



UNIVERSITY OF CALIFORNIA OBSERVATORIES/LICK OBSERVATORY
DEPARTMENT OF ASTRONOMY AND ASTROPHYSICS

SANTA CRUZ, CALIFORNIA 95064

February 25, 2010

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

Re: Scientific Operational Productivity and Capabilities

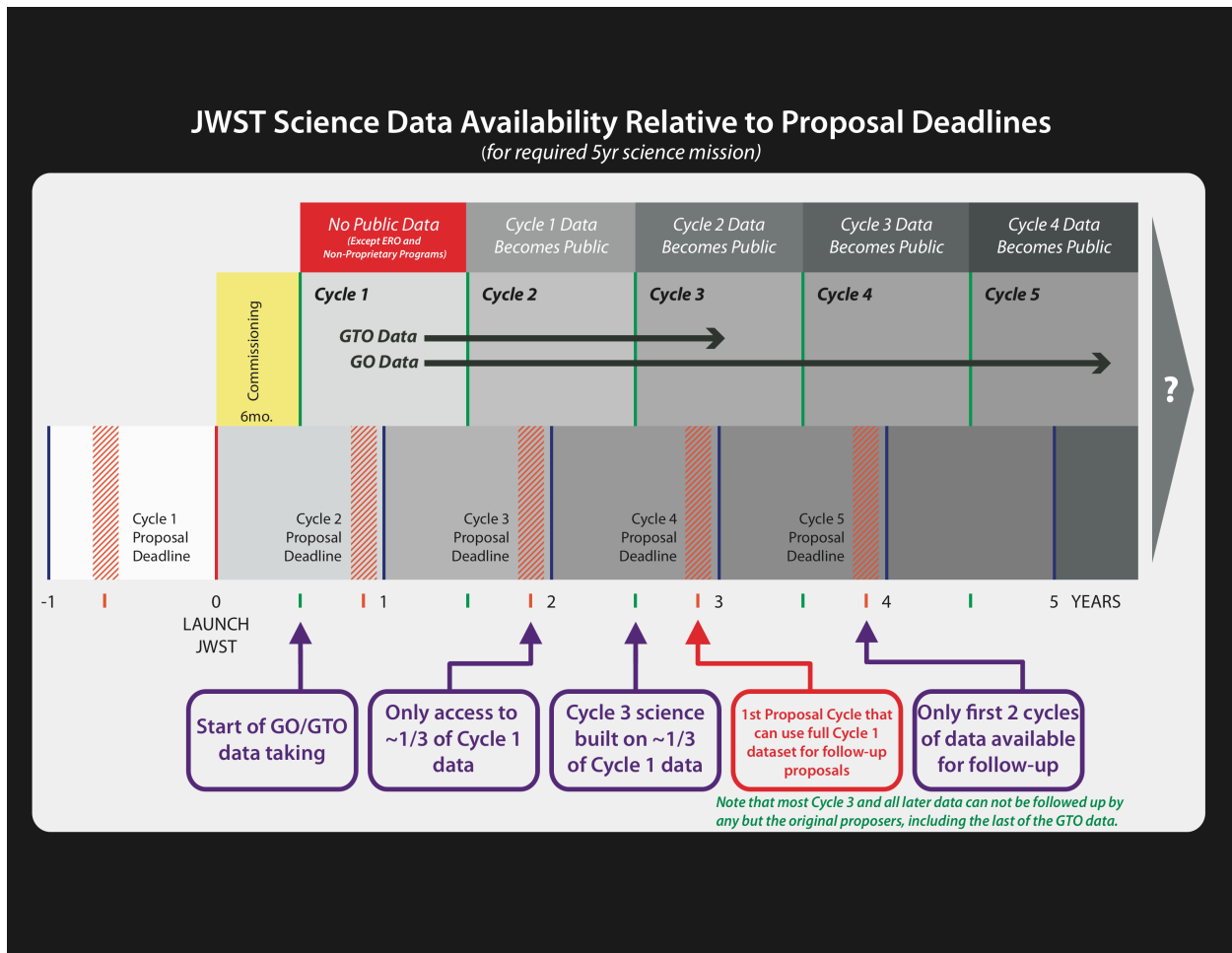
Dear Dr. Mountain:

The JSTAC appreciated the opportunity at its first meeting to become better informed about the JWST program. The comprehensive coverage in the presentations of the many aspects of the JWST program provided a great deal of insight into the status and current challenges. The JSTAC was cognizant during its broad-ranging discussions of a key phrase in its charge: *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.*

The JSTAC spent considerable time through briefings and Q&A discussion on the capabilities needed to operate the Observatory and its scientific instruments effectively and efficiently. The Committee quickly came to appreciate the rather unique challenges associated with maximizing the scientific productivity of JWST. A key factor is the short operational lifetime of JWST (the Level 1 requirement is 5 years). In this it is much more akin to Spitzer than to Chandra and Hubble. Even if JWST reaches its propellant-limited 10-year lifetime, this is short compared to Hubble and Chandra. The need for high scientific operational efficiency *right from the start of operation* became very clear to the JSTAC (especially given the Committee's recognition of the risks inherent in space missions, and the need for such a major mission to maximize the on-target time and the scientific return).

The challenges for carrying out comprehensive science programs that build iteratively on other JWST results, within the 5-year life, were highlighted in a figure discussed by the JSTAC (see below). Several important conclusions can be seen from this figure: (1) the 5-year nominal science lifetime combined with 1-year Cycles and 1-year proprietary periods result in limited opportunity for follow-up observations by those

other than the original proposers; (2) Cycle 3 is the first cycle where some follow-up observations can be done (but only on ~1/3 of the Cycle 1 proprietary data); (3) Cycle 4 is where first cycle where GO and GTO proposers can utilize a *full Cycle dataset* (Cycle 1) for follow-up proposals; (4) in the last cycle (Cycle 5) of the nominal mission the community can only exploit the dataset from just the first 2 Cycles (+ ~1/3 from Cycle 3) of JWST science operations.



GDI – 11/04/09 JSTAC
(with 7-8 months between proposal deadline and start of science observations)

Since the JSTAC members have had considerable experience operating the Great Observatories (Chandra, Hubble, Spitzer) and/or were involved in the efforts to provide operational capabilities for these telescopes, the Committee was quick to recognize the challenges ahead for the JWST Project and STScI. Maximizing the opportunities from the start of operations for effective scientific research with such a complex Observatory requires a major, focused effort. The JSTAC thus viewed with considerable concern the slow progress to date on the convergence between the

Project and STScI on a number of key activities that will provide operational capabilities and/or provide capabilities for efficient reduction and analysis of data (as reflected in the Project-requested “Modes Proposal”, for example). These capabilities are obviously of great importance to the GO community, but the GTOs have also noted the importance of implementing the capabilities in the “Modes Proposal”.

In addition, the Committee considered the need to involve the community in JWST activities (e.g., data processing, science approaches, etc). Such activities by other missions and projects (SIM, SOFIA, LISA, TPF, LSST, SKA, etc.) provide valuable input regarding the particular operational modes for science goals not represented within the GTO community or within STScI. Furthermore, such involvement provides a base of astronomers who can help to provide feedback and support, and interface with the broader astronomy community on a variety of aspects of the JWST mission. The JSTAC requested a discussion at their next meeting of some possible approaches for community involvement, such as “data challenges”, that appear to have been so effective for other missions.

An additional aspect of moving towards operational readiness that was discussed extensively by the committee was the progress on leveraging the extensive operational experience on HST into the JWST program. The Committee was concerned that the funding profile to support JWST operations was being delayed to the extent that HST operational expertise that took years to develop might be lost if the overall (JWST+HST) funding profile had a significant short-term dip. The value of this HST experience for JWST has long been noted within NASA, and within the various oversight and advisory committees, and constituted a significant reason for choosing STScI as the JWST science operations center. This HST ↔ JWST synergy now appears to be at some risk. The Committee has requested that STScI discuss this synergy aspect with us at some length at its next meeting. The Committee also noted that sudden ramp-ups of technical personnel are disruptive and potentially ineffective since the necessary experience and background for productive software development does not come about overnight.

In summary, the Committee strongly encourages STScI to work with the JWST Project to bring about a resolution of the open issues regarding the ramp-up of development for science operations (as reflected in the “Modes Proposal”, for example), and to explore ways to begin to involve the community in a phased way so as to prepare them for science operations (and to leverage the development of tools and capabilities, etc., that will diversify and maximize the scientific output of JWST). In addition to the GTOs, it is crucial to have a broad community of interested and involved scientists active in enhancing the science capabilities of JWST, and active in working for its success as a science mission, during the remaining, all-too-short period before launch.

The Committee is particularly appreciative of the support of the STScI staff (and, in particular, would like to thank Karen Keidel for her organizational assistance). We also

would like to thank you, your scientific and technical staff, and those from the agencies for their efforts in setting up and supporting this important activity.

A further letter from the JSTAC will deal with a number of thoughts and concerns that were discussed during the meeting by the JSTAC, but that were of a somewhat broader and/or longer-term nature.

Sincerely yours, on behalf of the Committee,

A handwritten signature in black ink, appearing to read "Garth D. Illingworth". The signature is fluid and cursive, with a long horizontal stroke at the bottom.

Garth D. Illingworth,
Chair, JSTAC

JSTAC Committee Members:

Roberto Abraham, Neta Bahcall, Stefi Baum, Roger Brissendon, Malcom Longair, Christopher McKee, Bradley Peterson, Joe Rothenberg, Sara Seager, Lisa Storrie-Lombardi, Monica Tosi

JSTAC Ex-officio representatives of the space agencies:

Alain Berinstain (CSA), John Mather (GSFC), Mark McCaughrean (ESA), Eric Smith (NASA HQ)

Cc. STScl:

Kathryn Flanagan, Massimo Stiavelli, Peter Stockman