



February 16, 2016

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

*Re: JSTAC recommendation regarding expeditious release of the JWST Exposure Time Calculator (ETC) with best-known values*

Dear Director Sembach:

The JSTAC is greatly encouraged by the growing interest and enthusiasm within the international scientific community for JWST. Many workshops and meetings by scientific groups and organizations from each of the partners, both community-initiated and agency-initiated, have contributed to this increased interest. An important element is the increasing discussion concerning preparatory observations. In particular, the HST Project and STScI established an important milestone recently by encouraging preparatory observations for JWST in the upcoming HST Cycle 24.

In order to carry out such preparatory observations it is crucial that the scientific community have a way to readily assess the expected performance of JWST in its key modes. This ability is also of great interest to those discussing future science programs, as well as teaming plans. The assessment of the expected performance has typically been done through use of Exposure Time Calculators (ETCs). Yet the ETC currently available to the community is an older version that only supports a minor fraction of JWST observing modes. It also uses numbers for throughput, etc., based on the requirements for JWST. These “requirement” numbers are becoming increasingly superseded by more direct measurements and improved models.

Given the increasing understanding of the instrument performance and improved understanding of the likely telescope performance, it seems timely to make available the more recent and more sophisticated ETC that includes best-known or best-estimate numbers. The growing interest in the community in assessing what JWST can do scientifically has reached the point where the best available ETCs need to be made accessible to all. This is particularly the case given the upcoming HST Cycle 24 opportunities for JWST preparatory programs.

The JSTAC discussed the availability of a more realistic and comprehensive ETC at its December 2015 meeting. The JSTAC recognized that the numbers for the instrument attributes, such as their throughputs, filter response functions and detector characteristics, are still uncertain. However, the committee also noted that the numbers are maturing to the point where they will be close to the “best available” values until JWST gets into orbit.

The JSTAC also recognizes that there are other aspects of the telescope performance (e.g., OTE throughput) and the infrared backgrounds and scattered light that are also maturing but will remain uncertain until on-orbit verification is performed (particularly so for the backgrounds). As

with the instruments, best-available current estimates from the models and measurements can be usefully and appropriately utilized for the telescope and backgrounds in a release of the current version of the ETC. Updates to all the numbers can be done as additional data becomes available, but large changes are generally not expected from this point forward.

Even though uncertainties remain, the need for planning within the science community for both JWST observations and preparatory observations does mean that the ETC should really be made available *now* with best-available numbers. When the ETC is released it is important to be clear and open about the uncertainties. Appropriate caveats need to be clearly stated, and it may well be useful, where practical, to give an assessment of the uncertainty in the ETC responses in cases where it is large (particularly where quite uncertain backgrounds could impact the observations).

The JSTAC also recognizes that there will be a formal delivery of operational software systems that include the ETC. However, this is not due for some time. The JSTAC understands that the ETC subsystem (the ETC “engine”) could be made available more quickly and felt that it should be made available as soon as possible.

Accordingly:

***The JSTAC would like to recommend that the Exposure Time Calculators (ETC) that has been under development should be released to the science community as soon as practical. The ETC should be populated with the best-available measured or model numbers from the instruments and the telescope, and the current best estimates of likely backgrounds.***

***The JSTAC recommends also that careful consideration be given to how best to display to the user the appropriate caveats regarding current uncertainties. This would include clearly worded disclaimers and explanations of the limitations of the ETC, but it would also be desirable, where practical, to display uncertainties or warnings, particularly where the outcome may be particularly uncertain (in those cases where background uncertainties could have a large impact, for example).***

The JSTAC looks forward to the availability of the ETC and to education of the science community as to its use. The ETC will play a crucial role in helping the science community plan for preparatory programs using existing telescopes, both in space and on the ground, and for the discussions that are already developing as teams form in anticipation of the proposals for the Early Release Science (ERS) observations and Cycle 1 observations. Expedient release of the ETC is also important given the upcoming Cycle 24 proposal deadline where JWST-related observations are encouraged.

Sincerely yours, on behalf of the Committee,



Garth Illingworth  
Chair, JSTAC

JSTAC members:

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JSTAC Ex-officio observers from the Agencies:  
(whose contributions to this letter were limited to factual input)

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