Clarke's novae

From Winch:

> In his 1968 short story Crusade, Sir Arthur C. Clarke notes
> that in the last half-century, almost one-quarter of the brighter
> novae have occurred in one tiny region of the sky: the constellation
> Aquila.
>
> This is used as evidence that Something Awful is coming our
> way, triggering novae to snuff out inhabited planets.
>
> Is it true about one quarter of the novae from circa 1930
> to circa 1970 being in the constellation of [Aquila]?

Analysis

```
In[2]:=  stars = AstronomicalData["NakedEyeStar"];
```

```
In[3]:=  Length[stars]
```

```
Out[3]=  8910
```

```
In[4]:=  stars2 = Select[stars, AstronomicalData[#, "ApparentMagnitude"] ≤ 6 &];
```
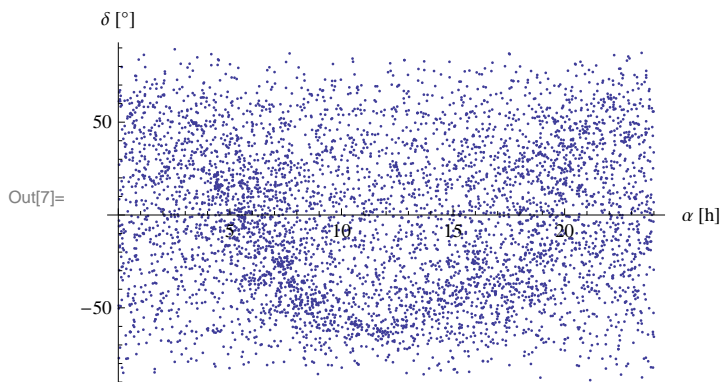
```
In[5]:=  Length[stars2]
```

```
Out[5]=  5185
```

```
In[6]:=  data = {AstronomicalData[#, "Name"],
            AstronomicalData[#, "RightAscension"],
            AstronomicalData[#, "Declination"],
            AstronomicalData[#, "DistanceLightYears"]} & /@ stars2;
```

Plot of all naked stars for reference. Note the cyclic concentration; that's just the galactic plane.

```
In[7]:=  ListPlot[
          Tooltip[{#[[2]], #[[3]]}, #[[1]]] & /@ data,
          AxesLabel → {"α [h]", "δ [°]"}, PlotStyle → PointSize[0.001]]
```


Novae list from CBAT List of Novae in the Milky Way:

```
In[25]:=  novaeData = Import["~/tmp/novae.csv", "CSV"];
```

```
In[9]:=  novae = {#[[1]], {#[[2]], #[[3]], #[[4]]}, #[[5]], #[[6]]} & /@ novaeData;
```
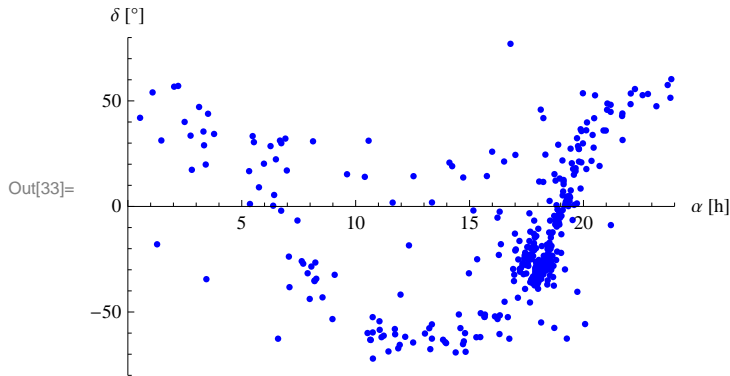
In[10]:= **Length[novae]**

Out[10]= 391

In[11]:= **allNovae = Select[novae, #[[2]][[1]] ≥ 0 &];**

Plot of all novae in the CBAT list.

In[33]:= **p1 = ListPlot[Tooltip[{#[[3]], #[[4]]}, #[[1]]] & /@ allNovae,**
AxesLabel → {"α [h]", "δ [°]"}, PlotRange → {{0, 24}, {-80, 80}},
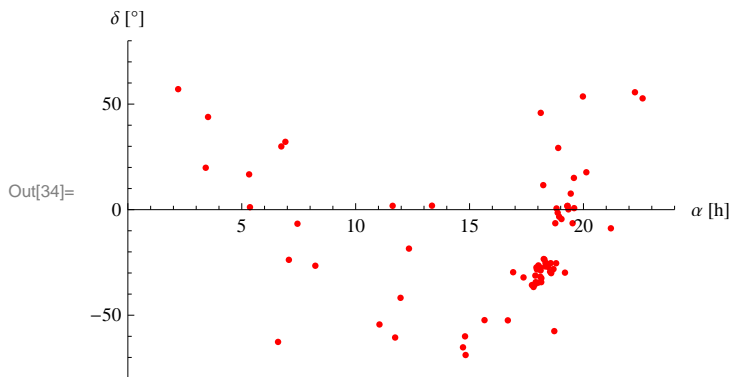**PlotStyle → Blue]**

Out[33]=

In[13]:= **clarkesNovae = Select[novae,**
#[[2]][[1]] ≥ 1899 && #[[2]][[1]] ≤ 1936 &];

In[14]:= **Length[clarkesNovae]**

Out[14]= 74

Plot of specific novae that Clarke referenced.

In[34]:= **p2 = ListPlot[Tooltip[{#[[3]], #[[4]]}, #[[1]]] & /@ clarkesNovae,**
AxesLabel → {"α [h]", "δ [°]"}, PlotRange → {{0, 24}, {-80, 80}},
**PlotStyle → Red]**

Out[34]=

Both plots together, with all CBAT novae in blue and Clarke's novae in red. There pretty clearly is no noticeable difference in the distribution; the concentration of the stars around the galactic plane is expected, as is the clump of novae around the galactic core (at roughly 18h, -30°). The concentration in Aquila is simply because it happens to be near to the galactic core, with its centroid at about 19.5h, +5°.

```
In[41]:= p3 = ListPlot[{{18, -30}},
         AxesLabel -> {"α [h]", "δ [°]"}, PlotRange → {{0, 24}, {-80, 80}},
         PlotStyle → {Gray, PointSize[0.1]}]
```

Out[41]=
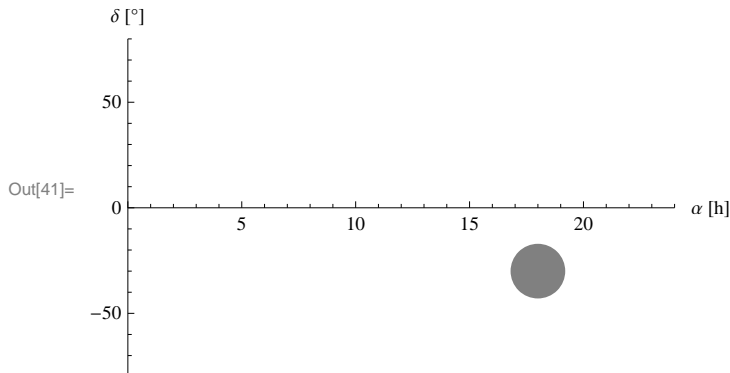
(The size of the spot is simply to make it clear, and is not intended to imply any apparent size.)

```
In[42]:= Show[p3, p1, p2]
```

Out[42]=
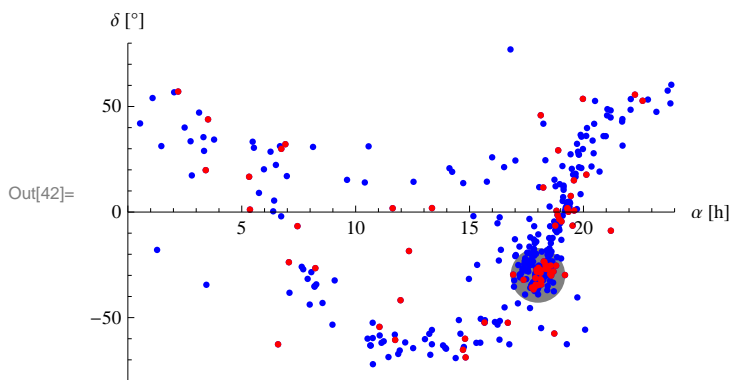
Interactive spherical plot of novae.

```
In[17]:= theta[alpha_] := 2 Pi alpha / 24
```

```
In[18]:= phi[delta_] := Pi - Pi (delta + 90) / 180
```

```
In[19]:= theta /@ {0, 6, 12, 18, 24}
```

$$Out[19]= \left\{ 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi \right\}$$

```
In[20]:= phi /@ {90, 45, 0, -45, -90}
```

$$Out[20]= \left\{ 0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi \right\}$$

```
In[21]:= Hour = 360 Degree / 24
```

Out[21]= 15 °

```
In[22]:= sphericalToCartesian[rho_, theta_, phi_] :=
         {rho Cos[theta] Sin[phi],
          rho Sin[theta] Sin[phi],
          rho Cos[phi]}
```

In[23]:= `First[clarkesNovae]`

Out[23]= {V606 Aql, {1899, 4, 21}, 19.34, 0.133333}

In[24]:= `Graphics3D[{Opacity[0.5], Sphere[{0, 0, 0}, 0.99],`
`    Tooltip[Point[sphericalToCartesian[1, theta[#[[3]]], phi[#[[4]]]]], #[[1]]] & /@`
`    clarkesNovae}]`

Out[24]=