

Photometry of Comet C/2013 UQ4

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A Brief History of Cometary Theory



Aristotle (384-322 BCE)



Tycho Brahe (1546-1601 CE)



Edmond Halley (1656 – 1742 CE)



Table Mountain Facility

Located near Wrightwood, CA
0.6 m Telescope

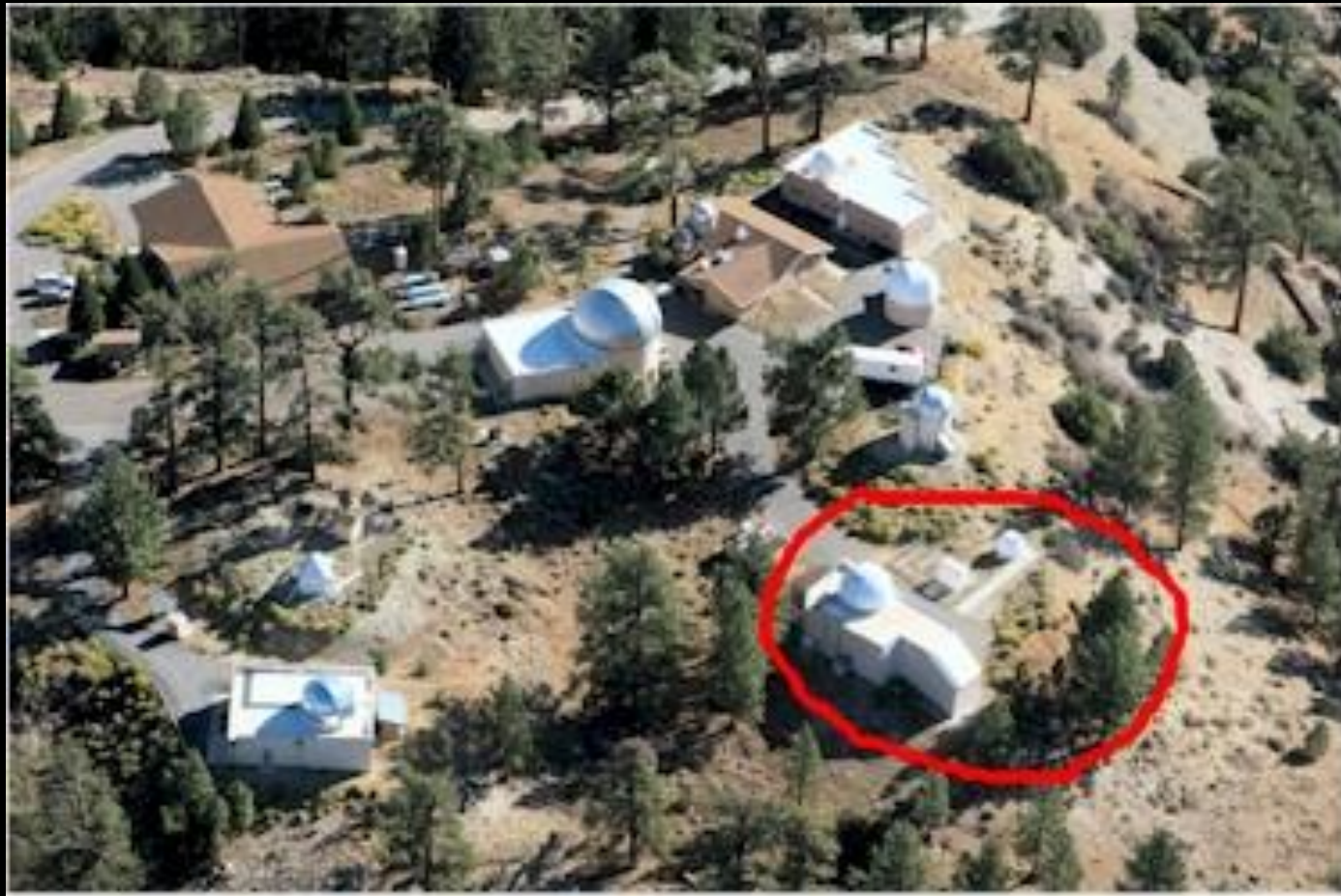


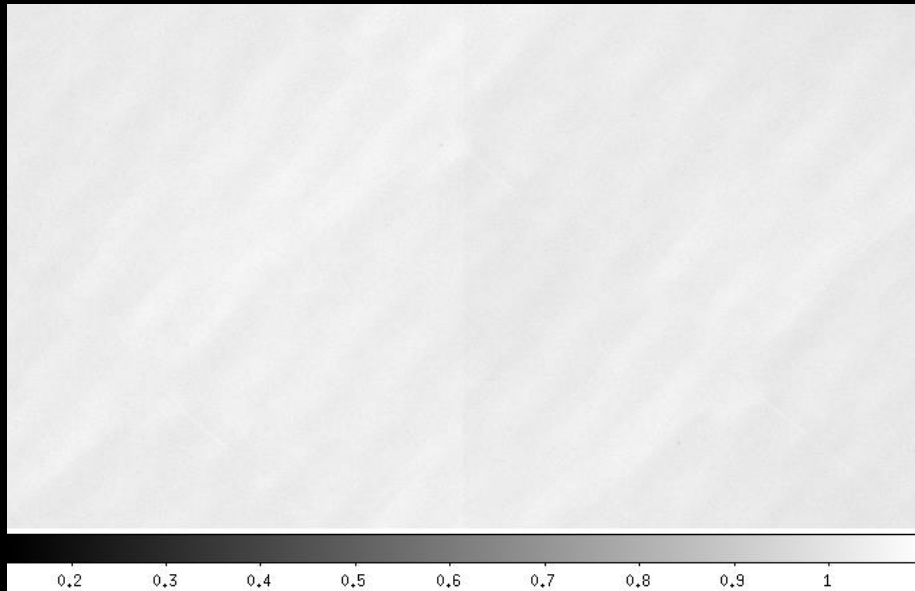
Table Mountain Facility

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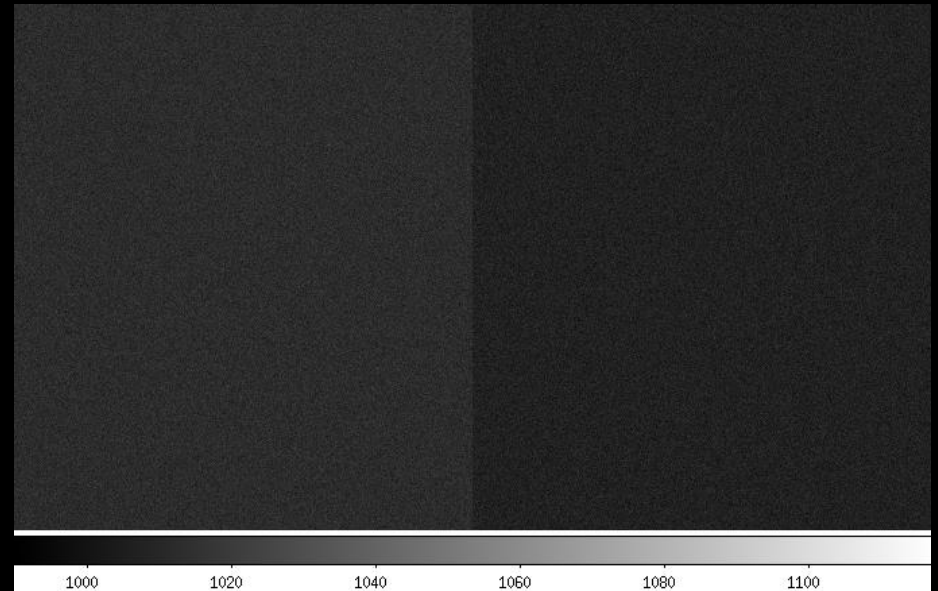


Photometry

- Measuring the flux of an object
- Can be done through different filters
- In our case, BVRI filters were used
- Many optical corrections ie. flats, biases, etc.



B-filter Flat



Bias

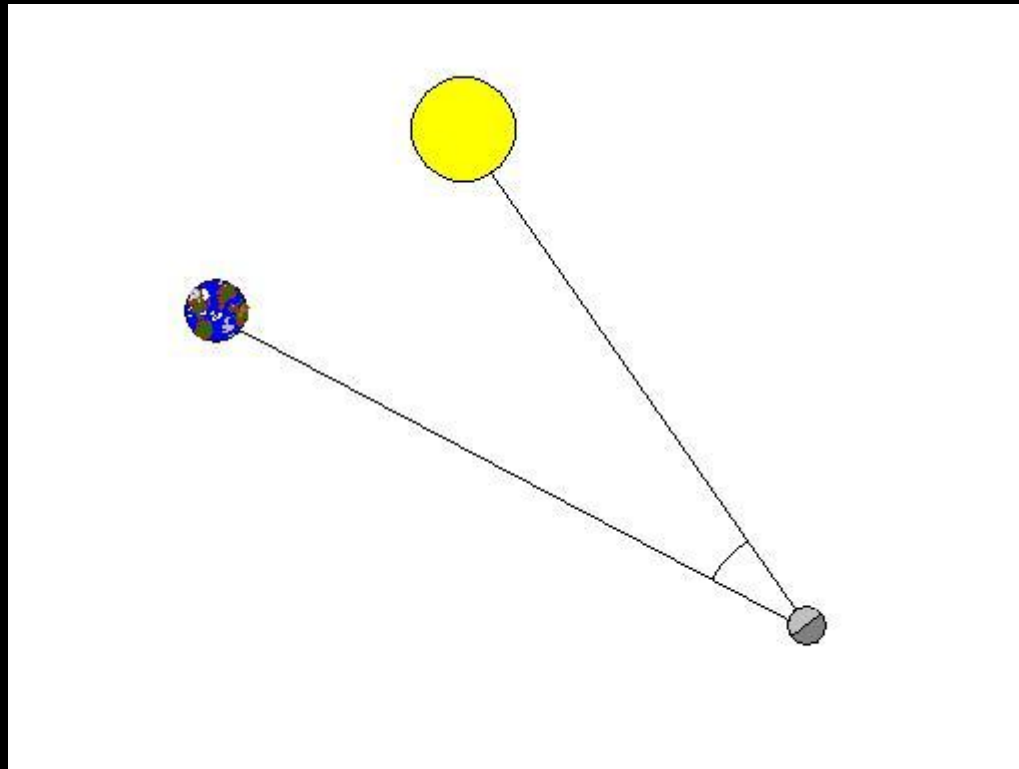
Photometry

Magnitudes of Solar System Bodies

Geometric corrections

Reduced magnitude is a function of the phase angle where heliocentric distance and geocentric distances are 1 A.U.

Absolute magnitude of object when geocentric and heliocentric distances are 1 A.U and solar phase angle is 0



$$\text{Reduced Mag} \\ R(1,1,\alpha) = V(r,\delta,\alpha) - 5 \log(r\delta)$$

Tisserand's Parameter

$$T_J = \frac{a_J}{a} + 2 \left[(1 - e^2) \frac{a}{a_J} \right]^{1/2} \cos(i)$$

a_J = Semi-major axis of Jupiter

a = Semi-major axis of object

e = Eccentricity of object

i = Inclination of object

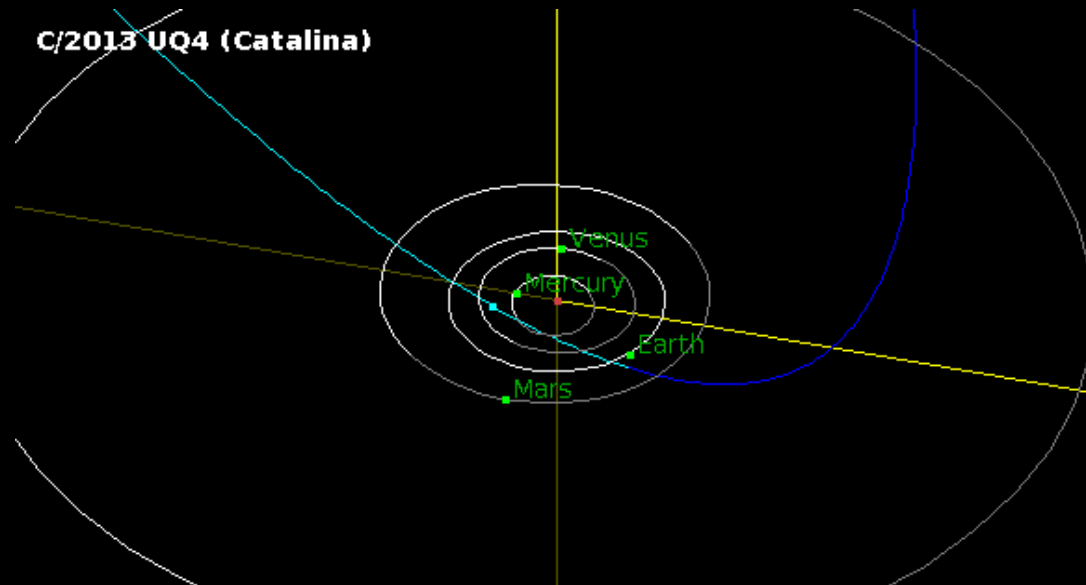
With few exceptions,

if $T_J > 3$ then the object is an
asteroid

If $T_J < 3$ then the object is a comet

C/2013 UQ4

- Discovered October 23, 2013
- Orbital parameters indicated a comet
 - Tisserand parameter < 3
- Lack of coma indicated an asteroid
- Possibly a dead comet
- The comet was not visible during conjunction with the Sun in early 2014.
- On May 7, 2014 detected coma
- In our observations, large drop in coma activity



C/2013 UQ4

June 29 2014



C/2013 UQ4

July 23, 2014



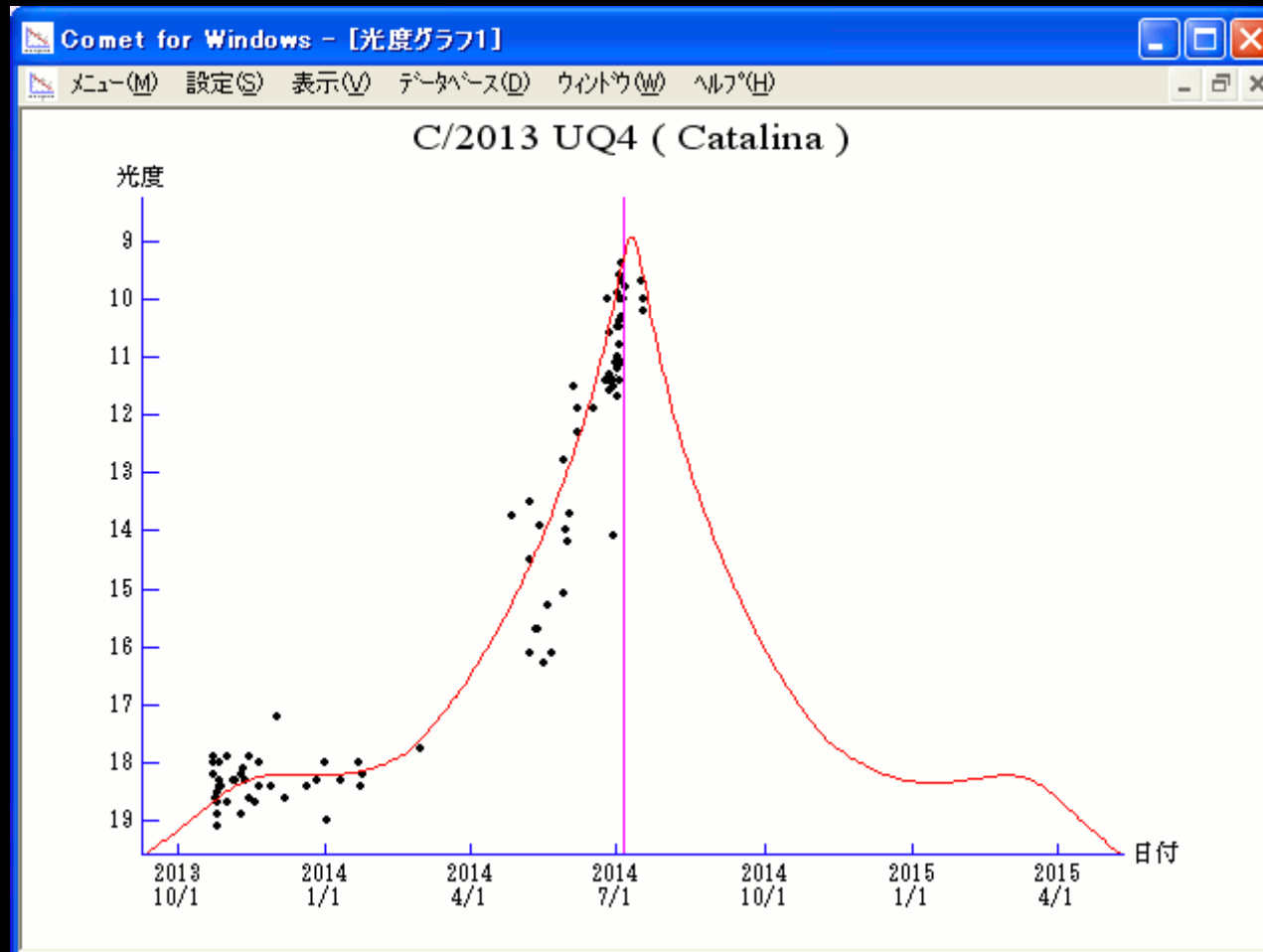
C/2013 UQ4

August 15, 2014



C/2013 UQ4

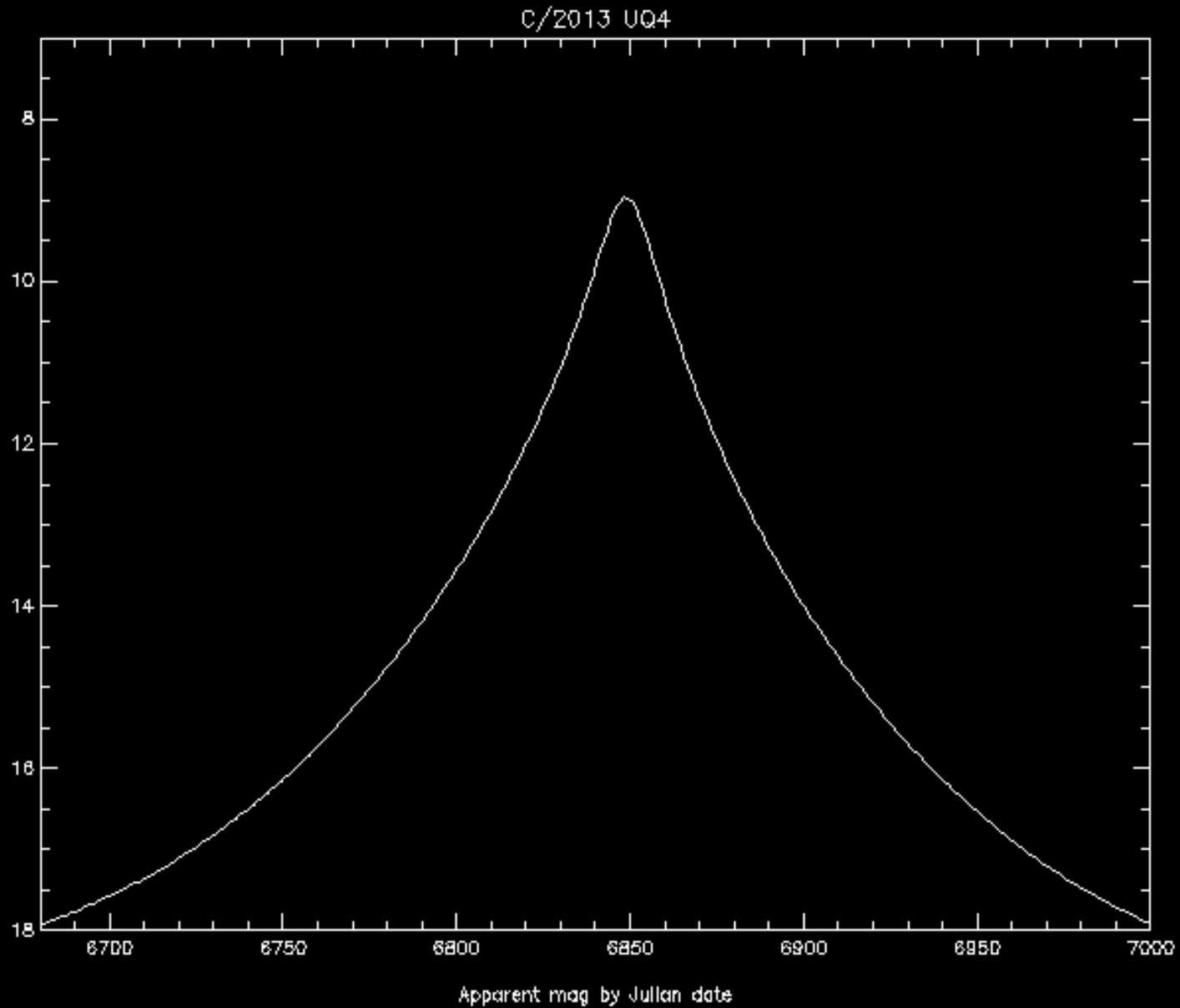
Estimated light curve and reported visual observations of magnitudes



Source: <http://www.aerith.net/comet/catalog/2013UQ4/2013UQ4.html>

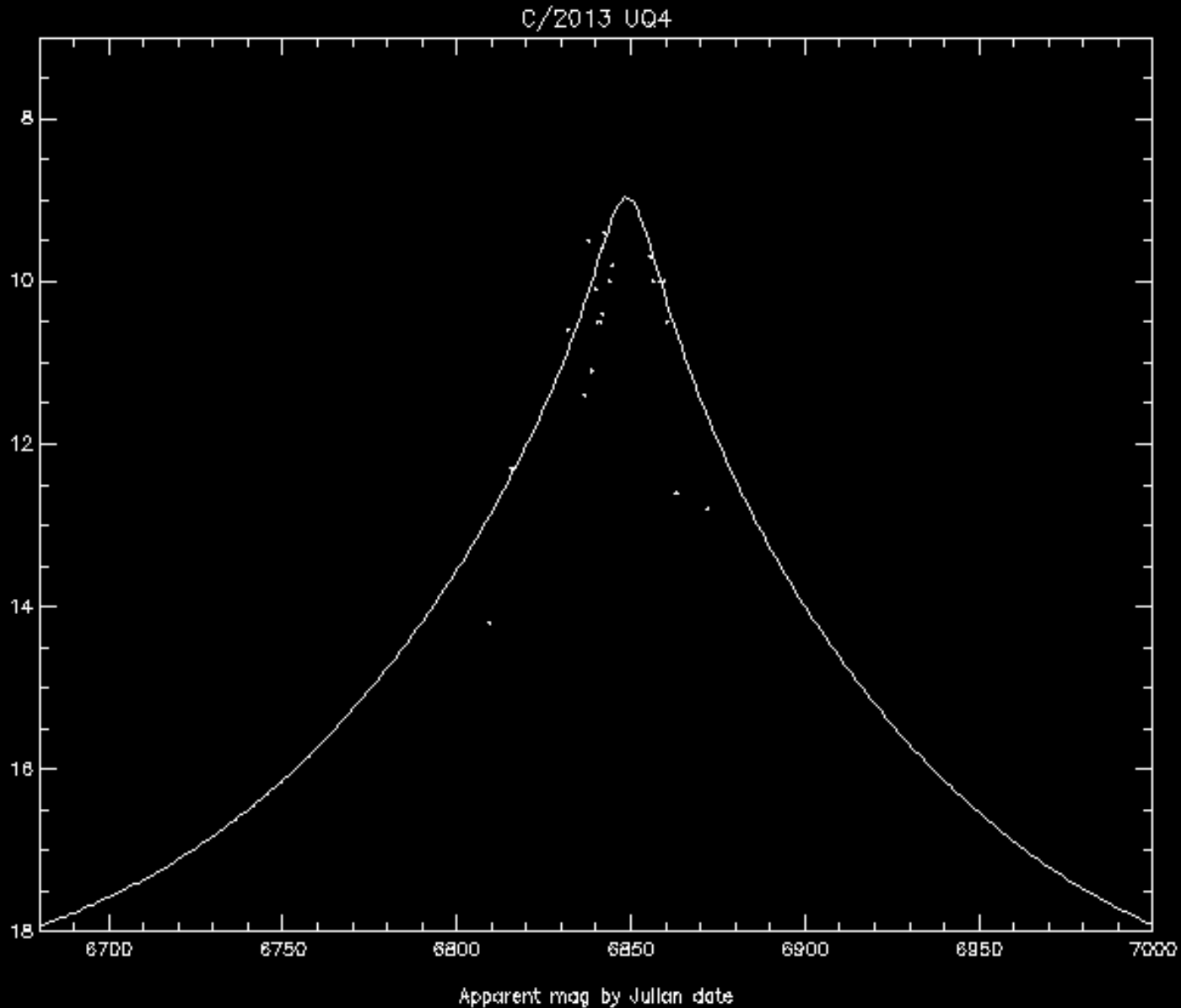
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Expected light curve of a comet



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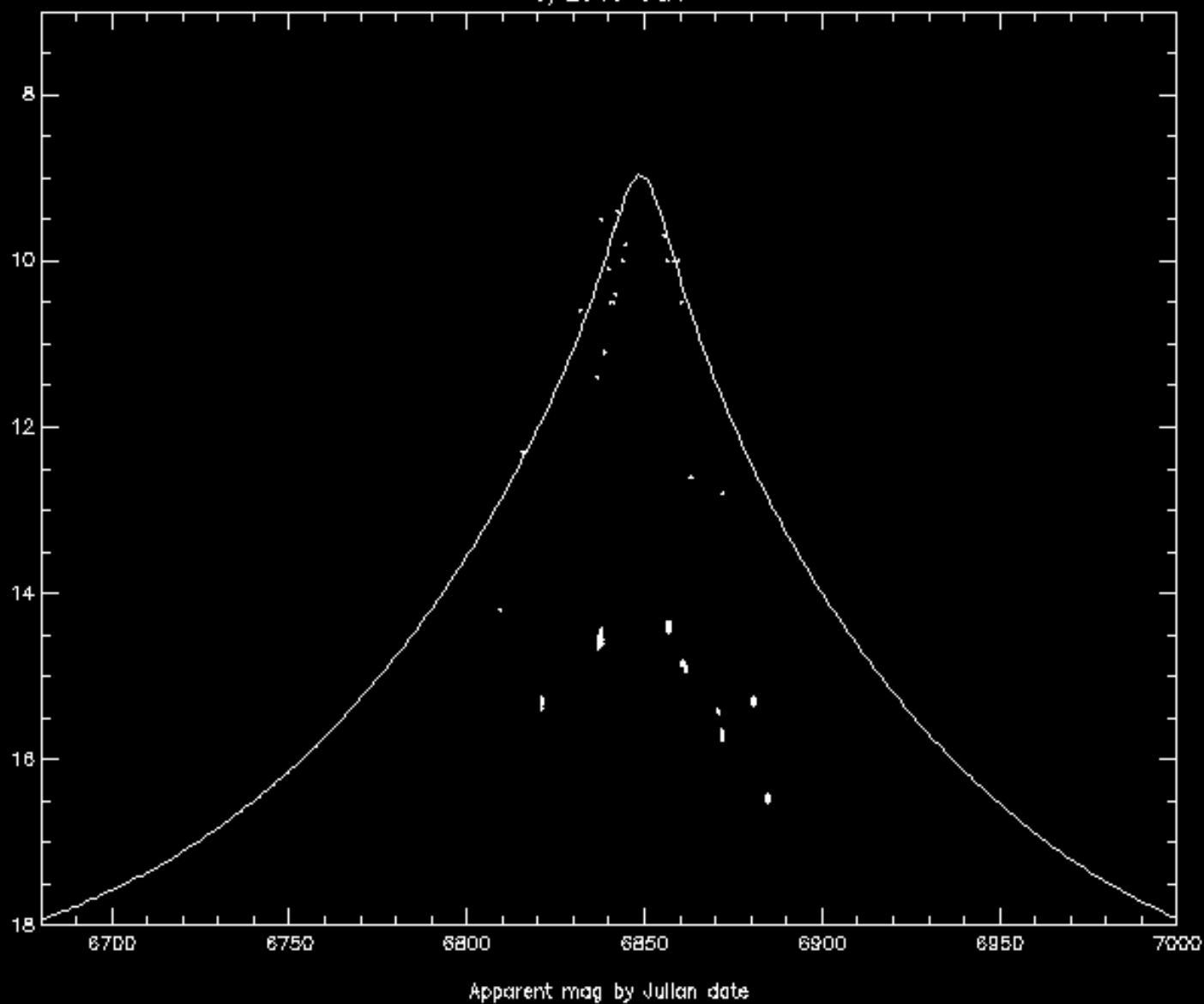
Other estimated magnitudes



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Our Data

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Conclusions

The brightness is considerably lower than would be expected for a comet with regular coma activity.

The low activity allows the direct observation of the nucleus from which composition and rotation rate can be obtained.



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