Results of the IMO Video Meteor Network – May 2018

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There is no other month where the climatic conditions are as stable as in May. At least we see that the observation results varied only little in the past four years. The effective observing time fluctuated between 7,000 and 7,800 hours, in which we recorded between 16,500 and 18,300 meteors. Those 7,500 observing hours which 40 observers collected with 78 video cameras in May 2018, match perfectly to the average. Only the yield was a little lower with 15,000 meteors. A quick look at the observation table teaches us that the first half of May was slightly better than the second. 80% of the cameras managed to observe in twenty or more observing nights, which is a top-class result. All observers but those from Slovenia enjoyed great observing conditions.

The eta Aquariids are the highlight of May, and we have reported about this shower several times. Whereas we notice only little from this shower in Central Europe, it is *the* shower of the year in the southern hemisphere. Figure 1 shows the activity profile of the eta Aquariids in 2018 covering the whole activity period. Around April 27 the activity starts to raise, and at the border between April and May it has already risen to 10 meteoroids per 1,000 km^2 and hour. Between May 5 and 9 we see a distinct plateau of high activity with over 30 meteoroids per 1,000 km^2 and hour. Thereafter the activity is quickly declining and reaches the base level near May 18. There are remarkable fluctuations early May, which can be attributed to an insufficient dataset between May 1 and 3, though.

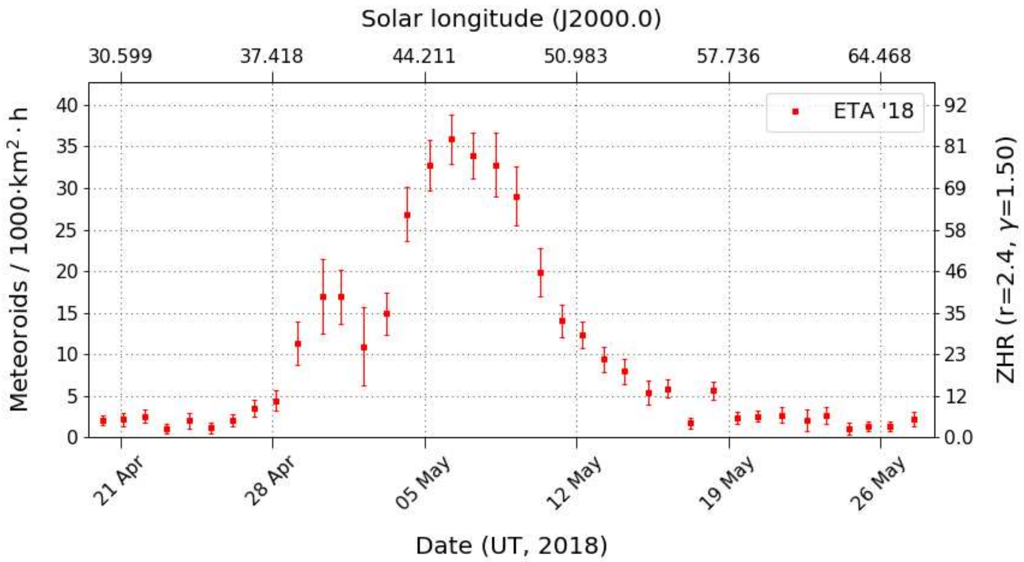

***Figure 1:** Flux density profile of the eta Aquariids in May 2018, derived from video data of the IMO Network.*

The population index of the eta Aquariids can only be determined over longer time intervals, because even in the maximum nights our cameras record too few meteors. Near the peak it has a value of about r=2.2, whereas at the same time the sporadic meteors show a population index of r=2.6 (figure 2). Last year we had obtained similar r-values of 2.0 and 2.6, respectively.

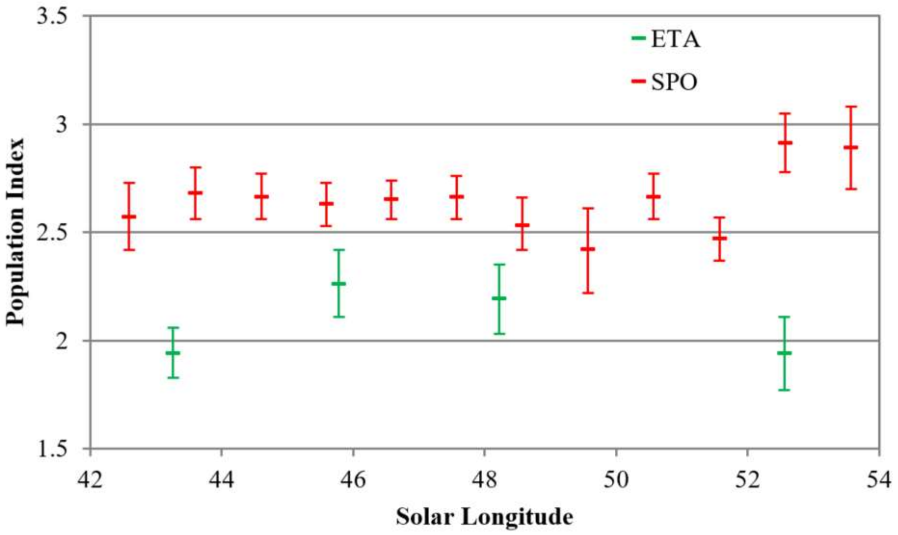

Figure 2: *Population index profile of the eta Aquariids and sporadic meteors in May 2018.*

Because of their radiant position, the eta Aquariids are of particular interest. Those few shower members which can be observed from central Europe, occur always at low radiant altitudes. Effects like the zenith exponent, which have a strong impact on the flux density at low radiant altitudes, can be analysed particularly well with this shower. Figure 3 shows three peak nights in detail. We do not see any systematic variation, which implies that the zenith exponent of 1.5 is of the right order.

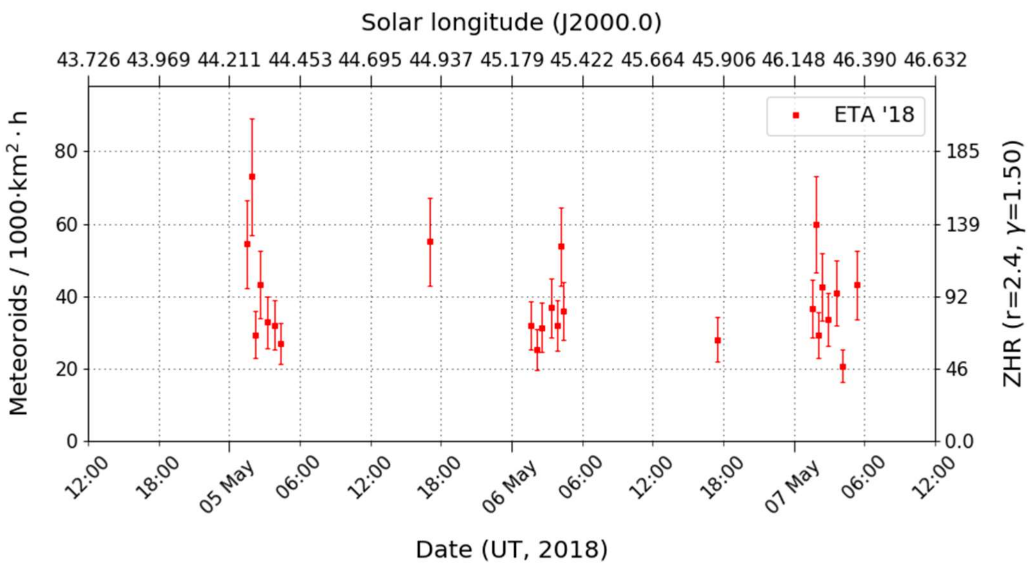

Figure 3: *High resolution flux density profile of the eta Aquariids on May 4-7, 2018.*

On the other hand, most observations are hampered by twilight, which leaves some uncertainty if that has an impact on the analysis. We could exclude that with an additional selection criterion in MeteorFlux. We could define a minimum stellar limiting magnitude, for example, to filter out observation at dawn. In addition, we could configure a maximum radiant altitude beside the already existing minimum altitude, to analyse other showers like the Quadrantids, Perseids or Geminids under similar radiant altitudes.

Unfortunately, both programmers that developed MeteorFlux and migrated in on a new AWS instance, have pulled themselves out of the project a long time ago. Many of my change requests have been put on hold since 2013, and since I have no knowledge of JavaScript, Python and PostgreSQL I never dared to approach the code.

During the ETA analysis of 2018, however, I decided to have a look at the source code, anyway, and to implement these new filters by copy&paste from existing code fragments. The result was quite encouraging, since after two evening I had understood the rough structure of the code and successfully implemented the additional filters. Figure 4 shows the same flux density profile as before, but only including observing intervals with a stellar limiting magnitude of 2 mag or better. The flux density profile changes only a little, so twilight does not seem to have a significant impact on the activity profile.

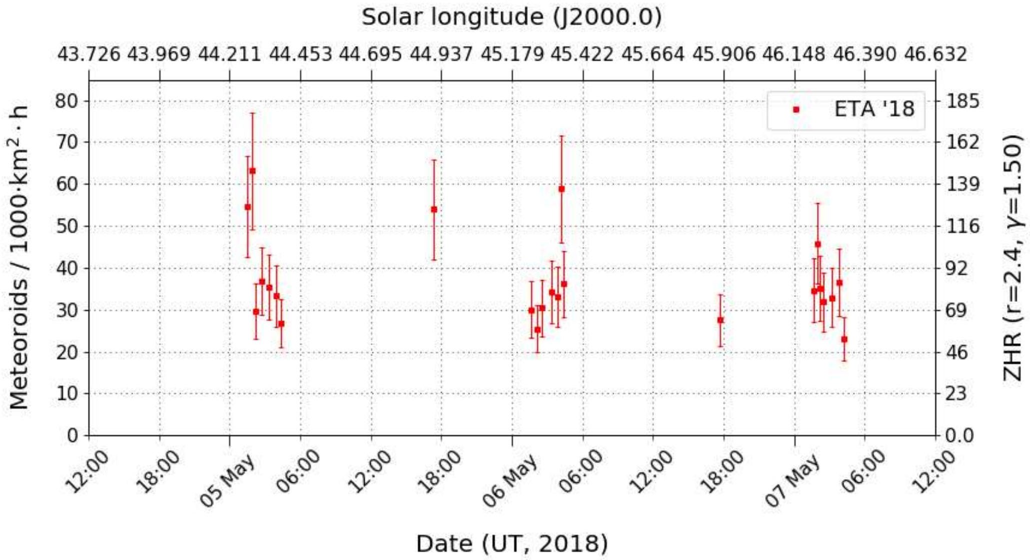

Figure 4: *High resolution flux density profile of the eta Aquariids on May 4-7, 2018, using only intervals with a stellar limiting magnitude better than 2.0 mag.*

Spurred on this success, I dared to implement the next selection criterion, which I had been waiting for many years, right away: the option to select individual cameras. This functionality was implemented in one evening, and later I provided the option to select the camera set by the observer, country and continent.

Euphorically I addressed a third aspect thereafter. Often you do not only want to create a single activity graph, but you want to compare two flux density profiles with one another. The aforementioned fluctuations of the eta Aquariids early May 2018 are a nice example. We want to compare the profiles with the average of the previous years to see if this is a recurring structure. Up to now I had to use a trick by generating both graphs independently of each other, and merge them together with Photoshop. Now you can generate two profiles with MeteorFlux in a single graph. In fact, you can not only vary the observing year, but also the other parameters used to generate the reference profile. This allows for a range of new analysis options, which we want to use intensively in the future, e.g.:

- You can compare the profile of a meteor shower from one year with the average of other years (and adapt the binning of the reference profile to lower or higher temporal resolution depending on the meteor number).
- The mean activity profile of years with new moon and full moon can be compared to search for systematic deviations.
- You can compare the activity of two meteor showers in the same time interval, e.g. from a meteor shower and sporadic meteors, or from the northern and southern Taurids. For better visibility, the reference shower can be offset and scaled linearly.
- If you select different binning parameters, you can compare a low resolution and high-resolution activity profile.
- Every observer can compare the results of his camera(s) with the outcome of other cameras. You can also compare the result of cameras from different countries.

- You can compare data with good and poor limiting magnitude, or observations with low and high radiant altitude.
- The impact of different zenith exponents can be studied directly in a single graph.

Also, these functional extensions were implemented in three evenings. The following figures 5-7 give a few examples for the new functions, which can now be used by everyone at meteorflux.org.

So far, all functions have been implemented primarily by copy&paste, but now I'm sufficiently optimistic to also try step by step extensions which require some new code.

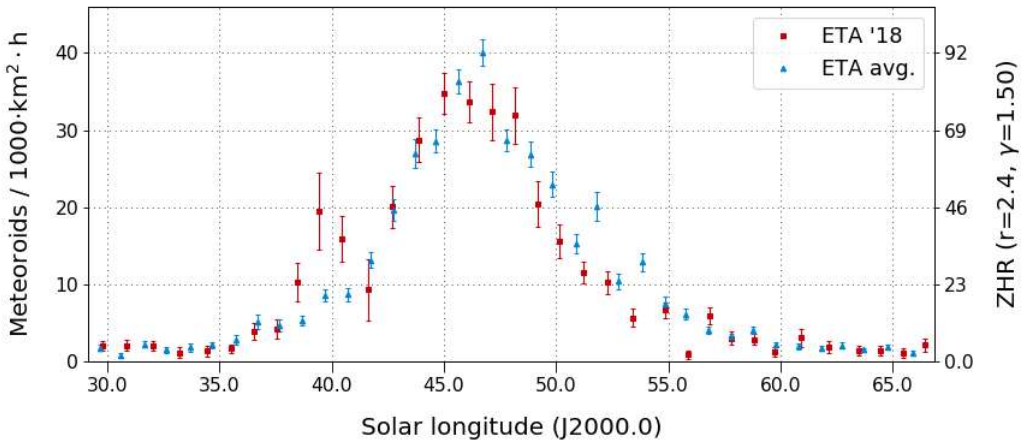

Figure 5: *Flux density profile of the eta Aquariids in 2018 (red) and in the average of 2014-2017 (blue), derived from video data of the IMO Network.*

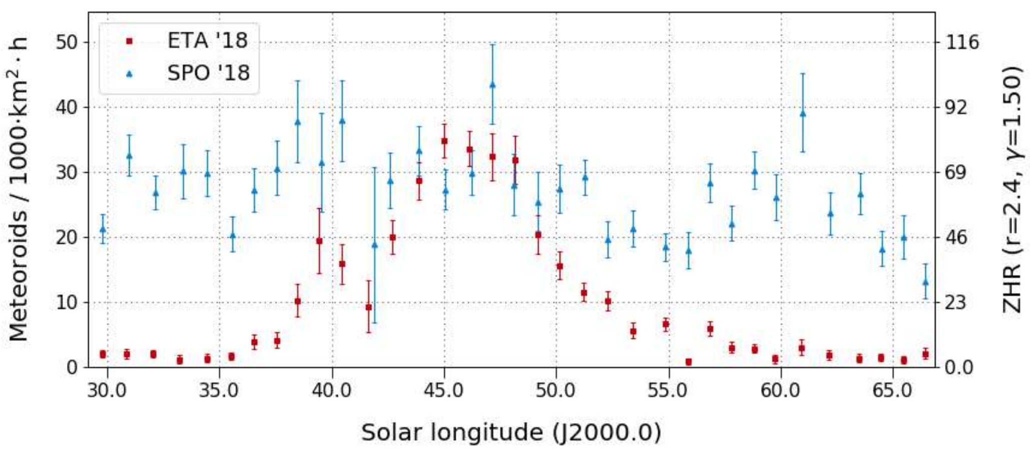

Figure 6: *Flux density profile of the eta Aquariids (red) and sporadic meteors (blue) in May 2018.*

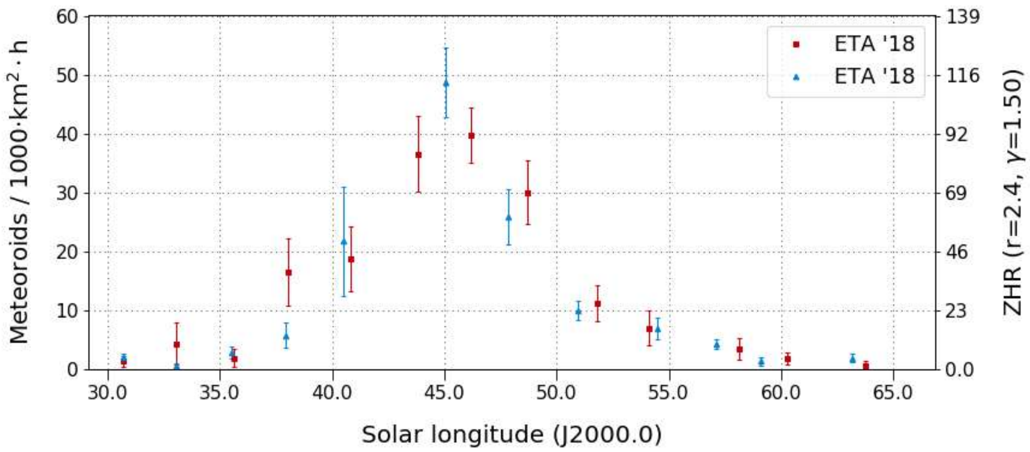

Figure 7: *Flux density profile of the eta Aquariids in May 2018, recorded by video cameras in Germany (red) and Italy (blue).*

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	28	124.5	440
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	5	34.9	90
BIATO	Bianchi	Mt. San Lorenzo/IT	OMSL1 (1.2/4)	6435	4.0	1705	23	118.1	149
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	28	117.0	287
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	24	121.8	145
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	25	103.7	175
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	25	104.9	174
CARMA	Carli	Monte Baldo/IT	BMH2 (1.5/4.5)*	4243	3.0	371	20	80.9	225
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	21	82.0	107
CINFR	Cineglosso	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	22	62.6	273
CRIST	Crivello	Valbrevenna/IT	ARCI (0.8/3.8)	5566	4.6	2575	23	83.0	157
			BILBO (0.8/3.8)	5458	4.2	1772	24	86.0	173
			C3P8 (0.8/3.8)	5455	4.2	1586	21	72.6	126
			STG38 (0.8/3.8)	5614	4.4	2007	26	110.8	337
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	13	51.2	103
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	19	92.7	229
GONRU	Goncalves	Foz do Arelho/PT	FARELHO1 (0.75/4.5)	2286	3.0	208	10	53.0	30
		Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	28	153.0	395
			TEMPLAR2 (0.8/6)	2080	5.0	1508	25	140.9	301
			TEMPLAR3 (0.8/8)	1438	4.3	571	25	148.6	128
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	24	130.3	267
			TEMPLAR5 (0.75/6)	2312	5.0	2259	24	134.8	262
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	24	76.4	106
			ORION3 (0.95/5)	2665	4.9	2069	4	1.1	6
			ORION4 (0.95/5)	2662	4.3	1043	22	49.1	62
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	28	241.4	358
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	26	111.3	220
IGAAN	Igaz	Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	18	84.5	38
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	27	121.2	80
			HUSOR2 (0.95/3.5)	2465	3.9	715	22	97.5	87
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	13	47.4	103
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	21	91.5	120
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	16	52.9	167
			STEFKA (0.8/3.8)	5471	2.8	379	13	45.8	68
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	14	76.2	219
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	26	91.0	143
			PAV36 (0.8/3.8)*	5668	4.0	1573	28	140.7	252
			PAV43 (0.75/4.5)*	3132	3.1	319	20	61.0	58
			PAV60 (0.75/4.5)	2250	3.1	281	27	139.5	286
MARRU	Marques	Lisbon/PT	CAB1 (0.75/6)	2362	4.8	1517	28	149.4	339
			RAN1 (1.4/4.5)	4405	4.0	1241	21	86.3	163
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	27	108.3	603
			ESCIMO2 (0.85/25)	155	8.1	3415	26	120.6	198
			MINCAM1 (0.8/8)	1477	4.9	1084	22	91.5	319
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	22	102.5	376
			REMO2 (0.8/8)	1478	6.4	4778	23	111.3	433
			REMO3 (0.8/8)	1420	6.4	1967	23	125.7	381
			REMO4 (0.8/8)	1478	6.5	5358	23	123.0	559
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	23	107.6	90
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	12	42.8	35
NAGHE	Nagy	Budapest/HU	HUKON (0.8/3.8)	5500	4.0	1575	24	54.9	157
		Piszkestetö/HU	HUPIS (0.8/3.8)	5615	4.0	1524	29	91.7	233
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	11	35.8	46
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	20	103.6	89
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	21	108.5	125
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	25	121.7	203
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	25	140.9	134
			RO2 (0.75/6)	2381	3.8	459	21	117.4	173
			RO3 (0.8/12)	710	5.2	619	23	131.8	246
			RO4 (1.0/8)	1582	4.2	549	16	77.8	57
			SOFIA (0.8/12)	738	5.3	907	23	102.3	147
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	22	75.2	61
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	26	103.3	176
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	18	53.2	123
			KAYAK2 (0.8/12)	741	5.5	920	12	47.6	24
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	26	71.8	276
			NOA38 (0.8/3.8)	5609	4.2	1911	24	85.5	249
			SCO38 (0.8/3.8)	5598	4.8	3306	26	86.3	322
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	25	118.7	321
			MINCAM3 (0.8/6)	2338	5.5	3590	25	120.6	174
			MINCAM4 (0.8/6)	2306	5.0	1412	24	115.5	129
			MINCAM5 (0.8/6)	2349	5.0	1896	25	123.9	212
			MINCAM6 (0.8/6)	2395	5.1	2178	24	111.8	217
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	24	105.6	145
			HUMOB (0.8/6)	2388	4.8	1607	26	98.4	157
WEGWA	Wegrzyk	Nieznaszyn/PL	PAV78 (0.8/6)	2286	4.0	778	20	68.1	91
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	10	21.2	47
ZAKJU	Zakrajšek	Petkovec/SI	TACKA (0.8/12)	714	5.3	783	21	93.0	70
Sum							31	7490.0	14846

* active field of view smaller than video frame

2. Observing Times (h)

May	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	5.9	-	5.5	5.6	5.5	5.4	5.4	5.3	3.5	-	5.1	5.0	5.0	4.8	4.3
BERER	-	-	-	-	7.2	7.0	7.0	7.0	-	-	-	-	6.7	-	-
BIATO	-	-	-	4.0	2.5	8.1	5.9	7.6	2.5	7.4	-	7.8	1.8	5.9	3.4
BOMMA	-	2.0	0.2	3.7	2.3	6.3	4.8	1.1	0.3	7.7	7.4	7.6	-	4.5	2.2
BREMA	5.8	1.7	5.9	6.7	6.6	6.5	7.0	7.0	-	5.6	1.5	6.4	-	6.2	3.6
BRIBE	6.9	-	6.9	6.8	6.8	6.7	6.6	6.5	0.2	3.5	-	-	-	6.1	-
	7.0	-	6.8	6.8	6.7	6.7	6.6	6.5	5.4	6.4	0.5	2.4	-	3.3	-
CARMA	-	-	-	4.0	2.9	1.0	6.9	3.4	-	6.2	1.1	6.5	2.1	2.5	6.8
CASFL	-	0.3	-	4.2	2.3	-	6.8	3.2	-	6.2	1.4	6.5	-	2.6	6.7
CINFR	-	0.7	-	1.7	1.0	1.5	1.6	-	0.2	2.3	1.0	2.3	0.2	2.4	0.8
CRIST	-	-	-	3.2	2.6	5.6	4.2	-	-	3.3	3.0	1.8	1.1	5.4	5.2
	-	-	-	2.7	1.9	5.2	4.4	2.2	-	6.7	3.4	2.3	1.0	6.0	4.9
	-	1.4	-	0.5	1.3	4.0	-	-	-	6.5	3.2	-	-	1.9	3.6
	-	-	-	3.2	2.8	6.6	5.0	3.0	-	6.7	3.3	1.9	0.8	5.9	6.2
ELTMA	-	-	-	-	-	4.2	2.0	-	-	6.8	-	-	-	-	-
FORKE	4.7	-	-	7.0	6.9	6.9	6.8	6.1	6.6	-	5.7	4.8	6.1	6.4	-
GONRU	-	5.8	7.0	6.1	7.1	2.9	-	-	1.1	-	1.9	6.9	6.9	-	-
	6.1	8.4	8.3	8.3	8.3	8.1	1.1	1.3	-	6.0	2.8	8.0	7.9	5.1	7.8
	4.9	8.5	8.1	8.4	8.3	7.5	0.8	-	-	5.7	2.8	8.1	8.1	5.2	8.0
	4.5	8.3	7.7	8.2	8.1	8.1	-	-	3.6	5.1	2.6	7.9	8.0	4.7	7.9
	4.7	8.2	8.2	8.2	8.2	7.2	0.5	-	-	5.2	2.8	7.9	7.9	4.9	7.9
	-	8.0	7.0	8.1	8.1	7.5	1.0	-	3.5	4.4	2.6	7.8	7.8	4.6	7.7
GOVMI	0.2	0.9	-	-	4.5	1.6	5.7	2.4	2.6	-	1.4	5.3	-	-	6.5
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	0.5	-	-	-	1.4	3.2	1.0	0.4	-	3.7	3.5	0.2	-	5.9
HERCA	-	-	9.2	9.2	9.1	8.6	9.0	9.0	9.0	8.9	8.8	8.9	8.8	8.3	8.8
HINWO	1.6	2.2	-	7.0	6.9	6.9	6.8	6.3	6.7	-	4.0	6.4	6.0	6.3	0.7
IGAAN	-	1.9	-	-	6.4	6.5	5.4	6.9	-	-	6.4	-	5.0	1.3	-
JONKA	1.5	2.3	7.3	6.1	7.1	6.6	4.6	4.2	-	5.1	7.0	3.8	5.4	-	1.2
	1.1	-	6.8	4.0	5.9	6.6	2.8	3.5	1.8	3.8	7.1	2.8	6.6	-	2.0
KACJA	-	-	-	-	7.2	4.0	3.1	-	-	3.7	7.0	6.0	1.2	-	-
	-	-	0.8	-	4.2	5.9	7.4	7.1	2.1	-	7.2	5.0	3.1	-	7.1
	-	-	-	-	7.5	3.7	3.4	-	-	4.1	7.3	6.1	0.9	-	1.9
	-	-	-	-	6.5	4.0	3.1	-	-	4.1	7.2	6.2	-	-	-
LOTJO	-	-	-	2.9	7.2	7.0	7.0	3.0	-	-	1.1	6.7	6.6	-	-
MACMA	1.5	2.3	6.1	3.7	6.7	6.7	3.6	5.4	4.6	3.7	6.3	6.1	4.9	1.9	-
	5.2	6.4	7.0	7.0	6.8	6.7	5.2	5.4	5.0	4.3	6.4	6.6	4.9	2.3	1.1
	0.5	-	-	1.7	2.0	2.0	-	1.4	0.6	-	2.0	0.5	-	1.7	-
	5.8	6.9	7.0	6.7	6.8	6.8	5.6	5.5	5.1	5.4	6.4	-	5.0	2.6	1.2
MARRU	-	8.4	8.3	8.3	8.2	8.2	4.0	-	4.1	8.0	2.5	8.0	7.9	7.9	7.9
	2.7	6.2	8.2	7.1	8.2	6.3	-	-	0.8	7.4	-	-	-	-	5.9
MOLSI	3.2	4.6	4.2	4.6	6.5	6.4	6.3	6.2	5.7	-	6.1	6.0	0.8	4.4	1.7
	2.2	4.0	3.5	5.3	7.0	6.9	6.9	6.8	5.0	-	6.6	6.6	0.8	4.1	1.5
	-	0.4	0.4	3.3	3.7	4.1	6.8	6.8	5.3	0.6	6.6	6.6	-	4.0	-
	5.8	3.3	5.6	-	-	-	5.5	5.5	4.1	-	5.3	5.1	5.2	5.2	-
	6.0	3.5	6.1	6.2	-	-	5.9	5.8	4.0	-	5.6	5.4	5.4	5.4	-
	6.9	3.4	6.7	6.6	-	-	6.4	6.3	4.8	-	6.1	6.1	6.0	5.9	-
	6.9	3.0	6.7	6.6	-	-	6.3	6.3	3.9	-	6.1	6.1	6.0	5.9	-
MORJO	0.4	1.1	0.9	0.8	1.6	1.7	7.4	7.1	6.4	5.1	7.1	2.4	7.0	-	-
MOSFA	-	-	-	-	-	-	5.9	1.4	-	5.2	-	4.5	2.3	1.1	3.5
NAGHE	0.2	-	-	-	-	-	-	1.2	0.3	0.7	1.7	1.0	2.7	0.2	0.6
	1.1	7.0	7.2	3.3	6.8	5.9	3.3	6.8	2.0	1.7	6.7	3.5	5.0	1.2	1.5
OCHPA	-	-	-	0.3	2.2	-	6.1	3.4	-	3.1	-	-	-	-	-
OTTMI	-	-	8.2	3.4	7.3	6.7	0.6	1.5	-	-	-	0.2	-	7.2	7.5
PERZS	0.8	3.5	-	-	6.2	4.1	7.4	7.3	6.7	1.4	6.5	7.1	-	-	6.9
ROTEC	6.7	-	6.5	6.5	6.3	6.3	6.2	6.1	3.1	-	5.8	2.1	5.8	5.6	4.5
SARAN	4.1	7.9	8.4	8.4	8.4	3.0	-	-	3.4	8.1	3.9	8.2	8.3	7.1	8.2
	4.1	7.6	8.2	8.2	8.4	6.8	-	-	2.1	8.1	3.0	-	8.0	6.3	8.0
	4.7	7.4	8.0	8.2	8.0	6.8	2.8	-	2.5	7.9	4.0	7.7	8.0	6.5	7.9
	-	6.8	8.1	7.9	8.4	5.7	-	-	1.7	3.9	1.7	-	4.3	3.8	6.2
	2.4	3.1	4.2	7.3	7.3	6.3	1.4	-	2.2	7.2	3.1	3.7	6.3	6.1	8.0
SCALE	-	-	-	4.6	0.5	-	-	1.9	0.3	4.3	5.8	3.7	3.9	0.1	3.6
SCHHA	6.9	0.8	6.9	6.8	6.8	1.3	2.1	-	-	6.5	6.1	2.4	-	5.5	4.5
SLAST	-	-	-	-	2.5	3.1	6.3	-	-	5.0	4.6	4.4	3.4	-	-
	-	-	-	-	3.5	-	1.2	-	-	5.0	5.4	5.4	4.4	-	-
STOEN	-	-	-	4.9	2.9	1.7	6.1	2.9	0.3	7.0	6.1	0.6	3.3	-	4.0
	-	0.2	-	4.8	4.2	1.0	6.6	4.7	1.3	7.4	6.8	1.7	4.0	-	4.5
	-	0.2	-	4.6	3.8	0.5	6.5	4.2	1.7	7.6	6.5	2.1	4.2	0.2	3.9
STRJO	6.9	2.8	6.3	6.7	6.6	6.6	6.5	6.4	6.3	-	1.3	6.0	5.5	6.0	1.7
	6.8	3.5	6.7	6.7	6.6	6.6	6.5	6.4	6.3	-	0.3	5.8	5.3	6.0	1.4
	6.6	-	6.8	6.7	6.6	6.6	6.5	6.4	6.3	-	1.4	6.1	0.2	6.0	0.9
	6.9	3.6	6.7	6.6	6.5	6.4	6.4	6.3	6.3	-	1.1	6.0	5.8	6.0	1.7
	6.7	2.6	6.0	6.4	6.3	6.2	6.1	6.0	6.0	-	0.6	5.6	5.6	5.9	1.5
TEPIS	1.3	0.2	6.7	-	-	6.3	-	4.3	1.1	3.2	6.8	2.8	6.7	-	-
	0.2	-	2.8	0.5	0.9	1.2	4.4	3.3	-	3.3	6.8	0.6	6.6	-	1.8
WEGWA	1.0	-	-	-	3.3	1.9	5.6	-	-	0.2	2.6	6.3	5.8	5.5	-
YRJIL	-	-	-	-	3.3	2.2	2.7	2.7	2.3	2.2	2.0	1.7	1.3	-	0.8
ZAKJU	-	2.2	0.4	-	-	5.3	7.4	-	-	5.3	5.4	-	3.2	-	3.9
Sum	169.4	174.0	274.5	317.3	371.0	350.1	330.4	255.3	171.1	270.2	299.4	327.3	289.0	241.9	237.4

May	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	4.1	4.6	-	4.7	4.6	4.4	4.4	4.5	4.3	1.4	2.6	2.9	4.0	3.9	4.1	3.7
BERER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIATO	7.6	2.6	7.5	7.5	5.6	-	1.6	7.1	-	7.1	7.1	3.7	-	0.2	-	3.6
BOMMA	7.5	1.1	7.4	7.4	5.1	-	1.9	6.3	4.6	7.0	7.0	3.5	0.2	0.9	0.3	6.7
BREMA	5.0	-	1.9	6.2	6.3	3.6	-	6.0	-	3.3	5.8	-	5.5	-	3.7	4.0
BRIBE	0.5	1.6	5.9	5.8	5.7	0.2	-	3.9	0.7	5.4	5.3	1.1	5.1	0.2	2.2	3.1
	1.0	4.6	1.2	5.4	4.8	3.6	-	-	2.3	5.0	5.3	1.5	1.8	2.4	-	0.9
CARMA	-	4.7	6.3	6.9	3.0	-	-	-	6.7	1.3	-	-	-	2.5	0.8	5.3
CASFL	-	4.8	5.6	7.0	3.2	-	-	0.6	6.6	2.4	2.8	-	-	2.1	1.1	5.6
CINFR	4.1	0.3	4.0	3.7	2.7	-	-	7.1	6.4	7.1	7.1	4.4	-	-	-	-
CRIST	1.3	5.8	-	3.6	6.9	-	2.1	5.0	6.7	6.7	5.0	0.6	-	1.7	1.1	1.1
	2.8	7.0	-	5.1	6.9	-	0.8	5.1	6.0	4.8	3.7	0.6	-	0.7	1.1	0.7
	1.0	5.7	7.0	4.5	6.4	-	2.1	5.6	1.0	6.7	6.4	1.1	-	0.6	2.1	-
	3.3	7.0	7.0	5.1	6.9	-	2.9	6.8	6.7	6.7	6.1	1.4	0.2	2.1	2.1	1.1
ELTMA	5.3	7.1	6.8	7.2	3.8	0.8	-	-	3.3	-	-	-	-	0.3	0.7	2.9
FORKE	-	-	-	1.8	5.9	5.8	-	-	-	1.8	2.7	0.2	1.7	-	4.8	-
GONRU	-	-	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.8	7.8	7.8	6.1	4.6	6.5	7.6	1.9	1.1	4.2	1.0	-	3.4	1.3	-	4.4
	7.9	7.7	7.8	6.2	-	6.6	7.7	0.8	1.5	2.9	0.9	-	2.4	-	-	4.1
	7.8	7.4	7.0	5.9	4.1	6.0	7.2	0.5	-	5.0	-	3.2	5.8	-	-	4.0
	8.0	7.9	7.7	5.0	3.9	5.5	4.9	0.2	0.2	-	-	-	-	1.5	-	3.7
	7.7	2.5	7.2	5.7	4.2	6.3	7.4	-	-	4.5	-	3.5	4.3	-	-	3.4
GOVMI	4.6	1.5	3.2	5.3	2.3	6.4	1.3	-	1.8	6.3	2.3	3.8	0.4	-	4.9	1.2
	-	-	-	-	-	0.2	-	-	-	-	0.5	0.2	-	-	0.2	-
	0.8	0.2	1.8	0.2	3.6	3.8	3.9	-	0.5	6.1	3.8	-	0.3	-	3.0	1.3
HERCA	8.9	8.8	8.8	8.7	7.9	8.7	8.7	8.6	8.4	7.3	-	8.3	8.3	7.7	8.5	8.2
HINWO	-	0.4	-	5.8	6.0	5.9	2.4	0.2	-	2.3	4.1	3.4	5.0	0.5	5.2	2.3
IGAAN	-	-	4.5	4.6	5.3	3.5	-	4.0	-	5.0	4.5	-	4.7	-	3.9	4.7
JONKA	1.0	1.0	4.8	-	5.5	4.2	2.1	3.6	-	5.3	5.0	6.2	6.0	2.6	6.2	5.5
	-	-	-	5.4	5.4	3.2	-	3.0	-	2.2	-	5.4	6.0	-	6.2	5.9
KACJA	-	-	1.9	-	1.5	3.9	-	-	2.1	3.0	-	2.8	-	-	-	-
	-	4.7	3.5	6.6	3.6	6.6	5.9	-	1.3	4.5	3.6	-	0.4	-	0.9	-
	-	1.2	2.3	1.5	-	3.5	-	-	2.3	2.9	1.4	2.9	-	-	-	-
	-	1.1	2.1	-	0.5	3.6	-	-	1.8	2.6	-	3.0	-	-	-	-
LOTJO	-	-	-	-	-	-	-	6.1	5.3	-	-	5.9	5.9	5.8	5.7	-
MACMA	-	-	-	-	5.6	3.9	3.9	1.0	2.1	0.2	0.7	1.4	1.6	1.9	2.4	2.8
	-	-	-	2.3	6.0	4.1	4.9	4.5	5.1	2.0	5.6	5.6	5.5	5.3	4.2	5.3
	-	-	-	-	5.9	4.6	5.1	4.1	-	1.2	4.7	5.4	5.4	5.5	2.0	4.7
	-	-	-	2.3	5.9	4.6	5.2	4.7	5.0	2.6	5.5	5.5	5.4	5.4	5.3	5.3
MARRU	7.7	7.7	5.3	5.1	1.1	2.1	7.6	1.9	2.8	5.8	-	2.8	0.4	0.6	1.4	5.4
	1.8	1.7	0.7	7.3	-	-	-	-	2.9	7.4	3.8	0.1	0.4	0.6	1.4	5.4
MOLSI	0.6	4.4	5.6	-	5.5	5.5	-	0.9	1.4	5.2	4.2	4.5	2.9	-	0.6	0.3
	-	3.8	6.2	-	6.1	6.1	-	2.2	2.0	5.9	5.8	5.8	5.0	-	2.5	2.0
	-	3.7	6.2	-	6.1	6.1	-	-	-	5.9	5.2	5.7	2.7	-	1.1	0.2
	-	-	-	4.8	4.8	4.7	4.6	4.5	4.5	4.3	-	3.4	4.2	4.0	4.1	4.0
	-	-	-	5.1	5.0	5.0	4.9	4.7	4.5	4.0	-	3.3	3.8	3.6	4.1	4.0
	-	-	-	5.6	5.5	5.4	5.4	5.3	5.2	4.9	-	3.9	5.0	4.8	4.8	4.7
	-	-	-	5.6	5.5	5.4	5.4	5.2	4.9	4.4	-	3.7	4.9	4.7	4.8	4.7
MORJO	5.7	6.2	6.5	6.1	6.7	5.8	-	-	-	2.7	6.4	6.3	6.2	-	-	-
MOSFA	-	4.8	-	3.9	-	3.6	-	-	3.1	-	-	-	-	-	-	3.5
NAGHE	0.3	-	1.4	5.0	4.2	3.7	0.8	4.5	0.4	4.9	4.1	4.9	5.8	1.9	2.9	1.5
	1.6	-	0.6	-	6.1	1.2	0.9	2.8	0.2	0.8	2.1	2.1	3.5	2.9	1.8	2.1
OCHPA	-	4.8	-	-	-	2.8	-	-	3.4	2.3	-	-	-	2.8	-	4.6
OTTMI	7.3	-	-	-	-	4.9	7.4	1.2	0.2	7.3	6.7	6.9	-	5.0	7.0	7.1
PERZS	6.5	-	2.7	-	6.6	6.8	6.0	-	3.0	5.9	6.6	4.0	-	-	2.5	-
ROTEC	-	5.2	-	5.3	5.3	5.2	5.1	4.8	4.8	4.3	-	-	0.7	4.3	4.4	0.8
SARAN	8.1	8.1	3.9	8.1	4.1	-	-	1.3	3.0	5.1	2.5	0.9	-	-	2.8	5.6
	8.0	-	-	7.9	5.1	-	0.6	0.5	-	-	6.1	1.6	-	-	3.6	5.2
	7.8	-	-	7.9	5.4	-	1.2	0.9	-	-	6.6	2.5	-	-	3.3	5.8
	-	-	-	7.4	-	-	-	0.7	-	-	4.0	-	-	-	4.4	2.8
	7.6	5.9	-	7.8	2.4	-	-	0.8	1.2	4.8	2.0	-	-	-	1.2	-
SCALE	3.9	5.0	5.8	6.3	3.1	-	2.1	-	4.3	2.3	1.4	-	-	2.9	3.1	6.3
SCHHA	3.4	2.0	5.5	5.7	5.6	2.5	-	4.1	3.3	0.3	0.3	2.4	4.6	4.0	3.0	-
SLAST	0.6	4.2	2.6	3.6	1.4	3.6	-	-	3.9	2.8	-	-	0.3	0.3	-	0.6
	-	5.6	-	-	-	4.4	-	-	2.3	3.0	-	-	-	-	4.1	3.3
STOEN	2.4	4.7	6.3	3.9	0.5	0.6	1.0	-	3.2	0.4	0.7	0.2	0.9	1.0	0.5	5.7
	3.2	5.1	7.3	6.8	1.4	1.8	-	-	-	-	0.6	0.5	1.0	1.4	2.6	6.6
	2.0	5.0	7.2	6.8	1.5	1.8	1.1	-	5.3	1.5	0.3	-	0.7	1.5	-	5.6
STRJO	4.3	-	4.7	5.6	5.6	5.4	-	3.9	-	1.6	1.5	-	4.6	-	4.2	1.7
	3.8	-	4.8	5.5	5.6	5.4	-	4.1	-	1.8	4.6	-	4.8	-	4.5	0.8
	4.0	-	4.0	5.7	5.6	5.5	-	4.3	-	2.6	4.8	-	5.1	-	4.7	2.1
	4.3	-	5.0	5.7	5.6	5.3	-	4.2	-	2.5	4.4	-	4.6	-	4.4	1.6
	3.2	-	4.4	5.4	5.6	5.2	-	3.5	-	1.5	2.5	-	4.8	-	4.2	-
TEPIS	2.4	-	6.4	6.4	4.9	6.0	1.6	4.3	-	3.5	6.0	4.1	5.6	3.3	5.9	5.8
	2.8	-	6.4	6.4	4.3	6.0	1.3	4.7	-	3.4	6.0	3.9	5.7	3.4	5.9	5.8
WEGWA	-	-	-	5.4	1.9	5.5	1.1	-	4.7	5.5	5.3	0.3	5.1	0.9	0.2	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZAKJU	3.6	3.9	5.3	6.4	6.2	4.6	1.7	-	4.2	-	4.1	5.4	5.4	-	3.9	5.2
Sum	204.9	200.9	253.1	332.0	303.9	257.9	153.8	176.5	172.5	255.4	219.1	166.7	188.0	109.0	192.6	226.3

3. Results (Meteors)

May	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	20	-	15	28	28	24	28	18	4	-	20	17	22	11	18
BERER	-	-	-	-	20	19	16	17	-	-	-	-	18	-	-
BIATO	-	-	-	6	1	9	13	10	1	20	-	13	2	3	2
BOMMA	-	4	1	8	2	25	7	1	2	16	19	32	-	14	5
BREMA	3	3	6	12	12	9	13	11	-	6	2	3	-	10	2
BRIBE	8	-	11	14	19	11	15	15	1	6	-	-	-	9	-
	9	-	8	14	19	16	19	12	7	12	1	2	-	5	-
CARMA	-	-	-	11	11	1	20	15	-	15	9	11	2	7	18
CASFL	-	1	-	7	1	-	2	5	-	6	6	9	-	2	11
CINFR	-	4	-	11	6	13	10	-	1	13	6	20	1	18	7
CRIST	-	-	-	10	3	9	6	-	-	7	8	3	1	4	13
	-	-	-	11	2	12	10	1	-	8	12	7	2	3	3
	-	1	-	3	1	10	-	-	-	12	5	-	-	3	8
	-	-	-	23	5	15	9	4	-	19	17	4	2	10	25
ELTMA	-	-	-	-	-	7	10	-	-	13	-	-	-	-	-
FORKE	9	-	-	7	31	22	32	6	8	-	8	15	7	15	-
GONRU	-	4	6	4	3	2	-	-	2	-	2	3	3	-	-
	13	27	31	22	25	23	1	2	-	12	15	16	21	8	21
	7	11	18	23	21	27	4	-	-	8	13	18	13	8	10
	1	7	6	10	15	10	-	-	5	2	4	6	13	1	6
	2	22	27	14	23	23	3	-	-	7	10	17	11	4	16
	-	7	12	17	22	22	2	-	19	2	13	12	19	6	17
GOVMI	1	5	-	-	2	3	8	6	4	-	1	4	-	-	6
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	3	-	-	-	2	5	3	1	-	5	3	1	-	2
HERCA	-	-	22	14	16	14	17	15	16	21	15	14	13	15	14
HINWO	3	2	-	13	25	15	18	10	9	-	5	16	8	15	2
IGAAN	-	1	-	-	1	1	3	1	-	-	3	-	3	1	-
JONKA	1	1	5	2	1	5	6	6	-	3	5	4	4	-	1
	1	-	4	3	8	7	2	6	4	2	5	4	4	-	3
KACJA	-	-	-	-	15	12	2	-	-	3	22	18	2	-	-
	-	-	1	-	3	11	12	10	1	-	14	10	4	-	5
	-	-	-	-	16	10	9	-	-	14	33	36	2	-	1
	-	-	-	-	8	6	2	-	-	4	19	10	-	-	-
LOTJO	-	-	-	23	26	23	18	12	-	-	8	12	25	-	-
MACMA	7	3	8	11	6	7	3	3	6	5	11	10	4	1	-
	3	4	8	17	19	11	8	8	8	10	15	12	6	3	3
	3	-	-	5	4	4	-	2	3	-	1	3	-	2	-
	4	8	11	11	11	21	5	8	11	13	12	-	10	4	2
MARRU	-	23	21	22	26	25	3	-	16	22	1	14	26	20	25
	2	12	15	11	12	21	-	-	4	16	-	-	-	-	16
MOLSI	7	10	11	18	39	53	47	37	19	-	58	37	1	28	6
	1	3	3	9	12	15	21	17	6	-	13	12	1	16	1
	-	3	2	12	14	29	24	34	8	1	29	27	-	20	-
	23	5	26	-	-	-	21	22	10	-	15	14	18	18	-
	14	8	28	33	-	-	38	31	16	-	21	12	28	20	-
	19	5	33	26	-	-	22	27	9	-	13	16	21	14	-
	30	11	45	37	-	-	28	31	9	-	22	28	27	38	-
MORJO	1	3	4	1	4	2	6	9	6	5	3	2	7	-	-
MOSFA	-	-	-	-	-	-	2	1	-	4	-	1	3	2	3
NAGHE	1	-	-	-	-	-	-	8	2	5	11	7	19	1	4
	4	8	15	11	12	13	5	11	10	8	11	7	9	2	1
OCHPA	-	-	-	2	5	-	8	7	-	2	-	-	-	-	-
OTTMI	-	-	7	2	6	8	3	8	-	-	-	1	-	5	2
PERZS	1	5	-	-	3	3	9	9	8	1	11	5	-	-	15
ROTEC	12	-	12	8	15	13	11	19	1	-	14	4	9	4	3
SARAN	1	6	12	10	6	11	-	-	7	5	5	5	9	8	6
	3	12	16	5	17	18	-	-	8	20	6	-	9	6	8
	7	14	17	30	29	7	3	-	11	21	9	7	14	10	10
	-	5	7	4	5	8	-	-	1	2	4	-	1	3	1
	3	8	5	8	12	8	2	-	10	10	10	7	11	7	8
SCALE	-	-	-	5	2	-	-	4	2	3	6	4	4	1	1
SCHHA	9	4	18	18	12	1	3	-	-	16	14	5	-	9	1
SLAST	-	-	-	-	2	11	15	-	-	11	8	14	4	-	-
	-	-	-	-	1	-	3	-	-	2	3	1	1	-	-
STOEN	-	-	-	20	10	6	15	19	2	25	27	5	12	-	17
	-	1	-	20	11	3	18	28	2	25	23	1	9	-	14
	-	1	-	24	13	3	18	25	2	27	30	7	13	1	14
STRJO	13	2	21	25	29	22	27	22	23	-	3	6	15	17	6
	10	4	15	16	11	11	10	11	11	-	2	6	7	7	1
	16	-	6	10	5	7	18	4	8	-	1	3	1	6	1
	12	3	10	13	18	16	17	12	14	-	1	3	10	19	6
	16	5	13	20	17	17	15	11	14	-	1	3	11	14	3
TEPIS	3	1	10	-	-	10	-	9	2	2	11	5	16	-	-
	1	-	9	3	6	8	8	6	-	5	7	3	10	-	2
WEGWA	3	-	-	-	11	5	1	-	-	1	3	12	4	10	-
YRJIL	-	-	-	-	6	2	5	8	4	11	4	3	2	-	2
ZAKJU	-	3	1	-	-	3	9	-	-	4	6	-	2	-	2
Sum	307	283	582	777	802	820	773	637	358	513	750	651	557	488	400

May	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	5	11	-	28	16	21	23	7	18	2	5	3	12	12	15	9
BERER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIATO	15	2	8	13	4	-	2	6	-	1	7	4	-	1	-	6
BOMMA	20	3	30	15	7	-	2	11	12	12	13	7	1	1	1	16
BREMA	2	-	1	7	9	1	-	9	-	5	6	-	5	-	6	2
BRIBE	1	1	9	6	13	1	-	5	3	8	6	5	4	1	1	2
	1	9	2	7	5	5	-	-	2	6	9	1	1	1	-	1
CARMA	-	14	7	16	13	-	-	-	21	2	-	-	-	7	1	24
CASFL	-	8	4	15	3	-	-	1	5	1	2	-	-	4	4	10
CINFR	29	2	36	34	21	-	-	16	5	6	10	4	-	-	-	-
CRIST	1	18	-	8	7	-	1	11	14	10	10	2	-	6	2	3
	3	19	-	8	19	-	4	10	16	8	8	1	-	3	2	1
	1	12	11	7	8	-	9	4	6	11	6	3	-	3	2	-
	2	27	27	8	23	-	6	24	41	18	13	3	1	4	3	4
ELTMA	9	7	13	17	5	2	-	-	8	-	-	-	-	2	4	6
FORKE	-	-	-	13	15	12	-	-	-	12	2	2	5	-	8	-
GONRU	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	27	26	23	9	8	11	17	4	2	7	2	-	9	1	-	12
	26	19	17	14	-	9	10	3	3	6	4	-	2	-	-	6
	2	6	4	3	2	3	7	1	-	5	-	2	5	-	-	2
	15	14	11	18	5	8	10	1	1	-	-	-	-	1	-	4
	17	8	6	18	6	10	4	-	-	8	-	5	9	-	-	1
GOVMI	7	1	4	5	3	11	3	-	3	12	2	2	2	-	4	7
	-	-	-	-	-	1	-	-	-	-	3	1	-	-	1	-
	5	1	3	1	6	5	3	-	1	6	2	-	1	-	2	1
HERCA	9	12	11	17	12	7	11	10	8	10	-	5	6	14	12	8
HINWO	-	1	-	8	11	10	1	1	-	4	6	5	8	1	13	10
IGAAN	-	-	2	2	4	1	-	3	-	4	3	-	1	-	1	3
JONKA	1	1	2	-	2	7	1	1	-	3	4	3	3	1	5	2
	-	-	-	4	4	5	-	1	-	4	-	4	4	-	5	3
KACJA	-	-	2	-	4	6	-	-	6	4	-	7	-	-	-	-
	-	5	1	7	4	11	7	-	1	7	4	-	1	-	1	-
	-	3	3	2	-	13	-	-	3	10	2	10	-	-	-	-
	-	1	4	-	1	4	-	-	2	3	-	4	-	-	-	-
LOTJO	-	-	-	-	-	-	-	20	5	-	-	10	12	11	14	-
MACMA	-	-	-	-	5	5	4	4	6	1	4	5	6	6	5	7
	-	-	-	2	15	7	5	7	7	2	13	11	12	12	12	12
	-	-	-	-	1	2	1	2	-	2	3	4	2	4	6	4
	-	-	-	6	23	7	14	6	9	3	17	5	13	21	19	12
MARRU	12	16	8	12	3	4	7	1	7	8	-	6	2	2	2	5
	6	9	1	12	-	-	-	-	1	11	2	1	2	2	2	5
MOLSI	1	26	32	-	50	45	-	4	6	14	18	15	12	-	8	1
	-	2	9	-	12	10	-	2	4	10	3	8	5	-	2	1
	-	6	16	-	23	20	-	-	-	13	8	17	10	-	2	1
	-	-	-	22	28	25	13	18	14	16	-	7	17	18	15	11
	-	-	-	36	22	27	31	7	16	12	-	5	5	2	8	13
	-	-	-	21	23	20	15	14	18	12	-	5	13	13	8	14
	-	-	-	26	28	27	18	27	16	21	-	7	13	24	24	22
MORJO	2	7	2	3	3	4	-	-	-	1	6	6	3	-	-	-
MOSFA	-	4	-	1	-	5	-	-	7	-	-	-	-	-	-	2
NAGHE	2	-	10	11	10	7	1	6	1	10	10	6	10	3	4	8
	6	-	1	-	14	5	3	13	1	3	11	9	13	13	6	8
OCHPA	-	10	-	-	-	2	-	-	2	1	-	-	-	4	-	3
OTTMI	2	-	-	-	-	6	8	3	1	8	3	5	-	3	5	3
PERZS	10	-	2	-	10	6	5	-	2	10	4	2	-	-	4	-
ROTEC	-	8	-	7	8	9	11	9	7	8	-	-	2	3	4	2
SARAN	6	9	3	6	3	-	-	3	2	4	1	1	-	-	4	1
	9	-	-	10	4	-	1	1	-	-	6	2	-	-	8	4
	14	-	-	13	4	-	3	2	-	-	10	2	-	-	3	6
	-	-	-	6	-	-	-	1	-	-	2	-	-	-	6	1
	5	3	-	8	4	-	-	1	6	5	3	-	-	-	3	-
SCALE	1	5	3	4	3	-	2	-	5	1	1	-	-	1	1	2
SCHHA	8	3	5	10	11	5	-	2	3	1	1	2	5	7	3	-
SLAST	5	7	4	6	4	10	-	-	6	9	-	-	2	2	-	3
	-	3	-	-	-	1	-	-	2	2	-	-	-	-	3	2
STOEN	8	15	27	13	3	2	10	-	8	2	5	1	7	3	3	11
	8	11	27	18	5	2	-	-	-	-	2	3	5	3	1	9
	7	21	24	22	11	7	5	-	18	5	2	-	4	10	-	8
STRJO	6	-	7	14	25	14	-	3	-	4	4	-	6	-	5	2
	3	-	3	5	8	3	-	3	-	3	7	-	6	-	10	1
	3	-	3	5	11	2	-	1	-	1	9	-	2	-	4	2
	4	-	2	9	10	8	-	4	-	6	5	-	4	-	5	1
	1	-	7	5	13	8	-	2	-	5	5	-	7	-	4	-
TEPIS	1	-	7	7	5	8	1	7	-	5	9	7	5	2	5	7
	2	-	10	11	6	9	1	5	-	2	12	4	9	7	4	7
WEGWA	-	-	-	3	2	5	2	-	3	9	4	1	5	6	1	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZAKJU	2	2	4	5	5	5	1	-	3	-	3	4	1	-	2	3
Sum	332	398	459	649	655	496	283	307	367	425	322	244	300	245	318	347