Results of the IMO Video Meteor Network – March 2015

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Spring is further developing in a promising way. There were some period where the weather took a time-out, but overall March was pleasant and sympathetic to the observers. 50 out of the 84 active cameras spread over all regions managed to obtain twenty or more observing nights. Even though the total effective observing time could not quite catch up with the result of 2014, it was still the third most successful month ever with over 11,000 hours. As in previous years, the hourly average reached the annual low with just 1.7 meteors per hour, which yields a total of almost 19,000 meteors in March. Since the start of the IMO network in 1999, we have recorded more than 100,000 meteors in this low-activity month, which is after January the best total in the first half of the year. All other months still have slightly less meteors.

In March, our Portuguese team could win a new observer for the IMO network. Alvaro Lopes operates a Watec 902H2 camera with 6 mm f/0.75 Panasonic lens in Lisbon. In Hungary another camera saw first light. HUSOR2 is operated by Karoly Jonas, and just like its twin camera it consists of a KTC 350BH camera with a 1/3" f/0.95 zoom lens from Fujinon.

In months without noticeable meteor activity we are clutching at straws and eventually have another look at the sporadic meteors. Due to the low activity, the data set is small, but the results cannot be affected by major showers.

The flux density profile (figure 1) yields no surprises. The activity scatters around an average values and there are only few outliers.

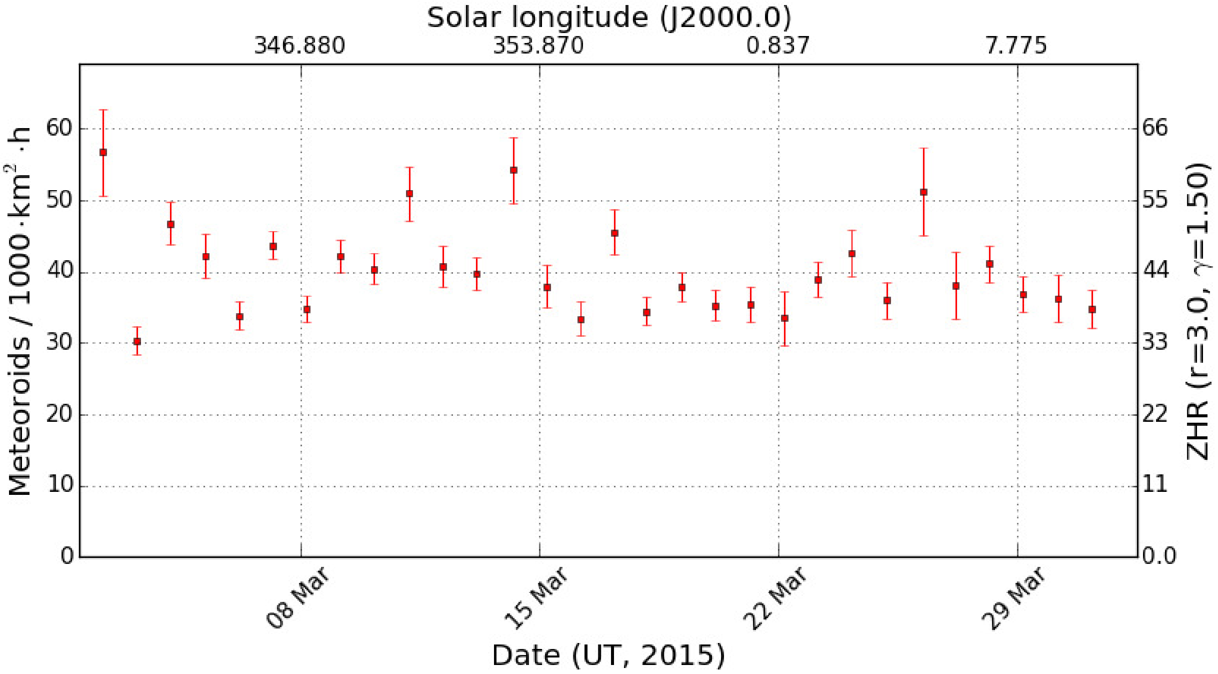

***Figure 1:** Flux density profile of sporadic meteors, obtained from video observations of the IMO network in March 2015.*

More thrilling is a look at the population index profile (figure 2), and here we are again: The r-value is relatively stable over a longer period of time or shows a continuous behavior, and there are also these sudden outliers. We see a flat profile between March 9 and 26, but also a downward outlier on March 14 followed by two upward outliers on March 15 and 26.

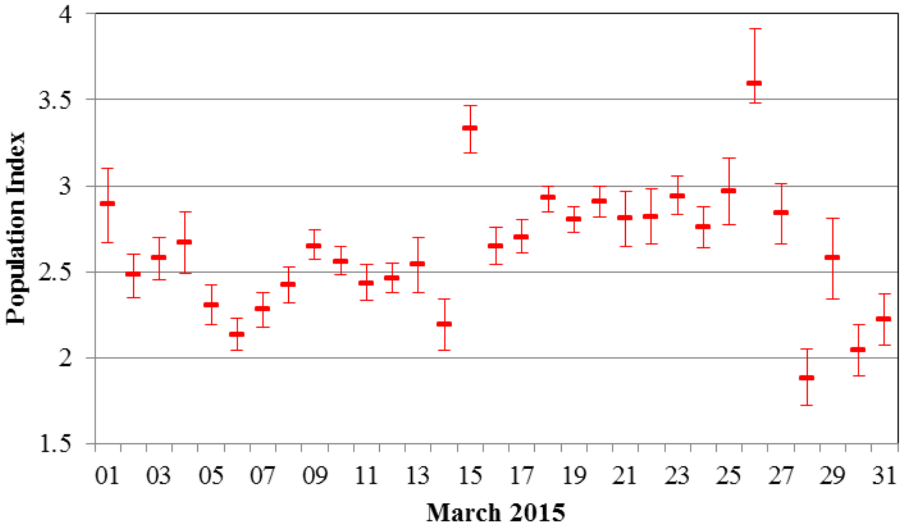

Figure 2: *Population index profile of sporadic meteors in March 2015.*

As always, the raw data are checked first: Are there any special features at these times? Is the data set particularly big or small? Are there specific cameras, which are (not) in operation in these nights?

Wrong! The raw data show no peculiarities. If, for example, each camera in turn is taken out of the March 15 data set and the population index is recalculated without this camera, there are only minor deviations in the population index. In this particular case, taking three sensitive cameras out lowered the r-value most, but even when all three cameras were removed at the same time, the population index was still beyond 3.0.

If the interim results of the population index calculation are checked it becomes clear, that the most powerful cameras recorded fewer meteors on March 14, but more on March 15 and 26 than in the nights before and thereafter. This is depicted in figure 3. Here the observing intervals are splits into four brightness classes depending on the limiting magnitude such that each class contains about a quarter of the effective collection area. Then it was checked, how many meteors were recorded in each class. In most nights, the intervals with lowest limiting magnitude have the biggest share of meteors, but on March 15 and 26 suddenly the more sensitive cameras are most successful A large percentage of meteor from highly sensitive cameras results obviously in a larger population index, but it still does not explain why the cameras were so successful in these nights.

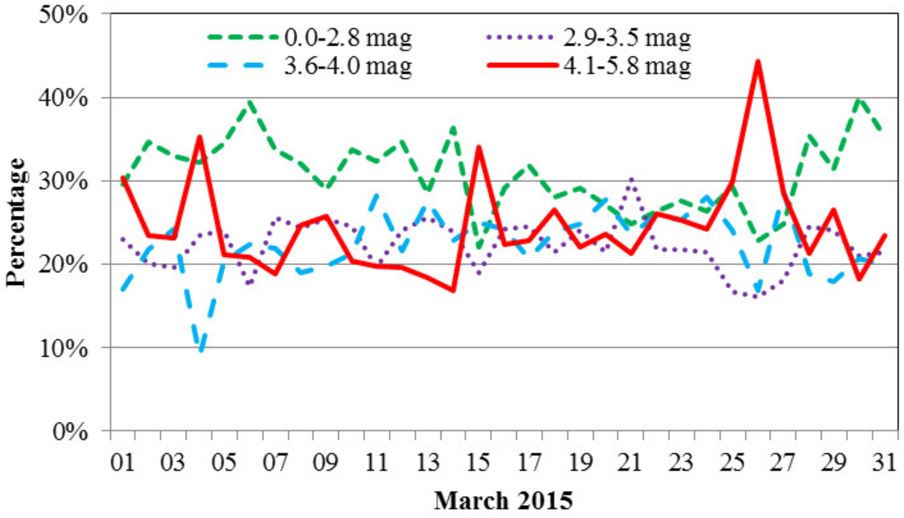

Figure 3: *Percentage of sporadic meteors in different limiting magnitude classes, each of which contains about a quarter of the effective collection areas*

Since we still don’t know if the outliers in the r-profile are real or just artifacts from specific boundary conditions, we looked for an independent confirmation. One option is to calculate the population index in the traditional way based on meteor magnitudes. Unfortunately we know that the accuracy of our video data is not very good in this respect, since the brightness is calculated from pixel sums in single, noisy video frames. Bright stars near the meteor trail or a bright image border may distort the result significantly. But that’s not yet all – there is also a systematic error in brightness calculations. If skies are pristine, a faint meteor will yield a small pixel sum. If it’s misty or cloudy such that only the brightest stars are visible, a very bright meteor that just makes it through the mist yields the same small pixel sum and brightness. The true meteor brightness is underestimated by several magnitudes. To avoid this error, all brightness measures would need to be systematically corrected by the difference between the current stellar limiting magnitude and the one when the reference image was taken. In practice that correction was neither implemented nor tested.

Still there is hope: If all meteor brightnesses are reduced to a single average value per night, the errors should mostly cancel each other out with a few hundred sporadic meteors. In addition, the number of meteors is significantly decreasing when the limiting magnitude is getting worse If there is a loss of two magnitudes, only about ten percent of sporadic meteors are visible, such that only one out of ten meteors shows a systematic deviation of two magnitudes. So the traditional meteor brightness based approach may at least give a hint, if the procedure that uses meteor counts of different cameras has some basic problem.

Figure 4 compares the average brightness of sporadic meteors with the population index of the same night. The average meteor magnitude was plotted against the y-axis on the right side, which is scaled such that both curves fit best. Indeed, the essential structures of the profile are all found here – the low value at the start of month, the minimum at March 14, larger values thereafter and the breakdown towards the end of the month. That is also reflected by the relatively large correlation coefficient of 0.74 between the two curves. The two outliers on March 15 and 26 are hardly visible, though.

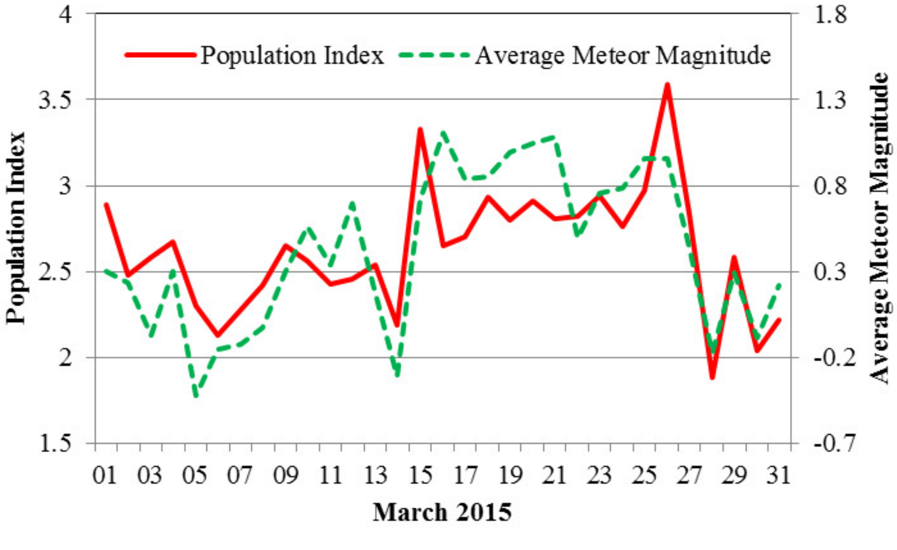

Figure 4: *Comparison of the average meteor brightness per night with the population index of sporadic meteors in March 2015.*

Now this presentation has some flaw, because it lumps cameras with different limiting magnitudes together. If a particularly sensitive camera has to pause because of clouds, the average meteor magnitude lowers automatically. That effect is even intensified by the fact, that sensitive cameras record more meteors. For this reason we alternatively plotted the average difference between the meteor brightness and the limiting magnitude just as done in visual observations. Note that the values of the y-axis at the right side are now in reverse order. Indeed, the profiles fit here as well and even the outliers seem to be present, but the peak on March 15 has a certain flaw: The shift by one day seems to be negligible, but it’s not. The data sets from

March 15 and 16 are completely independent from each other. One method yields an outlier on March 15, the other method one day later. That’s not a good agreement. This may also explain why the correlation coefficient of -0.60 is absolutely a bit smaller (the negative sign reflects the inverse correlation).

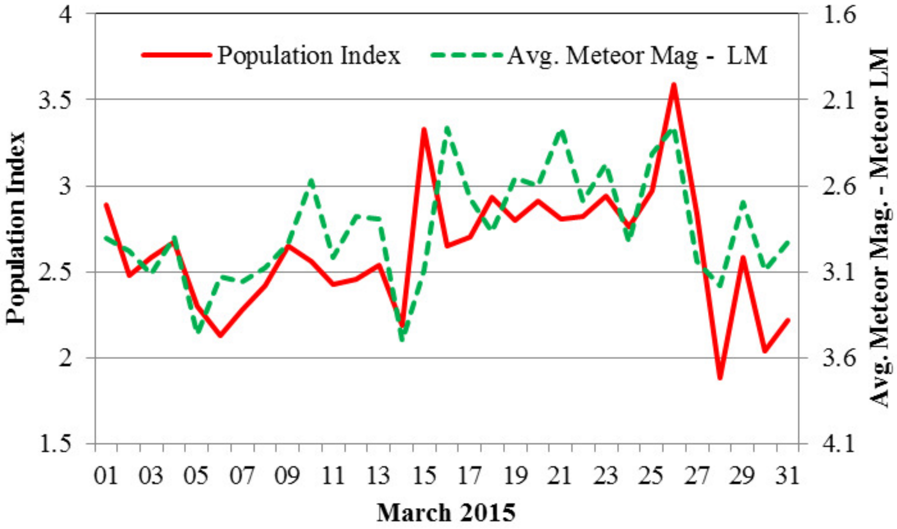

***Figure 5:** Comparison of the average difference between the meteor brightness and the limiting magnitude of the camera with the population index of sporadic meteors in March 2015.*

Now how do we obtain real population indices from average meteor brightness values or differences between meteor brightness and limiting magnitude? In case of visual observations, a transformation is applied that was derived 25 years ago by Ralf Koschak and Jürgen Rendtel based on „double count“observations. With these observations it was analysed, if in case one observer spots a meteor, the other would see it as well. The result was converted into a probability to spot a meteor. In visual observation there are two important factors – the difference between the meteor brightness and the limiting magnitude (the fainter a meteor, the lower the chance to see it), and the distance from the center of the field of view (the farther away a meteor, the lower the chance to see it).

For video observations, the second factor is irrelevant, because the detection probability is the same in the full field of view. So it comes as no surprise that the visual transformation function yields no sensible result when applied directly to video data. What remains is the dependency from the difference between meteor and limiting magnitude. In our video flux density calculation, a simple step function is assumed: Up to the limiting magnitude, all meteors are detected, beyond that none. This step function still does not provide a sensible result when applied to the calculation of the population index.
A better approach is to model the detection probability with the same type of function as in visual observation. The result of the „double count“ observation was, that the log detection probability *LOGPROB* is growing linearly with the difference between meteor and limiting magnitude *DIFFLM* (figure 6). At the upper end the linear function is snapping off, but that’s simply ignored here.

WGN, the Journal of the IMO 18:2 (1990)

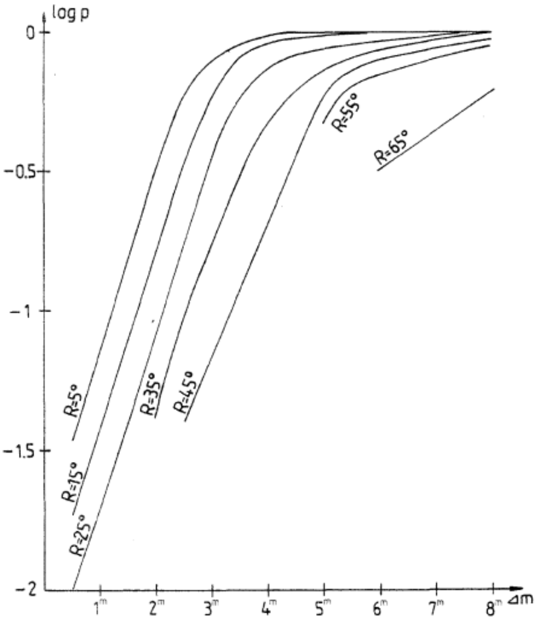

Figure 9 – Probabilities of perception $p(\Delta m, R)$ in dependence on Δm for some distance classes R.

Figure 6: *Log detection probabilities for meteors depending on the difference between the meteor brightness and visual limiting magnitude as well as the distance from the center of field of view. The illustration was taken from the WGN article of Koschak and Rendtel in 1990.*

The dependency can alternatively be described by an exponential function of type $PROB = const1 \times DIFFLM^{const2}$. Unfortunately the WGN paper gives no formula but only a table with the raw values. These values were copied into an Excel file and an exponential resp. linear function was fitted. As can be seen in figure 6, all linear functions have about the same slope of 0.6. It means that the increase in detection probability with increasing brightness differences is in principle the same – the functions only deviate in the value at which the detection probability is 100%. Or to say it with other words: The bigger the distance from the center of field of view, the brighter must be a meteor to be safely detected.

Using the probability function above and with the help of a little program by Rainer Arlt it was now possible to calculate the population index from the average difference between meteor brightness and video limiting magnitude. Also at this step we obtain only a long list of values that are imported to Excel and approximated by an exponential function of type $r = const3 \times DIFFLM^{const4}$. The exponent *const4* was in many cases almost exactly -1.0. That it, *r* and *DIFFLM* are inverse proportional and the formulae can be further simplified to $r = const3 / DIFFLM$.

That's the theory for visual observations. If we take a similar transformation function $r = const3 \times DIFFLM^{const4}$ for video observations and adjust the parameters until the population index profile fits best to the target function, we find values of $const4=-1$ and $const3=7.5$. Hence, also video observations can apply the simplified transformation function $r = const3 / DIFFLM$.

Figure 7 presents a comparison of both population index profiles. The new graph looks very similar to the one presented in figure 5. With 0.59, also the correlation index is almost identical in both cases. That's probably because the population index and the difference between meteor brightness and limiting magnitude are inverse proportional. We may conclude that the detection probability of meteors depending on brightness difference from the limiting magnitude is comparable to visual observers at constant distance from the center of field of view. Looking at the log probabilities, we also find a linear function with a slope of roughly 0.6.

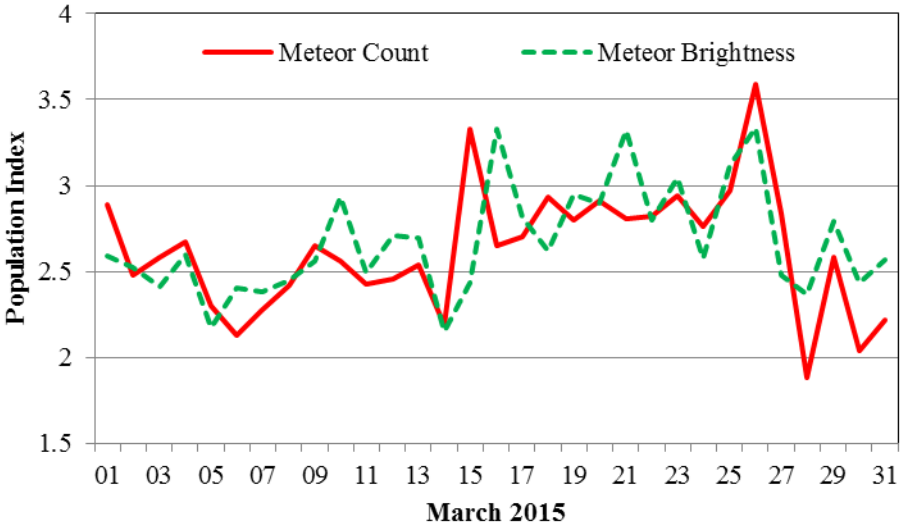

Figure 7: *Comparison of population indices of sporadic meteors in March 2015, obtained from the meteor count at different limiting magnitudes, and the meteor brightness values.*

Now it only remains to be understood why in case of video observations the 100% detection probability is obtained at a larger difference between meteor and limiting magnitude than at the center of field of view of visual observers. There is also a nice explanation for this offset. The determination of the limiting magnitude in MetRec works as follows: A number of video frames are stacked, all point-like objects above the noise level are extracted, the stars are identified, and their number is transformed into a limiting magnitude by the star field counting method. To detect a meteor, on the other hand, it must be above the detection threshold in at least three consecutive video frames. The meteor brightness is then calculated from the pixel sum in individual video frames. Both algorithms are not directly comparable to each other and will yield a constant offset. In stacked video frames, fainter stars become visible and will be identified, which will systematically increase the determined limiting magnitude and thereby also increase the difference between the meteor brightness and the limiting magnitude.

To summarize: There is good reason to assume, that video cameras and visual observers have the same type of dependency for the detection probability of meteors, which is inversely proportional to the difference between meteor brightness and limiting magnitude. If the average meteor brightness is compared with the population index profile, the outliers mostly disappear. However, if the limiting magnitude is considered as well, they partly show up again. That gives hint not to search for the root cause in the algorithm to calculate population indices, but rather in the limiting magnitude calculation of sensitive cameras.

Finally there was a last attempt to explain the outliers from data. One possible interpretation may be that in these nights a small, unknown meteor shower with large population index was active, that shifted the whole brightness distribution. To verify this hypothesis, the program RadFind was adjusted such that is calculates the mean meteor brightness for each detected radiant. Then the active radiants including their average meteor brightness were calculated for each day of March. The values from the three most active radiants (without the Anthelion source) per neight were averaged and plotted in figure 8.
Wrong again! Also this type of analysis shows no peculiarities in the nights in question. So we have some new ideas but still no satisfying explanation for the outliers in the population index profile.

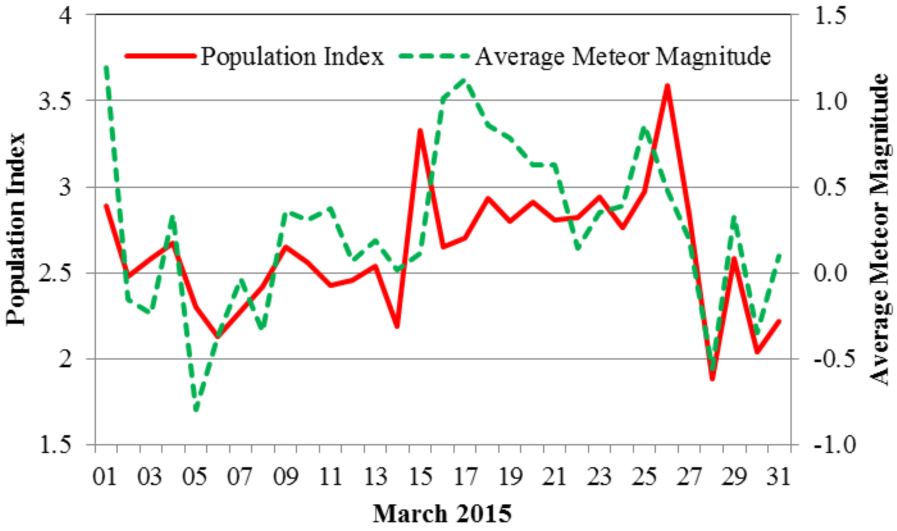

Figure 8: *Comparison of the average meteor brightness of the three strongest sporadic radiants per night with the population index of sporadic meteors in March 2015.*

1. Observers

Code	Name	Place	Camera	FOV [°^{2}]	St.LM [mag]	Eff.CA [km^2]	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG2 (0.8/8)	1475	6.2	3779	24	127.2	385
BANPE	Bánfalvi	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	11	20.4	71
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	12	106.4	293
			HULUD3 (0.95/4)	4357	3.8	876	11	76.6	69
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	21	147.7	293
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	17	127.4	119
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	21	151.6	245
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	23	145.7	227
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	25	206.2	401
			BMH2 (1.5/4.5)*	4243	3.0	371	23	188.0	264
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	25	169.7	311
			C3P8 (0.8/3.8)	5455	4.2	1586	22	160.6	189
			STG38 (0.8/3.8)	5614	4.4	2007	26	191.8	614
DONJE	Donati	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	18	116.1	250
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	19	131.7	165
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	15	105.8	221
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	27	207.2	427
			TEMPLAR2 (0.8/6)	2080	5.0	1508	27	209.9	365
			TEMPLAR3 (0.8/8)	1438	4.3	571	23	175.2	144
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	25	189.0	302
			TEMPLAR5 (0.75/6)	2312	5.0	2259	26	182.4	281
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	24	162.0	239
			ORION3 (0.95/5)	2665	4.9	2069	15	109.1	100
			ORION4 (0.95/5)	2662	4.3	1043	14	106.6	95
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	29	234.7	392
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	13	102.6	249
IGAAN	Igaz	Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	23	173.4	146
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	22	131.1	113
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	16	135.2	37
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	23	182.2	146
			HUSOR2 (0.95/3.5)	2465	3.9	715	19	131.9	97
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	16	112.6	256
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	1	7.8	7
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	24	155.9	101
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	19	126.8	424
			STEFKA (0.8/3.8)	5471	2.8	379	18	120.2	232
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	16	95.3	40
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	12	61.9	339
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	24	151.9	792
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	21	130.5	179
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	11	73.3	50
LOPAL	Lopes	Lisboa/PT	NASO1 (0.75/6)	2377	3.8	506	10	29.1	56
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	22	149.3	177
			PAV36 (0.8/3.8)*	5668	4.0	1573	24	157.9	280
			PAV43 (0.75/4.5)*	3132	3.1	319	21	158.4	185
			PAV60 (0.75/4.5)	2250	3.1	281	25	153.9	358
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	13	78.5	60
MARRU	Marques	Lisbon/PT	CAB1 (0.8/3.8)	5291	3.1	467	20	169.6	248
			RAN1 (1.4/4.5)	4405	4.0	1241	24	143.7	242
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	11	60.5	129
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	22	139.9	686
			MINCAM1 (0.8/8)	1477	4.9	1084	22	133.2	315
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	2	11.6	15
			REMO2 (0.8/8)	1478	6.4	4778	25	139.5	387
			REMO3 (0.8/8)	1420	5.6	1967	18	70.8	158
			REMO4 (0.8/8)	1478	6.5	5358	26	145.2	452
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	25	180.8	143
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	23	34.3	138
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	13	77.0	99
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	18	121.1	133
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	25	195.2	339
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	18	139.7	139
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	8	56.0	50
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	24	175.0	214
			RO2 (0.75/6)	2381	3.8	459	26	216.0	302
			RO3 (0.8/12)	710	5.2	619	28	223.1	425
			SOFIA (0.8/12)	738	5.3	907	26	189.9	203
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	21	128.5	235
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	24	165.2	142
			KAYAK2 (0.8/12)	741	5.5	920	22	175.2	88
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	23	149.4	355
			NOA38 (0.8/3.8)	5609	4.2	1911	24	166.3	366
			SCO38 (0.8/3.8)	5598	4.8	3306	24	170.7	420
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	21	124.7	184
			MINCAM3 (0.8/6)	2338	5.5	3590	19	122.8	171
			MINCAM4 (1.0/2.6)	9791	2.7	552	22	115.5	108
			MINCAM5 (0.8/6)	2349	5.0	1896	19	120.6	158
			MINCAM6 (0.8/6)	2395	5.1	2178	22	128.6	138
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	25	196.9	191
			HUMOB (0.8/6)	2388	4.8	1607	24	169.9	329
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	21	54.0	131
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	10	73.9	110
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	12	63.5	65
			HUVCSE04 (1.0/4.5)	1484	4.4	573	1	7.6	4
Sum							31	11124.1	18798

* active field of view smaller than video frame

2. Observing Times (h)

March	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	1.3	2.5	1.9	0.9	4.6	1.9	3.1	2.7	9.5	8.2	7.2	7.7	-	-	3.9
BANPE	-	-	2.5	-	1.8	1.3	4.7	1.8	2.6	0.5	-	-	-	-	-
BERER	-	-	6.5	-	-	10.4	10.4	10.7	10.7	10.1	-	-	-	-	-
	-	-	6.0	-	-	9.3	8.4	7.3	7.1	6.7	-	-	-	-	-
BOMMA	-	9.1	-	-	8.9	10.7	7.8	6.1	11.0	9.6	5.2	9.8	7.1	-	-
BREMA	3.1	7.9	-	-	2.9	10.1	10.9	3.4	1.8	8.1	10.6	10.6	7.1	-	-
BRIBE	4.8	9.6	6.6	0.9	2.2	9.6	10.9	6.4	5.9	9.2	10.7	10.6	8.7	-	5.0
	0.6	7.0	5.3	1.3	6.2	10.3	10.9	7.6	7.1	10.6	10.6	10.6	7.7	1.1	7.0
CASFL	1.0	11.3	9.4	1.7	11.2	11.1	10.8	11.1	10.8	4.1	10.9	10.8	10.7	10.0	-
	-	11.1	8.5	1.4	7.8	10.9	9.6	10.9	9.5	2.2	10.7	10.7	9.5	7.6	-
CRIST	-	11.0	6.0	0.9	10.9	10.4	8.0	10.7	6.3	7.8	8.8	10.5	7.4	1.1	-
	-	10.9	5.6	0.3	10.9	10.4	6.9	10.7	8.1	6.4	7.1	10.5	2.4	-	-
	-	9.9	9.4	1.3	10.9	10.5	10.8	10.7	10.7	9.1	8.9	10.5	9.6	2.2	-
DINJE	2.0	-	-	-	-	11.0	11.0	10.8	10.8	9.3	6.5	10.1	-	0.9	-
ELTMA	-	2.7	1.7	-	8.3	10.0	4.2	9.8	10.9	5.7	7.8	9.7	9.5	8.5	-
FORKE	-	-	0.3	-	-	-	6.1	9.3	10.5	-	-	-	-	-	6.2
GONRU	-	1.0	9.9	10.9	10.7	10.8	10.8	8.4	7.6	3.0	4.9	8.3	7.2	10.6	10.5
	-	0.8	10.3	11.1	11.0	11.0	11.0	8.5	7.7	3.0	5.0	7.4	7.8	10.7	10.5
	-	-	2.9	10.9	10.8	10.9	10.9	8.4	7.0	-	4.2	6.8	6.2	10.6	10.5
	-	-	9.2	10.5	11.0	11.0	10.9	8.5	7.7	3.0	4.9	6.4	6.9	10.7	10.6
	-	0.3	6.7	7.3	8.6	11.0	10.9	8.2	6.9	2.6	4.3	5.3	7.2	10.7	10.6
GOVMI	4.9	5.6	8.6	-	9.0	7.3	10.8	10.7	10.7	8.8	2.6	0.3	-	3.5	7.4
	-	-	8.3	-	7.2	7.3	10.6	9.8	9.9	8.7	3.2	-	-	3.1	-
	3.8	1.6	8.0	-	6.8	7.3	10.8	10.0	10.6	8.5	-	-	-	-	-
HERCA	5.7	3.5	3.1	4.2	11.2	10.9	11.2	7.9	11.0	10.9	11.0	3.2	7.3	10.6	10.4
HINWO	-	3.3	-	-	-	-	5.6	9.4	10.8	-	-	-	-	-	-
IGAAN	0.2	3.2	10.8	4.3	6.6	10.8	10.8	10.7	-	-	-	3.1	-	7.4	3.7
	1.8	3.0	7.7	-	0.8	7.7	7.7	7.7	7.4	2.0	-	-	-	2.5	-
	-	5.8	10.7	-	7.5	11.0	11.0	10.9	10.8	-	-	-	-	-	-
JONKA	2.9	5.2	11.2	-	8.8	11.0	11.0	10.9	10.8	4.4	-	-	-	-	-
	-	-	1.0	-	-	1.6	9.8	10.9	10.8	2.7	-	-	-	-	-
KACJA	-	-	8.8	-	-	4.9	6.1	5.7	10.7	9.3	6.7	7.6	4.8	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	3.2	7.4	-	7.8	10.7	10.6	10.7	10.0	8.9	5.5	8.8	7.2	2.7	-
	-	2.9	8.8	-	-	4.9	6.1	5.7	10.9	9.3	6.9	7.7	4.6	-	-
	0.2	-	8.2	-	-	4.9	6.2	5.8	10.9	9.2	6.4	7.9	3.9	-	-
KISSZ	-	3.9	-	-	9.1	11.0	10.8	4.9	1.2	-	-	-	-	-	-
KOSDE	4.5	-	2.0	2.2	1.1	2.9	-	3.7	8.1	-	6.1	8.8	8.1	8.0	-
	6.6	-	5.0	4.5	5.0	4.2	-	5.5	5.5	6.0	6.0	7.0	8.0	9.1	9.5
	4.4	2.7	7.0	6.4	-	0.4	5.7	3.7	-	10.1	8.6	10.0	6.6	-	-
LOJTO	-	-	-	-	-	-	-	-	8.1	7.8	-	-	-	-	1.3
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6
MACMA	1.1	4.9	5.3	6.0	3.0	9.1	3.6	-	10.6	10.1	-	-	-	-	-
	3.0	5.9	5.4	8.2	4.0	9.0	5.9	-	10.9	10.7	-	-	-	-	-
	5.6	8.2	-	8.4	1.1	9.7	8.3	-	10.9	10.8	-	-	-	-	-
	5.3	7.1	5.9	8.4	1.6	9.7	6.7	-	10.8	10.7	0.3	-	-	-	-
MARGR	8.8	3.3	7.8	6.0	-	5.3	-	8.5	-	9.9	-	-	-	-	3.8
MARRU	-	4.4	10.0	5.8	10.8	10.8	-	-	9.6	6.7	-	-	8.4	10.6	10.6
	-	8.9	9.1	0.5	1.1	2.7	3.0	3.9	5.2	2.1	3.0	-	8.1	10.3	6.2
MASMI	-	-	-	2.8	-	7.0	5.2	10.3	-	-	-	4.2	-	2.4	-
MOLSI	0.6	5.7	2.3	5.5	0.7	4.8	10.3	9.6	8.3	-	4.8	4.6	2.9	1.8	9.8
	-	5.4	1.7	2.8	1.1	3.7	10.2	8.9	10.3	1.7	3.7	3.8	0.9	1.6	9.5
	6.5	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.2	3.8	3.6	-	1.9	4.1	2.3	3.3	10.4	7.6	7.2	8.8	-	-	2.7
	1.4	4.9	2.5	-	5.3	5.5	1.0	-	-	6.6	3.1	7.7	-	-	-
	1.9	3.9	3.6	1.6	4.3	5.3	2.3	4.1	10.1	8.1	7.0	9.2	-	-	2.5
MORJO	4.8	4.8	11.2	-	5.8	11.0	10.9	10.9	7.8	6.6	-	-	-	4.3	2.9
MOSFA	-	9.6	5.1	1.6	0.8	1.3	1.1	0.3	0.8	0.2	2.3	1.3	0.5	0.3	-
OCHPA	-	-	-	-	-	-	-	9.4	7.7	3.5	9.6	9.4	3.9	1.9	-
OTTMI	10.9	-	-	8.4	9.8	4.3	4.7	9.9	4.8	7.9	10.2	3.7	8.6	8.8	2.1
PERZS	3.6	6.6	8.9	-	6.5	10.2	11.0	10.9	10.8	5.6	-	-	-	4.1	7.6
PUCRC	-	-	6.1	-	7.7	10.8	-	2.1	9.2	8.2	10.4	8.2	10.5	7.9	-
ROTEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SARAN	-	6.7	6.9	5.3	8.2	8.0	10.0	-	10.5	10.5	9.0	-	4.8	9.4	10.2
	-	8.6	9.0	7.9	10.4	10.9	10.8	10.8	10.7	10.6	10.2	1.6	9.8	8.1	10.5
	-	10.3	9.7	8.3	9.8	10.6	10.6	10.6	10.5	10.3	8.4	5.0	9.7	7.9	10.3
	-	7.1	7.1	2.8	10.1	8.6	9.7	8.0	9.3	7.9	8.0	2.3	4.9	9.4	10.2
SCHHA	4.3	7.9	6.9	3.0	2.8	8.7	7.2	5.1	2.6	9.2	10.2	10.3	6.1	-	5.9
SLAST	-	4.7	0.8	-	9.7	11.0	11.0	10.9	10.9	10.0	6.9	10.0	1.3	4.5	4.9
	-	3.7	8.2	-	9.7	11.0	11.0	10.9	6.7	9.0	7.4	9.9	10.5	-	5.3
STOEN	-	5.9	2.9	-	9.1	10.2	4.0	11.0	10.2	6.4	8.3	10.9	9.7	8.3	0.2
	-	4.8	3.8	-	11.1	11.2	7.4	11.1	11.1	5.7	8.8	10.9	9.8	8.9	0.3
	-	8.2	4.5	-	11.0	11.1	7.7	11.1	11.0	6.8	8.8	10.8	9.8	8.8	0.2
STRJO	2.3	5.7	3.4	-	1.7	3.9	7.4	5.6	7.8	5.8	10.6	5.7	2.8	-	4.9
	2.2	6.2	4.8	0.4	2.6	6.2	9.4	5.8	8.9	5.5	10.6	5.7	-	-	5.0
	1.7	2.9	0.2	0.3	0.3	3.5	9.8	6.2	8.1	5.8	10.6	5.7	2.8	-	1.2
	2.3	5.7	3.6	-	1.2	5.9	7.7	6.1	8.0	5.5	10.5	5.6	2.7	-	4.9
	2.2	5.8	4.4	-	2.3	5.2	9.6	5.6	9.0	5.5	10.6	5.6	2.8	-	4.8
TEPIS	1.6	5.8	11.0	2.5	9.2	10.8	10.8	10.7	10.5	10.6	-	-	-	-	1.8
	-	-	11.0	2.4	7.8	10.8	10.8	10.7	10.6	10.6	-	-	-	-	2.4
TRIMI	-	4.0	1.5	-	3.5	1.6	2.0	3.4	1.7	3.1	1.5	-	1.1	0.9	-
YRJIL	-	-	-	-	-	-	-	-	-	-	8.0	5.4	9.3	9.2	8.8
ZELZO	-	-	6.4	-	-	8.5	5.7	6.9	6.3	1.7	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sum	120.1	335.5	419.9	179.9	405.6	593.4	582.9	559.2	631.0	483.3	401.3	387.0	307.2	261.0	267.2

March	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	7.2	9.2	8.9	8.8	8.8	1.1	6.0	5.0	6.3	7.1	-	-	-	-	3.4	-
BANPE	-	1.2	1.0	2.0	-	-	-	-	1.0	-	-	-	-	-	-	-
BERER	8.9	6.0	-	9.1	9.8	4.0	-	9.8	-	-	-	-	-	-	-	-
	7.1	6.0	-	6.7	6.3	-	-	5.7	-	-	-	-	-	-	-	-
BOMMA	-	1.9	9.6	10.4	3.8	-	-	8.6	-	-	0.2	1.2	8.1	0.7	9.0	8.9
BREMA	10.3	10.2	-	5.7	-	-	9.9	8.0	-	-	-	6.8	-	-	-	-
BRIBE	10.2	10.2	-	6.9	-	-	9.9	-	-	-	-	5.2	-	2.9	-	5.2
	10.3	10.3	-	-	-	-	9.8	-	3.5	-	-	2.7	-	1.8	0.8	2.6
CASFL	-	7.4	10.3	10.4	7.9	-	7.6	-	-	-	1.6	10.0	5.7	0.8	9.8	9.8
	-	6.6	10.0	10.2	7.3	-	7.0	-	-	-	-	9.8	5.5	1.9	9.7	9.6
CRIST	-	5.3	10.2	9.5	5.1	-	1.3	0.5	-	-	5.0	9.5	4.7	4.0	8.9	5.9
	-	4.8	10.2	8.6	5.8	-	5.7	-	-	-	5.5	9.7	5.8	-	5.9	8.4
	0.2	5.3	10.2	9.5	5.2	-	2.0	0.4	-	-	5.4	9.7	6.7	4.8	9.6	8.3
DINJE	-	4.0	-	-	-	-	-	8.8	-	0.2	0.5	1.4	9.5	1.1	9.4	8.8
ELTMA	-	-	7.4	5.1	10.0	-	8.7	-	-	-	-	3.7	4.2	-	3.8	-
FORKE	9.7	10.0	10.0	9.9	9.9	-	4.6	8.1	8.4	-	-	-	-	0.8	2.0	-
GONRU	4.4	-	8.2	2.1	-	3.4	10.0	6.2	10.1	7.9	-	4.1	7.7	9.5	9.5	9.5
	4.9	-	8.4	1.8	-	3.4	10.2	6.3	10.2	7.7	-	4.1	8.1	9.8	9.8	9.4
	3.2	-	4.0	-	-	3.7	7.8	-	10.1	6.5	-	3.9	9.9	7.5	9.3	9.2
	3.5	-	4.7	-	-	2.7	9.3	6.0	10.2	7.2	-	4.1	5.1	6.3	9.2	9.4
	3.2	-	5.3	-	-	3.2	8.3	5.4	10.2	7.5	-	3.9	10.0	8.4	7.9	8.5
GOVMI	1.5	6.7	10.2	10.1	10.0	9.5	4.9	5.6	9.8	0.8	2.7	-	-	-	-	-
	2.1	6.6	-	10.1	10.0	-	-	5.6	6.6	-	-	-	-	-	-	-
	-	6.5	-	9.7	10.0	-	-	4.1	8.9	-	-	-	-	-	-	-
HERCA	10.5	9.8	-	4.2	7.8	9.8	1.7	-	10.3	10.3	10.2	10.2	9.1	9.8	4.0	4.9
HINWO	10.3	10.2	10.1	10.1	10.1	-	3.0	9.2	9.1	1.4	-	-	-	-	-	-
IGAAN	10.3	10.3	9.3	9.4	10.2	9.3	9.2	10.0	4.9	-	8.7	-	-	-	8.2	2.0
	7.8	6.7	6.3	7.8	7.8	7.8	7.7	7.7	4.1	5.8	7.6	-	-	-	5.7	-
	-	10.4	-	7.6	10.2	6.5	5.7	-	9.6	-	2.2	-	-	-	9.1	6.2
JONKA	8.0	10.4	10.0	7.3	10.2	8.5	6.8	10.1	9.7	1.5	4.3	-	4.8	-	9.3	5.1
	6.7	10.4	8.5	7.2	10.2	8.9	6.1	10.0	7.7	2.0	-	-	4.5	-	9.0	3.9
KACJA	-	-	8.3	10.2	10.0	3.9	-	8.8	6.2	-	-	-	-	0.6	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	7.8	-	-	-
	0.2	8.2	5.4	8.5	9.6	-	-	8.0	5.6	-	-	0.9	5.9	1.4	3.6	5.1
	-	10.5	8.4	10.0	10.2	3.7	-	9.0	6.1	-	-	-	-	0.8	0.3	-
	-	10.4	8.5	10.2	10.0	2.3	-	8.9	6.1	-	-	-	-	0.2	-	-
KISSZ	0.6	10.3	8.7	-	0.8	7.3	-	0.3	7.3	-	5.9	-	-	-	9.3	3.9
KOSDE	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9.1	9.9	-	-	-	-	-	1.4	2.3	9.8	9.8	9.3	3.0	6.7	2.7	6.0
	9.2	6.7	-	5.8	2.9	-	9.4	9.1	-	3.5	-	6.7	-	7.3	-	4.3
LOJTO	7.9	10.2	7.6	10.0	-	1.8	6.5	9.8	2.3	-	-	-	-	-	-	-
LOPAL	-	-	3.7	0.3	-	-	7.5	-	3.7	0.3	-	0.7	0.3	-	1.2	0.8
MACMA	10.3	10.3	10.2	10.1	8.6	6.6	9.7	9.9	6.5	4.6	7.8	0.2	-	-	0.8	-
	10.4	10.4	10.3	8.4	8.1	5.9	9.9	10.0	6.4	3.7	7.1	0.3	-	1.6	1.5	0.9
	10.3	10.4	10.3	10.1	-	5.8	10.1	10.1	5.3	8.1	8.8	1.0	-	-	3.9	1.2
	8.7	10.2	10.1	8.8	9.3	7.9	4.1	9.8	6.7	0.4	8.6	0.2	-	1.7	0.7	0.2
MARGR	-	3.3	-	-	-	-	-	9.2	-	-	-	3.3	-	1.4	-	7.9
MARRU	3.6	-	7.2	-	-	-	9.6	4.3	10.1	8.5	-	-	9.9	9.3	9.8	9.6
	-	3.9	6.9	3.1	-	-	8.1	-	9.7	6.8	-	9.7	9.1	6.6	7.2	8.5
MASMI	-	-	-	7.4	-	9.3	-	0.9	-	-	-	-	-	3.1	7.9	-
MOLSI	9.7	9.5	9.6	9.6	9.5	-	-	9.2	9.3	-	-	1.8	-	-	-	-
	8.6	9.6	9.9	9.8	9.8	-	-	9.2	9.5	-	-	1.5	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.1	9.9	9.6	9.8	8.8	3.3	8.9	4.2	4.8	7.9	0.9	-	-	-	3.2	2.2
	-	-	0.1	3.4	7.0	3.5	9.1	-	0.8	-	-	-	-	0.7	4.6	3.6
	8.2	9.8	9.9	10.0	8.8	3.4	9.0	3.5	5.3	6.9	-	-	-	0.8	3.5	2.2
MORJO	9.5	10.4	8.6	8.6	8.6	2.0	10.1	10.1	-	4.0	9.6	-	3.2	2.3	9.2	3.6
MOSFA	-	-	0.6	0.3	0.2	-	0.5	-	-	-	0.3	2.2	0.8	0.2	2.2	1.8
OCHPA	-	-	8.0	5.0	3.1	-	5.6	-	-	-	-	-	0.1	-	-	9.8
OTTMI	2.7	3.2	-	-	10.0	-	-	-	-	-	-	-	-	-	2.8	8.3
PERZS	-	10.4	10.4	10.3	10.2	9.7	7.7	10.1	9.8	3.5	4.4	-	9.8	0.3	8.3	4.5
PUCRC	-	9.1	10.3	-	-	-	8.9	9.9	-	-	-	-	5.6	1.4	7.2	6.2
ROTEC	-	9.9	9.9	9.8	8.3	3.2	5.6	5.3	4.0	-	-	-	-	-	-	-
SARAN	-	2.7	7.6	3.1	1.2	-	8.7	3.0	10.4	-	-	10.2	6.0	6.5	7.5	8.6
	-	1.7	8.2	1.4	1.1	-	8.5	-	10.2	7.3	-	10.3	9.8	7.3	10.1	10.2
	0.3	2.7	9.1	2.2	0.2	-	8.7	3.6	9.8	8.1	-	9.9	8.9	8.1	9.8	9.7
	-	2.6	6.5	1.2	-	-	8.3	2.3	10.3	8.5	-	10.2	8.4	7.4	9.4	9.4
SCHHA	9.5	7.6	-	-	-	-	8.8	-	-	-	1.8	5.6	-	3.1	-	1.9
SLAST	-	9.4	2.5	10.0	10.2	3.8	-	9.6	8.0	-	-	1.6	7.4	1.8	4.3	-
	-	9.3	9.1	9.7	10.2	4.0	3.4	10.1	7.5	-	-	1.5	7.1	-	-	-
STOEN	-	2.7	6.4	1.2	5.7	-	9.6	8.5	-	-	-	9.5	3.7	1.4	3.6	-
	-	2.2	7.1	1.6	5.0	-	9.4	9.1	-	-	-	9.8	4.8	1.6	6.4	4.4
	-	4.2	7.2	1.6	5.8	-	9.6	9.2	0.2	-	-	9.6	5.4	2.1	6.0	-
STRJO	10.3	10.2	8.6	9.7	-	-	9.9	-	5.1	-	-	2.5	-	0.8	-	-
	10.2	9.8	8.5	9.1	-	-	9.8	-	-	-	-	2.1	-	-	-	-
	10.3	10.2	8.6	9.0	-	-	9.4	-	5.8	-	-	2.2	-	0.9	-	-
	10.2	10.2	8.7	9.7	-	-	9.8	-	-	-	-	2.3	-	-	-	-
	10.3	10.2	8.6	9.6	-	-	9.9	-	-	-	-	2.6	0.2	2.2	-	1.6
TEPIS	8.2	10.2	10.1	7.2	10.0	4.7	8.2	9.4	9.8	2.5	-	6.5	9.5	-	8.8	6.5
	3.8	10.0	10.1	7.5	9.9	4.2	6.7	9.7	9.2	2.6	0.3	1.5	5.2	-	5.9	6.2
TRIMI	0.9	2.1	1.2	2.6	10.2	-	-	3.7	3.6	-	-	1.3	2.8	-	1.3	-
YRJIL	8.9	9.3	7.3	4.6	3.1	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	3.2	-	5.3	-	3.0	-	7.6	1.4	-	-	-	-	-	7.5	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.6	-
Sum	346.7	513.4	500.7	486.0	402.8	181.1	442.2	397.9	369.8	162.9	119.2	237.0	244.1	159.7	341.4	284.7

3. Results (Meteors)

March	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	1	1	6	2	2	4	4	3	39	31	29	27	-	-	7
BANPE	-	-	2	-	10	8	10	6	7	3	-	-	-	-	-
BERER	-	-	19	-	-	28	29	36	50	19	-	-	-	-	-
	-	-	5	-	-	11	8	3	8	10	-	-	-	-	-
BOMMA	-	11	-	-	21	31	15	10	19	15	10	16	15	-	-
BREMA	1	3	-	-	1	9	8	1	1	10	15	16	6	-	-
BRIBE	11	15	14	3	8	3	17	5	4	21	33	18	14	-	8
	3	12	14	2	11	8	10	9	9	18	26	22	17	1	12
CASFL	2	22	20	4	28	25	25	27	16	4	27	23	10	8	-
	-	21	10	4	11	16	12	19	9	4	8	18	9	8	-
CRIST	-	17	7	1	24	16	18	19	13	14	19	16	9	3	-
	-	13	7	1	18	11	8	9	9	3	9	12	5	-	-
	-	39	18	5	35	26	37	40	24	32	37	43	17	4	-
DINJE	2	-	-	-	-	31	19	23	16	12	17	34	-	1	-
ELTMA	-	2	1	-	12	11	7	13	9	3	14	15	11	4	-
FORKE	-	-	1	-	-	-	1	15	25	-	-	-	-	-	5
GONRU	-	2	11	21	18	24	30	20	18	2	4	8	13	19	30
	-	1	19	12	30	16	32	10	14	3	1	6	8	36	32
	-	-	4	9	14	6	7	13	5	-	1	4	2	15	6
	-	-	10	14	17	17	20	17	12	2	4	3	10	26	18
	-	1	14	14	18	16	21	12	6	2	1	2	5	23	30
GOVMI	5	10	15	-	5	15	19	19	19	15	5	1	-	1	3
	-	-	4	-	4	12	10	7	8	13	3	-	-	1	-
	3	4	6	-	9	6	9	6	8	8	-	-	-	-	-
HERCA	8	3	8	5	17	17	19	8	22	19	12	3	12	11	18
HINWO	-	10	-	-	-	-	6	12	23	-	-	-	-	-	-
IGAAN	1	7	10	4	5	11	7	9	-	-	-	7	-	1	4
	1	5	8	-	1	7	10	8	6	3	-	-	-	3	-
	-	3	3	-	4	3	5	3	3	-	-	-	-	-	-
JONKA	1	6	10	-	7	9	14	16	7	1	-	-	-	-	-
	-	-	6	-	-	3	6	7	9	1	-	-	-	-	-
KACJA	-	-	23	-	-	26	22	22	22	17	9	29	5	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	3	7	-	7	10	9	8	3	5	2	5	1	1	-
	-	7	25	-	-	32	27	32	34	25	20	36	10	-	-
	1	-	13	-	-	25	13	21	23	24	16	16	2	-	-
KISSZ	-	2	-	-	1	4	5	2	1	-	-	-	-	-	-
KOSDE	32	-	13	19	3	5	-	13	40	-	40	57	42	43	-
	58	-	46	50	35	7	-	19	20	16	21	29	31	44	53
	9	8	19	9	-	2	13	4	-	15	12	13	10	-	-
LOJTO	-	-	-	-	-	-	-	-	5	4	-	-	-	-	3
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
MACMA	1	11	6	3	6	18	12	-	16	8	-	-	-	-	-
	3	17	7	26	6	21	6	-	27	11	-	-	-	-	-
	2	15	-	19	1	19	10	-	16	5	-	-	-	-	-
	3	24	13	31	5	28	16	-	35	10	2	-	-	-	-
MARGR	7	1	5	7	-	3	-	12	-	5	-	-	-	-	1
MARRU	-	1	12	4	22	21	-	-	12	6	-	-	11	13	16
	-	15	10	3	6	14	15	15	14	11	17	-	16	19	8
MASMI	-	-	-	5	-	19	13	18	-	-	-	6	-	6	-
MOLSI	3	28	8	15	3	20	42	25	54	-	16	32	9	6	59
	-	17	2	9	2	16	20	15	21	3	4	9	2	2	23
	9	6	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	3	13	-	4	2	3	6	27	20	24	31	-	-	6
	1	6	5	-	6	4	3	-	-	13	4	17	-	-	-
	3	7	10	4	7	11	2	3	32	40	26	58	-	-	3
MORJO	2	6	13	-	4	9	13	12	5	3	-	-	-	1	2
MOSFA	-	9	6	7	5	10	7	2	5	1	12	9	3	2	-
OCHPA	-	-	-	-	-	-	-	13	5	5	11	17	4	2	-
OTTMI	6	-	-	10	9	1	1	14	2	10	15	1	6	10	4
PERZS	5	20	14	-	6	9	26	14	23	9	-	-	-	6	5
PUCRC	-	-	1	-	7	9	-	6	10	10	14	6	10	10	-
ROTEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SARAN	-	4	12	1	9	9	11	-	12	8	7	-	8	13	7
	-	12	9	7	19	10	16	15	18	16	9	1	18	12	16
	-	26	14	6	24	24	22	23	25	23	12	1	20	18	18
	-	11	2	3	9	10	10	12	6	8	6	4	11	15	10
SCHHA	18	4	15	6	2	20	16	1	5	13	27	19	13	-	6
SLAST	-	5	2	-	11	13	9	5	6	5	6	17	3	4	2
	-	1	5	-	10	6	6	6	6	3	4	7	4	-	2
STOEN	-	13	3	-	39	19	16	22	22	10	28	37	16	12	1
	-	3	10	-	30	28	15	20	22	14	29	26	19	16	2
	-	18	9	-	40	41	24	21	20	11	29	24	21	24	1
STRJO	6	10	10	-	2	4	9	7	11	4	25	3	4	-	6
	10	17	5	1	4	11	9	3	6	6	20	3	-	-	7
	5	11	1	2	1	1	7	5	4	3	10	5	2	-	1
	4	18	9	-	1	5	8	4	5	4	15	11	1	-	5
	7	2	3	-	5	5	7	7	5	7	13	4	1	-	6
TEPIS	1	5	9	4	9	10	13	11	20	8	-	-	-	-	1
	-	-	22	2	15	19	25	21	25	8	-	-	-	-	4
TRIMI	-	10	6	-	10	6	4	9	5	9	4	-	4	3	-
YRJIL	-	-	-	-	-	-	-	-	-	-	9	13	12	10	22
ZELZO	-	-	6	-	-	7	7	5	7	1	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sum	237	584	675	354	715	993	955	878	1100	705	793	840	482	457	480

March	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	13	47	62	49	19	2	9	6	10	7	-	-	-	-	5	-
BANPE	-	7	6	7	-	-	-	-	5	-	-	-	-	-	-	-
BERER	12	20	-	23	24	6	-	27	-	-	-	-	-	-	-	-
	3	7	-	5	7	-	-	2	-	-	-	-	-	-	-	-
BOMMA	-	5	16	27	4	-	-	6	-	-	1	3	25	1	21	21
BREMA	10	14	-	1	-	-	13	5	-	-	-	5	-	-	-	-
BRIBE	15	18	-	1	-	-	17	-	-	-	-	11	-	4	-	5
	16	16	-	-	-	-	13	-	1	-	-	3	-	1	1	2
CASFL	-	8	18	21	8	-	18	-	-	-	2	31	22	1	12	19
	-	6	8	8	5	-	6	-	-	-	-	17	15	3	20	27
CRIST	-	8	24	11	8	-	1	1	-	-	11	22	13	6	14	16
	-	5	9	9	5	-	1	-	-	-	10	10	17	-	7	11
	1	19	43	18	13	-	3	1	-	-	11	32	23	11	33	49
DINJE	-	3	-	-	-	-	-	11	-	1	2	6	21	1	24	26
ELTMA	-	-	8	6	8	-	9	-	-	-	-	14	11	-	7	-
FORKE	26	13	30	25	25	-	14	12	23	-	-	-	-	5	1	-
GONRU	6	-	17	1	-	8	29	9	34	18	-	6	13	17	27	22
	3	-	13	1	-	6	19	6	29	16	-	7	12	8	16	9
	2	-	4	-	-	3	10	-	7	5	-	1	10	3	7	6
	3	-	8	-	-	4	14	4	24	15	-	9	8	16	14	13
	1	-	7	-	-	7	18	3	27	10	-	3	19	8	5	8
GOVMI	4	16	13	17	18	6	6	10	14	1	2	-	-	-	-	-
	4	11	-	10	5	-	-	5	3	-	-	-	-	-	-	-
	-	8	-	7	6	-	-	6	9	-	-	-	-	-	-	-
HERCA	20	18	-	3	13	15	12	-	19	12	22	20	18	18	3	17
HINWO	26	15	24	29	38	-	20	21	24	1	-	-	-	-	-	-
IGAAN	8	10	10	4	12	5	7	5	1	-	3	-	-	-	14	1
	6	3	10	8	9	4	3	5	1	4	4	-	-	-	4	-
	-	1	-	2	1	2	1	-	1	-	1	-	-	-	2	2
JONKA	8	3	8	6	7	4	2	5	5	2	5	-	8	-	8	4
	6	12	3	9	5	3	3	5	2	1	-	-	5	-	4	7
KACJA	-	-	18	20	21	2	-	11	6	-	-	-	-	3	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-
	1	8	5	1	6	-	-	2	4	-	-	2	3	1	1	6
	-	46	23	32	36	5	-	21	11	-	-	-	-	1	1	-
	-	18	11	14	13	1	-	10	10	-	-	-	-	1	-	-
KISSZ	1	3	4	-	2	4	-	1	3	-	2	-	-	-	4	1
KOSDE	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	53	48	-	-	-	-	-	6	4	48	56	55	9	36	6	42
	7	3	-	4	3	-	10	7	-	8	-	10	-	8	-	5
LOJTO	4	11	2	3	-	2	8	6	2	-	-	-	-	-	-	-
LOPAL	-	-	1	1	-	-	16	-	10	3	-	3	3	-	7	5
MACMA	16	18	13	12	3	3	7	11	5	3	1	1	-	-	3	-
	25	24	14	17	6	4	22	19	3	5	6	2	-	1	6	2
	11	13	11	9	-	3	15	18	6	3	1	1	-	-	6	1
	22	30	21	18	12	8	30	20	13	3	7	1	-	1	4	1
MARGR	-	1	-	-	-	-	-	3	-	-	-	2	-	4	-	9
MARRU	2	-	7	-	-	-	20	1	26	9	-	-	21	16	16	12
	-	5	8	3	-	-	12	-	9	3	-	11	4	5	9	10
MASMI	-	-	-	8	-	22	-	1	-	-	-	-	-	8	23	-
MOLSI	27	28	55	49	73	-	-	45	73	-	-	16	-	-	-	-
	16	9	28	30	36	-	-	21	22	-	-	8	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	37	56	46	19	21	21	4	12	7	1	-	-	-	3	6
	-	-	30	14	12	11	13	-	7	-	-	-	-	1	2	9
	24	36	38	36	22	22	23	3	21	12	-	-	-	4	1	4
MORJO	7	7	8	6	6	2	4	5	-	2	9	-	2	1	10	4
MOSFA	-	-	4	2	1	-	2	-	-	-	2	15	5	1	14	14
OCHPA	-	-	3	1	2	-	3	-	-	-	-	-	14	-	-	19
OTTMI	2	4	-	-	11	-	-	-	-	-	-	-	-	-	18	9
PERZS	-	21	24	22	16	6	13	12	12	4	8	-	24	1	20	19
PUCRC	-	10	4	-	-	-	10	8	-	-	-	-	4	1	15	4
ROTEC	-	9	14	12	3	5	4	2	1	-	-	-	-	-	-	-
SARAN	-	4	5	3	2	-	11	1	18	-	-	21	7	7	20	14
	-	2	14	1	4	-	16	-	17	10	-	18	13	7	14	8
	1	3	19	3	1	-	16	2	30	15	-	22	14	10	17	16
	-	2	3	1	-	-	17	1	8	5	-	16	3	5	16	9
SCHHA	19	15	-	-	-	-	15	-	-	-	4	9	-	5	-	3
SLAST	-	8	2	5	12	1	-	5	7	-	-	4	6	1	3	-
	-	3	3	4	5	1	2	7	1	-	-	1	1	-	-	-
STOEN	-	4	12	5	8	-	16	6	-	-	-	40	12	6	8	-
	-	4	14	2	5	-	15	5	-	-	-	42	18	3	7	17
	-	9	9	4	8	-	16	19	1	-	-	42	15	8	6	-
STRJO	19	11	9	12	-	-	22	-	2	-	-	3	-	5	-	-
	18	10	9	6	-	-	23	-	-	-	-	3	-	-	-	-
	7	10	3	6	-	-	12	-	2	-	-	4	-	6	-	-
	19	16	9	4	-	-	17	-	-	-	-	3	-	-	-	-
	6	17	8	12	-	-	15	-	-	-	-	1	1	4	-	2
TEPIS	5	8	14	6	9	1	3	11	7	2	-	3	10	-	9	12
	7	14	17	12	15	1	8	25	15	4	2	5	20	-	21	22
TRIMI	2	7	2	10	13	-	-	6	5	-	-	4	4	-	8	-
YRJIL	20	8	10	3	3	-	-	-	-	-	-	-	-	-	-	-
ZELZO	-	8	-	5	-	1	-	8	2	-	-	-	-	-	8	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
Sum	579	845	905	772	628	201	705	488	614	239	173	568	460	264	559	550