# Improvements to **eleanor**, an open-source pipeline for FFI light curve extraction

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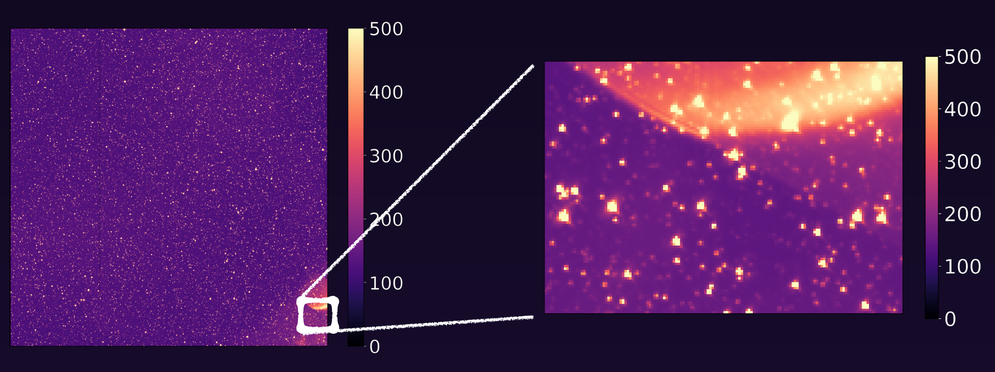
## introduction

- 1 sector contains ~$10^6$ stars, but light curves are only produced for 20,000 short-cadence targets
- **We are creating light curves for the remaining 98% of stars and searching them for exoplanets as well as providing the community with software for their own analysis of targets within the FFIs**
- Our software is open-source and ready for use for all your time-series photometry needs

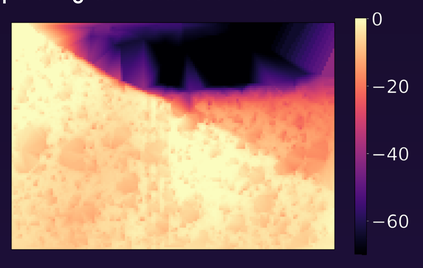
## light curve creation

- We download all FFIs and slice them into a user-friendly format
- "Postcards" are 148 x 104 pixels, with 50 pixel overlap between postcards (below)

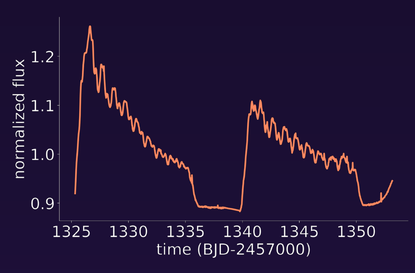



- We test two different methods of background estimation to obtain a light curve with a minimized CDPP

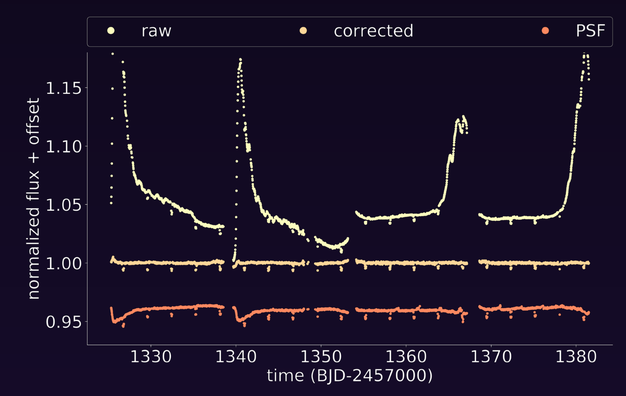
1. We remove the extended PSF of stars in the postcard and model a 2D background, interpolating across where the stars are



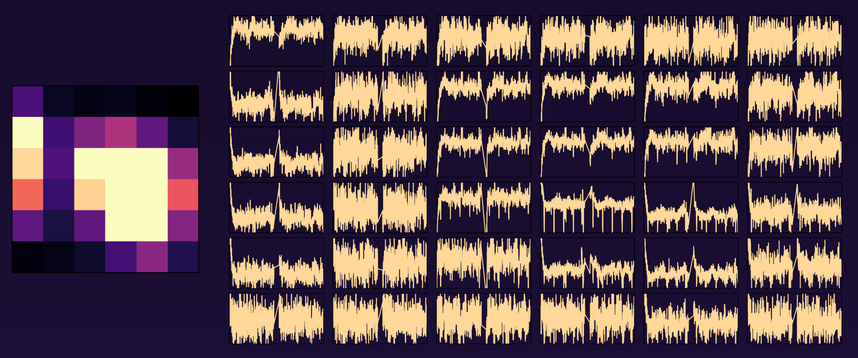

2. We estimate the background as a constant value for each cadence on the postcard and TPF level




- We test a variety of apertures for light curve extraction, choosing the best aperture to minimize noise post background subtraction
- Principal Component Analysis using the CBVs from the SPOC pipeline enables cotrending to remove shared systematics
- Point spread function(PSF) modeling is also available for detailed analyses



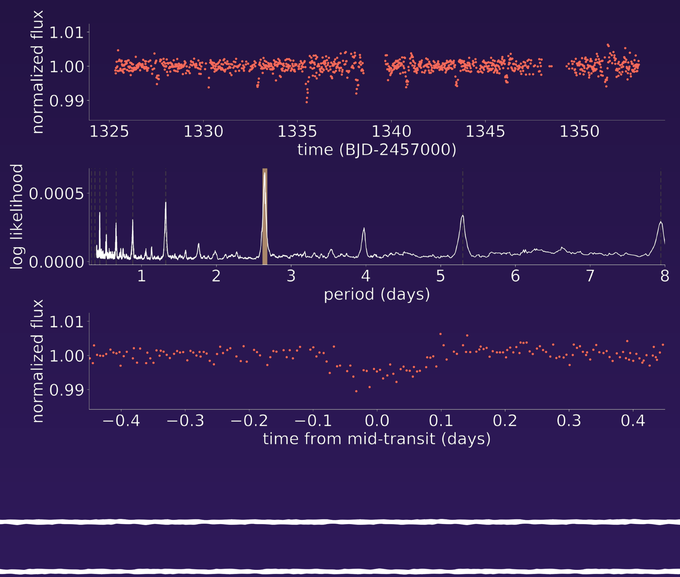

- **Analysis of different correction techniques for light curves of TIC 234503282 (above).** Long term trends are nicely removed in the corrected and PSF flux.



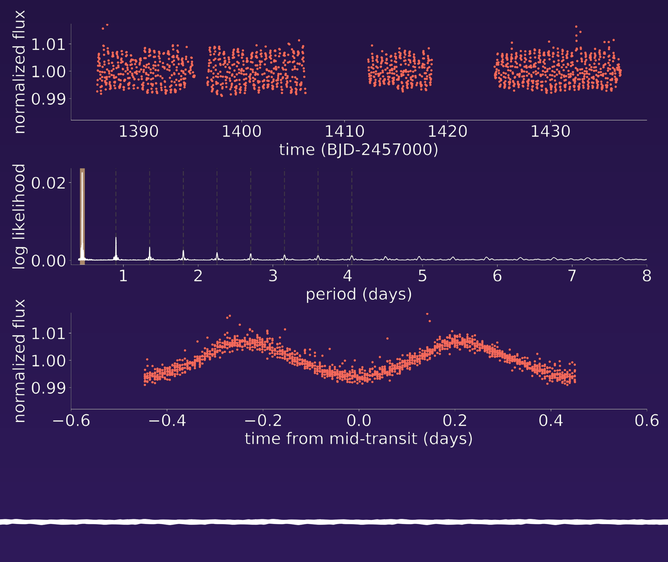
- **Don't let the large TESS pixels fool you! (above).** We're implementing new vetting diagnostics to help users determine exactly which pixels are associated with a given astrophysical signal

## new science with eleanor

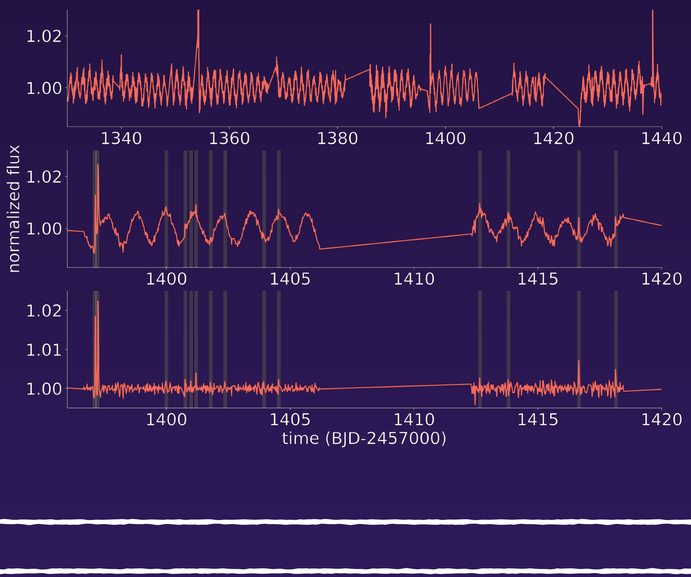
- New exoplanet candidates: TIC 350930938




- Calibrating gyrochronology for young low-mass stars
- Example: $T_{eff}$ = 3707 K; $P_{rot}$ = 0.45 days; Tuc-Hor candidate




- Identifying flares in members of young moving groups (check out my new software **https://github.com/afeinstein20/stella**!)




## eleanor availability

- Software tools are available **NOW** for all 12 current sectors**!** **pip install eleanor**
- Documentation: http://adina.feinste.in/eleanor/
- **Accepted** paper on arXiv: https://arxiv.org/abs/1903.09152

Questions? Let's chat! @afeinstein20

Stop by my talk **Wednesday @ 1:50** during the Count all the Photons! FFI splinter session.