Flux levels of the present Star Tracker CCD

Sam Ragland dated on 20th Nov. 2003

The flux levels of the present Star Tracker CCD are characterized using data from March 2003 (Mira run). Sixty-three independent measurements taken on seven calibrators, all early K type stars, are used here. Measurements were made with an integration time of either 10ms or 4ms. Data taken with 4ms integrations are scaled (by a factor of 2.5) and used with that of '10ms integration'.

We find that **I magnitude is a better magnitude than V & R magnitudes to characterize this Star Tracker CCD**. Fig. 1 & 2 show plots of observed Maximum CCD counts as a function of I magnitudes. While taking one telescope data, shutters corresponding to the other two telescope beams were closed. Also, background data has been taken and taken into account.

Assuming that the CCD has linear response over its dynamical range, the expected fluxes for different integration times and for a range of I magnitudes are listed in Table 1.

I mag	Integration time (ms)					
	4	10	20	30	40	50
3.0	3105					
3.5	1959					
4.0	1236	3090				
4.5	780	1950	3901			
5.0	492	1230	2462	3691		
5.5	310	776	1553	2329	3105	3880
6.0	196	490	980	1470	1959	2448
6.5	124	309	618	927	1236	1545
7.0	78	195	390	585	780	975
7.5	49	123	246	369	492	615
8.0	31	78	155	233	310	388
8.5	20	49	98	147	196	245
9.0	12	31	62	93	124	154
9.5	8	19	39	59	78	97
10.0	5	12	25	37	49	61
10.5	3	8	16	23	31	39
11.0	2	5	10	15	20	24

Table 1: Max. CCD counts as function of I magnitudes for different integration times

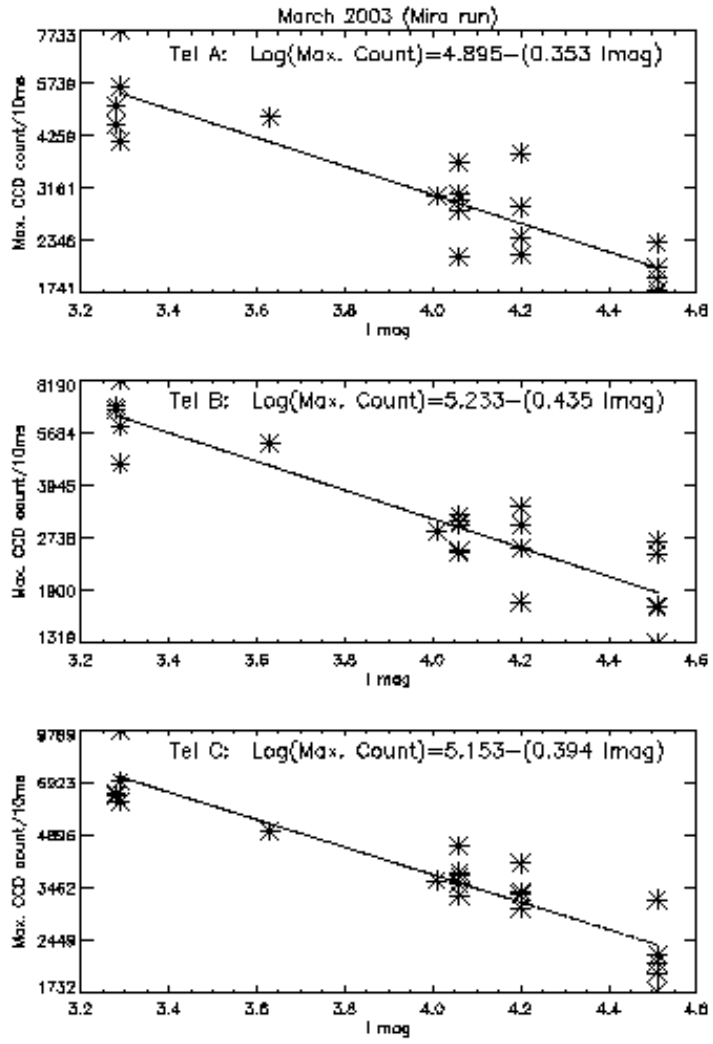

Fig.1: Maximum CCD counts are plotted against I magnitudes for all three telescopes. A least square fit to the data are shown and the best fit parameters are given.

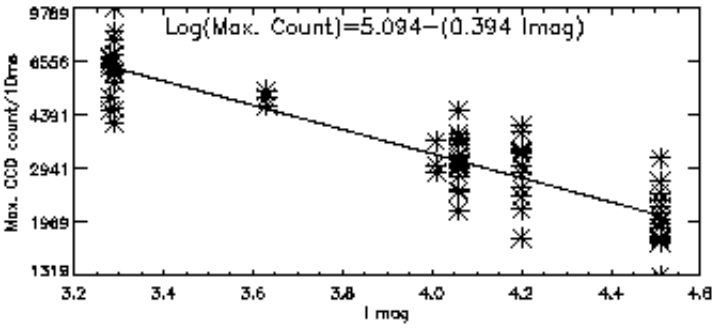

Fig2: Same as figure 1, but all three telescope values are used together. A least square fit to the data and the best fit parameters are given.

The slope of the best fit (Fig. 2) is -0.394, which is close to the expected value of -0.4, suggestion that this **calibration is probably independent of the spectral type of the target**. This slope for calibrations based on V magnitude and R magnitudes (Fig. 3) are respectively -0.299 and -0.353. Strictly speaking, these (V & R magnitude based) calibrations are good for only early K type stars. And, targets of later spectral types would have more counts and earlier spectral types would have fewer counts.

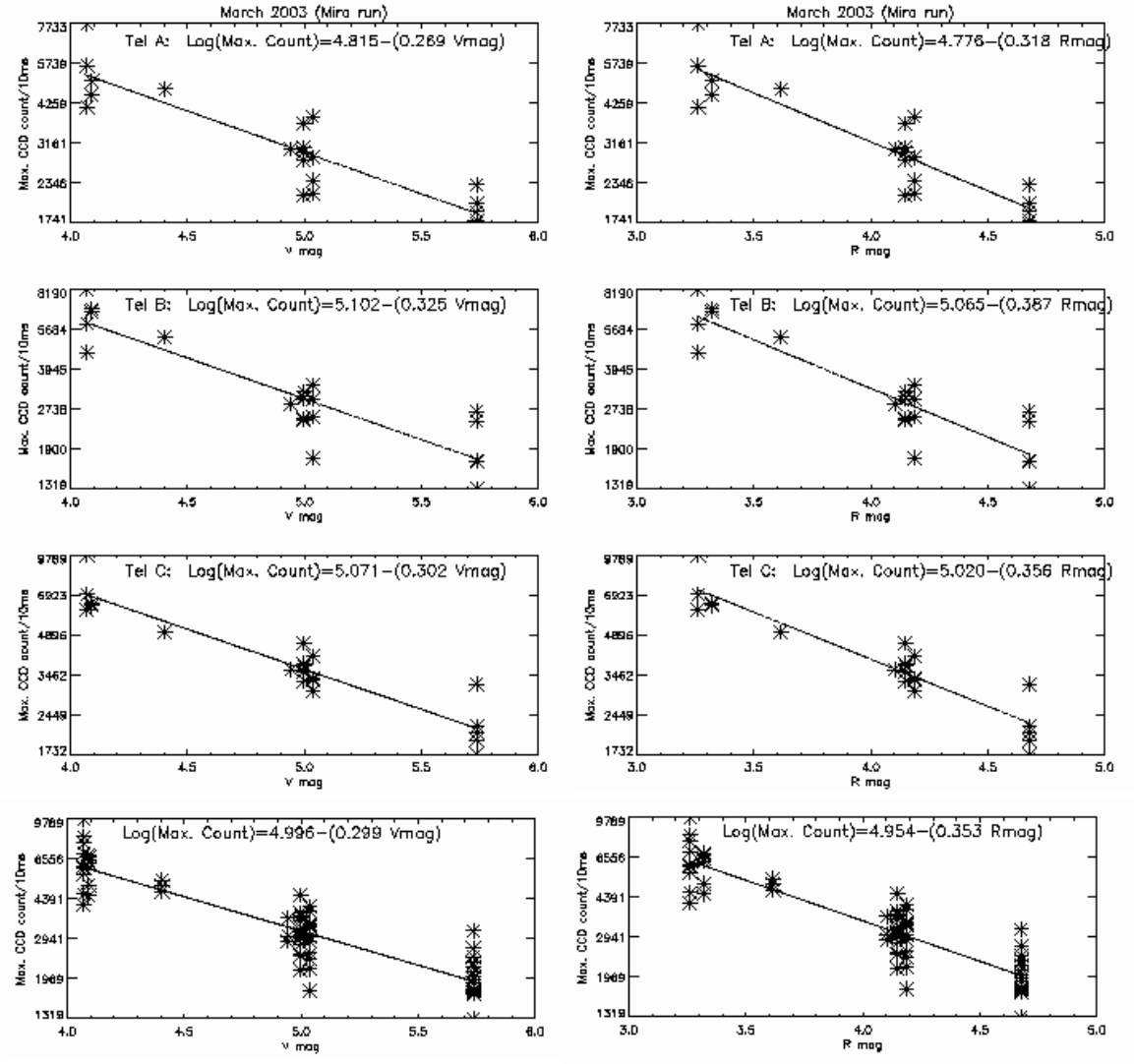

Fig.3: Maximum CCD counts are plotted against V magnitudes (left) and R magnitudes (right) for all three telescopes. Top three rows correspond to Telescope A, B & C respectively and the bottom row shows all three telescope data together.