Results of the IMO Video Meteor Network – July 2012

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July 2012 was once more an unusually successful months. Even though you did not get the impression of a sunny Summer month in northern Europe, the observing statistics is unequivocal. Only a short glimpse on the tables reveals that there were hardly any observing breaks. And that first impression is indeed correct: In fifteen nights, there were fifty or more cameras in operation – on July 26 it was even 63 out of 68 cameras. Overall there were record-breaking fifty cameras with twenty and more observing nights. With almost 6,800 hours of effective observing time and 28,000 meteors, July cannot compete with top-class months like August or October, but that is still much more observing data than we ever obtained in a July before.

With the alpha Capricornids and southern delta Aquariids, two well-known showers reached their maxima end of July. From both of them we got already nice flux density profiles in the year before, so that we could compare the results from 2011 and 2012 directly.
Figure 1 shows the flux density profile of the alpha Capricornids between July 17 and August 7 (115-135° solar longitude), calculated with a zenith exponent of 1.5. The result is remarkable: Until 123° solar longitude, both profiles are virtually identical. Thereafter, however, the profiles look different. Last year, the maximum occurred already at 125° solar longitude (July 28). In 2012 the activity further rose until 130° solar longitude (August 2) and then declined much faster than in the previous year. At 132° solar longitude, both graphs matched well again. In the long-term statistics, the maximum occurs at 125°, so it is 2012 where the maximum actually deviates from the long-term average.

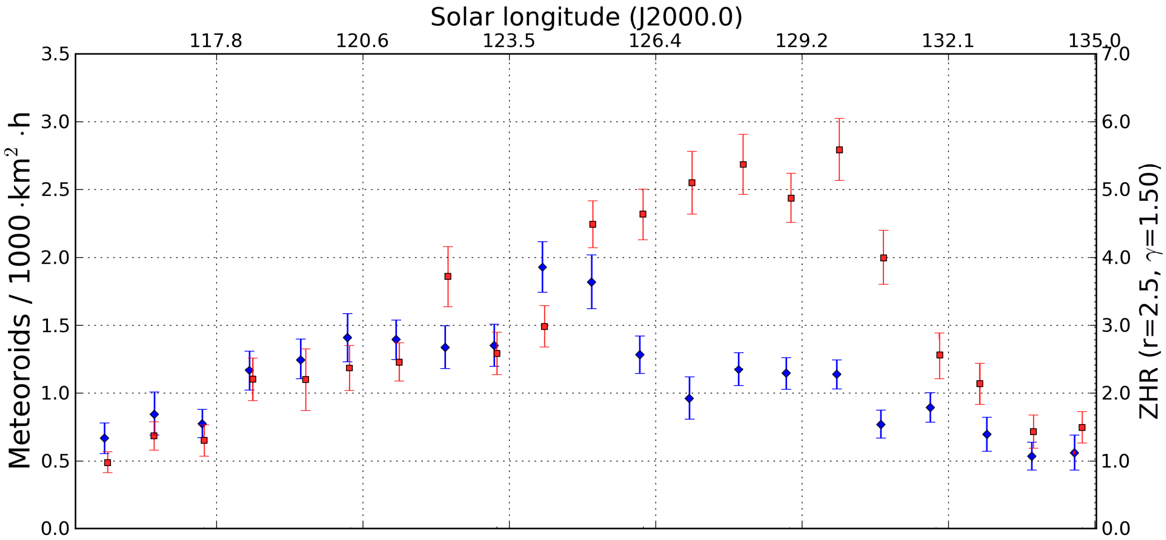

Figure 1: *Comparison of the alpha Capricornid flux density profiles of 2011 (blue diamonds) and 2012 (red squares).*

In the recent analysis of the IMO Video Meteor Database based on over a million meteors, the alpha Capricornids (1 CAP) were detected between June 25 and August 12. However, the first days are quite uncertain – only between July 16 and August 10 the shower can be identified unequivocally. The parameters in table 1 were derived from over 6,000 shower members. Already in the 2009 analysis we had found a significant reduction of meteor shower velocity by 0.18 km/s per day (or more precise: per degree in solar longitude). That values is confirmed by our latest analysis.

Table 1: *Parameters of the alpha Capricornids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
MDC	127	-	305.6	+0.5	-8.7	+0.3	24.9	-
IMO 2012	125	113-137	305.3	+0.52	-10.0	+0.24	24.1	-0.19

Also in case of the southern delta Aquariids there are large deviations in the 2011 and 2012 data sets (figure 2). Even though the activity plateau between 125° and 130° solar longitude can be found in both years, the peak flux density in 2012 is about twice as high as in the year before. We do not yet have any reasonable explanation for this phenomenon. Given the size of the data sets, individual cameras like the Australian GOCAM1 (which had to pause in 2012) cannot have such a strong influence. Also when another zenith exponent than 1.5 is chosen, the result is still the same.

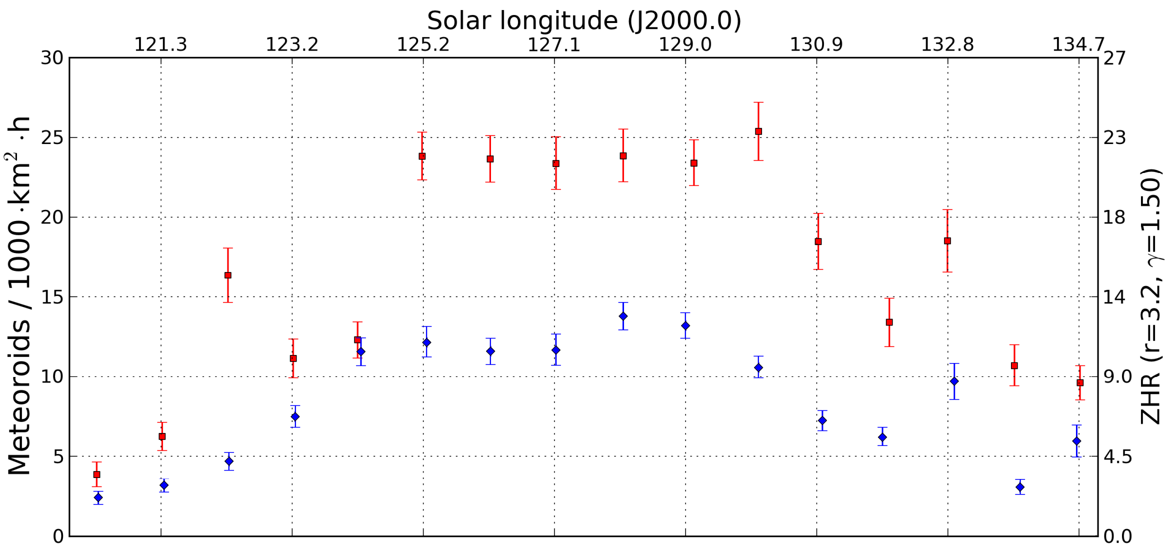

Figure 2: *Comparison of the southern delta Aquariid flux density profiles of 2011 (blue diamonds) and 2012 (red squares).*

In the current meteor shower analysis, the southern delta Aquariids (5 SDA) can be safely detected between July 20 and September 8 (table 2). At this time, both the radiant position and the meteor shower velocity yield a consistent picture with almost no scatter. Thanks to the large data set of over 13,000 meteors, we can even detect fine structures within the activity interval. The declination, for example, is not growing constantly, but by 0.2° per day between 117° and 138° solar longitude, and by twice that amount thereafter. Also the shower velocity is not constant. The details for both segments are given in table 2 as well.

Table 2: *Parameters of the southern delta Aquariids from the MDC Working List and the analysis of the IMO Network 2012. Given are average values for the whole activity interval, and values for the two segments up to and after 138° solar longitude.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
MDC	126	-	341.6	+0.9	-13.9	+0.3	42.0	-
IMO 2012	126	117-165	339.7	+0.83	-16.6	+0.34	43.8	-0.15
	126	117-138	339.7	+0.80	-16.4	+0.21	44.1	-0.34
	152	139-165	1.3	+0.82	-7.7	+0.41	41.0	-0.04

Let's now have a look at further meteor showers that we found in our recent analysis. We only list showers which can be regarded as save detections based on their parameters. Additional candidates of more questionable nature can be found at http://www.imonet.org/showers.

As their name suggests, the Microscopids (370 MIC) are a southern meteor shower. We can track them from end of June until mid-July with only little scatter in the parameters. The activity profile shows no clear peak – the highest flux density is reached at the beginning of the activity interval. Table 3 compares our from more than 500 meteors derived parameters with the values from the MDC list. They are in very good agreement.

Table 3: *Parameters of the Microscopids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	**Solar Longitude**		**Right Ascension**		**Deklination**		**Vinf**	
	Mean [°]	**Interval [°]**	**Mean [°]**	**Drift [°]**	**Mean [°]**	**Drift [°]**	**Mean [km/s]**	**Drift [km/s]**
MDC	104	-	320.3	-	-28.3	-	39.6	-
IMO 2012	105	98-111	320.0	+1.1	-26.7	+0.15	40.8	-0.07

The activity interval of the July Pegasids (175 JPE) starts on July 5. Already five days later the shower reaches highest activity, but it still can be tracked until early August in our data. Based on more than 2,100 shower meteors, we see some variation in the meteor shower velocity, but almost none in the right ascension and declination values. So it is even more remarkable that there is significant deviation from the values given in the MDC list (table 4).

Table 4: *Parameters of the July Pegasids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	**Solar Longitude**		**Right Ascension**		**Deklination**		**Vinf**	
	Mean [°]	**Interval [°]**	**Mean [°]**	**Drift [°]**	**Mean [°]**	**Drift [°]**	**Mean [km/s]**	**Drift [km/s]**
MDC	108	-	340.0	-	+15.0	-	62.3	-
IMO 2012	108	103-131	347.6	+0.82	+11.0	+0.23	67.5	-0.03

The slow July gamma Draconids (184 GDR) can be detected in an interval of 6 days only, but still more than 700 meteors were assigned to that shower. Peak activity is reached on July 28/29. The radiant shows almost no drift in the activity interval, and our parameters match very well to the values from the MDC list (table 5)

Table 5: *Parameters of the July gamma Draconids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	**Solar Longitude**		**Right Ascension**		**Deklination**		**Vinf**	
	Mean [°]	**Interval [°]**	**Mean [°]**	**Drift [°]**	**Mean [°]**	**Drift [°]**	**Mean [km/s]**	**Drift [km/s]**
MDC	125	-	280.1	-	+51.1	-	29.6	-
IMO 2012	125	122-127	280.6	+0.0	+50.8	+0.1	26.6	-0.06

Given that the southern iota Aquariids (3 SIA) are an established MDC meteor shower, it is quite difficult to detect them in our data. In fact, there are two different showers which are similar to SIA. One of them is active between July 21 and August 8. Our from more than 1,000 shower meteors derived parameters deviate significantly from the MDC data (table 6). The maximum occurs earlier, the shower is slower and the radiant lies north-west of the expected position. The second shower, which is based on 500 meteors, shows a better agreement with respect to peak date and velocity, but it still lies eight degrees north of the expected position. Both showers show significant scatter in their parameters. Maybe they represents a rather diffuse radiation area.

Table 6: *Parameters of the southern iota Aquariids from the MDC Working List and the analysis of the IMO Network 2012. Both shower candidates do not fit particularly well to the MDC data.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
MDC	132	-	333.9	+1.1	-16.5	+0.2	36.6	-
IMO 2012	127	118-135	316.1	+0.58	-10.6	+0.26	29.1	+0.26
	132	130-135	329.1	-	-8.3	-	32.4	-

The eta Eridanids (123 ERI), another established shower in the MDC list, can be detected between July 26 and August 15. The radiant appears even two to three days earlier and later in our data, but with strong deviations. There is no clear activity peak, which is why the data in table 7 are given for the center of the activity interval. The radiant position, which is derived from over 1,900 shower meteors, shows only little scatter. The velocity varies a little stronger, but a systematic drift during the activity interval is not found.

Table 7: *Parameters of the eta Eridanids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
MDC	138	-	45.0	-	-12.9	-	65.0	-
IMO 2012	133	123-142	40.1	+0.82	-12.3	+0.41	66.6	+0.03

We have no unequivocal detection of the alpha Triangulids (414 ATR) in our data. There is, however, a shower between July 26 and August 20 which shows some similarities. The activity profile shows no clear peak, which is why the shower data in table 8 derived from over 4,100 meteors are given for the center of the activity interval. While the right ascension is equally growing, there is stronger scatter in declination and meteor shower velocity. With a rank of 6, however, this shower can be regarded as a safe detection.

Table 8: *Parameters of the alpha Triangulids from the MDC Working List and the analysis of the IMO Network 2012.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
MDC	120	-	28.9	-	+28.1	-	71.9	-
IMO 2012	135	123-147	44.3	+1.10	+37.6	-0.22	67.9	+0.07

Finally there are once more two new shower candidates (table 9). The first shower is derived from about 450 meteors and active at the middle of the month. It has only a rank of 18, but just small scatter in the shower parameters. The second shower is based on over 600 meteors and occurs in the last July decade.
Both showers are fast and show no sign of a drift in meteor shower velocity. As soon as there is independent confirmation for these, we will report them to the MDC.

Table 9: *Parameters of two possible new meteor showers from the analysis of the IMO Network 2012.*

Source	Solar Longitude		Right Ascension		Deklination		Vinf	
	Mean [°]	Interval [°]	Mean [°]	Drift [°]	Mean [°]	Drift [°]	Mean [km/s]	Drift [km/s]
IMO 2012	110	106-115	33.8	+0.8	+7.9	+0.3	68.9	-
	121	118-129	42.2	+0.73	+10.0	+0.25	69.0	-

1. Observers

Code	Name	Place	Camera	FOV [°²]	St.LM [mag]	Eff.CA [km²]	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG1 (0.8/8)	1488	4.8	726	13	46.2	31
BERER	Berko	Ludanyhalaszi/HU	HULUD1 (0.95/3)	2256	4.8	1540	20	98.0	493
			HULUD2 (0.75/6)	4860	3.9	1103	20	79.9	293
			HULUD3 (0.75/6)	4661	3.9	1052	20	65.1	225
BIRSZ	Biro	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	23	103.4	315
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	31	188.5	937
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	19	62.5	231
			MBB4 (0.8/8)	1470	5.1	1208	20	65.7	193
BRIBE	Brinkmann	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	25	77.3	234
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	21	75.2	271
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	29	145.6	501
			BMH2 (1.5/4.5)*	4243	3.0	371	27	99.1	365
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	31	158.7	825
			C3P8 (0.8/3.8)	5455	4.2	1586	25	95.9	454
			STG38 (0.8/3.8)	5614	4.4	2007	27	132.7	1189
CSISZ	Csizmadia	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	17	35.4	176
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	29	169.9	797
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	29	182.0	945
			TEMPLAR2 (0.8/6)	2080	5.0	1508	29	183.8	741
			TEMPLAR3 (0.8/8)	1438	4.3	571	29	172.9	511
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	26	133.9	555
			ORION3 (0.95/5)	2665	4.9	2069	23	111.8	291
			ORION4 (0.95/5)	2662	4.3	1043	26	112.9	327
HINWO	Hinz	Brannenburg/DE	ACR (2.0/35)*	557	7.4	4954	7	27.3	356
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	26	125.0	336
		Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	30	152.1	481
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	29	164.1	395
		Sopron/HU	HUSOP (0.8/6)	2031	3.8	460	22	92.3	588
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	28	124.1	314
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	15	70.3	430
		Kostanjevec/SI	METKA (0.8/8)*	1372	4.0	361	6	30.7	38
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	23	97.4	199
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	14	64.1	455
			STEFKA (0.8/3.8)	5471	2.8	379	14	64.7	366
KOSDE	Koschny	Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	17	51.0	240
LERAR	Leroy	Gretz/FR	SAPHIRA (1.2/6)	3260	3.4	301	11	16.0	55
MACMA	Maciejewski	Chelm/PL	PAV35 (1.2/4)	4383	2.5	253	22	89.3	170
			PAV36 (1.2/4)*	5732	2.2	227	26	114.4	484
			PAV43 (0.95/3.75)*	2544	2.7	176	22	100.0	197
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	17	85.2	447
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1776	6.1	3817	13	55.8	671
			MINCAM1 (0.8/8)	1477	4.9	1084	25	95.8	386
		Ketzür/DE	REMO1 (0.8/8)	1467	6.0	3139	27	89.8	759
			REMO2 (0.8/8)	1475	5.6	1965	24	90.0	371
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	26	135.7	319
OCAFR	Ocana Gonzales	Madrid/ES	FOGCAM (1.4/7)	1890	3.9	109	25	128.3	214
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	24	49.7	247
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	27	79.1	417
PERZS	Perko	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	27	134.8	847
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	28	132.1	438
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	19	36.3	141
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	27	185.7	471
			RO2 (0.75/6)	2381	3.8	459	28	189.2	502
			SOFIA (0.8/12)	738	5.3	907	21	117.0	243
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	30	137.7	460
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	22	76.2	193
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	588	-	-	17	39.0	133
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	29	163.7	1191
			NOA38 (0.8/3.8)	5609	4.2	1911	28	156.6	913
			SCO38 (0.8/3.8)	5598	4.8	3306	30	162.8	1211
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2362	4.6	1152	15	57.3	114
			MINCAM3 (0.8/12)	728	5.7	975	24	65.9	133
			MINCAM4 (1.0/2.6)	9791	2.7	552	17	61.2	79
			MINCAM5 (0.8/6)	2349	5.0	1896	22	68.5	250
TEPIS	Tepliczky	Budapest/HU	HUMOB (0.8/6)	2388	4.8	1607	22	101.1	491
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	23	82.8	281
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	1	2.3	15
ZELZO	Zelko	Budapest/HU	HUVCSE02 (0.95/5)	1606	3.8	390	6	19.4	57
Sum							31	6778,2	27998

* active field of view smaller than video frame

2. Observing Times (h)

July	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	-	-	-	3.7	-	-	3.1	4.1	-	4.8	-	2.4	-	1.1	2.1
BERER	5.5	4.1	3.5	5.7	-	-	5.8	4.9	4.0	3.6	-	-	-	-	6.1
	5.7	2.3	1.3	3.7	-	-	0.9	5.0	4.4	1.4	-	-	-	-	4.9
	4.1	2.3	1.2	0.3	-	-	1.1	3.9	2.2	2.5	-	-	-	-	4.4
BIRSZ	5.4	5.3	4.1	5.6	3.0	-	4.9	5.7	2.3	0.7	-	-	4.8	-	5.5
BOMMA	4.3	4.4	4.1	6.1	6.2	6.9	7.0	7.0	7.0	7.0	6.7	7.1	7.1	3.3	6.8
BREMA	4.5	4.6	1.3	2.0	-	2.2	2.4	-	-	-	1.5	-	0.9	-	3.4
	4.5	4.6	0.2	-	-	2.2	2.8	-	0.8	-	-	-	0.8	1.1	3.3
BRIBE	4.8	4.8	-	3.9	2.2	3.1	4.0	0.7	2.2	1.6	2.3	1.0	1.1	-	4.9
	4.5	4.7	0.2	3.6	3.5	3.1	4.2	-	4.4	-	1.8	-	-	-	2.3
CASFL	2.9	1.1	6.0	2.8	5.8	2.4	5.3	7.0	4.8	5.9	7.1	2.5	2.8	1.0	-
	4.7	-	2.8	1.7	1.5	-	5.0	-	5.6	4.1	6.6	1.5	1.8	1.2	0.7
CRIST	2.8	2.3	6.3	6.3	1.2	2.2	6.3	6.4	6.4	3.3	6.5	5.6	2.4	6.6	6.6
	1.9	0.2	4.3	6.3	-	-	2.2	1.8	-	0.8	2.3	0.3	-	2.7	6.6
	2.3	3.1	4.5	5.5	2.0	2.8	5.8	6.4	6.4	2.5	6.5	5.0	-	6.0	6.4
CSISZ	1.1	-	-	0.6	3.4	1.3	2.4	2.5	-	0.7	-	-	3.4	-	-
ELTMA	4.1	2.4	6.3	6.4	5.6	6.4	6.4	6.5	6.5	3.6	6.5	4.6	6.3	6.7	3.8
GONRU	6.9	7.0	-	6.8	7.0	3.5	7.0	4.4	6.0	4.2	7.2	7.2	-	7.4	7.3
	6.9	7.1	-	6.7	7.0	3.3	6.9	4.4	5.9	4.2	7.2	7.2	-	7.4	7.4
	7.1	7.0	-	6.6	7.1	2.9	6.6	3.4	5.5	-	7.3	7.3	4.3	7.4	7.4
GOVMI	5.7	5.9	3.7	5.9	5.6	6.0	6.0	6.0	3.5	3.4	-	-	6.1	0.6	2.6
	4.8	4.8	3.9	4.9	5.0	5.4	6.0	5.8	2.4	-	-	-	5.4	-	2.2
	5.8	5.9	3.9	5.9	5.1	5.4	6.0	6.0	5.1	2.6	-	0.3	2.2	0.6	2.2
HINWO	-	-	-	-	-	-	-	-	2.4	-	-	-	-	-	-
IGAAN	6.0	5.4	2.9	4.4	4.0	2.3	6.2	6.1	4.0	3.8	0.6	4.1	6.1	6.0	5.3
	5.7	5.7	5.6	5.7	5.7	5.0	5.7	4.3	5.9	6.0	2.3	5.3	5.1	2.1	6.2
	6.1	6.1	6.1	6.1	6.2	1.4	6.2	6.3	6.3	6.3	1.6	6.4	5.8	6.1	6.5
	0.7	5.2	-	5.6	5.6	5.5	4.4	2.1	2.8	2.6	-	-	0.3	-	4.1
JONKA	5.1	5.8	5.1	6.0	2.7	1.0	3.2	6.1	4.3	1.7	0.2	0.7	5.4	-	6.3
KACJA	6.1	5.6	5.6	4.2	6.4	5.8	6.3	6.3	2.7	1.4	-	-	-	-	-
	-	-	-	-	-	-	4.9	-	-	-	-	-	-	-	-
	6.0	5.7	4.0	4.1	3.7	4.7	6.2	6.5	4.5	4.1	-	-	3.0	-	-
	6.1	3.6	3.1	1.4	6.5	6.0	6.4	6.5	2.9	-	-	-	-	-	-
	6.2	3.7	3.9	2.2	5.7	6.2	6.5	6.5	2.7	-	-	-	-	-	-
KOSDE	3.6	-	-	-	-	3.7	1.5	1.4	-	-	1.5	-	0.5	-	-
LERAR	-	0.5	0.3	0.3	-	-	-	-	-	-	0.3	-	-	0.3	-
MACMA	-	0.9	4.3	-	1.0	5.0	5.5	1.8	5.3	5.6	-	3.8	-	-	-
	-	4.9	5.4	-	5.3	5.3	5.6	1.9	5.4	5.7	2.1	3.1	-	0.8	-
	-	-	5.2	1.2	5.1	5.0	5.3	-	5.0	5.5	1.3	2.7	-	-	-
MARGR	-	-	-	7.6	6.8	1.8	-	6.9	1.7	4.0	7.5	4.7	-	-	-
MOLSI	-	-	-	-	-	-	4.0	-	3.1	-	2.6	2.4	-	3.1	-
	-	-	5.5	1.2	0.6	0.5	5.8	-	4.3	0.7	4.0	2.6	0.9	2.1	3.4
	4.3	-	0.2	4.3	-	0.3	4.4	3.9	2.0	3.3	1.9	4.5	1.9	4.4	1.9
	4.1	-	-	4.4	-	-	4.7	4.3	2.0	3.5	2.0	4.5	1.4	4.2	-
MORJO	4.0	6.0	6.0	6.0	4.8	1.7	6.0	6.1	6.1	5.1	-	2.3	5.6	3.5	6.4
OCAFR	0.9	3.5	1.6	3.2	3.8	3.3	4.7	5.9	2.7	-	-	-	2.3	0.3	2.8
OCHPA	0.2	-	-	-	-	0.3	3.0	2.2	1.2	2.5	5.0	1.7	-	0.3	0.5
OTTMI	0.9	1.5	2.1	2.0	-	0.8	1.8	2.8	0.4	0.6	2.8	6.2	-	1.6	2.5
PERZS	5.9	5.9	0.2	1.2	4.1	4.7	6.3	6.2	-	3.7	-	1.1	6.5	1.9	4.6
PUCRC	5.2	5.2	5.2	2.7	4.7	4.1	1.9	6.3	6.3	3.2	-	-	6.3	1.3	-
ROTEC	2.0	-	-	4.6	-	-	4.7	4.4	1.0	4.0	-	-	0.7	-	2.3
SARAN	7.1	7.2	-	5.2	6.7	-	7.3	5.5	6.1	6.3	7.4	5.2	-	7.2	7.1
	7.2	7.3	-	5.1	2.7	-	7.1	4.4	5.9	6.0	7.3	5.2	-	7.5	7.2
	3.1	-	-	1.6	-	-	5.9	3.0	4.3	3.7	5.0	-	-	7.1	6.9
SCALE	2.3	0.3	6.1	4.2	4.8	6.0	6.2	5.9	6.3	2.1	6.3	3.9	6.4	5.7	2.6
SCHHA	4.9	5.0	0.8	1.4	1.9	4.6	2.4	-	2.0	4.1	4.3	-	-	-	3.8
SLAST	0.5	0.5	0.3	-	-	-	-	4.1	1.4	1.1	-	-	1.2	-	-
STOEN	6.0	1.0	6.6	5.7	6.0	5.0	6.6	6.6	5.9	3.3	5.7	3.0	6.3	6.9	-
	6.0	0.7	6.4	6.0	6.2	5.1	6.5	6.5	5.9	4.2	5.5	3.1	6.3	6.6	-
	6.2	1.1	6.3	6.6	6.3	4.8	6.6	6.6	5.7	3.6	5.5	2.5	6.1	6.7	-
STRJO	2.4	-	-	3.8	3.9	3.5	3.4	-	-	-	-	-	-	-	2.9
	2.4	1.6	3.8	1.3	3.2	3.9	4.0	0.2	0.2	-	1.4	2.4	-	-	3.1
	-	1.6	3.9	3.1	3.2	3.6	3.6	-	-	-	-	-	-	-	2.9
	2.4	1.6	3.3	3.8	2.9	3.8	4.0	-	0.6	-	-	2.5	0.3	-	2.8
TEPIS	5.5	5.6	3.1	5.6	-	2.2	5.1	5.6	1.0	0.8	-	-	2.2	-	5.7
TRIMI	4.3	3.5	-	3.2	4.4	3.7	4.7	4.5	1.9	2.5	1.6	-	2.0	-	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5
Sum	239.7	196.1	170.5	236.0	206.1	179.7	302.7	249.6	217.6	167.9	155.2	135.9	132.0	138.8	198.2

July	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	-	-	3.5	2.1	2.9	5.1	5.6	5.7	-	-	-	-	-	-	-
BERER	5.2	4.6	5.8	-	-	-	6.0	5.7	-	4.8	1.0	6.5	3.1	-	5.4	6.7
	4.2	3.0	4.7	-	-	-	5.0	5.3	-	4.1	0.7	6.7	3.7	-	6.3	6.6
	3.2	4.0	3.7	-	-	-	4.9	4.7	-	1.5	0.3	5.4	3.6	-	5.6	6.2
BIRSZ	4.9	5.3	6.1	0.3	-	-	3.0	5.8	-	2.6	6.5	6.6	1.4	-	6.8	6.8
BOMMA	7.2	7.2	7.3	7.2	6.2	2.9	0.2	3.1	5.4	6.5	7.6	7.6	7.7	7.7	7.1	6.6
BREMA	-	-	-	2.7	4.3	-	3.2	5.6	5.7	5.8	5.8	-	-	1.1	4.2	1.3
	-	-	-	2.8	5.2	5.5	3.5	5.6	5.5	5.7	5.8	-	-	0.7	4.2	0.9
BRIBE	-	-	-	0.6	-	4.8	5.4	5.8	5.9	5.9	4.8	1.4	0.2	2.3	1.9	1.7
	-	-	0.5	-	-	5.6	4.9	5.7	5.1	4.6	5.1	2.3	-	1.4	2.5	5.2
CASFL	7.2	6.6	4.9	4.7	-	3.1	4.0	4.4	5.6	4.0	7.6	6.2	7.7	6.6	7.8	7.8
	4.5	4.6	3.6	4.2	-	1.5	2.3	3.0	3.4	5.2	5.2	3.9	3.0	5.6	6.6	5.3
CRIST	6.7	6.7	6.7	5.6	3.1	2.1	5.2	2.4	4.0	6.0	6.8	5.4	6.3	7.2	6.0	7.3
	6.6	6.7	6.8	-	-	1.6	4.1	2.3	6.7	4.4	3.0	5.6	3.5	4.3	3.6	7.3
	6.7	6.6	6.6	6.7	3.3	2.3	5.3	2.3	2.1	7.0	7.0	5.9	5.7	-	-	-
CSISZ	3.3	0.7	2.2	0.2	-	-	-	1.5	-	-	3.5	-	-	3.0	1.9	3.7
ELTMA	6.7	6.8	6.8	5.4	6.5	-	-	4.4	4.9	4.7	7.0	7.1	7.3	5.9	7.4	6.9
GONRU	7.3	7.4	7.0	7.0	7.4	7.5	6.3	6.0	7.5	7.3	1.0	4.2	7.5	7.3	4.2	5.2
	7.4	7.3	6.9	6.7	7.5	7.5	6.3	5.5	7.6	7.7	2.5	4.3	7.6	7.3	4.6	5.5
	7.4	7.5	7.5	5.7	7.6	7.6	5.2	4.5	7.6	5.5	1.8	3.9	7.7	7.1	2.0	4.4
GOVMI	6.3	6.2	6.4	5.4	4.0	-	-	6.5	-	3.5	4.8	6.8	6.5	5.0	4.5	7.0
	6.3	6.0	6.4	4.3	3.1	-	-	6.1	-	-	3.5	6.0	4.7	5.4	2.4	7.0
	6.3	5.3	3.5	4.9	4.3	0.2	-	6.3	-	3.1	4.5	6.8	6.4	4.3	-	-
HINWO	-	-	-	-	-	-	-	5.8	1.7	-	5.5	5.6	-	-	0.7	5.6
IGAAN	3.9	3.8	6.6	6.6	6.6	-	2.2	6.6	-	2.7	6.0	6.9	5.9	-	-	-
	6.3	6.4	6.3	1.3	6.3	0.4	4.5	6.5	2.7	-	6.4	6.7	6.7	1.6	6.8	6.9
	6.5	5.0	6.6	6.5	6.7	-	2.5	5.8	-	3.6	6.0	7.0	7.0	3.4	7.1	6.9
	5.3	1.9	5.3	1.2	-	-	6.3	6.3	-	4.6	4.7	6.6	-	4.4	-	6.8
JONKA	6.3	6.3	6.5	-	3.8	0.9	4.0	6.5	-	4.9	5.7	6.9	4.0	0.6	7.0	7.1
KACJA	-	-	-	-	-	-	-	-	-	-	2.2	6.8	2.7	1.0	-	7.2
	-	-	6.2	-	-	-	-	-	-	-	4.6	6.6	4.8	-	-	3.6
	3.3	3.2	6.7	6.8	1.7	0.2	-	2.6	-	4.8	4.4	-	5.9	2.2	-	3.1
	-	-	-	-	-	-	-	-	-	-	2.6	7.1	2.8	1.8	-	7.3
	-	-	-	-	-	-	-	-	-	-	2.5	7.0	2.8	1.4	-	7.4
KOSDE	-	-	-	-	2.1	5.0	4.7	5.4	5.1	5.4	4.8	-	2.2	1.3	1.5	1.3
LERAR	-	-	-	-	-	-	-	-	-	3.1	1.5	-	1.9	1.7	3.6	2.5
MACMA	4.3	5.1	-	2.5	0.8	-	6.2	6.2	6.4	-	4.6	5.6	6.0	2.0	2.2	4.2
	4.7	4.9	0.7	3.0	3.0	0.3	6.2	6.2	6.3	-	5.7	6.0	6.4	3.4	5.7	6.4
	2.7	4.9	-	2.6	2.6	-	6.2	6.3	6.3	-	5.2	6.4	6.4	3.0	5.0	6.1
MARGR	5.4	-	-	-	3.6	2.4	3.2	6.5	6.9	7.0	3.9	-	-	-	5.3	-
MOLSI	-	3.8	5.3	-	-	-	5.5	5.6	5.7	-	-	4.4	-	-	4.2	6.1
	-	4.3	6.2	-	-	3.5	6.4	6.5	6.5	4.4	4.0	6.1	0.7	3.9	4.8	6.9
	-	0.4	1.4	5.2	4.0	2.5	5.5	5.5	5.5	5.5	5.6	2.4	-	2.7	5.8	0.5
	-	0.4	1.4	5.3	4.2	3.9	5.5	5.6	5.6	5.6	5.5	2.1	-	3.1	5.9	0.8
MORJO	6.5	6.4	6.4	-	-	-	2.5	5.6	-	4.0	5.5	6.8	6.4	2.4	7.2	6.4
OCAFR	5.1	7.3	7.4	7.5	7.3	7.2	5.6	7.4	7.5	-	-	-	7.7	7.6	7.8	7.9
OCHPA	4.8	3.0	2.2	0.8	-	0.2	2.8	2.8	2.8	2.6	2.2	2.5	-	3.6	0.2	2.3
OTTMI	6.7	6.1	1.0	-	1.9	5.8	3.5	0.6	4.0	1.0	3.3	4.9	-	2.0	5.0	7.3
PERZS	6.6	6.6	6.7	5.1	4.9	-	0.4	5.9	-	6.9	6.6	7.0	6.2	5.5	6.8	7.3
PUCRC	4.7	6.7	6.7	6.7	4.0	2.1	0.4	4.7	0.9	5.7	6.7	6.7	5.2	5.3	6.7	6.5
ROTEC	-	1.1	-	0.2	0.8	0.5	-	0.7	2.4	1.5	2.4	-	0.2	0.2	2.6	-
SARAN	6.5	7.6	7.0	-	7.7	7.6	7.5	7.8	7.8	7.8	7.2	2.5	6.8	8.0	7.8	7.8
	7.4	7.6	7.5	7.6	7.7	7.7	7.5	7.8	7.7	7.7	6.9	2.7	6.9	8.0	8.0	7.6
	7.5	5.9	6.9	7.6	7.6	7.1	-	-	-	7.8	5.3	2.7	5.7	-	6.1	6.2
SCALE	4.2	5.4	5.6	2.9	4.3	-	0.2	2.1	3.0	4.5	6.9	6.1	7.0	4.6	6.8	5.0
SCHHA	-	2.0	-	-	-	5.8	5.3	6.0	6.0	5.9	1.3	-	1.7	1.0	2.3	3.7
SLAST	3.2	0.8	3.0	4.0	-	-	-	-	0.5	3.9	5.1	6.4	-	2.2	-	0.8
STOEN	6.9	5.9	7.0	6.2	5.4	0.2	-	6.2	4.7	5.1	7.3	7.3	7.4	6.2	7.6	5.7
	6.7	5.7	6.8	6.9	4.5	0.3	-	5.9	3.9	-	7.3	7.3	7.4	6.7	7.5	4.7
	6.9	5.7	6.9	6.6	5.2	0.5	0.2	5.1	3.9	5.5	7.4	7.3	7.3	6.6	7.6	5.5
STRJO	-	-	-	-	4.4	4.7	3.6	4.9	5.0	4.4	5.1	-	-	3.1	2.2	-
	-	-	-	1.0	4.8	2.6	2.7	4.9	5.1	4.3	5.2	1.3	0.3	3.3	2.9	-
	-	-	-	1.9	4.4	4.4	3.0	5.0	5.1	4.2	5.2	-	-	3.7	2.4	-
	-	-	-	1.8	4.8	3.2	3.4	4.9	5.1	5.0	5.2	1.5	-	3.5	2.1	-
TEPIS	5.3	5.2	6.1	-	-	1.7	2.4	6.0	-	5.8	6.5	6.6	-	-	6.3	6.8
TRIMI	3.8	2.2	5.6	5.6	-	0.1	-	0.5	-	2.5	4.1	7.0	6.8	1.6	-	6.7
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
ZELZO	5.3	3.7	-	-	-	-	1.6	0.7	-	-	-	4.6	-	-	-	-
Sum	254.2	247.8	255.4	191.3	189.7	135.9	201.4	297.5	216.8	247.6	299.9	294.0	242.8	204.8	266.5	306.6

3. Results (Meteors)

July	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	-	-	-	2	-	-	2	4	-	1	-	1	-	1	3
BERER	15	8	7	19	-	-	10	26	9	10	-	-	-	-	34
	12	5	2	9	-	-	2	13	9	4	-	-	-	-	20
	10	5	2	1	-	-	5	10	3	5	-	-	-	-	10
BIRSZ	9	5	7	13	12	-	12	19	5	1	-	-	14	-	17
BOMMA	8	18	14	24	20	30	32	31	33	31	25	31	39	15	29
BREMA	13	12	5	9	-	9	9	-	-	-	3	-	2	-	7
	10	7	2	-	-	4	7	-	3	-	-	-	4	4	3
BRIBE	13	14	-	6	3	9	10	2	1	2	6	1	1	-	18
	9	9	1	5	4	13	15	-	11	-	4	-	-	-	10
CASFL	6	5	9	9	15	4	13	21	13	20	18	8	12	4	-
	10	-	8	6	6	-	19	-	17	12	26	4	7	3	2
CRIST	14	5	7	12	4	3	26	19	27	6	41	20	4	35	35
	10	1	12	16	-	-	7	8	-	6	10	2	-	14	19
	23	18	26	32	11	14	53	53	47	15	62	32	-	62	40
CSISZ	7	-	-	1	13	6	13	16	-	5	-	-	13	-	-
ELTMA	11	8	33	19	17	28	19	29	25	14	31	11	40	16	6
GONRU	39	27	-	22	34	4	35	19	27	8	35	47	-	39	50
	20	16	-	21	24	7	24	8	27	5	39	25	-	33	36
	14	19	-	18	18	4	11	6	16	-	20	27	23	25	34
GOVMI	7	10	3	10	20	18	31	30	5	6	-	-	35	2	8
	5	2	1	7	15	9	16	11	2	-	-	-	17	-	4
	13	11	2	8	15	8	19	11	9	2	-	1	6	2	2
HINWO	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
IGAAN	14	13	4	4	9	2	11	12	6	7	3	4	18	19	11
	14	13	9	8	10	7	9	5	16	21	5	18	19	5	31
	15	12	11	6	5	1	14	10	16	13	1	14	10	15	15
	4	19	-	21	20	22	17	9	18	11	-	-	2	-	17
JONKA	12	10	7	8	4	2	9	8	7	5	2	3	10	-	19
KACJA	26	9	13	10	33	19	43	35	4	4	-	-	-	-	-
	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
	5	5	2	5	5	5	15	20	6	1	-	-	11	-	-
	27	4	10	1	21	19	27	43	10	-	-	-	-	-	-
	12	9	16	2	20	26	34	21	7	-	-	-	-	-	-
KOSDE	5	-	-	-	-	10	3	5	-	-	4	-	3	-	-
LERAR	-	2	1	1	-	-	-	-	-	-	1	-	-	1	-
MACMA	-	2	2	-	1	2	5	1	14	11	-	6	-	-	-
	-	6	5	-	14	10	16	2	18	26	3	14	-	1	-
	-	-	7	1	6	4	6	-	12	12	1	4	-	-	-
MARGR	-	-	-	13	18	15	-	26	6	16	32	15	-	-	-
MOLSI	-	-	-	-	-	-	62	-	19	-	14	12	-	27	-
	-	-	3	2	1	5	16	-	13	3	8	2	1	2	6
	22	-	1	31	-	2	45	37	16	26	17	37	5	28	3
	8	-	-	11	-	-	14	13	9	20	12	22	2	16	-
MORJO	10	9	10	6	6	1	9	14	11	8	-	3	12	7	17
OCAFR	6	8	5	9	8	12	11	12	12	-	-	-	5	1	7
OCHPA	2	-	-	-	-	2	7	9	7	11	7	6	-	1	2
OTTMI	5	11	13	16	-	4	13	19	3	4	19	10	-	11	12
PERZS	25	19	1	4	7	14	18	32	-	11	-	3	40	4	18
PUCRC	4	5	6	2	7	7	12	21	14	7	-	-	24	6	-
ROTEC	6	-	-	6	-	-	13	18	4	10	-	-	2	-	5
SARAN	18	15	-	4	16	-	10	8	17	12	18	15	-	24	23
	11	16	-	10	8	-	13	10	8	13	26	15	-	20	24
	9	-	-	1	-	-	14	5	9	8	16	-	-	16	16
SCALE	7	2	18	16	17	16	14	15	12	14	20	6	29	12	4
SCHHA	3	9	1	1	2	7	6	-	2	8	7	-	-	-	3
SLAST	3	3	2	-	-	-	-	7	2	5	-	-	7	-	-
STOEN	20	6	19	18	23	23	28	45	37	40	48	18	51	32	-
	17	4	11	22	19	17	24	41	26	21	41	8	41	26	-
	15	8	31	22	40	35	40	41	27	33	40	6	45	32	-
STRJO	6	-	-	3	3	6	9	-	-	-	-	-	-	-	4
	5	3	7	4	2	9	9	1	1	-	1	4	-	-	6
	-	3	3	5	1	3	3	-	-	-	-	-	-	-	5
	5	5	4	4	6	11	16	-	2	-	-	2	2	-	9
TEPIS	12	14	4	17	-	7	19	26	4	3	-	-	10	-	24
TRIMI	7	7	-	4	11	9	15	21	2	5	6	-	11	-	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Sum	638	456	367	567	574	504	1042	928	689	542	672	457	577	561	678

July	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	-	-	1	1	2	3	7	3	-	-	-	-	-	-	-
BERER	18	48	26	-	-	-	27	23	-	15	3	66	7	-	47	75
	17	12	12	-	-	-	24	22	-	12	4	42	8	-	25	39
	15	12	9	-	-	-	22	15	-	5	1	41	9	-	19	26
BIRSZ	20	13	14	1	-	-	11	10	-	4	23	38	1	-	34	32
BOMMA	35	26	34	28	21	5	1	11	32	21	47	59	61	66	57	53
BREMA	-	-	-	5	19	-	18	21	33	20	20	-	-	6	15	5
	-	-	-	13	14	18	5	22	26	12	13	-	-	1	21	4
BRIBE	-	-	-	1	-	15	17	29	29	15	15	1	1	10	2	13
	-	-	2	-	-	25	22	30	35	13	14	8	-	6	10	25
CASFL	28	18	14	15	-	9	11	10	23	15	27	36	30	37	38	33
	10	17	16	13	-	5	9	8	12	23	17	20	9	39	25	22
CRIST	43	44	37	27	8	8	36	11	24	36	56	25	41	63	57	51
	22	33	29	-	-	6	23	10	27	13	13	27	22	49	30	45
	69	83	69	50	15	16	59	19	18	72	89	64	78	-	-	-
CSISZ	12	4	8	1	-	-	-	10	-	-	18	-	-	14	10	25
ELTMA	35	32	29	15	17	-	-	7	25	17	51	39	64	37	66	56
GONRU	40	35	22	36	46	17	31	29	38	40	3	20	67	89	16	30
	41	26	30	22	27	33	21	3	34	26	4	12	73	63	15	26
	27	18	23	6	31	21	6	10	25	10	1	7	46	32	4	9
GOVMI	34	28	30	14	11	-	-	20	-	7	30	56	39	28	16	57
	19	14	12	14	2	-	-	10	-	-	22	29	21	14	6	39
	29	12	16	9	4	1	-	10	-	7	26	37	38	29	-	-
HINWO	-	-	-	-	-	-	67	73	38	-	64	57	-	-	8	46
IGAAN	14	15	14	16	25	-	6	11	-	3	23	48	24	-	-	-
	20	21	15	1	20	2	16	29	6	-	23	37	28	1	39	33
	15	19	14	10	9	-	6	5	-	8	16	35	28	12	33	27
	31	13	27	6	-	-	45	34	-	38	36	54	-	36	-	108
JONKA	18	15	11	-	7	1	16	14	-	8	13	33	12	2	25	33
KACJA	-	-	-	-	-	-	-	-	-	-	15	73	42	7	-	97
	-	-	4	-	-	-	-	-	-	-	8	8	6	-	-	9
	14	6	15	13	2	1	-	3	-	6	13	-	23	18	-	5
	-	-	-	-	-	-	-	-	-	-	26	100	61	9	-	97
	-	-	-	-	-	-	-	-	-	-	21	76	44	7	-	71
KOSDE	-	-	-	-	6	24	21	41	28	30	28	-	8	9	7	8
LERAR	-	-	-	-	-	-	-	-	-	4	5	-	11	3	8	18
MACMA	4	10	-	3	1	-	13	16	17	-	11	18	14	2	2	15
	12	17	2	14	5	1	35	37	32	-	30	47	40	18	31	48
	3	11	-	4	3	-	12	15	18	-	8	22	21	8	10	9
MARGR	39	-	-	-	22	24	32	33	33	52	48	-	-	-	23	-
MOLSI	-	48	65	-	-	-	99	84	107	-	-	29	-	-	54	51
	-	17	27	-	-	5	30	36	27	9	24	26	6	24	44	49
	-	1	3	47	32	16	59	69	77	53	49	16	-	12	51	4
	-	1	4	28	13	8	38	38	29	18	24	7	-	7	25	4
MORJO	6	22	13	-	-	-	9	10	-	9	13	36	19	9	27	23
OCAFR	4	6	8	6	3	4	12	3	5	-	-	-	17	18	15	17
OCHPA	11	19	14	5	-	1	12	13	18	18	19	15	-	34	1	13
OTTMI	24	10	7	-	14	21	13	2	26	1	29	37	-	16	17	60
PERZS	54	53	46	21	15	-	1	14	-	45	56	74	53	78	53	88
PUCRC	20	21	14	17	11	5	3	9	2	22	32	37	55	16	25	34
ROTEC	-	2	-	1	5	3	-	5	15	10	16	-	1	2	17	-
SARAN	16	11	21	-	20	17	16	13	18	26	20	5	26	27	32	23
	20	12	14	17	19	23	10	20	22	18	15	8	34	43	26	27
	13	8	9	8	9	12	-	-	-	9	7	9	29	-	18	18
SCALE	20	19	19	9	6	-	1	4	13	18	21	20	27	29	27	25
SCHHA	-	1	-	-	-	20	17	19	22	20	2	-	4	2	5	32
SLAST	12	4	9	8	-	-	-	-	3	7	20	23	-	13	-	5
STOEN	69	53	36	37	32	1	-	20	36	41	71	60	96	72	105	54
	47	50	31	32	17	2	-	15	24	-	45	57	68	86	83	38
	66	48	45	47	34	3	1	14	34	44	72	56	102	80	94	56
STRJO	-	-	-	-	13	9	1	13	16	6	12	-	-	10	3	-
	-	-	-	3	15	4	5	17	10	6	6	2	1	7	5	-
	-	-	-	1	2	5	1	10	10	3	13	-	-	9	2	-
	-	-	-	4	24	8	10	31	27	21	27	8	-	21	3	-
TEPIS	22	33	25	-	-	2	16	25	-	18	33	42	-	-	64	71
TRIMI	19	6	17	13	-	1	-	3	-	9	18	27	39	9	-	22
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
ZELZO	12	13	-	-	-	-	1	1	-	-	-	20	-	-	-	-
Sum	1119	1060	961	642	600	404	970	1146	1097	963	1529	1849	1554	1339	1495	2018