Results of the IMO Video Meteor Network – March 2018

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Previously March was often the first highlight of the year with over 10.000 hours of effective observing time, but in March 2018 we experienced a negative record. We have to look back until January 2014 to find a month in which we collected less than those roughly 6,200 hours of effective observing time. We hardly recorded 10,000 meteors – last time we recorded so few meteors was in June 2011!
Reason was not a lower number of active video cameras – overall 40 observers operated 78 cameras in March 2018. Our new Hungarian observer Henrietta Nagy even started to operate the new camera HUKON, but only 15 cameras managed to observe in twenty or more nights. In Slovenia the weather was particularly poor, but even our southern European observers in Italy and Spain which are typically spoiled by the weather conditions suffered significantly and hardly collected twenty observing nights with their cameras.

The average rate dropped to 1.7 meteors per hour, which is the lowest annual activity just as in the 1999-2018 long-term statistics of the IMO network (figure 1).

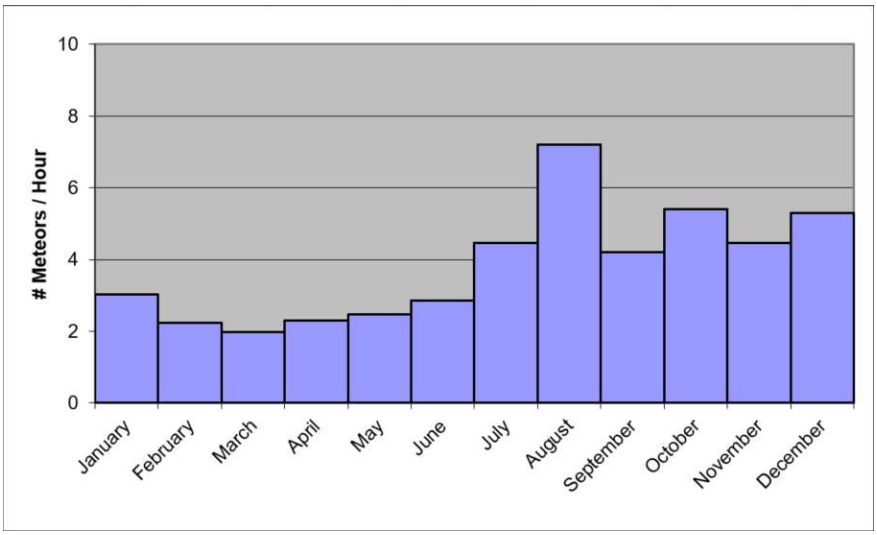

Figure 1: *Mean number of recorded meteors per hour effective observing time in the years 1999-2018.*

But when exactly is the point of lowest activity reached? To answer this question, we analyzed data from February to April of the years 2011-2018, for which we have flux density measurements. A that time of year we can observe sporadic meteors, the Antihelion source (which is actually also a sporadic source, but reported separately for historic reasons) and hardly any "real" meteor shower. The IMO working list contains the delta Leonids in February/March and the Lyrids and eta Aquariids end of April. Otherwise there is no meteor shower for observers in mid-northern latitudes.

Let's have a closer look at the individual sources. Figure 2 presents the temporal distribution of the average number of Antihelion meteors per hour. Each data point reflects 0.1° solar longitude, the solid red line is the sliding mean over 2 degrees solar longitude. The activity level is constant with one meteor every four to five observing hours. A quadratic fit (black line) is basically linear and parallel to the abscissa.

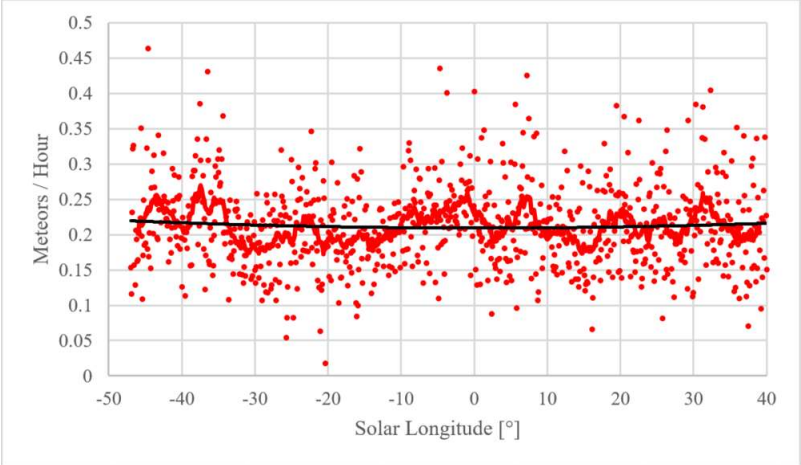

Figure 2: *Temporal distribution of the average number of recorded Antihelion meteors per hour effective observing time, derived from data of the IMO Video Meteor Network in 2011-2018.*

That is surprising, because the anti-solar point moves quickly from positive to negative declination around the vernal equinox, and the observing conditions for Antihelion meteors deteriorate. That is reflected by the flux density profile of the Antihelion source (figure 3): The same number of meteors at a lower effective collection area implies a steady increase of the flux density. We have currently no better explanation than a real increase in particle density.

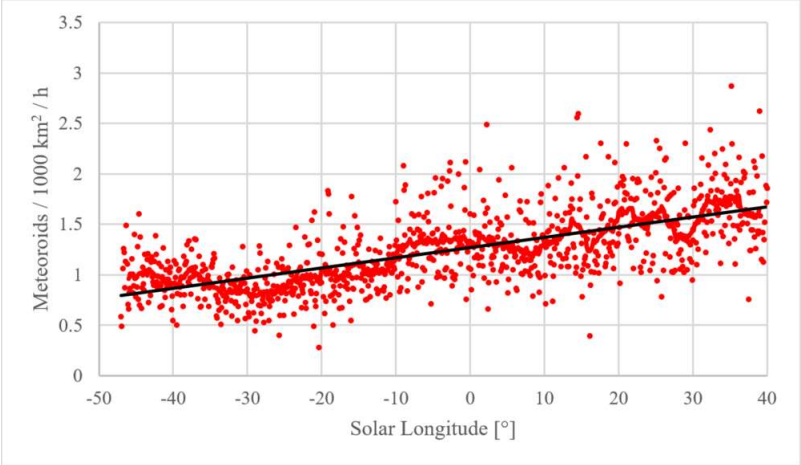

Figure 3: *Temporal distribution of the flux density of Antihelion meteors in 2011-2018.*

The picture looks different for sporadic meteors. Here we see the sought-after minimum in hourly meteor rates at the end of March (Figure 4). The activity drops down to 1.3 sporadic meteors per hour. A quadratic fit yield a minimum at 5° solar longitude, i.e. shortly after the vernal equinox. A possible explanation is quickly at hand: The Apex source makes up for a substantial part of the sporadic activity. It follows the Sun at 90° ecliptical longitude distance and reaches lowest declination just at the vernal equinox. Thus, the Apex “radiant” culminates end of March at the lowest possible altitude, which is why Apex meteors are particularly rare in spring.

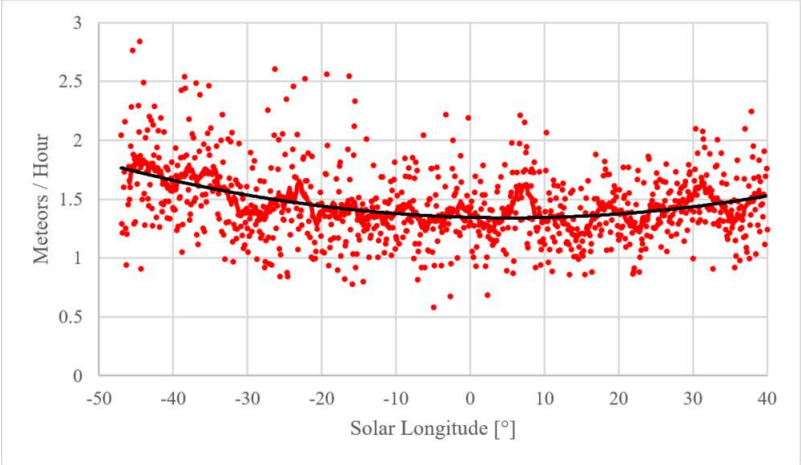

Figure 4: *Temporal distribution of the average number of recorded sporadic meteors per hour effective observing time, derived from data of the IMO Video Meteor Network in 2011-2018.*

MetRec calculates the flux density of sporadic meteors empirically as a weighted sum of individual sporadic sources (N/S Apex, Antapex, Helion, N/S Toroidal), whereby Apex has the biggest weight. So, it comes as no surprise that the sporadic flux density is constant in the analyzed time interval (figure 5): The number of sporadic meteors drops proportional to the effective collection area, which implies a constant sporadic flux density.

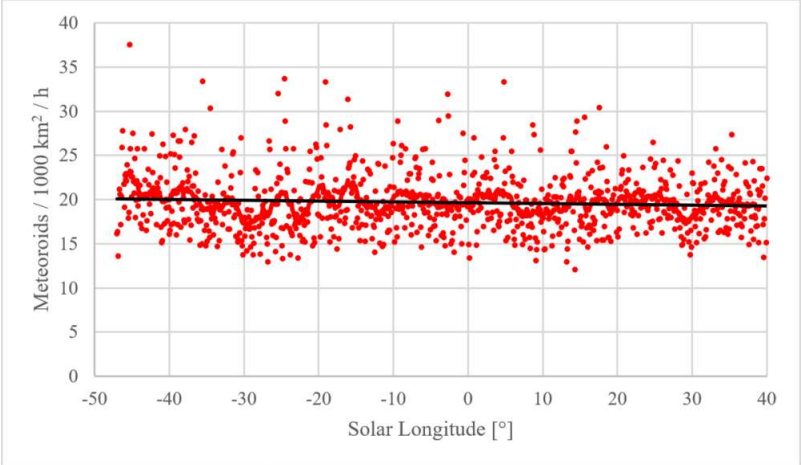

Figure 5: *Temporal distribution of the flux density of sporadic meteors in 2011-2018.*

Figure 6 shows the resulting average meteor count (Antihelion source, sporadic meteors and all meteor showers) per observing hour between February and April.

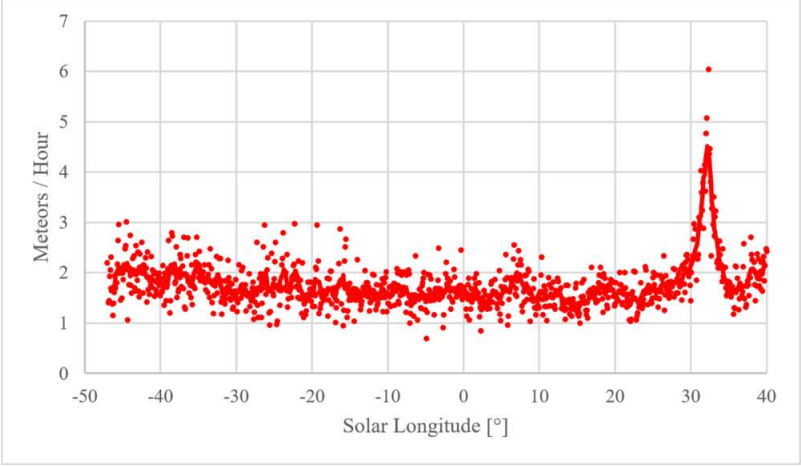

Figure 6: *Temporal distribution of the average number of recorded meteors per hour effective observing time, derived from data of the IMO Video Meteor Network in 2011-2018.*

We can draw the following conclusions:

- Lowest hourly meteor counts (in the northern hemisphere) are reached end of March right after the vernal equinox.
- The Apex source seems to be the dominating meteor source at this time of year. At least the low declination of the Apex would be a simple explanation for the observed minimum. To support this hypothesis, however, each meteor would have to be assigned to one the individual sporadic sources or the true random background activity.
- In the inspected time interval, the Antihelion source provides a constant number of meteors per observing hour, even though the observing geometry deteriorates quickly in sping.

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	20	112.1	289
BIATO	Bianchi	Mt. San Lorenzo/IT	OMSL1 (1.2/4)	6435	4.0	1705	14	16.4	107
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	25	137.4	303
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	13	27.4	86
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	11	66.8	123
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	19	105.4	178
CARMA	Carli	Monte Baldo/IT	BMH2 (1.5/4.5)*	4243	3.0	371	13	84.7	245
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	9	60.7	90
CINFR	Cineglosso	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	21	25.0	169
CRIST	Crivello	Valbrevenna/IT	ARCI (0.8/3.8)	5566	4.6	2575	20	95.2	211
			BILBO (0.8/3.8)	5458	4.2	1772	19	89.5	183
			C3P8 (0.8/3.8)	5455	4.2	1586	16	82.3	161
			STG38 (0.8/3.8)	5614	4.4	2007	16	86.1	244
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	9	46.3	77
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	9	62.8	102
GONRU	Goncalves	Foz do Arelho/PT	FARELHO1 (0.75/4.5)	2286	3.0	208	16	75.8	46
		Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	21	106.4	176
			TEMPLAR2 (0.8/6)	2080	5.0	1508	21	109.1	197
			TEMPLAR3 (0.8/8)	1438	4.3	571	19	105.8	76
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	19	90.5	159
			TEMPLAR5 (0.75/6)	2312	5.0	2259	21	99.8	137
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	9	41.7	47
			ORION3 (0.95/5)	2665	4.9	2069	9	19.5	30
			ORION4 (0.95/5)	2662	4.3	1043	13	31.1	36
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	29	252.4	354
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	17	82.8	103
IGAAN	Igaz	Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	6	37.1	12
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	14	78.0	56
			HUSOR2 (0.95/3.5)	2465	3.9	715	13	61.8	52
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	2	15.3	25
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	5	36.0	53
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	2	15.5	38
			STEFKA (0.8/3.8)	5471	2.8	379	2	15.5	26
KOSDE	Koschny	Izana Obs./ES	LIC1(2.8/50)*	2255	6.2	5670	5	23.2	69
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	7	49.8	138
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	13	58.0	62
			PAV36 (0.8/3.8)*	5668	4.0	1573	17	104.2	160
			PAV43 (0.75/4.5)*	3132	3.1	319	15	95.3	41
			PAV60 (0.75/4.5)	2250	3.1	281	19	113.4	151
MARRU	Marques	Lisbon/PT	CAB1 (0.75/6)	2362	4.8	1517	24	150.4	228
			RAN1 (1.4/4.5)	4405	4.0	1241	17	97.3	138
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	19	94.5	394
			ESCIMO2 (0.85/25)	155	8.1	3415	16	101.4	92
			MINCAM1 (0.8/8)	1477	4.9	1084	14	72.5	188
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	19	124.8	361
			REMO2 (0.8/8)	1478	6.4	4778	19	120.9	318
			REMO3 (0.8/8)	1420	5.6	1967	21	148.7	301
			REMO4 (0.8/8)	1478	6.5	5358	20	131.7	384
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	10	61.4	49
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	16	81.1	90
NAGHE	Nagy	Budapest/HU	HUKON (0.8/3.8)	5500	4.0	1575	10	32.6	67
		Piszkestető/HU	HUPIS (0.8/3.8)	5615	4.0	1524	14	30.7	80
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	7	44.0	14
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	25	205.7	175
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	14	41.2	99
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	12	92.2	83
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	18	92.0	80
			RO2 (0.75/6)	2381	3.8	459	18	101.4	128
			RO3 (0.8/12)	710	5.2	619	17	105.8	173
			RO4 (1.0/8)	1582	4.2	549	13	72.8	43
			SOFIA (0.8/12)	738	5.3	907	17	68.3	94
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	10	33.4	42
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	19	107.8	137
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	7	40.1	111
			KAYAK2 (0.8/12)	741	5.5	920	7	34.0	24
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	16	62.8	183
			NOA38 (0.8/3.8)	5609	4.2	1911	6	8.1	62
			SCO38 (0.8/3.8)	5598	4.8	3306	17	63.2	178
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	22	110.9	304
			MINCAM3 (0.8/6)	2338	5.5	3590	19	112.6	117
			MINCAM4 (0.8/6)	2306	5.0	1412	21	98.8	116
			MINCAM5 (0.8/6)	2349	5.0	1896	18	111.0	161
			MINCAM6 (0.8/6)	2395	5.1	2178	14	105.7	143
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	7	59.7	80
			HUMOB (0.8/6)	2388	4.8	1607	7	41.8	36
WEGWA	Wegrzyk	Nieznaszyn/PL	PAV78 (0.8/6)	2286	4.0	778	19	98.1	88
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	20	148.4	221
ZAKJU	Zakrajšek	Petkovec/SI	TACKA (0.8/12)	714	5.3	783	8	48.3	45
Sum							31	6172.2	10439

* 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	6.1	9.1	9.0	6.3	9.0	-	1.3	4.7	7.1	6.9	5.6	0.4	-	-	-
BIATO	-	-	-	-	-	-	-	1.5	1.3	-	0.9	0.2	1.7	2.1	-
BOMMA	-	5.3	6.2	-	-	3.7	7.3	11.0	9.1	3.4	1.4	7.8	4.6	9.6	0.3
BREMA	1.5	-	0.7	-	-	2.8	-	1.5	-	-	-	-	0.3	6.9	-
BRIBE	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	-
	5.8	-	-	2.0	9.6	1.3	2.7	10.6	-	4.5	5.7	-	-	10.3	-
CARMA	-	2.3	7.9	-	-	4.2	9.7	4.1	3.1	-	-	9.1	9.4	7.3	-
CASFL	-	2.5	6.3	-	-	-	10.1	-	-	-	-	8.8	9.4	6.1	-
CINFR	-	1.2	0.7	-	-	0.5	1.8	2.0	1.4	-	0.2	0.2	1.4	1.2	-
CRIST	-	-	0.7	-	-	3.0	10.7	0.3	3.3	-	-	3.4	10.5	4.4	2.0
	-	-	2.0	-	-	2.5	10.8	0.2	2.0	-	-	1.7	10.5	4.3	1.0
	-	3.5	7.9	-	-	-	10.8	-	-	-	-	1.2	6.9	0.6	5.2
	-	-	-	-	-	4.2	10.8	-	3.8	-	-	1.3	9.4	-	0.5
ELTMA	-	-	-	-	-	-	-	1.0	2.6	-	-	4.1	-	-	-
FORKE	8.6	-	-	4.2	4.1	-	-	-	-	-	-	-	-	1.1	-
GONRU	-	3.9	4.5	-	2.3	7.0	-	-	1.8	2.6	5.5	-	-	-	-
	-	1.6	-	2.6	5.2	-	-	1.1	-	-	-	3.3	2.1	-	6.7
	-	0.8	-	2.3	4.7	10.9	-	0.5	-	-	-	2.4	-	-	6.4
	-	-	0.8	-	5.1	10.7	-	-	0.6	2.3	7.6	-	-	4.1	5.3
	-	0.3	-	1.8	4.5	10.7	-	-	-	-	-	1.4	-	-	3.6
	-	-	-	0.6	-	9.2	-	-	-	2.6	6.3	1.2	-	3.7	5.4
GOVMI	-	-	-	-	-	-	-	-	-	8.0	-	2.6	-	-	-
	-	-	-	-	-	0.2	-	0.5	0.2	1.3	-	0.9	-	0.7	-
	-	-	-	-	-	0.3	-	0.8	3.2	8.2	-	-	0.2	0.8	-
HERCA	4.1	9.8	11.0	6.6	11.0	10.7	10.9	3.5	9.9	9.2	-	9.6	10.1	5.9	9.1
HINWO	11.0	-	8.6	5.2	6.8	-	0.3	3.6	-	-	2.5	1.6	-	1.2	-
IGAAN	-	-	-	7.4	-	-	-	5.6	-	5.3	-	-	5.7	-	-
JONKA	-	-	-	7.1	-	-	7.1	7.1	4.2	4.0	-	5.0	8.5	10.3	-
	-	-	-	6.1	-	-	6.4	5.6	3.4	5.0	-	7.3	8.0	8.4	0.2
KACJA	-	-	-	-	-	-	-	10.8	4.5	-	-	-	-	-	-
	-	-	-	-	-	4.1	-	10.0	8.8	8.1	-	5.0	-	-	-
	-	-	-	-	-	-	-	11.0	4.5	-	-	-	-	-	-
	-	-	-	-	-	-	-	11.0	4.5	-	-	-	-	-	-
KOSDE	-	-	-	-	10.4	7.0	-	-	-	-	-	-	-	-	0.7
LOTJO	-	-	-	-	-	-	-	-	6.9	-	8.4	9.7	-	-	-
MACMA	-	-	0.7	8.4	0.2	-	-	0.6	1.5	0.2	-	5.0	-	-	-
	3.7	7.8	4.2	11.2	1.4	-	-	3.2	3.8	1.3	1.6	8.6	-	-	-
	2.1	7.3	3.9	10.6	0.2	-	-	3.2	4.2	-	1.2	6.9	-	-	-
	9.6	7.9	4.4	11.1	1.7	-	0.3	3.5	4.2	1.6	1.7	8.6	-	-	-
MARRU	-	7.2	-	4.9	5.2	10.8	-	-	-	4.1	9.0	0.8	-	2.8	9.6
	-	2.6	2.7	-	-	9.8	-	-	-	-	6.1	-	-	-	4.7
MOLSI	8.9	-	2.4	2.8	-	1.4	7.1	7.0	1.5	5.5	-	-	-	9.9	0.2
	8.2	-	-	-	7.4	-	7.2	6.9	1.4	3.0	-	8.6	-	10.3	-
	5.8	0.4	1.8	1.0	-	-	-	-	-	-	1.6	8.0	-	10.3	-
	9.6	9.6	9.4	6.1	9.9	-	-	5.9	8.1	5.6	-	-	-	0.5	-
	6.0	8.5	9.5	6.1	10.1	-	-	5.9	8.3	6.3	-	-	-	0.4	-
	11.3	11.2	10.9	6.8	11.0	-	-	6.5	8.8	6.9	-	-	-	0.6	-
	6.8	11.1	10.4	6.8	11.0	-	-	6.6	8.7	6.5	-	-	-	0.7	-
MORJO	-	-	-	10.5	-	-	7.6	10.9	9.9	1.6	-	-	-	-	-
MOSFA	-	-	-	-	-	-	6.8	8.8	0.7	-	-	4.5	8.9	8.0	0.3
NAGHE	-	-	-	2.6	-	-	-	4.8	1.6	-	-	5.2	5.0	6.3	0.8
	-	-	-	-	-	-	1.9	0.2	-	0.8	0.4	1.8	2.1	0.2	0.3
OCHPA	-	-	-	-	-	-	-	7.4	-	-	-	-	6.7	-	-
OTTMI	11.3	3.6	11.2	6.0	-	4.1	8.0	10.9	8.9	-	-	10.5	10.7	10.6	10.6
PERZS	-	-	-	-	-	0.9	0.9	4.7	4.4	7.3	1.4	0.8	0.3	-	-
ROTEC	-	8.1	9.6	7.4	10.8	-	-	4.4	-	3.3	4.6	-	-	-	-
SARAN	-	1.5	1.2	1.7	-	10.4	-	-	-	-	7.6	1.1	-	-	-
	-	-	-	1.8	-	9.5	-	-	-	-	7.6	-	-	-	6.3
	-	-	-	1.2	2.6	10.4	-	-	-	-	9.1	0.2	-	-	-
	-	-	-	-	-	9.2	-	-	-	-	3.8	-	-	-	0.7
	-	1.3	1.0	2.2	2.3	9.2	-	-	-	-	5.4	-	-	-	-
SCALE	-	-	1.2	-	-	-	4.0	-	-	-	-	2.0	1.1	-	-
SCHHA	6.3	-	2.8	4.2	6.0	4.5	3.2	10.2	0.2	5.3	5.2	-	-	10.4	-
SLAST	-	-	-	-	-	-	-	7.0	3.8	1.6	-	-	-	-	-
	-	-	-	-	-	-	-	8.2	4.1	1.0	-	-	-	-	-
STOEN	-	-	0.2	-	-	-	7.1	3.8	0.9	-	-	8.7	1.3	1.9	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	7.4	3.9	0.8	-	0.2	9.7	1.6	0.8	-
STRJO	8.5	9.4	1.0	-	11.0	3.2	-	6.3	-	1.3	4.5	1.5	-	10.4	2.8
	11.2	11.2	1.3	-	11.0	1.3	-	4.5	-	1.5	3.9	1.5	-	10.4	2.5
	11.3	11.2	1.6	0.2	11.0	3.2	-	5.0	-	-	0.3	0.2	-	10.3	0.2
	9.1	9.3	-	-	11.0	2.9	-	5.8	-	1.3	4.2	1.9	-	10.4	2.6
	11.3	11.2	1.4	-	11.1	-	-	6.3	-	0.6	5.9	-	-	10.4	-
TEPIS	-	-	-	10.9	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	10.6	-	-	6.1	-	-	-	-	-	-	-	-
WEGWA	10.7	7.4	10.9	10.7	-	-	4.5	7.4	4.0	3.5	1.4	0.4	0.2	-	3.5
YRJIL	11.0	10.2	9.9	5.7	0.8	6.7	9.7	-	-	-	-	-	-	8.5	9.5
ZAKJU	-	-	-	-	-	-	-	8.8	-	-	-	5.1	-	0.8	-
Sum	199.8	198.3	179.9	203.7	208.4	190.5	182.5	286.6	176.0	141.5	130.8	189.8	136.6	234.3	101.0

March	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	4.5	8.7	8.5	8.5	2.0	-	2.1	8.2	-	1.1	-	-	3.0	-	-
BIATO	-	0.7	-	-	-	-	1.5	1.1	2.3	0.8	-	1.2	-	0.7	-	0.4
BOMMA	-	5.4	1.1	-	-	9.3	10.0	6.1	7.1	10.0	1.1	6.8	2.0	4.5	3.3	1.0
BREMA	-	1.2	2.2	-	2.3	0.3	-	-	6.2	0.7	-	-	-	-	0.8	-
BRIBE	-	0.8	10.1	7.3	10.0	-	-	3.7	9.7	0.2	5.6	-	-	4.9	4.1	-
	-	-	5.0	8.7	10.0	0.7	-	6.5	9.6	-	4.4	-	-	5.8	1.9	0.3
CARMA	-	-	-	-	-	-	-	7.1	-	8.5	2.3	9.7	-	-	-	-
CASFL	-	-	-	-	-	-	-	-	-	8.6	2.0	6.9	-	-	-	-
CINFR	-	1.1	0.6	-	-	1.6	2.0	2.4	1.3	1.6	-	1.8	0.8	0.5	0.7	-
CRIST	0.2	-	-	8.1	2.3	10.0	10.0	4.7	4.6	9.8	2.6	4.3	-	-	-	0.3
	0.2	0.7	-	8.0	2.2	10.0	10.0	6.5	4.9	9.8	2.2	-	-	-	-	-
	-	-	-	9.2	2.1	10.0	7.7	3.9	-	9.8	1.1	1.6	-	-	-	0.8
	-	-	-	5.2	0.2	9.5	10.0	6.4	5.3	9.8	3.6	5.9	-	-	-	0.2
ELTMA	-	-	-	-	4.8	9.8	5.9	6.2	2.9	9.0	-	-	-	-	-	-
FORKE	-	-	9.4	9.1	-	9.2	-	-	9.8	-	-	-	-	7.3	-	-
GONRU	-	-	-	4.5	9.7	7.3	-	3.7	-	6.1	1.1	-	4.2	3.7	7.9	-
	4.1	1.5	5.5	7.6	10.2	10.0	2.8	4.3	-	10.0	8.9	4.3	3.4	3.1	8.1	-
	4.4	1.3	5.2	7.6	10.4	9.7	-	4.2	-	10.1	9.0	4.1	2.5	3.1	5.8	3.7
	1.0	-	5.1	9.1	10.3	9.1	-	5.5	-	10.0	8.8	3.4	3.2	3.8	-	-
	2.9	-	4.1	7.0	10.4	9.5	1.6	2.6	-	9.6	8.7	4.0	1.7	0.6	5.5	-
	1.8	0.5	5.8	8.5	9.8	8.6	1.2	5.0	-	9.7	8.3	3.6	2.7	3.0	2.3	-
GOVMI	4.2	-	-	-	4.7	2.7	8.3	-	4.5	-	-	6.3	-	-	0.4	-
	-	-	-	-	-	9.2	6.3	-	-	0.2	-	-	-	-	-	-
	0.2	-	-	-	0.5	9.1	7.2	-	0.2	0.2	-	-	-	-	-	0.2
HERCA	10.0	6.8	8.5	10.8	10.5	10.3	10.1	6.7	6.1	9.6	-	7.0	7.5	9.0	9.8	8.3
HINWO	-	-	5.4	8.5	0.2	9.4	-	0.2	9.6	1.4	-	-	-	7.3	-	-
IGAAN	-	-	-	-	-	-	-	5.7	7.4	-	-	-	-	-	-	-
JONKA	2.6	-	-	-	-	1.9	3.6	5.9	7.8	-	-	2.9	-	-	-	-
	1.5	-	-	-	-	1.4	-	2.8	5.7	-	-	-	-	-	-	-
KACJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KOSDE	-	-	-	4.2	-	-	-	-	0.9	-	-	-	-	-	-	-
LOTJO	-	9.4	6.4	-	-	-	-	-	8.4	0.6	-	-	-	-	-	-
MACMA	-	1.9	-	-	-	9.4	7.9	9.0	6.5	6.7	-	-	-	-	-	-
	-	7.4	-	-	-	10.1	10.0	9.9	9.9	9.8	-	-	-	-	0.3	-
	-	7.6	-	-	-	9.8	9.6	9.7	9.6	9.4	-	-	-	-	-	-
	-	9.1	0.2	-	-	10.0	9.9	9.8	9.8	9.7	-	-	-	-	0.3	-
MARRU	6.1	1.3	7.0	7.5	5.5	10.2	5.3	6.1	-	10.0	10.0	9.4	2.7	3.9	6.9	4.1
	2.4	-	3.1	7.4	10.2	9.6	-	4.1	-	10.0	5.9	10.0	2.8	2.5	3.4	-
MOLSI	7.1	-	-	-	-	9.5	-	3.8	9.3	6.4	-	-	0.7	7.2	3.0	0.8
	7.0	-	-	-	-	9.9	-	4.0	9.7	7.3	-	-	0.9	6.9	-	2.7
	6.4	-	-	-	-	9.9	-	3.3	9.7	6.9	-	-	0.9	6.5	-	-
	1.1	8.6	9.1	8.4	8.8	-	-	2.0	8.2	-	5.2	-	-	4.6	4.1	-
	1.2	9.4	9.6	8.9	9.5	-	-	2.1	9.1	-	4.7	-	-	2.5	2.8	-
	0.9	10.2	10.1	9.3	10.0	1.6	-	3.3	9.7	-	5.9	2.7	-	5.7	5.3	-
	0.7	10.2	10.1	9.3	10.0	1.3	-	2.2	9.7	-	4.3	-	-	2.6	2.7	-
MORJO	8.5	-	-	-	-	-	-	3.4	7.6	-	-	0.9	0.5	-	-	-
MOSFA	1.1	-	-	-	0.7	9.6	9.0	6.1	0.7	8.9	2.4	4.6	-	-	-	-
NAGHE	0.9	-	-	-	-	-	-	2.8	-	-	-	2.6	-	-	-	-
	0.3	-	-	-	-	-	0.2	8.0	7.6	-	-	4.8	-	-	2.1	-
OCHPA	-	-	-	-	2.0	10.1	9.4	8.1	-	-	-	-	-	-	-	0.3
OTTMI	-	10.5	10.4	10.4	3.3	8.4	10.2	8.8	10.1	-	1.4	-	1.6	4.6	9.8	9.8
PERZS	4.6	-	-	-	2.4	3.6	1.5	2.9	-	-	-	5.5	-	-	-	-
ROTEC	-	6.8	10.0	9.9	9.8	-	-	-	7.5	-	-	-	-	-	-	-
SARAN	-	-	1.4	7.8	10.6	10.6	-	4.2	-	8.6	7.3	8.0	2.5	2.6	2.7	2.2
	2.9	-	3.7	3.0	9.8	10.5	1.3	2.3	0.5	9.6	8.6	10.2	4.6	3.7	5.5	-
	2.5	-	2.2	7.8	10.3	10.3	-	4.5	-	9.7	8.0	9.9	5.8	4.6	6.7	-
	2.1	-	-	4.9	9.0	9.9	-	2.1	-	9.4	7.3	9.6	-	2.1	2.7	-
	-	-	-	4.2	5.3	10.3	-	1.4	-	8.2	7.7	5.2	1.9	0.9	1.4	0.4
SCALE	-	-	-	-	-	8.3	3.7	-	2.6	7.9	-	2.4	-	-	-	0.2
SCHHA	-	0.2	8.0	7.7	8.7	0.9	-	-	9.5	-	8.5	-	-	-	6.0	-
SLAST	-	-	-	-	-	9.4	9.7	4.2	-	4.4	-	-	-	-	-	-
	-	-	-	-	-	1.2	9.9	4.8	-	4.8	-	-	-	-	-	-
STOEN	-	-	-	0.8	0.7	9.2	6.4	7.0	2.4	9.8	-	2.4	-	-	0.2	-
	-	-	-	-	-	-	-	2.5	0.3	3.9	-	1.0	0.2	-	-	0.2
	0.3	-	-	-	0.5	8.5	6.7	6.8	2.8	10.1	-	2.3	0.2	-	-	0.6
STRJO	-	8.3	10.1	6.0	10.0	0.5	-	0.4	7.6	0.2	1.0	-	-	6.5	0.4	-
	-	9.1	9.9	5.8	9.8	-	-	0.2	7.7	-	1.9	-	-	7.9	-	-
	0.2	1.4	9.9	5.8	10.0	-	-	0.5	7.7	-	1.2	-	-	7.4	-	0.2
	-	9.6	10.0	5.8	9.9	-	-	1.6	7.9	-	1.7	-	-	6.0	-	-
	-	8.3	9.6	5.6	9.9	-	-	-	7.5	-	-	-	-	6.6	-	-
TEPIS	-	-	-	-	8.8	8.3	7.9	9.8	9.7	-	-	4.3	-	-	-	-
	-	-	-	-	6.4	2.3	-	9.6	4.8	-	-	2.0	-	-	-	-
WEGWA	-	1.1	-	-	-	9.7	2.3	-	9.7	8.5	-	1.4	-	0.8	-	-
YRJIL	9.2	7.9	-	7.4	8.0	-	-	8.9	-	-	5.9	8.1	0.2	6.7	8.1	6.0
ZAKJU	-	-	-	-	-	7.4	10.1	3.9	4.4	7.8	-	-	-	-	-	-
Sum	98.6	162.8	217.5	275.6	319.0	410.9	229.2	287.4	342.3	334.1	169.7	181.1	53.5	163.1	125.0	42.7

3. Results (Meteors)

March	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	5	14	17	13	14	-	1	13	5	23	13	1	-	-	-
BIATO	-	-	-	-	-	-	-	10	8	-	6	1	13	15	-
BOMMA	-	6	17	-	-	10	20	28	9	7	3	5	14	21	1
BREMA	9	-	3	-	-	8	-	5	-	-	-	-	2	22	-
BRIBE	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-
	1	-	-	3	17	1	7	18	-	8	5	-	-	26	-
CARMA	-	5	32	-	-	12	44	7	2	-	-	9	40	21	-
CASFL	-	2	14	-	-	-	19	-	-	-	-	7	18	9	-
CINFR	-	8	7	-	-	3	11	15	8	-	1	1	10	8	-
CRIST	-	-	1	-	-	3	24	1	2	-	-	6	21	3	4
	-	-	3	-	-	6	22	1	2	-	-	3	24	3	1
	-	4	13	-	-	-	16	-	-	-	-	1	11	2	14
	-	-	-	-	-	8	35	-	2	-	-	2	5	-	3
ELTMA	-	-	-	-	-	-	-	3	3	-	-	6	-	-	-
FORKE	14	-	-	4	2	-	-	-	-	-	-	-	-	1	-
GONRU	-	1	4	-	1	4	-	-	2	3	2	-	-	-	-
	-	4	-	2	2	-	-	2	-	-	-	8	2	-	9
	-	4	-	5	4	24	-	2	-	-	-	5	-	-	5
	-	-	2	-	3	6	-	-	2	2	4	-	-	3	1
	-	1	-	2	1	28	-	-	-	-	-	4	-	-	4
	-	-	-	3	-	9	-	-	-	2	15	1	-	8	6
GOVMI	-	-	-	-	-	-	-	-	-	18	-	3	-	-	-
	-	-	-	-	-	1	-	3	1	8	-	1	-	1	-
	-	-	-	-	-	2	-	2	1	7	-	-	1	4	-
HERCA	7	13	15	12	20	11	20	3	10	27	-	9	14	2	13
HINWO	13	-	8	4	4	-	1	8	-	-	2	2	-	2	-
IGAAN	-	-	-	3	-	-	-	1	-	2	-	-	2	-	-
JONKA	-	-	-	3	-	-	6	2	1	7	-	5	8	6	-
	-	-	-	6	-	-	1	1	1	13	-	4	10	4	1
KACJA	-	-	-	-	-	-	-	23	2	-	-	-	-	-	-
	-	-	-	-	-	5	-	13	10	14	-	11	-	-	-
	-	-	-	-	-	-	-	32	6	-	-	-	-	-	-
	-	-	-	-	-	-	-	21	5	-	-	-	-	-	-
KOSDE	-	-	-	-	25	18	-	-	-	-	-	-	-	-	6
LOTJO	-	-	-	-	-	-	-	-	17	-	7	29	-	-	-
MACMA	-	-	2	8	1	-	-	3	4	1	-	5	-	-	-
	3	2	6	13	3	-	-	5	6	1	2	17	-	-	-
	3	2	1	2	1	-	-	3	2	-	1	4	-	-	-
	4	6	5	15	3	-	1	4	7	2	1	12	-	-	-
MARRU	-	11	-	9	4	21	-	-	-	3	24	1	-	4	9
	-	2	10	-	-	14	-	-	-	-	11	-	-	-	11
MOLSI	11	-	3	4	-	4	18	15	4	41	-	-	-	72	1
	8	-	-	-	2	-	3	2	1	8	-	8	-	10	-
	5	1	1	1	-	-	-	-	-	-	1	22	-	32	-
	30	22	32	21	29	-	-	19	14	17	-	-	-	2	-
	7	17	17	13	15	-	-	27	8	21	-	-	-	1	-
	15	26	24	8	15	-	-	17	14	17	-	-	-	1	-
	12	24	23	21	28	-	-	18	17	21	-	-	-	2	-
MORJO	-	-	-	5	-	-	5	5	7	1	-	-	-	-	-
MOSFA	-	-	-	-	-	-	14	9	1	-	-	4	11	6	1
NAGHE	-	-	-	10	-	-	-	8	1	-	-	12	8	14	1
	-	-	-	-	-	-	12	1	-	5	3	12	13	1	2
OCHPA	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-
OTTMI	5	4	10	4	-	1	9	11	9	-	-	7	11	9	10
PERZS	-	-	-	-	-	1	1	14	11	30	3	2	1	-	-
ROTEC	-	3	6	7	7	-	-	2	-	4	2	-	-	-	-
SARAN	-	2	1	2	-	7	-	-	-	-	6	2	-	-	-
	-	-	-	1	-	11	-	-	-	-	11	-	-	-	2
	-	-	-	2	3	20	-	-	-	-	10	1	-	-	-
	-	-	-	-	-	5	-	-	-	-	1	-	-	-	2
	-	2	5	1	2	4	-	-	-	-	9	-	-	-	-
SCALE	-	-	3	-	-	-	7	-	-	-	-	3	1	-	-
SCHHA	4	-	3	7	4	4	5	17	1	7	3	-	-	12	-
SLAST	-	-	-	-	-	-	-	12	1	8	-	-	-	-	-
	-	-	-	-	-	-	-	6	2	1	-	-	-	-	-
STOEN	-	-	2	-	-	-	19	6	4	-	-	22	2	2	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	26	7	3	-	1	14	3	2	-
STRJO	5	9	2	-	37	3	-	21	-	5	5	2	-	52	3
	6	4	4	-	14	1	-	9	-	1	5	1	-	14	1
	10	8	4	1	15	1	-	8	-	-	2	1	-	12	1
	11	12	-	-	19	1	-	10	-	2	4	2	-	26	1
	11	12	3	-	18	-	-	9	-	1	3	-	-	21	-
TEPIS	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	9	-	-	3	-	-	-	-	-	-	-	-
WEGWA	3	5	5	10	-	-	6	4	1	2	1	4	1	-	4
YRJIL	21	15	12	6	1	10	10	-	-	-	-	-	-	17	15
ZAKJU	-	-	-	-	-	-	-	5	-	-	-	3	-	1	-
Sum	223	251	320	256	314	267	366	493	217	340	167	285	247	502	132

March	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	19	43	41	30	1	-	9	15	-	6	-	-	6	-	-
BIATO	-	5	-	-	-	-	9	7	14	5	-	7	-	4	-	3
BOMMA	-	8	4	-	-	21	14	16	22	30	1	15	9	12	9	1
BREMA	-	5	10	-	6	1	-	-	11	2	-	-	-	-	2	-
BRIBE	-	2	11	5	29	-	-	13	19	1	7	-	-	2	6	-
	-	-	5	11	23	1	-	15	22	-	7	-	-	4	3	1
CARMA	-	-	-	-	-	-	-	13	-	32	5	23	-	-	-	-
CASFL	-	-	-	-	-	-	-	-	-	9	3	9	-	-	-	-
CINFR	-	7	4	-	-	11	15	16	8	11	-	12	5	3	5	-
CRIST	1	-	-	26	2	21	27	12	12	29	11	4	-	-	-	1
	1	1	-	6	1	19	25	17	13	28	7	-	-	-	-	-
	-	-	-	22	2	19	15	10	-	19	5	5	-	-	-	3
	-	-	-	9	1	27	34	20	31	34	10	21	-	-	-	2
ELTMA	-	-	-	-	8	15	10	7	8	17	-	-	-	-	-	-
FORKE	-	-	14	8	-	17	-	-	21	-	-	-	-	21	-	-
GONRU	-	-	-	3	6	3	-	3	-	4	1	-	5	1	3	-
	7	2	8	22	24	23	1	8	-	20	12	3	4	3	10	-
	9	3	6	16	21	19	-	6	-	25	13	4	10	8	6	2
	1	-	2	8	10	5	-	6	-	5	8	1	4	3	-	-
	3	-	3	10	21	16	4	9	-	24	13	4	5	1	6	-
	1	1	1	8	13	12	1	6	-	19	7	3	1	13	7	-
GOVMI	2	-	-	-	3	7	6	-	3	-	-	4	-	-	1	-
	-	-	-	-	-	11	3	-	-	1	-	-	-	-	-	-
	1	-	-	-	3	9	2	-	1	2	-	-	-	-	-	1
HERCA	15	9	13	16	21	16	7	1	7	9	-	8	12	17	19	8
HINWO	-	-	9	12	1	7	-	1	17	1	-	-	-	11	-	-
IGAAN	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-
JONKA	2	-	-	-	-	1	1	6	6	-	-	2	-	-	-	-
	2	-	-	-	-	1	-	1	7	-	-	-	-	-	-	-
KACJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KOSDE	-	-	-	17	-	-	-	-	3	-	-	-	-	-	-	-
LOTJO	-	43	11	-	-	-	-	-	20	11	-	-	-	-	-	-
MACMA	-	2	-	-	-	9	9	6	8	4	-	-	-	-	-	-
	-	6	-	-	-	19	18	15	27	15	-	-	-	-	2	-
	-	2	-	-	-	8	3	2	4	3	-	-	-	-	-	-
	-	7	1	-	-	17	18	11	16	18	-	-	-	-	3	-
MARRU	5	1	10	7	8	28	2	10	-	15	22	8	4	9	11	2
	3	-	1	5	17	11	-	7	-	15	5	16	2	2	6	-
MOLSI	29	-	-	-	-	64	-	41	50	13	-	-	3	12	7	2
	5	-	-	-	-	18	-	4	8	5	-	-	1	8	-	1
	9	-	-	-	-	40	-	12	23	12	-	-	1	28	-	-
	2	34	38	26	42	-	-	4	14	-	6	-	-	6	3	-
	2	32	45	40	29	-	-	1	24	-	12	-	-	6	1	-
	1	34	21	19	30	1	-	5	31	-	7	1	-	5	9	-
	2	47	41	36	49	2	-	5	21	-	9	-	-	3	3	-
MORJO	4	-	-	-	-	-	-	4	10	-	-	5	3	-	-	-
MOSFA	1	-	-	-	2	13	7	6	1	6	2	6	-	-	-	-
NAGHE	3	-	-	-	-	-	-	8	-	-	-	2	-	-	-	-
	2	-	-	-	-	-	1	14	7	-	-	1	-	-	6	-
OCHPA	-	-	-	-	1	3	1	4	-	-	-	-	-	-	-	2
OTTMI	-	7	10	7	2	10	13	12	8	-	1	-	1	3	6	5
PERZS	7	-	-	-	5	9	1	2	-	-	-	12	-	-	-	-
ROTEC	-	7	11	13	16	-	-	-	5	-	-	-	-	-	-	-
SARAN	-	-	3	4	9	4	-	4	-	12	8	7	4	1	2	2
	2	-	2	9	12	23	2	2	2	12	9	11	5	2	10	-
	6	-	7	10	13	21	-	5	-	23	17	18	4	2	11	-
	1	-	-	2	1	5	-	1	-	9	7	4	-	2	3	-
	-	-	-	2	12	11	-	5	-	9	7	13	3	1	6	2
SCALE	-	-	-	-	-	8	2	-	6	10	-	1	-	-	-	1
SCHHA	-	1	9	10	21	1	-	-	12	-	10	-	-	-	6	-
SLAST	-	-	-	-	-	31	38	10	-	11	-	-	-	-	-	-
	-	-	-	-	-	6	7	1	-	1	-	-	-	-	-	-
STOEN	-	-	-	1	4	34	26	15	3	33	-	9	-	-	1	-
	-	-	-	-	-	-	-	17	2	33	-	7	1	-	-	2
	2	-	-	-	2	32	28	18	3	29	-	5	1	-	-	2
STRJO	-	18	32	22	45	1	-	1	25	1	3	-	-	11	1	-
	-	11	9	8	11	-	-	1	7	-	2	-	-	8	-	-
	1	10	10	4	12	-	-	1	4	-	2	-	-	8	-	1
	-	16	12	6	18	-	-	2	7	-	2	-	-	10	-	-
	-	12	13	8	19	-	-	-	8	-	-	-	-	5	-	-
TEPIS	-	-	-	-	10	12	5	11	18	-	-	8	-	-	-	-
	-	-	-	-	7	2	-	12	1	-	-	2	-	-	-	-
WEGWA	-	1	-	-	-	9	3	-	12	12	-	3	-	2	-	-
YRJIL	17	10	-	8	18	-	-	11	-	-	9	10	1	12	13	5
ZAKJU	-	-	-	-	-	11	11	3	3	8	-	-	-	-	-	-
Sum	149	363	419	487	640	746	369	496	633	647	256	274	89	255	187	49