

The International Space Station: A Platform for Research, Collaboration and Discovery

Witnesses:

William Gerstenmaier

Associate Administrator, Human Exploration and Operations, National Aeronautics and Space Administration

Donald Petit

Astronaut, National Aeronautics and Space Administration

Thomas Reiter

Director, Human Spaceflight and Operations, European Space Agency

James Royston

Interim Executive Director, Center for the Advancement of Science in Space

Committee Members Present:

Bill Nelson, (D-FL), Acting Chair

Kay Bailey Hutchison (R-TX), Ranking Member

John Boozman (R-AK)

Marco Rubio (R-FL)

The Senate Committee on Commerce, Science and Transportation held a hearing on July 25 to discuss the current operations and possible future for the International Space Station (ISS). ISS has hosted human astronauts from Russia, Canada, Japan, Europe and the U.S. since 2000. ISS is unique because experiments conducted there are free from the effects of gravity. This allows researchers to gain significant insight from experiments in combustion physics, virology, astronomy and meteorology. The U.S. involvement in ISS was called into question in 2010 when President Barack Obama halted manned space missions by the National Aeronautics and Space Administration (NASA) to the station. Since 2010, supplies and American Astronauts have been transported to ISS by the Russian Space Agency (Roscosmos) and American corporation SpaceX.

Senator Bill Nelson (D-FL) opened the hearing as the chairman of the Subcommittee on Science and Space and acting chair of the full committee. He began with a description of ISS which he called an “extraordinary contraption.” He said the station is “as large as a whole football field” and contains research from many countries and corporations. He explained that since the closure of the manned spaceflight program, the most recent U.S. crew on the station was delivered by Roscosmos. Since the successful transportation of experiments and supplies by the SpaceX craft on May 25, 2012 Nelson said he hopes Americans will no longer have to be delivered to the station by foreign nations. He “tooted the horn” of Ranking Member Kay Bailey Hutchison (R-TX) for her role in making the U.S. module of the ISS a national laboratory. Nelson said this opens the way for more U.S. companies to transport research to the station.

Hutchison began her opening statement by praising the accomplishments of recently deceased astronaut Sally Ride. Beyond being the first woman in space, Hutchison said Ride was “committed to physics and science” and their usefulness to humankind. Ride told Hutchison in an interview that the “ability to work with people” is the most important trait to exhibit in accomplishing humanity’s goal to explore space.

The ranking member said she and Nelson set up this hearing “to keep NASA in the forefront” and ensure Americans know its many benefits. She said she envisions ISS as a national lab which can be used by federal agencies and private entities. She acknowledged the role of mapping equipment in satellites like ISS in homeland security. She cited the Alpha Magnetic Spectrometer (AMS-02) as a possible “unforeseen practical benefit” of the space station. The apparatus detects dark matter in space, and was almost left off the ISS because of budget cuts in fiscal year 2010. Now the AMS-02 has measured over 18 billion hits of cosmic rays for evidence of dark matter.

Chairman John Rockefeller (D-WV) did not attend the hearing but submitted an opening statement which said ISS is “a unique opportunity to inspire our children’s interest in ... the STEM fields.” He mentioned the YouTube Space Lab Challenge, which brings

high school students' science projects to the station. The chairman said U.S. involvement with the station will allow private companies to conduct research in microgravity conditions. Since the station's construction has been completed in 2011, all focus can be turned towards practical research on the station to benefit people's everyday lives.

William Gerstenmaier, Associate Director for Human Exploration and Operations of NASA, began his testimony by saying astronauts on ISS are "doing research every day" in fluids, combustion, material processing and vacuum interface. He said researchers on the station work for around 14 hours a day, performing maintenance and construction duties while conducting this important research. The Japanese portion of the station contains equipment to observe Earth hazards like earthquakes and volcano eruptions which Gerstenmaier stated was "necessary to security" on Earth. He said he is hopeful about the future of ISS, saying the involved agencies are "making it easier" to get research into space. He closed by touting research and "the platform of discovery."

Donald Petit, NASA astronaut, provided his testimony as a veteran space-explorer with three missions on ISS. Petit was on the space station for six months in 2002 and 2003, and had just returned from an eight month trip which spanned two expeditions at the time of the hearing. He said he feels the duty of explorers in every age is to "tell stories about what it means to explore." Space is "one of the many frontiers" and "rich in discovery" according to Petit who said he hopes the federal government will support the U.S. commitment to the station.

Thomas Reiter, Director of Human Spaceflight and Operations of the European Space Agency (ESA), said ISS is a "unique platform for research and technology development" in his testimony. He discussed the joint NASA and ESA-run ISS module *Columbus* contributions to fluid physics and materials science. Materials research has produced lightweight alloys which are now used in jet engines. Reiter said he hopes the future of ISS will support exploration beyond low-earth orbit, perhaps boosting the station to the LaGrangian point, the point where an object is no longer affected by Earth's gravity. The LaGrangian point between the Earth and moon could serve as a way station for transport between the two bodies.

James Royston, Interim Executive Director for the Center for Advancement of Science in Space (CASIS), discussed his role in promoting the ISS in his testimony. The goal of CASIS is to "maximize investment on the national lab (ISS)" according to Royston. He said his organization works with academia and industry to transport research to the station, and has increased the speed of this transportation. He suggests seeking "new players" to test consumer products in space, and promoting education to students about the station. Royston said "history will look at this moment" as the beginning of an extremely lucrative partnership between industry, academia and government.

During the question and answer period, Nelson asked about viral vaccination research on the station. Gerstenmaier said viruses mutate to various strengths and strains in space. He explained if researchers can better understand this process, they can learn which genes dictate these factors and make more effective vaccines. Hutchinson asked if hazard observation can be done on another satellite. Gerstenmaier said ISS is the best place to test new equipment because of its size and operational capability. Petit added that it takes a human being to "know what to look at" while the equipment is being perfected. Senator Marco Rubio (R-FL) asked for a summary of other advances which "justify the expenditures" of U.S. support of the station. Petit explained astronauts study combustion outside the influence of gravity saying, "Fire brought us out of the cave." Reiter said the station is a "great platform to do Earth observation." He said there is "great value" to seeking knowledge for its own sake, and most research on the station will create tangible benefits. Gerstenmaier added that every physical process influenced by gravity can be better understood without it.

Hutchison asked for the panel's recommendations on how research on the station can be improved. Petit said the three U.S. crew members are already "stretched thin", but he said that since construction on the station is completed, more time can be devoted to research. Reiter suggested that it is too early to tell how to improve efficiency because the station has just reached a "quasi steady-state." Royston, prompted by Nelson, explained CASIS's role in managing ISS research. He said CASIS provides the "baseline" to researchers by gathering ISS research and passing it on to the community.

Senator John Boozman (R-AK) asked if NASA has lost capability to do significant research on the station without U.S. shuttles. Gerstenmaier answered that NASA can still bring research to space, but needs multiple ways to bring the crew to space and back for safety reasons. Petit passionately explained the need for human astronauts at the station and elsewhere, saying it "would break [his] heart" to tell students they could not go to space.

Hutchison asked about the possibility of extending ISS past 2020. Gerstenmaier explained NASA and the other countries' space agencies are still looking at physical systems of the station, trying to determine the "life-limiting factor" of ISS. NASA's current estimate is that the station could last until 2028 with proper maintenance and supply.

Witness testimony, opening statements and an archived web cast of the hearing can be found on the committee's web site.
