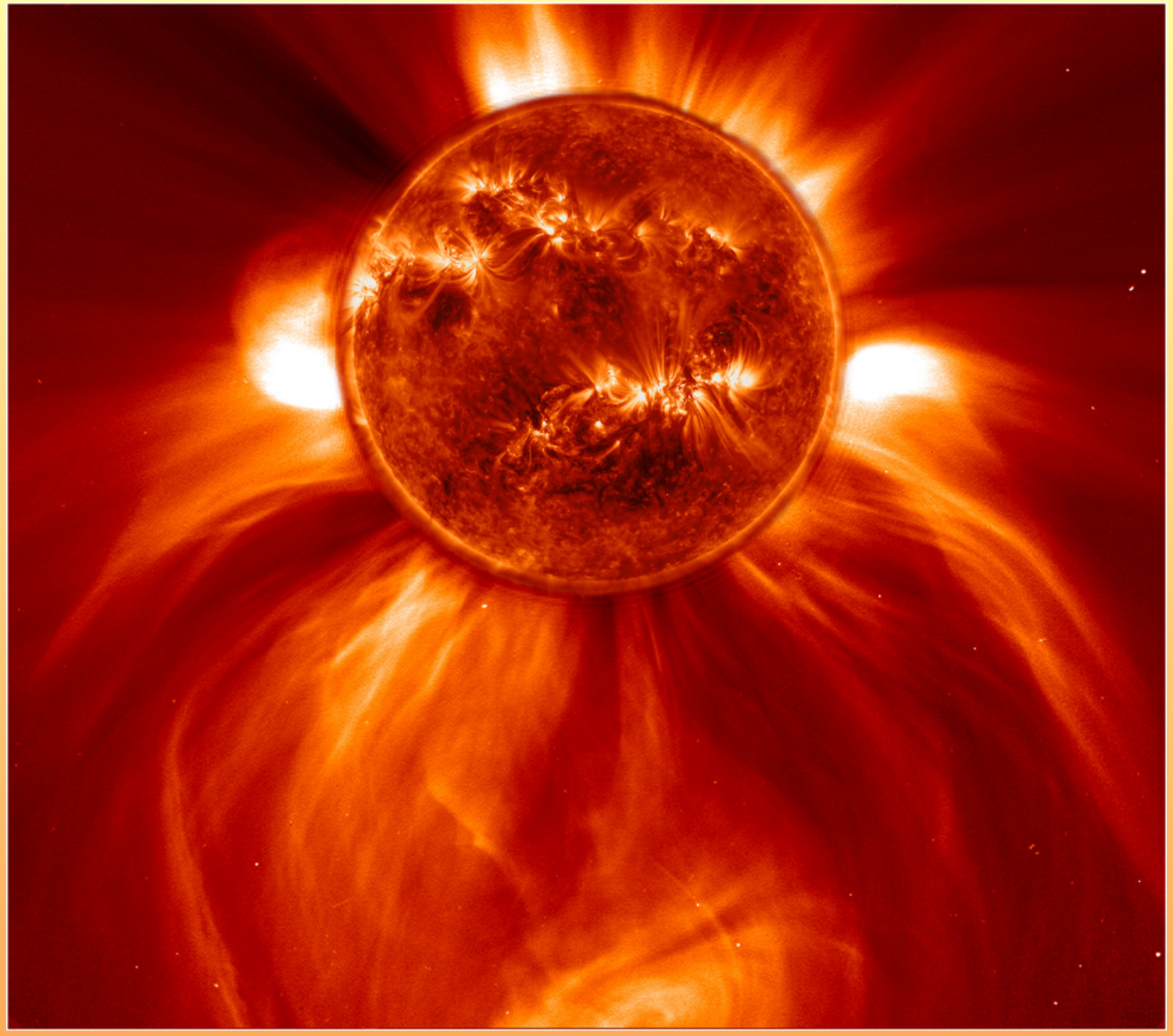
National Aeronautics and Space Administration



The Sun as Art exhibit presents a new way of looking at the Sun as seen from space, made possible by advances in imaging technology and sophisticated spacecraft engineering. Its goal is to entertain and engage, while generating a new interest in the science of the Sun, a star that is generally taken for granted as an ordinary round ball of fiery gas that changes very little. The images (and actual data) show otherwise. These are based on images captured by NASA's premier solar mission, SDO (the Solar Dynamics Observatory), with a few partial images from the SOHO (Solar and Heliospheric Observatory) mission.

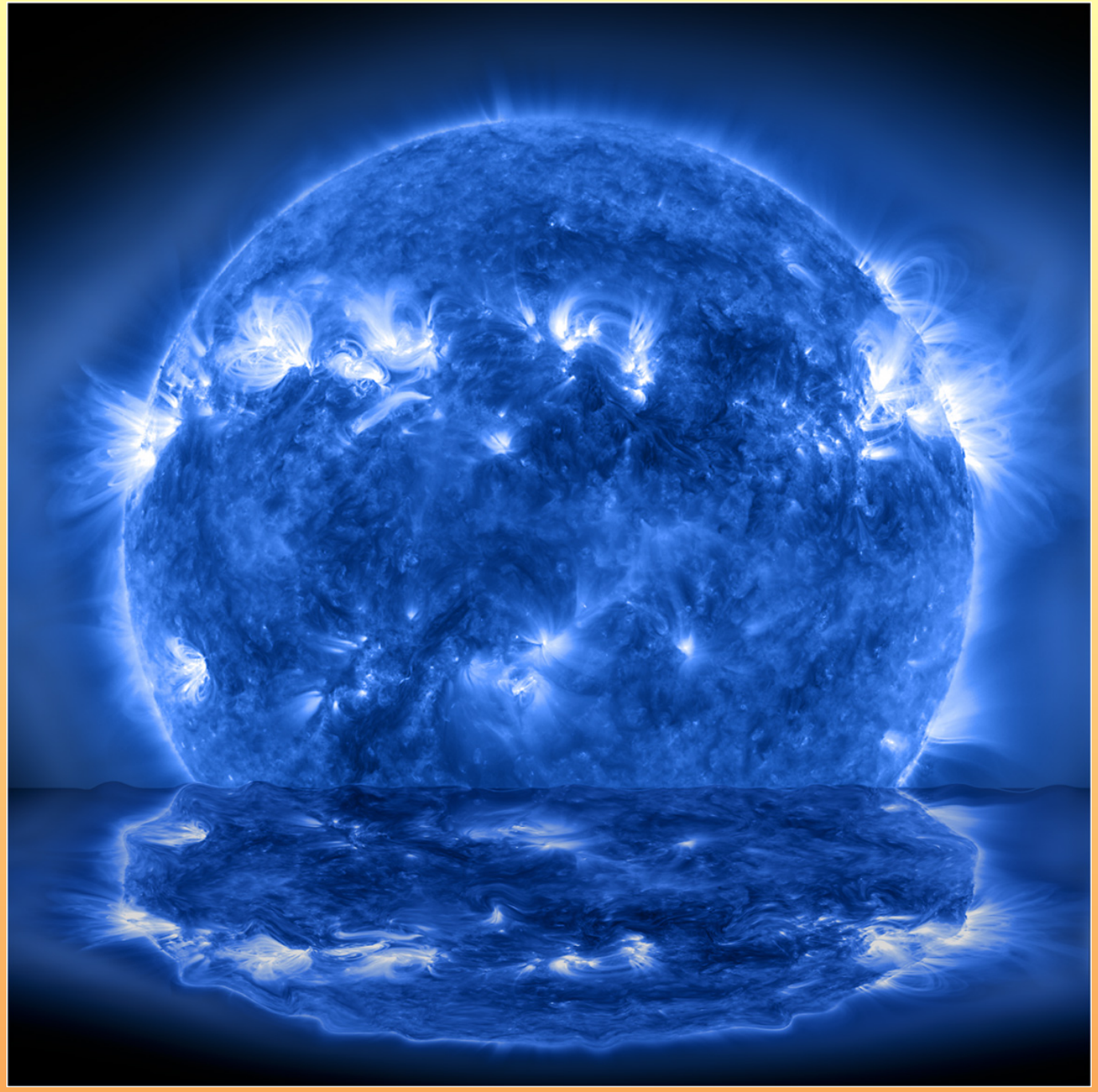
We hope that visitors are surprised with the range of colors, shapes and striking beauty that our observations of the Sun have captured. SDO images are taken at super-HD resolution and, thus, offer an unprecedented level of detail. Most images were taken in extreme ultraviolet wavelength of light. Many images are presented with no manipulation at all; in some, only color tables are altered; in the more inventive ones, pieces were cut and moved around. At least here, perhaps art and science are not so far apart as we often believe. To see images and movies of the Sun as it appears right now, go to **sdo.gsfc.nasa.gov**.

www.nasa.gov



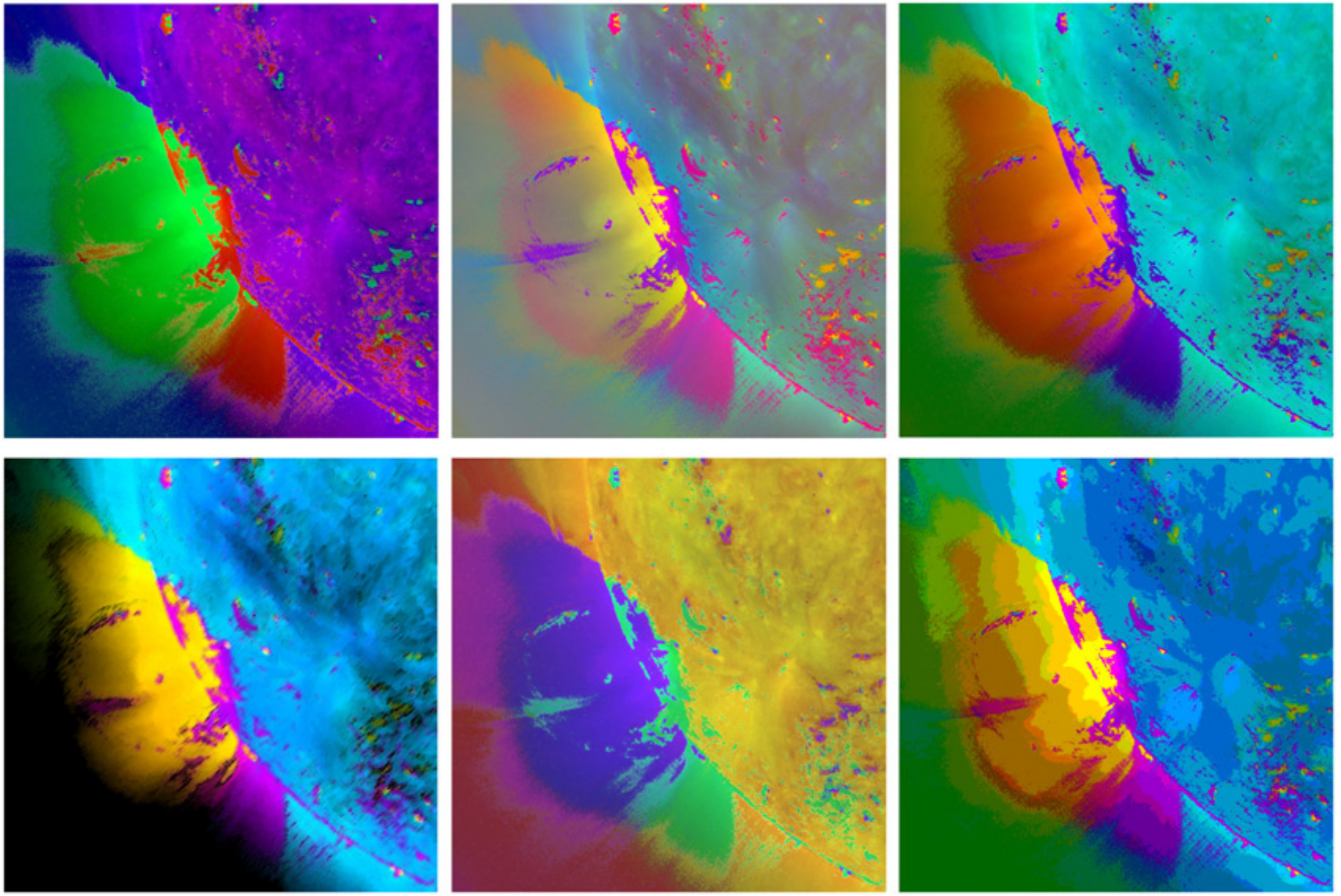
Majestic Blast

An extreme ultraviolet image of the Sun itself was enlarged and superimposed on a larger background image. The background image from the SOHO spacecraft shows a widely spreading coronal mass ejection (CME) as it blasts more than a billion tons of matter out into space at over a million miles per hour.



Blue Bayou Sunset

If one were to observe the Sun rising over a bayou or ocean in extreme ultraviolet light and apply a blue filter, it might look a little like this. The active Sun is peppered with magnetic field lines and active regions busily connecting and reconnecting over its surface. Yet, the subtle tones of blue suggest a watery fluidity nonetheless.



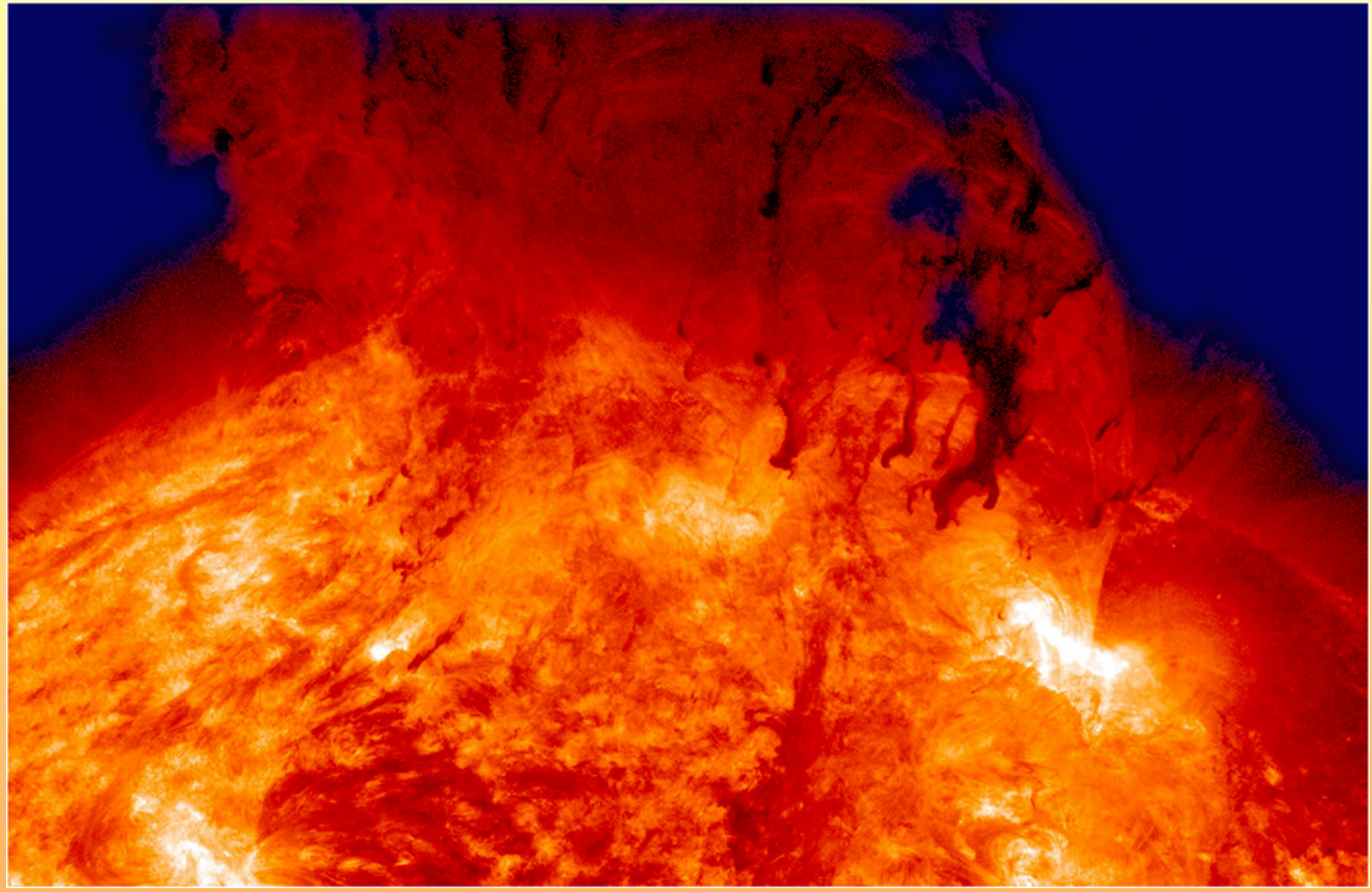
Credit: Barbara Thompson, NASA

Sun Shades of Warhol

This close-up of a solar eruption seemed to lend itself to a modernistic approach with color tables. The original image combined three wavelengths in extreme UV light.

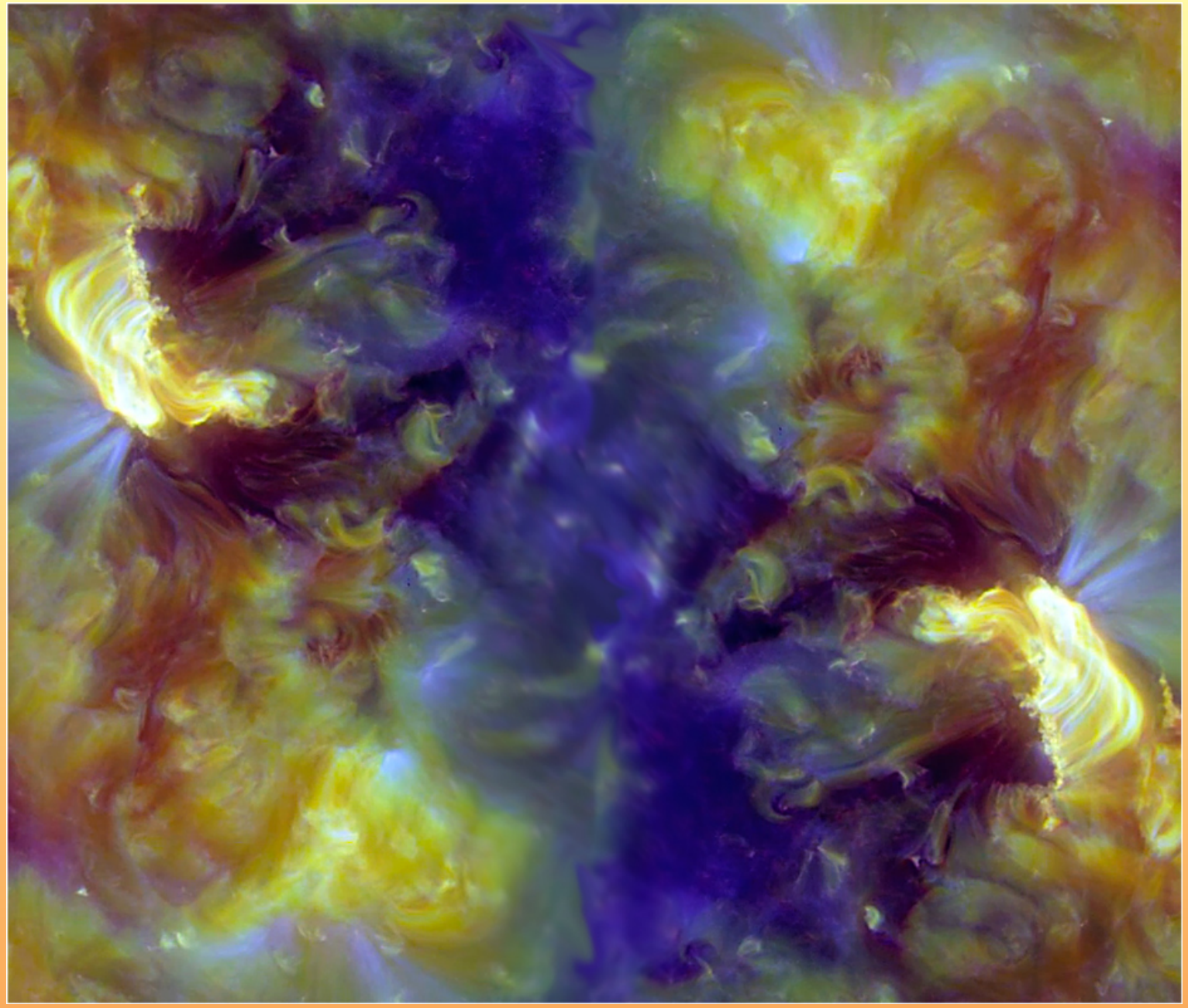
Stonehenge Sunrise

Stonehenge in England is a mammoth stone and timber structure built 2700 years ago over hundreds of years. It is speculated that the builders oriented some of the structure to mark astronomical events like equinoxes. Hence, there is a kind of logical tie-in to the Sun.



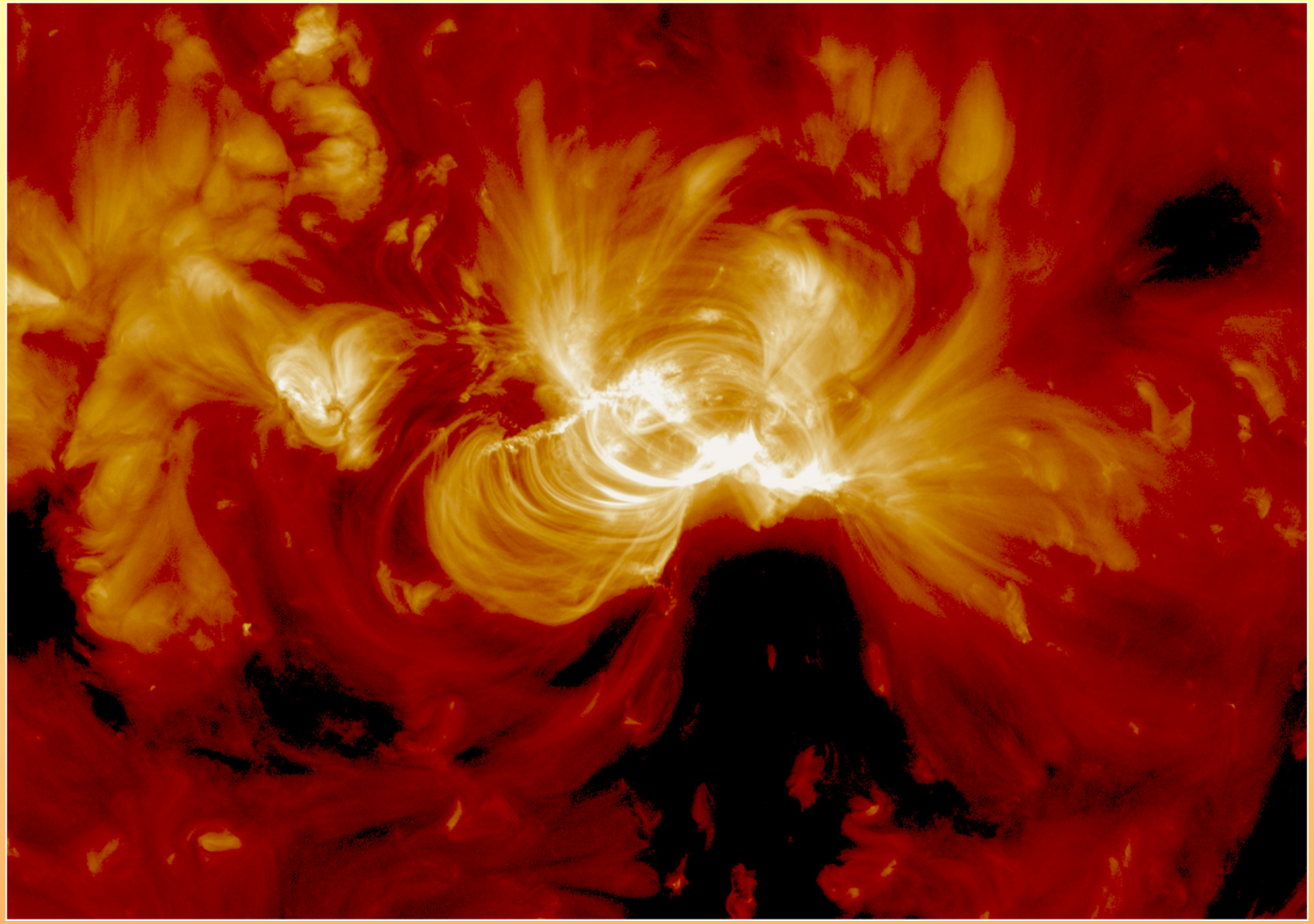
Volcanic Eruption

Not a volcano really, but a spectacular solar blast of particles called a coronal mass ejection viewed in extreme UV light. A small part of this cloud fell back to the Sun's surface but much more rocketed into space at over a million miles per hour.



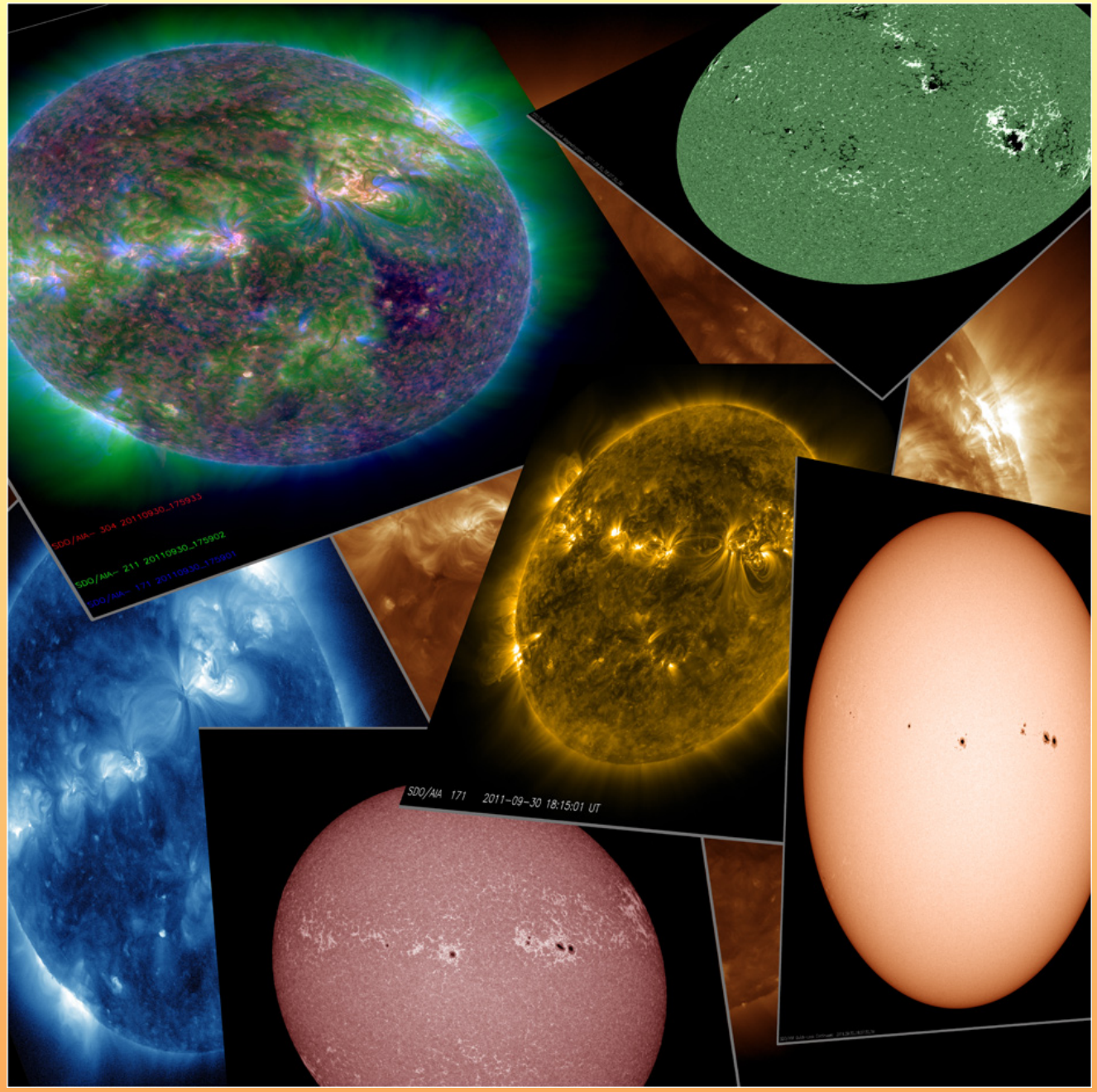
Making an Impression

This Monet-like close-up of an erupting active region (brightest area) combines three color-coded wave-lengths of extreme UV light. Besides doubling and turning the image, very little was altered from the original, very vibrant image.



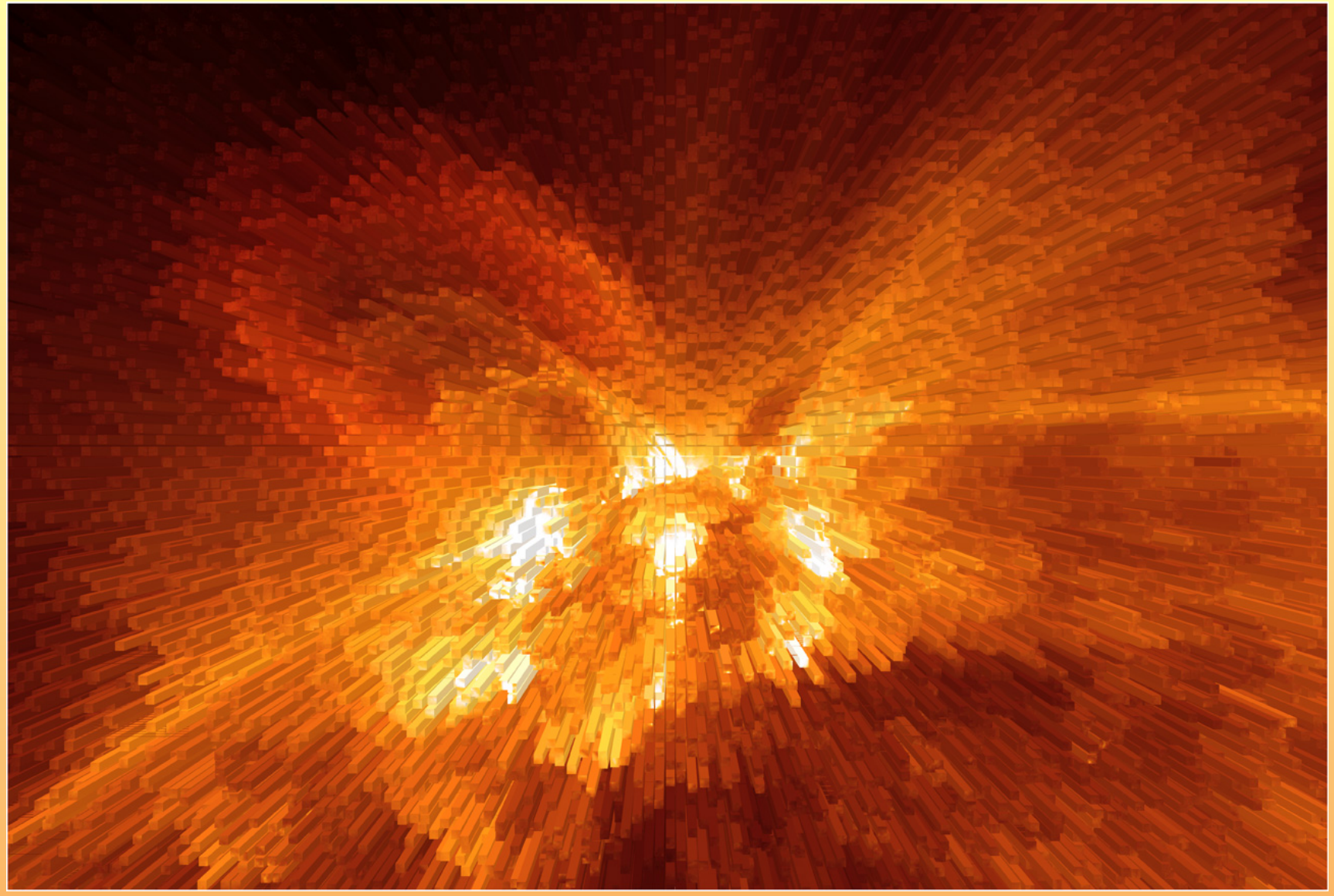
Magnetic Slinkies

These detailed and tight coils of particles spiraling along magnetic field lines above an active region look a lot like slinky toys. However, solar physicists would explain that after a solar flare these loops are busily recreating new magnetic re-connections after the magnetic field was disrupted.



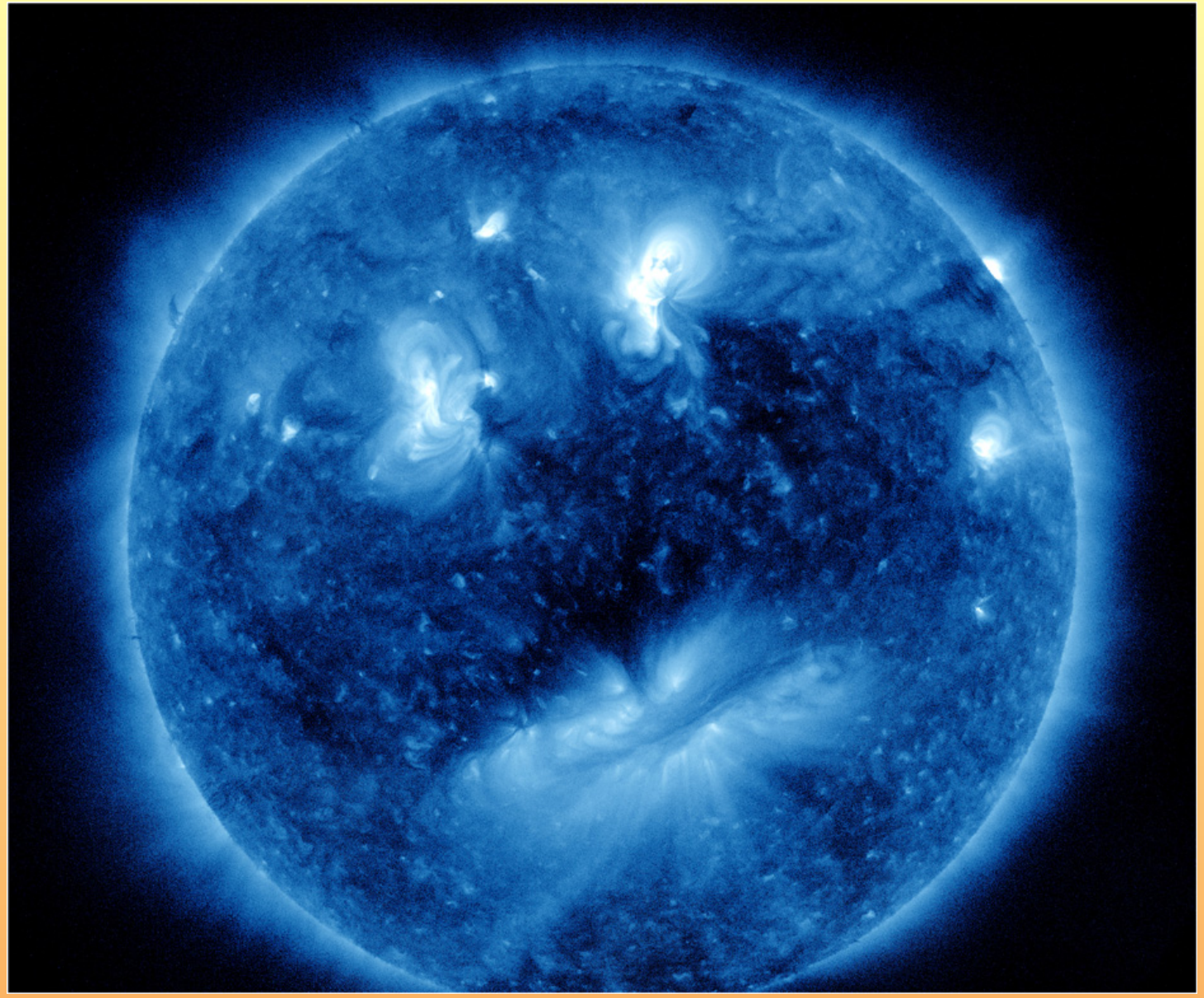
Shuffle the Deck

These seven images cascading around were all taken at almost the same time. Each one shows different features of the Sun in different wavelengths of light at varying heights and temperatures. And there were many more to choose from. Scientists compare and contrast them to learn more about the secrets of the Sun.



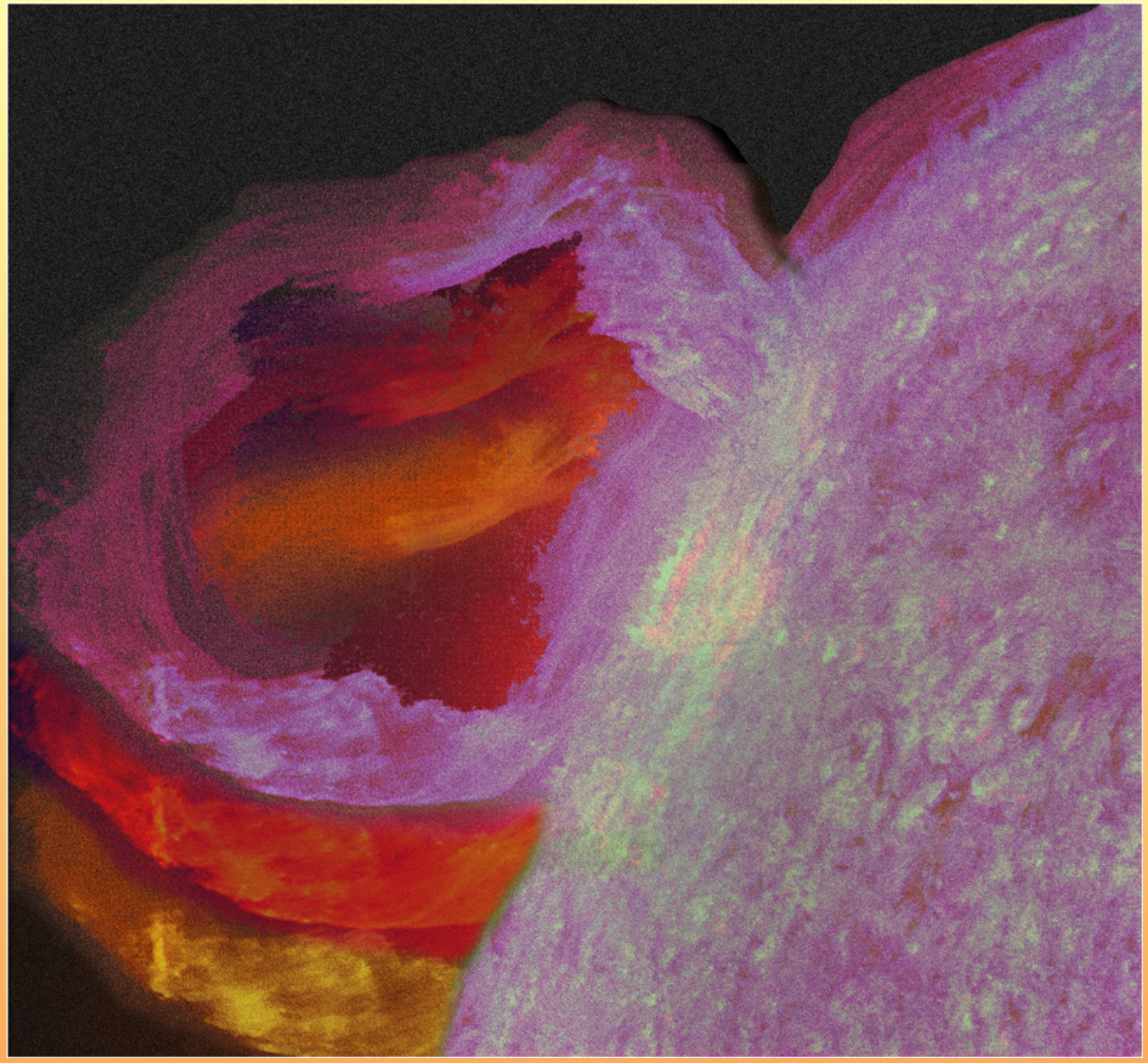
Dazzling Red Hot Arcs

Charged particles spiraling along magnetic field lines rise above several active regions, then were made to zoom out to the viewer. The field lines are in constant motion and often break apart and reconnect. The ionized material imaged here was heated to over one million degrees.



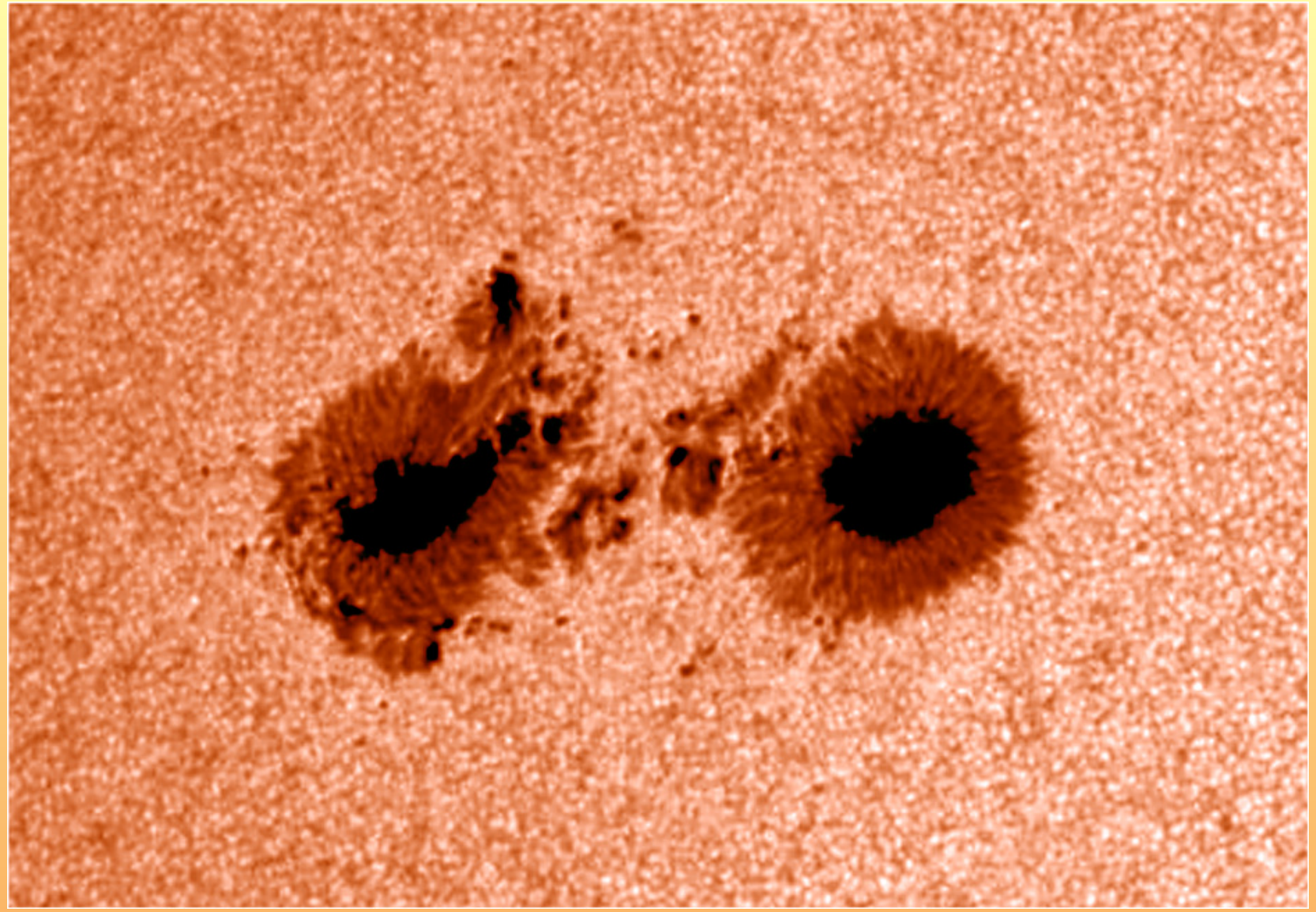
Old Man in the Sun

By sheer coincidence several active regions seen in extreme UV light, without any re-arranging, aligned themselves to resemble a contemplative face.



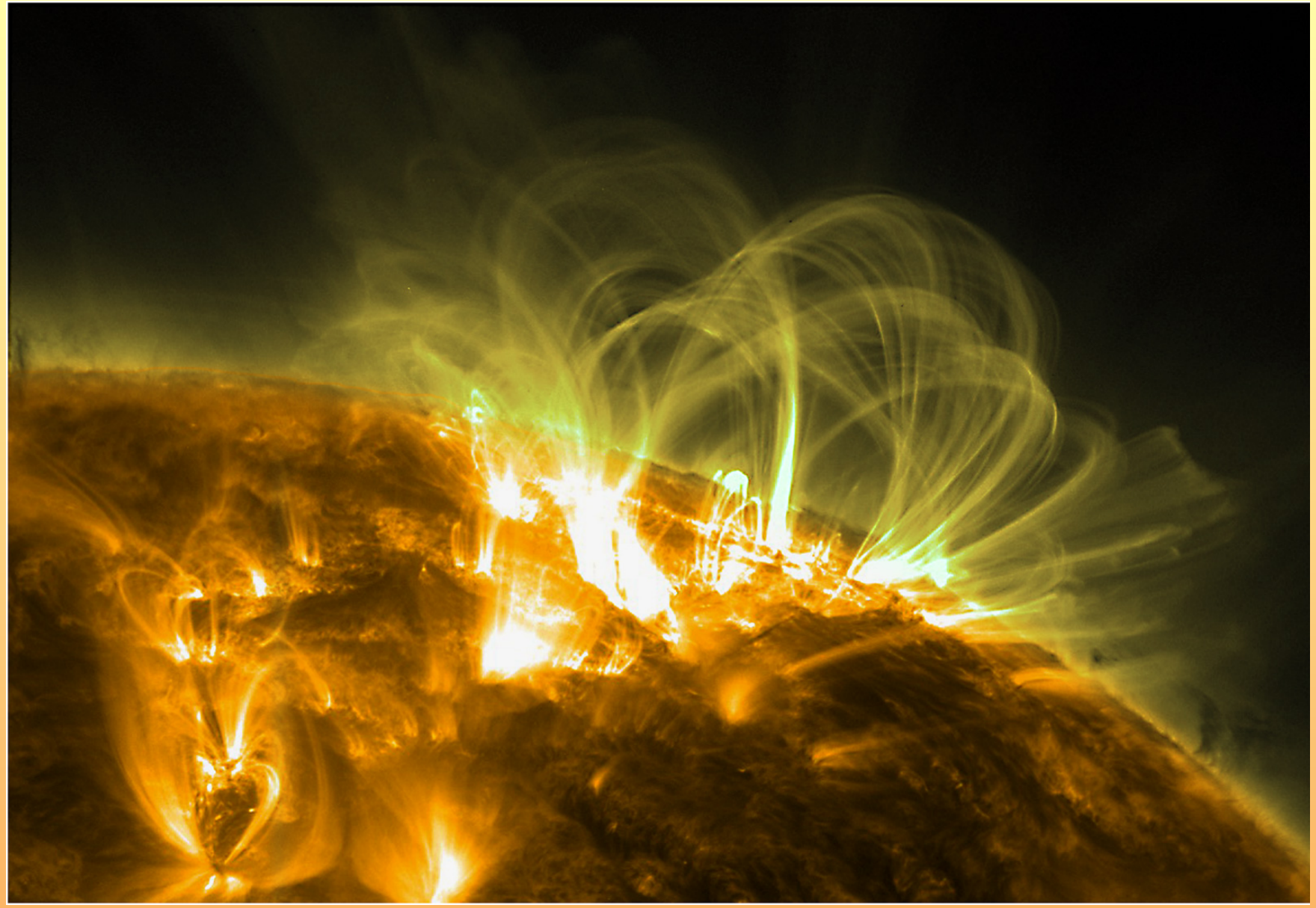
Huge Prominence

A single, gigantic prominence blossomed out from the Sun on the first day that SDO began taking images. It reached out over 25 times the size of Earth. Prominences are unstable clouds of cooler gas tethered above the Sun's surface by magnetic forces. Here we just repeated the prominence three times with different colors.



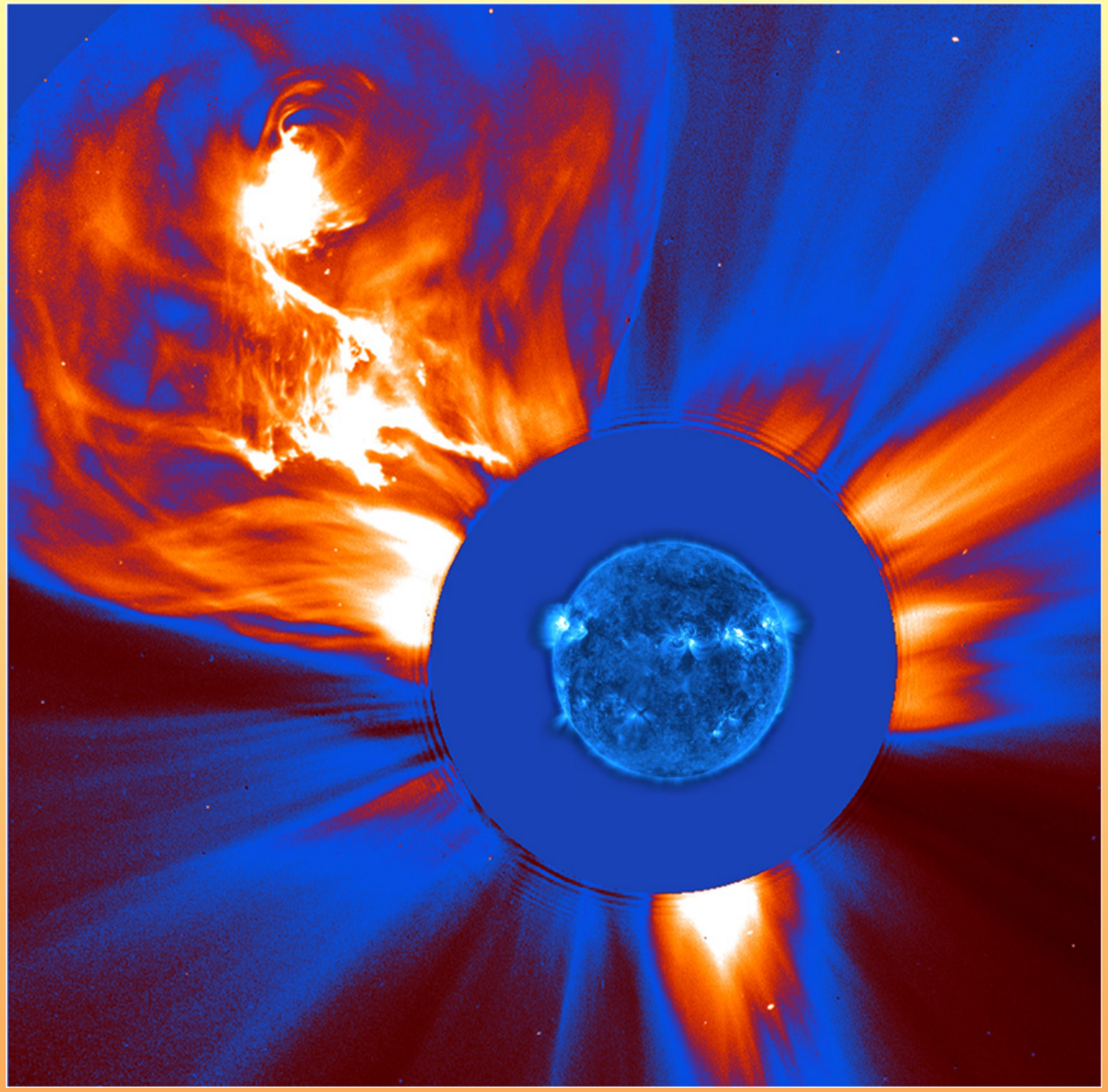
Observant Sunspots

It appears that these pairs of sunspots are peering out from the Sun. Sunspots are a little cooler (7,000 degrees F.) and thus appear darker than the Sun's surface (10,000 degrees F.). Notice how the surface looks dimpled everywhere you look: each of these granules is the top of a convection cell where hot fluid rises up, spreads out, then sinks back over about 20 minutes. Each granule is about 620 miles across.



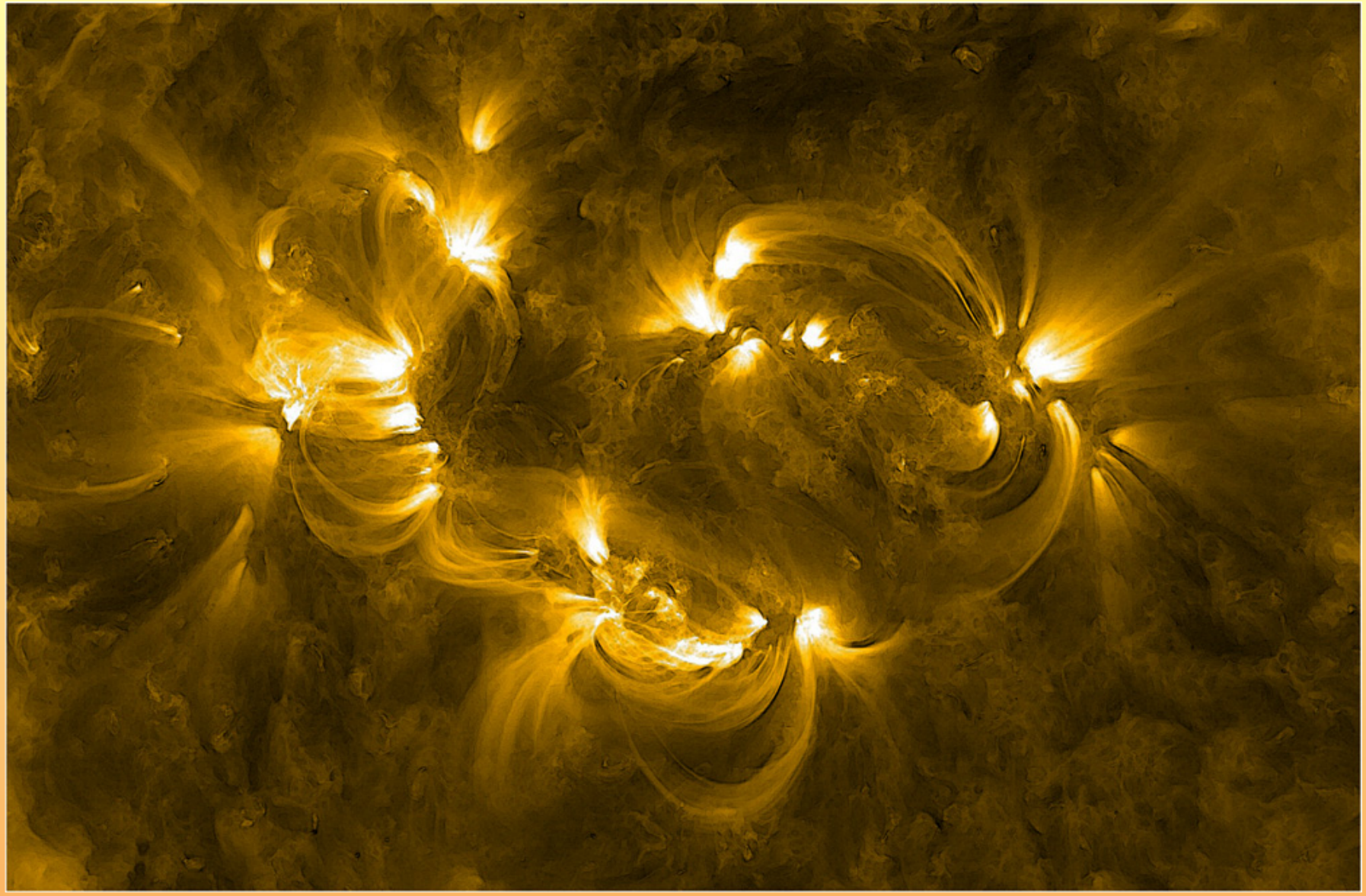
Making Detailed Connections

When viewed in profile, the intricate series of looping magnetic field lines appear graceful and well designed. In fact these very hot and energetic connections emerged from beneath the surface where powerful magnetic forces are engaged in a huge tug of war.



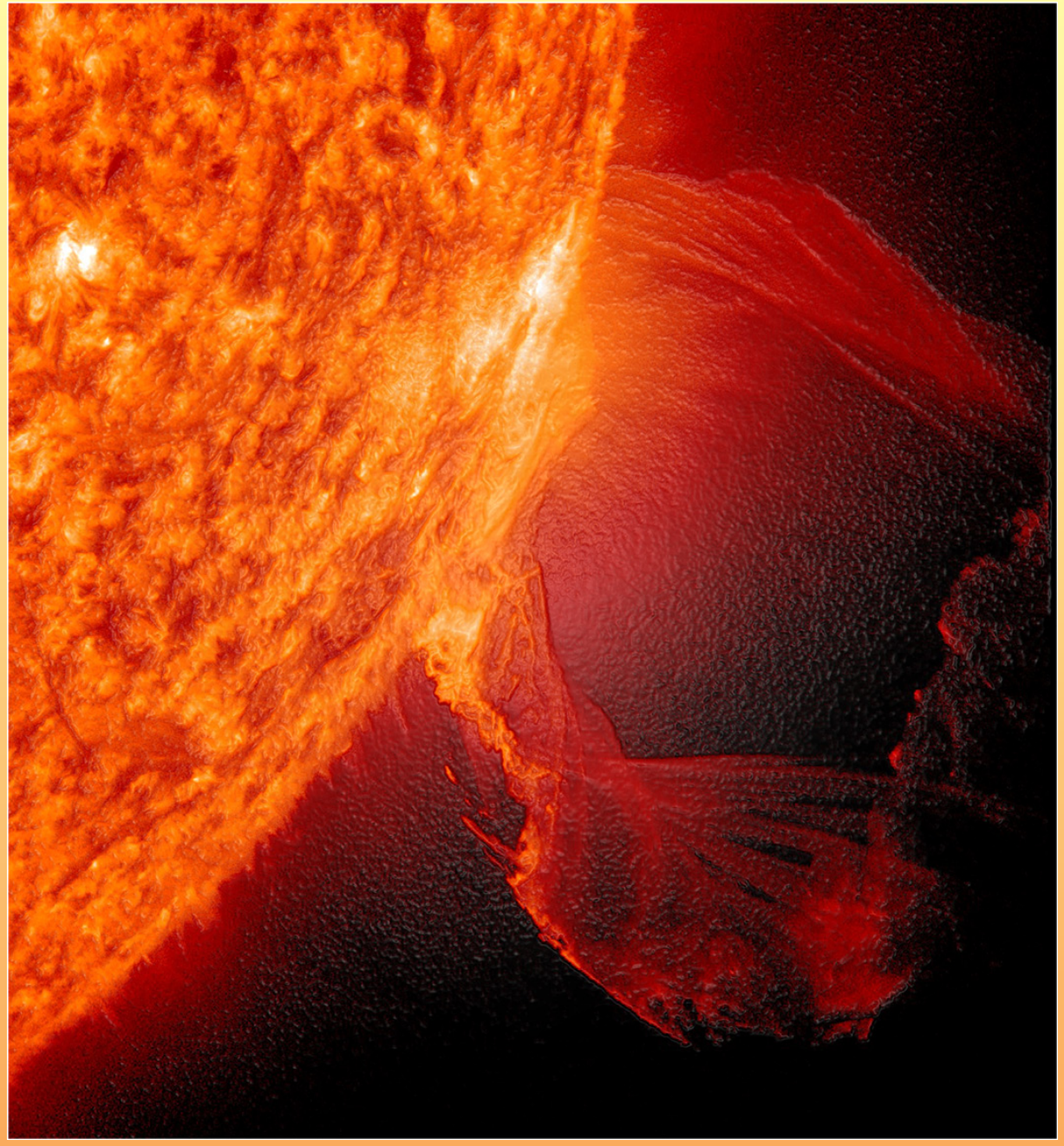
Fire Breather

An especially complex and large coronal mass ejection in January 2002 made even seasoned solar physicists gasp with awe. An instrument onboard the SOHO spacecraft observed the particles blasting into the corona. The plain blue disk blocks out the Sun and the area right around it. Areas of white indicate the greatest intensity of matter; the reds somewhat less; blues, even less. An extreme ultraviolet image of the Sun (blue) was superimposed on the foreground to give a sense of scale.



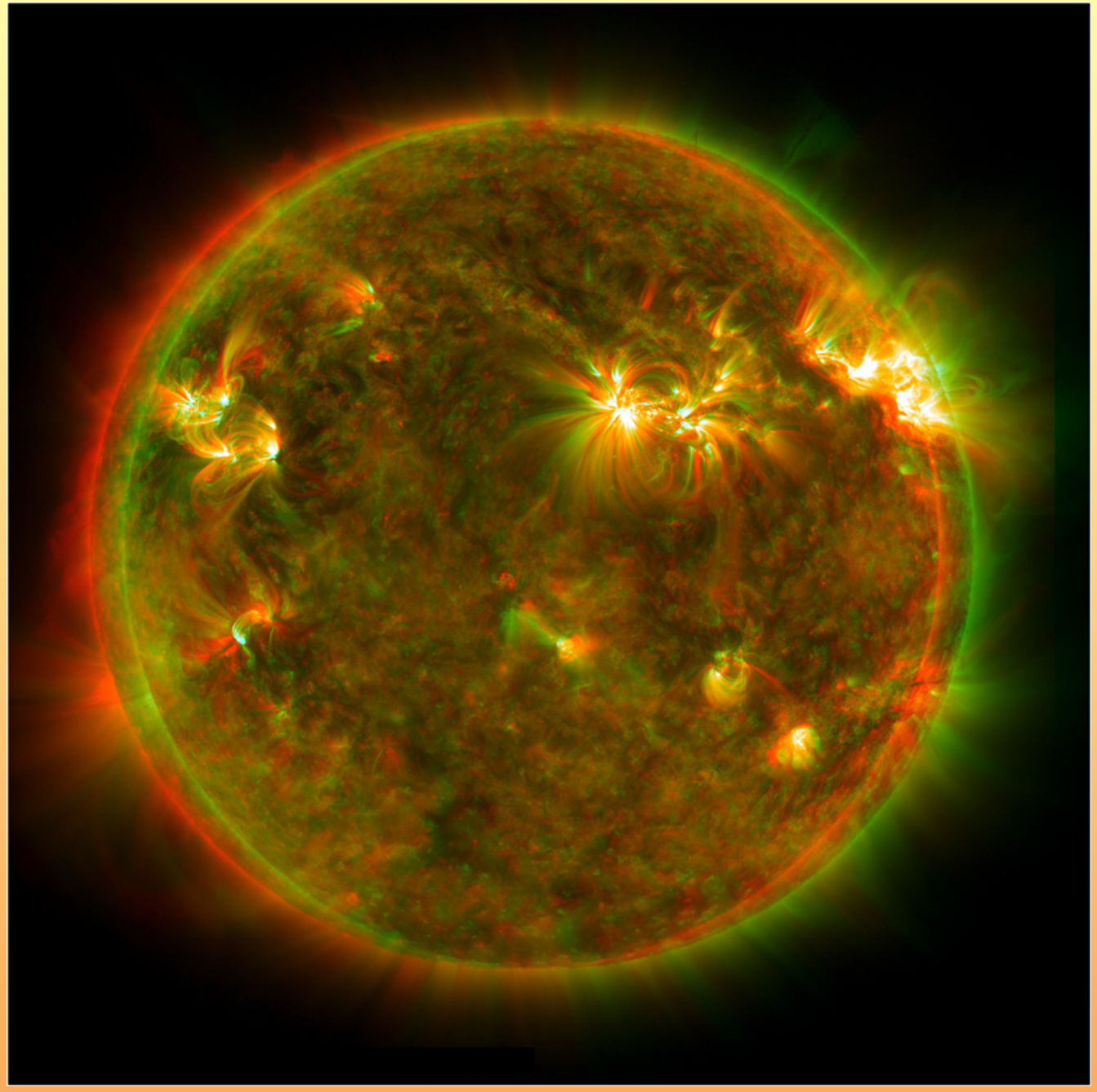
Magnetic Loop Swirls

A close up of an active region in extreme UV light reveals tangles of loops and coils of arcs. This static image of particles spinning along magnetic field lines conceals the fact that the dynamic region is in motion every second.



Let's Twist Again

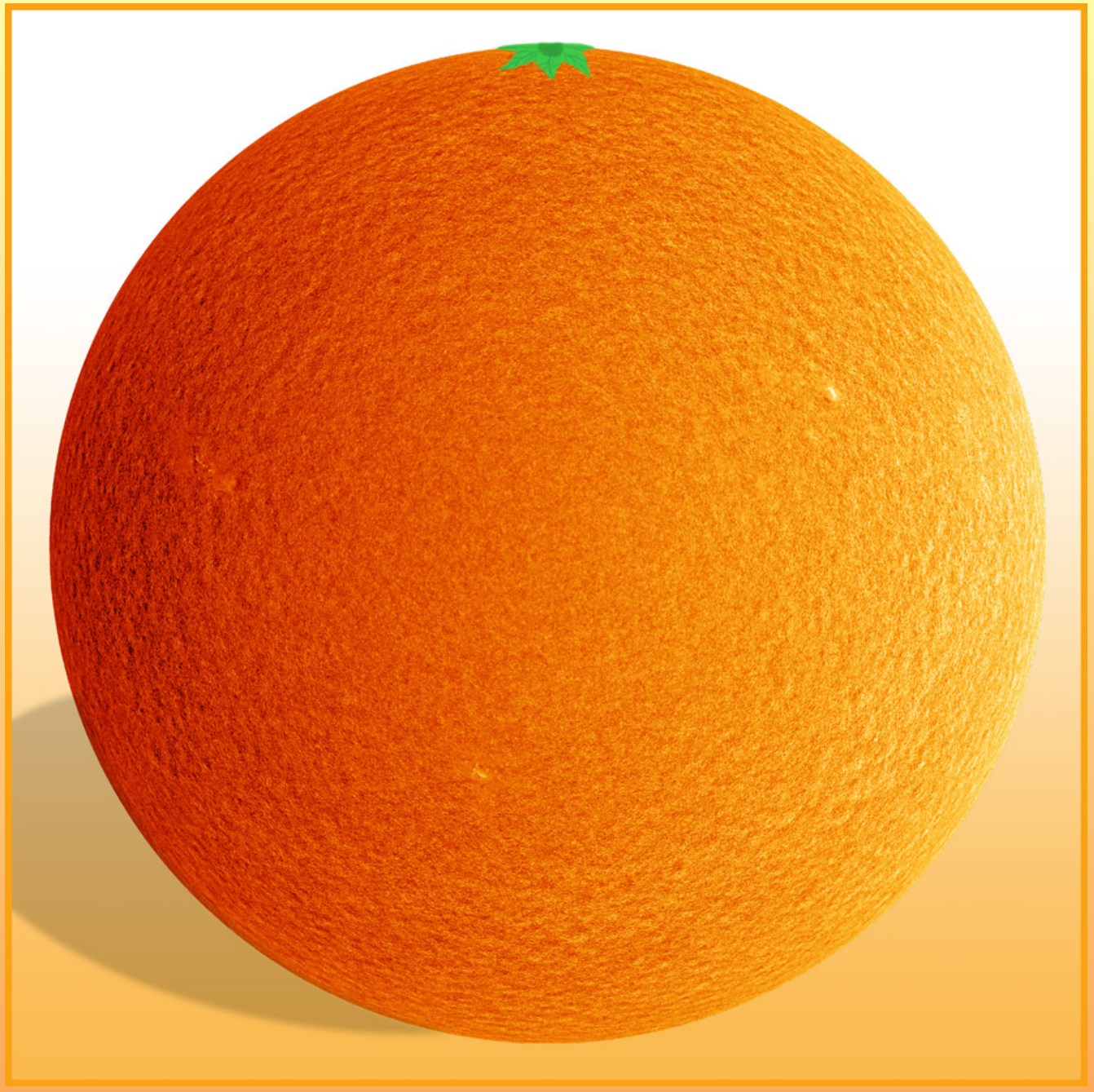
Prominences are huge clouds of relatively cool dense plasma suspended in the Sun's hot, thin corona. At times, they can erupt out into space, propelled by magnetic forces from the Sun's atmosphere. Ultraviolet emission in this wavelength (ions of helium at 304Å) shows the upper chromosphere (not far above the visible surface) at a temperature of about 100,000 degrees F. For a size comparison, the Earth would be no larger than your little fingertip.



3D Sun

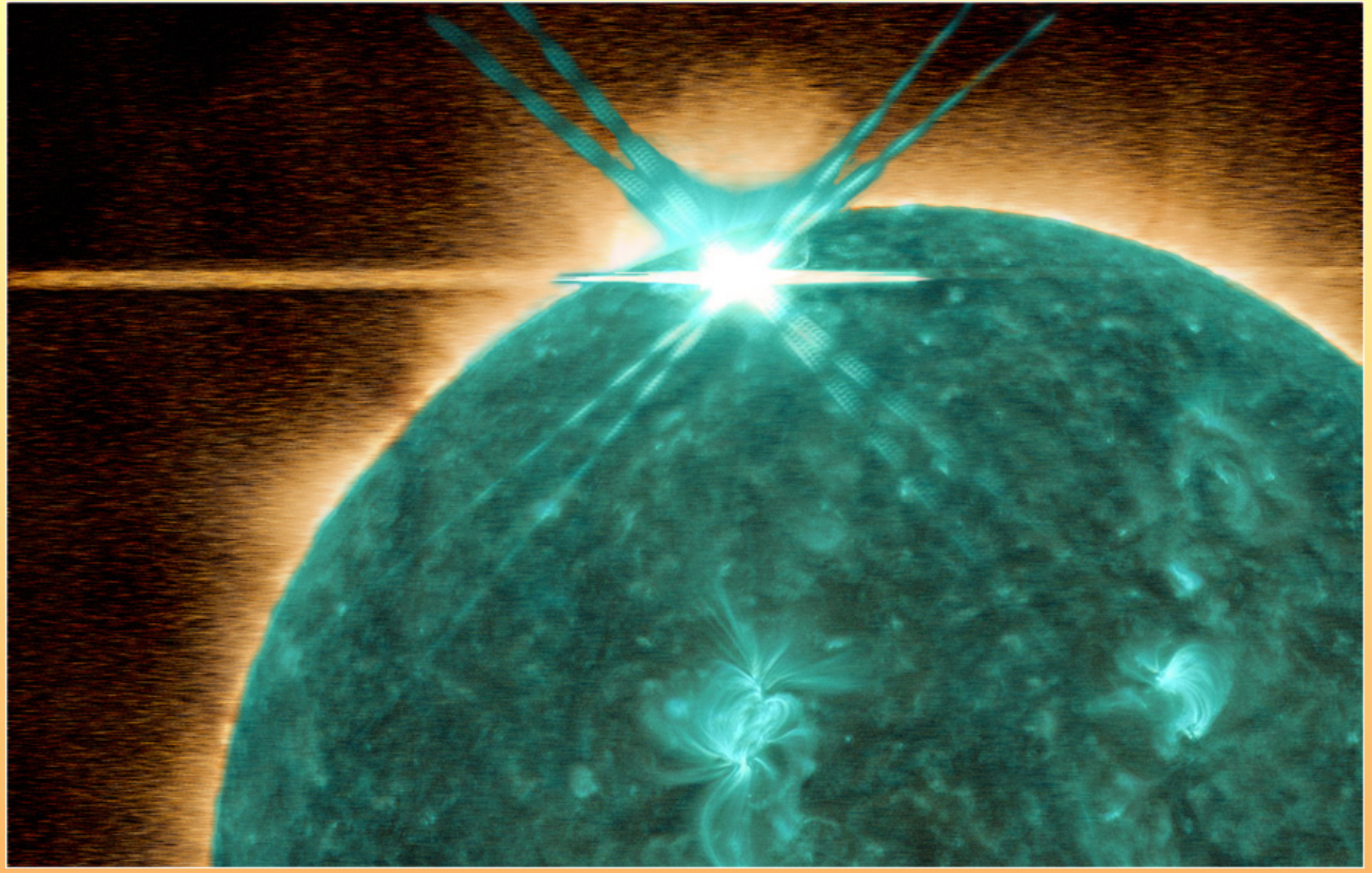
(needs 3D glasses)

With this 3D effect the Sun really does seem to be floating in space, while the arcing loops above the brighter active regions can be seen rising up above the solar surface. Since we do not have a stereo perspective of the Sun with SDO (although for a time the STEREO solar mission did), we combined images about nine hours apart to get that sense of perspective.



Orange you glad to see the Sun?

Though very orange-like in appearance, a “dopplergram” image of the Sun measures millions of subtle motions on the Sun’s surface that helps us learn about movement and structure inside the Sun. It takes supercomputers to handle the calculations.



Flash of a Flare

A solar flare on August 9, 2011 overwhelmed the SDO imager with such strong light that it caused the brightness to spread out in broken lines above and below the flare site for just a few minutes. When flares erupt, they unleash a lot of radiation into space that can be harmful to astronauts.

Sun Flower

There was something about the bright coronal mass ejection (cropped but un-retouched) in February 2002 that, when copied into a circular pattern, suggested the splash of color found in a flower petal. Add an extreme ultraviolet image of the Sun as the centerpiece and it seemed to suggest a recreation of oneness in the universe. The English poet William Blake expressed it as “all the world in a grain of sand.”