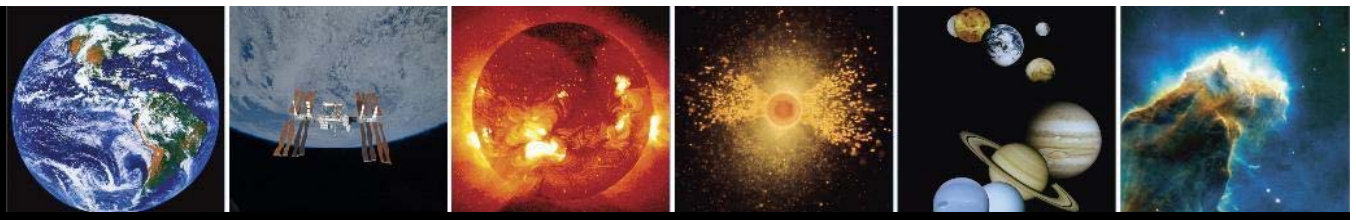
SPACE STUDIES BOARD NEWS



APRIL—JUNE 2017

Inside This Issue

I am sure over the course of my tenure as SSB chair, I will return to that day's events to provide insights not only into the challenges and opportunities faced by our nation's space program, but also into where the board and our discipline and study committees can continue to provide the best advice we can to our nation's leaders in space.

—Fiona Harrison, SSB Chair

The National Academies of
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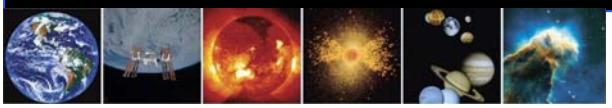
SPACE STUDIES BOARD NEWS



FROM THE SSB CHAIR

It is now close to a year since I agreed to be nominated as chair of the Space Studies Board, and the first few months of my tenure have been perhaps some of the busiest in recent SSB history—with over 10 committees in operation or in formation and 7 reports released since the beginning of the year. Three of those reports were authored by three of the board's four discipline committees which since January 1, have been chartered by the National Academies to issue reports on the implementation of the relevant decadal surveys. A very welcome development and one which complements well the evolution of NASA's SMD advisory committees under the NASA Advisory Council on which I have the honor to serve as an ex-officio member.

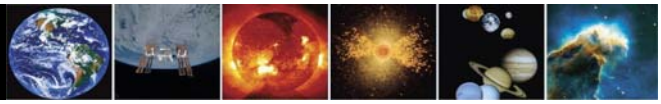
In May, I also had the honor of co-chairing along with the chair of the Aeronautics and Space Engineering Board, Alan Epstein, a major symposium on *America's Future in Civil Space*. The symposium—jointly organized by the SSB and ASEB—had several objectives: review the history of U.S. space policy and how it might form a broad policy basis for 21st century leadership in space; examine the balance and interfaces between fundamental scientific research in space, human space exploration, robotic exploration, earth observations, and applications of space technology and civil space systems for societal benefits; discuss the value, purpose and goals of international cooperation in space; discuss the role that the evolving commercial space sector could play in fulfilling national space goals and the role of the government in facilitating the further evolution and success of new actors and new modes of working with the commercial sector; highlight the challenges in maintaining the sustainability of outer space activities; and highlight options for government attention to address and potentially resolve problems that might prevent achieving key national goals. Symposium participants sought to capture what has changed, determine how to harness new opportunities, and decisively inform and compel bold and timely implementation.

We were honored to have Dr. Robert Lightfoot, acting NASA Administrator, open the meeting. He noted that the agency still refers to the Academies 2009 report—*America's Future in Space: Aligning the Civil Space Program with National Needs*—for instance in the preparation for the recent political transition. He noted the "N" in NASA is key—with the agency providing a national capability and leadership in space and space exploration. Over the years, NASA has been able to push forward with a constancy of purpose—in fostering new discoveries and science with robotic and human exploration, global engagement and diplomacy, supporting the nation's economic security and industrial base, addressing societal challenges (including STEM workforce development and technology transfer to human challenges on Earth), and leadership and inspiration for the nation as a symbol of American leadership. His remarks only underscored once more the important role the SSB (and ASEB) has in assisting NASA with the pursuit of these goals by providing the best possible advice we can from the scientific and engineering communities.

During the wrap-up discussion at the end of the symposium, John Olson from the ASEB and I identified some of the key themes that we discerned from the day's discussions. Although these were by no means a consensus view but personal assessments of the days' key themes and issues, in summary we noted:

- The goals for our national civil space efforts from the 2009 *America's Future in Space* report are still largely valid today, although the environment in which we pursue those goals has changed.
- NASA remains a symbol of American leadership at home and around the world and can continue to be a tool of international policy, power, and diplomacy.
- Scientific discovery in our space program is transformational because it changes our collective perception of reality.
- 2028 is a key date for ISS and will drive decisions and actions now while there was also a strong message from a number of participants that we need to continue to plan for a NASA program that goes beyond ISS and beyond low Earth orbit.
- Many asked the question about what new paradigms will get us out of low Earth orbit and how can we leverage off ideas like repurposing existing spacecraft to establish an infrastructure (including an internet-like backbone) on which to build new private and government activities. New paradigms are also likely to benefit from advances in artificial intelligence, robotics and human-machine teaming as enablers for staging, operations, and sustainment.

(Continued on page 3)



SSB ACTIVITIES

THE BOARD AND ITS DISCIPLINE/STANDING COMMITTEES

The **Space Studies Board (SSB)** met May 2-4 in Washington, DC. The first day was a symposium held with the Aeronautics and Space Engineering Board on America's Future in Civil Space. In the context of revisiting the National Academies effort that led to the 2009 report, *America's Future in Space: Aligning the Civil Space Program with National Needs*, the boards organized this symposium to address the evolution of the 2009 report's recommendations in the context of current topics and issues in civil space policy. The agenda was coordinated by a small organizing committee drawn from both boards and the one-day participatory workshop will focus on three moderated panel and audience discussions on **Space in Support of National and International Challenges, Future of Exploration and Discover,** and **Public-Private Partnerships in Pursuit of National Space Priorities**. The symposium also included a set of "lightning" talks on key challenges and opportunities in technology development and space science. The goal was to conduct the one-day meeting as a dynamic discussion-focused event with the leaders of our civil space efforts in the room. We emphasized discussion among the panelists and the attendees, in an intimate meeting venue and with the goal of thoroughly discussing and looking forward to the challenges and opportunities that lie ahead for this important national effort. This event was sponsored by NASA, through its support of the ASEB and SSB Spring meetings, by the Lockheed Martin Corporation's support of the ASEB's 50th Anniversary Fund, and by the Heising Simons Foundation. Information on the symposium, including a recording, the presentations and the agenda can be found at http://sites.nationalacademies.org/deps/spaceandaeronautics/deps_178446. A full video of the symposium is available at https://livestream.com/accounts/7036396/events/7253002.

(From the SSB Chair—continued from page 2)

- New paradigms will also require the development of a new culture in NASA and the advancement of multi-generational teams while retaining institutional knowledge and expertise.
- The right motivation for partnering with private industry needs to be identified and then policies and incentives need to be established to bring industry into contributing to the public good at the core of the program under consideration. Nevertheless, one size does not fit all.
- Among what has stayed the same in recent years is that Mars has remained the horizon goal for exploration. What also has not changed is that NASA has too much on its plate and many constraints.
- What has changed includes new international actors in space—including an impressive space program from China. These new entrants and new industry players and new ways of doing business with established industry provide many new opportunities.

In my opinion, the discussion that day was thoughtful, important and impactful not only for what was said publicly, but also what was said in conversation on the margins among the leaders from Washington and elsewhere who attended. I look forward to reading the short summary of the public discussions that the Academies will issue soon, and for those readers who were not present, the day's activities are archived on the board's web page. I am sure over the course of my tenure as SSB chair, I will return to that day's events to provide insights not only into the challenges and opportunities faced by our nation's space program, but also into where the board and our discipline and study committees can continue to provide the best advice we can to our nation's leaders in space.

—Fiona Harrison, SSB Chair

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

SSB MEMBERSHIP

JULY 1, 2016—JUNE 30, 2017

FIONA HARRISON, *Chair from January 1, 2017*
California Institute of Technology

ROBERT D. BRAUN, *Vice Chair*
Georgia Institute of Technology

DAVID N. SPERGEL, *Vice Chair from January 1, 2017*
Princeton University

JAMES ANDERSON
Harvard University

JEFF M. BINGHAM
Consultant

JAY C. BUCKEY
Geisel School of Medicine at Dartmouth

MARY LYNNE DITTMAR
Dittmar Associates, Inc.

JOSEPH FULLER, JR.
Futron Corporation

THOMAS R. GAVIN
Jet Propulsion Laboratory

SARAH GIBSON
National Center for Atmospheric Research

WESLEY HUNTRESS
Carnegie Institution of Washington

ANTHONY C. JANETOS
Boston University

CHRYSSA KOUVELIOTOU
The George Washington University

DENNIS P. LETTENMAIER
University of California, Los Angeles

ROSALY M. LOPES
Jet Propulsion Laboratory

DAVID J. MCCOMAS
Princeton Plasma Physics Laboratory

LARRY PAXTON
Johns Hopkins University, Applied Physics Laboratory

SAUL PERLMUTTER
Lawrence Berkeley National Laboratory

ELIOT QUATAERT
University of California, Berkeley

BARBARA SHERWOOD LOLLAR
University of Toronto

HARLAN E. SPENCE
University of New Hampshire

MARK H. THIEMENS
University of California, San Diego

MEENAKSHI WADHWA
Arizona State University

LIAISON

CHARLES KENNEL
U.S. Representative *TO COSPAR*

On May 3-4 the SSB held its spring meeting. The first day included updates from the standing/discipline committee chairs, Sarah Gibson (CSSP), Michael King (CESAS), Chris House (CAPS), Steve Ritz (CAA), and Rob Ferl (CBPSS); an update and discussion session with the NASA Science Mission Directorate Associate Administrator, Thomas Zurbuchen; a discussion of the integrating themes across the disciplines lead by David Spergel, and an update from Steve Volz (NOAA-NESDIS). The last day included a visit from Representative Culberson, Chair of the House Subcommittee on Commerce, Justice, Science Appropriations; several updates and discussions, including the European Space Sciences Committee (Athena Coustenis, ESSC Chair), NSF Atmospheric and Geospace Sciences (Paul Shepson), NOAA NWS: GOES-16 Cal-Val Program (Steve Goodman), and COSPAR (David Smith, SSB Staff); and an overview of the newly released report, *Review of the Restructured Research and Analysis Programs of NASA's Planetary Science Division*.

The SSB Executive Committee will meet August 8-9 in Pasadena, CA and the next full meeting of the SSB will be held November 1-3 in Irvine, CA. More information on the SSB can be found at http://sites.nationalacademies.org/SSB/index.htm.

The **Committee on Astrobiology and Planetary Science (CAPS)** did not meet this quarter. Committee efforts were focused on the drafting a short, topical report entitled "Getting Ready for the Next Planetary Science Decadal Survey." This report, requested by James L. Green , the director of NASA's Planetary Science Division is concerned with the identification of potential mission studies to be initiated in preparation for consideration by the next planetary science decadal survey, to be initiated in 2020. Work on the report began during Space Science Week and a complete draft of the 20-page report was completed in late April and sent to external reviewers in early June. A fully revised draft responding to reviewers comments was completed on July 17 and the report was approved for release on July 19. In addition, CAPS Co-Chair William McKinnon was invited to give testimony to the Space Subcommittee of the House Science Committee during a hearing on the topic "Planetary Flagship Missions: Mars Rover 2020 and Europa Clipper" on 18 July. Details of the hearing, including Dr. McKinnon written testimony, is available at https://science.house.gov/legislation/hearings/space-subcommittee-hearing-planetary-flagship-missions-mars-rover-2020-and. The committee's next meeting is scheduled to take place at the National Academies Beckman Center in Irvine, California, on September 12-14, 2017.

The **Committee on Astronomy and Astrophysics (CAA)** recently released its short report titled *Report Series: Committee on Astronomy and Astrophysics: Small Explorer Missions*. For more details, see page 7. The report was produced after the CAA's spring meeting that occurs in conjunction with Space Science Week. Through the solicitation of community input via the American Astronomical Society and through communications with current and former SMEX principle investigators, among other resources, which provided the committee with the capability to respond to the request to address whether or not there is *compelling science motivations for a SMEX-sized mission to justify a SMEX Announcement of Opportunity in the next few years.* The CAA is currently planning for its fall meeting on October 24-25, 2017, at the Beckman Center in Irvine, CA.

The **Committee on Biological and Physical Sciences in Space (CBPSS)** did not meet face-to-face during this period, but worked with NASA and the American Astronautical Society to organize a July 17th panel session on the evolution of ISS science and the role of SSB advice at the 2017 ISS R&D Conference in Washington, DC. The committee continues to follow developments relevant to the progress of NASA's microgravity program, as well as oversee the ongoing ad hoc midterm review of the 2011 microgravity decadal.

The **Committee on Earth Science and Applications from Space (CESAS)** did not meet during this quarter; however, committee members were busy with a number of related activities. These included work on committees of the ongoing decadal survey in Earth Science and Applications from Space (see below) as several members of CESAS are participating in the survey: Joyce Penner, CESAS Co-Chair, University of Michigan; Steven A. Ackerman, University of Wisconsin, Madison; Stacey W. Boland, Jet Propulsion Laboratory; Efi Foufoula-Georgiou; University of California, Irvine; Everette Joseph, University of Albany, SUNY; Eric J. Rignot, University of California, Irvine; Christopher S. Ruf, University of Michigan; and David L. Skole, Michigan State University. In addition, the committee co-chairs reviewed the terms of reference for a potential Academy activity that would focus on novel techniques and applications for data analytics on Earth observational data. The committee's next meeting will take place in either Irvine, California or Washington DC on October 23-24, 2017. Further information about the committee is posted at: http://sites.nationalacademies.org/SSB/SSB_066587.

The **Committee on Solar and Space Physics (CSSP)** did not meet this quarter; however, it spent much of the quarter writing and releasing its first report as a discipline committee titled *Report Series: Committee on Solar and Space Physics: Heliophysics Science Centers*. For more details, see page 7. The committee is in the process of planning its fall meeting to be held October 24-26, 2017, in Irvine, CA.

STUDY COMMITTEES

The **Committee on an Astrobiology Strategy for the Search for Life in the Universe** is currently being recruited. This study was requested by NASA's Science Mission Directorate on April 20 in response to direction from a Congressional mandate contained in the NASA Transition Authorization Act of 2017. It is anticipated that the committee will be appointed and hold its first meeting in the third and fourth quarters of 2017, respectively. A report is due to NASA by the end of August 2018.

The **Committee on Best Practices for a Future Open Code Policy for NASA Space Science** is in the process of being nominated. The study is to investigate and recommend best practices for NASA as it considers whether to establish an open code and open models policy, complementary to its current open data policy. More information about the project is available at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_178892.

The **2017-2027 Decadal Survey for Earth Science and Applications from Space (ESAS 2017)** was very active during the quarter with numerous teleconferences among and between the steering committee and its five study panels. In addition, the survey steering

committee met in person for their sixth and seventh meetings on May 9-11, 2017 and June 19-20, 2017 in Boulder, Colorado and Irvine, California, respectively. As the quarter ended, preparations were underway for a no-later-than mid-August submission of the committee's draft report to peer review. An approved pre-publication version of the steering committee's final report is due by the end of 2017. Some 100 members of the community are serving on one or more of the survey's committees. Links on the survey's website, www.nas.edu/esas2017, describe survey activities during the quarter in more detail; also posted on the website are survey newsletters to the community.

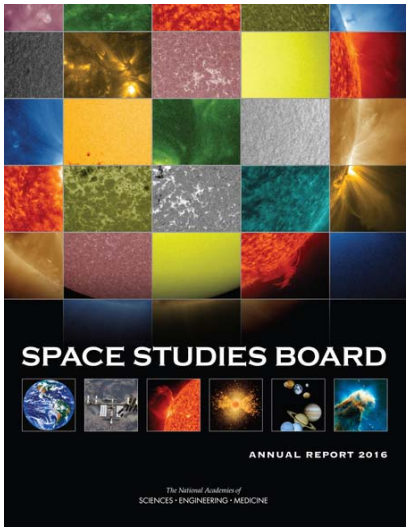
The **Committee on an Exoplanet Science Strategy** is currently being recruited. This study was requested by NASA's Science Mission Directorate in response to direction from a Congressional mandate contained in the NASA Transition Authorization Act of 2017. It is anticipated that the committee will hold its first meeting in the fourth quarter of 2017. A report is due to NASA by the end of August 2018.

The **Committee on Extraterrestrial Sample Analysis Facilities** is in the process of being nominated. The study is to prepare for what laboratory analytical capabilities and infrastructure will be needed by NASA's Planetary Science Division (and partners') analysis and curation of existing and future extraterrestrial samples. More information about the project is available at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_178893.

The **Committee on Large Strategic NASA Science Missions: Science Value and Role in a Balanced Portfolio** is co-chaired by Kathy Thornton of the University of Virginia and Ralph McNutt of the Johns Hopkins Applied Physics Laboratory. The committee's report entered review in May and received sign-off for release in July. The report will be delivered to NASA in early August and released to the public shortly after. Additional information about this project can be found at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_173492.

The **Committee on a Midterm Assessment of Implementation of the Decadal Survey on Life and Physical Sciences Research at NASA** held its second and third meetings on Apr. 18-20 in Washington, DC and on June 20-22, 2017 in Woods Hole, MA respectively. As part of its April meeting the committee held a one day Community Input Colloquium which included six moderated panel sessions each focused on a broad area of microgravity research. The live-streamed event had been widely advertised in the research community and was well attended by researchers both in person on on-line. Both the presentations and discussions were organized with the goals of addressing discipline-specific questions relevant to the statement of task, and enabling the committee to hear from the larger community on a range of issues and challenges. Video recordings of these sessions are can be found on the committee website at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_174910. In addition to the Colloquium presentations, the committee also heard during the meeting from SLPSRA Director, Craig Kundrot on grant data sets requested by the committee for its work, and from Kris Kandarpa (NIH), Richard Ricker (NIST) and Vyacheslav Lukin (NSF) regarding synergies between research at their agencies and NASA.

Following its April meeting the committee continued to work closely with SLPSRA on obtaining comprehensive data sets for SLPSRA grant and ISS research activities. At its June meeting the committee was briefed by ISS Chief Scientist, Julie Robinson on one of these data sets, and the committee was also briefed by ISS Deputy Director, Robyn Gatens on NASA's evolving strategy for ISS and exploration in the 2024 timeframe. The majority of the June meeting was held in closed session and was focused on analysis and report development. The committee plans to hold its next meeting on August 28-30 in Irvine, CA.



Space Studies Board Annual Report 2016, available at http://www.nap.edu/catalog/24748

The **Committee on the Review of NASA's Planetary Science Division's Restructured Research and Analysis Programs** has completed all of its planned meetings, issued its report and has been disbanded. A complete, edited copy of the report in prepublication format was delivered to NASA on 19 April and the chair of the committee briefed the leadership of NASA's Science Mission Directorate on the report's conclusions and recommendations on April 21, 2107. The public release of the report was April 26, 2017. Printed copies of the report became available in late June and are available on request from the Space Studies Board. The report is also available at https://www.nap.edu/catalog/24759/review-of-nasas-planetary-science-divisions-restructured-research-and-analysis-programs.

The **Committee on the Review of Planetary Protection Policy Development Processes** was formally appointed in February and has held three of its four planned meetings. The committee's first meeting, held at the National Academy of Sciences in Washington, D.C. on March 7-9, was devoted exclusively to beginning work on a short document outlining the goals, rationales and definition of planetary protection. The draft interim report was sent to eight external reviewers for comment on April 21 and the report was approved for release on May 27. The report was delivered to NASA on June 7 and Joseph Alexander, the committee's chair, briefed NASA on the report's contents on June 13. The committee's second and third planned meetings took place in Washington, D.C., and Irvine, California, on May 23-25 and June 27-29, respectively. The committee's fourth and final meeting will take place at the National Academies' J. Erik Jonsson Center in Woods Hole, Massachusetts, on August 8-10. The committee schedule call for a draft report to be sent to external reviewers in the fourth quarter of 2017 and for a final, approved draft to go to NASA late in the first quarter or early in the second quarter of 2018. Additional information about the committee and its activities can be found at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_175768.

The **Committee on the Review of Progress Toward Implementing the Decadal Survey Vision and Voyages for Planetary Sciences**

was approved in late February 2017. The committee is co-chaired by Louise Prockter of the Lunar and Planetary Institute and Joseph Rothenberg, formerly of Google. The committee's second meeting was held at Caltech, July 11-13. The third meeting is scheduled for late August in Woods Hole, MA and a fourth meeting is likely to be held at the Beckman Center in Irvine in November. In March the NASA Transition Authorization Act was signed into law and included provisions for an Academies assessment of NASA's Mars Exploration Program. NASA and the Academies determined that the best course of action would be to incorporate this assessment into the mid-term review and to add several members with Mars expertise. The committee aims to deliver its report to NASA in spring 2018. Additional information about this project can be found at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_177619.

The workshop, **Searching for Life Across Space and Time**, was held on December 5-6 at the Academies' Beckman Center in Irvine, California. A complete draft of the workshop's proceedings was assembled during the first quarter of 2017 and sent to external reviewer on April 28. Reviewer comments were received between June 2 and July 2. A revised version of the proceedings was submitted for approval on July 7 and is currently awaiting final approval for release. On April 26, James Kasting, the chair of the workshop's organizing committee, testified before the House Committee on Science, Space, and Technology, during the hearing, Advances in the Search for Life. Dr. Kasting's testimony and that of the other witnesses, can be found, together with recorded video, at https://science.house.gov/legislation/hearings/full-committee-hearing-advances-search-life. Additional details and the video recording of the workshop can be found at http://sites.nationalacademies.org/ssb/currentprojects/ssb_173278.

OTHER ACTIVITIES

The **Forum for New Leaders in Space Science** is a cooperative activity between the National Academies of Sciences, Engineering, and Medicine and the Chinese Academy of Sciences (CAS) and is designed to provide opportunities for a highly select group of young space scientists from China and the United States to discuss their research activities in an intimate and collegial environment. The third cohort of participants, representing the life- and physical-science research communities, held the second of their two scheduled meetings at the National Academies' J. Erik Jonsson Center in Woods Hole, Massachusetts, on May 16-17, 2017. In the meantime, the SSB successfully applied for and received funding from the National Academies of Sciences, Engineering, and Medicine Presidents' Committee to permit the recruitment of a fourth cohort of young U.S. and Chinese scientists. Details finalized with CAS during the forum in Woods Hole call for the recruitment of a fourth cohort from the astrophysics and heliophysics communities during the third quarter of 2017. The fourth cohort will meet in Guangzhou in southern China on January 23-24 and in Pasadena, California, on July 12-13 (i.e., immediately prior to the July 14-21 COSPAR Scientific Assembly). Additional details concerning this activity can be found at http://sites.nationalacademies.org/SSB/SSB_086017.

COSPAR is currently preparing for its 3rd Symposium to be held on September 18-22, 2017, in Jeju Island, South Korea and its 42nd Scientific Assembly to be held in Pasadena, California, on July 14-21, 2018. The next round of COSPAR business meetings (i.e., the Pasadena Assembly Science Program Committee, the COSPAR Scientific Advisory Committee and the COSPAR Bureau) will be held in Paris on March 19-21, 2018. The 43rd Scientific Assembly will be held in Sydney, Australia, on August 15-23 August 2020.

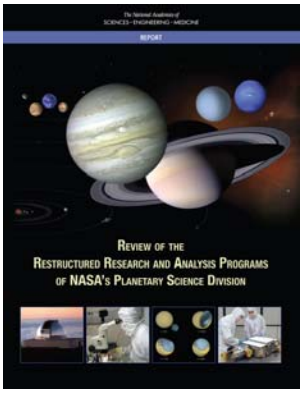
Planetary Protection of the Outer Solar System: This 3-year activity, funded via the European Union's Horizon 2020 funding program and organized by the European Science Foundation (ESF), was formally initiated in January 2016, and is designed to address a series of closely related topics in the general area of planetary protection for the icy bodies of the outer solar system. Although the National Academies' is not formally involved in this project, the Space Studies Board has observer status on the PPOSS steering group and has agreed, with NASA's concurrence, to sponsor the participation of two U.S. experts in activities associated with PPOSS' Work-Package 3 and 5. The last formal meeting associated with Work-Package 3—an activity to identifying current scientific and technical research issues relating to planetary protection for objects in the outer solar system—was held in Florence, Italy, on 10-12 April. Activities associated with Work-Package 5—a review of the current planetary protection regulation structure for the icy bodies of the outer solar system—will commence in 2018. The two US experts—Geoffrey Collins (Wheaton College) and Mark Saunders (NASA Langley Research Center, retired)—are participating in their own recognizance as scientific and technical experts and their work and that of PPOSS is not officially endorsed by the SSB or the National Academies. Additional information about PPOSS can be found at http://pposs.org/.

Science Strategy For Space Exploration Of The Outer Solar System Icy Moons Oceans (Exoceans) is a European activity to review and synthesize the current status of astrobiological knowledge about the outer solar system with particular emphasis on the icy satellites of the giant planets. The Exoceans group is a cooperative venture between the European Space Science Committee, the European Marine Board, and the International Space Science Institute (ISSI). The Space Studies Board is not formally involved in this activity but has agreed, with NASA's concurrence, to fund the participation of two US scientists in Exoceans activities. The relevant U.S. participants are Christopher House (Pennsylvania State University) and Alexander Hayes (Cornell University). The Exoceans group plans to hold three meetings: the first in Paris, France, in November and the others in Bern, Switzerland, in 2018. The outcome of this activity will be a book in the ISSI Space Science Series, published by Springer.

NEW RELEASES

Copies of reports are available from the SSB office at 202-334-3477 or at <http://www.nap.edu/>.

Review of the Restructured Research and Analysis Programs of NASA's Planetary Science Division



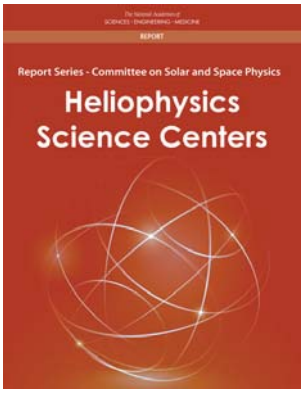
The Research and Analysis (R&A) program managed by NASA's Planetary Science Division (PSD) supports a broad range of planetary science activities, including the analysis of data from past and current spacecraft; laboratory research; theoretical, modeling, and computational studies; geological and astrobiological field-work in planetary analog environments on Earth; geological mapping of planetary bodies; analysis of data from Earth- and space-based telescopes; and development of flight instruments and technology needed for future planetary science missions. The primary role of the PSD R&A program is to address NASA's strategic objective for planetary science and PSD's science goals.

Recently, PSD reorganized the R&A program to provide better alignment with the strategic goals for planetary sciences. The major changes in the R&A program involved consolidating a number of prior program elements, many of which were organized by subdiscipline, into a smaller number of thematic core research program elements. Despite numerous efforts by PSD to communicate the rationale for the reorganization and articulate clearly the new processes, the report finds that there has been significant resistance from the planetary science community and concerns in some sectors regarding the major realignment of funding priorities.

Review of NASA's Planetary Science Division's Restructured Research and Analysis Programs examines the new R&A program and determines if it appropriately aligns with the agency's strategic goals, supports existing flight programs, and enables future missions. This report explores whether any specific research areas or subdisciplinary groups that are critical to NASA's strategic objectives for planetary science and PSD's science goals are not supported appropriately in the current program or have been inadvertently disenfranchised through the reorganization.

Available at http://www.nap.edu/24759

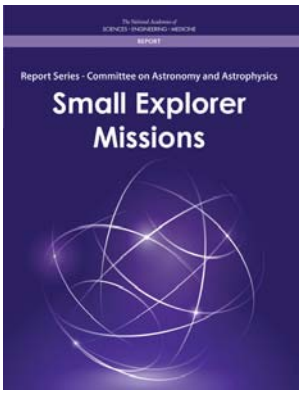
Report Series: Committee on Solar and Space Physics: Heliophysics Science Centers



The newly constituted Committee on Solar and Space Physics (CSSP) has been tasked with monitoring the progress of recommendations from the 2013 decadal survey *Solar and Space Physics: A Science for a Technological Society*. The committee held its first meeting as part of Space Science Week in Washington, D.C., on March 28-30, 2017. In advance of the meeting, and in response to discussions with the leadership of the Heliophysics Division of the National Aeronautics and Space Administration (NASA) and the Geospace Section of the National Science Foundation (NSF) Division of Atmospheric and Geospace Science, the committee identified the decadal survey's recommendation to create NASA-NSF heliophysics science centers (HSCs) as a timely topic for discussion. This report provides a set of options for NASA and NSF to consider for the creation of HSCs, including how to make the HSCs unique from other research elements and strategies for implementation.

Available at http://www.nap.edu/24803

Report Series: Committee on Astronomy and Astrophysics: Small Explorer Missions



The 2010 astronomy and astrophysics decadal survey, *New Worlds, New Horizons in Astronomy and Astrophysics*, laid out an exciting portfolio of recommended activities to guide the agencies' research programs over the period 2012-2021. The newly constituted Committee on Astronomy and Astrophysics (CAA) is tasked with monitoring the progress of the survey's recommended priorities.

The CAA met in conjunction with Space Science Week 2017 in Washington, D.C., on March 28- 30, 2017. This was the first meeting at which the CAA could produce a report, and in advance of that meeting, the CAA received a question from NASA about an upcoming Small Explorer (SMEX) mission call. This report addresses whether there may or may not be sufficient compelling science motivations for a SMEX-sized mission to justify a SMEX Announcement of Opportunity (AO) in 2018 or 2019 (as is currently planned).

Available at http://www.nap.edu/24808

SSB Staff News

The SSB welcomed a new Associate Program Officer, Nathan Boll and 2 new Lloyd V. Berkner Space Policy Interns this quarter, Madison Borrelli and Danielle Montecalvo.

Nathan J. Boll is an associate program officer with the Space Studies Board. Prior to joining SSB, he served as a research assistant in civil and commercial space at the Congressional Research Service in the Library of Congress and as a Christine Mirzayan Science and Technology Policy Graduate Fellow at the National Academies. Nathan's background in space policy and science communication includes experience in the Office of International and Interagency Relations at NASA Headquarters, the Aeronautics and Space Academies at the NASA Glenn Research Center, and the Montana Space Grant Consortium at Montana State University as a member of the advisory board. Nathan earned his M.S. in space sciences from the University of Michigan, his M.A. in international science and technology policy from The George Washington University's Space Policy Institute, and his B.S. in mathematics from the University of Montana Western.

Madison Borrelli is a rising senior studying physics with a minor in astronomy at Wheaton College in Massachusetts. She is interested in planetary science, primarily icy bodies and Earth's moon, and has previously conducted research regarding cratering on Saturn's moon Enceladus. Her interest in policy arose from joining Wheaton College's Model United Nations team, of which she is now Head Delegate. Originally from Cranston, Rhode Island, she recently returned from a semester abroad at the University of Edinburgh during which she had the opportunity to travel and explore another part of the world. She is pleased to be interning at the Space Studies Board this summer and is enjoying learning more about the interactions between policy and research.

Danielle Montecalvo is a rising senior pursuing a double major in International Studies and Physics at American University in Washington, D.C. She is interested in the intersection of international development and global governance with science and technology policy. In the fall 2016, Danielle studied abroad at the University of Queensland in Brisbane, Australia where she studied space and stellar astrophysics. In the past, she has produced research projects on Women in STEM and on the correlation between technological innovations and national development. She previously interned at the National Peace Corps Association, where she hopes to engage in development work overseas to teach and enhance STEM resources across the globe. On the side, she loves to play Ultimate Frisbee and the piano. Danielle is currently working on a variety of projects for the Space Studies Board including the planetary protection, strategic missions, and planetary science reports. She is excited to continue to grow in her role as an intern and aims to pursue a career in space science and technology policy.

SSB Staff

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Senior Program Officer

DWAYNE A. DAY[1]
Senior Program Officer

DAVID LANG[1]
Program Officer

ABIGAIL SHEFFER
Program Officer

NATHAN BOLL
Associate Program Officer

MIA BROWN
Research Associate

MARCHEL HOLLE
Research Associate

ANDREA REBHOLZ[1]
Program Associate

DIONNA WISE
Program Associate

ANESIA WILKS
Senior Program Assistant

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Administrative Coordinator

MEG KNEMEYER
Financial Officer

SU LIU
Senior Financial Assistant

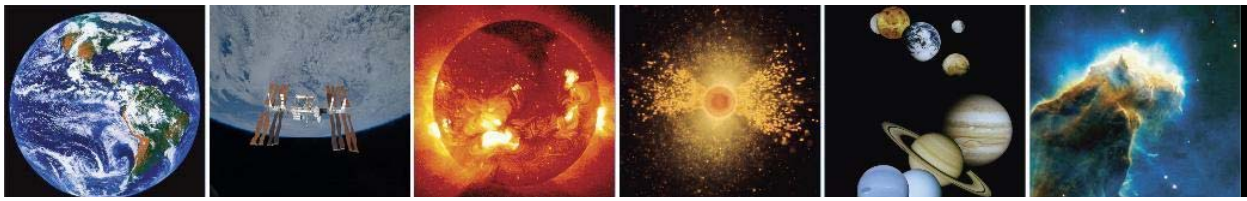
CELESTE A. NAYLOR
Information Management Associate

TANJA E. PILZAK
Manager, Program Operations

MADISON BORRELLI
Lloyd V. Berkner Space Policy Intern

DANIELLE MONTECALVO
Lloyd V. Berkner Space Policy Intern

** Staff of other Academies boards who are shared with the SSB.*



SSB Calendar

July

S	M	T	W	Th	F	Sa
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
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August

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September

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October

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22	23	24	25	26	27	28
29	30	31	1	2	3	4

July 11-13	Review of Progress Toward Implementing the Decadal Survey Vision and Voyages for Planetary Sciences	Pasadena, CA
August 8-10	Review of Planetary Protection Policy Development Processes	Woods Hole, MA
August 28-30	Review of Progress Toward Implementing the Decadal Survey Vision and Voyages for Planetary Science	Woods Hole, MA
August 28-30	A Midterm Assessment of Implementation of the Decadal Survey on Life and Physical Sciences Research at NASA	Irvine, CA
September 13-14	Committee on Astrobiology and Planetary Science (CAPS)	Irvine, CA
October 23-24	Committee on Earth Science and Applications from Space (CESAS)	TBD
October 24-25	Committee on Astronomy and Astrophysics (CAA)	Irvine, CA
October 24-26	Committee on Solar and Space Physics (CSSP)	Irvine, CA
October 31-November 2	Committee on Biological and Physical Science in Space (CBPSS)	Irvine, CA
November 1-3	Space Studies Board (SSB)	Irvine, CA

National Academy of Sciences Building
2101 Constitution Ave NW
Washington, DC

Keck Center
500 Fifth St NW,
Washington, DC

Arnold and Mabel Beckman
100 Academy Drive
Irvine, CA

J. Erik Jonsson Conference Center
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- ☐ NASA's Strategic Direction and the Need for a National Consensus (2012)
- ☐ The Effects of Solar Variability on Earth's Climate: A Workshop Report (2012)
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