Results of the IMO Video Meteor Network – October 2013

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The weather in October was mixed: Observers in Northern and Eastern Europe enjoyed very good observing conditions, but observers in Italy and Spain were less fortunate. 49 out of the overall 75 active cameras achieved twenty and more observing nights. This large number cannot disguise that there were many partly clouded nights, and in particular in southern Europe there was hardly any night with fully clear skies. The effective observing time summed up to over 9,300 hours, almost 600 hours more than in the previous year. However, the meteor count remained at about 43,000, i.e. we recorded just a few hundred meteors more than in 2012.

In October, Maciej Maciejewski reconstructed his cameras. PAV35 and PAV36 got new Mintron cameras and Computar 0.8/3.8 lenses, which was quite conductive for their detection rate. One of the old cameras was recycled, so that Maciej is now operating a fourth camera PAV60. Also Jörg Strunk equipped some of his MINCAMs with new Mintron cameras. And since the sky has four compass points, Sirko Molau installed a fourth Mintron camera REMO4 with 0.8/8 mm Computar lens at the roof of his house in Ketzür (figure 1). The camera achieves a stellar limiting magnitude of 6.5 in clear nights.

Figure 1: *The four remotely operated cameras REMO1 to REMO4 at the roof in Ketzür.*

The most important meteor shower of October are the Orionids, which had to suffer twice this year. On the one hand, their maximum occurred just after full moon, so that the night sky was brightly illuminated. On the other hand are the years of enhanced activity, where we could enjoy zenithal hourly rates beyond 50, over. The shower has settled at the normal activity level in agreement with the predictions. Figure 2 compares the flux density profiles of the last three years. Whereas in 2011 peak flux densities of 25 were still reached, the activity profiles of 2012 and 2013 largely coincide with peak values of about 15 meteoroids per 1,000 km^2 and hour (at a zenith exponent of γ=1.5).

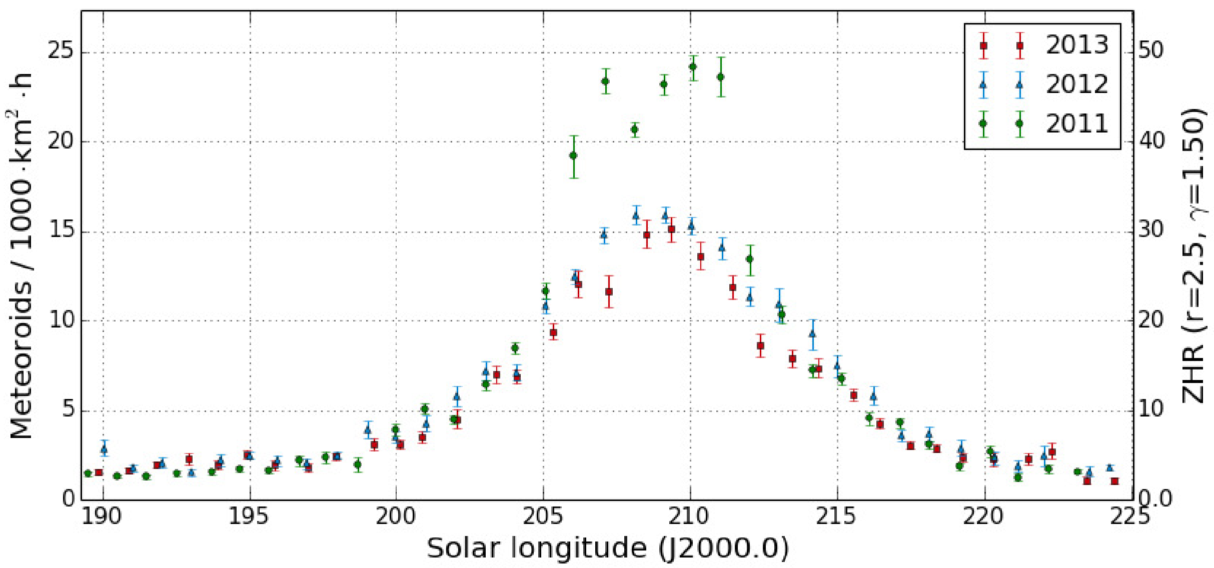

Figure 2: *Flux density profile of the Orionids in the years 2011 till 2013.*

The Orionids presented a second chance to test and optimize the new procedure for determination of the population index. The circumstances were less optimal, though, since hardly any camera enjoyed good observing conditions. Either the moon crossed the field of view and blinded the cameras, or it was partly clouded.
Still we recomputed the flux density profiles depending on the population index for each camera, and plotted them in a diagram. The result was desastrous: Even in the logarithmic presentation, the curves deviated largely from one another. In addition, they were often more or less parallel, since the limiting magnitude of all cameras was similarly poor. There was no sensible point of intersection between these curves.

For this reason we improved the algorithm. Even powerful cameras had phases with poor observing conditions, where the limiting Orionid magnitude was hardly better than 2 mag. So instead of plotting the dependency of the flux density from the population index for each camera, we accumulated the data according to the Orionid limiting magnitude. For each observing minute and each camera we determined, to which limiting magnitude bin (1 to 5 mag) the minute belongs, and then we accumulated the meteor count and the effective collection area (depending on the population index). In the end, those two figures were divided.
The resulting curves show expectedly a larger angle of intersection: At a limiting magnitude of 6.5, the population index has no impact on the flux density, and we would see a horizontal line in the diagram. The stronger the limiting magnitude deviates from 6.5, the larger is the impact of the population index and the steeper are the curves. A larger intersection angle, however, allows for a better determination of the point of intersection and thereby the population index.

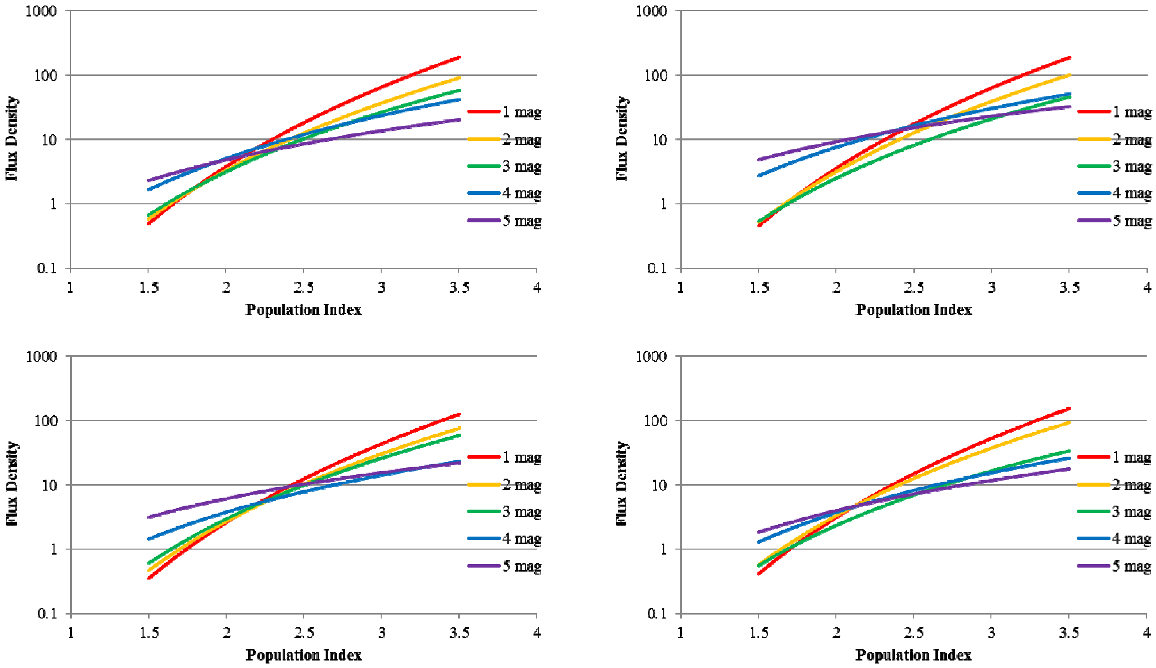

Figure 3: Dependency of the flux density from the population index, determined for different Orionid limiting magnitude bins over all active cameras. Shown are the values for the nights of October 21/22 (upper left graph) to 24/25 (lower right graph).

We can see immediately that the procedure is working in principle – the curves show a more or less well defined intersection point. At closer inspection we notice the following details:

- October 21/22 (up left): All five curves intersect in a relative compact interval between 2.0 and 2.5. The best population index is 2.2.
- October 22/23 (up right): The curves intersect at a population index of 2.5. The 2 mag curve deviates slightly towards lower values, the 3 mag curve even more.
- October 23/24 (down left): Once more there is a relatively well-defined intersection point at a population index of 2.4 This time the 5 mag curve sligthly deviates, but that curve is based on the smallest data set, anyway.
- October 24/25 (down right): The curves have a perfect intersection point at a population index of 2.1, but once more the 3 mag curve deviates noticably downwards.

If it was the curve at the low or high end of the limiting magnitude spectrum, it would be easy to explain the deviations. However, it is currently not clear why just the 3 mag curve with the biggest data set deviates most.

In search for an explanation we analysed, whether inidividual cameras would cause this effect. In addition, we repeated the analysis using only the "good intervals", when the limiting magnitude was no more than 1 mag below the best limiting magnitude of that camera in the particular night (to exclude side effects by the clouds and the moon). In the latter case, the r-values were by tendency a little larger, but the overall appearance did not change qualitatively.

As population index we determined in each graph that r-value, where the variance of the log flux densities was smallest, i.e. where the curves in figure 3 were closest to each other. The resulting profile is presented in figure 4.

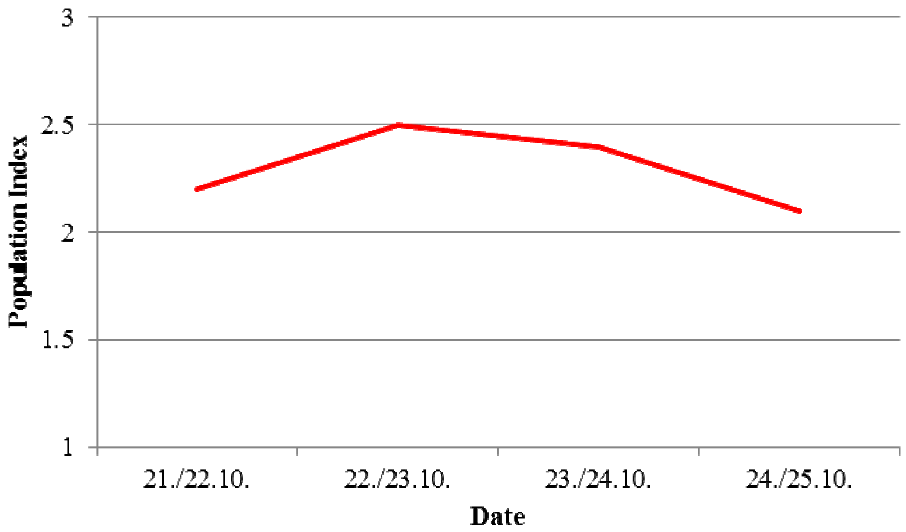

Figure 4: *Population index profile of the Orionids between October 21/22 and 24/25, 2013.*

We can conclude, that the population index can be determined nicely with the described method. However, it is still not clear how good our values agree with the r-values obtained from visual observations, since there is no analysis of visual Orionid data from 2013. At least, the range that we determined is not atypical for this shower.

We hope, that the observed discrepancies in the intersection point of the curves vanish when a better data set (fewer clouds, no moon) is available. In addition we should not forget, that we are still at an early stage of the population index analysis. In the future we will probably see further improvements in the calculation routine.

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	16	122.2	203
BANPE	Bánfalvi	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	14	76.4	278
BASLU	Bastiaens	Hove/BE	URANIA1 (0.8/3.8)*	4545	2.5	237	12	41.9	49
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	24	187.4	1219
			HULUD2 (0.95/4)	3398	3.8	671	24	182.0	454
			HULUD3 (0.95/4)	4357	3.8	876	23	172.1	259
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	20	100.9	630
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	16	94.5	349
			MBB4 (0.8/8)	1470	5.1	1208	10	43.1	113
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	26	110.9	442
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	24	116.8	502
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	22	79.8	379
			C3P8 (0.8/3.8)	5455	4.2	1586	23	91.2	385
			STG38 (0.8/3.8)	5614	4.4	2007	24	90.1	416
DONJE	Donati	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	20	119.9	691
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	13	53.9	221
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	19	166.1	857
			TEMPLAR2 (0.8/6)	2080	5.0	1508	21	170.6	640
			TEMPLAR3 (0.8/8)	1438	4.3	571	22	164.1	573
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	20	159.8	564
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	24	181.1	922
			ORION3 (0.95/5)	2665	4.9	2069	21	144.2	361
			ORION4 (0.95/5)	2662	4.3	1043	26	176.5	498
HINWO	Hinz	Schwarzenberg/DE	ACR (2.0/35)*	557	7.3	5002	21	116.2	662
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	27	154.0	514
		Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	26	190.5	572
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	27	192.6	511
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	26	163.5	153
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	25	185.8	409
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	15	76.2	516
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	4	27.8	181
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	15	41.0	77
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	14	71.9	577
			STEFKA (0.8/3.8)	5471	2.8	379	16	86.5	354
KERST	Kerr	Glenlee/AU	GOCAM1 (0.8/3.8)	5189	4.6	2550	9	35.7	128
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	26	135.1	171
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	29	233.6	3020
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	27	209.3	2653
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	21	132.9	694
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	17	119.3	493
			PAV36 (0.8/3.8)*	5668	4.0	1573	22	116.6	393
			PAV43 (0.75/4.5)*	3132	3.1	319	23	112.6	242
			PAV60 (0.75/4.5)	2250	3.1	281	17	64.3	144
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	25	219.8	664
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	13	70.8	663
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	26	176.6	1938
			MINCAM1 (0.8/8)	1477	4.9	1084	25	172.6	621
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	26	186.1	1745
			REMO2 (0.8/8)	1478	6.4	4778	25	195.6	1232
			REMO3 (0.8/8)	1420	5.6	1967	22	171.5	304
			REMO4 (0.8/8)	1478	6.5	5358	22	164.3	1328
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	29	219.9	586
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	3	17.1	62
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	25	166.0	746
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	24	148.7	1125
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	14	69.8	333
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	19	147.0	377
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	21	162.6	488
			RO2 (0.75/6)	2381	3.8	459	12	105.0	325
			SOFIA (0.8/12)	738	5.3	907	19	165.5	368
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	7	37.8	111
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	27	137.5	576
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	7	16.5	63
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	25	68.7	468
			NOA38 (0.8/3.8)	5609	4.2	1911	24	69.8	368
			SCO38 (0.8/3.8)	5598	4.8	3306	23	68.1	548
STORO	Štork	Ondrejov/CZ	OND1 (1.4/50)*	2195	5.8	4595	2	17.0	505
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	22	111.2	536
			MINCAM3 (0.8/12)	2338	5.5	3590	24	124.4	677
			MINCAM4 (1.0/2.6)	9791	2.7	552	22	93.7	287
			MINCAM5 (0.8/6)	2349	5.0	1896	24	119.6	501
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	27	171.4	578
		Budapest/HU	HUMOB (0.8/6)	2388	4.8	1607	29	181.5	859
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	18	112.8	420
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	15	101.2	533
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	10	48.3	143
Sum							31	9349.3	43547

* active field of view smaller than video frame

2. Observing Times (h)

October	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	8.5	10.2	10.6	-	-	-	-	-	-	-	-	-	11.1	4.8	-
BANPE	-	4.8	7.3	6.9	-	-	-	-	-	-	-	-	6.5	-	-
BASLU	5.7	5.5	-	-	-	4.5	-	-	-	-	0.9	-	-	-	0.9
BERER	1.9	9.6	10.6	10.6	8.6	8.5	10.6	10.8	-	-	-	-	10.0	-	2.9
	1.9	9.7	10.6	10.6	8.1	8.2	10.7	10.6	-	-	-	-	9.6	-	2.3
	1.9	9.5	10.6	10.6	7.6	8.1	10.7	9.8	-	-	-	-	9.9	-	2.8
BOMMA	1.2	10.5	1.8	-	-	-	-	-	4.5	2.4	3.2	11.0	5.8	-	-
BREMA	10.6	10.7	5.1	2.4	5.4	-	6.0	0.4	5.0	4.7	-	-	-	-	-
	10.2	10.5	1.4	1.8	2.0	-	5.5	0.4	5.2	4.1	-	-	-	-	2.0
BRIBE	10.5	10.7	5.0	-	4.3	1.5	1.6	-	1.2	5.3	4.4	1.0	1.7	1.1	0.6
	10.6	10.6	4.0	-	3.6	6.4	-	-	-	6.0	8.1	5.1	6.9	0.7	-
CRIST	9.4	-	3.3	-	4.9	1.1	2.9	10.1	1.5	4.3	1.6	4.3	-	0.5	0.7
	8.1	-	1.1	-	9.0	3.1	5.5	9.4	-	4.8	1.3	3.3	0.2	0.8	1.6
	9.5	-	5.7	0.3	5.2	3.1	1.6	7.8	2.0	4.5	1.7	5.4	0.3	0.7	1.6
DINJE	0.7	10.6	3.4	-	-	-	-	-	6.5	3.2	3.4	11.3	6.8	-	-
ELTMA	1.3	-	-	-	-	-	-	-	1.8	-	1.8	10.4	3.2	-	-
GONRU	-	-	8.6	6.9	-	10.9	10.4	11.0	10.1	11.1	10.3	-	7.9	-	6.0
	-	-	9.0	6.7	-	11.0	10.4	11.1	10.1	11.2	9.8	-	7.6	-	5.4
	0.7	-	8.8	5.7	5.4	10.5	10.5	10.9	11.0	11.1	6.5	4.1	7.2	1.1	6.0
	-	-	7.5	6.7	-	11.0	10.4	11.1	10.1	11.2	-	-	7.3	-	5.5
GOVMI	-	5.6	10.7	10.8	1.1	-	-	-	-	-	2.3	2.3	10.3	4.7	3.7
	-	4.6	10.7	10.3	1.0	-	-	0.9	-	-	2.1	-	9.1	4.0	3.2
	-	4.7	10.7	10.7	-	-	2.0	0.7	-	-	2.3	2.4	9.7	4.8	3.6
HINWO	-	-	-	8.9	-	-	5.2	-	-	-	1.6	5.2	9.9	-	1.2
IGAAN	2.8	5.1	-	10.7	6.9	5.6	0.7	1.5	-	6.1	4.8	3.6	5.7	2.2	3.3
	-	-	10.2	10.8	10.8	10.9	11.1	9.4	-	7.2	3.5	4.8	7.7	1.3	5.7
	-	8.2	9.7	9.6	9.0	9.6	2.8	4.1	-	9.2	4.3	0.8	9.3	4.8	4.5
	-	5.5	10.4	10.2	4.9	-	8.2	4.7	-	-	2.0	4.5	11.0	0.6	2.0
JONKA	-	7.9	10.7	10.9	8.5	3.0	7.7	5.4	-	-	-	4.3	11.4	1.2	4.7
KACJA	-	-	-	4.6	-	-	-	-	-	-	6.8	-	6.1	4.9	1.3
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	4.9	-	3.9	2.0	1.6
	-	-	-	-	-	-	-	-	-	-	6.8	-	6.4	5.7	0.8
	-	-	-	4.6	-	-	-	-	-	-	6.4	-	6.8	4.9	1.5
KERST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KISSZ	-	9.1	3.4	2.9	0.4	5.6	1.1	6.0	-	-	2.3	-	11.0	-	3.9
KOSDE	9.9	2.9	10.4	10.4	10.4	8.1	10.5	10.5	10.5	10.5	10.6	6.2	10.6	10.7	10.7
	5.6	3.0	10.3	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.0	9.0	8.0	7.1
	-	7.9	-	-	7.0	9.8	4.5	2.8	2.5	4.6	-	-	-	-	8.5
MACMA	-	-	-	10.9	10.9	4.9	5.5	8.0	-	7.1	6.6	-	-	-	-
	-	-	-	10.8	11.0	5.5	5.0	-	-	9.2	6.6	-	3.0	0.2	-
	-	-	-	10.8	10.5	4.4	3.8	7.3	-	6.0	5.7	-	1.9	1.3	-
	-	-	-	-	-	0.8	0.3	-	0.2	2.7	2.3	-	1.0	-	-
MARGR	8.5	0.3	-	-	-	-	-	8.6	10.7	10.6	10.5	10.6	10.6	9.7	8.6
MASMI	-	3.4	-	-	10.6	2.7	-	1.4	-	0.5	-	8.8	-	-	1.5
MOLSI	8.4	9.9	7.9	9.7	-	2.9	6.5	-	5.9	-	7.0	5.1	10.2	3.1	1.1
	8.0	10.7	8.5	10.8	-	2.3	6.4	-	4.5	-	7.3	5.3	10.6	2.0	1.0
	10.6	10.5	10.6	8.7	-	-	-	3.0	0.4	-	-	5.4	10.6	6.2	2.0
	10.6	10.7	8.5	9.4	-	-	-	2.5	-	-	-	5.6	10.6	6.3	1.8
	10.6	10.7	-	8.2	-	-	-	2.3	-	-	-	5.0	10.2	5.7	-
	-	-	7.6	9.1	-	-	-	2.3	-	-	-	5.4	11.4	6.1	1.3
MORJO	0.2	7.4	10.8	10.9	8.2	5.7	6.2	5.2	-	6.1	3.5	2.8	11.1	2.4	5.4
OCHPA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OTTMI	10.3	8.6	-	4.1	5.4	-	10.2	8.3	9.9	9.1	5.1	8.5	9.7	4.3	-
PERZS	1.6	5.3	10.8	10.9	1.2	1.2	3.9	3.9	-	-	0.2	0.9	-	-	-
PUCRC	4.6	4.5	5.9	1.8	-	-	1.3	0.9	0.5	0.4	7.5	9.5	5.2	-	-
ROTEC	10.6	10.6	10.6	7.9	-	-	-	4.7	-	-	-	4.3	10.4	-	0.6
SARAN	-	-	7.6	10.6	10.6	10.9	10.9	10.7	10.2	10.8	4.6	-	3.0	0.7	5.7
	-	-	7.5	10.4	10.6	10.8	10.0	10.9	9.9	11.0	6.0	-	5.9	3.7	8.3
	-	-	-	10.5	10.5	10.9	10.9	10.8	10.1	10.7	5.3	-	3.5	-	7.6
SCALE	-	-	-	-	-	-	-	-	0.6	-	-	6.2	2.0	-	-
SCHHA	10.6	10.7	-	-	3.3	4.6	3.7	0.3	2.3	1.2	5.9	-	1.1	2.0	1.2
SLAST	-	-	-	-	-	-	-	-	-	-	0.4	-	3.0	1.2	-
STOEN	-	0.3	-	0.5	0.2	-	0.2	0.4	2.1	2.2	3.1	9.7	2.1	0.8	1.1
	-	0.2	-	1.0	0.2	-	0.2	0.6	1.9	2.2	2.5	8.6	2.2	0.8	0.6
	-	-	-	1.1	0.2	-	0.2	0.3	1.4	2.3	2.5	9.4	3.5	1.2	1.0
STORO	-	-	-	-	-	-	9.8	7.2	-	-	-	-	-	-	-
STRJO	10.2	-	8.3	-	3.3	-	-	-	-	6.6	2.4	-	0.6	1.6	0.3
	10.2	10.1	6.2	-	3.6	-	-	-	-	4.6	1.5	3.4	7.5	1.9	0.4
	6.1	10.1	7.9	-	3.4	-	-	-	-	4.8	1.2	-	0.6	1.1	0.2
	10.2	10.1	8.2	-	3.3	-	-	-	0.3	6.4	0.8	3.3	7.9	1.8	-
TEPIS	1.0	5.1	10.6	10.7	-	-	6.5	3.3	-	2.1	1.7	5.2	11.0	1.5	5.8
	1.7	5.0	10.5	10.6	-	-	8.7	3.5	0.9	1.4	1.3	5.2	10.6	1.1	4.4
TRIMI	-	2.6	1.2	8.0	-	-	-	1.4	-	-	3.6	2.0	9.3	6.6	-
YRJIL	-	1.3	8.8	9.1	-	-	5.1	-	-	-	5.6	4.9	8.1	4.5	6.7
ZELZO	-	-	8.2	-	-	-	7.1	-	-	-	-	-	-	-	2.8
Sum	245.0	325.5	377.8	391.5	241.5	218.5	283.4	267.6	164.3	250.0	234.9	235.1	438.3	147.3	175.0

October	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	6.0	-	4.1	-	-	-	6.1	3.8	11.1	-	1.3	5.7	6.8	11.1	12.3	8.7
BANPE	-	7.0	6.9	-	0.4	7.0	2.6	3.1	8.0	6.2	8.5	-	-	-	-	1.2
BASLU	0.6	-	-	-	-	0.6	1.7	-	-	-	3.8	-	1.1	5.1	11.5	-
BERER	-	5.8	11.5	6.9	5.0	11.5	1.4	11.4	-	10.1	9.4	2.6	9.3	5.3	5.4	7.7
	-	6.1	11.5	6.9	5.2	11.4	1.4	11.3	-	10.5	8.8	2.5	7.4	4.2	4.9	7.6
	-	5.6	11.5	7.2	4.2	11.3	-	11.6	-	10.4	1.3	2.3	8.8	4.3	4.5	7.6
BOMMA	10.1	8.7	0.5	0.6	-	2.7	0.4	-	0.8	-	1.2	10.8	7.3	6.6	-	10.8
BREMA	-	5.9	3.5	0.5	-	9.2	-	-	6.9	-	11.1	-	7.1	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRIBE	-	6.0	3.9	1.0	0.8	2.8	1.2	1.6	5.1	-	4.9	2.8	11.1	8.5	12.3	-
	0.3	3.8	5.1	1.8	3.0	2.4	0.7	3.5	6.1	0.5	2.0	-	9.6	3.7	12.3	-
CRIST	11.3	7.9	1.2	-	0.2	-	-	-	4.1	0.7	1.2	0.2	-	3.9	4.5	-
	10.5	3.4	3.7	-	4.0	-	-	1.2	1.0	1.4	0.9	-	-	0.3	4.6	12.0
	11.2	9.7	1.0	-	-	-	-	0.4	3.5	0.5	0.3	-	-	7.7	6.2	0.2
DINJE	10.1	11.1	3.5	0.3	-	3.7	0.3	-	1.7	-	1.7	11.9	9.7	8.4	-	11.6
ELTMA	4.8	8.0	0.5	0.3	-	-	-	-	5.0	1.2	-	-	-	-	3.4	12.2
GONRU	10.2	3.2	-	3.4	-	-	-	-	-	-	8.6	7.2	9.0	10.7	11.8	8.8
	10.2	3.4	-	4.4	1.9	-	1.9	-	-	-	8.5	7.3	8.8	9.9	11.9	10.1
	11.2	-	1.6	4.9	-	-	-	-	-	-	-	8.8	8.9	8.8	11.9	8.5
	10.2	3.1	-	4.5	2.1	-	2.6	-	-	-	8.8	7.1	9.0	9.5	12.0	10.1
GOVMI	11.2	10.5	10.4	5.7	1.5	11.5	10.8	-	9.6	11.3	11.7	6.1	11.7	5.4	7.1	5.1
	11.3	-	7.3	2.7	-	11.5	11.0	3.0	8.3	11.1	11.6	6.3	9.6	4.6	-	-
	11.3	11.3	10.8	5.3	0.5	11.5	9.8	2.0	9.5	10.9	11.7	5.0	11.7	4.2	5.8	3.6
HINWO	4.4	-	6.0	2.8	2.8	7.7	8.3	1.9	10.5	1.1	4.0	3.5	3.9	7.2	10.9	9.2
IGAAN	-	5.4	6.6	6.0	2.4	5.3	5.2	7.3	3.4	6.5	8.7	6.6	10.1	11.9	9.6	-
	-	3.0	1.5	8.5	-	11.5	2.5	11.6	4.0	11.7	11.8	5.2	4.9	7.2	7.9	5.8
	-	7.5	9.3	9.1	7.8	8.3	3.5	9.4	6.4	9.5	9.5	5.1	4.9	8.6	7.8	-
	0.8	6.0	11.2	7.4	5.0	9.0	-	8.9	2.0	8.5	8.6	4.7	10.9	4.6	6.7	5.2
JONKA	-	6.5	11.6	8.2	4.4	11.0	-	8.5	5.0	9.8	8.5	5.2	11.4	5.9	8.9	5.2
KACJA	10.0	10.6	5.6	1.7	-	-	1.3	0.5	-	5.5	8.4	-	3.2	-	-	5.7
	-	9.2	2.5	4.7	-	-	-	-	-	-	11.4	-	-	-	-	-
	6.6	8.4	2.9	-	-	1.1	0.2	1.3	-	3.0	-	1.4	3.0	0.3	-	0.4
	10.2	10.4	5.6	1.7	-	1.0	2.3	1.0	-	5.8	11.1	-	3.1	-	-	-
	9.6	10.4	9.5	4.2	-	1.3	3.1	0.9	-	5.7	8.0	-	3.6	-	-	6.0
KERST	-	-	-	-	-	-	-	7.4	1.7	1.6	5.6	8.3	2.9	2.4	5.5	0.3
KISSZ	1.1	5.5	11.6	3.7	2.6	8.7	0.3	6.4	3.1	2.1	11.5	3.1	9.0	6.3	8.6	5.8
KOSDE	10.7	5.4	3.8	-	-	5.3	9.2	10.9	2.2	0.8	5.5	3.0	8.6	11.0	3.4	10.9
	4.5	-	-	-	3.0	4.0	4.5	5.3	2.3	-	7.4	4.3	9.0	9.6	10.3	8.6
	5.8	5.8	-	7.8	6.8	8.9	3.0	9.7	4.3	1.7	8.8	-	6.0	9.3	7.4	-
MACMA	-	-	-	-	-	4.9	9.4	7.2	4.4	-	5.8	5.3	3.5	1.8	10.6	12.5
	2.9	1.4	2.8	7.8	1.2	4.1	10.2	2.4	3.5	-	1.8	2.1	2.5	-	10.3	12.3
	1.8	1.8	4.1	7.4	0.9	9.0	10.6	5.5	2.7	-	1.8	1.7	1.5	-	8.6	3.5
	1.6	2.5	0.5	-	-	3.7	8.9	7.3	2.9	-	4.4	-	3.1	-	10.0	12.1
MARGR	1.7	-	7.8	6.1	10.4	8.9	10.7	7.5	10.2	9.5	10.1	10.3	9.1	9.9	9.3	9.6
MASMI	-	-	0.4	10.3	11.7	-	6.6	-	2.5	-	-	-	-	-	10.4	-
MOLSI	5.5	4.4	10.6	5.8	2.8	7.3	11.1	3.0	10.4	9.5	11.5	2.8	4.1	-	10.1	-
	5.6	5.1	9.9	5.1	3.0	7.9	11.8	2.4	10.6	9.5	11.5	2.5	-	-	10.3	-
	6.7	0.8	10.1	2.6	2.7	8.6	9.3	8.5	10.7	1.8	5.6	7.5	10.6	12.1	12.4	8.1
	4.2	0.4	9.6	3.4	1.8	9.5	11.8	8.7	10.5	12.0	4.9	8.2	10.7	12.2	12.4	9.3
	6.8	-	9.7	4.4	3.2	9.9	8.7	9.1	10.9	0.8	5.8	7.3	10.8	12.0	12.5	6.9
	5.8	-	10.1	2.8	2.3	10.2	8.8	9.6	11.0	1.8	6.0	8.4	10.9	12.2	12.5	8.7
MORJO	-	7.1	11.2	11.5	9.6	11.6	1.2	8.5	5.1	12.0	8.6	7.2	12.1	12.2	12.2	3.9
OCHPA	-	11.8	3.1	-	-	-	-	-	-	-	-	-	-	-	-	2.2
OTTMI	-	6.9	2.1	5.9	3.9	7.3	5.1	-	7.2	5.5	10.2	9.0	7.8	1.4	-	0.2
PERZS	8.6	8.9	6.8	4.3	3.3	-	9.1	-	7.4	11.3	11.9	4.4	11.4	7.4	11.8	2.2
PUCRC	9.8	10.8	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-
ROTEC	3.6	-	8.9	-	-	7.5	8.0	6.6	11.2	-	3.5	6.6	-	10.6	12.2	8.6
SARAN	7.6	3.9	-	2.5	-	-	-	-	-	8.1	-	10.1	7.7	4.3	11.8	10.3
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9.8	6.0	-	6.2	-	-	-	-	-	8.6	-	10.5	7.0	3.6	11.8	11.2
SCALE	4.9	9.8	-	-	-	-	-	-	-	-	-	-	-	-	2.3	12.0
SCHHA	3.8	4.9	2.9	3.3	5.8	8.5	0.8	8.5	5.4	0.3	10.1	2.5	11.8	9.6	12.4	-
SLAST	3.9	6.2	0.7	1.1	-	-	-	-	-	-	-	-	-	-	-	-
STOEN	6.3	7.1	0.6	0.7	-	0.3	-	-	4.8	3.9	7.3	0.4	0.4	0.2	2.8	11.2
	7.2	6.5	2.4	0.8	-	0.3	0.6	-	6.3	3.6	7.1	-	0.7	-	2.5	10.8
	7.8	6.3	1.3	1.9	-	-	-	-	5.1	2.2	4.2	0.8	0.9	0.5	4.0	10.0
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	-	2.4	6.6	1.2	3.1	6.5	3.9	6.5	8.3	0.4	7.2	3.9	9.5	6.4	12.0	-
	-	1.6	8.1	1.3	4.2	7.0	3.1	4.9	8.1	1.2	7.1	2.8	7.9	5.8	11.9	-
	-	1.1	3.3	0.4	2.8	4.7	1.8	3.3	7.4	-	6.3	2.3	8.4	4.5	12.0	-
	-	1.5	6.8	0.2	3.0	5.7	3.9	4.1	7.3	0.7	6.0	1.8	8.4	5.9	12.0	-
TEPIS	-	4.5	10.9	9.3	6.3	9.8	6.4	6.9	6.7	8.3	3.5	4.2	10.9	3.3	11.8	4.1
	0.3	4.7	10.3	8.7	6.2	9.7	7.4	7.2	7.3	9.4	11.8	3.7	11.6	2.7	11.7	3.9
TRIMI	11.5	11.6	-	6.7	-	7.8	8.3	-	9.0	8.2	10.4	1.7	2.9	-	-	-
YRJIL	5.2	-	-	11.7	8.3	-	-	-	-	7.4	-	-	-	2.6	11.9	-
ZELZO	-	-	5.1	-	-	-	-	6.9	3.4	-	-	3.9	5.4	-	4.4	1.1
Sum	337.1	354.6	360.0	255.6	160.1	350.9	272.8	278.5	325.9	284.1	430.5	268.9	433.0	347.7	530.3	363.6

3. Results (Meteors)

October	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	21	16	12	-	-	-	-	-	-	-	-	-	14	7	-
BANPE	-	22	23	19	-	-	-	-	-	-	-	-	15	-	-
BASLU	8	4	-	-	-	2	-	-	-	-	3	-	-	-	1
BERER	3	91	93	77	21	42	51	57	-	-	-	-	80	-	7
	1	45	41	32	3	13	35	21	-	-	-	-	21	-	2
	3	24	17	21	6	11	15	14	-	-	-	-	8	-	2
BOMMA	10	60	9	-	-	-	-	-	25	23	14	84	23	-	-
BREMA	33	31	8	8	18	-	13	2	25	9	-	-	-	-	-
	28	42	1	2	2	-	5	1	25	6	-	-	-	-	1
BRIBE	53	46	7	-	16	6	3	-	6	16	25	8	5	6	3
	56	50	7	-	18	43	-	-	-	13	45	18	17	4	-
CRIST	43	-	9	-	9	4	18	55	1	31	12	8	-	3	3
	28	-	3	-	27	16	31	33	-	36	8	6	3	6	8
	43	-	19	1	19	4	6	20	4	41	9	16	1	3	6
DONJE	3	71	10	-	-	-	-	-	23	24	12	63	33	-	-
ELTMA	6	-	-	-	-	-	-	-	2	-	4	44	17	-	-
GONRU	-	-	38	30	-	66	37	57	68	76	55	-	32	-	38
	-	-	28	15	-	40	52	50	46	50	28	-	20	-	18
	2	-	23	9	9	46	50	50	27	53	13	14	13	3	16
	-	-	22	11	-	34	46	46	43	60	-	-	24	-	13
GOVMI	-	36	50	67	3	-	-	-	-	-	8	5	38	33	10
	-	11	17	26	1	-	-	3	-	-	6	-	24	23	7
	-	15	27	26	-	-	8	3	-	-	8	1	22	25	7
HINWO	-	-	-	49	-	-	36	-	-	-	6	20	88	-	6
IGAAN	9	26	-	32	16	22	4	3	-	11	8	15	14	4	8
	-	-	43	40	48	44	36	20	-	15	17	4	30	3	8
	-	24	25	23	9	25	2	6	-	22	3	3	12	7	13
	-	8	9	7	2	-	2	1	-	-	4	1	13	2	1
JONKA	-	18	34	40	9	1	9	8	-	-	-	8	25	1	5
KACJA	-	-	-	30	-	-	-	-	-	-	29	-	25	40	8
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	13	-	4	1	3
	-	-	-	-	-	-	-	-	-	-	36	-	24	78	2
	-	-	-	16	-	-	-	-	-	-	16	-	21	22	5
KOSDE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	11	7	7	2	1	2	4	-	-	4	-	12	-	2
	91	33	127	126	148	150	142	155	141	138	165	63	150	183	161
KERST	30	14	114	120	149	173	125	155	147	139	173	144	143	121	150
KISSZ	-	50	-	-	56	101	9	8	12	26	-	-	-	-	50
MACMA	-	-	-	54	22	17	4	17	-	14	9	-	-	-	-
	-	-	-	50	22	15	7	-	-	13	13	-	4	1	-
	-	-	-	36	10	7	2	12	-	10	4	-	1	1	-
	-	-	-	-	-	6	2	-	1	2	3	-	3	-	-
MARGR	18	1	-	-	-	-	-	32	41	39	27	28	37	40	30
MASMI	-	15	-	-	99	29	-	12	-	3	-	51	-	-	24
MOLSI	107	212	100	222	-	10	118	-	62	-	79	32	132	14	10
	22	43	21	51	-	3	33	-	7	-	8	8	39	5	7
	155	122	112	31	-	-	-	10	1	-	-	71	107	36	11
	104	94	92	35	-	-	-	7	-	-	-	57	77	29	7
	22	28	-	7	-	-	-	2	-	-	-	11	16	5	-
	-	-	98	46	-	-	-	12	-	-	-	82	97	47	4
MORJO	1	22	35	44	15	10	5	12	-	11	3	6	20	2	7
OCHPA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OTTMI	43	19	-	21	39	-	44	30	46	40	21	46	47	8	-
PERZS	8	54	104	78	3	7	15	8	-	-	1	3	-	-	-
PUCRC	24	14	21	4	-	-	3	5	2	1	35	58	32	-	-
ROTEC	37	26	28	7	-	-	-	9	-	-	-	7	26	-	1
SARAN	-	-	11	33	31	28	35	30	30	26	2	-	6	4	13
	-	-	25	34	39	36	44	33	31	44	9	-	10	4	16
	-	-	-	18	21	22	29	25	26	17	5	-	6	-	15
SCALE	-	-	-	-	-	-	-	-	1	-	-	23	8	-	-
SCHHA	59	51	-	-	12	21	5	1	10	4	19	-	2	6	2
SLAST	-	-	-	-	-	-	-	-	-	-	5	-	8	8	-
STOEN	-	2	-	4	1	-	1	2	5	27	8	106	16	3	7
	-	1	-	5	1	-	1	4	2	17	7	73	19	4	2
	-	-	-	6	1	-	1	1	3	34	16	100	38	9	4
STORO	-	-	-	-	-	-	311	194	-	-	-	-	-	-	-
STRJO	40	-	30	-	16	-	-	-	-	15	4	-	7	3	1
	62	58	15	-	15	-	-	-	-	10	5	25	55	4	1
	22	26	11	-	11	-	-	-	-	3	1	-	4	1	1
	38	50	22	-	16	-	-	-	1	19	1	15	45	2	-
TEPIS	2	26	50	45	-	-	5	5	-	7	6	17	41	9	13
	5	34	45	47	-	-	11	4	1	4	4	32	38	3	17
TRIMI	-	12	7	22	-	-	-	4	-	-	7	7	27	31	-
YRJIL	-	11	50	47	-	-	21	-	-	-	24	31	61	7	44
ZELZO	-	-	32	-	-	-	13	-	-	-	-	-	-	-	6
Sum	1240	1669	1732	1781	965	1055	1447	1243	865	1149	1050	1414	2000	861	807

October	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	4	-	13	-	-	-	12	8	19	-	3	7	13	21	24	9
BANPE	-	25	23	-	4	27	13	16	35	16	37	-	-	-	-	3
BASLU	1	-	-	-	-	1	3	-	-	-	7	-	4	6	9	-
BERER	-	31	97	28	52	92	3	112	-	56	42	5	60	37	29	53
	-	10	37	22	15	34	1	29	-	19	14	2	19	11	14	13
	-	4	17	10	9	24	-	18	-	18	4	2	12	8	4	8
BOMMA	80	50	4	4	-	13	3	-	4	-	3	61	43	50	-	67
BREMA	-	8	15	3	-	111	-	-	19	-	34	-	12	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRIBE	-	12	16	6	1	3	1	6	11	-	15	4	56	37	74	-
	1	7	30	8	6	8	1	10	13	2	9	-	35	25	76	-
CRIST	86	43	4	-	1	-	-	-	13	5	6	1	-	13	11	-
	55	12	13	-	16	-	-	8	9	8	5	-	-	2	12	40
	91	67	4	-	-	-	-	3	7	3	2	-	-	19	27	1
DONJE	83	62	12	1	-	6	3	-	5	-	5	100	44	42	-	89
ELTMA	17	20	1	2	-	-	-	-	20	3	-	-	-	-	22	63
GONRU	47	7	-	8	-	-	-	-	-	-	28	26	56	61	81	46
	55	2	-	6	2	-	1	-	-	-	29	21	36	44	64	33
	63	-	11	7	-	-	-	-	-	-	-	32	27	47	40	18
	36	3	-	14	3	-	9	-	-	-	26	15	32	42	52	33
GOVMI	73	61	57	36	3	83	69	-	50	46	66	17	62	11	13	25
	35	-	8	9	-	46	40	5	25	19	25	12	18	1	-	-
	35	31	44	23	1	56	38	2	17	25	29	6	34	2	5	8
HINWO	20	-	33	9	11	39	58	14	79	3	10	16	12	16	84	53
IGAAN	-	17	10	35	10	18	51	27	18	16	28	9	44	38	21	-
	-	7	1	25	-	50	2	51	12	27	33	7	7	7	32	3
	-	22	43	42	14	28	22	24	14	30	30	8	12	26	22	-
	3	4	14	10	10	8	-	5	7	8	4	2	11	5	9	3
JONKA	-	7	45	28	17	28	-	9	18	20	12	2	34	10	19	2
KACJA	114	62	51	15	-	-	6	1	-	19	28	-	26	-	-	62
	-	41	32	28	-	-	-	-	-	-	80	-	-	-	-	-
	16	16	4	-	-	1	1	2	-	7	-	1	6	1	-	1
	112	114	55	3	-	2	4	1	-	22	101	-	23	-	-	-
	85	43	34	12	-	2	8	2	-	9	15	-	14	-	-	50
KERST	-	-	-	-	-	-	-	49	2	3	17	38	6	1	11	1
KISSZ	1	4	20	9	4	18	1	5	6	4	11	2	14	6	12	2
KOSDE	153	30	30	-	-	35	152	176	19	12	94	14	83	110	24	115
	88	-	-	-	12	28	23	38	7	-	90	29	86	104	129	122
	18	21	-	24	32	69	18	63	8	4	48	-	20	34	23	-
MACMA	-	-	-	-	-	26	43	52	8	-	21	35	13	1	81	76
	4	3	21	37	2	9	56	18	4	-	17	14	8	-	43	32
	4	1	15	26	2	10	32	14	4	-	7	9	5	-	19	11
	2	7	1	-	-	1	32	25	4	-	11	-	2	-	27	15
MARGR	2	-	25	3	28	18	38	38	31	24	47	33	31	19	19	15
MASMI	-	-	2	121	111	-	92	-	29	-	-	-	-	-	75	-
MOLSI	20	30	62	27	14	30	172	44	86	73	149	13	9	-	111	-
	12	10	49	14	21	34	76	19	43	21	43	1	-	-	31	-
	21	5	114	12	38	118	79	40	108	3	24	62	135	146	145	39
	5	3	58	2	22	69	37	20	80	4	22	45	105	109	121	28
	8	-	17	6	13	22	18	14	16	1	6	12	24	20	32	4
	14	-	62	2	6	102	63	38	117	2	36	49	146	148	131	26
MORJO	-	13	51	50	26	38	3	24	20	39	27	7	37	27	30	1
OCHPA	-	42	16	-	-	-	-	-	-	-	-	-	-	-	-	4
OTTMI	-	25	20	19	8	47	28	-	43	24	45	59	21	2	-	1
PERZS	95	71	34	50	7	-	79	-	96	83	128	17	97	29	51	7
PUCRC	58	47	29	-	-	-	-	-	-	-	-	-	-	-	-	-
ROTEC	2	-	15	-	-	25	24	10	46	-	4	16	-	36	48	10
SARAN	25	4	-	17	-	-	-	-	-	39	-	30	30	24	32	38
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	9	-	14	-	-	-	-	-	26	-	29	21	20	17	27
SCALE	17	20	-	-	-	-	-	-	-	-	-	-	-	-	5	37
SCHHA	21	3	14	9	30	35	3	62	8	1	44	2	57	35	60	-
SLAST	28	6	6	2	-	-	-	-	-	-	-	-	-	-	-	-
STOEN	48	35	5	2	-	2	-	-	39	7	19	2	3	1	28	95
	46	20	8	1	-	2	1	-	34	5	13	-	3	-	19	80
	73	47	10	13	-	-	-	-	36	10	14	4	6	3	39	80
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	-	8	28	3	14	35	10	35	28	3	29	3	85	42	97	-
	-	7	38	7	31	65	6	20	42	5	41	7	53	25	80	-
	-	8	17	2	21	29	3	13	16	-	15	4	27	19	33	-
	-	8	19	1	13	30	5	21	27	4	18	1	42	26	77	-
TEPIS	-	5	50	17	11	38	23	15	51	20	19	5	40	11	43	4
	2	10	69	47	27	59	46	41	65	41	62	10	61	11	54	9
TRIMI	35	33	-	17	-	34	35	-	26	34	54	14	21	-	-	-
YRJIL	7	-	-	59	69	-	-	-	-	36	-	-	-	14	52	-
	-	-	16	-	-	-	-	13	14	-	-	9	28	-	9	3
Sum	1942	1323	1649	1007	737	1708	1547	1260	1558	909	1905	931	2071	1605	2552	1565