SINGLE TRANSITING PLANET CANDIDATES FROM K2

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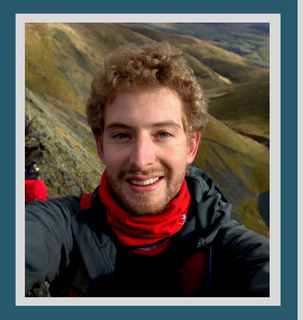


ABSTRACT

We present results from a search for Single transiting planet candidates in 6 campaigns of K2. More than 30 candidates were identified, with 15 of the brightest undergoing follow-up. We also develop the tool `Namaste` to estimate orbital parameters from a single transit.

INTRODUCTION

The high-precision photometry of K2, Kepler's secondary mission[1], has discovered more than 200 multi-transiting planet candidates to date. It is also capable of detecting (to 6-σ) exoplanets as small as super-Earths in a single transit. The detectability of single transits is also improved by K2's 80-day campaigns. Single Transiting objects have also been found and validated in the primary Kepler mission[2].

To detect K2 single transits, we performed an iterative search on 6 campaigns of K2 data. The best candidates were then selected by eye to rule out systematics.

CANDIDATES

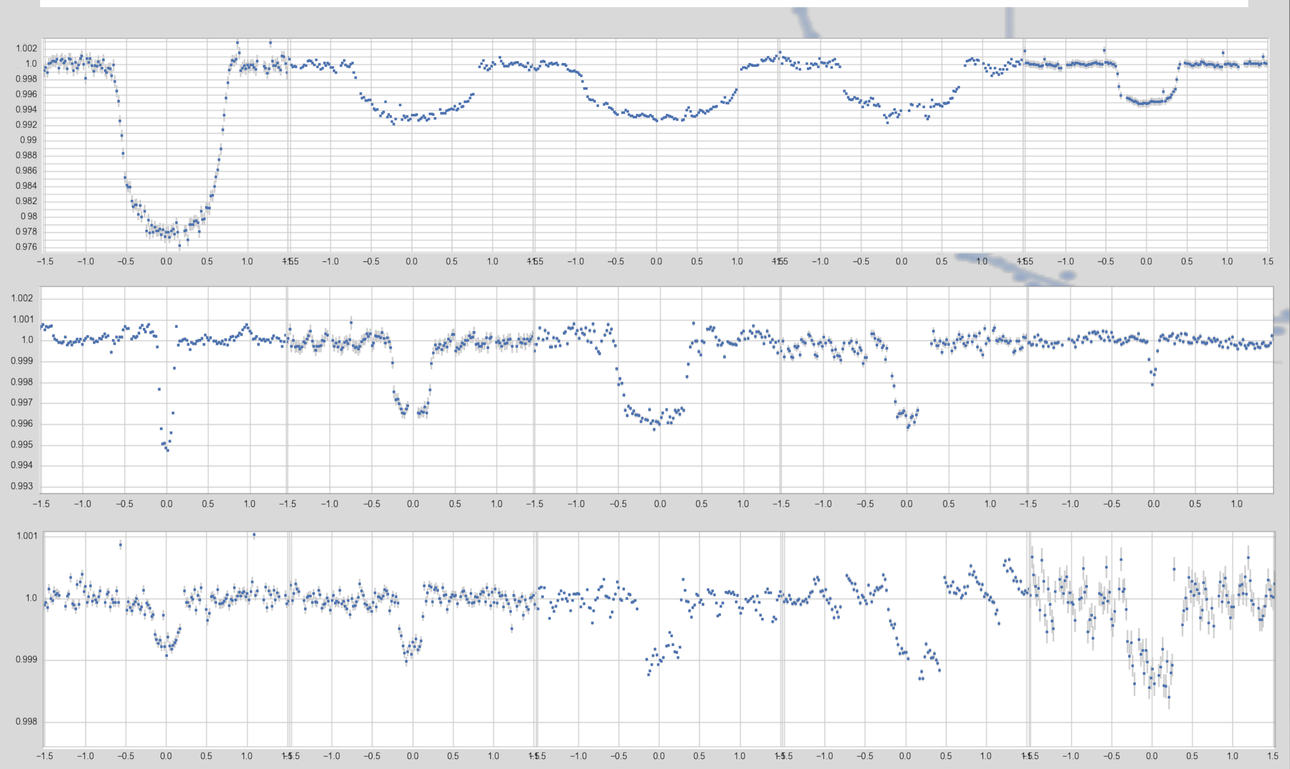


Figure 1: 15 Single transit candidate lightcurves from Jovians to super-Earths.

More than 30 candidates have so far been identified, with depths from 800ppm to 2%. As expected from planet populations, shallower transits are significantly more common than deep ones. This candidate list include two of the 5-planet HIP41378 system, validated in 2016[3].

Follow-up analysis including high-resolution spectroscopy is underway to rule out blended eclipsing binaries, improve stellar parameters, improve planetary orbital estimates & determine masses.

ANALYSIS

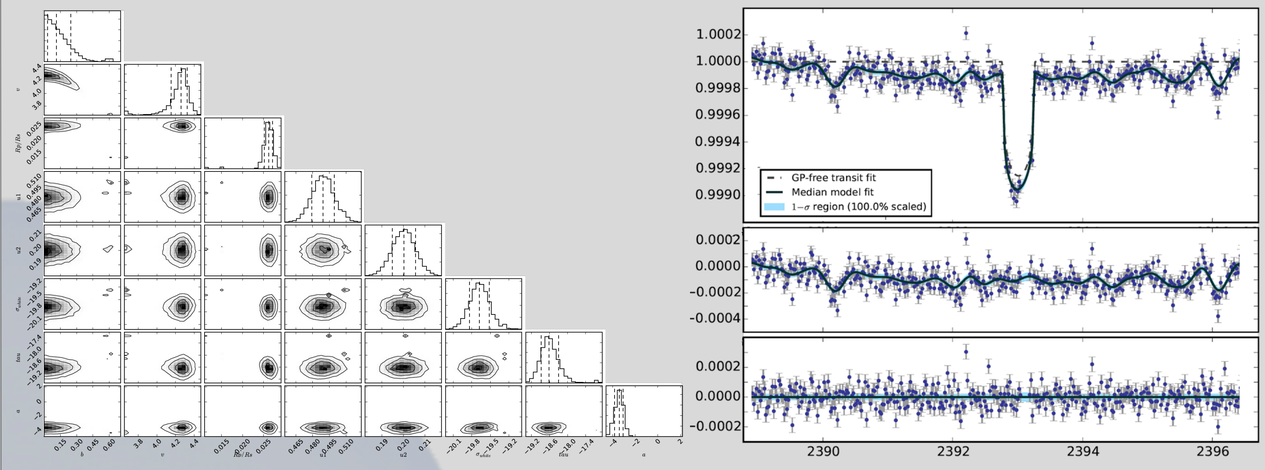
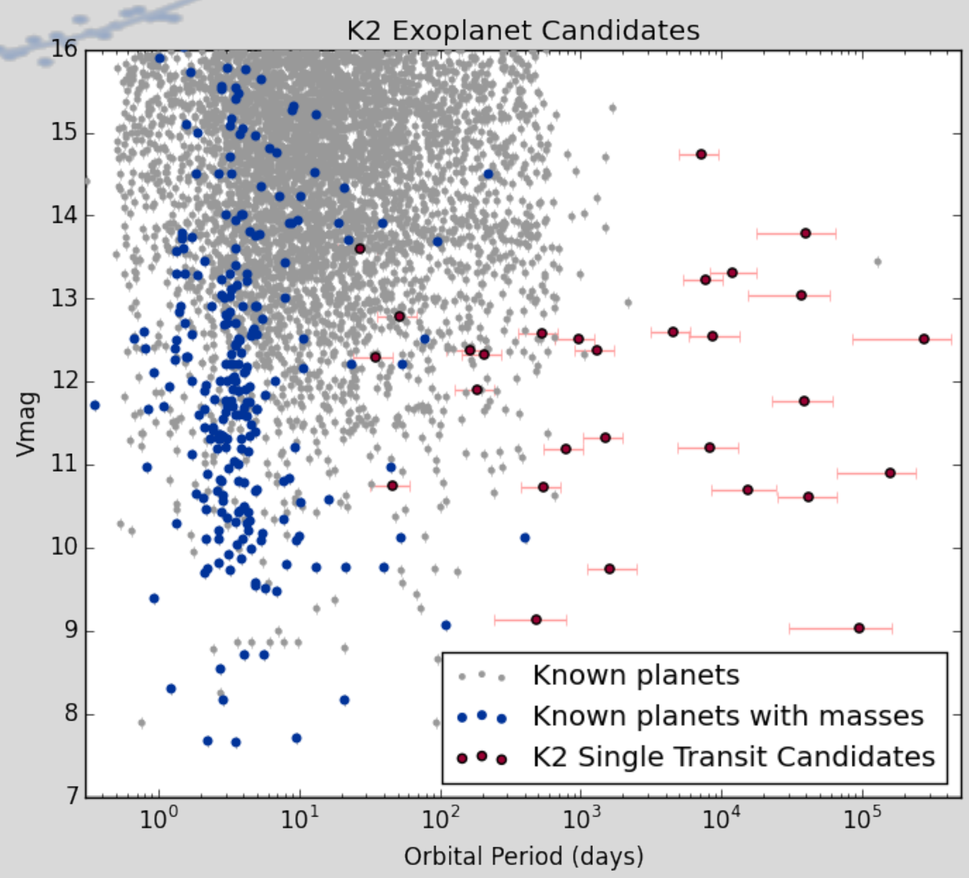


Figure 2: `Namaste` fit and posteriors for a single transit candidate.

Information from a single transit, combined with stellar parameters, can be used to estimate an orbital period for the planet. We built `Namaste` (An MCMC Analysis of Single Transiting Exoplanets)[4] to estimate this from the lightcurve. This uses Gaussian processes to model stellar and red noise, and `emcee` to estimate the errors on model parameters. It assumes eccentricity is negligible (e=0). Stellar information is estimated from photometric colours or from spectral fitting where available (eg ExoFOP).

RESULTS

Our planet candidates populate a wide and unexplored region of parameter space. Confirmation of such planets will reveal some of the brightest, longest-period transiting exoplanets. These would provide excellent follow-up opportunities, such as RVs, transmission spectra, RM, etc.



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