LIGHTCURVE ANALYSIS OF MINOR PLANETS OBSERVED AT THE OAKLEY SOUTHERN SKY OBSERVATORY: 2018 AUGUST–SEPTEMBER

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During 2018 August and September, we targeted seventeen minor planets for CCD photometric observations using the Oakley Southern Sky Observatory: 1359 Prieska, 1504 Lappeenranta, 2373 Immo, 3197 Weissman, 3248 Farinella, 3330 Gantrisch, 3819 Robinson, 3901 Nanjingdaxue, 4286 Rubtsov, 6086 Vrchlicky, 7291 Hyakutake, 7497 Guangcaishiye, (10565) 1994 AT1, (14874) 1990 US4, (16880) 1998 BW11, (17989) 1999 JE64, and (52402) 1993 TL.

In 2018 we made CCD photometric observations every clear night from Aug 1-11 for the minor planets 1504 Lappeenranta, 3197 Weissman, 3330 Gantrisch, 3901 Nanjingdaxue, (14874) 1990 US4, and (17989) 1999 JE64. From Aug 28 through Sep 9 we observed 1359 Prieska, 3248 Farinella, 6086 Vrchlicky, 7291 Hyakutake, (10565) 1994 AT1, (16880) 1998 BW11 at every opportunity. Minor Planets 2373 Immo, 3819 Robinson, 4286 Rubtsov, 7497 Guangcaishiye, and (52404) 1993 TL were observed when possible from Sep10-20.

The telescope in the Oakley Southern Sky Observatory is a 0.5-m corrected Dall-Kirkham reflector. The camera is a ProLine PL4240 made by Finger Lakes Instrumentation with 13.5 µm pixels. The camera was binned 2x2 which results an image scale of 1.63 arcseconds per pixel. Standard image processing was done using *MaxImDL*. The photometric measurements were made with *MPO Canopus*.

Table I lists the targets, the range of dates when they were observed, the number of data points used, the phase angle range, the phase angle bisector longitude and latitude. If a period was determined, that is also listed with an estimated uncertainty on the period. For all of the minor planets, the peak-to-peak amplitude was determined with an estimated uncertainty.

As it turned out, 3197 Weissman was only about a degree away from Mars during our observations. The glare from Mars prevented us from even measuring this minor planet, so it does not appear in Table I.

We were unable to determine a period for 1359 Prieska, 3819 Robinson, 6086 Vrchlicky, or 7291 Hyakutake because our data for these minor planets was too noisy.

1359 Prieska. In 2011 (Ditteon et al., 2012) and again in 2013 (Vinson et al. 2014), we collected data on this minor planet but were unable to determine a period. Unfortunately, we are still unable to determine a period. Our data collected in 2018 show a very long period (greater than 48 hours) and very low amplitude.

1504 Lappeenranta. Our period of 15.18 ± 0.05 h agrees with the period of 15.190 ± 0.009 h found by Garlitz (2013).

3248 Farinella. Previously (Ditteon, 2012), we reported a period of 6.676 ± 0.002 h for this minor planet. The new data have a better fit with a period of 3.339 ± 0.005 h, which agrees with half the previous period. The shorter period is almost certainly correct.

3819 Robinson. We collected data for 3819 Robinson in 2009 (Krotz, *et al*. 2010) but were unable to determine a rotation period. We were also unsuccessful in 2018.

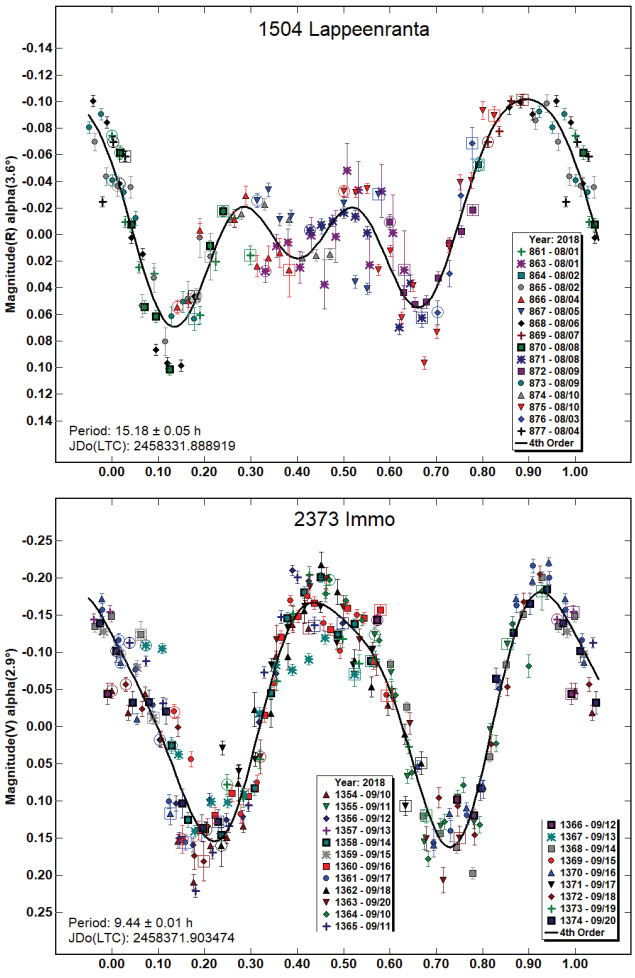
References

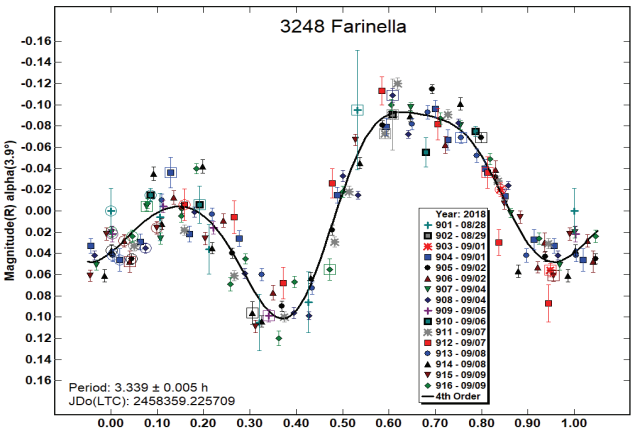
Ditteon, R., Horn, L., Kamperman, A., Vorjohn, B., Kirkpatrick, E. (2012). "Asteroid Lightcurve Analysis at the Oakley Southern Sky Observatory: 2011 April–May." *Minor Planet Bulletin* **39**, 26–28.

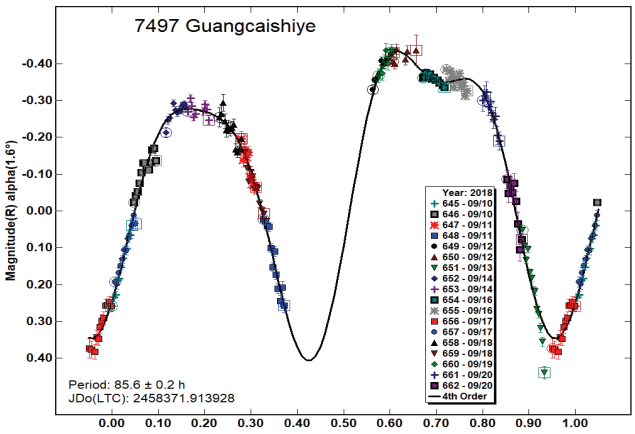
Garlitz, J. (2013). Posting on CALL web site. *http://www.minorplanet.info/call.html*.

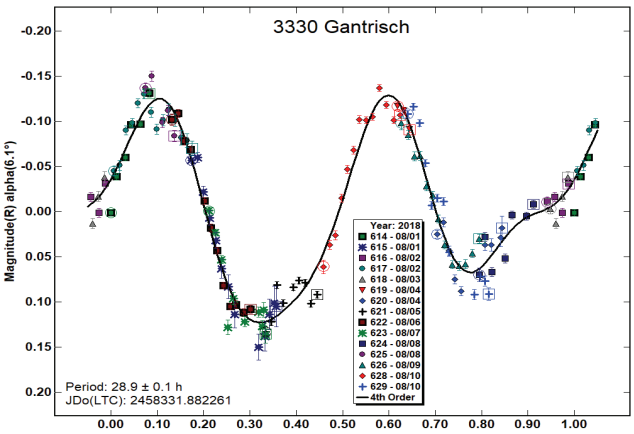
Krotz, J., Albers, K., Carbo, L., Kragh, K., Meiers, A., Yim, A., Ditteon, R. (2010). "Asteroid Lightcurve Analysis at the Oakley Southern Sky Observatory: 2009 August–November." *Minor Planet Bulletin* **37**, 99–101.

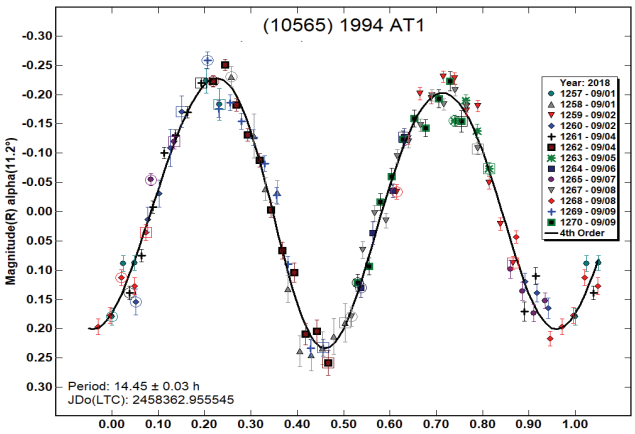
Vison, R., Moore, R., Ditteon R. (2014). "Asteroid Lightcurve Analysis at the Oakley Southern Sky Observatory: 2013 October." *Minor Planet Bulletin* **41**, 169–170.

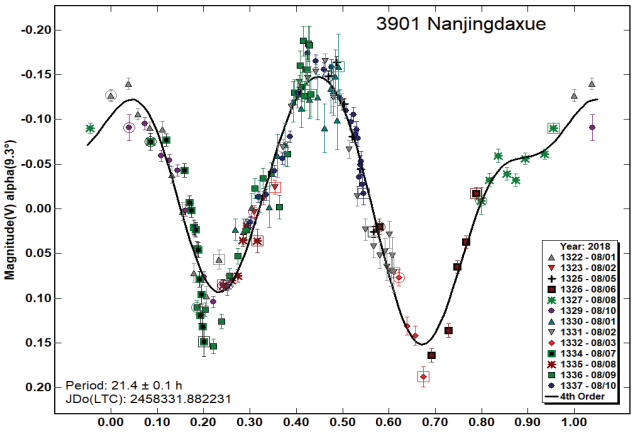


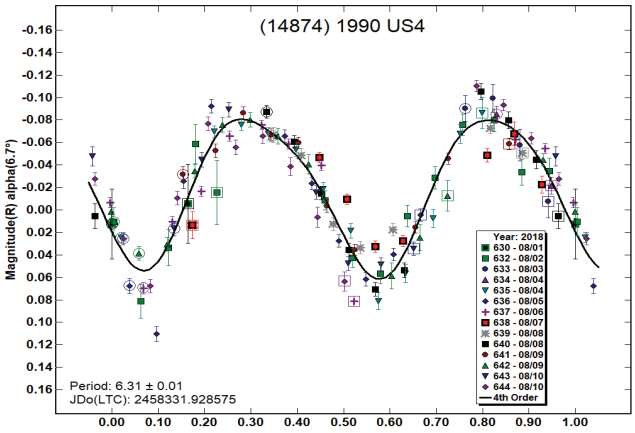

3248 Farinella
Magnitude(R) alpha(3.9°)
Period: 3.339 ± 0.005 h
JDo(LTC): 2458359.225709
Year: 2018
901 - 08/28
902 - 08/29
903 - 09/01
904 - 09/01
905 - 09/02
906 - 09/02
907 - 09/04
908 - 09/04
909 - 09/05
910 - 09/06
911 - 09/07
912 - 09/07
913 - 09/08
914 - 09/08
915 - 09/09
916 - 09/09
4th Order

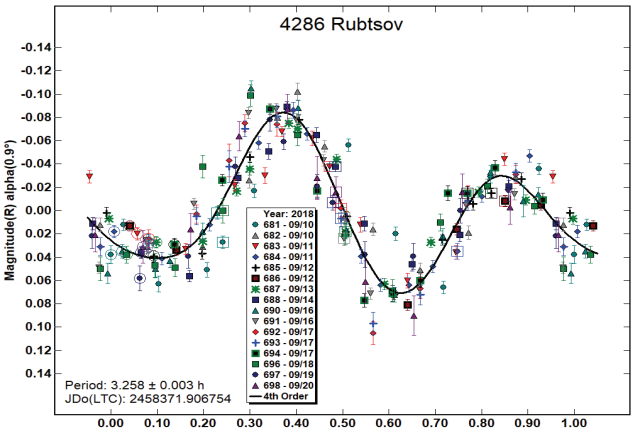

7497 Guangcaishiye
Magnitude(R) alpha(1.6°)
Period: 85.6 ± 0.2 h
JDo(LTC): 2458371.913928
Year: 2018
645 - 09/10
646 - 09/10
647 - 09/11
648 - 09/11
649 - 09/12
650 - 09/12
651 - 09/13
652 - 09/14
653 - 09/14
654 - 09/16
655 - 09/16
656 - 09/17
657 - 09/17
658 - 09/18
659 - 09/18
660 - 09/19
661 - 09/20
662 - 09/20
4th Order

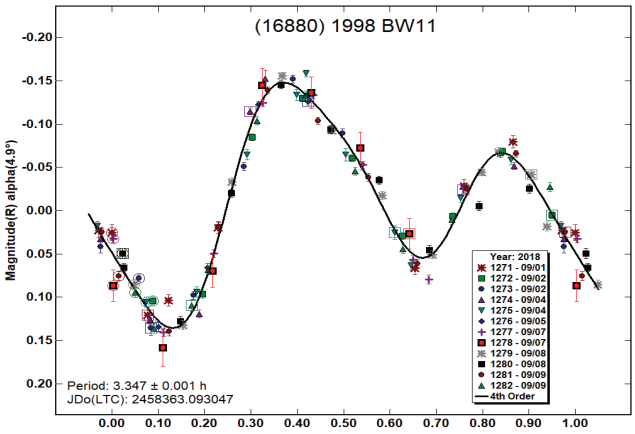

3330 Gantrisch
Magnitude(R) alpha(6.1°)
Period: 28.9 ± 0.1 h
JDo(LTC): 2458331.882261
Year: 2018
614 - 08/01
615 - 08/01
616 - 08/02
617 - 08/02
618 - 08/03
619 - 08/04
620 - 08/04
621 - 08/05
622 - 08/06
623 - 08/07
624 - 08/08
625 - 08/08
626 - 08/09
628 - 08/10
629 - 08/10
4th Order

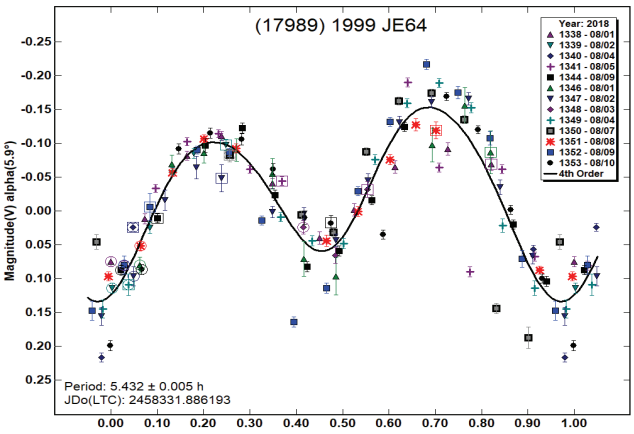

(10565) 1994 AT1
Magnitude(R) alpha(11.2°)
Period: 14.45 ± 0.03 h
JDo(LTC): 2458362.955545
Year: 2018
1257 - 09/01
1258 - 09/01
1259 - 09/02
1260 - 09/02
1261 - 09/04
1262 - 09/04
1263 - 09/05
1264 - 09/06
1265 - 09/07
1267 - 09/08
1268 - 09/08
1269 - 09/09
1270 - 09/09
4th Order

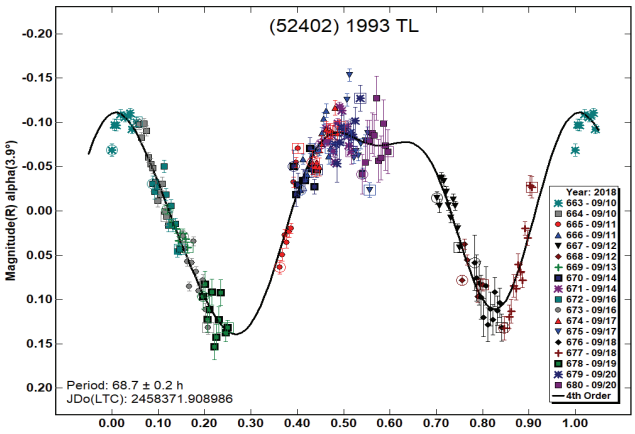

3901 Nanjingdaxue
Magnitude(V) alpha(9.3°)
Period: 21.4 ± 0.1 h
JDo(LTC): 2458331.882231
Year: 2018
1322 - 08/01
1323 - 08/02
1325 - 08/05
1326 - 08/06
1327 - 08/08
1329 - 08/10
1330 - 08/01
1331 - 08/02
1332 - 08/03
1334 - 08/07
1335 - 08/08
1336 - 08/09
1337 - 08/10
4th Order


(14874) 1990 US4
Magnitude(R) alpha(6.7°)
Period: 6.31 ± 0.01
JDo(LTC): 2458331.928575
Year: 2018
630 - 08/01
632 - 08/02
633 - 08/03
634 - 08/04
635 - 08/04
636 - 08/05
637 - 08/06
638 - 08/07
639 - 08/08
640 - 08/08
641 - 08/09
642 - 08/09
643 - 08/10
644 - 08/10
4th Order


4286 Rubtsov
Magnitude(R) alpha(0.9°)
Period: 3.258 ± 0.003 h
JDo(LTC): 2458371.906754
Year: 2018
681 - 09/10
682 - 09/10
683 - 09/11
684 - 09/11
685 - 09/12
686 - 09/12
687 - 09/13
688 - 09/14
690 - 09/16
691 - 09/16
692 - 09/17
693 - 09/17
694 - 09/17
696 - 09/18
697 - 09/19
698 - 09/20
4th Order


(16880) 1998 BW11
Magnitude(R) alpha(4.9°)
Period: 3.347 ± 0.001 h
JDo(LTC): 2458363.093047
Year: 2018
1271 - 09/01
1272 - 09/02
1273 - 09/02
1274 - 09/04
1275 - 09/04
1276 - 09/05
1277 - 09/07
1278 - 09/07
1279 - 09/08
1280 - 09/08
1281 - 09/09
1282 - 09/09
4th Order





Number	Name	2018 mm/dd	Pts	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.
1359	Prieska	08/28-09/09	151	5.5,5.4,6.3	337	-14			0.20	0.03
1504	Lappeenranta	08/01-08/10	130	3.5,5.7	307	-8	15.18	0.05	0.18	0.03
2373	Immo	09/10-09/20	237	2.7,6.8	345	-5	9.44	0.01	0.36	0.05
3248	Farinella	08/28-09/09	133	3.9,3.6,5.2	337	-8	3.339	0.005	0.18	0.03
3330	Gantrisch	08/01-08/10	134	6.0,7.5	307	-12	28.9	0.1	0.24	0.03
3819	Robinson	09/10-09/20	286	6.3,7.8	346	-13			0.15	0.05
3901	Nanjingdaxue	08/01-08/10	150	9.3,9.2,9.8	309	-15	21.4	0.1	0.28	0.05
4286	Rubstov	09/10-09/20	186	0.9,4.4	347	-2	3.258	0.003	0.12	0.03
6086	Vrchlicky	09/01-09/09	127	6.9,9.1	333	-12			0.10	0.05
7291	Hyakutake	09/01-09/09	103	5.6,7.9	333	-10			0.06	0.03
7497	Guangcaishiye	09/10-09/20	196	1.4,6.7	346	-2	85.6	0.2	0.80	0.03
10565	1994 AT1	09/01-09/09	107	11.1,12.4	335	-19	14.45	0.03	0.48	0.03
14874	1990 US4	08/01-08/10	132	6.5,9.7	306	-9	6.31	0.01	0.14	0.03
16880	1998 BW11	09/01-09/09	104	4.6,8.3	336	-5	3.347	0.001	0.27	0.03
17989	1999 JE64	08/01-08/10	126	5.8,8.1	306	-10	5.432	0.005	0.25	0.05
52402	1993 TL	09/10-09/20	200	3.7,8.6	345	-4	68.7	0.2	0.2	0.1

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date, unless there are three values. If so, the middle value is for the minimum phase angle during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range.