

Aging ISS a space lab of 'unlimited' opportunity

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The Orbital Sciences Corporation's unmanned Cygnus cargo ship arrives at the International Space Station, on January 12, 2014

It may be 350 kilometers (215 miles) above Earth and a place that only a privileged few will ever visit, but the International Space Station is crucial to advances in science, health and technology, experts say.

Earlier this month, NASA said the life of the \$100 billion ISS would be extended by four years, or until at least 2024, allowing for more global research and scientific collaboration.

John Holdren, a senior White House adviser on science and technology, hailed the space station—mainly built with US money—as "a unique facility that offers enormous scientific and societal benefits.

"The Obama administration's decision to extend its life until at least 2024 will allow us to maximize its potential, deliver critical benefits to our nation and the world and maintain American leadership in space," he said.

The orbiting outpost, which was launched to fanfare in 1998, has more [living space](#) than a six-bedroom house and comes complete with Internet access, a gym, two bathrooms and a 360-degree bay window offering spectacular views of Earth.

Its entire structure is made up of various working and sleeping modules, and extends the length of a football field (about 100 meters or yards), making it four times bigger than the Russian space station Mir and about five times as large as the US Skylab.

The aging structure requires regular maintenance, which is done by astronauts who don spacesuits and venture outside the lab.

One such repair was completed Christmas Eve when two Americans stepped out to replace a failed ammonia pump that served to cool equipment at the ISS.

Julie Robinson, an ISS scientist at NASA, insisted that the space station, which has a mass of 924,739 pounds (420,000 kilograms) but is near-weightless in space, is worth the trouble and expense.

The ISS, which is maintained by a rotating crew of six astronauts and cosmonauts who have hailed from 14 countries, allows scientists to study the long-term effects of weightlessness on the human body, she said, while testing new space technologies that will be essential for missions to Mars.



Crew members aboard the International Space Station release Orbital Sciences' Cygnus spacecraft from the station's robotic arm, on October 22, 2013

"The goal of using the space station is to make discoveries that cannot be made anywhere else... and do research that is really focused on bringing benefits back to Earth by developing knowledge that can directly help bio-medical treatments, make new materials, have better Earth and climate observations," she told AFP.

Robinson added that "many of our early research results are making their

way into drug development, medical technologies, pathways. We also have Earth-remote sensitive instruments that provide unique data about the Earth and its climate and there are a number of new instruments going up in the next two years.

"When you put all of that together it's really an extraordinary set of benefits back here on Earth."

Robinson noted that a [robotic arm](#) used at the space station can save lives during brain surgery.

"What was special about this one is the ability of the arm to perform inside an MRI machine so that doctors are able to see the tumor and then use the ability of the robotic arm to be more stable than the human hand," she said.



A view of Earth as seen from the Cupola on the Earth-facing side of the International Space Station, on June 18, 2013

"Those two things together have allowed surgery on patients who were considered inoperable before."

Cheryl Nickerson, a professor of microbiology at Arizona State University, has been involved since 2006 in research that has taken place as part of the space program, for example homing in on the salmonella bacteria that causes food poisoning.

"I believe that the discovery potential at microgravity research is enormous and holds potential to provide ground-breaking discoveries in some of the major causes of human morbidity and mortality on Earth," she said.

"That stems from the fact that there is no way on Earth that we can study our cells and biological systems respond without the force of gravity affecting it."

Robinson described the possibilities at the ISS as "unlimited," and noted that a growing amount of private money was supporting research at the space station.

"This is an era of [space research](#) that is unlike the past and we are looking at the decades ahead as the time when science can finally pursue these boundaries, explore these frontiers and make these unique discoveries," she said.

"I think as we look back, 20 or 30 years from now, we will call this the era of the space station... because of the number of advances and benefits that will come out."

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