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GEOPHYSICAL OBSERVATORY

2002/2004

REPORTS

OF THE GEODETIC AND GEOPHYSICAL  
RESEARCH INSTITUTE OF THE HUNGARIAN  
ACADEMY OF SCIENCES

YEAR

2002–2004

NAGYCENK GEOPHYSICAL OBSERVATORY



SOPRON

2006



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IAGA CODE: NCK

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SOPRON

2006  
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## Preface

The Széchenyi István Geophysical Observatory of the Hungarian Academy of Sciences is pleased to present the 2002–2004 report in the Geophysical Observatory Report series.

Nagyecenk Geophysical Observatory has been supplying data since 1957. Geophysical Observatory Reports comprise earth current data from 1957 on, geomagnetic data from 1961 on and atmospheric electricity data from 1962 on.

Further information and data including archived data are available by special arrangement at the institute:

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Sopron, November 2006

*V. Wesztergom*

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# I. DESCRIPTION OF THE OBSERVATORY

V. WESZTERGOM

Nagyecenk Geophysical Observatory was founded in 1956–1957 and it has been operated since then by the Geodetic and Geophysical Institute of the Earth Science Center, Hungarian Academy of Sciences.

The observatory is situated about 10 km to E of the city Sopron and 60 km SE of Vienna, on the southern shore of lake Fertő. The observatory lies on thick conductive sediment preserving the site from far industrial noise and it is surrounded by the Fertő-Hanság National Park which helps to shelter the long term measurements from any change caused by nearby manmade activity.

## *The co-ordinates of the observatory*

3-character IAGA code: **NCK**

Geographic co-ordinates:

$$\varphi = 47^{\circ}38' \text{ (N)}$$

$$\lambda = 16^{\circ}43' \text{ (E)}$$

$$\text{Altitude} = 153.70 \text{ m (magnetic house)}$$

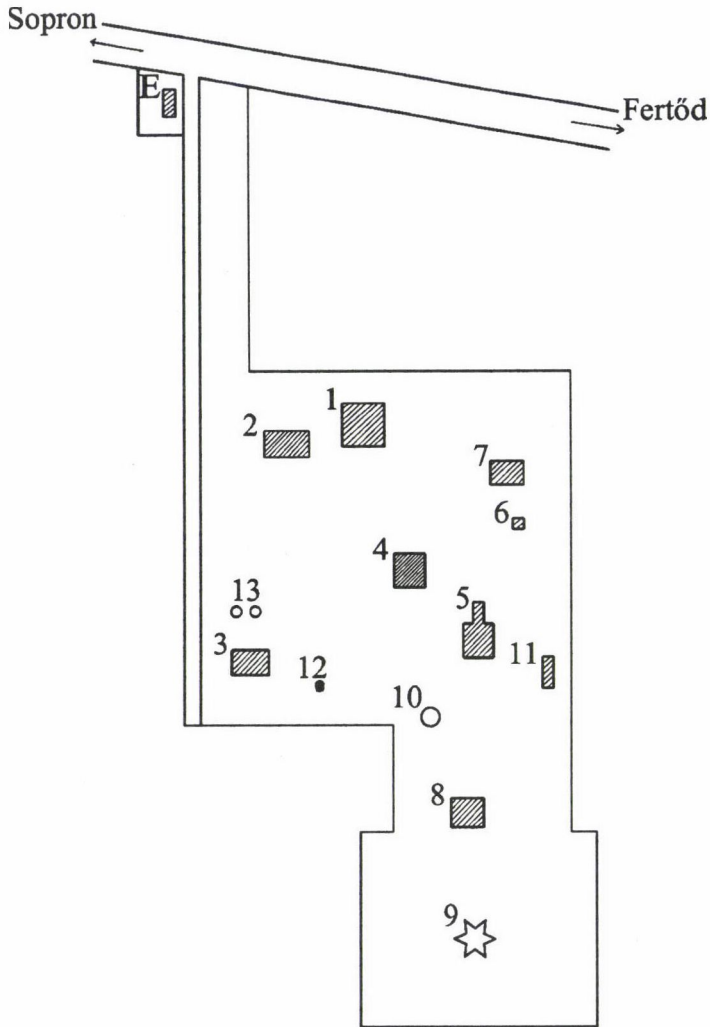
$$\text{McIllwain } L = 1.9$$

Measurements and reports started in 1957 (International Geophysical Year) with earth current data. The potential differences are measured in N-S and E-W directions with electrode spacings of 500 m. Low polarization lead plate electrodes are buried about 2 m below the surface. Potential differences are recorded with 1 sec and 10 sec sampling rate.

Continuous observation of atmospheric electricity started in 1962. Slow variation (DC component of vertical atmospheric electric field) is measured between the ground and an electrode (at 1 m height) around which the potential is equalized by means of a radioactive collector. Potential gradient is recorded with 15 sec sampling rate.

The publication of point discharge data has been abandoned from the year 2002.

Table I. Observatory site diagram



E – Entrance, 1 – Main building with staff hostel and electronic laboratory, 2 – Telluric instruments and office, 3 – Atmospheric electricity centre (laboratory of Schumann resonance, potential gradient, point discharge and radiowave absorption measurements), 4 – Magnetic absolute house with four pillars, 5 – Underground magnetic variometer chambers, 6 – Proton magnetometer (DI/DD) hut, 7 – Computer centre ( data loggers, server of local network, satellite transmitter) 8 – Ionosonde station, electric and mechanical workshop, 9 – Ionosonde D-antenna, 10 – Meteorological station, 11 – ELF induction coil chamber, 12 Ball antenna (Schumann resonance antenna), 13 – Potential gradient sensors

Continuous observation of geomagnetic elements with control of the absolute observations began in 1961. The observatory has belonged to the INTERMAGNET co-operation since 1993. Data are transmitted via METEOSAT satellite to geomagnetic information nodes and made also available to the international research community on CD ROM.

The early nineties are to be considered as a transition period in the observatory again. Schumann resonance measurements started in 1993, an ionosonde station type IPS 42 works since 1996 and a scientific meteorological station was installed in 1996. The meteorological station is based on a Campbell CR10X measurement and control modul, temperature, humidity, wind speed, wind direction, rainfall and radiation sensors.



## II. GEOMAGNETISM

### ELECTRIC ACTIVITY INDICES

The 3-hour electric activity indices T for the  $E_x$  and  $E_y$  component, have a linear scale with a step of 1.8 mV/Km. The range of values is 0 to 9.

Values in brackets mean extrapolated data, where the lacking intervals were substituted by the average of recorded intervals.

Times are given in CET (i.e. UT + 1 h), nearly corresponding to LT (-7 min).

A detailed description of the processing and compilation is found in the Report of the Observatory for 1966 in German and *Ádám A, Verő J, Cz. Miletits J, Holló L, Wallner Á: The geophysical observatory near Nagycenk. I. Electromagnetic measurements and processing of data (Acta Geod. Geoph. Mont. Hung., 16, 1981, 333).*

See CD (program Seenck.exe, menu item Tellurics/Indices).

## ELECTRIC ACTIVITY INDICES 2002

Date	T	Sum	Date	T	Sum
020101	01211131	10	020211	41142222	18
020102	01013121	9	020212	32221111	13
020103	00110000	2	020213	11253421	19
020104	00001000	1	020214	00131000	5
020105	00000000	0	020215	00011321	8
020106	00000001	1	020216	00111110	5
020107	01112121	9	020217	04331113	16
020108	23222100	12	020218	11222234	17
020109	00010110	3	020219	12121011	9
020110	11126952	27	020220	00113112	9
020111	65644483	40	020221	12222122	14
020112	32453442	27	020222	12222151	16
020113	13233213	18	020223	11121100	7
020114	11322111	12	020224	01121101	7
020115	11111111	8	020225	10122113	11
020116	01110000	3	020226	01121112	9
020117	23122310	14	020227	20111101	7
020118	20001100	4	020228	19346227	34
020119	00133444	19	020301	64111010	14
020120	44232112	19	020302	01112221	10
020121	13232112	15	020303	11223113	14
020122	01111111	7	020304	31332512	20
020123	11121062	14	020305	45545243	32
020124	01111100	5	020306	22353135	24
020125	01113332	14	020307	11223102	12
020126	22122111	12	020308	11321000	8
020127	11121111	9	020309	01021110	6
020128	11131111	10	020310	00123101	8
020129	01012000	4	020311	23112111	12
020130	00000001	1	020312	11243123	17
020131	10000003	4	020313	11132000	8
020201	52235311	22	020314	10110000	3
020202	23342222	20	020315	00210011	5
020203	11111100	6	020316	10101100	4
020204	01111111	7	020317	00010000	1
020205	33146157	30	020318	11119443	24
020206	45674433	36	020319	55832112	27
020207	12553212	21	020320	10002641	14
020208	22133221	16	020321	21331221	15
020209	11121115	13	020322	25421100	15
020210	12222101	11	020323	00116324	17



## ELECTRIC ACTIVITY INDICES 2002

11

Date	T	Sum	Date	T	Sum
020324	57734333	35	020504	02311111	10
020325	11111521	13	020505	00121110	6
020326	13457113	25	020506	11111332	13
020327	10223113	13	020507	21111221	11
020328	00000000	0	020508	22111111	10
020329	00001114	7	020509	20112110	8
020330	44659532	38	020510	11117545	25
020331	26995464	45	020511	21269988	45
020401	67214397	39	020512	52322212	19
020402	33472321	25	020513	33223311	18
020403	43552222	25	020514	13333375	28
020404	11212101	9	020515	24421223	20
020405	01101010	4	020516	11121111	9
020406	00112012	7	020517	21111211	10
020407	11222110	10	020518	21121119	18
020408	00111010	4	020519	55410000	15
020409	00101001	3	020520	05213440	19
020410	00112111	7	020521	21320101	10
020411	11353313	20	020522	61222222	19
020412	42233441	23	020523	33319995	42
020413	23223122	17	020524	11110110	6
020414	22125411	18	020525	00101011	4
020415	11111122	10	020526	11111122	10
020416	12211102	10	020527	23343522	24
020417	11239994	38	020528	23423211	18
020418	98436333	39	020529	12211211	11
020419	43399996	52	020530	12211211	11
020420	99953974	55	020531	11100001	4
020421	12112011	9	020601	00011011	4
020422	22322121	15	020602	34322222	20
020423	19873733	41	020603	42311111	14
020424	22211111	11	020604	23222111	14
020425	21111110	8	020605	22211101	10
020426	01111111	7	020606	11111111	8
020427	11132223	15	020607	10100112	6
020428	54364221	27	020608	10113434	17
020429	11232123	15	020609	22211122	13
020430	21122211	12	020610	12322432	19
020501	01111011	6	020611	11212111	10
020502	21111211	10	020612	21111111	9
020503	12411111	12	020613	21111112	10

## ELECTRIC ACTIVITY INDICES 2002

Date	T	Sum	Date	T	Sum
020614	01001111	5	020725	01112523	15
020615	10110001	4	020726	42222223	19
020616	32213110	13	020727	13222312	16
020617	11100111	6	020728	22322221	16
020618	00114222	12	020729	11212931	20
020619	14522222	20	020730	11211322	13
020620	21211101	9	020731	22112220	12
020621	01211121	9	020801	01427766	33
020622	11101111	7	020802	98735547	48
020623	11211121	10	020803	63233122	22
020624	11201111	8	020804	12422221	16
020625	12211211	11	020805	01111111	7
020626	21011210	8	020806	12211100	8
020627	00000001	1	020807	11111110	7
020628	00001010	2	020808	01101123	9
020629	01101012	6	020809	41113323	18
020630	21211112	11	020810	42422212	19
020701	32323322	20	020811	12113223	15
020702	11221011	9	020812	22232221	16
020703	00111101	5	020813	22211111	11
020704	01400011	7	020814	11211433	16
020705	22322222	17	020815	22233357	27
020706	34665431	32	020816	33341210	17
020707	31211211	12	020817	01221211	10
020708	11111113	10	020818	12221194	22
020709	31232232	18	020819	64457324	35
020710	12222121	13	020820	62243329	31
020711	11011112	8	020821	94342433	32
020712	12435421	22	020822	43240111	16
020713	11422210	13	020823	11111112	9
020714	11111110	7	020824	11111101	7
020715	00211123	10	020825	10111101	6
020716	12122322	15	020826	11316543	24
020717	33221292	24	020827	22229911	28
020718	23231000	11	020828	51131213	17
020719	01118362	22	020829	12112221	12
020720	35533323	27	020830	01232411	14
020721	45335565	36	020831	01211111	8
020722	12322422	18	020901	31111111	10
020723	22322338	25	020902	41223010	13
020724	12211112	11	020903	00125234	17

## ELECTRIC ACTIVITY INDICES 2002

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Date	T	Sum	Date	T	Sum
020904	29954452	40	021015	32153396	32
020905	22412110	13	021016	23523322	22
020906	11122211	11	021017	23232522	21
020907	12231299	29	021018	22432125	21
020908	99642114	36	021019	32233212	18
020909	21111113	11	021020	11232112	13
020910	54133237	28	021021	31123213	16
020911	71235354	30	021022	31123243	19
020912	42222213	18	021023	11112342	15
020913	12222221	14	021024	84488799	57
020914	12221210	11	021025	57677634	45
020915	11101111	7	021026	32468475	39
020916	10115412	15	021027	44334975	39
020917	00222223	13	021028	54543234	30
020918	12134321	17	021029	22331213	17
020919	21223342	19	021030	11332123	16
020920	21211101	9	021031	42154551	27
020921	11123211	12	021101	11112130	10
020922	11112211	10	021102	62346398	41
020923	11111000	5	021103	34458498	45
020924	00111100	4	021104	34322444	26
020925	00111200	5	021105	45455634	36
020926	11121012	9	021106	42445375	34
020927	21112110	9	021107	23242222	19
020928	10121121	9	021108	01131020	8
020929	10211211	9	021109	10211053	13
020930	12367439	35	021110	93661211	29
021001	82334999	47	021111	20124202	13
021002	96434999	53	021112	14247114	24
021003	98634394	46	021113	43345111	22
021004	99443399	50	021114	21112121	11
021005	99743593	49	021115	22122122	14
021006	65233685	38	021116	31111012	10
021007	22232335	22	021117	32111111	11
021008	63553469	41	021118	21112132	13
021009	81243274	31	021119	23221133	17
021010	32332101	15	021120	52133179	31
021011	31112112	12	021121	56998857	57
021012	11110101	6	021122	43365584	38
021013	12346821	27	021123	33332441	23
021014	32265333	27	021124	21131353	19

## ELECTRIC ACTIVITY INDICES 2002

Date	T	Sum
021125	21224514	21
021126	31111137	18
021127	86524132	31
021128	11232144	18
021129	11222242	16
021130	22233232	19
021201	24334414	25
021202	41223323	20
021203	12223222	16
021204	11122142	14
021205	11111110	7
021206	01121222	11
021207	44345234	29
021208	23332321	19
021209	20111111	8
021210	11111001	6
021211	00111000	3
021212	00101100	3
021213	10001011	4
021214	11123344	19
021215	31212101	11
021216	11111001	6
021217	11100000	3
021218	11101100	5
021219	13434669	36
021220	31323288	30
021221	84732121	28
021222	10122668	26
021223	12363273	27
021224	30244944	30
021225	23212242	18
021226	10112234	14
021227	45867954	48
021228	43345341	27
021229	11222432	17
021230	01121124	12
021231	21111001	7

Date	T	Sum	Date	T	Sum
030101	01111103	8	030211	42121110	12
030102	31111111	10	030212	01132427	20
030103	41222977	34	030213	11122004	11
030104	73343232	27	030214	42243231	21
030105	11111113	10	030215	44476642	37
030106	11111102	8	030216	22364343	27
030107	11111041	10	030217	43354132	25
030108	11011001	5	030218	28965935	47
030109	00001011	3	030219	22125425	23
030110	11112132	12	030220	22364363	29
030111	52111113	15	030221	13241414	20
030112	11112121	10	030222	12222312	15
030113	22111111	10	030223	21232222	16
030114	32212101	12	030224	11122102	10
030115	11012111	8	030225	11222224	16
030116	12121011	9	030226	55224224	26
030117	00112210	7	030227	59346435	39
030118	11222213	14	030228	41345432	26
030119	22224373	25	030301	32332243	22
030120	15333132	21	030302	12222263	20
030121	32342332	22	030303	21124494	27
030122	33222154	22	030304	54355555	37
030123	75222332	26	030305	21233646	27
030124	33233364	27	030306	44254567	37
030125	35598422	38	030307	24233123	20
030126	62324244	27	030308	11122222	13
030127	56111343	24	030309	11322125	17
030128	45222224	23	030310	11132427	21
030129	11124764	26	030311	31322141	17
030130	83335631	32	030312	11212114	13
030131	32343211	19	030313	32313111	15
030201	12001259	20	030314	12457353	30
030202	89965995	60	030315	45646454	38
030203	72134254	28	030316	22457599	43
030204	24572173	31	030317	23844739	40
030205	22233242	20	030318	66866622	42
030206	11133233	17	030319	23422132	19
030207	22222232	17	030320	12756556	37
030208	32134223	20	030321	64554247	37
030209	42133374	27	030322	32442125	23
030210	24322031	17	030323	42342252	24

## ELECTRIC ACTIVITY INDICES 2003

Date	T	Sum	Date	T	Sum
030324	323111110	12	030504	21112211	11
030325	01101111	6	030505	11222663	23
030326	01111122	9	030506	44447756	41
030327	63345323	29	030507	56665654	43
030328	22343657	32	030508	43554495	39
030329	63334395	36	030509	44599662	45
030330	86244468	42	030510	69840442	37
030331	93233999	47	030511	35455333	31
030401	56322149	32	030512	23434427	29
030402	11222246	20	030513	33644444	32
030403	61322234	23	030514	44632683	36
030404	53433236	29	030515	23433552	27
030405	32323249	28	030516	32221123	16
030406	32221130	14	030517	21212211	12
030407	20101311	9	030518	11201144	14
030408	17345421	27	030519	31321212	15
030409	34243222	22	030520	22212101	11
030410	13344337	28	030521	12212267	23
030411	23533326	27	030522	65422614	30
030412	52311321	18	030523	12222241	16
030413	12332111	14	030524	22333333	22
030414	22214433	21	030525	42323121	18
030415	53333222	23	030526	24321112	16
030416	45456656	41	030527	32323337	26
030417	33545464	34	030528	55855455	42
030418	12334523	23	030529	54429999	51
030419	31312123	16	030530	99965997	63
030420	32222122	16	030531	99621211	31
030421	52343324	26	030601	02442324	21
030422	25336223	26	030602	56664325	37
030423	31334324	23	030603	43534334	29
030424	21224457	27	030604	64245573	36
030425	23432223	21	030605	21122321	14
030426	91132337	29	030606	12232233	18
030427	11212124	14	030607	44433535	31
030428	42421201	16	030608	34559686	46
030429	00211279	22	030609	43434334	28
030430	44422588	37	030610	62563333	31
030501	77654842	43	030611	22225213	19
030502	24332322	21	030612	11221211	11
030503	12312221	14	030613	11000223	9

Date	T	Sum	Date	T	Sum
030614	24224544	27	030725	31112111	11
030615	43532232	24	030726	33224589	36
030616	27344476	37	030727	68753322	36
030617	72646994	47	030728	24113632	22
030618	43895454	42	030729	35556585	42
030619	33532223	23	030730	54743455	37
030620	11332322	17	030731	54664546	40
030621	33321226	22	030801	47555643	39
030622	11222133	15	030802	83533536	36
030623	23423122	19	030803	42664234	31
030624	24334412	23	030804	11321194	22
030625	12332233	19	030805	31111112	11
030626	42327643	31	030806	58333311	27
030627	36444543	33	030807	11213559	27
030628	42646954	40	030808	45995674	49
030629	45475534	37	030809	32544324	27
030630	44263222	25	030810	32222111	14
030701	13211111	11	030811	11313234	18
030702	11122232	14	030812	44566343	35
030703	22112344	19	030813	22432212	18
030704	45656542	37	030814	23225332	22
030705	35335444	31	030815	22222422	18
030706	12122432	17	030816	22212212	14
030707	13232311	16	030817	11111994	27
030708	00101110	4	030818	56965998	57
030709	00101112	6	030819	94264162	34
030710	11133313	16	030820	21231243	18
030711	23242845	30	030821	63696669	51
030712	98953232	41	030822	85875567	51
030713	43422231	21	030823	36464373	36
030714	11222332	16	030824	32333344	25
030715	64444117	31	030825	22533222	21
030716	54559438	43	030826	21111224	14
030717	64334329	34	030827	21111112	10
030718	72311122	19	030828	23232122	17
030719	33334343	26	030829	21123499	31
030720	93532322	29	030830	24423211	19
030721	33121118	20	030831	11111111	8
030722	11012110	7	030901	12421152	18
030723	11221322	14	030902	12223311	15
030724	22101222	12	030903	32243233	22

Date	T	Sum	Date	T	Sum
030904	22434656	32	031015	73697999	59
030905	42343321	22	031016	65343554	35
030906	12223222	16	031017	52444222	25
030907	21111010	7	031018	32333532	24
030908	10101111	6	031019	43444997	44
030909	32344445	29	031020	64342669	40
030910	52354243	28	031021	95548999	58
030911	33322234	22	031022	94655992	49
030912	22323211	16	031023	13153110	15
030913	32211012	12	031024	01232999	35
030914	11111111	8	031025	97747525	46
030915	30000002	5	031026	11131146	18
030916	36233743	31	031027	32221110	12
030917	38577996	54	031028	05579594	44
030918	74569699	55	031029	55999999	64
030919	63565796	47	031030	99887999	68
030920	22433572	28	031031	99999954	63
030921	22232333	20	031101	64362346	34
030922	22224447	27	031102	32452272	27
030923	02222231	14	031103	33321222	18
030924	35586757	46	031104	33992122	31
030925	54466977	48	031105	10120123	10
030926	12333323	20	031106	31112269	25
030927	31111101	9	031107	22312121	14
030928	10111111	7	031108	10121521	13
030929	10101001	4	031109	12239794	37
030930	00111211	7	031110	32344496	35
031001	13111113	12	031111	76789987	61
031002	51111112	13	031112	44555994	45
031003	22421241	18	031113	43359998	50
031004	21122100	9	031114	63765595	46
031005	00110113	7	031115	23986975	49
031006	41123422	19	031116	44575967	47
031007	44553342	30	031117	54866995	52
031008	32121112	13	031118	74477693	47
031009	32132110	13	031119	21141540	18
031010	00111101	5	031120	12399999	51
031011	10100011	4	031121	99932133	39
031012	00111111	6	031122	32234999	41
031013	12112228	19	031123	53533226	29
031014	22343499	36	031124	22233422	20



Date	T	Sum
031125	32343631	25
031126	12222112	13
031127	11212011	9
031128	01112100	6
031129	11111101	7
031130	13121362	19
031201	33123112	16
031202	21231001	10
031203	00110110	4
031204	10000012	4
031205	23334625	28
031206	22223532	21
031207	21111344	17
031208	35338899	48
031209	32335659	36
031210	46356997	49
031211	83665885	49
031212	33343456	31
031213	35355544	34
031214	43336684	37
031215	55347853	40
031216	21322223	17
031217	11111110	7
031218	10111000	4
031219	00011001	3
031220	01153393	25
031221	54232346	29
031222	22342344	24
031223	32111221	13
031224	11111322	12
031225	00111200	5
031226	21101102	8
031227	21131117	17
031228	22223132	17
031229	10121210	8
031230	00001032	6
031231	13213496	29

## ELECTRIC ACTIVITY INDICES 2004

Date	T	Sum	Date	T	Sum
040101	62234245	28	040211	11024692	25
040102	14122335	21	040212	14669697	48
040103	13352548	31	040213	34544747	38
040104	22333751	26	040214	32345764	34
040105	33346965	39	040215	45442522	28
040106	43332139	28	040216	41111002	10
040107	92454666	42	040217	00000011	2
040108	11022112	10	040218	01011232	10
040109	21342773	29	040219	22110032	11
040110	23333562	27	040220	11101110	6
040111	11245953	30	040221	11111222	11
040112	01111275	18	040222	12012113	11
040113	22127895	36	040223	11122122	12
040114	52121331	18	040224	31111113	12
040115	12121564	22	040225	21011022	9
040116	62335599	42	040226	10010000	2
040117	33353375	32	040227	13122056	20
040118	22324139	26	040228	11332314	18
040119	21233844	27	040229	12346555	31
040120	33224932	28	040301	32356555	34
040121	22222262	20	040302	44433418	31
040122	94699796	59	040303	12244231	19
040123	42236999	44	040304	11121111	9
040124	73231144	25	040305	01111101	6
040125	48253683	39	040306	21111000	6
040126	21123354	21	040307	00111112	7
040127	32422533	24	040308	01112100	6
040128	95342383	37	040309	01133653	22
040129	11221012	10	040310	85968469	55
040130	33244326	27	040311	64543799	47
040131	21133211	14	040312	94434533	35
040201	23224235	23	040313	21333222	18
040202	12333533	23	040314	31122242	17
040203	43443556	34	040315	22123132	16
040204	43333333	25	040316	21122122	13
040205	24132122	17	040317	21111021	9
040206	31543461	27	040318	21211121	11
040207	11111011	7	040319	41112011	11
040208	00110013	6	040320	21111282	18
040209	10112121	9	040321	32122222	16
040210	10111120	7	040322	12111142	13

## ELECTRIC ACTIVITY INDICES 2004

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Date	T	Sum	Date	T	Sum
040323	21111114	12	040503	01241123	14
040324	12244211	17	040504	22111112	11
040325	20101111	7	040505	11222262	18
040326	11124537	24	040506	22322122	16
040327	22434437	29	040507	32322261	21
040328	83753242	34	040508	21211111	10
040329	12222341	17	040509	11101111	7
040330	11222412	15	040510	02101111	7
040331	11121231	12	040511	22111125	15
040401	10011212	8	040512	45221122	19
040402	10111110	6	040513	11231114	14
040403	02163869	35	040514	11111111	8
040404	74102412	21	040515	23111101	10
040405	30112357	22	040516	20100011	5
040406	75343215	30	040517	11101102	7
040407	32232125	20	040518	21011100	6
040408	21221211	12	040519	01101232	10
040409	15331111	16	040520	21133123	16
040410	12111117	15	040521	34321281	24
040411	32111134	16	040522	01221101	8
040412	13221153	18	040523	25211212	16
040413	11101102	7	040524	21333210	15
040414	01001001	3	040525	11111110	7
040415	10012113	9	040526	01111119	15
040416	21222214	16	040527	11110111	7
040417	21111111	9	040528	01112222	11
040418	11111212	10	040529	13223322	18
040419	11111110	7	040530	41223133	19
040420	10010011	4	040531	34322223	21
040421	20222120	11	040601	14334221	20
040422	10011111	6	040602	32322224	20
040423	11123332	16	040603	11211113	11
040424	21133211	14	040604	21211121	11
040425	02222211	12	040605	12112232	14
040426	11100141	9	040606	22322213	17
040427	01111110	6	040607	13211111	11
040428	10111223	11	040608	42112113	15
040429	21100002	6	040609	31212279	27
040430	12210115	13	040610	22312223	17
040501	33121211	14	040611	154	[27]
040502	21113112	12	040612	01211100	6

## ELECTRIC ACTIVITY INDICES 2004

Date	T	Sum	Date	T	Sum
040613	00111221	8	040724	12947785	43
040614	20111222	11	040725	99989999	71
040615	22434332	23	040726	96422162	32
040616	22322111	14	040727	99999999	72
040617	11323112	14	040728	92221423	25
040618	12224321	17	040729	31211111	11
040619	11111100	6	040730	01111115	11
040620	29112111	18	040731	21111211	10
040621	01111111	7	040801	14111102	11
040622	01100001	3	040802	10121111	8
040623	01100010	3	040803	21100100	5
040624	11111000	5	040804	00011100	3
040625	00100211	5	040805	00111122	8
040626	00221511	12	040806	11111111	8
040627	10000100	2	040807	33923212	25
040628	22112124	15	040808	20110010	5
040629	43653333	30	040809	02211243	15
040630	22322221	16	040810	42111353	20
040701	22322292	24	040811	12122323	16
040702	21211221	12	040812	32211211	13
040703	21211112	11	040813	11111011	7
040704	11111111	8	040814	21243212	17
040705	22115927	29	040815	11003001	6
040706	20111100	6	040816	01001222	8
040707	01111101	6	040817	02111233	13
040708	00110100	3	040818	21321212	14
040709	11210011	7	040819	21011111	8
040710	01111121	8	040820	13113222	15
040711	12114325	19	040821	42132123	18
040712	74321114	23	040822	31122334	19
040713	54232322	23	040823	21111110	8
040714	01111120	7	040824	01101111	6
040715	11101122	9	040825	00121119	15
040716	20113925	23	040826	21112122	12
040717	69642111	30	040827	21111122	11
040718	21111111	9	040828	11221112	11
040719	11111122	10	040829	01013212	10
040720	12215112	15	040830	13142484	27
040721	11100000	3	040831	94532214	30
040722	11139739	34	040901	21211112	11
040723	93684491	44	040902	11121111	9

Date	T	Sum	Date	T	Sum
040903	11111000	5	041014	42344444	29
040904	01112101	7	041015	22221222	15
040905	31111241	14	041016	12111000	6
040906	21122242	16	041017	10010100	3
040907	42122112	15	041018	00001113	6
040908	11121101	8	041019	10121110	7
040909	00101011	4	041020	12222211	13
040910	20001000	3	041021	62231112	18
040911	00000101	2	041022	31121121	12
040912	00001110	3	041023	01120100	5
040913	00000009	9	041024	21111242	14
040914	63442488	39	041025	14443121	20
040915	48221332	25	041026	11101100	5
040916	31223346	24	041027	00112111	7
040917	56232334	28	041028	11010002	5
040918	53122200	15	041029	00011224	10
040919	00011012	5	041030	13322145	21
040920	32143300	16	041031	32123513	20
040921	22111111	10	041101	20112100	7
040922	10944466	34	041102	20111121	9
040923	35321111	17	041103	10112147	17
040924	11112011	8	041104	21221121	12
040925	10112111	8	041105	21004001	8
040926	10000012	4	041106	00001010	2
040927	10002111	6	041107	03165599	38
040928	01120002	6	041108	99999999	72
040929	41111111	11	041109	87499999	64
040930	30111102	9	041110	99999999	72
041001	00111013	7	041111	54472269	39
041002	12222211	13	041112	33583485	39
041003	20113425	18	041113	02121212	11
041004	31212124	16	041114	23221111	13
041005	31010001	6	041115	00101000	2
041006	20111000	5	041116	01332122	14
041007	00000100	1	041117	11111100	6
041008	21112212	12	041118	10011000	3
041009	31111100	8	041119	00110121	6
041010	12121212	12	041120	22232253	21
041011	23121311	14	041121	22343822	26
041012	31221111	12	041122	21221111	11
041013	44333655	33	041123	21001222	10

## ELECTRIC ACTIVITY INDICES 2004

Date	T	Sum
041124	21222112	13
041125	23325454	28
041126	21121225	16
041127	00121462	16
041128	41211223	16
041129	23325343	25
041130	43333244	26
041201	22342123	19
041202	11100111	6
041203	10111111	7
041204	00000000	0
041205	11993212	28
041206	21233453	23
041207	52222353	24
041208	22222234	19
041209	20012142	12
041210	21111232	13
041211	01113745	22
041212	44432973	36
041213	44121100	13
041214	01111112	8
041215	11100122	8
041216	11211226	16
041217	24543533	29
041218	34333311	21
041219	10110100	4
041220	12221101	10
041221	11142232	16
041222	32444331	24
041223	41111202	12
041224	10111210	7
041225	42432112	19
041226	13221312	15
041227	11211112	10
041228	21111225	15
041229	52112213	17
041230	23975431	34
041231	21112112	11

# MAGNETIC MEASUREMENTS AND DATA PROCESSING

V. WESZTERGOM

## Recording of geomagnetic variations

Geomagnetic variations are recorded by the ARGOS system. ARGOS (developed by the Geomagnetism Group of British Geological Survey) is a PC based automatic observatory equipped with triaxial fluxgate and a proton magnetometer in a DD/DI configuration. The fluxgate variometer sensors are aligned in X, Y, Z directions. 10 second samples are used to provide minute values centred on the minute by means of a 7-point cosine filter. Reported elements are: H (horizontal), Z (vertical), D (declination) and F (total force). From the year 1993 on the minute values are transmitted through the METEOSAT satellite to the Edinburgh Geomagnetic Information Node.

**Table I.** Main specifications of ARGOS used in Nagycenk Observatory

Device	Resolution	Dynamic range	Temperature coeff.
Triaxial Fluxgate			
Magnetometer	0.1 nT	$\pm 500$ nT/ $\pm 400$ nT	$\sim 1$ nT/ $^{\circ}$ C
Proton Magnetometer (ELSEC 820)	0.1 nT	10000–90000 nT	–

DI/DD coil system consists of two orthogonal sets of Helmholtz coils (proton head is mounted at the centre). Coils orientated so that one provides bias fields approximately perpendicular to F vector in the magnetic meridian and the other provides bias fields approximately perpendicular to F in the horizontal plane. DD and DI relative to the initial values ( $D_0$ ,  $I_0$ ) are calculated. DD/DI proton magnetometer is used in every tenth minutes from which F and almost absolute values of D and I are obtained.

Satellite transmitter, 6800 Series of Data Collection Platform, was supplied by Space Technology Systems. Power output to antenna (two linearly-polarised Yagi arranged to give circular polarisation) is 4 watts at 402 MHz. Data storage capacity is  $2 \times 40$  kbytes.

Timing is produced by the IBM clock corrected by the high stability crystal built in the Proton Magnetometer.

To ensure continuous recording a high stability torsion photoelectric magnetometer (type PSM-8711) has been run from 1 January 1998. Data along with telluric data are logged by a DR-02 type digital recording system. The PSM magnetometer records the H, D and Z component with an exceptionally high parameter stability. The baseline variation has never exceeded 1.5 nT/year. Maximum resolution is 3 pT, sampling rate applied is 10 s. Frequency response: 0.3 Hz to DC. Sensitivity to tilting: less than 10 nT'/.

Data are stored in the internal memory of the digital data logger DR-02. Both the PSM and the DR-02 was developed and provided by the Institute of Geophysics Polish Academy of Sciences.

### Absolute control, baselines

Baselines of the variometer systems are derived from absolute observations. Prior to 1989 the baseline was controlled by two QHM, one declinometer and one BMZ. From 1989 till the end of 1994 the standard instrument for absolute measurements was the vector proton magnetometer (NVP) constructed in Niemegk Observatory. In 1994 an Overhauser proton magnetometer (type: GSM 19 of GEM Systems) and a fluxgate theodolite (developed by the Danish Meteorological Institute) was purchased. Since then the standard instruments are the fluxgate theodolite for I and D and the Overhauser effect proton magnetometer for F.

To determine the momentary angle of declination four observations (four null positions in the horizontal plane) are taken and it is repeated at least two times. Generally the closer azimuth mark is used but it is checked regularly with the far azimuth mark. Inclination angle is determined in the plain of the momentary magnetic meridian in the same way as D. Total intensity is measured simultaneously with I-measurements on the next (F) pillar with the Overhauser magnetometer. Absolute values of all geomagnetic elements are referred to the same pillar of the absolute hut. Observation is made weekly, occasionally more often.

Absolute measurements are supplemented by quasi absolute baseline reference measurements. Declination, inclination and total intensity are determined by means of a proton vector magnetometer in every ten minutes.



### **Data processing and availability**

Sampling rate of magnetic variation data is 10s both for ARGOS and PSM. Minute mean values are produced with digital filter from the raw sampled data. According to the IAGA recommendation minute mean values are stored. Hourly means are calculated from minute means, yearly means are derived from hourly means. Final absolute values of H, D and Z field component are obtained from smoothed baselines.

ARGOS data are compared continuously to PSM data and gaps are filled.

Data are logged on floppy disk too. In addition to logging data to disk INTER-MAGNET V2.8 format satellite transmission packets are sent to DCP.

### **Presentation of the results**

- plot of hourly mean values of H, D, Z
- plot of daily mean values of H, D, Z
- tables of geomagnetic activity indices, K
- table of annual mean values of geomagnetic elements
- special phenomena: SSC, sfe

See CD (program Seenck.exe, menu item Magnetics).

## GEOMAGNETIC DATA

### **Hourly mean values of H, D, Z and F**

Hourly means are derived from minute means corrected using absolute observations. The units of the elements are 0.1 nT, Declination is also scaled to 0.1 nT. Minute means of F are calculated from H and Z. F values are checked by comparing them with proton magnetometer readings taken at every 10 minutes.

### **Daily mean values of H, D, Z and F**

Daily mean values are calculated from hourly mean values.

### **Geomagnetic activity indices: K-index**

The K-index is determined from the amplitude ranges of H and D components for each three-hour Universal Time interval. Limit for K=9 is 350 nT in Nagycenk.

### **Special phenomena**

List of special events is based on both magnetic and earth current records. Tables are given for SSC-s and sfe.

### **Annual mean values of geomagnetic elements**

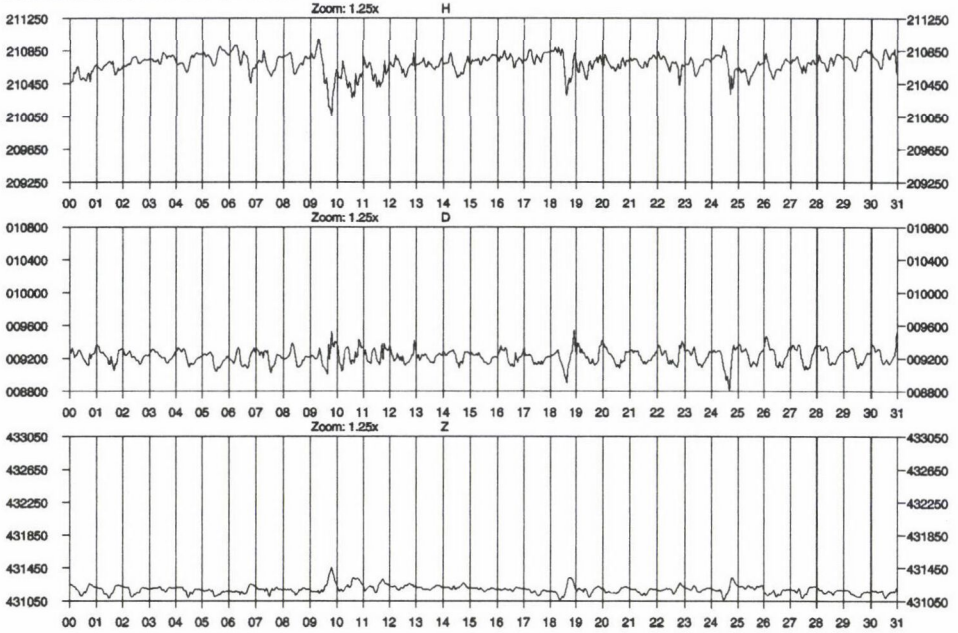
Table contains yearly means of the geomagnetic elements 1961 to 1993 in nT. These values are the results of a reevaluation of previously published data, including corrections eliminating disturbances caused by construction works in the observatory. Corrected values are noted by asterisk.

Times in this section are given in UT!

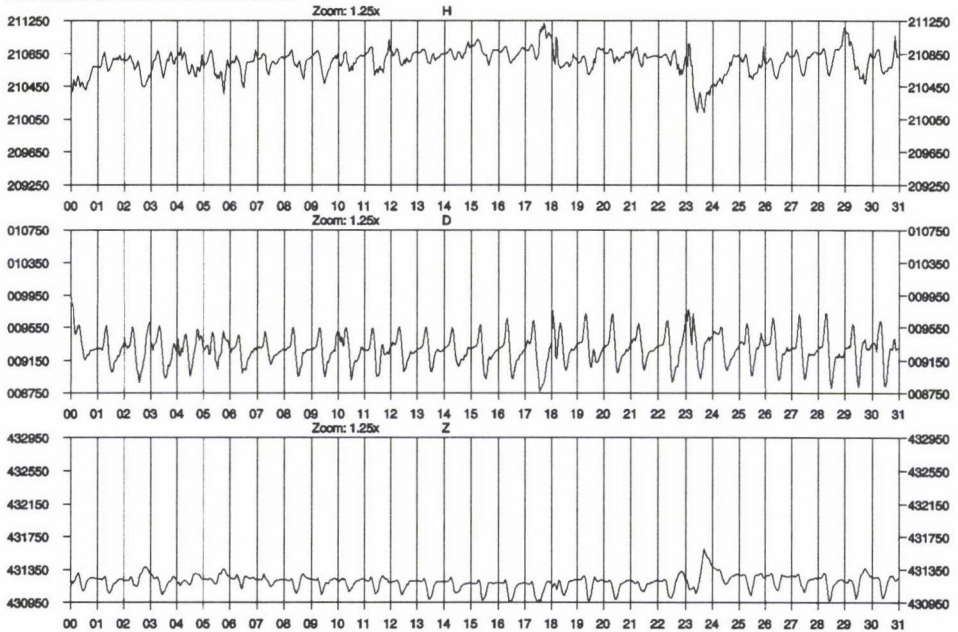
See CD (program Seenck.exe, menu item Magnetics).

*Hourly mean values of H, D, Z*  
*2002-2004*

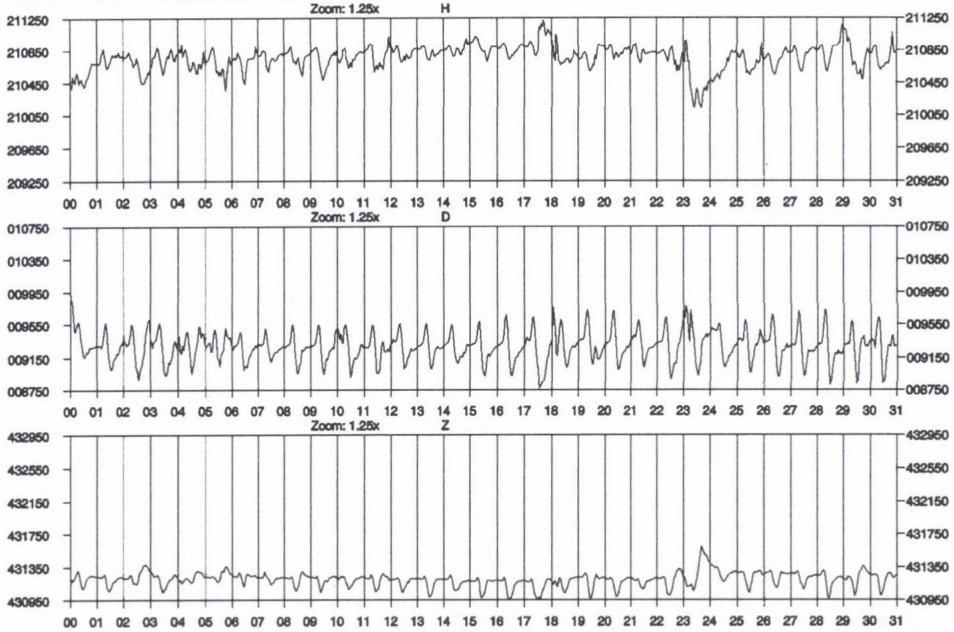
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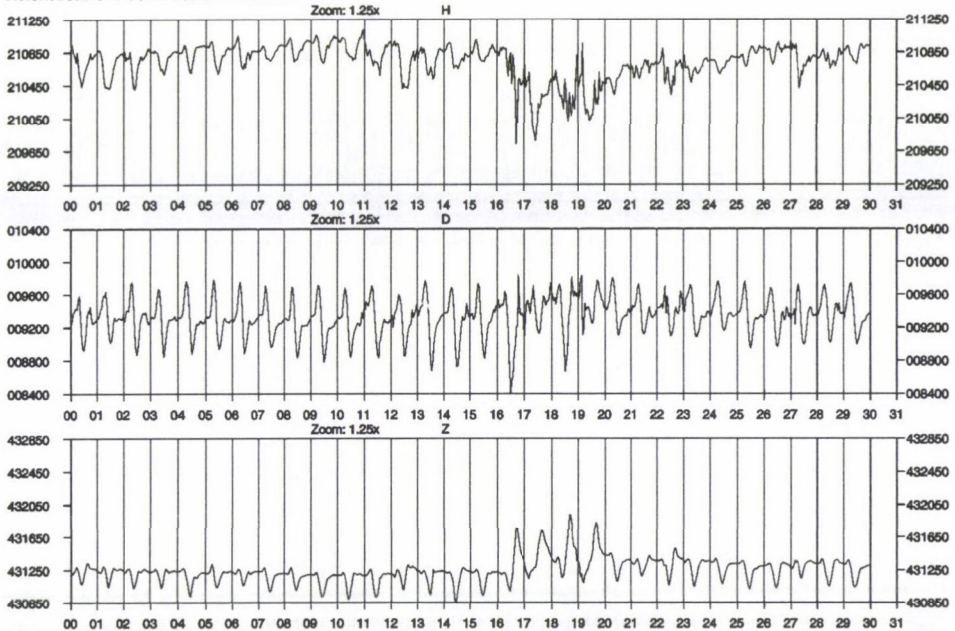
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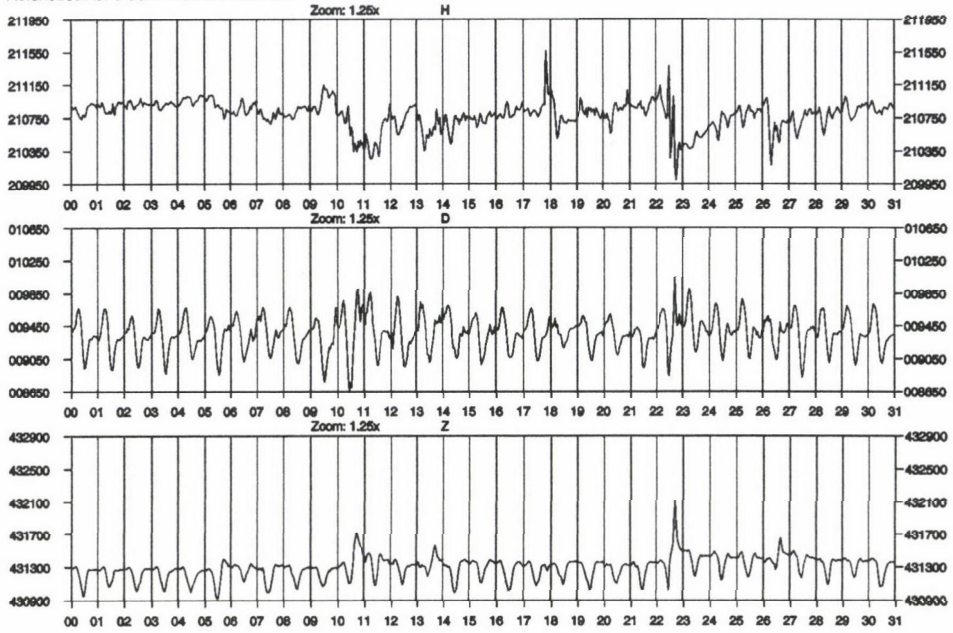
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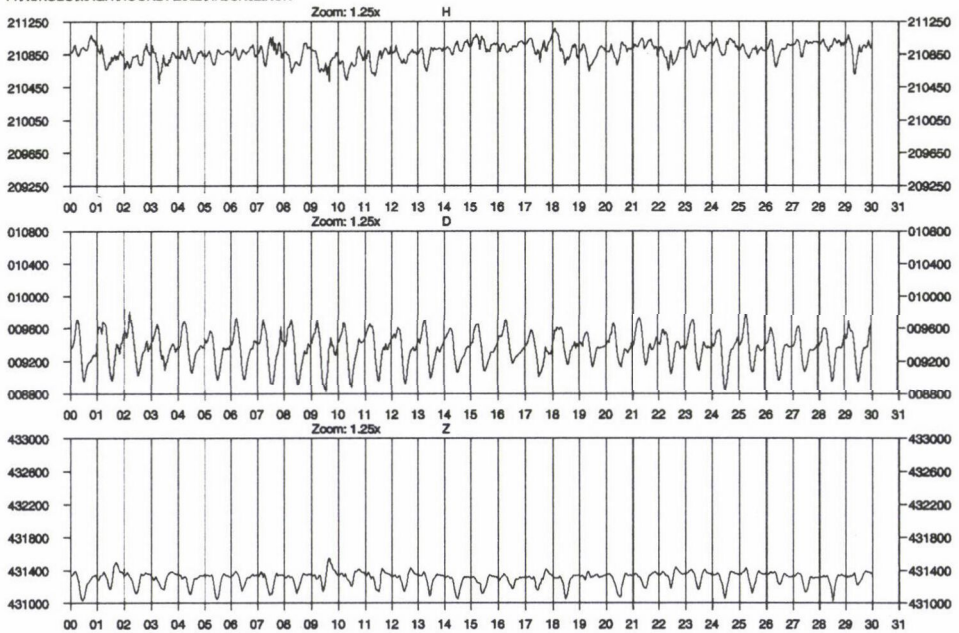
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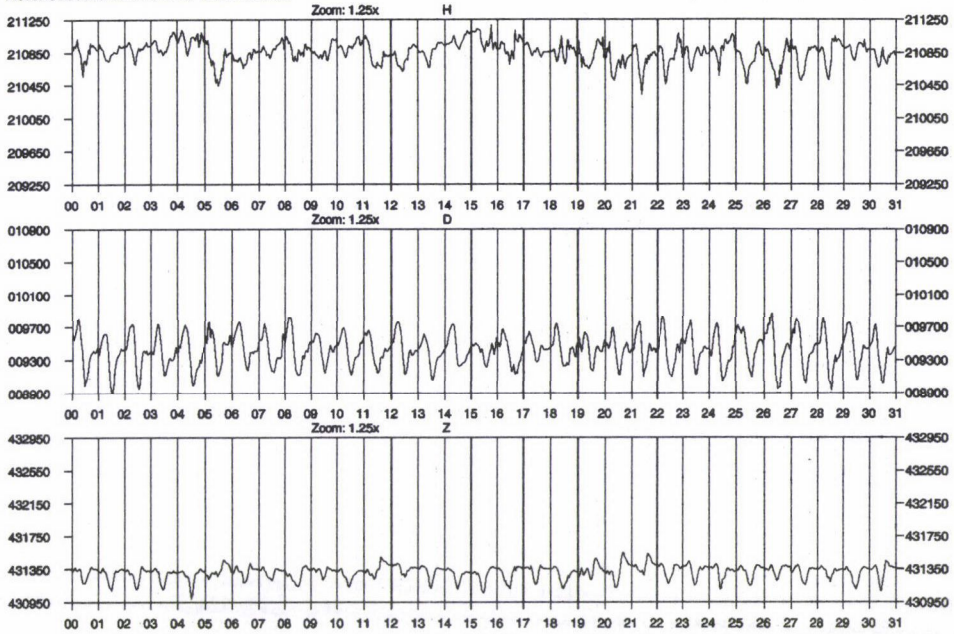


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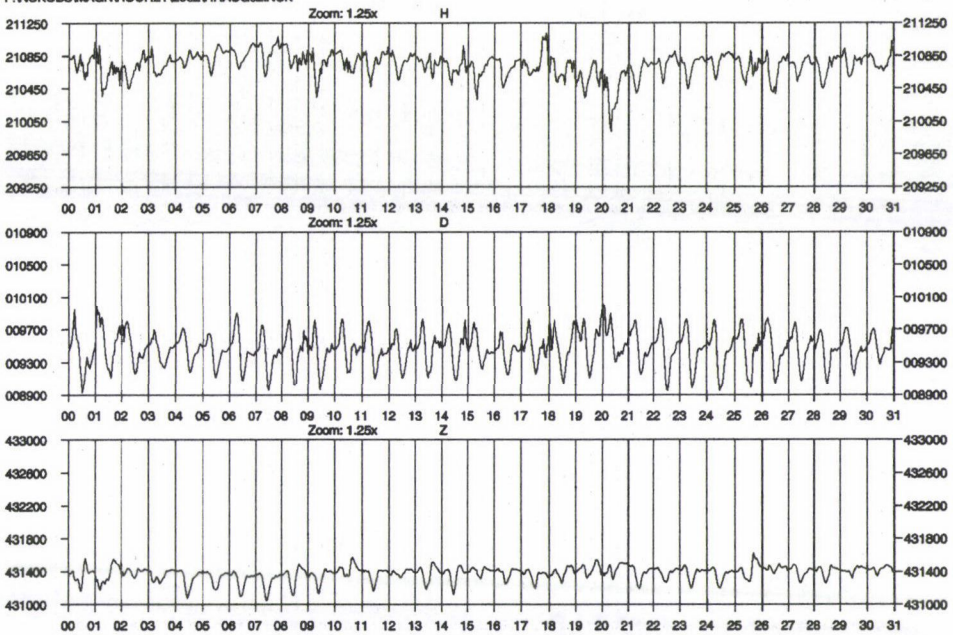




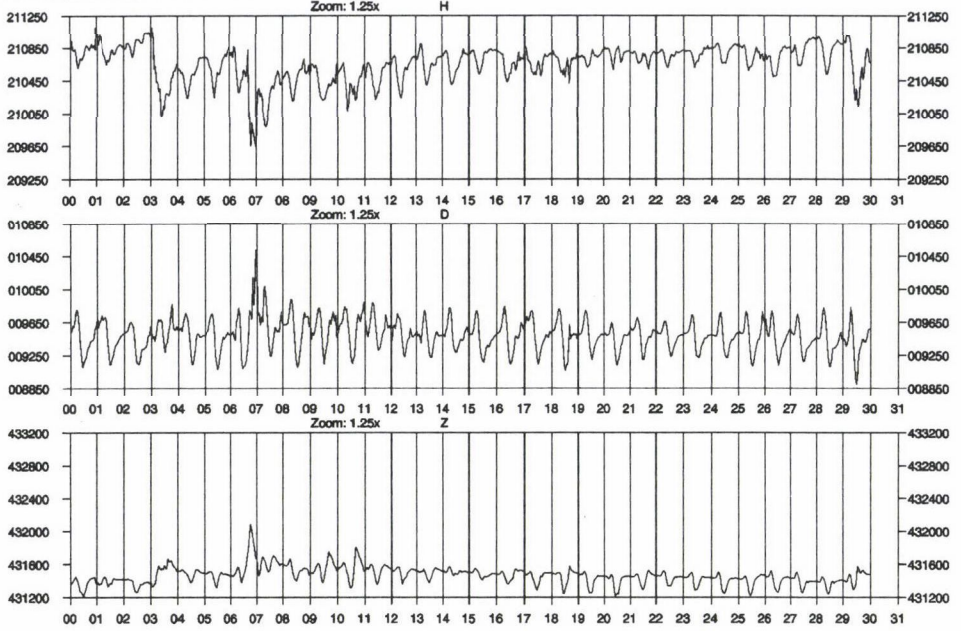
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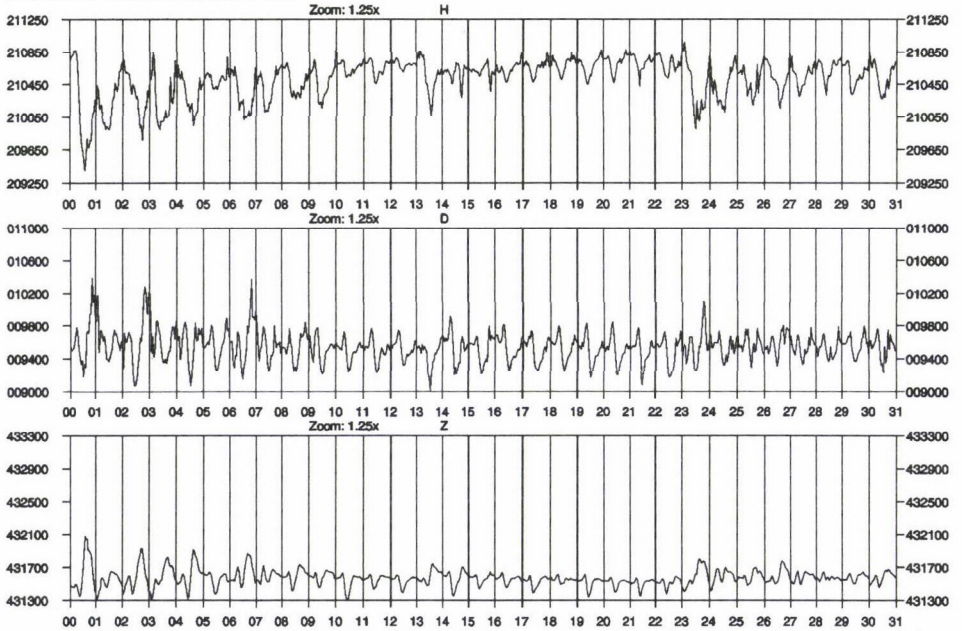
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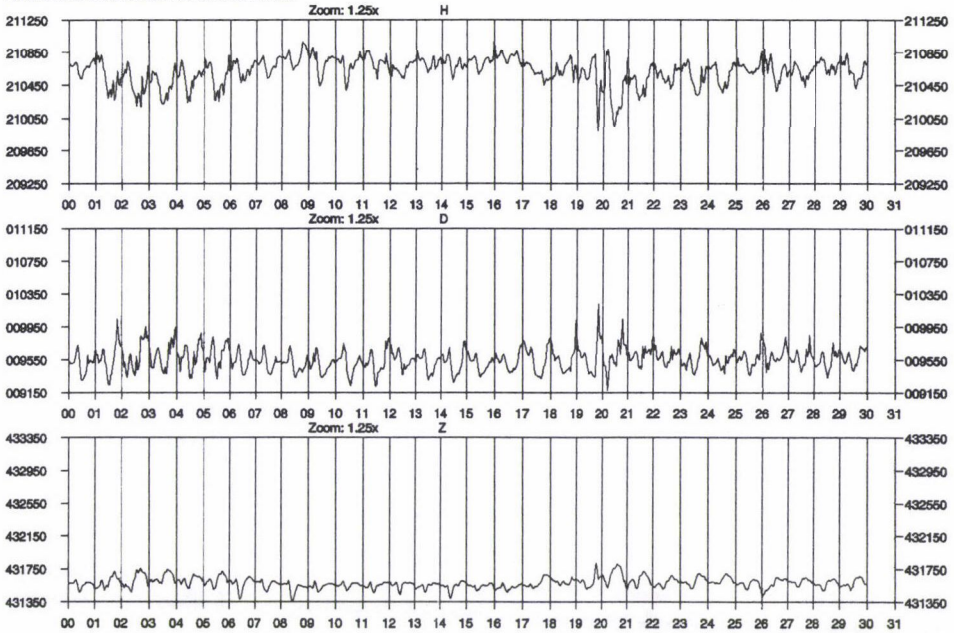


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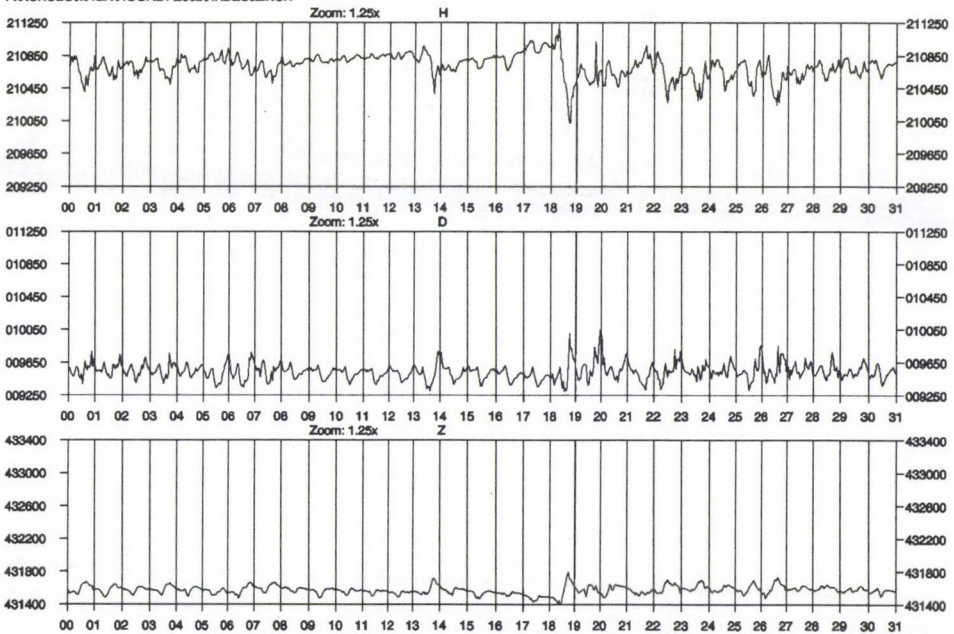




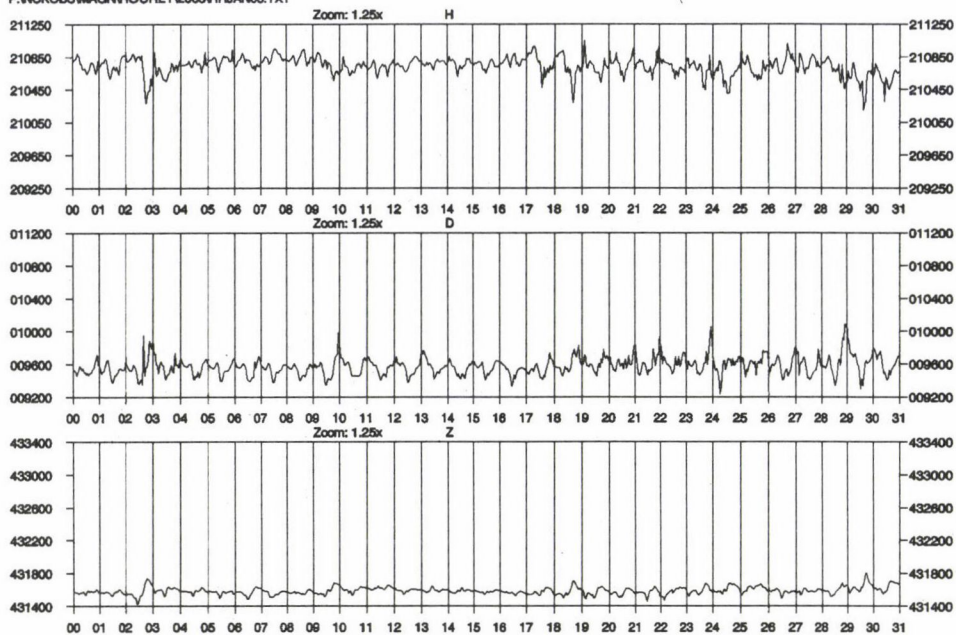
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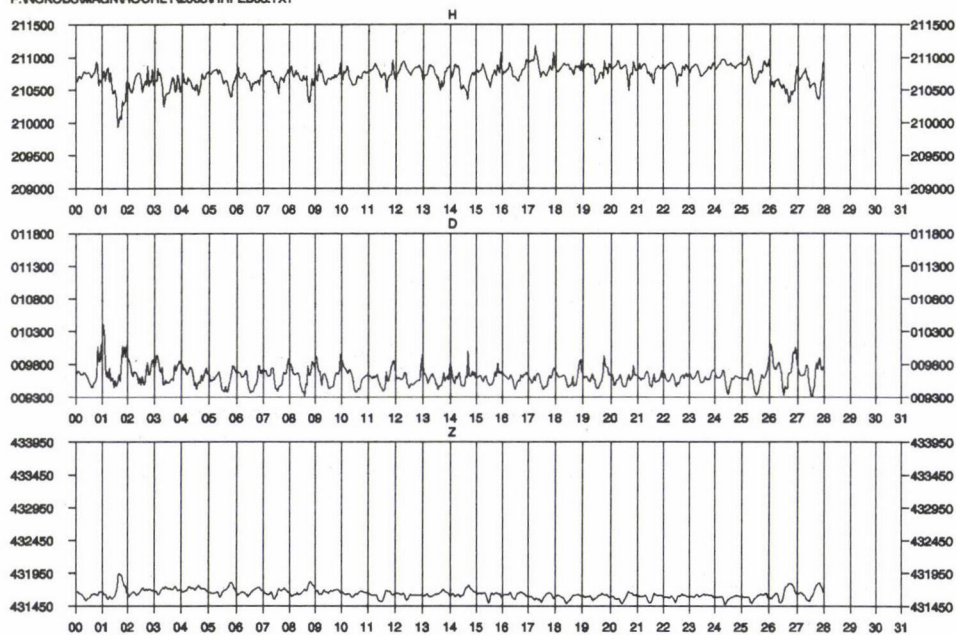
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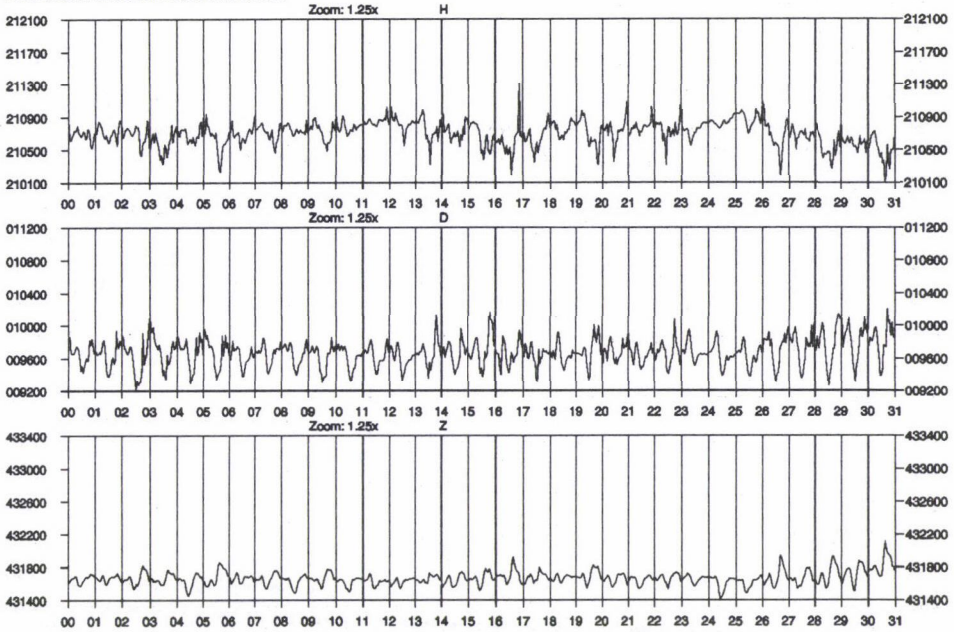
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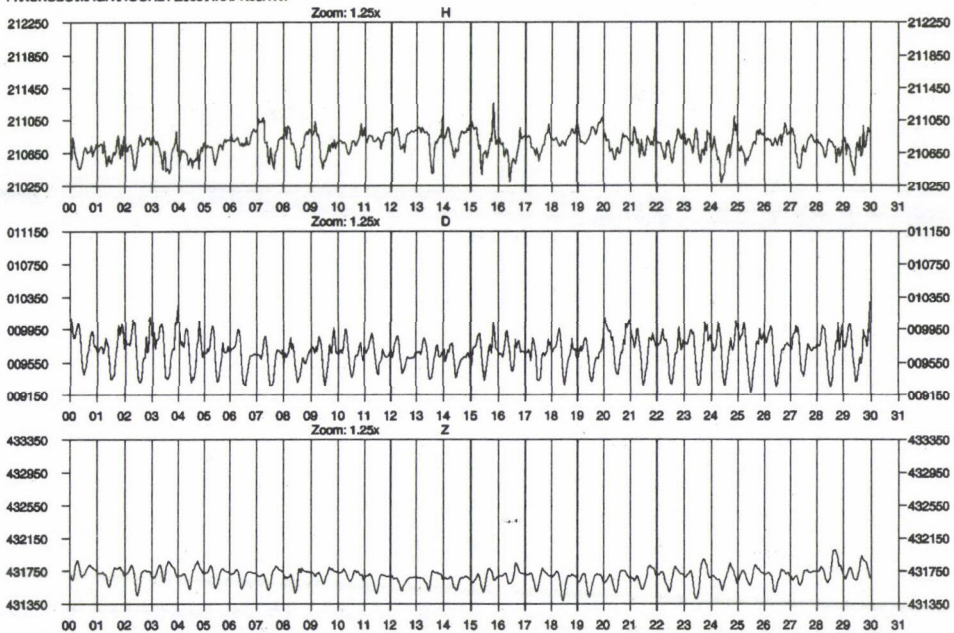
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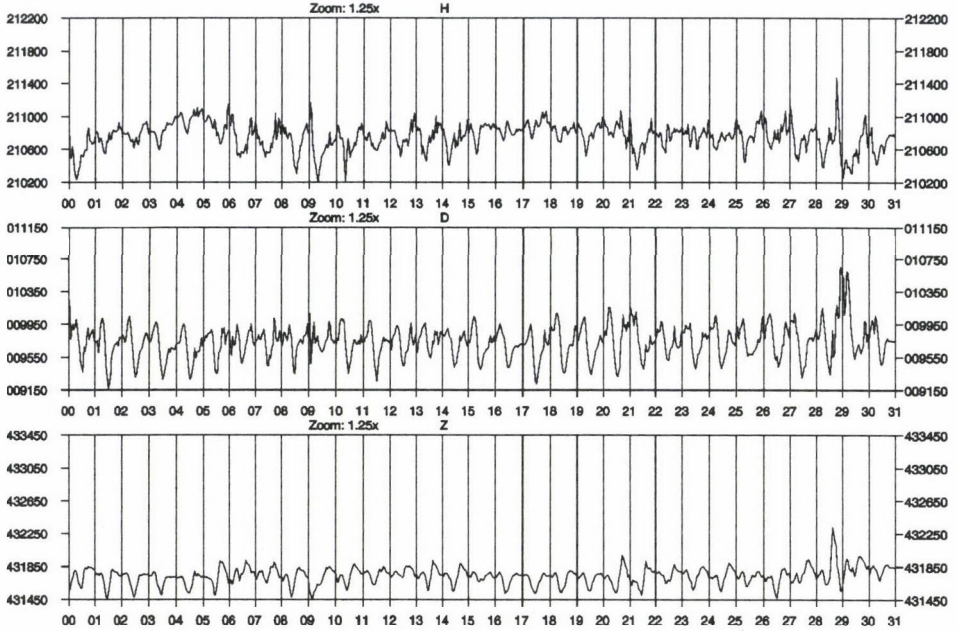


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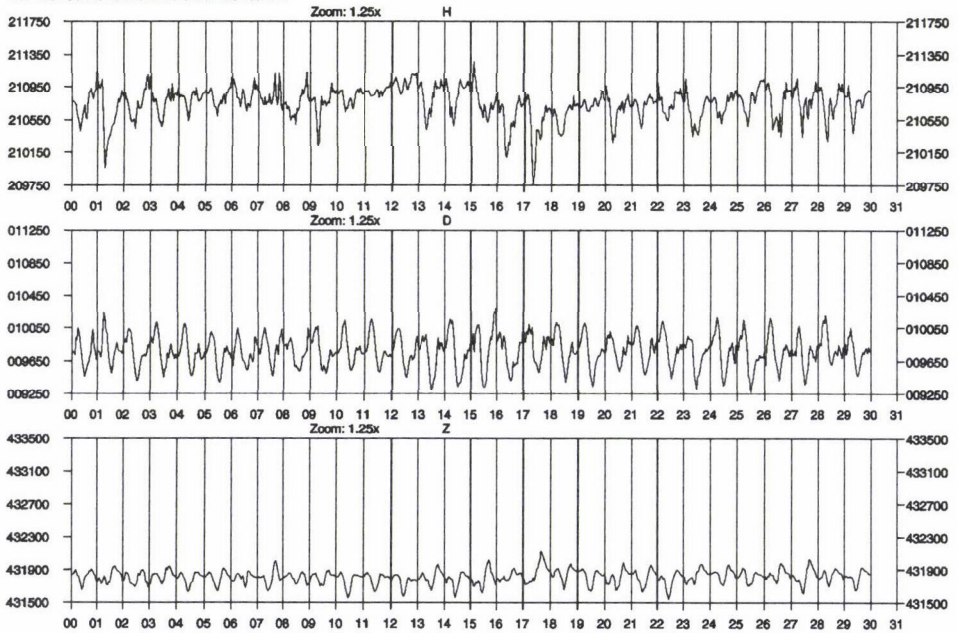




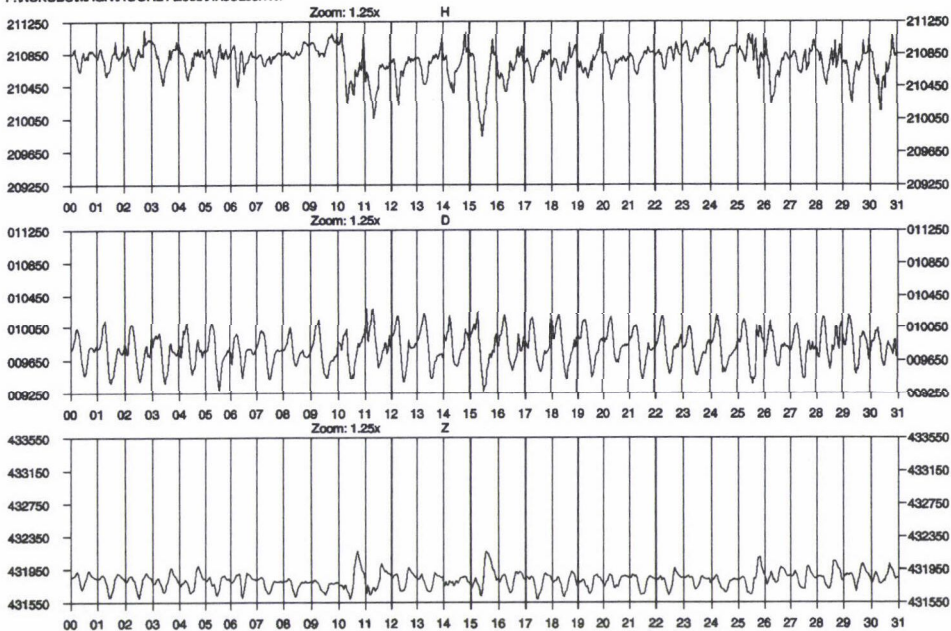
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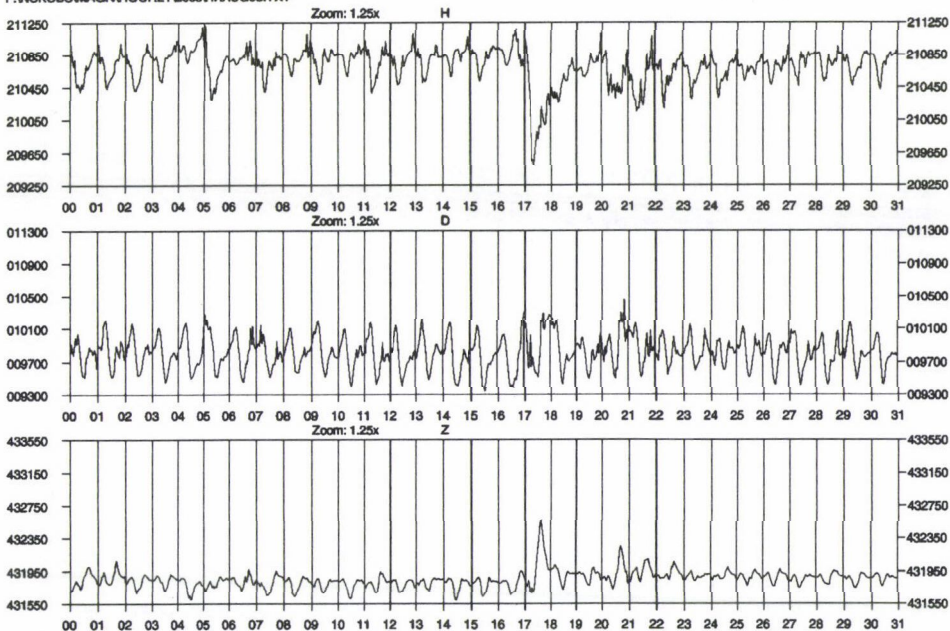
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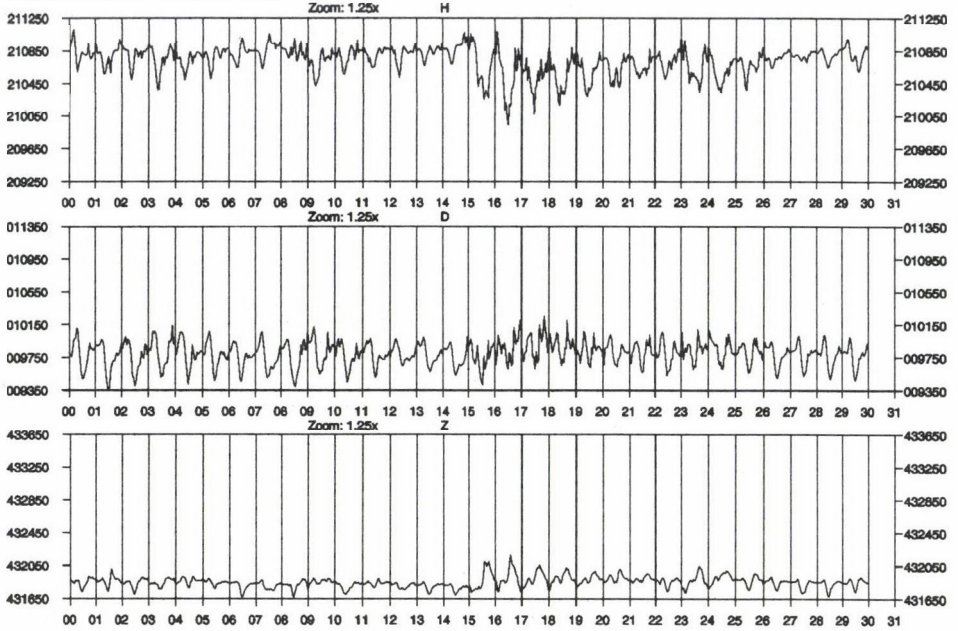
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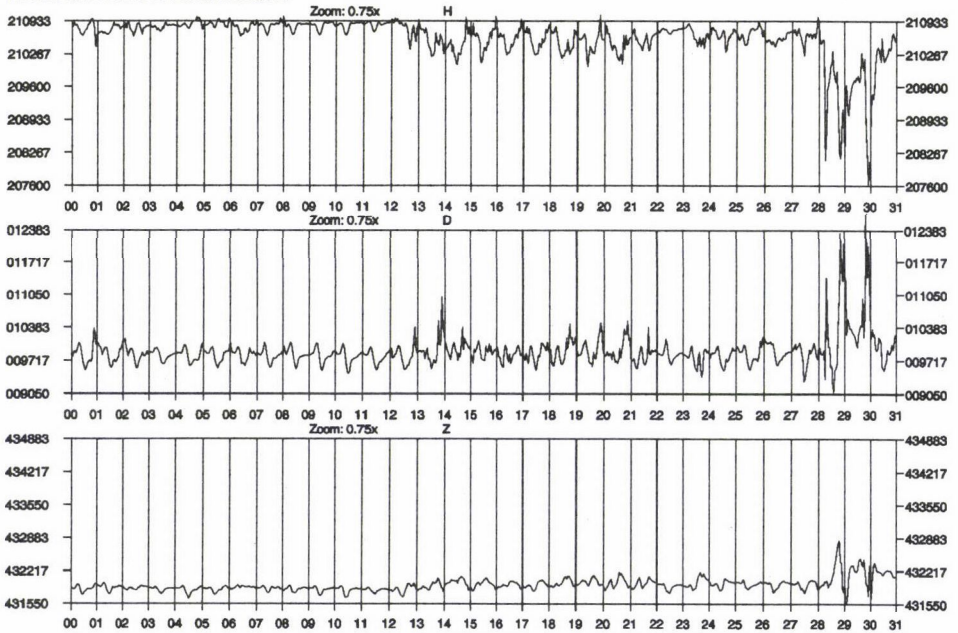
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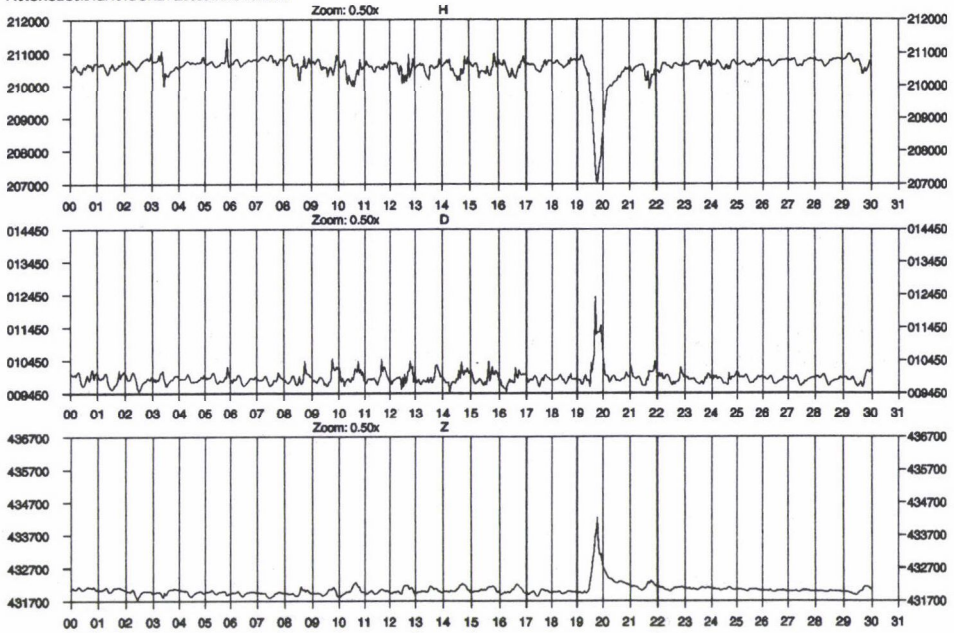


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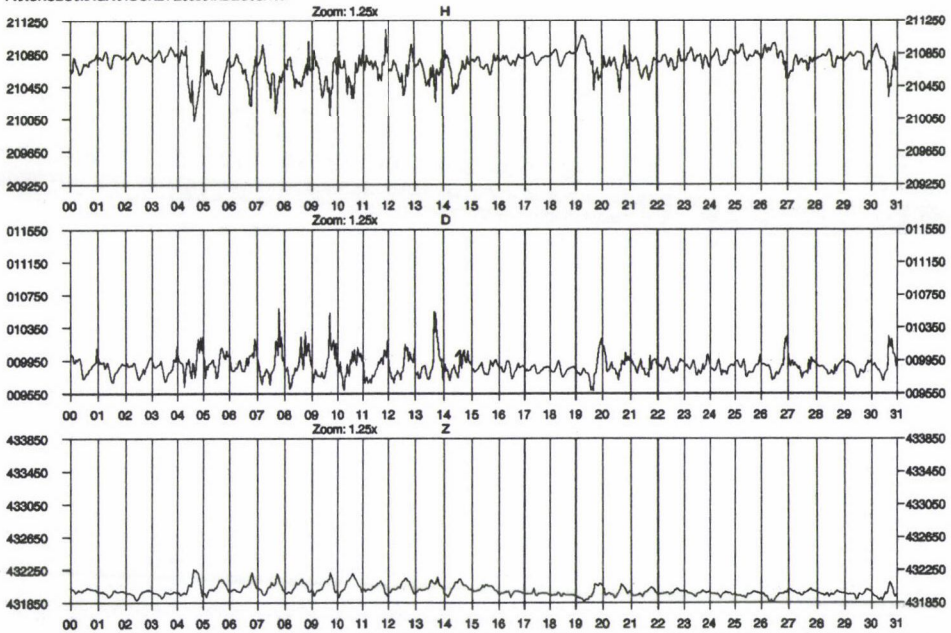




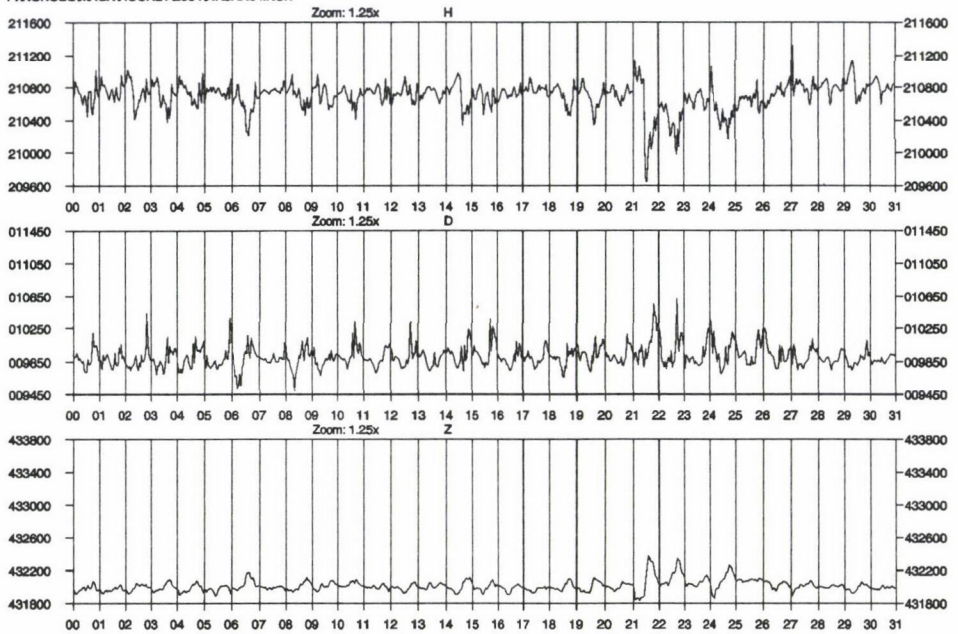
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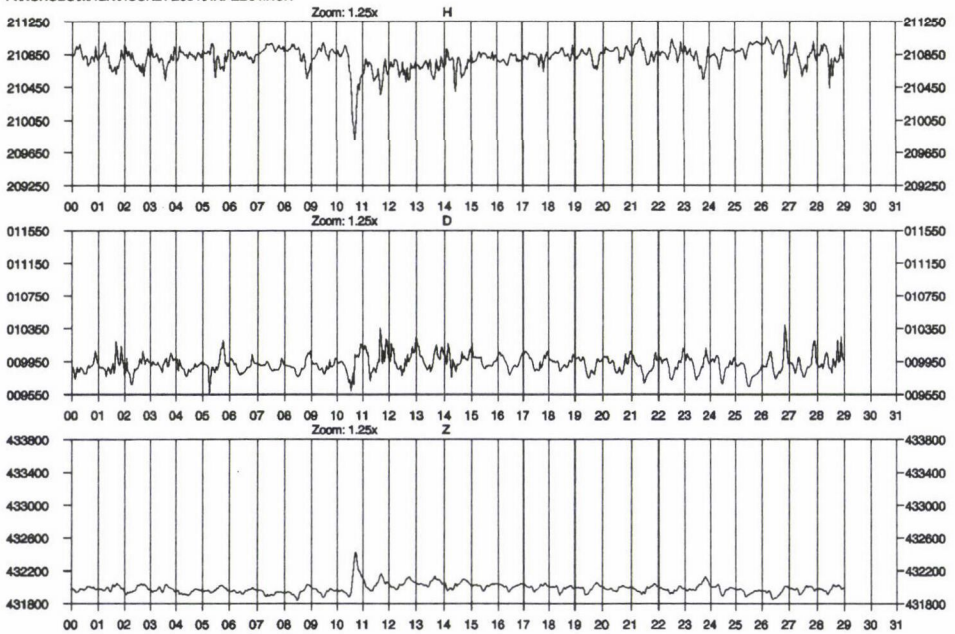
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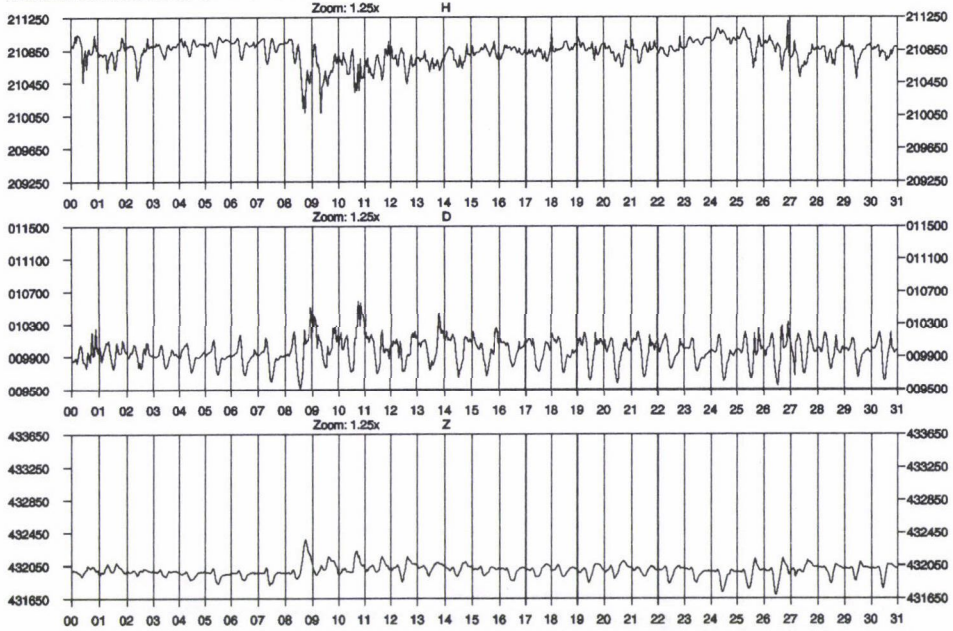


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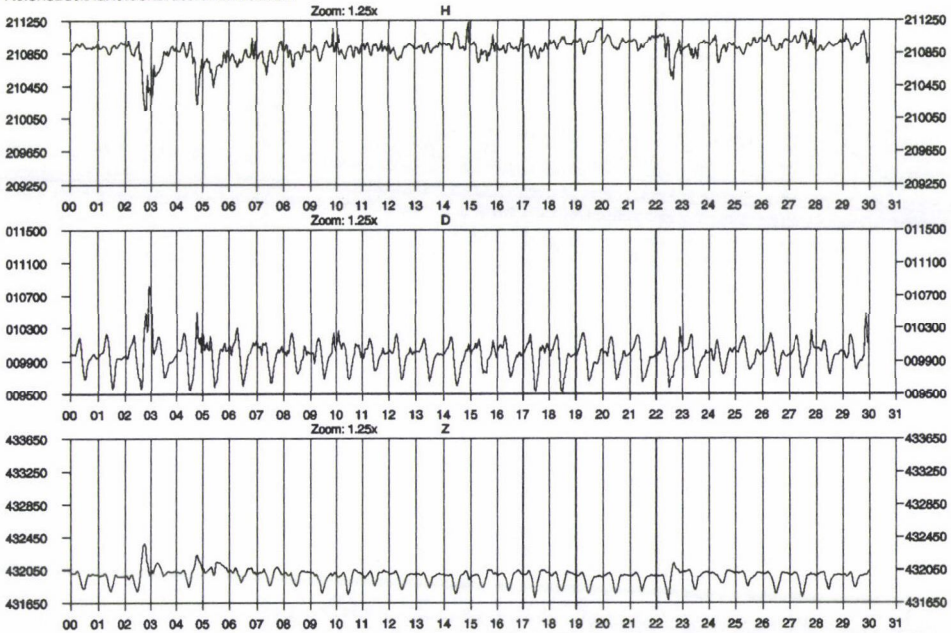




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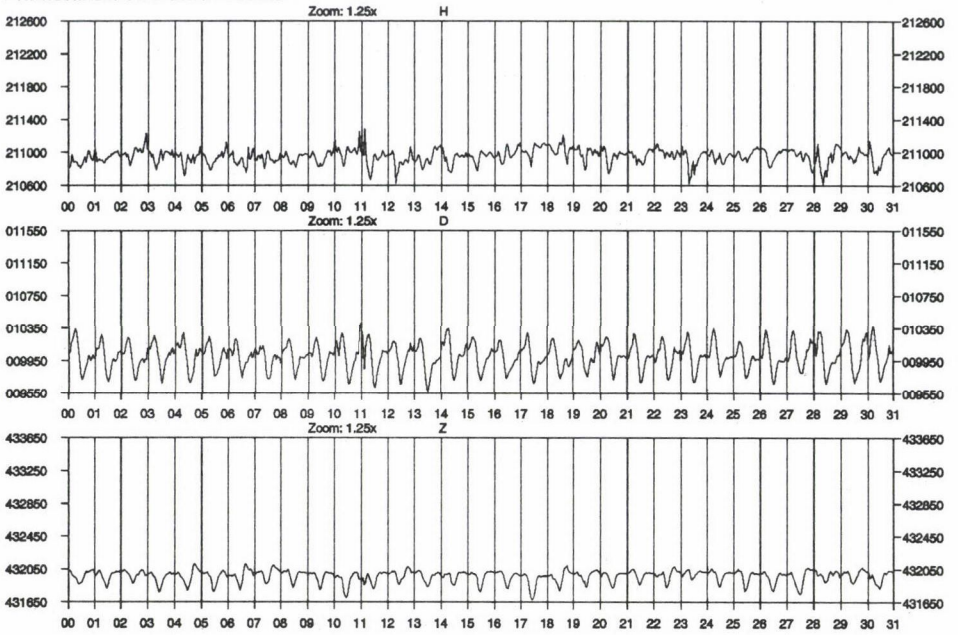


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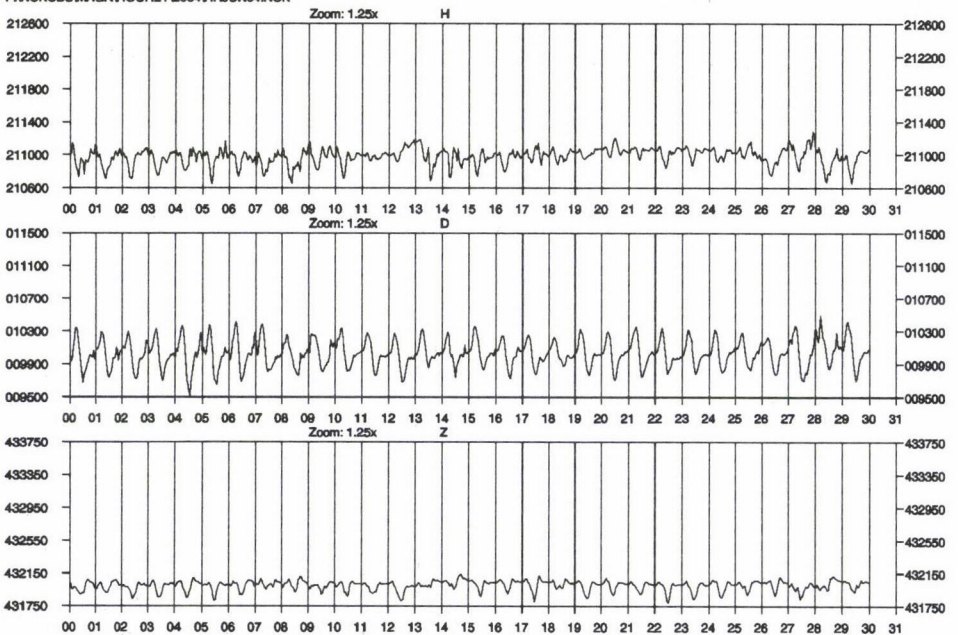


HOURLY MEAN VALUES OF H, D, Z, MAY-JUNE 2004

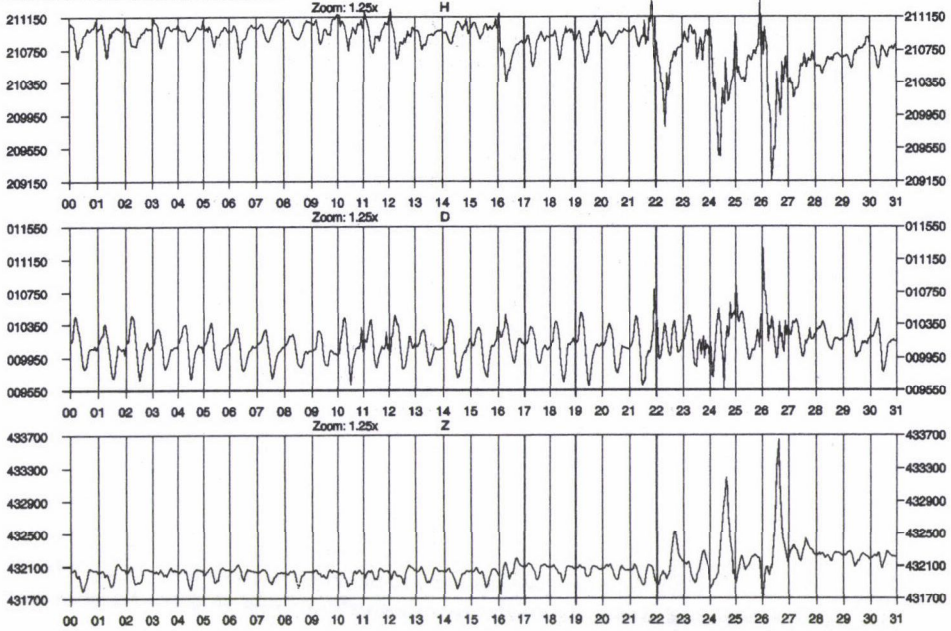
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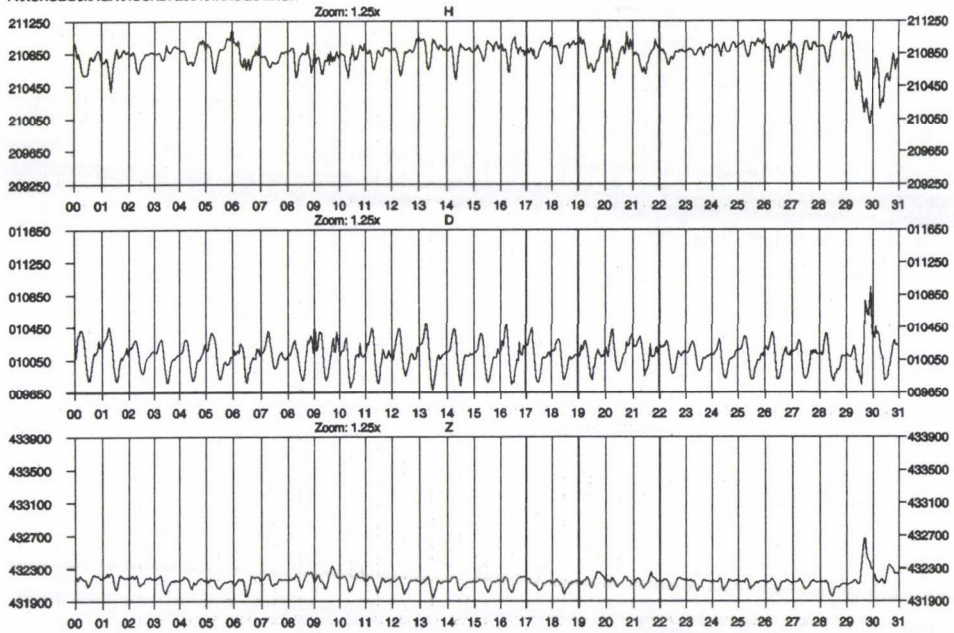
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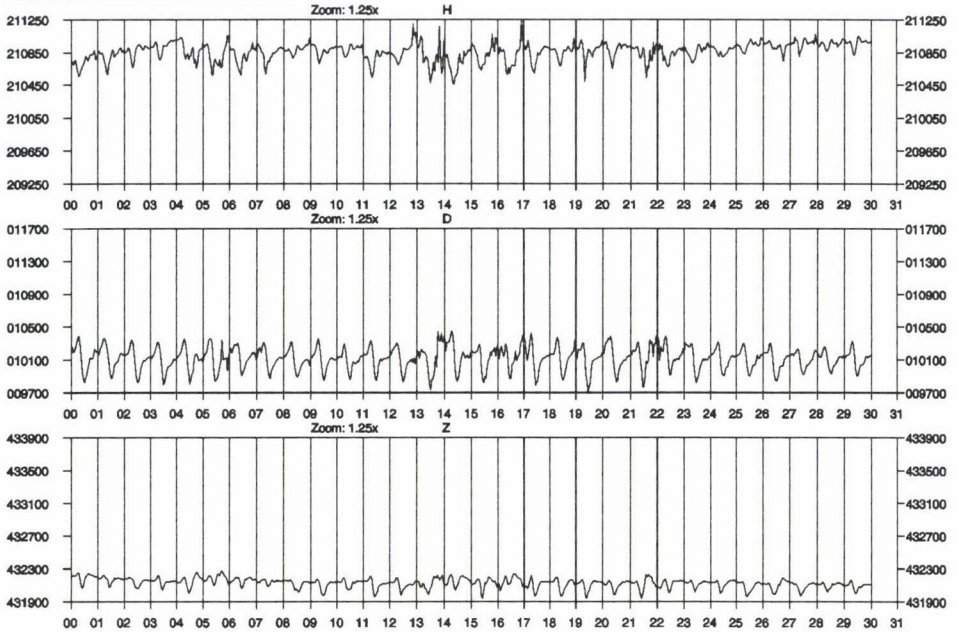


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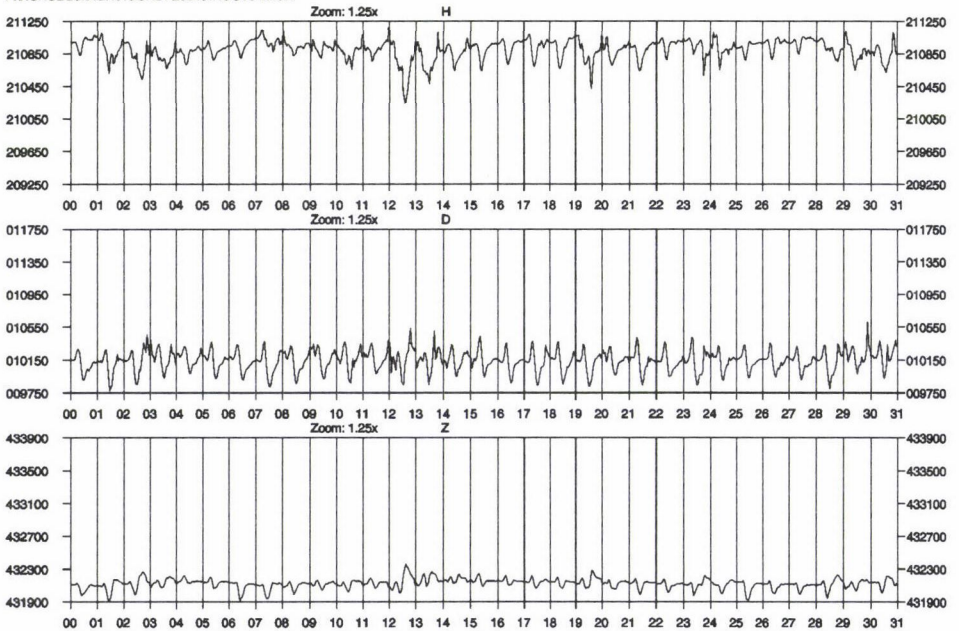




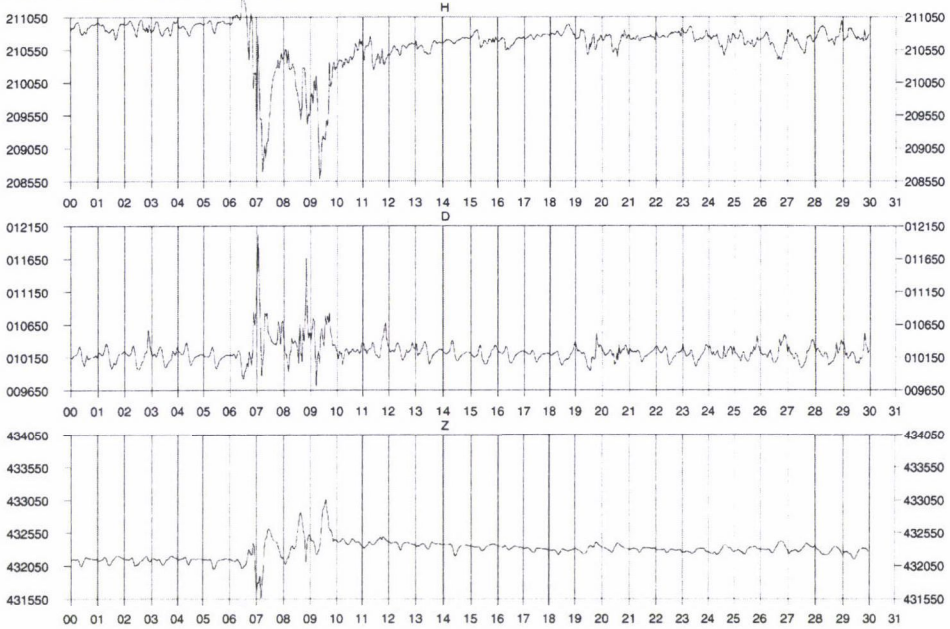
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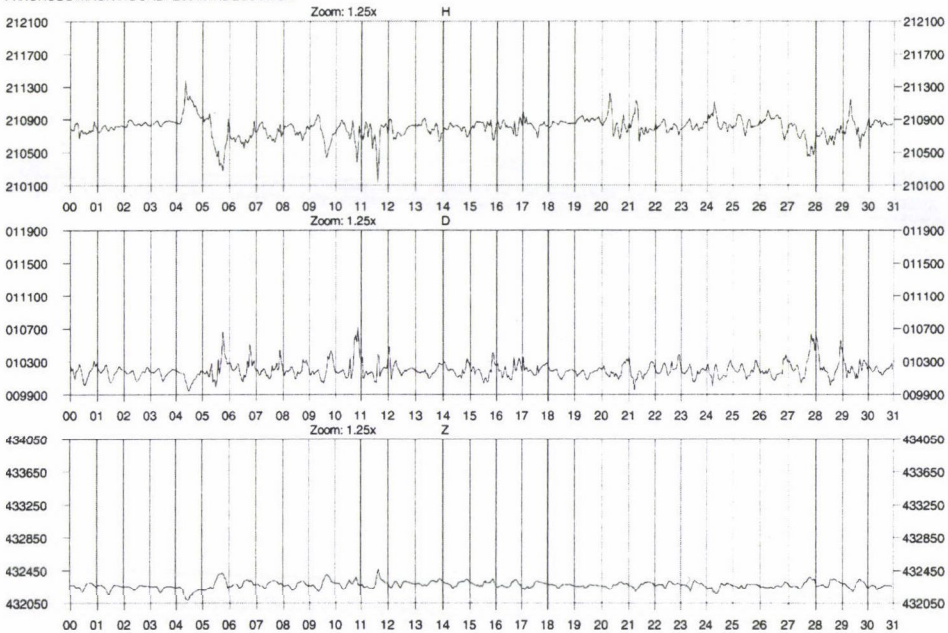
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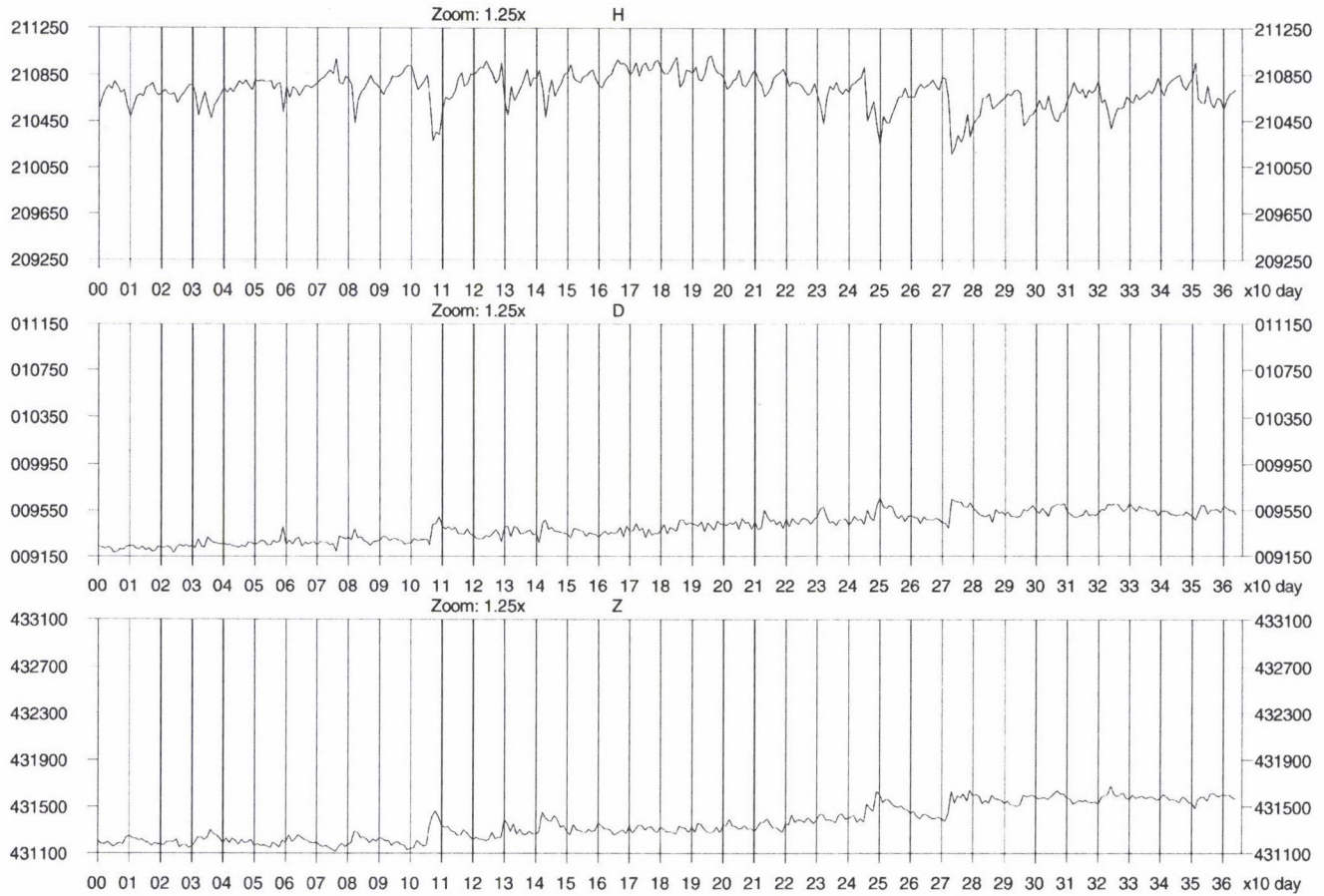
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*Daily mean values of H, D, Z*  
*2002-2004*

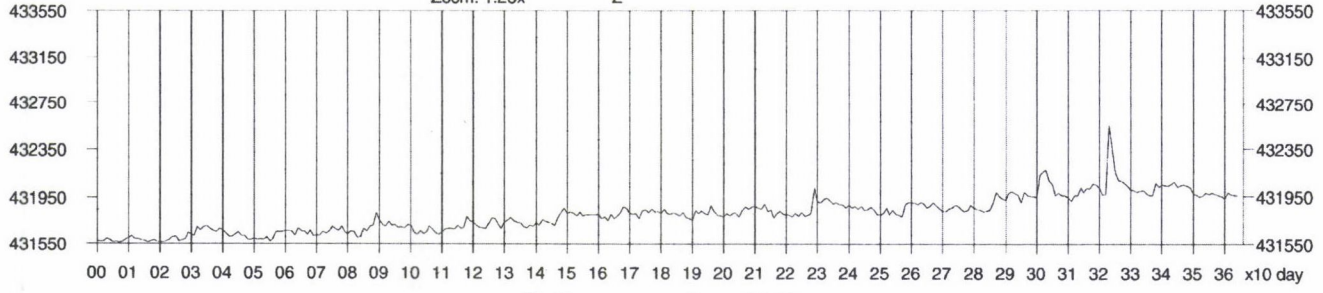
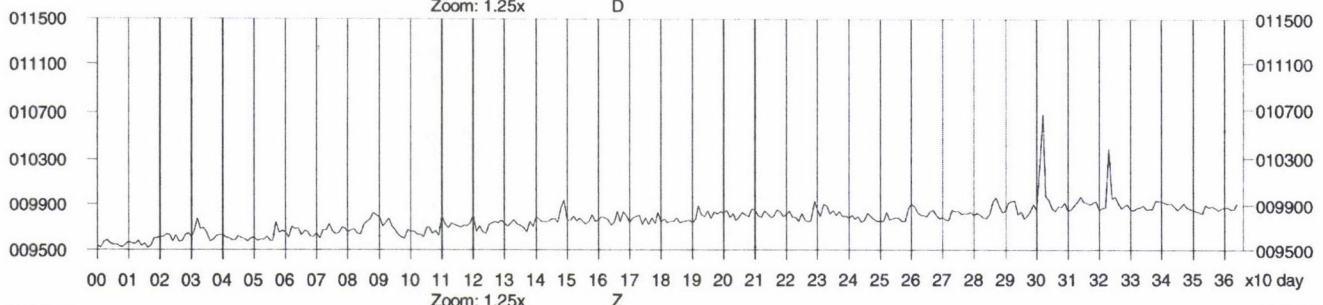
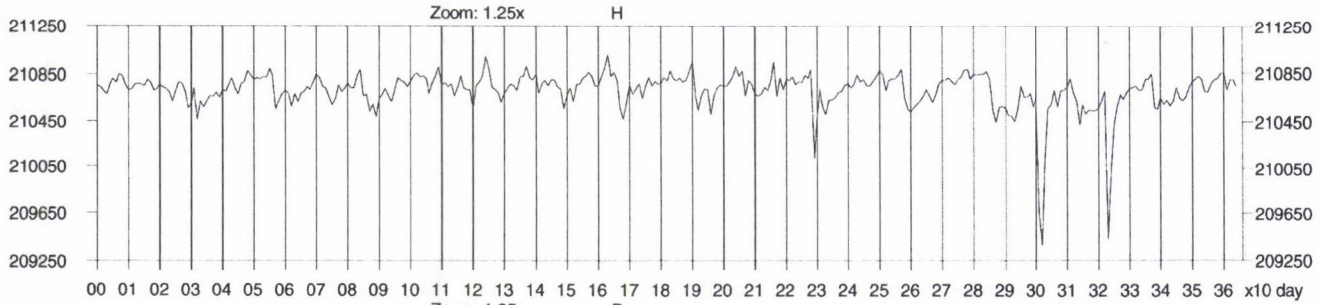
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Daily mean values 2002



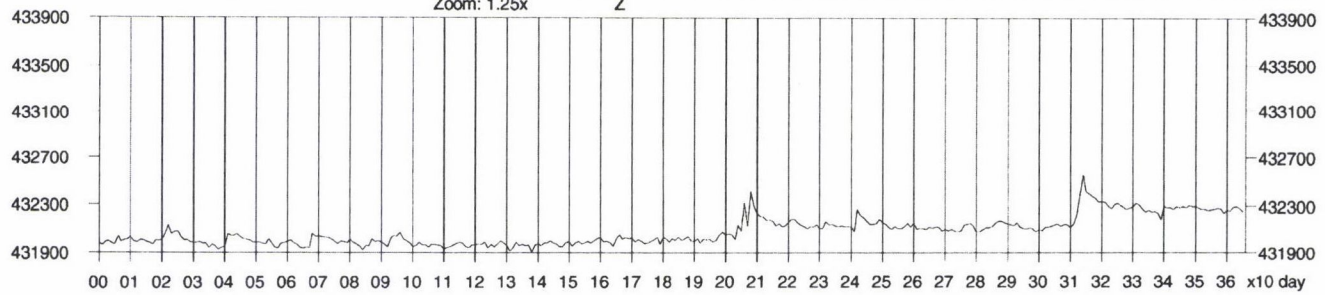
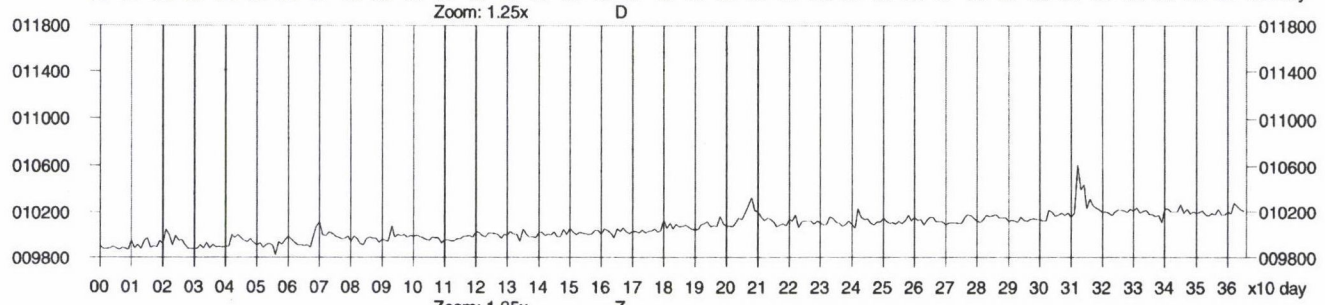
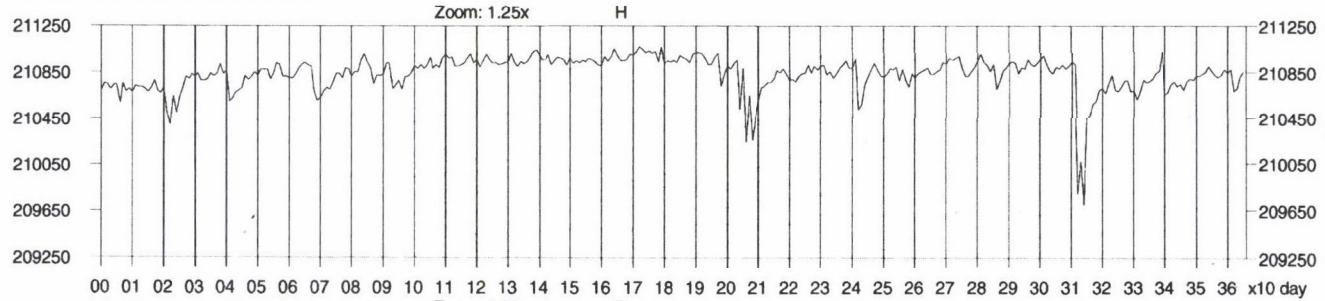
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Daily mean values 2003

DAILY MEAN VALUES 2003

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Daily mean values 2004

*Geomagnetic K indices*  
*2002-2004*

Date	K	Sum	Date	K	Sum
020101	13210032	12	020211	31243323	21
020102	10012211	8	020212	32221013	14
020103	00022220	8	020213	12233410	16
020104	00010012	4	020214	00111000	3
020105	10100000	2	020215	00010110	3
020106	00000100	1	020216	01021201	7
020107	01020232	10	020217	33332103	18
020108	33322100	14	020218	01222234	16
020109	00010201	4	020219	21210021	9
020110	01233653	23	020220	10023213	12
020111	33332543	26	020221	11222123	14
020112	43333442	26	020222	22222142	17
020113	22233224	20	020223	21111001	7
020114	22222323	18	020224	01121011	7
020115	01232212	13	020225	20222143	16
020116	11100100	4	020226	12122223	15
020117	32122413	18	020227	10121012	8
020118	30010100	5	020228	14333356	28
020119	01133444	20	020301	43111100	11
020120	43222232	20	020302	11122222	13
020121	43222332	21	020303	11233234	19
020122	01131112	10	020304	32222332	19
020123	30132243	18	020305	54433433	29
020124	13010000	5	020306	23443433	26
020125	11033441	17	020307	11232103	13
020126	32232121	16	020308	11221010	8
020127	22232211	15	020309	10122311	11
020128	21133212	15	020310	01123104	12
020129	21130001	8	020311	24233222	20
020130	00000011	2	020312	22332323	20
020131	21000004	7	020313	21323100	12
020201	43233313	22	020314	10110000	3
020202	44333403	24	020315	00211022	8
020203	11021200	7	020316	10021010	5
020204	02001123	9	020317	00010011	3
020205	42234465	30	020318	10115333	17
020206	43433342	26	020319	55422222	24
020207	23333113	19	020320	10003421	11
020208	21133421	17	020321	22311232	16
020209	22131044	17	020322	23321100	12
020210	33211101	12	020323	00143334	18

Date	K	Sum	Date	K	Sum
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020325	22112322	15	020505	10121012	8
020326	12343134	21	020506	01112323	13
020327	01201010	5	020507	21012322	13
020328	00000010	1	020508	22222212	15
020329	00010024	7	020509	30132111	12
020330	23435333	26	020510	21243445	25
020331	34333343	26	020511	00156664	28
020401	33333321	21	020512	42313223	20
020402	23332211	17	020513	32013211	13
020403	33322122	18	020514	25333354	28
020404	12111101	8	020515	34322342	23
020405	00001010	2	020516	21122132	14
020406	11011111	7	020517	00112012	7
020407	11223210	12	020518	01112065	16
020408	00111010	4	020519	44300000	11
020409	01001001	3	020520	12232342	19
020410	00212312	11	020521	30302114	14
020411	21233333	20	020522	22222322	17
020412	42234333	24	020523	24167733	33
020413	32233233	21	020524	00100000	1
020414	23024410	16	020525	00000121	4
020415	10101122	8	020526	10111322	11
020416	23201021	11	020527	42334323	24
020417	31255762	31	020528	22212222	15
020418	64543334	32	020529	21102101	8
020419	33455556	36	020530	11112212	11
020420	56434653	36	020531	10110110	5
020421	21001113	9	020601	00010212	6
020422	33221311	16	020602	44233324	25
020423	03533524	25	020603	23211132	15
020424	31121112	12	020604	33433322	23
020425	20000010	3	020605	31001101	7
020426	00000111	3	020606	10111101	6
020427	12123243	18	020607	00011120	5
020428	34333322	23	020608	00134433	18
020429	22232232	18	020609	32211132	15
020430	31122210	12	020610	22324432	22
020501	01011021	6	020611	12221111	11
020502	20001311	8	020612	31112123	14
020503	12111111	9	020613	12122321	14

Date	K	Sum	Date	K	Sum
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020615	11000013	6	020726	32132332	19
020616	32213122	16	020727	43234333	25
020617	21100211	8	020728	34222323	21
020618	01124332	16	020729	12114321	15
020619	33231322	19	020730	12111232	13
020620	21131010	9	020731	00012331	10
020621	12122232	15	020801	03345435	27
020622	11001223	10	020802	54234435	30
020623	12212222	14	020803	52232332	22
020624	22111311	12	020804	24232231	19
020625	22123113	15	020805	12010112	8
020626	20001310	7	020806	22002000	6
020627	00000110	2	020807	10111110	6
020628	00000100	1	020808	00002234	11
020629	00010122	6	020809	22223343	21
020630	13223223	18	020810	44223223	22
020701	33244321	22	020811	02133333	18
020702	21100121	8	020812	32333313	21
020703	01111020	6	020813	33220032	15
020704	11001012	6	020814	12124433	20
020705	22212333	18	020815	21243355	25
020706	34343433	27	020816	32312210	14
020707	42112221	15	020817	03212122	13
020708	21022124	14	020818	32012155	19
020709	32332332	21	020819	53443345	31
020710	22221232	16	020820	24202356	24
020711	10001113	7	020821	44423343	27
020712	23254422	24	020822	33321220	16
020713	23121111	12	020823	11111132	11
020714	01020100	4	020824	22110010	7
020715	00210210	6	020825	10111002	6
020716	11132344	19	020826	12243534	24
020717	33223543	25	020827	33233314	22
020718	22210000	7	020828	02221223	14
020719	01033413	15	020829	30013311	12
020720	45322124	23	020830	11223120	12
020721	34314431	23	020831	01112123	11
020722	22343323	22	020901	42122125	19
020723	32223345	24	020902	32231001	12
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Date	K	Sum	Date	K	Sum
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020905	13221201	12	021016	32233363	25
020906	11223111	12	021017	33323223	21
020907	24312566	29	021018	33223243	22
020908	75321234	27	021019	33211133	17
020909	20002134	12	021020	33222123	18
020910	40123455	24	021021	22221122	14
020911	02332534	22	021022	31332140	17
020912	33222242	20	021023	11233424	20
020913	42132031	16	021024	44355655	37
020914	23211121	13	021025	44444233	28
020915	10011222	9	021026	23445553	31
020916	00123110	8	021027	33324444	27
020917	02122332	15	021028	43333353	27
020918	32234122	19	021029	32233142	20
020919	21234532	22	021030	22321233	18
020920	21100002	6	021031	43245542	29
020921	10123310	11	021101	10120232	11
020922	11212231	13	021102	53334455	32
020923	10110000	3	021103	33235665	33
020924	00110010	3	021104	33332545	28
020925	00011101	4	021105	34334334	27
020926	20110123	10	021106	42334455	30
020927	20022211	10	021107	33121232	17
020928	10111221	9	021108	00121030	7
020929	00211112	8	021109	00111233	11
020930	23444335	28	021110	44422222	22
021001	22436746	34	021111	12334132	19
021002	55432424	29	021112	13144152	21
021003	53333566	34	021113	33234111	18
021004	75343365	36	021114	21122321	14
021005	43234543	28	021115	22222123	16
021006	12320244	18	021116	31111013	11
021007	34534565	35	021117	32100110	8
021008	44344543	31	021118	31111233	15
021009	01433443	22	021119	33322135	22
021010	23232114	18	021120	22221574	25
021011	11121222	12	021121	34555455	36
021012	21132212	14	021122	43334534	29
021013	11000012	5	021123	33232442	23
021014	33345323	26	021124	22221534	21

Date	K	Sum
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021128	22213441	19
021129	22222433	20
021130	32322333	21
021201	32233424	23
021202	22232433	21
021203	22233231	18
021204	11223442	19
021205	22121310	12
021206	11021323	13
021207	33333244	25
021208	23312333	20
021209	21011101	7
021210	20010011	5
021211	00121000	4
021212	11012100	6
021213	10011001	4
021214	22232433	21
021215	31112120	11
021216	11011002	6
021217	21000001	4
021218	00002000	2
021219	23443562	29
021220	32224465	28
021221	54222322	22
021222	20024243	17
021223	31344453	27
021224	30235553	26
021225	32213241	18
021226	20122435	19
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021228	33333422	23
021229	21221533	19
021230	30212242	16
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Date	K	Sum	Date	K	Sum
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030102	10012121	8	030212	11131453	19
030103	30112645	22	030213	11021005	10
030104	54222243	24	030214	43133444	26
030105	11122224	15	030215	44244522	27
030106	01110123	9	030216	22233445	25
030107	11111142	12	030217	21222312	15
030108	20100001	4	030218	24422234	23
030109	00001021	4	030219	11023334	17
030110	12122334	18	030220	22333353	24
030111	33121124	17	030221	13221443	20
030112	11212222	13	030222	22224403	19
030113	32120013	12	030223	32123333	20
030114	32231212	16	030224	00111003	6
030115	30012201	9	030225	10112101	7
030116	10121021	8	030226	11322223	16
030117	01112201	8	030227	44234444	29
030118	11224343	20	030228	21132436	22
030119	22233444	24	030301	31233243	21
030120	44122342	22	030302	22122353	20
030121	43333333	25	030303	31123365	24
030122	22122445	22	030304	44344544	32
030123	54123323	23	030305	32133544	25
030124	32222444	23	030306	53332444	28
030125	34344323	26	030307	43222033	19
030126	53233343	26	030308	01123323	15
030127	33100413	15	030309	12221134	16
030128	44222123	20	030310	02222445	21
030129	11123554	22	030311	32222420	17
030130	52333541	26	030312	11111013	9
030131	32343211	19	030313	33123011	14
030201	21000264	15	030314	11234253	21
030202	55443565	37	030315	43223443	25
030203	42134554	28	030316	11134454	23
030204	44532254	29	030317	24335456	32
030205	52123412	20	030318	44445122	26
030206	22233343	22	030319	33222232	19
030207	33113241	18	030320	02334335	23
030208	33233234	23	030321	43344045	27
030209	42223543	25	030322	12231033	15
030210	33321134	20	030323	32342434	25

Date	K	Sum	Date	K	Sum
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030325	01000110	3	030505	12122433	18
030326	01111223	11	030506	32135455	28
030327	42334433	26	030507	54534442	31
030328	23322445	25	030508	33244554	30
030329	43223365	28	030509	43435324	28
030330	52333445	29	030510	75311341	25
030331	32135555	29	030511	42434333	26
030401	43221342	21	030512	22332252	21
030402	12322445	23	030513	43343344	28
030403	22212244	19	030514	43324453	28
030404	43333355	29	030515	22223424	21
030405	33223453	25	030516	21001123	10
030406	11100312	9	030517	21111110	8
030407	10013101	7	030518	01000343	11
030408	42243311	20	030519	33212333	20
030409	43333322	23	030520	21222012	12
030410	23343343	25	030521	32122545	24
030411	12121243	16	030522	54324342	27
030412	21013310	11	030523	13242412	19
030413	21212011	10	030524	33223344	24
030414	22033334	20	030525	32231313	18
030415	32233222	19	030526	42322133	20
030416	42353455	31	030527	33333344	26
030417	13243441	22	030528	44444343	30
030418	13243323	21	030529	32326677	36
030419	12011133	12	030530	56244655	37
030420	22113324	18	030531	55202111	17
030421	33322343	23	030601	14323244	23
030422	53343344	29	030602	34433423	26
030423	13332342	21	030603	43243334	26
030424	20214345	21	030604	23233442	23
030425	24242315	23	030605	21012232	13
030426	21323342	20	030606	22123333	19
030427	22121433	18	030607	43333324	25
030428	33221021	14	030608	33343555	31
030429	12103463	20	030609	23233334	23
030430	33223456	28	030610	22533332	23
030501	63334422	27	030611	23323231	19
030502	24222202	16	030612	10102311	9
030503	12132111	12	030613	10001233	10

Date	K	Sum	Date	K	Sum
030614	23234443	25	030725	00322110	9
030615	34322333	23	030726	22135654	28
030616	34233354	27	030727	53333321	23
030617	34345543	31	030728	11024333	17
030618	43542443	29	030729	34224454	28
030619	32232341	20	030730	23333444	26
030620	03222331	16	030731	33354444	30
030621	42212324	20	030801	53335134	27
030622	21211332	15	030802	33222442	22
030623	43342323	24	030803	32221333	19
030624	43334223	24	030804	02110233	12
030625	12332334	21	030805	30111203	11
030626	33234223	22	030806	53332222	22
030627	43335433	28	030807	02124565	25
030628	24255434	29	030808	44442453	30
030629	33343344	27	030809	23332225	22
030630	33322322	20	030810	32121231	15
030701	22112222	14	030811	01222333	16
030702	11222333	17	030812	33433432	25
030703	31113444	21	030813	23223124	19
030704	44353434	30	030814	32322232	19
030705	43324342	25	030815	22222323	18
030706	21112332	15	030816	22121220	12
030707	32313221	17	030817	00005455	19
030708	00002100	3	030818	54635645	38
030709	01100021	5	030819	43333322	23
030710	11223123	15	030820	01211435	17
030711	33435544	31	030821	34545655	37
030712	45433244	29	030822	54445555	37
030713	32212322	17	030823	35334433	28
030714	11223334	19	030824	31332242	20
030715	53242245	27	030825	23422322	20
030716	43444344	30	030826	30011223	12
030717	43133243	23	030827	00111233	11
030718	22112334	18	030828	42232232	20
030719	31244435	26	030829	11023342	16
030720	33123224	20	030830	33121211	14
030721	32100010	7	030831	11002120	7
030722	10121230	10	030901	22310241	15
030723	12212332	16	030902	31124123	17
030724	21002223	12	030903	22223233	19

Date	K	Sum	Date	K	Sum
030904	32223344	23	031015	24454656	36
030905	42221320	16	031016	43345544	32
030906	31021222	13	031017	44444334	30
030907	10000110	3	031018	33325444	28
030908	00002113	7	031019	43335565	34
030909	21134244	21	031020	32223445	25
030910	41232343	22	031021	42345666	36
030911	32122243	19	031022	44434641	30
030912	22121120	11	031023	20311100	8
030913	32100013	10	031024	01115766	27
030914	00001022	5	031025	42335414	26
030915	00000033	6	031026	22231155	21
030916	42335343	27	031027	22322210	14
030917	54445655	38	031028	44352534	30
030918	55353654	36	031029	11955576	39
030919	43344553	31	031030	84344698	46
030920	34324523	26	031031	87666444	45
030921	31123432	19	031101	53323354	28
030922	32233451	23	031102	32333353	25
030923	13232422	19	031103	33221333	20
030924	54435354	33	031104	33671232	27
030925	42334544	29	031105	10010024	8
030926	31122333	18	031106	30011264	17
030927	10010001	3	031107	22021221	12
030928	00011220	6	031108	10013432	14
030929	00010002	3	031109	11326563	27
030930	00100212	6	031110	33233455	28
031001	30000055	13	031111	54345654	36
031002	22211223	15	031112	43233652	28
031003	33322432	22	031113	42556666	40
031004	01122000	6	031114	54345354	33
031005	00000114	6	031115	24555654	36
031006	10122133	13	031116	24436665	36
031007	41232433	22	031117	44445654	36
031008	11121012	9	031118	52333532	26
031009	42121100	11	031119	10123440	15
031010	00000001	1	031120	02357978	41
031011	10010000	2	031121	66543332	32
031012	00011012	5	031122	52133564	29
031013	32113355	23	031123	34323254	26
031014	22334377	31	031124	32124234	21

Date	K	Sum
031125	33322422	21
031126	12112323	15
031127	22111121	11
031128	22022000	8
031129	11111102	8
031130	12010343	14
031201	23120103	12
031202	01220001	6
031203	00000200	2
031204	00000134	8
031205	34435545	33
031206	42332533	25
031207	20113354	19
031208	24234565	31
031209	23335545	30
031210	53234555	32
031211	54545555	38
031212	33223445	26
031213	33235554	30
031214	43224655	31
031215	43235433	27
031216	21220332	15
031217	21011210	8
031218	11000000	2
031219	00100000	1
031220	00033533	17
031221	44222443	25
031222	23233443	24
031223	12100231	10
031224	01001322	9
031225	00012200	5
031226	21010113	9
031227	22131115	16
031228	23223342	21
031229	10021300	7
031230	10000132	7
031231	32112654	24

Date	K	Sum	Date	K	Sum
040101	33225554	29	040211	20024653	22
040102	43123343	23	040212	33443553	30
040103	23333363	26	040213	43234445	29
040104	32324552	26	040214	31223534	23
040105	43234655	32	040215	34441432	25
040106	42221136	21	040216	40010020	7
040107	33344552	29	040217	00000111	3
040108	00021014	8	040218	31010333	14
040109	32423442	24	040219	32110133	14
040110	33433342	25	040220	02000010	3
040111	00135532	19	040221	20011131	9
040112	01001344	13	040222	30012242	14
040113	21024544	22	040223	21022223	14
040114	32123332	19	040224	32011233	15
040115	12024554	23	040225	20012032	10
040116	42233554	28	040226	00000000	0
040117	22233354	24	040227	03012053	14
040118	22232055	21	040228	12333443	23
040119	32214543	24	040229	23154445	28
040120	33224513	23	040301	32324553	27
040121	12223252	19	040302	32423244	24
040122	54365464	37	040303	21233331	18
040123	43344665	35	040304	00120220	7
040124	52221334	22	040305	11111001	6
040125	45344554	34	040306	21000000	3
040126	31133354	23	040307	00020022	6
040127	32314414	22	040308	00020000	2
040128	63222453	27	040309	01133555	23
040129	10112013	9	040310	55634255	35
040130	22232344	22	040311	43335765	36
040131	10131111	9	040312	54222534	27
040201	13211133	15	040313	30434233	22
040202	10333514	20	040314	32323254	24
040203	32324423	23	040315	33233342	23
040204	41232234	21	040316	31022223	15
040205	32231223	18	040317	22010132	11
040206	13442452	25	040318	22222234	19
040207	10210031	8	040319	41011022	11
040208	00010103	5	040320	21012533	17
040209	10112032	10	040321	32213231	17
040210	00021301	7	040322	31101343	16

Date	K	Sum	Date	K	Sum
040323	11010032	8	040503	00100023	6
040324	10000001	2	040504	22210022	11
040325	00000211	4	040505	11122433	17
040326	10114553	20	040506	12111033	12
040327	22234535	26	040507	23223243	21
040328	35332432	25	040508	22121222	14
040329	21223322	17	040509	12001100	5
040330	01233121	13	040510	00010012	4
040331	00312330	12	040511	32111124	15
040401	00001020	3	040512	44010110	11
040402	00000000	0	040513	01421243	17
040403	21134566	28	040514	00001112	5
040404	61022222	17	040515	32110002	9
040405	00003355	16	040516	10000001	2
040406	42453043	25	040517	10010002	4
040407	31112144	17	040518	10011000	3
040408	23233122	18	040519	01013322	12
040409	33321031	16	040520	11231221	13
040410	22101045	15	040521	32100310	10
040411	31111231	13	040522	12221001	9
040412	32210040	12	040523	32122221	15
040413	10001031	6	040524	22334201	17
040414	10000002	3	040525	11001000	3
040415	00121024	10	040526	00000110	2
040416	12231243	18	040527	20000000	2
040417	11021102	8	040528	00012212	8
040418	01101223	10	040529	23231324	20
040419	30111101	8	040530	21123234	18
040420	00000102	3	040531	43232231	20
040421	13110031	10	040601	32233223	20
040422	00102011	5	040602	22211223	15
040423	12234424	22	040603	12111112	10
040424	10032222	12	040604	12122221	13
040425	03311211	12	040605	33122324	20
040426	00000310	4	040606	33223141	19
040427	01001011	4	040607	22112115	15
040428	00212243	14	040608	31121231	14
040429	00000011	2	040609	32232433	22
040430	33101255	20	040610	32202132	15
040501	31112232	15	040611	31000010	5
040502	10031030	8	040612	02000000	2



Date	K	Sum	Date	K	Sum
040613	00121212	9	040724	32435546	32
040614	10012232	11	040725	66566776	49
040615	33324333	24	040726	63111246	24
040616	22112001	9	040727	75667765	49
040617	02121222	12	040728	33213433	22
040618	12122221	13	040729	11211100	7
040619	22011200	8	040730	00110123	8
040620	10000101	3	040731	12112211	11
040621	01000200	3	040801	42111033	15
040622	02000000	2	040802	00001103	5
040623	00000100	1	040803	11000000	2
040624	00202000	4	040804	00001000	1
040625	00002010	3	040805	00001212	6
040626	02123311	13	040806	20000013	6
040627	00001002	3	040807	31133223	18
040628	22132243	19	040808	10100000	2
040629	34332342	24	040809	20222344	19
040630	12212221	13	040810	42014433	21
040701	32222223	18	040811	20322332	17
040702	22122323	17	040812	31021111	10
040703	11101220	8	040813	11000113	7
040704	21020002	7	040814	22232121	15
040705	21012222	12	040815	11002000	4
040706	02111100	6	040816	00002212	7
040707	01000010	2	040817	20012233	13
040708	00000000	0	040818	11312112	12
040709	11000010	3	040819	10001101	4
040710	01100221	7	040820	21133323	18
040711	31034235	21	040821	33321144	21
040712	43211134	19	040822	21122332	16
040713	43322333	23	040823	20001200	5
040714	01111321	10	040824	10010100	3
040715	11010123	9	040825	01010100	3
040716	00004214	11	040826	10002222	9
040717	54421022	20	040827	10101132	9
040718	10120201	7	040828	11210121	9
040719	12012313	13	040829	00022122	9
040720	13113232	16	040830	31233636	27
040721	21100000	4	040831	43432242	24
040722	00034346	20	040901	11111323	13
040723	54554421	30	040902	20000001	3

Date	K	Sum	Date	K	Sum
040903	10000000	1	041014	33234444	27
040904	00010001	2	041015	23112331	16
040905	10011330	9	041016	30000000	3
040906	31132423	19	041017	00000000	0
040907	31122121	13	041018	00000231	6
040908	32212000	10	041019	00000112	4
040909	00001013	5	041020	11223304	16
040910	00000000	0	041021	23221020	12
040911	00000000	0	041022	31211311	13
040912	00000100	1	041023	00000102	3
040913	00000054	9	041024	11011442	14
040914	33324465	30	041025	23332311	18
040915	53213322	21	041026	00000000	0
040916	31323444	24	041027	00002211	6
040917	52223325	24	041028	10000002	3
040918	43123000	13	041029	00002242	10
040919	00100014	6	041030	42122334	21
040920	30433302	18	041031	31133442	21
040921	22011112	10	041101	30012002	8
040922	00324443	20	041102	10110022	7
040923	43210102	13	041103	10020345	15
040924	21020212	10	041104	12210233	14
040925	01021110	6	041105	20010000	3
040926	10000022	5	041106	00000000	0
040927	00012200	5	041107	23042577	30
040928	01200013	7	041108	88743355	43
040929	10000013	5	041109	45356796	45
040930	10000020	3	041110	77767743	48
041001	00010022	5	041111	44332425	27
041002	12112223	14	041112	43443454	31
041003	00123224	14	041113	11111202	9
041004	33021243	18	041114	43111010	11
041005	10000012	4	041115	00000000	0
041006	10010000	2	041116	00122223	12
041007	00000000	0	041117	00110001	3
041008	00122102	8	041118	00000100	1
041009	41100001	7	041119	00000123	6
041010	31122023	14	041120	22123453	22
041011	22213313	17	041121	22233532	22
041012	11110003	7	041122	10110011	5
041013	44425444	31	041123	20010123	9

Date	K	Sum
041124	21112013	11
041125	23224243	22
041126	21120224	14
041127	00101424	12
041128	31211223	15
041129	32232445	25
041130	33222253	22
041201	22320213	15
041202	11000110	4
041203	00000010	1
041204	00000000	0
041205	01421211	12
041206	21315444	24
041207	22322343	21
041208	21113223	15
041209	30022132	13
041210	21112423	16
041211	00205445	20
041212	22342643	26
041213	43210100	11
041214	01222122	12
041215	21000312	9
041216	12203255	20
041217	33232423	22
041218	43223021	17
041219	10010000	2
041220	20110011	6
041221	10342332	18
041222	34343233	25
041223	11111332	13
041224	00000210	3
041225	42421113	18
041226	22111331	14
041227	21211032	12
041228	21012354	18
041229	42223304	20
041230	23433433	25
041231	21122113	13

*Special phenomena*  
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Date	CET (UT+1h)	Ampl. in H(nT)	Hx	Hy	Hz	Remark
020217	0253	23	+	-	+	
020228	0549	18	+	-	+	
020318	1420	74	+	-	+	
020320	1427	20	+	-	+	
020329	2337	41	+	-	+	
020417	1206	51	+	-	-	
020419	0935	39	+	-	-	
020423	0546	23	+	-	+	
020510	1224	26	+	-	+	
020511	1113	34	+	-	-	
020518	2106	77	+	-	-	
020520	0438	10	+	-	+	
020523	1149	27	+	-	-	
020523	1641	100	+	-	+	
020601	1744	11	+	-	+	
020608	1241	17	+	-	+	
020719	1107	20	+	-	-	
020729	1421	49	+	-	-	
020801	0608	4	+	-	-	
020801	0010	52	+	-	+	
020818	1943	65	+	-	-	
020904	0247	9	+	-	-	
020907	1736	23	+	-	+	
020930	0910	15	+	-	-	
021109	1652	11	+	-	+	
021109	1948	22	+	-	+	
021126	2249	29	+	-	-	
030127	0209	14	+	-	+	
030408	0207	32	+	-	+	

Date	CET (UT+1h)	Ampl. in H(nT)	Hx	Hy	Hz	Remark
030529	1324	42	+	-	+	
030530	1724	58	+	-	+	
030608	1153	30	+	-	-	
030629	0408	10	+	-	+	
030817	1522	58	+	-	+	
031024	1617	46	+	-	+	
031026	2007	14	+	-	+	
031028	0306	16	+	-	+	
031029	0710	870	-	+	+	
031104	0727	46	+	-	-	
031115	0649	29	+	-	+	
031120	0901	49	-	+	-	
031121	0350	28	+	-	+	
040122	0236	48	+	-	+	
040403	1509	33	+	-	+	
040409	0331	16	+	-	+	
040410	2109	34	+	+	-	
040716	1453	23	+	-	+	
040722	1132	21	+	-	-	
040724	0710	40	+	-	-	
040726	2349	79	+	-	-	
040730	2214	27	+	-	+	
040913	2103	53	+	-	+	
041107	1257	12	+	-	+	
041107	1151	35	+	-	-	
041107	1922	54	+	-	-	
041111	1808	28	+	-	+	
041205	0846	36	+	-	-	

*Special phenomena*  
sfe 2002–2004

Date	Beginning	Maximum	End	Ampl.	Sign		
	GMT	GMT	GMT		nT	Hx	Hy
020122	1525	1530	1537	3	-	+	-
020518	0800	0808	0811	2	-	+	-
020610	0710	0722	0730	19	-	+	+
020627	1633	1640	1647	4	-	+	-
020711	1013	1019	1025	2	-	+	-
020730	1234	1238	1252	2	-	+	-
021012	1027	1033	1039	6	+	-	+
030610	1024	1030	1033	14	-	+	-
030903	0823	0829	0834	9	-	+	-
031108	1735	1738	1741	15	-	+	+
031129	0737	0744	0751	3	-	+	-
031201	1217	1223	1228	8	-	+	-
040401	1343	1352	1407	5	-	+	+
040502	1218	1229	1238	18	-	+	-
041109	1030	1034	1040	29	-	+	-

*Annual mean values of geomagnetic elements*

Year	D	H nT	Z nT	I	X nT	Y nT	F nT
1961	-0°23.6'	20816	42077	63°40.7'	20816	-143	46944
1962	-0°19.6'	20827	42093	63°40.5'	20827	-119	46964
1963	-0°14.3'	20839	42116	63°40.4'	20839	-87	46990
1964	-0°10.5'	20845	42126	63°40.4'	20845	-64	47001
1965	-0°08.1'	20877	42137	63°38.6'	20877	-49	47025
1966	-0°06.8'	20888	42156	63°38.5'	20888	-41	47047
1967	-0°06.0'	20903	42179	63°38.3'	20903	-36	47074
1968	-0°03.0'	20921	42196	63°37.7'	20921	-18	47098
1969	0°00.2'	20942	42214	63°36.9'	20942	1	47123
1970	0°02.8'	20964	42235	63°36.1'	20964	17	47152
1971	0°04.3'	20992	42262	63°35.2'	20992	26	47188
1972	0°06.5'	21011	42286	63°34.7'	21011	40	47218
1973	0°10.2'	21028	42317	63°34.6'	21028	62	47254
1974	0°13.6'	21046	42350	63°34.5'	21046	83	47291
1975	0°18.5'	21072	42380	63°33.8'	21072	113	47330
1976	0°23.8'	21084	42413	63°34.0'	21084	146	47365
1977	0°28.8'	21106	42443*	63°33.6**	21105	177	47401*
1978	0°34.6'	21108	42473*	63°34.4**	21107	212	47429*
1979	0°41.4'	21113*	42496*	63°34.8**	21112*	254	47452*
1980	0°46.3'	21107*	42512*	63°35.8**	21105*	284	47463*
1981	0°52.4'	21097*	42530*	63°37.0**	21095*	322	47475*
1982	0°57.5'	21078	42549	63°38.8'	21075	353	47484
1983	1°02.7'	21078	42581	63°39.8'	21074	384	47512
1984	1°08.1'	21075	42601	63°40.7'	21071	417	47529
1985	1°12.7'	21073	42625	63°41.7'	21068	446	47550
1986	1°17.8'	21065	42660	63°43.1'	21060	477	47577
1987	1°21.9'	21067	42689	63°44.0'	21061	502	47604
1988	1°26.6'	21052	42723	63°46.0'	21045	530	47628
1989	1°31.3'	21041	42761	63°48.0'	21034	559	47657
1990	1°35.5'	21044	42782	63°48.3'	21036	584	47678
1991	1°36.3'	21027	42816	63°50.4'	21019	589	47701
1992	1°38.1'	21037	42834	63°50.4'	21028	600	47721
1993	1°43.2'	21039	42853	63°51.0'	21030	631	47739
1994	1°48.4'	21037	42877	63°52.0'	21026	663	47760
1995	1°56.6'	21052	42898	63°51.7'	21039	713	47785
1996	2°02.0'	21062	42920	63°51.7'	21048	747	47809
1997	2°07.5'	21060	42955	63°52.9'	21045	781	47839
1998	2°13.7'	21053	42997	63°54.7'	21037	819	47875
1999	2°18.3'	21055	43030	63°55.6'	21038	847	47905



## YEARLY MEANS OF GEOMAGNETIC ELEMENTS

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Year	D	H nT	Z nT	I	X nT	Y nT	F nT
2000	2°23.7'	21054	43068	63°56.9'	21035	880	47938
2001	2°28.4'	21064	43099	63°57.2'	21045	909	47972
2002	2°33.7'	21072	43136	63°57.9'	21051	942	48008
2003	2°39.6'	21071	43180	63°59.3'	21048	978	48047
2004	2°44.4'	21084	43208	63°59.4'	21060	1008	48078



### III. ATMOSPHERIC ELECTRICITY AND THE IONOSPHERE

#### ATMOSPHERIC ELECTRICITY DATA

##### Hourly means of the potential gradient

Atmospheric electricity data have been published since 1962. This table contains the hourly average values of the potential gradient expressed in V/m. The date column gives year, month, day (e.g. 990101 indicates 1999 January 1). Hourly averages have been taken only from hours having a recording period of 30 minutes or more. If values were available only for part of an hour the average is entered in square brackets [ ]. These data have been used in the determination of the daily means. Values uncertain for some reason are entered in round brackets ( ) and have not been used in calculating daily means. Daily means of each day with 24 hours of recording are entered. However, loss of a maximum of one hour's data out of twelve (for example, on account of instrument maintenance or calibration) has not precluded entering this mean value. In hours marked by S the value of the potential gradient exceeded permanently or several times the measuring limits of the equipment making the determination of an hourly average impossible. The direction of the deviations is marked by signs. OBS indicates that the potential gradient exceeded the measuring limits of the equipment both in positive and negative directions. Gaps of some days are generally due to missing records. Data are presented in universal time (GMT).

See CD (program Seenck.exe, menu item AtmElectr).

*Hourly means of the  
2002*

Date	00	01	02	03	04	05	06	07	08	09	10	11
020101	10	30	40	30	40	40	40	[40]	40	-20	30	40
020102	30	40	30	20	30	30	40	30	[0]	+S	+S	50
020103	40	40	40	30	30	40	[40]	-	50	50	50	50
020104	50	40	40	40	40	50	50	70	[70]	60	50	60
020105	60	50	50	50	60	50	70	[80]	[80]	80	70	70
020106	60	60	50	60	60	60	70	70	80	[90]	90	70
020107	30	40	40	20	40	40	40	-	[30]	30	50	50
020108	40	40	30	20	30	40	50	[50]	[80]	70	50	80
020109	40	30	40	30	40	40	50	[60]	50	50	60	80
020110	60	80	60	70	60	50	40	[30]	[40]	30	30	40
020111	-30	0	-10	-10	-20	20	0	[-10]	10	10	30	30
020112	60	50	30	30	40	30	30	40	[30]	30	40	30
020113	30	50	40	-10	20	40	40	[40]	30	-10	0	10
020114	10	20	10	10	10	30	20	-	-	30	20	20
020115	-20	0	0	-10	10	20	20	[30]	20	30	20	0
020116	-10	-10	20	30	-10	10	10	0	10	0	0	-20
020117	-20	-20	-10	0	0	0	10	0	10	10	20	30
020118	30	40	40	40	30	50	30	{40}	30	40	50	60
020119	40	30	40	30	30	10	-10	20	60	50	70	60
020120	70	80	40	40	50	50	70	60	60	60	70	60
020121	30	30	20	0	-50	-40	10	-	-	10	10	20
020122	90	100	90	100	110	80	60	40	-	-	-	-10
020123	0	20	20	20	30	30	70	80	[100]	130	120	70
020124	40	20	30	40	40	50	70	[60]	70	80	70	50
020125	50	40	30	30	40	40	40	[40]	-S	-S	OBS	30
020126	0	-10	-10	0	-10	0	10	[0]	+S	OBS	-S	30
020127	80	70	30	40	40	60	50	[50]	80	70	80	60
020128	10	10	-20	30	80	80	-	60	-	[30]	30	20
020129	10	20	20	20	20	20	30	[30]	30	40	40	50
020130	30	30	30	20	30	30	30	[30]	40	40	40	50
020131	40	40	40	30	30	40	20	[40]	60	60	50	50

*potential gradient*

12	13	14	15	16	17	18	19	-20	21	22	23	mean
40	40	50	50	50	60	60	60	50	40	40	30	39
30	50	50	50	40	OBS	OBS	10	50	50	40	40	-
50	50	50	60	60	60	80	100	80	70	80	70	55
70	70	80	90	80	60	70	70	70	70	70	50	61
70	70	70	60	60	60	50	50	80	80	80	70	65
70	80	70	70	70	70	80	80	60	50	40	30	66
60	70	80	90	80	100	80	70	80	80	80	60	58
70	80	80	70	60	60	70	70	60	40	40	40	55
70	90	90	80	60	80	90	100	80	80	80	70	64
70	70	60	30	30	40	20	0	-10	-10	-40	-30	34
50	10	30	40	40	40	30	10	30	30	30	60	18
30	30	50	40	40	80	70	20	30	20	20	80	40
10	20	40	30	20	30	50	40	50	30	30	10	27
30	30	40	40	40	50	40	40	20	10	0	0	-
-10	20	40	20	30	40	0	-20	0	-30	-10	-30	7
20	30	30	40	30	20	30	30	40	10	10	-10	13
30	30	30	40	50	40	30	30	20	40	40	30	18
50	40	40	40	40	30	30	30	20	40	50	40	39
80	80	90	80	80	100	80	110	130	90	80	80	63
60	50	50	50	50	70	50	60	40	80	40	40	54
0	-40	-60	-10	20	40	80	110	130	140	130	120	-
30	50	40	30	40	40	30	30	-10	-30	-20	-20	-
40	40	40	40	40	30	30	20	30	10	20	20	44
50	30	50	80	70	80	80	70	50	50	40	40	55
20	30	40	50	60	70	70	50	40	30	20	10	-
60	80	80	30	30	50	30	30	10	20	0	30	-
60	80	70	-S	-S	40	40	30	10	20	30	40	-
20	30	50	50	50	50	30	30	30	20	10	10	-
40	50	50	50	40	40	40	70	50	50	40	30	37
40	40	40	50	50	70	70	50	50	50	40	40	41
50	40	40	40	30	40	50	40	40	30	40	40	41

Date	00	01	02	03	04	05	06	07	08	09	10	11
020201	40	30	30	20	20	20	30	[30]	40	50	40	40
020202	40	40	40	40	40	30	30	[40]	50	50	50	50
020203	-20	10	-20	-10	0	-10	-60	-60	-20	[-10]	-60	-20
020204	-60	-80	-60	-80	-40	-10	-	-	-	40	60	40
020205	70	70	120	90	80	110	110	100	[90]	130	90	80
020206	20	10	10	20	40	40	70	[70]	70	(50)	40	50
020207	80	50	40	0	-10	0	10	20	[10]	-30	-70	-50
020208	30	20	10	20	10	20	20	[30]	-10	-40	40	50
020209	40	40	40	30	0	20	10	[-10]	10	40	40	50
020210	40	40	0	OBS	30	-10	0	(30)	40	40	30	30
020211	30	30	20	20	20	30	-	-	-	40	40	40
020212	30	30	30	30	30	30	20	[30]	40	50	60	50
020213	30	30	20	20	20	20	30	[30]	40	30	20	40
020214	10	20	10	10	0	10	20	[30]	30	40	40	40
020215	30	30	20	30	30	40	40	[40]	40	30	40	40
020216	40	50	50	50	40	40	40	[40]	60	40	40	40
020217	20	20	10	0	0	20	10	10	10	[20]	10	20
020218	40	50	100	110	-	+S	-	-	-	50	60	60
020219	30	30	30	30	30	40	40	[20]	[30]	40	40	40
020220	10	10	10	10	10	10	20	-	-	30	20	30
020221	-20	20	20	20	20	0	10	[30]	30	30	30	30
020222	30	30	30	30	10	20	30	[40]	40	30	40	30
020223	30	40	30	30	30	30	[30]	20	40	40	40	40
020224	OBS	-S	10	10	20	10	20	[30]	30	30	30	30
020225	30	30	30	20	30	30	-	-	-	-20	-10	20
020226	40	70	70	50	50	60	60	[40]	60	60	40	50
020227	20	20	10	20	30	30	30	[40]	40	60	50	40
020228	10	10	10	30	20	20	20	[20]	10	10	10	30

12	13	14	15	16	17	18	19	20	21	22	23	mean
40	40	40	40	40	40	40	40	40	40	40	40	36
60	60	50	50	50	50	40	40	-10	30	0	-40	37
0	-10	-10	-20	-30	-60	-10	0	-10	-20	-40	-70	-23
40	40	40	40	40	40	50	40	50	50	50	80	-
130	130	80	70	60	40	30	100	30	60	50	10	80
50	50	60	50	50	60	80	80	70	40	30	40	48
-30	30	70	70	40	40	30	20	20	20	20	30	17
60	60	60	40	40	40	50	50	40	30	30	40	31
40	40	40	40	20	20	30	30	20	-10	-10	40	25
40	40	40	40	40	40	40	40	30	30	40	30	-
40	40	40	20	40	50	50	50	40	40	40	30	-
40	40	40	50	50	40	30	30	30	30	30	30	36
40	30	30	40	30	30	20	10	OBS	10	-S	+S	-
50	50	50	60	50	40	40	40	40	50	40	40	34
40	40	50	40	50	50	60	70	70	60	50	40	43
40	40	40	40	40	40	30	40	30	30	20	10	39
20	40	30	30	20	0	OBS	OBS	-10	10	30	30	-
50	40	30	20	30	40	60	90	30	20	10	20	-
30	40	40	40	50	20	-10	-70	-40	20	20	10	23
40	40	40	40	30	30	30	40	30	30	10	-20	-
30	30	OBS	+S	20	30	20	20	30	30	30	30	-
30	30	40	30	30	40	20	20	20	-50	-50	10	22
30	0	-S	20	30	40	20	30	OBS	OBS	OBS	20	-
30	40	30	10	30	40	60	40	40	30	30	30	-
30	30	20	-60	-60	-50	-140	-50	-50	-30	-20	-10	-
60	50	50	40	40	40	40	40	50	40	30	30	49
40	50	40	40	30	40	40	40	20	10	0	0	31
OBS	30	70	30	20	-20	20	20	20	30	30	10	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
020301	10	10	20	10	10	10	20	20	[20]	20	0	0
020302	10	10	10	20	30	30	10	[10]	20	0	0	-10
020303	10	30	10	10	20	10	20	[40]	30	30	30	50
020304	40	40	30	30	40	40	-	-	-	(40)	50	50
020305	20	10	10	20	20	30	+S	30	[30]	20	20	20
020306	70	50	40	40	30	40	40	[70]	40	30	40	30
020307	30	30	30	30	20	30	30	[40]	40	40	-	30
020308	-10	0	0	0	10	20	30	40	[40]	40	40	50
020309	30	30	30	30	30	20	30	30	[40]	40	40	40
020310	40	30	20	10	20	30	30	[10]	0	30	40	40
020311	30	30	30	20	30	30	-	[40]	-	50	40	50
020312	30	30	20	30	30	20	30	40	[30]	30	30	40
020313	20	10	10	20	10	10	10	[20]	30	30	40	40
020314	40	30	40	30	30	50	40	[60]	60	50	40	40
020315	20	20	-10	10	-10	-10	-10	[-10]	0	20	20	30
020316	0	20	20	20	0	-10	-10	[10]	20	30	40	50
020317	30	10	10	0	10	0	[-20]	-30	-10	0	20	20
020318	10	10	10	0	0	0	-	20	-	30	30	40
020319	20	20	30	30	40	40	40	[50]	50	50	50	50
020320	40	40	30	40	40	30	30	-	-	-	OBS	OBS
020321	120	50	40	30	-10	0	[-S]	OBS	50	OBS	OBS	OBS
020322	50	30	30	30	30	10	40	[40]	40	20	30	OBS
020323	40	40	30	OBS	50	50	40	[30]	30	30	50	OBS
020324	10	10	10	10	10	10	10	10	10	30	[40]	30
020325	10	10	10	20	20	20	-	-	[10]	20	20	20
020326	-10	-10	10	0	-10	10	30	[40]	30	40	40	40
020327	40	40	40	40	40	40	40	[60]	60	70	50	50
020328	30	10	10	10	10	20	30	[40]	50	60	70	70
020329	30	20	30	30	30	30	40	[50]	60	80	80	80
020330	40	30	40	50	40	40	30	[40]	[40]	40	40	40
020331	50	40	40	50	50	[60]	50	50	30	40	40	50



12	13	14	15	16	17	18	19	20	21	22	23	mean
0	30	30	40	40	40	40	40	30	30	20	20	21
10	-10	-10	-20	0	-10	30	40	20	10	10	20	10
-S	80	50	50	60	70	60	70	50	50	40	40	40
40	50	50	40	40	50	60	40	20	20	20	10	-
30	30	50	50	40	30	40	40	50	30	20	50	30
20	-S	20	30	40	40	40	50	50	40	40	40	40
30	50	50	30	20	20	10	30	30	-S	OBS	OBS	-
50	60	60	70	60	60	60	70	50	50	40	40	39
40	30	30	30	20	20	20	20	30	20	40	40	30
30	30	30	40	30	20	40	70	70	50	40	40	33
50	50	50	40	40	40	40	40	40	40	30	30	-
30	40	40	40	40	40	40	40	40	40	40	30	34
40	40	40	40	30	50	40	40	40	30	20	30	28
40	50	50	40	40	30	40	40	50	50	30	30	42
30	30	40	40	30	30	30	20	20	10	10	0	15
50	60	60	60	40	40	40	40	40	40	20	20	29
20	30	30	30	30	20	20	30	20	10	10	10	13
40	40	50	40	30	40	40	40	30	30	20	30	-
50	30	30	0	0	-20	50	50	50	50	60	50	36
OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	120	170	120	170	-
OBS	70	70	0	OBS	100	OBS	70	70	70	70	60	-
OBS	-S	OBS	OBS	OBS	10	-S	40	50	50	40	40	-
OBS	OBS	OBS	OBS	OBS	OBS	OBS	30	30	30	20	0	-
-10	40	30	OBS	30	40	40	40	40	40	30	10	23
10	10	0	10	0	0	0	-10	-10	-10	-10	-10	-
40	50	50	40	30	30	40	40	40	30	40	40	28
40	50	40	40	40	70	60	50	50	40	30	30	46
70	70	60	60	80	50	40	40	40	40	40	40	43
90	90	100	80	80	80	80	80	60	50	40	50	60
50	60	70	50	40	40	40	50	40	40	20	20	41
40	40	40	40	30	20	40	30	30	20	20	30	39

Date	00	01	02	03	04	05	06	07	08	09	10	11
020401	30	30	20	30	30	20	[20]	-	50	50	60	60
020402	30	30	30	20	20	10	[10]	-	20	30	40	40
020403	10	20	30	20	10	10	[20]	20	20	40	40	40
020404	30	30	30	30	20	20	[30]	40	40	40	40	40
020405	10	20	10	10	30	30	[40]	40	40	40	40	40
020406	40	30	30	20	20	30	[40]	40	40	40	40	40
020407	30	30	40	OBS	20	30	50	(40)	40	50	40	40
020408	20	20	20	20	20	-	30	[40]	40	40	40	40
020409	20	20	40	30	30	40	[40]	40	40	40	40	40
020410	40	40	40	30	30	30	[30]	-20	0	10	0	0
020411	50	20	10	0	20	-10	-20	10	30	20	40	30
020412	10	10	20	20	10	10	10	20	-50	-40	-30	-20
020413	-20	20	40	0	-30	-20	[-20]	30	0	-10	10	0
020414	30	30	40	50	30	40	50	OBS	OBS	OBS	-10	OBS
020415	20	10	0	10	0	-	10	20	10	20	10	40
020416	30	40	40	40	40	40	50	[40]	40	40	40	40
020417	30	40	30	30	30	30	[40]	30	20	40	OBS	OBS
020418	0	20	10	10	20	30	[30]	40	40	40	40	40
020419	10	0	10	0	0	0	[-10]	0	10	10	20	30
020420	30	30	20	10	20	[20]	0	10	30	20	20	40
020421	30	30	20	20	10	20	30	[30]	40	40	40	40
020422	30	30	40	40	40	-	30	-	30	40	40	40
020423	-10	0	0	-20	-10	0	[0]	40	40	40	50	50
020424	-S	30	OBS	30	70	70	20	40	50	30	-10	-S
020425	30	30	30	20	30	40	[40]	40	40	40	40	40
020426	20	20	20	20	30	30	[30]	30	40	30	40	30
020427	40	40	30	10	0	-10	[0]	20	40	0	20	30
020428	30	20	20	10	20	20	[30]	30	20	30	30	30
020429	20	10	10	10	10	-	+S	OBS	40	-	30	30
020430	10	20	10	20	30	40	[40]	30	40	40	40	30

12	13	14	15	16	17	18	19	20	21	22	23	mean
60	70	70	60	50	40	40	60	40	30	30	30	43
40	40	40	40	30	30	40	30	30	10	10	10	27
40	40	40	50	40	30	30	40	40	30	40	40	31
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OBS	OBS	OBS	30	40	40	70	80	80	50	40	30	-
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020522	10	10	20	30	20	-10	[-10]	[-10]	-10	-10	10	20
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020526	OBS	OBS	OBS	-30	30	30	20	20	10	40	30	30
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020529	20	20	20	30	30	40	[40]	40	40	40	40	40
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OBS	-S	80	30	40	40	30	30	30	20	20	30	-
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020606	10	20	30	10	20	+S	[30]	[20]	30	40	40	30
020607	OBS	+S	OBS	10	20	30	[30]	40	10	-10	-10	OBS
020608	30	20	0	0	-10	0	[10]	20	30	30	40	70
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020613	20	20	30	20	30	40	[40]	40	40	40	50	50
020614	20	20	10	20	30	40	40	[30]	30	30	+S	20
020615	40	40	30	20	30	[30]	30	40	30	40	40	60
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020617	20	20	20	10	20	-	-	-	40	60	70	70
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020619	20	20	20	10	30	40	40	[30]	30	40	40	50
020620	20	20	20	10	10	20	[20]	20	30	40	40	40
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020622	40	30	30	30	30	30	[40]	[30]	40	50	50	60
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020625	30	30	30	40	40	40	40	[50]	40	40	30	40
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OBS	-10	0	10	30	30	40	40	40	30	30	20	-
80	50	50	40	40	30	40	20	30	OBS	OBS	30	-
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OBS	OBS	50	30	30	-S	40	30	20	10	10	20	-
80	50	50	40	30	20	30	30	20	30	30	40	32
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+S	OBS	+S	OBS	-S	OBS	10	20	10	10	30	20	-
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020705	20	10	10	10	10	20	[40]	40	40	40	40	40
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020712	30	30	30	30	30	30	[40]	70	40	40	50	60
020713	40	40	40	30	30	30	[30]	30	30	40	40	50
020714	30	30	30	40	50	40	40	[70]	40	40	40	40
020715	10	30	-30	OBS	70	-	70	-	[80]	80	60	60
020716	80	30	+S	OBS	30	80	OBS	70	80	50	50	30
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020719	10	20	10	20	30	30	[30]	30	40	50	50	40
020720	40	30	30	30	20	30	40	[30]	30	40	30	40
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020728	30	30	30	30	30	30	40	50	[50]	50	50	50
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020730	10	10	20	20	20	50	[70]	70	50	60	50	50
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OBS	OBS	OBS	-S	30	10	10	10	10	10	0	0	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
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020803	40	40	40	40	30	[40]	[40]	40	40	50	50	40
020804	30	30	30	30	30	30	40	[40]	90	OBS	OBS	OBS
020805	30	30	30	20	30	-	-	[80]	80	70	40	40
020806	30	20	20	20	20	30	[30]	40	40	50	60	60
020807	-20	-S	-80	20	0	-70	[-30]	[90]	+S	150	130	70
020808	20	10	10	-70	10	60	[120]	[80]	90	80	80	60
020809	30	20	20	20	20	30	[30]	30	40	40	50	50
020810	40	40	40	40	40	40	[40]	40	40	40	40	40
020811	40	30	30	30	30	40	[30]	[30]	70	30	30	40
020812	OBS	-20	OBS	-10	10	10	-	-	40	40	OBS	OBS
020813	20	20	10	10	10	30	[40]	40	90	-20	40	50
020814	30	30	20	20	30	30	[20]	30	40	30	30	30
020815	20	10	10	10	20	20	[20]	20	20	30	30	30
020816	30	-S	40	40	30	40	OBS	OBS	90	80	40	40
020817	30	20	20	20	10	20	[20]	20	30	40	50	50
020818	+S	20	10	10	10	20	60	[50]	70	50	40	50
020819	-	-	-	-	-	-	-	30	30	20	40	60
020820	10	10	10	10	10	10	[20]	[20]	20	30	40	40
020821	10	10	10	20	20	30	OBS	-S	OBS	10	30	40
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020823	30	30	20	30	20	70	40	40	[40]	30	30	40
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020825	40	40	20	40	30	40	[40]	30	30	40	40	40
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020827	20	10	10	10	10	10	[20]	30	20	30	40	40
020828	20	20	20	30	30	40	[50]	40	40	40	40	40
020829	40	40	50	40	50	70	[50]	[40]	OBS	40	40	40
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020831	40	40	40	40	30	20	[30]	40	60	70	30	50

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OBS	40	30	10	20	20	20	10	20	20	10	30	-
50	50	-S	OBS	30	40	40	40	30	40	40	30	-
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OBS	OBS	OBS	OBS	OBS	20	30	40	20	20	30	20	-
40	40	40	40	30	30	30	30	30	30	50	50	35
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50	60	30	30	40	50	50	50	40	40	50	40	46
50	60	60	70	50	50	40	40	OBS	OBS	-S	-S	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
020901	130	70	40	40	40	50	130	130	100	70	60	40
020902	40	40	40	40	40	-	50	-	50	60	60	60
020903	20	10	10	10	20	20	[30]	[30]	30	40	50	50
020904	20	10	20	10	20	30	[30]	[30]	30	30	30	30
020905	30	20	10	20	20	10	20	[20]	30	30	80	OBS
020906	10	10	20	20	10	30	80	[80]	80	60	40	40
020907	40	30	30	30	30	30	[40]	40	40	40	50	50
020908	10	20	20	20	20	20	20	[30]	40	30	40	50
020909	40	40	30	30	30	-	-	30	30	30	30	40
020910	40	40	40	40	30	30	[40]	40	30	40	30	40
020911	40	30	50	70	40	50	[50]	50	40	40	30	30
020912	40	40	40	40	40	40	40	[40]	50	60	50	60
020913	40	30	30	30	30	30	(30)	30	30	30	40	40
020914	20	20	20	20	20	[20]	30	30	40	40	50	50
020915	20	20	20	20	0	30	30	[20]	40	40	30	-S
020916	50	40	30	40	40	-	-	-	50	40	40	40
020917	10	10	10	10	20	10	[20]	[40]	40	40	30	30
020918	10	20	10	10	10	10	[30]	[30]	40	40	40	40
020919	20	10	20	20	10	20	30	[40]	40	40	40	50
020920	40	30	30	30	20	10	-	30	-50	30	40	40
020921	50	50	50	40	30	40	[50]	[50]	50	60	50	50
020922	20	30	-20	-150	-100	-10	[-40]	30	40	40	40	30
020923	20	30	30	30	50	-	-	-	70	90	90	40
020924	20	10	40	70	120	130	110	90	110	70	50	70
020925	60	60	70	40	50	50	[70]	70	90	50	30	-S
020926	30	30	30	20	30	40	[40]	40	50	50	40	40
020927	20	20	10	10	20	20	[40]	30	10	10	20	10
020928	40	30	20	10	10	10	[30]	30	30	10	10	-20
020929	30	30	30	30	30	30	[40]	30	50	60	50	50
020930	30	40	20	20	20	20	30	-	50	50	50	60

	12	13	14	15	16	17	18	19	20	21	22	23	mean
	40	40	50	50	50	50	50	50	50	40	40	40	60
	40	40	40	40	40	30	20	10	20	20	40	20	-
	40	40	40	30	40	40	30	30	30	20	30	30	30
	30	30	10	30	30	30	20	20	10	10	20	20	23
OBS	OBS	+S	30	40	30	30	40	40	40	20	40	50	-
	50	40	40	40	40	40	40	50	40	40	30	30	40
	40	60	50	40	40	30	40	30	20	20	20	10	35
	50	50	50	40	40	40	40	40	40	30	30	30	33
	40	40	40	40	40	40	30	30	30	30	30	40	-
	40	20	70	OBS	OBS	OBS	OBS	OBS	OBS	OBS	20	50	-
	30	20	30	20	20	10	30	40	40	40	40	40	37
	50	50	40	60	70	80	60	50	40	40	40	40	48
	40	40	40	40	40	40	40	50	40	40	40	30	37
	50	50	50	50	40	40	40	40	40	40	40	30	36
OBS	-S	+S	OBS	OBS		50	60	70	60	50	40	40	-
OBS	40	40	40	40	40	40	50	40	40	30	20	20	-
	30	30	20	10	40	30	30	30	20	20	10	10	23
	40	40	40	30	20	20	40	40	30	20	10	10	26
	50	50	50	50	40	30	40	40	40	40	20	30	34
	40	0	40	OBS	OBS	-S	40	50	40	30	60	40	-
	50	50	40	30	30	50	40	30	40	30	30	30	43
	0	30	30	40	30	30	40	40	40	30	30	20	11
	0	+S	-10	-S	-30	-60	-50	-S	-10	30	30	20	-
	70	100	80	70	50	60	60	20	40	40	40	60	66
-50	20	30	30	30	30	20	30	40	40	40	40	30	41
	20	30	40	40	30	40	40	40	30	10	20	20	33
	10	20	20	30	20	30	40	40	40	40	50	40	25
	0	-40	-20	-10	-20	10	40	40	50	40	40	40	16
	40	40	40	40	40	30	40	40	40	50	40	30	39
	60	60	60	70	40	40	40	40	40	40	30	40	41

Date	00	01	02	03	04	05	06	07	08	09	10	11
021001	40	30	20	20	20	30	[30]	40	50	70	50	50
021002	10	10	10	10	20	30	[40]	40	30	40	50	50
021003	10	10	10	20	10	20	[40]	50	50	40	40	40
021004	10	10	-S	OBS	OBS	-40	-	-	-	-	-	-
021005	30	20	10	20	20	30	[40]	70	70	40	40	30
021006	10	10	20	0	10	0	-20	-20	-50	20	20	20
021007	-50	10	10	0	10	-	[40]	-	40	40	40	40
021008	10	20	20	20	10	30	OBS	OBS	40	[20]	30	30
021009	40	40	40	30	40	30	[30]	30	20	30	30	20
021010	10	10	10	10	0	0	[0]	0	0	20	0	-20
021011	10	10	20	10	0	30	20	30	40	40	30	30
021012	-60	-80	0	30	-60	-80	[-60]	-40	20	-S	-S	OBS
021013	40	40	30	40	30	30	[40]	70	70	40	40	40
021014	30	30	30	30	30	-	[60]	-	40	40	40	40
021015	20	20	40	40	40	70	[80]	80	70	50	40	30
021016	20	40	30	30	40	40	[80]	100	80	50	60	50
021017	80	50	40	30	30	30	40	-	30	40	40	40
021018	OBS	OBS	OBS	-S	-70	-60	100	OBS	30	80	70	60
021019	50	40	40	40	40	0	30	[50]	50	50	50	40
021020	20	20	20	20	20	20	0	20	40	40	[50]	40
021021	50	50	40	40	40	60	50	-	0	-10	-10	20
021022	30	40	20	40	40	40	-	-	30	30	40	30
021023	110	100	130	120	90	110	120	[80]	70	30	40	40
021024	20	10	0	10	30	40	[50]	40	40	40	40	40
021025	10	10	-10	0	40	10	[10]	10	10	10	20	30
021026	10	30	40	20	20	20	[30]	40	40	30	30	20
021027	20	30	30	30	20	20	30	[40]	20	20	20	10
021028	-	-	-	-	-	-	-	-	-	[40]	40	40
021029	40	30	30	30	40	40	40	[60]	50	40	50	60
021030	30	40	40	50	60	40	40	[40]	40	40	70	30
021031	-50	-40	-20	10	10	50	40	[40]	30	20	0	-30

	12	13	14	15	16	17	18	19	20	21	22	23	mean
	50	40	40	40	30	30	40	50	40	30	20	20	37
	50	40	40	30	20	40	40	40	40	20	20	10	30
	40	40	40	40	30	30	30	30	30	30	10	20	30
	-	-	-	20	20	-10	-50	-30	30	30	40	40	-
	40	40	40	40	40	50	50	40	40	30	20	10	36
	10	10	20	30	40	40	40	50	40	30	20	-50	13
	40	40	40	40	40	40	40	50	40	30	30	20	-
	40	50	40	40	40	50	50	40	50	40	40	40	-
	30	20	20	30	20	10	10	10	10	10	10	20	24
	-10	-10	10	20	10	30	40	50	10	-10	0	0	8
	20	50	40	40	30	40	30	-40	30	30	40	40	26
OBS	40	40	100	80	80	50	70	80	60	50	40	40	-
	50	30	30	20	20	30	30	40	40	50	40	30	38
	40	50	60	60	60	60	40	40	30	20	10	20	-
	40	60	70	70	50	40	20	10	10	10	0	0	40
	60	50	40	60	60	70	70	80	30	100	120	100	63
	40	30	30	40	40	40	30	+S	+S	+S	OBS	OBS	-
	80	60	30	40	40	40	70	70	60	50	40	40	-
	40	40	40	40	30	40	40	40	30	30	30	20	38
	40	40	40	40	40	50	70	70	70	60	50	50	39
	40	40	50	40	40	40	50	70	60	50	40	40	39
	40	50	30	70	60	50	30	40	40	60	50	80	-
	40	50	50	30	20	30	20	0	+S	30	-50	10	55
	40	40	40	40	40	40	80	60	40	30	30	20	36
	30	20	20	10	10	0	0	-20	-30	-30	0	10	7
	40	40	40	40	40	50	40	40	40	40	30	20	33
	0	-10	-10	-10	-10	-10	10	40	40	-	-	-	-
	40	40	40	40	50	60	70	60	60	40	40	40	-
	60	50	50	50	80	120	80	40	30	60	40	40	50
	10	-20	-20	-30	10	30	40	50	90	60	0	10	31
	0	10	10	10	20	0	0	30	-30	-20	-10	-10	3

Date	00	01	02	03	04	05	06	07	08	09	10	11
021101	10	10	10	20	10	30	30	40	[60]	[90]	60	40
021102	10	10	10	10	10	10	10	[30]	10	-10	-30	-50
021103	60	60	70	80	80	70	70	[70]	60	40	40	40
021104	10	20	20	30	20	60	-	-	30	30	30	-60
021105	40	50	60	40	50	40	40	[30]	40	50	30	40
021106	70	70	70	70	70	50	40	[50]	40	60	50	60
021107	40	40	30	40	30	[30]	40	[30]	50	40	40	50
021108	30	40	40	30	20	10	30	[20]	-80	-70	0	20
021109	30	40	40	40	10	0	-10	[20]	20	-30	-90	-S
021110	20	OBS	30	40	30	30	40	[40]	40	40	40	40
021111	40	40	30	30	10	-	-	60	-10	30	40	40
021112	60	50	40	30	30	40	70	[70]	-	70	50	40
021113	30	10	40	50	80	80	90	[70]	80	80	70	60
021114	10	20	30	40	30	40	40	[40]	40	40	40	40
021115	10	10	10	20	10	20	20	[30]	40	40	40	30
021116	10	20	20	30	20	30	30	[30]	30	30	30	20
021117	-10	0	10	20	20	30	30	40	[40]	40	40	40
021118	50	40	20	-30	-30	OBS	-	-	70	50	40	40
021119	80	70	80	70	100	70	40	0	30	40	40	50
021120	40	40	40	30	30	30	30	[40]	-	40	40	40
021121	60	70	100	80	80	140	120	80	50	10	[20]	40
021122	30	40	30	30	30	30	40	[50]	[40]	40	30	30
021123	40	30	30	30	30	20	20	30	-	-	-	-
021124	-	-	-	-	-	-	-	-	-	50	70	50
021125	30	20	20	0	30	20	-	[40]	-	40	30	40
021126	10	-10	10	10	10	30	20	[40]	30	30	30	40
021127	40	40	40	40	40	70	80	[80]	60	30	10	10
021128	-10	10	20	30	30	20	30	0	-10	0	-10	-10
021129	-10	-20	-20	-20	-30	-40	-30	[-40]	-10	-20	20	0
021130	0	30	40	40	40	60	70	[80]	50	20	10	10



12	13	14	15	16	17	18	19	20	21	22	23	mean
30	30	30	0	0	-10	0	10	-10	-10	-10	0	20
10	40	40	30	40	0	80	120	90	70	80	70	29
10	0	0	10	-20	-10	-40	-30	-10	-10	-10	10	27
-70	-60	-90	-10	30	40	30	80	10	20	30	20	-
30	40	50	50	60	60	80	80	80	60	50	60	50
70	70	80	60	50	60	70	70	70	40	40	30	59
50	50	50	40	30	20	30	30	30	40	40	40	38
40	40	40	40	40	40	40	40	60	50	40	40	25
-100	-20	30	40	40	30	70	60	50	50	30	20	16
40	50	40	60	90	80	80	80	40	60	50	40	48
50	80	80	90	OBS	50	130	130	90	80	80	70	-
40	40	40	40	20	10	10	-20	20	0	10	20	34
50	40	40	60	80	80	80	60	130	170	170	0	71
40	40	40	40	40	50	60	50	40	40	30	20	38
40	40	40	40	40	40	40	30	30	20	10	10	28
20	-10	-10	0	-10	10	10	20	30	-10	-40	-10	13
40	50	60	30	20	20	10	30	30	40	-10	20	27
20	10	10	10	10	30	60	90	50	40	70	70	-
40	50	60	50	40	40	50	40	30	10	30	0	46
40	30	30	40	40	60	50	70	80	50	60	60	44
40	50	40	40	40	40	60	50	60	50	40	40	58
40	OBS	20	70	70	OBS	OBS	80	60	50	50	60	-
-	-	-	-	-	-	-	-	-	-	-	-	-
50	70	50	40	40	50	60	50	40	40	40	30	-
40	30	10	20	10	10	20	0	10	20	20	30	-
40	50	40	40	50	40	40	40	30	30	20	20	29
10	30	40	40	30	20	40	50	40	40	20	20	38
-10	-10	-10	-10	-20	-10	0	10	-20	-20	-20	-10	-1
10	0	30	30	40	80	30	0	30	-50	+S	30	0
20	20	20	30	30	40	40	40	50	50	40	40	36

Date	00	01	02	03	04	05	06	07	08	09	10	11
021201	40	30	30	20	10	10	30	[40]	-	30	30	40
021202	20	30	20	20	10	0	10	20	-	10	20	30
021203	40	40	30	20	30	10	20	-30	0	10	10	10
021204	-10	10	20	30	10	10	40	[30]	10	20	20	20
021205	0	-30	-20	-30	-50	-60	10	[0]	10	-30	-60	-50
021206	-20	-20	-30	-10	-20	20	-10	30	10	20	30	30
021207	-10	-20	0	-10	-10	-10	0	0	0	-20	20	10
021208	-60	-20	-40	-70	-50	-40	-50	-70	-30	-10	0	20
021209	20	10	30	10	20	20	-	[50]	-	60	70	40
021210	40	40	40	30	30	20	10	[10]	-20	-20	0	20
021211	-10	0	10	10	10	10	20	[30]	30	20	30	40
021212	20	-10	-20	-40	-30	-10	-20	[-40]	[-50]	-40	-50	-30
021213	-10	-10	0	-20	-20	20	-10	[-20]	-10	0	80	70
021214	20	10	-10	20	50	80	60	[30]	20	20	10	-10
021215	-40	-30	-30	-30	-20	-30	-20	-20	[-10]	-10	-10	-10
021216	40	40	40	40	60	40	-	10	10	10	20	20
021217	-20	-20	-30	-30	-20	-10	-20	[-20]	-10	30	30	50
021218	80	90	90	90	70	80	80	[40]	40	30	10	10
021219	10	10	10	10	10	30	40	[60]	50	50	60	70
021220	40	40	30	20	10	10	10	[30]	[10]	40	40	10
021221	80	30	40	40	-S	-S	30	[40]	30	40	70	50
021222	70	30	-20	-10	20	30	30	30	[70]	[10]	-10	30
021223	50	160	140	80	70	90	-	100	40	40	80	130
021224	40	30	-10	-10	-10	-20	-10	[-30]	0	40	30	10
021225	50	60	40	40	40	40	[40]	40	40	20	40	60
021226	-20	-20	-20	-20	-50	-70	-40	[-60]	-30	-30	-30	-40
021227	-50	-50	-50	-50	-50	-50	-50	[-50]	-60	-50	-40	-30
021228	10	20	30	60	80	90	80	[80]	100	100	70	70
021229	-30	-20	30	10	30	100	100	90	140	260	180	80
021230	30	0	0	20	40	40	-	-	+S	+S	-S	50
021231	10	10	10	0	-10	-10	-30	-20	-10	30	50	50

12	13	14	15	16	17	18	19	20	21	22	23	mean
30	40	40	40	50	60	40	50	40	30	30	10	34
20	30	30	-40	-70	0	-10	20	10	10	-10	30	7
10	20	10	10	-10	-10	0	20	20	0	-20	-40	8
20	30	30	40	30	20	20	20	10	20	30	10	20
-60	-40	-10	40	20	-40	-40	-30	20	0	-10	-10	-20
20	10	10	10	0	-30	-10	10	10	30	20	10	5
0	30	0	-10	-10	-20	-10	-20	-50	-50	-60	-70	-13
50	50	20	-40	-10	-70	-30	-70	-50	40	20	-10	-22
50	50	50	40	30	30	30	20	30	40	40	40	-
20	30	30	20	20	10	10	0	10	20	10	-10	15
40	50	40	40	50	40	30	10	-20	20	0	10	21
-20	-20	-30	-10	-30	-10	-50	-50	-50	-50	-50	-50	-31
50	30	30	30	20	0	0	-20	-20	-10	10	30	10
-10	10	0	-20	-20	-30	-20	-30	-40	-50	-40	-50	0
-20	-30	-20	-10	-10	-10	10	20	30	30	30	40	-11
-10	20	70	30	40	-10	-20	-10	-10	-10	-10	-20	17
110	80	120	150	130	160	140	110	110	110	130	90	57
30	30	40	20	20	40	50	80	70	70	70	30	53
80	80	80	70	70	90	80	80	90	70	50	70	55
0	0	40	70	80	80	90	130	130	80	50	0	43
70	80	120	130	90	110	70	40	80	110	80	50	-
70	60	30	30	20	0	-20	-30	-30	-20	0	30	18
160	200	190	180	150	160	180	140	100	80	40	20	112
40	30	40	30	40	40	30	40	40	40	40	50	22
50	40	50	40	40	70	70	40	20	20	10	10	40
-50	-60	-30	-60	-50	-50	-60	-50	-60	-70	-70	-60	-46
-40	-40	-30	-40	0	40	50	70	60	60	50	30	-15
80	80	70	20	30	30	-10	-10	20	10	-10	-20	45
60	50	60	50	80	90	80	80	80	70	50	30	73
+S	-20	40	-20	20	10	20	30	30	20	10	10	-
40	30	50	50	50	50	50	60	50	60	50	60	28

Hourly means of the  
2003

Date	00	01	02	03	04	05	06	07	08	09	10	11
030101	50	70	70	50	70	60	70	[70]	60	50	50	50
030102	-10	0	-50	-20	-40	-20	0	[0]	-10	-10	0	30
030103	30	20	30	30	20	20	30	20	30	30	[40]	40
030104	10	20	-20	-10	20	30	40	[40]	60	60	40	40
030105	70	70	0	0	-50	-40	20	[30]	30	30	20	40
030106	10	10	30	30	30	20	-	[30]	-	20	30	30
030107	70	70	80	80	70	-30	-20	-50	[-70]	-170	-80	-80
030108	30	10	10	10	30	30	10	10	[30]	60	70	70
030109	40	40	30	30	20	40	40	[60]	80	90	80	60
030110	-S	-S	-S	-30	-S	-30	-10	-10	-10	-10	-10	-20
030111	-30	-40	-50	-20	-10	0	20	[30]	40	80	100	100
030112	10	20	20	40	30	30	40	[40]	30	40	60	60
030113	50	40	40	40	40	30	-	-	-	-	70	60
030114	0	20	50	-10	-40	-40	0	-10	20	30	50	30
030115	60	40	40	30	40	40	30	[30]	40	50	60	60
030116	80	60	110	120	110	130	150	[120]	140	130	80	30
030117	30	40	30	30	30	40	40	[40]	50	60	60	20
030118	30	20	20	-30	-10	30	0	10	20	20	30	40
030119	80	80	80	80	80	80	100	[80]	80	40	20	40
030120	0	20	20	40	50	60	-	-	20	60	70	40
030121	-30	-30	-30	-40	-40	-20	-40	[-50]	-40	-30	-50	-70
030122	-70	-60	-90	-60	-50	-40	[-70]	-10	0	-70	-60	-80
030123	180	190	190	170	+S	+S	80	[130]	130	100	130	100
030124	10	20	20	10	30	40	60	[60]	60	30	20	30
030125	40	40	40	40	40	40	30	[40]	30	40	40	40
030126	60	40	30	30	20	30	20	30	[40]	50	50	40
030127	40	40	30	30	20	30	30	-	[40]	-	50	50
030128	50	70	40	50	60	50	70	[60]	60	70	60	50
030129	40	30	30	30	30	30	40	[50]	50	40	30	40
030130	40	40	40	40	40	40	50	[60]	60	50	-S	-30
030131	60	50	50	60	70	50	40	[30]	50	60	40	40

*potential gradient*

12	13	14	15	16	17	18	19	20	21	22	23	mean
50	50	40	40	50	40	40	40	30	0	-10	0	45
30	-	10	20	30	-S	-10	OBS	30	40	40	40	-
40	40	40	40	40	50	70	70	70	60	40	10	38
40	40	40	70	70	50	40	50	40	30	20	30	35
40	30	40	40	30	40	40	50	50	40	40	40	29
30	40	30	30	40	20	10	10	30	30	30	80	-
0	-60	-110	70	40	-S	-S	50	40	50	-S	-20	-
80	90	80	60	60	60	70	70	50	70	70	50	49
50	60	60	50	10	0	10	20	0	-10	-60	-140	-28
-10	-20	-20	-20	-50	-50	-160	-170	-60	-60	-50	-50	-
80	70	70	80	80	80	80	70	60	40	20	30	41
60	70	80	80	90	80	90	80	90	70	80	60	56
60	40	20	10	10	0	10	10	20	90	70	30	-
30	80	130	100	70	70	40	50	50	50	50	40	36
70	70	80	50	40	30	10	20	50	80	70	80	49
30	80	70	80	60	70	60	40	40	30	40	40	79
30	50	80	50	60	50	40	30	30	30	10	20	40
0	10	70	70	80	80	130	70	50	90	80	90	42
70	30	0	70	30	30	80	70	20	30	30	30	55
80	80	80	70	30	10	10	-20	-20	-30	-20	-30	-
-50	-40	-40	-60	-120	-130	-60	-80	-50	-40	-110	-100	-56
-50	40	80	100	80	90	80	80	130	140	130	180	18
120	110	30	-20	50	80	40	40	60	80	40	20	-
10	30	40	20	30	40	50	50	70	70	60	50	38
40	50	60	60	40	40	70	70	80	40	40	30	45
50	60	50	40	40	30	30	10	20	30	30	40	36
-S	-S	-S	-S	-S	50	70	100	80	70	70	70	-
40	-S	OBS	70	120	120	120	180	170	140	70	50	-
50	50	40	50	50	60	40	40	40	50	50	40	42
50	70	70	50	60	70	60	70	70	60	70	50	51
70	110	60	50	50	50	30	50	40	30	20	-20	48

Date	00	01	02	03	04	05	06	07	08	09	10	11
030201	-70	-20	-10	20	40	30	30	[30]	40	40	40	40
030202	50	50	50	50	70	40	40	[50]	60	70	50	50
030203	50	50	40	40	40	40	-	30	-	30	60	80
030204	20	-20	-10	-20	10	20	40	[40]	40	10	40	20
030205	40	30	10	10	0	-10	10	10	[30]	30	30	40
030206	-30	-40	-50	-50	-10	10	30	[30]	30	30	30	30
030207	-50	-50	-S	-S	-S	-20	10	[30]	40	50	40	50
030208	20	10	0	10	10	10	20	[40]	30	30	20	30
030209	30	30	10	20	10	30	40	40	[40]	40	40	40
030210	-40	-50	0	10	0	0	-	[20]	-	60	60	60
030211	-10	0	-10	-S	-20	-10	-10	[0]	10	20	20	10
030212	-10	-20	10	30	30	40	50	[60]	50	70	80	70
030213	30	40	50	40	50	40	60	[80]	80	80	70	70
030214	40	40	40	30	20	30	40	[50]	60	50	50	60
030215	40	40	40	40	40	60	60	[60]	50	50	50	60
030216	-30	-40	-50	-40	10	20	30	[20]	30	40	40	40
030217	40	50	30	10	20	10	-	-	-	60	70	60
030218	30	40	40	40	30	10	20	[40]	40	50	60	70
030219	20	30	30	30	20	40	40	[30]	-10	-60	-20	10
030220	40	50	30	40	20	20	0	[-10]	-10	20	30	30
030221	40	50	60	50	50	-10	10	[30]	10	20	30	40
030222	40	40	30	30	30	20	40	[40]	40	40	40	30
030223	20	20	30	20	20	30	30	[40]	30	30	40	50
030224	70	70	60	130	130	140	-	[130]	-	120	120	90
030225	70	70	80	80	90	110	130	[90]	80	70	40	30
030226	20	-10	-10	-10	-20	-30	-10	[-10]	-10	-10	10	30
030227	-70	-40	-70	-80	-30	-20	-40	[-30]	0	20	30	40
030228	50	40	30	30	50	50	50	[50]	70	60	50	60

12	13	14	15	16	17	18	19	20	21	22	23	mean
30	30	40	50	50	50	50	70	60	50	50	50	33
50	50	50	40	40	40	50	40	50	50	40	50	49
90	90	90	80	70	80	70	80	60	40	30	30	-
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40	40	40	30	30	30	30	40	40	40	30	20	27
30	40	40	40	40	40	30	10	30	30	10	-10	14
50	60	50	50	80	70	50	40	30	30	30	30	-
20	30	50	60	60	50	60	60	50	40	40	30	33
40	40	40	40	40	40	30	10	-10	-10	0	20	27
60	60	60	70	50	80	50	40	30	30	40	0	-
0	-10	20	30	40	10	-10	-10	-20	0	40	20	5
70	70	70	70	60	60	50	50	40	40	40	40	47
80	70	60	50	40	60	50	60	70	40	50	40	57
40	40	40	40	80	60	60	80	70	40	40	40	48
60	60	60	70	40	-10	-10	-10	-10	0	-10	-40	33
30	40	60	60	60	50	40	70	70	40	40	40	28
70	70	60	60	80	60	70	60	50	40	40	40	-
80	90	80	80	80	80	80	50	30	10	0	20	48
30	50	50	60	60	70	60	70	60	60	60	40	35
30	50	40	50	50	70	70	40	50	50	40	30	35
50	70	50	40	40	40	40	40	40	40	40	40	38
40	40	30	40	40	30	40	40	10	20	20	30	33
50	40	40	40	40	20	0	30	60	60	50	70	36
90	90	90	90	80	80	80	80	80	90	80	40	-
40	40	40	40	40	40	50	50	40	40	40	30	60
40	40	40	10	-10	-10	-10	-10	-10	0	-50	-70	-4
50	50	40	30	20	30	50	60	30	20	30	30	6
50	50	40	40	60	40	70	70	80	90	80	70	55

Date	00	01	02	03	04	05	06	07	08	09	10	11
030301	60	80	50	40	30	40	50	[50]	70	80	80	80
030302	40	40	40	40	40	40	40	[40]	50	40	40	50
030303	-70	+S	30	30	30	-30	-	-10	-	-60	-10	-10
030304	50	60	60	60	50	70	70	[60]	50	40	30	30
030305	40	40	30	40	70	80	-	[80]	80	60	70	40
030306	30	30	10	10	20	30	60	60	[60]	60	60	70
030307	-10	-20	0	0	-10	-10	-10	[-10]	-20	-40	-20	-10
030308	-10	10	30	40	40	20	30	[40]	50	40	40	30
030309	30	20	10	10	20	10	20	[30]	20	30	20	30
030310	30	30	20	20	30	40	-	[40]	-	40	40	40
030311	10	30	30	30	20	10	30	[40]	40	40	40	40
030312	10	0	0	10	20	20	40	[40]	30	40	30	20
030313	30	30	20	20	+S	OBS	30	[40]	40	30	40	30
030314	0	0	10	10	-40	-50	-30	[-10]	0	10	10	10
030315	40	40	50	50	50	50	60	[60]	50	60	60	50
030316	60	50	50	40	50	30	40	[60]	40	40	30	40
030317	40	40	40	40	30	40	-	[50]	-	50	60	70
030318	40	30	30	30	40	40	40	[40]	40	40	40	40
030319	40	40	30	30	30	40	40	[40]	40	40	40	40
030320	30	50	30	30	30	40	40	[40]	40	40	50	50
030321	40	40	20	30	40	70	70	[70]	80	80	70	60
030322	40	40	40	40	40	40	40	[40]	40	30	40	40
030323	40	40	30	40	30	40	40	[50]	50	60	60	70
030324	50	-	-	-	-	-	-	-	-	50	70	70
030325	20	10	20	20	30	30	30	[40]	40	40	50	40
030326	40	40	40	40	30	30	40	40	[40]	40	50	40
030327	30	30	20	10	10	30	40	[40]	30	30	20	30
030328	10	20	20	20	20	20	30	[30]	40	40	40	40
030329	20	20	10	20	20	20	30	40	40	40	40	[40]
030330	20	20	30	20	20	20	[20]	10	10	30	30	40
030331	10	20	10	10	10	-	[20]	[40]	40	40	40	40



12	13	14	15	16	17	18	19	20	21	22	23	mean
80	70	80	70	80	80	70	30	40	40	30	30	59
60	70	70	50	40	40	40	30	30	30	30	-10	41
-10	30	40	40	40	40	40	40	30	30	30	40	-
40	60	60	70	70	80	80	80	80	70	70	50	60
40	50	50	60	40	60	70	60	60	50	50	30	53
70	70	40	40	20	10	-10	-10	-10	-10	-10	-10	29
-10	-10	-10	-10	-10	10	30	40	30	20	20	10	-2
30	30	40	40	40	50	60	40	30	20	10	10	32
20	10	30	40	40	30	-20	20	10	10	10	30	20
40	40	40	50	40	40	20	30	10	10	20	10	-
40	40	30	20	20	30	20	10	10	30	40	30	28
20	20	10	10	30	30	40	40	40	40	40	30	25
20	20	40	40	40	40	40	40	20	0	0	10	-
10	0	0	0	-10	0	-50	-110	-50	20	20	30	-9
50	50	50	50	40	40	50	70	70	70	60	50	53
40	40	40	40	40	50	50	50	50	60	50	50	45
60	60	70	70	50	40	40	50	40	40	40	40	-
40	50	50	50	50	50	60	50	50	40	40	40	43
50	50	40	40	40	40	40	40	40	40	30	40	39
50	50	50	50	50	50	40	50	50	50	40	40	43
70	60	70	80	80	80	120	110	110	110	50	40	69
50	60	60	70	60	50	50	50	50	50	50	40	46
80	80	110	80	80	70	70	60	70	80	60	50	60
60	60	50	40	30	50	50	50	40	40	30	30	-
50	50	50	50	50	50	70	50	40	40	40	30	39
40	50	40	40	30	30	40	40	40	30	30	30	38
30	20	20	30	20	20	10	10	10	10	10	10	22
40	40	40	40	40	40	40	30	20	20	20	10	30
40	50	40	40	30	40	30	30	40	30	30	20	32
40	30	30	30	OBS	-S	20	40	20	20	20	10	-
50	40	40	40	40	50	60	60	60	60	40	40	37

Date	00	01	02	03	04	05	06	07	08	09	10	11
030401	30	30	20	20	30	40	(30)	[40]	30	30	30	30
030402	30	30	30	30	40	40	[40]	[30]	30	30	30	30
030403	-	-	-	-	-	-	0	10	20	30	30	40
030404	30	30	30	30	30	30	40	[40]	30	30	30	20
030405	30	30	30	20	10	30	40	30	[30]	30	40	30
030406	20	30	30	40	40	40	[50]	50	40	OBS	OBS	OBS
030407	40	30	30	-	-	-	-	-	30	30	+S	+S
030408	80	10	20	30	10	20	[30]	40	40	40	40	40
030409	30	30	30	10	20	30	[40]	30	30	30	40	40
030410	30	30	20	20	10	10	[30]	[20]	30	20	30	20
030411	20	40	30	10	30	40	[10]	30	30	-10	10	30
030412	40	30	30	40	30	30	[30]	40	40	30	30	30
030413	-10	0	20	20	30	30	[40]	40	40	50	50	50
030414	30	30	20	20	20	-	-	-	30	40	40	40
030415	20	30	20	20	20	30	40	[30]	20	30	40	40
030416	10	10	20	20	20	20	[40]	30	30	40	50	50
030417	30	30	20	20	20	30	30	[30]	40	30	40	40
030418	30	30	30	30	30	30	20	[20]	30	30	40	40
030419	OBS	OBS	30	20	10	10	[20]	30	40	40	40	40
030420	30	30	30	30	20	[20]	30	30	20	20	20	30
030421	20	30	30	30	30	30	30	[30]	30	30	20	20
030422	10	10	10	10	20	20	-	-	40	40	40	40
030423	10	10	20	10	10	10	10	[10]	10	-10	OBS	OBS
030424	20	30	20	30	30	40	[40]	20	20	30	30	20
030425	20	20	20	20	20	20	[40]	40	40	40	40	40
030426	10	10	10	10	10	20	20	[20]	20	20	20	20
030427	30	30	30	10	0	10	-10	0	[10]	20	30	0
030428	40	30	30	20	30	-	-	-	30	30	40	40
030429	30	40	40	30	30	40	40	[40]	40	40	40	40
030430	30	30	20	20	30	30	[30]	[30]	30	30	40	30



Date	00	01	02	03	04	05	06	07	08	09	10	11
030501	30	30	30	20	10	10	[20]	30	+S	+S	20	30
030502	30	20	20	20	10	30	[30]	[30]	40	40	50	40
030503	40	30	40	30	20	20	[20]	20	20	10	10	-20
030504	20	20	20	20	20	[30]	30	40	30	40	40	40
030505	30	30	30	30	40	-	20	-	30	30	40	40
030506	30	30	20	30	20	30	[40]	40	40	40	50	50
030507	20	20	10	10	20	30	[30]	30	30	40	40	40
030508	10	10	10	0	0	20	[20]	30	40	50	60	60
030509	10	20	10	10	10	10	30	[30]	30	40	40	40
030510	30	30	20	20	20	30	[20]	20	30	20	30	30
030511	+S	OBS	OBS	OBS	20	30	OBS	[40]	-10	-10	30	30
030512	20	30	20	20	20	-	[30]	-	30	30	40	+S
030513	OBS	-S	-10	10	10	10	30	[20]	30	20	10	10
030514	10	20	OBS	OBS	20	30	[10]	0	0	10	10	10
030515	10	10	0	0	0	10	[10]	20	20	20	20	30
030516	10	30	20	10	20	30	30	[40]	40	40	40	40
030517	20	20	10	20	20	10	[10]	10	10	10	10	10
030518	10	10	10	10	10	10	[10]	20	20	30	20	0
030519	20	20	10	20	20	-	[10]	-	-	30	30	30
030520	10	20	20	20	20	10	[10]	10	10	0	-20	30
030521	0	10	10	0	0	-20	30	[30]	30	10	0	0
030522	-10	-10	10	-20	-10	-10	-10	-10	-10	0	10	10
030523	20	10	10	0	10	20	30	30	[30]	40	50	40
030524	20	20	30	30	30	40	[30]	30	30	40	40	40
030525	20	20	20	10	10	30	30	[30]	20	30	30	40
030526	10	10	10	10	20	-	-	20	20	30	30	30
030527	10	20	OBS	OBS	40	40	[20]	10	10	20	30	40
030528	0	-10	0	10	-10	-10	-10	-10	0	10	20	30
030529	OBS	OBS	OBS	OBS	-	-20	[50]	120	30	30	40	40
030530	30	30	20	30	30	40	[40]	[30]	30	30	40	40
030531	10	10	10	20	20	30	30	[20]	10	20	30	40

12	13	14	15	16	17	18	19	20	21	22	23	mean
40	40	40	40	30	30	30	40	40	30	30	30	-
40	40	40	40	30	40	40	40	30	40	40	40	34
20	OBS	20	40	40	40	40	40	30	30	30	20	26
40	40	50	40	40	40	40	30	30	30	30	30	33
40	40	50	40	50	40	30	30	30	30	20	20	-
50	50	50	50	40	40	40	30	30	30	30	20	37
50	50	40	40	40	40	30	30	20	30	10	20	30
70	70	60	50	40	40	40	30	30	40	40	30	35
40	40	30	20	-30	-10	40	40	20	10	20	20	22
40	30	20	70	30	10	10	10	10	20	+S	+S	-
20	40	40	40	50	50	30	40	30	10	10	10	-
OBS	OBS	50	30	50	50	20	-S	-S	OBS	OBS	OBS	-
10	20	20	20	-S	-20	-S	10	0	10	20	10	-
10	10	0	0	0	10	20	30	20	30	10	10	-
30	30	30	30	30	30	40	40	40	30	30	30	23
40	40	40	40	30	30	30	30	20	30	20	20	30
10	20	20	20	20	10	10	10	10	10	10	10	13
OBS	-S	OBS	-S	OBS	40	30	30	30	30	30	30	-
40	40	40	20	20	20	10	10	10	10	10	10	-
-10	-10	30	-40	-50	30	10	-20	-20	-10	-10	-10	1
0	0	0	10	0	0	-20	-30	-30	-20	-40	-S	-1
10	20	30	30	30	40	30	30	20	10	10	10	9
40	40	40	60	60	50	40	40	30	30	20	20	9
40	40	40	40	30	40	40	40	30	20	20	20	33
40	40	50	40	40	30	30	20	10	10	10	10	26
40	20	30	30	10	-S	-S	-20	OBS	30	30	10	-
40	40	40	40	40	50	40	40	30	30	20	0	-
30	40	40	30	60	OBS	-S	30	20	0	0	OBS	-
40	50	60	70	30	10	20	20	30	20	20	20	-
50	50	50	40	40	40	30	30	30	20	30	20	34
40	40	40	30	40	30	30	20	10	OBS	10	-S	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
030601	OBS	OBS	OBS	30	30	30	80	70	50	40	30	OBS
030602	10	10	10	10	10	-	-	[60]	40	40	40	30
030603	10	10	10	20	20	30	[30]	30	40	40	40	40
030604	0	0	10	10	10	30	[30]	20	20	30	30	40
030605	30	20	20	10	10	20	[30]	[30]	30	30	30	40
030606	20	20	20	20	20	30	[30]	20	20	30	40	40
030607	40	30	30	30	30	20	[30]	40	40	50	60	50
030608	10	10	10	10	20	30	30	[30]	30	30	30	30
030609	10	10	10	10	10	-	-	10	0	10	20	30
030610	10	10	10	20	30	30	[40]	[40]	40	40	40	40
030611	20	20	20	20	20	30	[30]	[40]	30	70	80	70
030612	30	30	20	30	30	40	40	[40]	40	50	60	60
030613	10	OBS	OBS	30	10	30	[70]	80	60	50	40	40
030614	30	30	20	20	30	80	90	[80]	80	70	80	60
030615	-	-	-	-	-	-	-	80	70	70	70	60
030616	0	0	20	20	20	30	[40]	-	30	OBS	OBS	100
030617	20	10	20	20	20	30	30	[40]	60	40	40	40
030618	10	10	10	10	10	20	20	-40	0	10	OBS	OBS
030619	40	30	30	30	40	40	40	[40]	60	30	30	30
030620	30	30	20	20	30	20	[40]	30	40	40	30	20
030621	30	40	20	30	30	20	40	[40]	40	40	40	40
030622	40	40	30	20	20	30	40	[40]	40	40	40	40
030623	20	30	30	30	-	-	-	-	60	60	60	70
030624	30	20	10	OBS	30	10	[40]	20	20	30	OBS	OBS
030625	20	20	30	20	30	40	[40]	40	40	40	50	40
030626	30	40	40	30	30	40	[40]	40	40	50	60	60
030627	20	30	30	20	30	[20]	20	30	30	40	40	40
030628	10	10	0	0	10	20	[30]	30	40	50	50	50
030629	10	10	10	10	20	20	[30]	30	30	30	30	30
030630	30	30	20	20	30	-	20	30	30	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	mean
OBS	OBS	+S	20	40	10	10	10	0	20	10	10	-
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50	50	60	40	40	30	30	20	10	10	10	0	28
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70	80	90	80	60	20	20	30	20	30	30	30	42
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30	30	40	40	30	30	20	20	0	0	-10	0	-
60	40	40	40	40	40	40	40	30	30	20	10	-
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30	30	30	30	30	20	40	40	30	40	40	40	35
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40	40	60	60	60	70	70	60	40	40	40	40	43
40	60	60	80	80	70	60	40	40	30	20	20	43
80	80	80	90	80	+S	OBS	-S	OBS	20	30	30	-
80	60	60	70	30	OBS	30	30	30	20	20	20	-
40	40	40	40	40	50	50	50	70	70	60	40	42
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40	40	40	50	40	30	30	30	20	10	10	10	27
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Date	00	01	02	03	04	05	06	07	08	09	10	11
030701	10	10	10	10	10	10	10	[10]	20	30	-	40
030702	20	10	10	10	30	30	50	80	70	[30]	30	20
030703	20	20	10	OBS	OBS	30	60	[70]	[40]	40	50	60
030704	30	40	40	40	40	40	40	[40]	40	30	30	110
030705	20	-20	30	30	50	80	[60]	[40]	40	30	30	30
030706	10	20	10	OBS	10	10	[30]	[30]	30	30	20	20
030707	30	20	20	30	30	-	50	[40]	40	-	[50]	40
030708	30	30	30	30	30	40	[50]	60	50	50	40	40
030709	20	10	10	10	10	20	[40]	[40]	40	50	40	40
030710	40	40	30	30	40	40	[40]	40	40	40	40	40
030711	20	20	10	20	30	40	[60]	70	50	50	50	40
030712	10	10	20	20	20	30	40	40	40	20	10	30
030713	10	10	30	30	40	30	60	[40]	40	10	30	30
030714	30	30	20	20	20	-	40	-	50	40	50	40
030715	10	10	10	20	20	30	[30]	40	40	50	50	50
030716	20	20	20	20	30	30	[30]	20	20	30	30	40
030717	+S	OBS	-S	20	20	30	[20]	OBS	+S	70	130	80
030718	50	40	10	30	30	30	[40]	40	40	40	40	40
030719	40	40	40	40	40	40	[40]	[40]	40	40	40	40
030720	20	20	20	10	20	30	30	40	[40]	50	50	60
030721	20	20	10	10	20	-	-	-	20	30	40	40
030722	10	10	10	10	OBS	-S	[30]	90	80	90	80	70
030723	-S	OBS	OBS	+S	10	30	[30]	40	40	40	30	-20
030724	40	20	20	10	10	20	[30]	30	20	40	40	40
030725	-40	60	-S	OBS	OBS	+S	[30]	90	110	60	40	30
030726	20	10	10	20	30	30	[40]	40	40	60	70	70
030727	20	20	10	20	10	20	30	[30]	30	30	40	40
030728	40	40	30	30	30	-	-	-	20	20	30	30
030729	50	40	30	50	70	50	50	40	40	50	40	[40]
030730	30	30	30	30	30	[40]	40	50	30	40	30	0
030731	30	30	20	10	10	10	10	10	[20]	20	30	30



12	13	14	15	16	17	18	19	20	21	22	23	mean
40	40	40	-S	-50	-30	-10	10	10	40	OBS	OBS	-
20	40	40	40	40	40	30	30	30	30	30	30	33
60	70	-S	OBS	OBS	OBS	-S	30	40	30	10	20	-
OBS	OBS	OBS	30	10	10	10	-10	-10	30	30	20	-
40	40	30	40	40	40	40	30	30	30	20	20	34
30	30	40	40	50	40	40	40	40	30	30	30	29
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30	-S	-S	OBS	-40	10	10	+S	OBS	OBS	30	20	-
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50	50	60	70	50	40	30	30	20	30	20	20	35
40	40	40	40	30	30	30	30	20	20	30	20	28
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40	40	30	40	40	40	50	60	40	40	40	40	39
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70	70	80	90	40	30	30	30	30	+S	OBS	+S	-
-S	30	40	40	40	40	40	40	40	40	30	30	-
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40	40	40	40	30	40	40	40	40	40	20	30	-
70	80	70	80	60	40	40	40	30	20	20	20	42
40	60	60	60	40	40	40	60	60	60	60	40	38
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30	30	30	30	30	30	30	40	40	40	40	30	40
20	30	50	50	40	40	40	40	30	50	40	30	35
30	30	40	OBS	OBS	10	50	40	-10	40	40	30	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
030801	30	20	20	20	OBS	50	[70]	70	70	50	50	40
030802	30	30	30	30	30	40	40	[40]	40	50	50	50
030803	10	10	10	10	10	20	30	[20]	30	40	40	50
030804	10	10	10	10	10	20	20	-	-	30	40	50
030805	20	20	10	10	30	70	[40]	[80]	80	70	80	70
030806	20	20	10	10	10	20	[30]	[30]	30	40	40	50
030807	20	30	20	20	30	30	[40]	50	60	60	70	60
030808	10	10	10	20	20	20	[30]	40	40	40	40	50
030809	10	20	20	10	20	30	[40]	40	40	50	60	50
030810	20	10	10	10	10	20	[20]	40	40	50	60	70
030811	20	10	10	20	20	30	-	-	70	60	40	40
030812	10	10	20	10	10	20	[30]	40	40	40	40	40
030813	20	10	10	10	10	10	[10]	[20]	30	20	30	40
030814	10	10	10	10	20	20	30	40	[40]	40	50	60
030815	10	+S	+S	20	20	20	[40]	30	40	OBS	OBS	90
030816	30	30	20	20	20	20	[20]	30	30	30	40	40
030817	20	20	30	30	20	30	30	30	[40]	40	40	40
030818	20	20	20	20	20	-	-	[40]	40	40	50	50
030819	30	20	30	20	10	30	[40]	40	40	30	20	30
030820	10	20	20	10	20	20	[30]	40	30	40	40	50
030821	20	20	20	10	20	10	20	[30]	30	30	40	70
030822	20	10	10	10	10	20	[20]	30	30	40	50	60
030823	30	30	30	30	30	30	[40]	40	40	40	50	40
030824	30	30	30	30	30	30	[30]	40	40	40	40	40
030825	10	10	20	10	20	-	-	-	40	40	50	40
030826	40	30	30	30	30	20	[30]	40	40	40	40	50
030827	20	10	10	10	10	10	[20]	20	20	20	30	40
030828	30	20	20	20	20	20	[20]	30	40	40	40	40
030829	30	30	20	10	10	20	[-50]	-20	-40	20	20	-S
030830	40	40	40	20	20	30	[40]	80	60	50	40	40
030831	40	20	20	20	0	20	OBS	-S	+S	OBS	OBS	OBS

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60	60	50	-S	OBS	-S	0	0	0	10	20	20	-
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50	40	60	60	30	30	30	30	10	+S	10	10	25
+S	OBS	OBS	-S	30	40	30	30	30	30	30	20	-
40	40	40	40	40	30	20	30	30	30	20	20	-
40	30	30	30	20	30	30	20	30	20	30	20	28
50	50	50	OBS	OBS	OBS	-S	30	30	30	30	30	-
70	60	60	60	30	+S	OBS	30	40	40	40	40	-
30	30	40	40	40	40	40	40	40	40	20	10	31
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40	50	50	50	50	40	40	40	40	60	70	50	33
30	30	40	30	40	40	40	30	30	30	30	30	31
-S	-S	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	-
40	40	40	40	50	OBS	OBS	OBS	OBS	+S	OBS	OBS	-
OBS	OBS	40	30	30	40	30	40	40	40	30	30	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
030901	30	30	20	20	20	-	-	80	70	60	50	40
030902	30	20	20	20	20	30	[30]	OBS	40	30	20	20
030903	20	10	10	10	20	20	30	[40]	40	50	40	40
030904	10	20	20	20	10	20	[20]	30	40	40	40	40
030905	10	20	10	10	20	20	[30]	40	-S	40	40	40
030906	10	10	10	10	10	[10]	20	20	20	30	40	40
030907	30	30	20	10	10	10	[10]	10	10	10	30	40
030908	30	30	30	20	30	-	-	40	30	30	30	40
030909	10	10	20	0	10	[10]	20	70	30	40	20	30
030910	30	40	20	0	-10	0	10	[10]	0	10	60	30
030911	20	20	20	20	30	30	[20]	40	40	50	20	30
030912	30	30	30	30	30	40	[40]	40	40	30	30	40
030913	30	20	20	10	20	20	20	30	30	20	10	30
030914	30	30	40	40	30	40	[40]	60	50	60	60	60
030915	40	30	40	40	40	-	40	50	40	40	40	40
030916	20	20	30	20	30	30	[40]	30	40	40	40	40
030917	20	30	30	30	[40]	30	30	30	40	40	40	50
030918	30	30	30	30	30	20	[30]	-	30	40	70	60
030919	20	20	30	30	30	30	[30]	30	30	30	40	40
030920	20	30	30	20	30	30	[40]	40	40	40	40	40
030921	30	40	30	20	20	30	40	[40]	40	40	40	40
030922	30	30	40	40	40	-	-	-	40	40	40	40
030923	30	30	30	20	30	30	[40]	[40]	40	40	40	40
030924	OBS	-10	0	OBS	20	50	[70]	70	60	40	30	20
030925	40	40	40	40	40	40	40	[40]	40	50	50	50
030926	20	10	10	20	20	20	40	[30]	40	30	40	40
030927	20	20	30	30	30	40	[40]	30	40	40	30	40
030928	30	20	10	10	10	30	[30]	30	30	30	30	30
030929	30	30	20	10	20	-	-	-	10	-70	-90	-70
030930	30	30	30	30	20	40	[40]	70	60	70	50	40

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-S	40	-20	30	30	40	40	40	40	40	30	20	27
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40	40	40	40	40	40	40	40	30	30	30	30	28
40	40	30	30	40	30	30	30	30	40	30	30	26
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-90	-20	0	0	30	30	30	40	40	50	50	40	-
40	40	40	40	40	30	30	40	40	40	30	30	40

Date	00	01	02	03	04	05	06	07	08	09	10	11
031001	30	20	10	10	10	20	[30]	20	20	20	20	30
031002	30	40	40	40	40	40	[40]	40	40	40	40	40
031003	20	20	10	10	10	10	20	[30]	30	30	40	40
031004	20	20	0	30	40	[30]	0	OBS	OBS	80	130	40
031005	-S	-S	-S	-S	OBS	-S	70	-20	-S	40	30	10
031006	20	20	20	20	30	-	-	-	30	20	20	30
031007	30	40	30	30	30	30	[30]	20	30	30	20	10
031008	10	10	10	30	30	30	40	[40]	40	30	30	30
031009	-60	-S	-S	-10	10	30	[40]	30	40	10	OBS	OBS
031010	20	10	10	10	20	0	[-10]	[10]	10	20	40	40
031011	30	30	20	20	30	20	[10]	20	40	30	30	30
031012	30	30	30	30	30	30	[10]	20	30	40	40	30
031013	40	40	30	30	40	-	-	-	30	30	30	30
031014	20	20	20	20	30	30	[30]	40	40	40	40	40
031015	20	20	20	20	20	30	[30]	40	40	40	40	40
031016	30	30	20	20	30	30	[40]	30	40	30	20	30
031017	20	20	20	20	20	20	[30]	-	-	-	-	70
031018	30	30	10	10	10	0	-10	-10	0	10	20	30
031019	10	10	0	0	10	0	0	10	10	10	20	20
031020	0	-10	0	10	0	-	-	-	10	0	10	40
031021	40	40	40	40	30	30	[30]	50	30	40	40	20
031022	40	30	30	20	20	20	[10]	30	20	20	30	40
031023	30	30	30	30	30	30	[40]	40	40	40	40	40
031024	-	-	-	-	-	-	-	-	-	-	-	-
031025	40	40	30	30	30	30	[20]	[40]	40	40	50	50
031026	30	20	20	10	10	10	20	[30]	30	40	50	50
031027	40	40	40	30	30	30	-	-	[40]	40	40	30
031028	30	30	40	20	30	40	40	[50]	40	40	40	40
031029	-40	-60	-80	-60	-70	-60	-40	[-60]	-60	-60	-60	-40
031030	0	-10	0	0	0	10	20	20	30	20	30	40
031031	10	20	30	30	40	30	40	[20]	30	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	mean
30	30	30	30	20	20	30	30	30	40	30	40	25
40	40	40	30	30	30	30	20	30	20	20	20	34
40	40	40	40	30	30	40	30	-10	OBS	OBS	40	-
40	40	40	40	40	40	40	40	30	40	30	OBS	-
20	OBS	-10	30	30	20	0	+S	30	20	30	20	-
30	20	30	40	40	40	40	40	30	30	30	30	-
20	30	30	40	30	30	40	40	40	-S	OBS	0	-
40	30	30	40	30	40	40	40	40	30	20	-10	29
OBS	OBS	OBS	40	40	10	40	40	40	40	40	30	-
50	50	50	50	50	70	70	60	60	60	40	30	34
30	30	30	30	20	30	40	40	40	40	30	30	29
40	40	40	40	40	40	40	50	40	40	40	40	35
40	40	40	40	40	40	40	40	30	20	10	20	-
40	50	40	40	30	30	40	50	40	40	30	30	35
40	40	40	30	40	40	40	40	40	40	30	30	34
OBS	-S	30	40	40	40	40	40	30	30	40	30	-
70	60	60	50	60	70	40	40	40	40	30	30	-
20	[30]	40	30	30	20	20	10	10	20	10	10	16
20	30	30	30	30	30	30	20	30	20	30	20	18
40	30	-60	-S	30	50	50	40	40	50	40	40	-
30	OBS	-30	20	30	30	30	40	30	20	30	30	30
50	40	50	30	30	40	40	40	30	30	40	40	32
40	40	0	10	OBS	OBS	OBS	-S	OBS	OBS	OBS	-	-
-	-	-	30	40	40	40	40	40	50	40	40	-
60	60	50	50	50	40	70	70	50	40	30	30	43
40	50	40	40	40	40	60	50	50	50	50	40	36
30	40	30	30	30	30	20	30	40	40	40	40	-
40	40	40	50	50	40	10	20	10	-10	-10	-10	30
-40	-30	-30	-20	-10	-20	-30	-40	-30	-20	0	10	-40
60	70	70	80	70	40	80	70	40	30	10	20	34
40	40	50	50	50	60	60	50	50	40	40	30	39

Date	00	01	02	03	04	05	06	07	08	09	10	11
031101	30	20	(20)	-	-	-10	10	10	20	10	0	10
031102	0	-10	0	0	0	-30	-20	[-S]	-S	10	40	40
031103	10	20	10	20	30	70	-	-	-	50	40	40
031104	10	30	10	10	10	10	30	[30]	40	40	40	30
031105	10	10	10	10	10	20	[20]	40	50	50	60	70
031106	30	20	20	20	10	10	-10	[10]	40	40	40	40
031107	60	60	40	30	30	30	OBS	20	0	10	-90	0
031108	40	30	40	30	40	40	60	70	[50]	40	40	30
031109	10	20	20	30	10	30	40	[40]	30	10	10	20
031110	20	40	80	80	70	60	-	[20]	40	60	50	40
031111	30	30	40	40	40	70	50	50	[50]	-	-	70
031112	40	50	40	40	40	40	30	[50]	40	30	30	40
031113	20	20	20	10	10	10	10	[10]	30	30	40	40
031114	40	40	40	30	20	30	30	[30]	20	-S	0	10
031115	40	40	40	30	30	40	30	[30]	10	0	10	30
031116	-10	-20	-20	-10	-40	-30	-60	-20	[20]	30	40	50
031117	30	30	30	50	50	30	-	[30]	-20	30	10	20
031118	30	40	30	30	40	30	40	[30]	-	40	40	40
031119	40	30	20	20	30	30	30	40	40	70	70	40
031120	80	60	40	40	40	30	30	[30]	[40]	60	60	40
031121	80	100	110	110	140	130	120	[130]	110	140	100	100
031122	0	-10	0	10	10	10	10	[20]	30	20	30	30
031123	130	100	100	90	90	90	90	90	[90]	60	40	30
031124	80	90	80	80	70	40	-	[70]	80	80	70	40
031125	30	30	20	30	40	[30]	30	40	40	40	40	70
031126	130	90	90	90	80	[80]	70	90	70	30	30	40
031127	10	10	10	10	-10	-10	-10	0	0	10	30	30
031128	30	30	30	40	40	[60]	40	60	70	60	60	70
031129	10	10	10	10	10	10	20	[10]	10	30	40	40
031130	30	10	30	30	20	20	30	30	[60]	40	20	30



12	13	14	15	16	17	18	19	20	21	22	23	mean
10	20	10	10	30	30	30	30	40	0	-10	-10	-
40	40	30	40	40	40	40	40	30	20	10	20	-
40	50	50	30	20	20	40	40	30	40	30	10	-
30	40	30	40	50	50	60	50	40	30	20	10	31
60	60	40	30	40	40	40	30	30	30	40	40	35
40	40	40	40	30	-10	OBS	-S	10	20	30	40	-
0	10	-10	30	30	40	40	40	30	50	50	40	23
40	40	40	40	40	40	50	40	30	40	40	20	40
10	30	30	40	40	30	40	40	40	40	40	30	28
40	50	40	40	40	30	10	30	40	40	40	30	43
60	40	40	40	50	40	40	40	50	50	40	40	-
40	50	40	50	50	50	40	30	30	30	30	30	39
40	50	50	40	50	70	50	50	70	60	50	40	36
20	20	10	20	20	30	10	40	40	40	30	40	27
40	70	70	60	60	50	40	30	10	0	10	-10	32
70	80	80	90	80	30	20	30	20	-10	-50	-10	15
20	30	40	50	40	40	50	40	50	40	40	30	33
40	40	40	30	30	30	30	40	40	30	30	60	36
40	[40]	80	60	80	90	100	110	120	100	90	80	60
40	40	40	40	40	40	40	60	40	40	40	40	44
90	90	90	90	60	90	40	80	30	30	30	10	88
40	40	30	60	40	30	70	130	90	60	100	130	41
40	40	40	30	40	70	80	90	90	90	90	60	73
40	60	90	80	90	110	60	30	20	0	10	30	61
90	60	40	40	60	90	140	90	120	110	140	100	63
40	30	40	30	30	40	40	30	0	10	20	10	50
30	30	30	30	30	30	30	30	30	10	10	10	16
40	60	40	30	30	40	30	10	OBS	40	20	10	41
40	40	40	40	40	70	90	70	90	80	40	40	37
20	10	20	20	0	0	0	10	-20	-10	-10	-10	16

Date	00	01	02	03	04	05	06	07	08	09	10	11
031201	-10	-10	-20	-30	-40	-	-10	[-20]	[-20]	-10	-10	-10
031202	-10	0	0	10	30	20	-10	[-10]	-20	-30	-30	-20
031203	-20	-10	-10	-20	-30	-20	0	-10	-10	-10	0	-30
031204	-30	-20	-20	-20	-20	-20	[-10]	-10	0	-40	-30	-20
031205	30	30	30	20	10	10	20	[30]	20	10	20	20
031206	30	70	60	30	30	30	20	[30]	10	20	10	10
031207	20	30	40	40	40	40	40	40	[40]	40	40	40
031208	40	40	40	30	30	40	-	-	70	70	40	50
031209	40	40	40	30	30	40	40	[40]	40	40	50	60
031210	40	30	20	40	40	30	30	[30]	30	40	30	40
031211	10	10	-10	-30	-20	-30	-20	-10	-10	0	0	-10
031212	40	60	60	70	80	50	80	[80]	50	50	80	80
031213	30	20	30	20	10	20	20	[40]	40	50	40	40
031214	-10	-30	-10	-10	20	30	0	10	-	0	10	OBS
031215	30	30	30	20	20	10	OBS	OBS	-	30	40	40
031216	-20	-10	10	20	20	30	20	-10	10	30	40	30
031217	30	30	30	40	40	30	40	[40]	70	60	40	30
031218	40	40	40	40	40	40	30	[40]	60	50	40	40
031219	30	30	50	20	30	40	30	[40]	[40]	60	50	60
031220	90	80	70	80	70	40	40	[70]	40	50	50	20
031221	20	-30	-60	-30	10	30	70	[60]	70	80	70	40
031222	20	10	20	20	30	40	-	-	-	60	60	60
031223	20	30	30	30	30	30	30	[30]	30	30	30	40
031224	40	40	40	40	30	30	30	[40]	40	40	40	50
031225	30	40	40	40	40	40	[30]	40	40	40	50	40
031226	40	40	40	40	50	30	40	40	[40]	50	70	80
031227	40	40	40	30	30	20	20	[20]	[0]	-20	-10	10
031228	80	40	30	30	20	30	-10	-	-50	-50	20	0
031229	10	20	20	10	10	0	-10	[10]	20	30	-70	0
031230	50	30	0	-10	10	0	40	[40]	50	40	30	30
031231	-10	30	10	10	10	10	0	10	-10	-70	-20	-10

12	13	14	15	16	17	18	19	20	21	22	23	mean
-10	-10	0	-10	0	10	20	0	10	-10	0	0	-8
-10	-10	-30	-40	-30	-20	-30	-30	-20	-30	-30	-30	-16
-20	-20	-30	-30	-30	-30	-10	0	-10	-20	-30	-30	-18
-20	-30	-30	-20	20	30	10	20	20	30	30	30	-6
30	30	40	30	40	40	60	40	40	40	30	20	29
-10	OBS	-10	10	40	40	40	40	30	30	30	20	27
40	40	40	40	40	40	30	40	80	70	70	40	43
50	50	50	70	60	80	60	70	70	70	70	50	-
60	60	70	70	80	80	90	80	40	40	40	60	53
40	40	40	40	10	30	30	20	20	20	30	10	30
[0]	0	-10	-20	-20	-20	0	-10	-30	-50	0	30	-10
90	40	40	50	40	40	40	30	40	40	30	30	54
40	40	40	40	40	0	30	10	30	30	20	0	28
50	-10	30	40	40	40	40	40	40	40	40	30	-
30	OBS	40	40	OBS	OBS	OBS	OBS	OBS	OBS	OBS	20	-
20	10	10	-S	OBS	40	60	40	20	20	30	30	-
10	0	0	10	40	50	40	30	30	30	30	30	33
60	70	60	60	50	60	60	60	50	30	50	30	48
60	60	60	40	80	80	50	70	100	100	90	90	57
70	60	70	50	60	80	80	80	30	70	60	30	60
40	60	60	-10	20	10	20	40	30	30	10	30	28
50	50	60	60	60	60	40	50	50	40	40	40	-
30	30	40	40	40	40	40	40	40	40	40	40	34
60	60	60	60	60	50	50	60	50	40	40	40	45
40	40	40	50	60	70	100	80	70	70	60	40	50
80	70	70	60	70	60	60	60	50	70	60	50	55
10	30	50	50	50	70	80	80	70	50	50	40	35
10	20	20	20	20	30	20	10	20	10	10	10	15
30	0	-30	-40	30	40	40	10	40	40	40	40	12
70	80	70	60	80	90	110	120	10	30	40	30	46
-30	-70	-70	20	-10	-20	-20	-50	-40	-60	-50	0	-18

*Hourly means of the  
2004*

Date	00	01	02	03	04	05	06	07	08	09	10	11
040101	10	30	40	40	40	10	10	[10]	10	30	20	30
040102	40	30	30	30	30	30	30	-	-	30	30	30
040103	10	20	20	20	30	20	20	[10]	[20]	40	40	40
040104	30	20	20	10	30	20	30	[40]	40	40	40	40
040105	70	80	80	80	+S	OBS	-S	-	-	OBS	-50	120
040106	40	50	50	40	50	50	60	80	[40]	70	70	70
040107	30	40	30	0	-10	-50	-20	[-10]	-20	0	20	50
040108	70	60	50	40	40	50	60	40	[70]	80	80	80
040109	-50	-50	-60	-60	-50	-40	-30	-40	[-30]	-60	-50	-40
040110	70	70	80	150	110	80	90	[150]	40	40	30	40
040111	40	40	40	40	50	30	30	[30]	40	40	80	80
040112	20	40	90	-	-	-	-	-	30	40	30	70
040113	-10	-20	-10	10	20	30	40	[30]	-	40	40	50
040114	-S	OBS	-S	10	30	30	40	[40]	30	40	40	40
040115	40	30	-S	OBS	OBS	-S	OBS	[20]	50	40	40	30
040116	30	30	30	30	40	40	50	[60]	50	50	60	60
040117	60	70	50	50	40	40	[40]	50	70	80	80	70
040118	60	40	50	40	40	40	40	40	[40]	50	40	40
040119	30	40	30	20	30	30	-	-	-	50	40	40
040120	-50	-30	-30	-30	-20	-110	-30	-10	-10	-10	10	10
040121	30	30	40	30	40	50	50	[50]	50	40	40	30
040122	40	40	30	30	40	30	OBS	OBS	-S	-S	30	40
040123	80	50	50	70	60	50	70	[80]	[80]	80	80	70
040124	80	70	70	60	80	70	70	[70]	[80]	70	70	60
040125	70	60	40	40	40	50	60	[70]	[80]	80	80	80
040126	40	30	40	40	30	10	-	30	20	30	40	60
040127	10	40	40	40	40	40	20	[-10]	-	10	0	30
040128	70	80	130	80	90	50	40	40	[30]	40	30	40
040129	20	20	20	20	30	40	40	40	80	[80]	90	70
040130	30	30	30	30	30	40	40	60	[50]	70	80	90
040131	60	40	60	80	70	80	90	[90]	[90]	80	90	80

*potential gradient*

12	13	14	15	16	17	18	19	20	21	22	23	mean
40	40	50	60	60	60	60	60	50	50	40	40	37
30	30	30	40	40	40	40	40	30	30	30	20	-
50	50	60	70	70	50	50	50	50	40	30	30	37
40	40	50	30	20	30	80	50	30	30	30	-10	33
-30	80	30	20	70	70	50	40	-10	10	10	10	-
80	80	90	90	80	80	70	80	50	30	40	30	61
80	90	70	60	70	30	50	50	110	80	60	50	36
90	120	80	30	30	50	20	-40	-60	-40	-50	-30	38
0	-30	-60	10	20	30	40	20	30	30	30	60	-16
70	60	60	40	40	40	40	40	40	60	40	40	63
80	50	40	40	30	30	20	30	20	-S	-S	-S	-
60	50	30	40	50	50	40	40	-40	-20	-10	0	-
50	40	-20	30	40	40	30	30	0	40	60	70	27
40	40	40	60	70	80	100	90	50	50	40	40	-
30	30	30	30	30	20	20	30	10	30	30	30	-
70	90	80	80	70	60	60	60	50	60	50	50	55
20	30	80	80	50	40	50	60	50	50	60	60	55
40	50	30	30	30	40	40	50	40	40	30	30	40
40	50	50	40	40	30	40	30	20	20	-20	-S	-
0	30	40	10	30	40	40	40	50	50	40	40	4
30	40	30	OBS	40	50	40	-S	20	50	40	40	-
40	40	50	50	50	70	80	80	90	80	80	80	-
70	80	80	90	80	70	70	60	80	100	80	80	73
60	60	70	70	40	40	50	60	80	60	60	70	65
70	60	40	40	40	70	40	50	30	140	130	30	62
70	60	40	30	40	40	20	10	0	10	20	0	31
40	30	0	50	40	170	130	130	110	80	70	80	52
40	40	50	60	50	70	60	80	80	50	30	30	57
80	70	70	70	120	80	80	60	30	40	40	40	55
90	80	70	50	70	80	80	80	90	80	60	50	61
90	90	110	90	90	100	110	90	110	100	90	80	86

Date	00	01	02	03	04	05	06	07	08	09	10	11
040201	70	60	60	80	80	80	70	[70]	80	80	70	100
040202	40	30	30	30	40	40	-	-	[40]	40	50	70
040203	-	-	-	-	60	40	80	80	80	80	60	40
040204	10	20	30	10	10	20	30	30	[40]	40	30	40
040205	30	30	30	30	20	30	40	[30]	[40]	40	50	70
040206	30	20	20	30	20	20	30	30	[30]	40	50	40
040207	60	40	30	20	10	20	20	[40]	[30]	40	40	40
040208	30	30	30	20	30	30	30	[-10]	20	20	30	30
040209	10	10	10	30	10	10	-	-	[30]	30	30	30
040210	OBS	OBS	60	30	30	20	30	[40]	[30]	40	40	30
040211	40	40	30	20	20	20	20	[10]	-10	-10	20	30
040212	30	30	30	50	40	50	70	10	[40]	40	50	20
040213	60	40	40	40	40	110	+S	[20]	-	40	70	70
040214	30	30	30	20	20	10	10	10	10	10	30	50
040215	30	30	30	10	10	10	10	20	[40]	40	40	40
040216	30	20	+S	+S	10	10	20	-	-	40	40	40
040217	30	30	30	40	40	40	40	[60]	[50]	50	60	50
040218	70	50	40	30	30	30	30	40	[40]	70	40	40
040219	30	30	30	20	20	30	40	[70]	-	60	50	50
040220	40	40	40	30	30	30	30	[40]	[60]	50	50	50
040221	40	40	40	30	40	40	50	[50]	50	50	40	60
040222	10	10	20	10	-10	0	0	[-10]	-10	-10	-10	10
040223	-20	20	70	130	130	120	-	-	-30	-30	10	OBS
040224	40	40	30	30	30	30	40	40	[50]	50	40	40
040225	30	30	30	30	30	40	50	[60]	60	70	60	60
040226	80	60	70	40	50	50	80	[40]	40	50	100	120
040227	OBS	OBS	+S	40	10	20	0	10	[20]	40	40	30
040228	20	30	40	30	30	40	40	[40]	[40]	40	40	50
040229	-S	-S	-S	-20	10	10	0	-10	30	40	30	30

12	13	14	15	16	17	18	19	20	21	22	23	mean
90	90	130	90	80	80	80	80	80	60	60	40	78
80	70	60	20	-10	20	-	-	-	-	-	-	-
50	70	80	50	50	40	40	40	30	30	20	10	-
30	40	50	60	80	90	90	70	80	40	40	30	42
50	50	50	40	40	40	30	40	30	30	30	20	37
40	40	40	50	50	40	50	40	40	40	30	30	35
40	30	40	30	20	10	-50	30	30	30	30	30	28
40	OBS	20	-40	20	20	20	20	20	20	20	10	20
OBS	OBS	40	40	OBS	OBS	OBS	OBS	OBS	-S	OBS	OBS	-
40	40	40	40	50	50	50	40	40	40	40	40	-
20	40	90	20	OBS	OBS	10	-S	40	40	60	60	-
40	40	50	60	60	70	80	80	90	80	80	80	53
50	70	80	10	40	80	40	30	70	50	30	30	-
60	50	60	60	70	50	50	60	60	30	20	20	35
40	50	60	40	40	40	40	40	30	30	10	20	31
40	40	40	40	30	70	40	40	40	40	40	30	-
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OBS	OBS	OBS	OBS	80	60	30	30	40	40	40	40	-
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80	30	80	+S	40	30	50	130	120	80	70	OBS	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
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040302	40	30	30	30	30	30	40	[60]	[30]	20	30	10
040303	10	10	10	10	10	20	30	[40]	40	40	40	40
040304	30	20	20	20	30	40	50	[40]	40	40	40	50
040305	40	40	40	30	30	40	40	[40]	[30]	30	20	30
040306	40	40	40	30	20	30	30	20	[10]	30	50	50
040307	20	20	0	-10	20	20	20	[20]	[30]	30	30	30
040308	OBS	OBS	OBS	OBS	OBS	-S	-	-	-	30	20	10
040309	-40	-50	-10	-30	-50	0	0	10	[-10]	-20	30	10
040310	20	10	10	10	10	20	20	30	-	40	40	40
040311	40	40	30	30	30	30	30	40	[40]	40	40	40
040312	20	30	30	30	30	20	30	[40]	[40]	40	40	40
040313	-10	0	-10	-10	-20	-30	0	[20]	10	20	30	30
040314	30	40	40	40	40	30	40	[40]	40	60	60	50
040315	40	40	30	40	50	70	90	[80]	-	50	60	60
040316	40	30	30	20	20	30	30	-	-	30	30	30
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040320	20	20	20	20	10	10	20	[0]	20	30	30	40
040321	0	40	40	20	20	20	20	[20]	20	10	30	30
040322	OBS	-S	10	-50	0	-30	-	-	-	20	30	30
040323	30	20	20	20	30	[20]	0	-30	-20	0	-70	-60
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040325	80	80	50	30	10	10	0	-30	-30	10	-10	-40
040326	30	20	10	10	10	0	-30	[20]	[40]	40	40	40
040327	-20	-40	-30	-10	-10	[30]	60	70	40	30	-10	50
040328	20	20	30	30	30	30	[40]	30	30	30	30	40
040329	40	40	30	40	40	-	[40]	-	50	40	50	50
040330	50	30	30	40	30	30	[30]	40	40	40	30	30
040331	30	30	20	30	30	30	30	[20]	30	40	30	30



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-70	-30	-10	-10	-30	-20	-10	-20	-10	-10	-10	-40	-13
0	-20	0	0	-20	-S	+S	0	40	60	80	80	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
040401	30	30	30	40	50	30	[30]	[40]	30	40	40	30
040402	10	10	10	10	20	20	30	[20]	30	30	30	30
040403	20	10	10	10	10	10	[10]	20	30	40	30	40
040404	20	10	0	10	20	OBS	OBS	[20]	30	30	30	30
040405	-	-	-	-	-	-	[20]	-	20	20	OBS	-S
040406	30	30	30	30	30	20	[30]	40	40	30	30	40
040407	40	50	40	30	30	40	[40]	[50]	30	20	20	20
040408	20	20	30	20	10	20	30	[40]	30	30	30	30
040409	30	40	20	30	30	20	[40]	40	40	40	40	50
040410	30	30	10	10	10	10	[20]	20	30	40	40	40
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040414	10	10	10	10	10	10	20	[20]	30	30	40	40
040415	30	30	20	20	20	30	[30]	[30]	30	20	20	20
040416	10	0	-10	0	10	0	[20]	[30]	30	30	30	40
040417	30	20	30	10	-10	10	10	10	10	10	20	40
040418	10	0	20	40	40	40	30	30	[30]	30	40	40
040419	50	80	30	10	10	-	-	-	40	40	30	30
040420	OBS	0	30	-50	-10	-10	-	-	10	30	20	40
040421	30	20	10	10	20	[30]	40	40	40	40	40	40
040422	30	20	10	30	20	[20]	40	40	40	40	40	40
040423	20	10	20	10	20	30	[40]	[30]	30	40	40	40
040424	30	20	30	20	30	0	[20]	20	30	30	20	20
040425	40	40	40	30	30	30	[30]	30	30	30	30	20
040426	20	20	30	20	20	-	-	-	40	50	60	50
040427	30	30	30	30	20	30	[30]	[30]	30	30	30	40
040428	20	20	20	20	20	30	[30]	[30]	30	30	30	30
040429	10	20	20	20	30	30	[20]	20	20	30	30	30
040430	20	10	20	10	20	20	[20]	30	30	30	30	40

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20	-S	OBS	+S	OBS	30	40	70	80	-	-	-	-
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20	20	OBS	-60	0	20	-40	40	30	30	30	30	19
40	40	40	40	30	30	40	30	30	30	30	30	35
40	30	-10	-10	30	10	30	30	30	40	30	40	24
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40	40	40	40	40	40	30	OBS	OBS	30	30	20	-
30	OBS	OBS	+S	+S	OBS	OBS	OBS	OBS	OBS	OBS	OBS	-
80	70	50	40	30	30	20	20	20	10	10	10	-
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20	30	30	30	30	20	20	30	30	30	30	20	29
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Date	00	01	02	03	04	05	06	07	08	09	10	11
040501	30	20	20	20	30	30	[40]	40	40	40	40	40
040502	30	30	30	30	30	30	40	[30]	30	10	10	20
040503	20	0	10	10	10	-	-	-	30	20	20	30
040504	10	20	20	10	0	10	[20]	30	20	20	30	0
040505	10	0	10	10	10	10	[10]	[20]	10	0	10	0
040506	10	20	10	30	10	10	20	10	30	OBS	-S	OBS
040507	10	10	10	10	20	30	[30]	30	20	10	20	20
040508	30	30	30	20	30	[30]	30	30	-20	20	60	20
040509	20	10	10	10	20	40	70	40	30	0	10	10
040510	30	30	20	20	30	-	-	-	30	20	20	20
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040513	20	20	20	20	30	30	[50]	30	20	20	10	OBS
040514	40	30	30	30	30	30	[30]	20	30	30	20	30
040515	10	10	10	10	10	[30]	40	40	40	40	40	40
040516	-S	OBS	OBS	OBS	-S	-20	[140]	70	30	30	10	10
040517	30	30	30	20	20	-	-	-	10	20	20	30
040518	30	30	20	10	10	30	[30]	[20]	20	30	30	30
040519	0	0	0	0	0	0	[10]	30	40	30	40	40
040520	20	10	10	10	10	30	[30]	30	30	40	40	40
040521	20	30	20	10	40	70	40	[40]	40	40	40	40
040522	-20	0	20	30	10	OBS	OBS	-10	80	80	80	50
040523	0	0	10	10	20	30	40	[30]	30	10	10	10
040524	20	30	20	10	20	-	-	50	40	30	30	30
040525	10	10	10	10	10	10	10	[20]	20	30	30	40
040526	20	20	10	10	10	30	20	[30]	30	30	30	30
040527	20	30	20	20	30	50	80	[70]	-10	10	50	80
040528	30	30	20	20	30	OBS	[-30]	[-20]	-30	30	OBS	OBS
040529	30	30	30	30	40	50	[80]	[80]	50	40	40	30
040530	30	30	30	30	40	40	[40]	50	40	50	50	50
040531	30	30	30	30	30	30	-	[50]	50	60	60	50

12	13	14	15	16	17	18	19	20	21	22	23	mean
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30	30	20	20	20	20	30	30	20	20	20	10	-
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10	20	20	10	20	20	20	20	30	30	20	20	-
40	40	40	40	30	40	40	40	40	30	30	30	-
30	30	30	30	30	30	-S	-S	20	-10	10	10	-
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-S	OBS	OBS	OBS	OBS	OBS	70	20	20	20	10	-20	-
-10	20	10	0	0	10	0	10	10	10	-10	-10	-
20	30	20	-S	OBS	OBS	30	-S	30	20	OBS	20	-
30	30	30	30	30	30	20	10	20	20	10	10	-
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-S	OBS	-S	-S	30	60	70	50	40	40	40	30	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
040601	10	20	20	20	20	30	-	-	20	20	10	20
040602	20	10	10	0	OBS	+S	OBS	-S	OBS	OBS	OBS	30
040603	30	40	40	30	20	-S	-S	[-S]	-S	-S	-10	30
040604	0	30	10	-20	10	30	[40]	[40]	0	0	30	40
040605	30	30	20	10	10	[10]	[20]	30	50	60	50	30
040606	30	30	30	10	30	40	30	[40]	[40]	20	30	30
040607	20	20	20	20	10	-	-	-	40	40	40	40
040608	10	10	0	10	10	20	[20]	30	30	40	50	50
040609	10	10	10	10	10	30	[30]	[30]	30	50	50	60
040610	20	30	20	20	10	20	[30]	40	40	OBS	OBS	30
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040612	OBS	OBS	10	10	30	40	[80]	60	60	40	30	0
040613	10	10	30	70	50	50	50	[40]	40	50	50	40
040614	30	30	30	20	20	-	-	-	30	40	50	40
040615	10	10	10	10	10	10	[30]	30	40	30	30	40
040616	10	80	10	10	10	10	10	10	10	10	40	40
040617	20	20	20	20	20	40	[40]	[30]	30	30	20	30
040618	10	10	10	10	10	20	[30]	-S	OBS	OBS	20	0
040619	30	30	40	20	30	20	[30]	[40]	30	30	40	30
040620	OBS	OBS	60	20	40	30	[40]	OBS	80	20	50	40
040621	20	10	10	10	10	-	-	-	50	40	30	30
040622	10	10	10	10	30	40	40	[40]	40	40	40	40
040623	40	30	30	20	20	40	[30]	[30]	30	40	40	40
040624	20	20	30	10	20	30	[30]	40	30	30	30	40
040625	10	30	-S	-S	OBS	OBS	OBS	OBS	-S	OBS	OBS	OBS
040626	10	20	10	10	20	30	[70]	80	90	60	40	30
040627	20	20	20	10	10	30	[30]	30	30	30	40	40
040628	10	10	10	10	10	-	-	-	30	30	30	30
040629	20	10	10	10	10	30	[30]	30	30	40	40	40
040630	10	10	0	10	10	30	[60]	40	50	40	40	40



Date	00	01	02	03	04	05	06	07	08	09	10	11
040701	20	30	40	20	30	30	[30]	40	40	40	40	40
040702	10	10	10	0	0	10	20	[-10]	10	-10	-10	-20
040703	20	30	20	20	30	[50]	80	80	70	50	40	50
040704	30	20	20	20	10	20	[20]	30	30	40	40	40
040705	40	40	40	40	50	-	-	50	40	40	+S	40
040706	10	20	20	(10)	20	30	[90]	70	60	40	40	40
040707	20	10	10	10	10	30	[40]	50	50	80	50	40
040708	20	30	40	40	40	40	[30]	40	40	50	50	50
040709	30	30	30	30	30	30	OBS	+S	30	30	30	OBS
040710	30	30	30	30	30	30	[30]	40	30	40	40	40
040711	30	30	20	20	20	30	40	30	[30]	30	30	30
040712	20	30	20	20	20	-	-	-	20	30	30	30
040713	20	30	30	30	40	40	[40]	40	40	40	40	40
040714	40	30	30	30	30	40	[40]	40	40	40	30	40
040715	10	20	0	-10	10	30	[80]	[50]	80	50	10	20
040716	30	10	10	10	10	20	[30]	40	40	40	40	50
040717	10	20	10	10	10	10	10	20	20	30	40	40
040718	30	30	40	30	40	40	40	[40]	40	50	50	50
040719	20	20	0	10	10	-	[40]	-	30	30	40	50
040720	20	10	10	10	10	30	[30]	30	30	30	40	30
040721	10	10	10	10	20	30	[30]	30	40	40	60	60
040722	20	20	20	20	20	30	[40]	30	40	30	20	OBS
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040725	10	10	10	10	10	10	20	20	[30]	40	40	50
040726	30	30	30	30	20	-	[30]	-	40	40	40	40
040727	20	20	20	10	20	30	[30]	30	40	40	40	30
040728	30	30	30	20	20	30	[30]	30	30	40	40	30
040729	10	10	30	30	30	0	0	0	10	10	10	0
040730	30	30	30	30	30	30	[40]	40	40	40	40	30
040731	40	30	30	30	30	40	[40]	40	40	40	60	50



12	13	14	15	16	17	18	19	20	21	22	23	mean
40	60	+S	OBS	OBS	OBS	-S	OBS	-S	20	OBS	0	-
0	10	20	10	-20	20	-20	-20	-10	-30	0	10	0
40	40	40	40	30	30	20	-S	10	30	30	30	38
40	40	40	40	40	50	40	40	40	40	40	30	33
OBS	OBS	OBS	OBS	OBS	0	10	OBS	OBS	10	10	10	-
+S	OBS	OBS	OBS	OBS	20	40	40	30	40	30	30	-
40	40	30	30	30	40	40	30	30	20	20	20	32
60	60	70	60	60	50	50	60	70	70	40	40	48
50	10	0	OBS	30	40	30	30	30	40	40	30	-
40	40	30	30	30	30	20	40	40	40	40	30	34
0	-10	-10	0	30	30	40	10	30	30	30	30	23
40	40	40	40	20	OBS	30	40	20	20	20	20	-
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30	30	10	30	30	40	40	40	40	30	20	20	33
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40	50	60	80	60	50	40	50	40	40	30	20	37
[40]	[40]	40	40	40	30	30	30	20	30	30	30	26
40	40	+S	+S	20	30	30	20	20	20	10	10	-
+S	+S	OBS	-S	30	30	40	30	30	20	10	20	-
40	40	40	40	40	30	30	30	20	20	10	20	27
70	70	70	70	50	40	30	20	20	20	20	20	35
OBS	OBS	OBS	30	30	40	40	40	50	40	40	40	-
50	60	50	50	50	40	40	40	30	40	30	30	45
40	40	40	+S	20	20	30	30	30	20	10	10	30
50	40	50	40	50	50	40	40	40	40	40	40	33
40	30	30	30	30	30	30	30	30	20	20	20	-
40	40	40	40	30	30	30	30	30	40	30	30	31
20	30	30	30	30	30	30	40	20	10	10	10	27
0	-10	0	10	20	20	30	30	30	30	30	30	15
40	40	40	40	40	30	30	30	20	30	30	40	34
50	60	60	50	60	50	40	40	40	40	20	20	42

Date	00	01	02	03	04	05	06	07	08	09	10	11
040801	20	30	20	10	10	20	-S	OBS	0	40	40	50
040802	20	20	20	20	20	-	-	[30]	30	40	40	40
040803	20	20	20	10	10	10	20	[30]	30	30	60	50
040804	20	20	30	20	20	30	[50]	50	50	40	40	50
040805	20	20	20	20	20	20	30	[30]	30	40	40	40
040806	10	20	20	20	20	30	[20]	30	30	30	30	40
040807	20	20	20	OBS	OBS	-S	[80]	150	80	50	40	40
040808	30	40	30	30	30	40	50	40	[40]	60	70	60
040809	40	40	30	30	20	-	-	30	40	50	60	60
040810	30	30	30	30	20	40	[50]	40	50	50	60	50
040811	20	20	10	20	30	30	[30]	30	40	40	40	30
040812	10	20	10	10	10	20	[40]	30	20	30	30	40
040813	20	10	-S	-S	20	30	[10]	30	80	30	30	30
040814	OBS	OBS	0	20	20	[30]	40	40	40	40	40	40
040815	10	10	20	20	30	30	40	40	40	40	40	40
040816	10	10	20	20	10	-	-	30	30	30	30	40
040817	30	30	20	20	20	20	[20]	[30]	30	30	40	40
040818	20	10	10	10	20	30	[20]	30	30	30	40	50
040819	10	10	20	20	10	20	30	[30]	30	30	30	40
040820	20	10	10	10	20	30	[40]	30	30	30	10	20
040821	+S	OBS	+S	20	20	20	[40]	40	40	40	30	30
040822	10	10	20	20	20	20	[30]	30	30	30	40	30
040823	30	30	30	30	30	-	-	-	40	40	40	40
040824	40	30	40	30	40	40	[40]	40	40	40	30	30
040825	+S	-70	OBS	30	+S	-S	[70]	+S	0	30	10	30
040826	OBS	20	10	10	10	+S	[30]	50	40	50	20	20
040827	40	30	30	20	20	30	[40]	30	30	40	50	40
040828	20	20	20	30	20	[20]	30	30	30	30	40	40
040829	20	10	20	20	30	40	[30]	10	30	20	30	30
040830	20	20	10	20	20	-	-	-	20	30	30	30
040831	10	10	10	0	0	0	[50]	0	0	20	10	0

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50	60	70	50	40	30	10	20	10	10	20	20	28
10	0	0	30	+S	80	0	50	30	30	30	20	23
20	20	20	10	10	-S	OBS	-30	30	30	30	10	-
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30	30	-20	-30	30	30	30	30	30	30	30	40	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
040901	10	10	10	10	10	20	[30]	40	40	40	30	30
040902	30	30	20	20	20	[30]	[40]	30	20	20	30	30
040903	20	30	30	20	30	30	[30]	30	30	30	40	40
040904	20	10	10	10	[10]	20	30	30	30	40	40	40
040905	20	20	20	10	10	20	[40]	40	40	30	40	40
040906	40	30	30	30	30	30	-	30	(40)	60	60	60
040907	20	30	20	20	20	20	[20]	30	30	30	40	50
040908	10	20	20	10	20	20	[20]	20	(10)	30	30	30
040909	30	40	30	30	30	30	[40]	40	50	50	40	50
040910	40	30	30	30	30	30	30	[20]	20	30	30	30
040911	20	30	20	20	30	[30]	30	20	10	30	30	30
040912	30	30	30	30	30	20	[30]	30	30	30	40	40
040913	30	30	30	30	30	-	-	[40]	40	40	40	40
040914	40	40	50	40	50	40	[60]	[40]	30	40	40	40
040915	40	40	40	30	30	30	[10]	20	30	30	50	70
040916	30	30	30	20	30	20	40	-	40	30	30	40
040917	40	30	30	30	[30]	30	40	40	50	40	40	50
040918	10	10	20	20	20	20	[20]	30	30	30	40	40
040919	20	20	20	20	20	30	[30]	[30]	30	30	30	30
040920	20	20	20	20	20	-	[30]	-	30	40	40	40
040921	30	30	30	30	30	30	[30]	[30]	30	40	40	30
040922	30	30	20	30	0	10	[20]	[20]	20	10	0	10
040923	-70	-160	-50	-20	10	30	[30]	40	30	30	20	30
040924	-30	20	-S	10	0	10	30	[40]	40	40	60	30
040925	20	20	20	20	30	30	30	40	40	40	40	40
040926	30	20	30	20	30	30	[20]	[10]	20	30	30	40
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040928	10	10	10	10	10	10	[10]	[20]	30	40	40	40
040929	10	10	10	10	10	10	[30]	40	40	30	30	40
040930	OBS	20	20	20	20	[20]	30	30	40	40	-20	-10

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40	30	30	30	30	30	40	30	OBS	OBS	-S	OBS	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
041001	30	20	20	20	20	20	[20]	10	30	30	40	40
041002	20	30	30	30	30	20	[20]	40	40	30	40	40
041003	20	20	30	10	10	10	-	30	60	40	40	40
041004	20	20	10	20	20	30	-	-	30	40	40	40
041005	10	-10	-10	10	20	40	[40]	30	20	40	40	40
041006	30	30	30	30	[30]	30	20	20	20	-	-	-
041007	-	-	-	-	-	-	-	-	-	-	-	-
041008	-	-	-	-	-	-	-	-	-	-	-	-
041009	-	-	-	-	-	-	10	OBS	OBS	30	40	40
041010	OBS	-S	10	OBS	-10	0	OBS	OBS	OBS	30	80	30
041011	20	20	20	20	20	-	-	-	60	50	40	50
041012	30	30	30	20	30	30	[20]	[20]	20	30	40	40
041013	0	0	10	10	-30	10	[10]	[10]	-10	10	10	10
041014	-10	10	10	0	-10	[-10]	-10	-10	-20	-20	-10	0
041015	0	0	0	10	10	20	10	-30	0	0	10	20
041016	10	20	20	20	10	10	-10	-80	-110	-S	OBS	-70
041017	30	30	30	20	20	10	[10]	30	40	50	40	40
041018	20	30	40	30	40	-	-	-	40	40	40	40
041019	20	20	30	20	20	30	[30]	30	40	40	40	40
041020	30	30	40	40	40	40	[40]	40	50	40	60	50
041021	30	30	20	30	20	[10]	[20]	10	20	10	30	40
041022	20	0	-90	OBS	-S	+S	-S	[-10]	20	80	80	70
041023	100	140	140	170	160	130	[80]	50	20	0	10	10
041024	80	50	30	40	30	40	[30]	20	20	10	20	30
041025	80	90	80	80	30	-	[70]	50	30	30	30	30
041026	30	30	0	20	30	30	[50]	40	40	30	40	40
041027	10	10	10	10	30	30	[40]	30	20	20	20	30
041028	10	20	10	10	10	10	[30]	30	30	30	30	30
041029	30	40	40	30	30	40	30	[40]	30	30	40	40
041030	40	30	30	20	10	10	[20]	30	30	30	30	40
041031	30	30	30	30	20	-30	-30	[20]	40	40	30	40

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-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
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Date	00	01	02	03	04	05	06	07	08	09	10	11
041101	10	10	10	20	10	20	10	[20]	-	30	30	30
041102	10	10	10	10	10	10	10	[30]	50	30	30	30
041103	40	30	20	20	30	10	30	40	[30]	20	30	20
041104	0	10	10	20	20	30	[10]	10	20	20	30	40
041105	30	30	40	40	40	40	40	[40]	50	70	60	40
041106	10	10	30	20	20	20	30	30	30	40	30	30
041107	10	10	10	20	20	20	20	-	-	40	20	30
041108	20	20	30	30	20	30	-	-	-	40	40	30
041109	-10	-20	-20	-10	OBS	OBS	-S	-S	-S	+S	-S	-S
041110	40	70	80	60	40	60	80	[80]	[70]	80	60	40
041111	30	30	20	10	20	10	10	[10]	30	30	40	30
041112	10	0	0	10	10	10	10	[30]	40	40	40	40
041113	30	10	20	-20	-30	20	20	[30]	10	10	0	20
041114	20	30	20	20	30	30	30	[40]	40	40	40	40
041115	20	20	20	10	20	20	-	-	-	30	40	40
041116	40	40	40	40	40	30	30	[20]	20	30	20	20
041117	30	20	10	10	40	40	60	[50]	70	50	50	60
041118	40	50	40	40	40	40	40	[50]	60	60	50	40
041119	30	30	40	40	30	30	30	20	[20]	30	OBS	-S
041120	20	-S	OBS	OBS	OBS	40	30	[40]	[40]	40	40	40
041121	30	40	40	40	OBS	-S	30	[40]	40	40	40	40
041122	30	30	20	20	10	20	-	-	-	50	-20	-70
041123	20	10	20	10	10	30	30	[30]	30	30	30	30
041124	40	40	40	40	40	40	30	40	[40]	40	40	40
041125	40	40	40	40	40	40	40	[60]	80	70	60	40
041126	70	70	50	40	40	40	40	[50]	50	70	70	70
041127	40	50	40	30	30	30	20	[10]	40	40	30	30
041128	30	30	30	20	20	30	30	[30]	30	40	40	40
041129	80	80	60	80	70	60	-	-	-	80	80	70
041130	130	80	80	90	90	90	80	[50]	50	20	10	10



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30	40	40	40	40	40	30	10	10	10	OBS	-20	-
10	0	20	30	30	40	50	60	80	80	70	80	-
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30	40	30	[30]	20	10	20	20	20	20	10	10	22
40	30	30	20	10	0	0	-10	20	20	30	40	20
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20	10	30	60	30	10	40	30	30	20	30	10	46

Date	00	01	02	03	04	05	06	07	08	09	10	11
041201	-20	20	-10	10	10	-10	[0]	10	0	0	0	0
041202	0	20	10	30	30	40	30	[40]	30	40	40	40
041203	20	30	20	20	10	20	30	[30]	40	60	60	50
041204	30	30	30	30	30	30	30	[20]	30	40	40	40
041205	30	30	20	30	30	20	30	[30]	30	10	10	10
041206	30	30	30	-	-	-	-	-	-	90	60	40
041207	40	40	30	30	30	40	40	[60]	40	40	40	40
041208	80	40	30	10	30	30	20	[30]	[40]	40	70	60
041209	40	30	30	40	40	30	40	[40]	[60]	40	40	40
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041211	30	30	40	30	20	20	30	[30]	20	20	20	30
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041213	30	40	40	40	40	30	-	-	-	40	40	40
041214	10	10	10	10	30	40	20	[20]	30	20	20	30
041215	20	0	10	10	30	10	30	[0]	-10	0	0	30
041216	30	0	0	10	30	0	10	[-10]	-10	-20	-20	-10
041217	-40	-30	-30	-20	-40	-20	0	0	-S	OBS	-10	-20
041218	20	0	0	10	30	30	0	70	80	70	30	20
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041221	60	50	50	50	40	[40]	40	60	40	50	60	70
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041225	80	70	60	40	20	-10	0	40	[40]	50	50	60
041226	20	10	10	10	10	30	30	[20]	20	40	60	40
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041231	40	40	40	40	40	40	40	[40]	40	40	80	80

12	13	14	15	16	17	18	19	20	21	22	23	mean
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40	40	40	20	40	40	40	30	10	-10	-20	-10	24
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30	20	30	30	30	40	30	20	10	20	30	30	24
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20	30	0	-30	-30	-30	-10	-30	-40	-60	-40	-30	-10
-30	-70	30	70	40	40	20	90	30	40	30	10	-
20	30	30	[40]	40	40	40	40	60	40	40	40	34
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60	80	80	80	60	90	120	110	100	90	70	60	62
60	70	60	50	70	80	90	110	100	80	70	60	63
60	30	30	-10	-20	30	30	40	10	40	30	30	41
0	30	40	40	70	80	80	60	30	30	30	20	42
70	80	70	80	80	80	80	90	100	80	50	60	55
50	50	50	50	40	50	40	50	50	50	40	40	44
20	10	-S	-S	-10	30	70	70	90	100	90	30	-
40	40	20	20	70	70	60	80	80	60	70	80	-
10	10	0	30	30	30	10	0	0	0	20	20	30
40	40	40	50	50	50	60	60	50	40	40	40	-
40	50	40	50	60	40	50	80	80	50	40	40	46
60	70	70	70	70	70	60	50	70	30	-S	OBS	-



# SCHUMANN RESONANCE OBSERVATIONS

G. SÁTORI

Schumann resonances are the electromagnetic eigenmodes of the Earth-ionosphere cavity maintained by the world thunderstorm activity (Schumann 1952).

The first efforts were already made in sixties to record the variations of the natural electromagnetic energy source in the Schumann resonance (SR) frequency range. P Bencze constructed an equipment for measuring SR and reported on the first results together with A Ádám (Ádám and Bencze 1963).

The experiments were renewed in eighties to realize the continuous measurements of Schumann resonance frequencies and amplitudes. Since May of 1993, the vertical electric field component in SR frequency range between 2 and 25 Hz has regularly been measured in the Nagycenk Observatory (47.6°N, 16.7°E) using a very stable ball-antenna, a preamplifier with high input impedance and low noise, an amplifier and a personal computer with high speed, multi-channel AD-converter. The complex demodulation as a spectral technique has been applied for the quasi-continuous determination of the actual peak-frequencies and the corresponding amplitudes of the first three SR modes (Sátori et al. 1996).

Using convolution filters the phase-variations of the complex wave vector relating to the central period of the filters are determined. By computing the phase changes versus time the frequency (and the amplitude) can also be monitored in time. Using this spectral technique, the frequency can be determined within a given range of frequencies, in the case applied here in the frequency range of the first three Schumann-resonance modes, namely between 7–9 Hz, 13–15 Hz and 19–21 Hz. An alternate sampling and computation process yields a quasi real-time technique.

The horizontal magnetic field components (north-south and east-west) have regularly been measured since January of 1997 using induction coils. The spectral technique is the same as in case of the vertical electric field component.

The electronics of the SR recording system was developed by J Pongrácz and J Horváth, the ball-antenna was constructed by Gy Pálla.

Recording SR-transients started in the frame of US-Hungarian Joint Found (JF.554) in 1998. These events, so called Q-bursts, are excited by individual energetic lightning strokes.

The hourly averages of the peak-frequencies and the amplitudes for the first

three modes and SR transients for selected time periods (international campaigns) are available (e-mail: satori@ggki.hu). Figure 1 shows Schumann resonance recording system with the ball-antenna for the measurement of the vertical electric field component, as well as the two induction coils for the horizontal north-south and east-west magnetic field components. Figure 2, as example, exhibits the daily frequency and amplitude variations of the first three modes characteristic for a winter month. Figure 3 depicts a SR-transient.

### Some results based on SR observations

The observation of Schumann resonances is important from the point of view of the world thunderstorm activity in the troposphere, as well as the different emissions (red sprite, blue jet, elves) induced by lightning strokes and large scale influences of extraterrestrial origin in the lowest ionosphere.

The semiannual variations of SR amplitudes measured at the Nagycenk Observatory, Central Europe, are the manifestation of the semiannual variation of the surface air temperature in the tropical continental regions (Sátori and Zieger 1996). The latter is due to the semiannual wave of solar insolation with maxima at the equinoxes. The magnitude of the semiannual temperature variation is about 1.5–2.0 °C. The high significance level of the semiannual variation of the SR amplitudes at Nagycenk shows that the quality of this SR data set makes it suitable for detecting temperature variations at the level of some tenths of a degree centigrade. In this way, the observation of the SR amplitudes/intensities have great importance from the point of view of global climatic changes.

Parameters of global thunderstorm activity were deduced from the long term Schumann resonance records at Nagycenk (Nickolaenko et al. 1998).

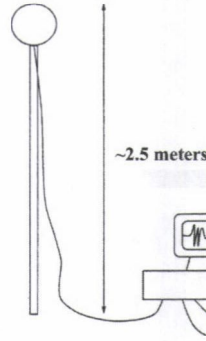
The ENSO (El Niño Southern Oscillation) phenomenon is among others characterized by sea surface temperature anomaly in the equatorial Pacific which can affect weather patterns around the world. A meridional redistribution of the world thunderstorm activity was deduced from the variations of SR frequencies on the ENSO time scale observed at Nagycenk (Sátori and Zieger 1999).

Lightning properties of the two tropical continental chimneys, the Congo and Amazon basins were compared based on Schumann resonance measurements at Nagycenk, Hungary and Rhode Island, USA and satellite observations (Williams and Sátori 2004).

See CD (program Seenck.exe, menu item SchumannRes).



Electric Field Antenna



Magnetic Field Antennas

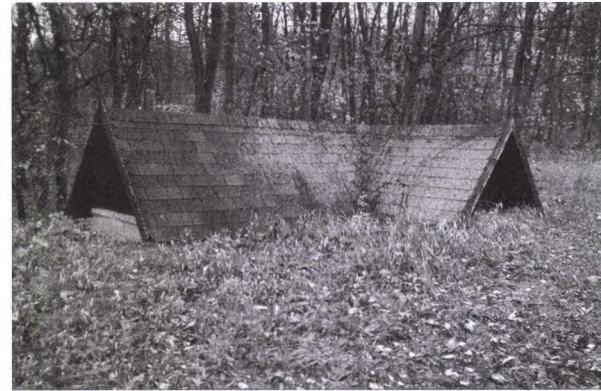
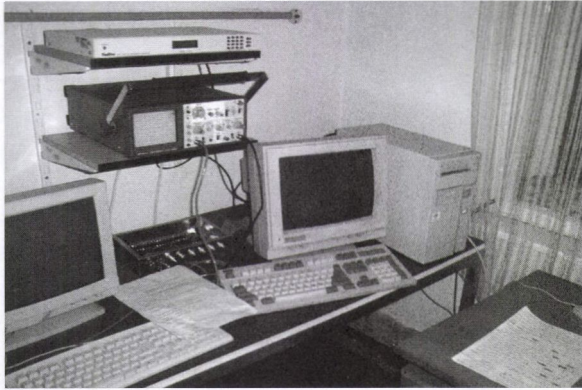
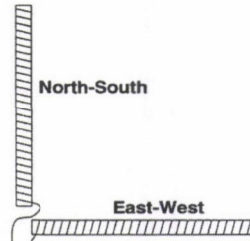


Fig. 1. Schumann resonance recording system: ball-antenna (top left), block diagram of the measurement (top middle), induction coils (top right), data acquisition system (bottom left), hut for the induction coils (bottom right)

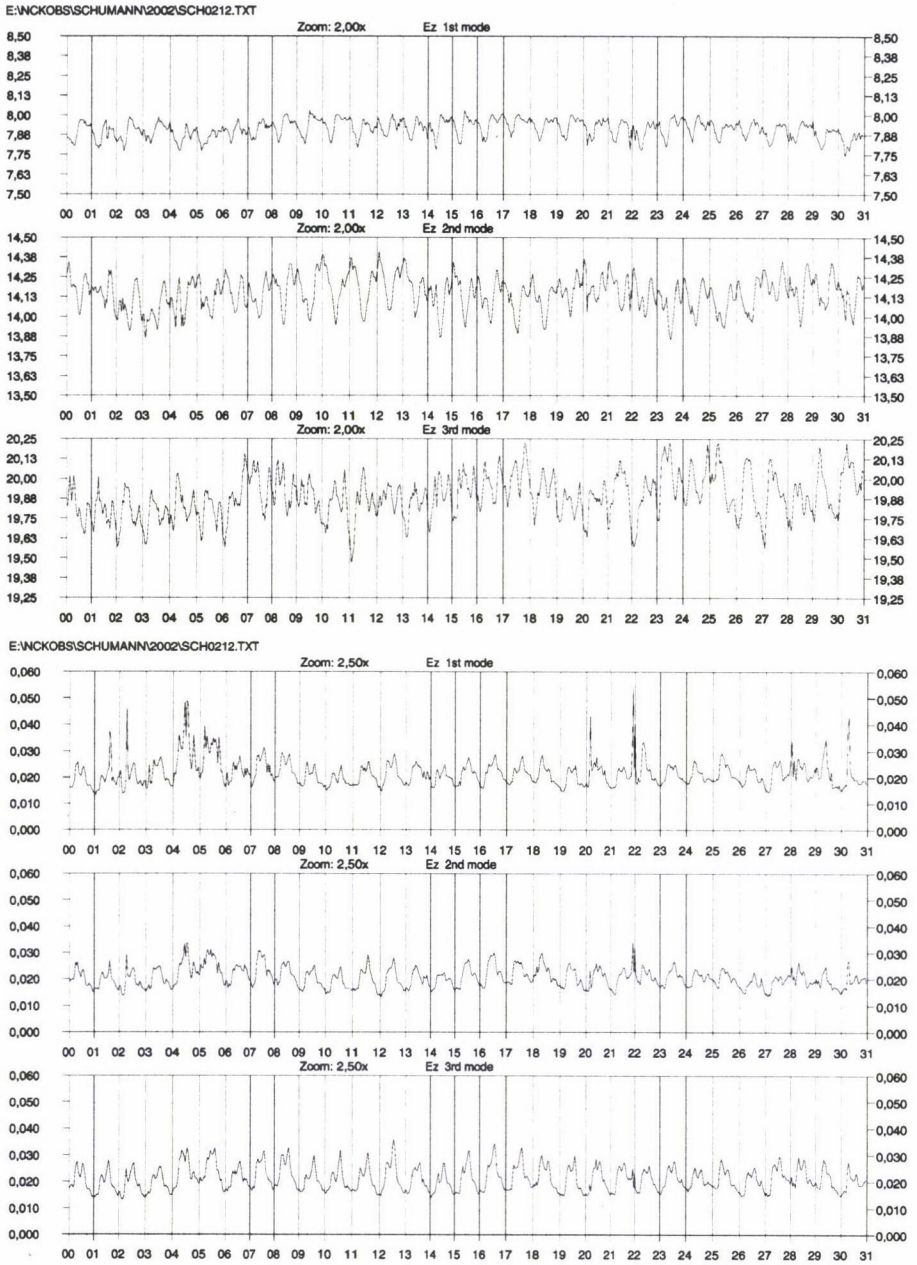


Fig. 2. Hourly means of SR frequencies in Ez (top) and relative amplitudes in V (bottom) measured for the first three modes in the days of December, 2002



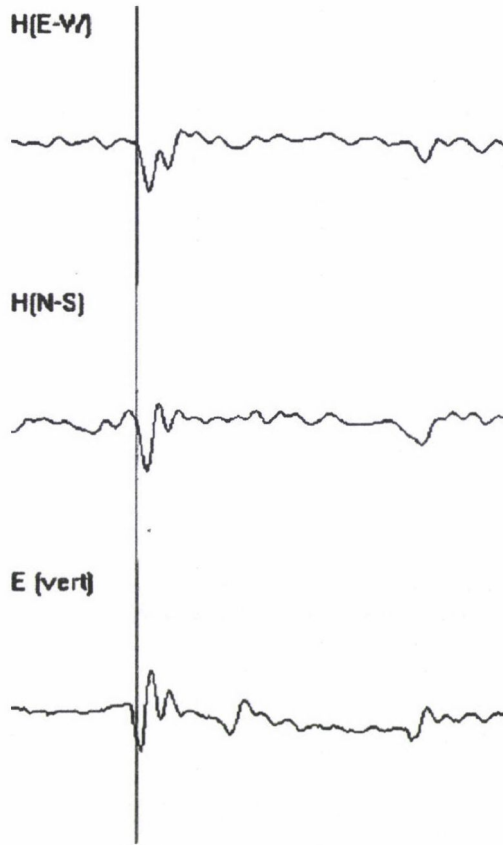


Fig. 3. SR-transient recorded at Nagycenk. Time markers include intervals of 100 ms. The horizontal broken lines indicate the trigger level of  $\pm 0.6$  V

### References

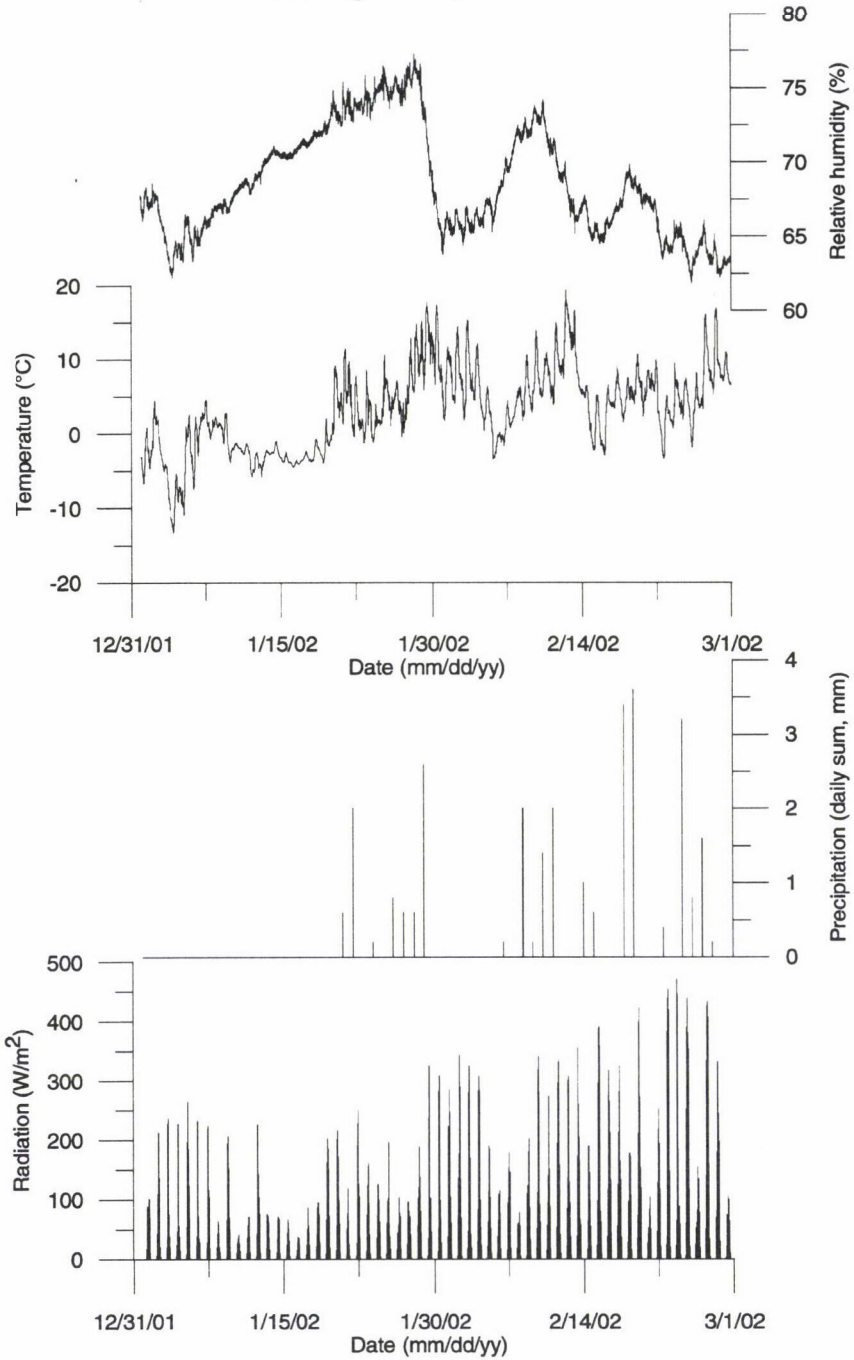
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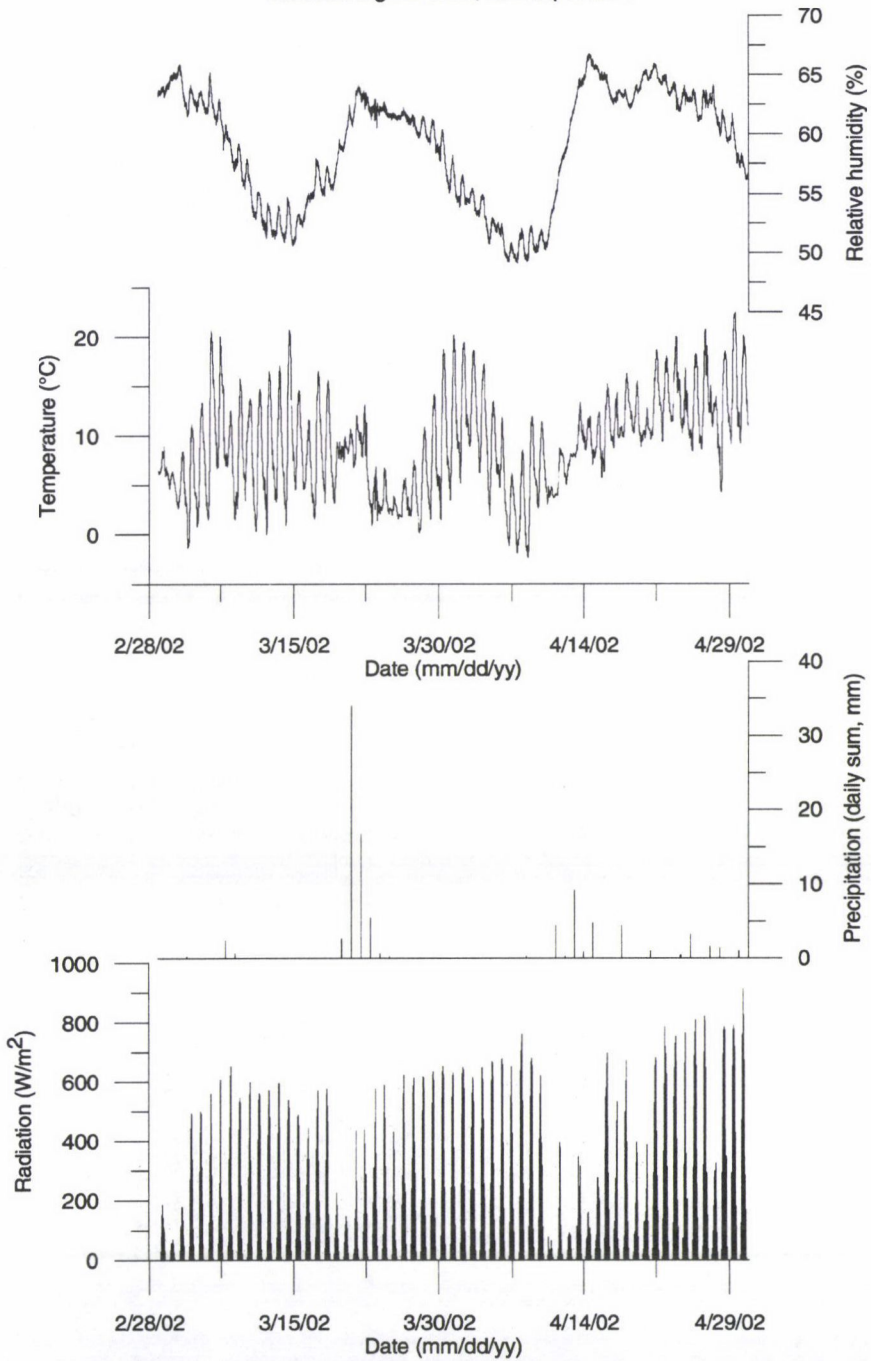
## **IV. METEOROLOGICAL OBSERVATIONS**

2002-2004

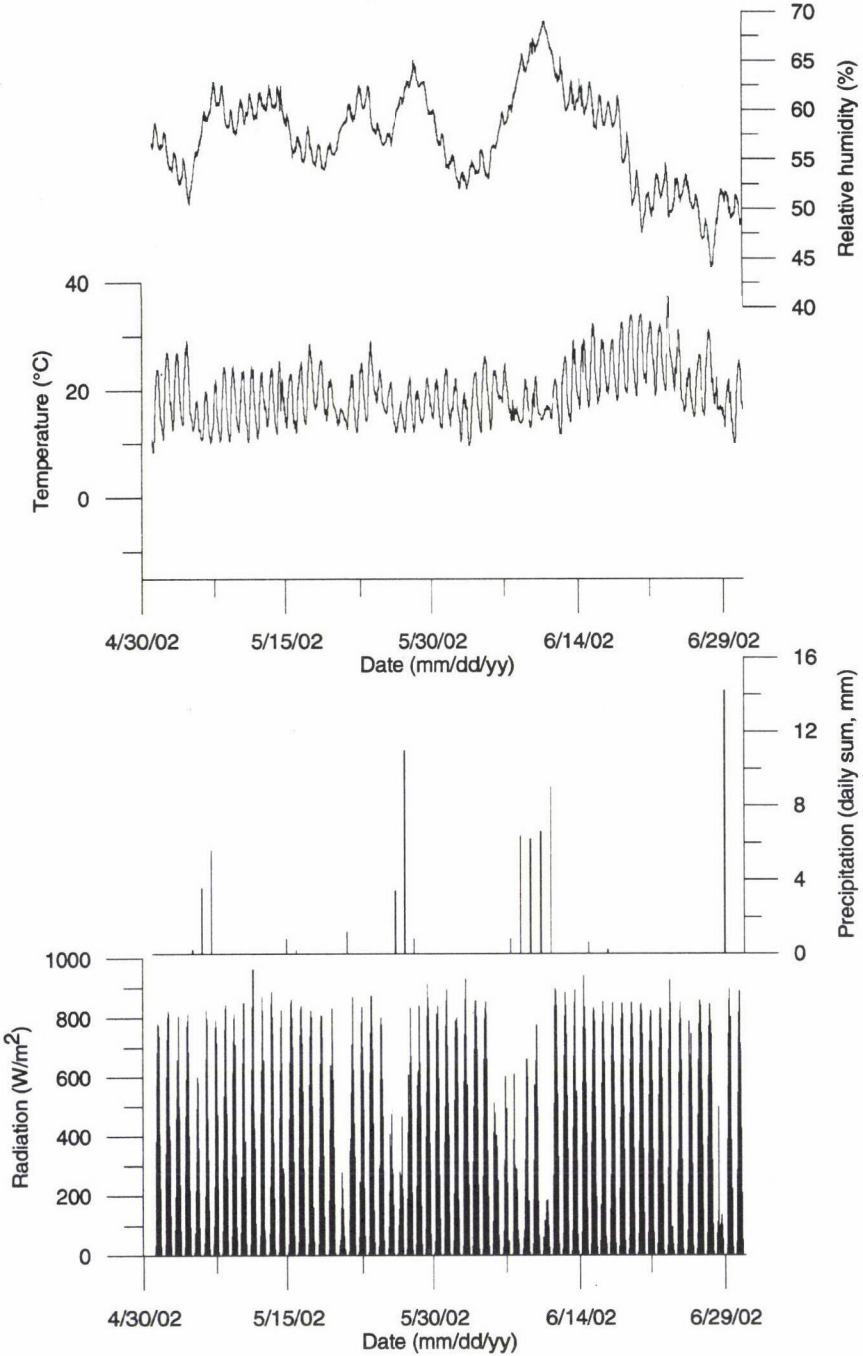
Meteorological data, Jan-Feb 2002



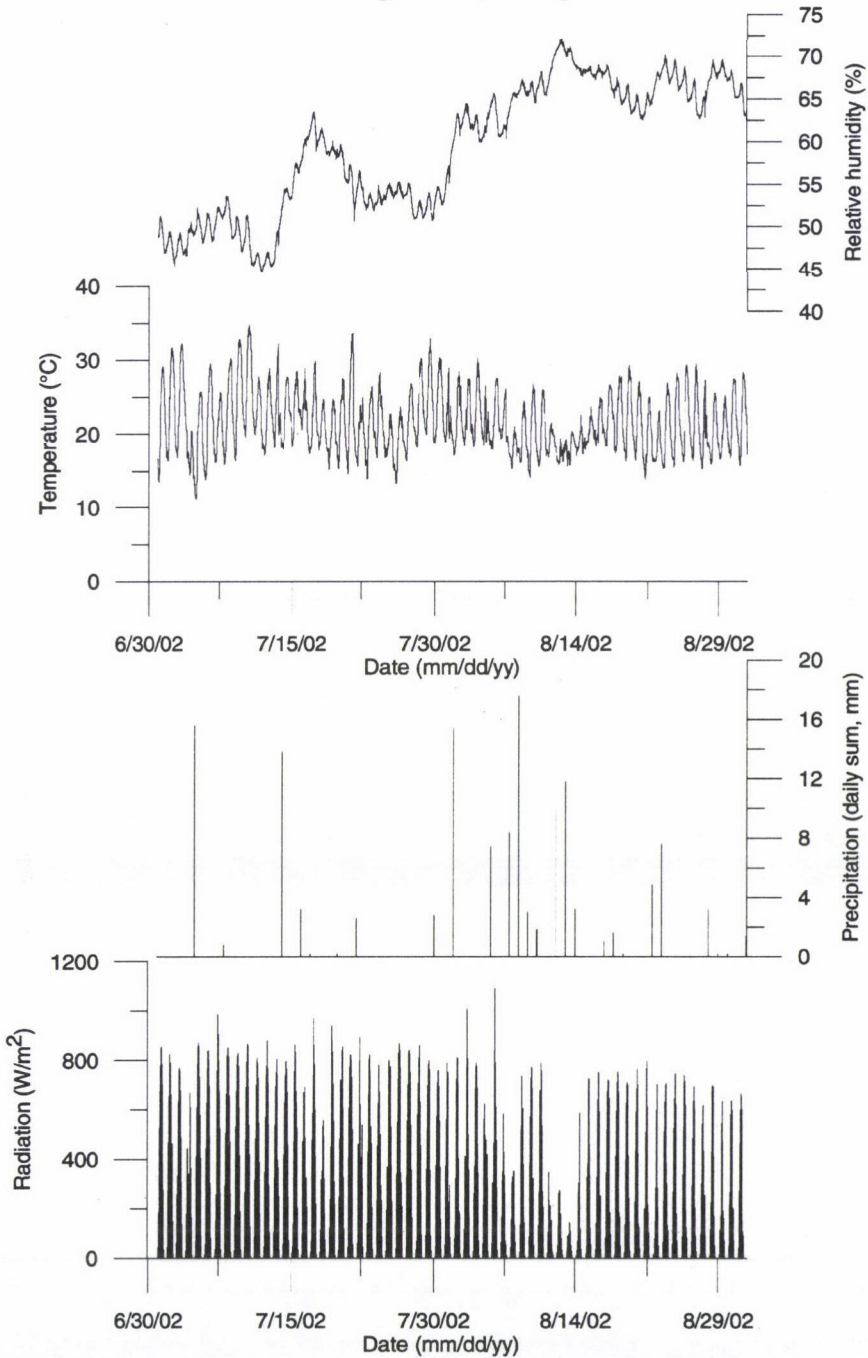
Meteorological data, Mar-Apr 2002



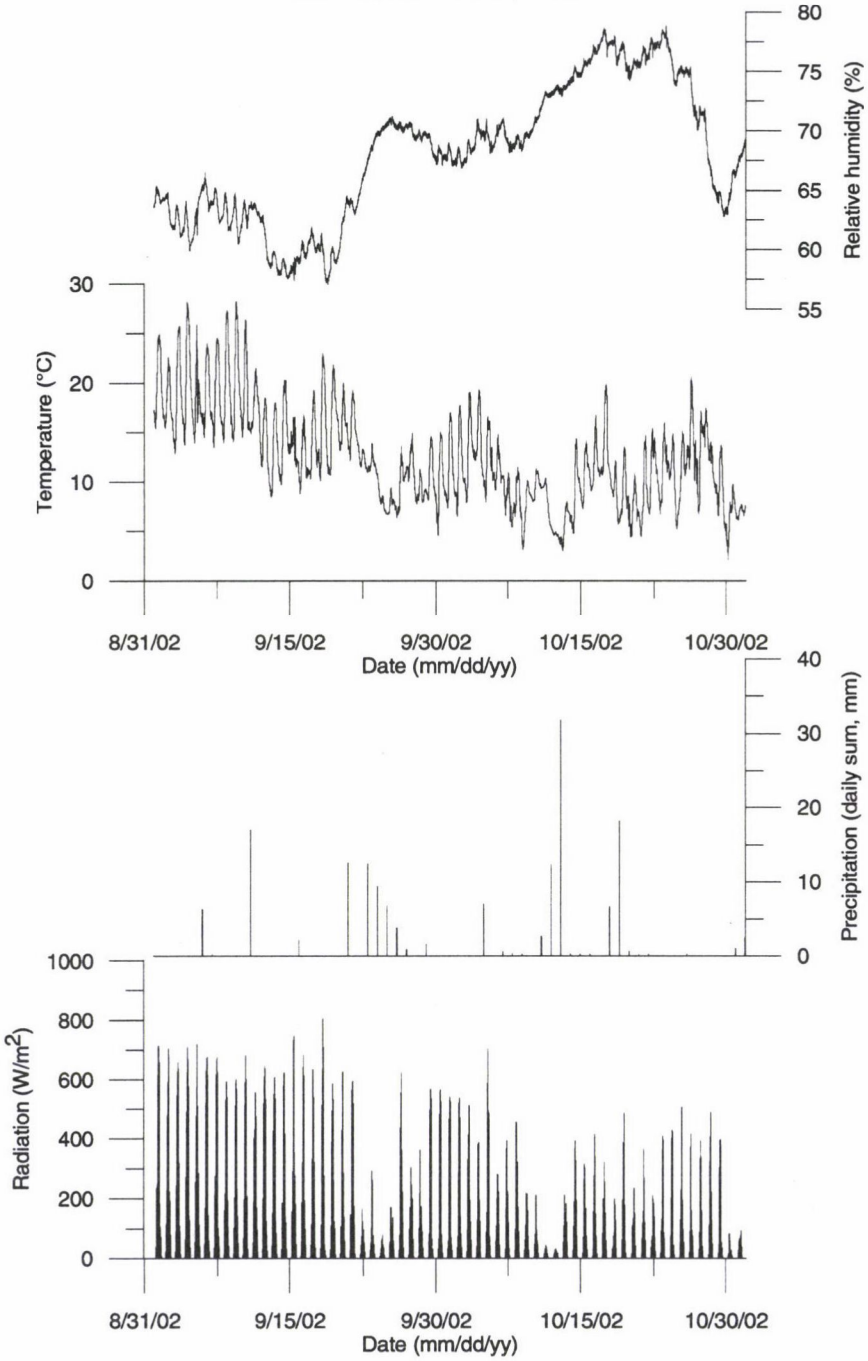
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Meteorological data, Jul-Aug 2002

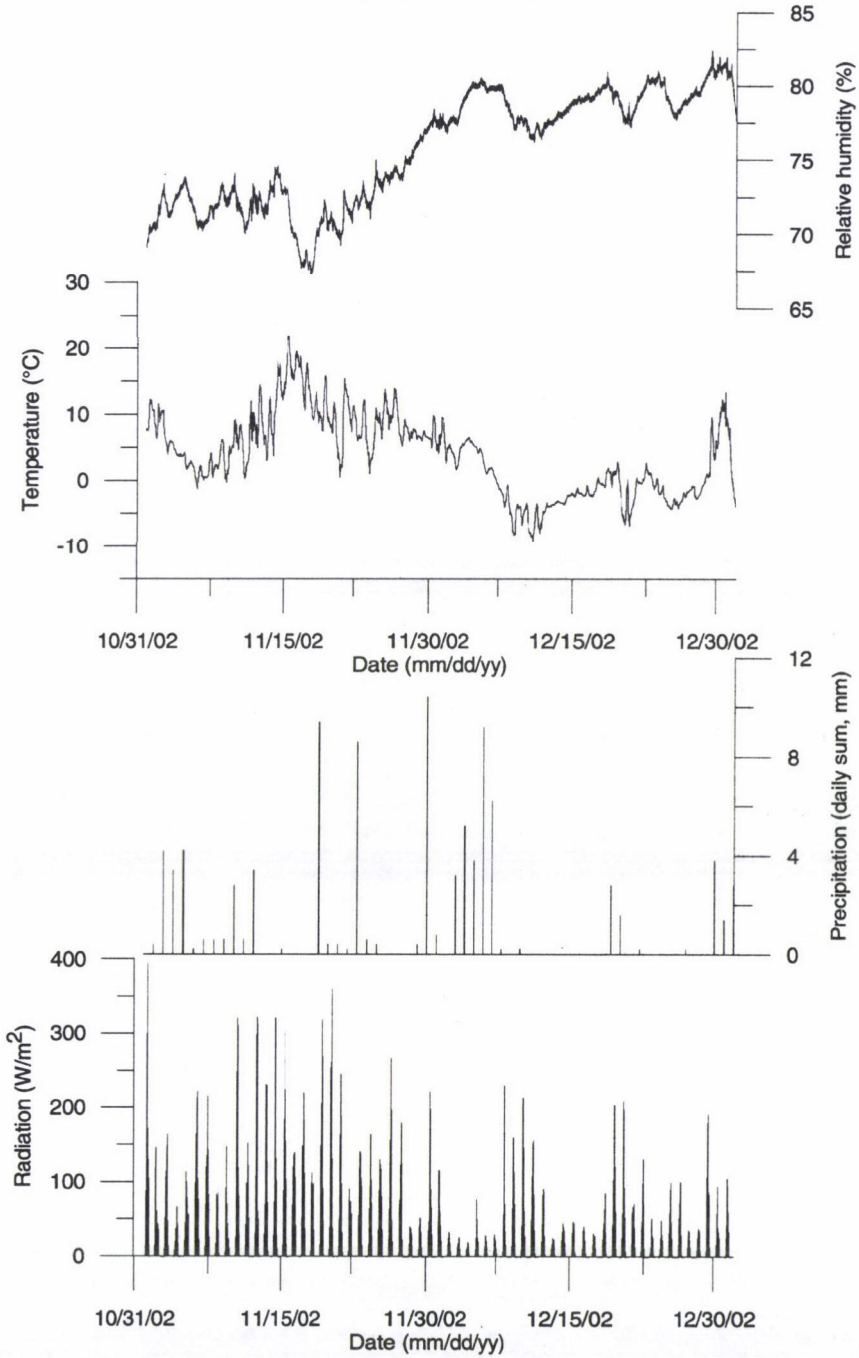


Meteorological data, Sep-Oct 2002

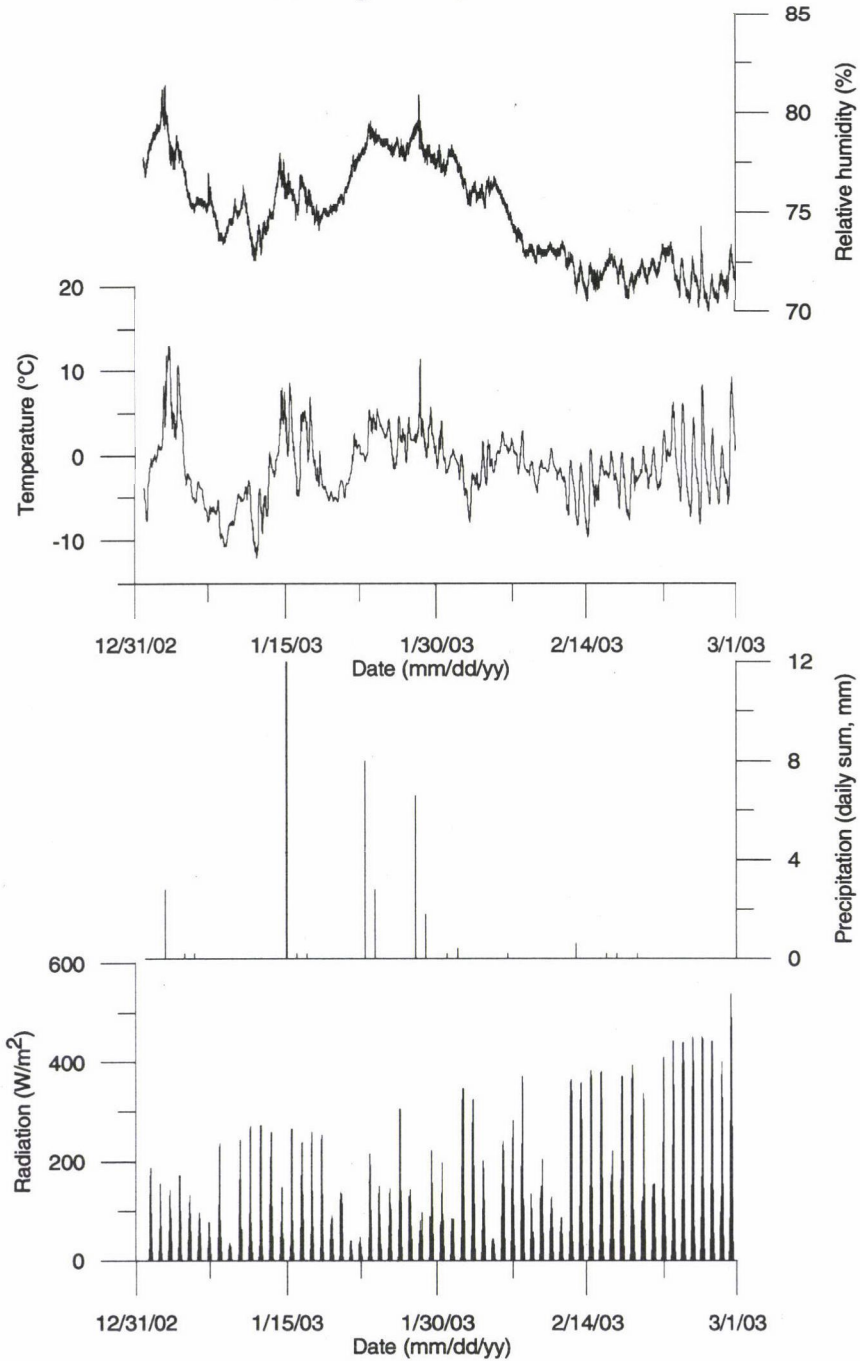




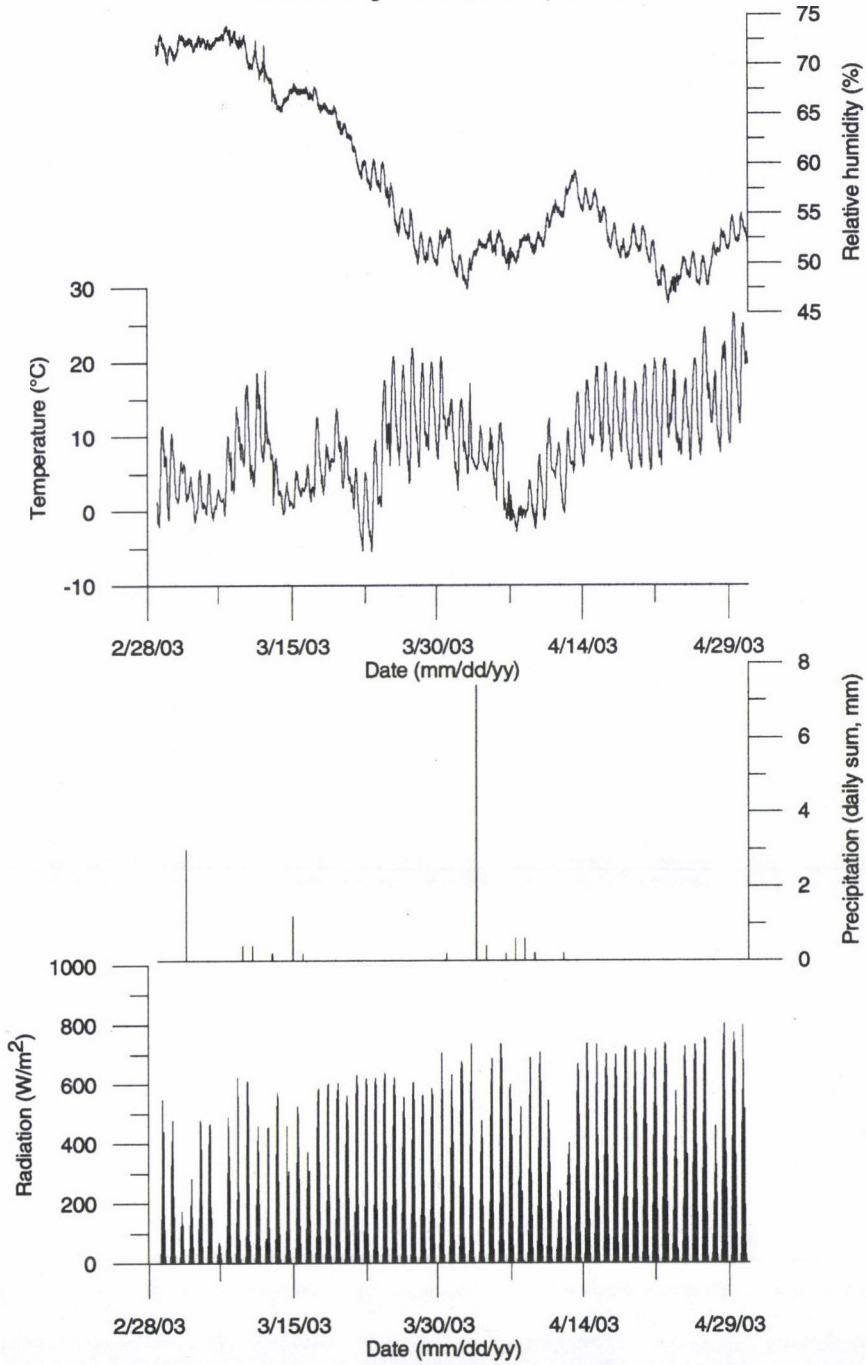
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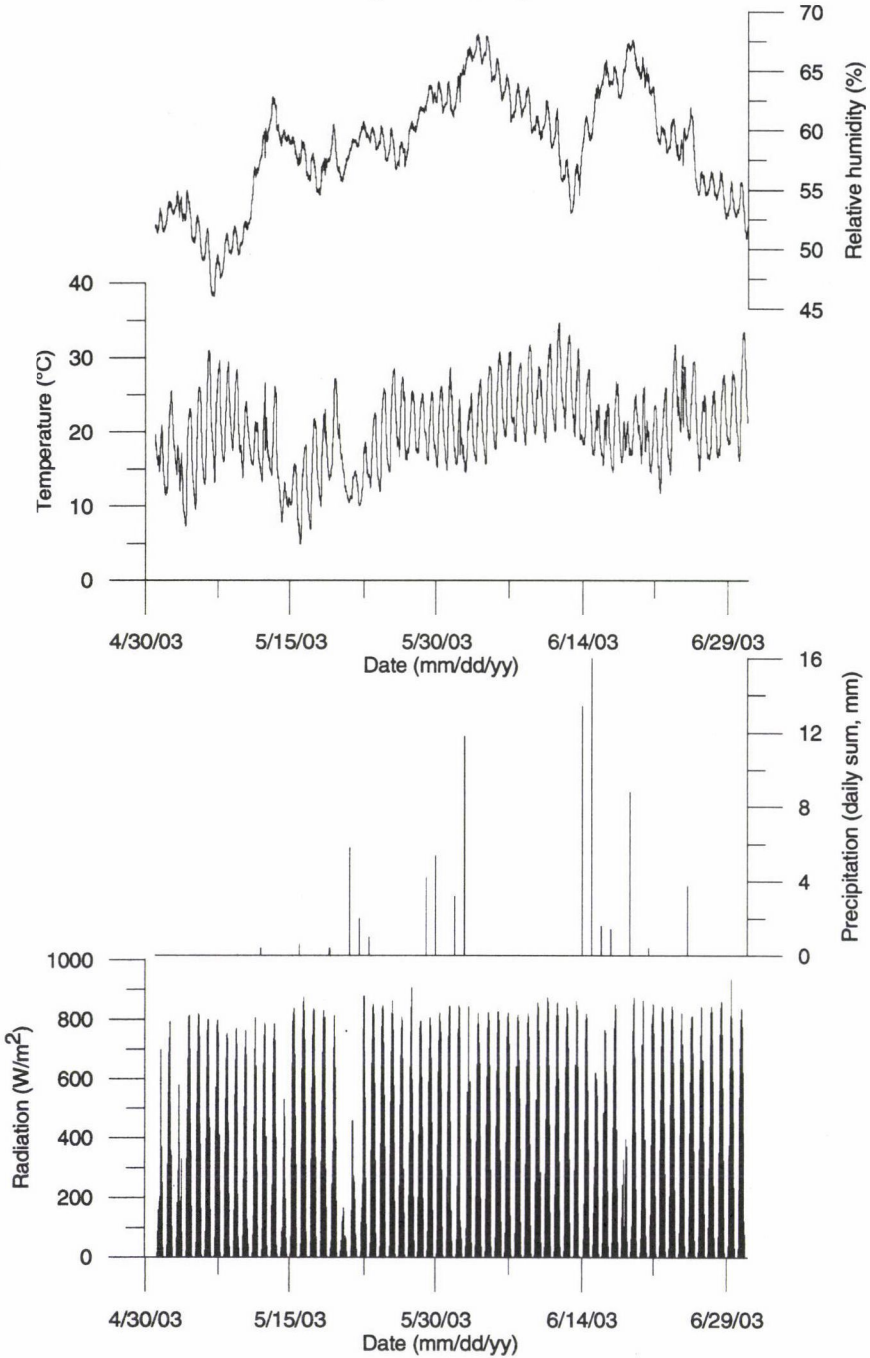
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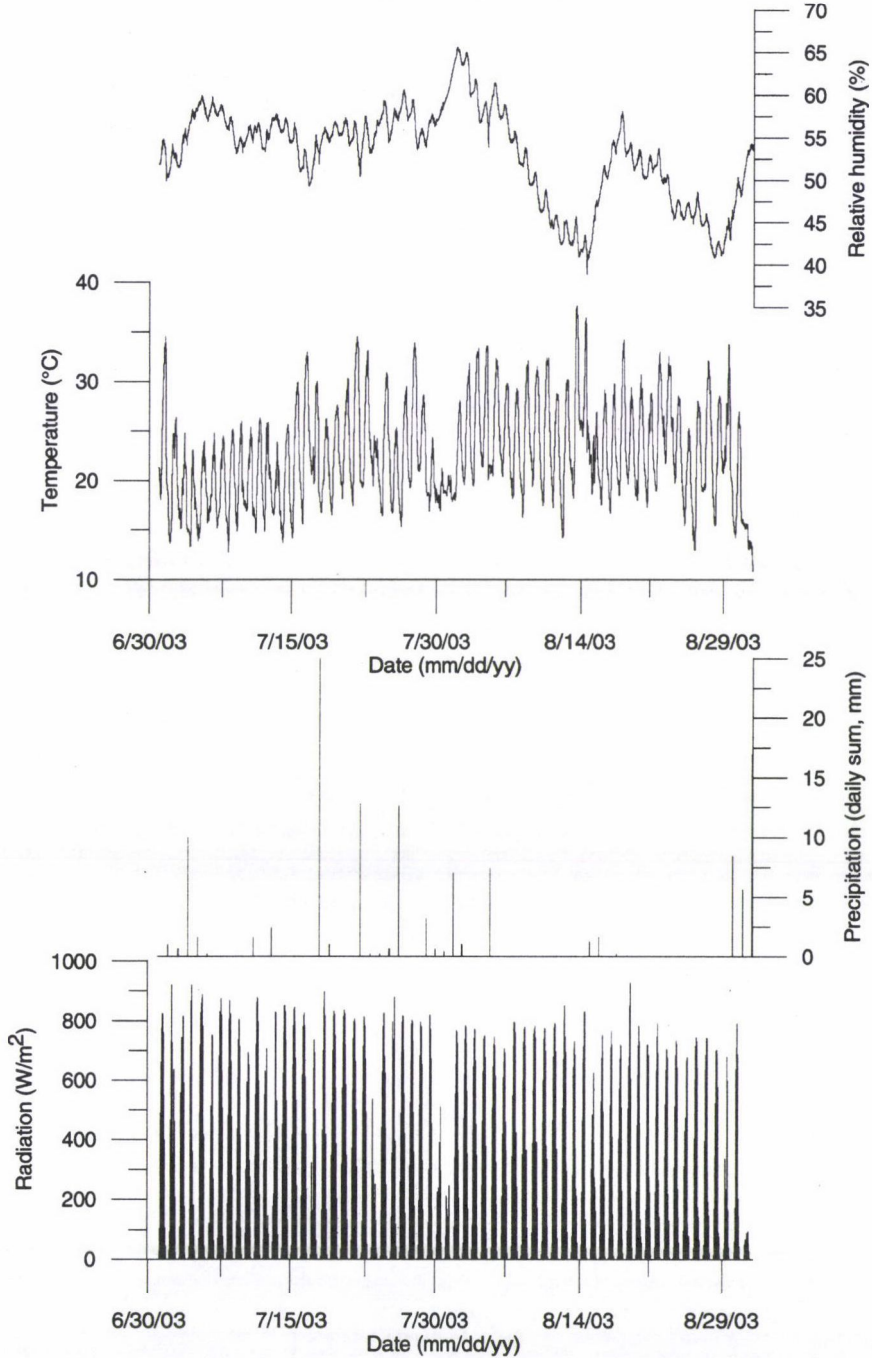
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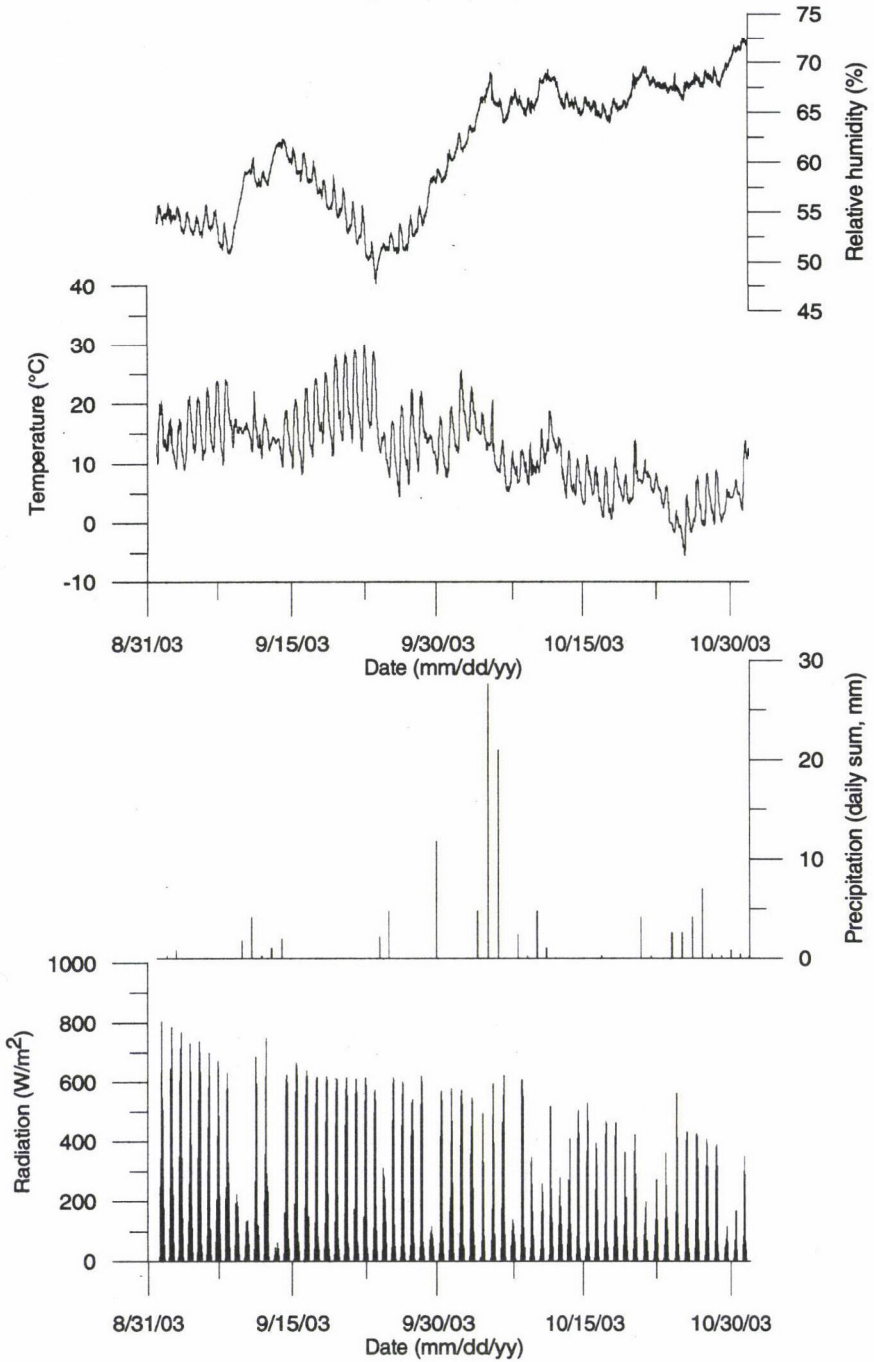
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Meteorological data, Jul-Aug 2003

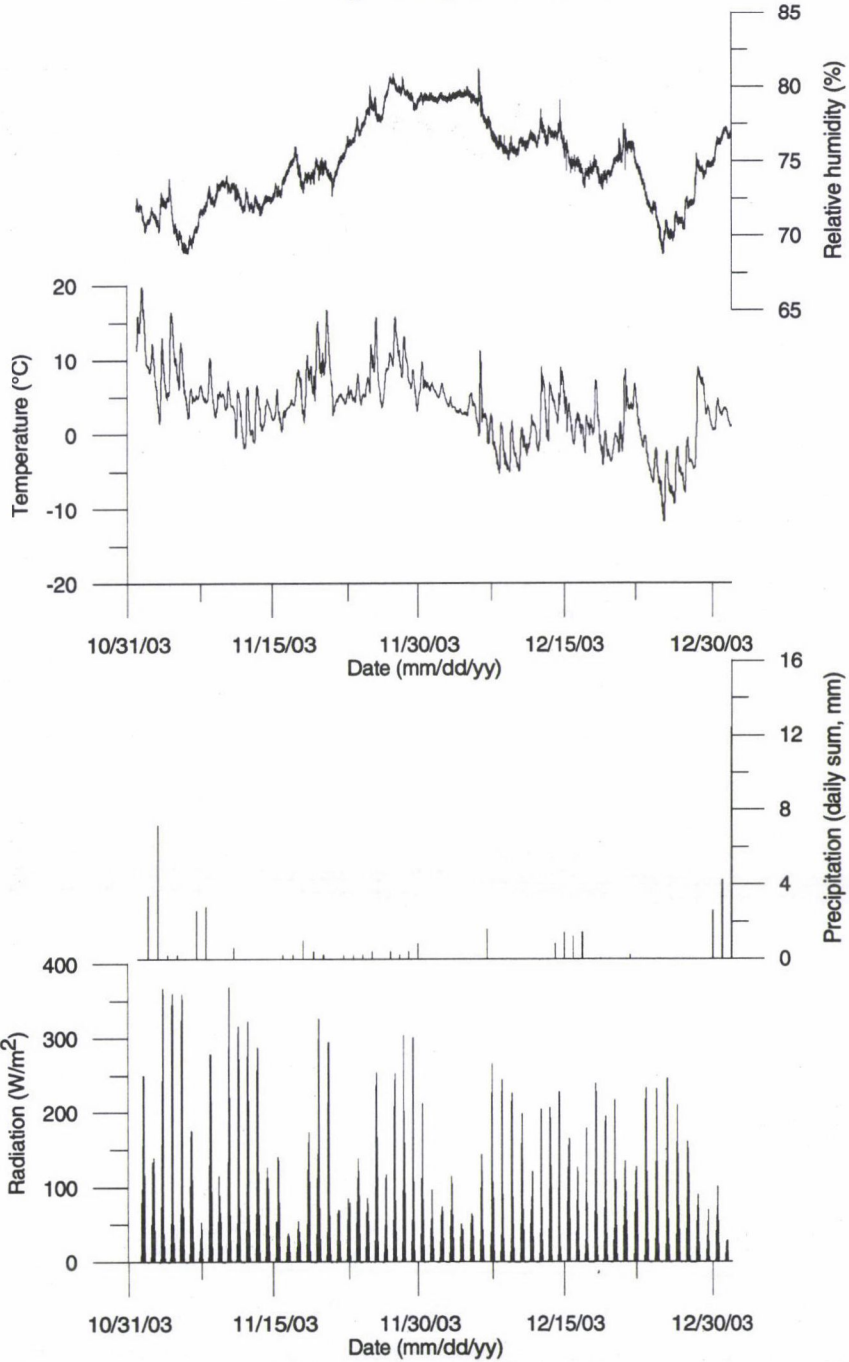


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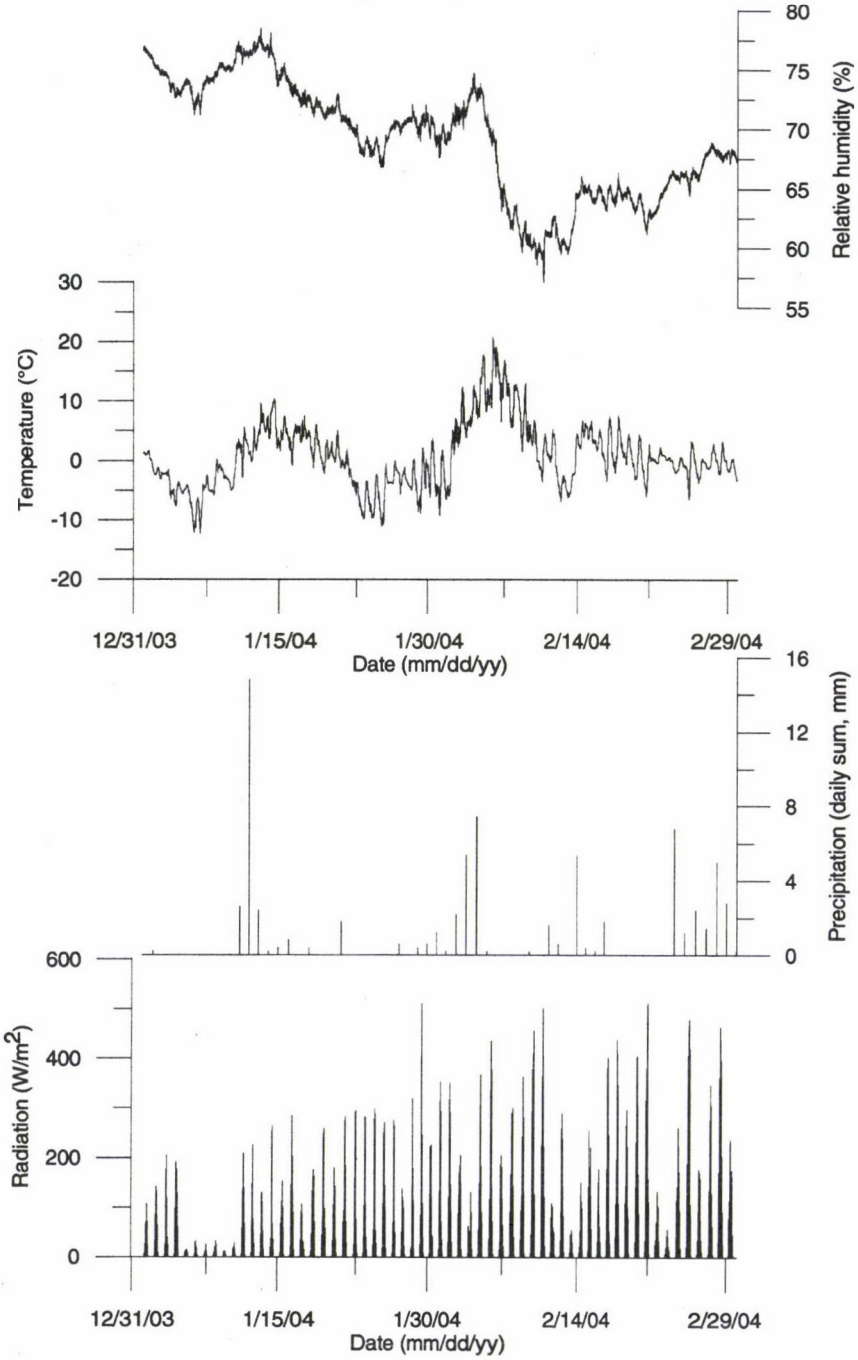




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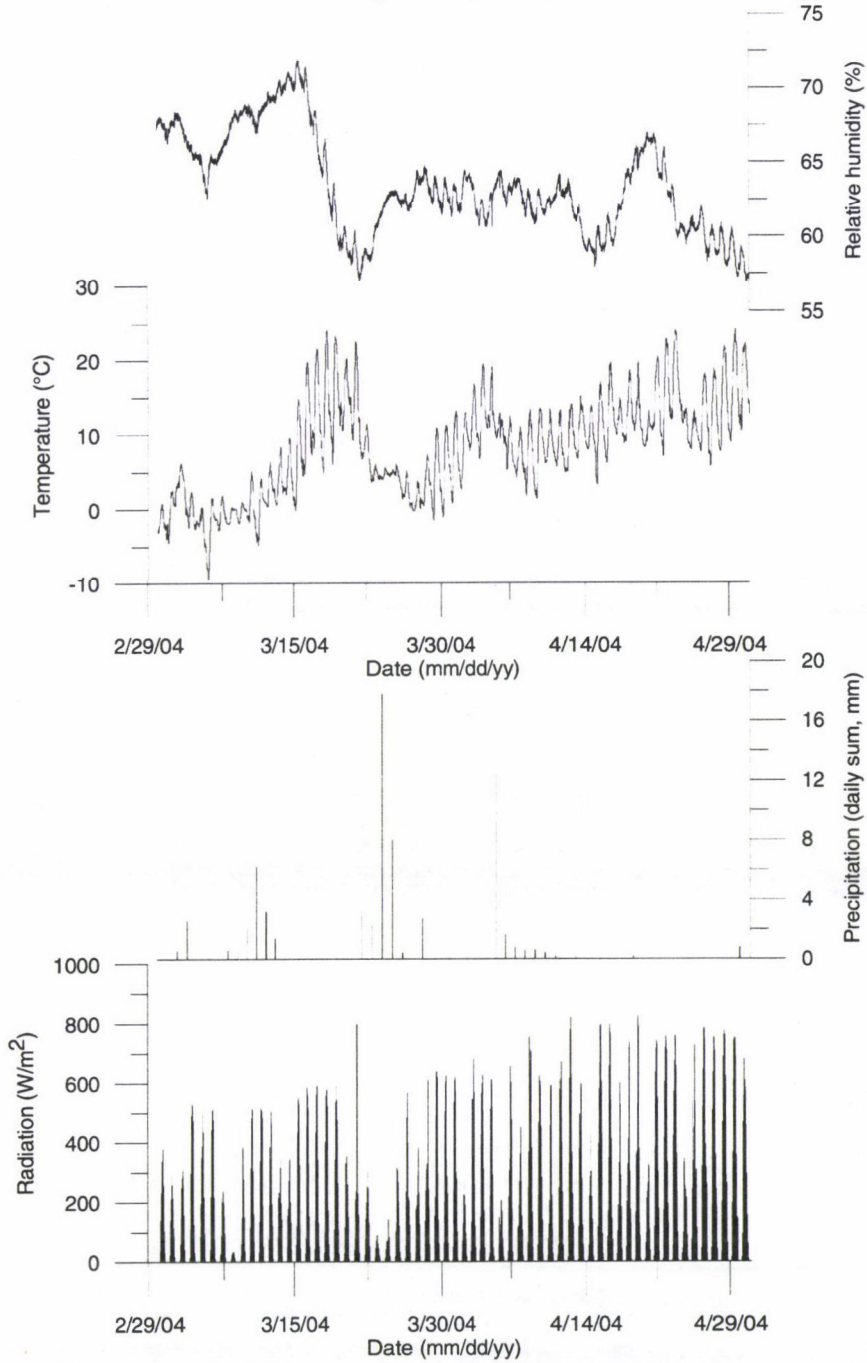


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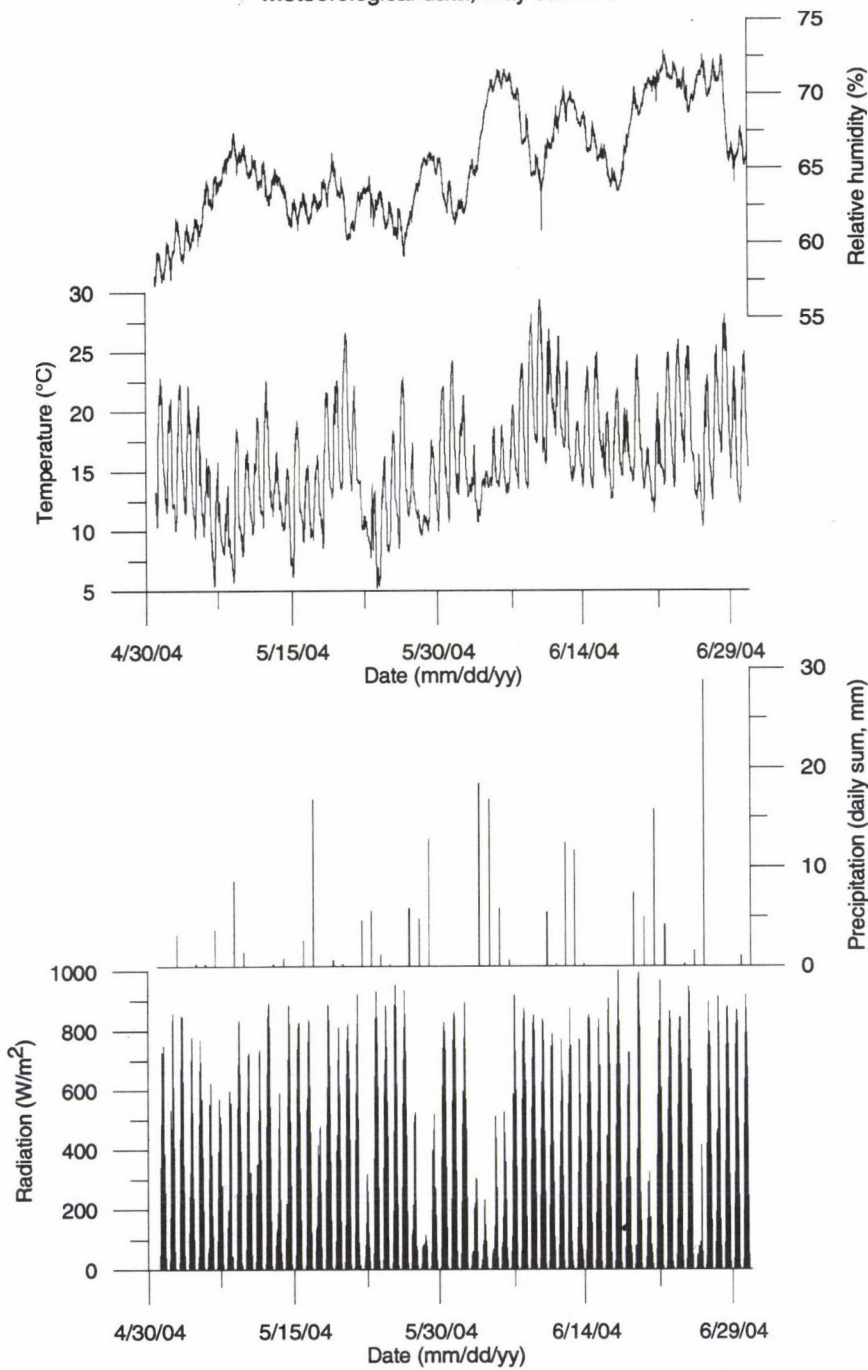




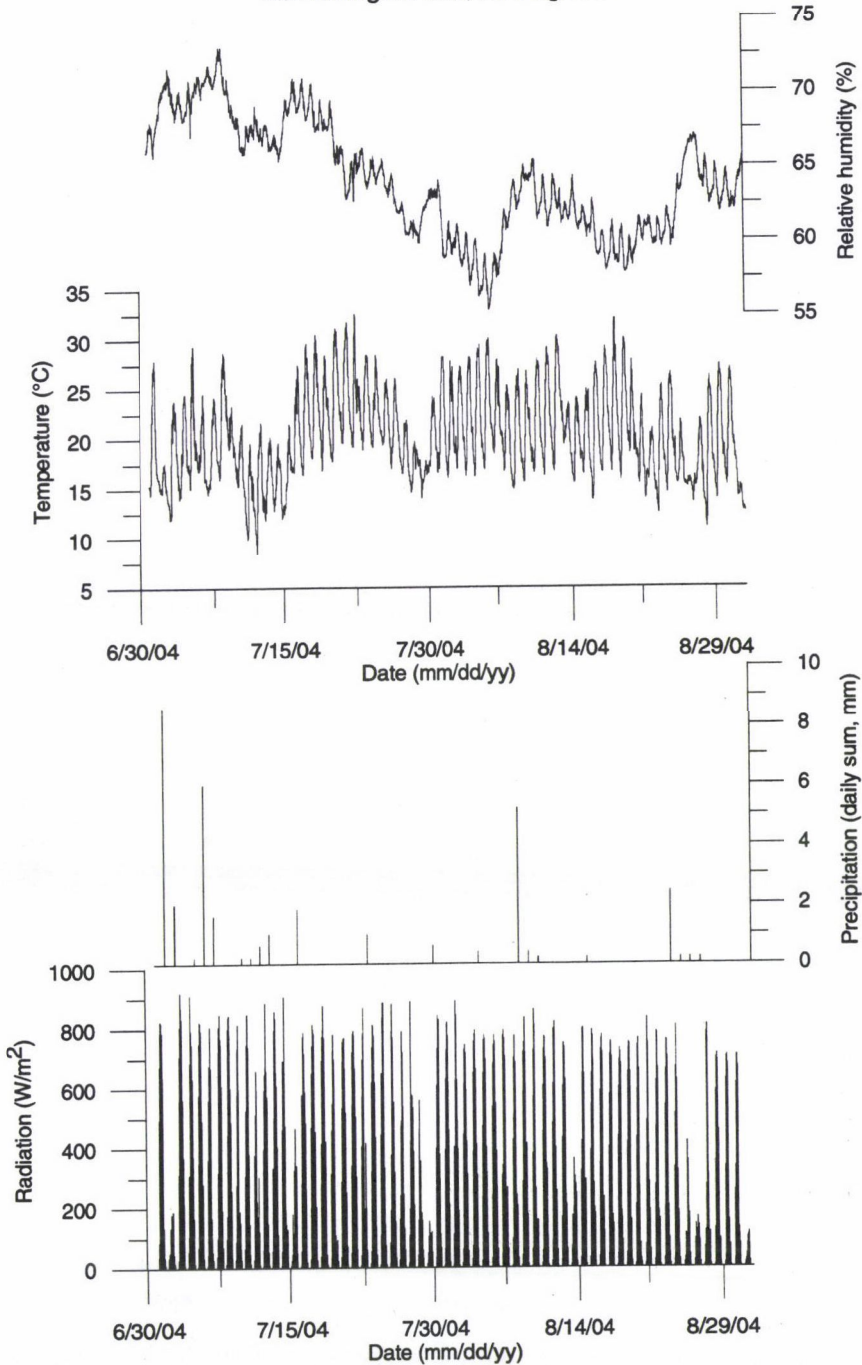
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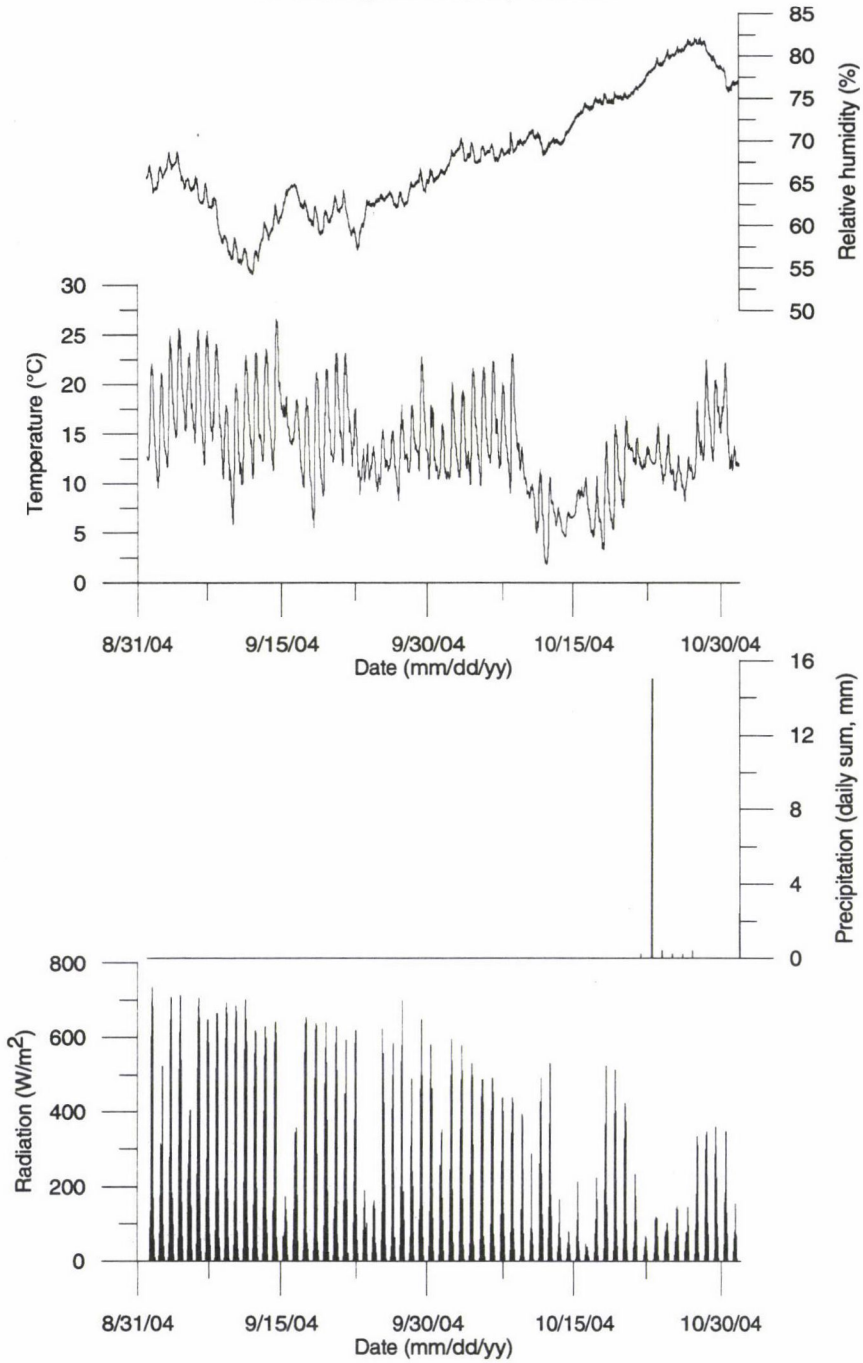
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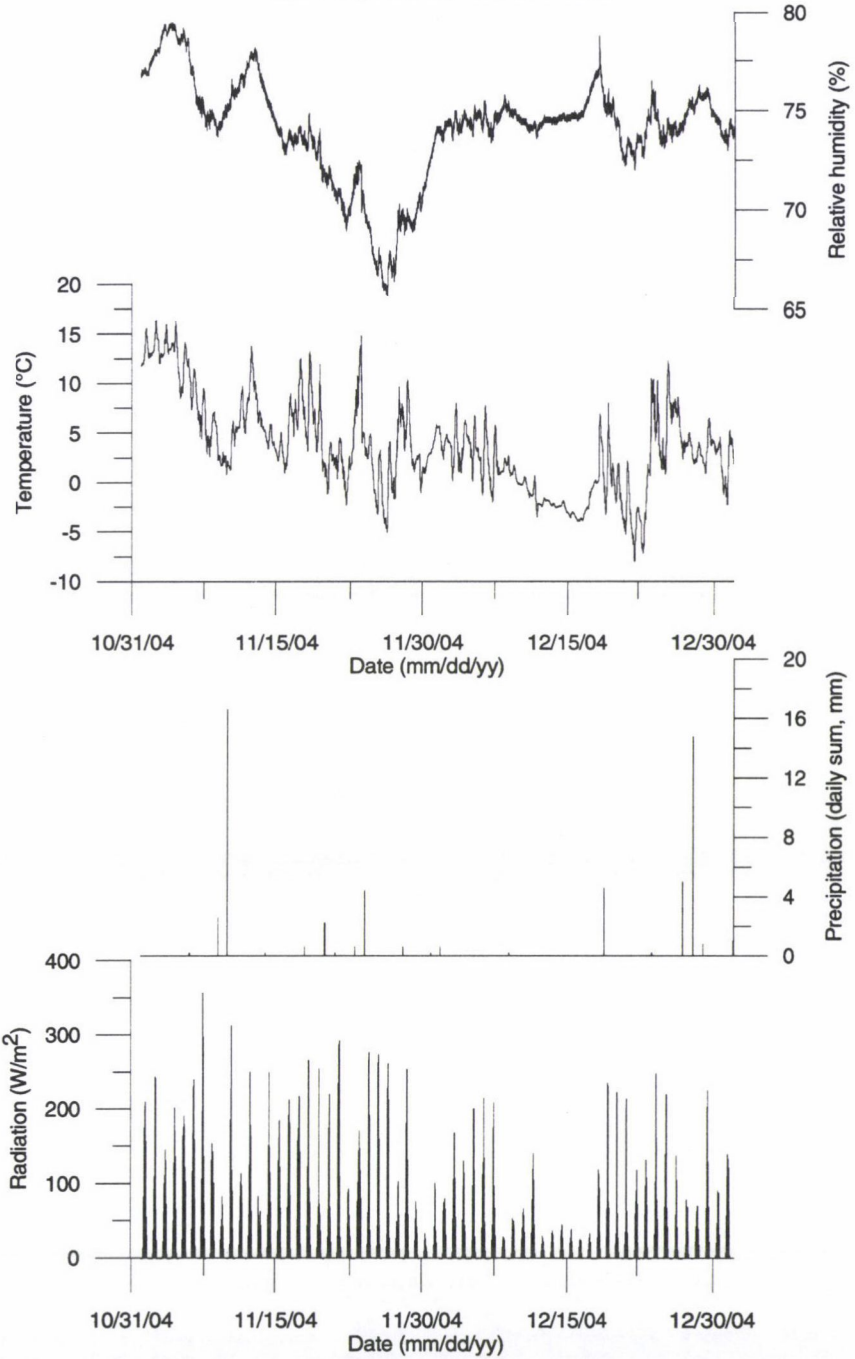


Meteorological data, Sep-Oct 2004



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 Periodika 2008/1103 n.

Meteorological data, Nov-Dec 2004



MAGYAR  
TUDOMÁNYOS AKADÉMIA  
KÖNYVTÁRA

NOTES

## NOTES





