

4767 SUTOKU LIGHTCURVE DETERMINATION

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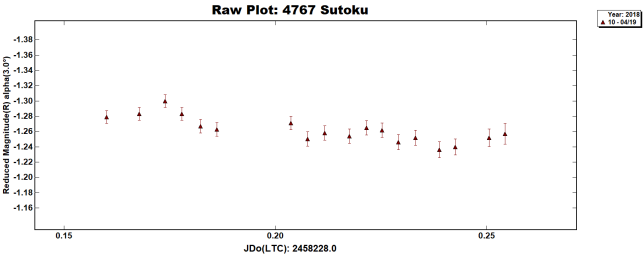
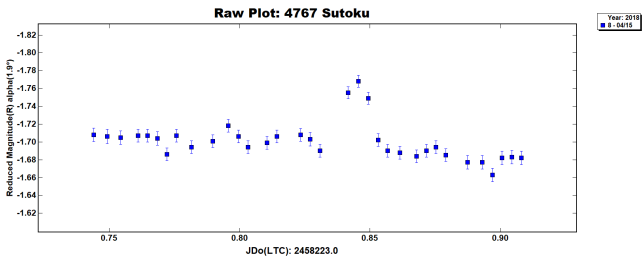
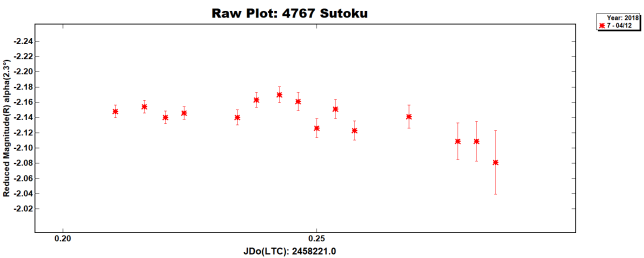
Images from three nights of observing 4767 Sutoku were analyzed using aperture photometry. The asteroid’s raw data did not yield a definitive periodic trend.

Named in honor of the 75th emperor of Japan, 4767 Sutoku is a main-belt asteroid discovered in 1953. It has a diameter of 8.36 km and a semi-major axis of 2.69 AU.

Two different telescopes were used for our observations, both provided and maintained by iTelescope.net. The first telescope was T30, in the Siding Spring Observatory in Australia. The T30 telescope uses an FLI Proline PL6303 CCD, with a 3072 x 2048 array of 9- μ m pix. The telescope has a field of view of 27.8 x 41.6 arcminutes and an angular resolution of 0.81 arcsec/pix. The second telescope used was iTelescope’s T21, in Mayhill, New Mexico. This telescope is also fitted with an FLI Proline PL6303E CCD. It has a resolution of 0.96 arcsec/pix and a field of view of 32.8 x 49.2 arcminutes. These telescopes were both used to take images with an exposure of 300 seconds and a luminance filter.

4767 Sutoku was successfully observed on 2018 April 12, 15, and 19. Over the nights of observation, Sutoku’s brightness varied very little. As such, Sutoku’s rotation period could not be determined. This could be a result of Sutoku having one or more of the following properties: nearly spherical shape, extremely long rotation period, or rotation pole pointed towards the observer.

The three figures display the raw data plots for the three nights of observation.



It was difficult to identify any periodic trends in the raw plots. The highest fluctuation measured was a mere 0.1 magnitude. Additionally, some of the changes that did occur in the data are difficult to explain. Particularly, on April 15th there is an anomalous peak around a date of 0.8. The data for this night have been reanalyzed several times and this feature has appeared each time.

Overall, we did not acquire sufficient data to propose a reasonable phased lightcurve and rotation period for 4767 Sutoku. Due to the lack of prior research and low quantity of images analyzed, additional research will be necessary in order to determine a model for the rotation period of Sutoku. These three proposed scenarios regarding Sutoku can serve as a basis to guide future observations and analyses.

Acknowledgements

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References

Harris, A.W., Young, J.W., Scaltriti, F., Zappala, V. (1984). “Light curves and phase relations of the asteroids 82 Alkmene and 444 Gytis.” *Icarus* **57**, 251-258.

JPL (2018). Small-Body Database Browser. <http://ssd.jpl.nasa.gov/sbdb.cgi#top>

Warner, B.D., Harris, A.W., Pravec, P. (2009). “The Asteroid Lightcurve Database.” *Icarus* **202**, 134-146. Updated 2016 Sep. <http://www.minorplanet.info/lightcurvedatabase.html>

Warner, B.D. (2017). MPO Software. MPO Canopus v10.7.7.0. Bdw Publishing. <http://minorplanetobserver.com>

Number	Name	2018 05/04	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
4767	Sutoku	04/12-04/19	67	8.6, 9.6	350.3	-22.2					MB

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). Grp is the asteroid family/group (Warner *et al.*, 2009).