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**NEW VARIABLE STARS DISCOVERED IN THE MISAO PROJECT**

**I: MisV0001–MisV0100**

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This report describes the 100 new variable stars (MisV0001–MisV0100) discovered in the course of the MISAO Project.

The goal of the MISAO Project, standing for Multitudinous Image-based Sky-survey and Accumulative Observations, is to discover new celestial objects or to obtain photometric data from multitudinous astronomical images. The details are described on the MISAO Project Home Page:

<http://www.info.waseda.ac.jp/muraoka/members/seiichi/misao/>

Here we use only the unfiltered CCD images taken by KenIchi Kadota in Ageo City, Japan, for new variable stars survey. The images were taken between 1998 December and 1999 June, mainly with a 0.18-m f/5.5 reflector and 0.16-m f/3.3 reflector. The CCD chip is Kodak KAF-1600.

We used the PIXY system for the survey. The PIXY system, standing for Practical Image eXamination and Inner-objects Identification system, is developed and distributed by Seiichi Yoshida. It automatically detects stars from images, measures the position and magnitude, identifies them with known variable stars in the GCVS, etc., and outputs candidates of new objects and new variable stars. After the PIXY system output candidates of variable stars, Seiichi Yoshida and KenIchi Kadota manually checked each of them on our CCD images. Then we found 100 objects are really variable and previously unknown. We judged only ones whose variability is surely evident as new variable stars.

Here is the list of 100 new variable stars (Table 1). The position and magnitude are measured with USNO–A1.0 catalog. Because the pixel size is 3.7 arcsec/pixel or 6.9 arcsec/pixel, astrometric errors may sometimes exceed 2 arcsec, except for stars identified with data in the Guide Star Catalogue or the USNO–A1.0 catalog. The magnitude is based on a preliminary *V* magnitude calculated from *R* and *B* magnitude in the catalog based on Taichi Kato's (1998) equation:

$$V = R + 0.375(B - R)$$

So the value is somewhat shifted from magnitude in the standard system. But it does not matter for range of variability. Because they were observed on a few nights, the period is quite uncertain. The preliminary type is attached for some objects observed for several

nights. Most of them were observed twice or more during a few month interval and the magnitude difference is over 1 mag, so most of them will be long period variable stars (M or SR type). The latest list, being updated with our follow-up observations, is available at the MISA0 Project Home Page. The finding charts are available electronically as 4746-f[*nnn*].eps, where [*nnn*] refers to the serial number assigned to the star in the first column of Table 1.

We would like to thank Dr. Taichi Kato for checking known variable stars, his advice on type of variability, and many informative discussions.

#### References:

Seiichi Yoshida, *Practical Image Examination and Inner-Objects Identification System*, in preparation for PASP

Taichi Kato, 1998,

<http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-chat/msg00700.html>

Table 1: List of New Variable Stars

Code	R.A. (J2000.0)	Decl.	Unfiltered		Type	Identified with
			CCD Mag.	Max Min		
MisV0001	17 <sup>h</sup> 52 <sup>m</sup> 26 <sup>s</sup> .59	-17°40'00".7	13.9	16.9	M	
MisV0002	07 24 03.56	+41 26 02.0	13.3	14.7	E:	GSC 2965.0210 USNO 1275.06972791
MisV0003	17 52 44.93	-17 24 01.4	12.5	13.7	SR:	
MisV0004	17 53 13.59	-17 28 44.2	12.1	14.8	M:	
MisV0005	16 59 28.08	-13 23 14.1	12.3	14.1	?	USNO 0750.10268837
MisV0006	17 56 05.00	-31 15 20.9	11.7	13.2	?	
MisV0007	17 00 05.99	-16 04 14.3	12.7	13.8	?	USNO 0675.11655030
MisV0008	17 55 53.96	-31 14 43.2	14.1	15.9	?	
MisV0009	18 59 11.39	-01 34 10.9	11.5	13.4	?	USNO 0825.13934695 IRAS 18565-0138
MisV0010	17 55 13.12	-31 14 51.8	13.0	15.8	?	USNO 0525.24816214
MisV0011	17 50 40.92	-17 40 38.1	12.0	13.6	SR:	IRAS 17477-1739
MisV0012	17 56 44.26	-31 04 01.5	11.8	14.1	SR?	IRAS 17534-3103
MisV0013	17 56 48.87	-31 01 48.7	12.7	15.0	?	
MisV0014	17 56 37.90	-31 00 45.7	12.6	16.3	?	
MisV0015	17 56 26.80	-31 11 01.1	12.8	14.1	?	USNO 0525.24950305
MisV0016	17 56 39.69	-30 59 28.7	13.4	16.3	?	
MisV0017	17 57 22.16	-30 54 57.3	11.1	14.1	M:	
MisV0018	17 54 48.31	-31 02 20.2	11.8	14.7	?	
MisV0019	17 54 56.77	-31 02 25.8	14.0	[16.5	?	IRAS 17516-3101
MisV0020	17 54 52.49	-31 02 48.3	13.2	15.6	?	

Table 1 (cont.)

Code	R.A. (J2000.0) Decl.		Unfiltered		Type	Identified with
			CCD Mag.	Max Min		
MisV0021	17 <sup>h</sup> 55 <sup>m</sup> 31 <sup>s</sup> .57	−31°05′23″.0	11.9	15.0	?	
MisV0022	17 55 28.00	−31 04 25.0	12.9	17.0	?	
MisV0023	17 55 53.13	−31 02 24.8	15.0	16.3	?	
MisV0024	17 55 58.13	−30 47 10.7	13.1	16.2	?	
MisV0025	17 56 33.46	−30 46 29.0	13.1	14.8	?	
MisV0026	17 57 08.98	−30 58 22.8	13.5	14.8	?	
MisV0027	17 54 44.64	−31 05 39.9	12.8	[16.5	?	
MisV0028	17 55 17.97	−31 00 32.8	13.9	[16.0	?	
MisV0029	17 54 44.64	−30 53 40.2	13.2	[15.9	?	
MisV0030	17 56 37.14	−30 51 05.4	13.8	16.4	M?	USNO 0525.24967963
MisV0031	17 54 24.43	−31 05 34.1	14.5	16.0	?	USNO 0525.24729694
MisV0032	17 54 37.67	−30 53 27.4	13.9	16.9	?	
MisV0033	18 57 42.22	−10 49 04.0	11.7	12.7	?	
MisV0034	17 55 52.15	−30 48 38.8	15.5	[17.5	?	
MisV0035	17 56 44.25	−30 49 46.8	14.3	16.2	?	USNO 0525.24980364
MisV0036	17 56 38.72	−30 53 18.4	14.7	[16.5	?	
MisV0037	18 02 29.85	−28 14 13.3	12.1	13.5	?	
MisV0038	16 51 24.64	−28 21 54.5	10.8	12.7	?	
MisV0039	16 52 24.02	−28 15 48.9	11.1	13.8	?	
MisV0040	17 53 39.87	−17 38 43.5	12.7	16.5	?	USNO 0675.14692405
MisV0041	17 59 49.03	−29 35 40.5	12.6	14.6	?	GSC 6853.4327 USNO 0600.14864584 IRAS 17566-2935
MisV0042	19 00 40.53	−09 51 47.4	12.8	14.0	SR:	IRAS 18579-0956
MisV0043	18 01 49.51	−30 15 48.9	12.4	13.4	SR?	
MisV0044	18 01 45.26	−30 05 00.9	13.1	14.2	SR?	
MisV0045	18 01 35.80	−30 15 57.1	13.7	15.0	?	USNO 0525.25491989
MisV0046	18 00 20.27	−29 42 58.4	13.3	14.4	SR?	
MisV0047	17 59 59.90	−29 34 20.6	12.7	13.8	SR?	
MisV0048	17 58 02.28	−29 44 39.7	13.7	15.2	?	IRAS 17548-2944
MisV0049	18 01 13.80	−30 20 36.3	13.9	15.1	?	
MisV0050	18 00 44.22	−29 53 14.8	12.9	15.0	SR?	
MisV0051	19 01 09.98	−10 03 30.2	12.5	14.0	SR?	USNO 0750.16201845
MisV0052	18 09 13.80	−27 12 00.0	14.2	16.0	?	USNO 0600.15381676
MisV0053	18 09 02.56	−27 25 40.9	13.9	14.9	?	
MisV0054	18 07 36.96	−27 33 48.2	12.7	14.7	?	
MisV0055	18 23 30.51	−27 27 14.5	13.6	16.4	?	
MisV0056	18 22 21.19	−27 29 52.2	12.8	13.5	?	IRAS 18192-2731
MisV0057	18 22 08.54	−27 31 06.9	13.4	14.8	?	
MisV0058	18 21 50.91	−27 28 04.6	12.8	14.0	?	
MisV0059	18 21 26.89	−27 43 41.4	12.9	14.0	?	
MisV0060	17 54 47.58	−31 01 25.9	12.3	14.3	SR?	

Table 1 (cont.)

Code	R.A. (J2000.0) Decl.		Unfiltered		Type	Identified with
			CCD Mag.			
			Max	Min		
MisV0061	17 <sup>h</sup> 57 <sup>m</sup> 28 <sup>s</sup> .21	−31°15′30″.1	12.4	15.0	M?	
MisV0062	17 59 20.99	−31 09 19.0	14.0	[15.7	?	
MisV0063	18 02 34.53	−31 19 35.1	13.8	15.2	?	
MisV0064	17 55 12.07	−31 01 14.4	11.7	13.7	SR?	
MisV0065	18 02 33.86	−31 25 19.8	12.2	14.3	SR?	
MisV0066	17 57 36.24	−30 59 50.4	11.3	13.9	?	
MisV0067	17 54 53.08	−30 57 36.1	13.5	14.8	SR?	
MisV0068	18 02 24.98	−31 24 07.2	14.1	15.9	?	
MisV0069	17 55 54.00	−31 11 19.9	14.2	[16.1	?	IRAS 17526-3110
MisV0070	18 01 02.50	−31 14 25.4	12.5	15.4	M?	USNO 0525.25432269
MisV0071	17 54 23.46	−30 57 50.2	14.1	15.3	SR?	USNO 0525.24728130
MisV0072	17 54 53.12	−31 16 15.2	13.6	15.3	?	
MisV0073	17 51 41.20	−17 36 07.1	14.2	15.3	L	USNO 0675.14585664
MisV0074	17 56 23.92	−31 10 47.9	14.8	[16.1	?	IRAS 17531-3110
MisV0075	17 57 25.34	−30 49 08.7	13.7	15.4	?	IRAS 17542-3049
MisV0076	17 55 33.09	−30 46 33.1	13.3	15.8	M?	IRAS 17523-3046
MisV0077	18 00 43.16	−31 15 40.3	12.2	15.2	?	IRAS 17573-3115
MisV0078	18 06 26.93	−27 29 21.2	14.3	15.2	?	USNO 0600.15154453
MisV0079	17 56 54.33	−30 48 50.1	14.1	16.1	?	
MisV0080	18 01 14.28	−31 05 42.8	11.6	13.0	?	
MisV0081	17 57 46.39	−31 20 06.9	12.9	14.2	?	
MisV0082	17 57 08.21	−30 04 28.6	13.0	14.3	?	USNO 0525.25021831
MisV0083	17 59 42.50	−31 22 37.7	12.8	14.7	?	USNO 0525.25291095
MisV0084	17 59 48.12	−31 22 47.2	12.9	14.8	SR?	USNO 0525.25302138
MisV0085	17 58 31.37	−31 14 46.3	11.8	13.2	SR?	
MisV0086	17 59 40.48	−29 37 56.5	12.5	13.6	SR?	
MisV0087	17 58 45.86	−29 56 08.7	11.4	12.9	SR?	
MisV0088	17 59 37.33	−29 38 30.2	11.6	13.2	SR?	
MisV0089	18 00 42.98	−30 13 06.2	12.6	13.8	?	
MisV0090	18 00 00.97	−29 28 56.1	12.1	13.9	?	IRAS 17568-2928
MisV0091	18 05 29.22	−27 48 22.5	12.7	14.2	SR?	USNO 0600.15079523
MisV0092	18 00 39.72	−28 31 46.3	13.2	14.8	?	IRAS 17575-2831
MisV0093	18 00 04.49	−29 50 09.0	12.7	14.7	SR?	IRAS 17568-2950
MisV0094	17 54 20.48	−30 47 50.2	13.6	15.2	?	IRAS 17511-3047
MisV0095	17 57 13.50	−30 06 16.8	12.7	13.8	?	
MisV0096	17 55 05.29	−30 56 11.5	13.3	14.6	?	USNO 0525.24802319
MisV0097	18 01 30.15	−31 32 15.9	14.8	16.2	?	
MisV0098	18 01 15.93	−31 34 05.8	13.1	14.2	?	
MisV0099	17 59 36.96	−31 24 47.1	13.2	[15.4	?	
MisV0100	17 58 41.05	−31 15 17.2	13.2	16.6	?	