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S^3OS^2: the visible spectroscopic survey of 820 asteroids ☆

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Abstract

We present the results of a visible spectroscopic survey of 820 asteroids carried on between November 1996 and September 2001 at the 1.52 m telescope at ESO (La Silla). The instrumental set-up allowed an useful spectral range of about 4900 Å $< \lambda <$ 9200 Å. The global spatial distribution of the observed asteroids covers quite well all the region between 2.2 and 3.3 AU though some concentrations are apparent. These are due to the fact that several sub-sets of asteroids, such as families and groups, have been selected and studied during the development of the survey. The observed asteroids have been classified using the Tholen and the Bus taxonomies which, in general, agree quite well.

Keywords: Asteroids; Asteroids, composition; Spectroscopy; Surfaces, asteroids

1. Introduction

It has long been realized the importance of a precise compositional characterization of the asteroid belt to model the Solar System origin and evolution. We recall that the majority of the asteroids have orbits in the region between 2.2 and 3.3 AU and this region defines the transition between terrestrial and giant planets. Therefore, the identification of the compositional and mineralogical properties of a large sample of these objects will ultimately lead to a better understanding of the physical and chemical evolution of the Solar System.

Although more than 60,000 asteroids have well established orbital behavior, less than 10% of these have their compositional properties determined. This knowledge is due mainly to two large surveys: the Eight-Color Asteroid Survey (ECAS) (Zellner et al., 1985) and, more recently, the Small Main-Belt Spectroscopic Survey (SMASS) (Xu et al., 1995; Bus, 1999; Burbine, 2000; Bus and Binzel, 2002a; Burbine and Binzel, 2002). Spectrophotometric observations of nearly 600 asteroids were obtained by the ECAS while SMASS obtained spectroscopic observations of about 1400 asteroids. These two large sets of data were followed by new schemes of classification, or taxonomies. The ECAS originated three main taxonomies, with very similar results, by Tholen (1984), Barucci et al. (1987), and Tedesco et al. (1989). Of these, the most used has been the first one, known as the Tholen taxonomy (Tholen and Barucci, 1989). In the case of SMASS, a new classification has been developed by Bus and Binzel (Bus, 1999; Bus and Binzel, 2002b) and will be referred as the Bus classification hereafter.

In order to contribute to the compositional characterization of the main belt we performed a new visible spectroscopic survey of asteroids, the Small Solar System Objects Spectroscopic Survey, denominated S^3OS^2 (Lazzaro et al., 1997). The observations were carried out at ESO (La Silla, Chile) under the agreement with the Observatório Nacional. We present here the complete survey, consisting of spectra and taxonomic classification of 820 asteroids, and an overview of its main results, some of which were published in separate papers. A description of the observations and data reduction will be given in the next section. In Section 3 we

☆ Based on observations made with the 1.52 m telescope at the European Southern Observatory (La Silla, Chile) under the agreement with the CNPq/Observatório Nacional.

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describe the main characteristics of the S^3OS^2 while some discussions and conclusions are given in the last section.

2. Observations and data reduction

The observations were carried out at the European Southern Observatory at La Silla (ESO–Chile). We used the ESO 1.52-m telescope equipped with a Boller and Chivens spectrograph and a CCD 2048×2048 pixels with a readout noise of $7[e^- rms]$ and a square pixel of 15 μm. A grating of 225 gr/mm with a dispersion of 330 Å/mm in the first order was used. This configuration resulted in an useful spectral range of 4900 Å $< \lambda <$ 9200 Å with a FWHM of 10 Å. The spectra were taken through a 5 arcsec slit oriented in the East–West direction. This slit direction and width has been chosen in order to minimize the consequences of loss of light due to the asteroid's differential motion with respect to the telescope sideral tracking. The lack of an automatic differential tracking of the telescope was compensated by a procedure which paused an exposure as many times as necessary in order to guarantee that the object would always be inside the slit. A wide slit oriented in the E–W direction allowed, most of the times, a minimum number of pauses. It is important to note that although the atmospheric dispersion occurs in the N–S direction, the effect is not significant in our observations which were made, with just few exceptions, at small zenith distances.

The spectra discussed in the present paper were obtained in sixteen observing runs between November 1996 and September 2001 under atmospheric conditions from good to excellent in most of them. The observational circumstances for all the objects are listed in Appendix A, Table A.1, where for each asteroid are presented its denomination, the night of observation, the observing time, the exposure time, the airmass, the apparent visual magnitude, the solar phase angle and the solar analog star used in the reduction. In the last column N/M indicates, for each asteroid, the number of obtained spectra, N, distributed on how many different nights, M. Note that the values for the night of observation, start and exposure time, apparent visual magnitude and phase angle refer to just one selected spectrum which was chosen as the one with the smallest noise in the region between 6000 and 6500 Å.

The analysis of Appendix A gives some insight on the general properties of the survey. First of all, the observations were made as near as possible to the local meridian of the asteroid, at airmasses between 1 and 2.11, with a median value of 1.13, as can be seen in Fig. 1a. Another important characteristic is that 70% of the asteroids have been observed more than once and 53% of them on two different, and quasi-consecutive, nights. This procedure guarantees that the given classification of the spectra can be considered quite secure, once a similar classification is obtained over the diverse observations. Note, however, that compositional differences on an asteroid's surface can exist and these will give rise to

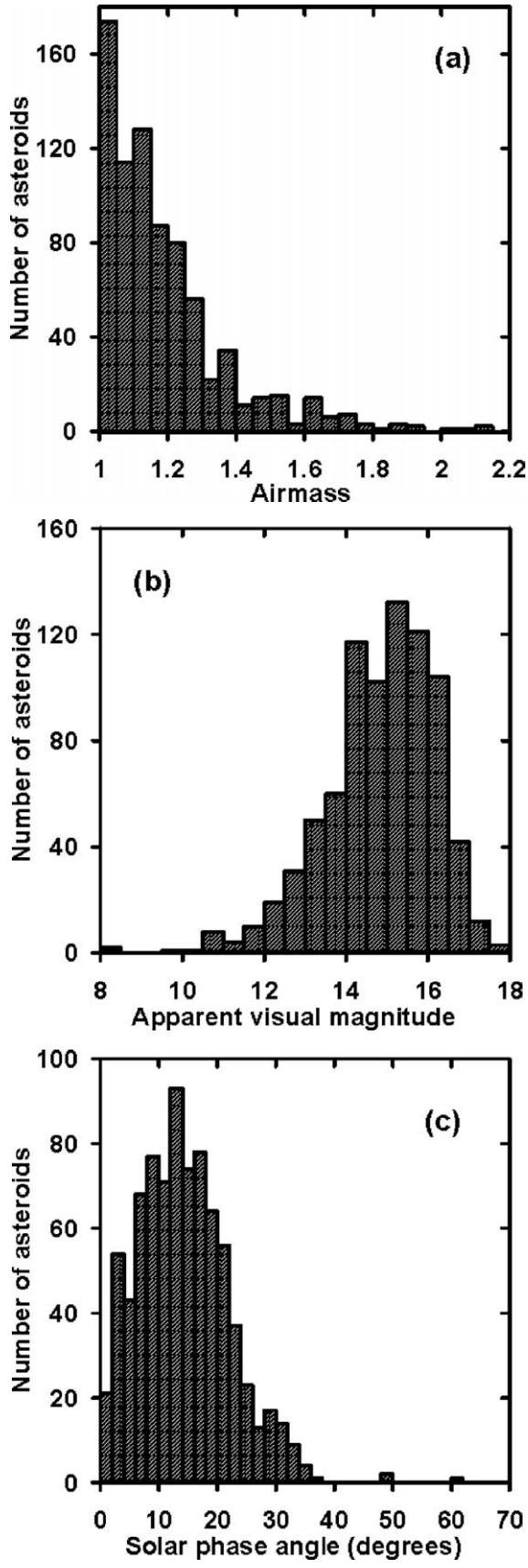

Fig. 1. Distribution of the observational characteristics of the S^3OS^2: (a) airmass, (b) apparent visual magnitude, and (c) solar phase angle.

slightly distinct spectra. As the asteroid rotates around its axis and as the viewing geometry changes, due to the orbital motion of the Earth and the object, different areas are probed. We can, therefore, or give the spectrum of a specific instant which will represent the surface composition of the area visible at that moment, or average all the obtained spectra trying to identify a "mean" spectra for each asteroid. In the present paper we preferred the first option, being aware that the given classification rigorously is representative only of the observed surface.

The observed asteroids had apparent visual magnitude between 8.3 and 17.9, with a median value of 15.0, as shown in Fig. 1b. Finally, most of the main-belt asteroids (Fig. 1c) were also observed at small solar phase angles, median of 13.7°, in order to avoid the effect known as "phase reddening" which appears at large phase angles (Millis et al., 1976; Bowell and Lumme, 1979; Lumme and Bowell, 1981; Luu and Jewitt, 1990).

The spectral data reduction was performed using the IRAF package and the classical procedure with averaged bias and dome flat-fields. Wavelength calibration was performed using a He–Ar lamp, which spectrum was obtained several times during each night. The spectra were corrected for airmass by using the mean extinction curve of La Silla (Tüg, 1977). Different solar analogs (Hardorp, 1978) were observed in each observational run in order to compute reflectivities. In particular, at least two solar analogs were observed during each night of observation. The solar analog spectra were reduced in the same fashion as the asteroids. After reduction, the asteroid spectra were divided by that of the solar analog star thus yielding the reflectance spectrum of the asteroid. Tests made using different solar analogs produced differences in the reflectance spectra which, in general, are smaller than 1%/10^3 Å. The solar analogs HD44594 and HD144585 were the most adopted in the survey. All the obtained asteroid spectra have been normalized around 5500 Å by convention.

In Appendix B (Fig. B.1) is given, for each asteroid, the selected spectrum for which the observing circumstances are given in Appendix A. For comparison purposes, all the plots are given in the same scale allowing a visual assessment of the quality of the spectra. These data are also available for download at the web site http://www.on.br.

3. The S^{3}OS^2 survey

The global spatial distribution of the observed asteroids is shown in Fig. 2 where the semi-major axis versus eccentricity (a) and inclination (b) are plotted. It can be easily seen that the present survey covers quite well all the main belt, between 2.2 and 3.3 AU, though some concentrations are apparent in and outside this region. These are due to the fact that the survey focused on the study of several sub-sets of asteroids such as several large families and groups, as well as the outer part of the belt, around 3.1 AU.

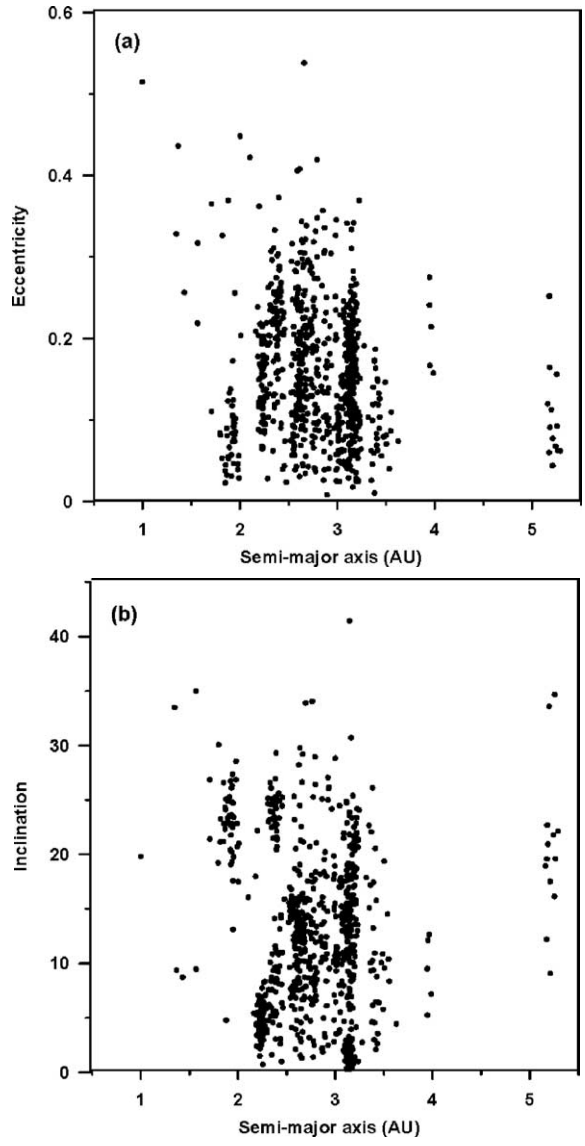

Fig. 2. Spatial distribution of the asteroids observed in the S^{3}OS^2: (a) semi-major axis versus eccentricity, and (b) semi-major axis versus inclination.

The analysis of the observational bias of the survey as well as its complementariness with the SMASSII survey has been discussed in Mothé-Diniz et al. (2003). For comparison, in Fig. 3(a)–3(b) is given the distribution in semi-major axis versus diameter of the objects observed in SMASSII and S^{3}OS^2 surveys, respectively. As can be seen, the two surveys are quite similar, with the SMASSII more concentrated in the inner and intermediate zone of the belt while the S^{3}OS^2 in the outer part. The combined data of the two surveys confirm the trend in compositions already shown in previous works (Gradie et al., 1989; Bell et al., 1989; Bus, 1999) going from S-types in the inner belt to D-types in the outer part. However, a greater mixing of compositions is apparent as we go to smaller objects and as we go from objects with nearly circular and planar orbits to "scattered" asteroids, i.e., in high-inclination and/or high-eccentricity orbits (Mothé-Diniz et al., 2003).

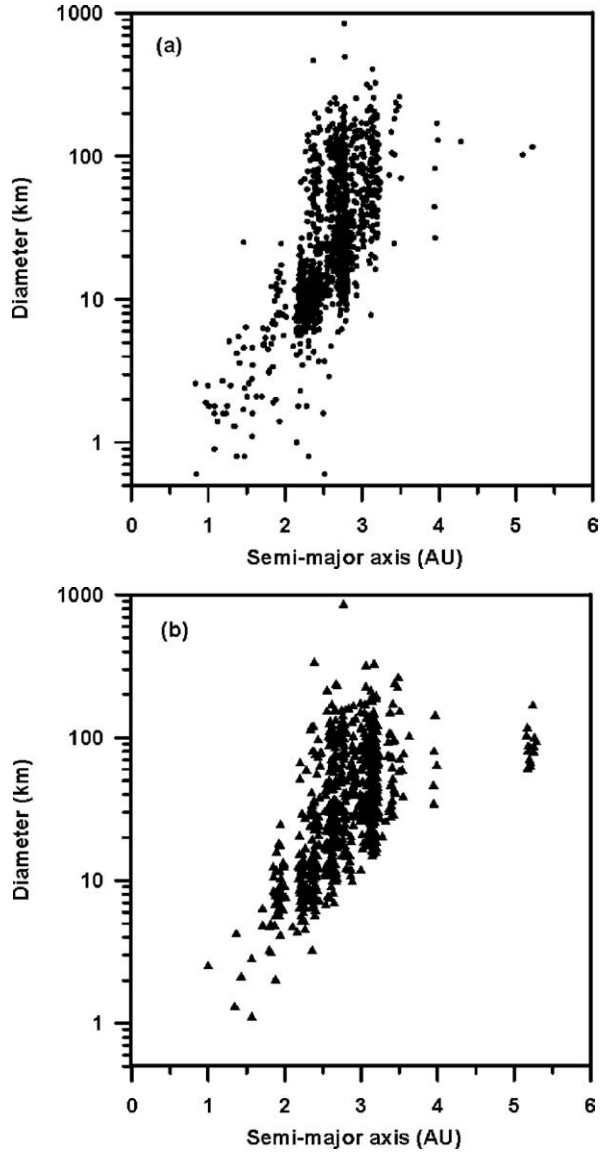

Fig. 3. Distribution of semi-major axis versus diameter of the asteroids observed in the SMASS, (a), and the S^3OS^2, (b).

The obtained spectra have been used to classify the asteroids according to the Tholen and the Bus taxonomies. In the first case the classification has been performed just by a visual comparison with templates of the Tholen classes. This "Tholen-like" classification was further modified including a "Caa" class which indicates an asteroid with a C-type classification by Tholen, but presenting a broad absorption band that can be associated to a process of aqueous alteration (Vilas et al., 1994). On the other hand, the classification by Bus has been obtained through a semi-automatic program developed following the scheme described in Bus (1999). The taxonomic classification of all the observed asteroids is given in Table 1. For each observed asteroid is given our classification using Tholen-like (T) and Bus (B) taxonomies and, whenever available, its classification by Tholen (1989) and by Bus and Binzel (2002b). We would like to point out that the classification of Asteroid 7868 Barker is just ten-

Table 1
Classification of the observed asteroids

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
1	Ceres	G	C	C	C
3	Juno	S	Sk	S	Sk
9	Metis	S		T	T
12	Victoria	S		D	D
21	Lutetia	M	Xk	X	X
23	Thalia	S		S	S
24	Themis	C	B	B	C
25	Phocaea	S	S	S	Sa
27	Euterpe	S		S	L
29	Amphitrite	S	S	S	L
33	Polyhymnia	S	Sq	S	S
37	Fides	S	S	S	K
43	Ariadne	S	Sk	S	S
47	Aglaja	C	B	B	B
50	Virginia	X	Ch	Caa	Ch
56	Melete	P	Xk	X	X
57	Mnemosyne	S	S	S	S
58	Concordia	C	Ch	Caa	Cgh
62	Erato	BU	Ch	B	B
65	Cybele	P	Xc	C	C
68	Leto	S		S	S
78	Diana	C	Ch	Caa	Ch
84	Klio	G	Ch	Caa	Ch
85	Io	FC	B	C	Cb
87	Sylvia	P	X	X	X
89	Julia	S	K	S	Ld
90	Antiope	C	C	Caa	Ch
91	Aegina	CP	Ch	Caa	Ch
93	Minerva	CU	C	C	Cb
95	Arethusa	C	Ch	Caa	Ch
98	Ianthe	CG	Ch	Caa	Ch
104	Klymene	C	Ch	Caa	Ch
105	Artemis	C	Ch	Caa	Ch
106	Dione	G	Cgh	Caa	Cgh
107	Camilla	C	X	X	X
109	Felicitas	GC	Ch	Caa	Ch
112	Iphigenia	DCX	Ch	Caa	Ch
115	Thyra	S	S	S	K
117	Lomia	XC	X	X	X
119	Althaea	S	Sl	A	Ld
127	Johanna	C	Ch	Caa	Ch
130	Elektra	G	Ch	Caa	Ch
133	Cyrene	SR	S	S	S
140	Siwa	P	Xc	C	Cb
141	Lumen	CPF	Ch	Caa	Ch
145	Adeona	C	Ch	Caa	Ch
148	Gallia	GU	S	S	Sl
154	Bertha		C	C	Cb
156	Xanthippe	C	Ch	Caa	Ch
164	Eva	CX	X	X	X
166	Rhodope	GC:	Xe	X	Xk
168	Sibylla	C	Ch	Caa	Ch
169	Zelia	S	Sl	S	O
170	Maria	S	S	S	Sl
171	Ophelia	C	C	C	Cb
173	Ino	C	Xk	X	X
176	Iduna	G	Ch	Caa	Ch
177	Irma	C:	Ch	Caa	Ch
181	Eucharis	S	Xk	X	X
183	Istria	S	S	S	S
184	Dejopeja	X	X	X	X

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
191	Kolga	XC:	Cb	X	X
194	Prokne	C	C	Caa	Ch
199	Byblis		X	X	X
205	Martha	C	Ch	Caa	Ch
207	Hedda	C	Ch	Caa	Ch
214	Aschera	E	Xc	B	B
217	Eudora	X		X	X
219	Thusnelda	S		S	L
220	Stephania	XC		X	Xk
223	Rosa	X		X	Xc
224	Oceana	M		X	T
226	Weringia		S	S	Sk
227	Philosophia			X	X
229	Adelinda	BCU		C	Cb
233	Asterope	T	K	T	T
241	Germania	CP	B	C	Cb
246	Asporina	A	A	A	L
249	Ilse			Caa	Ch
251	Sophia			S	Sl
252	Clementina			Caa	Ch
254	Augusta			S	Sl
255	Oppavia			X	X
258	Tyche		S	S	S
259	Aletheia	CP	X	X	X
260	Huberta	CX:		X	X
265	Anna			X	X
266	Aline	C	Ch	Caa	Ch
268	Adorea	FC		X	X
270	Anahita	S		S	Sl
271	Penthesilea	PC		C	Ch
273	Atropos	SCTU		K	Xk
274	Philagoria			S	L
283	Emma	X		C	C
286	Iclea	CX	Ch	Caa	Ch
293	Brasilia	CX		Caa	Ch
294	Felicia			C	C
298	Baptistina			X	Xc
303	Josephina			Caa	Ch
307	Nike	CX		X	X
309	Fraternitas			X	X
311	Claudia	S		S	Sk
314	Rosalia			B	B
316	Goberta			C	C
323	Brucia	S		S	S
324	Bamberga	CP		C	Cb
329	Svea	C		C	C
332	Siri		Xk	X	X
339	Dorothea	S	K	K	T
350	Ornamenta	C		Caa	Ch
352	Gisela	S	Sl	S	Sl
354	Eleonora	S	Sl	A	S
356	Liguria	C		Caa	Ch
357	Ninina	CX		Caa	B
361	Bononia	DP		D	D
362	Havnia	XC		Caa	Ch
365	Corduba	X	C	Caa	Ch
366	Vincentina		Ch	Caa	Ch
372	Palma	BFC	B	C	X
373	Melusina	C		X	Ch
381	Myrrha	C	Cb	C	X
386	Siegena	C	C	Caa	Ch
388	Charybdis	C	C	X	X
390	Alma	DT		S	S

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
391	Ingeborg	S	S	S	Sl
393	Lampetia	C	Xc	Caa	Ch
394	Arduina	S	S	S	Sl
397	Vienna	S	K	K	T
400	Ducrosa			B	B
403	Cyane	S	S	S	K
404	Arsinoe	C	Ch	Caa	B
405	Thia	C	Ch	Caa	Ch
407	Arachne	C		Caa	Ch
412	Elisabetha		C	X	X
414	Liriope	C	Cg	C	Ch
415	Palatia	DP		X	Xk
417	Suevia	X	Xk	X	X
418	Alemannia	M		X	X
419	Aurelia	F		C	Cb
422	Berolina	DX		X	X
424	Gratia			X	Xc
426	Hippo	F		X	X
429	Lotis	C		X	Xk
431	Nephele	B	B	B	B
434	Hungaria	E	Xe	X	Xe
436	Patricia			X	Xk
437	Rhodia			X	Xc
439	Ohio	X:		T	T
445	Edna	C		Caa	Ch
447	Valentine	TD		X	X
451	Patientia	CU		C	Cb
455	Bruchsalia	CP		X	Xk
457	Alleghenia			X	Xk
459	Signe	S		A	Ld
461	Saskia	FCX		X	X
465	Alekto			T	T
468	Lina	CPF		X	Xk
469	Argentina	X		X	Xk
472	Roma	S		S	K
479	Caprera		C	C	C
480	Hansa	S		S	S
485	Genua		S	S	S
487	Venetia	S		S	K
488	Kreusa	C		Caa	Ch
489	Comacina	C		X	X
491	Carina		C	X	X
493	Griseldis			X	X
494	Virtus	C	Ch	Caa	Ch
500	Selinur			S	Sk
501	Urhixidur			Caa	Cg
502	Sigune	S		S	S
504	Cora		X	X	X
506	Marion	XC		X	X
508	Princetonia	C		X	X
510	Mabella	PD		T	T
511	Davida	C	C	X	X
514	Armida	XC		X	Xe
517	Edith	X		X	C
521	Brixia	C	Ch	Caa	Ch
522	Helga	X		X	X
524	Fidelio	XC		Caa	Ch
525	Adelaide	SU		S	S
526	Jena	B		C	Ch
527	Euryanthe		Cb	C	Cb
530	Turandot	F		C	Cb
536	Merapi	X		X	X

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
537	Pauly	DU:		S	S
539	Pamina		Ch	Caa	Ch
544	Jetta			S	Sl
545	Messalina	CD	Cb	C	Cb
547	Praxedis	XD:	Xk	T	T
558	Carmen	M		X	Xk
565	Marbachia	S		D	D
567	Eleutheria	CFB:		X	X
568	Cheruskia			C	C
569	Misa	C	Cg	Caa	Ch
573	Recha			T	T
576	Emanuela			Caa	Cgh
579	Sidonia	S	K	K	D
581	Tauntonia		Xk	X	X
589	Croatia	CX		X	X
595	Polyxena			T	T
598	Octavia	C:	X	D	Cb
601	Nerthus	X	C	C	Cb
602	Marianna	C		Caa	Ch
607	Jenny			X	Ch
612	Veronika			D	D
616	Elly	S		S	L
618	Elfriede	C		C	C
619	Triberga	S		S	Sl
621	Werdandi	FCX:		B	B
625	Xenia		Sa	A	Ld
626	Notburga	CX	Xc	C	Cb
628	Christine	SD		X	Xc
630	Euphemia			S	Sl
635	Vundtia	C		Caa	B
640	Brambilla	G		C	C
657	Gunlod			C	C
660	Crescentia	S		S	Sl
662	Newtonia			S	Sk
663	Gerlinde	X		X	X
665	Sabine			X	X
666	Desdemona			D	D
667	Denise			C	C
680	Genoveva	XC		X	X
683	Lanzia			C	C
685	Hermia			S	S
690	Wratislavia	CPF		B	B
692	Hippodamia	S		S	Sl
694	Ekard	CP:		Caa	Ch
696	Leonora	XC		X	X
697	Galilea	C:		Caa	Ch
699	Hela	S	Sk	S	Sk
702	Alauda	C	B	C	X
704	Interamnia	F	B	B	B
705	Erminia	X	C	X	X
713	Luscinia	X	C	X	Ch
714	Ulula	S		S	L
716	Berkeley	S	S	K	Sq
717	Wisibada	DX:		T	T
721	Tabora	D		D	D
726	Joella			D	T
727	Nipponia	DT		X	X
728	Leonisis			A	Ld
729	Watsonia	STGD	L	T	D
732	Tjilaki			D	D
734	Benda			X	X
739	Mandeville	X	X	X	X
740	Cantabia	CX		C	Cb

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
746	Marlu	P		C	X
747	Winchester	PC	C	B	B
752	Sulamitis			Caa	Ch
753	Tiflis	S	L	A	L
756	Lilliana			D	T
760	Massinga	SU		S	Sl
761	Brendelia	SC		S	S
762	Pulcova	F		C	Cb
764	Gedania	C		Caa	Ch
768	Struveana	X		X	X
772	Tanete	C		C	Cb
775	Lumiere	S		T	D
777	Gutemberga			C	Cb
778	Theobalda	F		C	C
779	Nina		X	X	X
780	Armenia			C	C
788	Hohensteina			Caa	Ch
790	Pretoria	P		X	X
791	Ani	C		C	Ch
796	Sarita	XD	X	X	X
804	Hispania	PC	C	C	C
808	Merxia		Sk	S	Sq
809	Lundia			V	V
814	Tauris	C	C	X	X
815	Coppelia		Xe	X	Xk
816	Juliana			X	Xc
817	Annika			S	Sl
822	Lalage	DXCU		A	Sl
829	Academia			Caa	Ch
834	Burnhamia	GS:		X	X
838	Seraphina	P		X	X
846	Lipperta	CBU:		C	C
847	Agnia	S	S	S	S
848	Inna			C	Cb
850	Altona			X	X
857	Glasenappia	MU		S	Sl
859	Bouzareah			C	X
869	Mellena			C	C
870	Manto		S	S	S
874	Rotraut			Caa	Ch
881	Athene			S	Sl
882	Swetlana			X	X
889	Erynia			S	Sl
891	Gunhild			D	T
892	Seeligeria			X	X
893	Leopoldina	XF		C	C
894	Erda			X	X
897	Lysistrata	S	Sl	S	L
899	Jokaste	XB		X	X
904	Rockefellia			Caa	Ch
906	Respsolda			K	K
911	Agamemnon	D		D	D
914	Palisana	CU		Caa	Ch
917	Lyka			X	X
921	Jovita			Caa	Ch
923	Herluga			C	C
928	Hildrun			X	X
929	Algunde		S	S	Sl
932	Hooveria	CB		Caa	Ch
936	Kunigunde			B	B
943	Begonia	ST		X	Ch
947	Monterosa			S	S

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
949	Hel			X	Xk
950	Ahrensa		Sa	S	S
952	Caia			X	X
953	Painleva			S	S
954	Li	FCX		C	Cb
955	Alstede			S	Sl
956	Elisa			V	V
957	Camelia			C	Cb
966	Muschi	S		S	Sl
968	Petunia	S		S	Sl
972	Cohnia			X	X
973	Aralia		Xk	X	X
977	Philippa	C		X	X
978	Aidamina	PF		X	X
979	Ilsewa			T	T
981	Martina	CFU:		B	B
982	Franklina			A	Ld
983	Gunila	XD		X	Xk
986	Amelia			T	T
987	Wallia			D	T
988	Appella			B	Cb
989	Schwassmannia			S	T
1000	Piazzia			C	Cb
1003	Lilofee			B	B
1004	Belopolskya	PC		X	X
1005	Arago			X	Xk
1006	Lagrangea			D	T
1013	Tombecka	XSC		X	Xk
1018	Arnolda			S	Sk
1021	Flammario	F	B	C	Cb
1022	Olympiada		X	X	X
1023	Thomana	G		Caa	Ch
1024	Hale		Ch	Caa	X
1025	Riema	E	Xe	X	Xe
1028	Lydina	C		C	C
1030	Vitja			X	X
1031	Arctica	CX:		Caa	Ch
1034	Mozartia		S	S	Sl
1035	Amata			B	B
1036	Ganymed	S	S	S	S
1042	Amazone			Caa	X
1050	Meta			S	Sl
1051	Merope			X	Xc
1056	Azalea		S	S	Sl
1057	Wanda			Caa	Ch
1060	Magnolia			S	S
1067	Lunaria			S	Sl
1075	Helina	SU		K	Xc
1077	Campanula			S	Sq
1086	Nata		Ch	Caa	Ch
1089	Tama			S	S
1090	Sumida			T	T
1094	Siberia		Xk	T	T
1095	Tulipa			K	T
1097	Vicia			C	B
1099	Figneria			S	L
1101	Clematis			B	B
1108	Demeter	CX		C	C
1109	Tata	FC		D	X
1114	Lorraine		Xc	X	X
1115	Sabauda			X	Ch
1117	Reginita			S	S
1118	Hanskya			D	D

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
1122	Neith			S	S
1123	Shapleya			S	S
1127	Mimi	CX		X	X
1130	Skuld			S	Sl
1137	Raissa			S	Sl
1139	Atami	S	S	Caa	Cb
1146	Biarmia	X		X	X
1149	Volga			X	X
1150	Achaia			S	Sl
1154	Astronomia	FXU:		X	X
1164	Kobolda			S	S
1171	Rusthawelia	P		X	X
1177	Gonnessia	XFU		C	X
1178	Irmela			C	C
1180	Rita	P		X	Xe
1194	Aletta			Caa	Ch
1209	Pumma			T	T
1213	Algeria			B	B
1215	Boyer	S		S	L
1219	Britta			S	S
1226	Golia			D	Xk
1229	Tilia			B	B
1236	Thais	T		T	T
1242	Zambesia			C	C
1243	Pamela			Caa	Ch
1244	Deira			X	X
1246	Chaka			A	Sl
1252	Celestia	S	S	S	Sl
1261	Legia			X	X
1263	Varsavia	X	Xc	X	X
1266	Tone	P		D	T
1274	Delportia	S		S	Sl
1276	Ucclia			C	C
1280	Baillauda	X		X	X
1281	Jeanne			X	X
1282	Utopia			X	Xe
1283	Komsomolia			X	X
1284	Latvia	T	L	D	D
1294	Antwerpia		C	C	C
1301	Yvonne		C	C	Cb
1306	Scythia	S		T	T
1312	Vassar			X	X
1317	Silvretta	CX:		X	Xk
1318	Nerina			X	Xe
1319	Disa			X	X
1320	Impala			C	Cb
1321	Majuba			D	D
1322	Coppernicus			S	Sq
1326	Losaka	CSU		Caa	Ch
1328	Devota	X		D	U
1329	Eliane	S	S	S	S
1330	Spiridonia	P		C	Cb
1333	Cenevola			S	Sq
1335	Demoulina			S	S
1337	Gerarda			X	Xk
1340	Yvette			B	B
1351	Uzbekistania		Xk	X	Xc
1355	Mangoeba	X		X	Xe
1356	Nyanza			X	X
1361	Leuschneria			D	D
1362	Griqua	CP		B	B
1365	Henyey			S	S

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
1367	Nongoma			S	L
1369	Ostanina			Caa	Ch
1384	Kniertje			Caa	Ch
1392	Pierre	DX		X	X
1396	Outeniqua			S	Sl
1399	Tenriffa			S	S
1400	Tirela			D	D
1403	Ildesonia		Cgh	Caa	Ch
1409	Isko			Caa	Ch
1414	Jerome		Ch	B	Ch
1425	Tuorla			S	L
1431	Luanda			S	L
1432	Ethiopia			C	Cg
1436	Salonta			X	X
1444	Pannonia			C	B
1449	Virtanen	S		S	Sl
1455	Mitchella			A	Sa
1459	Magnya			V	V
1467	Mashona	GC		Caa	Ch
1469	Linzia			X	X
1481	Tubingia			D	D
1487	Boda			B	B
1499	Pori			S	S
1506	Xosa			A	Sl
1509	Esclangona	S		A	Ld
1530	Rantaseppa			S	S
1531	Hartmut			S	Sl
1535	Paijanne			D	D
1539	Borrelly		B	B	B
1546	Izsak			X	X
1554	Yugoslavia			S	S
1556	Wingolfia	XC		X	X
1568	Aisleen			S	S
1571	Cesco			X	Xc
1573	Vaisala			S	Sl
1574	Meyer			D	D
1575	Winifred			S	Sr
1576	Fabiola	BU		B	B
1579	Herrick	F		B	B
1585	Union			X	X
1591	Baize			S	Sk
1600	Vyssotsky		A	A	A
1602	Indiana	S		S	S
1605	Milankovitch			X	X
1609	Brenda			D	D
1615	Bardwell	B		B	Ch
1621	Druzhba	S		S	Sl
1625	The NORC	C		Caa	Ch
1637	Swings			Caa	Cb
1646	Rosseland			C	C
1654	Bojeva			K	Xk
1656	Suomi	S		A	Ld
1660	Wood		S	S	Sl
1665	Gaby	S		S	Sq
1677	Tycho Brahe			S	Sl
1685	Toro	S	S	S	S
1689	Floris-Jan			D	D
1691	Oort	CU		C	Cb
1693	Hertzsprung	CBU		X	X
1694	Kaiser	GC		Caa	Ch
1701	Okavango			S	S
1728	Goethe Link			A	Ld
1731	Smuts			C	C

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
1747	Wright	AU:	Sl	A	Ld
1750	Eckert	S		S	Sl
1754	Cunningham	P		X	X
1759	Kienle			S	S
1765	Wrubel	DX		X	X
1771	Makover			Caa	Ch
1775	Zimmerwald			S	L
1793	Zoya			S	Sl
1796	Riga	XFCU	Cb	X	X
1798	Watts		S	S	S
1806	Derice			S	Sl
1816	Liberia			S	S
1819	Laputa			X	X
1828	Kashirina			B	B
1838	Ursa			Caa	Cgh
1841	Masaryk			X	X
1883	Rimito			S	S
1901	Moravia			B	B
1904	Massevitch		R	R	Q
1919	Clemence	X		X	Xe
1936	Lugano		Ch	X	X
1943	Anteros	S		A	Ld
1980	Tezcatlipoca	SU	Sl	A	A
1992	Galvarino			X	Xk
1994	Shane			Caa	Ch
1999	Hirayama			Caa	Ch
2001	Einstein	X	Xe	X	Xe
2014	Vasilevskis			S	S
2019	van Albada		S	S	S
2031	BAM			S	Sl
2050	Francis	S		S	K
2060	Chiron	B	Cb	X	X
2074	Shoemaker			A	Sa
2091	Sampo			S	Sq
2093	Genichesk			C	C
2096	Vaino			B	C
2103	Laverna			X	X
2104	Toronto			X	X
2105	Gudy			D	D
2111	Tselina	S		T	T
2112	Ulyanov			S	Sl
2121	Savastopol			S	Sl
2150	Nyctimene			A	Ld
2151	Hadwiger			S	Sl
2157	Ashbrook		S	S	L
2204	Lyyli			X	X
2235	Vittore			D	D
2263	Shaanxi			T	D
2266	Tchaikovsky	D		D	D
2272	Montezuma	S		S	L
2291	Kevo			C	C
2292	Seili			S	Sl
2296	Kugultinov			C	Ch
2303	Retsina			X	X
2332	Kalm			B	B
2341	Aoluta			S	Sl
2349	Kurchenko		Xc	X	Xk
2374	Vladvysotskij			Caa	Ch
2381	Landi			A	L
2397	Lappajarvi			S	Sq
2407	Haug	C		X	X
2448	Sholokhov		L	T	T

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S³OS² (T)	S³OS² (B)
2463	Sterpin			S	Sl
2464	Nordenskiold			B	B
2478	Tokai		S	S	Sl
2489	Suvorov			Caa	X
2490	Bussolini			S	K
2491	Tvashtri	X		X	Xe
2510	Shandong	S		S	S
2519	Annagerman			B	Ch
2524	Budovicium			B	B
2525	O'Steen			B	B
2548	Leloir			A	Sl
2577	Litva	EU		S	Sl
2612	Kathryn			T	T
2634	James Bradley			X	X
2651	Karen			Caa	Ch
2655	Guangxi			K	Xk
2685	Masursky			S	Sl
2717	Tellervo			S	S
2780	Monnig			A	Ld
2796	Kron			S	L
2810	Lev Tolstoj			S	S
2815	Soma			S	S
2820	Iisalmi			S	L
2829	Bobhope			Caa	Ch
2841	Puijo			S	Sk
2891	McGetchin			D	D
2906	Caltech		Xc	C	B
2911	Miahelena		S	S	S
2914	Glarnisch			S	S
2927	Alamosa			S	K
2938	Hopi			C	Cb
2959	Scholl			D	Ld
2961	Katsurahama			S	S
2962	Otto			S	L
2965	Surikov			S	S
2975	Spahr			A	A
2988	Korhonen		S	S	Sl
2991	Bilbo			Caa	Ch
2993	Wendy			S	K
3015	Candy			D	D
3022	Dobermann			X	Xk
3023	Heard			S	S
3033	Holbaek			S	S
3036	Krat			B	B
3043	San Diego			A	A
3063	Makhaon			D	D
3066	McFadden			S	L
3067	Akhmatova			S	Sl
3073	Kursk			S	Sl
3101	Goldberger			X	Xe
3104	Durer			Caa	Ch
3105	Stumpff			S	Sl
3106	Morabito			Caa	Ch
3116	Goodricke			S	Sl
3128	Obruchev			C	Cb
3139	Shantou			C	B
3141	Buchar			D	D
3152	Jones			D	T
3162	Nostalgia			B	B
3169	Ostro	TS	Xe	C	Cb
3181	Ahnert		S	S	Sl
3182	Shimanto			S	S
3197	Weissman		Cgh	Caa	Ch

Table 1 (*continued*)

Asteroid		(1)	(2)	S³OS² (T)	S³OS² (B)
3198	Wallonia		S	K	K
3204	Lindgren			B	B
3225	Hoag			S	L
3242	Bakhchisaraj			S	Sl
3246	Bidstrup			C	Cg
3259	Brownlee			S	S
3267	Glo			S	K
3274	Maillen			C	C
3296	Bosque Alegre			S	Sk
3300	McGlasson			S	S
3308	Ferreri			S	Sl
3309	Brorfelde		S	A	Ld
3328	Interposita			K	Xc
3330	Gantrisch			X	X
3333	Schaber			D	D
3341	Hartmann			T	T
3343	Nedzel			S	S
3352	McAuliffe		A	S	Sq
3388	Tsanghinchi			S	S
3400	Aotearoa			X	Xe
3445	Pinson			X	X
3447	Burckhalter			X	Xe
3478	Fanale			S	S
3483	Svetlov			X	Xk
3492	Petra-Pepi			S	S
3507	Vilas		Ch	B	Cgh
3533	Toyota		Xk	X	X
3573	Holmberg			S	Sr
3600	Archimedes			S	Sl
3615	Safronov			C	X
3635	1981 WO1		S	A	A
3663	Tisserand			C	B
3682	Welther			T	T
3702	Trubetskaya			Caa	Cgh
3709	Polypoites			D	D
3728	IRAS			C	Cb
3753	Cruithne		Q	R	Sq
3767	DiMaggio		Sa	S	S
3786	Yamada			S	Sl
3787	Aivazovskij			S	Sl
3789	Zhongguo			T	Xk
3793	Leonteus			D	D
3816	Chugainov			S	L
3829	Gunma		Ch	Caa	Ch
3832	Shapiro			C	X
3873	Roddy		S	A	A
3875	Staehle			S	Sq
3880	Kaiserman			X	Xe
3888	Hoyt			S	Sq
3894	Williamcooke			S	Sl
3906	Chao			T	T
3913	Chemin			S	Sk
3915	Fukushima			C	Xc
3925	Tret'yakov			C	Cb
3939	Huruhata			X	X
3940	Larion			X	T
3990	Heimdal			D	D
3995	Sakaino			S	S
4055	Magellan	V		V	V
4056	Timwarner			S	Sq
4060	Deipylos			C	Cb
4063	Euforbo			D	D

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
4068	Menestheus			D	D
4083	Jody			S	S
4100	Sumiko			C	B
4103	Chahine			A	D
4112	Hrabal			C	Cb
4116	Elachi		Sl	S	Sl
4121	Carlin			S	S
4125	Lew Allen			A	Ld
4127	Kyogoku			S	Sq
4132	Bartok			S	Sl
4143	Huziak			Caa	Ch
4175	Billbaum			S	Sa
4191	Assesse			S	Sl
4201	Orosz			X	X
4220	Flood			Caa	B
4276	Clifford		Cb	C	Ch
4278	Harvey			V	V
4299	WIYN		S	S	S
4340	Dence		S	S	Sl
4375	Kiyomori			A	A
4422	Jarre		S	S	Sk
4448	Phildavis			S	Sk
4457	van Gogh			S	L
4460	Bihoro			X	X
4483	Petofi			X	X
4484	Sif			B	B
4489	1988 AK			D	D
4490	Bambery			A	Sa
4497	Taguchi			S	Sl
4502	Elizabethann			S	L
4511	Rembrandt			S	Sl
4520	Dovzhenko			S	L
4522	Britastra			Caa	Ch
4533	Orth			S	S
4556	Gumilyov			A	L
4558	Janesick		S	S	S
4580	Child			S	Sk
4601	Ludkewycz			S	S
4613	Mamoru			S	Xe
4617	Zadunaisky			D	D
4621	Tambov			C	Ch
4666	Dietz			D	D
4695	1985 RU3			S	K
4706	1988 DR		S	S	S
4713	Steel		A	A	Sl
4725	Milone			S	Sl
4730	1980 XZ			Caa	Ch
4759	1978 VG10			C	Cb
4764	Joneberhart			X	X
4770	Lane			S	Sl
4778	Fuss			B	B
4820	Fay			S	S
4826	Wilhelms			S	Sq
4833	Meges			D	D
4835	1989 BQ			D	D
4843	Megantic			X	X
4856	Seaborg			S	Sl
4880	Tovstonogov			S	S
4889	Praetorius			Caa	Ch
4902	Thessandrus			D	D
4914	Pardina			S	Sl
4931	Tomsk			A	Ld
4950	House		Sk	S	S

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
4954	Eric		S	S	Sl
4955	Gold			B	Cgh
4957	Brucemurray		S	A	Ld
5016	Migirenko			S	L
5045	1978 UL2			C	B
5057	1987 DC6			B	Cg
5090	Wyeth			S	S
5122	Mucha			S	S
5147	Maruyama			S	Sl
5215	Tsurui			S	Sl
5216	1941 HA			A	Sl
5230	Asahina		S	S	Sl
5264	Telephus			D	D
5301	Novobranets			C	X
5343	Ryzhov			X	X
5362	1978 CH			D	T
5461	Autumm			D	D
5481	Kiuchi			V	V
5559	1990 MV			S	Sl
5592	Oshima			Caa	Ch
5600	1991 UY			S	Sl
5639	1989 PE			C	B
5648	1990 VU1			D	D
5651	Traversa			X	X
5751	Zao		X	X	X
5818	1989 RC1			D	D
5832	Martaprincipe			Caa	C
5870	Baltimore			B	B
5914	1990 WK			D	D
5959	Shaklan			X	X
6051	Anaximenes			X	X
6057	Robbia			X	X
6084	Bascom			S	S
6139	Naomi			S	Sl
6193	Manabe			Caa	U
6297	1988 VZ1			B	Cb
6307	1989 WL7			S	K
6310	Jankonke			K	Xe
6384	Kervin			S	Sq
6394	1990 QM2			X	Xe
6447	Terrycole			X	Xe
6461	1993 VB5			X	Xe
6493	Cathybennett			X	Xe
6560	Pravdo			S	Sl
6916	Lewispearce			A	Sl
6974	1992 MC			S	L
7002	Bronshten			S	S
7052	1988 VQ2			Caa	Cgh
7353	Kazuya			S	L
7480	Norwan		S	S	S
7482	1994 PC1		S	S	Sa
7496	Miroslavholub			Caa	Ch
7516	Kranjc			D	D
7638	Gladman			S	Sk
7868	Barker			Caa	U
7898	Ohkuma			S	Sl
8106	Carpino			C	C
8518	1992 DM6			B	B
8795	1981 EO9			C	X
8906	Yano			B	Cb
9219	1995 WO8			B	B
10007	1976 YF3			C	C

(*continued on next page*)

Table 1 (*continued*)

Asteroid		(1)	(2)	S^3OS^2 (T)	S^3OS^2 (B)
10094	1991 DK			S	K
10261	Nikdollezhal'			X	Xk
11079	Mitsunori			S	S
11548	Jerrylewis			S	S
12447	Yatescup			S	S
13111	Papacosmas			A	Sl
14465	1993 NB			D	D
26879	Haines			S	S
43754	1983 AA			S	Sl

The columns indicated by (1) and (2) indicate values taken from Tholen (1989) and Bus and Binzel (2002b), respectively.

tative, because, although both spectra are similar, they are quite unusual and seem contaminated by telluric features at long wavelengths.

As can be seen in the table, the application of the two schemes of classification gives results very similar with just some cases of significant discrepancy. Out of 820 asteroids, 299 had previous classification in the Tholen taxonomy and 200 in the Bus taxonomy. Also, among these 499 asteroids, 125 had been classified in both taxonomies. Thus, a main result of the present work is the classification of 446 asteroids.

For the 200 asteroids which already had classification in the Bus taxonomy we see that most of them, 118, received different classifications in the present work. Comparing our spectra with those from SMASS we see that these mismatches fall into three categories: difference in the spectral range used, limitations that are inherent to the taxonomic scheme, and actual differences in the spectra. The first case is due to the fact that our spectra cover the range 0.5–0.92 μm, whereas the Bus taxonomy was designed considering 0.44–0.92 with some classes being distinguishable only by features in this missing interval. Examples of this mismatch are Asteroids 173, 241, and 1301.

The second case is a consequence of two characteristics of the Bus taxonomy. One is that the assignment of some classes depends on a decision by the user whether a given feature is present or not. We found that for some asteroids these decisions were rather subjective. The other is that for many classes the classification depends on the steepness of the continuum of the spectrum. Hence, for those asteroids with values lying near the boundary of two of such classes a minor variation of this parameter could mean a different classification. This is the cause of the mismatch, for example, of Asteroids 511, 625, 808, and 950.

The other differences in classification are simply due to the fact that the spectra are significantly different. This is the case, for example, of Asteroids 194, 579, and 1024. The causes of these discrepancies, however, are difficult to explain and can be quite diverse such as technical problems during the observation, weather conditions, geometrical effects, surface inhomogeneities, etc. The most striking difference, however, is the classification of Asteroid 1139 Atami, for which the SMASS spectrum clearly shows an absorption band near 1 μm that it is not present in our spectra being, therefore, classified as Cb. This problem was already pointed out in Angeli and Lazzaro (2002) paper and the causes of such different spectra are unknown.

It must be noted, however, that if we consider just the large complexes defined in the Bus taxonomy, the mismatch between the two classifications drops to only 39 asteroids, most of these being between the X- and C- complexes which main distinction is the steepness of the continuum.

For the 299 asteroids already classified in the Tholen taxonomy only 85 asteroids received different classifications in the present work. Most of these are differences in the steepness of the continuum, like, for example, Asteroid 977 Philippa, with C and X classifications, or 47 Aglaja, with C and B. There is a great number of asteroids for which the two classifications are strictly different, but this, in general, occurs with objects that have just a partial data set leading to a dubious classification by Tholen as, for example, Asteroids 390, 537, 628, 822, 943, and 1139. It is important to note that the complete set of ECAS's photometric data covers a wider range than our spectra, 3400–10,450 and 4900–9200 Å, respectively, which lead to a most reliable taxonomic assignment.

From our data it seems clear that the S class as defined by Tholen (1984) is insufficient to classify all the differences observed in the visible spectra of objects having the 1 μm absorption band, with the clear exceptions of the A, V and R types. This fact was already pointed out by several authors, starting with Gaffey et al. (1993). However, the sub-division of the "S-complex" as proposed by Bus and Binzel (2002b) seems not to be able to reproduce results from two distinct observations. This is clearly seen in the fact that among the 64 asteroids of the "core" of the S-complex (S, Sa, Sk, Sl, Sq, and Sr) with classification in both works, only 20 received the same classification. Obviously, this non-repeatability could be due to external causes (such as weather conditions, phase angle, etc.) and not to the classification scheme itself since differences also occur between the Tholen (1989) and our "Tholen-like" classification. The robustness of the proposed taxonomic schemes is, for sure, a very interesting problem which deserves a detailed study, but which is outside the scope of this paper. We hope to return to this problem in a near future.

4. Discussion and conclusions

As mentioned above, several sub-sets of asteroids have been selected and studied focusing on specific aspects about their formation and evolution. This is the case of families and groups of asteroids for which a compositional characterization of a statistical significant number of objects provides insight on their origin. On the other hand, the occurrence and the extent of thermal events can be inferred from the spectroscopic analysis of specific classes or regions of the asteroid belt.

Several families were selected in order to confirm or not their genetic relation as well as to identify the background

objects, or interlopers (Migliorini et al., 1995). The observed families were chosen among the largest ones defined by Zappalà et al. (1995). Trying to cover the inner, middle and outer regions of the main belt were studied the Flora (Florczak et al., 1998), the Eunomia (Lazzaro et al., 1999) and the Themis (Florczak et al., 1999) families. The obtained results are consistent with a common origin for each family. An interesting feature of all the spectroscopically observed families, as already pointed out by Cellino et al. (2002), is the almost homogeneous taxonomic classification of their members. Note that up to the present, no remnants of a complete disrupted differentiated body have been identified, with the unique exception of the Vesta family (Binzel and Xu, 1993). Even in this case, the fragments are only of the surface of the parent body (4 Vesta). This fact is very intriguing and must be taken into account when trying to model the thermal processes and the collisional evolution undergone in the main belt.

Among the diverse groups we analyzed the Hungaria and Phocaea (Carvano et al., 2001) as well as some Mars-crossers and NEAs (Angeli and Lazzaro, 2002). Our survey shows that both groups present a substantial mixing of compositions which is compatible with a non-genetic origin. Regarding the Mars-crossers and NEAs, most of the observed sample fall in the "S-complex," including S, Sa, Sk, Sl, Sq, and A classes, as introduced by Bus (1999). The spectra of two of these objects, 3352 McAuliffe and 3753 Cruithne, resemble that of some ordinary chondrite meteorites, fact that corroborates a possible link between the two populations (Chapman, 1976; Binzel et al., 1996). In the outer belt several asteroids of the Cybeles and Trojan groups were also observed, all presenting featureless spectra. The comparative analysis of some of these asteroids with similar objects in the main belt tends to indicate differences that may be linked to their formation (Carvano et al., 2003).

Rotationally resolved spectra of several S-type asteroids were observed trying to identify substantial variations in composition that could be indicative of a differentiated body (Mothé-Diniz et al., 2000). However, no great variations were observed, implying in a probable low degree of differentiation for these asteroids.

Lazzaro et al. (2000) discovered a basaltic asteroid, 1459 Magnya, in the outer part of the main belt. If this object formed where we now see it, this implies that some outer belt objects experienced substantial thermal heating. However, the small size (30 km) of 1459 Magnya raises the question whether it is possible to completely differentiate an object of this size, or is it more likely a fragment of a larger object that was completely disrupted. No other V-type asteroid was found in the vicinity of 1459 Magnya, so if an object was disrupted there, the fragments must have dispersed (Michtchenko et al., 2002). Hardersen et al. (2004) find that spectroscopic differences exist between Vesta fragments and 1459 Magnya, suggesting that it is not related to Vesta. If 1459 Magnya is a fragment of a disrupted body which formed elsewhere in the main belt, this is a very important evidence in support of the idea that more than one body like Vesta once populated the asteroid belt, being Vesta the only lucky survivor.

To conclude we would like to stress that the S^3OS^2 is the second spectroscopic survey in number of observed asteroids yet released. Several interesting results have already been obtained and we believe that this large sample can contribute to increase the knowledge about the diverse thermal, physical, chemical, and dynamical processes that shaped the main belt of asteroids.

Acknowledgments

We acknowledge the technical staff of ESO for their prompt help whenever needed. We also thank to the referees, R.P. Binzel and E. Howell, for their thoughtful and valuable comments which much improved the paper. Diverse fellowships and grants by CNPq, CAPES, and FAPERJ supported the authors.

Appendix A

Table A.1
Observational parameters of the S^3OS^2 asteroids

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
1	Ceres	07/13/97	08:44	10	1.01	8.3	16.0	HD144585	15/7
3	Juno	11/21/96	03:34	5	1.24	8.3	23.4	HR2290	1/1
9	Metis	10/04/00	02:16	60	1.10	10.6	22.1	HD1835	71/9
12	Victoria	03/10/98	00:19	60	1.42	12.3	20.0	HD44594	1/1
21	Lutetia	06/14/99	23:55	60	1.11	12.0	21.9	HD144585	3/2
23	Thalia	06/17/99	02:32	120	1.01	11.1	8.9	HD144585	3/2
24	Themis	03/20/97	01:21	90	1.53	11.6	17.6	HD44594	3/2
25	Phocaea	01/11/97	05:19	180	1.05	12.5	10.5	HD44594	40/6
27	Euterpe	06/19/99	03:05	60	1.02	11.1	11.1	HD144585	3/2
29	Amphitrite	08/29/98	01:36	120	1.03	9.7	12.4	HD144585	14/2
33	Polyhymnia	03/05/98	06:13	480	1.10	14.0	7.2	HD44594	3/2
37	Fides	06/18/99	23:53	60	1.14	12.6	20.3	HD144585	3/2
43	Ariadne	01/24/01	09:07	60	1.10	12.3	27.3	HD76151	8/2
47	Aglaja	01/06/97	09:00	300	1.19	13.4	16.8	HD44594	2/1

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
50	Virginia	03/16/97	03:14	240	1.35	14.0	10.0	HD44594	3/2
56	Melete	06/18/99	03:31	60	1.09	10.5	7.7	HD144585	60/4
57	Mnemosyne	01/25/01	03:46	40	1.17	11.5	10.5	HD76151	5/3
58	Concordia	11/19/96	08:58	180	1.37	13.6	19.9	HR2290	2/1
62	Erato	07/13/97	04:51	180	1.03	13.4	3.6	HD144585	3/2
65	Cybele	01/29/00	06:52	120	1.38	11.9	4.1	HD76151	3/2
68	Leto	01/29/00	09:06	180	1.11	12.6	17.2	HD76151	3/2
78	Diana	06/15/99	00:06	180	1.01	12.6	20.5	HD144585	2/1
84	Klio	06/15/99	03:10	120	1.00	12.2	10.9	HD144585	2/1
85	Io	01/03/97	06:12	120	1.19	12.7	13.1	HD44594	2/1
87	Sylvia	12/12/99	06:35	240	1.93	12.0	3.0	HD76151	3/2
89	Julia	12/20/98	08:29	120	1.23	11.9	19.1	HD44594	3/2
90	Antiope	03/06/98	04:58	120	1.22	13.2	2.2	HD44594	5/2
91	Aegina	03/20/97	02:09	120	1.44	12.7	15.0	HD44594	1/1
93	Minerva	06/17/99	02:59	60	1.18	10.8	7.4	HD144585	26/3
95	Arethusa	01/02/98	08:19	300	1.09	13.0	14.9	HD44594	3/2
98	Ianthe	05/26/01	08:07	480	1.03	13.5	15.0	HD144585	3/2
104	Klymene	05/31/00	02:05	480	1.04	13.7	9.2	HD144585	2/1
105	Artemis	01/02/97	01:59	480	1.75	13.8	21.3	HD44594	3/2
106	Dione	08/29/98	09:57	60	1.37	11.9	19.5	HD144585	3/2
107	Camilla	07/15/97	08:30	120	1.19	12.8	8.6	HD144585	2/1
109	Felicitas	05/26/00	01:46	480	1.03	14.1	8.0	HD144585	4/3
112	Iphigenia	06/19/99	10:22	420	1.11	13.9	28.2	HD144585	3/2
115	Thyra	03/09/98	03:06	60	1.16	10.9	4.7	HD44594	2/1
117	Lomia	06/17/99	02:07	120	1.01	12.7	10.9	HD144585	2/1
119	Althaea	12/15/99	08:43	240	1.21	13.2	20.4	HD44594	3/2
127	Johanna	06/19/99	08:15	120	1.02	12.8	11.1	HD144585	3/2
130	Elektra	12/21/98	05:43	120	1.16	11.7	10.9	HD44594	3/2
133	Cyrene	02/01/00	09:03	120	1.26	12.8	12.2	HD76151	2/1
140	Siwa	01/03/97	02:45	240	1.70	13.3	19.7	HD44594	3/2
141	Lumen	03/19/97	06:22	120	1.75	12.8	7.5	HD44594	3/1
145	Adeona	03/19/97	08:19	120	1.07	12.6	18.5	HD44594	3/1
148	Gallia	03/06/98	08:26	120	1.35	12.9	13.6	HD44594	3/2
154	Bertha	03/05/98	09:27	180	1.11	13.5	18.8	HD44594	5/3
156	Xanthippe	12/19/98	07:48	240	1.19	13.2	20.5	HD44594	3/2
164	Eva	05/25/00	07:28	120	1.05	12.4	8.3	HD144585	3/2
166	Rhodope	01/11/97	06:51	300	1.38	14.0	12.2	HD44594	1/1
168	Sibylla	03/17/97	03:53	120	1.33	13.3	8.7	HD44594	3/2
169	Zelia	11/18/96	07:03	120	2.08	13.1	13.0	HR2290	1/1
170	Maria	05/24/01	10:13	600	1.02	14.1	19.7	HD144585	3/2
171	Ophelia	12/30/97	01:03	900	1.36	14.3	17.0	HD44594	5/4
173	Ino	01/03/97	05:53	60	1.23	11.4	6.4	HD44594	2/1
176	Iduna	12/28/97	07:04	360	1.05	13.0	12.5	HD44594	5/2
177	Irma	05/27/00	01:22	720	1.11	14.4	6.4	HD144585	3/2
181	Eucharis	09/05/98	09:53	120	1.12	12.8	20.1	HD1835	2/1
183	Istria	12/10/98	03:58	120	1.04	12.2	21.8	HD44594	43/14
184	Dejopeja	06/19/99	09:08	120	1.05	13.7	13.6	HD144585	17/3
191	Kolga	12/29/97	03:43	300	1.22	13.2	9.6	HD44594	2/1
194	Prokne	01/03/97	07:51	240	1.18	13.0	14.2	HD44594	2/1
199	Byblis	12/16/99	02:49	480	1.26	14.1	14.8	HD76151	5/3
205	Martha	03/21/97	01:22	150	1.24	13.5	8.7	HD44594	1/1
207	Hedda	06/20/99	05:49	120	1.00	12.6	6.1	HD144585	3/2
214	Aschera	06/16/99	01:25	120	1.28	12.9	2.5	HD144585	4/2
217	Eudora	12/30/97	01:30	900	1.21	14.5	20.8	HD44594	2/1
219	Thusnelda	03/09/98	05:20	240	1.08	13.4	6.3	HD44594	2/1
220	Stephania	10/02/00	00:37	720	1.17	14.5	34.2	HD196755	4/3
223	Rosa	01/29/01	03:20	300	1.70	13.5	6.9	HD76151	3/2
224	Oceana	03/09/98	05:34	60	1.15	12.1	3.6	HD44594	2/1
226	Weringia	09/05/98	02:10	480	1.05	13.2	22.5	HD1835	2/1
227	Philosophia	06/19/99	08:43	300	1.02	13.6	17.4	HD144585	3/2
229	Adelinda	02/02/00	08:05	1800	1.13	15.5	13.9	HD76151	3/2
233	Asterope	12/22/98	06:32	120	1.27	12.6	12.4	HD44594	3/2

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Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
241	Germania	05/31/00	05:04	120	1.02	11.8	1.9	HD144585	2/1
246	Asporina	12/16/98	04:42	120	1.15	13.1	7.8	HD44594	3/2
249	Ilse	03/17/97	02:53	780	1.33	15.4	10.5	HD44594	3/2
251	Sophia	01/20/01	00:59	1200	1.24	14.9	19.1	HD76151	3/2
252	Clementina	02/02/00	07:00	720	1.12	14.3	9.1	HD76151	2/1
254	Augusta	05/31/00	05:48	480	1.03	13.7	3.3	HD144585	2/1
255	Oppavia	05/31/00	03:12	480	1.00	14.1	7.1	HD144585	3/2
258	Tyche	12/22/98	06:52	180	1.15	13.1	16.0	HD44594	3/2
259	Aletheia	03/20/97	09:18	90	1.08	12.6	16.7	HD44594	3/2
260	Huberta	05/25/00	07:00	480	1.12	13.8	3.9	HD144585	3/2
265	Anna	07/08/97	09:38	1200	1.04	14.9	22.2	HD144585	3/2
266	Aline	12/28/97	07:32	300	1.26	12.8	9.9	HD44594	2/1
268	Adorea	07/09/97	07:17	300	1.08	13.7	13.6	HD144585	4/2
270	Anahita	05/24/00	23:32	120	1.16	13.2	23.4	HD144585	6/2
271	Penthesilea	09/22/01	00:51	900	1.01	14.6	16.1	HD1835	2/1
273	Atropos	01/01/98	02:07	1380	1.10	14.9	19.9	HD44594	3/2
274	Philagoria	05/31/00	07:10	300	1.26	13.6	1.5	HD144585	2/1
283	Emma	01/29/01	07:36	600	1.12	14.2	11.0	HD76151	3/2
286	Iclea	09/03/98	08:38	600	1.18	13.7	10.2	HD1835	4/2
293	Brasilia	05/26/01	03:01	900	1.16	14.3	14.2	HD144585	3/2
294	Felicia	11/20/96	02:52	300	1.63	14.3	23.3	HR2290	1/1
298	Baptistina	01/04/97	01:44	360	1.86	14.4	20.2	HD44594	2/1
303	Josephina	09/04/98	01:40	480	1.00	13.8	13.1	HD9562	3/2
307	Nike	05/24/01	03:09	1500	1.09	15.1	9.1	HD144585	3/2
309	Fraternitas	05/31/00	02:39	600	1.03	14.3	13.7	HD144585	2/1
311	Claudia	06/17/99	00:21	900	1.07	14.8	17.5	HD144585	3/3
314	Rosalia	02/02/00	07:16	1200	1.24	14.8	6.1	HD76151	3/2
316	Goberta	07/08/97	04:03	1500	1.10	15.4	9.1	HD144585	2/1
323	Brucia	07/08/97	05:20	180	1.00	12.4	2.9	HD144585	4/2
324	Bamberga	03/20/97	01:01	60	1.76	11.9	18.9	HD44594	3/2
329	Svea	12/14/99	04:21	480	1.23	13.6	14.5	HD1835	3/2
332	Siri	06/19/99	03:13	240	1.00	13.5	9.8	HD144585	3/2
339	Dorothea	12/20/98	06:55	480	1.27	14.6	13.3	HD44594	3/2
350	Ornamenta	01/03/97	01:00	300	1.13	13.5	21.3	HD44594	2/1
352	Gisela	01/02/97	06:36	120	1.39	12.6	10.9	HD44594	2/1
354	Eleonora	08/30/98	04:18	60	1.02	10.7	3.2	HD144585	22/3
356	Liguria	06/17/99	00:12	300	1.04	13.7	17.0	HD144585	2/1
357	Ninina	11/18/96	00:13	360	1.05	14.3	19.4	HR2290	2/1
361	Bononia	07/14/97	04:10	720	1.08	15.1	6.9	HD144585	3/2
362	Havnia	01/28/01	09:00	540	1.12	14.1	21.7	HD76151	3/2
365	Corduba	02/01/00	04:07	180	1.40	13.2	15.2	HD76151	1/1
366	Vincentina	06/18/99	00:02	480	1.04	14.0	18.0	HD144585	3/2
372	Palma	08/29/98	23:42	600	1.05	13.7	14.3	HD144585	3/2
373	Melusina	05/27/01	00:02	1500	1.10	15.0	15.0	HD144585	3/2
381	Myrrha	06/20/99	06:07	120	1.04	12.4	5.6	HD144585	3/2
386	Siegena	03/16/97	00:37	60	1.25	12.4	15.7	HD44594	3/2
388	Charybdis	06/19/99	00:46	300	1.01	13.7	15.8	HD144585	3/2
390	Alma	03/06/98	06:24	480	1.00	14.1	15.9	HD44594	4/2
391	Ingeborg	01/01/98	06:43	720	1.02	14.2	16.8	HD44594	3/2
393	Lampetia	12/25/97	07:29	780	1.17	14.1	9.0	HD44594	2/1
394	Arduina	06/20/99	07:28	300	1.00	13.0	16.0	HD144585	3/2
397	Vienna	12/30/97	06:11	300	1.16	13.3	10.8	HD44594	3/2
400	Ducrosa	06/01/01	04:39	1200	1.06	14.2	8.4	HD144585	3/2
403	Cyane	03/09/98	03:20	120	1.13	12.6	5.6	HD44594	3/1
404	Arsinoe	01/02/97	02:28	600	2.11	14.8	18.0	HD44594	2/1
405	Thia	03/05/98	04:22	60	1.07	10.9	11.6	HD44594	6/3
407	Arachne	12/21/98	06:07	240	1.67	13.4	17.9	HD44594	3/2
412	Elisabetha	06/19/99	09:15	460	1.03	13.6	16.5	HD144585	3/2
414	Liriope	07/13/97	05:01	600	1.03	14.8	3.0	HD144585	3/2
415	Palatia	05/28/00	07:19	600	1.27	14.3	2.7	HD144585	3/2
417	Suevia	06/16/99	00:57	300	1.08	13.5	20.0	HD144585	3/2
418	Alemannia	05/27/00	10:23	480	1.17	14.0	17.8	HD144585	3/2

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Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
419	Aurelia	05/27/00	06:33	120	1.09	10.0	2.3	HD144585	3/2
422	Berolina	06/18/99	10:16	420	1.04	14.0	32.9	HD144585	3/2
424	Gratia	05/28/00	05:11	480	1.05	14.1	2.9	HD144585	5/3
426	Hippo	03/07/98	02:30	120	1.26	12.3	11.6	HD44594	4/2
429	Lotis	02/01/00	09:16	600	1.24	14.3	13.5	HD76151	2/2
431	Nephele	01/10/97	01:09	360	1.63	14.1	20.3	HD44594	2/1
434	Hungaria	01/06/97	05:19	480	1.32	14.3	21.6	HD44594	2/1
436	Patricia	05/31/00	08:38	1200	1.07	15.0	12.0	HD144585	2/2
437	Rhodia	03/17/97	06:31	360	1.01	14.4	14.6	HD44594	3/2
439	Ohio	08/30/98	08:56	1200	1.38	15.1	18.7	HD144585	4/3
445	Edna	01/01/98	07:50	1080	1.18	14.8	11.8	HD44594	4/2
447	Valentine	05/30/00	01:14	600	1.15	14.2	16.3	HD144585	2/2
451	Patientia	03/06/98	08:09	60	1.23	11.8	13.2	HD44594	3/2
455	Bruchsalia	05/27/00	09:30	120	1.04	12.4	19.6	HD144585	3/2
457	Alleghenia	02/01/00	04:14	2100	1.17	15.7	4.9	HD76151	2/2
459	Signe	05/27/01	06:45	1500	1.02	15.1	13.0	HD144585	3/2
461	Saskia	07/13/97	04:05	1500	1.08	15.9	8.7	HD144585	3/2
465	Alekto	05/25/00	06:01	240	1.02	12.8	3.4	HD144585	3/2
468	Lina	03/19/97	09:33	1560	1.54	15.3	6.3	HD44594	3/2
469	Argentina	01/05/97	08:37	360	1.16	16.3	15.1	HD44594	2/1
472	Roma	03/09/98	09:43	720	1.16	14.3	20.6	HD44594	2/1
479	Caprera	06/17/99	07:33	420	1.03	14.1	12.3	HD144585	3/2
480	Hansa	12/23/98	07:19	240	1.15	13.2	22.1	HD44594	2/1
485	Genua	11/20/96	08:46	120	1.18	12.5	25.9	HR2290	1/1
487	Venetia	01/28/01	08:09	120	1.27	12.9	17.2	HD76151	3/2
488	Kreusa	03/20/97	09:10	90	1.19	12.3	14.6	HD44594	3/2
489	Comacina	12/14/99	07:03	240	1.21	13.3	12.0	HD1835	3/2
491	Carina	09/04/98	01:55	600	1.30	14.3	16.8	HD9562	4/2
493	Griseldis	05/25/00	06:19	1800	1.05	15.6	6.3	HD144585	2/2
494	Virtus	06/20/99	07:06	240	1.00	13.4	12.0	HD144585	3/2
500	Selinur	01/29/01	08:10	720	1.04	14.4	16.3	HD76151	2/1
501	Urhixidur	05/24/00	23:58	600	1.11	14.1	10.4	HD144585	3/2
502	Sigune	12/29/97	01:36	2100	1.23	15.8	22.2	HD44594	2/1
504	Cora	12/31/97	02:28	600	1.28	13.4	17.0	HD44594	2/1
506	Marion	06/20/99	00:22	720	1.05	14.4	18.4	HD144585	3/3
508	Princetonia	06/20/99	02:06	60	1.00	13.0	9.2	HD144585	3/2
510	Mabella	01/02/98	02:56	600	1.33	14.4	12.8	HD44594	2/1
511	Davida	01/03/97	03:57	30	1.55	10.5	17.3	HD44594	2/1
514	Armida	01/23/01	03:34	305	1.63	13.6	9.2	HD76151	3/2
517	Edith	05/26/01	01:22	1500	1.05	15.1	10.9	HD144585	3/2
521	Brixia	03/20/97	08:52	720	1.08	14.6	16.7	HD44594	3/2
522	Helga	07/06/97	06:30	300	1.10	13.9	0.4	HD144585	3/2
524	Fidelio	06/19/99	01:18	720	1.00	14.6	13.5	HD144585	3/2
525	Adelaide	01/04/97	08:41	1080	1.21	15.5	20.8	HD44594	1/1
526	Jena	03/07/98	07:28	1200	1.06	14.9	15.1	HD44594	3/3
527	Euryanthe	06/20/99	05:43	180	1.07	13.2	3.9	HD144585	3/2
530	Turandot	12/11/98	02:12	480	1.17	14.0	14.3	HD44594	3/2
536	Merapi	07/15/97	10:31	180	1.09	13.4	14.2	HD144585	3/2
537	Pauly	01/30/00	08:21	900	1.29	14.5	18.1	HD76151	2/1
539	Pamina	06/19/99	07:31	300	1.03	13.5	10.8	HD144585	3/2
544	Jetta	06/16/99	01:06	300	1.00	13.3	18.3	HD144585	3/2
545	Messalina	06/19/99	00:57	240	1.00	13.4	14.3	HD144585	3/2
547	Praxedis	12/29/97	07:23	600	1.08	13.8	15.3	HD44594	6/3
558	Carmen	05/28/00	03:20	300	1.17	13.8	12.3	HD144585	3/2
565	Marbachia	01/30/00	09:12	480	1.15	14.1	19.9	HD76151	1/1
567	Eleutheria	06/17/99	00:39	420	1.07	14.0	17.2	HD144585	3/2
568	Cheruskia	01/24/01	07:25	900	1.13	14.7	18.4	HD76151	3/2
569	Misa	06/19/99	02:05	1200	1.01	14.9	11.0	HD144585	3/2
573	Recha	06/20/99	08:46	900	1.06	14.6	20.0	HD144585	2/1
576	Emanuela	01/26/01	06:47	1200	1.17	14.9	8.4	HD76151	3/2
579	Sidonia	08/29/98	03:27	120	1.00	12.0	10.6	HD144585	3/2
581	Tauntonia	12/30/97	02:28	900	1.22	14.4	10.8	HD44594	3/2

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
589	Croatia	02/01/00	06:28	480	1.17	13.9	7.2	HD76151	1/1
595	Polyxena	03/05/98	08:56	240	1.00	13.5	17.5	HD44594	3/2
598	Octavia	06/19/99	04:39	300	1.02	13.8	4.3	HD144585	4/4
601	Nerthus	12/30/97	06:38	1200	1.17	14.9	8.6	HD44594	1/1
602	Marianna	06/16/99	23:12	1200	1.05	14.8	15.2	HD144585	3/3
607	Jenny	05/30/01	04:57	900	1.03	13.1	5.6	HD144585	4/3
612	Veronika	05/28/00	04:43	1200	1.15	15.3	7.8	HD144585	3/2
616	Elly	03/09/98	07:30	720	1.09	14.3	10.5	HD44594	2/1
618	Elfriede	01/04/98	01:05	600	1.17	13.8	18.9	HD44594	2/1
619	Triberga	01/30/00	08:40	600	1.17	14.2	13.8	HD76151	2/1
621	Werdandi	07/04/97	01:40	1808	1.02	16.1	12.9	HD144585	2/1
625	Xenia	06/19/99	09:31	240	1.07	13.4	24.1	HD144585	3/2
626	Notburga	03/06/98	03:42	120	1.30	13.0	2.2	HD44594	3/2
628	Christine	11/18/96	01:16	180	1.03	13.5	19.1	HR2290	1/1
630	Euphemia	07/09/97	01:42	1500	1.05	15.3	15.5	HD144585	2/1
635	Vundtia	02/01/00	07:28	480	1.18	13.9	8.6	HD76151	1/1
640	Brambilla	12/14/99	07:25	720	1.21	14.4	11.4	HD1835	3/2
657	Gunlod	01/22/01	06:29	600	1.25	14.2	9.7	HD76151	3/2
660	Crescentia	09/04/98	01:05	180	1.08	13.2	23.9	HD9562	3/2
662	Newtonia	01/23/01	06:48	1200	1.50	14.9	3.3	HD76151	3/2
663	Gerlinde	01/05/98	07:53	600	1.03	13.8	18.2	HD44594	5/3
665	Sabine	01/21/01	04:33	180	1.64	13.1	2.6	HD76151	3/2
666	Desdemona	03/09/98	04:52	1200	1.11	15.0	2.8	HD44594	1/1
667	Denise	10/02/00	05:17	480	1.09	13.7	7.2	HD196755	3/2
680	Genoveva	06/18/99	09:33	120	1.01	13.1	22.3	HD144585	3/2
683	Lanzia	01/20/01	09:03	300	1.02	13.3	17.4	HD76151	5/4
685	Hermia	01/05/97	01:03	1800	1.68	16.0	28.0	HD44594	1/1
690	Wratislavia	01/29/01	06:46	360	1.08	13.5	9.2	HD76151	3/2
692	Hippodamia	08/30/98	02:10	1500	1.06	15.4	11.4	HD144585	3/2
694	Ekard	01/01/98	05:57	600	1.13	14.1	9.8	HD44594	5/2
696	Leonora	06/18/99	09:05	600	1.05	14.1	16.5	HD144585	3/2
697	Galilea	05/27/00	09:55	600	1.02	14.2	19.7	HD144585	3/2
699	Hela	06/18/99	08:36	600	1.29	14.1	35.4	HD144585	2/2
702	Alauda	12/21/98	05:49	120	1.53	12.6	14.1	HD44594	3/2
704	Interamnia	03/05/98	03:33	60	1.14	11.2	8.5	HD44594	3/2
705	Erminia	03/05/98	08:35	240	1.00	13.5	17.6	HD44594	3/2
713	Luscinia	03/06/98	02:54	900	1.16	14.7	4.6	HD44594	3/2
714	Ulula	12/23/98	05:45	120	1.19	12.4	10.9	HD44594	3/2
716	Berkeley	01/04/98	02:03	2400	1.27	15.9	16.0	HD44594	4/3
717	Wisibada	05/31/00	07:47	2700	1.00	15.8	14.7	HD144585	1/1
721	Tabora	01/20/01	08:29	1200	1.49	15.0	9.8	HD76151	3/2
726	Joella	12/21/98	07:25	1800	1.12	15.4	15.7	HD44594	3/3
727	Nipponia	12/30/97	03:23	300	1.18	13.1	15.1	HD44594	2/1
728	Leonisis	08/30/98	05:36	2400	1.05	15.9	6.1	HD144585	1/1
729	Watsonia	12/31/97	01:38	600	1.10	14.5	17.3	HD44594	2/1
732	Tjilaki	03/17/97	09:07	600	1.06	15.0	24.0	HD44594	3/2
734	Benda	09/23/01	03:43	551	1.06	14.2	5.8	HD1835	2/1
739	Mandeville	12/20/98	06:26	180	1.52	12.7	20.0	HD44594	6/4
740	Cantabia	01/03/97	02:18	600	1.44	14.6	17.3	HD44594	2/1
746	Marlu	01/24/01	08:23	2400	1.29	15.9	11.5	HD76151	4/3
747	Winchester	09/04/98	23:59	480	1.11	13.9	16.6	HD1835	2/1
752	Sulamitis	01/26/01	02:33	300	1.77	13.6	17.3	HD76151	3/2
753	Tiflis	10/17/99	04:04	720	1.08	13.4	7.0	HD1835	3/2
756	Lilliana	12/26/97	00:52	2100	1.23	15.7	14.4	HD44594	2/2
760	Massinga	01/26/01	07:54	180	1.21	12.8	23.3	HD76151	4/2
761	Brendelia	06/17/99	01:21	1500	1.02	15.3	13.6	HD144585	3/3
762	Pulcova	12/16/99	08:34	300	1.26	13.4	19.3	HD76151	2/1
764	Gedania	05/28/01	23:07	1800	1.09	15.4	16.9	HD144585	3/2
768	Struveana	05/27/00	05:09	2100	1.11	15.7	5.0	HD144585	2/2
772	Tanete	10/04/00	06:46	240	1.07	13.4	10.2	HD1835	3/2
775	Lumiere	03/09/98	03:39	720	1.16	14.5	6.0	HD44594	2/1
777	Gutemberga	01/20/01	06:29	600	1.18	14.3	8.5	HD76151	3/2

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
778	Theobalda	05/25/00	00:34	1500	1.01	15.1	13.8	HD144585	3/2
779	Nina	09/04/98	00:46	240	1.75	13.4	22.4	HD9562	3/2
780	Armenia	01/27/01	00:35	720	1.17	14.5	19.5	HD76151	3/2
788	Hohensteina	01/26/01	02:23	360	1.20	13.6	11.1	HD76151	3/2
790	Pretoria	12/10/98	05:43	420	1.35	13.7	5.8	HD44594	3/2
791	Ani	12/16/98	03:52	420	1.16	13.9	10.6	HD44594	3/2
796	Sarita	03/09/98	06:19	720	1.18	14.4	8.9	HD44594	4/2
804	Hispania	09/03/98	06:21	120	1.13	10.9	3.7	HD1835	2/1
808	Merxia	11/20/96	00:18	600	1.18	15.3	19.4	HR2290	1/1
809	Lundia	05/26/01	06:17	1200	1.05	14.8	14.4	HD144585	3/2
814	Tauris	12/13/99	03:16	240	1.19	12.4	22.8	HD76151	3/2
815	Coppelia	11/21/96	01:08	1500	1.13	16.0	20.9	HR2290	1/1
816	Juliana	11/19/96	00:41	1500	1.20	16.6	16.7	HR2290	1/1
817	Annika	12/22/98	03:21	420	1.24	14.0	19.0	HD44594	3/2
822	Lalage	05/28/01	03:23	2400	1.03	15.6	9.0	HD144585	2/1
829	Academia	10/18/99	00:49	1020	1.21	14.1	13.9	HD1835	2/1
834	Burnhamia	06/14/99	23:37	600	1.13	14.4	21.0	HD144585	3/3
838	Seraphina	03/17/97	00:17	960	1.28	15.4	16.4	HD44594	3/2
846	Lipperta	07/08/97	01:37	2400	1.04	16.1	13.7	HD144585	2/1
847	Agnia	09/05/98	01:05	1500	1.04	15.4	19.5	HD1835	2/1
848	Inna	07/06/97	09:13	660	1.10	15.2	18.2	HD144585	3/2
850	Altona	09/20/01	08:48	720	1.23	14.4	9.3	HD1835	3/2
857	Glasenappia	09/20/01	03:41	240	1.02	13.5	1.0	HD1835	3/2
859	Bouzareah	11/17/96	00:26	600	1.06	15.2	18.8	HR1405	2/1
869	Mellena	05/29/01	03:33	1800	1.13	15.3	13.9	HD144585	3/2
870	Manto	11/20/96	06:51	2400	1.54	17.5	16.8	HR2290	1/1
874	Rotraut	12/15/99	08:02	1803	1.18	15.3	16.6	HD44594	2/2
881	Athene	01/30/00	04:46	1200	1.17	15.0	7.3	HD76151	3/2
882	Swetlana	09/30/00	23:40	1980	1.02	15.6	21.1	HD20630	1/1
889	Erynia	10/03/00	00:15	1680	1.01	15.3	24.1	HD1835	1/1
891	Gunhild	09/19/01	23:24	900	1.06	14.8	17.5	HD1835	4/2
892	Seeligeria	12/24/97	06:45	900	1.08	14.2	13.5	HD44594	3/2
893	Leopoldina	10/07/00	09:13	600	1.18	14.4	20.3	HD1835	2/2
894	Erda	01/01/98	03:11	1200	1.22	14.6	8.8	HD44594	2/1
897	Lysistrata	03/06/98	03:14	480	1.06	14.1	8.4	HD44594	3/2
899	Jokaste	01/29/00	06:22	1500	1.07	15.2	10.3	HD76151	3/2
904	Rockefellia	03/05/98	05:37	480	1.07	14.0	5.1	HD44594	3/2
906	Respsolda	11/19/96	01:15	480	1.29	14.7	21.4	HR2290	1/1
911	Agamemnon	01/20/01	07:02	1500	1.34	15.1	6.4	HD76151	3/2
914	Palisana	12/24/97	04:42	300	1.33	12.7	3.8	HD44594	4/2
917	Lyka	06/19/99	02:43	480	1.00	14.3	13.3	HD144585	2/1
921	Jovita	01/25/01	02:08	3600	1.19	16.4	10.3	HD76151	2/2
923	Herluga	01/25/01	03:54	1200	1.12	14.9	9.1	HD76151	3/2
928	Hildrun	06/20/99	04:21	420	1.12	14.8	7.2	HD144585	3/2
929	Algunde	01/06/97	08:17	2100	1.19	15.8	18.8	HD44594	1/1
932	Hooveria	05/30/00	09:48	600	1.08	14.2	16.2	HD144585	3/2
936	Kunigunde	09/03/98	07:41	600	1.21	14.2	12.9	HD1835	5/3
943	Begonia	05/25/00	04:12	900	1.21	14.6	9.6	HD144585	3/2
947	Monterosa	05/28/00	02:02	900	1.08	14.6	4.8	HD144585	3/2
949	Hel	05/27/00	08:09	600	1.01	14.3	18.0	HD144585	3/2
950	Ahrensa	11/19/96	06:13	720	1.06	15.2	13.6	HR2290	1/1
952	Caia	08/30/98	00:10	600	1.03	13.6	18.6	HD144585	3/2
953	Painleva	09/20/01	03:28	240	1.05	13.4	5.9	HD1835	3/2
954	Li	01/10/97	08:18	1800	1.20	15.8	13.5	HD44594	1/1
955	Alstede	05/26/00	03:06	300	1.00	13.1	13.1	HD144585	3/2
956	Elisa	05/26/01	08:39	2100	1.05	15.5	26.8	HD144585	3/2
957	Camelia	01/01/98	07:13	600	1.12	13.9	13.1	HD44594	3/2
966	Muschi	05/31/00	03:05	120	1.07	12.6	1.4	HD144585	3/2
968	Petunia	01/26/01	08:17	780	1.05	14.5	21.5	HD76151	3/2
972	Cohnia	05/27/00	09:02	600	1.03	14.4	13.8	HD144585	3/2
973	Aralia	03/09/98	05:41	1200	1.08	15.0	12.1	HD44594	1/1
977	Philippa	05/25/00	09:45	900	1.08	14.8	13.4	HD144585	3/2

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Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
978	Aidamina	12/21/98	03:59	420	1.25	14.2	11.3	HD44594	3/2
979	Ilsewa	05/31/00	06:09	600	1.06	14.0	2.1	HD144585	2/1
981	Martina	01/22/01	03:52	1800	1.69	15.4	3.5	HD76151	3/3
982	Franklina	08/29/98	01:54	240	1.06	13.4	12.2	HD144585	3/2
983	Gunila	05/30/00	03:48	240	1.01	13.3	1.4	HD144585	3/2
986	Amelia	06/17/99	05:55	300	1.02	13.5	2.1	HD144585	3/2
987	Wallia	06/17/99	04:02	300	1.01	13.6	6.9	HD144585	1/1
988	Appella	10/01/00	00:41	1800	1.04	15.4	17.2	HD20630	3/3
989	Schwassmannia	01/28/01	00:39	2400	1.64	15.8	29.4	HD76151	2/2
1000	Piazzia	01/22/01	05:53	900	1.92	14.5	2.9	HD76151	3/2
1003	Lilofee	01/10/97	01:34	1200	1.72	15.6	20.2	HD44594	1/1
1004	Belopolskya	07/09/97	03:51	900	1.01	14.9	3.9	HD144585	2/1
1005	Arago	05/25/00	02:51	1200	1.01	15.0	8.0	HD144585	3/2
1006	Lagrangea	05/30/00	04:18	3600	1.00	16.5	3.6	HD144585	2/2
1013	Tombecka	05/29/00	07:53	900	1.05	14.7	9.2	HD144585	3/3
1018	Arnolda	01/27/01	07:50	2100	1.27	15.6	11.5	HD76151	3/2
1021	Flammario	12/12/99	01:45	120	1.06	12.3	28.1	HD76151	3/2
1022	Olympiada	06/17/99	04:46	300	1.15	13.6	10.5	HD144585	3/2
1023	Thomana	12/16/99	06:05	600	1.27	14.1	6.7	HD76151	3/2
1024	Hale	05/29/00	10:18	1200	1.24	14.9	13.2	HD144585	1/1
1025	Riema	01/06/97	05:54	900	1.10	15.2	21.1	HD44594	2/2
1028	Lydina	07/08/97	07:41	900	1.00	15.1	10.3	HD144585	2/1
1030	Vitja	12/15/99	06:56	1500	1.15	15.2	11.9	HD44594	3/2
1031	Arctica	01/11/97	05:10	300	1.09	14.0	10.5	HD44594	1/1
1034	Mozartia	05/28/00	06:57	480	1.14	14.0	3.5	HD144585	3/2
1035	Amata	11/20/96	02:26	900	1.59	15.2	22.8	HR2290	1/1
1036	Ganymed	12/20/98	04:31	120	1.24	11.5	24.8	HD44594	40/14
1042	Amazone	11/18/96	00:57	600	1.01	14.9	18.1	HR2290	1/1
1050	Meta	07/14/97	07:47	1500	1.01	15.9	12.3	HD144585	2/2
1051	Merope	11/20/96	08:14	1500	1.13	15.9	16.1	HR2290	1/1
1056	Azalea	01/04/97	06:27	900	1.56	15.4	7.6	HD44594	1/1
1057	Wanda	10/18/99	01:33	900	1.18	13.9	14.9	HD1835	2/1
1060	Magnolia	01/07/97	04:06	1800	1.48	16.4	9.3	HD44594	2/1
1067	Lunaria	01/28/01	06:38	1500	1.20	15.2	7.5	HD76151	3/2
1075	Helina	10/17/99	00:20	900	1.13	14.4	14.9	HD1835	4/2
1077	Campanula	11/20/96	00:40	1800	1.22	16.1	30.8	HR2290	1/1
1086	Nata	06/16/99	05:13	1480	1.00	13.9	2.8	HD144585	3/2
1089	Tama	01/04/97	02:24	660	2.11	15.4	30.3	HD44594	2/2
1090	Sumida	02/02/00	00:44	3600	1.18	16.4	29.8	HD76151	2/2
1094	Siberia	12/23/98	04:50	1200	1.28	14.9	12.7	HD44594	3/2
1095	Tulipa	01/02/98	03:15	1500	1.30	15.3	12.3	HD44594	1/1
1097	Vicia	05/25/01	09:40	1500	1.04	15.1	31.8	HD144585	3/2
1099	Figneria	05/27/00	05:50	1800	1.16	15.6	4.7	HD144585	3/2
1101	Clematis	01/30/00	01:06	2400	1.12	15.7	13.2	HD76151	2/1
1108	Demeter	07/06/97	02:28	600	1.16	14.8	24.5	HD144585	3/2
1109	Tata	06/20/99	06:41	600	1.01	14.2	7.2	HD144585	3/3
1114	Lorraine	02/01/00	02:44	900	1.30	14.7	13.5	HD76151	1/1
1115	Sabauda	08/29/98	08:25	900	1.06	14.6	11.4	HD144585	4/3
1117	Reginita	01/03/97	07:03	2100	1.33	16.1	14.1	HD44594	1/1
1118	Hanskya	05/28/00	02:41	600	1.00	14.2	8.6	HD144585	3/2
1122	Neith	01/21/01	03:48	900	1.90	14.1	9.7	HD76151	3/2
1123	Shapleya	09/21/01	06:58	360	1.12	13.6	10.7	HD1835	3/2
1127	Mimi	12/12/99	08:00	600	1.29	14.3	21.3	HD76151	3/2
1130	Skuld	01/04/97	04:18	900	1.65	15.4	10.2	HD44594	1/1
1137	Raissa	05/31/00	09:32	600	1.17	14.2	14.0	HD144585	2/1
1139	Atami	12/27/97	05:11	300	1.06	13.3	20.5	HD44594	4/2
1146	Biarmia	01/27/01	01:18	2700	1.30	16.0	14.3	HD76151	3/3
1149	Volga	05/30/01	00:32	2850	1.32	16.4	18.6	HD144585	1/1
1150	Achaia	05/29/00	06:53	1200	1.06	15.0	6.5	HD144585	3/2
1154	Astronomia	07/06/97	00:01	1800	1.10	16.2	18.1	HD144585	2/1
1164	Kobolda	02/02/00	07:41	1200	1.15	15.0	18.7	HD76151	2/2
1171	Rusthawelia	07/13/97	08:56	600	1.09	14.8	17.8	HD144585	3/2

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
1177	Gonnessia	01/29/00	08:14	1200	1.02	14.8	14.3	HD76151	2/1
1178	Irmela	01/28/01	02:30	720	1.58	14.4	3.5	HD76151	3/2
1180	Rita	07/14/97	10:12	900	1.11	15.3	16.2	HD144585	3/3
1194	Aletta	02/01/00	08:43	720	1.21	14.3	12.9	HD76151	1/1
1209	Pumma	11/21/96	00:21	2100	1.18	16.3	19.0	HR2290	1/1
1213	Algeria	05/26/00	23:56	3600	1.06	16.9	16.0	HD144585	2/2
1215	Boyer	01/01/98	05:05	600	1.33	14.2	4.8	HD44594	3/2
1219	Britta	01/04/97	01:03	1500	1.67	16.0	28.9	HD44594	1/1
1226	Golia	05/30/01	06:05	2400	1.01	14.7	7.0	HD144585	2/1
1229	Tilia	03/08/98	04:26	14211	1.21	16.2	0.5	HD44594	1/1
1236	Thais	10/18/99	02:12	900	1.06	13.9	16.1	HD1835	3/2
1242	Zambesia	05/31/00	03:36	900	1.00	14.8	5.8	HD144585	3/2
1243	Pamela	01/23/01	02:48	900	1.42	14.8	11.9	HD76151	3/2
1244	Deira	05/29/00	01:36	600	1.01	14.3	15.5	HD144585	3/2
1246	Chaka	05/25/00	08:33	600	1.01	14.4	25.3	HD144585	3/2
1252	Celestia	12/11/98	07:00	1800	1.06	15.4	16.0	HD44594	3/2
1261	Legia	05/28/00	23:52	2100	1.18	15.7	21.0	HD144585	2/2
1263	Varsavia	12/29/97	08:29	600	1.07	14.1	20.9	HD44594	3/2
1266	Tone	08/30/98	04:43	600	1.10	14.1	1.8	HD144585	3/2
1274	Delportia	01/08/97	08:53	1200	1.14	15.7	28.3	HD44594	1/1
1276	Ucclia	12/15/99	02:04	1200	1.11	14.9	12.1	HD44594	2/2
1280	Baillauda	05/28/01	05:09	2100	1.03	15.4	3.0	HD144585	3/2
1281	Jeanne	01/25/01	04:54	2700	1.27	15.9	3.5	HD76151	3/3
1282	Utopia	03/21/97	03:13	540	1.08	14.8	4.3	HD44594	2/1
1283	Komsomolia	01/24/01	00:31	1800	1.38	15.3	22.9	HD76151	3/3
1284	Latvia	05/30/00	23:05	1800	1.07	15.5	19.8	HD144585	2/2
1294	Antwerpia	10/17/99	04:22	480	1.15	12.4	7.1	HD1835	2/1
1301	Yvonne	12/25/97	05:16	900	1.00	13.9	23.5	HD44594	3/2
1306	Scythia	01/30/00	05:43	900	1.09	14.7	10.2	HD76151	2/1
1312	Vassar	10/16/99	07:33	1200	1.08	14.4	14.4	HD1835	3/2
1317	Silvretta	05/31/00	00:41	3000	1.22	16.3	15.0	HD144585	2/2
1318	Nerina	03/17/97	05:32	90	1.13	13.0	1.1	HD44594	3/2
1319	Disa	01/22/01	08:00	1500	1.13	15.4	17.3	HD76151	5/3
1320	Impala	05/24/01	04:12	300	1.05	13.3	4.4	HD144585	3/2
1321	Majuba	05/28/00	09:51	600	1.06	14.3	18.2	HD144585	3/2
1322	Coppernicus	01/11/97	03:22	1626	1.21	17.1	7.3	HD44594	1/1
1326	Losaka	01/20/01	02:21	900	1.50	14.6	18.2	HD76151	3/3
1328	Devota	06/01/01	05:29	3600	1.23	16.1	5.9	HD144585	1/1
1329	Eliane	09/04/98	09:37	1500	1.15	15.1	20.5	HD9562	3/2
1330	Spiridonia	12/30/97	04:16	1200	1.18	14.9	8.5	HD44594	2/1
1333	Cenevola	11/17/96	01:41	1200	1.03	15.8	20.7	HR1405	1/1
1335	Demoulina	09/23/01	02:48	1200	1.07	14.8	11.0	HD1835	2/1
1337	Gerarda	10/17/99	08:38	1500	1.16	15.5	16.0	HD1835	1/1
1340	Yvette	03/07/98	04:07	1200	1.25	14.8	1.3	HD44594	3/2
1351	Uzbekistania	11/19/96	00:19	960	1.19	15.5	17.6	HR2290	1/1
1355	Mangoeba	03/08/98	08:43	1800	1.05	15.5	26.9	HD44594	2/1
1356	Nyanza	05/31/00	06:36	600	1.15	14.1	0.9	HD144585	2/1
1361	Leuschneria	11/21/96	07:50	2100	1.13	16.4	15.6	HR2290	1/1
1362	Griqua	09/30/00	08:19	960	1.04	14.7	26.3	HD1835	6/4
1365	Henyey	01/07/97	01:58	1500	1.61	16.0	19.7	HD44594	2/2
1367	Nongoma	03/09/98	02:00	3000	1.04	16.5	14.9	HD44594	2/2
1369	Ostanina	09/21/01	06:35	720	1.21	14.5	6.2	HD1835	2/1
1384	Kniertje	01/11/97	04:05	300	1.30	12.5	6.0	HD44594	2/1
1392	Pierre	07/13/97	09:42	1500	1.19	16.0	26.8	HD144585	3/2
1396	Outeniqua	05/30/00	09:21	1200	1.00	14.9	27.3	HD144585	2/2
1399	Tenriffa	01/05/97	06:14	1800	1.34	16.3	7.4	HD44594	1/1
1400	Tirela	05/29/01	08:50	2400	1.16	15.6	20.5	HD144585	3/2
1403	Ildesonia	10/16/99	06:50	600	1.21	12.7	8.3	HD1835	3/2
1409	Isko	12/31/97	06:25	1020	1.39	14.2	4.8	HD44594	3/2
1414	Jerome	01/10/97	02:06	2100	1.30	16.4	15.1	HD44594	1/1
1425	Tuorla	07/08/97	06:28	1500	1.14	15.4	9.5	HD144585	3/2
1431	Luanda	12/24/97	02:30	1500	1.17	15.5	16.8	HD44594	2/2

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
1432	Ethiopia	01/24/01	01:06	2100	1.39	15.7	20.1	HD76151	3/3
1436	Salonta	05/31/00	01:39	1200	1.01	15.3	14.0	HD144585	3/2
1444	Pannonia	02/01/00	06:40	1200	1.62	13.7	1.1	HD76151	4/2
1449	Virtanen	01/05/97	03:03	2100	1.48	16.2	13.5	HD44594	1/1
1455	Mitchella	05/29/01	07:46	1500	1.14	15.0	11.2	HD144585	3/2
1459	Magnya	09/03/98	04:43	420	1.03	13.7	13.0	HD1835	2/1
1467	Mashona	03/06/98	03:28	480	1.25	14.1	4.0	HD44594	3/2
1469	Linzia	01/24/01	03:02	720	1.30	14.5	14.8	HD76151	3/3
1481	Tubingia	07/15/97	06:44	420	1.26	14.4	5.3	HD144585	3/2
1487	Boda	07/15/97	07:07	600	1.24	14.8	2.0	HD144585	3/2
1499	Pori	01/09/97	06:46	1800	1.13	16.1	10.6	HD44594	1/1
1506	Xosa	05/24/01	08:36	1200	1.08	14.6	27.6	HD144585	3/2
1509	Esclangona	03/08/98	06:40	1200	1.06	15.1	25.7	HD44594	4/2
1530	Rantaseppa	01/04/97	07:40	2700	1.35	16.6	14.1	HD44594	1/1
1531	Hartmut	07/04/97	06:09	1800	1.02	16.2	4.4	HD144585	2/2
1535	Paijanne	09/30/00	01:27	1200	1.10	14.9	14.5	HD1835	3/2
1539	Borrelly	01/04/98	07:48	2400	1.31	15.8	12.9	HD44594	1/1
1546	Izsak	12/21/98	04:50	1200	1.28	15.0	10.6	HD44594	3/2
1554	Yugoslavia	01/10/97	05:15	1800	1.17	16.1	7.0	HD44594	1/1
1556	Wingolfia	05/29/01	05:49	2400	1.11	15.6	3.1	HD144585	2/2
1568	Aisleen	12/23/97	06:28	1500	1.07	15.1	15.8	HD44594	3/2
1571	Cesco	01/29/00	06:55	3600	1.06	16.6	13.3	HD76151	2/2
1573	Vaisala	03/07/98	01:02	3000	1.07	16.5	15.8	HD44594	2/2
1574	Meyer	07/07/97	04:48	1200	1.05	15.5	3.9	HD144585	2/1
1575	Winifred	11/18/96	07:47	2280	1.07	16.4	19.9	HR2290	1/1
1576	Fabiola	07/14/97	06:30	1200	1.04	15.6	3.7	HD144585	3/2
1579	Herrick	07/14/97	04:52	2100	1.06	16.2	3.2	HD144585	2/2
1585	Union	12/17/98	07:38	1200	1.20	15.0	21.7	HD44594	3/2
1591	Baize	11/17/96	03:04	1800	1.06	16.2	20.9	HR1405	1/1
1600	Vyssotsky	06/19/99	23:47	1200	1.14	15.1	30.8	HD144585	3/2
1602	Indiana	01/09/97	08:17	2100	1.29	16.1	28.2	HD44594	1/1
1605	Milankovitch	12/30/97	07:55	1200	1.18	14.7	15.0	HD44594	1/1
1609	Brenda	05/26/01	10:20	780	1.02	14.4	30.0	HD144585	3/2
1615	Bardwell	07/14/97	08:29	1800	1.08	16.0	13.7	HD144585	2/2
1621	Druzhba	01/02/97	02:46	720	1.79	15.1	28.4	HD44594	2/1
1625	The NORC	03/20/97	03:51	900	1.17	14.6	7.8	HD44594	3/2
1637	Swings	06/20/99	01:15	900	1.00	15.4	13.3	HD144585	3/3
1646	Rosseland	11/21/96	07:09	1500	1.89	15.9	25.4	HR2290	1/1
1654	Bojeva	10/18/99	03:25	1200	1.11	14.8	7.9	HD1835	3/2
1656	Suomi	01/27/01	01:03	600	1.15	14.2	26.4	HD76151	4/2
1660	Wood	01/03/97	04:07	360	1.28	14.4	25.8	HD44594	2/1
1665	Gaby	01/23/01	04:28	480	2.04	13.8	9.5	HD76151	3/2
1677	Tycho Brahe	05/31/00	10:00	1500	1.17	15.3	17.5	HD144585	1/1
1685	Toro	03/16/97	06:18	1020	1.01	15.7	17.0	HD44594	3/2
1689	Floris-Jan	11/21/96	08:37	1045	1.54	16.4	24.6	HR2290	1/1
1691	Oort	12/27/97	08:16	1800	1.33	15.9	14.1	HD44594	2/2
1693	Hertzsprung	05/24/01	09:22	1200	1.03	14.7	28.9	HD144585	3/2
1694	Kaiser	05/31/00	04:28	1800	1.08	15.5	9.7	HD144585	2/2
1701	Okavango	10/17/99	03:37	900	1.03	14.3	8.8	HD1835	3/2
1728	Goethe Link	05/31/00	05:26	481	1.05	14.0	2.3	HD144585	2/1
1731	Smuts	01/23/01	01:12	1800	1.39	15.3	18.0	HD76151	3/3
1747	Wright	12/28/97	07:55	1000	1.09	15.8	24.7	HD44594	2/2
1750	Eckert	03/16/97	01:39	1800	1.09	16.4	22.6	HD44594	2/1
1754	Cunningham	05/29/00	09:16	1200	1.13	15.1	13.6	HD144585	2/2
1759	Kienle	09/02/98	05:22	900	1.13	15.8	1.4	HD144585	2/1
1765	Wrubel	05/28/00	06:42	480	1.07	14.0	2.4	HD144585	3/2
1771	Makover	10/18/99	02:56	1200	1.01	14.3	13.7	HD1835	3/2
1775	Zimmerwald	03/07/98	05:31	1800	1.07	15.7	6.7	HD44594	3/2
1793	Zoya	01/11/97	00:57	3600	1.45	16.9	23.7	HD44594	1/1
1796	Riga	12/15/99	00:48	2100	1.10	15.8	14.6	HD44594	3/2
1798	Watts	01/05/97	01:45	1500	1.65	16.0	27.0	HD44594	2/2
1806	Derice	01/02/97	07:52	480	1.46	14.4	13.9	HD44594	2/1

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
1816	Liberia	12/12/99	03:40	1800	1.02	15.6	22.4	HD76151	5/4
1819	Laputa	12/12/99	02:04	2400	1.02	15.7	15.6	HD76151	3/2
1828	Kashirina	12/13/99	04:38	1200	1.16	14.9	7.4	HD76151	3/2
1838	Ursa	10/17/99	00:45	3000	1.05	16.0	13.9	HD1835	1/1
1841	Masaryk	05/28/00	01:17	2100	1.10	15.7	8.3	HD144585	2/2
1883	Rimito	08/29/98	07:16	2400	1.04	16.0	22.0	HD144585	2/2
1901	Moravia	09/04/98	03:47	3300	1.02	16.2	9.6	HD9562	2/2
1904	Massevitch	11/18/96	01:25	1200	1.03	15.6	18.3	HR2290	1/1
1919	Clemence	03/17/97	05:32	540	1.13	14.8	2.1	HD44594	2/1
1936	Lugano	03/21/97	09:01	1080	1.00	15.4	21.2	HD44594	2/1
1943	Anteros	01/11/97	07:23	3600	1.20	17.4	49.6	HD44594	1/1
1980	Tezcatlipoca	12/23/97	02:35	900	1.30	14.5	37.3	HD44594	3/2
1992	Galvarino	01/09/97	05:16	3600	1.23	17.4	7.1	HD44594	1/1
1994	Shane	01/04/98	06:04	3000	1.26	16.1	6.5	HD44594	2/2
1999	Hirayama	12/16/99	06:43	1200	1.27	14.9	8.8	HD76151	3/2
2001	Einstein	09/02/98	07:00	2400	1.12	15.2	9.8	HD144585	4/3
2014	Vasilevskis	01/12/97	02:04	3000	1.43	16.7	21.0	HD44594	1/1
2019	van Albada	01/02/97	04:40	1200	1.81	15.7	9.4	HD44594	2/1
2031	BAM	01/04/97	06:07	600	1.71	15.3	6.7	HD44594	1/1
2050	Francis	06/19/99	07:02	720	1.06	14.4	13.8	HD144585	2/2
2060	Chiron	03/09/98	08:16	3000	1.03	16.2	5.5	HD44594	6/4
2074	Shoemaker	11/19/96	07:33	2400	1.00	16.3	31.4	HR2290	1/1
2091	Sampo	11/20/96	06:26	480	1.41	14.6	12.4	HR2290	1/1
2093	Genichesk	01/06/97	02:55	3000	1.39	16.8	14.5	HD44594	1/1
2096	Vaino	10/01/00	02:32	1800	1.07	15.4	15.7	HD20630	1/1
2103	Laverna	05/28/00	03:32	1200	1.00	14.7	4.1	HD144585	3/2
2104	Toronto	01/30/00	03:58	900	1.14	14.8	10.3	HD76151	2/1
2105	Gudy	03/09/98	00:53	1200	1.10	15.0	17.5	HD44594	3/2
2111	Tselina	12/31/97	04:54	900	1.27	14.5	5.4	HD44594	2/1
2112	Ulyanov	01/03/97	01:12	1800	1.62	16.6	30.3	HD44594	1/1
2121	Savastopol	05/31/00	09:06	600	1.25	14.2	14.7	HD144585	2/1
2150	Nyctimene	01/07/97	08:31	2160	1.00	16.5	29.7	HD44594	1/1
2151	Hadwiger	05/27/00	02:01	1200	1.02	15.1	14.1	HD144585	3/2
2157	Ashbrook	06/20/99	03:52	900	1.01	14.7	7.8	HD144585	1/1
2204	Lyyli	11/17/96	07:46	180	1.01	14.5	33.2	HR1405	1/1
2235	Vittore	12/23/98	05:58	1800	1.37	15.3	21.1	HD44594	4/2
2263	Shaanxi	08/30/98	01:06	1500	1.05	15.3	13.2	HD144585	2/2
2266	Tchaikovsky	01/23/01	07:13	3300	1.05	16.0	13.9	HD76151	3/3
2272	Montezuma	01/08/97	00:55	3600	1.06	17.1	34.7	HD44594	1/1
2291	Kevo	01/03/98	02:39	1800	1.05	15.6	15.8	HD44594	4/2
2292	Seili	05/28/01	06:42	1200	1.18	14.6	19.3	HD144585	3/2
2296	Kugultinov	03/07/98	04:40	1200	1.21	15.0	4.3	HD44594	3/2
2303	Retsina	12/11/98	06:23	1800	1.17	15.4	8.8	HD44594	2/2
2332	Kalm	09/20/01	06:29	1200	1.06	14.9	6.5	HD1835	3/2
2341	Aoluta	01/06/97	07:49	1200	1.52	15.4	16.8	HD44594	1/1
2349	Kurchenko	09/04/98	08:22	1800	1.10	15.4	12.5	HD9562	2/2
2374	Vladvysotskij	09/20/01	01:20	1200	1.11	15.1	11.2	HD1835	3/2
2381	Landi	01/09/97	05:02	360	1.28	14.3	10.2	HD44594	1/1
2397	Lappajarvi	11/21/96	05:59	600	1.36	14.9	14.9	HR2290	1/1
2407	Haug	05/28/00	07:51	1200	1.01	15.1	17.3	HD144585	3/2
2448	Sholokhov	12/30/97	05:33	900	1.28	14.4	5.3	HD44594	4/3
2463	Sterpin	03/21/97	02:34	660	1.24	15.2	6.4	HD44594	2/1
2464	Nordenskiold	01/25/01	05:58	2400	1.33	15.7	11.9	HD76151	3/3
2478	Tokai	01/02/97	08:16	1380	1.23	15.9	20.0	HD44594	2/1
2489	Suvorov	07/14/97	07:02	1200	1.03	15.6	7.2	HD144585	3/2
2490	Bussolini	01/09/97	06:25	900	1.12	15.3	11.7	HD44594	1/1
2491	Tvashtri	01/09/97	00:58	3600	1.06	17.0	32.0	HD44594	1/1
2510	Shandong	01/07/97	00:53	3000	1.33	16.8	26.0	HD44594	1/1
2519	Annagerman	07/09/97	08:22	1800	1.11	15.9	20.7	HD144585	1/1
2524	Budovicium	07/06/97	06:12	300	1.07	14.1	0.5	HD144585	3/2
2525	O'Steen	07/06/97	08:30	600	1.05	14.8	13.6	HD144585	3/2
2548	Leloir	05/29/01	23:26	3600	1.14	16.4	16.6	HD144585	1/1

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
2577	Litva	12/23/97	00:43	2400	1.19	16.9	32.6	HD44594	1/1
2612	Kathryn	12/23/97	02:58	1200	1.10	14.8	12.7	HD44594	3/2
2634	James Bradley	01/20/01	05:23	900	1.52	14.7	1.3	HD76151	3/2
2651	Karen	09/20/01	09:18	900	1.12	14.7	28.6	HD1835	3/2
2655	Guangxi	11/19/96	02:37	2400	1.09	16.4	17.9	HR2290	1/1
2685	Masursky	01/10/97	07:10	1800	1.09	16.0	21.8	HD44594	3/3
2717	Tellervo	11/21/96	04:22	600	1.34	14.8	4.3	HR2290	1/1
2780	Monnig	01/07/97	07:33	2700	1.25	16.5	16.4	HD44594	1/1
2796	Kron	01/10/97	05:55	1800	1.23	16.2	12.1	HD44594	1/1
2810	Lev Tolstoj	03/16/97	06:57	1380	1.08	16.3	8.6	HD44594	3/2
2815	Soma	01/03/97	06:19	2100	1.49	16.3	8.2	HD44594	1/1
2820	Iisalmi	01/08/97	07:17	2100	1.27	16.3	14.6	HD44594	1/1
2829	Bobhope	05/24/01	00:03	2700	1.06	15.8	17.2	HD144585	2/2
2841	Puijo	01/05/97	08:11	1200	1.52	15.7	16.1	HD44594	1/1
2891	McGetchin	10/04/00	05:33	1680	1.08	15.4	4.5	HD1835	3/3
2906	Caltech	12/12/98	03:43	720	1.14	14.5	12.6	HD44594	5/4
2911	Miahelena	01/02/98	06:30	1800	1.33	15.4	1.3	HD44594	1/1
2914	Glarnisch	01/06/97	04:03	3300	1.66	16.6	16.5	HD44594	1/1
2927	Alamosa	09/23/01	08:29	1500	1.12	15.4	18.5	HD1835	2/1
2938	Hopi	12/25/97	01:14	2400	1.05	15.7	27.4	HD44594	2/2
2959	Scholl	12/13/99	00:45	3600	1.15	16.5	19.2	HD76151	2/2
2961	Katsurahama	01/02/97	06:59	1200	1.29	15.7	13.9	HD44594	2/1
2962	Otto	05/30/00	08:05	1200	1.02	15.2	13.3	HD144585	2/2
2965	Surikov	01/12/97	04:36	2400	1.28	16.3	5.3	HD44594	1/1
2975	Spahr	01/04/97	06:59	1500	1.21	15.7	15.4	HD44594	1/1
2988	Korhonen	01/09/97	03:29	1800	1.51	16.2	12.0	HD44594	1/1
2991	Bilbo	05/30/00	05:54	1200	1.13	15.2	5.5	HD144585	3/2
2993	Wendy	01/10/97	06:35	1500	1.49	16.0	9.6	HD44594	1/1
3015	Candy	08/29/98	03:58	1800	1.02	15.6	11.7	HD144585	3/2
3022	Dobermann	02/01/00	03:03	3000	1.18	16.2	31.1	HD76151	2/2
3023	Heard	01/07/97	06:22	1800	1.27	16.8	16.3	HD44594	2/1
3033	Holbaek	01/04/97	05:31	1500	1.39	15.9	4.0	HD44594	1/1
3036	Krat	10/04/00	03:28	600	1.00	14.3	10.5	HD1835	3/2
3043	San Diego	03/17/97	04:02	1560	1.42	16.1	11.6	HD44594	3/2
3063	Makhaon	01/28/01	06:04	1800	1.23	15.3	3.1	HD76151	3/2
3066	McFadden	12/22/98	04:02	1200	1.39	15.0	20.5	HD44594	3/2
3067	Akhmatova	01/03/97	08:06	2160	1.30	14.4	25.7	HD44594	1/1
3073	Kursk	01/02/97	03:37	1200	1.40	15.7	13.8	HD44594	2/1
3101	Goldberger	01/06/97	07:06	1800	1.16	16.9	18.3	HD44594	1/1
3104	Durer	11/19/96	08:24	1800	1.08	16.0	18.9	HR2290	1/1
3105	Stumpff	01/04/97	03:31	2100	1.41	16.4	13.2	HD44594	2/2
3106	Morabito	11/20/96	04:28	300	1.09	14.2	10.3	HR2290	1/1
3116	Goodricke	09/21/01	01:58	900	1.00	14.9	25.8	HD1835	2/2
3128	Obruchev	07/14/97	09:25	1800	1.10	16.1	18.9	HD144585	2/2
3139	Shantou	12/11/98	07:52	2700	1.15	15.9	13.7	HD44594	2/2
3141	Buchar	05/28/00	22:54	3000	1.10	16.3	16.7	HD144585	2/2
3152	Jones	05/26/00	22:52	1500	1.13	15.2	19.5	HD144585	3/2
3162	Nostalgia	11/18/96	04:03	1200	1.05	15.7	12.1	HR2290	1/1
3169	Ostro	12/28/97	00:59	3600	1.09	16.4	31.4	HD44594	1/1
3181	Ahnert	01/05/97	03:48	960	1.47	15.5	9.0	HD44594	2/2
3182	Shimanto	12/27/97	06:14	1200	1.36	15.2	5.7	HD44594	3/2
3197	Weissman	01/02/98	01:47	1500	1.15	15.5	23.9	HD44594	2/1
3198	Wallonia	10/05/00	06:25	1560	1.02	15.3	13.9	HD196755	3/3
3204	Lindgren	10/05/00	00:01	4500	1.03	17.9	18.5	HD196755	2/2
3225	Hoag	12/18/98	05:38	3600	1.00	16.4	23.1	HD44594	3/3
3242	Bakhchisaraj	12/23/97	04:18	1200	1.17	15.2	9.0	HD44594	3/2
3246	Bidstrup	11/19/96	05:31	1800	1.14	16.1	6.4	HR2290	1/1
3259	Brownlee	03/06/98	03:47	480	1.03	14.1	8.3	HD44594	3/2
3267	Glo	09/20/01	07:38	1800	1.09	15.4	22.4	HD1835	3/2
3274	Maillen	07/04/97	02:29	2701	1.01	16.5	13.1	HD144585	2/2
3296	Bosque Alegre	12/21/97	03:12	1200	1.23	15.4	12.5	HD44594	3/2
3300	McGlasson	11/20/96	02:00	1080	1.37	15.6	21.6	HR2290	1/1

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Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
3308	Ferreri	11/19/96	06:34	1800	1.09	15.8	18.3	HR2290	1/1
3309	Brorfelde	03/17/97	06:55	1080	1.14	15.8	20.8	HD44594	2/1
3328	Interposita	11/17/96	05:12	1200	1.45	15.6	1.1	HR1405	1/1
3330	Gantrisch	05/25/01	07:47	1800	1.02	15.2	13.3	HD144585	3/2
3333	Schaber	05/25/01	03:44	2100	1.02	15.5	6.0	HD144585	3/2
3341	Hartmann	01/12/97	00:57	3600	1.37	17.3	24.3	HD44594	2/2
3343	Nedzel	05/25/00	01:42	1200	1.03	14.9	18.8	HD144585	3/2
3352	McAuliffe	12/19/98	02:16	1800	1.26	15.6	30.8	HD44594	3/3
3388	Tsanghinchi	12/12/99	05:11	1500	1.21	15.2	13.7	HD76151	3/2
3400	Aotearoa	01/08/97	06:30	2100	1.02	16.2	23.8	HD44594	1/1
3445	Pinson	06/01/01	03:28	3600	1.02	15.8	11.6	HD144585	4/2
3447	Burckhalter	08/29/98	05:55	900	1.01	14.8	8.5	HD144585	3/2
3478	Fanale	01/08/97	08:02	2400	1.25	16.8	21.9	HD44594	1/1
3483	Svetlov	10/04/00	08:46	2100	1.03	15.6	28.6	HD1835	3/2
3492	Petra-Pepi	01/10/97	03:01	1500	1.27	16.1	9.0	HD44594	1/1
3507	Vilas	07/06/97	01:22	1800	1.08	16.1	19.5	HD144585	3/2
3533	Toyota	01/04/97	02:46	1200	1.47	15.8	23.9	HD44594	1/1
3573	Holmberg	11/20/96	04:56	720	1.67	15.1	5.5	HR2290	1/1
3600	Archimedes	05/29/01	01:20	3600	1.02	15.6	14.0	HD144585	2/2
3615	Safronov	07/03/97	22:53	2400	1.09	16.5	20.8	HD144585	2/2
3635	1981 WO1	12/14/98	07:01	3600	1.10	17.2	32.9	HD44594	3/2
3663	Tisserand	07/13/97	06:54	2400	1.02	16.4	8.1	HD144585	2/2
3682	Welther	12/29/97	06:30	1200	1.39	14.9	5.4	HD44594	3/3
3702	Trubetskaya	11/20/96	04:42	480	1.07	14.2	12.5	HR2290	1/1
3709	Polypoites	12/21/98	02:12	2700	1.14	16.1	7.8	HD44594	3/3
3728	IRAS	11/17/96	06:25	600	1.60	15.6	1.1	HR1405	1/1
3753	Cruithne	10/01/00	08:51	3000	1.00	16.1	49.7	HD20630	2/2
3767	DiMaggio	11/21/96	03:46	1500	1.10	16.1	9.9	HR2290	1/1
3786	Yamada	05/26/01	00:41	1800	1.03	15.4	21.8	HD144585	2/2
3787	Aivazovskij	01/02/98	05:38	1500	1.25	15.2	7.6	HD44594	2/1
3789	Zhongguo	09/05/98	06:30	3300	1.11	16.3	5.1	HD1835	2/1
3793	Leonteus	12/19/98	03:59	1800	1.21	15.6	6.4	HD44594	2/2
3816	Chugainov	03/05/98	07:13	1500	1.00	15.6	17.2	HD44594	3/2
3829	Gunma	01/10/97	04:38	900	1.31	15.3	6.3	HD44594	1/1
3832	Shapiro	07/13/97	05:47	3000	1.01	16.7	3.1	HD144585	2/2
3873	Roddy	12/27/97	03:23	720	1.37	13.9	17.5	HD44594	3/1
3875	Staehle	01/05/97	06:59	2700	1.43	16.6	9.1	HD44594	1/1
3880	Kaiserman	07/13/97	02:35	1800	1.03	16.2	22.7	HD144585	2/2
3888	Hoyt	06/20/99	05:07	1200	1.64	15.1	24.1	HD144585	3/2
3894	Williamcooke	07/15/97	09:24	780	1.26	15.6	19.9	HD144585	2/2
3906	Chao	12/12/99	07:24	1800	1.14	15.4	11.7	HD76151	3/2
3913	Chemin	11/17/96	03:53	2400	1.02	16.6	12.6	HR1405	1/1
3915	Fukushima	11/20/96	04:06	960	1.21	15.9	15.7	HR2290	1/1
3925	Tret'yakov	01/23/01	02:09	2100	1.19	15.8	16.5	HD76151	3/3
3939	Huruhata	09/05/98	02:41	4200	1.11	16.2	17.5	HD1835	2/2
3940	Larion	01/02/98	07:28	1800	1.01	15.5	25.6	HD44594	2/2
3990	Heimdal	11/21/96	05:37	960	1.41	15.5	10.6	HR2290	1/1
3995	Sakaino	11/20/96	02:33	2400	1.21	16.7	23.0	HR2290	1/1
4055	Magellan	12/12/98	04:42	2807	1.01	17.3	21.7	HD44594	3/3
4056	Timwarner	11/18/96	05:29	1680	1.14	16.0	8.0	HR2290	1/1
4060	Deipylos	12/13/98	02:15	2700	1.13	15.8	7.9	HD44594	2/2
4063	Euforbo	12/17/98	03:54	1200	1.20	15.1	6.1	HD44594	3/2
4068	Menestheus	12/15/99	03:17	3600	1.16	16.3	4.9	HD44594	1/1
4083	Jody	11/18/96	06:28	1200	1.16	15.6	11.9	HR2290	1/1
4100	Sumiko	11/21/96	01:46	2100	1.24	16.7	20.8	HR2290	1/1
4103	Chahine	03/20/97	06:07	1377	1.09	15.6	16.7	HD44594	3/2
4112	Hrabal	02/02/00	03:36	2700	1.17	16.0	6.0	HD76151	1/1
4116	Elachi	12/21/98	06:18	3600	1.24	16.2	33.5	HD44594	2/2
4121	Carlin	07/08/97	22:57	1800	1.04	15.7	25.5	HD144585	1/1
4125	Lew Allen	03/19/97	00:59	2556	1.08	16.4	17.9	HD44594	3/2
4127	Kyogoku	11/20/96	05:14	1200	1.54	16.0	7.0	HR2290	1/1
4132	Bartok	12/12/98	08:00	1200	1.07	15.0	30.5	HD44594	4/3

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Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
4143	Huziak	07/09/97	05:28	2100	1.03	16.2	8.2	HD144585	4/2
4175	Billbaum	11/19/96	03:41	1500	1.12	16.3	14.7	HR2290	1/1
4191	Assesse	07/03/97	23:44	3000	1.05	16.5	24.2	HD144585	2/2
4201	Orosz	05/24/01	06:21	780	1.02	14.3	7.2	HD144585	3/2
4220	Flood	01/10/97	03:35	1500	1.35	16.2	8.5	HD44594	1/1
4276	Clifford	12/22/98	02:16	3600	1.26	16.7	34.1	HD44594	2/2
4278	Harvey	01/08/97	02:08	2400	1.38	16.7	15.8	HD44594	1/1
4299	WIYN	01/03/97	02:56	1800	1.52	15.9	19.9	HD44594	1/1
4340	Dence	07/07/97	01:25	1620	1.05	15.8	28.0	HD144585	2/2
4375	Kiyomori	11/21/96	04:54	2100	1.63	16.3	12.9	HR2290	1/1
4422	Jarre	01/02/97	05:51	900	1.50	15.1	2.8	HD44594	2/1
4448	Phildavis	11/18/96	02:00	2100	1.03	16.2	16.4	HR2290	1/1
4457	van Gogh	01/30/00	03:22	1800	1.16	15.4	8.8	HD76151	2/1
4460	Bihoro	05/24/01	01:48	3600	1.04	16.2	13.1	HD144585	3/3
4483	Petofi	12/25/97	03:26	900	1.00	14.6	25.9	HD44594	4/2
4484	Sif	12/18/98	03:04	2700	1.13	15.9	17.9	HD44594	3/3
4489	1988 AK	21/12/98	03:04	3000	1.22	16.3	8.6	HD44594	2/2
4490	Bambery	12/16/99	01:39	2400	1.02	15.8	33.4	HD76151	2/1
4497	Taguchi	10/16/99	07:04	600	1.20	13.0	11.3	HD1835	3/2
4502	Elizabethann	03/16/97	03:27	600	1.27	15.1	11.4	HD44594	3/2
4511	Rembrandt	08/29/98	04:58	600	1.06	14.2	19.2	HD144585	3/2
4520	Dovzhenko	09/20/01	03:00	600	1.05	14.3	9.4	HD1835	3/2
4522	Britastra	01/12/97	03:14	1500	1.33	16.0	14.1	HD44594	1/1
4533	Orth	03/17/97	02:26	600	1.16	15.0	13.3	HD44594	3/2
4556	Gumilyov	09/20/01	02:11	1200	1.09	15.3	10.2	HD1835	3/2
4558	Janesick	12/13/98	06:21	720	1.40	14.4	7.5	HD44594	3/2
4580	Child	03/16/97	01:09	1260	1.31	16.0	20.9	HD44594	3/2
4601	Ludkewycz	12/28/97	05:19	3000	1.21	16.1	7.8	HD44594	1/1
4613	Mamoru	12/12/99	04:47	480	1.33	13.8	10.9	HD76151	3/2
4617	Zadunaisky	12/18/98	07:20	3600	1.09	16.3	15.6	HD44594	2/2
4621	Tambov	09/21/01	02:56	1800	1.11	15.5	7.5	HD1835	2/2
4666	Dietz	12/20/98	05:10	3600	1.16	17.2	7.5	HD44594	2/2
4695	1985 RU3	02/02/00	05:47	1500	1.19	15.2	6.3	HD76151	2/1
4706	1988 DR	01/02/98	03:56	2100	1.27	15.4	15.9	HD44594	1/1
4713	Steel	07/15/97	08:51	480	1.12	14.7	16.2	HD144585	2/2
4725	Milone	12/15/99	04:22	2100	1.26	15.6	15.7	HD44594	3/2
4730	1980 XZ	09/21/01	05:08	1800	1.02	15.6	6.7	HD1835	3/2
4759	1978 VG10	10/07/00	02:54	2700	1.08	15.9	11.3	HD1835	2/2
4764	Joneberhart	12/16/98	06:25	3600	1.22	16.6	22.0	HD44594	1/1
4770	Lane	10/17/99	04:45	2700	1.00	15.3	18.5	HD1835	1/1
4778	Fuss	09/30/00	03:48	4800	1.13	16.8	2.8	HD1835	2/2
4820	Fay	01/27/01	06:54	1200	1.27	14.9	13.5	HD76151	3/2
4826	Wilhelms	01/11/97	02:09	3000	1.36	16.6	25.2	HD44594	2/2
4833	Meges	12/11/98	04:19	2700	1.12	15.9	5.0	HD44594	3/3
4835	1989 BQ	12/16/99	05:16	1800	1.24	15.6	4.1	HD76151	2/1
4843	Megantic	12/16/99	03:50	1200	1.23	15.0	6.1	HD76151	2/1
4856	Seaborg	01/01/98	04:19	1800	1.16	15.5	12.2	HD44594	2/2
4880	Tovstonogov	12/28/97	02:41	1800	1.21	16.3	15.9	HD44594	1/1
4889	Praetorius	12/14/99	05:09	1800	1.18	15.4	8.4	HD1835	3/2
4902	Thessandrus	01/27/01	02:59	3300	1.51	16.3	1.5	HD76151	3/3
4914	Pardina	01/05/98	05:46	1500	1.21	15.3	10.4	HD44594	2/1
4931	Tomsk	12/10/98	04:15	720	1.00	14.4	22.4	HD44594	3/2
4950	House	12/31/97	03:28	1200	1.19	14.8	15.6	HD44594	2/1
4954	Eric	03/16/97	05:53	600	1.13	15.1	3.7	HD44594	3/2
4955	Gold	11/19/96	04:38	900	1.33	15.5	2.5	HR2290	1/1
4957	Brucemurray	01/05/97	05:12	2100	1.15	16.5	23.0	HD44594	2/2
5016	Migirenko	09/20/01	03:56	1500	1.11	15.3	3.8	HD1835	3/2
5045	1978 UL2	10/07/00	06:18	2880	1.35	16.1	3.3	HD1835	2/2
5057	1987 DC6	11/19/96	04:14	900	1.21	15.8	7.1	HR2290	1/1
5090	Wyeth	12/16/99	07:09	1800	1.31	15.3	12.5	HD76151	1/1
5122	Mucha	10/07/00	07:29	1080	1.14	14.7	12.1	HD1835	2/2
5147	Maruyama	05/25/01	03:15	1200	1.00	15.0	10.8	HD144585	3/2

(*continued on next page*)

Table A.1 (*continued*)

Asteroid		Date	Time (UT)	Exp. (sec)	Airmass	Mag. V	Solar phase	Analog star	N/M
5215	Tsurui	05/26/01	05:44	780	1.10	14.3	11.4	HD144585	3/2
5216	1941 HA	09/22/01	01:37	900	1.04	14.6	14.9	HD1835	2/2
5230	Asahina	12/10/98	04:48	900	1.02	14.7	28.9	HD44594	3/2
5264	Telephus	12/15/98	02:12	3600	1.02	16.6	8.7	HD44594	1/1
5301	Novobranets	01/26/01	04:03	3000	1.25	16.3	3.8	HD76151	3/3
5343	Ryzhov	09/22/01	07:20	2100	1.15	15.7	14.0	HD1835	1/1
5362	1978 CH	10/01/00	03:57	3420	1.08	16.3	3.9	HD20630	1/1
5461	Autumm	09/20/01	00:01	2100	1.08	15.7	16.4	HD1835	3/2
5481	Kiuchi	05/28/01	01:11	3600	1.05	16.6	22.4	HD144585	2/2
5559	1990 MV	05/25/01	06:21	900	1.02	14.5	15.8	HD144585	3/2
5592	Oshima	03/07/98	03:05	3000	1.16	16.4	4.5	HD44594	2/2
5600	1991 UY	09/22/01	01:58	2100	1.03	15.6	15.4	HD1835	2/2
5639	1989 PE	01/04/98	03:42	3600	1.01	16.6	22.1	HD44594	3/3
5648	1990 VU1	10/02/00	06:49	2160	1.43	15.7	9.2	HD196755	1/1
5651	Traversa	10/01/00	07:15	2520	1.10	15.9	13.4	HD20630	3/3
5751	Zao	01/05/98	02:01	1200	1.12	16.0	33.9	HD44594	3/2
5818	1989 RC1	10/02/00	05:48	1800	1.28	15.2	23.8	HD196755	1/1
5832	Martaprincipe	10/01/00	01:29	2160	1.03	15.7	21.9	HD20630	2/2
5870	Baltimore	01/03/98	04:17	1500	1.03	15.1	30.1	HD44594	4/2
5914	1990 WK	05/29/01	02:27	3600	1.08	16.3	9.1	HD144585	1/1
5959	Shaklan	09/21/01	05:32	1800	1.02	15.5	5.9	HD1835	2/1
6051	Anaximenes	10/06/00	01:24	3600	1.02	17.2	12.7	HD196755	2/2
6057	Robbia	01/12/97	03:50	1800	1.17	16.3	9.8	HD44594	1/1
6084	Bascom	12/10/98	07:47	2686	1.17	16.3	26.9	HD44594	2/2
6139	Naomi	05/23/01	23:08	3000	1.06	16.2	25.8	HD144585	2/2
6193	Manabe	05/27/01	09:09	2100	1.00	15.6	28.2	HD144585	2/2
6297	1988 VZ1	01/22/01	04:28	1500	1.55	15.2	0.8	HD76151	3/2
6307	1989 WL7	09/22/01	04:50	1500	1.01	15.4	11.3	HD1835	2/1
6310	Jankonke	01/07/97	02:43	1800	1.65	16.8	31.0	HD44594	2/1
6384	Kervin	01/06/97	02:14	1320	1.47	15.9	27.4	HD44594	1/1
6394	1990 QM2	01/11/97	06:04	2400	1.07	16.1	17.0	HD44594	1/1
6447	Terrycole	01/09/97	07:27	1800	1.02	16.5	22.5	HD44594	1/1
6461	1993 VB5	01/07/97	05:37	1800	1.22	15.5	23.2	HD44594	1/1
6493	Cathybennett	01/08/97	03:07	2400	1.20	16.2	30.7	HD44594	1/1
6560	Pravdo	01/11/97	04:41	900	1.38	15.4	3.8	HD44594	1/1
6916	Lewispearce	05/26/01	22:57	3600	1.03	16.4	24.1	HD144585	3/3
6974	1992 MC	09/22/01	06:00	600	1.15	14.3	2.8	HD1835	2/1
7002	Bronshten	09/30/00	02:44	2400	1.09	15.7	17.4	HD1835	3/3
7052	1988 VQ2	09/23/01	03:15	1200	1.03	15.2	23.3	HD1835	2/2
7353	Kazuya	09/23/01	00:12	1200	1.08	15.2	21.2	HD1835	2/1
7480	Norwan	01/08/97	04:01	3000	1.35	16.8	22.9	HD44594	2/2
7482	1994 PC1	01/03/97	05:14	720	1.11	15.6	61.6	HD44594	2/1
7496	Miroslavholub	10/03/00	01:13	3200	1.00	16.1	20.0	HD1835	1/1
7516	Kranjc	05/27/01	05:11	1200	1.09	14.8	8.4	HD144585	3/2
7638	Gladman	10/03/00	04:59	900	1.17	14.4	6.5	HD1835	3/2
7868	Barker	06/01/01	07:48	3600	1.01	16.5	17.7	HD144585	3/2
7898	Ohkuma	09/23/01	06:22	900	1.20	14.4	13.4	HD1835	3/2
8106	Carpino	05/30/00	06:18	1500	1.02	15.3	9.5	HD144585	3/2
8518	1992 DM6	10/07/00	05:09	2340	1.18	15.7	3.3	HD1835	2/2
8795	1981 EO9	10/05/00	23:46	3600	1.03	17.1	19.2	HD196755	2/2
8906	Yano	10/05/00	02:57	4200	1.07	16.9	10.3	HD196755	2/2
9219	1995 WO8	10/05/00	08:07	3600	1.19	17.3	8.9	HD196755	2/2
10007	1976 YF3	02/01/00	05:18	3600	1.08	15.8	9.3	HD76151	1/1
10094	1991 DK	09/21/01	04:56	600	1.13	14.1	1.5	HD1835	2/1
10261	Nikdollezhal'	10/02/00	01:28	3240	1.13	16.3	32.7	HD196755	1/1
11079	Mitsunori	10/04/00	06:57	2160	1.06	15.9	16.4	HD1835	2/2
11548	Jerrylewis	01/27/01	05:39	1320	1.12	15.4	11.7	HD76151	4/3
12447	Yatescup	05/24/01	04:32	1500	1.02	15.2	2.9	HD144585	3/2
13111	Papacosmas	01/09/97	02:15	3420	1.10	17.8	29.3	HD44594	1/1
14465	1993 NB	09/23/01	08:59	1200	1.18	15.5	18.7	HD1835	2/1
26879	Haines	05/29/01	06:36	1800	1.12	15.0	14.4	HD144585	2/1
43754	1983 AA	01/11/97	05:30	1500	1.27	15.8	19.7	HD44594	1/1

Appendix B

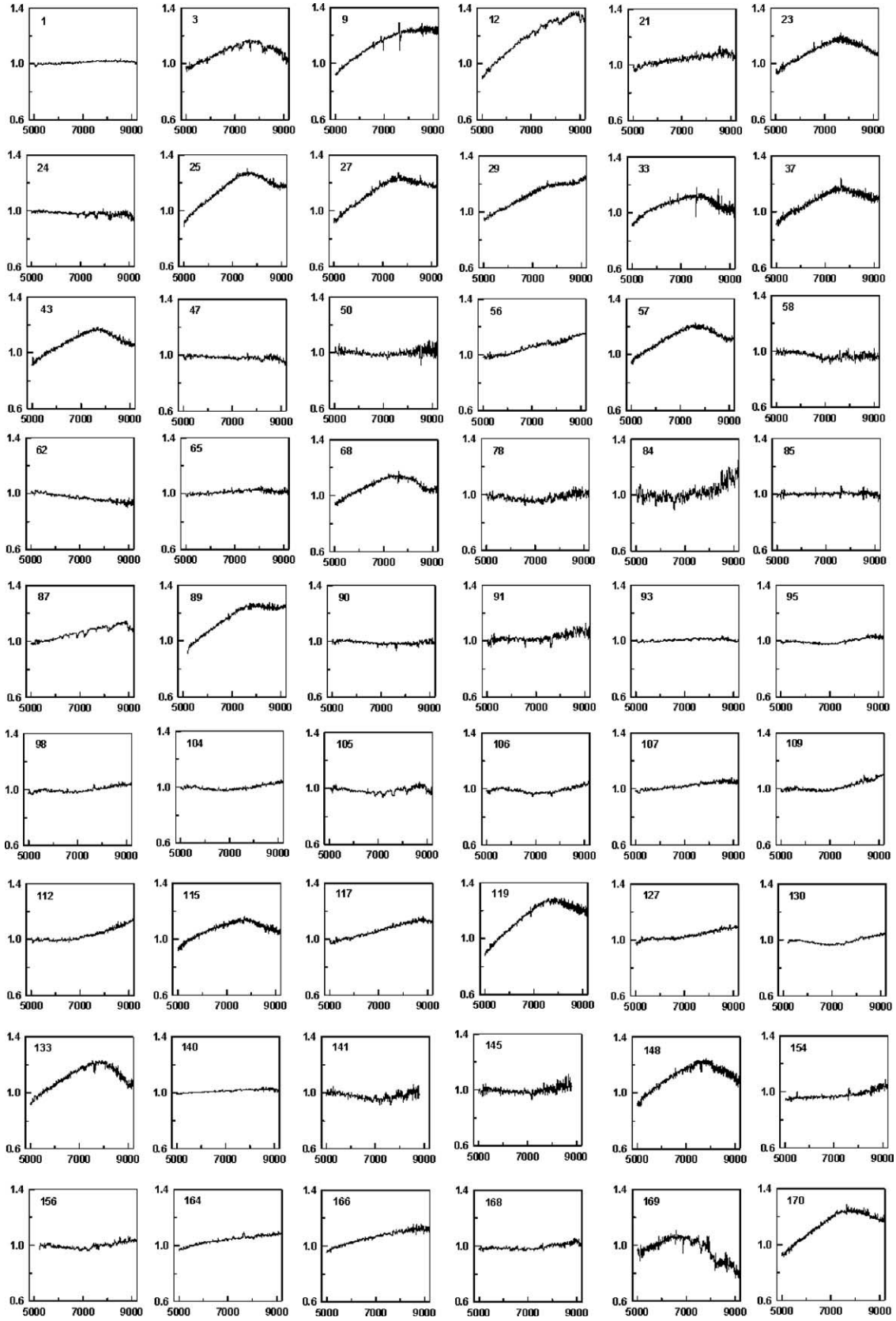


Fig. B.1.

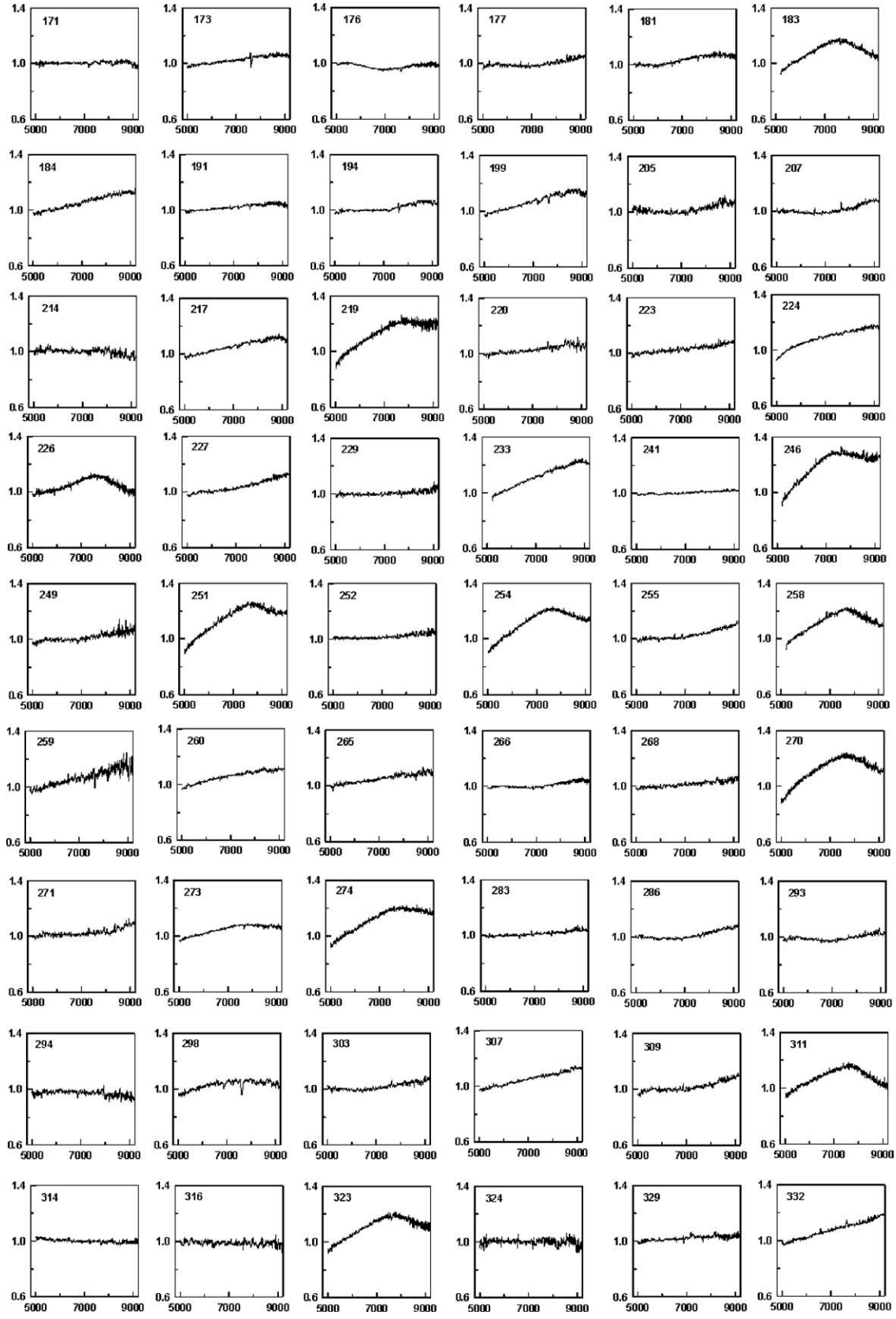
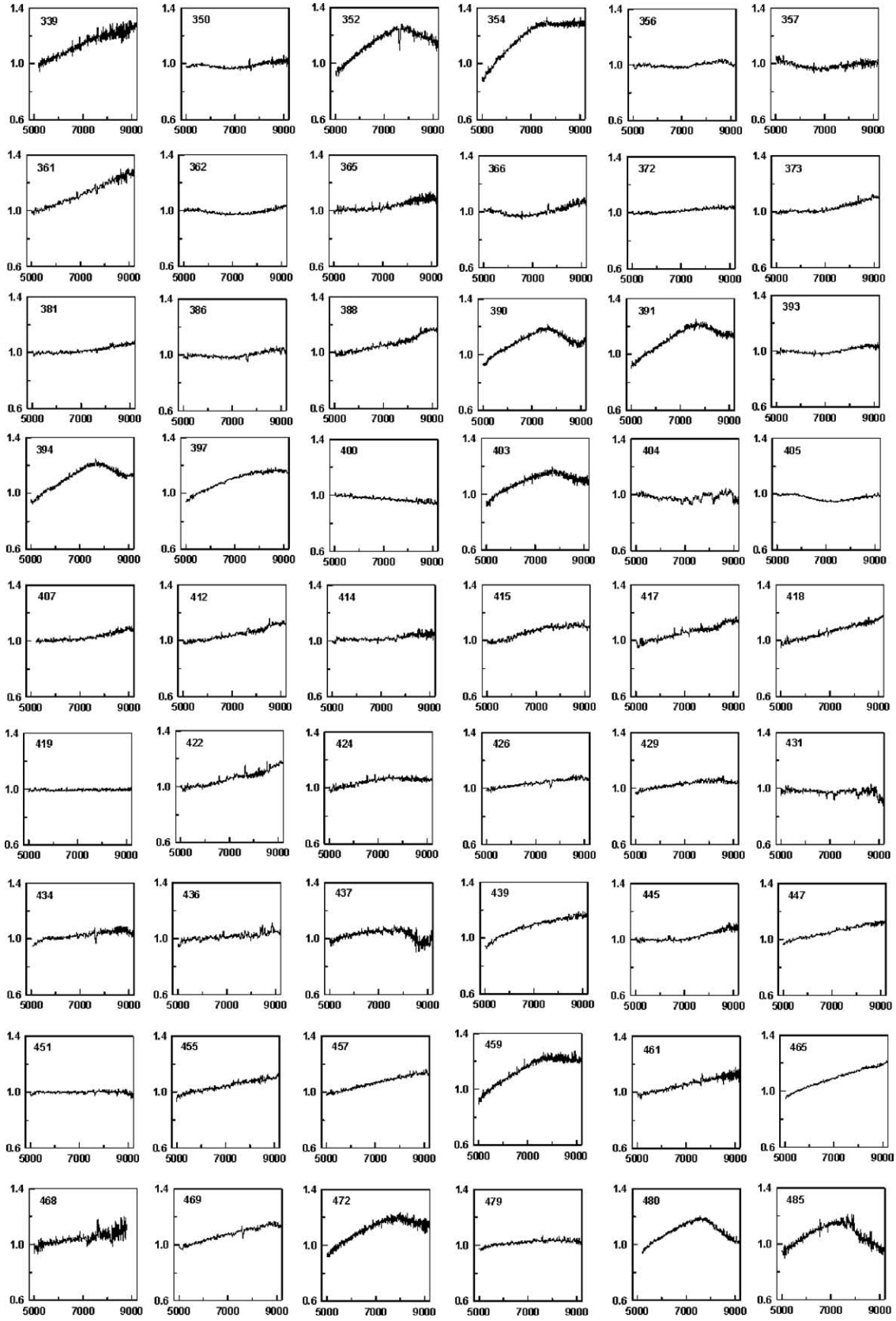


Fig. B.1. Continued.



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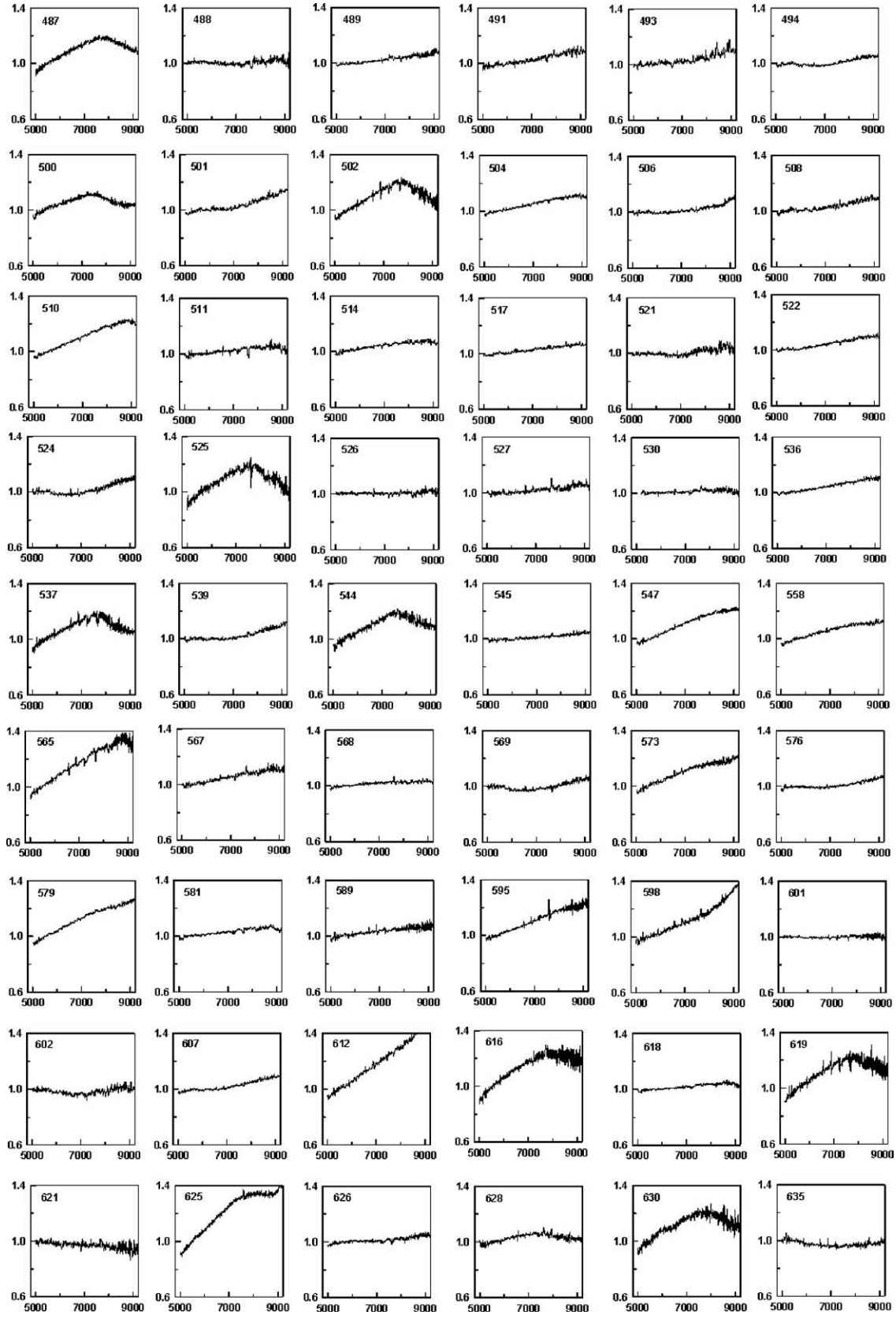

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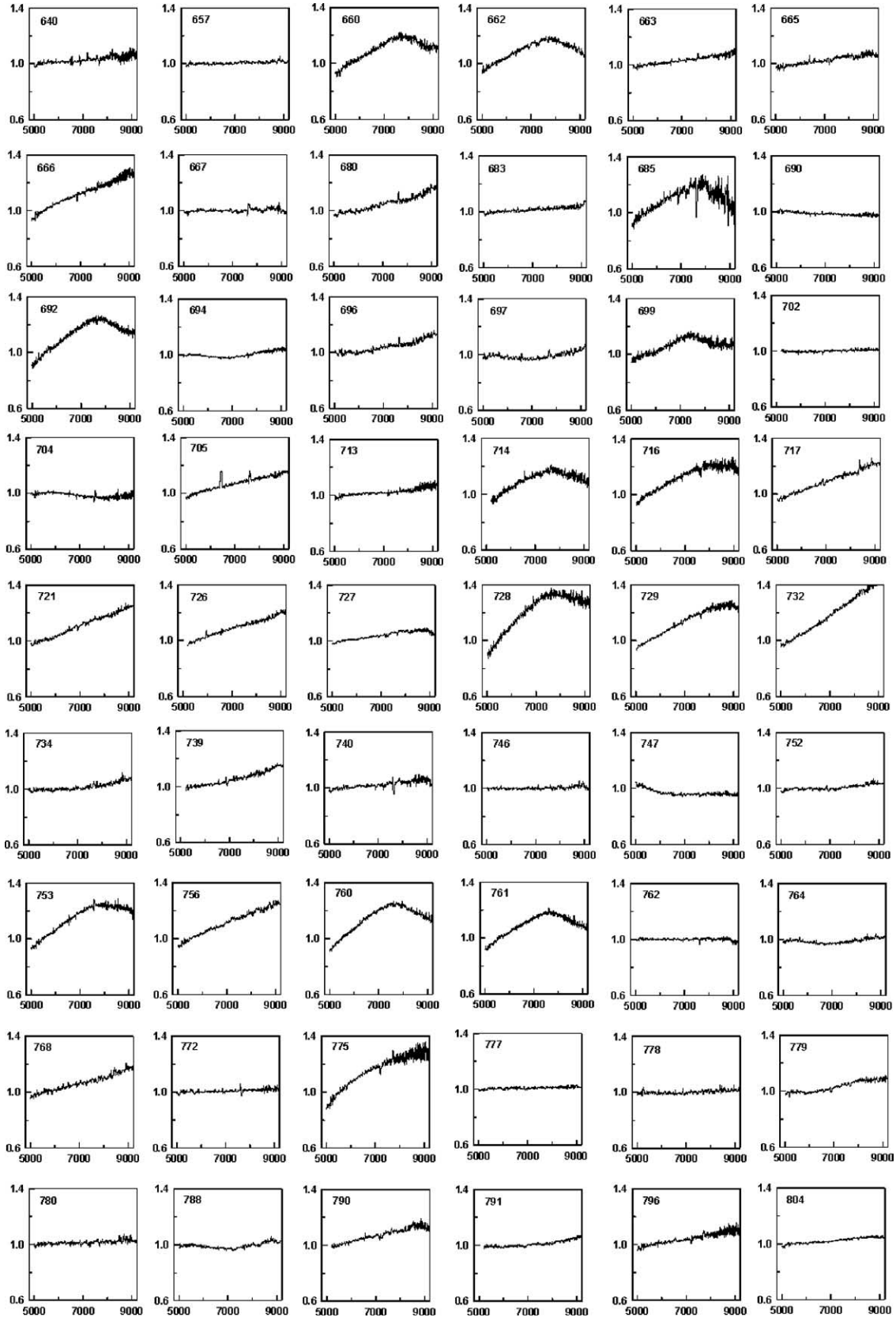

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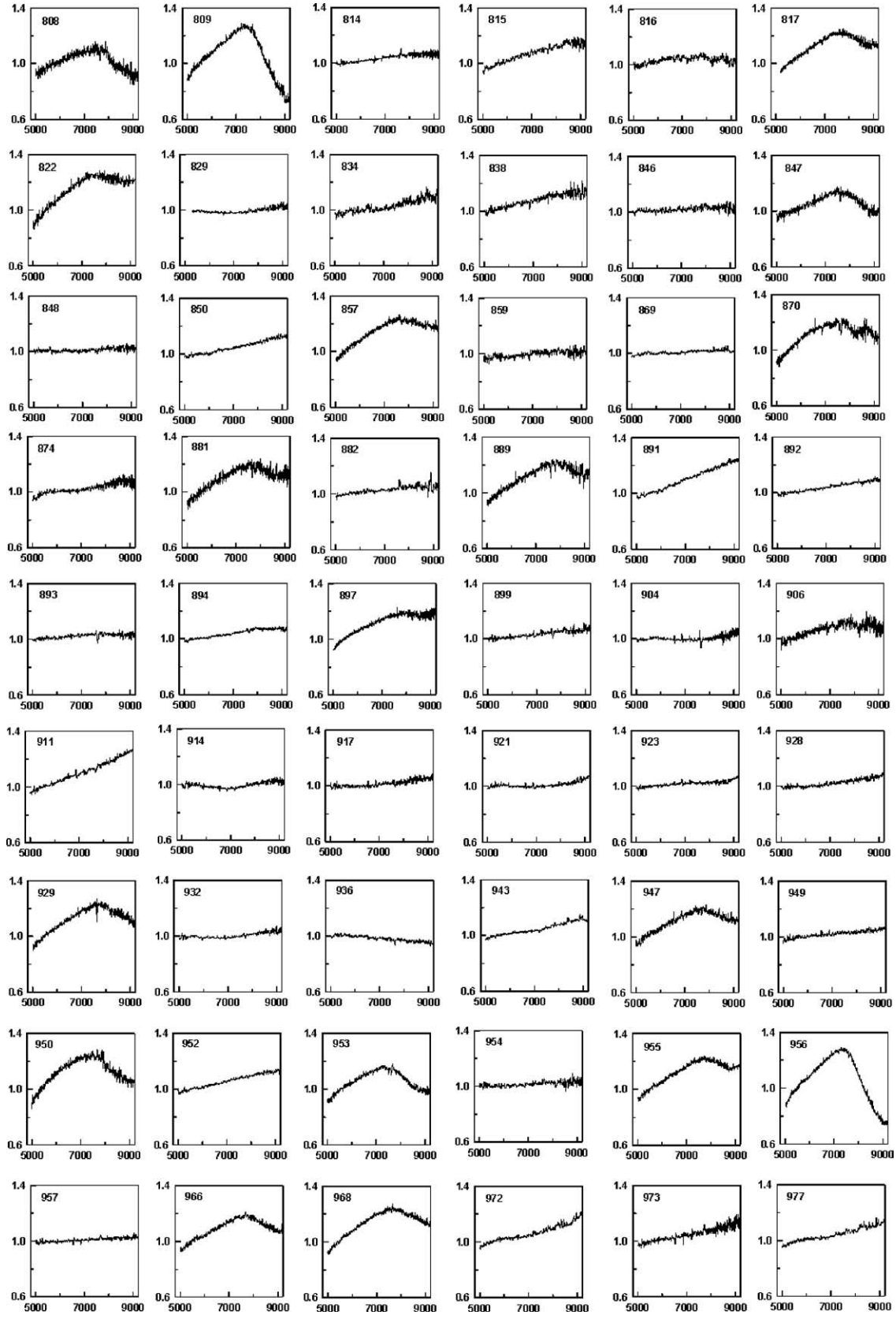

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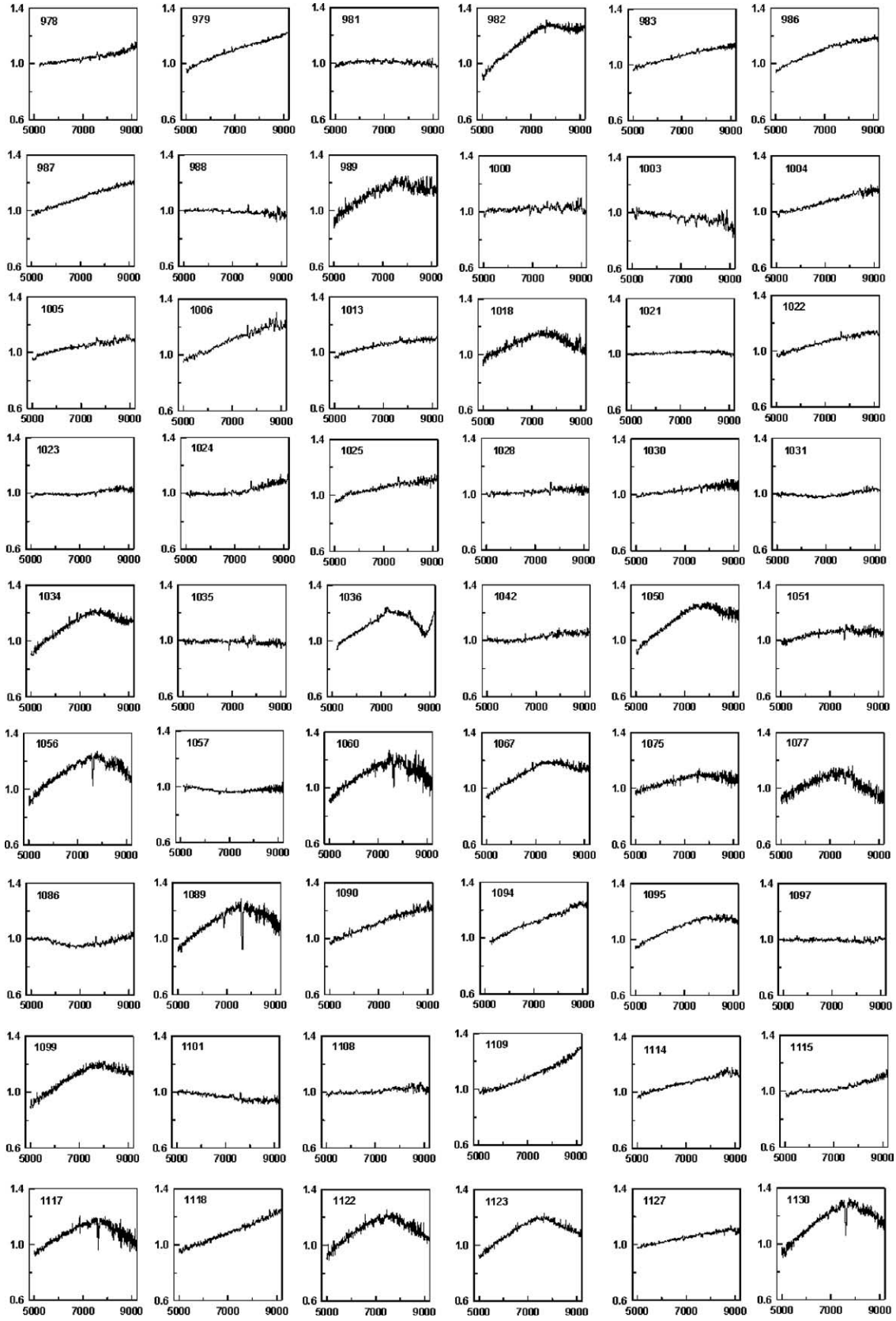

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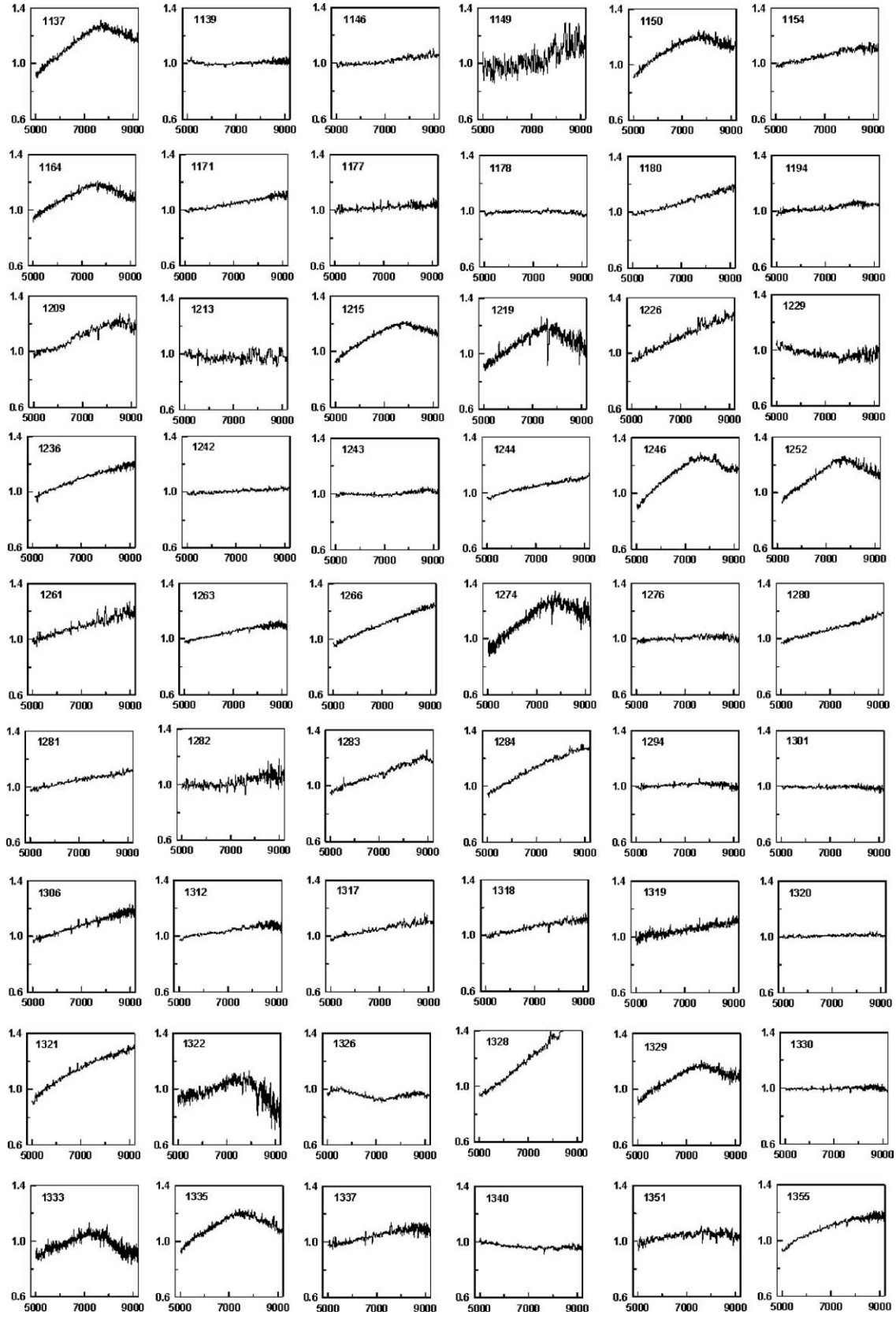

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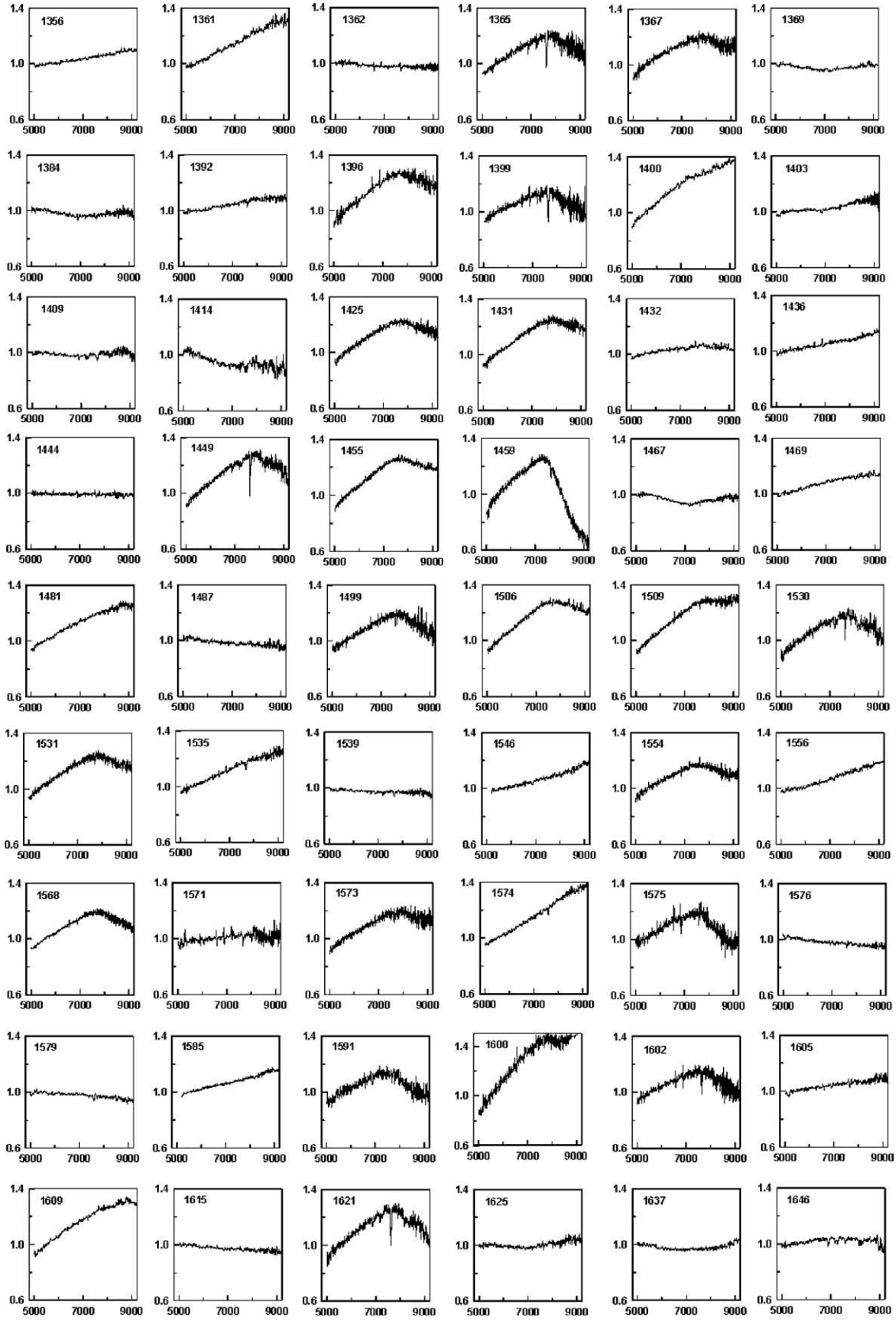

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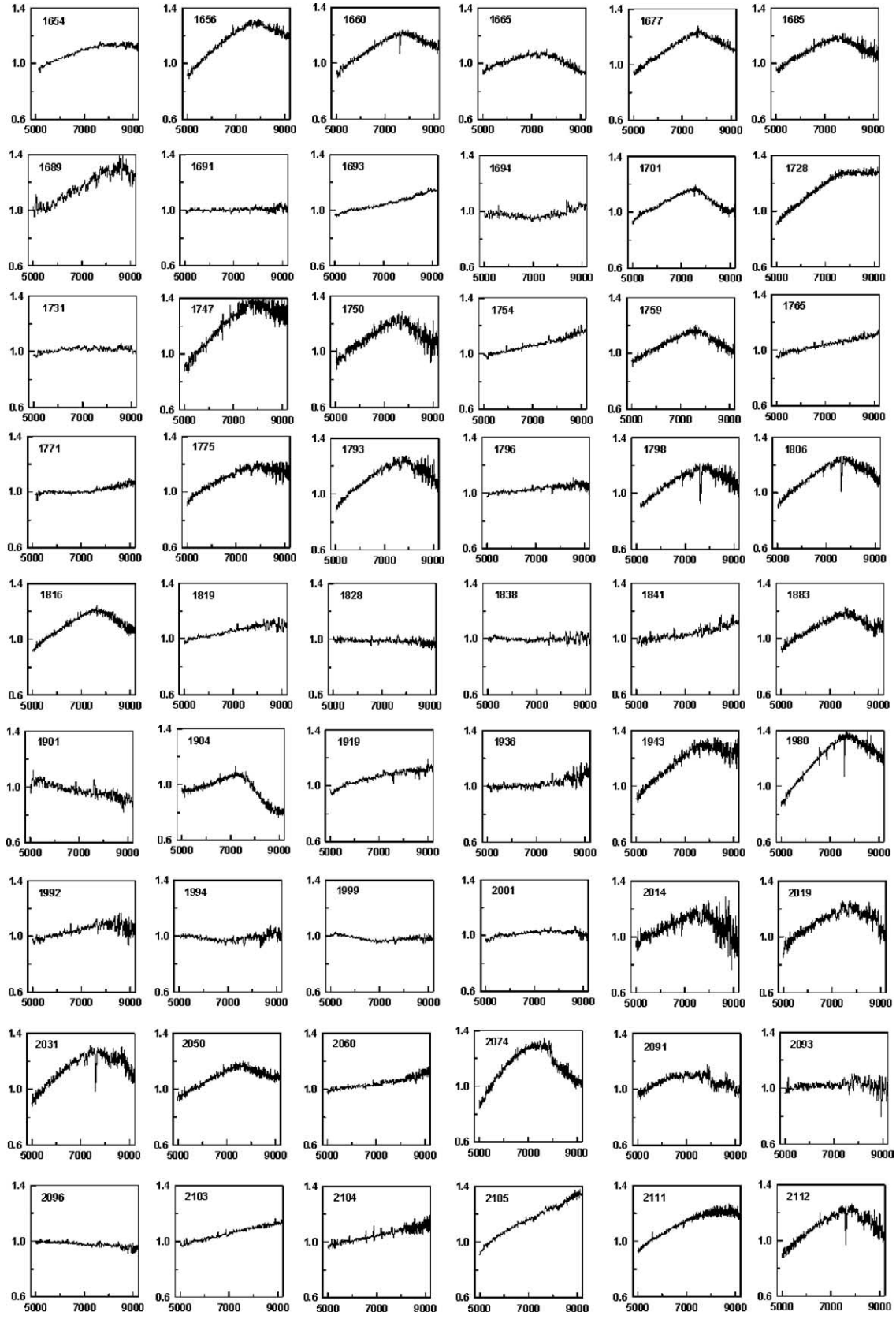

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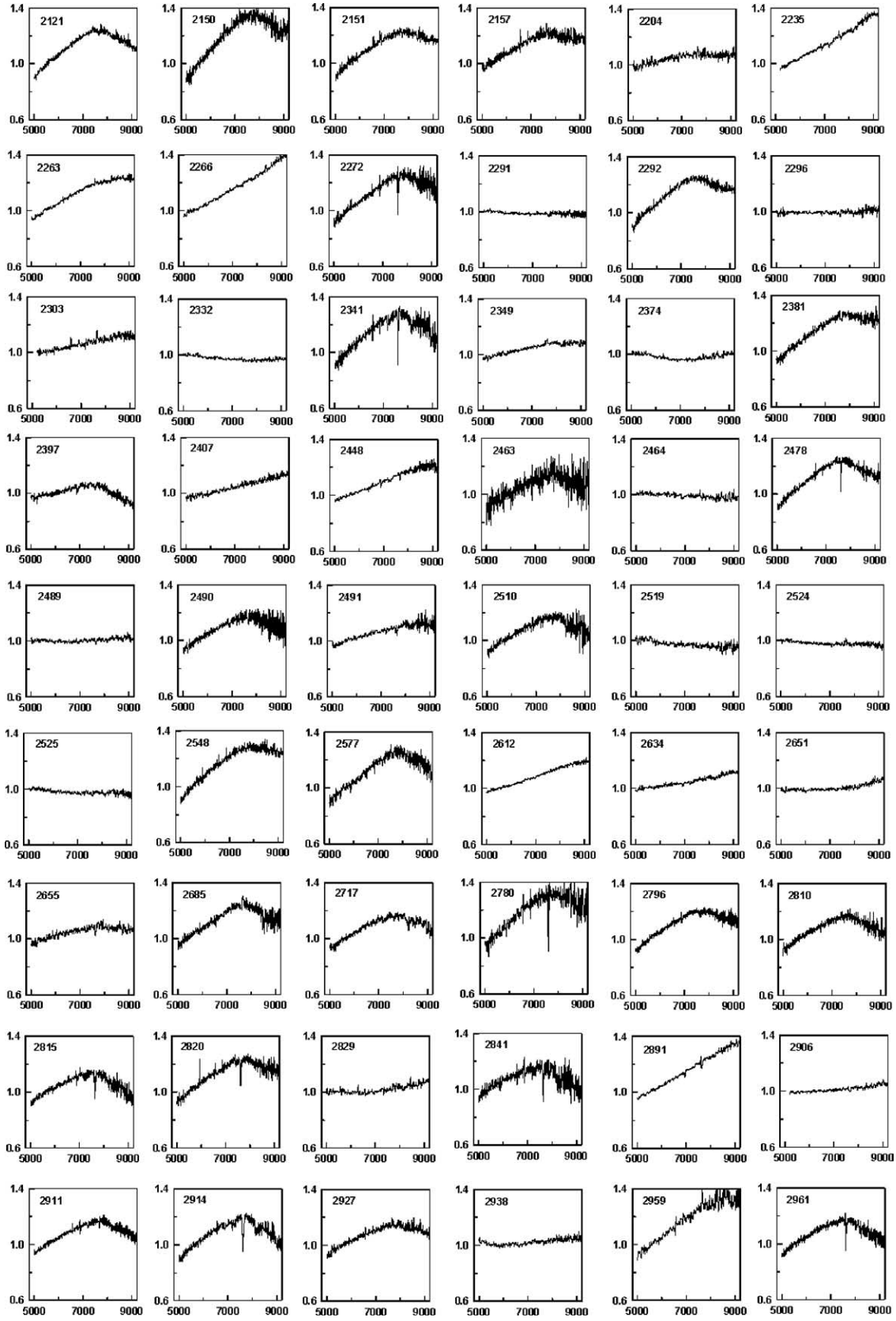

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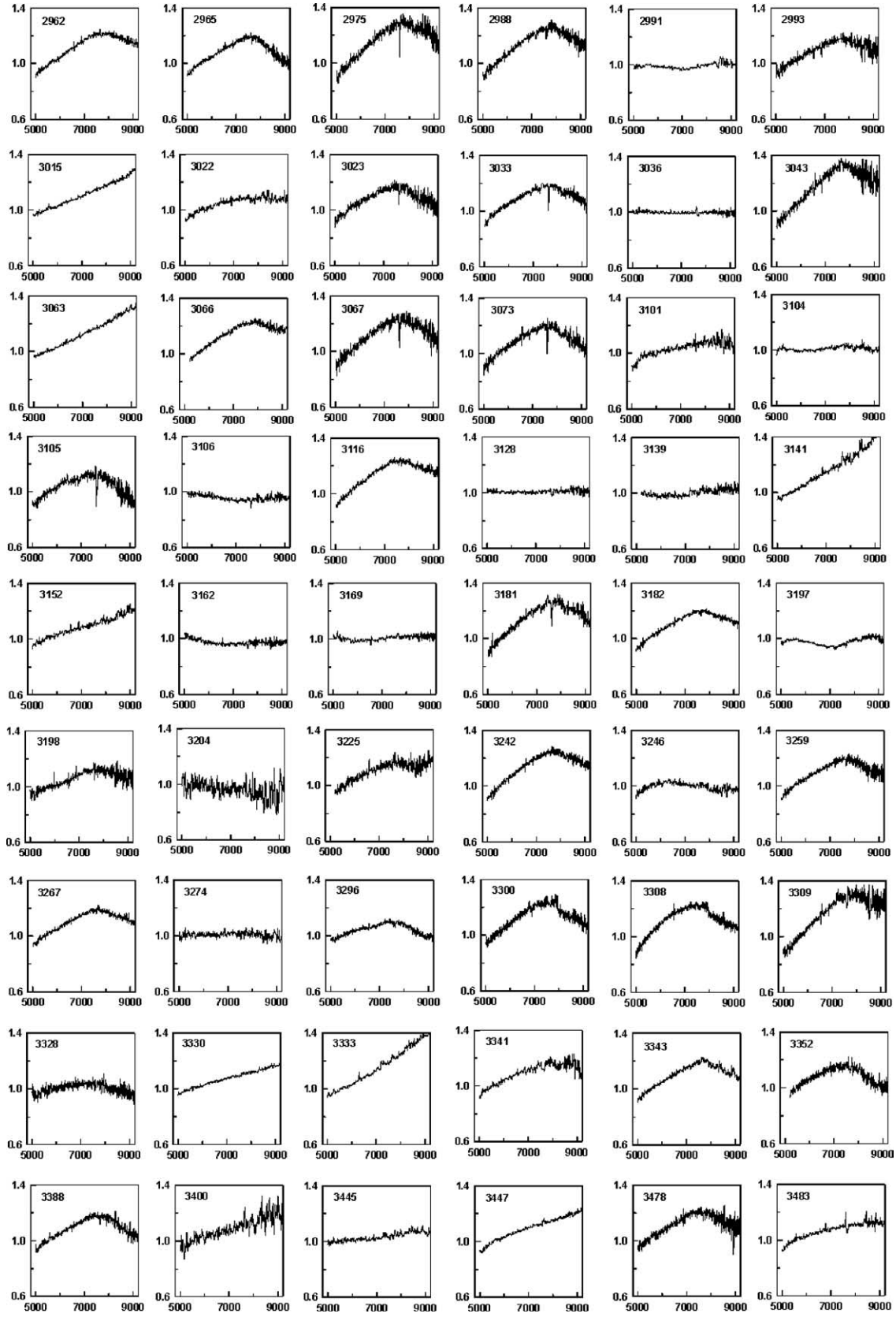

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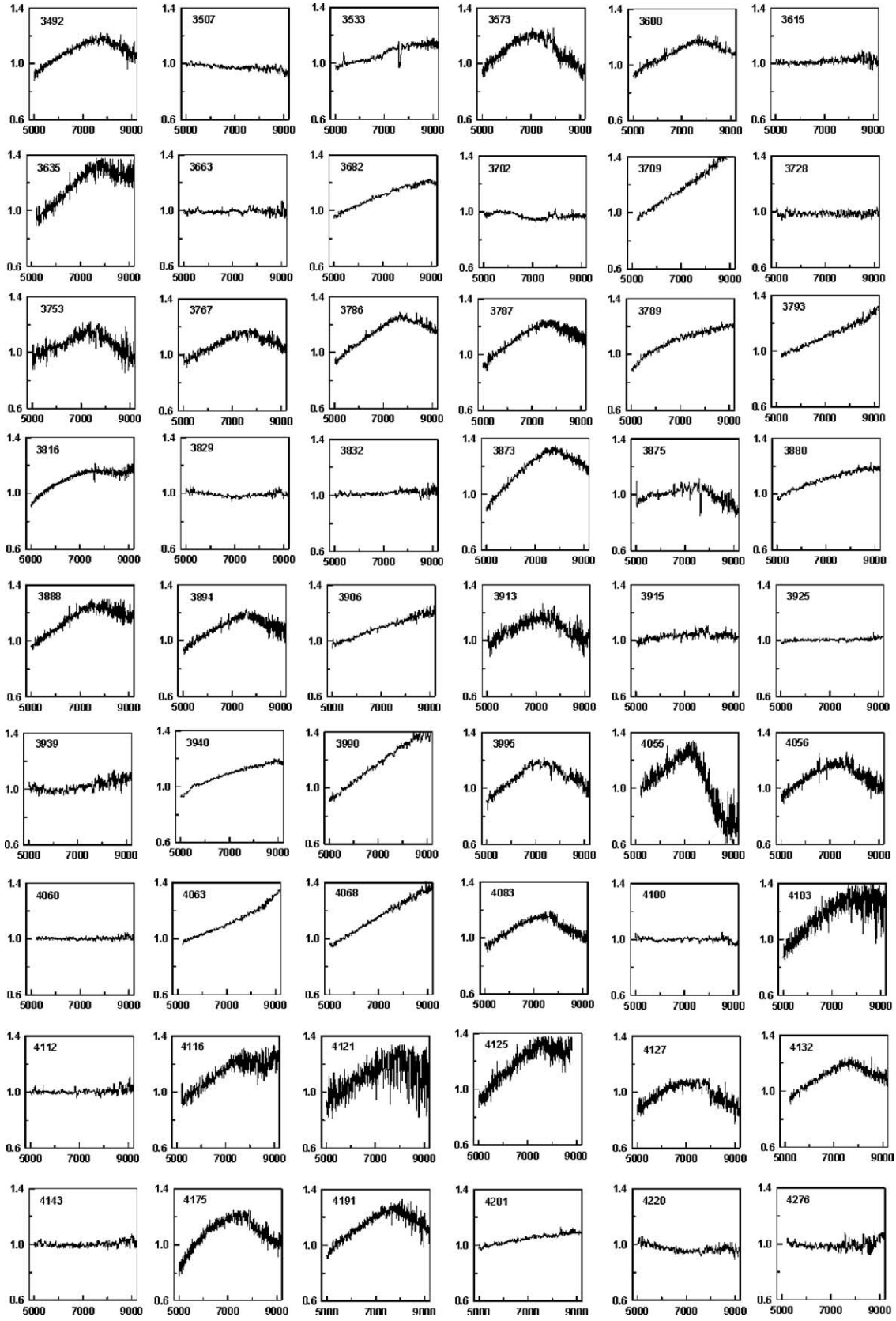

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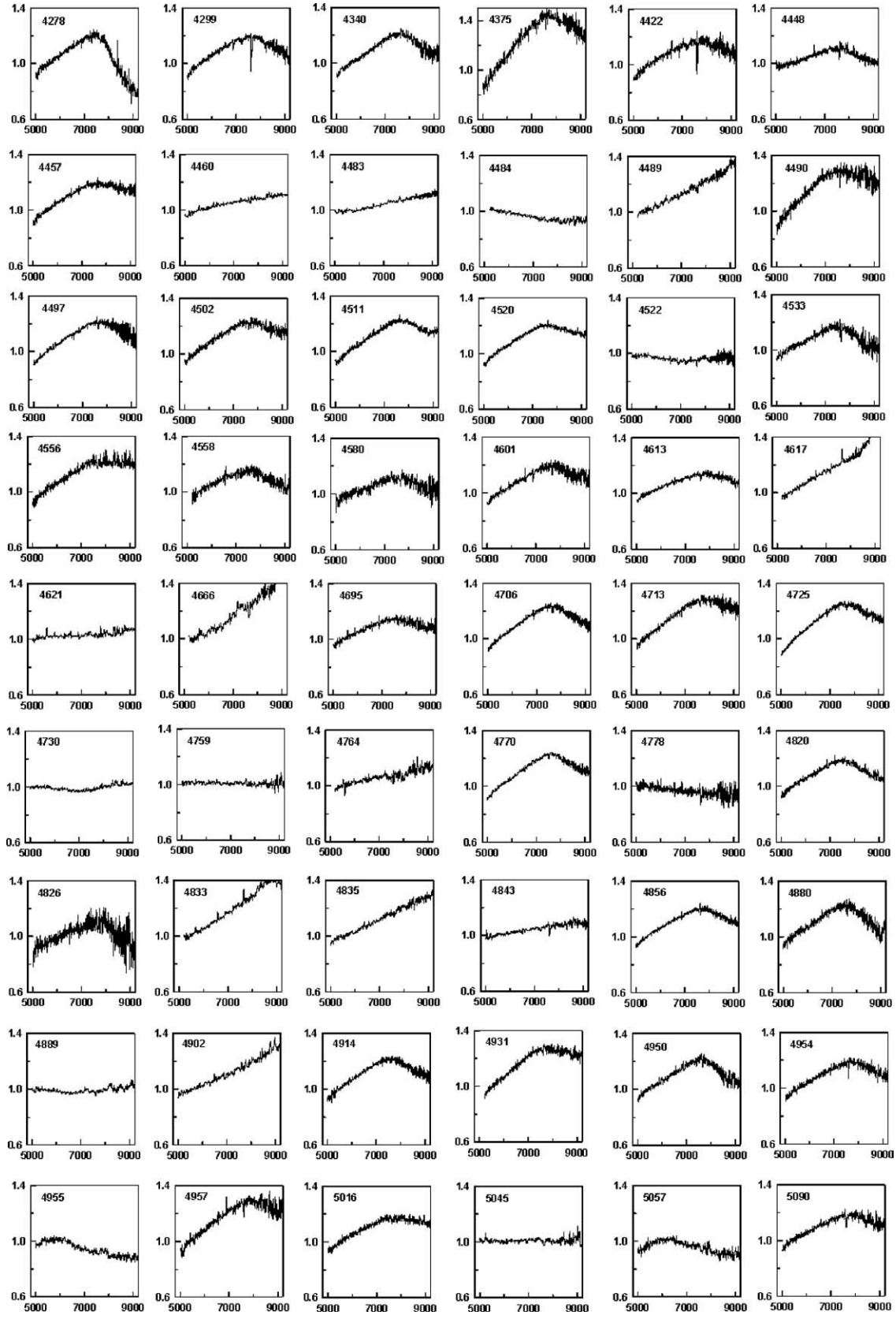

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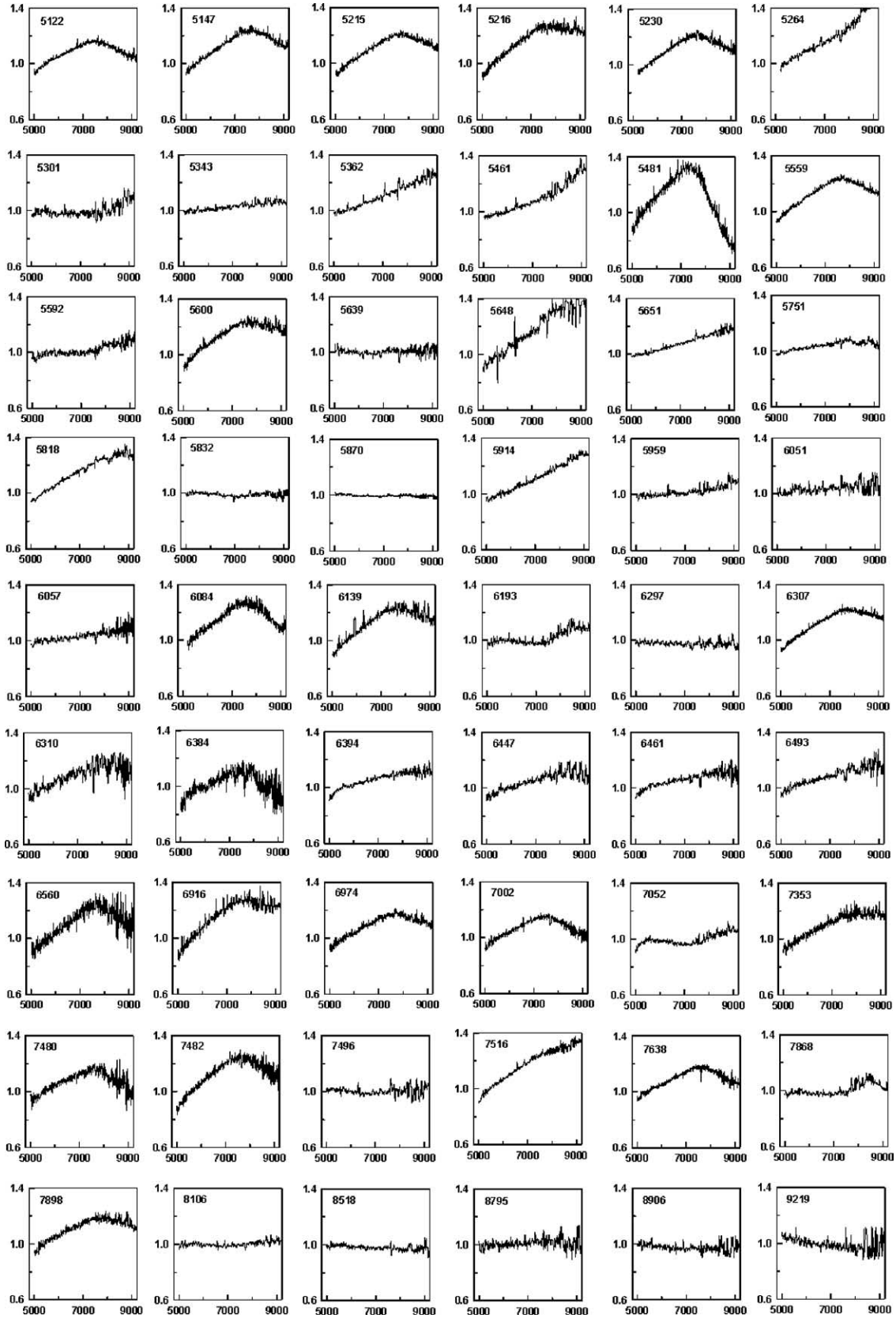

Fig. B.1. Continued.

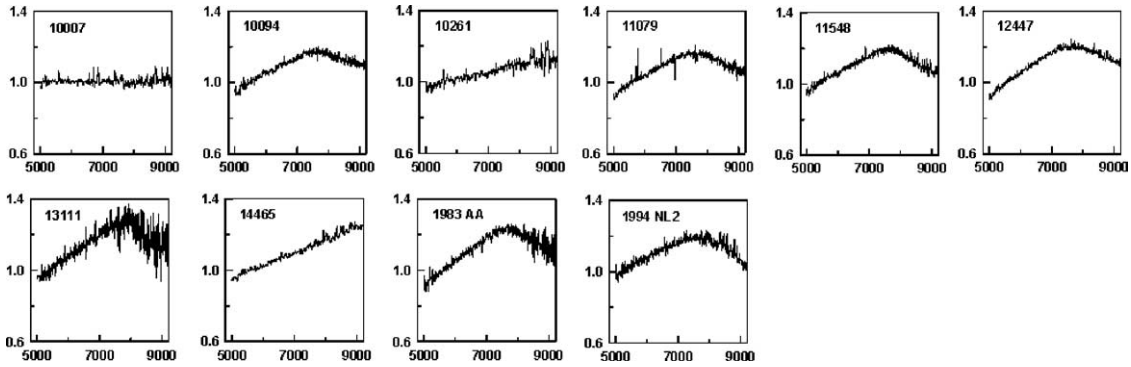

Fig. B.1. Continued.

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