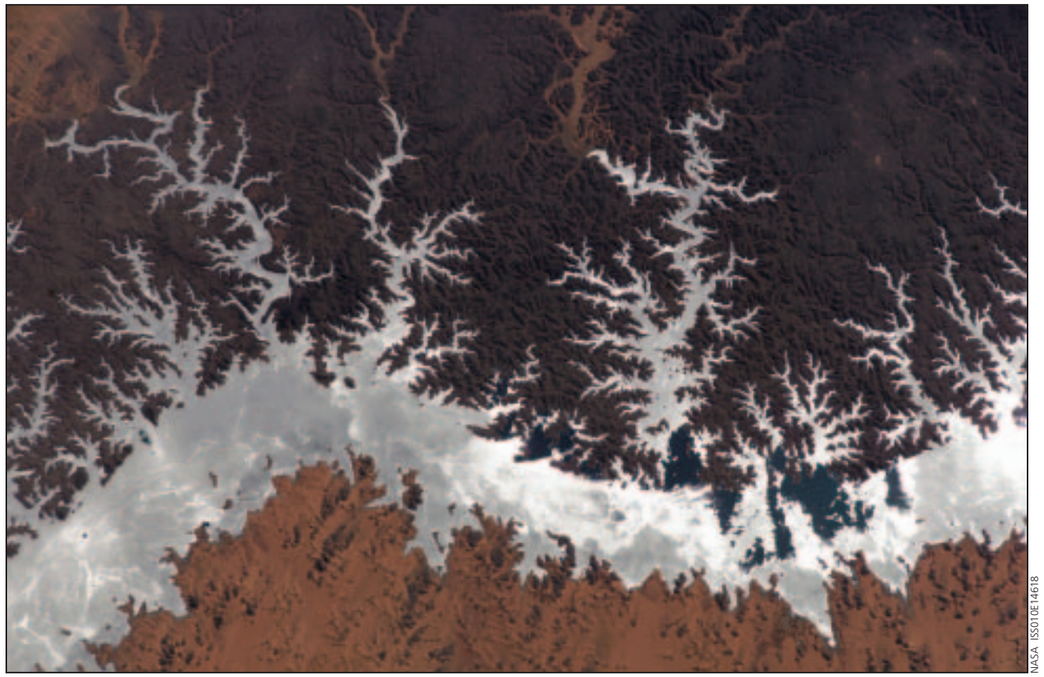
"The beauty of the Earth was very inspiring, and I tried to find new ways to capture and express that beauty."

Leroy Chiao



NASA ISS010E14618

Egypt's Lake Nasser, centered roughly at 22.64 degrees north latitude and 32.45 degrees east longitude, was captured with an electronic still camera by Leroy Chiao onboard the International Space Station. The sun glinting on the lake makes it more easily visible.

Still, pointing a digital camera at Earth from space while flying 230 miles above the planet calls for a different approach to "light writing" altogether.

"Being in space means having to find ways to support yourself and the camera," Chiao said. "Since the Earth is moving past at 17,500 mph, one must pan the camera as the shutter is released, otherwise the image will smear and appear out of focus."

A special team of scientists identifies photo opportunities that align with the orbiting vehicle's path and notifies the working astronauts in advance. Other shots come by chance as astronauts peer out their window to the world.

Flying at five miles a second, however, these opportunities come only as mere flashes. Trigger-happy fingers must set the perfect aperture and shutter speed – major aspects of good photography – before the opportunity vanishes.

Weather and lighting also play a major factor in photography from space.

With six months of consistent practice, Chiao improved his camera skills while in space and developed a real passion for it.

"Technically, one can practice and master the right methods of shooting good space photos," he said. "For engineers like me, I recommend that they think about composition. That is, don't just capture the data, but try to compose photos that are beautiful too."

In photography, the eyes have it. When shooting from space, this is especially true. The camera's eye – the lens – determines what will be in the picture and how. It also gives the photographer more reach or wider angles.

"I shot mostly 180mm, 400mm and 800mm, but also worked with 50mm and 58mm," said Chiao, who chose his lenses to grab the best focus and exposure of his targets.

Depending on the lens and the aperture (the size of the camera's "eye" opening), some shots show great depth of field with artistic details of hard rock, ridges, valleys and rivers.

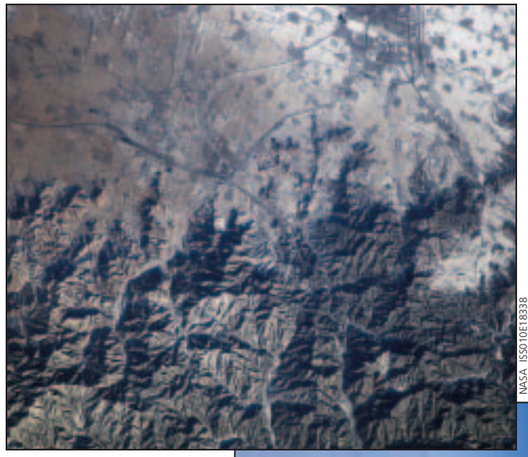
Within Chiao's photo album is the first confirmed picture from space of the Great Wall of China. Although the Great Wall was difficult to see with the unaided eye, Earth's geological diversity in Chiao's collage of images remained very visible. Chiao also collected snapshots of the Chinese launch site.

"The launch site was of great interest to me because of its historical significance," Chiao said. "It is only the third place in history from where astronauts were launched into space."

Other memorable shots for Chiao were the Tokan Lakes in Egypt, the pyramids at Giza and the moon next to the Earth's limb – a shot that can only be taken from space's vantage point.

"I try to be artistic, but I am in many ways a typical engineer," Chiao said. "Photography in space helped bring out the artistic side in me. The beauty of the Earth was very inspiring, and I tried to find new ways to capture and express that beauty."

Chiao's vivid experience in space opened new horizons for him. Though being an astronaut will always come first, he plans to continue to develop his photography skills now that he's back on Earth.



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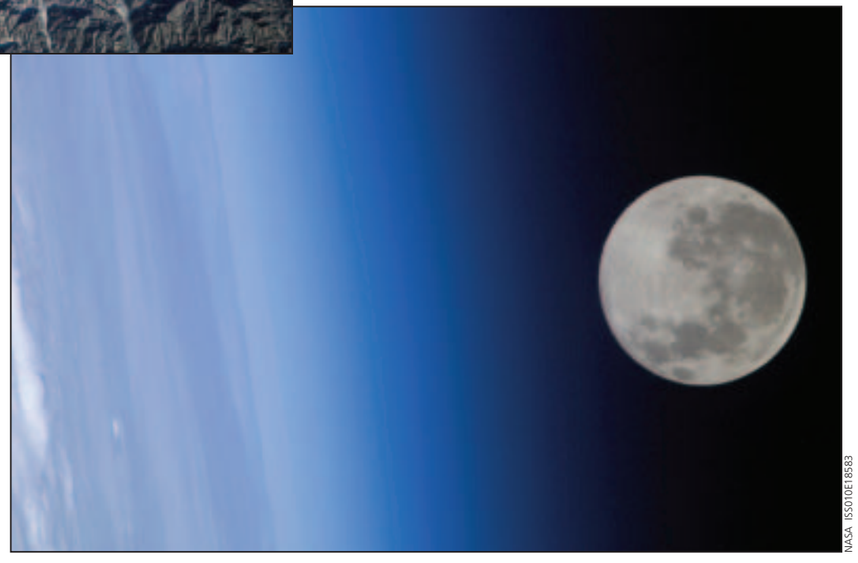


NASA ISS010E18583

Clockwise from above left: *The Great Wall of China and Inner Mongolia are featured in this image.*

An unpiloted Progress 17 resupply craft launched at 1:09 p.m. (CST) on Feb. 28 from the Baikonur Cosmodrome in Kazakhstan to deliver two tons of food, water, supplies, equipment and fuel to the Expedition 10 crewmembers onboard the station.

A full moon is visible in this view above Earth's horizon and airglow.

THE HUMAN PRESENCE IN SPACE

We've only just begun

by Catherine E. Borsché

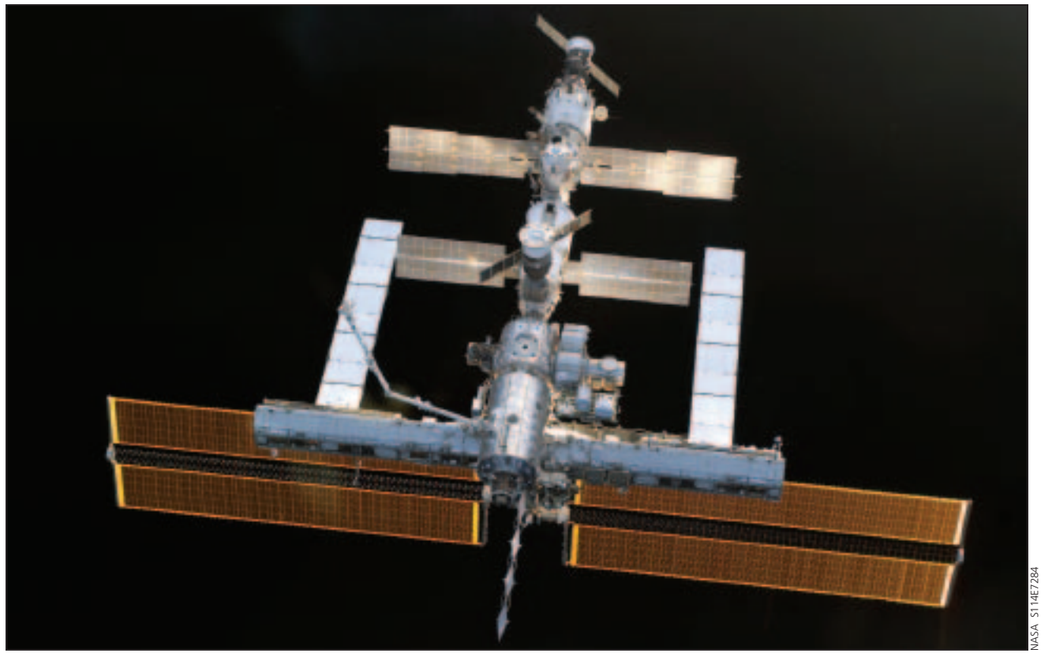
Break out the thermostabilized beef tips with mushrooms and rehydratable apple cider! NASA is poised to celebrate a major space milestone on Nov. 2, as the International Space Station will clock its fifth anniversary of continuous human presence in space.

Since Expedition 1 arrived on the scene Nov. 2, 2000, the space station has grown and evolved into an unprecedented, state-of-the-art laboratory complex. Offering a microgravity environment that cannot be duplicated on Earth, space station continues to further humankind's knowledge of science and how the human body functions for extended periods of time in space – all of which will prove to be vital on long-duration missions to Mars.

"It gives us unique access to the space environment, where we hope we can do very interesting and productive research, but it really means we (will) develop a lot of the capabilities and technology that'll allow humans to go elsewhere away from the planet," Expedition 1 Commander Bill Shepherd said about the space station. "So, if we don't have this progress with this space station, it means that humans in space are pretty much destined to stay close to the Earth – and I don't think that's what humans are about."

Solving unsolved mysteries

To date, 89 scientific investigations have been conducted on the space station and more breakthroughs are to come. New results from early space station research, including basic science to exploration research, are being published each month.



NASA S114E7284

The International Space Station was photographed onboard the space shuttle Discovery *following the undocking of the two spacecraft.*

For instance, great strides have been made in understanding the significant rate of bone loss by crewmembers while in orbit, and where in the bones the loss is occurring. Also, a complete characterization study of the radiation environment in the space station has been done, with evaluation of models of radiation shielding by the station's structure.

Many things, including eating habits and nutritional deficiencies, have been looked into to see how they all relate to the physiological effects of being in microgravity. New use of medical ultrasound equipment as a diagnostic tool and in-space soldering to repair potential hardware damage have also been tested on the space station. And that's only a tiny fraction of the studies conducted so far.

Expedition 9 Flight Engineer and ISS Science Officer Mike Fincke, who had the opportunity to work with Advanced Diagnostic Ultrasound and In-Space Soldering experiments while on the space station, believes that many unknowns can be solved during expeditions.

"The International Space Station is a perfect stepping-stone for us to perfect the technology, to perfect the operational tempo, operational parameters that we need to in order to make those long-duration missions successful," Fincke said.

A silver lining

Due to a space shuttle hiatus after the *Columbia* accident on Feb. 1, 2003, the space station had to become a more efficient research machine. Crews have been limited to two people, and experiments and supplies are now ferried to the orbiting outpost using either the Russian Soyuz or Progress ship.

However, what could have been a problem for the program turned into a unique learning tool. Future trips to Mars could take years to complete roundtrip, with little or no resupply opportunities, as well as limited cargo space. Repair techniques that are being perfected now could also be used during long-duration missions. Lessons taken from the space station during this period of heightened efficiency will help in planning for Mars missions later.

There's no place like home

As the space station has served as a science laboratory, it has also given crews something more important – a home away from home on Earth. During the upcoming five-year anniversary, the space station will be home to Expedition 12. Inside the ultra-modern "home," 15 Americans and 15 Russians have lived and worked aboard the space station.

With 15,000 cubic feet of habitable volume, more room than a conventional three-bedroom house, the space station affords many of the comforts one finds on Earth. There is a weightless "weight room" and even a musical keyboard alongside research facilities. Holidays are observed, and, with them, traditional foods such as turkey and cobbler are eaten – with lemonade to wash the foods down.

Continued on page 8

NASA ISS002E7172

The Expedition 2 and STS-100 crewmembers (above) get together for a group portrait in the emptied Raffaello Multi-Purpose Logistics Module. Clockwise from the 12 o'clock point in the circle are Kent V. Rominger, Yuri V. Lonchakov, Yury V. Usachev, Umberto Guidoni, James S. Voss, Jeffrey S. Ashby, Scott E. Parazynski, John L. Phillips and Chris A. Hadfield, with Susan J. Helms at center. Usachev, Helms and Voss were members of the Expedition 2 crew, with the other seven serving as the STS-100 crew on the space shuttle Endeavour.

Astronaut Mike Fincke (below), Expedition 9 ISS science officer and flight engineer, performs one of multiple tests of the Capillary Flow Experiment (CFE) investigation in the Destiny laboratory of the International Space Station. CFE observes the flow of fluid, in particular capillary phenomena, in microgravity.

NASA ISS009E23442