

Improvements to the AO Process

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Please don't shoot the messenger!

Introduction

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Scientists and Engineers at Space Science Laboratory (SSL) of the University of California heartily concur that the recent AO has been the most difficult. As a result SSL scientists and lead engineers who participated in the 2007 SMEX competition (Prof. Stuart Bale, Prof. S. E. Boggs, Dr. G. T. Delory, Prof. R. P. Lin, D. W. Curtis, P. R. Harvey and myself) compiled a letter to advocate changes in the AO process.

SSL is an important training center for future space scientists. Several University Faculty members currently active in space sciences at American Universities were trained at SSL. There are dozens of under- and post-graduate students at SSL training in space science and engineering activities.

SSL has an extensive track record of management of spaceflight instruments and full spacecrafts.

Recent UCB, Space Science Laboratory managed NASA explorer programs are listed in Table.

Mission	Type of Mission	Launch date	Costs* RY \$M/inflated \$2008 cost
FAST (SMEX)	LEO auroral obs.	Aug. 21, 1996	40/51.7
RHESSI (SMEX)	LEO solar obs	Feb 5, 2002	49/56.3
THEMIS (5 S/C MIDEX)	High alt. orbit	Feb 17, 2007	90/95.5

* Costs are Spacecraft + Phases ABCD (No LV)

In addition SSL provided experiments for recent NASA missions:
STEREO, CLUSTER, IMAGE, POLAR etc.

What is wrong with the current process?

1. **Unfair competition.** The competition is not truly open to PI-s from “poorer” institution. Under current constraints the writing of a compliant proposal needs an investment of \$200,000 - \$500,000 (32 proposals ~ \$10 M impact on community). Only individuals in “rich” institutions can participate in the AO process. UCB feels threatened. If the “inflation” continues we might not be able to participate in future competitions.
2. **Indirect increases of burden on NASA science budgets.** Although the proposal costs are borne by proposing institutions (and not by NASA), the high cost of proposals ultimately reflects back as increased (negotiated) overheads or B&P set asides for all future contract work. Thus simplifying the AO process would enhance NASA’s ability to buy more missions per dollar.
3. **Costly review process.** To review the current number of complex proposals must requires a major undertaking and the cost to NASA must be also large.

Major Recommendation – Stepped proposal process.

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Summary

Step 1 Science Selection

Step 2 TMC Selection

Phase A study

Confirmation

Major Recommendation – Stepped proposal process.

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Step 1 AO: NASA would solicit Science proposals (white papers):

- Science proposals describe the science which will fit under mission cost cap. These would include minimal resource and cost info. (2 page fact sheet). E.g. Mass, Volume, Power and a Cost Table to a level of detail of one number per instrument or spacecraft bus (~ 30% accuracy). Justification of the fact sheet data would be optional in Step 1.
- NASA would select science that has sufficient merit and fits NASA's program priorities.
- Primary purpose of step 1 would be to deselect scientifically less worthy ideas from further consideration and eliminate science projects that do not fit NASA's current programmatic goals or those that are obviously "off the wall" in terms of TMC.

Major Recommendation – Stepped proposal process.

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- To aid in the TMC the sanity checks the TMC panel could ask PI-s to clarify certain data items via e-mail.

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Step 2.: Only those who pass step 1 are invited back.

- Produce “full up” detailed proposals similar to the current SMEX 2007.
- NASA would select the proposal based on the PI-s ability to deliver the step 1 promised science while having a low TMC risk.
- Minimal Science review conducted to asses if any science changes had occurred from step 1.
- Major review focus on engineering feasibility, implementation, team management and project costs.
- After step 2 the selected team(s) would perform a full but brief phase A study.

Major Recommendation – Stepped proposal process.

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Why is it needed now?

Although the two step proposal has been around in various forms (1995 MIDEX and 1999 SMEX TMC-lite) we think that things have changed sufficiently and it is time to bring it back.

What has changed?

- NASA has become much more risk averse. Less money around. Sad lessons from mission cancellations. Closer scrutiny.
- AO-s are more demanding in every aspect and proposals are more difficult to write. (The AO has more pages of requirement questions than the allowed page limits for answers.)
- NASA introduced the concept of qualifying PI-s. In the new system each PI should have prior space hardware experience and are less likely to write unrealistic “off the wall” proposals.

Major Recommendation – Stepped proposal process.

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There are merits for a paid phase after step 1 to prepare step 2 proposals with a few hundred k per team to enhance success of the missions.

It is highly recommended that step 2 selection should be for prime and backup mission(s) and no further down select competitions would be contemplated.

Further competitions after the almost-final selection can cause major delays and program managers cannot pick the the right team personnel, compromising the quality of the project and causing waste of resources later.

Major Recommendation – Two step proposal process. Advantages

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1. People of relatively limited resources could put forward a good step 1 proposal.
2. A PI selected for step 1 would have a great leverage in drawing on institutional and other community resources because he/she would be perceived as having a real “shot” at getting a project to be eventually selected for flight.
3. The number of teams involved in writing detailed proposals would be reduced to only the handful teams selected in step 1. Thus saving a great deal of effort for many persons and for the entire community chasing too few opportunities.
4. The spacecraft vendor selections could take place in step 2 in a more orderly manner and if needed some teams could be assisted by NASA.

Major Recommendation – Two step proposal process. Comparison to “TMC lite”

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Today’s proposals are greatly more demanding than the 1999 proposals and today it is significantly more work to write a full proposal than a Step 1 type proposal. We suggest here that the step 1 submitted summary data should be subjected to some TMC evaluation.

There is always pressure on proposers to squeeze in as much science as possible into the proposals. However the pre-qualification of PI-s will lessen the likelihood of their putting in science they could not support in step 2. Science reviews should emphasize “adequate science” and should substantially over select (4-8 times as many that will eventually fly).

Major Recommendation – Stepped proposal process.

Differences from “TMC lite”

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During the Step 1 selection process, experienced NASA officials and TMC panels should evaluate the “Fact Sheet” info and skepticism and major questions on clarification should be sent to the PI by e-mail. Barring satisfactory reply these views should have some weight in the Step 1 selection.

The requirement of producing a resource summary “Fact Sheet” as part of the step 1 proposal would be a significant exercise for the PI team in tabulating the resource requirements and costs which would uncover “tall poles”.

After step 2 selection there should be a full and paid phase A. At the conclusion of such a Phase A, the project(s) would have low risk.

Additional suggested improvement to future AO-s:

1. The AO process should join the electronic age.
 - Do the endorsements of Co-Is and collaborators electronically through NSPIRES and remove the printed endorsement letter requirement.
 - Make the proposal hard copy requirement to be a small (less than 10) number of printed proposals and use them only as samples and distribute the rest electronically.
2. Straighten out the reference library or create a special one for each specific AO. Sending proposers to the Explorer library where there are many conflicting documents is often not helpful.
3. Limit the page number to all sections (especially for step 1 proposals). Composing large volumes of auxiliary material favors high overhead institutions who have lots of resources to invest into proposals.

We hope that you will consider these suggestions helpful.