Sounding Rocket Working Group

National Aeronautics and Space Administration

Meeting of July 10-11, 2018

Findings

1. Concerns on Limited NSROC Support Staff and Available Integration Space

Summary

The SRWG recognizes that the NSROC work force is considerably strained and needs, in particular, additional electrical technicians. Furthermore, space in F-10 appears to be at a premium, with very limited available room for experiment teams to integrate payloads. We urge the SRPO and NSROC to work towards improving this situation as soon as possible.

Background

The SRWG recognizes that the NSROC work force appears to be overworked with a number of personal working on numerous missions simultaneously. As such, the work force appears to be considerably strained and needs, in particular, additional electrical technicians. Furthermore, space in F-10 appears to be at a premium, with very limited available room for experiment teams to integrate payloads, which often must compete with each other for use of the ground stations and environmental testing stations. With the increase of new missions and ramp of several campaigns on the horizon, it would appear that both NSROC support staff and working space should be increased.

We urge the SRPO and NSROC to work towards improving this situation as soon as possible.

2. Remarks on the Implementation of Safety Procedures

Summary

General remarks are provided from the user perspective regarding the implementation of safety procedures that involve the experiment team. The lack of baseline information for the drafting of safety procedures along with the time-consuming review process places an undue burden on the experiment teams. This process needs significant improvement. Suggestions to improve this process are provided.

Background

The SRWG appreciates the need for experiment teams to follow safety procedures for hazardous (e.g., cryogenic, laser) operations while in the field. The current paradigm is that each experiment team drafts and submits these procedures well before launch operations, and then is

"in the loop" as the owners of those procedures throughout a lengthy multi-agency review process.

Past experience with the process reveals that there is often location or campaign-specific information that is not known to the experiment team at the onset -- e.g. payload orientation; required signage or protective gear for a specific site or operation; etc. -- which leads to immediate review issues with the draft procedures.

This lack of baseline information for the drafting of the procedures along with the time-consuming review process places an undue burden on the experiment team and suggests that a change in the process is needed. With this in mind, the SRWG proposes the following course of action:

First, SRPO and NSROC should collect a representative sample of recently used safety procedures for each of the commonly used permanent and transient launch sites - e.g. PFRR, WSMR, WFF, Andoya, Kwajalein.

Second, relevant personnel from the SRPO and NSROC (e.g. Range Safety, Mission Safety) should distill these representative procedures into a library of generic procedures that shall serve as the starting draft for the specific procedures for a given campaign, class of payload, and launch facility. This library shall be under the control of the SRPO or NSROC, and be made available to the Experiment Team through some standard document repository implementation.

Third, this library of procedures should be made available to the experiment team early in the effort (suggest at MIC or certainly by the RDM), and the experiment team shall work with their Mission Manager and other relevant personnel (e.g. Range and Mission Safety) to select and tailor the relevant generic procedures for the specific campaign.

Fourth, once tailored, a single omnibus review of the draft procedure by all relevant stakeholders should occur on or about the time of the DR (TBR), with the goal of a single review-revision cycle from draft to final versions for campaign use.

Fifth, any further reviews or updates to the tailored procedures should occur as part of the usual milestone reviews in the program -- e.g. IRR, MRR -- and will again be omnibus reviews managed by SRPO and NSROC, rather than the Experiment Team.

Sixth, any updates that arise in the field should be tracked via a standard "red line" tracking process, with the MM holding primary signature approval authority.

Seventh, any "Lessons Learned" regarding generic or specific issues with the procedures should be collected by the MM as part of any post-flight review and fed back to the owner of the generic procedures for integration into the draft procedure library.

3. Remarks on Recent Water Recovery Operations

Summary

The SRWG congratulates the SRPO and NSROC on the successful implementation of the Kwajalein campaign in early 2018 that involved the successful water recovery of two astronomical payloads. This achievement represents a long standing goal of the community, strongly advocated over the years by the SRWG. We recognize in particular that this success was highly dependent on the effective management provided by SRPO and NSROC and their effective interactions with the payload teams.

Background

The SRWG congratulates the SRPO and NSROC on the successful implementation of the Kwajalein campaign in early 2018. Two astronomical telescope payloads were successfully flown and recovered from the water, a first at the Kwajalein range for NASA. While Wallops has carried out successful water recovery of payload previous payloads, this marked the first time such operations were carried out with highly complex, telescope payloads. Accordingly, these payloads provided flight heritage for several new or improved water recovery systems including sealed skins, GPS trackers, float bags/LED strobes, and water impactor while using an NFORSe recovery system. The Great Bridge, the US Army recovery ship at Kwajalein, was able to quickly locate, recover, and return the payloads with rapid response. The ability to launch and recover telescope payloads in the water at remote ranges that preclude land recovery is now a viable and tested option.

This campaign also demonstrated the terrific flexibility of SRPO and NSROC and their willingness to respond to the needs of the scientific community. The turnaround for campaign readiness was on a short timeframe, yet the hard work of the team created a punctual and efficient campaign. Researchers are typically unaware of the large amount of work that goes into a remote campaign, including site preparation and closeout, which takes months prior to and after the missions. For instance, due to the environmental factors at Kwajalein, several temporary structures/GSE installations are erected in support of the missions. Finally, the resource management for such a campaign can be extremely challenging. We particularly recognize the degree by which effective SRPO and NSROC campaign management, such as that shown at Kwajalein and incorporating input from the Mission Managers, PIs, and team members, contributed to the success of these water-recovery campaigns.

The SRWG also supports the expansion of water recovery activities to include solar payloads for which there appears to be hesitation at Wallops due to a limited number of sun sensors available and the possibility of losing them on reentry. (See next finding.) The SRWG suggests that additional (i.e., new) solar sensors be procured in order to ease this concern and enable solar payloads to benefit from the water recovery system when scientifically justified.

4. Concern regarding the limited number of LISS and SPARCS devices

Summary

Planning for future solar sounding rocket launches, including campaigns and water recovery, are impacted by the very limited number of LISS and SPARCS devices available. We request a presentation at the next meeting on the current and future availability of SPARCS and LISS devices, as well as comments from Wallops on the feasibility of solar campaigns, solar water recovery, and solar pointing technology development.

Background

Members of the solar community, including members of the SRWG, have expressed interest in:

1. The launch of multiple solar payloads, as detailed in the "Solar Flare Campaign" presentation at the July 2018 SRWG meeting.
2. The possibility of water recovery of solar payloads.

The solar rockets are impacted by the very limited number of LISS and SPARCS devices available. The SRWG requests a presentation at the next meeting on SPARCS, LISS, feasibility of solar campaigns, solar water recovery, and solar pointing technology development.

Our understanding is that there are presently 4 LISS units ready to fly, 1 on the air bearing, and 2 more being pressed in to service, one of which is complete. There are also parts to build more, and although, sadly, the engineer who designed it passed away 18 years ago, 2 more could be built given adequate manpower. If Wallops decides to do this, it would seem worthwhile to incorporate electronics, already designed, that will pull the A/D digitization into the LISS, rather than having an external A/D. This will improve signal-to-noise, and thereby achieve better pointing. This improved pointing capability would be advantage to a number of solar payloads. In order to do so, a new LISS chassis needs to be designed and built to accommodate the original optics together with the new electronics (and same footprint as the old LISS).

In summary, there will soon be 6 LISS units ready to fly, and with resources, two improved units could be built. Improved pointing is certainly of value to the solar community, as instruments and investigations push to increasingly higher imaging resolution. In parallel, there are only 4 SPARCS systems available, which limits the number of launches which could occur in one campaign.

5. Optimizing Shipping Logistics

Summary

Shipping logistics and related paperwork associated with remote campaigns present an increasing source of stress and possible delays in these projects. The SRWG suggests that PI's and their teams be given as much advance notice as possible to help organize, document, and prepare experiment-related hardware that requires shipping to remote sites. We further propose

that the SRPO and NSROC consider procurement or development of customized shipping containers that would enabling efficient transport of such experiment-specific cargo along with the rest of the payload and rocket shipment.

Background

The SRWG applauds ongoing efforts by the Sounding Rocket Program Office in support and execution of both domestic and foreign sounding rocket campaigns. Shipping logistics and related paperwork associated with such campaigns present an increasing source of stress and possible delays in these projects. The SRWG suggests that PI's and their teams be given as much advance notice as possible to help organize, document, and prepare experiment-related hardware that requires shipping to remote sites. Along these lines, it is suggested that the Mission Manager provide an outline of classes of equipment and materials to be shipped to a launch site and the packing and documentation requirements that are likely to be levied on those classes. This would allow the PI's (and their co-I's) to prepare their equipment and materials accordingly, as well as the supporting docs for the shipment and customs activities, with some modest amount of updating required late in the game to accommodate any late-breaking details.

A separate aspect of shipping logistics is special handling required for some payloads, payload components, and/or ground support equipment (GSE), such as temperature/humidity control, nitrogen purge, cryogenics, vacuum, or powered GSE during transport. In the past, such transport has been the responsibility of the PI's and Co-I's, which has resulted in the fact that such shipments have not benefited from NASA expertize in customs or other shipping logistics, and has incurred schedule and cost risk accordingly. Anticipating an increasing number of Geospace, Astro, and Solar instruments and payloads that require special handling, the SRWG proposes that SRPO and NSROC consider procurement or development of customized shipping containers that would enable efficient transport of such cargo. along with the rest of the campaign shipment. The requirements of such a customized container would be developed in consultation with the SRWG and broader user community, but would remain NASA equipment for multiple campaign use. The container could be obtained either through the procurement of an existing product, such as a refrigerated container, or through modification of a bare shipping container, with the goal of having such a container to support the upcoming Astro campaign in Australia in 2020, as well as the Peru campaign and solar campaigns in later years.

6. Supporting NASA's International Relations Office for Remote Campaigns

Summary

The SRWG recognizes the significant work that the NASA International Relations Office carries out, in conjunction with the Program Offices at NASA HQ and Wallops, with respect to international agreements in planning and making possible remote sounding rocket campaigns. We seek ways to help with these discussions, insofar as possible, by serving as science liaisons during meetings with the Office of International Relations and providing scientific background and excitement to help explain the motivation and justification for the remote missions.

Background

The SRWG recognizes the significant work that the NASA International Relations Office carries out, in conjunction with the Program Offices at NASA HQ and Wallops, with respect to international agreements with Norway, Australia, and (eventually) Peru in planning and making possible remote sounding rocket campaigns. The science community realizes that carrying out the diplomatic aspects of the campaign is a complex process and we appreciate all of the work that must be done behind the scenes including sensitive programmatic discussions.

The SRWG seeks ways to help NASA HQ (and the SRPO) in their dealings with such international relations and diplomatic considerations, insofar as possible. Beyond helping to build relationships by explaining the science motivation for foreign campaigns, members of the science community (particularly the SRWG) are willing to serve as science liaisons during meetings with the Office of International Relations and provide appropriate scientific context to provide background and excitement to help explain the motivation and justification for the remote missions. In particular, we could help facilitate the involvement of local scientists and engineers, particularly young researchers who are customarily extremely enthusiastic with engaging with such NASA projects.

7. Welcome to Mr. Giovanni Rosanova

The SRWG extends a very warm and enthusiastic welcome to the new Chief of the Sounding Rocket Program Office, Mr. Giovanni Rosanova. Many of us first met Giovanni as an engineer with NSROC and then later as a key member of the Sounding Rocket Program Office working for the previous SRPO Chief, Mr. Phil Eberspeaker. We believe that Giovanni Rosanova is exceptionally well qualified to serve as the Chief of the Sounding Rocket program. He brings much knowledge of how sounding rockets work, management skills necessary to keep the program on course, and leadership skills to guide the program to new and fruitful directions. The SRWG looks forward to working with Giovanni to advance the unique scientific research tools that sounding rockets provide to the nation's space program.

NASA Sounding Rocket Working Group

Dr. Robert Pfaff, Jr. (Chair and Project Scientist)
NASA/Goddard Space Flight Center

Dr. Scott Porter (Deputy Project Scientist)
NASA/Goddard Space Flight Center

Committee Members:

Dr. Aroh Barjatya
Embry-Riddle Aeronautics University

(Continued)

Dr. John Bonnell
University of California, Berkeley

Dr. Adrian Daw
NASA/Goddard Space Flight Center

Dr. Lindsay Glesener
University of Minnesota

Dr. Sarah Jones
NASA/Goddard Space Flight Center

Dr. James LaBelle
Dartmouth College

Dr. Gerald Lehmacher
Clemson University

Dr. Stephan McCandliss
Johns Hopkins University

Dr. Randall McEntaffer
The Pennsylvania State University

Dr. Amy Winebarger
NASA/Marshall Space Flight Center