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Catalogue of Ap, HgMn and Am stars★

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ABSTRACT

We present a catalogue of 8205 known or suspected Ap, HgMn and Am stars. This paper is a major update of our first edition of the catalog of Ap and Am stars and includes revised identifications, additional stars and revised information obtained from the literature.

Key words. catalogs – stars: chemically peculiar

1. Introduction

A large amount of observational data has been collected on Ap, HgMn and Am stars over the last decades. Still, there remain many unsolved issues concerning the phenomena they harbor. Pursuing the study of these stars seems thus necessary and a catalogue compiling their known characteristics is a valuable tool. Since the first edition of such a catalogue (Renson et al. 1991), new Ap, HgMn and Am stars have been recognized in various works, e.g., in the fifth Michigan catalogue (Houk & Swift 1999). Others have been discovered in observational surveys, mainly in relatively distant open clusters (see, e.g., compilations by Bayer et al. 2000; Paunzen & Maitzen 2001, 2002; Paunzen et al. 2002, 2003, 2005, 2006; Netopil et al. 2007). and in other searches, such as a photometric study based on the Strömgren-Crawford indices (Masana et al. 1998) yielding 60 new CP candidates, the more than 500 Ap and Am stars discovered at Abastumani Astrophysical Observatory in the course of classifying stars in the galactic anticenter direction (Kharadze & Chargeishvili 1990) or the study by Radoslavova (1989) in the direction of the OB associations Cygnus OB4, Cepheus-Lacerta OB1 and Cassiopeia OB9.

New data have been gathered, such as new periods of Ap stars (see, e.g, compilations by Catalano et al. 1991, 1993; Catalano & Renson 1997, 1998; Renson & Catalano 2001). Very strong magnetic fields have been discovered in some Ap stars (see, e.g., Babel et al. 1995; Babel & North 1997; Bagnulo et al. 2003; Hubrig et al. 2005) and considerable efforts have been brought into the analysis of magnetic fields (e.g., Mathys 1991, 1995; Mathys & Lanz 1992; Mathys & Hubrig 1997; Mathys et al. 1997; Hubrig et al. 2000, 2004, 2005, 2006; Aurière et al. 2007; Wade et al. 2000; and the catalogue by Bychkov et al. 2003, and references therein).

2. Description

The catalogue includes 8205 stars (vs. 6684 for the first edition), among which 3652 Ap stars (or probably Ap), 162 HgMn (or probable) and 4299 Am (or probable), and 92 stars which have been wrongly catalogued at least once as Ap, HgMn or Am.

As for the first edition, all stars are grouped together in a single list. The new name of the catalogue reflects the fact that, according to current usage, HgMn are no longer referred to as Ap stars. The category "Ap star" is taken in the broadest sense. It also includes Bp stars, in particular the He-weak and He-strong stars. Similarly, we include the Fm stars under the Am banner. Those having a δ Del type are mentioned. However, the chemically peculiar stars having abundance anomalies resulting from selective accretion of circumstellar material, i.e., the weak-lined λ Boo stars, are not included.

Whenever possible, the data included in the catalogue have been taken from original papers in order to avoid faulty ratifications of existing misprints and other errors, some being repeated from paper to paper. This is especially true for components of double stars as it is often difficult to establish whether the data found in a paper or a table relate to the whole system or to one component and to which one.

The data have been collected according to the same principles as for the first edition (Renson et al. 1991). The columns of the table are mostly the same. Table 1 shows the first records of the catalogue.

The following identificators are given: the HD number (Cannon & Pickering 1918–24) or HDE number (Cannon 1925–36; Cannon & Mayall 1949), the HR number (Pickering et al. 1908), most generally used for bright stars since it serves as a running number in all editions of the Bright Star Catalogue, a Durchmusterung number, the designation (Greek or Latin letter, or number) of the star in its constellation.

Hipparcos and Tycho numbers have been added wherever possible. Bertaud's number (Bertaud 1959, 1960, 1965; and Bertaud & Floquet 1974) and GC numbers (Boss 1937) have been dropped. However, the latter appear in the N notes when no HIP designation is available, or, for multiple stars, in the D notes when the GC numbers of the components are different.

Additional identifications for some stars can also be found in the N notes, e.g., another Durchmusterung number, the [B10] numbers from the preliminary general catalogue by Lewis Boss (1910) and the GCRV numbers from the catalogue of radial velocities by Wilson (1953). These two catalogues (previously designated as B and W) have been used as the only identifiers in older works.

★ Catalogue (full Table 1) 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/498/961

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Table 1. First records of the catalogue. The full table is available at the CDS.

	Rns	HD	HIP	HR	DM	TYC	name	RA1900	Dec1900	RA2000	Dec2000	sp	V	$B-V$	$U-B$	$b-y$	m_1	c_1	β	Notes
	4	236298			BD+54 3108	3656–506–1		0:00.4	+54:43	0:05:36	+55:16.2	A0 Si	9.4							D
	10	154A			BD+33 4835A	2267–251–1		0:01.3	+34:03	0:06:24	+34:36.4	A9–F2	8.7			0.223	0.230	0.746	2.782	D
	16	267	609		BD–12 6617	5263–315–1		0:02.3	–12:10	0:07:23	–11:36.8	A3–F0	7.8							
?	20	294	628		BD+0 3	1–1394–1		0:02.5	+00:32	0:07:40	+01:05.7	A0–	8.2	+0.18	+0.14					
	30	315	635	11	BD–3 2	4666–548–1	4 Cet	0:02.6	–03:06	0:07:44	–02:32.9	B9 Si	6.3	–0.14	–0.46	–0.078	0.138	0.539	2.722	N R
	40	341	659		BD+30 3	2259–560–1		0:03.0	+30:49	0:08:10	+31:22.7	A3–F2	7.3	+0.29		0.096	0.247	0.985		D B R
∗	50	358	677	15	BD+28 4		α And	0:03.2	+28:32	0:08:23	+29:05.4	B9 Mn Hg	2.1	–0.11	–0.44	–0.046	0.120	0.520	2.743	NDAVPBHR
?	60	416A			BD+36 4A	2271–1799–1		0:03.7	+36:40	0:08:52	+37:12.9	A5–F0	8.8	+0.31	+0.07	0.194	0.211	0.746	2.803	ND
	70	434	728		BD+27 3	1735–1440–1		0:03.8	+27:41	0:09:00	+28:14.9	A3–F0 Sr	6.5							N B R
?	80	573	835		BD+24 7	1732–1341–1		0:05.1	+24:58	0:10:13	+25:31.6	F0 Cr Eu	8.7			0.208	0.253	0.783	2.780	
?	90					6415–1033–1		0:05.0	–26:46	0:10:07	–26:12.9	B He	12.9	–0.13	–1.13	–0.044	0.019	–0.199		N
	100	653			BD+39 18	2786–379–1		0:05.7	+40:01	0:10:52	+40:34.7	A0 Cr Eu	8.9							N
?	110	719			CD–26 42	6416–403–1		0:06.4	–26:49	0:11:29	–26:15.2	A3–F0	9.3			0.213	0.191	0.753	2.754	
	113	728			BD–0 13	2–229–1		0:06.6	–00:26	0:11:41	+00:07.3	A – dD	9.7							
?	120					5842–603–1		0:07.1	–19:33	0:12:14	–18:59.7	A2–	11.							N
∗	130	861	1063		BD+61 16	4018–687–1		0:07.9	+61:29	0:13:13	+62:02.5	A2–F2	6.6	+0.19						BR
?	140	923	1088		CD–30 48	6419–677–1		0:08.5	–30:08	0:13:34	–29:34.5	A6–F2	8.6	+0.18	+0.15	0.091	0.214	1.022	2.850	
?	150	952	1123	44	BD+32 21	2264–770–1		0:08.8	+32:39	0:14:02	+33:12.4	A1 Si	6.2	+0.02	–0.01	–0.003	0.162	1.000	2.881	N R
∗	160	965	1127		BD–0 21	4664–318–1		0:08.9	–00:35	0:14:04	–00:02.0	A8 Sr Eu Cr	8.6							HR
?	170	1009	1180		BD+63 15	4022–891–1		0:09.3	+64:01	0:14:43	+64:34.0	B9 Mn	8.4	+0.16						
	180	1048	1193	49	BD+21 13	1185–2318–1		0:09.8	+21:44	0:14:56	+22:17.1	A1 Si	6.2	–0.01	+0.12	0.001	0.149	1.070	2.868	N A P HR
?	190	1086			BD–18 30	5839–652–1		0:10.0	–17:49	0:15:06	–17:15.5	A0–	9.8	+0.18	+0.14	0.093	0.220	0.952	2.829	
?	200	1092			BD+44 47	3247–2274–1		0:10.1	+44:58	0:15:22	+45:31.8	F0–	9.6	0.13		0.094	0.178	1.072	2.865	
	210	1097	1210		CD–29 50	6419–927–1		0:10.1	–29:34	0:15:08	–29:00.4	A4–F4 Sr	9.2			0.239	0.326	0.465	2.727	∗ V
?	220	1114	1237		BD–13 35	5267–654–1		0:10.3	–13:37	0:15:25	–13:03.3	A6–	8.7			0.110	0.231	0.899	2.858	R
	230	1169A	1286A		BD+7 23A	595–773–1		0:10.9	+07:34	0:16:05	+08:06.9	A8–F2	8.0			0.187	0.240	0.716	2.772	D
	240	1185A	1302A	56A	BD+42 41A	2794–1917–1		0:11.1	+43:02	0:16:22	+43:35.7	A1 Si	6.1	+0.05	+0.03	0.013	0.186	1.047	2.899	ND R
	250				BD+63 20	4022–946–1		0:11.1	+63:51	0:16:32	+64:24.8	A –	9.							
	260	1263			BD+75 6	4492–1648–1		0:11.8	+75:35	0:17:32	+76:08.7	A1–	8.8			0.108	0.200	0.946	2.848	
?	270	1280A	1366A	63A	BD+37 34A	2782–2251–1	θ And A	0:11.9	+38:08	0:17:05	+38:40.9	A2 Si Sr	4.6	+0.06	+0.04	0.026	0.181	1.050	2.881	ND B R
?	273	1302	1378		BD–14 38	5267–939–1		0:12.1	–14:40	0:17:13	–14:06.5	B8	9.5			–0.035	0.121	0.817	2.787	VP C
	275		1414		BD+72 14	4306–1396–1		0:12.1	+73:05	0:17:41	+73:38.3	A4–	9.4			0.164	0.242	0.810	2.826	
?	280	1447	1521		BD+62 48	4019–1650–1		0:13.5	+62:44	0:18:57	+63:17.3	F0–F3	7.6			0.204	0.209	0.817	2.742	
	290				BD+65 32	4027–539–1		0:13.7	+65:35	0:19:11	+66:08.8	A Si Sr	10.							
?	300	1499			CP–60 23	8471–125–1		0:14.0	–60:02	0:18:50	–59:28.4	A1–	9.8							
?	308					2794–1297–1		0:14.2	+43:20	0:19:32	+43:53.5		11.3			–0.01	0.13	0.81	2.75	N C
?	310	1525	1452		CP–83 3	9490–1444–1		0:14.3	–83:37	0:18:06	–83:03.7	A9–	9.7							
?	320	1541	1561		CD–38 68	7524–686–1		0:14.4	–38:19	0:19:25	–37:45.5	A0–A8	9.7	+0.27	+0.15	0.156	0.213	0.888	2.781	
	330	1607			BD+21 25	1185–1386–1		0:15.3	+21:55	0:20:28	+22:28.8	F0–	8.6			0.254	0.222	0.638	2.723	
	340	1619			CD–25 99	6413–782–1		0:15.3	–25:15	0:20:20	–24:42.2	A2–F3	8.7	+0.35	+0.15	0.199	0.241	0.677	2.757	R
	350				BD+61 45	4019–2973–1		0:15.6	+62:13	0:21:01	+62:46.2	A Si	9.							∗
?	355	1651	1663		BD–1 31	4665–980–1		0:15.7	–01:26	0:20:50	–00:52.3	A6–A9	9.3			0.188	0.209	0.734	2.765	
	360	1677	1688		BD+35 53	2273–238–1		0:15.9	+35:19	0:21:09	+35:52.7	A2–F0	7.4	+0.24	+0.09					
	370	1714	1722		BD+35 56	2273–670–1		0:16.4	+35:42	0:21:39	+36:15.2	A2–F2	8.5	+0.35	+0.13					
	380	1732	1748		BD+65 41	4027–607–1		0:16.6	+65:54	0:22:08	+66:27.6	A8–F3	7.7	0.33		0.201	0.249	0.827		
	390				BD+41 43	2791–225–1		0:16.7	+41:57	0:21:58	+42:30.6	Si	9.3							
	400	1756A	1740A		BD+26 42A	1733–31–1		0:16.8	+26:38	0:22:00	+27:11.2	A2–	8.5							D
	402	1758			BD+0 43	3–65–1		0:16.7	+00:22	0:21:48	+00:55.0	A2 Sr	9.1							
	410	1826	1799		BD+28 49	1737–852–1		0:17.6	+28:54	0:22:50	+29:27.3	A3–	6.9			0.094	0.231	1.000	2.860	N AV B
∗	420	1909	1830	89	CD–31 138	6990–1102–1	65G.Scl	0:18.2	–31:35	0:23:13	–31:02.1	B9 Hg Mn	6.5	–0.00	–0.3	–0.029	0.123	0.693	2.768	N VPB R
	430	1913	1817		CP–60 28	8841–286–1		0:18.2	–60:50	0:23:01	–60:17.0	A3–A8	10.2							
	440	1968	1903		BD+30 52	2261–1229–1		0:18.8	+30:38	0:24:03	+31:11.3	A2– dD	9.4							
	450				BD+75 12	4492–1761–1		0:19.1	+75:56	0:25:04	+76:28.8	A2–	9.7			0.190	0.140	1.006	2.857	
	460	2019	1952		BD+30 55	2261–204–1		0:19.4	+30:49	0:24:40	+31:22.4	B9 Hg	6.8			–0.035	0.140	0.669	2.780	N B R
	470	2026	1928		CD–29 106	6420–121–1		0:19.3	–29:32	0:24:19	–28:58.8	A2–A7 Sr	8.3	+0.14	+0.14	0.057	0.235	1.001	2.889	
	480	2032			BD+62 73	4019–2026–1		0:19.6	+62:39	0:25:08	+63:12.3	A2–	8.7							
?	490	2054	1982	96	BD+52 61	3653–1364–1		0:19.7	+52:30	0:25:06	+53:02.8	B9 Si	5.7	–0.06	–0.32	–0.022	0.123	0.693	2.775	N B R
	500				BD+40 77A	2791–734–1		0:19.9	+40:47	0:25:13	+41:20.7	A2–A7 Sr	9.7							D
?	510				BD+63 44	4023–293–1		0:20.1	+63:16	0:25:38	+63:49.0	B8 Si	10.							
?	520	2202A	2028		CD–51 101			0:20.9	–51:24	0:25:43	–50:50.3	F1 Sr	8.4							D
	530		2077		BD+25 52	1734–922–1		0:21.0	+25:19	0:26:14	+25:52.3	A –	9.6							
?	540	2263	2071		CP–52 39	8029–592–1		0:21.4	–52:12	0:26:12	–51:38.3	A3 Si	9.2							
	550	2280			CP–59 37	8471–283–1		0:21.5	–59:21	0:26:14	–58:47.8	A2–A7	9.0							
∗	560	2453	2243		BD+31 59	2266–725–1		0:23.2	+31:53	0:28:29	+32:26.3	A1 Sr Eu Cr	6.9	+0.06	+0.05	0.022	0.244	0.887	2.854	N VPBHR
?	570	2454	2235	107	BD+9 47			0:23.2	+09:39	0:28:20	+10:11.4	F4 Sr Ba	6.0	+0.43	–0.06	0.293	0.141	0.441	2.651	N A B R
?	580	2471A	2252A		BD+36 62A	2274–1419–1		0:23.4	+36:45	0:28:41	+37:18.2	A7–F0	9.0			0.084	0.251	0.900	2.892	∗ D
	590	2514A	2228A		CP–66 31A	8847–938–1		0:23.7	–66:28	0:28:14	–65:54.7	A2–F0	8.5							D
	600	2523	2280		BD+10 54	599–1049–1		0:24.0	+10:46	0:29:09	+11:19.2	A8–F2	8.0			0.219	0.208	0.655	2.733	D
?	610				BD+64 51	4023–641–1		0:24.0	+64:51	0:29:42	+65:23.9	Si	9.							
?	620	2628	2355	114	BD+28 75	1737–2790–1	28 And	0:24.8	+29:12	0:30:07	+29:45.1	A7–F2	5.2	+0.25	+0.09	0.169	0.166	0.870	2.754	ND V R
?	630	2641			CD–30 138	6991–108–1		0:25.0	–30:47	0:29:58	–30:13.9	A2 Sr	9.5	+0.15	+0.10	0.050	0.209	0.996	2.897	R
	640		2418		BD+65 65	4027–242–1		0:25.1	+65:35	0:30:49	+66:07.9	B8 Si	9.							
	650				BD+30 71	2262–426–1		0:26.4	+31:13	0:31:41	+31:45.6	A5–	9.9							
?	660				BD+35 87	2274–617–1		0:26.6	+35:24	0:31:58	+35:57.3	A5–	9.9							
	670	2837	2534		BD+42 96	2796–1269–1		0:26.8	+43:10	0:32:09	+43:42.7	A1 Cr Eu Sr	9.1	+0.1	+0.1					
	680	2852			BD+53 86	3654–1500–1		0:26.9	+53:24	0:32:24	+53:56.7	A5 Sr Eu	8.6							
	690	2883	2488		CP–62 43	8841–1090–1		0:27.0	–61:54	0:31:35	–61:20.8	F4 Sr	9.4							

The first column indicates the degree of confidence in the peculiarity character. The next columns are identifiers (HD, HIP, HR, DM, TYC, and the designation in the constellation), the 1900 and 2000 coordinates, the spectrum and Johnson and Strömgren photometric data. The last column refers to additional notes. See text for more information.

The 1950 coordinates listed in the previous edition are dropped in favour of the 2000 coordinates. They are obtained from the Hipparcos, Tycho or 2MASS catalogues, after carefully checking the identification, and are listed with a better precision than in the first edition, thus removing any ambiguity.

The running numbers, often quoted as Rns in the literature, have been kept for the stars already present in the first edition. Initially these numbers were chosen as successive multiples of 10, allowing the insertion of additional stars. This preliminary list was presented at the 19th meeting of the European Workgroup on Ap Stars and the assigned numbers have then been considered as definitive. Because of delays in its publication, the first edition already included 500 new insertions.

The Rns numbers closely follow the HD order or, in the absence of HD number, the 1900 right ascension.

The stars added for the present edition have been inserted between the existing ones, following the same scheme. Obviously there were several instances where 9 slots were not sufficient (e.g., clusters, Kharadze's field), and the 1900 RA order could not be always exactly obeyed. The extra precision on the right ascension revealed that some stars present in the first edition were not ordered perfectly. There are necessarily a few more such instances in the present edition. On the other hand it has still been possible to strictly respect the HD order.

Details about multiplicity are found in the D notes. For a double or multiple star the ADS number (Aitken 1932) if any, or sometimes the BDS number (Burnham 1906), is given in note D, in which the distance(s) and magnitude(s) of the other component(s) are given. The identifiers (HD, HR, DM, HIP) of multiple stars are followed by a letter (A, B, ...) unless the magnitude of the other components is too faint ($\Delta m \geq 5$) or the angular separation is too large. The absence of such a letter does not mean the absence of a faint or still undiscovered companion. This is especially true for the fainter stars of the catalogue. Similarly, spectroscopic binaries may still be undetected (absence of B note). This can be the case for stars included on the basis of purely photometric criteria (notes C: Str., Gen., Mtz., ...) for which no indication of radial velocity variations exist.

The next data are the magnitude and Johnson's colour indices $B-V$ and $U-B$. For most stars the given magnitude is V in Johnson's system or y in Strömgren's one, but for less luminous stars it can be Tycho V, or an approximate value and sometimes a photographic magnitude. For close doubles (except for very close ones detected only by speckle interferometry, etc.) the magnitude is corrected for the light of the companion. This is never done for the colour indices. No correction is introduced for interstellar absorption and reddening.

The numerical data given for each star such as magnitude and colour, spectral type, projected rotational velocity, etc. are weighted means of values found in the literature. For the spectral types, the HD catalogue (and the Michigan Spectral Catalogue for southern stars) is always consulted as well as specific papers. All the numerical values quoted are given for information only, without claiming a high precision.

A flag indicates the degree of confidence for the CP nature of the stars. A slash (/) denotes a star that was improperly considered to have an Ap, HgMn or Am nature. Question marks (?) mean doubtful cases (2314 stars, among which are 311 Ap stars detected by photometric criteria, reported in notes C, and not yet confirmed by ordinary spectroscopy). On the contrary asterisks (*) denote well-known confirmed Ap, HgMn or Am stars (only 426).

Notes A indicate the cluster, group or association to which the stars belong. Another identificator of when the star is known to vary is the variable-star name. It is then given in note V. The period of variation, which the rotator model considers to be the rotation period, is quoted in note P, with the indication of the quantities observed to vary with that period (luminosity, spectral line intensities, magnetic field, ...). The period is to be read in note B if the variation originates from an orbital motion (eclipses, ...). The presence of note B means that eclipses or radial-velocity variations have been observed and, whenever possible, the period (and sometimes the eccentricity) is given. If the star received a variable-star name because of oscillations or pulsations such as in δ Sct variables, it is indicated in note V itself. Other notes give the effective magnetic field (L), the mean modulus of the field (M) and the quadratic field (Q).

For Ap stars the most conspicuously overabundant elements are indicated by their chemical symbols besides the spectral type. The K-line type and the metallic-line type are both given for Am stars, separated by a hyphen. If only one type is known, the hyphen nevertheless appears, so that it is always the test to distinguish Ap and Am stars. The δ Del type stars are included among the Am stars, but are marked with dD. Comments about the spectral type may sometimes be found in notes *, e.g., the fact that an author found an Ap type for an Am star or vice versa. However these notes may include other remarks.

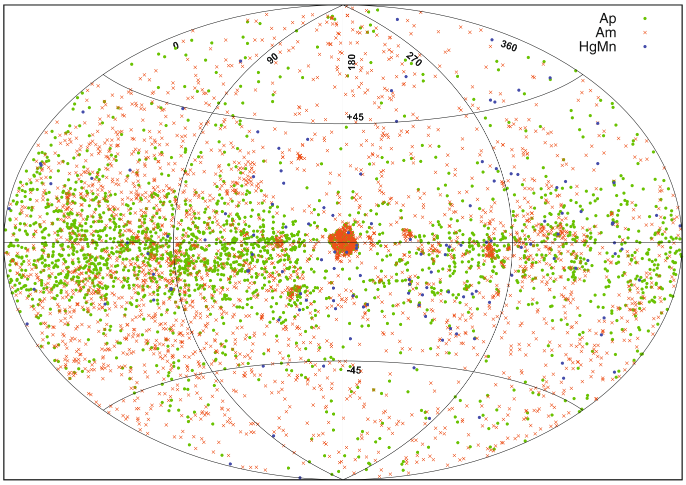

Fig. 1. Distribution of Ap, HgMn and Am stars in galactic coordinates. The chart is centered on the galactic anticenter, $l = 180$, where the density of identified CP stars is highest thanks to Kharadze & Chargeishvili's survey (1990).

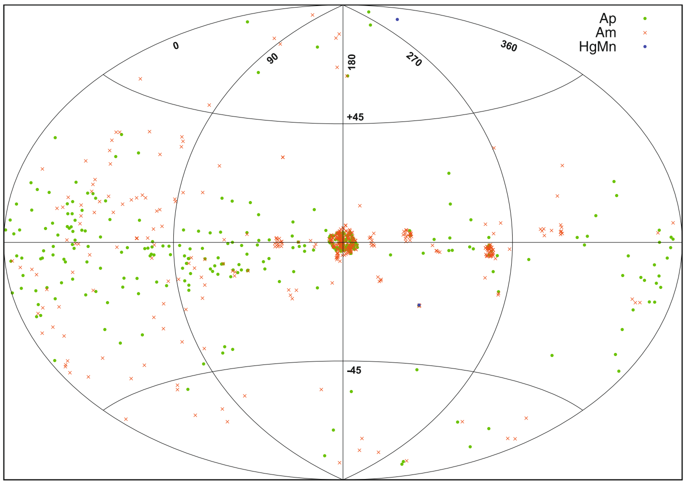

Fig. 2. Distribution of faint ($V > 10$) Ap, HgMn and Am stars in galactic coordinates.

3. Analysis

The catalogue is far from homogeneous and there remains considerable observational biases relative to several parameters. As such it is not well suited to perform statistical analyses. We nevertheless illustrate its content with several informative plots.

The spatial distribution of stars is shown in Figs. 1, 2. The darkest patches mainly correspond to areas where the greatest observational efforts have been done, rather than actual concentrations of Ap and Am stars. This is particularly true around the galactic anticenter. The galactic equator is prominent mainly for the Ap stars – which are more luminous and globally more distant – and several galactic clusters can be identified.

The color–magnitude diagram (Fig. 3) is given for stars having parallaxes with relative errors smaller than 0.1. Different symbols are used for stars with different spectral characteristics (Si, HgMn, EuSrCr, Am, etc.). These results concern relatively nearby stars with accurate data and, consequently, small samples. Larger samples can be used for color-color ($U-B$, $B-V$)

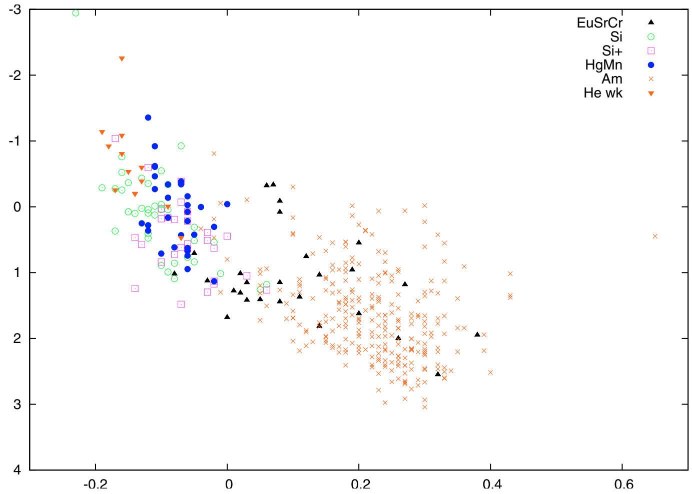

Fig. 3. Absolute V magnitude as a function of $B - V$ for different groups of stars. ApSi with and without additional elements have distinct symbols.

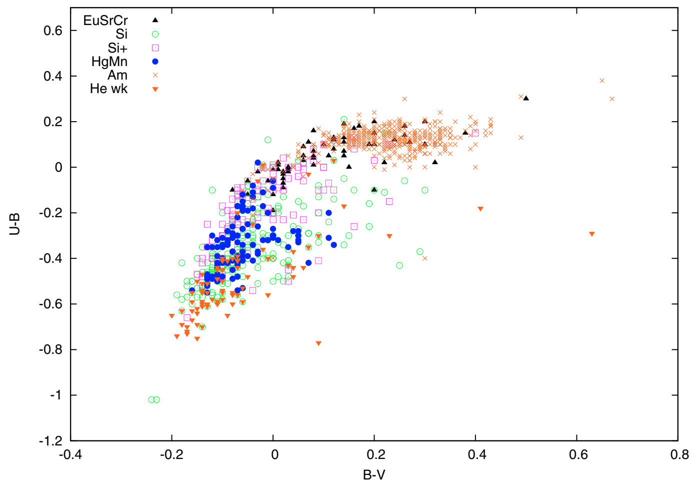

Fig. 4. Colour–colour diagram for stars brighter than $V = 9$.

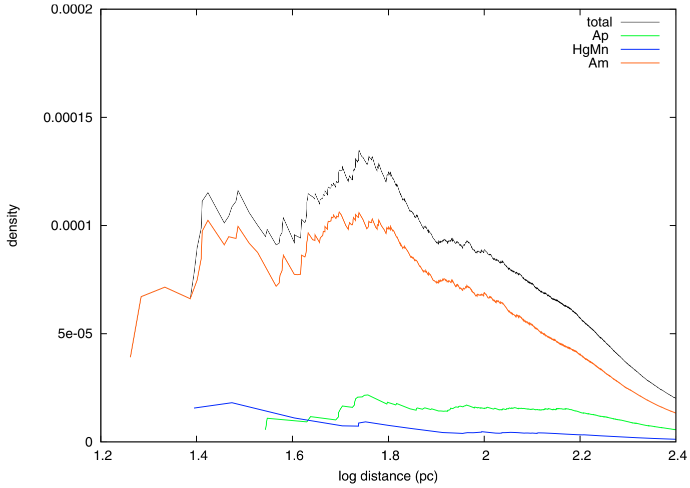

Fig. 5. Average space density in pc^{-3} of confirmed Ap, HgMn and Am stars within a sphere of a given radius, up to about 250 pc.

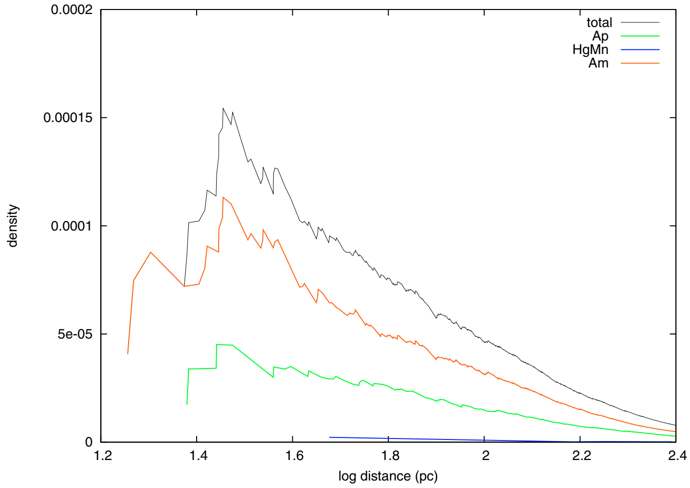

Fig. 6. Average space density of candidate Ap, HgMn and Am stars.

diagrams (Fig. 4). The scatter is larger since the accuracy for the fainter stars is worse, and extinction effects are not accounted for.

The local space density of confirmed and candidate (or uncertain) Ap and Am stars is shown in Figs. 5 and 6. Only stars with a relative parallax error smaller than 0.2 are included. The density of well-established Am stars declines rather sharply above $\log(d) \sim 1.8$, i.e., 60 pc. The density of Ap stars shows a plateau up to $\log(d) \sim 2.15$, i.e., 140 pc. Counts for the less numerous HgMn are not meaningful below $\log(d) \sim 1.8$. Above this they show a plateau similar to the Ap. Perhaps not coincidentally, those distances correspond to an apparent magnitude $V \sim 6$, which shows that the catalogue is at best complete only for the very brightest stars. These spheres include only 103 Am, 45 HgMn and 178 Ap stars. The respective average densities are 1.0×10^{-4} pc^{-3}, 4.0×10^{-6} pc^{-3} and 1.5×10^{-5} pc^{-3}. Confirmation of a fraction of the candidates would significantly boost those values.

The rotational periods are the subject of Figs. 7, 8. The histogram shows the well-known peaked distribution with a maximum around 2 days. No correlation of the period with the color index can be found.

The number of known variables among helium-weak stars has significantly increased from a single one (Landis et al. 1985) or 15 (Renson 1985) to 39 out of a total of 111 stars.

Eclipsing Ap-stars are still uncommon. Their spectral variations during the eclipses could help map the stellar surface (see, e.g., Renson & Mathys 1984). However, their primary interest is the possibility to determine unambiguously the fundamental parameters of the components, which in turn allow one to derive other constraints, such as their evolutionary status. Table 2 lists the eclipsing Ap-stars of the catalogue, including those with a "?", i.e., of a still doubtful Ap nature. We excluded the well-known Ap star 3 Cen A=V983 Cen (Rns 34750), because the presence of eclipses is not well established. Among the 15 remaining stars, 8 are flagged with a "?". Moreover, V883 Cen=HR 5292 (Rns 35356) is a poor candidate for the suggested analysis since the Ap star is the secondary component and its spectrum is diluted by the much brighter B5 primary. IU Lup (Rns 37610) is also doubtful because it is perhaps a δ Del type star rather than an Fp Sr. Thus, only 5 bona fide candidates remain: AR Aur (Rns 8740), V414 Pup (18190), AO Vel (19090), HY Vir (33030), V892 Cen (34910).

Not surprisingly, the eclipsing Am are much more frequent (73 in the catalogue). Similarly, the distribution of orbital periods (Fig. 9) among binaries confirms a lower proportion of

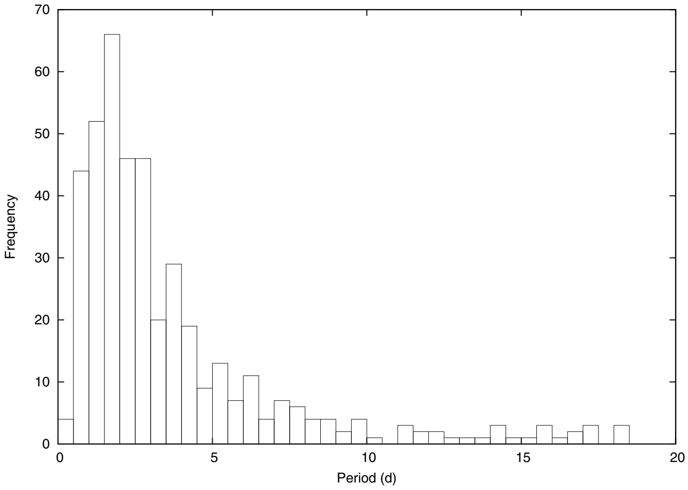

Fig. 7. Distribution of rotational periods of Ap stars below 20 days. Confirmed as well as candidate stars are included. When several periods are possible, only the first listed in the catalogue is considered.

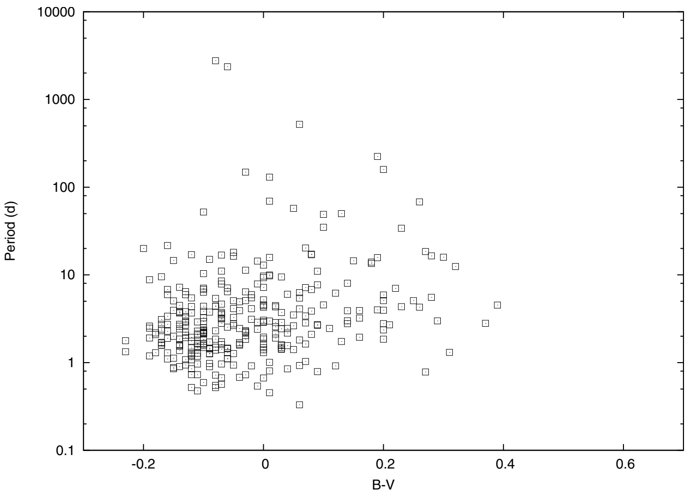

Fig. 8. Rotational periods of Ap stars as a function of $B - V$.

Table 2. Eclipsing variables among Ap. A question mark denotes star for which the Ap character is uncertain.

Rns	HD	Name	P (d)	V	Spectrum	Note
8740	34364	AR Aur	4.1347	6.1	B9 Hg Mn	
12830	47755	V684 Mon	1.8514	8.4	B6	?
18190	66051	V414 Pup	4.75	8.7	A0 Si	
19090	68826	AO Vel	1.5847	9.3	B9 Si	
26180	91021	V349 Vel	P = 3.02	9.7	F3 Sr	?
33030	114125	HY Vir	2.73234	7.8	F2 Sr Eu Cr	
33790		AX Vir	0.70253	10.3	A2	?
34656	120166	BF Vir	0.6406	10.2	A0	?
34910	121276	V892 Cen	6.5146	9.9	A0 Si Cr He	
35356	123335	V883 Cen	35.45	7.	B He wk. Sr	
37610	132515	IU Lup	1.619	9.3	F8 Sr	
37660	132742	δ Lib	2.32735	4.9	A0	?
41470	146772	CC Her	1.734	10.2	A1 Sr	?
49600	178001	BH Dra	1.817	8.4	A2+Ap	?
50300	181615	υ Sgr	137.95	4.6	B8 He	?

tight orbits among the Ap class (see, e.g., North et al. 1998), and probably also the HgMn. Nevertheless, unlike previous surveys (see, e.g., North & Debernardi 2004), the catalogue contains 5 sure cases of Ap stars with orbital periods shorter than 3 days.

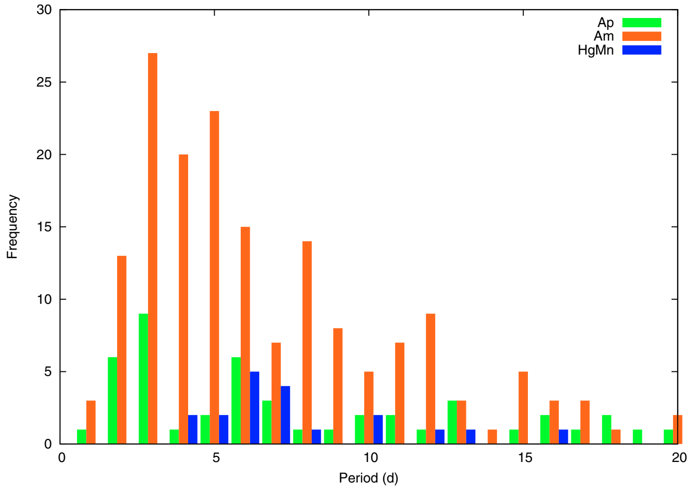

Fig. 9. Distribution of orbital periods below 20 days among the Ap, HgMn and Am binaries. Confirmed as well as candidate stars are included. The first bin corresponds to the interval 0.5–1.5 d.

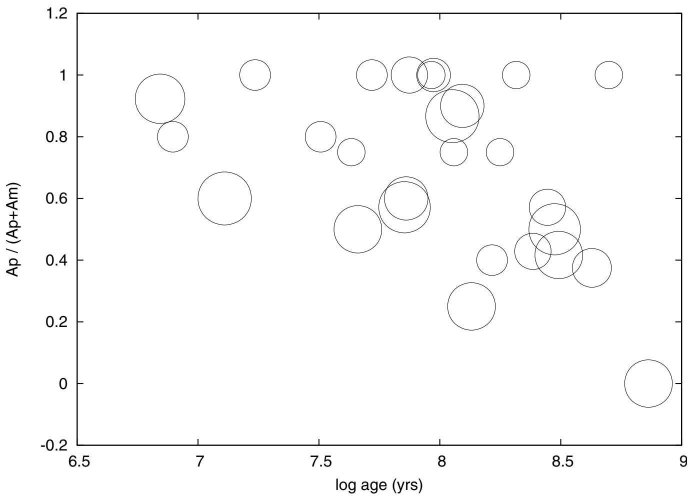

Fig. 10. Fraction of Ap stars among the CP stars in clusters, as a function of the age. The area of the circles is proportional to the number of stars included in the sample. The smallest circles contain 4 stars.

Additionally, there are 7 stars of uncertain Ap nature, and 3 of uncertain period.

Finally a rough correlation between the fraction of Ap stars among all CP stars in clusters and the age of the clusters can be deduced from Fig. 10, as already noticed by Renson (1971).

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