

# **JWST Cycle 1 Grants Task Force**

## **Report**

### **Context**

NASA provides funding support for research by US scientists through grants programs, including programs associated with individual Great Observatories. The budget submission deadline for JWST Cycle 1 programs was May 20, 2021. Budgets were submitted for 268 programs requesting total funding of \$99,111,827, approximately three times the notional funding level being considered by NASA. Cuts at this level are beyond the scope of a Financial Review Committee (FRC) and require a different approach.

These circumstances were discussed in a presentation to the JWST User Committee (JSTUC) at their meeting on June 14th. The JSTUC raised serious concerns regarding the impact on the ability of the US community to realize JWST's scientific potential, particularly given the limited mission lifetime. They noted that previous estimates, notably by the JWST Advisory Committee (JSTAC) in 2015, had recommended funding of ~\$60 million level for Cycle 1. The JSTUC urged STScI and NASA to develop a better understanding of the funding required to support Cycle 1 research and to work together to identify additional funding if that were justified. As a first step, they recommended reviewing a subset of the submissions to confirm their consistency with the TAC-approved proposals and provide an independent verification of the funding required to achieve the proposed science goals.

### **Task force recruitment and charge**

Following the JSTUC's recommendation, STScI constituted a Task Force to review a subset of the budget proposals. The Task Force includes ten scientists recruited to serve on the Cycle 1 FRC: Tom Brown (STScI), Rupali Chandar (U. Toledo), Mike Crenshaw (Georgia State University), Daniel Dale (U. Wyoming), Lori Feaga (U. Maryland), Emily Levesque (U. Washington), Lucas Macri (Texas A&M), Alex Pope (U. Mass), Dan Watson (U. Rochester), and Kate Whitaker (U. Mass). In addition, three members of the JSTUC agreed to join the task force: Saida Caballero-Nieves (Florida Institute of Technology), Mercedes Lopez-Morales (SAO) and Els Peeters (University of Western Ontario). Several Task Force members have extensive experience from serving on the Hubble Space Telescope FRC. The STScI Associate Director for Science (Neill Reid) served as meeting coordinator.

The Task Force charge is included as Appendix 1. The task force members met virtually with the coordinator and members of the STScI Grants Administration (Paula Sessa, Bob Gicking and Dana Hairsine-Rohr) on June 29<sup>th</sup> to discuss the charge and clarify the assessment process.

### **The assessment process**

STScI selected 65 budget proposals for review; the submissions were ordered by the total request, and every fourth proposal was selected for review. Those proposals are representative of the overall submission: for example, they include 9 (of 42) proposals with PIs having no past HST experience; they include PIs from a broad range of US institutions, including liberal arts, HSI and AANAPISI universities; they include AR, GO and pure parallel programs using all of the major instrument modes. Grants Administration entered the appropriate information for those proposals into the STGMS

database, identified conflicts with task force members and distributed the materials. Each proposal had a primary and secondary reviewer, so each member was responsible for 10 reviews.

The assessment meeting was held virtually from July 20<sup>th</sup> to July 23<sup>rd</sup>. Grants Administration and other STScI staff provided logistical support for the meeting. Additional attendees included Massimo Stiavelli, the JWST Mission Office Head, Katey Alatalo representing the Science Mission Office, Don Hough, Associate Director for Administration, Nancy Levenson, the STScI Deputy Director, and Ken Sembach, the STScI Director. Susan Neff (GSFC) attended as an observer on behalf of the JWST Project Science Team.

The first two days of the meeting were devoted to individual reviews of the 65 selected programs. The Task Force members followed standard FRC procedures to identify areas where the budget was either over-costed (i.e. requesting more resources than is judged reasonable to achieve the science goals) or out of scope (i.e. proposing activities beyond the scope of the science goals outlined in the original proposal). During a standard FRC, Grant Administration staff would apply specific reductions to the budget in STGMS; for the Task Force, the coordinator noted the items listed in STGMS and determined the corresponding percentage cut in the overall budget.

Five programs reviewed request more than \$1 million. Those proposals had correspondingly complex budget proposals. Summary reviews of those programs were included during the first two days, but the Task Force determined that these budgets required a more comprehensive investigation, and they returned to them for more detailed, comparative discussions on July 22<sup>nd</sup>.

July 23<sup>rd</sup> was devoted to a broader discussion of factors that might be taken into account in developing budgets for Cycle 1 programs, and of lessons learned that could be applied to improving the budget submission process for the community in JWST Cycle 2. STScI provided a set of questions to the Task Force as a starting point for those discussions (Appendix 2).

**Statistics**

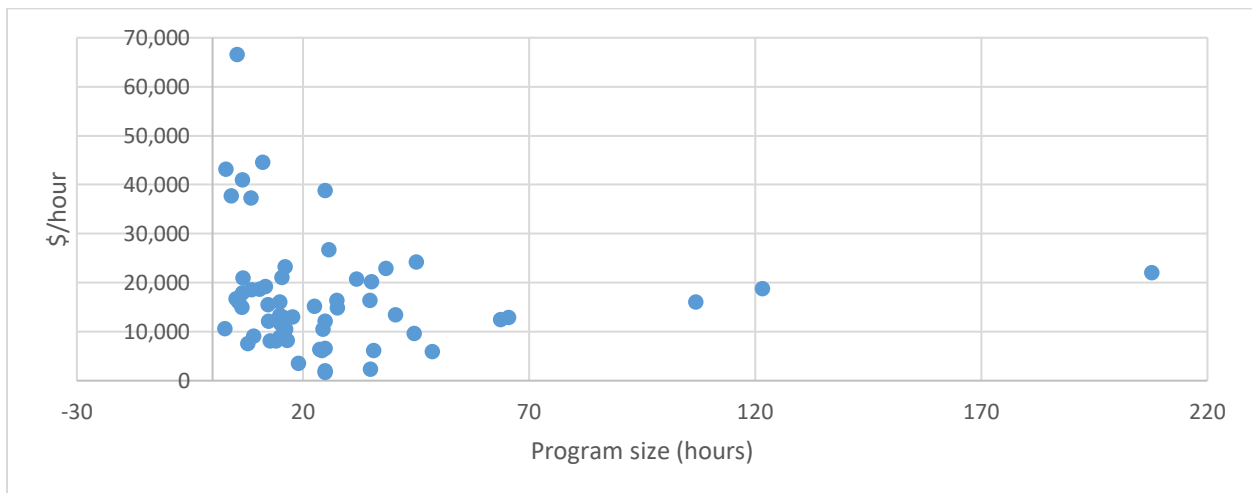


Figure 1: Funding requests expressed as \$/hour for GO programs

There is a perception in the community that there is a “Webb constant” manifested as a typical \$/hour expected for a GO program. Figure 2 plots those data for the 60 GO programs assessed by the

Task Force. The distribution is broadly consistent with Hubble programs, with a substantial scatter for smaller programs. The funding requested depends on multiple factors beyond the total time requested, including the complexity of the observations, the contributions from foreign (unfunded) co-investigators, and the level of seniority of staff funded to carry out the data reduction and analysis.

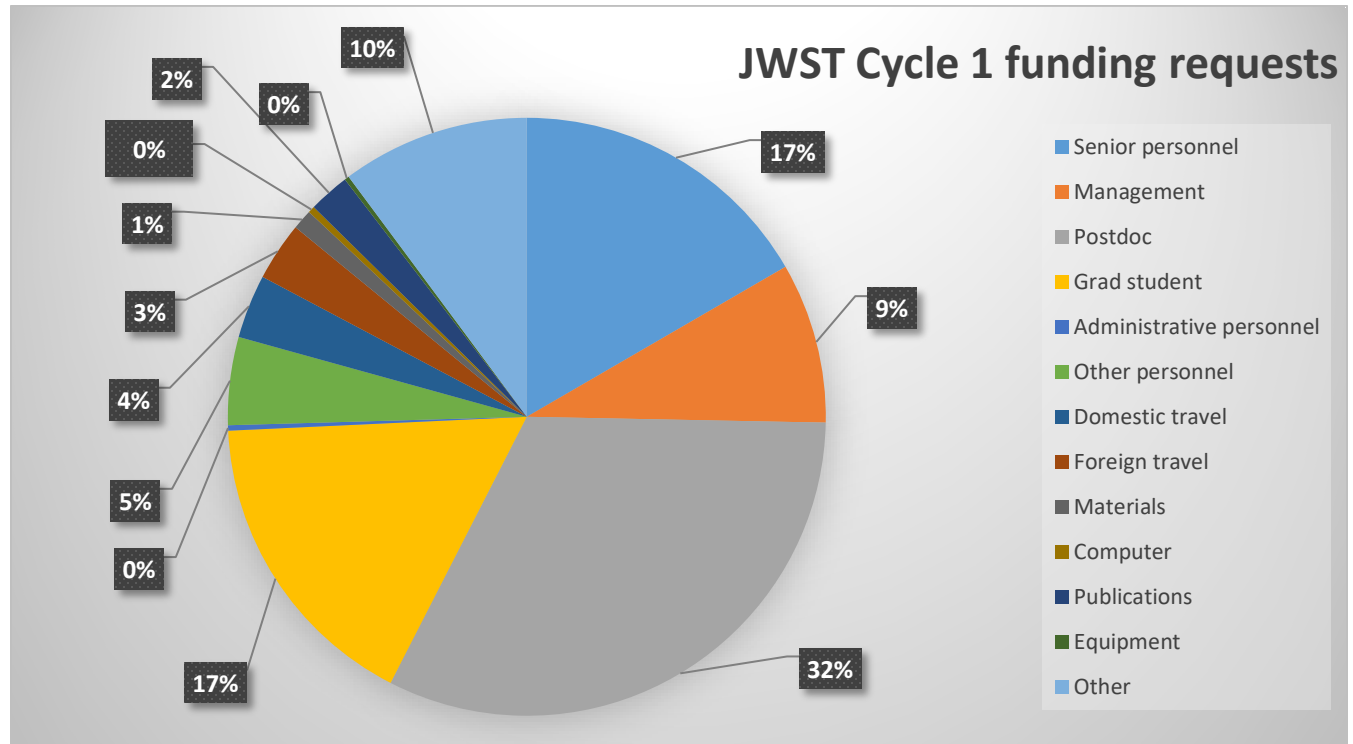


Figure 2: The distribution by category of funding requested by JWST Cycle 1 budget proposals; “other” includes some funding for graduate student support

The overwhelming majority of funding requested, approximately 85%, is for salary support (Figure 1). Approximately 7% of funding is for travel, ~2% for publications and ~2% for materials, computers and equipment. This is generally consistent with the distribution of requests for Hubble Space Telescope programs.

**Results**

In their assessments, the Task Force recommended budget reductions for three main reasons:

- Redundant work effort, where multiple personnel were assigned to the same task, where the level of work required for a task was over-estimated or where the work was not described clearly;
- Out of scope activities, where the work was not associated with the goals described in the science proposal; and
- Excessive travel and publication costs.

Larger programs are particularly susceptible to those issues, with extensive, complicated budget descriptions where personnel at different institution might be assigned the same task without

differentiating their individual contributions, travel for multiple team meetings, and an overly-ambitious publication schedule. However, as Figure 3 shows, some large programs have well-justified budgets and smaller programs can also be over-costed.

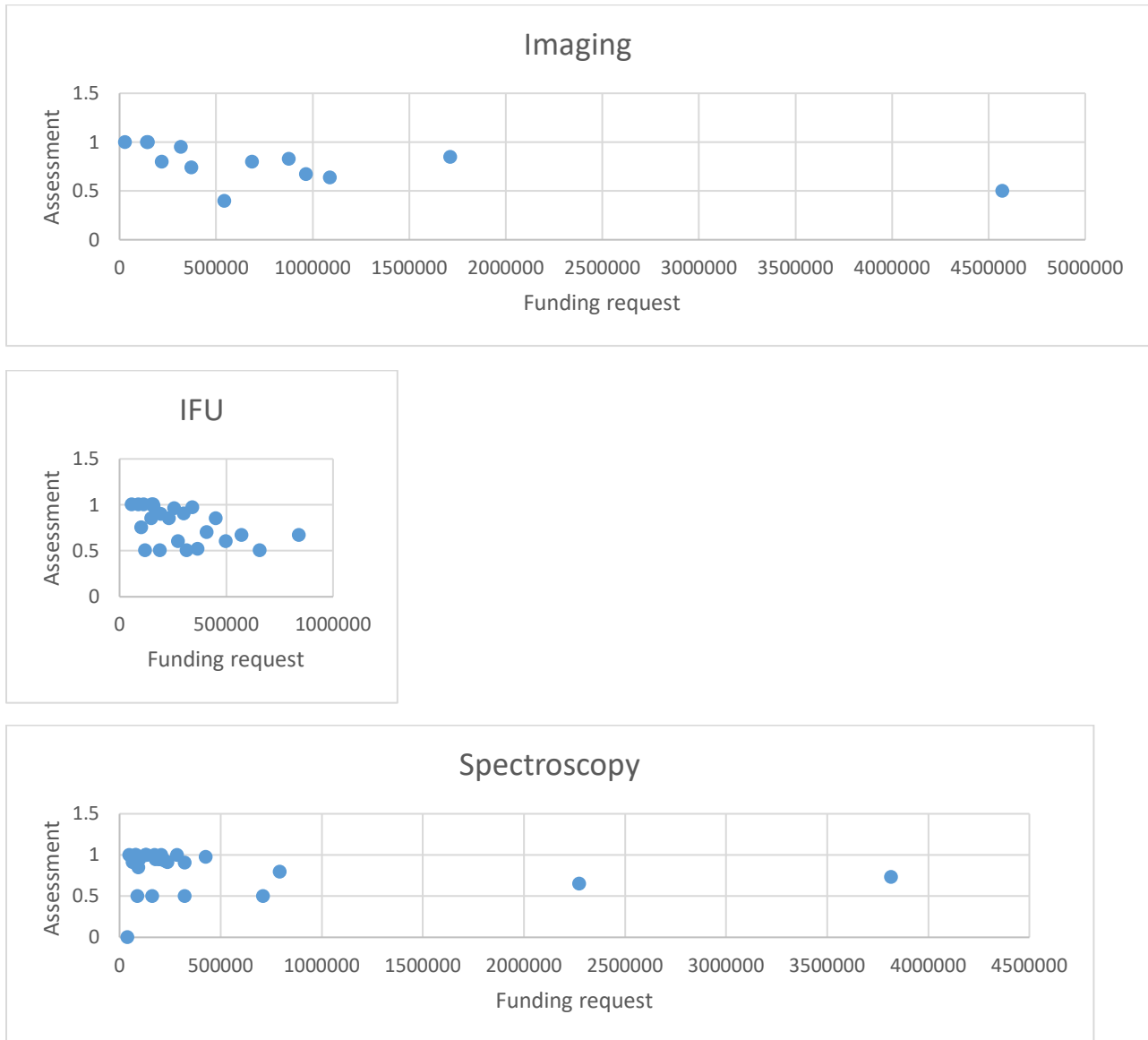


Figure 3: Budget assessments for programs discussed by the Task Force – an assessment of 1.0 indicates full funding; an assessment of 0.5 indicates that the Task Force believed that funding at the 50% level would be appropriate.

Figure 3 compiles the task force assessments for all 65 programs reviewed, segregating programs by the type of data acquired and analyzed. There is no substantive difference by instrument mode: the average reduction is 22% for imaging and IFU data (i.e. recommended funding is 78% of the initial request), and 17% for other spectroscopic data (funding at 83% of the initial request). Only one (small) program was deemed entirely out of scope; one program, from a PI with no Hubble experience, was under-scoped. Combined, the reductions would reduce the total funding level to 70% of the requested value; the overwhelming majority (four-fifths) of those reductions come from programs

requesting more than \$500,000. Extrapolating to the full science program, the total budget request would be ~\$70 million; allowing for inflation, this is consistent with the JSTAC estimate.

In the general discussion, **the task force noted that there were programs with similar observations and science goals that requested different resources.** This could be for a number of reasons, including the personnel involved (senior or junior), how the work is shared with foreign investigators, as well as whether the work is over- or underestimated in one or other proposal. There can also be institutional factors: researchers at a larger university have the advantage of accessing more infrastructure support, whereas those at smaller universities may need to request additional funds to provide all the resources. Overall, there was strong consensus that an FRC-type review is essential to understanding such issues, rather than relying on a simple formula.

**There was also strong consensus that the community needs better guidelines in budget preparation;** the HST FRC members are working on such a document, and that should be made available for JWST proposers. As noted above, there was only one proposal assessed by the Task Force that was substantially under-costed; these guidelines would help level the playing field for future cycles.

**The Task Force identified personnel support as the most important budget factor.** Travel and publications were least important, with travel for conference participation by junior team members regarded as more valuable rather than in-person team meetings. There was recognition that judiciously scheduled face-to-face meetings can be very effective, but virtual meetings can also be if organized properly. The Task Force noted that there is the potential for inequity in how travel and publications are assessed, with smaller programs getting line-by-line scrutiny while larger programs are given a proportional cut. This could be addressed by providing the community clearer guidelines and expectations.

**Programs span a range in complexity, and that is generally taken into account in the requested budgets.** Complexity reflects a wide range of factors, so there is not a simple way of matching work effort against a single parameter such as instrument mode.

In the general discussion, **the Task Force was unanimous that cutting funding below the level of their assessments will have a major impact on the science produced from JWST observations,** and that that impact will be substantially higher than the level of the reduction. There was strong concern that a simple formula, such as an across-the-board cut, would render some of the smaller program essentially inviable. Moreover, such an approach would reward programs that have over-estimated their submitted budgets; consequently, the Task Force recommended completing assessments of all programs requesting more than \$500,000.

The Task Force noted that many programs were requesting three years of funding with relatively weak justifications for the third year. This may reflect some confusion about the “period of performance”: this is set to 3 years to provide contingency for hiring postdoctoral fellows, etc., but the general expectation is that the work effort should be limited to 2 years. This needs clarification for future cycles, but for the present cycle cutting the third year of funding would generally be appropriate.

Looking forward, the Task Force suggested methods of streamlining the review, given the volume of JWST programs (50% more than HST). Those included limiting the budget description to personnel, requiring concise descriptions of the work performed by all investigators (funded or

unfunded), and assigning travel and publications as fixed costs. They also suggested providing the community with guidelines on the likely level of funding, either as an average \$/hour or a range.

## Conclusions

The Task Force supports the following major conclusions:

- Funding support below the level assessed by the Task Force will have a disproportionate effect on the science produced by US researchers from JWST observations.
- Reduced support has a major impact beyond delaying science since there are fewer community members with direct experience analyzing JWST data; therefore fewer members able to build on that experience for future cycles. Deferred science could well become lost science for a limited lifetime mission like JWST.
- An FRC-style review should be part of the budget review process for subsequent JWST cycles, but the process needs to be simplified.

## Recommendations

The Task Force supports the following recommendations

### Cycle 1

- NASA should give serious consideration to finding additional funding for JWST Cycle 1 programs
- Small programs require foundational funding
- Complete a Task Force assessment for all large (>\$500K) programs to give fair basis for cuts
- Cap funding for travel and publications
- Cut third year work

### Cycle 2

- Provide budget preparation guidelines for Cycle 2 investigators; those should include recommendations to
  - Provide well-defined science goals and a clear work-plan in the TAC proposal;
  - Map all activities proposed for funding against the work-plan and specific science goals in the TAC-approved proposal;
  - Define clear roles and responsibilities for all investigators, notably including foreign co-I contributions – avoid or strongly justify apparently-redundant effort;
  - Clarify the period of performance – the expectation is 2 years of work effort that can be spread over 3 calendar years.
- Simplify how the budget handles travel and publications – these could be given as fixed costs, or limited to a fraction of total budget
- Low priority for support of ancillary observations
- Provide the community with an expectation for the average level of funding – proposers should be required to justify going above that level

Supplement

Following their own recommendation, the Task Force completed assessment of all Cycle 1 programs that request total budgets in excess of \$500,000, meeting on August 27 and September 3, 2021. The procedures adopted were identical with those followed in the initial meeting. Overall, 37 additional programs were reviewed, with most recommended for substantial cuts due to redundant work, out-of-scope activities or excessive costs. Results for the individual programs are shown in Figure 4; the overall budget request is reduced from \$34.7 million to \$23.6 million, i.e. a reduction of 32%. This funding level (68%) is consistent with the results from the initial task force assessments.



Figure 4: Task Force assessments for the 37 programs reviewed on August 27 and September 3

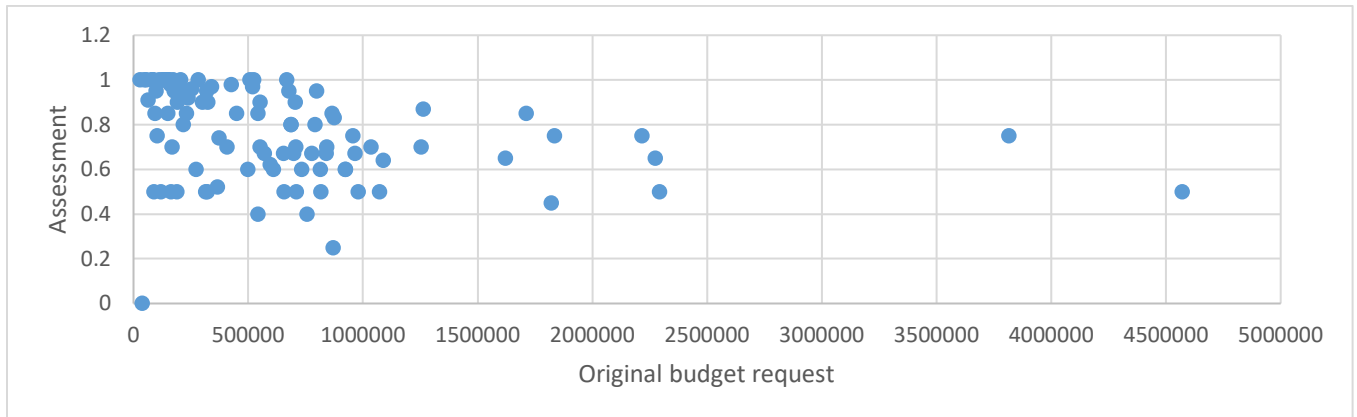


Figure 5" Task Force assessments for all programs

## Appendix 1: Task force charge

### JWST Cycle 1 Grant Support Task Force

The budget request by the community to support JWST Cycle 1 science exceeds the available funding by a substantial fraction. This task force is charged with reviewing a representative subset of budget proposals and providing the STScI Director with an assessment of the level of funding (irrespective of likely funding limits) that would be appropriate to support Cycle 1 science for those programs, and advice on implementing funding within the available JWST Cycle 1 grants budget.

The task force membership includes the JWST Financial Review Committee supplemented by representatives from the JWST User Committee.

The task force will review the proposals following standard procedures, with emphasis on aligning the budget allocations to the proposed science programs. They will be provided with the budgets, budget narratives, and TAC-approved science proposals for programs. They will assess if the funding requested is reasonable, allowable, and allocable to reduce, analyze, and publish the TAC-approved science goals. The assessment will

- Identify priority areas for support in each proposal
- identify effort that is over-scoped or outside the analysis described in the science proposal,
- identify excessive cost (in any cost category).

STScI Grants Administration staff will review the proposals for unallowable costs.

The task force will provide written feedback to the STScI Director summarizing the assessment of the total funding that would be required to support a) work within the scope of the science proposal and, b) when possible or specified by the proposal, a prioritization of that work.

The task force will also provide recommendations on factors that could/should be used in developing a model to estimate not-to-exceed budget allocations for the Cycle 1 programs, and in providing guidelines for budget submission in future cycles.



9/7/2021

## Appendix 2:

### Questions for the Task Force

These questions aim at achieving two goals:

- Provide insight into how STScl and NASA might use the submitted budget materials to match allocations against the funding available for Cycle 1;
- Help prepare guidelines for the community to assist their budget planning in Cycle 2.

### Questions

1. Overall, what proportion of the requested resources are consistent with achieving the science goals described in the TAC proposals?
2. Were any proposal substantially out of scope or substantially over-costed?
3. Did you notice any trends in how the funding requests scaled with the size of the program?
4. Were there cases where two or more proposals for similar observations request significantly different resources?
5. Are there guidelines we could offer that would make the budget process more equitable?
6. Are there general categories of funding (personnel, travel, publications) that should be given higher priority in determining the final level of funding? Any categories that could/should be given low priority?
7. What is the range of complexity in the proposals that you reviewed? Were there particular programs that were clearly either significantly more complex or less complex than the average? Particular instrument modes, or large data volume, for example.
8. Based on your assessment of this set of budgets, what overall impact do you believe that additional cuts of 10-20% (on average) would mean for these programs (e.g., 10-20% loss of science, 20-40% loss of science, more than 50% loss of science)? Does your answer depend on program size?
9. Looking forward, are there particular analysis tools or additional processes that would significantly lessen the work for proposal teams that should be given priority for implementation for cycle 2?