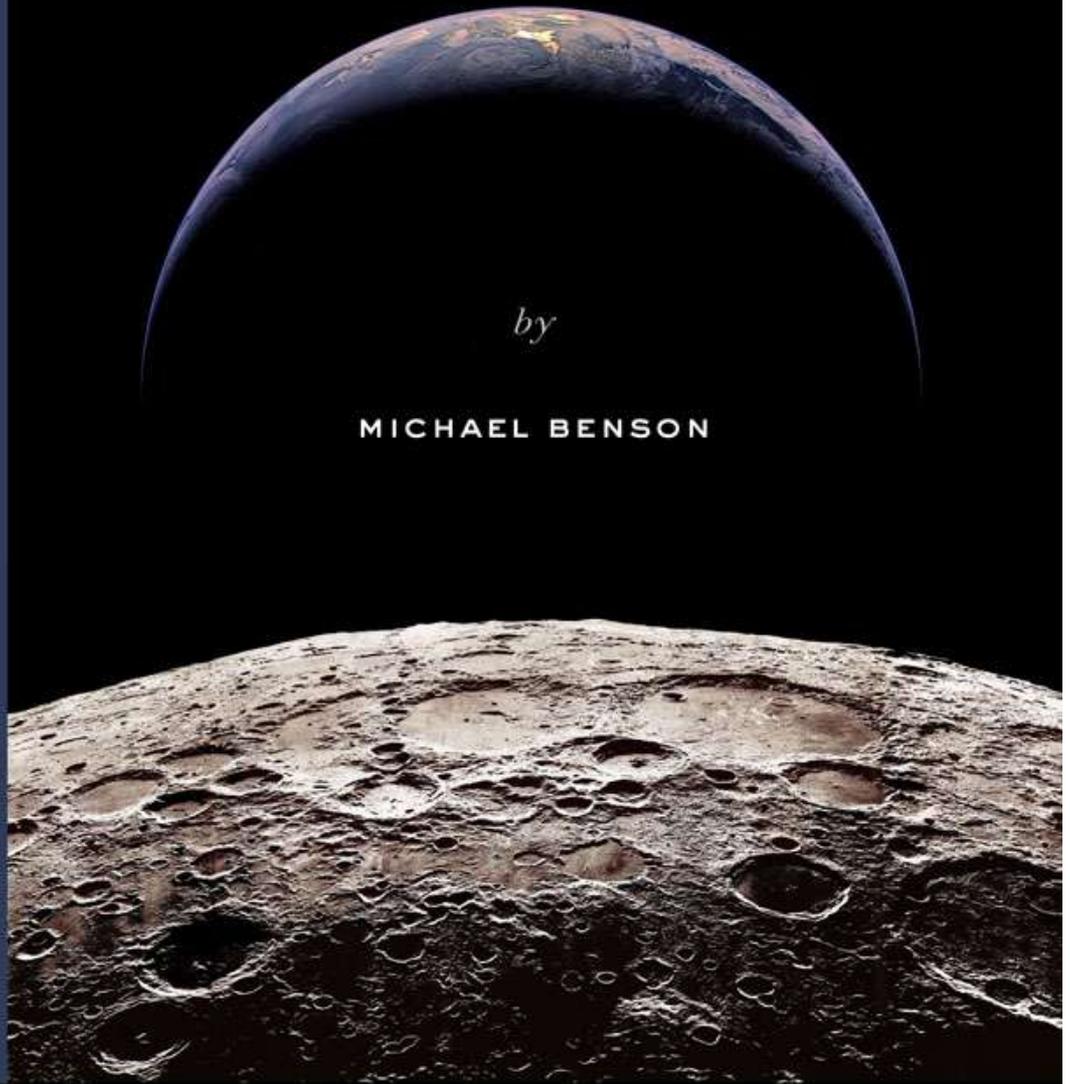


Washington Dulles International Airport
Gateway Gallery

NASA presents

B E Y O N D

VISIONS of our SOLAR SYSTEM



by

MICHAEL BENSON

THIS SPECIAL DISPLAY OF PHOTOGRAPHS FROM THE EXHIBITION **BEYOND: VISIONS OF OUR SOLAR SYSTEM** IS PRESENTED BY NASA IN COOPERATION WITH THE METROPOLITAN WASHINGTON AIRPORTS AUTHORITY'S ART PROGRAM.

THE COMPLETE **BEYOND** EXHIBITION IS ON VIEW AT THE NATIONAL AIR AND SPACE MUSEUM, 6TH AND INDEPENDENCE AVENUE SW, GALLERY 211 FROM MAY 26, 2010 TO MAY 2, 2011. FOR MORE ON THE **BEYOND** EXHIBITION SEE: WWW.BEYONDEXHIBITION.NET

THE METROPOLITAN WASHINGTON AIRPORTS AUTHORITY'S ART PROGRAM UTILIZES THE ARTS TO ENHANCE TRAVEL AT DULLES INTERNATIONAL AND REAGAN NATIONAL AIRPORTS.

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY
WWW.MWAA.COM



Source images: Rosetta, November 13, 2009, Lunar Orbiter 5, August 11, 1967

Credits: Poster design © 2010 Michael Benson. Picture credits: Earth: ESA; MPS for OSIRIS Team MPS/ UPD/ LAM/ IAA /RSSD/ INTA/ UPM/DASP/IDA; Michael Benson. Moon: NASA RPIF

BEYOND: VISIONS OF OUR SOLAR SYSTEM

Through use of contemporary image processing software, raw data from planetary science databases can be utilized to create seamless images with extraordinarily high detail, contrast and print quality. Most of these pictures were retrieved from deep archives containing tens or even hundreds of thousands of images sent to Earth by five decades of space probe missions; many have never been seen by the public before. Others were taken in already processed form from NASA or ESA (the European Space Agency) or JAXA (the Japanese Space Agency) sites, and then further optimized and refined for fine arts print production. *Beyond* is continuously updated, with new images added all the time. For more on the Beyond project see www.beyondexhibition.net.

The largest *Beyond* exhibition can currently be seen at the Smithsonian Institution's National Air and Space Museum, 6th and Independence Avenue SW, Gallery 211, Washington DC. It is open until May 2, 2011.

- Michael Benson, 2010



Gateway Gallery - Upper Level:



The Orion Nebula, a Solar System Crucible

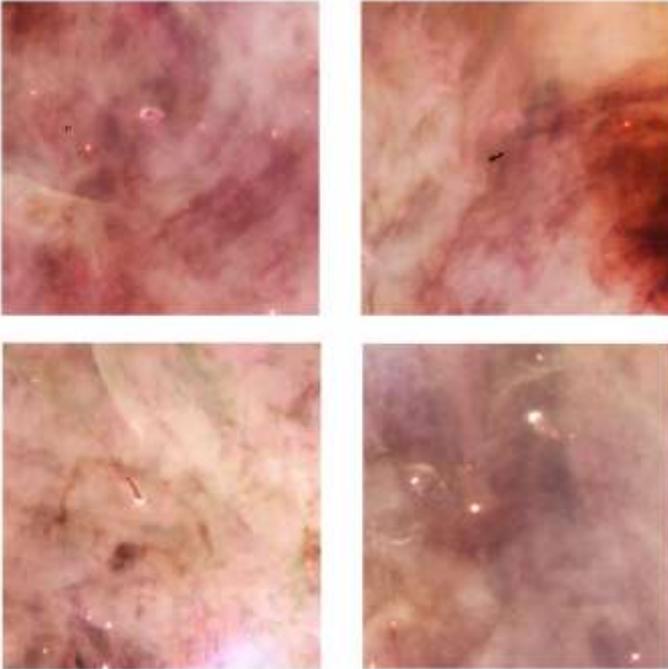
As of July 2010, astronomers had discovered 473 extra solar planets – worlds orbiting other stars – and that number is swiftly growing. The Orion Nebula, which is about 1,270 light years away, is a seething cauldron of star-formation activity. NASA’s Earth-orbiting Hubble Space Telescope, which is 20 years old this year, has revealed numerous emerging solar systems in Orion.

Hubble Space Telescope

Credit: NASA, ESA; Massimo Roberto, STSI; Michael Benson

###

Gateway Gallery - Upper Level:



New Solar Systems in Orion

Four closer views of proplyds, or emerging solar systems, in the Orion Nebula. On the top left, a ring of material surrounds an emerging star. To its right, a larger blimp-like proplyd hovers. On the top right, a dark disc is seen edge-on, with the fires of its emerging star visible above and below its dense belt of matter. This surrounding disc of gas, dust and ice grains will likely coalesce into planets. Our own solar system, which is visible elsewhere in this gallery, likely went through stages similar to this before planets finally emerged, about 4.5 billion years ago.

Hubble Space Telescope

Credit: NASA, ESA; Massimo Roberto, STSI; Michael Benson

###

Gateway Gallery - Upper Level:



A Planetary Nebula Spreads its “Wings”

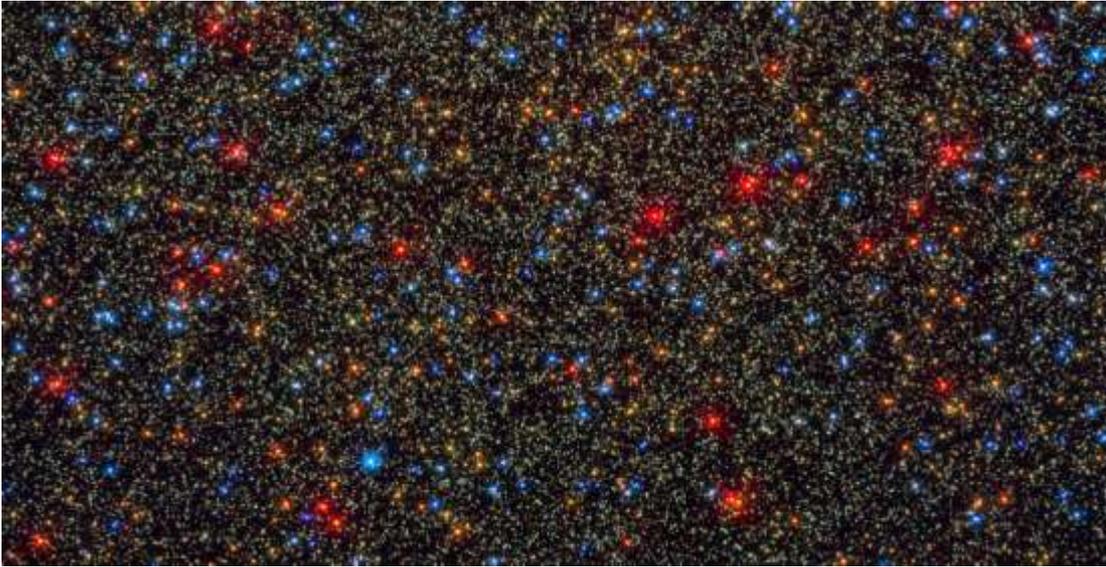
At the opposite end of the stellar life cycle from what can be seen in Orion is the sometimes explosive death of stars, many of which may have their own planetary systems. The misnamed “planetary” nebulae, however, are so-called only because many of them have a round appearance, resembling a planet, when viewed through low-power telescopes. The butterfly-like planetary nebula NGC 6302 lies within our Milky Way Galaxy, roughly 3,800 light years away. Who can say if a planetary system was scorched, or even destroyed, when NGC 6302’s central star exploded over a period of some 2,200 years? Our own solar system may resemble this scene at the end of its life, some 5 billion years from now.

Hubble Space Telescope

Credit: NASA, ESA and the Hubble SM4 ERO Team; Michael Benson

###

Gateway Gallery - Upper Level:



A Glittery Swarm of Stars

The image reveals a small region inside the massive globular star cluster Omega Centauri, which boasts nearly 10 million stars. The majority of the stars in the image are yellow-white, like our Sun. These are adult stars that are shining by hydrogen fusion. Towards the ends of their normal lives, the stars become cooler and larger. These late-life stars are the orange dots in the image. Evidence suggests that hundreds, maybe thousands of solar systems may be contained within this image.

Globular clusters, ancient swarms of stars united by gravity, are almost as old as our Milky Way galaxy. The stars in Omega Centauri are between 10 billion and 12 billion years old. The cluster lies about 16 000 light-years from Earth.

Hubble Space Telescope

Credit: NASA, ESA and the Hubble SM4 ERO Team; Michael Benson

###

Gateway Gallery - Lower Level:



North, Central, and South America

This image was made by a space probe on its way to the planet Mercury.

MESSENGER, August 2, 2005

Credit: NASA; Johns Hopkins University Applied Physics Laboratory; Carnegie Institution of Washington; Michael Benson

###

Gateway Gallery - Lower Level:



The Mediterranean Sea

Sahara dust blows across the Mediterranean toward Italy. Below it, smoke from forest fires in the Balkans extends in the opposite direction, across the southern Adriatic Sea.

OrbView 2, August 22, 2000

Credit: SeaWiFS Project; NASA; Orbimage; Michael Benson

###

Gateway Gallery - Lower Level:



Arctic Ice

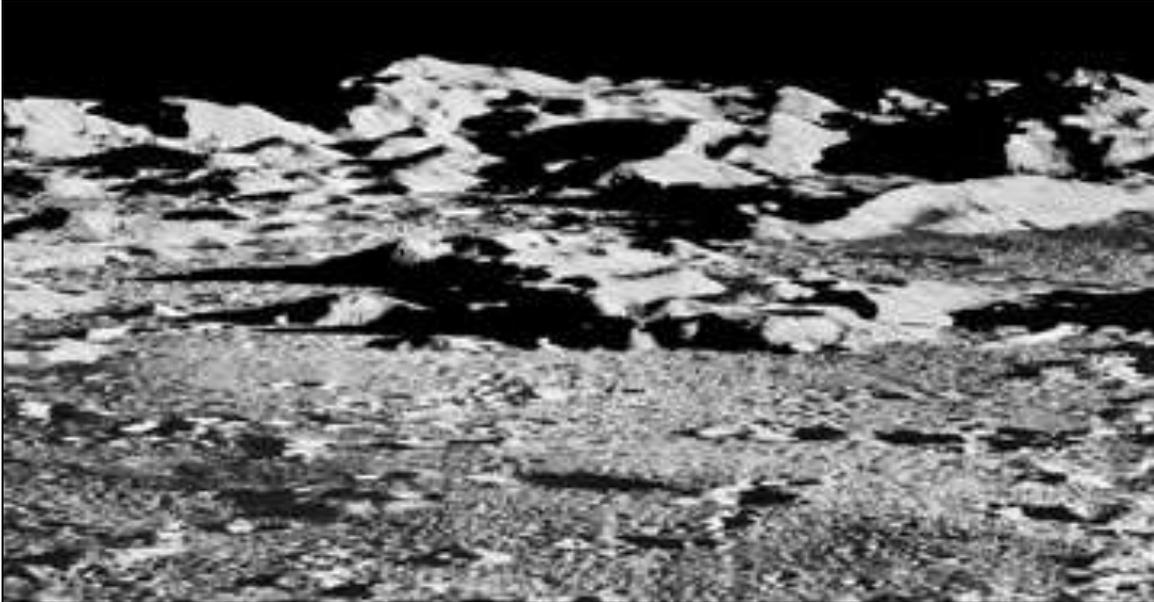
The Arctic pack ice breaks into individual floes in this summer view of Northern Canada and Northern Greenland. The Arctic Sea is at the bottom. Scientists predict that, due to global warming, the Arctic may have an entirely ice-free summer in the future.

OrbView-2, July 9, 1999

Credit: SeaWiFS Project; NASA; Orbimage; Michael Benson

###

Gateway Gallery - Lower Level:



Lunar Mountains Around the Sea of Tranquility

Mare Tranquillitatis is where humans first landed on the Moon on July 20, 1969.

Lunar Orbiter 3, February 20, 1967

Credit: NASA RPIF; Michael Benson

###

Gateway Gallery - Lower Level:



Cloud-Covered Venus

This ultraviolet light image reveals details in the swirling atmosphere of Venus. In visible light, the dense carbon dioxide atmosphere makes Venus look like a bright, featureless ball.

Ultraviolet image

Mariner 10, February 5, 1974

Credit: NASA; Calvin Hamilton; Michael Benson

###

Gateway Gallery - Lower Level:



Lava Flows on Venus

Lava flows form streaks across the Gunda Planitia (plain). At the left are the Uretsete Mons and Spandarmat Mons volcanoes.

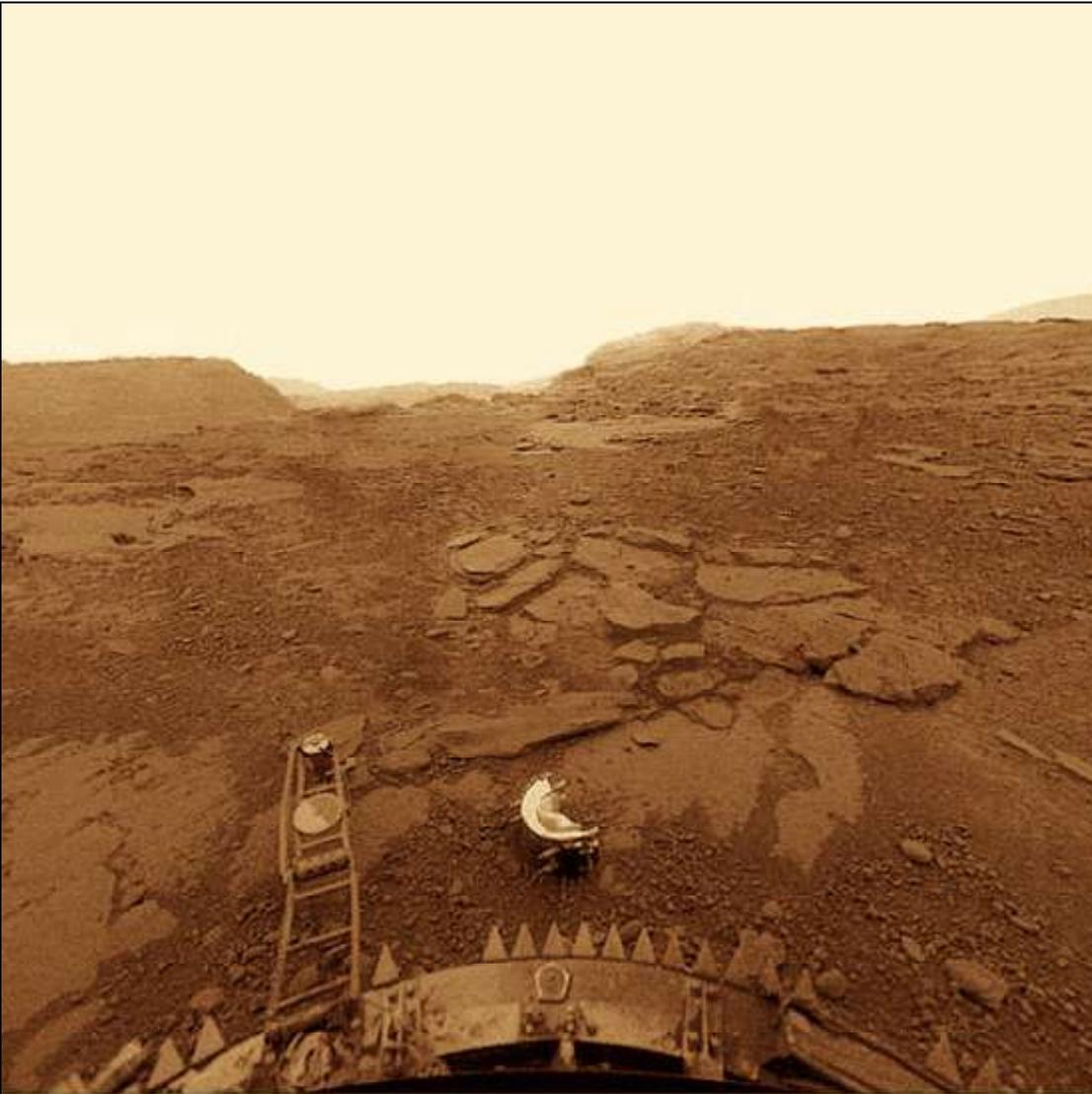
Radar image

Magellan, Sept. 15, 1990 – Sept. 14, 1992

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



The Surface of Venus

The surface of Venus, a furnace of 900° Fahrenheit, as photographed by one of the 10 Soviet spacecraft to land successfully there. The spacecraft itself is visible at the bottom of this view reprocessed by space artist Don P. Mitchell. It is thought that Venus's surface rocks are so hot that they glow a dull red at night.

Venera 13, March 1, 1982

Credit: Soviet Space Program, Don P. Mitchell

###

Gateway Gallery - Lower Level:



Tusholi Corona on Venus

The oval-shaped feature in the upper left, Tusholi Corona overlaps La Fayette impact crater in the Tethus Regio (region).

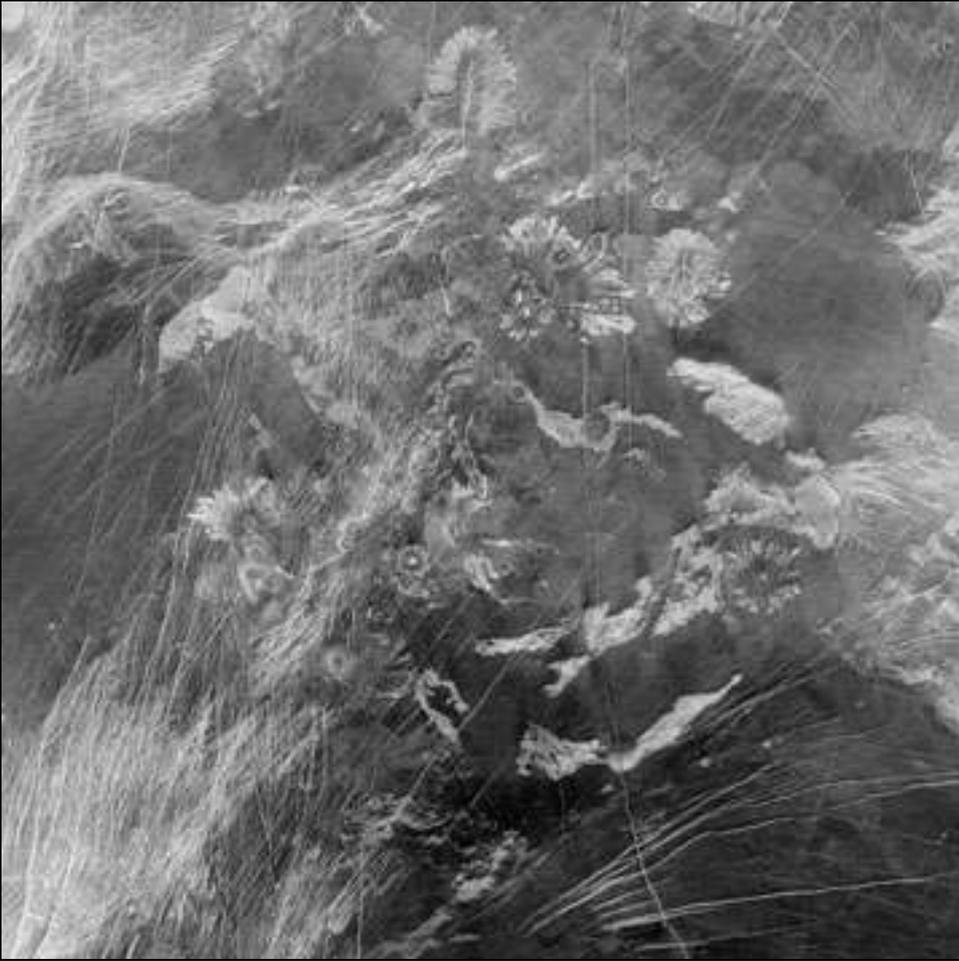
Radar image

Magellan, Sept. 15, 1990 – Sept. 14, 1992

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



Venusian Surface Fractures

Radar can see through the clouds to the surface of Venus and reveal some of the planet's geologic history. These fractures and volcanic features lie in the Atla region of Venus.

Radar image

Magellan, Sept. 15, 1990 – Sept. 14, 1992

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



Venus Under the Clouds

Radar images can see some of the planet's geologic history. The large, circular feature in the lower left, Artemis Chasma, is a deep chasm that's over 1,000 miles in diameter. The chasm walls are about 74 miles from side to side.

Radar image, orthographic projection.

Magellan, Sept. 15, 1990 - Sept. 14, 1992.

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



The Himalayas of Venus

Maxwell Montes (mountains) of Ishtar Terra, a continent-sized feature, is the highest point on Venus.

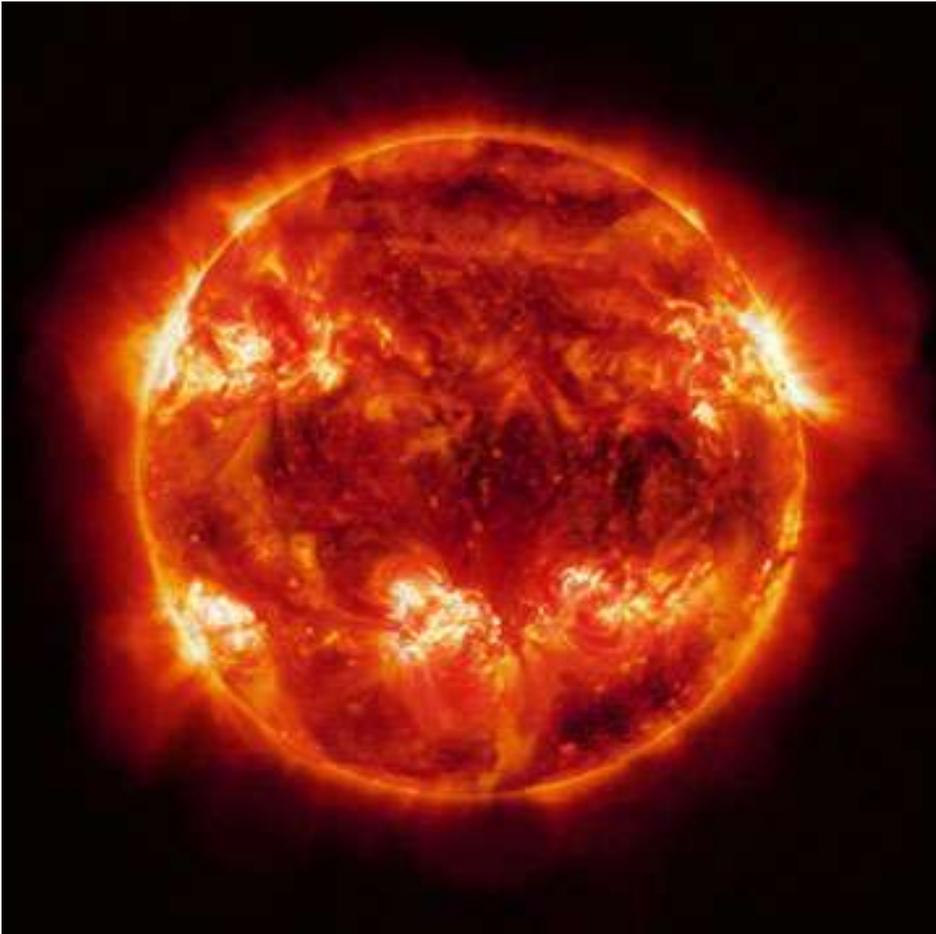
Radar image

Magellan, Sept. 15, 1990 – Sept. 14, 1992

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



The Ultraviolet Sun

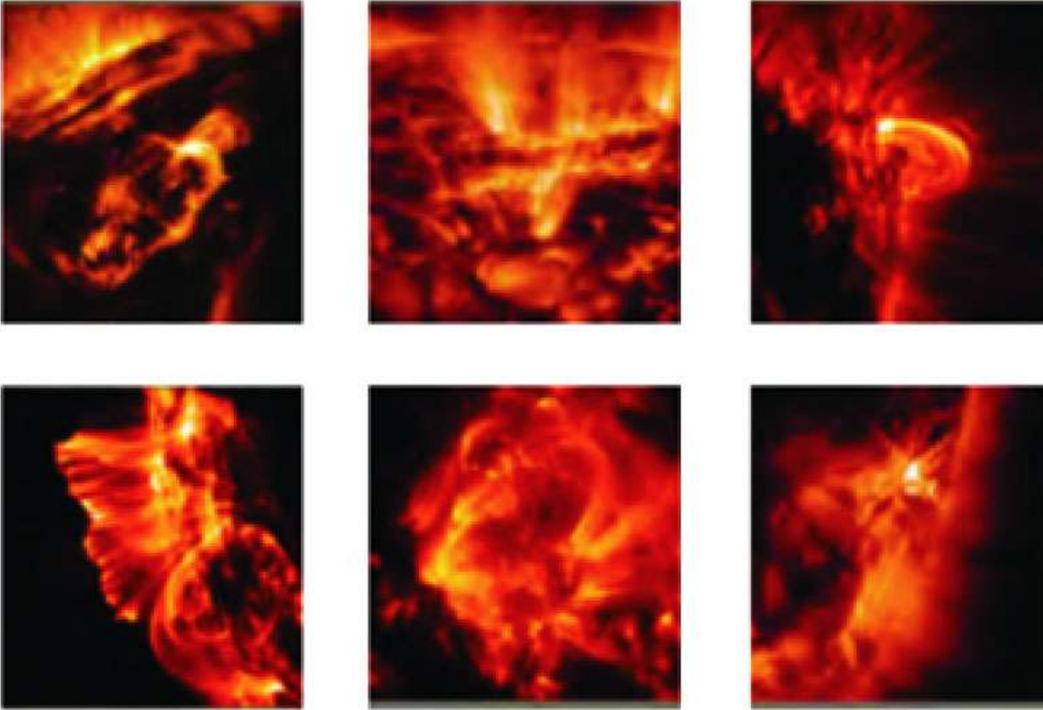
Ultraviolet light reveals the million-degree outer atmosphere of the Sun. Active regions are evident in both hemispheres.

**Ultraviolet exposure, multi-frame mosaic
TRACE, July 30, 1999**

Credit: NASA TRACE Project; Stanford-Lockheed; Michael Benson

###

Gateway Gallery - Lower Level:



Ultraviolet Views of the Sun

Top left: A rapidly cooling arcade of post-flare loops.

TRACE, June 25, 2000

Top middle: Solar magnetic activity at the base of coronal loops.

TRACE, July 3, 2001

Top right: A post-flare cooling loop.

TRACE, April 19, 2001

Bottom left: A post-flare cooling, draining loop system.

TRACE, November 8, 2000

Bottom middle: A rapidly cooling arcade of loops.

TRACE, June 25, 2000

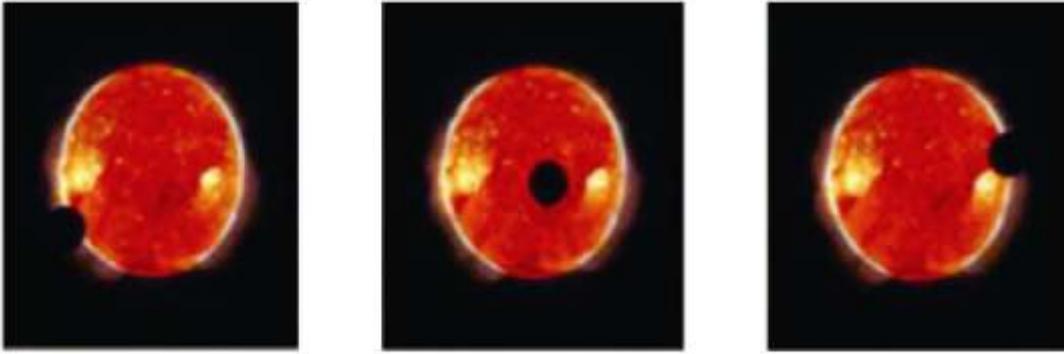
Bottom right: A large x-ray flare.

TRACE, July 23, 2002

Credit: NASA TRACE Project; Stanford-Lockheed; Michael Benson

###

Gateway Gallery - Lower Level:



The Moon Passing in Front of the Sun

This sight cannot be seen from Earth. It was visible only from the STEREO-B spacecraft following behind the Earth. Because the spacecraft was farther from the Moon than we are on Earth, the Moon appeared smaller than what we're used to seeing.

**Ultraviolet exposures
STEREO-B, February 25, 2007**

Credit: NASA STEREO project; Michael Benson

###

Gateway Gallery - Lower Level:



Mercury's True Colors

The large, light-colored area in the upper left is the interior of the Caloris Basin. Because of the sunlight angle, the basin is much less prominent than on the image taken by Mariner 10.

Multi-frame mosaic

MESSENGER, January 14, 2008

Credit: NASA; Johns Hopkins University Applied Physics Laboratory; Carnegie Institution of Washington; Gordan Ugarkovic; Michael Benson

###

Gateway Gallery - Lower Level:



Late Northern Summer on Mars

The bright area to the right is carbon dioxide frost in the Hellas impact basin.

Multi-frame orthographic projection

Viking Orbiter 1, July 7, 1980

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



Southern Spring on Mars

At this time of the Martian year, a large fraction of the planet's atmosphere evaporates from the southern polar cap (bottom) and migrates to the northern polar cap. Clouds are visible at the north cap and at the horizon to the right.

Rosetta, February 24, 2007

Credit: MPS for OSIRIS Team; UPD; LAM; IAA; RSSD; INTA; UPM; DASP; IDA; Michael Benson

###

Gateway Gallery - Lower Level:



The Valles Marineris Canyon System

The largest canyon in the Solar System, Valles Marineris is almost 2,500 miles long—nearly as long as the continental United States is wide. A ground fog hugs the canyon floor. Haze in the thin Martian atmosphere is visible on the horizon.

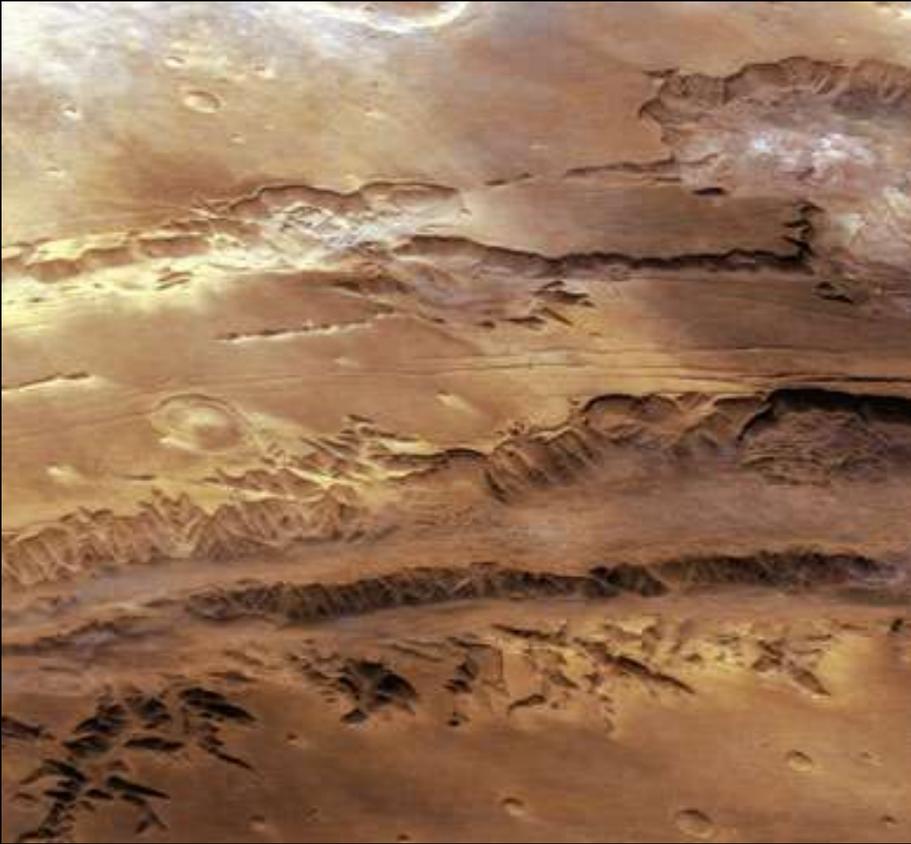
Multi-frame mosaic

Viking Orbiter 1, July 16, 1978

Credit: NASA; JPL; Dr. Paul Geissler; Michael Benson

###

Gateway Gallery - Lower Level:



Martian Canyon-Land

This small central section of the vast Valles Marineris canyon system includes the West Candor Chasma (chasm) at the top right and the Ius Chasma, spanning the lower part of the image.

Multi-frame mosaic

Viking Orbiter 1, August 17, 1976

Credit: NASA; JPL; Dr. Paul Geissler; Michael Benson

###

Gateway Gallery - Lower Level:



Part of Valles Marineris

The maze-like curving rift valleys in the center are called Noctis Labyrinthus—Night Labyrinth. Two Martian volcanoes are visible: Arsia Mons (top right) and Pavonis Mons (bottom right).

Multi-frame mosaic

Viking Orbiter 1, February 22, 1980

Credit: NASA; JPL; Dr. Paul Geissler; Michael Benson

###

Gateway Gallery - Lower Level:



A High Plateau

This plateau rises from the center of Hebes Chasma, a vast enclosed trough almost 5 miles deep, just north of Valles Marineris. Scientists think water flowed here in the distant past. A moat may even have surrounded the plateau, creating an oval Martian lake.

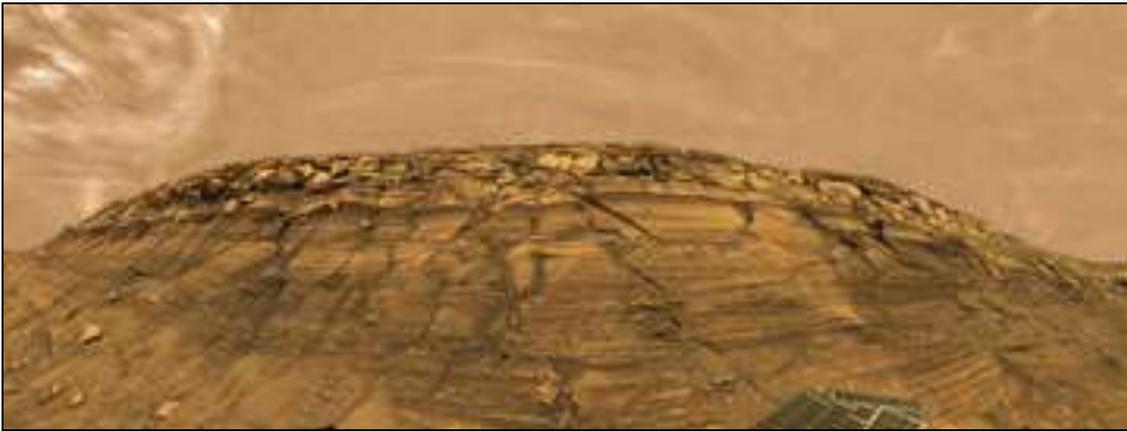
Multi-frame mosaic

Mars Express, September 16, 2005

Credit: ESA; DLR; FU Berlin (G. Neukum); Michael Benson

###

Gateway Gallery - Lower Level:



Cliffs and Clouds

Wispy equatorial clouds drift above the cliffs and inner wall of Endurance Crater on Mars. Solar panels on the Opportunity Rover can be seen at the lower right.

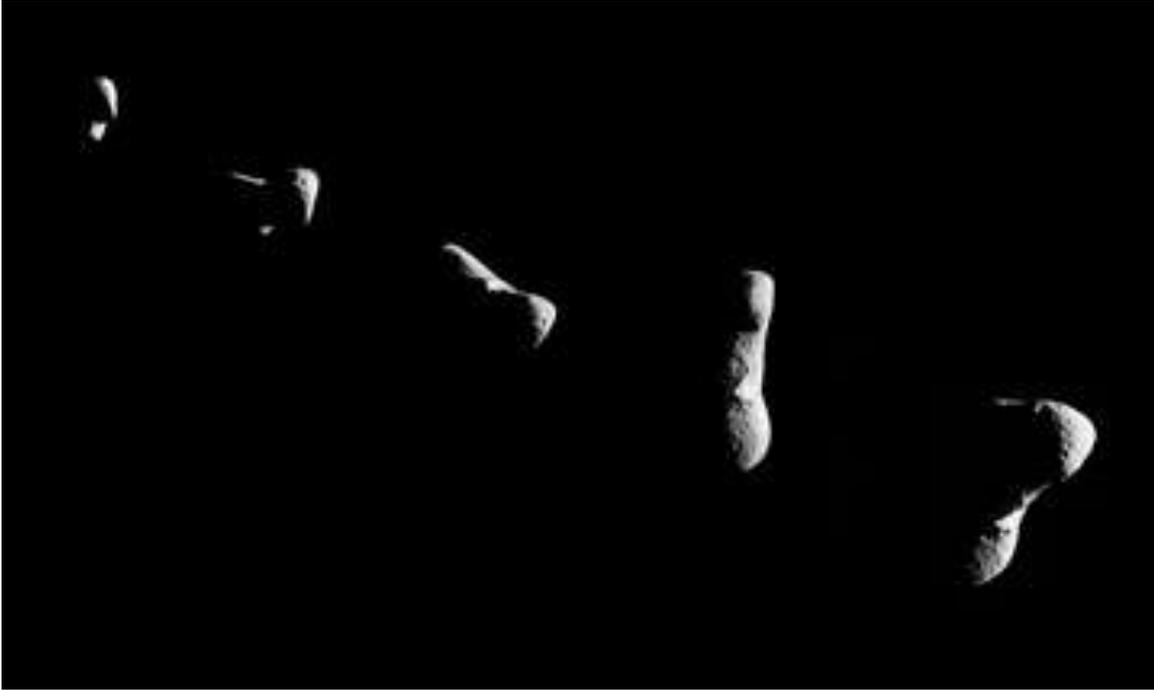
Multi-frame mosaic

Opportunity Rover, November 13–20, 2004

Credit: NASA; JPL; Cornell University; Michael Benson

###

Gateway Gallery - Lower Level:



Asteroid Eros

Tumbling through space, Eros looks something like a thrown potato in this time-lapse series of shots. The first Near Earth Asteroid ever discovered, Eros is about 21 miles long and makes one complete rotation in just over five hours. Eros may contain more gold, silver, zinc, aluminum, and other useful metals than could ever be mined from the Earth's upper crust.

Multi-frame mosaic.

NEAR, February 16, 2000

Credit: NASA; Mark S. Robinson; Northwestern University; Michael Benson

###

Gateway Gallery - Lower Level:



Jupiter, the Largest Planet

The Great Red Spot, a cyclonic storm system that has been raging for hundreds of years, is clearly visible in this portrait of Jupiter.

Multi-frame mosaic

Cassini, December 29, 2000

Credit: NASA; JPL; Cassini Imaging Team; Michael Benson

###

Gateway Gallery - Lower Level:



Io Rising

Jupiter's volcanic moon rises at the upper right over the giant planet's night side.

Multi-frame mosaic

Voyager 1, February 24, 1979

Credit: NASA; JPL; Dr. Paul Geissler; Michael Benson

###

Gateway Gallery - Lower Level:



Io High Above Jupiter's Storms

Io appears near the transition area between Jupiter's day and night sides. Even though Jupiter is immense, it rotates much faster than Earth—once every 10 hours.

Cassini, January 1, 2001

Credit: NASA; JPL; Ciclops; University of Arizona; Michael Benson

###

Gateway Gallery - Lower Level:



Jupiter and Io

Jupiter's volcanic moon Io (upper right) is slightly smaller than our Moon.

Cassini, January 15, 2001

Credit: NASA; JPL; Ciclops; University of Arizona; Michael Benson

###

Gateway Gallery - Lower Level:



Jupiter and Two of Its Moons

A “fire and ice” pair of Jupiter’s large moons—volcanic Io (lower left) and frozen Europa (upper right)—orbit across the face of the giant planet.

Voyager 1, March 2, 1979

Credit: NASA; JPL; Dr. Paul Geissler; Michael Benson

###

Gateway Gallery - Lower Level:



The Volcanic Landscape of Io

Jupiter's innermost large moon, Io is the most volcanic object in the Solar System. The gravitational pull of Jupiter squeezes the moon, forcing lava to the surface in eruptions from over 400 active volcanoes. Some of Io's volcanic centers have bright and colorful flows, perhaps due to sulfur.

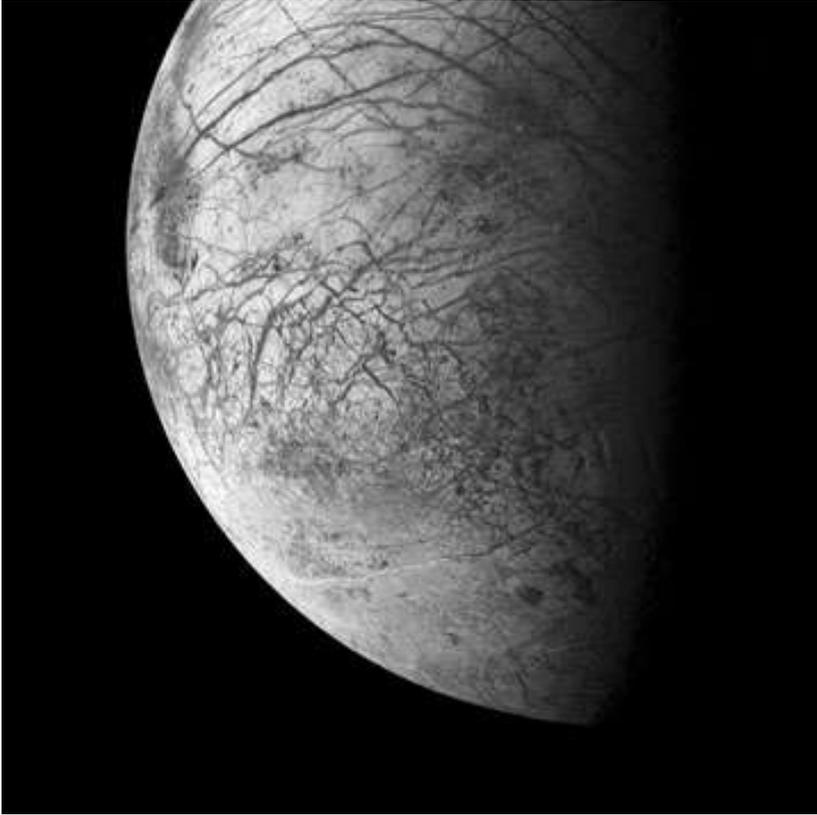
Multi-frame mosaic

Galileo, July 3, 1999

Credit: NASA; JPL; PIRL; University of Arizona; Michael Benson

###

Gateway Gallery - Lower Level:



An Ice-Covered Ocean

Chaos terrain, faults, and curving ridges cover the face of Europa, one of the most tantalizingly enigmatic worlds in the Solar System. Europa almost certainly has a vast, ice-capped global ocean kept warm by the gravitational effects of Jupiter and its moons, and perhaps by volcanoes on the sea floor. Europa may have enough heat, water, and organic material for life to have evolved here.

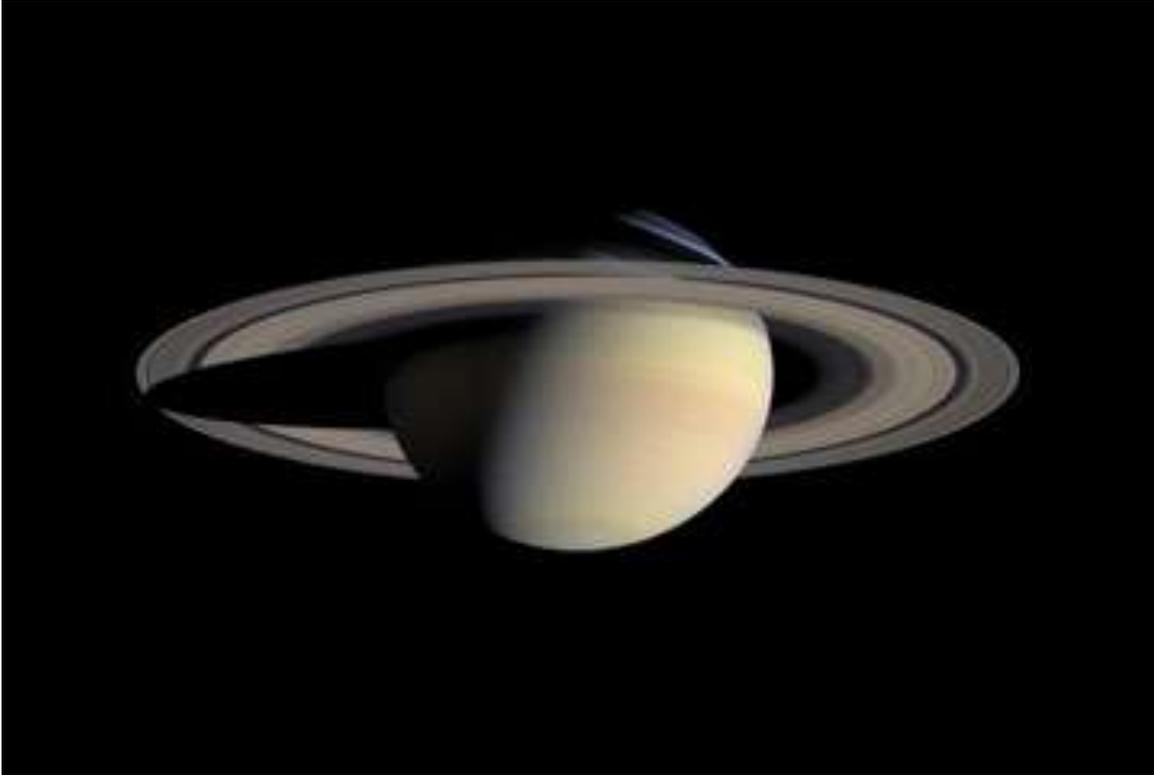
Multi-frame mosaic

Galileo, March 29, 1998

Credit: NASA; JPL; Michael Benson

###

Gateway Gallery - Lower Level:



Glorious Saturn

This view is the most detailed, natural color image of Saturn and its rings ever made. The planet's shadow crosses the rings to the left. Blue-gray storms can be seen in the southern hemisphere to the right. Subtle color variations appear across the rings. The thread-like F ring casts ring shadows against the blue northern hemisphere. Saturn's tiny moons Mimas and Janus are faintly visible (lower left).

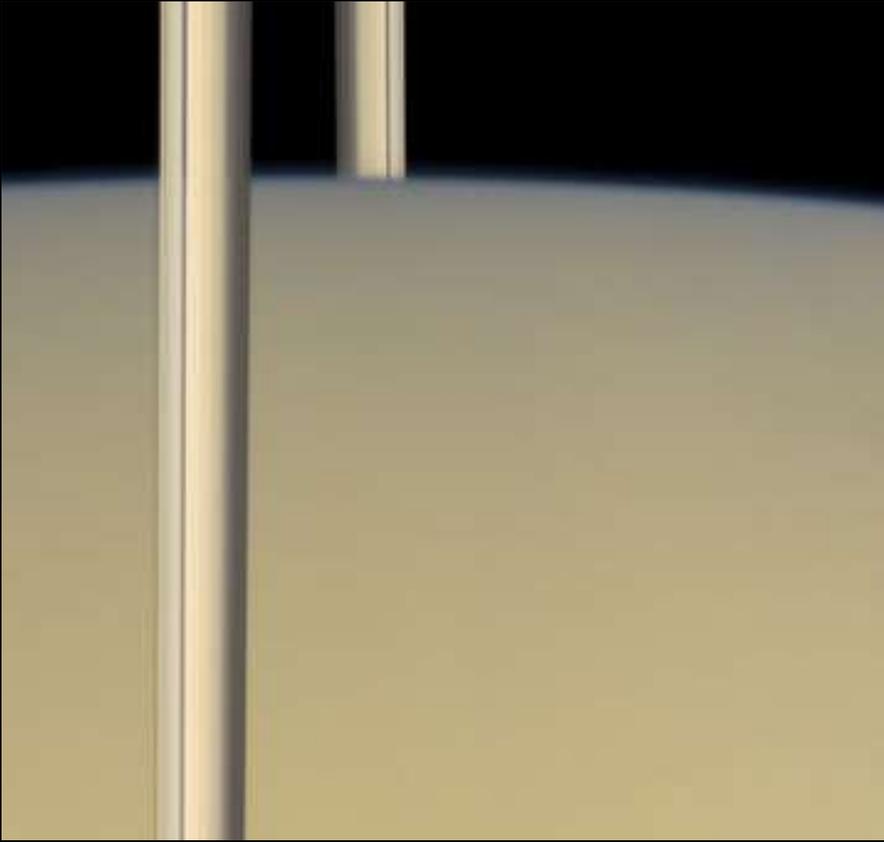
Multi-frame mosaic

Cassini, October 6, 2004

Credit: NASA; JPL; Cyclops; SSI; Michael Benson

###

Gateway Gallery - Lower Level:



Saturn's Rings Nearly Edge-On

The rings appear immaculate and solid, encircling Saturn in a hoop of gold. The giant planet's atmosphere appears nearly featureless.

Multi-frame mosaic

Cassini, October 26, 2007

Credit: NASA; JPL; Gordan Ugarkovic; Michael Benson

###

Gateway Gallery - Lower Level:



Lonely Mimas Above Saturn

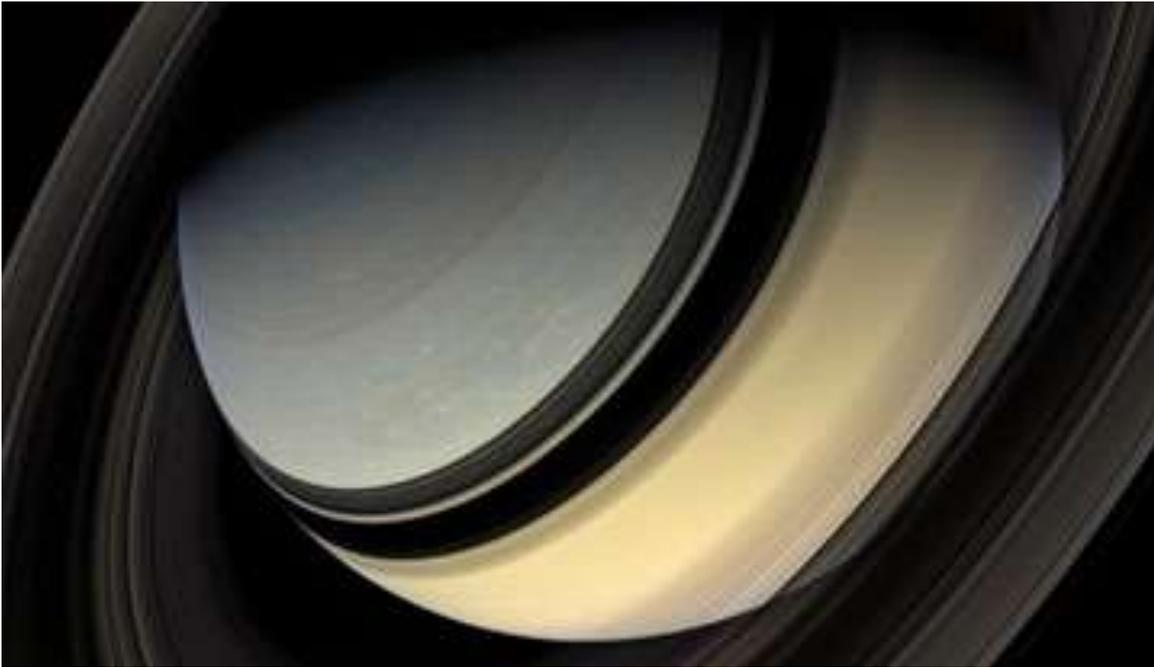
Saturn's moon Mimas appears against the blue-streaked backdrop of the planet's northern hemisphere. The rings (bottom) cast graceful shadows across the planet (top), with the shadows fading into darkness on Saturn's night side.

Cassini, November 7, 2004

Credit: NASA; JPL; Cyclops; SSI; Michael Benson

###

Gateway Gallery - Lower Level:



Above the Rings

Early in 2007, the Cassini Orbiter shifted its orbit to climb high above the rings. This spectacular view looks down on the planet's northern regions, with its pole still in the darkness of the northern hemisphere winter.

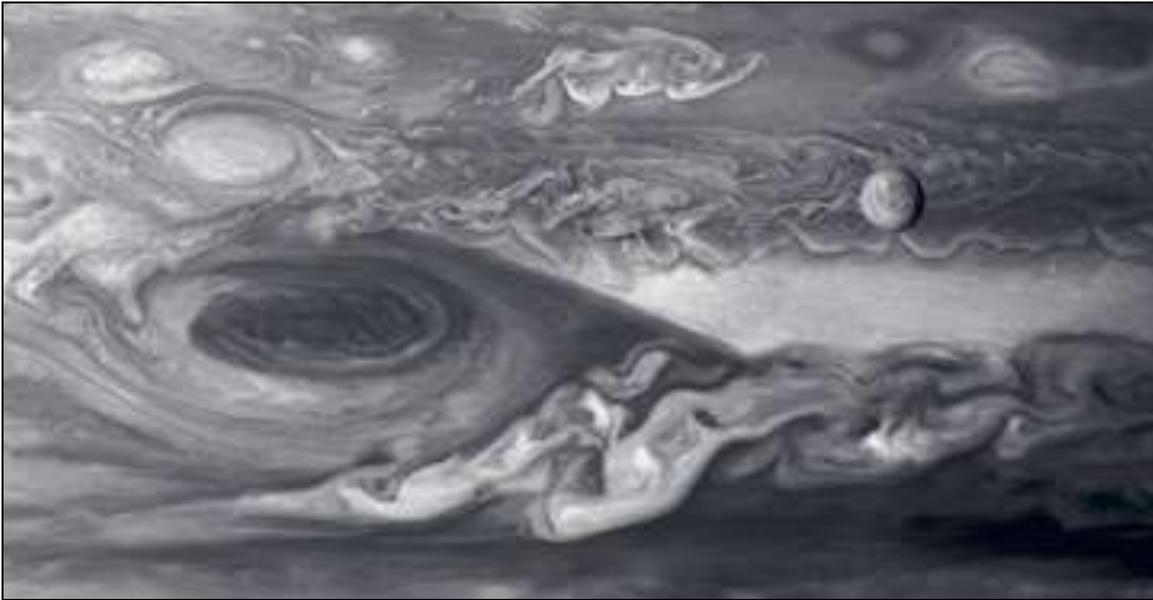
Multi-frame mosaic

Cassini, January 20, 2007

Credit: NASA; JPL; Gordan Ugarkovic; Michael Benson

###

Gateway Gallery - Lower Level:



Europa and Jupiter's Great Red Spot

Europa (upper right) is slightly smaller than Earth's Moon. Jupiter's Great Red Spot, a vast cyclonic storm system about two times the size of Earth, is surrounded by other oval storms and banded clouds.

Multi-frame mosaic

Voyager 1, March 3, 1979

Credit: NASA; JPL; Michael Benson

###

Gateway Gallery - Lower Level:



A Frosty Impact Basin on Mars

The bright area in this view of Mars is carbon dioxide frost in the Hellas impact basin.

Multi-frame orthographic projection

Viking Orbiter 1, July 7, 1980

Credit: NASA; JPL; USGS; Michael Benson

###

Gateway Gallery - Lower Level:



Southern Africa from High Orbit

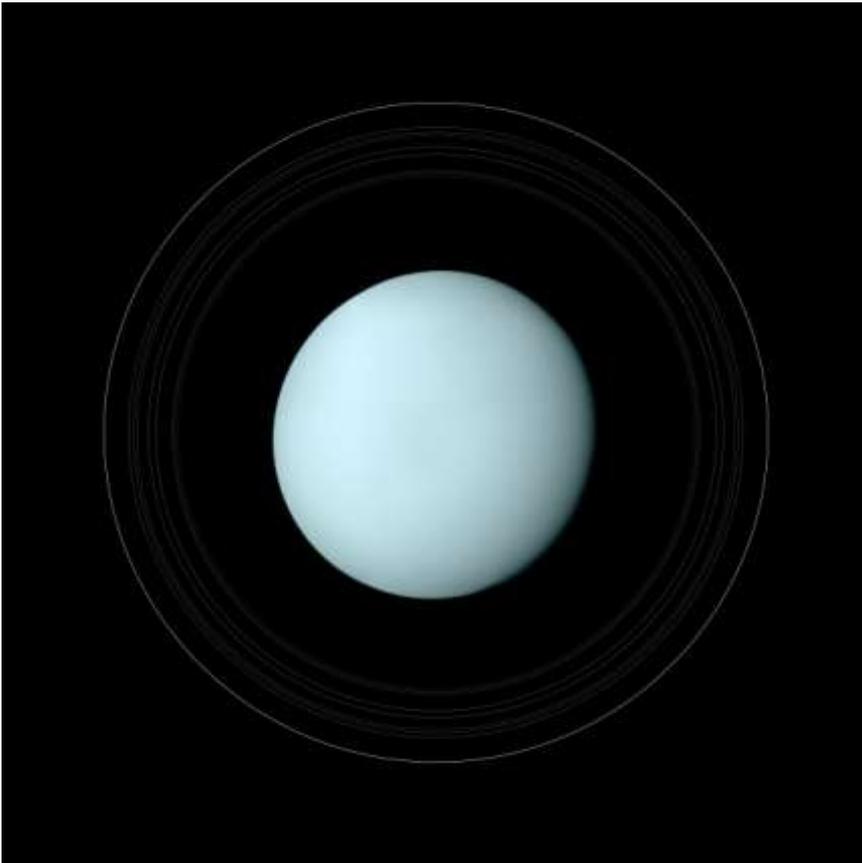
Dust can be seen blowing into the Atlantic Ocean from Namibia.

OrbView-2, August 18, 1999

Credit: SeaWiFS Project; NASA; Orbimage; Michael Benson

###

Gateway Gallery - Lower Level:



Uranus and Its Rings

This remarkable picture shows the planet's very faint rings, which were discovered in 1977. Extremely dark, they may be made of countless fragments of water ice containing radiation-altered organic material. Uranus was unknown to ancient astronomers. British astronomer William Herschel discovered the planet in 1781 using a homemade 15-centimeter telescope.

Multi-frame mosaic

Voyager, January 24, 1986

Credit: NASA; JPL; Calvin Hamilton; Michael Benson

###

Gateway Gallery - Lower Level:



In Saturn's Shadow

With giant Saturn sheltering Cassini from the Sun's blinding glare, the spacecraft viewed the rings as never before, revealing previously unknown faint rings and even glimpsing the pale blue dot of Earth, here visible at the ten o'clock position just outside the brightest rings. Earth was almost a billion miles away when the 165 individual pictures comprising this picture were taken. The Sun can be seen peeking over Saturn to the lower left.

Multi-frame mosaic

Cassini, September 15, 2006

Credit: NASA/JPL/Space Science Institute; Michael Benson

###

Gateway Gallery - Lower Level:



Neptune and Triton

This crescent view of the Solar System's outermost planet is one of the last images recorded by Voyager 2 as it sped onward toward interstellar space, having surveyed most of the outer Solar System.

Voyager 2, August 31, 1989

Credit: NASA; JPL; Calvin Hamilton; Michael Benson

###