Discussion with JWST SWG re JSTAC recommendations*

*from two recent JSTAC letters (March 26 & March 27 2014)
see: https://jwst.stsci.edu/about-jwst/history/jwst-advisory-committee-jstac

Garth Illingworth, Chair
on behalf of the JSTAC

JWST SWG April 01, 2014
JSTAC charter

“The committee is charged with advising the STScI Director on the optimum strategies and priorities, consistent with NASA policy and international agreements, for the operations of the James Webb Space Telescope in order to maximize its scientific productivity.”

https://jwst.stsci.edu/about-jwst/history/jwst-advisory-committee-jstac
JSTAC charter

“The areas that the JSTAC will advise on include:

• Capabilities at launch to maximize science return, including archive, data analysis tools, and observing modes
• Prioritization of the capabilities offered at launch
• Observing time allocation strategies, including the balance between large and small programs
• The readiness status of the JWST Science and Operation Center
• Policy implementation, including items such as resolution of conflicts, and availability, timing and level of support of observing modes for GO and GTO observers”
JSTAC members:
• Roberto Abraham University of Toronto
• Neta Bahcall Princeton University
• Stefi Baum Rochester Institute of Technology
• Roger Brissenden Smithsonian Astrophysical Observatory
• Timothy Heckman Johns Hopkins University
• Malcolm Longair Cavendish Laboratory, University of Cambridge
• Garth Illingworth University of California, Santa Cruz
• Christopher McKee University of California, Berkeley
• Bradley Peterson Ohio State University
• Joseph Rothenberg JHR Consulting
• Sara Seager Massachusetts Institute of Technology
• Lisa Storrie-Lombardi Spitzer Science Center, Caltech
• Monica Tosi INAF – Osservatorio Astronomico di Bologna

JSTAC Ex-officio observers from the Agencies:
Hashima Hasan NASA HQ
John Mather NASA GSFC
Mark McCaughrean ESA
Alain Ouellet / Jean Dupuis CSA
Eric Smith NASA HQ

Key STScI Interfaces:
Massimo Stiavelli JWST Office Head
Neill Reid Science Mission Office Head
Jason Kalirai JWST MO;
JSTAC Executive Secretary
JSTAC focus

The bottom line for JSTAC is:

Advise on maximizing the scientific productivity of JWST

$8.8B is large and visible
JWST is the largest basic scientific research program in the US

We need to argue convincingly that we, the astronomy community and NASA, are doing all we can to make the investment by the tax-paying public, the Administration and Congress return the most scientific bang for the buck.
JSTAC – Paul’s questions for discussion

From a presentation by Paul Hertz to the JSTAC on Dec 10, 2012

• How can NASA maximize the science return from JWST?
• What can be done to maximize science productivity and community involvement with JWST in its first 1-2 years?

• What are the appropriate policies for data rights such as the period of exclusive use?

• What do NASA and STScI need to do in order to ensure that the community is prepared?

• What are metrics for determining appropriate level of GO funding in context of lessons learned from Spitzer, Hubble, etc.?

• What do NASA and STScI need to do in order to ensure that the project (including STScI) is prepared?

• Can you identify “unfunded mandates” created through developmental choices that will lien the JWST budget in the operational era?

JWST SWG April 01, 2014
maximizing the science return

The bottom line for JSTAC is:

Advise on maximizing the scientific productivity of JWST

$8.8B is a large commitment

The 5-year required lifetime of JWST adds a particular challenge

When JWST launches with all its remarkable observational capabilities and with data analysis capabilities, it has been clear for some time that a key issue for “maximizing the science return from JWST” will be the length of the proprietary period.

As we found in 2010, in a limited-life mission, such as JWST with its 5-year lifetime, the interplay between proprietary time and proposal periods can seriously impact the astronomy community’s ability to iterate on key science objectives.
the interplay between proprietary time and proposal periods can seriously impact the astronomy community’s ability to iterate on key science objectives.

From JSTAC Letters of Feb 25 2010 & June 21 2010

JWST Science Data Availability Relative to Proposal Deadlines
(for required 5yr science mission)

Note that most Cycle 3 and all later data can not be followed up by any but the original proposers, including the last of the GTO data.
the interplay between proprietary time and proposal periods can seriously impact the astronomy community’s ability to iterate on key science objectives.

- With a 12-month proprietary period, Cycle 4 is the first cycle able to use all Cycle 1 data to do follow-up.
- By Cycle 3, only ~1/3 of the Cycle 1 data would be available.
- **This seriously impacts the science return from the mission.**
- Recent refinements do not change these early conclusions.

as we discussed in July 2013, and will see again later, major gains occur with a 6 month proprietary period.
Dear Colleague,

In the recent past a discussion of the concept of "community fields" - regions of the sky with significant NASA satellite time invested in them - led to concern and some confusion about how such a concept if implemented would or might affect JWST guaranteed time observers (GTOs). NASA intends to abide by the rules and procedures established in the AO 01-OSS-05 that formed the basis for the selection of guaranteed time observers, and the JWST Science Policies document. Neither of those documents recognize the concept of community fields. Those documents, and the proposals received in response to the AO, do define the science programs and targets or target classes selected by NASA through competitive peer review and the sequence by which the GTOs will finalize their target selection in relation to other observers. The AO also defines the period of exclusive use for GTO data to be 12 months. While GTOs are always free to make their data public at any point within those initial 12 months there will be no change to the default exclusive use period.

At a future Science Working Group meeting we will invite a member or members of the JWST Space Telescope Advisory Committee (JSTAC) to discuss their ideas about the benefits to the astronomical community that could be recognized by voluntary reduction of the GTO exclusive use period as well as their recommendation (to the director of the STScI) to reduce the exclusive use period for general observers to six months.

I hope that this clarification will be helpful to you and your teams as you further refine your science programs.

Best Regards,

Eric

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Eric’s May 2013 email clarification of the situation re GTO rights

a key question is how the SWG and the JSTAC can work together to maximize the overall science return for JWST cognizant of those rights

are there aspects that the GTOs would be willing to do to help the overall goal of maximizing the productivity of JWST in its five-year lifetime?

JWST SWG April 01, 2014
(A) open access “community” fields & Early Release Science (ERS)

March 26, 2014 JSTAC letter
open access “community” fields and early release science (ERS)

Both items first raised in June 21 2010 letter from JSTAC (as “First Look” for ERS) with some JSTAC discussion in May 2013

Problems with JWST meant that we never got to have a discussion of these aspects with the SWG until July 2013

Mikulski-requested JWST Independent Comprehensive Review Panel activity dominated attention from July 2010

2011 (and much of 2012) dominated by replan activities and House cutting JWST budget to zero in July 2011

JSTAC further discussed the community fields and ERS observations in its November 2013 meeting

JSTAC letter based on all these discussions now submitted (and on GO proprietary time).
open access “community” fields and early release science

June 2010 Letter detailed number of aspects that JSTAC felt were important for “maximizing the science return”.

First-Look program (Early Release Science – ERS)
cf. Neill’s presentation to the GTOs in July 2013

Open access (zero proprietary period) for large programs –
current baseline for JWST based on HST default periods: zero for large and treasury programs (comparable for Chandra and Spitzer equivalents)

letters at: http://www.stsci.edu/jwst/advisory-committee
open access “community” fields
JSTAC recommendation regarding open access “community” fields

The JSTAC discussed the question of what to recommend regarding the role of open access “community” fields for GOs. As Brad Peterson and I mentioned in our July 2013 SWG presentation, the JSTAC expected the number of such fields that would fall into this category would be relatively small.

The JSTAC revisited this question in Nov 2013. The consensus in the JSTAC was that the concept of open access community fields had merit, but that at this time just one field stood out clearly for open access through the community field concept.

This field is the HUDF/GOODS-S/CDF-S

Following a request by JSTAC, STScI did a search for the 50 most visited regions of the sky by Hubble. This table groups the ten most visited areas:

<table>
<thead>
<tr>
<th>Field</th>
<th>Visits</th>
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<tbody>
<tr>
<td>UDF</td>
<td>14457</td>
</tr>
<tr>
<td>HDF North</td>
<td>9222</td>
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<tr>
<td>47 Tuc</td>
<td>5766</td>
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<tr>
<td>OmegaCen</td>
<td>4330</td>
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<tr>
<td>SHER-25</td>
<td>4323</td>
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<tr>
<td>(N3603 - Carina Nebula)</td>
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<tr>
<td>PAR</td>
<td>2274</td>
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<td>also Carina Nebula</td>
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<td>NGC 6397</td>
<td>1841</td>
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<tr>
<td>WASP12</td>
<td>1677</td>
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<tr>
<td>Trapezium</td>
<td>1658</td>
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<tr>
<td>SN1987A</td>
<td>1528</td>
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CDF-South region
Appendix: Community Fields

Some background regarding the most-studied HST fields was presented to the JWST SWG in July 2013 (http://www.stsci.edu/jwst/advisory-committee/SWG_072213-JSTAC.pdf). This background is helpful for recognizing why the JSTAC felt that the HUDF/GOODS-S/CDF-S region stood out from all others. More detail can be found in the presentation.

Following a request by JSTAC, STScI did a search for the 50 most visited regions of the sky by Hubble. The small table groups the ten most visited areas and numbers of exposures. The UDF (HUDF/GOODS-S/CDF-S) and HDF-North (HDF-N/GOODS-N/CDF-N) regions are the most observed, along with several galactic clusters. Just the ACS data is shown below for these two fields.

There are currently about 3000 orbits of ACS and WFC3 data on the HUDF/GOODS-S/CDF-S and about 1400 orbits on the HDF-N/GOODS-N/CDF-N. Over the life of HST including all instruments ~6470 orbits, or ~18030 exposures, have been put on the HUDF/GOODS-S/CDF-S and ~4300 orbits, or ~13550 exposures, on the HDF-N/GOODS-N/CDF-N).

The JSTAC discussed the two major regions HDF-N/GOODS-N/CDF-N and HUDF/GOODS-S/CDF-S region but decided to recommend just the HUDF/GOODS-S/CDF-S region.

The other Great Observatories and ground-based telescopes have focused on these areas also. For the HUDF/GOODS-S/CDF-S region, Hubble’s 6 Ms (ACS and WFC3 data) is matched by 6 Ms from Spitzer and 4 Ms from Chandra. This extensive dataset from all the Great Observatories resulted in the JSTAC recommending that the HUDF/GOODS-S/CDF-S region be considered as a “community field” with open access (zero proprietary period).
JSTAC recommendation regarding open access “community” fields (from Mar 26 letter)

“The JSTAC recommends that STScI identify the HUDF/GOODS-S/CDF-S region as an open access “community” field such that GO data acquired on that region normally have zero proprietary/exclusive access period.”

The JSTAC recognizes that agreements limit the extension of the community fields concept to include GTO observations. The uniquely open nature of the investment made in the HUDF/GOODS-S/CDF-S has been widely recognized by the astronomy community, as exemplified by the open access accorded to essentially all data taken in this region.

The JSTAC would like to request that the GTOs voluntarily cooperate in adhering to the principle of open access to GTO data obtained in the HUDF/GOODS-S/CDF-S.

Based on Eric’s email last year, you, the GTOs, can do what you like regarding fields, but we would like to ask you to think about the impact of your decisions and their impact on “maximizing the science return”. Let us come back to this.
Early Release Science (ERS)
JSTAC recommendation regarding early release science – ERS (from Mar 26 letter)

The JSTAC has discussed an open access ERS program (initially as a First–Look program) since its inception. The JSTAC again endorsed the concept of an open access ERS program to be done as early as possible within Cycle 1.

The JSTAC identified the primary goals of an ERS program to be:
(i) educate the community as to the scientific capabilities of JWST’s key instruments and modes;
(ii) ensure rapid data availability so that the community can generate proposals for Cycle 2 that take maximal advantage of JWST’s new and uniquely powerful capabilities (since the Cycle 2 deadline is part way through Cycle 1);
(iii) involve the community in the planning of the ERS program.

The JSTAC noted that to achieve these goals, the ERS program should:
(i) provide a wide range of scientifically-interesting datasets that will enhance the science proposals for Cycle 2;
(ii) exercise a wide range of the expected–to–be most used modes for a range of science topics;
(iii) be carried out very early in the first cycle;
(iv) begin the planning process in an early, open way with proposals from community members.
The ERS program was outlined in a nominal timeline developed for JSTAC by STScI. The selection of science, targets and modes would involve the community and be carried out over the next two years.

The JSTAC recognized that the ERS program would need to be iterated with the GTOs and finalized as the GTO program matures and is finalized.
JSTAC recommendation regarding ERS

“The JSTAC recommends that STScI work with the community to plan for implementation of an Early Release Science (ERS) program that will provide non-proprietary, open access data to the community on a wide range of science programs and modes that (i) demonstrate the scientific capabilities of JWST, (ii) quantify the observational capabilities and (iii) position the astronomy community to submit Cycle 2 proposals that are based on real-world experience with JWST, thereby allowing the community to exploit the full potential of JWST very early in its 5-year life.”

The JSTAC recognizes that as the ERS program is being planned and implemented that iteration will be needed with the GTOs to resolve duplications. The JSTAC encourages STScI to work with the GTOs so that the community involvement in the selection of targets, science objectives and modes is carried out efficiently and is completed when needed before the Cycle 1 Call for Proposals.
open access “community” fields & early release science

summary

The JSTAC’s recommendations for an ERS program and for designation of the HUDF/GOODS-S/CDF-S as an open access “community” field relate to the GO program.

However, the GTOs can also benefit from ERS data and from access to GO data quickly as well. You have the ability to reset your program prior to the GOs at subsequent cycles and you will benefit from seeing new results and opportunities.

Furthermore, when you inevitably submit proposals as GOs or are part of GO teams you will directly benefit also from data that is open access.

The JSTAC asks you to think about this as you plan your program:

As GTOs, you will have a major impact on the GO science program and the overall science return from JWST by (1) your choice of targets and fields, particularly those “benchmarks” with unique characteristics, and (2) by the length of the proprietary period that you choose for those observations.
(B) proprietary/exclusive access period for GOs

March 27, 2014 JSTAC letter
proprietary/exclusive access period

The proprietary period represents a balance between the benefits to the proposal team and the benefits to the community as a whole.

However, the political and the social environment is leading towards more open data access for taxpayer-supported programs which will inevitably push the proprietary time to shorter periods, if not zero.
context: proprietary period/exclusive access period within NASA SMD and other Agencies

**Earth Science:** No proprietary/exclusive access period for all Earth science data from NASA, ESA and JAXA. The proprietary period was set by agreement to make all data open access, i.e., non-proprietary, for Earth science missions.

**Heliophysics:** Has an open access data policy, i.e., no proprietary period.

**Planetary:** The proprietary/exclusive access period for planetary data varies, but two major high-impact programs have 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.

**Astrophysics:** Variable. Smaller missions range from 0-12 months. The ESA Herschel mission had a 12-month proprietary period for the first year, but 6 months thereafter. Large and DD (Directors Discretionary) are typically open access (0 proprietary period) for the Great Observatories.

*For its flagship missions, NASA Astrophysics stands out for its use of a consistently long proprietary/exclusive access period – surprising given the cost of such missions. Lengthy proprietary/exclusive access periods are increasingly at odds with the actions of policymakers towards requiring open access for taxpayer-funded datasets*
the impact of a long proprietary period (12-month)

- Cycle 4 is the first cycle where all of the Cycle 1 data can be used for follow-up
- For Cycle 3, only \(\sim 1/3\) of the Cycle 1 data would be available
- *This seriously impacts the science return from the mission*

[These numbers includes 2 months \((\sim 0.2 \text{ cycle})\) as the data familiarization and proposal preparation period – see next slide]
the proposal cycle

- P proprietary period
- D=>C proposal process duration
- preparation period to assess data before proposing

JWST SWG April 01, 2014
pre-proposal “preparation” period

The early 2010 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 before the proposal deadline to generate a credible and competitive proposal.

Include 2 months (~0.2 cycle) as the data familiarization and proposal preparation period: i.e., for data reduction, familiarization with the results, consideration of the scientific implications, and proposal preparation.
data availability for new proposals

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

<table>
<thead>
<tr>
<th>D → C</th>
<th>P</th>
<th>12 months</th>
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<td>for Cycle 2 proposers</td>
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<td>14 months</td>
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D=→C proposal process duration      P proprietary period

**For 2 month preparation period (for data reduction, familiarization with the results, consideration of the scientific implications, and proposal preparation). Note that ~1 month of data could be available for Cycle 2 proposers from the ERS and any other non-proprietary datasets.
Exclusive access/proprietary time period for JWST GO observations 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).

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<th>( D \rightarrow C )</th>
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<th>12 months</th>
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<tr>
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“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.”

From the March 27, 2014 JSTAC letter

JWST SWG April 01, 2014
proprietary period

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

<table>
<thead>
<tr>
<th>( D \rightarrow C )</th>
<th>( P )</th>
<th>12 months</th>
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</table>

Cycle 2 remains a particular problem – even for a 6-month proprietary period and an expedited TAC process no data is available for Cycle 2 proposers from GO programs, other than ERS data (**~1 month of data could be available for Cycle 2 proposers from the ERS and any other non-proprietary datasets).

The JSTAC spent considerable time discussing what to do for Cycle 1.

Much discussion focused on a recommendation of zero proprietary time for Cycle 1. JSTAC members were uneasy with just zero.

A suggestion was made that JSTAC recommend 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.

This was seen as consistent with JSTAC’s goal of finding balanced approaches to the question of proprietary time vs. data access (previous slide).
there is nothing special about 12 months!

For HST the median time from first observation to first paper for GO programs is \(~2.3\) years

i.e. \(2.3\times\) current 12-month proprietary period

Chandra: 2.36 years

Spitzer: 2–3 years

This clearly indicates that protecting data through publication is not a priority for most PIs, regardless of mission.

A 6-month proprietary period will not impact the publication timescales for individual research programs, yet it will have a substantial positive impact on the quality and timeliness of the science proposed and carried out in each JWST cycle.

JWST SWG April 01, 2014
JSTAC recommendations regarding GO proprietary / exclusive access period

The JSTAC made 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.

These are of particular importance at this time given the scientific gains to be made, given the very large investment in JWST and its 5-year nominal mission life, given 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.
JSTAC’s request to the SWG/GTOs
request to GTOs to consider a shorter proprietary period

Eric's invitation:
“….we will invite a member or members of the JWST Space Telescope Advisory Committee (JSTAC) to discuss their ideas about the benefits to the astronomical community that could be recognized by voluntary reduction of the GTO exclusive use period as well as their recommendation (to the director of the STScI) to reduce the exclusive use period for general observers to six months.”

The JSTAC recognizes the GTO rights that have been granted by NASA, ESA and CSA, but would like to ask you to voluntarily agree to releasing data after 6 months. And even earlier in the first part of Cycle 1.

JSTAC is concerned that a 12 month proprietary period for the GTOs will impact the science productivity of JWST. And that this could do so very significantly in some cases if the GTO observations are spaced out over the first 2-3 cycles in ways that constrain GO (and some GTO) access to key fields or objects. It was noted that some objects or fields may be effectively unavailable to GOs (and some GTOs) for the whole 5-year life of the mission.
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we humbly ask for your munificence

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a collegial approach to GO ↔ GTO data access is what JSTAC is really requesting of the SWG

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JSTAC recommends an Early Release Science (ERS) program

JSTAC recommends a single region as an open access “community” field (the HUDF/GOODS-S/CDF-S region)

Reducing the proprietary period significantly increases the community data access at each proposal submission deadline. JSTAC recommends a baseline 6 month proprietary/exclusive access period throughout JWST’s life for small and medium programs – and 0 months for large and treasury (as currently used for HST, Chandra and Spitzer).

The JSTAC recommends that the baseline 6 months be 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.

The JSTAC expects that the 12-month proposal cycle will remain (due to target visibility and demands on the community for TACs and the cost of TACs)

The GTOs will benefit from the ERS program and the reduced proprietary/exclusive access period for GOs, both as GTOs and subsequently as GOs

JSTAC asks that the GTOs be collegial and generous, and volunteer to reduce their proprietary time to 6 months and to structure their programs so that fields and targets become available quickly to the GO and to the full GTO community.