

# SPACE STUDIES BOARD NEWS



JANUARY - MARCH 2019

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We are honored to announce the new Space Studies Board Chair, Margaret Kivelson

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*The National Academies of*  
**SCIENCES • ENGINEERING • MEDICINE**

# SPACE STUDIES BOARD NEWS

## New Space Studies Board Chair, Margaret Kivelson.



Dr. Kivelson is the Distinguished Professor of Space Physics, Emerita at the Department of Earth, Planetary and Space Sciences at UCLA and a Research Professor in the Department of Climate and Space Sciences and Engineering at the University of Michigan, Ann Arbor.

Dr. Kivelson's research interests are in the areas of solar terrestrial physics and planetary science. Her recent research has focused on Earth, Jupiter, Saturn and Jupiter's Galilean moons. She was the Principal Investigator for the Magnetometer on the Galileo Orbiter that acquired data in Jupiter's magnetosphere for eight years and a Co-Investigator on the FGM (magnetometer) of the earth-orbiting NASA-ESA Cluster mission. She is actively involved as a Co-Investigator on NASA's Themis

mission, as the team leader for the Magnetometer Facility Instrument on the Europa Clipper mission, and as a participant in a team proposing for the European JUICE mission to Jupiter. She was a member of Cassini's magnetometer team until the mission ended in 2017. Dr. Kivelson co-discovered an intrinsic magnetic field of Jupiter's satellite, Ganymede. She interpreted other Galileo data indicating that Io and asteroids Gaspra and Ida may possess intrinsic fields. Induced fields detected at Europa and Callisto imply subsurface salty liquid oceans. These are among the decade's most significant results in planetary magnetism.

Dr. Kivelson earned her Ph.D. from Radcliffe College, Harvard University. She has been awarded a Guggenheim Fellowship, the Radcliffe Graduate Society Medal, the Harvard University 350th Anniversary Alumni Medal, several NASA Group Achievement Awards, the Alfvén medal of the European Geophysical Union, and the Fleming medal of the American Geophysical Union. She is an elected member of the American Academy of Arts and Sciences, the National Academy of Sciences (Councilor 2007-2010) and the American Philosophical Society, and an elected Fellow of the American Geophysical Union, the American Physical Society, the International Academy of Astronautics, the American Association for the Advancement of Science and the Royal Astronomical Society (Great Britain). In 2017, she was awarded the Kuiper Prize, from the Division of Planetary Sciences of the American Astronomical Society.

Dr. Kivelson is a highly active Member of the National Academies. She currently serves on the 2019 Arctowski Medal Selection Committee and has recently completed service with the Committee on the Review of Progress Toward Implementing the Decadal Survey Vision and Voyages for Planetary Sciences and the Committee on NASA Science Mission Extensions. She has previously been a member of the Commission on Physical Sciences, Mathematics, and Applications, the Plasma Science Committee, and the Space Studies Board. Dr. Kivelson has also served on analogous committees for NASA and the National Science Foundation, and on scientific Visiting Committees at Harvard, the University of Michigan, various campuses of the University of California, and JPL.

## THE BOARD AND ITS DISCIPLINE COMMITTEES

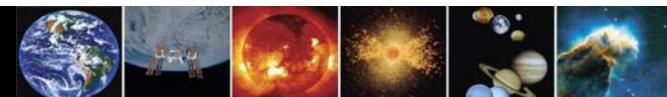
The Space Studies Board (SSB) did not meet during the first quarter. The next meeting of the SSB will be April 30-May 2, 2019. The first day will be a joint session with the Aeronautics and Space Engineering Board. More information on the board is available at [http://sites.nationalacademies.org/SSB/SSB\\_052281](http://sites.nationalacademies.org/SSB/SSB_052281).

During this quarter, the five discipline committees of the SSB (CAA, CAPS, CBPSS, CESAS, and CSSP) met in plenary and parallel sessions at the **2019 Space Science Week**, March 26-28, 2019. During the afternoon of March 26 all 5 committees met in plenary

## SSB MEMBERSHIP

JULY 1, 2018—JUNE 30, 2019

<b>MARGARET KIVELSON</b> , <i>Chair (as of April 1, 2019)</i> University of California, Los Angeles
<b>JAMES H. CROCKER</b> <i>Vice Chair</i> Lockheed Martin Space Systems Company (retired)
<b>GREGORY P. ASNER</b> Carnegie Institution for Science
<b>JEFF M. BINGHAM</b> Consultant
<b>ADAM BURROWS</b> Princeton University
<b>MARY LYNNE DITTMAR</b> Dittmar Associates, Inc.
<b>JEFF DOZIER</b> University of California, Santa Barbara
<b>JOSEPH FULLER, JR.</b> Futron Corporation (retired)
<b>SARAH GIBSON</b> National Center for Atmospheric Research
<b>VICTORIA HAMILTON</b> Southwest Research Institute
<b>CHRYSSA KOUVELIOTOU</b> The George Washington University
<b>DENNIS P. LETTENMAIER</b> University of California, Los Angeles
<b>ROSALY M. LOPES</b> Jet Propulsion Laboratory
<b>STEPHEN J. MACKWELL</b> Universities Space Research Association
<b>DAVID J. MCCOMAS</b> Princeton University
<b>LARRY PAXTON, JR.</b> Johns Hopkins University, Applied Physics Laboratory
<b>ELIOT QUATAERT</b> University of California, Berkeley
<b>BARBARA SHERWOOD LOLLAR</b> University of Toronto
<b>HARLAN E. SPENCE</b> University of New Hampshire
<b>MARK H. THIEMENS</b> University of California, San Diego
<b>ERIKA WAGNER</b> Blue Origin, LLC
<b>PAUL WOOSTER</b> Space Explorations Technologies
<b>EDWARD L. WRIGHT</b> University of California, Los Angeles
<b>LIAISON</b>
<b>CHARLES KENNEL</b> U.S. Representative to COSPAR



which commenced with an overview of the NASA Science Mission Directorate budget, program, and priorities from Thomas Zurbuchen (SMD Associate Administrator). The plenary session also included two panels on international collaboration. The first panel featured representatives from ESA Space Science (Fabio Favata, ESA SCI), the Chinese Academy of Sciences (Xiaolong Dong, CAS NSSC), JAXA Institute of Space and Astronautical Science (Masaki Fujimoto, JAXA ISAS), and the Committee on Space Research (Len Fisk, COSPAR) and was moderated by Steve Running. The second panel featured representatives from ESA Human and Robotic Exploration (David Parker, ESA HRE), the Canadian Space Agency – Space Exploration Development (Erick Dupuis, CSA-SED), NOAA National Environmental Satellite, Data, and Information Service (Steve Volz, NOAA-NESDIS), and the NASA Science Mission Directorate (Thomas Zurbuchen, NASA-SMD). For more information on the discipline committees, please visit [http://sites.nationalacademies.org/SSB/SSB\\_052296](http://sites.nationalacademies.org/SSB/SSB_052296).

On the evening of March 27, Eric Rignot (University of California, Irvine and Jet Propulsion Laboratory) gave a public lecture on **Sea Level Rise from Melting Ice Sheets and What We Should Do About It**, which drew over 200 attendees. A recording of the lecture is available at <https://livestream.com/NASEM/SeaLevelRise>.

The **Committee on Astrobiology and Planetary Science (CAPS)** met in Washington, D.C., on March 26-28 as part of the 2019 Space Science Week. The committee welcomed three new members: Katharine H. Freeman, Pennsylvania State University; Melissa A. McGrath, SETI Institute; and Clive R. Neal, University of Notre Dame. In addition, the committee heard updates from NASA's Planetary Science Division and Astrobiology program, multiple missions that are in-progress, and missions currently in development. The principal items of discussion were four-fold.

First, the role of a functioning of research coordination networks in the Astrobiology program. Second, cost overruns in the development of the sample handling system and instrumentation for Mars 2020. Third, the deletion of the ICEMAG instrument from Europa Clipper and NASA's plans to substitute a facility magnetometer in its place. Fourth, planning for the committee's September meeting which will be devoted to organizational issues relating to the planned initiation of the next planetary science decadal survey in the first quarter of 2020. The committee's next in-person meeting will be held at the California Institute of Technology in Pasadena, CA, on September 10-12, 2019. More information on CAPS and its activities is available at [http://sites.nationalacademies.org/SSB/SSB\\_067577](http://sites.nationalacademies.org/SSB/SSB_067577).

The **Committee on Astronomy and Astrophysics (CAA)** held its spring meeting March 26-27, as part of the 2019 Space Science Week. The committee received programmatic updates from Paul Hertz, NASA Astrophysics Division, Richard Green, NSF's Division of Astronomical Sciences, and Eric Linder, DOE's Office of High Energy Physics. The committee received status and schedule updates on JWST from Gregory Robinson, NASA, Jonathan P. Gardner, NASA Goddard Space Flight Center, and a follow-up report from the JWST Independent Review Board by A. Thomas Young. Jamie Dunn and Jeffrey Kruk, NASA Goddard Space Flight Center presented a status report, and science and technical update on WFIRST. In addition, Steve Kahn, LSST Director provided

the committee with update on the project status and plans for operations. This was followed by Federica Bianco, University of Delaware, who provided an overview of LSST Science Collaborations. The final presentation was a science-focused talk from Karin Öberg, Harvard University, regarding the Astrochemical Origins of Planets and Planetary Habitability. The committee also heard a presentation and had a discussion with the Astro2020 co-chairs ( Fiona Harrison and Robert Kennicutt). The CAA's fall meeting is tentative, date and location to be determined. More information on CAA is available at [http://sites.nationalacademies.org/BPA/BPA\\_048755](http://sites.nationalacademies.org/BPA/BPA_048755).

During this period the **Committee on Biological and Physical Sciences in Space (CBPSS)** was reformed as a discipline committee, enabling it to write brief reports on specific questions related to the implementation of the decadal report or its midterm review. The membership of the committee was also reconstituted during this period, with appointments of both previously serving and new members, including Dava Newman (MIT) who joined Rob Ferl as committee co-chair.

The new committee met on March 26-28 as part of the 2019 Space Science Week in Washington, DC. The meeting was designed to address several key questions, such as the role of non-NASA agencies, identified by the committee in prior discussions with NASA as crucial to planning the upcoming decadal study in life and physical sciences (LPS) in space. On the first day, the committee heard from Craig Kundrot on SLPSRA program activities, including the status of ISS transition planning, and Dominique Langevin provided an update from the European Space Science Committee panel on life and physical sciences. The committee also discussed its new charge and the status of decadal planning in preparation for

## SSB DISCIPLINE COMMITTEE CO-CHAIRS

### Committee on Astrobiology and Planetary Science (CAPS)

Christopher H. House, The Pennsylvania State University  
William B. McKinnon, Washington University, St. Louis

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

Vassiliki (Vicky) Kalogera, Northwestern University  
Steven Ritz, University of California, Santa Cruz

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

Robert J. Ferl, University of Florida  
Dava Newman, Massachusetts Institute of Technology

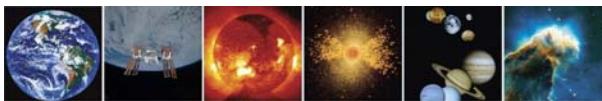
### Committee on Earth Science and Applications from Space (CESAS)

Chelle Gentemann, Earth & Space Research  
Steve Running, University of Montana (emeritus)

### Committee on Solar and Space Physics (CSSP)

Sarah Gibson, National Center for Atmospheric Research  
Maura E. Hagan, Utah State University

For more information, go to <[http://sites.nationalacademies.org/SSB/ssb\\_052296](http://sites.nationalacademies.org/SSB/ssb_052296)>.



the next day's symposium. The day concluded in afternoon plenary with the other discipline committees of the Space Studies Board, where panelists discussed international programs and collaboration. CBPSS devoted its second day to a symposium titled "Issues Informing the Decadal Study." On-line access information for the symposium had been publicized to the relevant science community, which was able to follow the live discussions and presentations as well as ask questions. The morning session included a NASA technology leaders forum where the role of "technology pull" on the decadal was extensively discussed. An invited talk was also given by Robert Hoyt of Tethers Unlimited on the role of in-space manufacturing in supporting and driving research relevant to the decadal. The early afternoon included a talk and an industry panel on commercial platforms and capabilities expected to be available to support orbital LPS research in the 2024-2034 timeframe. The committee also heard an invited talk from Yusuf Khan of the University of Connecticut on the emerging field of regenerative medicine and engineering. This was followed by a panel of representatives from NSF, NIH, USDA and DOD, who talked about current joint activities with NASA and future research interests relevant to the decadal study. On the third morning the committee discussed with SLPSRA representatives what had been learned, or confirmed, during the previous day and how this should be applied to the development of the decadal statement of task. It was also agreed that regular meetings would be scheduled between NASA and project staff in order to move the decadal task statement development forward. More information on CBPSS can be found at [http://sites.nationalacademies.org/SSB/SSB\\_145312](http://sites.nationalacademies.org/SSB/SSB_145312).

**The Committee on Earth Science and Applications from Space (CESAS)** held its spring meeting March 26-27 in Washington, DC as part of the 2019 Space Science Week. At the meeting, the committee engaged with decadal survey sponsors from NASA, NOAA, and the USGS and received briefings from Sandra Cauffman, Acting Director, NASA Earth Science Division; Steve Volz, head of NOAA NESDIS; and Tim Newman, National Land Imaging Program Coordinator/USGS. The committee also discussed a potential workshop on uncertainty quantification for Earth observations with David Higdon, Va. Tech; Jeffrey Anderson, NCAR; and Peter Challenor, Univ. of Exeter. A session on Enhancing the Influence of the Earth Science Decadal included a roundtable discussion with Bethany Johns, American Institute of Physics; Kasey White, Geological Society of America; Brittany Webster, American Geophysical Union; and Karl Anderson, American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. Other sessions included a discussion with Jack Kaye, NASA ESD, on planning for key datasets currently derived from instruments on EOS Terra, Aqua, and Aura, which are all well past their nominal lifetimes, and an update on the PACE mission by committee member Ivona Cetinić.

The committee remains interested in cloud computing issues as they intersect with data analysis and data stewardship; in addition, the committee remains interested in issues related to the use of commercial data for Earth remote sensing and technology on-ramps for NOAA and USGS operational programs. The next meeting of the committee will be in late summer/early fall 2019, location to be determined. More information on CESAS is available at

[https://sites.nationalacademies.org/SSB/SSB\\_066587](https://sites.nationalacademies.org/SSB/SSB_066587).

The **Committee on Solar and Space Physics (CSSP)** held its spring meeting March 26-28 as part of the 2019 Space Science Week. CSSP heard updates from NASA Heliophysics Division, NSF Geospace Section, NSF Division of Astronomical Sciences, NOAA Space Weather Prediction Center, and the NASA Heliophysics Advisory Council. CSSP also received an update from OSTP on the activities of the Space Weather Operations, Research, and Mitigation (SWORM) working group. CSSP held two focus sessions, one on demographics collection from the 2013 decadal and one on agile responses to rideshare opportunities for NASA Heliophysics. The committee also heard an update on Parker Solar Probe, and they joined CAPS for a briefing on the intersection of the interstellar probe mission concept with planetary science. Finally, the committee held discussions on a statement of task for a future short report on the agile responses to the rideshare opportunities concept. The CSSP's fall meeting will be held October 22-24, 2019, location TBD. More information on CSSP is available at [http://sites.nationalacademies.org/SSB/SSB\\_052324](http://sites.nationalacademies.org/SSB/SSB_052324).

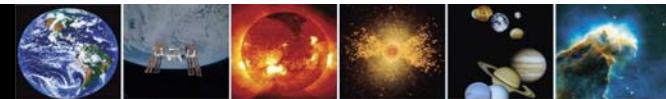
## STUDY COMMITTEES

### The Decadal Survey on Astronomy and Astrophysics 2020

**(Astro2020)** is in the process of forming the survey steering committee, and panel committee formation will begin soon. Science white papers were accepted from January 7 to February 19, 2019, and notices of intent for activity, project, and state of the profession considerations (APC) white papers were accepted from February 11 to March 20, 2019. APC white papers are tentatively due on July 1, 2019. The survey co-chairs held a webinar on April 17, 2019, to discuss plans for the study and take questions from the community. More information on Astro2020 is available at <http://nas.edu/astro2020>.

The **Committee on Near Earth Object Observations in the Infrared and Visible Wavelengths** held its final meeting in Washington April 17-18. The committee heard from NASA about the NEO program and finalized its report. The report will enter review at the end of April with the plan of delivering it to NASA by June. This study was requested by the NASA Chief Scientist's Office. More information on the project is available at [http://sites.nationalacademies.org/SSB/CurrentProjects/SSB\\_190172](http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_190172).

The **Committee on Planetary Protection Requirements for Sample-Return Missions from Martian Moons**, a joint activity between the Space Studies Board and the European Space Science Committee of the European Science Foundation (ESF), with some participation by Japanese scientists, has completed its work and its report was issued in prepublication format on January 18, 2019. The committee was the result of parallel requests sent by the Planetary Protection Offices of NASA and the European Space Agency to the National Academies and ESF, respectively. Its task was to determine whether or not samples returned from the martian moons be classified as "restricted" or "unrestricted" Earth return for planetary protection purposes. Committee members presented the results of their study at a meeting of COSPAR's Panel on Planetary Protection (PPP) in Vienna in late January. The PPP subsequently made a recommendation to COSPAR's Bureau supporting the conclusions of the joint committee and a JAXA team that such samples



be classified as unrestricted Earth return. COSPAR's Bureau accepted the PPP's recommendation at its meeting in Paris in March (see COSPAR summary below). The formal publication of the report of the joint committee by the National Academies Press will take place in the second quarter of 2019. More information on the project is available at [http://sites.nationalacademies.org/SSB/CurrentProjects/SSB\\_181917](http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_181917). The report is available at <https://www.nap.edu/catalog/25357>.

**The Committee on the Review of Progress Toward Implementing the Decadal Survey-Solar and Space Physics: A Science for a Technological Society** held its first in-person meeting—delayed because of the government shutdown--on February 25-27, 2019 in Washington, DC. The committee's very full agenda included sessions on the survey and its implementation with NASA (Thomas Zurbuchen, NASA SMD associate administrator and vice chair of the 2013 decadal survey steering committee; and Nicky Fox, director of the Heliophysics Division), NSF (including Mike Wiltberger, section head for Geospace; Dave Boboltz, Program Director, NSO & DKIST; and Valentin Pillet, director, National Solar Observatory (NSO), and NOAA (Elsayed Talaat, director, Office of Projects, Planning, and Analysis, NOAA/NESDIS). The committee also had discussions with Mike Liemohn and Janet Kozyla, the chair and executive secretary, respectively, of NASA's Heliophysics advisory committee; Anthea Coster and Mark Linton, the co-chairs of NASA's Living With a Star Program Analysis Group (LPAG); Tim Bastian, the chair of the National Academies Committee that performed the 2015 review of the NSF Geospace Portfolio; Ed DeLuca, the chair of the NASA Heliophysics Roadmap, which was charged with implementing the 2013 decadal survey; Terry Onsager, NOAA SWPC, for a session on the National Space Weather Program Action Plan; and Dan Baker, chair of the 2013 decadal survey steering committee. As the quarter ended, the committee was planning its second in-person meeting, which was scheduled for April 3-5, 2019 in Boulder, Colorado. A third in-person meeting is scheduled for July 23-25, 2019 in Woods Hole, Massachusetts. Information about the committee and links to meeting presentations are available at [http://sites.nationalacademies.org/SSB/CurrentProjects/SSB\\_188088](http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_188088).

Work began on forming a workshop organizing committee for **Science Opportunities Enabled by Gateway: A Workshop** during this period and approval of the final slate of nominees is now pending. Nominees have been polled for a meeting date in the April-May timeframe in Washington, DC. The committee will hold one face-to-face meeting and multiple on-line meetings in order to plan a workshop facilitating an expert dialog on issues related to the science that can be supported by NASA's planned Gateway platform.

## OTHER ACTIVITIES

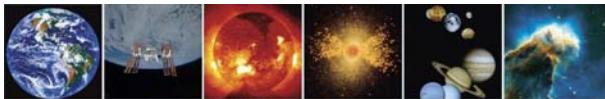
**The Committee on Space Research (COSPAR)**, for which the SSB is the U.S. National Committee, held an annual round of business meetings—i.e., meetings of the COSPAR Bureau and the science program committees for the 2019 symposium in Israel and the 2020 scientific assembly in Australia—in Paris, France, on March 18-21, 2019. The March meeting also included a detailed briefing

about the decisions made by COSPAR's leadership during a strategic seminar held at Caron, in the south of France, on December 3-4, 2018. The strategic seminar was held to develop strategies whereby COSPAR can become financially sustainable and have increased impact. The output of the seminar was the drafting of a strategic action plan describing a series of activities to be undertaken by the leaders and volunteers of COSPAR that will, "in fact and in perception establish COSPAR's unique importance for each of its constituents and stakeholders. The actions also recognize that in certain cases there are opportunities for increased income, which will enable a sustainable financial future for COSPAR." Additional information about COSPAR is available at <https://cosparhq.cnes.fr/>.

**Planetary Protection of the Outer Solar System (PPOSS)** was a 3-year activity, funded via the European Union's Horizon 2020 funding program and organized by the European Science Foundation (ESF); it concluded its activities at the end of 2018. The SSB is not formally engaged in this activity but did fund the participation of two U.S. experts in a subset of its activities. Additional information about PPOSS, including the various documents and reports it generated, is available at <http://pposs.org/>.

**Science Strategy for Space Exploration of the Outer Solar System Icy Moons Oceans (ExoOceans)** is a cooperative venture between the European Space Science Committee, the European Marine Board, and the International Space Science Institute (ISSI). It did not meet during this quarter. Its goal is 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 SSB is not formally involved in this activity but is funding the participation of two U.S. experts in its activities. The final report of the ExoOceans activity will be published by the International Space Science Institute in 2019. More details about the ExoOceans project is available at <http://www.essc.esf.org/membership/exooceans-study-group-meeting/> and <http://www.issibern.ch/workshops/exooceans/>.

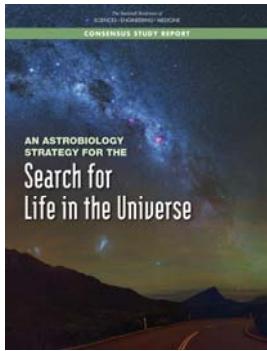
The **Forum for New Leaders in Space Science**, a cooperative activity between the National Academies of Sciences, Engineering, and Medicine and the Chinese Academy of Sciences (CAS), is designed to provide opportunities for a highly select group of young space scientists from China and the United States to discuss their research activities in an intimate and collegial environment. Participants in the 9th and 10th forums—focusing on planetary science and Earth observation from space—were selected by an international organizing committee in March. Eight young (<40 years old), researchers based in the United States and a like number of their counterparts from Chinese institutions will meet twice to discuss their research: in Beijing on May 15-16 and in Washington, D.C. on October 28-29. Also participating in the meetings of the 16 young researchers are a smaller number of more senior members of the relevant U.S. and Chinese scientific communities. The senior U.S. participants in the 9th and 10th forums include William B. McKinnon (Washington University) and Steven W. Running (University of Montana). Additional details concerning this activity are available at [http://sites.nationalacademies.org/SSB/SSB\\_086017](http://sites.nationalacademies.org/SSB/SSB_086017).



## REPORT RELEASES

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

### An Astrobiology Strategy for the Search for Life in the Universe

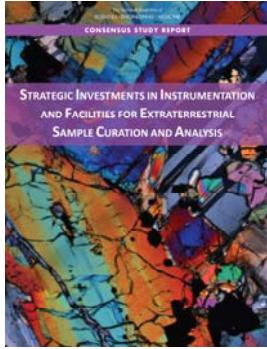


Astrobiology is the study of the origin, evolution, distribution, and future of life in the universe. It is an inherently interdisciplinary field that encompasses astronomy, biology, geology, heliophysics, and planetary science, including complementary laboratory activities and field studies conducted in a wide range of terrestrial environments. Combining inherent scientific interest and public appeal, the search for life in the solar system and beyond provides a scientific rationale for many current and future activities carried out by the National Aeronautics and Space Administration (NASA) and other national and international agencies and organizations.

Requested by NASA, this study offers a science strategy for astrobiology that outlines key scientific questions, identifies the most promising research in the field, and indicates the extent to which the mission priorities in existing decadal surveys address the search for life's origin, evolution, distribution, and future in the universe. This report makes recommendations for advancing the research, obtaining the measurements, and realizing NASA's goal to search for signs of life in the universe.

Available at: <https://www.nap.edu/catalog/25252>

### Strategic Investments in Instrumentation and Facilities for Extraterrestrial Sample Curation and Analysis



The United States possesses a treasure-trove of extraterrestrial samples that were returned to Earth via space missions over the past four decades. Analyses of these previously returned samples have led to major breakthroughs in the understanding of the age, composition, and origin of the solar system. Having the instrumentation, facilities and qualified personnel to undertake analyses of returned samples, especially from missions that take up to a decade or longer from launch to return, is thus of paramount importance if the National Aeronautics and Space Administration (NASA) is to capitalize fully on the investment made in these missions, and to achieve the full scientific impact afforded by these extraordinary samples. Planetary science may be entering a new golden era of extraterrestrial sample return; now is the time to assess how prepared the scientific community is to take advantage of these opportunities.

Strategic Investments in Instrumentation and Facilities for Extraterrestrial Sample Curation and Analysis assesses the current capabilities within the planetary science community for sample return analyses and curation, and what capabilities are currently missing that will be needed for future sample return missions. This report evaluates whether current laboratory support infrastructure and NASA's investment strategy is adequate to meet these analytical challenges and advises how the community can keep abreast of evolving and new techniques in order to stay at the forefront of extraterrestrial sample analysis.

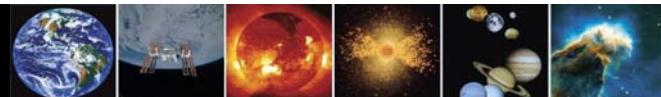
Available at: <https://www.nap.edu/catalog/25312/>

### Planetary Protection Classification of Sample-Return Missions from the Martian Moons

An international consensus policy to prevent the biological cross-contamination of planetary bodies exists and is maintained by the Committee on Space Research (COSPAR) of the International Council for Science, which is consultative to the United Nations Committee on the Peaceful Uses of Outer Space. Currently, COSPAR's planetary protection policy does not specify the status of sample-return missions from Phobos or Deimos, the moons of Mars. Although the moons themselves are not considered potential habitats for life or of intrinsic relevance to prebiotic chemical evolution, recent studies indicate that a significant amount of material recently ejected from Mars could be present on the surface of Phobos and, to a lesser extent, Deimos.

This report reviews recent theoretical, experimental, and modeling research on the environments and physical conditions encountered by Mars ejecta during certain processes. It recommends whether missions returning samples from Phobos and/or Deimos should be classified as "restricted" or "unrestricted" Earth return in the framework of the planetary protection policy maintained by COSPAR. This report also considers the specific ways the classification of sample return from Deimos is a different case than sample return from Phobos.

Available at: <https://www.nap.edu/catalog/25357/>



## SSB STAFF NEWS

This summer the SSB will be welcoming three Lloyd V. Berkner Interns.



**Ben Cassesse will be joining us on June 17, 2019.** Ben is a rising senior double majoring in Planetary Science and History at the California Institute of Technology (Caltech). Originally from Rhode Island, he is excited to head back to the East Coast to blend his interests in policy and scientific research. At school he is involved with research analyzing the surface composition of the Galilean satellites, and in previous summers he has completed two Summer Undergraduate Research Fellowships (SURFs) on modeling exoplanet formation and determining the completeness of galaxy catalogs. Out of the lab and classroom he is involved in theater, acapella, and student government, and he enjoys all things outdoors. He's looking forward to joining the Space Studies Board for the summer and hopes to take a broader perspective on the interactions between government, the public, and scientists into his future studies.



**Phoebe Kinzelman will be joining us on May 13, 2019.** Phoebe is a rising senior majoring in Planetary Science with a minor in Global Liberal Arts Studies at Purdue University. She is interested in planetary geology and has worked on an undergraduate research project for two semesters at Purdue, where she used JMARS computer software to map the large fracture networks of Mawrth Vallis, Mars, for the European Space Agency. The resulting data was used to help inform ESA's landing site selection for their ExoMars science rover. In the summer of 2018, she participated in a communications study abroad in Heidelberg, Germany, where she took both Intercultural Communications and Judgement & Decision-Making courses and traveled to Strasbourg, Paris, and Berlin. This exposure to communication differences across countries, along with the completion of international relations coursework for her minor, sparked Phoebe's interests in domestic and international science policy. In her spare time, she enjoys rock climbing and recording music videos for her YouTube channel, youtube.com/phoebesings. Phoebe is thrilled to intern at the Space Studies Board and is excited to gain an understanding of the variety of governmental interests that guide space studies and exploration. In the future, she hopes to use the knowledge she acquires at the Board to help foster understanding between scientists, politicians, and the public and work towards her goal of becoming an astronaut on Mars.



**Stephen Tames will be joining us on June 3, 2019.** Stephen is a rising senior at the George Washington University pursuing an International Affairs and Physics double major. When asked 'Why International Affairs and Physics?' he is quick to respond that they are one and the same, the study of the world. Throughout his studies Stephen has sought to merge International Affairs and Physics under the umbrella of space foreign policy, a dynamic and challenging field with an uncertain future. Beyond his career he has a passion for world-building, war-gaming, and when there's time, blacksmithing. Stephen is beyond enthusiastic to bring his talents and skills to the table as a Space Studies Board Intern.

### SSB Staff

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Senior Program Officer

#### SANDRA J. GRAHAM

Senior Program Officer

#### GREGORY MACK\*

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#### DAVID H. SMITH

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#### SARAH BROTHERS

Associate Program Officer

#### MIA BROWN

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#### ANESIA WILKS

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#### DIONNA WISE

Program Associate

#### MEG KNEMEYER

Financial Officer

#### RADAKA LIGHTFOOT

Senior Financial Associate (from October 22, 2018)

#### CELESTE A. NAYLOR

Information Management Associate

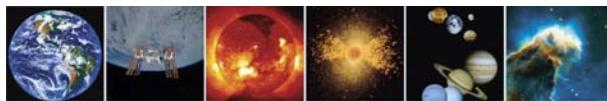
#### TANJA E. PILZAK

Manager, Program Operations

#### SARA CRANDALL

Christine Mirzayan Science and Technology Policy Fellow (from January 22, 2019)

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



**Host Organization: The Israel Academy of Sciences and Humanities**

Scientific Program Chair: Professor Morris Podolak, Tel Aviv University, Dept. of Geosciences

**Abstract Deadline: April 30, 2019**

More information is available at [cospar@cosparhq.cnes.fr](mailto:cospar@cosparhq.cnes.fr) and <http://www.cospar2019.org/>



### 43rd COSPAR Scientific Assembly

15-23 August 2020  
International Convention Centre  
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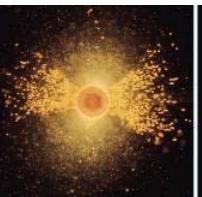
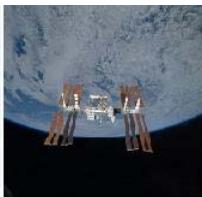
**Host Organization: Australian Academy of Science**

Scientific Program Chair: Prof. Iver Cairns, University of Sydney, School of Physics

**Abstract Deadline: Mid-February 2020**

More Information is available at [cospar@cosparhq.cnes.fr](mailto:cospar@cosparhq.cnes.fr), <https://www.cospar-assembly.org> (scientific program), and <http://www.cospar2020.org> (registration, accommodation, etc.)

**Selected papers from both events will be published in *Advances in Space Research* and *Life Sciences in Space Research*, fully refereed journals with no deadlines open to all submissions in relevant fields.**



## SSB Meetings Calendar

A P R I L							
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April 3-5              Review of the Progress Toward Implementing the Decadal Survey—Solar and Space Physics: A Science for a Technological Society              Boulder, CO

April 17-18              Near Earth Object Observations in the Infrared and Visible Wavelengths              Washington, DC

April 30-May 2              Space Studies Board              Washington, DC

May 15-16              Forum for New Leaders in Space Science              Beijing, China

June 10-11              Science Opportunities Enabled by the Gateway: A Workshop—Organizing Committee              Washington, DC

July 23-25              Review of the Progress Toward Implementing the Decadal Survey—Solar and Space Physics: A Science for a Technological Society              Woods Hole, MA

## Upcoming Events

November 6-8, 2019      Space Studies Board              Irvine, CA

March 31-April 2, 2020      Space Science Week              Washington, DC

April 28-30, 2020      Space Studies Board              Washington, DC

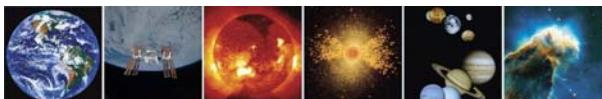


National Academy of Sciences  
Building  
2101 Constitution Ave NW  
Washington, DC

Keck Center  
500 Fifth St NW,  
Washington, DC

Arnold and Mabel Beckman  
Center  
100 Academy Drive  
Irvine, CA

J. Erik Jonsson Conference Center  
314 Quissett Ave  
Woods Hole, MA



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- Report Series: Committee on Astrobiology and Planetary Science: Review of the Planetary Science Aspects of NASA SMD's Lunar Science and Exploration Initiative (2019) [Available online only](#)
- Report Series: Committee on Astrobiology and Planetary Science: Review of the Commercial Aspects of NASA SMD's Lunar Science and Exploration Initiative (2019) [Available online only](#)
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- Strategic Investments in Instrumentation and Facilities for Extraterrestrial Sample Curation and Analysis (2019)
- An Astrobiology Strategy for the Search for Life in the Universe (2019)
- Open Source Software Policy Options for NASA Earth and Space Sciences (2018)
- Exoplanet Science Strategy (2018)
- Visions into Voyages for Planetary Sciences in the Decade 2013-2022: A Midterm Review (2018)
- Report Series: Committee on Astronomy and Astrophysics: Mission Concept Studies (2018) [Available online only](#)
- Review and Assessment of Planetary Protection Policy Development Processes (2018)
- Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space (2018) [Available online only](#)
- A Midterm Assessment of Implementation of the Decadal Survey on Life and Physical sciences Research at NASA (2017)
- America's Future in Civil Space: Proceedings of a Workshop-in Brief (2017)
- Searching for Life Across Space and Time: Proceedings of a Workshop (2017)
- Powering Science: NASA's Large Strategic Science Missions (2017)
- Report Series: Committee on Astrobiology and Planetary Science: Getting Ready for the Next Planetary Sciences Decadal Survey (2017) [Available online only](#)
- Report Series: Committee on Astronomy and Astrophysics: Small Explorer Missions (2017) [Available online only](#)
- Report Series: Committee on Solar and Space Physics: Heliophysics Science Centers (2017) [Available online only](#)
- Review of the Restructured Research and Analysis Programs a NASA's Planetary Science Division (2017)
- Assessment of the National Science Foundation's 2015 Geospace Portfolio Review (2017)
- Extending Science—NASA's Space Science Mission Extensions and the Senior Review Process (2016)
- New Worlds, New Horizons: A Midterm Assessment (2016)
- Achieving Science with CubeSats: Thinking Inside the Box (2016)
- Continuity of NASA Earth Observations from Space: A Value Framework (2015)
- Review of the MEPAG Report on Mars Special Regions
- The Space Science Decadal Surveys: Lessons Learned and Best Practices (2015)
- Sharing the Adventure with the Student: Exploring the Intersections of NASA Space Science and Education: A Workshop Summary
- Solar and Space Physics: A Science for a Technological Society: An Overview (2014) Booklet
- Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration (2014)
- Evaluation of the Implementation of WFIRST/AFTA in the Context of New Worlds, New Horizons in Astronomy and Astrophysics (2014)
- Review of the Draft 2014 Science Mission Directorate Science Plan (2014)
- Opportunities for High-Power, High-Frequency Transmitters to Advance Ionospheric/Thermospheric Research: Report of a Workshop (2014)
- Lessons Learned in Decadal Planning in Space Sciences: Summary of a Workshop (2013)