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| --- |
| **Overall Finding**  Plots: ratio vs magnitude, depth 120 vs depth 20, ratio vs depth  Main thing is offset in ratio vs depth (or potential trend in ratio vs magnitude)  Want depth20/depth 120 = x =🡺 median(x) (more resilient against outliers)  y = std(x)/sqrt(n) – standard error of the mean (SEM) (uncertainty in our value)  say x +/- y (‘average’ value of ratio +/- uncertainty in ratio)  **Find standard offset – interesting result**  Take depth 0.05 and greater - because individual offset below that goes over the systematic offset (ratio) - can't measure the scatters well enough to distinguish  We’ve measured a 1-2 percent offset - but is it significant? at lower depth no because the individual error in the plots is bigger than that offset - we can't tell if it’s the random error at lower depths causing the trend.  e.g if systematic at 0.5, and random at 0.1 - we can measure random precisely, but if that random precision is way bigger (e.g small depth) we can’t tell if the systematic is a result of the random error  At the larger depths we can tell and have a significant result.  **Quantify this separation:** measurement error - numerical justification + visually  Take in transit (flat bottom) data (std) and divide by number of points for the individual error.  ratio of error / depth = relative error  Find percent error in individual vs percent error in median (at the two depth bins) |
| **Overall Uncertainties/Precisions**  Also want std(light curve 20)/std(light curve 120) against magnitude (precision in data)  What Dan did but still interesting – compare the uncertainties/scatter in the two cadences |
| **Individual Results**  set a limit to the smallest planet that could hide in the data 🡪 2min vs 20sec - binned to same cadence - 20sec should have a smaller scatter at binned cadence - had a planet hiding in the noise of 2min, but since 20sec has smaller scatter - can now detect - but some planets still can hide - what is the limiting transit depth and therefore planet size for a star  pi men for example - 2 earth radius planet (he thinks)  How to do? 🡪 injection/recovery test  take light curve - just noise, no planet - noise case periodogram - nothing really there  now inject a planet signal - generate a model of data with the planet added - add planet signal and noise signal - take periodogram again - can make signal smaller and smaller - can take signal to noise ratio in periodogram - keep making planet signal smaller - signal to noise vs planet radius graph - cutoff when signal to noise is below 4 - minimum planet size limit. Now repeat at different phases - different parts of light curve and repeat - and see distribution of limit.  **measuring signal to noise ratio - how to do it? - use bls - if max period/average noise > 4 its good - average across different sections**  measure scatter - standard deviation - 120 sec vs 20 sec - bin 20 to 120 and take stdev of noise (remove transit) |

report - explain tess, cadences, observing strategy, important is different modes, pros and cons - explaining cadences, why is it important - reasons - new planets, making sure things haven't been changed poorly, why is the 20sec cadence data better? - don't really know - better precision - onboard vs on earth processing of cosmic ray processing

for presentations - explain transits, light curves, planet size relative to star, animation of transit - explain cadences, tess

then ramp up the level, don't want to confuse everyone, just some people

conclusions - what is scatter - do depths agree - do durations agree - ratio vs depth, ratio vs magnitude, are there any trends - if not - good - then processing is valid - if trends are present - interesting - what difference in precision - many many tois - individual tois - presence of extra planets - or something interesting - look at brightest ones

toi 573 is an interesting one - big depth - good difference in scatter.

presentation:

5 +5 +5

intro and motivations - tess, why, what, 20 vs 120, cadence, data processing, cosmic ray rejection (onboard, vs on earth - the way they reject the rays)

methods - individual transits, how we did it, then iterating