



May 28, 2016

Dr Ken Sembach, Director
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218

Re: JSTAC recommendations regarding JWST Cycle 1 GO proposals

Dear Director Sembach:

The programs selected in Cycle 1 will establish the foundation for future JWST observing cycles. Though substantial preparatory work for JWST science has been carried out in advance of the mission, nothing can duplicate the value for the science community of having the first JWST data sets. The first cycle also assumes particular importance given the substantial investment in JWST, and the need to maximize the rate of science return from a mission operating in a challenging environment where the mission lifetime may prove shorter than expected or desired.

Over the last several years the JSTAC has been discussing a number of aspects of the GO proposal process. Of particular importance is the framework for the types of proposals that will be announced in the Cycle 1 proposal call (and how they complement the Early Release Science – ERS – program selections). Cycle 1 will play a major role in establishing the capabilities and the overall scientific productivity of JWST in the subsequent observing cycles.

Cycle 1 proposal options: The JSTAC has had a number of presentations from the Science Mission Office at STScI regarding the nature of GO proposals, and has discussed a number of options and approaches for the particularly important first cycle – the Cycle 1 Call for Proposals. These have spanned a wide range of topics related to how the Cycle 1 Call might be structured. For example, Cycle 1 could:

- (1) consist largely, or even entirely, of Treasury/Legacy programs, as was the Spitzer first year approach;
- (2) have a distributed approach (e.g., for "small, medium, large"), with a community-driven or laissez-faire balance;
- (3) have a distributed approach, as in (2), but with some explicit encouragement towards particular program size scales;
- (4) include very large science-focused programs akin to the HST "Key projects";
- (5) allow the consideration of very large proposals and/or large multi-cycle projects;
- (6) encourage proposers to focus on the four science areas (First Light and Reionization; Assembly of Galaxies; Birth of Stars and Protoplanetary Systems; Planets and Origins of Life) that have defined the scientific objectives of JWST for policy-makers and the public.

Background for the recommendations: These specific examples helped focus the committee's discussion. However, a number of other considerations also played a role and, before highlighting the recommendations, we would like to summarize the considerations that provided additional framework for the recommendations that JSTAC has developed.

First, the JSTAC heard extensively about the various approaches used by the Great Observatories for optimizing the science return from proposals in their TAC cycles. In particular, these discussions covered the experience from Hubble regarding proposal program size and balance, the evolving approaches used by Chandra, as well as the legacy program model used by Spitzer for the first cycle. The experience gained from the different approaches was valuable in helping JSTAC think about the ways to maximize the scientific return in Cycle 1, and also for the subsequent cycles, based on "real-world" experience.

Second, a further factor was the development of a plan to carry out a substantial Early Release Science (ERS) program (see the JSTAC letters regarding the First Look or what is now called the ERS program – e.g., [the 2014 ERS letter](#)). The ERS program is expected to be about 500 hrs. The goal is to accept proposals in the ERS program for a range of science topics that span the expected most-used modes of the instrument suite on JWST. The ERS will provide, in particular, insight into the performance of the instruments. This program will be carried out early in Cycle 1 so as to allow the community to become familiar with the instruments and modes of operation before the Cycle 2 call for proposals.

Third, while important, the ERS program is actually <10% of the time available in Cycle 1. Thus, as JSTAC has enunciated on a number of occasions, it is equally crucial that data becomes quickly available as early as possible from as many as possible of the Cycle 1 programs. The JSTAC understands that Large, Treasury and DD time programs will have zero exclusive use/proprietary period, following the current practice for HST and the other great Observatories. However, as JSTAC has noted (see the [March 2014 letter](#) regarding exclusive use/proprietary period), it is important that the proprietary/exclusive use period be as short as possible early on the life of JWST (primarily so as to maximize the data, insights and results that are available from Cycle 1 programs for Cycle 2 proposers). JSTAC recommended that the normal exclusive use/proprietary period for JWST GOs be 6 months throughout its life, modified just for Cycle 1 to a default of 0 months, with the option for proposers to request up to 6 months.

Subsequent discussions with the JWST SWG led to the approach that a 6-month period be used for all cycles for JWST programs (small and medium), thereby dropping the recommended default of zero in Cycle 1. This approach was subsequently also endorsed by the NAC Astrophysics Subcommittee (APS). While the final outcome for the recommendation of a 6-month proprietary period remains TBD, the JSTAC recommendations regarding the nature of the proposals in Cycle 1 have generally been developed with the expectation that JWST will have an ~6-month proprietary/exclusive use period in Cycle 1 and beyond.

Fourth, the JSTAC recognized that Cycle 1 posed a particular challenge for establishing guidelines, since proposals will be selected pre-launch for a mission whose on-orbit performance, as well as the optimal analysis techniques, will still be unknown at the time the TAC meets. While the on-orbit performance is hoped to be "as expected" from the mission requirements and ground testing to the point pre-launch when the JWST Cycle 1 TAC meets, the reality is that the early on-orbit performance, and initial data optimization, is likely not to be at the level expected in the long-term. Conservatism is needed in establishing guidelines for the first TAC. The JSTAC's recommendations are developed with this cautionary aspect in mind.

Recommendations: Based on consideration of the options (1) to (6) above, and the background framework, the discussion (covering several JSTAC meetings) led to a series of recommendations for the Cycle 1 TAC program structure. They are, as follows:

(A) JSTAC recommends that programs be “balanced” across the broad categories of small, medium and large programs, as per recent Great Observatory practice, with procedures to ensure that an appropriate balance is obtained. JSTAC felt that the experience with the Great Observatories has proven that such balanced approaches were scientifically-productive and an effective scientific use of resource-intensive, observatory-level space missions.

(B) JSTAC recommends that very large programs should not be part of the baseline for Cycle 1. Such programs, involving a huge investment of time (broadly discussed as being those requesting ~500-1000 hours), were seen by the JSTAC as unwise for selection before launch in Cycle 1, when the performance of the telescope and its instruments have not been measured on-orbit.

(C) JSTAC similarly recommends that large multi-cycle programs should not be part of the baseline for Cycle 1, though well-justified smaller programs that require multi-cycle observations (transient, transit or proper motion programs) were considered by the JSTAC to be appropriate (possibly with additional review in Cycle 2 to ensure viability once the performance characteristics of JWST are better known).

(D) JSTAC recommends that “Key projects” should not be established for JWST. While JWST has a number of high-level science objectives, the maturity and sophistication of the science community following many years of Great Observatory science programs indicated to the JSTAC that such “directed” science was not necessary.

Findings: In addition to the above recommendations, JSTAC recognized also that there were broad aspects of Cycle 1 (or the early cycles) that were important for the scientific success of JWST. These are more in the nature of findings.

First, the JSTAC recommendations regarding very large programs and large multi-cycle programs are for Cycle 1 where the actual on-orbit performance of JWST and its instruments remains TBD. Such very large programs are expected to play a significant role in subsequent cycles once JWST’s on-orbit performance is established, and will contribute significantly to the scientific excellence of JWST, as they have done for Hubble, Spitzer and Chandra.

Second, the JSTAC members and presenters noted a number of times in discussions about the proposal sizes that JWST is so powerful that much unique cutting edge science can be done with short observations. While encouraging balance across the small-medium-large categories was a clear recommendation from the JSTAC, in (A) above, the committee recognized that a modest bias towards smaller programs might be a scientifically-beneficial approach initially.

Third, the JSTAC wanted to convey an important goal that should be used to help guide the Cycle 1 process and outcomes. **In addition to their overall scientific merit, the Cycle 1 TAC should include in their assessment the foundational nature of the Cycle 1 programs and the JWST-unique observations and science that they will subsequently enable.** For example, imaging programs that are designed to return significant samples of targets for spectroscopic follow-up could provide a valuable set of objects for later cycles, or programs that demonstrate new science opportunities or observing capabilities could provide the basis for large programs in subsequent

cycles (including large multi-cycle programs). In a potentially limited-life mission, it is prudent to establish datasets that are stepping-stones for major scientific investigations.

Fourth, the widely-espoused four science themes for JWST (First Light and Reionization; Assembly of Galaxies; Birth of Stars and Protoplanetary Systems; Planets and Origins of Life) have a special place in defining the science mission for JWST. These have, for example, been widely used to justify to policy-makers the very substantial expenditure of public funding for JWST. At first sight, this might suggest that consideration be given early in the life of JWST to providing guidance to proposers and the TAC towards ensuring progress on meeting the widely-recognized science goals of JWST.

However, JSTAC currently expects that, given the breadth of the four science goals, it is quite likely that the community-selected ERS and Cycle 1 programs will cover those science areas to the satisfaction of all concerned. But if not, some guidance could be given in subsequent cycles. Thus, while some guidance towards fulfilling the key science goals of JWST may not be needed, or optimal, for Cycle 1, JSTAC notes that there may prove to be a need for more explicit guidance in Cycle 2 (and beyond) to meet the expectations of policy-makers and the broad science community.

The JSTAC felt it would be very useful to discuss the expected approach for Cycle 1 with the broad science community through workshops and presentations at large meetings such as the AAS, as well as through the usual communication channels, so that the rationale for the choices that are made is widely understood and recognized.

Sincerely yours, on behalf of the Committee,



Garth Illingworth
Chair, JSTAC

JSTAC members:

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