

ANOTHER ASTEROID WITH A CHANGING LIGHTCURVE: 232 RUSSIA

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During its early 2014 apparition the lightcurve shape and inferred synodic rotation period for 232 Russia changed considerably. The best fit to data in the entire interval 2014 Mar. 25 - May 25 is with a lightcurve with a period 21.905 ± 0.001 hours, amplitude 0.14 ± 0.01 magnitudes.

Changes in asteroid lightcurves caused by changing phase angle and viewing aspect are frequently noted when the observations include a large range of phase angles. They provide information useful for spin/shape modeling. The photometric observations of 232 Russia in the interval 2014 Mar. 25 - May 25 constitute an example of an unusually large change in lightcurve appearance. Previously published rotation periods for 232 Russia are by Behrend (2005), 21.72 hours with only partial phase coverage; Torno et al. (2008), 21.8 hours from a very sparse data set; and Ruthroff (2009), 21.91 hours from a dense data set which looks convincing.

New observations of 232 Russia have been made at the Organ Mesa Observatory with a 35.4 cm Meade LX200 GPS S-C and SBIG STL 1001-E CCD. Photometric measurement and lightcurve construction are with *MPO Canopus* software. All exposures are 60 second exposure time, unguided, clear filter. To reduce the number of points on the lightcurves and make them easier to read data points have been binned in sets of 3 with maximum time difference 5 minutes.

Observations on 8 nights 2014 March 25 - April 7 at phase angles 21.5 degrees to 17.0 degrees provide a good fit to a lightcurve with period 22.016 ± 0.004 hours, amplitude 0.15 ± 0.01 magnitudes, with full phase coverage. A second set of observations on 8 nights 2014 Apr 28 - May 25 at phase angles between 5.2 degrees and 9.6 degrees provides a good fit to a lightcurve with period 21.904 ± 0.002 hours, amplitude 0.14 ± 0.01 magnitudes, again with full phase coverage. When all 16 sessions are plotted on a single lightcurve a large misfit is shown between the March 25 - Apr 7 large phase angle observations and the April 28 - May 25 small phase angle observations. The synodic period which best represents all 16 sessions is 21.905 ± 0.001 hours. This value is consistent with all of the previous period determinations.

References

- Behrend, R. (2005). Observatoire de Geneve web site, http://obswww.unige.ch/~behrend/page_cou.html
- Ruthroff, J. (2009). "Photometric Observations and Lightcurve Analysis of Asteroids 129 Antigone, 174 Phaedra, 232 Russia, 291 Alice, and 343 Ostara." *Minor Planet Bull.* **36**, 121-122.
- Torno, S., Oliver, R. L., Dittion, R. (2008). "Asteroid Lightcurve Analysis at the Oakley Southern Sky Observatory - October 2007." *Minor Planet Bull.* **35**, 54-55.

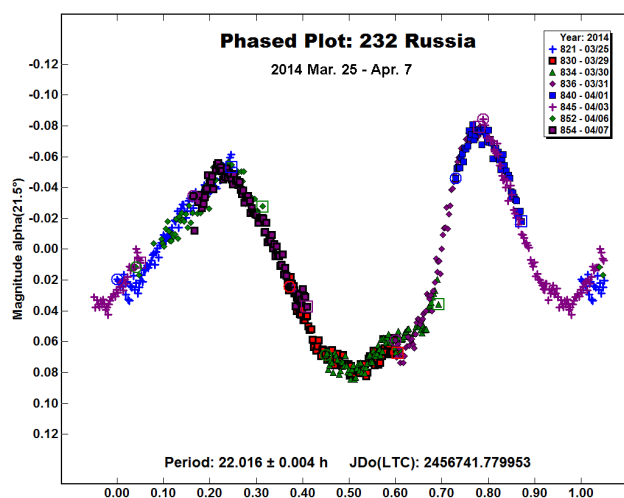


Figure 1. Lightcurve of 232 Russia in the interval 2014 Mar. 25 - Apr. 7

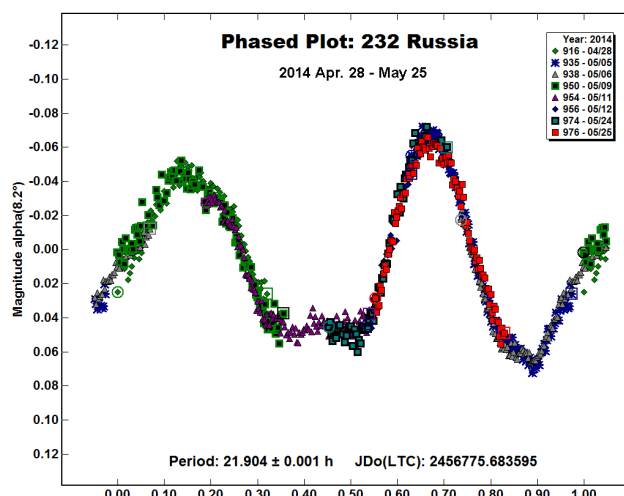


Figure 2. Lightcurve of 232 Russia in the interval 2014 Apr. 28 - May 25

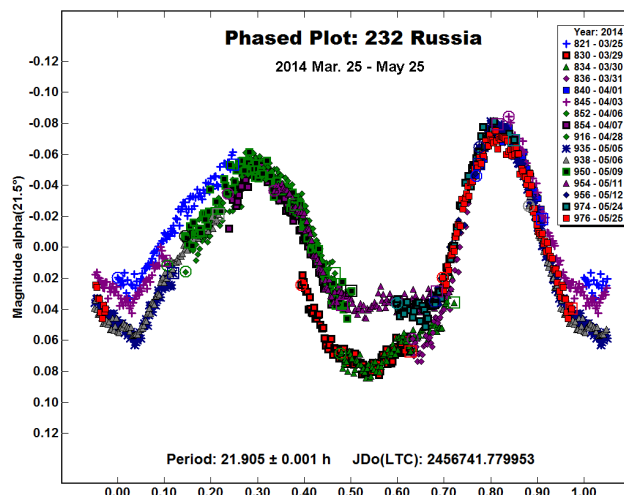


Figure 3. Lightcurve of 232 Russia in the interval 2014 Mar. 25 - May 25