



March 27, 2014

Dr. Matt Mountain, Director  
Space Telescope Science Institute  
3700 San Martin Drive  
Baltimore, MD 21218

Re: JSTAC recommendations regarding the exclusive access/proprietary time period for JWST GO observations

Dear Director Mountain:

At the last two JSTAC meetings a major topic of discussion has been the question of the proprietary period for observations with JWST. This question has been forefront in JSTAC discussions since some of its earliest meetings and was addressed in one of its first letters to you in the context of large programs (June 21, 2010 – <http://www.stsci.edu/jwst/advisory-committee/JSTAC-legacy.pdf>). The JSTAC recognized very early in its deliberations that the length of the proprietary period would have a major impact on the scientific return from JWST (as shown by the timeline figure in both the June 21, 2010 letter and in an earlier letter dated Feb 25, 2010). Careful consideration of this aspect of science operations is necessary given the JSTAC's clear mandate to offer advice on how to maximize the scientific return from JWST.

To recap, in a limited-life mission, such as JWST with its 5-year required life, the interplay between proprietary time and observing cycles can seriously lessen the astronomy community's ability to build new proposals from data taken during the mission. This will impact the overall science productivity of the mission. This letter addresses the situation for JWST, outlines the extensive deliberations within the JSTAC and provides background for its recommendation regarding proprietary/exclusive access periods.

*The current situation regarding proprietary periods in Astrophysics:* The common proprietary/exclusive access period within Astrophysics has been 12 months. However, the reality is that 12-month periods are not uniform. A number of smaller missions have had shorter (and in some cases zero) proprietary/exclusive access periods (Kepler, Swift, Nustar). Spitzer has adopted a zero default proprietary period (maximum 90 days) for all programs >100 hours in its extended mission. Furthermore, even within the Great Observatories the proprietary/exclusive access period is not uniformly 12 months. HST Large, Treasury and Director's Discretionary (DD) time all have no proprietary period. The equivalent Legacy programs, Early Release Observations, First Look Survey and DD time on Spitzer similarly had no proprietary period. Nearly half of all time in Spitzer's first cycle had zero proprietary period. Chandra Visionary Programs have no proprietary period, and DD programs have 3 months. JWST is a new mission of Great Observatory scale but with a required 5-year life is more akin to Spitzer than the longer-lived HST and Chandra. It is therefore important to assess whether the assumption of a 12-month proprietary period for JWST is wise and appropriate. This is of particular interest also at this time given the very large investment in JWST, as well as the actions of policymakers towards requiring open access for taxpayer-funded datasets.

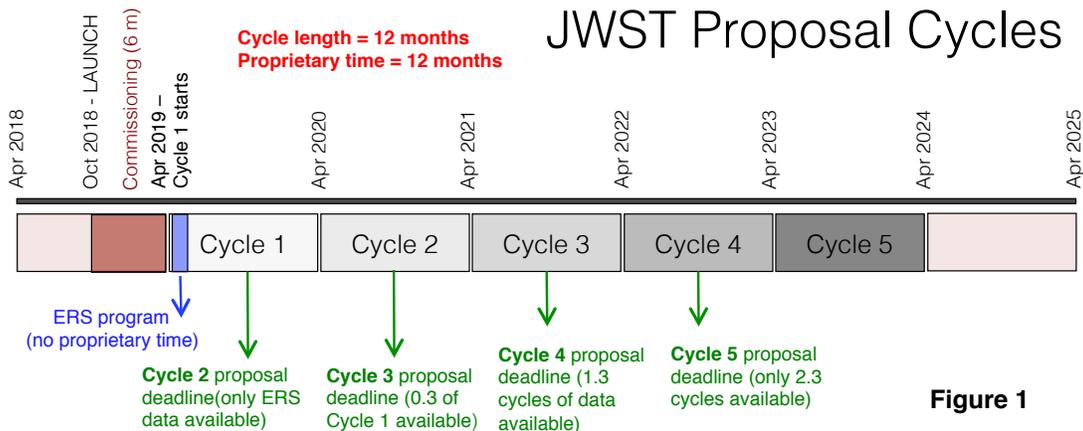
*Proprietary periods (Exclusive access) at NASA and other agencies:* To put this discussion regarding proprietary time/exclusive access periods for JWST into a broader context, different and shorter proprietary periods are common within the NASA Science Mission Directorate (SMD), and occur also in ESA and other agencies. It was noted during the JSTAC discussion that there is no proprietary/exclusive access period for NASA Earth science data (the statement is: “There will be no period of exclusive access to NASA Earth science data.” from <http://science1.nasa.gov/earth-science/earth-science-data/data-information-policy/>). This was established through international agreements with other space agencies, including ESA and JAXA. The proprietary period was set to zero for data from Earth science missions from all three agencies. Similarly, there is no proprietary period for NASA Heliophysics missions. Heliophysics, like Earth science, has an open access data policy. The proprietary/exclusive access period for planetary data varies, but two major high-impact programs make data available immediately (i.e., no proprietary time – Cassini and the Mars Exploration Rovers). Typically planetary missions have 6-month proprietary periods for NASA and 6-12 months for ESA. The ESA Herschel mission had a 12-month proprietary period for the first year, but 6 months thereafter.

For its major missions, NASA Astrophysics stands out for its use of a consistently long proprietary/exclusive access period. This is surprising given the cost of major astrophysics missions. Lengthy proprietary/exclusive access periods are increasingly at odds with the trend to open data access that is being discussed within OSTP/OMB and Congress.

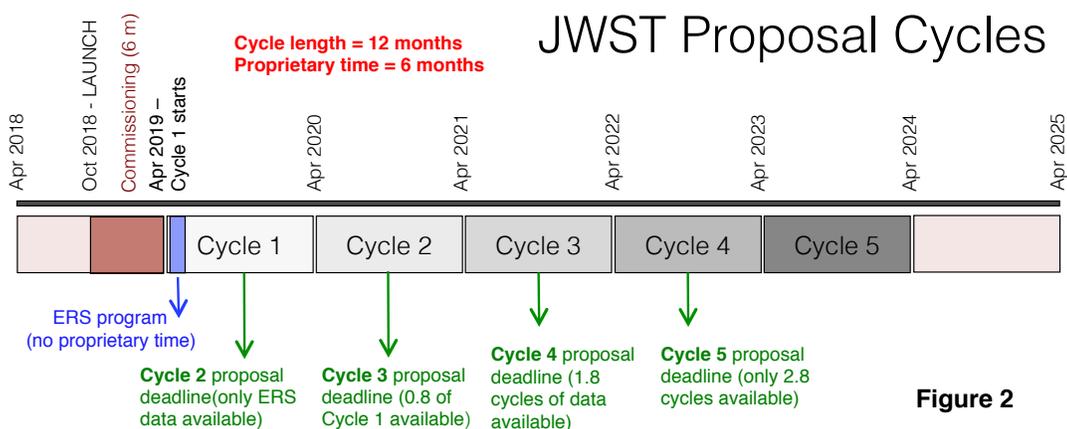
**The recommendation from the May 2013 meeting for a 6-month proprietary period:** The JSTAC in May 2013 was again impressed by the impact on scientific productivity that would occur with a 12-month proprietary period. In a 5 year, 5-cycle mission, with a 12-month proprietary period, *Cycle 4 is the first cycle able to use all Cycle 1 data to do follow-up.* At the Cycle 3 proposal deadline only a small portion of the Cycle 1 data would be available. Based on the chart developed for JSTAC’s June 21 2010 letter this fraction was only 1/3<sup>rd</sup> of the Cycle 1 data. By the final (Cycle 5) proposal deadline only data from a little more than the first two full cycles taken by JWST would be available to the community for follow-up. The limited data availability for proposers is obviously a very undesirable situation and is clearly a serious concern for the overall science return from the mission.

*However, even this undesirable situation is optimistic.* The above estimate of how much data is available assumes zero time between the end of the proprietary period and the proposal submission date. This is clearly unrealistic: access to the data for a proposal is needed well before the proposal deadline to generate a credible and competitive proposal. To be more specific, time is needed for data reduction, familiarization with the results, consideration of the scientific implications, and proposal preparation. Several months were mentioned in the JSTAC discussions as being needed – such estimates are uncertain, but it is certainly >0 months. For illustrating the impact of different proprietary periods the figures and tables here assume 2 months as the data familiarization and proposal preparation period (or ~0.2 cycle in round numbers).

The data usefully available at each proposal deadline for the nominal 12-month proprietary period is shown in Figure 1 (this includes 0.2 cycle as the time needed to process new data, evaluate new results and write proposals). Figure 1 is shown on the following page.



*Reducing the proposal cycle time:* Consideration was given in the JSTAC discussion to reducing the proposal cycle from 12 months but this was seen as a major burden on the community, on STScI and on the operations budget. Furthermore, JWST target visibilities naturally involve a 12-month cycle, and so changes to shorter periods (e.g., 9 months) resulted in mismatches with target visibility. Any shorter, e.g., 6-month, proposal cycles were seen as unrealistic. Since HST may well be operating in the early years of JWST science operations the demands of dealing with proposals for two missions with disparate cycle times was considered to be quite daunting, and would add to the demands on the science community when populating TACs. It became clear to the JSTAC that anything less than 12-month proposal cycles were impractical.



*The 6-month proprietary period:* The gains with 6-month proprietary period can be seen in Figure 2 (again assigning a 0.2 cycle data processing and evaluation period before proposal submission).

**After considerable discussion at its May 2013 meeting the JSTAC came to the consensus that a proprietary period of 6-months be recommended to STScI.**

The JSTAC also re-confirmed the value of the now widely-accepted approach of zero proprietary time for Large/Treasury/Legacy programs as is now done for HST, most Chandra and all Spitzer programs, as well as for Director’s Discretionary time, and recommended that such policies be continued for JWST.

At the conclusion of the May meeting there remained some open questions about other ways to optimize the program and whether a 6-month proprietary period was in itself adequate to open up the majority of the mission dataset for use in proposals over multiple cycles. Would shorter proprietary periods be needed? Would different proprietary periods be needed at different times? While 6-month periods were baselined as the recommendation from the May meeting, the question of whether periods shorter than 6 months were needed was deferred until the November 2013 meeting so that further modeling could be done by STScI.

It was decided to discuss the JSTAC recommendations with the GTOs, and to discuss with them the concerns that the JSTAC had regarding a long proprietary time. The opportunity for a first presentation and discussion with the JWST SWG members occurred at a SWG meeting in July 2013 where the background to the SWG recommendation was given in a presentation and a Q&A session ensued ([http://www.stsci.edu/jwst/advisory-committee/SWG\\_072213-JSTAC.pdf](http://www.stsci.edu/jwst/advisory-committee/SWG_072213-JSTAC.pdf)). The JSTAC Chair and JSTAC member Brad Peterson (Chair of the NAC Astrophysics Subcommittee) made the presentation. A request was made for the SWG to discuss changing their proprietary period to match that being recommended for the GO user community. Further discussions are planned with the SWG.

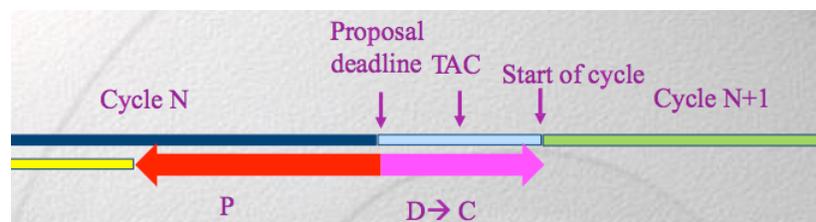
JSTAC also requested at its May 2013 meeting that STScI Science Mission Office (SMO) evaluate a number of options that had been mentioned for improving the efficiency of the TAC process, and to carry out a number of simulations involving different proprietary periods and other refinements in the timeline. The JSTAC expressed particular interest in lessening the time between the Call for Proposals and the start of the new Cycle. The gains appeared to be modest, but could not be quantified in the meeting. The JSTAC requested an update on both of these topics for its November meeting so that the recommendations could be finalized.

**The recommendations from the November 2013 meeting:** The discussion regarding the ways to enhance access to data from JWST continued in the November 2013 meeting with additional input from STScI SMO on the questions that the JSTAC had asked at the conclusion of its May 2013 meeting.

The JSTAC discussed a number of aspects of the observing process for JWST. Two of these topics (Early Release Science and Community Fields) have been discussed in a companion letter, along with the resulting JSTAC recommendations.

*Proposal cycle duration:* The question of the interaction of the proprietary periods and the proposal cycle was discussed extensively by the JSTAC in this meeting. Further discussion highlighted again that proposal periods other than 12 months brought major challenges for both the community and STScI. The dominant factor in enhancing data availability is clearly the proprietary period, but it was recognized that improvements in data availability could also come from minimizing the time between receipt of proposals and the start of the next proposal cycle.

This period, along with the proprietary time period, are the two primary factors governing the number of years of JWST data that would be available to proposers. The figure shows those two primary factors: the proprietary period  $P$  (red) and the proposal process duration  $D \rightarrow C$  (magenta).



The yellow line represents observations that are non-proprietary at the proposal *deadline* (as noted above the actual useful datasets are

those that are available a few months prior to the deadline, but this figure is illustrative for the discussion of the proposal process duration  $D \rightarrow C$ ).

STScI SMO discussed with JSTAC the extensive modeling of potential changes to the proposal cycle  $D \rightarrow C$  that they had been carrying out. After many years of HST scheduling, the time between the receipt of proposals and the start of the next proposal cycle has stabilized at about 5.5 months. Since the current two-phase approach (proposals first followed by Phase II scheduling information) has undergone considerable refinement over the many years of HST proposal cycles it is unlikely that  $D \rightarrow C$  can be cut enough with a two-phase approach to make much of a difference.

Some discussion then followed regarding the use of a single-phase approach. This brought to mind the challenging early days of HST when *all* proposers had to submit detailed target information with proposals. However, refinements, akin to what Spitzer now does, could be used to minimize the work needed on target information for all proposers. While gains can be made this way, even going to a single-phase approach reduces the  $D \rightarrow C$  period only to about 4 months, for a saving of 1.5 months. This is valuable, but is clearly **not** going to solve the problem of open access to recent-enough data for proposers.

The JSTAC noted that Cycle 1, with its pre-launch TAC process, does not necessarily need to adopt the single-phase approach, if that is what is adopted for Cycles 2–5. An interim approach for the first cycle may be desirable when proposers are coming to grips with proposing for JWST for the first time.

Without lengthening an already lengthy letter, the JSTAC discussed other options beyond the proposal cycle duration  $D \rightarrow C$ , such as extending and shortening the cycle length, as well as using interim calls for proposals, but none of these were seen as to be having such an impact (or such potential gains) as reducing the length of the proprietary period  $P$ . The proprietary period  $P$  is the “elephant in the room” that most impacts the amount of JWST data that is available to proposers.

**The final recommendations:** The focus of the JSTAC’s discussion became the optimal length of the proprietary period (and whether the proprietary period should be fixed or even change during the life of JWST). Table 1 below is based on information from STScI SMO that shows the effect of different proprietary periods on the amount of data available for two different cycles (for two proposal process durations, the current 5.5 months and a single-phase 4-month option).

Table 1: Data availability for proposers with varying proprietary periods  $P$  and proposal cycle duration  $D \rightarrow C$

$D \Rightarrow C$	$P$	12 months	6 months	4 months	3 months
<u>for Cycle 2 proposers</u>		<u>maximum months of data available</u>			
5.5 months		0 months	0 months	0.5 months	1.5 months
4 months		0 months	0 months	2 months	3 months
<u>for Cycle 3 proposers</u>		<u>maximum months of data available</u>			
5.5 months		4.5 months	10.5 months	12.5 months	13.5 months
4 months		6 months	12 months	14 months	15 months

As discussed above, to use prior data effectively proposers need time for data reduction, familiarization with the results, consideration of the science implications, and proposal preparation before the proposal deadline. This is accommodated in Table 1 by adopting 2 months for those activities. This 2-month period is probably less than is desirable or typically needed, but it is useful to illustrate of the impact of changes in the proprietary time. If one feels that 3 months is needed, or even if just 1 month is enough, then the numbers in the table can be decreased (3 months) or increased (1 month) by one month (except for those which show “0 months”, since *only* the “4-months D→C, 6-months P” combination becomes >0 for a 1 month data familiarization/evaluation period).

Clearly the data that is available for community use in enhancing proposals increases by a considerable amount in going from 12 months to 6 months. The gains with decreasing proprietary periods of 3 or 4 months were valuable, but modest by comparison with the change from 12 months to 6 months. By Cycle 3 the amount of data accessible to the GOs effectively doubled with this change in proprietary period. For the effect on subsequent cycles just add 12 months to all the Cycle 3 numbers.

Note that ERS data that is made available early in Cycle 1 (see Figure 2) will be available to Cycle 2 proposers (consistent with the goal of the ERS program). Similarly data from any programs with zero proprietary period (e.g., Director’s Discretionary time or Large, Treasury, or Legacy programs) taken quite early in a cycle will also be available for the subsequent proposal deadline. Realistically the amount of non-proprietary data from such programs will be a small fraction of the data taken in the early part of a cycle since the current plan is for a normal balance of small/medium/large proposals.

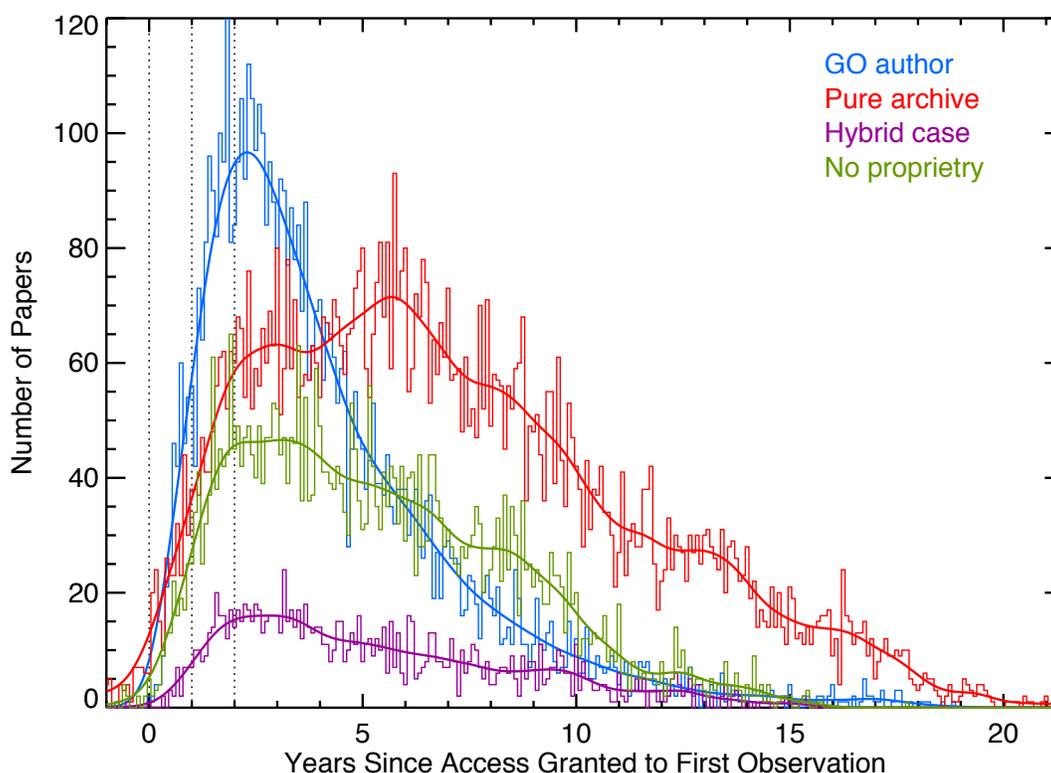
Consideration of these numbers confirmed for the JSTAC that its recommendation of a 6-month proprietary period in its May 2013 meeting was the right step. The 6-month proprietary time substantially increased the amount of data available for proposers. The 6-month proprietary period (vs a 12-month period) also enhances the ability of the GO community to gain needed experience not just with the unique characteristics of JWST datasets, but also with the new-to-JWST data processing tools and proposal preparation tools. The shorter proprietary period helps the astronomy community make optimal use of JWST datasets and minimizes the learning curve while enabling the successful proposer to have some period of proprietary use (exclusive access). *The balance of a 6-month proprietary period between these competing interests (data availability vs. proprietary time) appealed to the JSTAC.*

**The challenge of data access for Cycle 2:** However, as can be seen from Table 1, Cycle 2 presents a particular problem. The lack of data availability from Cycle 1 programs was a concern to the JSTAC. Even with a 6-month proprietary period essentially no data were available from Cycle 1 GO programs in a time that was useful (~2 months before the proposal deadline), either for a 5.5 months proposal process duration D→C or for a 4 month rapid D→C. Even if one thought that 1 month was adequate for data reduction, familiarization with the results, science implications and proposal preparation (and the situation is likely to be the opposite in this first year of JWST operation), no Cycle 1 data was available for a 5.5 months D→C and only 1 month of data for a 4 months D→C.

The lack of access to data from Cycle 1 programs for the crucially-important Cycle 2 proposals, when the first JWST-specific science programs could be established based on real results, led to a lot of discussion within JSTAC. The suggestion was made that the proprietary period should be set to zero for the first cycle. This would allow as much data as practical to be available 1-2 months before the Cycle 2 proposal deadline, but there were concerns expressed that open access for Cycle 1 would not provide the right balance. After further discussion it was

decided that an approach that should provide improved data availability, while also providing opportunities for proposers to ask for a proprietary period, was to set the proprietary period for Cycle 1 alone to be a default period of 0 months, with an option for proposers to request up to 6 months. The 6 months was chosen so as to be consistent with the proprietary period for the remainder of JWST's life. The likely result of the Cycle 1 TAC process will be a distribution of proprietary periods resulting in an average that is  $>0$  and  $<6$  months. This will benefit Cycle 2 proposers, while offering the option of a successful Cycle 1 proposer the potential benefit of whatever proprietary period they request.

**Time to publication:** One other aspect that has been discussed within JSTAC is shown in the figure below. It has often been claimed that a 12-month proprietary period is needed to ensure that proposers get adequate time to carry out their analysis and publish the results. However, an interesting analysis shows that the median time from first observation to first paper for GO programs is  $\sim 2.3$  years, *i.e.*,  $2.3X$  the current 12-month proprietary period, regardless of the source of the HST GO data. By 12 months only a tiny fraction of data has been published. It



seems that 12 months does not in itself play a significant role in driving the timescales for carrying out research programs on HST data. Interestingly an almost identical median time from observation to first paper is also found for Chandra data (2.36 years); Spitzer also sees a similar delay. It is not obvious why such a lengthy delay arises for the time to publication for the Great Observatories (HST, Chandra or Spitzer) data, but it does appear that protecting data through publication is *not* a priority for almost all PIs. *Given this it would seem that a 6-month proprietary period will not impact the publication timescales for individual research programs, yet it will have a substantial impact on the quality and timeliness of the science proposed and carried out in each JWST cycle.*

*Funding:* Related to the question of analysis and publication timescales is that of research funding. Some discussions occurred in JSTAC regarding the different research funding models between the partners, i.e., between Europe, Canada and the USA. The models differ significantly and pros and cons can be identified with each. While some of the discussion suggested that a shorter proprietary time was detrimental others suggested that it might help open up funding opportunities. While the JSTAC recognized that this might be an issue in some aspects, the unanimity for the recommendations below suggested that funding details should not limit so fundamental and important a principle as enhancing the scientific return from a mission that represents such a large investment for each of the three partners.

**The recommendations:** The recommendations of the JSTAC for shorter proprietary/exclusive access periods are based on discussions at several meetings regarding the impact on the scientific productivity of JWST of long proprietary/exclusive access periods. JWST will be strikingly powerful and will open up new opportunities in long-established fields as well as greatly enhancing the discovery space. The inability of the astronomy community to quickly follow up on discoveries and new results would be a major loss to science, and a major loss to the huge investment made by the US and its international partners. It would be unfortunate if the science community did not make every effort to maximize the science return from the most expensive scientific mission that the US has ever undertaken, and to provide the appropriate return on the major investments by its partners, Canada and Europe as well.

The JSTAC concluded from all its deliberations that a shorter proprietary/exclusive access period is needed to maximize the scientific productivity of JWST.

The JSTAC recognizes this is a change from what has been a standard proprietary period for the data from several major astrophysical missions. However, in the light of the scientific gains to be made, given the cost of JWST and its 5-year nominal mission life, as well as the trend among policymakers to require more open access to data, the JSTAC makes the following recommendations:

- 1) ***The JSTAC recommends that STScI implement a proprietary/exclusive access period for GOs for JWST that is 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, so as to ensure that some data is available quickly from Cycle 1 programs for Cycle 2 proposers.***
- 2) ***The JSTAC reaffirms its July 21, 2010 recommendation that the proprietary/exclusive access period for Large/Treasury/Legacy and Director's Discretionary programs remain at 0 months, as is the current situation for HST.***

**Discussions with the JWST partners:** The JSTAC recognizes that these recommendations for GOs will require discussions by NASA with the partner agencies ESA and CSA to elicit agreement on a revised proprietary period. We hope that the three partners will recognize that the spirit of the JSTAC discussions was to focus on the broad principles behind "making JWST as scientifically productive as possible". While the JSTAC recommendations are built on the principle of maximizing the science return, we recognize that enunciation of such principles is just the first step to implementing them. We encourage STScI to work with NASA and the partner agencies ESA and CSA to enunciate the value for JWST and the scientific community of these recommendations and to work towards their implementation.

The JSTAC would like to thank those at STScI for responding so thoughtfully and extensively to requests from JSTAC regarding many aspects of the proposal process and for providing detailed feedback on JSTAC's many questions.

The importance to the JSTAC of the questions discussed here and the recommendations made in this and in the companion letter for maximizing the scientific productivity of JWST can be gauged from the number of meetings that have focused extensively on these issues. This is of particular importance at this time given the very large investment in JWST, a launch date in an era in which fewer NASA missions will be operating, as well as actions of policy makers towards requiring open access for taxpayer-funded datasets.

The JSTAC looks forward to working with STScI to clarify our recommendations and to respond to any questions that may arise as the details of the implementation of the recommendations are considered in discussions between the partners (NASA, ESA and CSA) and with STScI for one of the most ambitious and most expensive scientific projects ever undertaken.

Sincerely yours, on behalf of the Committee,



Garth Illingworth  
University of California, Santa Cruz  
Chair, JSTAC

JSTAC members:

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Stefi Baum	Rochester Institute of Technology
Roger Brissenden	Smithsonian Astrophysical Observatory
Timothy Heckman	Johns Hopkins University
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(whose contributions to this letter were limited to factual input)

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