

The PHEMU03 catalogue of observations of the mutual phenomena of the Galilean satellites of Jupiter

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ABSTRACT

Context. In 2003, the Sun and the Earth passed through both the equatorial plane of Jupiter and therefore the orbital planes of its main satellites.

Aims. During this period, mutual eclipses and occultations were observed and we present the data collected.

Methods. Light curves of mutual eclipses and occultations were recorded by the observers of the international campaign PHEMU03 organized by the Institut de mécanique céleste, Paris, France.

Results. We completed 377 observations of 118 mutual events from 42 sites and the corresponding data are presented in this paper. For each observation, information about the telescope, receptor, site, and observational conditions are provided.

Conclusions. This paper gathers all data and indicates a first estimate of its precision. This catalogue of these rare events should constitute an improved basis for accurate astrometric data useful in the development of dynamical models.

Key words. Jupiter – Galilean satellites – Mutual events – Eclipses – Occultations – Astrometry

1. Receptors

When observing mutual events, only relative photometry can generally be completed. Since the elevation of Jupiter above the horizon may be small, the air mass is often too high and absolute photometry is then impossible. Telescopes were equipped with the receptors listed in Table 2. Three kinds of receptors were used, the photoelectric photometric single channel receptors, the video cameras, and the two-dimensional CCD receptors. Visual observations are reported only for comparison. The code for the receptors are those provided in the tables for each observation.

2. Sites of observation

Coordinated by the IMCCE, this campaign involved the different locations given in Table 3. This table gives the names, longitudes, latitudes, and elevations of the observational sites and the telescopes used (L means refractor and T means reflector, followed by the aperture in cm).

3. The data

In table 4, we present the following data for each observed event, where all dates are in UTC:

- predicted time of the event:

Table 2. Sites of observation for the PHEMU03 campaign

Sites	Telescope	Longitude				Latitude				elevation meters
		°	'	"		°	'	"		
Alma-Ata (Kazakhstan)	T 60	76	57	15	E	43	12	00	N	1450
Antony (France)	T 13	2	17	12	E	48	45	00	N	50
Armagh (Northern Ireland)	T 25	6	38	59	W	54	21	11	N	67
Bordeaux (France)	T 60	0	31	36	W	44	50	06	N	73
Brescia (Italia)	T 20	9	59	30	E	45	26	12	N	94
Bucharest (Romania)	T 15	26	05	48	E	44	24	48	N	267
Catania (Italia)	T 20	15	03	19	E	37	32	54	N	300
Chateaugiron (France)	T 21	1	30	12	W	48	2	41	N	70
Chemnitz (Germany)	L 6	12	51	10	E	50	49	25	N	344
Cluj-Napoca (Romania)	T 41	23	35	37	E	46	42	36	N	750
Dax (France)	T 32	1	01	43	E	43	41	35	N	35
Dolberg (Germany)	T 20	7	54	53	E	51	42	45	N	68
Ekaterinburg (Russia)	T 45	59	30	00	E	56	49	00	N	237
Elgin, Oregon (USA)	T 20	117	55	16	W	45	34	22	N	835
Gieres (France)	T 20	5	44	00	E	45	11	00	N	210
Kavalur-VBO (India)	T 234	78	49	15	E	12	34	38	N	725
Kavalur-VBO (India)	T 102	78	49	15	E	12	34	38	N	725
Lanester (France)	T 20	3	21	15	W	47	45	00	N	0
La Palma (Spain)	T 35	17	53	00	W	28	45	26	N	2300
Lille (France)	L 32	3	4	15	E	50	36	57	N	32
Tomar (Portugal)	T 25	8	23	02	W	39	31	23	N	90
Lumezzane (Italia)	T 40	10	12	27	E	45	39	59	N	830
Massa (Italia)	T 18	10	6	11	E	44	2	31	N	40
Mainz (Germany)	T 25	8	14	56	E	49	55	05	N	205
Meudon (France)	T 100	2	13	54	E	48	48	18	N	162
Monegrillo (Spain)	T 41	0	24	43	E	41	38	38	N	425
Monterrey (Mexico)	T 18	100	22	26	W	25	38	36	N	661
Mt Dushak (Ukraine)	T 80	57	53	00	E	37	55	27	N	2020
Mundolsheim (France)	T 15	7	42	50	E	48	38	50	N	135
Nauchny (Ukraine)	T 60	34	01	00	E	44	43	37	N	600
Novara (Italia)	L 6	8	37	30	E	45	28	30	N	160
Nyrola (Finland)	T 41	25	30	47	E	62	20	32	N	210
OHP (France)	L 15	5	42	36	E	43	53	36	N	665
OHP (France)	T 80	5	42	36	E	43	53	36	N	665
OHP (France)	T 120	5	42	36	E	43	53	36	N	665
Prague (Czech Rep.)	L 18	14	23	52	E	50	04	53	N	327
Prague (Czech Rep.)	T 41	14	23	53	E	50	04	52	N	327
Pulkovo (Russia)	L 65	30	19	30	E	59	46	18	N	75
Pulkovo (Russia)	T 32	30	19	30	E	59	46	18	N	75
Rozhen (Bulgaria)	T 60	24	44	30	E	41	41	35	N	1750
Sabadell (Spain)	T 80	2	05	29	E	41	33	04	N	224
Strasbourg (France)	L 48	7	46	12	E	48	35	00	N	425
Sendai (Japan)	T 36	140	52	30	E	38	16	36	N	55
Sobota (Slovakia)	T 15	20	02	00	E	48	39	00	N	225
Terskol (Russia)	T 60	42	30	03	E	43	16	36	N	3100
Torrecilla de Valmadrid (Spain)	T 20	0	51	19	W	41	30	07	N	382
Ukkel (Belgium)	T 85	4	21	28	E	50	47	51	N	105
Vienna (Austria)	T 10	16	24	00	E	48	12	00	N	190
Yunnan Obs. (China)	T 100	102	47	15	E	25	01	45	N	1940

1. date (year, month, day) and nature of the event (4O1 means that satellite 4 occults satellite 1; 3E2 means that satellite 3 eclipses satellite 2; P means partial event, A annular, T total, and blank, an eclipse by the penumbra only);
2. beginning of event;
3. maximum of event;
4. end of event;
5. calculated magnitude drop;
6. phase angle in degrees;
7. apparent distance between satellite and planet in planetary radii.

Table 1. Receptors used for the observations

Code as given in the tables	Description
CCT	intensified camera of T120-OHP
CCD	unknown
CCD1	CCD SONY ICX021CL
CCD2	Video Watec 902H
CCD3	Video B/W CCD KC381
CCD5	same as CCT
CCD4	Sony ICX098BQ
CCD6	WebCam Toucam
CCD7	KAF3200E
CCD8	Johnson I-type filter
CCD9	ST-6V
CCD10	Hi Sys 22
CCD11	Audine400
CCD12	Sony ICX083AL
CCD13	Sony ICX027BL
CCD14	camera SBIG ST-8
CCD15	TH7852
CCD16	Imaintel intensified camera
CCD17	Kaf400E with V-Filter
CCD18	TC245-40
CCD19	OS45D
CCD20	Sony ICX 039 BLA (Camera OS45D)
CCD21	Starlight Xpress SX
CCD22	Pictor 416
CCD23	KAF-6300 with filter in methane band 892 nm +/- 20 nm
CCD24	KAF-0400
CCD25	ST7
CCD26	CCD SBIG ST-6
CCD27	Sony HAD ICX38DLA
CCD28	Tektronics CCD
CCD29	CCD Troms Univ. (Ostensen, 2002)
VIDEO	Astrovid 2000 video camera with a SONY ICX038 detector chip
WAT	WATEK 902H Camera
PM	unknown
PM1	EMI-9789QA
PM2	one-channel 1 P21
PM3	Hamamatsu Johnson system V-mag (PCPA-R647-04)
PM4	EMI9502B
PM5	WBVR photometer
PM6	one Channel electro-photometer (Filter V)
PMTF	FEU-136 (S-20 (Cs)Na2K Sb photocathode)
NOCT	Nocticon Vidicon camera
VISU	visual

- for each observation of the above event:

1. site of observation;
2. -

3. observed time of the maximum of magnitude drop and observational error;
4. -
5. observed magnitude drop and observational error;
6. -
7. -
8. (C-O) of the observation in seconds of time; these quantities take into account a phase effect by means of the Aksnes et al. (1986) method;
9. aperture of the telescope in centimeters (T= reflector; L= refractor);
10. code of the used receptor in column "Recept." (cf Table 2);
11. elevation of Jupiter above the horizon in degrees;
12. elevation of the Sun above the horizon in degrees;
13. observational conditions in column "Obs. cond.": [0] means no information, [1] means very good conditions, [2] means acceptable, and [3] very difficult conditions;
14. filter used, if any, during the observations in column "Filter"; no filter used is denoted by "-";
15. integration time of the measurements in seconds; a variable integration time is denoted by "v";
16. size of the diaphragm when used;
17. satellites inside the diaphragm, i.e. those taken into account when compiling the light curve (if nothing is indicated, then this is only the eclipsed satellite during the eclipses and both satellites responsible for the occultations)

A corresponding light curve is presented for each observation described in these tables, in which the magnitude drop is indicated in terms of the UTC timescale.

These data and light-curves are available for anyone interested from the electronic database of the Natural Satellite Data Center (NSDC) server on the WEB server ¹.

¹ at the web address <http://www.imcce.fr/nsdc> or on the ftp server at ftp://ftp.imcce.fr/pub/NSDC/jupiter/raw_data/phenomena/mutual/2003/

Table 3. Observational data

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2002/10/28 2 O1(P)	1 8 8	1 10 59	1 13 50	.410	10.6	5.2										
PULKOVO		1 10 53 ± 3		1.111 ± .125			6	T 32.	CCD26	32	-30	0	-	-	-	-
2002/11/11 2 O1(P)	5 47 54	5 50 58	5 54 3	.291	10.8	5.5										
CHATEAUGIRON-R		5 50 44 ± 6		.396 ± .027			14	T 21.	CCD1	54	2	1	-	0.02	-	-
CHATEAUGIRON-V		5 51 56 ± 21		.353 ± .113			-58	T 21.	CCD1	54	2	1	-	-	-	-
2002/11/12 4 O2(P)	23 5 20	23 8 26	23 11 32	.158	10.8	6.4										
CLUJ-NAPOCA		23 8 13 ± 6		.468 ± .029			13	T 41.	CCD22	20	-59	0	V	1.	-	-
2002/11/18 2 E1()	6 2 35	6 5 4	6 7 34	.059	10.7	4.8										
LA PALMA		6 4 46 ± 13		.054 ± .018			18	T 35.	CCD14	76	-19	2	G	0.2	-	-
2002/11/18 2 O1(P)	8 7 43	8 10 43	8 13 45	.188	10.7	5.6										
MONTERREY		8 10 50 ± 18		.254 ± .044			-7	T 18.	VIDEO	33	-65	1	-	0.5	-	-
2002/11/25 2 E1(P)	8 21 46	8 24 57	8 28 10	.193	10.4	5.0										
MONTERREY		8 24 58 ± 14		.169 ± .033			-1	T 18.	VIDEO	42	-63	1	-	0.5	-	-
2002/11/25 2 O1(P)	10 27 44	10 30 34	10 33 25	.110	10.4	5.7										
MONTERREY		10 30 37 ± 28		.113 ± .028			-3	T 18.	VIDEO	70	-34	2	-	0.5	-	-
2002/11/28 2 E1(P)	21 31 51	21 35 18	21 38 49	.275	10.2	5.1										
CLUJ-NAPOCA		21 35 26 ± 4		.336 ± .022			-8	T 41.	CCD22	15	-64	0	V	3.	-	-
KAVALUR		21 35 21 ± 2		.303 ± .006			-3	T 234.	CCD28	61	-45	0	-	-	-	-
2002/11/28 2 O1(P)	23 37 37	23 40 20	23 43 3	.080	10.2	5.8										
CLUJ-NAPOCA		23 40 11 ± 12		.065 ± .011			9	T 41.	CCD22	36	-59	0	V	1.5	-	-
2002/12/5 2 E1(P)	23 53 49	23 57 52	0 1 57	.453	9.7	5.4										
EKATERINBURG		23 58 7 ± 8		.477 ± .034			-15	T 45.	PM6	49	-35	2	V	1.0	-	-
OHP		23 57 43 ± 10		1.675 ± .227			9	L 15.	CCD16	32	-68	0	-	0.04	-	-
OHP		23 57 53 ± 16		.031 ± .005			-1	T 80.	CCD2	32	-68	0	-	-	-	-
2002/12/7 1 O4(P)	22 10 51	22 17 31	22 24 1	.343	9.5	5.9										
ALMA-ATA		22 12 54 ± 13		.190 ± .014			277	T 60.	CCD9	61	-41	0	-	-	-	-
PULKOVO		22 16 26 ± 31		.326 ± .048			65	T 32.	CCD26	29	-53	0	-	-	-	-
2002/12/13 2 E1(A)	2 18 19	2 22 57	2 27 38	.624	8.9	5.5										
OHP		2 2 9 ± 43		.297 ± .132			-2	L 15.	CCD2	59	-49	0	-	-	-	-
PULKOVO		2 22 56 ± 5		.999 ± .062			1	T 32.	CCD26	46	-31	0	-	-	-	-
BUCHAREST		2 22 58 ± 3		1.174 ± .038			-1	T 15.	CCD9	62	-35	0	V	-	-	-
CHEMNITZ		2 23 30 ± 7		2.585 ± .166			-33	L 6.	VISU	54	-42	0	-	-	-	-

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2002/12/15 4 O3(P)	10 30 12	10 33 56	10 37 40	.171	8.7	2.7										
MONTERREY		10 33 30 ± 10		.271 ± .023			26	T 18.	VIDEO	80	-36	1	-	0.5	-	-
2002/12/15 4 O2(T)	11 36 11	11 39 14	11 42 16	.295	8.7	2.3										
MONTERREY		11 39 2 ± 5		1.141 ± .059			12	T 18.	VIDEO	71	-22	1	-	0.5	-	-
2002/12/16 4 O1(T)	2 7 13	2 10 31	2 13 47	.361	8.6	3.8										
OHP		2 10 13 ± 9		.466 ± .063			18	L 15.	CCD2	59	-52	0	-	-	-	-
CLUJ-NAPOCA		2 10 12 ± 3		1.218 ± .030			19	T 41.	CCD22	59	-39	0	V	0.9	-	-
2002/12/20 2 E1(A)	4 46 13	4 51 27	4 56 45	.711	8.1	5.7										
CHATEAUGIRON		4 51 27 ± 5		1.618 ± .109			0	T 21.	CCD1	42	-13	0	-	-	-	-
OHP		4 51 27 ± 4		1.557 ± .070			0	L 15.	CCD16	54	-23	0	-	0.04	-	-
CLUJ-NAPOCA		4 51 27 ± 1		1.668 ± .016			0	T 41.	CCD22	42	-12	0	V	0.9	-	-
VIENNA		4 51 9 ± 3		.650 ± .016			18	T 10.	VISU	46	-17	1	-	-	-	-
MASSA		4 51 21 ± 6		1.756 ± .126			6	T 18.	CCD3	-25	-9	1	-	0.04	2	-
CHEMNITZ		4 51 37 ± 8		4.733 ± .283			-10	L 6.	VISU	46	-20	0	-	-	-	-
GIERES		4 51 37 ± 7		2.904 ± .286			-10	T 20.	CCD6	53	-24	0	-	-	-	-
2002/12/20 2 O1(P)	21 1 3	22 56 11	23 33 1	.245	8.0	3.3										
CLUJ-NAPOCA		21 41 32 ± 151		.346 ± .027			-146	T 41.	CCD22	31	-65	0	V	0.8	5	-
2002/12/23 2 O3(A)	0 14 35	0 48 37	1 17 34	.480	7.7	8.3										
OHP		0 59 10 ± 144		.852 ± .217			-93	T 80.	CCD16	52	-65	0	-	0.04	-	-
ROZHEN		0 50 31 ± 76		.203 ± .013			-114	T 60.	PM1	63	-54	1	-	1.	-	-
MONEGRILLO		0 48 9 ± 41		.309 ± .015			28	T 41.	CCD21	49	-69	0	R	-	-	-
2002/12/24 1 O4(P)	3 53 23	3 56 9	3 58 55	.332	7.6	1.7										
SABADELL		3 55 23 ± 0		.199 ± .000			46	T 80.	CCD26	77	-52	0	-	-	-	-
2002/12/30 2 O3(P)	5 54 46	6 9 14	6 23 10	.237	6.7	9.0										
SABADELL		6 9 47 ± 19		.170 ± .009			-33	T 80.	CCD26	56	-23	0	-	-	-	-
OHP		6 8 54 ± 261		.154 ± .195			19	T 80.	CCD16	35	-11	0	-	0.04	-	-
2002/12/30 2 E1(P)	20 38 29	20 44 54	20 51 28	.584	6.6	5.9										
PULKOVO		20 45 3 ± 13		.804 ± .075			-9	T 32.	CCD26	30	-51	0	-	-	-	-
BUCHAREST		20 44 56 ± 7		1.096 ± .057			-2	T 30.	CCD7	31	-52	1	-	0.3	-	-
NYROLA		20 44 54 ± 4		1.023 ± .027			0	T 41.	CCD14	30	-49	0	V	-	-	-
KAVALUR		20 44 55 ± 1		1.055 ± .010			-1	T 234.	CCD28	79	-60	0	-	-	-	-
2002/12/30 4 O3(P)	21 12 46	21 19 27	21 26 10	.205	6.5	13.9										
NYROLA		21 19 18 ± 17		.330 ± .028			9	T 41.	CCD14	30	-49	0	V	-	-	-
ROZHEN		21 18 27 ± 10		.388 ± .013			60	T 60.	PM1	36	-67	1	-	1.	-	-
KAVALUR		21 19 25 ± 4		.356 ± .005			2	T 234.	CCD28	86	-52	0	-	-	-	-
PULKOVO		21 19 26 ± 9		.481 ± .025			1	T 32.	CCD26	34	-53	0	-	-	-	-
BUCHAREST		21 19 23 ± 22		.365 ± .040			4	T 30.	CCD9	37	-66	1	-	0.3	-	-

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2003/1/6 2 E1(P)	23 24 57	23 32 47	23 40 53	.449	5.3	5.8										
BORDEAUX		23 32 53 ± 4		.730 ± .016			-6	T 60.	CCD15	46	-67	2	-	2.6	5	-
CATANIA		23 32 49 ± 38		.892 ± .165			-2	T 20.	CCD6	60	-74	1	-	0.5	-	-
CHATEAUGIRON		23 32 46 ± 114		.354 ± .174			1	T 21.	CCD1	56	-62	0	-	-	-	1-2
NYROLA		23 32 48 ± 4		.650 ± .014			-1	T 41.	CCD14	43	-48	0	C	-	-	-
PULKOVO		23 32 52 ± 25		.452 ± .061			-5	T 32.	CCD26	46	-50	0	-	-	-	1-2
PULKOVO		23 32 49 ± 6		.668 ± .021			-2	L 65.	CCD26	46	-50	0	V	0.1-0.5	-	-
MONTEGRILLO		23 32 51 ± 9		.662 ± .027			-4	T 41.	CCD21	47	-69	0	R	-	-	-
2003/1/7 2 O1(P)	19 0 15	19 4 37	19 8 55	.063	5.2	5.8										
KAVALUR		19 4 57 ± 8		.039 ± .003			-20	T 234.	CCD28	64	-80	0	-	-	-	-
2003/1/8 3 O1(P)	18 46 29	18 54 29	19 2 55	.069	5.0	5.7										
EKATERINBURG		18 55 19 ± 55		.088 ± .019			-50	T 45.	PM6	36	-53	0	R	1.	-	-
ALMA-ATA		18 55 20 ± 23		.080 ± .008			-51	T 60.	CCD9	53	-69	0	-	-	-	-
KAVALUR		18 55 40 ± 12		.079 ± .004			-71	T 234.	CCD28	62	-80	0	-	-	-	-
2003/1/9 3 O1(P)	0 33 8	0 43 25	0 53 19	.064	5.0	2.5										
SABADELL		0 42 47 ± 181		.056 ± .033			38	T 80.	CCD26	55	-81	0	-	-	-	-
UKKEL		0 41 22 ± 144		.087 ± .054			123	T 85.	CCD23	54	-59	1	-	0.1	-	-
2003/1/9 3 O1(P)	16 9 5	16 11 59	16 14 53	.041	4.8	5.7										
ALMA-ATA		16 12 51 ± 117		.038 ± .042			-51	T 60.	CCD9	26	-50	-	-	-	-	-
2003/1/14 2 E1(P)	2 34 14	2 45 57	2 58 41	.329	4.0	5.6										
NYROLA		2 46 18 ± 13		.425 ± .014			-21	T 41.	CCD14	52	-30	0	C	-	-	-
OHP		2 46 0 ± 71		.212 ± .045			-3	T 120.	CCD5	57	-46	0	-	0.04	-	1-2
PULKOVO		2 46 4 ± 78		.276 ± .056			-7	T 32.	CCD26	35	-28	0	-	-	-	1-2
MONTEGRILLO		2 46 12 ± 24		.202 ± .017			-15	T 41.	CCD21	65	-64	0	V	-	-	1-2
2003/1/14 2 O1(P)	21 24 6	21 27 37	21 31 6	.056	3.8	5.9										
BUCHAREST		21 27 15 ± 35		.052 ± .040			22	T 30.	CCD7	49	-64	0	-	-	-	-
OHP		21 28 7 ± 86		.019 ± .037			-30	L 15.	CCD2	36	-54	0	-	-	-	-
2003/1/17 4 O2(P)	0 38 16	0 43 51	0 49 29	.238	3.4	9.1										
MEUDON		0 43 24 ± 9		.742 ± .058			27	T 100.	NOCT	58	-61	0	-	0.04	-	-
NYROLA		0 43 34 ± 3		.781 ± .013			17	T 41.	CCD14	44	-42	0	V	-	-	-
OHP		0 43 6 ± 18		.074 ± .009			45	T 120.	CCD5	63	-64	0	-	0.04	-	-
LA PALMA		0 43 39 ± 3		.824 ± .015			12	T 35.	CCD14	62	-80	0	-	-	-	-
ROZHEN		0 43 35 ± 2		.805 ± .010			16	T 60.	PM1	63	-55	1	V	1.	-	-
TORRECILLA		0 43 36 ± 5		.777 ± .024			15	T 20.	CCD21	63	-68	0	R	-	-	-
2003/1/17 2 E1(P)	16 33 25	16 54 36	17 23 31	.296	3.3	5.1										
KAVALUR		16 56 9 ± 58		.187 ± .018			-93	T 234.	CCD28	43	-60	0	-	-	-	-
2003/1/17 2 E1(P)	19 20 45	19 55 17	20 21 13	.423	3.2	3.4										
CLUJ-NAPOCA		19 52 47 ± 90		.261 ± .032			150	T 41.	CCD22	34	-49	0	-	0.8	-	1-2

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL Jup. (°)	EL Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 1/18 4 O2(P)	4 48 44	5 0 11	5 11 44	.161	3.2	2.6										
SABADELL		5 0 48 ± 9		.402 ± .011			-37	T 80.	CCD26	54	-39	0	-	-	-	-
LA PALMA		5 0 32 ± 13		.266 ± .009			-21	T 35.	CCD14	54	-39	0	-	-	-	-
LA PALMA		5 0 9 ± 28		.318 ± .035			2	T 60.	CCD29	54	-39	0	R	-	-	-
2003/ 1/18 4 O1(P)	12 31 14	12 36 35	12 41 52	.361	3.1	5.6										
SENDAI		12 36 19 ± 8		.969 ± .060			16	T 36.	PM3	42	-58	1	V	0.1	-	-
2003/ 1/19 4 O3(P)	1 1 19	1 5 51	1 10 24	.160	3.0	10.5										
LUMEZZANE		1 5 39 ± 39		.272 ± .060			12	T 40.	PM2	61	-58	0	-	-	-	-
OHP		1 6 2 ± 26		.326 ± .050			-11	L 15.	CCD2	63	-61	0	-	-	-	-
CHATEAUGIRON		1 6 7 ± 48		.271 ± .067			-16	T 21.	CCD1	55	-50	0	-	-	-	-
2003/ 1/20 2 E3(P)	15 45 22	15 54 48	16 4 6	.250	2.7	8.8										
ALMA-ATA		15 54 20 ± 23		.258 ± .030			28	T 60.	CCD9	32	-45	0	-	-	-	-
2003/ 1/20 2 O3(P)	17 5 19	17 12 48	17 20 13	.218	2.7	9.4										
ALMA-ATA		17 14 13 ± 33		.305 ± .039			-85	T 60.	CCD9	46	-58	0	-	-	-	-
TERSKOL		17 12 16 ± 49		.240 ± .068			32	T 60.	CCD9	22	-35	1	-	-	-	-
2003/ 1/21 2 O1(P)	23 40 58	23 43 53	23 46 46	.046	2.4	5.9										
TERSKOL		23 44 4 ± 18		.042 ± .008			-11	T 60.	CCD9	57	-51	1	-	-	-	-
2003/ 1/24 3 O4(P)	18 28 32	18 35 22	18 42 14	.328	1.8	13.4										
TERSKOL		18 35 1 ± 21		.234 ± .028			21	T 60.	CCD9	40	-48	1	-	-	-	-
2003/ 1/25 2 O4(A)	13 29 37	13 33 14	13 36 50	.405	1.7	6.2										
SENDAI		13 33 34 ± 74		.076 ± .067			-20	T 36.	PM3	58	-65	3	-	-	-	-
2003/ 1/25 1 E4()	18 9 12	18 22 58	18 35 53	.129	1.6	4.3										
NOVARA		18 24 39 ± 3		.208 ± .010			-101	T 60.	VISU	16	-23	0	-	-	-	-
SENDAI		18 19 51 ± 3		.076 ± .010			187	T 36.	PM3	46	-40	3	V	0.1	-	1-4
2003/ 1/27 2 E3(A)	19 44 8	19 52 29	20 0 44	.288	1.2	9.1										
BRESCIA		19 53 21 ± 8		.573 ± .033			-52	T 20.	VISU	32	-37	0	-	-	-	-
MEUDON		19 52 19 ± 29		.251 ± .041			10	T 100.	NOCT	27	-32	3	-	0.04	-	2-3
NOVARA		19 52 33 ± 12		.385 ± .035			-4	T 60.	VISU	33	-38	0	-	-	-	-
SABADELL		19 46 46 ± 41		.141 ± .049			343	T 50.	CCD26	27	-32	0	-	-	-	-
KALAVUR		19 52 17 ± 6		.222 ± .007			12	T 102.	CCD28	81	-75	1	-	-	-	-
2003/ 1/27 2 O3(P)	20 17 54	20 24 47	20 31 36	.241	1.2	9.4										
KAVALUR		20 25 0 ± 7		.258 ± .010			-13	T 102.	CCD28	74	-68	1	-	-	-	-
BRESCIA		20 26 17 ± 11		.581 ± .039			-90	T 20.	VISU	38	-43	0	-	-	-	-
MEUDON		20 24 54 ± 35		.297 ± .062			-7	T 100.	NOCT	32	-37	0	-	0.04	-	-
OHP		20 24 54 ± 71		.257 ± .123			-7	L 15.	CCD2	35	-40	0	-	-	-	-
SABADELL		20 20 17 ± 79		.166 ± .054			270	T 50.	CCD26	33	-38	0	-	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 2/ 3 4 O2(T)	5 5 51	5 8 58	5 12 6	.294	.2	3.3										
SABADELL		5 8 50 ± 3		.978 ± .038			8	T 80.	CCD26	36	-36	0	-	-	-	-
2003/ 2/ 3 4 O1(T)	17 9 18	17 12 8	17 14 58	.361	.3	1.7										
ALMA-ATA		17 11 53 ± 3		1.298 ± .054			15	T 60.	CCD9	56	-54	0	-	-	-	-
PULKOVO		17 11 54 ± 5		.767 ± .075			14	T 32.	CCD26	24	-22	0	-	-	-	-
CLUJ-NAPOCA		17 12 1 ± 2		.884 ± .022			7	T 41.	CCD24	19	-18	0	-	-	-	-
PULKOVO		17 12 11 ± 3		.598 ± .020			-3	L 65.	CCD26	24	-22	0	V	0.1-0.5	-	-
2003/ 2/ 3 2 O3(A)	23 24 25	23 30 52	23 37 16	.479	.4	9.3										
LILLE		23 30 35 ± 10		.181 ± .014			17	L 32.	CCD10	57	-55	1	-	0.5	-	-
LA PALMA		23 30 44 ± 14		.289 ± .014			8	T 35.	CCD14	64	-62	0	-	-	-	-
LA PALMA		23 30 56 ± 14		.209 ± .013			-4	T 60.	CCD29	64	-62	0	R	-	-	-
UKKEL		23 30 57 ± 16		.275 ± .023			-5	T 85.	CCD23	57	-55	1	-	0.1	-	-
PULKOVO		23 31 21 ± 7		.281 ± .008			-29	T 32.	CCD26	45	-44	0	-	-	-	-
CLUJ-NAPOCA		23 31 3 ± 11		.341 ± .018			-11	T 41.	CCD24	59	-58	0	-	-	-	-
2003/ 2/ 3 2 E3(A)	23 32 0	23 39 36	23 47 9	.320	.4	9.3										
LA PALMA		23 38 53 ± 14		.167 ± .012			43	T 35.	CCD14	66	-64	0	-	-	-	2-3
LA PALMA		23 39 6 ± 21		.255 ± .021			30	T 60.	CCD29	66	-64	0	R	-	-	2-3
UKKEL		23 39 29 ± 16		.243 ± .020			7	T 85.	CCD23	57	-55	1	-	0.1	-	2-3
PULKOVO		23 39 42 ± 4		.254 ± .005			-6	T 32.	CCD26	45	-44	0	-	-	-	2-3
CLUJ-NAPOCA		23 39 26 ± 10		.285 ± .012			10	T 41.	CCD24	58	-57	0	-	-	-	2-3
NAUCHNY		23 39 50 ± 10		.161 ± .009			-14	T 60.	PM5	55	-55	0	V	1.	-	2-3
2003/ 2/11 2 O3(A)	2 27 33	2 33 39	2 39 42	.479	1.9	9.2										
LA PALMA		2 33 45 ± 19		.163 ± .017			-6	T 35.	CCD14	63	-68	0	-	-	-	-
LA PALMA		2 33 43 ± 17		.279 ± .031			-4	T 60.	CCD29	63	-68	0	R	-	-	-
ARMAGH		2 33 57 ± 136		.255 ± .368			-18	T 25.	CCD27	37	-38	0	-	-	-	-
OHP		2 33 38 ± 28		.323 ± .052			1	T 80.	CCD16	41	-44	0	-	0.04	-	-
2003/ 2/11 2 E3(A)	3 12 54	3 19 57	3 26 59	.346	1.9	9.5										
ARMAGH		3 19 45 ± 51		.461 ± .169			12	T 25.	CCD27	79	-32	0	-	-	-	-
OHP		3 19 59 ± 22		.656 ± .109			-2	T 80.	CCD16	32	-37	0	-	0.04	-	-
LA PALMA		3 19 39 ± 14		.119 ± .010			18	T 35.	CCD14	32	-37	0	-	-	-	2-3
LA PALMA		3 19 44 ± 14		.273 ± .025			13	T 60.	CCD29	32	-37	0	R	-	-	2-3
2003/ 2/15 2 O1(P)	19 15 42	19 16 25	19 17 8	.002	2.8	5.7										
PULKOVO		19 15 44 ± 131		.040 ± .034			41	L 65.	CCD26	44	-33	0	V	0.1-0.5	-	-
2003/ 2/18 2 O3(A)	5 28 53	5 34 39	5 40 22	.479	3.3	9.1										
MONTERREY		5 34 46 ± 19		.283 ± .027			-7	T 18.	VIDEO	82	-67	1	-	0.5	-	-
2003/ 2/18 2 E3(A)	6 48 44	6 55 22	7 1 58	.365	3.3	9.6										
MONTERREY		6 55 7 ± 11		.348 ± .023			15	T 18.	VIDEO	72	-76	1	-	0.5	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL. Jup. (°)	EL. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 2/18 4 O3(P)	17 46 56	17 53 40	18 0 26	.335	3.4	13.3										
MEUDON		17 54 14 ± 25		.241 ± .038			-34	T 100.	NOCT	24	-7	0	-	0.04	-	-
OHP		17 53 31 ± 17		.800 ± .085			9	T 80.	CCD2	26	-9	0	-	-	-	-
YUNNAN		17 53 17 ± 4		.738 ± .018			23	T 100.	CCD8	65	-75	0	-	-	-	-
TERSKOL		17 53 47 ± 7		.664 ± .028			-7	T 60.	CCD9	59	-40	1	-	-	1	-
CLUJ-NAPOCA		17 53 44 ± 9		.744 ± .041			-4	T 41.	CCD24	38	-21	0	-	0.7	5	-
2003/ 2/18 4 E3(P)	20 39 31	20 48 49	20 58 7	.384	3.4	13.9										
PULKOVO		20 48 32 ± 12		.557 ± .029			17	L 65.	CCD26	49	-39	3	V	0.1-0.5	-	-
ARMAGH		20 46 44 ± 26		.389 ± .111			125	T 25.	CCD27	49	-35	0	-	-	-	-
BORDEAUX		20 48 38 ± 9		.588 ± .026			11	T 60.	CCD15	52	-35	1	-	-	-	-
CHATEAUGIRON		20 48 39 ± 36		.845 ± .209			10	T 21.	CCD1	59	-46	0	-	-	-	-
LANESTER		20 48 29 ± 100		.541 ± .334			20	T 20.	CCD6	52	-36	2	-	-	-	-
LILLE		20 48 18 ± 25		.528 ± .063			31	L 32.	CCD10	50	-35	2	-	1.0	-	-
MEUDON		20 48 24 ± 21		.179 ± .022			25	T 100.	NOCT	51	-35	0	-	0.04	-	3-4
NAUCHNY		20 48 33 ± 3		.359 ± .005			16	T 60.	PM5	62	-51	0	-	-	-	3-4
MAINZ		20 48 18 ± 28		.501 ± .077			31	T 25.	CCD25	53	-38	0	-	-	-	-
NOVARA		20 48 54 ± 9		2.254 ± .229			-5	T 6.	VISU	57	-41	0	-	0.1	-	-
OHP		20 48 35 ± 35		.346 ± .069			14	T 80.	CCD2	56	-39	0	-	-	-	3-4
YUNNAN		20 48 25 ± 12		.570 ± .032			24	T 100.	CCD8	25	-39	0	-	-	-	-
TERSKOL		20 48 43 ± 8		.522 ± .022			6	T 60.	CCD9	64	-58	1	-	-	1	-
UKKEL		20 48 35 ± 15		.696 ± .059			14	T 85.	CCD23	50	-35	1	-	0.1	-	-
MUNDOLSHEIM		20 48 35 ± 57		.536 ± .172			14	T 15.	CCD4	54	-38	2	-	-	-	-
CLUJ-NAPOCA		20 48 26 ± 13		.567 ± .019			23	T 41.	CCD24	61	-48	0	-	0.6	5	-
2003/ 2/19 4 O1(P)	20 28 22	20 31 16	20 34 9	.299	3.6	2.9										
ANTONY		20 31 3 ± 17		.990 ± .244			13	T 22.	CCD6	46	-30	1	-	-	-	-
BRESCIA		20 31 39 ± 7		.496 ± .035			-23	T 20.	VISU	55	-38	0	-	0.1	-	-
LILLE		20 31 1 ± 5		.787 ± .060			15	L 32.	CCD10	48	-32	1	-	0.1	-	-
NOVARA		20 31 31 ± 5		.725 ± .063			-15	T 6.	VISU	55	-38	0	-	0.1	-	-
NYROLA		20 31 1 ± 2		.855 ± .023			15	T 41.	CCD14	45	-35	0	V	-	-	-
TERSKOL		20 30 57 ± 6		.837 ± .054			19	T 60.	CCD9	64	-56	1	-	-	1	-
UKKEL		20 31 1 ± 3		1.146 ± .065			15	T 85.	CCD23	49	-33	1	-	0.1	-	-
MUNDOLSHEIM		20 31 0 ± 11		.916 ± .174			16	T 15.	CCD4	52	-36	0	-	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 2/19 4 E1()	22 11 19	22 15 42	22 20 6	.419	3.6	4.1										
CATANIA		22 15 26 ± 20		.407 ± .090			16	T 20.	CCD6	70	-61	1	-	0.5	-	-
LILLE		22 15 24 ± 5		.524 ± .028			18	L 32.	CCD10	57	-45	0	-	1.0	-	-
MEUDON		22 15 21 ± 18		.597 ± .109			21	T 100.	NOCT	59	-46	0	-	-	-	-
NYROLA		22 15 21 ± 3		.535 ± .017			21	T 41.	CCD14	45	-39	0	V	-	-	-
LA PALMA		22 15 25 ± 7		.522 ± .047			17	T 35.	CCD14	64	-44	0	-	-	-	-
LA PALMA		22 15 8 ± 13		.528 ± .064			34	T 60.	CCD29	64	-44	0	R	-	-	-
UKKEL		22 15 21 ± 7		.727 ± .060			21	T 85.	CCD23	57	-45	1	-	0.1	-	-
VIENNA		22 15 59 ± 12		.223 ± .018			-17	T 10.	VISU	60	-51	2	-	-	-	-
2003/ 2/20 4 O2(T)	1 30 21	12 18 30	12 21 40	.295	3.8	3.7										
YUNNAN		12 18 24 ± 4		1.059 ± .048			6	T 100.	CCD8	26	-46	1	-	-	-	-
2003/ 2/20 4 E2(P)	14 22 54	14 27 29	14 32 4	.543	3.8	2.3										
YUNNAN		14 27 14 ± 3		.824 ± .025			14	T 100.	CCD8	63	-46	1	-	-	-	-
2003/ 2/20 1 O2(P)	15 47 28	15 49 17	15 51 5	.381	3.8	1.3										
YUNNAN		15 49 3 ± 1		.534 ± .011			14	T 100.	CCD8	76	-66	1	-	-	-	-
2003/ 2/25 2 E3(A)	10 21 17	10 27 34	10 33 48	.380	4.7	9.7										
SENDAI		10 27 21 ± 19		.442 ± .067			13	T 36.	PM3	51	-26	1	-	0.1		-
2003/ 2/27 1 O2(P)	17 46 8	17 47 56	17 49 43	.334	5.8	1.5										
NAUCHNY		17 47 44 ± 3		.426 ± .025			12	T 60.	PM5	49	-23	0	V	1.	-	-
YUNNAN		17 47 44 ± 1		.420 ± .008			12	T 100.	CCD8	54	-83	1	-	-	-	-
ROZHEN		17 47 30 ± 6		.189 ± .029			26	T 60.	PM1	46	620	1	V	1.	-	-
STRASBOURG		17 47 41 ± 15		.273 ± .080			15	L 49.	CCD4	33	-7	1	-	-	-	-
CLUJ-NAPOCA		17 47 41 ± 1		.467 ± .013			15	T 41.	CCD24	44	-18	0	-	0.8	5	-
2003/ 2/27 1 O4(P)	21 59 30	22 2 56	22 6 24	.254	5.2	4.6										
ROZHEN		22 2 42 ± 3		.201 ± .007			14	T 60.	PM1	61	-56	1	V	1.	-	-
MONEGRILLO		22 2 40 ± 10		.146 ± .018			16	T 41.	CCD21	67	-46	0	B	-	-	-
SOBOTA		22 2 35 ± 18		.120 ± .028			21	T 15.	CCD14	58	-49	0	-	0.1	1	-
UKKEL		22 2 42 ± 19		.154 ± .036			14	T 85.	CCD23	58	-42	1	-	0.1	-	-
STRASBOURG		22 2 9 ± 29		.131 ± .069			47	L 49.	CCD4	60	-45	2	-	-	-	-
NAUCHNY		22 2 37 ± 4		.154 ± .006			19	T 60.	PM5	55	-52	0	V	1.	-	-
CLUJ-NAPOCA		22 2 28 ± 3		.173 ± .006			28	T 41.	CCD24	58	-51	0	V	0.8	-	-
LA PALMA		22 2 40 ± 5		.156 ± .009			16	T 35.	CCD14	68	-40	0	-	-	-	-
LA PALMA		22 2 33 ± 10		.155 ± .012			23	T 60.	CCD29	68	-40	0	R	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL Jup. (°)	EL Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 2/28 1 E4(A)	1 8 33	1 16 8	1 23 55	.483	5.2	3.3										
MONEGRILLO		1 15 34 ± 7		.659 ± .034			34	T 41.	CCD21	46	-54	0	B	-	-	-
BORDEAUX		1 15 36 ± 6		.706 ± .026			32	T 60.	CCD15	45	-51	1	-	-	-	-
SOBOTA		1 15 34 ± 20		.166 ± .021			34	T 15.	CCD14	31	-40	0	-	0.1	1	-
CLUJ-NAPOCA		1 15 35 ± 6		.710 ± .027			33	T 41.	CCD24	29	-39	0	V	0.9	-	-
2003/ 2/28 1 E4(A)	12 30 5	12 40 26	12 50 41	.534	5.3	1.4										
YUNNAN		12 40 59 ± 6		.707 ± .024			-33	T 100.	CCD8	47	-20	1	-	-	-	-
2003/ 2/28 1 O4(P)	23 37 40	23 45 9	23 52 21	.137	5.4	5.9										
NAUCHNY		23 44 54 ± 22		.082 ± .008			15	T 60.	PM5	39	-46	0	V	1.	-	-
TORRECILLA		23 44 47 ± 26		.884 ± .012			22	T 20.	CCD21	61	-56	0	V	-	-	-
TERSKOL		23 44 8 ± 115		.705 ± .036			61	T 60.	CCD9	30	-42	1	-	-	1	-
ARMAGH		23 44 45 ± 254		.134 ± .137			24	T 25.	CCD27	48	-43	0	-	-	-	-
CLUJ-NAPOCA		23 44 52 ± 34		.081 ± .013			17	T 41.	CCD24	43	-48	0	V	0.5	-	-
2003/ 3/ 1 2 O4(A)	2 58 10	3 2 4	3 5 58	.405	5.4	7.2										
SABADELL		3 1 51 ± 15		.445 ± .061			13	T 80.	CCD26	27	-41	0	-	-	-	-
2003/ 3/ 6 1 O2(P)	19 46 8	19 47 53	19 49 39	.290	6.4	1.7										
TOMAR		19 47 54 ± 5		.107 ± .011			-1	T 25.	CCD12	51	-16	1	-	0.1	-	-
MONEGRILLO		19 47 40 ± 3		.350 ± .021			13	T 41.	CCD21	55	-21	0	R	-	-	-
PULKOVO		19 47 40 ± 9		.305 ± .060			13	L 65.	CCD26	49	-30	3	V	0.1-0.5	-	-
2003/ 3/ 9 4 O2(P)	16 30 40	16 37 10	16 43 36	.293	6.8	9.2										
PULKOVO		16 37 8 ± 14		.769 ± .061			2	T 32.	CCD26	38	-8	0	-	-	-	-
TERSKOL		16 37 12 ± 4		.817 ± .022			-2	T 60.	CCD9	54	-18	1	-	-	1	-
2003/ 3/ 9 4 E2()	21 59 35	22 5 19	22 11 4	.232	6.9	7.8										
ARMAGH		22 5 48 ± 51		.266 ± .166			-29	T 25.	CCD27	53	-36	0	-	-	-	-
BORDEAUX		22 5 0 ± 14		.251 ± .026			19	T 60.	CCD15	63	-41	1	-	-	-	-
SABADELL		22 5 13 ± 11		.242 ± .019			6	T 80.	CCD26	66	-45	0	-	-	-	-
LILLE		22 5 6 ± 19		.288 ± .039			13	L 32.	CCD10	57	-38	2	-	0.8	-	-
OHP		22 4 49 ± 53		.315 ± .120			30	T 80.	CCD16	63	-45	1	-	0.2	5	-
LA PALMA		22 4 49 ± 3		.153 ± .004			30	T 35.	CCD14	77	-39	0	-	-	-	2-4
MUNDOSLHEIM		22 5 14 ± 57		.299 ± .133			5	T 15.	CCD4	58	-41	1	-	-	-	-
TORRECILLA		22 4 54 ± 8		.236 ± .015			25	T 20.	CCD21	67	-43	0	V	-	-	-
2003/ 3/11 2 O3(P)	14 34 22	14 38 50	14 43 16	.217	7.1	8.6										
KAVALUR		14 38 46 ± 4		.224 ± .009			4	T 102.	CCD28	66	-26	1	-	-	-	-
2003/ 3/11 2 E3(A)	17 17 5	17 22 43	17 28 20	.377	7.2	9.8										
KAVALUR		17 22 30 ± 3		.488 ± .009			30	T 102.	CCD28	72	-66	1	-	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL. Jup. (°)	EL. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 3/13 1 O2 (P)	21 47 40	21 49 23	21 51 7	.253	7.5	1.9										
ARMAGH		21 49 13 ±20		.221 ±.167			10	T 25.	CCD27	53	-33	0	-	-	-	-
SABADELL		21 49 0 ±8		1.992 ±.411			23	T 50.	CCD26	66	-41	0	-	-	-	-
MUNDOLSHEIM		21 49 6 ±14		.335 ±.083			17	T 15.	CCD4	58	-39	1	-	-	-	-
2003/ 3/15 3 E4 (A)	22 5 7	22 14 49	22 24 33	.649	7.8	10.4										
ANTONY		22 14 38 ±79		1.054 ±.532			11	T 22.	CCD6	52	-34	1	-	-	-	-
ARMAGH		22 14 42 ±37		.939 ±.190			7	T 25.	CCD27	50	-35	0	-	-	-	-
BORDEAUX		22 14 42 ±6		1.128 ±.033			7	T 60.	CCD15	61	-40	0	-	1.5	-	-
CHATEAUGIRON		22 14 44 ±46		1.131 ±.278			5	T 21.	CCD1	48	-44	0	-	-	-	-
DAX		22 14 34 ±5		1.033 ±.030			15	T 32.	CCD11	63	-41	0	-	-	-	-
DOLBERG		22 14 27 ±28		.642 ±.220			22	T 20.	WAT	52	-37	0	-	-	-	-
GIERES		22 14 40 ±18		1.129 ±.121			9	T 20.	CCD6	68	-66	2	-	-	-	-
LILLE		22 14 27 ±18		1.114 ±.100			22	L 32.	CCD10	55	-37	1	-	0.5	-	-
MEUDON		22 14 34 ±31		1.270 ±.240			15	T 100.	NOCT	57	-38	0	-	0.04	-	-
NYROLA		22 14 39 ±3		1.008 ±.020			10	T 41.	CCD14	38	-30	0	R	-	-	-
PULKOVO		22 14 44 ±6		.798 ±.028			5	T 32.	CCD26	38	-32	0	-	-	-	-
PULKOVO		22 14 44 ±3		.994 ±.019			5	L 65.	CCD26	38	-32	0	V	0.1-0.5	-	-
UKKEL		22 14 42 ±11		1.282 ±.066			7	T 85.	CCD23	54	-37	1	-	0.1	-	-
MUNDOLSHEIM		22 14 14 ±41		.899 ±.348			35	T 15.	CCD4	55	-40	2	-	-	-	-
2003/ 3/17 1 E3 ()	18 18 8	18 22 36	18 27 8	.061	8.0	3.8										
ALMA-ATA		18 22 49 ±20		.047 ±.009			-13	T 60.	CCD9	51	-47	0	R	0.5	-	-
NAUCHNY		18 22 32 ±7		.052 ±.004			4	T 60.	PM5	61	-24	0	V	1.	-	-
NYROLA		18 22 36 ±34		.052 ±.018			0	T 41.	CCD14	45	-14	0	V	-	-	-
MUNDOLSHEIM		18 22 4 ±100		.083 ±.118			32	T 15.	CCD4	50	-9	1	-	-	-	-
2003/ 3/18 2 E3 (A)	20 41 34	20 46 53	20 52 12	.353	8.2	9.7										
ARMAGH		20 46 44 ±26		.389 ±.111			9	T 25.	CCD27	54	-26	0	-	-	-	-
BORDEAUX		20 46 41 ±4		.502 ±.014			12	T 60.	CCD15	64	-27	0	-	1.	-	-
CATANIA		20 46 42 ±11		.399 ±.034			11	T 20.	CCD6	69	-41	1	-	0.2	-	-
CHATEAUGIRON		20 46 50 ±23		.665 ±.147			3	T 21.	CCD1	57	-37	0	-	-	-	-
LILLE		20 46 50 ±7		.456 ±.028			3	L 32.	CCD10	58	-26	1	-	0.5	-	-
OHP		20 46 46 ±13		.665 ±.071			7	T 80.	CCD16	65	-32	0	-	0.04	-	-
LA PALMA		20 46 44 ±5		.472 ±.019			9	T 35.	CCD14	69	-21	0	-	-	-	-
LA PALMA		20 46 56 ±9		.486 ±.040			-3	T 60.	CCD29	69	-21	0	R	-	-	-
TORRECILLA		20 46 46 ±6		.454 ±.025			7	T 20.	CCD21	67	-29	0	R	-	-	-
UKKEL		20 46 44 ±8		.578 ±.035			9	T 85.	CCD23	58	-27	1	-	0.1	-	-
MUNDOLSHEIM		20 46 41 ±16		.387 ±.065			12	T 15.	CCD4	60	-30	1	-	-	-	-
2003/ 3/19 2 E1 ()	18 20 50	18 23 12	18 25 35	.091	8.3	4.4										
MUNDOLSHEIM		18 23 5 ±111		.048 ±.081			7	T 15.	CCD4	52	-8	1	-	-	-	-
2003/ 3/20 1 O2 (P)	23 50 52	23 52 34	23 54 16	.225	8.4	2.2										
CATANIA		23 52 26 ±35		.296 ±.196			8	T 14.	CCD6	35	-51	1	-	-	-	-
NYROLA		23 52 20 ±3		.296 ±.023			14	T 41.	CCD14	26	-25	0	V	-	-	-
SABADELL		23 52 26 ±13		.162 ±.029			8	T 50.	CCD26	44	-48	0	-	-	-	-
PULKOVO		23 52 21 ±4		.149 ±.016			13	L 65.	CCD26	24	-27	0	V	0.1-0.5	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 3/24 1 E3(P)	21 54 20	22 1 32	22 8 57	.136	8.9	3.7										
BORDEAUX		22 1 19 ± 13		.142 ± .010			13	T 60.	CCD15	59	-36	1	-	-	-	-
BUCHAREST		22 1 8 ± 8		.147 ± .006			24	T 50.	PM4	43	-44	0	V	-	-	-
CATANIA		22 1 44 ± 115		.123 ± .097			-12	T 20.	CCD6	53	-48	0	-	-	-	-
LILLE		22 1 31 ± 24		.149 ± .017			1	L 32.	CCD10	53	-33	1	-	0.5	-	-
MEUDON		22 1 34 ± 40		.060 ± .017			-2	T 100.	NOCT	54	-34	0	-	0.04	-	1-3
NAUCHNY		22 1 29 ± 12		.132 ± .010			3	T 60.	PM5	39	-42	0	V	1.	-	-
OHP		22 1 54 ± 70		.113 ± .038			-22	L 15.	CCD	56	-39	0	-	-	-	-
PRAGUE		22 1 0 ± 206		.140 ± .127			32	L 18.	CCD19	48	-36	1	-	-	-	-
PULKOVO		22 1 30 ± 29		.159 ± .029			2	T 32.	CCD26	35	-29	0	-	-	-	-
TORRECILLA		22 1 35 ± 18		.144 ± .015			-3	T 20.	CCD21	61	-38	0	V	-	-	-
UKKEL		22 1 32 ± 32		.169 ± .029			0	T 85.	CCD23	52	-33	1	-	0.1	-	-
MUNDOLSHEIM		22 1 11 ± 74		.126 ± .103			21	T 15.	CCD4	52	-36	1	-	-	-	-
2003/ 3/25 4 E3()	13 32 19	13 38 59	13 45 39	.523	9.0	4.7										
KAVALUR		13 38 52 ± 8		.390 ± .022			7	T 102.	CCD28	66	-12	2	-	-	-	-
2003/ 3/25 1 E3(P)	20 2 45	20 8 28	20 14 5	.118	9.0	7.9										
BORDEAUX		20 8 1 ± 15		.155 ± .015			27	T 60.	CCD15	64	-20	1	-	1.	-	-
BRESCIA		20 9 33 ± 5		.145 ± .015			-65	T 20.	VISU	63	-26	0	-	0.1	-	-
CATANIA		20 8 34 ± 84		.149 ± .081			-6	T 25.	CCD6	70	-33	1	-	0.2	-	-
LILLE		20 8 49 ± 51		.113 ± .045			-21	L 32.	CCD10	58	-19	2	-	0.5	-	-
MEUDON		20 8 22 ± 33		.152 ± .047			6	T 100.	NOCT	60	-20	0	-	0.04	-	-
NAUCHNY		20 8 15 ± 6		.857 ± .004			13	T 60.	PM5	56	-36	0	V	1.	-	2-3
NYROLA		20 8 19 ± 15		.081 ± .010			9	T 41.	CCD14	45	-21	0	V	-	-	2-3
OHP		20 7 50 ± 49		.182 ± .052			38	L 15.	CCD2	65	-24	0	-	-	-	2-3
PULKOVO		20 8 24 ± 37		.091 ± .026			4	T 32.	CCD26	46	-24	0	-	-	-	2-3
TORRECILLA		20 8 20 ± 22		.076 ± .013			8	T 20.	CCD21	67	-21	0	V	-	-	2-3
2003/ 3/25 2 O3(P)	20 44 50	20 48 10	20 51 30	.102	9.0	8.2										
BRESCIA		20 49 20 ± 9		.108 ± .014			-70	T 20.	VISU	61	-31	0	-	0.1	-	-
SABADELL		20 48 23 ± 8		.107 ± .008			-13	T 80.	CCD26	75	-20	0	-	-	-	-
CATANIA		20 48 0 ± 45		.052 ± .067			10	T 25.	CCD26	67	-29	1	-	0.2	-	-
LILLE		20 49 10 ± 65		.435 ± .161			-60	L 32.	CCD10	58	-24	2	-	0.5	-	-
MEUDON		20 48 13 ± 31		.057 ± .019			-3	T 100.	NOCT	60	-25	0	-	0.04	-	-
NAUCHNY		20 47 57 ± 5		.120 ± .005			13	T 60.	PM5	50	-39	0	V	1.	-	-
NYROLA		20 48 9 ± 10		.104 ± .011			1	T 41.	CCD14	42	-23	0	V	-	-	-
OHP		20 48 48 ± 51		.074 ± .057			-38	L 15.	CCD2	64	-30	0	-	-	-	-
LA PALMA		20 48 9 ± 14		.104 ± .012			1	T 35.	CCD14	75	-20	0	-	-	-	-
PULKOVO		20 48 6 ± 20		.124 ± .028			4	T 32.	CDD26	42	-27	0	-	-	-	-
TORRECILLA		20 48 7 ± 20		.122 ± .020			3	T 20.	CCD21	67	-27	0	V	-	-	-
BORDEAUX		20 48 0 ± 24		.100 ± .019			10	T 60.	CCD15	64	-26	1	-	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 3/26 2 E3(A)	0 4 26	0 9 26	0 14 27	.314	9.0	9.6										
ARMAGH		0 9 33 ± 45		.345 ± .126			-7	T 25.	CCD27	32	-33	0	-	-	-	-
CATANIA		0 9 18 ± 26		.376 ± .096			8	T 25.	CCD6	27	-48	0	-	-	-	-
LILLE		0 9 15 ± 8		.403 ± .030			11	L 32.	CCD10	35	-37	1	-	1.	-	-
NYROLA		0 9 18 ± 7		.390 ± .019			8	T 41.	CCD14	21	-23	0	V	-	-	-
OHP		0 9 30 ± 14		.335 ± .047			-4	L 15.	CCD2	34	-44	0	-	0.04	-	-
LA PALMA		0 9 13 ± 8		.412 ± .030			13	T 35.	CCD14	54	-56	0	-	-	-	-
PULKOVO		0 9 12 ± 11		.540 ± .046			14	T 32.	CCD26	19	-24	0	-	-	-	-
2003/ 3/26 2 E1(P)	20 38 23	20 40 56	20 43 30	.181	9.1	4.2										
PULKOVO		20 40 34 ± 13		.199 ± .037			22	T 32.	CCD26	43	-26	0	-	-	-	-
UKKEL		20 40 28 ± 41		.197 ± .121			28	T 85.	CCD23	58	-24	3	-	0.1	-	-
VIENNA		20 40 58 ± 13		.317 ± .019			-2	T 10.	VISU	70	-53	1	-	-	-	-
BRESCIA		20 40 58 ± 5		.087 ± .020			-2	T 20.	VISU	61	-30	0	-	0.1	-	-
SABADELL		20 40 44 ± 5		.118 ± .008			12	T 80.	CCD26	75	-18	0	-	-	-	-
CATANIA		20 40 34 ± 28		.148 ± .054			22	T 25.	CCD6	65	-38	1	-	0.2	-	-
LILLE		20 40 32 ± 12		.149 ± .028			24	L 32.	CCD10	58	-23	1	-	0.5	-	-
OHP		20 41 5 ± 27		.097 ± .049			-9	T 80.	CCD2	64	-29	0	-	-	-	-
LA PALMA		20 40 38 ± 7		.158 ± .018			18	T 35.	CCD14	75	-18	0	-	-	-	-
LA PALMA		20 40 35 ± 6		.170 ± .019			21	T 60.	CCD29	75	-18	0	R	-	-	-
PULKOVO		20 40 35 ± 15		.175 ± .049			21	L 65.	CCD26	43	-26	2	V	0.1-0.5	-	-
2003/ 3/28 1 O2(P)	1 55 50	1 57 32	1 59 14	.208	9.2	2.4										
ARMAGH		1 57 29 ± 33		.211 ± .173			3	T 25.	CCD27	15	-26	0	-	-	-	-
SABADELL		1 57 14 ± 1		.213 ± .003			18	T 80.	CCD26	15	-38	0	-	-	-	-
MONTERREY		1 57 18 ± 6		.254 ± .026			14	T 18.	VIDEO	73	-15	1	-	0.5	-	-
2003/ 3/28 1 E2(P)	3 30 2	3 32 15	3 34 29	.404	9.2	1.3										
MONTERREY		3 31 57 ± 8		.392 ± .054			18	T 18.	VIDEO	81	-35	1	-	0.5	-	-
2003/ 4/ 1 1 E3(P)	23 25 49	23 30 41	23 35 29	.193	9.7	7.7										
VIENNA		23 31 16 ± 7		.242 ± .014			-35	T 10.	VISU	24	-71	1	-	-	-	-
PULKOVO		23 31 5 ± 63		.222 ± .105			-24	L 65.	CCD26	20	-23	0	V	0.1-0.5	-	-
2003/ 4/ 2 2 E4()	20 12 18	20 16 29	20 20 39	.124	9.8	1.6										
MUNDOLSHEIM		20 16 39 ± 60		.104 ± .067			-10	T 15.	CCD4	59	-22	1	-	-	-	-
2003/ 4/ 2 2 E1(P)	22 55 20	22 58 1	23 0 40	.296	9.8	3.9										
BORDEAUX		22 57 42 ± 3		.339 ± .020			19	T 60.	CCD15	45	-38	1	-	-	-	-
PULKOVO		22 57 50 ± 15		.553 ± .166			11	T 32.	CCD26	24	-24	0	-	-	-	-
MUNDOLSHEIM		22 57 35 ± 25		.302 ± .127			26	T 15.	CCD4	39	-36	1	-	-	-	-
PULKOVO		22 57 21 ± 16		.327 ± .072			40	L 65.	CCD26	24	-24	0	V	0.1-0.5	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL. Jup. (°)	EL. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 4/ 3 1 E4(P)	17 15 44	17 22 54	17 29 57	.233	9.8	9.9										
ALMA-ATA		17 21 47 ± 12		.367 ± .033			67	T 60.	CCD9	50	-37	1	R	1.	-	-
2003/ 4/ 5 3 E1(P)	0 48 59	0 52 3	0 55 7	.465	9.9	2.2										
BORDEAUX		0 52 6 ± 3		.675 ± .030			-3	T 60.	CCD15	24	-38	1	-	-	-	-
2003/ 4/ 7 1 O2(P)	17 6 40	17 8 24	17 10 7	.205	10.1	2.7										
KAVALUR		17 8 8 ± 2		.234 ± .009			16	T 102.	CCD28	50	-59	0	-	-	-	-
2003/ 4/ 7 1 E2()	18 50 58	18 52 54	18 54 52	.144	10.1	1.5										
NOVARA MUNDOLSHEIM		18 53 31 ± 5 18 52 30 ± 25		1.594 ± .177 .146 ± .096			-37 24	T 6. T 15.	VISU CCD4	63 60	-10 -8	0 1	- -	0.1 -	- -	- -
2003/ 4/11 3 E2()	20 58 57	21 1 59	21 5 1	.116	10.4	6.6										
NYROLA TORRECILLA UKKEL CATANIA PULKOVO		21 2 11 ± 34 21 2 9 ± 15 21 2 6 ± 46 21 2 0 ± 48 21 1 59 ± 5		.069 ± .029 .085 ± .035 .078 ± .057 .064 ± .058 .080 ± .007			-12 -10 -7 -1 0	T 41. T 20. T 85. T 25. L 65.	CCD14 CCD21 CCD23 CCD6 CCD26	35 60 51 51 34	-18 -25 -21 -36 -21	0 0 1 0 0	V V - - V	- - 0.1 - 0.1-0.5	- - - - -	- - - - -
2003/ 4/11 4 E1()	21 22 26	21 25 41	21 28 56	.085	10.4	2.3										
UKKEL CATANIA		21 25 18 ± 52 21 25 12 ± 87		.075 ± .048 .088 ± .081			23 29	T 85. T 25.	CCD23 CCD6	48 46	-24 -39	1 1	- -	0.1 0.2	- -	- -
2003/ 4/13 2 E1(P)	14 19 46	14 22 32	14 25 17	.498	10.5	3.5										
KAVALUR		14 22 11 ± 1		.693 ± .018			21	T 102.	CCD28	82	-22	1	-	-	-	-
2003/ 4/14 1 O2(P)	19 16 12	19 17 59	19 19 46	.219	10.5	2.9										
EKATERINBURG NAUCHNY NOVARA PRAGUE MUNDOLSHEIM		19 17 44 ± 2 19 17 44 ± 2 19 18 31 ± 4 19 17 43 ± 30 19 18 1 ± 18		.249 ± .009 .248 ± .009 .471 ± .039 .251 ± .136 .245 ± .075			15 15 -32 16 -2	T 45. T 60. T 6. L 18. T 15.	PM6 PM5 VISU CCD19 CCD4	32 52 62 57 59	-23 -24 -12 -13 -10	0 0 0 1 1	V V - - -	1. 1. 0.1 - -	- - - - -	- - - - -
2003/ 4/16 1 E3(A)	5 31 38	5 35 48	5 39 59	.378	10.6	7.0										
ELGIN		5 35 37 ± 15		.479 ± .086			11	T 20.	CCD18	48	-26	2	-	0.1	-	-
2003/ 4/16 2 E3()	10 6 43	10 10 40	10 14 35	.121	10.6	9.1										
SENDAI		10 10 33 ± 30		.080 ± .033			7	T 36.	PM3	70	-12	1	-	0.1	-	2-3
2003/ 4/19 3 E2()	0 14 19	0 17 46	0 21 13	.221	10.7	7.0										
LILLE		0 17 45 ± 30		.192 ± .078			1	L 32.	CCD10	19	-28	2	-	0.5	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	EL Jup. (°)	EL Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 4/21 1 O2(P)	21 27 31	21 29 23	21 31 15	.247	10.8	3.1										
SABADELL		21 29 16 ± 4		.420 ± .036			7	T 80.	CCD26	47	-28	0	-	-	-	-
CHATEAUGIRON		21 29 14 ± 27		.254 ± .175			9	T 21.	CCD1	32	-29	0	-	-	-	-
GIERES		21 29 14 ± 10		.273 ± .036			9	T 20.	CCD6	44	-51	2	-	-	-	-
NAUCHNY		21 29 9 ± 2		.286 ± .010			14	T 60.	PM5	26	-31	0	V	1.	-	-
OHP		21 29 24 ± 6		.634 ± .175			-1	L 15.	CCD16	44	-27	0	-	0.04	-	-
LA PALMA		21 29 10 ± 2		.289 ± .013			13	T 35.	CCD14	66	-24	0	-	-	-	-
TORRECILLA		21 29 10 ± 3		.314 ± .017			13	T 20.	CCD21	49	-26	0	V	-	-	-
PULKOVO		21 29 10 ± 5		.211 ± .022			13	L 65.	CCD26	26	-18	0	V	0.1-0.5	-	-
2003/ 4/27 2 E1(A)	18 50 57	18 53 40	18 56 23	.662	10.9	2.9										
CATANIA		18 53 20 ± 4		1.516 ± .109			20	T 20.	CCD6	63	-13	1	-	0.2	-	-
NAUCHNY		18 53 20 ± 1		.973 ± .029			20	T 60.	PM5	48	-17	0	V	1.	-	-
PULKOVO		18 53 18 ± 4		1.607 ± .193			22	T 32.	CCD26	41	-8	0	-	-	-	-
TERSKOL		18 53 17 ± 5		.917 ± .101			23	T 60.	CCD9	41	-26	1	-	-	1	-
2003/ 4/28 4 O2(P)	14 56 5	15 0 5	15 4 4	.213	10.9	7.9										
ALMA-ATA		15 0 1 ± 2		.633 ± .013			4	T 60.	CCD9	17	-33	1	-	1.	-	-
2003/ 5/ 2 1 O2(P)	12 47 47	12 49 48	12 51 49	.315	10.9	3.5										
SENDAI		12 49 23 ± 10		.292 ± .057			25	T 36.	PM3	33	-32	1	-	0.1	-	-
2003/ 5/ 4 2 E1(A)	21 5 59	21 8 37	21 11 15	.608	10.8	2.7										
SABADELL		21 8 23 ± 2		1.119 ± .046			14	T 80.	CCD26	42	-22	0	-	-	-	-
CATANIA		21 8 17 ± 5		1.657 ± .261			20	T 25.	CCD6	33	-31	1	-	0.2	-	-
NAUCHNY		21 8 15 ± 1		.801 ± .026			22	T 60.	PM5	21	-27	0	V	1.	-	-
NOVARA		21 8 36 ± 2		.700 ± .052			1	T 6.	VISU	37	-22	0	-	0.1	-	-
PRAGUE		21 8 19 ± 3		.947 ± .059			18	T 41.	CCD19	32	-20	2	-	-	-	-
TERSKOL		21 8 9 ± 6		.934 ± .139			28	T 60.	CCD9	12	-31	1	-	0.1	-	-
MUNDOLSHEIM		21 8 16 ± 7		1.050 ± .127			21	T 15.	CCD4	76	-19	1	-	-	-	-
2003/ 5/ 7 2 O4(A)	2 27 25	2 39 58	2 52 4	.406	10.8	9.4										
MONTERREY		2 39 52 ± 83		.150 ± .029			6	T 18.	VIDEO	60	-18	1	-	0.5	-	-
2003/ 5/ 7 1 E3(A)	14 1 10	14 4 46	14 8 20	.441	10.8	5.4										
KAVALUR		14 4 31 ± 3		.640 ± .025			15	T 102.	CCD28	67	-16	0	-	-	-	-
2003/ 5/ 9 1 O2(P)	15 3 26	15 5 33	15 7 41	.377	10.8	3.7										
ALMA-ATA		15 5 17 ± 2		.389 ± .013			16	T 60.	CCD9	50	-11	1	R	0.5	-	-
KAVALUR		15 5 16 ± 2		.481 ± .018			17	T 102.	CCD28	51	-29	0	-	-	-	-
2003/ 5/10 3 E1(P)	14 44 40	14 48 50	14 53 3	.868	10.8	5.0										
KAVALUR		14 48 56 ± 2		2.556 ± .063			-6	T 102.	CCD28	52	-8	0	-	-	-	-

Dates Phenomena Locations	Begins h m s	Maxi. h m s	Ends h m s	Magn. drop	Ph. (s)	Dist. (Rs)	C-O (s)	Ap. (cm)	Rec.	El. Jup. (°)	El. Sun (°)	Cd.	Filt.	T. int. (s)	Dia. (")	Sat. in dia.
2003/ 5/14 4 O1(P)	21 53 12	22 2 54	22 13 0	.173	10.6	3.5										
ARMAGH		22 2 7 ± 107		.400 ± .173			47	T 25.	CCD27	23	-14	0	-	-	-	-
CHATEAUGIRON		22 2 51 ± 55		.432 ± .168			3	T 21.	CCD1	12	-23	0	-	-	-	-
2003/ 5/21 1 E3(P)	19 30 41	19 33 45	19 36 50	.230	10.3	4.0										
NOVARA		19 34 0 ± 2		.153 ± .020			-15	T 6.	VISU	42	-7	0	-	0.1	-	-
OHP		19 33 29 ± 30		.223 ± .107			16	L 15.	CCD2	45	-6	0	-	-	-	-
2003/ 5/23 1 O2(P)	19 39 43	19 42 1	19 44 18	.422	10.2	4.1										
OHP		19 41 49 ± 8		.393 ± .055			12	L 15.	CCD2	42	-7	0	-	-	-	-
TERSKOL		19 41 38 ± 13		.524 ± .141			23	T 60.	CCD9	15	-24	1	-	-	1	-
2003/ 5/24 3 E1(P)	20 46 1	20 51 4	20 56 12	.694	10.2	5.7										
CATANIA		20 51 22 ± 17		1.846 ± .301			-18	T 25.	CCD6	22	-25	1	-	0.2	-	-
OHP		20 51 19 ± 9		.451 ± .062			-15	L 15.	CCD2	29	-15	0	-	-	-	-
SOBOTA		20 51 15 ± 8		.987 ± .079			-11	T 15.	CCD14	20	-17	0	-	1.	-	-
VIENNA		20 51 46 ± 7		1.512 ± .105			-42	T 10.	VISU	22	-16	1	-	-	-	-
2003/ 5/31 3 E2(P)	20 5 40	20 10 45	20 15 50	.940	9.7	8.5										
CATANIA		20 10 49 ± 12		3.987 ± .465			-4	T 25.	CCD6	25	-19	1	-	0.2	-	-
LUMEZZANE		20 10 53 ± 3		2.388 ± .079			-8	T 40.	CCD17	29	-10	0	-	0.1	-	-
SOBOTA		20 10 50 ± 2		1.455 ± .018			-5	T 15.	CCD14	22	-12	0	-	1.	-	-
MUNDOLSHEIM		20 10 49 ± 9		2.499 ± .303			-4	T 15.	CCD4	30	-7	1	-	-	-	-
2003/ 6/8 3 O1(P)	17 7 20	17 14 23	17 21 53	.006	9.1	3.7										
MT DUSHAK		17 12 9 ± 1		.029 ± .005			134	T 80.	PMTF	21	-17	0	-	-	-	-
2003/ 6/10 1 O2(P)	13 34 28	13 36 40	13 38 52	.192	8.9	4.7										
KAVALUR		13 36 30 ± 1		.218 ± .005			10	T 102.	CCD28	47	-7	1	-	-	-	-
2003/ 6/16 4 O1(P)	17 43 49	17 47 7	17 50 25	.248	8.4	4.4										
MT DUSHAK		17 47 8 ± 11		.415 ± .044			-1	T 80.	PMTF	9	-20	1	V	0.1	-	-
2003/ 6/17 4 O2(P)	16 9 41	16 11 52	16 14 3	.063	8.3	4.8										
MT DUSHAK		16 11 53 ± 10		.051 ± .011			-1	T 80.	PMTF	27	-7	2	V	0.1	-	-
2003/ 7/7 2 O1(P)	16 5 55	16 7 46	16 9 36	.412	6.1	1.7										
MT DUSHAK		16 9 9 ± 1		.044 ± .005			-81	T 80.	PMTF	15	-7	3	B	0.1	-	-
2003/ 7/17 1 O3(A)	16 8 27	16 11 28	16 14 30	.356	4.9	3.5										
MT DUSHAK		16 11 57 ± 18		.309 ± .074			-29	T 80.	PMTF	8	-8	2	V	0.1	-	-

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