

Eclipsing Binaries in the WTS 19a Field



Hristo Stoev
Department of Astrophysics,
Centre of Astrobiology,
CSIC/INTA,
Spain

L.M. Sarro (UNED)
A. Moya, D. Barrado (CAB)

RoPACS Workshop

Lisbon, 8 September 2010

Outline

- Reduction of the WTS light curves
- Results from the search of variable stars in the field
- Focus on eclipsing binaries
 - Characteristics
 - Temperatures
- Summary and outlook

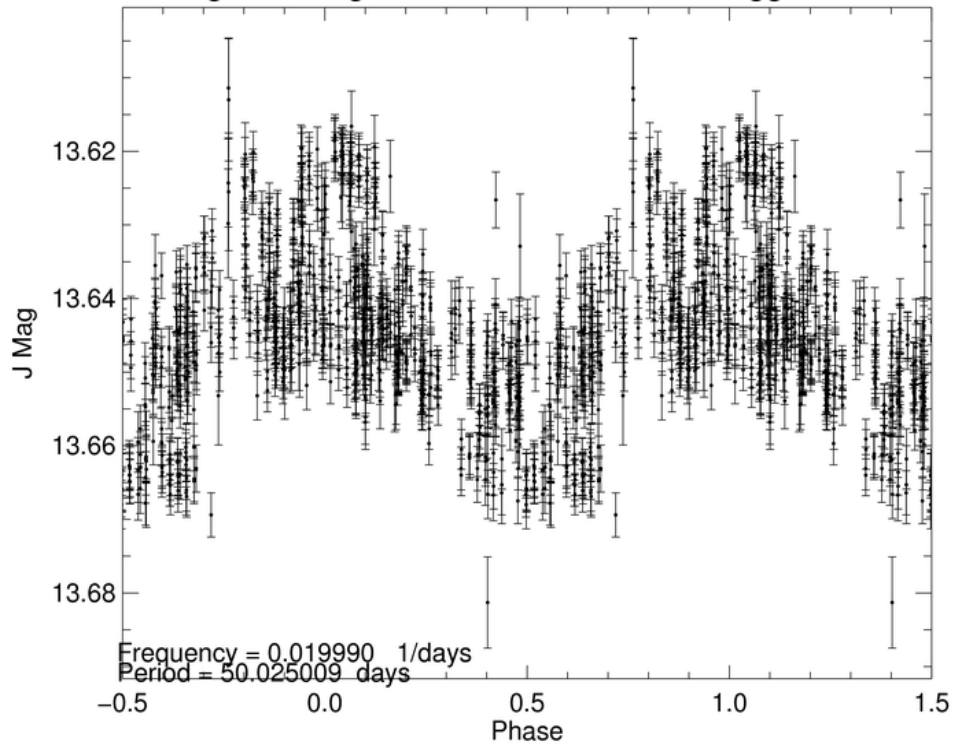


Data reduction of Release 2.0

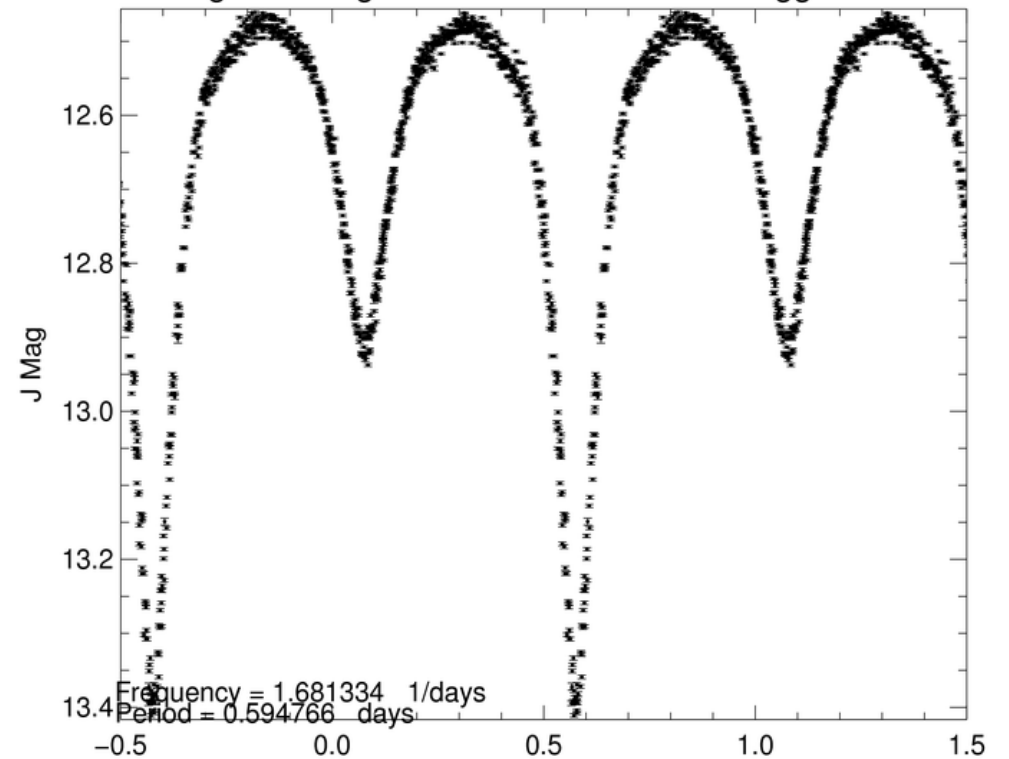
- A bit stricter rejection criteria:
 - Median magnitude: $J < 19$
 - Obtain parameters of variability using *bossirr* algorithm
 - Folds light curves with a range of frequencies and chooses the most significant one by least-square fitting
 - Computes amplitudes corresponding to those frequencies
 - Rejections based on *bossirr* results if:
 - $A/E < 0.99$
 - Amp < 5 mags
 - Frequency not aliasing (i.e. multiple of 1 due to observation windows)
-
-

Results:

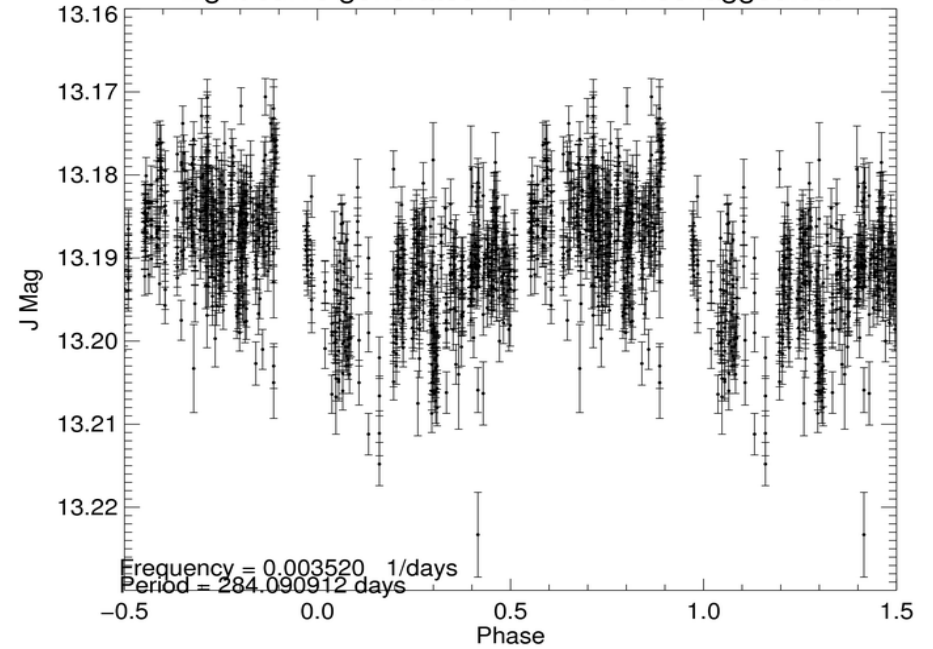
Light curve generated from file 05201flagged.dat

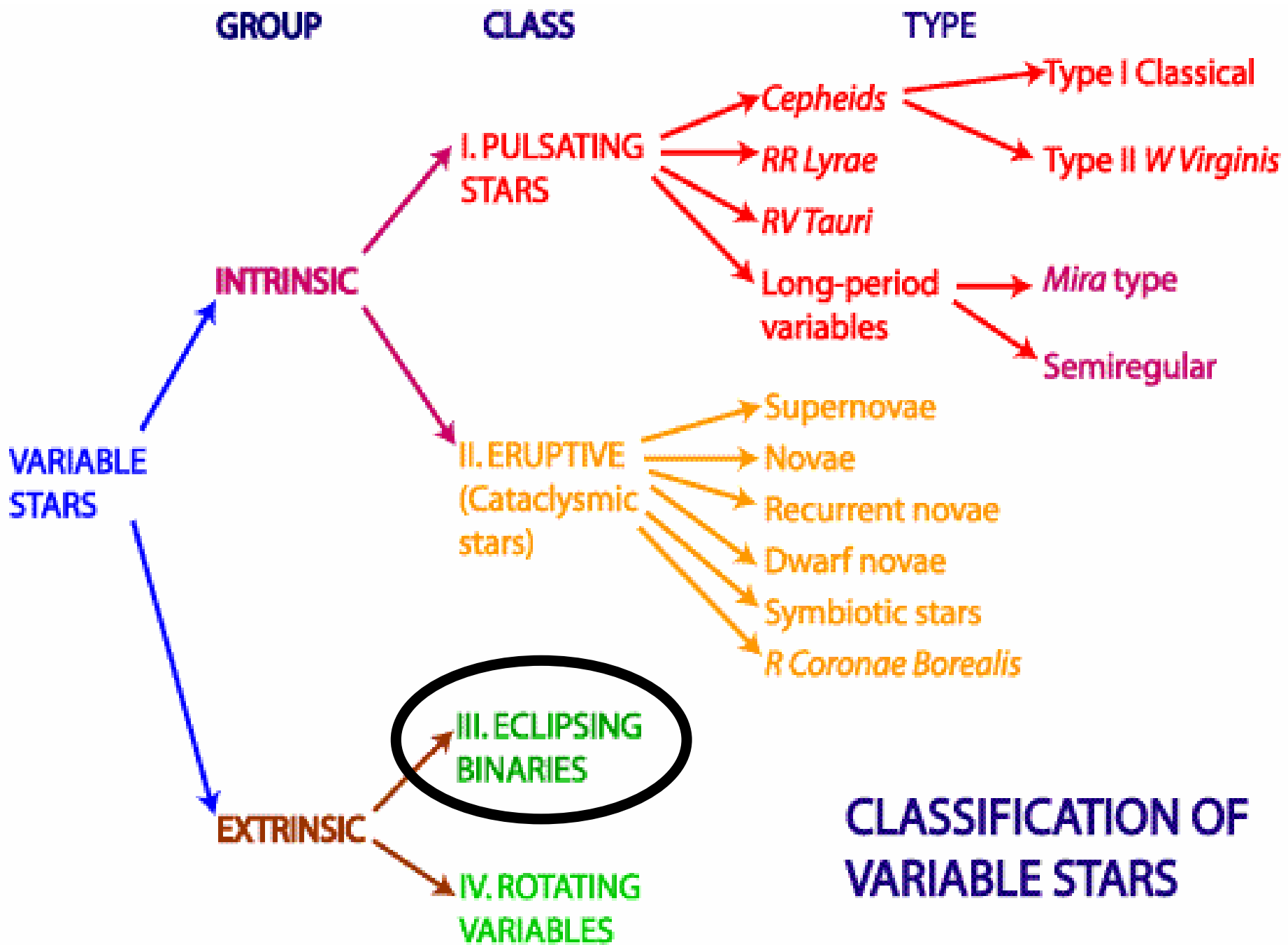


Light curve generated from file 05976flagged.dat



Light curve generated from file 01786flagged.dat

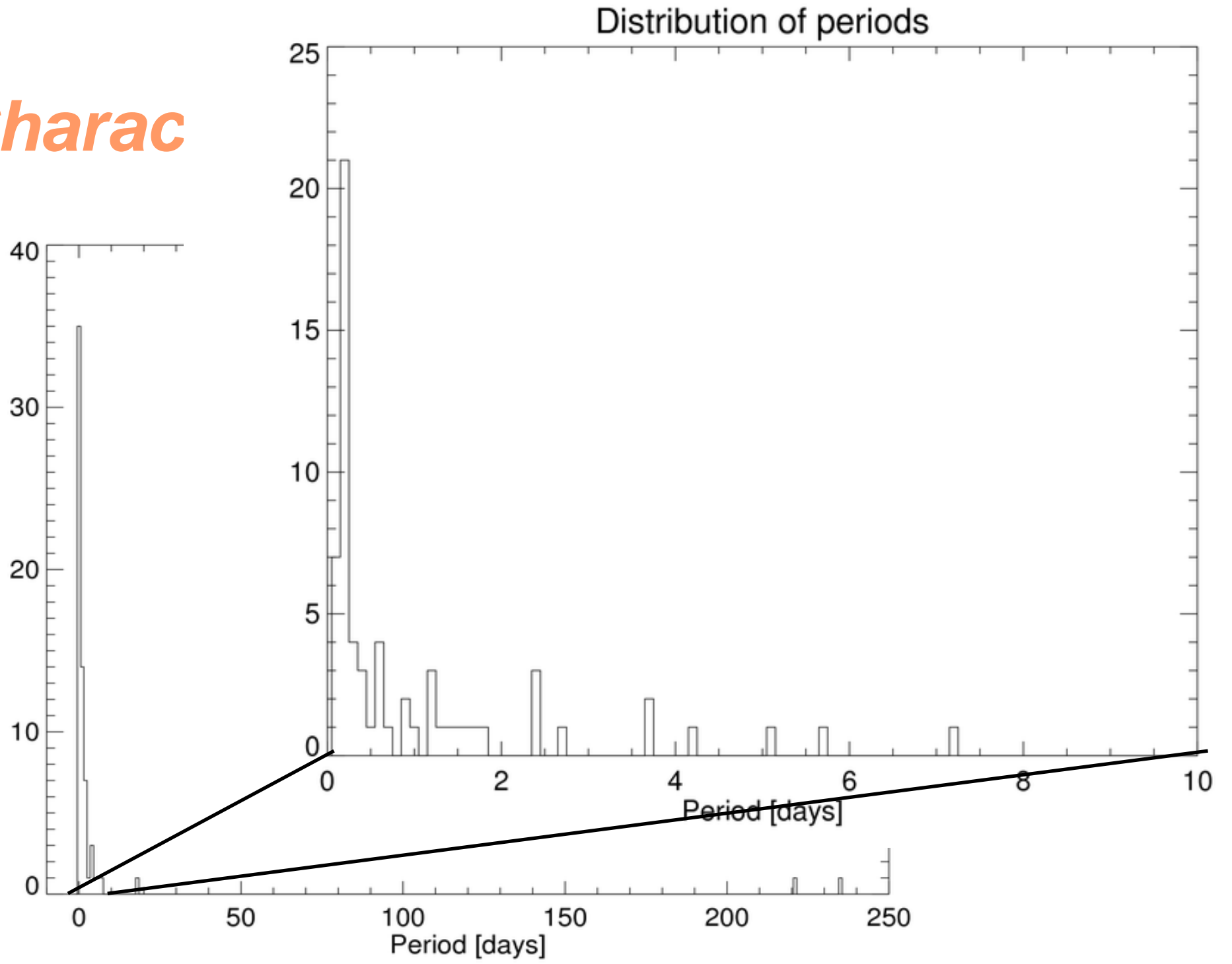




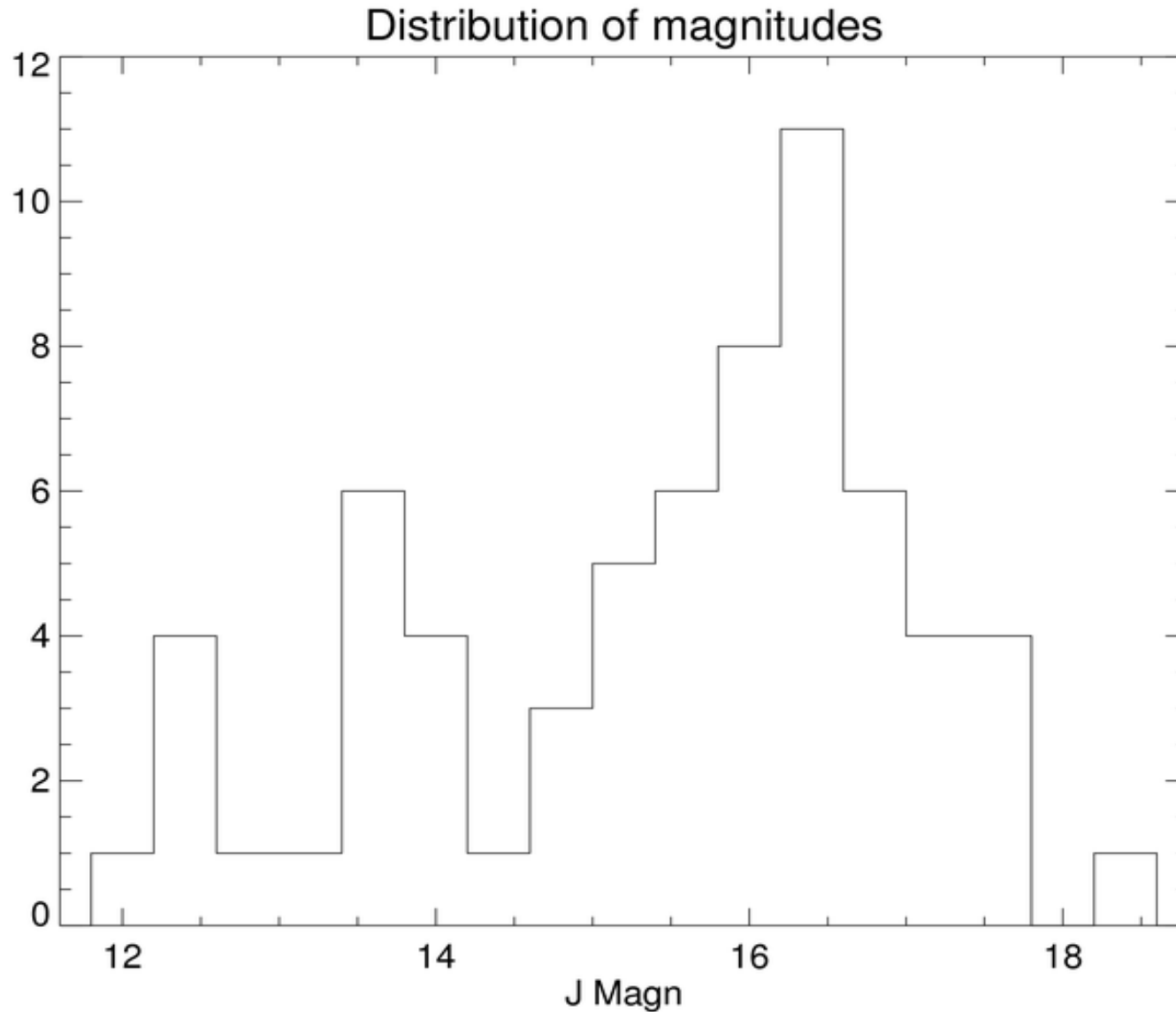
CLASSIFICATION OF VARIABLE STARS



Charac



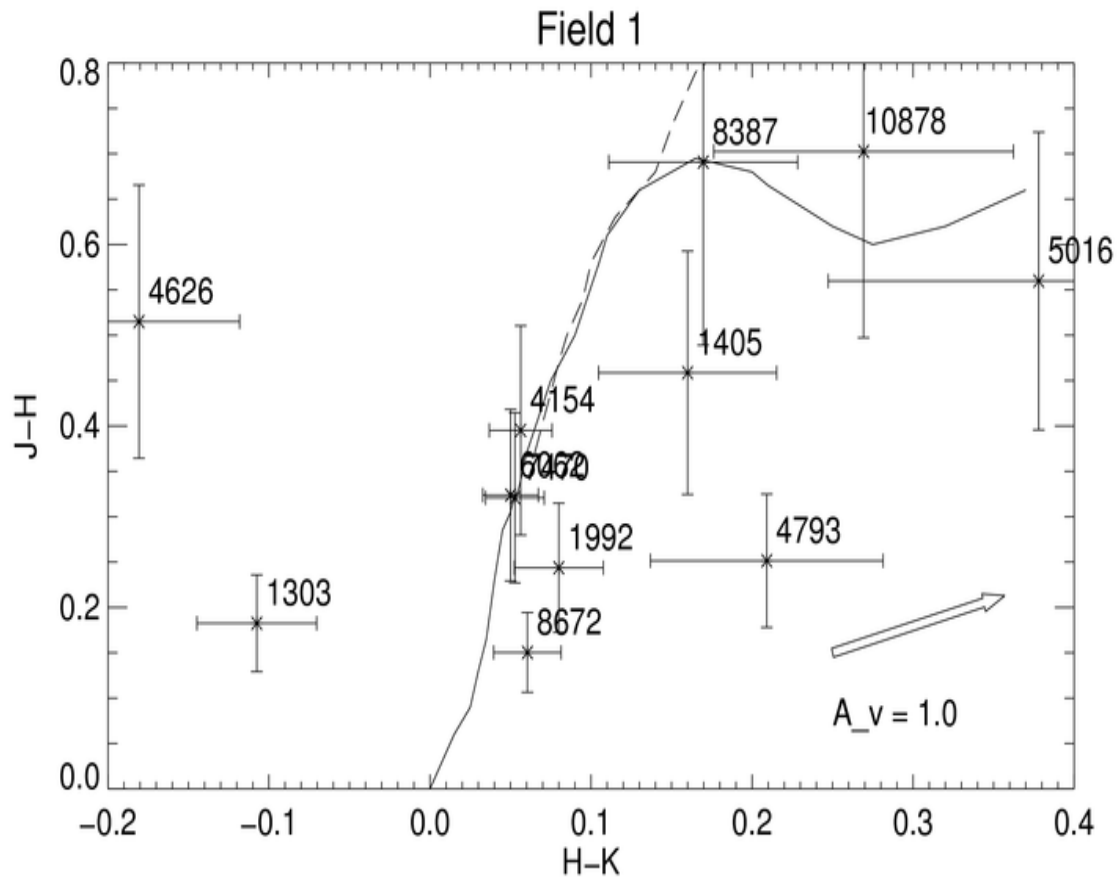
Characteristics: Magnitudes



Focus on eclipsing binary stars

- As it is expected from an unbiased survey, we identify eclipsing variables of all types: Algol-type, β Lyrae, W UMa, RS CVa
 - None of the identified eclipsing binaries are present in the last release of GCVS (Samus *et al.*, 2010), including the New Suspected Variables (NSV) => all of them are previously unknown
 - For some stars, association with a certain type of variability is ambiguous only on the basis of the shape of their light curve
-
-

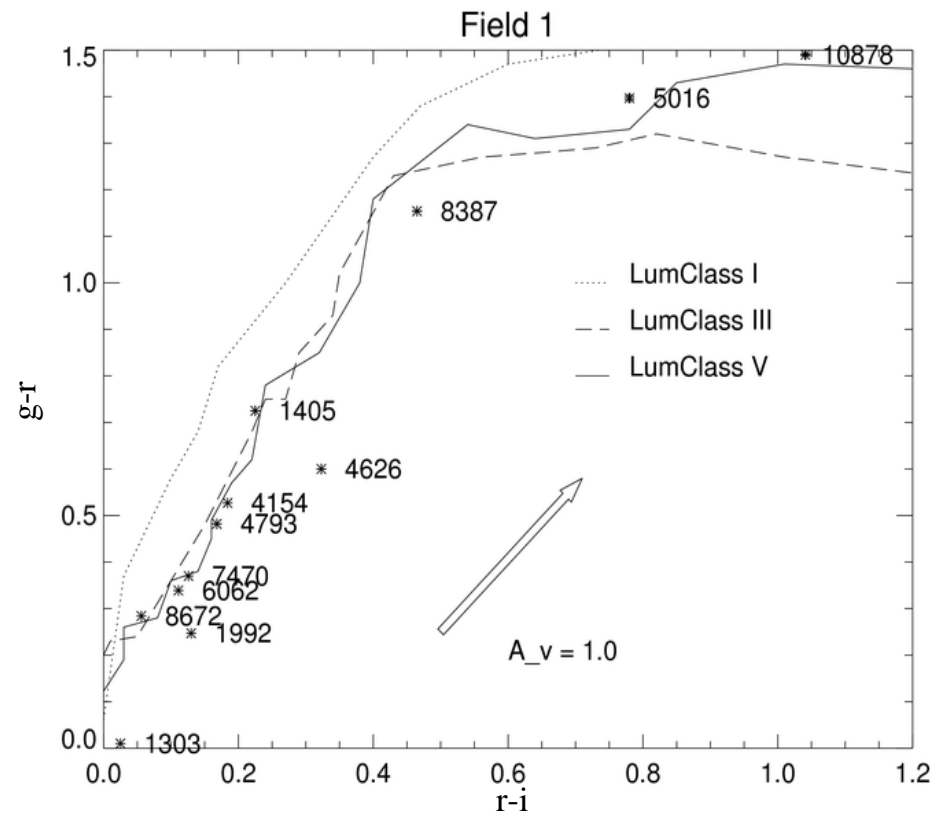
Characteristics: Field 1



$E(J-H)/E(H-K) = 1.7$
(Rieke & Lebofsky, 1985)

Limits on affiliation with PMS binaries
after Miller *et al.*, 2010

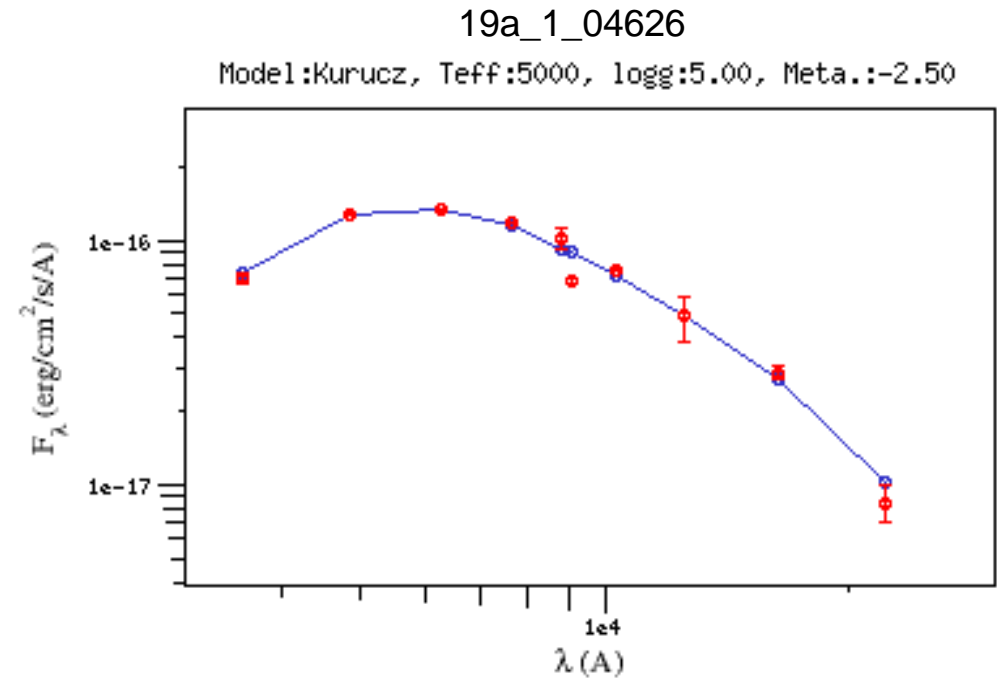
$E(G-R)/E(R-I) = 1.57$
(Rieke & Lebofsky, 1985,
Bayo *et al.*, 2008)



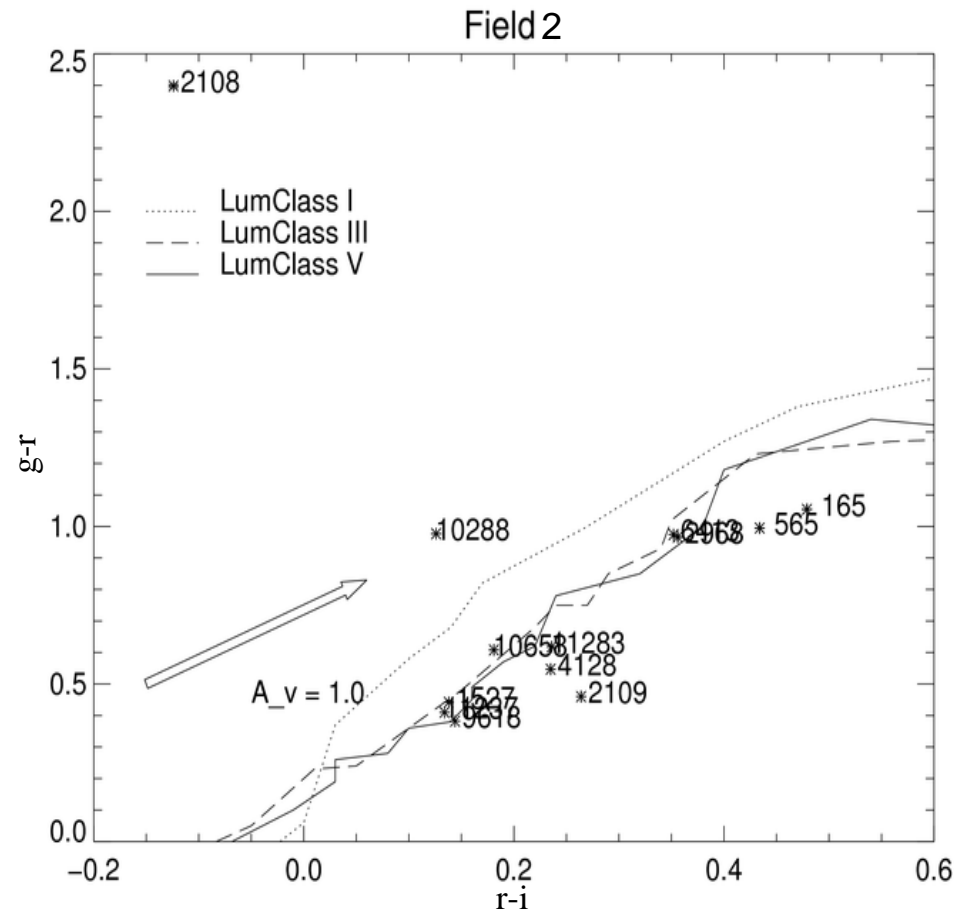
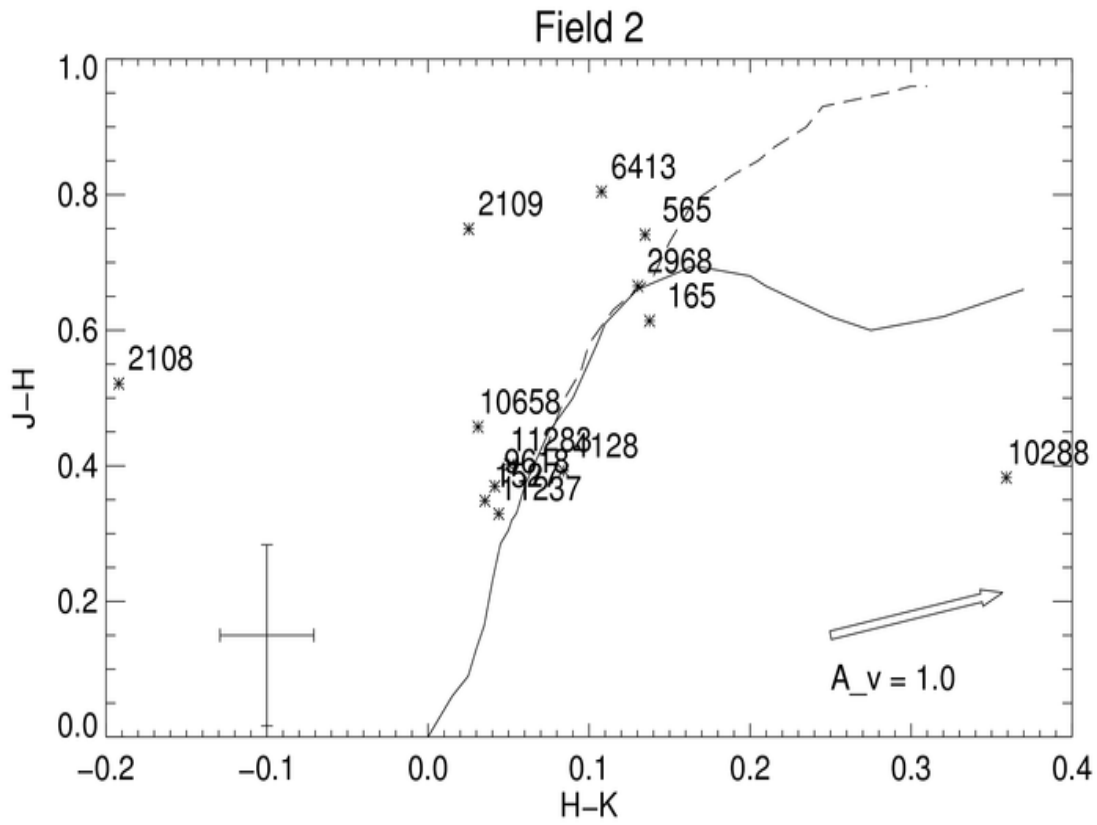
Luminosity classes after Covey *et al.*, 2007

Temperatures: Field 1

#	T [K]
19a_1_01303	7500
19a_1_01405	5000
19a_1_01992	6250
19a_1_04626	5000
19a_1_04793	5250
19a_1_05016	3500
19a_1_06062	6200
19a_1_07470	5750
19a_1_08387	4250
19a_1_08672	6200
19a_1_10878	3500
19a_1_04154	5500

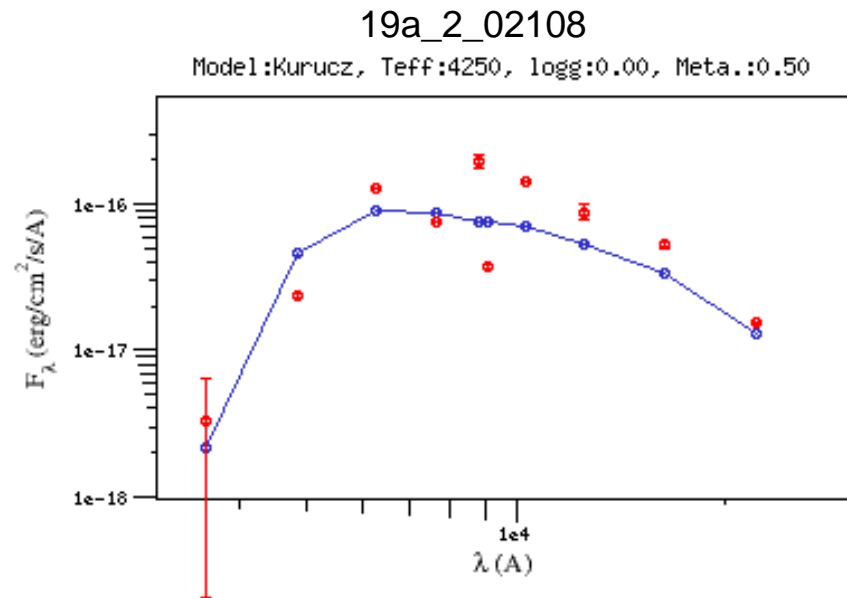


Characteristics: Field 2

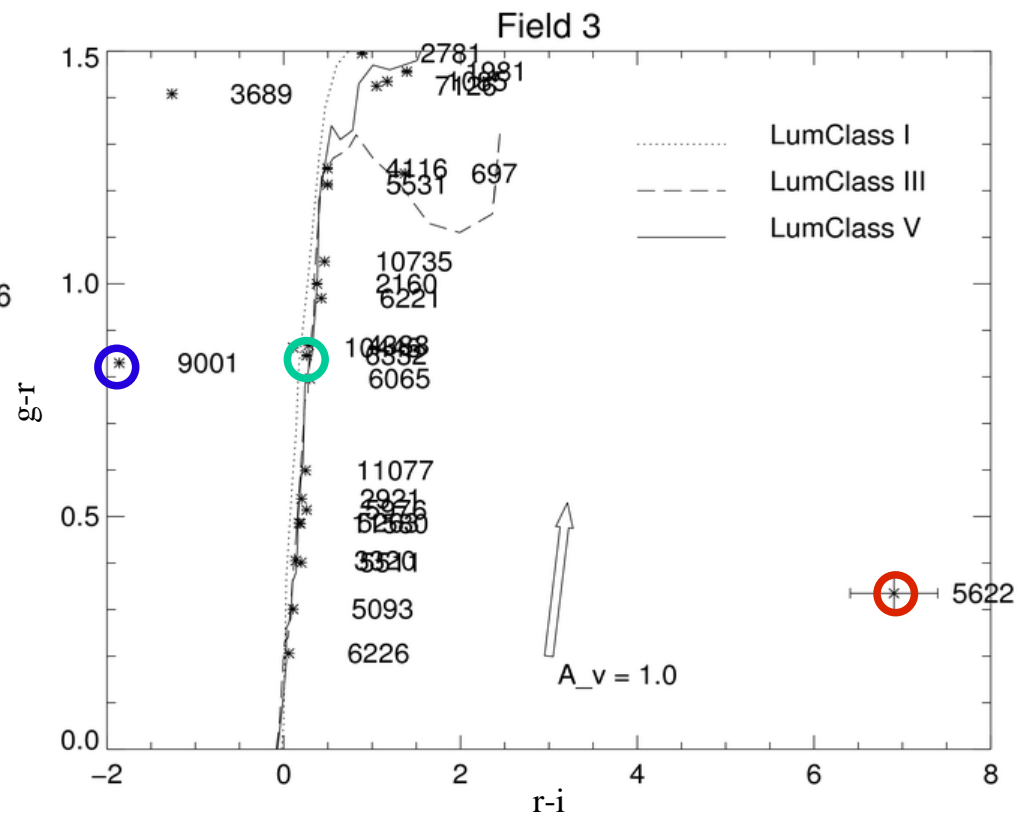
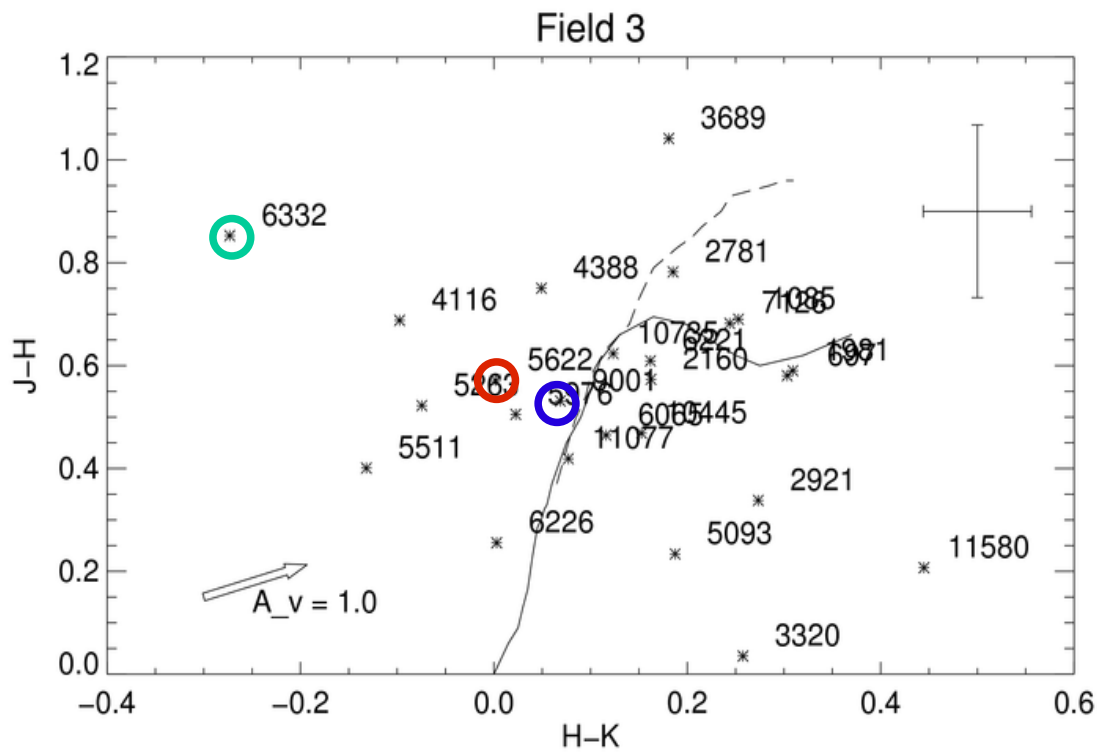


Temperatures: Field 2

#	T [K]
19a_2_00165	4250
19a_2_00565	4250
19a_2_01527	5750
19a_2_02108	4250
19a_2_02109	5000
19a_2_02968	4500
19a_2_04128	5250
19a_2_06413	4500
19a_2_09618	5750
19a_2_10288	4500
19a_2_10658	5250
19a_2_11237	5800
19a_2_11283	5200

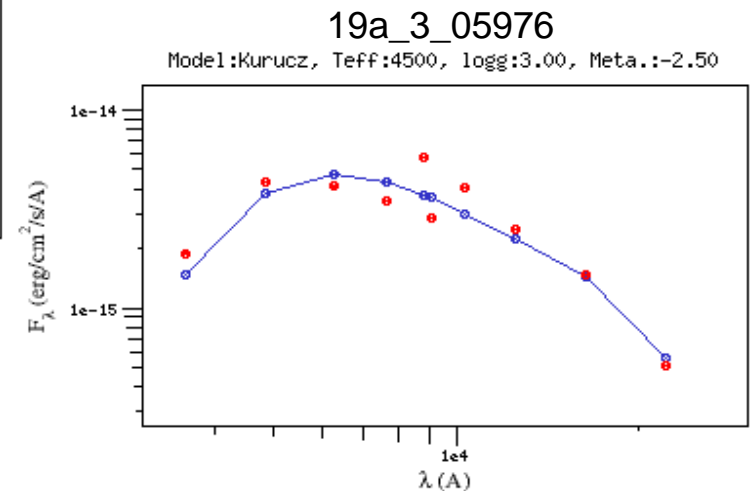
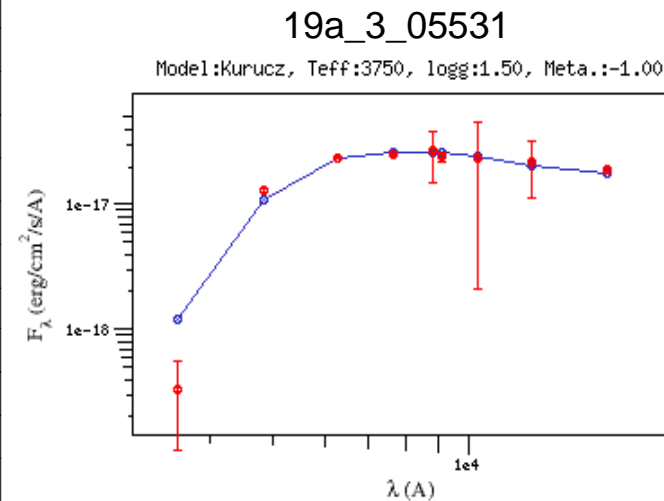
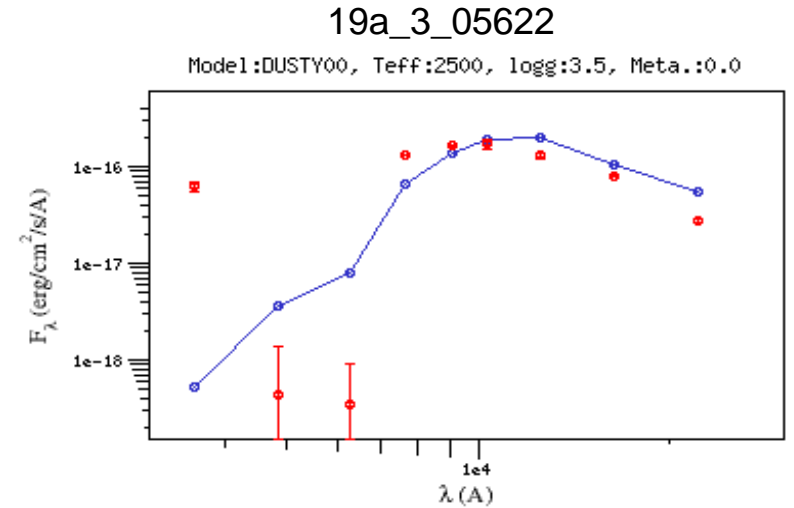
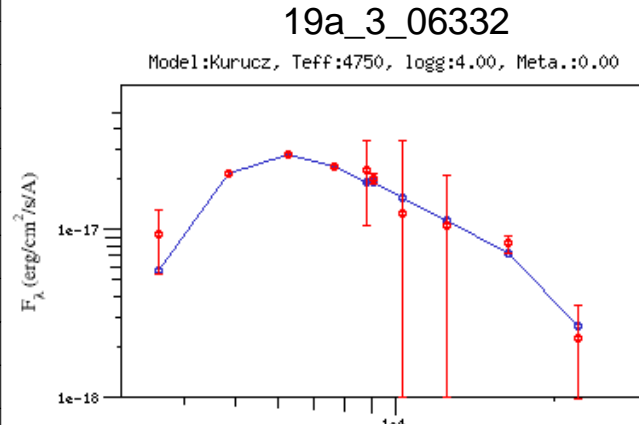


Characteristics: Field 3

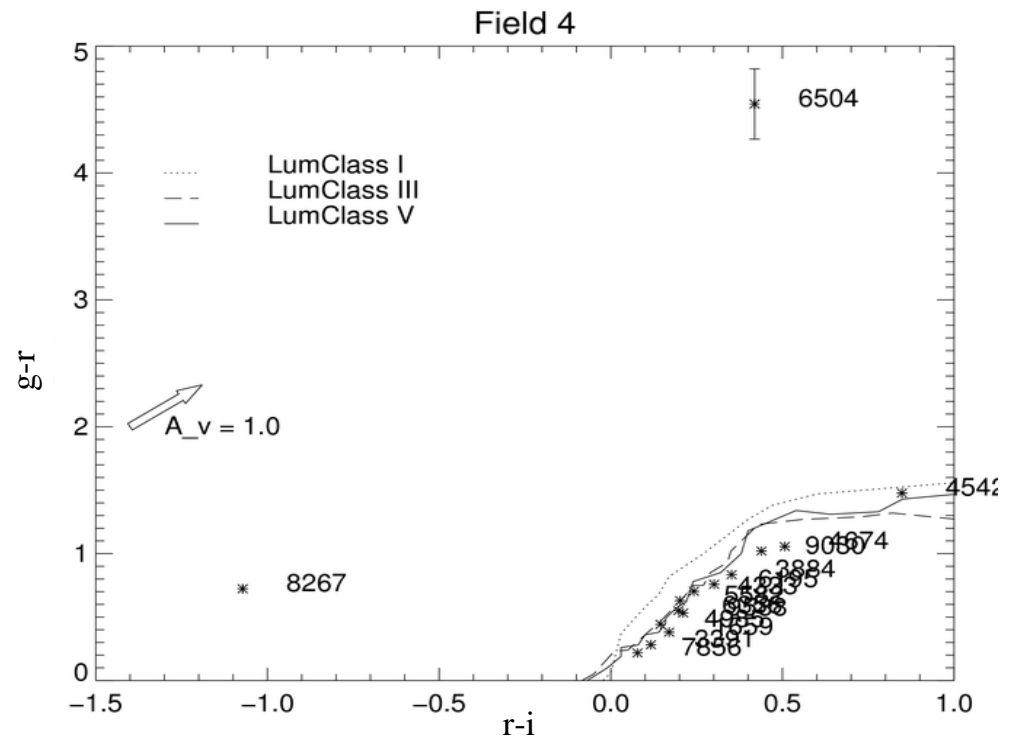
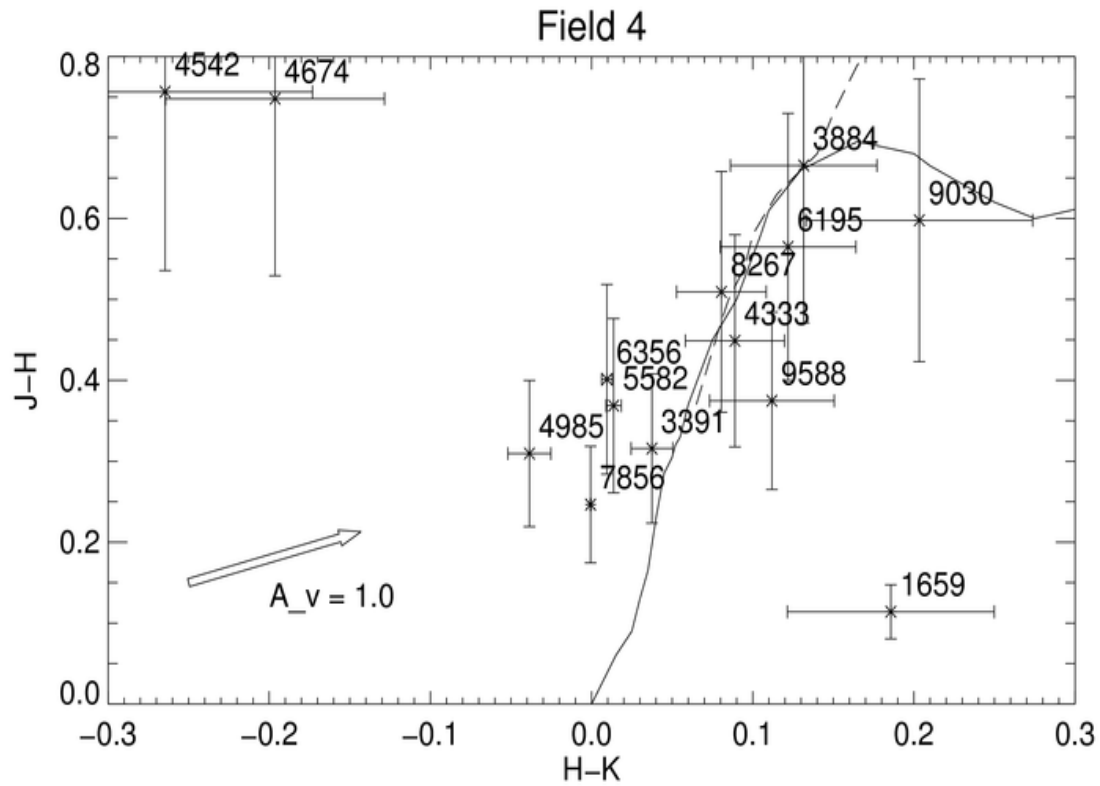


Temperatures: Field 3

#	T [K]
19a_3_00697	3200
19a_3_01085	3400
19a_3_01981	3200
19a_3_02160	4500
19a_3_02781	3500
19a_3_02921	5400
19a_3_03320	6200
19a_3_03689	3700
19a_3_04116	4000
19a_3_04388	4750
19a_3_05093	6000
19a_3_05263	5600
19a_3_05511	6500
19a_3_05531	3750
19a_3_05622	2500
19a_3_05976	4500
19a_3_06065	4500
19a_3_06221	4250
19a_3_06226	6250
19a_3_06332	4750
19a_3_07126	3500
19a_3_09001	4200
19a_3_10445	4800
19a_3_10735	4250
19a_3_11077	5250
19a_3_11580	5500

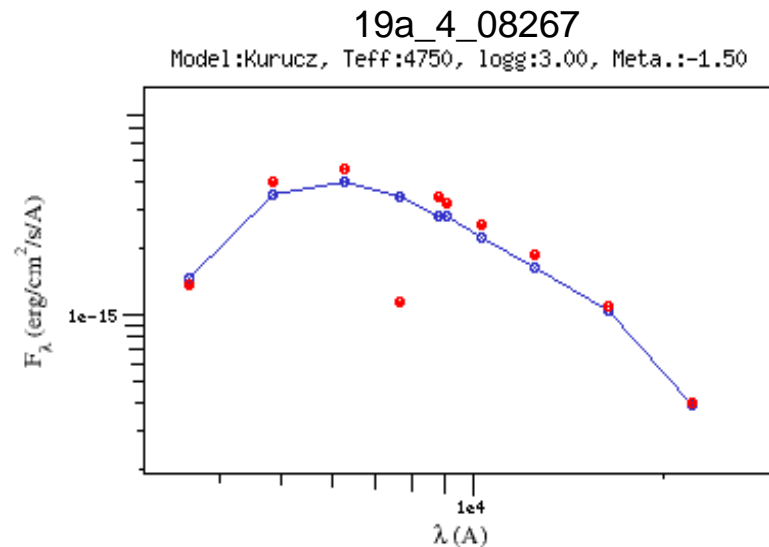
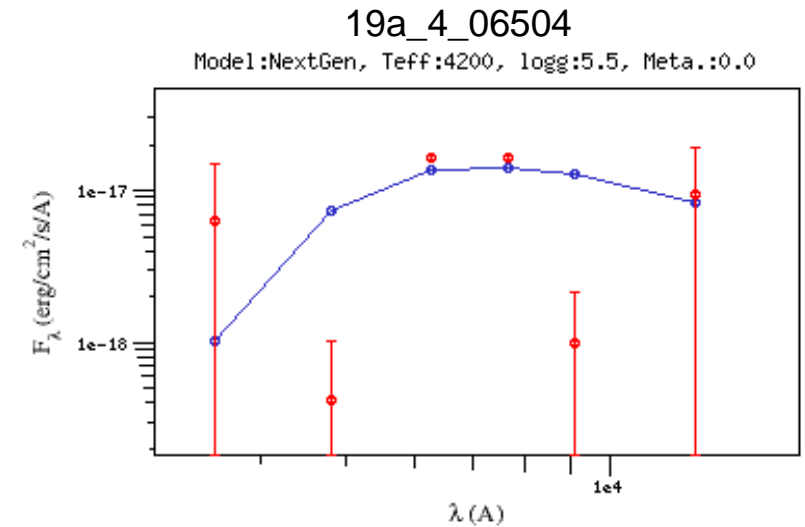


Characteristics: Field 4



Temperatures: Field 4

#	T [K]
19a_4_01659	5750
19a_4_03391	6000
19a_4_03884	4500
19a_4_04333	5000
19a_4_04542	3500
19a_4_04674	4000
19a_4_04985	5800
19a_4_05582	5000
19a_4_06195	4750
19a_4_06356	5500
19a_4_06504	4200
19a_4_07856	6250
19a_4_08267	4750
19a_4_09030	4250
19a_4_09588	5250

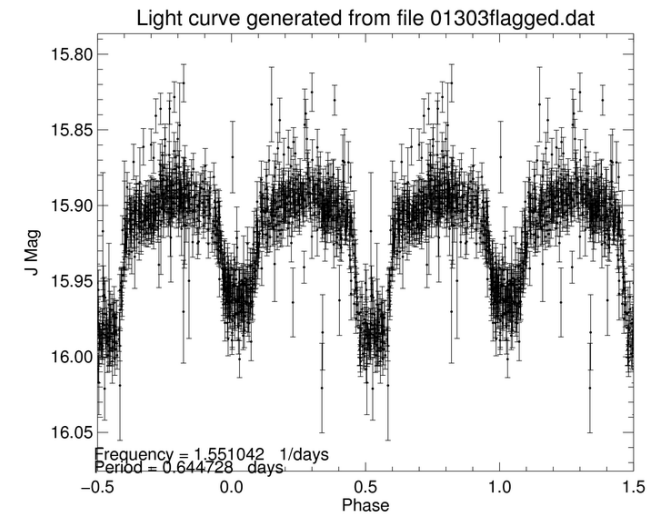
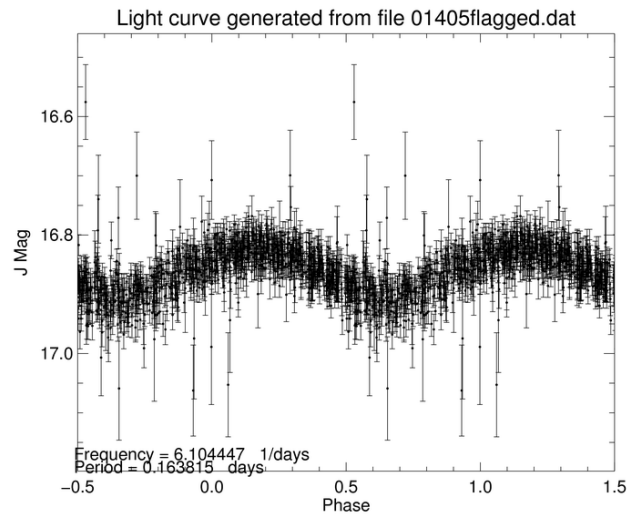
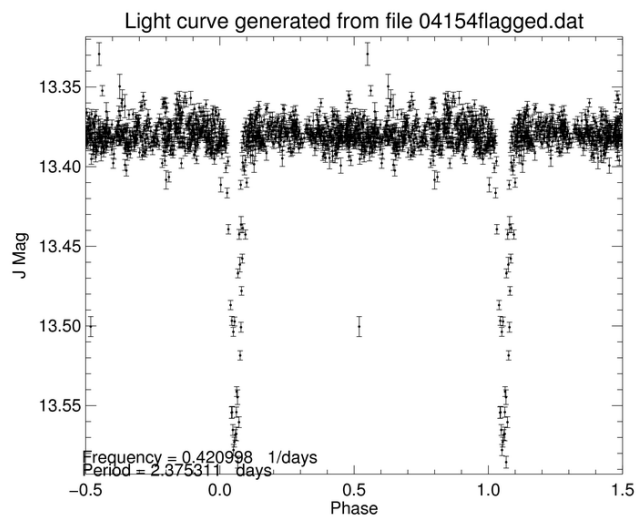
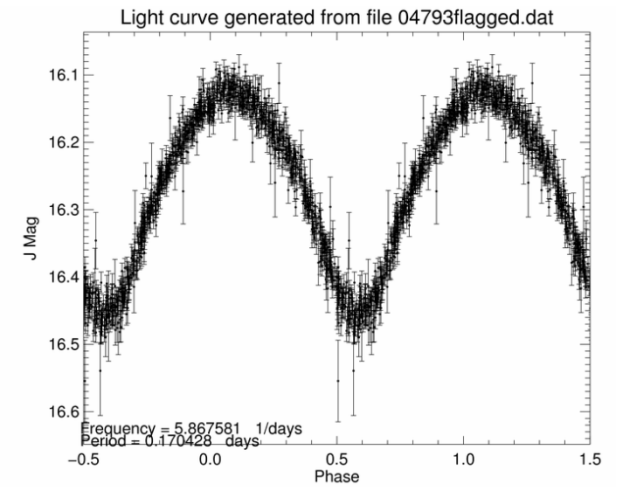
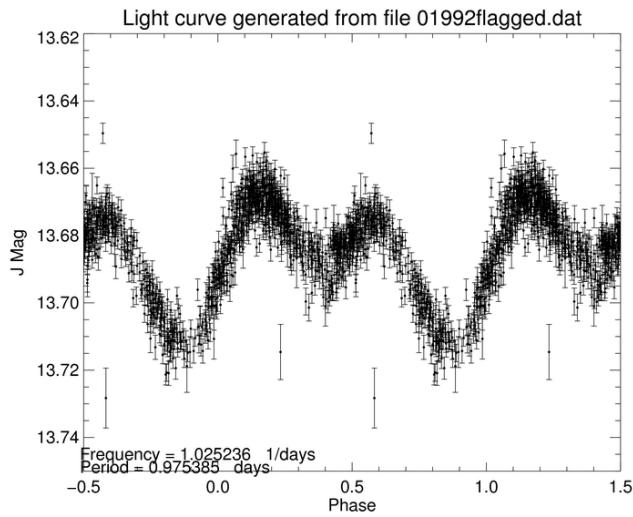
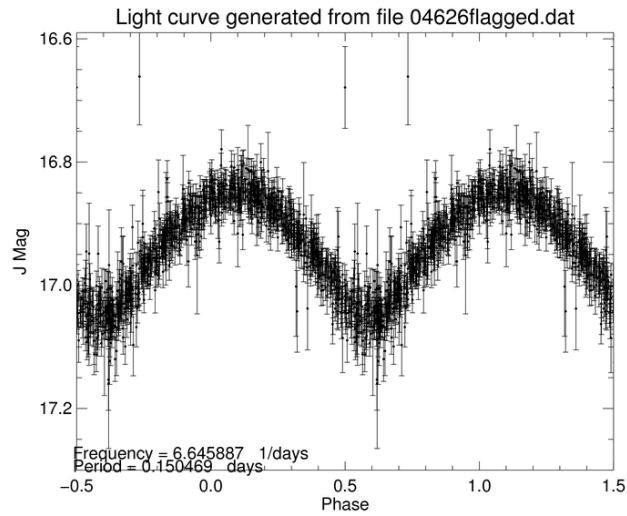


Summary and outlook

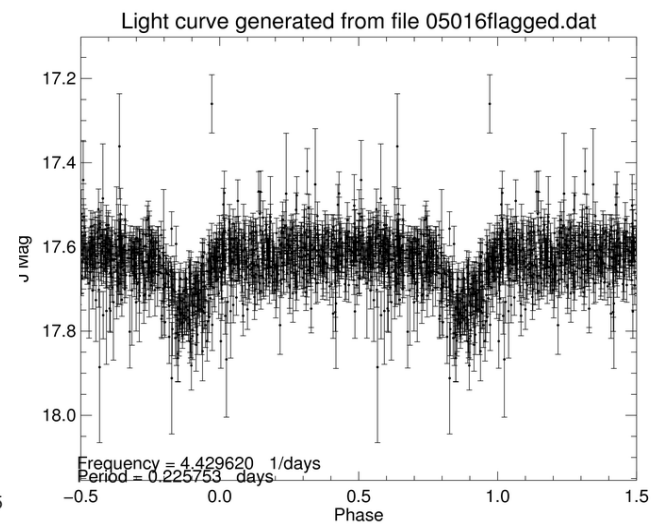
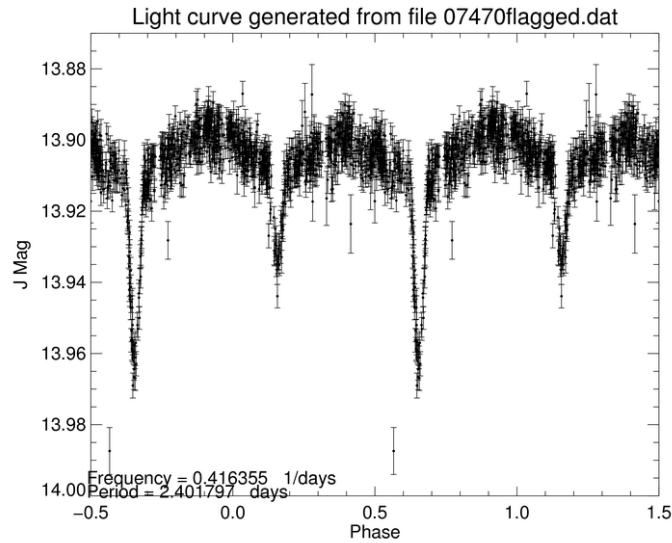
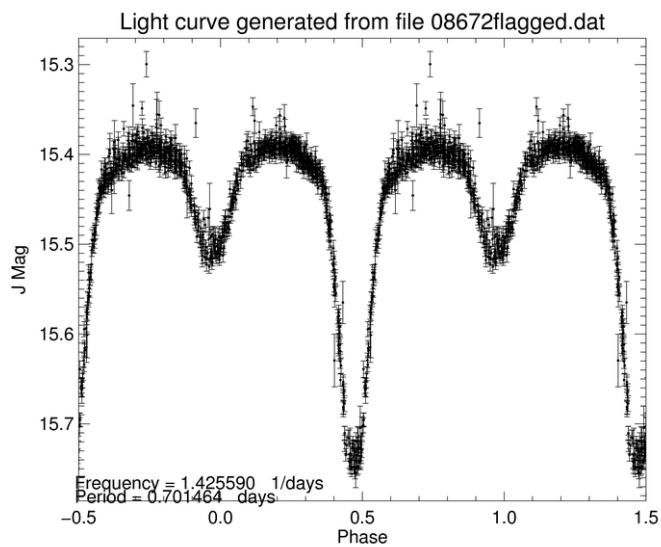
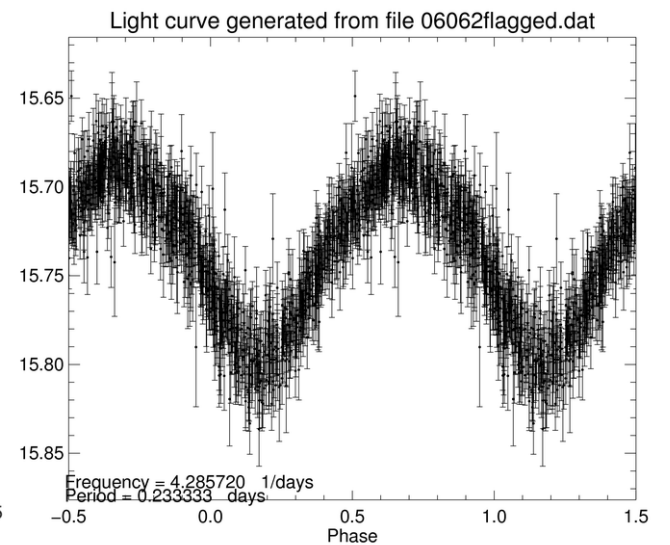
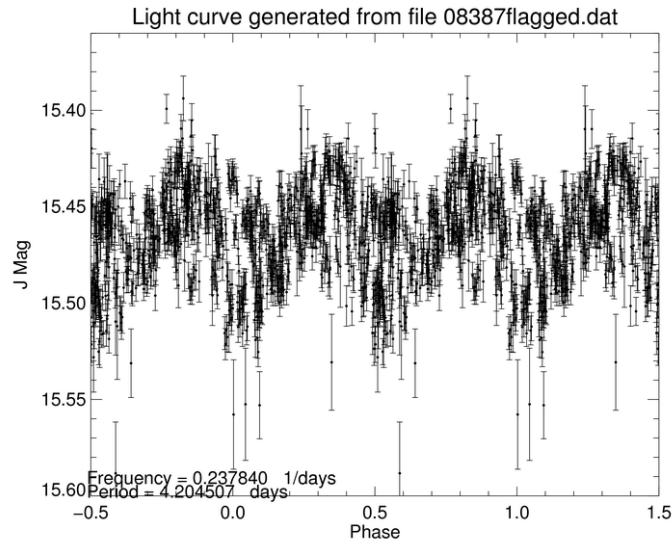
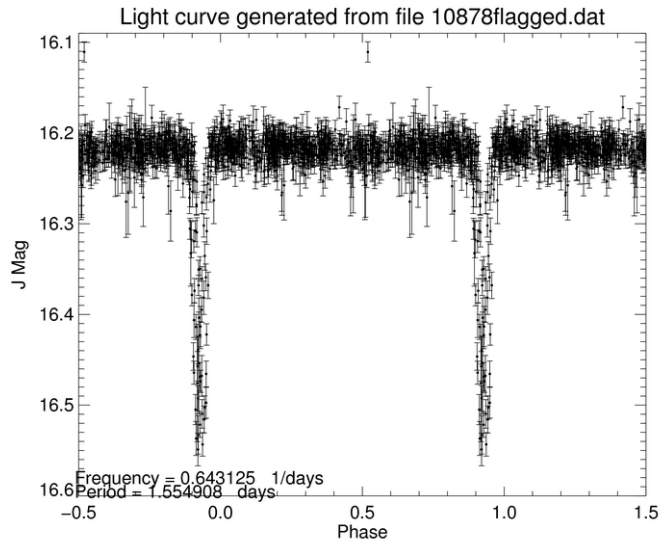
- 66 high-quality light curves of eclipsing binaries have been identified in the WTS 19a field;
- Estimation for temperatures and position on the HR diagram;
- Spectroscopic measurements are needed to confirm their temperatures and their nature;



Folded light curves: Field 1

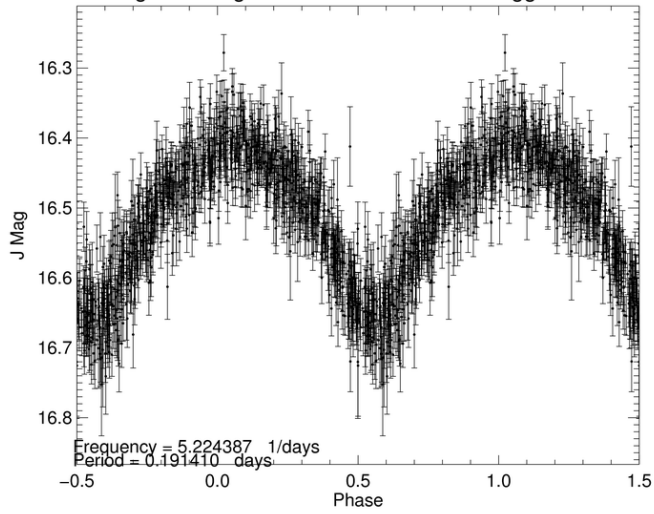


Folded light curves: Field 1

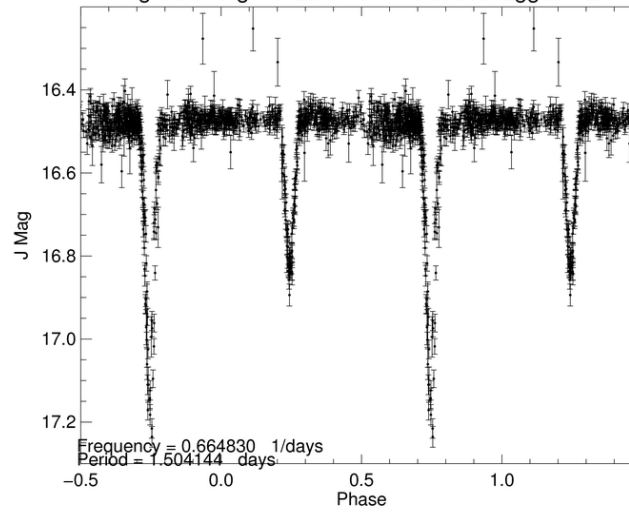


Folded light curves: Field 2

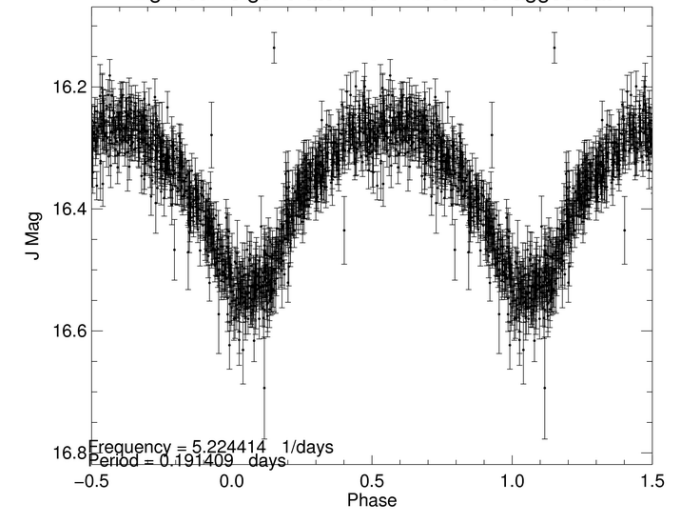
Light curve generated from file 02109flagged.dat



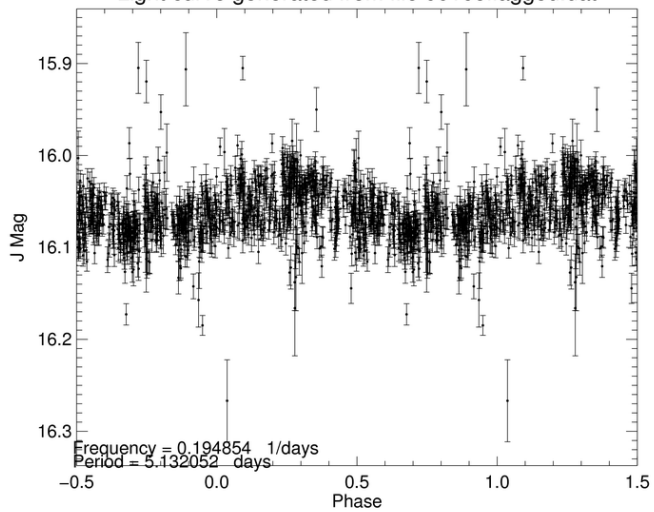
Light curve generated from file 00565flagged.dat



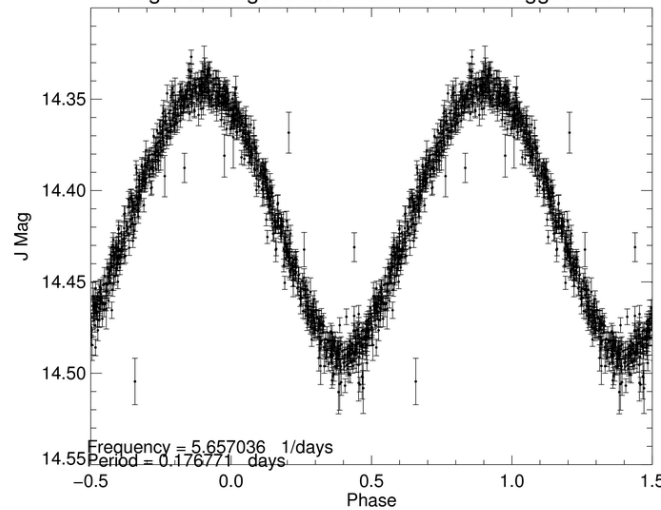
Light curve generated from file 02108flagged.dat



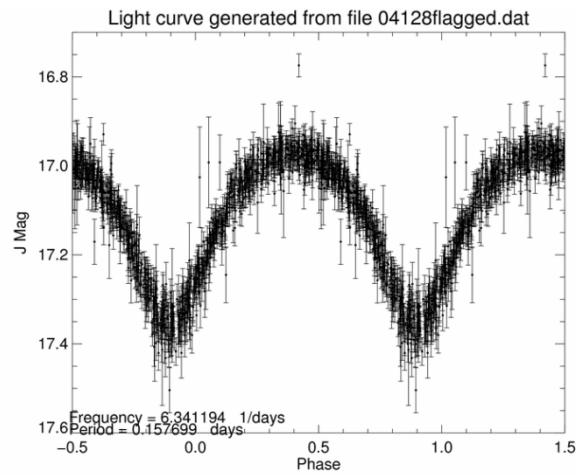
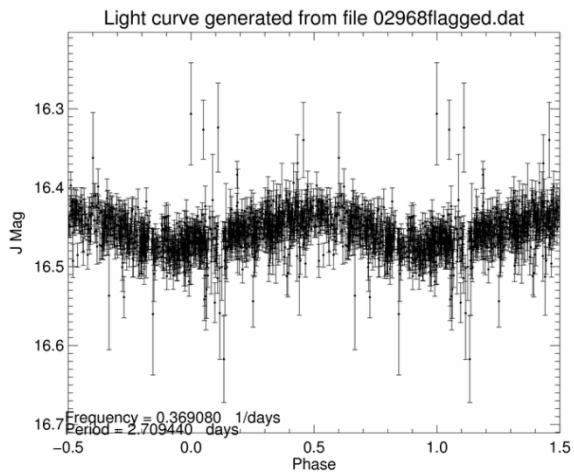
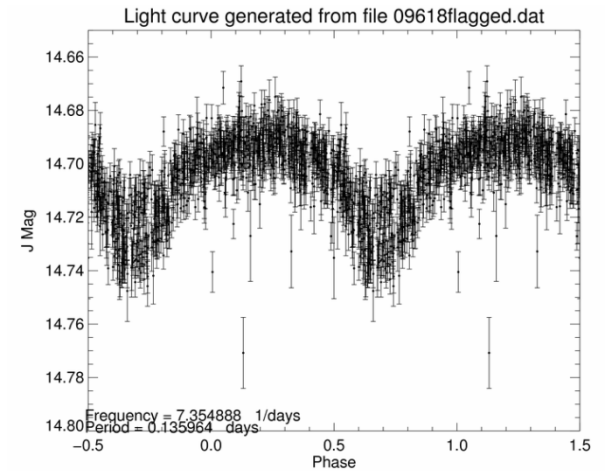
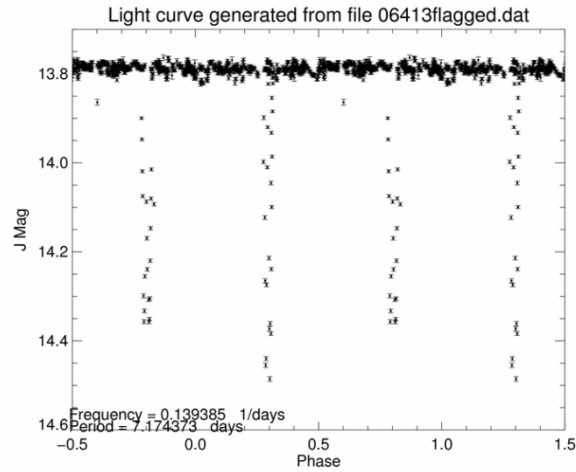
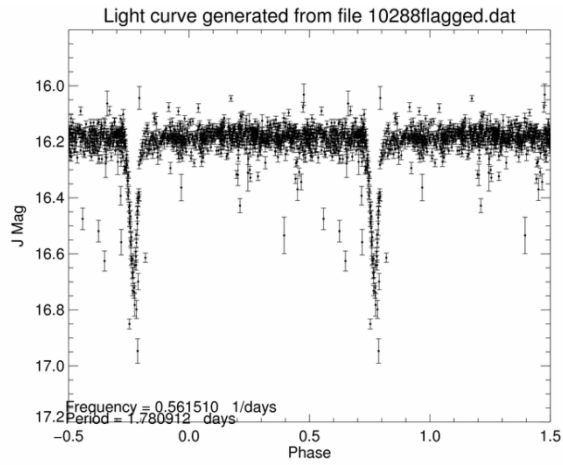
Light curve generated from file 00165flagged.dat



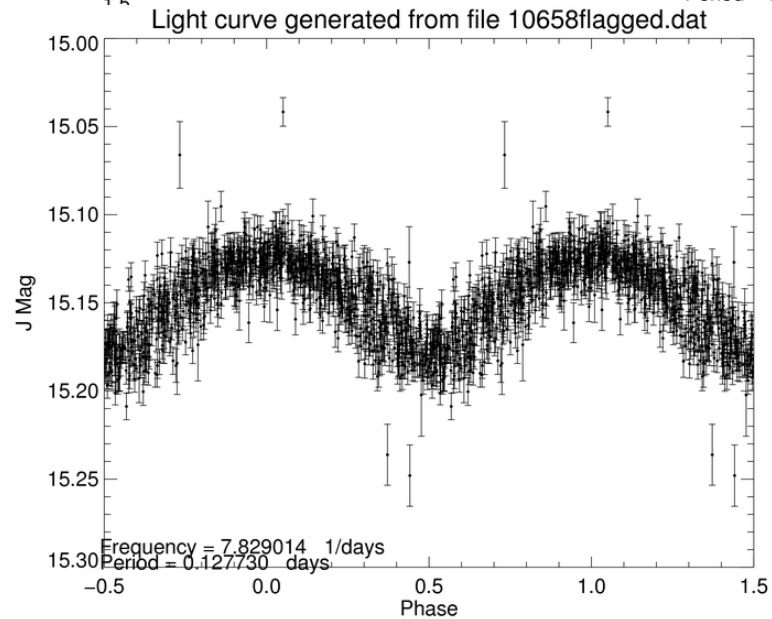
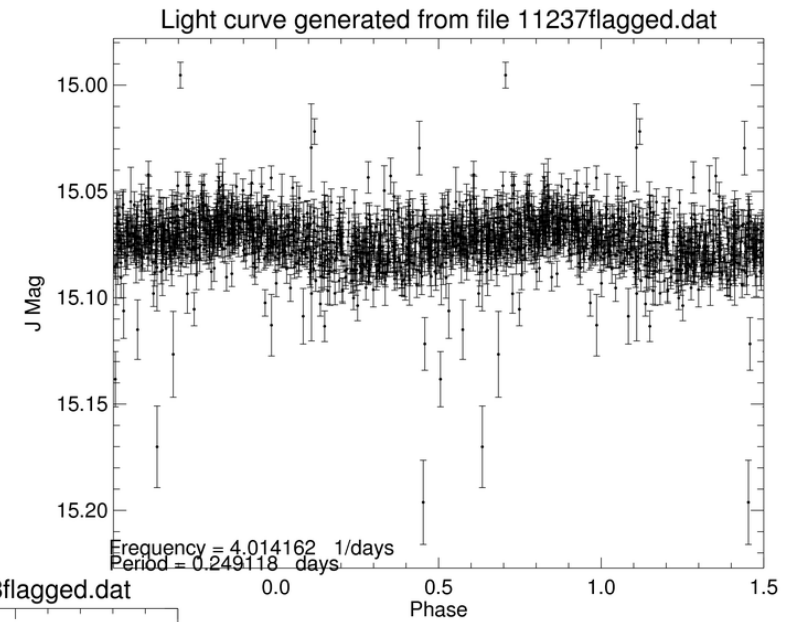
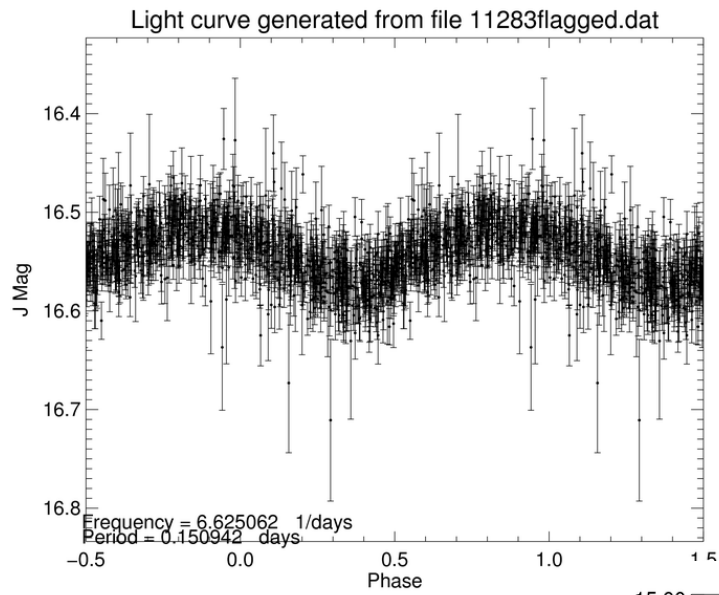
Light curve generated from file 01527flagged.dat



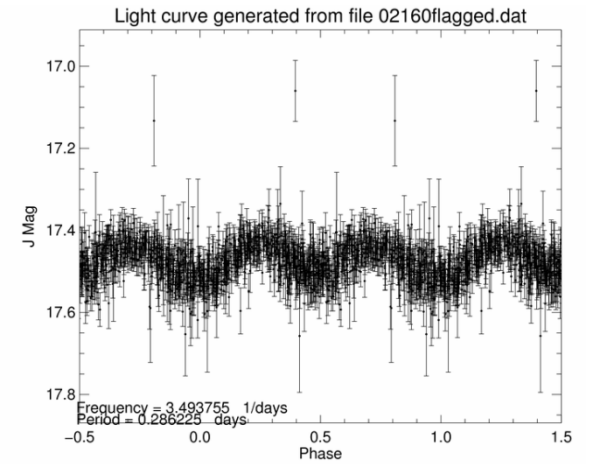
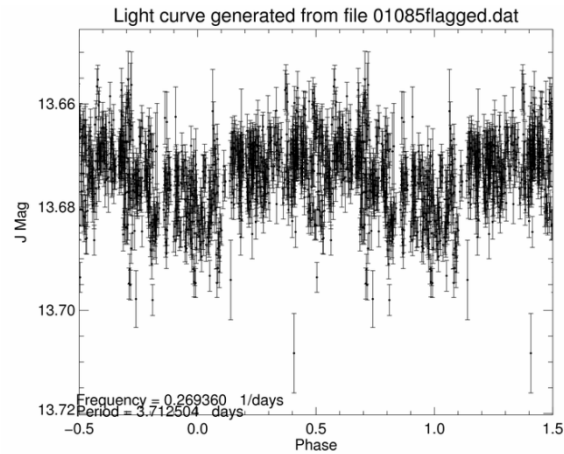
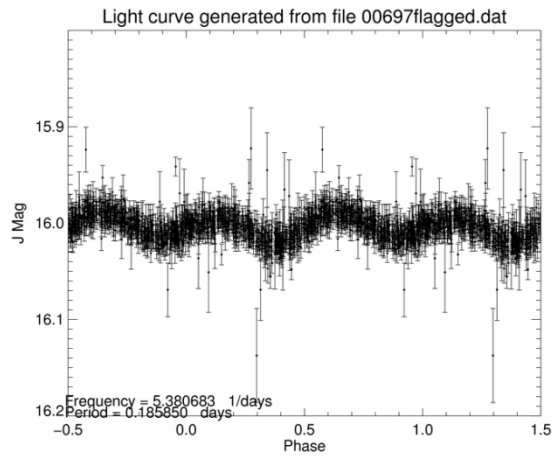
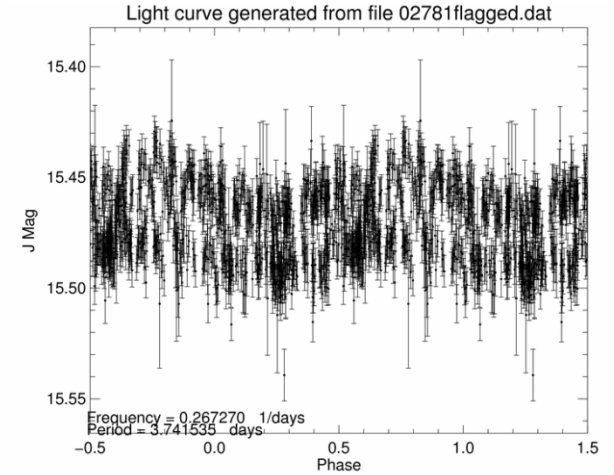
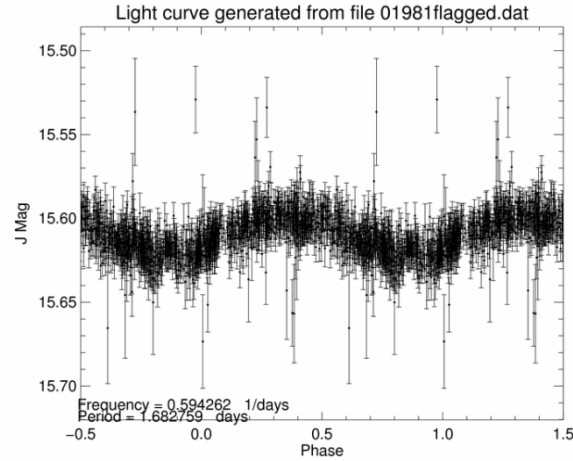
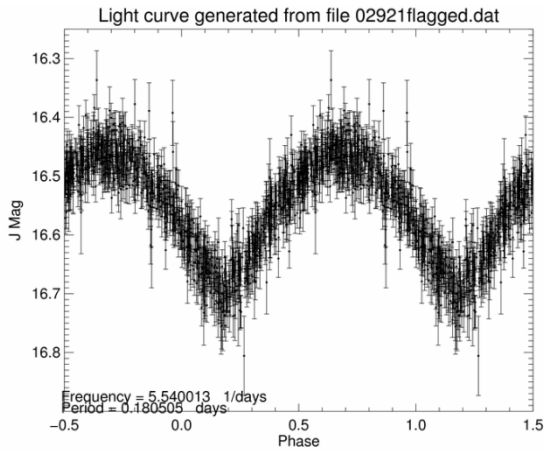
Folded light curves: Field 2



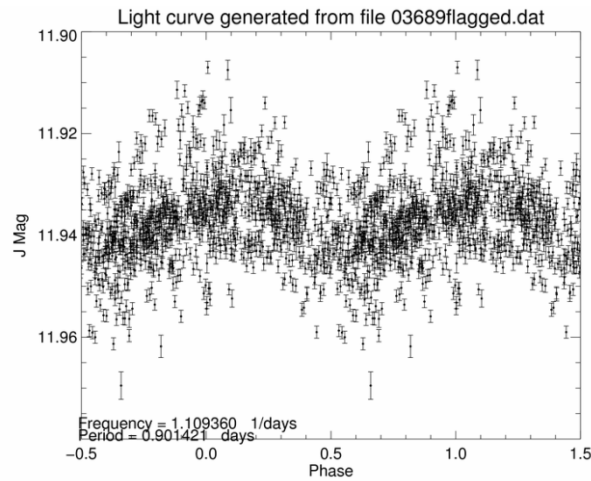
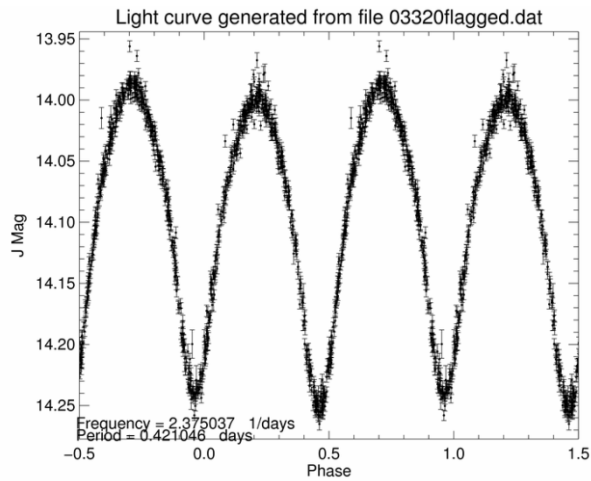
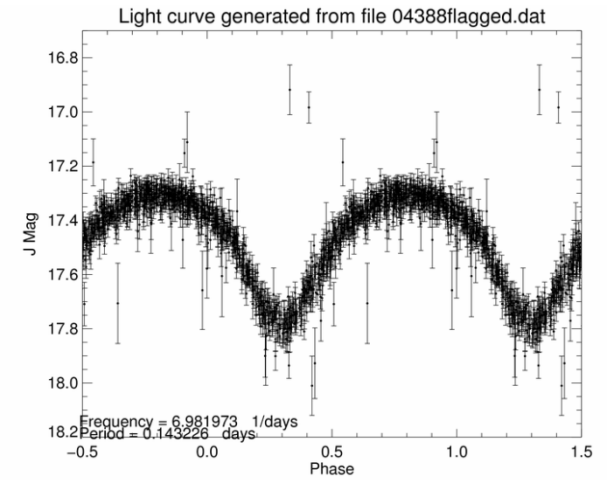
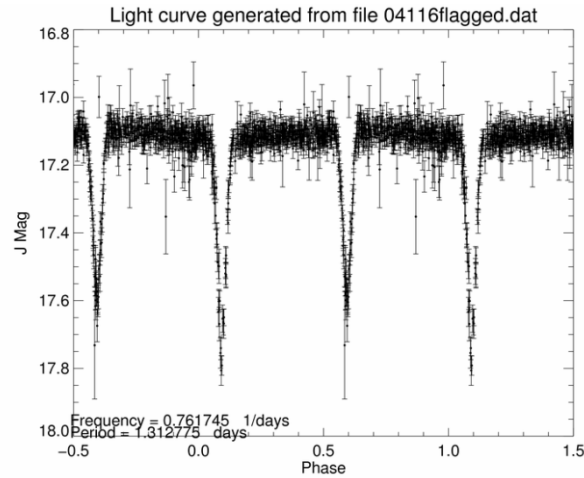
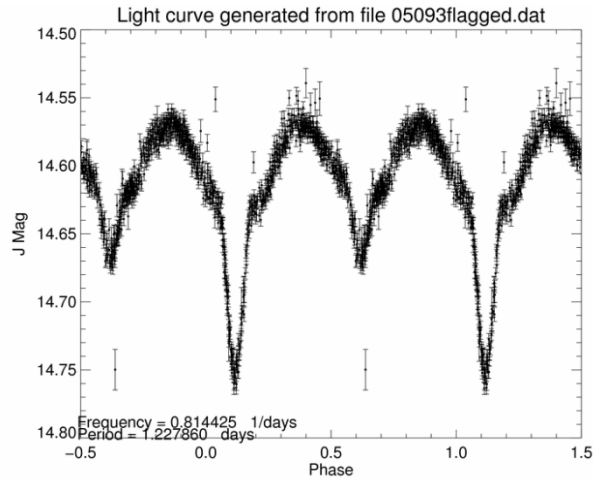
Folded light curves: Field 2



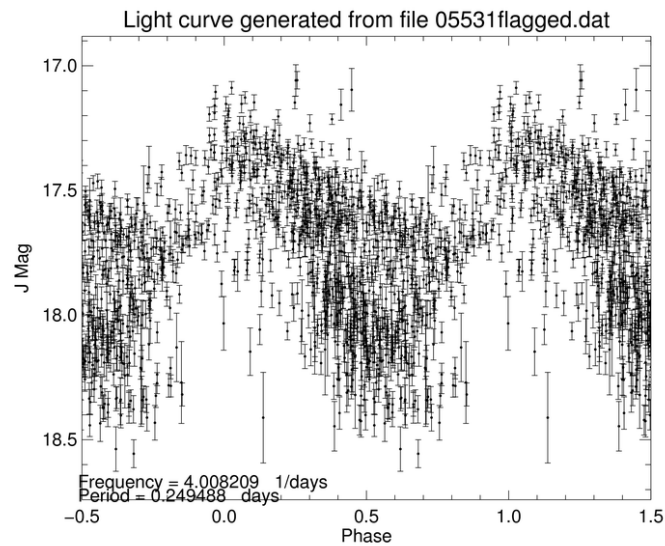
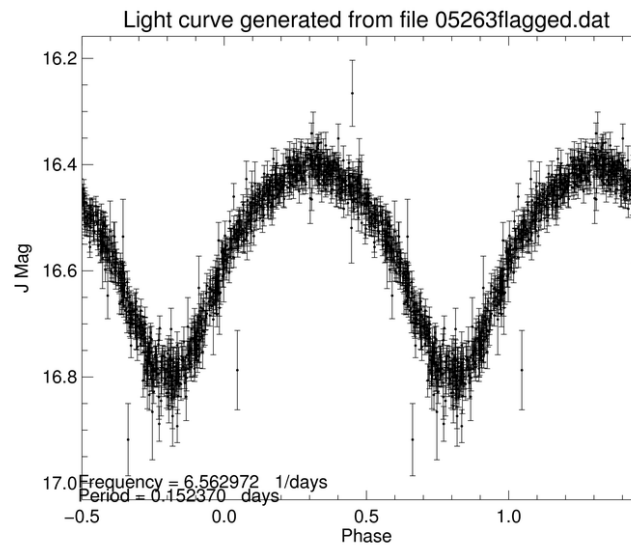
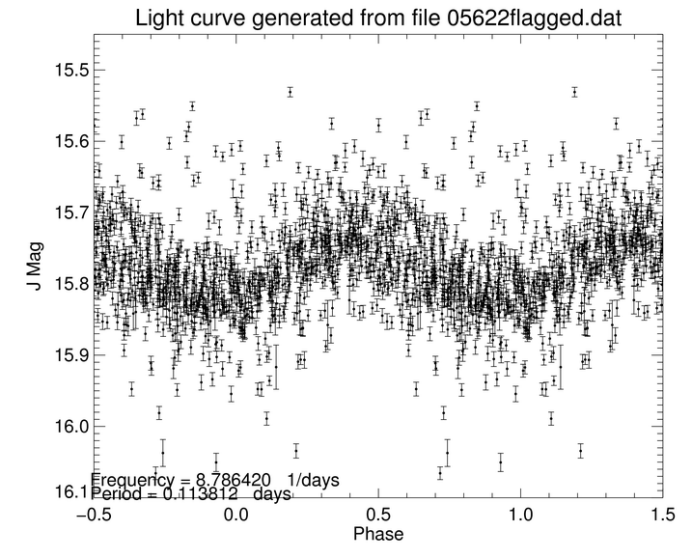
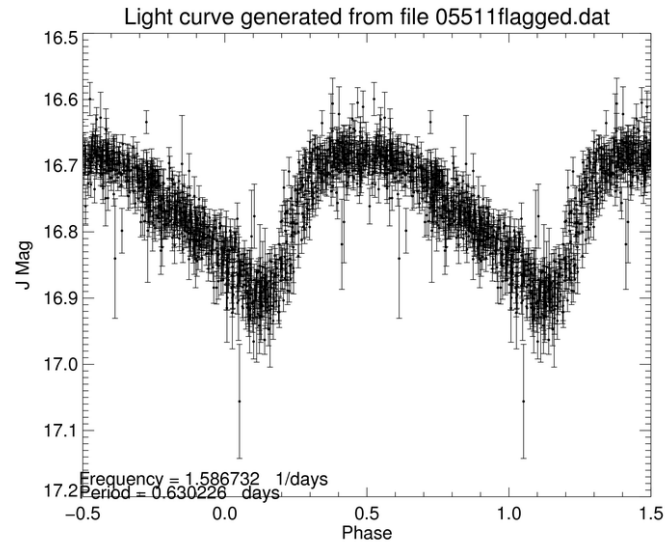
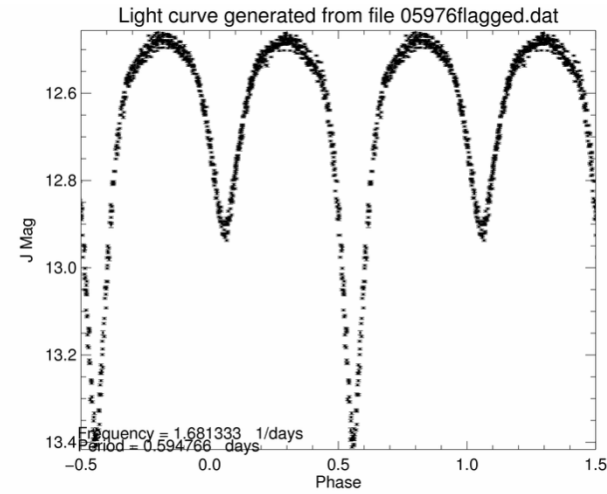
Folded light curves: Field 3



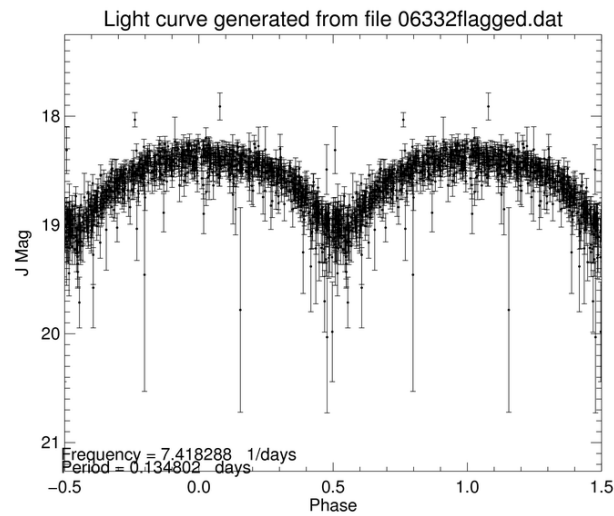
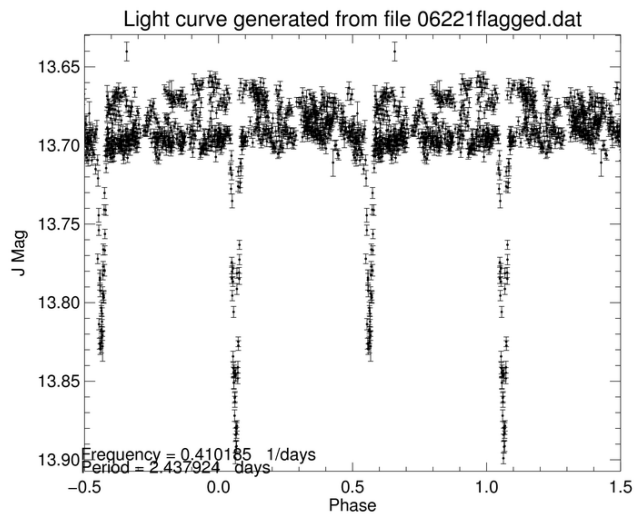
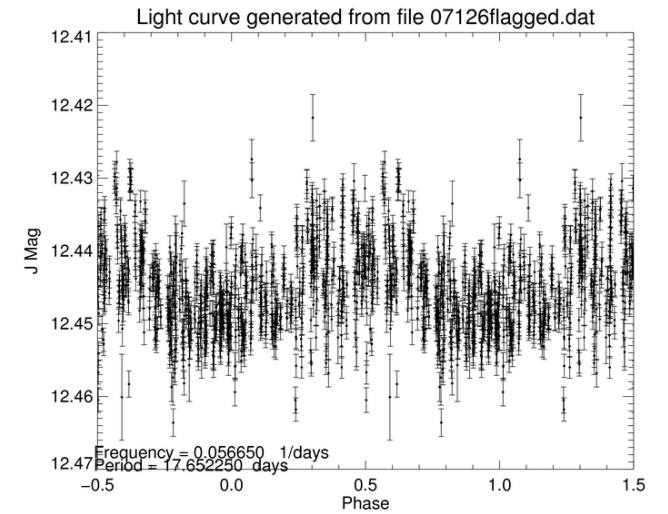
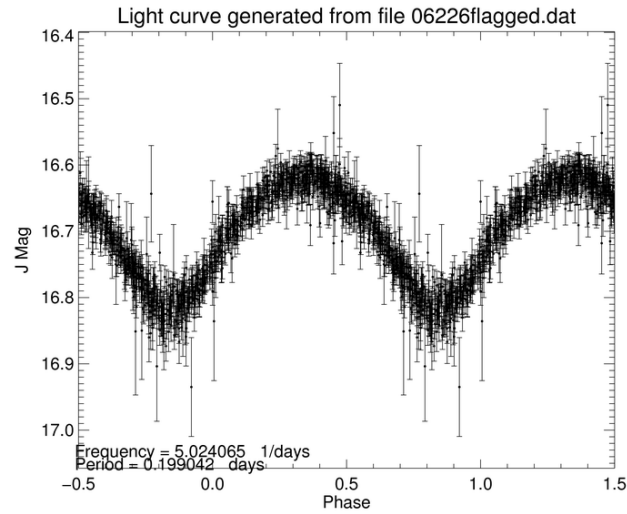
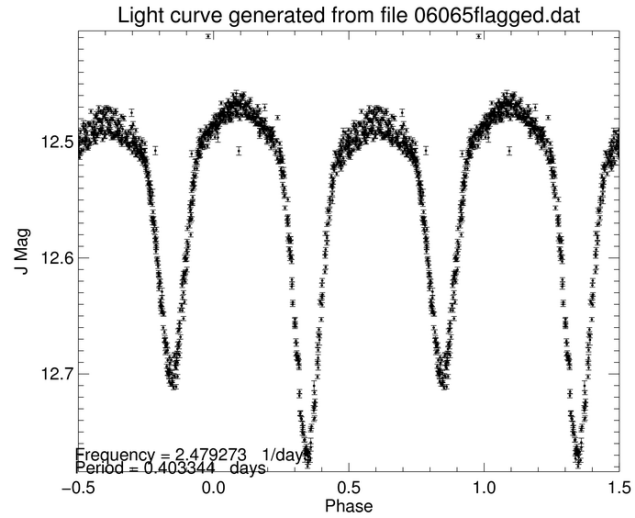
Folded light curves: Field 3



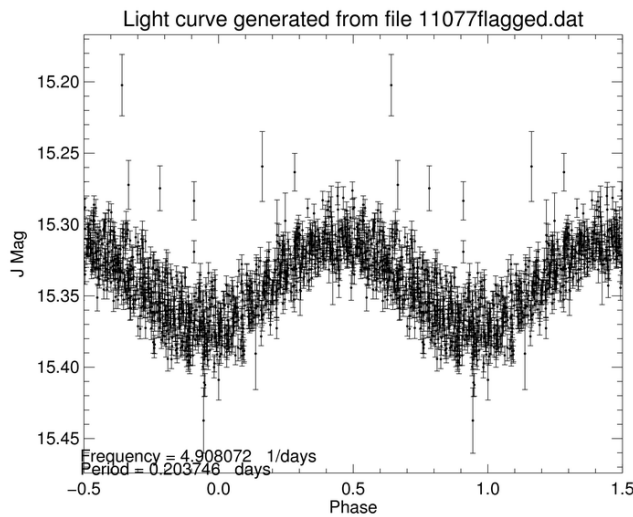
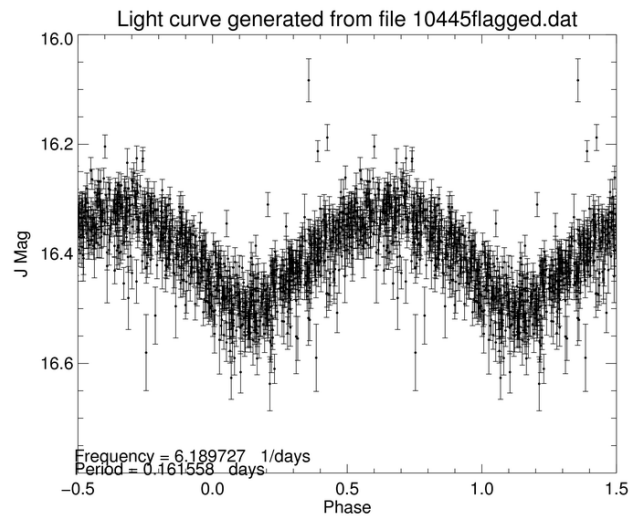
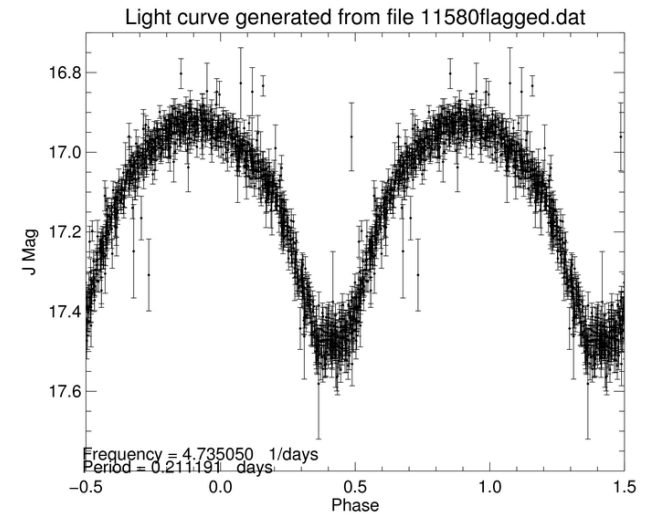
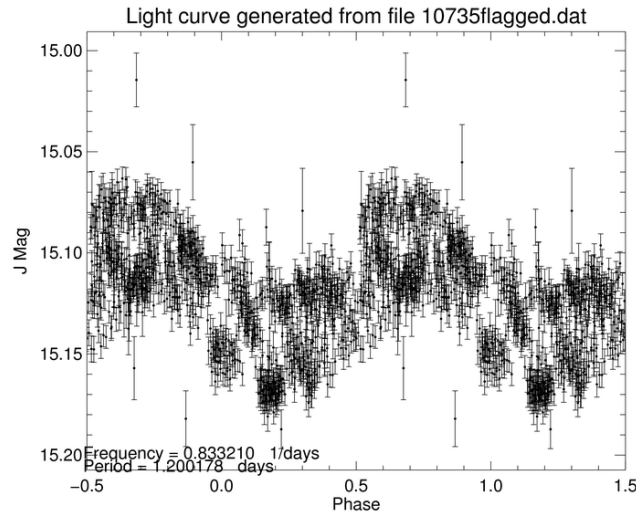
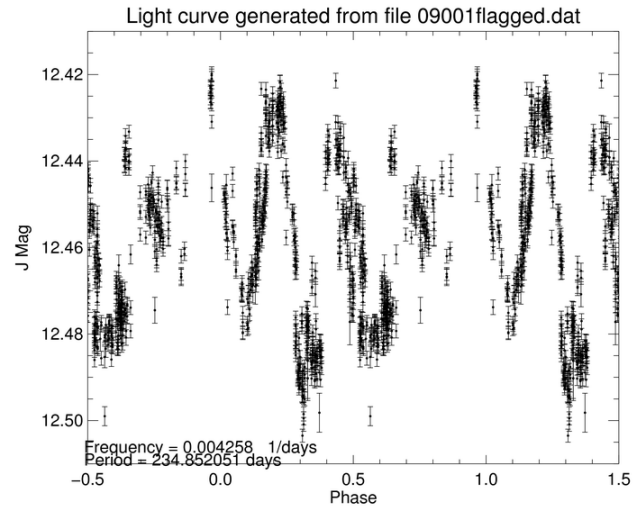
Folded light curves: Field 3



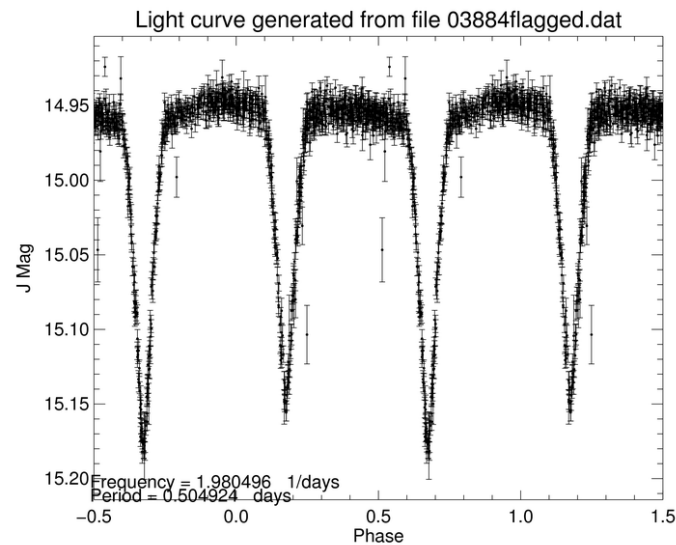
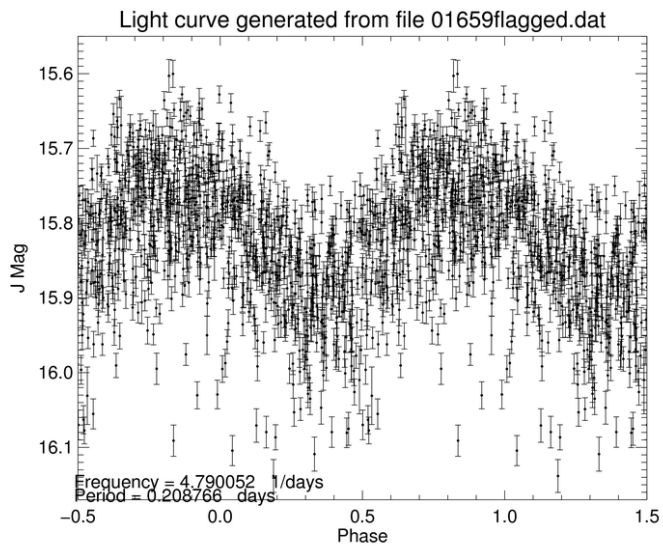
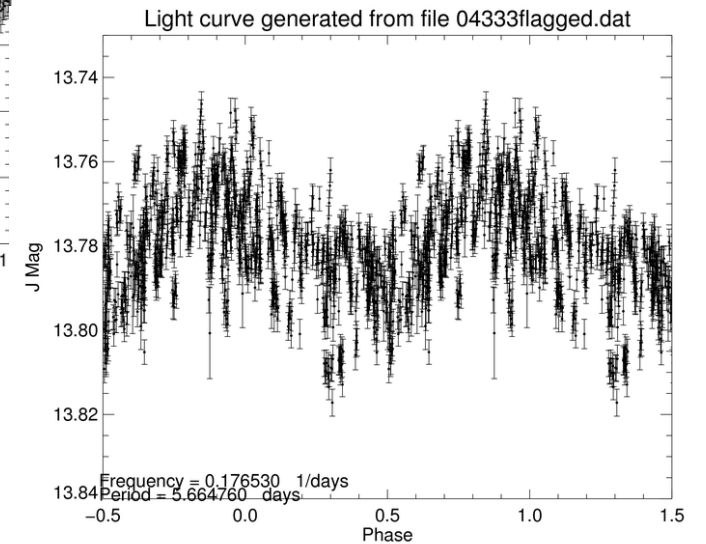
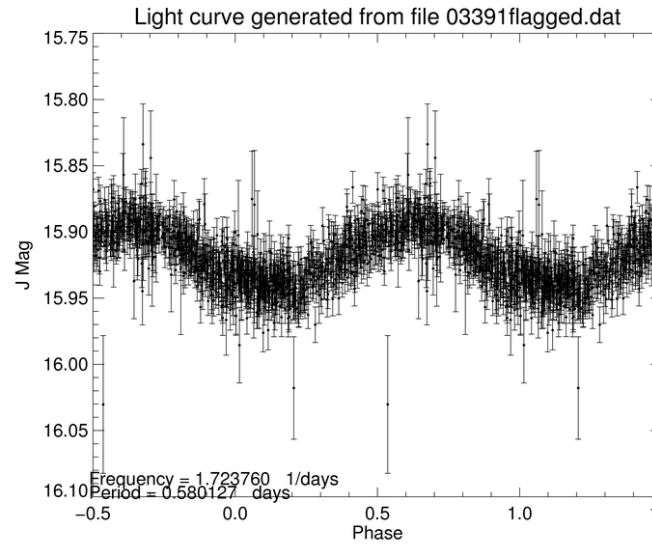
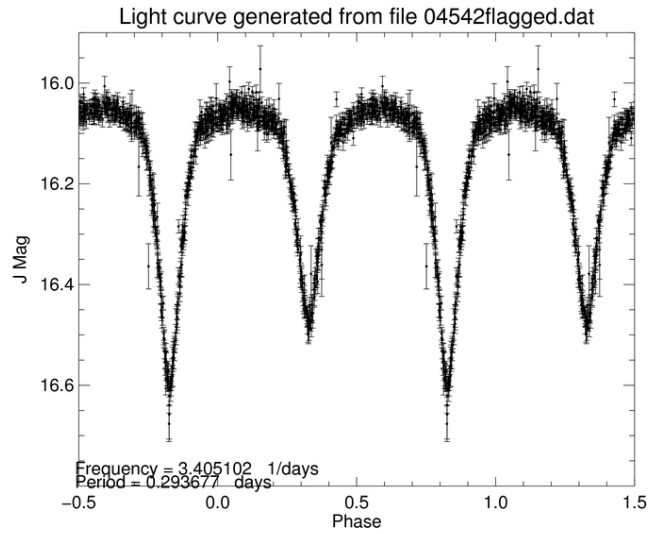
Folded light curves: Field 3



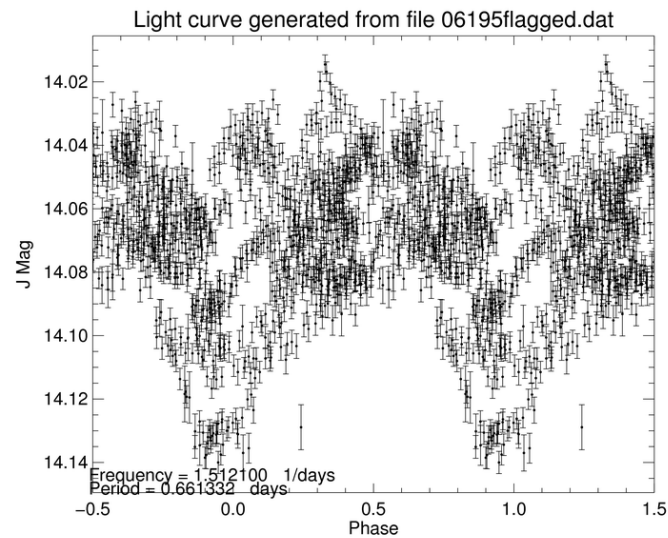
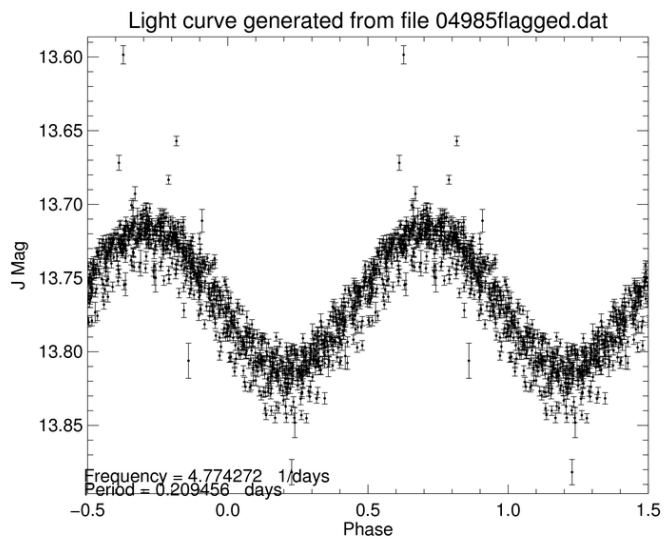
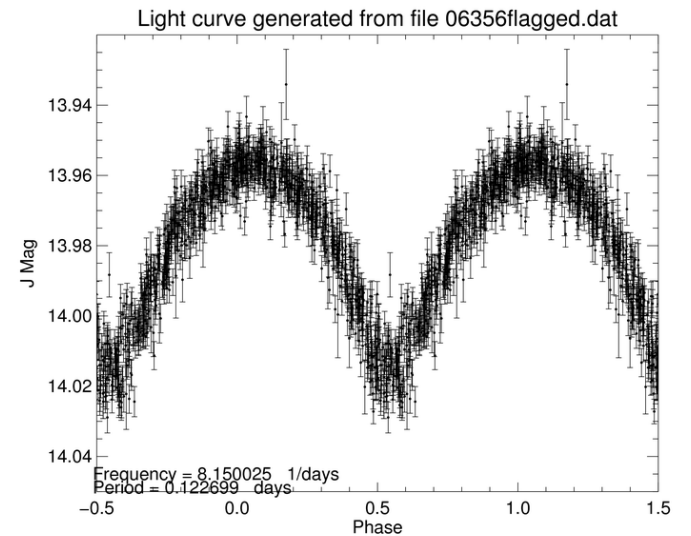
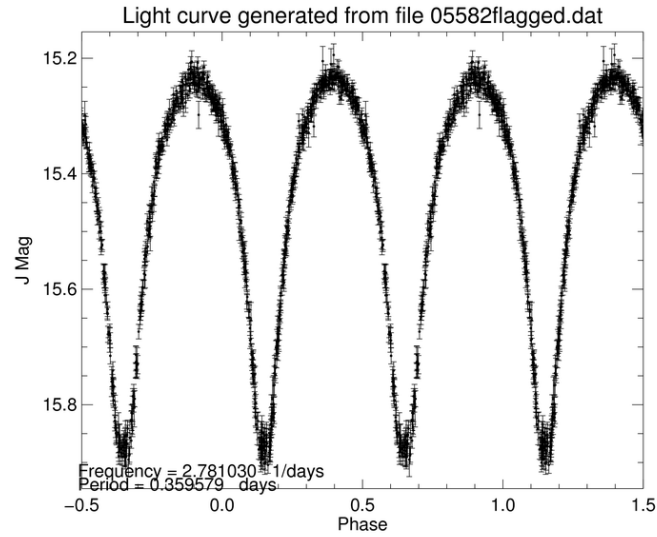
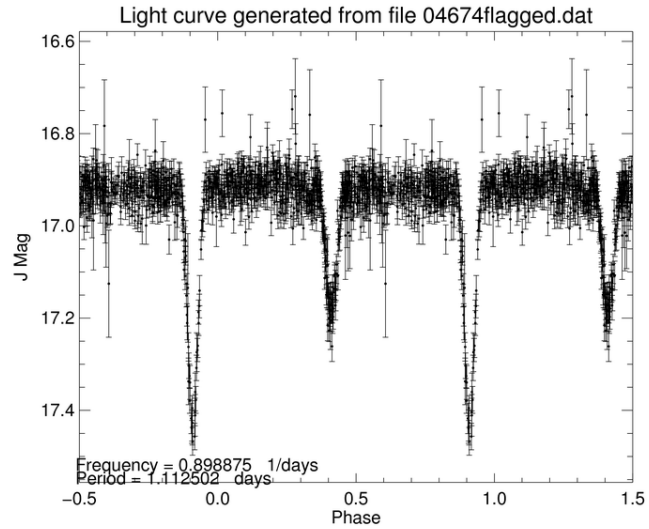
Folded light curves: Field 3



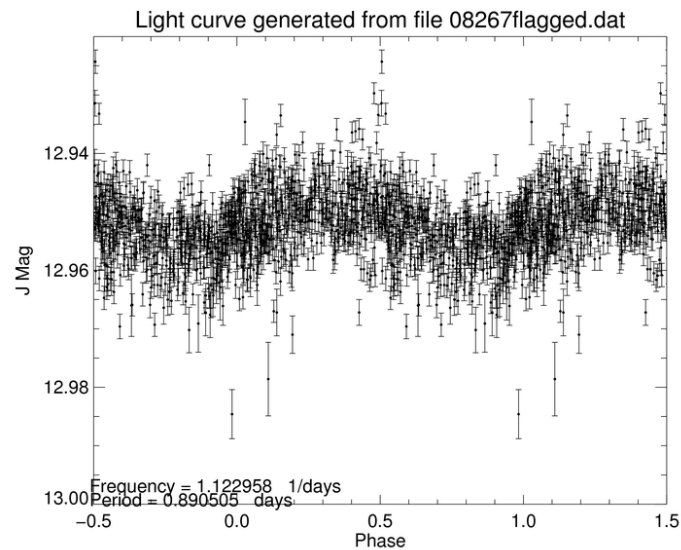
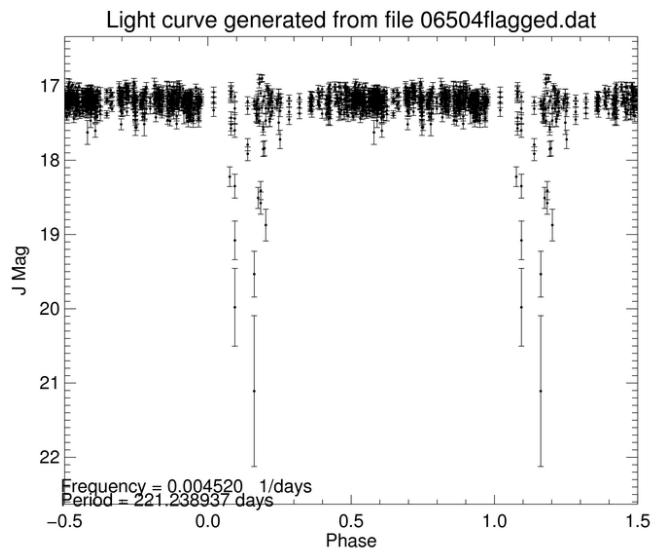
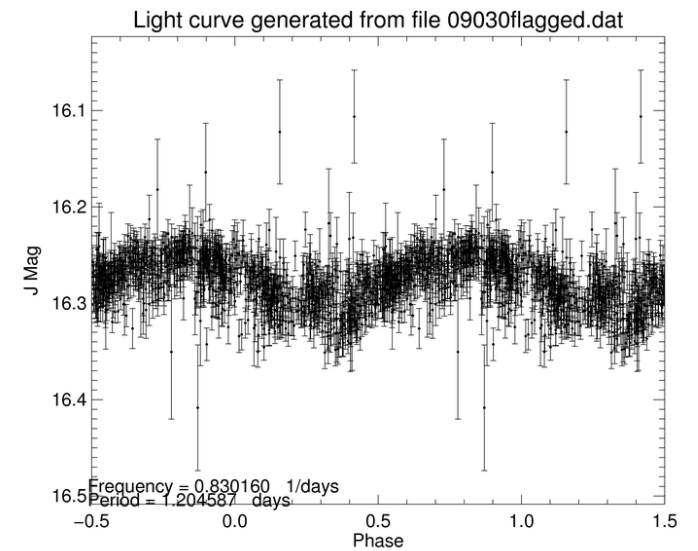
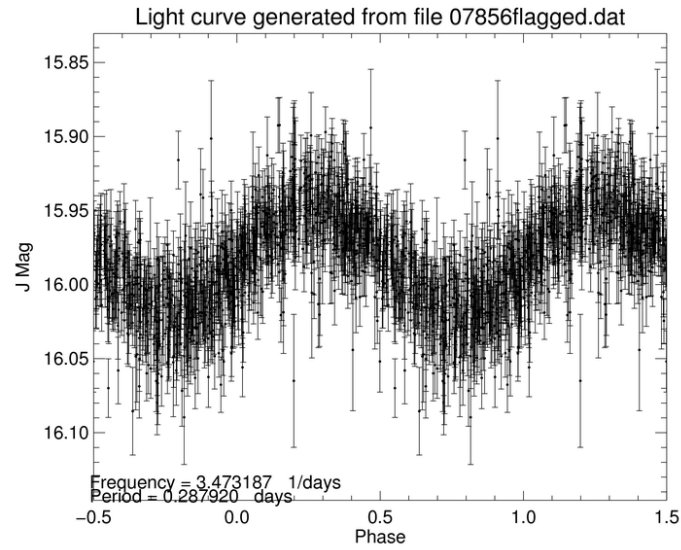
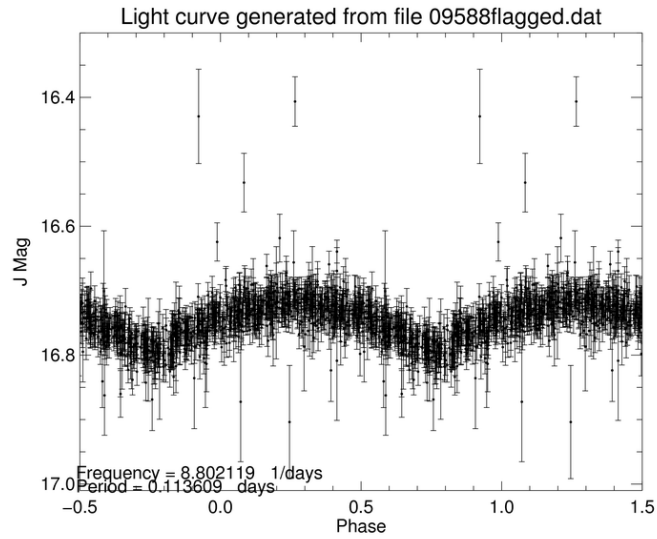
Folded light curves: Field 4



Folded light curves: Field 4



Folded light curves: Field 4



References:

- Sterken, C. and Jaschek, C. (1996). Light curves of variable stars. Melbourne: CUP
- Bayo, A. et al., 2008, A&A, 492, 277B
- Rieke, G. and Lebofsky, M., 1985, ApJ, 288, 618
- Carpenter, J., 2001, ApJ, 121, 2851
- Covey, K. et al., 2007, AJ, 134, 2398
- Bessel, S. and Brett, M., 1988, PASP, 100, 1134

