The authors want to thank Dr. Harris for his continuing and invaluable support and insights.

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# PERIOD DETERMINATIONS FOR 265 ANNA AND 1584 FUJI

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Minor planets 265 Anna and 1584 Fuji were observed from two sites widely separated in longitude. The former was observed over 12 nights (22 rotations) and the latter over 15 nights (23 rotations). Unfiltered CCD photometry yielded a synodic rotation period of 11.681 ± 0.006 hours for Anna and a period of 14.880 ± 0.013 hours for Fuji. The amplitudes are 0.48 and 0.17, respectively.

## Introduction

Minor planet 265 Anna was discovered in 1887 by J. Palisa at Vienna Observatory. No previously published lightcurves have been found for this main-belt asteroid and no data are listed in the tabulations of Harris and Warner (2003). Its diameter is quoted as 30 km and the albedo as 0.054. Minor planet 1584 Fuji was discovered in 1927 by O. Oikama at Tokyo and named after the highest mountain in Japan. This main-belt, S-type asteroid is one of the Phocaea group with an albedo of 0.13 and a B-V of 0.89. There are no previously published lightcurves, but the asteroid is listed in the tabulations of Harris and Warner (2003), where its period is noted as possibly 10 hours with an amplitude of 0.3 magnitudes. The diameter is quoted as 25 km. Both of these asteroids were chosen from the lists published in the *Minor Planet Bulletin* (e.g. Warner, et al., 2004).

## Observations and Results

In early 2004 both these minor planets were favorably placed for southern observers. Unfiltered CCD photometry was employed and no light-time corrections have been applied. Data were plotted as instrumental differential magnitude vs JD and initial graphical analysis was carried out.

For 265 Anna, some 14 extrema observed during March 2004 yielded an initial period of 11.700 hours. Analysis was then performed using the AVE software (Barbera, 2004) and the Phase Dispersion Minimisation (PDM) technique. Periods between 0.35 and 1.2 days were searched and a distinct minimum on the periodogram occurred at 0.486 days. This was then refined further by trial phase stacks – finally yielding a period of 0.487 days or 11.681 ± 0.006 hours. Using this period and a zero phase epoch of JD 2453083.96 the data were phase stacked as shown in Figure 1. An additive constant was applied to match the magnitudes on different nights. The lightcurve variation is 0.48 magnitudes. Using a tri-axial ellipsoid model, this implies an axial ratio a/b of 1.55 – a significantly non-spherical shape – possibly a good candidate for shape modelling. The high value of the variation suggests that this asteroid was at near-equatorial aspect at this opposition. As all phases of the rotation were observed with a good density of points, we believe this is a secure result.

For 1584 Fuji, some 11 extrema observed in February 2004 were used in the initial graphical analysis, yielding a period of 14.89 hours. The AVE software and the PDM method were then employed to search periods between 0.3 and 0.85 days. The periodogram showed a large distinct minimum at 0.620 days (14.880 ± 0.013 hours) and a secondary minimum at 0.310 days. The latter was judged to be an alias as the phase stack produced a single maximum and minimum. The data were phase stacked using the above period and a zero phase epoch of JD 2453047.049 (Figure 2). For the final lightcurve the individual night lightcurves were adjusted by an additive constant. The lightcurve amplitude is 0.17 magnitudes. This variation implies an axial ratio a/b of 1.17, however, the previously reported variation of 0.3 magnitudes suggests a higher ratio at more equatorial aspects. Almost all phases of the rotation were observed with a high density of points yielding a secure result.

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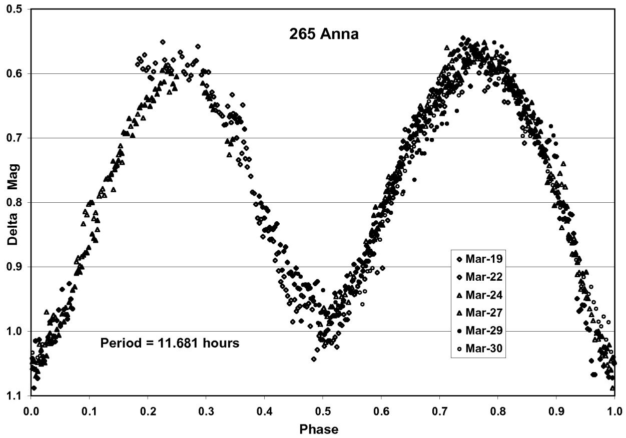


Figure 1. Composite lightcurve – 265 Anna in March 2004.

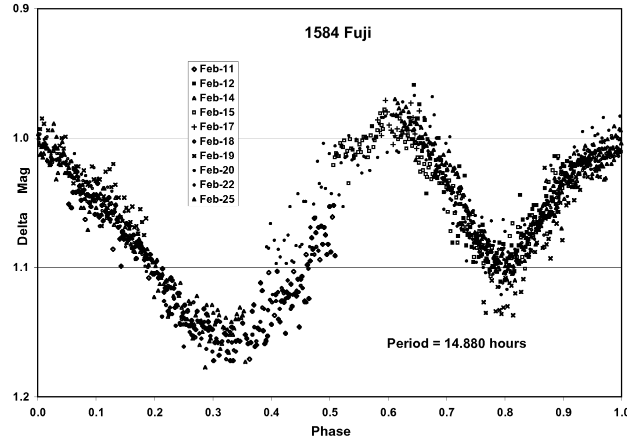


Figure 2. Composite lightcurve – 1584 Fuji in February 2004.

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## THE MINOR PLANET OBSERVER: DATA AND MORE DATA!

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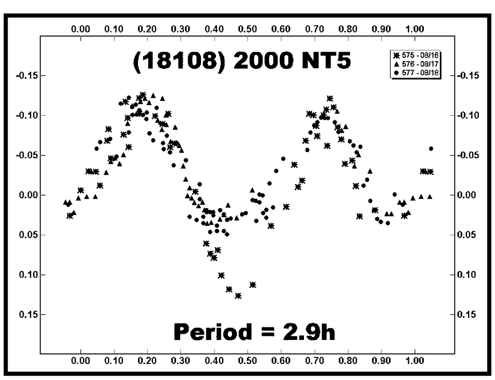
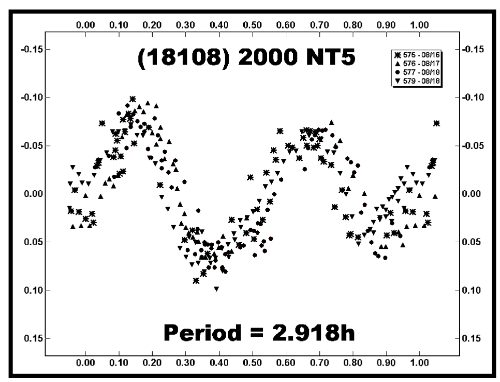
The oft-heard phrase in asteroid photometry is "More Data!" Asteroids do not always give up their secrets easily with the initial runs of data showing the promise of finding a period (or none) and the subsequent runs only confusing the issue. If a "normal" curve suddenly displays something unusual, say an unexpected dip, the urge is think "binary". It's a temptation difficult to ignore. However, good science says that the proof is not in the pudding but in multiple observations for which there is no explanation other than the data represents something physically real.




The plot above shows the data that I acquired over three nights for (18108) 2000 $NT_5$ when phased against a period of 2.9h. My immediate thought was that I'd caught a binary event (the "dip" at 0.5 phase). Was it real? I sent the data to Petr Pravec at Ondrejov Observatory in the Czech Republic and asked if he might be able to observe the asteroid. He set Peter Kusnirak on the task and then sent me the resulting data. In the meantime, I also remeasured my images, using a different set of comparison stars for the one session that showed the anomalous behavior, even though the plots for the comparisons didn't show anything wrong. In the second set, I used some brighter comparisons to cut down the noise and dropped a few images where clouds had rolled in. The net result is shown below.




Note that the dip is gone. Measuring the images with a second set comparisons and not using some "bad" images gave a much different result! Is it *the true* result? Mostly likely it is. Another rule to remember is that the less complicated answer is usually the best answer. A binary asteroid, while not as rare as once thought, is also not that common. When in doubt, check and double check. If after that you still have something, then you can quote the famous fictional detective, Sherlock Holmes: "When you have exhausted all other possibilities, then whatever remains, no matter how improbable, must be the truth."

### SAPC and OLAF

For sometime, it's been the hope of Mikko Kaasalainen of the University of Helsinki to get an on-line database of asteroid lightcurve data established. The Uppsala system was a bit cumbersome and hasn't been updated for some time. Toward that goal of an easy to use site, I've worked with Dr. Kaasalainen to develop something that allows observers to upload text files for use by other researchers. The Standard Asteroid Photometry Catalog (SAPC) can be found at

http://www.minorplanetobserver.com/sapc/default.htm

This is a very basic site but it's a beginning. The problem is that it's not overly formal and its lifetime is whatever I can support. Should I suddenly inherit millions, my inclinations may change!