TESS Objects of Interest Catalog

July 29, 2019 | MIT | TESS Science Conference

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the TOI process

Threshold-crossing events (TCEs) → Triage → Vetting → TOI Catalog

QLP (FFIs) → SPOC (2-min)
Convolutional neural network triages phase-folded light curves into “transiting” and “non-transiting” categories. (Yu et al, arxiv:1904.02726)

Applied to sector 5 onwards for QLP light curves from 30-minute FFI data.

Deep learning for automated vetting in development.

Code and training set are publicly available!

https://github.com/yuliang419/AstroNet-Triage
https://github.com/yuliang419/AstroNet-Vetting
TESS Exo-Class (TEC) triages 2-minute targets with SPOC DV products using a decision tree and a database of attributes/metrics.

Applied from sector 2 onwards

Code is publicly available!

https://github.com/christopherburke/TESS-ExoClass
the TOI process

- QLP (FFIs)
- Threshold-crossing events (TCEs)
- SPOC (2-min)
- Triage
- Vetting
- TOI Catalog
Vetting identifies potential TOIs among the TCEs.
Identify planet candidates that need follow-up:

- promising likely planets for TESS L1 requirement (50 planets, Rp < 4Re, w/mass)
- promising non-L1 likely planets
- marginal candidates

Record TESS detection of known planets
**TOI vetting team**

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Tansu Daylan  
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Steven Villanueva  
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Pam Rowden  
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Ian Crossfield  
Zahra Essack  
Daniel Yahalomi  
Prajwal Niraula  
William Fong  
Lizhou Sha  
Dave Latham  
Sam Quinn  

...
TOIs go out first at tev.mit.edu
ExoFOP shares TOIs with the follow-up community.

<table>
<thead>
<tr>
<th>TIC ID</th>
<th>TOI</th>
<th>TFOPWG on</th>
<th>TESS mag</th>
<th>RA (degrees)</th>
<th>Dec (degrees)</th>
<th>PM RA (mas/yr)</th>
<th>PM Dec (mas/yr)</th>
<th>Midpoint (BJD)</th>
<th>Period (days)</th>
<th>Duration (hours)</th>
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</table>
ExoFOP hosts Community TOIs (cTOIs)
syntax: `<TIC ID>.<index>`
example: `100000001.01`

TOI team reviews cTOIs and can add in targets the project missed.
syntax: `<TOI ID>.<index>`
example: `101.01`

Natalia Guerrero | MIT TESS Science Office | @TESSatMIT
993 planet candidates (so far!)

from twelve sectors

271 candidates less than Neptune size

24 published planets and many more to come…
We predicted TESS would fill in this region:
We are mapping the “neighborhood” of TESS planets

Guerrero et al (in prep)
TESS sees many bright, small(ish) planets to follow up!

Guerrero et al (in prep)
993 planet candidates
(so far!)
from twelve sectors
271 candidates less than Neptune size
24 published planets and
many more to come...
Backup slides
SPOC is the pipeline of record. QLP is MIT-internal, primarily intended to supplement SPOC for the first four sectors and for FFIs.

TOI list:
- ExoFOP
- MAST
- Public website
Threshold-crossing events (TCEs)

- Planet candidates
- Eclipsing binary
- Stellar variability
- Other astrophysical
- Instrument noise and systematics