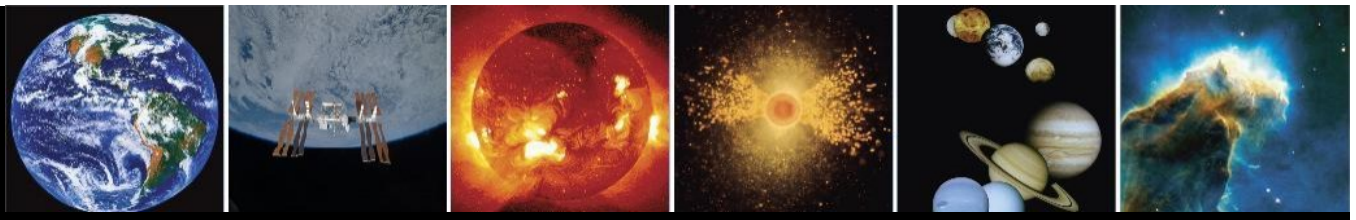
SPACE STUDIES BOARD NEWS



APRIL-JUNE 2016

INSIDE THIS ISSUE

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The National Academies of
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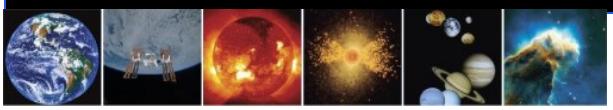


IN MEMORIAM

The space and aeronautics community lost two valued members this summer, Patti Grace Smith and Molly K. Macauley. The staff and members of the Space Studies Board and Aeronautics and Space Engineering Board and their associated committees will miss the insights and advice these remarkable women provided.

Photo courtesy of Secure World Foundation

Patti Grace Smith came recently to her work with the National Academies of Sciences, Engineering, and Medicine—serving as the vice chair of the Aeronautics and Space Engineering Board and as a member of the Aeronautics Research and Technology Roundtable where in a short time she made countless important contributions in advising our nation's government and aerospace community. Patti had a successful career in the communications industry, and from 1995-2008 was the head of the FAA's Office of Commercial Space Transportation (AST). During her tenure at the FAA the Mojave Air & Space Port in California became the first inland commercial spaceport in the U.S. and in 2004 SpaceShipOne was launched. She was also instrumental in the implementation of the 2004 amendments to the Commercial Space Transportation Act. We will miss her extensive expertise and her guiding words, but most of all we will miss her friendship and her welcoming spirit.

Photo courtesy of Resources for the Future

Molly Macauley was a frequent volunteer over the last 27 years for the National Academies of Sciences, Engineering, and Medicine—serving on nearly twenty committees and boards and contributing to important policy and technical advisory studies for the government on issues as varied as the scientific uses of the radio spectrum, the challenge of orbital debris in space, the opportunities for international cooperation in the space sciences, and assessments of the opportunities for solar power. As an economist with research interests including space policy, and the intersection of economics and public policy with environmental regulation, climate and Earth science Molly brought an unrivaled expertise to the work of the Academies in the importance and impact of science and technology on the citizens of our nation and our world. She was most recently serving on the "decadal survey" study to prioritize the scientific opportunities of our Earth observing system for the decade ahead—a study the Academies is conducting for NASA, NOAA, and USGS and an activity to which Molly's expertise was perfectly matched, in particular because she had an unusually deft way of reminding us all of the human dimensions of science and technology. She was a remarkable woman who rose to be a leader in science policy, an adviser to the nation, and a forever generous and caring individual who will be missed terribly.

Board Member News

Photo courtesy of University of Colorado Boulder

Space Studies Board vice chair, Bobby Braun, was named dean of the College of Engineering and Applied Science at the University of Colorado Boulder.

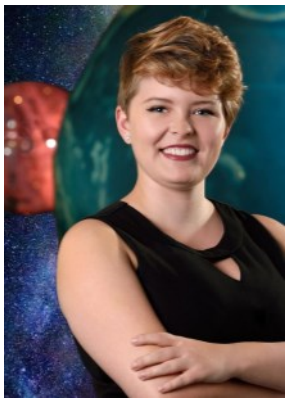
Excerpt from the University of Colorado Boulder announcement :

> "'From helping lead the team that put the first rover on Mars, to heading up large engineering organizations in the federal government, to growing Georgia Tech's space science and space technology focus, Bobby has successfully led diverse teams through periods of dynamic growth in a manner that builds community, enhances quality and yields tangible results,' said Moore. [University of Colorado Boulder Provost Russel L. Moore] 'He is an outstanding scholar whose technical and organizational leadership skills will be an asset as we continue to strive for increasing our student success, creating a culture of innovation and entrepreneurship, and elevating our reputation. We are very excited to have Bobby join the CU Boulder leadership team.'"

The full announcement is available at <http://www.colorado.edu/news/features/braun-named-new-dean-engineering-and-applied-science>.

Staff News

The SSB welcomed 2 new Lloyd V. Berkner Space Policy Interns this quarter, Sara Denbo and Caroline Juang.



Sara Denbo is a rising senior studying astrophysics and women's and gender studies with minors in mathematics and science, technology, environment, and public policy at Michigan State University (MSU). Originally from Lindenhurst, Illinois, she is interested in the interactions between science and policy and how the two inform one another. Previously, she has completed Research Experiences for Undergraduates (REUs) at the University of Rochester in Rochester, New York and the National Radio Astronomy Observatory in Green Bank, West Virginia. Ms. Denbo is also president of Spartan Women in Physics and Astronomy (SWiPA), a group dedicated to strengthening the community of undergraduate women in the Physics and Astronomy Department at MSU. In conjunction with her work at SSB, she is currently taking a course on natural resources policy. She likes to spend her free time caring for her plants, practicing knitting, and dreaming of one day owning a pug.

Caroline Juang is a junior studying Earth and Planetary Sciences (EPS) with a minor in Environmental Science and Public Policy (ESPP) at Harvard University. She is most interested in climate, energy, space, and their intersections with public policy. In the past, Caroline has interned with NASA Goddard Space Flight Center, the Smithsonian National Air and Space Museum, and the Joint US-China Collaboration on Clean Energy (JUCCCE). Most recently she interned at Harvard Forest, where she curated a mobile-friendly, online virtual tour for their newest recreational trail that includes both historical knowledge and ongoing research in the forest. On the side, she loves art, environmental advocacy, and exploring museums.

Caroline is excited to be a Space Studies Board Intern this summer. She is looking forward to contributing to the many ongoing projects at the Space Studies Board as well as learning as much she can about space policy from everyone.

SSB ACTIVITIES

THE BOARD AND ITS STANDING COMMITTEES

The **Space Studies Board (SSB)** met in Washington, DC, April 26-28, 2016. The first day was a joint meeting of the SSB and the Aeronautics and Space Engineering Board. The Boards held discussions with General Charlie Bolden (NASA Administrator), Ralph Roe (NASA Chief Engineer), Jim Adams (NASA Deputy Chief Technologist), and Gale Allen (NASA Deputy Chief Scientist). They then had a discussion with Senator Gary Peters (D-MI); and received an update from staffers from Capitol Hill (Tom Hammand and Pam Whitney, HSC and Nick Cummings, SCC) and from White House staff (Paul Shawcross and Grace Hu, OMB and Meredith Drosback and Ben Roberts, OSTP). In the afternoon the Boards received updates on the NASA/STMD program (James Reuter) and the NASA/HEOMD program (William Gerstenmaier). The end of the first day was devoted to a session on the Future of Low Earth Orbit—Moving Toward a Commercial Market which included an update on the SSB Committee on Biological and Physical Sciences in Space (Betsy Cantwell, co-chair); NASA's vision for LEO (Sam Scimemi, NASA); and a panel and Boards discussion which included Carissa Christensen (Tauri Group), John Elbon (Boeing), Mike Gold (COMSTAC Chair), Ben Roberts (OSTP), Greg Johnson (CASIS), and George Nield (FAA).

The second and third days were focused on SSB activities and included updates from the SSB/BPA standing committee chairs, including Todd Hoeksema (CSSP), Joyce Penner (CESAS), Phil Christensen (CAPS), and Steve Ritz and Marcia Rieke (CAA). The Board then held a discussion with John Grunsfeld (Associate Administrator, SMD/NASA) and the SMD division directors or their representatives, including Mike Freilich (Earth Science), Peg Luce (Heliophysics), David Schurr (Planetary Science), and Paul Hertz (Astrophysics). A focus session on the Status of Selected Decadal Priority Missions included status updates on Mars 2020 (Ken Williford, JPL); JWST (Eric Smith, NASA HQ); WFIRST (Neil Gehrels, NASA GSFC); Europa Mission (Louise Prockter, APL and Barry Goldstein, JPL); and Solar Probe Plus (John Lee, NASA HQ). The afternoon was devoted to international issues and included an update on the European Space Sciences Committee by Athena Coustenis (ESSC Chair) and on COSPAR by David Smith (SSB staff). The final day included updates and key issues at NOAA and NSF Geoscience from Steve Volz (NOAA) and Paul Shepson (NSF Geoscience); Staff then reported on several new and ongoing studies.

Visit <www.nas.edu/ssb> to stay up to date on board, workshop, and study committee meetings and developments.

The **Committee on Astrobiology and Planetary Science (CAPS)** did not meet during this quarter. The next meeting of CAPS will be held at the Academies' Beckman Center in Irvine, California, on September 14-15. To learn about upcoming meetings, and download presentations from past meetings, please visit http://sites.nationalacademies.org/SSB/SSB_067577.

The **Committee on Astronomy and Astrophysics (CAA)** did not meet in person this quarter but continued to have active discussions about preparations for the next decadal survey. Both co-chairs, Steven Ritz and Marcia Rieke, represented the committee at the SSB meeting on April 26-27 in Washington D.C. and Marcia Rieke participated in the BPA (Board on Physics and Astronomy) meeting on May 3-4 in D.C. The next committee meeting will take place October 31-November 1 in Irvine, CA. For more information about the CAA, and to download presentations from past meetings, please visit http://sites.nationalacademies.org/BPA/BPA_048755.

The **Committee on Biological and Physical Sciences in Space (CBPSS)** did not meet in person during this quarter, but has been in discussions with NASA regarding a mid-term review of the microgravity decadal survey and that study is expected to begin later this summer. Committee co-chair Elizabeth Cantwell represented the committee at the joint SSB-ASEB meeting on April 25-28 in Washington D.C. where she led a session on commercial space that followed up on the CBPSS symposium on this subject at its March meeting. The committee is also in the process of rotating a portion of its memberships as some members reach the ends of their terms in July. The next in person meeting will be held in the fall of 2016. More information about the committee, its membership, and meeting dates can be found at http://sites.nationalacademies.org/SSB/SSB_145312.

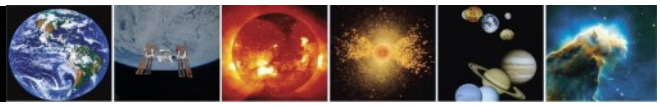
The **Committee on Earth Science and Applications from Space (CESAS)** did not meet during this quarter, having held its annual Spring meeting shortly before the start of the 2nd quarter. The committee's next meeting is scheduled for October 4-5, in Washington, DC. The CESAS website, http://sites.nationalacademies.org/SSB/SSB_066587 and links therein have information about that meeting and other recent meetings.

The **Committee on Solar and Space Physics (CSSP)** is planning their fall meeting for October 5-7, 2016 in Washington, DC. The committee has also met via teleconference monthly to discuss current events as well as meeting planning. Further information about the committee is available at http://sites.nationalacademies.org/SSB/SSB_052324.

STUDY COMMITTEES

The **Committee on Achieving Science Goals with CubeSats** has completed its task, releasing the prepublication report *Achieving Science with CubeSats: Thinking Inside the Box* in May 2016. The committee chair, Thomas H. Zurbuchen, and vice chair, Bhavya Lal, have held briefings for multiple federal agencies and congressional committee staff and have presented the report at several conferences. Dr. Zurbuchen also will present the report at the Small Satellite Conference in Logan, Utah, on August 8, 2016. The report can be downloaded at http://www.nap.edu/cubesats.

The **Committee on the Assessment of the National Science Foundation's 2015 Geospace Portfolio Review** held their first meeting on May 13-14, 2016 at the National Academy of Sciences building in Washington, DC. The committee heard from members



of the Geospace Portfolio Review committee for an overview briefing and discussions about community input, integrative science, CubeSats, solar science, and facilities. The committee also heard from Therese Moretto Jorgensen, the Geospace Section Head. The committee has held several teleconferences to discuss their task. More information about this project is available at: http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_169109.

The **2017-2027 Decadal Survey for Earth Science and Applications from Space (ESAS 2017)** was very active during the quarter with appointments to the survey's five study panels finalized; the initiation of a second "Request for Information;" a meeting, held from June 2-5, 2016 at the Beckman Center in Irvine, California, of the survey steering committee and all of the study panels; and numerous teleconferences by the steering committee and the panels. In total, nearly 100 members of the community are participating on one or more of the survey's committees. Links on the survey 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. In May, following the announcement of his appointment as the president of the University Corporation for Atmospheric Research (UCAR), survey co-chair Dr. Antonio Busalacchi, Jr. resigned from the committee. The Academies subsequently approved, in June, the appointment of Dr. William Gail as survey co-chair. Dr. Gail, currently a member of the decadal survey steering committee, joins Dr. Waleed Abdalati in leading the decadal survey.

The **Committee on Large Strategic NASA Science Missions: Science Value and Role in a Balanced Portfolio** was initiated in March. The committee was named in June and will be co-chaired by Kathy Thornton of the University of Virginia and Ralph McNutt of the Johns Hopkins Applied Physics Laboratory. The committee is planning its first in-person meeting for October 5-6 at the Keck Center and its second meeting in December at the Beckman Center in Irvine. The committee plans to deliver its report to NASA in spring 2017. Additional information about this project can be found at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_173492.

The **Committee on NASA Science Mission Extensions** was named in October of 2015 and held its first in-person meeting February 1-2, 2016 at the Keck Center in Washington DC, the second meeting March 2-4, 2016 at the Beckman Center in Irvine, and its third meeting April 18-20 at the NAS Building in Washington, DC. At the first meeting the committee heard perspectives on mission extensions from the various stakeholders (NASA/SMD, NOAA and Congressional staff). During the second meeting the committee heard from people involved both in proposing mission extensions and those involved in the Senior Review process for four NASA science divisions. At the third meeting, the committee heard about several unusual examples of mission extensions, such as the Opportunity rover, which was designed to last 90 days but has been operational on Mars for over twelve years. The committee was interested in ways that extended missions might reduce costs after hearing from several mission teams that the largest cost reductions occur when transitioning from prime to extended phase, but that further cost reductions create additional challenges, particularly as spacecraft age and mission teams mature. The committee's final report entered review in June and is due for delivery later this summer. The committee addressed the process by which NASA conducts science mission extensions. More information about this project can be found at: http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_169078.

The **Review of NASA's Planetary Science Division's Restructured Research and Analysis (R&A) Programs** committee was approved in April and held the first meeting on May 12-13 at the NAS building in Washington, D.C. The committee heard briefings from NASA's James Green, Johnathan Rall, and Max Bernstein to provide the committee with context regarding its charge, the status of the R&A Restructuring, and an overview of the R&A programs. Report briefings on *An Enabling Foundation for NASA's Earth and Space Science Missions* and the Planetary Science Subcommittee's Greeley-Sykes report were provided by Lennard A. Fisk (University of Michigan) and Mark Sykes (Planetary Science Institute), respectively. The committee also received perspective updates from the Lunar Exploration Analysis Group (Clive Neal, University of Notre Dame), the Small Bodies Assessment Group (Nancy Chabot, Applied Physics Laboratory), the Outer Planets Assessment Group (Alfred McEwen, University of Arizona), the Curation and Analysis Planning Team for Extraterrestrial Materials (Andrew Westphal, University of California, Berkeley), the Perspective of Mars Exploration Program Analysis Group (Jeffrey Johnson, Applied Physics Laboratory), the Venus Exploration Analysis Group (Robert Grimm, Southwest Research Institute), and an activities update on the Mapping and Planetary Spatial Infrastructure Team (Jani Radebaugh, Brigham Young University).

The second meeting will be held on August 16-18 at the Keck Center, Washington, DC, the committee is extending invitations to potential speakers at this time. The third meeting is scheduled for September 21-23 at the Jonsson Center in Woods Hole, MA. The committee's report is scheduled to be delivered to NASA by December 2016. Additional information about this project can be found at http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_169563.

The **Committee to Review of Progress Toward the Decadal Survey Vision in New Worlds, New Horizons in Astronomy and Astrophysics** revised its draft report in response to the comments received during external peer review. The final report is anticipated in summer 2016. For more information on the project please visit: http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_161177.

The planning committee for **Searching for Life Across Space and Time: A Workshop,** is currently planning a workshop that was requested by NASA to address issues relating to the detection of solar system and extrasolar planetary systems. The organizing committee has met via telecon and will meet in person next quarter to plan the workshop. The workshop will be held December 5-6 at the Academies' Beckman Center in Irvine, CA. Additional details about 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 Academies 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 second meeting of the second cohort of young scientists was held at the Academies' Beckman Center in Irvine, California on May 16-17, 2016. Scientific discussions in Irvine focused on planetary science and Earth observations from space. Thanks to an infusion of new funds from the Academies Presidents Fund, the recruitment of a third cohort of young scientists is currently underway. Final selections of the participants for the fifth and six forums, to be held in Beijing (December 2-3, 2016) and Woods Hole (May 16-17, 2017), will be made by mid-August. The scientific foci of the fifth and sixth forums is biological/biomedical and physical (including fundamental physics) research in the space environment. Additional details concerning this activity can be found at http://sites.nationalacademies.org/SSB/SSB_086017 .

Cancellation of the 41st COSPAR Assembly in Istanbul—The letter from COSPAR President, Len Fisk, to the attendees is reproduced below.

The most recent events in Istanbul, involving a coup [attempt] from a faction of the national army against the Turkish government on 15 July, require us to cancel the 41st COSPAR Assembly. This is a difficult and sad decision, taken in consultation with the Executive Director of the COSPAR Secretariat and in consideration of the advice spontaneously expressed by several Bureau and Council members as well as COSPAR officers and Main Scientific event Organizers. It also reflects the sense of responsibilities of the President, Bureau and Secretariat of COSPAR.

Up to now we have been trying to maintain this event with its high scientific level and international character, in close coordination with our Turkish partners. In particular we have been working with the LOC at setting up a practicable solution for remote presentations. Our decision to do so reflected our common intent to resist terrorism and our willingness to respect the efforts of the local organizers. But now, that is no longer possible.

I have informed the LOC of my intent to work with them and the COSPAR Secretariat in minimizing the negative impacts of this situation on their organization, on COSPAR, and, first and foremost, on the registered participants. I am aware that registrants have incurred costs for paid registration fees and hotel bookings. Decisions concerning reimbursements reside with the organization that received the payments and so the LOC should be contacted first regarding related matters. Therefore I invite you to address any concerns for reimbursement to the LOC, bearing in mind the financial limitations that our hosts are now experiencing. Be assured that on its side, COSPAR will try and be helpful in obtaining any needed reimbursements.

Dear COSPAR Associates, this is an unprecedented situation with profound consequences, the sources of which are far beyond the responsibilities of our Turkish partners or our own organization. As a scientific body dedicated since its inception in 1958 to promoting international cooperation in space research, without regard to any geopolitical impediments, it was our duty to try and maintain the Istanbul Assembly, notwithstanding the risks related to terrorism that can strike anywhere, as sadly demonstrated on 14 July in Nice (France), but also in the last few weeks in Orlando (USA), Dhaka (Bangladesh), Bagdad (Iraq) and other places. What happened on 15 July in Turkey is of a different nature, and I am sure that you will understand and approve our decision as the only wise one available. I am also certain of your continued interest in pursuing the noble goals of international cooperation in space research and in preparing for the next COSPAR Scientific Assembly that will take place in Pasadena in 2018.

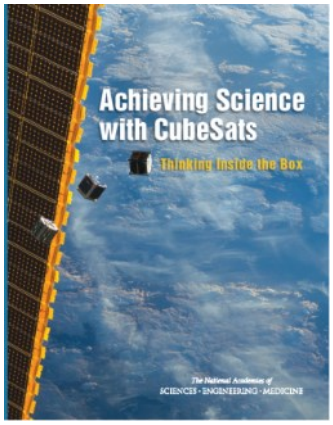
Planetary Protection for Outer Solar System Bodies: This 3-year activity, funded via the European Union's Horizon 2020 funding program and organized by the European Science Foundation, is designed to address a series of closely related topics in the general area of planetary protection. The project was formally initiated in January, 2016, and its steering group met for the first time in Paris on March 25. PPOSS' next major activity was to be a workshop on the margins of the COSPAR Scientific Assembly in Istanbul, Turkey, on July 31. However, given security concerns about travel to Turkey, the workshop is currently being rescheduled and will likely take place at Noordwijk, the Netherlands, sometime in September. Although the Academies' is not formal involved in this project, the Space Studies Board has observer status on the PPOSS steering group. Additional information about PPOSS can be found at http://pposs.org/.

The SSB's sister Board, the Aeronautics and Space Engineering Board, also publishes a newsletter; visit <http://sites.nationalacademies.org/DEPS/ASEB/DEPS_046908> to subscribe or to view past newsletters. SSB's division, the Division on Engineering and Physical Sciences, also publishes a newsletter; visit <http://sites.nationalacademies.org/DEPS/DEPS_059299> to subscribe.

NEW RELEASES

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

Achieving Science with CubeSats: Thinking Inside the Box



Space-based observations have transformed our understanding of Earth, its environment, the solar system and the universe at large. During past decades, driven by increasingly advanced science questions, space observatories have become more sophisticated and more complex, with costs often growing to billions of dollars. Although these kinds of ever-more-sophisticated missions will continue into the future, small satellites, ranging in mass between 500 kg to 0.1 kg, are gaining momentum as an additional means to address targeted science questions in a rapid, and possibly more affordable, manner. Within the category of small satellites, CubeSats have emerged as a space-platform defined in terms of (10 cm x 10 cm x 10 cm)- sized cubic units of approximately 1.3 kg each called "U's." Historically, CubeSats were developed as training projects to expose students to the challenges of real-world engineering practices and system design. Yet, their use has rapidly spread within academia, industry, and government agencies both nationally and internationally.

In particular, CubeSats have caught the attention of parts of the U.S. space science community, which sees this platform, despite its inherent constraints, as a way to affordably access space and perform unique measurements of scientific value. The first science results from such CubeSats have only recently become available; however, questions remain regarding the scientific potential and technological promise of CubeSats in the future.

Achieving Science with CubeSats reviews the current state of the scientific potential and technological promise of CubeSats. This report focuses on the platform's promise to obtain high- priority science data, as defined in recent decadal surveys in astronomy and astrophysics, Earth science and applications from space, planetary science, and solar and space physics (heliophysics); the science priorities identified in the 2014 NASA Science Plan; and the potential for CubeSats to advance biology and microgravity research. It provides a list of sample science goals for CubeSats, many of which address targeted science, often in coordination with other spacecraft, or use "sacrificial," or high-risk, orbits that lead to the demise of the satellite after critical data have been collected. Other goals relate to the use of CubeSats as constellations or swarms deploying tens to hundreds of CubeSats that function as one distributed array of measurements.

SSB STANDING COMMITTEES

Committee on Astrobiology and Planetary Science (CAPS)

Philip R. Christensen, Arizona State University (Co-Chair)
Christopher H. House (Co-Chair)

Committee on Astronomy and Astrophysics (CAA)
(joint with the Board on Physics and Astronomy)

Marcia Rieke, University of Arizona (Co-Chair)
Steven Ritz, University of California, Santa Cruz (Co-Chair)

Committee on Biological and Physical Sciences in Space (CBPSS)
(joint with the Aeronautics and Space Engineering Board)

Elizabeth Cantwell, Lawrence Livermore National Laboratory (Co-Chair)
Robert J. Ferl, University of Florida (Co-Chair)

Committee on Earth Science and Applications from Space (CESAS)

Michael D. King, University of Colorado, Boulder (Co-Chair) *from March 2016*
Joyce E. Penner, University of Michigan (Co-Chair)

Committee on Solar and Space Physics (CSSP)

J. Todd Hoeksema, Stanford University (Co-Chair)
Mary K. Hudson, Dartmouth College (Co-Chair)

For more information, go to <http://sites.nationalacademies.org/SSB/ssb_052296>.

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Consultant

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JAMES ANDERSON
Harvard University

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Consultant

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Geisel School of Medicine at Dartmouth

MARY LYNNE DITTMAR
Dittmar Associates, Inc.

JOSEPH FULLER, JR.
Futron Corporation

THOMAS R. GAVIN
Jet Propulsion Laboratory

NEIL GEHRELS
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Information Management Associate

TANJA E. PILZAK
Manager, Program Operations

SARA DENBO
Lloyd V. Berkner Space Policy Intern

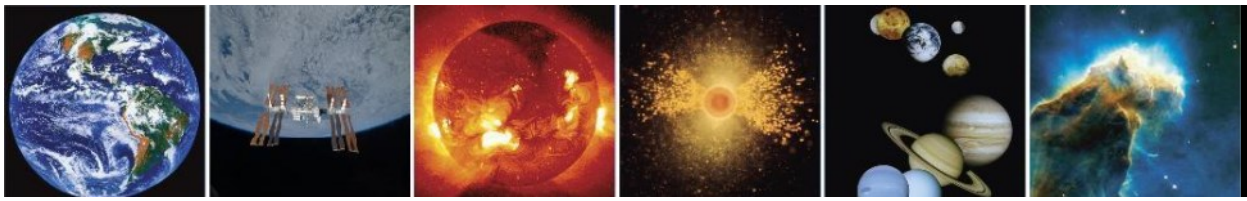
CAROLINE JUANG
Lloyd V. Berkner Space Policy Intern

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

More information on the SSB and ASEB can be found at <http://sites.nationalacademies.org/SSB/SSB_054577> (SSB)

and

<http://sites.nationalacademies.org/DEPS/ASEB/DEPS_058923> (ASEB)



SSB Calendar

July

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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

August

S	M	T	W	Th	F	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September

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October

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July 18-19	Assessment of the National Science Foundation's 2015 Geospace Portfolio Review	Washington, DC
August 16-18	Review of NASA's Planetary Science Division's Restructured R&A Program	Washington, DC
August 22-23	Assessment of the National Science Foundation's 2015 Geospace Portfolio Review	Woods Hole, MA
August 30-31	ESAS—Earth Surface and Interior: Dynamics and Hazards	Washington, DC
September 1-2	ESAS—Panel on Global Hydrological Cycles and Water Resources	Irvine, CA
September 12-14	ESAS—Panel on Weather and Air Quality: Minutes to Subseasonal	Washington, DC
September 14-15	Committee on Astrobiology and Planetary Science	Irvine, CA
September 21-23	Review of NASA's Planetary Science Division's Restructured R&A Program	Woods Hole, MA
September 27-28	ESAS—Panel on Climate Variability and Change: Seasonal to Centennial	Washington, DC
September 28-30	ESAS—Panel on Marine and Terrestrial Ecosystems and Natural Resource Management	Irvine, CA
October 4-5	Committee on Earth Science and Applications from Space	Washington, DC
October 5-7	Committee on Solar and Space Physics	Washington, DC
October 5-7	Large Strategic NASA Science Missions: Science Value and Role in a Balanced Portfolio	Washington, DC
Oct 31-Nov 1	Committee on Astronomy and Astrophysics	Irvine, CA

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