Committee on NASA Science Mission Extensions

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Victoria E. Hamilton, Co-chair
Harvey D. Tananbaum, Co-chair

Opportunity Sol 4228
42.65 km driven

Why did NASA ask for a study on science mission extensions?

- Grunsfeld's "Urban Legends"
- Continued budget pressure
  - NASA senior leadership
  - Office of Management and Budget
- Other reasons?
  - October 2014 NASA Inspector General's report
  - Two-year requirement for Senior Reviews creates pressure and costs

John Grunsfeld's Urban Legends of Extended Missions

- We can't build new missions because of the cost of extended missions
- NASA never turns anything off
- SMD spends most of its budget on extended missions for limited science return

Despite doubts from some members of the committee, Grunsfeld assured us that he frequently encounters these kinds of statements and attitudes.

Budget Realities and Pressures

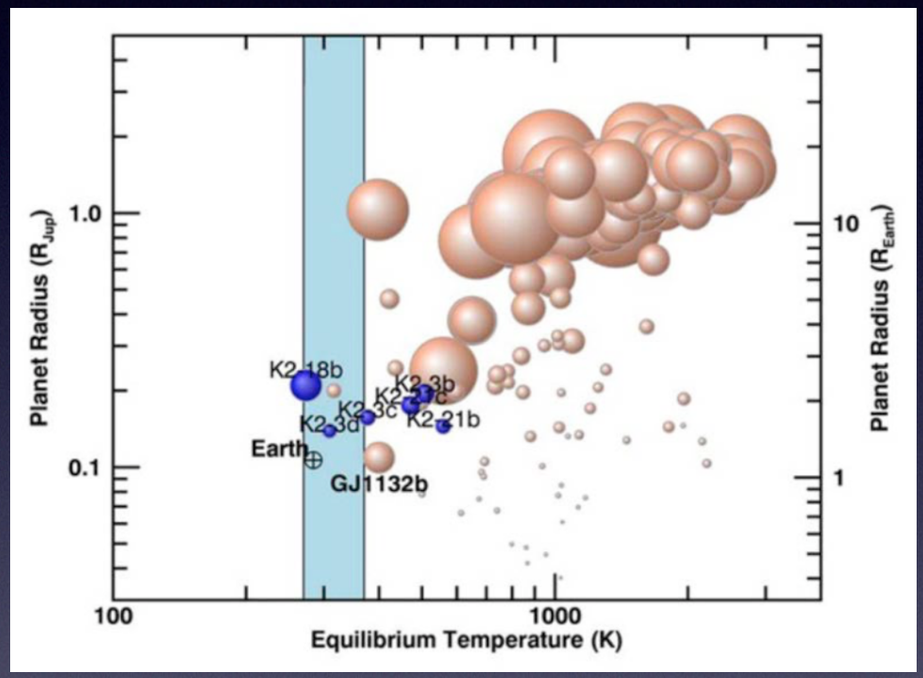
- About 10-20% of SMD's budget is devoted to extended missions, varying from year-to-year
- In previous Presidential budget requests, missions that scored well in Senior Review have been zeroed out early or entirely
  - e.g., Lunar Reconnaissance Orbiter, Opportunity rover, Cassini

Statement of Task - Summary

1. Historically, what have been the scientific benefits of mission extensions? How important are these benefits?
2. What is the current SMD Senior Review process for extending missions? What should be division dependent and what should be uniform across the Directorate?
3. Is the biennial time period for Senior Reviews optimal for all divisions?
4. Does the balance currently struck between starting new missions and extending operating missions provide the best science return within NASA's budget?
5. Are there innovative cost reduction approaches that could increase the science cost-effectiveness of extended missions?

Cadence for Senior Reviews - 1

- Established in 2005 Authorization Act
- Two years was the cadence previously established by Astrophysics at NASA in the early 1990s
- NASA is using exceptions on an ad-hoc basis (for instance, no reason to hold a senior review for a mission that will expire in only a few more months)
- Widespread agreement among people from whom the committee heard that two years is too short a cadence
  - Requires a lot of preparation by mission teams
  - Places a lot of burden on NASA/review panels to conduct them

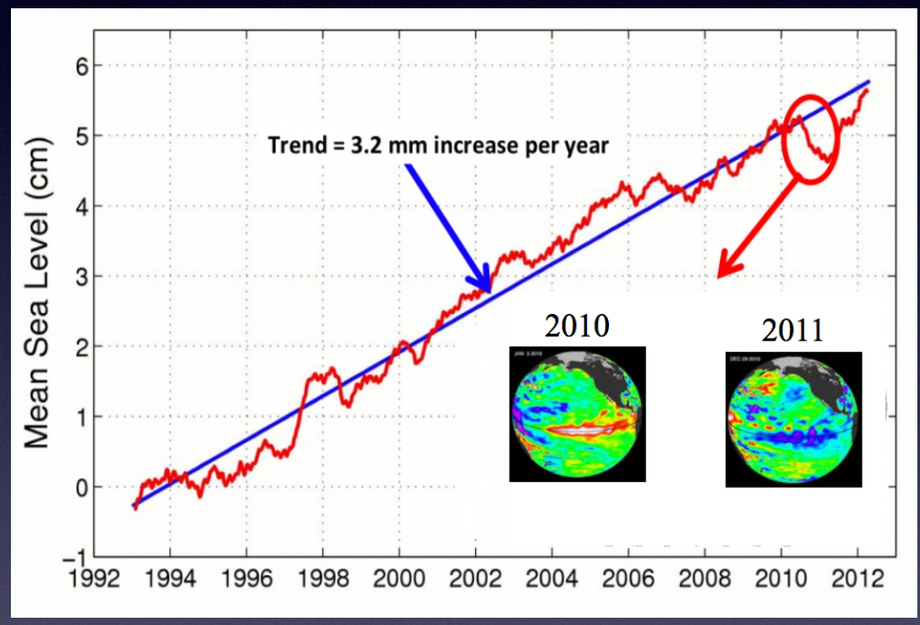


Kepler/K2 added many potentially rocky planets to set of known transiting planets

Cadence for Senior Reviews - 2

- Some good news
  - Committee heard from former congressional staff who wrote the 2-year requirement
  - Committee also heard from current congressional staff

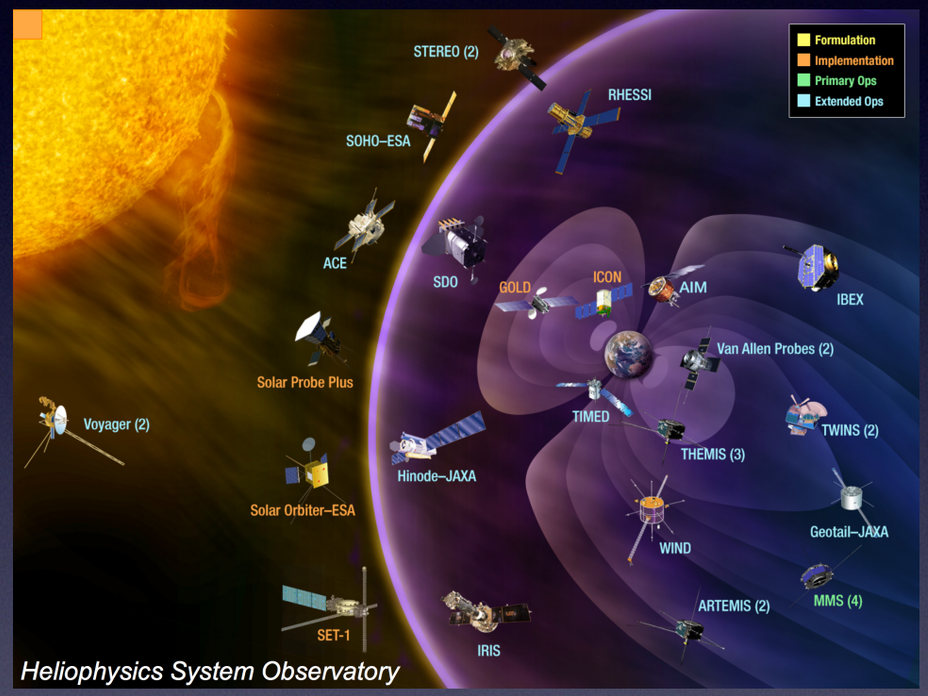
All agreed that changing the 2-year requirement for senior reviews was reasonable if the committee can justify it.



A half-dozen Earth Science missions contribute to documenting sea level rise and ocean mass changes

Other Issues

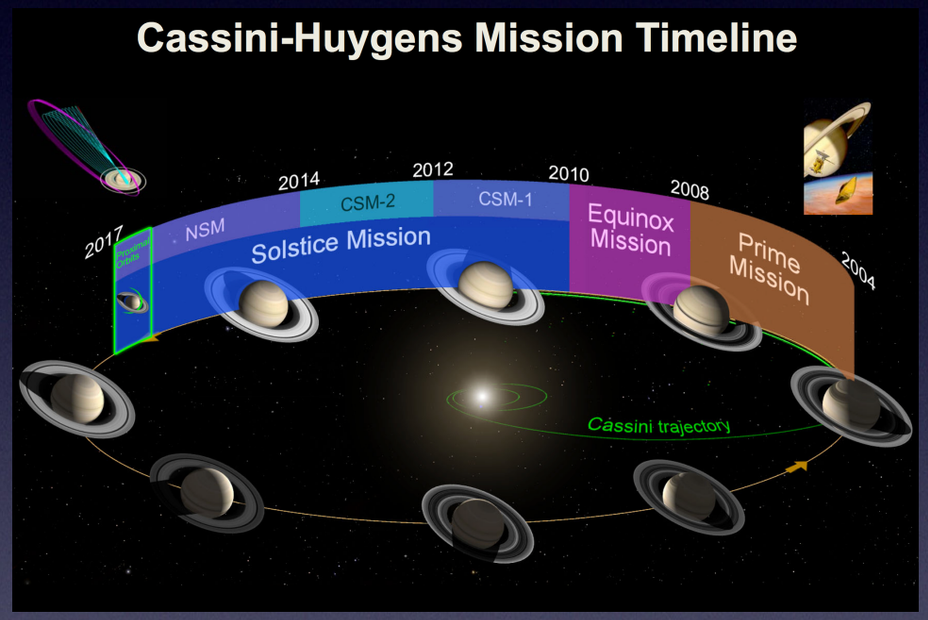
- Proposal requirements vary from division to division and senior review to senior review
  - One size does not fit all and divisions have reasons for differences
- Divisions do communicate with each other about SR processes; may still have lessons to teach each other (e.g., Earth science does a separate review of spacecraft health)
- Committee is looking at length of the proposals, but committee has heard that the length is about right, detail is required for thorough reviews
- NASA does not always follow the recommendations of the senior reviews and does not clearly explain why not



HSO depends on extended missions for synoptic view of heliosphere

2016 Schedule for Study

- First meeting early February
- Second meeting early March
- Third meeting later April
- If needed, fourth meeting in late May/early June
- Report should enter review in June or July
- Delivery to NASA in ~September



Significantly more of the Saturnian year observed since prime mission

Committee Membership

Victoria E. Hamilton, *Co-Chair*
Southwest Research Institute
Department of Space Studies

Harvey D. Tananbaum, *Co-Chair*
Smithsonian Astrophysical Observatory

Alice Bowman
John Hopkins University Applied Physics Laboratory

John R. Casani
Retired- Jet Propulsion Laboratory

James H. Clemmons
The Aerospace Corporation

Neil Gehrels
Astroparticle Physics Laboratory
NASA Goddard Space Flight Center

Fiona A. Harrison
California Institute of Technology

Michael D. King
University of Colorado Boulder
Laboratory for Atmospheric and Space Sciences

Margaret G. Kivelson
Department of Earth, Planetary, and Space Sciences
University of California, Los Angeles

Ramon E. Lopez
The University of Texas at Arlington

Amy Mainzer
Jet Propulsion Laboratory

Alfred S. McEwen
Lunar and Planetary Laboratory
University of Arizona

Deborah G. Vane
Deputy Manager, Office of Operating Earth Science Missions

Statement of Task

The NRC will appoint an ad hoc committee to conduct an assessment of the scientific value of extended missions in the overall program of NASA's Science Mission Directorate (SMD). The committee's report will provide recommended guidelines for future NASA decision-making about such mission extensions. In conducting this study, the committee could address the following questions:

1. Historically, what have been the scientific benefits of mission extensions? How important are these benefits (for example, benefits that might only accrue during the extended mission phase but not earlier)?

2. What is the current SMD Senior Review process for extending missions--for example, how are reviews chartered and conducted, by whom, and using what criteria? What should be division dependent and what should be uniform across the Directorate?

3. The NASA Authorization Act of 2005 requires biennial Senior Reviews for each mission extension. Is this biennial time period optimal for all divisions? Would a longer or shorter time period between reviews be advantageous in some cases?

4. Does the balance currently struck between starting new missions and extending operating missions provide the best science return within NASA's budget? That is, how much of an acceleration of new mission initiation could realistically be achieved by reallocating resources from mission extensions to new programs, compared to the corresponding scientific loss from terminated or diminished mission extensions?

5. Are there innovative cost reduction approaches that could increase the science cost-effectiveness of extended missions? Are there any general principles that might be applied across the board or to all of the missions for an individual science theme or a particular class? Are there alternative mission management approaches (e.g., transfer to an outside technical or educational institution for training or other purposes) that could reduce mission costs during extended operations and continue to serve SMD's science objectives?