Results of the IMO Video Meteor Network – October 2014

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October regaled on the observers with unusually good weather conditions, even though there were regional differences. The observing conditions in Poland and Germany were close to perfect. More southerly located observers, however, had to cope with a few cloudy nights in the first decade. Also the Orionids were clouded out at some places.
The number of meteor cameras increased to the all-time high of 86, and up to 71 of these were active in parallel (October 19/20). Our new observer Rui Marquez put the second camera CAB1 in operation. Also the camera ESCIMO of Sirko Molau, which was retired for many years, was resurrected as will be described later in detail.
57 of the cameras collected twenty or more observing nights. The effective observing time summed up to 11,200 hours, which is more than we collected in any October before, and after March 2014 the second best outcome ever. In that time, almost 52,000 meteors were recorded, which is again more than in previous years. Only in 2011, when there was exceptional Orionid activity, we recorded more meteors in October.

Which leads us directly to the most important meteor shower of the month. The Orionid (8 ORI) peak of 2014 coincided well with the new Moon, which promised good observing conditions. However, the years of enhanced activity are over for now, so that only "normal" zenithal hourly rates below 20 were expected and confirmed by the quick-look-analysis of IMO. Only in a single interval the ZHR exceeded 20, otherwise it remained in the 10 to 15 range contrary to 2012, when still a peak ZHR of 25 was reported.
Exactly the same picture is drawn by the video data of the IMO network (figure 1). In 2011, we measured flux densities of up to 25 meteoroids per 1,000 km^2 and hour. This figure reduced to values near 15 in 2012 and 2013, and in this year they declined again by 20%. So in 2014 we measured roughly half of the flux density of 2011, which confirms that the Orionids are back at the standard activity level.

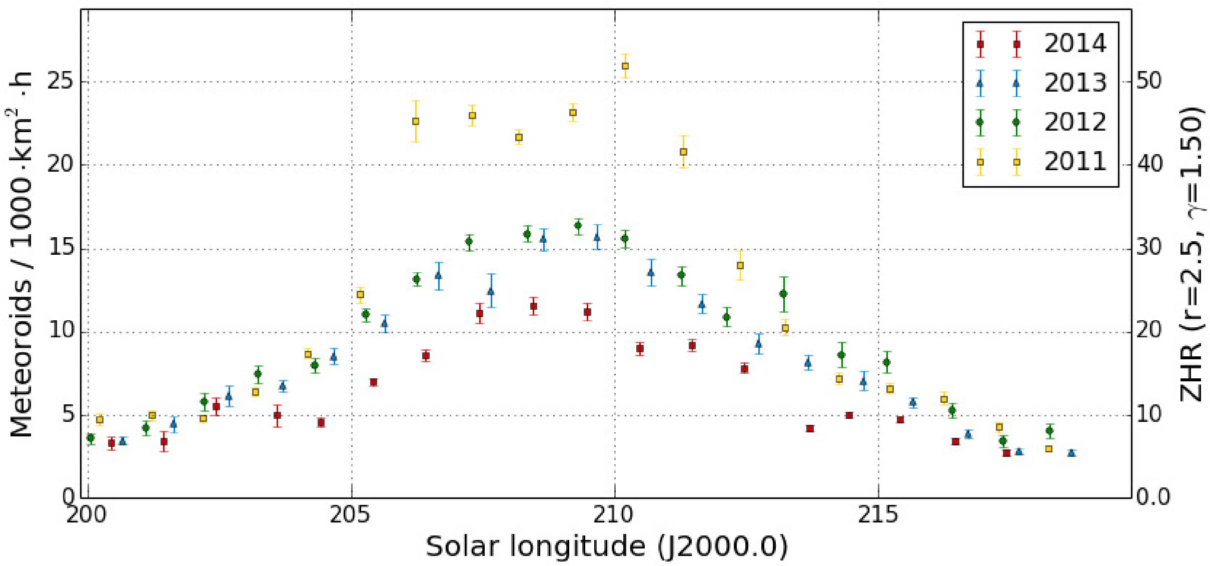

Figure 1: *Flux density profile of the Orionids 2011-2014, derived from observations of the IMO Video Meteor Network.*

At about the same time the epsilon Geminids (23 EGE) are active. We do not obtain a clear activity profile for this shower. 2011 and 2013 left the impression that there might be a peak between 205° and 207° solar longitude. However, the data of 2012 and 2014 do not show this peak (figure 2).

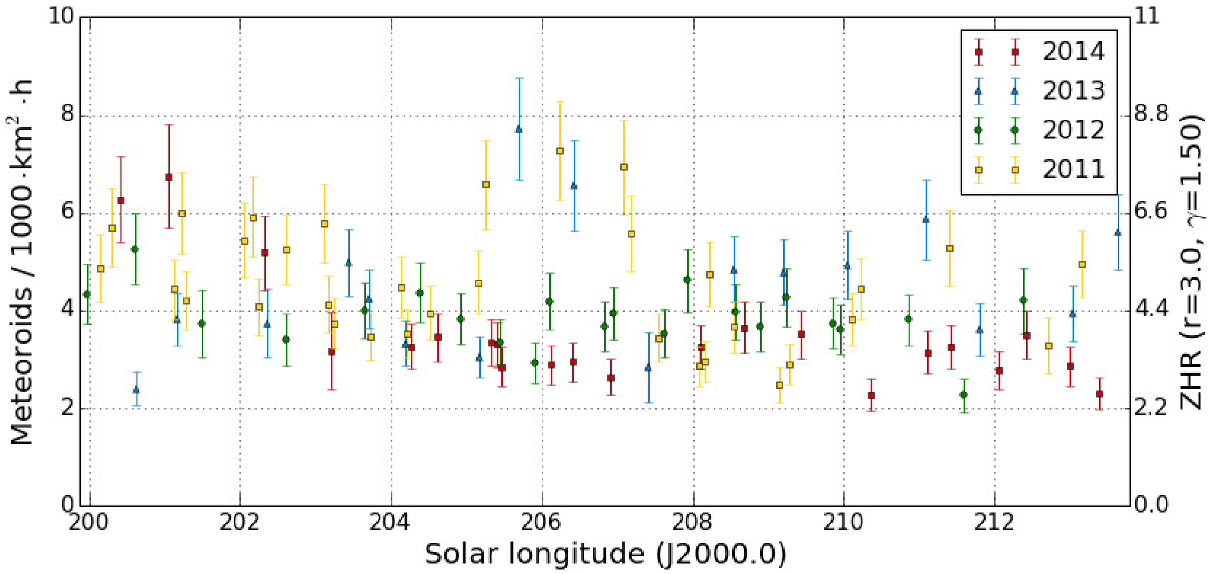

Figure 2: *Flux density profile of the epsilon Geminids 2011-2014, derived from observations of the IMO Video Meteor Network.*

The activity profile of the Leonis Minorids (22 LMI) is flat as well, if we ignore a single outlier on October 24/25, 2011 (figure 3). The flux density reaches typically values of about 6 meteoroids per 1,000 km^2 and hour, which is slightly more than what we see from the epsilon Geminids.

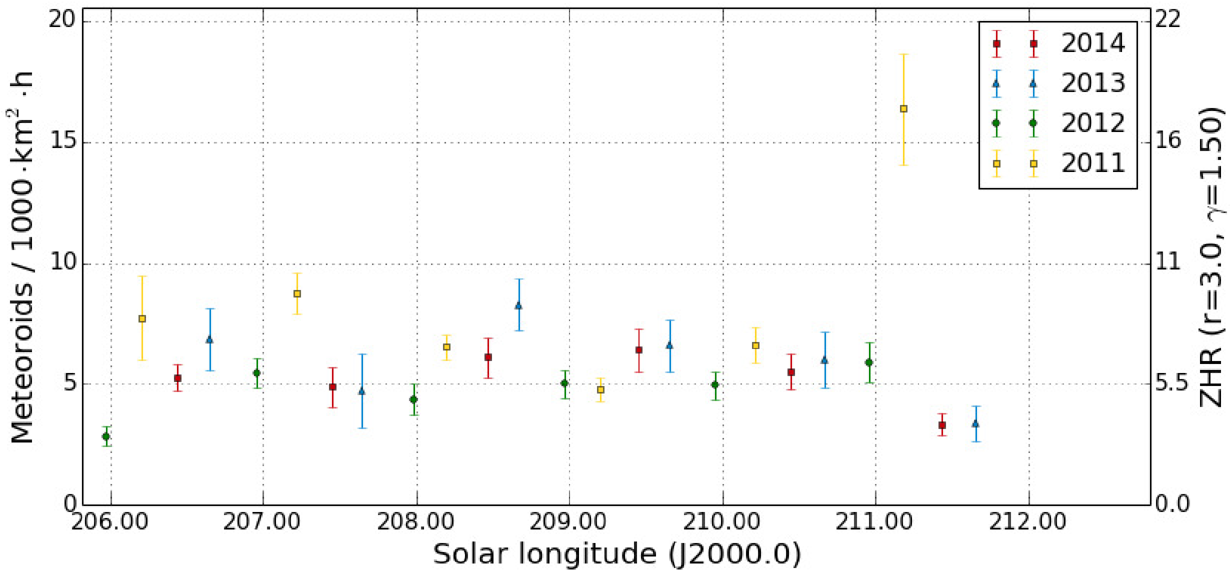

Figure 3: *Flux density profile of the Leonis Minorids 2011-2014, derived from observations of the IMO Video Meteor Network.*

The October Camelopardalids (281 OCT) are renowned for their short peak (FWHM 6 hours) centered at 192.6° solar longitude. This year the peak fell into the European morning hours of October 6, so chances were good to detect the shower again. That's what indeed happened – exactly at the expected time we found a clear increase in rates (figure 4). The flux density reaches values of more than 5 meteoroids per 1,000 km^2 and hour. This time we had to choose a zenith exponent of γ=1.7 to smooth the activity profile.

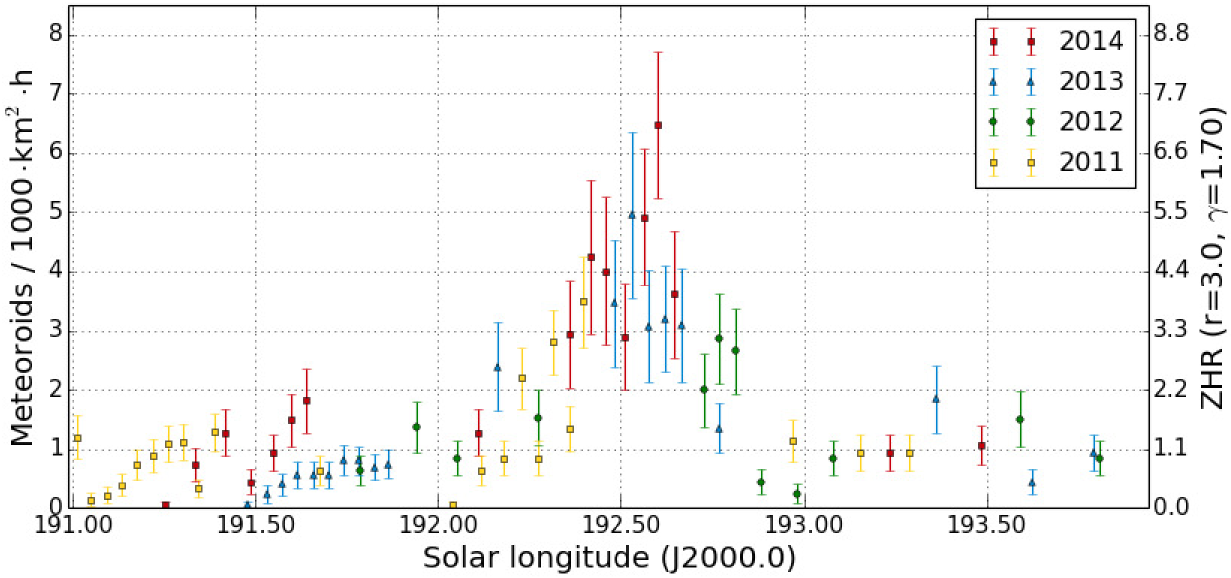

Figure 4: *Flux density profile of the October Camelopardalids 2011-2014, derived from observations of the IMO Video Meteor Network.*

Last but not least, also the October Ursae Majorids (333 OCU) are a shower that was discovered in the late 2000s with a maximum a few days before the Orionids. The shower can be detected every year in our video data thanks to its high declination and a flux density of 5 meteoroids per 1,000 km^2 and hour at maximum.

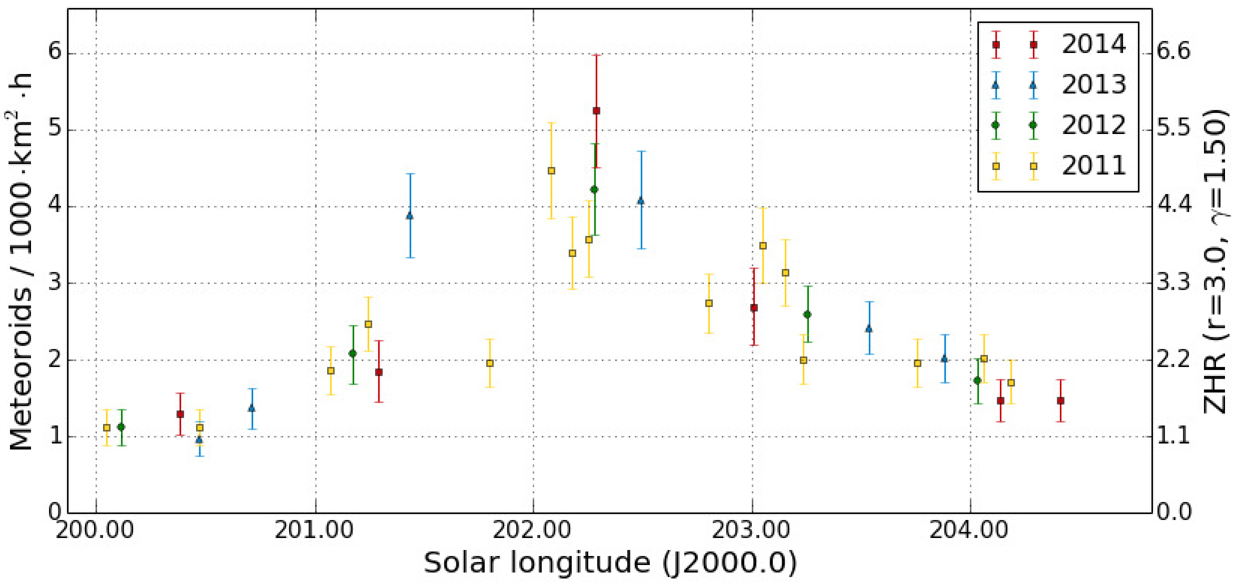

Figure 5: *Flux density profile of the October Ursae Majorids 2011-2014, derived from observations of the IMO Video Meteor Network.*

In the end, we calculated the population index for all showers (figure 6). The r-value of the sporadic meteors varied around 2.5 in the first half of the month with single upward outliers. Just at the Orionid peak, however, we find a clear minimum with r-values down to 2.0.
The population index of the October Camelopardalids is 2.1 on October 5/6, i.e. about 0.5 smaller than the value for sporadic meteors. We yield also for the October Ursae Majorids a r-value of 2.1. In this case, we combined the data of all relevant nights in order to have sufficient statistics. Also here the r-value is smaller than for the sporadic meteors.
In case of the epsilon Geminids, we combined the data of four consecutive nights. Their population index is comparable to the one of the sporadic meteors.
The Orionids show a well-defined population index profile. It starts at r=2.6 and decreases to a value of 1.4 on October 24. Thereafter it rises again to 2.7 Even though the time of the minimum coincides with the sporadic minimum we can still conclude, that also the Orionids have a larger fraction of bright meteors than the Sporadics.

Last but not least we averaged the Leonis Minorid observations over three consecutive nights. Their r-values are more than 0.5 below the sporadic value, which means that this shower has a particularly high percentage of bright meteors.

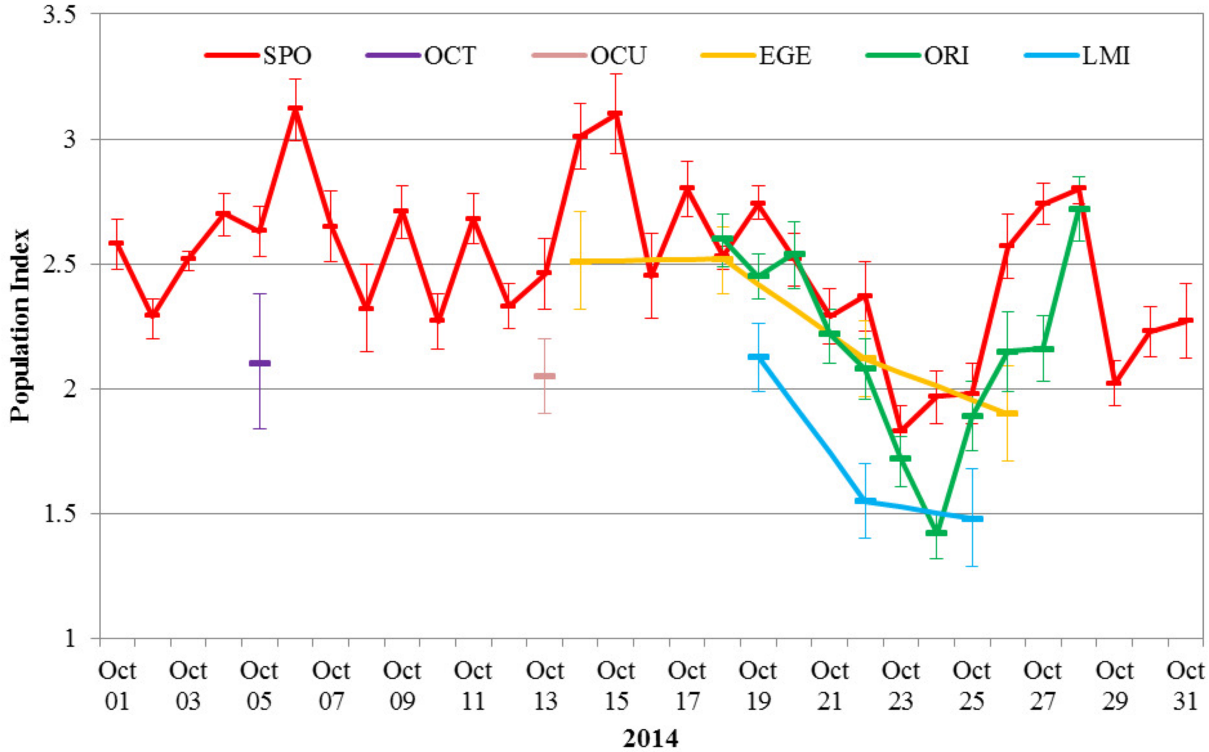

Figure 6: *Population index for different meteor showers and sporadic meteors in October 2014.*

Note that the intersection point of graphs in the flux density vs. population index plot is much more precise for minor showers (OCT, OCU, EGE, LMI) with roughly 200 meteors per data point. In case of ORI and SPO with more meteors, there is often no well-defined intersection point.

The population index analysis was continued in a different fashion in October. At the 2014 IMC I had presented a new procedure to derive r-values from heterogeneous video data. The discussion with other IMC participants underlined, that the procedure would be more precise the larger the covered limiting magnitude range. Typically I use Mintron cameras (e.g. MINCAM1) with 8 mm f/0.8 Computar lens, which yields a field of view of 43x32° (resp. 1,474 square degrees). Depending on the sky quality, I obtain stellar limiting magnitudes between 6.0 and 6.5 mag. The image-intensified camera AVIS2 goes even down to 7.0 mag within the 1,230 square degrees field of view. So after the IMC I started to experiment with lenses of longer focal length to check, whether this will increase the limiting magnitude range in a sensible way. At first I equipped a Mintron camera with a 1″ f/0.85 c-mount lens from Fujinon with 25 mm focal length. In this setup, the field of view is reduced to 14x11° (resp. 155 square degrees), but the camera reaches a limiting magnitude of 7.7 mag. Thereafter also my special camera ESCIMO was tested, which contains an aplanatic mirror system after Flügge (similar to a Schmidt-Cassegrain telescope with a large secondary mirror) with integrated 25 mm Gen II image intensifier. The circular field of view of this camera with military origin has a diameter of 5.5° resp. a field of view of 22 square degrees and it reaches a stellar limiting magnitude of 10.0 mag (figure 7). If this image-intensified camera is compared to a ½″ Mintron camera, you derive an effective focal length of 65 mm with a free aperture of 220 mm. In order to be able to process observations with ESCIMO, MetRec had to be extended first. Based on the Tycho-2 catalog, the software can now detect stars up to 11 mag, whereas the limit was 8 mag before.

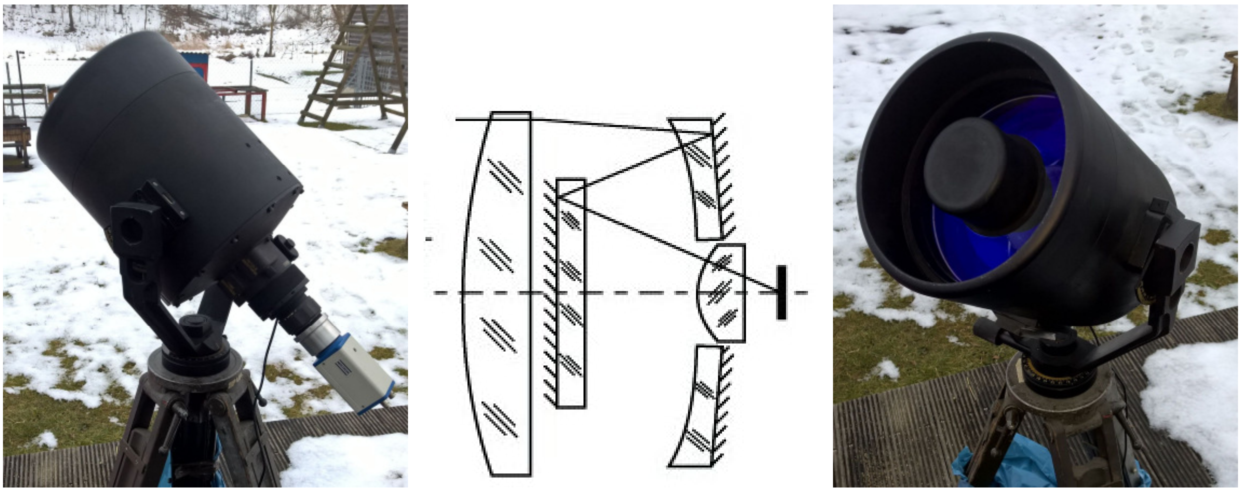

Figure 7: *The image-intensified camera ESCIMO and a schematic drawing of an aplanatic mirror system after Flügge (from http://www.spektrum.de/lexikon/optik/aplanatische-spiegelsysteme/189)*

So the gain in stellar limiting magnitude by these setups is 1.7 resp. 4.0 mag. Depending on the population index r, this translates into a gain in meteor counts by the factor of $r^{1.7}$ resp. $r^{4.0}$. Will that be sufficient to compensate for the loss in field of view by a factor of 9.5 resp. 67?

Practical tests between October 2014 and January 2015 showed that both cameras are better in recording slower meteors (figure 8). That is no surprise, since a meteor with 30 °/s angular velocity needs at most 5 video frames to cross the complete field of view. The gap between stellar and meteor limiting magnitude is particularly big at such small fields of view. So in total the cameras record fewer meteors than the reference camera MINCAM1.

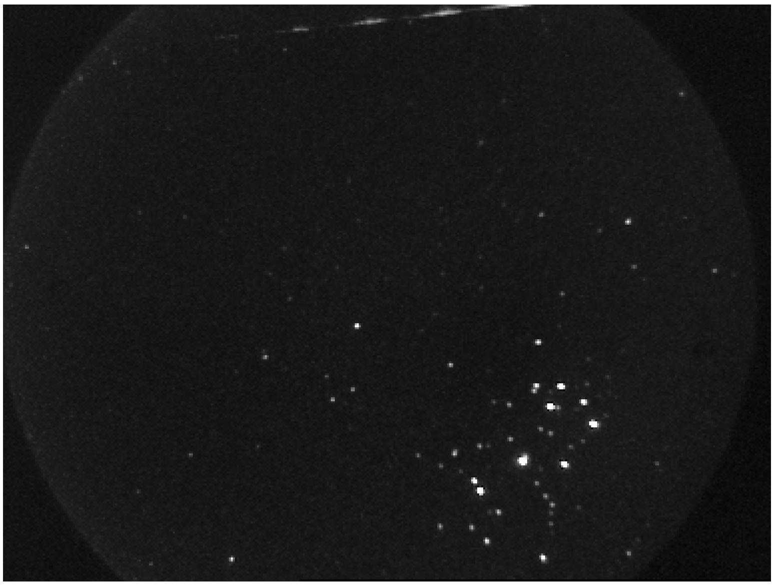

Figure 8: *A 13°/s Geminid with Pleiades, recorded by ESCIMO on December 12, 2014.*

For a more detailed analysis, we compared the meteor limiting magnitude and the effective collection area of all the setups. The calculation was based on the night of October 20/21 with identical alignment of all cameras. They were pointing towards southeast at medium altitude above the horizon.

Let's start with a slow shower, the northern Taurids. At the begin of night, the radiant is less than 20° away from the field of view, and the meteors are moving on average with 2°/s in the field of view. By the end of the night, the radiant distance has increased to 90° and the angular velocity increased to 12°/s (Figure 9, up left).

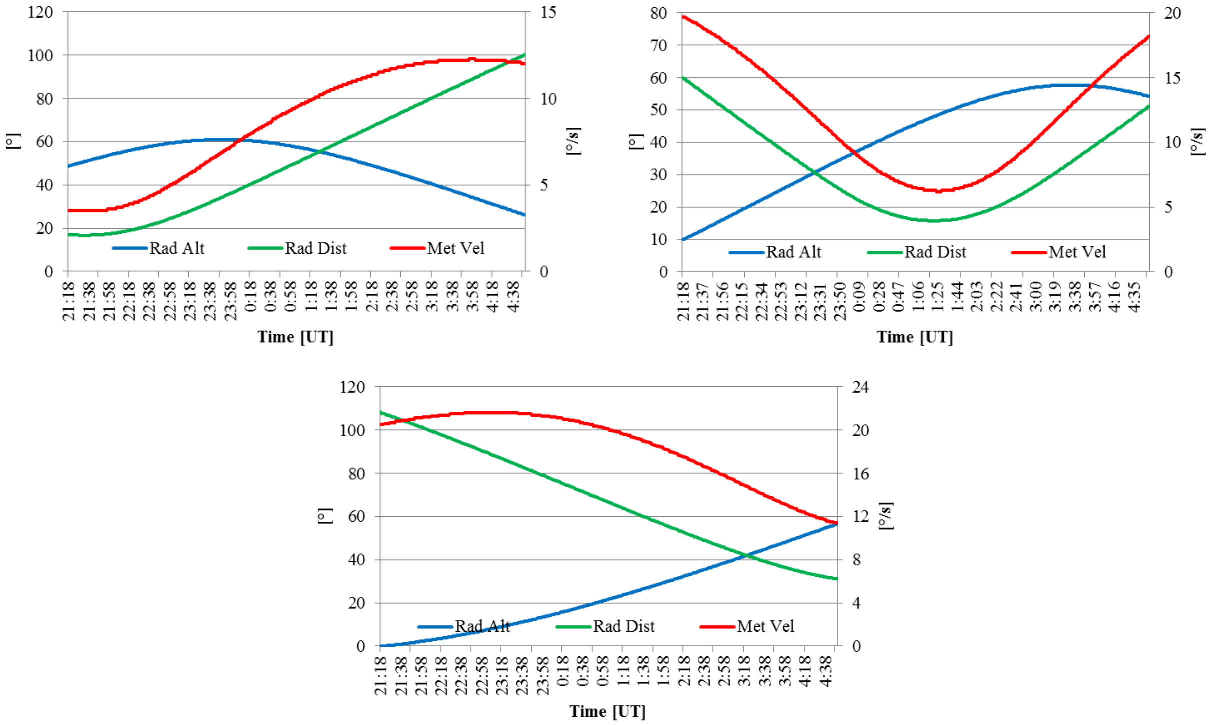

Figure 9: *Boundary conditions for the comparison of different cameras pointing towards southeast at medium altitude on October 20/21: Radiant altitude (Rad Alt) in °, mean radiant distance from the field of view (Rad Dist) in ° and mean apparent meteor velocity (Met Vel) in °/s. Given are the values for the northern Taurids (up left), Orionids (up right), and Leonis Minorids (down).*

At the begin of night, the meteor limiting magnitude varied between 5.2 (MINCAM1) and 8.1 mag (ESCIMO), towards the end of the night they are decreasing to values between 4.5 and 6.1 mag because of the increasing angular velocity (Figure 10, left). Hence, the loss in limiting magnitude due to the motion of meteors amounts to 0.8 resp. 1.9 mag at first, and then to values between 1.5 mag (MINCAM1) and almost 4 mag (ESCIMO). In addition, there is a lower detection limit in MetRec of 1.5 °/s meteor velocity to avoid false detections by satellites. Thus, ESCIMO is partly blind for Taurids at the begin of night. It is no surprise that the effective collection areas (calculated with r=2.3) of the more powerful cameras falls well behind the reference system (figure 10, right). The camera with 25 mm lens has only 19% of the Taudid collection area in the course of the night, and it is only 8% for ESCIMO.

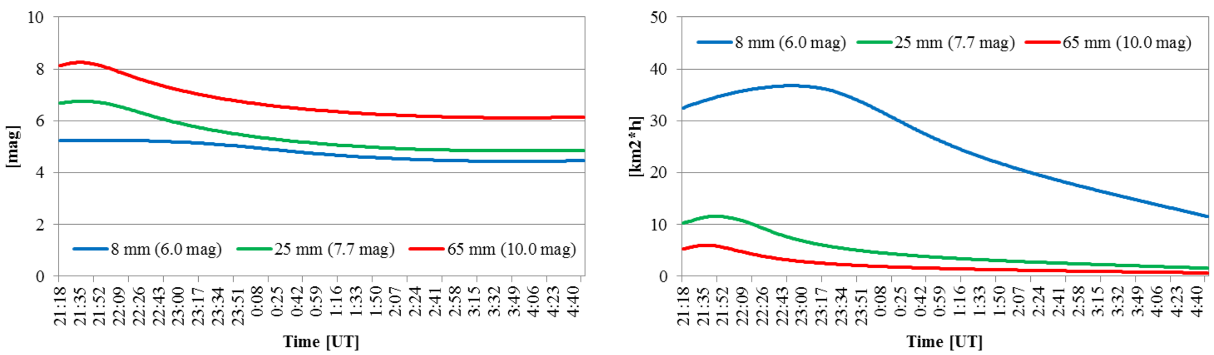

Figure 10: *Meteor limiting magnitude (left) and effective collection area (right) for the northern Taurids, calculated for three cameras with different focal lengths and stellar limiting magnitudes between 6.0 and 10.0 mag.*

At the begin of night, the Orionid radiant is 60° away from the field of view and shower meteors are moving at roughly 20°/s. After midnight the radiant reaches the smallest distance of about 15°, and the apparent meteor velocity drops to 6°/s, before the values are increasing again towards the morning hours (figure 9, right) At the begin of night, the Orionid limiting magnitude varies between 3.9 and 5.6 mag, which corresponds to a loss between 2.1 (MINCAM1) and 4.4

magnitudes (ESCIMO). After midnight the meteor limiting magnitude reaches values between 5.1 and 8.1 mag, i.e. the loss reduces to 0.9 till 1.9 mag thanks to the smaller radiant distance (Figure 11, left). In this case of a faster shower, the reduction in effective collection area (calculated with r=2.5) is nearly the same – it reduces to 20% resp. 10% of the value from the reference camera MINCAM1 (figure 11, right).

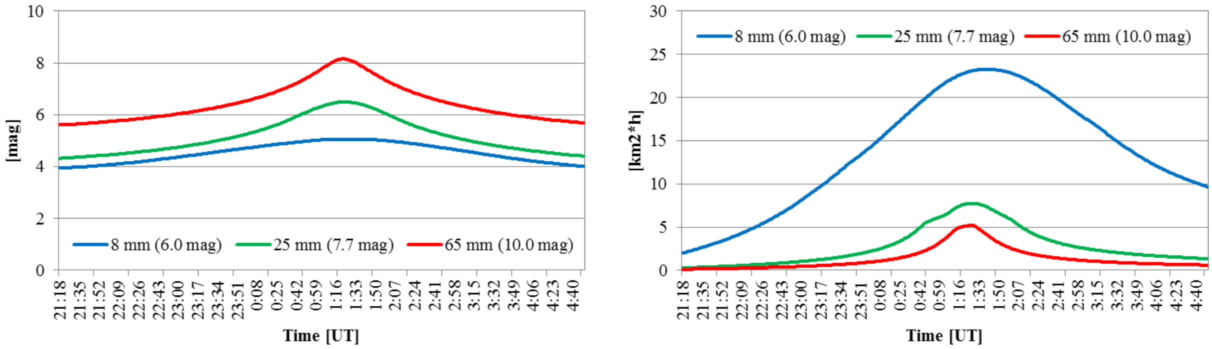

Figure 11: *Meteor limiting magnitude (left) and effective collection area (right) for the Orionids, calculated for three cameras with different focal lengths and stellar limiting magnitudes between 6.0 and 10.0 mag.*

The radiant distance of the Leonis Minorids decreases from over 100° in the evening (when the radiant is just rising) to 30° at dawn. In parallel, the apparent meteor velocity reduces from an average value of 22°/s down to 11°/s. The meteor limiting magnitude varies between 3.9 and 5.6 mag, which is equivalent to a loss in limiting magnitude between 2.1 magnitudes for MINCAM1 and 4.4 for ESCIMO. At dawn, the limiting meteor magnitude varies between 4.5 and 6.2 mag, i.e. the loss reduces to values between 1.5 and 3.8 mag (figure 12, left). Given a population index of 3.0, the effective collection area reduces to 15% resp. 8% relative to the reference camera MINCAM1 (figure 12, right).

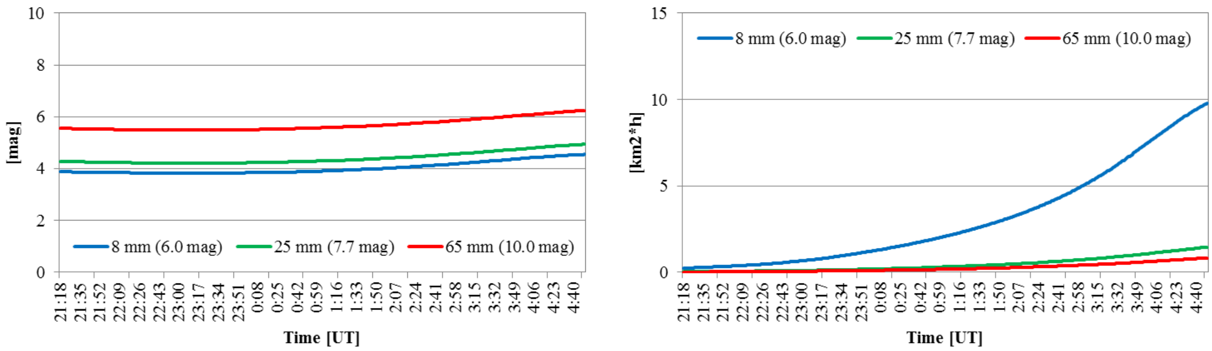

Figure 12: *Meteor limiting magnitude (left) and effective collection area (right) for the Leonis Minorids, calculated for three cameras with different focal lengths and stellar limiting magnitudes between 6.0 and 10.0 mag.*

Bottom line: Cameras with longer focal lengths can indeed increase the limiting magnitude range by 2 to 3 mag, whereby the gain is biggest for slow meteor showers. However, this gain in limiting magnitude comes at the cost of a significantly reduction of the field of view, so that the effective collection resp. the number of recorded meteors reduces by about one order of magnitude. The use of lenses with very long focal length is only worthwhile in case of major showers with sufficient amounts of shower members.

1. Observers

Code	Name	Place	Camera	FOV [$^{\circ 2}$]	St.LM [mag]	Eff.CA [km^2]	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG2 (0.8/8)	1475	6.2	3779	25	130.9	1190
BANPE	Bánfalvi	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	15	46.4	246
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	18	142.4	730
			HULUD3 (0.95/4)	4357	3.8	876	17	130.9	212
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	30	205.9	1107
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	20	126.9	355
			MBB4 (0.8/8)	1470	5.1	1208	20	115.5	272
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	24	134.4	528
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	23	125.7	521
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	19	153.9	816
			BMH2 (1.5/4.5)*	4243	3.0	371	13	128.2	615
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	24	183.8	1259
			C3P8 (0.8/3.8)	5455	4.2	1586	22	183.4	917
			STG38 (0.8/3.8)	5614	4.4	2007	23	175.6	1477
CSISZ	Csizmadia	Baja/HU	HUVCSE02 (0.95/5)	1606	3.8	390	22	96.9	266
DONJE	Donati	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	30	211.2	1327
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	25	171.7	830
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	21	150.1	794
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	22	192.3	1087
			TEMPLAR2 (0.8/6)	2080	5.0	1508	23	198.6	837
			TEMPLAR3 (0.8/8)	1438	4.3	571	22	191.3	421
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	23	200.5	893
			TEMPLAR5 (0.75/6)	2312	5.0	2259	24	197.4	848
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	20	112.0	584
			ORION3 (0.95/5)	2665	4.9	2069	20	109.0	246
			ORION4 (0.95/5)	2662	4.3	1043	11	71.7	142
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	26	261.8	845
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	24	188.2	1119
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	23	130.2	282
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	23	134.0	382
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	12	28.6	60
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	18	146.1	294
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	18	86.1	406
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	5	35.9	191
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	23	87.4	150
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	20	95.8	574
			STEFKA (0.8/3.8)	5471	2.8	379	14	79.1	268
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	20	120.3	107
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	17	139.1	1233
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	22	131.8	1330
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	18	97.7	321
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	19	133.0	318
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	26	196.3	864
			PAV36 (0.8/3.8)*	5668	4.0	1573	26	220.1	1445
			PAV43 (0.75/4.5)*	3132	3.1	319	24	198.0	808
			PAV60 (0.75/4.5)	2250	3.1	281	28	214.2	1328
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	23	176.8	405
MARRU	Marques	Lisbon/PT	CAB1 (0.8/3.8)	5291	3.1	467	3	22.0	69
			RAN1 (1.4/4.5)	4405	4.0	1241	11	62.8	272
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	12	44.2	331
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	24	150.6	1144
			ESCIMO (0.6/130)*	21	10.0	3507	2	17.0	10
			MINCAM1 (0.8/8)	1477	4.9	1084	24	131.2	571
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	25	156.9	1326
			REMO2 (0.8/8)	1478	6.4	4778	24	156.3	945
			REMO3 (0.8/8)	1420	5.6	1967	15	96.8	578
			REMO4 (0.8/8)	1478	6.5	5358	24	163.2	1180
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	20	138.8	261
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	17	37.6	327
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	21	125.8	521
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	20	133.7	331
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	21	151.8	866
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	20	130.3	508
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	13	78.9	244
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	20	173.7	292
			RO2 (0.75/6)	2381	3.8	459	20	189.4	513
			RO3 (0.8/12)	710	5.2	619	20	187.9	721
			SOFIA (0.8/12)	738	5.3	907	19	145.9	402
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	7	29.6	123
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	28	134.1	662
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	17	92.9	163
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	23	137.7	1092
			NOA38 (0.8/3.8)	5609	4.2	1911	28	172.1	1268
			SCO38 (0.8/3.8)	5598	4.8	3306	28	172.5	1651
STORO	Štork	Ondrejov/CZ	OND1 (1.4/50)*	2195	5.8	4595	1	8.0	81
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	27	143.3	551
			MINCAM3 (0.8/6)	2338	5.5	3590	28	138.1	680
			MINCAM4 (1.0/2.6)	9791	2.7	552	26	129.7	465
			MINCAM5 (0.8/6)	2349	5.0	1896	24	133.6	538
			MINCAM6 (0.8/6)	2395	5.1	2178	28	146.6	513
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	23	134.2	374
			HUMOB (0.8/6)	2388	4.8	1607	26	154.2	480
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	17	66.1	202
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	14	92.6	387
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	5	16.1	44
			HUVCSE04 (1.0/4.5)	1484	4.4	573	4	15.8	43
Sum							31	1199.1	51979

* 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	4.7	7.3	8.8	10.5	3.3	8.0	-	0.5	1.9	1.0	-	5.1	-	2.7	5.7
BANPE	-	1.8	0.3	-	2.8	3.6	1.9	3.5	5.2	4.4	1.1	5.1	3.1	1.2	-
BERER	-	-	-	-	5.4	1.9	-	-	-	10.3	6.4	3.8	9.1	10.3	-
	-	-	1.0	-	6.4	-	-	-	-	9.3	4.4	7.6	8.6	9.1	-
BOMMA	1.1	10.7	10.2	9.6	7.3	11.0	3.8	10.9	5.4	5.4	4.1	2.5	3.5	-	3.5
BREMA	0.2	6.1	10.8	-	-	-	7.8	-	7.5	2.0	-	-	8.9	-	-
	-	5.0	10.5	2.4	-	-	8.0	-	6.7	2.5	1.5	-	8.6	-	-
BRIBE	6.5	9.7	10.8	3.1	2.7	-	4.8	-	5.2	2.0	7.6	0.2	10.5	-	1.2
	10.6	10.7	10.7	4.3	0.7	-	1.7	-	3.5	1.2	6.2	0.8	9.8	3.8	0.1
CASFL	9.2	3.0	1.4	7.3	5.2	8.8	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRIST	8.2	10.6	7.9	10.7	0.9	2.9	-	-	-	-	3.0	-	1.6	0.6	2.4
	8.3	10.3	9.3	7.3	-	4.9	-	-	-	-	0.6	-	2.7	1.0	0.2
	8.7	9.6	9.1	10.7	-	5.8	-	-	-	-	0.6	-	-	0.5	1.4
CSISZ	0.2	1.2	-	0.9	2.5	-	5.4	3.4	8.9	7.4	3.5	7.9	6.0	2.1	-
DINJE	1.2	10.7	10.3	10.4	6.0	11.1	4.6	11.2	4.3	0.4	3.5	3.7	3.4	0.2	2.7
ELTMA	6.7	5.0	9.0	10.6	5.1	7.2	-	2.7	-	0.6	-	5.3	1.1	1.8	-
FORKE	7.2	10.5	10.5	10.2	1.1	8.4	-	2.7	5.4	-	5.8	4.8	-	6.6	-
GONRU	10.1	10.3	6.8	9.0	10.5	-	-	-	-	5.4	-	-	1.8	-	-
	10.3	10.5	6.9	9.0	10.8	-	-	-	-	6.5	-	3.4	2.2	-	-
	10.5	10.6	5.9	8.8	10.9	-	-	-	1.6	4.9	0.9	2.7	-	-	-
	10.3	10.5	6.9	9.0	10.7	-	-	-	-	6.5	-	2.7	2.3	-	-
	10.8	10.8	6.0	8.6	9.4	-	-	-	2.0	3.4	-	2.9	0.5	-	-
GOVMI	-	4.5	-	-	3.9	1.2	4.1	5.8	10.8	10.8	-	10.9	-	4.9	-
	-	5.7	1.6	-	5.1	1.9	3.1	5.9	10.2	10.3	7.9	11.2	7.6	3.1	-
	-	7.9	-	-	6.0	1.1	3.1	5.9	10.7	11.1	10.8	-	-	2.1	-
HERCA	9.0	10.9	10.3	11.1	10.7	-	-	-	-	10.5	9.5	7.4	-	11.4	11.3
HINWO	7.5	10.0	10.7	10.8	4.2	9.3	-	3.8	5.6	-	8.4	5.8	-	7.5	6.5
IGAAN	0.2	1.0	-	0.3	7.4	-	10.3	4.8	10.9	10.9	11.0	10.2	6.3	1.8	-
	-	-	-	3.9	8.2	0.6	8.6	7.6	8.9	8.6	8.8	8.8	5.9	2.2	-
	-	-	0.3	-	-	-	-	-	4.3	4.1	2.0	1.4	1.7	2.6	-
JONKA	-	-	-	-	1.8	1.1	4.2	8.1	8.7	11.0	11.3	10.8	9.6	8.2	-
KACJA	-	2.2	0.4	-	-	-	1.3	-	0.3	10.7	3.6	8.8	-	1.6	-
	-	-	-	-	1.2	-	-	-	-	-	8.3	9.6	-	-	-
	1.1	6.1	3.0	-	3.6	0.2	2.4	2.6	4.5	9.9	3.2	10.3	3.8	3.4	-
	-	3.3	0.5	0.3	-	-	1.8	-	-	10.0	4.8	8.4	-	1.9	-
	-	-	1.6	-	-	-	2.0	-	0.3	8.7	6.1	10.9	-	-	-
KISSZ	-	-	2.3	-	0.7	-	1.7	-	7.6	8.5	10.3	7.4	-	8.3	-
KOSDE	10.3	10.3	9.5	-	10.4	10.4	-	6.7	5.6	6.4	10.0	4.9	10.6	10.6	10.7
	10.3	10.3	8.8	7.9	6.9	5.9	5.4	-	5.0	3.2	2.7	3.3	4.3	6.5	6.4
	-	8.9	10.3	1.3	-	-	2.6	-	6.7	4.1	5.2	-	2.7	3.7	-
LOJTO	-	10.4	9.1	10.7	9.9	3.4	-	-	10.3	8.0	2.2	2.3	5.6	-	-
MACMA	1.7	10.6	10.9	10.9	7.4	7.0	6.2	6.9	11.1	9.8	6.7	2.6	6.6	-	4.3
	0.5	10.6	10.9	10.9	9.4	8.5	9.5	8.6	11.1	10.6	7.2	3.8	7.2	2.9	6.2
	-	10.7	10.8	10.8	9.0	3.1	8.0	6.4	11.0	10.1	6.9	2.4	6.4	-	4.8
	0.5	10.1	10.7	10.4	9.8	8.8	10.1	8.2	11.0	10.6	7.4	3.6	7.4	0.7	5.7
MARGR	10.3	10.5	5.9	7.8	3.2	-	-	-	-	4.6	8.4	10.2	9.6	10.2	10.3
MARRU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.3	10.0	10.5	10.5	-	-	-	-	-	-	-	-	-	-	-
MASMI	5.4	9.2	4.3	-	0.3	0.6	-	4.9	-	-	-	-	-	-	2.0
MOLSI	4.7	10.1	10.1	2.3	5.3	2.7	-	8.2	9.3	6.1	8.0	10.4	-	5.3	1.8
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.7	10.2	9.9	2.6	4.5	1.1	0.2	6.0	8.6	2.9	6.0	9.7	-	5.1	-
	6.1	8.7	10.4	10.5	5.5	9.7	2.7	2.7	4.1	-	1.8	4.9	-	8.1	9.1
	9.3	8.7	10.5	10.5	4.7	8.5	2.0	1.6	3.9	-	0.7	4.0	-	8.1	9.0
	0.9	5.0	10.7	10.8	5.6	4.7	-	3.4	4.4	-	-	4.7	-	7.6	-
	7.6	9.4	10.7	10.8	5.7	9.4	1.4	3.4	4.4	-	1.3	4.9	-	8.6	9.7
MORJO	-	1.1	-	-	4.0	1.3	7.3	5.8	10.8	11.1	11.2	11.3	8.6	5.1	-
MOSFA	0.7	0.4	-	1.5	1.3	2.0	-	-	0.2	2.3	0.2	0.7	-	-	1.2
OCHPA	6.0	0.8	0.9	-	5.0	4.2	-	-	0.2	1.2	-	1.2	-	-	-
OTTMI	-	-	-	6.9	-	5.0	5.9	-	3.5	6.0	8.5	-	-	-	-
PERZS	-	1.6	3.9	-	6.5	7.0	2.9	4.4	9.2	9.2	9.2	10.1	9.1	-	0.8
PUCRC	4.2	9.0	5.3	8.8	7.4	4.1	-	5.1	5.2	6.9	1.8	6.9	2.9	-	-
ROTEC	-	-	-	10.6	-	-	-	-	-	-	-	4.6	-	2.8	6.4
SARAN	10.6	9.5	6.0	9.5	8.4	-	-	-	-	8.9	-	8.4	5.5	-	-
	10.6	9.4	10.2	8.4	10.2	-	-	-	-	10.1	-	6.1	9.5	-	-
	10.4	10.4	9.9	10.1	10.1	-	-	-	-	10.3	-	7.7	5.0	-	-
	9.9	5.3	5.2	9.3	8.6	-	-	-	-	7.5	-	7.7	5.3	-	-
SCALE	5.5	4.0	8.4	-	3.3	5.0	-	2.3	1.1	-	-	-	-	-	-
SCHHA	5.9	4.8	8.9	1.0	2.4	0.8	2.3	0.8	4.2	3.3	8.8	0.6	10.5	1.0	-
SLAST	2.9	4.6	3.7	3.4	-	-	1.4	1.9	4.6	10.6	5.7	9.0	-	-	-
STOEN	6.0	5.6	6.0	10.1	7.6	7.1	-	0.5	0.3	0.7	-	4.1	4.1	0.8	2.9
	6.4	5.2	5.8	10.1	10.3	9.4	-	1.0	0.2	1.0	0.6	4.3	3.2	0.7	3.6
	6.9	3.9	7.0	10.2	10.9	11.1	-	0.7	0.3	1.1	0.6	3.5	4.6	0.7	3.7
STORO	-	-	-	-	-	8.0	-	-	-	-	-	-	-	-	-
STRJO	4.9	7.1	10.5	10.5	6.0	-	5.3	-	4.7	1.4	1.1	0.7	8.3	4.8	5.6
	4.1	7.1	9.6	7.6	4.9	1.6	7.1	1.6	5.2	1.4	0.8	0.6	8.1	3.5	5.5
	6.3	5.8	10.5	10.5	4.8	0.6	2.8	0.4	5.2	1.5	1.3	0.6	7.1	3.5	5.4
	4.9	6.9	10.4	10.0	3.7	-	5.9	-	2.7	1.5	0.8	1.2	5.8	4.6	5.4
	5.2	7.1	10.5	10.5	4.6	1.1	7.1	0.8	6.1	1.7	1.7	0.6	8.1	4.4	5.7
TEPIS	-	-	0.6	-	4.7	9.6	3.9	3.4	10.0	9.0	3.8	9.1	6.4	5.5	0.5
	-	1.9	2.5	0.2	4.2	10.7	3.0	4.0	11.0	10.4	7.4	9.8	10.2	8.6	0.6
TRIMI	0.2	2.6	-	1.0	-	-	0.3	-	3.4	4.9	4.1	6.2	2.0	-	-
YRJIL	9.8	-	-	7.5	-	-	8.6	-	-	0.6	6.1	-	-	1.8	4.4
ZELZO	-	-	-	-	-	-	-	-	4.5	-	-	4.1	2.4	-	-
	-	-	-	-	-	-	-	-	2.3	-	-	4.8	3.3	-	-
Sum	346.6	494.3	483.6	455.2	381.0	261.4	192.5	179.1	341.8	397.3	303.4	376.0	309.0	224.1	166.7

October	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	3.7	9.2	11.4	6.3	3.1	-	0.6	-	1.7	2.2	4.2	12.0	12.1	-	0.7	4.2
BANPE	-	-	6.6	5.6	-	-	-	-	-	-	-	-	0.2	-	-	-
BERER	2.0	11.4	10.9	10.1	-	2.5	-	9.9	-	7.5	11.6	8.9	11.7	-	8.7	-
	1.8	11.6	9.6	9.7	-	-	-	8.7	-	3.6	11.8	7.0	11.9	-	8.8	-
BOMMA	7.8	10.0	7.2	9.1	6.1	6.2	2.6	0.2	8.7	12.0	4.2	4.3	2.5	12.1	12.1	11.8
BREMA	6.3	9.0	11.7	8.1	1.8	-	2.0	0.2	-	5.5	4.8	11.6	4.6	-	6.4	11.6
	-	8.1	11.6	8.8	1.9	2.1	2.5	-	-	4.9	3.5	3.6	4.6	-	6.2	12.5
BRIBE	2.9	9.3	11.7	3.2	5.9	1.0	0.2	-	-	3.5	0.2	10.6	10.1	-	-	11.5
	2.1	10.0	11.6	4.5	-	-	0.9	-	-	2.5	7.9	5.8	-	-	5.5	10.8
CASFL	-	3.6	1.9	6.1	-	-	11.1	9.0	9.4	8.9	8.0	12.1	12.2	12.2	12.3	12.2
	-	9.3	4.9	10.5	-	-	10.1	11.1	8.9	7.7	6.9	11.7	12.0	12.0	12.1	11.0
CRIST	-	0.6	11.4	11.4	1.4	10.6	11.6	11.6	11.7	5.4	11.8	11.8	11.9	11.9	11.9	-
	-	-	11.1	9.2	-	7.5	11.6	11.6	11.7	4.8	11.8	11.8	11.9	11.9	12.0	11.9
	-	0.4	9.7	10.0	1.1	10.8	11.5	11.6	11.6	0.5	10.7	10.4	10.5	10.4	10.0	10.0
CSISZ	-	8.4	4.7	10.8	8.0	3.3	-	-	-	1.6	4.0	2.3	1.6	-	2.8	-
DINJE	7.9	9.9	7.8	8.8	7.4	9.3	3.6	-	11.4	11.8	6.7	4.8	2.2	12.0	11.8	12.1
ELTMA	-	8.6	10.4	4.1	-	5.9	3.5	4.1	4.3	10.5	12.1	11.3	12.2	7.6	10.0	12.0
FORKE	-	2.0	11.4	5.6	9.7	-	-	-	6.4	-	9.0	11.2	9.7	2.8	-	9.1
GONRU	3.1	-	7.2	10.3	11.1	11.0	8.3	11.4	11.4	11.5	11.3	2.4	10.8	11.7	11.7	5.2
	2.7	-	2.0	11.3	11.5	11.6	11.6	11.7	11.6	11.7	11.2	1.6	11.1	11.9	11.9	5.6
	-	-	8.6	11.3	11.4	11.5	7.7	11.3	11.7	11.6	11.5	4.1	10.2	11.8	11.8	-
	1.9	-	5.7	11.4	11.4	11.6	11.5	11.7	11.6	11.8	11.7	2.0	11.1	11.9	11.9	4.4
	2.0	-	7.6	11.2	10.8	11.6	11.2	11.6	11.7	11.6	11.5	5.7	9.7	11.7	11.9	3.2
GOVMI	-	8.5	11.3	11.2	5.5	1.7	0.2	-	-	6.9	0.5	8.3	-	0.4	-	0.6
	-	6.8	11.4	11.5	2.1	-	0.6	-	-	1.6	0.2	1.2	-	-	-	-
	-	6.4	6.6	-	-	-	-	-	-	-	-	-	-	-	-	-
HERCA	9.8	8.7	11.1	5.1	10.4	11.2	9.9	11.6	11.2	11.5	11.0	7.8	6.1	11.5	11.9	10.9
HINWO	2.7	1.5	11.7	8.0	10.0	1.2	-	-	11.9	-	10.6	12.2	12.2	6.2	-	9.9
IGAAN	1.2	11.4	6.9	11.4	4.2	3.0	-	-	-	2.4	6.1	-	1.4	-	2.7	4.4
	-	8.1	8.0	8.4	8.6	0.9	0.2	-	-	1.2	6.8	7.8	1.3	-	6.2	4.4
	-	3.1	-	-	-	-	-	1.8	-	-	-	-	3.0	2.2	2.1	-
JONKA	-	10.7	10.3	-	-	-	-	-	-	8.6	-	8.0	6.0	5.7	12.2	9.8
KACJA	0.8	1.9	10.1	10.8	3.8	-	-	-	-	-	-	3.6	11.4	1.3	10.0	3.5
	-	6.4	10.4	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.5	2.3	5.8	2.0	-	-	-	0.4	-	-	2.9	1.4	8.2	2.4	7.4	-
	0.9	2.1	11.0	11.1	4.1	-	1.1	-	-	-	1.3	5.1	12.1	0.2	12.1	3.7
	-	-	11.0	11.0	2.5	-	-	-	-	-	-	3.5	10.0	0.9	7.2	3.4
KISSZ	-	11.7	9.1	11.6	0.8	-	-	0.2	-	8.3	2.4	12.0	3.5	2.3	11.2	0.4
KOSDE	10.7	1.0	-	-	-	0.1	10.9	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	5.5	-	3.2	9.2	2.4	-	2.3	2.4	10.8	9.1
	2.6	3.1	5.3	-	-	1.4	1.0	-	-	5.0	-	11.2	-	-	10.6	12.0
LOJTO	-	-	-	8.3	-	-	-	3.3	0.1	9.4	0.8	12.3	12.3	12.1	-	2.5
MACMA	-	-	-	11.6	6.2	1.1	-	1.6	6.8	12.0	12.0	12.2	12.1	12.3	5.4	0.3
	-	-	-	11.8	6.1	2.6	-	3.4	11.0	12.2	12.3	12.5	12.4	12.4	5.5	-
	-	-	-	11.5	5.3	1.2	-	2.0	11.4	12.1	12.2	12.0	12.3	12.3	5.3	-
	-	0.2	-	11.4	5.6	2.5	-	3.6	11.0	12.1	12.1	10.4	12.2	12.3	5.4	0.4
MARGR	7.9	8.9	4.5	7.1	10.6	9.3	-	-	5.6	8.0	-	6.2	3.6	7.5	6.6	-
MARRU	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	11.5	4.9
	-	-	-	-	2.7	1.3	2.7	3.9	4.7	2.7	3.5	-	-	-	-	-
MASMI	-	0.1	6.5	5.5	-	-	-	-	-	4.2	-	1.2	-	-	-	-
MOLSI	-	9.9	9.7	11.1	2.9	7.1	-	3.5	6.5	1.5	-	-	-	5.7	2.7	5.7
	-	-	-	10.5	-	-	-	-	6.5	-	-	-	-	-	-	-
	-	8.8	8.3	11.4	2.8	7.0	-	2.7	6.4	0.6	-	-	-	4.4	1.7	5.6
	6.5	9.4	11.4	6.2	3.0	-	1.4	1.1	0.5	3.6	5.7	11.8	12.0	-	-	-
	7.1	9.7	11.6	7.1	3.2	-	1.7	1.5	-	3.5	5.4	11.8	12.2	-	-	-
	-	-	9.4	0.3	-	-	-	-	-	-	6.3	10.7	12.3	-	-	-
	7.0	10.1	11.7	7.1	2.7	-	2.0	1.6	-	3.5	5.9	12.0	12.3	-	-	-
MORJO	-	11.6	11.6	11.7	8.8	-	-	-	0.7	2.2	-	7.3	2.3	-	-	5.0
MOSFA	-	-	1.0	0.8	-	3.1	6.1	7.0	5.8	3.3	-	-	-	-	-	-
OCHPA	-	10.3	-	7.5	-	5.0	2.9	10.1	9.1	8.8	9.2	8.3	8.8	9.4	8.9	8.0
OTTMI	9.2	4.2	10.1	8.5	8.3	10.0	8.7	-	3.4	8.7	5.5	1.1	-	7.2	2.2	10.8
PERZS	-	9.4	11.5	11.6	8.1	-	-	-	-	8.6	-	11.6	10.2	5.4	1.5	-
PUCRC	-	-	-	-	-	4.7	8.4	0.1	8.8	8.4	-	-	11.4	9.5	11.4	-
ROTEC	1.4	8.8	11.6	4.3	-	-	-	-	2.8	0.7	-	12.0	12.1	-	0.8	-
SARAN	-	-	5.4	8.3	10.1	9.4	10.7	10.6	9.5	-	9.7	-	9.3	11.7	11.8	0.4
	-	-	6.7	8.3	9.7	9.9	9.2	10.5	10.8	9.2	8.1	-	9.1	11.7	11.7	-
	-	-	6.9	8.2	10.1	9.9	10.3	10.3	10.6	10.1	8.7	-	9.0	8.4	11.5	-
	-	-	5.8	5.7	5.7	3.6	9.5	10.6	8.5	-	8.3	-	8.2	11.3	9.9	-
SCALE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCHHA	2.4	9.0	10.4	5.4	6.8	3.9	1.8	2.9	-	3.6	1.8	8.7	5.3	-	4.6	12.2
SLAST	-	-	-	5.5	2.6	-	-	-	-	-	-	8.0	10.1	5.9	9.9	3.1
STOEN	-	4.7	11.0	2.6	-	4.9	6.1	-	-	8.3	11.4	10.1	-	-	10.7	12.1
	-	4.9	10.9	1.9	-	4.8	6.9	9.2	4.7	7.9	11.4	12.1	0.1	11.1	12.2	12.2
	-	3.9	10.9	1.1	-	4.5	8.1	9.5	4.6	8.0	11.5	12.0	12.0	0.1	12.2	8.9
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	4.1	8.2	8.1	6.7	2.1	1.4	0.3	-	0.3	4.4	1.3	11.9	10.2	-	2.2	11.2
	6.1	8.8	9.7	4.2	2.2	-	0.8	0.3	0.2	4.3	-	11.4	9.2	-	1.1	11.1
	0.3	7.8	11.5	6.2	1.5	0.8	-	2.0	-	2.0	-	11.9	8.2	-	-	11.2
	5.3	7.7	11.5	4.9	-	-	0.5	-	-	4.4	1.0	11.9	10.3	-	1.8	10.5
	4.1	8.0	11.5	5.6	1.8	0.9	0.4	-	0.2	4.4	-	11.7	10.1	-	1.7	11.0
TEPIS	-	7.1	10.2	10.3	-	-	-	5.5	-	2.0	3.0	11.9	7.2	3.2	3.4	3.9
	0.3	7.6	11.2	11.5	-	1.0	-	2.9	-	8.8	3.4	5.8	3.4	-	6.3	7.5
TRIMI	-	-	9.8	9.5	3.2	-	3.0	-	-	2.8	-	-	6.9	-	2.8	3.4
YRJIL	9.4	8.5	-	-	-	-	11.3	2.1	-	-	-	-	-	7.7	10.5	4.3
ZELZO	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	4.7	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	-
Sum	144.5	403.1	607.1	570.7	286.7	245.9	264.3	271.5	320.6	412.1	401.1	529.9	559.4	374.6	498.2	397.4

3. Results (Meteors)

October	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	16	33	121	103	9	31	-	2	31	2	-	19	-	8	37
BANPE	-	10	2	-	13	10	2	17	32	17	2	18	16	9	-
BERER	-	-	-	-	20	1	-	-	-	56	23	8	42	27	-
	-	-	1	-	4	-	-	-	-	8	5	6	12	16	-
BOMMA	2	78	49	63	21	35	24	34	12	9	29	10	28	-	19
BREMA	1	3	30	-	-	-	24	-	9	6	-	-	30	-	-
	-	8	21	3	-	-	16	-	9	7	1	-	29	-	-
BRIBE	9	35	37	6	11	-	15	-	5	7	27	1	42	-	2
	30	57	43	4	4	-	4	-	2	5	20	1	61	17	1
CASFL	43	3	4	26	19	14	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRIST	52	63	27	40	1	5	-	-	-	-	11	-	2	4	12
	37	44	38	22	-	5	-	-	-	-	3	-	14	5	1
	53	81	52	60	-	12	-	-	-	-	3	-	-	3	7
CSISZ	1	2	-	1	8	-	12	8	20	14	11	22	14	3	-
DINJE	2	85	57	53	24	47	35	41	10	4	29	17	29	1	23
ELTMA	42	20	45	43	26	20	-	5	-	2	-	10	5	5	-
FORKE	20	55	54	47	2	25	-	12	13	-	46	32	-	15	-
GONRU	54	64	21	54	61	-	-	-	-	9	-	-	3	-	-
	44	47	9	32	62	-	-	-	-	19	-	12	7	-	-
	21	26	8	12	25	-	-	-	4	5	1	8	-	-	-
	39	43	15	30	48	-	-	-	-	18	-	19	9	-	-
	44	43	11	39	49	-	-	-	9	13	-	8	1	-	-
GOVMI	-	25	-	-	16	7	10	42	54	39	-	50	-	12	-
	-	6	2	-	13	2	4	11	17	14	13	23	18	4	-
	-	11	-	-	5	3	8	21	25	14	12	-	-	1	-
HERCA	24	19	25	32	31	-	-	-	-	22	30	26	-	34	29
HINWO	25	31	57	65	14	54	-	10	19	-	81	28	-	47	28
IGAAN	1	3	-	2	27	-	19	8	24	14	16	33	14	5	-
	-	-	-	6	15	1	22	16	27	17	15	27	8	6	-
	-	-	1	-	-	-	-	-	12	9	4	1	6	4	-
JONKA	-	-	-	-	3	5	5	9	20	16	18	21	24	14	-
KACJA	-	7	2	-	-	-	4	-	2	24	13	50	-	5	-
	-	-	-	-	3	-	-	-	-	-	31	33	-	-	-
	2	5	9	-	3	1	3	9	11	14	4	24	22	4	-
	-	7	1	1	-	-	1	-	-	39	9	21	-	3	-
	-	-	2	-	-	-	6	-	1	29	17	39	-	-	-
KISSZ	-	-	3	-	1	-	2	-	6	7	7	2	-	9	-
KOSDE	94	106	82	-	105	44	-	5	35	48	77	62	121	105	112
	108	115	109	107	95	106	81	-	48	11	15	18	15	36	39
	-	26	20	6	-	-	7	-	16	16	9	-	14	12	-
LOJTO	-	19	18	15	23	2	-	-	16	9	3	1	10	-	-
MACMA	2	43	46	27	24	16	5	8	25	23	13	2	5	-	17
	1	68	53	52	34	38	13	40	54	42	35	9	17	12	45
	-	28	68	62	20	20	17	18	43	34	19	2	4	-	27
	1	60	58	49	34	37	19	27	46	31	32	6	9	1	27
MARGR	25	21	2	8	1	-	-	-	-	4	15	30	19	30	23
MARRU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	29	30	21	-	-	-	-	-	-	-	-	-	-	-
MASMI	36	51	37	-	2	1	-	16	-	-	-	-	-	-	8
MOLSI	19	59	135	8	15	4	-	38	58	31	34	64	-	31	2
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	28	61	5	7	1	1	23	49	11	17	24	-	13	-
	14	55	107	104	32	50	5	7	58	-	9	22	-	41	82
	14	51	77	71	12	18	3	2	16	-	1	7	-	37	59
	3	16	59	50	26	17	-	10	28	-	-	13	-	24	-
	18	54	85	95	20	31	1	15	20	-	5	14	-	34	57
MORJO	-	1	-	-	11	3	9	14	16	13	16	24	10	7	-
MOSFA	4	2	-	9	8	13	-	-	2	1	1	4	-	-	8
OCHPA	21	2	4	-	8	9	-	-	1	4	-	1	-	-	-
OTTMI	-	-	-	8	-	12	10	-	8	17	19	-	-	-	-
PERZS	-	6	4	-	18	24	10	27	41	37	23	54	42	-	1
PUCRC	10	40	33	33	21	11	-	13	1	22	2	2	6	-	-
ROTEC	-	-	-	33	-	-	-	-	-	-	-	3	-	4	16
SARAN	17	17	9	13	22	-	-	-	-	8	-	12	13	-	-
	15	18	17	17	26	-	-	-	-	18	-	13	24	-	-
	36	36	36	48	59	-	-	-	-	19	-	25	26	-	-
	18	19	14	18	31	-	-	-	-	7	-	14	16	-	-
SCALE	28	11	38	-	17	13	-	11	5	-	-	-	-	-	-
SCHHA	15	8	40	7	12	5	10	2	12	23	36	10	63	5	-
SLAST	4	9	15	9	-	-	1	5	5	17	9	10	-	-	-
STOEN	59	34	71	63	41	36	-	2	2	4	-	14	46	5	16
	54	29	47	55	30	23	-	4	1	6	4	12	33	5	20
	73	27	73	71	43	54	-	6	3	6	3	12	55	4	38
STORO	-	-	-	-	-	81	-	-	-	-	-	-	-	-	-
STRJO	10	29	51	18	20	-	18	-	5	3	2	2	20	7	13
	7	53	59	25	28	3	37	4	17	4	1	1	32	14	13
	10	24	44	27	21	1	20	1	14	3	4	2	17	10	10
	10	50	43	16	20	-	18	-	3	1	1	3	19	8	11
	10	35	48	17	16	3	33	1	13	4	4	2	27	11	16
TEPIS	-	-	1	-	5	29	6	4	23	20	7	14	16	3	3
	-	5	9	1	3	30	7	9	49	38	15	38	38	18	1
TRIMI	1	6	-	3	-	-	2	-	10	14	9	15	5	-	-
YRJIL	40	-	-	35	-	-	18	-	-	1	20	-	-	12	14
ZELZO	-	-	-	-	-	-	-	-	10	-	-	10	9	-	-
	-	-	-	-	-	-	-	-	9	-	-	9	7	-	-
Sum	1372	2204	2450	1950	1448	1013	567	557	1136	1009	941	1149	1174	750	837

October	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	15	77	165	90	16	-	1	-	18	14	47	161	164	-	5	5
BANPE	-	-	49	48	-	-	-	-	-	-	-	-	1	-	-	-
BERER	1	72	50	38	-	3	-	80	-	26	85	40	119	-	39	-
	1	20	20	12	-	-	-	18	-	4	35	5	37	-	8	-
BOMMA	43	61	44	29	19	55	4	1	87	95	21	31	21	68	62	53
BREMA	4	21	64	8	3	-	4	1	-	16	18	42	7	-	26	38
	-	13	49	8	5	5	5	-	-	25	5	1	2	-	30	30
BRIBE	2	38	62	9	26	4	2	-	-	29	1	66	29	-	-	63
	2	35	78	36	-	-	5	-	-	8	20	9	-	-	17	62
CASFL	-	28	13	54	-	-	86	62	50	52	49	58	83	65	71	36
	-	41	11	60	-	-	66	82	50	49	36	54	48	47	49	22
CRIST	-	5	72	72	8	108	144	108	110	8	81	59	109	78	80	-
	-	-	61	42	-	77	123	96	73	6	57	50	67	41	39	16
	-	4	103	104	6	126	164	153	114	3	69	35	107	85	94	39
CSISZ	-	31	11	46	26	6	-	-	-	2	14	2	6	-	6	-
DINJE	56	61	36	39	23	79	9	-	131	103	37	45	27	83	70	71
ELTMA	-	28	31	9	-	31	17	25	28	45	80	71	84	48	63	47
FORKE	-	13	106	11	83	-	-	-	51	-	34	93	63	6	-	13
GONRU	9	-	34	43	57	70	20	85	92	85	65	6	86	79	82	8
	6	-	1	28	29	54	47	67	85	53	60	8	49	59	45	14
	-	-	32	20	21	28	14	31	29	20	27	7	27	32	23	-
	2	-	26	30	38	55	52	75	81	50	59	7	65	57	68	7
	1	-	46	45	21	53	43	68	76	50	61	19	49	51	47	1
GOVMI	-	38	96	109	16	3	1	-	-	23	3	33	-	3	-	4
	-	17	30	44	8	-	2	-	-	10	1	7	-	-	-	-
	-	14	28	-	-	-	-	-	-	-	-	-	-	-	-	-
HERCA	37	12	49	13	39	54	34	39	54	49	49	15	34	36	31	28
HINWO	13	3	115	51	91	3	-	-	106	-	31	111	103	14	-	19
IGAAN	1	43	8	32	2	2	-	-	-	3	15	-	2	-	7	1
	-	33	41	47	26	1	1	-	-	2	23	31	1	-	13	3
	-	10	-	-	-	-	-	3	-	-	-	-	5	2	3	-
JONKA	-	43	31	-	-	-	-	-	-	24	-	21	6	2	19	13
KACJA	2	3	91	87	9	-	-	-	-	-	-	16	55	6	27	3
	-	15	109	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	6	4	1	-	-	-	1	-	-	1	3	11	5	5	-
	2	4	116	125	10	-	9	-	-	-	2	19	115	1	79	10
	-	-	51	53	6	-	-	-	-	-	-	7	41	2	9	5
KISSZ	-	11	12	15	1	-	-	1	-	4	2	14	1	1	6	2
KOSDE	101	3	-	-	-	1	132	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	23	-	28	88	25	-	52	9	122	80
	5	4	23	-	-	2	2	-	-	11	-	68	-	-	32	48
LOJTO	-	-	-	10	-	-	-	20	34	29	5	42	36	23	-	3
MACMA	-	-	-	54	21	4	-	5	91	101	93	87	82	61	8	1
	-	-	-	117	27	16	-	28	124	136	133	131	118	86	16	-
	-	-	-	57	10	9	-	9	55	77	66	60	51	47	5	-
	-	1	-	120	23	17	-	31	130	114	110	106	143	80	15	1
MARGR	9	20	5	17	41	35	-	-	34	29	-	11	6	14	6	-
MARRU	-	-	-	-	-	-	-	-	-	-	-	-	-	32	26	11
	-	-	-	-	20	8	26	36	37	23	22	-	-	-	-	-
MASMI	-	90	42	26	-	-	-	-	-	18	-	4	-	-	-	-
MOLSI	-	56	85	177	76	144	-	34	40	2	-	-	-	12	8	12
	-	-	-	5	-	-	-	-	5	-	-	-	-	-	-	-
	-	27	39	74	40	89	-	14	16	1	-	-	-	9	2	7
	37	77	135	64	8	-	8	1	1	22	71	135	181	-	-	-
	15	49	143	68	11	-	7	2	-	23	43	97	119	-	-	-
	-	-	97	2	-	-	-	-	-	-	42	75	116	-	-	-
	29	71	147	65	22	-	6	2	-	21	79	134	155	-	-	-
MORJO	-	26	38	34	18	-	-	-	3	2	-	7	3	-	-	6
MOSFA	-	-	4	5	-	34	75	81	50	26	-	-	-	-	-	-
OCHPA	-	40	-	54	-	38	8	57	44	47	28	31	42	31	34	17
OTTMI	14	12	17	29	35	32	23	-	11	25	13	1	-	13	4	28
PERZS	-	55	108	119	38	-	-	-	-	54	-	103	73	18	11	-
PUCRC	-	-	-	-	-	4	12	1	85	68	-	-	60	38	46	-
ROTEC	2	20	56	14	-	-	-	-	9	1	-	34	49	-	3	-
SARAN	-	-	5	9	16	4	19	33	30	-	16	-	14	17	17	1
	-	-	17	10	26	18	36	45	41	35	34	-	32	35	36	-
	-	-	29	12	26	15	54	38	48	31	38	-	49	53	43	-
	-	-	9	7	18	4	39	38	29	-	26	-	33	29	33	-
SCALE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCHHA	1	40	73	36	29	21	5	39	-	8	1	57	16	-	31	57
SLAST	-	-	-	17	1	-	-	-	-	-	-	3	27	10	19	2
STOEN	-	28	70	8	-	61	51	-	-	82	118	91	-	-	110	80
	-	21	53	2	-	39	80	84	29	92	97	111	114	90	68	65
	-	27	57	3	-	66	108	108	35	98	133	151	149	109	83	56
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	6	37	61	40	11	3	1	-	1	41	2	43	45	-	10	52
	7	36	81	20	5	-	4	1	1	47	-	52	38	-	12	78
	2	27	78	32	3	3	-	7	-	10	-	37	15	-	-	43
	5	22	78	31	-	-	2	-	-	51	1	51	49	-	3	42
	7	21	82	14	6	2	4	-	1	36	-	38	23	-	6	33
TEPIS	-	13	36	50	-	-	-	15	-	24	3	39	24	9	14	16
	2	28	40	65	-	2	-	19	-	21	6	6	17	-	8	5
TRIMI	-	-	28	39	5	-	6	-	-	9	-	-	27	-	15	8
YRJIL	56	45	-	-	-	-	54	1	-	-	-	-	-	16	54	21
ZELZO	-	3	-	-	-	-	-	-	-	-	-	-	-	-	12	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
Sum	497	1699	3681	2964	1125	1488	1638	1745	2247	2361	2293	2951	3582	1712	2053	1386