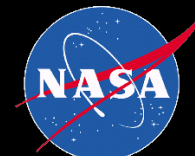


National Aeronautics and Space Administration

NASA R&A Update

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Science Mission Directorate*





Alignment with Decadal Survey



The NASA FY17 Appropriation and the FY18 President's Budget Request support the following:

0.0 Complete the current program

Extended operations of current operating missions as recommended by the 2015 Senior Review; 5 missions currently in development (SET, ICON, GOLD, SOC and Parker)

1.0 Implement DRIVE (Diversify, Realize, Integrate, Venture, Educate)

Implemented DRIVE initiative wedge in FY15; fully funded in FY17 and onwards

2.0 Accelerate and expand Heliophysics Explorer program

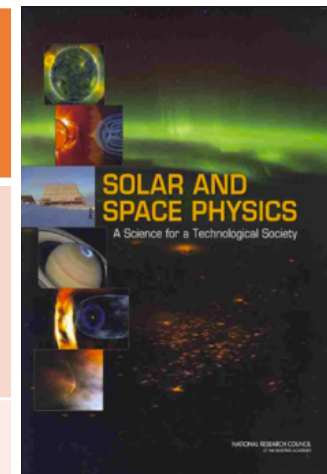
Decadal recommendation of every 2-3 years; Explorer mission AO released in 2016; plan to release next Explorer AO in 2018. Notional mission cadence will continue to follow Decadal recommendation going forward.

3.0 Restructure STP as a moderate scale, PI-led flight program

STP-5 (IMAP) mission AO released with IMAP as a PI-led mission with a LRD ~2024

4.0 Implement a large LWS GDC-like mission

Start of mission formulation targeted for NET2019; RFI call for innovative ideas is out; inputs will feed into GDC STDT that will start in 2017.





HPD ROSES16 Status



ELEMENT	STEP 1 PROPOSALS (Due Date)	STEP 2 PROPOSALS (Due Date)	AWARDS (Expected)	YEAR 1 (\$M)	~ % Success Rate
B.2 H-SR	235	212	31	\$6.3M	15
B.3 H-TIDeS	87	71	13	\$5.3M	18
B.4 H-GI Open	197	181	33	\$3.0M	18
B.5 H-GCR TMS	44	40	10	\$4.4M	25
B.6 H-LWS	74	63	20	\$3.8M	32
B.7 H-DEE	28	24	7	0.5M	29
B.8 H-GI MMS	57	40	10	1.3M	25
B.9 H-GCR SC	<i>PPD to ROSES17</i>	<i>PPD to ROSES17</i>	-	-	
B.10 H-USPI	7	5	2	\$0.4M	40
E.5 ISE	41	39	11	\$0.95M	28

Success rate = # proposals funded / # STEP 2 proposals received



HPD ROSES17 Status



ELEMENT	STEP 1 PROPOSALS (Due Date)	STEP 2 PROPOSALS (Due Date)	AWARDS (Expected)	YEAR 1 (\$M)
B.2 H-SR	194	177	(25-30)	(\$6.0M)
B.3 H-TIDeS	101	88	(12)	(\$4.0M-\$6.0M)
B.4 H-GI Open	193	175	(25-30)	(\$4.7M)
B.5 H-GCR TMS	N/A	N/A	N/A	N/A
B.6 H-LWS	(12/5)	(2/6/2018)	(15-20)	(\$3.75M)
B.7 H-DEE	15	9	(<=9)	(0.5M)
B.8 H-GI MMS	54	(1/11/18)	(8-10)	(1.3M)
B.9 H-GCR SC	TBD	TBD	TBD	TBD



DRIVE implemented in FY18 President's Budget



\$M		FY16	FY17	FY18	FY19	FY20	FY21	FY22	Delta FY18	FY20-FY18
Sounding Rocket Program Office	FY15 PBR	48.3	53.0	53.0	53.0				10.7	4.1
	FY18 PBR	49.8	53.3	59.0	61.1	63.1	63.1	63.1		
Guest Investigator	FY15 PBR	8.0	8.0	8.0	8.0				7.2	4.8
	FY18 PBR	10.5	11.6	15.2	20.0	20.0	20.0	20.0		
Research & Analysis (HSR, H-TIDeS, H-GCR)	FY15 PBR	34.0	33.9	33.9	33.9				16.0	8.7
	FY18 PBR	36.3	39.4	49.9	58.2	58.6	58.6	58.6		
LWS Science	FY15 PBR	17.5	17.5	17.5	17.5				7.1	6.3
	FY18 PBR	18.4	21.9	29.0	35.5	35.3	35.3	35.3		

+\$41M +\$24M



ROSES17 and 18 Planned Elements



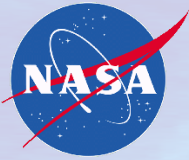
- Heliophysics DRIVE Science Centers (ROSES17, ROSES18)
- Heliophysics Career Enhancement for New Technologists and Scientists (ROSES18)
- NASA–NSF (NASA-NSF MOU)
 - New opportunity focused on “Computational Aspects of Space Weather” (ROSES17)
 - Coordinating ICON & GOLD opportunities (NASA mission GI, NSF CEDAR, joint opp.) (ROSES18)
- NASA-NSF-NOAA
 - Pilot O2R research activity (ROSES17)
- Heliophysics-Planetary
 - Joint Juno Participating Scientist Program (ROSES17)



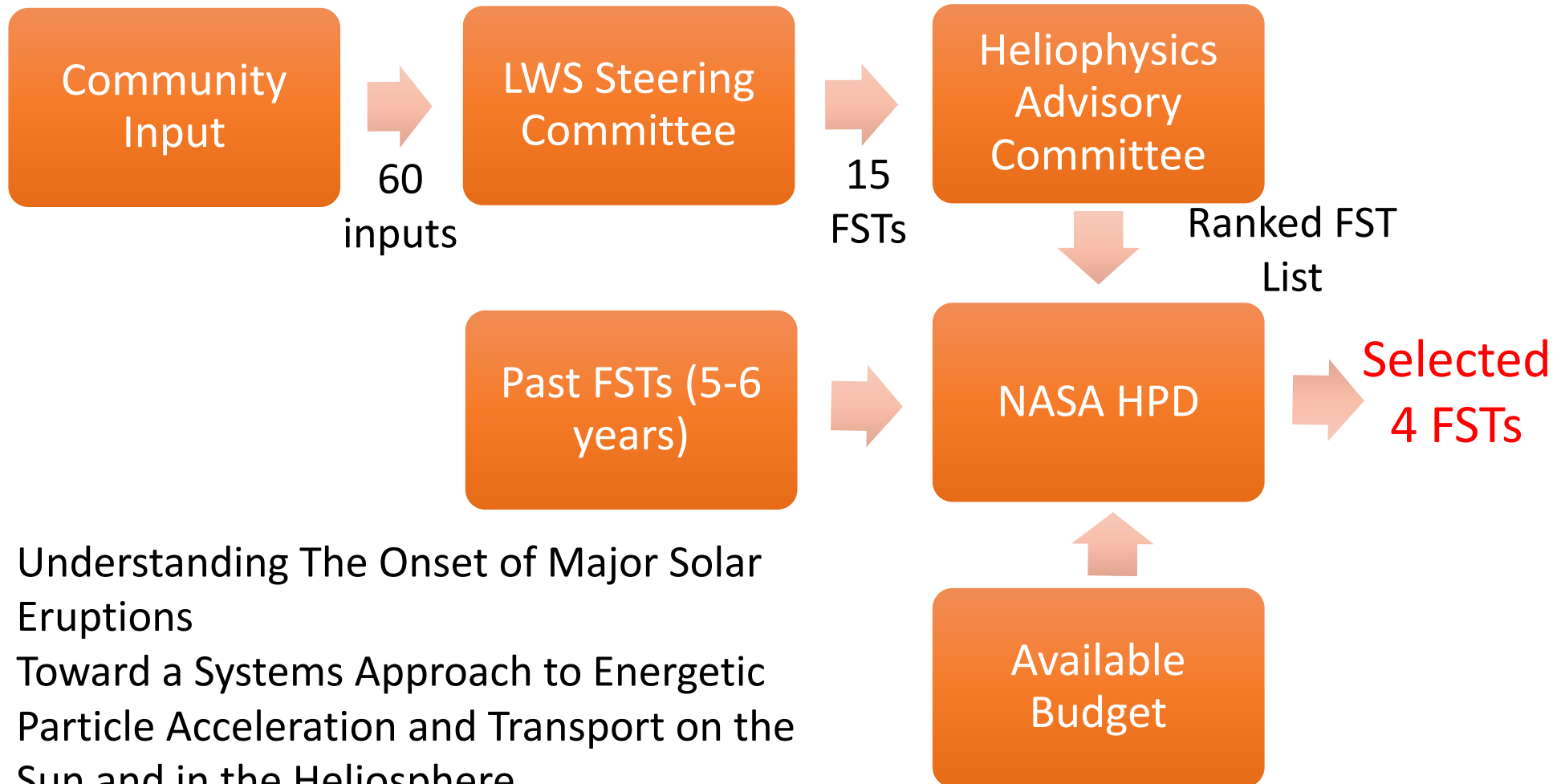
ROSES – H-LWS 2016



- ROSES 2016 LWS FSTs developed incorporating inputs from previous Steering Committee reports and *informed* by SWAP science priorities.
- Proposals were due November 2016.
- A total of 63 Step-2 proposals were received by NSPIRES.
- Three FST Teams (20 proposals) were selected.
 - Advances Toward a Near Real Time Description of the Solar Atmosphere and Inner Heliosphere
 - Characterization of the Earth's Radiation Environment
 - Studies of the Global Electrodynamics of Ionospheric Disturbances
- Kickoff Workshop planned
 - All new FST teams will meet and develop comprehensive work plans for team member activities.
 - Goal is to have teams produce a clear set of targets and plan of action at the outset of the FST.



FST Development and Selection Process (ROSES 2017)



- 1) Understanding The Onset of Major Solar Eruptions
- 2) Toward a Systems Approach to Energetic Particle Acceleration and Transport on the Sun and in the Heliosphere
- 3) Ion Circulation and Effects on the Magnetosphere and MI-Coupling
- 4) Understanding Physical Processes in the Magnetosphere & Ionosphere Thermosphere / Mesosphere System During Extreme Events



2017 ROSES – LWS TR Solicitation



- ROSES 2017 LWS Step-1 and Step-2 submissions delayed until after the ROSES 2016 selections.
 - Delay in part due to delay in announcement of NASA budget.
- Revised ROSES 2017 LWS Amendment to be announced shortly. Four chosen FST topics not altered. Changes:
 - Location of the “Relevance Discussion” and its evaluation
 - Clarification of the data usage for LWS FST studies.
- Due Dates:
 - Step-1 December 5, 2017
 - Step-2 February 5, 2018
- Should still be able to access any previous STEP-1 work done on the NSPIRES web site.



LWS Science looking forward



- **LWS Steering Committee reconstituted as the LWS Analysis Group (LPAG).**
 - Interdisciplinary forum for soliciting & coordinating community input in support of LWS objectives
 - Two LPAG Co-Chairs and an LPAG Executive Committee (EC) – organize meetings, collect & summarize community input, prepare reports to HPD Director
 - The full LPAG consists of all members of the community who participate in the open meetings.
 - NSF, NOAA ex officio members; adding DOD
 - DCL soliciting candidates for the LPAG
- **Core LWS Science activities continue:**
 - ROSES – 2017, ... LWS FST calls
 - ROSES – 201X LWS Strategic Capabilities (with NSF)
- **Partnerships:**
 - Joint NSF-NASA – Computational Aspects of Space Weather
 - Space weather focused aspects of Heliophysics Science Centers
- **Seeking to enable Space Weather-oriented opportunities:**
 - R2O & O2R tools, SBIR's, Space Weather-oriented tech development



Living With a Star Institutes



A typical award may include:

- Two 5-day meetings for up to 15 team members including: travel, catering, meeting room and audiovisual costs (Please note that UCAR cannot support travel for federal employees).
 - A ½ day team meeting at either AGU or AMS including meeting room rental and audiovisual.
 - Teleconferencing using Go-to-Meeting or Ready Talk
 - Publication costs
- 2015: Principles in relation to the effects of geomagnetically induced currents (GICs) during CME-driven geomagnetic disturbances (GMDs)
 - 2016: Now-casts of atmospheric drag for LEO spacecraft
 - 2017: Now-casts of radiation storms (proton events) at energy levels that could create a radiation hazard for aircrew and passengers
 - 2017/18: Two new institutes will be solicited

R2O Concept of Operations

NSF-NASA
"Computational Aspects of Space Weather"

- 3 -Year Grants (FY18-20)
- ~ \$2M/YR from LWS Science

NSF-NASA MOU

Tri-agency O2R pilot in development

Joint R2O modeling. Approved 18 May

NOAA-NASA MOU

Targeted Modeling Research and Development

Fundamental Research

LWS
Focus Science Teams

LWS
Strategic Capabilities

CCMC

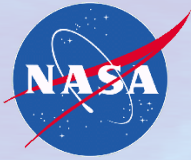
SWPC
(& 557th Weather Wing)
Operational Models

Access to best models, implements int'l metrics, leverages expertise & access to information, rapid implementation & testing, access portal to simulation results & observations

RFI closed 9/5
~20+ responses;
Planned start FY18

International Contributions/Partnerships

Most recently **Europe** (L5), **Japan** (NGSPM), **Korea** (SW model, balloon), **India** (L1, SW modeling)



Heliophysics Research 1/2



Heliophysics Community Concerns	Some Thoughts on Way Forward
Randomness in the selection process. Little consistency between panels	Increase number of reviewers per proposal on panels. How to increase community participation?
Elevation of small, often irrelevant points to major weaknesses. Major strengths/weaknesses often missed. Numerous scientific & technical errors in panel reports	Debriefs are encouraged! How to increase community participation? Cognitive biases involving peer review panels is now an active area of research we can tap.
Ignoring of entire paragraphs or even sections of a proposal	Consider longer panels, more lead time.
Erosion of community trust	Engage advisory committees in assessing review process. How to increase community participation?

Research finds similar concerns across disciplines, funding agencies, and countries around the world.

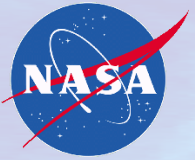


Heliophysics Research 2/2



Consequences of Low Success Rates	Some Thoughts on Way Forward
Higher proposal submissions to counteract lower success rates	Investing in DRIVE and anticipate higher success rates. Inputs from advisory groups.
Large workload increase to proposers, referees, panelists, program mgrs	NASA HPD is increasing R&A funding by ~\$60M in the DRIVE initiative. Increased success rates may help to lower workloads & solve some problems listed in this table.
Related increase in conflict of interest problems means panels populated by more non-subject matter experts	How to increase community participation? Conflicting research on effectiveness of limiting reviewers to focused experts only.
Oversight by program managers more challenging	Internally assessing our review processes and training.

Are we capturing the major concerns?



Some discussion points from CSSP



- What can be done to encourage more diversity among mission proposers?
- What can we do to get the community more engaged in the R&A review process?
- What suggestions does the HPAC have regarding the R&A review process?

- More rigor/discipline recommended in vetting of reviews by Program Officer/Panel Lead
- Feedback regarding competitiveness in decision letters
- Questions about the effectiveness of mail in reviews
- Advance notice recommended for planning in participation in proposals
- Encourage diversity in the PI grant program as well as in flight missions
- Inquiry whether a feedback process could be implemented in review process