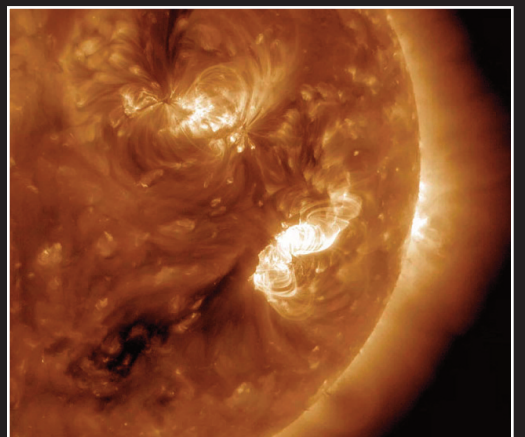
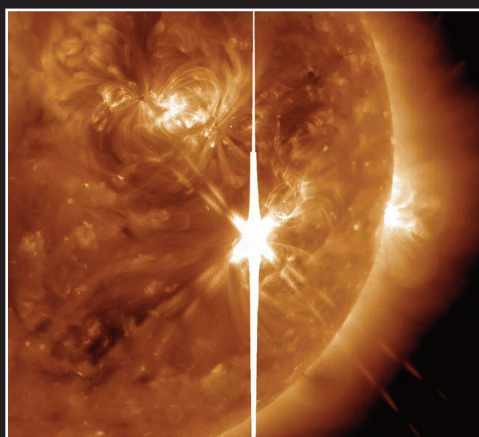
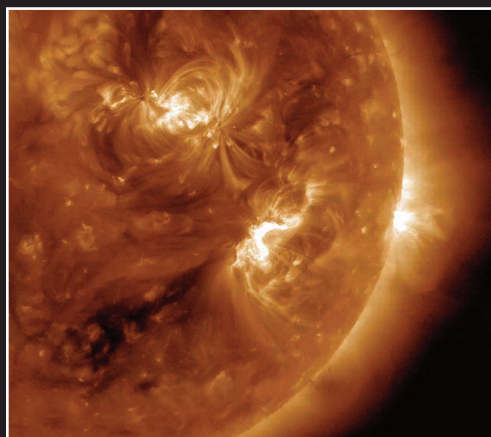
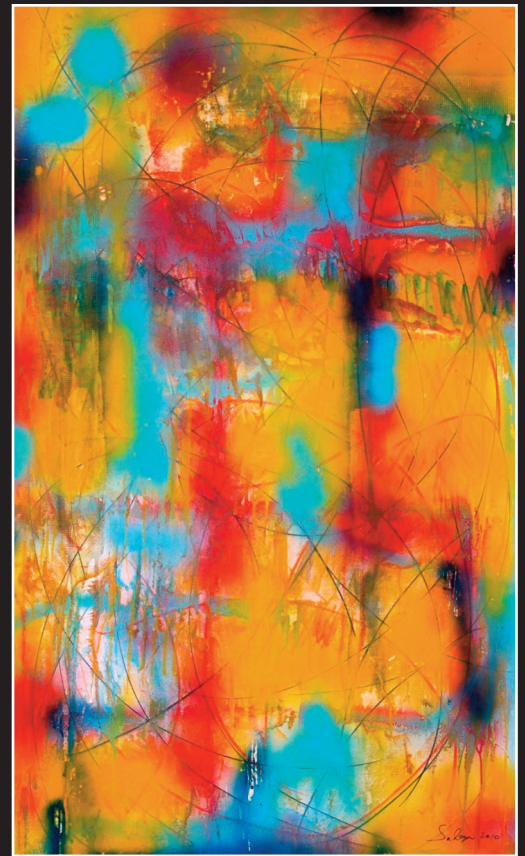
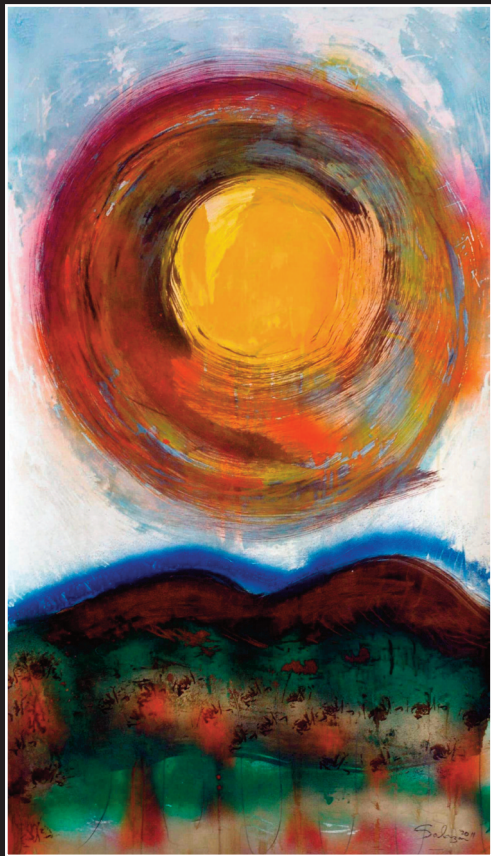


# Solar Flares & Salazar

An Art/Science Collaboration



Roland Salazar Rose

John Ripton

Shawn Laatsch



ramblin/rose publications

Solar Flares and Salazar – An Art/Science Collaboration

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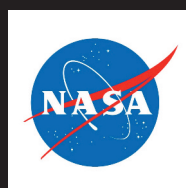
This e-publication a production in the United States of America

Front Cover Images Top: Left to Right: Precursor Stage, Solar Flare painting # 8; Impulsive Stage, Solar Flare painting # 6; Decay Stage, Solar Flare painting # 10

Bottom: Left to Right: SDO NASA photo Solar Stage # 1; SDO NASA photo Solar Stage #2; SDO NASA Solar Flare # 3



Funded in part by a grant from the Maine Arts Commission, an independent state agency supported by the National Endowment for the Arts.





# Foreword

## The Project

I resided in Mexico over three decades bridging the 20th and 21st centuries. In 2011-12 our Sun was about to give forth an impressive burst of magnetic energy, and emit radiation across the entire 'electronic spectrum.' I decided to paint 11 works to memorialize the event.

I was visiting Maine, looking forward to moving back in 2012. I sought a way to exhibit my Solar Flare series, but other art projects, and resettling in Maine, made that project impossible. In 2017 I contacted the International Planetarium Society Office of Education and it was suggested that I contact Shawn Laatsch, Director of Emera Astronomy Center, UMO, Maine. I did so and we discussed my proposal. He said he would like to be involved. The idea became an art/science project, "Solar Flares and Salazar."

This art/science project would not be possible without the project team I was able to assemble: Shawn Laatsch, Director of Emery Astronomy Center (digital sky/ dark matter programming); John Ripton, PhD, (curator and script); Duane Shimmel, IMFA, Center of Innovation and Learning, USMO (original music and sound program); Steele Hill, Media Specialist, SDO, NASA, ( Solar Images); Eleanor Kipping, voice talent, (narration).

*By Roland Salazar Rose*

## The Script

When Salazar painted his Solar Flares series in 2012, an 11-year cycle of sun flares was completing its course. Scientists witnessed heightened activity on the sun's surface and expected it to erupt dramatically. The anticipated solar event piqued Salazar's scientific interest and inspired him to paint his reflections on the sun flare phenomenon. He painted the eleven images of the series in three phases, corresponding to the three stages of the 11-year solar flare cycle. These large oil paintings on Stonehenge paper constitute a complex aesthetic interpretation of the solar flare cycle. The paintings confront and engage the viewer, often at a gut level, though also intellectually. Like me, other viewers may need time to reflect, to take in the series painting by painting, considering and questioning what lies within their composition and how one painting may relate to others. Provocative and timely, the Solar Flares paintings' strong lines and dramatic colors contain the mystery, irony, ambiguity and emotional complexity bound up in our relationship to the sun. The accompanying script provides historical and ecological background and poses aesthetic and existential questions. As the artist Salazar said in 2012, "I felt it important [that] my artistic treatment of the solar flare event increased public awareness on how important it is to observe and protect our 'spaceship earth.'"

*By John Ripton*

## The Video

Emera Astronomy Center found this project a perfect match of art and science, allowing us to bring new content to our visitors. The collaboration of Roland Salazar Rose, John Ripton and Duane Shimmel allowed us to bring an artistic interpretation of the natural phenomenon of solar flares into our dome. Combining Roland's paintings with images from NASA, along with the script John Ripton wrote, we created a way to share this story. Duane Shimmel, who has worked with the astronomy center on a number of projects, composed a dramatic soundscape. The resulting mini-program "Solar Flares and Salazar" was played as an introduction to our full-dome program "Solar Superstorms," combining artistic and scientific interpretation in a unique and exciting way. The paintings, script voice-over and soundscape immersed audiences in an unusually compelling story of our star, the Sun. The program was enthusiastically received by our planetarium attendees.

*Shawn Laatsch*

# Our Sun

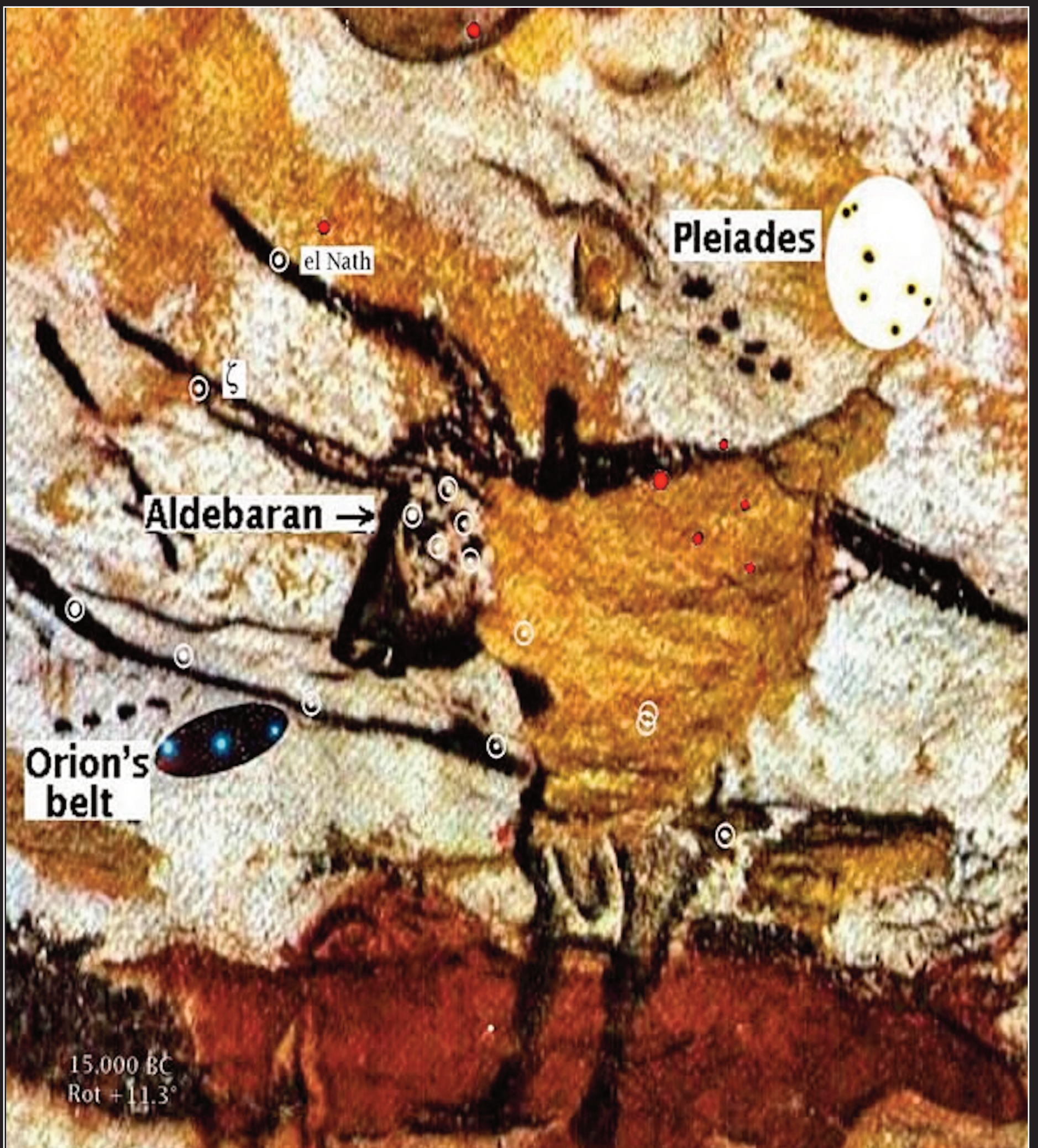


**I**t passes overhead daily. Most of the time we take it for granted, unless it's a rainy day and we want to be outside or we need sunscreen for the beach. Sometimes, though, we marvel at a spectacular sunrise or sunset. Solar or lunar eclipses capture our imaginations. Yet, while sunlight envelops us even on the greyest days, we generally give little or no thought to the presence of the star around which our lives literally revolve.



**N**evertheless life on Earth is profoundly linked to our Sun. It is the principal energy source that drives photosynthesis, generates weather and climate and regulates our metabolism. Our food, our fuel, our very evolution on this planet depends on our Sun. For these reasons and more, the Sun literally means life.





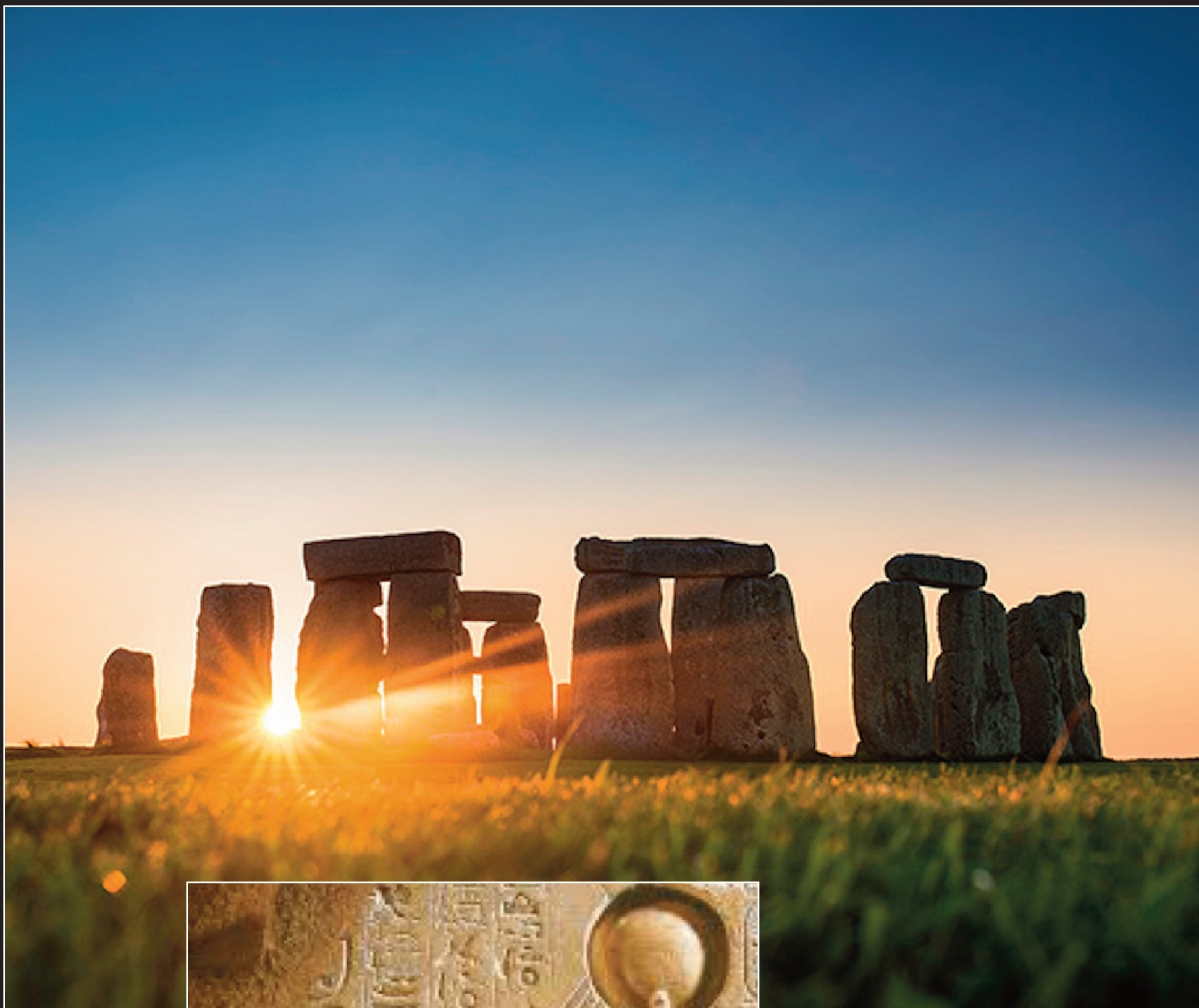
From the beginnings of human life 2-3 million years ago, daylight stirred us, lifted our spirits and ignited our imaginations. When rock walls of caves became the canvas for the first artistic revolution, Cro-Magnon humans drew animals in the shape of constellations of stars, connecting the planet and its life, and the cycle of seasons to the light of our sun.





The Sun's awe-inspiring presence has led humans to worship it as a god across human history. Mesopotamians, Egyptians, Greeks, Mayas, Aztecs, Incas, Polynesians and many other ancient peoples worshipped sun-gods. The world's first farmers more than 6000 years ago followed sacred solar and lunar calendars to determine when to plant, cultivate and harvest crops.

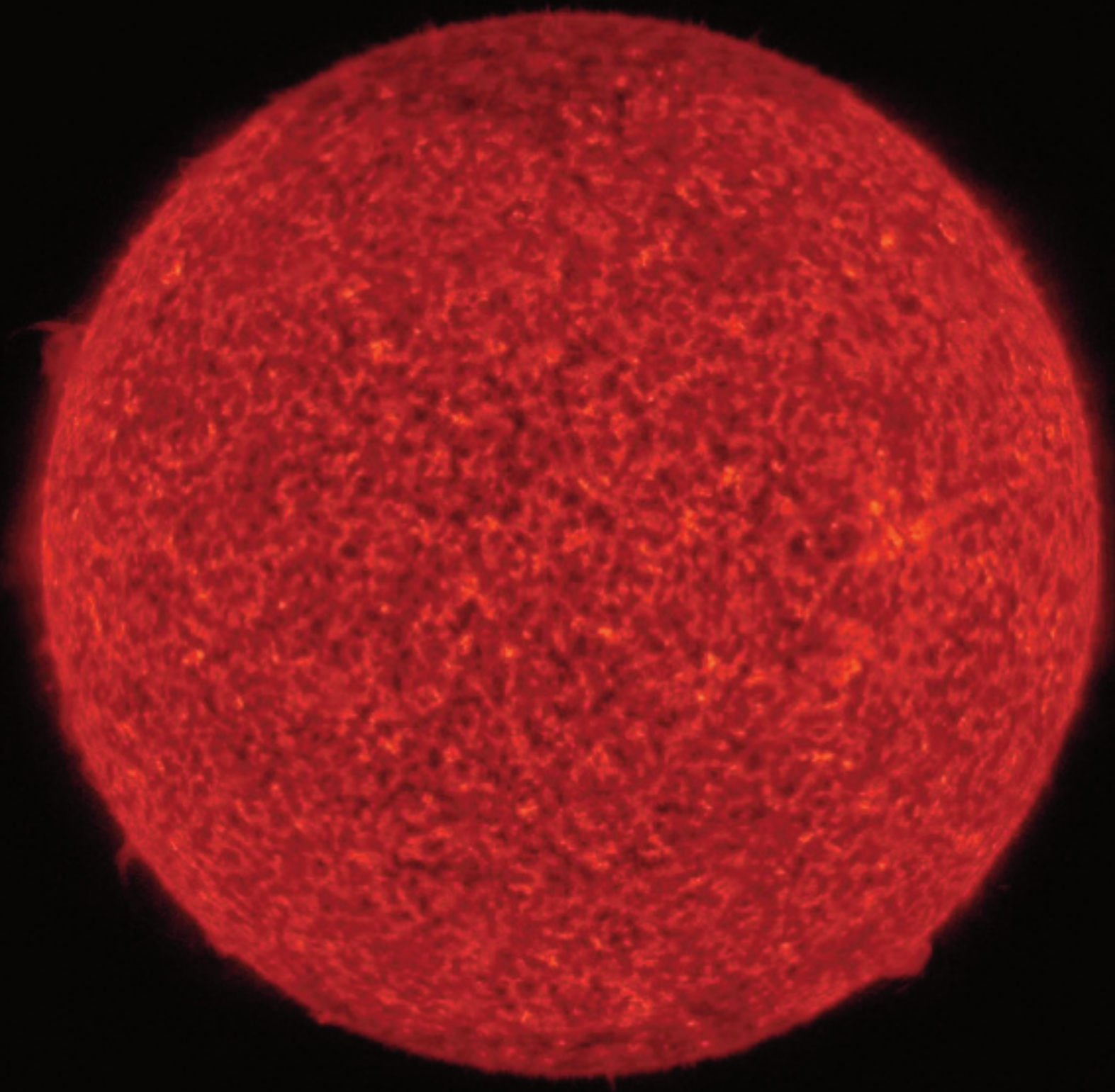




The solar solstices and equinoxes were observed with religious ritual and ceremony.

Some modern scholars even suggest that the Egyptian sun-god Aten more than 3000 years ago influenced the rise of monotheism among the Israelites.





Today, however, solar observations from space have provided extraordinary images of the sun. Missions like SOHO, STEREO and especially SDO (Solar Dynamics Observatory launched in 2010) have vastly deepened our knowledge of the sun. With such extraordinary instruments we've actually learned more about our Sun and its properties in recent decades than our species has in all the previous millions of years we've inhabited the Earth.





While modern astronomers and other scientists explore the properties and activities of the Sun, contemporary artists are equally inspired to capture aspects of the sun with their pigments, brushes, chisels, lenses and lasers. The artist Roland Salazar Rose is one of them. Salazar, as the artist is known, became intensely fascinated with the Sun in 2011 while painting in Mexico.





“I was a resident artist in Mexico in 2011 when the Sun was to reach the maximum in its eleven year cycle. I decided to paint 11 images, some 50 X 30 inches on Stonehenge paper to memorialize the event.... In 2011 our Sun was about to give forth an impressive burst of magnetic energy, and emit radiation across the entire ‘electromagnetic spectrum.’ I felt it important to introduce the public to my artistic treatment of this event, and increase public awareness on how important it is to observe and protect our “spaceship earth’.”

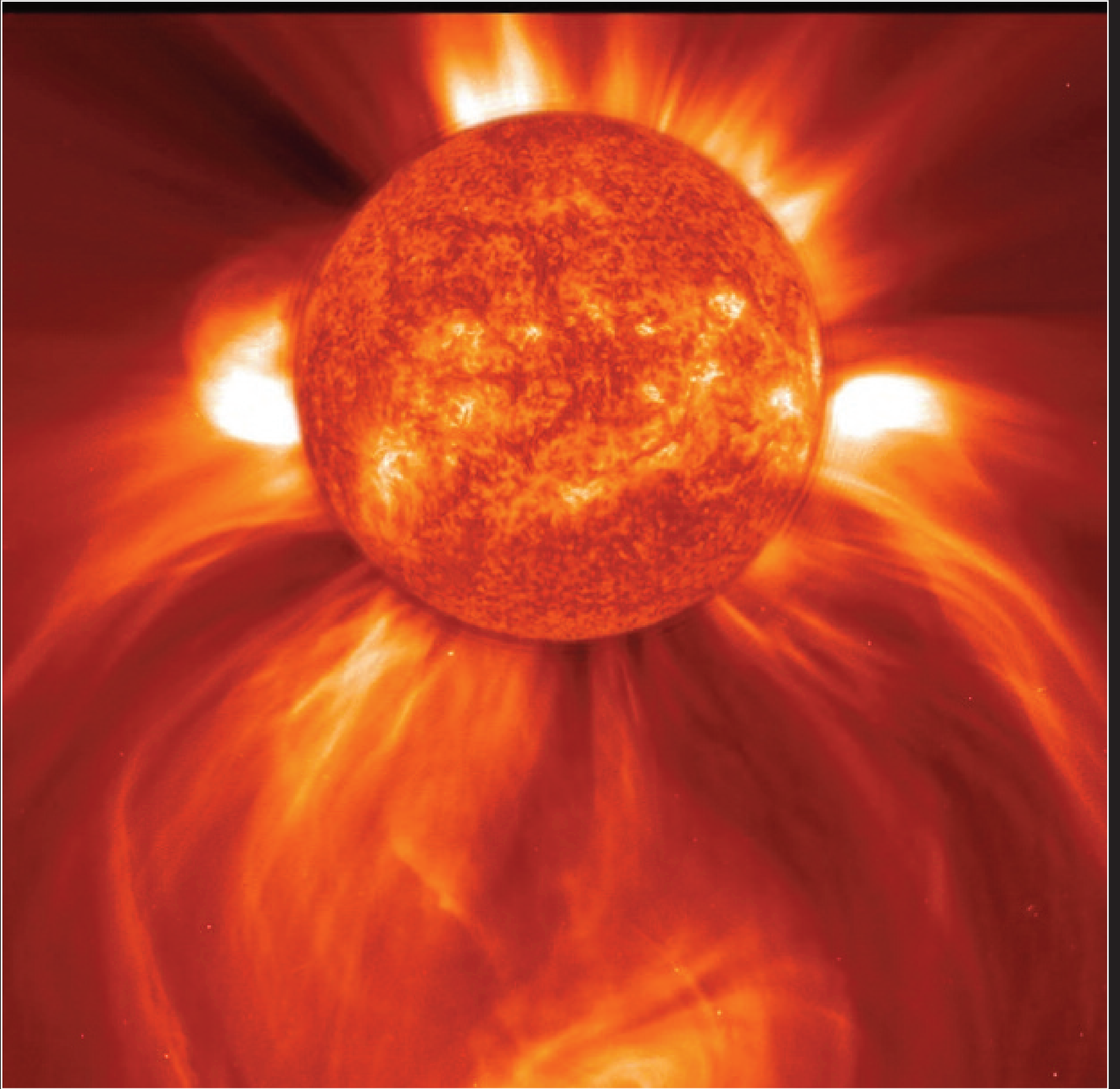




Swipe to slide images

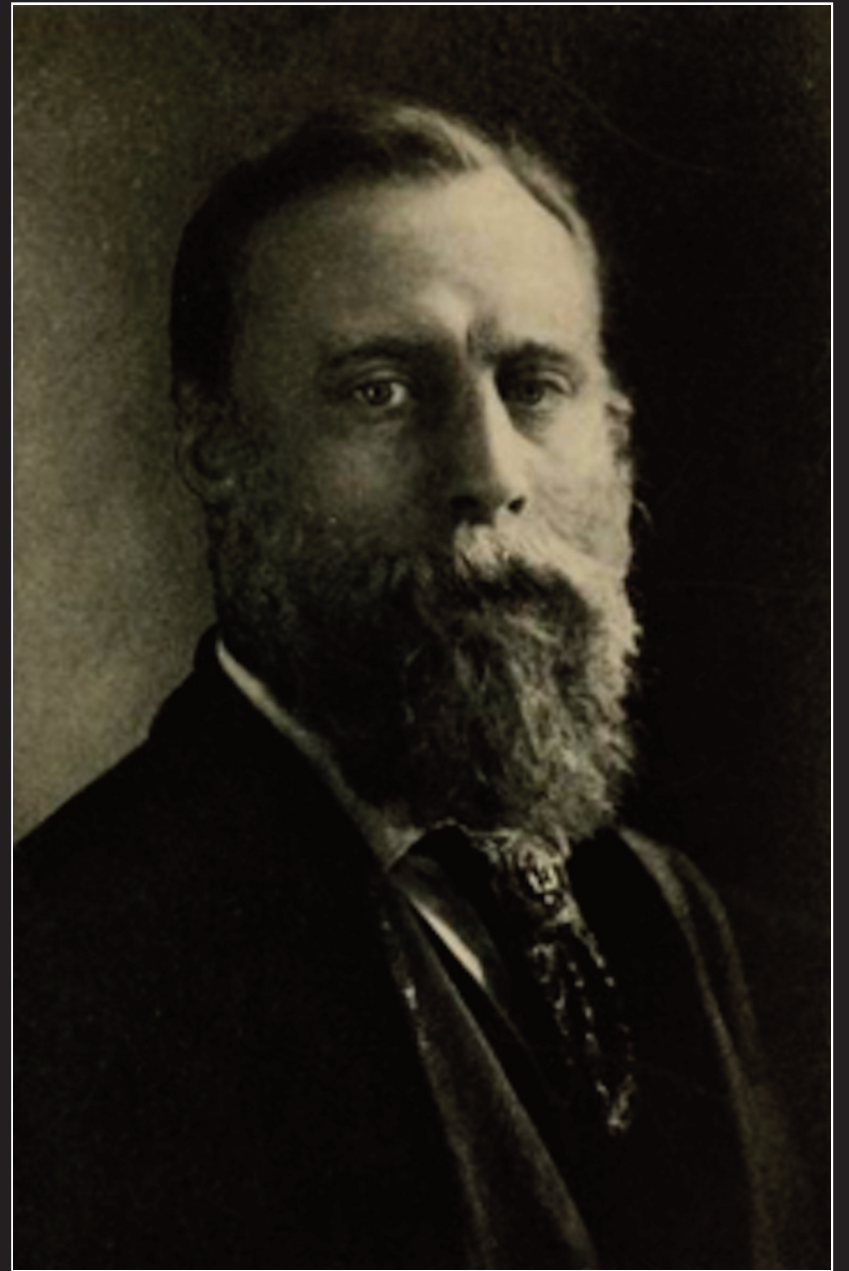
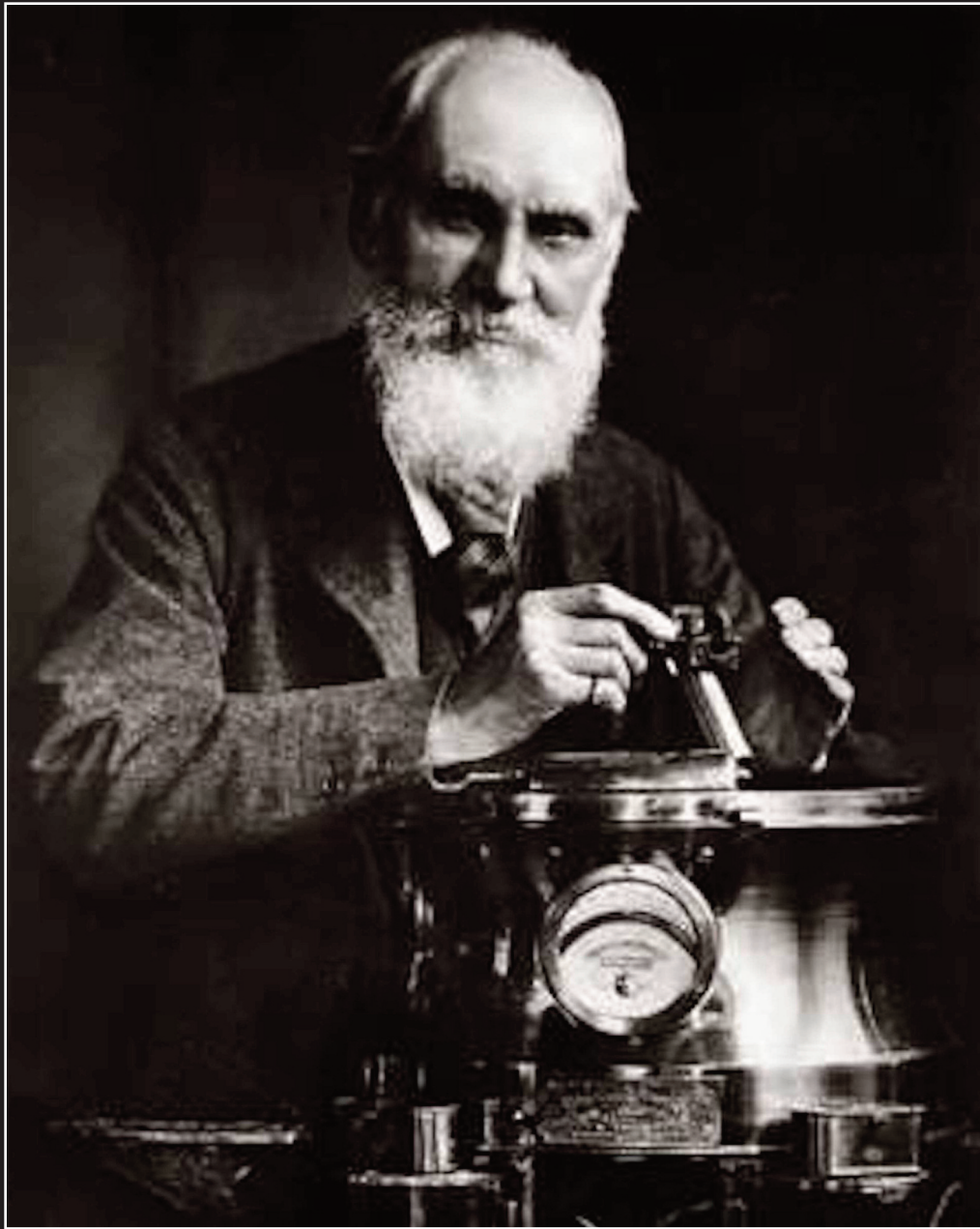
Fascinated by the spectacular solar flare events he read about, Salazar started his series of 11 paintings known simply as “Solar Flares: 2011-2012.” Solar flares, he thought, speak directly to the relationship between our Sun and planet. Inspired by what he learned, Salazar created a dramatic vision of the sun’s place in our lives, urging us to take notice of its awesome creativity and mystery.





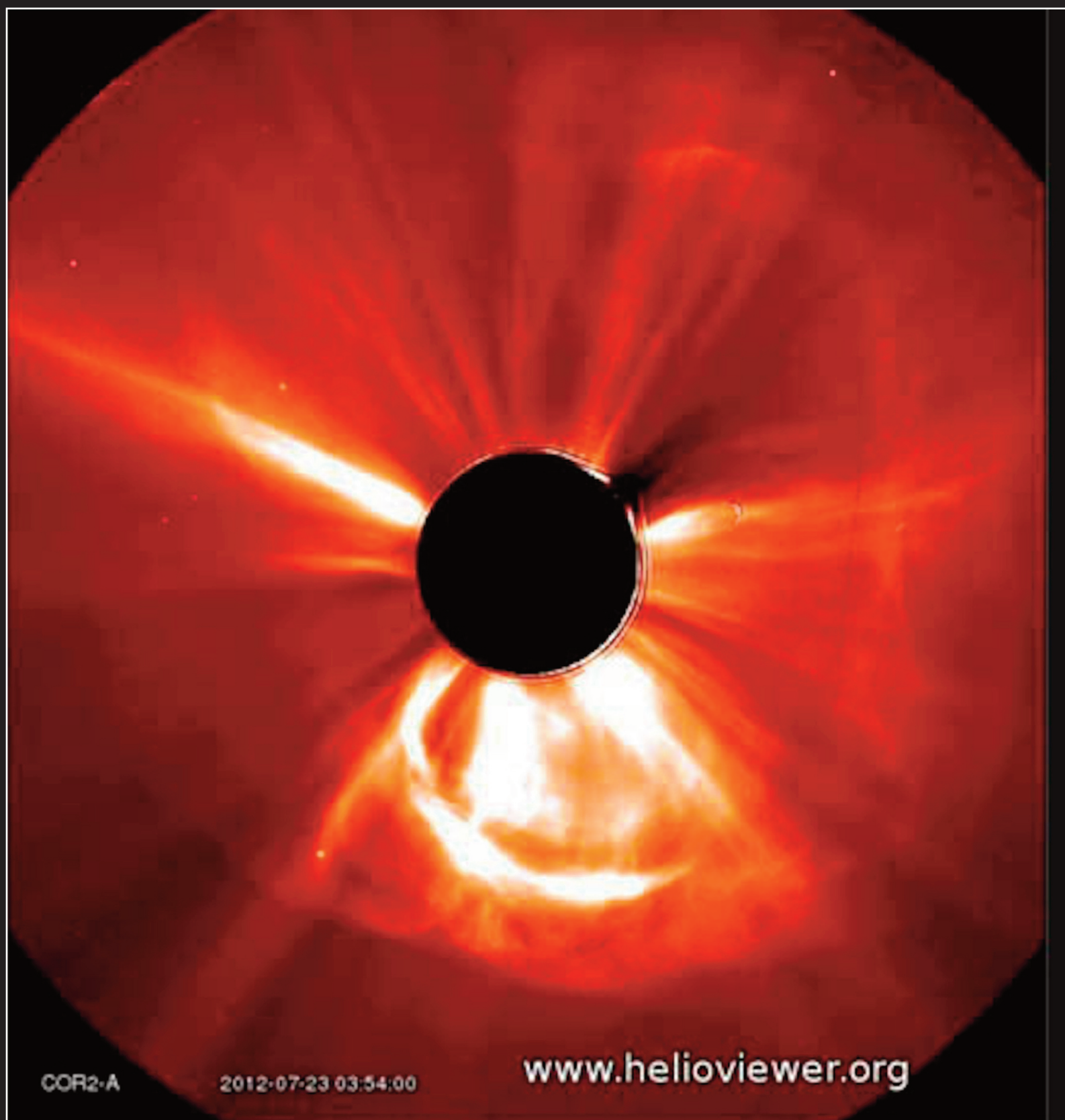
Solar flares, especially when followed by a Coronal Mass Ejection (CME for short) of the Sun's interior particles or plasma, are known to disrupt and damage satellite and ground communication systems on Earth. CMEs are caused by the sun's rotation as it twists magnetic fields, ultimately causing massive eruptions.





The CME that accompanied a solar flare in September 1859 shut down electric communications across the planet, mostly telegraph wire systems. British astronomer Richard Carrington (left) and Australian astronomer Richard Hodgson (right) observed the solar event, both noting a giant white flash on the Sun. What Carrington and Hodgson witnessed turned out to be the greatest solar flare and CME ever recorded.





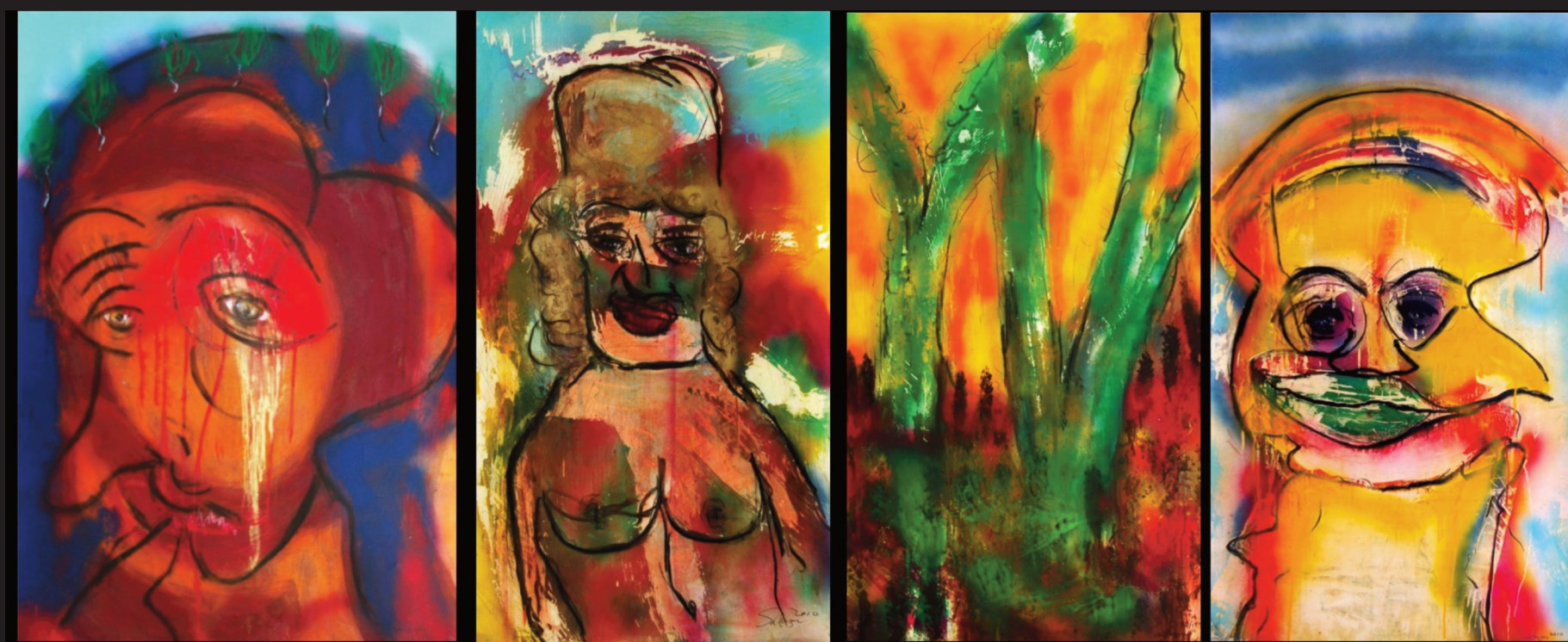
In July 2012 a solar flare and CME occurred that was comparable to the 1859 event. Because of the sun's rotation on its axis (once every 26 hours), the massive CME was not aimed directly toward the Earth. If it had been, it would have been catastrophic. A study in 2013 estimated that the July 2012 CME would have caused extensive damage across our planet. In the United States alone, it would have cost as much as 2.6 trillion dollars to repair and replace damaged electric and electronic systems from computers to satellites. That's nearly 20 percent of the 2012 Gross Domestic Product of the U.S., or about the same as all Americans spent on healthcare that year. Chinese professor Ling D. Yu of China's State Key Laboratory of Space Weather projected that it would take the world 4 to 10 years to recover from such a disaster.



## Precursor



## Impulsive



## Decay



Salazar decided to organize his series of 11 painting on sun flares into three stages, following the stages of the 11-year life-cycle scientists have ascribed to sun flares: **Precursor**, **Impulsive** and **Decay**.





Salazar selected four paintings for the Precursor Stage when the conditions for sun flares are building. These paintings reflect the intimate relationship between the sun and the Earth that produces the dynamic vitality of our planet. The first painting shows a beautiful, brilliant sun rising above the blue sky and the organic curves of Earth. The sun is exaggerated in size from our perspective on Earth's surface, reflecting its powerful central place in the evolution of the planet and its life.

The second image depicts four human figures in the background with a giant green leaf in the foreground. The figures are splashed in red paint that drips down their faces. Red is such a passionate, highly energized, even aggressive and violent, color that the viewer is struck by the way Salazar applied it in this image. Is it blood?

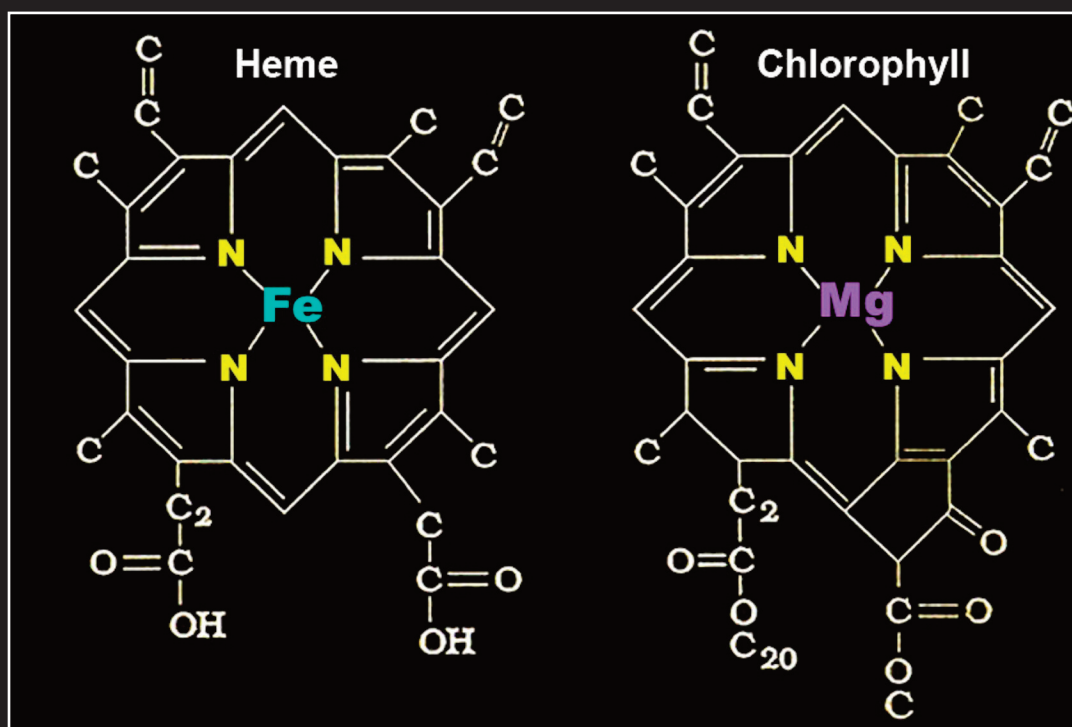






It is intriguing to note here the close relationship between the atomic structure of green chlorophyll in leaves to that of blood. Chlorophyll is built around one atom of magnesium and blood or hemoglobin has an atom of iron at its core. Otherwise chlorophyll and blood are remarkably similar, chemically speaking. Is the artist emphasizing life's intimate dependence on the sun and its light?

Certainly life on Earth depends on the chemical cycles driven by the sun's energy. Sunlight drives photosynthesis, leaves taking in CO<sub>2</sub> and releasing oxygen into the atmosphere. We depend on photosynthesis for virtually all our food, whether eaten directly as vegetation or indirectly as meat and other animal by-products.







Whether or not the artist Salazar intended the red to represent blood, its presence on the faces of the figures gives an ominous value to the image. A sense of foreboding is surely heightened in the third painting in the Precursor Stage. In this image a person cloaked in red appears frightened. Is this individual warding off some obvious threat?





In 2012, while Salazar painted in Mexico, interest in the ancient Maya prediction of the sun's death piqued. In the sacred Mayan text *Popol Vuh* ancient astronomers had determined the sun would die on December, 20, 2012. Salazar realized, of course, that neither an ancient doomsday prediction nor a CME was likely to destroy life on Earth. Other human and geological forces were far greater threats to our existence: global warming, melting glaciers, deforestation, habitat loss.





In the sharp light of northern Mexico, Salazar's fears for Earth and our existence surfaced. Yes, he was frightened of something that he had seen building for many years. Does the yellowish-brown-colored flower in this third painting of the Precursor Stage suggest a loss of vitality? Why is the center of this curious flower ruby-colored? Is the sadness, confusion and fear in the eyes of this cloaked person a reflection of the artist's concern with life on Earth?

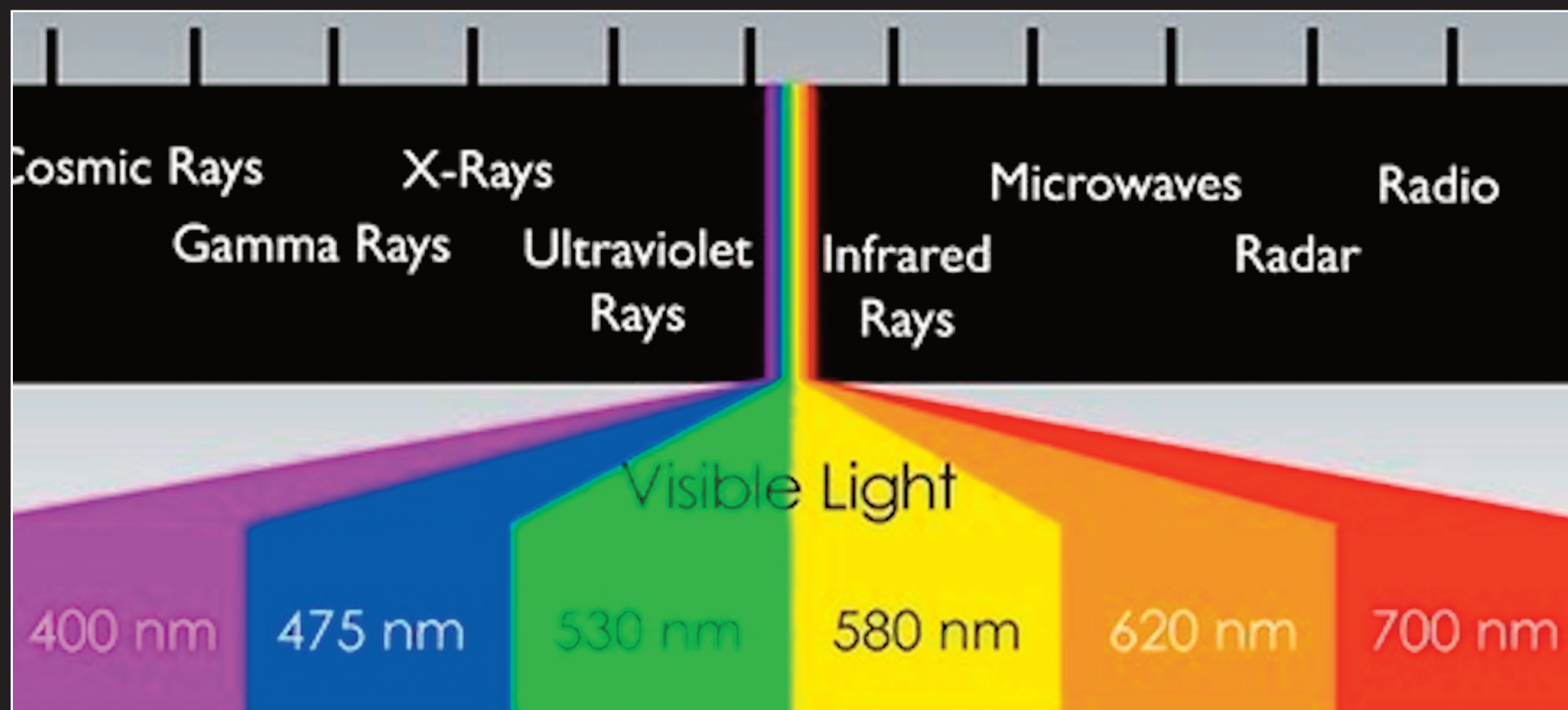
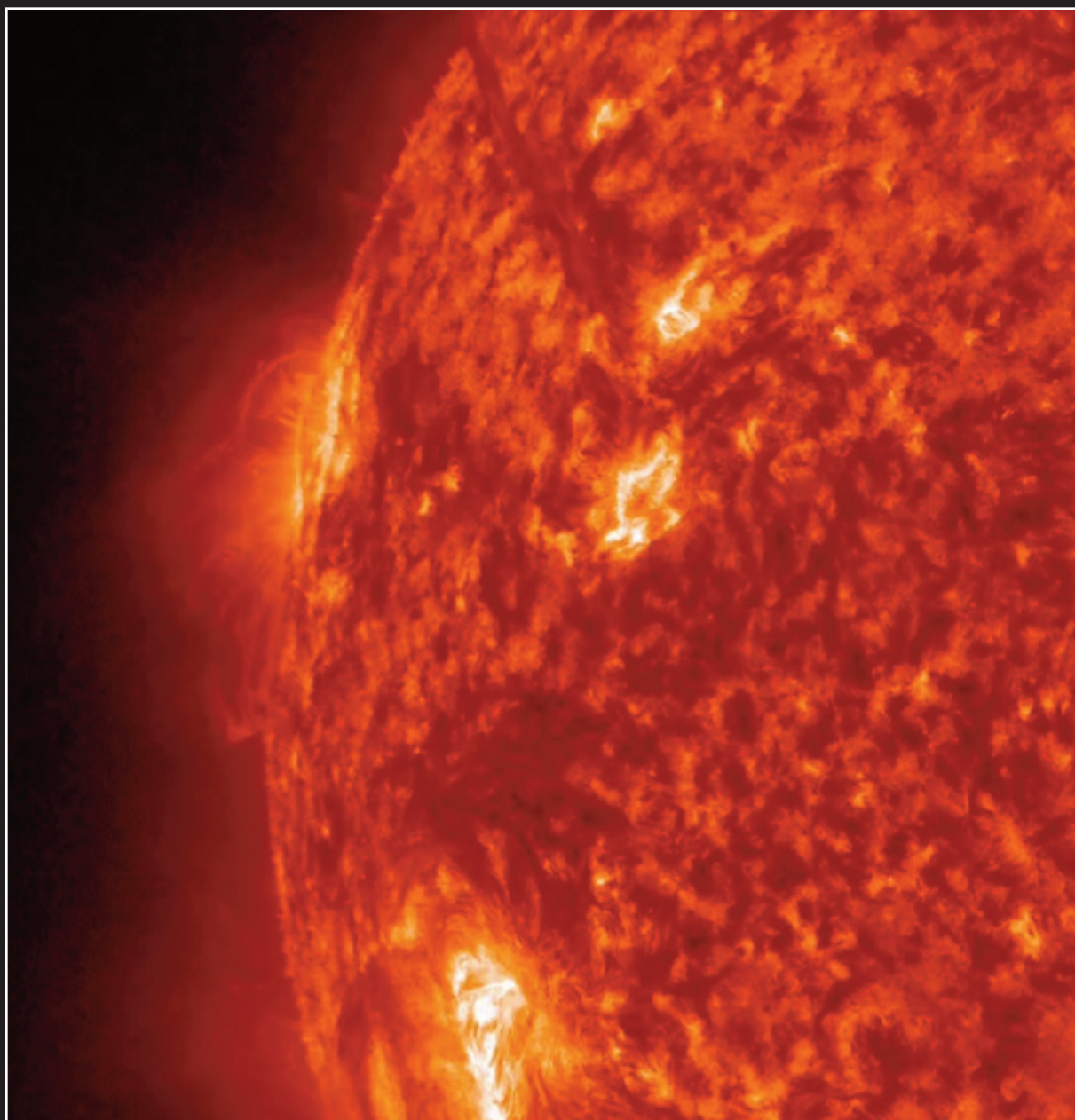




The last image of the Precursor Stage contains what appear to be orange-red flowers with deep blue outlines highlighted by green stems and “clouds” of green with traces of yellow. A field of red-to-orange pigment blankets an apparent landscape with low hills beyond. The blues in the sky suggest good weather. A sun appears to be rising. The foreboding quality of the previous image is not present here. This image radiates warmth. Is this a respite before powerful solar flares disturb the Sun's surface and blast into interplanetary space? Is it a quiet moment of the artist's reflection on Earth's beauty?

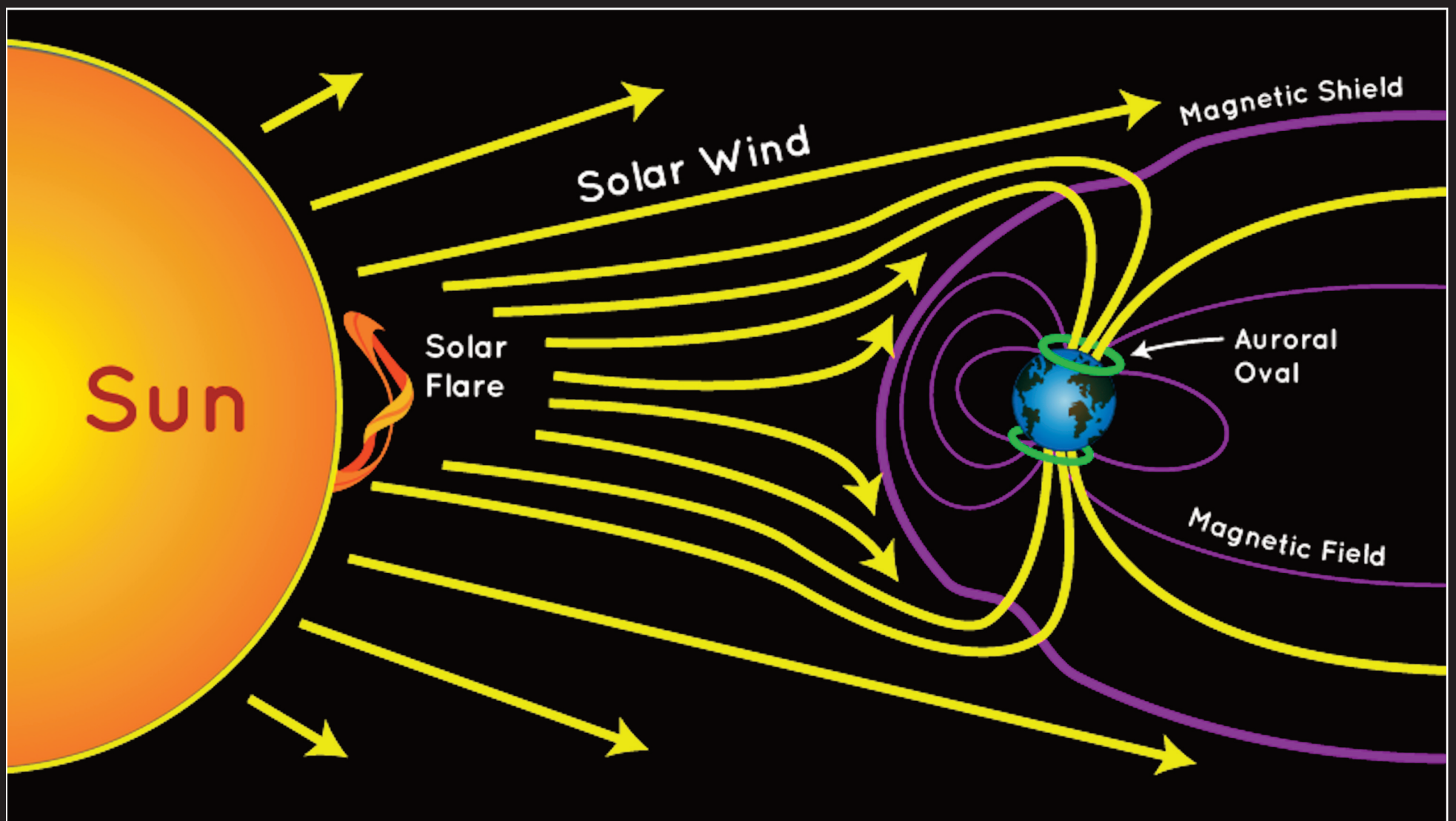


In the second series another four paintings represent the “Impulsive Stage.” This stage corresponds to solar flares and CME events.



They are the most dramatic events in our solar system. The particles contained in these events include radio waves, microwaves, infrared, ultraviolet light, X-rays and gamma rays.



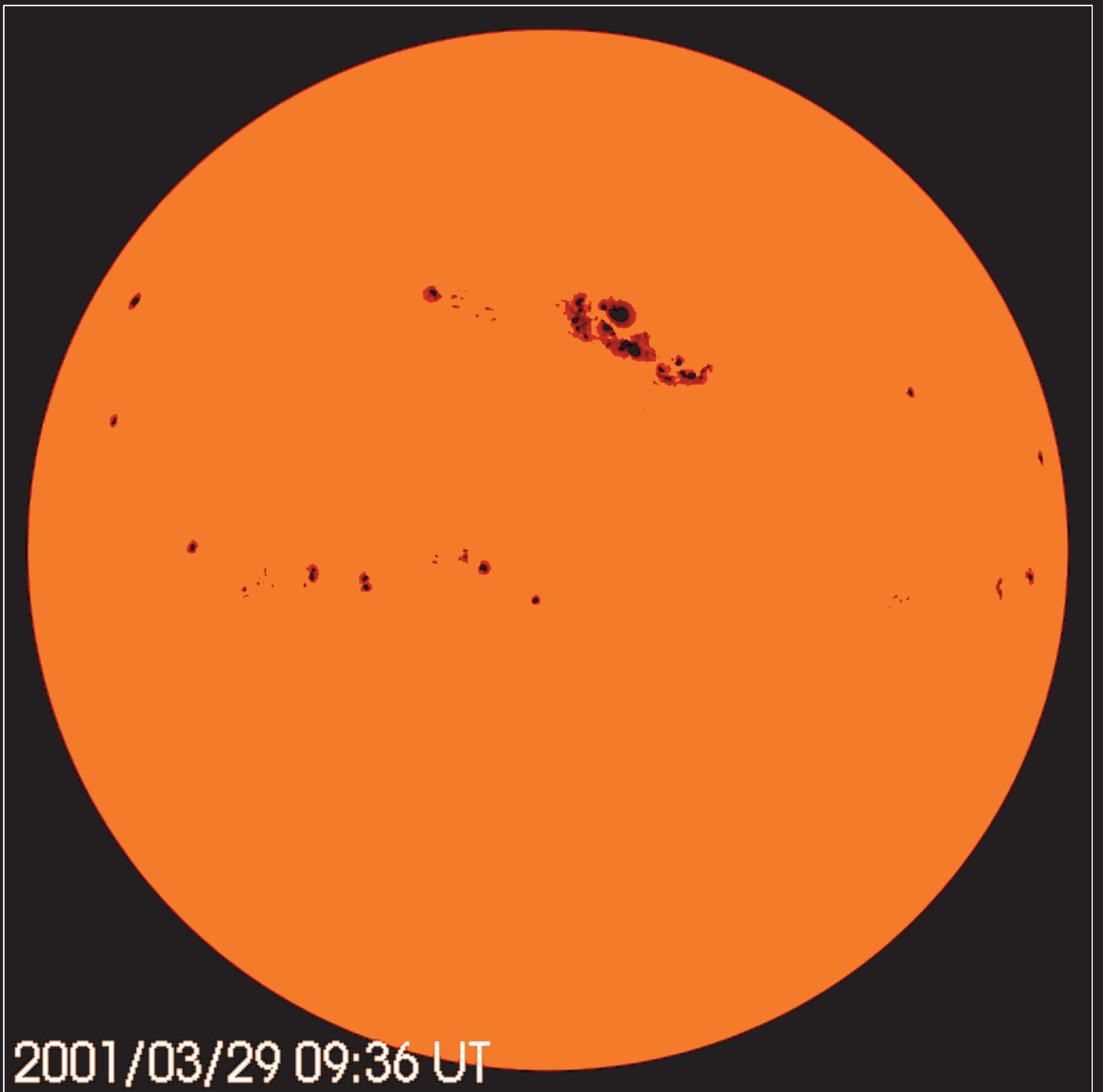


In this stage the artist Salazar seems to reflect on the titanic power and enormous speed of solar flares and CMEs. Solar flares are sudden bursts of energy from the Sun's surface traveling tens of millions of miles out into interplanetary space at the speed of light.

The release of energy in solar flares is gargantuan. It is estimated to equal the explosion of millions of 100-megaton hydrogen bombs at one time, or ten million volcanos erupting simultaneously.

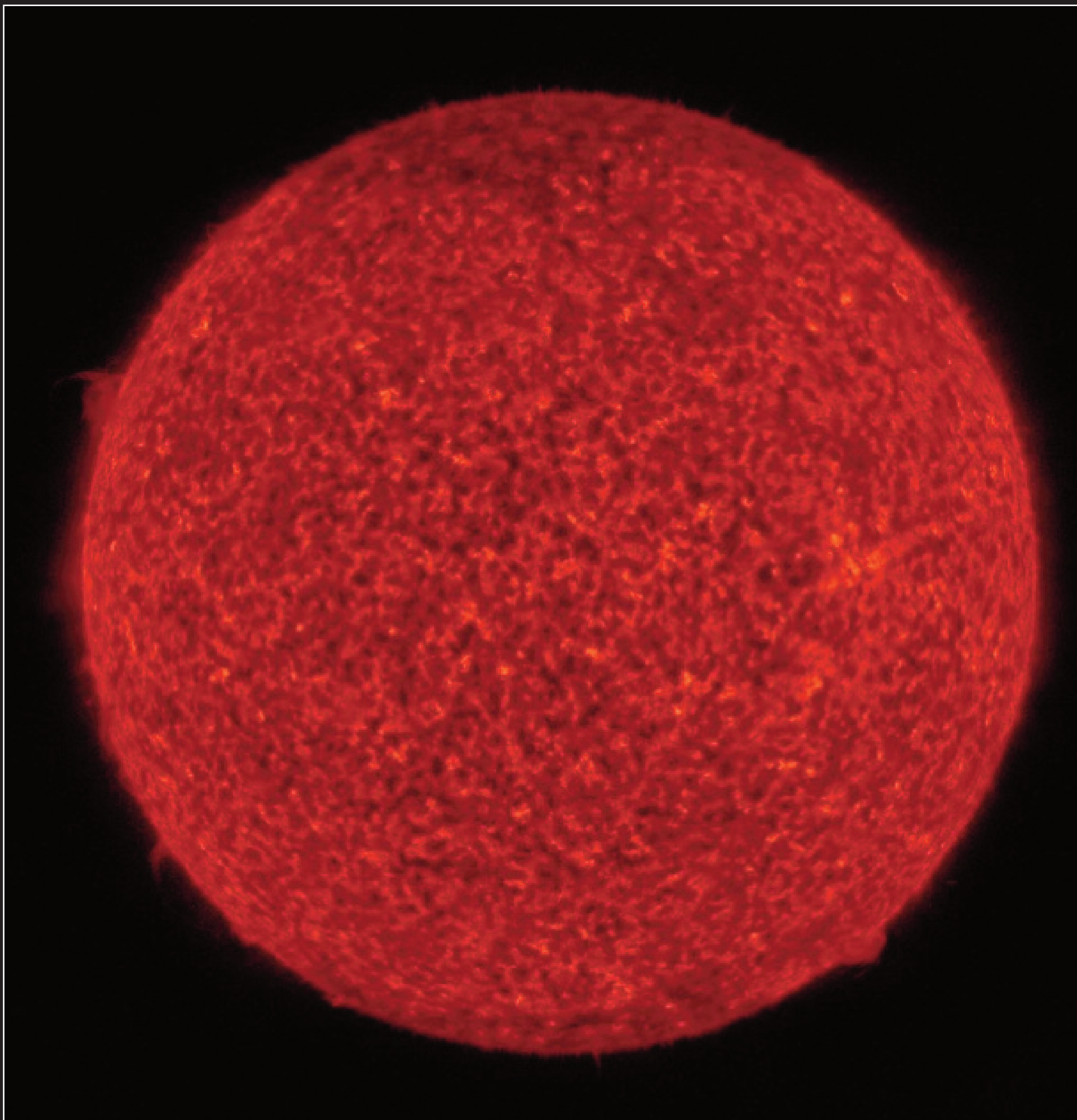






Sunspots on the sun's surface are the regions of greatest magnetic activity. These sunspots usually appear near the equator of the sun. They are regions of enormous shifting magnetic forces and violent solar winds. Near the end of solar flares' 11-year cycle these solar windstorms increase in intensity and frequency. Sometimes, though relatively rarely, the heightened electromagnetic forces seem to cause the Sun to thrust forth its molten inner particles in a CME, usually following a sun flare.





By contrast with sun flares, however, the energy released by a CME is far more violent. The energy equivalent of a CME is the simultaneous explosions of one billion 100-megaton hydrogen bombs. CMEs also move at a much slower speed, up to 2 million miles per hour. At this velocity the CME particles reach the Earth in two days.





Aware for the first time of some of this information on solar flares and CMEs, Salazar reacted as any human being would. In the first Impulsive Stage image a contorted face is splashed with red pigment on the left eye. Rivulets of paint run down the face. The paint forms rivulets down the face. Again, it seems much like blood. A light yellow pigment from the same eye also streaks the face. Is this face weeping for Earth? Is it the outward expression of the artist imagining the unimaginable? Again, green “clouds” appear, but they now appear as trees or other vegetation.





Perhaps the second painting in the “Impulsive Stage” sheds light on the mystery of the green “clouds.” The painting is disturbing; the female depicted seems to have coiffed hair or wears a hat, but her face is also contorted. The blotches and streaks of paint on her body and in the background add to the disturbance of this image. Do the faint lines crossing the right breast suggest something about fertility or fecundity? Green can represent fertility. Is this a reference to the loss of Earth’s fertility? Can the green “clouds” seen in early images suggest destruction and rebirth at the same time?





The third image of the “Impulsive Stage” shows green columns against a highly-energized orange-yellow background. They might be cacti or trees. Red dominates the lower background. The orange-yellow light suggests the sky is burning.





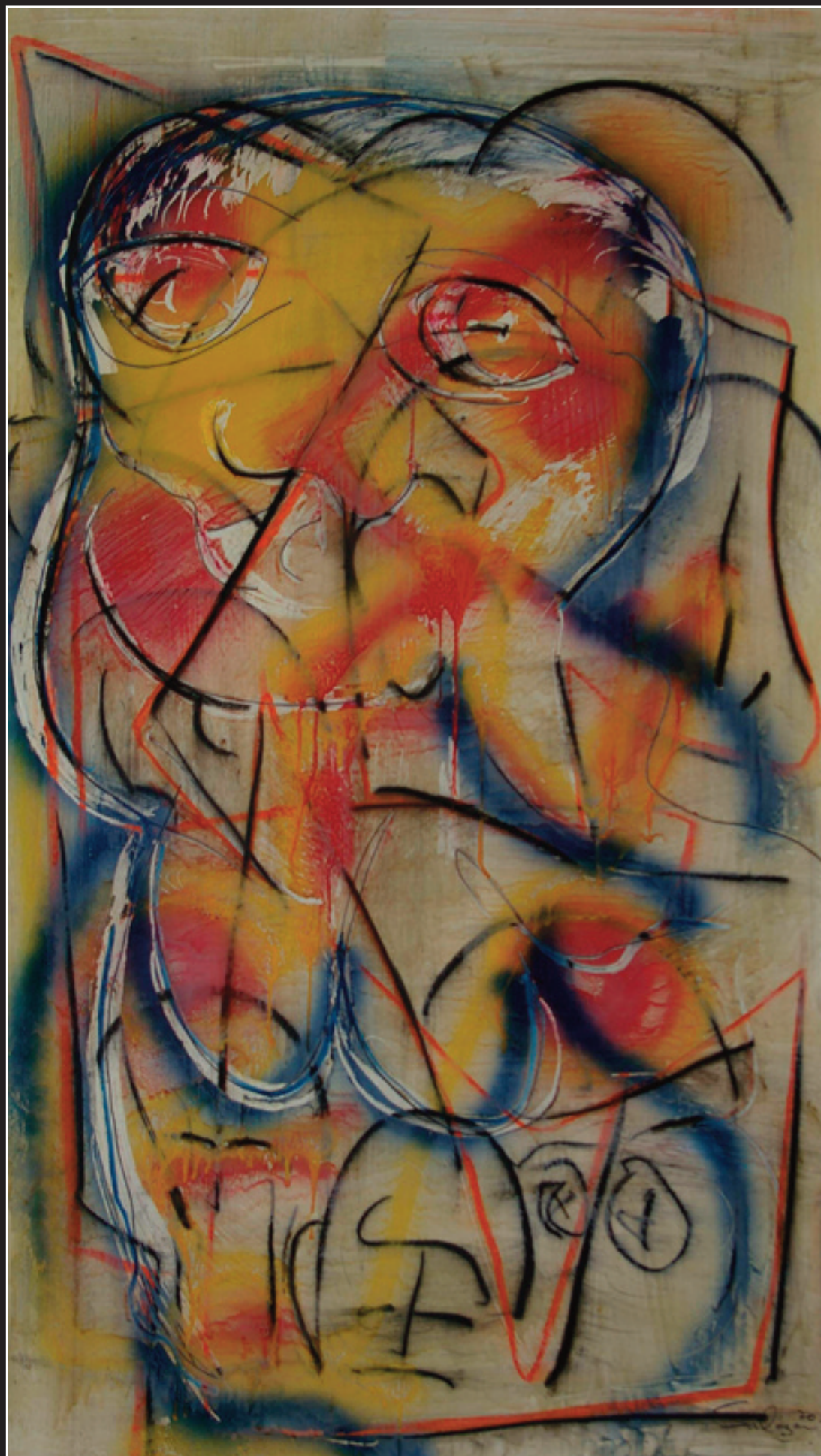
At the same time, the sky seems to be in motion, shifting waves of light similar to an aurora borealis, or Northern Lights, or the aurora australis (Southern Lights) seen in polar latitudes when highly charged electrons enter Earth's magnetic field. These electrons collide with oxygen and nitrogen molecules in the upper atmosphere. The result is a spectacular display of colors sweeping and sliding across the polar sky.





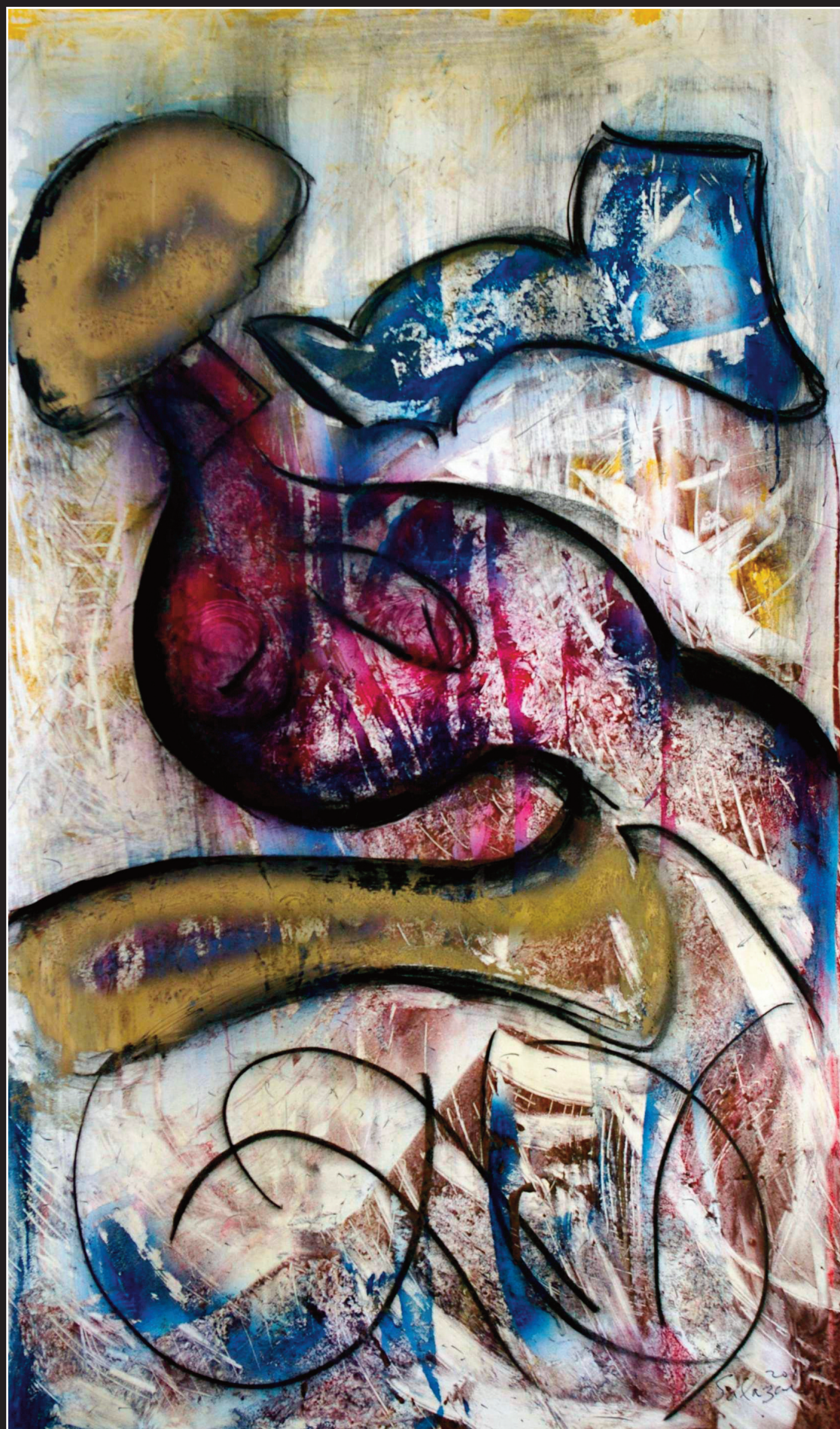
The fourth painting in the “Impulsive Stage” intensifies Salazar’s emotionally-charged series of images. The most haunting aspect of this image’s grotesque figure is the eyes set deeply in their black-violet sockets. They peer directly at the viewer. They are the eyes of a lost soul. Is this a woman? Does she have shrunken breasts? Ironically, as desperate as the dark eyes seem, there are hopeful elements in this image. Cerulean blues in the background and the green leaf suggesting a mouth are possible signs that Earth’s fertility may yet survive. Even the red appears less violent.





More subdued colors generally define the final three paintings in the “Decay Stage” of solar flares’ 11-year cycle. In the first image Salazar suggests the beginnings of a breakdown with black and red lines ensnaring a woman with sightless eyes. At the same time, though, the geometric structure of these lines suggest construction more than destruction. Is the artist more optimistic in this stage than he led viewers to believe from the previous “Impulsive Stage”? Is the artist anticipating a transition in humans’ relationship with Earth?





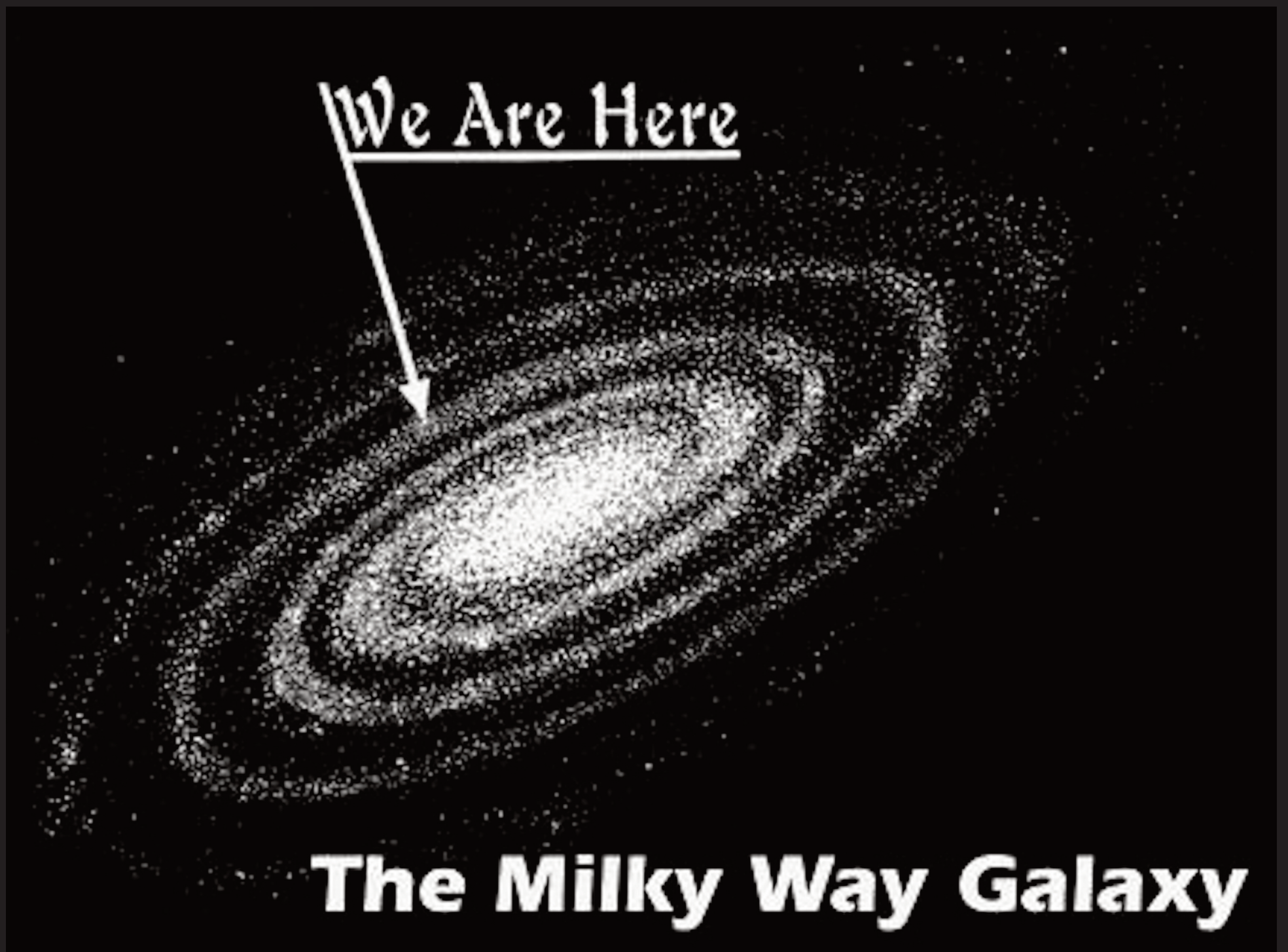
Salazar's range of colors shift in the second painting of the "Decay Stage." The ferocity of his palette diminishes. Yet there is still energy and motion in the slashes of white and circular black lines in the lower third of the image. Some form at the center of the painting seems to be emerging. Here the stronger black lines of a strange organic shape dominate the image. Is there a hint of eyes outlined in black on a color field dominated by shades of magenta and lilac? The strokes of color are looser, their wavelengths less intense. Is there a hint of eyes outlined in black on a color field dominated by shades of magenta and lilac?





The last painting of the “Decay Stage” is also the final image of the eleven paintings of Salazar’s “Solar Flares: 2011-2012” series. The electromagnetic solar wind storms subside in the “Decay Stage.” The once highly charged electrons in the solar flares weaken. The shorter wavelengths of x-rays emitted by supercharged solar flare electrons become “softer,” with longer wavelengths that carry less energy. The long circular lines in this final painting parallel the longer wavelengths of “soft x-rays.” The field of colors in this image seem more stable, less energized. The beautiful values of these softened colors with the gently curved intersecting lines are easy on the viewer’s eyes. Is the artist optimistic? Is he at peace with his vision?





Salazar's earlier words linked this series of paintings to humans relationship to Earth. The astonishing solar events he interpreted in these eleven images awakened him to the dynamic evolution of the Sun and Earth in this planetary system at the far reaches of the Milky Way Galaxy. He intended his treatment of the solar flares and Coronal Mass Ejections of 2011 and 2012 to convey his hope that we, too, awaken to the critical need "to observe and protect our 'spaceship earth'."

*John Ripton – December 15, 2017*



# For more information

## The video

“Solar Flares and Salazar” was projected during November 2018 on the dome of the planetarium at Emera Astronomy Center, USMO. This unique video preceded the showing of “Solar Superstorms;” it incorporates art and science in a bold way which highlights connections of our natural world with artistic interpretation. For information about ‘Solar Flares and Salazar,’ or leasing it in your planetarium, or for use in science/art education, email [planetarium@maine.edu](mailto:planetarium@maine.edu).

## Links

### SOLAR FLARES:

<http://www.spaceweather.com/> (For seeing current solar status, possible aurora alerts, etc.)

[https://www.nasa.gov/mission\\_pages/stereo/main/index.html](https://www.nasa.gov/mission_pages/stereo/main/index.html) (Stereo Images of the Entire Sun)

<https://www.nasa.gov/content/goddard/parker-solar-probe> (Parker Solar Flare Probe)

<https://solarflare.njit.edu/> (Database of Solar Flares)

<https://hesperia.gsfc.nasa.gov/rhessi3/data/solar-data-browsing/index.html> (NASA The Sun Today)

[http://solar.physics.montana.edu/max\\_millennium/data\\_archives.shtml](http://solar.physics.montana.edu/max_millennium/data_archives.shtml) (Links to Solar Archives)

<https://iopscience.iop.org/article/10.3847/1538-4365/aa79a9> (An Inter-active Database of Solar Flares)

[https://en.wikipedia.org/wiki/Solar\\_storm](https://en.wikipedia.org/wiki/Solar_storm) (Solar Storm)

<https://www.swpc.noaa.gov/> (Home Page NOAA)

### GLOBAL WARMING:

<https://cdiac.ess-dive.lbl.gov/pns/gcclinks.html> (Carbon Dioxide Information Analysis Center)

<https://climate.nasa.gov/> (NASA Global Climate Change)

<https://www.ucsusa.org/our-work/global-warming/science-and-impacts/global-warming-impacts> (Union of Concerned Scientists)

<http://www.globalissues.org/issue/178/climate-change-and-global-warming> (32 articles)

<https://www.unenvironment.org/news-and-stories/story/tricky-business-reaching-global-consensus-environment> United Nations Environment (Article News-and-stories)

[https://en.wikipedia.org/wiki/Global\\_Environment\\_Facility](https://en.wikipedia.org/wiki/Global_Environment_Facility) WIKIPEDIA

<https://www.globalchange.gov/about> (Trump Administration Climate Report)

<https://thehill.com/policy/energy-environment/418796-trump-officials-attack-science-in-dire-climate-change-report> (Trump Officials attack their own Official Climate report)



# Images and credits

Sun from Earth – [images.google.com](https://images.google.com)

“Curtain of Lightning” - [jerbarber/thinkstock.com](https://jerbarber.com)

Trois-Freres Cave (France - 13,000 BCE) – [images.google.com](https://images.google.com)

Tablet of Shamash, Mesopotamian Sun-God (850 BCE) – [images.google.com](https://images.google.com)

Sunrise at Stonehenge (3100 BCE) – [images.google.com](https://images.google.com)

Egyptian Pharaoh Akhenaten (r. 1353-1336 BCE) and sun-god Aten – [images.google.com](https://images.google.com)

Artist Roland Salazar Rose – Photographer Jan Pieter van Voorst van Beest

“The Blue Marble” (Earth from space) – [en.wikipedia.org](https://en.wikipedia.org)

British Astronomer Richard Carrington (1826-1875) – [SolarStorms.org](https://SolarStorms.org)

British Astronomer Richard Hodgson (1804-1872) – [en.wikipedia.org](https://en.wikipedia.org)

Hemoglobin and Chlorophyll chart – [images.google.com](https://images.google.com)

Sun's rays through forest photograph – [images.google.com](https://images.google.com)

Maya serpent-sun god Quetzalcoatl (1000 CE)

Visible Light chart – “monkeysee” [youtube.com](https://youtube.com)

Solar Flare chart – [stephenpoon.com](https://stephenpoon.com)

Sakurjima Volcano eruption in 2013 – Photographer Tom Pfeiffer

Aurora Borealis (Iceland) – [images.google.com](https://images.google.com)

“We Are Here” Milky Way Galaxy – [images.google.com](https://images.google.com)

\*All “Solar Flares” images by artist Roland Salazar Rose – [www.salazargallery.com](https://www.salazargallery.com)



**In memory of my painting odyssey  
under the brilliant Sun of Mexico, and  
in appreciation to its people, who so  
graciously provided *me casa* in  
San Miguel de Allende.**

*Salazar*



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