Committee on Biological and Physical Sciences in Space (CBPSS)

Disclaimer: These slides are a personal assessment of issues discussed during recent Committee on Biological and Physical Sciences in Space meetings, and should not be cited or quoted - as the views expressed do not necessarily reflect those of Committee, the SSB, the ASEB or the Academies.

CBPSS Status

- Committee
  - Final contract approval for the transition of CBPSS from a standing to discipline committee came at end of 2018
  - The new discipline committee met for the first time in March (Space Science Week)
  - The new discipline committee has six new members who did not previously serve on CBPSS, including new co-chair Dava Newman
  - The discipline committee is now able to write short reports on NASA's implementation of the previous decadal or mid-term review
- NASA reorganizations related to CBPSS
- Space Life and Physical Sciences Mid Term Assessment
- Mission architectures, destinations and impacts to CBPSS
- Next Decadal

CBPSS Status

- Committee Round of transitions, including co-chair rotation

Robert J. Ferl, University of Florida (Co-Chair)

Dava J. Newman, Massachusetts Institute of Technology (Co-Chair)
Mary L. Bouxsein, Harvard Medical School
Marianne Bronner, California Institute of Technology
Steven Collicott, Purdue University
Vijay K. Dhir, University of California, Los Angeles
Alain Karma, Northeastern University

Mohammad Kassemi, Case Western Reserve University

Douglas M. Matson, Tufts University
Wayne Nicholson, University of Florida
James A. Pawelczyk, The Pennsylvania State University
Marylyn D. Ritchie, University of Pennsylvania

Jessica Scott, Memorial Sloan Kettering Cancer Center
Pol D. Spanos, Rice University

Jana Stoudemire, Space Tango
Krystyn J. Van Vliet, Massachusetts Institute of Technology
Hai Wang, Stanford University
David Weitz, Harvard University

CBPSS Status

- **CBPSS**
  - Round of transitions, including co chair rotation
- **CBPSS is associated with HEOMD**
  - SLPSRA and other reorganization within human exploration
  - Discussions with SLPSRA on the outset of the reorgs
  - Still an open discussion at this point and include potentially splitting the portfolio
- **Notion of primarily NASA providing the access to this science portfolio**
  - NASA will likely remain the funnel that collects and aggregates the science
  - Including discussions with ISSNL CASIS
- **Next Decadal real soon**

SPACE SCIENCE WEEK

The National Academies of | SCIENCES ENGINEERING MEDICINE

SPRING 2019 MEETING OF THE COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE

March 27, 2019

NAS Building – 2101 Constitution Ave NW – Washington D.C.

SYMPOSIUM AGENDA

Wednesday, March 27, 2019

COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Room 120

7:30 AM	*Registration opens and breakfast is available in the Great Hall*	
	OPEN SESSION **Symposium[1]: Issues Informing the Decadal Study**	
9:00 AM	**Welcome and Introductions**	**Robert Ferl, Co-Chair**
9:15 AM	**NASA Technology Leaders Forum – Understanding Research Needs and Directions** Moderator: Krystyn Van Vliet, CBPSS Member *Moderator Intro 5 min* *Presentation 12 min Each* *Moderated Discussion and Q&A 30 min*	**Al Conde, OCT** **Jim Reuter, STMD** **Christopher Moore, Advanced Exploration Systems** **Robyn Gatens, ISS** (via Zoom) **Craig Kundrot, SLPSRA**
10:50 AM	*Break Available Outside Room*	
11:10 AM	**Accomplishments and Potential in Space Manufacturing**	**Robert Hoyt, Tethers Unlimited**
11:40 AM	*Working Lunch Available in the Great Hall*	

1:00 PM	**Forecasting the 2024-2035 Space Based National Laboratory for Life and Physical Sciences Space Research**	**Richard Leach, ISS National Laboratory**
1:15 PM	**Panel: Commercial Providers of Research Platforms and Capabilities** Moderator: Steven Collicott *Moderator Intro 5 min* *Presentation 12 min Each Panelist* *Moderated Discussion and Q&A 35 min*	**John Koroshetz, Sierra Nevada Corporation** **Christian Maender, Axiom Space**(via Zoom) **Bob Richards, Northrop Grumman** **Jana Stoudemire, Space Tango**
2:45 PM	*Break Available Outside Room*	
3:00 PM	**High Priority Questions and Emerging Areas in Regenerative Engineering and Medicine**	**Yusuf Khan, UConn Health Center**
3:30 PM	**Panel: Research Interests and Future Needs at Federal Agencies Outside NASA** Moderator: Jim Pawelczyk, CBPSS Member *Moderator Intro 5 min* *Presentation 12 min Each Panelist* *Moderated Discussion and Q&A 35 min*	**Shahab Shojaei-Zadeh, NSF CBET** **Lucie Low, NIH (NCATS&NCI)** **Hongda Chen, USDA-NIFA** **Carolynn Conley, MEI Technologies (DOD Space Test Program)**
5:00 PM	**Wrap-Up Discussion**	**All**
5:30 PM	*Symposium Adjourns*	

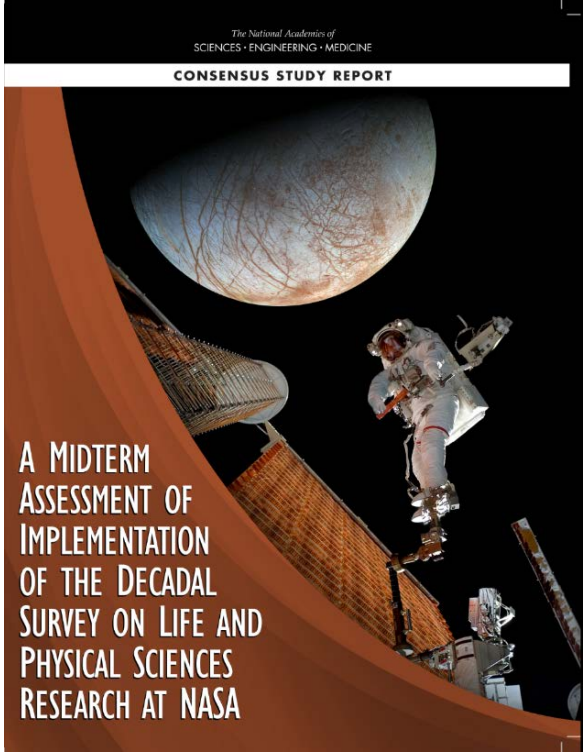
CBPSS Science and Applications

- **Major Considerations**
  - ISS and the attendant NASA ISSNL relationship
  - Role of commercial applications and other agencies
    - stressed that it was not possible for their organizations to develop internal programs to supply the kind of fundamental phenomenological understanding needed to inform systems design
    - Yet keen interest and support

CBPSS Science

- **ISS horizon and transition as ~~the~~ a major policy impacting this area of science**
  - Especially wrt what is not yet known about microgravity and its impacts on systems
  - Especially wrt the length of time that some experiments need to approach realistic Mars timelines
  - Significant shift if shorter durations are envisioned for the moon
- **Gateway**
  - Major science opportunity that is unfolding in real time especially wrt radiation and integrative science
  - But is limited in volume and capability
  - Brings into stark focus the time needed on ISS vs the opportunity for deep space
- **Both points are addressed in the Mid Term Assessment**
- **The Moon**
  - Not directly or significantly addressed (yet)

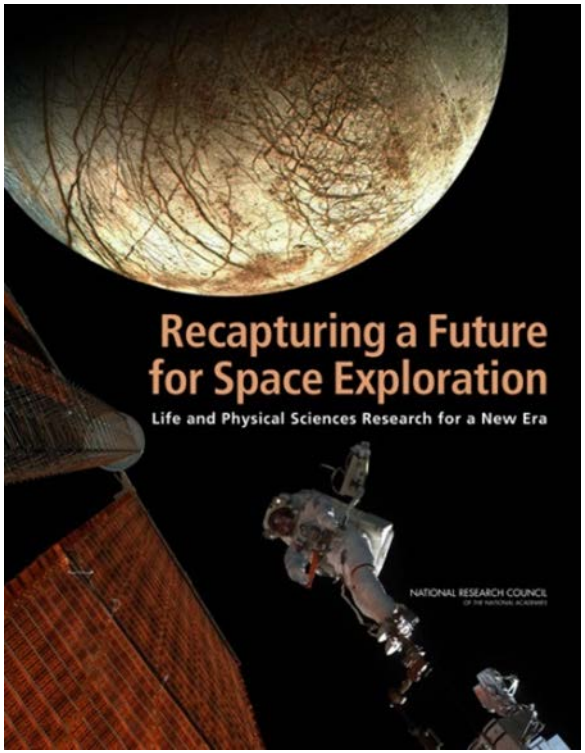
Mid-Term Assessment



- **Science and Technology development impacts**
  - Mapping technologies to provide solutions
  - Deep space anticipated, lunar now
  - Radiation and combinations of effects
  - Every area provides impact for exploration
  - Example of life support
    - Draws upon science principles of microgravity and radiation effects
    - Biology on surfaces and in fluids, including humans and metals
    - Behaviors of fluids, cryogenics storage, humans
    - Systems interactions

Next Decadal

- Discussions with community have begun
- ASGSR and others query to input
- CBPSS interactions and following that interest
- 2019 nominal for formal discussions on the process and the SOT



Recap Issues for CBPSS

- **Questions include:**
  - Timing and steps in the ISS transition? Decadal and platforms
  - *NASA reorganization* directly influences this portfolio
  - Interest and creativity of the research community is very high, given the transitions occurring in exploration
  - *ISS operations and policies* increasingly critical
  - *Deep space* science opportunities are new areas
  - Opportunities to fly sub-orbital experiments growing rapidly
  - Monitoring the LEO ecosystem(s)
  - Maintaining health and diversity of microgravity disciplines
  - *Modeling* out of science for ops and technology
  - *Gravity continuum* as part of those models
  - Enabling *Lunar* science

http://events.tvworldwide.com/Events/usra_190423/VideoId/3642/UseHtml5/True