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# The Arcetri Catalog of $H_2O$ maser sources: Update 2000⋆,⋆⋆

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**Abstract.** We present a second update of the Arcetri Catalog of water masers (Comoretto et al. 1990; Brand et al. 1994). The present study reports the results of the observations carried out with the Medicina 32-m radiotelescope from January 1993 to April 2000 on a sample of 300 sources. This compilation consists of newly discovered maser sources that did not appear in the previous Arcetri Catalogs and is made of: a) detections from the literature, and b) unpublished detections obtained with the Medicina antenna. Overall, 83 out of 300 sources were detected. The detection rate is low (28%) and we attribute this result to the inclusion in our survey of a rather large number of spurious maser detections that have appeared in one particular paper. The observational parameters are reported in tabular form for all the 300 sources and the spectra of the detected masers are presented. We discuss the global properties of the complete Arcetri Catalog based on Comoretto et al. (1990), Brand et al. (1994) and the present observations, which now contains 1013 galactic water maser sources. Of these, 937 have an IRAS counterpart within 1 arcmin from the nominal position of the maser. We establish a classification scheme based on the IRAS flux densities which allows to distinguish between water masers associated with star forming regions and late-type stars. The Arcetri Catalog represents a useful data base for systematic studies of galactic water maser sources.

**Key words.** astronomical data bases: catalogs – masers – ISM: molecules – radio lines: ISM – radio lines: stars

## 1. Introduction

The first Arcetri Catalog of $H_2O$ maser sources was published in July 1990 (Comoretto et al. 1990). A revised version of it was given by Palagi et al. (1993), who also discussed the statistical properties of the sources. The Catalog gives the observational parameters of all 500 $H_2O$ masers[1] with $\delta > -30°$ reported in the literature up to January 1989, and re−observed with the Medicina 32-m radio telescope (203 were detected at Medicina). After the publication of the Arcetri Catalog, a large number of new water masers were found in our own observing programs at Medicina and elsewhere. This development has prompted the compilation of a first update of the Catalog (Brand et al. 1994, hereafter U1), which contains all the sources reported in the literature from March 1989 to December 1992 as observed at Medicina. U1 gives the parameters of 213 sources[2] in tabular form (141 of these were detected at Medicina), bringing the size of the Arcetri Catalog to 712 masers[3] (a 42% increase).

The basic motivation of the Arcetri Catalog is to provide a homogeneous and complete list of all $H_2O$ maser "centers" observed as separate sources with the 1.9 arcmin HPBW of the 32-m Medicina telescope, and to present at

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⋆ Based on observations collected with the Medicina 32-m radiotelescope. The Medicina telescope is operated by the Istituto di Radioastronomia, C.N.R., Bologna.

⋆⋆ Table 2 is only available in electronic form at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.125.5) or via
http://cdsweb.u-strasbg.fr/cgi-bin/qcat?J/A+A/368/845

[1] Note that Comoretto et al. list 505 $H_2O$ sources. However, five of them (HH7-11(B), M17(6), S88, IRAS 09353+0319, BFS 11(A)) are at a distance of less than 1 arcmin from another source and should not be considered as separate entries.

[2] U1 contains 214 sources, but one of them (IRAS 18144−1723) is already present in Comoretto et al. (1990).

[3] With the criterion on distance defined in note 1, the merging of Comoretto et al. (1990) and U1 catalogs produces 712 independent entries in the Catalog instead of 713.

least one spectrum for each detected maser or an upper limit to the peak flux density for those not detected by us. Single dish and interferometric observations of higher spatial resolution have revealed the existence of many distinct components around a maser center reported in our Catalog. However, tabulation of all these finer components is beyond the scope and usefulness of our study.

There are two types of $H_2O$ masers, those that occur in star forming regions, and those that originate in the envelopes of evolved stars. From the scientific viewpoint, the importance of studying water masers is readily understood. Masers of the first type are beacons of star formation sites, and allow one to explore the environment of deeply embedded sources, completely inaccessible at optical and near-infrared wavelengths. Knowledge of maser emission having been observed towards an IRAS source pinpoints the direction in which more detailed searches for newly formed stars should be made (e.g. Schreyer et al. 1996; Plume et al. 1997; Launhardt et al. 1998; Zinchenko et al. 1998). Stellar masers are observed to obtain knowledge of the spatial- and velocity structure of the stellar envelopes and to study their variability. When used in combination with other (optical, IR, and high-resolution radio) observations these studies yield important information on the stellar mass loss rate, the physical conditions in the circumstellar shell, and the maser pumping mechanism (e.g. Benson & Little-Marenin 1996; Lewis 1999; Colomer et al. 2000).

The availability of a catalog, in which all known water masers are brought together is an important aid to these studies, in that it greatly facilitates the selection of objects on which to perform more detailed studies. The Arcetri catalog is such a data base. Moreover, because all masers in this catalog have been re-observed with the same telescope and receiver, the data presented therein allow statistical studies (e.g. Palagi et al. 1993). The Arcetri catalog is, so to speak, only the tip of the iceberg of the complete Arcetri archive of water masers: for many sources we have continued monitoring the maser emission over the years, resulting in a coverage of more than 10 years in several cases. Thus, maser variability studies on long time scales can also be performed.

The second update of the Catalog presented here (hereafter U2) contains 300 sources which satisfy the criteria established in Comoretto et al. (1990) and in U1. These are: the distance between two maser centers should be larger than 1 arcmin and the source must have a declination $\delta > -30°$. We note that such a separation represents a minimum value: when strong masers are present with intensities up to $\sim 10^5$ Jy, as in the case of Orion KL and W3 OH, the appropriate distance for two sources to be considered independent becomes much larger. Work is in progress to be more quantitative. Preliminary results from a large region mapped around Orion KL indicate that the emission of the strong maser (at the same velocity) can be seen in the sidelobes of the beam pattern with an intensity above our mean noise up to distances of 30 HPBWs.

The majority of the sources contained in U2 are associated with late-type stars, while the rest are IRAS sources selected for having colors typical of star forming regions (SFR). We have detected water emission in 83 sources, and their spectra, including multiple observations of the same source, are presented in Sect. 3. In total, U2 brings the total number of sources contained in the Arcetri Catalog to 1013 (423 detected at Medicina), a 42% increase with respect to U1. The global properties of the Catalog are discussed in Sect. 4.

## 2. Observations

All the observations reported in this paper were carried out with the Medicina 32-m radiotelescope during a number of sessions in the period January 1993–April 2000. A description of the telescope and the equipment is given by Comoretto et al. (1990), and here we will only give a summary of the main features.

At the frequency of the $6_{16}-5_{23}$ transition of $H_2O$ (22.23507985 GHz), the HPBW of the antenna is 1.9 arcmin. The pointing model was checked at the beginning of each 2–3 week session by maximizing the signal from a set of strong galactic $H_2O$ masers (W3OH, Orion KL, Sgr B2, W49N). The resulting accuracy was always better than 25 arcsec. The antenna gain as a function of elevation was determined regularly by doing short ($\sim$10 min) total power integrations on DR21 (adopted flux density 18.8 Jy, Dent 1972). For each observing day, all gain measurements as a function of elevation were fitted with a polynomial curve, which was then used to calculate the conversion factor from antenna temperature to flux density for the spectra observed on that day. The calibration error resulting from the dispersion of the single measurements from the fit turns out to be 19%. On a few dates, no gain curve was measured: in this cases we have applied the closest gain curve in time and we estimate a corresponding calibration uncertainty of 7%. Therefore, a conservative estimate for such an uncertainty has to be taken equal to 21%.

Observations were always done in total power mode, with 5 min integration time on- as well as off-source. Depending on weather conditions, elevation, and spectral resolution, this resulted in $1\sigma$ rms noise levels between 0.3 Jy and 6 Jy. The distribution of the rms noise for the 426 observations (including multiple observations of the same source) is shown in Fig. 1. The peak occurs at 0.7 Jy both for positions where emission was (solid line) and was not (broken line) detected. Compared to the observations presented in U1, there is a factor of $\sim$2 improvement in the rms of the present survey. In general, the band was centered on the expected velocity, either the velocity of the maser as reported in the literature, or, if available, the velocity of the molecular cloud in which the source is embedded.

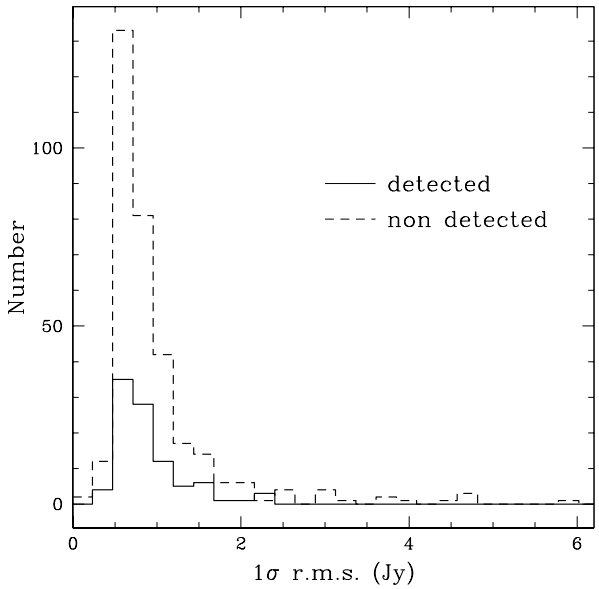


**Fig. 1.** The distribution of the $1\sigma$ rms noise for the 426 spectra observed in U2. The bin size is 0.25 Jy

## 3. Summary of results for Update2

We have collected all the information available in the literature on 300 new $H_2O$ maser sources discovered after the completion of the first update of the Arcetri Catalog (U1). All the entries of the observed sources are listed in Table 1, which gives:

- *Columns 1 and 2*: Source names: IRAS and/or another designation;
- *Columns 3 and 4*: Equatorial Coordinates (1950 equinox);
- *Column 5*: Color-based classification of the IRAS source associated with the $H_2O$ maser (see the Appendix);
- *Column 6*: Date of observation;
- *Column 7*: Spectral resolution in km $s^{-1}$;
- *Column 8*: Scan number;
- *Column 9*: $1\sigma$ rms noise level in the spectrum;
- *Columns 10 to 14*: Parameters of the $H_2O$ maser emission. We give the minimum and maximum velocity of the emission, the velocity of the peak signal, the peak flux density, and the integrated flux, respectively. In the case of no detection, the minimum and maximum velocities indicate the total velocity extent of the spectrum. The parameters were estimated by visual inspection of the spectra. Obviously, this is a subjective method, and we suggest the reader to consult the spectra of the detections, all of which are shown in Fig. A.2. The uncertainty in the peak flux density is taken to be equal to the maximum between the rms given in Col. 9 and the calibration error discussed in Sect. 2. The error in the integrated flux density is dominated by the uncertainty in the calibration. The error in velocity can be assumed equal to the corresponding spectral resolution, given in Col. 7;
- *Column 15*: Each entry is the coded reference to the publication in which the maser was first reported. No attempt was made to list all publications pertaining to a particular source. The reference codes are a continuation of those used in Comoretto et al. (1990) and U1, and are specified at the bottom of Table 1.

As in U1, we have classified each maser source following the scheme introduced by Palagi et al. (1993). A full explanation of the criteria adopted to distinguish objects based on the IRAS colors is given in the Appendix. Based on the fluxes in the four IRAS bands, two classes are readily identified: late-type stars (STAR) and star forming regions (SFR). In case of no assignment, the source is labeled as *unknown* (UNKN) or *strange* (STRN) (see Appendix).

Almost all sources in Table 1 have an IRAS point source as a counterpart (289 out of 300 entries). This is not surprising, since the input source lists for water maser studies are typically derived from the IRAS PSC. For the 11 sources without counterpart within 1 arcmin, we have searched in the IRAS catalog doubling the radius around the maser position, with no success. Overall, the classification criteria yield the following results: 201 STAR, 75 SFR, 10 UNKN, 3 STRN. The large number of STAR masers reflects the fact that recent studies have concentrated on $H_2O$ masers associated with late-type stars.

Of the 300 sources, 83 (28%) were detected at least once at Medicina during the period 01/1993–04/2000. About two thirds of the 300 sources were observed only once (199); of these, 59 (30%) were detected. More than half (33) of these 59 are associated with long-period variables, the rest are SFR (20) and UNKN (6). Spectra of all the detections are shown in Fig. A.2. The identification is by scan number (upper left) and source name (upper right). Note that, in order to make the spectra readable, only part of the velocity range covered in our observations is shown in the figure.

Table 1 contains 7 new water maser sources discovered during the course of a dedicated project aimed at studying the frequency of maser occurrence among 91 bright IRAS sources ($F_{60\ \mu m} \geq 100$ Jy) with colors corresponding to those of ultracompact HII regions (Wood & Churchwell 1 1989). These 91 sources had been already observed in 1989–90 and were reported in Palla et al. (1991) as non-detections. The newly detected sources are: IRAS 18372−0541, IRAS 19368+2239, IRAS 19560+3135, IRAS 20307+3749, IRAS 22267+6244, IRAS 22480+6002, IRAS 23545+6508. Another new detection is also listed in Table 1 as G23.27+0.08 (Codella & Moscadelli 2000).

Figure 2 shows the distribution of the peak flux densities (taken from the literature) of the sources that were *not* detected in the present survey. We see that the distribution is unusually bimodal. The peak below ∼1 Jy is expected, as it corresponds to the average 1 $\sigma$ rms of our observations (see Table 1). The second peak at ∼30 Jy, instead, is totally unexpected: however, this is determined by the non-detections obtained towards the sample of Han et al. (1995), as clearly demonstrated by the fact that such

**Table 1.** Arcetri update 2000

| IRAS | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 00067+6340 | | 00:06:47.7 | +63:40:34 | STAR | 13/03/97 | 0.263 | 56005 | 0.75 | −140 | 80 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74103 | 0.55 | −180 | 80 | | | | |
| 00087+5833 | LkHα198 | 00:08:47.9 | +58:33:09 | SFR | 13/03/97 | 0.263 | 56059 | 1.85 | −140 | 80 | | | | 104 |
| | | | | | 07/05/97 | 0.263 | 59295 | 1.07 | −140 | 80 | | | | |
| | | | | | 20/01/99 | 0.263 | 74105 | 0.49 | −120 | 150 | | | | |
| 00213+6530 | | 00:21:22.0 | +65:30:25 | UNKN | 13/03/97 | 0.263 | 56061 | 1.25 | −110 | 110 | | | | 104 |
| | | | | | 07/05/97 | 0.263 | 59297 | 1.11 | −110 | 110 | | | | |
| | | | | | 19/01/99 | 0.263 | 73954 | 0.62 | −130 | 130 | | | | |
| 00213+3818 | | 00:21:23.1 | +38:18:00 | STAR | 07/05/97 | 0.263 | 59299 | 1.46 | −120 | 120 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 73956 | 0.68 | −160 | 100 | | | | |
| 01265+4624 | CE And | 01:26:33.5 | +46:24:06 | STAR | 27/12/99 | 0.263 | 79036 | 0.78 | −15 | −11 | −13.2 | 10 | 10 | 118 |
| 01597+1601 | RY Ari | 01:59:45.9 | +16:01:52 | STAR | 27/12/99 | 0.263 | 79038 | 0.64 | −120 | 110 | | | | 118 |
| | | | | | 19/01/99 | 0.263 | 73960 | 0.62 | −115 | 130 | | | | |
| 02145+7831 | AG Cep | 02:14:33.8 | +78:31:48 | STAR | 27/12/99 | 0.263 | 79040 | 0.68 | −120 | 120 | | | | 110 |
| 02252+6120 | IC 1805 | 02:25:14.5 | +61:20:10 | UNKN | 19/01/99 | 0.263 | 73964 | 0.60 | −110 | 110 | | | | 100 |
| 02270−2619 | R For | 02:27:01.2 | −26:19:18 | STAR | 05/05/97 | 0.263 | 59122 | 2.47 | −101 | 115 | | | | 104 |
| 02293+5748 | | 02:29:21.0 | +57:48:51 | STAR | 13/03/97 | 0.263 | 56007 | 0.94 | −117 | 99 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 73966 | 0.62 | −150 | 40 | | | | |
| 02302+4525 | UX And | 02:30:12.0 | +45:25:59 | STAR | 27/12/99 | 0.263 | 79042 | 0.81 | −120 | 120 | | | | 110 |
| 02455+6034 | | 02:45:30.0 | +60:34:35 | SFR | 13/03/97 | 0.263 | 56009 | 0.90 | −130 | 86 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 73968 | 0.57 | −130 | 86 | | | | |
| 02455+1718 | T Ari | 02:45:32.0 | +17:18:06 | STAR | 27/12/99 | 0.263 | 79044 | 0.70 | −130 | 115 | | | | 113 |
| 02469+5646 | W Per | 02:46:55.0 | +56:46:35 | STAR | 27/12/99 | 0.263 | 79046 | 0.81 | −170 | 90 | | | | 115 |
| 03064+5638 | | 03:06:26.8 | +56:38:56 | SFR | 13/03/97 | 0.263 | 56011 | 0.85 | −71 | 143 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 73970 | 0.67 | −71 | 143 | | | | |
| 03094+5530 | | 03:09:27.1 | +55:30:56 | STAR | 13/03/97 | 0.263 | 56013 | 0.91 | −94 | 121 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 75979 | 0.68 | −147 | 120 | | | | |
| | L1448 | 03:22:34.3 | +30:33:35 | | 02/07/97 | 0.263 | 60797 | 1.50 | −100 | 100 | | | | 107 |
| | | | | | 17/03/98 | 0.263 | 69097 | 1.35 | −103 | 109 | | | | |
| | | | | | 19/01/99 | 0.263 | 73983 | 0.65 | −155 | 112 | | | | |

| IRAS | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 03258+3104 | N1333IRS2 | 03:25:49.9 | +31:04:16 | SFR | 18/01/94 | 0.165 | 32880 | 0 .4 | −18.2 | −12.3 | −16.4 | 3 | 7 | 105 |
| | | | | | 02/07/97 | 0.263 | 60799 | 1.54 | −100 | 100 | | | | |
| | OH141.7 | 03:29:08.9 | +60:10:18 | | 13/03/97 | 0.263 | 56015 | 0.92 | −136 | 79 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59144 | 1.40 | −136 | 79 | | | | |
| | | | | | 01/19/99 | 0.263 | 73987 | 0.62 | −188 | 79 | | | | |
| 03385+5927 | | 03:38:34.1 | +59:27:30 | STAR | 13/03/97 | 0.263 | 56017 | 0.89 | −118 | 98 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59146 | 1.30 | −118 | 98 | | | | |
| | | | | | 19/01/99 | 0.263 | 73989 | 0.63 | −165 | 93 | | | | |
| 03414+3200 | | 03:41:28.0 | +32:00:01 | SFR | 13/03/97 | 0.263 | 56019 | 0.88 | − 87 | 129 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59148 | 1.26 | − 87 | 129 | | | | |
| | | | | | 19/01/99 | 0.263 | 73991 | 0.58 | −136 | 124 | | | | |
| 03453+3207 | | 03:45:23.3 | +32:07:33 | STAR | 27/12/99 | 0.263 | 79048 | 0.81 | −43 | −19 | −22 | 2 | 2 | 117 |
| 03507+3623 | IRC+40072 | 03:50:46.2 | +36:23:28 | STAR | 27/12/99 | 0.263 | 79050 | 0.73 | −100 | −84 | −92 | 7 | 21 | 110 |
| 03598−1353 | WZ Eri | 03:59:49.0 | −13:53:16 | STAR | 27/12/99 | 0.263 | 79052 | 1.6 | −120 | 95 | | | | 111 |
| 04016+2610 | L1489 | 04:01:40.6 | +26:10:48 | SFR | 13/03/97 | 0.263 | 56021 | 0.67 | −150 | 64 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59150 | 1.34 | −149 | 64 | | | | |
| | | | | | 04/08/98 | 0.132 | 71029 | 1.71 | − 39 | 67 | | | | |
| | | | | | 19/01/99 | 0.263 | 73993 | 0.63 | −198 | 60 | | | | |
| 04034+5116 | | 04:03:23.8 | +51:16:45 | SFR | 13/03/97 | 0.263 | 56023 | 0.90 | −186 | 29 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59152 | 1.35 | −186 | 29 | | | | |
| | | | | | 19/01/99 | 0.263 | 73995 | 0.55 | −186 | 29 | | | | |
| 04157−1837 | RS Eri | 04:15:42.5 | −18:37:42 | STAR | 18/01/00 | 0.263 | 79408 | 1.10 | 46.9 | 51.5 | 49.6 | 41 | 58 | 110 |
| 04166+4056 | IR Per | 04:16:36.5 | +40:56:37 | STAR | 27/12/99 | 0.263 | 79054 | 0.78 | −140 | 60 | | | | 115 |
| 04260+2437 | IRC+20082 | 04:26:05.6 | +24:37:16 | STAR | 27/12/99 | 0.263 | 79056 | 0.69 | −110 | 90 | | | | 110 |
| | G165.35−9.03 | 04:26:50.0 | +35:09:24 | | 13/03/97 | 0.263 | 56025 | 1.04 | −150 | 65 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 73997 | 0.60 | −199 | 60 | | | | |

a peak disappears once these sources are removed from the distribution (dashed histogram in Fig. 2). We thus conclude that the large majority of the detections obtained by Han et al. (1995) are likely to be spurious. Such a conclusion is reinforced by the fact that out of the 13 sources of Han et al. detected at Medicina, only 7 show emission within 50 km s$^{-1}$ from the velocity quoted by Han et al., and for 4 of these the velocity difference is $\geq$19 km s$^{-1}$.

## 4. Global properties of the Arcetri Catalog

A computer-readable version of Table 1, plus the amended version of Table 2 of Comoretto et al. (1990) and Table 1

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 04287+1807 | XZ Tau | 04:28:44.4 | +18:07:36 | SFR | 13/03/97 | 0.263 | 56027 | 0.85 | −135 | 81 | | | | 104 |
| | | | | | 04/08/98 | 0.132 | 71033 | 1.68 | − 41 | 68 | | | | |
| | | | | | 19/01/99 | 0.263 | 73999 | 0.60 | −100 | 120 | | | | |
| 04311−0004 | BD Eri | 04:31:11.0 | −00:04:36 | STAR | 27/12/99 | 0.263 | 79058 | 0.89 | −120 | 100 | | | | 111 |
| 04325+2402 | L1535 | 04:32:31.6 | +24:02:08 | SFR | 13/03/97 | 0.263 | 56029 | 0.71 | −107 | 110 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74217 | 0.55 | −155 | 104 | | | | |
| 04382−1417 | BX Eri | 04:38:14.8 | −14:17:47 | STAR | 27/12/99 | 0.263 | 79060 | 1.6 | −110 | 110 | | | | 118 |
| 04393−0802 | | 04:39:23.2 | −08:02:59 | STAR | 05/04/00 | 0.263 | 80416 | 1.6 | −75 | 135 | | | | 118 |
| | R Lep | 04:57:19.7 | +14:52:46 | | 20/01/99 | 0.263 | 74115 | 1.25 | 60 | 160 | | | | 104 |
| 05104+2055 | | 05:10:26.0 | +20:55:59 | STAR | 13/03/97 | 0.263 | 56031 | 0.73 | −120 | 96 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74219 | 0.62 | −167 | 90 | | | | |
| 05220−0611 | EX Ori | 05:22:00.8 | −06:11:31 | STAR | 27/12/99 | 0.263 | 79064 | 1.1 | −160 | 80 | | | | 110 |
| 05281+3412 | | 05:28:07.7 | +34:12:46 | SFR | 13/03/97 | 0.263 | 56033 | 0.98 | − 63 | 152 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74225 | 0.54 | −112 | 147 | | | | |
| 05338−0624 | L1641 N | 05:33:54.7 | −06:23:58 | SFR | 20/01/99 | 0.263 | 74119 | 0.50 | −118 | 142 | | | | 100 |
| 05354+2458 | | 05:35:28.2 | +24:58:26 | STAR | 13/03/97 | 0.263 | 56035 | 0.73 | −1.2 | 6.0 | 2.9 | 23 | 24 | 104 |
| | | | | | 21/01/99 | 0.263 | 74229 | 0.52 | −4.3 | 6.4 | 1.2 | 5 | 10 | |
| 05358−0704 | Haro4-13A | 05:35:55.3 | −07:04:41 | SFR | 13/03/97 | 0.263 | 56037 | 0.91 | −126 | 89 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74231 | 0.76 | −130 | 130 | | | | |
| 05369−0728 | Haro4-13 | 05:36:56.4 | −07:28:14 | SFR | 05/04/00 | 0.263 | 80432 | 1.40 | −85 | 110 | | | | 107 |
| | NGC2023 | 05:39:04.1 | −07:17:56 | | 20/01/99 | 0.263 | 74121 | 0.59 | −117 | 142 | | | | 100 |
| 05423+2905 | | 05:42:18.9 | +29:05:54 | STAR | 27/12/99 | 0.263 | 79066 | 0.80 | 19 | 27 | 23.7 | 3 | 9 | 112 |
| 05480+2545 | | 05:48:01.9 | +25:44:50 | STRN | 19/01/94 | 0.165 | 32988 | 0.87 | −93 | 76 | | | | 110 |
| | | | | | 22/03/99 | 0.263 | 74960 | 0.78 | −134 | 133 | | | | |
| 05554+2013 | | 05:55:26.2 | +20:13:45 | SFR | 13/03/97 | 0.263 | 56039 | 0.74 | −175 | 39 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74239 | 0.68 | −224 | 34 | | | | |
| 06048+1839 | LkHα208 | 06:04:53.2 | +18:39:55 | SFR | 13/03/97 | 0.263 | 56041 | 0.76 | −188 | 29 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74241 | 0.85 | −139 | 129 | | | | |
| 06068+2030 | | 06:06:53.0 | +20:30:41 | SFR | 13/03/97 | 0.263 | 56043 | 0.72 | −151 | 63 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74243 | 0.62 | −199 | 58 | | | | |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 06183+1135 | | 06:18:19.3 | +11:35:42 | STAR | 13/03/97 | 0.263 | 56045 | 0.87 | − 94 | 122 | | | | 104 |
| | | | | | 05/05/97 | 0.263 | 59154 | 1.25 | − 93 | 122 | | | | |
| | | | | | 21/01/99 | 0.263 | 74245 | 1.00 | −143 | 116 | | | | |
| 06190+1040 | | 06:19:01.3 | +10:40:51 | SFR | 23/04/93 | 0.329 | 28736 | 2.89 | −168 | 168 | | | | 101 |
| | | | | | 21/01/99 | 0.263 | 74247 | 0.50 | −129 | 128 | | | | |
| 06278+2729 | DW Gem | 06:27:51.3 | +27:29:16 | STAR | 27/12/99 | 0.263 | 79068 | 0.77 | −120 | 120 | | | | 118 |
| 06304+6407 | RT Cam | 06:30:29.0 | +64:07:57 | STAR | 18/01/00 | 0.263 | 79400 | 0.61 | −110 | 60 | | | | 111 |
| 06349−0121 | SY Mon | 06:34:59.0 | −01:21:05 | STAR | 18/01/00 | 0.263 | 79434 | 0.64 | −100 | 0 | | | | 111,114 |
| 06423+0905 | FX Mon | 06:42:21.5 | 09:05:27 | STAR | 18/01/00 | 0.263 | 79436 | 0.53 | 32.2 | 36.5 | 35.2 | 4 | 5 | 110 |
| 06567−0350 | BFS 56 | 06:56:45.1 | −03:50:41 | SFR | 13/03/97 | 0.263 | 56051 | 0.88 | − 96 | 121 | | | | 104 |
| | | | | | 05/04/00 | 0.263 | 80420 | 1.06 | − 90 | 105 | | | | |
| 06568−1154 | CMA-W | 06:56:52.9 | −11:54:46 | SFR | 13/03/97 | 0.263 | 56053 | 1.09 | −115 | 101 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74253 | 1.01 | −129 | 129 | | | | |
| 06571−0441 | S287-B | 06:57:06.4 | −04:41:48 | SFR | 13/03/97 | 0.263 | 56055 | 0.94 | −132 | 84 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74255 | 0.61 | −180 | 79 | | | | |
| 06572−0742 | L1654 | 06:57:16.8 | −07:42:16 | SFR | 13/03/97 | 0.263 | 56057 | 1.30 | −106 | 109 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 74003 | 0.58 | −130 | 129 | | | | |
| 07331+0021 | AI CMi | 07:33:07.0 | +00:21:40 | STRN | 18/01/00 | 0.263 | 79438 | 0.70 | − 80 | 140 | | | | 112 |
| 07333−1838 | | 07:33:21.3 | −18:38:51 | SFR | 19/01/99 | 0.263 | 74007 | 1.37 | −138 | 119 | | | | 104 |
| 07445−2613 | CRL1192 | 07:44:34.0 | −26:13:11 | STAR | 13/03/97 | 0.263 | 56049 | 1.88 | 76.6 | 84.9 | 81.5 | 19 | 50 | 104 |
| | | | | | 19/01/99 | 0.263 | 74013 | 3.12 | − 52 | 208 | | | | |
| 08149−1338 | SV Pup | 08:14:57.9 | −13:38:57 | STAR | 18/01/00 | 0.263 | 79440 | 0.82 | − 10 | 100 | | | | 110 |
| 08272−0609 | RT Hya | 08:27:13.2 | −06:09:01 | STAR | 18/01/00 | 0.263 | 79442 | 0.74 | 0 | 100 | | | | 115 |
| 09057+1325 | CW Cnc | 09:05:42.1 | +13:25:23 | STAR | 18/01/00 | 0.263 | 79444 | 0.59 | − 95 | 100 | | | | 118 |
| 09076+3110 | RS Cnc | 09:07:37.7 | +31:10:04 | STAR | 18/01/00 | 0.263 | 79446 | 0.60 | −110 | 100 | | | | 115 |
| 09452+1330 | IRC+10216 | 09:45:14.1 | +13:30:40 | STAR | 11/03/97 | 0.263 | 55761 | 0.86 | − 83 | 128 | | | | 104 |
| | | | | | 19/01/99 | 0.263 | 74015 | 0.69 | −130 | 127 | | | | |
| 09507+3509 | S LMi | 09:50:45.0 | +35:09:42 | STAR | 18/01/00 | 0.263 | 79310 | 0.64 | −100 | 100 | | | | 111 |

of U1 is published electronically. The combined Table 2 contains all the 1013 sources observed at Medicina (423 detected) and lists one entry per source, usually the one with the highest flux density observed at Medicina.

Many sources have multiple observations in our database, in some cases covering a period of more than 10 years. An analysis of the variability of the maser emission for a subset of sources with the longest time coverage and largest sampling is under way (Valdettaro et al., in preparation). Information on multiple observations of selected sources can be obtained upon request to `palagi@arcetri.astro.it`.

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu dV$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 10132+3049 | CIT 6 | 10:13:11.0 | +30:49:17 | STAR | 20/01/99 | 0.263 | 74017 | 0.55 | −107 | 152 | | | | 104 |
| 11308−1020 | | 11:30:52.3 | −10:20:26 | STAR | 25/01/99 | 0.263 | 74459 | 4.67 | −108 | 151 | | | | 104 |
| 11445+4344 | | 11:44:36.0 | +43:44:57 | STAR | 11/03/97 | 0.263 | 55763 | 1.00 | −176 | 35 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74281 | 0.47 | −103.4 | −96.1 | −100.2 | 20 | 11 | |
| 12380+5607 | Y UMa | 12:38:03.5 | +56:07:19 | STAR | 11/03/97 | 0.263 | 55765 | 0.90 | −82 | 128 | | | | 104,115 |
| | | | | | 22/01/99 | 0.263 | 74285 | 0.62 | −131 | 128 | | | | |
| 13114−0232 | SW Vir | 13:11:29.7 | −02:32:34 | STAR | 11/03/97 | 0.263 | 55767 | 0.82 | −98 | 114 | | | | 104,110 |
| | | | | | 22/01/99 | 0.263 | 74287 | 0.54 | −144 | 114 | | | | |
| 14086−0730 | OH 334 | 14:08:40.0 | −07:30:42 | STAR | 27/12/99 | 0.263 | 79072 | 0.95 | −23 | −15 | −19 | 4 | 6 | 111 |
| 14280−2952 | Y Cen | 14:28:01.1 | −29:52:32 | STAR | 06/04/00 | 0.263 | 80467 | 4.65 | −100 | 105 | | | | 110 |
| 14524−2148 | EG Lib | 14:52:28.9 | −21:48:14 | STAR | 27/12/99 | 0.263 | 79076 | 3.29 | −120 | 120 | | | | 110 |
| 15410−0133 | BG Ser | 15:41:00.3 | −01:33:09 | STAR | 27/12/99 | 0.263 | 79080 | 0.75 | −4.0 | 0.2 | −1.9 | 7 | 10 | 110 |
| 16011+4722 | X Her | 16:01:07.9 | +47:22:36 | STAR | 14/03/97 | 0.263 | 56087 | 1.07 | −150 | 66 | | | | 104,115 |
| | | | | | 03/05/97 | 0.263 | 56738 | 1.30 | −203 | 66 | | | | |
| | | | | | 21/01/99 | 0.263 | 74143 | 0.47 | −180 | 50 | | | | |
| 16146−2246 | S Sco | 16:14:42.0 | −22:46:18 | STAR | 27/12/99 | 0.263 | 79084 | 5.9 | 60 | 290 | | | | 111 |
| 16231−2427 | S-R3 | 16:23:07.7 | −24:27:26 | UNKN | 22/05/93 | 0.263 | 56089 | 1.48 | −107 | 109 | | | | 104 |
| | GSS30 | 16:23:20.0 | −24:16:18 | | 06/04/00 | 0.263 | 80471 | 3.91 | −85 | 105 | | | | 120 |
| | VLA1623 | 16:23:25.0 | −24:17:47 | | 06/04/00 | 0.263 | 80473 | 2.98 | −95 | 105 | | | | 120 |
| 16313−1703 | S Oph | 16:31:21.9 | −17:03:30 | STAR | 27/12/99 | 0.263 | 79086 | 1.7 | −80 | 120 | | | | 111 |
| | RNO 90 | 16:31:38.0 | −15:42:04 | | 14/03/97 | 0.263 | 56091 | 1.12 | − 56 | 160 | | | | 104 |
| 16442−0930 | L255 | 16:44:14.2 | −09:30:03 | SFR | 14/03/97 | 0.263 | 56093 | 1.15 | −140 | 75 | | | | 104 |
| | | | | | 03/05/97 | 0.263 | 58736 | 1.02 | −198 | 76 | | | | |
| | | | | | 21/01/99 | 0.263 | 74033 | 0.55 | −19.5 | −9.4 | −13.4 | 2 | 5 | |
| 17034−1024 | V850 Oph | 17:03:24.9 | −10:24:59 | STAR | 27/12/99 | 0.263 | 79090 | 0.99 | −110 | 90 | | | | 111 |
| 17049−2440 | AFGL 1922 | 17:04:54.3 | −24:40:29 | STAR | 06/04/00 | 0.263 | 80475 | 3.61 | −90 | 105 | | | | 104 |
| 17103−0559 | | 17:10:18.5 | −05:59:29 | STAR | 14/03/97 | 0.263 | 56095 | 0.92 | −109 | 107 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74151 | 0.53 | −156 | 102 | | | | |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu dV$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 17162−1934 | V1848 Oph | 17:16:15.0 | −19:34:42 | STAR | 27/12/99 | 0.263 | 79094 | 2.04 | −150 | 90 | | | | 111 |
| 17190+2658 | V393 Her | 17:19:04.0 | +26:58:42 | STAR | 27/12/99 | 0.263 | 79096 | 0.55 | −90 | 150 | | | | 111 |
| 17334+1537 | | 17:33:24.9 | +15:37:02 | STAR | 14/03/97 | 0.263 | 56097 | 0.82 | − 81 | 135 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74153 | 0.46 | −100 | 120 | | | | |
| 17343+1052 | V790 Oph | 17:34:24.0 | +10:52:52 | STAR | 27/12/99 | 0.263 | 79098 | 0.51 | −60 | −53 | −57.0 | 20 | 23 | 111 |
| 17445−2900 | | 17:44:33.5 | −29:00:03 | UNKN | 06/04/00 | 0.263 | 80477 | 4.45 | −95 | 105 | | | | 103 |
| 17554+2946 | AU Her | 17:55:24.0 | +29:46:45 | STAR | 27/12/99 | 0.263 | 79100 | 0.71 | −140 | 90 | | | | 111,112 |
| 17581−1744 | | 17:58:11.3 | −17:44:20 | STAR | 20/01/99 | 0.263 | 74037 | 2.49 | −124 | 145 | | | | 104 |
| 18018−2802 | V1804 Sgr | 18:01:51.9 | −28:02:10 | STAR | 06/04/00 | 0.263 | 80479 | 4.80 | −95 | 105 | | | | 113 |
| 18033+2229 | | 18:03:18.3 | +22:29:38 | STAR | 15/01/00 | 0.263 | 79213 | 0.61 | 22.4 | 27.9 | 24.2 | 2 | 7 | 112 |
| 18052−2205 | | 18:05:16.9 | −22:05:42 | SFR | 21/01/99 | 0.263 | 74155 | 0.87 | −95.4 | −89.6 | −94.7 | 15 | 12 | 103 |
| 18061−1927 | | 18:06:09.6 | −19:27:56 | UNKN | 06/04/00 | 0.263 | 80481 | 2.20 | 11.3 | 26.0 | 21.7 | 59 | 124 | 103 |
| 18083−2630 | CRL2086 | 18:08:20.0 | −26:30:18 | STAR | 14/03/97 | 0.263 | 56099 | 1.95 | −128 | 88 | | | | 104 |
| 18085+0752 | XY Oph | 18:08:34.5 | +07:52:25 | STAR | 15/01/00 | 0.263 | 79215 | 0.90 | −70.6 | −62.5 | −67.9 | 10 | 10 | 112 |
| 18099+3127 | | 18:09:55.0 | +31:27:30 | STAR | 06/06/00 | 0.263 | 80485 | 1.17 | 16.3 | 29.6 | 19.2 | 5 | 22 | 112 |
| 18112−1801 | | 18:11:12.3 | −18:01:16 | UNKN | 06/04/00 | 0.263 | 80487 | 2.00 | −70 | 105 | | | | 103 |
| 18148−0440 | L 483 | 18:14:50.4 | −04:40:15 | SFR | 20/01/99 | 0.263 | 74039 | 1.34 | −2.1 | 2.1 | 0.3 | 23 | 18 | 100 |
| 18151−1208 | | 18:15:09.0 | −12:08:33 | SFR | 25/01/94 | 0.165 | 33535 | 1.47 | 28 | 33.7 | 30.3 | 33 | 48 | 105 |
| 18151−1134 | | 18:15:09.4 | −11:34:44 | SFR | 25/01/94 | 0.165 | 33546 | 1.48 | − 56 | 112 | | | | 105 |
| | | | | | 21/01/99 | 0.263 | 74163 | 0.70 | −90 | 150 | | | | |
| 18156−0653 | | 18:15:36.9 | −06:53:06 | STAR | 14/03/97 | 0.263 | 56101 | 0.92 | −142 | 74 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74291 | 1.61 | −95.9 | −88.3 | − 91.0 | 20 | 17 | |
| 18186+3143 | TU Lyr | 18:18:37.6 | +31:43:54 | STAR | 15/01/00 | 0.263 | 79219 | 0.74 | 0 | 11 | 5.9 | 9 | 33 | 118 |
| 18196−1331 | OH17.6 | 18:19:37.0 | −13:31:47 | SFR | 18/01/00 | 0.263 | 79322 | 2.38 | 23 | 31 | 27.1 | 330 | 360 | 111 |
| 18213+0335 | V2090 OPH | 18:21:22.9 | +03:35:42 | STAR | 18/01/00 | 0.263 | 79324 | 0.71 | −120 | 80 | | | | 118 |
| 18236+0706 | | 18:23:41.5 | +07:06:47 | STAR | 18/01/00 | 0.263 | 79326 | 0.76 | −30 | 250 | | | | 112 |
| 18250−0351 | | 18:25:00.4 | −03:51:49 | SFR | 14/03/97 | 0.263 | 56103 | 0.85 | −185 | 32 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74295 | 1.56 | −232 | 27 | | | | |
| 18251+0023 | | 18:25:10.5 | +00:23:18 | STAR | 18/01/00 | 0.263 | 79328 | 0.67 | −10 | 160 | | | | 112 |
| 18252−1305 | | 18:25:15.2 | −13:05:37 | STAR | 14/03/97 | 0.263 | 56105 | 1.03 | 22.7 | 65 | 27.0 | 19 | 42 | 104 |
| | | | | | 06/04/00 | 0.263 | 80489 | 2.00 | −50 | 130 | | | | |

Of the 1013 masers listed in the Arcetri catalog, 937 have an associated IRAS source. According to the classification criteria introduced in the previous section and in Appendix A, we find that the 937 masers are partitioned in the following way: 410 SFR, 460 STAR, 61 UNKN, 6 STRN. In Fig. 3 we show the IRAS color-color plot using the variables $u_4$ and $u_5$ defined in the Appendix. Note that the advantage of this classification over the more conventional two-color IRAS diagrams is that it exploits the information provided by the four far-infrared bands simultaneously. Also, sources with upper limits can be more properly treated (see Appendix). Water masers associated with SFR and STAR are well separated in this diagram. Figure 3 also indicates that the distribution of the UNKN

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 18262+0006 | VV Ser | 18:26:14.3 | +00:06:39 | SFR | 14/03/97 | 0.263 | 56107 | 0.89 | − 37 | 179 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74299 | 0.92 | − 84 | 174 | | | | |
| 18265−1517 | L379-IRS3 | 18:26:32.5 | −15:17:17 | SFR | 20/01/99 | 0.263 | 74041 | 1. 53 | −184 | 83 | −19.4 | 11 | 34 | 100 |
| 18273−0738 | | 18:27:24.0 | −07:38:57 | STAR | 14/03/97 | 0.263 | 56109 | 1.00 | −139 | 76 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74301 | 1.13 | −186 | 72 | | | | |
| 18276+0839 | V603 Oph | 18:27:39.7 | +08:39:18 | STAR | 18/01/00 | 0.263 | 79332 | 1.08 | 68 | 71 | 69.8 | 170 | 170 | 112 |
| 18303−0519 | | 18:30:20.4 | −05:19:42 | STAR | 14/03/97 | 0.263 | 56111 | 1.04 | − 93 | 123 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74307 | 0.72 | −141 | 118 | | | | |
| 18306−0835 | G23.27+0.08 | 18:30:40.0 | −08:35:53 | SFR | 22/04/93 | 0.329 | 28393 | 0.49 | 75.7 | 82.7 | 77.0 | 8.1 | 17.9 | 119 |
| 18308−0503 | | 18:30:50.8 | −05:03:26 | SFR | 18/01/93 | 0.329 | 26667 | 1.41 | 28.2 | 67.7 | 53.7 | 45 | 120 | 103 |
| | | | | | 22/01/99 | 0.263 | 74305 | 0.82 | −128 | 129 | | | | |
| 18317−0845 | | 18:31:45.8 | −08:45:47 | SFR | 14/03/97 | 0.263 | 56113 | 0.92 | −112 | 103 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74309 | 0.78 | −161 | 98 | | | | |
| 18317−0513 | | 18:31:46.1 | −05:13:23 | SFR | 20/01/94 | 0.165 | 33053 | 0.98 | 42.5 | 46.8 | 44.6 | 44 | 38 | 105 |
| | | | | | 19/03/99 | 0.263 | 74870 | 0.64 | 41.5 | 63.8 | 44.9 | 68 | 85 | |
| 18321−0854 | | 18:32:07.7 | −08:54:05 | UNKN | 19/01/93 | 0.329 | 26878 | 1.19 | 76.8 | 81.1 | 79 | 11 | 13.2 | 103 |
| | | | | | 06/04/00 | 0.263 | 80491 | 1.57 | 54.8 | 80.6 | 78.9 | 9 | 27 | |
| 18324−0820 | | 18:32:27.2 | −08:20:23 | SFR | 14/03/97 | 0.263 | 56115 | 0.86 | −149 | 67 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74315 | 0.64 | −196 | 62 | | | | |
| 18341+0005 | | 18:34:07.3 | +00:05:28 | STAR | 18/01/00 | 0.263 | 79334 | 0.69 | −50 | 150 | | | | 112 |
| 18355+0227 | | 18:35:34.5 | +02:27:17 | STAR | 18/01/00 | 0.263 | 79336 | 0.63 | 0 | 150 | | | | 112 |
| 18356−0951 | | 18:35:40.3 | −09:51:42 | STAR | 14/03/97 | 0.263 | 56117 | 0.91 | −139 | 75 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74319 | 0.61 | −188 | 70 | | | | |
| 18361−0627 | | 18:36:10.5 | −06:27:44 | SFR | 06/12/93 | 0.165 | 31756 | 1.62 | 82.1 | 93.4 | 91.1 | 10 | 26 | 101 |
| | | | | | 22/01/99 | 0.263 | 74321 | 0.59 | 88.3 | 95.4 | 92.0 | 4 | 6 | |
| 18362+0538 | | 18:36:14.7 | +05:38:41 | STAR | 18/01/00 | 0.263 | 79338 | 0.68 | −60 | 110 | | | | 112 |
| 18372−0541 | | 18:37:15.5 | −05:41:33 | SFR | 18/01/94 | 0.329 | 32827 | 1.03 | −168 | 169 | | | | 120 |
| | | | | | 19/03/99 | 0.263 | 74874 | 0.72 | 20.3 | 27.7 | 23.4 | 10 | 19 | |
| 18397+1738 | IRC+20370 | 18:39:41.6 | +17:38:16 | STAR | 19/01/99 | 0.263 | 73926 | 0 .63 | −140 | 100 | | | | 104 |
| 18397+0758 | | 18:39:43.9 | +07:58:13 | STAR | 18/01/00 | 0.263 | 79340 | 0.60 | −200 | 0 | | | | 112 |
| 18403−0417 | | 18:40:19.4 | −04:17:01 | SFR | 24/04/93 | 0.329 | 28787 | 1.02 | −168 | 169 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56119 | 0.85 | −132 | 83 | | | | |
| | | | | | 22/01/99 | 0.263 | 74323 | 0.59 | −129 | 131 | | | | |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 18403−0445 | | 18:40:20.7 | −04:45:01 | SFR | 22/01/99 | 0.263 | 74325 | 0.63 | −129 | 130 | | | | 103 |
| | | | | | 05/04/00 | 0.263 | 80378 | 2.50 | −100 | 90 | | | | |
| 18408+0730 | | 18:40:53.8 | +07:30:11 | STAR | 18/01/00 | 0.263 | 79342 | 0.60 | −50 | 120 | | | | 112 |
| 18414−0339 | | 18:41:28.9 | −03:39:52 | SFR | 28/01/93 | 0.329 | 27739 | 0.77 | 99 | 140 | 138 | 13 | 35 | 103 |
| | | | | | 07/05/93 | 0.330 | 28999 | 0.94 | 111.1 | 145.6 | 135 | 8 | 45 | |
| | | | | | 22/01/99 | 0.263 | 74329 | 0.62 | 104 | 127 | 125 | 13 | 30 | |
| 18415+0404 | | 18:41:35.7 | +04:04:14 | STAR | 18/01/00 | 0.263 | 79344 | 0.58 | −70 | 100 | | | | 112 |
| 18421−0404 | | 18:42:10.1 | −04:04:38 | SFR | 28/01/93 | 0.329 | 27741 | 3.0 | −168 | 169 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56121 | 0.87 | −45 | 171 | | | | |
| | | | | | 22/01/99 | 0.263 | 74331 | 0.61 | −94 | 166 | | | | |
| 18431−0312 | | 18:43.09.5 | −03:12:37 | SFR | 28/01/93 | 0.329 | 27743 | 1.17 | −168 | 169 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56123 | 0.22 | −137 | 80 | | | | |
| | | | | | 05/04/00 | 0.263 | 80380 | 2.39 | −100 | 105 | | | | |
| 18432+1343 | | 18:43:17.3 | +13:43:08 | STAR | 18/01/00 | 0.263 | 79346 | 0.54 | 45.0 | 49.1 | 47.0 | 3 | 5 | 117 |
| 18444+0734 | | 18:44:24.1 | +07:34:53 | STAR | 18/01/00 | 0.263 | 79348 | 0.61 | 33.4 | 40.4 | 35.8 | 5 | 10 | 112 |
| 18449−0158 | | 18:44:59.5 | −01:58:47 | SFR | 16/01/93 | 0.329 | 26622 | 1.21 | 99.8 | 106.5 | 101.7 | 6 | 29 | 104,103 |
| | | | | | 14/03/97 | 0.263 | 56125 | 0.88 | −111 | 103 | | | | |
| | | | | | 21/01/99 | 0.263 | 74171 | 0.57 | −140 | 80 | | | | |
| 18454−0136 | | 18:45:28.0 | −01:36:46 | SFR | 14/03/97 | 0.263 | 56127 | 0.81 | −127 | 89 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74175 | 0.56 | −174 | 103 | | | | |
| 18487+0617 | | 18:48:47.4 | +06:17:56 | STAR | 18/01/00 | 0.263 | 79350 | 0.64 | 70 | 190 | | | | 112 |
| 18513+0235 | | 18:51:22.9 | +02:35:13 | STAR | 19/01/00 | 0.263 | 79454 | 0.77 | 30 | 130 | | | | 116,117 |
| 18525+0210 | | 18:52:33.5 | +02:10:48 | STAR | 19/01/00 | 0.263 | 79456 | 0.69 | 30 | 130 | | | | 112 |
| 18530+0215 | | 18:53:03.0 | +02:15:13 | SFR | 15/10/93 | 0.329 | 30397 | 1.90 | −167 | 169 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56129 | 0.81 | −151 | 64 | | | | |
| | | | | | 21/01/99 | 0.263 | 74179 | 0.63 | −198 | 60 | | | | |
| 18542+0940 | | 18:54:13.4 | +09:40:01 | STAR | 19/01/00 | 0.263 | 79458 | 0.60 | −100 | 0 | | | | 112 |
| 18551+1345 | | 18:55:08.8 | +13:45:05 | STAR | 14/03/97 | 0.263 | 56131 | 0.85 | − 90 | 126 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74181 | 0.55 | −137 | 121 | | | | |
| 18553+0414 | | 18:55:23.8 | +04:14:00 | SFR | 21/01/99 | 0.263 | 74183 | 0.61 | 0.8 | 19.6 | 10.5 | 50 | 140 | 103 |
| 18554+0231 | | 18:55:25.6 | +02:31:10 | STAR | 19/01/00 | 0.263 | 79460 | 0.58 | −100 | 0 | | | | 112 |
| 18561+1642 | EU Aql | 18:56:09.0 | +16:42:43 | STAR | 19/01/00 | 0.263 | 79462 | 0.52 | −40 | 100 | | | | 111 |

sources overlaps that of the SFR-type, indicating a similar nature. On the other hand, the six STRN sources are equally distributed between STAR and SFR.

The distribution of the 937 sources with IRAS counterpart in the [60–12] vs. [25–12] diagram is displayed in Fig. 4. IRAS sources associated with SFR are

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 18563+0428 | | 18:56:23.8 | +04:28:03 | SFR | 16/01/93 | 0.329 | 26626 | 1.50 | 15.5 | 22.0 | 18.8 | 140 | 160 | 103 |
| | | | | | 21/01/99 | 0.263 | 74185 | 0.68 | 14.5 | 30.2 | 18.5 | 240 | 240 | |
| 18566+0408 | | 18:56:40.7 | +04:08:03 | SFR | 21/01/99 | 0.263 | 74187 | 0.71 | −129 | 129 | | | | 102 |
| 18568+0550 | | 18:56:52.9 | +05:50:28 | STAR | 19/01/00 | 0.263 | 79464 | 0.57 | −160 | 0 | | | | 112 |
| 18572+0618 | | 18:57:13.7 | +06:18:48 | UNKN | 19/01/00 | 0.263 | 79466 | 0.61 | −100 | 100 | | | | 112 |
| 18578+0831 | | 18:57:53.4 | +08:31:15 | STAR | 19/01/00 | 0.263 | 79468 | 0.59 | 0 | 100 | | | | 112 |
| 19007+1652 | | 19:00:46.8 | +16:52:02 | STAR | 19/01/00 | 0.263 | 79470 | 0.48 | −50 | 50 | | | | 112 |
| 19008+0726 | IRC+10401 | 19:00:52.8 | +07:26:15 | STAR | 21/01/99 | 0.263 | 73928 | 0 .61 | −140 | 90 | | | | 104 |
| 19010+1307 | | 19:01:02.4 | +13:07:29 | STAR | 19/01/00 | 0.263 | 79474 | 0.55 | −60 | 140 | | | | 112 |
| 19012+0505 | | 19:01:15.5 | +05:05:18 | SFR | 14/03/97 | 0.263 | 56133 | 0.90 | 33.1 | 35.5 | 34.0 | 4 | 3 | 104 |
| | | | | | 21/01/99 | 0.263 | 74189 | 0.67 | 35.0 | 46.7 | 37.3 | 4 | 6 | |
| 19035+0451 | | 19:03:30.4 | +04:51:04 | STAR | 19/01/00 | 0.263 | 79476 | 0.65 | 80 | 94 | 83.7 | 8 | 24 | 112 |
| 19041+1734 | | 19:04:10.8 | +17:34:47 | STAR | 19/01/00 | 0.263 | 79478 | 0.50 | −50 | 90 | | | | 112 |
| 19052+0922 | | 19:05:15.8 | +09:22:28 | STAR | 19/01/00 | 0.263 | 79484 | 0.53 | 5.6 | 12.4 | 10.1 | 5 | 11 | 112 |
| 19054+0419 | | 19:05:26.2 | +04:19:00 | STAR | 26/01/00 | 0.263 | 80040 | 1.14 | −150 | 70 | | | | 112 |
| 19057+0141 | | 19:05:46.4 | +01:41:37 | STAR | 25/01/00 | 0.263 | 79918 | 0.63 | −55 | 140 | | | | 112 |
| 19068+1127 | | 19:06:50.2 | +11:27:52 | STAR | 25/01/00 | 0.263 | 79920 | 0.56 | −11.2 | −0.8 | −8.3 | 7 | 23 | 112 |
| | OH 42.75 | 19:06:51.0 | +08:04:50 | | 25/01/00 | 0.263 | 79922 | 0.59 | 5.0 | 13.1 | 9.9 | 45 | 120 | 111 |
| 19071+2934 | V Lyr | 19:07:07.0 | +29:34:42 | STAR | 14/03/97 | 0.263 | 56135 | 0.86 | −14.2 | −11.4 | −12.6 | 2 | 4 | 104 |
| | | | | | 22/01/99 | 0.263 | 74333 | 0.53 | −17.2 | −10.2 | −14.2 | 3 | 12 | |
| 19081+0322 | | 19:08:06.5 | +03:22:04 | STAR | 25/01/00 | 0.263 | 79924 | 0.63 | 0 | 100 | | | | 112 |
| 19081+0903 | | 19:08:09.7 | +09:03:28 | SFR | 24/04/93 | 0.329 | 28752 | 1.16 | −124 | 60 | 10.3 | 140 | 920 | 102 |
| | | | | | 22/01/99 | 0.263 | 74335 | 0.75 | − 130 | 130 | 9.4 | 320 | 1770 | |
| 19085+0755 | | 19:08:30.6 | +07:55:12 | SFR | 25/01/00 | 0.263 | 79926 | 0.53 | 7.2 | 11.7 | 9.8 | 4 | 16 | 112 |
| 19087+0900 | | 19:08:42.0 | +09:00:05 | SFR | 22/01/99 | 0.263 | 74337 | 0.59 | −63 | 13 | 9.3 | 21 | 74 | 103 |
| 19099+6711 | U Dra | 19:09:57.9 | +67:11:36 | STAR | 25/01/00 | 0.263 | 79928 | 0.63 | −80 | 80 | | | | 111 |
| 19146+0959 | IRC+10414 | 19:14:39.5 | +09:59:17 | STAR | 25/01/00 | 0.263 | 79930 | 0.51 | −115 | 95 | | | | 110 |
| 19168+0814 | | 19:16:51.1 | +08:14:23 | STAR | 25/01/00 | 0.263 | 79932 | 0.52 | −100 | 100 | | | | 112 |
| 19175+0958 | | 19:17:32.0 | +09:58:35 | STAR | 19/01/00 | 0.263 | 79486 | 0.62 | −55 | 160 | | | | 112 |
| 19175+1042 | | 19:17:34.9 | +10:42:26 | STAR | 19/01/00 | 0.263 | 79488 | 0.59 | −55 | 160 | | | | 112 |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 19184+1055 | | 19:18:24.2 | +10:55:14 | STAR | 19/01/00 | 0.263 | 79490 | 0.59 | 0 | 100 | | | | 112 |
| 19206+2121 | | 19:20:39.0 | +21:21:05 | STAR | 19/01/00 | 0.263 | 79492 | 0.50 | 65 | 140 | | | | 112 |
| 19214+0513 | | 19:21:29.8 | +05:13:07 | STAR | 19/01/00 | 0.263 | 79494 | 0.59 | −100 | 100 | | | | 112 |
| 19227+1700 | | 19:22:45.6 | +17:00:55 | STAR | 19/01/00 | 0.263 | 79496 | 0.68 | −45 | 110 | | | | 116 |
| 19229+1708 | | 19:22:58.5 | +17:08:49 | STAR | 19/01/00 | 0.263 | 79498 | 0.65 | 24.3 | 45.7 | 27.8 | 17 | 62 | 112 |
| 19248+1441 | | 19:24:50.9 | +14:41:16 | STAR | 19/01/00 | 0.263 | 79502 | 0.63 | −60 | 100 | | | | 112 |
| 19248+1122 | IRC+10421 | 19:24:52.8 | +11:22:55 | STAR | 18/01/00 | 0.263 | 79356 | 0.58 | 38.2 | 41.8 | 40.3 | 3 | 11 | 112 |
| 19258+1111 | | 19:25:51.7 | +11:11:17 | STAR | 18/01/00 | 0.263 | 79358 | 0.65 | −100 | 100 | | | | 112 |
| 19259+0510 | | 19:25:54.0 | +05:10:15 | STAR | 18/01/00 | 0.263 | 79360 | 0.65 | −100 | 100 | | | | 112 |
| 19268+1754 | | 19:26:49.4 | +17:54:54 | SFR | 14/03/97 | 0.263 | 56137 | 0.27 | − 85 | 131 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74339 | 1.17 | −129 | 130 | | | | |
| 19269+0813 | | 19:26:57.0 | +08:13:06 | STAR | 18/01/00 | 0.263 | 79362 | 0.59 | −100 | 80 | | | | 112 |
| 19270+2239 | | 19:27:03.2 | +22:39:30 | STAR | 18/01/00 | 0.263 | 79364 | 0.68 | −100 | 100 | | | | 117 |
| 19271+1354 | | 19:27:11.9 | +13:54:30 | STAR | 18/01/00 | 0.263 | 79366 | 0.58 | 50 | 58 | 52.0 | 6 | 19 | 112 |
| 19274+0919 | | 19:27:27.7 | +09:19:07 | STAR | 18/01/00 | 0.263 | 79368 | 0.80 | −90 | 90 | | | | 112 |
| 19276+1500 | | 19:27:36.2 | +15:00:28 | STAR | 18/01/00 | 0.263 | 79370 | 0.68 | −70 | 100 | | | | 112 |
| 19277+0947 | | 19:27:44.9 | +09:47:35 | STAR | 18/01/00 | 0.263 | 79372 | 0.85 | −40 | 100 | | | | 112 |
| 19291+0502 | | 19:29:08.5 | +05:02:11 | STAR | 18/01/00 | 0.263 | 79374 | 0.98 | −100 | 80 | | | | 112 |
| 19296+4331 | UV Cyg | 19:29:37.9 | +43:31:45 | STAR | 18/01/00 | 0.263 | 79376 | 0.55 | 7.3 | 29 | 23.9 | 11 | 18 | 115 |
| 19305+2410 | | 19:30:33.8 | +24:10:24 | STAR | 18/01/00 | 0.263 | 79380 | 0.69 | −80 | 80 | | | | 112 |
| 19307+1338 | | 19:30:42.8 | +13:38:09 | STAR | 18/01/00 | 0.263 | 79382 | 1.02 | 37 | 44 | 41 | 14 | 21 | 117 |
| 19312+1130 | | 19:31:13.2 | +11:30:28 | STAR | 18/01/00 | 0.263 | 79384 | 1.11 | −40 | 100 | | | | 112 |
| 19316+0919 | | 19:31:38.8 | +09:19:30 | STAR | 25/01/00 | 0.263 | 79934 | 0.90 | −15 | 110 | | | | 112 |
| 19319+2214 | | 19:31:54.8 | +22:14:38 | STAR | 25/01/00 | 0.263 | 79936 | 0.90 | −45 | 60 | | | | 112 |
| 19321+2757 | IRC+30374 | 19:32:08.8 | +27:57:30 | STAR | 14/03/97 | 0.263 | 56139 | 0.94 | −138 | 78 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74341 | 0.50 | −185 | 73 | | | | |
| 19325+1925 | | 19:32:33.8 | +19:25:04 | SFR | 14/03/97 | 0.263 | 56141 | 0.86 | −120 | 97 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74343 | 0.52 | −129 | 129 | | | | |
| 19327+0903 | | 19:32:46.7 | +09:03:20 | STAR | 05/04/00 | 0.263 | 80382 | 1.38 | 38.9 | 44.5 | 42.4 | 8 | 11 | 112 |
| 19333+1918 | | 19:33:18.7 | +19:18:24 | STAR | 20/02/00 | 0.263 | 79940 | 0.76 | −26.6 | −24.9 | −25.7 | 4 | 3 | 112 |
| 19338+2301 | | 19:33:49.4 | +23:01:43 | UNKN | 19/01/99 | 0.263 | 73930 | 0.54 | 1.9 | 4.8 | 3.4 | 4 | 4 | 104 |
| 19351+1922 | | 19:35:08.3 | +19:22:03 | STAR | 25/01/00 | 0.263 | 79942 | 0.85 | −10 | 100 | | | | 116 |
| 19352+1914 | | 19:35:13.7 | +19:14:03 | STAR | 25/01/00 | 0.263 | 79944 | 0.78 | −100 | 30 | | | | 112 |

distributed in the upper part of the plane. The box in the upper right corresponds to the color criteria adopted by Wood & Churchwell (1989) to identify ultracompact HII regions. The majority of the SFR-type sources are located within these boundaries, consistent with the idea that $H_2O$ masers are active preferentially during the earliest phases of the evolution of bright, massive stars.

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 19361−1658 | AFGL 2425 | 19:36:09.0 | −16:58:50 | STAR | 18/01/00 | 0.263 | 79354 | 0.98 | 58.8 | 62.8 | 61.7 | 6 | 16 | 111 |
| | BG Cyg | 19:36:36.9 | +28:23:51 | | 25/01/00 | 0.263 | 79946 | 0.78 | −100 | 15 | | | | 111 |
| 19366+1149 | SV Aql | 19:36:40.8 | +11:49:50 | STAR | 25/01/00 | 0.263 | 79948 | 0.80 | −52.3 | −49.1 | −50.4 | 4 | 4 | 112 |
| 19368+2239 | | 19:36:49.7 | +22:39:37 | SFR | 31/03/99 | 0.263 | 75214 | 0.79 | 32.2 | 40.5 | 36.6 | 7 | 8 | 120 |
| 19371+2855 | | 19:37:07.3 | +28:55:41 | STAR | 25/01/00 | 0.263 | 79950 | 0.83 | −100 | 100 | | | | 112 |
| 19374+2359 | | 19:37:28.7 | +23:59:27 | STAR | 14/03/97 | 0.263 | 56145 | 0.82 | −148 | 68 | | | | 104 |
| | | | | | 22/01/99 | 0.263 | 74345 | 0.50 | −194 | 64 | | | | |
| 19378+1256 | V455 Aql | 19:37:53.4 | +12:56:08 | STAR | 25/01/00 | 0.263 | 79952 | 0.84 | −160 | 10 | | | | 112 |
| 19382+3400 | | 19:38:14.8 | +34:00:15 | STAR | 25/01/00 | 0.263 | 79954 | 0.81 | −100 | 35 | | | | 112 |
| 19394+4840 | V391 Cyg | 19:39:26.0 | +48:40:26 | STAR | 25/01/00 | 0.263 | 79956 | 0.77 | −25 | −20 | − 22.5 | 76 | 83 | 111 |
| 19399+2258 | | 19:39:54.9 | +22:58:55 | STAR | 25/01/00 | 0.263 | 79958 | 0.84 | −100 | 100 | | | | 116,117 |
| 19412+0337 | IRC+00450 | 19:41:15.3 | +03:37:15 | STAR | 25/01/00 | 0.263 | 79960 | 1.20 | −41.3 | −35.9 | −39.0 | 13 | 46 | 112 |
| 19425+3323 | | 19:42:35.3 | +33:23:17 | STAR | 25/01/00 | 0.263 | 79962 | 0.87 | −100 | 100 | | | | 112 |
| 19437+2408 | | 19:43:46.3 | +24:08:10 | UNKN | 25/01/00 | 0.263 | 79964 | 0.91 | −100 | 100 | | | | 117 |
| 19451+1628 | | 19:45:10.5 | +16:28:05 | STAR | 25/01/00 | 0.263 | 79966 | 1.27 | −100 | 100 | | | | 112 |
| 19453+1917 | | 19:45:22.1 | +19:17:20 | STAR | 25/01/00 | 0.263 | 79968 | 1.17 | −70 | 90 | | | | 112 |
| 19454+2536 | | 19:45:25.5 | +25:36:01 | STAR | 25/01/00 | 0.263 | 79970 | 1.14 | −60 | 160 | | | | 112 |
| 19454+0355 | | 19:45:25.9 | +03:55:04 | STAR | 26/01/00 | 0.263 | 80044 | 1.50 | −80 | 100 | | | | 117 |
| 19455+0920 | | 19:45:32.3 | +09:20:40 | STAR | 14/03/97 | 0.263 | 56147 | 0.83 | −81 | 136 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74195 | 0.63 | −128 | 130 | | | | |
| 19466+2751 | | 19:46:35.9 | +27:51:59 | STAR | 26/01/00 | 0.263 | 80046 | 0.70 | −2.8 | 5.0 | 3.3 | 15 | 33 | 116 |
| 19471+2641 | | 19:47:06.1 | +26:41:16 | SFR | 14/03/97 | 0.263 | 56149 | 0.77 | 21.1 | 37.5 | 23.8 | 11 | 27 | 104 |
| | | | | | 21/01/99 | 0.263 | 74197 | 0.53 | −160 | 50 | | | | |
| 19471+2944 | | 19:47:10.8 | +29:44:56 | STAR | 26/01/00 | 0.263 | 80048 | 0.70 | −100 | 0 | | | | 112 |
| 19479+2111 | | 19:47:56.5 | +21:11:24 | STAR | 26/01/00 | 0.263 | 80050 | 0.77 | −55 | 95 | | | | 112 |
| 19516+2217 | | 19:51:40.1 | +22:17:46 | STAR | 26/01/00 | 0.263 | 80054 | 0.80 | −60 | 80 | | | | 112 |
| 19519+2527 | | 19:51:57.5 | +25:27:10 | STAR | 26/01/00 | 0.263 | 80056 | 0.78 | −19 | −13 | −16 | 10 | 24 | 117 |
| 19522+2653 | | 19:52:12.7 | +26:53:43 | STAR | 26/01/00 | 0.263 | 80058 | 0.79 | −100 | 0 | | | | 112 |
| 19535+2157 | | 19:53:31.5 | +21:57:29 | STAR | 26/01/00 | 0.263 | 80060 | 0.76 | −55 | 100 | | | | 112 |
| 19547+1848 | RX Sge | 19:54:42.5 | +18:48:00 | STAR | 26/01/00 | 0.263 | 80062 | 0.74 | −50 | 100 | | | | 112 |
| 19560+3135 | | 19:56:05.5 | +31:35:57 | SFR | 31/03/99 | 0.263 | 75224 | 0.77 | −74.4 | −63.5 | −70.9 | 7 | 29 | 120 |
| 19564−0801 | RS Aql | 19:56:24.5 | −08:01:15 | STAR | 27/12/99 | 0.263 | 79002 | 0.98 | −100 | 120 | | | | 111 |
| 19565+3140 | | 19:56:32.0 | +31:40:00 | STAR | 27/12/99 | 0.263 | 79004 | 0.53 | −110 | 110 | | | | 112 |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.$^{(a)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 19573+2204 | | 19:57:19.1 | +22:04:49 | STAR | 27/12/99 | 0.263 | 79006 | 0.49 | −120 | 110 | | | | 112 |
| 19575+1143 | | 19:57:34.4 | +11:43:27 | STAR | 27/12/99 | 0.263 | 79008 | 0.55 | −100 | 100 | | | | 112 |
| 19579+3223 | | 19:57:54.0 | +32:23:50 | STAR | 27/12/99 | 0.263 | 79010 | 0.51 | 0 | 22 | 16.6 | 3 | 17 | 112 |
| 19579+2926 | | 19:57:54.3 | +29:26:13 | STAR | 17/01/00 | 0.263 | 79221 | 3.65 | −100 | 100 | | | | 112 |
| 19589+3320 | | 19:58:57.0 | +33:20:47 | SFR | 14/03/97 | 0.263 | 56151 | 0.84 | −136 | 81 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74199 | 0.52 | −182 | 75 | | | | |
| 19592+3302 | | 19:59:13.7 | +33:02:47 | SFR | 19/01/94 | 0.164 | 32903 | 1.12 | −148 | 20 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56175 | 0.24 | − 70 | 147 | | | | |
| | | | | | 21/01/99 | 0.263 | 74201 | 0.51 | −130 | 129 | | | | |
| 20010+3011 | | 20:01:05.2 | +30:11:45 | STAR | 14/03/97 | 0.263 | 56177 | 1.14 | 17.8 | 26.5 | 22.6 | 12 | 17 | 104 |
| | | | | | 20/01/99 | 0.263 | 74057 | 0.40 | 16.3 | 25.6 | 18.6 | 4 | 14 | |
| 20011+1752 | G57.27−6.92 | 20:01:10.4 | +17:52:02 | STAR | 17/01/00 | 0.263 | 79223 | 1.02 | −100 | 100 | | | | 112 |
| 20015+3019 | V719 Cyg | 20:01:34.9 | +30:19:24 | STAR | 17/01/00 | 0.263 | 79225 | 0.8 | 14 | 28 | 16.4 | 19 | 75 | 112 |
| 20024+1727 | | 20:02:24.6 | +17:27:22 | STAR | 17/01/00 | 0.263 | 79227 | 0.65 | −100 | 100 | | | | 112 |
| 20028+3910 | | 20:02:48.0 | +39:10:03 | STAR | 14/03/97 | 0.263 | 56179 | 0.33 | −93 | 123 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74059 | 0.52 | −141 | 119 | | | | |
| 20072+3116 | | 20:07:15.0 | +31:16:52 | STAR | 19/01/99 | 0.263 | 73932 | 0.75 | −80 | 179 | | | | 104 |
| 20109+3205 | V557 Cyg | 20:10:57.9 | +32:05:39 | STAR | 05/04/00 | 0.263 | 80384 | 1.07 | 51.1 | 55.3 | 53.3 | 8 | 12 | 111 |
| 20115+0844 | | 20:11:33.0 | +08:44:14 | STAR | 17/01/00 | 0.263 | 79233 | 0.70 | −100 | 120 | | | | 112 |
| 20125+0856 | R Del | 20:12:29.9 | +08:56:08 | STAR | 17/01/00 | 0.263 | 79235 | 0.78 | −35.3 | −27.8 | −31.5 | 71 | 61 | 111,114 |
| 20140+3620 | | 20:14:01.4 | +36:20:48 | STAR | 17/01/00 | 0.263 | 79237 | 0.67 | −100 | 100 | | | | 112 |
| 20153+2057 | | 20:15:23.5 | +20:57:45 | STAR | 17/01/00 | 0.263 | 79239 | 0.60 | −100 | 120 | | | | 112 |
| 20160+0725 | | 20:16:02.4 | +07:25:40 | STAR | 17/01/00 | 0.263 | 79241 | 0.93 | −90 | 130 | | | | 117 |
| 20216+4107 | | 20:21:37.4 | +41:07:56 | SFR | 19/01/94 | 0.165 | 32951 | 0.86 | −86 | 83 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56181 | 1.06 | −137 | 78 | | | | |
| | | | | | 20/01/99 | 0.263 | 74063 | 0.53 | −186 | 73 | | | | |
| 20248+7505 | UU Dra | 20:24:53.8 | +75:05:24 | STAR | 17/01/00 | 0.263 | 79245 | 0.96 | −120 | 100 | | | | 115 |
| 20280+2631 | | 20:28:00.7 | +26:31:25 | STAR | 17/01/00 | 0.263 | 79247 | 0.67 | −90 | 120 | | | | 112 |
| 20300+3847 | | 20:30:01.4 | +38:47:09 | SFR | 14/03/97 | 0.263 | 56183 | 1.04 | −144 | 73 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74065 | 0.52 | −192 | 68 | | | | |

The Medicina radiotelescope has been extensively used for water maser searches. In Fig. 5 we show the distribution of the 5074 independent positions in our database, using the same criterion of considering two positions independent if separated by more than 1 arcmin. The total sky coverage is small, with a noticeable higher coverage toward the galactic plane. Of the 5074 centers observed with the Medicina antenna, 1013 are known to be

**Table 1.** continued

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 20306+3749 | | 20:30:41.8 | +37:49:20 | SFR | 19/03/99 | 0.263 | 74914 | 0.89 | −94.3 | −78.2 | −89.1 | 37 | 171 | 120 |
| 20311+4222 | | 20:31:09.3 | +42:22:39 | STAR | 14/03/97 | 0.263 | 56185 | 1.04 | −81 | 135 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74067 | 0.11 | −128 | 130 | | | | |
| 20350+4126 | | 20:35:04.4 | +41:26:02 | SFR | 22/04/93 | 0.329 | 28364 | 0.97 | −168 | 167 | | | | 104 |
| | | | | | 14/03/97 | 0.263 | 56187 | 1.03 | −86 | 131 | | | | |
| | | | | | 20/01/99 | 0.263 | 74069 | 0.45 | −129 | 129 | | | | |
| 20351+3450 | | 20:35:09.9 | +34:50:37 | STAR | 17/01/00 | 0.263 | 79249 | 0.70 | −100 | 120 | | | | 112 |
| 20386+6751 | L1157 | 20:38:39.3 | +67:51:36 | SFR | 13/03/97 | 0.263 | 56063 | 1.24 | −146 | 70 | | | | 104,109 |
| | | | | | 07/05/97 | 0.263 | 59283 | 0.88 | −145 | 69 | | | | |
| | | | | | 01/07/97 | 0.263 | 60663 | 1.03 | −160 | 109 | | | | |
| | | | | | 08/04/98 | 0.132 | 70955 | 1.52 | −40 | 67 | | | | |
| | | | | | 20/01/99 | 0.263 | 74071 | 0.31 | −154 | 105 | | | | |
| 20396+4757 | | 20:39:41.8 | +47:57:45 | STAR | 14/03/97 | 0.263 | 56189 | 1.06 | −60 | 156 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74075 | 0.52 | −107 | 151 | | | | |
| 20403+3700 | | 20:40:23.3 | +37:00:51 | STAR | 17/01/00 | 0.263 | 79252 | 0.72 | −63.6 | −56.2 | −59.3 | 6 | 9 | 112 |
| 20406+2953 | | 20:40:41.5 | +29:53:18 | STRN | 14/03/97 | 0.263 | 56191 | 1.50 | −111 | 106 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74077 | 0.51 | −158 | 100 | | | | |
| 20417+3759 | DR Cyg | 20:41:46.9 | +37:59:02 | STAR | 05/04/00 | 0.263 | 80386 | 1.11 | 11.7 | 14.0 | 12.9 | 100 | 74 | 111 |
| 21027+5309 | | 21:02:43.4 | +53:09:04 | STAR | 14/03/97 | 0.263 | 56193 | 0.69 | −140 | 77 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74079 | 0.47 | −187 | 72 | | | | |
| 21086+5238 | IRC+50362 | 21:08:39.2 | +52:38:44 | STAR | 24/01/00 | 0.263 | 79824 | 0.61 | −13.5 | −8.3 | −11.4 | 3 | 6 | 110 |
| 21088+6817 | T Cep | 21:08:51.9 | +68:17:24 | STAR | 13/03/97 | 0.263 | 56065 | 1.28 | −101 | 115 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74205 | 0.46 | −148 | 110 | | | | |
| 21106+4712 | | 21:10:36.0 | +47:12:01 | SFR | 19/01/99 | 0.263 | 73936 | 0.73 | −130 | 129 | | | | 107 |
| 21115+5953 | | 21:11:30.6 | +59:53:24 | STAR | 13/03/97 | 0.263 | 56067 | 2.42 | −112 | 103 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74207 | 0.51 | −161 | 98 | | | | |
| 21208+7737 | GH Cep | 21:20:42.0 | +77:37:47 | STAR | 24/01/00 | 0.263 | 79826 | 0.54 | 34.6 | 37.2 | 35.9 | 3 | 7 | 111 |
| 21305+2118 | | 21:30:33.0 | +21:18:23 | STAR | 07/05/97 | 0.263 | 59289 | 0.91 | −119 | 98 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74209 | 0.49 | −166 | 93 | | | | |
| 21358+7823 | S Cep | 21:35:52.2 | +78:23:59 | STAR | 13/03/97 | 0.263 | 56069 | 1.05 | −159 | 57 | | | | 104 |
| | | | | | 21/01/99 | 0.263 | 74211 | 0.39 | −207 | 52 | | | | |

| Source | Other | RA (1950) | DEC (1950) | Class | Date | $\Delta V$ (km s$^{-1}$) | Scan | rms (Jy) | $V_{\rm min}$ (km s$^{-1}$) | $V_{\rm max}$ (km s$^{-1}$) | $V_{\rm peak}$ (km s$^{-1}$) | $F_\nu^{\rm peak}$ (Jy) | $\int F_\nu {\rm d}V$ (Jy km s$^{-1}$) | Ref.[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 21419+5833 | MU Cep | 21:41:58.0 | +58:33:03 | STAR | 24/01/00 | 0.263 | 79828 | 0.58 | −80 | 130 | | | | 113,114 |
| 21426+1228 | TU Peg | 21:42:39.0 | +12:28:00 | STAR | 24/01/00 | 0.263 | 79830 | 0.62 | 8.0 | 13.5 | 10.3 | 8 | 13 | 111 |
| 21576+3259 | WX Peg | 21:57:37.3 | +32:59:23 | STAR | 24/01/00 | 0.263 | 79832 | 0.53 | −140 | 60 | | | | 112 |
| 22097+5647 | CU Cep | 22:09:44.9 | +56:47:27 | STAR | 27/12/99 | 0.263 | 79012 | 0.59 | −160 | 60 | | | | 111 |
| 22180+3225 | YZ Peg | 22:18:05.6 | +32:25:32 | STAR | 27/12/99 | 0.263 | 79014 | 0.57 | −130 | 110 | | | | 112 |
| 22241+6005 | | 22:24:07.1 | +60:05:31 | STAR | 13/03/97 | 0.263 | 56071 | 2.06 | −111 | 105 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74087 | 0.51 | −158 | 99 | | | | |
| 22267+6244 | | 22:26:46.7 | +62:44:22 | SFR | 19/03/99 | 0.263 | 74924 | 0.64 | −2.0 | 5.9 | 1.5 | 5 | 6 | 120 |
| 22343+7501 | L1251A | 22:34:21.9 | +75:01:32 | SFR | 20/01/99 | 0.263 | 74089 | 0.45 | −13.3 | −9.3 | −11.2 | 24 | 21 | 100,107,108 |
| | | | | | 05/04/00 | 0.263 | 80388 | 1.08 | −105 | 90 | | | | |
| 22376+7455 | | 22:37:36.0 | +74:55:00 | SFR | 19/01/99 | 0.263 | 73940 | 0.56 | −125 | 133 | 2.1 | 9 | 22 | 106 |
| 22453+6146 | L1211 | 22:45:23.2 | +61:46:07 | SFR | 13/03/97 | 0.263 | 56073 | 1.93 | −95 | 122 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74093 | 0.46 | −142 | 117 | | | | |
| 22480+6002 | | 22:48:00.9 | +60:02:01 | STAR | 13/03/97 | 0.263 | 56075 | 2.12 | −53.2 | −42.3 | −50.2 | 48 | 110 | 120 |
| | | | | | 20/01/99 | 0.263 | 74095 | 0.59 | −60.7 | −43.3 | −50.3 | 160 | 290 | |
| 22510+3614 | IRC+40525 | 22:51:00.0 | +36:14:26 | STAR | 27/12/99 | 0.263 | 79016 | 0.65 | −170 | 10 | | | | 112 |
| 22512+6100 | | 22:51:13.6 | +61:00:58 | STAR | 13/03/97 | 0.263 | 56077 | 2.23 | −52.3 | −47.3 | −49.2 | 17 | 34 | 104 |
| | | | | | 20/01/99 | 0.263 | 74113 | 0.54 | −136 | 123 | | | | |
| 22542+5815 | | 22:54:13.5 | +58:15:11 | SFR | 20/01/99 | 0.263 | 74099 | 0.44 | −168 | 91 | | | | 104 |
| 22551+6140 | | 22:55:11.6 | +61:40:00 | SFR | 13/03/97 | 0.263 | 56081 | 1.71 | −117 | 100 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74101 | 0.53 | −165 | 93 | | | | |
| 22553+1744 | BI Peg | 22:55:23.6 | +17:44:58 | STAR | 24/01/00 | 0.263 | 79834 | 0.50 | −100 | 35 | | | | 115 |
| 23140+6121 | | 23:14:01.8 | +61:21:22 | SFR | 14/03/97 | 0.263 | 56083 | 1.64 | −70 | 147 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74107 | 0.73 | −48.3 | −44.5 | −47.0 | 5 | 4 | |
| | G108.38−8.71 | 23:15:05.4 | +51:12:41 | | 19/01/99 | 0.263 | 73942 | 0.69 | −182 | 77 | | | | 102 |
| 23166+1655 | AFGL3068 | 23:16:41.7 | +16:55:10 | STAR | 07/05/97 | 0.263 | 56291 | 1.00 | −135 | 81 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74109 | 0.96 | −183 | 76 | | | | |
| 23279+5336 | | 23:27:56.3 | +53:36:34 | STAR | 07/05/97 | 0.263 | 56293 | 1.32 | −104 | 112 | | | | 104 |
| | | | | | 20/01/99 | 0.263 | 74111 | 0.63 | −152 | 107 | | | | |
| 23545+6508 | | 23:54:34.0 | +65:08:29 | SFR | 31/03/99 | 0.263 | 75236 | 0.70 | −29.9 | −23.1 | −27.3 | 4 | 3 | 120 |
| 23561+6609 | LkH$\alpha$259 | 23:56:09.6 | +66:09:32 | SFR | 14/03/97 | 0.263 | 56085 | 1.49 | −165 | 51 | | | | 104 |

([a]) The reference codes are as follows: 100 Xiang & Turner (1995); 101 Codella & Palla (1995); 102 Mirallles et al. (1994); 103 Codella et al. (1995); 104 Han et al. (1995); 105 Codella et al. (1996); 106 Toth & Kun (1997); 107 Glaussen et al. (1996); 108 Toth & Walmsley (1994); 109 Meehan et al. (1998); 110 Lewis (1997); 111 Benson & Little-Marenin (1996); 112 Engels & Lewis (1996); 113 Takaba (1994); 114 Benson et al. (1990); 115 Szymczak & Engels (1995); 116 Lewis & Engels (1993); 117 Lewis & Engels (1995); 118 Szymczak & Engels (1997); 119 Codella & Moscadelli (2000); 120 Present Work.

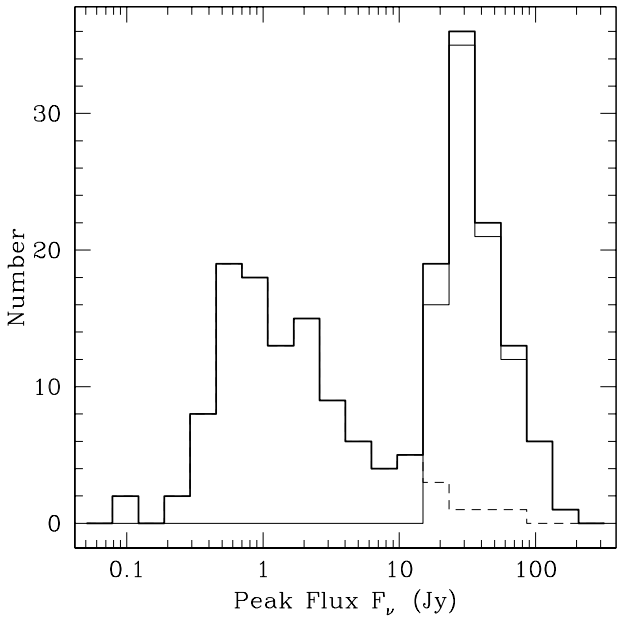


**Fig. 2.** The distribution (thick histogram) of the peak $H_2O$ fluxes taken from the literature for the sources not detected in our survey. The thin solid line represents the distribution of the peak fluxes published by Han et al. (1995). The dashed curve is the difference of the thick and thin histograms. At peak fluxes lower than ∼15 Jy, this curve coincides with the thick histogram

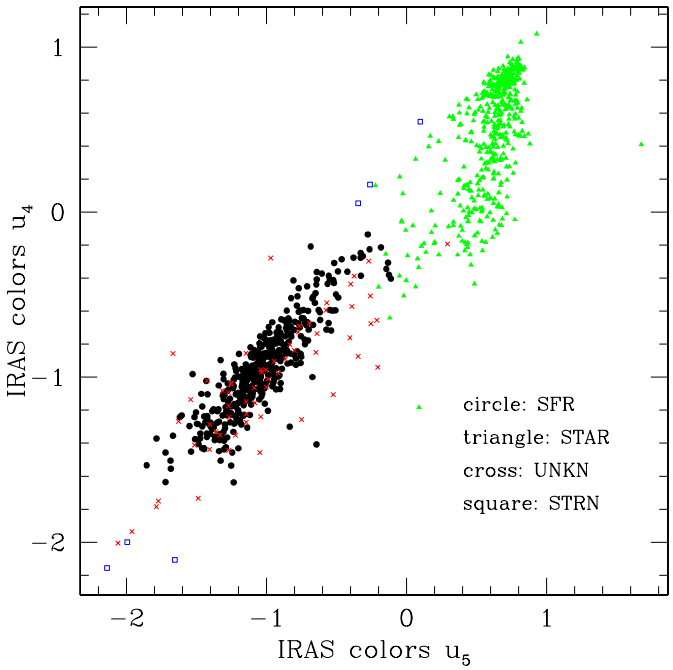


**Fig. 3.** The distribution in the $u_4$ vs. $u_5$ plane of the 937 sources of the Arcetri Catalog with an IRAS PSC counterpart. Water masers associated with SFR and STAR are clearly separated in this diagram

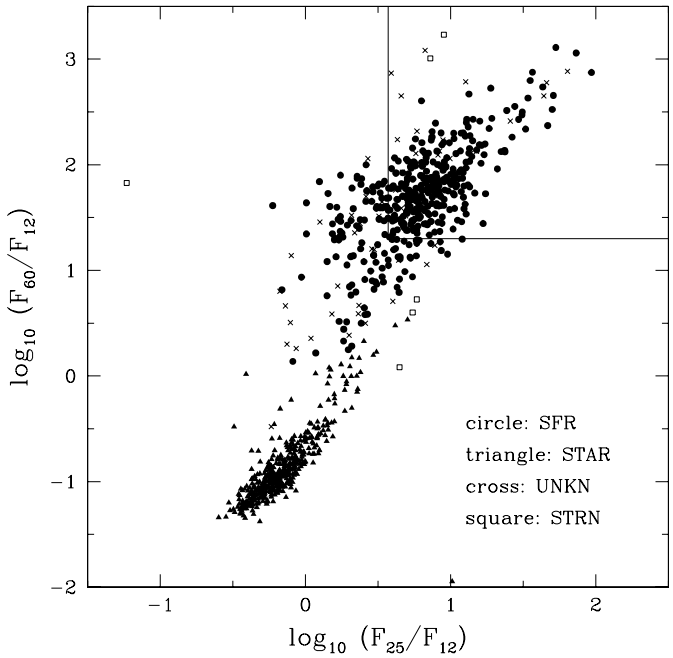


**Fig. 4.** Distribution in the [60–12], [25–12] plane of the 937 sources of the Arcetri Catalog with IRAS counterpart. The symbols have the same meaning as in Fig. 3. The box in the upper right corner delimits the colors for ultracompact HII regions, as suggested by Wood & Churchwell (1989)

associated with $H_2O$ maser emission. This corresponds to a high fraction (20%), which is simply the result of the biased searches conducted with the Medicina antenna: in fact, the large majority of the observations were carried out towards known $H_2O$ masers taken from the literature and/or associated with IRAS point sources, which are expected to show maser emission.

In Fig. 6 we show the distributions of the masers of type SFR (top) and those of type STAR (bottom). The two distributions are clearly different, with SFR concentrated towards the galactic plane and STAR much more uniformly distributed in galactic latitude. Such distributions are consistent with those expected respectively for young stars and late-type stars, thus giving further support to our classification based on color indices.

In Fig. 7 we show the distribution of the $H_2O$ integrated fluxes for the 423 maser sources detected by Comoretto et al. (1990), U1, and U2. The percentage of very bright masers is very small compared to the total. While the slope of the right part of the distribution represents the true increase in the number of sources towards lower integrated fluxes, the peak and subsequent decrease are instrumental effects due to the sensitivity limit. In order to inspect whether the brightest masers have all been detected in the first catalogs, we show in the lower panel of Fig. 7 the 203 sources detected by Comoretto et al. (1990) (full histogram), the 137 detected by U1 (dotted), and the 83 detected by U2 (dashed). The indication that emerges from this comparison is that continuing searches of new water masers tend to populate the region of lower integrated fluxes and that very few masers with integrated fluxes above 1000 Jy km $s^{-1}$ have been detected in more recent surveys.

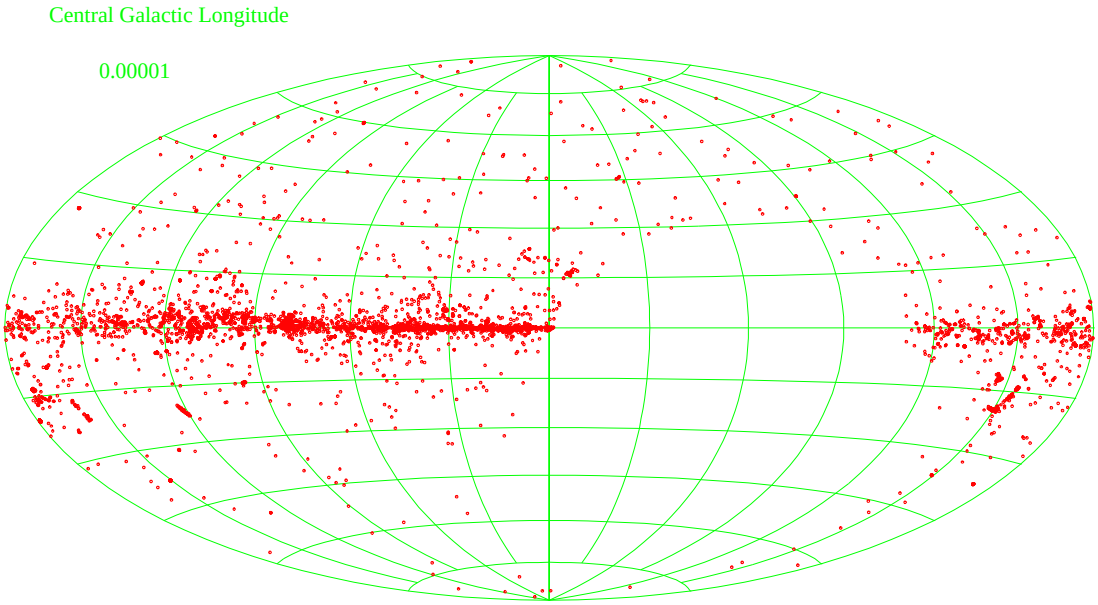


**Fig. 5.** Distribution in galactic coordinates of the 5074 positions observed at the frequency of the 22 GHz $H_2O$ maser line with the Medicina antenna since 1987

Finally, Fig. 8 shows the distribution of the integrated fluxes of maser sources detected by Comoretto et al. (1990), U1, and U2, separated into SFR (255) and STAR (133). Clearly, both distributions peak at the same integrated flux, but the SFR distribution is broader towards higher values. This indicates that $H_2O$ masers associated with late-type stars are likely to be fainter than those found in star forming regions.

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## Appendix A: Classification scheme of the sources with IRAS counterparts

Palagi et al. (1993) describe a procedure which classifies the $H_2O$ maser sources into two classes: those arising in star forming regions (SFR) and those found around late-type stars (STAR), according to the four FIR fluxes of the IRAS point source associated to the maser.

The classification criteria are derived applying a multivariate analysis (principal component analysis and linear discriminant analysis, Murtagh & Heck 1987) to the subsample of the Arcetri $H_2O$ maser catalog that satisfies the following conditions:

a) the $H_2O$ maser source has a good morphological classification as SFR or STAR.
b) the associated IRAS point source has no upper limit in any of the four bands.

**Table A.1.** Boundary definition of SFR and STAR regions

| | STAR | SFR |
|---|---|---|
| $u_1$ | +0.1 to +1.4 | −2.4 to −0.3 |
| $u_2$ | −1.8 to +0.8 | −1.2 to +1.2 |
| $u_3$ | −1.4 to +0.5 | −1.0 to +1.3 |
| $u_4$ | +0.0 to +1.2 | −2.0 to −0.1 |
| $u_5$ | −0.2 to +1.0 | −3.6 to −0.4 |

The results of the multivariate analysis can be summarized as follows:

– the principal component analysis provides three new observables $u_1$ (Eq. A1), $u_2$ (Eq. A2) and $u_3$ (Eq. A3) as combinations of the logarithms of the IRAS fluxes, whose distributions show that the subsample is composed of two main populations well correlated with the morphological classification of the $H_2O$ masers;
– the linear discriminant analysis provides a fourth combination of the IRAS colors, $u_4$ (Eq. A4), which maximizes the separation of the two populations;
– since a relevant fraction of the IRAS sources associated with the $H_2O$ masers have an upper limit at $\lambda = 100$ $\mu$m we derived a combination of IRAS colors, $u_5 = u_4 - 0.480 \cdot u_2$ (Eq. A5), that is independent of the 100 $\mu$m flux, but preserves most of the discriminating properties of $u_4$;
– from the distributions of each IRAS color combination we derive the boundaries of the STAR and SFR classes, as reported in Table A.1.

The five combinations of the logarithms of the FIR fluxes determined through the multivariate analysis are:

$$u_1 = +0.510[f_{12}] - 0.137[f_{25}] + 0.403[f_{60}] - 0.776[f_{100}] \quad \text{(A.1)}$$

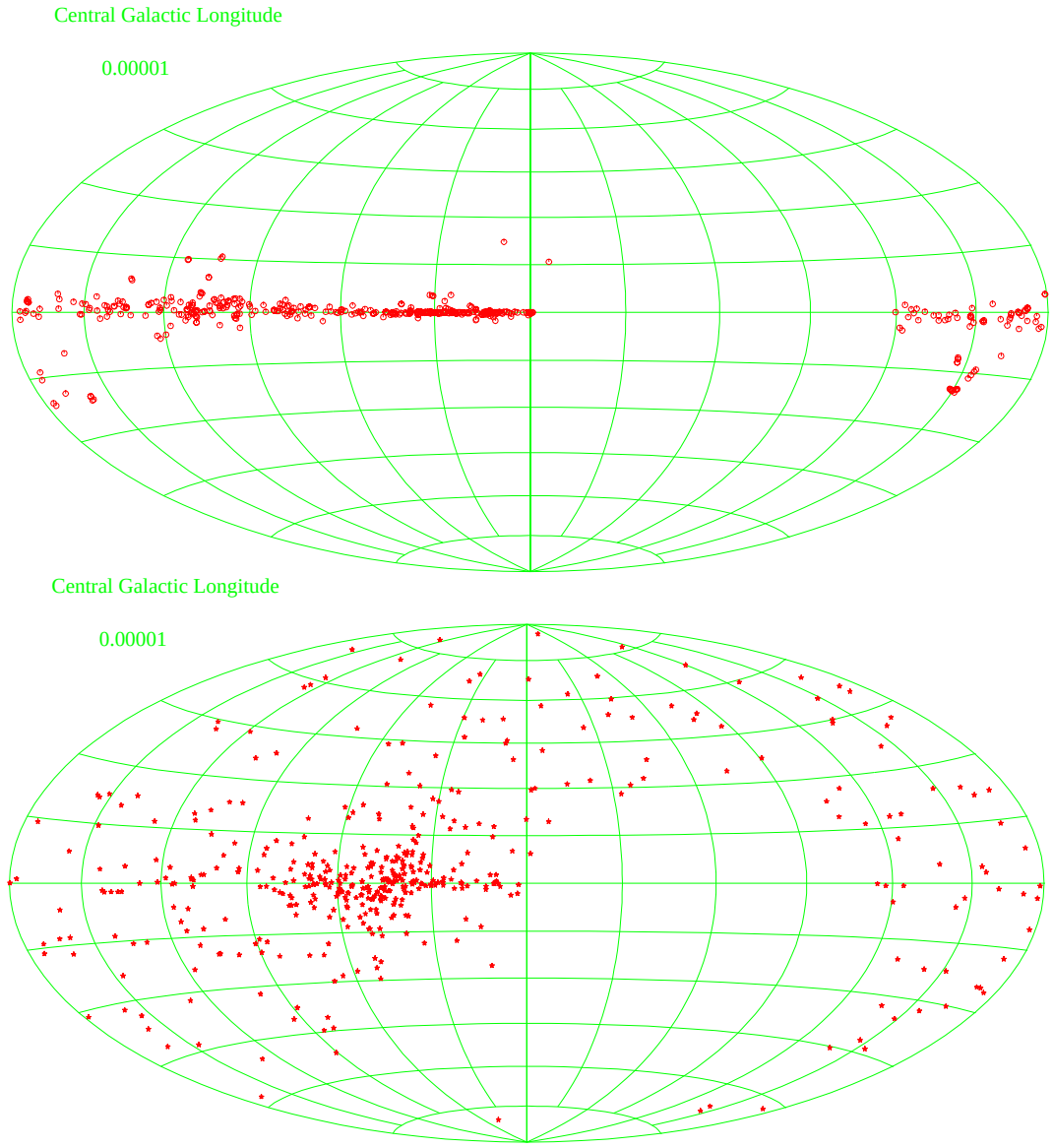


**Fig. 6.** Distributions in galactic coordinates of the $H_2O$ maser centers observed in the surveys of Comoretto et al. (1990), U1, and U2. The top panel shows the 410 sources classified as SFR and the bottom the 460 classified as STAR

**Table A.2.** Classification criteria

| $u_4$ | Color quality | | | $u_5$ |
|---|---|---|---|---|
| | Good | Upper | Lower | |
| $u_4 < -2.0$ | STRN | STRN | UNKN | $u_5 < -3.6$ |
| $-2.0 < u_4 < -0.1$ | SFR | SFR | UNKN | $-3.6 < u_5 < -0.4$ |
| $-0.1 < u_4 < 0.0$ | UNKN | UNKN | UNKN | $-0.4 < u_5 < -0.2$ |
| $0.0 < u_4 < +1.2$ | STAR | UNKN | STAR | $-0.2 < u_5 < +1.0$ |
| $u_4 > +1.2$ | STRN | UNKN | STRN | $u_5 > +1.0$ |

$$u_2 = -0.533[f_{12}] + 0.522[f_{25}] + 0.857[f_{60}] - 0.846[f_{100}] \quad \text{(A.2)}$$

$$u_3 = +0.473[f_{12}] - 1.057[f_{25}] + 1.244[f_{60}] - 0.660[f_{100}] \quad \text{(A.3)}$$

$$u_4 = +0.226[f_{12}] + 0.501[f_{25}] - 0.324[f_{60}] - 0.403[f_{100}] \quad \text{(A.4)}$$

$$u_5 = +0.482[f_{12}] + 0.250[f_{25}] - 0.735[f_{60}] \quad \text{(A.5)}$$

where $[f_u] = \log_{10}(f_u)$, with $u = 12, 25, 60, 100$. Based on the criteria determined from this subset of the Arcetri Catalog, for the remainder of the sources the classification proceeds as follows (see Fig. A.1 for the flow-chart representation):

1. If there are no upper limits in flux density, $u_4$ is considered a Good value and is compared with the class boundaries of Table A.1. The outcome is given by the

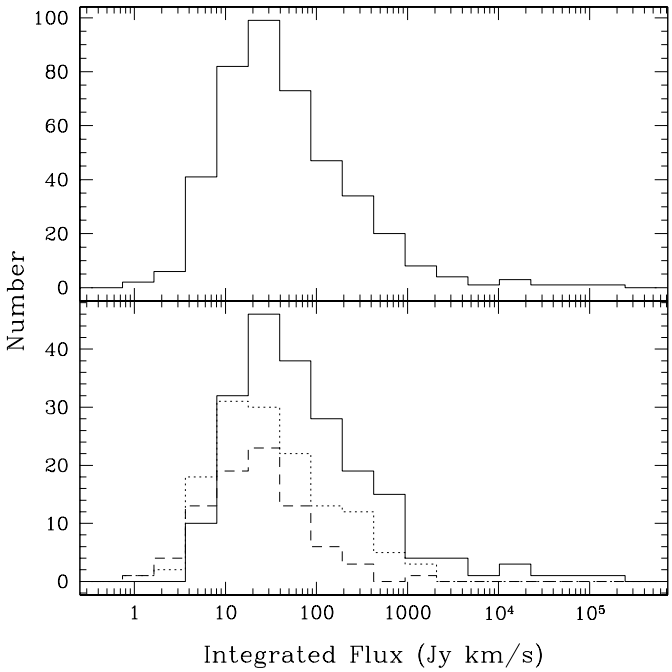


**Fig. 7.** Distributions of the integrated flux of the 423 maser sources detected by Comoretto et al. (1990), U1, and U2. The top panel shows the global distribution, while in the bottom panel a distinction is made between the 203 sources detected by Comoretto et al. (1990) (full histogram), the 137 detected by U1 (dotted), and the 83 detected by U2 (dashed)

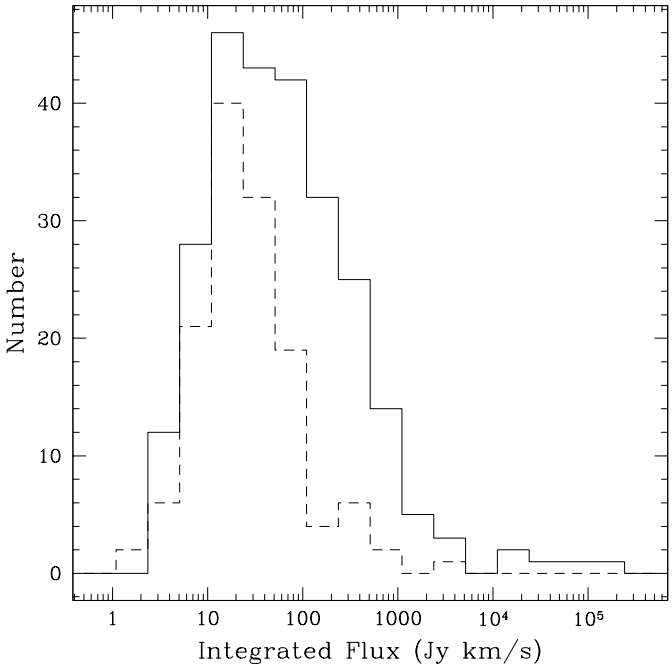


**Fig. 8.** Distributions of the integrated flux of maser sources detected by Comoretto et al. (1990), U1, and U2, according to their classification: 255 SFR (full histogram) and 133 STAR (dashed)

Good column of Table A.2, where UNKN stands for *unknown* and STRN stands for *strange*;

2. If the combination of upper limits in the FIR fluxes is such that $u_4$ can be assigned an Upper or Lower limit, then the corresponding column of Table A.2 gives the outcome of the classification;
3. If the outcome of the classification based on $u_4$ is UNKN, $u_5$ is computed and the procedure is iterated once more starting from point 2 and using the appropriate class boundaries;
4. In any case, when the outcome is either SFR or STAR, it is checked against $u_2$ and $u_3$ for consistency. If the check is not passed, the source is classified as STRN.

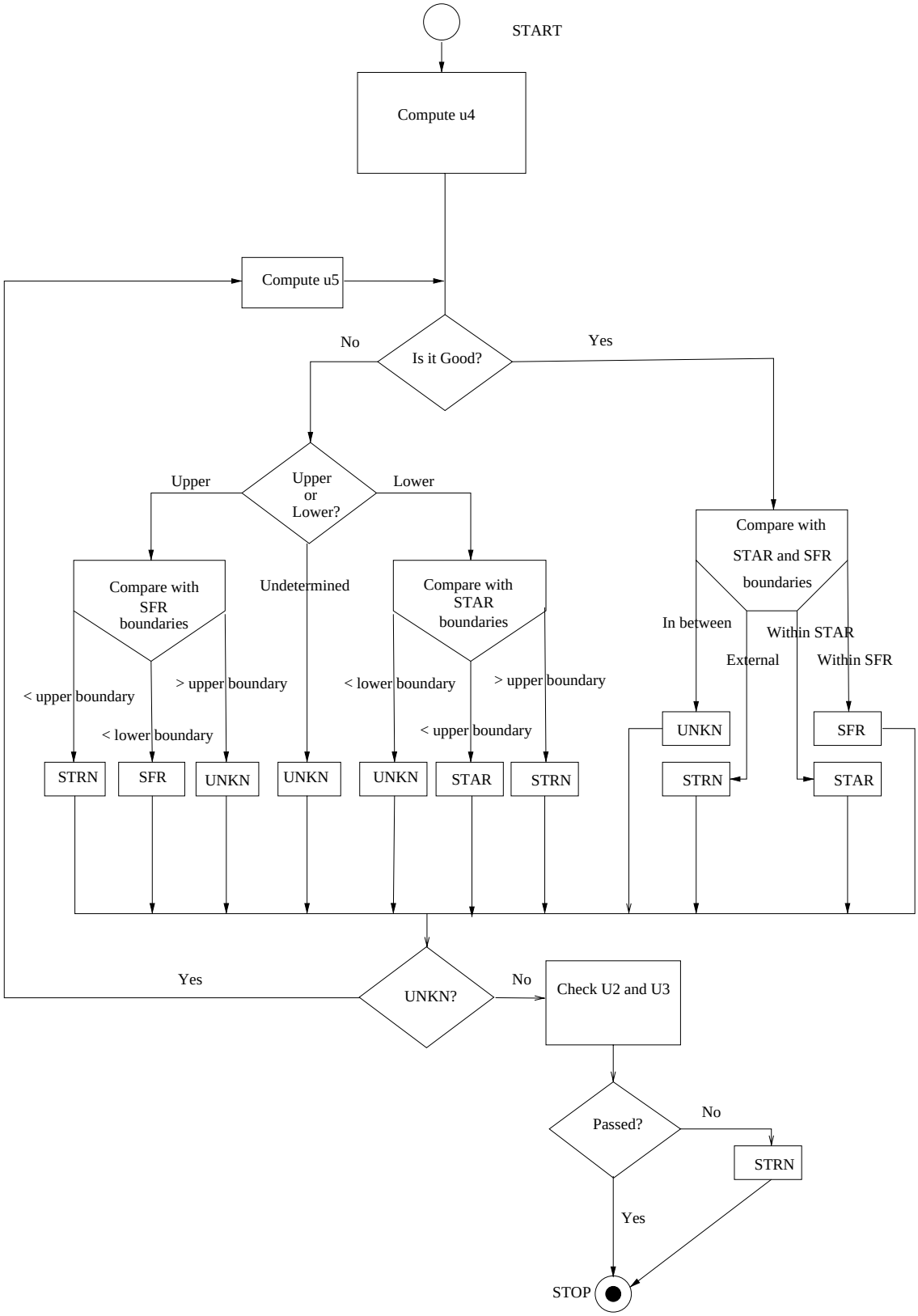


**Fig. A.1.** Flowchart of the classification procedure

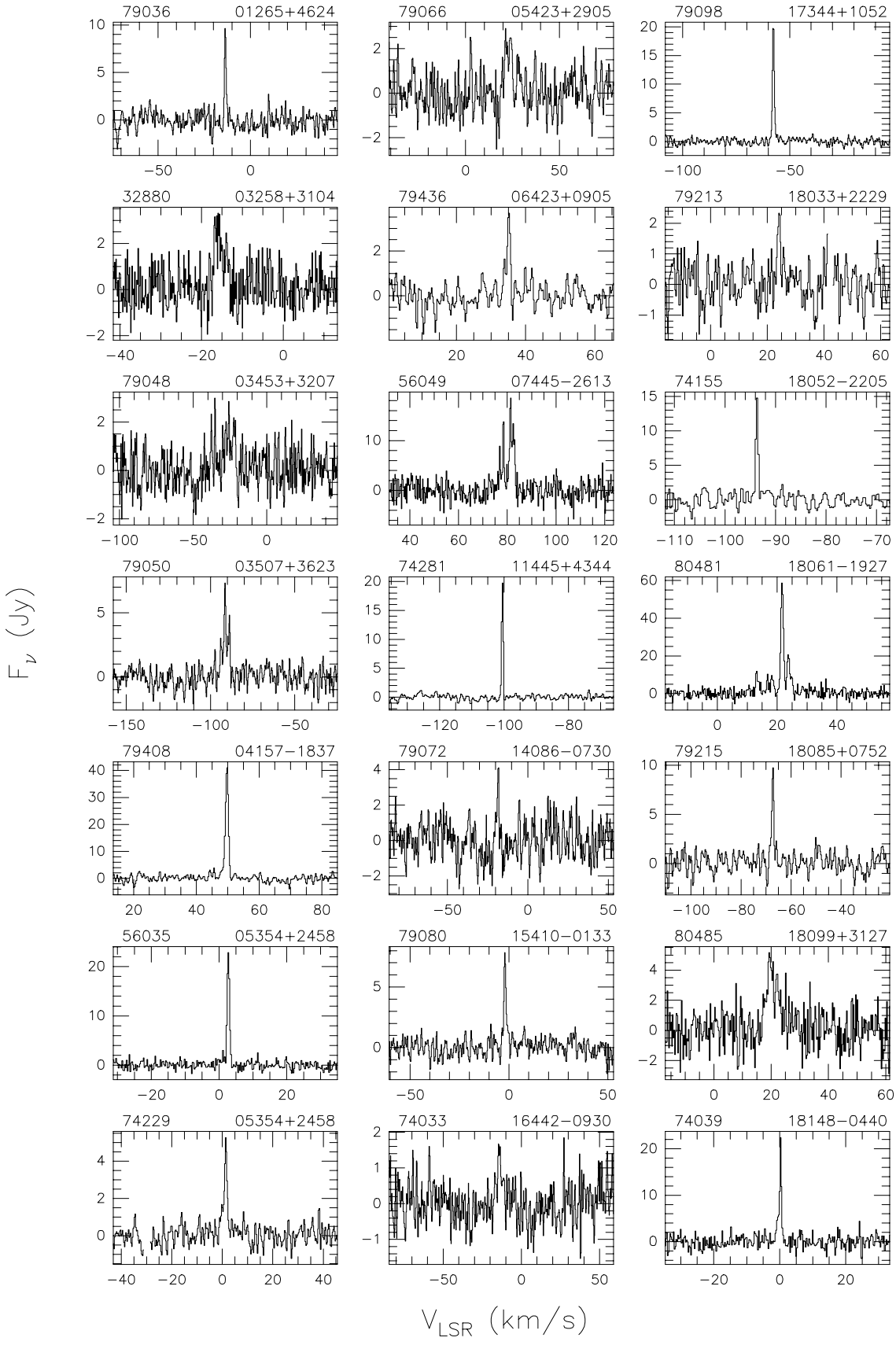


**Fig. A.2.** Spectra of all the detections listed in Table 1. Each source is identified by the scan number (upper left) and source name (upper right). The spectra are ordered in right ascension from top left to bottom right

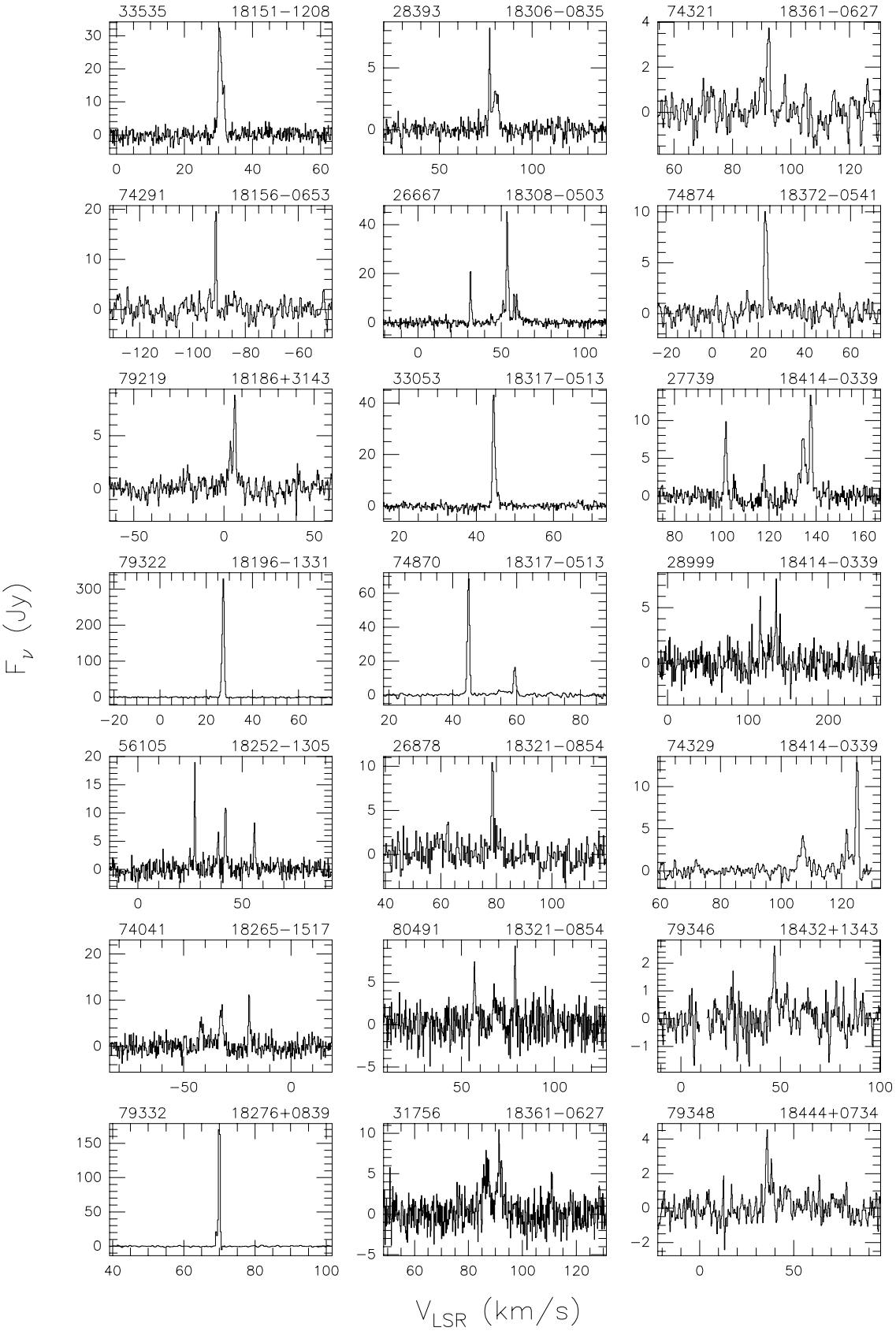


**Fig. A.2.** continued

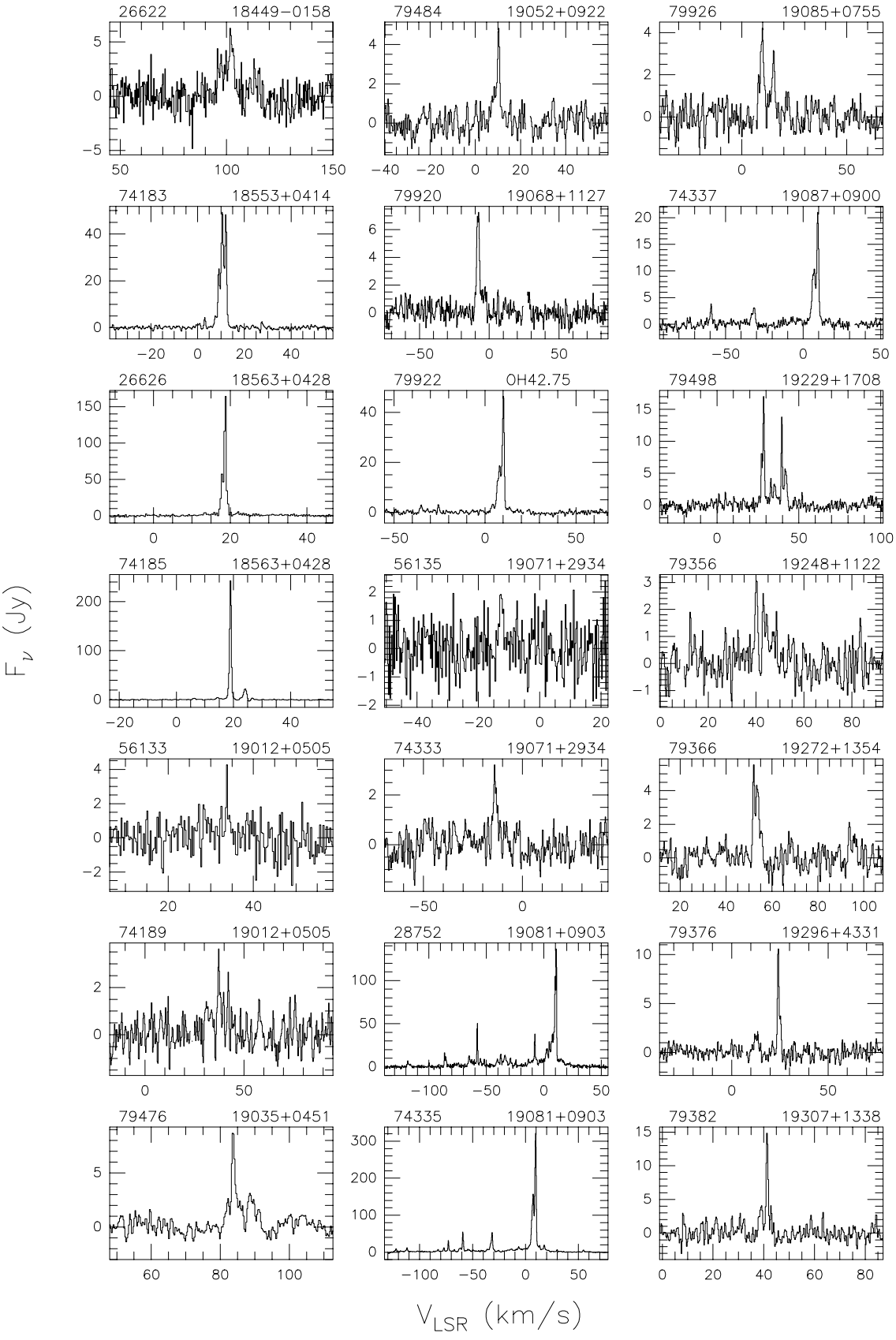


**Fig. A.2.** continued

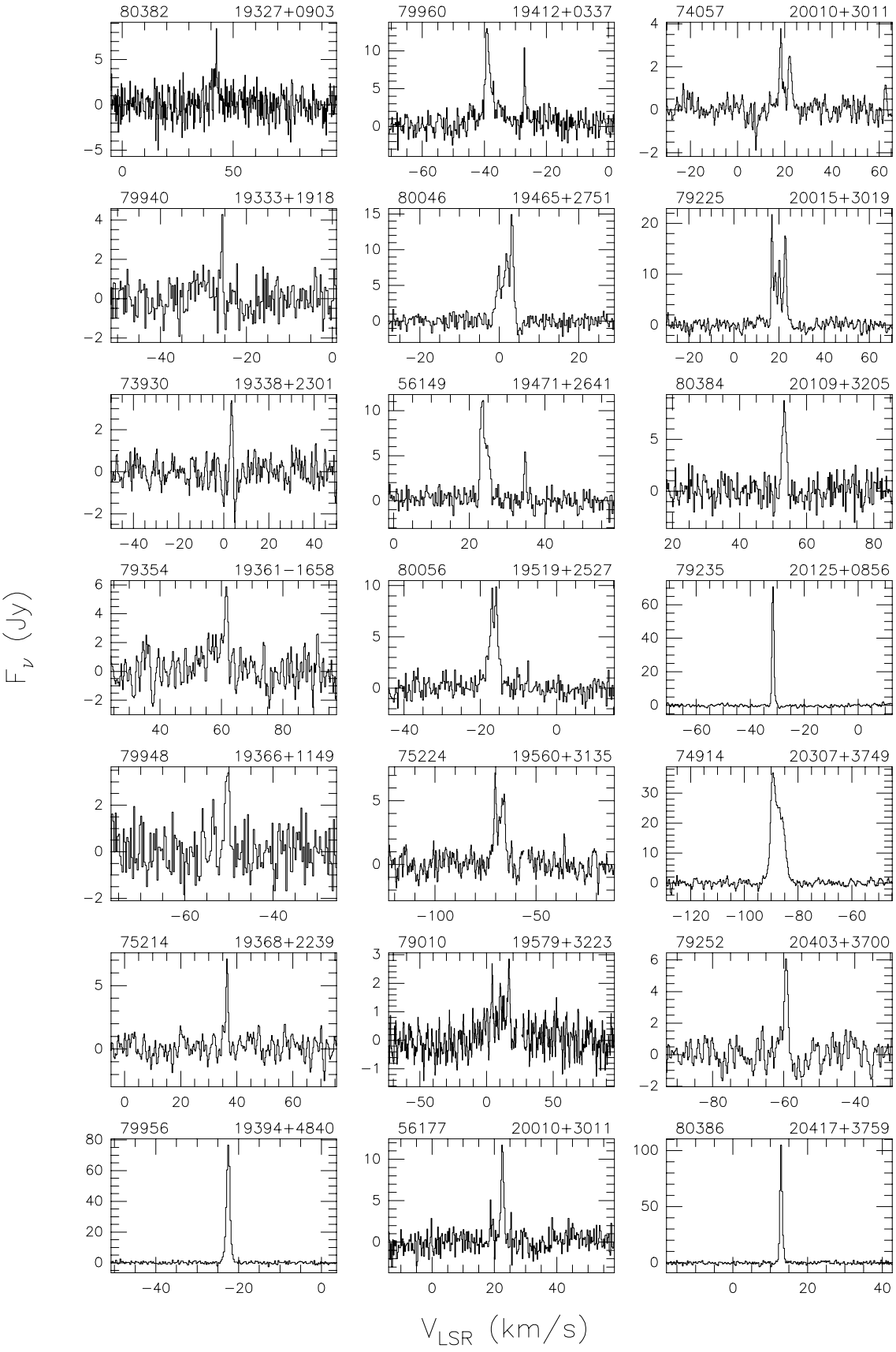


**Fig. A.2.** continued

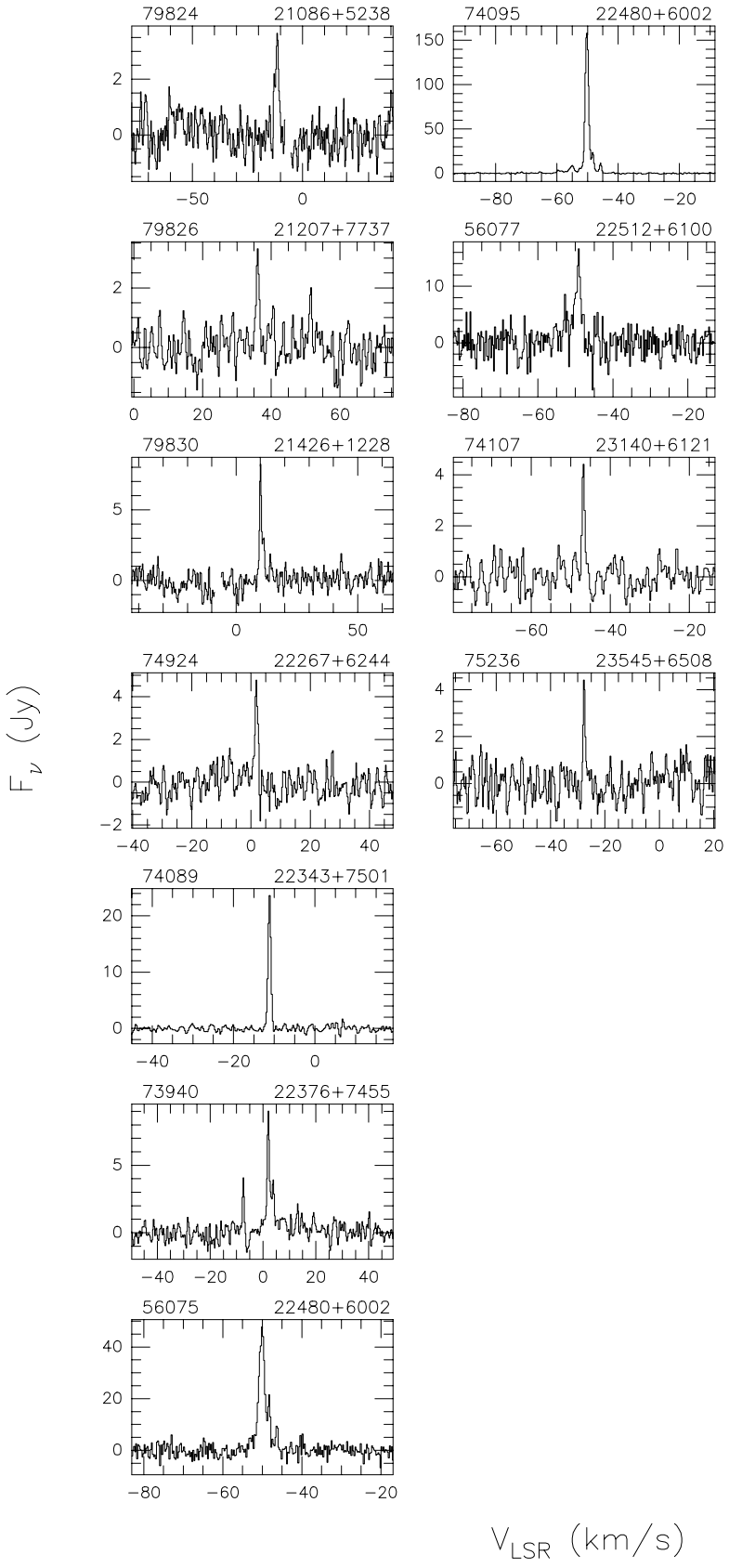


**Fig. A.2.** continued

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