Results of the IMO Video Meteor Network – January 2014

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The new year started not really spectacularly. With 6,000 observing hours and 18,000 meteors we have been more successful that in the previous year, but we could not reach the perfect result of January 2012 despite the fact that the boundary conditions were not so bad. The Quadrantids fell into a moon-free period (two days after new moon) and could be covered by many observers. However, in the end it's the exact time of the maximum and the weather in the rest of January that govern the output. The first half of the month was quite ok, but in the second half we have large gaps in the observing statistics. Only 12 out of the 82 active cameras managed to obtain twenty and more observing nights, eight of which located in Germany. Our southern European observers were less successful and in particular the Hungarians suffered from poor conditions. Many of their cameras reported less than ten observing nights.

The larger number of active camera hints on further growth of the network. In Italy, Fabio Moschini joined the network with ROVER, a Mintron camera with 4.5 mm f/1.4 lens. From Portugal we can report first light for RO3, the fourth camera of Carlos Saraiva. That's a Mintron camera as well, operated with a 12 mm lens to minimize the overlap with the other cameras operated at the same site.

Let's have a closer look at the Quadrantids. Their peak was predicted for the evening hours of January 3 (19:30 UT). Unfortunately the Quadrantid peak is very short – long-term visual observations revealed a full-width-at-half-maximum (FWHM) of just 14 hours – and the radiant was at lower culmination in Europe at the predicted peak time. Only at local midnight it reached sufficient heights. However, the case was not hopeless, since the Quadrantids are circumpolar at mid-northern latitudes, so even in the evening hours of January 3 it was a few degrees above the horizon. That is reflected in the activity profile (figure 1), which was obtained from video footage of over 1,500 Quadrantids. Flux density was highest in the first intervals on January 3/4, and then declined continuously. At around midnight UT it had fallen to half of the peak value, and in the morning hours of January 4 it had almost reached the background level again.

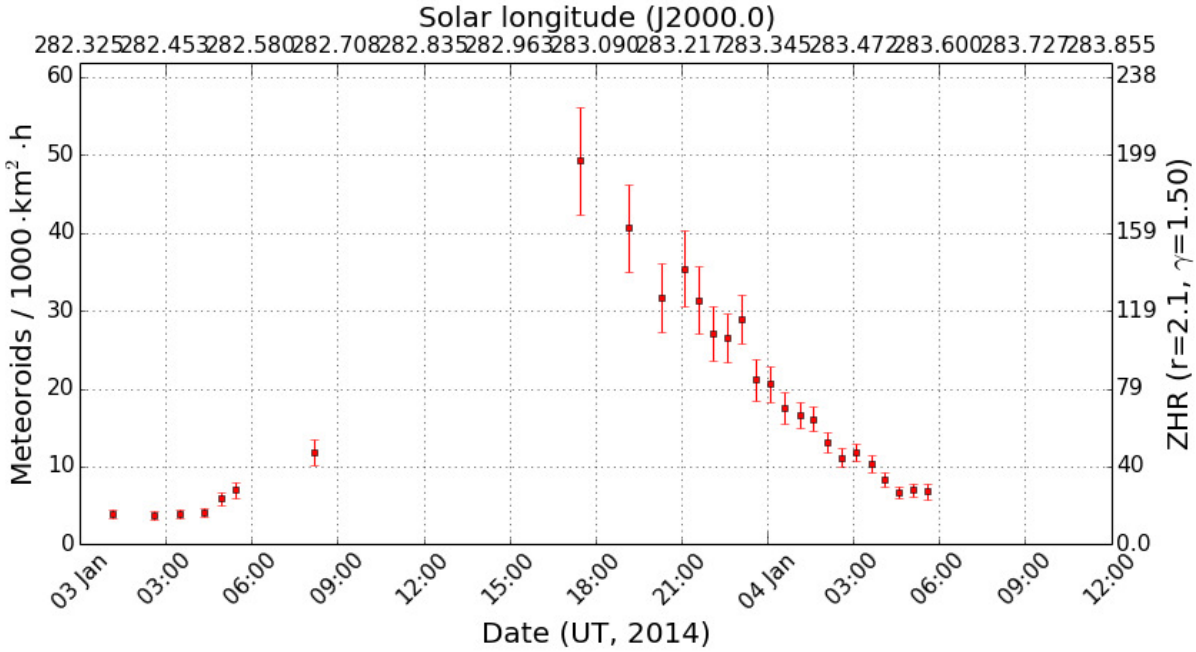

Figure 1: *Flux density profile of the Quadrantids, derived from observations of the IMO Video Meteor Network.*

The peak value of the flux density is difficult to estimate, since it strongly depends from the zenith exponent at such low radiant altitudes. At a moderate level of γ=1.5 we obtain a flux density of up to 50 meteoroids per 1,000 km^2 and hour, which is comparable to the Perseids. At γ=2.0, the flux density is already twice as high.

We might get a little better impression if we look at the flux data of the previous two years as well. Since the peak then occurred at a different time and radiant altitude, we might in the best case estimate the zenith exponent from the combination of all graphs. The reality is different, though (figure 2). At no zenith exponent value we get a somewhat consistent overall picture. Two possible explanations are that either the time or the strength of the peak varies. Indeed it can be read in the IMO Handbook for Visual Observers that the peak time of the Quadrantids varies from one year to the next. The long-term activity profile shows high activity between 283.0 and 283.5° solar longitude, even though the individual peaks are much shorter as described.

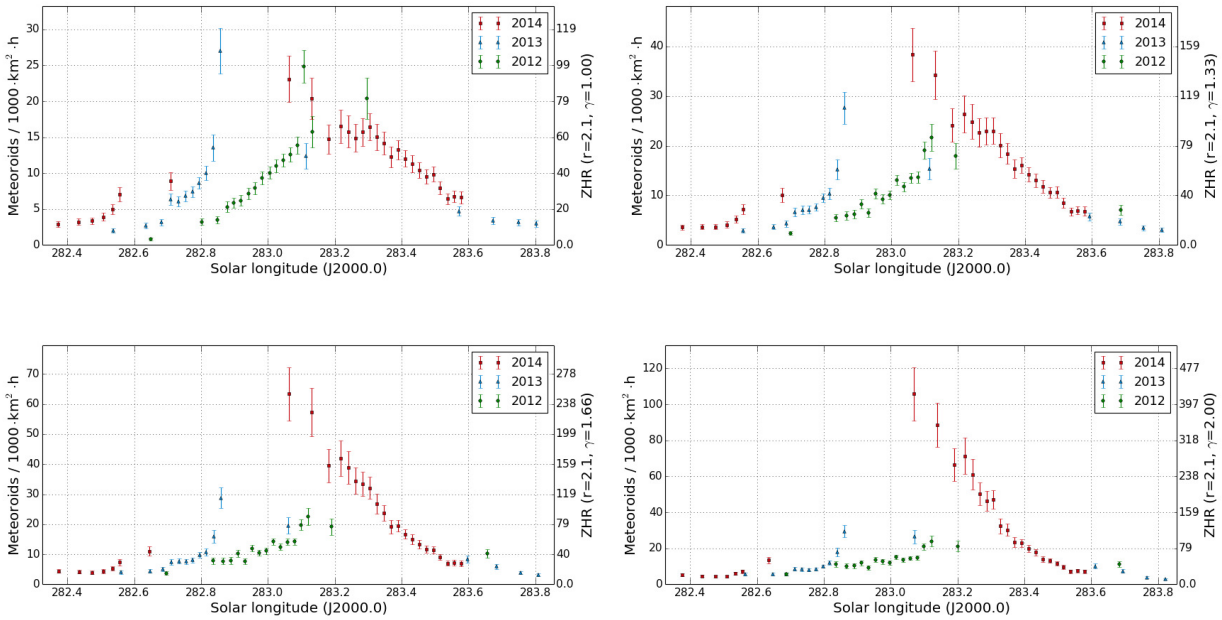

Figure 2: *Combined flux density profiles of the Quadrantids 2012 till 2014, calculated with a zenith exponent between 1.0 (up left) and 2.0 (down right).*

For the determination of the population index we did not use fixed limiting magnitude intervals in 1 mag steps, but adapted the intervals dynamically to the data set. For the pre-maximum night we obtain a value of r=2.5 and in the peak night of r=1.8 (figure 3). Visual observations in the past yielded a population index of 2.1 at the peak.

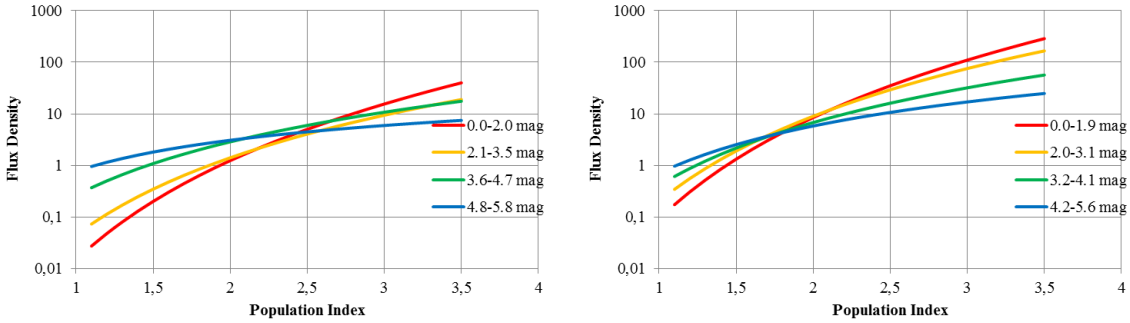

Figure 3: *Population index vs. flux density for different limiting Quadrantid magnitudes on January 2/3 (left) and 3/4 (right), 2014.*

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)	1534	5.8	2467	19	115.7	442
BERER	Berkó	Ludanyhalaszi/HU	HULUD1 (0.8/3.8)	5542	4.8	3847	6	37.3	216
			HULUD3 (0.95/4)	4357	3.8	876	5	42.2	42
BOMMA	Bombardini	Faenza/IT	MARIO (1.2/4.0)	5794	3.3	739	10	64.0	232
BREMA	Breukers	Hengelo/NL	MBB3 (0.75/6)	2399	4.2	699	19	137.0	225
			MBB4 (0.8/8)	1470	5.1	1208	18	106.4	178
BRIBE	Klemt	Herne/DE	HERMINE (0.8/6)	2374	4.2	678	23	160.2	340
		Berg. Gladbach/DE	KLEMOI (0.8/6)	2286	4.6	1080	23	109.4	292
CASFL	Castellani	Monte Baldo/IT	BMH1 (0.8/6)	2350	5.0	1611	20	68.6	377
			BMH2 (1.5/4.5)*	4243	3.0	371	16	104.1	207
CRIST	Crivello	Valbrevenna/IT	BILBO (0.8/3.8)	5458	4.2	1772	16	86.0	216
			C3P8 (0.8/3.8)	5455	4.2	1586	16	103.1	186
			STG38 (0.8/3.8)	5614	4.4	2007	14	75.8	194
DONJE	Donati	Faenza/IT	JENNI (1.2/4)	5886	3.9	1222	12	84.8	264
ELTMA	Eltri	Venezia/IT	MET38 (0.8/3.8)	5631	4.3	2151	8	55.8	109
GANKA	Gansel	Dingden/DE	DARO01 (1.4/3.6)	7141	3.1	652	13	97.9	257
GONRU	Goncalves	Tomar/PT	TEMPLAR1 (0.8/6)	2179	5.3	1842	10	73.4	175
			TEMPLAR2 (0.8/6)	2080	5.0	1508	16	96.3	151
			TEMPLAR3 (0.8/8)	1438	4.3	571	19	59.5	84
			TEMPLAR4 (0.8/3.8)	4475	3.0	442	15	75.1	157
			TEMPLAR5 (0.75/6)	2312	5.0	2259	22	93.6	158
GOVMI	Govedic	Sredisce ob Dr./SI	ORION2 (0.8/8)	1447	5.5	1841	18	58.4	238
			ORION3 (0.95/5)	2665	4.9	2069	9	26.6	41
			ORION4 (0.95/5)	2662	4.3	1043	14	56.9	125
HERCA	Hergenrother	Tucson/US	SALSA3 (1.2/4)*	2198	4.6	894	29	307.1	635
IGAAN	Igaz	Baja/HU	HUBAJ (0.8/3.8)	5552	2.8	403	9	28.5	71
		Debrecen/HU	HUDEB (0.8/3.8)	5522	3.2	620	8	44.5	68
		Hodmezovasar./HU	HUHOD (0.8/3.8)	5502	3.4	764	13	44.3	71
		Budapest/HU	HUPOL (1.2/4)	3790	3.3	475	8	21.1	19
JONKA	Jonas	Budapest/HU	HUSOR (0.95/4)	2286	3.9	445	9	57.5	62
KACJA	Kac	Kamnik/SI	CVETKA (0.8/3.8)	4914	4.3	1842	4	18.7	91
		Kostanjevec/SI	METKA (0.8/12)*	715	6.4	640	2	5.3	9
		Ljubljana/SI	ORION1 (0.8/8)	1402	3.8	331	8	17.6	35
		Kamnik/SI	REZIKA (0.8/6)	2270	4.4	840	5	29.4	193
			STEFKA (0.8/3.8)	5471	2.8	379	5	16.9	58
KERST	Kerr	Glenlee/AU	GOCAM1 (0.8/3.8)	5189	4.6	2550	7	11.3	83
KISSZ	Kiss	Sulysap/HU	HUSUL (0.95/5)*	4295	3.0	355	8	27.8	27
KOSDE	Koschny	Izana Obs./ES	ICC7 (0.85/25)*	714	5.9	1464	16	148.6	903
		La Palma / ES	ICC9 (0.85/25)*	683	6.7	2951	18	143.5	1361
		Noordwijkerhout/NL	LIC4 (1.4/50)*	2027	6.0	4509	15	75.4	102
LOJTO	Łojek	Grabniak/PL	PAV57 (1.0/5)	1631	3.5	269	9	41.8	94
MACMA	Maciejewski	Chelm/PL	PAV35 (0.8/3.8)	5495	4.0	1584	16	71.4	324
			PAV36 (0.8/3.8)*	5668	4.0	1573	16	73.5	382
			PAV43 (0.75/4.5)*	3132	3.1	319	10	57.3	122
			PAV60 (0.75/4.5)	2250	3.1	281	11	54.1	157
MARGR	Maravelias	Lofoupoli/GR	LOOMECON (0.8/12)	738	6.3	2698	14	96.5	165
MASMI	Maslov	Novosimbirsk/RU	NOWATEC (0.8/3.8)	5574	3.6	773	16	72.2	238
MOLSI	Molau	Seysdorf/DE	AVIS2 (1.4/50)*	1230	6.9	6152	11	93.0	663
			MINCAM1 (0.8/8)	1477	4.9	1084	14	101.9	202
		Ketzür/DE	REMO1 (0.8/8)	1467	6.5	5491	19	117.9	678
			REMO2 (0.8/8)	1478	6.4	4778	20	125.7	581
			REMO3 (0.8/8)	1420	5.6	1967	5	33.8	40
			REMO4 (0.8/8)	1478	6.5	5358	22	122.6	657
MORJO	Morvai	Fülöpszallas/HU	HUFUL (1.4/5)	2522	3.5	532	13	81.2	101
MOSFA	Moschini	Rovereto/IT	ROVER (1.4/4.5)	3896	4.2	1292	3	11.8	33
OCHPA	Ochner	Albiano/IT	ALBIANO (1.2/4.5)	2944	3.5	358	13	56.2	101
OTTMI	Otte	Pearl City/US	ORIE1 (1.4/5.7)	3837	3.8	460	23	159.1	381
PERZS	Perkó	Becsehely/HU	HUBEC (0.8/3.8)*	5498	2.9	460	13	60.9	302
PUCRC	Pucer	Nova vas nad Dra./SI	MOBCAM1 (0.75/6)	2398	5.3	2976	7	16.8	30
ROTEC	Rothenberg	Berlin/DE	ARMEFA (0.8/6)	2366	4.5	911	9	56.4	143
SARAN	Saraiva	Carnaxide/PT	RO1 (0.75/6)	2362	3.7	381	16	77.3	83
			RO2 (0.75/6)	2381	3.8	459	13	63.3	113
			RO3 (0.8/12)	710	5.2	619	5	24.4	27
			SOFIA (0.8/12)	738	5.3	907	15	84.9	92
SCALE	Scarpa	Alberoni/IT	LEO (1.2/4.5)*	4152	4.5	2052	8	39.2	55
SCHHA	Schremmer	Niederkrüchten/DE	DORAEMON (0.8/3.8)	4900	3.0	409	25	147.1	540
SLAST	Slavec	Ljubljana/SI	KAYAK1 (1.8/28)	563	6.2	1294	3	8.5	24
STOEN	Stomeo	Scorze/IT	MIN38 (0.8/3.8)	5566	4.8	3270	11	50.2	195
			NOA38 (0.8/3.8)	5609	4.2	1911	13	64.3	202
			SCO38 (0.8/3.8)	5598	4.8	3306	15	70.7	291
STORO	Štork	Kunzak/CZ	KUN1 (1.4/50)*	1913	5.4	2778	1	2.0	15
		Ondrejov/CZ	OND1 (1.4/50)*	2195	5.8	4595	2	6.0	191
STRJO	Strunk	Herford/DE	MINCAM2 (0.8/6)	2354	5.4	2751	20	79.4	473
			MINCAM3 (0.8/6)	2338	5.5	3590	21	105.3	394
			MINCAM4 (1.0/2.6)	9791	2.7	552	16	88.8	208
			MINCAM5 (0.8/6)	2349	5.0	1896	21	122.4	422
TEPIS	Tepliczky	Agostyan/HU	HUAGO (0.75/4.5)	2427	4.4	1036	17	83.9	132
		Budapest/HU	HUMOB (0.8/6)	2388	4.8	1607	15	91.4	189
TRIMI	Triglav	Velenje/SI	SRAKA (0.8/6)*	2222	4.0	546	13	97.7	145
YRJIL	Yrjölä	Kuusankoski/FI	FINEXCAM (0.8/6)	2337	5.5	3574	14	126.2	271
ZELZO	Zelko	Budapest/HU	HUVCSE03 (1.0/4.5)	2224	4.4	933	4	31.6	29
			HUVCSE04 (1.0/4.5)	1484	4.4	573	4	17.1	41
Sum							31	5971.4	18220

* active field of view smaller than video frame

2. Observing Times (h)

January	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	10.1	7.3	8.2	6.5	12.5	2.0	6.2	12.7	1.1	4.2	1.6	9.5	-	-	-
BERER	-	-	-	-	-	-	-	-	-	8.9	-	10.7	0.9	-	10.3
	-	-	-	-	-	-	-	-	-	9.6	-	12.7	-	-	12.0
BOMMA	9.3	-	-	-	4.9	8.9	12.0	3.9	1.5	-	-	-	-	-	-
BREMA	-	11.1	9.5	4.4	6.3	4.8	3.7	5.9	-	3.4	10.4	2.9	12.7	-	-
	-	10.4	9.4	-	7.2	4.7	3.6	4.8	-	-	9.0	2.4	13.0	2.6	-
BRIBE	2.2	11.5	10.4	4.2	8.5	3.4	-	7.3	3.8	10.8	12.5	10.1	5.2	1.7	-
	-	8.6	10.2	2.5	5.3	5.6	0.7	3.0	2.4	9.9	4.5	6.9	2.6	-	-
CASFL	0.8	1.2	-	-	5.3	5.0	6.3	4.3	0.8	0.3	5.3	5.6	-	3.5	2.1
	5.1	2.0	0.7	-	11.2	9.9	6.6	8.6	1.8	0.3	-	13.0	-	-	-
CRIST	-	-	-	-	1.3	8.1	-	-	-	-	0.6	7.1	-	3.0	2.4
	-	-	-	-	12.4	4.9	-	-	-	-	0.4	9.0	-	11.7	-
	-	-	-	-	0.7	2.5	-	-	1.8	-	0.9	6.8	-	2.5	-
DINJE	10.7	-	-	1.2	5.3	12.1	13.3	7.9	4.5	-	-	-	-	2.0	-
ELTMA	8.3	-	-	-	4.9	9.7	-	-	-	-	-	-	-	-	-
GANKA	-	7.1	10.7	4.6	8.0	5.9	3.5	5.5	8.3	-	7.8	4.8	-	-	-
GONRU	-	-	-	-	-	-	-	6.8	9.5	8.5	3.4	-	-	-	-
	-	-	-	-	-	-	-	5.7	10.6	8.9	8.0	1.6	1.4	-	-
	-	-	0.5	0.3	-	-	-	1.2	2.0	0.7	1.0	-	1.2	-	1.6
	-	-	-	-	-	-	-	2.7	6.9	8.6	5.8	0.7	1.3	-	-
	-	0.2	0.3	-	0.4	-	-	3.4	7.3	7.2	6.7	-	-	0.3	2.6
GOVMI	4.2	2.9	11.3	0.3	-	10.1	-	-	1.2	2.3	0.4	3.9	3.4	-	1.2
	4.8	-	-	1.0	-	-	-	-	-	2.3	1.3	4.4	-	-	-
	3.9	3.3	10.8	0.4	-	10.7	-	-	-	-	0.3	6.0	4.6	-	2.9
HERCA	12.7	12.6	12.7	12.6	12.6	12.6	12.2	6.9	12.0	11.1	12.6	12.6	10.6	11.9	12.2
IGAAN	4.0	1.8	6.1	-	-	2.8	-	-	-	0.6	-	-	-	-	-
	-	8.4	0.9	-	1.3	-	-	-	-	12.6	-	12.6	-	0.2	-
	3.7	1.6	1.8	0.8	2.3	-	-	-	-	3.5	1.6	7.2	7.4	-	7.0
	-	1.2	-	-	0.7	-	-	-	-	8.8	4.4	2.0	-	-	0.7
JONKA	-	5.6	0.2	-	-	5.7	-	-	-	9.0	-	13.4	0.3	-	11.4
KACJA	-	-	3.6	-	-	-	4.5	4.9	-	-	5.7	-	-	-	-
	-	-	-	-	-	-	-	-	3.6	1.7	-	-	-	-	-
	-	-	2.8	-	-	-	4.4	3.0	-	-	1.8	0.3	-	-	-
	-	-	4.5	-	-	-	7.8	9.2	-	-	6.0	-	-	-	-
	-	-	3.5	-	-	-	3.1	4.3	-	-	4.0	-	-	-	-
KERST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KISSZ	-	0.8	-	-	0.6	1.6	-	-	-	10.3	2.1	1.7	-	-	10.5
KOSDE	11.6	10.2	11.6	11.6	11.6	11.6	7.8	-	-	7.5	6.4	4.4	6.5	3.2	-
	9.4	10.8	9.8	9.9	10.7	10.7	10.7	-	-	8.2	6.1	-	5.6	1.4	-
	-	5.2	6.5	-	-	-	3.6	-	-	-	7.8	2.5	9.2	-	-
LOJTO	2.6	2.0	7.9	-	0.6	3.9	10.6	-	-	-	2.9	-	-	-	-
MACMA	2.3	0.6	10.8	-	1.1	12.7	11.4	5.4	0.2	-	-	2.0	3.4	-	-
	2.4	0.6	11.0	-	1.0	13.4	12.6	6.2	0.8	0.2	0.5	1.9	3.5	-	-
	2.5	-	10.3	0.2	-	11.9	12.6	6.2	-	-	-	2.6	-	-	-
	2.6	-	10.4	-	-	6.2	11.6	6.2	0.4	-	-	2.3	-	-	-
MARGR	8.0	0.6	3.9	-	10.4	0.9	-	1.1	-	11.6	5.0	-	-	9.2	-
MASMI	-	-	-	3.4	-	1.1	3.9	3.3	1.1	-	6.3	7.1	7.4	-	-
MOLSI	10.5	12.9	4.9	2.9	9.9	5.6	6.3	11.4	-	12.5	5.8	10.3	-	-	-
	7.7	12.3	2.9	1.9	8.2	5.3	6.3	10.4	-	13.5	7.1	9.9	-	-	0.8
	8.5	8.8	8.1	7.1	13.8	2.7	7.8	10.2	2.8	5.0	4.8	8.7	1.2	-	-
	8.5	9.0	8.4	7.4	13.8	2.7	7.2	9.8	2.9	4.9	4.1	7.8	1.7	-	-
	-	-	-	7.3	14.0	2.8	7.5	-	-	-	-	2.2	-	-	-
	8.1	9.2	8.3	8.1	14.0	3.3	7.3	9.9	2.1	3.7	3.2	5.6	1.9	-	-
MORJO	0.8	11.7	2.5	-	1.3	10.1	-	-	-	7.7	-	12.4	10.0	-	10.7
MOSFA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OCHPA	3.9	-	-	-	10.3	1.9	0.3	0.2	-	-	6.2	9.8	-	-	0.2
OTTMI	-	0.2	9.5	-	10.6	11.1	9.3	10.6	-	-	-	3.0	4.5	7.3	2.2
PERZS	-	5.1	13.5	-	1.2	10.2	-	-	1.6	2.9	4.4	4.7	0.6	-	2.3
PUCRC	-	-	-	-	-	-	-	3.3	-	-	0.8	-	-	-	-
ROTEC	8.3	6.3	5.7	4.8	12.4	-	-	-	-	3.2	-	-	-	-	-
SARAN	-	-	-	4.9	0.9	-	-	8.0	8.5	7.1	-	0.6	2.7	-	-
	-	-	3.1	4.7	-	-	-	8.5	12.2	8.3	-	-	1.3	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	5.5	1.0	-	-	7.8	11.0	9.2	-	-	4.1	-	-
SCALE	3.2	-	-	-	2.5	8.2	-	-	-	-	-	-	-	-	-
SCHHA	-	9.1	11.3	2.6	5.8	6.9	5.5	1.4	9.4	12.2	12.2	6.5	12.6	2.3	0.2
SLAST	1.8	-	6.2	-	-	-	-	0.5	-	-	-	-	-	-	-
STOEN	7.0	-	0.4	-	5.8	-	1.0	-	-	-	1.6	-	-	-	-
	7.3	-	-	-	6.6	9.4	0.8	-	-	-	0.3	-	-	-	-
	8.1	-	0.3	-	6.7	10.0	1.2	-	-	-	1.2	-	-	-	-
STORO	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-
	-	3.7	2.3	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	4.2	10.5	10.9	1.9	9.9	-	2.8	6.2	-	4.3	7.1	1.3	1.2	0.6	-
	6.0	11.0	10.7	2.9	10.0	4.2	4.4	8.9	-	3.7	10.4	7.9	4.7	1.2	-
	5.0	10.8	10.7	2.1	9.5	-	4.2	7.9	0.5	5.2	9.2	4.6	2.7	-	-
	4.3	10.5	10.8	3.0	10.2	3.5	4.9	10.1	-	5.3	9.7	4.7	3.4	-	-
TEPIS	4.5	8.2	1.6	0.8	-	13.3	0.7	0.4	2.1	3.1	-	13.2	6.4	-	9.4
	-	7.7	5.1	0.6	-	13.3	-	-	-	7.1	-	13.0	6.0	-	9.7
TRIMI	10.3	3.7	10.8	-	-	9.1	12.7	12.7	5.7	12.1	5.8	7.2	-	-	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	10.5	6.9	12.5
ZELZO	-	1.8	-	-	-	-	-	-	-	-	-	12.0	-	-	11.0
	-	2.0	-	-	-	-	-	-	-	-	-	5.2	-	-	7.8
Sum	239.2	282.1	350.3	132.4	325.5	337.0	262.9	278.6	140.4	302.0	247.0	341.3	175.7	71.5	143.7

January	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	7.4	1.4	-	-	-	-	-	5.1	3.9	-	1.5	-	-	2.0	12.5
BERER	-	-	-	-	-	-	-	-	-	-	5.0	-	-	-	-	1.5
	-	-	-	-	-	-	-	-	-	-	6.0	-	-	-	-	1.9
BOMMA	-	-	-	-	-	0.7	11.1	-	-	6.2	5.5	-	-	-	-	-
BREMA	5.6	-	11.4	-	-	-	8.9	-	-	-	3.2	2.0	11.5	9.5	9.8	-
	6.0	-	-	-	-	-	5.0	-	-	-	2.6	1.4	12.2	6.0	5.9	0.2
BRIBE	7.0	3.1	10.9	-	-	-	13.2	-	-	-	1.8	3.7	13.0	4.3	9.3	2.3
	2.9	4.0	4.1	3.4	-	-	11.3	-	1.7	-	0.8	2.1	13.1	3.2	0.6	-
CASFL	-	-	-	-	0.7	4.7	3.7	1.5	6.2	4.7	0.8	-	5.8	-	-	-
	-	-	-	-	5.1	-	8.8	3.8	8.8	7.0	-	-	11.4	-	-	-
CRIST	-	-	-	0.4	7.7	1.8	1.0	6.4	10.4	10.5	3.6	12.5	9.2	-	-	-
	-	-	-	0.4	7.7	1.8	1.0	6.4	10.4	10.5	2.6	12.5	8.6	-	-	2.8
	-	-	-	-	-	-	3.5	4.6	12.6	12.2	6.0	11.6	9.3	-	-	0.8
DINJE	-	-	-	-	-	1.0	12.1	-	-	7.9	6.8	-	-	-	-	-
ELTMA	-	-	-	-	-	4.7	7.8	-	7.6	6.8	6.0	-	-	-	-	-
GANKA	-	-	10.1	-	-	-	-	-	-	-	-	-	13.1	8.5	-	-
GONRU	-	-	-	1.1	-	1.0	12.5	12.1	-	-	-	7.5	-	11.0	-	-
	0.5	1.1	-	6.8	-	1.8	12.5	11.8	4.6	-	-	7.3	2.5	11.2	-	-
	-	2.1	3.1	4.7	-	0.8	12.4	2.0	3.8	3.0	-	5.9	1.8	11.4	-	-
	-	0.6	-	3.1	-	1.4	12.5	10.1	2.8	-	-	6.8	1.5	10.3	-	-
	-	2.0	3.2	4.7	0.8	1.0	12.6	11.2	2.8	4.8	1.9	6.2	2.2	11.8	-	-
GOVMI	-	-	2.6	0.2	4.8	1.4	-	-	-	2.3	1.7	-	-	4.2	-	-
	-	-	-	-	5.1	2.4	-	-	-	3.7	-	-	-	1.6	-	-
	-	-	4.3	0.2	4.9	-	-	-	-	4.0	0.6	-	-	-	-	-
HERCA	11.8	12.0	12.5	12.3	12.4	11.8	5.4	11.9	6.9	-	8.7	5.0	6.1	12.2	0.2	-
IGAAN	-	-	3.4	-	-	-	0.8	-	-	3.9	5.1	-	-	-	-	-
	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4
	-	-	3.2	-	-	-	-	-	-	-	-	-	-	3.0	-	1.2
	-	1.2	-	-	-	-	-	-	-	-	2.1	-	-	-	-	-
JONKA	-	-	-	-	-	-	1.6	-	-	-	10.3	-	-	-	-	-
KACJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.3	-	-	-	-	1.9	-	-	3.1	-	-	-	-	-	-	-
	-	-	-	-	-	-	1.9	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	2.0	-	-	-	-	-	-	-	-	-
KERST	-	-	-	0.9	1.4	4.2	0.8	3.1	0.6	-	-	0.3	-	-	-	-
KISSZ	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-
KOSDE	-	-	-	-	-	11.3	-	-	-	-	-	11.3	10.9	-	-	11.1
	-	-	-	-	-	-	-	0.9	-	8.8	10.5	10.5	8.7	-	10.4	0.4
	6.6	-	6.6	-	-	4.2	-	-	-	3.1	4.6	3.4	5.0	-	6.9	0.2
LOJTO	-	-	-	-	-	-	-	3.5	7.8	-	-	-	-	-	-	-
MACMA	-	-	-	-	-	-	-	4.9	6.3	-	1.4	0.9	-	-	5.9	2.1
	-	-	-	-	-	-	-	5.9	6.9	-	-	1.3	-	-	-	5.3
	-	-	-	-	-	-	-	5.8	4.1	-	-	-	-	-	-	1.1
	-	-	-	-	-	-	-	5.8	5.2	-	1.2	-	-	-	-	2.2
MARGR	6.9	8.2	-	9.6	9.8	11.3	-	-	-	-	-	-	-	-	-	-
MASMI	1.5	-	4.3	-	4.0	2.4	0.7	-	-	-	-	-	3.5	12.3	-	9.9
MOLSI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	2.9	-	-	-	12.7
	1.9	5.2	2.0	-	-	-	-	-	7.6	4.1	-	-	-	-	-	7.6
	1.5	4.9	2.3	-	-	-	-	-	7.7	5.0	-	-	-	-	3.4	12.7
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.1	4.3	2.3	-	-	-	-	-	7.9	4.0	0.6	2.1	-	-	3.4	12.2
MORJO	2.8	-	5.2	-	-	1.1	4.9	-	-	-	-	-	-	-	-	-
MOSFA	-	-	-	-	-	-	-	-	-	1.9	0.2	-	9.7	-	-	-
OCHPA	-	-	-	-	-	0.2	-	-	8.0	4.1	3.7	-	7.4	-	-	-
OTTMI	1.4	7.4	6.5	3.1	5.6	-	10.3	8.0	1.1	-	10.2	12.0	8.5	7.0	9.7	-
PERZS	-	-	4.6	-	-	-	-	-	-	8.3	1.5	-	-	-	-	-
PUCRC	-	-	-	-	4.4	2.1	3.5	-	2.2	-	-	-	0.5	-	-	-
ROTEC	-	4.2	-	-	-	-	-	-	-	2.1	-	-	-	-	-	9.4
SARAN	-	2.5	-	3.1	1.0	-	12.2	8.4	0.6	-	-	4.8	2.8	9.2	-	-
	-	1.8	-	3.2	1.0	-	-	8.3	-	-	-	1.4	2.1	7.4	-	-
	-	-	-	-	-	-	10.1	7.9	-	-	-	2.0	1.2	3.2	-	-
	-	2.8	-	3.9	1.5	0.3	12.2	8.6	-	-	-	4.2	3.1	9.7	-	-
SCALE	-	-	-	1.6	-	-	7.4	-	7.0	-	6.1	-	3.2	-	-	-
SCHHA	5.4	0.3	2.0	-	-	-	11.7	1.2	-	1.0	3.2	5.6	12.7	3.8	2.2	-
SLAST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STOEN	-	-	-	-	-	4.9	7.4	-	6.9	8.6	2.7	-	3.9	-	-	-
	-	-	-	1.9	3.1	5.1	7.4	-	6.9	8.4	3.3	-	3.8	-	-	-
	-	-	-	1.7	3.7	6.2	7.3	-	7.1	9.0	3.3	-	3.7	1.2	-	-
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	-	1.8	1.8	-	-	-	-	-	-	-	0.2	1.9	3.7	6.6	1.2	1.3
	4.7	2.4	2.3	-	-	-	-	-	-	-	0.2	0.8	1.4	6.6	0.9	-
	-	1.4	-	-	-	-	-	-	-	-	-	-	5.7	-	6.4	2.9
	1.9	3.4	7.4	-	-	-	-	-	-	-	0.3	4.2	6.9	6.6	7.0	4.3
TEPIS	1.8	2.8	-	-	-	-	-	-	-	-	12.1	0.7	-	2.8	-	-
	4.0	1.9	3.2	-	-	-	4.3	-	3.6	-	11.5	0.4	-	-	-	-
TRIMI	-	-	-	-	1.7	3.9	-	-	2.0	-	-	-	-	-	-	-
YRJIL	4.4	10.9	11.8	11.4	5.8	10.6	7.0	5.8	6.4	-	-	-	11.0	-	11.2	-
ZELZO	-	-	-	-	-	-	-	-	-	-	6.8	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	2.1	-	-	-	-	-
Sum	81.1	99.7	132.5	77.7	92.2	106.0	268.8	159.9	192.7	159.8	167.0	156.7	240.7	184.6	96.4	126.0

3. Results (Meteors)

January	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ARLRA	33	80	77	24	81	13	27	18	4	8	3	20	-	-	-
BERER	-	-	-	-	-	-	-	-	-	83	-	70	2	-	39
	-	-	-	-	-	-	-	-	-	20	-	14	-	-	5
BOMMA	26	-	-	-	32	26	43	18	7	-	-	-	-	-	-
BREMA	-	22	68	7	8	2	3	6	-	4	10	2	24	-	-
	-	27	55	-	6	7	4	2	-	-	7	1	17	3	-
BRIBE	2	23	92	2	12	8	-	5	11	27	29	5	7	4	-
	-	29	106	3	10	19	1	3	6	20	7	4	4	-	-
CASFL	5	8	-	-	29	26	15	26	5	2	34	36	-	28	6
	5	10	5	-	19	15	9	14	3	1	-	27	-	-	-
CRIST	-	-	-	-	2	18	-	-	-	-	2	21	-	20	1
	-	-	-	-	29	5	-	-	-	-	3	12	-	22	-
	-	-	-	-	1	5	-	-	4	-	4	28	-	2	-
DINJE	32	-	-	5	34	22	37	20	15	-	-	-	-	7	-
ELTMA	6	-	-	-	18	13	-	-	-	-	-	-	-	-	-
GANKA	-	27	127	5	10	13	3	7	26	-	7	1	-	-	-
GONRU	-	-	-	-	-	-	-	9	28	15	10	-	-	-	-
	-	-	-	-	-	-	-	2	11	11	6	2	1	-	-
	-	-	1	1	-	-	-	1	4	2	1	-	1	-	2
	-	-	-	-	-	-	-	10	26	9	2	2	1	-	-
	-	1	1	-	1	-	-	2	13	5	5	-	-	1	4
GOVMI	17	9	108	1	-	35	-	-	5	1	2	17	9	-	8
	17	-	-	2	-	-	-	-	-	1	2	9	-	-	-
	12	5	64	1	-	5	-	-	-	-	1	16	1	-	1
HERCA	35	28	64	11	16	30	32	14	19	32	25	27	24	17	18
IGAAN	8	1	33	-	-	2	-	-	-	1	-	-	-	-	-
	-	12	4	-	2	-	-	-	-	25	-	16	-	1	-
	7	5	9	3	4	-	-	-	-	6	6	9	8	-	7
	-	1	-	-	1	-	-	-	-	3	1	7	-	-	2
JONKA	-	6	2	-	-	5	-	-	-	8	-	16	1	-	14
KACJA	-	-	49	-	-	-	8	12	-	-	22	-	-	-	-
	-	-	-	-	-	-	-	-	7	2	-	-	-	-	-
	-	-	18	-	-	-	7	1	-	-	1	1	-	-	-
	-	-	79	-	-	-	33	39	-	-	40	-	-	-	-
	-	-	29	-	-	-	4	8	-	-	16	-	-	-	-
KERST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KISSZ	-	1	-	-	2	3	-	-	-	4	4	3	-	-	9
KOSDE	83	75	74	56	56	83	49	-	-	51	54	16	43	13	-
	108	102	91	88	103	110	73	-	-	105	92	-	84	21	-
	-	5	13	-	-	-	7	-	-	-	9	1	9	-	-
LOJTO	7	1	51	-	2	2	10	-	-	-	1	-	-	-	-
MACMA	7	2	184	-	2	41	40	11	1	-	-	9	6	-	-
	12	3	240	-	1	29	49	17	2	1	1	10	3	-	-
	4	-	71	1	-	8	20	6	-	-	-	8	-	-	-
	6	-	91	-	-	9	23	12	1	-	-	7	-	-	-
MARGR	18	2	14	-	16	1	-	4	-	16	17	-	-	15	-
MASMI	-	-	-	21	-	1	29	11	2	-	36	37	24	-	-
MOLSI	22	185	15	12	103	54	37	43	-	98	73	21	-	-	-
	7	44	5	3	24	3	10	15	-	26	19	22	-	-	2
	41	138	146	31	124	23	26	22	12	10	18	12	1	-	-
	31	122	122	37	100	29	25	13	9	6	9	19	4	-	-
	-	-	-	10	20	3	6	-	-	-	-	1	-	-	-
	34	116	143	45	110	36	28	25	7	2	9	20	5	-	-
MORJO	3	17	7	-	3	16	-	-	-	3	-	12	5	-	16
MOSFA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OCHPA	3	-	-	-	11	3	2	1	-	-	9	20	-	-	1
OTTMI	-	1	23	-	27	34	28	42	-	-	-	1	10	23	10
PERZS	-	10	138	-	9	22	-	-	9	3	22	45	1	-	8
PUCRC	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
ROTEC	15	26	60	12	25	-	-	-	-	1	-	-	-	-	-
SARAN	-	-	-	4	1	-	-	5	8	18	-	2	2	-	-
	-	-	19	2	-	-	-	25	17	15	-	-	2	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	3	1	-	-	7	7	19	-	-	3	-	-
SCALE	5	-	-	-	1	4	-	-	-	-	-	-	-	-	-
SCHHA	-	35	185	8	11	31	10	2	39	37	33	6	37	4	1
SLAST	1	-	22	-	-	-	-	1	-	-	-	-	-	-	-
STOEN	12	-	3	-	44	-	2	-	-	-	3	-	-	-	-
	14	-	-	-	39	19	1	-	-	-	2	-	-	-	-
	24	-	2	-	44	22	4	-	-	-	3	-	-	-	-
STORO	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
	-	168	23	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	8	72	174	4	39	-	15	17	-	28	40	1	4	2	-
	7	43	129	8	29	25	18	9	-	5	37	8	8	1	-
	4	24	101	6	5	-	5	8	1	11	15	8	6	-	-
	4	67	157	9	35	20	11	9	-	17	27	2	5	-	-
TEPIS	10	18	8	4	-	23	2	1	2	9	-	25	1	-	6
	-	16	31	1	-	18	-	-	-	7	-	43	5	-	19
TRIMI	15	1	34	-	-	3	30	15	7	15	11	8	-	-	-
YRJIL	-	-	-	-	-	-	-	-	-	-	-	-	32	8	29
ZELZO	-	1	-	-	-	-	-	-	-	-	-	18	-	-	9
	-	1	-	-	-	-	-	-	-	-	-	18	-	-	17
Sum	710	1590	3382	430	1302	944	786	539	318	793	791	766	400	192	234

January	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ARLRA	-	19	2	-	-	-	-	-	8	7	-	4	-	-	1	13
BERER	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-	5
	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
BOMMA	-	-	-	-	-	4	46	-	-	17	13	-	-	-	-	-
BREMA	5	-	9	-	-	-	17	-	-	-	1	2	21	5	9	-
	3	-	-	-	-	-	10	-	-	-	4	5	20	3	3	1
BRIBE	13	9	15	-	-	-	24	-	-	-	1	8	22	8	12	1
	3	9	5	3	-	-	18	-	3	-	1	3	24	10	1	-
CASFL	-	-	-	-	3	27	19	11	30	26	3	-	38	-	-	-
	-	-	-	-	9	-	15	13	23	12	-	-	27	-	-	-
CRIST	-	-	-	1	14	1	5	13	22	17	14	47	18	-	-	-
	-	-	-	1	14	1	5	13	22	17	2	24	14	-	-	2
	-	-	-	-	-	-	5	11	36	39	14	24	20	-	-	1
DINJE	-	-	-	-	-	5	59	-	-	23	5	-	-	-	-	-
ELTMA	-	-	-	-	-	11	9	-	35	13	4	-	-	-	-	-
GANKA	-	-	6	-	-	-	-	-	-	-	-	-	22	3	-	-
GONRU	-	-	-	7	-	2	46	21	-	-	-	11	-	26	-	-
	1	5	-	9	-	2	21	22	11	-	-	17	10	20	-	-
	-	3	7	4	-	1	26	6	6	5	-	3	3	7	-	-
	-	1	-	8	-	1	33	18	10	-	-	9	9	18	-	-
	-	7	17	5	2	1	28	12	5	3	1	8	8	28	-	-
GOVMI	-	-	11	1	5	1	-	-	-	4	2	-	-	2	-	-
	-	-	-	-	3	3	-	-	-	3	-	-	-	1	-	-
	-	-	11	1	5	-	-	-	-	1	1	-	-	-	-	-
HERCA	23	21	25	23	22	29	8	27	2	-	25	7	6	24	1	-
IGAAN	-	-	12	-	-	-	2	-	-	6	6	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	-	-	4	-	-	-	-	-	-	-	-	-	-	2	-	1
	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
JONKA	-	-	-	-	-	-	6	-	-	-	4	-	-	-	-	-
KACJA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	-	-	-	-	2	-	-	4	-	-	-	-	-	-	-
	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
KERST	-	-	-	6	10	32	5	23	6	-	-	1	-	-	-	-
KISSZ	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
KOSDE	-	-	-	-	-	58	-	-	-	-	-	62	61	-	-	69
	-	-	-	-	-	-	-	12	-	52	79	77	73	-	89	2
	8	-	9	-	-	4	-	-	-	7	8	3	16	-	2	1
LOJTO	-	-	-	-	-	-	-	6	14	-	-	-	-	-	-	-
MACMA	-	-	-	-	-	-	-	3	4	-	2	2	-	-	5	5
	-	-	-	-	-	-	-	7	3	-	-	1	-	-	-	3
	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	1
	-	-	-	-	-	-	-	2	3	-	2	-	-	-	-	1
MARGR	9	13	-	12	12	16	-	-	-	-	-	-	-	-	-	-
MASMI	1	-	10	-	24	3	5	-	-	-	-	-	1	15	-	18
MOLSI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	21
	14	15	1	-	-	-	-	-	16	6	-	-	-	-	-	22
	8	11	1	-	-	-	-	-	9	5	-	-	-	-	1	20
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	15	1	-	-	-	-	-	25	3	1	1	-	-	2	26
MORJO	2	-	5	-	-	1	11	-	-	-	-	-	-	-	-	-
MOSFA	-	-	-	-	-	-	-	-	-	14	1	-	18	-	-	-
OCHPA	-	-	-	-	-	1	-	-	15	10	7	-	18	-	-	-
OTTMI	5	9	4	3	31	-	31	8	4	-	19	29	25	9	5	-
PERZS	-	-	21	-	-	-	-	-	-	13	1	-	-	-	-	-
PUCRC	-	-	-	-	4	2	6	-	14	-	-	-	2	-	-	-
ROTEC	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	2
SARAN	-	2	-	5	3	-	12	4	2	-	-	3	5	7	-	-
	-	3	-	7	2	-	-	7	-	-	-	1	5	8	-	-
	-	-	-	-	-	-	12	8	-	-	-	1	3	3	-	-
	-	2	-	7	1	2	17	6	-	-	-	3	5	9	-	-
SCALE	-	-	-	2	-	-	5	-	22	-	5	-	11	-	-	-
SCHHA	12	2	1	-	-	-	18	4	-	4	9	19	25	3	4	-
SLAST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STOEN	-	-	-	-	-	28	19	-	40	26	4	-	14	-	-	-
	-	-	-	3	15	24	18	-	31	20	2	-	14	-	-	-
	-	-	-	5	28	31	12	-	56	28	6	-	25	1	-	-
STORO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STRJO	-	14	8	-	-	-	-	-	-	-	1	6	14	16	7	3
	9	4	17	-	-	-	-	-	-	-	1	5	10	16	5	-
	-	2	-	-	-	-	-	-	-	-	-	-	5	-	4	3
	5	10	8	-	-	-	-	-	-	-	2	5	8	18	2	1
TEPIS	2	5	-	-	-	-	-	-	-	-	11	1	-	4	-	-
	6	8	9	-	-	-	7	-	10	-	7	2	-	-	-	-
TRIMI	-	-	-	-	1	2	-	-	3	-	-	-	-	-	-	-
YRJIL	18	21	24	23	9	23	8	10	13	-	-	-	27	-	26	-
ZELZO	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
Sum	154	213	243	136	217	318	591	269	508	382	296	395	647	266	179	229