Result of the IMO Video Meteor Network – Second Quarter 2019

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As in the previous months, about 80 video cameras were active in the IMO network in the second quarter of 2019. The weather was mediocre (figure 1): phases with very good observing conditions and partly over 70 active meteor cameras (e.g. between April 15 and 21) interleaved with phases, where less than half of this number of cameras was in operation. The lowlight was April 12/13, when 18 cameras detected no more than 125 meteors in nearly 50 observing hours. With more than 8,000 observing hours and 18,000 meteors, the April output was close to the average of the previous years. There have been better years like 2015 with nearly 11,000 observing hours and 26,000 meteors, but also worse.
May 2019 was really poor. Not even 12,500 meteors could be recorded – last time we gathered so little data was 2010, when the network was only half of today's size.
June, on the other hand, was far better than average. Nearly 8,000 observing hours are more than we ever recorded in this month, and with regards to the number of meteors the month ranks second after 2016.

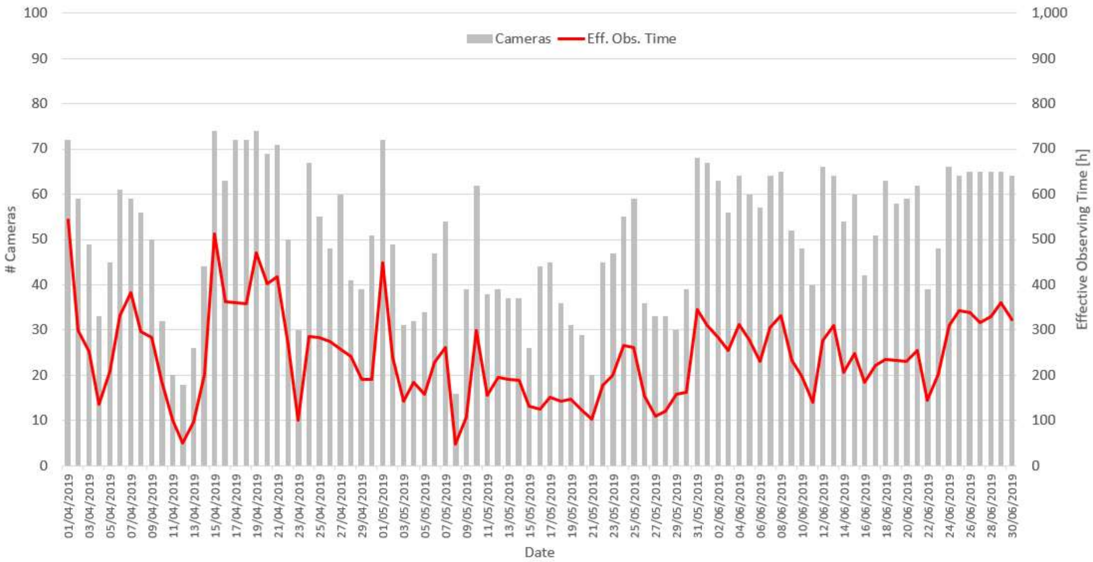

Figure 1: *Number of active cameras per night (grey bars) and effective observing time of these cameras (red line) in the second quarter of 2019.*

Looking at the number of recorded meteors per hour (figure 2), the Lyrids around April 22 are clearly visible, when the average meteor rate doubled. Away from that, the values scatter around the minimum of two meteors per hours. The eta-Aquariids in early May leave no imprint, because they are visible in only a short interval in the morning hours. Only in the last decade of June the average is raising to three meteors per hours – the spring minimum of meteor activity had passed.

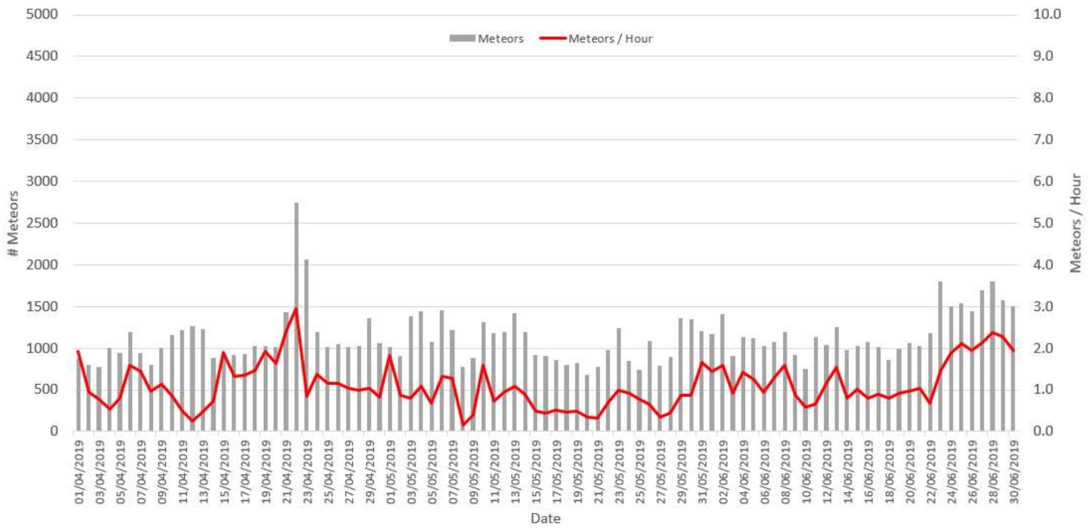

Figure 2: *Average number of meteors per hours (grey bars) and number of recorded meteors per night (red line) in the second quarter of 2019.*

Let’s have a look at the meteor showers which were active in the second quarter.
Figure 3 compares the activity profile of the 2019 Lyrids with the average of 2011 to 2018. Before and after the peak the values match well, and with five meteoroids per 1,000 km^2 and hour, also the height of the peak is nearly identical, but the time of maximum differs. Whereas the long-term average peak time from our video data is 32.18° solar longitude, we measured peak activity in 2019 at 32.37° solar longitude, which is more than four hours later. Also in the following night, rates where still higher than usual.

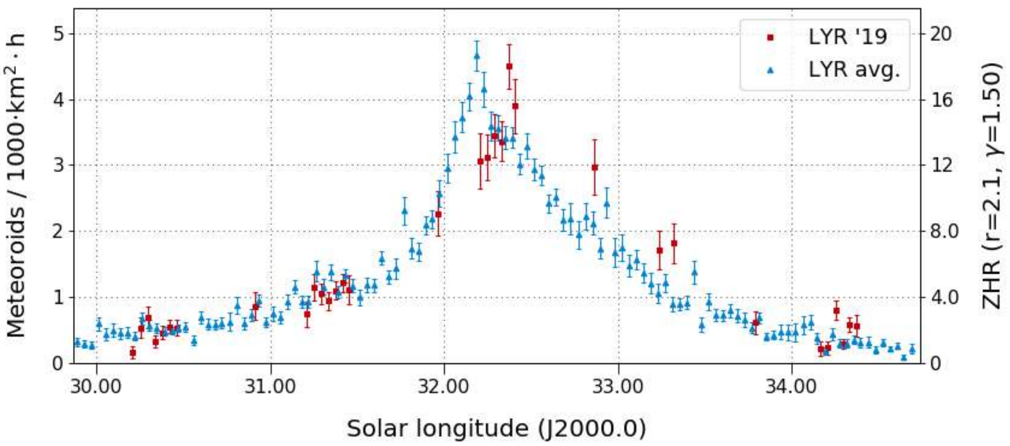

Figure 3: *Flux density of the Lyrids in 2019 (red) as well as in the average of the years 2011-2018 (blue), derived from observations of the IMO Network.*

Unfortunately, this result cannot be confirmed by data of IMO, because the number of visual observations was too low. Highest zenithal hourly rate of the few observing intervals was reached near midnight UT of April 22/23, which translates to 32.30° solar longitude. However, the error bars are quite large.

According to the IMO Meteor Shower Calendar, the long-term average of the Lyrid peak from visual data occurs at 32.32° solar longitude, i.e. closer to the value we determined for 2019. It is pointed out that the peak time may vary between 32.00° and 32.45°. It is also supposed that Lyrid peaks near the average are stronger than those farther away from the average.

Unfortunately, our video data are not (yet) sufficient to verify that, because we only cover the European night time hours sufficiently and, thus, catch only every four years a maximum.

For the eta Aquariids, we had to reduce the resolution of the activity profile strongly, because the weather was particularly poor in the first few days of May. Figure 4 shows also for this shower a comparison between the activity profile of 2019 (one value per night) and the average of the years 2011-2018. The only thing we can derive from it is, that the peak time at 46° solar longitude is confirmed and that the activity was lower than in the long-term average.

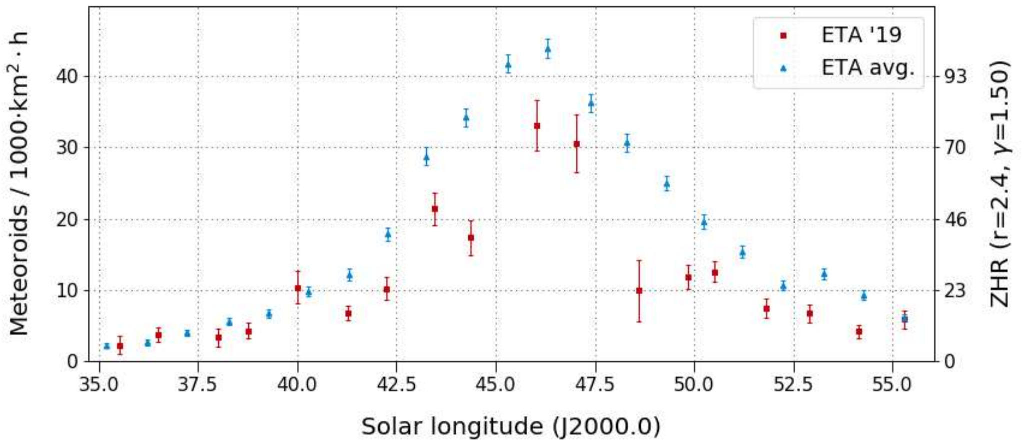

Figure 4: *Flux density of the eta Aquariids in 2019 (red) as well as in the average of the years 2011-2018 (blue), derived from observations of the IMO Network.*

The eta Lyrids in mid-May didn't play a role in for visual observers so far because of their low activity level. Still, we can regularly confirm them in our video data. Also here we compare a lower-resolution activity profile of 2019 with a higher resolution long-term profile of the years 2011 to 2018. We find that they are in excellent agreement. The peak flux density is only two meteoroids per 1,000 km^2 and hour, which is also the peak ZHR. This explains, why the shower is not a favourite of visual meteor observers.

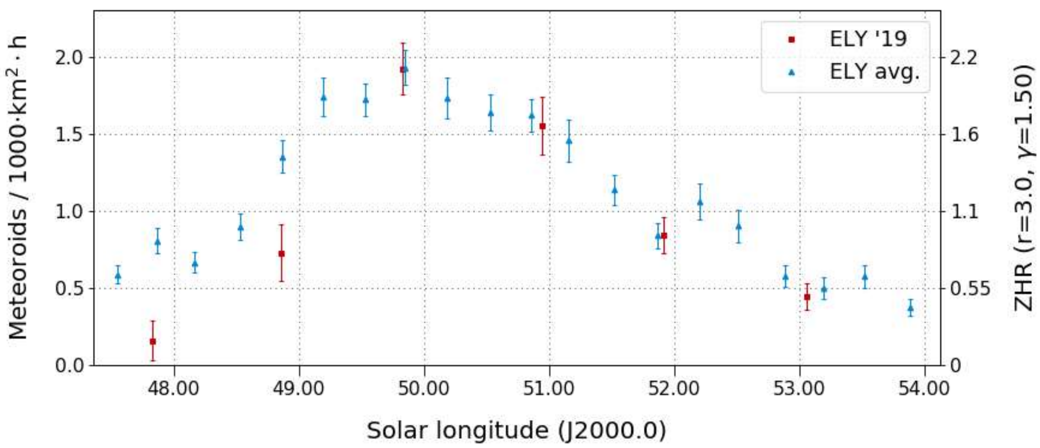

Figure 5: *Flux density of the eta Lyrids in 2019 (red) as well as in the average of the years 2011-2018 (blue), derived from observations of the IMO Network.*

The June Bootids of 2019 did not raise significantly from the sporadic background either. Finally, we have a look at the Anthelion source (figure 6), which is active full years and only in autumn replaced by the Taurids. In the second quarter of 2019 we see a tendency of increasing activity from less than two to over three meteoroids per 1,000 km^2 and hour. Further details cannot be derived from the plot with a resolution of two days per data point for 2019 resp. twice the resolution for the long-term profile

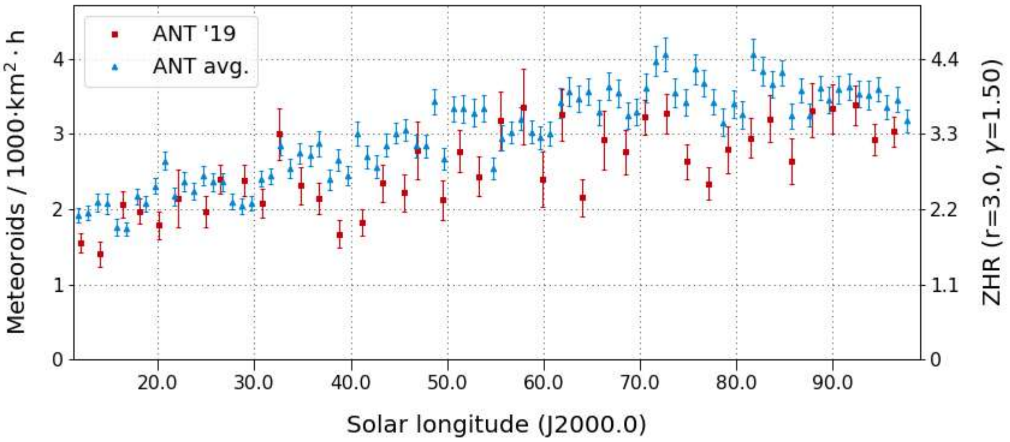

Figure 6: *Flux density of the Anthelion source in second quarter 2019 (red) as well as in the average of the years 2011-2018 (blue), derived from observations of the IMO Network.*

Table 2: *Observational statistics for first quarter of 2019.*

Code	Name	Place	Camera	April			May			June		
				Nights	Time [h]	Meteors	Nights	Time [h]	Meteors	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG2	25	140.7	412	21	82.9	237	27	82.5	426
BERER	Berkó	Ludanyhalaszi/HU	HULUD1	3	18.5	41	2	13.1	33	-	-	-
BIATO	Bianchi	Mt. San Lorenzo/IT	OMSL1	20	87.0	112	7	26.7	37	27	153.3	271
BOMMA	Bombardini	Faenza/IT	MARIO	25	120.5	249	19	97.3	295	28	156.1	458
BRIBE	Klemt	Herne/DE	HERMINE	20	118.1	286	24	90.0	167	24	87.2	218
		Berg. Gladbach/DE	KLEMOI	18	96.8	216	18	77.8	150	25	89.6	210
CARMA	Carli	Monte Baldo/IT	BMH2	16	89.9	266	12	58.8	186	26	134.9	520
CASFL	Castellani	Monte Baldo/IT	BMH1	15	95.3	128	10	49.7	89	21	127.6	193
CINFR	Cineglosso	Faenza/IT	JENNI	24	135.6	241	19	105.0	214	28	169.2	389
CRIST	Crivello	Valbrevenna/IT	ARCI	24	120.2	238	19	82.5	193	27	149.1	403
			BILBO	21	120.8	215	13	60.7	157	29	157.1	407
			C3P8	21	106.5	164	18	55.5	96	24	109.5	232
			STG38	20	40.3	118	17	20.7	68	18	74.4	303
ELTMA	Eltri	Venezia/IT	MET38	18	64.4	131	11	33.4	69	29	108.6	242
FORKE	Förster	Carlsfeld/DE	AKM3	24	153.5	371	17	67.0	140	15	53.5	171
GONRU	Goncalves	Tomar/PT	TEMPLAR1	23	149.1	365	28	196.7	574	28	168.0	507
			TEMPLAR2	27	154.2	266	28	194.4	447	26	165.9	405
			TEMPLAR3	25	140.4	103	27	178.3	170	26	147.9	148
			TEMPLAR4	25	124.5	249	28	188.7	375	26	159.1	371
			TEMPLAR5	27	126.5	199	28	176.6	386	27	155.8	359
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2	21	108.3	175	14	57.0	68	25	111.1	205
			ORION3	20	109.0	69	13	50.4	41	24	125.3	108
			ORION4	19	56.5	72	9	16.3	32	26	109.4	98
HINWO	Hinz	Schwarzenberg/DE	HINWO1	27	181.0	352	19	83.9	123	24	97.9	264
IGAAN	Igaz	Hodmezovasar./HU	HUHOD	17	107.3	96	5	25.0	20	-	-	-
		Budapest/HU	HUPOL	7	37.3	21	-	-	-	9	31.0	22
JONKA	Jonas	Budapest/HU	HUSOR2	16	90.5	85	14	60.6	64	27	130.4	147
KACJA	Kac	Kamnik/SI	CVETKA	10	53.4	135	6	27.6	80	21	93.9	284
			METKA	19	107.9	112	7	36.1	57			
		Kamnik/SI	REZIKA	11	49.8	175	6	29.5	146	21	92.1	366
		Ljubljana/SI	SRAKA	13	63.1	103	10	23.8	58	26	94.9	214
		Kamnik/SI	STEFKA	11	54.5	104	6	24.9	40	21	96.2	202
KNOAN	Knöfel	Berlin/DE	ARMEFA	20	119.7	173	15	66.5	97	11	33.6	54
KOSDE	Koschny	La Palma / ES	ICC7	-	-	-	-	-	-	14	55.2	125
			ICC9	27	160.0	595	11	59.7	287	-	-	-
			LIC1	-	-	-	-	-	-	15	50.0	194
			LIC2	27	186.6	1513	-	-	-	-	-	-
KWIMA	Kwinta	Krakow/PL	PAV06	16	77.3	43	3	5.6	3	20	76.4	62
			PAV07	19	105.4	72	5	14.9	9	18	73.8	68
			PAV79	20	123.4	152	6	21.9	23	21	85.2	174
MACMA	Maciejewski	Chelm/PL	PAV35	21	85.2	148	17	45.3	52	17	49.8	86
			PAV36	23	127.6	232	19	63.4	100	16	68.9	100
			PAV43	21	136.2	205	18	70.1	70	15	66.1	79
			PAV60	23	145.6	353	19	71.2	152	15	71.7	195
MARRU	Marques	Lisbon/PT	CAB1	27	168.9	334	28	198.4	409	28	175.1	339
			RAN1	25	134.5	196	25	165.9	237	24	138.1	184
MISST	Missiaggia	Nove/IT	TOALDO	13	69.5	168	8	26.1	46	22	80.9	253
MOLSI	Molau	Seysdorf/DE	AVIS2	24	138.4	509	20	79.6	339	28	91.9	549
			DIMCAM2	24	130.2	821	21	80.8	583	27	109.5	1135
			ESCIMO2	23	137.6	183	4	22.4	37	-	-	-
			ESCIMO3	-	-	-	16	60.0	287	28	107.3	648
		Ketzür/DE	REMO1	26	131.5	443	23	77.0	248	20	61.9	362
			REMO2	27	150.1	514	25	92.0	370	25	83.0	402
			REMO3	25	166.0	545	25	106.4	299	27	95.6	402
			REMO4	26	164.4	657	26	98.8	422	25	91.4	518
MORJO	Morvai	Fülöpszallas/HU	HUFUL	21	137.0	102	13	68.5	50	26	138.8	120
MOSFA	Moschini	Rovereto/IT	ROVER	16	22.0	64	9	27.7	53	25	108.4	121
NAGHE	Nagy	Budapest/HU	HUKON	17	35.9	191	11	54.1	87	15	18.5	131
		Piszkestetö/HU	HUPIS	23	109.7	216	16	63.7	133	26	113.3	266
		Zamardi/HU	HUZAM	21	101.3	141	14	34.0	67	3	2.3	15
OTTMI	Otte	Pearl City/US	ORIE1	15	13.9	48	8	6.9	20	-	-	-
PERZS	Perkó	Becsehely/HU	HUBEC	17	104.1	165	17	69.7	123	25	123.7	294
SARAN	Saraiva	Carnaxide/PT	RO1	2	8.1	11	27	186.5	191	29	197.9	214
			RO2	-	-	-	27	181.0	355	30	184.0	366
			RO3	1	7.4	55	27	188.0	402	30	200.8	498
SCALE	Scarpa	Alberoni/IT	LEO	17	51.1	43	15	36.4	42	26	118.7	92
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON	21	111.1	238	20	90.7	178	24	79.9	142
SLAST	Slavec	Ljubljana/SI	KAYAK1	13	68.8	61	10	47.6	101	26	114.5	196
			KAYAK2	13	92.0	64	10	53.6	50	24	126.7	98
STOEN	Stomeo	Scorze/IT	MIN38	20	93.9	259	15	42.2	134	28	109.3	451
			NOA38	20	113.4	197	12	39.0	124	28	130.5	306
			SCO38	18	79.0	226	17	33.0	122	30	125.2	396
STRJO	Strunk	Herford/DE	MINCAM2	25	140.7	472	24	102.0	279	25	90.5	270
			MINCAM3	23	138.0	188	24	99.5	127	24	83.7	129
			MINCAM4	23	113.3	136	19	82.5	75	22	82.1	93
			MINCAM5	23	137.7	183	20	94.6	114	23	84.4	110
			MINCAM6	23	134.1	246	22	92.7	159	25	78.5	144
TEPIS	Tepliczky	Agostyan/HU	HUAGO	21	130.0	195	16	80.0	95	24	115.3	183
			HUMOB	18	93.8	151	13	66.7	70	26	116.3	200
WEGWA	Wegrzyk	Nieznaszyn/PL	PAV78	23	116.1	143	15	22.3	49	14	32.2	50
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM	22	116.7	204	9	19.9	36	-	-	-
ZAKJU	Zakrajšek	Petkovec/SI	PETKA	20	103.2	298	13	65.3	254	29	144.1	540
			TACKA	15	101.4	97	11	60.0	48	28	136.1	167
Total				**30**	**8353.2**	**18119**	**31**	**5725.0**	**12420**	**30**	**7952.6**	**19664**