109 new Galactic open clusters*

N.V. Kharchenko1,2,3, A.E. Piskunov1,2,4, S. Röser2, E. Schilbach2, and R.-D. Scholz1

1 Astrophysikalisches Institut Potsdam, An der Sternwarte 16, D–14482 Potsdam, Germany
email: nkhar@iap.de, apiskunov@iap.de, rdscholz@iap.de
2 Astronomisches Rechen-Institut, Mönchhofstraße 12-14, D–69120 Heidelberg, Germany
email: nkhar@ari.uni-heidelberg.de, piskunov@ari.uni-heidelberg.de, roeser@ari.uni-heidelberg.de, elena@ari.uni-heidelberg.de
3 Main Astronomical Observatory, 27 Academica Zabolotnogo Str., 03680 Kiev, Ukraine
email: nkhar@mao.kiev.ua
4 Institute of Astronomy of the Russian Acad. Sci., 48 Pyatnitskaya Str., Moscow 109017, Russia
email: piskunov@inasan.rssi.ru

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Abstract. We present a list of 130 Galactic Open Clusters, found in the All-Sky Compiled Catalogue of 2.5 Million Stars (ASCC-2.5). For these clusters we determined and publish a homogeneous set of astrophysical parameters such as size, membership, motion, distance and age. In a previous work 520 already known open clusters out of the sample of 1700 clusters from the literature were confirmed in the ASCC-2.5 using independent, objective methods. Using these methods the whole sky was systematically screened for the search of new clusters. The newly detected clusters show the same distribution over the sky as the known ones. It is found, that without the a-priori knowledge about existing clusters our search lead to clusters which are, on average, brighter, have more members and cover larger angular radii than the 520 previously known ones.

Key words. Techniques: photometric – Catalogs – Astrometry – Stars: kinematics – open clusters and associations: general – Galaxy: stellar content

1. Introduction

For many years the major sources of open cluster lists were based on visual inspection of photographic plates. The present-day highly homogeneous and accurate all-sky surveys like the Hipparcos and Tycho catalogues (ESA 1997), or the 2MASS near-IR survey (Cutri et al. 2003) gave new impetus to a systematic search of new clusters. Platais, Kozhurina-Platais & van Leeuwen (1998) profited from the use of Hipparcos proper motions and parallaxes and detected six nearby associations and nine candidates of open clusters. Using photometric and kinematical data of the Tycho-2 catalogue (Hog et al. 2000), Alessi, Moitinho & Dias (2003) detected 11 new clusters and determined their ages, geometric and kinematical parameters. Dutra et al. (2003) and Bica et al. (2003) searched the 2MASS for compact embedded clusters in the direction of known nebulae. The visual inspection of J, H, Ks images has lead to the discovery of 346 infrared clusters, stellar groups and candidates all over the Milky Way. All new optical clusters and candidates are listed in a catalogue by Dias et al. (2002). These authors also maintain an online list of catalogues (DLAM hereafter) 1, which is updated in regular intervals.

Our work is based on a catalogue of 2.5 million stars with proper motions in the Hipparcos system and B, V magnitudes in the Johnson photometric system, spectral types (ASCC-2.5; Kharchenko 2001) and radial velocities, if available in the Catalogue of radial velocities of galactic stars with high precision astrometric data (Kharchenko, Piskunov & Scholz 2004). The ASCC-2.5 can be retrieved from the CDS 2; a detailed description of the catalogue can be found in Kharchenko (2001) or in the corresponding ReadMe file at the CDS. In a previous paper (Kharchenko et al. 2004a referred hereafter as Paper I), we used the ASCC-2.5 to identify known open clusters and

Send offprint requests to: R.-D. Scholz

* In fact, during this search of new clusters in the catalogue ASCC-2.5, we discovered 130 clusters. It turned out that 21 of them are listed in the online list DLAM as private communications. We stress the point that this paper is the first presentation of these 21 clusters in a refereed publication. Table[1] including only coordinates and sizes of the 109 new clusters as well as Table[2] with coordinates and sizes of the 21 confirmed clusters are available only in the electronic version of the Journal at http://www.edpsciences.org/aa. The complete set of data files for all 130 clusters is only available in electronic form at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsweb.u-strasbg.fr/cgi-bin/qcat?J/A+A/

1 http://www.astro.iag.usp.br/~wilton/
2 ftp://cdsarc.u-strasbg.fr/pub/cats/l/280A
compact associations, and developed an iterative pipeline for the construction of cluster membership based on combined spatial/kinematical/photometric criteria. For 520 known clusters a uniform set of structural (location, size), kinematical (proper motions and radial velocities) and evolutionary (age) parameters was derived (Kharchenko et al. 2004b referred hereafter as Paper II). The results encouraged us to start a search for new clusters in the ASCC-2.5.

The present paper describes this systematic search of new open clusters. Instead of a visual inspection of sky surveys, we implement a multi-factor search pipeline, which is based on the analysis of properties of known clusters already identified in the ASCC-2.5. As a result we could increase our sample of clusters present in the ASCC-2.5 by about 20%, determine memberships and derive a uniform set of basic astrophysical parameters in the same way as for the 520 previously known clusters.

The paper has the following structure. In Sec. 2 we discuss the properties of known clusters identified in the ASCC-2.5. These properties give us useful hints for the search of new clusters. In Sec. 3 we present details of the search procedure applied. In Sec. 4 we describe the sample of the newly discovered clusters and compare their properties with those of known clusters already identified in the ASCC-2.5. In Sec. 5 we summarise the results.

2. Properties of known open clusters identified in the ASCC-2.5

For each star, the ASCC-2.5 gives the equatorial coordinates, proper motions, $B$, and $V$ magnitudes. Only for a minority of them spectral and luminosity classes, and radial velocities are also known. Therefore, starting from the data content of the ASCC-2.5, we suggest and adopt the following strategy of searching new open clusters. This strategy is based on a clustering analysis in the multi-dimensional space of equatorial coordinates and proper motions with a follow-up check of colour-magnitude distributions of the candidates. Since the completeness and especially the accuracy of the ASCC-2.5 data show a strong dependence on stellar magnitude, a straightforward search routine must take these correlations into account. Furthermore, a successful approach requires a set of starting parameters which are related to typical properties of the given survey (e.g. mean surface density of stars, the limiting magnitude, wavelength range). The choice of starting parameters should yield a reasonable relation between the number of cluster candidates selected at the beginning and the number of real clusters confirmed at the end.

In this work we make use of the experience we got from the identification of known open clusters in the ASCC-2.5. In that study we could find 520 of some 1700 known clusters (Paper I), and we derived cluster parameters such as sizes, distances, ages, and space velocities (Paper II). The resulting parameters and supplementing information on these clusters were gathered in the Catalogue of Open Cluster Data (COCD) supplemented by the Open Cluster Diagrams Atlas (OCDA). The main reason that “only” 30% of known open clusters were confirmed with the ASCC-2.5 data is the relatively bright limit-

| Descriptor | $V_{lim}$ | $\bar{r}_s$ | $\bar{r}_c$ | $n_1$ | $n_2$ |
|------------|-----------|-------------|-------------|------|------|
| Value      | 9.5 mag   | 0.3 deg     | 0.15 deg    | 8    | 5    |
of geometric parameters and distances from the Sun. Also, it removes those candidates for which we are not able to derive these parameters (e.g. due to false clustering, or a lack of necessary data). The second run removes co-moving (non-member) stars and provides the final list of cluster members as well as the complete set of cluster parameters.

The crucial point of the search strategy is the selection of the threshold parameters which provide optimum starting conditions for a decision whether or not a real clustering exists. A common proper motion differing significantly from the field would be a good criterion. But in general, we should assume that unknown clusters would have relatively small proper motions (otherwise, they would already have been found). By increasing $V_s$ and $r_s$, we would find more cluster candidates, but the number of clusters really confirmed at the end would grow slowly and finally stop. From preliminary tests we found that quite a reasonable “cost-to-performance relation” can indeed be achieved with threshold parameters, which are based on the statistics given in Sec. 2.2.

The search procedure uses the descriptors and their thresholds as listed in Table 1. The quantity $r_s$ is the maximum search radius (analogue to the cluster radius). In order to take into account the expected negative gradient of stellar density in a cluster, we introduce a core radius $r_c$. The minimum numbers of members within the cluster area and core are called $n_s$ and $n_c$, respectively. The proper motions of members must follow the proper motion of the corresponding seed (i.e. analogue to the cluster radius). In order to take into account the expected negative gradient of stellar density in a cluster, we introduce a core radius $r_c$. The minimum numbers of members within the cluster area and core are called $n_s$ and $n_c$, respectively. The proper motions of members must follow the proper motion of the corresponding seed (i.e. analogue to the cluster radius).

The detailed procedure for searching new clusters consists of the following steps:

1. Selection of seed stars. All ASCC-2.5 stars with $V < V_s$ and $B - V < 2$ mag which are not 1σ-members of known clusters are considered as seeds. Altogether, about 221 000 stars have been selected for further tests.

2. Construction of cluster candidates. In a circle centred at a seed with radius $r_s$, we select all ASCC-2.5 stars which proper motions are known with a mean error $e_{pm} < 10$ mas/yr. Following the definitions in Paper I and assuming the corresponding seed star $s$ to be a cluster member and its proper motion $\mu_x$, $\mu_y$ to represent the mean cluster proper motion, we compute the kinematical probability $P_i^s$ of the cluster membership for each star $i$ in the circle as

$$P_i^s = \exp \left\{ -\frac{1}{4} \left[ \left( \frac{\mu_x - \mu_x^s}{e_{\mu_x}^s + \delta e} \right)^2 + \left( \frac{\mu_y - \mu_y^s}{e_{\mu_y}^s + \delta e} \right)^2 \right] \right\},$$

here $\mu_x$ and $\mu_y$ correspond to $\mu_x \cos \delta$ and $\mu_y$, respectively. $\delta e$ is a correction for external error of the proper motions in the ASCC-2.5 (see Paper I). A sub-sample of stars with $P_i^s > 61\%$ (“1σ-members”) is separated. If this sub-sample consists of $n_x \geq n_c$ stars with at least $n_c$ stars within the inner circle of a radius $r_c$, we include this area into the following tests. After this second step we have obtained 4767 sky fields containing cluster candidates. Some of them are overlapping areas.

3. Elimination of overlapping areas. If neighbouring cluster candidates have several stars in common, only those with the largest number $n_x$ have been considered. Cases of double and triple overlaps have been treated automatically, whereas a few cases of quadruple overlapping have been handled manually. After this step only 2472 candidate areas were retained for the next step.

4. Preliminary selection of cluster members and determination of cluster parameters. This step and the following step 5 are based on the pipeline developed in Papers I and II for member selection and determination of cluster parameters. Now we consider a larger sky region of $2 \times 2$ square degrees around each remaining seed star. Additionally to
the nominal kinematical selection, we carry out a simplified photometric selection, which removes stars located below the Main Sequence. Thus, at this stage, we keep possibly some red field stars which, by chance, show the same proper motions as a given cluster candidate. As expected, the vast majority of cluster candidates does not show any Main Sequence and was excluded from further considerations. We are also forced to remove those cluster candidates which do not contain at least one “kinematical and photometric member” with known spectral classification. In the current study, the spectral classification is the only information given in the ASCC-2.5 which can be used for deriving estimates of distance and color excess. In a few cases, significant parallaxes (from Hipparcos) were available for the brightest probable cluster members. These parallaxes were used to check the derived distances.

After this step, our list includes 308 cluster candidates with preliminary determined cluster memberships and with a number of preliminary cluster parameters like the position of the cluster’s centre, distance, and average proper motion.

5. Final determination of membership and cluster parameters. At this stage, the standard pipeline is applied with complete kinematical and photometric selection. After several iterations for each cluster, co-moving red stars are excluded and the final cluster membership is established. The complete set of cluster parameters including the cluster age is derived. If cluster members are present in the ASCC-2.5 subsample of stars with radial velocities (Kharchenko, Piskunov & Scholz 2004), the mean radial velocity of the cluster is computed. Only 130 clusters have passed this stage. The other 178 candidates have been excluded since after rejection of co-moving red stars, no more clustering

Table 2. List of newly-discovered clusters (cluster coordinates $\alpha_c$ in hours, $\delta_c$ in degrees, respectively for J2000). The cluster radii $r_{cl}$ (in degrees) are also given. Note that the complete set of cluster parameters is available only in electronic form via the CDS (see Sec. 4).

| Cluster | $\alpha_c$ | $\delta_c$ | $r_{cl}$ | Cluster | $\alpha_c$ | $\delta_c$ | $r_{cl}$ |
|---------|------------|------------|----------|---------|------------|------------|----------|
| ASCC 1  | 0.160      | 62.68      | 0.20     | ASCC 43 | 7.885      | −28.17     | 0.35     |
| ASCC 2  | 0.331      | 55.71      | 0.30     | ASCC 45 | 8.264      | −35.65     | 0.20     |
| ASCC 3  | 0.519      | 55.28      | 0.21     | ASCC 46 | 8.276      | −48.51     | 0.40     |
| ASCC 4  | 0.886      | 61.58      | 0.40     | ASCC 48 | 8.575      | −37.61     | 0.32     |
| ASCC 5  | 0.966      | 55.84      | 0.13     | ASCC 51 | 9.300      | −69.69     | 0.66     |
| ASCC 6  | 1.787      | 57.73      | 0.30     | ASCC 52 | 9.466      | −54.26     | 0.27     |
| ASCC 7  | 1.982      | 58.97      | 0.25     | ASCC 53 | 9.632      | −59.55     | 0.31     |
| ASCC 8  | 2.347      | 59.61      | 0.30     | ASCC 54 | 9.746      | −54.44     | 0.22     |
| ASCC 9  | 2.782      | 57.73      | 0.17     | ASCC 55 | 9.905      | −57.08     | 0.23     |
| ASCC 10 | 5.400      | 1.80       | 0.62     | ASCC 61 | 10.769     | −56.86     | 0.32     |
| ASCC 11 | 5.420      | 30.17      | 0.25     | ASCC 62 | 10.848     | −60.10     | 0.28     |
| ASCC 12 | 5.436      | 0.82       | 0.62     | ASCC 63 | 10.931     | −60.41     | 0.15     |
| ASCC 13 | 5.463      | −1.98      | 0.80     | ASCC 64 | 11.051     | −60.92     | 0.18     |
| ASCC 14 | 5.479      | 1.63       | 0.75     | ASCC 65 | 11.185     | −61.12     | 0.22     |
| ASCC 15 | 5.483      | 3.65       | 0.80     | ASCC 66 | 11.227     | −55.42     | 0.30     |
| ASCC 16 | 6.339      | 46.67      | 0.36     | ASCC 67 | 11.692     | −61.02     | 0.20     |
| ASCC 17 | 6.479      | −7.02      | 0.35     | ASCC 69 | 12.110     | −69.77     | 0.40     |
| ASCC 18 | 6.759      | 24.60      | 0.21     | ASCC 70 | 12.250     | −64.43     | 0.30     |
| ASCC 19 | 6.840      | 7.25       | 0.17     | ASCC 71 | 12.345     | −67.52     | 0.41     |
| ASCC 20 | 6.898      | −4.39      | 0.20     | ASCC 72 | 12.550     | −60.95     | 0.25     |
| ASCC 21 | 6.901      | −0.17      | 0.30     | ASCC 73 | 12.610     | −67.29     | 0.40     |
| ASCC 22 | 6.905      | −1.65      | 0.22     | ASCC 74 | 13.597     | −58.81     | 0.20     |
| ASCC 23 | 6.950      | −6.21      | 0.26     | ASCC 75 | 13.786     | −62.42     | 0.17     |
| ASCC 24 | 7.015      | 3.50       | 0.17     | ASCC 76 | 13.871     | −66.40     | 0.35     |
| ASCC 25 | 7.053      | −25.05     | 0.90     | ASCC 77 | 14.180     | −62.33     | 0.32     |
| ASCC 26 | 7.175      | 6.07       | 0.30     | ASCC 78 | 15.085     | −68.39     | 0.16     |
| ASCC 27 | 7.211      | 2.12       | 0.40     | ASCC 79 | 15.320     | −60.73     | 0.52     |
| ASCC 28 | 7.242      | −21.12     | 0.18     | ASCC 80 | 15.410     | −60.14     | 0.25     |
| ASCC 29 | 7.301      | −24.48     | 0.16     | ASCC 81 | 15.782     | −50.98     | 0.26     |
| ASCC 30 | 7.453      | −5.55      | 0.26     | ASCC 82 | 15.790     | −64.41     | 0.30     |
| ASCC 31 | 7.550      | −22.95     | 0.30     | ASCC 83 | 15.837     | −52.80     | 0.21     |
| ASCC 32 | 7.560      | −13.76     | 0.18     | ASCC 84 | 15.915     | −60.74     | 0.25     |
6. Visual inspection with sky maps. In a final step, supplementing the search for new clusters, we inspected Digitised Sky Survey (DSS) and SuperCOSMOS Sky Survey (SSS) blue and red images. The size of an image around a given cluster was selected according to the determined cluster corona radius with a minimum size of $30 \times 30$ arcmin$^2$, and up to $180 \times 180$ arcmin$^2$ for the largest clusters. The results of the visual inspection of the fields with new clusters are included in the notes to the extension of the OCDA. For about 30 cluster areas the notes are with respect to the presence of nebulae and/or varying surface density of faint stars, which could not yet been mentioned in the ASCC-2.5 sky maps.

4. Results of the search and comparison with properties of known clusters

We present the 130 new clusters in Tables 2 and 3. Among them we found 21 in the 15/feb/2004-update of DLAM (see Table 3). They were not included in the COCD with its 520 clusters, because the COCD had already been finished before this update became available. In DLAM only cluster centres and angular sizes are given for these 21 clusters, which were privately communicated to the authors of the data base. We detected these clusters, however, without using DLAM data as preliminary input and determined astrophysical parameters for them. Therefore, we consider them as independently confirmed. The celestial positions of these 21 confirmed clusters are given in Table 3. On the other hand, about a dozen of the new clusters (also privately communicated) in that update of DLAM could not be confirmed in our work.

At the moment of submission of this paper, we did not find any published information on the other 109 clusters. Therefore, we consider them as unknown clusters to date. They are listed in Table 2.

The current data refer to 130 sky areas and have the same content and format as the CSOCA described in Paper I. This file, which we call “The 1st Extension of CSOCA”, includes 26778 stars, with 10161 of them located within the determined cluster radii. According to the combined spatial/kinematical/photometric criteria, 6203 stars are classified as cluster members and 2127 out of them as 1$r$-members. For all these clusters, a homogeneous set of basic astrophysical parameters is derived and the corresponding cluster diagrams are prepared. Again, the data are presented in the same way as for the 520 known clusters (see Paper II) and called “The 1st Extension of the COCD” and “The 1st Extension of the OCDA”, respectively. An example of a page in the Extension Atlas is shown in Fig. 4 for the open cluster ASCC 13. The complete set of data files, extending the CSOCA, COCD and OCDA, is available in electronic form only via the CDS.

5. Summary and outlook

Starting from 221,000 stars in ASCC-2.5 which have passed the test for seeds of possible open clusters, we applied our search procedure based on spatial, kinematical and photometric criteria, and at the end of the study, we found 130 new open clusters. For each of these clusters a complete set of relevant parameters (memberships, locations, sizes, distances, ages, proper motions, and - for 69 clusters- radial velocities) was derived. It seems to be a paradox, but we have now more basic information on these new clusters than on many others reported as known clusters already for a long time. In our search for new clusters we profitied from all-sky astrometric and photometric surveys which became available in recent years. In papers I and II we used the ASCC-2.5 to identify known open clusters, to re-define (or to confirm) the membership, and to derive a uniform set of astrophysical parameters for these clusters. The preliminary information already published for these clusters was very helpful for this study, too. In search for new clusters, however, without any a-priori information, we needed at first clear criteria to decide whether an apparent clustering was indeed a real physical open cluster.

Comparing the histograms in Fig. 3b,c for the clusters from the COCD and from the COCD Extension, we can conclude that the newly discovered clusters are, on average, more prominent objects. There is possibly a potential to find poorer clusters in the ASCC-2.5 by diminishing the threshold values in Table 1. In this case, we must take into account a considerable increase of candidates with a lower success rate for a final confirmation as undoubted clusters.

Assuming a similar distribution of $V_b$ and $n(1r)$ for the known and for the new clusters, we suspect from (Fig. 3b,c) that the ASCC-2.5 should contain stars belonging to about 100 more open clusters still unknown. But without accurate data at fainter magnitudes, without any knowledge of their distances, it will be difficult to confirm them. We were already forced to reject a number of “good” candidates in step 4 of the search procedure due to the lack of spectral classification. Therefore, a more successful approach has to wait till more accurate data at fainter magnitudes will become available.

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3. http://archive.stsci.edu/
4. http://www-wfau.roe.ac.uk/sss/pixel.html
5. http://vizier.u-strasbg.fr/cgi-bin/VizieR
**Fig. 2.** Example of the spatial, kinematical and evolutionary parameters of the new open cluster ASCC 13. Left upper panel is a sky map of the cluster neighbourhood. The small circles are stars, their size indicates stellar magnitude (only in this panel). In all other diagrams stars are shown as grey dots. The error bars indicate the \( \text{rms} \)-errors in the corresponding data for \( 1\sigma \)-members. The large circles in the sky map outline the cluster core (solid) and corona (dashed). The cross indicates the cluster center. The upper right panel is the CMD of the cluster. Bold circles show the stars used for the calculation of the average age of the cluster. The curves are: the empirical ZAMS (leftmost), the red edge of the MS (thick line to the right), the isochrone corresponding to the calculated age, and the limits of the evolved MS (light curves). The legend within the CMD displays the derived parameters of the cluster. The lower left panel shows radial profiles of the projected density. The curves (from the top to the bottom) correspond to all stars, all members, \( 1\sigma \)-members. Vertical lines mark the core (solid) and cluster radii (dashed), respectively. The middle panel is the vector point diagram of proper motions. The two rightmost panels are “magnitude equation” \((\mu_x, y - V)\) relation diagrams, showing the proper motion of cluster members as a function of magnitude. The horizontal lines show the average proper motion of the cluster.

Database and the VizieR Catalogue Service operated at the CDS, France, and of the WEBDA facility at the Observatory of Geneva, Switzerland.

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**Fig. 3.** Open clusters identified with ASCC-2.5 data: the comparison of previously known (COCD) and newly discovered (COCD Extension) clusters. Panel (a) shows the distribution of clusters over the sky. The crosses indicate known clusters, the circles are for newly discovered ones. Histograms (b)-(f) are normalised to the number of known clusters ($N_{\text{tot}} = 520$), the filled and hatched histograms are for known and newly discovered clusters, respectively. Panel (b) is the distribution of clusters over the magnitude $V_b$ of the brightest $1\sigma$-member. Panel (c) shows the distribution over the number of $1\sigma$-members in a cluster, whereas Panels (d), (e), and (f) are the distributions of clusters over angular radius, distance, and age, respectively. For convenience, long tails in (c), (d) and (e) are truncated.

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Table 3. List of confirmed clusters (cluster coordinates $\alpha_c$ in hours, $\delta_c$ in degrees, respectively for J2000). Cluster radii $r_{cl}$ are in degrees. Previous names and radii of the cluster candidates (i.e. the only parameters which were provided by DLAM) are given in brackets. Note that the full astrophysical parameter set determined in the present paper is only available in electronic form via the CDS (see text).

| Cluster                  | $\alpha_c$ | $\delta_c$ | $r_{cl}$ |
|--------------------------|------------|------------|----------|
| ASCC 10 (Alessi-Teutsch 9) | 3.450      | 35.04      | 0.48 (0.36) |
| ASCC 22 (Ferrero 11)     | 6.242      | 0.64       | 0.18 (0.11) |
| ASCC 32 (Alessi 33)      | 7.033      | -26.50     | 0.50 (0.54) |
| ASCC 41 (Herschel 1)     | 7.784      | 0.02       | 0.36 (0.10) |
| ASCC 42 (Alessi-Teutsch 3) | 7.881    | -53.01     | 0.36 (0.29) |
| ASCC 44 (Alessi 34)      | 8.028      | -50.57     | 0.40 (0.48) |
| ASCC 47 (Alessi-Teutsch 7) | 8.530    | -39.08     | 0.50 (0.24) |
| ASCC 49 (Teutsch 38)     | 8.798      | -37.99     | 0.45 (0.37) |
| ASCC 50 (Alessi 43)      | 8.838      | -41.72     | 0.40 (0.38) |
| ASCC 68 (Alessi-Teutsch 8) | 12.049   | -60.92     | 0.20 (0.12) |
| ASCC 86 (Alessi J1701-58)| 17.033     | -59.01     | 0.55 (0.30) |
| ASCC 89 (Alessi 24)      | 17.388     | -62.64     | 1.10 (0.75) |
| ASCC 92 (Alessi 31)      | 17.852     | -11.88     | 0.30 (0.22) |
| ASCC 96 (Ferrero 1)      | 18.335     | -32.37     | 0.25 (0.12) |
| ASCC 97 (Alessi 40)      | 18.616     | -19.22     | 0.43 (0.40) |
| ASCC 103 (Teutsch 35)    | 19.603     | 35.67      | 0.36 (0.18) |
| ASCC 106 (Alessi 44)     | 19.719     | 1.60       | 0.66 (0.50) |
| ASCC 112 (Alessi 46)     | 20.274     | 52.10      | 0.22 (0.20) |
| ASCC 118 (Alessi-Teutsch 5) | 22.140  | 61.10      | 0.21 (0.18) |
| ASCC 124 (Alessi 37)     | 22.802     | 46.25      | 0.30 (0.24) |
| ASCC 129 (Alessi J2327+55)| 23.467   | 55.60      | 0.21 (0.21) |
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