

Putting the pieces together

More than 100,000 pictures have been taken from the Space Station

By Debbie Nguyen



Photographed by an Expedition 7 crewmember onboard the International Space Station, this image shows the limb of the Earth at the bottom transitioning into the orange-colored troposphere, the lowest and most dense portion of the Earth's atmosphere. The troposphere ends abruptly at the tropopause, which appears in the image as the sharp boundary between the orange- and blue-colored atmosphere. The silvery-blue noctilucent clouds extend far above the Earth's troposphere. The silver of the setting Moon is visible at upper right.

ISS007e10974

The mysteries of life can be thought of as an extraordinary puzzle with missing pieces. Our innate curiosity creates a network of questions, each trying to answer "Why?" and "How?" and fill in the gaps in human knowledge.

Thanks to the photographs taken by crews aboard the International Space Station, more than 100,000 of those puzzle pieces have been located, furthering us in our quest for answers.

The number of photographs of Earth taken by Space Station astronauts recently crossed the 100,000 mark. These images are not only breathtaking but also support all three objectives of the NASA Mission.

'To understand and protect our home planet'

Space provides an unequalled vantage point for observing and tracking changes on Earth. Pictures of the planet from space can greatly increase understanding of Earth's ongoing transformations – both natural and human-caused.

In order to get high-quality, useful images of Earth, astronauts must know what to look for. To accomplish this, Kamlash Lulla, Chief Scientist for Earth Observation at Johnson Space Center, coordinates Earth Observation training for Space Station astronauts.

The astronauts are trained to become "Earth smart" so they can be our "eyes and ears in orbit," Lulla said.

Aboard the Space Station, astronauts are equipped with commercial Kodak professional digital cameras and take their photos through the optical-quality window in the Space Station's Destiny module.

One application of these Earth photographs is urban development. For instance, photos of cities at night can tell engineers and researchers how populated an area is and how functional the local transportation systems are.

Expedition 6 Science Officer Don Pettit took many nighttime photos of cities from the Space Station, which were highlighted by Lulla in a technical publication article.

Environmental events can also be studied more effectively with photography from space. For example, pictures from the Russian space station Mir helped scientists explain natural events like El Niño and biomass burning.

The Earth's environment is dynamic and ever changing. From the vantage point of the ground, these changes can be nearly undetectable. With a view from space, the world looks a lot different: the vastness of hurricanes and the paths of forest fires can be seen in a blink of an eye, and dust storms and the movement of glaciers can be tracked more easily.

'To inspire the next generation of explorers...as only NASA can'

On December 7, 1972, Apollo 17 astronauts captured the first full image of Earth from space – the famous shot called "the Blue Marble." Since then, it has become the most requested space image, igniting humanity's curiosity.

The following Earth photography outreach efforts help to inspire and educate the public:

■ <http://eol.jsc.nasa.gov>: "The Gateway to Astronaut Photography of Earth," the Earth and Imaging Department's premiere online collection of astronaut photos

A mass of storm clouds was captured with an electronic still camera (ESC) from the International Space Station (ISS) by the Expedition 1 crewmembers. The picture was the first Earth observation still image downlinked by the three-man crew.

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On July 15, 2003, the Expedition 7 crew had a great seat from which to observe tropical storm Claudette as she became a hurricane and blew ashore with high winds and heavy rains that drenched their Houston home base and other Texas areas.

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■ "Costa Rica from Space": NASA scientists and EARTH University from Costa Rica's compilation of pictures taken by astronauts from space that records Costa Rica's geography

■ Lewis and Clark Expedition Project: NASA partnered with Geographic Communication Systems Research in an effort to create a map of Lewis and Clark's 3,700-mile expedition across North America in the early 1800s.

'To explore the universe and search for life'

The Vision for Space Exploration takes us to the Moon and Mars. These pictures can help get us there.

"We are at the forefront of this new vision," Lulla said. "To understand what's happening on Mars, you have to understand what's happening on Earth."

For instance, scientists at NASA's Jet Propulsion Laboratory use what they know about rocks, minerals, erosion and water on Earth to figure out the geology and history of Mars.

"If you look at the bigger picture, even though we are going to the Moon and Mars, there is always going to be an intense interest by the public on what's happening on the surface of Earth," Lulla said. "NASA will always have to have an active program where we are looking back on Earth and creating awareness of our own planet, our own habitat, our own home."

These planetary portraits have shed light on some enigmas and can serve as a platform for new visions. With each click of the camera, we get closer to unveiling the big picture and closer to quenching humankind's insatiable thirst for knowledge.



The dark area near Earth's horizon at center frame is actually a shadow cast by the Moon during the total solar eclipse of Dec. 4, 2002. The shadow obscures an area of cloud cover. The station, with three Expedition 6 crewmembers aboard, was over the Indian Ocean at the time of the eclipse. The out-of-focus object in the foreground is part of the frame for the viewing port.

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As geomagnetic storms cause beautiful displays of aurora across the United States, astronauts onboard the International Space Station also have the opportunity to take a look. Green colors of the aurora are dominant in this image captured by a digital still camera on October 4, 2001. Auroras are caused when high-energy electrons pour down from the Earth's magnetosphere and collide with atoms.

ISS003e6152