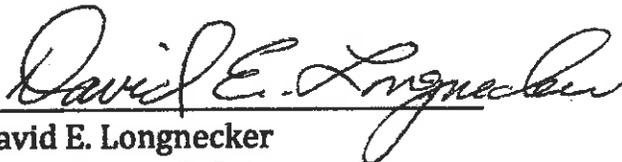


National Aeronautics and Space Administration

**Research Subcommittee
of the
NASA Advisory Council**

**April 17, 2013
NASA Headquarters
Washington, DC**

Meeting Minutes



**David E. Longnecker
Chair, Research Subcommittee**



**Brad Carpenter
Executive Secretary
Research Subcommittee**

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Welcome

Dr. David E. Longnecker

The public part of the initial meeting of the Research Subcommittee of the Human Exploration and Operations Committee began shortly after 10 am. Dr. Longnecker welcomed all participants.

Dr. Longnecker, the subcommittee chair; Dr. Brad Carpenter, the subcommittee executive secretary; and Dr. D. Marshall Porterfield, Division Director, Human Exploration and Operations Mission Directorate, were present. All other subcommittee members were connected via telephone and Webex.

Introductions

Dr. Longnecker asked subcommittee members to introduce themselves and make suggestions for the subcommittee's work.

- Dr. Robert A. Altenkirch is president of the University of Alabama at Huntsville. Dr. Altenkirch has worked on projects related to the behavior of fires in spacecraft and has an interest in propulsion. He has served on a National Research Council (NRC) committee supported by NASA focused on human exploration of space. Dr. Longnecker expressed appreciation for Dr. Alternkirch's input to the Research Subcommittee.
- Dr. M. Katherine Banks is vice chancellor and dean of engineering at Texas A&M University. She brings expertise in advanced life support, recycling of air and water, and the evaluation of water and air quality. She is interested in long-term space exploration, especially the reuse of water in that environment. Dr. Longnecker thanked Dr. Banks for her contributions to the subcommittee.
- Dr. Jeffrey Hoffman is an astrophysicist and has been a NASA astronaut. For four years Dr. Hoffman represented NASA in Paris. Since 2001, Dr. Hoffman has been working in aeronautics and astronautics at the Massachusetts Institute of Technology, specifically in technologies for space suits and other exploration-related technologies. Dr. Longnecker commented that Dr. Hoffman's experience will be valuable to the subcommittee.

- Dr. Terri L. Lomax is the vice chancellor for research, innovation and economic development at North Carolina State University. In the past, Dr. Lomax served at NASA Headquarters, where she was, at various times, director of fundamental space biology programs, deputy associate administrator for research, senior policy analyst for the NASA Office of Program Analysis and Evaluation, and a principal investigator (PI) in space biology. Dr. Longnecker told Dr. Lomax that the Research Subcommittee appreciates her time helping in this area.
- Dr. Stein Sture is vice chancellor for research at the University of Colorado. Originally from Norway, Dr. Sture has served as a NASA PI intermittently since about 1975. Dr. Sture has been involved in space research intermittently for a great many years and is happy to be back doing it. Dr. Longnecker thanked Dr. Sture. He noted that the variety of interests among subcommittee members will be valuable in the subcommittee's service to NASA.
- Dr. Kathryn C. Thornton is a nuclear physicist who was a NASA astronaut. She has been assistant dean at the University of Virginia. In the fall of this year Dr. Thornton will be unavailable for Research Subcommittee meetings while she serves as academic dean for Semester at Sea for the Fall Semester of 2013. Dr. Longnecker expressed appreciation for having Dr. Thornton on the subcommittee. He expressed regret at not having the group physically in one place to form a cohesive group at this initial welcoming meeting.

The people at the meeting introduced themselves:

- Dr. Longnecker, subcommittee chair, is an anesthesiologist. He has a medical degree from, and he did residency training at, Indiana University. He completed a research post-doctoral fellowship in physiology. Dr. Longnecker has held positions at the National Institutes of Health (NIH), the University of Missouri, the University of Virginia, and the University of Pennsylvania. Presently he serves at the Association of American Medical Colleges. Dr. Longnecker has been involved with NASA for 12 - 15 years in quality and safety in healthcare related to space flight.
- Dr. Carpenter, subcommittee executive secretary, has been with NASA since 1988. Dr. Carpenter has an undergraduate degree in chemistry from the University of California at Berkeley; a master's degree from the University of Virginia, where worked on fixed bed absorbers; and a PhD in fluid mechanics. At NASA, Dr. Carpenter was lead scientist for the microgravity program from 1996 to 2004. After 2004, he went to the ISS program; he returned when the Research Division was established in 2011. He said he saw the Research Subcommittee as an opportunity to help define the role of research in human space flight. Dr. Longnecker thanked Dr. Carpenter.

- Dr. Porterfield thanked Dr. Longnecker for his service to the subcommittee and expressed enthusiasm about working with the subcommittee. Dr. Porterfield has been at NASA since August 2012. He is a professor of biological engineering at Purdue University. He has a PhD from Louisiana State University, where he worked in space biology and plant physiology. He did post-doctoral work at the Marine Biological Laboratory at Woods Hole. Dr. Porterfield has also served as president of the American Society for Gravitational and Space Biology. Dr. Longnecker thanked Dr. Porterfield.

The Research Subcommittee's Charge

Dr. Longnecker sits on the Human Exploration and Operations (HEO) Committee to the NASA Advisory Council (NAC), which advises NASA on human operations and exploration activities. Recognizing the need for help defining the role of research in human exploration, the HEO committee recommended a that a subcommittee be formed to advise NASA. The subcommittee's charge:

The research subcommittee is established to review and assess NASA's approach to research in the support of human exploration. The subcommittee will specifically review and assess NASA's approach, progress, and plans for developing strategies and capabilities that reduce technical barriers to future human exploration missions and that strengthen the national research participation in human space flight.

The subcommittee has two specific objectives:

- 1) To provide advice and recommendations on the overall objectives, approach, content, and structure of the research activities in HEO mission directorate;
- 2) To provide assessments on the effectiveness of relationships between HEO and stakeholders in the research and educational sectors.

Dr. Longnecker explained the process: If the subcommittee develops recommendations, he will bring them to the Human Exploration and Operations (HEO) Committee, which, if it agrees, will take them to the NASA Advisory Council. Mr. Richard Kohrs, who chairs the HEO committee, is likely to be responsive to the Research Subcommittee's issues.

Dr. Longnecker introduced a presentation by Dr. Porterfield.

Presentation: Space Life and Physical Sciences

Dr. D. Marshall Porterfield, Division Director, Human Exploration and Operations Mission Directorate

Dr. Porterfield thanked Dr. Longnecker for his service and hard work in getting the Research Subcommittee started.

NASA's Space Life and Physical Sciences Research and Applications Division (SLPSRA), for which Dr. Porterfield is responsible, is a research division in an operations directorate, researching problems associated with human exploration, including research at the International Space Station as well as challenges associated with human space flight – for example, radiation. Within the Division, SLPSRA acts as Agency liaison for the International Space Station (ISS) national laboratory.

When Dr. Porterfield became division director in July 2012, because of budget limitations it was clear that it would not be possible to implement the full scope of the NRC Decadal Survey's recommendations. He is looking for opportunities to make progress in this given the current funding environment.

Dr. Porterfield talked about developing geneLAB, an open-source science approach for space research, and changing the paradigm of how to do science in space. Omics technologies relate genes to proteins and metabolite biomolecules. If these tiers of information can be organized and linked in an informatics database, ground-based research to understand space flight responses will be facilitated. These databases will be open to everyone. People can mine the information and follow their area of expertise and create observations from the data that will allow them to form and test hypotheses.

The model starts with a science definition team, which would create science requirements. Hardware would be created based on those requirements. Materials would be brought from the International Space Station back to the ground, where bioanalytic work would be done. Once the analysis was done, the information would be assembled into an open-source space bioinformatics database, one that is able to interface with other databases. In this effort, NASA is hoping to partner with NIH. Beyond creating a database that gives people a chance to download data, this approach creates the informatics tool to turn the data in to useful information.

Once the architecture for the geneLAB is established, NASA will be able to work with international partners. SLPS is trying to create the common platform that all different geneLAB projects would use. Because of the limitations of space stations, the current approach does not offer the necessary opportunity for throughput. The new approach opens a pipeline.

Dr. Lomax commended Dr. Porterfield for his approach, saying it accomplishes, quickly and creatively, exactly the direction recommended by the Decadal Survey.

Dr. Hoffman said Dr. Andrei Ruckenstein, who is a member of the board of the Center for the Advancement of Science in Space (CASIS), which manages non-NASA

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utilizations of the ISS, had brought to his attention some impediments with ISS-based research: 1) A lot of time is needed to get a project onboard the ISS, and 2) It is difficult to get samples back to Earth. The alternative – analyzing samples on the ISS – is problematic because ISS's instrumentation is about 10 years out of date. Dr. Hoffman also suggested that the Research Subcommittee include technology research in its purview. Dr. Carpenter agreed. He said he would make sure the Advanced Exploration Systems (AES) group is involved.

Dr. Banks commended Dr. Porterfield for an exciting project. She asked him to comment on the challenge of handling so much data. Dr. Porterfield replied that this is an opportunity for NASA to take leadership.

Discussion

Dr. Longnecker thanked Dr. Porterfield for the presentation. He said people who have advised NASA were disappointed when, in the past, budgetary restrictions forced an end to research below technology readiness level (TRL) level 3. Dr. Porterfield's approach opens up a new world, with potential for science. Dr. Longnecker suggested that the subcommittee provide feedback to Dr. Porterfield and his division. This initial meeting is just an opening discussion.

Dr. Carpenter and Shawanda Robinson, who was providing meeting support, said they would e-mail the presentation viewgraphs to subcommittee members.

Dr. Longnecker invited questions from the broader community. There were none.

Conclusion

Dr. Longnecker thanked participants for joining the meeting.

In regard to planning the next meeting, Dr. Carpenter commented that travel is difficult because of the sequester and other budget restrictions. He noted that the annual all-hands meeting for the NAC is scheduled for July 30 and 31; it was not clear whether the meeting would be face to face or virtual[Note: the meeting is now planned as a face to face event in Washington on July 29-30(BC)] Dr. Longnecker said that in the past such meetings have been candid discussions between the Administrator and committees. Dr. Carpenter said he would e-mail the Research Subcommittee with the meeting dates. Dr. Longnecker stated his wish to have one face-to-face meeting if possible. He thanked all participants.

The meeting adjourned at noon.