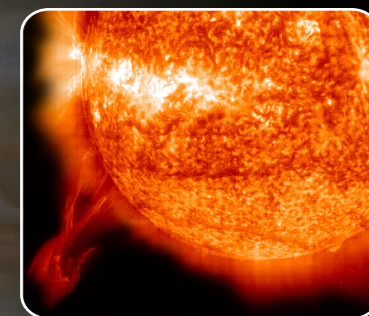


# BEYOND

Earth



More than just Stars...

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“**Humanity** will not remain on the **Earth** forever,  
but in the pursuit of light and space will, at first timidly, penetrate **beyond**  
the **limits** of the atmosphere, and then will **conquer** all the space around the **SUN.**”

—**Konstantin Tsiolkovsky**, 1911  
Father of Soviet space exploration



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### The Cover:

A portrait of the swirling gas giant Jupiter as seen from the Cassini spacecraft during its flyby in December 2000. A planet that lives up to the word giant, it is over 11 times the diameter of Earth. The smallest visible storm in this photo is similar in size to a hurricane here on earth.

**Image:** Cassini Imaging Team, NASA

### Left Page:

At an elevation of 7,200 feet, the Roque de los Muchachos Observatory atop La Palma in the Canary Islands. Thanks to its lack of urban development and high elevation, it is considered to be one of the premiere observatories on Earth, allowing for some of the sharpest images of the night sky.

**Image:** Nik Szymanek, Isaac Newton Group

### Fly Sheet:

The lunar landscape taken by James Irwin on the Apollo 15 mission to the moon. In the distance, David Scott can be seen examining a boulder while the Lunar Rover, the first of its kind to ever be used on the moon, sits in waiting. The two men spent three days on the moon, while Alfred Worden orbited above in the Command Module.

**Image:** Apollo 15 crew, NASA

### The Back Cover:

The space shuttle Endeavour takes off from Kennedy Space Center in Florida on yet another mission. This particular launching of a space shuttle was the 68th launch of any shuttle and the second longest mission to date. Endeavour orbited Earth for 15 days and was the first to link to the internet.

**Image:** NASA

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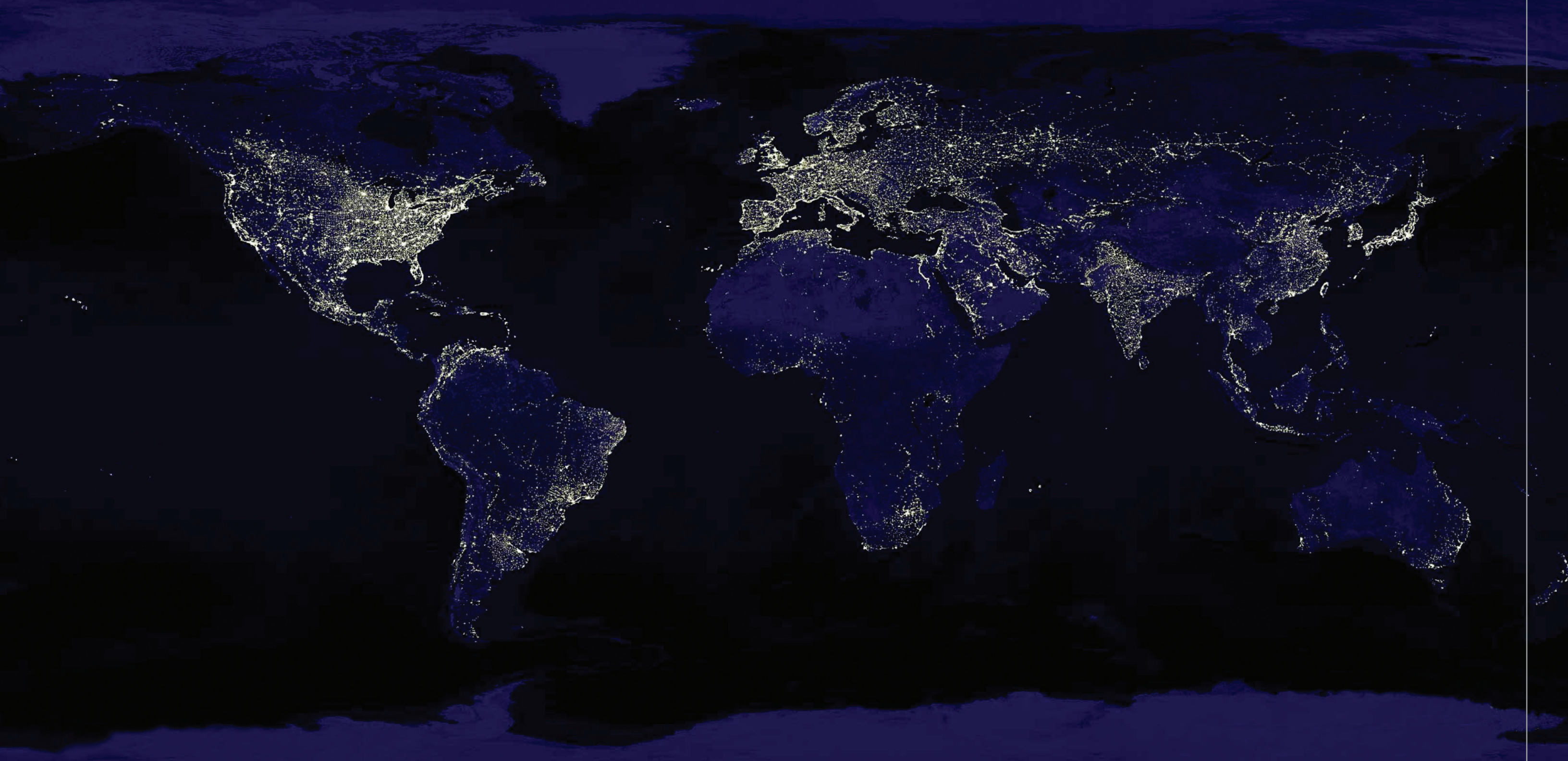
It sometimes seem as if the entire Milky Way Galaxy is going to rain down on us. Don't despair, for it happens twice a day, ten thousand miles away. As the Earth rotates around, spectacular sites can be seen. This double exposed image of the night sky was taken over the Kofa Mountains in Arizona, USA. Dark dust, millions of stars, and bright glowing red gas highlights our milky way.

Image: Richard Payne, USA

Located atop a Chilean mountain lies one of the premier observatories of the southern sky, the Cerro Tololo Inter-American Observatory (CTIO). Above is the dome surrounding the 4-meter Blanco Telescope. Far beyond the dome are thousands of individual stars and the diffuse light of 3 galaxies: the Small Magellanic cloud (upper left), the Large Magellanic cloud (lower left), and our Milky Way Galaxy (right). Also visible are the four bright stars of the Southern Cross (bottom).

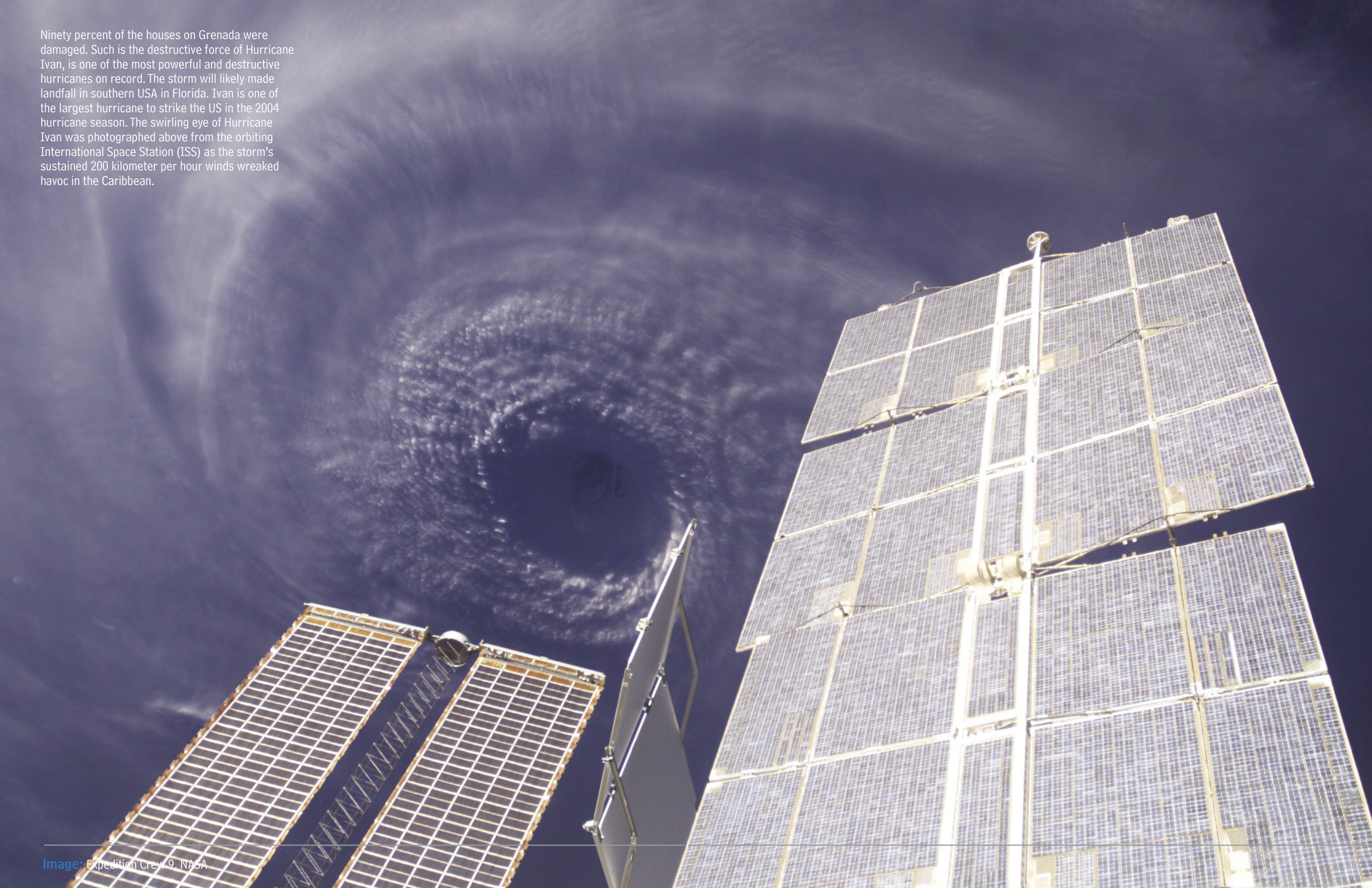


Image: Roger Smith, CTIO



This is what the Earth looks like at night. Can you find your favorite country or city? Surprisingly, city lights make this task quite possible. Human-made lights highlight particularly developed or populated areas of the Earth's surface, including the seabords of Europe, the eastern United States, and Japan. Many large cities are located near rivers or oceans so that they can exchange goods cheaply by boat. Particularly dark areas include the central parts of South America, Africa, Asia, and Australia. The above image is actually a composite of hundreds of pictures made by the orbiting DMSP satellites.

Ninety percent of the houses on Grenada were damaged. Such is the destructive force of Hurricane Ivan, is one of the most powerful and destructive hurricanes on record. The storm will likely made landfall in southern USA in Florida. Ivan is one of the largest hurricane to strike the US in the 2004 hurricane season. The swirling eye of Hurricane Ivan was photographed above from the orbiting International Space Station (ISS) as the storm's sustained 200 kilometer per hour winds wreaked havoc in the Caribbean.





The crew on board the International Space Station sometimes needs supplies. As the US Space Shuttle fleet prepares to return to flight, supplies usually now come from a robot progress supply vessel launched from Kazakhstan. Pictured here, a progress ship approaches the ISS on May 27, delivering over 2,500 kilograms of food, water, fuel and other important items. The supply ship soon docked with the Zvezda Service Module while orbiting the Earth over 300 kilometers over central Asia.

**Image:** ISS Expedition 9, USA

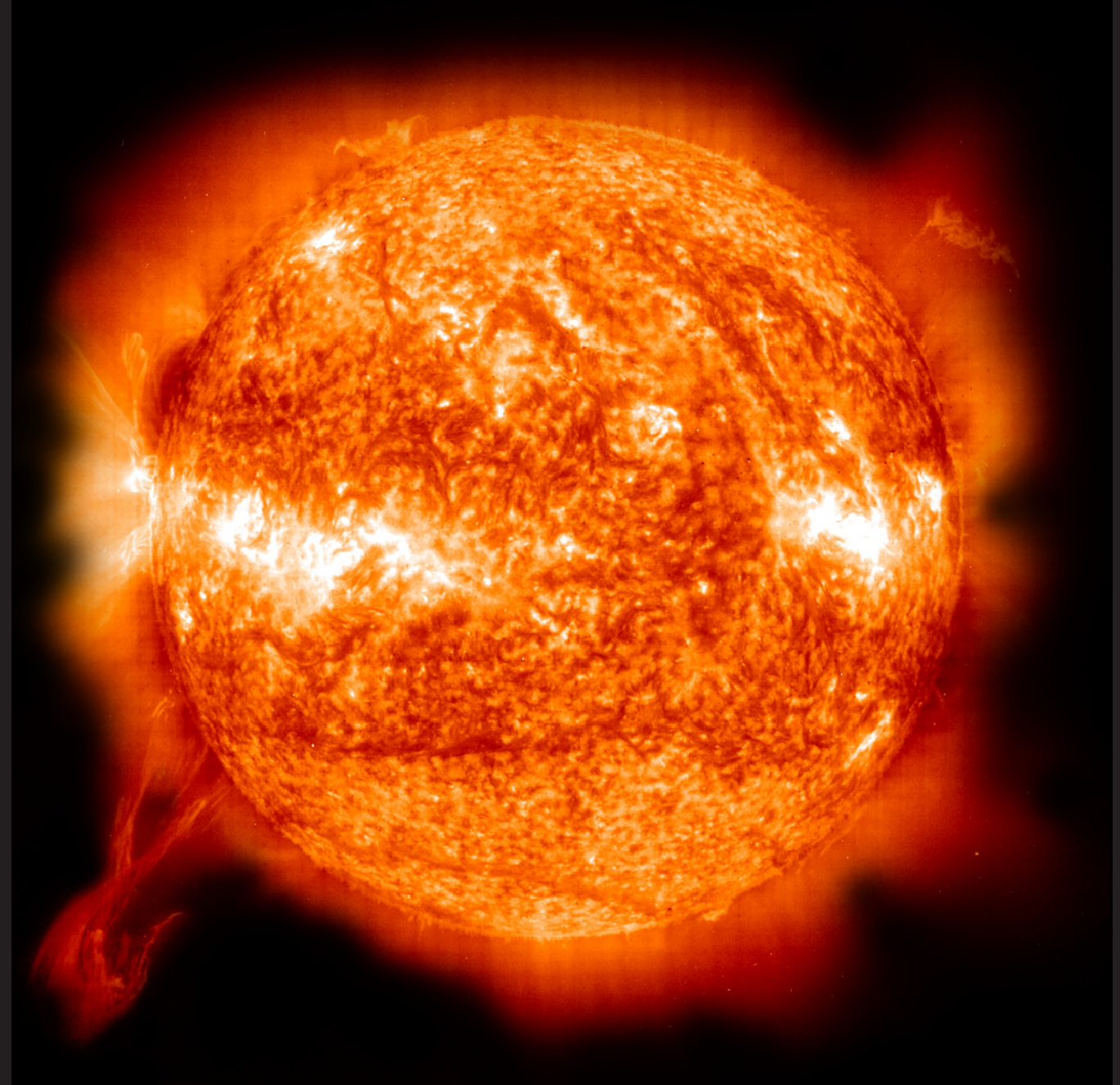
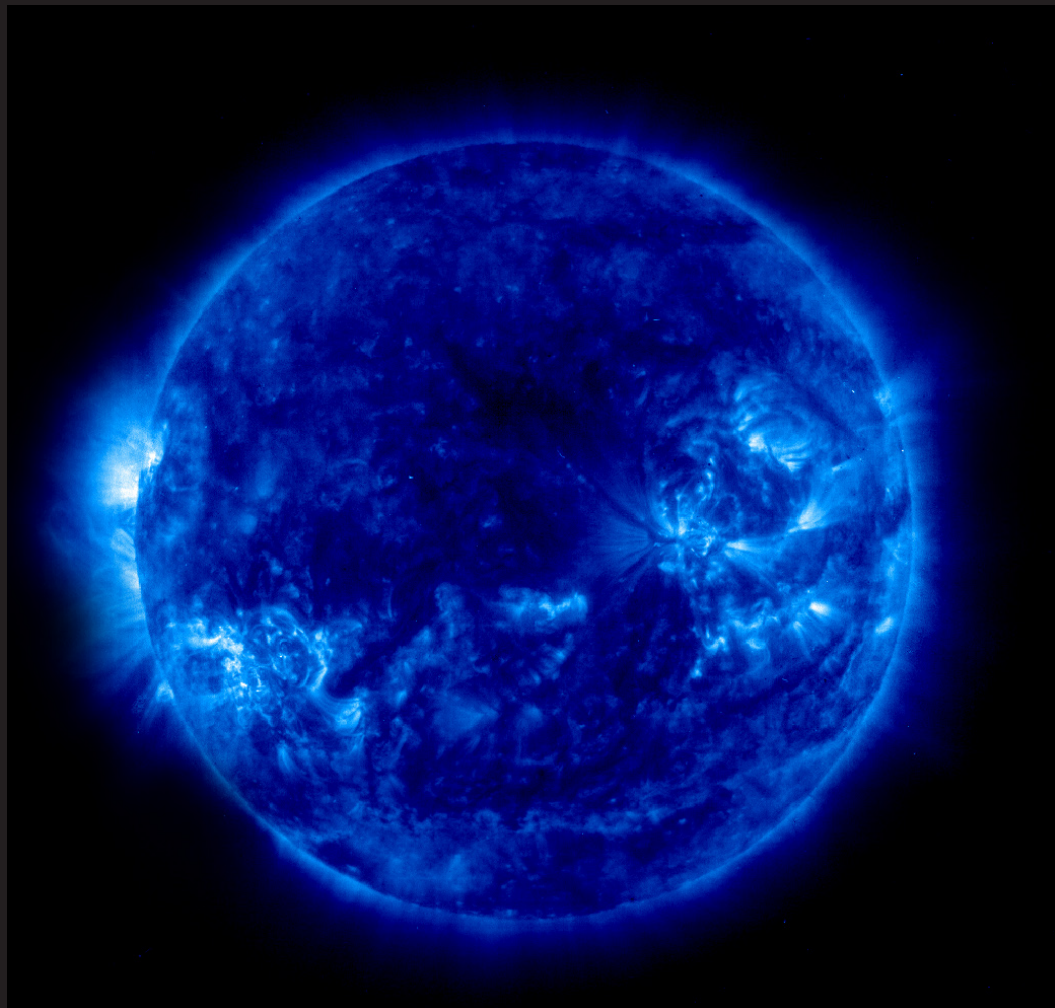


Image: James Doe, USA



Image: Robert Gendler, USA

On July 20, 1969 Neil Armstrong and Edwin E. "Buzz" Aldrin, Jr. became the first humans to walk on the moon. After 3 years and 11 astronauts, the sixth and final manned lunar landing took place on December 7, 1972. The moon has fascinated man since his birth. With a good pair of binoculars or a telescope, one can see how the moon is pocked with impact craters. Copernicus (left center) and Tycho (bottom) can be seen clearly.



Spinning on its axis at thousands of miles per hour at a temperature of 1,800,000°F sits the sun. Like the moon, it too has fascinated man for thousands of years, bringing us warmth and life. These two pictures taken by the Solar & Heliospheric Observatory(SOHO) show the sun through different color x-ray filters, showing us the transition region of the sun. Composed of burning gases such as hydrogen, helium and nitrogen. Generating Solar winds that move at over a 1,000,000 miles per hour, and having an internal temperature of 27,000,000°F, the sun is a truly hostile place to be. The sun itself is in the top 10% of stars in the galaxy, yet is still considered to be insignificant due to it's size. The images above show various details of the sun such as filaments and plage, chromospheric networks, spicules, solar flares and prominences.



Staring across interstellar space, the alluring Cat's Eye Nebula lies three thousand light-years from Earth. A classic planetary nebula, The Cat's Eye represents a final, brief yet glorious phase in the life of a sun-like star. This nebula's dying central star may have produced the simple yet stunning spiral pattern we see above. This image gives us a chance to see what our sun will look like when it enters its planetary nebula phase of evolution... in 5 billion years.



Andromeda is the nearest major galaxy to our own Milky Way Galaxy. Our galaxy is thought to look much like Andromeda. The diffuse light from Andromeda is caused by the hundreds of billions of stars that compose it. The several distinct stars that surround Andromeda's image are actually stars in our Galaxy. Andromeda is frequently referred to as M31 since it is the 31st object on Messier's list of diffuse sky objects. M31 is so distant, it takes about two million years for light to reach us from there. Although visible without aid, the above image of M31 is a digital mosaic of 20 frames taken with a small telescope.



Look up into the sky tonight, and even with a good telescope you won't come across a sight quite like this one. It is a familiar object though, the grand stellar nursery known as the Orion Nebula. But the striking picture combines images taken through three separate filters, each designed to record different emission lines—light from sulfur, oxygen, and hydrogen atoms glowing in the tenuous nebular gas. At such low densities, sulfur and hydrogen atoms emit red colors while oxygen glows green. To distinguish their contributions in the final image, sulfur was assigned to red, hydrogen to green, and oxygen to blue, a color scheme used in mapped-color images of other astronomical nebulae as well.



It is considered to be one of the most famous star clusters in the sky. The Pleiades can be seen without binoculars from even the depths of a polluted city. Also known as the Seven Sisters and M45, the Pleiades is one of the brightest and closest open clusters. Containing over 3,000 stars, it is about 400 light years away and only 13 light years across. As evident in the photograph, one can see the blue reflection nebulae that surround this bright cluster of stars. Typically, at least 6–9 stars can be seen by the naked eye. While using more advanced observation equipment, one can see nearly 500 brightly lit stars. This cluster of stars has been known through out history, being mentioned in Homer's *Odyssey*, the Bible, used by sailors for navigation, and as far back as 1,000 B.C. by farmers as a way to track the agricultural season.



Astronomy compels the **soul** to look upward,  
and leads us from **this world** to another.

—**Plato**, 342 B.C.  
'The Republic'

