Late-Time Observations of Novae

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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](http://www.aavso.org)
Cumulative observations in AAVSO International Database (current rate: 1.5M/year)
Novae

Credit: David Hardy/PPARC
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
V2677 Oph
Nova Oph 2012 n2
CBET 3124 2012-05-19.5
V2677 Oph

s type
V2676 Oph
Nova Oph 2012
CBET 3072 2012-03-25.8
V2676 Oph
o type
V1368 Cen
c type
V834 Car
Nova Car 2012
CBET 3040: 2012-02-26.5
V834 Car
S-type
V1312 Sco

Type?
V1311 Sco
Nova Sco 2010 n2
CBET 2262 2010-04-25.8

Credit: Guido
OC61 4.6x4.6’
V1310 Sco
Nova Sco 2010
CBET 2183 2010-02-20.9

Credit: Guido 15’

OC61 4.6x4.6’
V1310 Sco

o type?
V5589 Sgr
Nova Sgr 2012
CBET 3089 2012-04-21.0

OC61 4.6x4.6'
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