



NASA Planetary Science Division Budget Update

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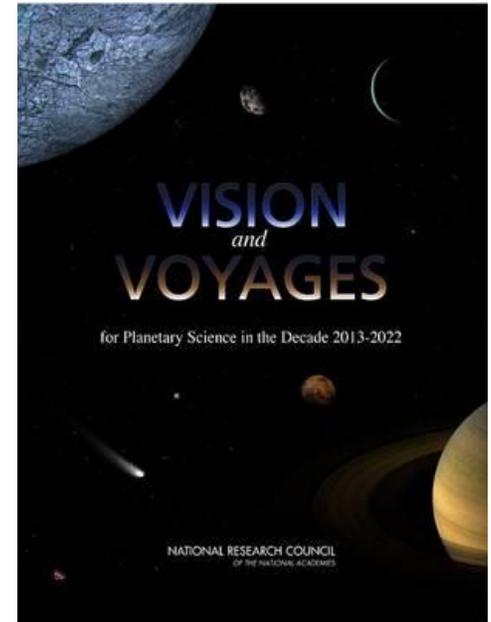
29 November 2017

With comments by M.V. Sykes

Question on PSD Research Spending

- Question: Has the NASA Planetary Science Division met the recommendations of the Vision and Voyages report for Research spending?
 - “...the committee recommends that NASA increase the research and analysis budget for planetary science by 5% above the total finally approved FY2011 expenditures in the first year of the coming decade, and increase the budget by 1.5% above the inflation level for each successive year of the decade.*”
- **Answer: Yes, the actual Research spending through 2016 is ahead of V&V recommendations despite the overall PSD budget in those years being lower than anticipated**
- Caveat: Different people have different opinions about what “counts” as research
 - *Choice of which budget elements to include could influence the answer*

Which is why it is important for details of what “counts” need to be included. Detail at the program element level is needed at a minimum. NASA refuses to provide this, making their totals and conclusion difficult to assess.





The Math

- “5% above the total finally approved FY2011 expenditures in the first year of the coming decade*”
 - *First year of the coming decade assumed to be 2013*
- “Increase the budget by 1.5% above the inflation level for each successive year**”
 - *2016 NASA New Start Inflation Index used for inflation factors*
 - *Ranges from 1.5% to 2.1% per year*
- 2016 value should be 15% higher than 2011
 - *Assuming 2012 as first year of the coming decade increases value to 19%*

	2013	2014	2015	2016
V&V Recommendation	5%	1.5%	1.5%	1.5%
Inflation		2.1%	1.5%	1.5%
Total Escalation	5%	3.6%	3.0%	3.0%
Cumulative Escalation	5%	8.8%	12.0%	15.4%

NASA New Start Inflation Index higher than CPI-based values used by Sykes making the decadal funding level higher.

**Vision and Voyages, Pg. 7*

PSD Research Spending

Equating these high-level federal budget lines to “R&A” is a radical shift from the definition used in May 2017 and they include many programs that are not competed (e.g., Science Enabling Research Activities at NASA Centers, Outer Planets Flagship Funding, LPI Support, and much more). A program element breakdown would make this clear.

- NASA PSD spending data from NASA budget requests

	RY\$M	2011	2012	2013	2014	2015	2016
All Research Total		\$ 245	\$ 245	\$ 256	\$ 275	\$ 281	\$ 308
Planetary Science Research Budget Line		\$ 159	\$ 174	\$ 196	\$ 222	\$ 253	\$ 274
Planetary Science Research and Analysis		\$ 122	\$ 122	\$ 129	\$ 130	\$ 162	\$ 163
Other Missions and Data Analysis		\$ 24	\$ 27	\$ 43	\$ 47	\$ 46	\$ 58
Education and Directorate Management		\$ 5	\$ -	\$ -	\$ -	\$ -	\$ -
Near Earth Object Observations		\$ 8	\$ 20	\$ 21	\$ 41	\$ 40	\$ 50
Directorate Management		\$ -	\$ 4	\$ 4	\$ 4	\$ 4	\$ 3
Other Research Total		\$ 86	\$ 71	\$ 60	\$ 53	\$ 28	\$ 34
Lunar Science Research		\$ 32*	\$ 20*	\$ 11*	\$ 4*	\$ - *	\$ - *
Discovery Research		\$ 17	\$ 15	\$ 15	\$ 14	\$ 10	\$ 16
New Frontiers Research		\$ 1	\$ 0	\$ -	\$ -	\$ -	\$ -
Mars Research and Analysis		\$ 17	\$ 19	\$ 19	\$ 20	\$ 10	\$ 10
Outer Planets Research		\$ 18*	\$ 16*	\$ 15*	\$ 16	\$ 9	\$ 9

* Value not provided in NASA budget requests. Value shown in table was provided by Jonathan Rall. **without support. A check of the actual values for FY11 appearing in the FY13 budget request shows a Lunar Science line of \$61.7M, which would increase the decadal recommended budget for later years.**



PSD Research Spending Has Increased

- Recent PSD budgets have contained 6-7 major categories
 - One is “Planetary Science Research”
 - Spending on this line has grown significantly since 2011 (+73%)
 - There is also research listed under other categories
 - For example: “Mars Research and Analysis” is under “Mars Exploration”
 - The spending for the total of these elements has shrunk (-60%)
 - Total of all categories described above has increased (+26%)

	2011	2016	Change
Planetary Science Research Line	\$159M	\$274M	73%
Other Research Total	\$86M	\$34M	-60%
Lunar Science Research	\$32M*	-*	-100%
Discovery Research	\$17M	\$16M	-9%
New Frontiers Research	\$1M	-	-100%
Mars Research and Analysis	\$17M	\$10M	-43%
Outer Planets Research	\$18M*	\$9M	-51%
All PSD Research	\$238M	\$313M	26%

* Value not provided in NASA budget requests. Value shown in table was provided by Jonathan Rall.

Rounding can explain why Other Research Total does not add up, but not All PSD Research

Mark Sykes White Paper and Spreadsheet <http://planetarypolicy.org>



- Spreadsheet that accompanies the white paper has considerable detail beyond what is provided in NASA budget requests
 - *BUT, it is not a complete PSD budget and does not include some items that fall under “Research” in the NASA budget requests* *Sykes states the assumption of competed research and data analysis in ROSES, excluding Technology due to separate decadal recommendation.*
- Some or all of this may be intentional *Absolutely, and explicitly detailed.*
 - *Dr. Sykes describes some efforts to remove non-competed elements*
 - *For example, he separates “TECH” and does not include that spending in his calculations* *Yes, but not because they are non-competed. Mission-related programs like PSPs are also excluded. However, all are free to define “R&A” differently and modify cell formulas with the information provided.*
- There is significant growth in some elements that are excluded
 - *Near Earth Object Observations*
 - Grows from \$8M in 2011 to \$50M in 2016 *This includes NEOWISE mission support, Minor Planet Center, and other non-R&A items.*
 - Sykes spreadsheet shows growth from \$5M to \$9M *Estimated from funded proposals and SARA data.*
 - *Other Missions and Data Analysis*
 - Grows from \$24M in 2011 to \$58M in 2016
 - Growth from items including Joint Robotics Program for Exploration, Science Innovation Fund, and Science Data & Computing *none of which can be linked to a ROSES call*
- These items do not appear in the Sykes spreadsheet



Jim Green Plot

- Jim Green presented the plot below at the May committee meeting*
- From discussions with Jim Green and Jonathan Rall, this plot is based on a keyword search of NASA WBS elements to find items that represent competed research and technology
- Also shows increasing spending since 2011

Unfortunately, these numbers cannot be reproduced

R&A Program Expenditures



Note: Orange “Decadal Suggested” line is calculated assuming the first year is 2012 and does not include inflation for the remaining years. Adding inflation raises 2015 suggested level to \$188M. Changing first year to 2013 and adding inflation raises 2015 to \$182M. In all cases, the actual spending reported is higher than the calculated suggested level.

For instance, Green’s FY11 number is \$13.3M lower than the conservative value calculated by Sykes. What is being excluded?

The exercise of determining the extent to which NASA has complied with the planetary decadal recommendation for R&A funding is important, but should not be problematic. This is a sensitive issue to the planetary community and the NASA Planetary Science Division has the information to do this in a manner that gives confidence to the community in the reliability of the conclusion (positive or negative). Obfuscation, wittingly or unwittingly, sends a bad message that NASA is trying to hide information and deceive. My personal opinion is that these are unforced errors in an effort to rush to a particular conclusion.

NASA needs to:

- (1) Clearly define what it considers to be R&A in the context of the decadal survey and identify all program elements that are included. For example, does a program element need to be research and data analysis that is announced in ROSES? Are technology program elements included? What types of program elements are excluded?
- (2) There are a few program elements (e.g., NEOO) that include competed and uncompleted activities. Break those budgets down.

I agree that the choice of budget elements will influence the outcome. Going back to the spreadsheet I provide at <http://planetarypolicy.org>, by including TECH programs and the NASA inflation rates, there is still a deficit of \$45M net from FY13-FY16, but what I call R&A funding then exceeds the decadal level of funding recommended for FY16 by \$500K.

—
Mark V. Sykes