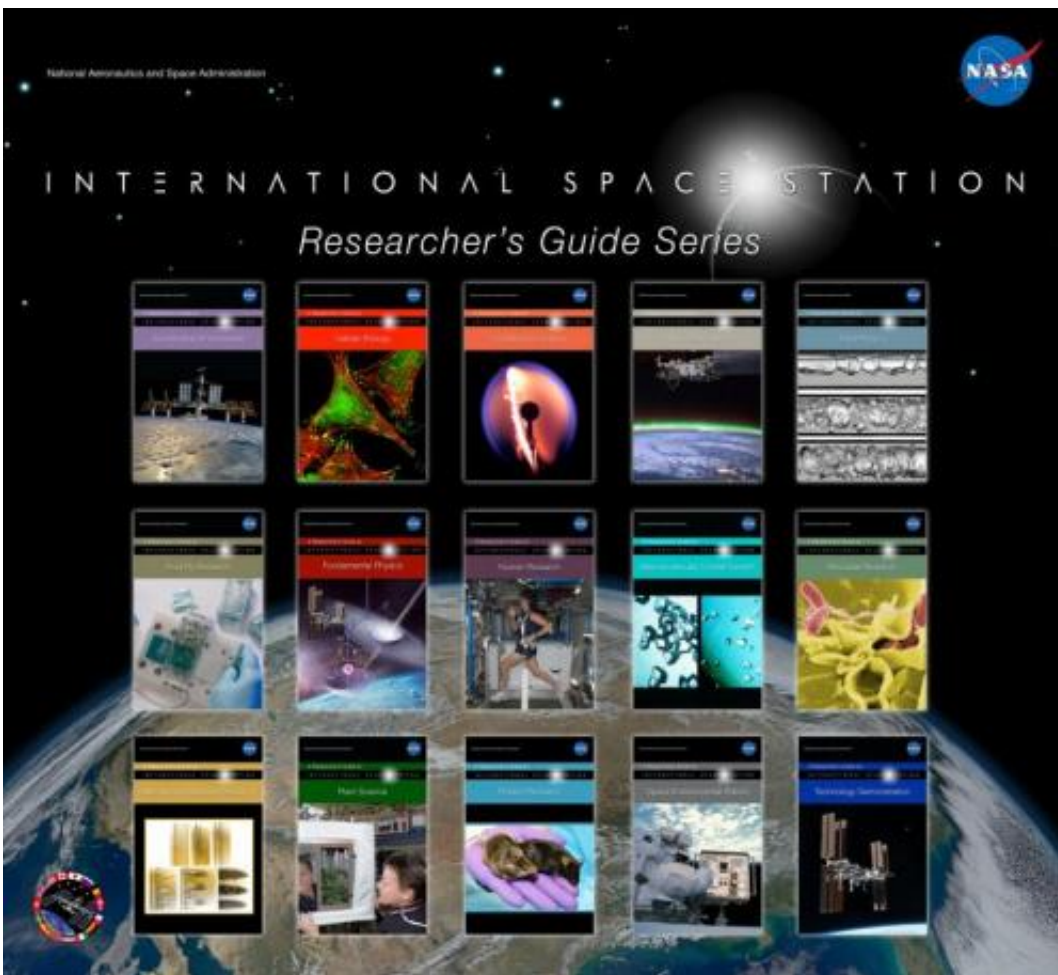


# International Space Station researcher guides aim to maximize science

July 21 2014, by Jessica Nimon



The Researchers Guide Series can help scientists realize their potential for microgravity research aboard the International Space Station. The first part of the series is already available online. Credit: NASA

How many times do we see an innovation and think, "Of course! Why didn't I think of that?" Our minds start turning towards thoughts of our own invention, sparking ideas and building possibilities. This type of inspiration is the concept behind the International Space Station Program Science Office's new 15-book Researcher's Guide Series. When scientists see what their colleagues have going on in orbit, their mental wheels may begin to speed up!

"Our goal is to encourage investigators to propose new research and potentially make discoveries that they could not make in an Earth-based lab," said Amelia Rai, International Space Station Program Office scientific communications specialist and project manager for the research guides. "We have the unique opportunity with these [books](#) to increase utilization of the space station as a national laboratory. The guides are part of a strategic plan to educate potential users of the space station platform on how they could transfer their ground-based experiments to space."

Organized by discipline, the books detail on-orbit studies and facilities to prompt new investigations. Scientists who might not have considered [microgravity research](#) before may be only a book away from getting a light bulb moment of their own.

"Our target audience is scientists who have not yet done space research, but who are experienced in discipline research in their own laboratories," said Rai. "In addition, we are targeting systems experts who might not be aware of opportunities to use space station as an engineering test bed."

The first part of the series launched online on May 14 with three books already available for download in pdf format and online viewing. These include Technology Demonstration, Microbial Research, and Earth Observations. The first book made its official debut at the July 2013 ISS Research and Development Conference in Denver, with the latter two

debuting at the 2014 conference in Chicago in June.



International Space Station Program Manager Mike Suffredini officially announced the availability of the space station Research Guide Series at the 2013 ISS Research and Development Conference in Denver. Suffredini is pictured here at the 2014 event where two additional guides debuted. Credit: NASA/Bill Hubscher

"We were all excited to hear Mike Suffredini, ISS Program Manager, announce that [the books] were available at the conference when he made his keynote speech last July," said Rai. "The feedback has been extremely positive, and I had co-workers contact me from the conference venue to tell me the books were going fast and generating a lot of interest."

The rest of the books should finish rolling out by December, completing

the series. The remaining topics include Plant Science, Rodent Research, Combustion Science, Fluid Physics, Fundamental Physics, Fruit Fly Research, Cellular Biology, Space Environment Effects, Human Research, Acceleration Environment, Microgravity Materials Research, and Macromolecular Crystal Growth.

"The books were also well received by the Government Printing Office which is making them available in bookstores and libraries across the country," said Rai. "I was told that this rarely happens and will likely happen for the entire series."

The hope is that each guide book will start a conversation in the community of each research discipline, educating, engaging and encouraging scientists to seek opportunities. The question researchers should ask themselves while reading is, "how can my ground-based experiments translate to the microgravity environment?" The answers can be endless with the books offering a jumping point to the creative process. Once an idea emerges for interested scientists, NASA and the Center for the Advancement of Science in Space (CASIS) have avenues to assistance and resources to help take research concepts into reality and ultimately to orbit.

"The books are written at a level that would help new users see opportunities and begin developing proposals for these opportunities through either NASA or CASIS," said Rai. "These guides would answer the questions of a 'first conversation' about how to use the space station in their discipline, and motivate them to learn enough from other sources, or find a partnership to develop full proposals within the future."

As the books point out, the unique factors of the space environment create fertile grounds for scientific investigation. By removing a variable that is essentially a constant on the Earth—gravity—researchers increase

the chances of discovery. They also have factors such as exposure to radiation, extreme temperatures, the vacuum of space and atomic oxygen to add to the mix. The station provides a platform with a 51 degree inclination that orbits the Earth every 90 minutes, which may appeal to those interested in Earth remote sensing.

"We decided to put ourselves in the position of a researcher who may not be aware of the benefits of research in microgravity and considered the questions they might ask," said Rai. "We want researchers to be aware that humankind has never before had a laboratory where the variable of gravity could be controlled and now they do for at least ten more years. The [space station](#) is currently approved to fly until 2024 affording us a decade to continue experiments in microgravity by offering scientists and engineers opportunities to further explore, make scientific discoveries and support the commercial use of space."

What this means for researchers, who can find the books online here, depends on their area of focus. For those interested in external instruments, the station can offer improved spatial resolution and varied times of day for capturing data. This could fill in the gaps for satellite instruments, which are on a different, sun-synchronous orbit from that of the station. For those measuring how a material may stand up to harsh conditions, you have quite the mix of elements to expose that sample to by mounting it externally. And with flames that burn as spheres, fluids that fill containers based on the shape of the vessel, and bacteria and viruses that may behave differently in space, there's much to explore and discover. Removing that one variable—gravity—makes a world of difference.

"These books are designed to start that conversation with the appropriate contacts in that discipline," said Rai. "In truth, the benefactors of this research are potentially all of us. The books are designed to engage the research community, but the research has the potential to change the

world. Nowhere on Earth or in its orbit is there an equivalent multi-discipline lab that can support experiments in microgravity. Taking gravity out of the equation creates a unique research environment that alters many observable phenomena within the physical and life sciences."

Provided by NASA

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