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New Mira Variables from the MACHO Galactic Bulge Fields, part II

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Abstract: We present a new sample of 525 Mira variables in the direction of the Galactic Bulge, expanding on previous samples of 69 and 500 objects, respectively, and thereby concluding our search for new Mira variables in the MACHO Galactic Bulge fields. 364 Miras of the present sample are reported as variable stars for the first time. We have cross-correlated our sample with the sample of Mira stars from the OGLE-III Catalog of Long-Period Variables (LPVs) in the Galactic Bulge and found 146 matches; MACHO and OGLE periods are in very good overall agreement. We present summary data for all stars of the present sample and give a statistical overview, comparing the properties of the MACHO and OGLE samples and enlarging on the analyses in our previous paper. Lightcurves, folded lightcurves and further details are available via the AAVSO International Variable Star Index (http://www.aavso.org/vsx/). Data of the complete sample of Mira variables from the MACHO Galactic Bulge fields, as presented in our papers (Bernhard, 2011; Huemmerich and Bernhard, 2012 and the present paper), can be found in the appendix.

1. Introduction

We have continued our search for Mira variables in the MACHO Galactic Bulge fields (Bernhard, 2011; Huemmerich and Bernhard, 2012). The MACHO project (http://macho.anu.edu.au/) comprises observations carried out between 1992 and 2000 with the 1.27 m Great Melbourne Telescope situated at Mount Stromlo in Australia. All observations were taken simultaneously through the non-standard MACHO blue filter (~4500-6300 Å; hereafter MACHO B-band) and MACHO red filter (~6300-7600 Å; hereafter MACHO R-band) using a combination of eight 2048*2048 CCD cameras (Alcock et al., 1999). For more information on the MACHO project see e.g. Alcock et al. (1997).

Retaining the methodology outlined in our first paper, we have inspected MACHO R-band lightcurves from the MACHO Galactic Bulge fields in order to find suitable Mira candidates. MACHO R-band was chosen over B-band photometry because of its increased sensitivity towards the red band of the electromagnetic spectrum, making it more suitable for identifying red variables such as Miras. In the case of three stars, however, it was necessary to fall back on B-band observations because of bad R-band photometry. We have then transformed MACHO instrumental magnitudes on to the Kron-Cousins system by using equation (2) of Alcock et al. (1999). Only stars with an amplitude > 2 mag (Rc) were investigated and subjected to a visual inspection of their lightcurves; objects exhibiting significant changes in amplitude, mean magnitude and / or period suggesting semi-regularity have been rejected. For the very bright objects, ASAS-3 V data (Pojmanski, 2002) has been included into the analysis whenever available in order to increase the time baseline and achieve a period solution of higher accuracy.

We have cross-matched our sample with the 2MASS Catalog (Skrutskie et al., 2006), from which we derive astrometric positions and near-infrared color indices. Each object was checked against the Strasbourg CDS Vizier service (Ochsenbein et al., 2000) and the AAVSO International Variable Star Index (Watson et al., 2006) for pre-existence as a Mira-type star in variability catalogs. In addition, we have established a cross-correlation with the sample of Mira stars from the OGLE-III Catalog of Long-Period Variables (LPVs) in the Galactic Bulge (Soszyński et al., 2013; hereafter OGLE sample), the results of which are presented in Chapter 2 along with a comparison of the MACHO and OGLE samples.

Summary data for all new Mira variables are presented in Table 1, which also gives corresponding identifiers from other lists. Lightcurves, folded lightcurves and further details are available via the AAVSO International Variable Star Index (Watson et al., 2006; http://www.aavso.org/vsx/). Data of the Mira variables from our previous papers can be found online at VizieR (catalog J/other/OEJV/149) and in the Peremennye Zvezdy Variable Stars Supplement (PZP, vol. 11, N 12). Additionally, data of the complete sample of Mira stars from the MACHO Galactic Bulge fields, as presented in our papers (Bernhard, 2011[1]; Huemmerich and Bernhard, 2012 and the present paper), can be found in the appendix, including 2MASS J, H, K photometry (Skrutskie et al., 2006).

2. Properties of the MACHO Mira sample and comparison with the OGLE sample

2.1 Cross-correlation with Mira variables from the OGLE-III Catalog of Long-Period Variables (LPVs) in the Galactic Bulge

We have cross-correlated the present sample of MACHO Miras with the OGLE sample (Soszyński et al., 2013). We find 146 matches, which is in agreement with our expectations as the sky coverage of the two surveys is different and many of the brighter MACHO objects will likely be saturated in the OGLE frames. Corresponding OGLE identifiers (OGLE-BLG-LPV-NNNNNN) are listed in Table 1.

Except for two cases, in which the given period was half the actual value[2], MACHO and OGLE periods are in very good overall agreement. In exactly 50% of cases, MACHO and OGLE periods agree to within 1%, while the period difference is more than 4.5% for only 5 stars of the entire sample (see Figure 1). Examples of excellent period agreement between MACHO and OGLE Miras are presented in Figure 2.

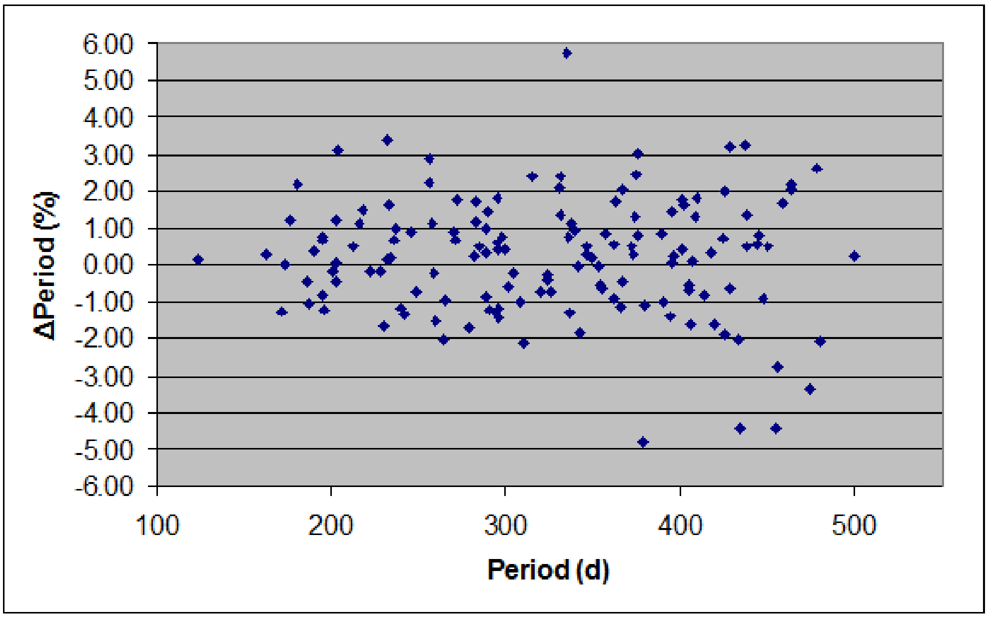


Figure 1: Difference between OGLE and MACHO periods, as expressed in ΔPeriod (%)

We have investigated all stars with ΔPeriod > 3% and find that the observed differences in period are mostly due to the disparity between MACHO and OGLE coverage. Both samples are based on quite heterogeneous datasets. OGLE time coverage and number of datapoints vary "[...] from about 100 points collected over two years to more than 3,000 observations obtained between 1997 and 2009

[1] One star of the sample presented in Bernhard (2011) has been identified as a duplicate entry (MACHO 101.20779.46 = MACHO 104.20779.6004). As better coverage of the object has been achieved in field 101, we retain MACHO 101.20779.46 and drop the other identifier from our sample.

[2] Both objects (MACHO 180.22111.49, P = 182.5 d in the MACHO sample; OGLE-BLG-LPV-211391, P = 155.96 d in the OGLE sample) are listed with their corrected periods (P = 365 d and P = 305 d, respectively) in Table 1.

(OGLE-II + OGLE-III)." (Soszyński et al., 2013). MACHO data, on the other hand, comprises from about 200 to more than 1,200 datapoints which were mostly collected over a timespan from 1,500 to 2,500 days in the case of the Galactic Bulge fields. MACHO fields with fewer than 200 observations have been excluded from our analysis.

As indicated above, longer time coverage results in more accurate results in almost all cases. This was expected, as small cycle-to-cycle variations, which Mira variables are notorious for, may have a great impact on the period solutions for stars with short time baselines that only cover a small number of cycles. This holds especially true for long-period Miras, for which analyses are sometimes based on only two consecutive maxima. Furthermore, in some cases, maxima have been covered only partially or not at all, which is seen frequently in stars whose periods are very nearly equal to one year. Additionally, varying lightcurve shapes add uncertainty to the period analysis. Considering these difficulties, and the fact that Mira variables are prone to exhibiting intrinsic period scatter (cf. e.g. Koen and Lombard, 1995; Zijlstra and Bedding, 2002), the excellent agreement of MACHO and OGLE periods is noteworthy. Figures 3 and 4 give examples of the period solutions for MACHO and OGLE Miras with ΔPeriod > 3% which illustrate the frequent disparity in time coverage between both datasets.

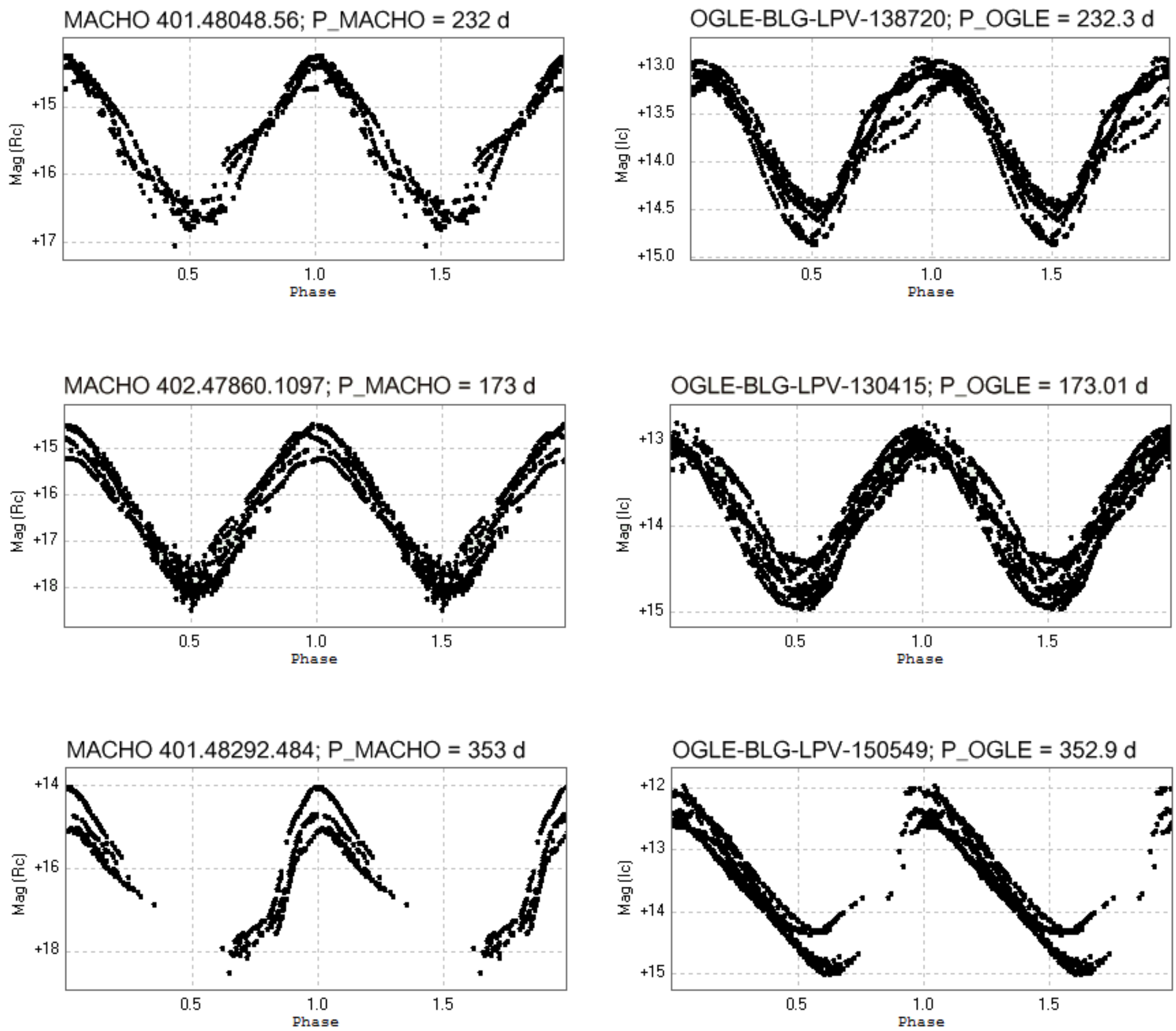


Figure 2: Period solutions for the stars MACHO 401.48048.56 / OGLE-BLG-LPV-138720 (top), MACHO 402.47860.1097 / OGLE-BLG-LPV-130415 (middle), MACHO 401.48292.484 / OGLE-BLG-LPV-150549 (bottom), based on MACHO data (left side) and OGLE data (right side). Although MACHO and OGLE data were taken at different epochs, there is excellent agreement between MACHO and OGLE periods, which also indicates the stability of the pulsational behaviour of these Miras.

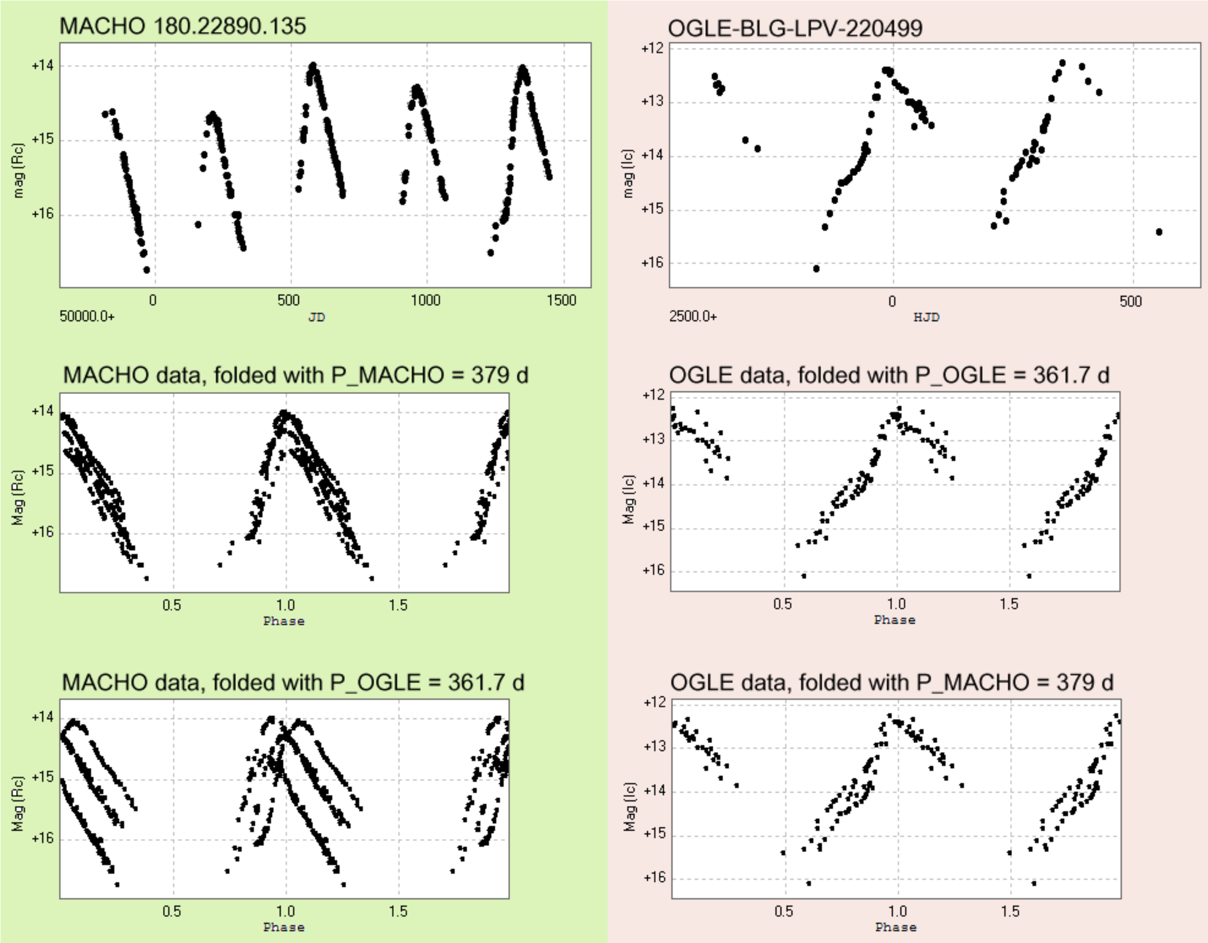


Figure 3: The star MACHO 180.22890.135 / OGLE-BLG-LPV-220499. The left side of the figure shows MACHO Rc data (green-shaded area): lightcurve (top) and corresponding phase plots based on MACHO period (middle) and OGLE period (bottom). The right side of the figure shows OGLE Ic data (red-shaded area): lightcurve (top) and corresponding phase plots based on OGLE period (middle) and MACHO period (bottom). The MACHO period produces a better fit of both datasets, which is to be expected because of longer time coverage.

In agreement with the above mentioned deductions, the disparity in coverage seems to be most pronounced for objects with ΔPeriod > 3%. We have therefore chosen to augment this situation by combining MACHO and OGLE data for all objects with ΔPeriod > 3%. The resulting increment of the time baseline enables us to obtain a period solution of higher accuracy for these stars; an example of this procedure is illustrated in Figure 5. Stars, whose periods result from a combination of MACHO and OGLE data, are marked as such in Table 1.

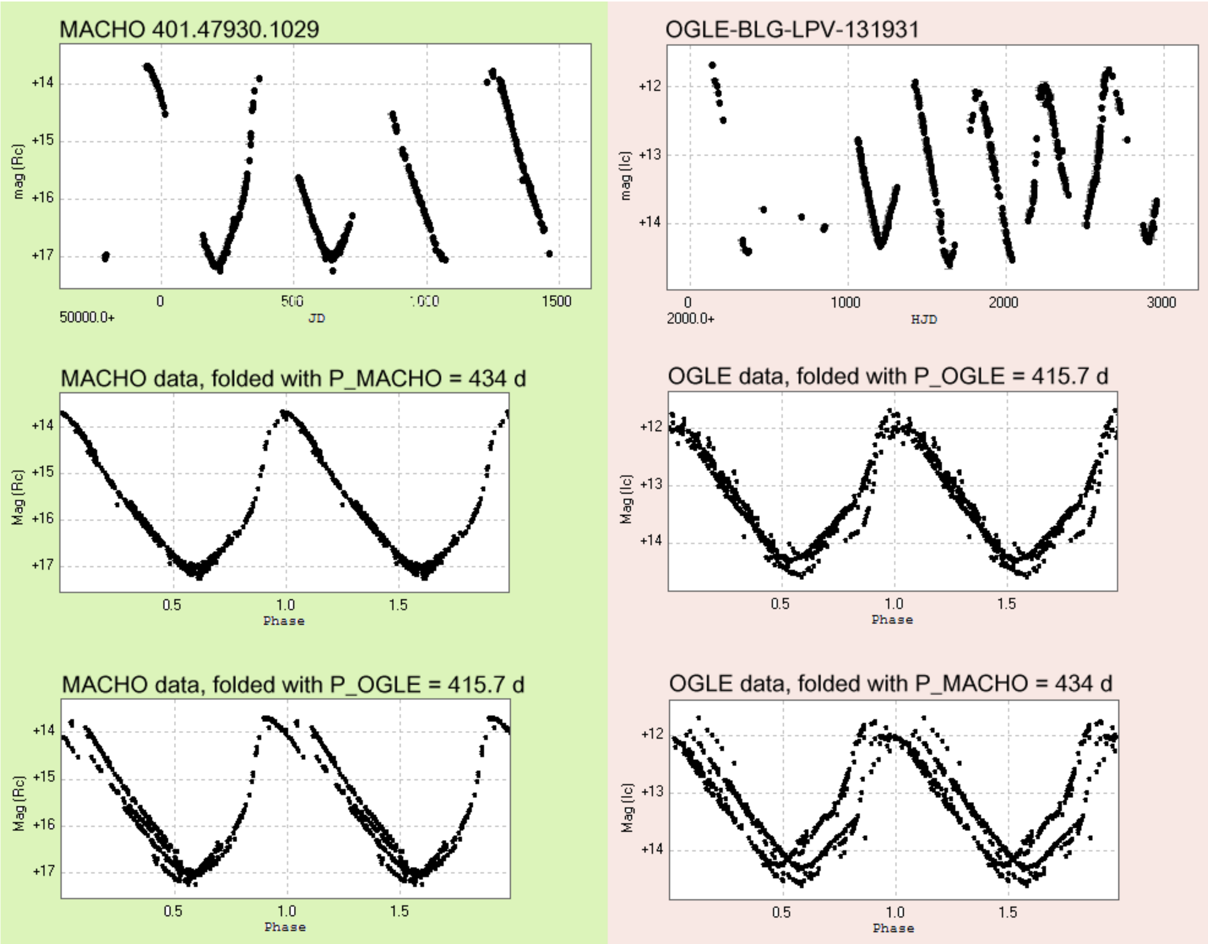


Figure 4: The star MACHO 401.47930.1029 / OGLE-BLG-LPV-131931. The specification and arrangement of the data are the same as in Figure 3. Both period solutions produce a better fit of their respective data sets. The period solution of the OGLE sample is preferable in this case as it has been based on a considerably larger dataset which also boasts better coverage of maxima.

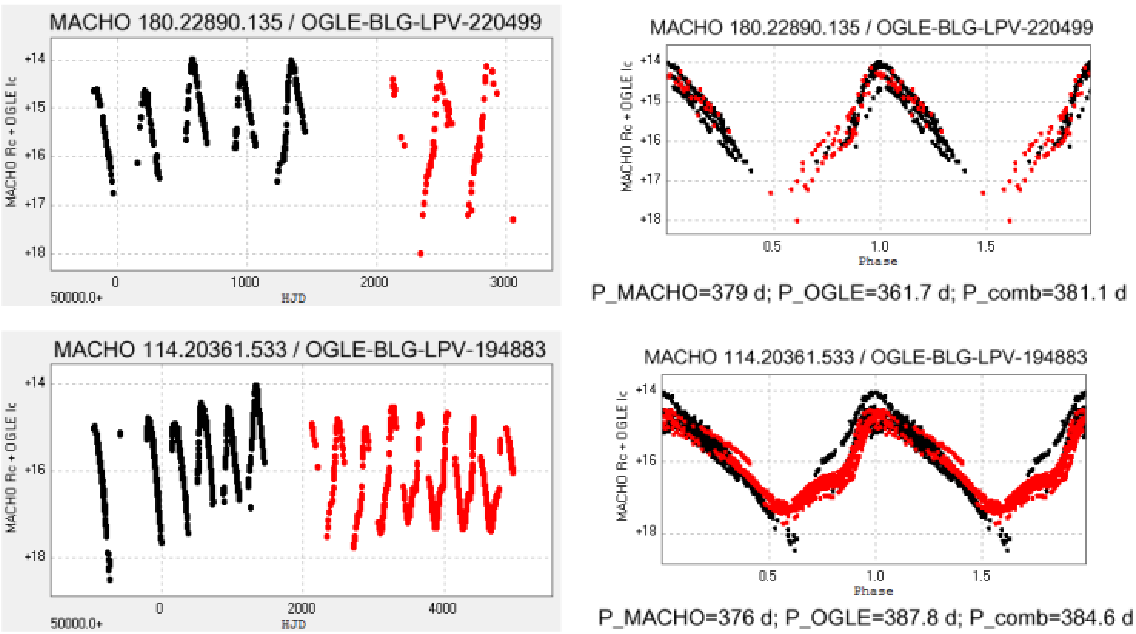


Figure 5: Period solutions for the stars MACHO 180.22890.135 / OGLE-BLG-LPV-220499 (top) and MACHO 114.20361.533 / OGLE-BLG-LPV-194883 (bottom), based on a combination of MACHO and OGLE data. For the period analysis, OGLE Ic (red) has been shifted to match MACHO Rc (black).

2.2 Period distribution[3]

We have compared the period distribution of the MACHO and OGLE samples, the result of which is illustrated in Figure 6. The OGLE sample (N = 6528) is more complete and comprises about six times as many Mira variables as the MACHO sample (N = 1094), which bears on the following results. Nevertheless, and despite of an overall good agreement, there is a noteworthy discrepancy in the period distribution between both samples. The MACHO sample contains more Miras with periods ranging from 201-350 days, notably in the range from 201-300 days. In contrast, the OGLE sample encompasses a much higher percentage of Miras in the period range > 350 days. In fact, the longest-period Mira we have been able to identify in MACHO data is the OH maser source MACHO 305.35072.100 with a period of P = 592 d (cf. also Huemmerich and Bernhard, 2012); there do not seem to be Miras of longer period in the entire MACHO sample.

The observed discrepancy is most likely due to the different passbands and limiting magnitudes of the MACHO and OGLE projects. OGLE observations are taken in the Cousins I-band (Ic), which roughly comprises a wavelength region between ~6800 and ~9000 Å (cf. e.g. Moro and Munari, 2000), and are thus much more suited to finding long-period Miras which are mostly very red objects due to extinction by circumstellar dust (cf. e.g. Matsunaga et al., 2005). Furthermore, a fraction of the brighter Miras will likely be saturated in the OGLE frames, which possibly contributes to the observed differences in period distribution between both samples.

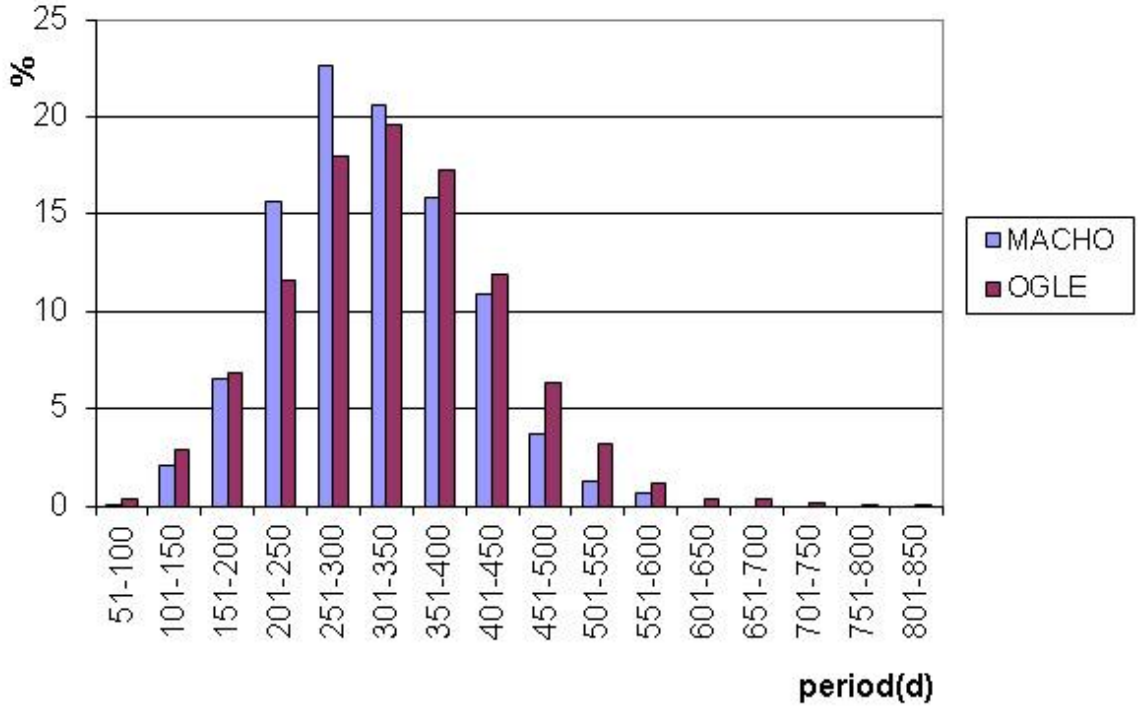


Figure 6: Period distribution of Mira variables in the direction of the Galactic Bulge (lilac: MACHO sample; N = 1094 / purple: OGLE sample; N = 6528)

[3] All analyses presented in this chapter and the following ones are based on the whole sample of Mira variables from the MACHO Galactic Bulge fields as presented in Bernhard (2011), Huemmerich and Bernhard (2012) and the present paper.

2.3 Properties in colour-magnitude, period-colour and period-luminosity space

2.3.1 Colour-magnitude diagrams

Figure 7 shows the colour-magnitude diagrams for Mira variables from the MACHO and OGLE samples, the results of which are in excellent agreement. Both diagrams exhibit a red tail of Miras with (H-Ks) ≥ 1, extending to about (H-Ks) = 1.5 in the case of MACHO Miras and (H-Ks) = 2 in the case of the OGLE sample. This is in agreement with the findings of Matsunaga et al. (2005); cf. in particular their Figure 7. It is noteworthy that Miras with (H-Ks) ≥ 1 become fainter with increasing (H-Ks), which becomes especially obvious in the OGLE sample, demonstrating again the advantages of OGLE in discovering Miras towards the red and faint end. This underluminosity in the 2MASS Ks-band is likely caused by circumstellar extinction due to dust (cf. e.g. Fraser, 2008).

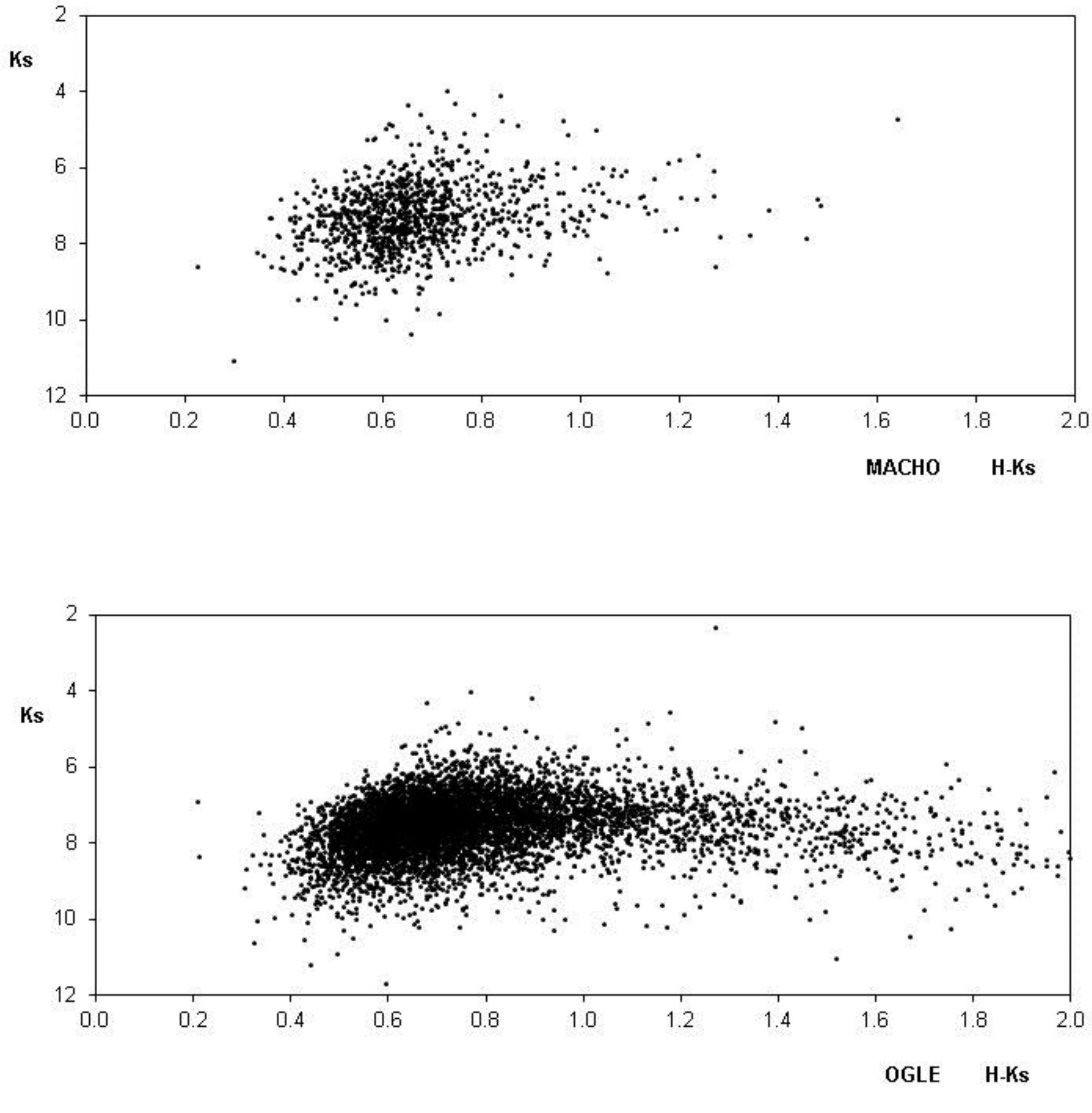
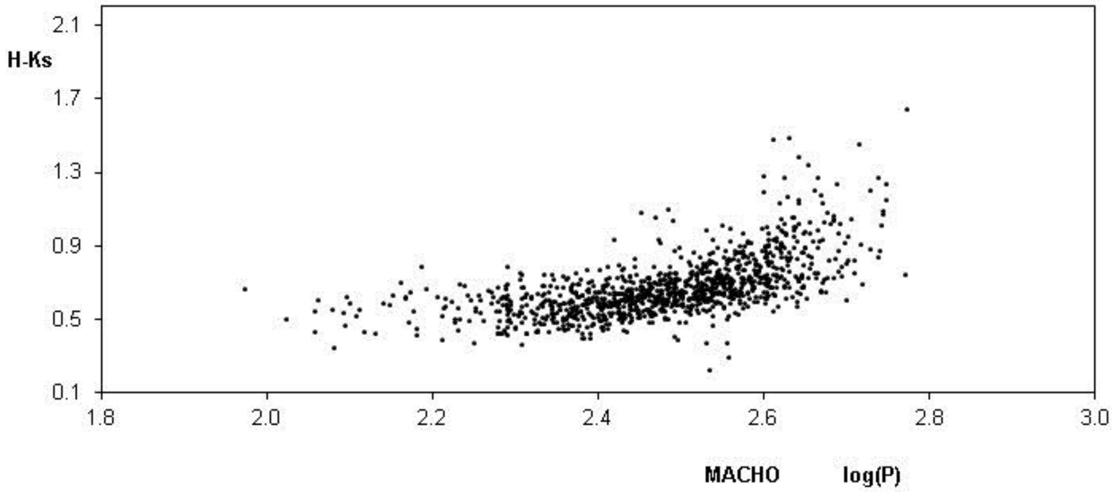


Figure 7: 2MASS (H-Ks) vs. Ks diagrams for the MACHO sample (top; N = 1094) and the OGLE sample (bottom; N = 6528)

2.3.2 Period-colour diagrams

Period-colour diagrams of the MACHO and OGLE samples are given in Figure 8; period is expressed in log (P). As expected, Miras of longer period have larger (H-Ks) values and thus redder colours. There is a turn-off point at log (P) ~ 2.6, at which the increase in (H-Ks) follows a steeper slope, indicating that Miras with periods longer than log (P) ~ 2.6 tend to show colour excesses because of circumstellar dust shells, as denoted by Matsunaga et al. (2005).



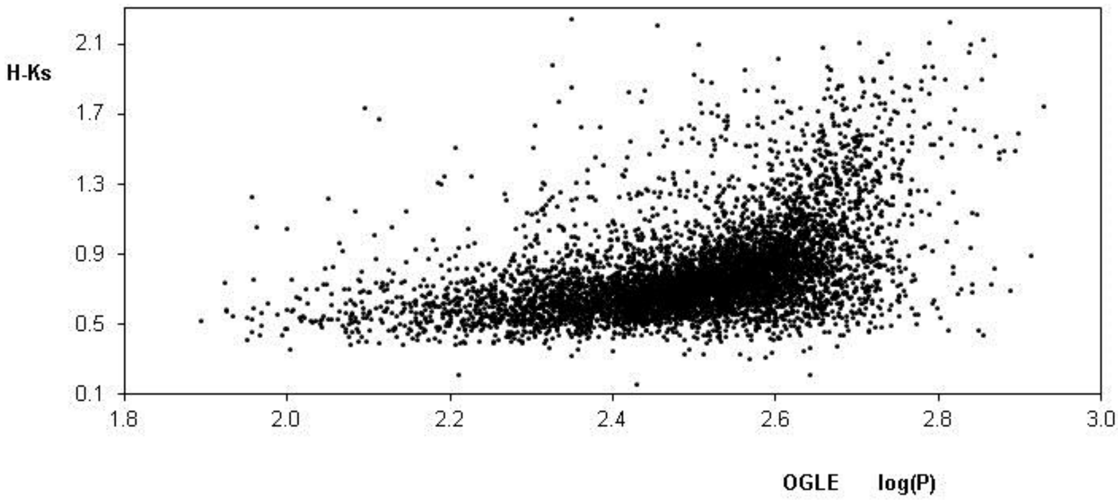
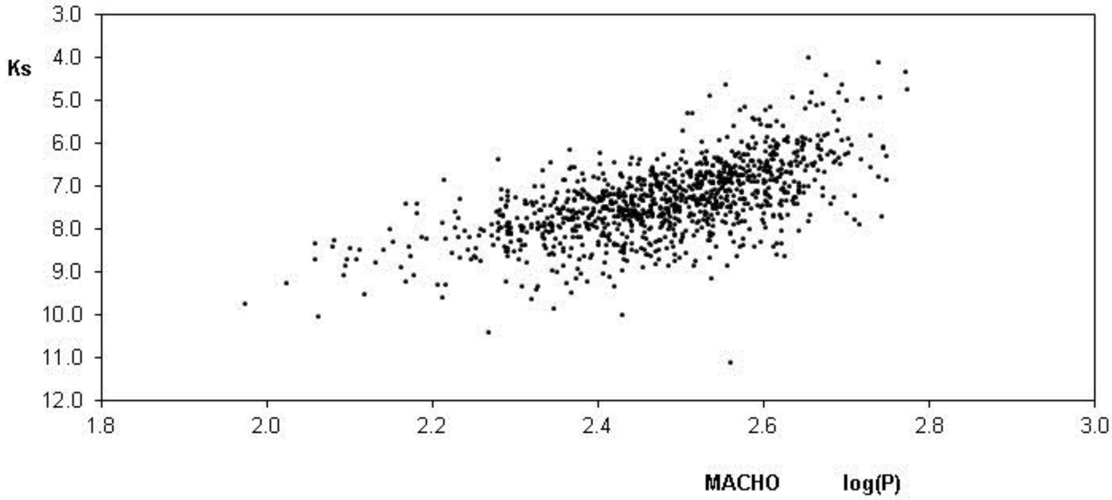


Figure 8: Log (P) vs 2MASS (H-Ks) diagrams for the MACHO sample (top; N = 1094) and the OGLE sample (bottom; N = 6528)

2.3.3 Period-luminosity diagrams

The distribution of Mira variables in the period-luminosity plane is rather clearly outlined. They occupy what has become to be known as "sequence C" and are well separated from the semi-regular and OSARG (OGLE Small Amplitude Red Giant) variables (cf. e.g. Wood et al., 1999; Soszyński et al., 2013; especially their Figure 5). There is excellent agreement in the distribution of Mira variables in the period-luminosity diagrams for both samples, with OGLE data reaching to fainter Ks.



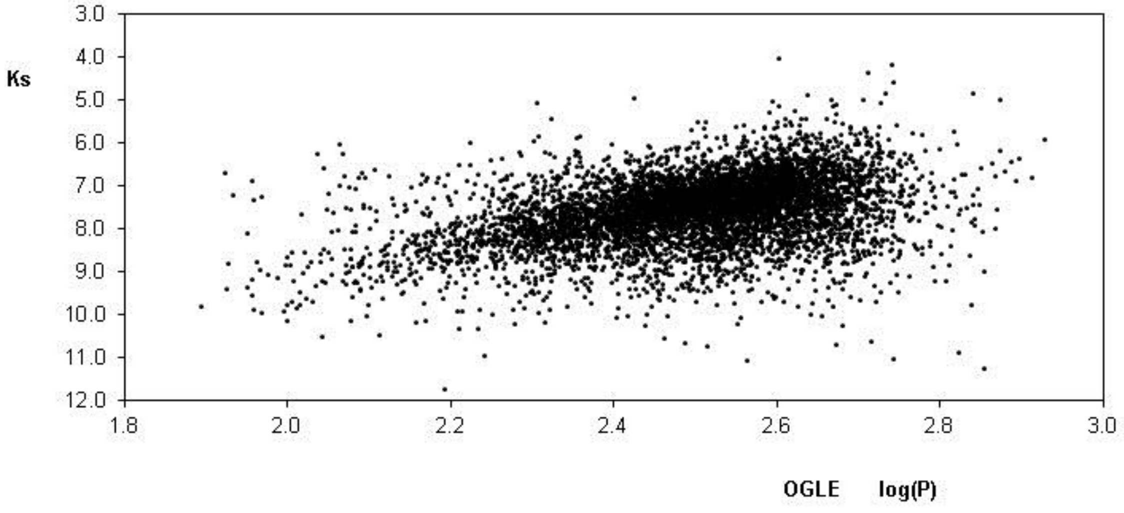


Figure 9: Log (P) vs 2MASS Ks diagrams for the MACHO sample (top; N = 1094) and the OGLE sample (bottom; N = 6528)

Table 1: Summary data for the new sample of 525 Miras from the MACHO Galactic Bulge fields

No.	MACHO	RA (J2000)	DEC (J2000)	Range(MACHO)	Epoch(Max)	Per(d)	Other ID / Remarks
501	403.47552.12	17 54 44.10	-29 27 50.1	12.3-15.3 Rc	2451254	331	OGLE-BLG-LPV-114862
502	402.47618.372	17 55 17.01	-29 04 50.8	13.1-17.1 Rc	2451268	197	
503	402.47624.8	17 55 17.77	-28 40 43.5	12.2-<16.4 Rc	2450959	241	
504	402.47678.275	17 55 27.31	-29 02 33.2	12.2-<16.7 Rc	2450885	268	
505	402.47680.779	17 55 27.40	-28 57 43.8	14.1-17.8: Rc	2451055	400	
506	402.47675.8	17 55 30.05	-29 15 10.0	>12.4-<15.5 Rc	2451028	203	OGLE-BLG-LPV-121843
507	402.47676.58	17 55 32.71	-29 11 58.6	>13.4-16.8 Rc	2451427	312	
508	402.47683.5	17 55 33.86	-28 44 55.7	12.0-15.7 Rc	2450632	197	
509	402.47684.48	17 55 35.08	-28 41 15.1	>11.4:-17.0 Rc	2451405	547	
510	402.47683.10	17 55 35.92	-28 43 01.9	12.7-16.5 Rc	2451279	215	
511	402.47739.56	17 55 39.15	-28 59 53.5	>12.4-16.3 Rc	2451404	284	
512	402.47744.10	17 55 43.46	-28 41 01.3	10.8:-<14.6 Rc	2450965	232	
513	402.47744.1236	17 55 49.82	-28 39 09.5	14.6-18.4: Rc	2451072	376	
514	402.47745.178	17 55 50.45	-28 35 42.0	15.5:-18.5: Rc	2450894	333	
515	402.47742.51	17 55 51.75	-28 48 13.4	>13.2-<17.0 Rc	2450918	222	
516	402.47796.1591	17 56 04.94	-29 13 21.0	>14.7-19.3: Rc	2450978	232	
517	403.47794.99	17 56 11.63	-29 18 35.9	12.8-16.9 Rc	2451390	271	OGLE-BLG-LPV-127802
518	401.47812.11	17 56 12.82	-28 07 42.3	13.9-16.7 Rc	2450940	402	OGLE-BLG-LPV-127960
519	401.47870.821	17 56 15.15	-28 16 18.9	14.0:-17.2: Rc	2450665	124	OGLE-BLG-LPV-128355
520	403.47855.7	17 56 16.10	-29 18 04.4	>13.2-15.7 Rc	2450652	209	
521	402.47861.12	17 56 16.80	-28 51 29.4	12.8-16.3: Rc	2451012	206	
522	403.47847.26	17 56 17.19	-29 49 07.8	13.0-16.5: Rc	2450980	258	OGLE-BLG-LPV-128742
523	403.47844.144	17 56 17.84	-29 59 24.4	12.6-16.5 Rc	2451253	240	OGLE-BLG-LPV-128864
524	402.47863.43	17 56 20.89	-28 43 40.3	12.5-<16.5 Rc	2450992	240	
525	401.47871.515	17 56 21.32	-28 14 04.0	13.6-<18.0 Rc	2451370	386	
526	403.47853.708	17 56 21.91	-29 25 57.6	13.0-16.8 Rc	2451343	257	
527	402.47865.12	17 56 24.28	-28 38 08.7	12.6-<14.8 Rc	2451322	357	
528	402.47859.92	17 56 24.40	-28 59 25.9	12.7-16.4 Rc	2451328	252	
529	402.47860.1097	17 56 26.25	-28 56 32.4	14.5-18.2 Rc	2450975	173	OGLE-BLG-LPV-130415
530	403.47849.1260	17 56 26.55	-29 42 14.7	12.4-16.7 Rc	2450572	244	
531	403.47854.30	17 56 28.29	-29 21 40.6	12.8-16.3: Rc	2450195	270	OGLE-BLG-LPV-130789
532	402.47861.231	17 56 30.45	-28 54 03.5	15.4-18.4 Rc	2451319	216	OGLE-BLG-LPV-131151
533	402.47864.10	17 56 30.91	-28 39 03.7	>12.0-<15.6 Rc	2451260	176	OGLE-BLG-LPV-131231
534	401.47930.1029	17 56 34.85	-28 17 11.3	13.7-17.2 Rc	2454248	429.5	OGLE-BLG-LPV-131931, c
535	403.47908.117	17 56 34.87	-29 43 55.1	11.8-16.4: Rc	2451260	295	OGLE-BLG-LPV-131936
536	403.47908.29	17 56 37.77	-29 42 57.1	13.5-16.6 Rc	2450637	428	OGLE-BLG-LPV-132456
537	402.47920.811	17 56 38.88	-28 56 11.5	14.8:-18.0 Rc	2450582	288	OGLE-BLG-LPV-132639
538	401.47930.68	17 56 39.75	-28 14 51.3	14.0-16.9 Rc	2450928	248	OGLE-BLG-LPV-132799
539	402.47915.16	17 56 42.12	-29 16 49.7	12.8:-17.0 Rc	2450905	230	OGLE-BLG-LPV-133205
540	401.47929.17	17 56 42.47	-28 19 42.9	12.4-16.0 Rc	2450660	201	OGLE-BLG-LPV-133271
541	403.47904.301	17 56 46.56	-29 59 50.8	12.8-16.3 Rc	2450972	164	
542	403.47904.1888	17 56 47.96	-30 00 00.8	15.2-18.5 Rc	2451303	195	OGLE-BLG-LPV-134223
543	403.47908.93	17 56 49.85	-29 45 06.2	13.7-16.5 Rc	2450979	272	
544	401.47986.11	17 56 50.63	-28 31 35.3	12.5-16.3 Rc	2450898	236	OGLE-BLG-LPV-134680
545	403.47973.18	17 56 51.01	-29 25 14.5	12.8-16.1: Rc	2450560	274	
546	401.47988.38	17 56 53.20	-28 23 52.0	12.5-16.5 Rc	2451361	215	
547	403.47971.4455	17 56 55.50	-29 31 19.8	16.1-20.2: V	2451295	288	V4656 Sgr, OGLE-BLG-LPV-135449
548	403.47964.31	17 56 56.12	-29 59 28.4	13.4-16.8 Rc	2450705	425	OGLE-BLG-LPV-135555
549	401.47986.30	17 56 56.46	-28 31 25.9	14.5-<18.1 Rc	2450573	171	OGLE-BLG-LPV-135614
550	401.47996.25	17 56 56.77	-27 53 30.4	13.4-18.0 Rc	2451313	275	
551	401.47991.546	17 56 57.06	-28 14 07.3	12.5:-16.1 Rc	2451010	210	
552	401.47987.82	17 56 57.44	-28 27 11.3	12.3-16.4 Rc	2450876	197	
553	403.47965.28	17 56 58.37	-29 56 37.6	12.4-16.0 Rc	2450985	410	
554	403.47968.172	17 57 00.24	-29 45 45.8	13.0-16.2 Rc	2451427	192	
555	402.47976.33	17 57 02.03	-29 11 18.3	12.6-16.7 Rc	2451278	253	
556	402.47983.526	17 57 04.08	-28 44 15.1	14.6-<18.4: Rc	2450659	366	OGLE-BLG-LPV-136817
557	402.47976.8	17 57 05.26	-29 10 41.2	13.2-16.7 Rc	2451414	402	
558	401.47991.529	17 57 05.93	-28 13 27.8	13.9-17.0 Rc	2450938	237	OGLE-BLG-LPV-137086
559	401.47995.786	17 57 06.18	-27 56 17.3	14.1-18.0: Rc	2450609	278	
560	401.47991.606	17 57 06.54	-28 13 14.5	>13.2-17.0: Rc	2451375	245	
561	402.48037.33	17 57 10.73	-29 06 41.4	13.1-16.4 Rc	2451032	390	
562	402.48039.31	17 57 14.04	-29 01 05.8	13.3-16.4 Rc	2451392	288	OGLE-BLG-LPV-138285
563	401.48056.67	17 57 16.20	-27 53 16.6	14.6-18.3 Rc	2451384	239	
564	403.48025.50	17 57 16.83	-29 58 17.3	12.5-<16.2 Rc	2450958	262	
565	402.48041.152	17 57 16.83	-28 53 55.3	>11.8-15.9 Rc	2451430	356	Mis V0531
566	401.48048.56	17 57 17.04	-28 25 57.6	14.3-<17.0 Rc	2450897	232	OGLE-BLG-LPV-138720
567	401.48049.161	17 57 17.36	-28 22 22.3	12.7-16.3 Rc	2450895	187	OGLE-BLG-LPV-138761
568	401.48049.1073	17 57 17.84	-28 21 58.4	13.5-17.1: Rc	2450897	282	OGLE-BLG-LPV-138829
569	401.48054.248	17 57 23.93	-28 01 58.8	>14.3-17.4 Rc	2450870	366	OGLE-BLG-LPV-139727
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571	401.48114.555	17 57 28.35	-27 58 46.7	13.5-17.8 Rc	2451014	311	
572	401.48112.111	17 57 32.62	-28 10 15.5	12.3-16.3 Rc	2450676	190	
573	402.48096.84	17 57 33.70	-29 11 18.6	12.9-16.6 Rc	2451410	251	
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575	402.48100.1187	17 57 36.49	-28 57 40.4	14.7-17.4:	Rc	2451402	374	OGLE-BLG-LPV-141561
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577	401.48113.23	17 57 37.49	-28 02 46.6	12.2-16.3:	Rc	2450666	377	Mis V0477
578	401.48108.260	17 57 38.27	-28 23 55.0	14.4-18.5:	Rc	2450605	480	OGLE-BLG-LPV-141814
579	401.48107.171	17 57 38.34	-28 29 32.6	13.2:-16.3	Rc	2450531	232	
580	401.48106.390	17 57 38.36	-28 31 05.6	13.8-17.1	Rc	2450893	283	OGLE-BLG-LPV-141826
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583	401.48168.2186	17 57 57.31	-28 25 15.0	12.7-16.0	Rc	2450681	220	Mis V0858
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585	401.48231.373	17 58 06.33	-28 11 56.4	13.5-17.0	Rc	2451338	404	OGLE-BLG-LPV-146523
586	118.17880.14	17 58 09.41	-30 04 19.2	14.6-18.9	V	2451040	194	V4666 Sgr
587	401.48231.397	17 58 09.97	-28 14 19.8	13.8-17.0	Rc	2451305	256	
588	401.48237.16	17 58 11.16	-27 50 00.9	14.0-17.2	Rc	2450650	412	
589	401.48235.62	17 58 11.77	-27 56 53.3	15.2-<18.4	Rc	2451288	353.3	OGLE-BLG-LPV-147554, c
590	401.48228.20	17 58 12.16	-28 25 37.2	12.0-15.6	Rc	2450647	242	OGLE-BLG-LPV-147607
591	118.18009.13	17 58 14.39	-30 08 42.5	13.5-<17.5	Rc	2450999	375	OGLE-BLG-LPV-148017
592	401.48235.98	17 58 19.75	-27 57 10.0	15.7-19.3:	Rc	2450634	390	OGLE-BLG-LPV-149029
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594	401.48231.348	17 58 20.66	-28 12 00.0	14.0-16.9	Rc	2454231	208.5	OGLE-BLG-LPV-149185, c
595	401.48292.278	17 58 22.92	-28 06 52.3	13.5-<17.2	Rc	2450641	354	OGLE-BLG-LPV-149605
596	401.48294.428	17 58 24.15	-28 01 37.1	13.7-17.5:	Rc	2450572	266	OGLE-BLG-LPV-149841
597	118.18012.472	17 58 24.58	-29 57 58.2	15.1-18.5	Rc	2450582	279	OGLE-BLG-LPV-149937
598	401.48288.405	17 58 24.61	-28 25 06.4	14.5-<18.1	Rc	2451368	363	
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600	401.48292.242	17 58 25.89	-28 07 34.0	>14.4-18.1:	Rc	2450542	369	
601	401.48287.380	17 58 26.12	-28 26 37.4	14.2-<17.1	Rc	2451358	352	
602	401.48293.22	17 58 26.15	-28 05 59.9	>12.3-<16.0	Rc	2450264	233	OGLE-BLG-LPV-150230
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610	118.18270.2512	17 58 54.44	-30 03 52.9	15.8-<20.0:	Rc	2451247	450	OGLE-BLG-LPV-155390
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616	401.48471.275	17 59 24.35	-28 12 07.2	13.9-19.0	V	2450274	252	Mis V0641
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625	108.18819.1271	18 00 18.96	-28 11 25.8	14.7-17.2	Rc	2451383	340	
626	108.18816.1283	18 00 20.20	-28 19 55.8	14.1-17.3	Rc	2451270	394	OGLE-BLG-LPV-170300
627	108.18948.438	18 00 25.02	-28 11 48.8	14.8-18.3:	Rc	2450726	413	
628	176.18962.250	18 00 33.20	-27 18 12.3	14.1-17.3	Rc	2451335	236	
629	108.19082.450	18 00 40.74	-27 57 52.6	13.8-<20.0	Rc	2450708	409	OGLE-BLG-LPV-173320
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634	108.19342.24	18 01 30.19	-27 57 01.4	11.5-15.8	Rc	2449872	237	V4706 Sgr, a
635	176.19352.191	18 01 33.16	-27 18 44.8	15.9-19.5	Rc	2451300	463	OGLE-BLG-LPV-180581
636	108.19468.1211	18 01 39.06	-28 12 19.1	14.1-17.3	Rc	2450715	463	OGLE-BLG-LPV-181343
637	108.19468.207	18 01 39.39	-28 13 54.3	14.2:-17.4	Rc	2451445	343	OGLE-BLG-LPV-181388
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639	108.19595.42	18 01 54.64	-28 25 53.8	11.3-15.1	Rc	2453170	195.5	Mis V0546, OGLE-BLG-LPV-183330, a
640	176.19612.498	18 01 54.87	-27 19 32.4	15.7-17.7	Rc	2450658	330	OGLE-BLG-LPV-183355
641	114.19580.126	18 01 56.70	-29 26 37.2	13.1-16.9	Rc	2451433	349	
642	113.19583.433	18 01 57.68	-29 12 31.2	14.0-17.5	Rc	2451047	438	OGLE-BLG-LPV-183706
643	114.19582.1686	18 01 58.82	-29 16 36.2	12.7-16.5	Rc	2450871	298	OGLE-BLG-LPV-183862
644	114.19579.17	18 02 02.26	-29 28 53.7	>11.3-15.8	Rc	2450524	296	Mis V0547, OGLE-BLG-LPV-184236
645	108.19592.2243	18 02 02.90	-28 37 03.4	12.5-16.1	Rc	2451276	295	OGLE-BLG-LPV-184313
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647	114.19849.1497	18 02 31.69	-28 48 53.7	12.3-16.0	Rc	2451302	302	OGLE-BLG-LPV-187883
648	114.19844.1893	18 02 33.39	-29 09 37.3	12.0-15.1	Rc	2450608	179	
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650	109.19988.32	18 02 57.58	-28 11 51.5	11.2:-15.4	Rc	2451389	223	Mis V0880 OGLE-BLG-LPV-190766
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654	114.20099.3642	18 03 08.77	-29 29 02.6	15.4-19.8:	Rc	2451015	560	
655	114.20105.188	18 03 09.21	-29 05 45.5	12.7-18.5:	Rc	2451408	212	OGLE-BLG-LPV-191899
656	104.20127.996	18 03 10.99	-27 39 23.0	14.4-17.7	Rc	2451248	404	OGLE-BLG-LPV-192094
657	114.20103.1344	18 03 12.30	-29 14 32.4	>16.4-19.8:	Rc	2451375	438	OGLE-BLG-LPV-192232
658	109.20113.520	18 03 12.89	-28 35 41.9	12.5-16.4	Rc	2450302	469.0	OGLE-BLG-LPV-192304, c
659	104.20124.1176	18 03 13.84	-27 50 43.5	13.8-17.2	Rc	2451027	203	OGLE-BLG-LPV-192393
660	104.20129.142	18 03 14.53	-27 31 09.3	>13.6-17.0	Rc	2451180:	357	OGLE-BLG-LPV-192453
661	114.20103.1127	18 03 20.66	-29 14 32.3	12.7-17.0	Rc	2450989	424	OGLE-BLG-LPV-193043
662	104.20123.506	18 03 22.28	-27 55 11.4	14.5-18.0:	Rc	2451403	396	OGLE-BLG-LPV-193180
663	104.20259.61	18 03 25.67	-27 31 40.0	12.3-15.8	Rc	2451020	228	
664	114.20234.1541	18 03 25.96	-29 11 02.7	12.8-16.0	Rc	2451325	257	
665	114.20233.530	18 03 32.51	-29 14 59.1	15.0-<17.4	Rc	2450598	305	OGLE-BLG-LPV-194043
666	104.20252.1432	18 03 41.12	-27 59 33.0	14.6:-17.5	Rc	2451321	290	OGLE-BLG-LPV-194802
667	114.20361.533	18 03 42.01	-29 22 43.7	14.0-<18.4	Rc	2451338	384.6	OGLE-BLG-LPV-194883, c
668	104.20383.1969	18 03 45.48	-27 52 55.4	14.5-18.0	Rc	2451020	433	OGLE-BLG-LPV-195147
669	104.20384.290	18 03 47.15	-27 48 08.2	>13.0-16.5	Rc	2451440	427	
670	104.20384.732	18 03 50.09	-27 49 19.6	14.4-17.5	Rc	2450552	303	
671	104.20380.3404	18 03 56.72	-28 04 29.5	>13.3-15.9	Rc	2451257	408	OGLE-BLG-LPV-196119
672	104.20388.795	18 03 56.97	-27 31 54.2	13.5-16.9	Rc	2451417	343	
673	104.20383.48	18 03 58.22	-27 53 37.6	11.6:-16.0	Rc	2451250	218	OGLE-BLG-LPV-196281
674	104.20519.21	18 04 03.22	-27 30 43.4	11.4:-15.3	Rc	2451305	240	
675	114.20492.62	18 04 08.95	-29 19 26.8	>12.0-14.9	Rc	2450998	246	OGLE-BLG-LPV-197307
676	109.20508.87	18 04 11.53	-28 14 59.1	11.7-15.7	Rc	2451312	251	
677	114.20499.1439	18 04 15.30	-28 51 00.4	10.8-14.7	Rc	2451343	335	
678	104.20640.4674	18 04 19.73	-28 04 55.0	11.2:-14.5	Rc	2451296	190	
679	104.20649.5962	18 04 20.41	-27 28 17.6	11.7:-14.7	Rc	2451380	114.5	
680	114.20620.819	18 04 31.45	-29 24 40.2	14.0-17.2	Rc	2451062	420	OGLE-BLG-LPV-199537
681	101.20654.170	18 04 33.00	-27 08 20.8	13.1-16.6	Rc	2451230	365	OGLE-BLG-LPV-199690
682	101.20787.65	18 04 37.83	-26 58 57.7	13.3-16.4	Rc	2449997	401	OGLE-BLG-LPV-200174
683	101.20785.33	18 04 38.33	-27 07 26.6	11.8:-15.4	Rc	2451385	324	OGLE-BLG-LPV-200228
684	101.20786.1066	18 04 40.88	-27 00 36.7	12.4-17.1	Rc	2451468	360	
685	101.20779.191	18 04 51.24	-27 28 37.3	>12.8-15.7:	Rc	2450175	322	
686	114.20883.41	18 04 56.67	-29 14 22.0	11.0:-15.2	Rc	2451342	228	OGLE-BLG-LPV-202245
687	109.20891.113	18 04 57.89	-28 43 28.1	11.9-15.3	Rc	2451363	353	
688	104.21032.445	18 05 28.73	-27 57 55.3	>13.0-16.1	Rc	2451364	296	OGLE-BLG-LPV-205560
689	101.21173.381	18 05 32.95	-27 14 03.9	14.5-<17.7	Rc	2451437	397	
690	101.21176.964	18 05 34.24	-27 03 28.8	>13.5-17.7	Rc	2451388	339	
691	101.21170.797	18 05 43.68	-27 25 15.9	13.9-16.9:	Rc	2451262	380	OGLE-BLG-LPV-206825
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693	101.21307.439	18 06 00.41	-26 56 24.5	14.0:-17.2	Rc	2450865	375	
694	101.21429.60	18 06 10.17	-27 30 20.9	11.1:-15.5	Rc	2450167	318	
695	128.21407.362	18 06 10.42	-28 58 42.1	12.7-15.8	Rc	2451313	399	
696	101.21437.204	18 06 12.44	-26 59 16.9	11.6-<15.8	Rc	2450628	443	
697	128.21409.540	18 06 15.09	-28 49 19.4	13.2-17.0	Rc	2451370	345	
698	128.21409.579	18 06 16.38	-28 49 50.7	15.3-20.4:	Rc	2451028	483	
699	101.21428.114	18 06 17.90	-27 33 31.1	>12.7-15.8	Rc	2451213	358	
700	101.21432.307	18 06 21.40	-27 16 22.4	12.5-16.6	Rc	2451440	346	OGLE-BLG-LPV-209515
701	120.21395.990	18 06 22.53	-29 46 23.3	13.2-16.9:	Rc	2451289	324	OGLE-BLG-LPV-209583
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703	128.21538.224	18 06 28.43	-28 52 56.3	>14.5-16.9	Rc	2450328	433	
704	128.21541.15	18 06 28.45	-28 40 58.7	12.5-16.4	Rc	2450536	289	OGLE-BLG-LPV-209889
705	128.21534.130	18 06 29.26	-29 07 53.9	14.1-16.9	Rc	2450162	349	OGLE-BLG-LPV-209932
706	179.21579.922	18 06 33.47	-26 10 09.7	15.3-18.9	Rc	2451403	340	OGLE-BLG-LPV-210173
707	179.21585.69	18 06 33.48	-25 46 38.1	13.4:-17.0:	Rc	2453557	442.8	OGLE-BLG-LPV-210174, c
708	179.21585.2061	18 06 33.61	-25 46 50.3	15.1-20.0:	Rc	2451375	342	OGLE-BLG-LPV-210185
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710	120.21655.785	18 06 44.42	-29 45 33.0	15.7-18.7	Rc	2450200	518	
711	105.21684.924	18 06 45.92	-27 49 44.0	14.2-17.7	Rc	2451222	405	OGLE-BLG-LPV-210891
712	179.21705.30	18 06 48.92	-26 27 34.0	11.0-<14.1	Rc	2451007	450	
713	128.21672.319	18 06 54.62	-28 37 24.5	12.4-15.8	Rc	2451392	305	OGLE-BLG-LPV-211391
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715	105.21683.366	18 06 58.83	-27 54 47.3	>15.6-17.8:	Rc	2450973	456	OGLE-BLG-LPV-211621
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718	120.21787.672	18 07 19.56	-29 37 45.9	14.4-17.0	Rc	2451390	435	
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726	128.22058.402	18 07 46.49	-28 52 44.0	14.5-17.2	Rc	2451245	444	OGLE-BLG-LPV-214720
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730	180.22247.288	18 08 01.29	-24 59 29.0	15.3-<19.1	Rc	2450678	376	
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732	110.22193.126	18 08 09.89	-28 31 42.4	12.8-16.0	Rc	2451343	290	
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737	180.22371.729	18 08 28.71	-25 22 36.9	14.8-<18.0	Rc	2451335	400	
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744	102.22463.4	18 08 41.83	-27 54 06.7	12.0-15.9	Rc	2451418	285	
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750	110.22585.827	18 08 57.41	-28 25 12.7	14.0-17.9	Rc	2450284	260	OGLE-BLG-LPV-218704
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755	180.22639.364	18 09 06.34	-24 50 31.8	14.1-18.5:	Rc	2451355	418	
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757	115.22699.120	18 09 13.77	-29 28 04.4	11.6-15.3	Rc	2450633	270	
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773	102.22851.229	18 09 38.27	-28 03 27.4	12.2:-16.2	Rc	2451265	378	
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775	102.22859.31	18 09 39.15	-27 30 09.6	11.0:-15.4	Rc	2454524	267	a
776	180.22896.764	18 09 42.78	-25 02 47.9	15.0-18.6	Rc	2451289	190.5	OGLE-BLG-LPV-220814
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779	110.22975.402	18 09 49.42	-28 26 51.6	12.2-16.4	Rc	2450695	359	
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781	102.22988.46	18 09 53.69	-27 35 31.7	11.5-15.0	Rc	2450551	274	
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785	110.22970.1618	18 09 57.36	-28 47 04.8	>13.7-17.2	Rc	2450162	329	
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793	115.23214.146	18 10 27.79	-29 51 03.4	12.0-15.6	Rc	2451252	248	
794	102.23243.363	18 10 29.08	-27 53 16.5	14.4-17.0	Rc	2450277	414	OGLE-BLG-LPV-222645
795	115.23213.1551	18 10 31.71	-29 52 24.4	15.0-19.0:	Rc	2450545	447	OGLE-BLG-LPV-222753
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797	115.23213.17	18 10 35.84	-29 52 32.8	>11.7-<15.1	Rc	2449125	350	
798	102.23250.264	18 10 36.95	-27 24 24.0	14.8-17.5:	Rc	2450657	295	OGLE-BLG-LPV-222951
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802	115.23215.70	18 10 40.24	-29 47 30.0	>11.8-14.7	Rc	2451375	214	
803	110.23359.47	18 10 42.27	-28 48 41.0	>13.5-16.4	Rc	2449127	331	
804	180.23412.6	18 10 42.35	-25 19 36.2	11.7:-14.2	Rc	2450569	152	
805	102.23372.281	18 10 47.06	-27 56 15.2	11.5:-16.0	Rc	2450652	275	a

806	102.23376.436	18 10 49.27	-27 41 19.7	11.7:-16.7	Rc	2451443	269	
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812	111.23483.459	18 11 17.32	-29 15 40.7	13.9-17.5	Rc	2450285	458	
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814	102.23634.254	18 11 26.56	-27 50 10.0	15.0:-17.5:	Rc	2451407	228	
815	178.23788.141	18 11 42.73	-26 14 01.2	13.0-15.7	Rc	2451043	474	
816	102.23764.71	18 11 49.68	-27 49 02.2	>11.7-14.1	Rc	2451247	385	
817	167.23784.190	18 11 54.28	-26 30 00.1	13.9-16.6	Rc	2453248	233.4	OGLE-BLG-LPV-225157, c
818	103.24034.3927	18 12 14.31	-27 11 39.1	12.8-16.2	Rc	2451320	486	
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830	111.24268.46	18 13 02.01	-28 52 04.0	>11.4-14.4	Rc	2451337	303	
831	111.24264.332	18 13 03.21	-29 08 20.5	>12.8-<16.4	Rc	2451060:	363	
832	111.24270.80	18 13 03.61	-28 47 31.4	11.2:-14.4	Rc	2450608	229	
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843	103.24683.102	18 13 50.99	-27 14 00.3	13.2:-15.8:	Rc	2451343	300	OGLE-BLG-LPV-227045
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847	103.24809.3394	18 14 18.01	-27 31 01.7	14.0-17.3	Rc	2450633	216	
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849	307.35038.26	18 14 28.60	-23 52 05.0	12.2-16.5	Rc	2451318	276	
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852	306.35055.57	18 14 34.91	-22 46 48.0	13.3-17.0	Rc	2451015	447	
853	305.35067.40	18 14 35.04	-21 56 00.3	15.4-19.3	Rc	2450537	309	
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855	306.35214.385	18 14 37.00	-23 22 00.2	14.2-18.0	Rc	2451352	346	
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881	305.35745.791	18 15 34.01	-21 32 32.8	14.8-18.4	Rc	2451390	343	
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909	306.36221.243	18 16 26.44	-23 25 11.1	12.6-16.9	Rc	2450945	234	
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911	305.36414.88	18 16 42.96	-21 46 29.6	13.3-<17.1	Rc	2450886	363	
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916	157.25904.24	18 17 04.51	-32 29 05.3	>12.7-15.1	Rc	2449750:	362	
917	155.26045.67	18 17 09.66	-31 44 21.4	>13.0-16.4	Rc	2451376	316	
918	305.36917.497	18 17 26.96	-21 47 31.3	>14.8-18.0	Rc	2451245:	402	
919	304.36906.128	18 17 27.67	-22 31 42.7	14.3-<16.7	Rc	2451352	327	
920	305.36919.1000	18 17 27.85	-21 42 45.0	15.7-<19.2	Rc	2450664	467	
921	305.36917.36	18 17 30.51	-21 47 41.4	12.7-15.6	Rc	2450978	168.5	
922	305.36918.44	18 17 31.51	-21 46 16.0	11.8-15.5	Rc	2450542	280	
923	309.36911.41	18 17 32.72	-22 11 12.7	11.5-15.5	Rc	2450610	215	
924	308.36917.519	18 17 35.07	-21 47 12.7	13.3-17.5	Rc	2450592	283	
925	308.36915.105	18 17 35.40	-21 58 13.4	12.5-16.4	Rc	2450891	233	
926	308.37090.146	18 17 42.45	-21 28 09.3	13.1-16.7	Rc	2450925	290	
927	308.37081.19	18 17 42.46	-22 03 11.5	12.4-16.6	Rc	2450233	273	
928	308.37090.433	18 17 46.63	-21 27 15.1	14.0-18.0	Rc	2450932	404	
929	309.37076.962	18 17 48.93	-22 26 07.2	14.5-17.6	Rc	2450540	356	
930	308.37087.4	18 17 55.44	-21 39 51.2	12.2-16.0	Rc	2450924	255	
931	308.37084.235	18 17 56.03	-21 54 21.6	13.8:-17.2	Rc	2450894	365	
932	311.37227.694	18 17 58.70	-23 31 49.5	14.5-18.3	Rc	2451297	383	
933	309.37247.217	18 18 01.63	-22 13 10.2	12.7-16.7	Rc	2451346	337	
934	310.37236.71	18 18 02.97	-22 55 56.7	12.1-16.6	Rc	2451330	234	
935	309.37244.9	18 18 05.00	-22 23 44.3	13.6-17.2	Rc	2449876	278	
936	155.26430.26	18 18 05.87	-32 03 54.6	>12.1-15.6	Rc	2449630:	383	
937	310.37231.57	18 18 05.96	-23 15 11.8	12.3-16.4	Rc	2451325	232	
938	308.37259.119	18 18 07.30	-21 23 12.8	13.5-17.0	Rc	2450540	298	
939	311.37223.1206	18 18 08.88	-23 49 11.0	13.4-17.0:	Rc	2450535	331	
940	310.37237.368	18 18 08.93	-22 52 40.6	13.2-17.5	Rc	2451294	398	
941	308.37252.26	18 18 10.25	-21 54 08.7	12.3-16.5	Rc	2451340	233	
942	311.37225.124	18 18 14.43	-23 42 31.6	>13.2-16.8:	Rc	2451281	382	
943	311.37227.89	18 18 14.45	-23 34 12.0	13.8:-16.3:	Rc	2450637	428	
944	309.37247.71	18 18 14.88	-22 12 46.2	12.6-16.6	Rc	2450968	295	
945	310.37407.177	18 18 16.38	-22 46 48.9	13.5-17.2	Rc	2450539	283	
946	155.26431.24	18 18 17.80	-32 01 55.6	13.2-15.6	Rc	2451301	315	
947	309.37407.243	18 18 19.35	-22 44 35.2	14.5-16.9	Rc	2451308	309	
948	308.37421.123	18 18 21.12	-21 48 56.0	14.6-18.3	Rc	2451334	511	
949	310.37399.459	18 18 22.59	-23 18 27.7	13.6-17.6	Rc	2450977	475	
950	308.37417.47	18 18 23.60	-22 03 13.7	15.2-19.2	Rc	2450941	222	
951	311.37394.18	18 18 28.32	-23 35 32.4	12.2-16.6	Rc	2451279	138	
952	308.37425.44	18 18 30.61	-21 34 24.5	13-<16.6	Rc	2450221	290	
953	310.37401.23	18 18 30.71	-23 10 34.4	12.5-16.2:	Rc	2451403	253	
954	155.26565.69	18 18 34.28	-31 46 03.8	12.5-16.4	Rc	2450951	156	
955	309.37576.222	18 18 39.42	-22 41 50.5	13.9-<17.1	Rc	2450580	298	
956	310.37572.20	18 18 40.57	-22 57 47.5	>13.8-16.9	Rc	2450205	308	
957	311.37564.351	18 18 43.55	-23 29 51.2	13.8-17.5	Rc	2451294	328	
958	308.37585.95	18 18 43.58	-22 03 48.9	13.6:-<17.8	Rc	2450587	287	
959	310.37573.9	18 18 45.13	-22 54 56.6	12.4-15.7	Rc	2450196	311	

960	310.37740.758	18 18 56.11	-22 57 34.0	12.1-<16.0	Rc	2450670	220	
961	308.37762.2492	18 19 04.10	-21 30 55.7	>12.4-<16.3	Rc	2451330	300	
962	160.27048.224	18 19 23.87	-25 34 43.4	14.6:-19.4	Rc	2450680:	559	
963	310.38079.25	18 19 27.25	-22 46 57.0	12.4-<16.4	Rc	2450168	362	
964	310.38077.52	18 19 33.17	-22 53 40.7	14.1-17.4	Rc	2450266	195	
965	309.38088.127	18 19 34.13	-22 07 08.7	14.2-18.0:	Rc	2451333	299	
966	149.27108.65	18 19 39.32	-30 13 28.3	>11.7-15.0	Rc	2449899	304	
967	308.38266.162	18 19 42.61	-21 30 31.3	13.0-17.5	Rc	2450642	314	
968	310.38242.89	18 19 44.17	-23 04 54.6	13.8-16.6	Rc	2450560	406	
969	311.38230.1146	18 19 46.27	-23 52 05.7	13.6-17.9	Rc	2450594	534	
970	311.38398.126	18 19 59.30	-23 54 14.3	11.5:-15.5	Rc	2451272	257	
971	149.27240.6	18 20 01.31	-30 07 24.5	11.6-14.6	Rc	2451295	175.5	
972	311.38567.1070	18 20 14.38	-23 48 29.2	12.5-15.8	Rc	2451283	380	
973	308.38597.243	18 20 21.20	-21 47 14.8	13.3-17.1	Rc	2450574	263	
974	149.27360.929	18 20 22.02	-30 46 55.1	>13.0-15.8	Rc	2451300	402	
975	310.38577.136	18 20 24.52	-23 08 49.8	12.3-16.9:	Rc	2450679	523	
976	308.38597.974	18 20 24.60	-21 50 53.6	15.2-18.8	Rc	2450970	320	
977	149.27752.4254	18 21 16.74	-30 36 47.5	13.0-15.0	Rc	2450621	408	
978	149.27889.7	18 21 23.04	-30 10 30.3	11.7-14.5	Rc	2450277	241	
979	149.27889.43	18 21 29.41	-30 11 30.7	12.8-16.7	Rc	2450306	450	
980	136.27916.215	18 21 30.59	-28 20 38.5	14.3-<20.4	Rc	2451357	305	
981	136.28044.51	18 21 39.11	-28 30 10.4	14.0-<17.7	Rc	2451373	269	
982	136.28047.41	18 21 51.87	-28 17 18.3	>12.0-<15.3	Rc	2450895:	387	
983	136.28171.57	18 22 12.08	-28 42 18.5	13.5-17.7	Rc	2450285	398	
984	136.28430.126	18 22 36.46	-28 45 48.3	>11.5-16.4	Rc	2450585	305	
985	153.28397.1410	18 22 44.41	-30 57 23.6	16.3-18.6	Rc	2451310	427	
986	136.28561.2314	18 22 56.95	-28 41 17.6	15.6-<20.0	Rc	2451280:	398:	
987	136.28566.126	18 23 03.24	-28 22 16.7	12.0-16.1	Rc	2451372	414	
988	136.28820.47	18 23 36.01	-28 43 57.6	12.0-15.0	Rc	2450242	448	
989	136.28824.483	18 23 36.96	-28 30 52.3	>14.0-<17.5	Rc	2451327	423	
990	150.28922.21	18 23 51.64	-30 36 35.9	11.0-14.1	Rc	2450997	240	
991	150.28927.26	18 23 53.52	-30 18 42.3	11.3:-15.3	Rc	2451318:	276:	Cl*NGC 6624 V1, b
992	150.28928.5	18 24 02.41	-30 13 33.6	11.3:-15.0	Rc	2449425:	335	
993	150.29053.55	18 24 11.22	-30 34 35.0	11.9-15.7	Rc	2450948	320	
994	150.29315.15	18 24 55.68	-30 25 44.5	11.7-15.5	Rc	2450582	292	
995	166.30683.260	18 28 00.04	-25 52 22.4	13.9:-17.5	Rc	2450640	463	
996	147.31143.28	18 29 02.44	-29 53 16.3	12.2-<15.1	Rc	2450999	293	
997	303.44071.35	18 29 28.84	-15 18 03.4	14.5-<19.0	Rc	2451329	383	TSVSC1 TN-S300112321-306-67-2
998	303.44578.145	18 30 15.88	-15 03 16.0	16.1-20.5:	Rc	2451397	512	
999	303.44581.276	18 30 19.57	-14 52 46.2	>14.8-<17.5	Rc	2451054	422	
1000	303.45088.65	18 30 57.37	-14 41 06.9	12.9-<15.5	Rc	2451320	375	TSVSC1 TN-S300112130-888-67-2
1001	303.45086.512	18 30 58.76	-14 50 32.8	14.0-18.1	Rc	2451366	412	
1002	147.32054.11	18 31 07.93	-29 50 37.9	10.5:-14.6	Rc	2450999	292	GSC 06869-00888
1003	301.45108.136	18 31 08.40	-13 19 11.2	15.0-17.7	Rc	2451431	346	
1004	301.45278.157	18 31 16.56	-13 11 59.2	15.5-<18.5	Rc	2450986	362	
1005	302.45268.365	18 31 20.99	-13 54 39.1	14.8-18.0	Rc	2451237	311	
1006	301.45269.57	18 31 23.06	-13 48 22.3	>14.3-<17.5	Rc	2450947	265	
1007	302.45261.155	18 31 23.31	-14 19 08.7	16.0-19.8:	Rc	2451370	185	
1008	302.45264.936	18 31 24.62	-14 08 01.9	14.3:-18.5	Rc	2451337	330	
1009	301.45447.41	18 31 31.56	-13 10 33.4	>14.8-19.4:	Rc	2449775:	363	
1010	301.45447.87	18 31 41.60	-13 10 48.2	>14.9-<18.7	Rc	2451260	312	
1011	301.45442.409	18 31 43.84	-13 30 44.5	14.2-17.1	Rc	2451073	257	
1012	301.45611.486	18 31 50.52	-13 24 08.9	>13.5-18.0	Rc	2449977	376	
1013	302.45600.25	18 31 57.94	-14 07 05.6	>13.9-<17.2	Rc	2451283	349	
1014	302.45594.500	18 31 58.40	-14 33 26.6	14.0-17.9:	Rc	2451350	349	
1015	303.45586.33	18 32 00.92	-15 04 04.3	12.6-<17.5	Rc	2451401	370	TSVSC1 TN-S300112121-277-67-2
1016	301.45949.218	18 32 20.53	-13 18 12.9	13.9-17.5	Rc	2451340	254	
1017	301.46108.40	18 32 51.42	-13 53 06.7	14.3-17.8:	Rc	2451044	388	
1018	302.46270.66	18 32 57.06	-14 15 24.3	11.0:-15.0	Rc	2451374	276	TSVSC1 TN-S300113102-63-67-2
1019	301.46284.33	18 32 59.65	-13 21 38.4	14.0-17.7	Rc	2450320	409	
1020	301.46276.189	18 32 59.97	-13 53 26.2	>13.8-16.3	Rc	2451180:	364	
1021	301.46448.926	18 33 11.46	-13 38 25.0	14.4-17.8	Rc	2451418	344	
1022	301.46451.1111	18 33 14.70	-13 23 30.6	15.3-18.7	Rc	2450545	484	
1023	301.46453.72	18 33 16.15	-13 17 14.7	13.7-<19.0:	Rc	2450547	311	
1024	301.46445.287	18 33 26.36	-13 47 02.7	14.5-17.4	Rc	2450575	286	
1025	301.46784.864	18 33 55.94	-13 36 09.1	14.2-18.0	Rc	2450601	507	

Remarks:

a Period based on a combination of MACHO Rc and ASAS-3 V data.

b Contained in the globular cluster NGC 6624 and discovered as a variable object by Laborde and Fourcade (1966). It is identified here as a Mira variable for the first time.

c Period based on a combination of MACHO Rc and OGLE Ic data.

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