Results of the IMO Video Meteor Network – December 2016

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A year with unusually nice weather ended with an unusually successful December. The statistics show a few gaps in the second half of the month, but overall there are a number of dense observing intervals which - in connection with the long winter nights - led to a record-breaking outcome. 81 video cameras participated in the IMO network in December, whereby 51 of these managed to observe in twenty or more observing nights. The overall effective observing time increased by more than 30% to the previously best December, and it fell only 3% short of the all-time high of September 2016. Because of the full moon, which ruined the most important shower, we saw "only" an increase of 5% in meteor counts compared to December 2015.

Let's start the detailed analysis with the November Orionids (250 NOO) that were added only recently to the IMO working list of meteor showers. In our 2012 meteor shower analysis, we safely detected this shower between November 14 and December 7. End of November it is the strongest source in the sky. We re-processed all data since 2011 to obtain an activity profile of this shower. Figure 1 compares the average profile of 2011-2015 with 2016. As in case of many showers, the ascending branch is somewhat shallower than the descending branch. The average profile shows a continuous increase up to the peak exactly at the end of November (solar longitude 248°). The flux density reaches 2 meteoroids per 1,000 km^2 and hour, which is equivalent to a ZHR of about ten. Thereafter the activity is declining and we can probably shift the end date a few days back.
In 2016, the shower behaved similarly – only the peak activity was somewhat lower.

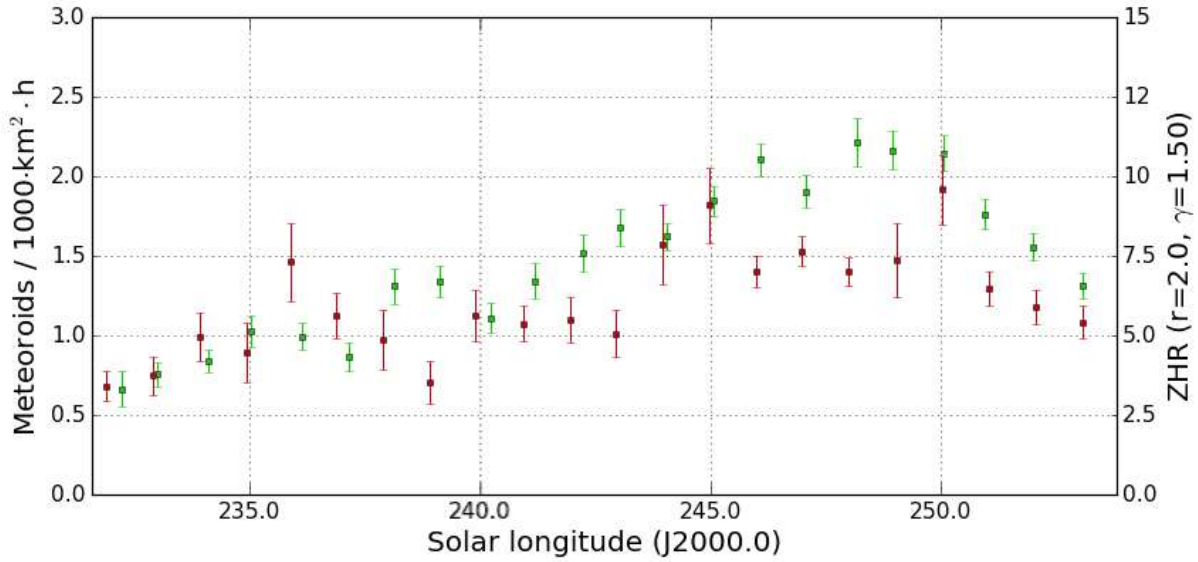

Figure 1: *Comparison of the flux density of the November Orionids 2016 (red) with the average of the years 2011-2015 (green), derived from video data of the IMO Video Meteor Network.*

The second possibly interesting shower are the 66 Draconids (541 SSD). Based on Croatian investigations to link meteoroid streams to parent bodies and a simulation of J. Vaubaillon there was the chance that this shower would show slightly enhanced activity in the evening of November 2 and morning of November 3. Even though the first date was within the European observing window, the shower was practically untraceable (figure 2). In the morning hours of December 2, we see indeed a minor increase in rates, but that's one day earlier than predicted and not significant, anyway, since every data point is comprised of only about ten shower members. Thus, we could not confirm any relevant activity of the 66 Draconids.

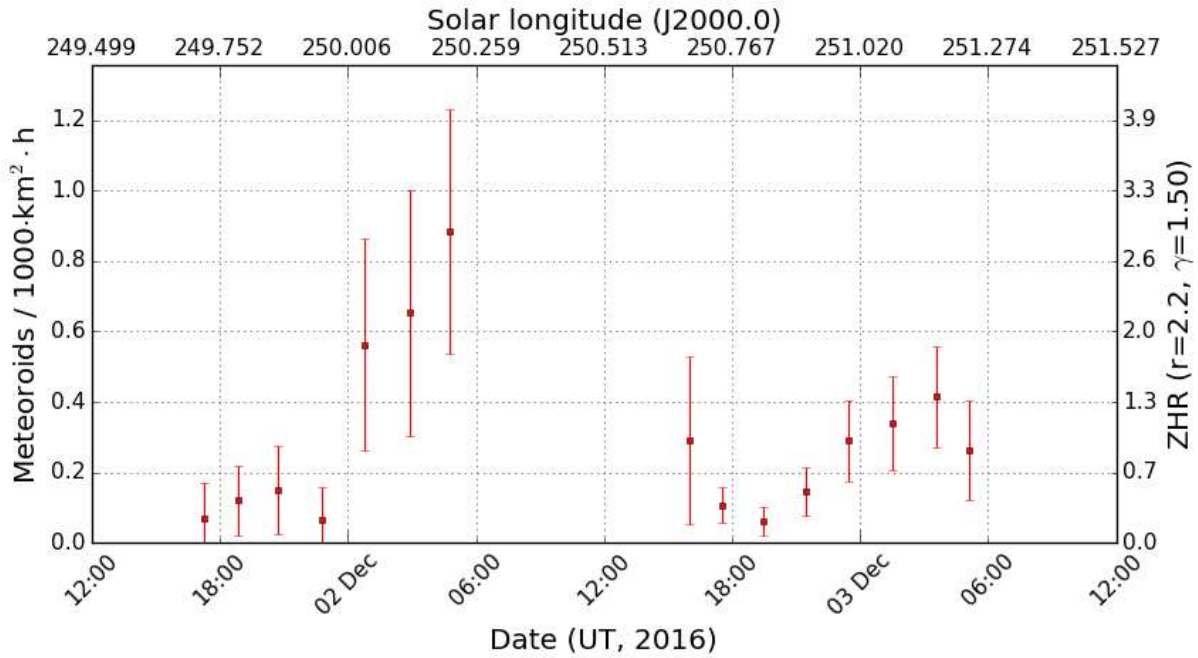

Figure 2: *Flux density profile of the 66 Draconids 2016, derived from video data of the IMO Video Meteor Network.*

Let's turn to the 2016 Geminids which happened to coincide with full moon (figure 3). Here we see an interesting result. Not only the high peak activity of up to 200 meteoroids per 1,000 km^2 and hour is exceptional, but there is also a double-maximum with peaks at December 13 near 21:00 UT (solar longitude 262.06°) and December 14 near 2:00 UT (solar longitude 262.28°). In-between we see a "minimum" at 23:30 UT (solar longitude 262.17°) that matches about to the usual Geminid peak activity.

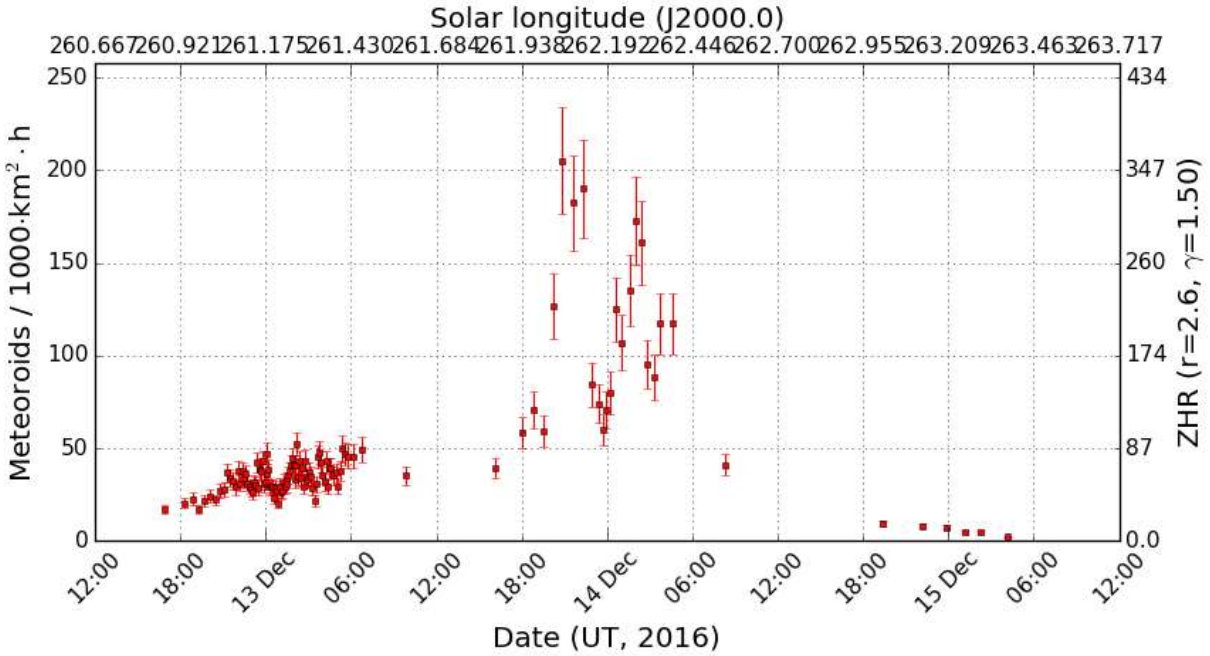

Figure 3: *Activity profile of the 2016 Geminid peak, derived from video data of the IMO Video Meteor Network.*

A comparison with past maxima confirms that the 2016 activity exceeds the fluctuations of previous years significantly (figure 4).

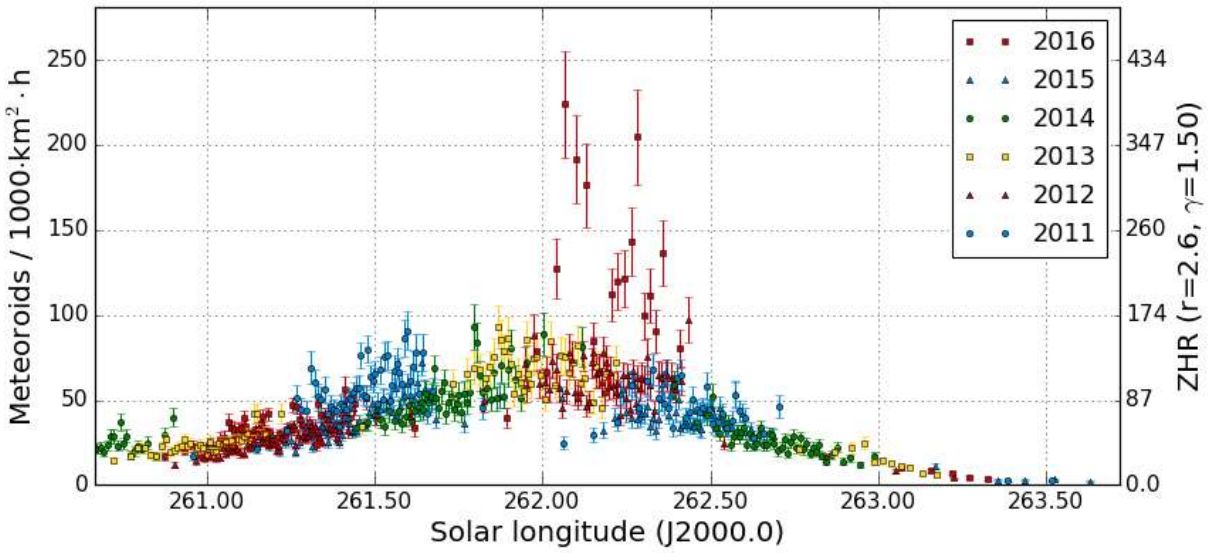

Figure 4: *Activity profiles of the Geminid peaks 2011-2016.*

Note that the weather was at the night of maximum quite poor which can be seen from less dense data points than in the night before (figure 3). Whereas we recorded almost 10,000 meteors in the Geminid peak night of 2015, it was only 3,000 meteors this time.
Unfortunately, we cannot check visual observations for comparison, since hardly any observer was active under those conditions. However, both the activity profile of the Monocerotids (figure 5, left) and the Anthelion source (figure 5, right) show similarly unusual activity at the same time. Hence, we can be quite sure even without visual confirmation, that the unusual activity is an artifact of poor observing conditions.

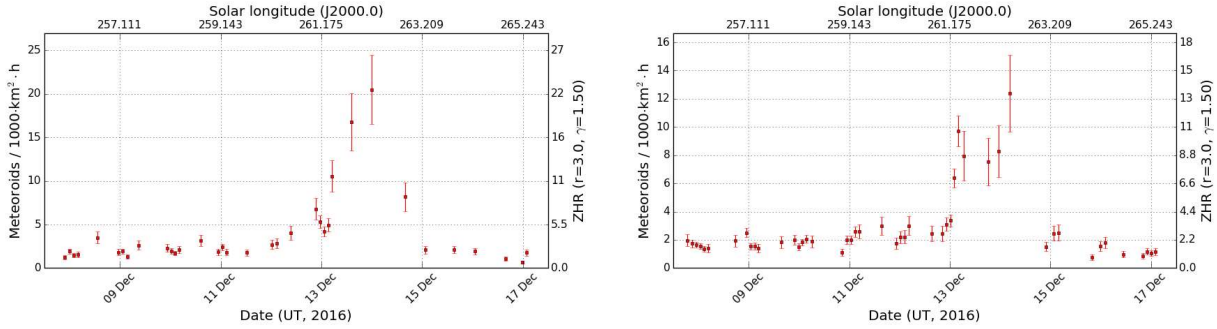

Figure 5: *Flux density profile of the Monocerotids (left) and the Anthelion source (right) in December 2016, derived from video data of the IMO Video Meteor Network.*

Just before Christmas, the Ursids sometimes present unexpected activity peaks. There was no prediction for very high activity in 2016, but model calculations by J. Vaubaillon hinted on possibly enhanced rates close to midnight UT of December 22/23 and 23/24. Indeed, the activity increased clearly towards dawn of December 22 and dropped significantly at the same evening (figure 6, left). The data point in-between is not significant, since we have only two cameras in that time zone. A comparison with the profiles of previous years (figure 6, right) shows that the activity of 2016 was in fact not unusual. In 2011 and 2014 we observed similar or even higher peaks – only the time of maximum varies by up to a day.

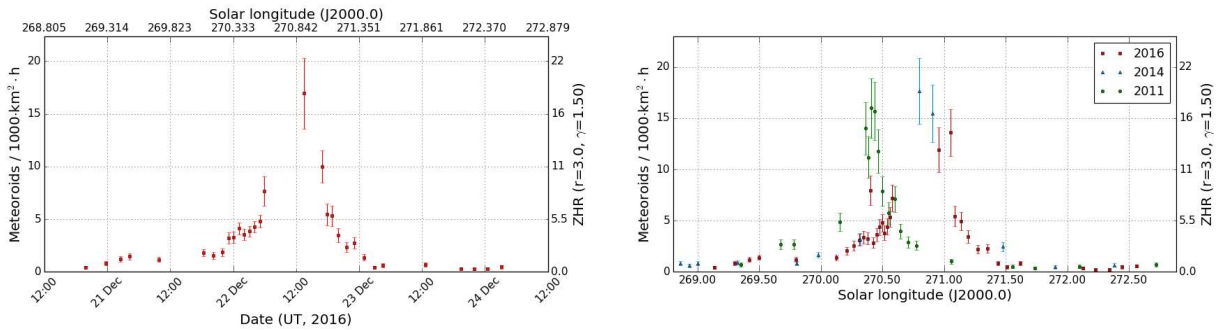

Figure 6: *Flux density profile of the Ursids 2016 (left) and comparison between 2011, 2014 and 2016 (right), derived from video data of the IMO Video Meteor Network.*

As usual we want to review the last year at the end of the December report. For the first time since many years, the number of observers and video cameras decreased clearly, which can be attributed mainly to the loss of Hungarian observers. 44 observers (2015: 48) from 12 countries (2015: 14) with a total of 85 meteor cameras (2015: 92) contributed to the IMO network in 2016. Whereas in Germany the number of cameras increased by one to 20, we see Hungary to relapse to fifth place behind Portugal (14), Italy (13) and Slovenia (11). They are followed by Poland (5) and Spain (4), Holland and the USA (each 2) as well as Greece, Finland, and Russia with one camera each.

In 366 observing nights (2015: 365) and 113,937 hours of effective observing time (2015: 121,853) we recorded a total of 474,658 meteors (2014: 480,362). The decrease in the number of cameras lead to a reduction of effective observing time by almost 7% but the meteor count remained effectively the same. Indeed, the balance of 2016 was for a long time better than in the year before. It was October/November and the poor lunar phase for all relevant showers in fall and winter which changed the game. In the end, we owe the great output to the unusually pleasant weather and to the four video cameras of Detlef Koschny at the Canary Islands, which were remarkably successful. The average hourly meteor rate in the IMO network increased from 3.9 to 4.2 in 2016.

Table 1 shows the monthly distribution of observations. The average number of observing hour per month dropped below 10,000 again, but September, December and August 2016 rank first, second and fourth in the long-term statistics of the IMO network. Also, those almost 100,000 meteors we collected in August were by far the best monthly output ever.

Table 1: *Monthly distribution of video observations in the IMO Network 2016.*

Month	# Observing Nights	Eff. Observing Time [h]	# Meteors	Meteors / Hour
January	31	9,087.7	27,969	3.1
February	29	7,024.8	15,526	2.2
March	31	8,296.6	17,512	2.1
April	30	7,717.5	16,606	2.2
May	31	7,013.1	17,402	2.5
June	30	6,977.6	21,916	3.1
July	31	8,742.2	42,142	4.8
August	31	12,251.8	98,386	8.0
September	30	14,146.1	62,458	4.4
October	31	9,184.1	47,491	5.2
November	30	9,774.9	42,776	4.4
December	31	13,720.5	64,474	4.7
Total	***366***	***113,936.9***	***474,658***	***4.2***

Eight observers managed to collect over 300 observing nights in 2016. For most of the time, Detlef Koschny spearheaded the statistics and was on the track to top his own record from the

year before (351 nights). However, in the middle of December all of his four cameras broke down due to a technical problem so that he had to surrenders to his closest haunter at the home straight with 340 nights. Sirko Molau pushed his best result by five to a total of 347 observing nights, and with 339 nights Rui Goncalves had two nights less on his balance than in the year before. There was only little motion in the following ranks, but Rui Marques, Carl Hergenrother, Enrico Stomeo, Stefano Crivello and Carlos Saraiva all managed to cross the 300 nights' mark. Regarding the effective observing time, the pictures of the past few years has not changed. Rui Goncalves collected over 10,000 observing hours, and he was followed again by Sirko Molau and Carlos Saraiva.
Until December 2016, Detlef Koschny had recorded already so many meteors that the technical defect of his cameras did not cost him the first place with respect to the meteor count. In fact, with over 75,000 meteors he was at such a distance that he recorded almost as many meteors as second ranked Sirko Molau and third ranked Rui Goncalves altogether. Another eight observers contributed more than 10,000 meteors to the overall output.
Table 2 gives the details for all active IMO network observers. The number of cameras and stations refers to the main part of 2016.

Table 2: *Distribution of video observation over the observers in 2016.*

Observer	Country	# Observing Nights	Eff, Observing Time [h]	# Meteors	Meteors / Hour	Cameras (Stations)
Sirko Molau	Germany	347	9,309.0	50,677	5.4	7 (2)
Detlef Koschny	Netherlands	340	7,804.9	75,865	9.7	4 (2)
Rui Goncalves	Portugal	339	11,669.6	37,588	3.2	6 (1)
Rui Marques	Portugal	319	4,082.5	14,101	3.5	2 (1)
Carl Hergenrother	USA	318	2,711.1	6,932	2.6	1 (1)
Enrico Stomeo	Italy	316	4,939.0	30,025	6.1	3 (1)
Stefano Crivello	Italy	315	5,405.0	29,811	5.5	3 (1)
Carlos Saraiva	Portugal	310	7,867.5	19,733	2.5	4 (1)
Jörg Strunk	Germany	293	6,344.8	19,230	3.0	5 (1)
Bernd Klemt	Germany	292	2,690.5	8,808	3.3	2 (2)
Rainer Arlt	Germany	288	1,401.8	8,480	6.0	1 (1)
Jenni Donati	Italy	282	1,800.8	10,682	5.9	1 (1)
Mario Bombardini	Italy	282	1,754.1	8,969	5.1	1 (1)
Istvan Tepliczky	Hungary	279	3,218.9	9,092	2.8	2 (1)
Flavio Castellani	Italy	278	2,681.9	8,521	3.2	2 (1)
Mitja Govedic	Slovenia	273	3,092.2	7,861	2.5	3 (1)
József Morvai	Hungary	272	1,797.8	3,296	1.8	1 (1)
Antal Igaz	Hungary	271	1,622.7	3,696	2.3	2 (2)
Maciej Maciejewski	Poland	267	4,989.2	20,959	4.2	4 (1)
Martin Breukers	Netherlands	260	1,475.2	3,654	2.5	1 (1)
Hans Schremmer	Germany	259	1,381.2	4,487	3.2	1 (1)
Karoly Jonas	Hungary	257	2,987.3	6,776	2.3	1 (1)
Mike Otte	USA	247	1,386.9	2,675	1.9	1 (1)
Zsolt Perkó	Hungary	236	1,216.9	6,364	5.2	1 (1)
Leo Scarpa	Italy	232	1,249.8	2,496	2.0	1 (1)
Fabio Moschini	Italy	233	258.8	1,713	6.6	1 (1)
Stane Slavec	Slovenia	231	2,353.8	4,919	2.1	2 (1)
Javor Kac	Slovenia	227	5,102.2	25,726	5.0	5 (3)
Maurizio Eltri	Italy	220	1,350.0	5,752	4.3	1 (1)
Mihaela Triglav	Slovenia	219	928.9	2,231	2.4	1 (1)
Alvaro Lopes	Portugal	214	1,333.4	1,622	1.2	1 (1)
Kevin Förster	Germany	193	1,111.0	4,526	4.1	1 (1)
Eckehard Rothenberg	Germany	176	672.9	1,776	2.6	1 (1)
Grigoris Maravelias	Greece	151	886.9	1,809	2.0	1 (1)
Tomasz Lojek	Poland	146	845.3	3,342	4.0	1 (1)
Mikhail Maslov	Russia	146	592.4	3,269	5.5	1 (1)
Ilkka Yrjölä	Finland	144	735.9	2,305	3.1	1 (1)

Erno Berkó	Hungary	116	844.7	6,567	7.8	1 (1)
Maurizio Carli	Italy	114	724.8	2,789	3.8	1 (1)
Péter Bánfalvi	Hungary	100	246.2	627	2.5	1 (1)
Wolfgang Hinz	Germany	93	606.3	2,674	4.4	1 (1)
Wala Wegrzyg	Poland	78	440.9	1,726	3.9	1 (1)
other	-	2	6.3	492	78.1	1 (1)
Paolo Ochner	Italy	2	15.6	15	1.0	1 (1)

Looking at the list of the ten most successful cameras of 2016, we see almost the same entries as in the year before. Meanwhile a camera has to collect almost 300 observing nights to rank in the Top-10!

Table 3: *The ten most successful video systems in 2016.*

Camera	Location	Observer	# Observing Nights	Eff. Observing Time [h]	# Meteors	Meteors / Hour
TEMPLAR5	Tomar (PT)	Rui Goncalves	320	2,100.4	7,927	3.7
TEMPLAR1	Tomar (PT)	Rui Goncalves	317	2,369.8	9,615	4.1
SALSA3	Tucson (US)	Carl Hergenrother	316	2,711.1	6,932	2.6
TEMPLAR2	Tomar (PT)	Rui Goncalves	314	2,369.7	7,922	3.3
TEMPLAR4	Tomar (PT)	Rui Goncalves	312	2,234.0	7,846	3.5
STG38	Valbrevenna (IT)	Stefano Crivello	307	2,002.1	14,100	7.0
SCO38	Scorce (IT)	Enrico Stomeo	300	1,707.3	11,288	6.6
REMO2	Ketzür (DE)	Sirko Molau	299	1,593.5	9,135	5.7
NOA38	Scorce (IT)	Enrico Stomeo	297	1,654.2	8,719	5.3
REMO1	Ketzür (DE)	Sirko Molau	297	1,557.3	10,744	6.9

The following cameras are not listed, but still recorded more than 10,000 meteors each: LIC2 (24.520), ICC9 (20.888), LIC1 (18.244), ICC7 (12.014), JENNI (10.682) and MIN38 (10.018).

The complete data set from 1993 to 2016 is available for download at the IMO Network homepage http://www.imonet.org. Currently the database contains 3,088,953 meteors from 748,283 hours of effective observing time in 6,104 nights.

As always, we like to thank our observers for their passion, which is the basis for the success of the IMO Network. Special thanks to Stefano Crivello, Enrico Stomeo, Rui Goncalves, Carlos Saraiva and Maciej Maciejewski, which check every month together with Sirko Molau the data consistency and guarantee the high quality of the database.

1. Observers

Code	Name	Place	Camera	FOV [°²]	St.LM [mag]	Eff.CA [km²]	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG2 (0.8/8)	1475	6.2	3779	24	143.2	1051
BANPE	Bánfalvi	Zalaegerszeg/HU	HUVCSE01 (0.95/5)	2423	3.4	361	9	50.3	90
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	16	151.9	1408
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	22	184.2	864
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	19	158.1	483
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	23	186.9	733
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	22	189.1	720
CARMA	Carli	Monte Baldo/IT	BMH2 (1.5/4.5)*	4243	3.0	371	11	109.4	441
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	21	238.8	1354
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	28	256.0	1809
			C3P8 (0.8/3.8)	5455	4.2	1586	26	224.4	1205
			STG38 (0.8/3.8)	5614	4.4	2007	25	239.1	2309
DONJE	Donati	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	21	188.8	966
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	19	168.1	642
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	21	171.4	888
GONRU	Goncalves	Foz do Arelho/PT	FARELHO1 (1.0/2.6)	6328	2.8	469	10	111.0	100
		Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	30	298.7	1376
			TEMPLAR2 (0.8/6)	2080	5.0	1508	30	308.8	1271
			TEMPLAR3 (0.8/8)	1438	4.3	571	28	298.3	570
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	30	294.6	1208
			TEMPLAR5 (0.75/6)	2312	5.0	2259	30	288.5	1286
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	19	139.4	506
			ORION4 (0.95/5)	2662	4.3	1043	20	132.0	399
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	27	233.6	863
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	22	193.2	799
IGAAN	Igaz	Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	17	119.2	485
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	21	146.6	269
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	20	164.2	680
			HUSOR2 (0.95/3.5)	2465	3.9	715	20	175.0	629
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	26	222.6	1553
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	20	180.2	527
		Ljubljana/SI	ORION1 (0.8/8)	1399	3.8	268	25	217.4	544
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	26	233.7	2368
			STEFKA (0.8/3.8)	5471	2.8	379	26	237.1	1371
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	12	84.7	637
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	10	72.0	825
		Izana Obs./ES	LIC1(2.8/50)*	2255	6.2	5670	15	122.1	1118
		La Palma / ES	LIC2 (3.2/50)*	2199	6.5	7512	11	79.0	808
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	10	66.1	331
LOPAL	Lopes	Lisboa/PT	NASO1 (0.75/6)	2377	3.8	506	2	11.9	18
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	13	72.0	374
			PAV36 (0.8/3.8)*	5668	4.0	1573	18	105.9	444
			PAV43 (0.75/4.5)*	3132	3.1	319	19	56.2	394
			PAV60 (0.75/4.5)	2250	3.1	281	17	97.3	696
MARRU	Marques	Lisbon/PT	CAB1 (0.75/6)	2362	4.8	1517	31	321.7	1415
			RAN1 (1.4/4.5)	4405	4.0	1241	28	281.2	1171
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	3	15.3	49
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	17	108.2	1228
			ESCIMO2 (0.85/25)	155	8.1	3415	16	108.8	454
			MINCAM1 (0.8/8)	1477	4.9	1084	16	102.9	979
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	25	141.8	1209
			REMO2 (0.8/8)	1478	6.4	4778	25	148.4	1148
			REMO3 (0.8/8)	1420	5.6	1967	24	156.6	753
			REMO4 (0.8/8)	1478	6.5	5358	6	39.3	268
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	17	160.2	523
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	29	63.7	463
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	18	125.5	305
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	22	130.9	807
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	18	122.7	278
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	26	260.7	679
			RO2 (0.75/6)	2381	3.8	459	27	263.3	1069
			RO3 (0.8/12)	710	5.2	619	28	244.6	1163
			RO4 (1.0/8)	1582	4.2	549	25	250.6	531
			SOFIA (0.8/12)	738	5.3	907	29	269.2	787
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	17	130.6	234
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	25	190.4	650
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	24	194.5	746
			KAYAK2 (0.8/12)	741	5.5	920	22	194.2	282
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	26	213.9	1202
			NOA38 (0.8/3.8)	5609	4.2	1911	26	217.0	1121
			SCO38 (0.8/3.8)	5598	4.8	3306	26	217.0	1370
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	24	175.3	1061
			MINCAM3 (0.8/6)	2338	5.5	3590	23	159.7	542
			MINCAM4 (1.0/2.6)	9791	2.7	552	15	129.7	143
			MINCAM5 (0.8/6)	2349	5.0	1896	23	170.9	543
			MINCAM6 (0.8/6)	2395	5.1	2178	22	159.0	561
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	20	199.2	867
			HUMOB (0.8/6)	2388	4.8	1607	20	188.6	1016
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	24	171.0	429
WEGWA	Wegrzyk	Nieznaszyn/PL	PAV78 (0.8/6)	2286	4.0	778	24	175.0	653
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	13	97.9	363
Sum							31	13720.5	64474

* active field of view smaller than video frame

2. Observing Times (h)

December	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	3.9	12.2	11.6	-	7.8	-	6.3	2.1	1.0	-	0.8	8.4	-	2.5	8.0
BANPE	5.2	3.3	3.2	-	3.5	5.2	-	-	5.4	7.9	-	-	-	-	-
BERER	-	13.2	13.1	13.4	10.3	-	9.6	-	5.8	2.1	9.5	13.5	2.5	6.4	-
BOMMA	10.2	13.0	-	-	-	0.7	1.7	4.0	0.9	1.8	-	0.8	-	-	-
BREMA	0.2	11.3	11.9	9.4	12.6	7.2	7.7	-	9.3	-	-	2.9	-	-	9.5
BRIBE	-	12.7	13.8	13.8	13.7	11.4	8.2	0.2	9.0	-	0.4	1.8	-	4.3	8.5
	-	12.0	13.5	13.6	13.6	12.6	8.7	2.6	10.4	-	0.7	2.1	-	-	-
CARMA	-	-	-	-	-	-	-	6.6	13.5	-	-	-	-	12.3	13.6
CASFL	8.6	11.9	-	2.8	13.5	13.5	13.5	13.1	13.0	11.7	12.6	13.6	8.6	13.5	13.6
CRIST	7.4	12.1	-	10.6	1.4	11.6	13.1	6.0	6.3	-	9.8	11.8	11.0	1.4	3.9
	0.7	5.0	-	11.2	-	12.9	13.1	10.5	2.0	-	7.9	11.1	10.5	0.9	7.5
	-	12.6	-	10.7	1.6	12.6	13.1	12.8	7.8	-	12.0	11.6	10.5	1.7	3.7
DONJE	7.3	13.0	-	-	-	-	2.4	4.5	1.1	2.2	-	0.6	-	-	-
ELTMA	3.8	0.2	-	-	2.8	5.8	11.5	-	-	-	1.6	-	0.8	-	-
FORKE	-	11.7	11.9	12.4	13.5	13.2	3.5	4.5	-	4.9	-	0.6	-	-	3.0
GONRU	-	-	-	-	-	-	-	-	-	9.5	-	-	-	-	-
	4.8	1.1	6.2	5.2	12.7	12.8	11.0	11.6	12.7	10.8	7.4	3.2	1.4	9.6	-
	4.8	1.2	6.1	5.4	12.9	12.9	11.2	11.9	13.0	9.6	8.8	6.6	3.1	11.8	-
	2.2	-	2.5	5.1	12.8	12.3	11.9	11.5	12.7	10.5	12.6	6.9	-	11.6	-
	3.7	0.7	4.4	5.6	12.9	12.4	10.0	10.2	12.8	7.8	7.0	5.5	2.8	9.1	-
	3.2	0.9	4.3	5.4	12.6	12.6	11.4	11.3	12.4	9.1	11.3	6.6	0.2	7.3	-
GOVMI	12.4	5.3	7.8	5.0	12.3	-	-	-	6.3	12.4	5.8	1.5	-	-	-
	-	5.1	7.7	4.7	12.3	0.2	-	-	3.5	12.3	5.7	1.2	5.5	-	-
HERCA	11.0	6.8	6.4	8.4	12.1	11.5	8.2	7.6	11.5	11.1	7.6	12.0	11.5	9.2	10.7
HINWO	-	13.4	13.1	13.5	13.7	10.1	4.2	4.1	4.2	3.7	-	0.8	-	-	10.6
IGAAN	-	9.4	9.4	8.9	5.4	1.8	-	1.6	4.9	9.4	2.8	8.0	5.3	-	-
	2.8	7.8	7.9	7.8	-	6.0	3.1	0.3	5.0	7.0	6.8	12.7	7.7	3.6	1.3
JONKA	0.6	13.5	13.5	13.5	-	12.1	2.5	-	4.1	1.9	2.6	13.6	8.6	1.0	-
	0.7	13.5	13.4	13.5	-	13.3	7.3	-	4.7	10.5	2.7	13.7	8.3	1.7	-
KACJA	9.7	4.5	6.5	3.1	11.4	12.9	11.9	9.7	13.0	13.1	3.5	9.0	4.4	7.8	-
	12.5	-	-	-	8.1	-	9.2	9.2	13.0	12.5	3.2	1.6	6.3	1.4	-
	13.3	8.9	8.6	2.8	12.8	7.9	10.3	11.6	11.4	9.5	2.6	0.4	8.5	4.7	-
	9.7	4.6	6.3	3.4	13.4	12.9	13.0	9.8	13.0	12.8	3.5	10.2	5.1	3.5	-
	9.8	4.6	6.7	3.9	11.2	12.6	13.1	9.5	13.0	13.1	4.9	9.9	7.5	5.7	-
KOSDE	-	8.2	3.4	10.4	11.5	11.5	11.2	0.6	6.3	3.4	-	4.3	-	6.1	7.8
	-	-	3.1	11.5	11.5	10.2	9.9	4.2	7.2	6.5	2.5	-	-	-	-
	0.2	8.4	4.0	10.4	12.0	12.0	10.3	10.8	7.6	9.4	0.9	8.5	7.5	8.2	11.9
	-	-	3.0	11.5	11.5	11.5	10.2	7.5	7.0	6.2	3.2	-	-	-	-
LOJTO	-	-	-	-	-	-	4.3	-	-	-	-	11.3	5.1	-	-
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	-	-	-	-	-	-	-	0.5	-	-	-	6.2	5.8	-	4.3
	-	-	0.9	5.6	9.7	1.8	7.9	0.5	-	-	0.2	7.4	7.5	-	6.0
	-	-	0.4	2.5	9.9	2.2	2.5	0.3	-	0.2	0.2	7.0	6.5	-	3.0
	-	-	0.6	3.8	-	-	8.1	0.3	-	0.3	0.8	8.0	8.1	-	6.9
MARRU	11.5	0.4	8.1	7.7	12.4	12.6	12.8	10.3	12.8	11.2	10.1	10.2	0.8	9.7	0.9
	6.4	-	-	3.0	12.8	12.5	7.4	10.9	0.8	3.6	12.7	10.2	-	8.1	1.1
MASMI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	4.6	8.2	12.8	7.2	-	-	-	8.3	4.7	13.1	-	8.1	0.9	-	-
	2.5	8.3	13.4	7.5	-	-	-	8.9	4.7	11.3	-	8.9	0.3	-	-
	4.2	7.9	13.4	7.2	-	-	-	8.6	4.8	12.4	-	7.8	0.6	-	-
	4.9	12.8	12.6	1.8	7.1	2.7	6.3	1.2	0.5	-	1.2	6.3	-	0.3	8.1
	5.7	13.0	12.9	-	7.7	3.0	6.9	0.9	1.0	-	1.5	5.7	-	0.2	8.6
	5.0	13.8	13.7	-	6.8	3.0	7.1	1.5	1.0	-	2.0	7.7	-	1.0	9.2
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MORJO	-	13.4	13.5	13.5	2.0	13.5	5.5	-	7.8	10.1	6.9	10.3	3.9	-	-
MOSFA	1.1	1.5	-	0.4	2.4	2.9	3.3	2.9	4.2	2.9	1.9	7.2	4.2	3.7	1.7
OTTMI	-	-	-	-	-	7.8	1.2	0.3	5.4	-	-	6.5	10.2	11.8	-
PERZS	4.7	4.2	3.5	0.8	5.2	2.5	-	0.2	7.1	9.5	2.2	5.5	4.9	0.7	-
ROTEC	2.2	13.7	11.5	-	5.7	-	6.3	1.8	-	-	0.5	10.2	-	3.5	2.7
SARAN	-	-	-	5.2	13.0	12.2	7.4	9.9	2.8	6.1	-	11.6	0.6	9.1	1.3
	6.0	-	-	3.5	12.2	12.1	6.4	11.2	3.2	8.9	13.0	11.7	-	6.4	0.6
	5.7	-	-	3.6	11.4	11.9	8.8	9.3	4.1	6.2	9.5	9.1	0.2	6.6	1.2
	-	-	-	1.8	12.1	2.3	9.2	12.4	3.3	9.3	13.0	11.3	-	9.4	-
	-	-	2.0	3.3	6.5	7.3	3.0	6.9	2.9	8.5	12.9	10.8	0.1	10.4	3.1
SCALE	0.6	-	-	-	-	-	-	-	-	-	1.1	-	0.2	-	0.3
SCHHA	0.2	9.1	10.8	13.7	13.1	12.5	8.0	1.2	10.9	-	0.6	3.3	-	4.9	8.3
SLAST	12.5	7.5	11.1	4.0	12.4	8.6	11.0	10.2	12.4	12.3	1.5	1.2	7.1	7.3	-
	1.7	1.2	10.9	-	5.7	8.8	11.9	10.3	13.4	13.4	5.1	0.5	-	8.3	-
STOEN	6.9	0.7	0.6	0.2	10.1	11.9	13.2	2.8	10.5	-	-	0.3	0.5	-	-
	3.1	-	0.6	0.5	10.8	12.9	13.5	2.9	12.8	-	1.0	4.1	-	-	-
	7.6	-	1.0	0.5	10.4	13.3	12.6	3.1	11.7	-	1.1	4.0	-	-	-
STRJO	-	12.9	13.9	11.5	14.0	6.6	7.1	0.6	5.2	-	-	1.8	-	2.8	10.6
	-	12.4	13.9	10.3	14.0	5.6	6.4	0.7	4.9	-	-	0.8	-	4.4	11.5
	-	11.9	8.1	11.2	10.2	-	6.0	1.3	7.7	-	-	-	-	-	11.4
	-	13.2	13.9	11.4	13.9	6.6	7.1	0.9	5.6	-	-	0.9	-	3.5	10.7
	-	12.0	13.9	11.4	13.9	3.6	6.0	-	3.9	-	-	0.7	-	4.1	11.3
TEPIS	-	10.3	10.6	13.3	8.0	13.4	10.0	-	2.5	12.1	7.1	13.3	7.9	5.3	8.5
	-	13.3	13.3	13.3	8.6	13.3	10.2	-	2.7	11.7	6.9	12.7	6.5	6.2	8.1
TRIMI	12.3	4.7	12.4	-	12.4	12.4	12.3	10.7	12.3	9.1	2.2	4.1	5.5	4.9	-
WEGWA	0.8	-	10.4	13.7	13.3	-	4.2	2.6	-	-	0.7	12.7	0.8	-	3.1
YRJIL	5.3	-	5.3	-	10.2	9.6	-	-	11.8	14.9	7.8	-	-	-	-
Sum	264.2	468.5	493.3	450.3	635.3	565.6	546.2	364.3	484.2	429.8	284.4	474.4	225.8	277.9	256.1

December	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	9.7	-	-	2.8	5.4	12.5	1.4	8.0	1.7	-	6.7	1.2	1.4	12.6	12.9	2.3
BANPE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	13.4
BERER	13.2	-	-	-	-	-	-	-	-	-	-	-	13.3	12.9	9.5	3.6
BOMMA	1.6	13.3	1.3	-	-	13.4	13.5	13.6	9.5	7.9	12.5	13.5	11.8	12.5	13.4	13.3
BREMA	5.2	-	-	12.3	11.5	-	2.8	-	-	-	11.6	12.8	2.9	13.8	3.2	-
BRIBE	6.7	-	-	13.3	13.1	1.0	2.5	2.2	-	-	9.8	-	6.5	13.9	13.9	6.2
	6.0	-	2.6	8.3	13.2	6.8	1.6	-	-	-	9.5	0.9	10.6	13.8	13.8	12.2
CARMA	13.5	13.8	4.7	-	0.2	13.7	-	-	-	-	-	-	-	-	13.8	3.7
CASFL	13.6	13.6	6.9	-	0.4	13.6	-	-	-	-	-	-	-	-	13.6	13.6
CRIST	3.0	13.2	3.7	-	0.2	11.0	13.2	13.2	11.4	8.6	6.8	13.2	13.2	13.1	13.2	12.6
	0.7	13.2	3.5	-	-	13.0	13.1	12.7	4.8	3.1	4.1	13.2	13.2	13.2	12.8	10.5
	2.2	13.2	4.6	-	0.7	13.2	13.2	13.2	13.0	8.9	6.6	13.2	13.2	13.2	-	-
DONJE	2.1	13.4	1.3	-	-	13.5	13.5	13.4	11.1	11.0	13.5	13.5	11.9	12.8	13.4	13.3
ELTMA	13.3	-	-	-	-	12.7	13.5	13.3	6.9	8.8	13.3	13.0	9.4	11.0	13.2	13.2
FORKE	13.2	0.9	-	7.0	13.3	13.2	1.6	5.8	-	-	0.9	-	-	12.2	12.2	11.9
GONRU	-	-	-	-	-	-	-	3.5	10.2	12.3	13.0	13.0	13.0	13.0	12.5	11.0
	10.2	12.8	12.8	12.8	12.8	12.7	6.0	5.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7
	10.4	13.0	13.0	12.7	12.4	12.7	5.9	5.9	13.0	12.9	12.9	12.9	12.9	13.0	13.0	12.9
	9.9	12.9	12.9	12.9	12.3	10.2	6.4	5.4	12.9	12.9	13.0	12.8	12.8	12.8	12.8	12.8
	10.4	12.9	13.0	12.8	13.0	12.5	5.9	5.9	13.0	12.9	12.9	12.9	12.9	13.0	12.9	12.8
	9.5	12.7	12.7	12.6	11.8	9.0	5.8	5.4	12.7	12.6	12.5	12.5	12.6	12.6	12.5	12.4
GOVMI	8.3	7.5	-	-	-	-	-	0.2	-	3.1	4.7	7.8	3.6	12.5	10.4	12.5
	8.8	7.5	-	-	-	-	-	0.7	-	3.8	4.8	7.5	3.5	12.4	12.4	12.4
HERCA	4.9	2.9	10.3	10.4	9.1	-	-	6.7	0.8	0.8	10.2	12.0	8.6	-	11.3	-
HINWO	13.4	0.9	-	13.2	13.5	13.5	1.3	8.0	-	-	1.6	-	-	11.2	12.5	12.7
IGAAN	-	-	-	-	-	-	-	-	-	-	3.5	9.9	7.6	10.7	9.9	10.7
	10.9	-	-	-	-	-	-	-	-	-	6.2	9.4	13.3	13.1	10.9	3.0
JONKA	12.9	-	-	-	-	-	-	-	-	0.3	4.3	9.7	13.1	13.6	13.6	9.2
	12.5	-	-	-	-	-	-	-	-	0.1	4.3	9.6	11.9	12.5	13.6	7.2
KACJA	7.6	13.5	4.8	-	-	-	-	7.7	0.5	8.4	3.4	13.5	2.6	13.4	13.4	13.3
	10.7	12.2	4.0	-	-	-	-	-	-	10.9	6.0	13.0	6.2	13.5	13.4	13.3
	9.4	13.5	7.7	-	-	-	-	9.6	2.2	-	7.4	13.4	4.1	13.6	12.8	10.4
	7.3	13.5	8.1	-	-	-	-	10.6	5.2	8.2	3.5	13.2	2.6	13.5	13.5	13.3
	7.8	13.5	7.4	-	-	-	-	10.4	3.3	9.0	3.7	13.5	2.9	13.5	13.2	13.4
KOSDE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	5.4	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	5.4	-	2.0	-	-	-	-	-	-	-	-	-
LOJTO	3.4	-	-	-	-	11.9	12.4	-	-	-	-	0.8	3.0	2.8	11.1	-
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	5.4
MACMA	5.0	-	-	-	1.4	10.3	14.0	-	-	-	1.9	0.9	-	0.5	14.0	7.2
	8.1	-	-	-	1.4	10.5	14.1	-	-	-	2.3	-	-	0.4	13.9	7.7
	2.6	-	-	-	1.0	3.3	7.0	-	-	-	0.9	-	-	0.2	4.3	2.2
	8.5	-	-	-	1.6	10.9	14.0	-	-	-	2.9	-	-	0.8	14.0	7.7
MARRU	4.9	12.9	12.8	12.6	12.6	12.8	12.7	9.3	12.9	12.8	12.7	12.8	12.7	12.8	12.5	10.4
	8.4	13.0	11.8	13.0	12.6	12.6	12.9	11.6	13.0	12.9	12.1	13.0	12.9	12.0	12.9	7.0
MASMI	-	-	-	-	-	-	3.1	-	2.3	-	-	9.9	-	-	-	-
MOLSI	-	-	-	4.9	1.7	-	-	-	-	0.9	8.2	0.3	8.3	13.0	3.0	-
	-	-	-	6.1	2.2	-	-	-	-	0.9	8.1	-	8.3	13.5	3.9	-
	-	-	-	4.8	-	-	-	-	0.2	0.8	6.7	-	6.8	13.4	3.3	-
	7.7	-	-	2.9	5.6	12.9	3.4	7.6	2.9	-	6.6	0.2	-	12.9	13.0	0.3
	7.9	-	1.2	3.0	6.1	13.2	3.5	8.1	3.2	0.3	7.6	-	-	13.2	13.4	0.6
	8.8	-	1.5	3.3	6.4	13.5	3.9	8.4	2.9	-	7.8	-	-	13.8	13.8	0.7
	-	-	-	-	-	-	-	-	3.0	0.3	7.8	-	-	13.8	13.7	0.7
MORJO	5.7	-	-	-	-	-	-	-	-	-	6.4	-	9.9	13.6	13.1	11.1
MOSFA	1.8	2.4	0.5	-	0.3	3.0	2.7	1.5	0.3	1.9	1.0	2.5	1.7	1.0	2.0	0.8
OTTMI	-	-	12.6	6.3	9.9	6.5	4.6	-	-	-	4.8	10.8	7.4	3.4	3.3	12.7
PERZS	7.7	7.2	-	-	-	-	-	-	-	2.9	5.5	2.6	13.4	13.6	13.5	13.5
ROTEC	8.7	-	-	3.0	4.3	13.9	-	3.9	-	-	5.4	-	-	14.0	11.4	-
SARAN	7.9	8.2	11.0	13.0	12.4	12.7	12.9	13.0	12.9	13.0	12.9	12.9	12.9	12.9	12.9	-
	8.8	12.8	12.1	12.9	11.0	12.1	10.2	12.3	12.8	11.5	-	12.8	11.7	12.8	10.5	3.8
	8.0	10.0	11.6	9.5	10.6	11.5	9.4	11.6	12.0	10.7	-	12.1	11.0	11.9	9.9	7.2
	9.0	12.8	12.0	13.0	10.3	10.9	10.1	12.4	12.8	11.5	-	12.9	11.7	12.8	10.6	3.7
	8.3	12.8	11.8	12.9	12.1	11.9	12.7	12.7	12.8	12.8	12.6	12.7	12.8	12.5	12.6	7.5
SCALE	12.6	-	-	-	3.7	11.9	10.3	9.9	4.0	8.0	11.3	13.3	7.6	11.5	12.1	12.2
SCHHA	6.8	-	1.6	11.9	11.4	-	3.9	-	0.5	-	12.6	3.1	11.8	13.7	12.1	4.4
SLAST	8.0	11.4	4.8	-	-	-	-	7.6	2.7	-	4.7	12.1	1.1	-	11.4	11.6
	9.1	12.2	10.5	-	-	-	-	6.9	4.0	-	7.7	13.4	-	13.3	12.7	13.2
STOEN	13.3	6.7	-	0.5	4.5	13.5	13.3	13.3	7.1	10.9	11.8	13.4	7.6	13.4	13.4	13.5
	13.4	6.7	0.2	0.5	4.2	13.6	13.4	13.6	5.7	10.2	12.1	13.7	7.2	13.3	13.5	13.5
	13.5	6.8	0.2	0.7	6.1	13.6	13.3	13.4	7.1	11.2	11.6	13.5	7.2	6.7	13.4	13.4
STRJO	10.5	1.4	0.2	11.9	9.2	3.8	2.0	4.6	-	-	7.7	-	5.8	14.1	14.1	3.0
	10.5	1.3	0.6	12.0	9.1	-	0.8	3.7	-	-	5.5	-	5.3	8.9	14.1	3.0
	10.9	-	-	9.5	10.0	3.4	-	-	-	-	-	-	-	11.4	14.1	2.6
	10.5	1.3	-	11.8	9.7	3.5	0.7	4.1	-	-	5.6	-	5.3	13.9	13.9	2.9
	10.3	1.3	0.4	11.9	9.1	2.5	0.9	-	-	-	6.0	-	4.9	14.1	14.0	2.8
TEPIS	6.0	-	-	-	-	-	-	-	-	-	7.6	9.6	13.5	13.4	13.4	13.4
	13.4	-	-	-	-	-	-	-	-	-	4.8	9.2	6.4	13.4	7.3	7.3
TRIMI	9.9	12.2	5.6	-	-	-	6.8	1.9	-	4.0	-	6.0	1.4	3.5	3.0	1.4
WEGWA	8.3	5.3	-	12.5	3.4	13.7	12.7	10.8	-	0.5	6.3	3.4	2.9	7.9	13.7	11.3
YRJIL	-	-	-	-	-	-	0.8	7.5	2.0	-	6.0	1.9	-	-	-	14.8
Sum	567.1	402.6	258.3	335.5	357.6	482.1	365.7	390.0	282.1	307.3	491.5	533.7	496.9	789.8	848.8	590.3

3. Results (Meteors)

December	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	55	138	67	-	46	-	52	12	9	-	11	76	-	15	57
BANPE	4	13	10	-	7	10	-	-	10	20	-	-	-	-	-
BERER	-	132	108	97	42	-	42	-	30	18	153	533	15	33	-
BOMMA	71	73	-	-	-	2	10	12	9	8	-	9	-	-	-
BREMA	1	45	54	30	61	7	21	-	28	-	-	22	-	-	33
BRIBE	-	58	76	91	69	15	27	1	22	-	3	33	-	14	24
	-	40	83	95	52	30	29	4	34	-	2	47	-	-	-
CARMA	-	-	-	-	-	-	-	33	72	-	-	-	-	88	41
CASFL	34	42	-	16	46	72	51	70	73	88	60	267	109	73	64
CRIST	15	48	-	64	5	82	100	29	56	-	94	354	224	9	10
	1	32	-	42	-	64	61	43	9	-	91	256	179	8	31
	-	100	-	54	13	99	144	120	91	-	140	406	206	21	4
DONJE	81	69	-	-	-	-	18	9	10	16	-	12	-	-	-
ELTMA	8	1	-	-	19	41	68	-	-	-	15	-	7	-	-
FORKE	-	91	64	89	92	77	9	32	-	16	-	2	-	-	22
GONRU	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-
	23	1	24	33	89	74	45	88	92	55	25	20	4	25	-
	28	2	11	35	84	62	38	72	88	42	37	63	18	45	-
	5	-	2	12	34	27	13	32	23	26	52	57	-	30	-
	22	1	11	38	67	47	26	72	91	30	27	81	17	40	-
	13	1	13	27	84	50	51	64	91	37	107	94	1	42	-
GOVMI	49	38	56	11	31	-	-	-	34	65	6	9	-	-	-
	-	38	37	8	21	1	-	-	8	57	7	7	70	-	-
HERCA	37	14	22	48	42	39	16	34	36	48	33	96	134	58	37
HINWO	-	88	43	62	70	55	11	17	24	6	-	6	-	-	64
IGAAN	-	33	20	15	13	2	-	3	19	57	8	143	89	-	-
	9	8	14	3	-	4	4	1	6	11	18	68	78	6	3
JONKA	3	33	33	30	-	20	1	-	19	14	29	191	183	7	-
	3	45	40	30	-	21	1	-	16	44	16	164	104	3	-
KACJA	69	12	30	4	60	85	61	77	141	188	9	209	106	31	-
	48	-	-	-	32	-	28	25	52	51	6	5	63	1	-
	22	16	24	4	29	7	9	36	28	43	3	4	70	22	-
	97	11	33	15	170	139	160	93	190	251	9	360	87	19	-
	51	8	20	10	47	72	71	49	107	136	15	231	111	42	-
KOSDE	-	52	26	106	96	90	74	4	70	15	-	28	-	25	51
	-	-	42	130	135	87	76	39	132	96	66	-	-	-	-
	1	61	49	129	126	121	92	71	93	107	3	118	74	25	48
	-	-	37	118	160	97	88	29	106	89	57	-	-	-	-
LOJTO	-	-	-	-	-	-	10	-	-	-	-	119	31	-	-
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	-	-	-	-	-	-	-	3	-	-	-	164	52	-	18
	-	-	6	18	25	6	12	2	-	-	1	124	80	-	18
	-	-	4	12	19	6	10	2	-	1	1	139	78	-	22
	-	-	8	14	-	-	20	1	-	2	6	214	120	-	45
MARRU	42	1	17	53	71	46	52	57	85	32	40	215	7	87	3
	25	-	-	15	61	52	22	48	6	29	128	184	-	59	2
MASMI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	23	114	177	37	-	-	-	194	68	197	-	95	7	-	-
	5	30	69	18	-	-	-	41	32	81	-	70	1	-	-
	15	91	143	20	-	-	-	136	81	155	-	137	4	-	-
	42	173	69	2	43	7	69	9	3	-	25	109	-	2	79
	53	155	96	-	29	11	71	10	3	-	33	51	-	1	59
	26	98	55	-	16	9	48	6	2	-	16	68	-	3	64
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MORJO	-	45	39	52	2	13	5	-	30	49	18	135	58	-	-
MOSFA	7	9	-	2	18	25	21	20	29	23	12	71	31	24	12
OTTMI	-	-	-	-	-	19	7	2	15	-	-	25	52	29	-
PERZS	41	32	27	5	43	16	-	1	51	98	14	154	57	4	-
ROTEC	6	56	19	-	4	-	19	2	-	-	1	62	-	4	1
SARAN	-	-	-	16	42	28	18	39	11	25	-	104	4	27	4
	19	-	-	23	67	40	13	47	15	34	121	158	-	35	1
	18	-	-	17	62	52	23	56	13	42	102	150	1	33	3
	-	-	-	16	19	15	4	22	15	22	71	90	-	27	-
	-	-	2	17	34	31	11	36	6	25	76	96	1	37	9
SCALE	2	-	-	-	-	-	-	-	-	-	5	-	1	-	2
SCHHA	1	50	39	69	31	22	43	1	31	-	3	64	-	17	26
SLAST	46	36	60	4	54	12	34	76	70	79	6	5	65	28	-
	3	1	5	-	16	3	17	20	33	31	9	3	-	17	-
STOEN	14	1	4	1	86	102	127	30	88	-	-	2	3	-	-
	13	-	3	4	71	81	89	20	93	-	12	25	-	-	-
	20	-	7	3	79	117	128	21	130	-	15	28	-	-	-
STRJO	-	74	110	130	123	17	39	1	23	-	-	28	-	18	47
	-	48	63	66	50	7	26	2	16	-	-	4	-	36	47
	-	10	4	18	6	-	6	2	10	-	-	-	-	-	21
	-	58	80	75	72	12	18	3	13	-	-	4	-	19	33
	-	50	66	75	55	4	19	-	14	-	-	10	-	20	43
TEPIS	-	32	39	46	18	28	31	-	11	52	60	199	133	23	11
	-	56	40	46	30	32	28	-	12	73	72	241	165	35	14
TRIMI	18	7	18	-	28	29	24	22	36	22	2	27	54	9	-
WEGWA	4	-	32	33	34	-	5	18	-	-	4	192	12	-	15
YRJIL	18	-	4	-	31	19	-	-	52	108	66	-	-	-	-
Sum	1211	2571	2354	2353	3181	2460	2566	2121	3016	2828	2021	7537	2966	1276	1088

December	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	33	-	-	15	56	130	9	18	2	-	20	1	7	94	118	10
BANPE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	7
BERER	57	-	-	-	-	-	-	-	-	-	-	-	72	53	21	2
BOMMA	15	62	2	-	-	87	72	70	19	52	49	55	46	47	64	30
BREMA	5	-	-	40	21	-	2	-	-	-	31	36	8	37	1	-
BRIBE	13	-	-	37	39	1	10	1	-	-	23	-	33	68	56	19
	9	-	12	26	44	11	3	-	-	-	22	1	31	59	51	35
CARMA	36	48	20	-	1	41	-	-	-	-	-	-	-	-	34	27
CASFL	56	48	13	-	2	64	-	-	-	-	-	-	-	-	47	59
CRIST	1	62	4	-	1	24	99	72	26	48	56	69	69	67	68	53
	1	33	1	-	-	55	47	33	10	11	21	50	45	27	23	31
	2	69	10	-	2	120	144	100	39	85	73	94	96	77	-	-
DONJE	23	58	1	-	-	98	76	71	22	75	68	55	37	54	63	50
ELTMA	58	-	-	-	-	59	50	45	8	31	44	49	22	32	42	43
FORKE	42	1	-	29	77	60	3	3	-	-	3	-	-	59	53	64
GONRU	-	-	-	-	-	-	-	11	9	27	11	8	3	3	3	11
	40	59	58	65	59	40	9	14	49	69	62	48	58	57	46	45
	41	46	41	55	38	31	10	10	55	45	47	42	43	45	52	45
	24	20	16	18	18	8	5	4	8	27	20	20	13	17	18	21
	38	54	55	63	43	21	7	1	29	57	47	54	45	41	35	48
	35	49	45	47	38	26	9	5	57	60	43	46	29	51	33	38
GOVMI	19	13	-	-	-	-	-	1	-	22	3	7	16	54	37	35
	7	8	-	-	-	-	-	1	-	17	3	7	13	24	28	37
HERCA	4	3	21	19	23	-	-	20	4	1	23	24	15	-	12	-
HINWO	47	1	-	47	48	57	3	9	-	-	1	-	-	57	43	40
IGAAN	-	-	-	-	-	-	-	-	-	-	7	21	13	11	12	19
	2	-	-	-	-	-	-	-	-	-	5	8	13	5	2	1
JONKA	14	-	-	-	-	-	-	-	-	1	9	31	22	19	19	2
	32	-	-	-	-	-	-	-	-	1	14	25	22	22	19	7
KACJA	68	77	9	-	-	-	-	13	2	21	4	65	2	62	56	92
	29	18	2	-	-	-	-	-	-	26	8	14	25	28	36	30
	33	21	6	-	-	-	-	10	1	-	8	31	18	35	32	32
	67	102	20	-	-	-	-	69	8	55	13	73	7	117	96	107
	55	65	7	-	-	-	-	18	2	14	5	49	2	63	39	82
KOSDE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	21	-	6	-	-	-	-	-	-	-	-	-
LOJTO	7	-	-	-	-	65	45	-	-	-	-	1	26	1	26	-
LOPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	5
MACMA	5	-	-	-	7	37	37	-	-	-	5	2	-	2	31	11
	6	-	-	-	13	43	39	-	-	-	7	-	-	1	29	14
	6	-	-	-	7	24	14	-	-	-	6	-	-	1	30	12
	26	-	-	-	9	73	60	-	-	-	12	-	-	3	53	30
MARRU	24	66	37	43	38	45	46	9	42	53	32	43	35	43	36	15
	23	42	37	38	35	38	50	38	35	32	36	36	24	42	29	5
MASMI	-	-	-	-	-	-	14	-	2	-	-	33	-	-	-	-
MOLSI	-	-	-	9	2	-	-	-	-	11	56	1	83	142	12	-
	-	-	-	5	4	-	-	-	-	2	23	-	15	52	6	-
	-	-	-	2	-	-	-	-	1	2	45	-	39	104	4	-
	24	-	-	33	68	150	35	18	7	-	24	1	-	116	100	1
	20	-	2	21	59	146	38	20	7	1	19	-	-	114	125	4
	19	-	3	16	41	74	20	8	3	-	21	-	-	74	62	1
	-	-	-	-	-	-	-	-	5	1	35	-	-	113	109	5
MORJO	3	-	-	-	-	-	-	-	-	-	5	-	18	21	14	16
MOSFA	13	15	3	-	2	23	19	9	2	13	7	16	11	6	14	6
OTTMI	-	-	20	2	6	35	3	-	-	-	10	12	30	13	4	21
PERZS	11	7	-	-	-	-	-	-	-	11	5	5	70	48	57	50
ROTEC	11	-	-	1	14	35	-	7	-	-	6	-	-	22	8	-
SARAN	24	35	21	22	14	36	37	20	21	25	22	24	20	28	12	-
	25	36	39	63	34	27	45	34	28	37	-	37	34	28	15	14
	29	57	32	52	37	37	53	49	55	42	-	37	34	33	38	6
	22	15	15	17	16	12	19	14	12	20	-	17	14	14	13	10
	21	24	24	32	22	19	40	34	27	25	25	29	29	30	21	4
SCALE	18	-	-	-	5	43	20	21	1	15	14	20	5	20	20	22
SCHHA	18	-	7	31	25	-	7	-	2	-	31	7	33	54	27	11
SLAST	23	23	3	-	-	-	-	9	1	-	7	42	1	-	42	20
	14	20	6	-	-	-	-	3	1	-	4	19	-	14	21	22
STOEN	66	15	-	3	32	108	78	65	19	42	52	64	21	49	59	71
	55	12	1	1	29	95	89	75	10	47	33	76	11	51	61	64
	84	21	1	2	46	108	92	65	16	45	59	77	20	40	53	93
STRJO	23	3	1	64	54	10	8	1	-	-	20	-	41	106	103	17
	17	1	2	46	17	-	3	5	-	-	5	-	11	14	48	8
	10	-	-	9	8	2	-	-	-	-	-	-	-	20	13	4
	8	2	-	32	14	4	1	3	-	-	7	-	10	37	32	6
	17	1	1	42	26	3	3	-	-	-	6	-	21	40	39	6
TEPIS	32	-	-	-	-	-	-	-	-	-	18	21	26	37	21	29
	41	-	-	-	-	-	-	-	-	-	20	27	7	36	18	23
TRIMI	15	14	10	-	-	-	27	3	-	12	-	14	3	17	11	7
WEGWA	47	1	-	32	20	42	29	15	-	3	13	8	9	6	40	39
YRJIL	-	-	-	-	-	-	3	15	4	-	9	3	-	-	-	31
Sum	1713	1327	608	1079	1257	2267	1538	1139	651	1184	1442	1655	1526	2977	2737	1825