Results of the IMO Video Meteor Network – November 2017

Sirko Molau, Abenstalstr. 13b, 84072 Seysdorf *2018/08/25*

As in the month before we managed to collect more than 10,000 hours of effective observing time in November. We clearly missed the record result of November 2015 (12,000 hours), but it was still the second-best result for this month. Eighty cameras recorded a total of over 42,000 meteors, which was the second-best November outcome as well.
About half of the cameras were active in twenty and more observing nights, but no camera got more than 28 nights.

November marks the nominal end of the Taurids – thereafter the activity is assigned to the Anthelion source again. Figure 1 shows the two-months flux density profile of the Taurids. As usual the Southern Taurids (red) dominate until the last October decade. Then they are vanishing and the Northern Taurids (green) take over and become the dominating branch until the end of the activity interval.

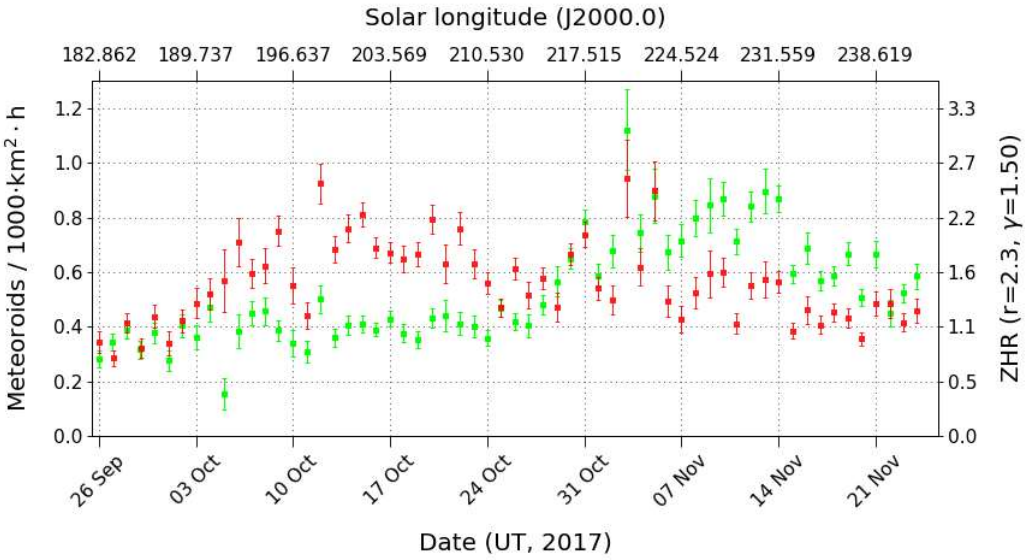

Figure 1: *Comparison of the flux density profile of the Northern (green) and Southern (red) Taurids in 2017, derived from video data of the IMO Network.*

A look at the population index (figure 2) shows a specialty of the Taurids. Whereas the population index of all analyzed showers is more or less smaller than the sporadic r-value, the population index of the Northern Taurids (left, green) is nearly identical to the sporadic value (left, red). In both cases, the average is r=2.5. The scatter results from the different lunar phases. With r=2.8 the Southern Taurids have even a larger population index than the sporadic meteors. That contradicts the IMO meteor shower working list, in which both branches are listed with a population index of r=2.3.

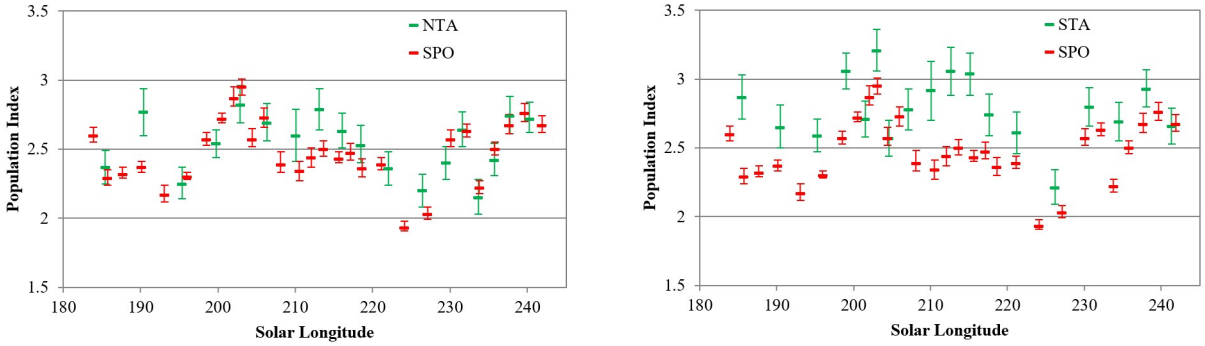

Figure 2: *Comparison of the population index profile of the Northern (green, left) and Southern (green, right) Taurids with the sporadic meteors (red) in 2017.*

Even if the average population index of the years 2011-2017 (without 2015, when the Taurid swarm occurred) is calculated, the discrepancy remains (figure 3). Also here the r-value of the Northern Taurids is nearly identical to the sporadic meteors, whereas it is up to 0,5 larger in case of the Southern Taurids and reaches the sporadic population index only at the end of their activity period.

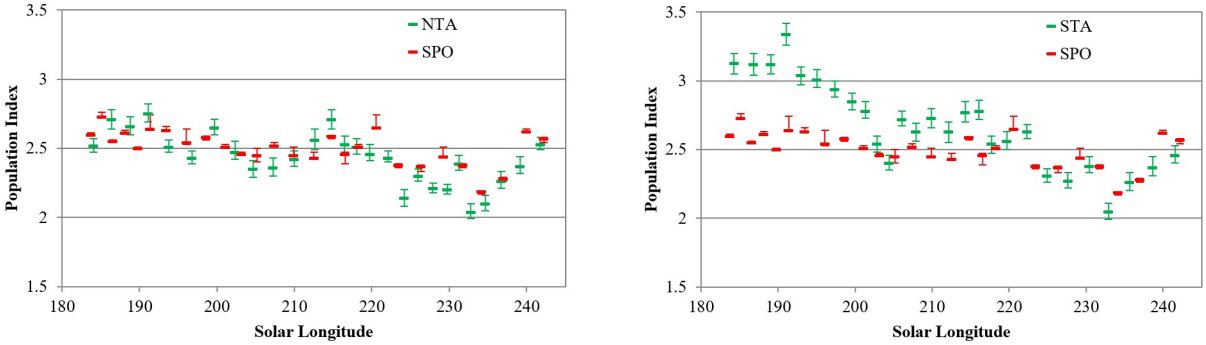

Figure 3: *Comparison of the population index profile of the Northern (green, left) and Southern (green, right) Taurids with the sporadic meteors (red) in the years 2011-2017.*

The activity profiles of the Leonids matches to the mean profile of the previous years (figure 4). Leonid activity starts at 233° solar longitude (November 15), peaks between 235° and 238° solar longitude (November 17-20) and vanishes at 241° solar longitude (November 23) in the sporadic background. Since the Leonid peak of 2017 coincided with new moon, we observed slightly smaller rates than in the long-term average.

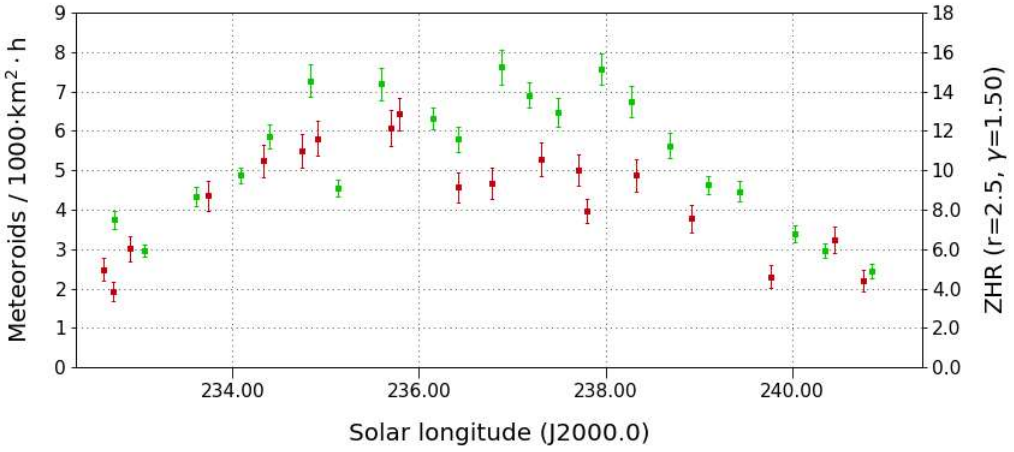

Figure 4: *Flux density profile of the Leonids 2011-2016 (green) and 2017 (red), derived from video data of the IMO Network.*

The Leonids are renowned for their low population index – the values measured in 2017 are still extraordinary. There average value of r=1.5 is 1.0 smaller than the sporadic population index (figure 5, left). Also in the long-term average of 2011-2017 the population index of the Leonids is quite low, but with 0.7 the difference to the sporadic meteors is somewhat smaller (figure 5, right).

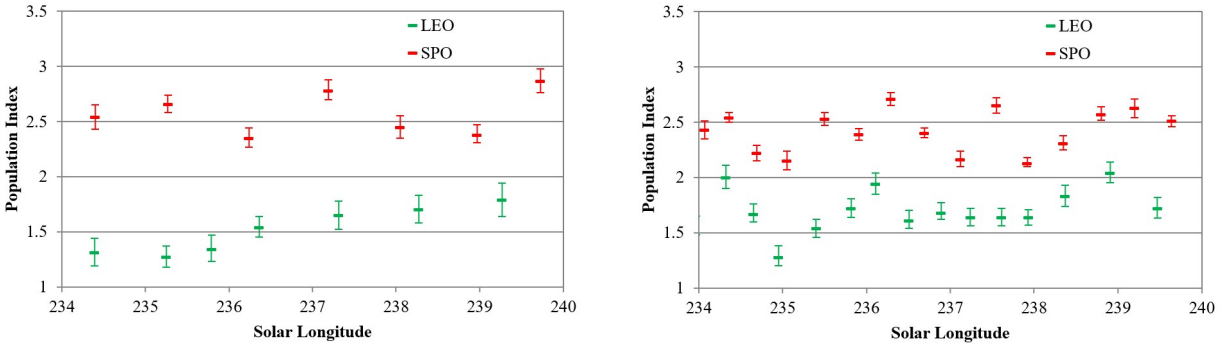

Figure 5: *Comparison of the population index profile of the Leonids (green) and sporadic meteors (red) in 2017 (left) and in the years 2011-2017 (right).*

Hence, whereas cameras with a good limiting magnitude (and with typically a small field of view) are preferred for the Taurids, you gain best results with a large field of view in case of the Leonids with their large percentage of bright meteors.

1. Observers

Code	Name	Place	Camera	FOV [^{o2}]	Slim [mag]	Eff.CA [km^2]	Nights	Time [h]	Meteors
ARLRA	Arlt	Ludwigsfelde/DE	LUDWIG2 (0.8/8)	1475	6.2	3779	21	107.2	644
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	8	83.2	536
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	24	153.4	827
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	18	70.0	180
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	21	105.6	329
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	15	67.1	207
CARMA	Carli	Monte Baldo/IT	BMH2 (1.5/4.5)*	4243	3.0	371	20	207.3	1572
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	21	203.5	698
CINFR	Cineglosso	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	24	87.1	877
CRIST	Crivello	Valbrevenna/IT	ARCI (0.8/3.8)	5566	4.6	2575	22	131.1	650
			BILBO (0.8/3.8)	5458	4.2	1772	25	162.5	821
			C3P8 (0.8/3.8)	5455	4.2	1586	24	145.4	558
			STG38 (0.8/3.8)	5614	4.4	2007	25	181.9	1242
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	15	127.2	597
FORKE	Förster	Carlsfeld/DE	AKM3 (0.75/6)	2375	5.1	2154	9	41.0	187
GONRU	Goncalves	Foz do Arelho/PT	FARELHO1 (0.75/4.5)	2286	3.0	208	25	191.2	179
		Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	24	250.5	1297
			TEMPLAR2 (0.8/6)	2080	5.0	1508	26	248.9	1072
			TEMPLAR3 (0.8/8)	1438	4.3	571	27	252.9	572
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	26	246.2	1136
			TEMPLAR5 (0.75/6)	2312	5.0	2259	27	239.3	1058
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	16	89.2	280
			ORION4 (0.95/5)	2662	4.3	1043	10	49.2	102
HERCA	Hergenrother	Tucson/US	SALSA3 (0.8/3.8)	2336	4.1	544	28	258.2	837
HINWO	Hinz	Schwarzenberg/DE	HINWO1 (0.75/6)	2291	5.1	1819	18	74.2	236
IGAAN	Igaz	Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	16	99.1	160
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	12	52.7	53
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	15	71.2	178
			HUSOR2 (0.95/3.5)	2465	3.9	715	15	93.0	184
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	11	61.1	229
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	12	112.6	426
		Ljubljana/SI	ORION1 (0.8/8)	1399	3.8	268	9	44.0	113
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	12	87.3	692
			STEFKA (0.8/3.8)	5471	2.8	379	10	71.5	222
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	23	163.5	709
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	21	143.8	1533
		Izana Obs./ES	LIC1(2.8/50)*	2255	6.2	5670	25	192.3	1005
		La Palma / ES	LIC2 (3.2/50)*	2199	6.5	7512	5	30.6	219
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	16	47.2	168
			PAV36 (0.8/3.8)*	5668	4.0	1573	16	93.1	293
			PAV43 (0.75/4.5)*	3132	3.1	319	15	43.6	172
			PAV60 (0.75/4.5)	2250	3.1	281	17	97.8	361
MARRU	Marques	Lisbon/PT	CAB1 (0.75/6)	2362	4.8	1517	28	260.3	1248
			RAN1 (1.4/4.5)	4405	4.0	1241	25	214.4	1006
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	2	6.1	35
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	17	96.4	785
			ESCIMO2 (0.85/25)	155	8.1	3415	13	75.9	184
			MINCAM1 (0.8/8)	1477	4.9	1084	17	81.5	459
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	23	106.9	554
			REMO2 (0.8/8)	1478	6.4	4778	20	115.8	712
			REMO3 (0.8/8)	1420	5.6	1967	24	136.3	557
			REMO4 (0.8/8)	1478	6.5	5358	19	117.0	715
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	16	33.3	231
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	21	186.0	470
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	17	145.9	522
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	23	168.8	324
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	21	121.3	632
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	14	75.8	129
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	28	243.6	590
			RO2 (0.75/6)	2381	3.8	459	27	238.3	869
			RO3 (0.8/12)	710	5.2	619	27	232.2	1036
			RO4 (1.0/8)	1582	4.2	549	26	179.9	366
			SOFIA (0.8/12)	738	5.3	907	26	248.5	664
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	16	108.0	230
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	20	112.1	339
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	8	44.3	140
			KAYAK2 (0.8/12)	741	5.5	920	10	60.3	72
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	22	162.9	1249
			NOA38 (0.8/3.8)	5609	4.2	1911	21	166.4	1033
			SCO38 (0.8/3.8)	5598	4.8	3306	21	167.8	1148
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	22	114.4	557
			MINCAM3 (0.8/6)	2338	5.5	3590	20	101.8	332
			MINCAM4 (0.8/6)	2306	5.0	1412	22	87.7	139
			MINCAM5 (0.8/6)	2349	5.0	1896	19	98.4	311
			MINCAM6 (0.8/6)	2395	5.1	2178	21	109.9	278
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	18	115.1	411
			HUMOB (0.8/6)	2388	4.8	1607	15	75.1	278
WEGWA	Wegrzyk	Nieznaszyn/PL	PAV78 (0.8/6)	2286	4.0	778	18	76.7	248
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	11	51.0	181
ZAKJU	Zakrajšek	Petkovec/SI	TACKA (0.8/12)	714	5.3	783	13	94.0	183
Sum							30	10107.8	42628

* active field of view smaller than video frame

2. Observing Times (h)

November	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	-	3.0	7.2	4.3	-	3.7	-	-	0.5	3.6	9.3	1.6	10.8	-	-
BERER	-	-	12.0	8.2	-	11.5	11.5	-	-	-	-	-	-	11.1	12.8
BOMMA	12.3	1.1	2.6	3.0	-	-	0.9	7.4	2.6	11.0	3.0	-	-	3.2	1.6
BREMA	3.8	5.4	-	-	1.3	8.7	-	-	-	1.3	0.3	2.0	7.9	-	-
BRIBE	2.0	-	4.7	-	11.1	6.5	1.6	-	-	8.6	7.5	4.0	9.1	-	0.3
	4.3	-	3.0	-	4.2	7.0	-	-	-	7.6	-	-	9.4	-	3.9
CARMA	12.1	5.5	10.7	-	-	-	3.2	-	9.4	9.6	12.1	-	1.1	13.0	-
CASFL	12.3	4.7	10.9	-	-	-	2.7	-	8.7	8.5	12.0	-	1.2	13.0	1.3
CRIST	5.9	0.2	0.3	1.4	-	-	0.2	4.0	1.7	6.6	0.5	-	-	1.0	1.8
	-	-	-	-	-	-	2.2	-	2.4	10.8	7.5	0.8	11.0	12.5	3.7
	7.2	2.4	0.7	-	-	-	1.1	-	1.5	8.3	7.6	0.5	10.8	12.5	4.0
	6.9	0.9	0.2	-	2.2	-	2.4	-	2.3	12.0	1.7	-	8.9	12.5	1.3
DONJE	8.8	2.8	0.7	-	-	-	2.5	-	2.3	12.2	7.8	0.8	11.6	12.5	6.5
ELTMA	10.6	-	3.2	-	-	-	-	-	6.6	4.6	-	-	-	8.4	4.6
FORKE	-	-	4.1	5.0	-	-	0.6	-	-	-	-	-	-	-	-
GONRU	4.6	7.7	-	9.0	6.5	11.7	5.0	11.5	11.7	6.6	5.2	2.4	11.1	11.4	11.5
	-	3.3	-	7.0	11.8	11.8	11.9	10.9	12.1	11.5	10.5	8.5	12.3	12.3	12.3
	-	3.5	0.2	6.7	12.1	12.1	12.2	11.1	12.3	11.6	10.3	8.6	12.4	12.4	12.5
	-	0.7	-	6.7	12.0	12.0	12.0	9.4	12.1	10.9	9.2	8.1	12.3	12.3	12.4
	-	2.4	0.2	6.7	12.0	12.1	12.1	10.6	12.3	11.4	10.4	8.5	12.4	12.4	12.5
	0.3	1.4	-	5.3	10.2	11.7	11.7	9.2	11.9	9.8	8.5	8.1	12.0	12.0	12.0
GOVMI	5.8	1.7	-	1.1	-	-	-	4.1	-	2.8	0.5	-	-	-	-
	-	-	-	-	-	-	-	1.5	-	8.1	0.6	-	-	5.5	-
HERCA	5.8	10.0	10.2	-	1.7	11.7	2.8	-	6.1	10.0	10.8	11.7	8.0	10.4	11.0
HINWO	3.8	-	12.4	9.2	-	-	0.6	-	-	1.7	2.0	-	2.4	1.8	-
IGAAN	3.9	1.3	10.5	4.5	11.5	11.6	3.3	-	5.3	-	0.5	3.3	-	-	-
	0.2	1.9	5.8	5.2	2.9	7.9	-	-	-	1.5	-	-	-	-	-
JONKA	0.6	-	8.7	2.2	2.2	9.6	0.9	-	-	-	-	-	-	12.8	2.0
	0.2	-	12.1	6.8	4.2	12.4	1.9	-	-	-	-	-	-	12.9	1.6
KACJA	8.9	0.2	-	-	-	-	-	-	-	-	0.3	-	-	8.2	-
	7.5	-	-	-	-	-	-	-	-	-	-	2.4	1.1	11.0	-
	4.9	-	3.7	-	-	-	-	-	-	0.9	-	-	-	9.0	-
	8.5	0.4	-	-	-	-	-	-	-	-	0.8	-	-	8.3	-
	10.5	-	-	-	-	-	-	-	-	-	0.7	-	-	8.2	-
KOSDE	8.6	5.6	4.7	1.7	-	6.8	8.1	6.5	-	-	-	9.2	10.2	10.8	11.3
	1.6	-	4.3	3.3	-	-	-	2.3	11.2	-	3.6	9.5	10.5	-	-
	9.5	8.2	5.4	-	1.0	3.2	9.6	-	10.5	1.7	-	11.4	10.9	11.3	10.3
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	-	-	-	5.0	4.0	2.5	-	-	-	-	2.2	0.8	0.2	4.6	-
	-	0.2	-	10.9	12.7	2.8	-	-	-	-	5.0	-	-	8.5	-
	-	-	-	5.4	8.6	0.9	-	-	-	-	2.2	1.2	-	4.5	-
	-	0.2	-	8.0	12.7	3.3	-	-	-	-	5.9	2.9	-	8.6	-
MARRU	1.5	6.7	-	10.2	11.7	12.0	12.1	10.2	12.1	12.1	11.1	9.6	12.3	12.2	11.1
	1.6	4.2	2.2	6.7	11.7	5.5	11.8	10.2	11.9	11.9	11.9	9.7	11.9	11.9	9.2
MASMI	5.2	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	9.0	0.5	6.0	8.5	-	-	-	-	-	2.6	-	-	10.4	-	-
	10.1	1.7	5.0	-	-	-	-	-	-	1.3	-	-	10.1	-	-
	8.2	0.2	2.8	6.6	-	-	-	-	-	1.7	-	-	10.2	-	-
	-	4.6	6.5	5.3	-	1.1	1.5	-	0.5	4.6	8.8	1.5	9.3	-	-
	-	4.0	4.1	4.9	-	1.2	-	-	-	6.2	10.6	2.6	11.3	-	-
	-	6.0	8.7	7.4	0.3	1.4	2.4	-	0.8	7.4	10.9	2.2	11.7	-	-
	-	5.2	6.2	6.6	-	-	1.8	-	1.1	7.0	10.9	1.8	11.5	-	-
MORJO	2.4	0.8	3.5	1.0	2.0	2.5	-	-	0.8	0.4	0.2	-	-	4.6	-
MOSFA	8.1	3.2	7.9	-	-	-	2.2	-	7.7	8.3	3.0	-	-	13.0	1.3
OCHPA	-	-	-	-	-	-	-	-	6.2	10.4	5.5	-	0.3	11.3	3.4
OTTMI	-	0.8	-	-	1.1	-	12.4	5.6	12.5	1.6	-	3.3	5.9	-	1.1
PERZS	6.5	0.3	5.4	2.2	2.3	0.6	-	0.9	-	5.5	0.7	0.2	-	10.7	-
ROTEC	-	-	4.9	3.8	-	6.9	-	-	-	1.5	2.7	-	10.7	-	-
SARAN	1.2	2.5	2.5	7.5	10.7	11.5	11.6	11.7	12.4	12.3	12.6	11.7	12.1	12.6	12.6
	0.7	4.9	1.6	11.0	12.1	12.1	12.2	10.7	12.2	12.3	-	11.1	12.6	12.4	12.5
	2.5	7.0	5.6	11.2	11.8	11.9	11.9	10.4	12.1	12.1	-	11.8	12.2	12.1	10.1
	1.3	2.9	0.2	6.6	12.0	6.2	4.9	6.6	7.9	10.2	-	4.2	9.0	9.2	10.5
	2.3	5.4	3.0	11.6	12.1	12.2	8.1	10.5	12.1	12.3	12.3	11.8	12.4	9.7	12.5
SCALE	9.2	1.6	4.0	-	-	-	6.1	-	8.2	5.5	-	0.2	1.4	-	3.9
SCHHA	5.3	-	4.9	-	9.8	12.4	-	-	-	10.0	1.8	6.8	9.3	-	-
SLAST	3.8	-	-	-	-	-	-	-	-	-	-	-	-	9.3	-
	9.5	-	3.5	-	-	-	-	-	-	-	1.9	-	-	8.9	-
STOEN	12.2	2.8	6.2	-	-	-	8.5	0.2	7.1	4.1	-	-	0.7	10.5	5.8
	12.3	2.3	7.0	0.2	-	-	8.4	-	9.6	4.9	-	-	0.3	10.6	4.5
	12.4	3.5	9.4	-	0.2	-	8.1	0.2	8.6	4.7	-	-	-	10.5	5.6
STRJO	1.4	1.4	5.2	-	7.8	7.8	0.4	-	-	6.0	8.3	1.2	9.6	-	-
	-	0.6	5.7	-	7.7	6.3	-	-	-	4.6	7.9	2.2	8.4	-	-
	1.3	-	9.9	-	1.5	2.0	-	0.6	-	6.0	2.5	1.2	5.4	-	-
	-	1.7	3.3	-	8.3	4.4	-	-	-	5.1	6.8	2.0	9.2	-	-
	-	1.9	6.9	-	10.7	6.8	-	0.4	-	5.2	8.0	1.0	8.6	-	-
TEPIS	-	-	5.7	2.6	4.9	12.4	2.4	-	-	0.7	-	-	4.3	12.7	7.1
	1.0	-	9.6	1.9	2.7	-	-	-	-	0.4	-	-	-	12.7	1.2
WEGWA	-	0.6	4.9	4.5	3.7	-	8.6	-	-	1.9	1.0	-	-	10.8	8.5
YRJIL	6.5	2.5	4.0	-	-	5.4	13.2	-	-	1.7	-	-	1.4	2.6	-
ZAKJU	8.7	3.7	8.1	-	-	-	-	-	-	8.1	-	0.2	2.2	7.7	-
Sum	315.6	159.1	312.9	246.9	290.0	324.1	269.6	166.7	287.3	403.8	297.9	202.6	432.3	524.9	272.1

November	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
ARLRA	3.2	9.0	8.1	7.7	-	-	11.1	3.5	2.3	8.2	1.1	-	3.0	3.3	2.7
BERER	-	-	3.2	-	-	-	-	-	-	-	-	12.9	-	-	-
BOMMA	11.0	4.9	11.3	13.1	7.8	11.5	3.2	5.8	-	3.8	7.1	13.2	-	0.6	11.4
BREMA	0.2	-	3.2	0.9	-	-	10.8	8.6	2.5	3.0	0.8	-	9.1	0.2	-
BRIBE	0.5	6.8	2.0	3.2	-	-	11.4	1.5	-	6.6	3.5	0.4	7.7	6.6	-
	-	8.5	2.0	0.5	-	-	10.0	0.4	-	2.9	1.7	-	1.7	-	-
CARMA	13.1	13.1	12.9	13.2	13.1	6.8	12.4	12.6	-	6.6	13.4	13.4	-	-	-
CASFL	13.0	13.0	12.9	13.1	13.1	6.6	11.0	12.5	-	6.4	13.3	13.3	-	-	-
CRIST	9.0	4.1	6.8	7.8	3.9	5.5	1.9	1.1	-	2.3	6.2	8.2	-	1.1	5.6
	12.5	8.1	5.1	6.7	5.3	1.0	1.2	1.5	-	3.5	12.9	6.4	0.2	5.3	10.5
	12.6	12.6	10.1	12.7	5.3	1.8	1.9	4.0	-	6.9	12.9	6.5	0.5	6.7	11.4
	12.6	11.7	8.3	12.7	3.1	0.7	-	0.6	-	7.4	12.9	5.7	0.7	9.5	8.2
DONJE	12.6	12.6	10.5	12.6	6.2	2.2	1.6	5.0	-	8.7	12.9	6.7	1.2	8.4	12.2
ELTMA	11.9	13.0	9.5	12.9	8.8	1.1	-	-	-	-	9.8	13.2	-	-	9.0
FORKE	5.1	-	-	-	-	-	12.9	9.7	-	-	-	-	1.4	1.1	1.1
GONRU	11.1	-	-	11.5	11.5	5.9	-	-	2.4	2.9	3.4	0.4	3.1	11.5	11.6
	11.4	12.4	12.4	12.4	12.5	12.1	-	-	4.4	7.1	4.5	-	-	12.6	12.5
	11.6	12.5	12.5	12.6	12.6	11.9	-	-	3.5	5.5	1.9	0.8	-	12.7	12.8
	12.3	12.3	12.4	12.5	12.5	12.3	0.5	-	6.3	8.0	5.7	0.2	2.5	12.6	12.7
	11.7	12.5	12.5	12.6	12.6	11.2	-	-	4.2	5.5	1.7	0.2	-	12.8	12.7
	12.1	12.0	12.0	12.0	12.2	12.3	1.0	-	4.4	7.1	3.4	-	2.6	11.7	12.4
GOVMI	-	-	8.6	9.4	0.9	1.5	12.4	11.2	8.0	-	8.1	12.5	-	-	0.6
	-	-	5.2	-	2.9	-	-	-	4.7	-	7.8	12.4	-	-	0.5
HERCA	10.4	10.6	8.3	10.3	12.0	11.1	10.8	10.8	10.4	12.0	11.6	10.5	9.8	7.4	2.0
HINWO	7.8	2.0	0.3	-	-	-	13.3	8.7	-	0.6	1.0	-	3.4	2.4	0.8
IGAAN	-	-	4.3	9.3	1.3	-	11.2	-	-	-	-	11.1	6.2	-	-
	-	-	-	7.9	3.1	-	3.7	-	-	-	4.6	8.0	-	-	-
JONKA	-	-	2.9	7.9	1.5	-	5.2	-	-	-	1.3	13.2	0.2	-	-
	-	-	3.0	10.4	1.9	-	8.8	-	-	-	1.3	13.3	2.2	-	-
KACJA	-	-	2.7	1.6	7.1	-	10.9	9.3	-	-	2.7	9.2	-	-	-
	-	-	10.8	12.9	10.0	-	13.0	13.1	8.5	-	9.2	13.1	-	-	-
	-	-	1.3	4.1	8.6	-	-	8.8	2.7	-	-	-	-	-	-
	-	-	5.3	8.5	8.2	-	11.2	12.2	2.2	-	8.8	12.9	-	-	-
	-	-	2.5	1.5	8.2	-	11.0	12.1	-	-	7.1	9.7	-	-	-
KOSDE	2.0	2.8	9.6	9.4	10.3	3.2	11.3	5.2	-	0.4	8.0	9.9	-	-	7.9
	7.0	11.2	10.3	11.4	11.4	4.1	9.7	10.8	1.3	-	-	4.4	8.7	1.7	5.5
	2.3	3.1	10.8	11.1	11.2	3.4	11.6	5.0	-	-	8.0	11.0	3.8	9.1	8.9
	-	-	-	-	9.4	4.1	10.1	-	1.8	-	-	-	-	-	5.2
MACMA	1.2	-	-	3.0	0.3	1.3	-	10.8	1.5	1.8	-	6.5	-	1.5	-
	2.3	0.9	-	4.9	0.7	2.8	-	13.5	6.9	4.7	-	13.1	-	3.2	-
	1.2	0.5	-	3.7	-	0.4	-	3.2	2.9	1.2	-	6.5	-	1.2	-
	-	2.4	1.7	5.1	1.3	3.4	-	13.4	7.7	4.8	-	13.0	-	3.4	-
MARRU	11.3	11.4	11.4	11.6	11.4	11.5	2.5	2.4	4.3	10.2	3.4	-	0.8	11.6	11.6
	11.9	11.8	8.0	11.9	11.9	-	0.3	1.6	-	-	1.4	-	-	11.1	12.2
MASMI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	-	-	-	1.4	0.5	12.6	12.5	10.0	2.7	3.7	4.2	3.7	-	2.9	5.2
	-	-	-	0.9	-	8.8	13.1	10.1	1.0	-	4.6	-	-	1.9	7.3
	-	-	-	0.7	0.2	11.3	13.0	9.9	2.4	2.9	3.0	1.8	-	1.4	5.2
	1.4	8.8	8.2	8.1	0.1	-	11.0	3.8	3.2	8.4	2.5	0.7	5.8	1.2	-
	1.9	11.0	10.1	10.1	-	-	12.7	4.8	3.8	9.9	3.1	1.2	-	1.7	0.6
	2.0	11.3	9.9	9.9	0.2	-	13.6	5.7	4.7	10.9	3.6	1.6	-	2.6	1.1
	1.9	11.1	10.4	-	-	-	13.5	5.8	4.4	10.7	3.4	1.7	-	2.0	-
MORJO	-	-	0.9	2.8	0.8	-	3.3	-	-	-	-	4.9	-	-	2.4
MOSFA	12.8	12.7	11.9	12.2	11.6	5.3	8.9	12.9	-	4.6	13.0	12.6	-	-	12.8
OCHPA	12.1	11.6	10.9	12.2	12.8	3.3	2.2	11.7	-	-	12.5	11.4	-	-	8.1
OTTMI	0.2	-	7.1	12.2	6.3	12.8	2.5	12.8	10.9	12.9	9.9	9.8	10.3	3.8	13.0
PERZS	-	-	12.2	12.4	3.6	3.6	13.0	12.0	10.5	-	4.6	13.2	-	-	0.9
ROTEC	-	9.7	-	8.6	-	-	11.7	2.7	-	8.3	0.6	-	1.6	2.1	-
SARAN	12.7	12.8	12.7	12.8	12.8	5.0	0.2	-	4.0	0.7	1.8	-	2.0	10.9	9.7
	12.5	12.6	12.6	12.7	12.7	4.5	0.2	-	2.1	0.6	1.8	-	1.8	12.9	12.9
	9.9	10.0	10.4	10.5	12.2	3.7	0.4	-	3.5	0.7	5.3	-	1.5	10.5	10.9
	6.0	4.3	12.5	12.7	12.7	4.7	-	-	2.9	2.1	4.1	-	0.9	12.7	12.6
	12.3	12.5	12.5	12.5	12.5	4.6	-	0.7	3.2	-	3.4	-	-	13.0	13.0
SCALE	9.7	12.5	8.4	12.9	6.6	-	-	-	-	-	9.5	8.3	-	-	-
SCHHA	2.0	5.7	3.0	2.7	-	0.3	11.6	-	0.2	8.5	5.6	1.2	7.1	3.9	-
SLAST	-	-	1.5	2.3	9.2	-	1.9	11.6	-	-	-	4.7	-	-	-
	-	-	4.2	2.3	9.8	-	1.8	12.7	-	-	-	5.7	-	-	-
STOEN	13.1	13.1	9.3	12.9	8.7	5.8	1.9	7.6	-	-	9.8	13.3	0.2	-	9.1
	13.0	12.4	9.9	13.0	8.8	5.8	1.7	8.9	-	-	9.8	13.1	-	-	9.9
	12.9	12.3	8.5	12.9	9.2	5.6	2.0	7.9	-	-	10.0	13.0	-	-	10.3
STRJO	2.2	5.7	9.5	5.9	-	-	11.6	5.8	3.5	6.2	2.5	0.4	8.8	3.2	-
	2.2	5.3	6.8	5.1	-	-	11.3	5.5	3.5	6.3	0.5	0.9	7.6	3.4	-
	0.4	5.7	7.0	6.4	-	-	11.9	6.4	2.3	6.8	2.2	0.5	3.9	3.2	0.6
	2.1	4.6	8.7	5.2	-	-	11.5	6.0	3.1	6.2	0.8	-	6.9	2.5	-
	2.2	4.2	8.3	5.5	-	-	11.0	5.8	3.7	6.9	1.1	0.2	7.8	3.7	-
TEPIS	-	-	1.4	3.1	0.8	-	11.9	6.4	8.2	-	10.8	12.7	-	-	7.0
	-	-	1.4	1.7	0.8	-	8.4	3.5	-	-	9.6	12.9	-	-	7.3
WEGWA	0.2	-	-	1.4	1.4	-	8.4	9.6	2.0	-	5.3	3.3	-	-	0.6
YRJIL	1.7	6.5	-	-	-	-	-	-	-	5.5	-	-	-	-	-
ZAKJU	-	-	-	12.3	8.6	-	0.3	11.9	-	-	10.0	12.2	-	-	-
Sum	392.3	452.2	504.9	604.9	437.0	247.4	486.9	431.4	178.7	260.9	382.3	456.8	135.0	268.8	362.5

3. Results (Meteors)

November	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	-	15	21	11	-	20	-	-	1	18	56	3	100	-	-
BERER	-	-	92	40	-	77	56	-	-	-	-	-	-	47	129
BOMMA	43	4	4	6	-	-	5	40	12	68	2	-	-	14	12
BREMA	22	7	-	-	5	20	-	-	-	6	2	6	16	-	-
BRIBE	13	-	8	-	41	14	6	-	-	21	25	13	33	-	2
	33	-	5	-	6	21	-	-	-	18	-	-	19	-	12
CARMA	57	50	62	-	-	-	17	-	87	48	87	-	4	123	-
CASFL	17	37	26	-	-	-	11	-	40	28	35	-	5	53	2
CRIST	53	3	2	9	-	-	1	33	12	70	5	-	-	6	14
	-	-	-	-	-	-	4	-	13	38	16	1	51	68	21
	20	18	2	-	-	-	7	-	6	20	24	1	63	76	22
	18	6	1	-	1	-	13	-	4	33	10	-	34	59	8
DONJE	39	17	4	-	-	-	19	-	13	81	28	1	100	131	33
ELTMA	21	-	5	-	-	-	-	-	43	20	-	-	-	23	48
FORKE	-	-	41	14	-	-	3	-	-	-	-	-	-	-	-
GONRU	3	5	-	7	10	17	8	9	11	7	4	2	6	9	15
	-	20	-	24	41	63	71	69	57	54	56	27	70	76	72
	-	20	1	30	51	55	31	43	61	49	37	29	56	59	53
	-	1	-	17	31	32	20	25	30	18	18	15	38	25	28
	-	9	1	12	60	62	62	55	66	42	38	37	56	53	62
	1	11	-	31	56	46	41	45	58	34	31	27	66	58	60
GOVMI	25	2	-	3	-	-	-	14	-	18	1	-	-	-	-
	-	-	-	-	-	-	-	2	-	11	1	-	-	14	-
HERCA	20	39	36	-	7	26	1	-	10	49	26	36	11	46	28
HINWO	8	-	43	28	-	-	3	-	-	10	6	-	13	2	-
IGAAN	7	5	17	4	20	15	3	-	5	-	2	3	-	-	-
	1	3	4	2	4	9	-	-	-	1	-	-	-	-	-
JONKA	2	-	22	7	8	13	1	-	-	-	-	-	-	36	3
	2	-	14	10	13	22	3	-	-	-	-	-	-	38	1
KACJA	56	1	-	-	-	-	-	-	-	-	1	-	-	27	-
	51	-	-	-	-	-	-	-	-	-	-	4	1	39	-
	21	-	9	-	-	-	-	-	-	2	-	-	-	25	-
	98	2	-	-	-	-	-	-	-	-	4	-	-	47	-
	39	-	-	-	-	-	-	-	-	-	4	-	-	24	-
KOSDE	16	1	9	2	-	8	51	30	-	-	-	52	59	52	67
	19	-	44	22	-	-	-	7	129	-	23	107	98	-	-
	32	34	15	-	4	16	27	-	66	13	-	82	85	52	74
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MACMA	-	-	-	21	21	2	-	-	-	-	3	1	1	23	-
	-	1	-	43	32	2	-	-	-	-	8	-	-	42	-
	-	-	-	20	22	2	-	-	-	-	7	1	-	40	-
	-	1	-	55	46	5	-	-	-	-	18	3	-	53	-
MARRU	5	41	-	56	55	54	37	48	55	57	54	31	70	53	67
	3	19	11	13	39	32	38	48	61	51	65	27	64	70	50
MASMI	32	3	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	22	3	17	34	-	-	-	-	-	24	-	-	135	-	-
	13	2	6	-	-	-	-	-	-	7	-	-	43	-	-
	11	1	4	41	-	-	-	-	-	17	-	-	98	-	-
	-	16	21	27	-	1	10	-	1	16	72	8	56	-	-
	-	5	22	14	-	2	-	-	-	26	91	16	100	-	-
	-	18	28	31	1	3	6	-	1	18	56	8	56	-	-
	-	19	11	35	-	-	3	-	1	33	116	5	89	-	-
MORJO	19	5	26	5	12	18	-	-	6	3	1	-	-	33	-
MOSFA	1	19	6	-	-	-	9	-	18	17	11	-	-	49	1
OCHPA	-	-	-	-	-	-	-	-	10	26	6	-	3	46	12
OTTMI	-	3	-	-	3	-	34	3	24	1	-	3	9	-	3
PERZS	50	2	37	8	6	5	-	9	-	21	3	1	-	46	-
ROTEC	-	-	2	1	-	7	-	-	-	1	4	-	19	-	-
SARAN	4	10	7	17	22	24	27	25	28	36	33	23	29	32	34
	4	25	9	30	41	43	52	32	48	47	-	36	43	29	37
	3	41	18	36	53	58	56	41	58	52	-	39	59	48	39
	3	7	1	23	22	22	20	21	27	18	-	14	11	8	19
	5	13	11	18	32	39	36	27	29	37	33	21	41	40	29
SCALE	13	3	3	-	-	-	19	-	16	10	-	1	6	-	19
SCHHA	32	-	6	-	25	39	-	-	-	16	2	25	20	-	-
SLAST	18	-	-	-	-	-	-	-	-	-	-	-	-	47	-
	15	-	4	-	-	-	-	-	-	-	4	-	-	14	-
STOEN	50	30	24	-	-	-	78	1	76	19	-	-	7	73	72
	25	20	15	2	-	-	62	-	78	15	-	-	2	77	62
	46	16	29	-	1	-	71	1	79	25	-	-	-	81	46
STRJO	8	9	11	-	24	24	1	-	-	28	50	4	64	-	-
	-	4	17	-	27	17	-	-	-	18	33	9	37	-	-
	6	-	6	-	1	2	-	1	-	8	1	3	6	-	-
	-	5	9	-	31	9	-	-	-	16	29	10	42	-	-
	-	7	8	-	34	12	-	1	-	11	27	3	26	-	-
TEPIS	-	-	34	6	5	33	2	-	-	1	-	-	14	61	21
	6	-	40	2	3	-	-	-	-	3	-	-	-	44	2
WEGWA	-	3	24	12	10	-	21	-	-	15	1	-	-	25	35
YRJIL	29	3	7	-	-	30	61	-	-	2	-	-	4	11	-
ZAKJU	12	14	9	-	-	-	-	-	-	16	-	1	6	12	-
Sum	1172	678	971	829	926	1021	1107	630	1340	1488	1270	739	2144	2339	1314

November	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
ARLRA	11	27	49	61	-	-	79	11	6	80	15	-	35	16	9
BERER	-	-	7	-	-	-	-	-	-	-	-	88	-	-	-
BOMMA	100	48	52	50	26	59	28	11	-	13	76	93	-	4	57
BREMA	1	-	3	4	-	-	27	11	15	5	2	-	27	1	-
BRIBE	4	24	15	2	-	-	39	2	-	21	4	1	31	10	-
	-	29	13	1	-	-	28	2	-	9	4	-	7	-	-
CARMA	137	118	67	120	101	67	50	89	-	65	125	98	-	-	-
CASFL	55	66	39	62	41	26	15	40	-	14	46	40	-	-	-
CRIST	121	50	60	78	41	54	20	8	-	18	79	86	-	9	45
	53	71	39	53	15	5	7	9	-	21	70	14	1	44	36
	62	98	50	81	17	8	12	17	-	13	92	13	5	59	35
	51	64	19	52	8	1	-	4	-	33	63	11	4	38	23
DONJE	74	135	58	97	27	11	13	21	-	32	131	22	5	82	68
ELTMA	84	82	21	46	35	2	-	-	-	-	73	31	-	-	63
FORKE	9	-	-	-	-	-	61	53	-	-	-	-	1	2	3
GONRU	8	-	-	10	8	6	-	-	1	1	2	1	5	9	15
	70	77	69	77	74	72	-	-	7	18	5	-	-	57	71
	80	74	64	68	52	42	-	-	2	6	3	2	-	51	53
	34	35	29	38	37	26	1	-	3	7	5	1	8	30	20
	65	74	80	70	66	50	-	-	6	5	6	1	-	46	52
	69	54	59	63	44	53	2	-	3	20	10	-	15	55	46
GOVMI	-	-	12	39	2	2	52	25	14	-	30	39	-	-	2
	-	-	1	-	20	-	-	-	9	-	19	24	-	-	1
HERCA	44	46	37	33	41	30	36	37	40	33	30	50	22	21	2
HINWO	21	4	2	-	-	-	47	31	-	3	6	-	3	5	1
IGAAN	-	-	9	16	6	-	19	-	-	-	-	23	6	-	-
	-	-	-	11	2	-	3	-	-	-	3	10	-	-	-
JONKA	-	-	7	27	4	-	7	-	-	-	3	37	1	-	-
	-	-	4	28	2	-	13	-	-	-	1	32	1	-	-
KACJA	-	-	4	5	26	-	55	19	-	-	9	26	-	-	-
	-	-	28	64	29	-	55	27	27	-	46	55	-	-	-
	-	-	2	6	26	-	-	21	1	-	-	-	-	-	-
	-	-	10	67	45	-	102	78	1	-	126	112	-	-	-
	-	-	1	4	16	-	49	26	-	-	29	30	-	-	-
KOSDE	6	35	55	41	57	20	63	10	-	1	37	36	-	-	1
	70	164	142	145	97	29	112	137	10	-	-	12	86	11	69
	7	33	56	61	63	16	70	11	-	-	42	45	14	46	41
	-	-	-	-	68	13	78	-	7	-	-	-	-	-	53
MACMA	9	-	-	6	2	4	-	16	15	1	-	37	-	6	-
	19	1	-	13	5	4	-	27	17	5	-	56	-	18	-
	8	3	-	10	-	3	-	12	7	2	-	27	-	8	-
	-	5	3	20	5	4	-	39	28	8	-	56	-	12	-
MARRU	76	63	70	79	57	67	11	2	10	13	9	-	2	49	57
	78	70	57	61	42	-	2	4	-	-	7	-	-	47	47
MASMI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLSI	-	-	-	4	3	160	137	83	33	35	10	4	-	25	56
	-	-	-	2	-	17	48	24	3	-	3	-	-	4	12
	-	-	-	2	2	68	94	39	9	18	3	1	-	7	44
	2	28	27	45	1	-	57	10	6	73	18	2	51	6	-
	7	45	51	80	-	-	100	18	9	88	28	3	-	6	1
	5	33	36	47	1	-	83	20	9	62	18	5	-	10	2
	5	67	53	-	-	-	112	16	9	91	29	7	-	14	-
MORJO	-	-	5	18	5	-	23	-	-	-	-	37	-	-	15
MOSFA	38	40	24	34	34	20	16	27	-	13	40	22	-	-	31
OCHPA	49	46	33	51	51	31	3	24	-	-	39	33	-	-	59
OTTMI	1	-	23	18	12	29	9	26	12	22	15	12	23	15	24
PERZS	-	-	62	78	13	15	86	28	33	-	36	86	-	-	7
ROTEC	-	14	-	26	-	-	27	6	-	15	2	-	2	3	-
SARAN	40	31	32	35	33	2	1	-	2	1	3	-	8	25	26
	41	61	59	48	58	4	2	-	9	2	8	-	12	38	51
	68	46	51	56	64	5	2	-	16	1	9	-	11	57	49
	22	18	22	22	18	3	-	-	8	2	2	-	2	16	15
	46	37	29	33	32	4	-	1	6	-	11	-	-	24	30
SCALE	33	28	9	26	5	-	-	-	-	-	27	12	-	-	-
SCHHA	13	26	23	5	-	1	39	-	1	16	11	7	23	9	-
SLAST	-	-	5	7	24	-	5	22	-	-	-	12	-	-	-
	-	-	3	3	17	-	1	10	-	-	-	1	-	-	-
STOEN	146	116	34	106	41	48	4	41	-	-	115	60	1	-	107
	105	96	41	100	42	29	1	26	-	-	101	52	-	-	82
	126	110	33	99	48	55	3	26	-	-	83	54	-	-	116
STRJO	23	28	54	19	-	-	72	35	14	16	5	2	59	7	-
	13	12	22	14	-	-	40	12	10	12	2	1	28	4	-
	3	11	18	6	-	-	35	11	2	4	2	1	7	2	3
	17	15	24	16	-	-	25	11	3	14	1	-	31	3	-
	10	11	20	12	-	-	38	13	10	5	3	1	17	9	-
TEPIS	-	-	2	2	1	-	45	14	17	-	46	68	-	-	39
	-	-	1	2	1	-	32	6	-	-	34	57	-	-	45
WEGWA	1	-	-	9	2	-	46	21	7	-	6	8	-	-	2
YRJIL	3	21	-	-	-	-	-	-	-	10	-	-	-	-	-
ZAKJU	-	-	-	32	13	-	1	18	-	-	30	19	-	-	-
Sum	2243	2490	2089	2826	1728	1165	2343	1388	457	947	1948	1776	554	1020	1686