NASA Resource Slide Set

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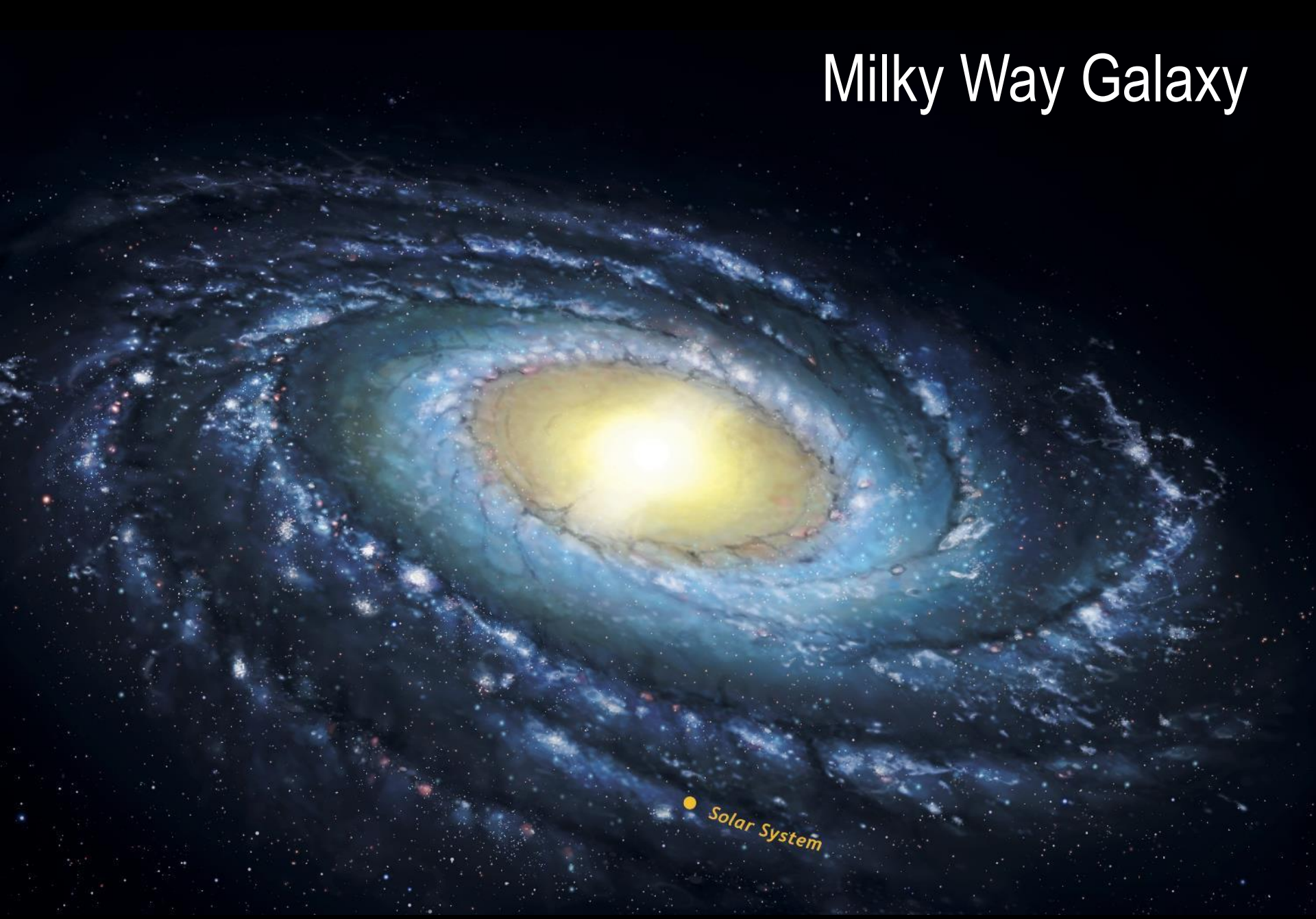
STAR net Science-Technology Activities & Resources For Libraries

NASA@ My Library

The Universe is vast and always changing. It includes planets, stars, galaxies, and all of space, matter, and energy. Looking at the night sky, you can sense how small Earth is in the vastness of space. A million Earths could fit inside the Sun. The Sun is the only star in our Solar System but is one of over 100 billion stars in a spiral galaxy we call the Milky Way. Our Solar System is located about 2/3 of the way out from the galaxy's center. Astronomers think that most of the stars in our galaxy may also have planets orbiting around them.

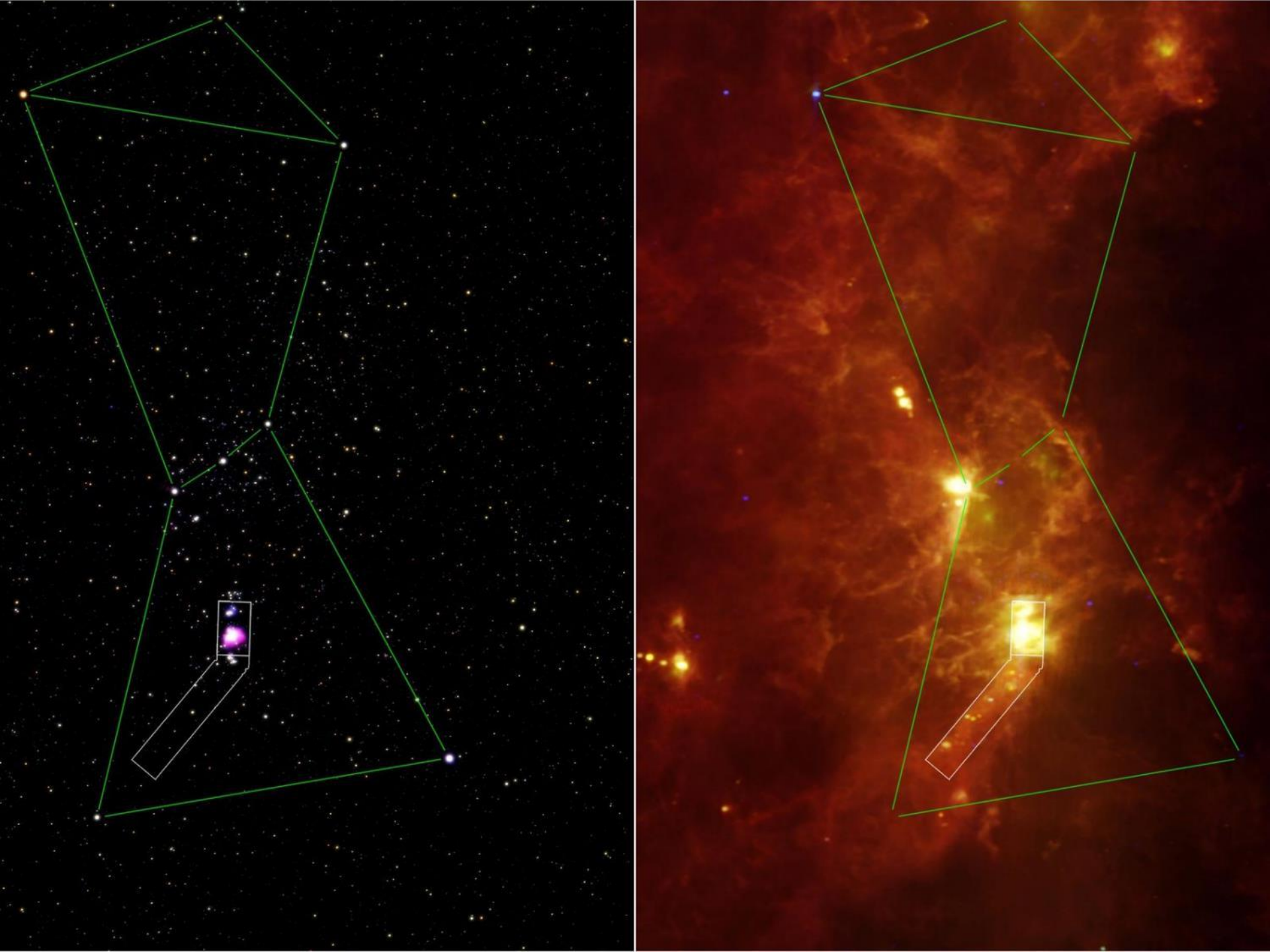
Milky Way Galaxy



Constellations

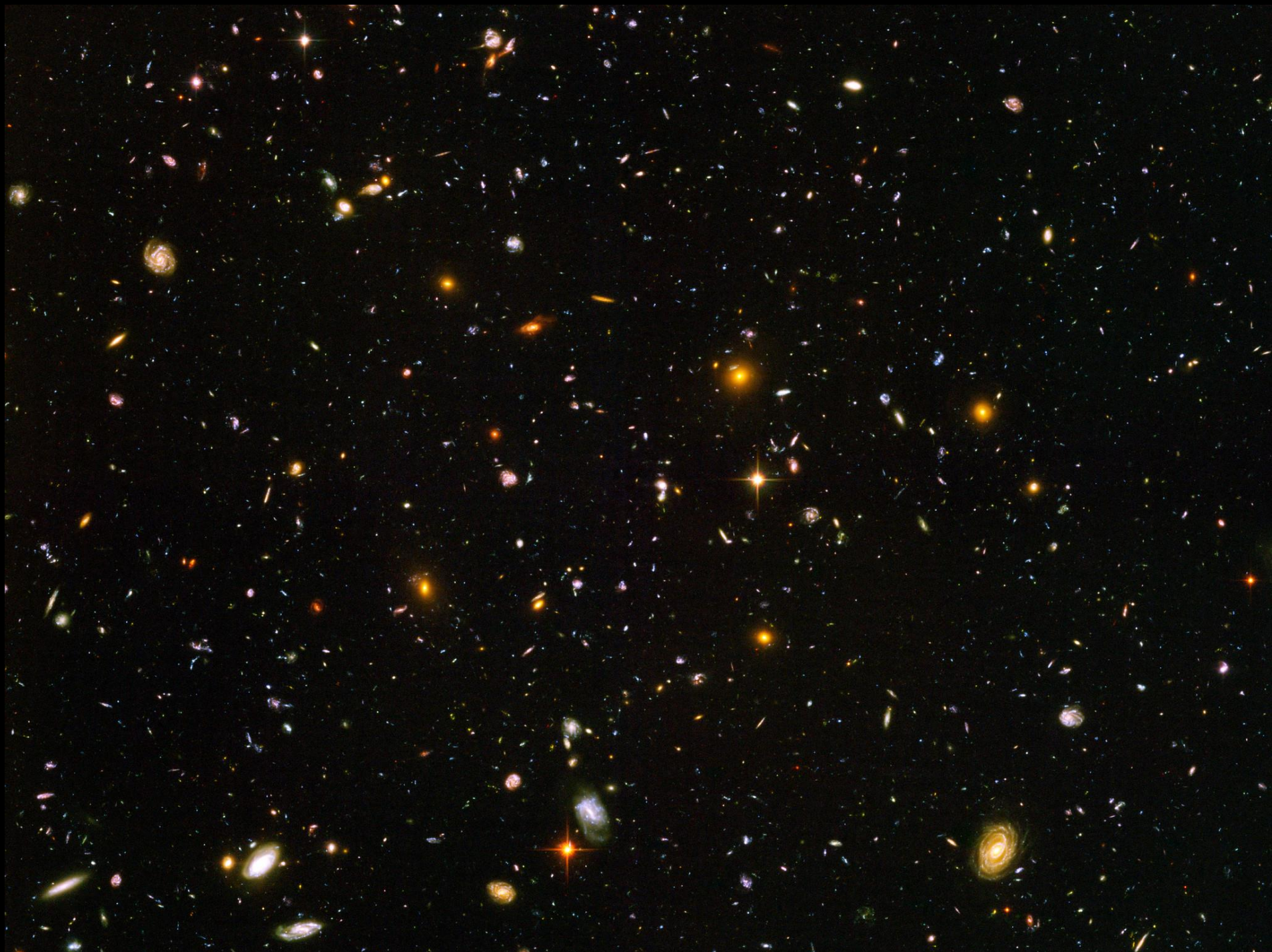
In contemporary astronomy, a *constellation* is one of 88 regions of the sky that cover the entire celestial sphere. The ancient Sumerians, and later the Greeks (as recorded by Ptolemy), established most of the northern constellations in international use today.

Orion is a prominent constellation located on the celestial equator and visible throughout the world. It was named after Orion, a hunter in Greek mythology. The image below outlines the region near Orion's sword that was surveyed by NASA's Spitzer Space Telescope (white box). The view on the left is from a visible-light telescope and the view on the right shows infrared light (IR). The bright spot in both images is the Orion nebula, our closest massive star-making factory.



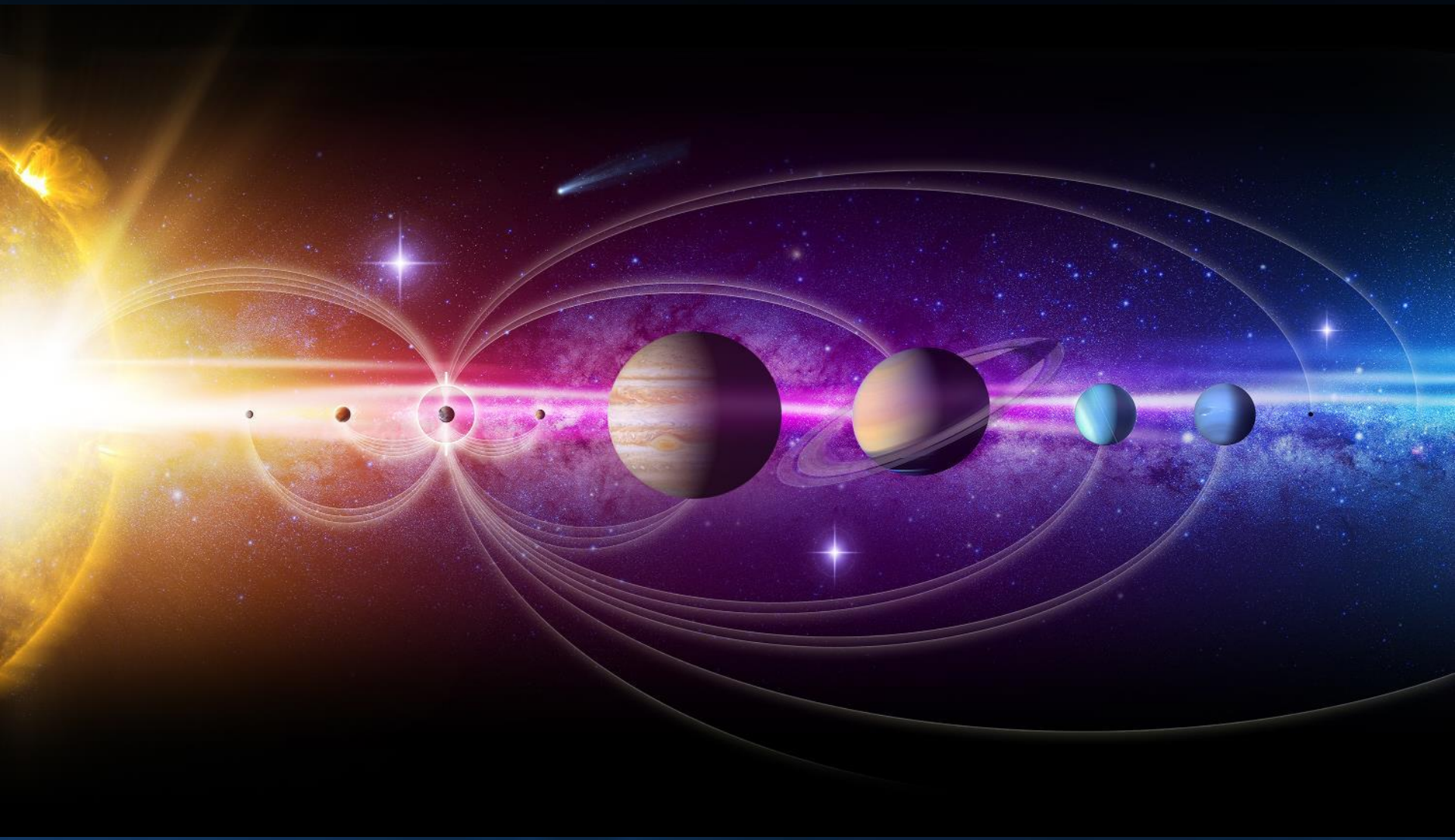
Galaxies Galore

Individual galaxies form into clusters. Galaxy clusters form into superclusters. Scientists estimate that there are more than 100 billion galaxies in the universe. This deep field view of the universe was taken by the Hubble Space Telescope. All but 4 specks in this “Hubble Deep Field” image are entire galaxies, each of them with 100 billion stars.



Andromeda Galaxy – 23 Million Light-Years Away

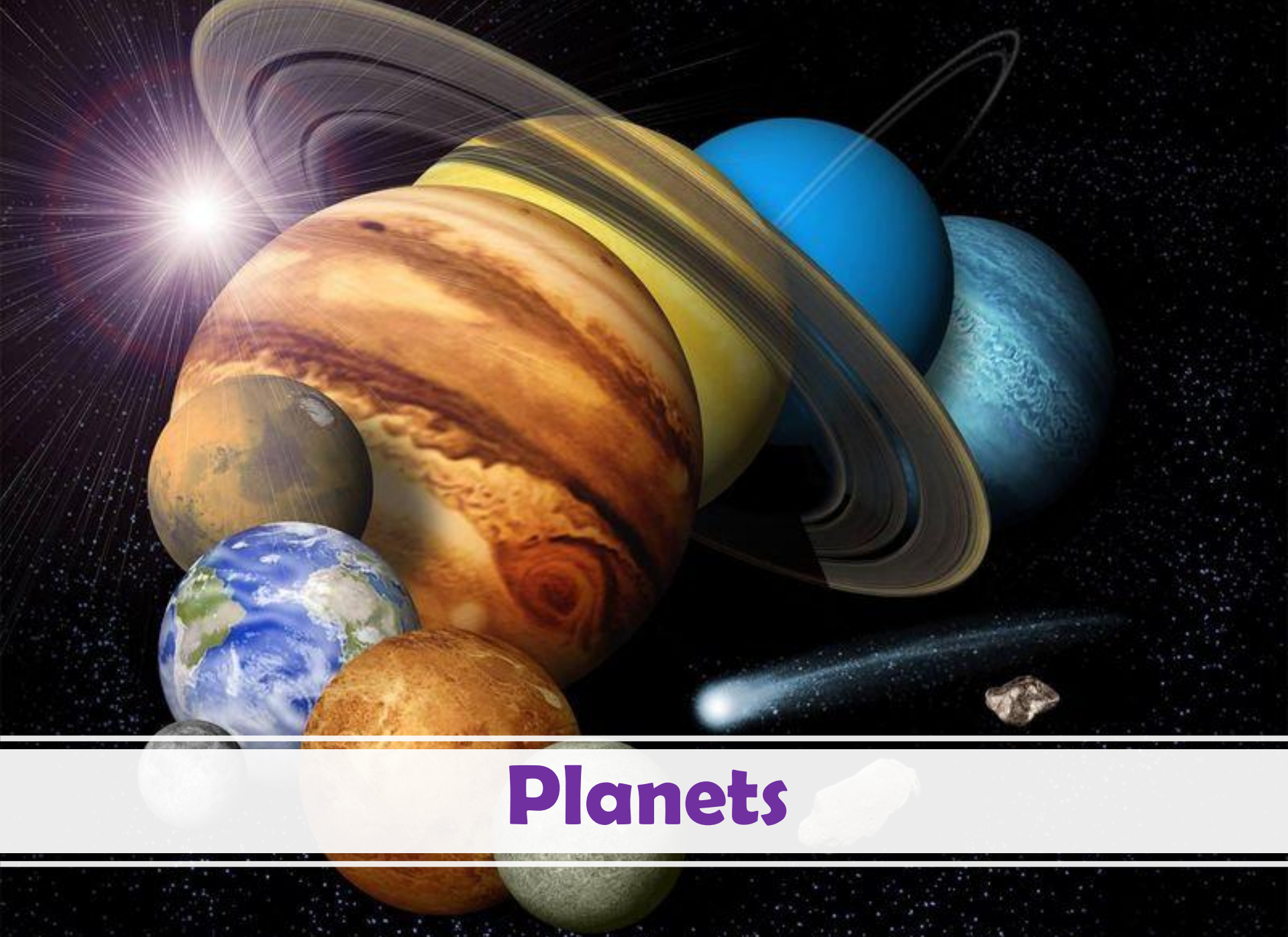
Our Solar System has one medium-sized star at the center, four small inner rocky worlds, and four large gaseous outer worlds. It formed 4.6 billion years ago from the gravitational collapse of a giant interstellar cloud of gas and dust.



Our Solar System

The vast majority of the Solar System's mass is in the Sun, with most of the remaining mass contained in Jupiter. It also contains at least 140 moons and millions of comets and asteroids.

The asteroid belt, which lies between the orbits of Mars and Jupiter, mostly contains objects composed of rock and metal, like the terrestrial planets. Beyond Neptune's orbit lies the Kuiper belt and Oort cloud, home to comets.

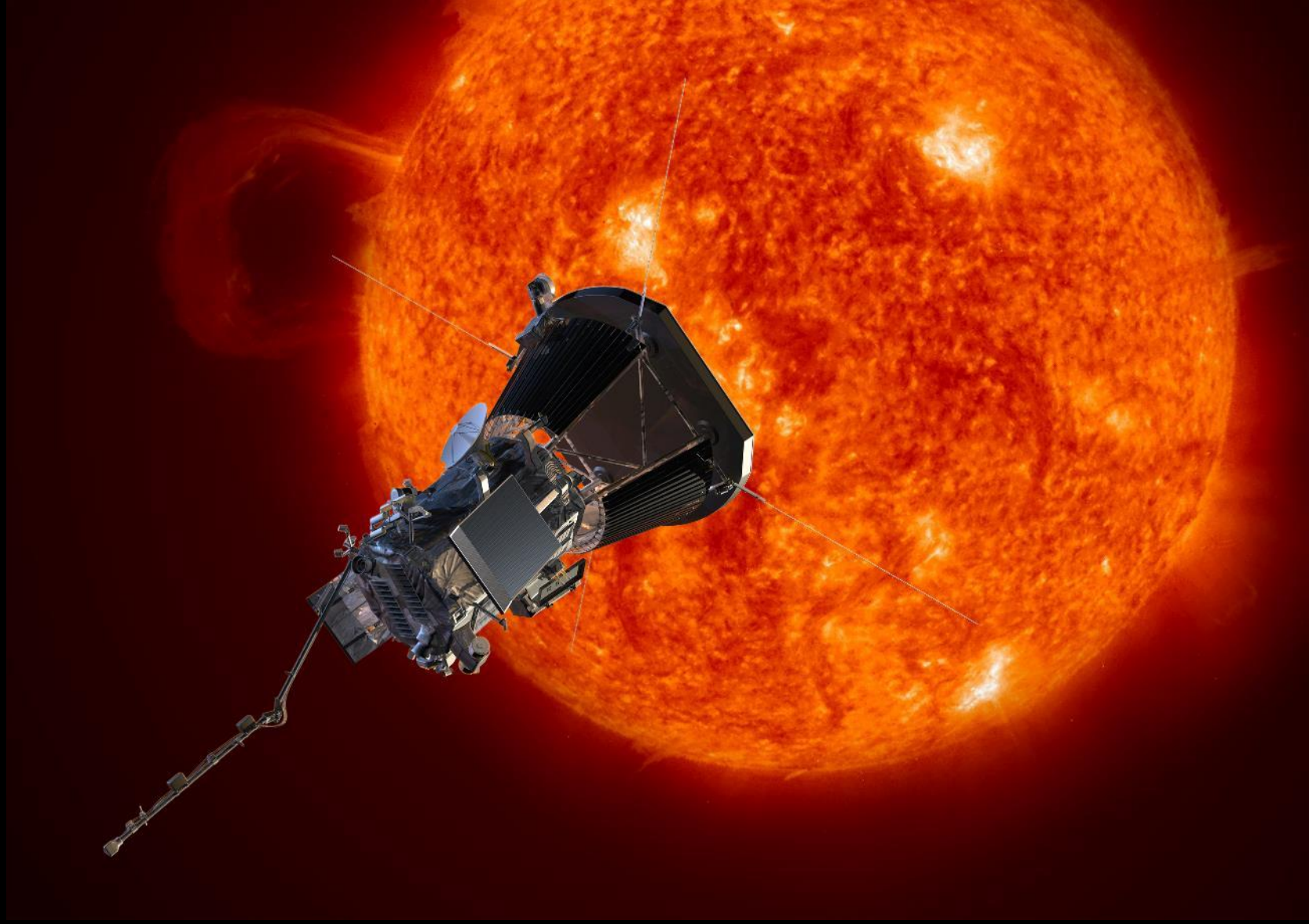


Planets

Our Sun

To the unaided eye, space appears to be a vast, dark void, and the Sun a tranquil sphere of light. But in fact, space is not empty, because Earth's orbit lies within the atmosphere of our dynamic Sun.

The space between the Sun and planets is filled with the Solar Wind, a continuous stream of ionized gas, or plasma, that pours out of the Sun at 200 tons per second and a million miles per hour. The Sun's surface can also explode, sending charged particles and electromagnetic radiation into space that can impact Earth and cause magnetic storms.



Solar Probe's Journey to the Sun

Earth is the 3rd planet from the Sun. It formed 4.5 billion years ago. Earth is often called the “Blue Planet” because about 70% of its surface is covered by water. Earth’s thin atmosphere is about 20 kilometers high. Earth is located in the Solar System’s Habitable Zone, where liquid water can exist at the surface. It’s the only planet in our Solar System where we know for certain that life has evolved.


Earth:
A Blue Marble

Our Sky

Northern Lights from the International Space Station

The **Moon** (Latin: *Luna*) is Earth's only natural satellite, and the fifth largest moon in the Solar System. It’s the only celestial body humans have travelled to and landed on.

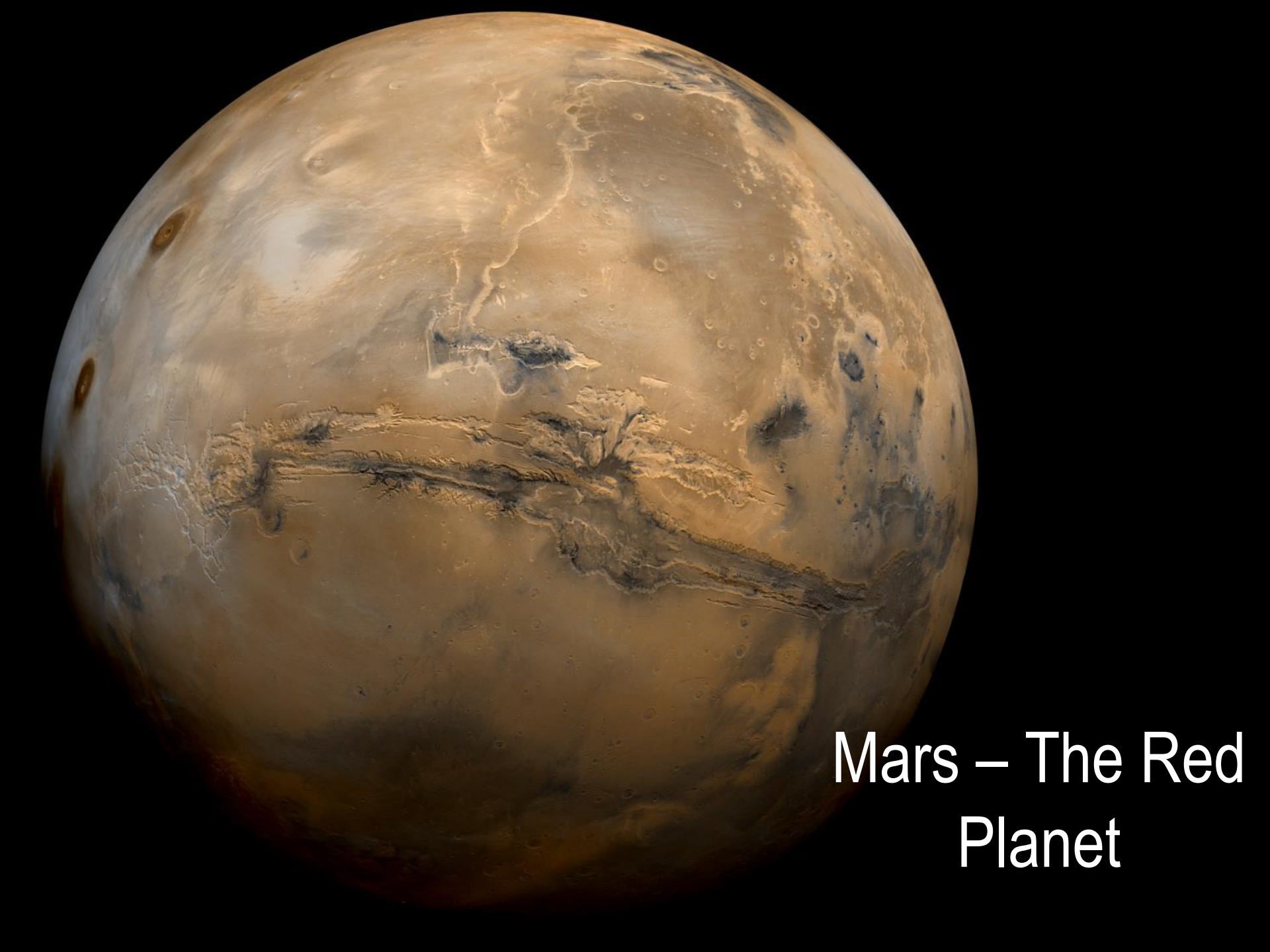
The dark and relatively featureless lunar plains humans can clearly see when the Moon is full are called *maria* (singular *mare*), Latin for seas, since they were believed by ancient astronomers to be filled with water. These are now known to be vast solidified pools of ancient basaltic lava that flowed into the depressions associated with impact basins that formed by the collisions of meteors and comets with the lunar surface.

The lighter-colored regions of the Moon are called *highlands*, since they are higher than most maria. Several prominent mountain ranges on the near side are found along the periphery of the giant impact basins, many of which have been filled by mare basalt.

Earth's Moon

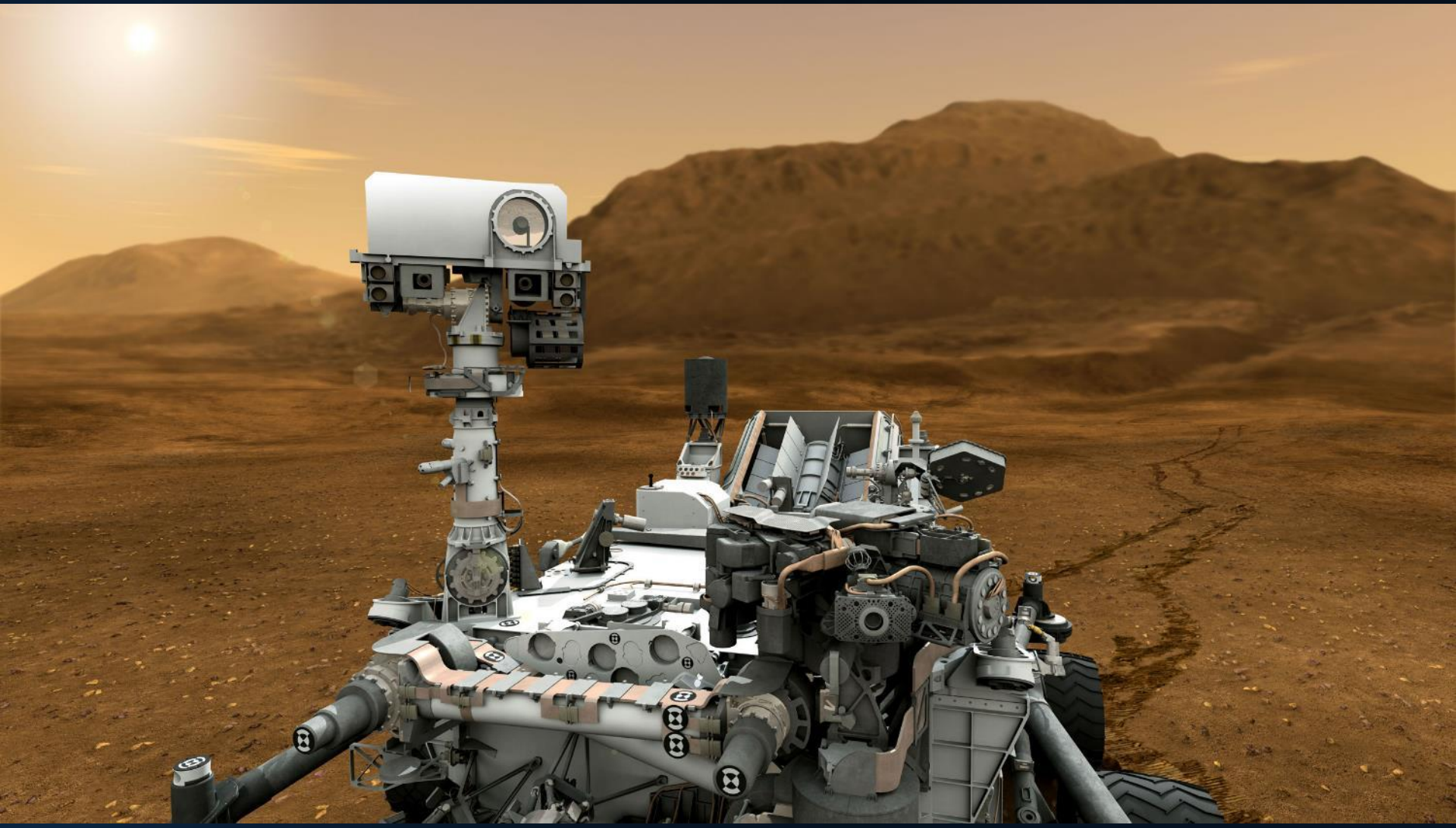
Mars has long fascinated astronomers and science fiction writers. While life hasn't been found on Mars yet, new research is happening there every day. The planet has seasons, polar caps, dormant volcanoes, canyons, and impact craters like Earth.

The surface of Mars is dry, rocky, dusty, and rust-colored. That's because its surface is covered with actual rust: oxidized iron is common in the surface minerals!


Mars – The Red Planet

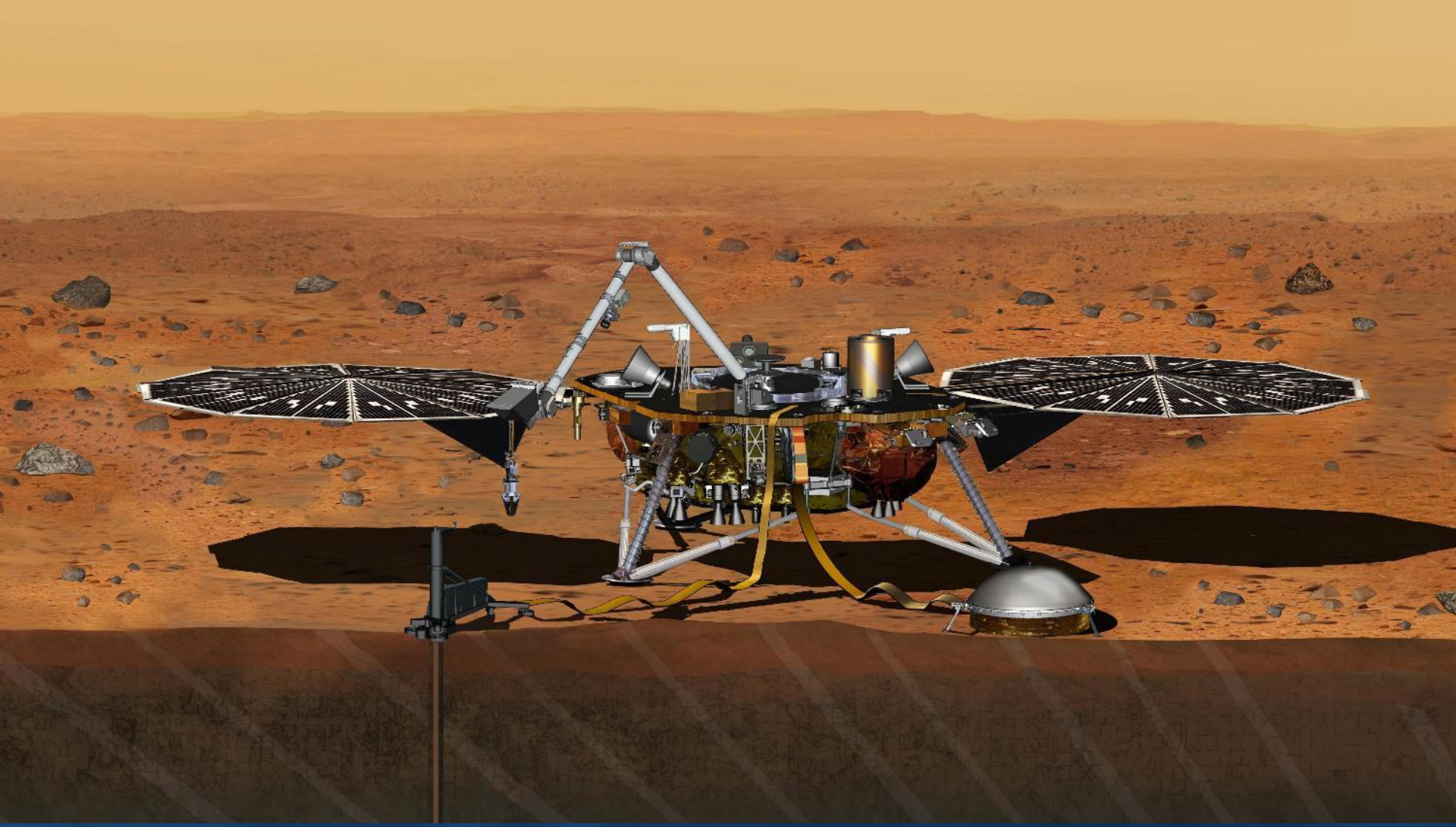
The Mars Curiosity Rover discovered smooth, water-worn Martian stones: telltale signs that liquid water once flowed on Mars. Scientists think that these are deposits of small deltas fed by rivers flowing down from the crater rim to the north into a lake to the south. This interests scientists because all life needs liquid water to survive. Was there once life on Mars?

Curiosity Rover on Mars



InSight is a robotic lander designed to study the interior of the planet Mars. The name is a backronym for **In**terior Exploration using **S**eismic **I**nvestigations, **G**eodesy and **H**eat **T**ransport. The mission launched from Vandenberg Air Force Base on California's Pacific coast aboard a two-stage Atlas V launch vehicle on 5 May 2018 and landed on the surface of Mars at Elysium Planitia on 26 November 2018.

InSight's objective is to place a stationary lander equipped with a seismometer and heat transfer probe on the surface of Mars to study the planet's early geological evolution. This could bring new understanding of the Solar System's terrestrial planets — Mercury, Venus, Earth, Mars — and Earth's Moon.



Mars Insight Lander

Juno is a NASA space probe orbiting the planet Jupiter. It's operated by NASA's Jet Propulsion Laboratory. The spacecraft was launched from Cape Canaveral Air Force Station on August 5, 2011 and entered a polar orbit of Jupiter on July 5, 2016. After completing its mission, *Juno* will be intentionally deorbited into Jupiter's atmosphere.

Juno's mission is to measure Jupiter's composition, gravity field, magnetic field, and polar magnetosphere. It will also search for clues about how the planet formed, including whether it has a rocky core, the amount of water present within the deep atmosphere, and its deep winds, which can reach speeds up to 380 mph.

Juno spacecraft near Jupiter

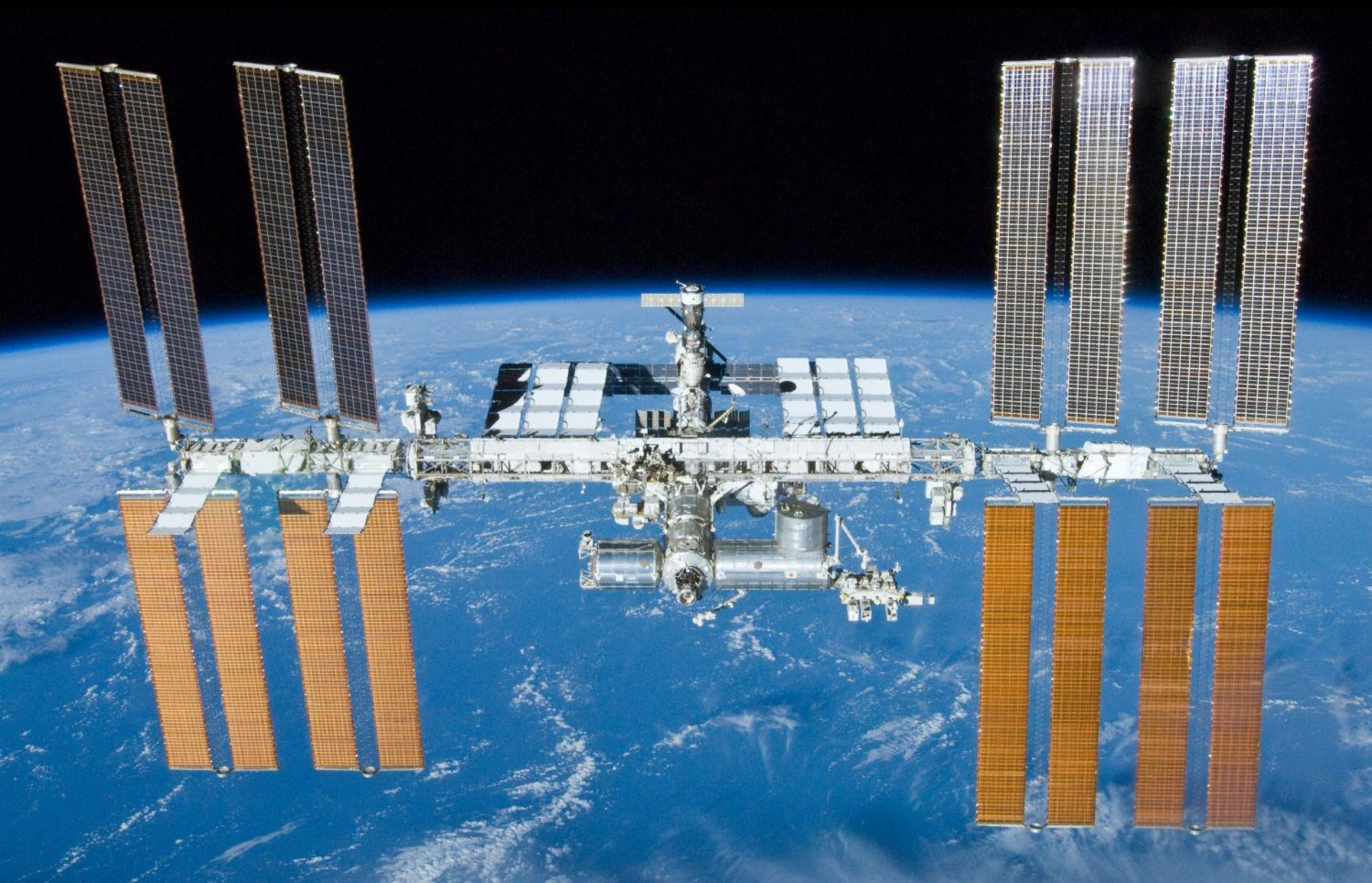
International Space Station

The space station is a scientific research facility orbiting 250 miles (400 km) above Earth. Astronauts live there and conduct experiments. It orbits Earth 16 times a day, or once every 90 minutes. It travels at 17,500 mph (nearly 5 miles per second).

Including its solar panels, the whole station is a little bigger than a football field. The area where astronauts work and live is the size of a five-bedroom house.

There are usually three to six astronauts on board at all times, representing several different countries. Though they have different native languages, astronauts on the ISS mostly communicate in English and Russian. The ISS has been continuously inhabited since November 2000.

International Space Station

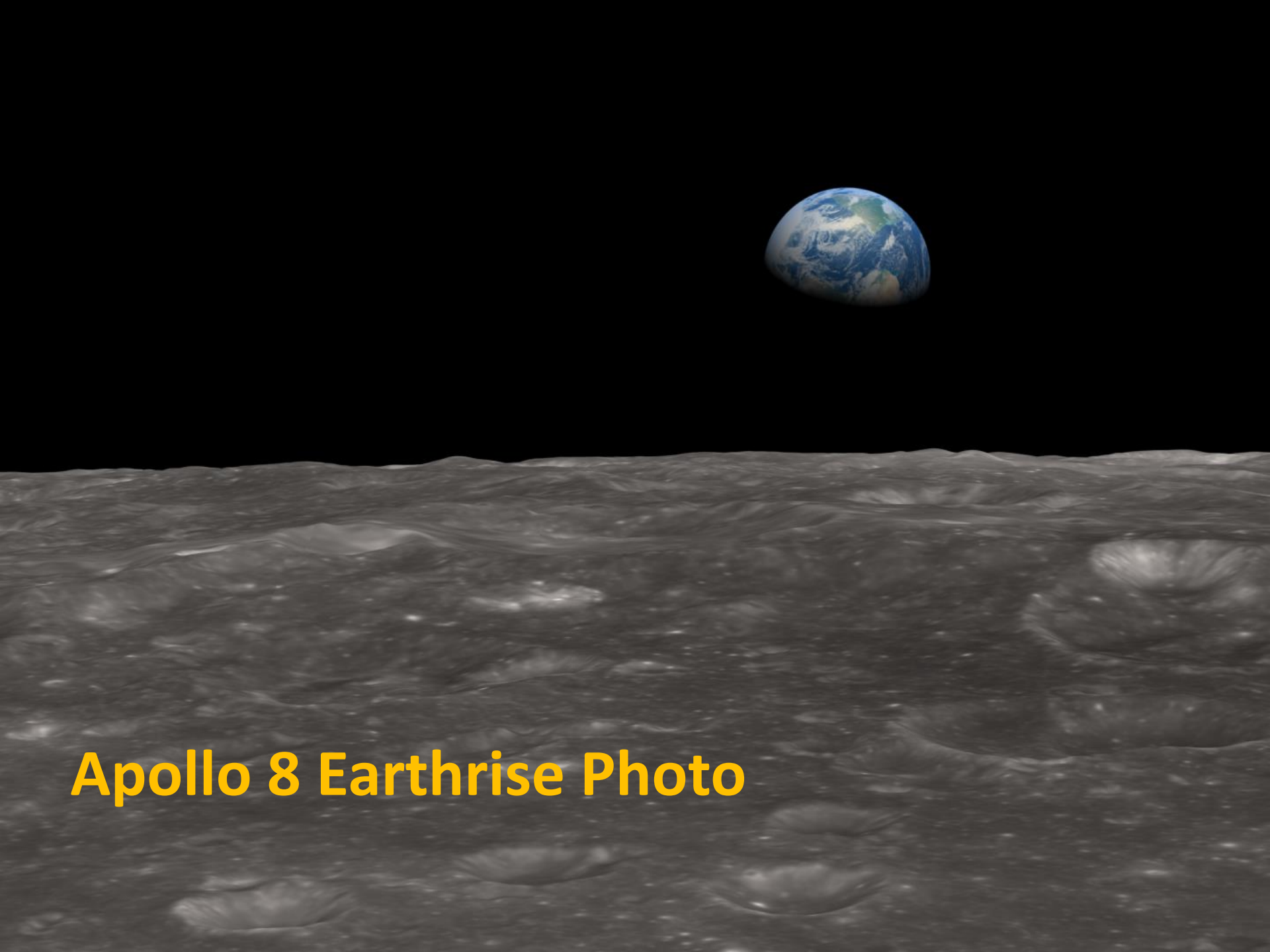


NOWAK · LINDSEY · STEGER · KELLY

Earthrise

The tumultuous year of 1968 saw escalation of war, riots in the streets, and assassinations of leaders. During this time of upheaval back on Earth, NASA gave the world hope through its Apollo mission to the Moon. Apollo 8 was the first mission ever to take astronauts to a world beyond Earth.

Crewmembers James Lovell, Frank Borman and Bill Anders launched on Dec. 21, 1968, and reached lunar orbit three days later, on Christmas Eve. The unexpected view of our world rising above our desolate neighbor was caught on film in one of the most iconic pictures in history, Earthrise from Moon orbit. Back on Earth, splashdown occurred on December 27, 1968.


Apollo 8 Earthrise Photo

NASA’s Apollo Mission to the Moon

On Jan. 9, 1969, NASA announced the prime crew of the **Apollo 11** lunar landing mission (lunar module pilot Buzz Aldrin; commander Neil Armstrong; and command module pilot Michael Collins). Later that year in July 1969, the crew launched to the Moon and into history. Their flight objectives included the scientific exploration by the lunar module crew; deployment of a television camera to transmit signals to Earth; and deployment of a solar wind composition experiment and seismic experiment package.

Apollo 17 was the final mission of NASA's Apollo program. It launched on December 7, 1972, with a crew made up of Commander Eugene Cernan, Command Module Pilot Ronald Evans, and Lunar Module Pilot Harrison Schmitt.

Apollo 17 was the first night launch of a U.S. human spaceflight and the final manned launch of a Saturn V rocket. The photo below shows Eugene Cernan aboard the Lunar Rover.