

TESS Science Conference Community Discussions Summary

29 August 2024

The TESS Science Conference took place from July 29 – Aug 2 2024 at MIT. Five community members of the TESS Users Committee (TUC; Bouma, Huber, Mathur, Rest, Rice) participated in person and facilitated a community discussion session on Thursday August 1 9am-10:30am. The agenda of the session was as follows:

- Introduction to the TUC, Goals for the session (Dan Huber)
- Plausible Changes in the Third Extended Mission (Roland Vanderspek)
- Community Survey Results Summary (Luke Bouma)
- Community Science Pitch Summary (Allison Youngblood)
- Open discussion (50min)

The slides of the presentations are available [here](#) and a recording of the session is available [here](#).

This document provides a high-level summary of discussions during this session, as well as general discussions with community members during the week. It also provides summary recommendations on how the broader community feedback (including the community survey, science pitches, and discussion) could be used for the upcoming extended mission proposal. These recommendations should be weighed against technical feasibility studies, funding realities, and other considerations.

Pointing Strategy:

Community members expressed interest in a pointing strategy that would increase continuous coverage at mid ecliptic latitudes, in exchange for less coverage at the ecliptic poles. This would enable the detection of transiting planets at longer orbital periods, which are currently often captured as single or double transit events, and provide additional planets for atmospheric studies with JWST. Transit detections at mid ecliptic latitudes also allow easier ground-based follow-up observations, since stars near the ecliptic poles are often only observable at high air masses. Extended coverage at mid latitudes would also benefit extragalactic science cases, for example longer duration transient events.

Counter arguments brought up during the discussion were that the ecliptic poles correspond to the continuous viewing zones of JWST, and thus the detection of transits at mid-latitudes would not provide ideal JWST targets. Furthermore, shifting fields too far away from the ecliptic plane would have some detrimental impact on solar system science. The mid-ecliptic pointing strategy suggestion also needs to be weighed against science pitches which argued for continued continuous coverage of the ecliptic poles, which would further extend the baseline to exceed the longest duration observations of Kepler (and PLATO in the future).

The TUC recommends that the TESS project considers all community input (community survey, science pitches, and the TSC discussions) and weighs pointing options against operational possibilities. One path forward may be to perform some form of modifications to the “status quo,” while keeping in mind that the majority of the community does not appear to favor a drastic change in pointing strategies. This could be realized by implementing longer (54 day) observing sectors with close to nominal pointing and roll angles, which would extend the CVZ baselines and provide some extended mid-latitude coverage, at the expense of less sky coverage in regions that have previously been observed.

Observing Cadences:

Community members voiced significant interest in increasing the number of targeted observations with higher cadence. One suggestion was to use on-board storage that is currently used as backup in case of a missed data downlink for additional 20-second cadence targets, and discarding those observations if a downlink is missed. Community members also flagged possible benefits of changing the FFI cadence for aliasing reduction, which however will likely be achieved by the intrinsic variability of the FFI cadence itself. The community showed significant interest in the possibility of targeted 2-second observations.

The TUC recommends that the TESS project considers rebalancing current priorities in observing cadence for EM3. One possible approach would be to increase the number of 20-second slots and consider offering 2-second light curves as a new observing mode for a small number of targets, if the resources required to do so are not prohibitive. As discussed in the TUC report from March 2024, reducing or removing 2-minute cadence data could be considered if the generation of SPOC-FFI light curves can be increased.

Data Products:

The community was supportive of increasing the number of SPOC produced FFI light curves. Some discussion surrounded the feasibility of implementing this on the project side, with a conclusion that it is feasible if sufficient resources are allocated.

Community members voiced support for producing a homogeneous catalog of TESS planet candidates. Current catalogs are produced using different pipelines, and thus are not yet suitable for exoplanet demographics studies such as planet occurrence.

The community expressed interest in a tool that allows users to connect the current latest version of the TIC (v8.2), which is based on Gaia DR2, to Gaia DR3.

The TUC recommends reprioritizing mission-generated data products in EM3, if feasible given budget realities. The highest priority should be the production of SPOC-generated FFI light curves, which was recommended in the TUC report from March 2024 and has strong support

from the community. The TUC also recommends providing guidelines to the community as to which NASA funding sources can be used to achieve catalog-focused work (such as the examples mentioned above).

Guest Investigator Program:

No specific points regarding the GI program were raised during the TSC discussion session. The TUC interprets this as overall content within the community with the current options offered by the GI program. The TUC recommends that the project requests strong support for the GI program for EM3, given that it is vital to keep the US community engaged in using TESS data.