

# Bright Variability Study Near NGC 6811



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Preliminary results of a BVRcIc stellar variability study conducted by the AAVSO in coordination with the BOKS program are given. Stars in a 1.5x0.75degree field brighter than V=15 were monitored over several months to extend the BOKS survey to brighter limits.

## Kepler

NASA Discovery Mission; see <http://kepler.nasa.gov>  
0.95m telescope, 105square degree FOV  
4-6yr mission duration, with continuous observations of 100,000 A-K main sequence stars, V=9-15. Temporal resolution 15mins  
one spectral band (400-850nm)  
6.5hr integration gives 20ppm for 12thmag star, capable of detecting earth-sized planets.

Field centered in Cygnus at 19:22:40, +44:30 (l=76.5, b=-13.3)  
launch October 2008

## NGC 6811

**Center: 19:37:17 +46:23:18 (l=79.2,b=+12.0)**  
Young open cluster in Cygnus, in Kepler field  
Roughly 100 members; mean distance: 1040pc; age: 0.7Gyr  
Primary early studies were Sanders (1971) and Lindoff(1972),  
Identifying 377 stars in region. Glushkova (1999) performed  
a radial velocity study. Frandsen & Arentoft (1998) added  
NGC6811 to STACC (Small Telescope Array with CCD Cameras) list.  
Mills et al., (2004,2006) studied NGC6811 as part of the  
WIYN UBVRi open cluster study with the KPNO 0.9m; see  
<http://www.astro.ufl.edu/~ata/wocs/index.html>

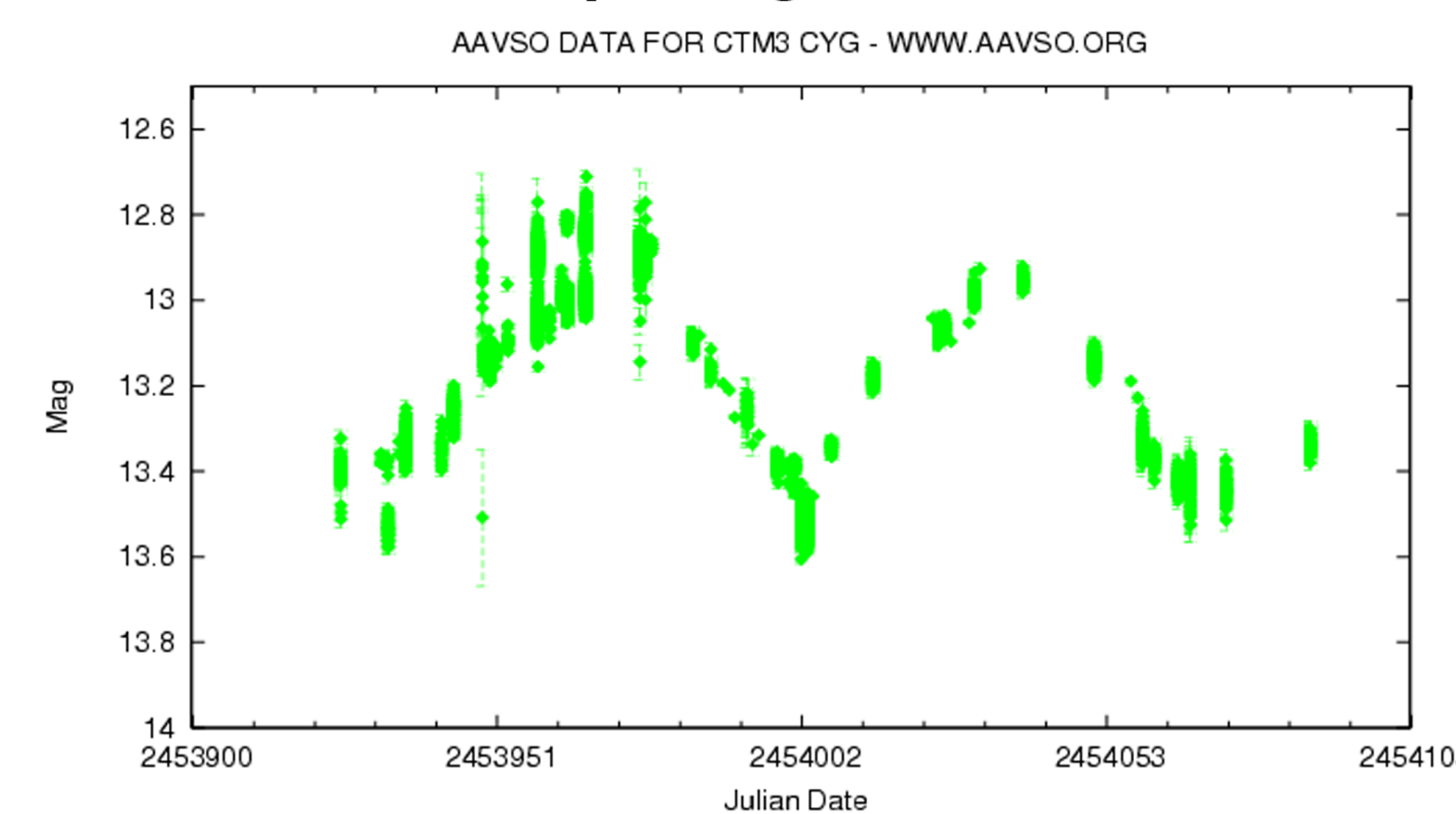
picture below courtesy J.Thommes



ID	RA (J2000)	DEC	V	Type	P(d)	ref
V894 CYG	19:33:00.90	+46:14:23.0	12.0	RRab	0.57	h
NSV 24812	19:33:08.64	+46:02:21.8	7.4	unk		
SRO_V7	19:33:44.46	+46:25:55.4	15.8	RRab	0.2729	k
SRO_V1	19:33:55.11	+46:26:42.4	13.0			k
SRO_V4	19:34:48.36	+46:24:53.9	15.1			k
GSC 3556-1944	19:35:04.82	+46:14:12.0	12.2	EA	1.219	m
NSV 12196	19:35:17.87	+46:25:08.4	9.0	EII:		a
GSC 3556-1262	19:35:19.47	+46:37:08.7	11.0	SR		m
6811 V08	19:36:01.98	+46:22:46.4	14.9	WUMa	0.414	d
GSC 3556-2320	19:36:13.43	+46:43:40.3	12.8	SR		m
6811 V09	19:36:29.85	+46:15:17.7	15.7	unk	2.0	d
CTM3 CYG	19:36:55.76	+46:18:36.8	13.0	SR	70.0	e
6811 V01	19:36:58.20	+46:20:23.9	12.1	DSCT	0.02	d
6811 V03	19:37:03.20	+46:19:25.6	10.9	DSCT	0.1333	d
SRO_V3	19:37:20.48	+46:34:56.6	14.9	unk		k
6811 V02	19:37:21.50	+46:24:33.8	11.1	DSCT	0.050	d
6811 V04	19:37:24.10	+46:23:52.1	11.5	unk	0.120	d
6811 V05	19:37:32.10	+46:19:15.1	11.5	unk	0.0770	d
SRO_V5	19:37:50.19	+46:12:49.6	15.9	unk		k
6811 V06	19:37:58.80	+46:14:19.4	11.0	DSCT	0.110	d
6811 V07	19:38:02.90	+46:17:22.7	13.6	DSCT	0.070	d
SRO_V6	19:39:02.68	+46:11:05.9	14.5	unk		k
NSV 12298	19:40:38.80	+46:45:02.3	10.8	const:		c

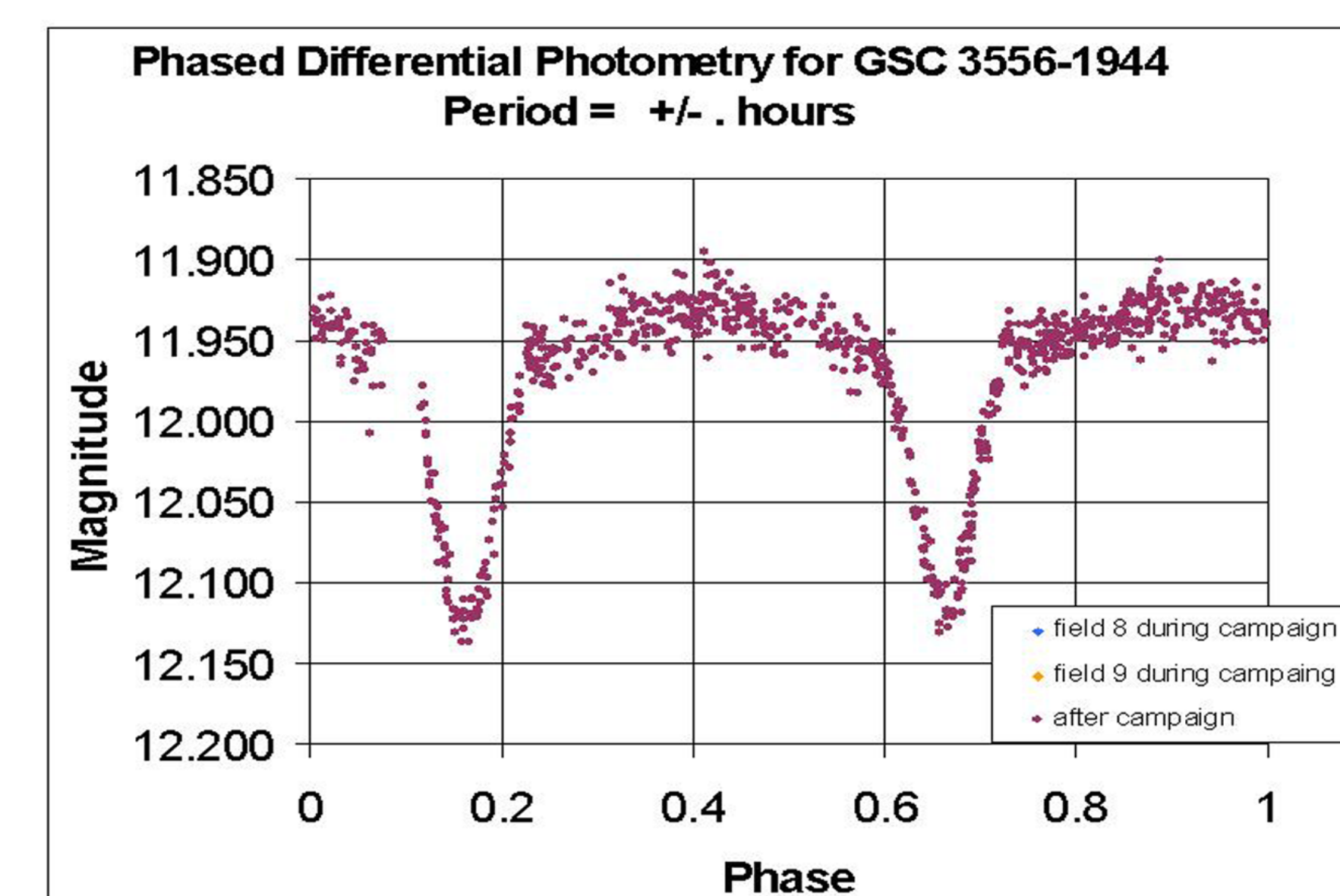
- a. F. Henroteau, J. F. Fredette, AN 219, 351, 1923  
b. F. W. Wright, HA 89, No. 13, 1940  
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j. J. Gross et al., Sonoita Research Observatory 2007  
k. W. Cooney et al., Sonoita Research Observatory 2007

## Sample Lightcurves



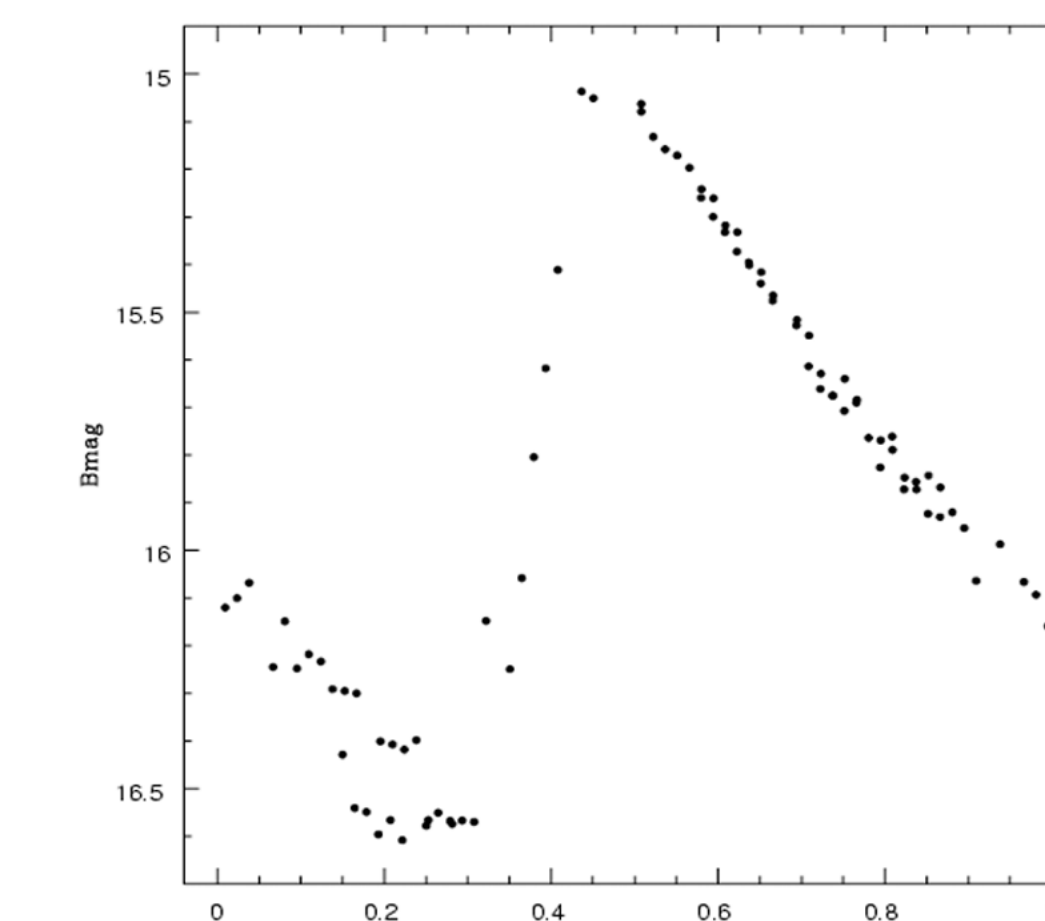
### CTM3 Cyg

This variable was discovered on a photographic survey by Marc Chapelet in the early 1990's. It was placed on the AAVSO program in 1996. Dense coverage began around JD 2453920, and shows a typical light curve of a semiregular pulsator with period around 70 days.



### GSC 03556-01944

This variable was discovered on Sonoita Research Observatory images, and then followed up by W. Cooney from his private observatory (Blackberry Observatory, Baton Rouge, LA). It shows a typical EA eclipsing binary.



### VX J193344.5+462555

This RRab variable was discovered on Sonoita Research Observatory images by J. Gross. A second night of observation completed the light curve and improved the period.

## References

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## The Campaign

This is a collaboration with the Howell, et al. Burrell-Optical-Kepler Survey (BOKS; see papers 162.15 and 162.16).

BOKS saturates around V=14, so the American Association of Variable Star Observers (AAVSO) initiated a worldwide campaign with amateurs to cover the 0.75x1.5deg field, primarily using Cousins Rc filters. The AAVSO campaign completes the stellar census from the BOKS saturation to the brightest stars in the field. The temporal coverage was extended over several months for the long period stars and to improve the periods of short period variables. The longitudinal coverage by AAVSO observers helps to remove period aliasing in BOKS data, and the geographical spread ensures continuous coverage of stars during lost KPNO nights. The AAVSO has 1000 members in 45 countries; another 1000 observers worldwide contribute data annually. See posters 162.04 and 162.05 for more detail. The AAVSO is an ideal organization for such campaigns, providing observers and training to achieve the highest scientific quality data.

15,000 CCD images were submitted from more than a dozen observers. Another 20 observers provided an additional 15,000 datapoints on the known variables in the field. Further analysis is in progress.

## Previous Variable-Star Studies

van Cauteren et al. (2005) monitored with BHO 0.4m telescope (26x28arcmin FOV) with typically 200 BV frames over several months in 2003. 441 stars studied; 9 were found to be new variables (6 delta Scuti, 1 short period, 2 longer period). See figures 4 and 5 below.

No other systematic survey has been made, though the field is covered by the unfiltered ROTSE-I NSVS survey (Wozniak et al. 2004).

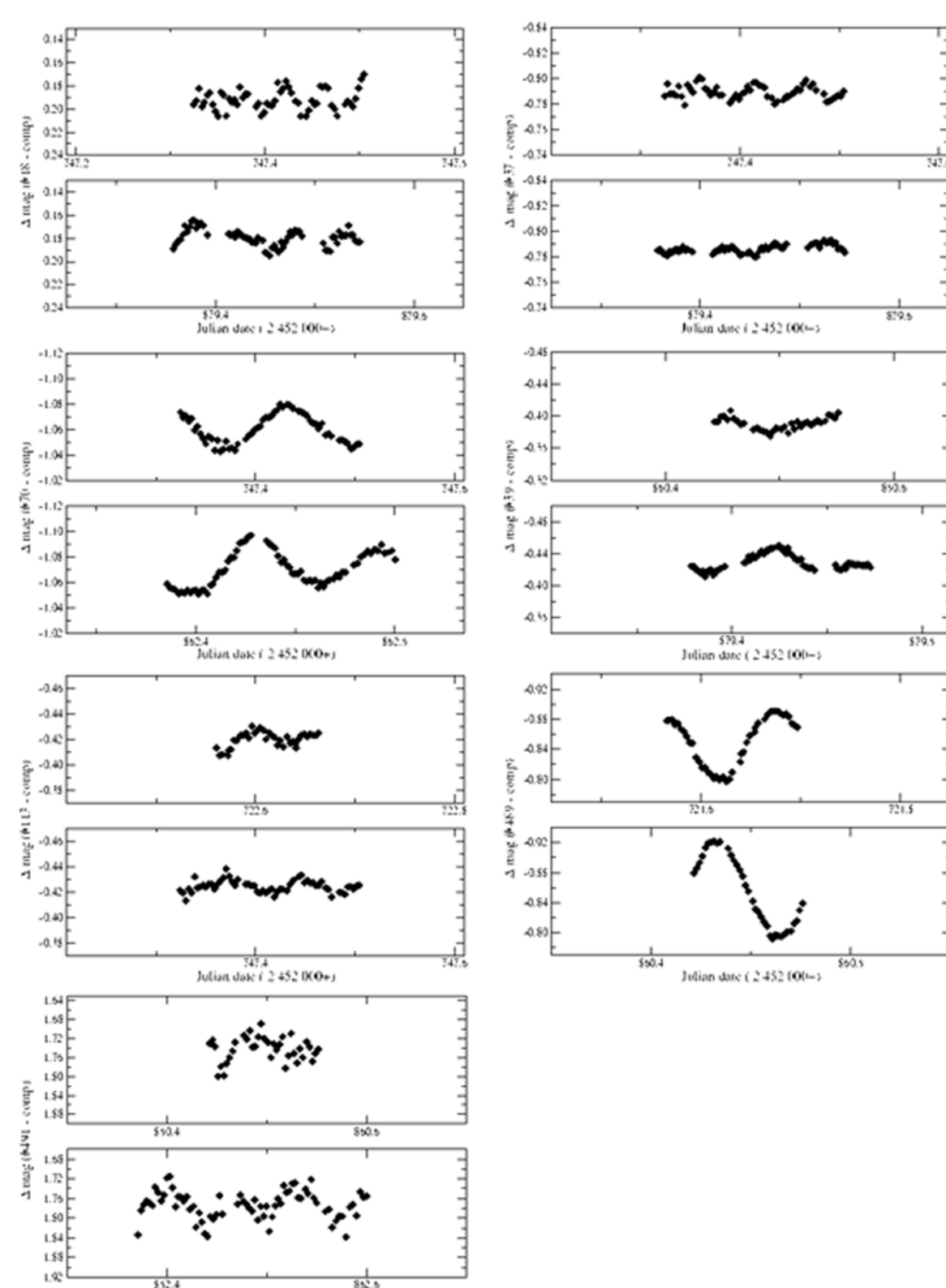


Figure 4: Light curves of NGC6811. From top to bottom and left to right: stars #18, #37, #70, #39, #113, #489, #491.

Download AAVSO Data: <http://www.aavso.org>