Briefing to the NRC SSB
Review of NASA PSD R&A Programs

May 13, 2016

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Bob Grimm, SwRI – VEXAG Deputy Chair
1. Are the PSD R&A program elements appropriately linked to, and do they encompass the range and scope of activities needed to support the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

2. Are the PSD R&A program elements appropriately structured to develop the broad base of knowledge and broad range of activities needed both to enable new spaceflight missions and to interpret and maximize the scientific return from existing missions?

In conducting its task, the committee will:
• Not examine the PSD R&A programs as they were prior to the restructuring;
• Conduct its review in the context of current budgetary realities that have differed from projections assumed prior to the release of the most recent planetary science decadal survey; and
• Not comment on the strategic science goals and objectives of PSD, SMD, or NASA.
Relevant VEXAG Deliberations

• April-May – NRC questions directly to VEXAG membership; Executive Committee correspondence.
• LPSC Town Hall, Mar 2016
• 13th VEXAG Meeting, Oct 2015 (Washington, DC)
  – Announcement & discussion of upcoming NRC review of NASA R&A
  – Presentation by AAAC Proposal Study & discussion.
• 12th VEXAG Meeting, Apr 2015 (Hampton, VA)
• LPSC Town Hall, Mar 2015
  – Discussion with Dr. Voytek
• LPSC Town Hall, Mar 2014
• Virtual & AGU Town Halls, Dec 2013
• 11th VEXAG Meeting, Nov 2013 (Washington, DC)
  – Initial concept of R&A reorg presented by Drs. Green & Rall
<table>
<thead>
<tr>
<th>NASA Science Goals</th>
<th>Decadal Survey Theme</th>
<th>Main NASA R&amp;A Programs At least 15 proposals funded Does not include “Institute” Programs</th>
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<tbody>
<tr>
<td>Formation and evolution of SS objects</td>
<td>Building new worlds</td>
<td>Emerging Worlds 2015–?/137; 2014–32/161 (20%)</td>
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<td>Physical &amp; chemical processes in SS</td>
<td>Workings of Solar Systems</td>
<td>Solar System Workings 2015–?/477; 2014–82/386 (21%)</td>
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<td>Past &amp; present habitats</td>
<td>Planetary habitats</td>
<td>Habitable Worlds 2015–?/?, 2014–15/72 (21%)</td>
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<td>Exobioiogy 2015–?/247, 2014 –30/144 (21%)</td>
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<tr>
<td>Origin &amp; evolution of life on Earth</td>
<td>N/A</td>
<td>EXO</td>
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<td>Threats &amp; Resources</td>
<td>Workings of Solar Systems</td>
<td><strong>Data Analysis Programs</strong> (multiple applications)</td>
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<td>CDAP 2015–?/79; 2014–19/78 (24%)</td>
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<td>MDAP 2015–?/?; 2014–28/104 (27%)</td>
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<td>PDART 2015–?/113; 2014–23/105 (22%)</td>
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<td>SSO 2015–?/51; 2014–21/71 (30%)</td>
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<td>DDA 9 selections &amp; LDAP 14 in 2014</td>
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VEXAG Responses to Question 1

- The linkage of NASA PSD R&A program elements to Science Goals is clear if broad.
- Range and scope of activities are largely appropriate. Factors that currently or might benefit Venus science include
  - Venus-specific science \( \approx \) OK (7/85 SSW, 1/32 EW, 0/15 HW selections).
  - Comparative planetology that includes research on why our sister planet turned out so different
    - 2015 Comparative Tectonics & Geodynamics Conference → ?
VEXAG Responses to Question 1, cont.

• Venus enhancements, continued
  – Better access to orbital and suborbital measurement facilities
    • Gondola for High-Altitude Planetary Science (GHAPS) is a good start.
  – Instruments and technology for the Venus environment (e.g., Glenn Extreme Environments Rig, NF Homesteader,)
  – Venus participating scientist opportunities in foreign missions; acquisition and analysis of Venus data acquired during flybys by other missions (VEGASO).
  – A new Venus mission (oops, not R&A).
VEXAG Responses to Question 2

• NASA is a target-oriented exploration agency but the current PSD basic R&A structure is process-based.
  – e.g., Venus mission tries to answer origin & evolution together, but EW & SSW are separated.
  – R&A program overall lacks specific structure to develop target-oriented knowledge base
    • Exception: SSERVI, because they are putative HEOMD targets
    • Target-based calls are tactical, not strategic.

• NASA is not NSF
  – Broad calls to the scientific community to identify the most compelling problems.
    – Uncontrolled, undirected, unactionable (in mission sense) responses

• VEXAG restructured Goals away from cross-disciplinary for better traceability
VEXAG Responses to Question 2, cont.

- **Factors influencing scientific workforce efficiency in responding to NASA’s needs**
- Stovepiping the R&A programs into a few science questions has resulted in programmatic imbalance due to the overwhelming response to SSW.
  - 13 non-flight, non-instr. Prog. EW = 11%, **SSW = 28%**, EXO+HW = 15%, DAPS/Obs = 46%.
  - Main issues are reviewer burden (clear) and viability of multiple submittals (need stats)
    - Now requires 150-225 panelists, >1000 external reviews: hard to meet
    - Three proposers were successful winning 2 proposals in SSW.
- **Proposal vetting and timing is incomprehensible:** Step 1 has introduced institutional burdens; encouraged/discouraged produces no actionable results; proximal Step-2 due dates (Exoplanets/EW, MDAP/LDAP) discourage additional valuable proposals.
- **Concerns (incomplete info?)** about transparency and uncompeteted directives.
  - Perceptions that restructuring was essentially a money-saving exercise without regard to community burden, SSERVI selections noted overwhelmingly from prior NLSI teams, NExSS constituted from Astrobiology runners-up without new competition.
Funding Rate

• NASA has calibrated most 2014 programs to ~20% funding rate.
• Regardless of “current budget realities,” this is well below the 30-35% threshold* that would
  1. provide a healthy competitive environment
  2. better utilize community facilities
  3. break the negative feedback of many resubmitted unsuccessful proposals

*AAAC Proposal Pressures Study Group, 2015.
Summary of VEXAG Responses

• VEXAG has a relatively small constituency that is largely a consequence of no US Venus mission launched in 27 years. Nonetheless our community remains active in research, workshops, annual meetings, and mission development.

• There isn’t much to argue with the broad linkage between NASA Goals and R&A programs via the Decadal Survey. Some additional scope would be beneficial to current and future studies of Venus.

• The main R&A program is process-based, which is not well aligned with the needs of a target-based agency.

• R&A program is imbalanced within due to the SSW behemoth. There are some perceptions of lost funding opportunities and noncompetitive selection.

• Low success rates induced negative feedback and decrease workforce efficiency.