

# V2762 Cyg=SAX J2103.5+4545の可視光での変光周期

清田誠一郎 (VSOLJ、TAO Kamagaya)

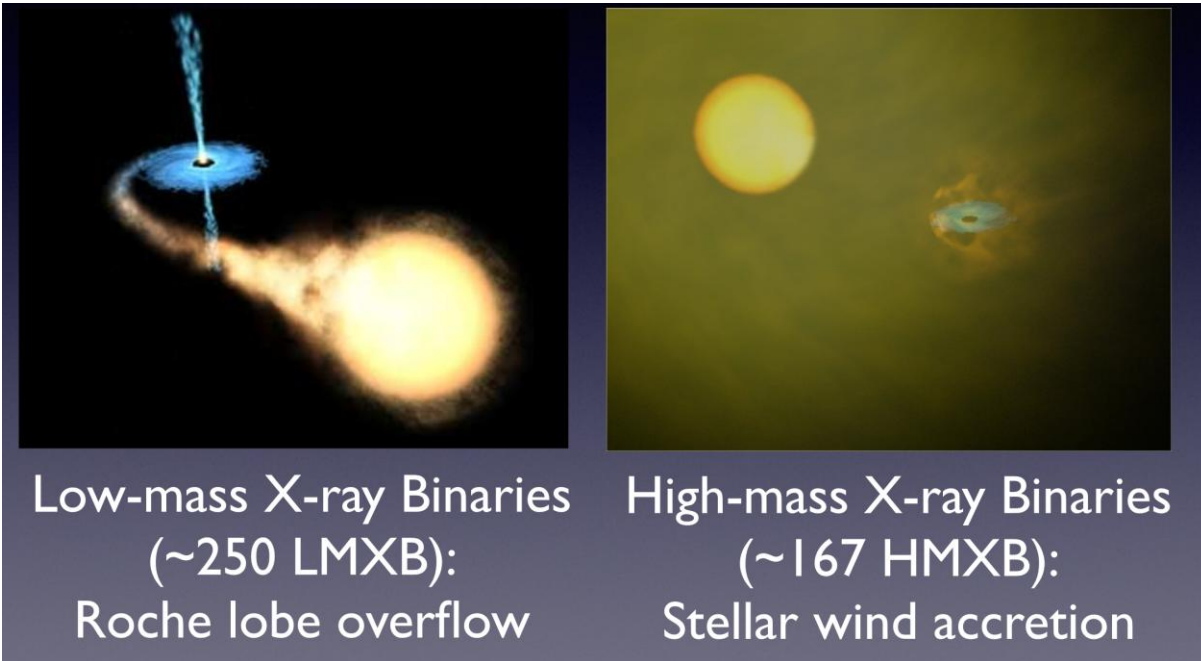
## Latest Details



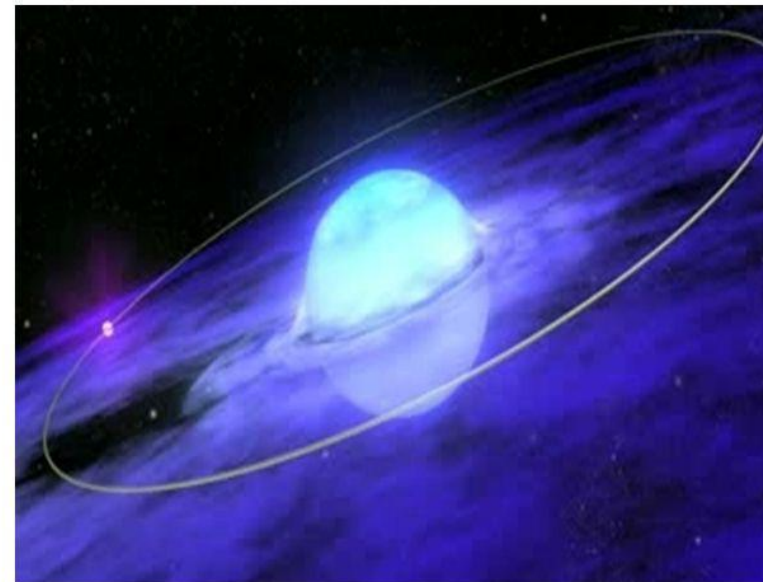
Log in to retrieve additional aliases from SIMBAD.

<b>Name</b>	<b>V V2762 Cyg</b>		
<b>AAVSO UID</b>	000-BLG-704 (4 observations)		
<b>Constellation</b>	Cygnus	<a href="#">» Sequence</a>	
<b>J2000.0</b>	21 03 35.72 +45 45 05.5 (315.89883 +45.75153)	<a href="#">» Search nearby</a>	
<b>B1950.0</b>	21 01 49.90 +45 33 08.5		
<b>Proper motion</b>	RA: -30.0 +/- 5.7 mas/y	Dec: -0.4 +/- 5.7 mas/y	Source: UCAC4
<b>Galactic coord.</b>	87.130 -0.685		
<b>Other names</b> (Internal only)	3UCAC 272-209099 SAX J2103.5+4545	GSC 03588-00834	IOMC 3588000111  (Not logged in) <a href="#">» Add name</a>
<b>Variability type</b>	HMXB	<a href="#">?</a>	
<b>Spectral type</b>	B0Ve		
<b>Mag. range</b>	13.27 - 14.6 R	<a href="#">?</a>	
<b>Discoverer</b>	--		
<b>Epoch</b>	--		
<b>Outburst</b>	--		
<b>Period</b>	--		
<b>Rise/eclipse dur.</b>	--		

# HMXB



## Be/X-ray binaries (BeX)



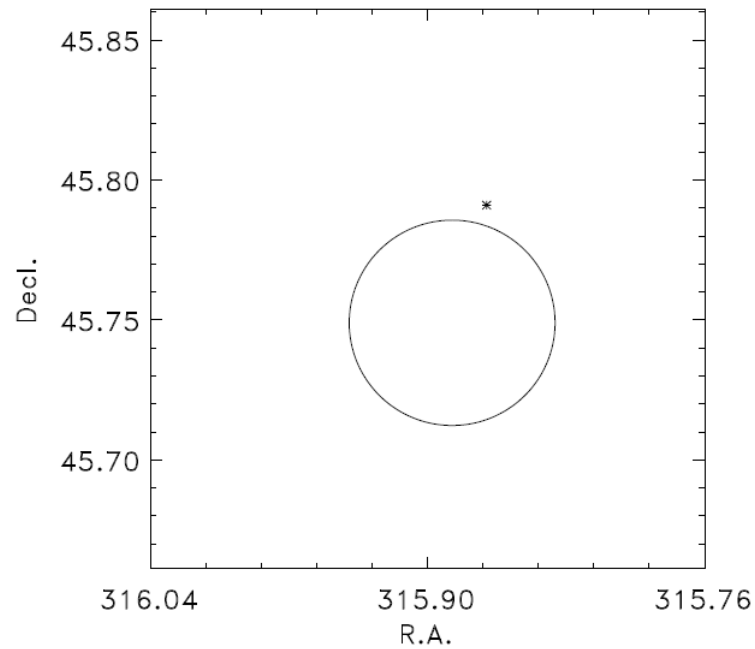
- Be Star  
+ X-ray pulsar
- **Transient** X-ray sources ( $L_x \sim 10^{37}$  erg.s<sup>-1</sup>)
- **Wide** and **eccentric** orbit ( $0.1 < e < 0.9$ )
- Accretion from the Be **equatorial disc**

S. Chaty, 2017

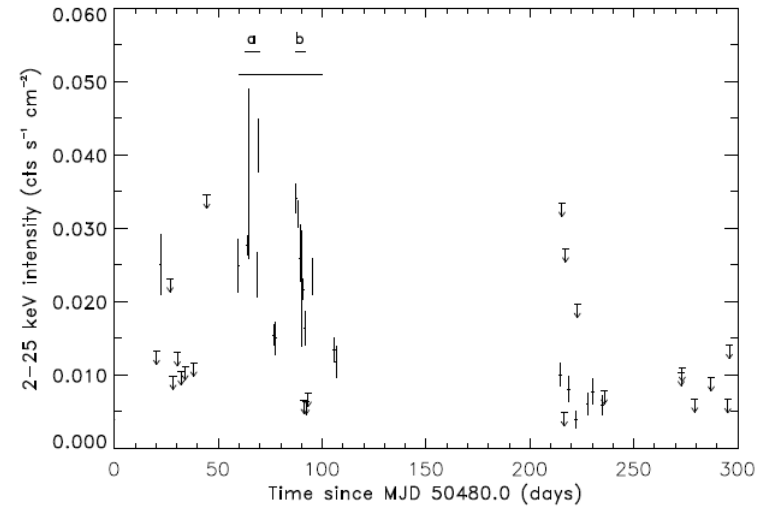
## Discovery of the transient X-ray pulsar SAX J2103.5+4545

F. Hulleman, J.J.M. in 't Zand and J. Heise

Space Research Organization Netherlands, Sorbonnelaan 2, 3584 CA Utrecht, the Netherlands



**Fig. 1.** Error box of SAX J2103.5+4545 at 99% confidence level, based on 2 to 10 keV data from two observation periods. Systematic and statistical sources of error are taken into account, the systematic errors dominate. The asterisk points to HD 200709.



**Fig. 2.** Time profile of SAX J2103.5+4545. The starting point of the time axis is February 1st, 1997. The thick vertical lines indicate the error bars on intensity for detections, the thin arrows indicate  $3\sigma$  upper limits. The time resolution is that of one observation period. This varies between 5 min and 1.15 days. The changing sensitivity is caused by changing off-axis angles for the source.  $0.01 \text{ cts s}^{-1} \text{ cm}^{-2}$  is 5 mCrab in 2 to 25 keV. The long horizontal line indicates the times for which a timing and spectral analysis was performed (see sections 3 and 4).

# Discovery of the optical counterpart to the X-ray pulsar SAX J2103.5+4545

P. Reig<sup>1,4</sup>, I. Negueruela<sup>2</sup>, J. Fabregat<sup>3</sup>, R. Chato<sup>1</sup>, P. Blay<sup>1</sup>, and F. Mavromatakis<sup>4</sup>

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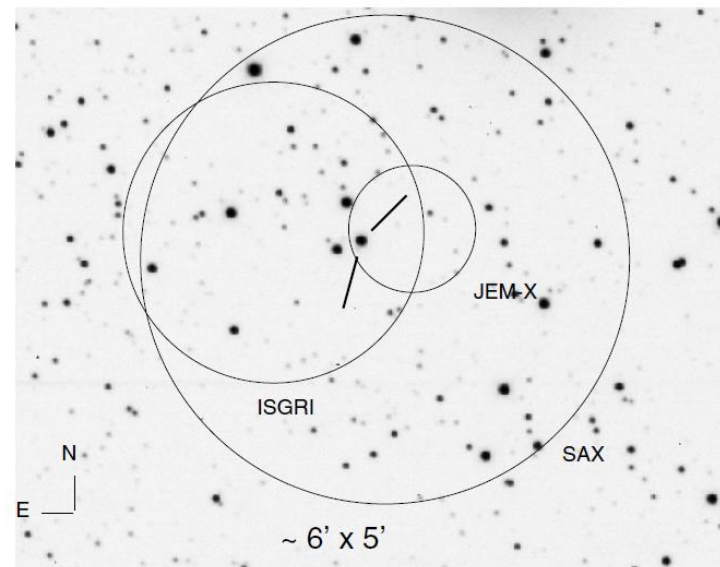
P. Reig et al.: The optical counterpart to SAX J2103.5+4545

**Table 1.** Optical and infrared magnitudes of SAX J2103.5+4545.

Optical				
Date	<i>B</i>	<i>V</i>	<i>R</i>	<i>I</i>
08/06/03	15.34 ± 0.02	14.22 ± 0.02	13.48 ± 0.02	–
24/08/03	15.36 ± 0.03	14.27 ± 0.02	13.59 ± 0.03	12.87 ± 0.03
Infrared				
Date	<i>J</i>	<i>H</i>	<i>K</i>	
24/08/03	11.97 ± 0.03	11.42 ± 0.03	11.20 ± 0.03	
27/08/03	11.38 ± 0.03	10.90 ± 0.03	10.67 ± 0.03	
05/12/03	11.41 ± 0.03	10.97 ± 0.03	10.75 ± 0.03	
04/01/04	11.40 ± 0.04	10.96 ± 0.05	10.75 ± 0.04	
07/01/04	11.40 ± 0.04	10.94 ± 0.04	10.71 ± 0.03	

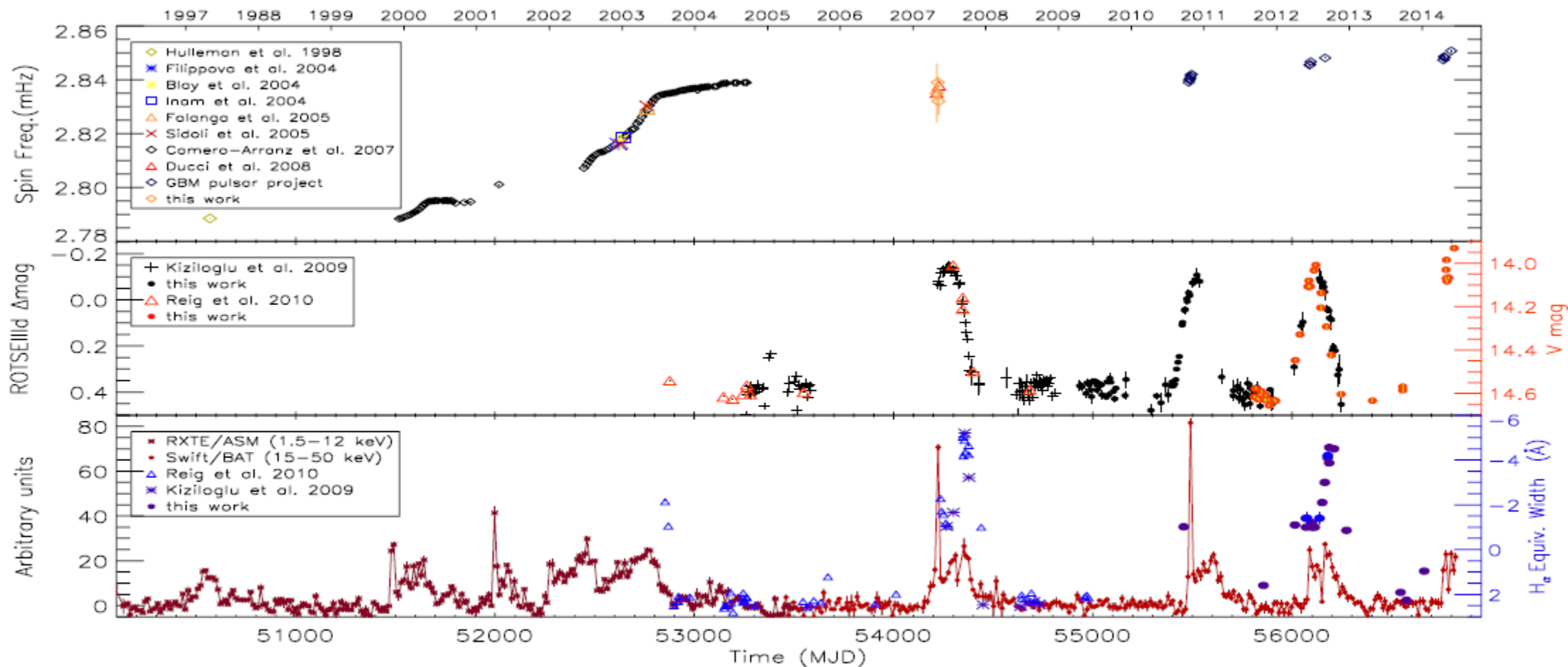
type (B8V) posed a serious hindrance to its candidacy as the correct optical counterpart.

In this work we present ground-based observations that identify the optical counterpart to SAX J2103.5+4545 and classify it as a Be/X-ray binary. The fast optical spectral variability,



**Fig. 1.** Optical *V* filter image of the field around SAX J2103.5+4545, with the X-ray position uncertainty circles from the WFC onboard BeppoSAX (99% confidence level) and ISGRI and JEM-X onboard INTEGRAL (90% confidence level). The coordinates of the proposed optical counterpart are RA = 21:03:35.7 Dec = +45:45:04 (Eq. 2000).

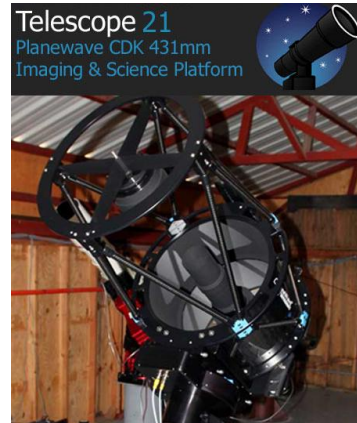
### A. Camero et al.: Recent activity of SAX J2103.5+4545



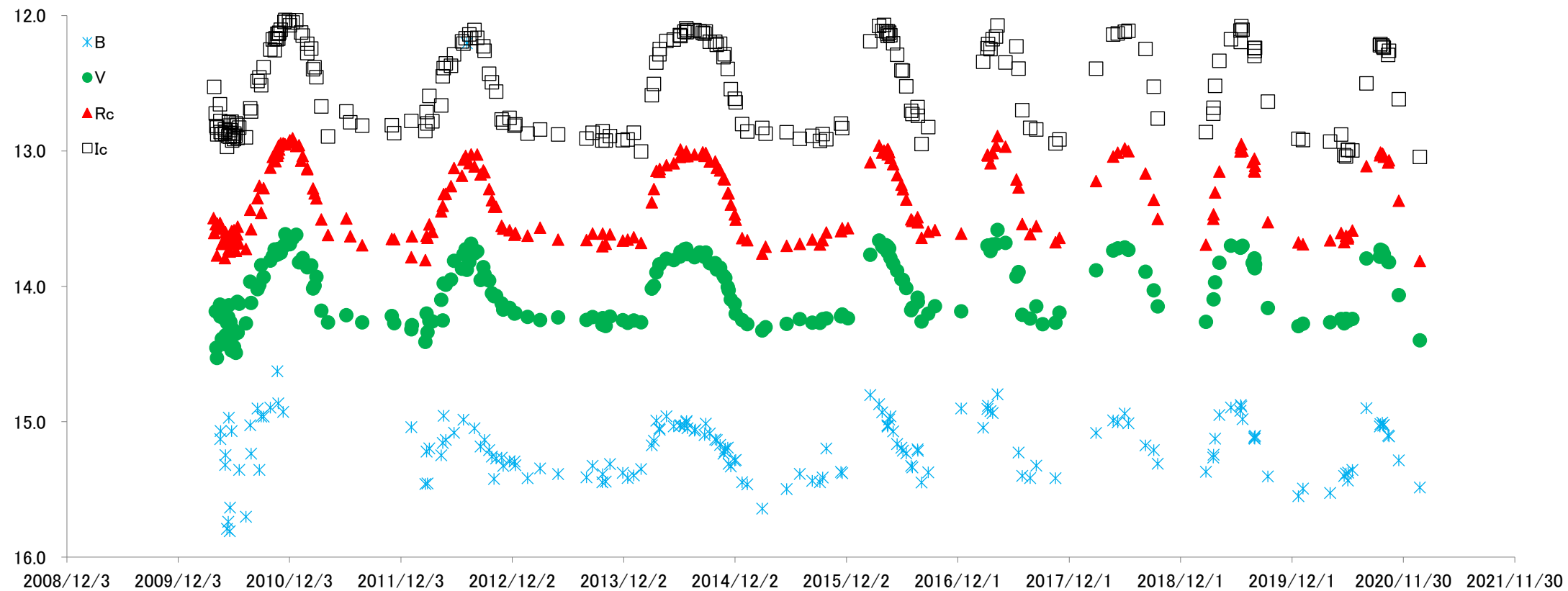
**Fig. 7.** *Top:* long-term spin frequency history of SAX J2103.5+4545 since its discovery in 1997. To visualize this plot more clearly we do not display the results from Baykal et al. (2002, 2007), our first XRT frequency determination from Table 3, and some values from Sidoli et al. (2005). *Middle:* long-term optical light curve of this source. *Bottom:* history of the outbursts during the same period. The peak intensities of the different outbursts are only intended to be illustrative of the times and types of events since they have not been corrected for the different energy bands. The long-term evolution of the H $\alpha$  EW (blue triangles, stars, and filled circles) is also overlotted.

**Observatory:** New Mexico Skies at Mayhill, New Mexico - MPC H06

**Telescope:** 0.43-m f/6.8 reflector + + f/4.5 focal reducer + [FLI-PL6303E](#) CCD camera



# Lightcurve



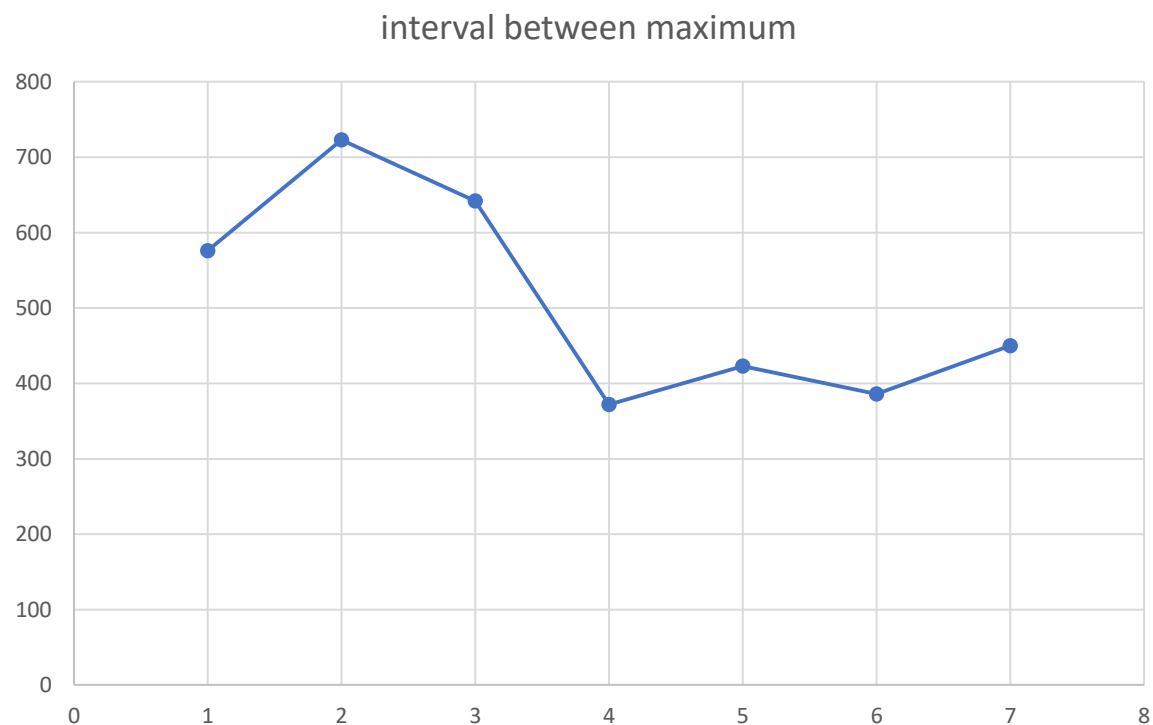


# Max-Max

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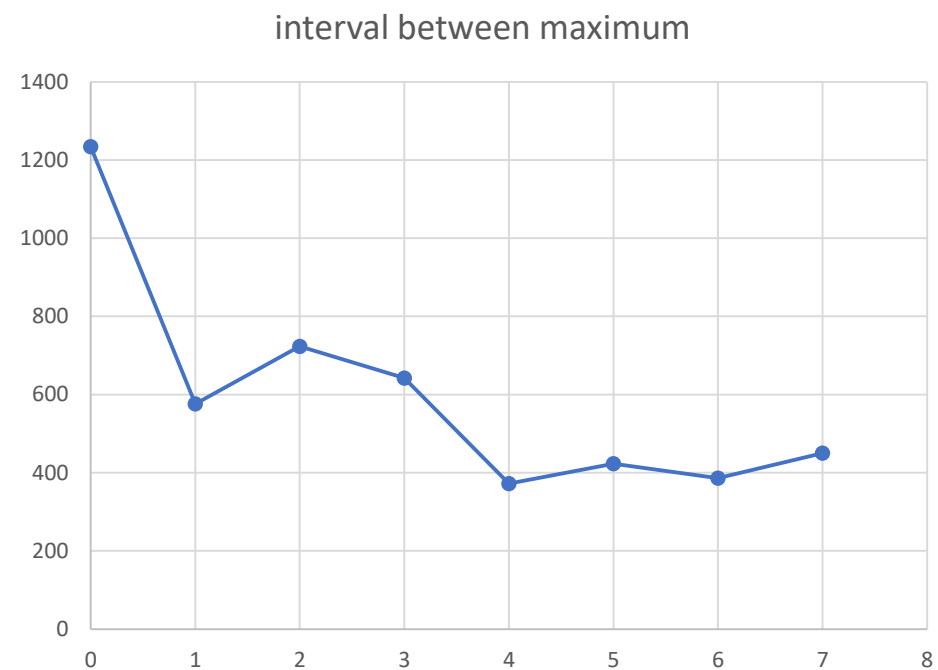
Max	E	Max-Max(d)
2455534	1	1234
2456110	2	576
2456833	3	723
2457475	4	642
2457847	5	372
2458270	6	423
2458656	7	386
2459114	8	450

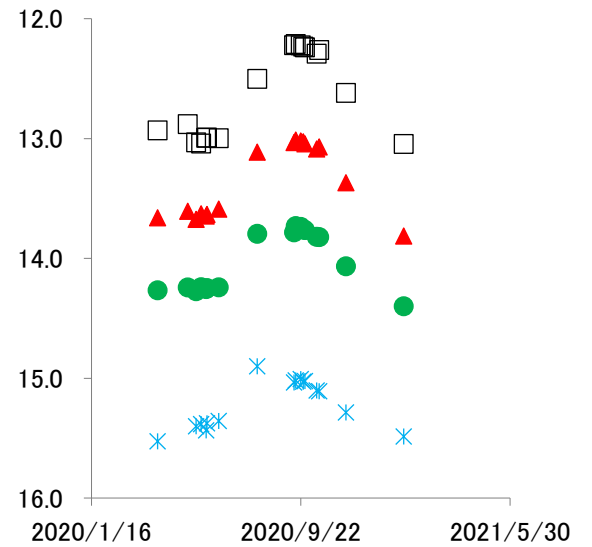
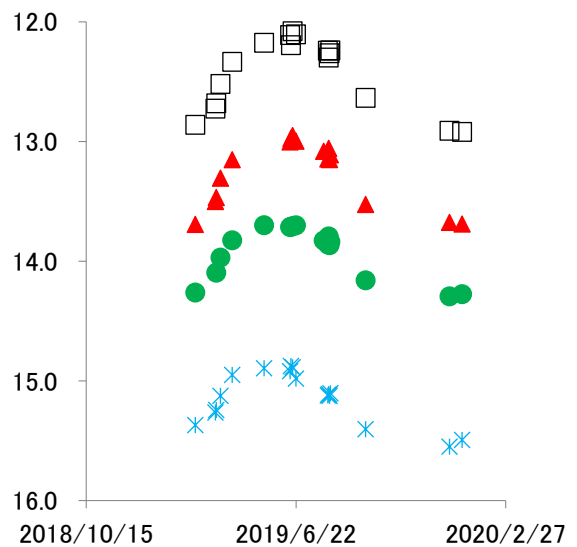
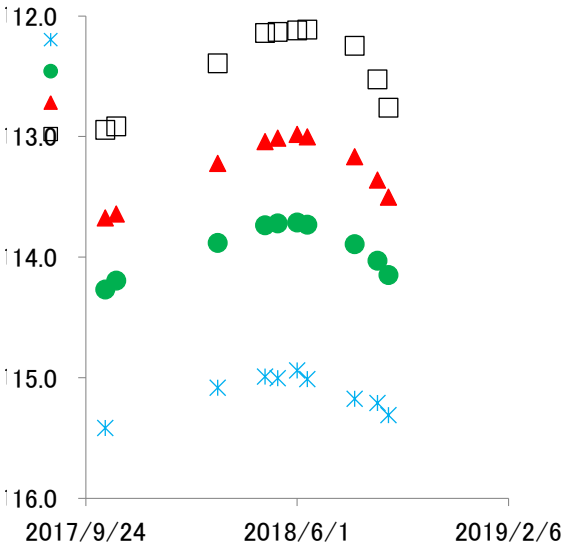
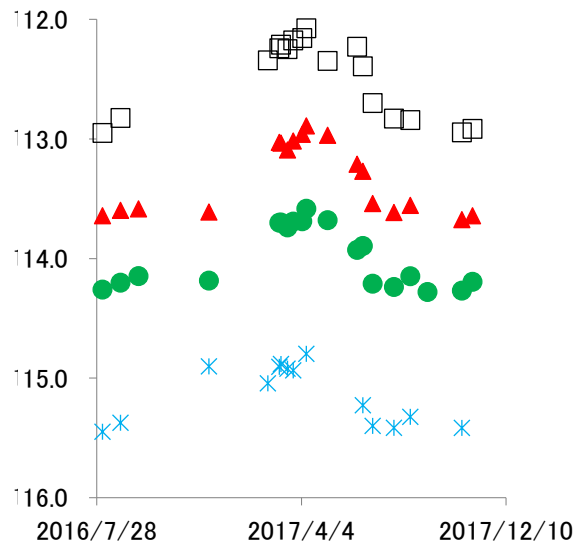
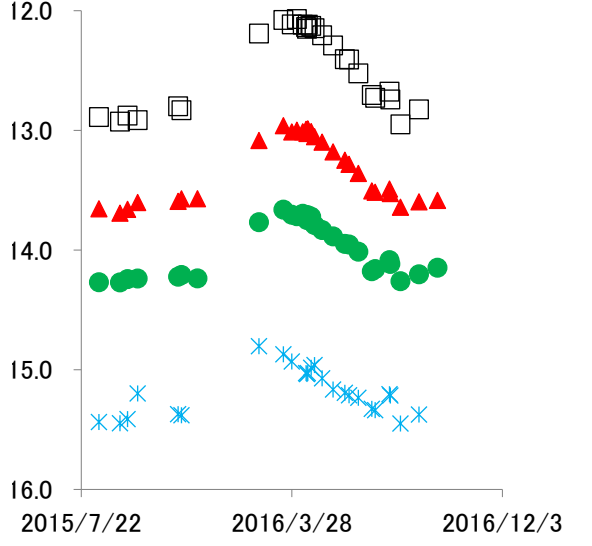
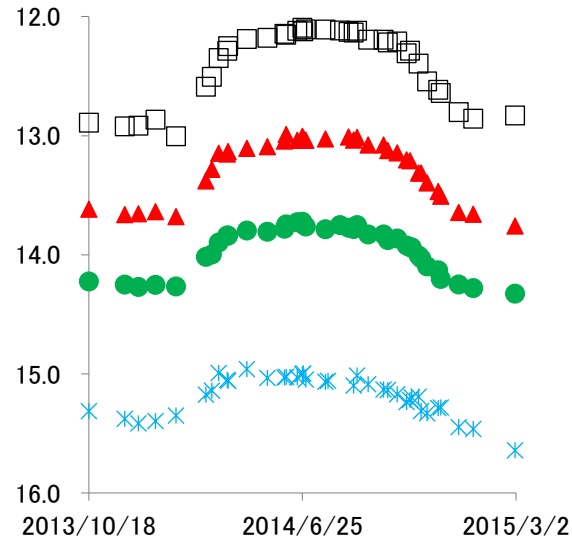
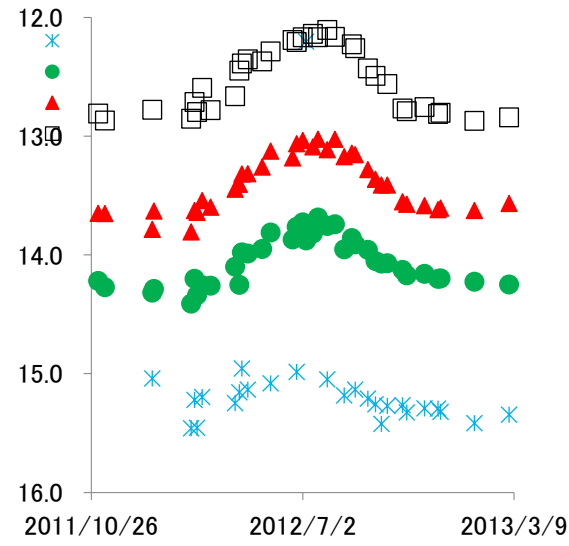
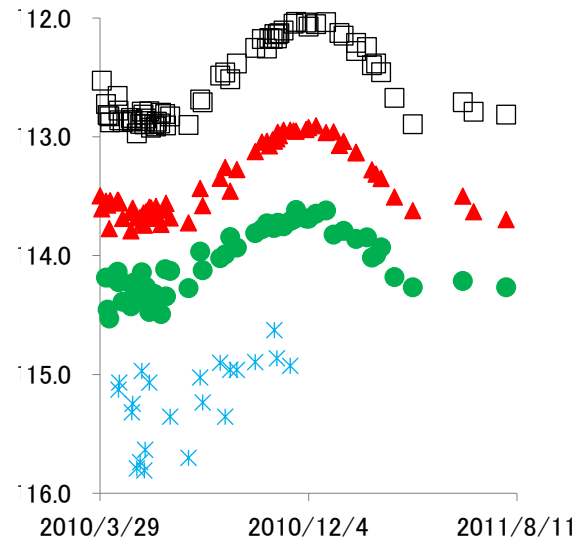
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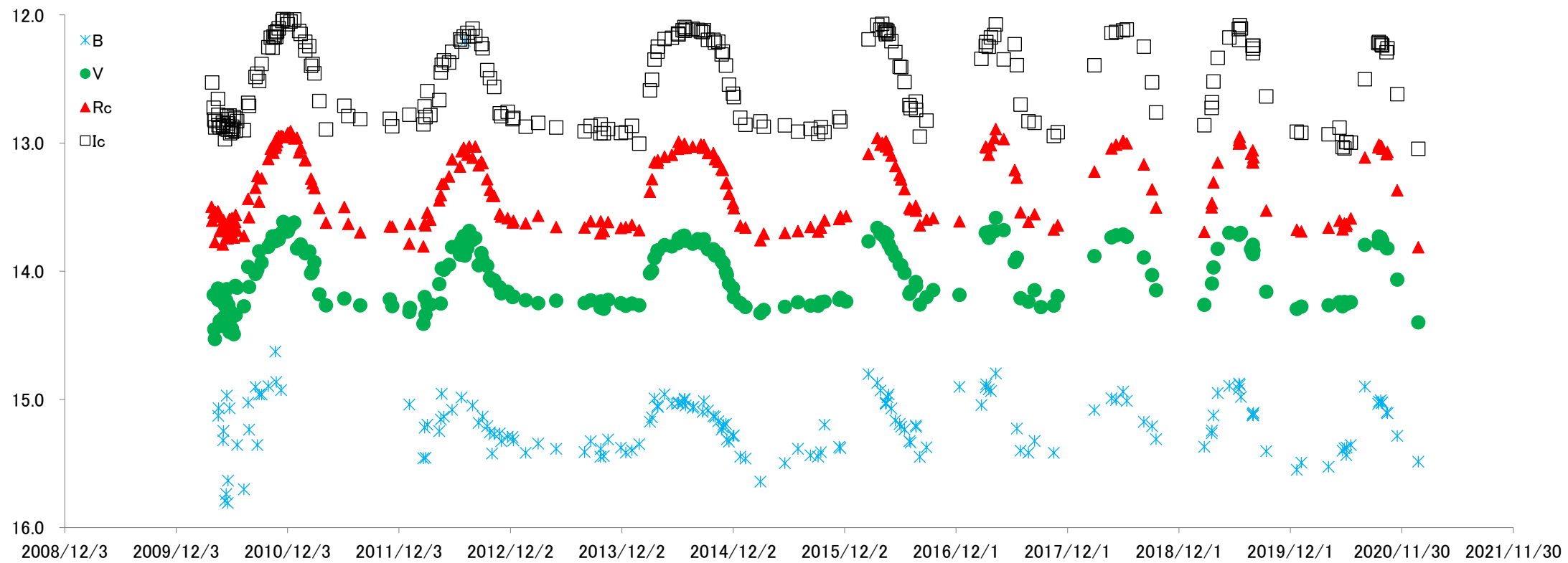


# Max-Max

Max	E	Max-Max(d)
2454300	0	Cameri(2014)
2455534	1	1234
2456110	2	576
2456833	3	723
2457475	4	642
2457847	5	372
2458270	6	423
2458656	7	386
2459114	8	450





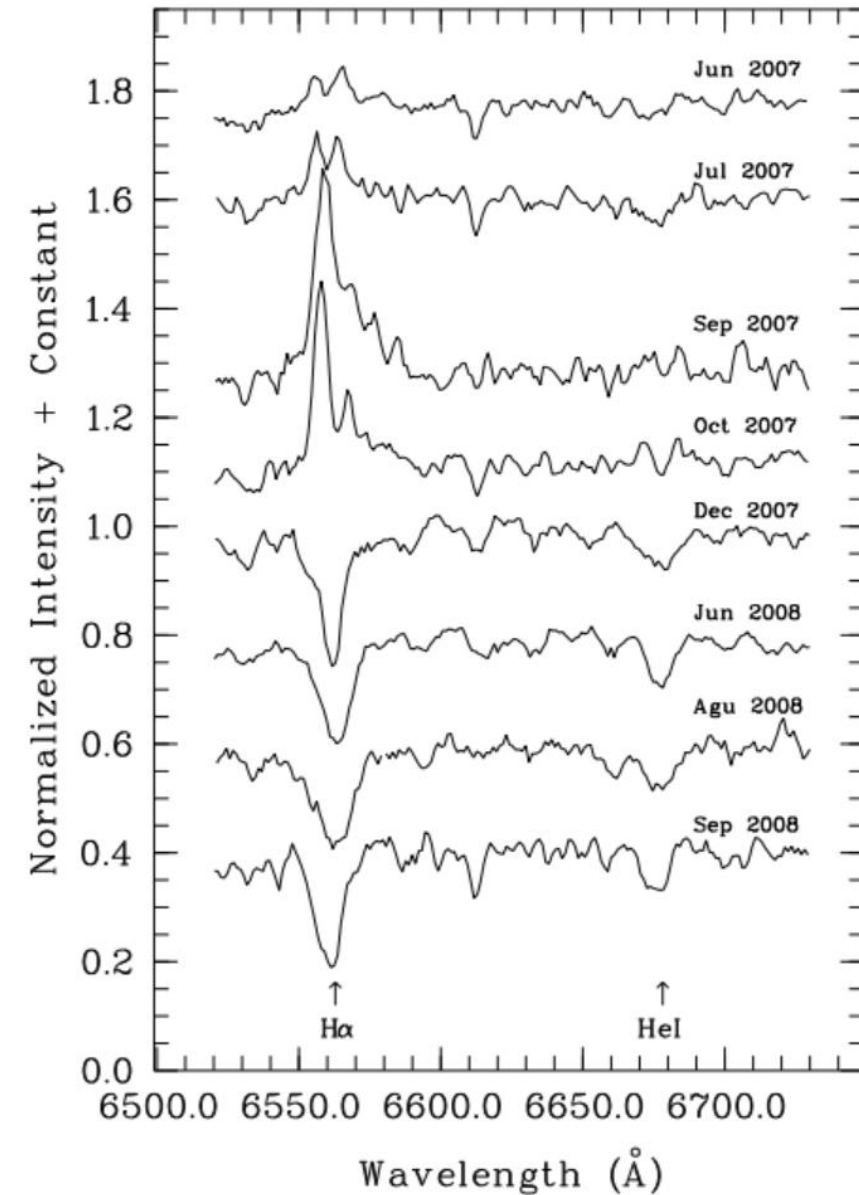


# Summary

- V2762 Cygの可視光から近赤外の増光の様子を11年ほどのスパンの観測を行った。
- 増光の間隔が徐々に短くなっている。
- 間隔が短くなっているのは、静穏期の期間が短くなっていることによる。
- 今後、どういう推移をたどるかモニターを続ける必要がある。

## Optical and X-ray outbursts of Be/X-ray binary system SAX J2103.5+4545

Ü. Kızıloğlu, S. Özbilgen, N. Kızıloğlu, and A. Baykal



**Fig. 6.**  $H\alpha$  and HeI ( $\lambda$  6678) profiles observed after The type II outburst. Each profile normalised and properly offsetted.