



Introduction

Metadata for digitized astronomical plates represent important issue for investigations using these databases. Description of metadata creation method used for digitization with digital camera will be presented.

Metadata from envelopes of astronomical plates are manually transcribed into an electronic database. Currently more than **1000** records of these plates are transcribed in database.

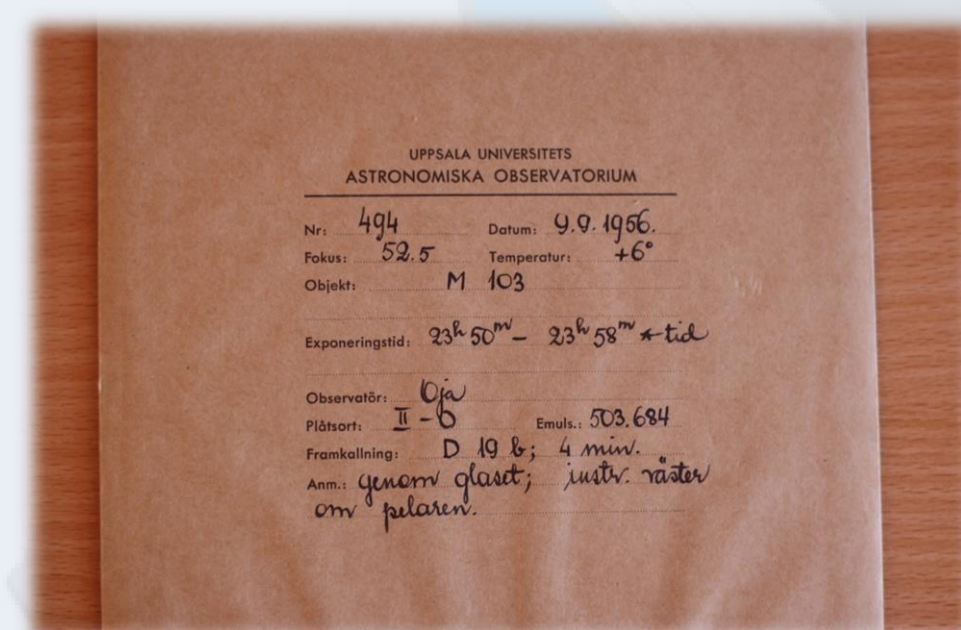
Materials and methods

Computer software is used for the processing of digitized metadata. All metadata must be *transcribed* from the envelopes of astronomical plates taken with a digital camera. This method is only one for metadata extracting from a digitized form and for the subsequent creation of electronic database.

For rewriting metadata is used:

- picture viewer and sophisticated image processor
- spreadsheet

Raw data



Sample of digitized metadata

All of the digitized metadata are saved in JPEG format. Important information are captured on digitized envelopes for individual plates. This information should be rewritten into an electronic database.

Results

ID	OBJECT	Observatory	Telescope	DATE	DATE - JD	Exposure start (UT)	Exposure end (UT)	Emulsion - TYPE	FILTER	Exposure - TIME (min)	RA	DEC
5572	NGC 6025	ESO		28.4.1982	2445088.10208	14:27:00	14:57:11a - J	GG 385		30	15°59'4"	-60°22'
23631	SMC	Cerro Tololo	Curtis Schmidt	14.11.1980	2445575.51181	0:17:00	3:17:08B-04	Ha (7 3/4 sg)		180	0°59'	73°15'
20121	SMC	Cerro Tololo	Schmidt	21.11.1976	2443103.55069	1:13:00	4:13:08B-09	S II		180	0°59'	73°15'
21000	SMC	Cerro Tololo	Schmidt	5/6.11.1977	2444952.5		103aD-IE6	S III		180	0°59'	73°15'
5551	IC 2944	ESO		25.4.1982	2445084.95833	11:00:00	13:00:08B-02	Ha		120	11°34'3"	62°45'
5552	IC 2944	ESO		26.4.1982	2445085.91458	9:57:00	12:57:08B-02	Ha		180	11°34'3"	62°45'
5569	IC 2944	ESO		28.4.1982	2445088.00764	12:11:00	12:41:11a J	GG 385		30	11°34'3"	62°45'
1170	Brac 1	Hawaii	Hawaii 3.6m	April 1956		11:12:00	12:49:11a J	none		97	12°56'38"	35°43'51"
3673	Bracessi	Hawaii	Hawaii 3.6m	21/22.4.1984	2445812.88426	9:13:20	11:13:20:11a J	B Johnson		120	13°03'40"	35°43'33"
3670	Bracessi	Hawaii	Hawaii 3.6m	20/21.4.1984	2445812.02234	12:32:10	13:32:10:11a 0	UG - 1		60	13°03'31"	35°52'09"
3669	Bracessi	Hawaii	Hawaii 3.6m	20/21.4.1984	2445811.97943	11:30:23	12:30:23:11a 0	UG - 1		60	13°03'40"	35°51'02"
3668	Bracessi	Hawaii	Hawaii 3.6m	20/21.4.1984	2445811.91738	10:01:02	11:01:02:11a 0	UG - 1		60	13°04'42"	35°43'33"
3667	Bracessi	Hawaii	Hawaii 3.6m	20/21.4.1984	2445811.8516	8:26:18	9:26:18:11a 0	UG - 1		60	13°02'38"	35°43'37"
1192	Brac 3	Hawaii	Hawaii 3.6m	10/11.4.1981	2444705.95465	10:54:42	11:54:42:11a J	GG385 + BG37		60	13°03'32"	35°43'51"
1184	Brac 3	Hawaii	Hawaii 3.6m	09/10.4.1981	2444704.88674	9:16:54	11:16:54:11a J	GG385 + BG37		120	13°03'32"	35°43'51"
1180	ARP field	Hawaii	Hawaii 3.6m	7/8.4.1981	2444703.05139	13:14:00	14:59:00:11a J	none		105	15°47'44"	48°32'43"
1179	Brac 3	Hawaii	Hawaii 3.6m	7/8.4.1981	2444702.95521	10:55:30	12:55:30:11a F	GG495		120	13°03'31"	35°44'02"
1178	Brac 3	Hawaii	Hawaii 3.6m	7/8.4.1981	2444702.87861	8:58:00	10:28:00:11a F	GG495		90	13°03'31"	35°43'56"
1175	Brac 3	Hawaii	Hawaii 3.6m	6/7.4.1981	2444701.9775	11:27:36	13:27:36:11a J	none		120	13°01'50"	35°45'53"
1174	Brac 1	Hawaii	Hawaii 3.6m	6/7.4.1981	2444701.8631	8:42:52	10:42:52:11a J	none		120	12°56'58"	35°43'51"
2008	SA 57	Hawaii	Hawaii 3.6m	21/22.5.1982	2445111.86314	8:42:55	10:42:55:11a J	none		120	13°07'08"	29°29'42"
2007	Brac 3	Hawaii	Hawaii 3.6m	21/22.5.1982	2445111.83317	7:59:46	8:19:46:11a J	none		20	13°03'12"	35°45'37"
2006	Brac 3	Hawaii	Hawaii 3.6m	21/22.5.1982	2445111.74895	5:58:29	7:58:29:11a J	none		120	13°03'14"	35°45'43"
2003	Brac 3	Hawaii	Hawaii 3.6m	20/21.5.1982	2445110.91339	10:23:55	12:23:55:11a F	GG495		102	13°03'17"	34°45'15"
2002	Brac 3	Hawaii	Hawaii 3.6m	20/21.5.1982	2445110.0663	13:35:11	15:35:11:11a F	GG495		120	13°03'14"	34°45'23"
2001	Brac 3	Hawaii	Hawaii 3.6m	20/21.5.1982	2445110.81687	7:36:18	7:56:18:11a F	GG495		20	13°03'14"	35°45'34"
1998	Brac 3	Hawaii	Hawaii 3.6m	19/20.5.1982	2445109.86086	8:39:38	10:27:38:11a J	none		108	13°03'10"	35°44'20"
1997	Brac 3	Hawaii	Hawaii 3.6m	19/20.5.1982	2445109.768	6:25:55	8:25:55:11a J	none		120	13°03'10"	35°44'25"
1996	Brac 3	Hawaii	Hawaii 3.6m	19/20.5.1982	2445109.7538	6:05:28	6:25:28:11a J	none		20	13°03'12"	35°44'33"
1973	Brac 3	Hawaii	Hawaii 3.6m	17/18.5.1982	2445107.83289	7:59:22	8:59:22:11a J	GG385 + BG37		60	13°04'07"	35°44'32"
155	NGC 6822	ESO		1/2.10.1981	2444880.35417	20:30:00	22:28:00:11a J	GG4390		118	19°43'43"	14°52'51"
150	NGC 6822	ESO		30.9.1981	2444878.35417	20:30:00	22:00:00:11a J-B	GG4390		90	19°43'48"	14°52'37"
3819	Veron/Kunth	ESO		20.7.1980	244441.42153	22:07:00	23:07:00:11a 0	GG385		60	22°06'02"	18°41'4"
3865	Veron	ESO		3.9.1980	2444486.36736	20:49:00	21:49:00:11a n - sensit.	RG715		60	22°06'05"	18°49'7"
3862	Veron	ESO		2.9.1980	2444485.39792	21:33:22:55	22:48:23:02:11a 0	UG1/GG385		75/7	22°06'05"	18°49'7"
3877	Veron	ESO		8.9.1980	2444491.37917	21:06:00	21:56:00:103a 0	GG495		50/22	22°06'06"	18°49'5"

Sample of metadata transferred into an electronic database

There are some examples of digitized metadata transcribed into an electronic database. These parameters are important for each astronomical plate: ID, Object name, Observatory, Telescope, Date, Exposure Start, Exposure End, Emulsion type, Filter type, Exposure – time and RA and DEC of specific object.

ID	OBJECT	Observatory	Telescope	DATE (DD-DDMMYYYY)	Exposure start (UT)	Exposure end (UT)	Emulsion - TYPE	FILTER	Exposure - TIME (min)	RA (h m)	DEC (° ' ")
14594	IC 2602	ESO	D19	20 2 1991	6 49/6 55	6 56/7 2	11a-0		6,6	10 42,7	(-54)20
14596	IC 2944	ESO	D19	20 2 1991	8 36/8 45	8 47/8 57	11a-0 backed		10,10	11 36,2	(-62)58
14597	IC 2944	ESO	D19	20 2 1991	9 3	9 6	11a-0 backed		3	11 36,2	(-62)58
14598	IC 2944	ESO	D19	20 2 1991	9 8	9 26	11a-0 backed		18	11 36,2	(-62)58
test	?	ESO	D19	13 2 1991	9 34 30	9 35 30	103a-D	GG495	1	17 46,1	(-28)51
test	Tr10	ESO	D19	16 2 1991	5 27	5 37	11a-0		10	8 47,4	(-42)27
test	Tr10	ESO	D19	16 2 1991	5 49	5 59	103a-D		10	8 47,4	(-42)27
?	C Vir	ESO	D19	16 2 1991			11a-0				
?	B Vir	ESO	D19	17 2 1991			11a-0				
test	Leporis	ESO	D19	16 2 1991			11a-0		6x10s	5 56	(-11)10
?	B Leporis	ESO	D19	17 2 1991	0 42	1 1	11a-0		28s		

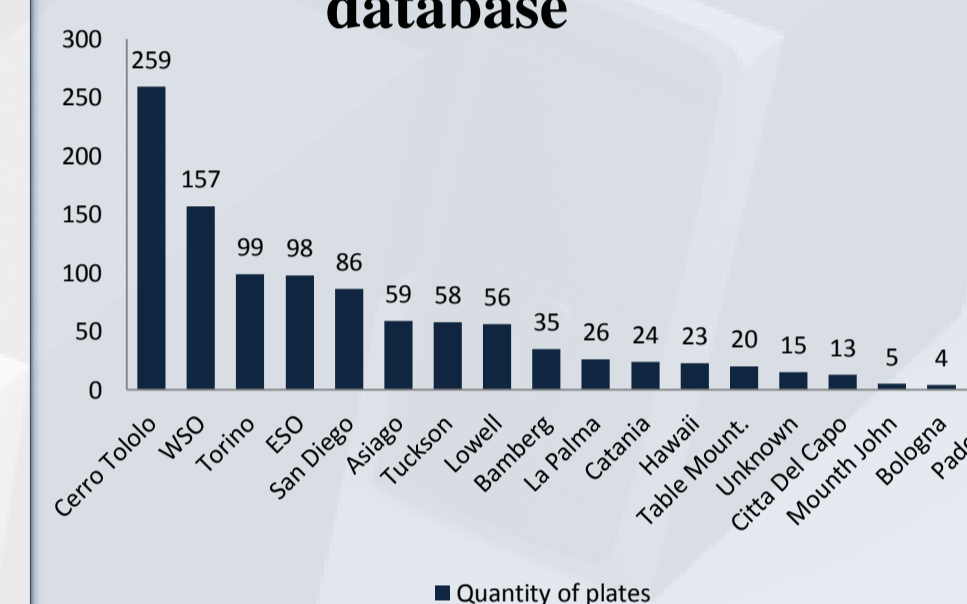
Another samples of electronic database of metadata – some data are missing

In terms of success of metadata transfer into an electronic form are 3 essential factors: **Focus** of digital images, **readability** of handwritten details and **missing data** issue.

ID	OBJECT	Observatory	Telescope	DATE (DD-DDMMYYYY)	Exposure start (UT)	Exposure end (UT)	Emulsion - TYPE	FILTER	Exposure - TIME (min)	RA (h m)	DEC (° ' ")
1125	?	Torino	Morais	9 3 1989	23 58	24 2	103a-0		6:30s	8 40	20 0
22713	?	ESO	D19	12 12 1988	8 30 30/8 32	8 31 30/ 8 34 30	11a-0	none	1, 2 30s	8 39	20
856	NGC 2264	Torino	Morais	2 12 1983	26 15		11a-0		60	6 40,6	9 41
381	NGC 2264	Torino	R	29 1 1989	22 20		103a-D	GG495	60	6 40,5	9 58
14034	NGC 2516	ESO	D19	22 3 1990	1 29	1 35	103a-D	GG495	6	7 58,2	(-60) 50
14003	NGC 2244	ESO	D19	26 3 1990	0 55	1 05	11a-0		10	6 31,9	4 52
1155	St 2	Torino	Morais	23 8 1989	26 52	27 6	103a-0		16,10	2 14,2	59 13
355	St 2	Torino	R	24 6 1985	19 2,5		103a-D	GG495	5	2 14,2	59 13
1171	Stock 2	Torino	Morais	25 7 1991	25 55		11a-0		44	2 14,4	59 13
356	St 2	Torino	R	24 1 1989	19 12,5		11a-0	GG385	5	2 14,2	59 13
1183	NGC 2422	Torino	Morais	25 2 1995	20 19		11a-0		16	7 36,2	(-14) 29
14497	IC 2395	ESO	D19	24 2 1992	3 35	3 45	103a-D	GG495	6	8 40,7	(-48) 9
14498	IC 2395	ESO	D19	24 2 1992	3 45	4 05	103a-D	GG495	20	8 40,7	(-48) 9

Data summary

There are **1039** of metadata records in this database



Quantity of plates metadata – local distribution

This figure represent only the currently processed metadata, not the real number of astronomical plates. There are **2000+** more digitized plates for other processing (e.g. Uppsala, Tuorla).

Conclusions

The **main advantage** is a manual and careful control of every data but, of course, limited by the human factor. However, this method is only suitable for further work with the relevant metadata.

The **disadvantage** is that this method is relatively time-consuming because of manual rewriting of metadata from envelopes of astronomical plates. It also requires consistent monitoring of each element.

Especially problematic are unreadable or missing data (particularly in names of the objects or missing IDs of some astronomical plates). Repairs of digitized metadata using a image processor are sometimes needed.

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