The Society of Popular Astronomy.

Variable Star Section.

Annual Section Report – 2020.

Introduction.

Despite the tumultuous events of 2020, the work of the section was able to proceed pretty much as normal. We received observations from Matthew Barrett, Andy Chapman, Tracie Heywood, Don Matthews, Jonathan Shanklin and Bob Steele.

The biggest variable star news story of 2020 was the fading of Alpha Orionis (Betelgeuse). Betelgeuse started fading at the end of 2019, and there was much speculation about the cause of this fading, but we now think that the fading was due to the build-up of dust within the star's atmosphere. Certainly, Betelgeuse will not be going supernova anything soon! Moreover, we observed Betelgeuse returned to its normal brightness over the first few months of the year.

The long period variables, R Bootis, R Leonis and R Trianguli were observed as they passed though their minima. While R Serpentis, Mira, T Ursa Majoris and T Cephei were seen as they reached maximum.

The semi-period variable Z Ursa Majoris was observed over the course of an entire cycle of variation.

Tracie Heywood observed an eclipse of U Cephei.

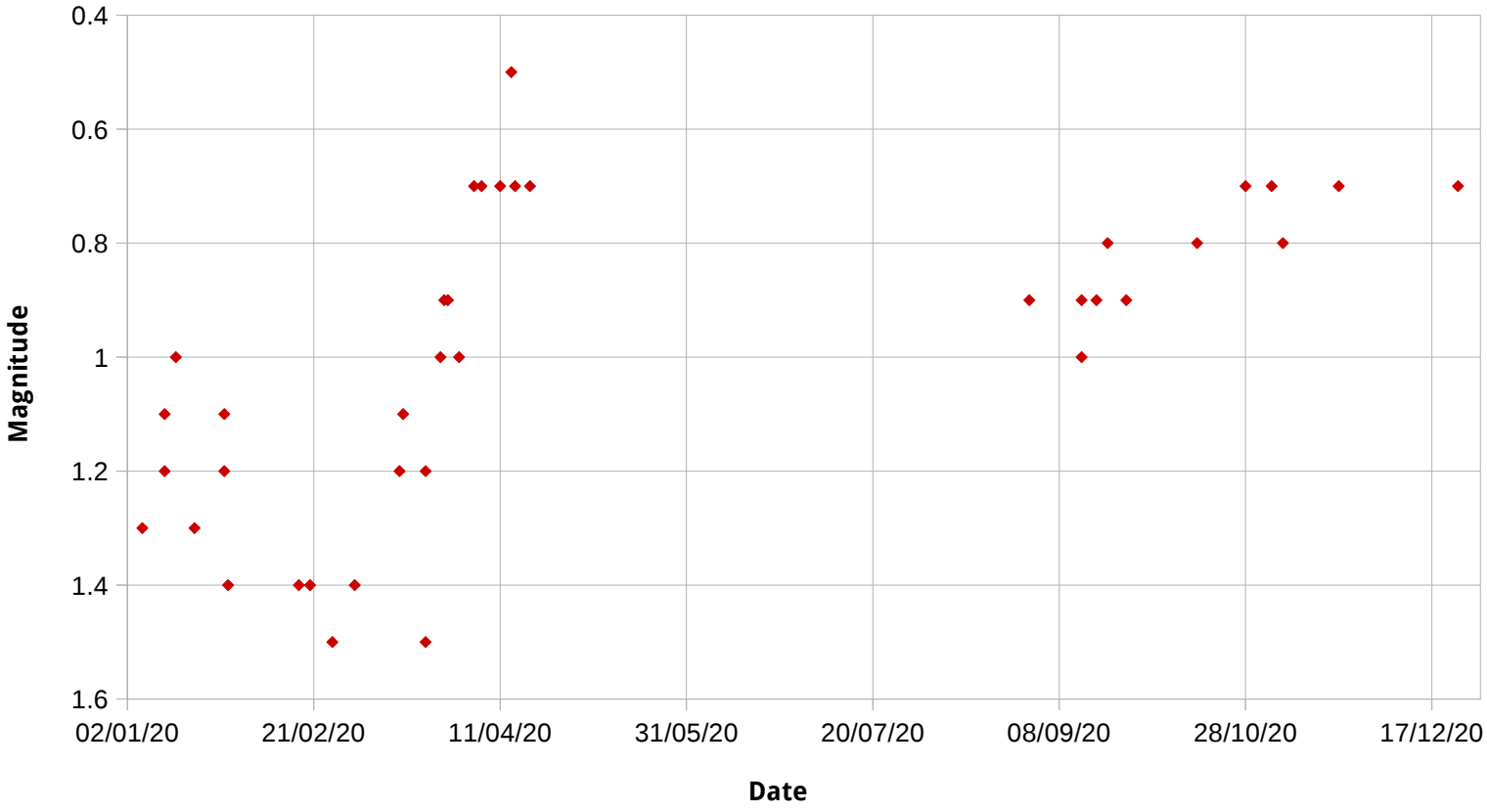
Light Curves for 2020.

Alpha Orionis.

Star	Extreme Range	Period	Type
α Ori	0.4 – 1.3	1600d?	Semi-Reg

Light Curve of Alpha Orionis.

Based on Member's Observations 2020.



After the unexpected dimming of Betelgeuse during the last month of 2019, members observed Betelgeuse, before Orion disappeared behind the Sun, returning to its usual brightness over the first few months of 2020. Observations made by Tracie Heywood, in the summer, after Orion had reappeared from behind the Sun, show that Betelgeuse was still shining at its normal brightness. Likewise, observations in early 2020 show that Betelgeuse is still behaving normally.

Recent studies, by professional astronomers, conclude that Betelgeuse dimming was primarily due to dust being released from Betelgeuse, combined with the effect of the star's pulsations. Betelgeuse's strange behaviour has prompted an intense programme of study, and a consequence of these studies, is that we now think that Betelgeuse is smaller and nearer to Earth then we originally thought.

Recent research by astronomer, puts Betelgeuse at only 530 light years away, compared with 700 light years, which was our original best estimate of its distance. Also, we originally thought that Betelgeuse, if placed within our Solar System, would have extended out past the orbit of Jupiter. Now, astronomers think that Betelgeuse would only extend out to about two-thirds the distance to Jupiter.

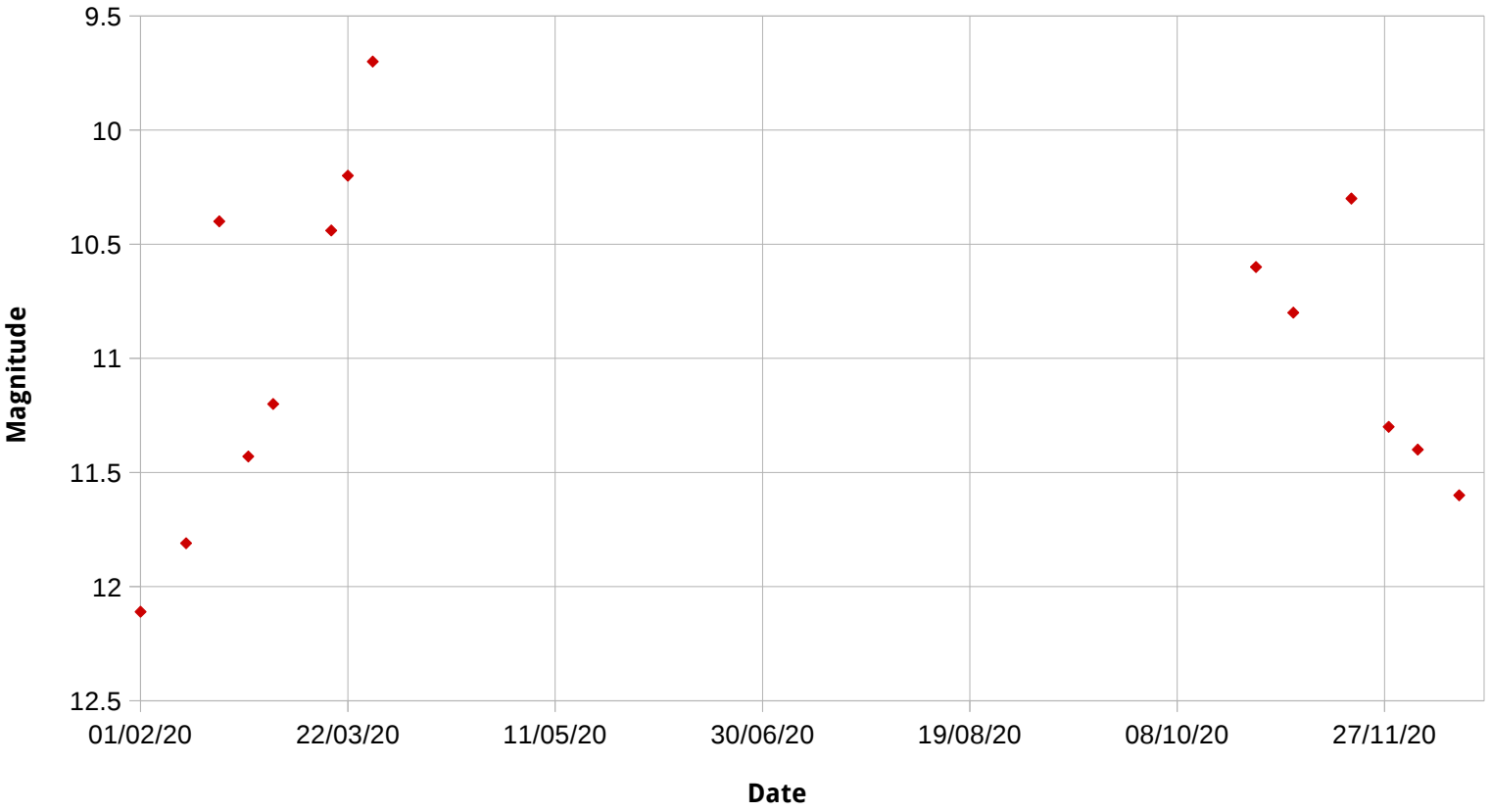
Betelgeuse will eventually end its life as a supernova, but this probably won't occur for another 100,000 years. You can also rest-assured that, even at a mere 500 light years, Betelgeuse is still far enough away, that it won't pose a danger to Earth when it does finally explode.

U Orionis.

Star	Extreme Range	Period	Type
α Ori	0.4 – 1.3	1600d?	Semi-Reg

Light Curve of U Orionis.

Based on Member's Observations 2020.



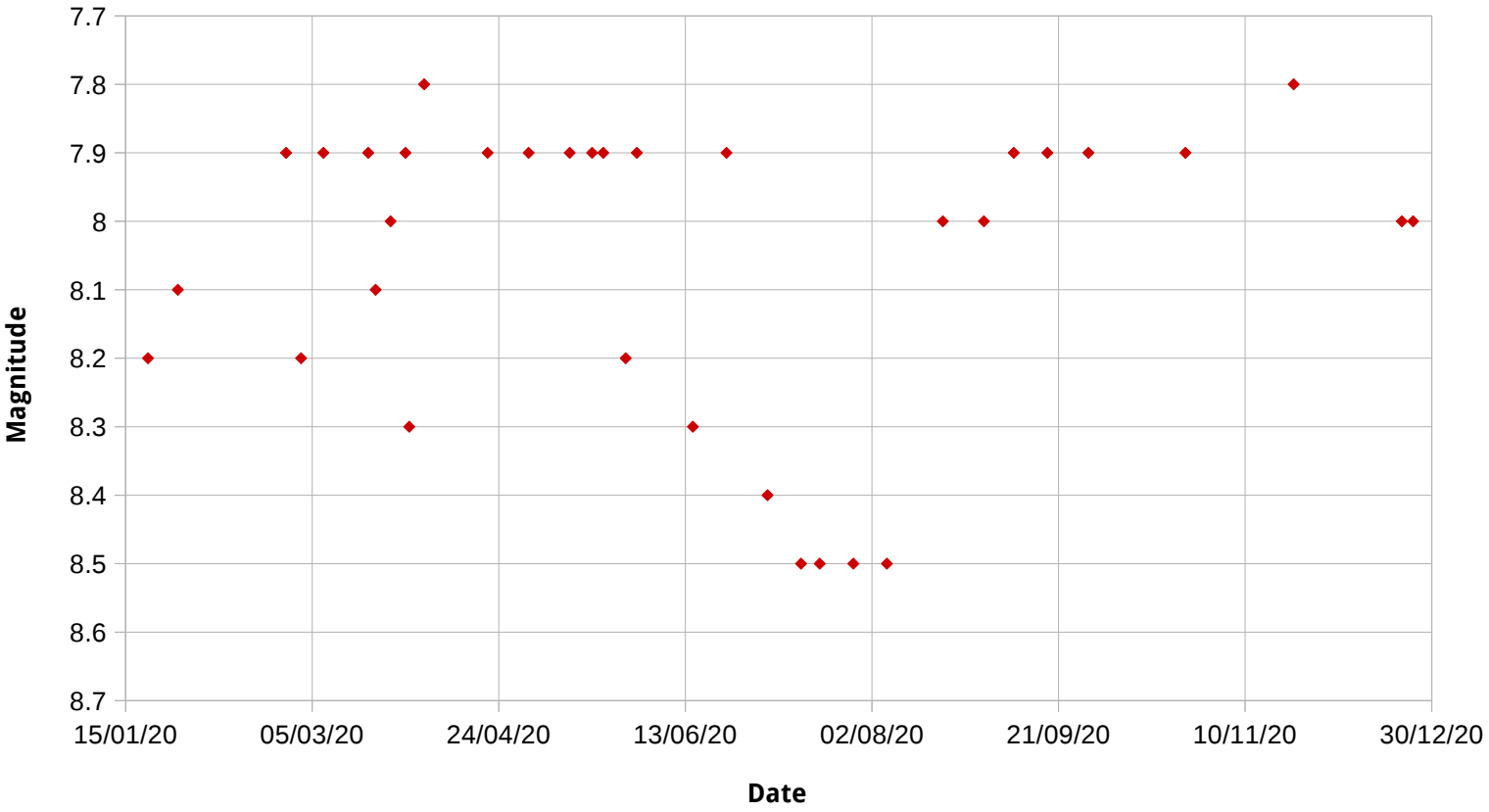
U Orionis is a long-period star that, at the moment, is rather problematic for UK observers to observe, as it's reaching maximum brightness during April, while Orion is behind the Sun. However, member's were able to observe U Orionis as it approached maximum brightness during the first quarter of the year, and receded from maximum brightness during the autumn.

RW Bootis.

Star	Extreme Range	Period	Type
RW Boo	7.4 – 8.9	209d?	Semi-Reg

Light Curve of RW Bootis.

Based on Member's Observations 2020.



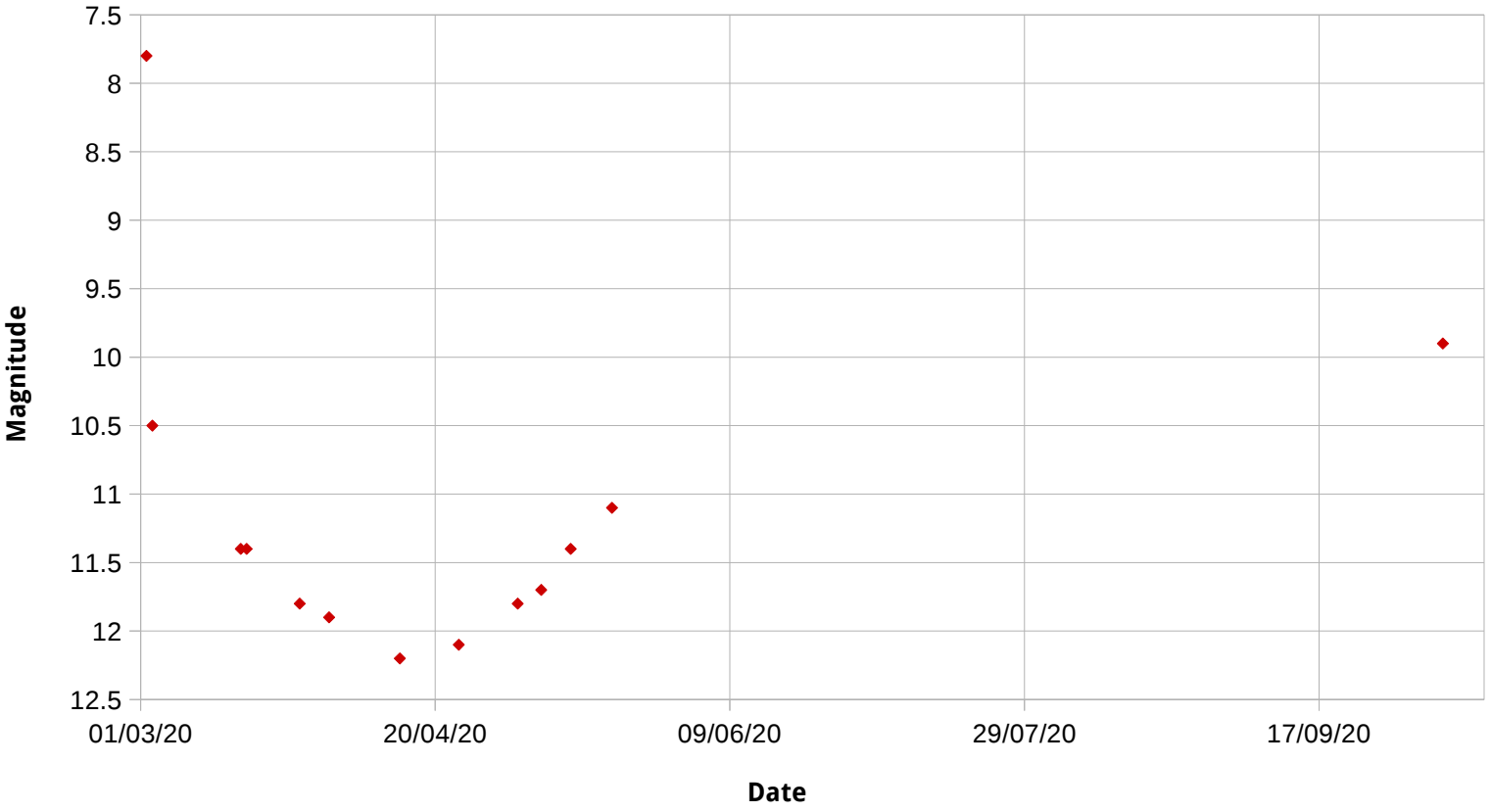
RW Bootis is a popular semi-regular variable star which as a typical range of 7.9 to 8.7. Over the course of 2020, RW Bootis has remained within its typical range of brightness. Most of the year, RW Bootis remained near maximum brightness, at about magnitude 7.9. We did see RW Bootis fall to a minimum of 8.5 during the summer.

R Bootis.

Star	Extreme Range	Period	Type
R Boo	6.2 – 13.2	223d	Long-Period

Light Curve of R Bootis.

Based on Member's Observations 2020.



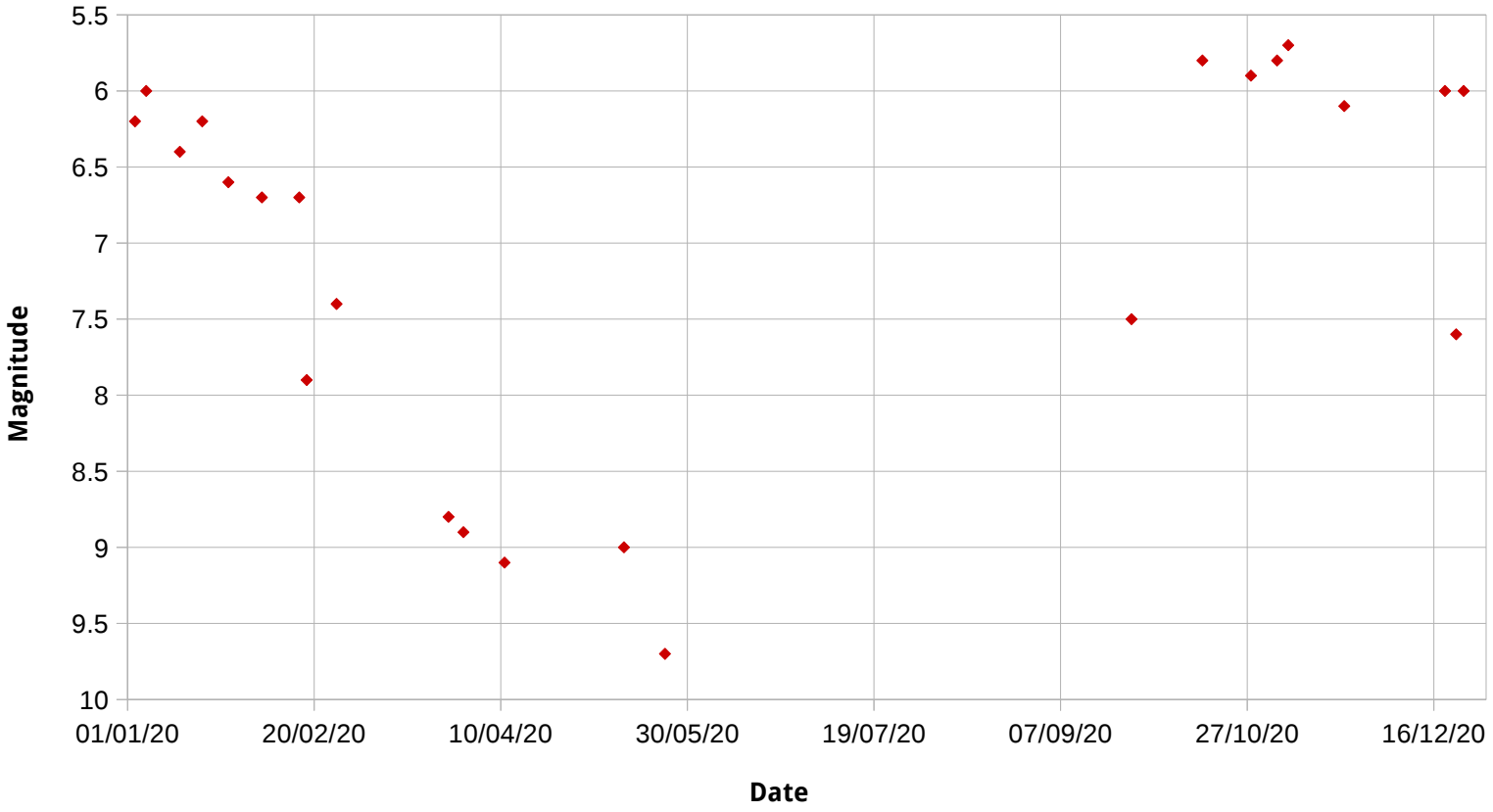
R Bootis is one of the more challenging stars on our program as it's very faint, with a typical range of 7.2 – 12.3. However, members were able to observe R Bootis as it reached minimum during April.

R Leonis.

Star	Extreme Range	Period	Type
R Leo	4.8 – 11.0	310d	Long-Period

Light Curve of R Leonis.

Based on Member's Observations 2020.



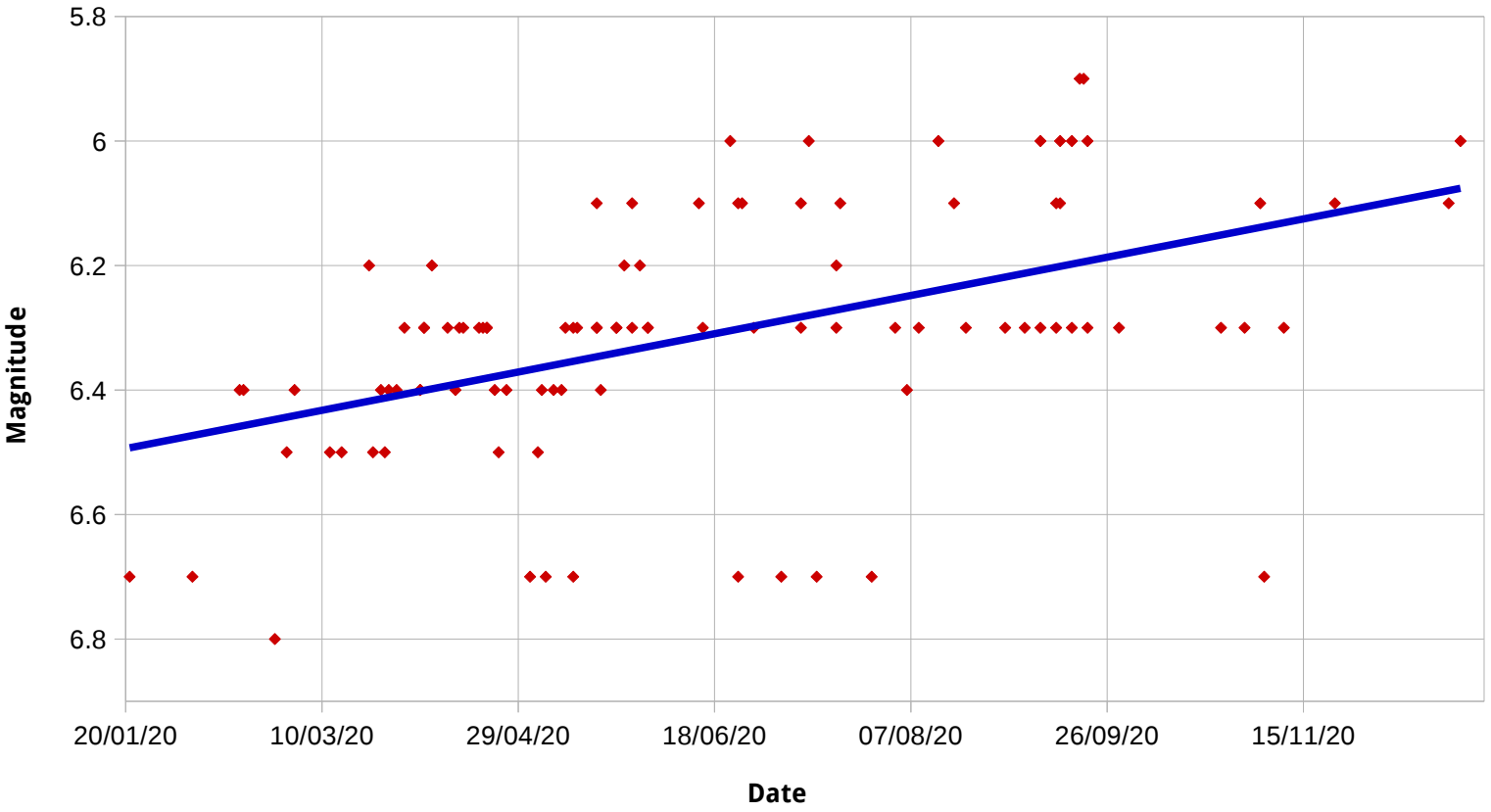
R Leonis is one of the more popular long-period variables on our program, mostly because it always remains relatively bright. It has an extreme range of 4.8 – 11.0, but a more typical range is 5.8 – 10.0. R Leonis remained within its typical range during 2020, falling from a maximum brightness of about six, to a minimum of about ten, during the spring.

R Coronae Borealis.

Star	Extreme Range	Period	Type
R CrB	5.8 – 15.0	None	RCB

Light Curve of R Coronae Borealis.

Based on Member's Observations 2020.



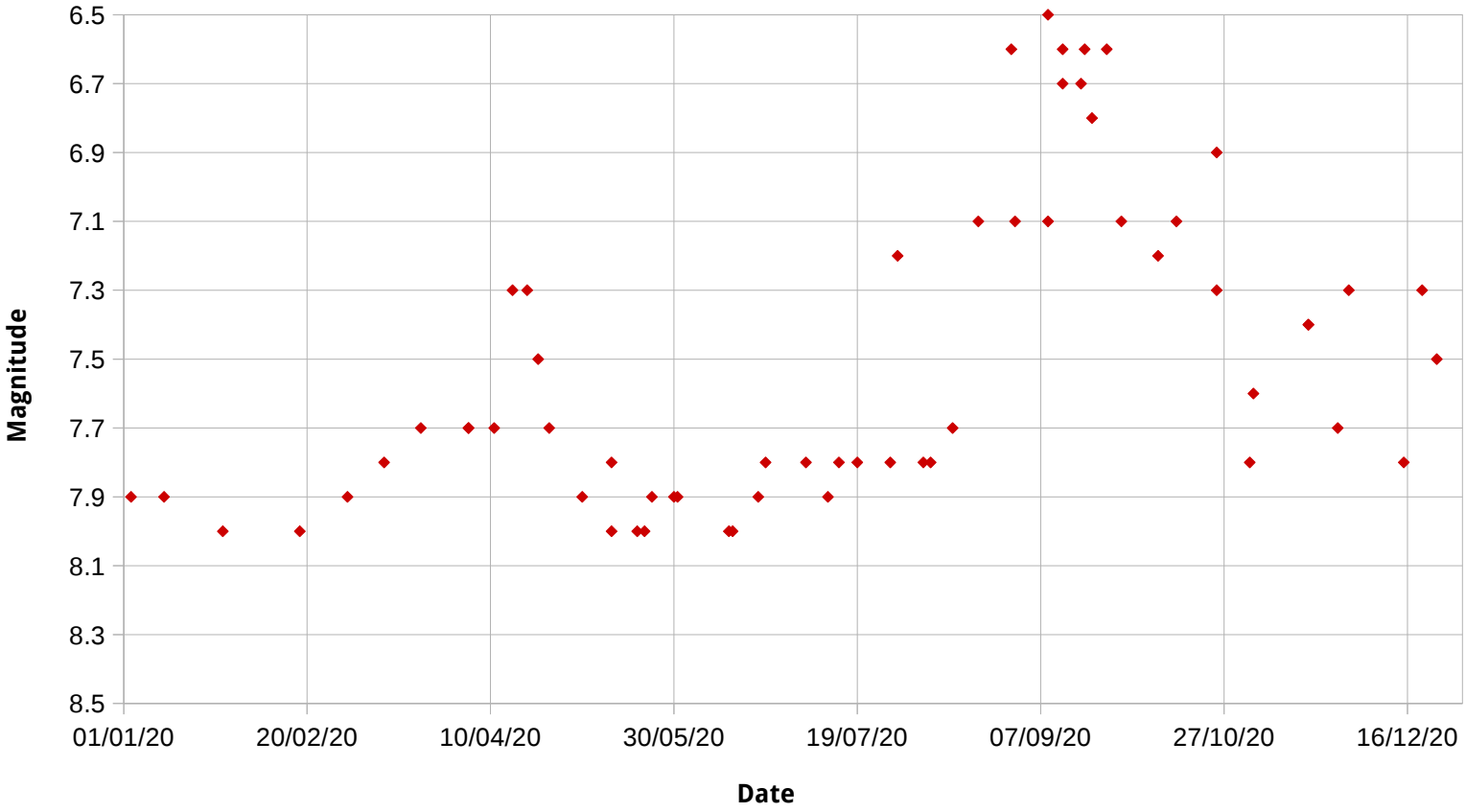
R Coronae Borealis is without doubt one of the most unusual stars in our programme. It usually shines around magnitude six, however, at random intervals it quite unexpectedly drops down to around magnitude fifteen. It is often referred to as a nova in reverse, as rather then suddenly increasing in brightness, it drops in brightness instead. This drop in brightness is due to the build-up of carbon dust within the star's atmosphere. Over the course of 2020, R Coronae Borealis has maintained a brightness of between 6.0 and 6.7. We received a large number of observations, but there was a large amount of scatter, still the trend was for R Coronae Borealis to slowly brighten over the year. However, we never know when it may undergo a sudden drop in brightness. So, it's worth keeping an eye upon this star.

AF Cygni.

Star	Extreme Range	Period	Type
AF Cyg	6.4 – 8.4	92d	Semi-Reg

Light Curve of AF Cygni.

Based on Member's Observations 2020.



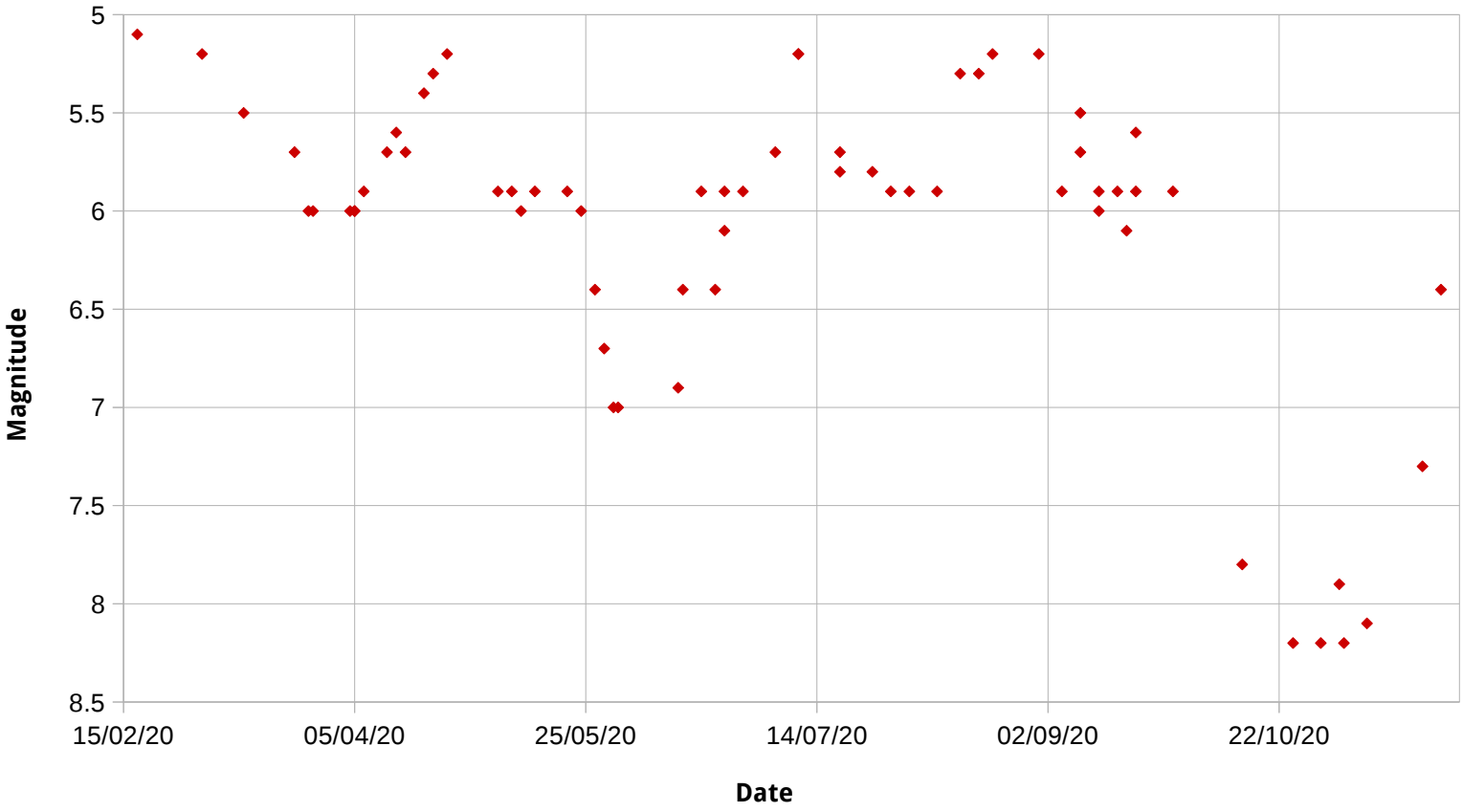
AF Cygni is another popular star with our members. It is always visible, even in small binoculars, and has a small enough period that is shows an interesting amount of activity over the period of a few months. It also helps that it can be observed during the warm summer months. During 2020, AF Cygni showed typical behaviour, reaching a maximum brightness of 6.6 during the autumn. However, AF Cygni did show some variation in brightness over the course of the spring.

R Scuti.

Star	Extreme Range	Period	Type
R Sct	4.5 – 8.6	142d	RV Tau

Light Curve of R Scuti.

Based on Member's Observations 2020.



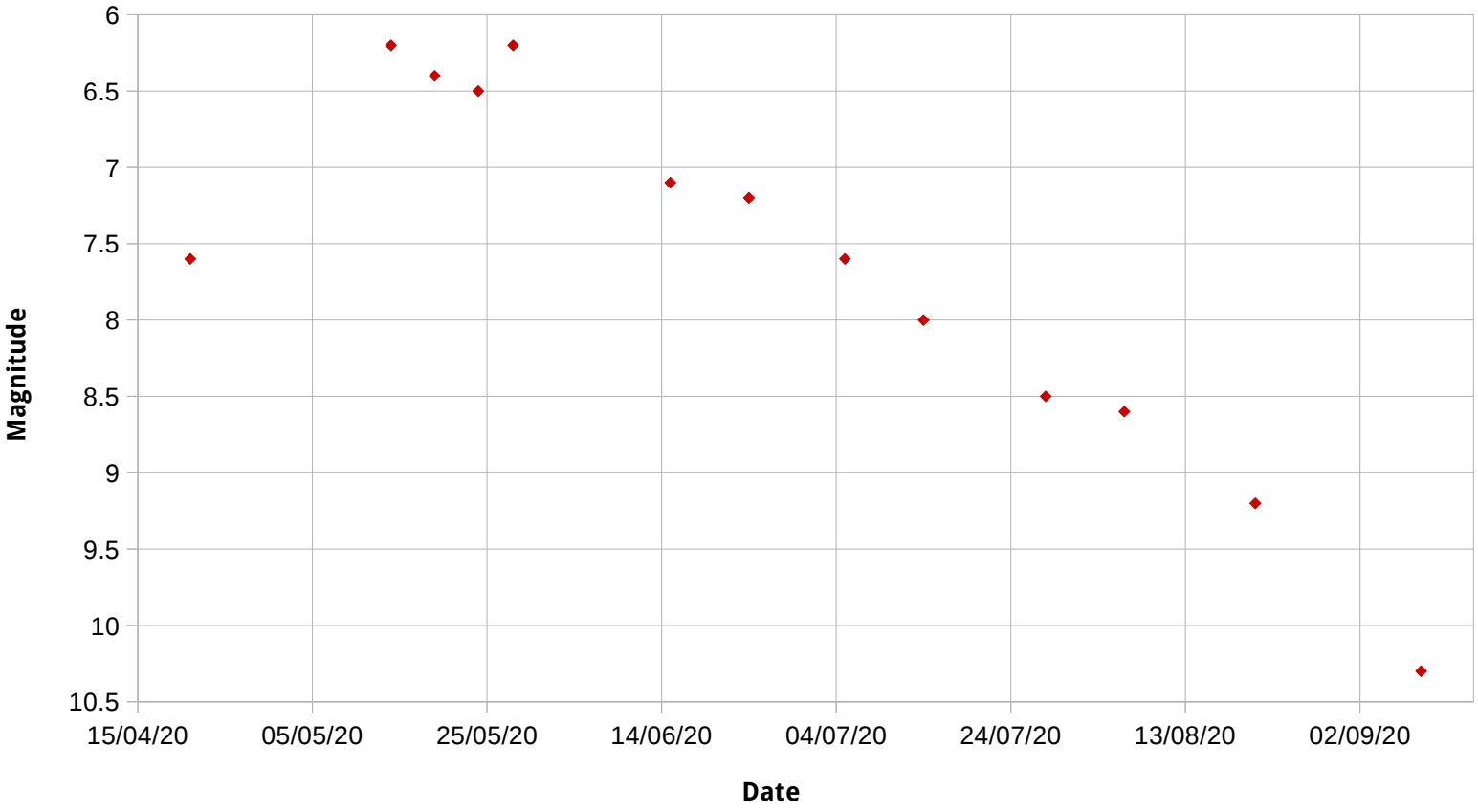
R Scuti is another very popular star, and it's always fascinating to observe, as it shows very complex behaviour. R Scuti often shows alternating deep and shallow minima, and we saw evidence of this behaviour during 2020. There appears to a shallow minima during the spring, followed by a deeper minima during the autumn. Moreover, R Scuti seems to show three minima. One shallow minima, in April, when it fell to magnitude 6.0, a second in May, when it fell to a magnitude of 7.0 and a third in October, when it fell to a magnitude of just below eight.

R Serpentis.

Star	Extreme Range	Period	Type
R Ser	5.7 – 14.4	357d	Long-Period

Light Curve of R Serpentis.

Based on Member's Observations 2020.



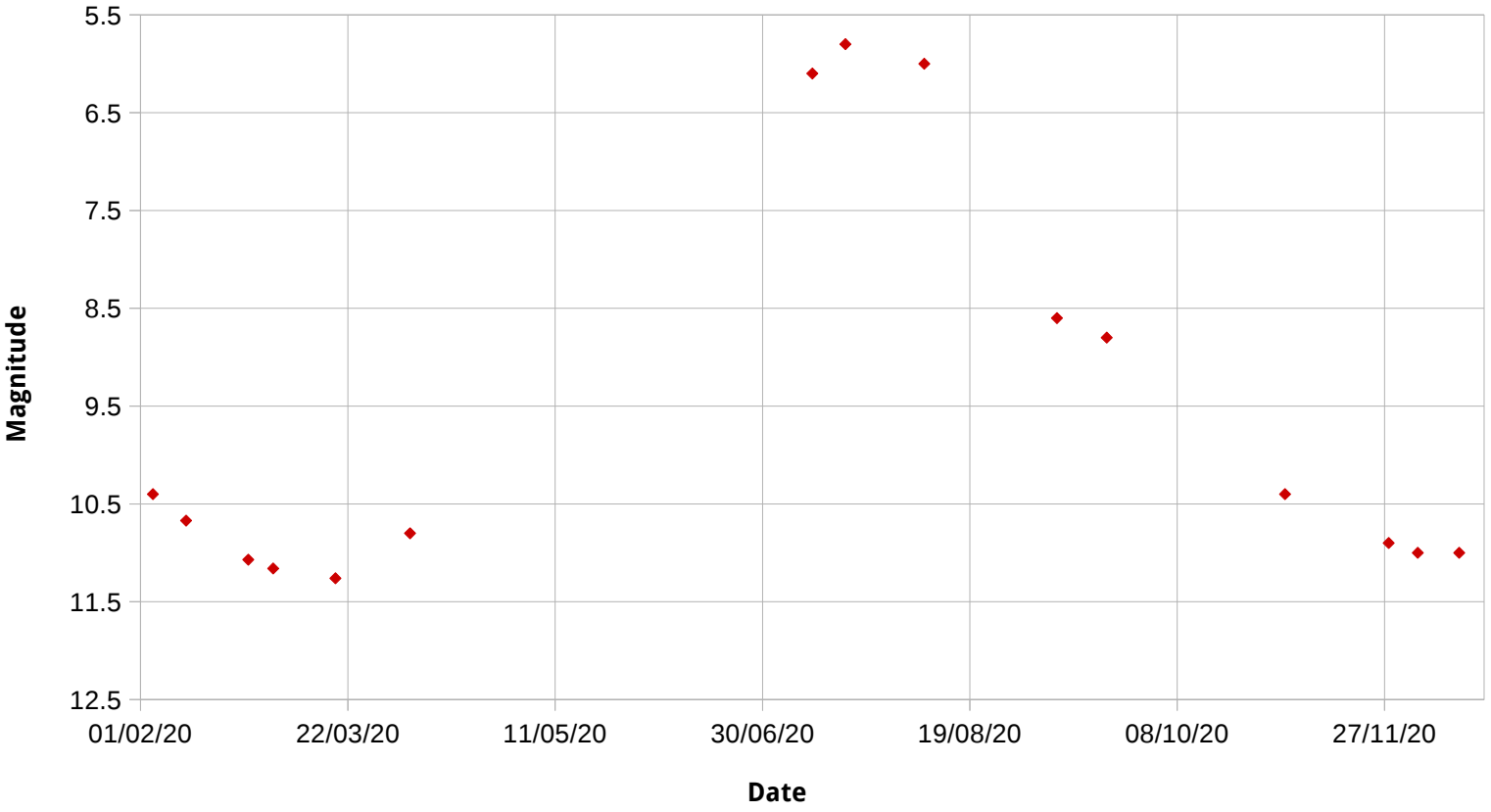
R Serpentis is a long-period star that rises to maximum and fades to minimum over the course of a year. Members were able to observe R Serpentis as it slowly descended to minimum in the autumn.

R Trianguli.

Star	Extreme Range	Period	Type
R Tri	5.4 – 12.0	266d	Long-Period

Light Curve of R Trianguli.

Based on Member's Observations 2020.



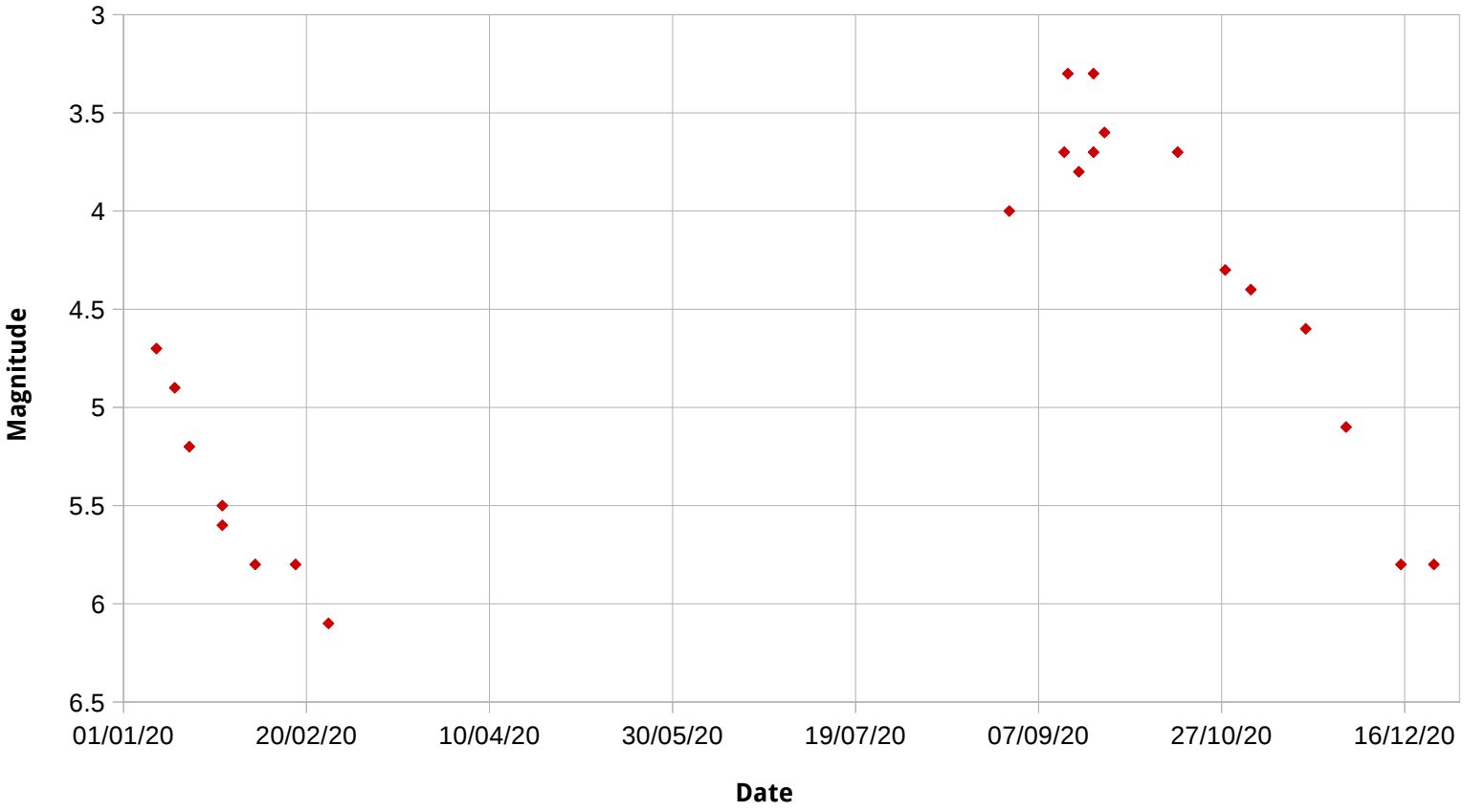
Members observed R Trianguli as it reached minimum brightness in the spring, however, its rise to maximum occurred while R Trianguli was behind the Sun. However, we were able to observe its decline towards another, slightly brighter, minima in the autumn.

Omicron Ceti.

Star	Extreme Range	Period	Type
Omicron Cet	1.7 – 10.1	332d	Long-Period

Light Curve of Omicron Ceti.

Based on Member's Observations 2020.



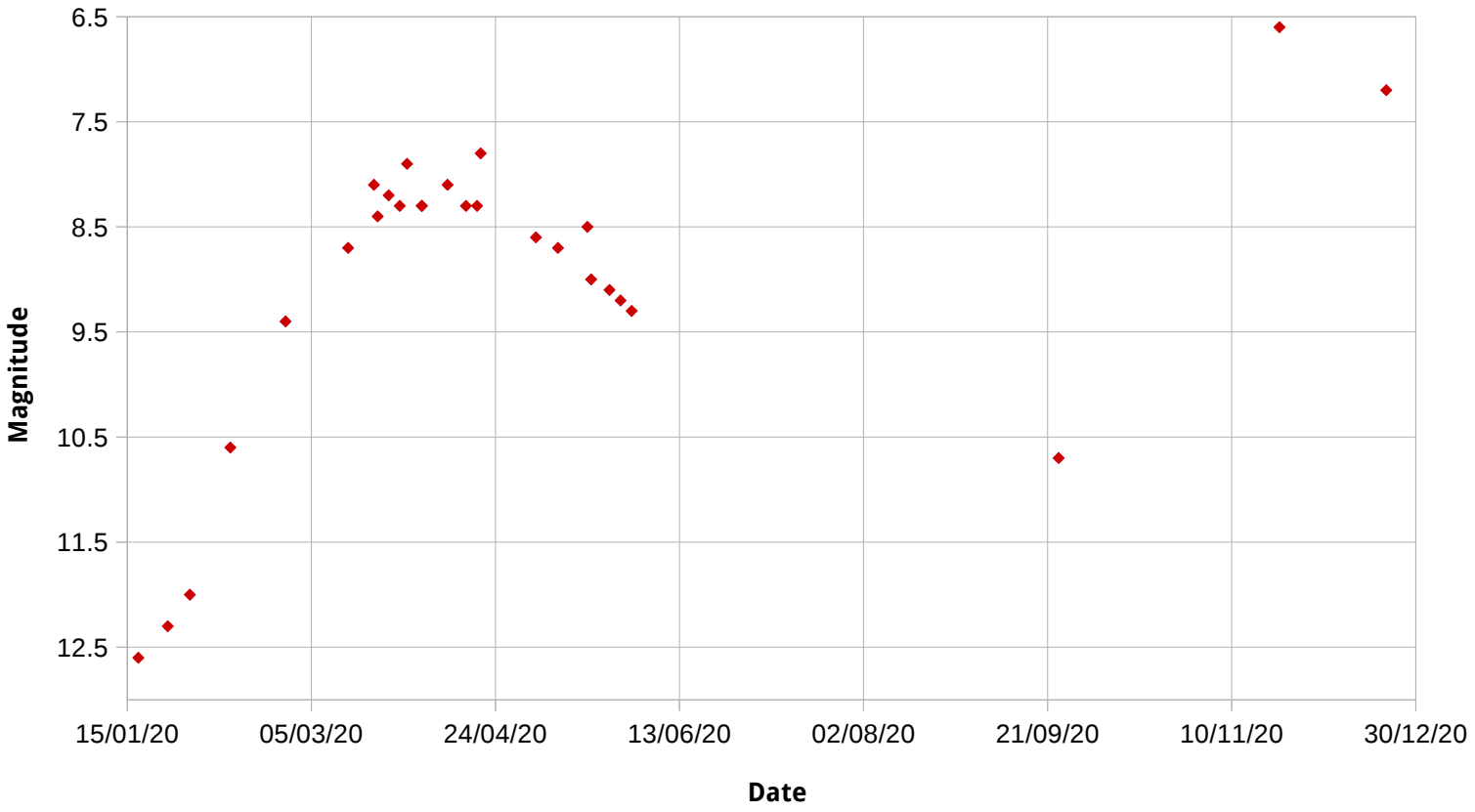
Omicron Ceti, also known as Mira, is another popular long-period star. Members observed Mira as is descended to minimum brightness over the first two months of the year. There is a gap in the observations when Mira was behind the Sun. However, when Mira reappeared in the autumn sky it was close to a typical maximum brightness of 3.3. Members then observed Mira as it declined in brightness of the remainder of the year.

T Ursa Majoris.

Star	Extreme Range	Period	Type
T UMa	6.6 – 13.5	257d	Long-Period

Light Curve of T Ursa Majoris.

Based on Member's Observations 2020.



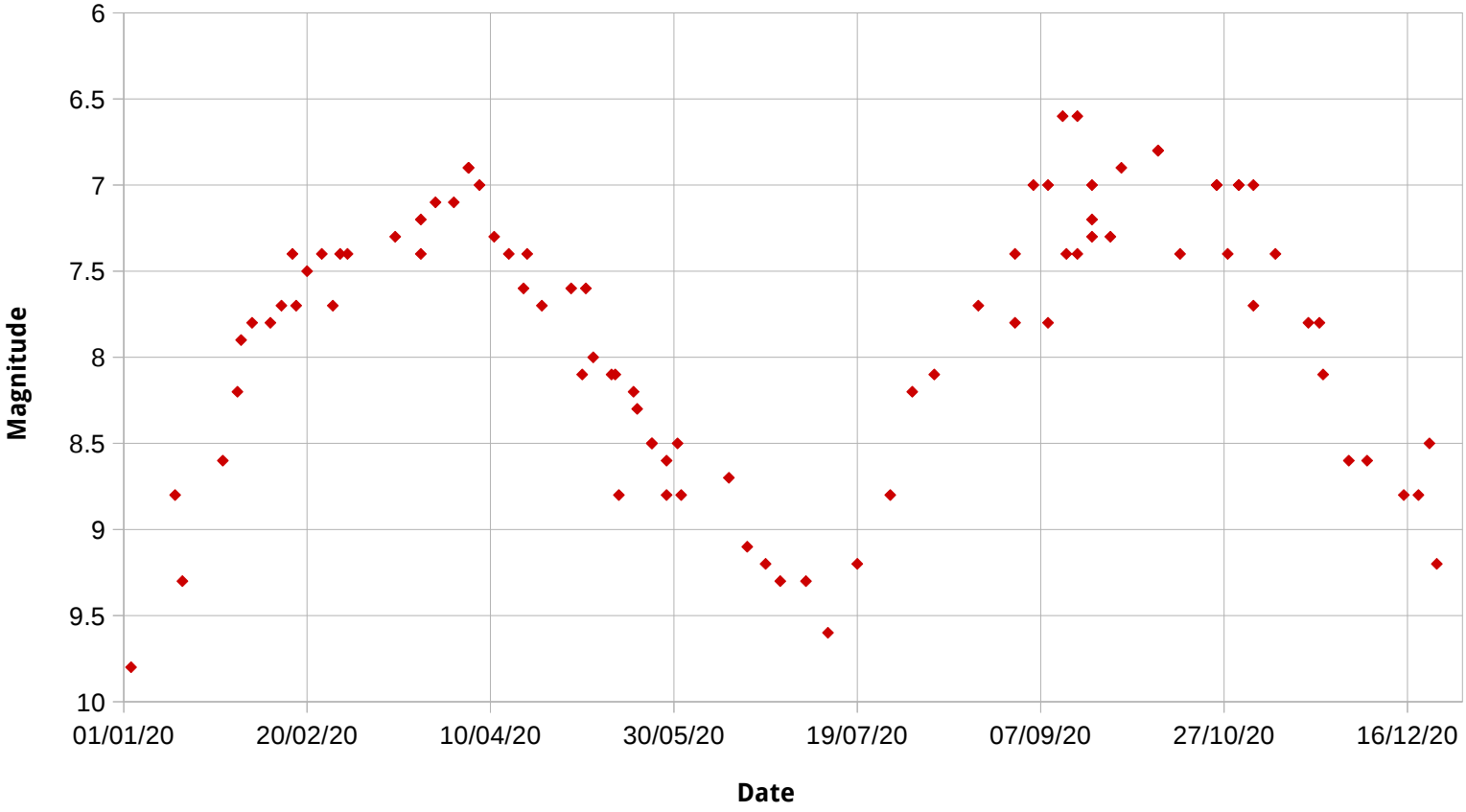
T Ursa Majoris is a long-period variable which reaches maximum brightness every year. Its typical range is between magnitudes 7.7 – 12.9, so as a rather faint variable it's not a very popular star to observe. However, T Ursa Majoris was observed reaching maximum brightness during the spring. It achieved a maximum brightness of 7.9 at the end of March – which is a rather faint maxima for this star. There were very few observations of T Ursa Majoris in the latter half of the year, possibly due to bad weather, but the few observations that were made suggest T Ursa Majoris reached a second maximum in November.

Z Ursa Majoris.

Star	Extreme Range	Period	Type
Z UMa	6.3 – 9.6	195d	Semi-Reg

Light Curve of Z Ursae Majoris.

Based on Member's Observations 2020.



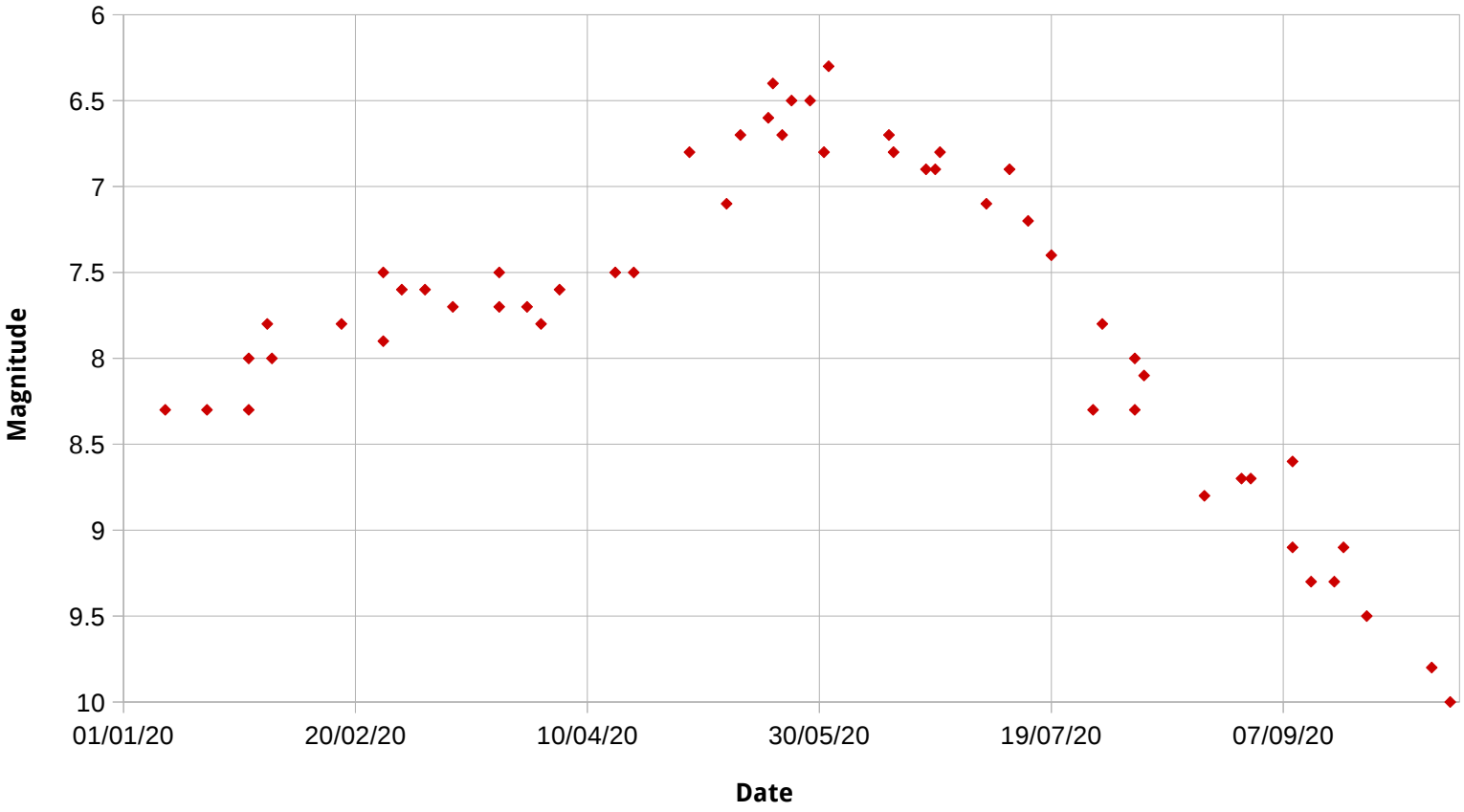
Z Ursa Majoris is a very popular semi-regular star, possibly because it's visible all year round. Members observed Z Ursa Majoris as it passed though an entire cycle of variation. Z Ursa Majoris as a typical range of 6.9 – 8.7. Over the course of 2020, Z Ursa Majoris reached a typical maximum of 6.9, but it did fall to a rather faint minima of 9.6.

T Cephei.

Star	Extreme Range	Period	Type
T Cep	5.4 – 11.0	389d	Long-Period

Light Curve of T Cephei.

Based on Member's Observations 2020.



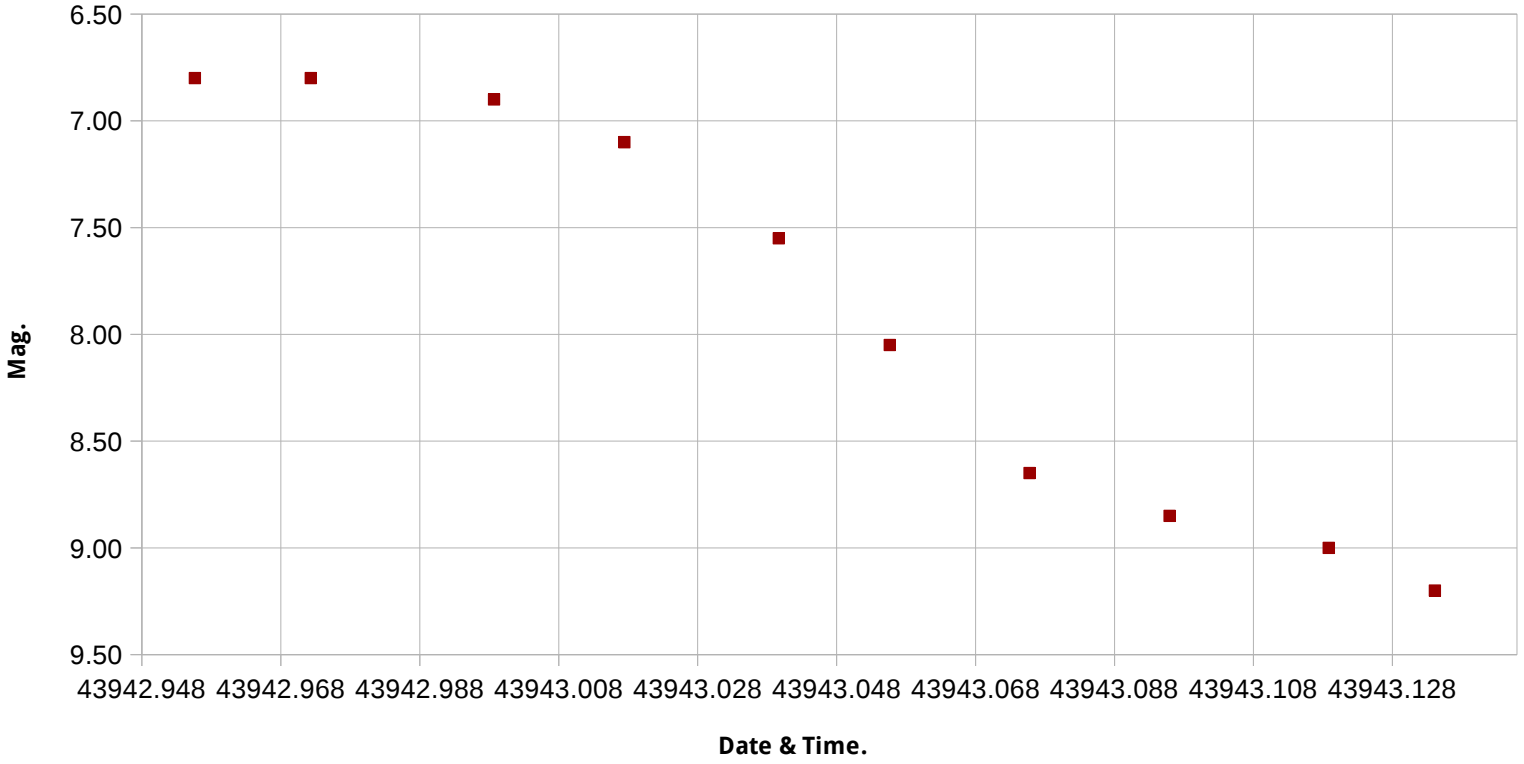
T Cephei is a well observed long-period variable. Members observed T Cephei reaching maximum in May. A typical range for T Cephei is 6.0 – 10.3, so in 2020, T Cephei reached a maximum that was slightly fainter then usual. As is typical for T Cephei, the star showed a pause as it rose to maximum.

U Cephei.

Star	Extreme Range	Period	Type
T Cep	5.4 – 11.0	389d	Long-Period

Light Curve for U Cephei.

22/04/20 - T. Heywood



This light curve is based on observation made by Tracie Heywood on the night of 22nd of April 2020. U Cephei is an under-observed eclipsing binary, with a range of 6.7 – 9.3 and a period of 2.5 days.