# Understanding Planetary R&A

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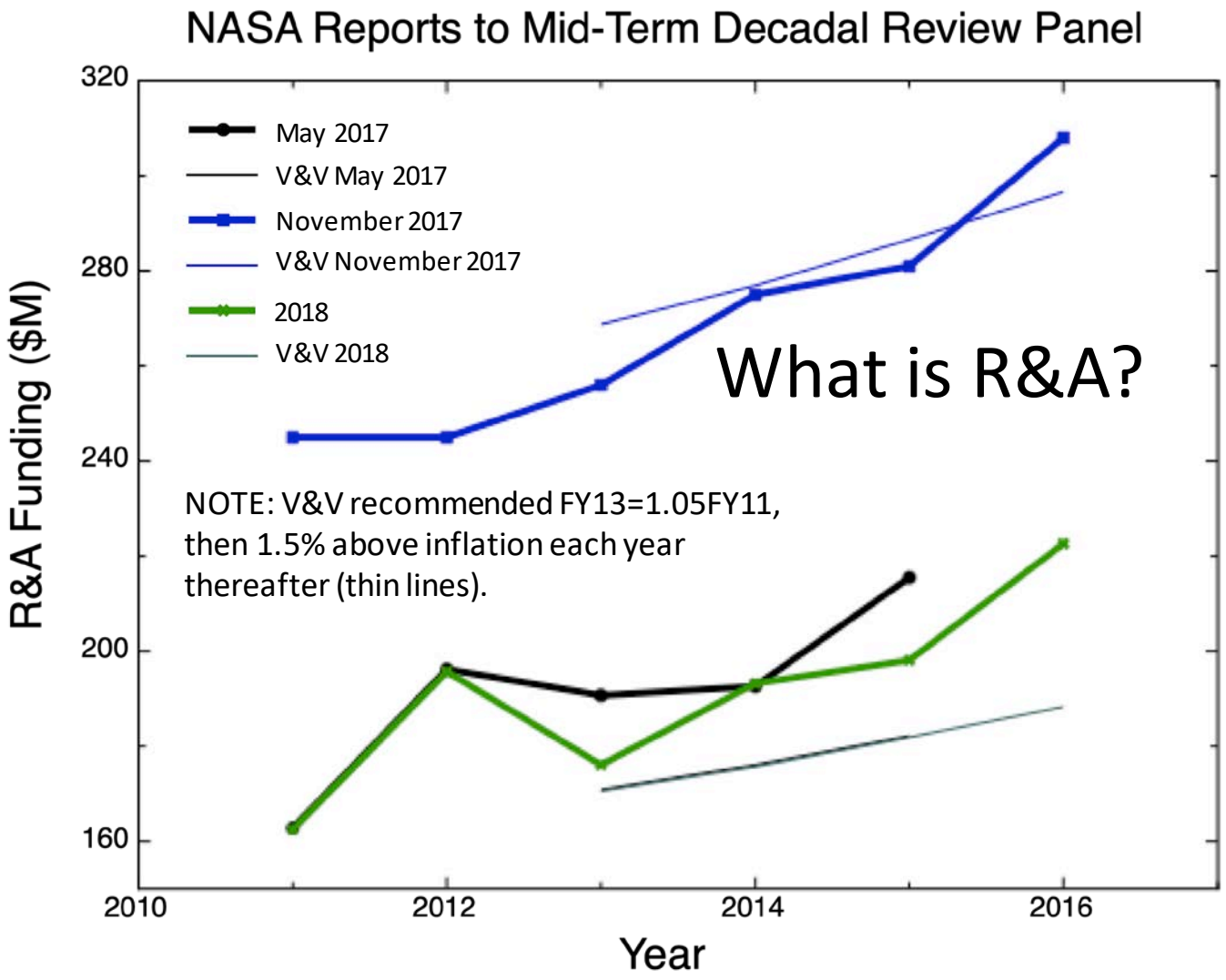
Planetary Science and Astrobiology Decadal Survey 2023-2032

During the NRC Midterm Assessment on the last Planetary Decadal Survey (V&V), NASA was challenged a couple of times on the extent to which it complied with the recommendation on Research and Analysis (R&A) funding. In response, NASA ended up submitting three very different funding profiles.




Different funding profiles from one month to the next were possible because past Decadal Surveys have never defined what comprised "R&A" programs. It was just assumed everyone knew!

The current Decadal Survey needs to explicitly define what is and is not included when it refers to "R&A".

Proposal:

Research and Analysis programs fund *openly competed proposals* for basic research and mission data analysis.

*R&A does not include:*

Mission development and support [this should be funded by mission programs, e.g., SmallSats]
Instrumentation/technology development [for which the Decadal Survey (V&V) made a separate rec of 6-8% PSD mission budget]
Research internally funded by the agency [which by definition is not openly competed, e.g., ISFM, SERA]

Over the past year, I have been building up a detailed budget for the NASA Planetary Science Division through a series of FOIA requests, focusing on FY17-FY20. Information started coming in two weeks ago, and into this week. Budget information for previous years was obtained for specific programs over a number of years, again primarily through the FOIA process. (210303_mvs_foia_psd_budget.xlsx)

Applying the proposed definition for R&A, it is clear that there are R&A programs in mission lines (filled)

| | | | 2017 | 2018 | 2019 | 2020* |
|---|---|---|---|---|---|---|
| **PLANETARY SCIENCE** | | | **1,827,500,000** | **2,217,900,000** | **2,746,700,000** | **2,712,600,000** |
| | | | | | | |
| ***Discovery*** | | | **194,600,000** | **258,300,000** | **409,500,000** | **508,700,000** |
| | ** Discovery Research* | | 11,400,000 | 6,697,000 | 7,656,000 | 6,783,597 |
| | | Laboratory Analysis of Returned Samples (LARS) (nee SRLIDAP) | 7,011,690 | 644,746 | 65,600 | 6,894 |
| | | Discovery Data Analysis Program | 3,626,504 | 3,140,678 | 3,671,890 | 3,207,377 |
| | | Ceres GIP [Dawn at Ceres GIP] | 761,804 | 0 | 0 | 0 |
| | | InSight PSP | 0 | 1,698,519 | 1,500,000 | 1,500,000 |
| | | Rosetta DAP | 0 | 1,213,057 | 2,418,510 | 2,069,326 |
| | | | | | | |
| ***New Frontiers*** | | | 134,000,000 | 88,100,000 | 93,000,000 | 136,800,000 |
| | ** New Frontiers Research* | | 1,626,000 | 2,123,000 | 7,900,000 | 5,770,000 |
| | | New Frontiers Data Analysis Program | 91,897 | 1,873,103 | 5,751,800 | 2,592,000 |
| | | Laboratory Analysis of Returned Samples - NF | 664,000 | 0 | 0 | 1,500,000 |
| | | OSIRIS REx PSP | 870,103 | 249,897 | 1,148,199 | 978,000 |
| | | Juno PSP | 0 | 0 | 997,714 | 700,000 |
| | | | | | | |
| ***Mars Exploration*** | | | **647,000,000** | **678,000,000** | **712,700,000** | 565,700,000 |
| | ** Mars Research and Analysis* | | 10,000,000 | 9,993,000 | 9,855,000 | 9,780,425 |
| | | Mars Fundamental Research (MFR) | 359,053 | 355,885 | 330,177 | 619,425 |
| | | Mars Data Analysis Program (MDAP) | 9,587,093 | 9,635,318 | 9,521,470 | 9,152,000 |
| | | | | | | |
| ***Outer Planets and Ocean Worlds*** **(nee Outer Planets)** | | | **359,500,000** | **676,200,000** | **793,600,000** | 632,000,000 |
| | ** Outer Planets Research* | | 7,500,000 | 8,500,000 | 6,700,000 | 7,021,000 |
| | | Cassini DAP | 7,236,624 | 8,500,000 | 6,697,643 | 7,021,000 |
| | | Outer Planets Research | 263,266 | | | |

By definition, it is also clear that there are programs in research lines that are NOT R&A (not filled!)

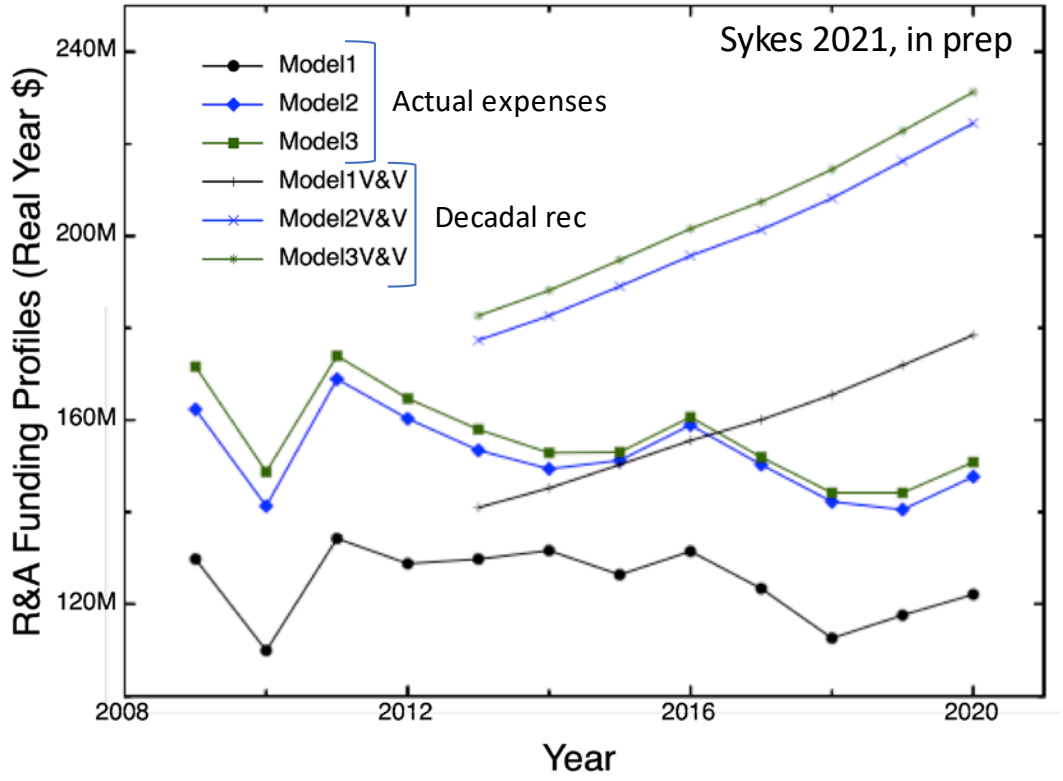
| | | 2017 | 2018 | 2019 | 2020* |
|---|---|---|---|---|---|
| ***Planetary Science Research*** | | 230,100,000 | 279,500,000 | 276,600,000 | 286,000,000 |
| | ** Planetary Science Research and Analysis (SSE R&A)* | *178,100,000* | *197,900,000* | *195,683,000* | *209,542,936* |
| | PSD Travel | 511,646 | 541,336 | 460,424 | 350,000 |
| | StratComm | 4,825,037 | 3,469,357 | 4,014,358 | 3,748,633 |
| | Program Managment | 3,427,761 | 4,460,902 | 2,105,287 | 2,089,891 |
| | Detailees | 1,701,239 | 1,124,461 | 762,373 | 323,655 |
| | Admin Support | 706,904 | 663,288 | 704,571 | 1,285,000 |
| | INSPIRE Cubesat | 0 | 0 | 0 | 0 |
| | International Support | 0 | 0 | 0 | 0 |
| | Venus Activities | 478,000 | 374,868 | 300,000 | 0 |
| | Planetary Decadal Support | 0 | 0 | 0 | 12,012,542 |
| | NRESS Contract | 0 | 0 | 293,148 | 1,512,817 |
| | Planetary Geology/Geophysics | 2,059,673 | 792,547 | 840,500 | 587,818 |
| | Cosmochemistry | 1,226,576 | 362,275 | 0 | 0 |
| | Planetary Astronomy | 5,800,270 | 4,905,527 | 4,970,001 | 4,500,000 |
| | Planetary Atmospheres | 846,075 | 0 | 0 | 0 |
| | Planetary Major Equipment | 1,296,254 | 3,287,167 | 569,826 | 842,345 |
| | Planetary Instrument Definition & Development | 0 | 0 | 0 | 0 |
| | Origins of Solar Systems-planetary | 236,490 | 0 | 0 | 5,692 |
| | NeoWISE/NEO | 0 | 0 | 0 | 0 |
| | Planetary Protection | 2,442,723 | 2,523,633 | 3,379,321 | 2,937,000 |
| | Astrobiology S&T-Exploring the Planets | 7,338,021 | 5,478,962 | 2,892,397 | 3,948,915 |
| | Astrobiology S&T-Instrument Dev | 79,270 | 0 | 0 | 0 |
| | Astrobiology Institute | 19,944,000 | 21,704,578 | 18,166,431 | 18,685,291 |
| | Exobiology & Evolutionary Biology | 16,545,680 | 16,996,724 | 16,787,156 | 16,936,000 |
| | R&A Program Support | 1,206,526 | 1,832,421 | 3,082,719 | 3,479,453 |
| | Planetary Mission Data Analysis Program (811073) | 209,321 | 0 | 0 | 0 |
| | Planetary SERA (Science Enabling Research Activities at NASA Centers) | 8,677,011 | 10,858,200 | 11,847,816 | 7,448,458 |
| | Joint Robotics Program For Exploration | 2,117,093 | 15,569,729 | 11,547,056 | 13,540,000 |
| | Planetary Science Enabling Facilities | 305,573 | 574,949 | 503,878 | 42,000 |
| | ISFM - Planetary | 0 | 19,586,718 | 19,723,680 | 21,421,450 |
| | Planetary R&A Discretionary Fund | 0 | 0 | 326,331 | 495,195 |

The current Decadal needs to apply its definition against every program element in the PSD budget to provide the guideline for that application to NASA.

# NASA NEEDS TO BE TRANSPARENT

NASA PSD should publish its budget after every fiscal year at a level of detail no less than what I am providing to the Survey. Budgets may need further granularity for some programs (e.g., research and tech tasks for PSTAR, research and facility tasks for NEOO).

NASA should also publish an assessment every year of its compliance with any Decadal Survey funding recommendations regarding R&A. In combination with detailed budget information, this will allow for open review by the planetary community and build much needed confidence in the agency.




NASA's compliance with the R&A recommendation by the last Decadal Survey (V&V) is POOR (~2/3 rec funding level).

<u>Proposed</u>
R&A Model 1 – excludes PSPs/GIPs, NAI, NLSI/SSERVI
R&A Model 2 – excludes PSPs/GIPs, includes NAI, NLSI/SSERVI
R&A Model 3 – includes PSPs/GIPs, NAI, NLSI/SSERVI

NOTE: When R&A budgets shrink, the reduction comes primarily out of funds for new awards with about three times the impact.

# SUMMARY

1) The Decadal Survey needs to explicitly define R&A and identify those programs that meet and do not meet its criteria.
2) NASA PSD needs to be transparent, annually reporting detailed budget information for independent public assessment of compliance with decadal funding recommendations for R&A.
3) NASA did not meet the R&A funding recommendation from the last Decadal Survey (V&V).