Sounding Rocket Working Group

National Aeronautics and Space Administration

Meeting of January 14/15, 2015

Findings

1. Technology Roadmap Progress and Next Steps

Summary

The SRWG applauds the revitalized New Technology Roadmap for sounding rockets and was pleased to be briefed on the ongoing and planned efforts along these lines. Infusion and development of new technologies into the program are important for its future and represent an appropriate and necessary investment of resources. The SRWG is interested in ensuring that these investments provide maximum benefit to the program, and suggests implementing methods by which a broader base of stakeholders would be involved in guiding the Roadmap. As a step in this direction, the SRWG endorses obtaining broader input by extending the SRWG meeting by adding a session to which the larger community would be invited to discuss new technology ideas.

Background

There is a strong consensus, both in the Sounding Rocket Program Office (SRPO) and the Sounding Rocket Working Group (SRWG), that the sounding rocket program should pursue highly innovative technologies that would enable major scientific advances across multiple disciplines. While we also applaud the flexibility that has allowed the program to address mission-driven technology, we mutually agree that a longterm plan and priorities are necessary to provide optimum benefit to all stakeholders. As a strategic implement, we applaud the technology development roadmap managed by the SRPO, which helps to frame a deeper interaction between SRPO and SRWG over technology priorities for the sounding rocket program. The working group looks forward to establishing a dedicated time for discussion of tech development priorities in subsequent meetings. We suggest in conjunction with our next meeting that we hold a technology development discussion with open community participation.

2. Water Recovery -- Next Steps

Summary

The Sounding Rocket Working Group continues to emphasize that establishing routine water recovery of telescope payloads should be a priority in the technology development area. Three major science advantages afforded by expanded water recovery capabilities for astrophysical payloads are: 1) longer flight times, 2) coverage of a wider swath of the celestial sky with access to southern hemisphere and equatorial targets, and 3) payload and data recovery with high telemetry. The SRWG will establish a sub-committee to work directly with Wallops on this issue.

Background

The Sounding Rocket Working Group continues to emphasize that establishing routine water recovery of telescope payloads should be a priority in the technology development area. Three major science advantages afforded by expanded water recovery capabilities for astrophysical payloads are: 1) longer flight times, 2) coverage of a wider swath of the celestial sky with access to southern hemisphere and equatorial targets, and 3) payload and data recovery with high telemetry. These are discussed below:

1) The ultimate limitation on the science production from most astrophysics rockets is the number of photons collected per flight. For most astrophysics rockets, the number of photons collected is directly proportional to the time above 150 km. The larger vehicles that can be launched from water sites (BB XI and BB XII vs. BB IX that can be accommodated at the White Sands Missile Range (WSMR)) can deliver up to ~twice the total exposure time of a ground-recoverable payload. This impacts both the quality of any given measurement, and more importantly, the types of investigations that can be undertaken from a rocket platform. This manifests in two ways: a) enough photons can be collected in a single flight to address a given science goal and b) the opportunity to observe several celestial targets in a given flight. Comparative observations open a fundamentally new science capability from a rocket platform.

2) One major limitation with all launches from WFF, WSMR, and Poker Flat (the available standard astronomical launch sites) is that they are at > +30˚ N latitude. From that location, one cannot observe crucial and unique celestial objects in the southern sky. For example, many astrophysics investigations would benefit from observations of the Magellanic Clouds, and these galaxies cannot be viewed from WSMR. By gaining access to the southern sky, the astrophysical community would gain access to a whole new set of potential science targets, greatly expanding the scope of the science investigations that could be carried out from a rocket platform.

From this perspective, Kwajalein (+9˚) would be advantageous because it would open up more of the southern sky to astrophysics observations. Kauai would also extend southern hemisphere coverage relative to WSMR and would enable longer-duration flights if water recovery were available. While Kauai (+22˚) is not as far south as Kwajalein or Peru, if there were other programmatic reasons to launch from this site (such as cost), then this opportunity should be investigated. High-altitude launches with water recovery from WFF would allow one to get more observing time (item #1), but does not offer any significant gains in sky coverage over WSMR. The committee also discussed the possibility of exploring joint astrophysics and space sciences missions out of Punta Lobos, Peru, (–12.5˚), which would open up most of the southern sky and for which water recovery was successfully carried out of NASA geospace payloads in 1983. All of these launch sites become available for expensive telescope payloads once water recovery has a sufficiently high probability of success.

The SRWG will respond to NSROC's request for input regarding the optimal water recovery site parameters and will convene a subcommittee to study this issue in collaboration with NSROC and the broader sounding rocket community.

3) As suborbital payloads fly larger format and higher data rate sensors, on board storage (for data rates greater than 50 Mbps) is becoming critical. The water recovery system would enable the recovery of the primary science data from missions launched out of any of the coastal sites. In addition, this would allow the science payloads themselves to be recovered. With an estimated water recovery cost of $275K per flight, it will often be financially advantageous to invest this money in the water recovery as opposed to re-building a payload that has been lost to a water landing.

The SRWG's initial recommendation would be for a high-altitude launch site with water-recovery in the north (e.g., WFF), one near the equator (e.g., Kwajalein, Peru, or Kauai), and one in the south (below ~-30˚ S). This would provide a fundamentally new science capability from sounding rockets. The subcommittee on water recovery will develop a series of crucial advantages for different disciplines within the sounding rocket community and produce a justification for the development of a key new capability for the NASA sounding rocket program.

3. Range Opportunities for New Missions

Summary

The SRWG appreciates the campaign operations planning presented/initiated by the SRPO and inclusion of tentatively planned launch sites in the Wallops report. Several questions have been raised, however, regarding how the process of ongoing range selection should work and how the available ranges to which one might propose are communicated to the community. The SRWG eagerly seeks ways to best advise the SRPO on science-driven reasons to consider new ranges as well as means to communicate which ranges are available to the community for new proposals each year.

Background

The SRWG appreciates the campaign operations planning presented/initiated by the SRPO and inclusion of tentatively planned launch sites in the Wallops report. Several questions have been raised, however, regarding how the process of ongoing range selection should work and how the available ranges to which one might propose are communicated to the community. These questions are outlined below. In general, the SRWG seeks ways to best advise the SRPO and contribute to the optimum prioritization for range availability in a given year. While the ROSES AO pertaining to sounding rockets typically includes language that allows the possibility of a number of launch sites, the steps that guide these decisions should be clarified.

1. How does the community provide input in the decision process to determine which range sites might be available in a given year and how are the final decisions made? How do campaign ideas become real campaigns?

2. What is the most effective way for the communication of availability (including large scale campaigns from a non-standard location) of that information between HQ and the science community? It would be beneficial to have a clearer picture of which range(s) might be supported each year and ensuring that the ROSES AO has timely and accurate material each year.

NASA Sounding Rocket Working Group

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