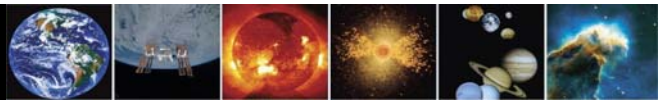
From the Space Studies Board Chair



Space Studies Board meeting, June 8-11, 2020

The Space Studies Board (SSB) of the National Academies of Sciences, Engineering, and Medicine (NASEM) held a virtual meeting on June 8-11, 2020, in part jointly with the Academy's Aeronautics and Space Engineering Board (ASEB). Presentations and discussions covered a wide range of topics of importance to the space community. Some past chairs have reported on the Board's activities semiannually, but the practice has not been followed in recent years. This message is being distributed because it seems worth renewing the tradition of informing the community that we serve about the broad range of topics discussed by the Board and updating our colleagues on issues of current importance.

The responsibilities of the SSB are described on the NASEM website as follows:

> "The Space Studies Board (SSB) was established in 1958 to serve as the focus of the interests and responsibilities in space research for the National Academies of Sciences, Engineering, and Medicine. The SSB provides an independent, authoritative forum for information and advice on all aspects of space science and applications, and it serves as the focal point within the Academies for activities on space research. It oversees advisory studies and program assessments, facilitates international research coordination, and promotes communications on space science and science policy between the research community, the federal government, and the interested public. The SSB also serves as the U.S. National Committee for the International Council for Science Committee on Space Research (COSPAR)."

The Board is assisted by a number of standing Committees that serve under its direction. An important Board activity is to organize and guide the committees that provide decadal surveys of the sub-disciplines related to space. In its efforts, the Board is supported by the following discipline committees:

- Committee on Astrobiology and Planetary Sciences (CAPS),
- Committee on Astronomy and Astrophysics (CAA),
- Committee on Biological and Physical Sciences in Space (CBPSS),
- Committee on Earth Sciences and Applications from Space (CESAS),
- Committee on Solar and Space Physics (CSSP), and
- Committee on Planetary Protection (CoPP)—committee members will be announced shortly.

Typically the Board meets semi-annually, in Washington, D.C. in the spring and at the Beckman Center in Irvine, CA in the fall. It hears reports from policy makers such as representatives of the National Space Council and the Office of Science and Technology Policy, representatives of Agencies (such as NASA and NSF), tracks the activities of Board committees, and learns about scientific developments (this time a panel on the 30th anniversary of the Hubble Space Telescope) and follows the progress of decadal surveys.

As a consequence of the COVID-19 pandemic, this year's spring meeting was held by Zoom conferencing. Despite the unusual format, the meeting was extremely productive and the committee members (information about the membership of the Board is provided at nationalacademies.org/ssb/about) managed to communicate effectively.

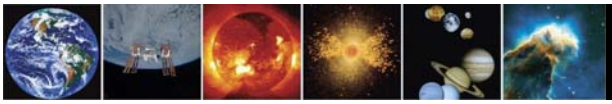
On **Day 1**, the SSB was welcomed by the ASEB as guests at their meeting, chaired by Alan Epstein (information about the membership of ASEB is provided at nationalacademies.org/aseb/about).

The first speaker was Robert Pearce, Associate Administrator for NASA's Aeronautics Research Mission Directorate (ARMD), who covered many topics of current interest including air passenger health and safety, challenges associated with enabling overland commercial supersonic transport, and issues related to education and skill development of the workforce.

A presentation on Advanced Aerial Mobility (AAM) by Nicholas Lappos, Chair of the AAM committee and ASEB member, was followed by an AAM ecosystem discussion panel.

Day 2 was again a joint meeting with the ASEB. Introductory remarks, representing personal views of both Chairs, acknowledged the multiple crises facing the nation, including "a global pandemic, a resultant economic catastrophe for many Americans, and, sadly, enduring racism and injustice." As individuals, we called for working together "to address injustice, to find new avenues to effect lasting change, and so seek to create a fair and equitable society."

The first speaker was Scott Pace, Executive Secretary of the National Space Council, who described new roles for the private sector in exploration, noted the ever-increasing problem of orbital debris, and commented on updated rules governing planetary protection. He was followed by Kenneth Bowersox, Acting Associate Administrator for the Human Exploration and Operations Mission Directorate, who described the challenges in sustaining astronauts over time scales of years (at least 3) required for the simplest manned mission to Mars, areas of incomplete knowledge related to effects of microgravity, and what we can learn about the challenges of Mars from preliminary missions to the Moon. Aaron Miles, Principal Assistant Director for National Security and international Affairs at the Office of Science and Technology Policy, focused on planetary defense, describing efforts to forecast impacts with near earth objects and possibly to deflect and disrupt such objects. He emphasized the strategic importance of our ability to predict space weather. NASA's response to the COVID-19 pandemic was discussed by Associate Administrator Steve Jurczyk. Time critical activities, such as work related to Mars 2020, whose launch date is 20 July 2020 (and subsequently has been slipped to 30 July), are being fully supported but other activities are slowed or on



hold. He described guidelines for ramping up on-site work before it is possible to resume normal activity and discussed the anticipated costs of the slow-down.

A panel of experts provided inspiring talks on the remarkable achievements of the Hubble space telescope in recognition of Hubble's 30th anniversary. Readers will understand that the Board members relished the opportunity to learn more about forefront science.

Day 3 of the meeting fell on June 10, 2020, a day on which many scientists had decided to strike in support the Black Lives Matter movement. Scientists had been encouraged to suspend normal work and devote attention to "explicit, implicit, and systemic racism in science and engineering;" some Board members joined the strike but most decided to move ahead with the meeting and to devote the closed planning sessions to the issue of racism in the community of scientists.

As Chair, I opened the meeting with some remarks on the strike and its focus, noting that

> "by the rules of the Academies, Academy boards do not issue findings or statements so my introductory remarks represent my personal thoughts. We have been encouraged by a group identified as #Shutdownstem to take time today, Wednesday June 10, 2020, to think about how racism impacts STEM and society in general. This provides an opportunity to ask ourselves what actions we can take together and individually to improve the participation of Blacks and other people of color in our STEM fields. The subject of racism in STEM fields was discussed at the annual meeting of the National Academy of Sciences by a Diversity Panel. Important points made in the discussion included the following:
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> - Most diversity efforts are NOT effective.
> - Most diversity efforts actually backfire.
> - Diversity efforts are viewed very differently by minorities and whites, which makes it almost impossible to find programs embraced by both.
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> With this sobering assessment in mind, it would be arrogant to expect that a spontaneous discussion of the subject at this meeting would be particularly helpful, so it is not explicitly on our agenda. However, the Board will meet in closed session later today to contemplate ideas. I would also welcome suggestions, ideally in writing, of ways in which this Board might consider actions designed to help topple the obstacles that have created a STEM workforce so far from representative of the talent available in this country. It's a tall order, but it's a most worthwhile goal."

A presentation by Thomas Zurbuchen, Associate Administrator of the Science Mission Directorate (SMD), covered many issues. NASA is working to provide support for those most affected by the "stay-at-home" restrictions, including soft money scientists and early career scientists, particularly affected by University hiring freezes. He commented on the challenges faced in supporting Flagship missions, noting that they must be managed so that they can succeed without greatly increasing their anticipated costs.

A presentation on the Mars 2020 Perseverance Mission by Adam Steltzner, Project Chief Engineer, followed. Following launch in July, the spacecraft will reach Mars in seven months. The ambitious project is on schedule and promises to provide a good start for Mars Sample Return.

The second half of the day was dedicated to hearing updates from the committees on Astronomy and Astrophysics, on Solar and Space Physics, on Earth Sciences and Applications from Space, on Astrobiology and Planetary Sciences, and on Biological and Physical Sciences in Space. It was noted that NASA's program in Biological and Physical Sciences in Space has recently moved into the Science Mission Directorate.

Day 4 began with an update from the European Science Committee presented by the chair of the European Space Science Foundation, Athena Coustenis. She described an ambitious program of missions being supported by our European colleagues, a combination of manned and robotic missions, and noted contributions to US-led missions.

Fleming Crim, Chief Operating Officer of the National Science Foundation (NSF), described its broad award program, which has not been slowed by the pandemic. He commented on the value of international research collaboration and the related issue of research security. NSF has commissioned and received a report on these issues from the science advisory group, JASON. While continuing to support access to fundamental research, it is particularly important for projects with international contributions to assure disclosure of conflicts of interest.

The rest of the day was devoted to presentations by a panel titled *Consideration of Satellite Constellations*. Astronomers are greatly concerned that reflection from large numbers of space objects will interfere with ground-based telescopic observations, but organizations such as SpaceX are working with scientists to address this issue as best they can.

The summary above does not begin to cover the informative material presented as the participants sat for several days glued to their computer monitors. Fortunately, many of the presenters provided their slides to the Board and they can be accessed at nationalacademies.org/event/06-08-2020/space-studies-board-and-aeronautics-_and-space-engineering-board-joint-spring-meeting-2020.

—Margaret Kivelson, Chair of the Space Studies Board of the National Academies of Sciences, Engineering, and Medicine

The views expressed here do not necessarily reflect those of the SSB or the National Academies of Sciences, Engineering, and Medicine.