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Earth Science

Current Earth Science Satellite Missions

This graphic shows NASA’s current fleet of Earth-observing satellite missions.

svs.gsfc.nasa.gov/goto?30065

NASA’s Earth-Observing Fleet: March 2017

This visualization shows the orbits of NASA’s Earth-observing satellite missions as of March 2017.

http://svs.gsfc.nasa.gov/4558

Remotely Sensing Our Planet

This diagram reveals the variety of remote sensing platforms used today—offering a multi-scale, multi-resolution view of our planet.

http://svs.gsfc.nasa.gov/30892

Five-Year Global Temperature Anomalies from 1880 to 2016

This visualization illustrates Earth’s long-term warming trend, showing temperature anomaly changes from 1880 to 2016 as a rolling five-year average.

http://svs.gsfc.nasa.gov/4546

Earth: A System of Systems

This visualization reveals that the Earth system, like the human body, comprises diverse components that interact in complex ways.

svs.gsfc.nasa.gov/30701

From Observations to Models

This visualization shows how models ingest different observation types. Scientists study how these observations are alike, how they differ, and how they interact with each other.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=30590
Blue Marble 2015

This composite image, captured by Suomi NPP's Visible Infrared Imaging Radiometer Suite, shows how Earth looked from space on October 14, 2015.

svs.gsfc.nasa.gov/30763

Black Marble 2016

This image of Earth at night in 2016 was created with data from the Suomi NPP satellite.

http://svs.gsfc.nasa.gov/30876

From a Million Miles Away, NASA Camera Shows Moon Crossing Face of Earth

This image series shows the far side of the Moon, illuminated by the Sun, as it crossed between DSCOVR and Earth.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=11971

Weekly Animation of Arctic Sea Ice Age: 1984-2016

This visualization shows the age of the sea ice between 1984 and 2016.

http://svs.gsfc.nasa.gov/4522

Annual Arctic Sea Ice Minimum 1979-2016 with Area Graph

A visualization of the annual minimum Arctic sea ice from 1979 to 2016 with a graph overlay.

http://svs.gsfc.nasa.gov/4573

OMG Maps Greenland Sea Floor Depth

This image shows a region off the coast of northwest Greenland mapped as part of the fall 2015 campaign of NASA's Oceans Melting Greenland mission.

svs.gsfc.nasa.gov/30767
<table>
<thead>
<tr>
<th>Greenland Ice Loss, 2002 to 2016</th>
<th>Antarctica Ice Loss, 2002 to 2016</th>
</tr>
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<tbody>
<tr>
<td><img src="image1" alt="Greenland Ice Loss" /></td>
<td><img src="image2" alt="Antarctica Ice Loss" /></td>
</tr>
<tr>
<td>These images, created with GRACE data, show changes in Greenland ice mass between 2002 and 2016.</td>
<td>These images, created with GRACE data, show changes in Antarctic ice mass between 2002 and 2016.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antarctic Ice Flow</th>
<th>Landsat “Sees in the Dark” the Evolution of Antarctica’s Delaware-Sized Iceberg</th>
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<tbody>
<tr>
<td><img src="image3" alt="Antarctic Ice Flow" /></td>
<td><img src="image4" alt="Landsat “Sees in the Dark” the Evolution of Antarctica’s Delaware-Sized Iceberg" /></td>
</tr>
<tr>
<td>This visualization shows the velocity of ice on Antarctica representing hundreds to thousands of years of motion.</td>
<td>The Thermal Infrared Sensor on Landsat 8 captured this snap of the 2,240-square-mile iceberg that calved from the Antarctic Peninsula’s Larsen C ice shelf on July 10-12, 2017.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Sea-Surface Temperatures in Ultra-High Resolution</th>
<th>The Motions of the Ocean</th>
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<tbody>
<tr>
<td><img src="image5" alt="Sea-Surface Temperatures in Ultra-High Resolution" /></td>
<td><img src="image6" alt="The Motions of the Ocean" /></td>
</tr>
<tr>
<td>This animation from January 1, 2010 to December 31, 2011, shows global sea surface temperatures at 1-kilometer (~0.6 mile) resolution.</td>
<td>Scientists use model simulations like this one from March 25, 2007 to March 3, 2008 to help resolve ocean eddies and other narrow-current systems that transport heat in Earth’s ocean.</td>
</tr>
</tbody>
</table>
22-Year Sea Level Rise

This visualization shows total sea level change between 1992 and 2014, based on data collected from the TOPEX/Poseidon, Jason-1, and Jason-2 satellites.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4345

Aquarius Sea Surface Salinity 2011-2014

This visualization celebrates over three years of successful Aquarius sea surface salinity observations.

svs.gsfc.nasa.gov/goto?4233

Global Sea Surface Temperature and Winds

This visualization shows the directional flow and magnitude of surface wind-vector data (calibrated to a 10 meter reference height) from June 1, 2011 to October 31, 2011.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4240

Ocean Surface Carbon Dioxide Flux with Wind Stress

This animation shows results from the ECCO2- Darwin ocean carbon cycle model, which was developed as part of the NASA Carbon Monitoring System (CMS) Flux Project.

svs.gsfc.nasa.gov/4398

Modeled Phytoplankton Communities in the Global Ocean

This visualization shows dominant phytoplankton types from 1994-1998 generated by the Darwin Project using a high-resolution ocean and ecosystem model.

svs.gsfc.nasa.gov/goto?30669

MODIS Ocean Bioproductivity

This visualization, derived using data from NASA’s MODIS instrument, shows a daily running weighted 31-day average of sea surface chlorophyll from January 2010 through May 2016.

svs.gsfc.nasa.gov/30786
2015 El Niño Disrupts Ocean Chlorophyll

These images compare monthly sea surface temperature anomalies (SSTA) and surface chlorophyll concentrations during El Niño (December 2015) and La Niña (December 1999).

svs.gsfc.nasa.gov/30747

Sea Surface Temperature and Anomalies During the 2015-16 El Niño

These maps, showing sea surface temperature and sea surface temperature anomalies, reveal the progression of the strong 2015-16 El Niño event from January 1, 2015 to January 2, 2016.

svs.gsfc.nasa.gov/goto?30748

El Niño Precipitation Anomaly

The top visualization shows rainfall amounts, while the bottom visualization shows rainfall anomalies during El Niño.

svs.gsfc.nasa.gov/30766

Painting the World with Water

This visualization shows the GPM constellation in action, revealing precipitation measurements underneath each satellite orbit.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4283

Near-Real-Time Global Precipitation

Shown here, the global IMERG precipitation dataset (generated using data from the GPM mission) provides rainfall rates for the entire world every 30 minutes.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4285

Global Rainfall-Triggered Landslides and Global Precipitation from IMERG

This visualization shows rainfall-triggered landslides and precipitation from August and September of 2014.

svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4304
SMAP Sees Soil Moisture and Sea Surface Salinity

This visualization compares weekly (8-day average) soil moisture and sea surface salinity data from NASA’s SMAP mission from April 18-25 through November 15-22, 2015.

svs.gsfc.nasa.gov/goto?30698

CYGNSS First Light

Three maps show a single pass of the CYGNSS constellation, while a larger image shows the full day’s data combined into one image.

http://svs.gsfc.nasa.gov/30884

A Menacing Line of Hurricanes

The Visible Infrared Imaging Radiometer Suite on the Suomi NPP satellite captured the data for a mosaic of Katia, Irma, and Jose as they appeared in the early hours of September 8, 2017.

http://svs.gsfc.nasa.gov/30898

GPM Examines Hurricane Irma

Shown here, the GPM Core Observatory satellite had an exceptional view of hurricane Irma’s eye when it flew above it on September 5, 2017.

http://svs.gsfc.nasa.gov/4584

Three Consecutive Swaths of Data, Three Different Hurricanes

Shown here, on September 7, 2017, hurricanes Katia (Category 1), Irma (Category 5), and Jose (Category 3) lined up across the Atlantic basin.

http://svs.gsfc.nasa.gov/30897

Harvey Floods Texas and Threatens Louisiana

The GPM Core Observatory captured these images of hurricane Harvey, August 27-30, 2017.

http://svs.gsfc.nasa.gov/4458
Monitoring Hurricane Matthew

This visualization shows various ways NASA observes hurricanes.

http://svs.gsfc.nasa.gov/4543

Hurricane Matthew Rainfall Totals

This visualization shows the amount of rainfall dropped by Hurricane Matthew over the life and track of the storm from September 28 – October 10, 2016, using IMERG data.

http://svs.gsfc.nasa.gov/30833

Hurricane Sandy Surface Winds

This animation shows hurricane Sandy surface wind speeds from the GEOS-5 beginning September 1, 2012.

svs.gsfc.nasa.gov/goto?30019

Carbon Dioxide from GMAO using Assimilated OCO-2 Data

This visualization provides a high-resolution, three-dimensional view of global atmospheric carbon dioxide concentrations from September 1, 2014 to August 31, 2015.

http://svs.gsfc.nasa.gov/4514

Assimilation of OCO-2 Carbon Dioxide into the GEOS Simulation

This visualization starts by showing carbon dioxide values being measured by the OCO-2 sensor. Then the total carbon dioxide from the GEOS simulation is shown under the OCO-2 data.

http://svs.gsfc.nasa.gov/4519

Atmospheric Carbon Dioxide with Mauna Loa Overlay

This visualization shows monthly average concentrations of mid-tropospheric carbon dioxide from 2000 to 2014 based on data collected by the Aqua/AIRS instrument.

svs.gsfc.nasa.gov/goto?4184
Simulated Atmospheric Carbon Concentrations

This visualization, created using data from the 7-km GEOS-5 Nature Run model, shows average column concentrations of atmospheric carbon dioxide and carbon monoxide in 2006.

svs.gsfc.nasa.gov/goto?30515

A Year of Global Carbon Dioxide Measurements

This animation shows column-averaged atmospheric carbon dioxide concentrations, from September 2014 to August 2015, observed by OCO-2.

svs.gsfc.nasa.gov/goto?4402

U.S. Air Quality Improvement

This visualization shows tropospheric column concentrations of nitrogen dioxide across the U.S. as detected by the Aura/OMI instrument, averaged yearly from 2005-2011.

svs.gsfc.nasa.gov/goto?11579

The Air We Breathe

This sequence of daily images from September 1, 2009 to August 31, 2010, shows the global perspective of tropospheric nitrogen dioxide as measured by the Aqua/OMI instrument.

svs.gsfc.nasa.gov/goto?30014

CATS Studies Volcanic Plumes, Wildfires, and Hurricanes

NASA's Cloud-Aerosol Transport System, or CATS, is a lidar remote-sensing instrument taking measurements of atmospheric aerosols and clouds from the International Space Station.

http://svs.gsfc.nasa.gov/4542

Around the World with Aerosols

This simulation shows how sea salt and dust swirl inside cyclones, sulfates stream from volcanoes, and carbon burst from fires from May 2005 to May 2007, produced by the GEOS-5 model.

svs.gsfc.nasa.gov/goto?30017
**Ozone Minimum Concentrations, 1979-2016**

Here, the globes show ozone data on the day that the minimum ozone concentration was reached over Antarctica, each year from 1979 and 2016.

[http://svs.gsfc.nasa.gov/30889](http://svs.gsfc.nasa.gov/30889)

**Ozonewatch 2016**

This Hyperwall series shows the recent status of the ozone layer over the Antarctic, with a focus on the ozone hole.


**World Avoided**

Shown here, a team of atmospheric chemists simulated what might have been if CFCs and similar ozone-depleting chemicals were not banned through the Montreal Protocol.


**The Antarctic Ozone Hole Will Recover**

Since the mid-1990s, global ozone levels have become relatively stable. Here, the four globes show monthly-averaged total ozone over Antarctica in October.


**Yearly Cycle of Earth’s Biosphere**

Satellite instruments reveal the yearly cycle of plant life on the land and in the water. Rather than showing a specific year, the animation shows an average yearly cycle.

[svs.gsfc.nasa.gov/30709](http://svs.gsfc.nasa.gov/30709)

**Using Satellite and Ground-Based Data to Develop Malaria Risk Maps**

Using NASA data (precipitation, soil moisture, air temperature, and humidity), scientists are better able to predict where malaria-spreading mosquitoes are breeding.

[http://svs.gsfc.nasa.gov/4581](http://svs.gsfc.nasa.gov/4581)
A Human-Driven Decline in Global Burned Area

During 1998-2015, global burned area declined by nearly 25%. The trend map shows strong declines in burned area across Africa, the Eurasian Steppe, and South America.

http://svs.gsc.nasa.gov/30888

Forests and Biodiversity

Global Fire Map

This visualization shows fires across the globe between July 2002 and July 2011, and includes vegetation and snow cover data to show how fires respond to seasonal change.

svs.gsc.nasa.gov/goto?3868

Amazon Deforestation

This image series, created with data from the MODIS instrument onboard NASA’s Terra satellite, shows deforestation in the state of Rondônia in western Brazil from 2000 to 2010.

svs.gsc.nasa.gov/cgi-bin/details.cgi?aid=30166

Sprawling Shanghai

Landsat satellites have collected images of Shanghai. These composite images show how cities in the Yangtze River Delta have expanded from 1984 to 2016.

http://svs.gsc.nasa.gov/30874

Cape Canaveral and Orlando Landsat Timeseries

These pairs of false-color images show Kennedy Space Center and the adjacent Cape Canaveral Air Force Station, as well as the Orlando region in 1972 and 2016.

http://svs.gsc.nasa.gov/30761

Urban Growth in Las Vegas

These false-color images show the rapid urbanization of Las Vegas between 1984 and 2014.

svs.gsc.nasa.gov/goto?30215
Through five decades of planetary exploration, NASA has developed the capacity to explore all of the objects in our solar system.

http://svs.gsfc.nasa.gov/30835

Our solar system is made up of a star—the Sun—eight planets, 146 moons, a bunch of comets, asteroids and space rocks, ice, and several dwarf planets, such as Pluto.

http://svs.gsfc.nasa.gov/30710

Cassini captured one of its last looks at Saturn and its main rings on October 28, 2016, at a distance of ~870,000 miles from Saturn.

https://svs.gsfc.nasa.gov/30902

These two views of Saturn's moon Titan exemplify how NASA's Cassini spacecraft has revealed the surface of this fascinating world.

https://svs.gsfc.nasa.gov/30903

This sequence of color-enhanced images shows how quickly the viewing geometry changes for NASA's Juno spacecraft as it swoops by Jupiter.

https://svs.gsfc.nasa.gov/30904

This series of enhanced-color images shows Jupiter up close and personal, as NASA's Juno spacecraft performed its eighth flyby of the gas giant planet.

https://svs.gsfc.nasa.gov/30905
**Jupiter: A New Point of View**

This striking Jovian vista was created by citizen scientists Gerald Eichstädt and Seán Doran using data from the JunoCam imager on NASA's Juno spacecraft.

https://svs.gsfc.nasa.gov/30906

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**Jupiter Storm of the High North**

A dynamic storm at the southern edge of Jupiter's northern polar region dominates this Jovian cloudscape, courtesy of NASA's Juno spacecraft.

https://svs.gsfc.nasa.gov/30907

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**Saturn's Hexagon as Summer Solstice Approaches**

These natural color views from NASA's Cassini spacecraft compare the appearance of Saturn’s north-polar region in June 2013 and April 2017.

http://svs.gsfc.nasa.gov/30883

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**Kepler Stares at Neptune**

In late 2014 and early 2015, NASA's Kepler telescope observed the eighth planet in our solar system, Neptune.

http://svs.gsfc.nasa.gov/4559

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**Moon Phase and Libration, 2017**

This animation shows the geocentric phase, libration, position angle of the axis, and apparent diameter of the Moon throughout the year 2017, at hourly intervals.

http://svs.gsfc.nasa.gov/4537

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**Gardening Rates on the Moon**

Gardening on the Moon refers to the mixing and disturbance of the top layers of lunar regolith when impacts form new craters. This visualization simulates the formation of a lunar crater.

http://svs.gsfc.nasa.gov/4505
Curiosity Selfies
This image comparison shows Curiosity on October 31, 2012 and October 5, 2015. Selfies like this allow mission engineers to track changes over time such as dust accumulation.

http://svs.gsfc.nasa.gov/30707

Rover’s Panorama of Entrance to “Murray Buttes” on Mars
This 360-degree panorama was acquired by the Mast Camera (Mastcam) on NASA’s Curiosity Mars rover as the rover neared features called “Murray Buttes” on lower Mount Sharp.

http://svs.gsfc.nasa.gov/30811

Rover’s Panorama Taken Amid “Murray Buttes” on Mars, 2016
This 360-degree panorama was acquired by the Mast Camera (Mastcam) on NASA’s Curiosity Mars rover while the rover was in an area called “Murray Buttes” on lower Mount Sharp.

http://svs.gsfc.nasa.gov/30819

Farewell to “Murray Buttes”
This view from the Mast Camera (Mastcam) on NASA’s Curiosity Mars rover shows an outcrop with finely layered rocks within the “Murray Buttes” region on lower Mount Sharp.

http://svs.gsfc.nasa.gov/30812

Curiosity’s First 16 Rock or Soil Sampling Sites on Mars
This map shows the site locations where NASA’s Curiosity Mars rover collected its first 16 rock or soil samples for analysis by laboratory instruments inside the vehicle.

http://svs.gsfc.nasa.gov/30818

Where on Mars Does Carbon Dioxide Frost Form Often?
This map shows the frequency of carbon dioxide frost’s presence at sunrise on Mars, as a percentage of days year-round.

http://svs.gsfc.nasa.gov/30813
The Color Wonderland of Mawrth Vallis

Mawrth Vallis has some of the most spectacular color variations seen anywhere on Mars. HiRISE captured this image of the colorful landscape.

http://svs.gsfc.nasa.gov/30814

OSIRIS-REx Orbits, Maneuvers, and Mapping

OSIRIS-REx launched on September 8, 2016, at 7:05 PM EDT. As planned, the spacecraft will reach a target asteroid in 2018 and return a sample to Earth in 2023.

http://svs.gsfc.nasa.gov/4482

Jupiter’s North Pole Unlike Anything Encountered in Our Solar System

NASA’s Juno spacecraft sent back this image of Jupiter’s north pole taken on August 27, 2016.

http://svs.gsfc.nasa.gov/30807

Pluto’s Heart: A Cosmic ‘Lava Lamp’

Like a cosmic lava lamp, a large section of Pluto’s icy surface is being constantly renewed by a process called convection, replacing older surface ices with fresher material.

http://svs.gsfc.nasa.gov/30806

Rosetta Images of Comet 67P

Rosetta is a spacecraft on a ten-year mission to catch the comet “67P/Churyumov-Gerasimenko” (C-G) and answer some of our questions about comets.

http://svs.gsfc.nasa.gov/30765

Rima Prinz and Vera

The visualization uses Lunar Reconnaissance Orbiter Camera (LROC) imagery at multiple resolutions to show Rima Prinz—the lava-flooded remains of a crater on the Moon.

http://svs.gsfc.nasa.gov/4444
The Mountainous Shoreline of Sputnik Planum

In this highest-resolution image from NASA’s New Horizons spacecraft, great blocks of Pluto’s water-ice crust appear jammed together in the informally named al-Idrisi mountains.

http://svs.gsfc.nasa.gov/30736

Pluto’s ‘Badlands’

This highest-resolution image from NASA’s New Horizons spacecraft shows how erosion and faulting has sculpted this portion of Pluto’s icy crust into rugged badlands.

http://svs.gsfc.nasa.gov/30737

Dawn Takes a Closer Look at Occator

This image taken by NASA’s Dawn spacecraft, shows Occator crater on Ceres, home to a collection of intriguing bright spots.

http://svs.gsfc.nasa.gov/30738

Apollo 17 Landing Site

These images help tell the story of Apollo 17’s exploration of the Taurus-Littrow site using data and imaging from Lunar Reconnaissance Orbiter and astronaut photographs.

http://svs.gsfc.nasa.gov/4302

Solar Wind Strips the Martian Atmosphere

Scientists have long suspected the solar wind of stripping the Martian upper atmosphere into space, turning Mars from a blue world to a red one.

http://svs.gsfc.nasa.gov/4370

Io in Motion

Io is the most volcanically active body in the Solar System. This new basemap of Jupiter’s moon Io was produced by combining the best images from both the Voyager 1 and Galileo Missions.

http://svs.gsfc.nasa.gov/30706
Hubble Maps Jupiter in 4k Ultra HD

These new maps and spinning globes of Jupiter were made from observations performed with NASA’s Hubble Space Telescope.

http://svs.gsfc.nasa.gov/12021

Seasonal Water on Mars

Dark, narrow streaks on Martian slopes such as these at Hale Crater are inferred to be formed by seasonal flow of water on contemporary Mars.

http://svs.gsfc.nasa.gov/30696

Fly Through Pluto’s Mountains

This simulated flyover of Pluto’s Norgay Montes (Norgay Mountains) and Sputnik Planum (Sputnik Plain) was created from New Horizons closest-approach images.

http://svs.gsfc.nasa.gov/30612

Charon in Enhanced Color

NASA’s New Horizons captured this high-resolution enhanced color view of Charon just before closest approach on July 14, 2015.

http://svs.gsfc.nasa.gov/30694

The Rich Color Variations of Pluto

An enhanced view of Pluto shows color variations across the surface, captured by NASA’s New Horizons spacecraft.

http://svs.gsfc.nasa.gov/30695

Moon Phases Loop

This looping animation shows a complete cycle of lunar phases.

http://svs.gsfc.nasa.gov/4310
NASA's Astrophysics Fleet

This graphic shows NASA's current fleet of astrophysics satellite missions.

https://svs.gsfc.nasa.gov/30834

TRAPPIST-1 Exoplanets Infrared Observations

This data plot shows infrared observations of a system of seven planets orbiting TRAPPIST-1—an ultracool dwarf star—observed by NASA's Spitzer Space Telescope.

https://svs.gsfc.nasa.gov/30868

TRAPPIST-1 Exoplanets and the Habitable Zone

The TRAPPIST-1 system contains a total of seven planets, all around the size of Earth. Three of them dwell in their star’s so-called “habitable zone.”

https://svs.gsfc.nasa.gov/30871

TRAPPIST-1 Exoplanets Illustration

This illustration shows the seven TRAPPIST-1 planets to scale as they might look as viewed from Earth using a fictional, incredibly powerful telescope.

https://svs.gsfc.nasa.gov/30867

NASA's Spitzer Telescope Brings 360-Degree View of Galaxy to Our Fingertips

A new, zoomable panorama from NASA's Spitzer Space Telescope shows us our galaxy's plane all the way around us in infrared light.

https://svs.gsfc.nasa.gov/30560

Fermi Observations of Dwarf Galaxies Provide New Insights on Dark Matter

Scientists working with data from NASA's Fermi Gamma-ray Space Telescope look for signals of hypothetical dark matter particles.

https://svs.gsfc.nasa.gov/10943
For the 26th birthday of NASA’s Hubble Space Telescope, astronomers are highlighting a Hubble image of an enormous bubble being blown into space by a super-hot, massive star.

https://svs.gsfc.nasa.gov/30773

Engineers used light waves to align the James Webb Space Telescope’s mirror segments to each other, so they act like a single, monolithic mirror.

https://svs.gsfc.nasa.gov/12721

Animation of the Webb Telescope deploying as it travels toward its orbit location.

https://svs.gsfc.nasa.gov/10660

Animation comparing the relative sizes of James Webb’s primary mirror to Hubble’s primary mirror.

https://svs.gsfc.nasa.gov/10776

A time-lapse video showing the installation of the 18 mirror segments of James Webb Space Telescope’s primary mirror.

https://svs.gsfc.nasa.gov/12145

The James Webb Space Telescope (JWST) will provide data to test theories behind events such as the galaxy mergers seen in this simulation.

https://svs.gsfc.nasa.gov/10687
Across the Universe: The Hubble Ultra Deep Field

The Hubble Ultra Deep Field (HUDF) peers deeper into the universe than any previous visible-light image.

https://svs.gsfc.nasa.gov/30687

Interacting Galaxies Arp 273 from Hubble

The galaxies of Arp 273 have recently interacted via gravity to make a shape resembling a cosmic rose.

https://svs.gsfc.nasa.gov/30857

The Sombrero Galaxy from Hubble

As seen from Earth, the Sombrero galaxy (Messier 104) is tilted nearly edge-on.

https://svs.gsfc.nasa.gov/30855

The Helix Nebula from Hubble

This Hubble Space Telescope image showcases the details of the Helix Nebula, one of the nearest planetary nebulae to Earth.

https://svs.gsfc.nasa.gov/30792

The Whirlpool Galaxy from Hubble

This NASA Hubble Space Telescope image provides a strikingly detailed view of the Whirlpool Galaxy, also known as Messier 51 and as NGC 5194.

https://svs.gsfc.nasa.gov/30852

Galaxy Collisions: Simulation versus Observations

This visualization of a galaxy collision supercomputer simulation compares different stages of the collision to different interacting galaxy pairs observed by Hubble.

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<th><strong>A Flight into the Bubble Nebula</strong></th>
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<td><img src="image1" alt="Bubble Nebula" /></td>
</tr>
<tr>
<td>This visualization allows you to experience a three-dimensional flight inside the Bubble Nebula.</td>
</tr>
<tr>
<td><a href="https://svs.gsfc.nasa.gov/30782">https://svs.gsfc.nasa.gov/30782</a></td>
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<tr>
<th><strong>The Horsehead Nebula in Infrared Light</strong></th>
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<tr>
<td><img src="image2" alt="Horsehead Nebula" /></td>
</tr>
<tr>
<td>This video presents a scientific visualization of the Horsehead Nebula as seen in infrared light.</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30679">https://svs.gsfc.nasa.gov/30679</a></td>
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<th><strong>Blast Wave from Supernova 1987A</strong></th>
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<tbody>
<tr>
<td><img src="image3" alt="Supernova 1987A" /></td>
</tr>
<tr>
<td>This scientific visualization shows the development of Supernova 1987A, from the initial explosion observed three decades ago to the luminous ring of material we see today.</td>
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<td><a href="https://svs.gsfc.nasa.gov/30863">https://svs.gsfc.nasa.gov/30863</a></td>
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<tr>
<th><strong>Spiral Galaxy Messier 106 from Hubble</strong></th>
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<tr>
<td><img src="image4" alt="M106" /></td>
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<tr>
<td>This portrait of M106 was created from a combination of Hubble images and ground-based observations.</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30864">https://svs.gsfc.nasa.gov/30864</a></td>
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<th><strong>Star Cluster Westerlund 2 in Nebula Gum 29 from Hubble</strong></th>
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<tbody>
<tr>
<td><img src="image5" alt="Westerlund 2" /></td>
</tr>
<tr>
<td>This giant star cluster is only about 2 million years old and contains some of our galaxy’s hottest, brightest, and most massive stars.</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30858">https://svs.gsfc.nasa.gov/30858</a></td>
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<thead>
<tr>
<th><strong>Starburst Galaxy Messier 82 from Hubble</strong></th>
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<tbody>
<tr>
<td><img src="image6" alt="M82" /></td>
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<tr>
<td>The NASA Hubble Space Telescope captured this richly detailed view of the magnificent starburst galaxy, Messier 82.</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30856">https://svs.gsfc.nasa.gov/30856</a></td>
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<tr>
<td><strong>Central Region of Spiral Galaxy M83 from Hubble</strong></td>
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<tr>
<td><img src="https://svs.gsfc.nasa.gov/30853" alt="Image" /></td>
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<tr>
<td>The full beauty of nearby spiral galaxy Messier 83 is unveiled in all of its glory in this NASA Hubble Space Telescope mosaic image.</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30853">https://svs.gsfc.nasa.gov/30853</a></td>
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<tr>
<th><strong>Spiral Galaxy Messier 101 in High-Definition from Hubble</strong></th>
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<tr>
<td><img src="https://svs.gsfc.nasa.gov/30793" alt="Image" /></td>
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<tr>
<td>This Hubble Space Telescope image of the face-on spiral galaxy Messier 101 is one of the largest and most detailed views of a spiral galaxy that has ever been released from Hubble.</td>
</tr>
<tr>
<td><a href="https://svs.gsfc.nasa.gov/30793">https://svs.gsfc.nasa.gov/30793</a></td>
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<tr>
<th><strong>Mystic Mountain: Pillars in the Carina Nebula from Hubble</strong></th>
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<tr>
<td><img src="https://svs.gsfc.nasa.gov/30860" alt="Image" /></td>
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<tr>
<td>A collection of pillars in the Carina Nebula creates a gaseous landscape nicknamed “Mystic Mountain.”</td>
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<tr>
<td><a href="https://svs.gsfc.nasa.gov/30860">https://svs.gsfc.nasa.gov/30860</a></td>
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<tr>
<th><strong>Hubble’s panoramic View of the Tarantula Nebula</strong></th>
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<tr>
<td><img src="https://svs.gsfc.nasa.gov/30796" alt="Image" /></td>
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<tr>
<td>The Tarantula nebula is close enough to Earth that Hubble can resolve individual stars, giving astronomers important information about the stars’ birth and evolution.</td>
</tr>
<tr>
<td><a href="https://svs.gsfc.nasa.gov/30796">https://svs.gsfc.nasa.gov/30796</a></td>
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<tr>
<th><strong>Hubble’s Sweeping View of the Coma Cluster of Galaxies</strong></th>
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<tr>
<td><img src="https://svs.gsfc.nasa.gov/30865" alt="Image" /></td>
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<tr>
<td>NASA’s Hubble Space Telescope captures the magnificent starry population of the Coma Cluster of galaxies, one of the densest known galaxy collections in the universe.</td>
</tr>
<tr>
<td><a href="https://svs.gsfc.nasa.gov/30865">https://svs.gsfc.nasa.gov/30865</a></td>
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<tr>
<th><strong>Andromeda Galaxy PHAT Mosaic</strong></th>
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<td><img src="https://svs.gsfc.nasa.gov/30561" alt="Image" /></td>
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<tr>
<td>This sweeping view of the Andromeda Galaxy covers a 61,000-light-year-long stretch over more than 2 billion pixels, the largest Hubble image ever assembled.</td>
</tr>
<tr>
<td><a href="https://svs.gsfc.nasa.gov/30561">https://svs.gsfc.nasa.gov/30561</a></td>
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Hubble Sees Rare Stellar Light Echo

This movie, created using eight images from the Hubble Space Telescope, reveals the dramatic changes observed in a red supergiant star named V838 Monocerotis between 2002 and 2006.

https://svs.gsfc.nasa.gov/30513

Bright Pillars in the Carina Nebula

The Carina Nebula is a vast, star-forming region in our Milky Way Galaxy.

https://svs.gsfc.nasa.gov/30683

Star-Forming Region Sharpless 2-106

The star-forming region Sharpless 2-106 has a bi-polar shape that was likened to a “celestial snow angel.”

https://svs.gsfc.nasa.gov/30682

Pillars in the Eagle Nebula from Hubble

NASA’s Hubble Space Telescope has revisited the famous Pillars of Creation, revealing a sharper and wider view of the structures in this visible-light image.

https://svs.gsfc.nasa.gov/30774

Visualization of the Veil Supernova Remnant

This 3-D visualization flies across a small portion of the Veil Nebula as photographed by the Hubble Space Telescope.

https://svs.gsfc.nasa.gov/30667

Flight to Star Cluster Westerlund 2

This visualization provides a three-dimensional perspective on Hubble’s 25th anniversary image of the nebula Gum 29 with the star cluster Westerlund 2 at its core.

https://svs.gsfc.nasa.gov/30666
Hand of God

Nicknamed the “Hand of God,” this object is called a pulsar wind nebula.

https://svs.gsfc.nasa.gov/30505

The Milky Way Galaxy’s Circumnuclear Ring

These images capture the infrared emission from stars, ionized gas, and warm dust within the central 10 light-years of the Milky Way.

https://svs.gsfc.nasa.gov/30497

WFIRST Spacecraft Beauty Pass Animations

Animation video and stills based off the Mission Concept Review design of the WFIRST spacecraft.

https://svs.gsfc.nasa.gov/20232

WFIRST versus Hubble Image Size Comparisons

The Wide Field Instrument on WFIRST will have a field of view that is 100 times greater than the Hubble infrared instrument, capturing more of the sky with less observing time.

https://svs.gsfc.nasa.gov/12308

Gravitational Microlensing Animation

This animation illustrates gravitational lensing, which will be used by the WFIRST microlensing survey.

https://svs.gsfc.nasa.gov/20242

WFIRST Coronagraph Animation

Animation illustrating how a planet can disappear in a star’s bright light, and how a coronagraph can reveal it.

https://svs.gsfc.nasa.gov/20243
Gigantic Wave Discovered in Perseus Galaxy Cluster

A wave spanning 200,000 light-years is rolling through the Perseus galaxy cluster, according to observations from NASA’s Chandra X-ray Observatory, coupled with a computer simulation.

https://svs.gsfc.nasa.gov/12587

Chandra X-Ray Observatory Celebrates 15th Anniversary

Four newly processed images of supernova remnants dramatically illustrate Chandra’s unique ability to explore high-energy processes in the cosmos.

https://svs.gsfc.nasa.gov/30575

X-Ray Telescopes Find Black Hole May Be a Neutrino Factory

The supermassive black hole at the center of the Milky Way, seen in this image from NASA’s Chandra X-ray Observatory, may be producing neutrinos.

https://svs.gsfc.nasa.gov/30576

Dwarf Galaxy Caught Ramming into a Large Spiral

Observations from NASA’s Chandra X-ray telescope reveal a massive cloud of multimillion-degree gas in a galaxy about 60 million light-years from Earth.

https://svs.gsfc.nasa.gov/30472

TESS Beauty Pass Animation

Artist’s concept of the Transiting Exoplanet Survey Satellite, an Explorer-class planet finder.

https://svs.gsfc.nasa.gov/20260

Swift Charts a Star’s ‘Death Spiral’ into Black Hole

Scientists used data from NASA’s Swift satellite to map how and where different wavelengths were produced when a star wandered too close to the central black hole of its galaxy.

https://svs.gsfc.nasa.gov/12499
NASA's Fermi Mission Sharpens its High-Energy View

Major improvements to methods used to process observations from NASA's Fermi Gamma-ray Space Telescope have allowed astronomers to produce detailed maps of the sky.

https://svs.gsfc.nasa.gov/12019

NASA's Fermi Preps to Narrow Down Gravitational Wave Sources

Fermi's GBM saw a fading X-ray flash at nearly the same moment LIGO detected gravitational waves from a black hole merger in 2015.

https://svs.gsfc.nasa.gov/12216

Active Galaxy Hercules A: Visible & Radio Comparison

The active galaxy Hercules A was given that name because it is the brightest radio source in the constellation of Hercules.

https://svs.gsfc.nasa.gov/30680

A Black Hole Visits Baltimore

This scientific visualization demonstrates the visual distortion known as gravitational lensing.

https://svs.gsfc.nasa.gov/30688

Supercomputer Simulations of Eta Carinae

These movies show supercomputer simulations of the interactive stellar winds of Eta Carinae, a binary system that includes the most luminous and massive star within 10,000 light-years.

https://svs.gsfc.nasa.gov/11722

AGN Feedback in Markarian 573

This animation illustrates the active galactic nuclei feedback process occurring in the galaxy Markarian 573.

https://svs.gsfc.nasa.gov/12657
Heliophysics

NASA's Heliophysics Fleet

Heliophysics improves our understanding of fundamental physical processes throughout the solar system and enables us to understand how the Sun impacts our technological society.

http://svs.gsfc.nasa.gov/30822

2017 Eclipse Image Collection

This image collection provides various views of the 2017 total solar eclipse across America.

http://svs.gsfc.nasa.gov/30893

What Determines When We Have an Eclipse?

Why are eclipses rare? The Moon’s orbit is tilted. Sometimes the Moon’s shadow is too high above the Earth. Sometimes it is too low. Other times, it is just right.

http://svs.gsfc.nasa.gov/12534

Flying Around the Eclipse Shadow

A view of the Moon’s shadow during the August 21, 2017 eclipse from both the night and day sides of the Earth.

http://svs.gsfc.nasa.gov/4579

2017 Path of Totality

This animation closely follows the Moon’s umbra shadow as it passes over the United States during the August 21, 2017 total solar eclipse.

http://svs.gsfc.nasa.gov/4515

Umbra Shapes

This animation shows the shape of the Moon’s umbral shadow during the August 21, 2017 total solar eclipse, calculated at three different levels of detail.

http://svs.gsfc.nasa.gov/4517
Insolation During the 2017 Eclipse

This animation shows how the Moon’s shadow dramatically affects insolation across the continental United States during the total solar eclipse of August 2017.

http://svs.gsfc.nasa.gov/4466

Exploring the Ionosphere: The View from GOLD

The GOLD mission will conduct measurements of ionospheric composition to better understand the connection between space weather and its terrestrial impacts.

http://svs.gsfc.nasa.gov/4503

Dynamic Earth: A New Beginning

This visualization illustrates the connections between the Earth and the Sun, as well as the power of computer simulation in understanding those connections.

http://svs.gsfc.nasa.gov/4469

Mercury Transit, May 2016

On May 9, 2016, Mercury passed directly between the Sun and Earth. NASA’s Solar Dynamics Observatory studies the Sun 24/7 and captured the entire event.

http://svs.gsfc.nasa.gov/30780

Zoom in to MMS and Magnetopause Connection

For the first time ever, on October 16, 2015, MMS traveled straight through a magnetic reconnection event.

http://svs.gsfc.nasa.gov/4453

MMS Front Side Reconnection

This animation shows the MMS spacecraft transiting through a reconnection event on the front side of Earth.

http://svs.gsfc.nasa.gov/20224
Beyond Earth: Earth’s Geomagnetic Activity

This animation shows the busyness of near-Earth space, where the magnetic environment around Earth can trap electrons and charged particles.

http://svs.gsfc.nasa.gov/20237

Summer Sun from SDO: Eruption and Coronal Loops on the Solar Limb

A prominent eruption off the lower right limb of the Sun, June 18, 2015, followed by some complex coronal loop evolution.

http://svs.gsfc.nasa.gov/4323

The Dynamic Solar Magnetic Field

A visualization of the slow changes of the solar magnetic field over the course of four years.

http://svs.gsfc.nasa.gov/4391

Space Weather to the Edge of the Solar System

To predict how the Sun’s radiation will impact spacecraft, scientists rely on computer models. Scientists use the Enlil model to simulate the space environment further than ever before.

http://svs.gsfc.nasa.gov/4392

NuSTAR Stares at the Sun

Flaring, active regions of our Sun are highlighted in this image from April 29, 2015, combining observations from several telescopes.

http://svs.gsfc.nasa.gov/30726

NASA Observes Auroras Across Canada

These aurora images were taken from the ground looking up with a network of all-sky cameras spread across Canada, studying auroras.

http://svs.gsfc.nasa.gov/12040
NASA’s SDO Observes a Cinco de Mayo Solar Flare

The Sun emitted a significant solar flare on May 5, 2015. NASA’s Solar Dynamics Observatory, which watches the Sun constantly, captured the event.

http://svs.gsfc.nasa.gov/11868

Solar Exposures

As kids, we’re taught to not look directly into the Sun. This SDO time-lapse video provides an opportunity to catch up on what we’ve been missing.

http://svs.gsfc.nasa.gov/11755

SDO: Year 5

Highlights from the Solar Dynamics Observatory’s five years of watching the Sun.

http://svs.gsfc.nasa.gov/11742

Twelve Days of AR12192 from SDO and GOES

The large active region AR12192 is carried across the solar disk by the Sun’s rotation. Shown in this visualization, the region erupted with a large number of flares.

http://svs.gsfc.nasa.gov/4232

Radiation Belts and Plasmapause

This visualization depicts Earth’s radiation belts with confined charged particles and plasmapause boundary.

http://svs.gsfc.nasa.gov/4241

Comparative Magnetospheres: A Noteworthy Coronal Mass Ejection

In mid-December of 2006, the Sun erupted with a bright flare and coronal mass ejection that launched particles Earthward. This visualization was used to simulate the impact of the event.

http://svs.gsfc.nasa.gov/4188
NASA’s Many Views of a Massive CME

Three NASA observatories work together to help scientists track the journey of a massive coronal mass ejection, or CME, in July 2012.

http://svs.gsfc.nasa.gov/11558

The Big CME that Missed Earth

Results from the Enlil model run of the July 23, 2012 CME and events leading up to it.

http://svs.gsfc.nasa.gov/4167

The Carrington-Class CME of 2012

STEREO-A, at a position along Earth’s orbit where it has an unobstructed view of the far side of the Sun, observed a powerful coronal mass ejection on July 23, 2012.

http://svs.gsfc.nasa.gov/4177

MMS Spacecraft

MMS beauty pass showing four observatories on the dayside.

http://svs.gsfc.nasa.gov/20210

SDO: Argo View

Argos was the 100-eyed giant in Greek mythology. While SDO has significantly less than 100 eyes, SDO sees the Sun through many filters.

http://svs.gsfc.nasa.gov/4117

Heliophysics and Space Weather

This illustration depicts Sun-Earth interactions that influence space weather.

http://svs.gsfc.nasa.gov/30481
Van Allen Probes Discover New Radiation Belt

This Van Allen Probes image shows three radiation belts around Earth in 2012.
http://svs.gsfc.nasa.gov/30470

Sharpest-Ever Image of the Sun’s Corona

High-resolution images of the Sun's corona from the Hi-C telescope, July 2012.
http://svs.gsfc.nasa.gov/30466

Full Map of the Sun’s Surface

This movie shows the evolution of the Sun's entire surface as seen in extreme ultraviolet light for the time period January 1 - September 27, 2012.
http://svs.gsfc.nasa.gov/30362

World of Change: Solar Activity

This series of images shows ultraviolet light and sunspots each spring from 1999-2010.
http://svs.gsfc.nasa.gov/30315

Heliophysics Fleet Captures Eruption and CME

Prominence eruption and CME captured by SDO and SOHO on May 1, 2013.
http://svs.gsfc.nasa.gov/30072

SDO Observes Large Coronal Hole

This visualization shows a coronal hole over the course of 24 hours, sampled about once per minute.
http://svs.gsfc.nasa.gov/4101