

Alf (aka Betelgeuse) Ori Preditions(v1.5)

Jan. 1918 - Nov.11, 2022

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2/17/2020

The American Association of Variable Star Observers (AAVSO)

The AAVSO is an international non-profit organization of variable star observers whose mission is to enable anyone, anywhere, to participate in scientific discovery through variable star astronomy. We accomplish our mission by carrying out the following activities:

- observation and analysis of variable stars
- collecting and archiving observations for worldwide access
- forging strong collaborations between amateur and professional astronomers
- promoting scientific research, education, and public outreach using variable star data.

Analysis Visual Observations of Betelgeuse

```
##      Ymd          year      month      day
## Min.   :1918-01-03  Min.   :1918  Min.   : 1.000  Min.   : 1.00
## 1st Qu.:1972-02-27  1st Qu.:1972  1st Qu.: 2.000  1st Qu.: 8.00
## Median :1991-12-23  Median :1991  Median : 3.000  Median :15.00
## Mean   :1988-09-03  Mean   :1988  Mean   : 5.471  Mean   :15.52
## 3rd Qu.:2009-09-21  3rd Qu.:2009  3rd Qu.:10.000  3rd Qu.:23.00
## Max.   :2020-02-18  Max.   :2020  Max.   :12.000  Max.   :31.00
##      Vis          Cts
## Min.   :0.0000  Min.   :0.0000
## 1st Qu.:0.5000  1st Qu.:1.0000
## Median :0.7000  Median :1.0000
## Mean   :0.7083  Mean   :0.9971
## 3rd Qu.:0.9000  3rd Qu.:1.0000
## Max.   :2.1700  Max.   :1.0000
```

```
AOri1 <- AOri %>% select(Ymd,year,Vis) %>%
  group_by(Ymd) %>% summarise(Mean = mean(Vis),
                             Sum = sum(Vis),
                             Obs = n())
```

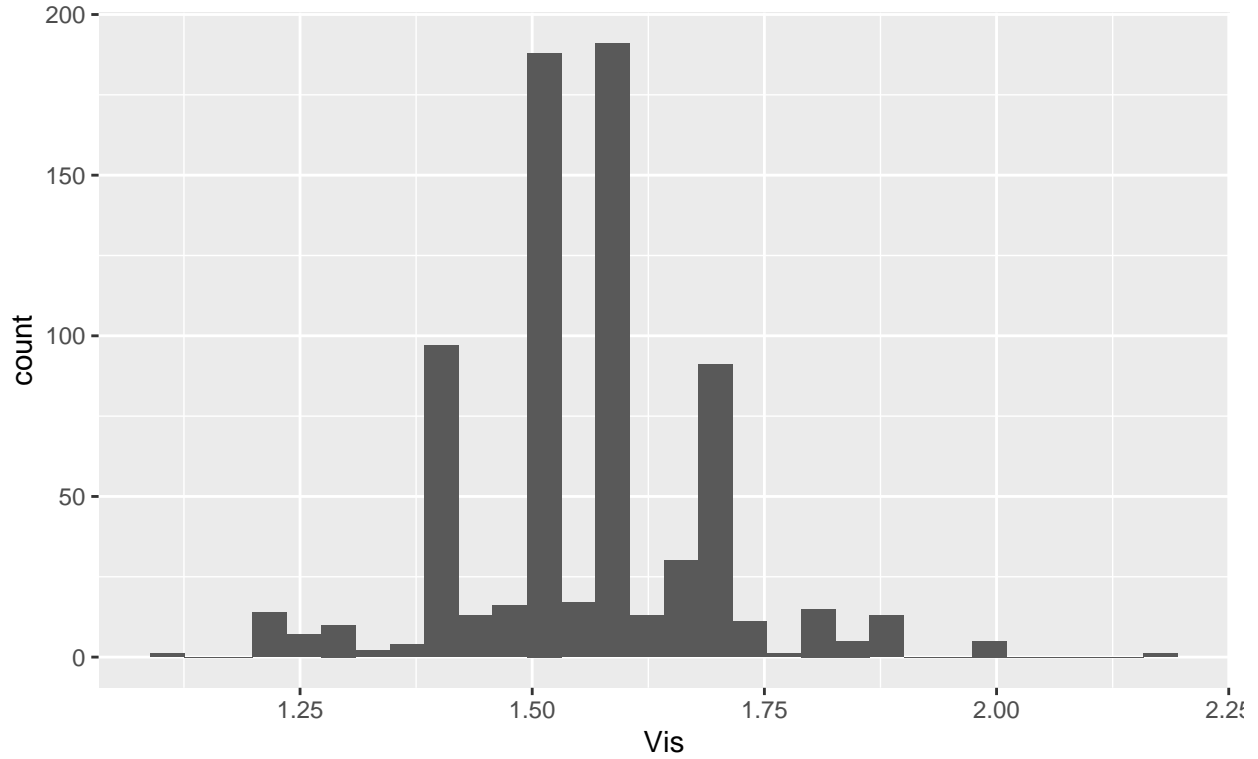
First some basic Summary Stats

```
##      Ymd          Mean          Sum          Obs
## Min.   :1918-01-03  Min.   :0.0000  Min.   : 0.000  Min.   : 1.00
## 1st Qu.:1965-11-06  1st Qu.:0.5257  1st Qu.: 0.800  1st Qu.: 1.00
## Median :1984-09-29  Median :0.7000  Median : 1.200  Median : 2.00
## Mean   :1982-06-14  Mean   :0.7012  Mean   : 1.657  Mean   : 2.34
## 3rd Qu.:2003-04-22  3rd Qu.:0.8900  3rd Qu.: 2.000  3rd Qu.: 3.00
```

```
## Max. :2020-02-18 Max. :1.9000 Max. :57.480 Max. :39.00
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

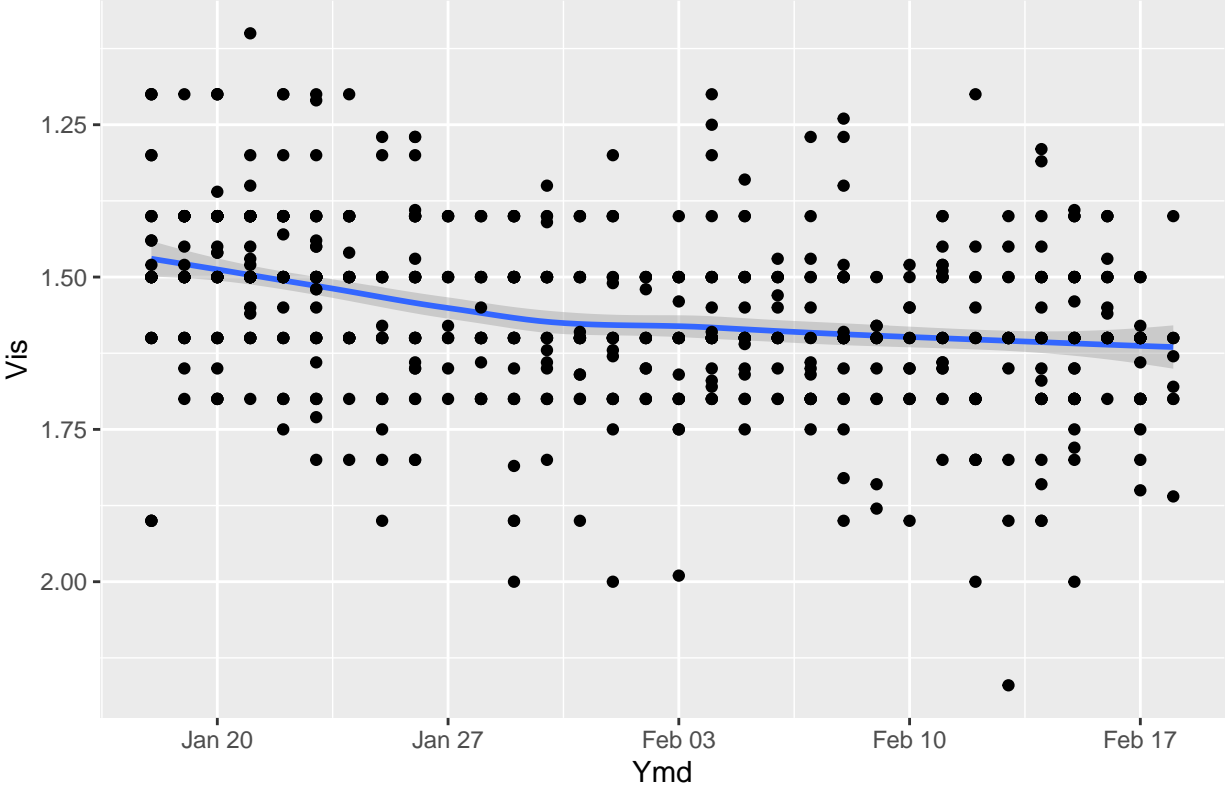
Histogram of Observed Magnitudes

Jan. 18,2020 – Mar. 16,2020



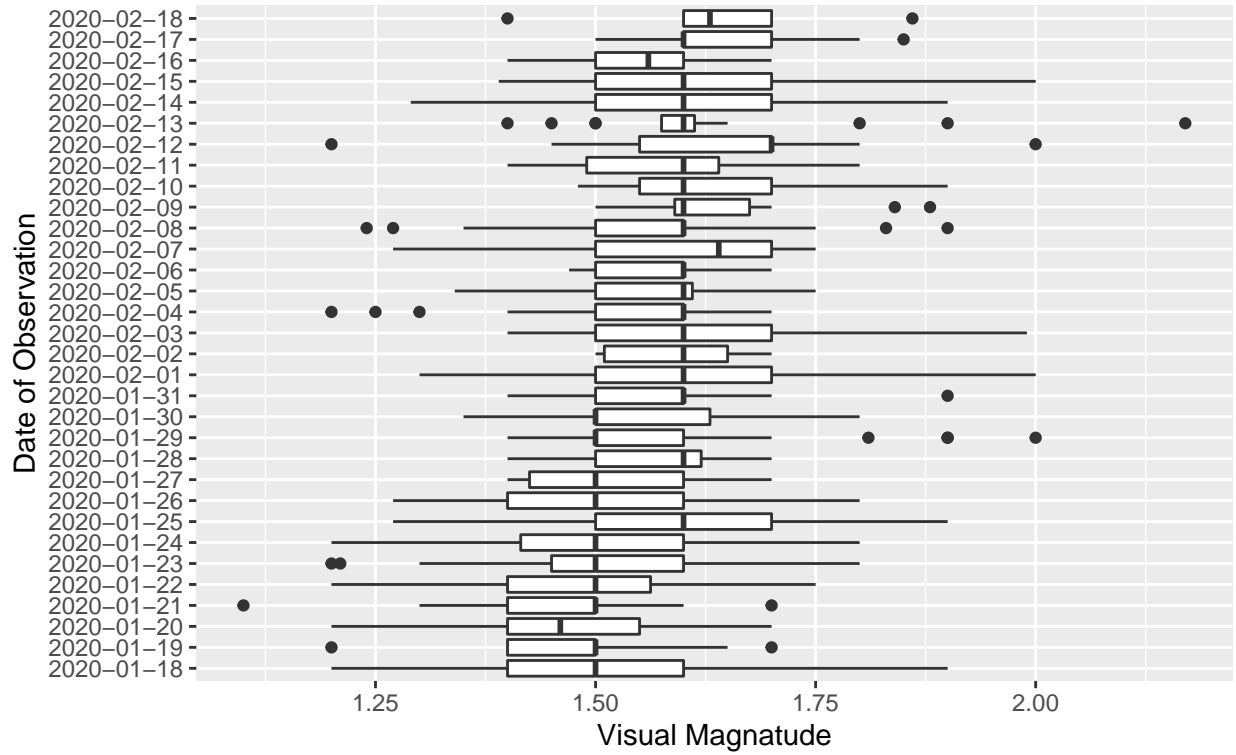
```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

Visual Obersvations for Jan 01,2020 – Feb.18, 2020



Daily Visual Magnatudes

Jan 18,2020 – Feb. 02, 2020

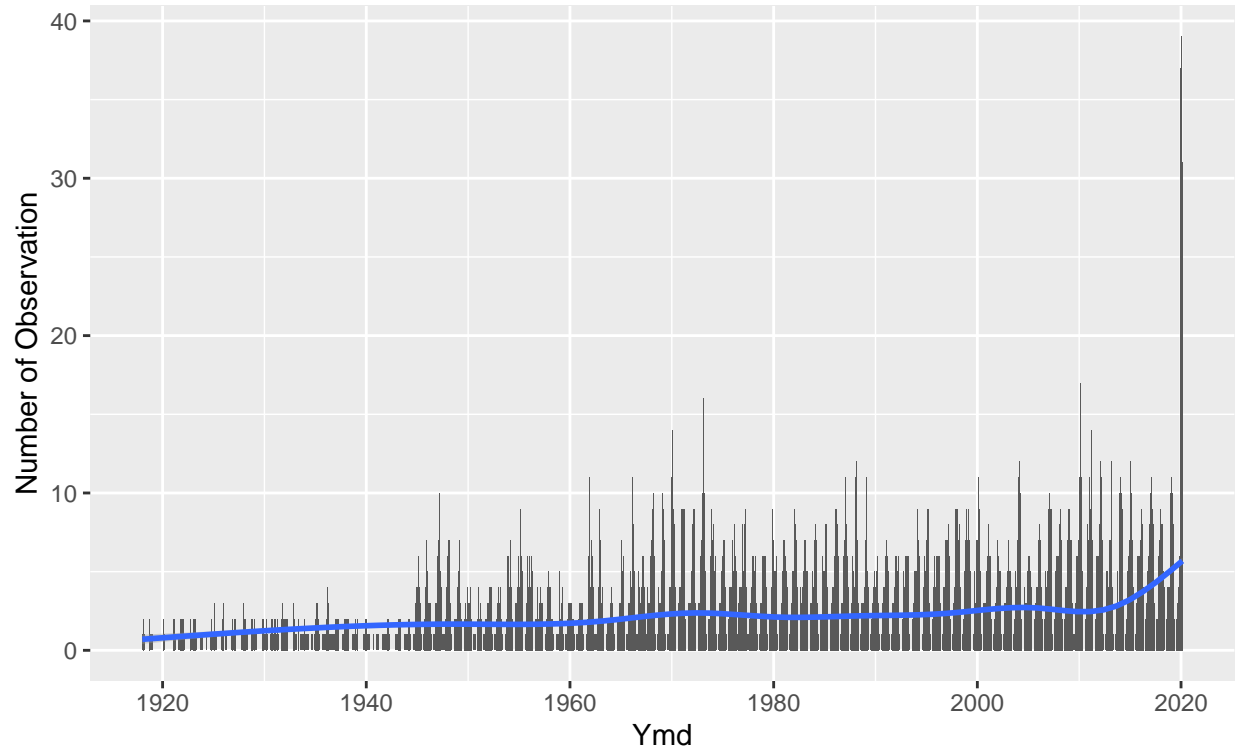


Seems a Spike in the Number of Observations

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```

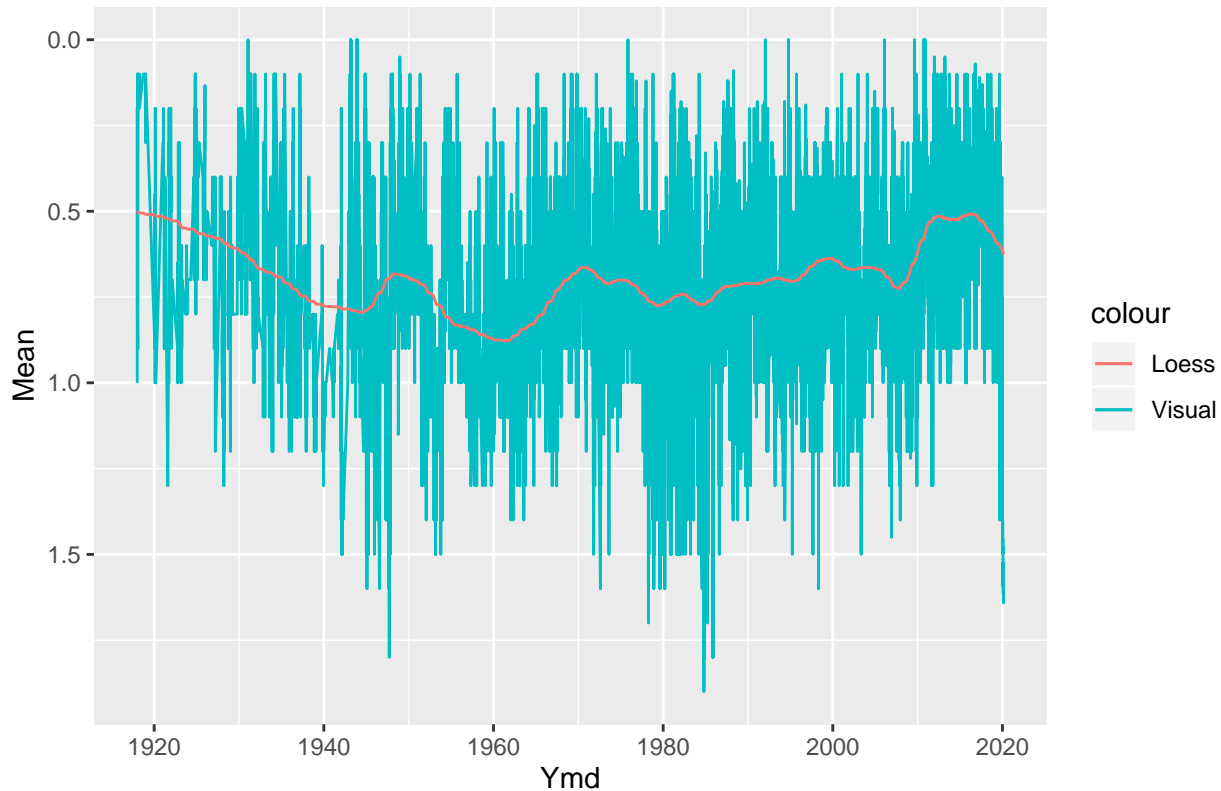
Betelgeuse: Number of Observation

J Jan 03,1918 – Feb.18, 2020

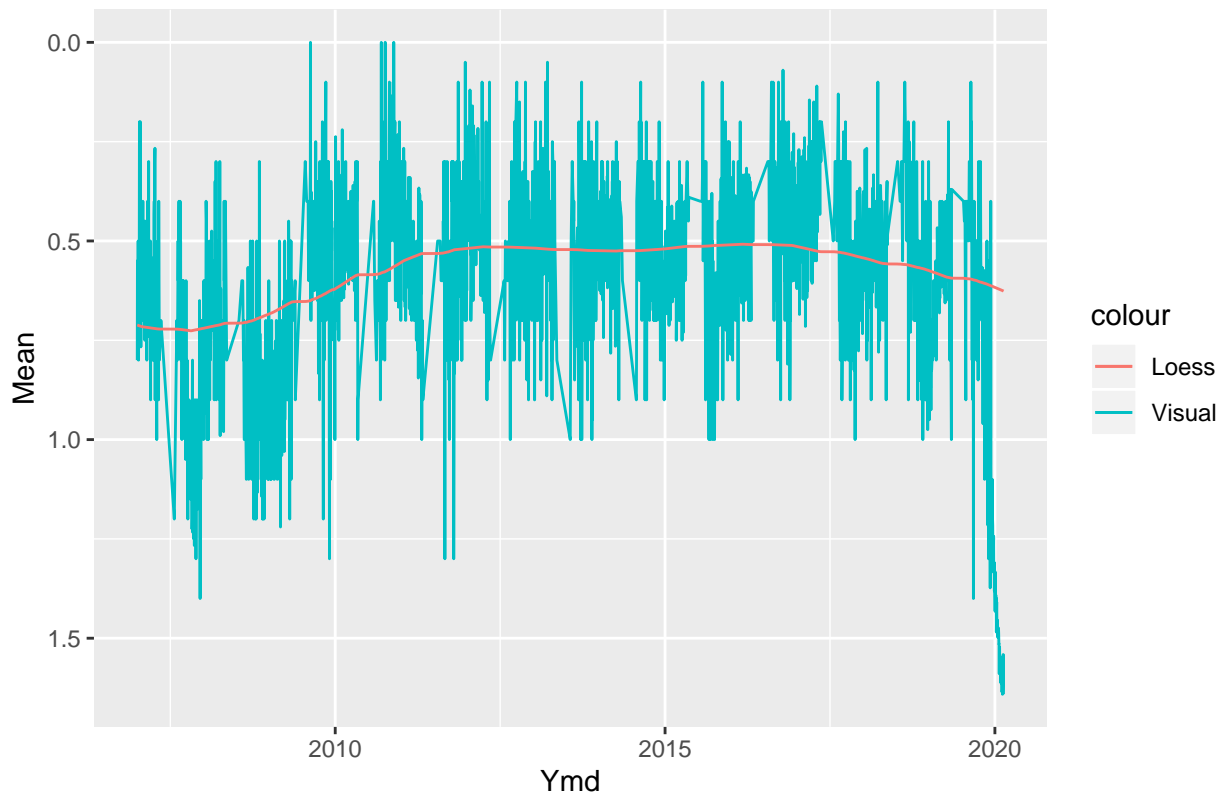


Plot of (mean) Daily with Loess

Alf Ori: Jan 03,1918 – Feb.18, 2020



Alf Ori: Jan. 1, 2007 – Feb. 18, 2020

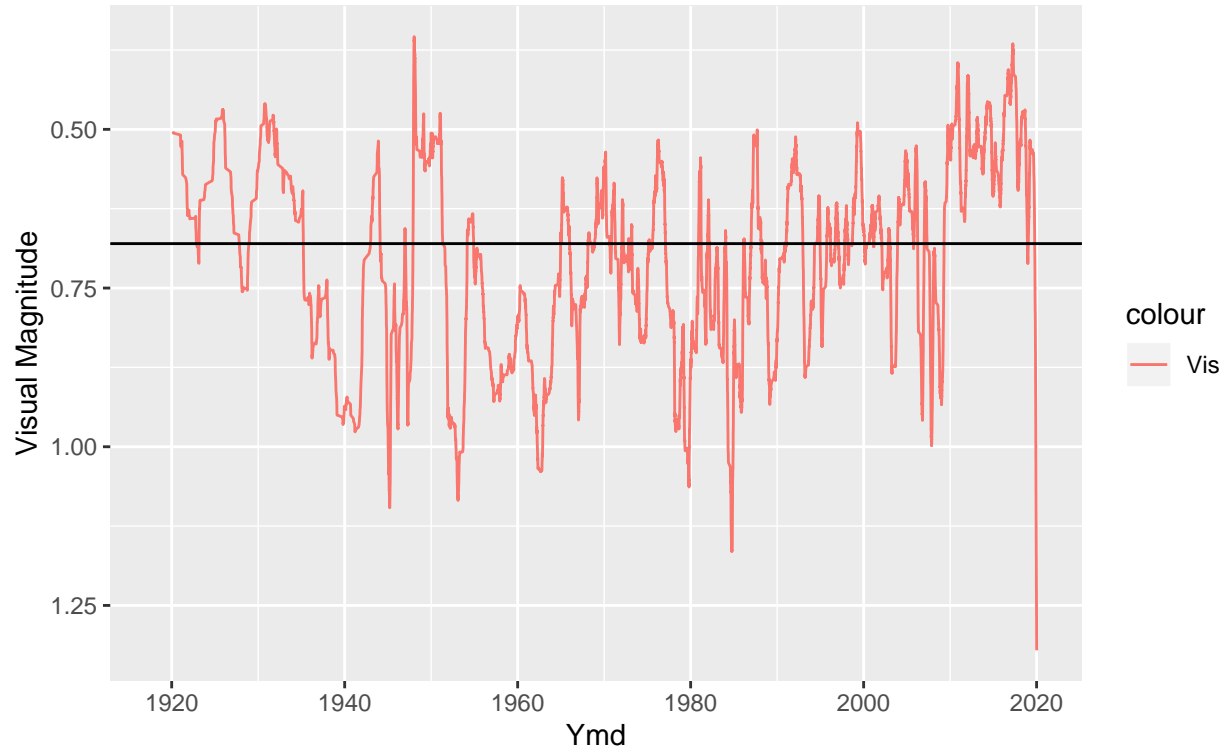


Calculate and Plot 90 Day Moving Average

Warning: Removed 90 rows containing missing values (geom_path).

Alf Ori (aka Betelgeuse) : Jan 03, 1918 – Feb.18, 2020

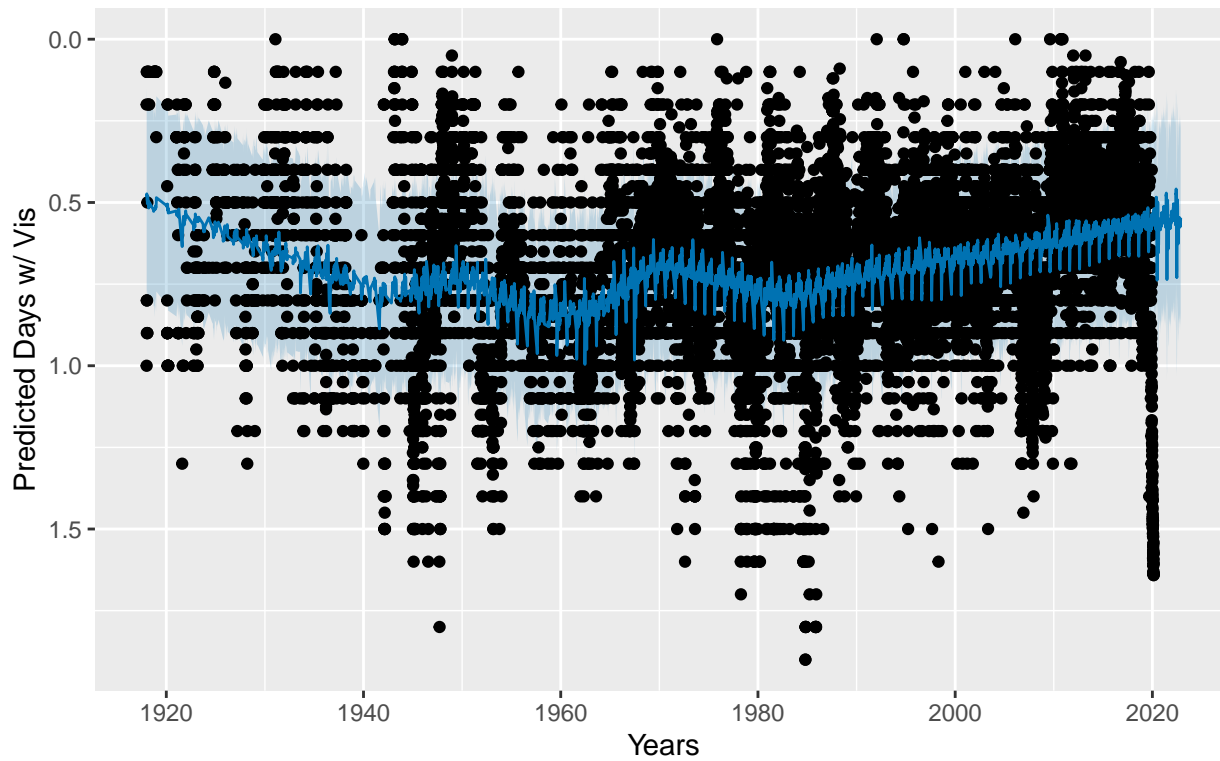
60 DAY Moving Average



Use Facebook Prophet to Predict Magnitutde

Disabling daily seasonality. Run prophet with daily.seasonality=TRUE to override this.

Vis Daily: Jan. 1918 – Mar. 2020



Alf (aka Betelgeuse) Ori: Actual vs Predicted (90 Day Moving Average)

