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4.2 Water Vapor Maser Survey by Using the Kashima 34m Radio Telescope

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ABSTRACT

We carried out an H_2O maser survey by using the 34 m radio telescope at Kashima Space Research Center, CRL in Japan. Sources were selected from the IRAS point source catalogue according to their position on the two-color diagram, and included most of the known H_2O maser sources associated with late-type stars and proto-stellar objects. From a total of 842 H_2O maser candidates, 265 were found to produce H_2O maser emissions, and 44 of these constitute new detections.

Keywords: Masers, Late-type, Proto-star, Mass loss. Infra-red source

1. Introduction

Radio emission from molecular gases usually takes the form of thermal radiation, which is emitted when molecules that have been excited to higher levels by collisions with other gas molecules fall back naturally to lower levels after a certain time has elapsed. But when a large quantity of molecules concentrated at a specific level are subjected to microwaves equivalent to the energy difference between this level and a lower level, stimulated emission of microwaves may take place, resulting in the generation of intense microwaves by stimulated emission (i.e., maser activity). Known celestial masers include red giants that are emitting large quantities of gas, proto-stellar objects that have formed in high-density gas clouds, and the rotating gas disks surrounding massive black holes at the core of active galaxies. Maser excitation sources include strong infrared radiation emitted by a central object and gas collisions resulting from violent mass ejections, and various characteristics of the central object can be investigated by studying the masers in detail. Strong celestial masers are known to include hydroxyl groups (OH), methanol (CH_3OH), water vapor (H_2O) and silicon monoxide (SiO) molecules, which can all be observed in the microwave region (1-100 GHz). In particular, H_2O masers are thought to be excited by gas collisions[(1)(2)], and are commonly observed in a variety of celestial objects where high-density gas is present, so they provide an ideal tool for studying mass ejection phenomena.

Early surveys of H_2O maser sources were centered on observations of oxygen-rich M type red giants, and a detection rate of 75% was obtained in Mira variables[(3)]. Later, many low-temperature infrared sources were discovered in a whole-sky (approx. 95% coverage) survey using the Infrared Astronomical Satellite (IRAS), leading to further observations of red giants and proto-stars in star formation regions, which made it clear that sources from which H_2O masers activity is observed have a specific temperature[(4)(5)], and which allowed a statistical survey to be implemented (see, e.g., References (6) through (10)). A number of maser catalogs summarizing these results have also been compiled (see, e.g., References (12) through (16)).

But since masers change with time, it is possible that new discoveries may be made through repeated observations of the same sources, and it repeated systematic observations of maser sources are an important means of investigating their physics. The characteristics of the 34 m radio telescope at Kashima Space Research Center make it suitable for observations in the 22 GHz band of H_2O masers, so in this study we made a systematic survey of H_2O maser sources with the aim of discovering new H_2O maser sources, compiling a catalog including known H_2O maser sources, and thereby investigating the physical characteristics of H_2O masers by listing the sources of particular interest and studying them in detail by VLBI.

2. Observations

The observations were made by CRL between October 1991 and January 1992 using the Kashima 34 m telescope. Details on the characteristics of the Kashima 34 m telescope can be found in Takaba et al. (1991)[(17)]. In particular, its aperture efficiency in the 22 GHz band is 57%, and during these observations, its system noise temperature at the zenith was 140-180K. A mobile acousto-optic spectrometer (AOS) developed at the Nobeyama radio observatory was used for the observations, which were conducted in the 40 MHz band with a frequency resolution of 40 kHz-this corresponds to a velocity resolution of 0.54 km/s and a velocity width of 540 km/s in the frequency band of H_2O masers. The radio wave absorber at room temperatures was used for intensity calibration. Although some of the observations were made on cloudy days, the absolute intensities agreed to within 30% in observations of standard maser sources. The observations were made with a position switch, using an integration time of 10-15 minutes per source, and the rms noise level was 0.2 Jy at a velocity resolution of 0.54 km/s.

New observation software was developed to perform the survey observations automatically by selecting candidates from a list of sources that have not been observed many times and are close to a meridian, and which can

be observed with minimal antenna repositioning. Since maser candidates are especially numerous toward the galactic center, an attempt was made to efficiently observe as many sources as possible by giving increased priority to sources with low declination and a low meridian transit height in the southern sky.

3. Selection of sources

The sources to be observed were chosen from the IRAS point source catalog. In Fig. 1, the H_2O maser candidates selected from IRAS are plotted on a two-color diagram for 12, 25 and 60 microns. This figure includes a sum total of about 13,000 sources corresponding to the following four kinds of sources observed as H_2O masers.

Mira variables:

$-1.1 < 2.5\log(F25/F12) < -0.5, -2.2 < 2.5\log(F60/F25) < -1.7$

IRC/AFGL sources:

$-0.5 < 2.5\log(F25/F12) < 0.0, -2.3 < 2.5\log(F60/F25) < -1.5$

OH/IR sources:

$0.0 < 2.5\log(F25/F12) < 2.0, -2.2 < 2.5\log(F60/F25) < 1.0$

Proto-stellar objects:

$0.0 < 2.5\log(F25/F12) < 5.0, 0.0 < 2.5\log(F60/F25) < 5.0$

It is thought that Mira variables, IRC sources and OH/IR sources are old oxygen-rich stars whose gas emission rates increase as they evolve, causing them to become surrounded by a thick covering of gas/dust. If they can be observed at visible wavelengths then they are referred to as Mira variables. IRC and OH/IR sources are similar systems that can be observed at near-infrared and far-infrared wavelengths respectively. Proto-stellar objects are celestial objects that have just formed in dark nebulae and are not yet hot enough for nuclear fusion reactions to begin. However, it is known that proto-stellar objects emit supersonic gas streams known as molecular outflow in the early stages of their evolution, and it is thought that this provides the energy source for the excitation of masers. Since OH/IR sources and proto-stellar objects are cold celestial objects that occupy overlapping regions in the IRAS two-color diagram, it is important to carefully distinguish between them. If it is a proto-stellar object, the high density gas cloud from which it formed can easily be detected by observing carbon monoxide molecules (CO; J=1—0) in the 115 GHz band, so observations of this sort need to be made separately.

Figure 2 shows the galactic plane distribution of the Mira variables (•), IRC sources (△), and OH/IR sources (○) selected in Fig. 1. The low-temperature IRC and OH/IR sources tend to appear at greater concentrations in the galactic plane, but this is thought to be an evolu-

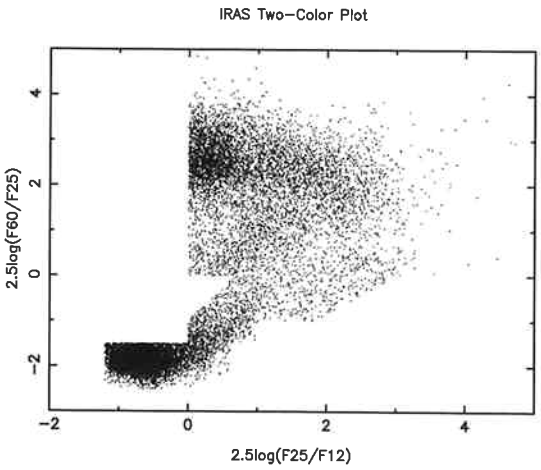

Fig. 1 H_2O maser candidates were selected from infra-red sources observed by the IRAS infra-red astronomical satellite by plotting them on a two-color diagram derived from their infra-red intensities at 12, 25 and 60 microns.

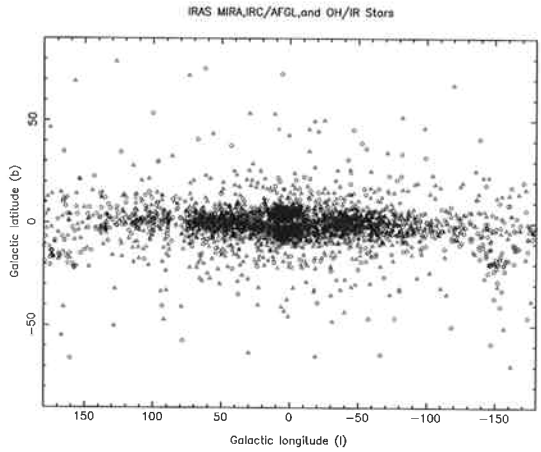

Fig. 2 The galactic plane distribution of the selected H_2O maser candidates thought to be red giants (Key: • = Mira variable; △ = IRC source; ○ = OH/IR source). It is thought that the reduction in numbers at the galactic plane ($b = 0°$) is due to the reduced accuracy of observations at 60 microns caused by the strong infra-red radiation from the galactic plane.

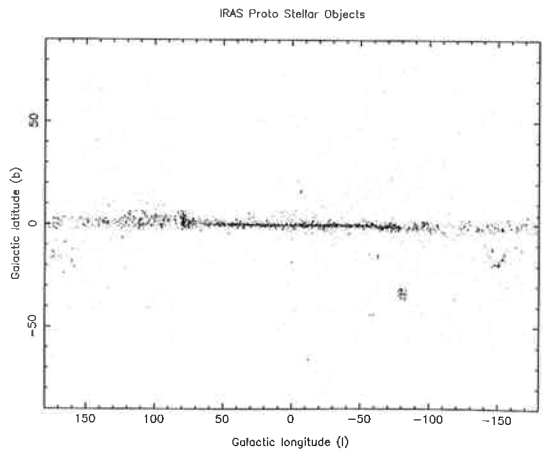

Fig. 3 The galactic plane distribution of the selected H_2O maser candidates thought to be proto-stellar objects.

tionary stage, and the length of time they remain at this stage is shorter for IRC and OH/IR sources, so there are fewer sources and consequently brighter and more remote sources are seen in greater numbers. Similarly, Fig. 3 shows the galactic plane distribution of the proto-stellar objects selected in Fig. 1, which can be seen to be strongly concentrated in the galactic plane. This is because star formation takes place in the dark molecular nebulae that are thinly distributed in the galactic plane.

4. Observation results

A list of the observed sources is shown in Table 1. A total of 842 H_2O maser candidates were surveyed. These were selected from a list of candidates arranged in order of infrared intensity. The spectra were displayed after performing automatic base line fitting, and then checked for the presence of maser emission lines. In cases where it was confirmed that spurious signals were not received and where two or more observations had been made, we checked the results of each observation for maser emission lines. H_2O masers were detected at 265 sources (31.5 %), of which 44 represented new detections. Of the sources where new detections were made, those for which a very narrow line width was obtained in just one measurement (17048−1601, 19348+2136, 19352+2030, 20296−2151) may be spurious detections. A total of 643 astronomical observations were made of late-type stars, of which H_2O masers were detected at 182 (28.3%), and 33 of these were new detections. Observations were also made at 199 candidate proto-stellar objects, and H_2O masers were detected at 83 (41.7%) of these, of which 11 were new detections.

Figure 4 shows the observation results plotted on the IRAS two-color diagram, and Fig. 5 shows the galactic plane distribution. In both figures, observations in which H_2O masers were detected are represented as "○", and observations in which no H_2O masers were detected are represented as "×". Since the region on the right side where there are no observations corresponds to sources with a declination of −40° or less, their meridian transit altitude from Kashima is 15° so they are in an unobservable region. The sources in the galactic plane are principally proto-stellar objects, while those further away from the galactic plane are late-type stars that are situated closer to the solar system.

Figure 6 shows the spectra of sources where H_2O masers were detected. Takaba et al. (1994)[18] have shown that Mira variables generally have a single peak, whereas IRC sources and OH/IR often have double peaks. This is thought to be because, as calculated theoretically by Cooke & Elitzur (1985)[1], H_2O masers are produced in regions of more or less uniform molecular density. As a result, the maser excitation region gets further away from a star as it evolves due to the associated increase in the mass loss rate and becomes a gas acceleration region, so the maser undergoes beaming in the radial direction of the source, resulting in a double peak. A detailed discussion of the results of these survey observations in relation to late-type stars can be found in Takaba et al. (2001)[19], to which the reader is referred.

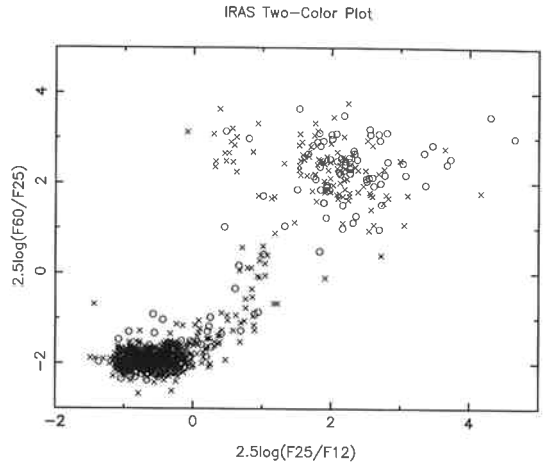

Fig. 4 A plot of the sources surveyed for H_2O maser activity on the IRAS two-color diagram (Key: ○ = H_2O maser activity detected; × = No H_2O maser activity detected).

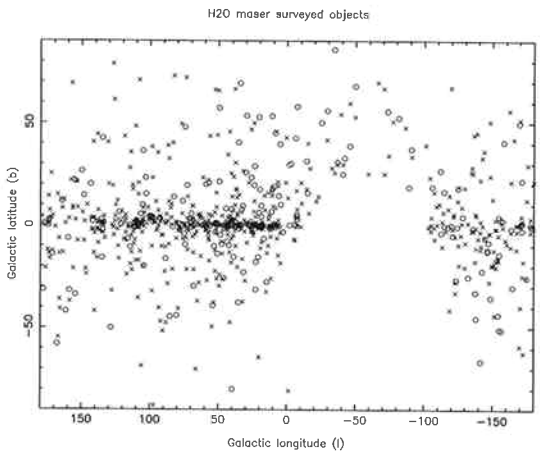

Fig. 5 The galactic plane distribution of sources surveyed for H_2O maser activity (Key: ○ = H_2O maser activity detected; × = No H_2O maser activity detected). The sources situated far from the galactic plane are thought to lie closer to the solar system.

5. Conclusion

We have used the Kashima 34 m radio telescope to observe H_2O masers in the 22 GHz band. A list of about 13,000 infra-red sources was drawn up from the IRAS point source catalogue, of which observations were made at 842 (those having a strong infra-red intensity). H_2O masers were detected at 265 of these objects, of which 44 constituted new detections. The H_2O maser detection rate was 31.5%. If the same figure applies to all 10,000 objects in our list, then it should be possible to detect about 3,000 H_2O masers in our galaxy from the IRAS list as long as observations can be made with an adequate S/N ratio. The National Astronomy Observatory is currently involved in the VERA project which aims to investigate the rotation of our galaxy by measuring the distance to H_2O masers based on the annual parallax in VLBI observations, and the maser sources detected in our survey are good candidates for this purpose. In addition to supporting the VERA project by making further detailed observations, we are also hoping to make advances in astrophysical research by finding interesting sources and studying them in detail by VLBI.

Acknowledgments

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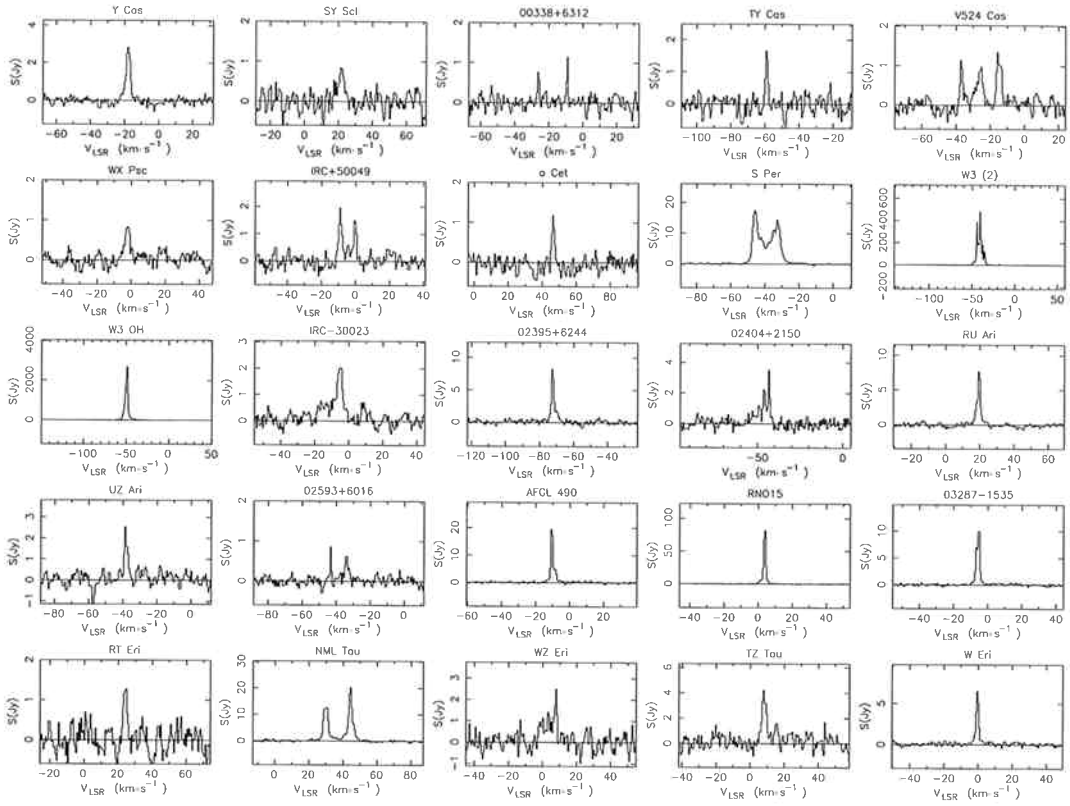

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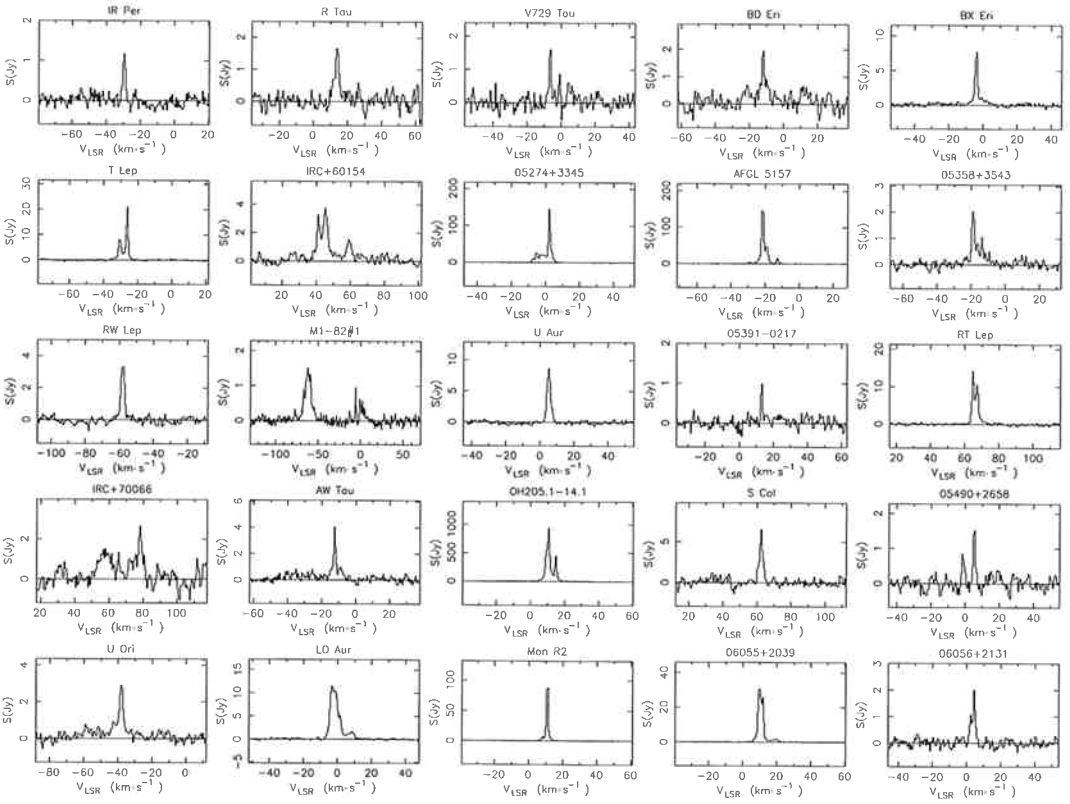
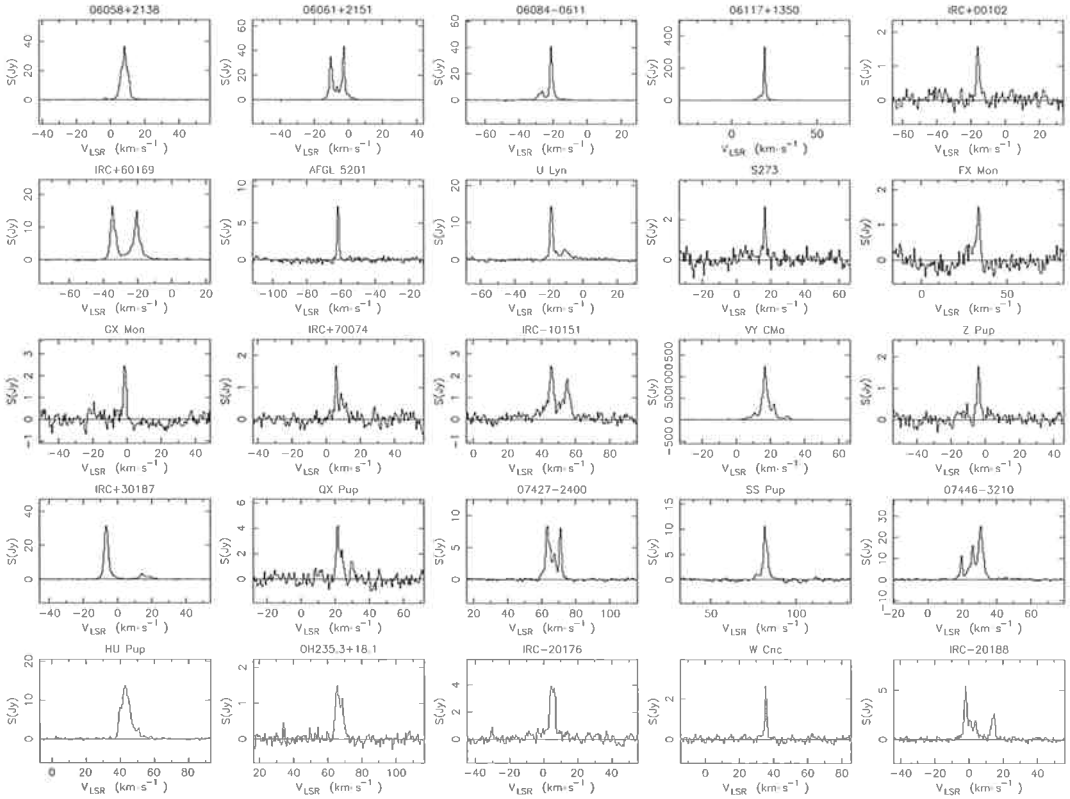


b

Fig. 6.1 The spectra of sources where H_2O maser activity was detected.



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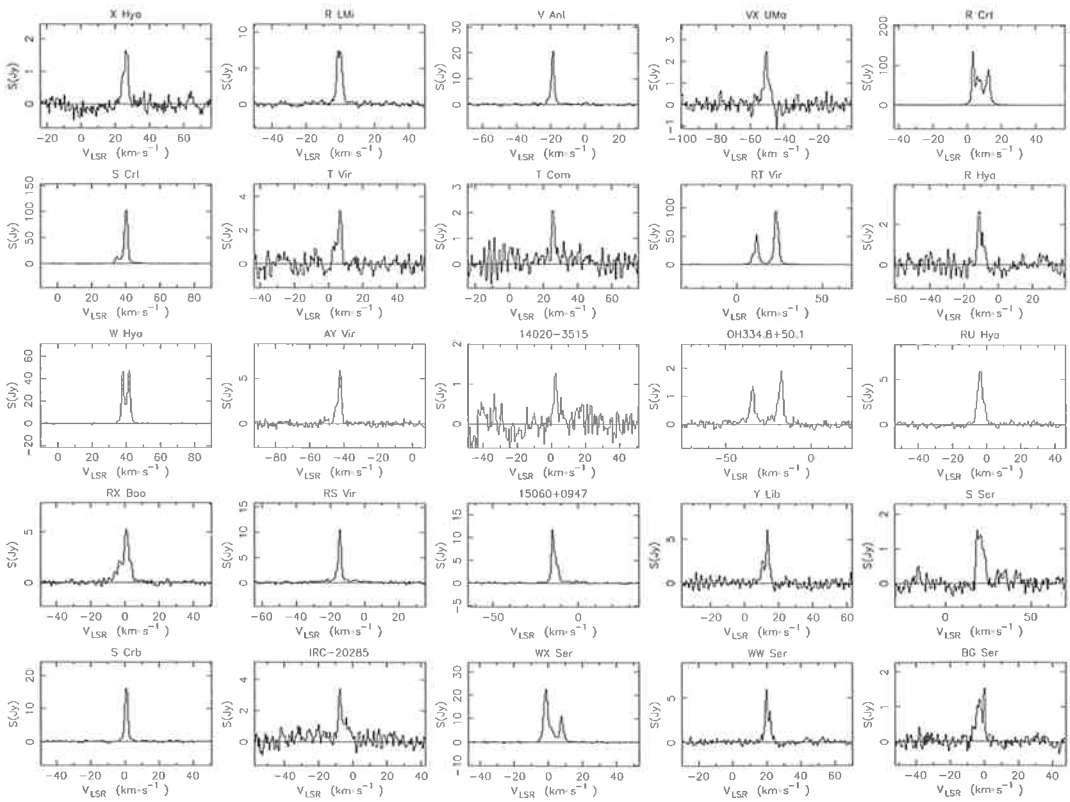
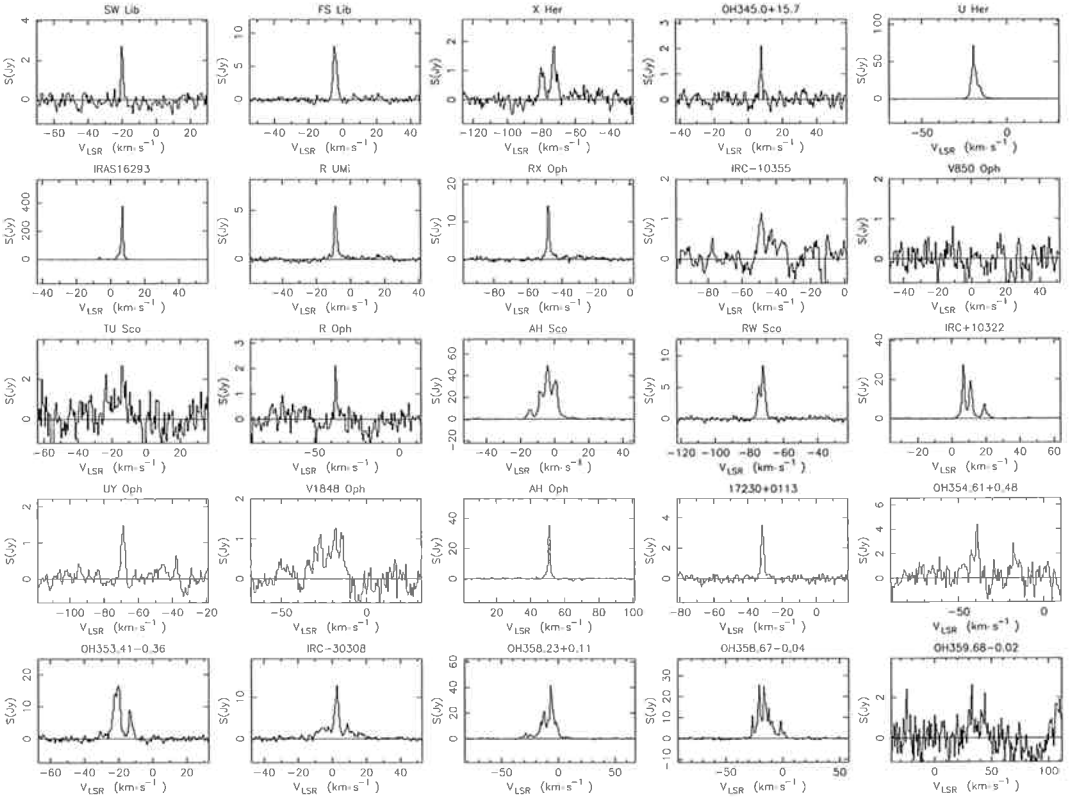


d

Fig. 6.2 The spectra of sources where H_2O maser activity was detected.



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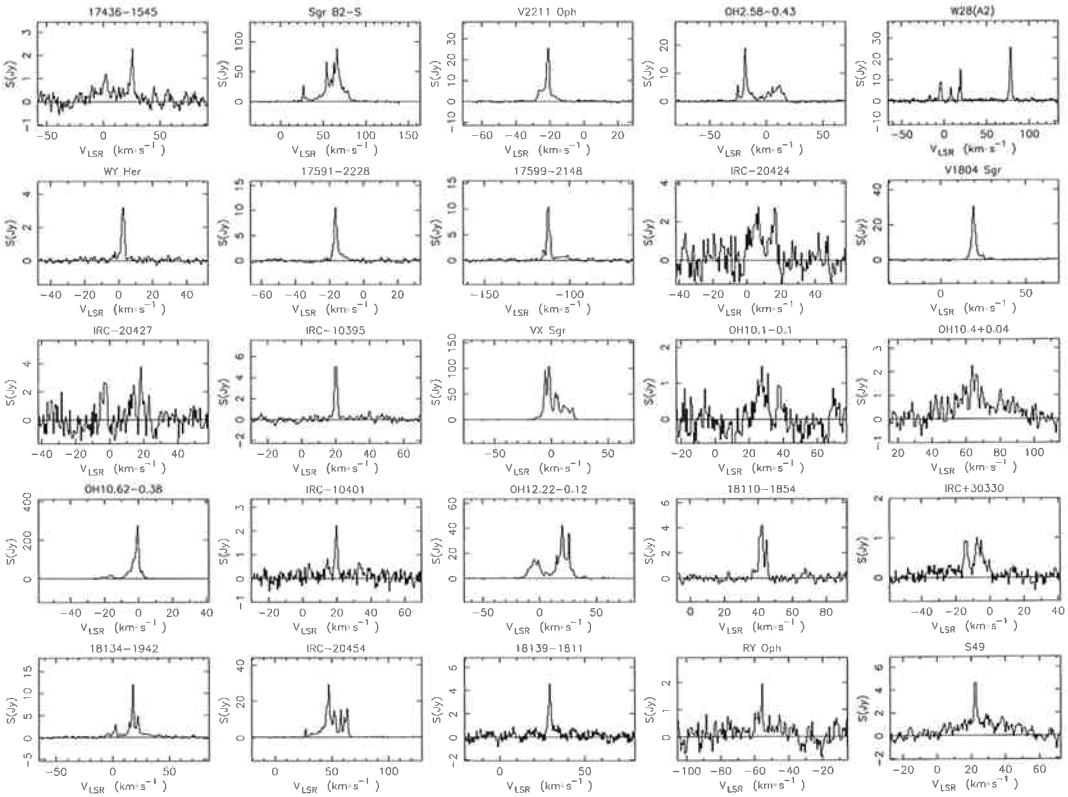

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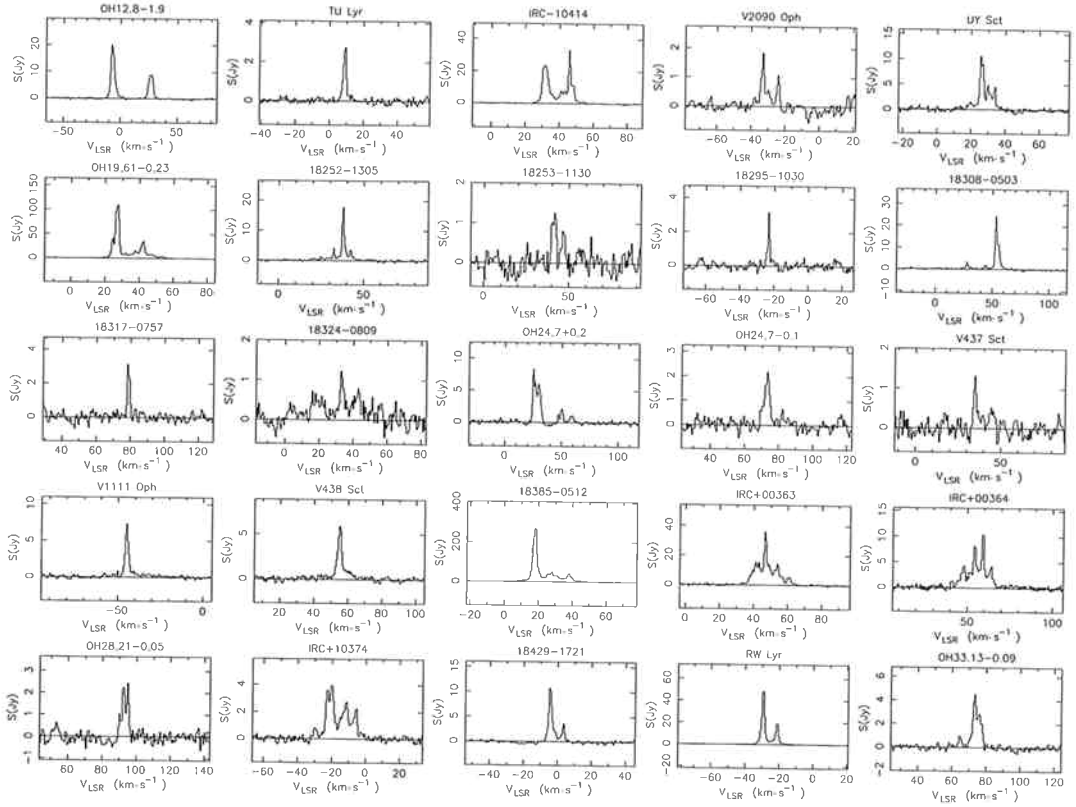
Fig. 6.3 The spectra of sources where H_2O maser activity was detected.



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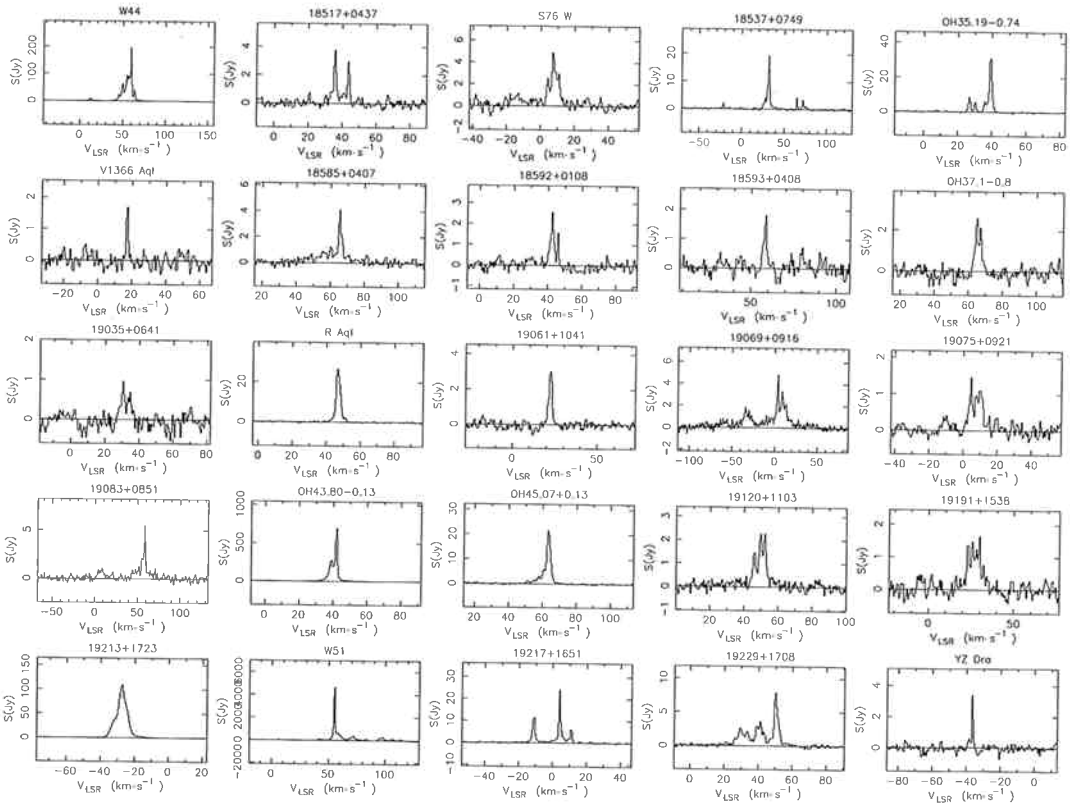

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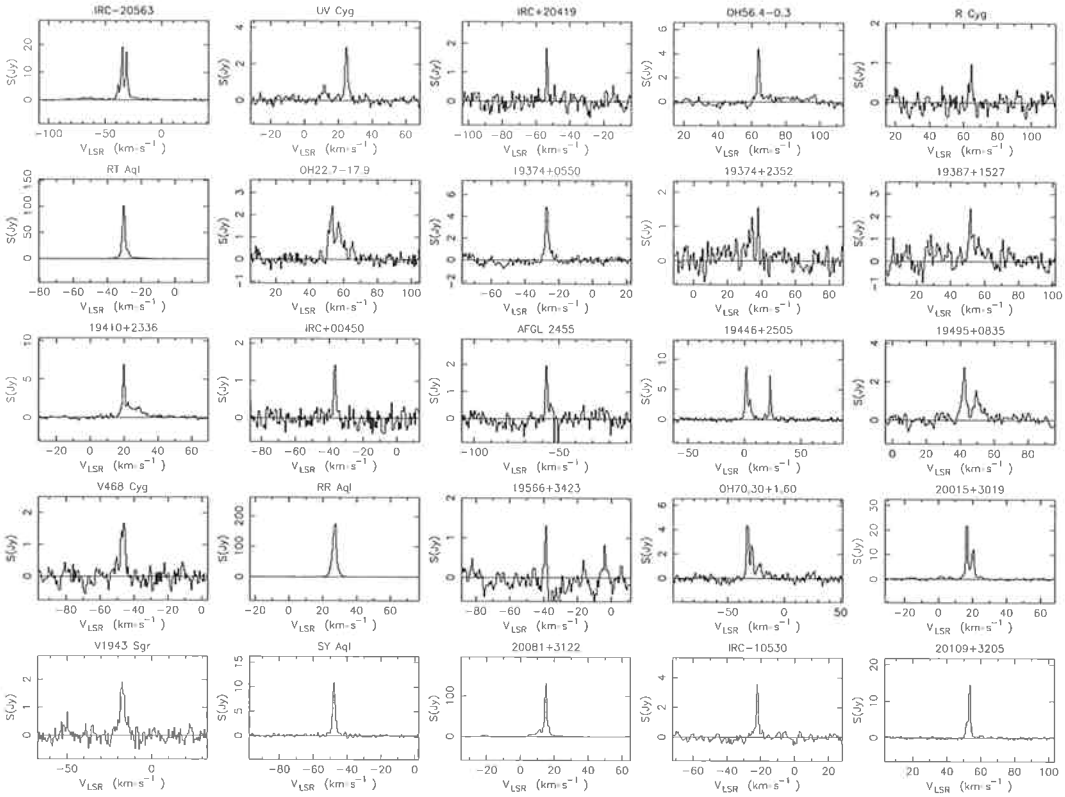
Fig. 6.4 The spectra of sources where H_2O maser activity was detected.



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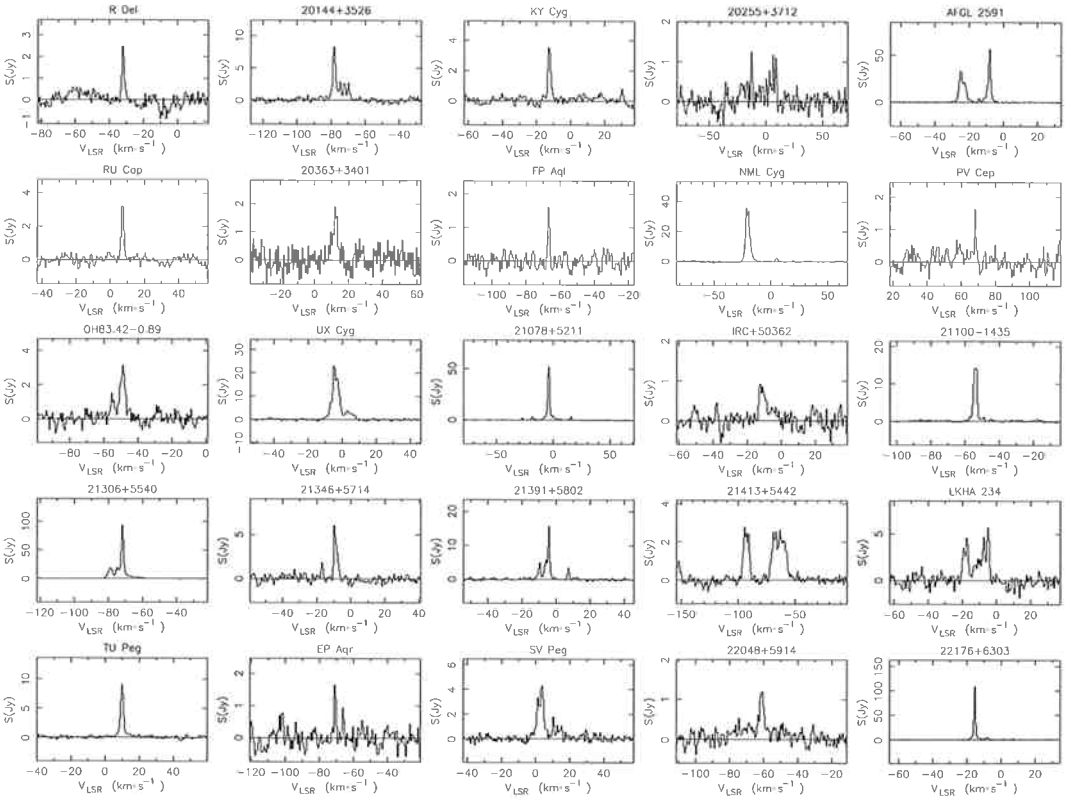

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Fig. 6.5 The spectra of sources where H_2O maser activity was detected.

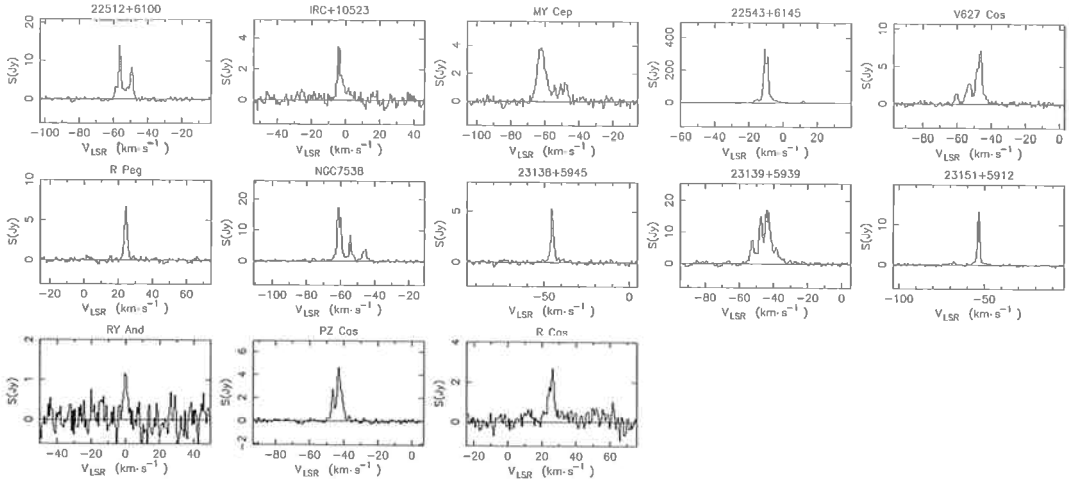

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Fig. 6.6 The spectra of sources where H_2O maser activity was detected.

Table 1: A list of the observed sources

Name	IRAS NAME	R.A. (1950)	Decl. (1950)	Type	Vlsr (km/s)	Flux (Jy)	DATE YYMMDD-YYMMDD	New
Y Cas	00007+5524	000046.7	+552408	Mira	-17.9	2.8	911023-920111	
SV And	00017+3949	000146.0	+394954	Mira		<.7	911023-911105	
KU And	00042+4248	000417.7	+424818	IRC/AFGL		<.5	911115-911220	
SY Scl	00050-2546	000503.0	-254618	Mira	21.5	.8	911029-911105	
V641 Cas	00067+6340	000647.7	+634034	Mira		<.5	920111	
LKHa198	00087+5833	000844.0	+583308	SFR		<.7	911106-911109	
00127+5437	00127+5437	001244.5	+543735	IRC/AFGL		<.5	911114	
S Scl	00128-3219	001251.0	-321924	Mira		<.8	911109-911112	
OH119.7+3.3	00170+6542	001707.0	+654254	OH/IR		<.9	911106-911123	
T Cas	00205+5530	002031.5	+553056	Mira		<.9	911023-911111	
R And	00213+3817	002123.1	+381800	Mira		<.7	911105-911111	
UY Cet	00245-0652	002433.7	-065253	Mira		<1.1	911112	
00247+6922	00247+6922	002447.2	+692214	Mira		<.9	911111	
00338+6312	00338+6312	003353.2	+631232	SFR	-17.0	1.1	911116-911124	
TY Cas	00340+6251	003405.0	+625130	Mira	-58.9	1.7	911023-911123	
V524 Cas	00428+6854	004253.2	+685431	IRC/AFGL	-25.9	1.3	911023-911220	
00450-2533	00450-2533	004505.1	-253345	SFR		<.5	911117-920119	
00468+6527	00468+6527	004651.2	+652719	SFR		<.8	911116-911124	
00479+4614	00479+4614	004754.5	+461410	IRC/AFGL		<.7	911115	
00506+5224	00506+5224	005038.9	+522453	IRC/AFGL		<.4	911114-911115	
S185	00560+6037	005600.7	+603721	SFR		<.9	911110	
01010+7434	01010+7434	010104.0	+743400	Mira		<.4	920111	
WX Psc	01037+1219	010348.0	+121952	IRC/AFGL	-2.2	.8	911023-911220	
IRC+30021	01085+3022	010830.2	+302209	IRC/AFGL		<.4	911023-911220	
01133+6434	01133+6434	011318.0	+643450	SFR		<.6	911106-911109	
01144+6658	01144+6658	011426.2	+665805	OH/IR		<.4	911116-920111	
01150+5732	01150+5732	011505.3	+573222	Mira		<.4	920111	
S Cas	01159+7220	011558.0	+722054	Mira		<.9	911023-911111	
01202+6133	01202+6133	012015.1	+613310	SFR		<.4	911116-920112	
01214+6118	01214+6118	012127.2	+611810	SFR		<.6	920112	
OH127.8-0.0	01304+6211	013027.6	+621131	OH/IR		<.4	911029-911116	
SV Psc	01438+1850	014352.0	+185009	Mira		<.7	920113	
IRC+50049	01556+4511	015537.9	+451134	Mira	-9.0	2.0	911022-911111	
XX Per	01597+5459	015947.0	+545931	Mira		<.5	920111	
W And	02143+4404	021423.0	+440430	Mira		<.8	911030-911111	
BU Per	02153+5711	021520.7	+571125	IRC/AFGL		<.7	911113	
o Cet	02168-0312	021649.0	-031222	Mira	46.4	1.2	911029-911111	
RS Per	02188+5652	021851.0	+565251	IRC/AFGL		<.4	911113-911220	
S Per	02192+5821	021915.1	+582134	IRC/AFGL	-39.2	17.4	911113-911123	
W3 (2)	02219+6152	022153.0	+615222	OH/IR	-41.3	482.6	911110	
02230+6202	02230+6202	022302.2	+620224	SFR		<.6	911116-920112	
W3 OH	02232+6138	022317.2	+613858	SFR	-49.4	2683.3	911115-911116	
R Cet	02234-0024	022329.0	-002412	IRC/AFGL		<.8	911029-911105	
IRC+60090	02236+6027	022340.2	+602721	IRC/AFGL		<.3	911113-911220	
RR Per	02251+5102	022506.0	+510253	Mira		<.5	911023-920112	

Name	IRAS NAME	R.A. (1950)	Decl. (1950)	Type	Vlsr (km/s)	Flux (Jy)	DATE YYMMDD-YYMMDD	New
UX And	02302+4525	023012.1	+452600	Mira		< .9	911111	
02309+6034	02309+6034	023057.7	+603441	SFR		<1.3	911110	
02310+6133	02310+6133	023101.7	+613340	SFR		< .8	911110	
U Cet	02313-1322	023120.0	-132201	Mira		< .7	911029-911105	
IRC+60092	02316+6455	023143.0	+645636	IRC/AFGL		< .6	911023-911113	
02318+6106	02318+6106	023148.0	+610632	SFR		< .8	911110	
R Tri	02339+3402	023400.0	+340250	Mira		<1.4	911023-911030	
YZ Per	02347+5649	023446.7	+564947	IRC/AFGL		< .8	911113	
IRC-30023	02351-2711	023511.3	-271137	Mira	-5.4	2.0	911029-911111	
RR Cep	02361+8055	023612.0	+805524	Mira		< .9	911023-911123	
02395+6244	02395+6244	023930.0	+624422	SFR	-72.4	8.2	911023-911111	
02404+2150	02404+2150	024025.0	+215052	Mira	-45.3	3.5	911106-911110	
TV Per	02407+3602	024043.2	+360220	IRC/AFGL		< .3	911114-911220	
RU Ari	02420+1206	024202.0	+120630	Mira	19.4	7.7	911029-911105	
T Ari	02455+1718	024532.0	+171806	Mira		<1.1	911105	
Z Eri	02455-1240	024532.2	-124005	Mira		< .7	920113	
W Per	02469+5646	024655.0	+564635	IRC/AFGL		< .5	911113-911220	
IRC+60100	02473+5738	024718.7	+573857	IRC/AFGL		< .6	911113	
02511+6023	02511+6023	025108.3	+602335	SFR		< .8	911110	
ER Per	02532+5426	025316.8	+542630	Mira		< .5	920111	
02547+1106	02547+1106	025444.2	+110603	IRC/AFGL		< .5	911115	
02570+6028	02570+6028	025703.5	+602829	SFR		< .8	911110	
02575+6017	02575+6017	025735.5	+601722	SFR		< .8	911110	
UZ Ari	02587+2136	025843.0	+213606	Mira	-38.2	2.5	911106-911109	
02593+6016	02593+6016	025920.6	+601608	SFR	-38.5	.9	911116-920119	
IO Per	03030+5532	030307.0	+553206	IRC/AFGL		< .4	911109-911113	
U Ari	03082+1436	030816.2	+143640	Mira		< .6	911022-920119	
03094+5530	03094+5530	030927.1	+553058	Mira		< .4	920111	
V411 Per	03113+5441	031123.7	+544155	IRC/AFGL		<1.1	911113	
UZ Per	03170+3150	031700.6	+315029	IRC/AFGL		< .3	911114-911220	
OH138.0+7.3	03206+6521	032041.5	+652131	OH/IR		< .6	911123-920119	
V384 Per	03229+4721	032259.4	+472120	Mira		< .9	911111	
AFGL 490	03236+5836	032338.0	+583633	SFR	-10.5	19.5	911106-911109	
03238+6034	03238+6034	032352.2	+603430	Mira		< .5	920112-920119	
RNO15	03245+3002	032434.9	+300236	SFR	3.9	81.7	911110	
03287-1535	03287-1535	032844.7	-153502	IRC/AFGL	-5.6	10.0	911115-911220	*
AFGL 5097	03293+6010	032923.0	+601004	OH/IR		<1.0	911106-911109	
RT Eri	03318-1619	033153.5	-161948	Mira	24.1	1.3	911112	*
03385+5927	03385+5927	033834.0	+592730	Mira		< .3	920111-920119	
SS Cep	03415+8010	034131.2	+801002	Mira		<1.1	911111-911112	
03448+4432	03448+4432	034449.2	+443251	IRC/AFGL		< .4	911113-911220	
SU Eri	03489-0131	034854.7	-013114	Mira		< .6	920113	
NML Tau	03507+1115	035043.5	+111532	Mira	37.1	20.2	911030-911112	
03572+5509	03572+5509	035716.1	+550921	IRC/AFGL		< .7	911113	
WZ Eri	03598-1353	035950.0	-135318	Mira	5.0	2.5	911029	

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TZ Tau	03599+1632	035955.0	+163218	Mira	8.2	4.2	911023-911030	*
V Eri	04020-1551	040202.0	-155142	Mira		<1.1	911029	
V394 Per	04064+3321	040628.0	+332142	Mira		< .8	911106-911109	
W Eri	04094-2515	040926.0	-251542	Mira	-.4	6.5	911105-920119	
IRC+30080	04137+3114	041347.4	+311433	Mira		< .6	920112	
IR Per	04166+4056	041636.5	+405637	Mira	-29.6	1.2	911111-911114	
T Tau	04190+1924	041904.0	+192506	SFR		<1.7	911106-911109	
R Tau	04255+1003	042534.4	+100313	Mira	13.8	1.7	911022-920113	
IRC+20082	04260+2437	042607.0	+243736	Mira		< .8	911106-911109	
S Tau	04264+0950	042627.0	+095012	Mira		<1.3	911023-911030	
RV Cam	04265+5718	042631.7	+571813	Mira		< .5	920111	
V729 Tau	04280+2722	042801.0	+272300	Mira	-6.5	1.6	911106-911110	
IRC+60144	04307+6210	043046.0	+621011	Mira		<1.2	911111	
BD Eri	04311-0004	043110.0	-000500	Mira	-12.0	2.0	911029-911105	
04324+5106	04324+5106	043228.7	+510639	SFR		< .3	911116-920112	
IU Tau	04328+2824	043249.7	+282446	Mira		< .7	920112	
RX Tau	04355+0814	043532.0	+081412	Mira		<1.3	911030-920113	
04361+2547	04361+2547	043609.3	+254726	SFR		< .5	911106-911109	
BX Eri	04382-1417	043814.8	-141747	Mira	-3.9	7.7	911111-911115	
R Cae	04387-3819	043846.0	-381949	Mira		<1.3	911106-911112	
AFGL 618	04395+3601	043934.0	+360115	OH/IR		< .4	911117-920112	
RV Tau	04440+2605	044402.0	+260524	IRC/AFGL		< .5	911106-911110	
04530+4427	04530+4427	045305.9	+442759	IRC/AFGL		< .4	911115-911220	
04547+4753	04547+4753	045444.7	+475354	SFR		< .4	911116-911125	
TX Cam	04566+5606	045644.0	+560654	Mira		< .8	911029-911111	
AFGL 5134	04575+1251	045735.4	+125142	IRC/AFGL		< .6	911115	
T Lep	05027-2158	050243.2	-215819	Mira	-28.4	21.0	911105-911111	
NV Aur	05073+5248	050719.7	+524854	OH/IR		< .7	911023-911116	
RX Lep	05090-1154	050903.7	-115433	Mira		< .9	911111	
05100+3723	05100+3723	051001.7	+372335	SFR		< .4	911116-911125	
R Aur	05132+5331	051315.0	+533154	Mira		<1.0	911023-911123	
IRC+60154	05151+6312	051507.8	+631249	Mira	51.7	3.8	911023-911111	
T Col	05174-3345	051727.0	-334530	Mira		<1.1	911106-911109	
S Ori	05265-0443	052632.7	-044352	Mira		<1.1	911029-911111	
05274+3345	05274+3345	052727.6	+334537	SFR	2.3	144.7	911124	
05281+3412	05281+3412	052807.8	+341246	SFR		< .5	911117-911124	
05286+1203	05286+1203	052840.2	+120313	SFR		< .7	911110	
05320-0300	05320-0300	053200.4	-030012	SFR		<1.3	911110	
L1641-N	05338-0624	053352.7	-062402	SFR		< .8	911110	
AFGL 5157	05345+3157	053435.0	+315824	SFR	-21.6	146.5	911106-911107	
05354+2458	05354+2458	053528.2	+245826	Mira		< .9	911111	
05355-0146	05355-0146	053533.2	-014650	SFR		< .8	911110	
05358+3543	05358+3543	053548.7	+354341	SFR	-17.4	2.0	911116-920119	
V883 Ori	05358-0704	053553.2	-070407	SFR		< .3	911117-920113	
S281	05359-0515	053558.5	-051548	SFR		< .9	911110	

Name	IRAS NAME	R.A. (1950)	Decl. (1950)	Type	Vlsr (km/s)	Flux (Jy)	DATE YYMMDD-YYMMDD	New
05361+4644	05361+4644	053608.1	+464410	OH/IR		< .3	911116-920111	
RW Lep	05365-1404	053637.0	-140348	Mira	-58.0	3.3	911105-920113	
RU Aur	05367+3736	053643.0	+373636	Mira		<1.6	911023-911029	
05371-0338	05371-0338	053711.8	-033846	SFR		< .7	911110	
05375+3536	05375+3536	053731.1	+353653	SFR		< .4	911125-920119	
M1-82#1	05375+3540	053732.0	+354045	SFR	-29.4	1.5	911116-920119	
05378+2804	05378+2804	053753.0	+280454	Mira		< .7	920112	
SZ Aur	05384+3854	053827.8	+385434	Mira		< .5	920111	
U Aur	05388+3200	053855.0	+320106	Mira	5.2	8.6	911111-911123	
05391-0217	05391-0217	053906.8	-021718	SFR	13.2	1.0	911117-920113	*
05391-0152	05391-0152	053907.0	-015245	SFR		< .3	911117-920113	
05394-0151	05394-0151	053926.8	-015148	SFR		< .4	911117-920113	
RT Lep	05404-2343	054028.8	-234302	Mira	66.0	14.2	920119	*
IRC+70066	05411+6957	054116.0	+695654	Mira	67.5	2.7	911023-911029	
05417+0907	05417+0907	054145.2	+090740	SFR		< .7	911110	
05418-3224	05418-3224	054151.7	-322444	Mira		< .9	920119	
AW Tau	05443+2707	054420.0	+270632	Mira	-12.3	4.1	911023-911123	
OH205.1-14.1	05445+0020	054430.0	+002001	SFR	10.3	934.4	911029-911030	
S Col	05450-3142	054503.0	-314230	Mira	62.4	6.5	911106-911109	*
05490+2658	05490+2658	054905.1	+265852	SFR	5.3	1.5	911117-911124	*
alfa Ori	05524+0723	055227.7	+072358	Mira		< .7	911111	
U Ori	05528+2010	055251.0	+201006	Mira	-38.1	2.9	911111-911123	
LO Aur	05535+4822	055335.2	+482223	IRC/AFGL	-2.0	11.5	911106-911115	
05543+5002	05543+5002	055420.8	+500224	IRC/AFGL		< .6	911115	
IRC+40419	05559+3825	055558.0	+382528	Mira		<1.3	911111	
05568+3206	05568+3206	055649.2	+320625	SFR		< .4	920111	
MWC 789	05591+1630	055906.0	+163059	OH/IR		<1.4	911106-911109	
V352 Ori	05592-0221	055915.8	-022113	Mira		< .6	911111	
06003+4747	06003+4747	060021.7	+474752	IRC/AFGL		< .7	911115	
BS Aur	06011+2829	060106.6	+282913	Mira		< .5	920112	
06012+0726	06012+0726	060117.1	+072603	IRC/AFGL		< .6	911115	
SS Lep	06027-1628	060245.0	-162848	Mira		< .7	911112	
S Lep	06036-2411	060342.0	-241124	Mira		< .9	911106-911109	
Mon R2	06053-0622	060522.0	-062219	SFR	10.9	88.5	911106-911109	
06055+2039	06055+2039	060533.9	+203947	SFR	10.4	30.7	911117-920112	
06056+2131	06056+2131	060540.9	+213132	SFR	4.0	2.0	911117-920112	
06058+2138	06058+2138	060553.9	+213857	SFR	8.2	36.5	911110-920112	
06061+2151	06061+2151	060607.3	+215112	SFR	-6.1	43.2	911117-920112	
06063+2040	06063+2040	060623.0	+204002	SFR		< .4	911117-920112	
06073+1249	06073+1249	060723.5	+124924	SFR		< .3	911117-920113	
06084-0611	06084-0611	060824.5	-061112	SFR	-21.1	40.6	911117-920113	
TV Gem	06088+2152	060850.0	+215251	Mira		< .6	920112	
BU Gem	06092+2255	060917.0	+225517	Mira		< .6	920112	
GI Ori	06104+1833	061025.0	+183330	Mira		< .9	911029-911030	
06105+1756	06105+1756	061033.0	+175622	SFR		< .6	911117-911124	

Name	IRAS NAME	R.A. (1950)	Decl. (1950)	Type	Vlsr (km/s)	Flux (Jy)	DATE YYMMDD-YYMMDD	New
06114+1745	06114+1745	061128.6	+174533	SFR		<.3	911117-920112	
06117+1350	06117+1350	061146.4	+135033	SFR	19.3	331.7	911117-920112	
06140-2729	06140-2729	061402.7	-272928	Mira		<1.1	920113	
HD44179	06176-1036	061737.7	-103653	OH/IR		<.4	911117-920113	
06181+0406	06181+0406	061807.3	+040636	IRC/AFGL		<.5	911115	
06192+4657	06192+4657	061913.6	+465707	IRC/AFGL		<.9	911113-911117	
IRC+00102	06193-0349	061922.3	-034912	IRC/AFGL	-15.9	1.6	911115-911220	*
S249	06199+2311	061956.5	+231132	SFR		<.6	911110	
06230-0930	06230-0930	062304.8	-093019	Mira		<.7	920113	
06250+6134	06250+6134	062504.4	+613432	IRC/AFGL		<1.1	911113-911116	
FS CMa	06259-1301	062559.0	-130113	IRC/AFGL		<.5	911115-911220	
06268+0849	06268+0849	062651.0	+084919	Mira		<.8	920112	
IRC+40156	06297+4045	062944.2	+404507	IRC/AFGL		<.5	911113-911220	
IRC+60169	06300+6058	063000.6	+605854	IRC/AFGL	-27.5	16.3	911030-911113	
AFGL 5201	06319-0501	063158.0	-050121	OH/IR	-61.6	7.2	911106-911109	
S275	06322+0427	063216.6	+042740	SFR		<.8	911110	
06329-0106	06329-0106	063259.5	-010656	IRC/AFGL		<.7	911115	
GL Mon	06333-0520	063319.0	-052007	Mira		<.8	920113	
06342+0328	06342+0328	063416.3	+032805	Mira		<.4	911111-911112	
SY Mon	06349-0121	063459.0	-012105	Mira		<.6	911029-911112	
U Lyn	06363+5954	063619.2	+595449	Mira	-18.5	14.3	911112-911123	
R Mon	06364+0846	063625.6	+084657	OH/IR		<.4	911116-920112	
S273	06382+1017	063817.6	+101754	SFR	16.6	2.6	911110	*
06398-0936	06398-0936	063953.0	-093646	IRC/AFGL		<.5	911115	
S Lyn	06402+5757	064015.0	+575742	Mira		<1.2	911030	
FX Mon	06423+0905	064221.0	+090524	Mira	33.3	1.5	911029-911123	*
X Gem	06439+3019	064355.0	+301954	Mira		<.8	911029-911123	
AFGL 1020	06487+0551	064844.7	+055110	Mira		<.6	920113	
06491-0654	06491-0654	064907.5	-065422	IRC/AFGL		<.5	911115-911220	
DL CMa	06496-1858	064937.4	-185837	Mira		<.8	920113	
GX Mon	06500+0829	064959.0	+082906	Mira	-1.2	2.4	911029-911123	
X CMa	06546-2353	065440.4	-235353	Mira		<1.0	920113	
BIP 14	06567-0355	065646.5	-035528	SFR		<.6	911110	
07014-1141	07014-1141	070126.7	-114117	SFR		<.8	911110	
07016-1118	07016-1118	070137.9	-111848	SFR		<.7	911110	
HN Mon	07021-0852	070207.5	-085240	Mira		<.8	911111-911112	
07023-1017	07023-1017	070221.3	-101725	SFR		<.7	911110	
07025-1204	07025-1204	070232.5	-120451	SFR		<.8	911110	
IRC+70074	07051+6601	070507.9	+660115	Mira	7.1	1.7	920112-920119	*
IRC-10151	07054-1039	070527.3	-103917	IRC/AFGL	46.0	2.4	911105-911220	
07061-0414	07061-0414	070609.8	-041417	SFR		<.4	911116-920113	
07098-2012	07098-2012	070953.7	-201217	Mira		<.7	911111-911112	
IRC+40172	07150+3808	071500.6	+380839	Mira		<.5	911111-911112	
AFGL 1099	07152-3444	071514.0	-344442	Mira		<1.2	911106-911109	
07153-2411	07153-2411	071522.5	-241144	IRC/AFGL		<1.3	911115	

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VY CMa	07209-2540	072055.5	-254017	IRC/AFGL	16.9	1238.0	911029-911220	
07217-1246	07217-1246	072143.9	-124632	Mira		<.6	911111-911112	
TT Mon	07232-0544	072313.0	-054442	Mira		<1.2	911106-911110	
Y Lyn	07245+4605	072433.7	+460534	Mira		<.7	911111-911112	
07266-0541	07266-0541	072641.2	-054121	IRC/AFGL		<.3	911114-911115	
07299-1651	07299-1651	072955.0	-165147	SFR		<.4	911117-920113	
S CMi	07299+0825	073000.0	+082535	Mira		<.7	911111	
Z Pup	07304-2032	073029.0	-203248	Mira	-3.9	1.7	911105-911111	
IRC+30187	07308+3037	073044.0	+303712	Mira	4.4	31.4	911024-911123	
07329-2352	07329-2352	073258.2	-235239	IRC/AFGL		<.6	911113-911220	
QX Pup	07399-1435	073959.0	-143544	SFR	22.0	4.2	911029	
S Gem	07400+2334	074003.0	+233406	Mira		<.9	911106-911110	
IRC-30099	07418-2850	074148.2	-285003	Mira		<.6	911111-911113	
07427-2400	07427-2400	074245.0	-240022	SFR	66.1	8.4	911116-920119	
BS3017	07434-3750	074328.2	-375046	Mira		<1.2	911112	
SS Pup	07445-2613	074433.5	-261308	Mira	82.1	10.6	920119	
07446-3210	07446-3210A	074438.5	-321054	IRC/AFGL	29.7	25.2	911106-911113	
HU Pup	07536-2830	075338.5	-283055	IRC/AFGL	43.0	13.7	911106-911220	
IRC-20152	07556-2017	075540.5	-201730	IRC/AFGL		<.5	911113-911220	
07582-1933	07582-1933	075812.8	-193356	Mira		<.6	920113-920119	
U Pup	07585-1242	075830.0	-124211	Mira		<.8	911106-920119	
08003+3629	08003+3629	080023.1	+362912	Mira		<.2	920111-920119	
08050-2838	08050-2838	080503.4	-283854	Mira		<1.0	920113-920119	
AS Pup	08078-3801	080750.4	-380134	Mira		<1.0	911111-911112	
AFGL 1235	08088-3243	080851.0	-324306	Mira		<.6	911111-911112	
08089-3511	08089-3511	080854.0	-351149	IRC/AFGL		<.9	911115	
R Cnc	08138+1152	081348.5	+115250	Mira		<.6	911111-911123	
SV Pup	08149-1339	081457.0	-133900	Mira		<1.1	911106-911110	
AFGL 5250	08171-2134	081706.9	-213447	OH/IR		<.5	920113-920119	
08189-3602	08189-3602	081854.0	-360300	SFR		<.7	911116-920119	
08189+0507	08189+0507	081854.9	+050706	Mira		<.4	920112-920119	
08191-3653	08191-3653	081906.5	-365353	IRC/AFGL		<1.4	911115	
08200-2528	08200-2528	082003.5	-252816	IRC/AFGL		<.7	911113-911115	
08212-3838	08212-3838	082114.1	-383849	Mira		<.7	920119	
RT Hya	08272-0609	082713.1	-060901	Mira		<.6	911111-911112	
08340-3357	08340-3357	083404.4	-335708	Mira		<.8	911111-911112	
OH235.3+18.1	08357-1013	083544.5	-101343	IRC/AFGL	66.6	1.5	911029-911220	
RV Hya	08372-0924	083717.6	-092431	Mira		<.9	920113-920119	
AK Hya	08375-1707	083735.9	-170732	Mira		<1.1	911111	
AFGL 1283	08391+0222	083910.1	+022205	IRC/AFGL		<.3	911113-911220	
IRC-30132	08416-2525	084140.4	-252548	Mira		<.5	920113-920119	
EY Hya	08437+0149	084345.2	+014900	Mira		<.4	911111-911115	
08439-2734	08439-2734	084358.0	-273447	Mira		<.6	920113-920119	
S Hya	08509+0315	085057.0	+031530	Mira		<1.1	911024-911030	
IRC-20176	08534-1901	085325.0	-190142	Mira	5.1	3.9	911029-911105	

Name	IRAS NAME	R.A. (1950)	Decl. (1950)	Type	Vlsr (km/s)	Flux (Jy)	DATE YYMMDD-YYMMDD	New
RT Cnc	08555+1102	085533.0	+110222	Mira		< .5	920112-920119	
CW Cnc	09057+1325	090542.0	+132523	Mira		< .3	920112-920119	
W Cnc	09069+2527	090658.0	+252706	Mira	35.6	2.6	911123-920111	
RS Cnc	09076+3110	090737.7	+311004	Mira		< .5	911112-911116	
09116-2439	09116-2439	091141.0	-243901	Mira		< .9	911111	
IRC-20188	09235-2347	092335.7	-234737	IRC/AFGL	6.1	5.4	911029-911220	
X Hya	09331-1428	093306.5	-142801	Mira	26.2	1.6	911105-920112	
R LMi	09425+3444	094234.7	+344434	Mira	-.6	7.4	911024-911112	
IW Hya	09429-2148	094258.2	-214805	IRC/AFGL		< .8	911106-911220	
R Leo	09448+1139	094452.2	+113940	Mira		<1.1	911022-911123	
CW Leo	09452+1330	094515.0	+133042	Mira		< .9	911022-911031	
S LMi	09507+3509	095045.0	+350942	Mira		<1.1	911022-911024	
09517+6954	09517+6954	095142.4	+695459	SFR		< .2	911116-920113	
V Leo	09572+2130	095715.0	+213012	Mira		< .7	911106-911110	
RW LMi	10131+3049	101312.0	+304924	Mira		< .8	911105-911112	
V Ant	10189-3432	101855.0	-343248	Mira	-18.6	20.7	911106-911123	*
10353-1145	10353-1145	103520.5	-114522	Mira		< .8	920112	
R UMa	10411+6902	104108.0	+690218	Mira		<2.0	911022	
V Hya	10491-2059	104911.3	-205906	Mira		<1.0	911111	
VX UMa	10521+7208	105208.0	+720812	Mira	-50.5	2.5	911107-911124	
R Crt	10580-1803	105806.0	-180321	Mira	7.3	134.9	911022-911105	
CS Dra	11125+7524	111232.0	+752455	Mira		< .3	920111-920113	
AF Leo	11252+1525	112517.0	+152600	IRC/AFGL		< .5	911105-911113	
11308-1020	11308-1020	113052.4	-102026	Mira		< .3	920112-920119	
11445+4344	11445+4344	114436.0	+434457	IRC/AFGL		< .3	911113-911220	
HD102608	11461-3542	114607.8	-354232	Mira		<1.0	911111	
II Hya	11462-2628	114613.0	-262818	Mira		<2.2	911106-911109	
S Crt	11501-0719	115012.0	-071906	Mira	40.1	102.5	911105-920113	
SV Vir	11577-0954	115747.0	-095426	Mira		<1.2	911106-911110	
T Vir	12120-0545	121203.0	-054530	Mira	6.4	3.2	911022-911024	
BK Vir	12277+0441	122747.7	+044134	Mira		< .6	911112	
R Vir	12359+0715	123558.0	+071548	Mira		<1.3	911022-911024	
Y UMa	12380+5607	123803.5	+560719	Mira		<1.0	911111	
12387-3717	12387-3717	123843.9	-371756	IRC/AFGL		< .7	911115	
U Cvn	12449+3838	124456.0	+383854	IRC/AFGL		< .6	911022-911105	
T Com	12562+2324	125613.0	+232436	Mira	25.7	2.1	911022-911105	
RT Vir	13001+0527	130006.0	+052714	Mira	17.3	94.3	911022-911112	
IRC-10278	13068-0927	130653.0	-092706	Mira		<1.6	911106-911110	
SW Vir	13114-0232	131129.7	-023234	Mira		< .6	911111-911113	
V Cvn	13172+4547	131717.0	+454724	Mira		< .6	911029-911105	
R Hya	13269-2301	132659.0	-230130	Mira	-10.7	2.6	911105-911111	
S Vir	13303-0656	133023.0	-065624	Mira		< .9	911105-911111	
T UMi	13336+7341	133339.0	+734112	Mira		< .7	911022-911123	
W Hya	13462-2807	134612.1	-280708	Mira	39.9	47.5	911023-911123	
R Cvn	13468+3947	134649.0	+394724	Mira		< .4	911105-911112	

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AY Vir	13492-0325	134916.0	-032548	Mira	-42.4	5.9	911022-911105	
TW Cen	13548-3049	135450.0	-304912	Mira		<1.3	911106-911110	
13582+3806	13582+3806	135814.6	+380643	IRC/AFGL		<.3	911114	
14020-3515	14020-3515	140201.3	-351528	Mira	1.2	1.3	911112-911113	*
OH334.8+50.1	14086-0730	140838.9	-073045	IRC/AFGL	-25.8	1.9	911115-911220	
RU Hya	14086-2839	140841.0	-283900	Mira	-3.7	5.9	911123-920112	
14106-2940	14106-2940	141037.7	-294018	Mira		<.5	920112-920119	
EW Vir	14142-1612	141414.6	-161229	Mira		<.4	920112-920113	
U UMi	14162+6701	141614.0	+670130	Mira		<.3	911105-920111	
RX Boo	14219+2555	142156.5	+255550	Mira	.8	5.3	911105-911112	
RS Vir	14247+0454	142446.0	+045409	Mira	-14.6	10.5	911105-911112	
14251-3246	14251-3246	142509.3	-324638	IRC/AFGL		<1.0	911115-911116	
Y Cen	14280-2952	142801.1	-295232	Mira		<.9	911112	
R Boo	14349+2657	143459.0	+265712	Mira		<1.0	911106-911110	
RV Boo	14371+3245	143709.0	+324515	Mira		<.9	911112	
RW Boo	14390+3147	143905.9	+314707	Mira		<.4	920112-920119	
14550-1214	14550-1214	145500.9	-121408	Mira		<.4	920112-920113	
15060+0947	15060+0947	150600.2	+094743	IRC/AFGL	-14.3	11.7	911114-911124	
Y Lib	15090-0549	150903.0	-054924	Mira	13.2	6.0	911023-911106	
S Ser	15193+1429	151919.0	+142936	Mira	20.3	1.5	911023-911124	
S Crb	15193+3132	151921.2	+313246	Mira	.8	16.1	911112-911123	
IRC-20285	15194-1829	151928.0	-182919	Mira	-7.4	3.4	911109	
RS Lib	15214-2244	152124.0	-224400	Mira		<1.1	911023-911123	
15223-0203	15223-0203	152219.0	-020334	IRC/AFGL		<.4	911115-911220	
WX Ser	15255+1944	152532.2	+194410	IRC/AFGL	3.3	22.6	911029-911220	
IRC+00266	15262+0400	152617.0	+035942	IRC/AFGL		<.6	911030-911115	
WW Ser	15298+0348	152955.0	+034842	Mira	20.2	6.0	911106-911124	
S UMi	15314+7847	153127.0	+784806	Mira		<.9	911022-911029	
IRC+20282	15341+1515	153408.8	+151555	Mira		<.7	911112	
FQ Lup	15402-3700	154018.0	-370041	Mira		<.7	920119	
BG Ser	15410-0133	154100.4	-013309	Mira	-2.2	1.5	911112-911115	
R Ser	15483+1517	154823.0	+151702	Mira		<.4	911030-911115	
ST Her	15492+4837	154916.0	+483755	Mira		<.6	911112	
SW Lib	15528-1242	155247.0	-124224	Mira	-20.1	2.7	911109-911123	
RU Lup	15534-3740	155324.0	-374036	SFR		<1.8	911111	
FS Lib	15576-1212	155737.0	-121236	Mira	-4.5	8.0	911106-911123	
15589-2850	15589-2850	155855.0	-285041	Mira		<1.3	920113	
X Her	16011+4722	160107.9	+472236	Mira	-76.2	1.8	911112-911116	
RZ Sco	16015-2357	160136.0	-235754	Mira		<1.8	911109-911111	
OH345.0+15.7	16029-3041	160259.7	-304130	OH/IR	7.5	2.1	911109-920113	
RU Her	16081+2511	160809.0	+251200	Mira		<.8	911106-911110	
S Sco	16146-2246	161442.0	-224618	Mira		<1.8	911109	
RY Crb	16211+3057	162107.0	+305754	Mira		<.6	911108-911111	
16235-2416	16235-2416	162331.5	-241656	SFR		<.6	920113	
U Her	16235+1900	162334.9	+190016	Mira	-19.3	71.3	911029-911123	

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V697 Her	16260+3454	162600.6	+345445	IRC/AFGL		< .4	911022-911220	
IRAS16293	16293-2422	162921.0	-242216	SFR	6.9	376.1	911111	
R UMi	16306+7223	163038.0	+722312	Mira	-8.9	5.4	911022-911123	
T Oph	16308-1601	163052.0	-160136	Mira		<1.0	911030-911123	
R Dra	16325+6651	163231.0	+665130	Mira		< .6	911106-911123	
ST Sco	16334-3107	163324.7	-310759	Mira		<1.0	920113	
OH344.07+5.8	16342-3814	163417.0	-381418	SFR		<2.5	911111	
S Dra	16418+5459	164151.7	+545945	Mira		< .8	911112	
V446 Oph	16438-1133	164352.7	-113333	Mira		<1.0	911112	
AH Dra	16473+5753	164723.7	+575358	Mira		< .4	920111-920113	
IRC-10348	16494-1252	164924.5	-125205	Mira		< .8	920113	
RX Oph	16503+0529	165020.0	+052924	Mira	-48.0	14.2	911030-911123	
SY Oph	16521-2153	165207.5	-215325	Mira		< .8	920113	
RR Sco	16534-3030	165326.2	-303009	Mira		< .9	911106-911112	
MV Her	16560+2252	165603.0	+225236	Mira		< .7	911029-911123	
IRC-10355	16574-1032	165727.5	-103237	Mira	-48.5	1.2	920113	*
17028-1004	17028-1004	170251.7	-100431	SFR		< .9	920113	
V850 Oph	17034-1024	170324.0	-102501	Mira	1.8	3.3	911106-911123	
TU Sco	17043-3145	170420.0	-314606	Mira	-13.7	2.7	911111	
R Oph	17048-1601	170453.0	-160142	Mira	-37.3	2.1	911106	*
VV Her	17050+1714	170503.0	+171412	Mira		<1.0	911029-911123	
17079-3243	17079-3243	170759.2	-324329	Mira		<1.3	911112-911113	
AH Sco	17080-3215	170802.2	-321553	Mira	-3.3	49.1	911111-911112	
TV Dra	17081+6422	170806.1	+642253	Mira		< .5	920111-920113	
IRC-10359	17102-1031	171016.2	-103113	IRC/AFGL		< .7	911115	
RW Sco	17115-3322	171136.0	-332224	Mira	-72.3	8.5	911111-911112	
IRC+10322	17119+0859	171156.0	+085918	IRC/AFGL	13.8	27.3	911116-911123	
V438 Oph	17123+1107	171219.0	+110730	Mira		< .4	911107-920112	
UY Oph	17139+0446	171357.5	+044631	Mira	-68.9	1.5	920112	*
RV Ser	17150-1156	171503.0	-115624	Mira		< .9	911107-911111	
V1848 Oph	17162-1934	171614.6	-193443	Mira	-17.8	1.3	920113	
17171-0843	17171-0843	171709.8	-084359	IRC/AFGL		< .8	911115	
17187-3750	17187-3750	171846.0	-375021	IRC/AFGL		<2.8	911111	
AH Oph	17229-0301	172259.0	-030130	Mira	51.0	35.3	911109-911123	
17230+0113	17230+0113	172304.0	+011339	IRC/AFGL	-31.4	3.5	911106-911123	
OH352.61-0.19	17242-3513	172413.0	-351327	SFR		<2.4	911111	
IRC+10329	17256+0504	172540.0	+050536	IRC/AFGL		<1.1	911030-911106	
IRC-10369	17265-0725	172631.3	-072530	Mira		< .7	911113	
OH354.61+0.48	17269-3312	172701.0	-331136	SFR	-39.8	4.4	911111	*
OH353.41-0.36	17271-3439	172705.0	-343926	SFR	-17.1	16.6	911111	*
IRC+20326	17297+1747	172942.5	+174727	IRC/AFGL		< .5	911114-911220	
AFGL 5353	17309-1724	173058.2	-172419	IRC/AFGL		<1.4	911030	
17313-1531	17313-1531	173118.6	-153103	IRC/AFGL		<1.4	911115	
MW Her	17334+1537	173325.0	+153702	IRC/AFGL		< .5	911114-911220	
IRC-30308	17354-3155	173527.0	-315548	IRC/AFGL	2.6	12.9	911106-911124	

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TY Dra	17361+5746	173611.6	+574606	IRC/AFGL		< .5	911113-911220	
OH358.23+0.11	17376-3021	173740.0	-302139	IRC/AFGL	-7.3	41.6	911105	
OH358.67-0.04	17393-3004	173920.0	-300419	IRC/AFGL	-16.9	25.4	911105	
OH359.68-0.02	17418-2910	174145.0	-291208		36.8	2.6	911111	
17436-1545	17436-1545	174340.7	-154552	IRC/AFGL	17.0	2.3	911115	*
Sgr B2-S	17441-2822	174410.3	-282244	SFR	64.0	88.5	911111	
V2211 Oph	17484-0800	174828.0	-080042	IRC/AFGL	-21.2	25.5	911030-911118	
IRC-20394	17485-2209	174830.5	-220959	Mira		< .9	920113	
OH2.58-0.43	17501-2656	175011.0	-265601	IRC/AFGL	-5.1	18.9	911105-911124	
17504-0234	17504-0234	175026.6	-023409	Mira		< .5	920113	
17507-1122	17507-1122	175046.2	-112208	IRC/AFGL		< .9	911115	
17528+1144	17528+1144	175253.0	+114412	IRC/AFGL		< .6	911106-911107	
OH13.1+5.1	17528-1503	175253.0	-150317	OH/IR		<1.7	911109	
17528+1144	17528+1144	175253.0	+114412	IRC/AFGL		< .8	911123	
RT Oph	17541+1110	175411.8	+111031	Mira		< .7	911022-920112	
17570-3713	17570-3713	175704.5	-371312	Mira		<1.2	911112	
W28(A2)	17574-2403	175726.0	-240356	SFR	34.1	25.4	911111	
17577-2320	17577-2320	175746.9	-232019	SFR		< .9	920113	
WY Her	17579+2335	175759.2	+233540	Mira	2.5	3.2	911106-920119	
17591-2228	17591-2228	175911.1	-222800	SFR	-16.5	10.6	920113	
17594+0826	17594+0826	175925.0	+082658	Mira		<1.0	911107	
17599-3653	17599-3653	175954.0	-365314	Mira		<1.4	911112	
17599-2148	17599-2148	175959.9	-214812	SFR	-112.6	10.3	920114	
18009-1539	18009-1539	180055.7	-153923	IRC/AFGL		<1.0	911118	
IRC-20424	18009-2019	180058.0	-201912	IRC/AFGL	8.2	2.8	911030	
V1804 Sgr	18018-2802	180152.5	-280210	Mira	19.3	30.2	911105-911112	
IRC-20427	18025-2113	180238.0	-211400	IRC/AFGL	8.0	3.8	911030	
IRC-10395	18039-0813	180359.0	-081336	Mira	20.1	5.0	911109-920113	
VX Sgr	18050-2213	180502.9	-221356	Mira	-2.3	103.7	911105-911113	
OH10.1-0.1	18052-2016	180517.0	-201637	SFR	27.2	1.5	911105	
OH10.4+0.04	18056-1954	180541.0	-195425	OH/IR	64.8	2.2	911111	*
18069+0911	18069+0911	180655.5	+091140	IRC/AFGL		< .6	911106-911114	
T Her	18072+3100	180713.0	+310042	Mira		< .7	911022-911029	
OH10.62-0.38	18075-1956	180730.0	-195607		-8.7	274.4	911111-911124	
18076+3445	18076+3445	180737.0	+344540	IRC/AFGL		< .5	911022-911117	*
IRC-10401	18076-1034	180737.5	-103459	Mira	19.7	2.2	911112-911114	
AFGL 2086	18083-2630	180818.7	-263014	OH/IR		< .7	911105	
18089-1837	18089-1837	180856.7	-183706	SFR		< .6	920119	
18092-0437	18092-0437	180917.5	-043710	IRC/AFGL		<1.0	911118	
OH12.22-0.12	18097-1825A	180947.0	-182527		8.5	42.3	911105-911124	
18110-1854	18110-1854	181103.7	-185418	SFR	42.2	4.2	920119	
V454 Oph	18112+1227	181113.6	+122707	IRC/AFGL		<1.1	911114	
W33A	18117-1753	181142.0	-175306	SFR		<2.2	911109	
IRC+30330	18125+3010	181231.5	+301042	Mira	-8.8	1.0	920111-920119	*
18134-1942	18134-1942	181324.6	-194225	SFR	10.0	12.0	920119	

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IRC-20454	18135-1641	181331.0	-164102	IRC/AFGL	54.3	29.4	911105-911124	
18139-1842	18139-1842	181356.7	-184247	SFR		< .9	920119	
18139-1811	18139-1811	181359.2	-181152	IRC/AFGL	29.3	4.6	911118	*
RY Oph	18141+0340	181407.0	+034024	Mira	-55.4	1.9	911030-911107	
18151-1208	18151-1208	181509.0	-120834	SFR		< .8	920113	
18156-0653	18156-0653	181537.0	-065306	Mira		< .7	911112	
S49	18159-1346	181555.0	-134609	OH/IR	22.4	4.6	911111	
OH12.8-1.9	18176-1848	181740.0	-184831	OH/IR	9.9	19.9	911022-920119	
OH16.12-0.29	18182-1504	181815.0	-150448	SFR		< .8	911105	
18184-1302	18184-1302	181826.7	-130254	OH/IR		< .7	911118-920113	
TU Lyr	18186+3143	181837.5	+314354	Mira	9.0	2.7	920111-920119	
IRC-10414	18204-1344	182028.0	-134406	IRC/AFGL	39.0	33.0	911114-920119	
V2090 Oph	18213+0335	182122.8	+033543	Mira	-28.5	1.8	920119	
18228-1312	18228-1312	182252.9	-131206	SFR		< .6	920113	
18231+0855	18231+0855	182310.0	+085502	IRC/AFGL		< .8	911106-911107	
18232-1154	18232-1154	182315.1	-115422	SFR		< .9	920113	
HO Sgr	18238-2542	182352.0	-254241	Mira		< .7	920119	
18239-1228	18239-1228	182358.5	-122823	SFR		< .6	920113	
AFGL 2155	18240+2326	182401.2	+232653	Mira		< .9	911113	
18242-1227	18242-1227	182417.6	-122734	SFR		< .6	920113	
18246-1151	18246-1151	182436.4	-115153	SFR		< .6	920113	
UY Sct	18248-1229	182448.0	-122954	IRC/AFGL	27.4	10.5	911114	
18248-0839	18248-0839	182449.7	-083919	IRC/AFGL		<1.1	911114	
OH19.61-0.23	18248-1158	182450.4	-115835	SFR	34.6	109.9	911109	*
18252-1305	18252-1305	182515.1	-130537	Mira	37.8	17.8	920113	
18253-1130	18253-1130	182523.3	-113058	SFR	42.3	1.3	920113	
V441 Sct	18257-1000	182545.0	-100012	OH/IR		<1.4	911109	
V435 Sct	18266-1239	182640.0	-123950	OH/IR		<1.2	911109	
18270+0326	18270+0326	182704.0	+032608	IRC/AFGL		<1.5	911107	
18276+8236	18276+8236	182736.2	+823655	IRC/AFGL		< .6	911113-911116	
OH17.7-2.0	18276-1431	182739.0	-143104	OH/IR		<1.5	911109	
18295-1030	18295-1030	182930.2	-103050	SFR	-23.1	3.1	920113	*
18298-2111	18298-2111	182951.2	-211154	OH/IR		< .9	920114	
IRC-10434	18304-0728	183027.8	-072836	IRC/AFGL		<1.2	911114	
18308-0503	18308-0503	183050.7	-050327	SFR	40.8	24.5	920113	*
18311-0809	18311-0809	183110.3	-080948	SFR		< .5	920114	
18314-0720	18314-0720	183126.7	-072029	SFR		< .7	920114	
18314-1131	18314-1131	183127.8	-113156	Mira		< .8	911112	
18317-0757	18317-0757	183142.0	-075712	SFR	78.8	3.1	920114	
18317-0918	18317-0918	183143.4	-091823	SFR		< .8	920114	
18317-0845	18317-0845	183145.9	-084547	SFR		< .7	920113	
18319-0834	18319-0834	183159.9	-083450	SFR		< .6	920114	
18324-0809	18324-0809	183229.8	-080911	SFR	33.0	1.2	920114	*
18325-1138	18325-1138	183234.2	-113831	IRC/AFGL		<2.1	911114	
OH24.7+0.2	18327-0715	183247.0	-071537	SFR	43.3	8.3	911105-911127	

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18328-0735	18328-0735	183248.5	-073551	SFR		< .7	920114	
18333+0533	18333+0533	183319.0	+053321	OH/IR		< .6	920119	
18334-0733	18334-0733	183328.5	-073344	SFR		< .7	920114	
OH24.7-0.1	18340-0720	183403.0	-072052		73.1	2.2	911109-911124	
OH23.5-0.9	18344-0850	183429.0	-085055	IRC/AFGL		<1.5	911109	
V437 Sct	18348-0526	183452.5	-052637	OH/IR	37.8	1.3	911022-911030	
V1111 Oph	18349+1023	183457.7	+102304	Mira	-44.8	7.3	911029-911112	
X Oph	18359+0847	183557.4	+084720	Mira		<1.2	911022-911029	
AFGL 2222	18373-0021	183721.5	-002132	IRC/AFGL		< .6	911116	
18375+0510	18375+0510	183732.0	+051023	IRC/AFGL		< .9	911106-911107	
V438 Sct	18385-0617	183832.0	-061806	OH/IR	55.0	5.9	911105	
18385-0512	18385-0512	183832.2	-051200	SFR	28.0	269.5	920114	
IRC+00363	18387-0423	183848.0	-042330	IRC/AFGL	46.7	36.0	911109	
IRC+00364	18395-0248	183932.0	-024800	IRC/AFGL	56.3	10.4	911109-911124	
18398-0220	18398-0220	183948.0	-022028	Mira		<1.0	911112	
OH28.21-0.05	18403-0417	184019.5	-041701	SFR	93.3	2.4	920113	*
IRC+10374	18413+1354	184118.8	+135418	IRC/AFGL	-16.5	4.0	911022-911116	
18414-0527	18414-0527	184128.2	-052727	IRC/AFGL		<1.3	911114	
18429-1721	18429-1721	184257.0	-172114	Mira	-4.3	10.7	920114	*
RW Lyr	18436+4334	184339.0	+433454	IRC/AFGL	-29.4	48.5	911124-920111	
V440 Sct	18437-0643	184344.0	-064344	OH/IR		<1.1	911109	
18450-0922	18450-0922	184505.4	-092244	IRC/AFGL		<1.5	911114	
18451-0824	18451-0824	184511.3	-082451	IRC/AFGL		<1.5	911114	
OH31.21-0.18	18464-0140	184621.0	-014013	SFR		<1.0	911109-911124	
18465-0717	18465-0717	184634.5	-071718	OH/IR		< .6	911127	
AFGL 2259	18475+0926	184731.7	+092634	Mira		< .7	911112	
S Sct	18476-0758	184737.0	-075759	Mira		< .8	911105	
18476+0555	18476+0555	184738.0	+055556	IRC/AFGL		<1.6	911114	
OH34.7+0.9	18487+0152	184840.0	+015324	OH/IR		<1.7	911109	
OH33.13-0.09	18496+0004	184936.2	+000459	SFR	74.2	4.5	911114	
V2059 Sgr	18501-2132	185010.3	-213216	Mira		< .5	911109	
W44	18507+0110	185046.4	+011110	SFR	57.2	195.1	911111-911222	
18512-0934	18512-0934	185114.6	-093446	IRC/AFGL		<1.3	911114	
18512+2029	18512+2029	185117.2	+202942	IRC/AFGL		<1.5	911116	
18515+0157	18515+0157	185132.7	+015745	SFR		< .7	920114	
18517+0437	18517+0437	185145.2	+043742	SFR	39.7	3.8	920119	
UX Sgr	18520-1635	185200.6	-163525	Mira		< .8	920114	
18520+1014	18520+1014	185203.7	+101409	IRC/AFGL		< .8	911106-911107	
IRC+00392	18522+0021	185214.1	+002133	IRC/AFGL		<1.4	911114	
18526+0140	18526+0140	185239.5	+014051	OH/IR		< .7	911116-920119	
18530+0817	18530+0817	185300.6	+081718	IRC/AFGL		<1.2	911114	
18530+0215	18530+0215	185303.0	+021513	SFR		< .9	920119	
18534+0218	18534+0218	185329.6	+021855	SFR		< .8	920119	
OH40.1+2.4	18535+0726	185331.0	+072631	OH/IR		< .6	911107-911123	
S76 W		185334.0	+074945		8.1	4.9	911111	

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18536+0753	18536+0753	185339.0	+075328	SFR		< .5	920119	
18537+0749	18537+0749	185346.2	+074930	SFR	30.0	19.3	920119	
18540+0302	18540+0302	185404.0	+030246	OH/IR		<1.3	911109	
18545+1040	18545+1040	185430.6	+104024	IRC/AFGL		<1.4	911114	
18545+0134	18545+0134	185434.5	+013449	SFR		< .6	920119	
18549+0905	18549+0905	185457.0	+090537	IRC/AFGL		<1.0	911107	
18556+0811	18556+0811	185539.5	+081122	IRC/AFGL		< .8	911107-911114	
OH35.19-0.74	18556+0136	185540.2	+013612		33.1	30.7	911109-911124	
V3953 Sgr	18560-2954	185603.0	-295431	Mira		<1.2	911112	
V1366 Aql	18560+0638	185603.9	+063849	OH/IR	17.2	1.7	911123-920119	
EU Aql	18562-0303	185618.0	-030524	OH/IR		<1.6	911109	
18567+0003	18567+0003	185647.2	+000314	IRC/AFGL		<1.0	911109-911114	
18577+0358	18577+0358	185746.5	+035852	SFR		< .8	920119	
18585+0407	18585+0407	185830.2	+040748	SFR	65.5	4.1	920114	
18592+0108	18592+0108	185914.5	+010846	SFR	42.6	2.6	920119	
18592+1455	18592+1455	185915.3	+145558	IRC/AFGL		<1.1	911116	
18593+0408	18593+0408	185923.8	+040828	SFR	58.3	1.8	920119	
OH37.1-0.8	18596+0315	185936.0	+031553	SFR	65.6	2.6	911109-911124	
IRC+10401	19008+0726	190053.0	+072615	Mira		< .8	911112	
AFGL 2318	19029+2017	190257.4	+201726	Mira		< .6	920111	
19035+0641	19035+0641	190334.9	+064155	SFR	31.9	1.0	920119	
R Aql	19039+0809	190357.7	+080910	Mira	46.9	26.6	911022-911123	
19043+1009	19043+1009	190421.0	+100951	IRC/AFGL		<1.0	911116	
FQ Sgr	19047-1706	190444.0	-170554	Mira		<1.1	911109-920114	
19055+0613	19055+0613	190534.5	+061339	Mira		< .8	920114	
V3880 Sgr	19059-2219	190556.0	-221912	IRC/AFGL		<1.4	911109	
19061+1041	19061+1041	190608.0	+104153	OH/IR	22.3	3.0	911106-911111	
V1368 Aql	19067+0811	190643.0	+081140	OH/IR		< .5	911107-911123	
19069+0916	19069+0916	190655.0	+091616	OH/IR	-13.4	4.9	911106-911111	
OH43.8+0.5	19071+0946	190709.0	+094702	OH/IR		< .7	911107-911123	
19074+0814	19074+0814	190725.6	+081444	SFR		<1.0	920119	
19075+0921	19075+0921	190734.0	+092156	OH/IR	7.6	1.5	911116-920119	*
W49 S	19078+0901	190758.2	+090003	SFR	4.1	1744.7	911111	
19083+0851	19083+0851	190823.0	+085120	IRC/AFGL	33.2	5.5	911116	
19087+0323	19087+0323	190847.0	+032321	OH/IR		<1.5	911107	
V342 Sgr	19093-3256	190920.8	-325606	IRC/AFGL		<1.1	911116	
OH43.80-0.13	19095+0930	190931.0	+093041	SFR	41.9	696.8	911123-920120	
U Dra	19099+6711	190958.0	+671136	Mira		< .5	911022-911105	
RU Lyr	19107+4113	191043.0	+411306	Mira		< .8	911022-911105	
OH45.07+0.13	19110+1045	191100.0	+104544	OH/IR	63.6	21.5	911111-911123	
19120+1103	19120+1103	191200.4	+110359	SFR	50.2	2.3	911117-920120	
19120+0917	19120+0917	191203.0	+091718	SFR		< .7	911116	
W Aql	19126-0708	191240.5	-070814	Mira		< .6	911112	
19134+2131	19134+2131	191326.0	+213113	OH/IR		<1.0	911106-911109	
AFGL 2350	19135+0931	191330.6	+093132	IRC/AFGL		<1.4	911114	

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19139+1113	19139+1113	191357.2	+111347	SFR		< .6	911117-920120	
19145+1116	19145+1116	191434.5	+111620	SFR		< .5	911117	
19160+0755	19160+0755	191601.0	+075504	OH/IR		<1.2	911107	
AFGL 2362	19161+2343	191608.6	+234355	OH/IR		< .7	911106-920113	
19175+1357	19175+1357	191731.0	+135709	SFR		< .9	911117	
19186+0315	19186+0315	191840.0	+031512	OH/IR		<1.1	911107	
19191+1538	19191+1538	191911.0	+153831	SFR	26.8	1.6	911116-920113	
OH44.79-2.31	19192+0922	191913.1	+092207	OH/IR		< .7	911107-920113	
T Sge	19194+1734	191928.2	+173414	Mira		< .9	911112	
19200+1403	19200+1403	192001.2	+140352	SFR		< .7	911117-920119	
19207+1410	19207+1410	192044.5	+141050	SFR		< .5	911117-920113	
19213+1723	19213+1723	192122.8	+172306	SFR	-27.4	109.6	911117-920119	
W51	19213+1424	192126.2	+142444	OH/IR	55.2	4662.4	911111	
19217+1651	19217+1651	192144.0	+165142	SFR	-3.5	24.2	911117	*
19227+1721	19227+1721	192245.7	+172135	SFR		< .8	911117	
19229+1708	19229+1708	192258.5	+170849	IRC/AFGL	40.7	7.9	911116-911124	
IRC+40346	19231+3555	192310.5	+355541	IRC/AFGL		<1.1	911117	
19240+3615	19240+3615	192402.5	+361527	IRC/AFGL		< .8	911117	
YZ Dra	19243+7135	192421.0	+713524	Mira	-36.6	3.4	911106-911123	
19244+1115	19244+1115	192426.2	+111509	OH/IR		< .4	911117-920112	
IRC-20563	19247-1722	192447.5	-172207	Mira	-33.4	19.2	920119	*
19248+0658	19248+0658	192448.5	+065803	Mira		< .6	920113	
19267+0345	19267+0345	192642.7	+034526	IRC/AFGL		<1.0	911114	
19268+1754	19268+1754	192649.5	+175454	SFR		< .5	911117-920112	
19270+2239	19270+2239	192703.2	+223930	IRC/AFGL		< .7	911116	
OH55.0+0.7	19283+1944	192818.1	+194419	OH/IR		< .4	911117-920111	
OH63.5+5.3	19288+2923	192851.0	+292336	OH/IR		< .7	911106-911109	
UV Cyg	19296+4331	192938.0	+433145	Mira	18.2	2.9	911112-911113	
19303+1553	19303+1553	193019.0	+155309	IRC/AFGL		<1.1	911107	
19321+2757	19321+2757	193208.6	+275728	Mira		< .9	911112	
19328+3039	19328+3039	193250.2	+303929	Mira		<1.0	920119	
19329+2641	19329+2641	193255.0	+264141	IRC/AFGL		< .7	911116	
V1319 Aql	19334-0033	193333.0	-003324	Mira		<1.3	911107	
IRC+20419	19348+2136	193449.2	+213644	IRC/AFGL	-53.6	1.8	911114	*
19352+2030	19352+2030	193512.6	+203006	OH/IR	64.0	4.4	920111	*
R Cyg	19354+5005	193528.7	+500509	Mira	64.3	1.0	911112-911113	*
RT Aql	19356+1136	193539.7	+113624	Mira	-30.4	101.1	911022-920112	
OH22.7-17.9	19361-1658	193609.3	-165850	IRC/AFGL	54.9	2.4	911109-911124	
19366+2301	19366+2301	193640.0	+230143	SFR		< .8	911117	
19371+2855	19371+2855	193707.4	+285541	IRC/AFGL		< .6	911117	
19374+0550	19374+0550	193726.2	+055056	IRC/AFGL	-27.2	4.9	911114-911124	*
19374+2352	19374+2352	193726.3	+235257	SFR	38.2	1.5	911117	
19375+2130	19375+2130	193730.2	+213030	SFR		< .6	911116-920111	
OH52.2-3.6	19386+1513	193839.0	+151316	IRC/AFGL		< .7	911107-911116	
19387+1527	19387+1527	193846.0	+152712	OH/IR	51.7	2.4	911107	

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19403+2258	19403+2258	194019.1	+225803	SFR		< .5	911117-920112	
19410+2336	19410+2336	194104.1	+233654	SFR	19.5	6.9	911117-920113	
IRC+00450	19412+0337	194115.3	+033715	Mira	-36.7	1.4	911112-911114	
AFGL 2455	19422+3506	194215.5	+350651	IRC/AFGL	-57.3	2.0	911117	
19442+2427	19442+2427	194413.5	+242800	SFR		< .5	911116-920112	
19446+2505	19446+2505	194441.4	+250517	SFR	12.0	8.8	911117	
19455+0920	19455+0920	194532.4	+092040	Mira		< .5	920112	
19456+1927	19456+1927	194536.0	+192750	OH/IR		< .8	911106-911123	
OH59.2-1.8	19467+2213	194643.0	+221342	OH/IR		<1.2	911107	
GY Aql	19474-0744	194724.7	-074432	Mira		< .9	911112	
NR Vul	19480+2447	194805.1	+244741	Mira		< .8	911112	
x Cyg	19486+3247	194838.5	+324711	Mira		< .6	911022-911105	
OH65.4+1.3	19493+2905	194919.0	+290520	OH/IR		<1.1	911106-911109	
19495+0835	19495+0835	194933.0	+083510	IRC/AFGL	45.9	2.8	911107-911116	
19499+2141	19499+2141	194957.0	+214143	IRC/AFGL		<1.6	911107	
NS Vul	19503+2219	195020.8	+221928	Mira		< .8	911112	
OH63.9-0.2	19508+2659	195056.0	+270022	OH/IR		<1.0	911106-911107	
19520+2759	19520+2759	195203.0	+275943	SFR		< .7	911106-911107	
19522+1935	19522+1935	195215.0	+193545	IRC/AFGL		<1.2	911107	
RR Sgr	19528-2919	195250.2	-291921	Mira		<1.2	911105-911112	
19528+0148	19528+0148	195252.2	+014801	IRC/AFGL		< .8	911114	
V468 Cyg	19536+3237	195343.0	+323736	Mira	-46.5	1.7	911106-911112	
RR Aql	19550-0201	195500.3	-020117	Mira	26.9	174.7	911112-911124	
19552+3142	19552+3142	195513.6	+314217	IRC/AFGL		<1.0	911116	
19566+3423	19566+3423	195638.0	+342320	OH/IR	-38.5	1.3	920112	
19585+5200	19585+5200	195834.4	+520041	Mira		< .6	920112	
V1511 Cyg	19586+3637	195839.0	+363750	IRC/AFGL		< .8	911113	
19591+1817	19591+1817	195908.3	+181737	IRC/AFGL		< .4	911116	
19594+4047	19594+4047	195925.1	+404714	IRC/AFGL		< .9	911113	
OH70.30+1.60	19598+3324	195951.0	+332425	SFR	-23.3	4.4	911107-920112	
Z Cyg	20000+4954	200002.5	+495407	IRC/AFGL		<1.9	911022-911116	
20010+3011	20010+3011	200105.1	+301145	IRC/AFGL		<1.0	911113	
20015+3019	20015+3019	200134.9	+301924	IRC/AFGL	18.5	21.6	911113	
20024+1727	20024+1727	200224.6	+172722	IRC/AFGL		< .5	911116	
V1943 Sgr	20038-2722	200351.7	-272213	Mira	-17.3	1.9	911112-911124	*
SY Aql	20047+1248	200445.0	+124824	Mira	-47.7	10.8	911124-920112	
IRC+10451	20052+0554	200515.5	+055428	IRC/AFGL		< .8	911114	
V1300 Aql	20077-0625	200747.4	-062511	IRC/AFGL		< .5	911116	
V584 Aql	20079-0146	200755.0	-014634	Mira		< .4	920112	
20081+2720	20081+2720	200807.0	+272011	SFR		< .4	920112	
20081+3122	20081+3122	200809.8	+312239	SFR	15.0	130.9	920112	
20082+3228	20082+3228	200812.6	+322822	Mira		< .7	920112	
IRC-10530	20094-1121	200928.7	-112124	Mira	-21.9	3.6	920112	*
20097+1107	20097+1107	200946.0	+110748	OH/IR		<1.3	911107	
20109+3205	20109+3205	201058.0	+320539	Mira	53.4	14.5	920112	

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AC Cyg	20113+4917	201121.3	+491757	Mira		< .5	911106-920112	
R Del	20125+0856	201230.0	+085606	Mira	-31.9	2.5	911030-911124	
20144+3526	20144+3526	201427.0	+352647	SFR	-77.1	8.3	911106-911107	
20160+3636	20160+3636	201603.5	+363609	SFR		< .6	920112	
20171+2732	20171+2732	201706.0	+273242	IRC/AFGL		<1.0	911022-911030	
20171+3519	20171+3519	201706.5	+351921	IRC/AFGL		< .8	911113	
BI Cyg	20194+3646	201929.0	+364619	IRC/AFGL		< .8	911106-911107	
20215+3205	20215+3205	202135.5	+320522	IRC/AFGL		< .8	911113	
20217+3330	20217+3330	202142.7	+333053	IRC/AFGL		< .7	911113	
20233+3343	20233+3343	202318.2	+334302	IRC/AFGL		< .8	911113	
20234-1357	20234-1357	202326.0	-135751	IRC/AFGL		< .8	911116	
KY Cyg	20241+3811	202406.8	+381114	IRC/AFGL	-12.5	3.5	911022-911113	
20246+2813	20246+2813	202441.0	+281358	IRC/AFGL		<1.3	911022	
T Mic	20248-2825	202451.9	-282541	Mira		<1.7	911112	
UU Dra	20248+7505	202453.7	+750524	IRC/AFGL		< .8	911115	
20255+3712	20255+3712	202533.5	+371250	SFR	-3.0	1.2	920112	
AFGL 2591	20275+4001	202736.0	+400116	SFR	-16.1	56.7	911110	
RU Cap	20296-2151	202938.7	-215140	IRC/AFGL	7.2	3.2	911116	*
20311+4222	20311+4222	203109.3	+422239	Mira		< .5	911112-911113	
20331+4621	20331+4621	203307.3	+462116	Mira		< .5	920119	
20332+4124	20332+4124	203312.8	+412424	SFR		< .6	920119	
20343+4129	20343+4129	203419.5	+412933	SFR		< .8	920119	
V1828 Cyg	20350+3741	203502.5	+374158	Mira		< .6	920113	
20350+4126	20350+4126	203504.8	+412602	SFR		< .6	920119	
V778 Cyg	20350+5954	203507.0	+595448	Mira		< .7	911106-911109	
20363+3401	20363+3401	203621.0	+340146	IRC/AFGL	12.3	1.9	911107-911109	
20365+1154	20365+1154	203635.0	+115456	IRC/AFGL		< .9	911114	
IRC+40439	20377+3901	203744.5	+390129	IRC/AFGL		< .9	911113	
20381+5001	20381+5001	203807.3	+500135	IRC/AFGL		< .6	911114	
20403+3143	20403+3143	204018.0	+314341	OH/IR		< .9	911109	
20403+3700	20403+3700	204023.2	+370051	IRC/AFGL		< .7	911113	
U Del	20431+1754	204311.1	+175425	Mira		< .8	911112	
20435+3825	20435+3825	204330.3	+382524	Mira		< .6	911112-911113	
FP Aql	20440-0105	204401.9	-010513	Mira	-66.6	1.6	911112-911113	*
V Aqr	20443+0215	204418.0	+021512	Mira		<1.0	911109	
20444+0540	20444+0540	204425.3	+054028	IRC/AFGL		< .7	911114	
NML Cyg		204433.7	+395557		-7.8	35.6	911022-911105	
PV Cep	20453+6746	204525.0	+674645	SFR	68.3	1.6	911106-911109	
20467-0044	20467-0044	204643.2	-004457	Mira		< .7	920112	
20482+3325	20482+3325	204817.0	+332517	OH/IR		< .8	911107-911109	
S117	20489+4410	204857.5	+441043	SFR		<1.3	911110	
OH83.42-0.89	20491+4236	204910.0	+423654	OH/IR	-49.0	3.1	911106-911109	
RZ Cyg	20502+4709	205012.6	+470956	Mira		< .6	911112-911113	
RX Vul	20507+2310	205047.4	+231053	Mira		< .5	920112	
UX Cyg	20529+3013	205300.2	+301320	Mira	-3.9	22.9	911022-911030	

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20532+5554	20532+5554	205315.8	+555406	IRC/AFGL		< .8	911113	
U Equ	20547+0247	205445.0	+024712	IRC/AFGL		<1.2	911109	
AFGL 2686	20570+2714	205700.5	+271455	Mira		<1.2	911112	
21003+4801	21003+4801	210021.7	+480103	IRC/AFGL		< .9	911113	
21006+4720	21006+4720	210040.0	+472012	Mira		< .7	920113	
GR Cyg	21027+3704	210242.0	+370442	Mira		< .6	920119	
21027+5309	21027+5309	210243.4	+530904	IRC/AFGL		< .8	911113	
21029+4917	21029+4917	210256.0	+491723	IRC/AFGL		< .9	911106	
RV Aqr	21032-0024	210316.2	-002452	Mira		< .6	911112	
V1549 Cyg	21035+5136	210333.0	+513616	Mira		< .5	911112-911113	
RS Cap	21044-1637	210428.8	-163723	Mira		<1.0	911113	
21078+5211	21078+5211	210750.2	+521129	SFR	-3.8	51.9	920113	
IRC+50362	21086+5238	210839.2	+523844	Mira	-11.3	.9	920113	
21100-1435	21100-1435	211001.2	-143555	Mira	-54.0	14.2	920112	*
21120+0736	21120+0736	211201.3	+073605	IRC/AFGL		< .5	911109-911114	
21147+5110	21147+5110	211445.7	+511005	IRC/AFGL		<1.2	911113	
21174+1747	21174+1747	211725.0	+174749	IRC/AFGL		<1.4	911109	
GH Cep	21208+7737	212048.4	+773754	Mira		< .8	920111	
21245+6221	21245+6221	212432.4	+622123	IRC/AFGL		< .5	911114	
21270+7135	21270+7135	212702.9	+713553	Mira		< .8	911112-911113	
21282+5050	21282+5050	212815.0	+505043	OH/IR		< .6	920113	
UU Peg	21286+1055	212839.0	+105600	IRC/AFGL		< .6	911109-911114	
21305+2118	21305+2118	213033.0	+211823	IRC/AFGL		<1.0	911114	
21306+5540	21306+5540	213037.0	+554005	SFR	-71.8	93.5	911125-920113	
21308+5710	21308+5710	213052.7	+571049	SFR		<1.0	911110	
IRC+50583	21312+5405	213112.8	+540538	Mira		< .9	920113	
21318+5631	21318+5631	213150.0	+563113	OH/IR		< .3	911116-920113	
V1426 Cyg	21320+3850	213205.6	+385048	Mira		< .7	911112	
21324+5537	21324+5537	213224.7	+553755	IRC/AFGL		< .9	911113	
W Cyg	21341+4508	213408.1	+450855	Mira		< .6	911112-911113	
21345+5410	21345+5410	213430.2	+541052	IRC/AFGL		< .9	911113	
21345+5818	21345+5818	213435.7	+581810	SFR		<1.1	911110	
21346+5714	21346+5714	213440.0	+571405	SFR	-9.1	6.0	911110	*
21373+4540	21373+4540	213718.5	+454051	Mira		< .5	911112-911113	
21377-0200	21377-0200	213744.7	-020047	Mira		< .5	920112	
V645 Cyg	21381+5000	213811.0	+500042	SFR		< .8	911107-911109	
21388+5622	21388+5622	213853.2	+562218	SFR		<1.0	911110	
RU Cyg	21389+5405	213858.0	+540542	Mira		< .7	911113	
21391+5802	21391+5802	213910.3	+580229	SFR	-4.3	15.7	911110	
21413+5442	21413+5442	214121.2	+544230	SFR	-79.2	2.8	911125-920113	
AM Cep	21414+7609	214133.0	+760900	Mira		<1.0	911107-911109	
V361 Cep		214142.0	+655236			<1.9	911106-911107	
LKHA 234	21418+6552	214153.2	+655242	SFR	-12.5	5.7	911106-911124	
mu Cep	21419+5832	214158.7	+583258	Mira		< .9	911105-911111	
TU Peg	21426+1228	214239.0	+122804	Mira	9.9	9.1	911022-920112	

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EP Aqr	21439-0226	214356.7	-022639	Mira	-70.8	1.7	911113	*
21445+5712	21445+5712	214430.7	+571229	SFR		<1.4	911110	
21449+4950	21449+4950	214456.2	+495008	IRC/AFGL		<1.2	911113	
21450+5658	21450+5658	214500.1	+565830	SFR		<1.2	911110	
21456+6422	21456+6422	214536.0	+642210	Mira		<.8	911111-911113	
IRC+40497	21468+3942	214648.5	+394249	IRC/AFGL		<.7	911117	
IRC-10573	21543-1421	215419.6	-142104	Mira		<.4	920112	
21554+6204	21554+6204	215529.6	+620424	OH/IR		<.4	911116-920111	
21565+4132	21565+4132	215634.0	+413203	Mira		<.6	920113	
V Peg	21585+0552	215832.0	+055248	Mira		<1.9	911030	
TW Peg	22017+2806	220143.2	+280619	Mira		<.6	911022-911112	
SV Peg	22035+3506	220331.0	+350618	Mira	7.5	4.3	911030-911112	
22048+5914	22048+5914	220450.0	+591448	IRC/AFGL	-61.2	1.2	911114	*
CU Cep	22097+5647	220945.0	+564727	IRC/AFGL		<.7	911106-911109	
22176+6303	22176+6303	221741.0	+630341	SFR	-15.4	108.6	911124-920111	
OH104.91+2.4	22177+5936	221743.0	+593616	OH/IR		<.5	911022-920111	
22190-0751	22190-0751	221904.0	-075141	Mira		<.8	920112	
RV Peg	22233+3013	222320.0	+301306	Mira		<1.0	911030-911112	
22241+6005	22241+6005	222407.0	+600531	Mira		<.7	911111-911113	
22264+5858	22264+5858	222627.7	+585840	Mira		<.6	920112	
IRC+50434	22277+4534	222744.0	+453454	Mira		<.9	911106-911107	
ST Cep	22282+5644	222816.6	+564435	IRC/AFGL		<1.0	911113	
22308+5812	22308+5812	223052.9	+581253	SFR		<.8	911124-920112	
SS Peg	22315+2418	223136.0	+241818	Mira		<1.3	911022	
V354 Cep	22317+5838	223142.2	+583815	Mira		<.6	920112	
W Cep	22345+5809	223433.0	+580956	IRC/AFGL		<.9	911113	
22402+1045	22402+1045	224017.0	+104507	IRC/AFGL		<.6	911109	
IRC+60364	22413+5929	224118.1	+592922	Mira		<.6	920111	
U Lac	22456+5453	224539.5	+545336	Mira		<.8	911111-911113	
22475+5939	22475+5939	224730.8	+593903	SFR		<2.2	911124	
22512+6100	22512+6100	225113.8	+610058	IRC/AFGL	-52.9	13.9	911113	
IRC+10523	22516+0838	225141.0	+083812	Mira	-3.8	3.5	911112	
MY Cep	22525+6033	225232.2	+603338	IRC/AFGL	-55.5	3.8	911030-911113	
V Psa	22525-2952	225234.9	-295246	Mira		<1.3	911113	
22539+5758	22539+5758	225356.2	+575844	SFR		<1.0	911124	
22543+6145	22543+6145	225420.2	+614555	SFR	-10.1	328.2	911110-920111	
IRC+60377	22546+6115	225437.2	+611502	IRC/AFGL		<1.0	911113	
22551+6221	22551+6221	225506.6	+622141	SFR		<.5	911124-920112	
22551+6139	22551+6139	225511.6	+614000	SFR		<.9	911124-920112	
V627 Cas	22556+5833	225538.0	+583312	IRC/AFGL	-46.9	7.1	911113-911123	
22566+5830	22566+5830	225637.0	+583052	SFR		<1.0	911124	
22570+5912	22570+5912	225702.7	+591222	SFR		<.8	911124	
22594+6117	22594+6117	225925.0	+611740	IRC/AFGL		<1.2	911113	
23000+5932	23000+5932	230000.8	+593255	IRC/AFGL		<.7	911113	
23030+5958	23030+5958	230304.9	+595828	SFR		<.5	911124-920111	

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23033+5951	23033+5951	230319.2	+595159	SFR		<1.5	911124	
R Peg	23041+1016	230408.8	+101625	Mira	24.4	6.7	911105-911112	
NGC7538	23116+6111	231136.5	+611147	SFR	-60.9	17.2	911110-911221	
23138+5945	23138+5945	231353.5	+594537	SFR	-45.3	5.2	911124-920111	
IRC+60393	23138+6204	231353.5	+620457	IRC/AFGL		< .7	911113	
23139+5939	23139+5939	231357.9	+593900	SFR	-44.7	16.9	911124	
23151+5912	23151+5912	231508.6	+591225	SFR	-53.3	13.3	911123-920111	
23166+1655	23166+1655	231641.7	+165503	OH/IR		< .6	911117-911125	
W Peg	23173+2600	231722.7	+260018	Mira		< .7	911022-911112	
EU And	23176+4658	231741.0	+465800	IRC/AFGL		<1.9	911107-911123	
S Peg	23180+0838	231801.0	+083842	Mira		< .6	911105	
RY And	23182+3920	231813.0	+392048	Mira	-.2	1.2	911022-911030	
BU And	23212+3927	232115.0	+392712	Mira		< .7	911030-911111	
AFGL 3099	23257+1038	232545.7	+103809	IRC/AFGL		< .8	911115	
V582 Cas	23278+6000	232752.7	+600001	IRC/AFGL		<1.0	911113	
23279+5336	23279+5336	232756.5	+533634	Mira		<1.3	920112	
V358 Cas	23281+5742	232808.1	+574200	IRC/AFGL		< .8	911113	
23284+5958	23284+5958	232825.7	+595844	IRC/AFGL		< .8	911113	
IRC+10537	23312+0601	233115.0	+060124	Mira		< .9	911105	
LP And	23320+4316	233200.0	+431618	Mira		<1.0	911022-911030	
SV Cas	23365+5159	233635.5	+515904	IRC/AFGL		<1.2	911111	
R Aqr	23412-1533	234114.0	-153342	Mira		< .8	911105	
PZ Cas	23416+6130	234139.0	+613043	OH/IR	-43.1	4.6	911022-920111	
Z Cas	23420+5618	234204.9	+561810	Mira		< .4	920111	
EY And	23425+4338	234232.9	+433843	IRC/AFGL		<1.1	911022-911115	
V657 Cas	23496+6131	234939.0	+613231	IRC/AFGL		< .8	911022-911113	
TZ Cas	23504+6043	235027.0	+604327	IRC/AFGL		< .8	911113	
RS And	23528+4821	235250.2	+482137	Mira		< .8	911030-911111	
23545+6508	23545+6508	235434.0	+650829	SFR		< .7	911124-920111	
R Cas	23558+5106	235552.4	+510640	Mira	25.7	2.7	911022-911111	
S171	23568+6706	235653.2	+670657	SFR		<1.0	911110	
A Peg	23575+2536	235733.2	+253629	Mira		< .7	920113	