

A simple guide to observing variable stars

I have used the Society for Popular Astronomy's website to help me compile this guide. The basic method of observing variable stars is described on various websites, but some of these give quite complicated instructions for working out the magnitude and reporting it. So, I have put together this guide, which I hope will prove easier to understand and enable us to get started with our observations.

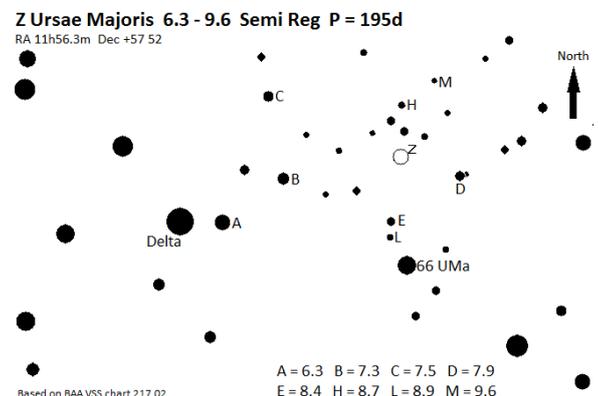
Identifying the correct stars

- Be familiar with the constellation which contains the variable star
- Observe when the moon is either not visible, or not too bright
- Use the charts to identify the target star – this is obviously very important!!
- Use the charts to identify the comparison stars – take time to become really familiar with these stars, so you can find them quickly, as this will help you later
- If you are using binoculars, keep them as steady as possible, maybe using a tripod, or leaning them on a fence post

Estimating the brightness of the variable star

To estimate the brightness of a variable star, we compare the brightness of the variable against that of other (comparison) stars that do not vary in brightness.

The charts provided show the position of the variable and its comparison stars, along with the comparison star magnitudes.



If the variable star appears to be the same brightness as one of the comparisons, you simply record it as having that magnitude.

In other cases, however, you will need to find one comparison star slightly brighter than the variable and one slightly fainter.

In this accompanying finder chart for Z UMa, suppose that you decide that Z UMa lies between comparisons B (mag 7.3) and D (mag 7.9) in brightness.

If it appears midway between them, then you would report it as being mag 7.6

If it appears slightly closer to comparison D in brightness, you would record it as being mag 7.7

If it appears much closer to D than to B in brightness, you would record it as being mag 7.8.

Reporting your observations

Record your observations on the correct reporting sheet for each target star, and then email a copy of your sheets to me every couple of weeks or so. I will collate the observations and draw up a light curve for each target star based on our group observations.

My email address: p.foster158@btconnect.com

Helpful hints and tips (from the SPA website)

1. Dark Adaptation

It is very important to allow time for your eyes to become adapted to the dark. This is important for two reasons. Most obviously, it allows us to see fainter stars. However, the colour sensitivity of our eyes change as they dark adapt and we need them to be fully dark adapted so that we will compare stars in a consistent way every time that we observe.

You should allow at least 10 minutes to become fully dark-adapted. You will need to allow longer if you have been looking at a PC monitor or watching television as these leave "after-images" on your retina that take quite some time to fade away fully.

2. Bias

Always record what you see, not what you think you should be seeing. Eclipses, for example, do not always occur at exactly the predicted times and aren't always symmetrical. Similarly, Mira type variables don't rise and fall in brightness at constant rates.

3. Red Stars (part 1)

Many variable stars are red in colour (although they will often "appear" to be white - our dark adapted eyes don't see colour well). The sensitivity of the eye to red light varies from person to person. Don't worry if your brightness estimates of red stars differ from those made by other observers by several tenths of a magnitude. This is quite common. The key thing is that you should see the variable star brightening when other observers see it brightening and fading when other observers see it fading.

4. Red stars (part 2)

One troublesome feature of the way that our eyes work is that if you stare at a red star, it will appear to brighten compared with other stars! This will obviously affect your brightness estimate. Hence staring at stars should be avoided. Short glances will produce a more accurate estimate.

5. Altitude

Stars that are closer to the horizon will appear to be fainter - due to the greater depth of atmosphere that their light must travel through. If possible, always use comparison stars that are nearly at the same altitude as the variable star.

6. Positioning the variable

When using binoculars or as telescope, always bring the variable and comparison star in turn to the centre of the field of view.

If a variable cannot be seen by direct vision, then it may be glimpsed by using averted vision. Always record when the variable was glimpsed with averted vision.

7. Sky conditions

There will be occasional nights when the atmosphere is so unsteady that it is impossible to make accurate estimates - stars may fade or brighten relative to each other as you watch them. Unfortunately, there is nothing that you can do in such circumstances other than to see if conditions have improved after an hour or more or to try again on another night when sky conditions will hopefully be better.