

TUC Community Survey Summary

This document lists relevant comments by TESS community members collected TESS Users Committee Community Survey conducted between December 2023 - January 2024 in response to the following question:

Is there any aspect of TESS that you feel could improve in the future? Possible areas include topics such as data accessibility, the TOI catalog, TFOP, ExoFOP, GI, ROSES, MAST, cadences, and pointings.

Comments have been grouped into common categories.

TESS Users Committee, March 2024

Cadence:

More 20 second cadence observations and longer dwell times on each field

Higher time cadence mode can help stellar flare science a lot. It is very important to keep the current 20-sec & 120-sec of the requested objects.

Make FFI lightcurves

Pipeline reduced FFI stars, as for the 120-s and 20-s data.

If it means slightly more stars would be observed in high cadence, a cadence mode between 20 and 120 second might be beneficial for asteroseismic studies. Depending on the target we can predict the frequency of the oscillations, and so targets may be assigned a lower cadence, thereby saving some bandwidth for more high cadence targets.

In the future, it may be desirable to continue including a 120-second cadence option to allow scientists to conduct uniform, high-precision analyses that also incorporate data from Years 1-7.

Better quality FFI light curves

Currently 20s data is of higher quality for bright stars due to the way cosmic rejection is handled. It would be great if 120s data and 200s FFIs were fixed to be the same

More consistent data products for larger number of stars (e.g. more SPOC FFI lightcurves)

Pointings:

If possible, sector timings should be aperiodic to improve long-period planet detection function - i.e. observing four sectors each separated by exactly 2 years is bad (many many periods missed). Two continuous sectors followed by a 3 year gap then a 1 year gap is far better (as detected transits have far fewer ambiguous periods).

extended pointings, user-driven pointings, user-proposed on-chip/cadence strategies, non-uniform on-chip binning,

I'd like to see longer single pointings.

TESS should have more sectors with less crowded fields (away from the Galactic plane and the Magellanic Clouds)

TESS pointings should aim to minimize scattered light, given that it's roughly qualitatively predictable.

Please observe the southern ecliptic equator.

TESS should point at a single field for as long as possible (overlap with Kepler or K2 would make sense)

I would advocate for a new pointing strategy with TESS that results in the most uniform possible coverage across the sky, with stares roughly 2 to 3 times longer than they currently are now, maximizing the discovery space for slightly longer period transiting planets than have been found by TESS so far (with ~25% of time per year available for other community projects). I would also advocate for the incorporation of light curves produced by the giants pipeline in an automated fashion into MAST as a High Level Science Product.

Software:

TESS needs better visualization and analysis tools that empower time domain analysis with a stack of the FFIs, preferably in a way that does not require downloading all the FFI data to one's computer, but with more flexibility than downloading small sections with TESScut.

There should be an opt-in listserv to announce when TICA data for a specific orbit is released, as I constantly have to refresh Twitter for this.

More detailed and/or more accessible descriptions of the data products, instrumental effects, systematics.

Hosting and processing TESS data for asteroseismic purposes. The SPOC pipeline data is useful but not optimal for asteroseismic inference. Its ease of accessibility through the MAST portal and software like Lightkurve make it the preferred data set to use for large asteroseismic surveys. A formal set of data for asteroseismic analysis, accessible through MAST, would be very useful.

An updated TIC based on Gaia DR3 would be exceptionally useful as the parameters for not most but a good fraction of TOIs or even just TIC entries are out of date or even blank at times. I recognize that this would be a significant effort, however I think that an update is necessary to do much of the exoplanet science that TESS is enabling in its extended missions.

Access to the TESS data and light curve plots through the MAST portal has been lost, but still exists for the Kepler and K2 data. I used to use this option a lot, and would love for it to be reinstated.

published light curves are really helpful- everyone having to make light curves slows down student projects by 6 months to a year every time. funding for things that rely heavily on archival data through TESS might also start to be a good option. Technically they are possible through ADAP, but the scale of an ADAP and the scale of a GI grant are pretty different.

The TESS data at MAST is a confusing mess. In particular, metadata columns such as Provenance, Instrument, Project are used inconsistently, and the labelling of different datasets is non-intuitive. This makes it very hard to download only the data products that one wants.

Maybe it exists and I missed it, but searching for TESS targets on MAST by stellar parameters (Teff, L, Vmag, etc.) would be very useful.

There are a large number of TESS HLSP products and only a limited amount of funding for the MAST to deal with them. It would be helpful for the TUC to provide feedback to the TESS project as to how these should be prioritized.

Working Groups:

A much clearer order of operations for what TFOP is and what officially joining it means. For example, I do not know how to direct others to join the TESS wiki if they do not already have an account. Perhaps a session dedicated to administrative topics like this might be useful at the next TESS Science Meeting.

The TOI catalog construction should be accompanied by more detailed information including completeness curves, relative roles of neural networks vs. periodograms, training sets for classifiers, etc with evolving overall assessment of catalog reliability in different regimes. Both internal NASA/MIT and extramural programs for methodological improvements are needed with

associated workshops. Simply releasing catalog entries from a fixed, opaque selection process is not sufficient for high quality science outcomes.

I think there could be more attention given to the Community TOIs, there doesn't seem to be much conversation about how CTOIs are followed up after they are published or if the quality of CTOIs are the same amongst one another.

I would like to see improved access to the TOI catalog and a TESS TCE catalog. Improvements would include better traceability and more rapid incorporation of the CTOIs. It would help to have a more comprehensive TOI/TCE catalog including QLP, QLP-Faint, SPOC, TESS_SPOC, CTOI, This might be the job of the Exoplanet Archive or MAST, rather than the TESS mission. In addition, a TCE catalog indicating which objects were *not* promoted to TOI is critical for other groups doing transit searches.

I would like to see a more detailed ExoFOP TOI catalog. For example, a federation of SPOC and QLP TCEs to a specific TOI, comprehensive documentation on the columns of the TOI catalog, a more clear way of linking TOIs with radial velocity observations, and a clear path on the method used to derive the dispositions (e.g., why is a TOI dispositioned as APC. The description under the comment column is nice but somewhat vague sometimes). Federating TOIs with KOIs would also be useful!

General Investigator Program:

It is increasingly difficult to motivate programs with new TESS data given the abundance of existing TESS data, even if the science idea is sound.

Large GI grants should automatically run for 2 years, rather than being for one with an expected renewal for the second.

Mission coordination:

It would be nice to do a joint observation with ULTRASAT, or pointing to southern hemisphere overlapping with Rubin, when these missions start observing.