CAA Report

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CAA Co-Chair

Recall that the CAA reports to both the Board on Physics and Astronomy and the Space Studies Board

Disclaimer: These slides represent a personal assessment of the issues discussed by the CAA. This document should not be cited or quoted because the views expressed do not necessarily reflect those of CAA, SSB, BPA, or the NRC.

CAA Membership

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Paul L. Schechter (NAS), Co-Chair, Massachusetts institute of Technology
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Megan Donahue, Michigan State University
Joshua A. Frieman, Fermilab and University of Chicago
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Timothy M. Heckman, Johns Hopkins University
Lynne Hillenbrand, California Institute of Technology
Bruce Macintosh, Stanford University
Christopher F. McKee (NAS), University of California, Berkeley
Rene A. Ong, University of California, Los Angeles
James M. Stone, Princeton University
Alexey Vikhlinin, Harvard-Smithsonian Center for Astrophysics
J. Craig Wheeler, University of Texas, Austin
Eric M. Wilcots, University of Wisconsin, Madison
A. Thomas Young (NAE), Lockheed Martin (Ret.)

Committee on Astronomy and Astrophysics Meeting

The CAA met during *Space Science Week*, Mar 31- Apr 2. The main emphasis of this CAA meeting was preparing for the upcoming Mid-Decadal review

- Received an update on the "Optimizing the U.S. Ground-based Optical and Infrared Astronomy System" study.
  - NSF and Congressional representatives were briefed by the report chair, Debra Elmegreen, on April 14; report released April 17
  - Report is available from The National Academies Press.
- Angela Olinto, co-chair of the Astronomy and Astrophysics Advisory Committee, summarized their recently released 2015 report.
  - AAAC has begun a year-long study to look at the growing burden of writing proposals and serving on review panels
  - AAAC was generally pleased with the level of cooperation among the three agencies funding astronomy
- Presentation by Ji Wu, Chinese Academy of Sciences. He described a roadmap for astronomy missions.
- Pierre Binétruy, ESSC Liason, participated in the meeting.

Mid-Decadal CAA Discussions - 1

CAA heard two science talks on two of the areas changing most rapidly:

- Lyman Page (Princeton) discussed the Cosmic Microwave Background, especially polarization measurements; all the results he showed were from the last year!
    - New Worlds New Horizons stated “significant progress on CMB studies, including the understanding of foregrounds, is certain given the successful operation of Planck and the suborbital and ground-based facilities that are currently operating or will come on line soon. A successful detection of B-modes from inflation could trigger a mid-decade shift in focus toward preparing to map them over the entire sky.”
- Bruce Macintosh (Stanford and CAA) discussed recent progress in direct-imaging exoplanet studies and prospects for exoplanet characterization using WFIRST-AFTA.
    - NWNH stated “If, by mid-decade, a DSIAC review determines that sufficient information has become or is becoming available on key issues such as planet frequency and exozodiacal dust distribution, a technology down-select should be made and the level of support increased to enable a mission capable of studying nearby Earth-like planets to be mature for consideration by the 2020 decadal survey, with a view to a start early in the 2020 decade.” [*Note: The DSIAC is manifested as the CAA]*

Mid-Decadal CAA Discussions - 2

- CAA heard presentations from NASA, NSF, and DOE about their expectations for the mid-decadal review.
  - NASA Astrophysics 2014 Implementation Plan will be a key input.
  - Committee should track progress on WFIRST-AFTA coronagraphy technical milestones.
  - Mid-decadal Review Committee will want to consider NASA Astrophysics' large mission studies in preparation for the 2020 Survey.
  - Both NASA and NSF will need advice on what will be the most effective strategy for CMB measurements (eg., what's the right mix of grand based and space based missions).

- CAA had a closed session discussion about what the current CAA members thought about mid-decadal issues and advice they would give to the Mid-Decadal Review Committee.
  - From the CMB discussions, concern was expressed about whether the Mid-Decadal Review Committee would have sufficient technical knowledge to sort out what should be done on the ground and what must be done from space so a mechanism may be needed to bring the right expertise to this issue.

Mid-Decadal Status

- Chair-nominee identified. General membership search underway.
- Cannot present nominees to NAS Pres. until NSF funding comes in.
- 3 meetings; 2nd mtg will include symposium
- Aiming for May 1, 2016 report release.

Important to note that the CAA will not have a Fall in person meeting while the Mid-Decadal Review is in progress.

Thank You!

BACKUP

Mid-Decadal Origin

- Recommended in *New Worlds New Horizons,* AAAC annual reports.
- Discussed at earlier CAA meetings.
- Oct 2014: NRC approached by NASA & NSF---had been discussing getting the mid-term going. Later that month, DOE was brought on board, and subsequently NRC was sent a draft charge.
- Nov 3-4: Mid-decadal discussed at CAA meeting. Immediately after, using CAA input, NRC submitted prospectus to Gov Bd Exec Cmte for approval. Later that month GBEC approved the plan, and NASA sent Request Letter.
- Nov-Jan: NRC wrote proposal and sent to the 3 agencies.
- Mar: NASA funding received

Mid-Decadal Statement of Task

The National Research Council shall convene an ad hoc committee to review the responses of NASA's Astrophysics program, NSF's Astronomy program, and DOE's Cosmic Frontiers program (hereafter the Agencies' programs) to previous NRC advice, primarily the 2010 NRC decadal survey, "New Worlds, New Horizons in Astronomy and Astrophysics" (NWNH).

In the context of funding circumstances that are substantially below those assumed in NWNH, the committee's review will include the following tasks:

1. Describe the most significant scientific discoveries, technical advances, and relevant programmatic changes in astronomy and astrophysics over the years since the publication of the decadal survey;

2. Assess how well the Agencies' programs address the strategies, goals, and priorities outlined in the 2010 decadal survey and other relevant NRC reports;

3. Assess the progress toward realizing these strategies, goals, and priorities; and

4. In the context of strategic advice provided for the Agencies' programs by Federal Advisory Committees, and in the context of mid-decade contingencies described in the decadal survey, recommend any actions that could be taken to maximize the science return of the Agencies' programs.

The review should not revisit or alter the scientific priorities or mission recommendations provided in the decadal survey and related NRC reports but may provide guidance on implementation of the recommended science and activities portfolio and on other potential activities in preparation for the next decadal survey.

Mid-Decadal Notional Schedule*

2015

Apr 1 Funding arrives
Apr 20 Committee approved by Dr. Cicerone
May 15 First in-person meeting
Sept 1 Second in-person meeting and symposium**
Nov 15 Third in-person meeting

2016

Dec 20 Consensus reached; Report into review
Jan 20 Reviews received
Apr 1 Response-to-review sent to Review Monitor
May 1 Report released

* *This is contingent on NSF funding arriving. NASA funding already received.*

** *The symposium will assess progress made on the science questions and discove*

Presentation by Ji Wu, Chinese Academy of Sciences

Described a roadmap for astronomy missions extending to 2050:

- **DAMPE**: Dark Matter Particle Explorer (DAMPE), to be launched later this year. Uses extremely high energy gamma-rays as a probe as well as high energy cosmic rays (as opposed to direct detection), launch in November
- **QUESS**: Quantum Experiments in Space, implements long-distance quantum communication using ground station, might lead to teleportation, launch in first half of 2016
- **HXMT**: Hard X-ray Modulation Telescope: 3 bands + sky environment monitor, launch in second half of 2016
- **XTP**: X-ray timing and Polarization Mission: in Phase A study, 1-30 KeV , 0.3 - 1 deg resolution depending on band, launch no earlier than 2020
- **S-VLB**I: two 10-M space antennae, elliptical orbits for better u,v coverage, 8,22,and 43 GHz, would participate in next year's mission selection
- **STEP**: Search for Terrestrial Exo-Planets, 1 micro arc second astrometric precision, select ~200 of the nearest stars, 500-900nm, 1.2-meter aperture, CMOS detector, did not get a start this year but will try again next year
- **E-P:** Einstein Probe to study soft x-ray transient sources, waiting to hear if it is selected now or will need to try again next year
- Open to international collaboration, working mostly with ESA