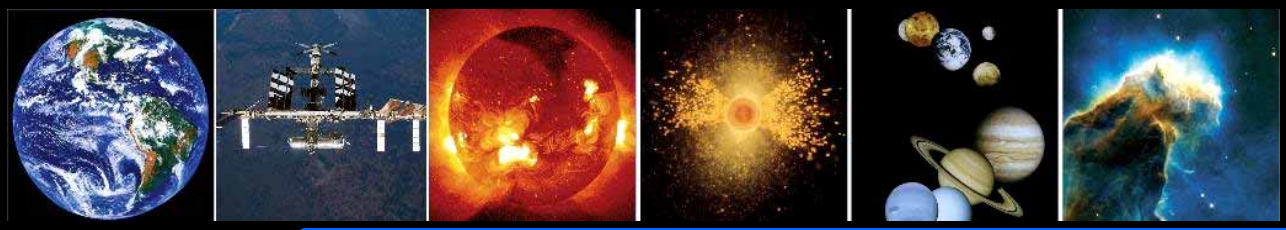
SPACE STUDIES BOARD NEWS



JULY—SEPTEMBER 2008

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-Charles F. Kennel, chair, SSB

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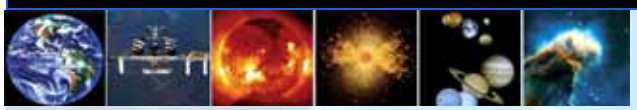


FROM THE CHAIR

Whither U.S. Earth System Science?

Earth system science in America is at a turning point.

On the one hand, U.S. Earth observations are enjoying a golden age. The Earth Observing System (EOS) is providing a cornucopia of observations. With advanced communications and multi-disciplinary laboratory facilities, research ships have never been so capable. Moreover, if recent advances in sensor-net technology and cyber-infrastructure can be captured, Earth system science, together with the environmental, hydrological, and ecological sciences, is poised to make great progress.

On the other hand, the golden age is nearly over. Two of the largest government programs that have played key roles in advancing Earth system science have uncertain futures.

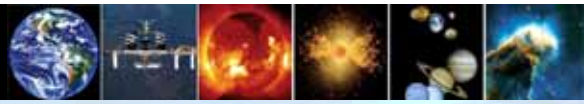
The EOS satellites are aging, the system will not be renewed, and replacement planning is in disarray. In retrospect, NASA's decision to not continue the system concept and instead rely on incorporating climate instruments in the payloads of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) was unfortunate. NPOESS, an operational system, did offer management commitment to long-term observations, but it did not have a strong policy commitment to climate observations. Climate was second priority; weather came first. When large cost overruns and delays overtook the NPOESS program, a natural, if unfortunate, response was to delete key climate measurements from the payload.

Choosing NPOESS for climate was a retrograde step, scientifically and managerially. Its architecture—a very large multi-instrument spacecraft—resembles the original EOS and not the flexible multi-spacecraft network that EOS became. Had NPOESS been designed like EOS, it might have been able to minimize the expensive, hard-to-resolve conflict between climate and weather. Such conflicts are inherent in engineering large complex spacecraft in any case. The first launch of NPOESS has now been delayed until 2014, so its climate data would have left gaps in continuity.

On the one hand, U.S. Earth observations are enjoying a golden age… On the other hand, the golden age is nearly over. Two of the largest government programs that have played key roles in advancing Earth system science have uncertain futures.

The SSB recently completed a decadal survey of Earth science and applications from space,[1] with an interim report published in 2005 and the final report in 2007. The interim report documented an Earth observation program that it concluded was "at risk of collapse." As part of a strategy to reverse this trend, the final report recommended 17 missions to be flown by NASA and NOAA in the coming decade. (It notably did not address how they might be integrated into a single system capable of coordination with in situ observations.) The report further noted that there is a lack of clear agency responsibility for sustained research programs and the transitioning of proof-of-concept measurements into sustained measurement systems, citing the elimination of the requirements for climate research-related measurements on NPOESS as "the most recent example of the failure to sustain critical measurements." That point was amplified in a more recent SSB report,[2] which noted that short-term actions would not address the longer-term structural problems associated with providing climate-quality measurements from space systems that are designed to meet national objectives more closely associated with operational weather forecasting. The future remains uncertain, in part because NASA no longer includes Earth observations among its prime missions.

The ships in the University-National Oceanographic Laboratory System (UNOLS) are also reaching the ends of their lifetimes, and there is no clear path to replacement of the academic research fleet. UNOLS has been sustained over the years by an agreement that the U.S. Navy would fund the capital costs and National Science Foundation (NSF) the operating costs of the



research fleet. This arrangement has deteriorated, and it has proven difficult for the Navy to fund the next generation of research vessels. In the meantime, higher fuel costs and operating expenses are forcing NSF to reduce the number of research cruises from its fleet.

The oceanographic research community no longer focuses exclusively on ship-borne observations as it did when UNOLS was founded in 1972, but now uses automated observing systems and space observations as well. This dispersion of focus blurs the impact of community advocacy for UNOLS. This problem will not be resolved until there is a unified plan that embraces ships, observing systems, and space observations. In other words, ocean science must plan from an Earth system science point of view.

When large central programs like EOS or UNOLS falter, a key contributing cause has to be an unclear sense of direction. The present difficulties stem in part from conflicts engendered by Earth system science's transition from a pure research enterprise into one that supports more applications. The conflicts are manifested by disagreements within the government about the relative roles of NASA, NOAA, USGS, and NSF. In the research community, there are disagreements about "science vs. applications," "discovery vs. monitoring," "ships vs. observing systems," and "research vs. operations."

Are the U.S. science and applications agencies presently able to provide forceful leadership? They have done so in the past and they can do so in the future. This does not necessarily mean that the government is presently configured to meet the new challenges ahead. The challenge of coordinating the programs pertinent to the Earth system science agenda were understood at the beginning, when the first Bush administration founded the U.S. Global Change Research Program (USGCRP) in 1990. USGCRP is an interagency forum represented at the head of program level. USGCRP scored major early successes by harmonizing the research goals of its participating agencies and by providing a framework for EOS. As time passed, however, needs to develop multi-disciplinary technical infrastructure requiring the participation of more than one agency emerged. Here, the USGCRP was less successful because it could not enforce the budget coordination on a sustained basis that is required to build and maintain infrastructure. The second Bush administration established an even more powerful coordinating council, represented at the head of agency level, and added the Climate Change Science Program to the USGCRP to provide a stronger focus on key policy issues.[3] However, this more powerful interagency council was unable to prevent the serious deterioration in the capacity to observe the Earth from space. This decline is only beginning to be reversed.

Is the government ready to provide the new decision support services made possible by its investments in Earth system science? Yes and no. By and large, NOAA, in partnership with NASA, has successfully addressed its primary mission, weather, for close to 40 years. It has done less well with its newer responsibility, climate. One reason is budgetary, which limits the technical capacity NOAA can deploy for climate-related purposes when it must continue its weather mission. But there is a more profound reason: NOAA alone is not configured to provide comprehensive Earth system services, since its mandate does not extend to the land. USGS, which does have responsibility for the land, does not deal with the oceanic and atmospheric processes that convey the impacts of climate change to the ecosystems and watersheds it is responsible for.

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Recently, there has been a proposal to create an independent agency by bringing NOAA and USGS together to form an Earth System Science Agency (ESSA). ESSA would be responsible for translating the research of NASA, NSF, DOE and others into Earth system applications. In particular, ESSA would have the capacity to assess the regional impacts of climate change and to support decision-making about adaptation to climate change. And there is at least one other managerial advantage. NASA has supported NOAA's weather mission by providing space technology and building weather satellites for 40 years; it could equally well support an ESSA, with one difference: NASA would have a customer who needs an Earth observing *system.*

The conflicts within Earth system science will not be resolved until it is realized that the future lies in connecting research and applications. Until the conflicts are resolved, institutional progress will be stymied. The key steps toward resolution include: U.S. science and applications agencies providing forceful leadership within the United States; the United States asserting more vigorous leadership in the international Group on Earth Observations (GEO) and its Global Earth Observation System of Systems (GEOSS); and above all, the Earth system science community adopting sustainability as a long-term goal.

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[1]National Research Council, *Earth Science and Applications from Space: Urgent Needs and Opportunities to Serve the Nation*, The National Academies Press, Washington, D.C., 2005; National Research Council, *Earth Science from Space: National Imperatives for the Next Decade and Beyond*, The National Academies Press, Washington, D.C., 2007.

[2]National Research Council, *Ensuring the Climate Record from the NPOESS and GOES-R Spacecraft: Elements of a Strategy to Recover Measurement Capabilities Lost in Program Restructuring*, The National Academies Press, Washington, D.C., 2008.

[3]For a recent review see National Research Council, *Evaluating Progress of the U.S. Climate Change Science Program: Methods and Preliminary Results*, The National Academies Press, Washington, D.C., 2007.

DIRECTOR'S CORNER

Changes

Marcia Smith, Director

This newsletter marks the first "From the Chair" column by our new chair, Charlie Kennel, whose appointment was announced in the April-June issue. Charlie succeeds Len Fisk, and we would like to thank Len for his five years of leadership, particularly his indefatigable work this past year traveling around the country as part of our commemoration of the 50th anniversary of the International Geophysical Year and the 50th birthday of the SSB. It was greatly rewarding to engage with the public to discuss all that we have learned from space and Earth science over the past 50 years and look forward to the next 50 years of discoveries, and we very much appreciate Len making his time available for that adventure! Len will hardly be a stranger to the SSB, though. He has agreed to chair a NASA-funded study looking at research & analysis (R&A) activities, and is vice chair of an National Research Council (NRC) funded study (chaired by Gen. Les Lyles, ret.) grappling with the rationale and goals of the U.S. civil space program. More information on those studies can be found elsewhere in this newsletter.

We would like to thank Len for his five years of leadership, particularly his indefatigable work this past year traveling around the country as part of our commemoration of the 50th anniversary of the International Geophysical Year and the 50th birthday of the SSB.

We are delighted to welcome Charlie as the new captain of our ship. Charlie is well known to many in the space and Earth science communities. His expertise spans astrophysics, heliophysics, and earth science. He is currently a professor and director emeritus in the Scripps Institution of Oceanography at the University of California, San Diego (UCSD). He is also chair of the California Council on Science and Technology. Prior to serving as director of Scripps, he was NASA's associate administrator for Mission to Planet Earth. Charlie has considerable experience with the NRC, having served as chair of our Board on Physics and Astronomy (BPA) and most recently as co-chair of the SSB/BPA Beyond Einstein Program Assessment Committee (BEPAC). As you know from our last newsletter, we also have five other new Board members: Yvonne Brill, Andy Christensen, Joan Johnson-Freese, Bob Pappalardo, and Ellen Zweibel.

As you undoubtedly have noticed we have changed the design of this newsletter. Many thanks to Tanja Pilzak, Victoria Swisher, and Kayleigh Bohemier for their terrific work.

These changes at the SSB are only a small sampling of the changes yet to come in the space program. All eyes are on the election race between Barack Obama and John McCain. Both have enunciated space policies, and Obama mentioned the space program in two of the three presidential debates. How the space program will fare in these turbulent economic times is anyone's guess, but it is a good sign that both candidates are at least familiar with NASA activities. Cynics may say it is only because Florida is such an important electoral state, but whatever the reason, the space program is receiving more attention than it has in any presidential campaign in recent memory.

Whoever wins, as the new presidential term and a new congressional session get underway, the SSB will be embarking upon three new decadal surveys to provide advice to the government on future priorities in (1) astronomy and astrophysics (with the BPA), (2) solar system exploration, and (3) microgravity and partial gravity life and physical sciences (with the Aeronautics and Space Engineering Board). The way we conduct our decadal surveys is changing, too. NASA and NSF already asked us to include independent cost estimates (ICEs), assessments of technology readiness, and "trip wires"—an identification of circumstances that might develop that could necessitate a reassessment of decadal survey priorities—in the upcoming astronomy and astrophysics decadal. Congress had similar thoughts and included the following language as Section 1104 of the recently enacted 2008 NASA Authorization Act (H.R. 6063)..

"(a) In General- The Administrator shall enter into agreements on a periodic basis with the National Academies for independent assessments, also known as decadal surveys, to take stock of the status and opportunities for Earth and space science discipline fields and Aeronautics research and to recommend priorities for research and programmatic areas over the next decade.

(b) Independent Cost Estimates- The agreements described in subsection (a) shall include independent estimates of the life cycle costs and technical readiness of missions assessed in the decadal surveys whenever possible.

(c) Reexamination- The Administrator shall request that each National Academies decadal survey committee identify any conditions or events, such as significant cost growth or scientific or technological advances, that would warrant NASA asking the National Academies to reexamine the priorities that the decadal survey had established."

We welcome these changes, especially the ability to hire our own subcontractors to provide independent cost estimates of projects under consideration, instead of relying on estimates from the teams proposing those new missions or from NASA itself. Our first experience in obtaining our own ICEs was for the BEPAC report. That study committee concluded that the mission teams did not deliberately understate mission costs, but that they could not account for "unknown unknowns," such as the potential effect of a launch delay. However, companies such as the Aerospace Corporation and SAIC have cost models based on historical data that do allow for factoring in some of those unknown unknowns that may result in cost estimates that come closer to actual costs.

As we begin these new decadal surveys, we unfortunately will not have the assistance of our erstwhile colleague Barbara Akinwole, who is leaving the SSB to join the Center to Champion Nursing in America, Public Policy Institute, AARP. Many of you will recognize her name from the emails you receive from us. She has served many roles for the SSB for the past 10 years, including distributor of this e-newsletter, manager of our website, FACA compliance officer, and exhibitor at professional meetings. If any of you have visited our booths at the American Astronomical Society or the American Geophysical Union conferences, you probably met Barbara in her capacity as our good will ambassador, sharing our reports with the scientific community. Though we will miss her acutely, we are very excited about her new opportunity. Good luck, Barbara!

A final change to note: the SSB offices on the 10th floor of the Keck Building are moving, though we do not yet know exactly where. The National Academy of Sciences building at 2101 Constitution Avenue will close for two years for renovation, meaning that the approximately 150 Academies staff with offices in that building must temporarily move into Keck. Some are headed to the 10th floor, necessitating our relocation. Anyone coming to the Keck Building after January 1 who wants to visit an SSB staff person should be sure to check in advance to find out where we are.

Congress, Space Research, and Export Controls

Joseph K. Alexander
Senior Program Officer

For more than a decade, the SSB has devoted attention to how implementation of export controls, especially the International Traffic in Arms Regulations (ITAR) which are administered by the State Department, impact space research and space research institutions.[1] Those impacts include uncertainty about when and how academic research interactions with foreign students and collaborators are subject to government controls, obstacles to industry and federal laboratory partnerships with academic scientists in international space research collaborations, the costs in time and money that accompany ITAR compliance in collaborative space projects, and the chilling effects on opportunities for forming international partnerships due to the implementation of current export control regulations.

Aerospace industry groups and advisory studies commissioned by the Departments of Commerce and Defense have addressed some of these and related issues. Partly in response to these efforts, some members of Congress have become increasingly interested in finding ways to mediate the unintended consequences of the current export control regime on industrial competitiveness and on science and technology, while still preserving the intended national security benefits of controlling inappropriate export of military technologies.

Partly in response to these efforts, some members of Congress have become increasingly interested in finding ways to mediate the unintended consequences of the current export control regime on industrial competitiveness and on science and technology, while still preserving the intended national security benefits from controlling inappropriate export of military technologies.

On September 12, 2008, three senators—Ken Salazar (D-CO), Wayne Allard (R-CO), and Jeff Bingaman (D-NM)—wrote to the Defense Technology Security Administration (DTSA) to express concern over the way in which satellites and all related components are currently included in the U.S. Munitions List (USML) and regulated under ITAR, and they called for a thorough review of the USML to determine if all the items now listed should be treated as "sensitive national security munitions." They suggested that some space components that are now regulated under the USML might more appropriately fall under the Commerce Control List, which is administered by the Commerce Department, where the export of dual-use items having both potential commercial and military applications is regulated.

In early 2007, three House of Representatives members—Donald Manzullo (R-IL), Joseph Crowley (D-NY), and Earl Blumenauer (D-OR)—formed the Congressional Export Control Working Group as a vehicle to help "raise awareness of current U.S. export control policy" and address needs for modernization of the policy. On September 24, 2008, the three congressmen sent a letter to DTSA in which they also called for a review of the USML. The letter went on to urge DTSA to work with the State Department in the near term to find improvements to the export licensing approval process.

The founders of the Congressional Export Control Working Group also hosted a congressional briefing on September 24 on "The Impact of Export Controls on Non-profit and University Efforts." The speakers were Claude Canizares (vice president for research and professor at MIT and former chair of the SSB), Fred Tarantino (president and CEO of the Universities Space Research Association), and Eileen Albanese (director of the Office of National Security and Technology Transfer at the Commerce Department). Canizares and Tarantino summarized how U.S. universities are important for education, advancement in science and technology, and national security, and they noted the various problems and impacts that universities experience due to implementation of export controls, especially ITAR. They also cited important actions that the government could and should take in the near term. Congressman Manzullo attended the briefing and appeared to be very interested and supportive of the ideas that were offered.

During the briefing, Ms. Albanese described the Emerging Technology and Research Advisory Committee—a new advisory committee established by the Commerce Department to address export control issues and problems—which had its first meeting on September 23. The committee roster includes 12 members from U.S. universities.[2] The State Department has a similar external advisory body—the Defense Trade Advisory Group—and its roster now includes three members who bring familiarity with space research issues to the committee.[3]

Finally, one of the 13 major findings presented in the recently enacted NASA Authorization Act of 2008 (H.R. 6063) cites the importance of properly balancing the interests of national security and U.S. space leadership: "It is in the national interest for the United States to have an export control policy that protects the national security while also enabling the United States aerospace industry to compete effectively in the global market place and the United States to undertake cooperative programs in science and human space flight in an effective and efficient manner."

The conclusion that one might draw from these recent developments is that while the current export control regime still creates a variety of significant problems for space research, there are opportunities to help Congress and federal agencies to gain a better appreciation of the problems and to recommend potential solutions. If the space community continues to inform policy makers about these issues, then the next Congress and the next administration may be open to pursuing solutions.[4]

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[1]The most recent relevant SSB activity is summarized in *Space Science and the International Traffic in Arms Regulations: Summary of a Workshop* (The National Academies Press, 2008), which is available at http://www.nap.edu/catalog.php?record_id=12093.

[2]See http://www.bis.doc.gov/news/2008/bis_press09232008.htm for more information.

[3]See http://pmddtc.state.gov/DTAG/index.html for more information.

[4]SSB Member Daniel Baker (University of Colorado) recently suggested that a blue ribbon commission be established to look at these issues. See: *ITAR: Revamping a Law of Unintended Consequences*, Space News, 16 September 2008, p, 19.

Can We Prevent Space from Becoming a Shooting Gallery?

l-r: Kayleigh Bohemier, Victoria Swisher, and Laura Delgado

Victoria Swisher, Research Associate
Kayleigh Bohemier
and Laura Delgado
Lloyd V. Berkner Space Policy Interns

The Center for Strategic and International Studies (CSIS) and the U.S. Chamber of Commerce's Space Enterprise Council co-sponsored the event "Can We Keep Space from Becoming a Shooting Gallery?" on Monday, July 21, 2008. The panel discussion and resulting question and answer session covered a variety of topics, including deterrence, operational sustainability, the regulation of space, enforcement, and how U.S. space policy will change in the next administration.

Moderated by David Logsdon, executive director of the Space Enterprise Council, the panel consisted of experts in fields related to space weaponization: James A. Lewis, director of CSIS's Technology and Public Policy Program; Ashley Tellis, senior associate at Carnegie Endowment for International Peace; Michael Krepon, co-founder of the Henry L. Stimson Center and diplomat scholar at the University of Virginia; and Theresa Hitchens, director of the Center for Defense Information.

Dr. Lewis noted that significant military and economic incentives exist for other countries to attack U.S. satellites, and he observed that several countries are already studying or developing anti-satellite technologies. Dr. Tellis agreed and suggested that the United States should use the following three-prong approach to the deterrence of space weapon development: pursuing strong dissuasive tactics to make the idea of an attack less viable to other nations; developing contingency plans and available-on-demand resources to respond quickly in the event of an attack; and "inflicting pain" (a term he did not further define) to respond to these attacks. Dr. Tellis mentioned that options to deter attacks include negotiating arms control measures and creating a space "code of conduct."

Mr. Krepon argued that the risks associated with developing anti-satellite weaponry far outweigh the benefits, especially when considering problems caused by space debris created during anti-satellite activities. Ms. Hitchens advocated regulations that would foster "space sustainability"—efforts by some in industry and government to "define 'good behavior' in space, set boundaries on space activities, and create disincentives for negative behaviors."

During the question and answer session, the panelists discussed how to define an "attack" on U.S. assets, which they concluded would have to be differentiated between peacetime and wartime. The panelists also discussed who would be responsible for enforcing rules or sanctions in space, and Dr. Lewis noted that self-regulation or an independent agency, like that used in the fields of biological and chemical weapon nonproliferation, could be successful in the space arena as well.

SSB MEMBERSHIP
JULY 1, 2008—JUNE 30, 2009

For more information on the membership of the SSB please visit our website at <www.nationalacademies.org/ssb>.

SSB ACTIVITIES

THE BOARD AND ITS STANDING COMMITTEES

The **Space Studies Board** (SSB) did not meet during this quarter; however, the SSB executive committee (XCOM) did meet on August 18-20, 2008, at the J. Erik Jonsson Woods Hole Center in Woods Hole, Massachusetts, for its annual strategic planning session. The XCOM spoke with congressional representatives from the Senate Commerce, Science, and Transportation Committee and the House Committee on Science and Technology on the outlook from Capitol Hill.

The committee continued general discussion on the roles and operations of the Board and its standing committees, ad-hoc committees, the financial status of the Board, the NRC efforts to streamline internal processes, and planning for the November SSB meeting and workshop. The latter included presentations by Mary Kicza, assistant administrator for Satellite and Information Services at NOAA; John Boright, executive director of the Office of International Affairs, National Research Council, and Marc Allen, assistant associate administrator for strategy, policy, and international, Science Mission Directorate at NASA.

In addition to the current chair, Charlie Kennel, and the current director, Marcia Smith, the XCOM was joined during this meeting by four former chairs, Len Fisk, Claude Canizares, Lou Lanzerotti, and Richard Goody and two former directors, Joe Alexander, and Marc Allen (see photo).

Above (l-r): Joe Alexander, Charlie Kennel (current SSB chair), Len Fisk, Claude Canizares, Marc Allen, Lou Lanzerotti, Richard Goody, and Marcia Smith (current SSB Director)

The full Board will meet next at the Arnold and Mabel Beckman Center in Irvine, California the morning of November 18, 2008, followed by the SSB Workshop on Future International Space Cooperation and Competition in a Globalizing World, which will take place November 18-20, 2008.

The **Committee on Astronomy and Astrophysics** (**CAA)** is on hiatus until the completion of the upcoming astronomy and astrophysics decadal survey, Astro 2010.

The **Committee on Earth Studies (CES)** met September 22-23 in Boulder, Colorado. At the meeting, the committee received a background briefing on the COSMIC mission and updates on progress in implementing the decadal survey-recommended missions ICESat-II and CLARREO. SSB member, Dr. Jack Fellows, vice president, University Corporation for Atmospheric Research, summarized a recently published report that provides program, management, and budget recommendations to the next administration and Congress on R&D needs to meet our nation's energy and climate change challenges. The report includes recommendations on how to make the nation more resilient to severe weather and climate change. By teleconference, the committee spoke at length with the director of NASA's Earth Science Program, Michael Freilich, and the head of NOAA/NESDIS, Mary Kicza. In addition to receiving updates on the status of NASA and NOAA Earth observation programs, Dr. Freilich and Dr. Kicza led discussions of potential new studies for ad hoc committees of the Space Studies Board. The committee also spoke by teleconference with former NOAA administrator Jim Baker regarding a proposed Earth Systems Science Agency.

CES is also collaborating with other units in the NRC to organize a workshop on December 4, 2008, "Uncertainty Management in Remote Sensing of Climate Data" to explore uncertainty management in remote sensing, with an emphasis on remotely sensed climate information. More information can be found at http://dels.nas.edu/basc/Uncertainty%20Workshop.shtml.

Several members of the committee are also participating in the planning of an NRC project entitled America's Climate Choices, a major initiative that will focus on providing decision-makers with near-term options related to mitigation and adaption to anticipated climate change.

Finally, as the quarter ended, some CES members were involved in the planning of a project initiation meeting that would consider the utility of an NRC study on attribution of climate change, with a particular focus on solar influences. This planning activity is sponsored jointly by the Space Studies Board and the Board on Atmospheric Sciences and Climate.

The **Committee on the Origins and Evolution of Life (COEL)** did not meet this quarter. Bruce Jakosky's term as the physical-sciences co-chair of COEL ended on June 30, and Robert Pappalardo of the Jet Propulsion Laboratory assumed this role beginning July1. Future meetings of COEL will take place on the following dates: October 28-30, in Irvine, California; and February 18-20, 2009, in Washington, DC.

The **Committee on Planetary and Lunar Exploration (COMPLEX)** met August 20-22, 2008, in Woods Hole, Massachusetts, to plan for the upcoming decadal survey on solar system exploration. The meeting included open discussions that examined lessons-learned from past decadal studies, with previous key participants such as Mark Sykes from the Planetary Science Institute, Michael Belton of Belton Space Exploration Initiatives, and Joseph Burns of Cornell University. The committee also discussed with Jim Green of NASA and Vern Pankonin of NSF the perspectives and needs of their respective agencies. In addition, the committee heard presentations on lessons learned from experts in mission cost estimating. The committee later utilized these various inputs in discussing a statement of task for the study, a general workplan, critical areas of expertise needed, and potential study participants. Following the meeting a draft statement of task was forwarded to NASA for review. The committee will stand down during the period of the upcoming decadal study, which is expected to begin in early 2009.

The **Committee on Solar and Space Physics (CSSP)** did not meet this quarter. The committee's next meeting is planned for early December.

(Continued on page 8)

(Continued from page 7)

STUDY COMMITTEES

Preparation for the next decadal survey for astronomy and astrophysics, **Astro2010**, is underway. In September, former SSB member and CAA co-chair Roger Blandford was appointed to chair the study. Dr. Blandford is now working with the NRC staff and the membership of the Board on Physics and Astronomy and the SSB to prepare a slate of nominations for the rest of the committee. Dr. Blandford will be discussing the study during an invited talk at the next meeting of the American Astronomical Society on January 6, 2009, in Long Beach, California. There will also be a town hall session for community members to ask questions at that meeting. For more information, please see <http://www.nas.edu/astro2010>.

The ad hoc **Planning Committee for the Future International Space Cooperation and Competition in a Globalizing World: A Workshop** began its work to organize a public workshop for the purpose of reviewing past and present international cooperation, coordination and competition mechanisms in civil space activities, identifying significant lessons learned, and discussing how those lessons could best be applied in the future in an increasingly global space environment. The workshop will feature invited presentations and discussions in plenary sessions and four parallel discussion groups dedicated to specific topics. The workshop will be held on November 18-20, 2008, concurrent with the SSB meeting at the Arnold and Mabel Beckman Center in Irvine, California.

The ad hoc **Heliophysics Performance Assessment Committee** met August 25-27 at the National Academies' Beckman Center in Irvine, California. The committee's report is expected to enter review in early November and a prepublication report is expected to be released by mid-January.

The ad hoc **Committee on Planetary Protection Requirements for Mars Sample-Return Missions** met twice—at Arizona State University in Tempe, Arizona, on August 12-14 and at the National Academy of Sciences Building in Washington, D.C., on September 8-10. The committee's report is expected to go to review at the end of October, with a prepublication version to be released at the beginning of December.

The ad hoc **Committee on Radioisotope Power Systems** held its first meeting September 18-19 at the National Academies' Keck Center. The committee will assess the technical readiness and programmatic balance of NASA's radioisotope power systems technology portfolio in terms of its ability to support NASA's near- and long-term missions of exploration and discovery. To carry out this task, the study committee will be conducting site visits at NASA's Glenn Research Center and two Department of Energy facilities: the Idaho National Laboratory and the Oak Ridge National Laboratory. The Department of Energy meetings will help the committee assess strategies for re-establishing domestic production of Pu-238, which serves as the fuel for radioisotope power systems. The committee's next meetings will be held October 27-29 at the Jet Propulsion Laboratory in Pasadena, California; and December 11-12 at the National Academy of Sciences Building in Washington, D.C.

An ad-hoc **Committee on Rationale and Goals of the U.S. Civil Space Program** has been organized under the auspices of the SSB and the ASEB to prepare a report to advise the government on critical issues in U.S. space policy. The study is internally funded by the NRC. The committee will, inter alia, analyze the rationale for U.S. efforts in space and the elements comprising leadership in this area; examine the balance and interfaces between fundamental scientific research in space, human space exploration, and applications of space technology and civil space systems for societal benefits; assess the role that commercial space companies can play in fulfilling national space goals and the proper role of the government in facilitating the emergence and success of commercial space companies; and recommend options for government attention to address and potentially resolve problems that the committee might identify. The committee will identify issues that are critically important to the future vitality and progress of the U.S. civil space program and recommend options to address and resolve critical issues. The committee will meet at the National Academies' Keck Center in Washington, D.C., on November 5-7 and again on December 3-5, 2008.

The ad hoc **Committee for the Review of Near-Earth Object Surveys and Hazard Mitigation Strategies** will undertake a two-phase study which will review the NASA reports, *2006 Near-Earth Object Survey and Detection Study*, *Near-Earth Object Survey and Deflection Analysis of Alternatives: Report to Congress*, and other relevant literature, and provide recommendations addressing two major tasks: determining the best approach to completing the NEO census required by Congress to identify potentially hazardous NEOs larger than 140 meters in diameter by the year 2020, and determining the optimal approach to developing a deflection strategy and ensuring that it includes a significant international effort. Both tasks will include an assessment of the costs of various alternatives, using independent cost estimating. The SSB and ASEB are currently forming a committee and the first meeting is scheduled for December 9-11 at the National Academies' Keck Center in Washington, D.C.

The ad hoc **Committee on the Role and Scope of Mission-Enabling Activities in NASA's Space and Earth Science Missions** is planning its study of mission-enabling activities, which traditionally encompass much of NASA's research and analysis (R&A) programs and include support for theory, modeling, and data analysis; sub-orbital flights and complementary ground-based programs; and advanced mission and instrumentation concept studies. The committee will identify the appropriate roles for mission-enabling activities and metrics for assessing their effectiveness. It also will evaluate how, from a strategic perspective, decisions should be made about balance between mission-related and mission-enabling elements of the overall program as well as balance between various elements within the mission-enabling component. The committee's first meeting will be at the National Academies' Beckman Center in Irvine, California, on January 21-23, 2009.

The ad hoc **Committee on Science Opportunities Enabled by NASA's Constellation System** was formed in January and held four meetings. The committee's interim report was released in May. The committee is charged with evaluating what opportunities the Constellation program hardware might enable for new science missions. The committee's final report is in review and is due for release in November.

The ad hoc **Planning Committee on the Societal and Economic Impacts of Severe Space Weather Events Workshop** completed development of a report summarizing the information presented and discussions from its May 22-23, 2008 workshop. The report entered external review in August and final NRC approval is now pending. Report publication is expected by the end of the year.

The ad hoc **Committee on a Strategy to Mitigate the Impact of Sensor Descopes and De-manifests on the NPOESS and GOES-R Spacecraft** delivered the final version of its report in late August 2008. The report, *Ensuring the Climate Record from the NPOESS and GOES-R Spacecraft: Elements of a Strategy to Recover Measurement Capabilities Lost in Program Restructuring* is available at <http://www.nap.edu/catalog.php?record_id=12254>. For convenience, this report also has an appendix that reproduces the final, edited version of the report from the June 2007 workshop, *Options to Ensure the Climate Record from the NPOESS and GOES-R Spacecraft: A Workshop Report*.

OTHER ACTIVITIES

The Committee on Space Research (COSPAR) of the International Council of Science held its biennial scientific assembly in Montreal, Canada, on July 13-19. Edward Stone, COSPAR vice president and U.S. representative to COSPAR, and staff of the U.S. National Committee for COSPAR participated in the 12 July pre-assembly and 20 July post-assembly meetings of the COSPAR Council. Major items discussed and approved by the COSPAR Council in this quarter include the initiation of a new program of Capacity-building Fellowships and changes in COSPAR planetary protection policies relating to the Moon, Venus, and Mars special regions and human exploration activities. Future COSPAR activities include the annual business meetings to be held in Paris in March, 2009, and the scientific assemblies to be held in Bremen, Germany, in 2010 and Mysore, India, in 2014.

SSB STANDING COMMITTEE CHAIRS

COMMITTEE ON ASTRONOMY AND ASTROPHYSICS (CAA)*

COMMITTEE ON EARTH STUDIES (CES)
Chair: Berrien Moore III
Vice Chair: Ruth Defries

COMMITTEE ON THE ORIGINS AND EVOLUTION OF LIFE (COEL)**
Co-Chairs: Kenneth H. Nealson and Robert T. Pappalardo

COMMITTEE ON PLANETARY AND LUNAR EXPLORATION (COMPLEX)
Chair: Joseph F. Veverka

COMMITTEE ON SOLAR AND SPACE PHYSICS (CSSP)
Chair: Daniel N. Baker
Vice Chair: Thomas H. Zurbuchen

*Joint with the Board on Physics and Astronomy. CAA is in hiatus during the Astro 2010 decadal survey.
**Joint with the Board on Life Sciences

LLOYD V. BERKNER SPACE POLICY INTERNSHIPS

WE ARE CURRENTLY ACCEPTING APPLICATIONS FOR INTERNSHIPS FOR SUMMER 2009 (UNDERGRADUATES ONLY).

As part of its celebration of the 50th anniversary of its founding, the Space Studies Board has expanded the scope of the Space Policy Intern program it has operated since 1992 by initiating the Lloyd V. Berkner Space Policy Internships. The goal of the program is to provide promising undergraduate and graduate students with the opportunity to work in the area of civil space research policy in the nation's capital, under the aegis of the SSB.

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

The Lloyd V. Berkner Space Policy Internships, named after the first chair of the SSB, are offered twice annually. The summer program is restricted to undergraduates and the autumn program is open to both undergraduate and graduate students. The deadline for applications for the summer 2009 program is February 2, 2009. The deadline for applications to the autumn program has not been set, but will be in the early summer.

Individuals seeking a Lloyd V. Berkner Space Policy Internship must have the following qualifications:

- Be a registered student at a U.S. university or college;
- Completed his/her junior year, majoring in physics, astronomy, chemistry, biology, or geology (other areas considered on a case-by-case basis);
- Have long-term career goals in space science research, applications, or policy;
- Possess good written and verbal communications skills and a good knowledge of his/her particular area of study;
- Be capable of responding to general guidance and working independently;
- Be familiar with the internet, world wide web and basic research techniques; and
- Familiarity with Microsoft Word and HTML is highly desirable, but not essential.

NOTE: SELECTION OF INTERN AND INITIATION OF PROGRAM IS DEPENDENT ON AVAILABILITY OF FUNDS.
Visit <http://www7.nationalacademies.org/ssb/SSB_Intern_HowToApply.html> to learn more about the internship program and to get application information.

STAFF NEWS

DEPARTURES

Kayleigh Bohemier *completed her assignment with the SSB as a Summer 2008 Lloyd V. Berkner Space Policy Intern. Her reflections on her experience with the SSB appear below.*

Albert Einstein once said that science is simple, and, if explained properly, everyone could understand it. Communicating science and its surrounding issues effectively to non-scientists is very important to me, and the time I spent at the Space Studies Board taught me how crucial this concept is to the work of the Board. To say that the SSB gave me a rewarding and educational experience would be a gross underestimation; the opportunities I had to learn and grow in this internship were invaluable.

I received word from the National Academies this spring that I had been accepted as a Lloyd V. Berkner Space Policy Intern. The wait from early spring to late June seemed like an eternity, but in no time at all I found myself walking through the large double doors of the National Academies' Keck Center. That week, the Space Studies Board was holding the International Geophysical Year and Space Studies Board 50th anniversary event, in addition to a regular board meeting. Almost immediately, I found myself swept up in the whirlwind of preparations for these two big events.

The office soon quieted down, but my tasks remained challenging and interesting. When called to assist in background preparations for the new Mars Sample-Return Planetary Protection study, I found that the research gave me a new perspective when thinking about what I had learned in my astronomy classes. In mid-August, I attended the study's first committee meeting in Tempe, Arizona. During my time with the SSB, I also went to two congressional hearings and a Center for Strategic and International Studies panel discussion on space weaponization. Back at the Keck Building, I aided in various aspects of several studies and helped brainstorm designs for a new SSB newsletter layout. Meeting with professionals in related fields, another part of the internship, gave me a glimpse of the diverse space policy community.

My experiences here taught me the process behind a National Research Council report and gave me a greater appreciation of the amount of effort that goes into a study. As I enter my last year at Smith College and prepare for the future, I will definitely remember what I learned at the National Academies and take this knowledge with me wherever life takes me.

Laura Delgado *completed her assignment with the SSB as a Summer 2008 Lloyd V. Berkner Space Policy Intern. Her reflections on her experience with the SSB appear below.*

Upon being notified of my selection as a Lloyd V. Berkner Space Policy Intern, I was greatly excited but also anxious. My interest in space policy had begun mere months earlier, and I knew that this experience would be crucial for the direction I would decide to take in the future, as this was my last summer before obtaining my degree in political science. Ten weeks at the SSB were just what I needed to expose myself to that juncture that had so quickly piqued my interest—the point where the space dream and reality interact with policy—the world I had been studying for the past three years.

My experience was engrossing, challenging, and inspiring. I came to appreciate the immense value of what the SSB does to carry out complex and large scale studies—from the "art" of putting a committee together (as SSB director Marcia Smith pointed out), the gathering of the background documents needed to start it off, the meeting process, all the way to review and publishing. I was particularly lucky to be able to attend two committee meetings in Boulder, Colorado, where I learned about some of the debates in the area of heliophysics and the opportunities enabled by NASA's Constellation System, while also getting to enjoy the amazing scenery, so much different from my own Caribbean setting.

Through my daily work at the SSB, I got to participate in a variety of projects, from writing segments for reports, researching about the accomplished scientists and engineers that would take part in new studies, to helping the staff carry out the events in commemoration of the SSB's 50th anniversary. I was so fortunate to find myself in the midst of a celebration, to learn in such a short time about the long history and successes of the Board, and to hear some of the stories of the countless people that have made these possible.

The internship experience at the SSB has been applauded before by those who precede me, some who shared just how much it meant for them personally and professionally. I echo their sentiments with deep gratitude; it not only afforded me the opportunity to be exposed to the breadth of issues that influence space policy, but also gave me access to the minds of many of the most influential people in the field.

As I seek to complete my degree, I look ahead to a future career in space policy. I know that the lessons learned this past summer will only spur me on, as I seek to become part of that distinguished community. I will join the others as I look back with a smile and say that it all began that "cold" May morning when I walked into the beautiful National Academies' Keck Center in Washington, D.C.

ARRIVALS

Lewis Groswald *is the Autumn 2008 Lloyd V. Berkner Space Policy Intern with the Space Studies Board.*

Mr. Groswald is a first-year graduate student pursuing his masters degree in International Science and Technology Policy at The George Washington University (GW). A recent graduate of GW, he studied international affairs with a double concentration in conflict and security and Europe and Eurasia as an undergraduate. Mr. Groswald has always expressed an interest in space dating back to childhood, but it was not until he had the opportunity to work with the National Space Society during his senior year at GW that he decided to pursue a career in space policy, educating the public on space issues, and formulating policy. In addition to his work and studies, Mr. Groswald also plays the cello, and has studied Spanish, Russian and a little French, which he hopes to put to good use through fostering international cooperation in space.

SSB STAFF

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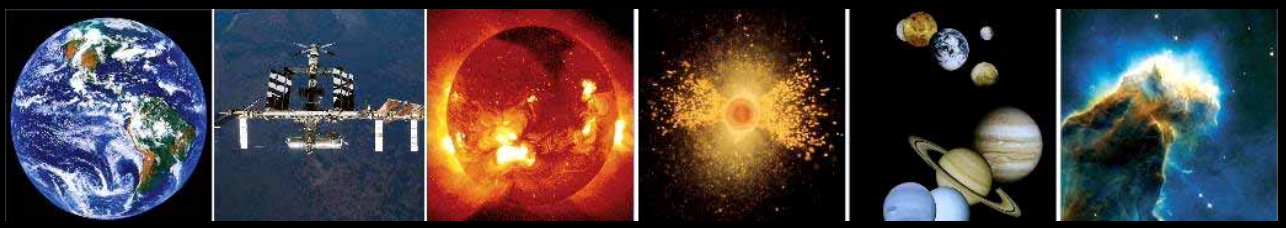
Lloyd V. Berkner
Space Policy Intern

*Staff of other NRC Boards who are shared with the SSB
**Resigned October 17, 2008



SSB Calendar

October

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October 27-29 — *Committee on Radioisotope Power Systems*—**Pasadena, CA**

October 28-29 — *Committee on the Origins and Evolution of Life (COEL)*—**Washington, DC**

November 5-7 — *Committee on Rationale and Goals of the U.S. Civil Space Program*—**Washington, DC**

November 18 — *Space Studies Board*—**Irvine, CA**

November 18-20 — *Future International Space Cooperation and Competition in a Globalizing World: A Workshop*—**Irvine, CA**

December 3-5 — *Committee on Rationale and Goals of the U.S. Civil Space Program*—**Washington, DC**

December 9-11 (tentative) — *Committee for the Review of Near-Earth Object Surveys and Hazard Mitigation Strategies*—**Washington, DC**

December 11-12 — *Committee on Radioisotope Power Systems*—**Washington, DC**

TBD — *Committee on Solar and Space Physics (CSSP)*—**Boulder, CO**

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- ☐ The Sun to the Earth—and Beyond: Panel Reports (2003)
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