

Weekly Report

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July 20, 2012

1 Working with star data

This week I attempted to gather magnitude values from the data collected last week, assuming the relation I found last week was sound, and fitting measurements to a line. So far I've been able to reliably obtain mostly consistent values for each site, within the limitations that I've mentioned in the past. I've compiled the measurements made from data from The Pas into a spreadsheet to start analyzing the results.

The results seem to show that there is some correlation between the measurements and apparent magnitude as listed in the Bright Star Catalog. A plot comparing the two measurements of magnitude is included in the spreadsheet. There are discrepancies, such as that Procyon should be brighter than Betelgeuse; the two stars have magnitude of 0.38 and 0.50 in the Catalog respectively. Another inconsistency is that Vega, which should be between Capella and Arcturus in brightness, appears dimmer than Capella; the three stars are very close in magnitude at 0.03, 0.08 and -0.04.

The first discrepancy suggests that the measurement of brightness may be colour-dependent, as Betelgeuse is very red in appearance and would appear brighter than comparable stars if the instruments respond to lower wavelengths disproportionately. The second draws attention to a pattern that I've noticed, where measurements are often lower in value during the latter portion of a night, lowering magnitude by around 0.1 at most. This comes into play as Vega is only visible for the latter half of most nights, because of its right ascension, while Capella has a high enough zenith that it is often within the field of view for whole nights; however, correcting for this by using regions in time where both stars are clearly seen only reduces the discrepancy.

I selected The Pas as the first site for which I would start doing this type of analysis, as I've seen the most consistent data coming out of it. However, I've also collected measurements from a few other sites. It appears that each site is able to produce mutually consistent magnitude values (around 9 for stars like Capella for example) except for Snap Lake, where the measured magnitudes are all shifted down by about 1.2. Because star visibility appears to be the same at Snap Lake as any other site, it would seem this has to do with the instrument rather than its surroundings. I intend to continue collection and complete the spreadsheet for every imager site.