

Volume 8 Issue 2

October 2015

Welcome to the latest installment of the ASEB News. This newsletter will update you on ASEB events and activities.

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Aeronautics and Space Engineering Board News



From the Chair

The upcoming 156th meeting of the Aeronautics and Space Engineering Board (ASEB) could not occur at a more pivotal time for both the aeronautics programs being developed by various U.S. organizations, and for the development of U.S. space programs. As mentioned at the last ASEB meeting, the world of aeronautics seems to be in the headlines more and more. From continued record sales of commercial aircraft, to an expected upcoming decision by the Department of Defense to develop a new Long-Range Strike aircraft, to increasing interest in and use of unmanned air vehicles/uninhabited air systems, aeronautics is at an important stage.

Associate Administrator for the Aeronautics Research Mission Directorate Dr. Jaiwon Shin will provide the ASEB members his updates on various NASA programs that address many of these aeronautics activities. Included will be NASA's response to the autonomy study led by the ASEB and released late last year (*Autonomy Research for Civil Aviation: Toward a New Era of Flight*). That study made recommendations on a research agenda required for the development, and maturation of increasingly autonomous systems in crewed aircraft, UAVs/UAS, and air traffic management systems. The Defense Science Board at the Pentagon is



just wrapping up its own year-long study on autonomy. The DSB study had a broader focus than the ASEB study, but I expect to see many similar recommendations when their report comes out. Also, the growing utilization of UAVs in our airspace – whether for commercial use, or for recreational use, places a renewed premium on the safety efforts being addressed by NASA. This is one of the aeronautics mission area challenges that Dr. Shin is expected to discuss.

UAVs are not the only area of growing interest. The ASEB conducted a deep dive look at rotorcraft developments a couple of years ago. However, interest in this technology area has prompted the ASEB to look at a long term vision for vertical lift/rotorcraft again. The focus session at our ASEB meeting will include a discussion of NASA's research programs, DoD's perspectives on capabilities needed in vertical lift, plus prototype efforts funded by the department, and industry perspectives from large and start-up firms. NASA has always had a major outreach program to universities for many of their research and development needs. However, there have been many concerns from various universities that these programs are not as effective as they could be, or that the university community does not sufficiently

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ASEB Board Members

Lester Lyles, Chair (NAE)
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Lockheed Martin Advanced Technology Center

David M. Van Wie
Johns Hopkins University Applied Physics Laboratory



Former ASEB (and Space Studies Board) Director, Marcia S. Smith was awarded the International Institute of Space Law (IISL) Lifetime Achievement Award at the 66th International Astronautical Congress (IAC 2015) held October 12-16 in Jerusalem, Israel. "In recognition of her four decades of outstanding service to the international community of nations and the IISL, to which she has made invaluable contributions as a director and as Vice President, played notable roles in the promotion of research and discourse on policy and legal aspects throughout her distinguished professional career, making significant contributions to the development of literary resources and rendering immense service to academies and policy making bodies at national and international levels in the fields of space and aeronautics."

ASEB Fall Calendar

October 21-23

ASEB Fall Meeting, Beckman Center, Irvine, California

October 27-29

Committee on Biological and Physical Sciences in Space Meeting, Beckman Center, Irvine, California

November 10-11

Low Carbon Aviation Meeting, Keck Center,

Washington, D.C.

November 12-13

NASA Space Technology Roadmaps Meeting, NAS Building, Washington, D.C.

January 11-12

NASA Space Technology Roadmaps Meeting, Beckman Center, Irvine, California

For updates to the ASEB calendar, please see
<http://www.national-academies.org/aseb>.

(Continued from page 1)

understand NASA's needs. The ASEB meeting will have a focus session on NASA/ARMD's university research programs, including a panel to address a broad set of university perspectives.

Space engineering programs have also received greater attention and interest. The Pluto flyby made by NASA's New Horizons spacecraft earlier this year raised public awareness and interest in space exploration. Likewise, NASA's recent announcement of the strong likelihood of liquid water on the surface of Mars reinforces one of the recommendations from the ASEB study on the future of human spaceflight, that Mars is the "horizon goal" toward which all human spaceflight efforts should be directed. The ASEB meeting will include a focus session on the progress in developing the Orion spacecraft and the Space Launch System. Both

of which are critical to future human spaceflight exploration.

ASEB Staff Members

Michael H. Moloney <i>Director</i>	Celeste Naylor* <i>Information Management Associate</i>
Alan Angleman <i>Senior Program Officer</i>	Tanja Pilzak* <i>Manager, Program Operations</i>
Carmela Chamberlain* <i>Administrative Coordinator</i>	Andrea Rebholz <i>Program Associate</i>
Katie Daud* <i>Research Associate</i>	Anesia Wilks* <i>Senior Project Assistant</i>
Dwayne Day <i>Senior Program Officer</i>	Sandra Wilson* ² <i>Senior Financial Assistant</i>
Charles Harris* ¹ <i>Research Associate</i>	*Staff of other NRC Boards who are shared with ASEB ¹ from October ² through October
Meg Knemeyer* <i>Financial Officer</i>	

Finally, there has been a renewed commitment from the current administration to ensure that all of our space systems can operate in a potentially contested environment. Several billions of dollars have been added to DoD's budget to address potential threats to operations in space. While the majority of the space programs affected by this effort are obviously focused on national security (and are highly classified), the general area of space situation awareness is also an area of interest for NASA as well. The possibility of the ASEB assisting NASA in addressing this mission area will be a question to discuss.

-Lester Lyles, Chair

Committee on NASA Space Technology Roadmaps

The Committee on NASA Space Technology Roadmaps held its first meeting at the Keck Center in Washington, DC on September 28-30. The committee is co-chaired by Todd Mosher of Syncroness and Lise Schioler of the National Institute of Aerospace. During the first meeting the committee heard presentations on: human exploration destination systems (artificial gravity systems); launch propulsion systems (including high altitude balloons); ground launch systems; entry, descent and landing systems; thermal management systems; modeling, simulation, information technology and processing; robotics and autonomous systems; and communications, navigation, and orbital debris tracking and characterization systems. The committee's second meeting is scheduled for November 12-13, in Washington, D.C., with a third meeting scheduled for January 11-12, 2016 in Irvine, California. The committee is scheduled to deliver its report in late summer 2016.



Above, Chris Culbert of NASA discussing NASA's roadmapping activities for human exploration destination systems. *Photo courtesy of Dwayne Day, ASEB Staff*

Committee on NASA Technology Roadmaps Members

Todd J. Mosher, co-chair
Syncroness

Liselotte J. Schioler, co-chair
National Institute of Aerospace

Arden L. Bement, Jr.
Purdue University

John C. Brock
Northrop Grumman Space Technology (retired)

James L. Burch
Southwest Research Institute

Stephen Gorevan
Honeybee Robotics, Ltd.

Charles L. Isbell, Jr.
Georgia Tech

H. Jay Melosh
Purdue University

David P. Miller
University of Oklahoma

Daniel O'Shaughnessy
The Johns Hopkins University Applied Physics Laboratory

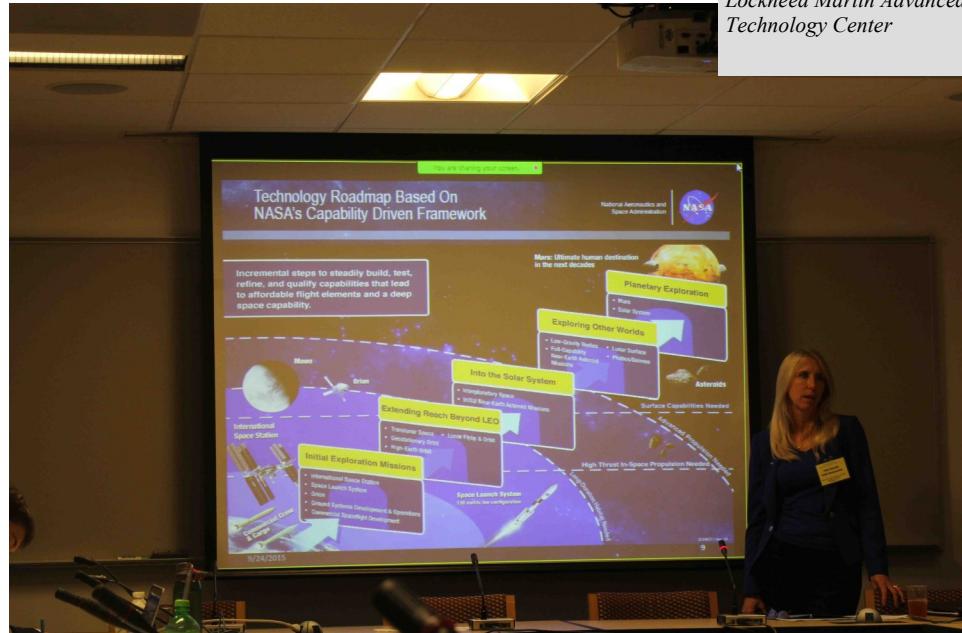
Torrey Radcliffe
The Aerospace Corporation

John R. Rogacki
Florida Institute for Human and Machine Cognition

Julie A. Shah
MIT

Alan M. Title
Lockheed Martin Advanced Technology Center

At right, Faith Chandler of NASA describing the agency's technology roadmapping process. *Photo courtesy of Dwayne Day, ASEB Staff*



ASEB Aeronautics Research and Technology Roundtable (ARTR)

The Aeronautics Research and Technology Roundtable held a meeting at the Keck Center on July 17, 2015. At that meeting, the Roundtable discussed NASA's new plans for flight research. NASA is devoting greater resources to a flight testing program in several key areas. The committee is chaired by John Tracy of Boeing.



Above, Committee chair John Tracy speaking at the July meeting of the Aeronautics Research and Technology Roundtable. Below, full roundtable during the July meeting. *Photos courtesy of Dwayne Day, ASEB Staff.*



ARTR Members

John J. Tracy, Chair
The Boeing Company

Michael Bragg
University of Washington

Daniel K. Elwell
Elwell & Associates, LLC

Alan H. Epstein (NAE)
Pratt & Whitney

Mike Hirschberg
American Helicopter Society International

Bruce J. Holmes
NextGen AeroSciences, LLC

Margaret T. Jenny
RTCA, Inc.

Nicholas D. Lappos
Sikorsky Aircraft Corporation

Lourdes Maurice
Federal Aviation Administration

M. Granger Morgan
Carnegie Mellon University

Steven Pennington
U.S. Air Force

Eli Reshotko (NAE)
Case Western Reserve, Emeritus

Thomas E. Romesser (NAE)
Northrop Grumman Aerospace Systems

Jaiwon Shin
NASA

Patti Grace Smith
Patti Grace Smith Consulting, LLC

Ian A. Waitz (NAE)
MIT

Robert Walters
Virginia Tech

David W. Yoel
American Aerospace Advisors, Inc.

ASEB Space Technology Industry-Government-University Roundtable (STIGUR)

The NRC Space Technology-Industry-Government-University Roundtable was established to engage senior representatives from industry, universities, NASA, and other government agencies in discussions of critical issues related to NASA's space technology research agenda that are of shared interest.

The Roundtable held its third meeting September 24, in Washington, D.C., led by Chair Ray Johnson, formerly the chief technology officer of Lockheed Martin, and Stephen Jurczyk, NASA's associate administrator for the Space Technology Mission Directorate (STMD), who is also a member of the Roundtable. The September meeting featured panels of senior personnel from academia and research laboratories. The Roundtable's discussion with the panelists focused on the following questions:

What processes and programs have worked well in academia's interactions with STMD, other NASA directorates, and/or other federal R&D organizations? What has not worked well? How could interactions with STMD be improved?

What research and technology development challenges could STMD address to support the priorities of laboratories and research centers in space as they relate to support for NASA projects and/or other organizations?

Roundtable members and NASA staff also discussed STMD space technology research grants and optical communications strategy and programs. As with all National Academies roundtables, the ASEB produced no written products as a result of the meeting; it is left to participants to make note of the key points relevant to them and their organizations. The next meeting of the Space Technology Roundtable will take place in March 2016 in Washington, D.C..

STIGUR Members

Ray O. Johnson, Chair
Lockheed Martin (retired)

Robert D. Braun
Georgia Institute of Technology

Claude Canizares
MIT

Carissa Christensen
Tauri Group Room

Raymond S. Colladay
Consultant

Douglas R. Cooke
Cooke Concepts and Solutions

Werner J.A. Dahm
Arizona State University

Antonio L. Elias
Orbital Sciences Corporation

Alec D. Gallimore
University of Michigan

Michael Gold
Bigelow Aerospace

Michael D. Griffin
Schafer Corporation

John W. Hines
Independent Consultant

Stephen G. Jurczyk
NASA

William C. Krenz
The Aerospace Corporation

Mark J. Lewis
Science and Technology Policy Institute, IDA

Sandra H. Magnus
AIAA

Gregg J. Martin
The Boeing Company

Roger M. Myers
Aerojet Rocketdyne

Russell E. Parth
U.S. Air Force

Marcia Smith
Space and Technology Policy Group, LLC

John C. Sommerer
Talitha Ventures

Alfred Tadros
Space Systems/Loral

Laurence R. Young
MIT



Looking like a messy workshop, the Milestones of Flight Gallery at the Smithsonian's National Air and Space Museum in Washington, DC, contains the Bell X-1 and a Lunar Module in pieces (with *The Spirit of St. Louis* and Space-Ship One overhead). The gallery is being renovated for the fortieth anniversary of the museum's opening, in July 2016. Photo courtesy of Dwayne Day, ASEB Staff.

Committee to Review the FAA Research Plan Members

William S. Leber, Jr., Co-chair *PASSUR Aerospace*

S. Michael Hudson, Co-chair *I Power Energy Systems*

Jandria S. Alexander, *The Aerospace Corporation*

Steven J. Brown
National Business Aviation Association

Victoria Cox
Victoria Cox Solutions, LLC

Joseph M. Del Balzo
JDA Aviation Technology Solutions

R. John Hansman, Jr.
MIT

Amy R. Pritchett
Georgia Institute of Technology

Agam N. Sinha
ANS Aviation International, LLC

Edmond L. Soliday
Indiana General Assembly

Raymond Valeika
Independent Consultant

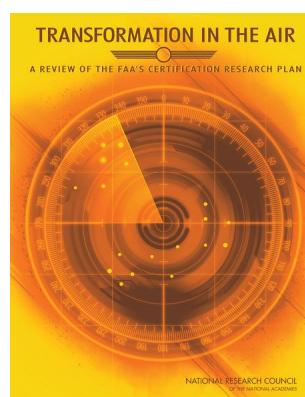
Edward L. Wright
UCLA

ASEB / Transportation Research Board Committee to Review the FAA Research Plan

The NRC's Committee to Review the FAA Research Plan delivered its report, *Transformation in the Air—A Review of the FAA's Certification Research Plan*, to the FAA in June and the final version was printed in early August. Committee co-chair Bill Leber testified about the report before the Subcommittee on Space, Committee on Science, Space, and Technology, U.S. House of Representatives, June 11, 2015.



Committee co-chair Bill Leber, middle, testifying before the House of Representatives in June about the committee's report on the FAA's Certification Research Plan. Also testifying were John Hansman, who was also a member of the committee, and Jaiwon Shin, NASA Associate Administrator for the Aeronautics Research Mission Directorate. Dr. Shin is a member of the Aeronautics Research and Technology Roundtable (ARTR). *Photo courtesy of Dwayne Day, ASEB Staff.*



Transformation in the Air: A Review of the FAA's Certification Research Plan

Available at www.nap.edu/catalog/21757/transformation-in-the-air-a-review-of-the-faas-certification

The Federal Aviation Administration (FAA) is currently undertaking a broad program known as Next Generation Air Transportation System (NextGen) to develop, introduce, and certify new technologies into the National Airspace System. NextGen is a fundamentally transformative change that is being implemented incrementally over a period of many years. Currently, the FAA is putting into place the foundation that provides support for the future building blocks of a fully operational NextGen. NextGen is a challenging undertaking that includes ground systems, avionics installed in a wide range of aircraft, and procedures to take advantage of the new technology.

Transformation in the Air assesses the FAA's plan for research on methods and procedures to improve both confidence in and the timeliness of certification of new technologies for their introduction into the National Airspace System. This report makes recommendations to include both ground and air elements and document the plan's relationship to the other activities and procedures required for certification and implementation into the National Airspace System.

Committee on Biological and Physical Sciences in Space Members

Elizabeth Cantwell, Co-chair
Arizona State University

Robert J. Ferl, Co-chair
University of Florida

Kenneth M. Baldwin
University of California, Irvine

Robert L. Byer
Stanford University

Ofodike (DK) A. Ezekoye
The University of Texas at Austin

Mohammad Kassemi
Case Western Reserve University

Ronald G. Larson
University of Michigan

Richard E. Lenski
Michigan State University

James A. Pawelczyk
The Pennsylvania State University

Maryln D. Ritchie
The Pennsylvania State University

Pol D. Spanos
Rice University

Krystyn J. Van Vliet
MIT

Space Studies Board/ASEB Standing Committee on Biological and Physical Sciences in Space

The Committee on Biological and Physical Sciences in Space (CBPSS) did not meet face-to-face during this quarter, but has continued to follow developments and discuss issues relevant to the health and direction of the nation's microgravity research endeavor. Extensive materials from the committee's 1-day April symposium on Genelab and Open Science have now been made available on the committee's website (below). Co-chair Robert Ferl and staffer Sandra Graham both attended the International Space Station R&D Conference July 7-9 in Boston, MA, where Dr. Ferl participated as a panelist discussing the role of ISS as a catalyst. Both Dr. Ferl and co-chair Elizabeth Cantwell represented the committee at the joint SSB-ASEB meeting on April 21-23 in Washington, D.C.. In addition, committee member Jim Pawelczyk was invited to testify at a July 10 congressional hearing in front of the House Subcommittee on Space, Committee on Science, Space and Technology. The hearing focused on the challenges and rationales, including science, pertaining to an extension of the operational lifetime of ISS. The committee has worked in this period to identify additional expertise areas most relevant to the emerging challenges in microgravity research and has expanded its membership with the addition of Mohammad Kassemi, Maryln Ritchie, and Pol Spanos. The next in-person meeting will be October 27-29, 2015 at the Beckman Center in Irvine, CA. More information about the committee and its membership can be found at http://sites.nationalacademies.org/SSB/SSB_145312.

ASEB Committee on Propulsion and Energy Systems to Reduce Commercial Aviation Carbon Emissions (Low Carbon Aviation Committee)

The purpose of this study is to examine options for reducing life-cycle carbon emissions from commercial aviation globally even if air traffic grows as expected. The recommended research agenda will consist of a prioritized set of research projects of importance to the national and international commercial aeronautics community, and it will focus on advances in technologies and capabilities that can only be achieved through substantial research and technology development. The study is focused on propulsion and energy systems research; it will not develop recommendations for research in other areas such as airframe designs or air traffic management systems. The membership of the committee, which is led by Dr. Karen A. Thole, Pennsylvania State University, and Dr. Woodrow Whitlow, Jr., Cleveland State University, was announced in April 2015. The committee held its first two meetings during June and September. The focus of these two meetings was on low carbon technologies related to combustion engines, electric propulsion systems, and drop-in biofuels. The committee's third meeting will take place on November 10-11 in Washington, D.C.

Low Carbon Aviation Committee Members

Karen A. Thole., Co-chair
Pennsylvania State University

Woodrow Whitlow, Co-chair
Cleveland State University

Meyer J. Benzakein,
The Ohio State University

R. Stephen Berry
University of Chicago Gordon Center for Integrative Studies Department of Chemistry and James Franck Institute

Marty K. Bradley
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David J.H. Eames
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Daniel K. Elwell
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Alan H. Epstein
Pratt and Whitney

Zia Haq
U.S. Department of Energy

Karen Marais
Purdue University

James F. Miller
Argonne National Laboratory

John G. Nairus
AFRL/RQQ

Stephen M. Ruffin
Georgia Institute of Technology

Hratch G. Semerjian
National Institute of Standards and Technology

Subhash C. Singhal
Pacific Northwest National Laboratory

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The ASEB's sister board, the Space Studies Board (SSB), also publishes a newsletter; visit [http://sites.nationalacademies.org/SSB/
ssb_052298](http://sites.nationalacademies.org/SSB/ssb_052298) to subscribe or to view past SSB newsletters. The ASEB's division, the Division on Engineering and Physical Sciences (DEPS), also publishes a newsletter; visit [http://sites.nationalacademies.org/DEPS/
DEPS_059299](http://sites.nationalacademies.org/DEPS/DEPS_059299) to subscribe.

About the ASEB...

The ASEB was established in 1967 "to focus talents and energies of the engineering community on significant aerospace policies and programs." In undertaking its responsibility, the ASEB oversees ad hoc committees that recommend priorities and procedures for achieving aerospace engineering objectives, and offers a way to bring engineering and other related expertise to bear on aerospace issues of national importance. Among these issues are: research and development aspects of the Next Generation Air Transportation System (NextGen); NASA's aeronautics research program; national aeronautics R&D policy and its implementation; space policy and programs, with a focus on human spaceflight and space operations; commercial space activities; and other aerospace engineering topics.



The air show returned to Joint Base Andrews outside of Washington, DC in September for the first time in three years. Here a North American B-25 Mitchell banks high over the airfield. *Photo courtesy of Dwayne Day, ASEB Staff.*

