The Society for Popular Astronomy.

The Annual Variable Star Section Report – 2024.

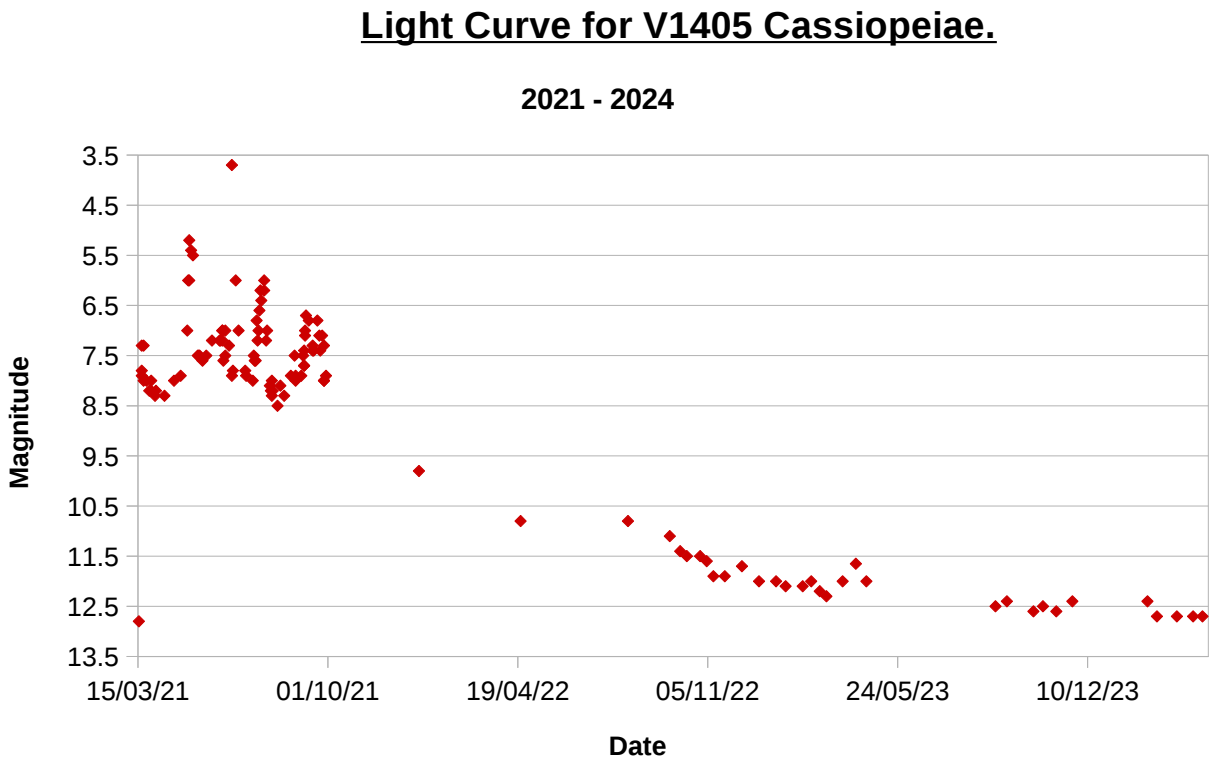
Over the course of 2024, we received observations from Bob Steele, Don Matthews, Doug Allen, Ed Sawyer, Jeff Stevens, Jonathan Shanklin, Mark Hardaker and Matthew Barrett.

One Slow Nova.

During March of 2021, the Japanese astronomer, Yuji Nakamura, discovered a nova in the constellation of Cassiopeia. This was a classic example of a slow nova, and therefore, was still being observed by members over the course of 2024. V1405 Cassiopeia, as this new star was designated, was the brightest nova seen from the UK since V339 Delphini of 2013.

Like all slow nova, it had several peaks. It first brightened to around magnitude 7.5 in March 2021, before brighting again to a magnitude of around 5, in May, before brightening a third time, to a magnitude of six, during the summer. Eventually, V1405 Cassiopeia began its slow decline to the 13th magnitude over the course of 2021 and 2024.

SPA members were still able to observe V1405 Cassiopeia until the beginning of 2024.



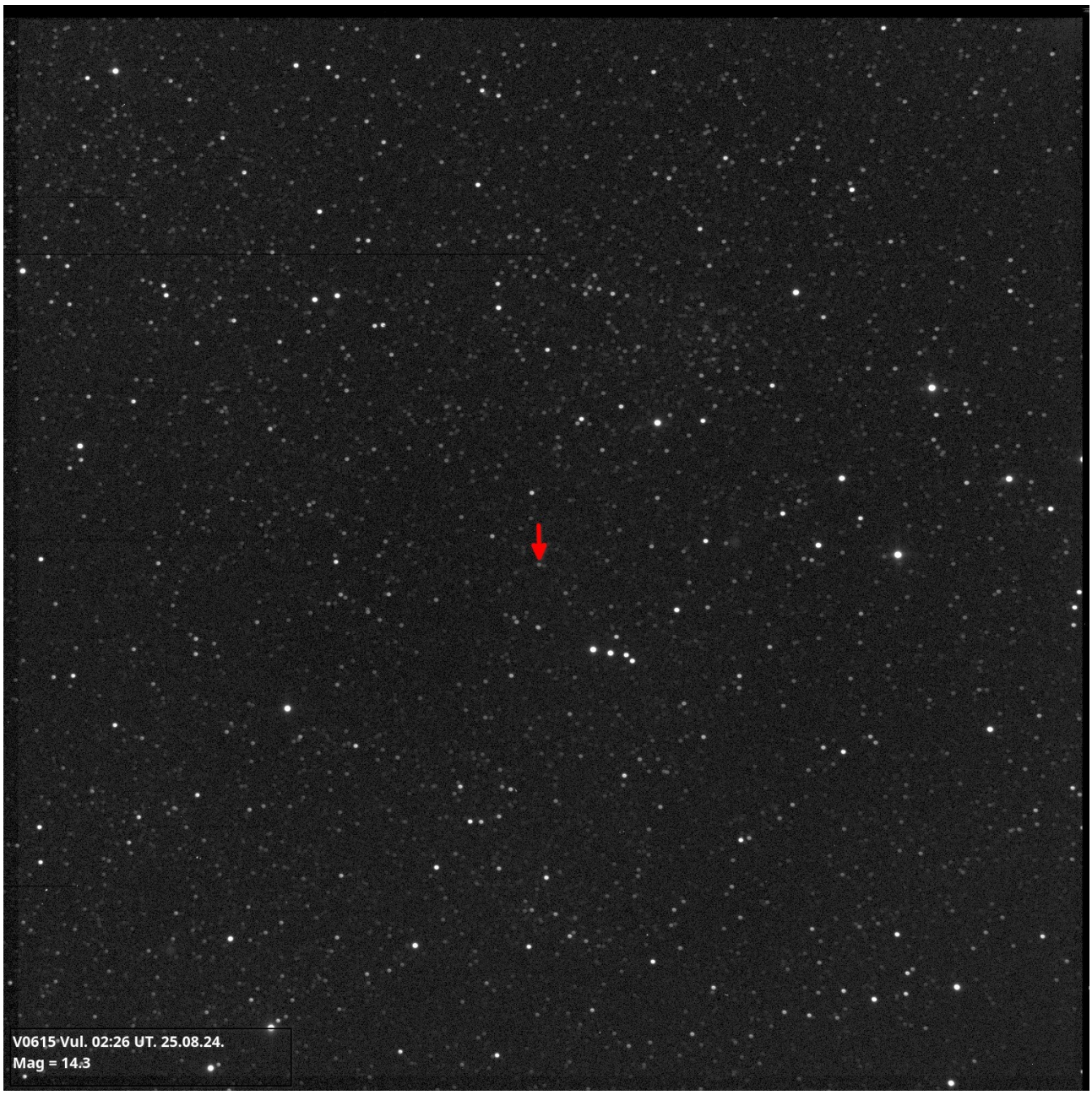
Two Fast Novae.

In contrast, two fast nova occurred during 2024, but both appeared, and disappeared, too rapidly to be observed by any of our members.

Nova Herculis, now designated V1674 Herculis, was discovered in the Japanese astronomer Seiji Ueda, on the 12th of June, when it had a magnitude of 8.4. Over the next two hours, it increased by two magnitudes. However, by the 18th, it had faded to magnitude ten, and quickly disappeared from view. The appearance of this nova corresponded with a period of clouded weather in the UK; therefore is went unobserved.

Nova V0615 Vulpeculae was discovered by the Milky Way Survey in the USA on the 29th of July, when it was around the 11th magnitude. A day later it had peaked at magnitude of 9.7, but a day later, it had fallen in brightness to magnitude 10.7.

Below are a couple of images of V0615 Vulpeculae taken by Mark Hardaker and Matthew Barrett. The first image, taken by Mark on the 2nd of August, when V0615 Vul was close to maximum brightness. The second image taken by M. Barrett, was taken at the end of August, when the nova was below the 14th magnitude.


V0615 Vul. 02:26 UT. 25.08.24.
Mag = 14.3

T Coronae Borealis.

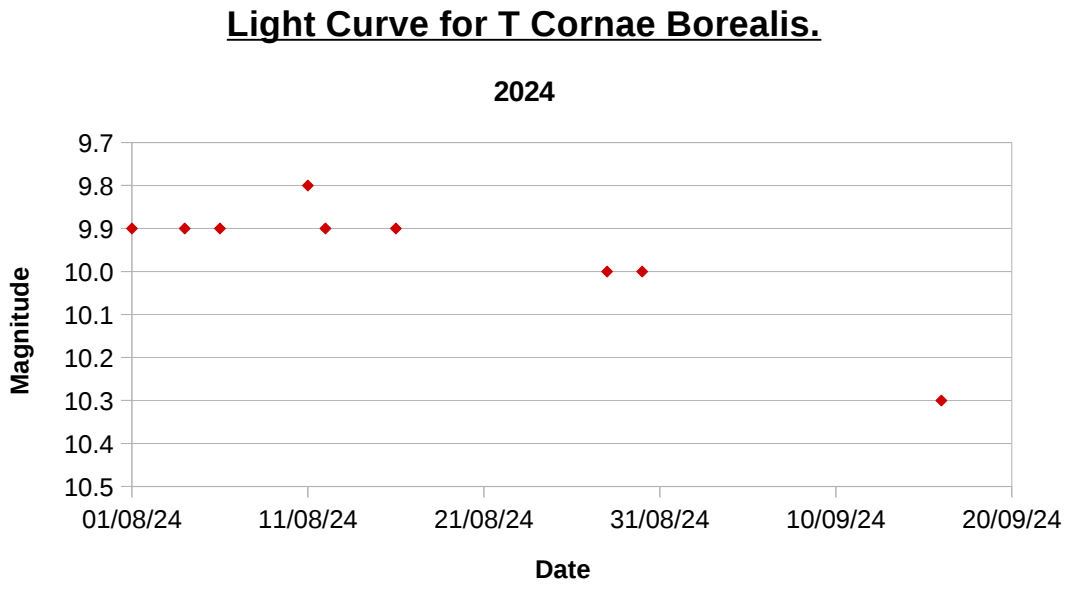
Of course, everyone has spent 2024 waiting for the possible outburst of T Coronae Borealis: aka ‘The Blaze Star’.

T Coronae Borealis (T CrB) is an example of a recurrent nova: a star that occasionally experiences large increases in brightness. It first underwent such an increase in 1866, it then repeated this behaviour in 1946. The 1946 outburst was heralded by sudden, and unexpected, changes in brightness; first increasing slightly in brightness, and then suddenly dropping in brightness again. Recent observations indicate that this active phase is once again occurring, and this opens-up the possibility that T CrB may once again experience an outburst during the next couple of years.

As I write this report, in March 2025, T CrB has yet to experience any outbursts, and there is no guarantee that it will ever experience another outburst again. However, all observers will continue to keep a close idea on T CrB; just in case!

T Coronae Borealis usually hovers around the tenth magnitude. However, during its 1866 outburst, it reach the third magnitude, and during its 1946 outburst, it reached the second magnitude. If T CrB does experience another outburst, it won’t ‘light-up the heavens’, as the media-hype will have you believe, but it will change the appearance of the constellation, and more importantly, it will be of great scientific importance to observe.

A light curve of T CrB made by the SPA member’s during August 2024.



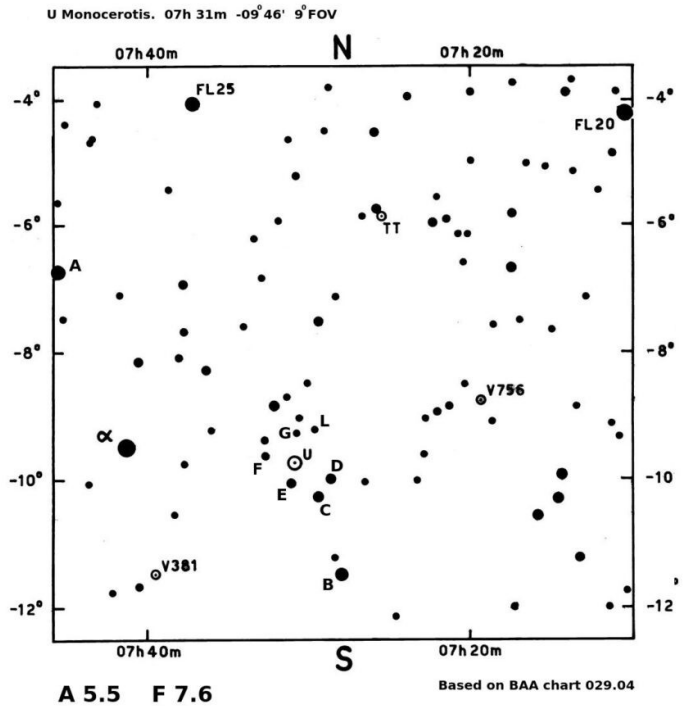
This light curve shows a slight fading of T CrB from magnitude 9.9 to 10.3.

U Monocerotis.

Extreme brightness range	**5.1 – 7.5**
More typical range	**5.1 – 7.1**
Period of variation	**Short period: 92 days. Long period: 2475**
Frequency of observation	**Once a week, or every ten days.**
Observe using	**40mm or 50mm binoculars will suffice for most of the time.**
Visibility	**Can be observed from September through to April, but best observed during November to February.**

During 2024, a new star, U Monocerotis, was added to the SPA programme. It varies between magnitudes 5.1 and 7.1, so its brightness changes can be easily followed in a small pair of binoculars. It lies, in a distinctive asterism, near to the fourth magnitude alpha Monocerotis. Alpha Monocerotis itself can be hard to see; especially if you have light-polluted skies. The best way to find alpha Monocerotis is to follow a line east, from Rigel (β Orionis), and through Saiph (χ Orionis). Alpha Monocerotis also lies just to the east of a line connecting Sirius (α Canis Majoris) and Procyon (α Canis Majoris). A finder chart can be found on the SPA Variable Star Section website.

Below is a comparison chart for U Monocerotis, which is adapted from the BAA chart 029.04.



Under-observed Stars.

Although we have received a large number of observations of most of the stars on the SPA programme, some stars remain understudied. We didn't receive any observations of U Cepheid, Algol, RZ Cassiopeia, Eta Geminorum and Zeta Geminorum, so it would be nice if we could make some observations of these stars over the course of 2025.

Eta Aquilae, EU Delphini, U Delphini, Alpha Herculis, RX Leporis and W Orionis were also understudied, so there won't be any light-curves of these stars in this report.

Popular Stars.

The most popular stars on the SPA programme are: Z Ursa Majoris, T Ursa Majoris, S Ursa Majoris, T Cephei, R Scuti, Beta Lyrae, Chi Cygni and R Coronae Borealis.

All of the long period, expect for U Orionis and Mira (Omicron Ceti), have been observed as they passed through maximum brightness. All of these stars showed typical behaviour; expect for T Ursa Majoris which showed a low maximum of about magnitude nine. U Orionis is getting more challenging to observe as it is reaching maximum in May, when it is lost in the glare of the Sun. Likewise, Mira is reaching maximum during the spring, again, when it is lost behind the Sun.

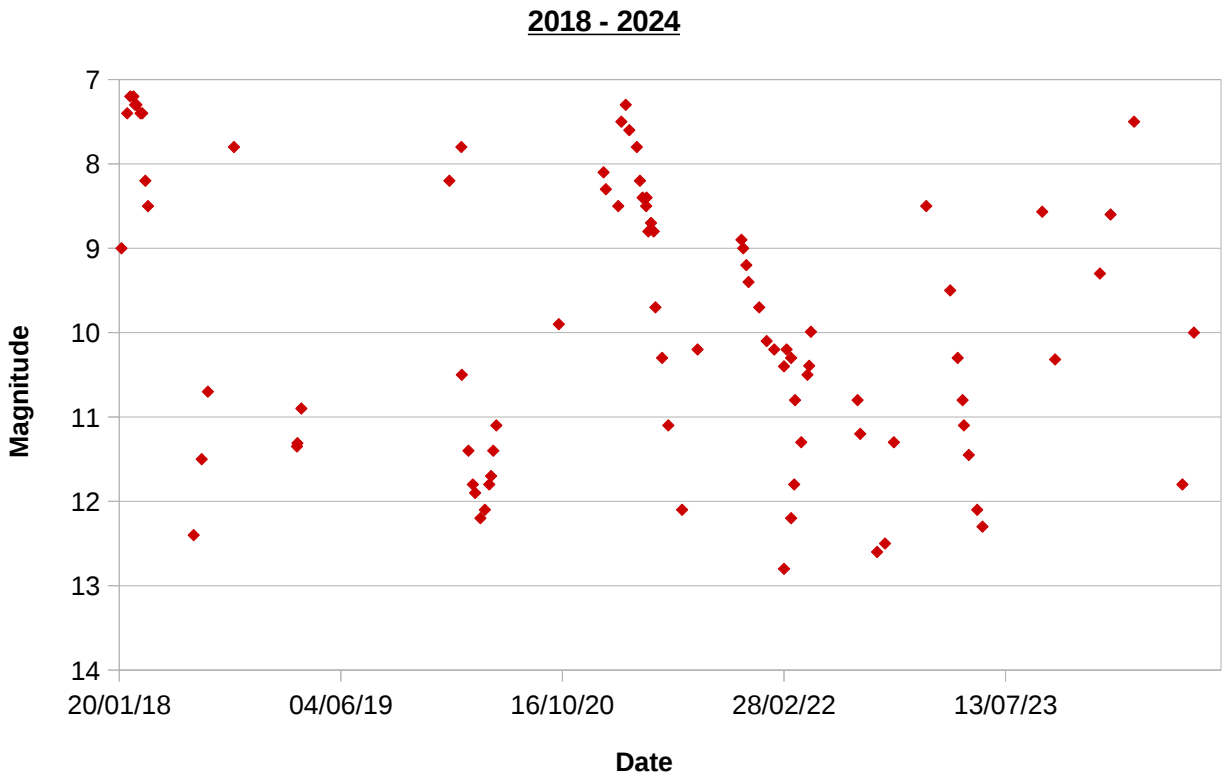
Neither Alpha Orionis (Betelgeuse), nor R Coronae Borealis, have show any unusual behaviour. Since its dramatic drop in brightness, in 2019, Betelgeuse has remained around its usual magnitude of around 0.4. R Coronae Borealis occasionally undergoes a sudden drop in brightness, but over the course of 2024, no drop in brightness was observed.

Most of the semi-regular stars on the programme were not as popular, so the graphs of RW Bootis, W Orionis, R Lyrae, RY Draconis, W Cygni and AF Cygni show a large amount of scatter.

R Bootis.

Extreme brightness range	**6.2 – 13.1**
More typical range	**7.2 – 12.3**
Period of variation	**223 days (approx 7.5 months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50mm binoculars will suffice when in the upper part of its brightness range. Larger binoculars will be required when it gets fainter. A telescope is required to follow it down to minimum.**

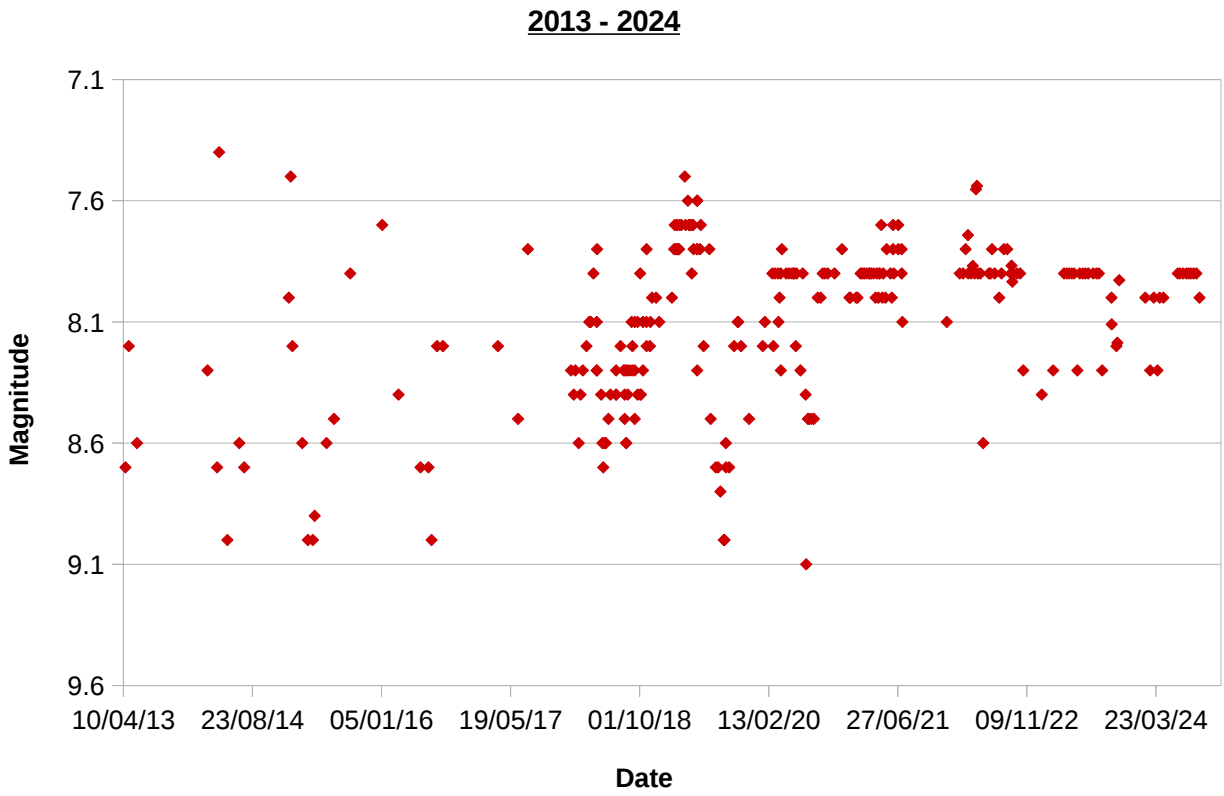
Light Curve for R Bootis.



RW Bootis.

Extreme brightness range	**6.4 – 9.2**
More typical range	**7.9 – 8.7**
Period of variation	**Listed as about 7 months, but recent observations suggest it is more like 10-11 months.**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50 – 80mm binoculars will suffice for most of the time. However, 70 – 80mm binoculars may be required if your observing site is not particularly dark, and may also be needed when RW Boo is low in the sky.**
Visibility	**Can be observed all year round, but is rather low in the evening sky during November and December. Not visible in the evening sky for most of January. Can be observed in the morning sky from late October onwards.**

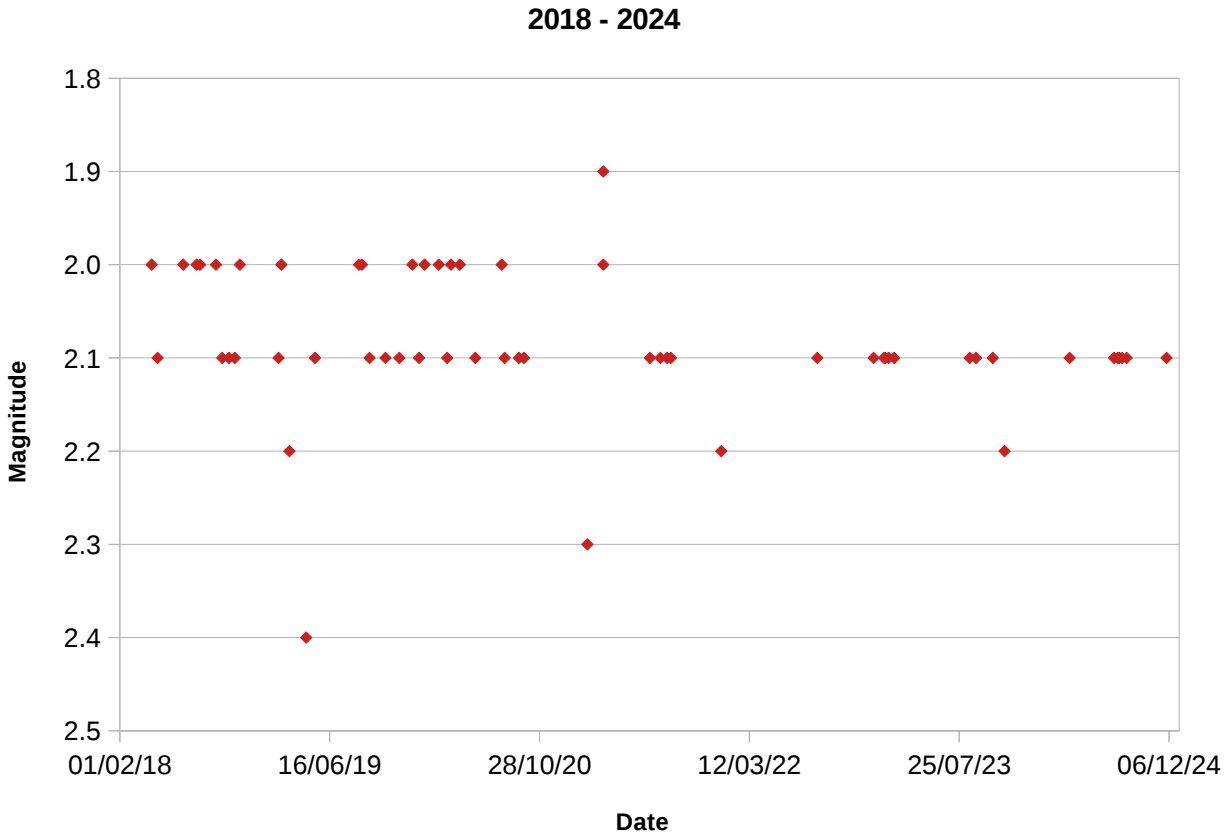
Light Curve for RW Bootis.



Gamma Cassiopeiae.

Extreme brightness range	**1.75 – 3.0**
More typical range	**2.0 – 2.2**
Period of variation	**None.**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**Naked Eye.**

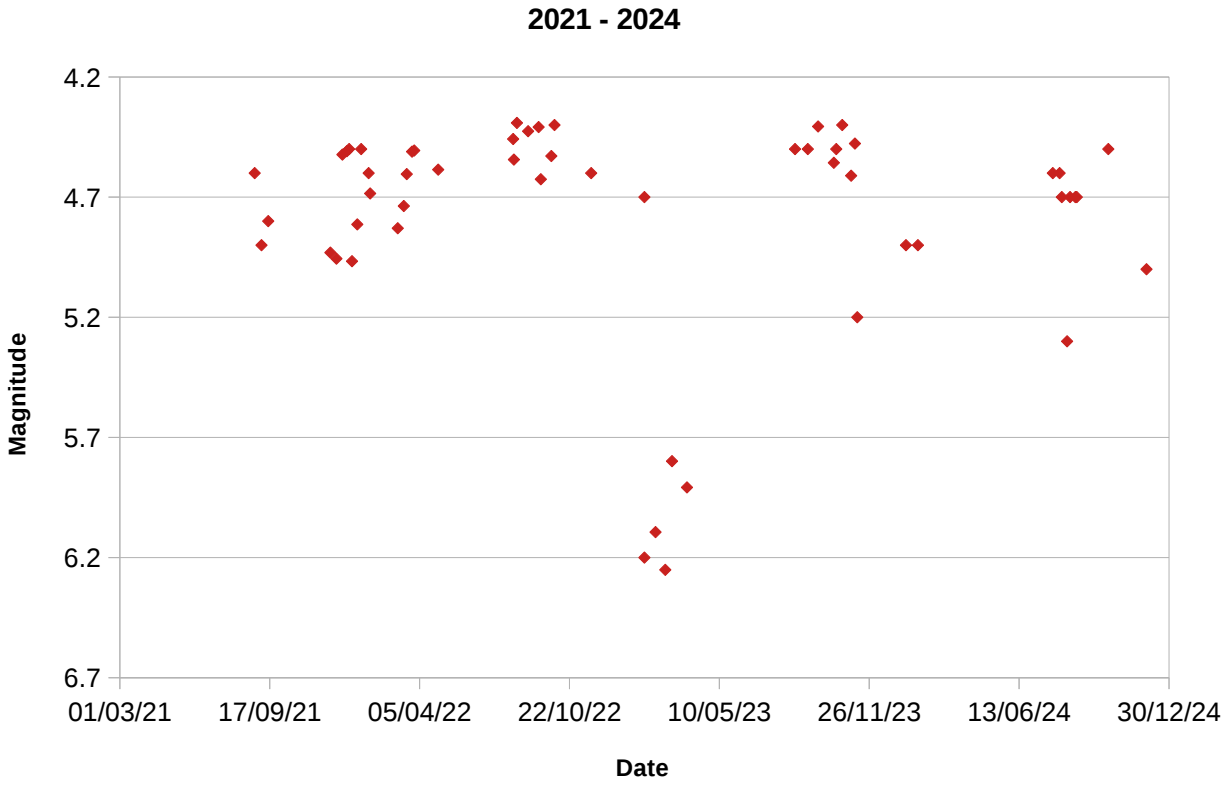
Light Curve for Gamma Cassiopeiae.



Rho Cassiopeiae.

Extreme brightness range	**4.1 – 6.2**
More typical range	**4.2 – 5.0**
Period of variation	**None.**
Frequency of observation	**Once a week.**
Observe using	**Naked eye – if you have a reasonably dark observing site. Otherwise use 40mm or 50mm binoculars.**
Visibility	**Can be observed all year round – but is low in the sky during the summer months.**

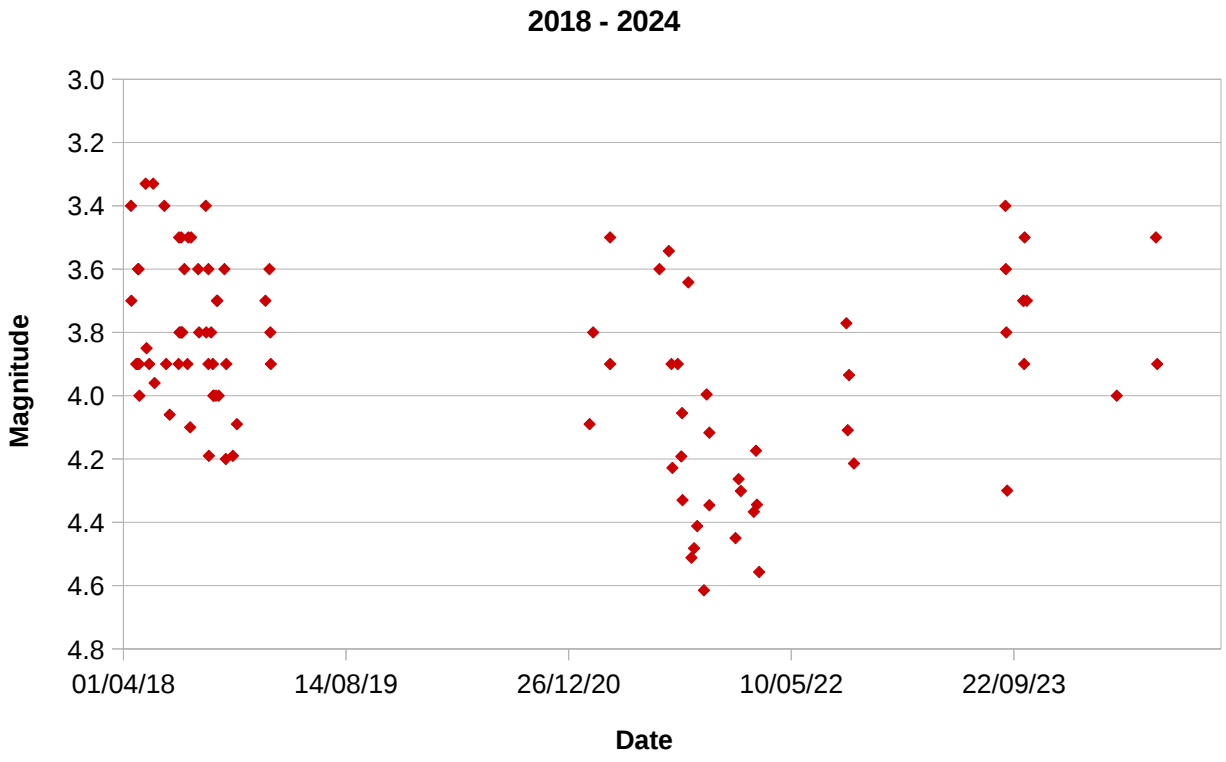
Light Curve for Rho Cassiopeiae.



Delta Cephei.

Extreme brightness range	**3.4-4.3**
More typical range	**Always the same range.**
Period of variation	**5.366 days**
Frequency of observation	**Worth checking on every clear night.**
Observe using	**Naked eye – if you have a reasonably dark observing site. Otherwise use 40mm or 50mm binoculars.**
Visibility	**Can be observed all year round, but is fairly low in the evening sky from March to May.**

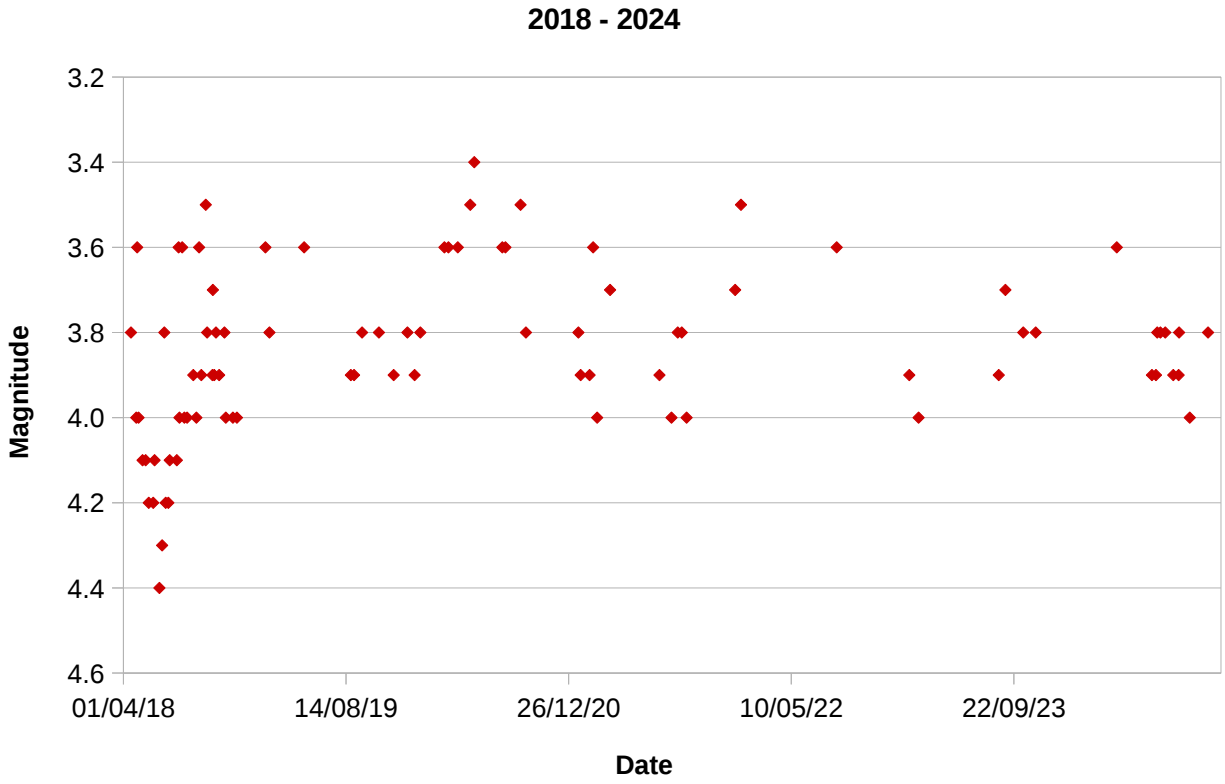
Light Curve for Delta Cephei.



Mu Cephei.

Extreme brightness range	**3.4 – 5.1**
More typical range	**3.5 – 4.0**
Period of variation	**860 days**
Frequency of observation	**Worth checking on every week.**
Observe using	**Naked eye – if you have a reasonably dark observing site. Otherwise use 40mm or 50mm binoculars.**
Visibility	**Can be observed all year round, but is fairly low in the evening sky from March to May.**

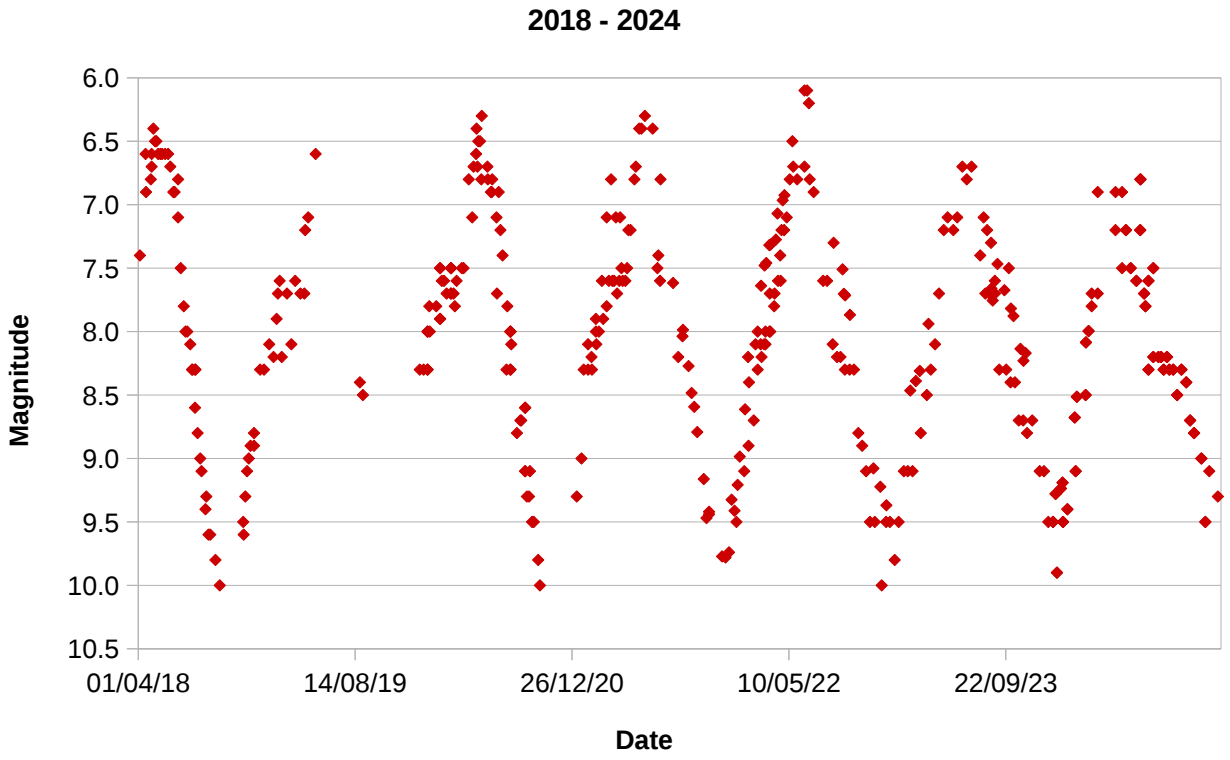
Light Curve for Mu Cephei.



T Cephei.

Extreme brightness range	**5.4 – 11.0**
More typical range	**6.0 – 10.5**
Period of variation	**389 days (nearly 13 months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**40mm or 50mm binoculars will suffice when the star is near maximum, but 50-80mm binoculars will be required when it gets fainter and a telescope will be needed at minimum.**
Visibility	**Can be observed all year round.**

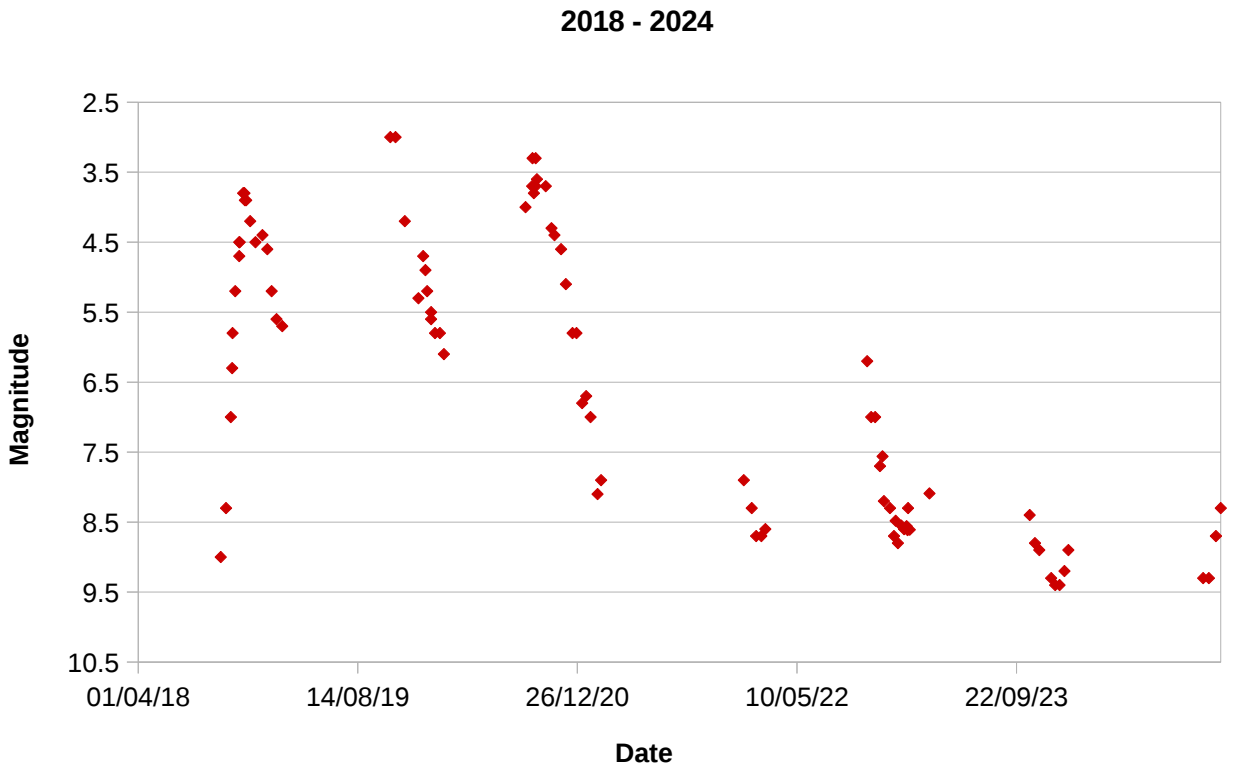
Light Curve for T Cephei.



Omicron Ceti – Mira.

Extreme brightness range	**1.7 – 10.1**
More typical range	**3.6 – 9.3**
Period of variation	**About 11 months.**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**Naked eye when near maximum. 40mm or 50mm binoculars when it is less bright. Larger binoculars or a telescope when it is near minimum.**
Visibility	**Can be observed from the UK from late July to early March.**

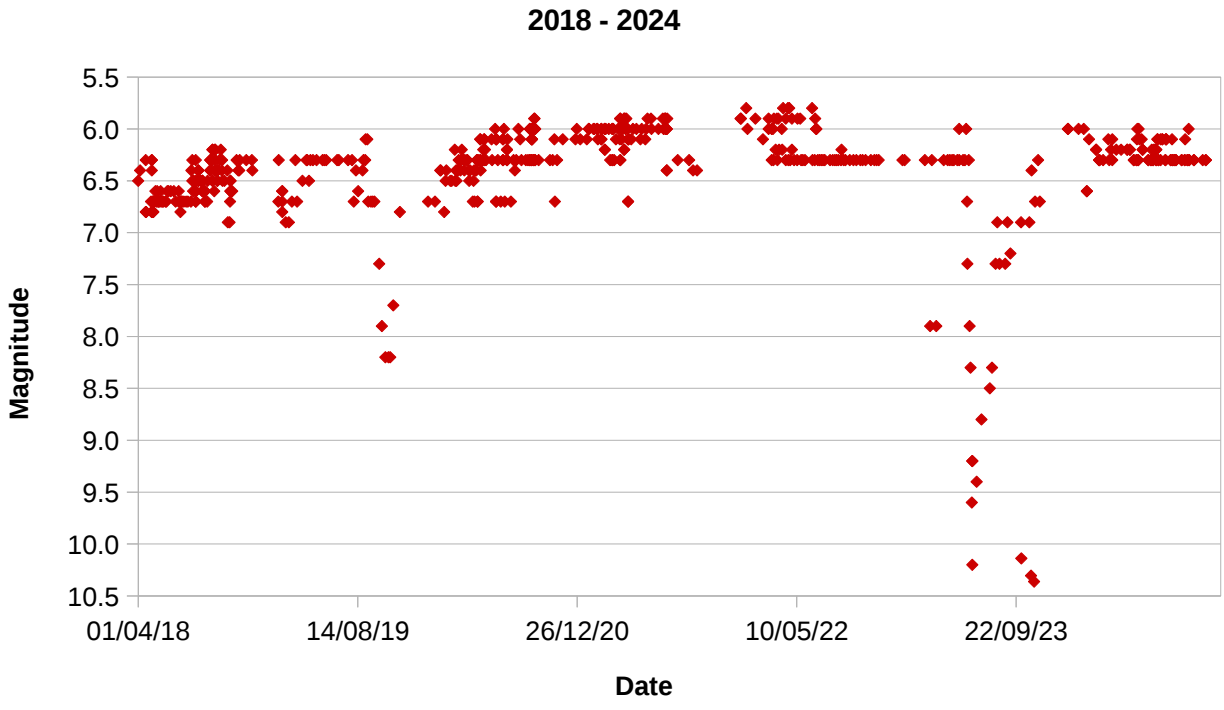
Light Curve for Omicron Ceti - Mira.



R Coronae Borealis.

Extreme brightness range	**5.8 – 15.0**
More typical range	**6.1 – 6.4 (until a fade starts …).**
Period of variation	**None – totally unpredictable.**
Frequency of observation	**Worth checking on every clear night.**
Observe using	**40mm or 50mm binoculars will suffice for most of the time, but 50-80mm binoculars will be required during smaller fades and a telescope is required during the deepest fades.**
Visibility	**Can be observed all year round, but is rather low in the evening sky in November and December. From late October it is visible in the pre-dawn sky and is only visible in the morning sky from Christmas to the end of January.**

Light Curve for R Coronae Borealis.

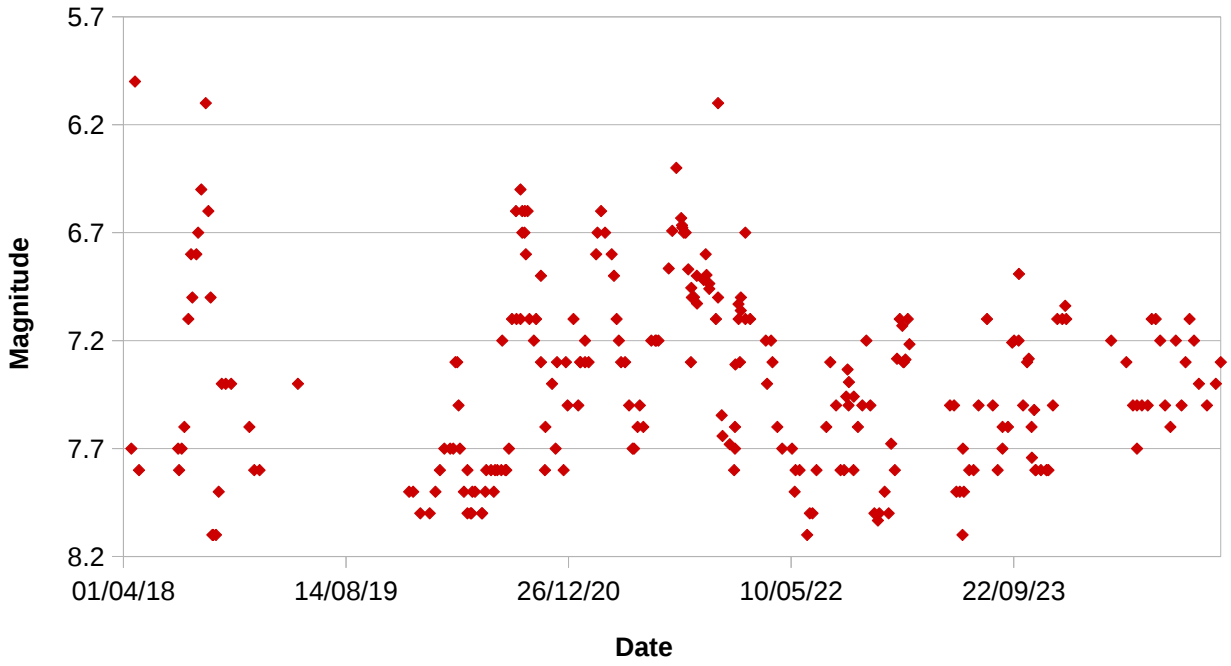


AF Cygni.

Extreme brightness range	**6.4 – 8.4**
More typical range	**6.7 – 7.7**
Period of variation	**About 3 months.**
Frequency of observation	**Worth checking a few times per month.**
Observe with	**40mm or 50mm binoculars will suffice for most of the time, but 50-80mm binoculars may be required during the deeper minima.**
Visibility	**Can be observed all year round, but is rather low in the evening sky from January to April.**

Light Curve for AF Cygni.

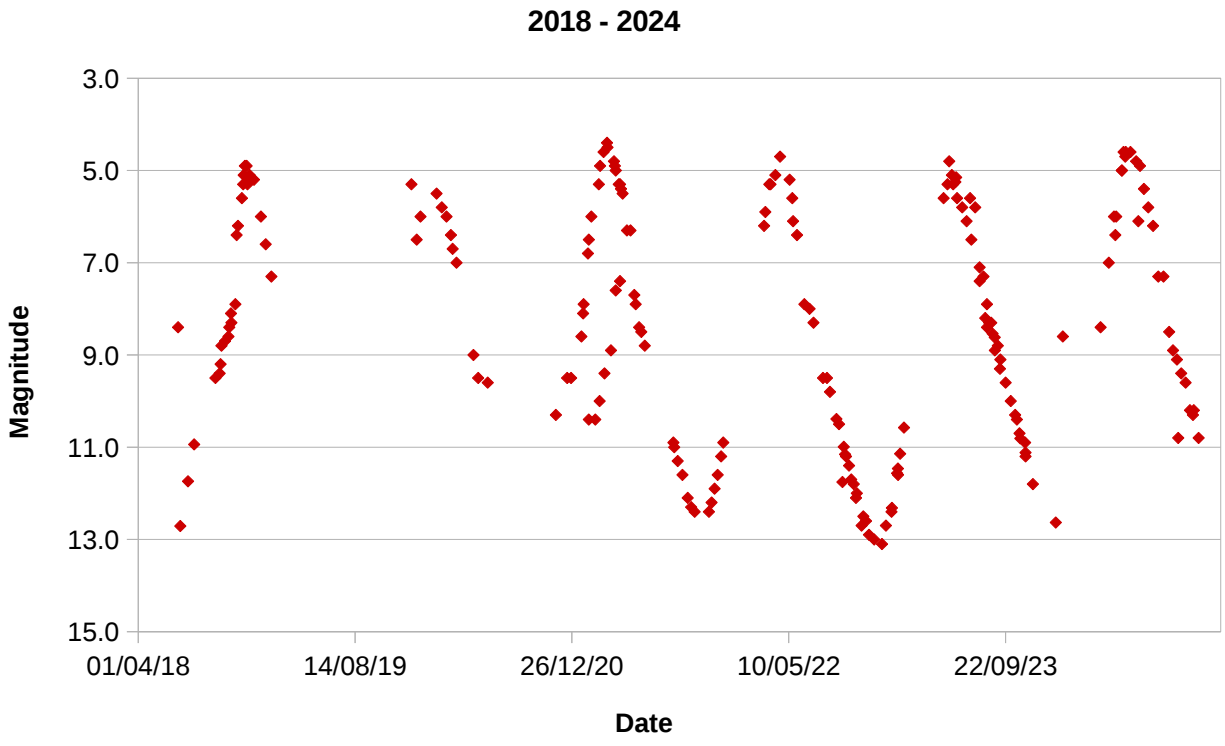
2018 - 2024



Chi Cygni.

Extreme brightness range	**3.4 – 14.2**
More typical range	**5.1 – 13.4**
Period of variation	**407 days (approx 13.5 months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**Naked eye for the brighter maxima, binoculars when fainter and a telescope to follow it all the way down to minimum.**
Visibility	**Can be observed all year round, but is only visible in the morning sky from mid January to April.**

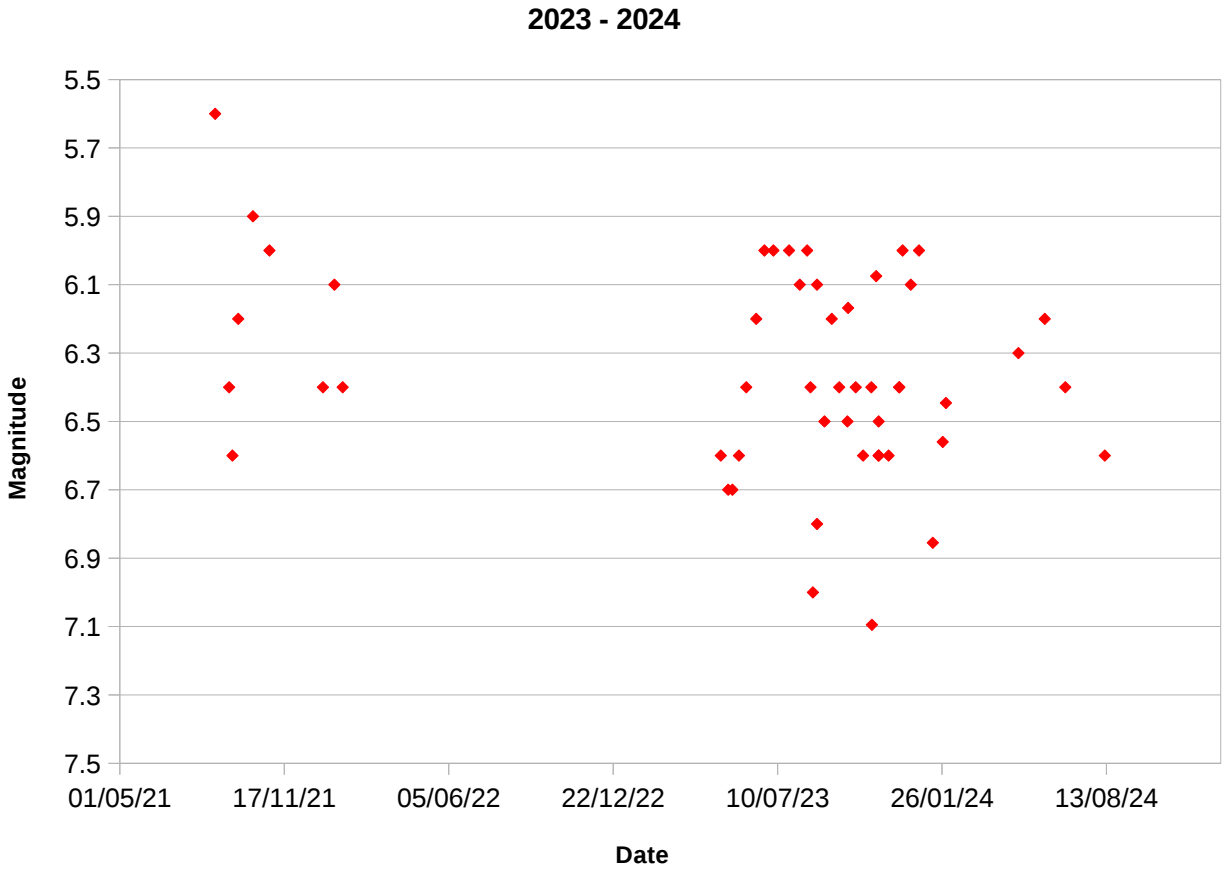
Light Curve for Chi Cygni.



W Cygni.

Extreme brightness range	**5.1 – 8.9**
More typical range	**5.1 – 6.8**
Period of variation	**132 days**
Frequency of observation	**Once a week.**
Observe using	**Best observed with 50mm binoculars.**
Visibility	**Can be observed all year round, but is rather low in the evening sky from January to April.**

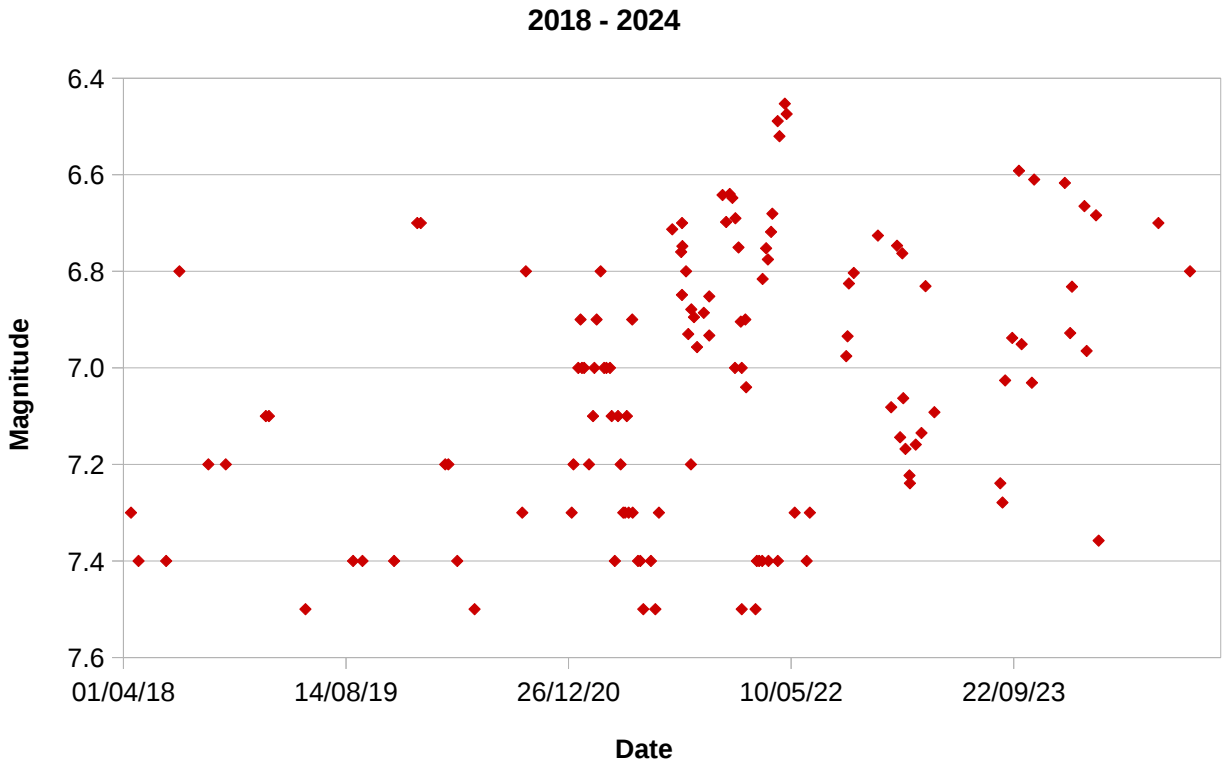
Light Curve for W Cygni.



RY Draconis.

Extreme brightness range	**6.0 – 8.0**
More typical range	**6.4 – 7.8**
Period of variation	**200 days?**
Frequency of observation	**Once a week.**
Observe using	**Best observed with 50mm binoculars.**
Visibility	**Can be observed all year round.**

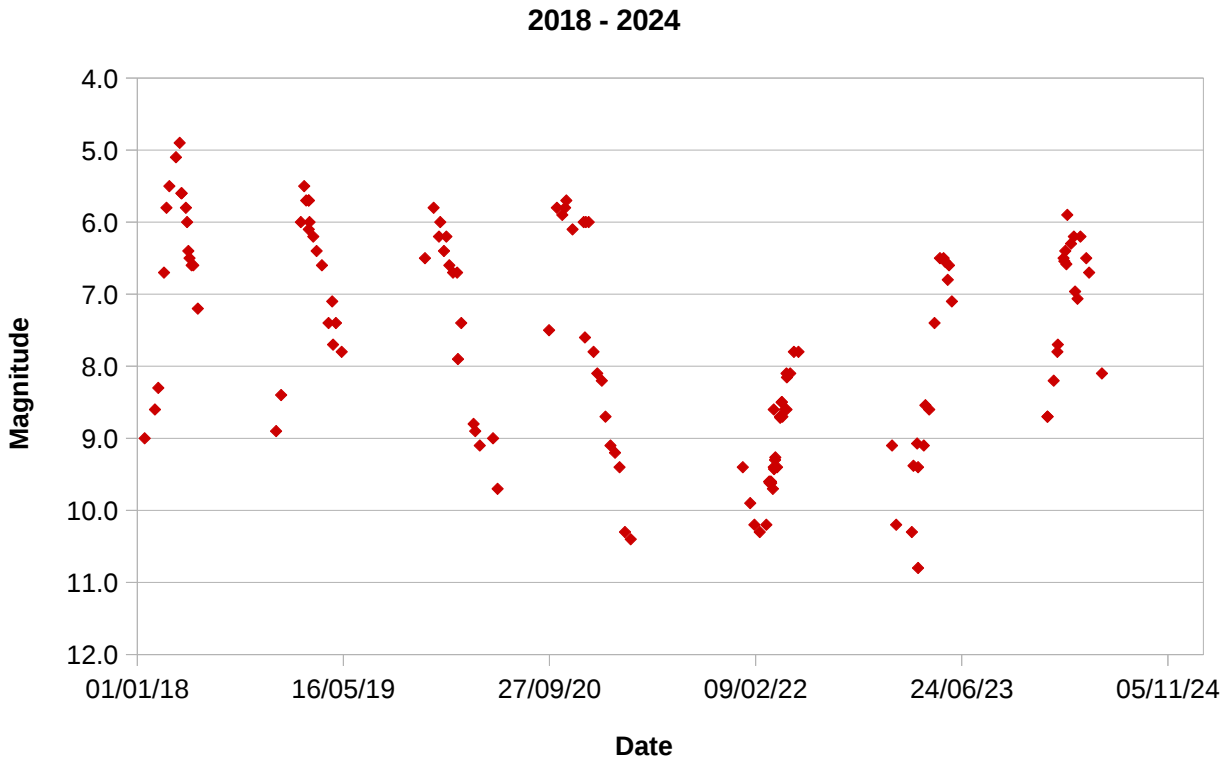
Light Curve for RY Draconis.



R Leonis.

Extreme brightness range	**4.8 – 11.0**
More typical range	**5.4 – 10.5**
Period of variation	**310 days (approx 10months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**40mm or 50mm binoculars will suffice when near maximum, but 50-80mm binoculars will be required when fainter. A telescope is required to follow R Leo all the way down to minimum.**
Visibility	**Mid September to early June.**

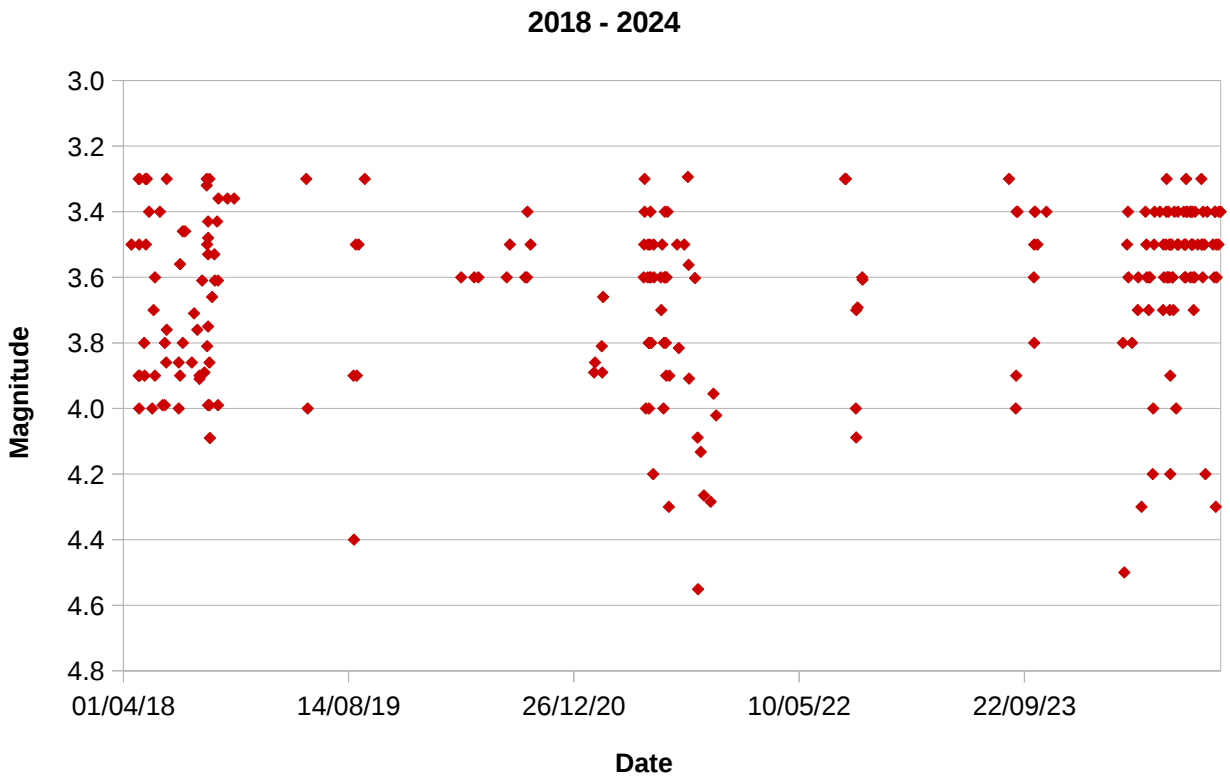
Light Curve for R Leonis.



Beta Lyrae.

Extreme brightness range	**3.4 – 4.3**
More typical range	**Always the same range.**
Period of variation	**12.941 days (and slowly increasing).**
Frequency of observation	**Check on every clear night.**
Observe using	**Can be observed with the naked eye, but 40mm or 50mm binoculars may also help, especially during eclipses.**
Visibility	**Can be observed all year round, but is rather low in the evening sky from January to April.**

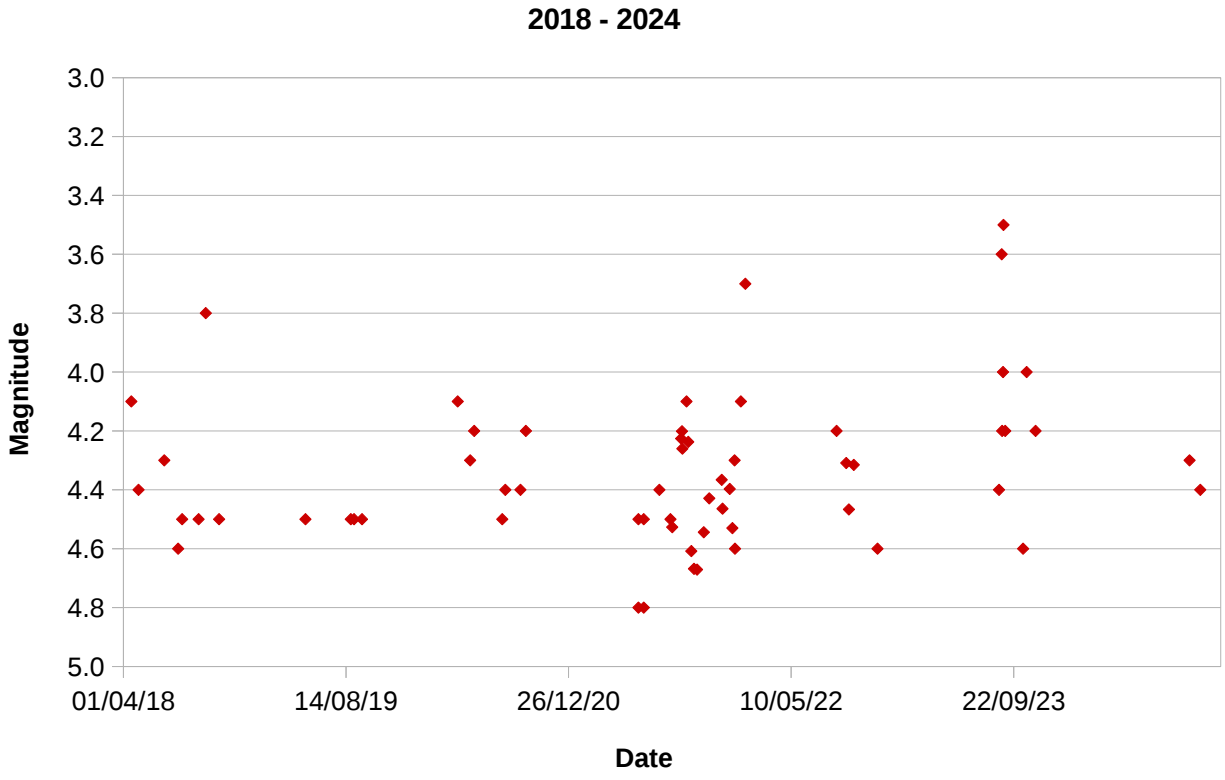
Light Curve for Beta Lyrae.



R Lyrae.

Extreme brightness range	**3.9 – 5.0**
More typical range	**3.8 – 4.4**
Period of variation	**46 days.**
Frequency of observation	**Once a week.**
Observe using	**Naked eye – if you have a reasonably dark observing site. Otherwise use 40mm or 50mm binoculars.**
Visibility	**Best observed between May and November.**

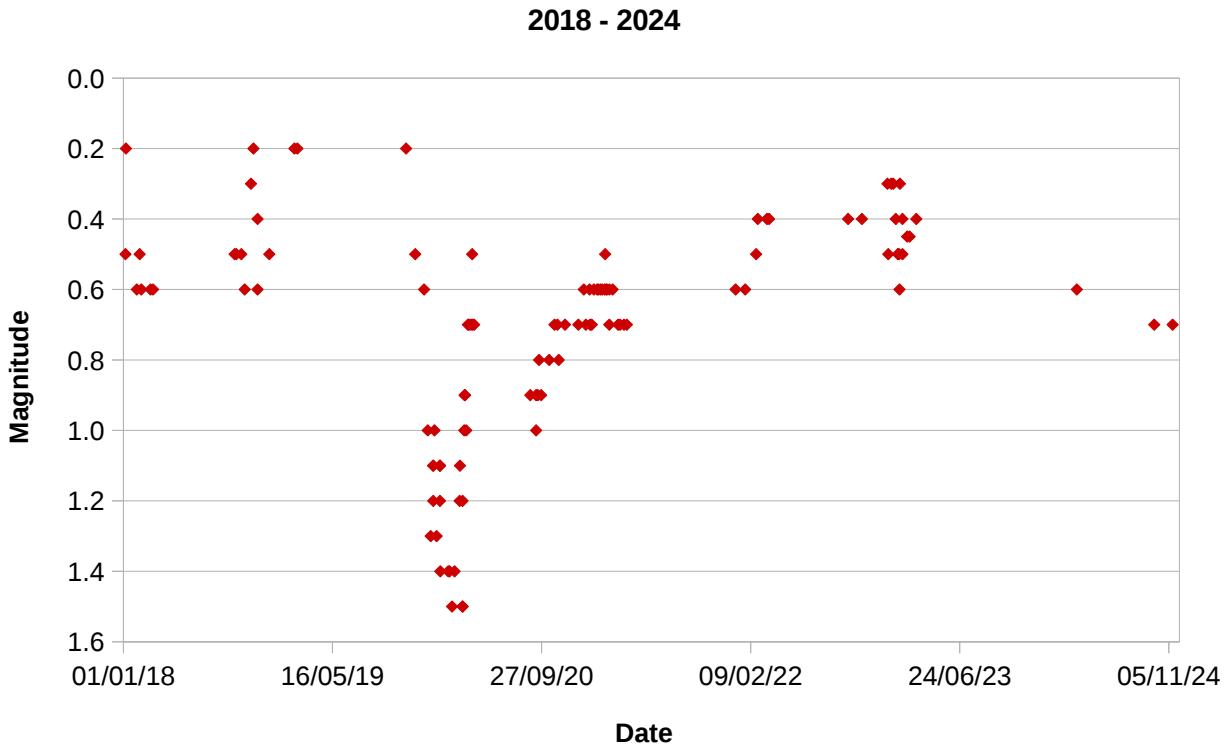
Light Curve for R Lyrae.



Alpha Orionis – Betelgeuse.

Extreme brightness range	**0.4 – 1.3**
More typical range	**0.4 – 0.8**
Period of variation	**Possible around 4 years (although the GCVS gives a longer value of 2070 days).**
Frequency of observation	**Worth checking once or twice each month.**
Observe using	**Naked Eye.**
Visibility	**Can be observed from mid August to late April.**

Light Curve for Alpha Orionis.

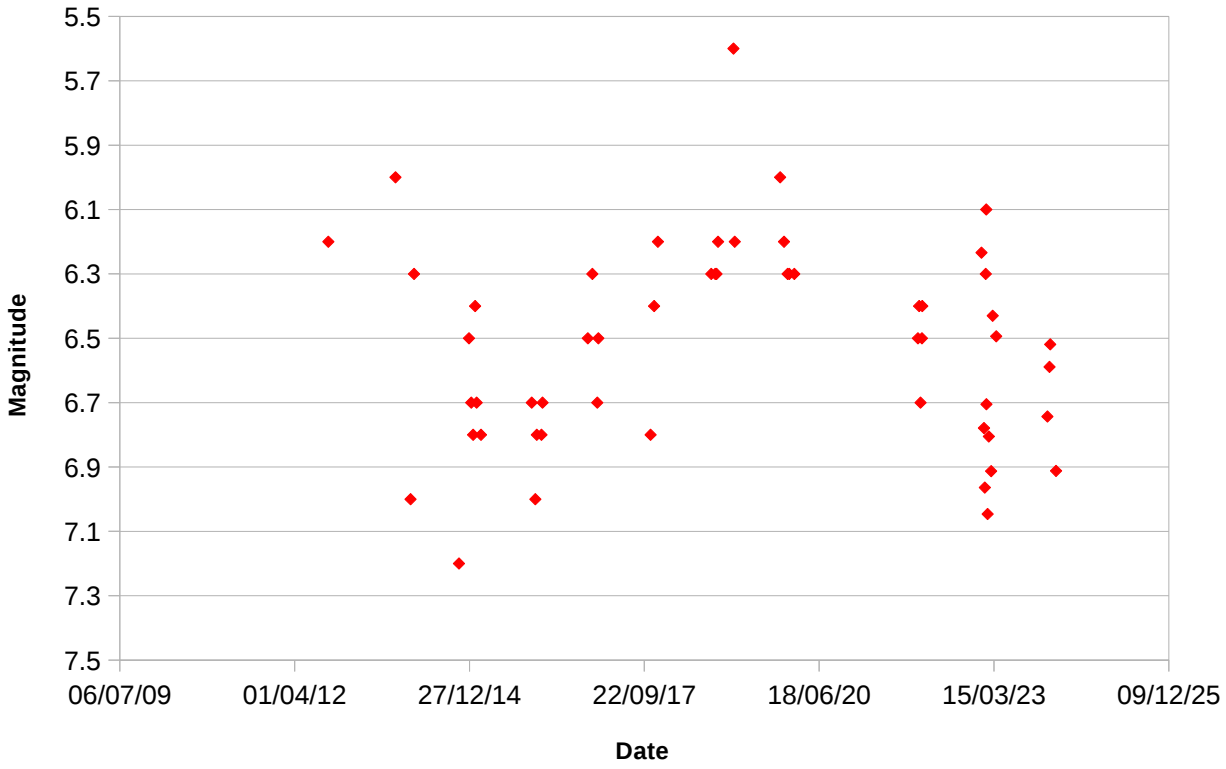


W Orionis.

Extreme brightness range	**5.9 – 7.7**
More typical range	**5.9 – 6.9**
Period of variation	**212 days**
Frequency of observation	**Once a week.**
Observe using	**Best observed with 50mm binoculars.**
Visibility	**Best observed October to March.**

Light Curve for W Orionis.

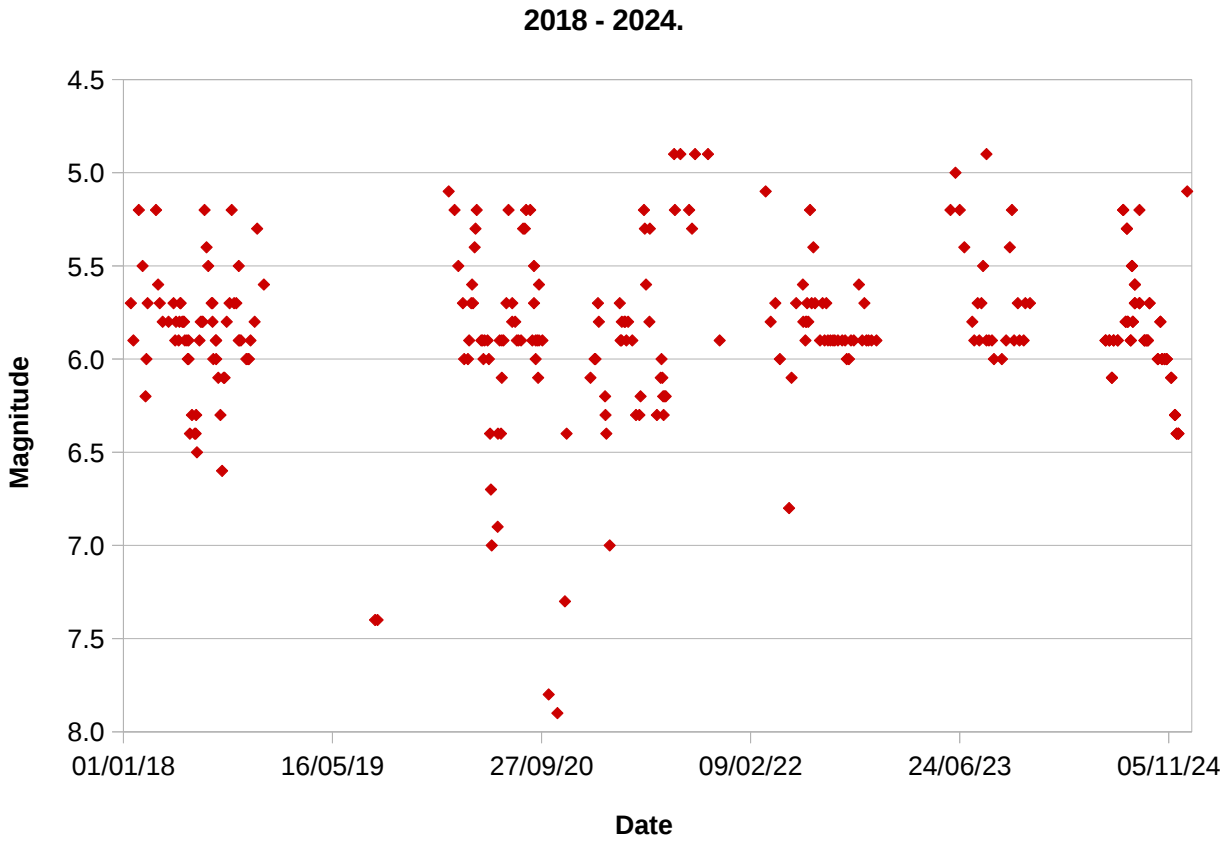
2013 - 2024



R Scuti.

Extreme brightness range	**4.5- 8.6**
More typical range	**5.0 – 7.5**
Period of variation	**142 days (often including one deep and one shallow minimum).**
Frequency of observation	**Worth checking a couple of times per week – possibly every other day during deep minima.**
Observe using	**40mm or 50mm binoculars will suffice for most of the time, but 50-80mm binoculars may be required during the deeper minima.**
Visibility	**Can be observed from mid January to mid December, but is rather low in the morning sky until April.**

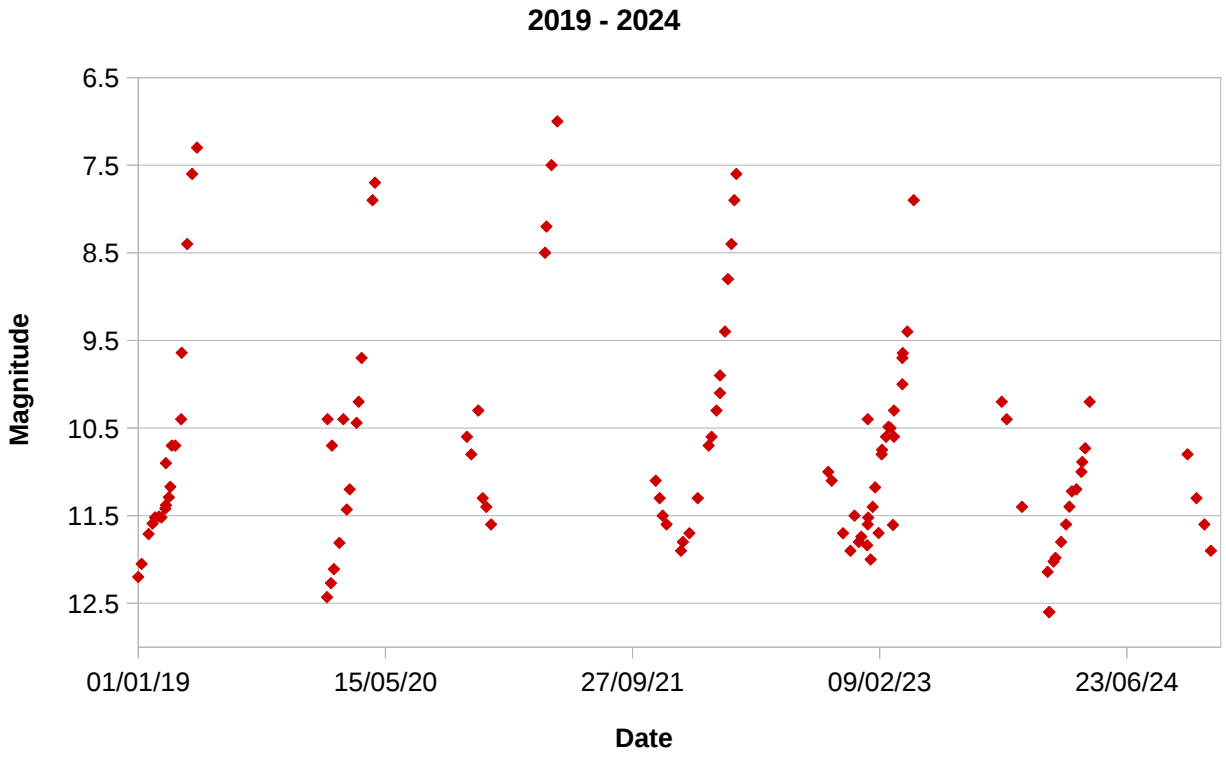
Light Curve For R Scuti.



U Orionis.

Extreme brightness range	**5.3 – 12.6**
More typical range	**6.3 – 12.0**
Period of variation	**372 days (a week longer than a year).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50mm binoculars will suffice for most of the time, but 50-80mm binoculars will be needed to cover the middle of its range. A telescope will be required to follow it all the way down to minimum.**
Visibility	**Can be observed from mid August to early May.**

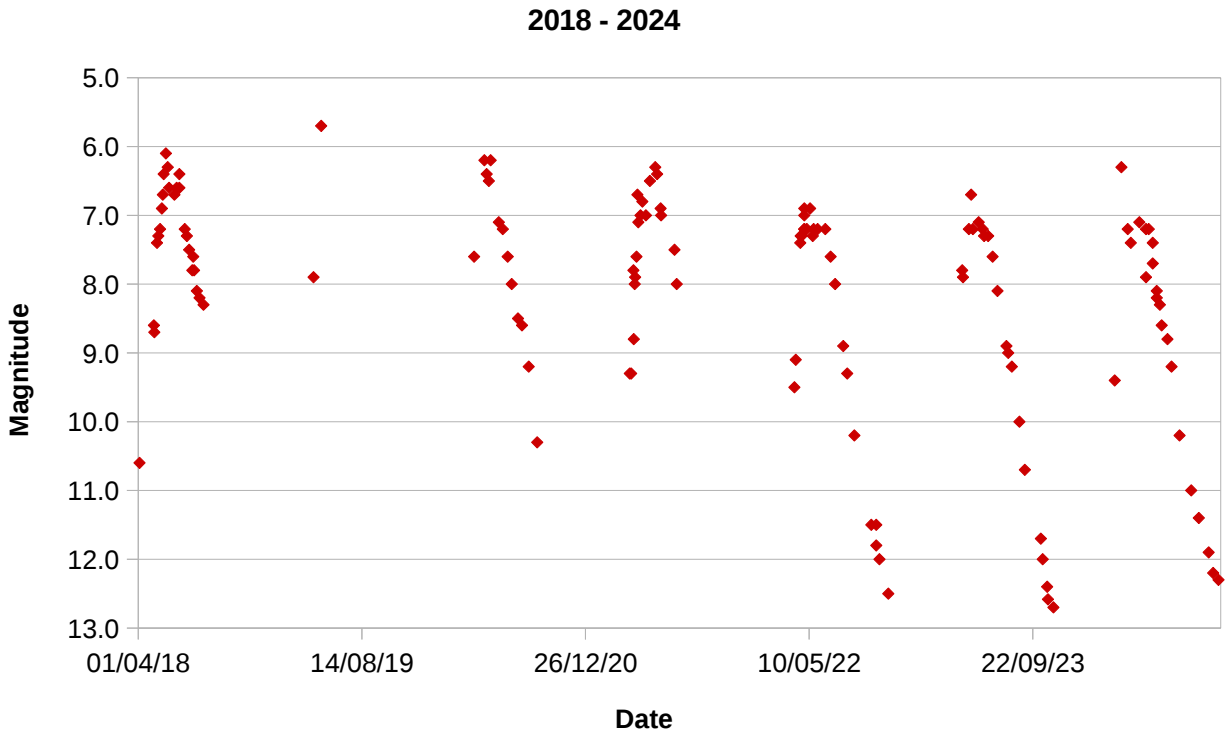
Light Curve for U Orionis.



R Serpentis.

Extreme brightness range	**5.7 – 14.4**
More typical range	**6.9 – 13.4**
Period of variation	**357 days (8 days shorter than a year).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50mm binoculars will suffice when near maxima. Larger binoculars will be required as it fades. A telescope will be required to follow it all the way down to minimum.**
Visibility	**Can be observed all year round, but is only visible in the morning sky from December to February.**

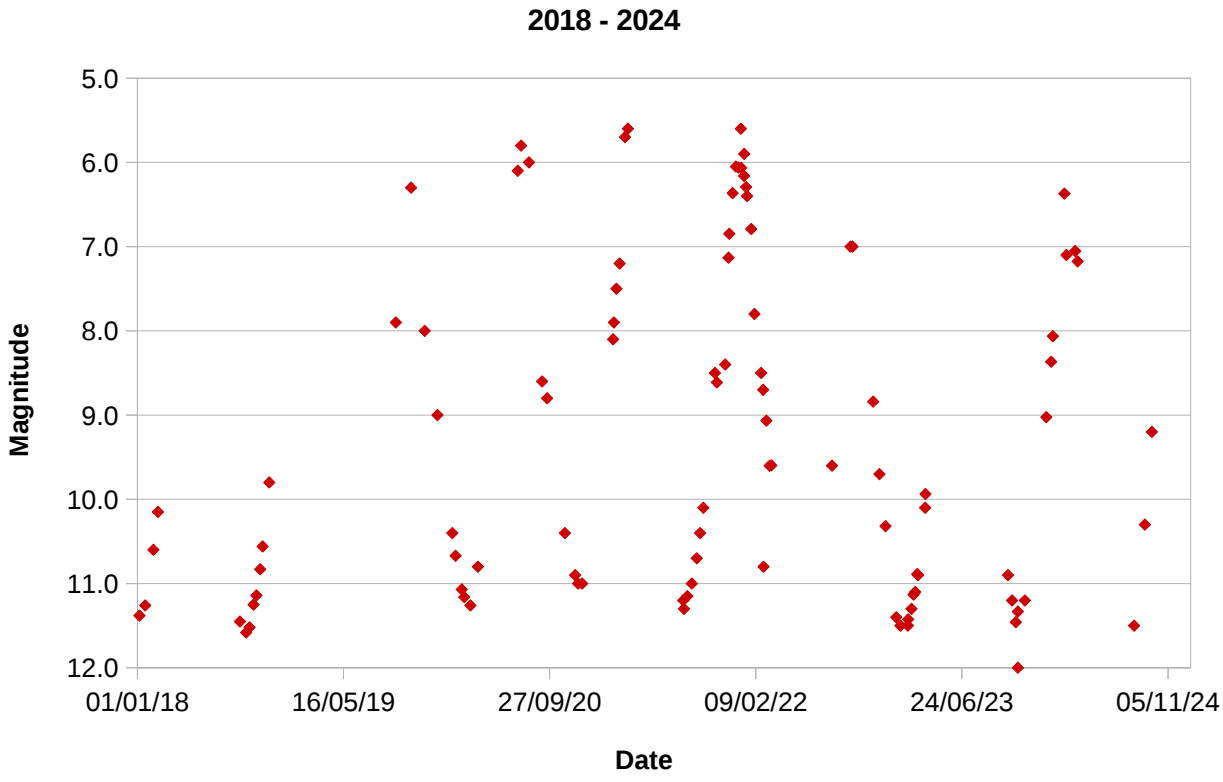
Light Curve for R Serpentis.



R Trianguli.

Extreme brightness range	**5.4 – 12.6**
More typical range	**6.0 – 11.7**
Period of variation	**Approx 7.5 months.**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**40mm or 50mm binoculars when near maximum. 50-80mm binoculars when fainter. A telescope is required to follow it all the way down to minimum.**
Visibility	**Late June to early April.**

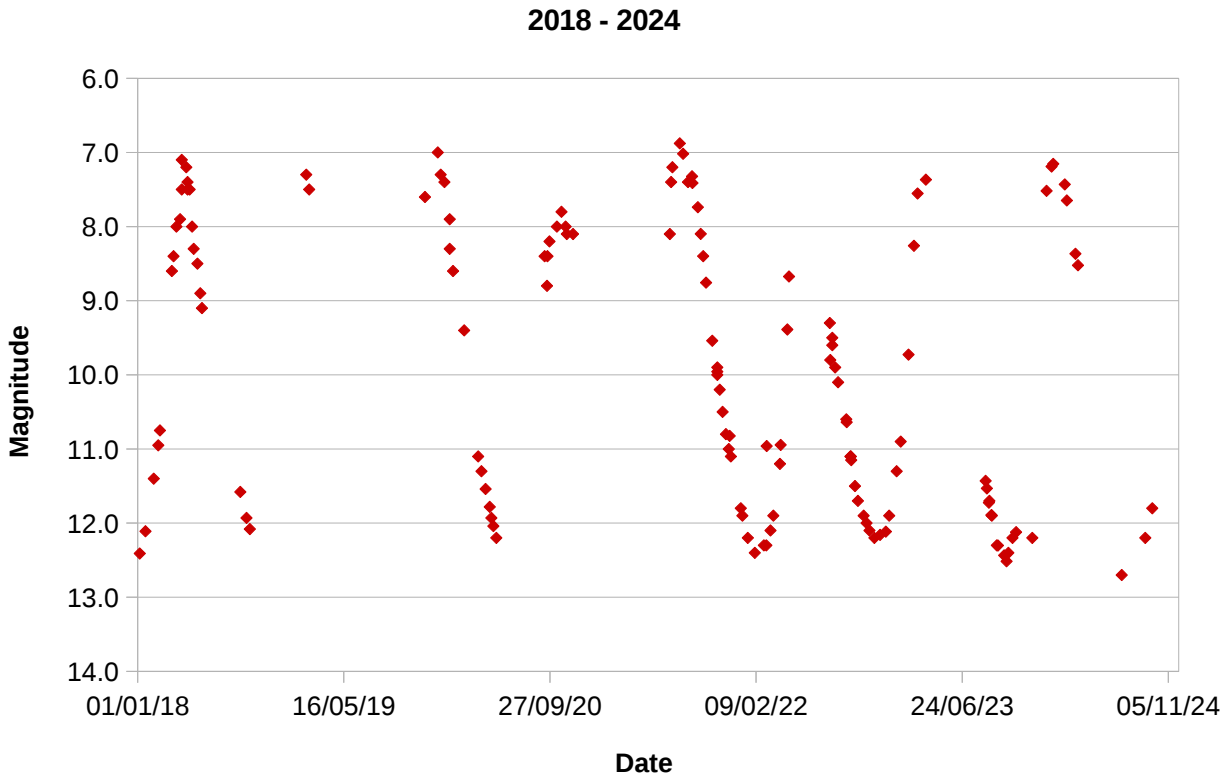
Light Curve for R Trianguli.



R Ursae Majoris.

Extreme brightness range	**6.7 – 13.4**
More typical range	**7.2 – 13.0**
Period of variation	**302 days – approx 10 months.**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50mm binoculars will suffice when it is near maximum. Larger binoculars will be needed when fainter. A telescope is required if you want to follow it down to minimum.**
Visibility	**Circumpolar – can be observed all year round.**

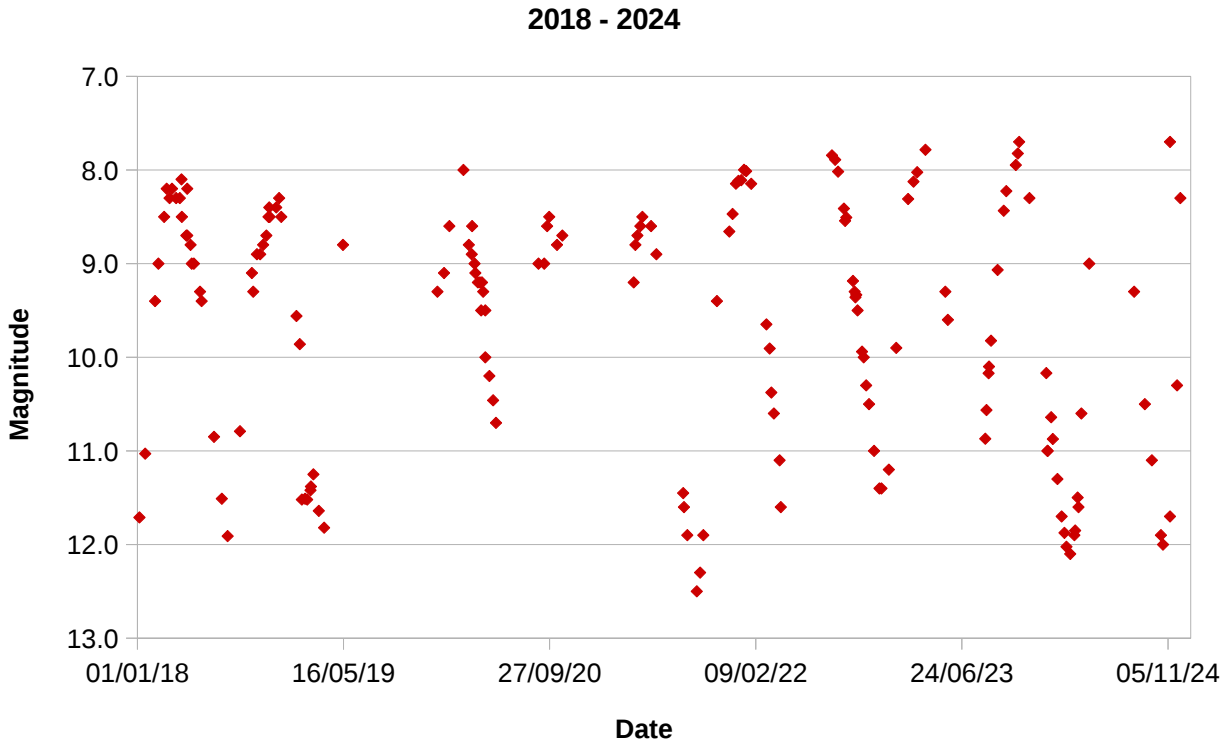
Light Curve for R Ursae Majoris.



S Ursae Majoris.

Extreme brightness range	**7.2 – 12.7**
More typical range	**7.9 – 11.7**
Period of variation	**226 days (approx 7.5 months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50-80mm binoculars when near maximum. A telescope will be required to follow it down to minimum.**
Visibility	**Star is circumpolar.**

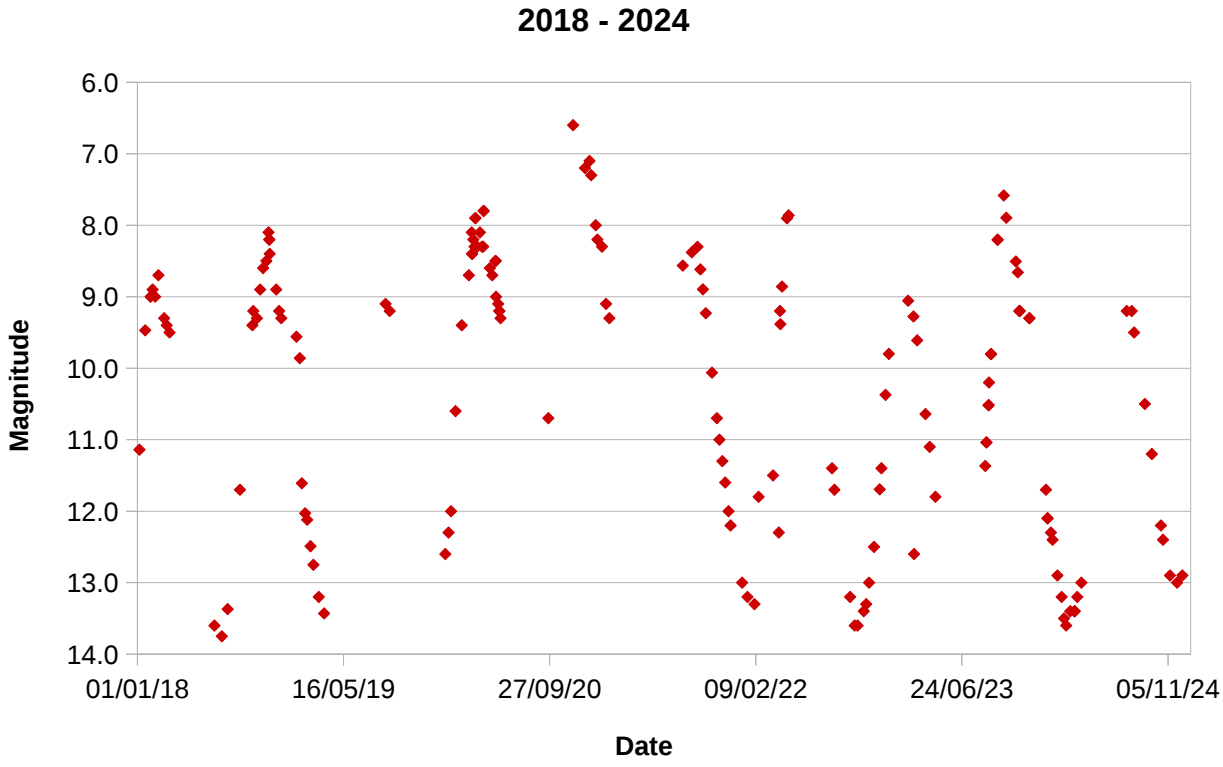
Light Curve for S Ursae Majoris.



T Ursae Majoris.

Extreme brightness range	**6.6 – 13.5**
More typical range	**7.7 – 12.9**
Period of variation	**257 days (approx 8.5 months).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50-80mm binoculars. A telescope will be required to follow it all the way down to minimum.**
Visibility	**Circumpolar – can be observed all year round.**

Light Curve for T Ursae Majoris.



Z Ursae Majoris.

Extreme brightness range	**6.3 – 9.8**
More typical range	**6.9 – 8.7**
Period of variation	**About 6 months (longer secondary period is also present).**
Frequency of observation	**Worth checking a few times per month.**
Observe using	**50mm binoculars will suffice for most of the time, but 60-80mm binoculars may be required during the deeper minima.**
Visibility	**Can be observed all year round. Circumpolar.**

Light Curve for Z Ursae Majoris.