Sounding Rocket Working Group

National Aeronautics and Space Administration

Meeting of February 5, 2019

Findings

1. Adjusting to Increased Flight Rates with High Complexity Level Payloads

Summary

The SRWG recognizes that the program has had an increase in flight rates in the last two years with an above average number of high mission complexity level payloads approved. Further, it appears as if this situation will continue as the "new normal", based on strong recommendations from high level advisory panels to NASA HQ to continue to not only support but also expand the Sounding Rocket Program. In view of this solid endorsement of the program, the SRWG seeks insight regarding how the Sounding Rocket Program Office at Wallops and NSROC intend to accommodate the increased flight rate, particularly with respect to the NSROC contract and staffing and space concerns identified in previous findings.

Background

The most recent Heliophysics Decadal Survey (2013) called for a substantial increase in sounding rocket flight rates for Solar and Geophysics missions via its DRIVE initiative (DRIVE = Diversify, Realize, Integrate, Venture, Educate). Similarly, and in parallel, the Astrophysics Decadal Survey (2010) specifically called for increased funding for suborbital programs (rockets and balloons) in support of science, technology development, and student training. This good news has been reflected with increased overall flight rates in the program in the last two years with high mission complexity levels.

The SRWG is thrilled with the solid endorsement of the program from the community and the positive response from NASA HQ. As this appears to be the "new normal", the SRWG seeks insight regarding how the Sounding Rocket Program Office (SRPO) plans to adjust to this new model in terms of personnel and support personnel. In this regard, this finding is a continuation of Finding #1 from the last meeting (July, 2018) in which concerns were raised about the need to increase NSROC support staff and working space in F-10. We are particularly eager to learn if the new model will be reflected in the next NSROC contract.

As representatives of the sounding rocket community, the SRWG is eager to engage with the program office at Wallops in any way possible to help ensure that the new mission model is welcomed and accommodated in a streamlined fashion.

2. Miniaturization of Sub-systems and Sub-payload development

Summary

The SRWG identified the miniaturization of sub-systems as a key avenue to create more capable, small payloads particularly useful for mesosphere payloads as well as for use on ejectable sub-payloads. Such lightweight sub-systems could also benefit missions that seek higher apogees, such as those used in the astrophysics and solar communities, as well as geospace payloads that seek the highest altitudes possible to explore the aurora, cusp, and other regions of geospace and/or those that eject small sub-payloads. The SRWG is poised to work with the SRPO technology engineers to identify those sub-systems for which light-weighting and miniaturization would appear to be most advantageous to the scientific needs of the program.

Background

The SRWG was pleased to learn at the last meeting that miniaturization efforts in the form of integrated 3-dimensional print structures have been undertaken for the Sub-Tec launch. We continue to encourage this line of development as it has important for enabling development of light-weighted delivery and support systems, for example for incorporation into new mesospheric exploration payloads long-advocated by space physics experimenters.

Such miniaturization work also benefits the development of ejectable sub-payloads, which the SRWG also vigorously supports. Communication of the sub-payloads with the main payload is an innovative concept for sounding rockets and should be further pursued. The SRWG is aware of many other challenges with the development of highly capable sub-payloads, such as integration of GPS, rocket powered ejectables, attitude stabilization, and applauds NASA and NSROC for tackling them.

In parallel with the miniaturization of sub-systems, we note that the community is also miniaturizing its scientific instruments, particularly those to be flown on multiple sub-payloads to distinguish temporal and spatial distribution of atmospheric and ionospheric parameters as well as those which will gather measurements on small mesospheric rockets. The miniaturization of scientific instruments driven by CubeSat programs creates great synergies for future sounding rocket experiments.

Finally, we note that miniaturization innovation is also important for enabling lighter, more compactified, and integrated systems for use on high altitude delivery systems, such as the Terrier-Oriole-Oriole (TOO) vehicle system, that have long been desired by astrophysical and solar experimenters. Reducing the number of individual skin sections required by the telemetry, guidance/navigation, and recovery systems into a monolithic package could provide the mass savings required to achieve the previously outlined goal of providing more than 600 seconds of exo-atmospheric (hang) time, which apparently the TOO system is on the verge of delivering. The TOO will provide a doubling of hang time in comparison to the BBIX system, providing increased sensitivity to fainter astronomical and solar phenomena. Such innovation would also benefit geospace payloads that seek to obtain the highest apogees possible to explore, for example, the aurora and cusp, as well as those geospace missions that include multiple small sub-payloads.

3. Concerns on the process and timeline for obtaining Technical Assistance Agreements

Summary

The SRWG is concerned about the lengthy time and lack of transparency in the process for obtaining TAAs for foreign nationals on experiment teams. These issues have caused disruption to experiments recently and, in some cases, have threatened launch schedules. To help remedy the situation, the SRWG recommends: (1) that discussion of TAAs and the timeline begin early, at the MIC; (2) that Mission Managers obtain and relay updates on TAA submission/approval status monthly in the year leading up to launch; and (3) that TAA text is shown to PIs prior to submission to the State Department in order to catch errors.

Background

Experiment teams that include foreign nationals must secure Technical Assistance Agreements (TAAs) before their foreign team members can access NSROC documents, interact with all payload systems, and participate in critical meetings such as the Design Review. For experiments launching from WSMR, TAAs are also required to be in place before foreign nationals can enter the launch facility for integration. Standard practice is for NSROC to secure the TAAs for the experiment teams.

In recent years, there have been multiple cases of long delays in TAA acquisition that have inconvenienced experiments and, in some cases, threatened launch schedules. Of course, the time for US State Department approval can't be controlled by the SRPO or NSROC, but the delays appear to have been incurred *prior to* the submission of documents to the state department. In one case (Glesener 36.325; FOXSI-3), paperwork was apparently not submitted to the State Department until just a couple months before the team was scheduled to arrive at WSMR, despite the experiment team having provided all documentation to NSROC over a year prior. For that experiment, the TAA was **not** obtained prior to the team's arrival at WSMR, and an alternate "control plan" had to be established and approved by SRPO, NSROC, and the Navy in order to allow team members to access the base for pre-integration activities. Confirmation that the team would be allowed on base was not obtained until 12 days prior to the planned arrival, meaning that all experiment team travel had to be arranged at the last minute, incurring thousands of dollars in extra cost and a great deal of schedule uncertainty. This control plan allowed the experiment team to carry out pre-integration activities and calibrations at WSMR, but could not be used for actual integration with NSROC systems. TAA approval was not granted until 3 business days before integration began, and final signatures were not obtained until after integration had begun. In addition to the long delays, the TAA was not shown to the PI prior to submission to the State Department, and turned out to include errors (e.g., incorrect names, institutions, and positions) that could have easily been caught. In this case the lack of TAA timeliness and correctness presented a very real threat to launch readiness, as well as a great deal of unnecessary uncertainty and stress in planning.

The process of obtaining TAAs is not transparent, and there is not much PIs can do to speed it up or get the status other than repeatedly requesting updates from their mission managers.

Although we appreciate the efforts of NSROC to obtain TAAs, and we especially applaud the extraordinary efforts of SRPO, NSROC, and the Navy to find an alternate way for the FOXSI-3 team to access WSMR without a TAA, it is clear that there are problems with the way TAAs are processed and requested. The SRWG recommends that TAAs be discussed between MMs and PIs starting at the MIC, including a target timeline for the process, and that MMs provide updates on TAA status (e.g., waiting for experiment documents, waiting for internal approvals, submitted in draft form, submitted in full) on a monthly basis for at least a year prior to the target launch. In addition, we recommend that the TAA text is shown to the PI prior to submission to the State Department so that errors can be caught.

NASA Sounding Rocket Working Group

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