

Findings

Sounding Rocket Working Group National Aeronautics and Space Administration

Meeting of January 19, 2005

I. Distribution of launches using standard (Brant-class) and surplus motors

Summary:

The SRWG remains extremely concerned about the proposed mix of 5 Brant-class and 15 surplus rocket launches per year as a means to save substantial program costs. As the price of a given payload is essentially the same whether launched on a surplus or a Brant-class vehicle, the only difference is the cost of the motor which typically amounts to less than 10% of the total mission costs. Hence, the SRWG does not understand how such a formula would save substantial dollars as well as saving jobs at NSROC and requests clarification from the SRPO concerning the payload class assumptions in the proposed mix and their relation to manpower requirements at NSROC. Our limited understanding is that only a significant increase of simpler payloads, such as chemical release payloads that do not require either telemetry or attitude control as well as high school student rockets launched to apogees of 50-60 km on single-stage Orion motors, might produce any significant reduction in program costs. The SRWG reiterates its strong belief that the proposed mix of vehicles would be extremely detrimental to the science served by the program, particularly to the astronomy, solar, planetary, and auroral acceleration physics disciplines that can only use the standard Brant-class platforms to meet their mission objectives.

Background:

The Sounding Rocket Working Group (SRWG) continues to be alarmed at the sudden drop in funding allocated to the program compared to the resources it expected to receive at the start of last year. To accommodate the reduced budget, the Sounding Rocket Program Office (SRPO) at Wallops has proposed a new yearly average distribution of missions that would utilize a mix of 5 standard or Brant-class vehicles and 15 surplus vehicles. Although we addressed this proposal at the previous meeting (see SRWG Finding #1 from its June, 2004 meeting), the SRWG has returned to this discussion as we seek clarification of the proposed mix, believe that the situation includes considerable misunderstanding and confusion, and remain convinced that the proposed formula would result in a significant deprecation of the scientific merit of the program.

The SRPO has argued that they would like to maintain an average launch rate of 20 rockets/year in order to satisfy the current NSROC contract and to maintain the critical contractor work force at Wallops. We applaud these goals and look forward to the restoration of the average launch rate of 30 science rockets/year, particularly as there is no dearth of excellent science proposals coming from the science community. As discussed at length in the June, 2004 meeting, during the last 10 years, approximately 70% of the science missions utilized Brant-class vehicles. Indeed, these are the "standard" launches that Wallops provides. The decrease to 5 standard (i.e., Brant-class) launches, or 25%, would severely limit the number of science missions, particularly from

those disciplines such as astronomy, planetary, solar, and auroral acceleration physics that can only utilize Brant-class vehicles to meet their mission objectives.

At our most recent meeting, the SRWG learned that the cost of most nominal science payloads developed and launched on surplus vehicles would be about the same compared to ones launched on a Brant vehicle system, with the only difference being the relative cost of the motor which is usually about \$200K. This is typically less than 10% of the total mission cost. The only significant difference is when a chemical release payload is launched on a surplus motor, as such payloads utilize no telemetry, fine pointing, gyro, etc. In FY2003 and FY2004, there were a total of 12 such chemical release payloads, all built by one experimenter, although these rockets supported more complex missions that were led by several different P.I.'s, all in ionospheric physics. Our understanding is that the SRPO-proposed mix of 5 Brant/15 surplus launches/year anticipates that a significant fraction of future missions each year would include such chemical release payloads. Additionally, payloads built and launched as part of the high school education program would also be included, which typically utilize single stage Orion surplus vehicles traveling to apogees of about 50-60 km.

We ask that the SRPO clarify the payload classes used in their "mix equation" and cost estimate. Indeed, the proposed mix of vehicles may rely to a larger extent on an anticipated ratio of simple/complex payloads, rather than primarily on a mix of Brant/surplus vehicles. Further, we note that there has been a large number of test vehicles flown in the past few years, as NSROC has been developing new sub-systems in support of science missions funded by NASA HQ. What is the anticipated rate of such test missions that the SRPO has assumed in their future planning? We would also like to better understand how the manpower and costs factor into the various payload and launch vehicle mix, particularly since the maintenance of the work force at Wallops has been portrayed to us as the most important factor in proposing the new mix.

Ultimately, a combination of complex and simple payloads, as well as a mix of Brant-class and surplus vehicles, must be achieved to enable a minimum rate of excellent science missions that fits within the envelope of available NASA HQ resources and Wallops capabilities. The SRWG believes that a larger number of standard missions (i.e., Brant-class launches) are necessary to keep the science portion of the program viable, even if the overall number of missions launched per year might temporarily fall below 20, during this, hopefully brief, interlude of extreme fiscal restraint.

II. Lack of Brant-class motors in FY07 and beyond

Summary:

There will be no Brant-class motors left after FY06 if the program flies all of the missions currently approved. The SRWG urges the SRPO and NASA HQ to find a way to procure Brant-class motors in the current fiscal year to maintain this standard launch capability in FY07. As the severe fiscal cuts to the program came without warning and without time for appropriate planning, surely some creative solution might be put forward to rescue this absolutely vital aspect of the nation's sounding rocket program.

Background:

Regardless of the number of Brant-class systems to be launched each year, the number of

Brant motors currently available to the program is perilously low. Indeed, the SRWG has been informed by the SRPO that there will be no Brant motors left after FY06 if they fly all of the missions currently approved.

The SRWG feels it is imperative that Wallops purchase more Brant motors at this time, as the lead time for such a procurement is about one year. This is essential in order to maintain the current launch capabilities in FY07 and beyond, even if there will be a reduced number of Brant launches in those years. Further, we have been informed that there are considerable savings by ordering the motors in bulk, and that these savings begin to become appreciable with a minimum order of 5. We urge the SRPO and NASA HQ to find the resources to keep the inventory alive such that the program might stay "ahead of the curve". The new fiscal reality has had a strong, negative impact on the program that came without warning and with no time for appropriate planning. This loss of anticipated funding is particularly difficult for the program to absorb since an augmentation for FY06 had been promised and would have gone expressly to restore the commercial motor inventory. Although we know that the SRPO and NASA HQ are aware of this situation, the SRWG urges that a creative solution be found to make such a purchase now in order to maintain the minimum program capabilities in FY07 and beyond.

III. Future mission cost estimates and availability of past mission cost data

Summary:

The SRWG supports the plans both for NASA HQ to carry out more detailed estimates of total mission costs prior to selection and for cost data of past missions to be shared with the PI's so they might understand the specific impact of their mission to the program. Though a departure from over 45 years of "business as usual" in which the science PI's and other researchers have benefited from NASA's sounding rocket capabilities without any detailed knowledge of the payload or operations costs, such accountability should help reduce costs and help facilitate cost/benefit trades to be made by the program management.

Background:

The SRWG supports the plan for NASA HQ to obtain robust estimates of the total mission cost while evaluating sounding rocket science proposals. Certainly in this time of constrained budgets, it is important for program managers to understand how much a given project will likely cost the agency.

We are also pleased with the efforts of the SRPO to provide investigators with a detailed accounting of the costs of past missions, including the costs of launch vehicles, sub-systems such as gyros and attitude control systems, and operations. Such data provides information to both investigators and program management that will help enable cost/benefit trades to be made when planning future missions. Ultimately, we believe that such accountability will help hold down costs while continuing to enable state-of-the-art scientific advances and technology developments to be carried out.

Concerning the plans to estimate the total mission cost during the AO process, we are hopeful that such estimates can be implemented with a minimal drain on valuable SRPO and NASA HQ resources. To this end, we would like to understand the impact on proposers, the SRPO, and NASA HQ. If the results of these calculations are to contribute to the proposal

evaluation process, at what point and how often will proposers be able to get feedback and cost estimates from the SRPO?

Finally, while the SRWG supports efforts to optimize the use of the scarce resources of the sounding rocket program, we hope that the traditional strengths of the program are not compromised. These include the program's flexibility, its small efficient mission teams, and its strong collegial working relationships between the experimenters, NSROC, and the SRPO. An overzealous application of detailed fiscal accounting might hinder the program by undermining these strengths.

IV. Recent NASA HQ review of SR operations and costs

Summary:

The SRWG acknowledges the observations of the NASA HQ review panel of the SR programmatic elements and is pleased with its conclusions that the program is run very efficiently, even heroically, at Wallops and that there are no obvious ways that the program might be run differently in order to save significant funds. The SRWG further comments on the wording of the one of the panel's observations and agrees that an increase in budget or a reduction in requirements are needed to maintain the current level of standard rocket services, adding that the latter is untenable from a scientific standpoint.

Background:

The SRWG acknowledges the observations of the Sounding Rocket Independent Review Team Report of the Programmatic Elements and Cost Structures of the Wallops Flight Facility Sounding Rocket Program Office as presented to us at the January 19, 2005 meeting. We are pleased that the review panel found very little room for improvement with the way the program is managed at Wallops as well as the fact that there are no obvious ways that the program could be run differently that would save significant resources. We particularly agree with the statement the review panel used to describe the Sounding Rocket Program: "Heroic efforts to meet the customer, public, or other stakeholder needs are common." The Sounding Rocket Program Office should be recognized and applauded for this level of sustained effort over the years.

In order to be clear, however, we take exception with the Review Team's observation that "...there are no significant changes to be made that will result in an increase of high performance missions without a commensurate increase in budget to the program or a reduction of the requirements it needs to address."

Although this might just be semantics, we believe it is important to clarify that the missions under question are nominal performance, not high performance, and result from standard services provided by Wallops for decades. Further, the increase in the budget is required to simply maintain the present level of these standard missions. We have watched the sounding rocket budget erode significantly over the years with "promised" re-adjustments always around the corner. At this point we are simply trying to maintain the current level of mission support, without an increase in either numbers or performance.

Our interpretation of the last part of the sentence concerning a reduction of the requirements the program needs to address is that without an increase in budget, there must be a decrease in the requirements. The statement should acknowledge, however, that if the requirements are reduced, the sounding rocket program is in danger of falling below a scientifically valid level. The SRWG emphasized this point in its findings from its previous meeting. The situation is underscored by the NASA HQ review panel conclusion.

V. User access to NSROC data base

Summary:

The SRWG recommends that a more formal method for the archiving and distribution of mission related documents and post-flight data via the internet be established by NSROC.

Background:

The SRWG recommends that NASA and NSROC establish a more formal method for archiving and electronically distributing mission related documents and data via the internet. In general, the suborbital program PI's and Co-I's are unacquainted with the existing FTP site which is used to distribute limited program documentation. In fact, we learn that some PI's are not even aware that detailed post flight reports are issued by NSROC, let alone how to access them. A more formal system should be developed to distribute electronic copies of program materials including design review documents and presentations, the science requirements data packages, and program schedules. The system should provide the science community access to relevant post-flight reports such as event times, trajectory, attitude and possibly raw flight data. This distribution system could be made consistent with the ISO 9000 document control and management requirements that NSROC is trying to implement. The SRWG also suggests that methods be explored to provide for security and access control of this information, as appropriate.

VI. Low cost mesospheric rocket development

Summary:

In response to a request by the SRPO, the SRWG reiterates its strong interest in the development of a low cost, small mesospheric payload. However, the SRWG needs to understand the projected costs of developing such a system before providing a blanket endorsement. Further, we would like to be involved in a discussion of the performance capabilities for such a vehicle and its standard sub-systems and suggest that the SRWG establish a sub-committee to work with the SRPO on the system requirements definition for such a new platform for scientific research.

Background:

The SRWG was asked by the SRPO at its recent meeting to provide feedback concerning the extent for which the community might be interested in the development of MRLS/Dart mesospheric rocket capabilities.

The SRWG remains very much interested in the development of a small rocket for mesospheric research, and indeed this initiative remains part of the technology roadmap developed by the SRPO with our input. Having said this, given the current severely constrained fiscal environment, we are particularly interested in discussing what new systems Wallops is proposing to develop and its projected costs, prior to providing our full endorsement. Further, since new development work is being considered, it is important that the system requirements be discussed and agreed upon by all interested parties before any new systems work is carried out.

For example, the 2-inch diameter Dart payload had been promoted at Wallops years ago, presumably because of its availability and low cost. Considerable work had been funded by NASA, both at universities and at Wallops, to develop the necessary sub-systems to make this small rocket available to the community as a standard launch platform. The rocket's high speed and its small diameter drove some very challenging engineering requirements that were never satisfactorily met to enable this rocket to be deemed "operational". We thus wonder whether Wallops should continue to pursue this vehicle, or whether developing a low-cost, small mesospheric rocket but with a somewhat larger diameter (e.g., 10-15 cm) payload might be a more prudent path to explore.

The SRWG is very willing to form a sub-committee (composed of members and interested community members) to work with Wallops on the requirements definition for a new mesospheric launch system. We look forward to working with the SRPO and NSROC in the development of this exciting new research vehicle.

VII. Kwajalein Campaign and possibilities for a new "standard" range

Summary:

The SRWG acknowledges the first-class achievement of the combined SRPO and NSROC efforts in the completion of its successful EQUIS-II sounding rocket campaign at Kwajalein Atoll in summer, 2004, that involved many logistical and operational challenges. The SRPO is currently accessing the feasibility of establishing this range as one where NASA sounding rocket operations might be carried out routinely, as is currently the case at ranges at White Sands and Poker Flat, Alaska. The SRWG supports this study and keenly awaits the cost estimates to learn if such launch activities might indeed be feasible on a routine basis.

Background:

The SRWG applauds the work of the SRPO and NSROC in carrying out the very successful Equatorial Ionospheric Studies II (EQUIS-II) sounding rocket campaign in Kwajalein during the summer, 2004. The campaign logistics and operations posed many challenges, and we appreciate the tremendous effort by Wallops personnel, led by Mr. John Hickman, to make this campaign a success.

Kwajalein's unique location near the earth's magnetic equator opens the door to a large number of important scientific research problems, in a similar manner in which the Poker Flat range in Alaska enables important high latitude science to be addressed. We understand that the SRPO is exploring the possibility of making the Kwajalein range accessible to routine operations, in much the same way that the White Sands and Poker Flat ranges are accessible now to NASA-funded science missions. The SRWG supports

this activity and, together with the larger science community, we keenly await the cost estimates to learn if such proposed operations will indeed be affordable on a routine basis at Kwajalein.

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