NASA says 2013 will be a year of science on the space station

January 7 2013, by Mark K. Matthews

Right before Christmas, a Russian rocket carrying three astronauts - one American, one Russian and one Canadian - launched from a chilly spaceport in Kazakhstan to begin a five-month mission to the International Space Station.

Unlike many of its predecessors, this crew's job is straightforward: Do science - from studying solar rays to investigating how microgravity affects fish and their bones, which could provide insight on why astronauts lose bone density while in space.

"Twenty-thirteen really promises to be a productive one," said Chris Hadfield, a Canadian Space Agency astronaut, after arriving at the outpost.

If that's true, NASA will get one step closer toward finally fulfilling the promise of the $100 billion space station that was intended to be a groundbreaking laboratory circling about 220 miles above Earth.

Although critics have questioned why it has taken so long - work began on the station in 1998 - NASA said the new emphasis on science and the arrival of new equipment mean the future looks bright.

"As the coming year unfolds, NASA will continue to conduct important research on the International Space Station, which continues to yield scientific benefits and provide key information about how humans may live and thrive in the harsh environment of space," NASA leaders wrote

in a year-end status report.

Key is the addition of new equipment.

By next fall, NASA plans to send to the station an "Animal Enclosure Module" that will allow scientists to study the effects of weightlessness on rodents - which could help doctors develop better medicines for bone and muscle ailments. The 60-pound module had flown 23 times aboard the space shuttle.

Marybeth Edeen, NASA manager of the station's national laboratory, said the rodents could be used to test drugs intended to treat osteoporosis or illnesses that degrade the muscles, such as Lou Gehrig's disease.

"A 30-day-old mouse on the station has the bone and muscle structure of a 60-to-70-year-old woman," said Edeen, adding that rapid changes brought on by weightlessness enable drug companies to quickly assess the results of experimental medicines.

"You start to get some quick models to test different pharmaceuticals," she said.

Similarly, NASA plans to increase the number of plant test beds on the station and add a new "atom lab" in the next couple years that will be cold enough to slow atomic particles - giving scientists a chance to better study their makeup.

Edeen said 2013 also promises to yield results from the Alpha Magnetic Spectrometer, a van-sized device that's essentially a tube wrapped in powerful magnets. Designed to study interstellar particles, it was flown to the station in 2011 and attached to the outside of the observatory. So far, it has tracked more than 27 billion cosmic rays.

The hope is AMS can provide new insight about the universe and its formation, particularly as it relates to a mysterious substance called antimatter. Scientific theory holds that the universe was formed from equal parts of matter and antimatter, but finding traces of antimatter is difficult - it's annihilated when it comes into contact with matter.

But more could be known in six months. "The first (AMS) papers will come out in summer 2013," Edeen said.

Getting to this point, however, hasn't been easy.

Though crews have staffed the station since 2000, astronauts were averaging only three hours of science work a week as late as 2008.

Two events changed that: NASA and its partners finished the station, and the crew in 2009 expanded from three to six. Last year, astronauts spent about 50 hours a week on science, including research on how microgravity affects the spinal cord and observations of Earth's environment, such as melting glaciers.

Still, there has been lingering criticism of why NASA didn't better prepare for the station's completion and whether the scientific returns are worth the roughly $1.5 billion spent annually to operate it.

Climate researcher Warren Washington, who recently served on a National Academies board that reviewed NASA's direction, said the station likely will be remembered more for its technological achievements than its scientific ones.

In particular, he expected the station to teach NASA a great deal about keeping astronauts alive in space. In 2015, Scott Kelly of NASA and Mikhail Kornienko of Roscosmos begin a yearlong mission - about twice the usual stay - to measure the physiological and psychological effects of

living in weightlessness and close quarters.

"As NASA gets ready to go to places like asteroids or Mars, the space-station experience will be very useful," he said.

Still, Washington said that NASA gets more bang for its science buck from unmanned spacecraft, such as Earth-monitoring satellites that circle the globe or the Mars rover now probing conditions on that planet.

What's more, NASA is using only about 72 percent of the space station's science racks, which house experiments - though the agency plans to up that figure to 80 percent this year.

In addition, the group that NASA picked in 2011 to develop a pipeline to get experiments to the station has suffered from internal strife, prompting Congress to warn it to get its act together.

The Florida-based organization, known as the Center for the Advancement of Science in Space, or CASIS, has revamped its board and now claims to be ready to move on to the next phase: "Maximize utilization of the ISS," said CASIS leader France Cordova.

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