The 2013-2022 NRC Decadal Survey for Solar and Space Physics

Daniel N. Baker, Chair
Thomas Zurbuchen, Vice-Chair
Arthur Charo, National Research Council

NRC Decadal Surveys:

- Take a long-term look at the field and recommend top priority scientific goals and directions for the future;
- Direct recommendations to the principal agencies that support facilities and research in the relevant fields;
- Provide recommendations for programmatic directions and explicit priorities for government investment in research facilities, including space flight missions; and
- Address issues of advanced technology, infrastructure, interagency coordination, education, and international cooperation.

Facilitates Planning, Coordination, Advocacy, and Outreach

OSTP View of Decadal Surveys

"Decadal Survey benefits:

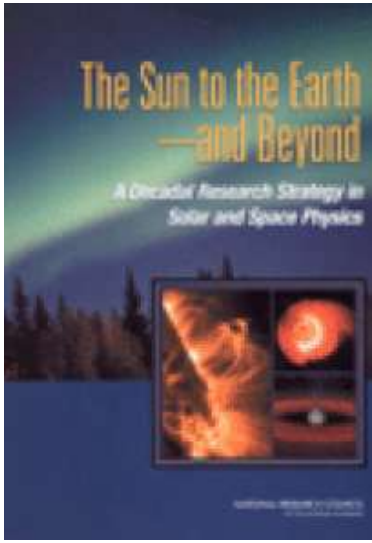
- **Community-based documents offering consensus of science opportunities to retain US scientific leadership**
- **Provides well-respected source for priorities & scientific motivations to agencies, OMB, OSTP, & Congress"**

"Most useful approach:

- **Frame discussion identifying key science questions**
  - **Focus on what to do, not what to build**
  - **Discuss science breadth & depth (e.g., impact on understanding fundamentals, related fields & interdisciplinary research)**
- **Explain measurements & capabilities to answer questions**
- **Discuss complementarity of initiatives, relative phasing, domestic & international context"**

*From "The Role of NRC Decadal Surveys in Prioritizing Federal Funding for Science & Technology," Jon Morse, Office of Science & Technology Policy (OSTP), NRC Workshop on Decadal Surveys, November 14-16, 2006

Context



- *The Sun to the Earth—and Beyond: A Decadal Research Strategy in Solar and Space Physics*
  - Summary Report (2002)
  - Compendium of 5 Study Panel Reports (2003)

- First NRC “decadal survey” in Solar and Space Physics
  - Community-led
  - Integrated plan for the field
  - Prioritized recommendations
  - Sponsors: NASA, NSF, NOAA, DoD (AFOSR and ONR)

2013-2022 Survey Task Summary

- **Provide an overview of the science and a broad survey of the current state of knowledge in the field**, including a discussion of the relationship between space- and ground-based science research and its connection to other scientific areas;
- **Identify the most compelling science challenges** that have arisen from recent advances and accomplishments;
- **Identify the highest priority scientific targets** for the interval 2013-2022 (having considered scientific value, urgency, cost category and risk, and technical readiness).
- **Develop an integrated research strategy** that will present means to address these targets

Note:

1. NASA missions not yet in formulation or development will be reprioritized;
2. Reference missions can be proposed by White Paper. No grandfathered missions.

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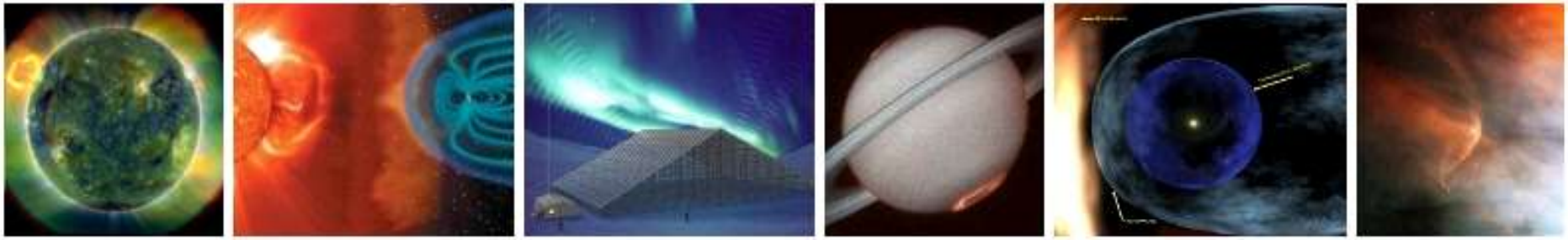
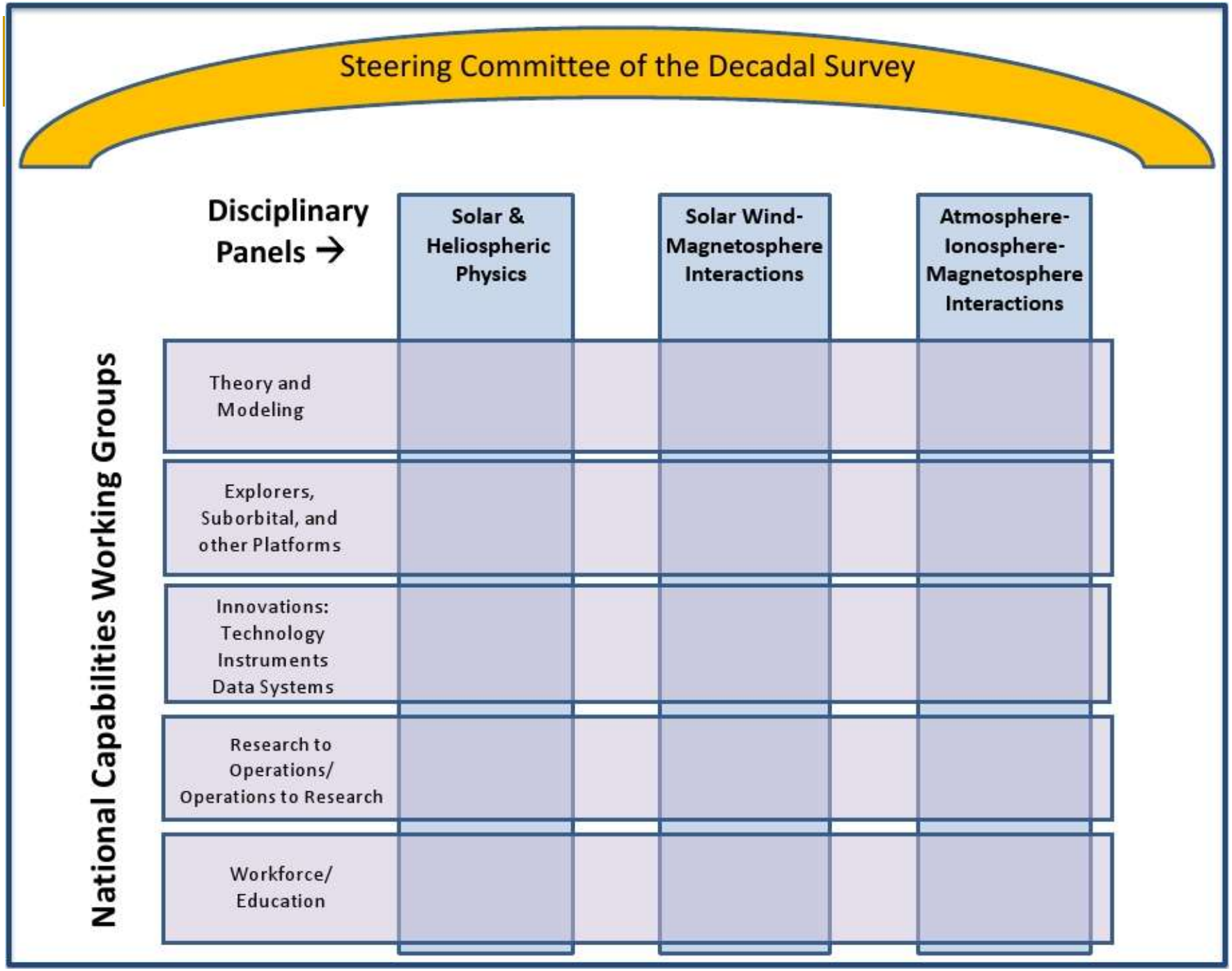


Background, upcoming events, progress reports and community inputs are posted at: www.nas.edu/ssb

(click on "A Decadal Strategy for Solar and Space Physics")

Survey Organization

- Steering Committee--Responsible for Final Report
  - Approximately 18 members representing the broad solar and space physics community
  - Representatives from the supporting study panels
- Disciplinary Study Panels ~ 15 members each
  - Atmosphere-Ionosphere-Magnetosphere Interactions
  - Solar Wind-Magnetosphere Interactions
  - Solar and Heliospheric Physics
- “National Capabilities” working groups to address important cross-disciplinary opportunities (next slide)
  - Option for focused workshops


Steering Committee of the Decadal Survey
Disciplinary Panels →
Solar & Heliospheric Physics
Solar Wind-Magnetosphere Interactions
Atmosphere-Ionosphere-Magnetosphere Interactions
National Capabilities Working Groups
Theory and Modeling
Explorers, Suborbital, and other Platforms
Innovations: Technology Instruments Data Systems
Research to Operations/ Operations to Research
Workforce/ Education

Your Participation is Needed

- A successful decadal survey engages the wide community in developing a consensus document that sets explicit science-based priorities. We strongly encourage you to:
  - Engage the survey members and attend survey events.
  - Write a concept paper (e.g., mission or extended mission, observation, theory, or modeling activity) that identifies and motivates one or more new or existing science or societal objectives and promises to advance the scientific objectives, contribute to fundamental understanding of the Sun-Earth/planetary system, and/or facilitate the connection between science and societal needs (e.g., improvements in space weather prediction).
    - Information on how to submit a paper is available on the survey website. For full consideration, responses are needed by Nov. 12, 2010. Earlier responses are strongly encouraged.

Town Halls/Outreach Events

Town Hall at National Center for Atmospheric Research (NCAR), October 1, 2010, 4:00-5:00 pm
Center Green Campus (CG1) Auditorium, 3080 Center Green Drive, Boulder, CO

Town Hall at the University of New Hampshire (Durham, NH), October 8, 2010, 10:00 am – 3:30 pm
Piscataqua Room at Holloway Commons, located on Main Street

Town Hall at the University of Maryland (College Park, MD), October 22, 2010, 8:30 am – 5:30 pm
UMD's Hoff Theater. For details: www.terpconnect.umd.edu/~drake/DCTownHall

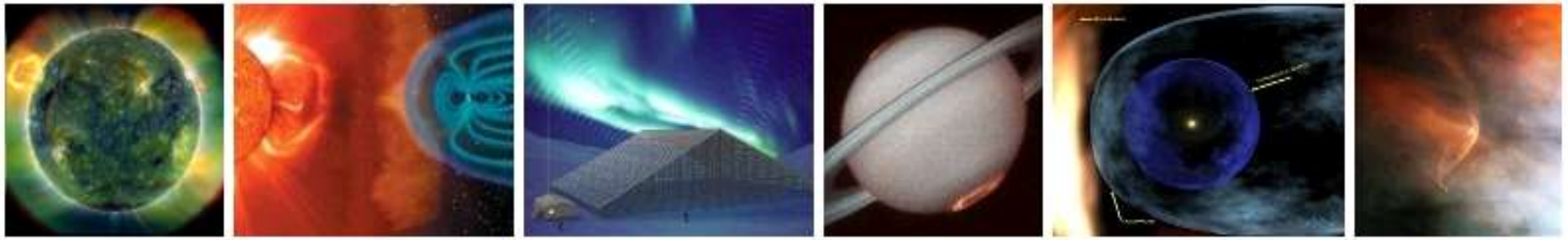
Town Hall at the Univ. of Michigan, October 14, 2010, 1:30 pm - 4:30 pm
2424 Space Research Building For details: http://aoss.engin.umich.edu/events/view/350

Session at NSF Upper Atmosphere Facilities Fall 2010 Meeting, October 28, 2010
The Hotel Roanoke & Conference Center, Roanoke, VA

Town Hall at the Fall Meeting of the AGU, Moscone Convention Center, San Francisco, CA
December 14, 2010

Details and Updated Information Available at the Survey Website

The 2013-2022 NRC Decadal Strategy for Solar and Space Physics



www.nas.edu/ssb

(click on “A Decadal Strategy for Solar and Space Physics”)

Backup Slides

Steering Committee

Steering Committee Members

Chair
Daniel Baker, NAE
University of Colorado, Boulder

Vice Chair
Thomas H. Zurbuchen
University of Michigan

Members

Brian H. Anderson
Johns Hopkins University APL

Steven J. Battel
Battel Engineering

James F. Drake Jr.
University of Maryland, College Park

Lennard A. Fisk NAS
University of Michigan

Sarah Gibson
National Center for Atmospheric Research

Michael A. Hesse
NASA Goddard Space Flight Center

J. Todd Hoeksema
Stanford University

David L. Hysell
Cornell University

Mary K. Hudson
Dartmouth College

Thomas Immel
University of California, Berkeley

Justin Kasper
Harvard-Smithsonian Center for Astrophysics

Judith L. Lean NAS
Naval Research Laboratory

Ramon E. Lopez
University of Texas, Arlington

Howard J. Singer
NOAA Space Weather Prediction Center

Harlan E. Spence
University of New Hampshire

Edward C. Stone, NAS
California Institute of Technology

Panel on Atmosphere-Ionosphere-Magnetosphere Interactions

- **Chair:** Jeffrey M. Forbes, University of Colorado, Boulder
- **Vice Chair:** James H. Clemmons, The Aerospace Corporation
- **Members:**

Panel on Solar Wind-Magnetosphere Interactions

- **Chair:** Michelle F. Thomsen, Los Alamos National Laboratory
- **Vice Chair:** Michael Wiltberger, National Center for Atmospheric Research
- **Members**

Harlan Spence (joint appointment with Steering Committee)

Joseph Borovsky, LANL
Jerry Goldstein, SwRI
Donald Gurnett, U. Iowa
Michael Liemohn, U. Michigan
Donald Mitchell, APL
Michael Shay, U. Delaware
Joseph Fennell, Aerospace
Janet Green, NOAA
Lynn Kistler, UNH
Robyn Millan, Dartmouth
Tai Phan, UC Berkeley
Richard Thorne, UCLA

Panel on Solar and Heliospheric Physics

- **Chair:** Richard Mewaldt, California Institute of Technology
- **Vice Chair:** Spiro K. Antiochos, NASA Goddard Space Flight Center
- **Members:**

Working Group Leads

- Theory and Modeling
  - Jim Drake, UMD and Jon Linker, Predictive Science, Inc
- Explorers, Suborbital, and other Platforms
  - Kristina Lynch, Dartmouth Univ. and Brian Anderson, JHUAPL
- Innovations: Technology, Instruments, Data Systems
  - Andy Christensen, Dixie State Univ. and Stuart Bale, UC Berkeley

Working Group Leads (con't)

- Research to Operations/Operations to Research
  - Michael Hesse, NASA GSFC and Ron Turner, ANSER Corp.
- Workforce and Education
  - Mark Moldwin, Univ. of Michigan and Cherilynn Morrow, Ga. State Univ.

Theory and Modeling Working Group

- The “Theory and Modeling” cross-disciplinary working group will examine the role that theory and modeling plays in exploring the key science issues of space and solar physics
- Specific Questions this WG addresses:
  - What role does theory and modeling play in unraveling the complex temporal and spatial dynamics revealed by satellite and ground-based observations?
  - Can theory and modeling serve as a bridge between the “heliophysics laboratory” and the plasma universe?
  - How can we use advances in computational power to increase the physics fidelity of models and obtain deeper insights?
  - Can laboratory based experiments explore key science issues underpinning the dynamics of the heliosphere?

Platforms Working Group

- Focus: concerns, issues, and new ideas for the various experimental platforms enabling Heliophysics investigations: suborbital, Explorers, CubeSats, ground-based facilities, secondary payloads, laboratory studies
- Tasks:
  - Generate a list of platforms of interest, both existing and new, ranging over all Heliophysics disciplines
  - Early, targeted, specific community outreach to ensure that these platforms are well-represented in the white paper process
  - Fall telecons to discuss issues of concern and ideas which we think the Survey should address explicitly
  - Spring meeting to ensure that these issues and ideas are sent upstream to the Steering Committee
  - Summer reading review of Survey drafts for closure

Research to Operations/Operations to Research Working Group

- The “Research to Operations” cross-discipline working group will represent to the Decadal Survey Steering committee the interplay between research and operations.
- Specific Questions this WG addresses:
  - How are observations, models, or data collected for research used to support operations?
  - How are operational observations, models, or data used to support research?
  - What are key science questions that need to be answered to substantially improve operational support?
  - What is the best strategy for improving the transition from research to operations and societal benefit?