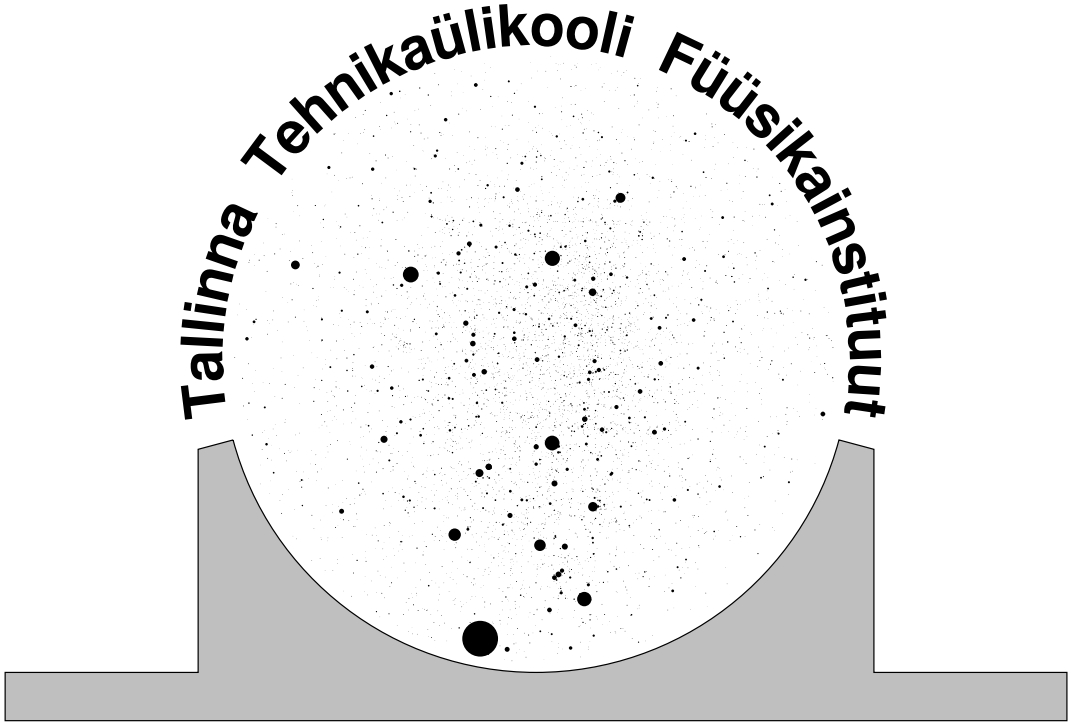

TALLINNA TÄHETORN
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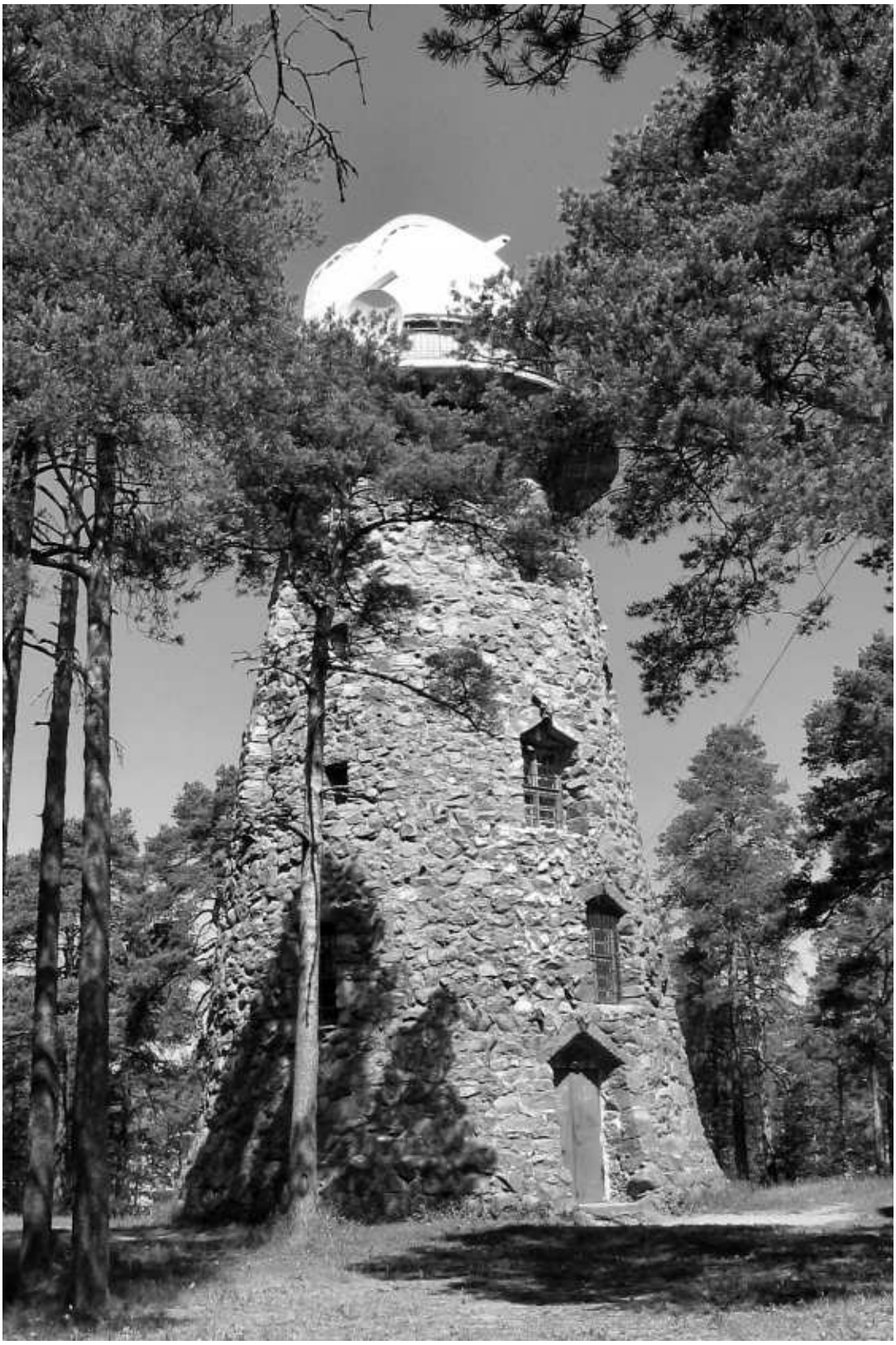
II

2003



Tallinna Tähetorn
Tallinn Observatory

TALLINNA TEHNIKAÜLIKOOL
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TALLINN TECHNICAL UNIVERSITY
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II

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Classical UBVR Photoelectric Photometry at Tallinn Observatory

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Tallinn Observatory is a typical small photoelectric observatory. It is located 12 km from the town center at southern boundary of Tallinn. The location has a rather dark sky and west winds take the smoke from Tallinn in the opposite direction. The first photoelectric photometer was attached to the Tallinn Observatory's AZT-14 (48 cm Cassegrain) in 1966. It was constructed in Tartu Observatory (located in Tõravere) by E.-M. Maasik (Maasik 1970). It is a classical UBV photometer (EMI 9502 B, DC amplifier, strip chart recording potentiometer EPP–009). In 1979 the PMT was replaced by new EMI 9502 A and R–filter was added. This photometer is still in working order. Thereupon we constructed three photometers described by P. Kalv (Kalv 1984), P. Kalv et. al. (Kalv 2002) and V. Harvig (Harvig 1987). During long years we have had entusiastic assistante - amateurs Harry Hoyer as optician and Johannes Kalli as specialist in electronics. Besides the autors of this paper, Ülo Kestlane took part in observations for several years and Linda Kalv assisted often during observations. At the end of 1968 Peep Kalv designed an observation program which takes into account the bad observing conditions in our region. He choose several objects which require long-time observations (long-period, semiregular and irregular variables) which are often overlooked by observers in better observational conditions. Being interested in eclipsing binaries, Peep Kalv tired to find binaries with long period, with components of different spectral types, and with intrinsic variability demonstrated by former visual or photographic observers. If a long-period system has an unusually "deformated"light curve, there exsists possibility, that the system is in a short and very fast evolution phase and interesting results are expected.

Klassikaline UBVR fotomeetria Tallinna Tähetornis.

Tallinna Tähetorn on tüüpiline väike "fotomeetriline observatoorium". Rajamisel, 1960-ndate aastate alul planeeriti Tallinna Tähetorni, kui rahvaobservatooriumit (Villmann 1961), kus oleks asjaarmastajatel võimalik tegutseda asjatundjate juhendamisel. Tähetorn paikneb suure linna jaks soodsas piirkonnas (Glehni pargis) kuna taeva valgusreostus on mõõdukas ja samal ajal on sinna ligipääs võrdlemisi hea. Esimene fotoelektriline fotomeeter saadi 1966. aastal Tõraverest (Tartu Observatoorium) mille koosseisu Tallinna Tähetorn kaua aastaid kuulus. Selle fotomeetri valmistas E.–M. Maasik ja seejärel valmistsi oma jõududega kolm fotomeetrit, millest kahes esimeses kasutati eelnimetatuga identseid võimendeid. Nende fotomeetrite valmistamises osalesid ka amatöörid Harry Hoyer ja Johannes Kalli. Vaatlusprogrammi koostamisel arvestas Peep Kalv asjaolu, et meie ilmatikuoludes tuleb valida objektid, mille vaatlustest paremate vaatlusvõimaluste korral naljalt ei hoolita – seega väga pikaajalisi vaatlusi nõudvad tähed. Sellega seoses oli programmis mitu pikaperioodilist kaksiktähte. Lisaks autoritele osales vaatlustes mitu aastat Ülo Kestlane ja ligi kolmkümmene aasta vältel Linda Kalv.

Photometric Systems of Tallinn Observatory's 50 cm Cassegrain in 1967 – 1996

Photomultiplier Tubes used:

1. EMI 9502B until JD 2444000
2. EMI 9502SA from JD 2444100 to JD 2444317 and from JD 2445500 up to CCD era
3. FEU-79 from JD 2444317 to JD 2445000

Filters:

1. B BG–12 + GG–13 (1 mm + 2 mm)
   V GG–11 (2 mm)
2. U UG–2 (2 mm)
   B BG–12 (1 mm)
   V GG–11 (2 mm)
   R Photographic
3. U UG–2 + SZS–21 (2 mm + 3 mm (for red leak))
   B BG–12 + SZS–21 (1 mm + 3 mm)
   V GG–11 + SZS–21 (2 mm + 3 mm)
   R Interference Filter $H_\alpha \pm 450$Å
   H_α Interference Filter $H_\alpha \pm 45$Å

Transformation coefficients of photometric system and mean extinction coefficients used with multipliers and filters above:

1.

$$\Delta(B-V) = \underset{\pm 0.004}{[(1 + \underset{}{0.047} \times \overline{X}) \times \Delta(b-v) - \underset{}{0.20} \times \Delta X]} \times \underset{\pm 0.005}{1.188}$$

$$\Delta V = \Delta v - \underset{}{0.36} \times \Delta X - \underset{\pm 0.004}{0.065} \times \Delta(B-V)$$

2.

$$\Delta(U-B) = \underset{\pm 0.017}{[\Delta(u-b) - \underset{}{0.262} \times \Delta X]} \times \underset{\pm 0.010}{1.189}$$

$$\Delta(B-V) = \underset{\pm 0.003}{[(1 + \underset{}{0.050} \times \overline{X}) \times \Delta(b-v) - \underset{\pm 0.002}{0.199} \times \Delta X]} \times \underset{\pm 0.007}{0.944}$$

$$\Delta V = \Delta v - \underset{\pm 0.006}{0.356} \times \Delta X - \underset{\pm 0.004}{0.089} \times \Delta(B-V)$$

$$\Delta(V-R) = \underset{\pm 0.003}{[\Delta(v-r) - \underset{}{0.107} \times \Delta X]} \times \underset{\pm 0.012}{1.249}$$

3.

$$\Delta(U-B) = \underset{\pm 0.004}{[\Delta(u-b) - \underset{}{0.320} \times \Delta X]} \times \underset{\pm 0.008}{1.116}$$

$$\Delta(B-V) = \underset{\pm 0.013}{[(1 + \underset{}{0.040} \times \overline{X}) \times \Delta(b-v) - \underset{\pm 0.003}{0.180} \times \Delta X]} \times \underset{\pm 0.003}{1.000}$$

$$\Delta V = \Delta v - \underset{\pm 0.003}{0.240} \times \Delta X - \underset{\pm 0.010}{0.110} \times \Delta(B-V)$$

$$\Delta(V-R) = \underset{\pm 0.023}{[\Delta(v-r) - \underset{}{0.105} \times \Delta X]} \times \underset{\pm 0.011}{1.087}$$

The light–curve for H_α has been reduced to an equivalent width of H_α line in the units of continuous flux in its neighbourhood according to the formula:

$$\frac{1+\frac{\Delta W_e}{\Delta\lambda_{H_\alpha}}}{1+\frac{\Delta W_e}{\Delta\lambda_r}} = \frac{J_{H_\alpha var}/J_{H_\alpha comp}}{J_{r\ var}/J_{r\ comp}} \tag{1}$$

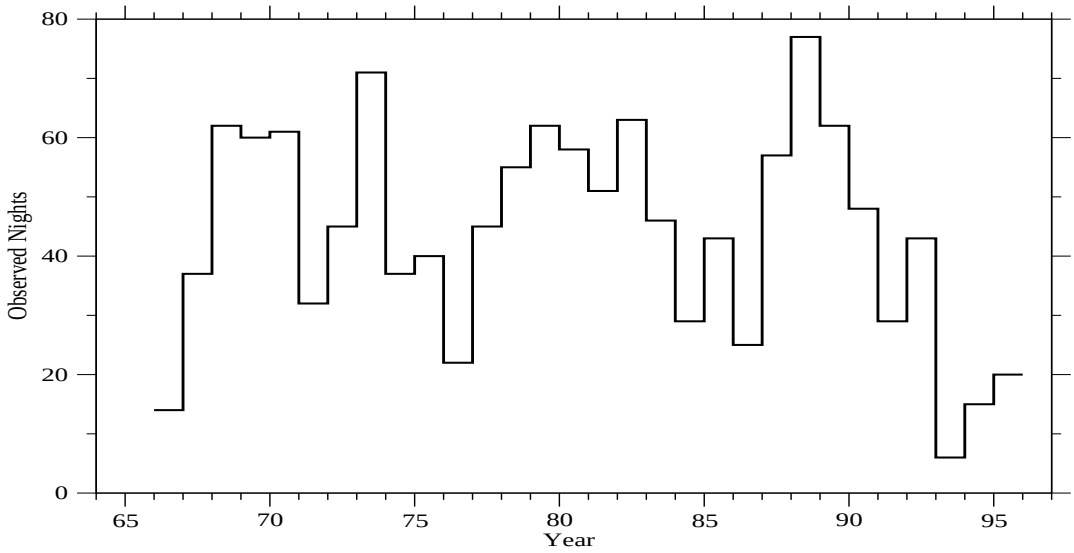
or approximately:

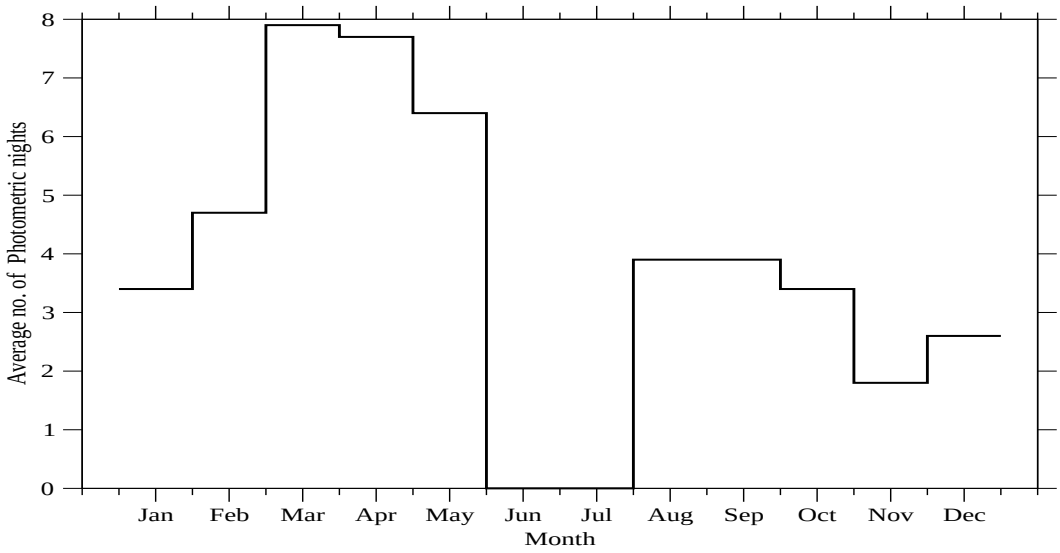
$$1-\frac{\Delta W}{\Delta\lambda_{H_\alpha}}+\frac{\Delta W}{\Delta\lambda_r} = \frac{J_{H_\alpha var}/J_{H_\alpha comp}}{J_{r\ var}/J_{r\ comp}} \tag{2}$$

where the traditional equivalent line width $\Delta W = -\Delta W_e$ has been taken into use. Since in our measurements $\Delta\lambda_{H_\alpha} = 90$Å and $\Delta\lambda_r = 900$Å it follows that:

$$\Delta W = -100 \times (\frac{J_{H_\alpha var}/J_{H_\alpha comp}}{J_{r\ var}/J_{r\ comp}} - 1) \tag{3}$$

Total number of photometric nights 1321.





Main Objects of the Observation Programme

Object		Sp	Period	Mag	Type
Eclipsing Binarys:					
BM Cam	= GSC 3746 2215	K0iii	$82\overset{d}{.}8$	$6\overset{m}{.}2 - 6\overset{m}{.}3$	RS CVn
TW Cnc	= GSC 0804 0221	G8III+A8	$70\overset{d}{.}8$	$8\overset{m}{.}5 - 9\overset{m}{.}0$	Algol
UU Cnc	= GSC 1376 2003	K4III	$96\overset{d}{.}7$	$8\overset{m}{.}7 - 9\overset{m}{.}4$	β Lyrae
RX Cas	= GSC 4313 0258	K1III+A5EIII	$32\overset{d}{.}3$	$8\overset{m}{.}6 - 9\overset{m}{.}5$	β Lyrae
AO Cas	= GSC 3259 0394	O9III+O9III	$3\overset{d}{.}5$	$6\overset{m}{.}1 - 6\overset{m}{.}3$	Elliptical
BM Cas	= GSC 4025 0406	A5IA-F0EIAB	$197\overset{d}{.}3$	$8\overset{m}{.}8 - 9\overset{m}{.}3$	β Lyrae
XZ Cep	= GSC 4276 0999	O9.5V	$5\overset{d}{.}1$	$8\overset{m}{.}0 - 8\overset{m}{.}8$	β Lyrae
AH Cep	= GSC 4273 0857	B0.5VNE+B05V	$1\overset{d}{.}8$	$6\overset{m}{.}8 - 7\overset{m}{.}1$	β Lyrae
CQ Cep	= GSC 3991 1076	WN5.5+O7	$1\overset{d}{.}6$	$8\overset{m}{.}6 - 9\overset{m}{.}1$	β Lyrae
CW Cep	= GSC 4282 4181	B0.5+B0.5IV-VEA	$2\overset{d}{.}7$	$7\overset{m}{.}6 - 8\overset{m}{.}0$	Algol
GG Cas	= GSC 3677 1698	B5-B8V+F0III	$3\overset{d}{.}8$	$9\overset{m}{.}9 - 10\overset{m}{.}3$	Algol
NY Cep	= GSC 4282 4681	B0IV+B0IV	$15\overset{d}{.}3$	$7\overset{m}{.}4 - 7\overset{m}{.}6$	Algol
V367 Cyg	= GSC 3166 0772	B8PEIA+F4III	$18\overset{d}{.}6$	$6\overset{m}{.}7 - 7\overset{m}{.}6$	β Lyrae
V448 Cyg	= GSC 2679 0493	O0.5E+B1IB-II	$6\overset{d}{.}5$	$7\overset{m}{.}0 - 8\overset{m}{.}7$	β Lyrar
RY Gem	= GSC 0134 0922	A2VE+K2IV	$9\overset{d}{.}3$	$8\overset{m}{.}7 - 11\overset{m}{.}0$	Algol
WY Gem	= GSC 1877 1504	M2EPIAB+B2V-B3V		$8\overset{m}{.}9 - 9\overset{m}{.}8$	Irregular
BU Bem	= GSC 1877 1719	M1-M2IA-IAB		$5\overset{m}{.}7 - 8\overset{m}{.}1$	Irregular
X–Ray Binary:					
X Per	= GSC 2357 2042	O9.5[III-V]EP		$6\overset{m}{.}0 - 7\overset{m}{.}0$	γ Cas
Be–Stars:					
BV Cam	= GCS 3746 2216	B2,5IIIE		$5\overset{m}{.}1 - 5\overset{m}{.}2$	γ Cas
CX Dra	= GSC 3918 1829	B2.5VE		$5\overset{m}{.}7 - 2\overset{m}{.}0$	γ Cas
V2148 Cyg	= GSC 3588 1102	B5			
V639 Cas	= GSC 4018 3804	B3IAE		$6\overset{m}{.}2 - 6\overset{m}{.}3$	α Cyg
Late Spectral Type Variable:					
HD 193092	= GSC 3155 2323	K3.5IIAB		micro-var	
Nonstationary Cepheid:					
RU Cam	= GSC 4364 0097	C0.1-C3.2E(K0-R0)	$22\overset{d}{.}2$	$8\overset{m}{.}1 - 9\overset{m}{.}8$	W Vir

Reference

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Photoelectric Light Curves of Delta Scuti Variable SZ Lyn

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The variable star SZ Lyncis was discovered by Hoffmeister (Hoffmeister 1949). SZ Lyncis = HD 67390 = BD +44° 1718 was chosen for the „first light star" of Talinn's variable stars program in 1967. The comparision star was HD 67254 and HD 67825 was used as check star. From 75 measurements of this pair their Δb = -0.$^{\mathrm{m}}$410 .

The Light Curves (Figure 1) are plotted according to the formula:

$$\text{Max JD Hel}=2438124.39824 + 0.^{\mathrm{d}}120534920\times\mathrm{E}$$

SZ Lyn fotoelektrilised heleduskõverad.

SZ Lyn muutlikkuse avastas Hoffmeister. Tallinna Tähetornis valiti see aga esimeseks muutlikuks „proovitäheks" peale esimese fotoelektrilise fotomeetri paigaldamist. Tegemist on üililühiperoodilise pulseeruva tähega, mida on klassifitseeritud kui kääbus tsefeiidi, AI Velorum või δ Scuti tüüpi muutliku tähena. Hilisemate tööde autorid kalduvad klassifitseerima seda tähte aga suure amplituudiga δ Scuti tüüpi muutlikuks täheks. Peale selle on antud täht eriti huvitav, kuna ta kuulub kaksiksüsteemi, mille orbitaalne periood on 1181.1 päeva. Teine (nähtamatu) komponent on arvatavasti põhijada hilisemat spektriklassi täht. Uuem ülevaade sellest süsteemist on antud (Moffett et. al. 1988), samas on leitud kaksiklust arvestav täpsustatud heleduse maksimumi määramise valem:

$$T_{max} = T_0 + EP_0\left[1+\frac{\gamma}{c}\right] + \frac{\beta}{2}E^2 + \frac{a\sin i}{2.59\times10^{10}}\left[\frac{1-e^2}{1+e\cos\nu}\sin(\nu+\omega) + e\sin\omega\right]$$

kus

$\mathrm{P}_0(\text{pulsatsioon}) = 0.^{\mathrm{d}}12052114 \pm 0.000000012$
$\mathrm{T}_0(\mathrm{E}{=}0) = 2438124.3987HJD \pm 0.0001$
$\beta = +3.0\times10^{-12}\ days\ cycle^{-1} \pm 0.4\times10^{-12}$
$\gamma = 34.17\ km\ s^{-1} \pm 0.04$

Seega osutus prooviks valitud täht teiste uurijate tööde põhjal erakordselt huvitavaks.

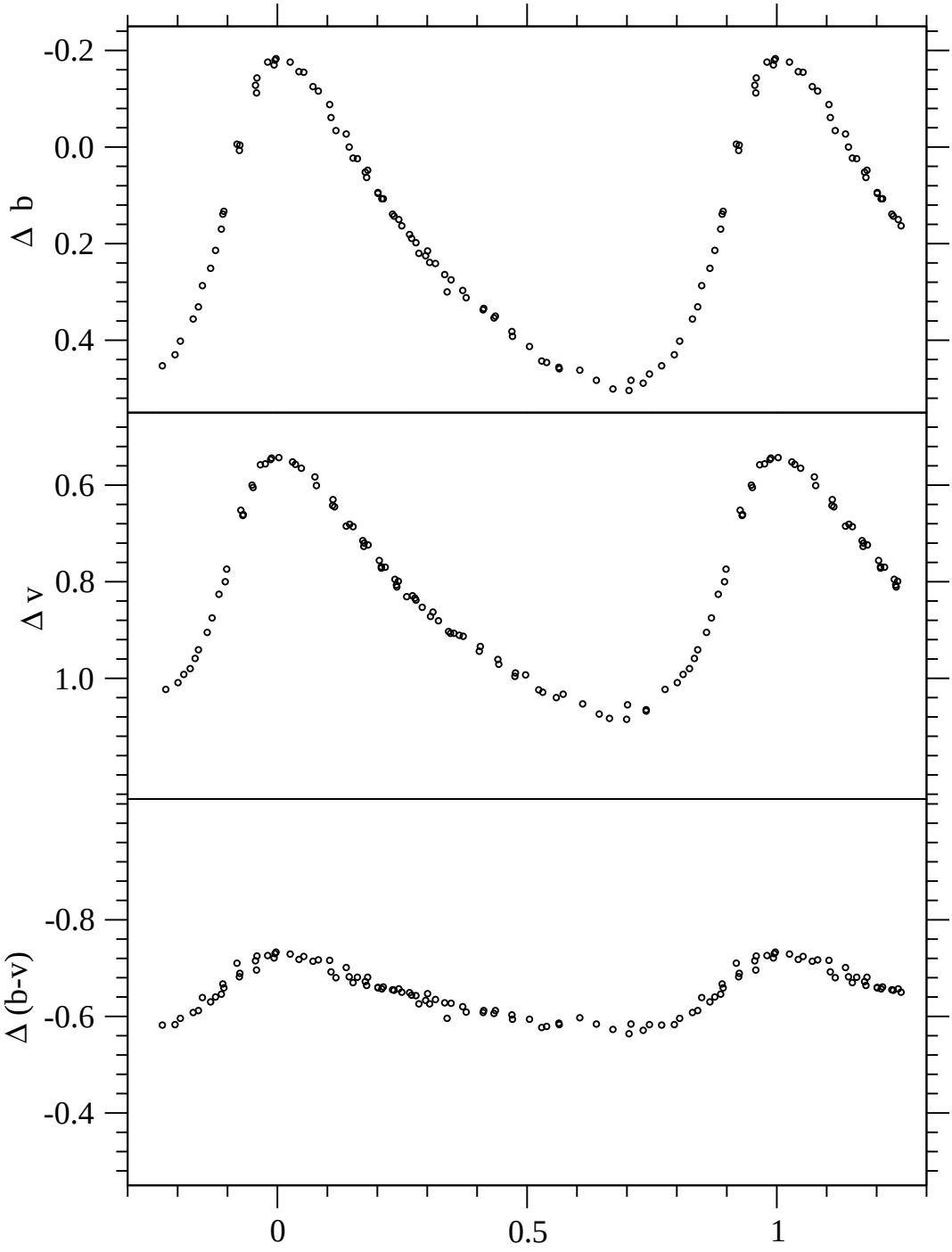

Figure 1: Light Curves of SZ Lyn

Observations of SZ Lyn

JD Hel. 2400000+	Δ b	Δ v
39539.3753	0.024	0.715
39539.3802	0.096	0.772
39539.3852	0.15	0.795
39539.3894	0.198	0.829
39539.3922	0.215	0.872
39539.3963	0.264	0.903
39539.4007	0.297	0.911
39539.4057	0.334	0.944
39539.4082	0.354	0.961
39539.4125	0.382	0.989
39539.4168	0.413	0.993
39539.4209	0.446	1.029
39539.4239	0.456	1.033
39539.4413	0.483	1.055
39539.4458	0.47	1.065
39539.4487	0.453	1.023
39539.4531	0.402	0.992
39539.4583	0.287	0.941
39539.4633	0.139	0.826
39539.4667	−0.006	0.652
39539.4715	−0.143	0.558
39539.4759	−0.18	0.544
39539.4817	−0.156	0.557
39539.4851	−0.125	0.601
39539.4894	−0.061	0.645
39539.4938	0	0.685
39539.498	0.063	0.727
39539.5007	0.094	0.769
39539.5046	0.143	0.811
39539.5084	0.181	0.831
39539.5122	0.225	0.853
39539.5146	0.241	0.881
39539.5184	0.275	0.907
39539.522	0.312	0.913
39539.5261	0.337	0.934
39539.5291	0.35	0.971
39539.5332	0.392	0.996
39539.5403	0.443	1.024
39539.5445	0.459	1.04
39539.5494	0.462	1.053
39539.5535	0.483	1.074
39539.5574	0.501	1.083
39539.5614	0.504	1.085
39539.5648	0.489	1.068
39539.5723	0.43	1.009
39539.5767	0.356	0.98
39539.5809	0.251	0.905
39539.5835	0.17	0.8
39539.5878	0.007	0.663
39539.5919	−0.112	0.605
39539.5962	−0.17	0.547

Observations of SZ Lyn: *continued*

JD Hel. 2400000+	Δ b	Δ v
39539.6111	−0.034	0.642
39539.6152	0.023	0.681
39539.6182	0.052	0.724
39539.6222	0.107	0.77
39539.627	0.163	0.799
39539.6312	0.22	0.838
39539.6337	0.239	0.863
39539.638	0.3	0.907
39554.2832	0.331	0.959
39554.2873	0.214	0.875
39554.2893	0.133	0.774
39554.2932	−0.004	0.661
39554.297	−0.128	0.6
39554.2999	−0.176	0.556
39554.3019	−0.183	0.543
39554.3053	−0.176	0.552
39554.3086	−0.155	0.565
39554.3122	−0.116	0.583
39554.3149	−0.088	0.63
39554.3189	−0.027	0.686
39554.324	0.048	0.72
39554.3278	0.107	0.756
39554.3301	0.139	0.807
39554.3346	0.189	0.834

Reference

Hoffmeister, C. 1949, Astr. Abhand. 12, 1.

Moffett, T. J., Barnes III, T, G., Fekel, F. C., Jefferys, W. H., Achtermann, J. M., 1988, Astron. J., Vol. 95(5), p. 1534

HD 193092: a New Variable Star. UBVR Observations from 1974-1996

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HD 193092 was chosen as red star of the pair of selective extinction but turned out to be variable. Thereupon the star was observed at times along with the stars of the main program. According to Hipparcos Variability Annex, HD 194193 (comparision star) is variable up to $0\overset{m}{.}04$. Magnitudes (figure 2) are relative to comparision star (var–comp). All points are normal–mean from three consecutive measurements.

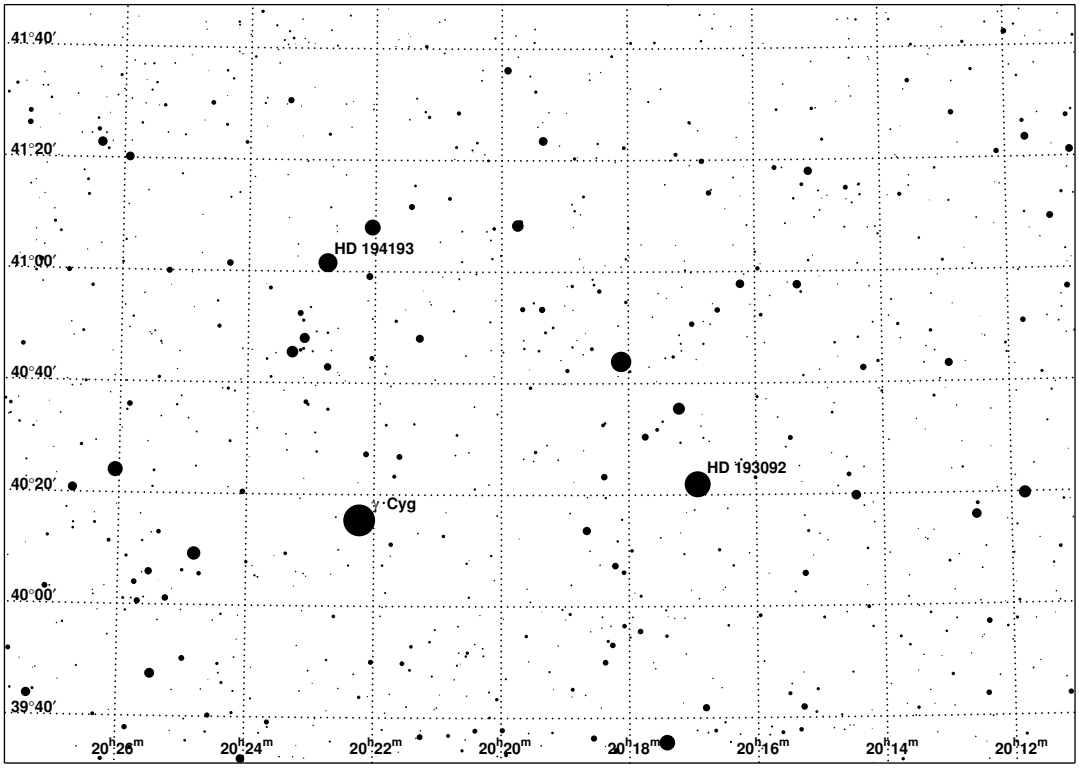

Figure 1: HD 193092 Finder Chart

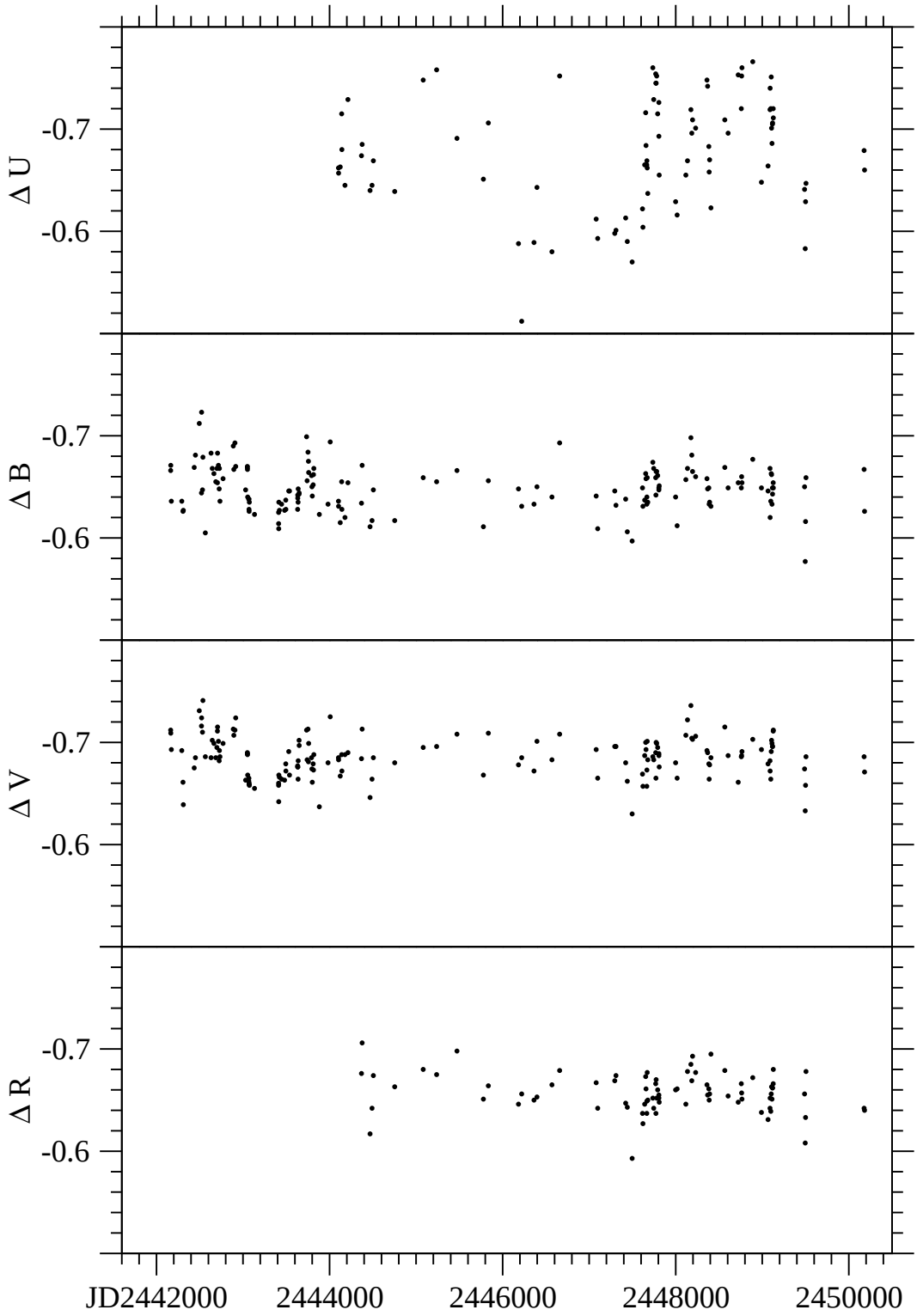

Figure 2: Light Curve of HD 193092

Observations of HD 193092

JD Hel. 2400000+	Δ U	Δ B	Δ V	Δ R
42164.4734		−0.666	−0.712	
42165.4852		−0.671	−0.709	
42171.5187		−0.636	−0.693	
42292.4573		−0.636	−0.692	
42306.4027		−0.626	−0.661	
42310.3477		−0.627	−0.639	
42436.1795		−0.669	−0.675	
42450.202		−0.681	−0.685	
42495.5793		−0.712	−0.731	
42520.5673		−0.644	−0.716	
42521.5023		−0.723	−0.724	
42532.5303		−0.647	−0.71	
42537.5169		−0.679	−0.741	
42565.4372		−0.605	−0.686	
42631.3952		−0.683	−0.685	
42645.438		−0.668	−0.702	
42664.3505		−0.663	−0.699	
42685.2897		−0.655	−0.685	
42698.3804		−0.668	−0.695	
42704.2853		−0.654	−0.711	
42706.3805		−0.683	−0.715	
42716.2742		−0.671	−0.701	
42725.1728		−0.648	−0.682	
42728.2941		−0.668	−0.692	
42734.3386		−0.636	−0.686	
42770.19		−0.658	−0.699	
42887.5224		−0.69	−0.713	
42894.5153		−0.667	−0.707	
42907.4847		−0.693	−0.712	
42916.4622		−0.67	−0.724	
43030.302		−0.647	−0.663	
43050.2724		−0.67	−0.69	
43051.2337		−0.669	−0.689	
43052.2632		−0.667	−0.688	
43054.2615		−0.64	−0.668	
43067.2448		−0.638	−0.662	
43068.235		−0.638	−0.665	
43070.2394		−0.628	−0.659	
43071.2574		−0.626	−0.66	
43073.2089		−0.635	−0.658	
43133.1949		−0.623	−0.655	
43411.3125		−0.614	−0.66	
43412.4056		−0.625	−0.658	
43413.35		−0.609	−0.642	
43414.4312		−0.635	−0.668	
43421.2198		−0.627	−0.666	
43446.2523		−0.633	−0.664	
43480.2704		−0.627	−0.663	
43494.1721		−0.637	−0.679	
43496.1833		−0.628	−0.672	
43529.1908		−0.646	−0.691	
43537.1823		−0.646	−0.668	
43631.4957		−0.628	−0.677	
43632.4911		−0.639	−0.676	

Observations of HD 193092: *continued*

JD Hel. 2400000+	Δ U	Δ B	Δ V	Δ R
43633.4796		−0.642	−0.676	
43636.4645		−0.635	−0.664	
43638.4552		−0.648	−0.682	
43648.4532		−0.643	−0.702	
43649.4386		−0.644	−0.697	
43734.4273		−0.699	−0.712	
43741.4		−0.656	−0.683	
43751.4327		−0.684	−0.713	
43756.3965		−0.675	−0.681	
43758.382		−0.664	−0.699	
43792.3225		−0.661	−0.685	
43797.3368		−0.65	−0.674	
43801.2801		−0.641	−0.661	
43811.3723		−0.652	−0.679	
43814.3863		−0.662	−0.673	
43819.2344		−0.668	−0.688	
43882.1855		−0.623	−0.637	
43982.5505		−0.633	−0.68	
44007.4792		−0.694	−0.725	
44103.4554	−0.662	−0.636	−0.685	
44104.3514	−0.657	−0.631	−0.683	
44124.368	−0.663	−0.615	−0.667	
44140.4993	−0.715	−0.655	−0.688	
44142.4134	−0.68	−0.628	−0.672	
44178.2509	−0.645	−0.62	−0.688	
44212.2125	−0.729	−0.654	−0.69	
44369.4843	−0.674	−0.634	−0.684	−0.676
44376.4526	−0.685	−0.671	−0.713	−0.706
44468.4847	−0.64	−0.611	−0.646	−0.617
44491.4293	−0.645	−0.617	−0.664	−0.642
44506.43	−0.669	−0.647	−0.685	−0.674
44753.4522	−0.639	−0.617	−0.68	−0.663
45082.5108	−0.748	−0.659	−0.695	−0.68
45237.4008	−0.758	−0.655	−0.696	−0.675
45472.4807	−0.691	−0.666	−0.708	−0.698
45777.6344	−0.651	−0.611	−0.668	−0.651
45835.4871	−0.706	−0.656	−0.709	−0.664
46183.518	−0.588	−0.648	−0.678	−0.646
46220.4286	−0.512	−0.631	−0.685	−0.656
46363.3366	−0.589	−0.633	−0.672	−0.65
46397.2559	−0.643	−0.65	−0.701	−0.653
46569.4648	−0.58	−0.64	−0.683	−0.665
46658.4699	−0.752	−0.693	−0.708	−0.679
47081.4559	−0.612	−0.641	−0.693	−0.667
47098.3713	−0.593	−0.609	−0.665	−0.642
47295.4814	−0.598	−0.646	−0.696	−0.669
47309.4364	−0.601	−0.632	−0.696	−0.674
47421.5104	−0.613	−0.638	−0.68	−0.647
47440.4097	−0.59	−0.606	−0.662	−0.643
47497.2677	−0.57	−0.597	−0.63	−0.593
47616.5925	−0.622	−0.649	−0.669	−0.637
47621.5942	−0.604	−0.631	−0.657	−0.627
47641.5313	−0.665	−0.637	−0.687	−0.646
47653.4503	−0.716	−0.663	−0.7	−0.673
47657.4932	−0.684	−0.658	−0.693	−0.661

Observations of HD 193092: *continued*

JD Hel. 2400000+	Δ U	Δ B	Δ V	Δ R
47665.4113	−0.665	−0.633	−0.657	−0.637
47667.4621	−0.669	−0.64	−0.673	−0.649
47671.4525	−0.662	−0.659	−0.701	−0.677
47677.4326	−0.637	−0.635	−0.683	−0.65
47735.3962	−0.76	−0.674	−0.686	−0.652
47746.49	−0.729	−0.668	−0.683	−0.642
47768.5586	−0.754	−0.659	−0.69	−0.666
47771.4589	−0.745	−0.642	−0.665	−0.637
47773.558	−0.745	−0.665	−0.7	−0.67
47780.5201	−0.752	−0.665	−0.699	−0.652
47792.4536	−0.715	−0.661	−0.695	−0.66
47805.5259	−0.726	−0.647	−0.689	−0.655
47806.4693	−0.693	−0.649	−0.687	−0.652
47809.2769	−0.655	−0.651	−0.676	−0.648
47999.5434	−0.629	−0.64	−0.68	−0.66
48016.5137	−0.616	−0.612	−0.665	−0.661
48117.412	−0.655	−0.657	−0.707	−0.646
48136.4793	−0.669	−0.668	−0.722	−0.678
48176.4543	−0.719	−0.698	−0.736	−0.685
48186.3069	−0.696	−0.681	−0.704	−0.669
48194.3615	−0.709	−0.665	−0.703	−0.693
48230.2819	−0.701	−0.66	−0.706	−0.677
48361.5151	−0.748	−0.658	−0.692	−0.665
48369.4807	−0.742	−0.648	−0.69	−0.655
48383.4858	−0.683	−0.649	−0.679	−0.661
48386.4914	−0.658	−0.633	−0.664	−0.65
48391.4628	−0.67	−0.635	−0.678	−0.656
48407.46	−0.623	−0.631	−0.685	−0.695
48567.2678	−0.709	−0.669	−0.715	−0.679
48605.2911	−0.696	−0.649	−0.687	−0.654
48722.5209	−0.753	−0.654	−0.661	−0.648
48758.4645	−0.72	−0.649	−0.686	−0.666
48761.4549	−0.752	−0.66	−0.687	−0.657
48766.4008	−0.76	−0.654	−0.691	−0.651
48890.2913	−0.766	−0.677	−0.703	−0.672
48990.2252	−0.648	−0.649	−0.693	−0.638
49066.5789	−0.664	−0.646	−0.679	−0.631
49089.5076	−0.719	−0.668	−0.682	−0.642
49091.5284	−0.74	−0.62	−0.672	−0.652
49098.4882	−0.72	−0.636	−0.664	−0.639
49103.4812	−0.751	−0.663	−0.691	−0.656
49107.5037	−0.701	−0.662	−0.702	−0.663
49112.4762	−0.686	−0.633	−0.699	−0.651
49117.4616	−0.705	−0.649	−0.696	−0.662
49119.3968	−0.706	−0.643	−0.696	−0.662
49126.415	−0.72	−0.654	−0.711	−0.666
49128.4291	−0.711	−0.649	−0.712	−0.68
49489.4744	−0.641	−0.65	−0.674	−0.656
49497.4211	−0.583	−0.577	−0.633	−0.608
49500.4309	−0.629	−0.616	−0.658	−0.633
49505.4276	−0.647	−0.659	−0.686	−0.678
50177.5658	−0.679	−0.667	−0.686	−0.642
50181.5419	−0.66	−0.626	−0.671	−0.64

HD 193092 - uus muutlik täht. UBVR vaatlused 1974-1995.

HD 193092 oli esialgselt valitud üheks standardtäheks, mis aga osutus peagi muutlikuks täheks. Seejärel vaadeldi seda tähte kahekümne aasta vältel. Hoolimata pikaajalistest vaatlustest võib tähe kohta öelda vaid seda, et tegemist on hilist spektriklassi väikese amplituudiga tähega, mille tüüpi ei ole meie vaatluste põhjal veel määrata. Ka kasutatud võrdlustäht on kahtlustatav muutlikkuses.

GSC 4266 1263: a New Variable Star.

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GSC 4266 1263 = SAO 19719 = PPM 23282 = HIP 108080 = HD 208440 = BD +61° 2217
With equatorial coordinates (J2000) R.A.= $21^h53^m53^s.34$ DEC.= $+62°36'01''.3$
We made CCD photometry on eclipsing EM Cephei in 2001. For the observations the star GSC 4266 1263 was employed as one of the reference stars. During the data reduction, we find that it is a variable star with rapid light variations. According to NSV (Kukarkin) it is a suspected variable star (NSV 25788). The full amplitude of light variations is larger then $0^m.02$. The type of variability remains unknown.

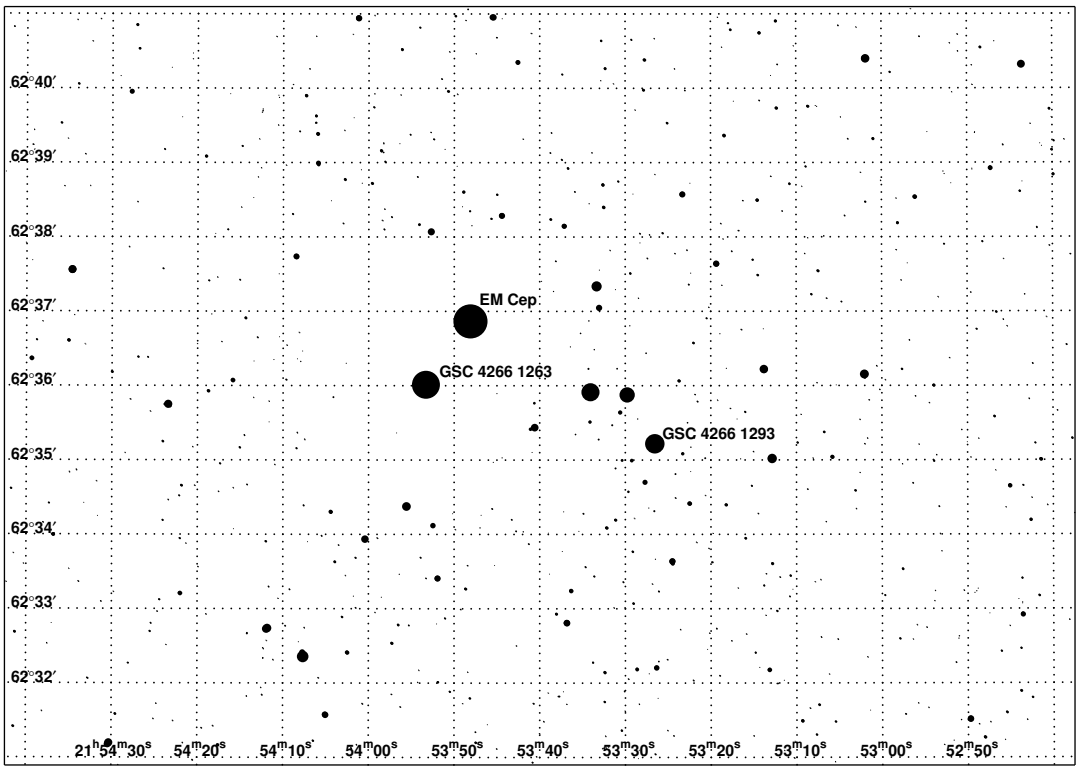

Figure 1: EM Cephei Finder Chart

GSC 4266 1263: uus muutlik täht.

EM Cephei CCD vaatluste ajal 2001 aastal oli GSC 4266 1263 üheks võrdlustähtedest, mis vaatlusandmete töötlemisel aga osutus muutlikuks täheks.

Reference: Kukarkin B.V., et. al., 1982, NSV Catalog, Moscow: Nauka Publishing House

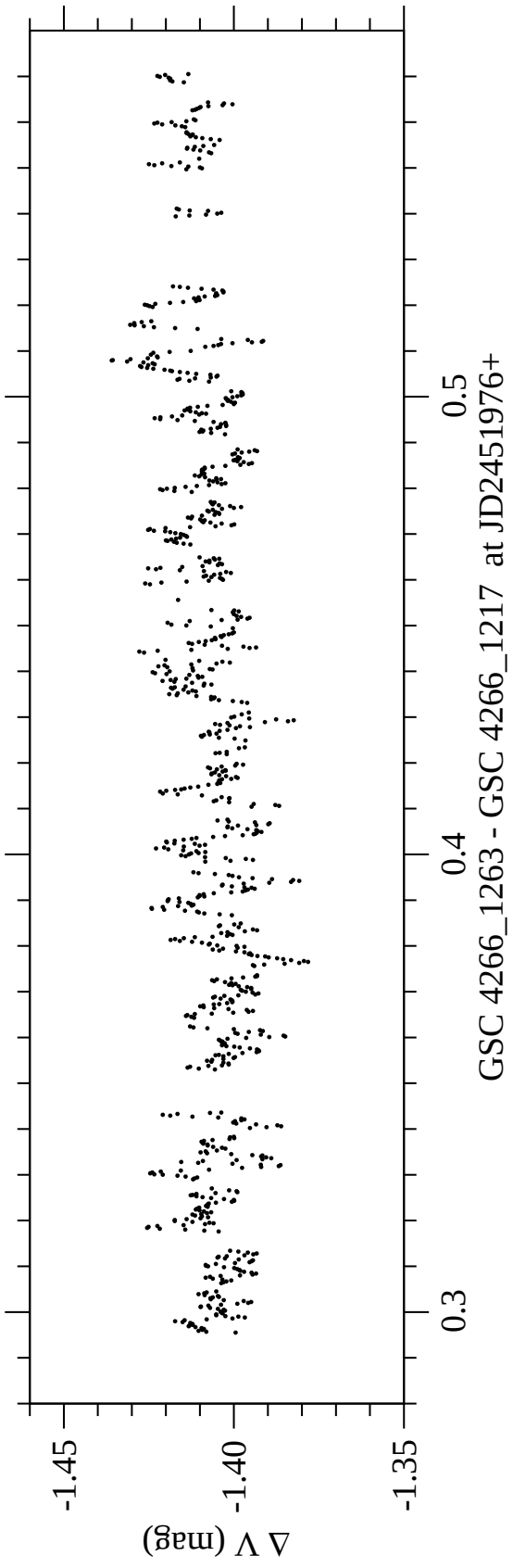

Figure 2: Light Curve of EM Cephei

Cosmic Weather Influence on Human

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The goal of the present investigation is to test if the „space weather“ conditions affect in any way the number of accidents in Estonia. The reason of this is the common opinion that moon phases and geomagnetic conditions play an important role in people‘s health.

In the research we use data of season changes, moon phases, sunspot numbers, solar activity and so on, and try to find correlation of this data with number of accidents in Estonia during a 2-years period.

In the work we realized an independent investigation of the above-mentioned influence factors. We used a legally obtained data from Eesti Haigekassa (the Estonian Health Insurance Fund) about accidents with people in the period 2001-2002.

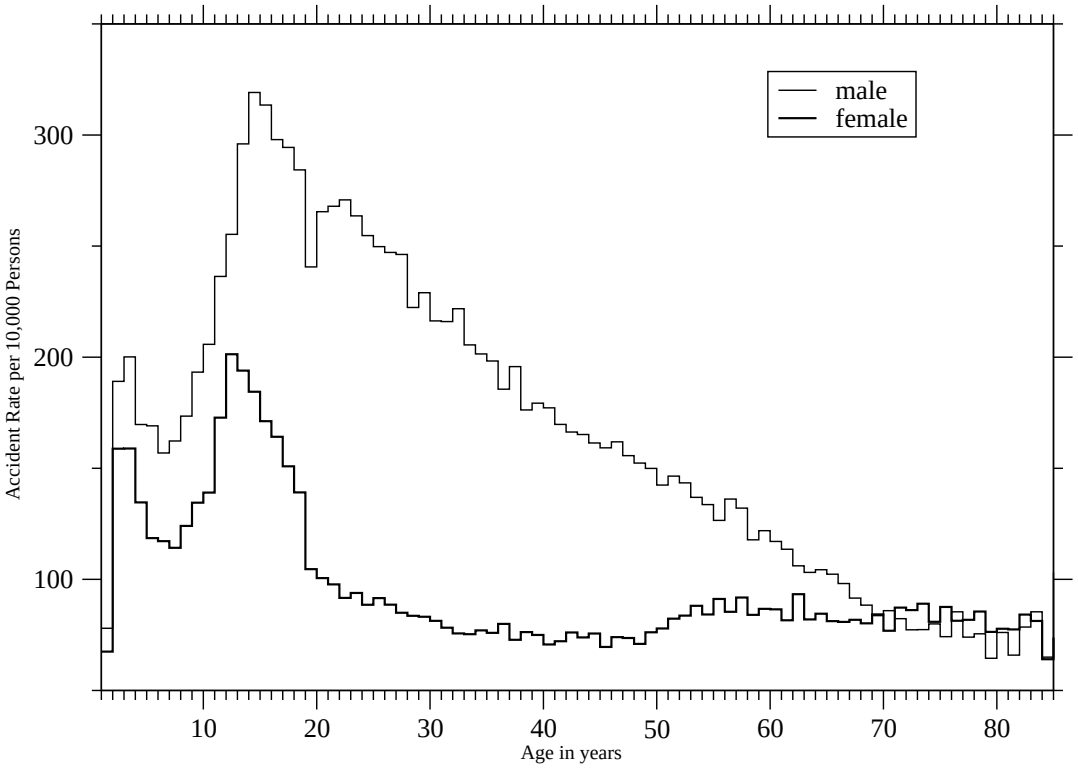
In the first step we found dependencies of accidents number on age, sex and season. Although it was out of the goals of our research, such dependencies were very noticible in the original data. The seasonal dependence was very clear. It was very evident also that the numbers of accidents with men was much higher than the number of accidents with women, although such conclusion could have been made even without the data treatment.

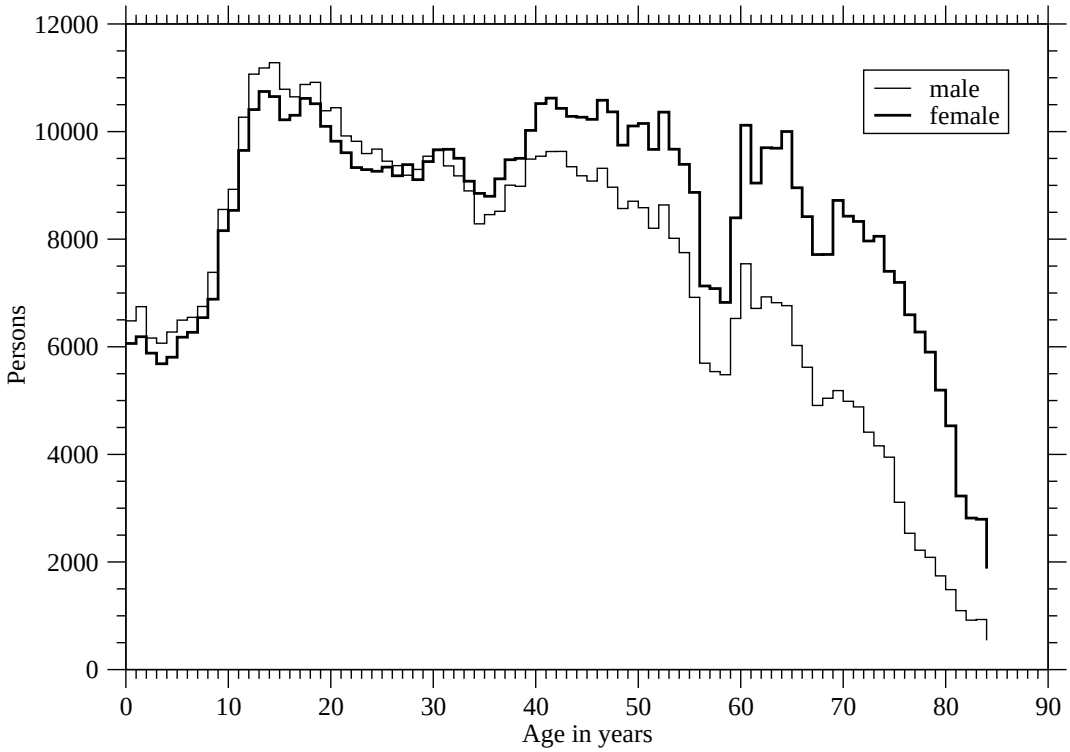
Than we sought for accidents numbers dependence on moon phases, cosmic climate and geomagnetic conditions. No dependence was found, so one may conclude that such influences are small or even negligible.

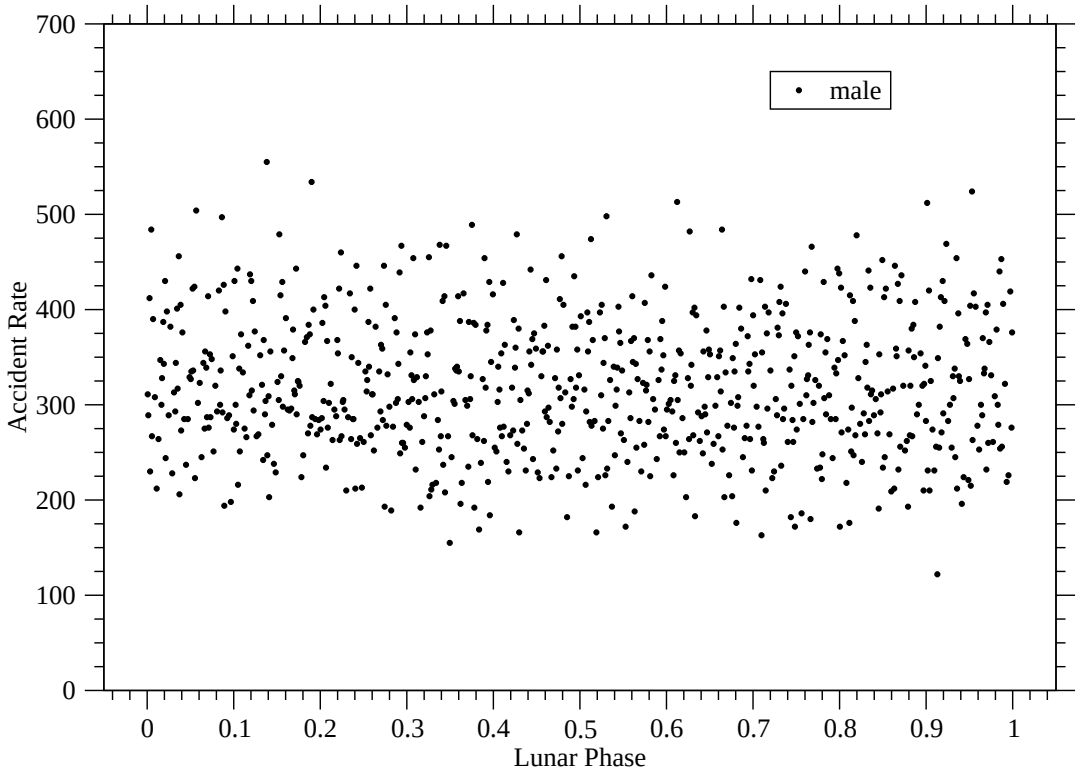
However we think that in spite of the negative results, the above-mentioned factors may play some small role. For instance, such influence may come through technical systems which are certainly affected by geomagnetic situation. A lot of emergency workers and police officers assure the presence of influence of the full moon on people, since during the full moon the number of emergency calls is significantly higher. The full moon may influence also people suffering psychiatric deseases.

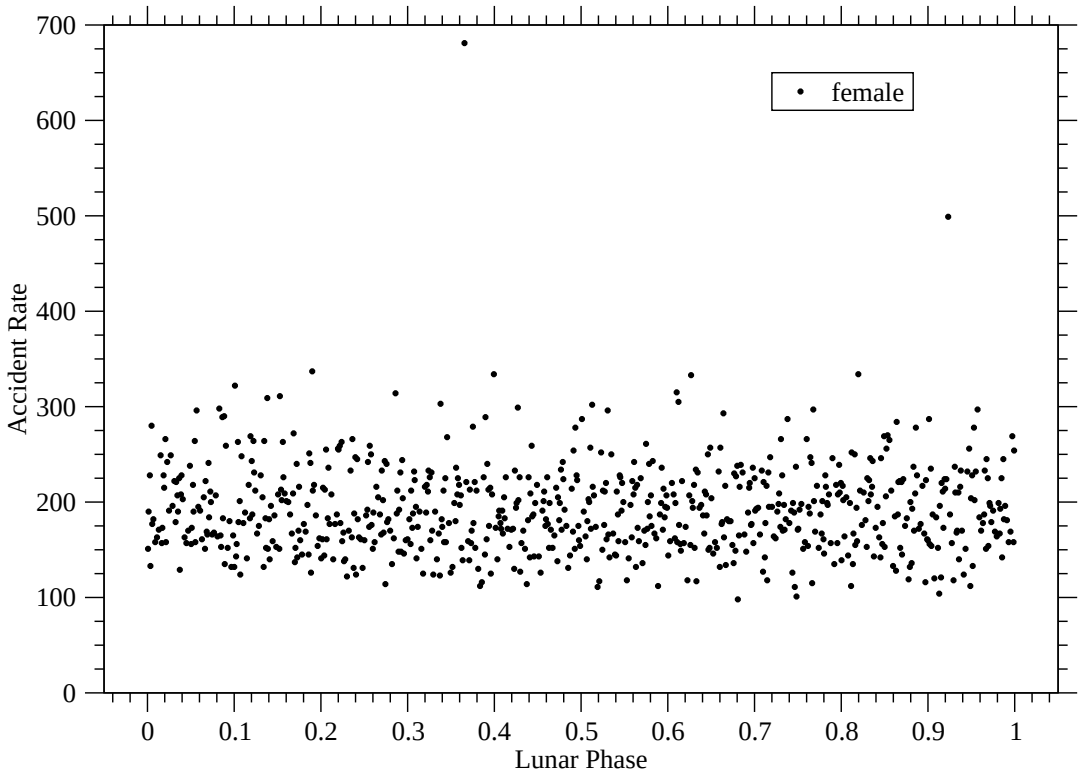
Magnetic storms are also much talked about, and a lot of people feel worse that days. Magnetic storms cause also problems with radio transmission. The direct and indirect influence of environmental factors on people‘s health is also of no doubt.

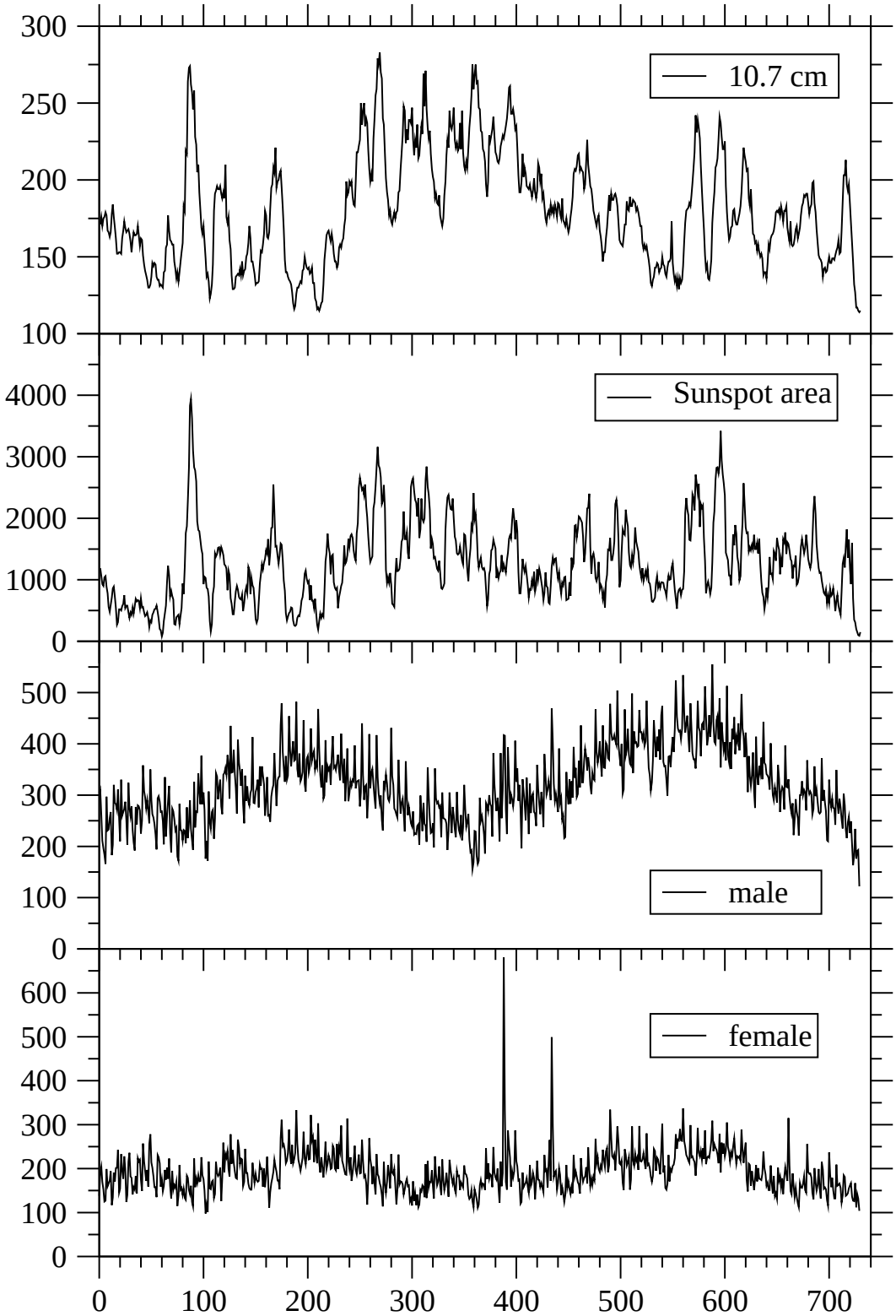
So we believe that the goal of the present research is well-founded and that such investigations are to be hold in future. We are thankful to V. Pustynski for checking the manuscript and the Estonian Health Insurance Fund for providing the necessary data.

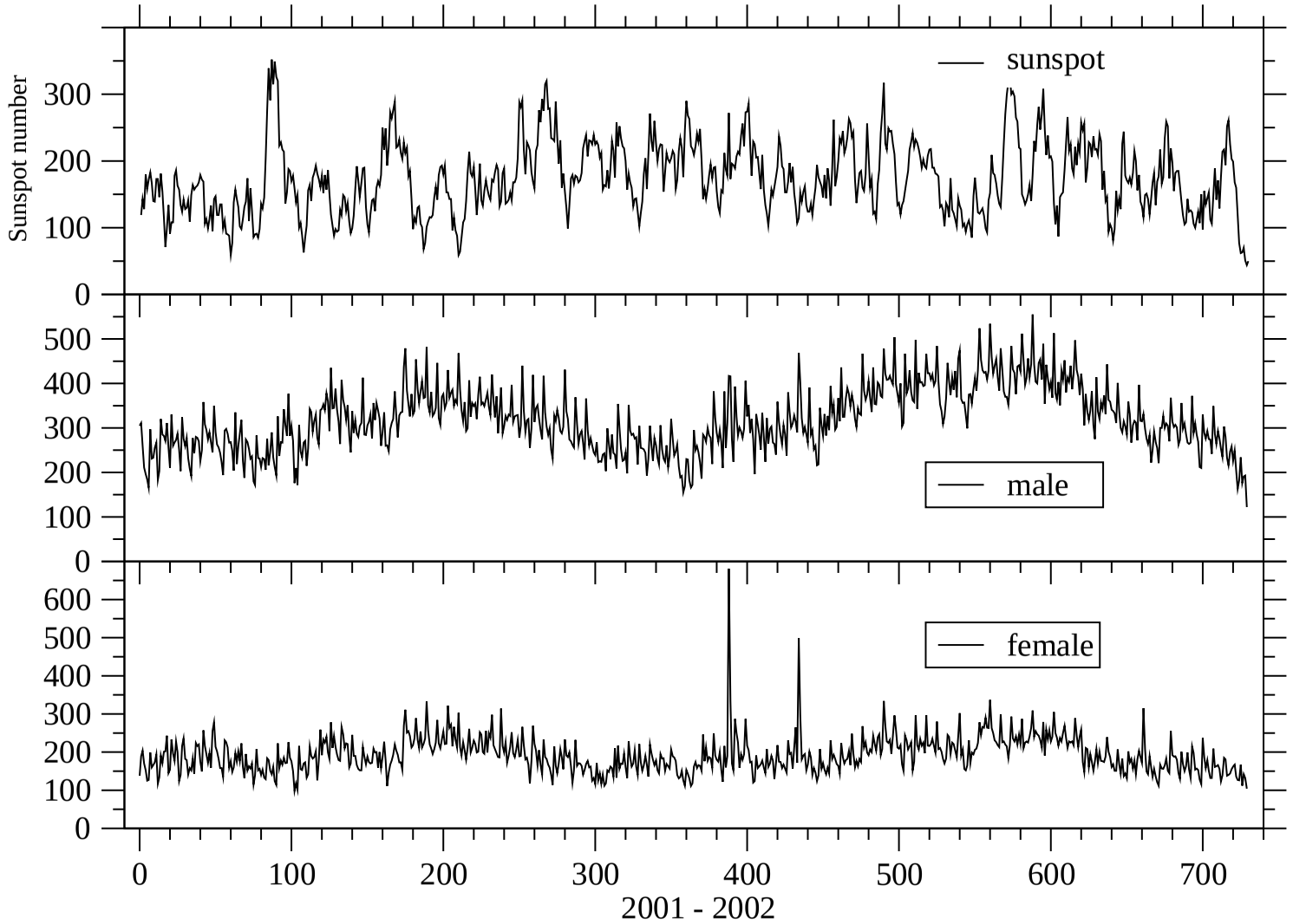

male
female
Accident Rate per 10,000 Persons
300
200
100
10
20
30
40
50
60
70
80
Age in years

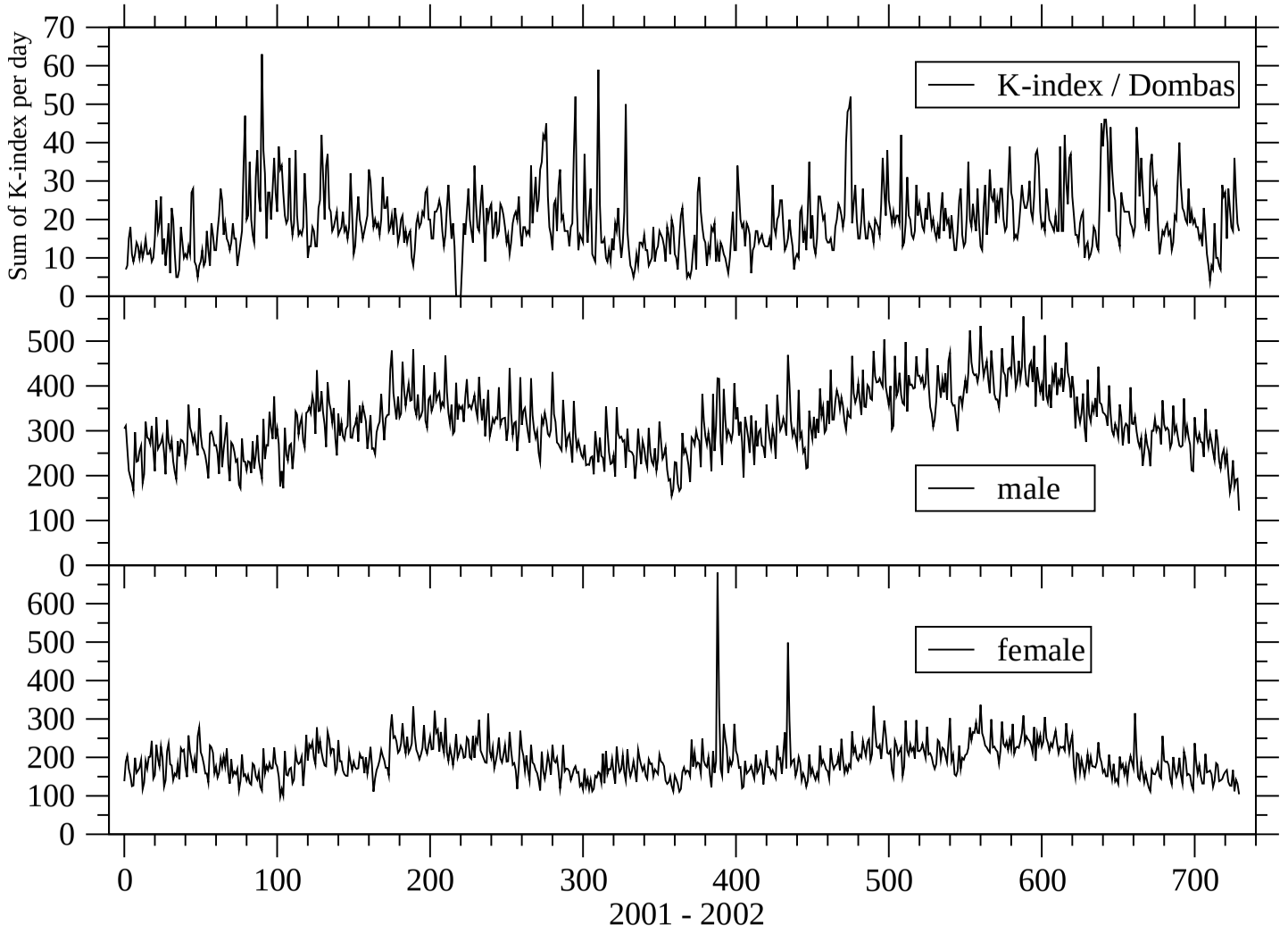

male
female
Persons
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60
70
80
90
Age in years

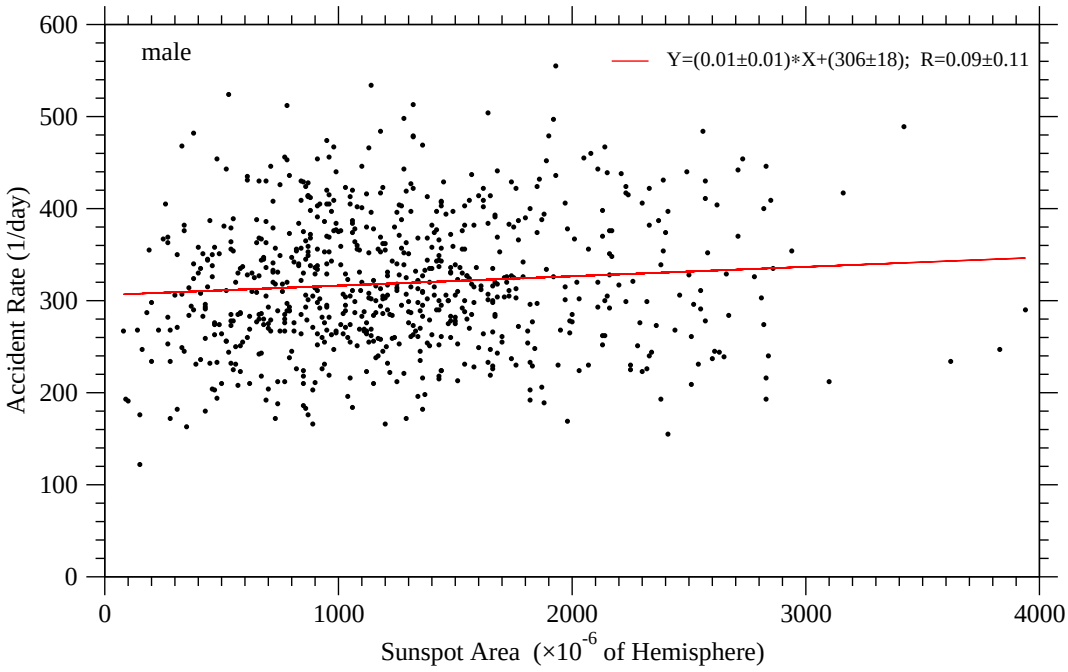

male
Accident Rate
Lunar Phase
0
100
200
300
400
500
600
700
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

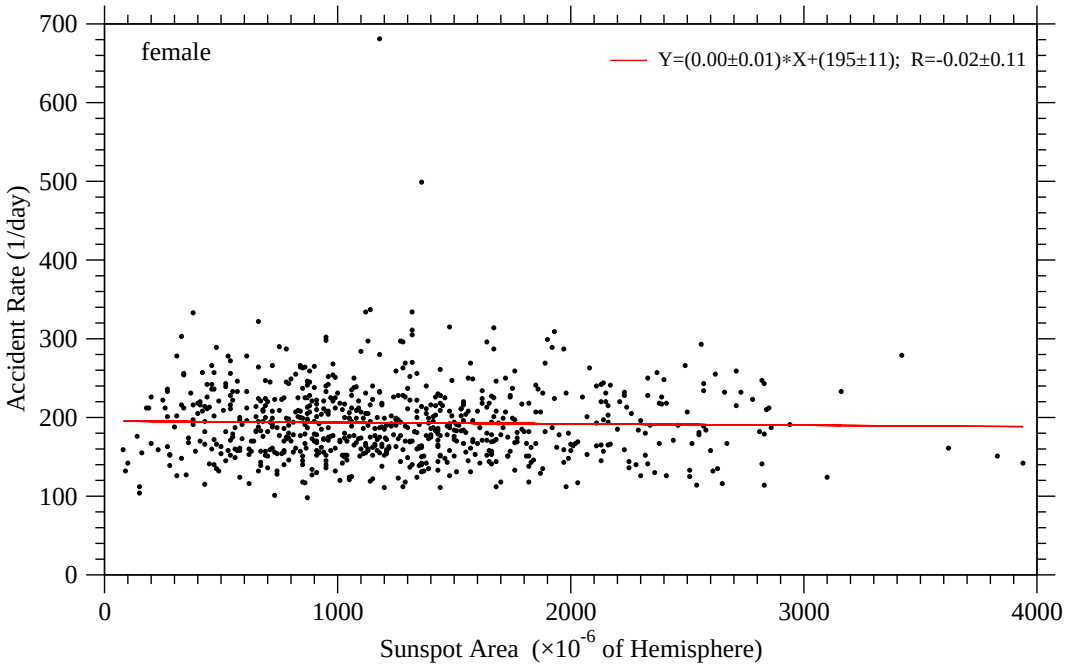

female
Accident Rate
Lunar Phase
0
100
200
300
400
500
600
700
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

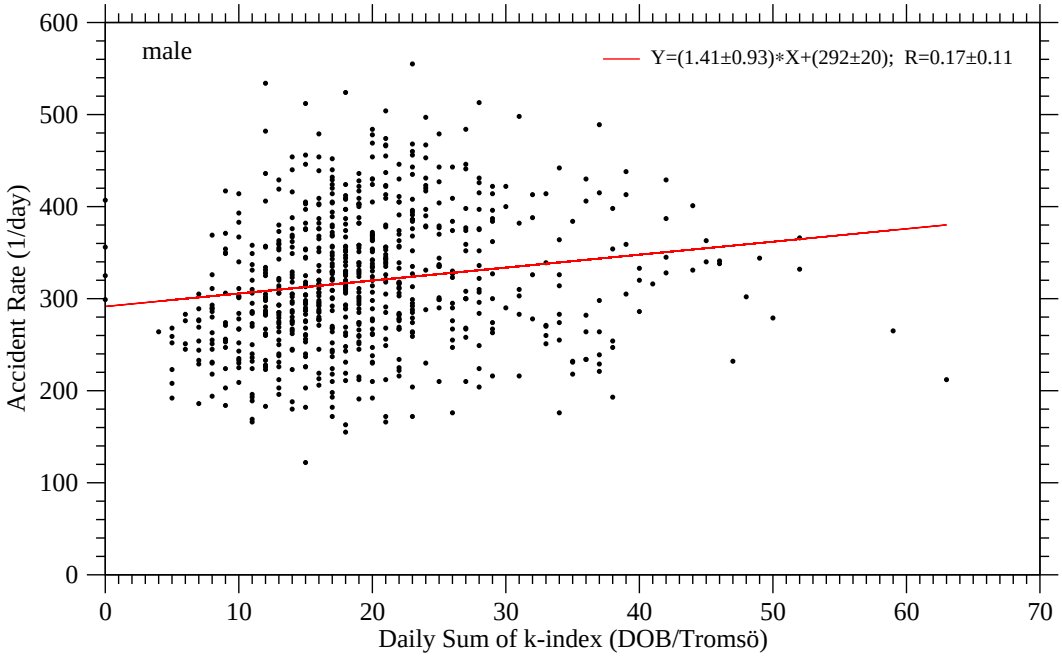

10.7 cm
Sunspot area
male
female
300
250
200
150
100
4000
3000
2000
1000
0
500
400
300
200
100
0
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700

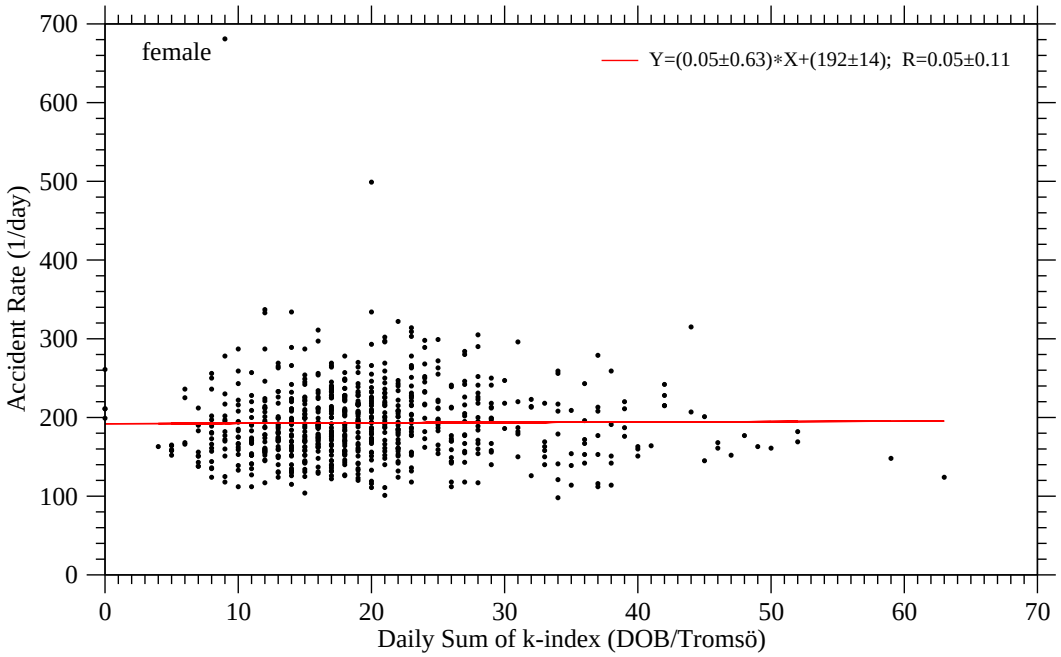

sunspot
male
female
Sunspot number
0
100
200
300
400
500
600
700
2001 - 2002

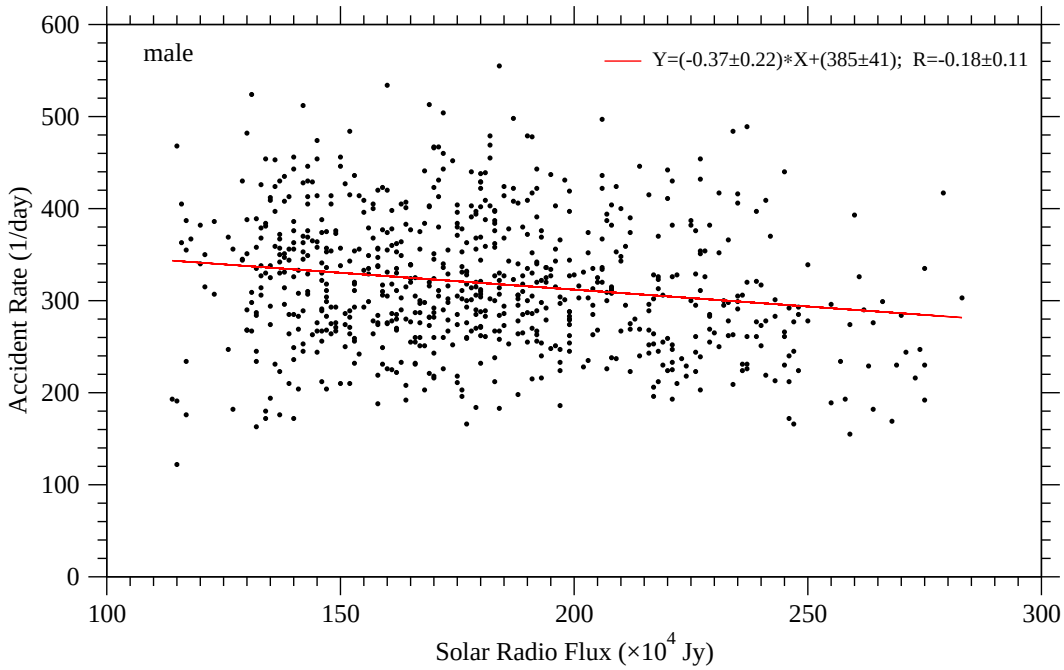

Sum of K-index per day
K-index / Dombas
male
female
2001 - 2002

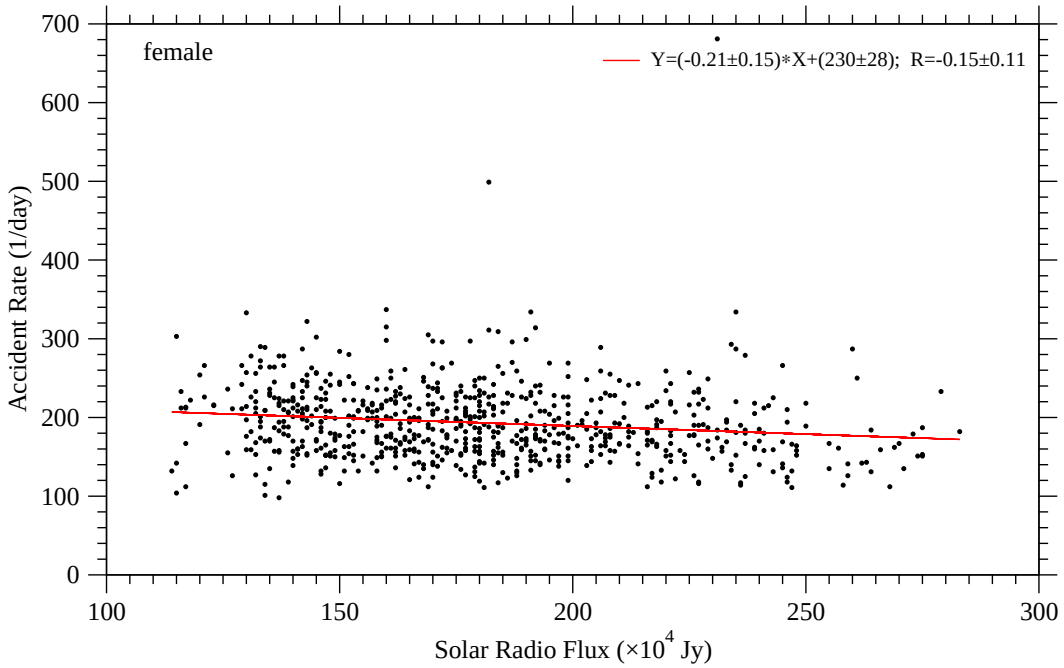

male
Y=(0.01±0.01)*X+(306±18); R=0.09±0.11
Accident Rate (1/day)
Sunspot Area (×10-6 of Hemisphere)
0
100
200
300
400
500
600
0
1000
2000
3000
4000

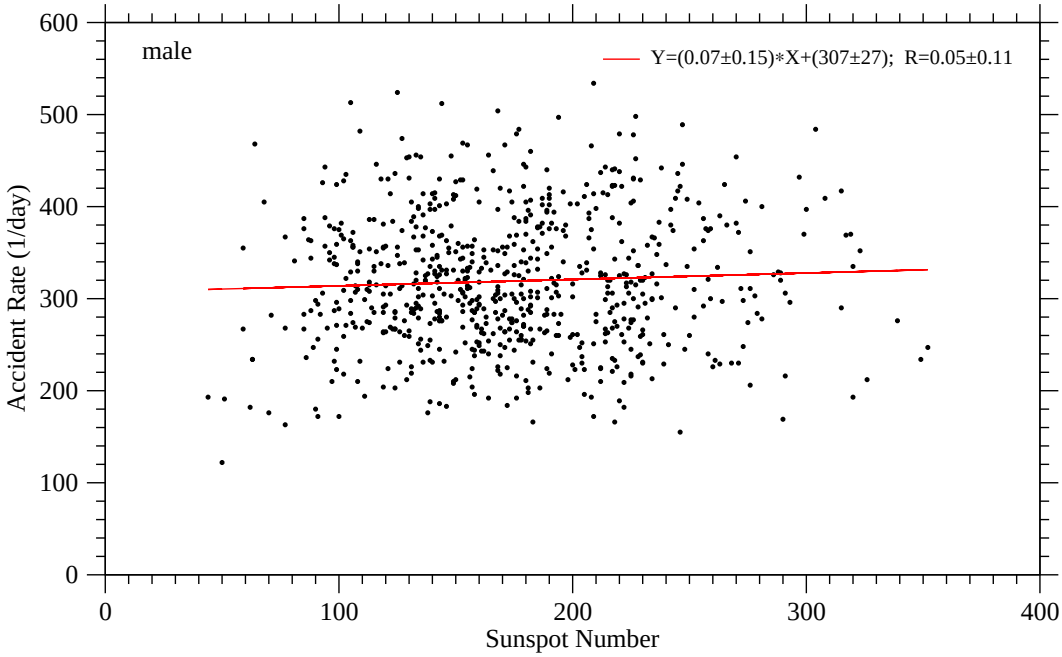

female
Y=(0.00±0.01)*X+(195±11); R=-0.02±0.11
Accident Rate (1/day)
Sunspot Area (×10-6 of Hemisphere)
0
100
200
300
400
500
600
700
0
1000
2000
3000
4000

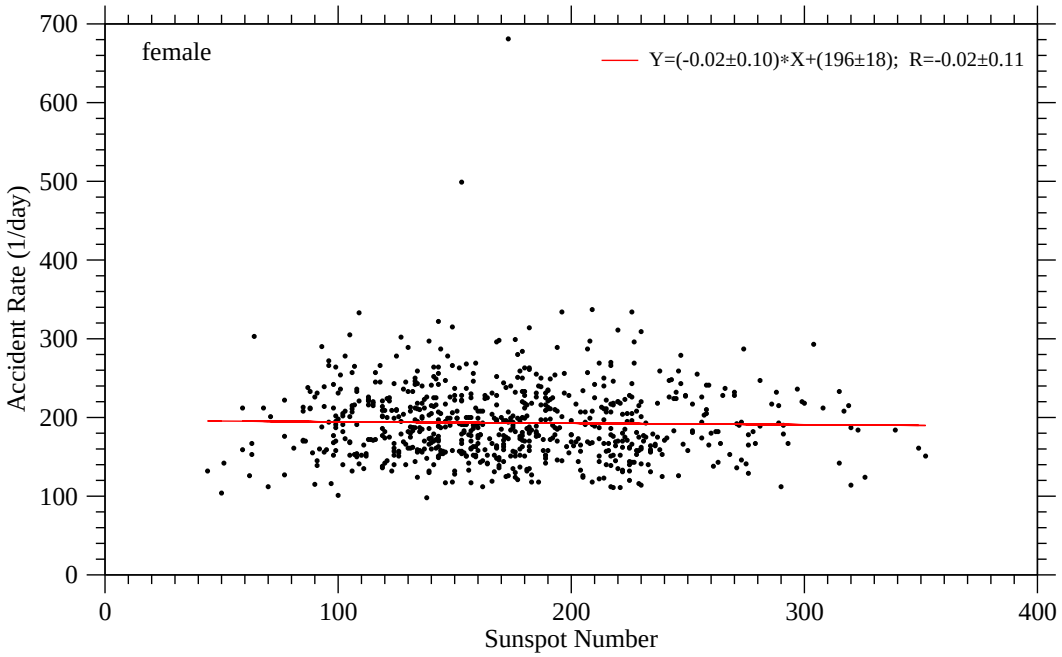

male
Y=(1.41±0.93)*X+(292±20); R=0.17±0.11
Accident Rate (1/day)
Daily Sum of k-index (DOB/Tromsö)
0
100
200
300
400
500
600
0
10
20
30
40
50
60
70

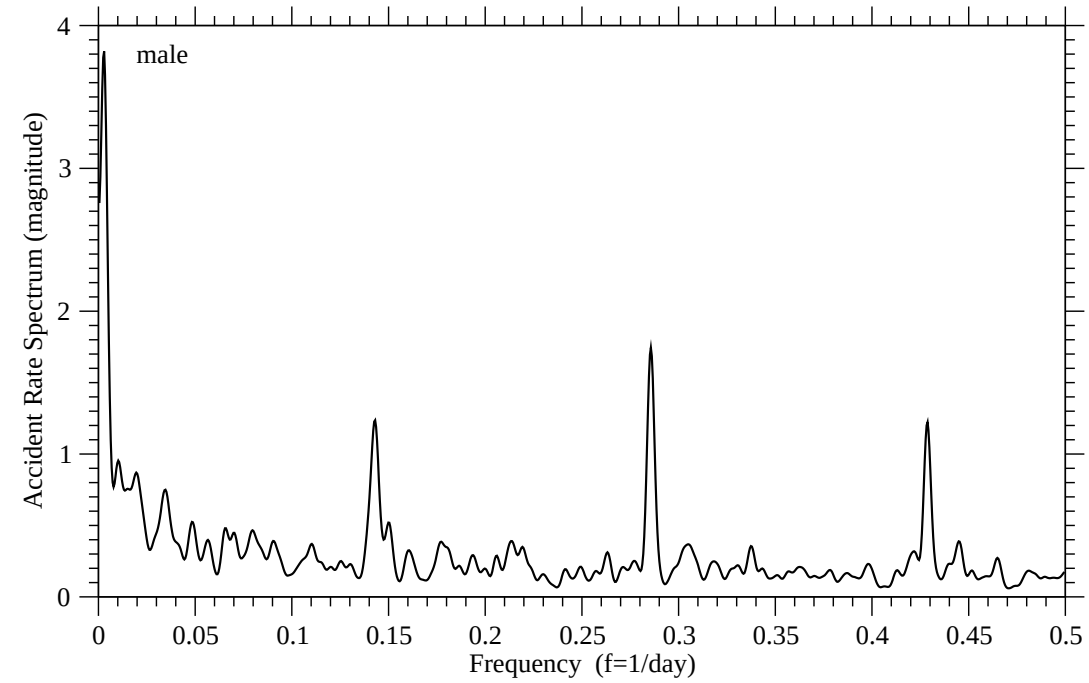

female
Y=(0.05±0.63)*X+(192±14); R=0.05±0.11
Accident Rate (1/day)
Daily Sum of k-index (DOB/Tromsö)
0
100
200
300
400
500
600
700
0
10
20
30
40
50
60
70


male
Y=(-0.37±0.22)*X+(385±41); R=-0.18±0.11
Accident Rate (1/day)
Solar Radio Flux (×10^4 Jy)
0
100
200
300
400
500
600
100
150
200
250
300


female
Y=(-0.21±0.15)*X+(230±28); R=-0.15±0.11
Accident Rate (1/day)
Solar Radio Flux (×10^4 Jy)
0
100
200
300
400
500
600
700
100
150
200
250
300


male
Y=(0.07±0.15)*X+(307±27); R=0.05±0.11
Accident Rate (1/day)
Sunspot Number
0
100
200
300
400
500
600


female
Y=(-0.02±0.10)*X+(196±18); R=-0.02±0.11
Accident Rate (1/day)
Sunspot Number
0
100
200
300
400
500
600
700


male
Accident Rate Spectrum (magnitude)
Frequency (f=1/day)
0
1
2
3
4
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5

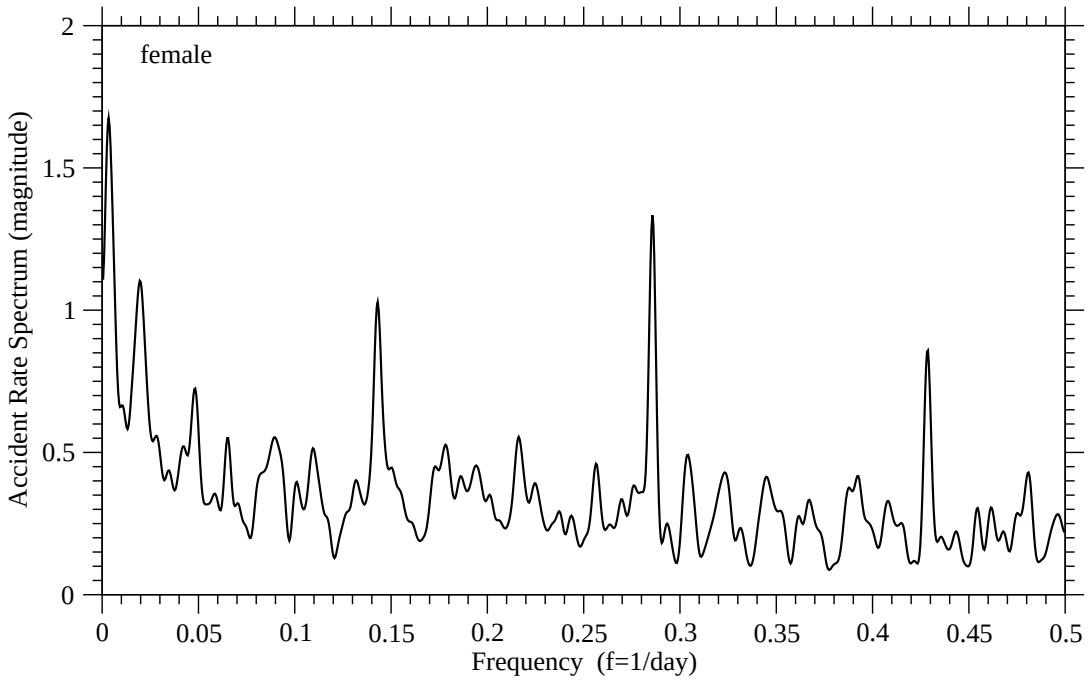

female
Accident Rate Spectrum (magnitude)
Frequency (f=1/day)
0
0.5
1
1.5
2
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5

Table of the data used in present investigation

No.	Date	Accident Rate male	Accident Rate female	Radio Flux	Sunspot Number	Magnetic Index
1	01.01.2001	305	138	171	119	7
2	02.01.2001	311	189	176	143	8
3	03.01.2001	260	204	170	128	15
4	04.01.2001	211	170	175	180	18
5	05.01.2001	196	152	176	158	11
6	06.01.2001	184	125	179	172	9
7	07.01.2001	166	127	177	183	11
8	08.01.2001	297	199	167	167	14
9	09.01.2001	231	160	166	140	13
10	10.01.2001	233	166	163	139	10
11	11.01.2001	255	173	166	173	13
12	12.01.2001	267	194	178	173	10
13	13.01.2001	183	117	184	146	12
14	14.01.2001	203	134	176	181	15
15	15.01.2001	320	191	169	154	11
16	16.01.2001	285	171	162	115	11
17	17.01.2001	282	201	152	71	12
18	18.01.2001	271	202	152	99	9
19	19.01.2001	311	243	153	134	10
20	20.01.2001	256	145	153	91	15
21	21.01.2001	210	154	152	108	25
22	22.01.2001	330	233	162	108	17
23	23.01.2001	260	196	167	178	19
24	24.01.2001	267	177	173	186	26
25	25.01.2001	273	228	169	163	11
26	26.01.2001	287	200	166	157	15
27	27.01.2001	251	124	167	134	8
28	28.01.2001	203	140	168	124	13
29	29.01.2001	324	216	165	142	19
30	30.01.2001	276	236	160	128	6
31	31.01.2001	259	182	153	130	23
32	01.02.2001	278	179	161	141	20
33	02.02.2001	232	141	166	109	11
34	03.02.2001	208	158	164	149	5
35	04.02.2001	192	152	164	164	5
36	05.02.2001	277	183	165	157	7
37	06.02.2001	243	143	170	161	18
38	07.02.2001	280	224	164	163	14
39	08.02.2001	278	216	157	168	10
40	09.02.2001	270	220	162	179	11
41	10.02.2001	225	175	161	172	10
42	11.02.2001	250	149	151	169	13
43	12.02.2001	358	257	145	106	11
44	13.02.2001	308	216	141	113	27
45	14.02.2001	296	195	138	99	28
46	15.02.2001	274	172	135	113	9
47	16.02.2001	290	197	130	133	8
48	17.02.2001	268	159	130	95	5
49	18.02.2001	245	256	132	143	8
50	19.02.2001	350	278	137	147	9
51	20.02.2001	291	214	146	119	12
52	21.02.2001	263	202	144	119	8
53	22.02.2001	256	182	146	135	9

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
54	23.02.2001	244	158	145	135	17
55	24.02.2001	223	158	137	99	12
56	25.02.2001	194	135	135	111	8
57	26.02.2001	294	231	135	91	19
58	27.02.2001	298	226	131	90	16
59	28.02.2001	287	212	132	88	12
60	01.03.2001	267	159	131	59	12
61	02.03.2001	268	176	130	77	17
62	03.03.2001	249	148	140	138	21
63	04.03.2001	204	160	141	157	28
64	05.03.2001	335	197	156	143	25
65	06.03.2001	219	175	158	131	16
66	07.03.2001	259	202	177	102	19
67	08.03.2001	287	177	167	98	15
68	09.03.2001	318	223	161	113	14
69	10.03.2001	226	161	160	131	12
70	11.03.2001	188	132	158	139	14
71	12.03.2001	274	195	158	174	19
72	13.03.2001	268	152	147	110	15
73	14.03.2001	253	163	142	159	15
74	15.03.2001	231	157	136	126	8
75	16.03.2001	236	170	140	86	11
76	17.03.2001	180	115	134	90	14
77	18.03.2001	172	139	140	91	17
78	19.03.2001	283	208	147	85	34
79	20.03.2001	232	152	153	98	47
80	21.03.2001	231	156	159	136	20
81	22.03.2001	212	140	183	129	21
82	23.03.2001	232	154	180	145	35
83	24.03.2001	230	133	219	204	20
84	25.03.2001	206	129	217	276	16
85	26.03.2001	276	184	264	339	14
86	27.03.2001	216	179	273	291	31
87	28.03.2001	247	151	274	352	38
88	29.03.2001	290	142	262	315	26
89	30.03.2001	234	161	257	349	22
90	31.03.2001	212	124	246	326	63
91	01.04.2001	193	114	258	320	38
92	02.04.2001	326	223	228	223	32
93	03.04.2001	237	158	223	228	15
94	04.04.2001	268	178	205	217	27
95	05.04.2001	267	167	210	214	27
96	06.04.2001	342	185	192	136	20
97	07.04.2001	307	171	180	153	28
98	08.04.2001	282	172	169	188	36
99	09.04.2001	377	226	165	185	27
100	10.04.2001	282	185	170	170	22
101	11.04.2001	305	176	160	178	39
102	12.04.2001	271	150	149	159	33
103	13.04.2001	176	98	137	138	34
104	14.04.2001	210	118	139	149	27
105	15.04.2001	172	101	134	100	21
106	16.04.2001	307	216	123	107	19
107	17.04.2001	247	155	126	89	20

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	Accident Rate female	Radio Flux	Sunspot Number	Magnetic Index
108	18.04.2001	234	153	132	63	36
109	19.04.2001	267	170	145	85	20
110	20.04.2001	271	173	180	103	16
111	21.04.2001	215	133	191	156	19
112	22.04.2001	254	142	193	164	38
113	23.04.2001	343	215	196	140	21
114	24.04.2001	336	190	194	175	16
115	25.04.2001	292	183	194	182	17
116	26.04.2001	315	187	196	193	16
117	27.04.2001	330	202	191	181	18
118	28.04.2001	278	126	188	173	32
119	29.04.2001	263	178	192	161	23
120	30.04.2001	340	259	188	178	10
121	01.05.2001	343	192	210	152	13
122	02.05.2001	353	233	176	179	13
123	03.05.2001	340	225	172	157	18
124	04.05.2001	378	240	176	186	17
125	05.05.2001	360	199	161	151	13
126	06.05.2001	293	182	155	120	13
127	07.05.2001	435	278	138	103	23
128	08.05.2001	344	211	129	88	25
129	09.05.2001	345	242	129	98	42
130	10.05.2001	388	214	130	94	32
131	11.05.2001	342	194	137	96	20
132	12.05.2001	314	179	138	127	34
133	13.05.2001	264	177	139	119	37
134	14.05.2001	408	266	138	149	23
135	15.05.2001	363	247	142	146	22
136	16.05.2001	347	210	138	125	17
137	17.05.2001	318	223	147	137	18
138	18.05.2001	351	221	138	109	20
139	19.05.2001	283	160	141	92	22
140	20.05.2001	245	170	142	99	16
141	21.05.2001	338	245	150	118	17
142	22.05.2001	289	190	152	159	18
143	23.05.2001	317	190	159	192	22
144	24.05.2001	287	166	170	171	17
145	25.05.2001	280	156	162	146	18
146	26.05.2001	304	152	147	167	15
147	27.05.2001	311	152	147	189	18
148	28.05.2001	413	213	143	190	32
149	29.05.2001	285	188	139	131	21
150	30.05.2001	284	168	132	105	11
151	31.05.2001	306	188	133	93	13
152	01.06.2001	314	174	133	120	20
153	02.06.2001	330	170	134	141	26
154	03.06.2001	276	172	145	143	20
155	04.06.2001	356	209	154	125	18
156	05.06.2001	318	199	153	160	15
157	06.06.2001	356	200	158	170	17
158	07.06.2001	339	159	165	163	19
159	08.06.2001	321	200	180	179	21
160	09.06.2001	260	158	177	250	33
161	10.06.2001	290	186	163	217	30

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
162	11.06.2001	335	227	162	249	23
163	12.06.2001	260	178	166	193	18
164	13.06.2001	261	111	181	221	20
165	14.06.2001	248	146	195	273	18
166	15.06.2001	297	167	197	264	19
167	16.06.2001	311	178	208	276	16
168	17.06.2001	320	193	205	289	20
169	18.06.2001	382	220	221	220	31
170	19.06.2001	327	204	195	222	23
171	20.06.2001	279	193	199	232	23
172	21.06.2001	328	173	200	212	26
173	22.06.2001	335	173	204	203	17
174	23.06.2001	336	153	206	228	18
175	24.06.2001	437	269	195	212	21
176	25.06.2001	479	311	182	220	16
177	26.06.2001	384	251	168	177	23
178	27.06.2001	354	255	148	185	20
179	28.06.2001	326	242	140	143	14
180	29.06.2001	376	212	140	98	16
181	30.06.2001	330	218	137	115	20
182	01.07.2001	338	236	135	108	21
183	02.07.2001	454	289	134	130	14
184	03.07.2001	389	233	132	132	17
185	04.07.2001	356	211	127	106	14
186	05.07.2001	382	254	120	101	16
187	06.07.2001	405	212	116	68	17
188	07.07.2001	367	222	118	77	10
189	08.07.2001	369	236	126	101	8
190	09.07.2001	482	333	130	109	12
191	10.07.2001	351	257	130	116	19
192	11.07.2001	335	220	132	115	21
193	12.07.2001	381	209	134	119	18
194	13.07.2001	327	195	133	146	19
195	14.07.2001	333	208	141	161	22
196	15.07.2001	345	225	142	142	21
197	16.07.2001	446	284	150	179	27
198	17.07.2001	322	223	146	191	28
199	18.07.2001	307	210	143	193	20
200	19.07.2001	370	233	142	180	20
201	20.07.2001	376	254	143	193	15
202	21.07.2001	344	221	139	153	15
203	22.07.2001	356	222	140	153	22
204	23.07.2001	430	322	143	143	22
205	24.07.2001	368	264	133	143	23
206	25.07.2001	379	272	133	96	25
207	26.07.2001	386	215	123	115	23
208	27.07.2001	350	266	121	96	17
209	28.07.2001	363	233	116	88	13
210	29.07.2001	355	212	117	59	16
211	30.07.2001	468	303	115	64	23
212	31.07.2001	387	213	117	85	29
213	01.08.2001	340	191	120	108	21
214	02.08.2001	315	226	121	113	15
215	03.08.2001	358	205	132	140	19

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	Accident Rate female	Radio Flux	Sunspot Number	Magnetic Index
216	04.08.2001	293	180	148	182	13
217	05.08.2001	299	211	156	214	0
218	06.08.2001	407	261	164	182	0
219	07.08.2001	325	199	166	177	0
220	08.08.2001	356	211	167	191	0
221	09.08.2001	349	230	163	157	9
222	10.08.2001	355	221	160	119	19
223	11.08.2001	320	199	165	151	16
224	12.08.2001	374	201	160	196	22
225	13.08.2001	415	252	152	141	28
226	14.08.2001	353	246	147	133	20
227	15.08.2001	357	200	147	155	17
228	16.08.2001	349	196	143	171	14
229	17.08.2001	364	256	145	158	34
230	18.08.2001	379	199	156	148	24
231	19.08.2001	347	249	158	142	18
232	20.08.2001	329	238	156	172	17
233	21.08.2001	420	298	160	169	24
234	22.08.2001	362	218	162	183	29
235	23.08.2001	324	208	170	194	20
236	24.08.2001	371	197	175	187	9
237	25.08.2001	288	187	199	132	23
238	26.08.2001	335	186	190	139	20
239	27.08.2001	391	314	192	182	23
240	28.08.2001	288	216	199	189	24
241	29.08.2001	304	199	197	136	15
242	30.08.2001	327	226	199	138	18
243	31.08.2001	318	172	189	142	22
244	01.09.2001	330	191	184	153	16
245	02.09.2001	327	214	183	141	17
246	03.09.2001	397	252	199	168	24
247	04.09.2001	313	197	218	168	23
248	05.09.2001	326	187	218	175	21
249	06.09.2001	328	207	222	204	18
250	07.09.2001	329	232	226	288	14
251	08.09.2001	278	189	250	281	16
252	09.09.2001	306	190	236	291	11
253	10.09.2001	440	266	245	217	14
254	11.09.2001	339	218	250	180	19
255	12.09.2001	291	181	235	228	21
256	13.09.2001	317	185	240	223	22
257	14.09.2001	320	167	237	216	20
258	15.09.2001	255	118	219	183	26
259	16.09.2001	300	178	207	169	17
260	17.09.2001	419	269	199	159	13
261	18.09.2001	313	222	204	215	18
262	19.09.2001	344	205	199	224	18
263	20.09.2001	351	165	227	276	16
264	21.09.2001	321	205	239	258	17
265	22.09.2001	296	167	255	293	16
266	23.09.2001	274	141	259	275	34
267	24.09.2001	417	233	279	315	19
268	25.09.2001	335	187	275	320	25
269	26.09.2001	303	182	283	278	31

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
270	27.09.2001	284	167	270	279	22
271	28.09.2001	299	159	266	234	25
272	29.09.2001	251	140	240	233	33
273	30.09.2001	231	114	236	230	35
274	01.10.2001	328	215	217	289	42
275	02.10.2001	316	164	201	236	41
276	03.10.2001	340	145	192	196	45
277	04.10.2001	323	170	187	231	26
278	05.10.2001	293	208	177	160	18
279	06.10.2001	288	186	180	181	16
280	07.10.2001	302	155	173	154	12
281	08.10.2001	431	233	171	130	24
282	09.10.2001	337	191	176	99	25
283	10.10.2001	320	187	179	133	17
284	11.10.2001	274	199	175	174	29
285	12.10.2001	270	163	179	179	33
286	13.10.2001	262	119	180	166	20
287	14.10.2001	256	152	192	178	21
288	15.10.2001	369	232	193	176	17
289	16.10.2001	309	164	207	168	17
290	17.10.2001	264	171	217	171	17
291	18.10.2001	285	170	229	182	13
292	19.10.2001	293	164	248	219	18
293	20.10.2001	266	141	245	230	19
294	21.10.2001	229	153	224	239	37
295	22.10.2001	366	169	233	207	52
296	23.10.2001	295	177	226	231	23
297	24.10.2001	261	160	239	230	12
298	25.10.2001	277	162	239	225	16
299	26.10.2001	261	125	237	239	15
300	27.10.2001	245	132	247	225	14
301	28.10.2001	239	116	227	229	37
302	29.10.2001	268	171	216	224	21
303	30.10.2001	223	126	226	205	14
304	31.10.2001	225	144	221	212	22
305	01.11.2001	224	117	236	157	28
306	02.11.2001	240	141	214	164	11
307	03.11.2001	243	112	216	162	10
308	04.11.2001	203	118	227	186	9
309	05.11.2001	299	152	235	159	23
310	06.11.2001	265	148	230	189	59
311	07.11.2001	230	162	269	230	24
312	08.11.2001	285	158	248	216	14
313	09.11.2001	244	135	271	175	14
314	10.11.2001	240	210	246	258	15
315	11.11.2001	209	133	234	222	10
316	12.11.2001	354	217	227	252	9
317	13.11.2001	300	157	232	234	12
318	14.11.2001	253	170	217	222	9
319	15.11.2001	226	169	207	219	15
320	16.11.2001	228	196	202	200	12
321	17.11.2001	245	161	199	157	19
322	18.11.2001	198	132	188	181	17
323	19.11.2001	352	228	191	168	23

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	Accident Rate female	Radio Flux	Sunspot Number	Magnetic Index
324	20.11.2001	294	187	185	160	15
325	21.11.2001	284	162	184	132	10
326	22.11.2001	287	170	190	143	14
327	23.11.2001	276	205	177	144	22
328	24.11.2001	279	161	173	124	50
329	25.11.2001	218	140	170	102	17
330	26.11.2001	305	221	175	122	12
331	27.11.2001	255	173	190	139	8
332	28.11.2001	254	151	199	180	7
333	29.11.2001	252	165	216	204	5
334	30.11.2001	244	190	226	158	7
335	01.12.2001	193	167	221	208	11
336	02.12.2001	230	136	245	271	8
337	03.12.2001	305	220	235	230	14
338	04.12.2001	262	197	233	214	14
339	05.12.2001	226	180	237	260	13
340	06.12.2001	277	166	247	226	16
341	07.12.2001	261	178	226	200	12
342	08.12.2001	233	152	221	218	12
343	09.12.2001	218	144	224	225	8
344	10.12.2001	306	195	219	224	9
345	11.12.2001	252	183	221	154	10
346	12.12.2001	231	184	237	183	18
347	13.12.2001	224	151	220	212	9
348	14.12.2001	261	169	245	202	12
349	15.12.2001	212	163	218	198	13
350	16.12.2001	237	157	209	204	17
351	17.12.2001	320	207	206	215	16
352	18.12.2001	275	189	212	210	15
353	19.12.2001	238	186	208	158	13
354	20.12.2001	247	177	221	171	9
355	21.12.2001	263	140	234	215	18
356	22.12.2001	213	131	243	234	16
357	23.12.2001	189	135	255	220	11
358	24.12.2001	192	151	275	176	20
359	25.12.2001	155	126	259	246	18
360	26.12.2001	169	112	268	290	11
361	27.12.2001	230	153	275	268	10
362	28.12.2001	229	143	263	263	7
363	29.12.2001	182	131	264	222	15
364	30.12.2001	166	111	247	218	21
365	31.12.2001	172	118	246	209	23
366	01.01.2002	295	162	232	222	16
367	02.01.2002	250	174	231	241	11
368	03.01.2002	259	158	220	229	5
369	04.01.2002	245	166	218	248	6
370	05.01.2002	223	164	212	201	5
371	06.01.2002	186	151	197	143	7
372	07.01.2002	285	246	189	158	12
373	08.01.2002	280	176	199	143	16
374	09.01.2002	269	212	229	159	7
375	10.01.2002	300	177	225	179	27
376	11.01.2002	283	187	229	195	31
377	12.01.2002	278	184	233	174	22

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
378	13.01.2002	219	158	241	190	18
379	14.01.2002	382	249	229	191	15
380	15.01.2002	323	191	218	155	14
381	16.01.2002	289	180	216	131	8
382	17.01.2002	269	175	212	122	13
383	18.01.2002	295	200	211	156	11
384	19.01.2002	269	154	214	153	18
385	20.01.2002	210	122	222	212	17
386	21.01.2002	382	216	225	187	19
387	22.01.2002	255	160	229	178	9
388	23.01.2002	311	190	227	272	13
389	24.01.2002	417	681	231	173	9
390	25.01.2002	416	334	235	196	14
391	26.01.2002	273	170	240	194	13
392	27.01.2002	224	152	248	189	11
393	28.01.2002	393	287	260	207	10
394	29.01.2002	326	250	261	214	8
395	30.01.2002	283	225	243	210	6
396	31.01.2002	301	159	243	238	10
397	01.02.2002	292	194	246	256	16
398	02.02.2002	278	180	241	222	22
399	03.02.2002	298	194	233	273	12
400	04.02.2002	406	287	235	274	12
401	05.02.2002	326	217	221	286	34
402	06.02.2002	352	205	203	226	27
403	07.02.2002	289	173	192	178	20
404	08.02.2002	320	175	192	229	18
405	09.02.2002	274	120	199	225	19
406	10.02.2002	196	124	217	205	13
407	11.02.2002	331	191	202	206	19
408	12.02.2002	308	158	208	182	18
409	13.02.2002	285	163	204	158	16
410	14.02.2002	251	168	196	209	6
411	15.02.2002	334	178	195	156	12
412	16.02.2002	279	159	194	134	13
413	17.02.2002	224	145	197	121	17
414	18.02.2002	322	208	193	103	17
415	19.02.2002	265	161	189	130	14
416	20.02.2002	298	170	193	157	15
417	21.02.2002	303	190	201	148	16
418	22.02.2002	267	178	192	161	14
419	23.02.2002	264	130	188	176	13
420	24.02.2002	240	172	193	191	13
421	25.02.2002	359	218	211	237	13
422	26.02.2002	313	175	208	223	15
423	27.02.2002	283	174	199	192	12
424	28.02.2002	263	158	204	188	29
425	01.03.2002	306	167	188	153	18
426	02.03.2002	286	157	191	153	16
427	03.03.2002	238	146	183	169	20
428	04.03.2002	380	231	175	197	21
429	05.03.2002	336	195	172	168	25
430	06.03.2002	301	198	178	191	25
431	07.03.2002	310	157	180	152	18

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
432	08.03.2002	328	212	177	133	12
433	09.03.2002	314	265	184	107	13
434	10.03.2002	290	172	179	114	15
435	11.03.2002	469	499	182	153	20
436	12.03.2002	403	297	178	139	16
437	13.03.2002	322	181	184	154	13
438	14.03.2002	289	191	181	162	7
439	15.03.2002	302	195	176	134	10
440	16.03.2002	286	152	185	124	11
441	17.03.2002	267	167	184	124	10
442	18.03.2002	391	201	178	136	22
443	19.03.2002	285	186	175	119	23
444	20.03.2002	295	140	188	141	14
445	21.03.2002	252	158	174	160	17
446	22.03.2002	260	146	172	194	12
447	23.03.2002	216	124	170	176	22
448	24.03.2002	218	139	175	169	35
449	25.03.2002	345	208	170	162	15
450	26.03.2002	305	157	166	145	21
451	27.03.2002	282	171	169	179	13
452	28.03.2002	331	154	176	144	11
453	29.03.2002	283	142	181	189	15
454	30.03.2002	327	159	189	171	26
455	31.03.2002	295	144	204	133	26
456	01.04.2002	394	231	207	189	23
457	02.04.2002	334	182	206	262	20
458	03.04.2002	353	193	209	162	21
459	04.04.2002	296	182	216	176	15
460	05.04.2002	302	169	217	200	14
461	06.04.2002	367	164	206	234	14
462	07.04.2002	315	143	208	227	15
463	08.04.2002	436	224	206	245	12
464	09.04.2002	325	187	205	212	12
465	10.04.2002	325	170	194	220	18
466	11.04.2002	366	179	197	235	20
467	12.04.2002	390	182	212	263	24
468	13.04.2002	376	203	226	257	23
469	14.04.2002	348	166	210	236	21
470	15.04.2002	374	248	203	243	18
471	16.04.2002	356	196	196	172	21
472	17.04.2002	320	160	194	137	40
473	18.04.2002	302	177	188	160	48
474	19.04.2002	344	163	180	182	49
475	20.04.2002	332	182	177	185	52
476	21.04.2002	329	174	173	160	19
477	22.04.2002	467	268	170	155	24
478	23.04.2002	384	212	175	180	29
479	24.04.2002	363	226	177	256	20
480	25.04.2002	375	199	167	208	15
481	26.04.2002	405	192	163	160	15
482	27.04.2002	368	207	157	173	20
483	28.04.2002	336	200	147	121	28
484	29.04.2002	436	243	153	124	19
485	30.04.2002	354	222	153	113	15

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
486	01.05.2002	353	204	162	166	15
487	02.05.2002	402	239	169	187	19
488	03.05.2002	397	247	179	242	18
489	04.05.2002	372	192	190	271	17
490	05.05.2002	369	208	180	317	14
491	06.05.2002	478	334	191	226	20
492	07.05.2002	422	270	187	217	19
493	08.05.2002	408	228	187	249	18
494	09.05.2002	409	224	190	244	16
495	10.05.2002	417	232	191	245	24
496	11.05.2002	406	196	188	226	36
497	12.05.2002	398	242	183	210	27
498	13.05.2002	504	296	172	168	21
499	14.05.2002	398	259	161	134	38
500	15.05.2002	377	212	159	137	25
501	16.05.2002	357	209	158	120	22
502	17.05.2002	400	218	157	134	19
503	18.05.2002	303	168	163	140	22
504	19.05.2002	311	151	171	155	19
505	20.05.2002	467	244	171	171	21
506	21.05.2002	378	231	186	185	21
507	22.05.2002	388	207	181	217	19
508	23.05.2002	429	215	180	229	42
509	24.05.2002	380	226	189	242	13
510	25.05.2002	362	152	183	221	14
511	26.05.2002	358	175	183	232	19
512	27.05.2002	498	296	187	227	31
513	28.05.2002	343	218	186	218	21
514	29.05.2002	424	207	185	206	20
515	30.05.2002	402	234	180	190	16
516	31.05.2002	403	217	182	202	15
517	01.06.2002	394	225	179	192	17
518	02.06.2002	396	197	175	189	29
519	03.06.2002	466	297	170	208	21
520	04.06.2002	423	217	170	217	24
521	05.06.2002	423	216	159	218	21
522	06.06.2002	409	221	155	190	18
523	07.06.2002	420	235	158	190	17
524	08.06.2002	396	216	155	181	23
525	09.06.2002	405	199	157	180	20
526	10.06.2002	484	280	152	177	27
527	11.06.2002	405	208	148	131	22
528	12.06.2002	353	211	142	134	18
529	13.06.2002	338	201	133	126	20
530	14.06.2002	309	182	131	102	17
531	15.06.2002	325	170	135	137	15
532	16.06.2002	367	183	137	132	18
533	17.06.2002	446	245	143	116	15
534	18.06.2002	405	240	143	174	22
535	19.06.2002	374	195	146	127	27
536	20.06.2002	414	225	145	122	17
537	21.06.2002	386	221	140	113	23
538	22.06.2002	428	205	142	102	19
539	23.06.2002	369	187	143	144	20

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
540	24.06.2002	456	242	150	133	15
541	25.06.2002	474	302	145	127	21
542	26.06.2002	365	191	144	102	16
543	27.06.2002	356	207	139	106	12
544	28.06.2002	357	156	137	94	12
545	29.06.2002	329	152	143	105	17
546	30.06.2002	299	165	147	111	25
547	01.07.2002	375	231	147	100	28
548	02.07.2002	376	171	149	85	16
549	03.07.2002	355	199	173	147	13
550	04.07.2002	388	194	146	175	14
551	05.07.2002	413	206	139	149	21
552	06.07.2002	384	209	134	123	35
553	07.07.2002	430	224	137	121	20
554	08.07.2002	524	278	131	125	18
555	09.07.2002	453	245	136	129	24
556	10.07.2002	430	266	129	118	20
557	11.07.2002	424	264	136	99	17
558	12.07.2002	426	290	133	93	28
559	13.07.2002	409	264	135	141	19
560	14.07.2002	429	263	144	152	13
561	15.07.2002	534	337	160	209	12
562	16.07.2002	460	263	172	182	23
563	17.07.2002	422	250	180	179	29
564	18.07.2002	439	231	181	166	16
565	19.07.2002	455	226	182	148	21
566	20.07.2002	414	218	185	136	33
567	21.07.2002	384	213	183	131	26
568	22.07.2002	479	299	190	176	25
569	23.07.2002	431	226	198	226	28
570	24.07.2002	382	228	208	270	19
571	25.07.2002	370	220	218	299	25
572	26.07.2002	370	215	242	319	22
573	27.07.2002	352	184	231	323	28
574	28.07.2002	397	218	239	300	28
575	29.07.2002	484	293	234	304	20
576	30.07.2002	432	236	227	297	17
577	31.07.2002	424	228	209	265	18
578	01.08.2002	376	241	193	259	28
579	02.08.2002	438	220	180	220	39
580	03.08.2002	441	246	168	218	27
581	04.08.2002	427	222	151	150	25
582	05.08.2002	512	287	142	144	15
583	06.08.2002	454	210	145	135	16
584	07.08.2002	397	225	136	141	15
585	08.08.2002	412	228	135	150	18
586	09.08.2002	456	225	140	164	23
587	10.08.2002	414	241	148	140	29
588	11.08.2002	443	263	172	180	25
589	12.08.2002	555	309	184	230	23
590	13.08.2002	443	240	192	214	23
591	14.08.2002	404	255	208	254	25
592	15.08.2002	400	247	210	281	30
593	16.08.2002	446	243	214	247	22

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
594	17.08.2002	454	232	227	270	20
595	18.08.2002	409	212	241	308	26
596	19.08.2002	489	279	237	247	37
597	20.08.2002	354	191	228	209	38
598	21.08.2002	442	259	220	238	34
599	22.08.2002	411	234	220	205	22
600	23.08.2002	387	257	225	207	18
601	24.08.2002	403	228	196	199	19
602	25.08.2002	368	240	179	136	17
603	26.08.2002	513	305	169	105	28
604	27.08.2002	378	250	161	133	24
605	28.08.2002	364	238	163	87	20
606	29.08.2002	403	217	169	146	19
607	30.08.2002	351	237	170	150	18
608	31.08.2002	429	228	180	153	17
609	01.09.2002	409	250	181	187	21
610	02.09.2002	452	269	174	227	17
611	03.09.2002	380	237	171	266	17
612	04.09.2002	413	211	171	215	39
613	05.09.2002	404	228	175	225	17
614	06.09.2002	440	225	178	189	17
615	07.09.2002	387	228	183	180	42
616	08.09.2002	422	218	192	221	30
617	09.09.2002	497	289	206	194	24
618	10.09.2002	430	243	221	226	36
619	11.09.2002	415	213	216	213	37
620	12.09.2002	374	241	212	258	26
621	13.09.2002	422	259	206	246	21
622	14.09.2002	387	174	207	256	16
623	15.09.2002	306	148	188	168	16
624	16.09.2002	376	211	183	190	14
625	17.09.2002	336	208	194	228	19
626	18.09.2002	318	161	177	225	21
627	19.09.2002	339	194	165	206	22
628	20.09.2002	383	175	164	237	10
629	21.09.2002	306	151	159	217	13
630	22.09.2002	275	176	160	218	14
631	23.09.2002	414	208	154	209	10
632	24.09.2002	337	171	158	240	11
633	25.09.2002	320	201	153	230	13
634	26.09.2002	357	177	150	157	18
635	27.09.2002	343	176	152	185	17
636	28.09.2002	373	174	149	140	13
637	29.09.2002	331	188	138	146	12
638	30.09.2002	443	239	140	94	26
639	01.10.2002	363	201	140	105	45
640	02.10.2002	359	187	136	99	39
641	03.10.2002	341	161	146	81	46
642	04.10.2002	338	168	158	98	46
643	05.10.2002	333	151	155	155	40
644	06.10.2002	311	151	162	126	22
645	07.10.2002	401	207	164	143	44
646	08.10.2002	339	169	165	128	33
647	09.10.2002	300	143	167	226	27

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	Accident Rate female	Radio Flux	Sunspot Number	Magnetic Index
648	10.10.2002	290	183	172	244	25
649	11.10.2002	315	137	179	178	16
650	12.10.2002	304	144	180	171	15
651	13.10.2002	285	131	179	167	13
652	14.10.2002	359	202	181	175	27
653	15.10.2002	331	173	177	165	24
654	16.10.2002	267	182	183	182	22
655	17.10.2002	306	157	179	215	22
656	18.10.2002	316	178	173	200	22
657	19.10.2002	312	142	180	156	22
658	20.10.2002	272	181	180	179	19
659	21.10.2002	397	203	183	139	18
660	22.10.2002	316	187	169	132	16
661	23.10.2002	315	172	164	116	18
662	24.10.2002	331	315	160	149	44
663	25.10.2002	298	208	173	151	37
664	26.10.2002	276	149	158	143	26
665	27.10.2002	264	142	157	120	36
666	28.10.2002	284	189	158	143	28
667	29.10.2002	222	161	162	168	22
668	30.10.2002	251	135	168	182	19
669	31.10.2002	292	156	170	134	23
670	01.11.2002	268	136	162	169	17
671	02.11.2002	255	121	165	177	34
672	03.11.2002	221	112	169	217	37
673	04.11.2002	300	167	177	166	29
674	05.11.2002	300	157	183	175	27
675	06.11.2002	327	156	185	234	29
676	07.11.2002	300	165	190	259	19
677	08.11.2002	310	183	189	252	11
678	09.11.2002	305	151	191	174	14
679	10.11.2002	270	145	191	219	17
680	11.11.2002	368	256	185	197	16
681	12.11.2002	314	192	178	155	18
682	13.11.2002	302	188	182	182	19
683	14.11.2002	307	189	184	185	16
684	15.11.2002	301	180	198	185	17
685	16.11.2002	262	145	199	162	12
686	17.11.2002	273	130	185	139	14
687	18.11.2002	356	201	179	119	21
688	19.11.2002	298	169	168	105	20
689	20.11.2002	310	150	159	108	31
690	21.11.2002	286	163	151	143	40
691	22.11.2002	267	199	149	124	29
692	23.11.2002	264	155	148	126	23
693	24.11.2002	267	132	146	123	22
694	25.11.2002	372	215	137	106	20
695	26.11.2002	289	198	142	100	19
696	27.11.2002	310	154	143	112	28
697	28.11.2002	285	157	140	124	19
698	29.11.2002	269	153	141	107	22
699	30.11.2002	212	128	146	150	19
700	01.12.2002	210	116	150	97	20
701	02.12.2002	330	237	146	155	18

Table of the data used in present investigation: *continued*

No.	Date	Accident Rate male	female	Radio Flux	Sunspot Number	Magnetic Index
702	03.12.2002	289	187	146	135	18
703	04.12.2002	276	158	149	144	15
704	05.12.2002	293	179	149	153	16
705	06.12.2002	275	151	148	112	13
706	07.12.2002	274	132	151	106	23
707	08.12.2002	242	132	154	150	17
708	09.12.2002	349	209	156	189	11
709	10.12.2002	286	161	161	142	8
710	11.12.2002	264	163	152	171	4
711	12.12.2002	293	166	153	129	8
712	13.12.2002	276	156	167	176	7
713	14.12.2002	253	123	186	214	19
714	15.12.2002	235	139	203	217	10
715	16.12.2002	303	185	203	194	10
716	17.12.2002	280	181	213	252	8
717	18.12.2002	233	138	197	261	7
718	19.12.2002	216	140	193	225	29
719	20.12.2002	247	144	197	203	26
720	21.12.2002	258	155	184	199	27
721	22.12.2002	226	162	172	168	15
722	23.12.2002	249	167	159	160	28
723	24.12.2002	204	136	147	119	23
724	25.12.2002	163	127	132	77	18
725	26.12.2002	182	126	127	62	17
726	27.12.2002	234	167	117	63	36
727	28.12.2002	176	112	117	70	26
728	29.12.2002	191	142	115	51	19
729	30.12.2002	193	132	114	44	17
730	31.12.2002	122	104	115	50	15

Kosmose ilmastiku mõju inimesele.

Antud uurimuse ajendiks oli laialt levinud arvamus, et inimeste käitumist väga oluliselt mõjutab kosmose ilmastik, seda eelkõige päikesetuulest tingitud magnettormide kaudu ja Kuu faas. Uurimuse aluseks olid Eesti Haigekassast legaalselt saadud andmed kõigi registreeritud traumade (kood S... ja T...) kohta kahe aasta (2001-2002) vältel. Traumad on taolise uuringu jaoks eelistatud, kuna nende toimumise korral pöördutakse arsti poole võimalikult kiiresti ja ajaline viivitus on tühine võrreldes näiteks krooniliste haigustega. Kokku registreeriti selle ajavahemiku jooksul 373354 traumat. Andmemassiivi esialgse töötlemise käigus ilmnes selgelt nädalane perioodilisus - nädalavahetusel registreeriti traumasi tunduvalt vähem ja esmaspäeval tunduvalt enam, kui keskmiselt , mis on ka ootuspärane. Tugevalt avaldub sõltuvus aastajast. Samuti ootuspäraselt esines traumasi naistel (140781) oluliselt vähem, kui meestel (232573). Eriti ilmekas on aga ealise traumade esinemise sageduse sõltuvuse erinevus meestel ja naistel. Kuigi nende seoste vaatlemine ei olnud põhieesmärgiks, võivad nad huvi pakkuda. Samal ajal töö põhieesmäärgiks olnud Päikese aktiivsusega seonduvat traumade esinemise olulist sõltuvust ei esine vaadeldud ajavahemikus. Samuti ei esine sõltuvust Kuu faasist.

Kuna varasemate uuringutega on saadud ka teistsuguseid tulemusi ja sarnase iseloomuga teadmised on olulised „käibetõed“, on otstarbekas jätkata taolisi uurimusi.

Täname Vladislav Pustõnskit käsikirja kontrollimise eest ja Eesti Haigekassat vajaliku lähtematerjali meie kasutusesse andmise eest.

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