Results of the IMO Video Meteor Network – July 2013

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July was the month that all the video observers had eagerly waited for: After we seriously lag behind the results of the previous year in the first half of 2013, or achieved a similar result at best, we could clearly improve the outcome in July 2013. That was particularly thanks to the overwhelming observing conditions. A whopping 60 of 70 active video cameras managed to observe in twenty and still more than half of the cameras in twenty-five and more nights. Four Hungarian cameras (HUDEB, HOHOD, HUSOR, HUFUL) could even observe in all of July without a break.
There were plenty of nights were fifty cameras were operated in parallel, and the peak was reached on July 22 with sixty-one cameras. Hence, we obtained with almost 8,000 hours of effective observing time a plus of 15% compared to July 2012, which was already a great month. Regarding the number of meteors, the increase was even more than 25% to 35,000. That was not sufficient to make up leeway, but the gap to 2012 has at least become smaller.

These great statistics are also thanks to a new camera: Detlef Koschny has now provided all data back until February 2013 from ICC9. That's the camera operated at La Palma which we could visit during the IMC excursion last year. Currently this camera is the measure of all things, thanks to the perfect observing conditions at 2,000m altitude and the high sensitivity of the image-intensifier. Together with the twin-camera ICC7 at Tenerife it rocketed Detlef on top of the observing statistics. Let's see whether this still holds in the second half of the year, when we have the long and meteor-rich nights in Europe.

Figure 1: *Visiting ICC9 on La Palma during the 2012 IMC.*

In addition, Jakub Koukal has provided a first test observation to the IMO network. The renowned visual observer from the Czech Republic is now operating both a camera with UFOcapture and "SYLVIE" with MetRec. Jakub also plans to reactivate the camera of late Milos Weber.

Let's now have a look at the meteor showers of July. The alpha Capricornids, the shower number one in the MDC list, was found in our 2012/13 analysis between 113° and 137° solar longitude. The flux density profile averaged over the last three years, which requires no more than a mouse click with the new MetRec Flux Viewer (http://meteorflux.io), is shown in figure 2. It shows indeed a profile that starts to emerge from the background at 114° and returns to it at 136° solar

longitude. The peak is reached somewhere between 125° and 128° and the activity profile is slightly asymmetric with a shallow increase followed by a steeper decrease.
But that's only half of the story: Last year we recognized that the activity profiles of 2011 and 2012 differed. Now we have an additional data set to confirm the result. We take the same flux viewer settings as before and only remove the tick to average the data, and so we obtain figure 3. We see that the 2013 profile is somewhere in between 2011 and 2012: Until a solar longitude of 125° all three profiles look similar. However, whereas activity starts to fall at this point in time in 2011, in further increased until 127° this year and even until 128° solar longitude last year. By 136°, all three profiles have reached the ground again. So you cannot always average the activity profiles as annual variations may get lost this way

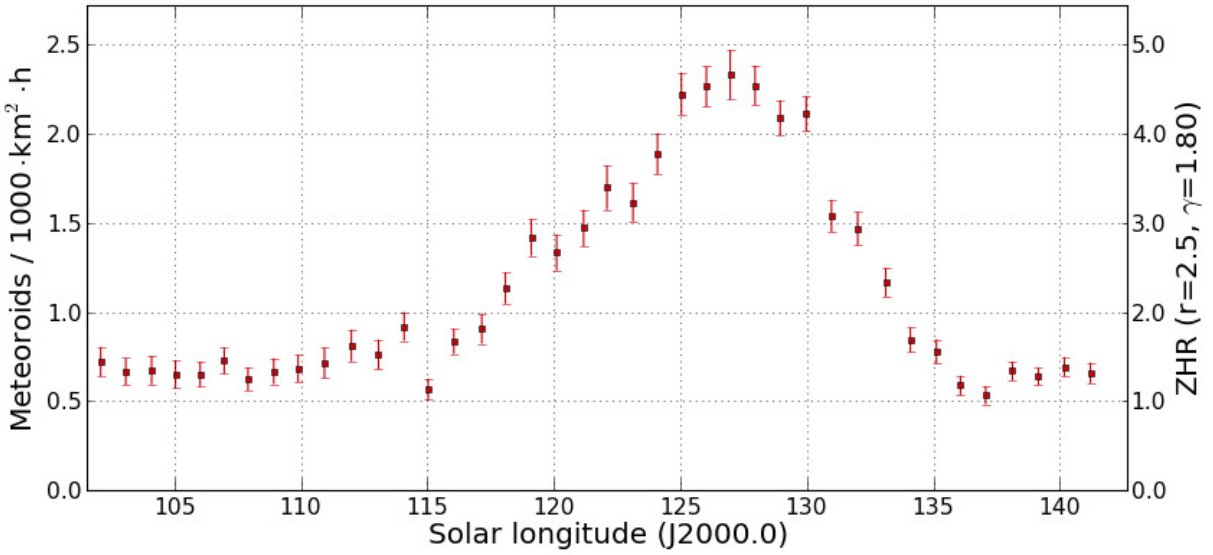

Figure 2: *Flux density profile of the alpha Capricornids, averaged over three years 2011-2013.*

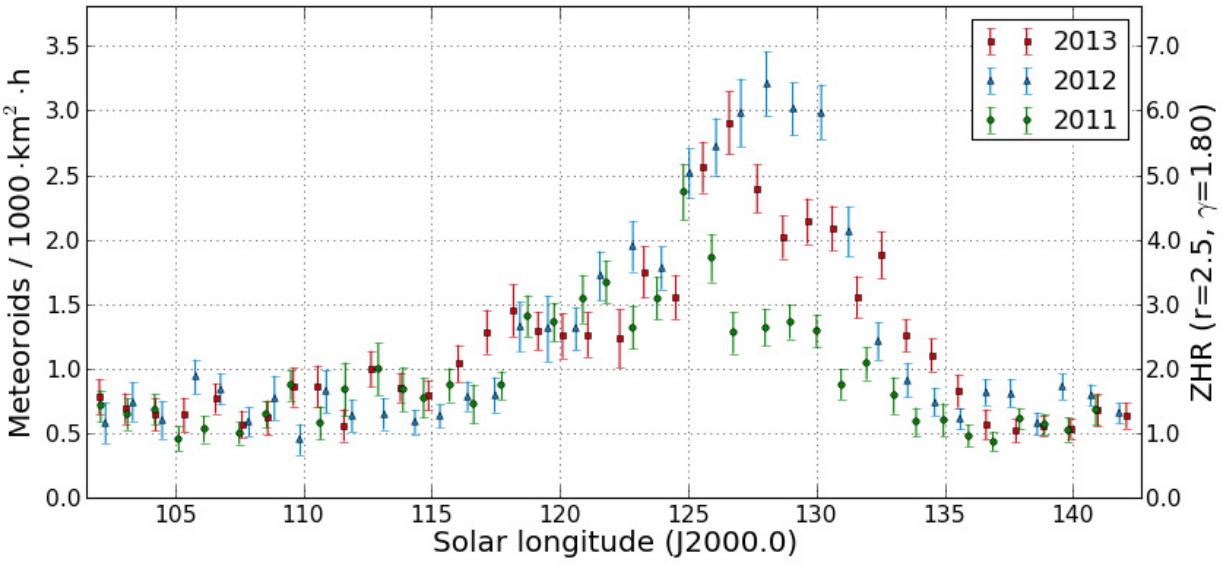

Figure 3: *Flux density profile of the alpha Capricornids, shown independently for the three years 2011-2013.*

The case of the southern delta Aquariids is similar. Also here we found last year significant deviations between 2011 and 2012. The averaged profile from 2011 to 2013 (figure 4) shows an increase starting at roughly 120° solar longitude. After the peak at 128° solar longitude the activity falls almost as fast as it was rising before, but only until 135° solar longitude. Thereafter we see some remaining activity that can be traced until 145° at least.

The profiles of the individual years show an increase in peak activity from one year to the next (figure 5). Whereas maximum flux density in 2011 was measured as 13 meteoroids per 1,000 km^2 and hour, it was already 25 in the last year, and in this year even 35 meteoroids per 1,000 km^2 and hour!

Unfortunately, there is no IMO Quick Look Analysis from visual data available for this shower, but the eta Aquariids have confirmed, that such significant deviations can typically be confirmed by both observing techniques. We shall note, that the increase in ETA peak activity by a factor of two to three was not as unexpected as we reported just two months ago. At the Meteoroids conference in Poznan we learnt, that Japanese Mikiya Sato had predicted just days before the peak enhanced activity by about a factor of two on May 6, 2013, thanks to some 3,000 years old dust trails. What an excellent confirmation of his prediction, which was published so late as the author did apparently not fully trust his own calculations.

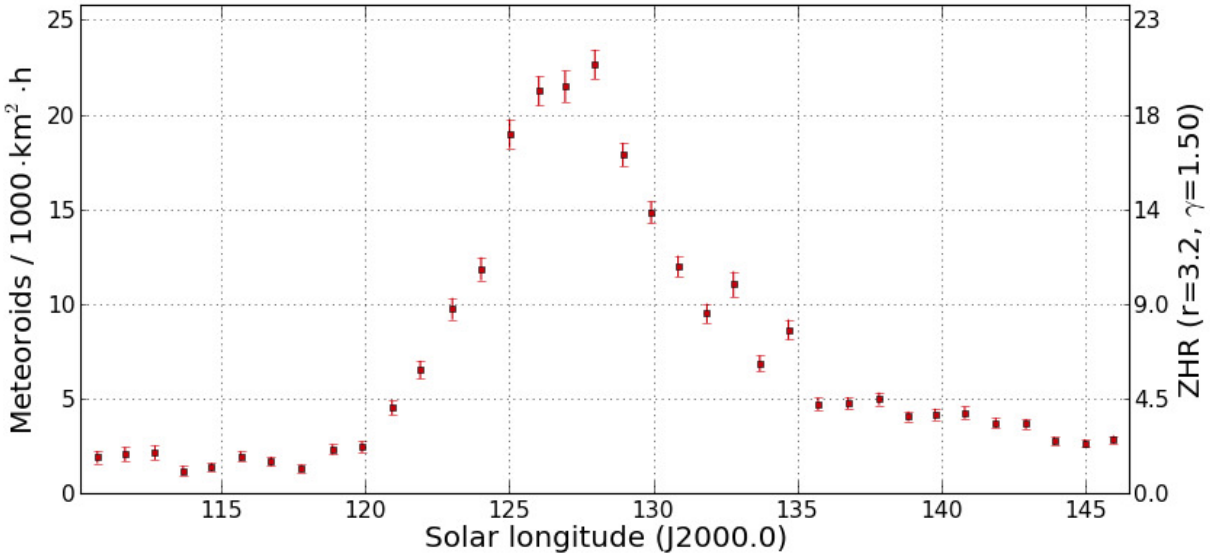

Figure 4: *Flux density profile of the southern delta Aquariids, averaged over three years 2011-2013.*

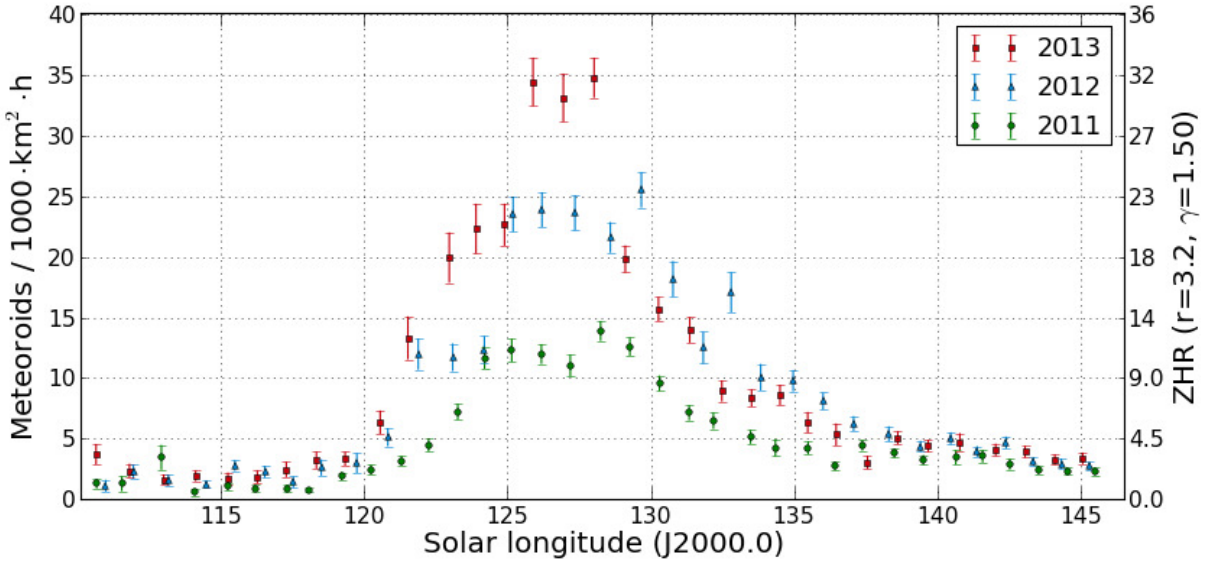

Figure 5: *Flux density profile of the southern delta Aquariids, shown independently for the three years 2011-2013.*

1. Observers

Code	Name	Place	Camera	FOV [°²]	St.LM [mag]	Eff.CA [km²]	Nights	Time [h]	Meteors
BANPE	Bánfalvi	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	26	107.1	231
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	29	165.7	1410
			HULUD2 (0.95/4)	3398	3.8	671	29	168.3	459
			HULUD3 (0.95/4)	4357	3.8	876	14	76.3	119
BIRSZ	Biro	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	28	155.6	442
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	22	88.8	545
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	21	85.3	212
			MBB4 (0.8/8)	1470	5.1	1208	23	84.2	165
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	27	117.0	361
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	27	107.3	405
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	11	65.3	349
			BMH2 (1.5/4.5)*	4243	3.0	371	24	109.5	366
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	30	169.0	773
			C3P8 (0.8/3.8)	5455	4.2	1586	30	152.8	597
			STG38 (0.8/3.8)	5614	4.4	2007	30	181.5	1112
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	15	49.5	498
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	25	145.7	638
			TEMPLAR2 (0.8/6)	2080	5.0	1508	26	155.1	601
			TEMPLAR3 (0.8/8)	1438	4.3	571	28	155.7	463
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	25	151.6	612
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	30	171.2	680
			ORION3 (0.95/5)	2665	4.9	2069	24	110.4	325
			ORION4 (0.95/5)	2662	4.3	1043	26	120.8	456
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	23	75.7	198
		Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	31	162.0	457
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	31	164.4	382
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	21	94.4	114
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	31	171.4	362
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	24	123.4	766
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	5	32.1	100
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	22	68.6	84
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	26	132.9	966
			STEFKA (0.8/3.8)	5471	2.8	379	26	126.5	616
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	29	144.8	166
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	27	223.7	1820
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	27	195.4	2634
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	9	20.5	107
KOUJA	Koukal	Kroměříž/CZ	SYLVIE	4280	3.5	381	1	3.0	14
MACMA	Maciejewski	Chelm/PL	PAV35 (1.2/4)	4383	2.5	253	24	73.2	144
			PAV36 (1.2/4)*	5732	2.2	227	25	109.4	337
			PAV43 (0.95/3.75)*	2544	2.7	176	22	79.9	162
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	13	67.2	322
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	19	53.5	246
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	25	118.7	1400
			MINCAM1 (0.8/8)	1477	4.9	1084	29	151.5	506
		Ketzür/DE	REMO1 (0.8/8)	1467	5.9	2837	27	109.2	980
			REMO2 (0.8/8)	1478	6.3	4467	27	111.9	649
			REMO3 (0.8/8)	1420	5.6	1967	24	96.9	201
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	31	186.8	407
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	29	116.0	569
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	27	151.4	929
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	25	125.6	624
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	24	87.6	211
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	20	109.0	364
			RO2 (0.75/6)	2381	3.8	459	23	152.9	475
			SOFIA (0.8/12)	738	5.3	907	21	128.4	312
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	26	110.0	400
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	27	107.7	401
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	24	120.2	218
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	29	150.6	1074
			NOA38 (0.8/3.8)	5609	4.2	1911	29	151.1	842
			SCO38 (0.8/3.8)	5598	4.8	3306	27	141.6	1029
STORO	Štork	Ondrejov/CZ	OND1 (1.4/50)*	2195	5.8	4595	1	3.7	43
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2362	4.6	1152	27	102.2	204
			MINCAM3 (0.8/12)	2338	4.5	1199	24	83.6	289
			MINCAM4 (1.0/2.6)	9791	2.7	552	25	79.6	163
			MINCAM5 (0.8/6)	2349	5.0	1896	28	98.7	319
TEPIS	Tepliczky	Budapest/HU	HUMOB (0.8/6)	2388	4.8	1607	30	154.3	789
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	2	1.7	11
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	5	17.3	50
Sum							31	7983.9	35275

* 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
BANPE	4.6	5.2	0.9	3.1	-	-	0.4	3.1	4.5	3.1	2.7	3.2	4.0	2.8	-
BERER	5.7	5.7	5.8	5.8	3.3	5.8	4.6	5.8	5.9	5.9	5.5	6.0	-	4.3	-
	5.7	5.8	5.8	4.8	2.9	5.7	5.6	5.9	6.0	6.0	5.3	6.1	-	4.2	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIRSZ	5.6	5.6	5.6	5.3	-	5.6	1.3	5.7	5.8	5.8	5.8	5.9	4.5	4.9	5.2
BOMMA	6.5	5.0	0.2	-	5.1	-	6.4	2.2	-	1.0	-	-	1.2	1.0	-
BREMA	3.9	-	-	1.7	4.7	-	-	4.6	4.9	2.5	4.9	-	3.8	5.1	5.2
	3.8	-	-	1.2	4.7	4.7	4.8	4.8	3.8	-	4.9	-	3.8	4.3	5.1
BRIBE	1.9	-	-	-	4.9	5.0	5.0	5.0	5.0	-	5.2	0.2	5.3	5.2	5.3
	4.6	-	2.5	-	5.1	5.1	5.1	5.1	2.7	0.7	3.0	5.2	5.2	-	5.2
CASFL	-	-	-	-	-	-	-	4.5	1.6	-	-	-	-	-	-
	5.2	0.7	3.7	5.8	-	0.9	1.5	4.4	1.3	1.3	-	-	1.4	4.7	4.0
CRIST	4.7	1.2	6.1	6.3	6.3	6.0	2.5	6.1	6.4	6.5	6.5	3.8	6.5	6.6	6.6
	5.0	0.7	4.8	6.3	6.3	5.8	4.2	6.5	6.5	5.4	2.7	0.2	4.6	6.6	6.6
	5.2	3.2	6.3	6.3	6.3	5.9	2.4	6.1	6.4	6.5	6.5	4.3	6.4	6.6	6.6
ELTMA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GONRU	-	7.2	7.3	7.3	7.2	7.4	7.4	7.4	7.4	2.0	-	-	2.7	3.8	6.0
	-	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	1.9	0.4	-	6.6	3.9	6.6
	-	7.2	7.1	7.1	7.2	7.3	7.3	7.1	7.3	1.5	-	-	5.5	2.6	2.4
	0.8	7.2	7.3	7.4	7.4	7.4	7.4	7.4	7.4	1.7	0.6	-	6.2	3.8	6.4
GOVMI	5.6	6.2	5.3	6.2	5.4	-	1.2	6.2	6.0	5.5	6.0	6.4	3.5	6.4	6.4
	-	-	-	-	4.5	-	-	5.7	5.5	2.0	2.6	5.6	2.5	6.0	5.4
	5.0	6.0	4.1	5.8	-	-	-	-	6.1	2.4	1.9	4.9	2.5	6.0	5.0
IGAAN	2.3	-	3.4	6.1	-	-	5.5	3.9	4.3	5.3	5.6	4.7	6.5	4.8	6.2
	5.8	5.8	5.7	5.9	4.5	5.4	5.9	5.9	5.3	5.8	6.1	6.1	2.1	3.6	1.5
	5.1	5.3	6.1	6.1	1.6	3.1	4.5	4.7	3.7	5.6	5.8	6.4	4.0	5.6	4.7
	5.6	4.4	3.7	-	-	1.3	-	-	-	1.4	1.7	-	-	1.2	-
JONKA	5.9	5.9	6.0	5.9	2.8	4.4	5.1	6.0	6.1	6.1	6.2	6.2	4.1	6.2	5.4
KACJA	6.0	5.9	5.7	5.0	4.1	-	-	6.2	1.2	1.4	-	3.9	-	-	1.1
	-	-	-	-	-	-	-	-	-	-	-	5.9	-	6.4	-
	3.9	4.0	3.3	-	1.8	-	-	5.0	-	-	-	1.2	1.8	1.5	0.7
	6.3	6.3	6.2	5.9	3.6	-	0.2	6.4	1.6	1.5	-	3.8	-	6.7	1.3
	6.1	6.2	5.5	4.3	3.3	-	0.3	6.4	0.9	0.7	-	3.3	-	6.7	0.9
KISSZ	-	4.5	4.6	5.2	2.9	6.0	2.5	6.1	4.6	5.4	6.2	6.2	3.5	3.6	3.7
KOSDE	8.3	6.3	8.3	8.2	8.3	-	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4
	7.2	8.0	8.4	8.0	8.2	8.0	6.8	7.8	7.4	8.1	8.1	7.6	8.3	8.4	8.2
	-	-	-	-	3.3	-	-	2.3	-	-	-	0.3	3.0	1.8	2.2
KOUJA	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	1.0	0.7	2.3	1.8	0.3	2.9	2.0	5.2	5.5	-	-	-	-	-	4.4
	5.2	5.2	5.4	4.1	4.1	5.3	5.0	5.6	5.4	0.4	-	2.5	-	1.4	4.7
	5.0	4.9	4.8	3.0	3.6	4.6	4.5	4.9	4.6	-	-	-	-	-	3.6
MARGR	7.2	3.8	7.1	5.6	4.6	-	5.0	5.8	6.4	3.9	4.8	5.6	-	5.1	2.3
MASMI	-	2.8	-	-	2.4	2.7	0.1	1.9	-	3.3	-	3.5	3.6	3.6	3.7
MOLSI	2.3	-	-	-	-	3.0	4.2	4.8	4.9	4.8	5.0	5.0	5.1	5.1	5.2
	4.8	-	-	1.2	5.5	5.4	5.3	5.5	5.8	5.5	5.9	6.0	6.0	5.7	6.1
	-	2.4	4.3	2.3	4.4	4.5	4.7	4.6	4.7	2.8	4.9	3.8	4.8	4.5	4.9
	-	2.8	4.5	2.6	4.6	4.6	4.7	4.7	4.8	2.9	4.9	3.9	5.0	4.5	5.1
	-	1.1	3.3	-	4.1	4.2	4.3	3.2	4.0	2.5	4.2	3.9	5.0	4.1	5.1
MORJO	6.0	6.1	6.1	6.1	5.6	6.1	6.2	6.1	6.2	6.1	6.3	6.2	5.6	6.3	6.4
OTTMI	5.4	4.8	6.1	2.7	3.0	2.9	2.2	5.4	5.9	6.4	3.4	5.1	4.6	5.9	5.0
PERZS	6.1	6.1	6.2	6.2	3.0	-	2.6	5.7	5.3	6.2	6.3	6.4	4.2	6.3	6.2
PUCRC	6.0	5.2	-	6.3	3.5	1.7	-	6.4	6.1	1.3	0.2	4.7	-	4.9	2.7
ROTEC	-	0.7	1.2	0.8	4.3	4.5	4.5	4.5	4.6	1.3	0.6	2.7	4.6	3.5	4.7
SARAN	-	7.5	7.5	6.2	6.4	2.7	3.9	-	3.5	-	-	-	-	-	7.4
	-	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.4	-	-	-	-	-	7.5
	-	7.1	7.2	7.1	7.2	2.7	-	7.3	7.3	-	-	-	-	-	7.1
SCALE	4.0	4.3	-	0.4	1.6	2.2	3.2	5.6	3.5	1.9	-	-	-	6.2	3.4
SCHHA	4.1	-	-	0.5	4.9	5.2	5.3	5.2	5.5	0.2	5.2	-	5.4	4.7	5.5
SLAST	5.3	5.5	5.1	5.4	4.7	2.6	-	5.7	5.9	1.4	-	2.9	3.7	6.0	5.0
STOEN	6.2	5.7	-	5.5	1.9	6.2	3.8	6.6	4.0	3.2	-	0.6	0.8	6.5	2.4
	6.2	4.6	0.2	5.7	2.1	5.6	4.0	6.6	5.0	2.3	-	-	1.2	5.7	2.5
	6.3	5.4	-	6.2	1.9	5.7	3.5	6.7	5.1	2.5	-	0.6	1.4	6.4	3.0
STORO	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	1.1	-	-	-	3.9	3.9	3.8	4.0	4.0	2.5	3.2	4.2	3.8	4.2	4.4
	0.8	-	-	-	3.7	3.9	2.1	3.9	2.0	2.3	2.8	-	3.7	4.0	4.3
	0.2	-	-	-	3.8	4.0	3.8	4.0	4.1	2.4	2.5	3.9	3.8	1.6	4.4
	0.8	-	-	-	3.8	3.9	4.0	4.0	4.1	2.4	3.0	4.2	3.8	3.8	4.4
TEPIS	5.5	5.5	5.5	4.8	-	5.7	2.1	5.4	5.8	5.8	5.8	5.9	3.9	5.4	5.3
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	-	-	-	-	-	-	-	-	2.3	-	4.2	-	-	5.4
Sum	228.8	239.9	231.0	240.2	239.3	222.2	215.7	326.6	292.8	188.0	181.6	201.6	197.9	269.1	274.4

July	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
BANPE	5.3	6.5	6.3	5.5	4.1	6.7	6.7	5.2	0.6	4.7	4.0	6.5	6.9	0.5	-	-
BERER	6.1	5.4	4.1	6.3	5.4	6.3	6.3	6.4	4.3	6.5	6.6	6.7	6.8	4.6	6.9	6.9
	6.2	4.8	4.5	6.3	5.6	6.4	6.4	6.4	6.6	6.7	6.7	6.8	6.8	4.7	6.6	7.0
	4.3	-	1.0	6.3	4.1	6.4	6.4	6.4	6.6	6.5	6.7	5.8	6.8	3.5	5.5	-
BIRSZ	6.0	6.1	-	6.2	5.5	6.3	6.3	5.2	4.8	6.3	3.6	6.6	6.6	-	6.7	6.8
BOMMA	-	-	6.6	-	3.2	3.5	2.4	2.6	5.7	3.4	7.2	5.6	6.2	7.5	3.7	2.6
BREMA	-	5.3	5.3	-	5.5	5.5	4.1	1.6	-	4.2	4.2	1.6	3.4	3.3	-	-
	0.4	5.3	5.3	0.8	5.4	5.5	1.0	-	-	2.7	3.4	1.4	3.6	3.5	-	-
BRIBE	4.8	5.5	5.5	5.4	5.6	5.7	4.0	2.4	4.8	5.2	3.5	3.5	3.3	3.1	0.9	5.8
	5.4	4.0	5.4	5.4	5.3	5.4	2.5	1.7	2.3	3.6	3.2	3.6	3.6	-	0.2	6.2
CASFL	-	-	-	-	-	-	-	4.4	4.7	6.7	7.2	7.1	6.9	7.1	7.5	7.6
	-	6.2	6.5	4.4	-	-	1.7	-	5.8	7.0	7.1	7.1	7.1	7.1	7.3	7.3
CRIST	6.3	4.8	-	5.8	4.8	6.8	2.7	5.7	1.9	6.2	6.6	6.8	7.1	6.8	7.3	7.3
	5.2	6.7	-	5.3	6.8	6.9	5.2	3.3	0.2	3.5	7.0	7.1	1.6	7.2	7.3	7.3
	6.2	6.7	-	6.8	6.8	6.9	4.6	6.4	3.2	6.4	6.4	7.1	7.2	7.2	7.3	7.3
ELTMA	-	3.3	2.4	3.0	1.9	2.5	2.0	2.6	1.4	3.8	3.6	3.4	4.7	4.8	5.2	4.9
GONRU	3.5	1.3	4.5	-	-	6.8	6.8	7.5	1.5	7.6	-	3.5	8.0	7.9	7.8	5.9
	3.4	1.3	4.6	-	-	7.5	7.1	7.5	1.6	7.6	-	6.0	8.1	8.1	8.1	5.8
	3.0	0.9	3.0	6.4	6.8	6.8	7.2	7.7	1.7	7.8	0.6	5.9	7.5	7.8	7.7	5.3
	3.5	-	4.3	-	-	7.0	7.1	7.5	-	7.6	-	5.7	8.1	8.1	8.0	6.3
GOVMI	6.4	6.5	6.5	6.5	1.1	6.5	6.5	6.6	6.6	6.7	6.9	6.9	6.9	2.5	7.1	4.7
	6.3	2.3	6.3	5.6	0.4	6.3	6.3	5.3	2.9	5.8	-	6.9	6.9	0.8	5.9	2.6
	6.0	6.0	5.1	2.7	-	5.1	4.5	2.5	3.5	5.5	5.2	6.4	6.4	1.7	6.1	4.4
IGAAN	4.8	3.5	6.1	0.8	-	-	0.3	0.2	-	-	0.2	0.3	0.3	-	0.2	0.4
	3.6	3.8	3.4	6.2	6.2	6.2	3.4	5.9	6.4	6.1	6.5	3.0	6.7	6.7	6.6	5.9
	6.5	6.2	5.3	6.2	1.3	6.4	6.5	6.8	6.1	6.4	5.6	7.0	7.0	2.7	5.7	6.4
	1.4	-	-	6.2	1.8	6.3	6.4	5.9	6.5	6.1	6.0	6.6	6.6	1.6	6.8	6.9
JONKA	6.4	6.4	2.6	2.4	1.8	6.6	6.6	6.6	6.7	6.8	6.4	6.9	6.9	3.1	5.8	7.1
KACJA	6.3	6.1	6.5	6.6	-	6.5	6.5	6.6	2.2	6.5	6.1	6.9	6.9	2.2	7.0	-
	-	6.4	-	-	-	6.6	6.8	-	-	-	-	-	-	-	-	-
	3.6	4.5	4.3	4.2	-	4.2	3.9	3.8	0.7	4.9	3.5	-	-	0.9	5.0	1.9
	6.7	6.6	6.7	6.8	-	6.6	6.8	6.9	1.7	6.0	4.1	7.0	7.1	2.7	7.4	-
	6.6	6.3	6.8	6.6	-	6.6	6.8	6.9	1.8	5.2	5.0	7.1	7.2	1.9	7.1	-
KISSZ	5.8	1.0	-	6.1	2.4	5.3	6.3	6.2	6.6	6.3	6.5	6.1	6.7	1.6	6.1	6.8
KOSDE	8.5	8.5	-	-	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7	5.7	-	8.8
	8.6	8.5	8.4	8.1	-	5.3	-	-	2.9	-	3.9	4.7	5.4	6.5	7.0	7.6
	-	-	-	-	-	-	-	-	-	-	-	-	2.8	4.0	-	0.8
KOUJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	0.9	5.9	5.5	0.2	1.8	3.7	3.2	-	-	4.5	2.7	3.6	6.6	6.4	0.2	1.9
	0.7	6.0	5.7	-	3.2	4.5	5.2	-	-	5.3	3.8	5.7	6.1	6.4	-	2.5
	0.4	4.6	4.7	-	1.7	3.0	2.4	-	-	2.6	2.9	4.9	4.0	3.8	-	1.4
MARGR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MASMI	-	3.2	-	2.5	4.1	1.5	-	3.5	2.9	-	-	2.0	-	-	1.1	5.1
MOLSI	5.2	5.3	4.7	5.3	5.4	5.4	5.5	-	4.0	5.4	4.4	5.7	5.2	-	1.7	6.1
	6.1	5.8	5.0	6.1	6.3	6.4	6.4	0.2	5.6	5.6	5.7	6.4	5.9	1.3	3.1	6.9
	4.9	5.0	5.1	1.2	5.2	5.3	5.2	5.3	-	4.1	0.2	5.6	-	-	1.7	2.8
	5.1	5.1	5.3	1.2	5.3	5.4	5.3	5.4	-	3.2	0.2	5.8	-	-	2.0	3.0
	4.8	4.9	5.3	-	5.4	5.4	5.5	5.6	-	4.1	-	3.4	-	-	1.5	2.0
MORJO	6.4	6.4	4.5	6.5	1.8	6.6	6.8	6.4	6.5	6.4	6.6	6.9	6.9	2.5	7.1	7.1
OTTMI	4.3	4.1	3.3	3.9	2.8	1.6	1.7	0.2	3.4	0.2	4.5	-	5.9	3.8	-	7.5
PERZS	6.6	6.6	6.6	6.2	2.6	6.8	6.3	6.4	-	-	-	4.7	4.8	2.9	7.2	6.9
PUCRC	5.2	5.6	-	4.3	5.7	6.1	6.1	6.1	-	-	5.9	7.1	7.2	2.7	7.3	7.3
ROTEC	4.7	4.1	5.1	3.5	-	5.2	5.1	5.2	-	4.4	-	5.2	-	-	2.6	-
SARAN	7.4	-	4.6	6.1	-	6.9	4.4	-	2.8	7.8	0.2	-	7.7	8.2	0.9	6.9
	7.5	-	5.6	6.6	4.2	7.5	6.6	6.4	3.2	7.8	0.3	-	7.6	7.9	8.0	7.9
	7.5	-	5.7	6.1	-	5.3	4.5	5.7	2.3	7.5	0.3	-	7.5	8.0	7.3	7.7
SCALE	6.5	6.2	5.8	-	1.0	5.8	4.5	4.8	1.7	6.9	5.5	4.9	6.6	5.2	2.4	5.9
SCHHA	4.0	3.1	5.8	5.8	5.8	5.9	3.7	-	4.5	2.3	3.7	1.5	3.1	2.0	0.4	4.4
SLAST	6.1	6.0	5.9	5.5	-	-	-	3.1	-	5.3	3.5	6.3	6.3	-	6.2	6.8
STOEN	6.7	6.3	6.9	6.8	2.9	5.6	3.8	5.5	2.3	7.0	7.0	7.3	7.3	6.6	7.6	7.6
	5.9	5.8	6.9	6.6	2.7	5.9	3.8	7.2	3.3	7.2	7.2	7.3	7.4	7.0	7.6	7.6
	-	6.2	6.8	6.9	3.3	6.2	4.1	7.3	4.2	-	7.2	7.2	6.7	6.7	6.5	7.6
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	4.5	4.6	4.6	1.8	4.7	4.8	4.9	4.7	3.3	5.0	4.8	3.2	3.5	4.6	0.2	-
	3.9	3.1	-	-	3.4	4.7	3.6	5.0	3.2	5.1	4.6	3.5	3.0	4.9	-	2.1
	4.5	4.6	4.7	1.6	4.7	4.8	2.4	3.9	0.7	3.9	3.6	0.5	-	-	-	1.2
	4.5	4.6	4.5	1.5	4.7	4.8	4.9	4.1	2.1	5.0	3.1	3.2	2.9	4.4	0.2	2.0
TEPIS	6.0	6.0	0.3	6.1	6.2	6.1	6.2	5.9	4.2	5.5	2.7	5.7	6.3	1.9	6.6	6.2
YRJIL	-	-	-	-	-	-	-	-	-	-	-	0.3	1.4	-	-	-
ZELZO	-	-	-	-	-	-	3.6	-	-	-	-	-	-	1.8	-	-
Sum	287.4	285.8	266.2	251.2	195.2	343.1	302.3	277.2	181.1	317.0	252.8	310.2	342.7	246.4	277.2	299.0

3. Results (Meteors)

July	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
BANPE	6	11	2	8	-	-	2	8	8	5	5	6	6	6	-
BERER	59	51	34	38	6	40	22	51	35	28	37	32	-	17	-
	13	11	14	7	1	10	8	11	14	11	15	18	-	7	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIRSZ	15	20	9	9	-	8	3	12	13	13	16	12	10	9	23
BOMMA	28	21	1	-	24	-	23	3	-	4	-	-	5	4	-
BREMA	5	-	-	8	8	-	-	9	13	7	5	-	7	6	15
	6	-	-	1	6	10	13	9	6	-	8	-	8	3	11
BRIBE	3	-	-	-	10	18	18	7	10	-	8	1	19	11	22
	15	-	4	-	10	17	19	12	4	2	14	13	22	-	19
CASFL	-	-	-	-	-	-	-	5	2	-	-	-	-	-	-
	4	2	12	10	-	1	5	7	4	1	-	-	6	9	13
CRIST	20	5	24	31	23	15	14	18	33	26	36	7	22	25	32
	23	4	7	24	17	12	14	14	17	7	13	1	5	27	21
	26	7	34	30	43	22	10	20	29	23	30	7	27	45	35
ELTMA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GONRU	-	34	31	28	23	16	5	30	24	3	-	-	22	14	11
	-	32	31	22	21	26	20	24	21	3	2	-	11	5	16
	-	13	23	14	14	17	14	18	10	2	-	-	9	5	2
	1	16	36	28	21	17	14	15	13	3	1	-	13	3	10
GOVMI	13	23	10	29	14	-	3	19	13	12	11	14	15	19	16
	-	-	-	-	4	-	-	6	5	6	9	15	12	9	8
	8	22	9	18	-	-	-	-	14	9	12	11	8	14	14
IGAAN	11	-	12	16	-	-	8	9	13	11	14	11	14	8	18
	14	9	12	11	7	8	7	15	14	12	11	25	2	11	8
	6	13	12	11	1	9	6	10	6	5	10	13	12	6	10
	7	3	4	-	-	2	-	-	-	1	1	-	-	2	-
JONKA	10	15	10	9	6	8	5	3	11	5	20	12	5	8	14
KACJA	22	28	15	14	9	-	-	22	3	2	-	15	-	-	4
	-	-	-	-	-	-	-	-	-	-	-	16	-	20	-
	2	2	2	-	1	-	-	2	-	-	-	2	5	1	2
	48	48	21	27	20	-	1	48	5	3	-	16	-	55	8
	13	30	8	15	15	-	1	25	5	1	-	5	-	27	3
KISSZ	-	2	4	2	5	3	2	4	3	3	4	3	3	4	4
KOSDE	66	21	61	46	68	-	60	45	46	53	63	69	59	59	54
	87	77	110	99	116	128	99	88	76	93	102	90	103	110	119
	-	-	-	-	9	-	-	8	-	-	-	2	12	8	7
KOUJA	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	6	4	8	3	1	7	2	14	5	-	-	-	-	-	6
	18	16	19	13	7	13	12	12	9	1	-	1	-	1	10
	8	5	7	4	7	4	5	5	5	-	-	-	-	-	8
MARGR	26	17	30	31	23	-	19	26	31	19	27	25	-	28	20
MASMI	-	7	-	-	6	10	15	10	-	14	-	18	13	16	26
MOLSI	28	-	-	-	-	42	44	72	54	44	69	61	55	37	78
	10	-	-	1	11	13	12	9	11	10	17	15	15	9	26
	-	7	32	6	22	47	46	32	40	33	46	49	21	54	67
	-	9	24	6	22	34	35	34	33	19	29	30	21	33	40
	-	1	5	-	3	9	4	7	16	8	10	7	7	8	16
MORJO	9	13	9	9	8	7	9	10	10	5	14	12	15	6	7
OTTMI	21	17	16	16	21	19	5	12	17	16	14	24	18	22	17
PERZS	35	38	30	36	4	-	4	21	24	30	22	37	25	37	37
PUCRC	20	14	-	22	10	7	-	26	22	5	1	14	-	23	20
ROTEC	-	1	1	2	6	12	15	12	10	2	1	4	11	4	13
SARAN	-	14	15	7	11	7	12	-	13	-	-	-	-	-	13
	-	17	19	15	13	10	8	14	11	-	-	-	-	-	15
	-	8	17	18	4	10	-	7	7	-	-	-	-	-	19
SCALE	2	7	-	1	8	7	6	12	6	1	-	-	-	21	7
SCHHA	5	-	-	1	7	21	23	18	17	2	10	-	24	14	25
SLAST	5	12	4	9	13	2	-	5	12	1	-	1	2	12	9
STOEN	25	17	-	38	8	33	16	44	13	7	-	1	8	31	8
	10	14	1	27	10	21	23	38	12	3	-	-	5	25	3
	21	27	-	45	17	23	11	40	19	6	-	1	10	35	11
STORO	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	1	-	-	-	5	10	7	4	9	4	4	6	7	5	16
	3	-	-	-	6	6	6	4	3	5	3	-	8	4	13
	1	-	-	-	3	12	11	8	6	4	3	6	4	1	9
	1	-	-	-	8	16	15	16	13	5	2	11	13	9	20
TEPIS	24	25	22	22	-	20	9	23	25	21	28	19	11	7	31
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	-	-	-	-	-	-	-	-	5	-	15	-	-	17
Sum	824	853	811	887	766	809	770	1112	923	624	747	773	735	999	1126

July	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
BANPE	14	9	18	8	6	8	8	13	1	15	8	22	25	3	-	-
BERER	57	20	12	44	35	49	53	44	45	55	62	66	106	44	119	149
	20	7	3	15	16	22	20	18	30	15	23	17	23	18	36	36
	11	-	1	7	3	3	5	11	10	8	5	12	23	9	11	-
BIRSZ	20	17	-	19	11	18	13	14	8	14	8	26	27	-	40	35
BOMMA	-	-	14	-	10	16	3	18	35	29	60	55	37	78	43	34
BREMA	-	18	19	-	14	10	10	2	-	10	13	5	9	19	-	-
	1	9	9	2	10	10	3	-	-	5	7	1	7	20	-	-
BRIBE	11	8	17	18	23	22	8	10	13	19	9	20	8	12	2	34
	22	17	19	26	16	20	14	10	4	13	9	19	11	-	1	53
CASFL	-	-	-	-	-	-	-	14	28	33	38	27	32	52	63	55
	-	9	10	6	-	-	7	-	15	24	20	24	27	50	48	52
CRIST	24	12	-	9	11	21	2	10	4	27	36	37	34	61	85	69
	15	10	-	15	23	19	11	9	1	19	28	33	1	60	69	78
	33	30	-	28	39	46	11	35	15	36	47	63	57	73	99	112
ELTMA	-	33	19	28	13	16	14	17	12	33	28	30	50	67	71	67
GONRU	7	1	6	-	-	10	26	48	6	54	-	11	57	78	78	15
	7	3	7	-	-	10	15	31	1	41	-	27	79	61	47	38
	6	1	2	7	25	16	21	34	2	23	3	19	43	58	45	17
	8	-	7	-	-	9	21	35	-	49	-	31	69	68	83	41
GOVMI	33	23	42	23	2	31	22	24	11	23	38	45	41	9	61	41
	16	6	15	10	1	16	14	18	17	19	-	27	28	3	44	17
	18	13	14	7	-	16	19	17	17	19	26	27	30	6	56	32
IGAAN	11	9	17	4	-	-	2	1	-	-	1	2	2	-	1	3
	6	8	2	13	18	21	10	17	22	20	18	7	25	35	39	30
	9	8	9	7	5	13	21	16	14	18	14	24	30	8	27	29
	3	-	-	8	1	2	6	5	4	5	2	9	13	1	21	14
JONKA	11	6	4	8	7	8	10	15	14	13	10	19	24	7	29	36
KACJA	53	38	42	32	-	38	45	38	7	44	39	65	75	12	104	-
	-	32	-	-	-	16	16	-	-	-	-	-	-	-	-	-
	4	3	5	4	-	1	11	4	1	5	6	-	-	1	10	10
	62	65	40	46	-	55	39	34	3	33	14	57	82	15	121	-
	33	22	24	17	-	29	27	26	4	38	27	45	72	5	99	-
KISSZ	8	3	-	5	2	5	6	3	9	9	5	9	20	6	17	13
KOSDE	77	73	-	-	90	82	42	47	94	105	97	98	101	77	-	67
	121	120	118	138	-	116	-	-	43	-	38	61	59	84	117	122
	-	-	-	-	-	-	-	-	-	-	-	-	32	27	-	2
KOUJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	1	11	4	1	3	5	6	-	-	8	2	7	19	17	1	3
	1	9	16	-	14	16	19	-	-	15	10	23	29	40	-	13
	4	5	12	-	8	5	7	-	-	9	7	15	15	15	-	2
MARGR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MASMI	-	5	-	18	24	2	-	5	8	-	-	4	-	-	4	41
MOLSI	74	42	51	62	39	44	35	-	31	48	59	80	96	-	12	143
	27	13	14	20	23	25	23	1	25	17	28	43	25	5	11	47
	37	29	61	5	53	61	61	49	-	32	1	61	-	-	8	20
	24	12	37	1	54	33	29	29	-	8	1	40	-	-	8	4
	3	5	15	-	17	16	10	13	-	6	-	6	-	-	4	5
MORJO	14	10	2	9	4	20	15	17	17	15	12	22	27	7	39	34
OTTMI	18	12	15	29	14	10	15	1	30	1	35	-	49	38	-	47
PERZS	40	44	45	17	17	35	29	17	-	-	-	32	54	18	96	105
PUCRC	27	29	-	9	14	22	27	27	-	-	28	25	46	15	88	83
ROTEC	11	2	18	7	-	17	6	14	-	10	-	19	-	-	13	-
SARAN	18	-	11	15	-	18	13	-	9	27	1	-	57	42	2	59
	21	-	8	22	5	19	13	23	6	31	1	-	46	58	55	45
	16	-	8	12	-	13	12	4	4	24	1	-	31	37	36	24
SCALE	17	19	19	-	5	18	16	11	12	28	19	26	32	39	19	42
SCHHA	19	6	22	29	23	28	5	-	17	6	12	8	14	6	1	38
SLAST	10	11	14	4	-	-	-	2	-	5	3	10	18	-	31	23
STOEN	28	38	45	49	18	30	20	21	15	46	38	45	73	111	130	118
	13	25	25	30	11	19	15	17	24	42	37	45	57	90	98	102
	-	35	45	42	17	49	27	29	34	-	61	57	65	92	94	116
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	6	6	5	1	14	13	6	3	4	14	19	6	13	15	1	-
	8	5	-	-	22	34	10	14	10	27	25	11	16	35	-	11
	8	3	10	1	11	11	9	7	5	7	14	1	-	-	-	8
	10	11	28	3	21	22	9	7	1	12	11	7	6	25	1	16
TEPIS	32	26	2	27	28	35	33	24	12	36	22	41	43	8	54	79
YRJIL	-	-	-	-	-	-	-	-	-	-	-	1	10	-	-	-
ZELZO	-	-	-	-	-	-	9	-	-	-	-	-	-	4	-	-
Sum	1208	1046	1027	967	840	1394	1034	973	754	1347	1186	1675	2200	1844	2492	2529