Observational Efforts

What we've done

Observational Efforts

At our meeting last year, we had observed 5 nights and processed very little data.

Since then, we have observed about 45 additional nights and have processed a fair fraction of the data.

Observational Efforts

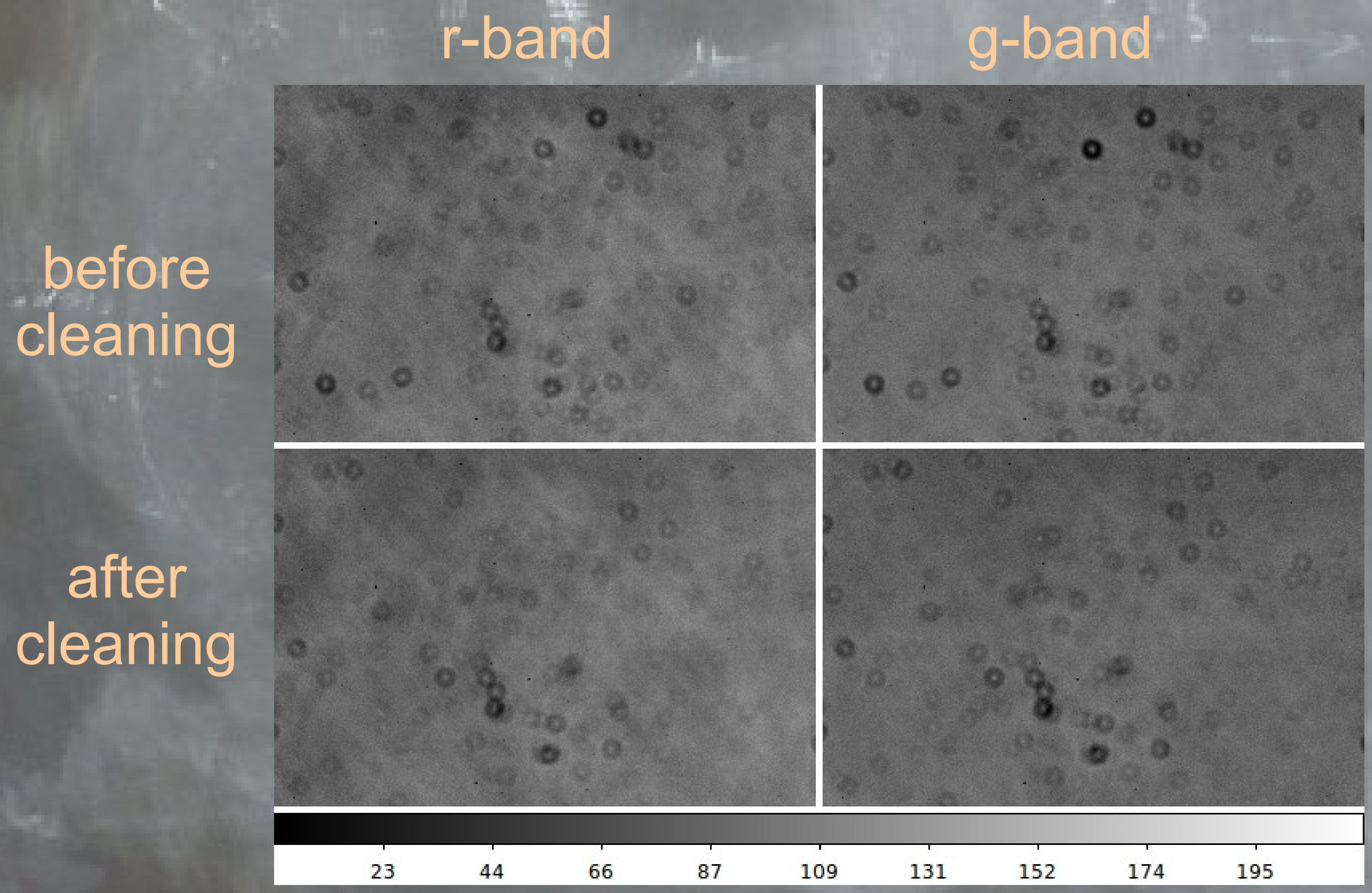
Kent will talk more about this after lunch.

Observational Efforts

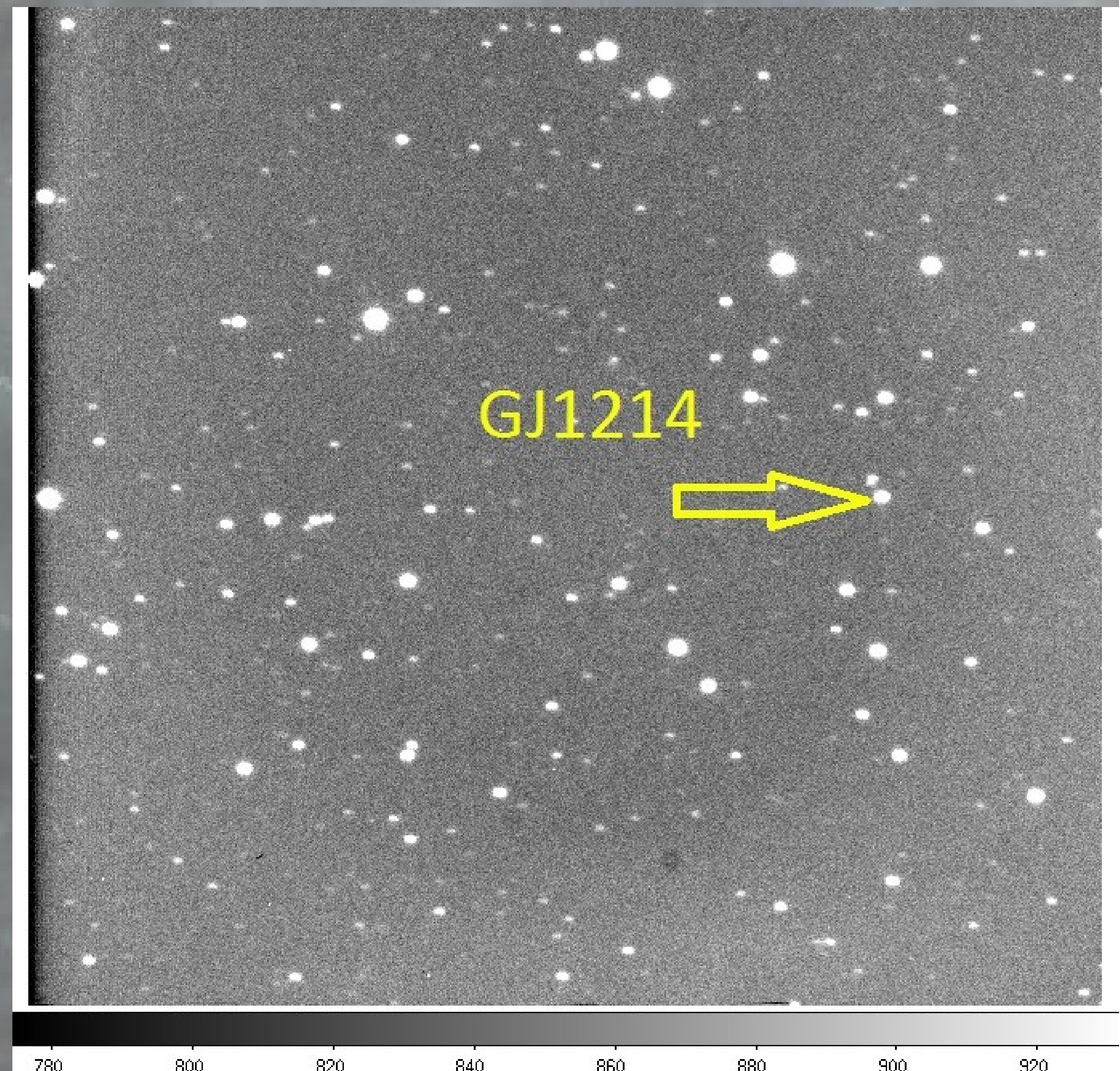
What we've done

So what have we learned?

The CCD camera we were using had issues: as a result, it is likely our data are limited by *systematics* rather than S/N or local conditions



Different detectors have different fields of view.



Snapshot -vs- Continuous Mode

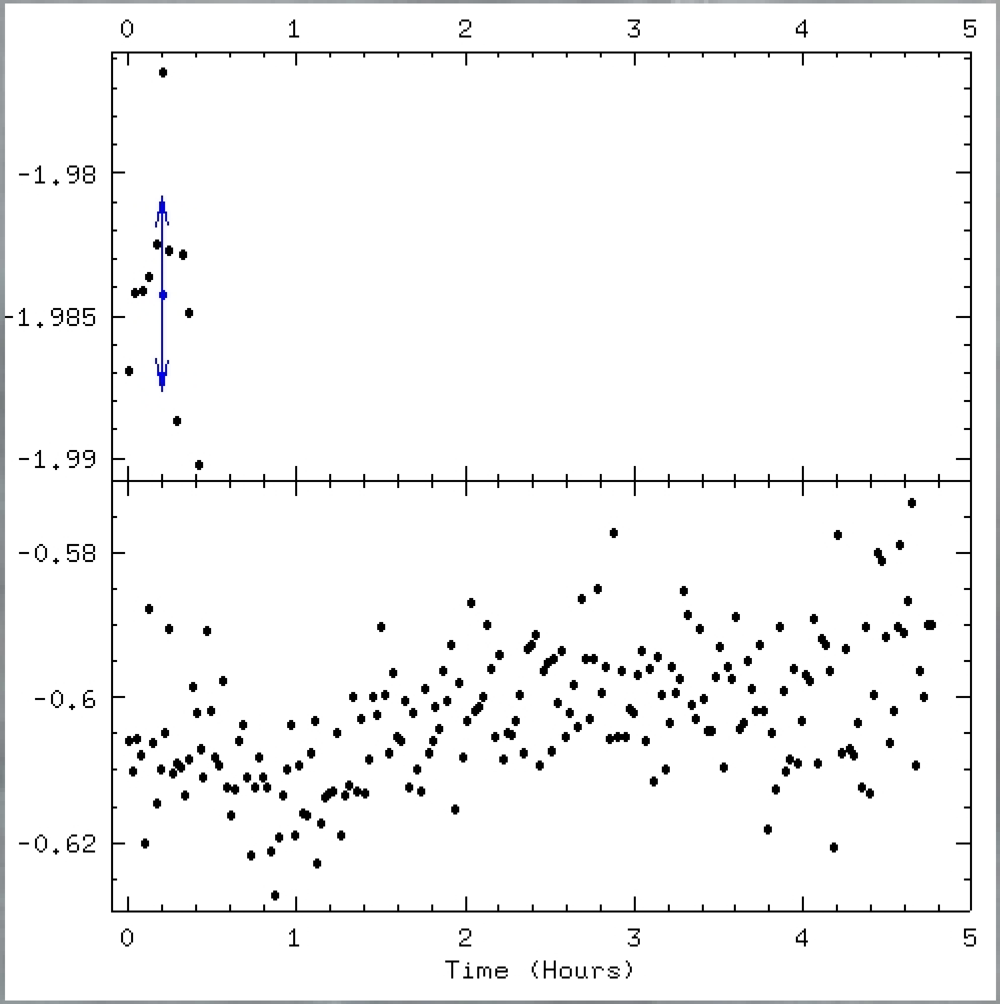
Snapshot mode is taking a set of 10 images at a time and cycling through several stars.

Continuous mode is observing one star for as long as it's visible during a night.

Snapshot -vs- Continuous Mode

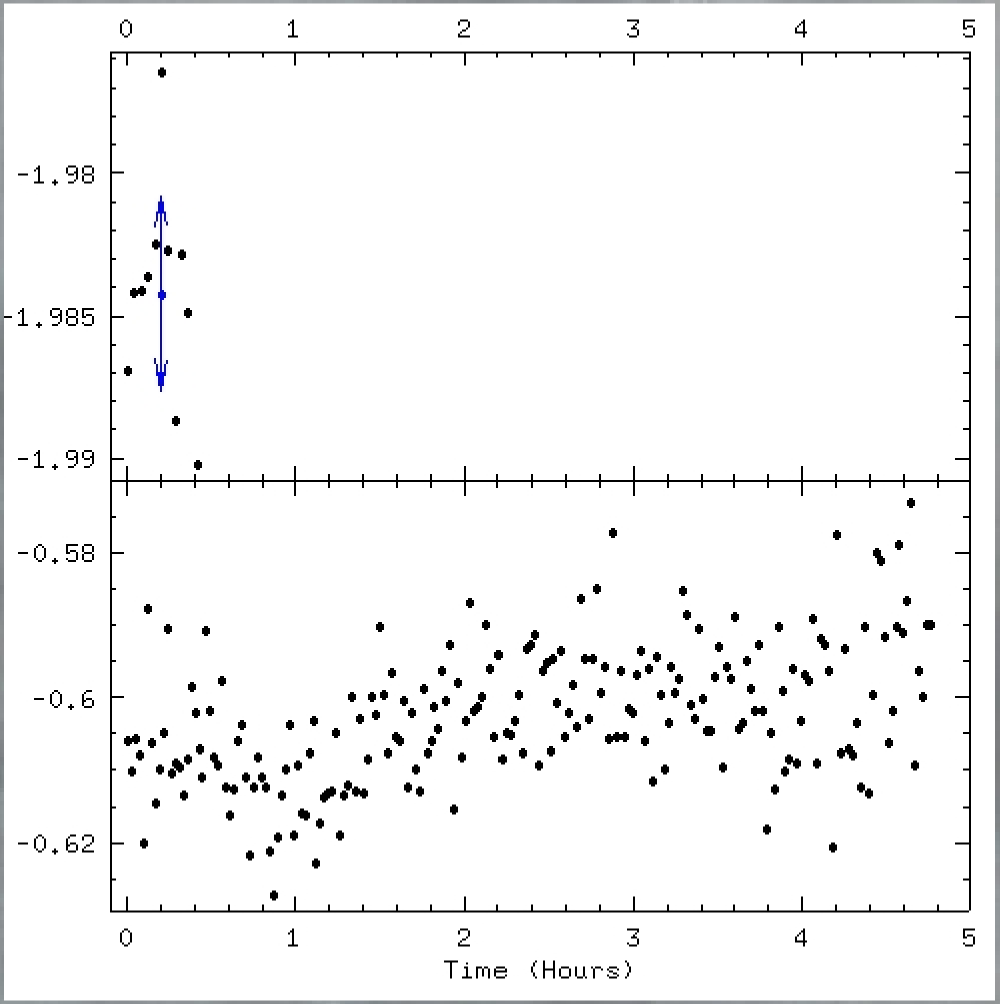
The idea behind snapshot mode: discrete points around an orbit.

The idea behind continuous mode: coverage.



Snapshot -vs- Continuous Mode

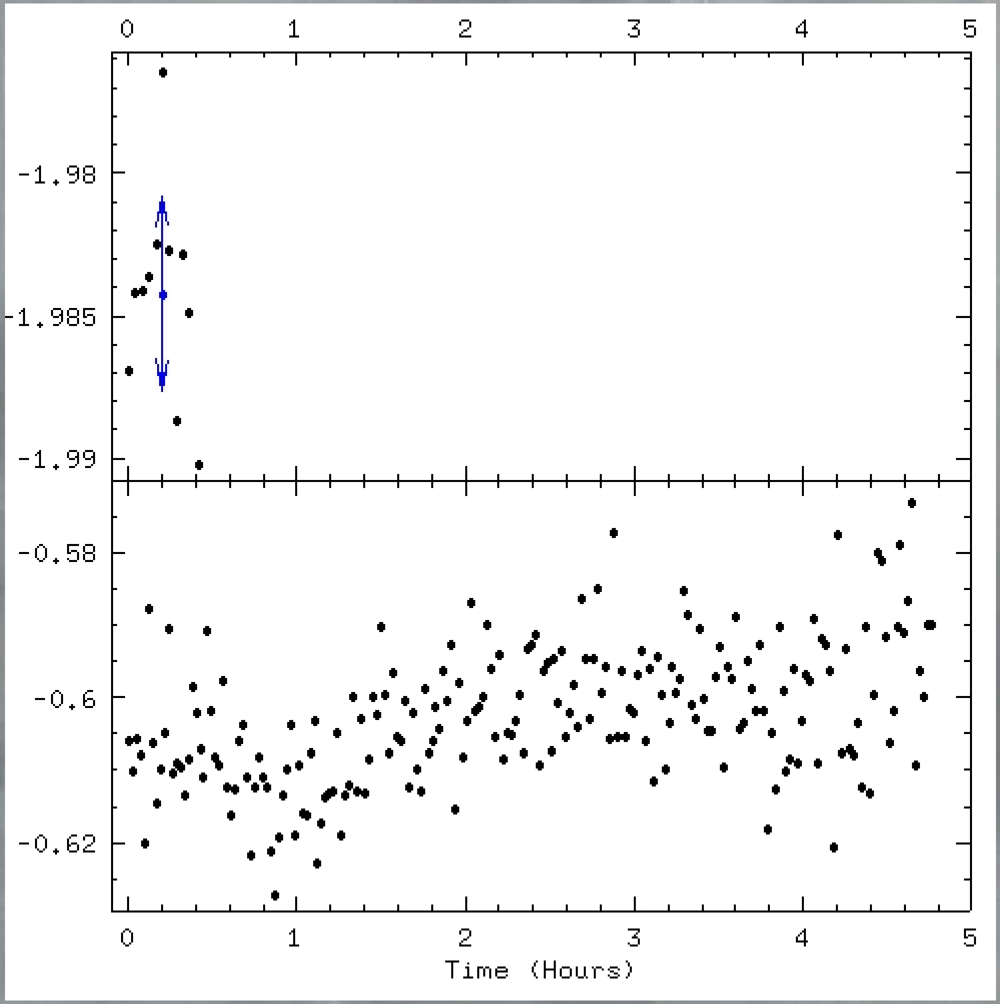
The idea behind snapshot mode: discrete points around an orbit. Since 1 night might cover little of an orbit, it's better to get bits of orbits for a lot of stars.



Snapshot -vs- Continuous Mode

The idea behind snapshot mode: discrete points around an orbit.

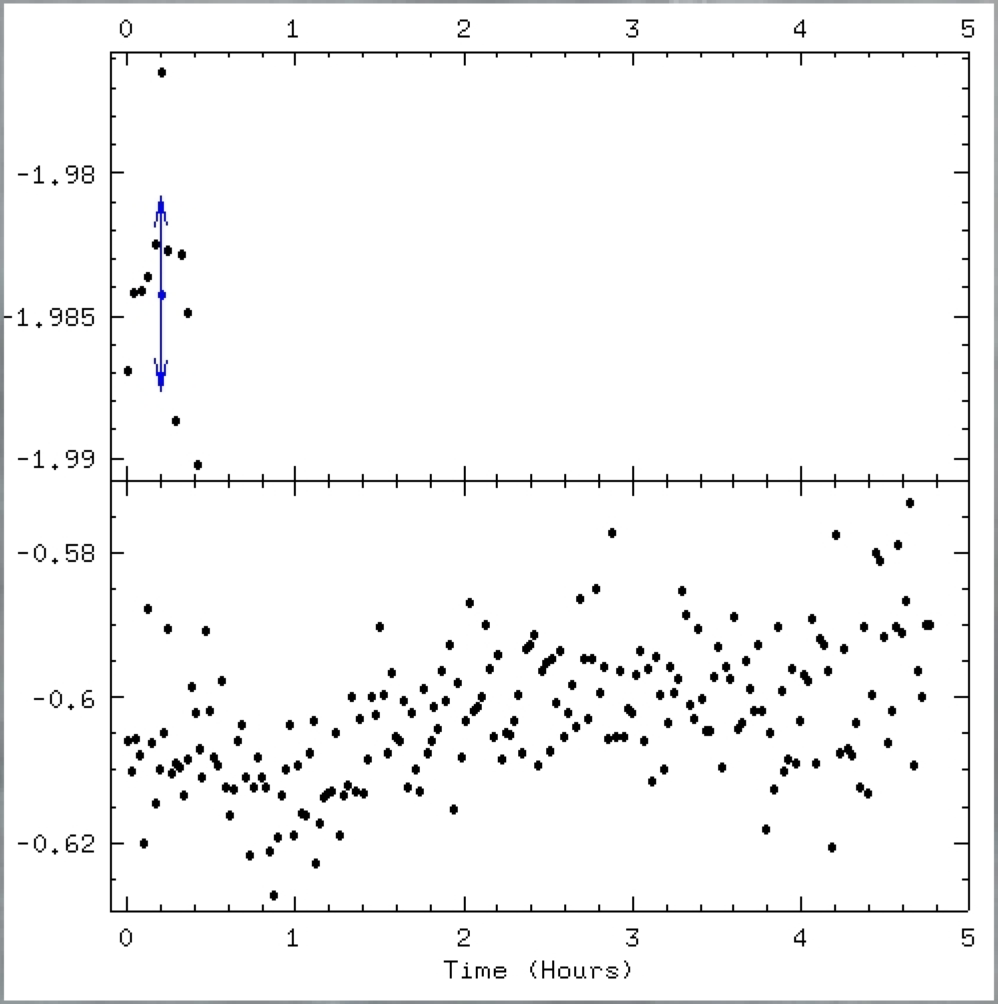
Nice idea, but calibration is difficult!



Snapshot -vs- Continuous Mode

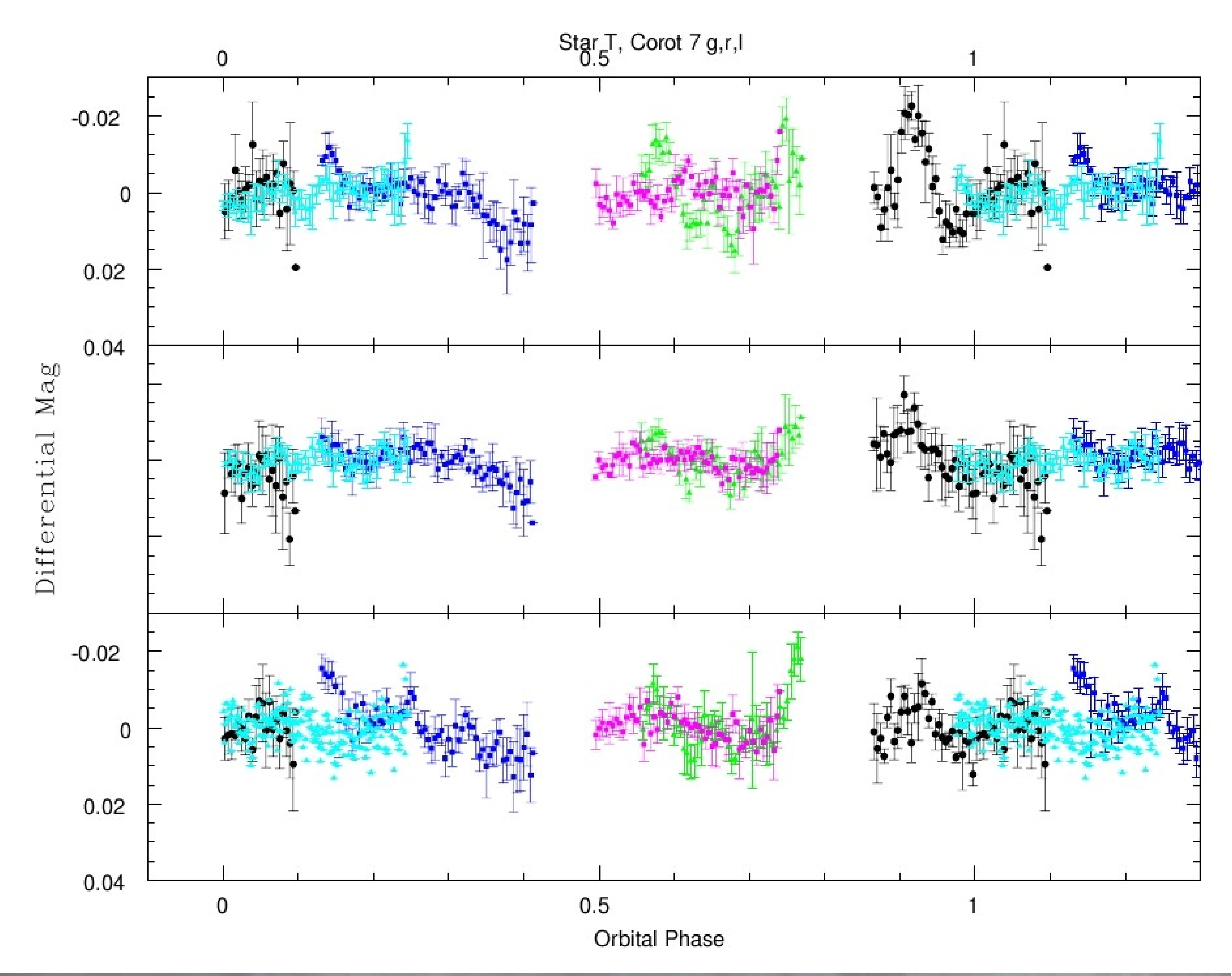
The idea behind continuous mode: coverage.

Especially if you want to see features- like transits and eclipses.



Snapshot -vs- Continuous Mode

The idea behind continuous mode: coverage. Extra advantage: calibration and data characterization



What have we learned?

* Continuous mode is preferred
* Make sure the optics are good!
* Start EASY and work from there.
* Optical photometry may not be the way to go, at this time.
* We need to have a 'best' data set to determine our real limitations, and we've not had that yet.

Observing- my example

Corot 7b.

Period= 0.85 days

Transit depth = 0.00035 mag

$M \sim 5M_{Earth}$

$R \sim 1.7R_{Earth}$

$\rho \sim 8.8$ (+/-3) g/cc

Spectral class: K0V

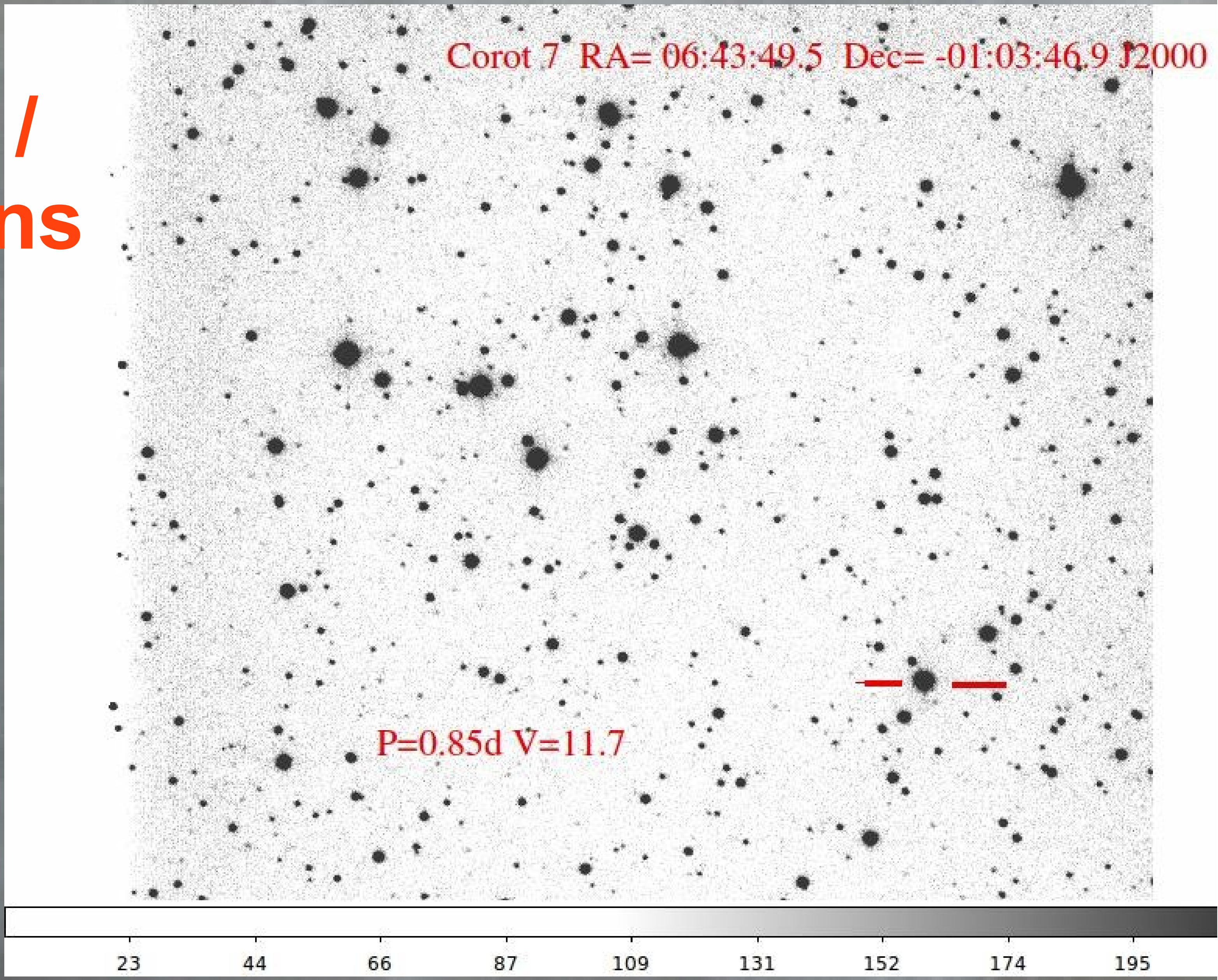
V=11.7

$R = 0.87R_{sun}$

$M = 0.93M_{sun}$

$T_{eff} = 5275$ K

Corot7: A nice rich field with many comparison stars. 25.5 hrs over 5 nights.

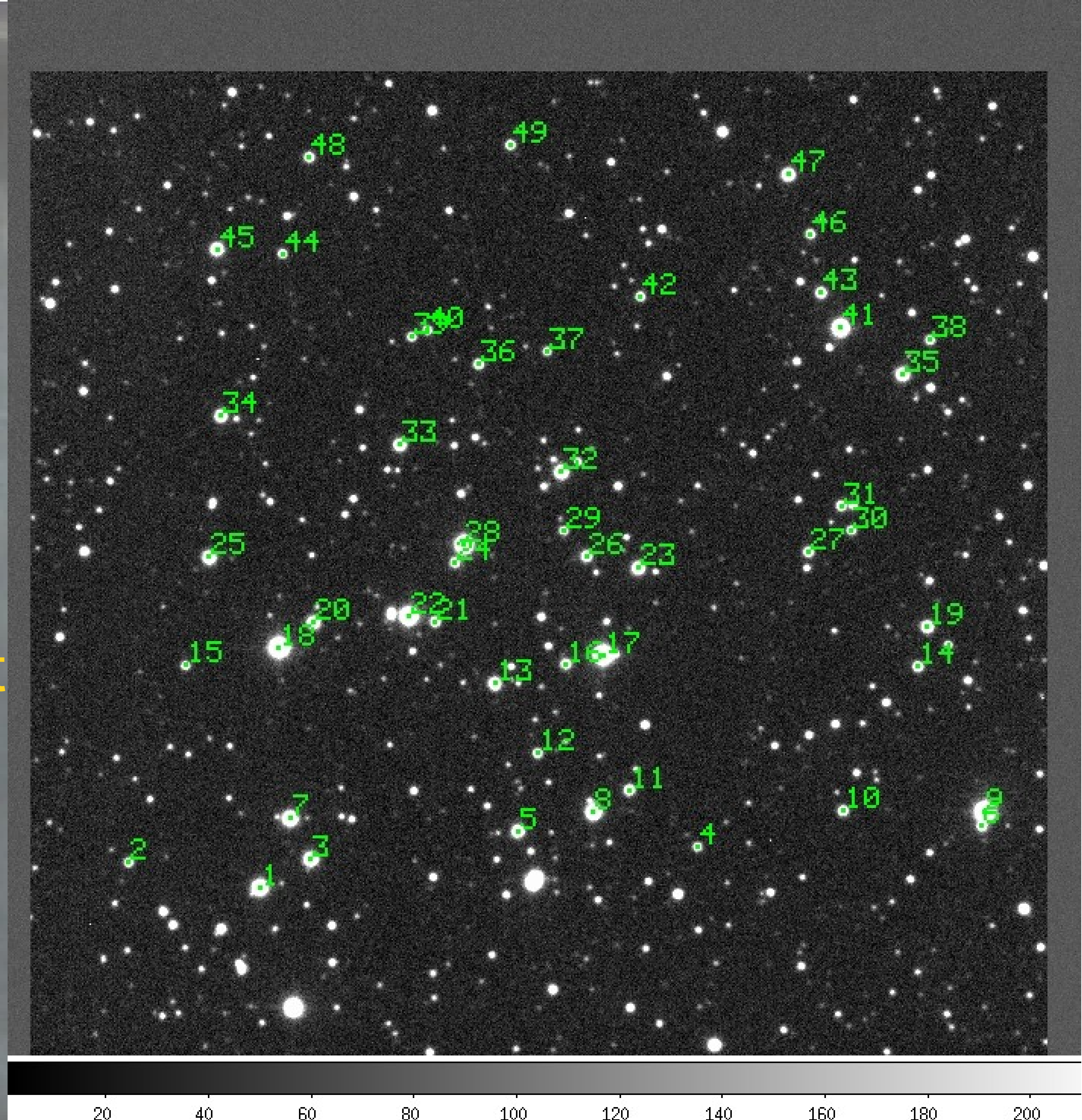


Questions / Suggestions most welcome!

A good MOMF target. Lots of prospective comparison stars.

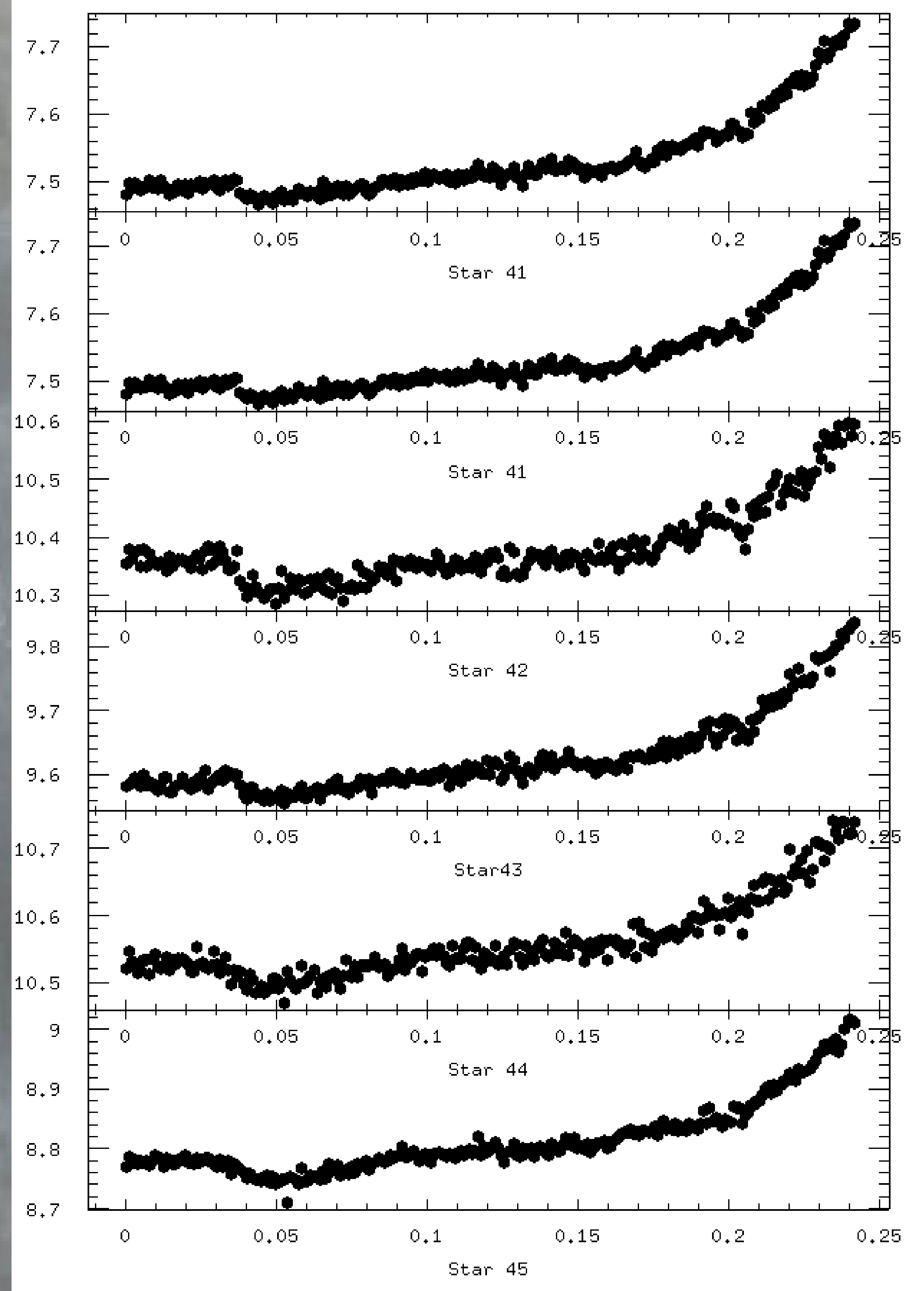
About 200 images per night using the RS1340 CCD (at it's worst!) with g,r,I filters.

25 s exposures



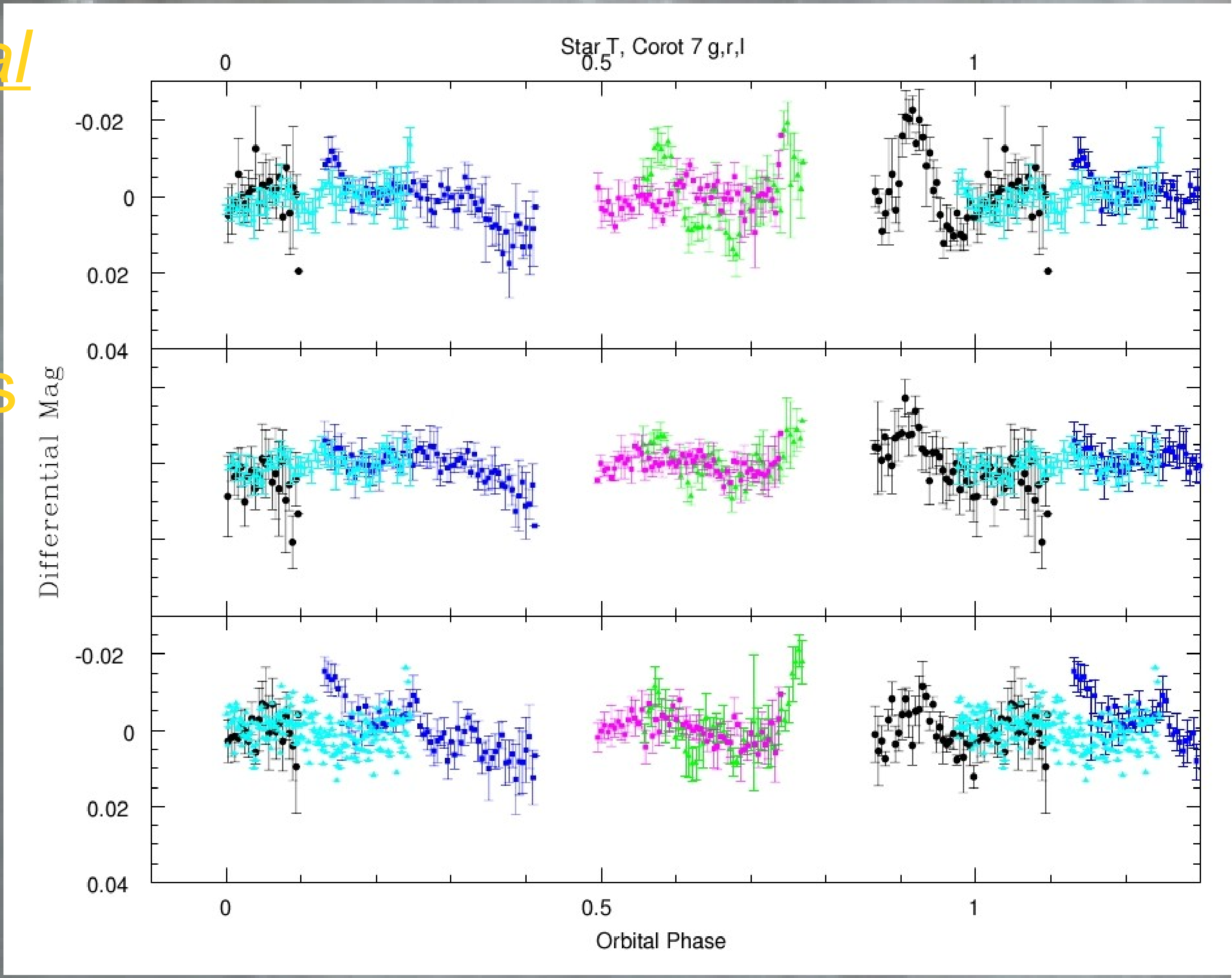
MOMF Pass 1:
Do ALL stars, then make a list of stars with shapes similar to the target.

This is then the comparison star list for Pass 2.



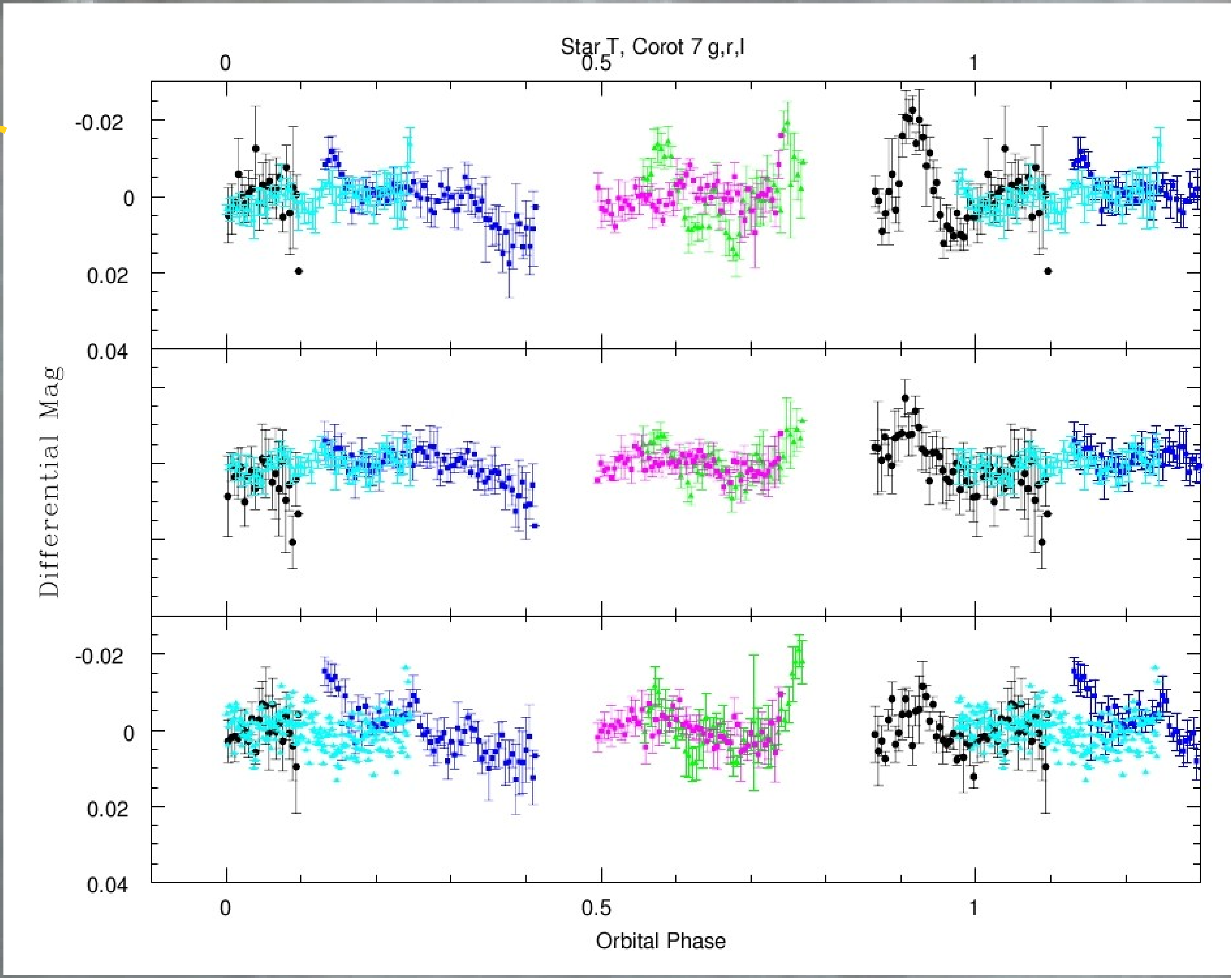
And that roughly gets us here.

This is *<u>differential</u>* photometry, using as many similar-shaped comparison stars as possible.
And then offsetting the lightcurves so they overlap.



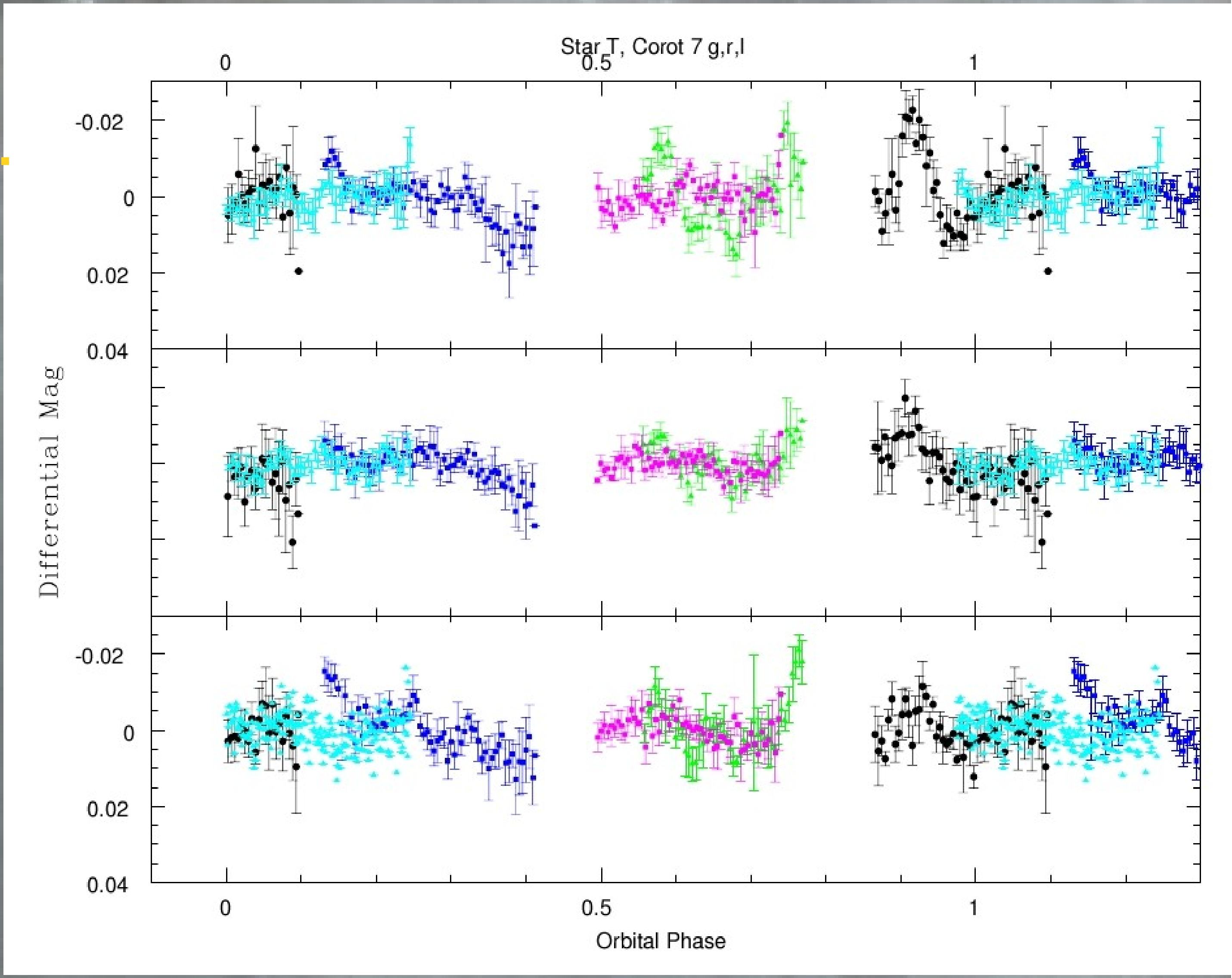
And that roughly gets us here.

Reminder:
We're looking for some <u>shape</u> in there!

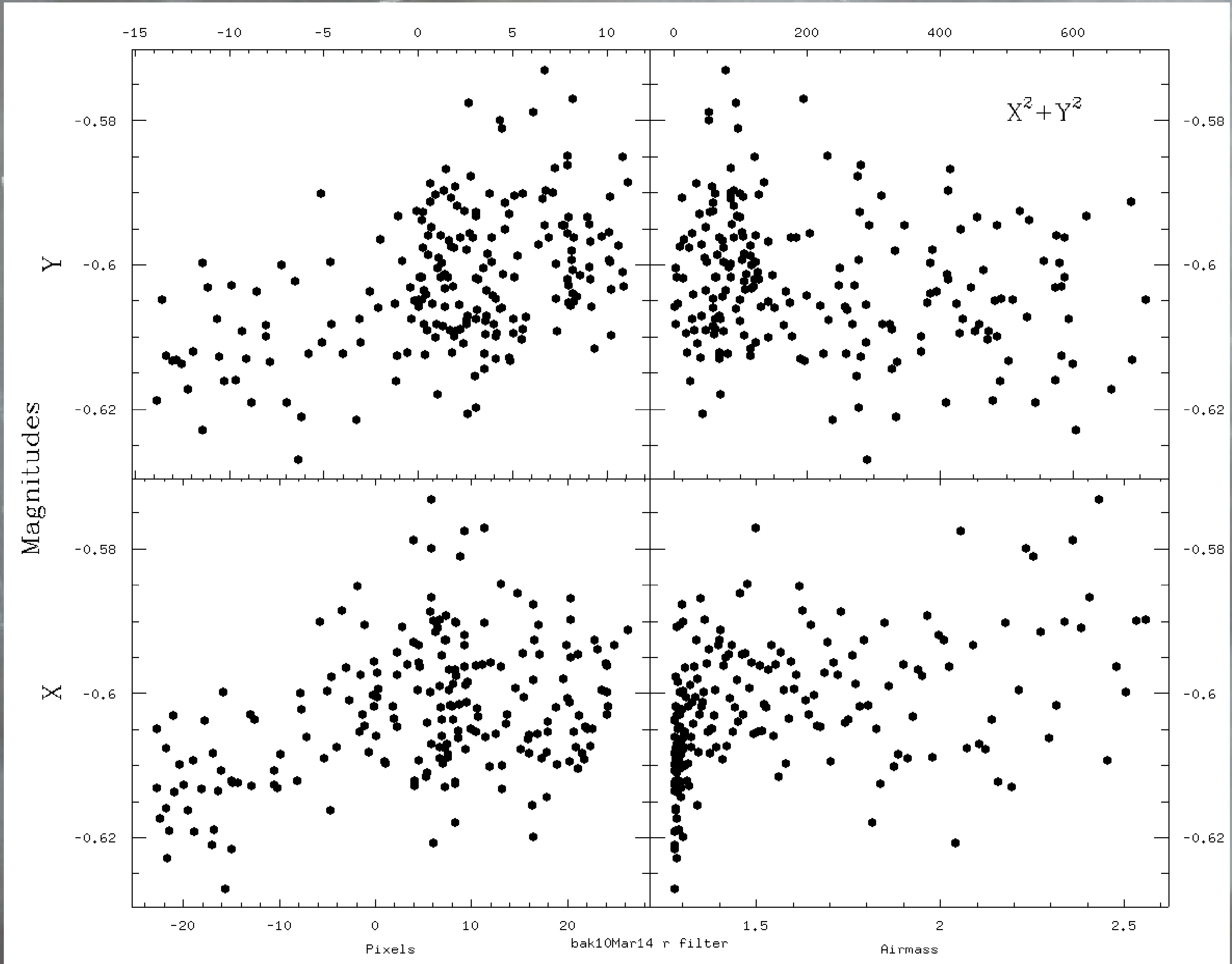


And that roughly gets us here.

But there are obviously issues. So how to go about making corrections to improve the results?

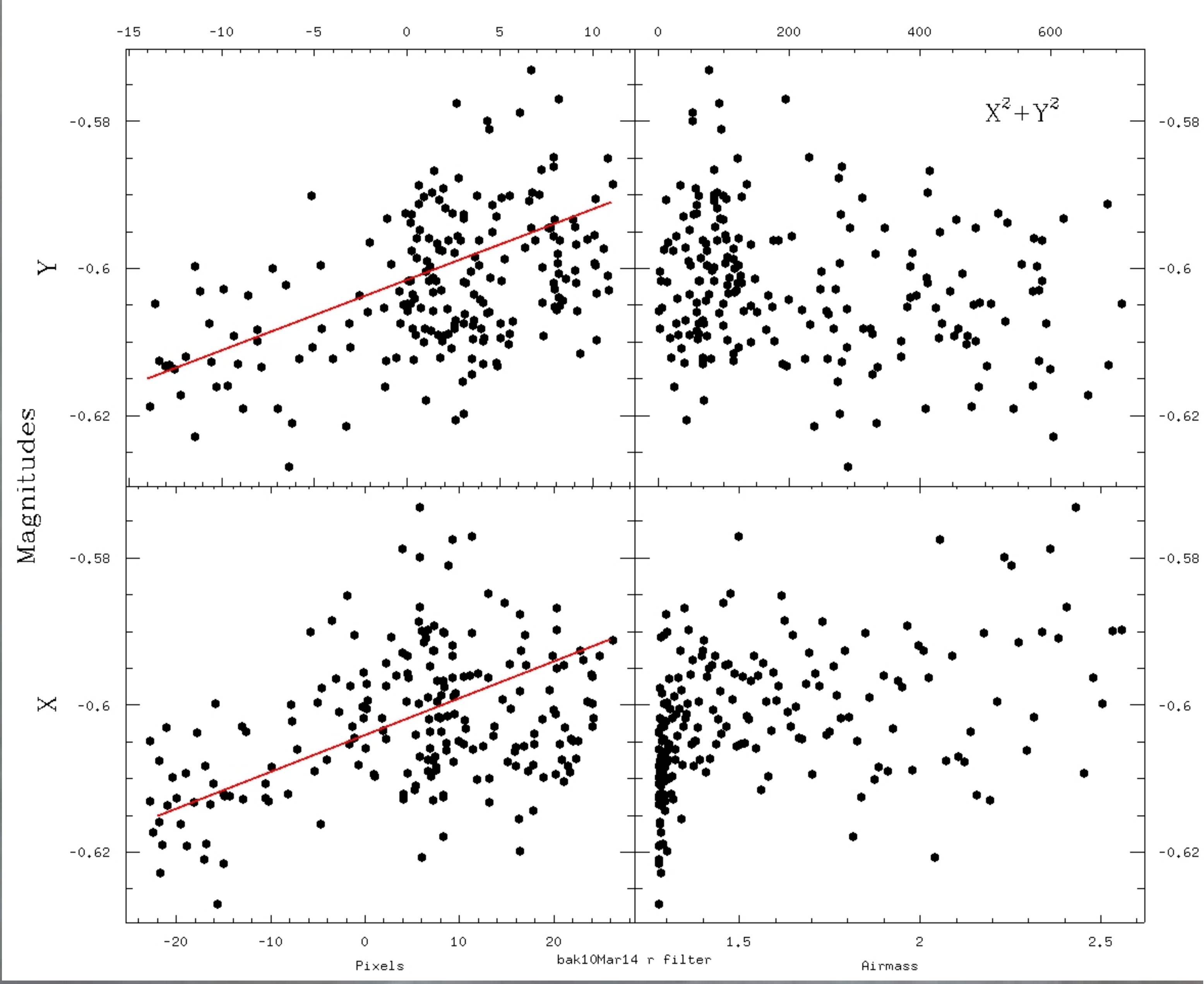


Look for systematic things to fix!



Look for systematic things to fix!

Perhaps a positional correction.



Look for systematic things to fix!

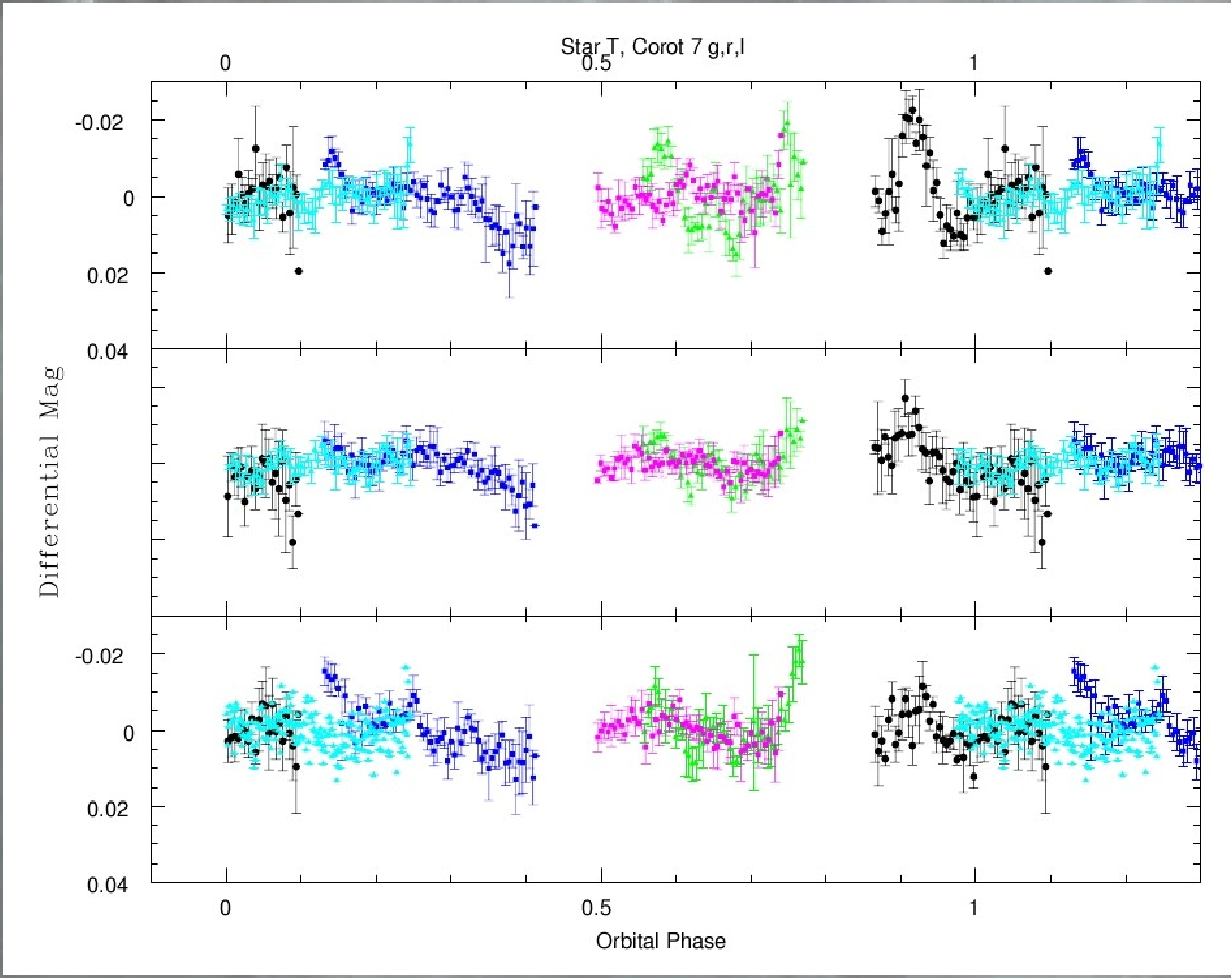
Look at colors of comparison stars and try to use only those which are similar in color to our target.

(The lightcurve shapes were very different)

	Bak10MarT		Bak10MarT		Bak10MarT	
	Colors		Colors		Colors	
r IDs	g-r	error	g-I	error	r-I	error
30	1.523	0.014	2.611	0.013	1.088	0.011
44	1.039	0.018	1.632	0.020	0.593	0.016
13	0.941	0.017	1.454	0.017	0.513	0.016
2	0.936	0.015	1.644	0.016	0.708	0.018
34	0.913	0.022	1.444	0.020	0.531	0.015
36	0.906	0.016	1.362	0.018	0.456	0.016
29	0.847	0.015	1.264	0.015	0.417	0.014
15	0.813	0.011	1.218	0.014	0.405	0.013
37	0.773	0.013	1.159	0.013	0.386	0.008
43	0.638	0.015	0.998	0.015	0.36	0.011
9	0.488	0.013	0.597	0.014	0.109	0.016
61	0.408	0.024	0.56	0.024	0.152	0.017
6	0.363	0.021	0.359	0.021	-0.004	0.017
32	0.361	0.016	0.449	0.016	0.088	0.013
27	0.346	0.017	0.449	0.017	0.103	0.013
42	0.343	0.016	0.394	0.014	0.051	0.011
14	0.321	0.012	0.566	0.012	0.245	0.010
50 target	0.321	0.013	0.407	0.012	0.086	0.011
4	0.295	0.025	0.282	0.027	-0.013	0.028
10 Var	0.224	0.022	0.155	0.021	-0.069	0.017
16	0.18	0.021	0.153	0.021	-0.027	0.018
21	0.171	0.022	0.143	0.021	-0.028	0.016
58	0.128	0.017	0.08	0.016	-0.048	0.013
53	0.121	0.024	0.173	0.023	0.052	0.017
22	0.108	0.020	0.033	0.021	-0.075	0.018
18	0.1	0.019	0.03	0.021	-0.07	0.017
25	0.074	0.014	0.028	0.014	-0.046	0.012
56	0.026	0.013	-0.061	0.016	-0.087	0.015
40	0.015	0.021	-0.043	0.023	-0.058	0.022
35	-0.012	0.022	-0.161	0.024	-0.149	0.021
17	-0.143	0.013	-0.341	0.012	-0.198	0.011
26	-0.195	0.011	-0.44	0.013	-0.245	0.012
45	-0.244	0.018	-0.526	0.018	-0.282	0.014

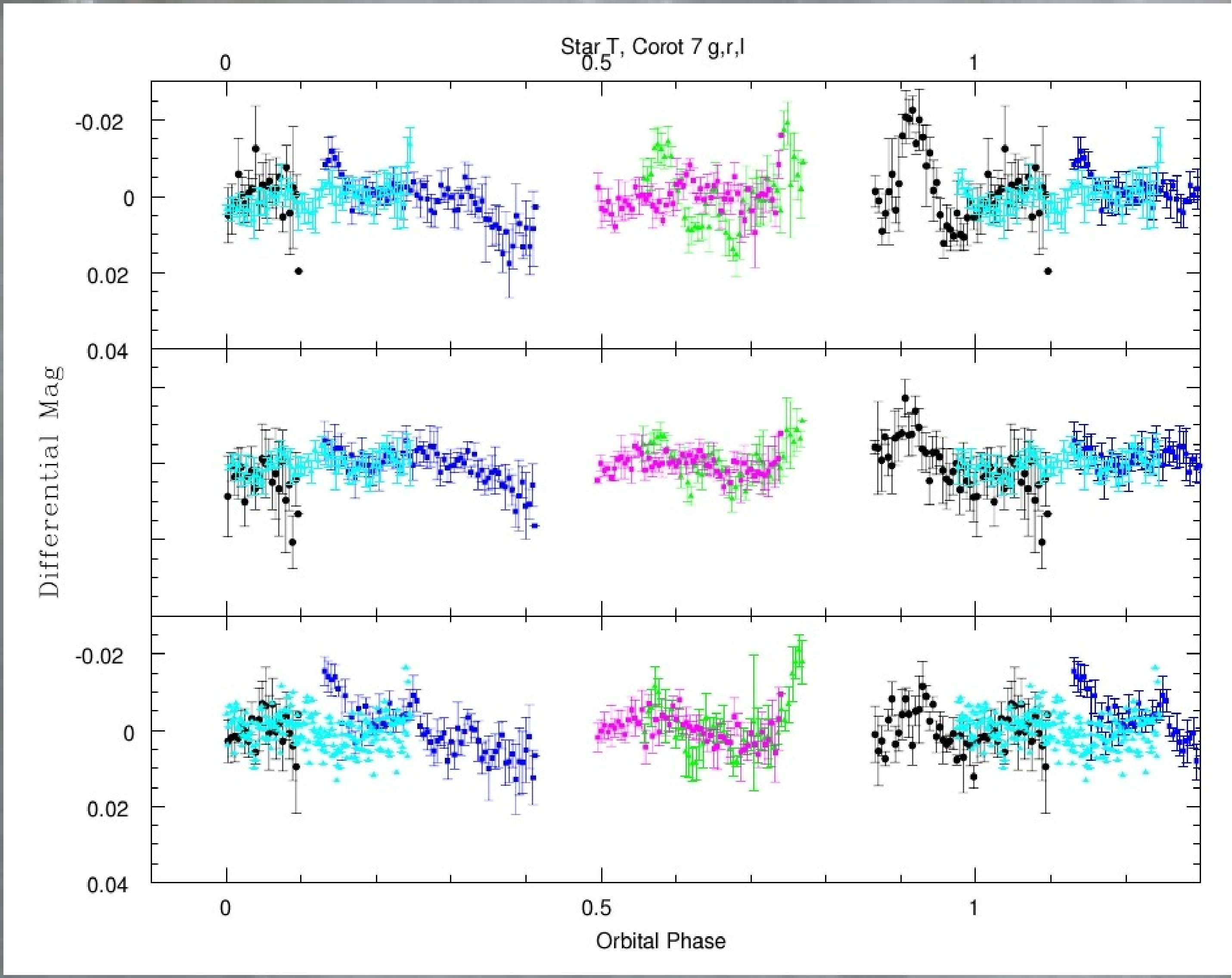
And that roughly gets us here.

These data still have to be massaged, BUT.... maybe I could get this to 1mmag. The transit is 0.35mmag



And that roughly gets us here.

I think the equipment is going to make these data not useful.



BACK TO....
WHAT HAVE WE LEARNED?

* We need to have a 'best' data set to determine our real limitations, and we've not had that yet.

Best= cloud-free, little Moonlight, no instrument spots, many comparison stars, several orbits covered.