Results of the IMO Video Meteor Network – June 2013

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In June we finally saw the long-expected turn regarding the weather conditions. After a much too long and cold winter and a much too wet spring, summer started with more than average Sunshine and plenty of clear skies. More than half of the 63 cameras in operation that month obtained twenty and more observing nights. Stefano Crivello even observed in every night with his camera STG38. In total, we obtained 5,400 hours of effective observing time, which is just 200 hours short of the result from 2012, and also the meteor yield was with 14,000 a little lower than last year. The reason is that in 2012 we had six cameras more in operation.

In the last few monthly reports we analysed step-by-step the meteor showers which were automatically detected in over a million single station video meteors recorded until the end of 2011. The parameters of the strmfind tool were set such that a shower had to last for at least five degrees in solar longitude. The identified showers were manually checked and "fine-tuned" (e.g. by shortening the activity interval and recalculating the shower parameters).

Just before the 2013 IMC in Poznan, the meteor shower list was further completed. At first, all MDC showers with status "established" were analysed in detail. In this step we identified six additional showers in our data, which are active in only a short time interval and therefore fell through the cracks of the automated search.
Then we checked for every of the few hundred showers from the MDC list that were not yet detected, if there are matching radiants in the IMO network data. This way, we could confirm another 22 showers from the MDC list. The comparison was laborious in the beginning, because there is no tool which supports a targeted search in the MDC list. Thus, the complete MDC list of meteors showers (ignoring incomplete entries) and radiants found in our data were imported into an Excel file, and a simple search function was implemented. It finds:

- the best fitting shower from the MDC list, given an IMO network radiant
- the best fitting IMO network radiant, given a shower from the MDC list
- the best fitting MDC shower resp. IMO network radiant given an arbitrary tupel of solar longitude / right ascension / declination / velocity

The file can be downloaded from the IMO Network homepage www.imonet.org for further use.

Overall 365,000 out of the 1.06 million meteors where assigned to a meteor shower. That is, two out of three meteors recorded by the IMO network are sporadic. Ignoring the Antihelion source, we could find 106 meteor showers, which correspond to 39 "established" and 77 "working list" MDC showers. There were another 23 individual sources belonging to the Antihelion source. Among these are two "established" showers (NTA and STA), 18 "working list" showers and six sources without a counterpart in the MDC list.
The reason why the sums are not identical is that we found some inconsistencies during our analysis. Based on our data we suggest that the following pairs of MDC showers are in fact one and the same shower:

- April rho Cygnids (348 ARC) and nu Cygnids (409 NCY)
- c Andromedids (411 CAN) and upsilon Andromedids (507 UAN)
- July Pegasids (175 JPE), August Piscids (415 AUP) and Southern alpha Pegasids (522 SAP)
- Southern delta Aquariids (5 SDA) and August iota Cetids (505 AIC)
- Perseids (7 PER) and zeta Cassiopeiids (444 ZCS)
- Orionids (8 ORI), zeta Taurids (226 ZTA) and nu Eridanids (337 NUE)
- Southern Taurids (2 STA), Southern October delta Arietids (28 SOA) and omega Taurids (286 FTA)
- eta Virginids (11 EVI) and lambda Virginids (49 LVI)
- alpha Scorpiids (55 ASC) and Southern May Ophiuchids (150 SOP)

Meteor showers are reported twice, because the shower has typically a long activity interval, and one shower fits to the early or late part of the other shower.

35 „established" MDC showers as of June 2012 were not found. Among these are 13 daytime showers (which can only be observed by radar), 12 showers that were detected by radar (and which are probably invisible in the visual range) and 4 showers in the far southern hemisphere (for which our data set may be insufficient). Of the remaining 6 showers, 3 were only active in the past. In question (because we did not detect them) are, thus, only the kappa Serpentids (27 KSE), Pisces Austrinids (183 PAU) and April Lyncids (252 ALY).

The results are currently prepared for the IMC proceedings. However, the presentation and the meteor shower list can already be downloaded from the homepage of the IMO network.

Right after the IMC and in the same city of Poznan, the "Meteoroids" conference took place. I was invited to talk about the history and current status of the IMO network. In parallel, Geert Barentsen presented a poster on the new MetRec flux viewer tool including a number of flux density profiles from the past three years. The new tool version is not only significantly faster than the old one thanks to a database redesign, but it offers also a number of new features. It is now possible, for example, to analyse the data of different years, whereby the data can either be shown independently, or as an average value. Looking at the Lyrids (figure 1), for example, it can be seen immediately how the observations of the last three years make up for almost a complete activity profile without lengthy parameter tweaking.

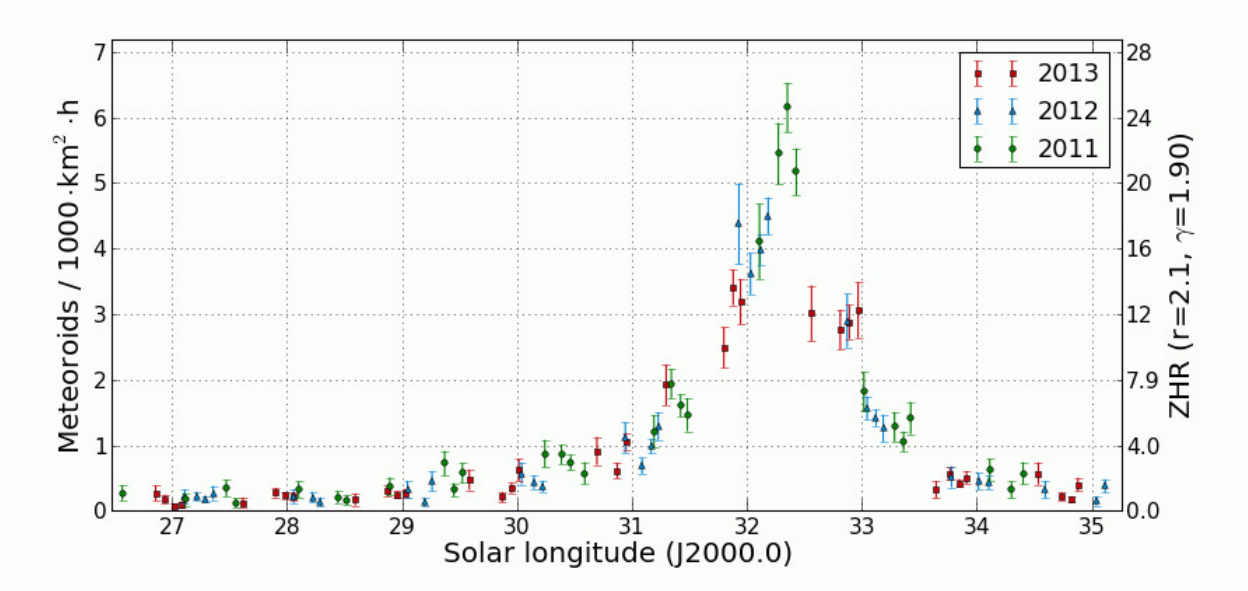

Figure 1: *Flux density profile of the Lyrids 2011-2013, created with the new MetRec flux viewer.*

Currently the tool is migrated to another server, and then it is permanently available.

1. Observers

Code	Name	Place	Camera	FOV [°²]	St.LM [mag]	Eff.CA [km²]	Nights	Time [h]	Meteors
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	17	78.2	310
			HULUD2 (0.95/4)	3398	3.8	671	14	72.3	103
BIRSZ	Biro	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	22	87.7	121
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	24	110.0	370
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	12	42.7	81
			MBB4 (0.8/8)	1470	5.1	1208	14	55.9	85
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	22	75.4	122
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	20	45.4	112
CASFL	Castellani	Monte Baldo/IT	BMH2 (1.5/4.5)*	4243	3.0	371	20	83.2	138
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	29	149.9	425
			C3P8 (0.8/3.8)	5455	4.2	1586	28	128.1	298
			STG38 (0.8/3.8)	5614	4.4	2007	30	159.9	592
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	23	139.1	426
			TEMPLAR2 (0.8/6)	2080	5.0	1508	24	143.7	331
			TEMPLAR3 (0.8/8)	1438	4.3	571	25	141.6	257
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	24	140.4	385
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	23	111.0	283
			ORION3 (0.95/5)	2665	4.9	2069	20	90.1	135
			ORION4 (0.95/5)	2662	4.3	1043	22	77.6	188
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	24	99.4	173
		Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	24	89.7	119
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	23	113.0	131
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	16	68.5	34
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	24	105.2	142
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	18	78.8	302
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	5	28.4	73
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	15	47.8	36
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	21	91.3	459
			STEFKA (0.8/3.8)	5471	2.8	379	19	82.1	249
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	22	96.1	63
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	29	229.2	1643
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	10	25.1	50
MACMA	Maciejewski	Chelm/PL	PAV35 (1.2/4)	4383	2.5	253	19	38.8	69
			PAV36 (1.2/4)*	5732	2.2	227	21	89.0	178
			PAV43 (0.95/3.75)*	2544	2.7	176	19	80.5	62
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	19	92.5	288
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	13	24.0	92
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	14	54.4	486
			MINCAM1 (0.8/8)	1477	4.9	1084	17	75.5	184
		Ketzür/DE	REMO1 (0.8/8)	1467	5.9	2837	20	72.9	349
			REMO2 (0.8/8)	1478	6.3	4467	22	75.7	271
			REMO3 (0.8/8)	1420	5.6	1967	19	63.2	84
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	25	124.5	176
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	10	7.8	55
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	20	82.0	192
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	13	60.4	194
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	20	91.0	229
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	17	51.6	78
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	22	125.6	188
			RO2 (0.75/6)	2381	3.8	459	24	150.9	252
			SOFIA (0.8/12)	738	5.3	907	22	129.3	129
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	16	59.0	94
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	20	77.3	186
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	10	43.4	64
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	27	119.9	451
			NOA38 (0.8/3.8)	5609	4.2	1911	28	119.7	360
			SCO38 (0.8/3.8)	5598	4.8	3306	28	125.6	481
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2362	4.6	1152	15	46.6	52
			MINCAM3 (0.8/6)	2338	4.5	1199	17	41.4	47
			MINCAM4 (1.0/2.6)	9791	2.7	552	17	37.2	46
			MINCAM5 (0.8/6)	2349	5.0	1896	18	47.5	100
TEPIS	Tepliczky	Budapest/HU	HUMOB (0.8/6)	2388	4.8	1607	23	85.1	242
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	8	36.2	41
Sum							30	5415.5	13956

* active field of view smaller than video frame

2. Observing Times (h)

June	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
BERER	2.8	5.7	0.2	-	-	0.9	-	-	4.7	-	5.7	5.7	5.7	5.4	-
	2.3	6.0	-	-	-	-	-	-	-	-	5.7	5.7	5.6	5.7	-
BIRSZ	1.1	-	-	-	1.1	1.5	-	5.2	2.3	-	3.8	5.4	5.5	4.6	3.2
BOMMA	-	-	5.6	0.9	2.5	-	2.3	4.2	-	5.7	2.1	2.9	6.6	-	6.2
BREMA	-	-	-	4.8	3.8	4.7	4.0	-	-	-	-	-	-	4.4	4.4
	3.6	4.5	1.0	4.7	4.5	4.6	4.6	3.7	4.6	4.5	-	-	-	4.4	4.4
BRIBE	-	5.1	3.1	5.0	4.1	4.9	4.8	2.7	1.6	4.3	1.6	1.1	1.9	4.7	2.3
	-	5.1	5.2	3.7	4.2	-	0.5	0.8	-	0.6	0.3	0.7	0.5	3.0	1.3
CASFL	3.9	-	2.1	-	-	5.2	6.3	2.3	1.2	-	-	4.3	5.6	2.7	3.3
CRIST	6.1	5.3	3.3	5.4	6.3	6.3	6.3	2.2	2.7	6.2	6.1	6.2	6.2	1.4	6.2
	3.5	1.8	4.2	3.5	6.4	6.3	6.3	1.6	2.3	4.0	5.4	6.2	6.2	-	3.1
	6.4	5.0	5.7	6.2	6.3	6.3	6.3	2.8	2.8	6.2	6.1	6.2	6.2	1.4	6.2
GONRU	7.3	7.4	7.3	7.1	6.4	-	2.6	-	-	-	-	3.7	5.9	7.3	7.3
	7.4	7.4	7.5	6.7	6.6	-	4.6	-	-	-	1.3	3.8	7.1	7.3	7.3
	7.5	7.2	7.2	7.3	3.9	2.6	-	3.6	-	5.7	-	3.3	4.1	7.1	7.0
	7.4	7.5	7.4	7.3	6.4	-	3.9	-	-	-	0.7	3.7	5.9	7.3	7.3
GOVMI	-	2.0	-	-	-	-	5.0	6.1	5.0	-	6.0	6.0	6.0	3.6	3.7
	-	1.7	-	-	-	-	4.8	5.9	1.8	-	-	5.9	5.9	2.5	1.8
	-	1.7	-	-	-	-	5.0	5.8	3.5	-	4.1	5.9	5.7	2.6	0.2
IGAAN	2.7	3.0	-	0.2	-	-	2.3	2.7	-	2.4	4.1	3.5	3.2	6.0	2.2
	-	5.9	-	-	-	0.2	2.3	5.6	5.8	1.9	5.8	5.6	5.7	5.6	5.3
	-	6.3	-	-	-	1.4	1.3	6.1	3.4	3.3	6.0	-	6.0	5.6	6.0
	1.1	3.6	1.6	-	2.2	2.0	-	5.2	-	-	5.6	-	5.5	5.7	4.4
JONKA	0.8	2.7	-	0.5	4.4	2.9	-	4.5	2.6	2.3	5.7	5.9	5.9	5.8	5.8
KACJA	-	-	-	-	1.2	0.9	3.1	5.3	1.4	-	4.2	5.8	5.8	4.9	-
	-	-	-	-	-	-	-	5.3	-	-	-	-	5.9	5.6	-
	-	-	-	-	-	-	-	-	-	0.8	2.5	2.2	5.7	5.4	-
	-	-	-	-	2.2	1.1	3.6	6.2	1.5	-	5.0	5.9	6.1	5.9	5.0
	-	-	-	-	1.8	1.3	3.5	6.0	1.4	-	3.7	5.5	6.3	4.9	-
KISSZ	3.8	6.1	3.2	-	4.0	2.7	1.7	4.7	-	3.9	5.9	5.5	5.6	5.1	5.1
KOSDE	8.4	8.3	8.1	3.9	8.3	8.3	8.3	8.3	8.3	-	8.3	8.3	7.7	7.7	8.2
	-	3.5	-	3.3	3.3	1.4	2.7	-	-	-	-	-	-	2.9	0.6
MACMA	2.4	-	0.4	1.3	-	1.5	4.1	-	2.5	-	-	1.8	2.8	2.0	2.6
	5.3	-	-	2.2	-	4.5	5.2	3.6	4.8	-	-	4.6	5.2	4.8	4.9
	-	-	1.6	-	-	4.5	5.3	3.8	4.7	-	-	4.7	5.1	4.4	4.8
MARGR	2.5	5.3	5.9	7.1	7.1	4.2	6.1	-	-	-	-	-	-	-	6.4
MASMI	-	3.2	2.6	-	0.5	-	-	-	-	-	0.8	-	-	2.6	-
MOLSI	-	-	-	-	4.7	4.6	4.7	4.6	-	-	-	4.5	2.8	-	-
	-	-	-	-	5.7	5.7	5.5	5.6	-	-	2.1	5.6	3.3	1.4	-
	-	-	4.6	4.5	4.4	4.4	3.9	4.3	-	4.3	4.1	4.1	-	4.1	2.3
	-	-	4.7	4.6	4.6	4.6	3.8	4.5	0.5	4.4	3.8	4.4	-	4.3	2.2
	-	-	4.7	4.7	4.6	4.6	-	4.5	-	4.4	3.5	3.3	-	4.4	2.0
MORJO	-	3.2	-	-	0.6	4.7	5.8	6.0	2.5	4.2	5.9	5.9	5.9	6.0	5.9
OCHPA	0.2	-	-	-	-	-	-	-	-	-	0.8	1.0	1.0	-	1.1
OTTMI	3.5	6.3	4.7	-	-	-	5.7	-	4.4	6.3	3.3	-	6.9	0.9	1.2
PERZS	5.3	-	-	-	0.8	2.8	4.2	6.1	4.0	-	6.1	6.1	-	-	-
PUCRC	-	-	-	-	5.4	6.1	4.9	6.2	-	-	-	-	-	-	6.1
ROTEC	-	-	4.0	-	4.4	4.3	4.0	2.9	-	4.2	3.6	3.3	0.6	3.0	1.0
SARAN	6.8	7.5	7.4	0.5	5.4	4.3	4.9	-	-	4.7	2.0	7.0	6.9	7.0	7.4
	7.4	7.2	7.4	6.7	5.3	4.7	5.5	-	-	5.6	1.7	7.2	7.1	6.8	7.2
	7.0	7.0	6.8	7.0	5.4	4.4	5.1	-	-	5.4	1.6	5.9	6.7	5.6	6.9
SCALE	-	-	-	-	-	-	-	-	-	5.3	1.7	0.5	5.0	-	4.4
SCHHA	5.2	5.2	5.0	5.0	4.5	5.1	5.1	-	-	3.8	0.2	1.2	4.6	5.0	1.3
SLAST	-	-	-	-	-	-	-	-	2.0	-	5.2	5.2	5.8	5.3	4.0
STOEN	3.2	3.0	-	0.2	2.8	5.6	6.5	5.8	2.3	5.8	4.6	0.7	6.4	4.6	6.3
	2.2	3.2	0.2	0.2	2.3	6.0	6.5	5.7	2.2	5.5	4.7	1.1	6.4	4.1	6.4
	3.1	2.3	0.3	0.3	4.2	6.0	6.6	6.0	2.2	6.2	4.9	1.7	6.4	4.7	6.3
STRJO	-	-	-	3.7	3.6	3.9	3.1	2.5	-	-	3.6	-	-	3.6	3.1
	-	4.0	-	3.7	3.3	3.6	-	2.2	-	3.7	2.6	-	-	1.6	2.7
	-	-	-	3.4	3.7	3.9	1.9	1.3	-	3.2	3.4	-	-	3.5	2.5
	-	-	-	3.7	3.6	3.6	2.8	2.1	0.7	3.7	3.6	-	-	2.6	2.8
TEPIS	0.7	-	-	-	0.3	0.6	0.7	5.6	2.1	-	4.7	4.0	5.4	5.5	2.9
ZELZO	-	-	-	-	-	1.4	-	-	-	-	5.9	5.1	-	4.4	4.5
Sum	130.9	170.2	133.0	129.3	177.1	175.1	208.0	190.1	91.8	132.5	190.1	213.8	254.3	248.7	227.0

June	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
BERER	5.5	5.6	5.4	5.0	5.1	5.5	-	4.5	-	-	-	-	-	-	4.8
	5.3	5.6	5.6	5.6	5.2	5.1	-	4.5	-	-	-	-	-	-	4.4
BIRSZ	5.5	5.5	5.4	5.4	5.4	5.1	-	4.2	-	-	3.3	1.8	1.4	5.5	5.5
BOMMA	4.4	6.2	6.1	6.4	3.9	6.5	6.4	6.1	4.7	2.9	3.6	-	4.7	3.0	6.1
BREMA	2.0	-	2.3	-	-	-	-	1.3	-	4.2	-	-	-	4.5	2.3
	-	-	-	-	-	-	-	-	-	-	-	-	-	4.4	2.4
BRIBE	3.9	2.0	4.6	0.8	-	2.9	-	-	-	4.7	-	-	-	4.7	4.6
	2.7	2.0	4.3	-	0.7	-	-	-	-	4.6	-	0.4	-	3.4	1.4
CASFL	4.7	5.9	2.9	3.7	3.3	4.6	4.8	-	5.7	-	-	-	-	6.4	4.3
CRIST	6.2	6.2	6.1	5.6	3.8	5.9	5.1	-	6.2	1.7	5.9	2.4	6.2	6.2	6.2
	6.2	6.2	5.7	4.6	0.5	2.9	1.8	-	6.2	3.1	6.2	5.3	6.2	6.2	6.2
	6.2	6.2	6.1	5.7	4.6	6.1	5.5	1.0	6.2	1.8	6.2	5.6	6.2	6.2	6.2
GONRU	-	-	3.7	2.5	3.1	5.7	5.7	7.1	6.9	7.1	6.6	7.1	7.1	7.1	7.1
	-	-	3.5	2.2	2.6	5.8	6.0	7.2	6.7	7.2	6.7	7.2	7.2	7.3	7.1
	-	-	2.2	2.3	3.1	7.1	4.2	6.9	6.9	7.0	7.0	7.2	7.0	7.1	7.1
	-	-	3.1	1.9	2.0	5.8	5.4	7.3	7.2	7.2	6.8	7.2	7.2	7.3	7.2
GOVMI	5.8	4.2	5.0	5.8	6.1	6.0	4.0	-	0.6	5.9	5.6	5.9	2.0	4.7	6.0
	5.7	5.8	5.0	5.4	5.2	5.8	1.5	-	-	5.1	4.3	5.7	-	4.4	5.9
	4.1	4.4	2.8	3.0	2.3	2.3	1.0	-	-	5.2	4.8	1.4	1.4	4.6	5.8
IGAAN	6.0	5.9	6.0	4.5	5.7	4.5	-	6.0	-	4.4	6.0	2.6	3.4	6.0	6.1
	4.0	5.6	5.2	1.7	4.9	2.8	-	1.3	0.7	-	1.7	0.4	0.8	5.3	5.6
	6.0	6.0	6.0	6.0	5.9	6.0	-	5.6	-	0.2	6.0	2.9	5.2	6.0	5.8
	5.5	5.5	5.7	5.5	3.8	-	-	5.6	-	-	-	-	-	-	-
JONKA	5.8	5.8	5.8	5.8	5.2	5.4	-	5.2	-	-	4.8	-	0.6	5.2	5.8
KACJA	5.9	5.7	6.0	5.8	5.7	4.4	4.7	2.6	-	-	-	-	-	-	5.4
	-	5.9	-	-	5.7	-	-	-	-	-	-	-	-	-	-
	3.4	4.1	2.2	3.6	4.8	5.2	3.3	2.0	-	-	-	1.8	-	-	0.8
	6.1	6.1	6.2	6.2	6.1	4.5	4.9	1.9	-	2.1	-	-	-	0.5	4.2
	6.3	6.0	6.0	6.1	6.0	4.6	4.5	1.7	-	1.5	-	-	-	-	5.2
KISSZ	5.4	5.5	5.8	5.8	5.4	-	-	2.4	-	0.3	-	-	-	4.7	3.5
KOSDE	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	3.8	8.2	8.3	8.3
	1.7	-	-	-	-	-	-	-	-	2.8	-	-	-	2.9	-
MACMA	4.2	3.1	-	2.2	4.2	-	0.9	0.3	-	-	0.3	-	-	0.6	1.6
	4.7	4.9	4.7	5.1	5.1	-	5.0	1.5	1.1	-	1.5	-	-	5.1	5.2
	4.6	4.8	4.4	5.0	5.0	-	4.8	1.6	-	-	1.7	-	-	4.7	5.0
MARGR	7.5	5.9	6.1	3.4	-	-	-	-	1.4	7.3	5.2	3.0	2.3	2.9	2.9
MASMI	2.5	-	1.3	0.1	-	2.5	2.5	-	2.5	-	2.6	-	0.3	-	-
MOLSI	4.5	4.5	4.5	4.5	-	-	-	2.3	-	-	-	1.0	3.8	-	3.4
	5.5	5.5	5.5	5.5	1.4	-	5.4	-	-	-	-	-	4.5	3.4	3.9
	-	4.1	4.3	-	-	3.7	3.4	1.2	-	-	2.1	2.4	-	4.2	2.5
	0.3	4.1	4.1	3.2	-	3.3	3.3	-	-	-	3.0	1.9	-	4.4	1.7
	0.3	2.5	3.9	-	-	3.0	2.5	-	-	-	3.8	1.1	-	4.4	1.0
MORJO	2.9	5.8	5.9	5.9	5.9	5.3	-	5.7	-	5.6	6.0	2.2	5.8	6.0	4.9
OCHPA	0.9	1.5	0.7	0.3	-	-	-	-	0.3	-	-	-	-	-	-
OTTMI	4.1	2.5	1.8	2.0	0.3	-	4.0	-	-	-	5.0	6.9	5.3	-	6.9
PERZS	-	-	-	-	-	-	-	-	-	4.8	6.0	6.0	2.6	5.6	-
PUCRC	6.0	6.0	6.1	6.1	4.4	5.5	4.1	4.9	1.3	0.9	0.5	5.8	5.1	4.1	1.5
ROTEC	-	-	-	1.8	-	4.0	3.7	-	-	-	1.4	-	-	3.7	1.7
SARAN	-	-	-	-	-	7.3	6.0	7.2	-	6.3	5.8	6.0	7.0	3.8	4.4
	-	-	1.2	-	-	7.2	7.2	7.0	7.0	7.1	6.9	6.0	7.2	7.1	7.2
	-	-	-	-	-	6.7	5.3	5.4	5.2	5.8	6.6	5.9	6.5	-	7.1
SCALE	-	-	5.9	6.0	4.8	6.0	0.9	3.4	0.7	-	3.5	-	4.0	3.7	3.2
SCHHA	2.4	-	4.6	-	-	3.0	-	-	1.0	4.9	-	-	-	5.1	5.1
SLAST	-	2.7	5.8	5.7	-	-	-	-	-	-	-	-	-	-	1.7
STOEN	4.7	6.3	5.9	5.7	3.7	6.3	6.0	2.1	2.1	-	4.8	-	6.2	6.5	1.8
	4.0	6.1	5.9	6.4	4.4	6.4	6.4	2.2	1.2	-	5.1	-	6.4	6.6	1.9
	5.1	6.2	6.2	6.4	4.6	6.3	6.4	2.3	1.7	-	5.1	-	6.1	6.5	1.5
STRJO	2.6	-	3.5	3.1	-	-	-	-	-	2.7	1.4	-	-	3.6	2.6
	2.2	0.8	3.1	1.0	-	-	0.2	-	-	-	1.0	-	-	3.6	2.1
	0.2	1.5	3.4	0.7	-	-	-	-	-	0.3	0.3	-	-	3.6	0.4
	2.6	1.3	3.5	2.2	-	-	1.3	-	-	-	1.3	-	-	3.6	2.5
TEPIS	5.5	5.4	5.4	5.3	5.4	4.3	-	2.8	-	-	2.8	2.5	2.2	5.5	5.5
ZELZO	-	6.0	-	2.9	-	6.0	-	-	-	-	-	-	-	-	-
Sum	209.8	227.6	250.6	215.6	173.5	215.5	156.3	142.5	91.7	132.9	177.4	119.4	150.1	240.2	240.5

3. Results (Meteors)

June	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
BERER	11	19	1	-	-	1	-	-	13	-	31	30	27	32	-
	2	7	-	-	-	-	-	-	-	-	13	8	13	8	-
BIRSZ	4	-	-	-	2	1	-	6	2	-	3	6	9	5	7
BOMMA	-	-	18	4	2	-	11	15	-	14	7	1	25	-	22
BREMA	-	-	-	8	7	6	4	-	-	-	-	-	-	13	7
	3	9	1	8	3	3	10	5	8	6	-	-	-	6	5
BRIBE	-	7	4	10	3	6	3	5	1	2	1	1	4	17	2
	-	6	11	8	5	-	3	5	-	1	1	1	2	18	2
CASFL	2	-	3	-	-	8	10	4	3	-	-	8	10	4	6
CRIST	14	9	9	17	18	17	25	7	3	17	13	16	26	4	22
	3	6	9	1	15	14	12	1	4	5	14	14	10	-	10
	16	12	23	22	17	17	22	7	5	29	31	22	28	3	29
GONRU	29	17	22	15	10	-	8	-	-	-	-	11	20	30	37
	21	23	21	16	6	-	7	-	-	-	1	6	7	18	29
	16	11	18	12	4	6	-	4	-	7	-	5	6	16	13
	25	25	16	11	7	-	5	-	-	-	1	6	13	24	16
GOVMI	-	7	-	-	-	-	16	16	8	-	19	19	21	6	7
	-	2	-	-	-	-	4	7	2	-	-	6	14	4	2
	-	5	-	-	-	-	7	10	5	-	5	12	12	8	1
IGAAN	3	4	-	1	-	-	7	6	-	3	6	6	9	8	5
	-	13	-	-	-	1	2	3	6	2	9	9	8	13	4
	-	4	-	-	-	1	4	4	1	2	7	-	13	6	6
	1	1	2	-	1	1	-	2	-	-	3	-	3	9	2
JONKA	1	3	-	2	3	2	-	6	2	5	9	6	10	3	10
KACJA	-	-	-	-	6	4	10	10	5	-	11	17	22	4	-
	-	-	-	-	-	-	-	15	-	-	-	-	17	14	-
	-	-	-	-	-	-	-	-	-	1	3	2	2	1	-
	-	-	-	-	8	1	22	45	7	-	14	33	44	26	13
	-	-	-	-	7	2	12	11	4	-	10	15	21	18	-
KISSZ	1	7	1	-	1	1	1	5	-	3	5	1	4	1	7
KOSDE	48	62	62	21	51	57	57	52	56	-	59	47	66	59	51
	-	6	-	7	10	2	6	-	-	-	-	-	-	1	2
MACMA	3	-	1	1	-	5	4	-	2	-	-	2	8	8	4
	8	-	-	4	-	12	7	7	7	-	-	12	9	17	10
	-	-	1	-	-	3	3	2	4	-	-	4	2	3	2
MARGR	3	8	13	14	17	2	3	-	-	-	-	-	-	-	20
MASMI	-	12	4	-	1	-	-	-	-	-	1	-	-	13	-
MOLSI	-	-	-	-	72	59	45	23	-	-	-	38	20	-	-
	-	-	-	-	17	19	12	6	-	-	1	12	5	6	-
	-	-	26	29	26	20	14	30	-	32	8	8	-	32	7
	-	-	23	18	20	20	14	26	2	20	12	10	-	24	14
	-	-	7	4	3	5	-	6	-	7	5	1	-	9	2
MORJO	-	2	-	-	1	2	4	5	1	9	11	9	11	4	10
OCHPA	1	-	-	-	-	-	-	-	-	-	5	8	7	-	7
OTTMI	4	6	7	-	-	-	5	-	6	11	5	-	14	2	4
PERZS	10	-	-	-	1	1	20	17	10	-	21	27	-	-	-
PUCRC	-	-	-	-	13	20	8	17	-	-	-	-	-	-	11
ROTEC	-	-	5	-	10	2	5	8	-	6	3	2	1	3	2
SARAN	6	8	10	3	6	8	4	-	-	7	2	9	8	9	20
	19	22	11	9	7	8	3	-	-	8	3	17	11	4	11
	12	8	5	8	2	4	3	-	-	2	2	3	7	6	10
SCALE	-	-	-	-	-	-	-	-	-	6	1	2	13	-	5
SCHHA	7	15	8	19	11	11	11	-	-	4	1	3	11	19	1
SLAST	-	-	-	-	-	-	-	-	1	-	8	10	15	7	3
STOEN	15	12	-	1	9	20	23	11	10	20	14	1	25	14	17
	7	3	1	1	10	18	18	11	7	16	10	3	24	14	11
	18	5	2	2	16	20	23	12	15	24	11	12	39	9	18
STRJO	-	-	-	4	5	4	1	2	-	-	2	-	-	6	1
	-	2	-	2	2	3	-	2	-	3	2	-	-	3	4
	-	-	-	2	4	3	2	1	-	2	1	-	-	5	3
	-	-	-	5	10	11	2	3	1	8	5	-	-	11	4
TEPIS	5	-	-	-	2	2	5	17	6	-	12	16	22	17	3
ZELZO	-	-	-	-	-	1	-	-	-	-	10	8	-	4	5
Sum	318	368	345	289	451	434	507	457	207	282	432	525	718	628	526

June	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
BERER	13	23	18	33	18	9	-	15	-	-	-	-	-	-	16
	4	5	10	9	6	6	-	3	-	-	-	-	-	-	9
BIRSZ	5	9	8	9	1	4	-	7	-	-	4	5	3	6	15
BOMMA	16	13	15	21	17	29	18	27	17	17	14	-	14	6	27
BREMA	4	-	4	-	-	-	-	2	-	9	-	-	-	8	9
	-	-	-	-	-	-	-	-	-	-	-	-	-	14	4
BRIBE	5	1	9	1	-	4	-	-	-	14	-	-	-	13	9
	5	5	8	-	2	-	-	-	-	8	-	2	-	13	6
CASFL	6	13	5	5	5	4	9	-	12	-	-	-	-	13	8
CRIST	11	17	11	16	18	12	7	-	24	2	9	5	23	26	27
	13	23	11	10	2	4	6	-	22	5	8	17	16	21	22
	21	32	19	12	22	14	17	1	36	7	16	22	29	25	36
GONRU	-	-	8	8	5	18	6	21	31	27	14	23	15	26	25
	-	-	4	2	4	17	3	24	14	15	14	20	14	21	24
	-	-	3	1	1	13	6	20	25	13	14	11	8	13	11
	-	-	3	7	1	17	7	21	27	30	23	24	20	32	24
GOVMI	14	9	11	12	10	19	6	-	2	18	14	20	2	12	15
	5	12	7	6	6	8	5	-	-	10	6	10	-	4	15
	13	13	5	10	11	9	7	-	-	16	6	4	3	7	19
IGAAN	10	10	12	9	5	7	-	9	-	11	10	3	4	12	13
	6	7	3	2	3	5	-	4	1	-	3	2	1	4	8
	5	7	3	5	8	7	-	10	-	1	12	2	6	7	10
	3	1	1	1	1	-	-	2	-	-	-	-	-	-	-
JONKA	4	9	7	7	4	7	-	6	-	-	9	-	2	10	15
KACJA	27	23	21	35	24	33	20	5	-	-	-	-	-	-	25
	-	11	-	-	16	-	-	-	-	-	-	-	-	-	-
	2	8	1	2	1	7	2	2	-	-	-	1	-	-	1
	28	26	29	44	35	21	29	2	-	11	-	-	-	1	20
	17	14	13	26	12	16	19	2	-	9	-	-	-	-	21
KISSZ	2	2	1	2	2	-	-	4	-	1	-	-	-	3	8
KOSDE	56	69	62	75	49	76	55	61	61	92	48	20	47	63	61
	5	-	-	-	-	-	-	-	-	4	-	-	-	7	-
MACMA	2	3	-	2	6	-	4	2	-	-	2	-	-	1	9
	7	13	9	7	7	-	7	2	1	-	3	-	-	12	17
	6	3	4	4	3	-	5	1	-	-	2	-	-	7	3
MARGR	18	16	19	17	-	-	-	-	10	28	23	18	18	16	25
MASMI	7	-	1	4	-	13	8	-	9	-	17	-	2	-	-
MOLSI	50	54	29	32	-	-	-	20	-	-	-	5	21	-	18
	19	16	8	13	2	-	26	-	-	-	-	-	4	9	9
	-	12	28	-	-	21	13	1	-	-	9	5	-	23	5
	3	7	9	2	-	8	7	-	-	-	10	3	-	17	2
	1	2	4	-	-	6	3	-	-	-	4	1	-	11	3
MORJO	4	8	11	5	8	8	-	9	-	13	12	4	5	7	13
OCHPA	7	11	5	2	-	-	-	-	2	-	-	-	-	-	-
OTTMI	9	17	12	14	2	-	6	-	-	-	14	23	13	-	18
PERZS	-	-	-	-	-	-	-	-	-	26	25	12	5	19	-
PUCRC	26	12	14	13	13	9	7	14	4	5	2	9	15	13	4
ROTEC	-	-	-	1	-	7	4	-	-	-	2	-	-	13	4
SARAN	-	-	-	-	-	9	5	10	-	16	8	18	5	6	11
	-	-	3	-	-	15	12	10	8	15	10	12	11	16	7
	-	-	-	-	-	8	3	5	7	9	4	9	3	-	9
SCALE	-	-	7	5	16	11	1	10	2	-	6	-	3	4	2
SCHHA	3	-	10	-	-	2	-	-	2	17	-	-	-	13	18
SLAST	-	7	3	9	-	-	-	-	-	-	-	-	-	-	1
STOEN	14	20	22	17	10	35	9	14	7	-	21	-	36	41	13
	9	15	15	12	19	16	11	11	4	-	23	-	31	31	9
	11	30	12	17	24	24	20	10	8	-	22	-	36	30	11
STRJO	5	-	1	6	-	-	-	-	-	2	1	-	-	9	3
	2	1	6	1	-	-	1	-	-	-	2	-	-	9	2
	1	1	6	4	-	-	-	-	-	2	2	-	-	5	2
	3	2	10	1	-	-	3	-	-	-	2	-	-	11	8
TEPIS	15	13	15	7	8	16	-	6	-	-	10	8	7	9	21
ZELZO	-	5	-	4	-	4	-	-	-	-	-	-	-	-	-
Sum	522	630	575	569	407	578	377	373	336	453	460	318	422	699	750