Intense observations of RR Lyr stars

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VVS, GEOS, BAV, AAVSO

Interest in RR Lyr stars

- RR Lyr stars are old stars with about 0.7 Msun
- Red giants with Helium core burning
- Radial pulsators with less than 1 day period
- Light curve changes of 1 mag and more
- Light curve shape different for RRab and RRc Lyr stars
- Many RR Lyr stars show additional variability called Blazhko effect

Observatory in Mol, Belgium

- Several scopes
- CCD with BVRI photometric filters
- Usage each clear night (if at home)

Remote Observatory in New Mexico

- 50cm RC f/8.4 (4200mm FL)
- STL11K with BVI photometric filters
- New Mexico Skies (altitude about 2400m)
- UT + 7h
- Shared usage

AAVSO scope K28 and other non AAVSO scopes at Astrokolkhoz site

ROAD: Remote Observatory Atacama Desert

- San Pedro de Atacama
- 2450 m above sealevel
- 5000 inhabitants
- Electricity, Water, Lodging, Food, Shops
- High speed (4MB and more) internet
- + 300 clear nights / year
- Southern Hemisphere (23 deg south)
- Competent people for service
- Dark sky 22.00 mag/sq arcsec

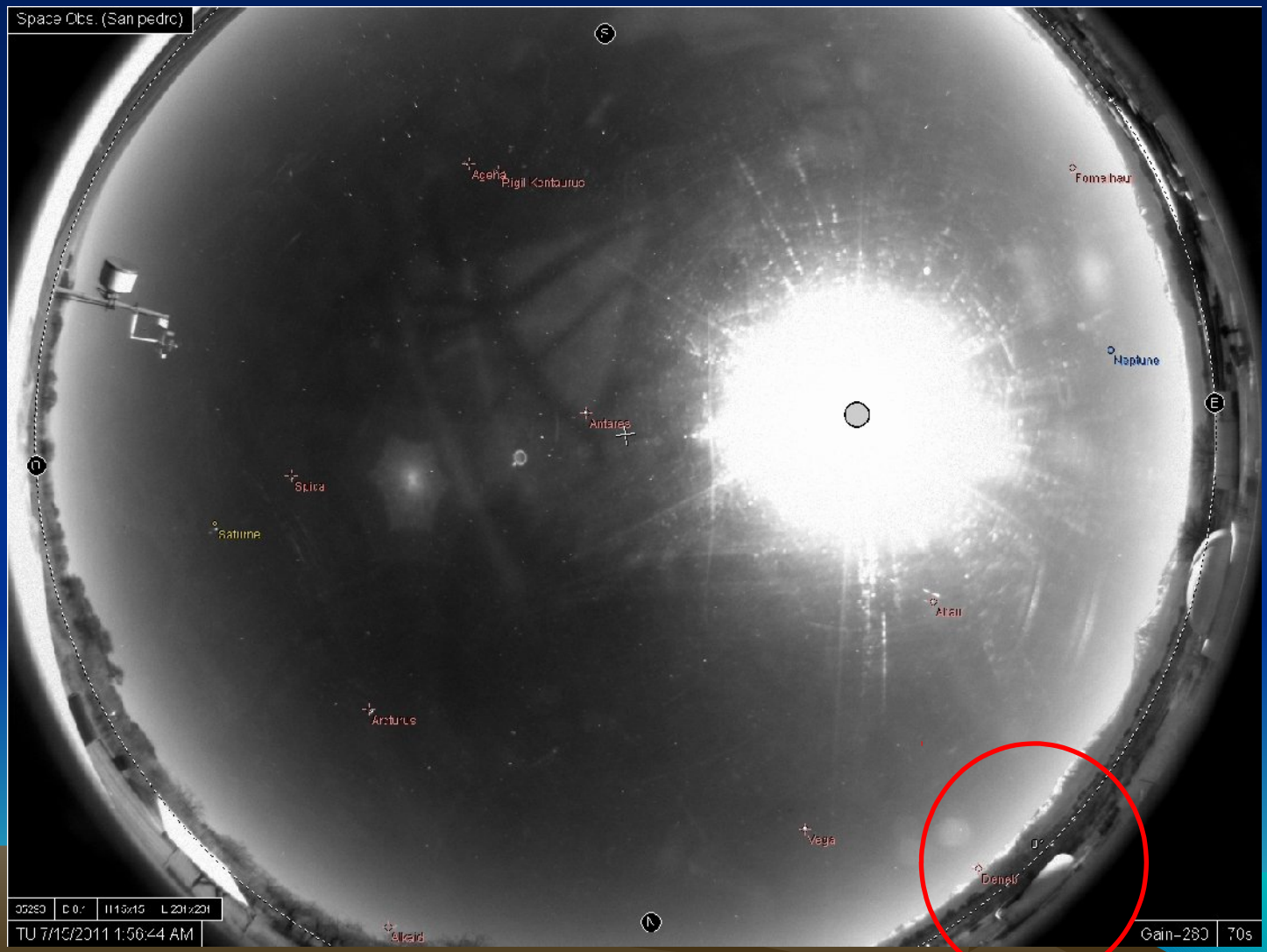
ROAD during setup

40 cm f/6.8 ODK Orion Optics with FLI ML16803 CCD

ROAD in action

Courtesy Y. Beletsky

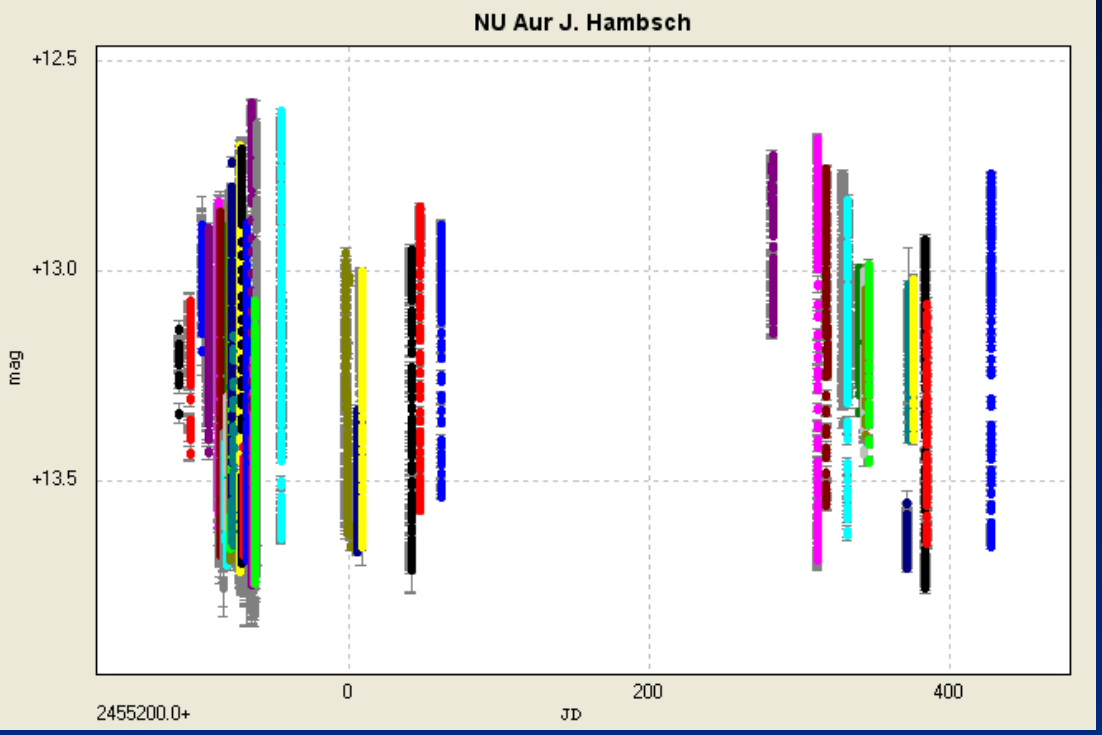
ROAD
All Sky camera during full moon



ROAD in numbers

- Starting regular observations Aug. 1, 2011
- Clear nights (Aug 2011-July 2012 = 320)
- 2012 = 319, 2013 so far more than 140
- Number of clear nights = observed nights

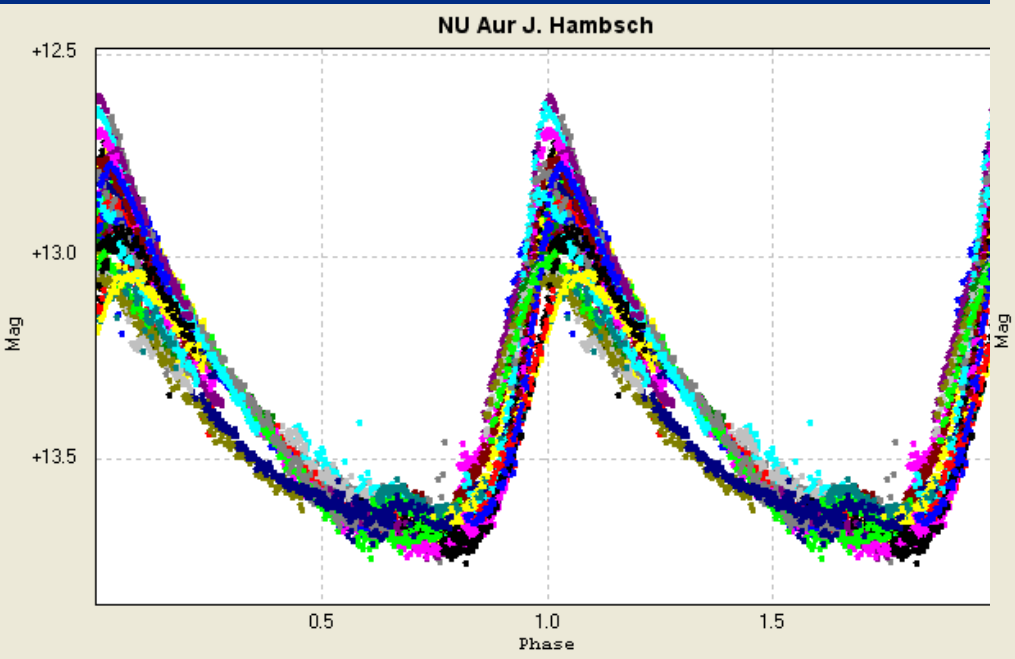
- Some RR Lyr observed intensively mainly from Northern Hemisphere
- NU Aur, VY CrB, DY And, CX Lyr,

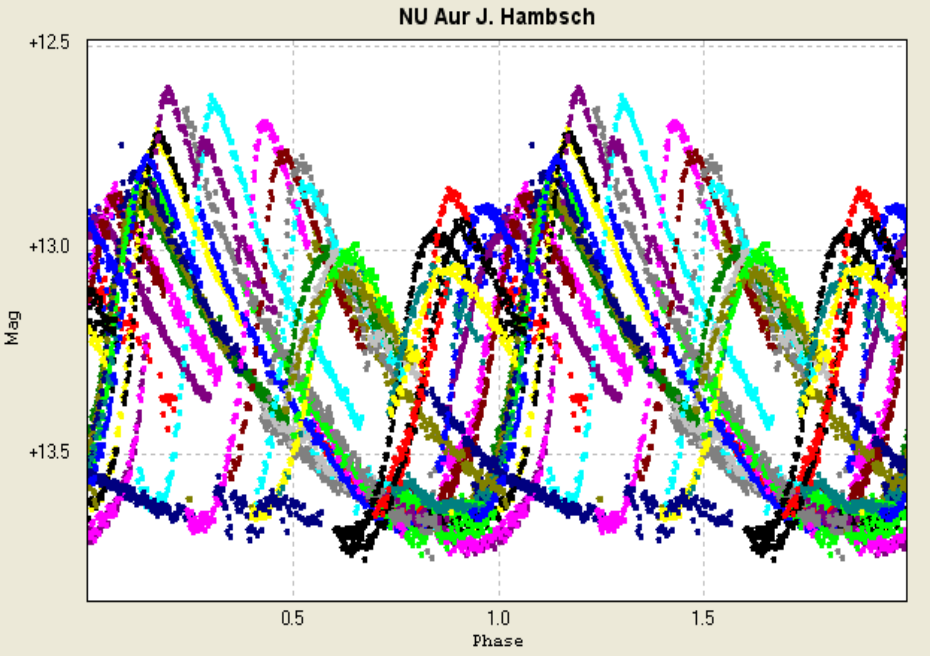


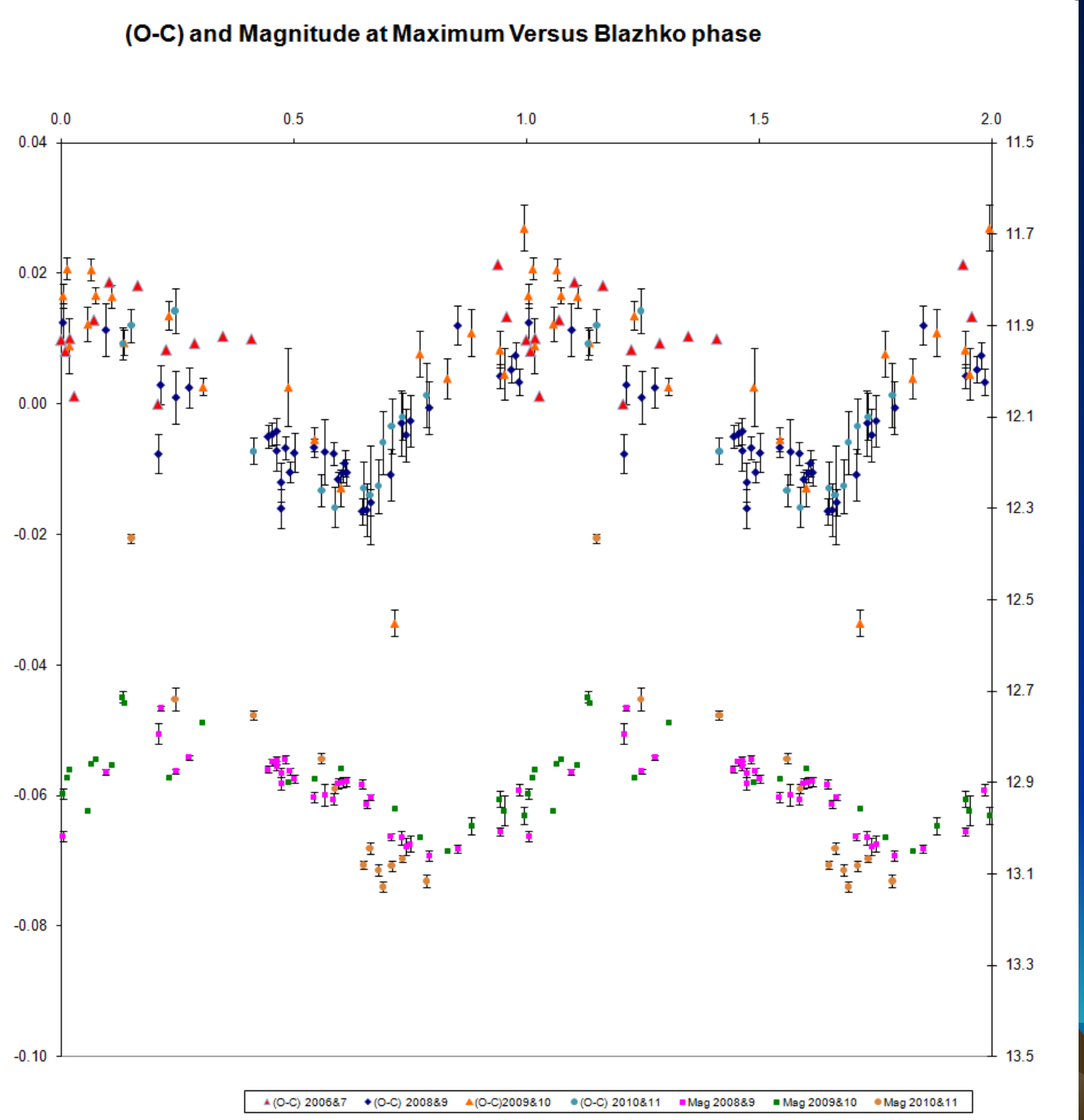
E = 2455087.44 HJD
P = 0.53940 +/- 0.00002 d

NU Aur

Blazhko Effect !!

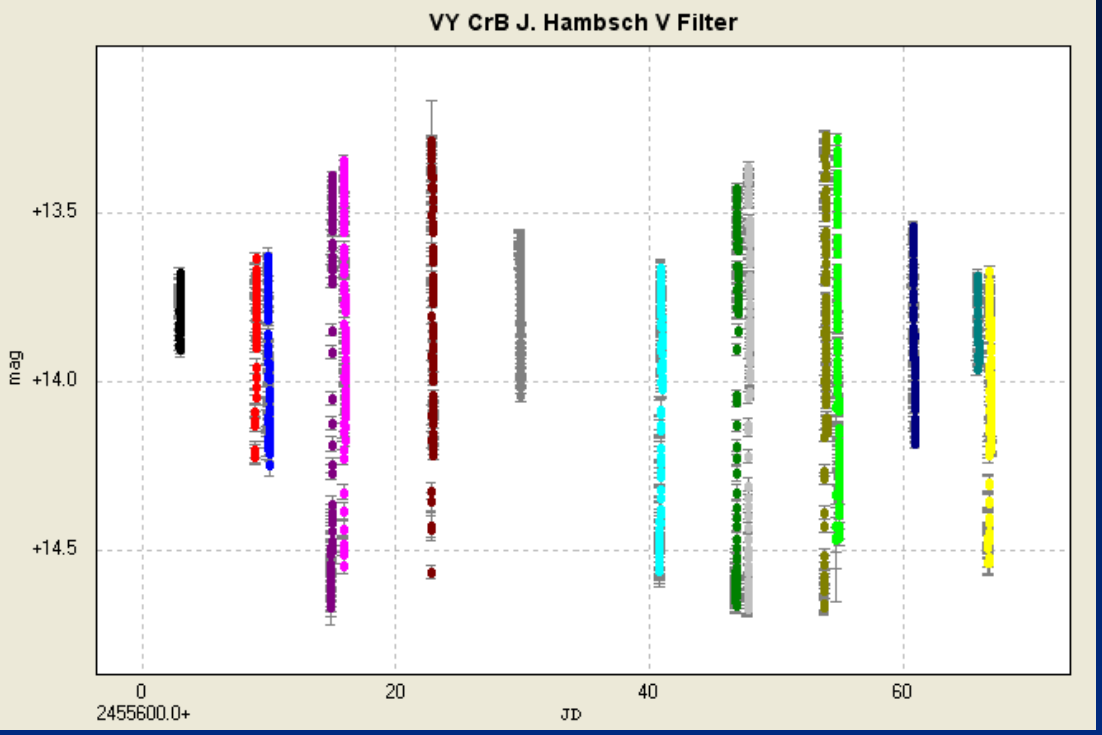






NU Aur

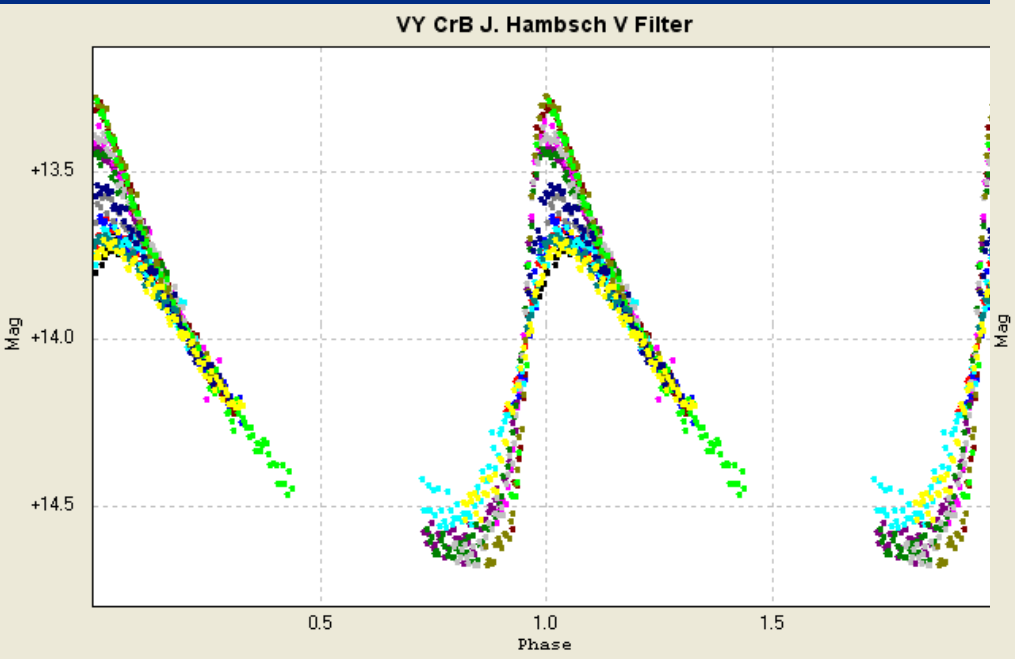
Blazhko period
114.7 d

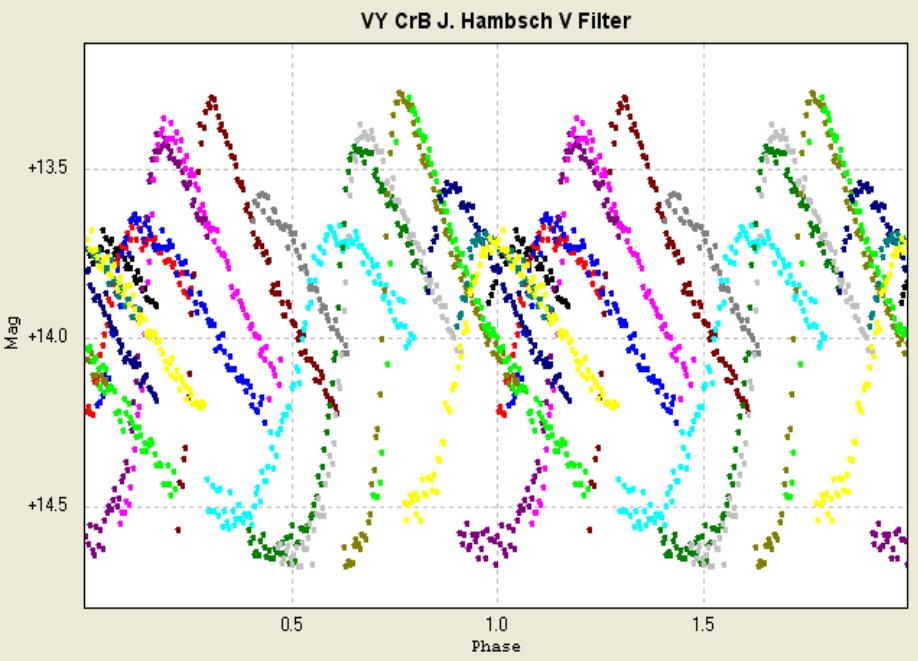


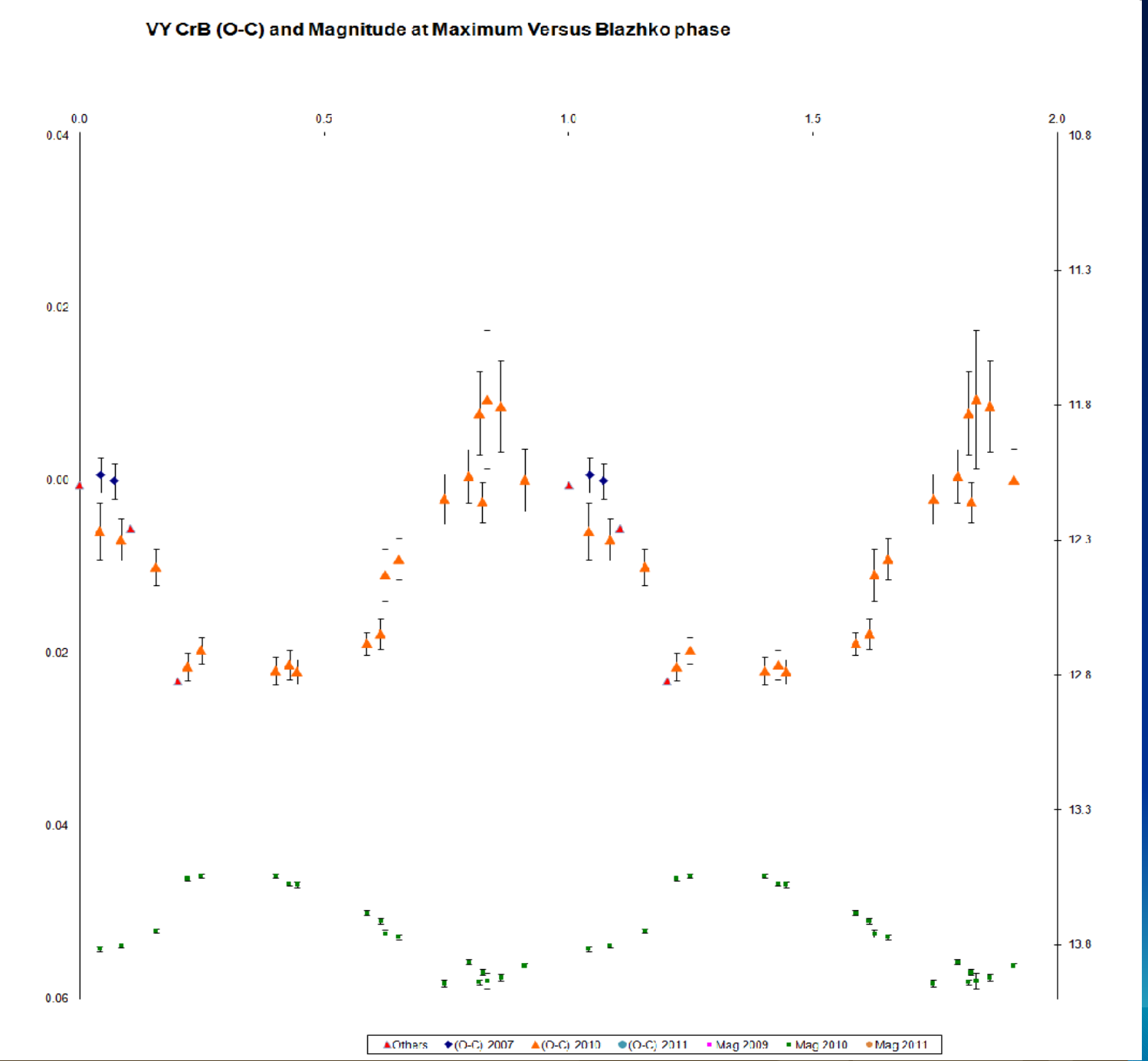
E = 2455602.945 HJD
P = 0.46296 +/- 0.00008 d

VY CrB

Blazhko Effect !!

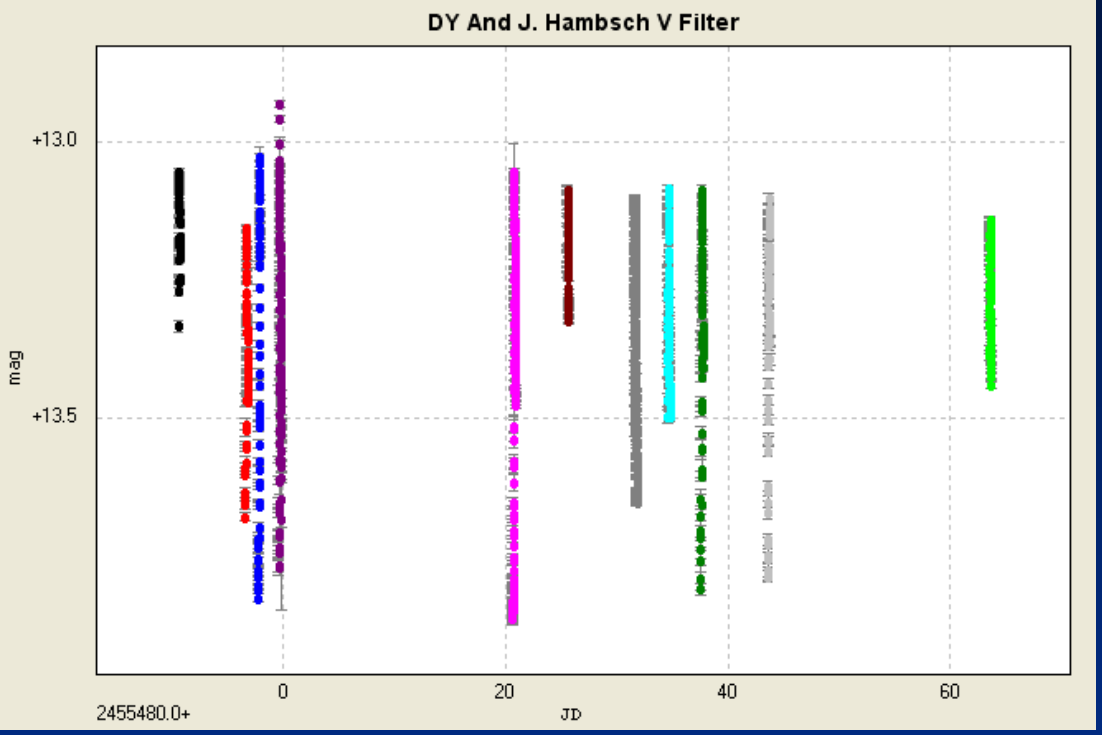






VY CrB

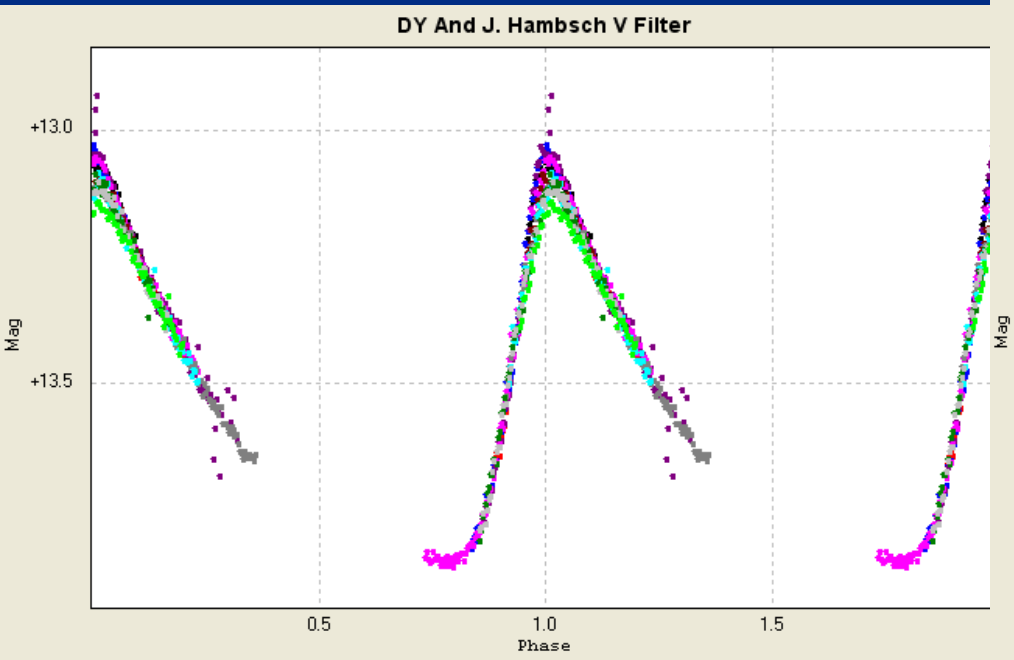
Blazhko period
33.4 d

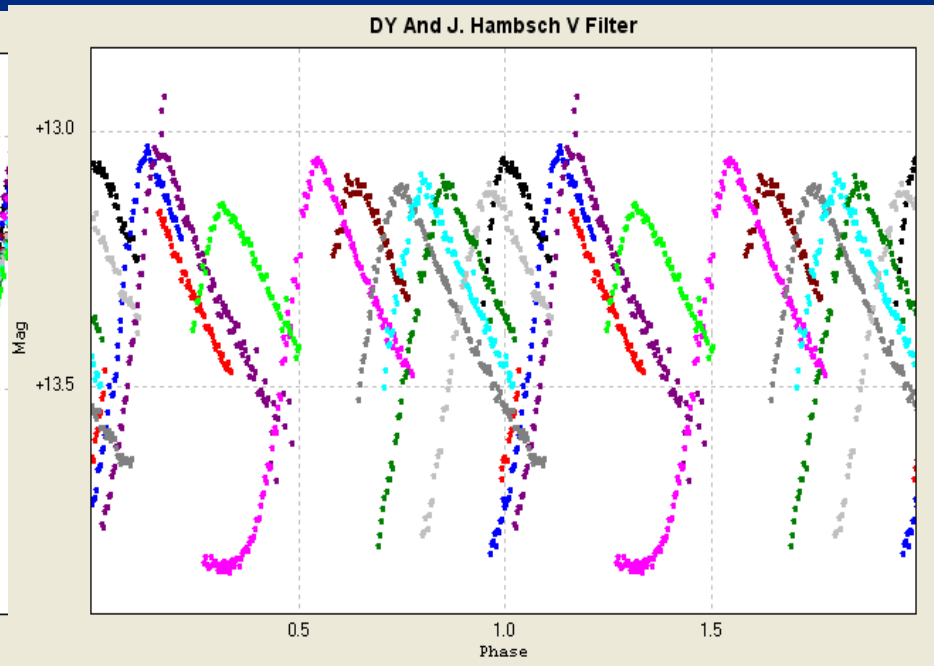


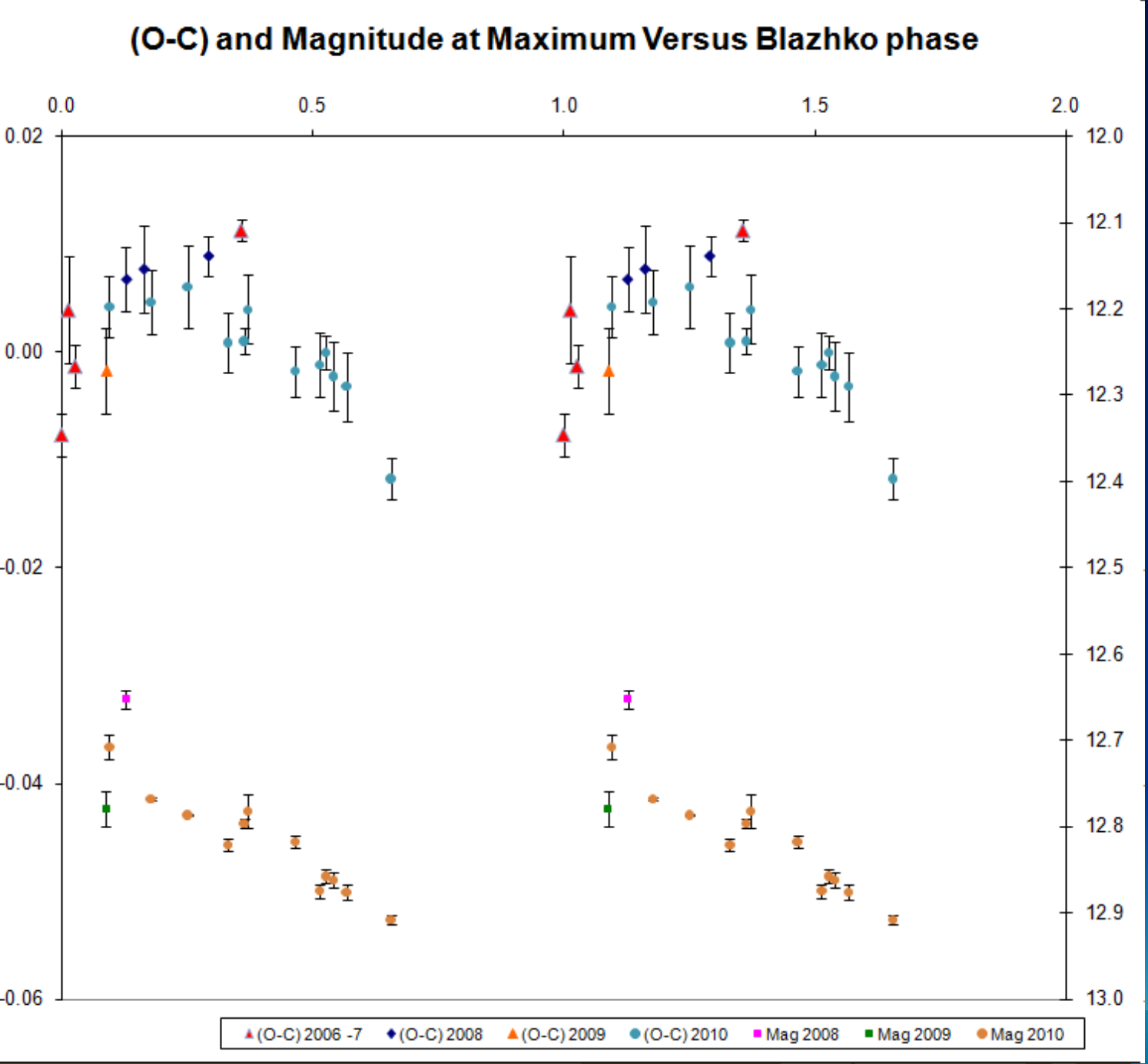
E = 2455470.615 HJD
P = 0.5965 +/- 0.013 d

DY And

Blazhko Effect !!

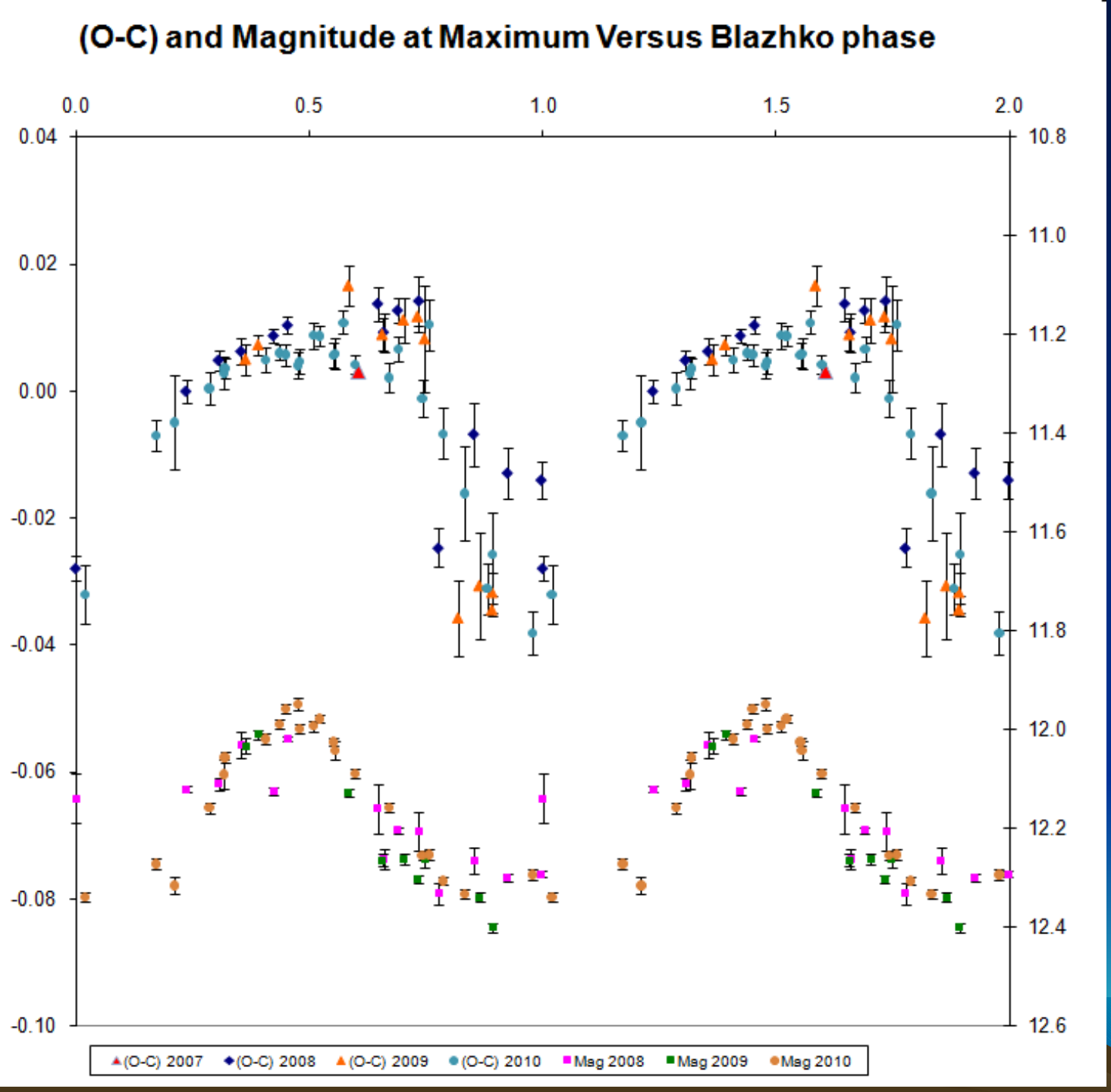






DY And

Blazhko period
224.8 d

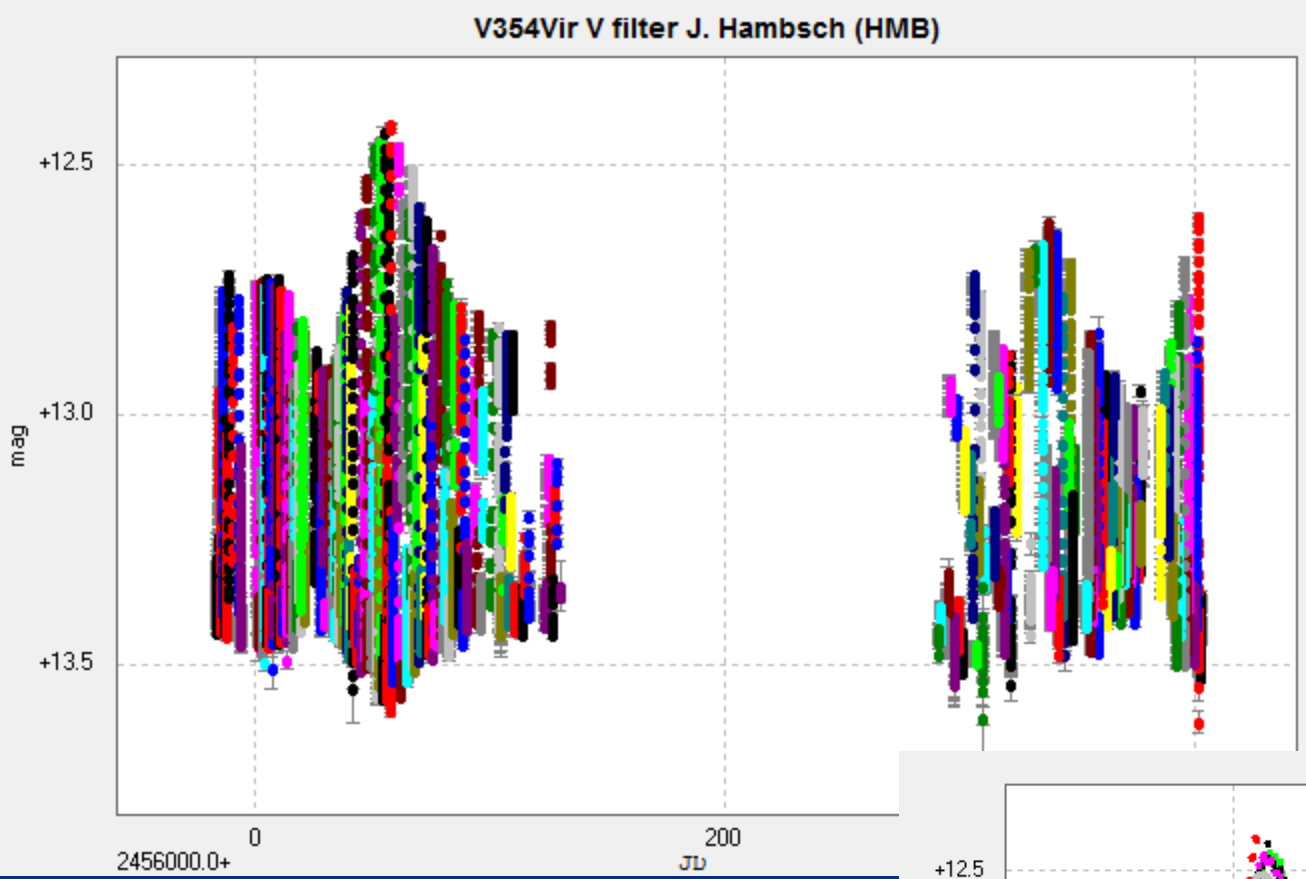


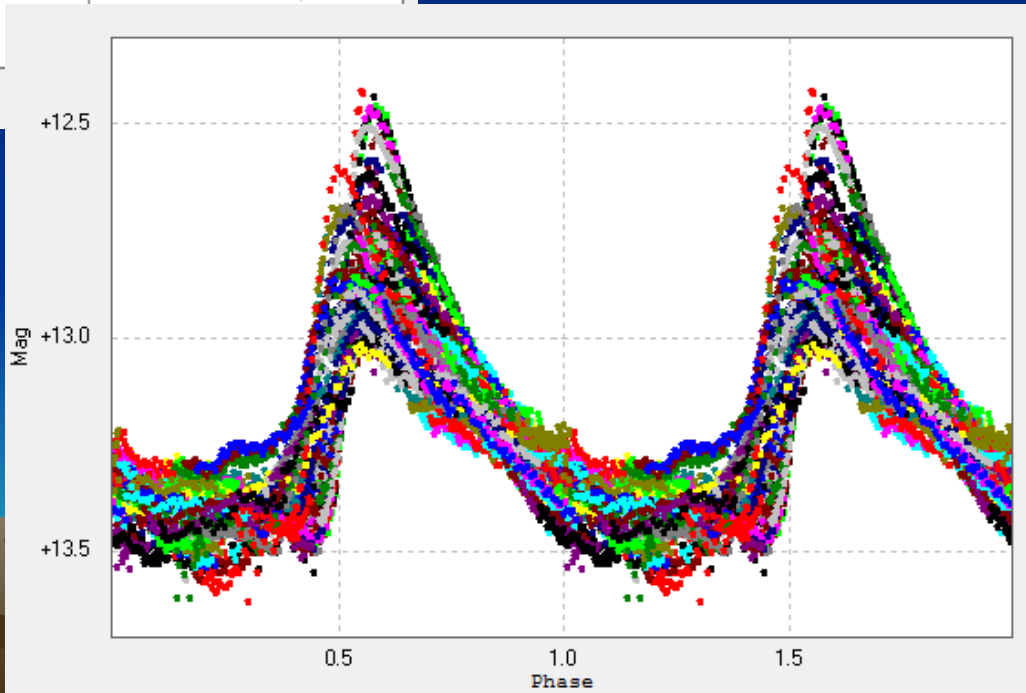
CX Lyr

Blazhko period
68.04 d

- Data mainly from ROAD Chile
- V354Vir, AL Pic, V1820 Ori, V784 Oph

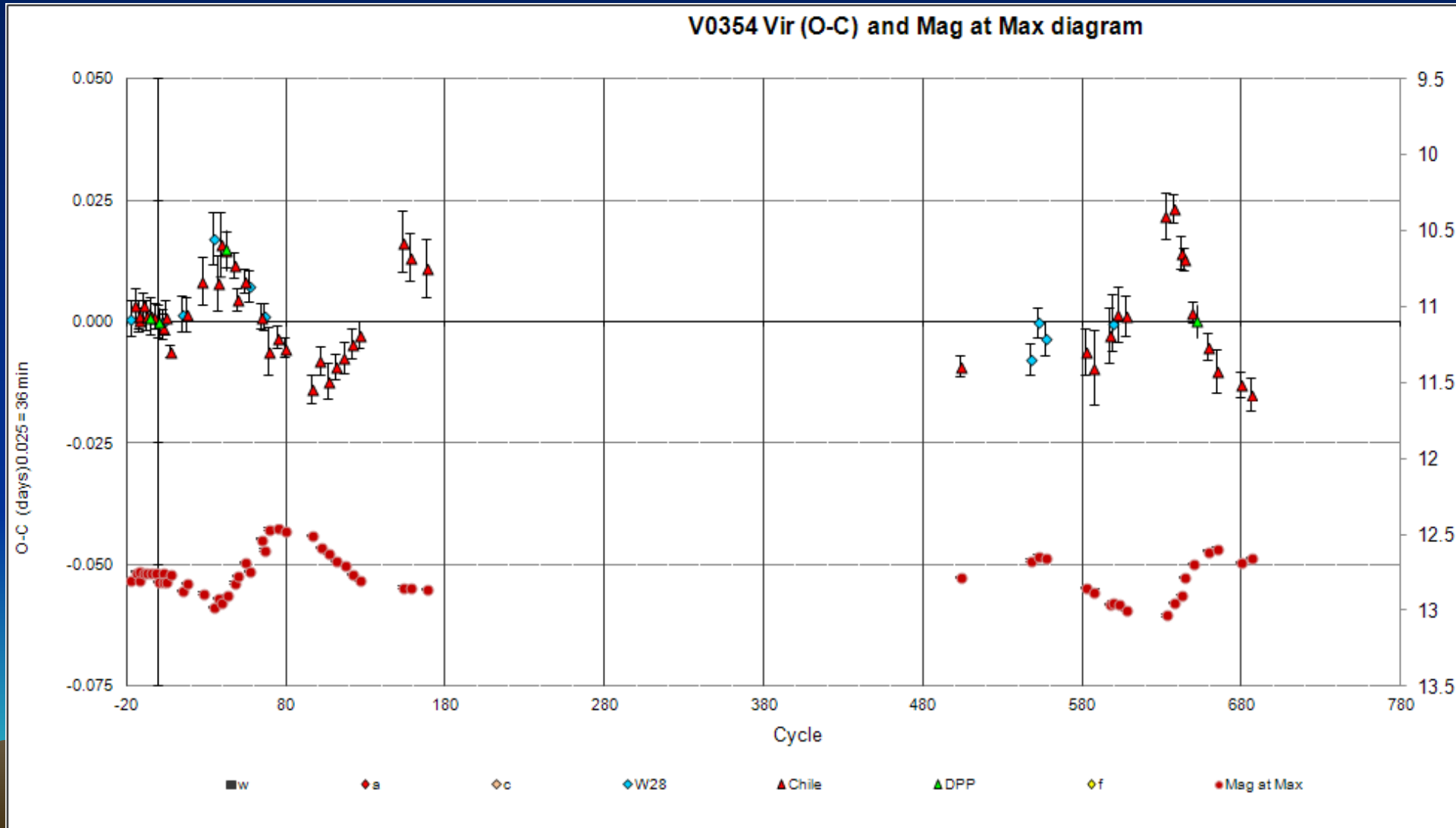
V354Vir 2012-13



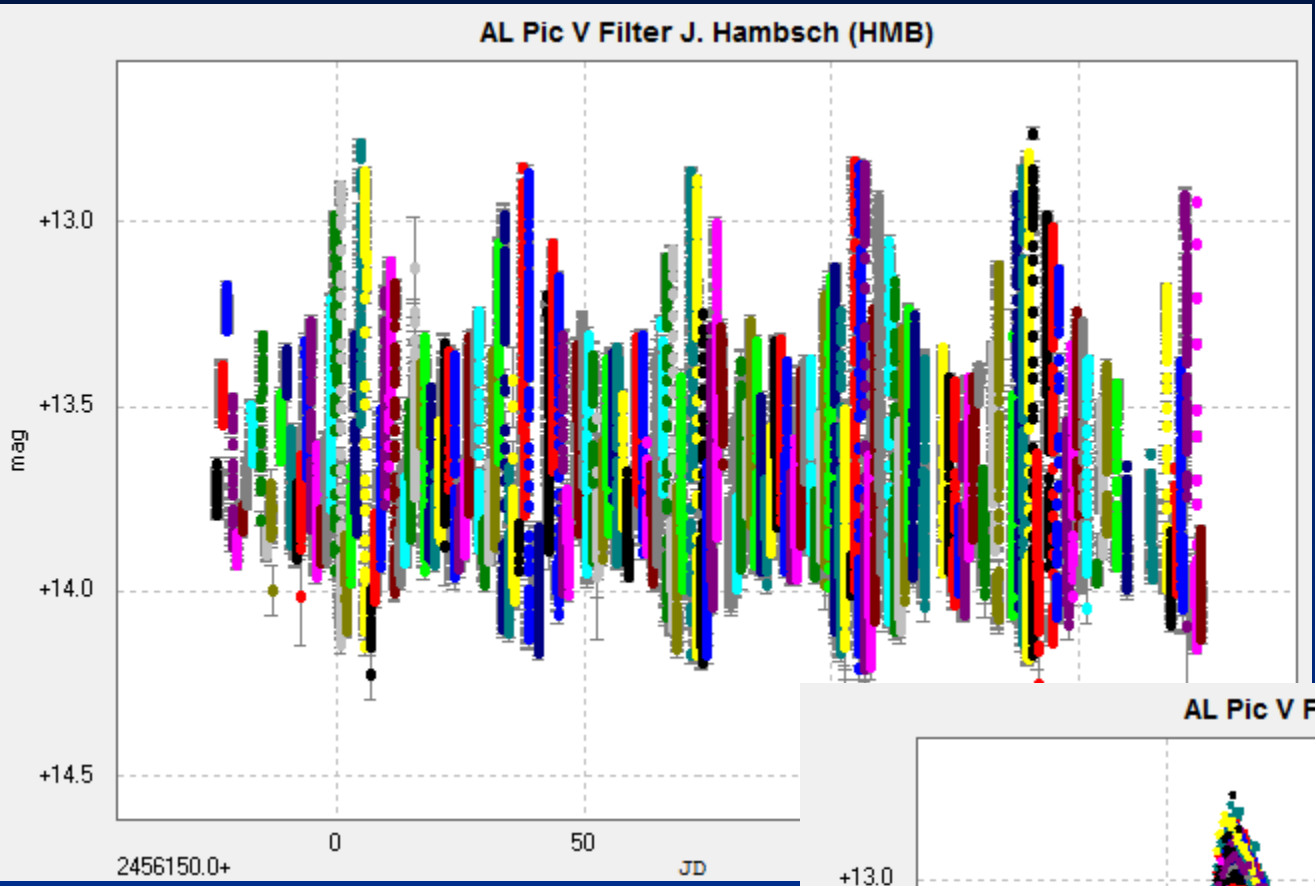


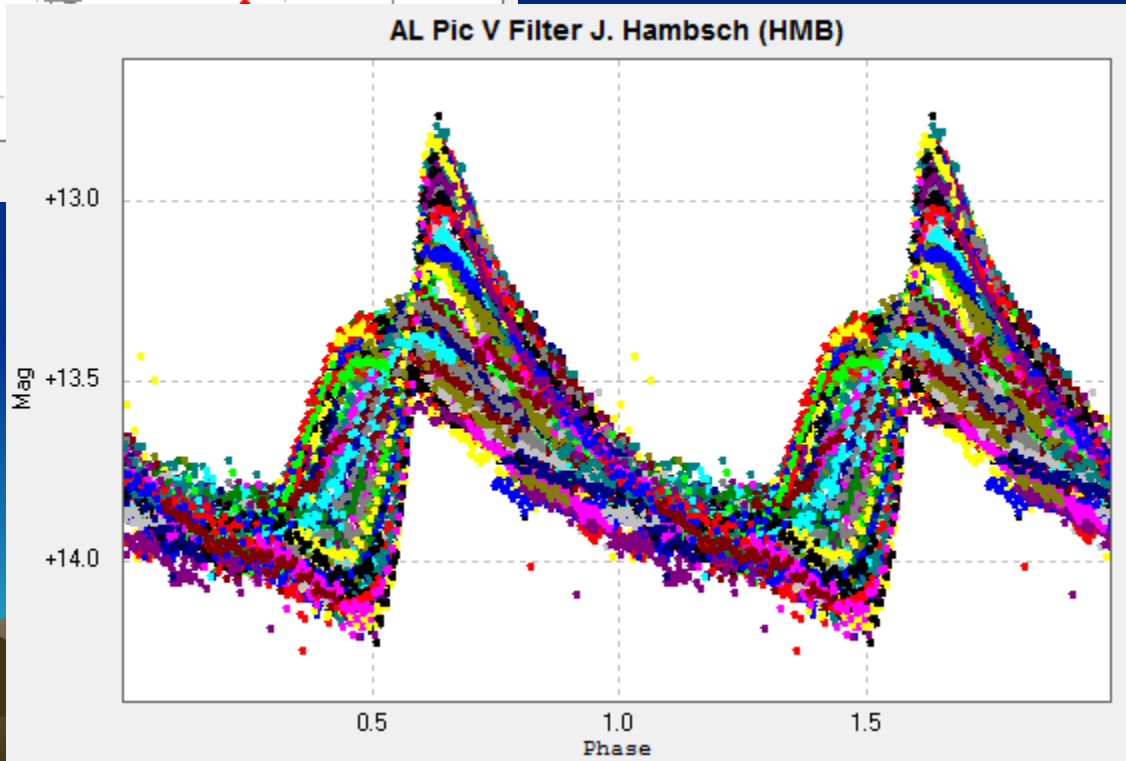
V354 Vir

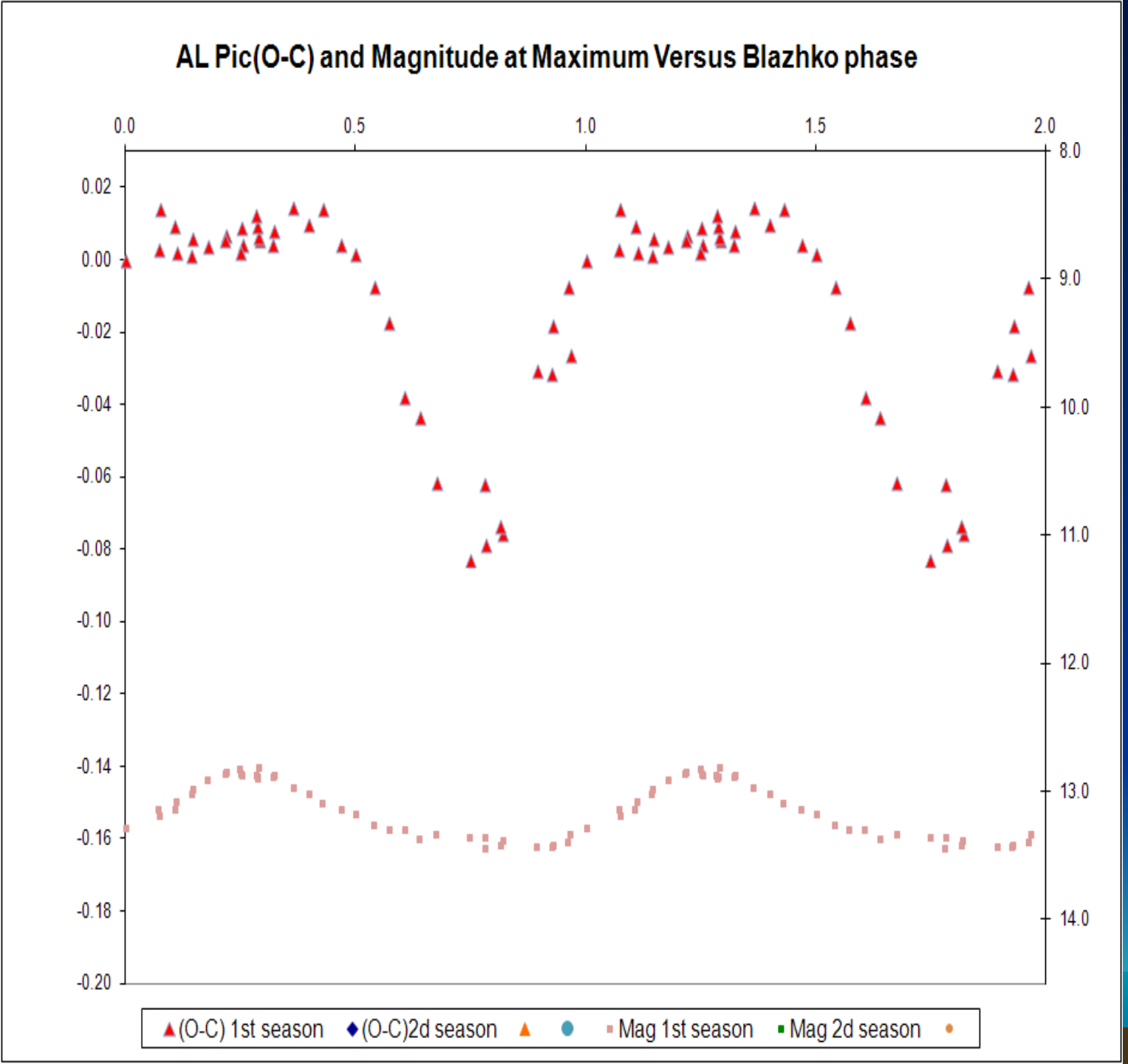
Blazhko period
88.7 d



AL Pic


AL Pic V Filter J. Hambsch (HMB)
+13.0
+13.5
+14.0
+14.5
mag
0
50
2456150.0+
JD


AL Pic V Filter J. Hambsch (HMB)
+13.0
+13.5
+14.0
Mag
0.5
1.0
1.5
Phase

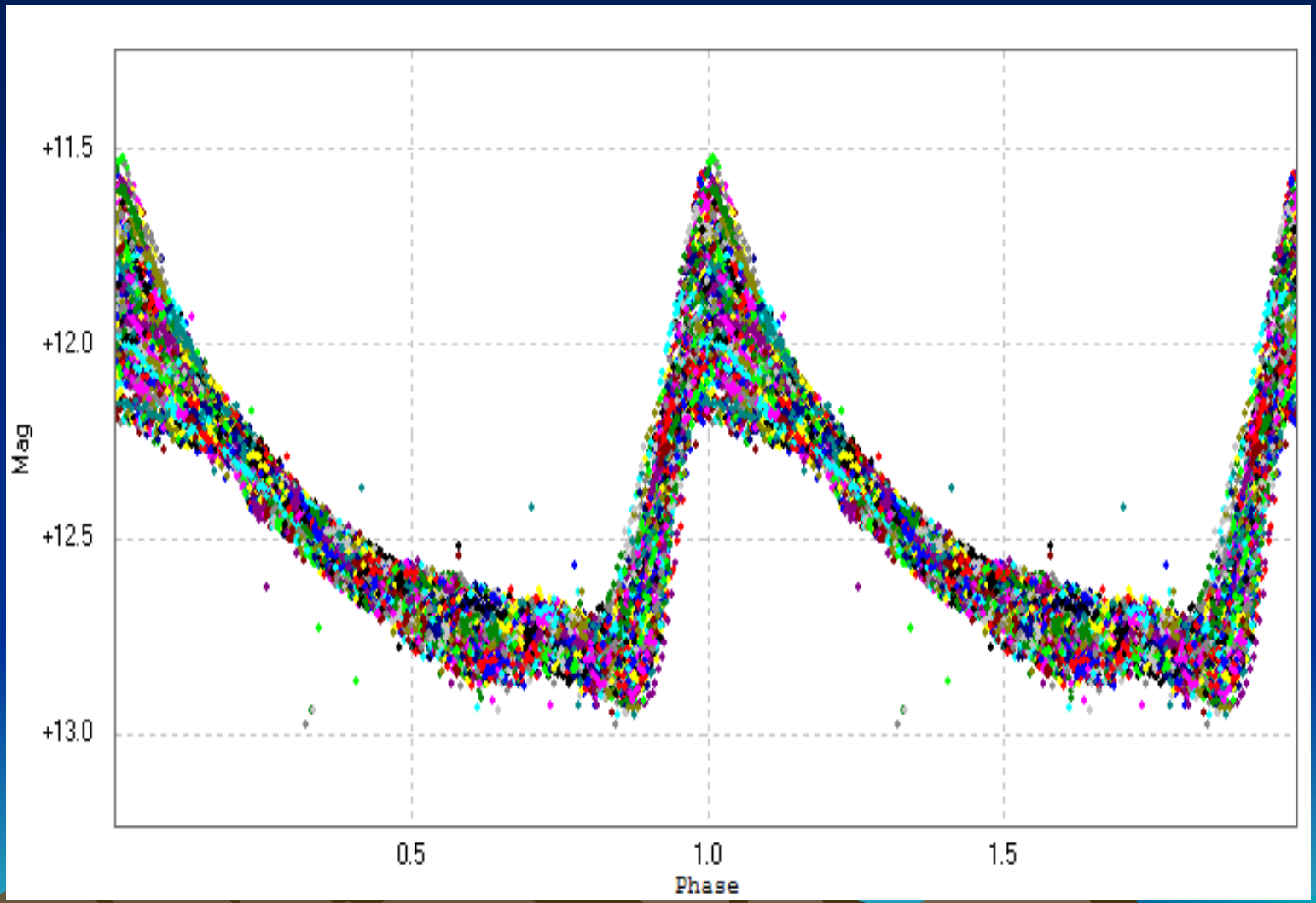


AL Pic

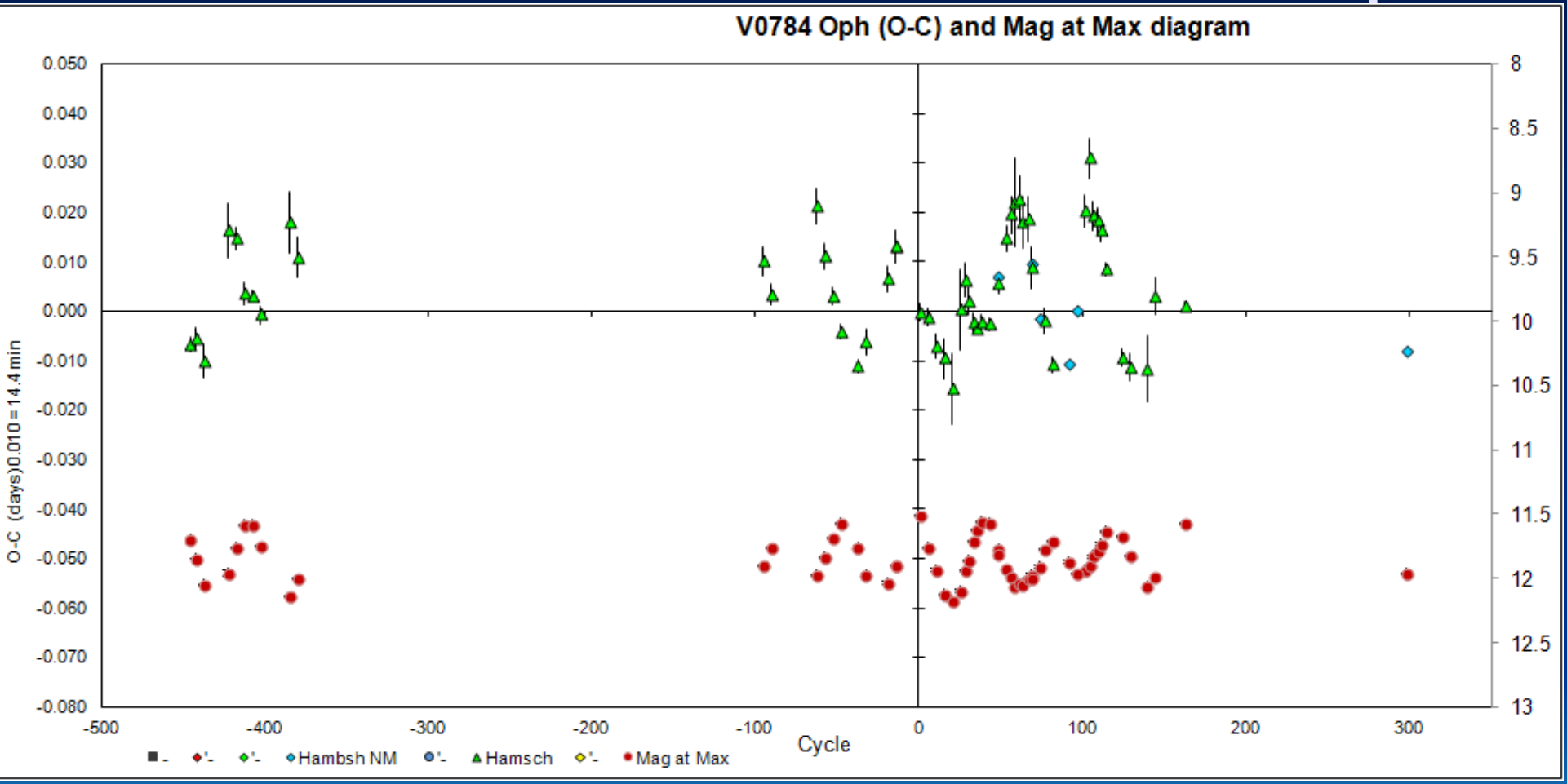
Blazhko period
32.4 d

E = 2456047.7942 HJD
P = 0.6033557 +/- 0.0000078d

V784Oph



V784Oph

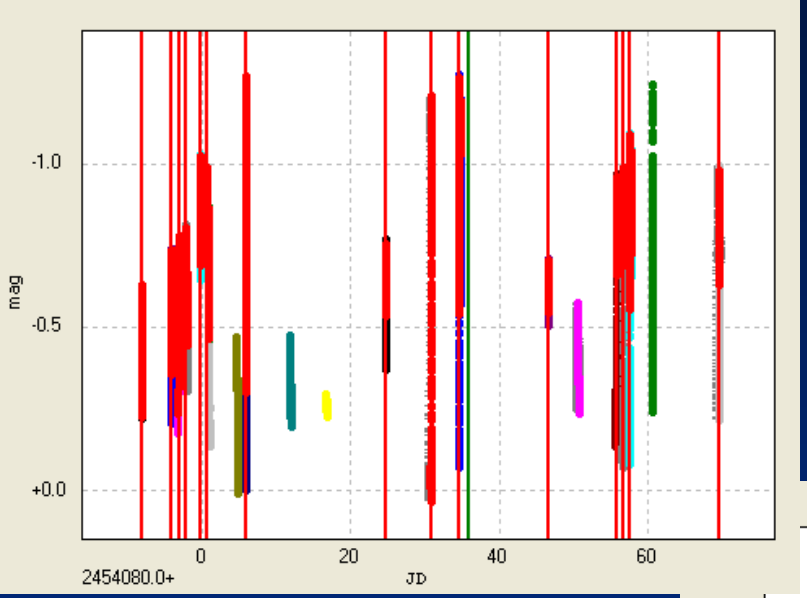


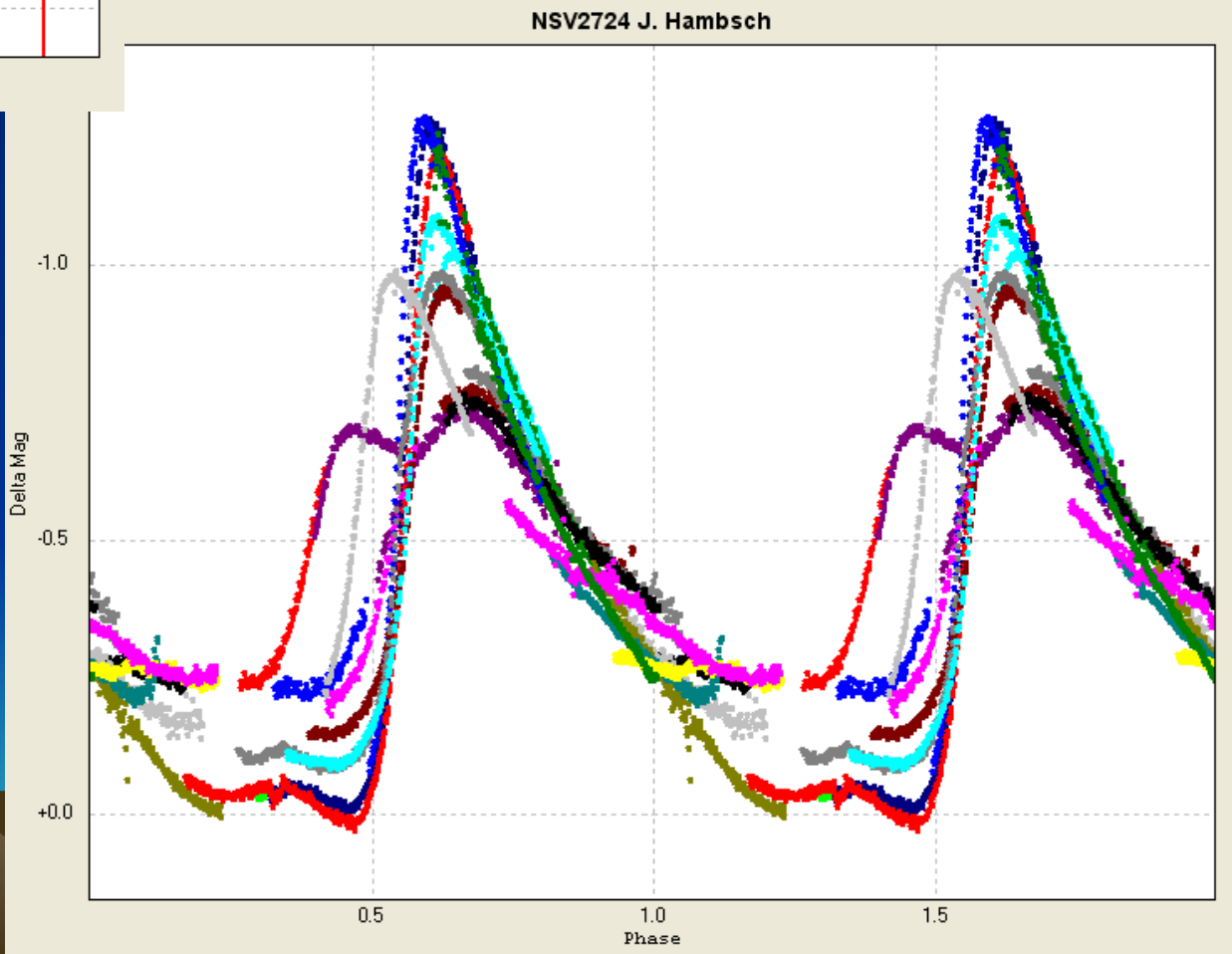
Blazhko periods 24.51 d and 34.70 d

V1820 Ori

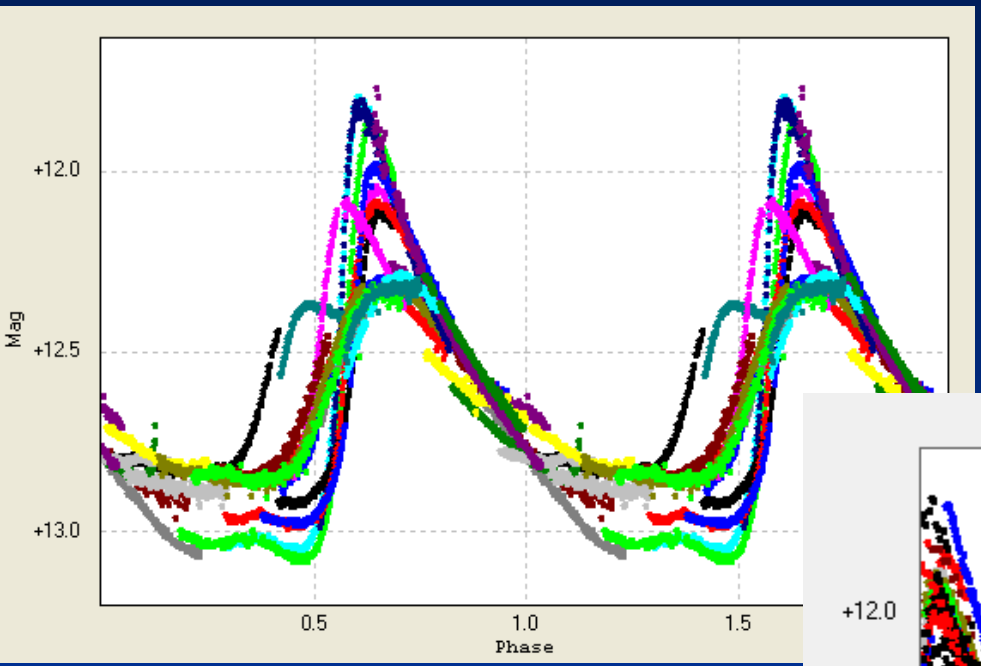
- V1820 Ori is a RR Lyrae star of type RRab
- Period: (0.479078 +/- 0.000032) d
- Strong Blazhko effect
  - Blazhko amplitude modulation of 0.85 mag
  - Blazhko phase modulation 30% of pulsation period
- Blazhko period: 27.89 d
- Variable Blazhko period!!

GSC0125-0449
New Mexico



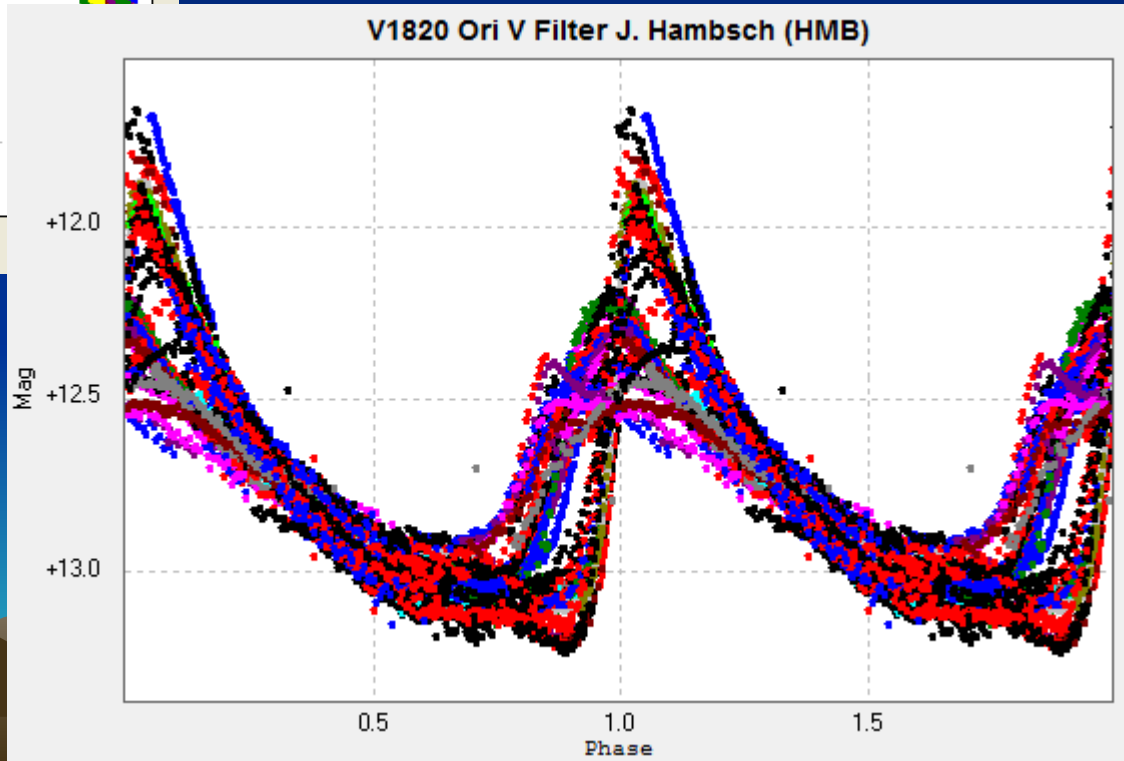


Strong Blazhko effect

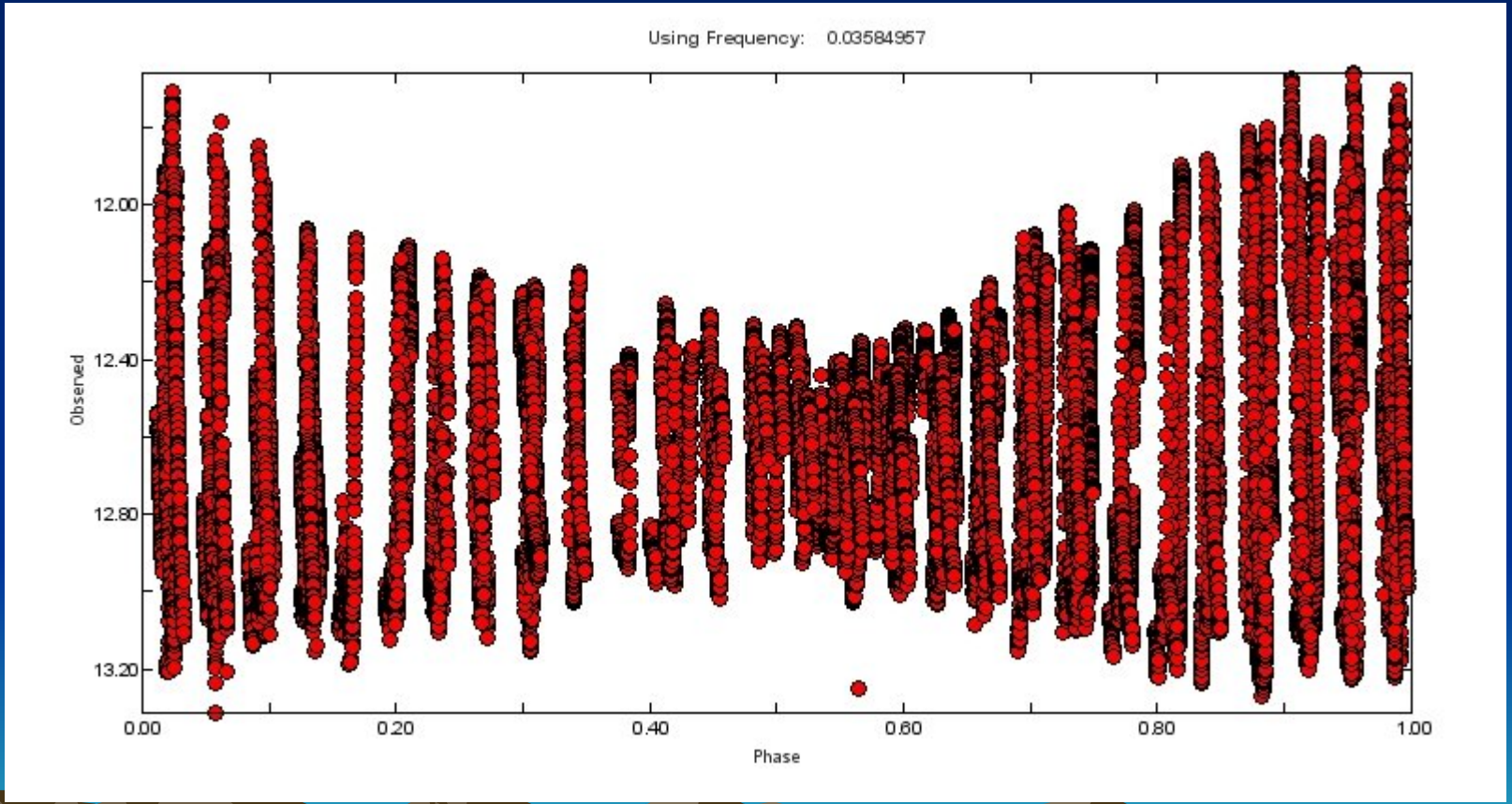


New Mexico 2007/2008

ROAD 2011/2012

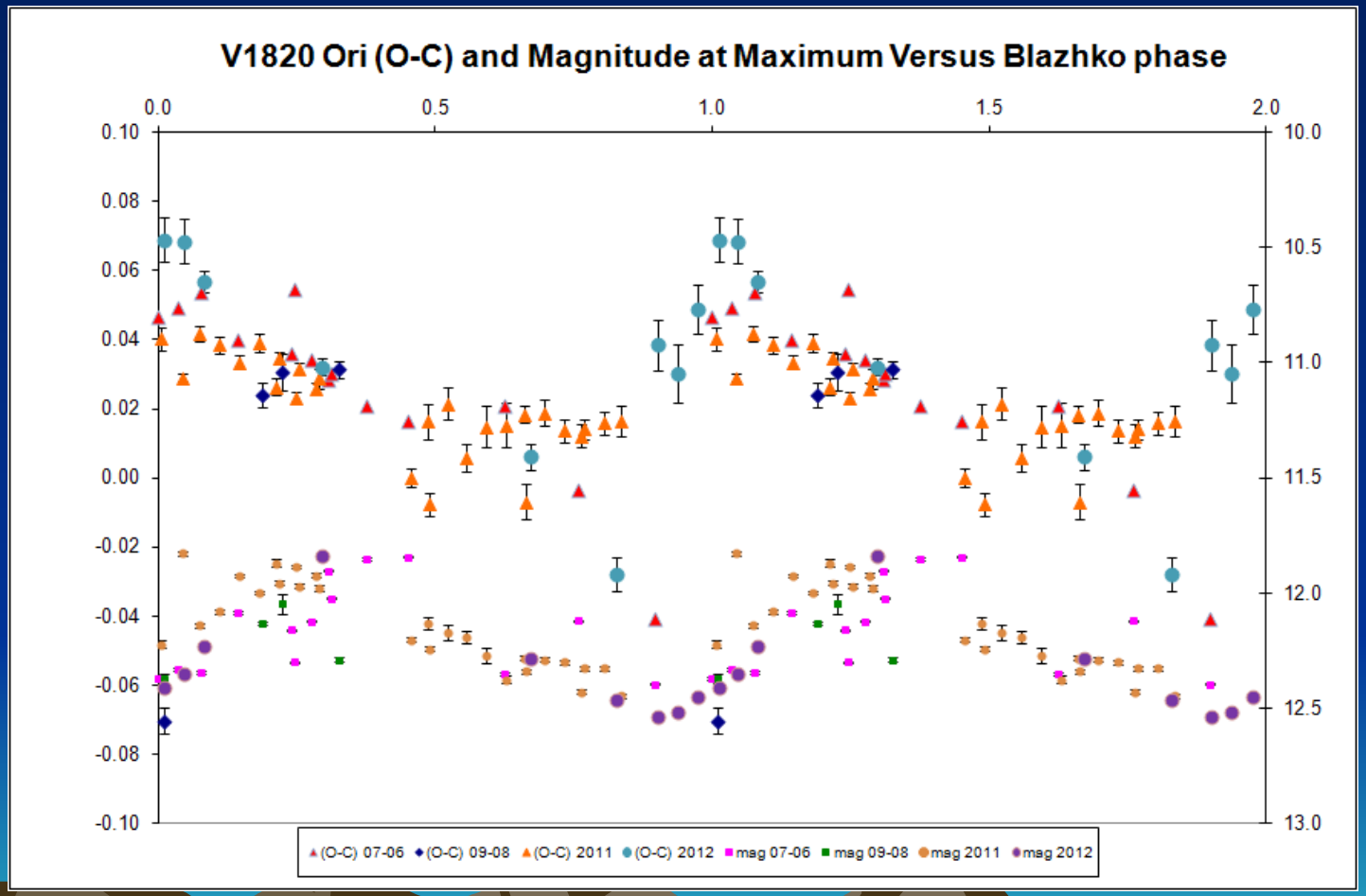


Blazhko cycle coverage



Blazhko period: 27.89 days

Blazhko cycle coverage



Blazhko period: 27.89 days

Publications

- de Ponthière et al., JAAVSO 40, 2012, GEOS RR Lyrae Survey: Blazhko Period Measurement of Three RRab Stars—CX Lyrae, NU Aurigae, and VY Coronae Borealis

- de Ponthiere et al., JAAVSO 41, 2013, V1820 Orionis: an RR Lyrae Star With Strong and Irregular Blazhko Effect

- More to come

The end

Thank you for your attention