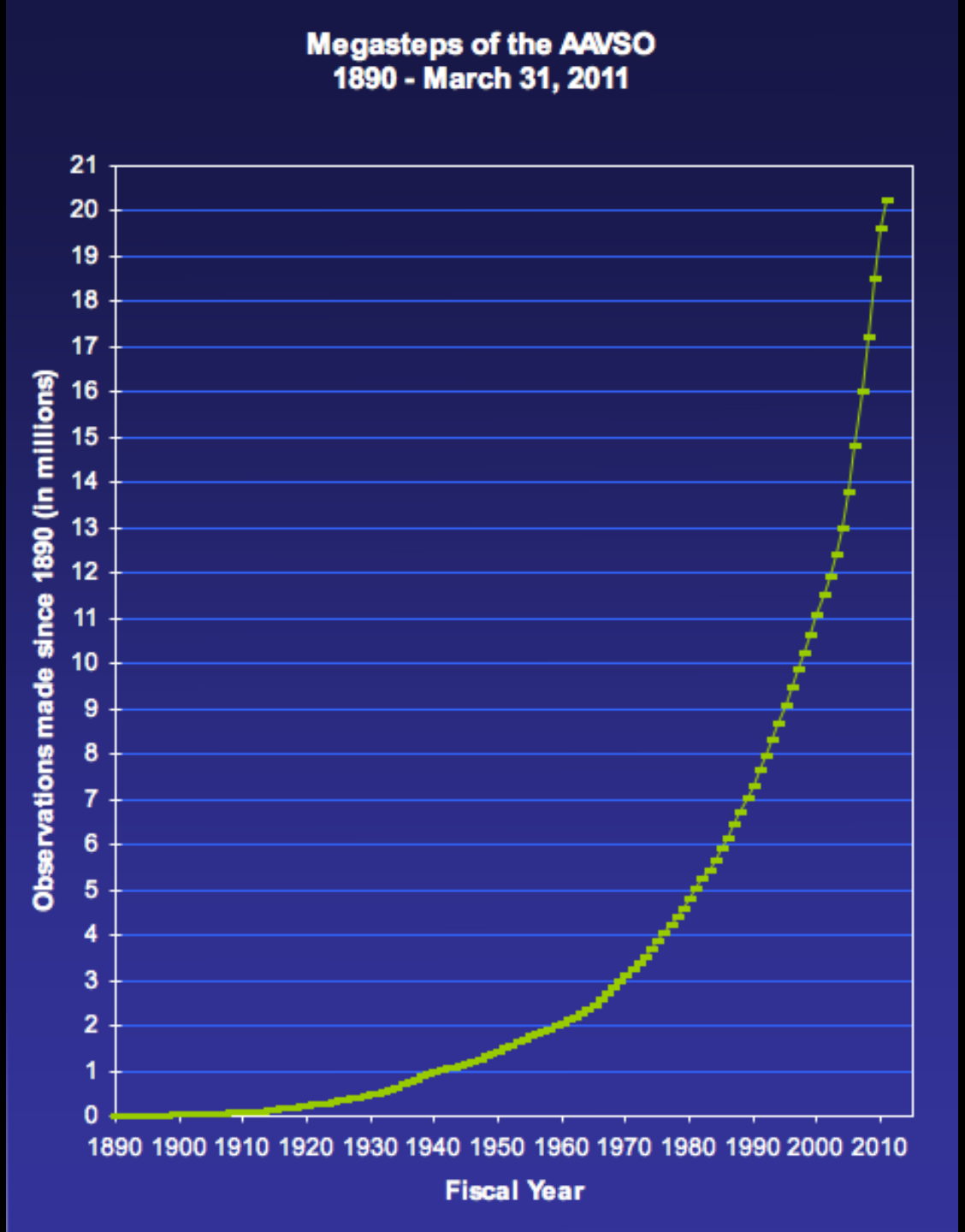
Late-Time Observations of Novae

Arne Henden
Director, AAVSO
arne@aavso.org

The American Association of Variable Star Observers (AAVSO)

- Dedicated to the study of variable stars
- One of the largest & oldest Citizen Science organizations in the world
- International: 1000 members in 45 countries
- 15% professional, 85% amateur members
- 3000 total observers (800 active per year)
- 23 million online observations
- http://www.aavso.org

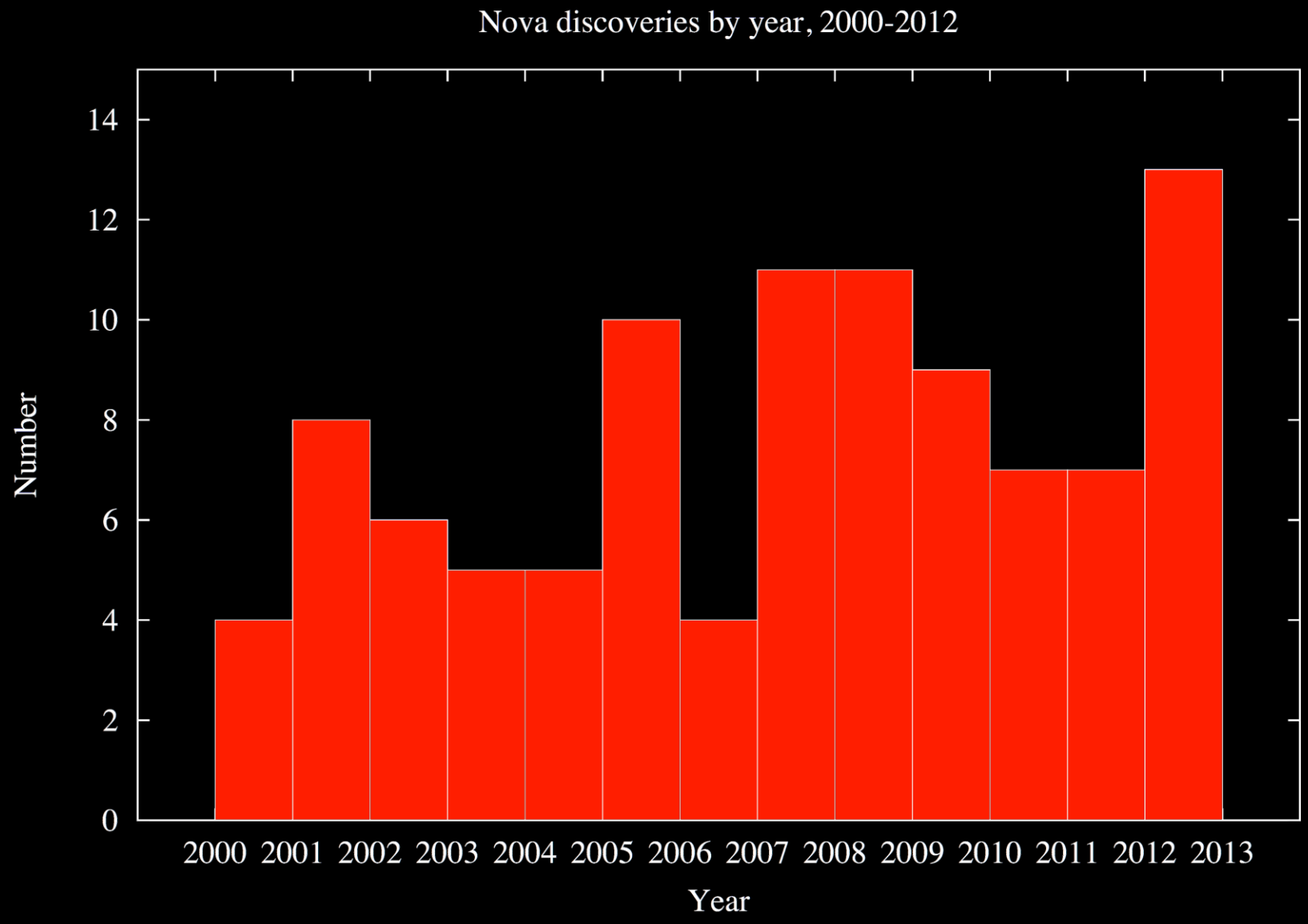
Cumulative observations in AAVSO International Database (current rate: 1.5M/year)



AAVSO HQ 2km from Harvard/CfA

Novae

Credit: David Hardy/PPARC


Nova discoveries by year, 2000-2012
Number
0
2
4
6
8
10
12
14
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

Late-time Monitoring of Novae

- What happens after the main decline?
- How long does it take to return to quiescence?
- Can we see the white dwarf or donor star?
- Are there contaminating stars in the measurement aperture?
- Can we uniquely identify the quiescent counterpart?
- Are there any periodicities (orbital, pulsating)?
- Are there wavelength-dependent variations?
- Is any proper motion evident?

Precursor

- In most cases, we know the precursor location and magnitude from photographic plates
- There may be evidence of variability prior to outburst
- What is relationship to recurrent novae?
- Precursor object defines amplitude of outburst; indicates what magnitude can be expected at late times
- Follow-up observations take “large” telescope with good seeing

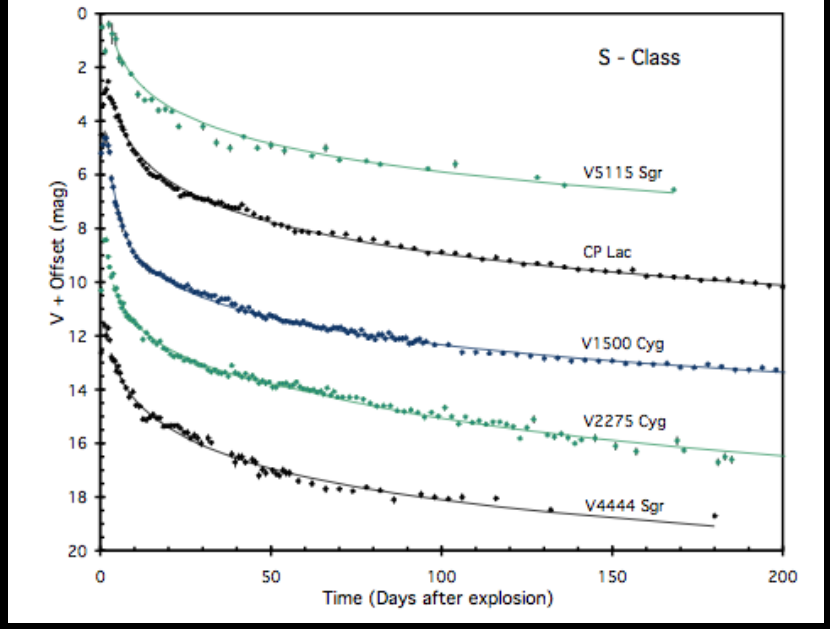
Observations

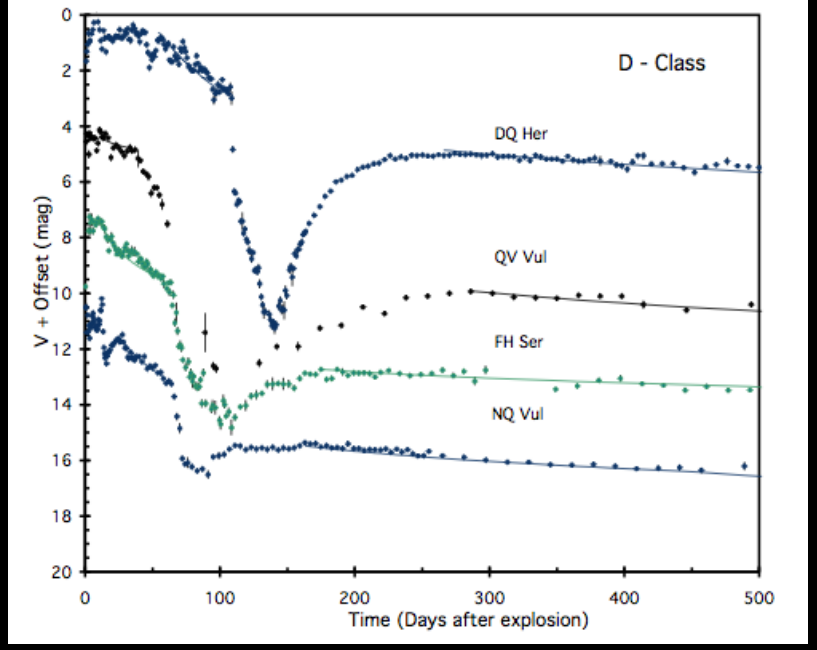
- Many of the novae were observed at peak with BSM, multi-filter
- Some additional images available on the web
- Current-epoch images with AAVSOnet 61cm telescopes; typically 1000s B, 500s V
- About 20 fields imaged so far

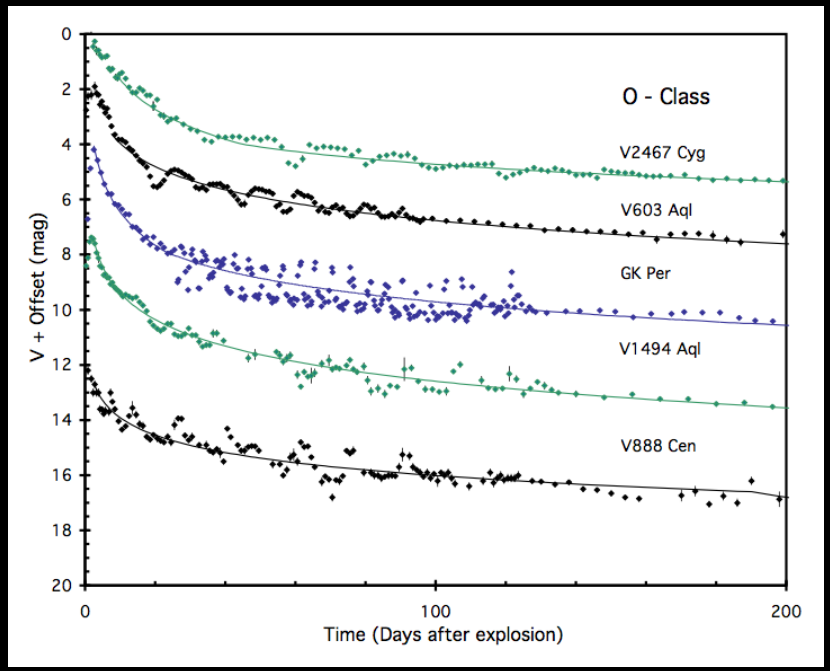
Telescopes Utilized

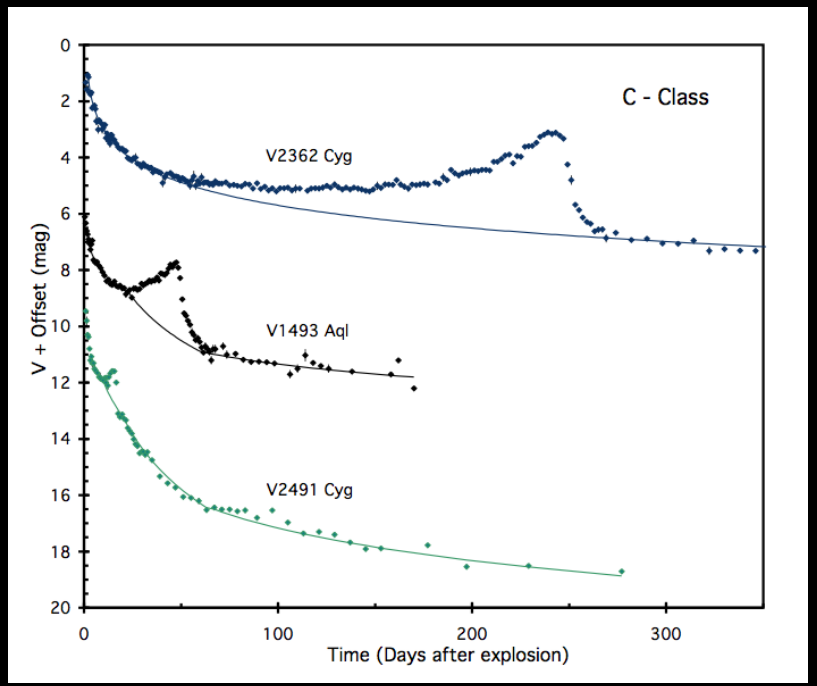
small aperture for peak monitoring

larger aperture for quiescent monitoring



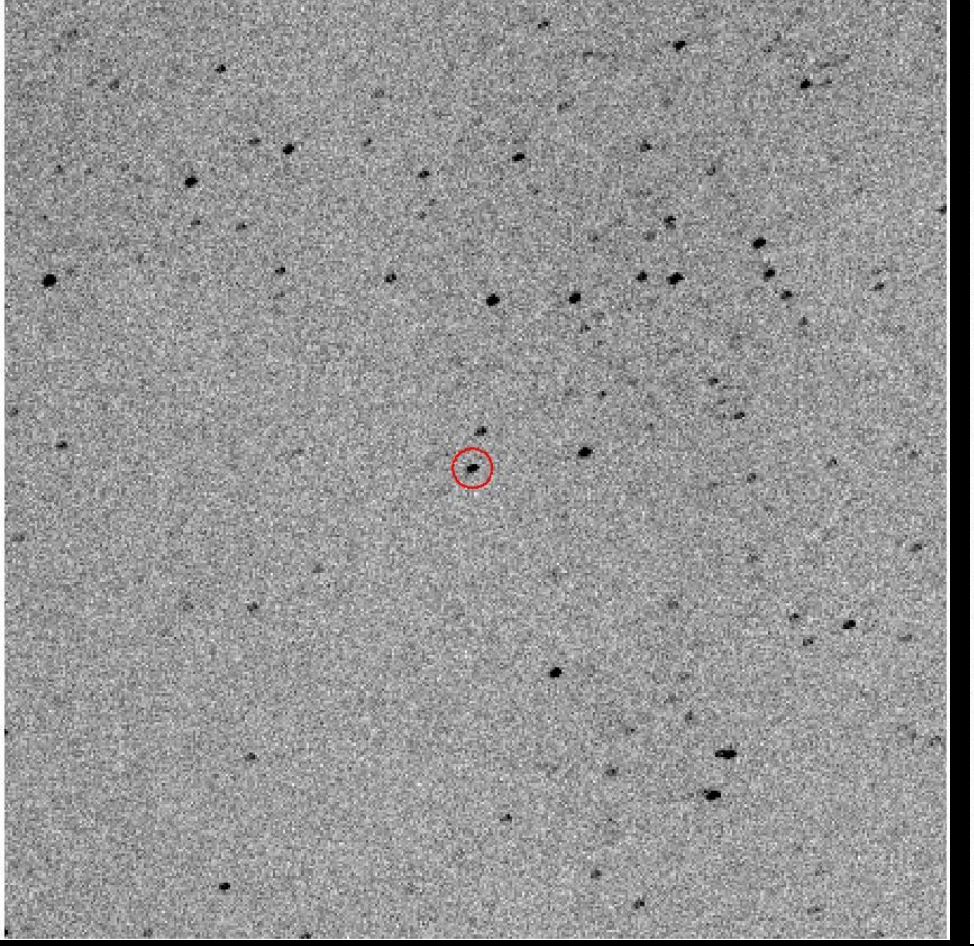




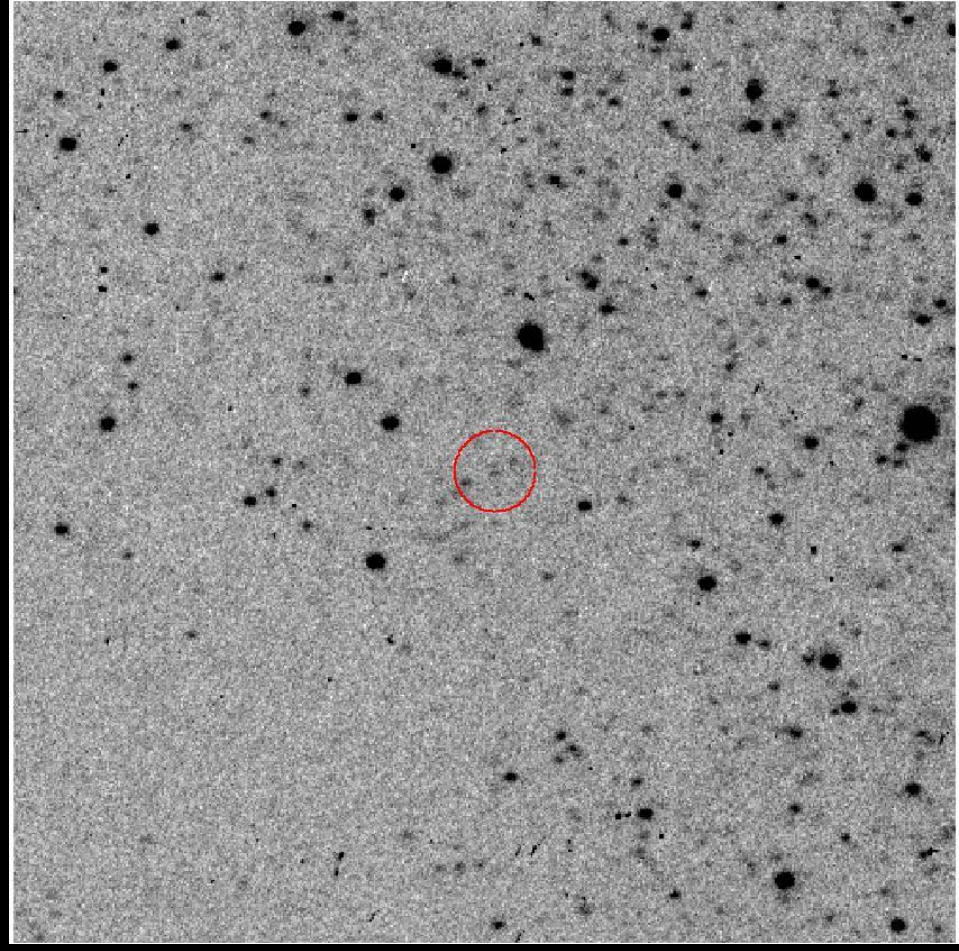


Nova light curve types

Credit: B. Schaefer



BSM-S 23x23’

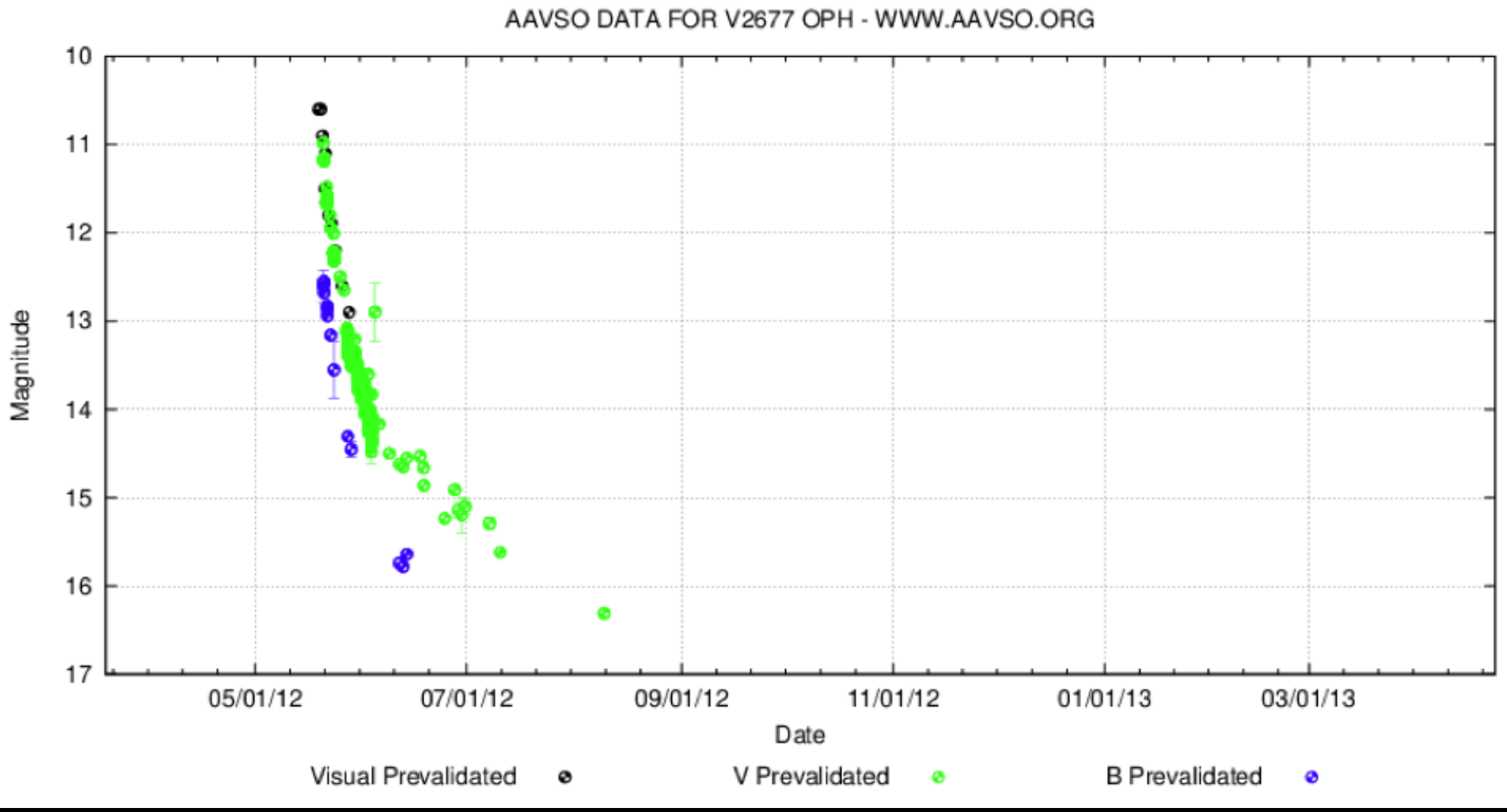


OC61 4.6x4.6’

V2677 Oph

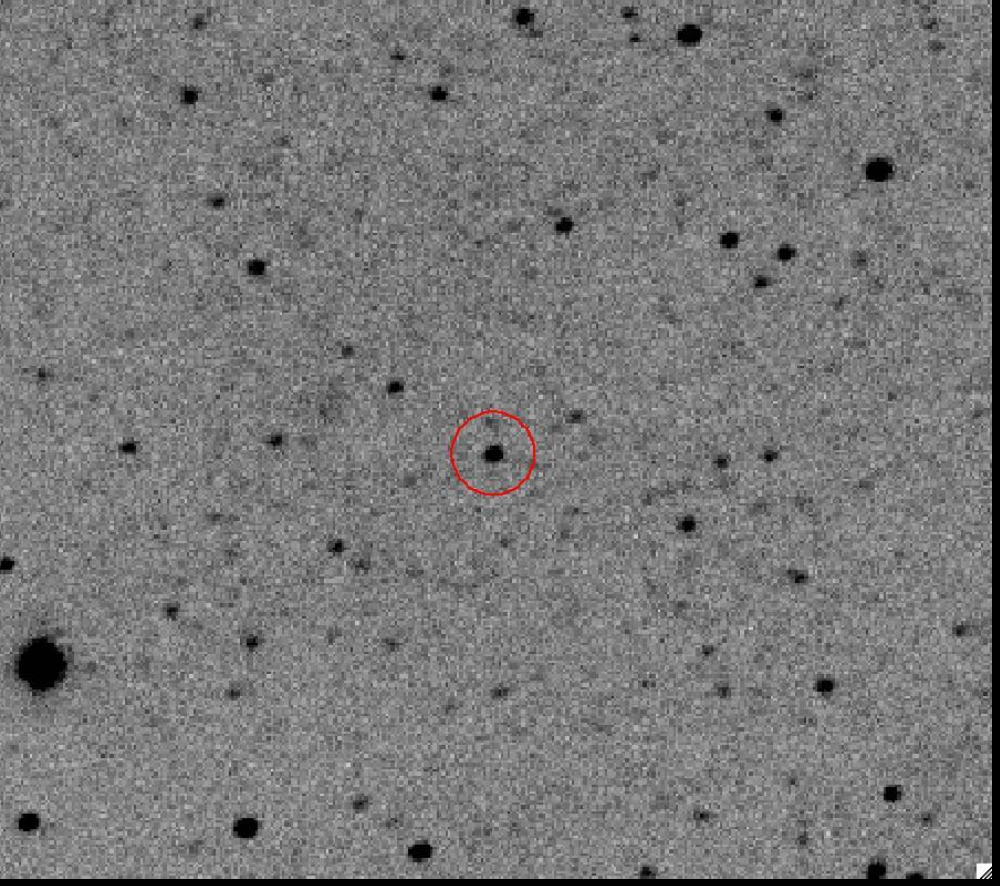
Nova Oph 2012 n2

CBET 3124 2012-05-19.5

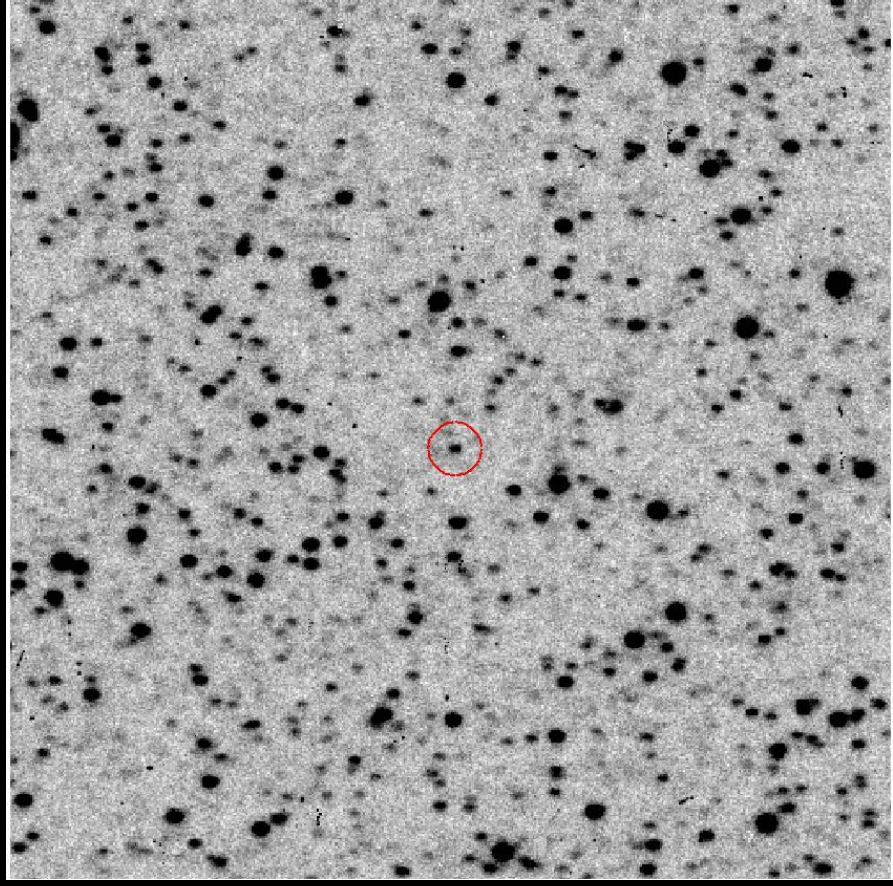


V2677 Oph

s type



BSM-S 23x23’

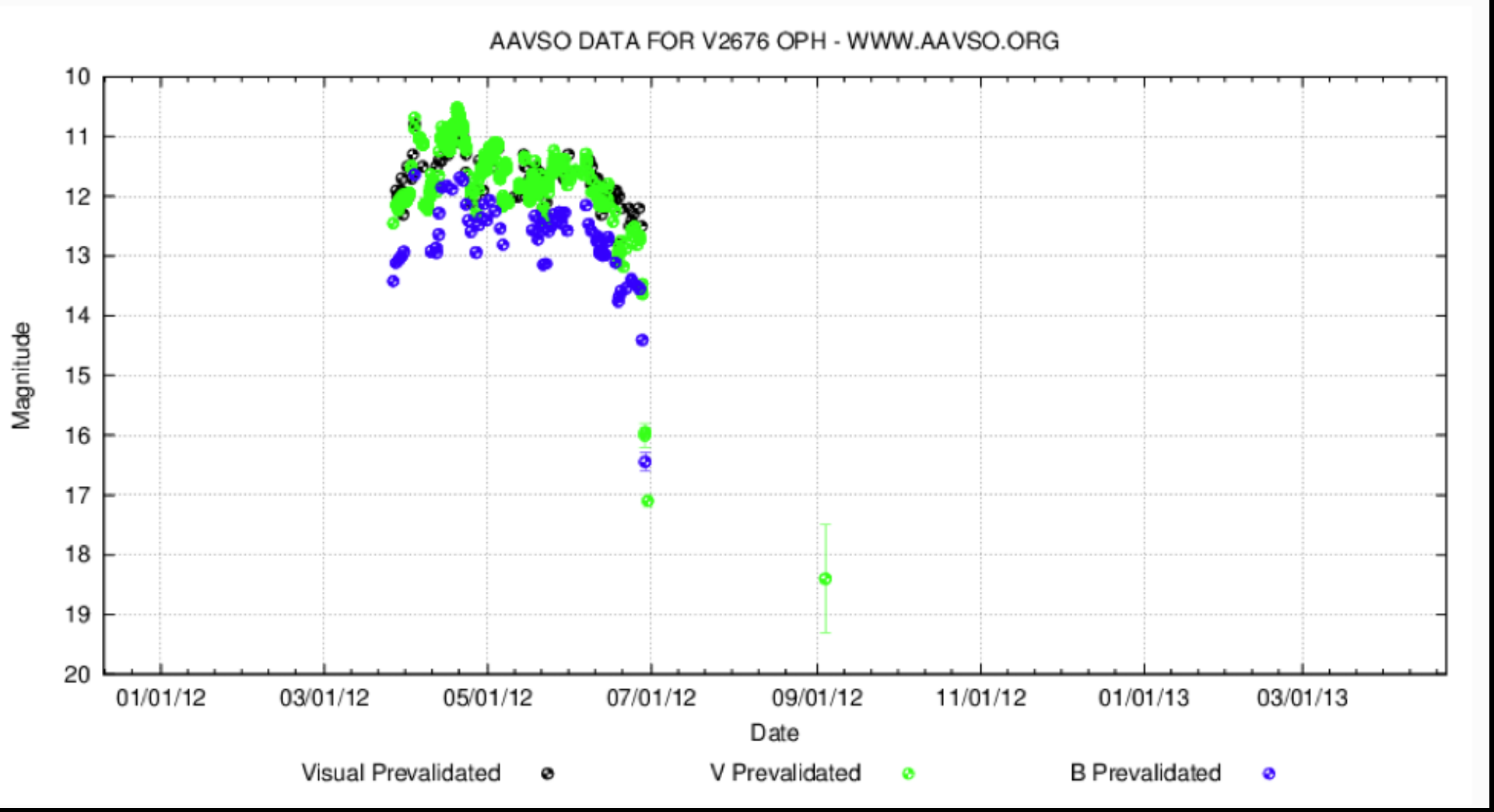


OC61 4.6x4.6’

V2676 Oph

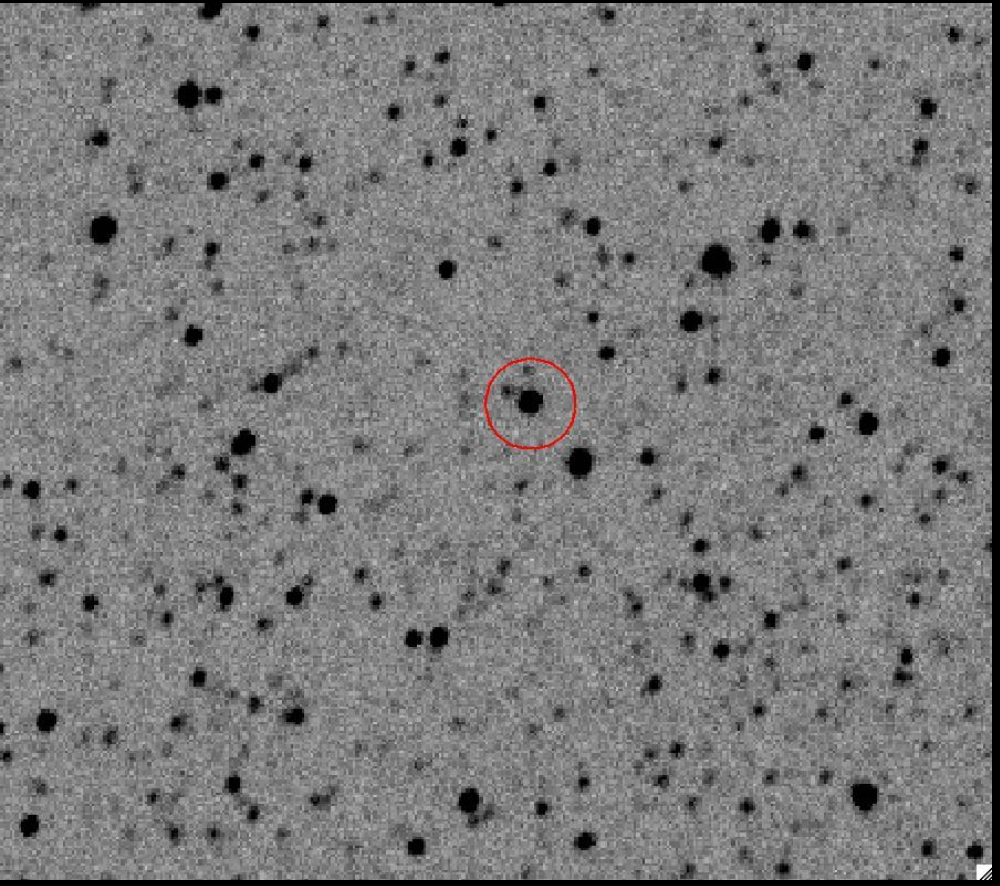
Nova Oph 2012

CBET 3072 2012-03-25.8

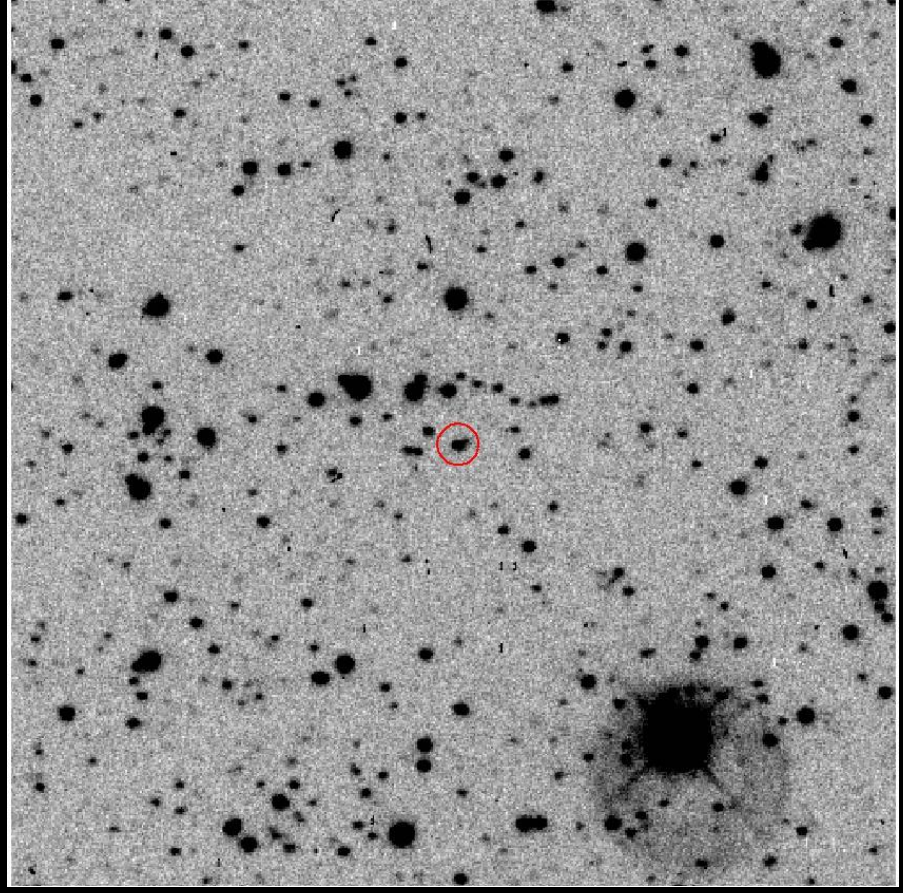


V2676 Oph

o type



BSM-S 23x23’

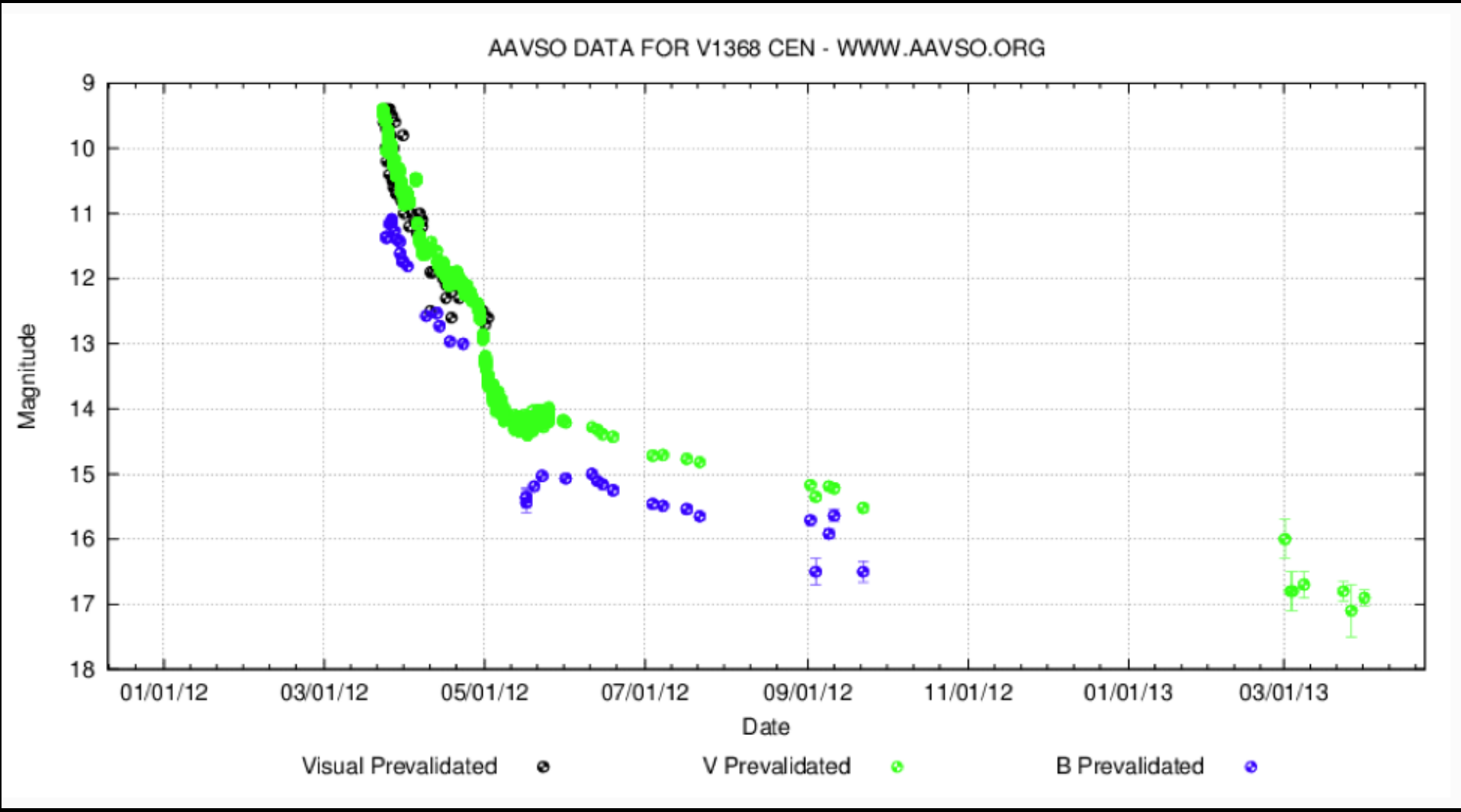


OC61 4.6x4.6’

V1368 Cen

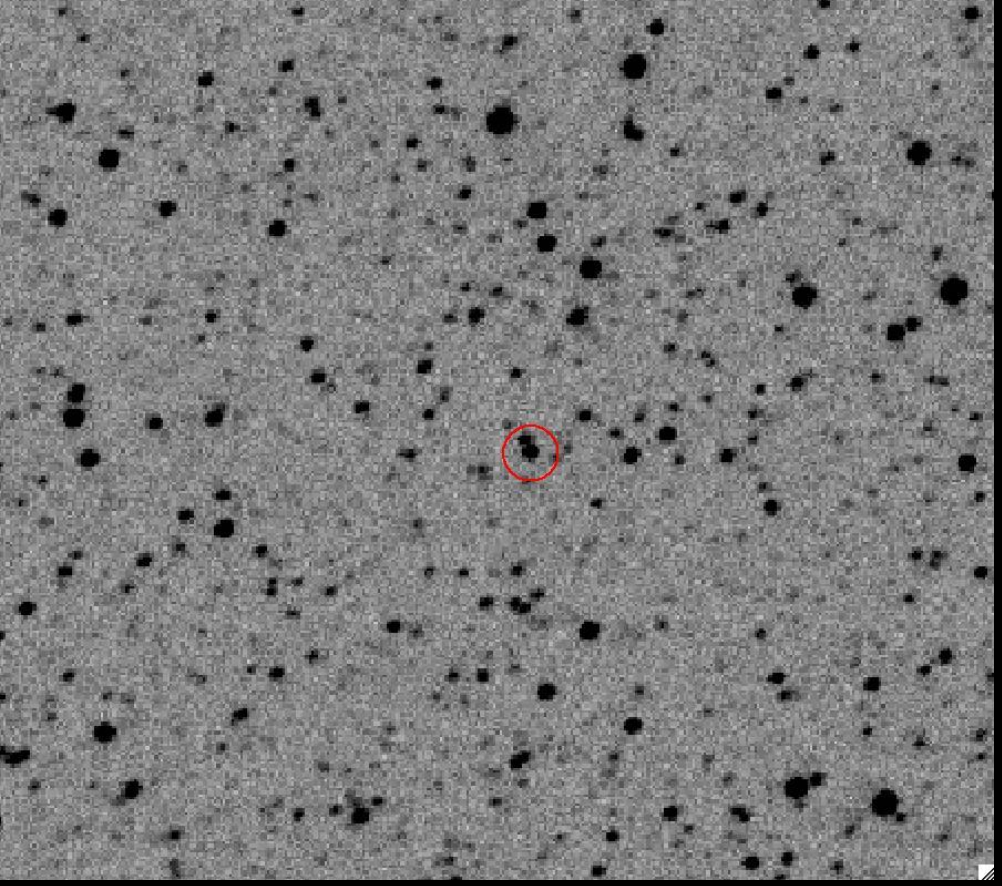
Nova Cen 2012

CBET 3073 2012-03-23.4

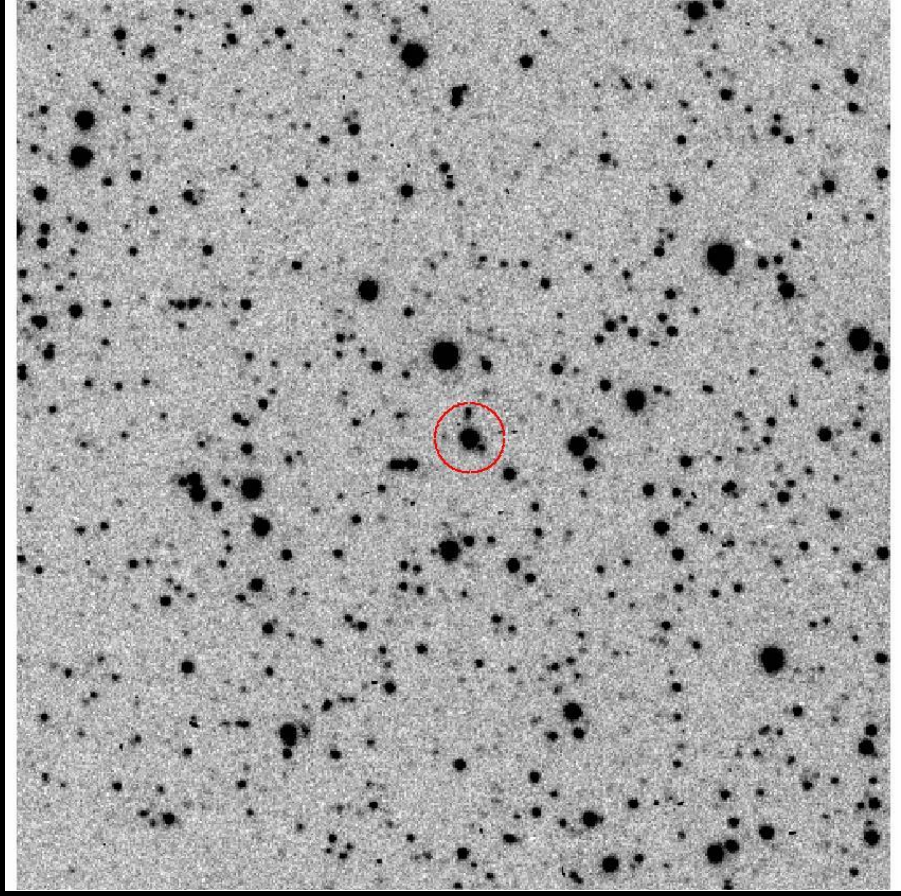


V1368 Cen

c type



BSM-S 23x23’

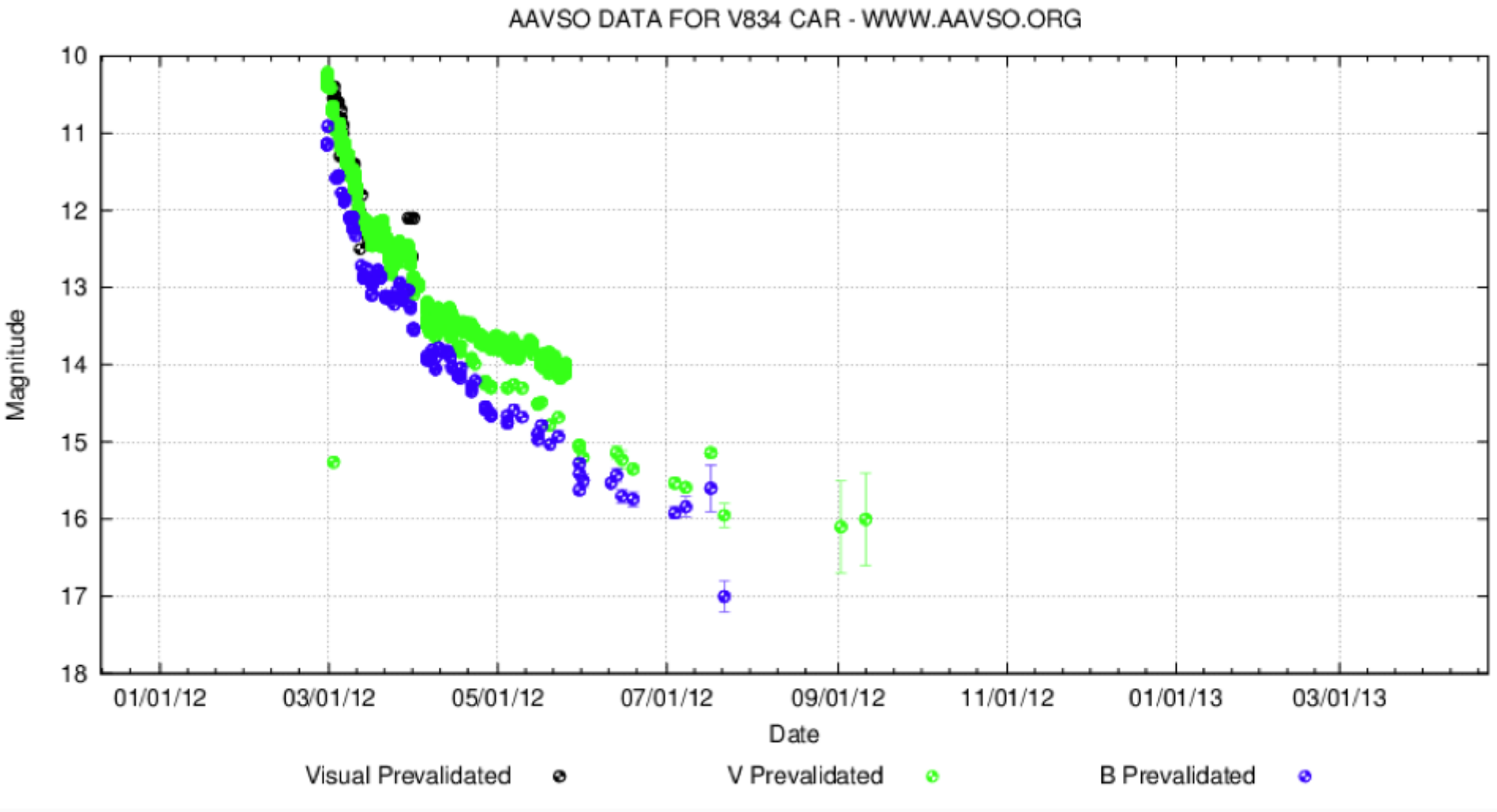


OC61 4.6x4.6’

V834 Car

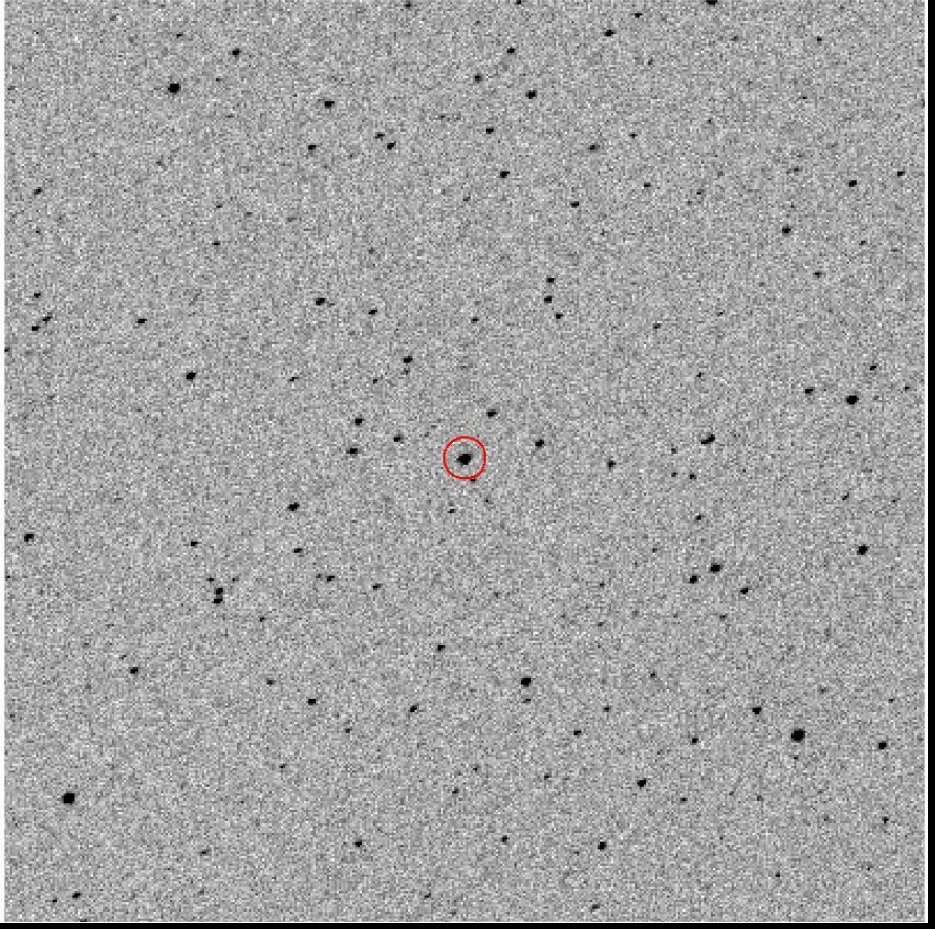
Nova Car 2012

CBET 3040: 2012-02-26.5

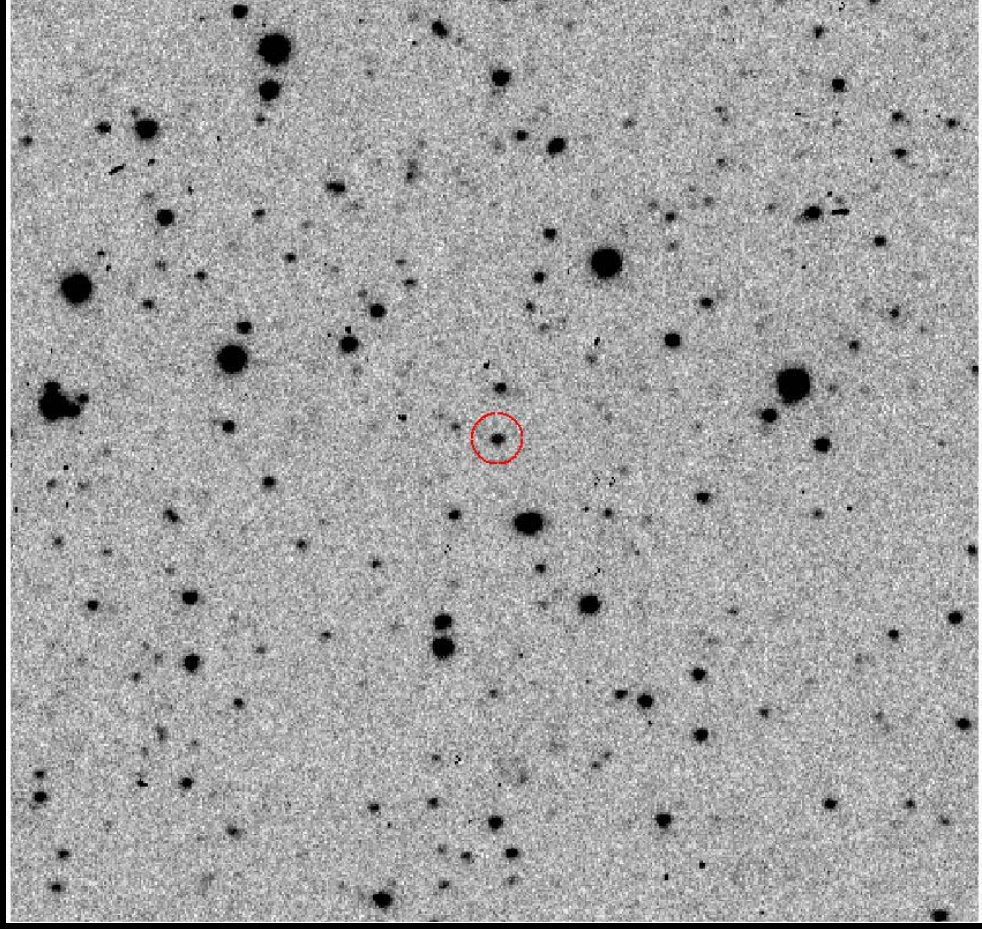


V834 Car

S-type



BSM-S 23x23’

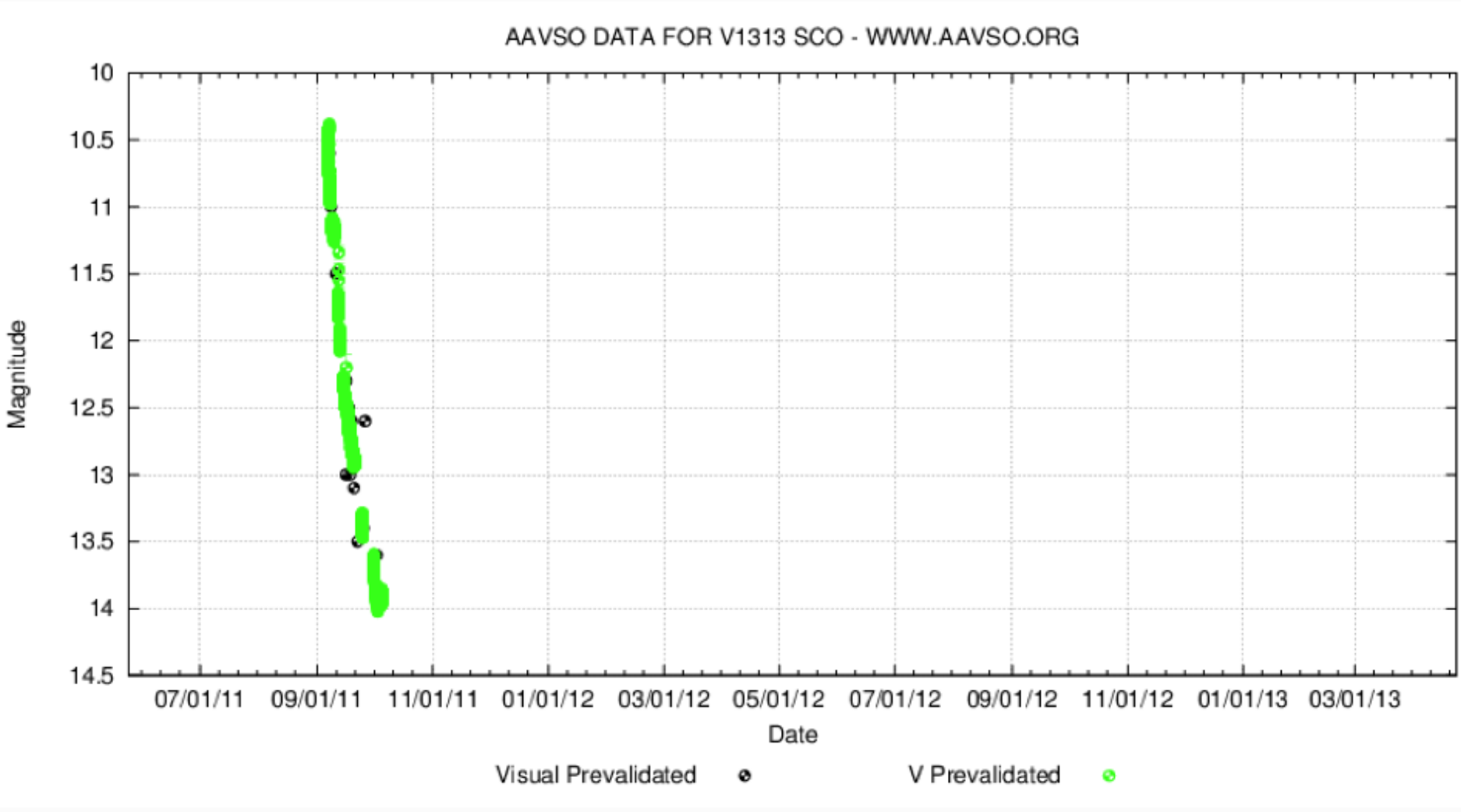


OC61 4.6x4.6’

V1313 Sco

Nova Sco 2011 n2

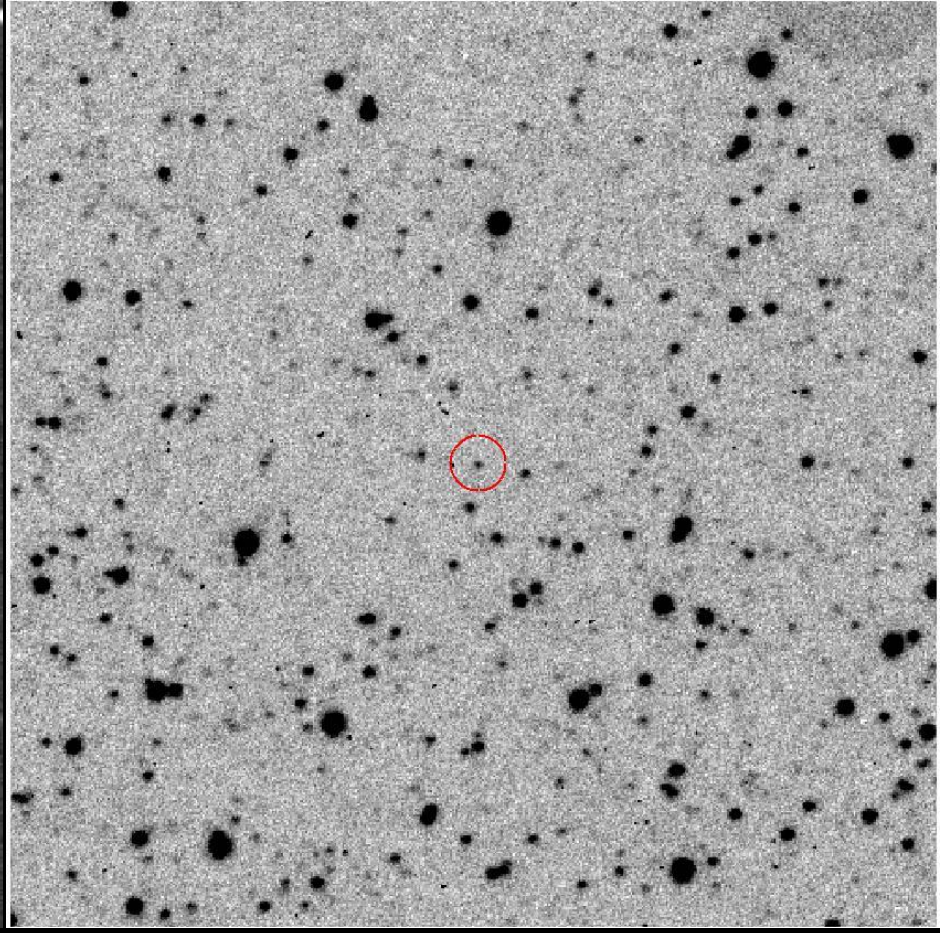
CBET 2813 2011-09-06.4



V1313 Sco

s type

Credit: Guido 10’

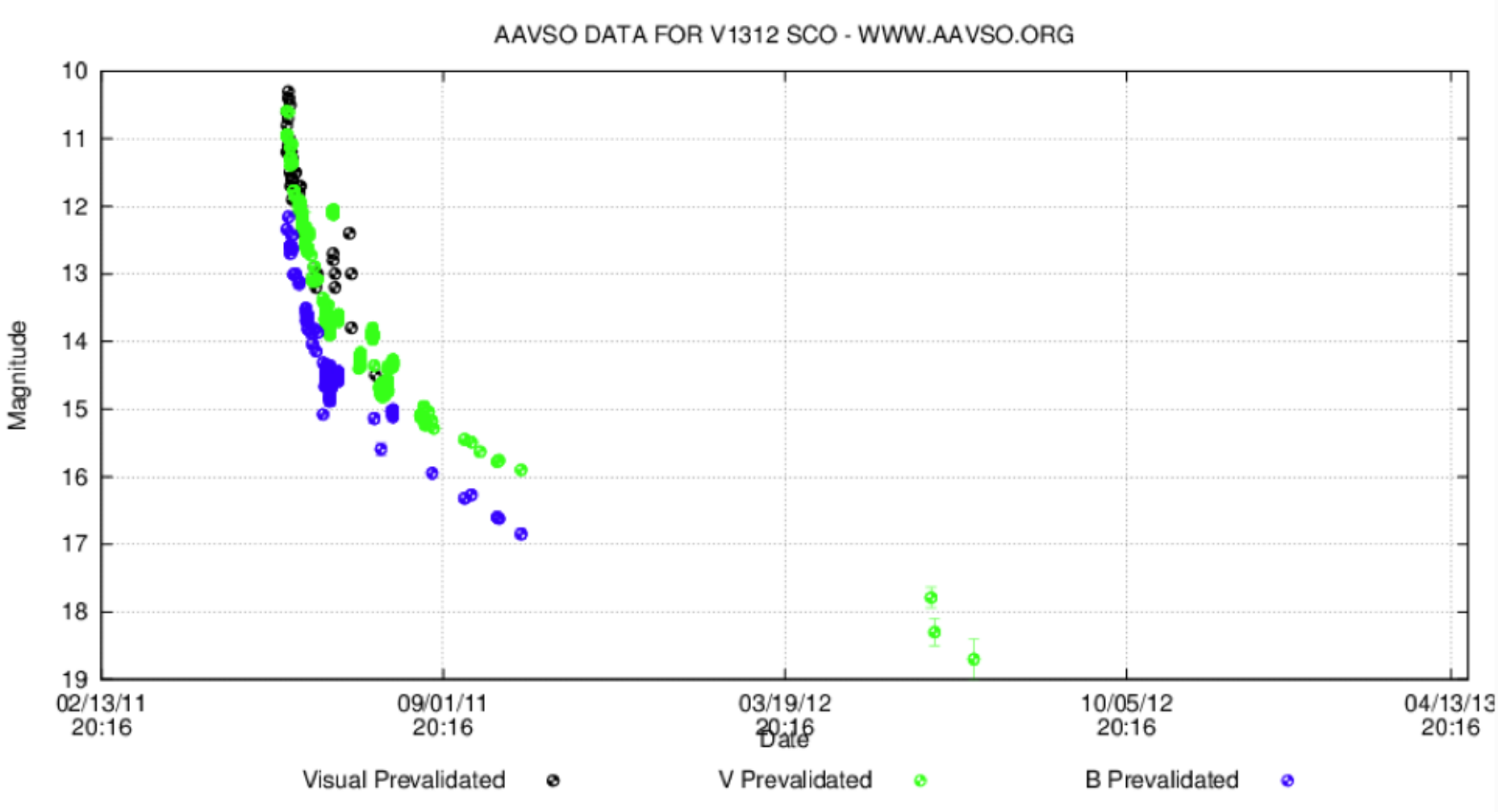


OC61 4.6x4.6’

V1312 Sco

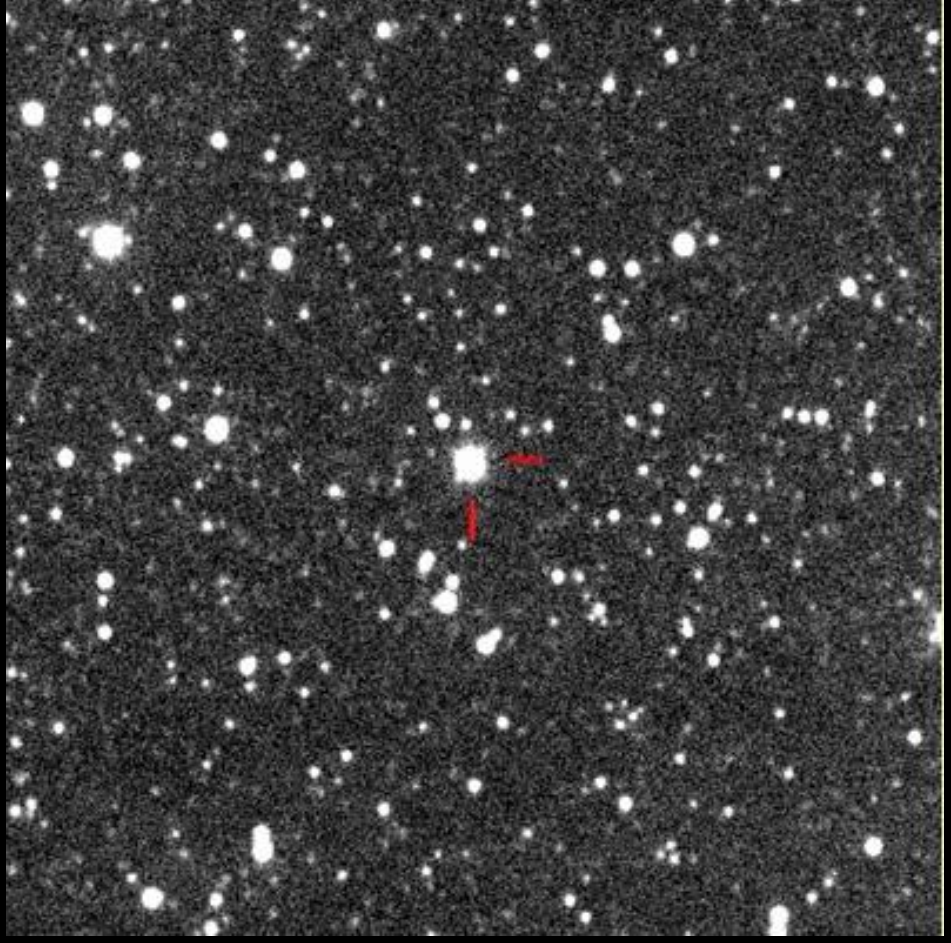
Nova Sco 2011

CBET 2735 2011-06-01.4

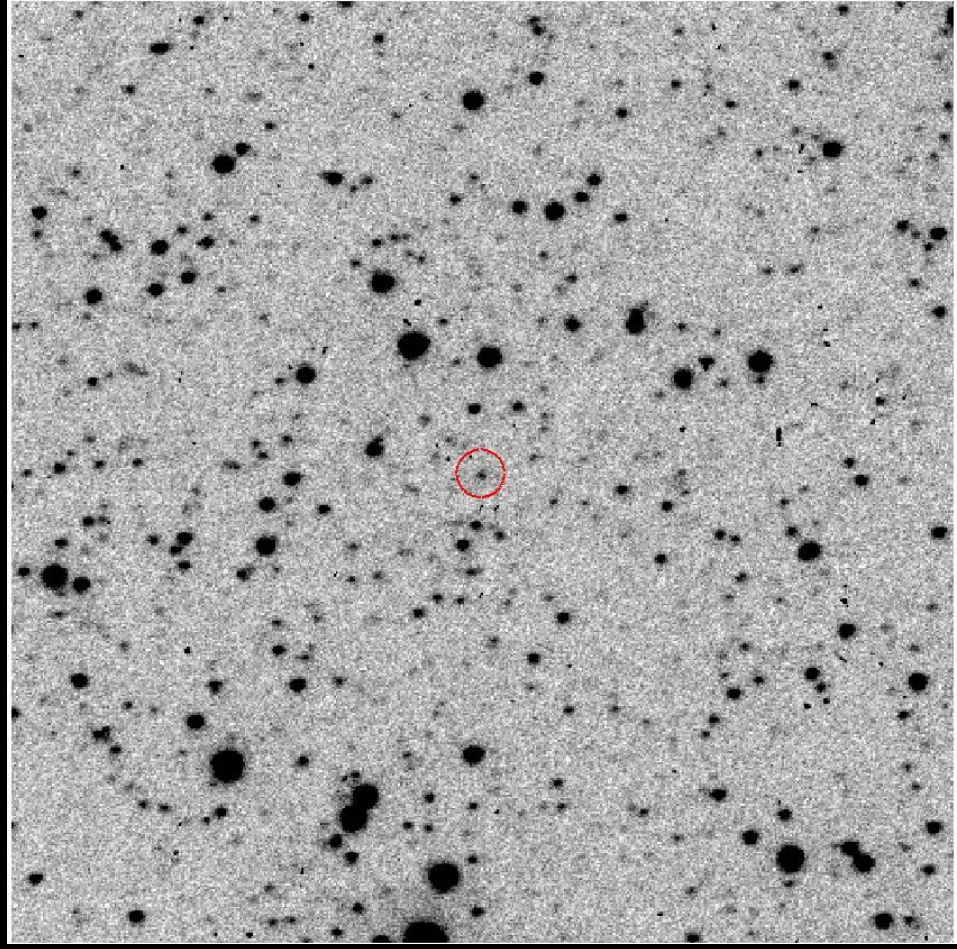


V1312 Sco

o type?



Credit: Guido 15’

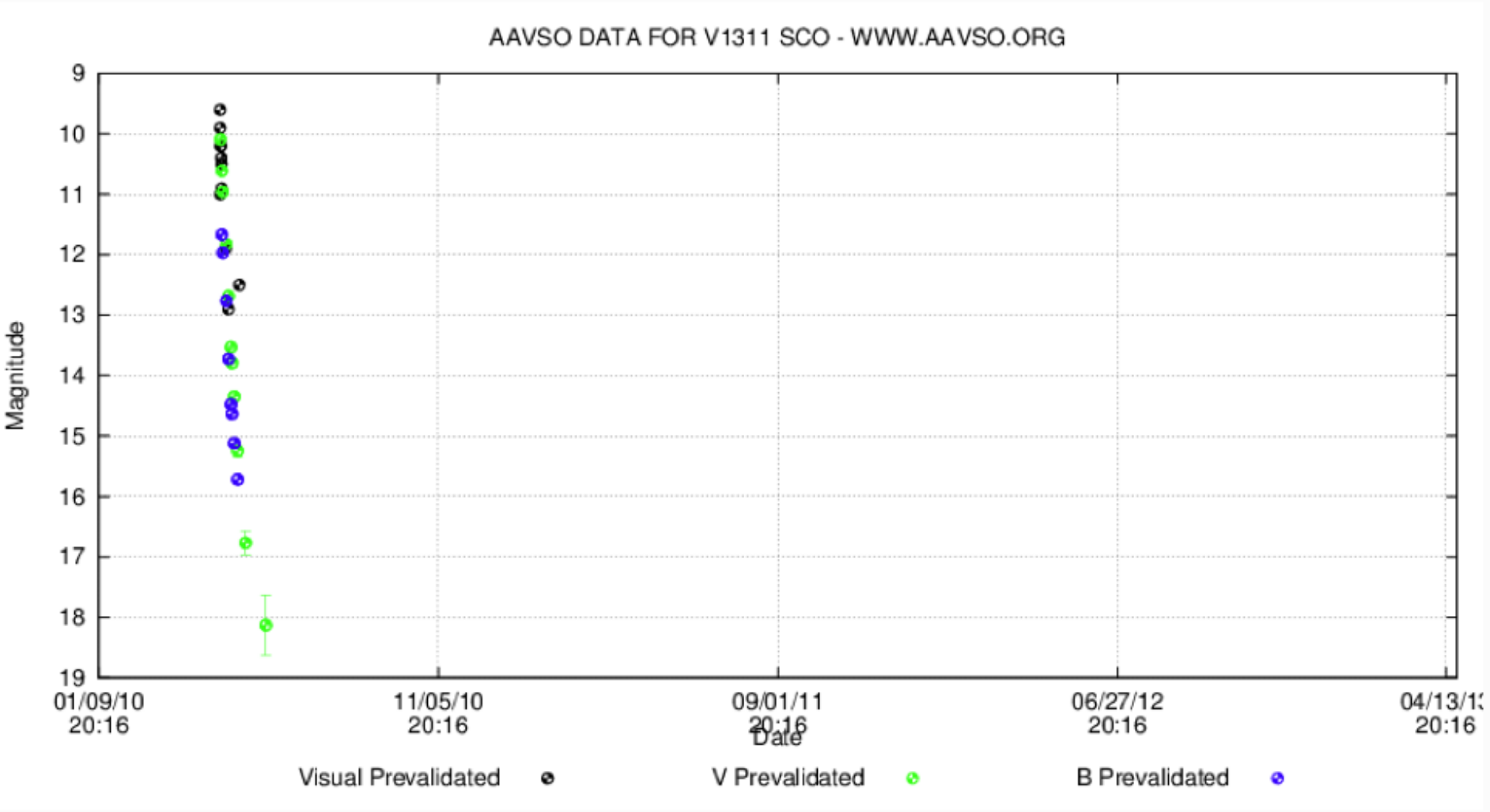


OC61 4.6x4.6’

V1311 Sco

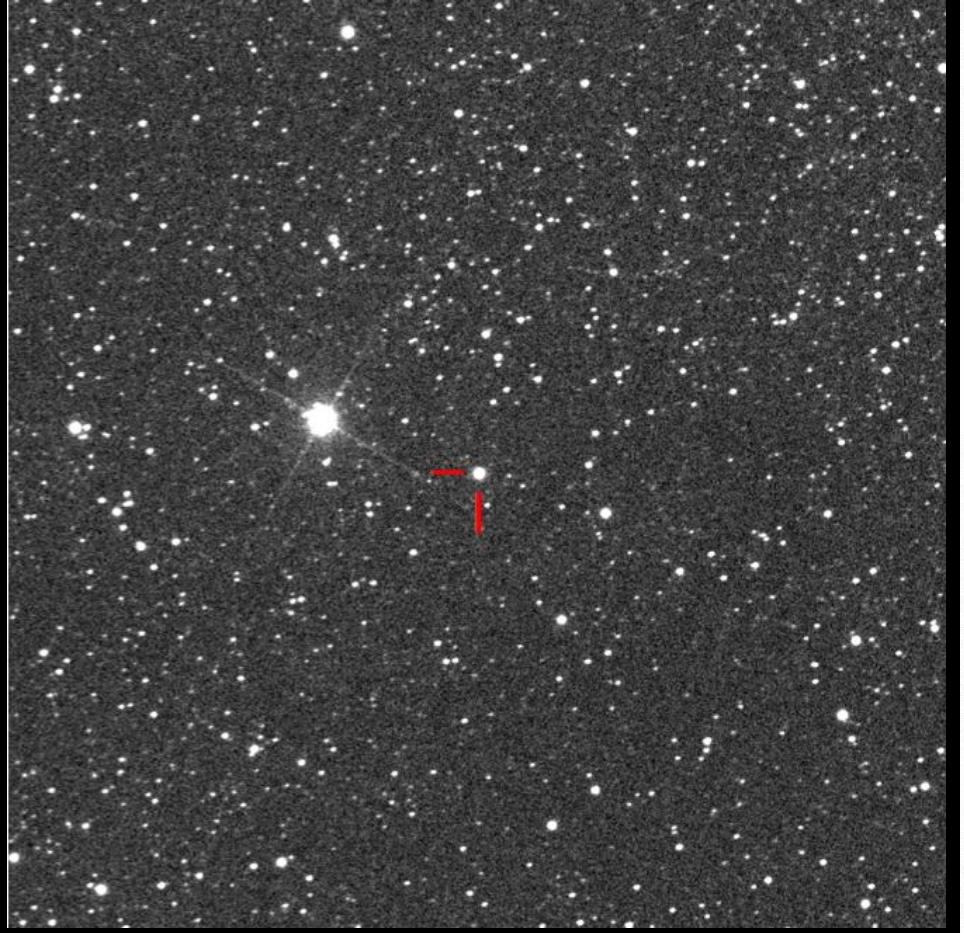
Nova Sco 2010 n2

CBET 2262 2010-04-25.8

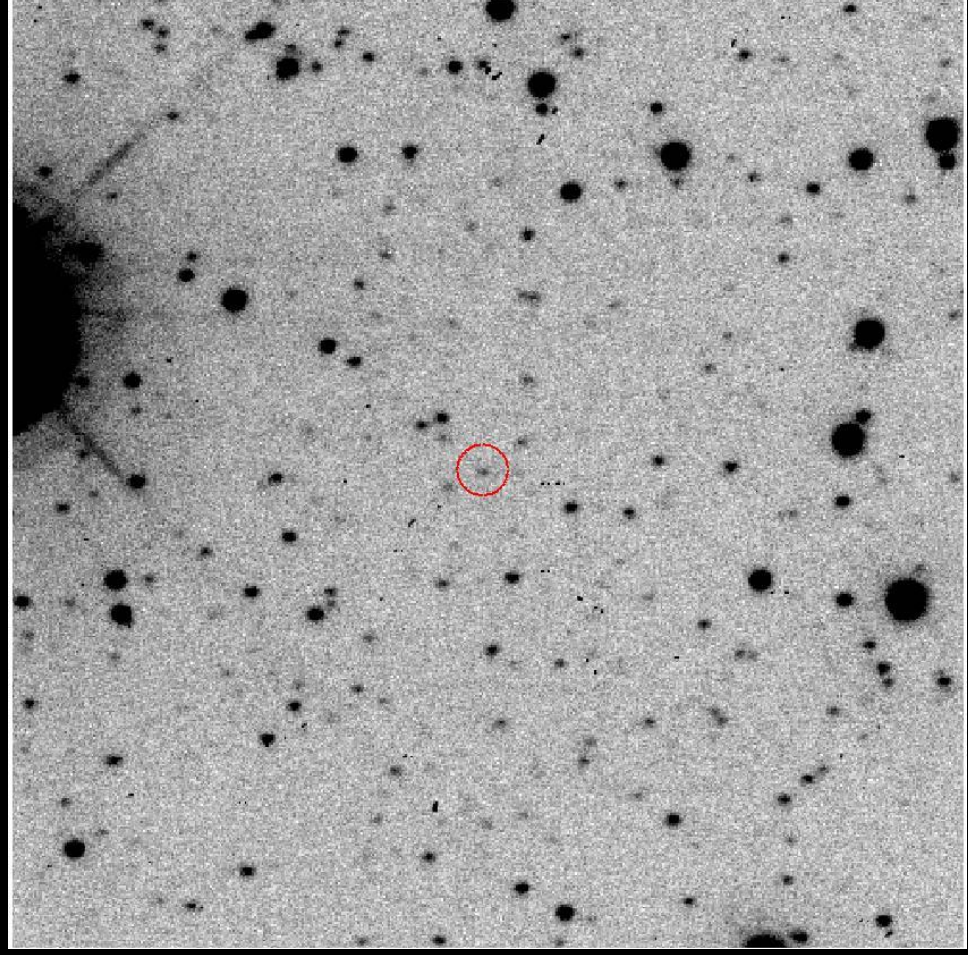


V1311 Sco

s type



Credit: Guido 15’

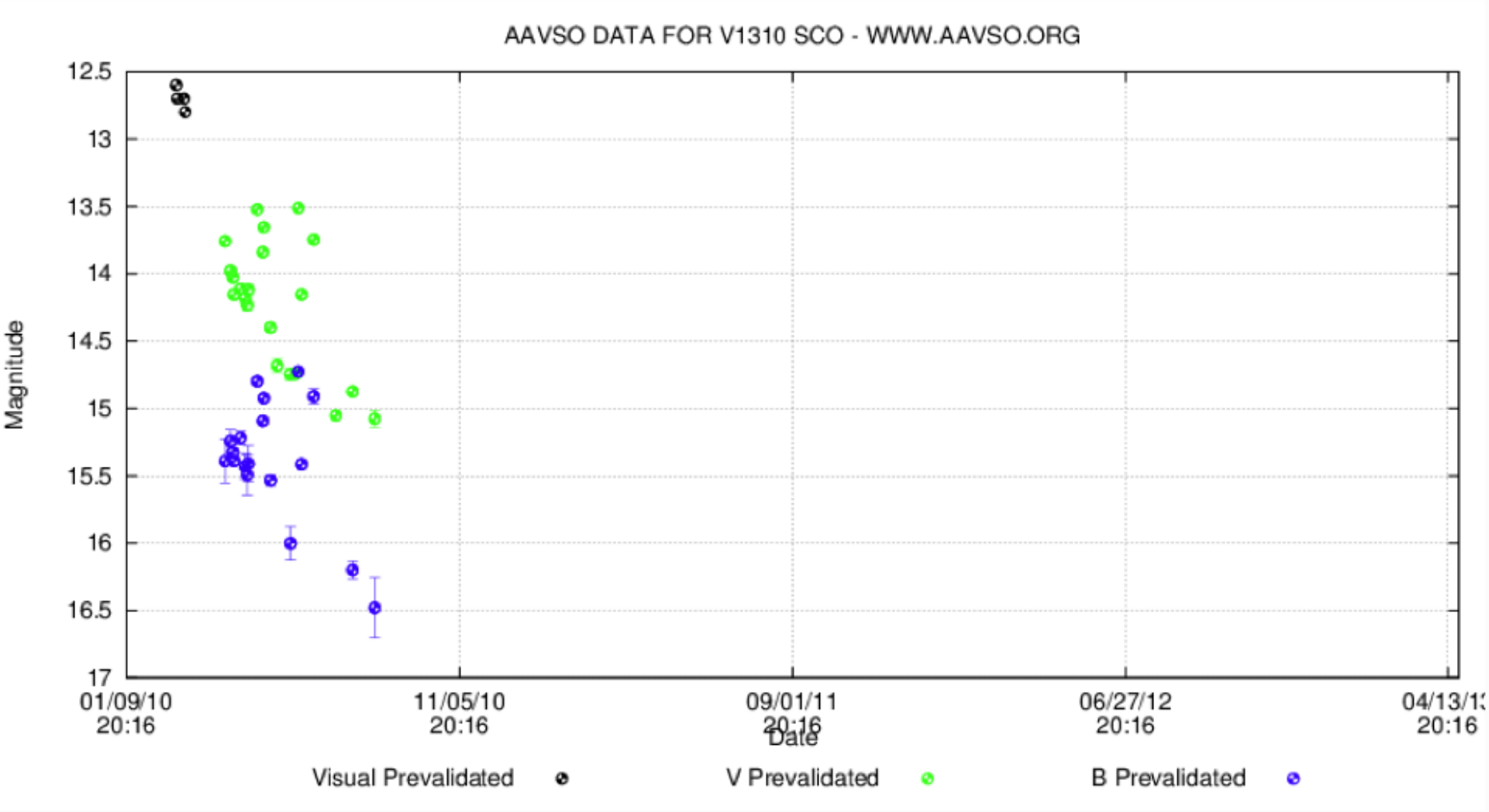


OC61 4.6x4.6’

V1310 Sco

Nova Sco 2010

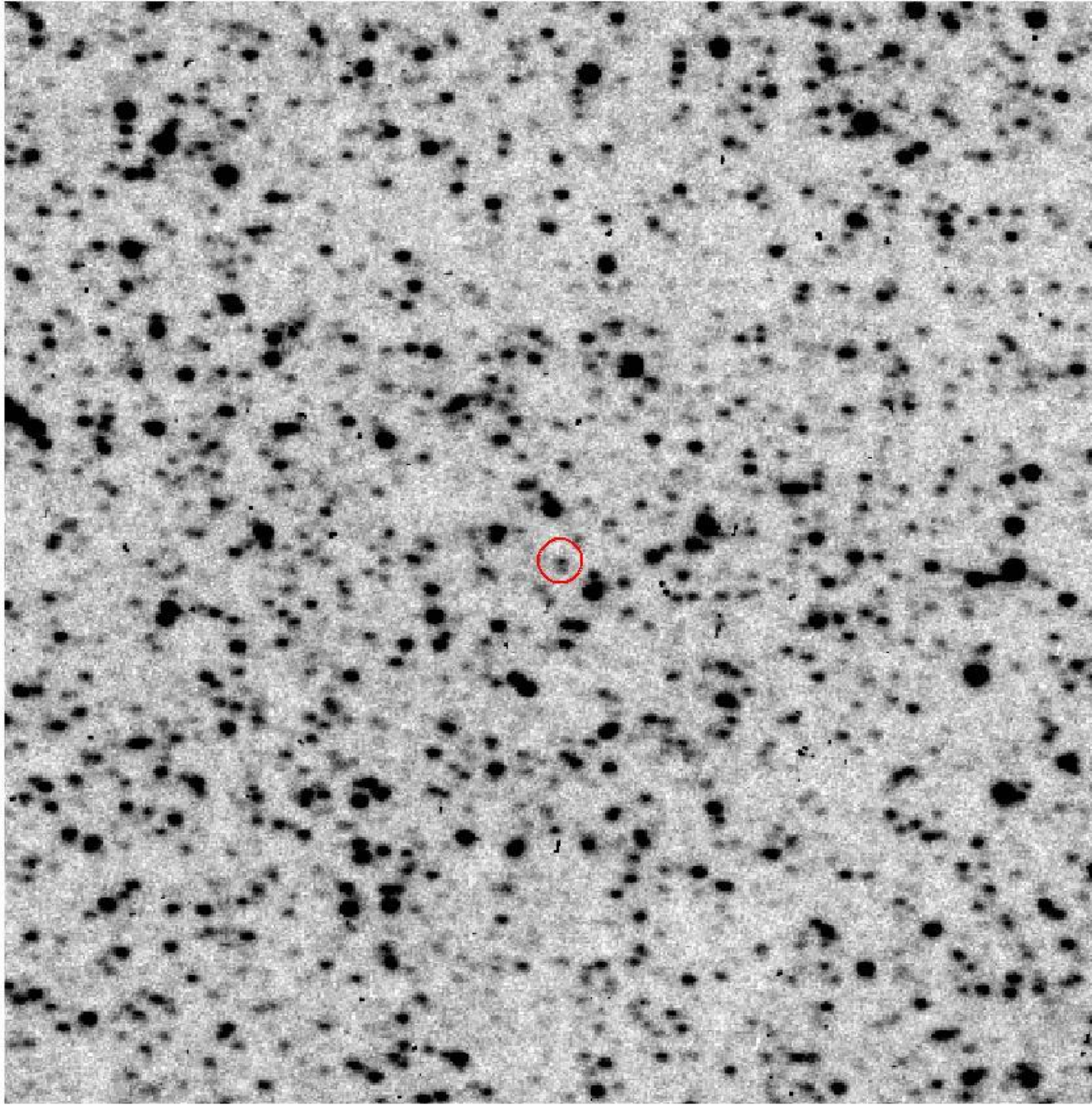
CBET 2183 2010-02-20.9



V1310 Sco

o type?

OC61 4.6x4.6’



V5589 Sgr

Nova Sgr 2012

CBET 3089 2012-04-21.0

Opportunities to help

- Do you have novae images near peak?
- Literature search to get best light curves
- Data-mining to find precursors
- Monitor all new novae and brighter old novae as long as possible
- Tie-in with Sokoloski grant/campaign for all new novae
- 2GSS future discovery space

Next Steps

- Accurate positions and 2-filter magnitudes for all novae since 2000
- Continued monitoring of the brighter targets
- Consider time series
- Consider spectroscopy followup (4m+)
- NIR photometry?
- Note: also have ~20 old novae fields covered with NOFS 1.55m; good team research project