DANISH METEOROLOGICAL INSTITUTE

TECHNICAL REPORT

03-01

Magnetic Results 2001

Brorfelde, Qeqertarsuaq, Qaanaaq and Narsarsuaq Observatories

COPENHAGEN 2003

DMI Technical Report 03-01

Compiled by Børge Pedersen

ISSN 1399-1388 (Online)

The address for the observatories is:

Danish Meteorological Institute
Solar-Terrestrial Physics Division
Lyngbyvej 100
DK-2100 Copenhagen
Denmark

Phone	+45 39 15 74 75
Fax	+45 39 15 74 60
E-mail	or@dmi.dk
Internet	http://www.dmi.dk

Cover: The picture shows the second observatory building at Qeqertarsuaq Geomagnetic Observatory.

The first observatory building was raised in the summer of 1925 cf. the cover picture of "Magnetic Results 2000". But similar to what has happened to a number of magnetic observatories around the world, the development of the settlement caused an increase in the level of artificial disturbances, so that it was getting more and more difficult to keep the observatory measurements at the wanted standard. For this reason the authorities offered to reserve a new disturbance free area and to build a new magnetic observatory outside the village limits. During 1975 the observatory was therefore moved from the old position to a new site as described in Section III in this yearbook.

PREFACE

As shown in the tables and on the map below the Danish Meteorological Institute (DMI) operates four permanent geomagnetic observatories in Denmark and Greenland, namely Brorfelde, Qeqertarsuaq (formerly Godhavn), Qaanaaq (formerly Thule) and Narsarsuaq, and further also two magnetometer chains in Greenland. The chain on the west coast consists of the three permanent observatories and a number of variation stations, while the east coast chain consists of five variation stations. Together with Space Physics Research Laboratory (SPRL) of University of Michigan, USA, DMI also operates a Magnetometer Array on the Greenland Ice Cap (MAGIC). The variation stations are without absolute control.

This yearbook presents the result of the geomagnetic measurements carried out at the four permanent observatories during 2001. The yearbook has been compiled by Børge Pedersen.

The yearbook is divided in seven sections. **Section I** describes the instrumentation and methods of data reduction and distribution used for all four observatories, while the **sections II-V** describes what is relevant for each individual observatory, such as observatory description, diary, tables of adopted baseline values, tables of monthly mean values, and tables and plots of annual mean values. Maps of the magnetic declination for Denmark, Faeroe Islands and Greenland are shown in **section VI**. In **section VII** the following plots are presented: plots of observed and adopted baseline values, plots of differences between observed and calculated absolute values *D, H* and *Z*, and plots of hourly and daily mean values of *X*, *Y* and *Z*.

Danish Meteorological Institute
Solar-Terrestrial Physics Division
January 2003

TABLE 1. Permanent Geomagnetic Observatories Operated by DMI.

Observatory	IAGA-code	Geographic Coordinates			Geomagnetic Coordinates[1]		Invariant Latitude[2]
		°N	°W	°E	°N	°E	°N
Qaanaaq	THL	77.47	69.23	290.77	87.92	14.28	85.21
Qeqertarsuaq	GDH	69.25	53.53	306.47	78.77	34.36	75.79
Narsarsuaq	NAQ	61.16	45.44	314.56	70.09	38.63	66.50
Brorfelde	BFE	55.63		11.67	55.45	98.66	

TABLE 2. Greenland West Coast Geomagnetic Variation Stations Operated by DMI.

Station	Acronym	Geographic Coordinates			Geomagnetic Coordinates[1]		Invariant Latitude[2]
		°N	°W	°E	°N	°E	°N
Savissivik	SVS	76.02	65.10	294.90	86.26	24.80	83.46
Kullorsuaq	KUV	74.57	57.18	302.82	84.14	40.46	81.08
Upernavik	UPN	72.78	56.15	303.85	82.38	36.52	79.36
Uummannaq	UMQ	70.68	52.13	307.87	79.97	39.30	76.87
Attu	ATU	67.93	53.57	306.43	77.51	32.52	74.56
Kangerlussuaq	STF	67.02	50.72	309.28	76.34	36.09	73.21
Maniitsoq	SKT	65.42	52.90	307.10	75.01	31.03	72.07
Nuuk	GHB	64.17	51.73	308.27	73.68	31.80	70.66
Paamiut	FHB	62.00	49.68	310.32	71.36	33.25	68.15

TABLE 3. Greenland East Coast Geomagnetic Variation Stations Operated by DMI.

Station	Acronym	Geographic Coordinates			Geomagnetic Coordinates[1]		Invariant Latitude[2]
		°N	°W	°E	°N	°E	°N
Nord	NRD	81.60	16.67	343.33	81.12	129.27	81.05
Danmarkshavn	DMH	76.77	18.63	341.37	79.20	102.91	77.29
Daneborg	DNB	74.30	20.22	339.78	77.78	92.54	75.26
Illoqqortoormiut	SCO	70.48	21.97	338.03	75.06	80.84	71.82
Tasiilaq	AMK	65.60	37.63	322.37	73.31	53.48	69.49

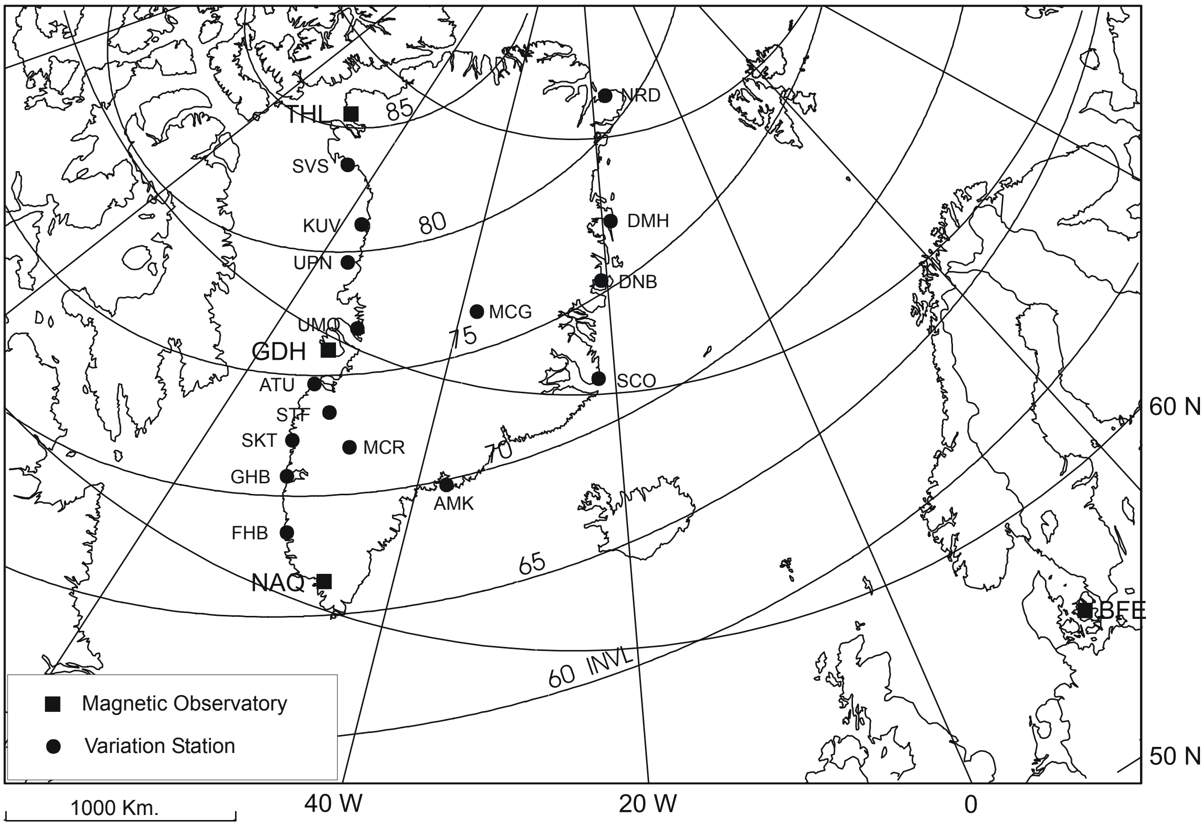
TABLE 4. MAGIC Stations on the Greenland Ice Cap Operated by DMI and SPRL.

Station	Acronym	Geographic Coordinates			Geomagnetic Coordinates[1]		Invariant Latitude[2]
		°N	°W	°E	°N	°E	°N
GISP	MCG	72.60	38.35	321.65	79.68	66.29	76.36
Raven Skiway	MCR	66.48	46.29	313.71	75.31	42.28	71.91

[1]The geomagnetic coordinates are based on the IGRF 2000.0 magnetic field model in which the geomagnetic north pole position is 79.5°N, 288.4°E.

[2]Based on the IGRF 2000.0 magnetic field model, Epoch 2000.0 and a height of 105 km.

Map of the Geomagnetic Observatories and Variation Stations



NOTE: The invariant latitudes are based on the IGRF2000 model (Epoch 2000.0) and a height of 105 Km

Table of Contents

SECTION I

Instrumentation and data handling.

1. CONTINUOUS RECORDING OF FIELD VARIATIONS.

Continuous recording of the magnetic field variations were performed by means of two digital variometer systems, a primary one and a supplementary one. The main parts of the two independent variometer systems are a tri-axial fluxgate magnetometer and a data logger, which is based on a single-board personal computer. The magnetometers and the data loggers are manufactured by DMI. The PC data logger (PCD) converts the analogue output from the magnetometers to digital values and writes them on ZIP disks. Temperatures measured in the environment of the sensors and data loggers as well as outdoor temperatures are normally also recorded. As the values written on the ZIP disk can only be accessed after computer processing at the DMI, both variometer systems are equipped with a printer for hard copy of the recorded data during times when absolute measurements are made. As monitor for the observatory staff, real-time magnetograms are displayed on a graphics screen. The data logger offers the possibility for remote control as well as data transfer from an observatory to the DMI via the public telephone network. The units in the primary variometer system (except for the peripherals: printer and graphics screen) are all supplied from an Uninterruptible Power Supply (UPS) which has internal batteries capable of powering the system for a couple of hours in the event of mains failure. The units in the supplementary variometer system are all mains powered without standby battery supply. The PC-clock, though, ensures correct time after power failures. In this way, although no data are recorded during power failures, the data will be properly timed, when power is restored. The fluxgate sensors and electronics of the two variometer systems are placed in the variometer house which is heated by means of thermostatically controlled non-magnetic electric heaters. The data loggers, printers and the graphics screens are all placed in the electronics house.

The instrumentation of the variometer systems are shown in table 1 and 2, while block diagrams of the systems are shown in figure 1.

The fluxgate magnetometer is model FGE, versions D and E designed at the laboratory of the Solar-Terrestrial Physics Division, and consists of a sensing head with three sensors mounted orthogonally to each other, and an electronic unit. The fluxgate sensors are mounted in groves milled in a precision machined marble cube in order to provide accurate and stable sensor alignment. The marble cube is suspended by two crossed phosphor-bronze bands, working as a Cardan's suspension in order to overcome the difficulty with tilting pillars which causes much trouble by baseline drift, cf. reference 7. The three fluxgate sensors are oriented so that they record H_N and H_E and Z, where H_N and H_E are the magnetic north and east components respectively. This orientation has been chosen because setting up the magnetometers is easy, but also in order to keep the continuity from the photographic recordings. The fluxgate magnetometers are regarded as digital variometers the output of which is referred to the main pillar of the observatory by means of absolute measurements.

Description of the magnetometers is given in the references 1 and 2.

Technical specification of the fluxgate magnetometer model FGE

Analogue output	±10 V
Dynamic range	±4000 nT
Resolution	
Version D	0.2 nT
Version E	0.1 nT
Compensation:	
Range	64000 nT
Steps	128 nT
Misalignment of sensor axis	< 2 mrad (7 min. of arc)
Long time drift	< 3 nT/year
Temperature coefficients:	
Sensor	< 0.2 nT/°C
Electronics	< 0.1 nT/°C
Resolution of temperature	0.1 °C
Bandpass	DC to 1 Hz
Band suspended sensor:	
Range of compensation	±0.5°
Factor of compensation	> 1000
Dimensions and weights:	
Band suspended sensor	25×25×55 cm^3; 20 kg
Electronics	13×7×22 cm^3; 1.0 kg
Power requirements	220 VAC, 2W
Operating temperature	0 to +40 °C

Figure 1.

Block diagram of the variometer systems.

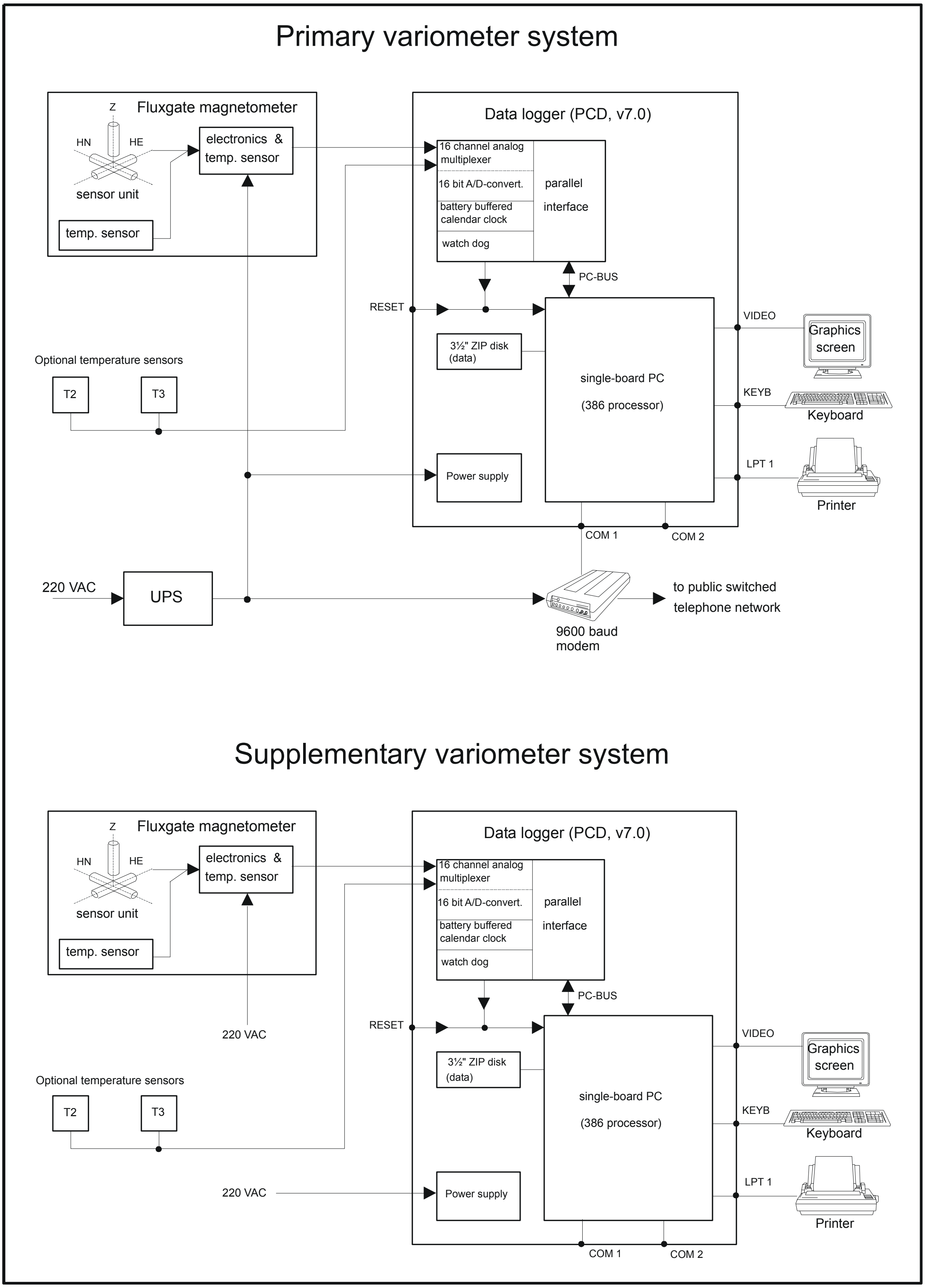


TABLE 1.
Primary variometer systems 2001

Station	Period	Fluxgate magnetometer		Data logger			
		Model	Sensitivity	Model	A/D-converter	Reso-lution	Recorded data
BFE	JAN 01 -FEB 09	FGE, v.D band-suspen-ded cube	400 nT/V	PCD,v.6.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
	FEB 09 -DEC 31	FGE, v.D band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
GDH	JAN 01 -DEC 31	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
THL	JAN 01 -MAR 10	FGE, v.D band-suspen-ded cube	400 nT/V	PCD,v.6.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
	MAR 10 -DEC 31	FGE, v.D band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
NAQ	JAN 01 -JUN 13	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.6.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
	JUN 13 -DEC 31	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values

TABLE 2.
Supplementary variometer systems 2001

Station	Period	Fluxgate magnetometer		Data logger			
		Model	Sensitivity	Model	A/D-converter	Reso-lution	Recorded data
BFE	JAN 01 -DEC 31	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
GDH	JAN 01 -DEC 31	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
THL	JAN 01 -DEC 31	FGE, v.D band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
NAQ	JAN 01 -JUN 12	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.5.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values
	JUN 12 -DEC 31	FGE, v.E band-suspen-ded cube	400 nT/V	PCD,v.7.0	16 bits	1/8 nT	20 sec. mean values 1 sec. spot values

2. REDUCTION FORMULAS.

The following reduction formulas, which are independent of the sensor orientation relative to the magnetic meridian, have been used, cf. Appendix A in the yearbook for 1991 (Data Report 92-3)

$$H = \sqrt{\left(H_0 + S_{HN} \times \Delta H_N\right)^2 + \left(S_{HE} \times \Delta H_E\right)^2}$$

$$D = D_0 + \arctan\left[\frac{S_{HE} \times \Delta H_E}{H_0 + S_{HN} \times \Delta H_N}\right]$$

$$Z = Z_0 + S_Z \times \Delta Z$$

The used notation means

H_0 D_0 Z_0	baseline values.
ΔH_N ΔH_E ΔZ	the digital values recorded by the data logger
S_{HN} S_{HE} S_Z	scale values.

The scale values are normally calibrated so that $S_{HN} = S_{HE} = S_Z$

The scale value of the recorded data (raw data) is 1/8 nT/LSB as shown in table 1 and 2. LSB means Least Significant Bit. When the data are reformatted to our standard data format, all scale values are converted to 1/4 nT/LSB.

There are no temperature terms in the formulas, partly because the fluxgate magnetometers of DMI design have very small temperature coefficients, and partly because the temperature of the variometer house is kept stable.

3. ABSOLUTE MEASUREMENTS.

3.1. Introduction.

Absolute measurements were carried out on a regular basis by means of a DI-fluxgate magnetometer (DI-flux) for measuring the angles D and I, and a Proton Precession Magnetometer (PPM) for measuring the total field intensity F. The absolute values H and Z are then derived from

$$H = F\cos I$$
$$Z = F\sin I$$

where H, Z and F are field values at the time of the I measurement. Baseline values H_0, D_0 and Z_0 necessary for calibration of the variometer systems were calculated by means of the reductions formulas shown in chapter 2, and running plots kept.

Two DI-flux measurements were on the average made once a week on the same day at all observatories. At Brorfelde a Proton Vector Magnetometer measurements were used as an independent control of the H and Z values obtained by the DI-flux combined with the PPM.

3.2. Instrumentation.

3.2.1. The DI-fluxgate magnetometer, DI-flux.

The DI-flux consists of a non-magnetic geodetic theodolite from ZEISS and a fluxgate magnetometer manufactured at DMI. The sensor of the magnetometer is fixed in a block of plexiglas, which provides adequate mechanical protection, and mounted on top of the telescope with the positive direction of the magnetic axis almost parallel to the sighting direction of the telescope. The output from the sensor is displayed on a digital voltmeter in nT with a resolution of 0.1 nT and a dynamic range of ±200 nT. The DI-flux is used as a null-detector as described in reference 8. In order to find the zero positions in a quick and easy way, the magnetometer is equipped with a sound signal, which keeps silent when the output from the sensor is within 0±70 nT.

The theodolite used is either type 010B or 020B. Type 010B was introduced in BFE in 1986 and at the Greenlandic observatories in 1988/89. Type 020B was introduced in NAQ in September 2001 to be used in routine measurements instead of type 010B because it is more convenient to handle for the two new observers, cf. Section V.

Both theodolites have centesimal circle graduation, i.e. 400 grades in a circle. In modern usage, the *grade* is referred to as the *gon* (from Greek: *gonia*, angle). Subdivision by 10^3 gives the *milligon* (mgon). The relation between the centesimal and the sexagesimal units is (exact): 1 gon = 0.9°.

TABLE 3 Circle reading		
Theodolite	Reading principle	Mean directional accuracy
010B	Optical micrometer reading	±0.3 mgon (±1'')
020B	Optical scale reading	±1 mgon (±3'')

The DI-flux is considered an absolute instrument, which means that the angles measured by the instrument do not deviate from the true values D and I. This is achieved by using an observation procedure which eliminates the unknown parameters such as sensor offset, collimation angles, and theodolite errors. The accuracy of the measurements of the angles D and I has been treated by O. Rasmussen and B. Pedersen, cf. reference 6. The theory of the DI-flux has been carefully treated by E. Kring Lauridsen, cf. reference 3.

3.2.2. The Proton Precession Magnetometer, PPM.

At the observatories in Greenland absolute measurements of the total intensity F was made by means of the proton precession magnetometer, type 105 from EDA, which measures F with a resolution of 0.1 nT. At Brorfelde a manually operated PPM from ELSEC, type 880B with a resolution of ¼ nT, was used for ordinary measurements of F and for vector measurements of H and Z, cf. chapter 3.2.3.

The frequency of the time base in the proton precession magnetometers has been determined from time to time by means of a frequency standard, and it was found that all the PPM's needed corrections. These corrections $\Delta F_{electronics}$ are since January 01 1992 based on the most recent value of the proton gyromagnetic ratio recommended by CODATA[1]

$$\gamma_p = 2.67515255(81)\times 10^8 \text{ rad/(T}\times\text{s)}$$

as decided at the IAGA Working Group V-1 meeting on August 19th, 1991 during the IUGG General Assembly in Vienna.

In connection with a re-examination of pillar differences and gradients in the absolute house at Brorfelde, Kring Lauridsen found that the sensor of the ELSEC proton precession magnetometer was magnetic, cf. Brorfelde yearbook 1988-89 (Technical Report 91-3). This permanent magnetism causes small corrections, ΔF_{sensor} , in H and Z. See also Wienert, reference 5 page 113. The formula for F measured by the PPM is therefore

$$F = F_{PPM} + \Delta F_{PPM} \quad \text{where} \quad \Delta F_{PPM} = \Delta F_{electronics} + \Delta F_{sensor}$$

[1]CODATA is the Committee on Data for Science and Technology of the International Counsil for Scientific Unions.

3.2.3. The Proton Vector Magnetometer, PVM.

The PVM at Brorfelde comprises the stationary vertical coil at pillar G and a proton precession magnetometer with the sensor positioned at the center of the coil. The system is used to measure the horizontal component *H* of the geomagnetic field by means of Nelson's compensation method, i.e. the *Z* component is cancelled when *H* is measured. The error in *H* caused by the possible misalignment of the coil axis is measured directly by means of a suspended magnet variometer with liquid damping.

Description of the coil system is given in the Brorfelde yearbok for 1984, while the details of the theory and practice of the method are explained in reference 4.

3.3. Azimuth marks used for observation of the magnetic declination.

TABLE 4
Azimuth marks valid for 2001

observatory	mark	azimuth	distance	remarks
BFE, pillar G	M1*)	188°31.90’	106.5 meters	target plate
(main absolute pillar)	M3	358°47.45’	86.0 meters	target plate
BFE, pillar A	M2	348°52.15’	88.5 meters	target plate
	M3	358°47.75’	80.0 meters	target plate
BFE, pillar X	M1*)	189°01.1’	90 meters	target plate
GDH	M1*)	55°44.0’	400 meters	vertical cliff
	M2	56°50.2’	100 meters	target plate
THL	M2	110°07.0’	135 meters	target plate
NAQ	M4	337°42.5’	250 meters	ionosonde transmitter mast
	M5	337°17.3’	about 3 km	sheep stable
	M6*)	263°35.7’	about 6 km	mountain peak

*) main azimuth marks

3.4. PPM corrections.

TABLE 5 Adopted PPM corrections valid for 2001					
observatory	PPM	$\Delta F_{electronics}$	ΔF_{sensor}	ΔF_{PPM}	remarks
BFE	Elsec 880B	0.5 nT	-0.2 nT	0.3 nT	For F~49000 nT
		0.2 nT	0.1 nT	0.3 nT	For F~17000 nT
GDH	EDA 105	-0.5 nT	0.0 nT	-0.5 nT	
THL	EDA 105	-0.5 nT	0.0 nT	-0.5 nT	
NAQ	EDA 105	-0.5 nT	0.0 nT	-0.5 nT	

3.5. Measurement and calculation.

At the observatories in Greenland *D* and *I* are measured by means of the DI-fluxgate magnetometer on the single pillar in the absolute house, while *F* is measured by the EDA proton precession magnetometer, the sensor of which is put up on a pillar at some distance from the absolute pillar, cf. reference 9. The site difference in *F*, ΔF_{pillar} between the two pillars has been measured, which enable the *F* measurements to be reduced to the absolute pillar:

$$F_{abs.pillar} = (F_{PPM} + \Delta F_{PPM}) + \Delta F_{pillar}$$

The values of *D*, *I* and *F* are thus obtained at the absolute pillar, and the calculated values of *H* and *Z* are also referred to that point, the observatory standard reference point, i.e. equal to the height of the tilting axis of the DI-theodolite above pillar surface (= 22.5 cm).

TABLE 6 ΔF_{pillar} valid for 2001	
observatory	ΔF_{pillar}
GDH	24.0 nT
THL	7.9 nT
NAQ	8.5 nT

When the theodolite 020B was introduced in Narsarsuaq in September 2001 (cf. chapter 3.2.1) it was found by comparison measurements that

$$H_{010B} = H_{020B} - 1\,\text{nT} \quad \text{and} \quad Z_{010B} = Z_{020B} + 0.2\,\text{nT}$$

These corrections are due to an error in the I measurements which again probably is due to an eccentricity error of the vertical circle which is not compensated for by the reading method (optical scale reading). We thus have a correction ΔI_{020B} to the I measurements done by 020B

$$I = I_{010B} = I_{020B} + \Delta I_{020B} \qquad \text{where} \qquad \Delta I_{020B} = -\sin I \frac{\Delta H}{F} + \cos I \frac{\Delta Z}{F}$$

Using mean values for I and F we found that

$$\Delta I_{020B} = -\sin 76.8° \frac{-1}{54700} + \cos 76.8° \frac{0.2}{54700} = 4 \text{ arc seconds}$$

At Brorfelde the routine DI-flux measurements were made on pillar A, while supplementary measurements were made on both pillar A and pillar G in order to determine the pillar differences ΔD_{pillar} and ΔI_{pillar} to be added to the measurements on pillar A in order to refer the measurements to the observatory standard reference point on pillar G. As the total intensity F is measured on pillar G no pillar difference in F, ΔF_{pillar} is needed

TABLE 7
Pillar differences at BFE 2001

ΔD_{pillar}	0.4’
ΔI_{pillar}	0.0’

The measurements of *F* must further refer to the time of the I measurements with the DI-flux. As the proton precession magnetometer is manually operated, the measurements of F must be performed before or after the DI-flux measurements. In order to refer the measurements of F to the time of the I measurements, a time difference in F, ΔF_{time} is therefore needed

$$F_{I-measurement} = F_{PPM-measurement} + \Delta F_{time}$$

Calculation of the DI-flux and PPM measurements gives primarily the absolute values of the magnetic elements *DIFHZ*, and subsequent, by using the reduction formulas shown in chapter 2, the baseline values H_0, D_0 and Z_0 necessary for calibration of the variometer systems. Also the DI-flux constants, i.e. sensor offset S_0 and the sensor misalignment angles ("collimation" angles) δ and ε, are calculated regularly as they serve as checking quantities of the measuring procedures for D and I. For easier comparison, it is convenient to convert the angular values for δ and ε to nT by multiplication with the normalizing factors H and Z.

4. ACCURACY OF DATA.

Assuming uncertainties equivalent to 1 nT (or better) in *D* and *I*, and better than 1 nT in *F*, in the absolute measurements, the uncertainty in the adopted baseline values as well as in the final one-minute values in magnetic units, is estimated to be less than 2 nT in Greenland (quiet conditions), and less than 1 nT at Brorfelde.

5. PRESENTATION OF RESULTS.

In this yearbook the following data are organised by observatory in the sections II-V:

- Tables of adopted baseline values.
- Tables of monthly and annual mean values of all geomagnetic elements.
- Plots of the annual mean values and annual changes of *X, Y* and *Z*.

while the following plots are presented in section VII:

- Plots of observed and adopted baseline values.
- Plots of differences between observed and calculated absolute values.
- Plots of hourly and daily mean values of *X*, *Y* and *Z*.

<u>The final baseline values</u> presented in section II-V are adopted by a graphical smoothing process as described in section VII.

<u>Monthly mean</u> values and <u>Annual mean values</u> of the observed magnetic elements (*HDZ*) as well as the derived values (*XYFI*) for All Days, Quiet Days and Disturbed Days are tabulated in section II-V. In the case of Brorfelde, annual mean values (All Days) from Rude Skov are also tabulated. In the case of Narsarsuaq we have not calculated annual means for the period 1968-82. Instead QWD ("Quiet Winter Days") values are calculated from field values (DHZ) determined at nighttime hours of very quiet winter days (December and January)
Declination and inclination are expressed in degrees and decimal minutes, while the units of all the other elements are nanoteslas. In the tables of annual mean values for THL and GDH the decimal minutes are rounded to the equivalent of 1 nT, i.e. to the nearest minute or half-minute respectively.

<u>Plots of annual mean values</u> (All Days) of the observed magnetic elements *HDZ*, and of first differences of the annual means, i.e. secular variation at the observatories, are also presented. For Narsarsuaq plots of Quiet Winter Days 1968-84 are also presented together with plots of All Days.

6. DATA DISTRIBUTION AND AVAILABILITY.

Preliminary one-minute digital data from all four observatories are sent by E-mail on a daily basis to the INTERMAGNET **G**eomagnetic **I**nformation **N**odes (**GINs**) in Ottawa, Canada, in Edinburgh, Scotland, and in Kyoto, Japan. These data are available through Internet:

http://www.intermagnet.org

Tables of hourly mean values of the magnetic elements are no longer published in this series of publications. Final digital one-minute values and hourly mean values are available through the World Data Center for Geomagnetism, Copenhagen:

http://www.dmi.dk/projects/wdcc1/

The data are also published on the annual INTERMAGNET CD-ROM. More information:

http://www.intermagnet.org

To be used in modelling work, monthly mean values are sent to IPGP in Paris. Accessible through Internet:

http://www.ipgp.jussieu.fr:/AM-MONTHLY/index.html

Annual means are sent to the WDC for Geomagnetism, Edinburgh, also to be used in modelling work. Accessible through Internet:

http://www.geomag.bgs.ac.uk/gifs/annual_means.shtml

PC-indices (plots and digital values) based on Thule data are published through the WDCs for Geomagnetism, Copenhagen, Denmark and Boulder, USA. Accessible through Internet:

http://www.dmi.dk/projects/wdcc1/pcn/pcn.html

One-minute digital data from Narsarsuaq are sent once a month to the WDC for Geomagnetism, Kyoto, Japan. The data are used in preparation of the AE-index. Accessible through Internet:

http://swdcdb.kugi.kyoto-u.ac.jp/

K-indices from Brorfelde are sent by E-mail twice a month to GFZ in Potsdam, Germany. The K-index is used in the preparation of K_p-indices published by the International Association of Geomagnetism and Aeronomy (IAGA). The lower limit for $K = 9$ at BFE is 600 nT.

http://www.gfz-potsdam.de/pb2/pb23/GeoMag/niemegk/kp_index/

Momentary values from Brorfelde at 02 UT on 10 quiet days per month selected by G. Schulz at the magnetic observatory in Wingst are used for comparisons between observatories all over Europe.

7. REFERENCES.

1. O. Rasmussen: Improvements in Fluxgate Magnetometers at Danish Meteorological Institute's Magnetic Observatories.
Proceedings of the International Workshop on Geomagnetic Observatory Data Acquisition and Processing. Geophysical Publications No. 15. Finnish Meteorological Institute 1990.

2. E. Kring Lauridsen, O. Rasmussen: Experience with Band Suspended Fluxgate Sensors. Tecnical Report 90-10. Danish Meteorological Institute 1990.

3. E. Kring Lauridsen: Experiences with the DI-fluxgate Magnetometer Inclusive Theory of the Instrument and Comparison with other Methods.
Geophysical Papers R-71. Danish Meteorological Institute 1985.

4. E. Kring Lauridsen: Absolute Measurements with Proton Magnetometers in Stationary Coils. Geophysical Papers R-57. Danish Meteorological Institute 1980.

5. K. A. Wienert: Notes on Geomagnetic Observatory and Survey Practice.
Earth Sciences 5. UNESCO 1970.

6. O. Rasmussen and B. Pedersen: D&I Fluxgate Measurements at the Danish Magnetic Observatories.
Proceedings of the VIIth Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing at the Adolf Schmidt-Observatory for Geomagnetism Niemegk, Germany. Scientific Technical Report STR98/21. GeoForschungsZentrum Potsdam 1998.

7. Thule Geophysical Observatory, Magnetic Results 1985-1990.
Data Report 92-4. Danish Meteorological Institute 1992.

8. Magnetic Results 1994. Brorfelde, Godhavn, Thule and Narsarsuaq observatories
Data Report 95-1. Danish Meteorological Institute 1995.

9. Magnetic Results 1997. Brorfelde, Qeqertarsuaq, Qaanaaq and Narsarsuaq observatories
Data Report 98-1. Danish Meteorological Institute 1998.

SECTION II

Brorfelde Geomagnetic Observatory 2001.

OBSERVATORY DETAILS.

The Danish main geomagnetic observatory Brorfelde was established in 1978 by the Danish Meteorological Institute as a successor to the observatory at Rude Skov which suffered from disturbances from electric trains. The observatory is situated on a hilltop near the small village Brorfelde about 60 km West of Copenhagen. The protected area which has been put at the disposal of DMI by the University of Copenhagen is the triangular eastern part of the 45 ha area used by the University of Copenhagen.
The observatory consists of 4 houses: An office and guest house (52 m^2), an absolute house (48 m^2), an electronics house (32 m^2) and a sensor house (30 m^2). Further description of the new observatory and its location is given in the observatory yearbook for 1984 as well as the background for the removal.

The following coordinates etc. are valid for the observatory:

Acronym (IAGA-code)	BFE
Elevation (top of absolute pillar)	80 m
Geographic latitude	55°37.5'N
Geographic longitude	11°40.3'E
Geomagnetic latitude	55.45°N
Geomagnetic longitude	98.66°E

The geomagnetic coordinates are based on the IGRF 2000.0 magnetic field model in which the geomagnetic north pole position is 79.5°N, 288.4°E.

STAFF.

The routine absolute measurements were made by Mr. Henrik Schwartz, while Mr. Børge Pedersen attended to the observatory at irregular intervals in order to make supplementary measurements.

DIARY.

JAN	26	The data logger of the supplementary variometer system was replaced. The printers of both variometer systems were further replaced by better ones (type OKI).
FEB	09	The data logger of the primary variometer system was replaced by a new type (PCD v.7.0.
FEB	23	Adjustment of the temperarure sensors.
JUN	27	The recordings were disturbed from a farmers tractor.
JUL	27	Power failure.
AUG	02	Adjustment of the DI-flux sensor.
AUG	16	The DI-flux sensor was replaced and adjusted.
AUG	30	The software of the data loggers was updated.
DEC	19	Power failure.
DEC	20	Power failure again.

MISSING DATA.

Intervals of missing primary variometer data were, if possible, replaced by data from the supplementary recorder.

The hourly mean values are missing in the following intervals

FEB	23	11-12 UT	due to adjustments of temperature sensors.
JUN	27	16-19 UT	due to disturbances from a farmers tractor.
JUL	27	06-07 UT	due to power failure.
DEC	19	12-18 UT	due to power failure.
DEC	20	13-14 UT	due to power failure.

OBSERVED AND ADOPTED BASELINE VALUES.

Tables of adopted baseline values are shown below, while graphs of the observed and adopted baseline values are shown in section VII.

Adopted baseline values for the primary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	16969.5 nT	0°25.5'	46431.5 nT
JAN	26	10:00 UT	16969.0 nT		46431.0 nT
FEB	09	11:30 UT	16968.0 nT	0°25.2'	46430.0 nT
MAY	01	00:00 UT	16968.5 nT	0°25.3'	
MAY	22	00:00 UT		0°25.4'	
JUN	11	00:00 UT		0°25.5'	
JUN	20	00:00 UT		0°25.6'	
JUN	26	00:00 UT			46430.5 nT
AUG	14	00:00 UT			46431.0 nT
NOV	21	00:00 UT			46430.0 nT
NOV	26	00:00 UT	16967.5 nT		46429.0 nT
DEC	19	15:00 UT	16967.0 nT	0°25.8'	

Adopted baseline values for the supplementary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	not adopted	not adopted	not adopted
FEB	09	00:00 UT	17062.5 nT	0°25.7'	46392.0 nT
FEB	10	00:00 UT	not adopted	not adopted	not adopted
JUL	19	00:00 UT	17066.5 nT	0°26.2'	46390.0 nT
JUL	20	00:00 UT	not adopted	not adopted	not adopted
SEP	18	00:00 UT	17066.0 nT	0°26.0'	46391.0 nT
SEP	23	00:00 UT	not adopted	not adopted	not adopted
OCT	06	00:00 UT	17065.5 nT	0°25.9'	46391.0 nT
OCT	20	00:00 UT		0°26.0'	
NOV	02	00:00 UT	not adopted	not adopted	not adopted

Baseline values for the supplementary variometer system have only been adopted when they were used in connection with data supplementation.

Monthly Mean Values, BFE 2001, All Days, Quiet Days and Disturbed Days.

Year	*D*		*I*		*H*	*X*	*Y*	*Z*	*F*	*	ELE
2001	°	'	°	'	nT	nT	nT	nT	nT		
JAN	0	41.5	69	47.7	17133	17132	207	46554	49607	A	DHZ
FEB	0	42.1	69	47.4	17137	17136	210	46552	49606	A	DHZ
MAR	0	43.4	69	48.0	17129	17128	216	46557	49608	A	DHZ
APR	0	44.6	69	48.4	17127	17126	222	46567	49617	A	DHZ
MAY	0	44.1	69	46.8	17148	17147	220	46559	49617	A	DHZ
JUN	0	44.7	69	46.6	17152	17151	223	46559	49618	A	DHZ
JUL	0	45.1	69	46.8	17150	17149	225	46562	49620	A	DHZ
AUG	0	45.7	69	47.4	17144	17142	228	46570	49625	A	DHZ
SEP	0	46.7	69	47.8	17139	17137	233	46572	49625	A	DHZ
OCT	0	48.4	69	49.5	17120	17118	241	46592	49638	A	DHZ
NOV	0	48.8	69	49.4	17123	17121	243	46595	49642	A	DHZ
DEC	0	48.3	69	48.2	17139	17137	241	46590	49642	A	DHZ
WINTER	0	45.1	69	48.1	17133	17132	225	46573	49625	A	DHZ
EQUINOX	0	45.8	69	48.4	17129	17127	228	46572	49622	A	DHZ
SUMMER	0	44.9	69	46.9	17148	17147	224	46562	49619	A	DHZ
YEAR	0	45.3	69	47.8	17136	17135	226	46569	49622	A	DHZ
JAN	0	41.1	69	47.1	17141	17140	205	46550	49606	Q	DHZ
FEB	0	41.7	69	47.2	17140	17139	208	46551	49606	Q	DHZ
MAR	0	42.3	69	47.0	17142	17141	211	46551	49607	Q	DHZ
APR	0	43.9	69	47.6	17138	17137	219	46564	49618	Q	DHZ
MAY	0	43.9	69	46.6	17151	17150	219	46558	49617	Q	DHZ
JUN	0	45.1	69	46.6	17152	17151	225	46561	49620	Q	DHZ
JUL	0	44.9	69	46.6	17152	17151	224	46561	49620	Q	DHZ
AUG	0	45.7	69	47.4	17144	17142	228	46569	49624	Q	DHZ
SEP	0	45.7	69	47.2	17146	17144	228	46568	49624	Q	DHZ
OCT	0	47.6	69	48.4	17134	17132	237	46585	49636	Q	DHZ
NOV	0	48.1	69	48.4	17137	17135	240	46592	49644	Q	DHZ
DEC	0	48.3	69	48.1	17140	17138	241	46588	49641	Q	DHZ
WINTER	0	44.7	69	47.7	17139	17138	223	46570	49624	Q	DHZ
EQUINOX	0	44.9	69	47.5	17140	17139	224	46567	49621	Q	DHZ
SUMMER	0	44.9	69	46.8	17149	17148	224	46562	49620	Q	DHZ
YEAR	0	44.9	69	47.3	17143	17142	224	46566	49621	Q	DHZ
JAN	0	42.2	69	48.6	17122	17121	210	46561	49609	D	DHZ
FEB	0	42.9	69	47.8	17131	17130	214	46554	49606	D	DHZ
MAR	0	45.6	69	50.5	17097	17095	227	46571	49610	D	DHZ
APR	0	46.4	69	49.7	17108	17106	231	46570	49613	D	DHZ
MAY	0	44.7	69	47.7	17136	17135	223	46562	49615	D	DHZ
JUN	0	44.9	69	46.9	17147	17146	224	46559	49616	D	DHZ
JUL	0	45.3	69	46.9	17149	17148	226	46563	49621	D	DHZ
AUG	0	45.7	69	47.7	17141	17139	228	46574	49628	D	DHZ
SEP	0	48.2	69	48.8	17126	17124	240	46578	49627	D	DHZ
OCT	0	50.7	69	51.5	17092	17090	252	46601	49637	D	DHZ
NOV	0	51.3	69	52.2	17082	17080	255	46602	49634	D	DHZ
DEC	0	49.0	69	48.8	17131	17129	244	46592	49641	D	DHZ
WINTER	0	46.4	69	49.3	17117	17115	231	46577	49623	D	DHZ
EQUINOX	0	47.6	69	50.1	17106	17104	237	46580	49622	D	DHZ
SUMMER	0	45.1	69	47.3	17143	17142	225	46565	49621	D	DHZ
YEAR	0	46.4	69	48.9	17122	17120	231	46574	49621	D	DHZ

*A = All days
*Q = Q-days
*D = D-days
ELE = Elements recorded

ANNUAL MEAN VALUES.

In the following two tables the observatory means of the magnetic elements in Denmark since 1891 are presented. In the first table the annual means are shown for the two old observatories Copenhagen (COP) and Rude Skov (RSV) for the period 1891-1980. The second table shows the means for Brorfelde since 1980.

Annual Mean Values, Copenhagen and Rude Skov 1891-1980, All Days.

YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1891.5	348 54.3	69 04.6	17198	16877	-3310	44982	48158	C	DHZ
1892.5	349 01.0	69 05.3	17206	16891	-3278	45030	48205	C	DHZ
1893.5	349 07.2	69 03.8	17234	16924	-3253	45045	48229	C	DHZ
1894.5	349 13.6	69 02.4	17250	16946	-3224	45032	48223	C	DHZ
1895.5	349 19.6	69 00.0	17277	16978	-3200	45010	48212	C	DHZ
1896.5	349 25.4	68 58.0	17299	17005	-3175	44988	48199	C	DHZ
1897.5	349 30.5	68 55.5	17327	17037	-3155	44964	48187	C	DHZ
1898.5	349 35.2	68 53.8	17344	17058	-3135	44941	48172	C	DHZ
1899.5	349 39.2	68 51.7	17367	17085	-3119	44918	48158	C	DHZ
1900.5	349 42.8	68 49.6	17390	17110	-3105	44895	48145	C	DHZ
1901.5	349 45.7	68 47.6	17411	17134	-3095	44872	48131	C	DHZ
1902.5	349 48.5	68 46.2	17423	17148	-3083	44850	48115	C	DHZ
1903.5	349 51.5	68 45.1	17431	17159	-3069	44826	48096	C	DHZ
1904.5	349 55.3	68 44.2	17434	17165	-3051	44802	48075	C	DHZ
1905.5	350 00.1	68 43.7	17432	17167	-3027	44778	48051	C	DHZ
1906.5	350 05.5	68 43.4	17427	17167	-2999	44752	48025	C	DHZ
1907.5	350 11.8	68 43.2	17420	17166	-2966	44727	48000	A	DHZ
1908.5	350 18.5	68 43.5	17403	17155	-2930	44694	47963	A	DHZ
1909.5	350 25.7	68 43.9	17386	17144	-2891	44666	47930	A	DHZ
1910.5	350 32.9	68 44.2	17375	17139	-2853	44648	47910	A	DHZ
1911.5	350 41.2	68 44.8	17359	17130	-2809	44631	47888	A	DHZ
1912.5	350 49.4	68 45.4	17342	17120	-2766	44610	47862	A	DHZ
1913.5	350 58.1	68 46.6	17319	17104	-2719	44597	47842	A	DHZ
1914.5	351 08.0	68 48.2	17293	17086	-2665	44592	47828	A	DHZ
1915.5	351 17.3	68 50.6	17257	17058	-2614	44591	47814	A	DHZ
1916.5	351 27.0	68 52.7	17229	17038	-2561	44599	47811	A	DHZ
1917.5	351 35.6	68 54.8	17198	17013	-2514	44599	47800	A	DHZ
1918.5	351 44.5	68 56.5	17167	16989	-2466	44587	47778	A	DHZ
1919.5	351 54.2	68 58.2	17144	16973	-2415	44592	47774	A	DHZ
1920.5	352 04.4	68 59.7	17124	16960	-2361	44596	47771	A	DHZ
1921.5	352 14.8	69 01.2	17105	16949	-2308	44607	47774	A	DHZ
1922.5	352 26.2	69 02.6	17087	16938	-2249	44615	47775	A	DHZ
1923.5	352 37.4	69 03.6	17073	16932	-2192	44615	47770	A	DHZ
1924.5	352 49.6	69 05.1	17053	16920	-2129	44621	47769	A	DHZ
1925.5	353 02.3	69 07.2	17025	16899	-2064	44631	47768	A	DHZ
1926.5	353 14.8	69 10.0	16992	16874	-1998	44654	47778	A	DHZ
1927.5	353 26.6	69 11.6	16974	16863	-1938	44670	47786	A	DHZ
1928.5	353 38.0	69 13.9	16948	16843	-1879	44691	47797	A	DHZ
1929.5	353 49.0	69 16.2	16924	16826	-1823	44718	47813	A	DHZ
1930.5	353 59.6	69 19.0	16893	16800	-1768	44747	47830	A	DHZ

continues...

Annual Mean Values, Copenhagen and Rude Skov, continued.

YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1931.5	354 09.6	69 20.5	16879	16791	-1717	44767	47843	A	DHZ
1932.5	354 20.1	69 23.1	16855	16773	-1664	44805	47870	A	DHZ
1933.5	354 30.4	69 25.0	16839	16762	-1612	44838	47896	A	DHZ
1934.5	354 40.7	69 26.9	16824	16751	-1560	44875	47925	A	DHZ
1935.5	354 51.2	69 29.6	16804	16736	-1507	44927	47967	A	DHZ
1936.5	355 01.1	69 31.9	16786	16723	-1458	44972	48003	A	DHZ
1937.5	355 10.7	69 34.4	16767	16708	-1409	45022	48043	A	DHZ
1938.5	355 19.7	69 36.7	16752	16696	-1364	45071	48084	A	DHZ
1939.5	355 28.5	69 38.2	16745	16693	-1321	45113	48120	A	DHZ
1940.5	355 37.2	69 39.8	16739	16690	-1278	45162	48164	A	DHZ
1941.5	355 45.9	69 41.5	16730	16684	-1235	45207	48203	A	DHZ
1942.5	355 53.4	69 42.5	16727	16684	-1199	45240	48233	A	DHZ
1943.5	356 01.5	69 44.4	16714	16674	-1159	45281	48267	A	DHZ
1944.5	356 09.0	69 45.6	16710	16672	-1122	45318	48301	A	DHZ
1945.5	356 16.5	69 46.9	16701	16666	-1085	45349	48327	A	DHZ
1946.5	356 25.2	69 49.3	16680	16647	-1042	45386	48354	A	DHZ
1947.5	356 32.9	69 50.3	16677	16647	-1004	45419	48384	A	DHZ
1948.5	356 40.3	69 50.7	16676	16648	-968	45435	48399	A	DHZ
1949.5	356 47.8	69 51.5	16675	16649	-932	45465	48426	A	DHZ
1950.5	356 55.2	69 51.7	16685	16661	-896	45498	48461	A	DHZ
1951.5	357 02.7	69 52.0	16692	16670	-860	45529	48492	A	DHZ
1952.5	357 09.8	69 52.0	16701	16681	-827	45554	48519	A	DHZ
1953.5	357 16.2	69 51.5	16713	16694	-796	45568	48536	A	DHZ
1954.5	357 22.4	69 51.1	16726	16708	-767	45586	48558	A	DHZ
1955.5	357 28.4	69 51.3	16733	16717	-738	45616	48588	A	DHZ
1956.5	357 34.2	69 52.4	16732	16717	-709	45657	48626	A	DHZ
1957.5	357 39.0	69 52.6	16738	16724	-686	45683	48653	A	DHZ
1958.5	357 43.1	69 52.5	16749	16736	-667	45707	48679	A	DHZ
1959.5	357 47.3	69 52.6	16759	16747	-647	45737	48711	A	DHZ
1960.5	357 51.6	69 52.6	16771	16759	-626	45772	48748	A	DHZ
1961.5	357 55.2	69 51.7	16794	16783	-610	45798	48780	A	DHZ
1962.5	357 59.2	69 50.8	16814	16804	-591	45815	48803	A	DHZ
1963.5	358 03.0	69 50.5	16825	16815	-573	45833	48824	A	DHZ
1964.5	358 05.6	69 49.8	16841	16832	-560	45847	48842	A	DHZ
1965.5	358 08.4	69 49.1	16859	16850	-547	45867	48867	A	DHZ
1966.5	358 11.3	69 49.0	16868	16860	-533	45887	48889	A	DHZ
1967.5	358 13.8	69 49.0	16878	16870	-521	45914	48918	A	DHZ
1968.5	358 15.2	69 48.4	16895	16887	-515	45937	48945	A	DHZ
1969.5	358 16.2	69 47.7	16917	16909	-511	45966	48980	A	DHZ
1970.5	358 17.5	69 47.2	16936	16928	-505	45997	49016	A	DHZ
1971.5	358 19.1	69 46.1	16963	16956	-498	46025	49051	A	DHZ
1972.5	358 21.8	69 45.5	16985	16978	-485	46059	49091	A	DHZ
1973.5	358 25.1	69 45.0	17006	17000	-469	46096	49133	A	DHZ
1974.5	358 30.1	69 44.9	17021	17015	-445	46133	49173	A	DHZ
1975.5	358 34.5	69 44.4	17041	17036	-424	46168	49213	A	DHZ
1976.5	358 40.3	69 44.2	17058	17053	-395	46204	49252	A	DHZ
1977.5	358 46.4	69 43.9	17071	17067	-365	46226	49277	A	DHZ
1978.5	358 54.0	69 44.8	17071	17068	-328	46266	49315	A	DHZ
1979.5	359 01.2	69 44.9	17077	17075	-292	46286	49336	A	DHZ
1980.5	359 08.4	69 45.2	17078	17076	-256	46300	49349	A	DHZ

*C = The values from 1891 to 1906 are calculated from the old Copenhagen observatory and transformed to RSV values, as described in the observatory yearbook "Rude Skov, Magnetic Results 1980. Copenhagen 1983".
*A = All days.
ELE = Elements recorded.

Annual Mean Values, Brorfelde, All Days, Quiet Days and Disturbed Days.

YEAR	D	I	H	X	Y	Z	F	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1980.5	0 38.2	0 15.3	-135	-131	194	265	201	J	DHZ
1980.5	358 30.2	69 29.9	17213	17207	-450	46035	49148	A	DHZ
1981.5	358 36.9	69 31.2	17204	17199	-416	46062	49170	A	DHZ
1982.5	358 44.0	69 32.4	17194	17190	-380	46087	49190	A	DHZ
1983.5	358 50.6	69 32.8	17194	17190	-347	46100	49202	A	DHZ
1984.5	358 57.0	69 33.7	17185	17182	-315	46116	49214	A	DHZ
1985.5	359 03.2	69 34.6	17178	17176	-284	46134	49228	A	DHZ
1986.5	359 09.3	69 36.1	17165	17163	-253	46158	49246	A	DHZ
1987.5	359 14.9	69 36.9	17160	17159	-225	46177	49262	A	DHZ
1988.5	359 20.7	69 38.6	17145	17144	-196	46209	49287	A	DHZ
1989.5	359 26.2	69 40.5	17129	17128	-168	46242	49313	A	DHZ
1990.5	359 30.8	69 41.2	17125	17124	-145	46263	49331	A	DHZ
1991.5	359 35.8	69 42.5	17115	17115	-120	46288	49351	A	DHZ
1992.5	359 40.7	69 42.7	17118	17118	-96	46304	49367	A	DHZ
1993.5	359 46.7	69 42.9	17121	17121	-66	46320	49383	A	DHZ
1994.5	359 53.8	69 43.6	17119	17119	-31	46346	49407	A	DHZ
1995.5	0 00.4	69 43.8	17125	17125	2	46368	49429	A	DHZ
1996.5	0 07.8	69 43.7	17133	17133	39	46389	49452	A	DHZ
1997.5	0 15.7	69 44.6	17132	17132	78	46422	49482	A	DHZ
1998.5	0 23.7	69 45.9	17126	17126	118	46462	49518	A	DHZ
1999.5	0 30.9	69 46.6	17129	17128	154	46496	49551	A	DHZ
2000.5	0 38.1	69 47.7	17127	17126	190	46536	49588	A	DHZ
2001.5	0 45.3	69 47.8	17136	17135	226	46569	49622	A	DHZ
1980.5	358 30.0	69 29.7	17216	17210	-451	46034	49148	Q	DHZ
1981.5	358 36.3	69 30.5	17212	17207	-419	46058	49169	Q	DHZ
1982.5	358 43.5	69 31.8	17202	17198	-383	46084	49190	Q	DHZ
1983.5	358 49.7	69 32.1	17204	17200	-352	46100	49206	Q	DHZ
1984.5	358 56.5	69 33.3	17191	17188	-318	46115	49215	Q	DHZ
1985.5	359 02.8	69 34.2	17184	17182	-286	46133	49229	Q	DHZ
1986.5	359 08.8	69 35.6	17172	17170	-256	46157	49248	Q	DHZ
1987.5	359 14.6	69 36.6	17164	17163	-227	46176	49263	Q	DHZ
1988.5	359 20.2	69 38.1	17152	17151	-199	46206	49287	Q	DHZ
1989.5	359 25.4	69 39.8	17138	17137	-172	46239	49313	Q	DHZ
1990.5	359 30.1	69 40.6	17133	17132	-149	46259	49330	Q	DHZ
1991.5	359 35.1	69 41.8	17123	17123	-124	46283	49349	Q	DHZ
1992.5	359 40.1	69 42.1	17125	17125	-99	46300	49366	Q	DHZ
1993.5	359 46.2	69 42.4	17127	17127	-69	46318	49383	Q	DHZ
1994.5	359 53.0	69 43.0	17128	17128	-35	46344	49408	Q	DHZ
1995.5	359 59.8	69 43.3	17132	17132	-1	46366	49430	Q	DHZ
1996.5	0 07.2	69 43.5	17136	17136	36	46388	49452	Q	DHZ
1997.5	0 15.4	69 44.2	17137	17137	77	46421	49483	Q	DHZ
1998.5	0 23.3	69 45.5	17132	17132	116	46460	49518	Q	DHZ
1999.5	0 30.5	69 46.2	17134	17133	152	46494	49551	Q	DHZ
2000.5	0 37.7	69 47.1	17134	17133	188	46533	49587	Q	DHZ
2001.5	0 44.9	69 47.3	17143	17142	224	46566	49621	Q	DHZ

continues...

Annual Mean Values, Brorfelde, continued.

YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1980.5	358 30.8	69 30.6	17204	17198	-446	46040	49149	D	DHZ
1981.5	358 37.5	69 32.0	17193	17188	-413	46068	49172	D	DHZ
1982.5	358 45.1	69 33.6	17177	17173	-374	46091	49188	D	DHZ
1983.5	358 51.6	69 33.7	17180	17177	-342	46100	49197	D	DHZ
1984.5	358 57.9	69 34.5	17173	17170	-310	46117	49211	D	DHZ
1985.5	359 04.0	69 35.2	17169	17167	-280	46135	49226	D	DHZ
1986.5	359 10.1	69 36.7	17155	17153	-249	46158	49243	D	DHZ
1987.5	359 15.3	69 37.4	17153	17152	-223	46180	49263	D	DHZ
1988.5	359 21.3	69 39.5	17134	17133	-193	46214	49288	D	DHZ
1989.5	359 27.8	69 41.9	17110	17109	-160	46249	49312	D	DHZ
1990.5	359 31.7	69 42.2	17112	17111	-141	46267	49330	D	DHZ
1991.5	359 36.9	69 43.9	17097	17097	-115	46298	49354	D	DHZ
1992.5	359 41.3	69 43.6	17105	17105	-93	46308	49366	D	DHZ
1993.5	359 47.5	69 43.7	17109	17109	-62	46322	49381	D	DHZ
1994.5	359 54.4	69 44.4	17108	17108	-28	46347	49404	D	DHZ
1995.5	0 01.2	69 44.3	17117	17117	6	46370	49428	D	DHZ
1996.5	0 08.4	69 44.1	17127	17127	42	46389	49450	D	DHZ
1997.5	0 16.3	69 45.2	17123	17123	81	46424	49481	D	DHZ
1998.5	0 24.5	69 46.9	17113	17113	122	46465	49516	D	DHZ
1999.5	0 31.7	69 47.3	17119	17118	158	46498	49549	D	DHZ
2000.5	0 39.4	69 48.7	17112	17111	196	46540	49586	D	DHZ
2001.5	0 46.4	69 48.9	17122	17120	231	46574	49621	D	DHZ

*J = Site differennces RSV-BFE calculated from the annual means 1980. A linear regression based on measurements during 1980-94 yields the following values of the field differences

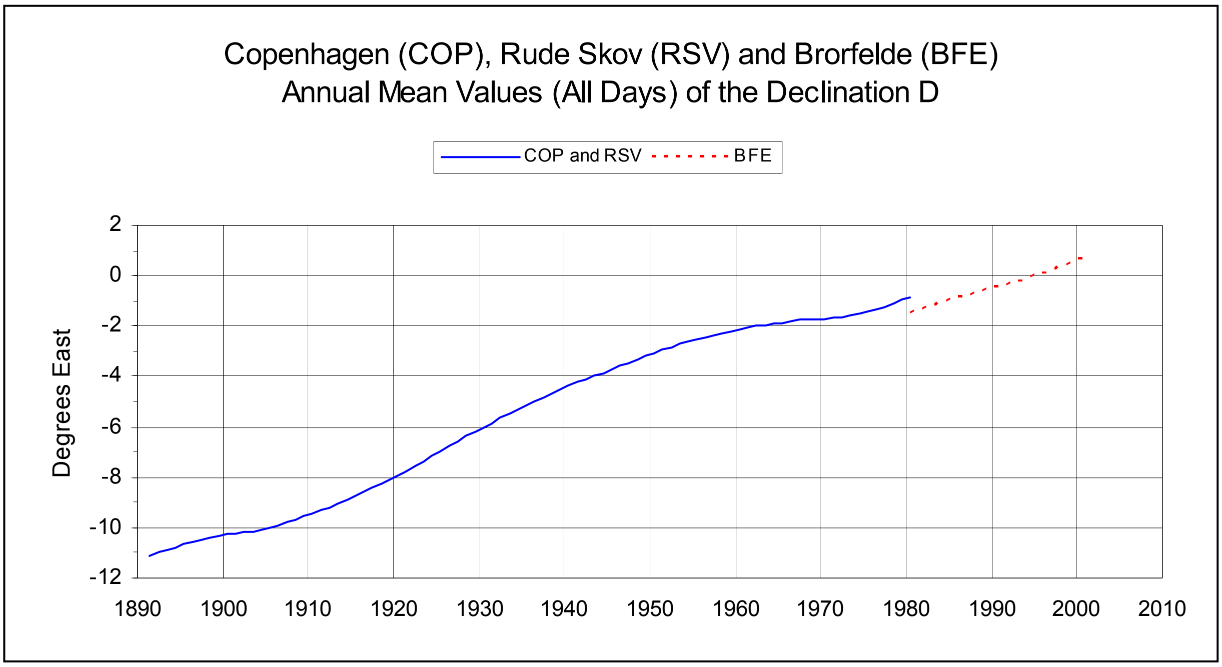
$$D_{RSV} - D_{BFE} = 39 - 0.2 \times (t - 1980.0) \text{ minutes of arc}$$

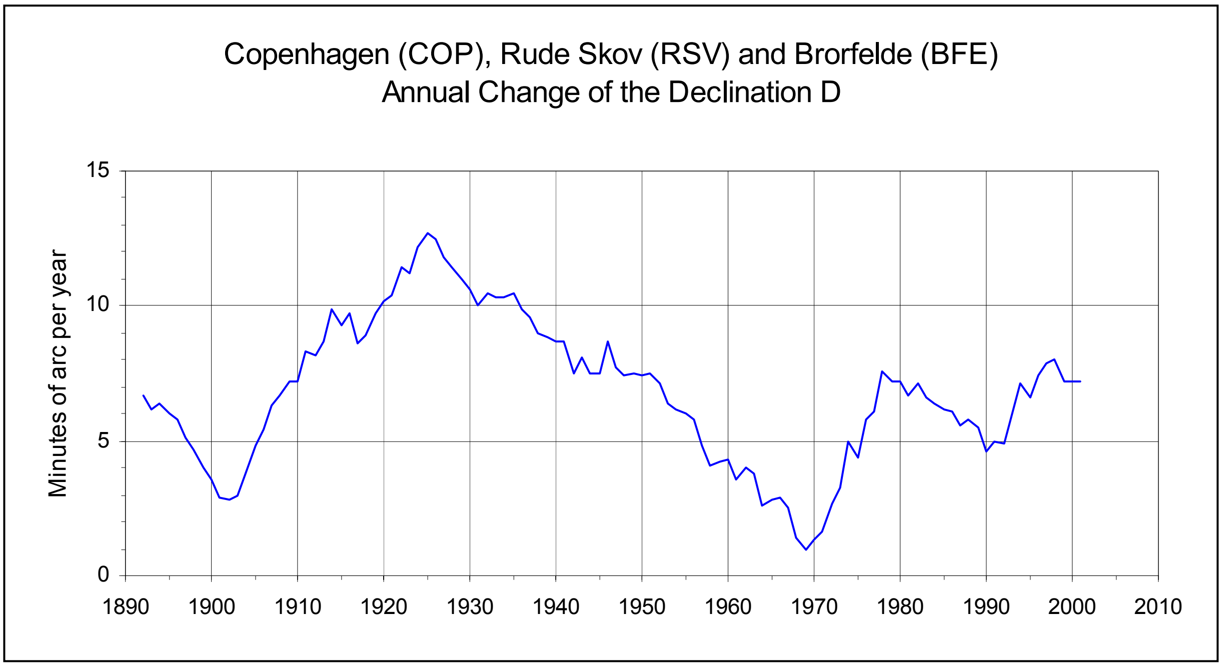
$$H_{RSV} - H_{BFE} = -136 - 0.7 \times (t - 1980.0) \text{ nT}$$

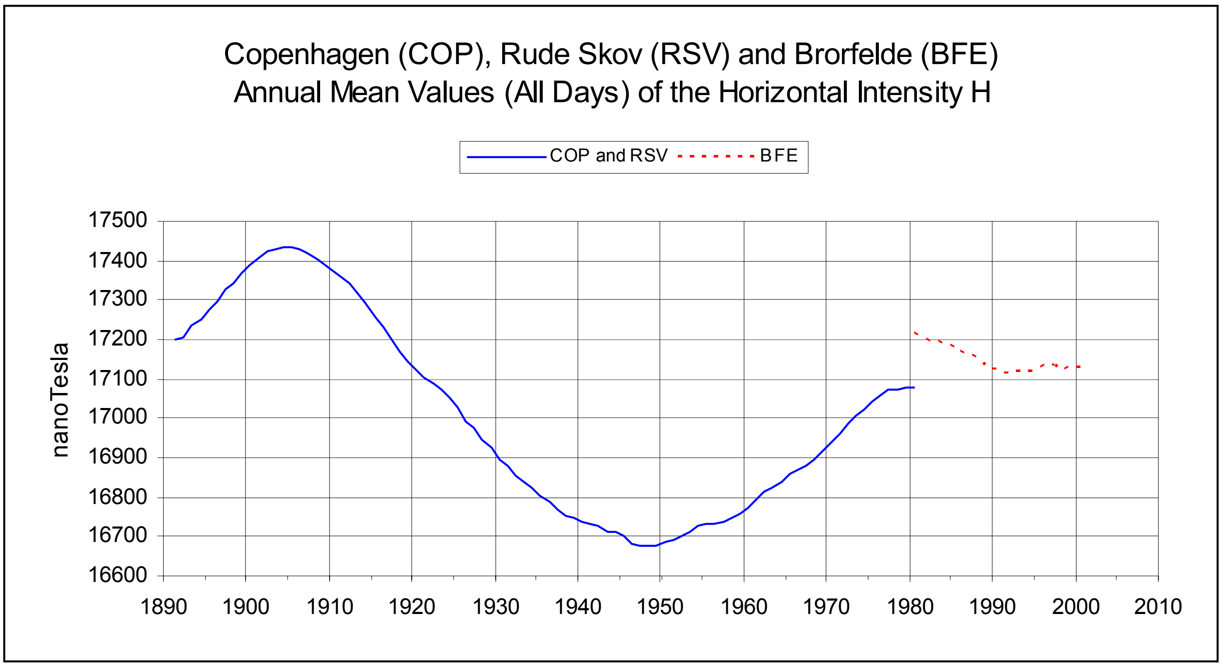
$$Z_{RSV} - Z_{BFE} = 265 \text{ nT}$$

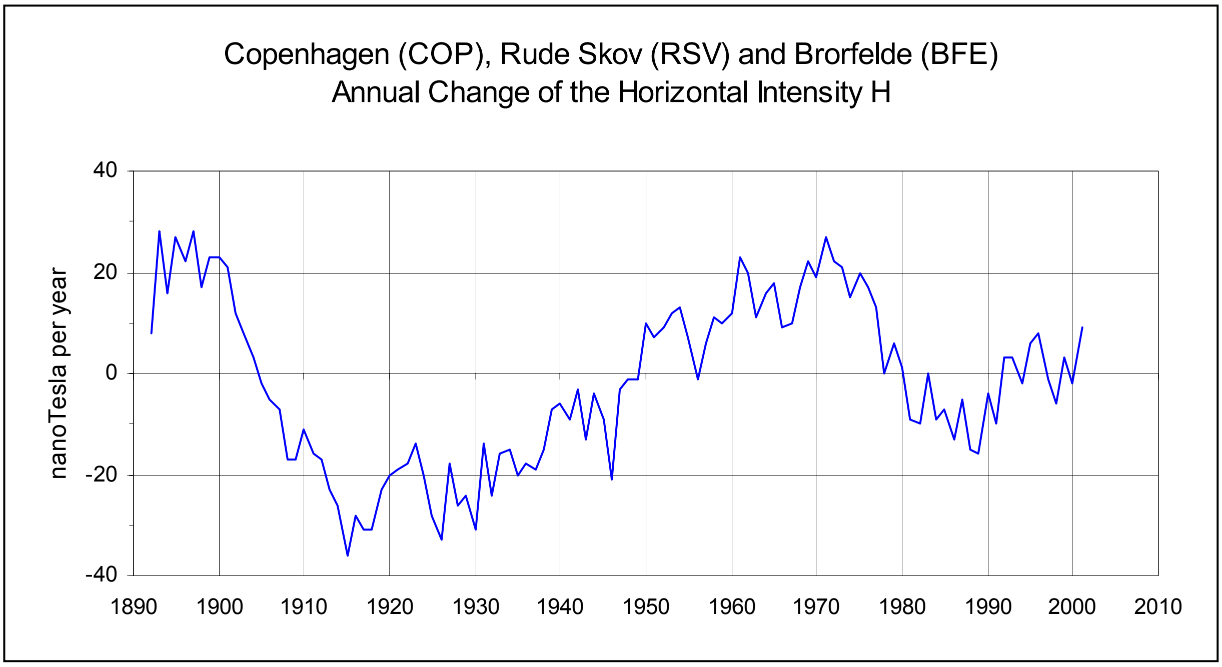
cf. Appendix A in the observatory yearbook for 1994 (Reference 8 in Section I).

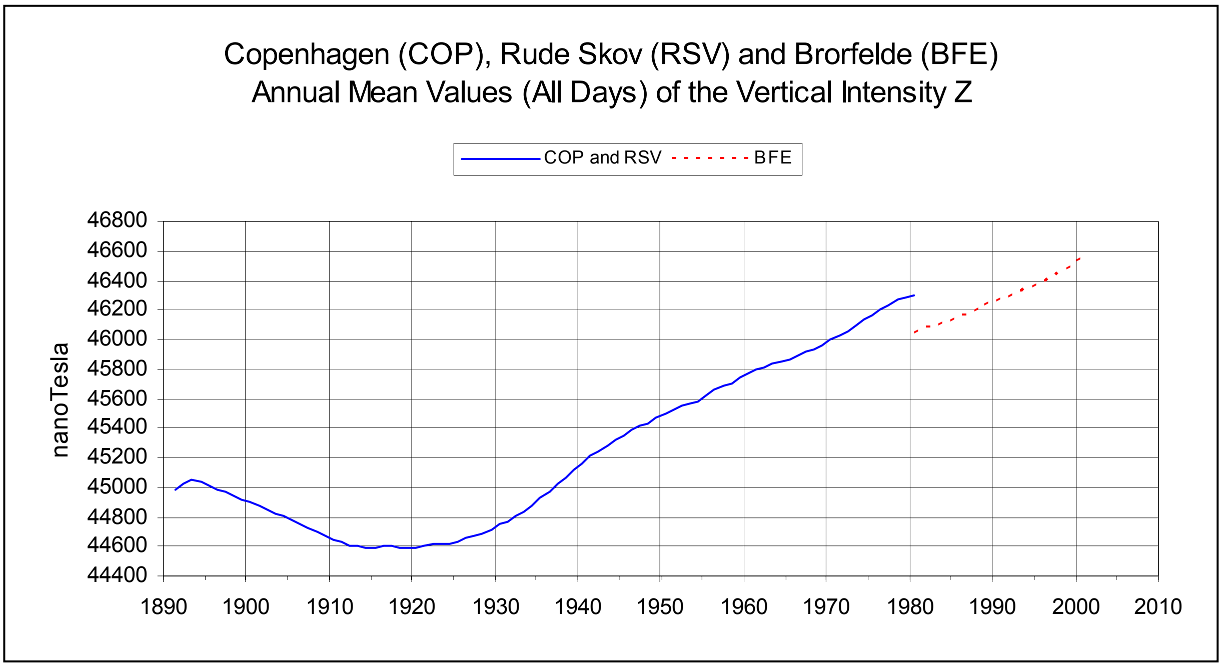
*A = All days.
*Q = Quiet days.
*D = Disturbed days.
ELE = Elements recorded

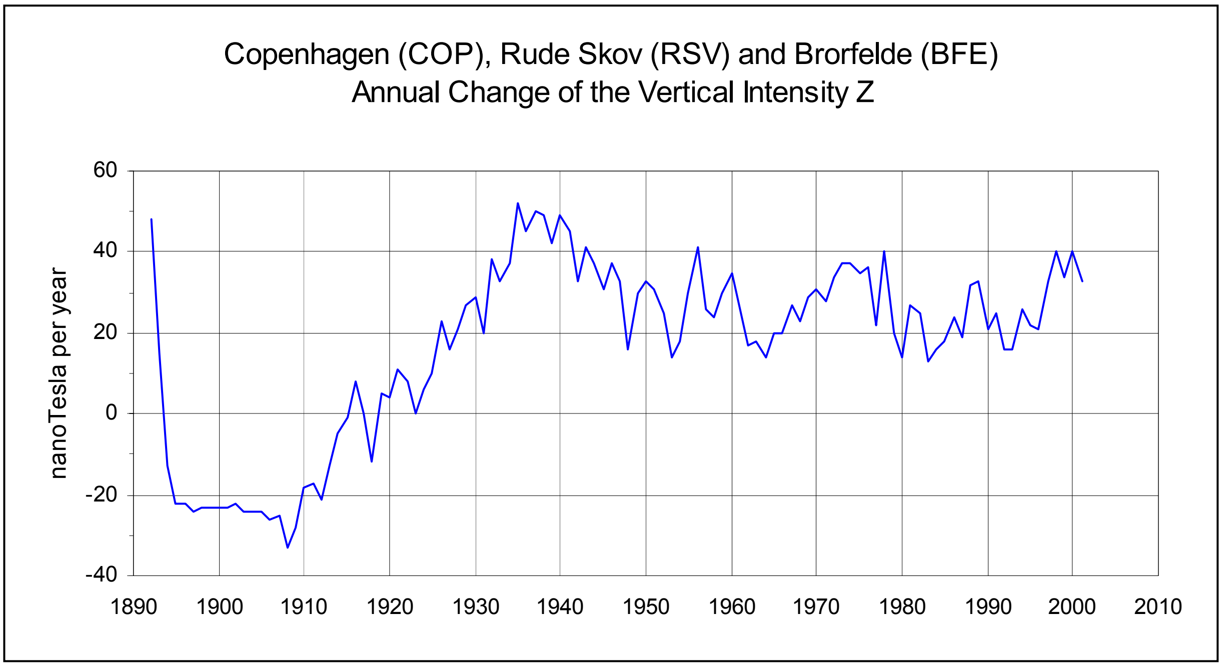

Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Mean Values (All Days) of the Declination D
COP and RSV
BFE
Degrees East
2
0
-2
-4
-6
-8
-10
-12
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Change of the Declination D
Minutes of arc per year
15
10
5
0
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Mean Values (All Days) of the Horizontal Intensity H
COP and RSV
BFE
nanoTesla
17500
17400
17300
17200
17100
17000
16900
16800
16700
16600
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Change of the Horizontal Intensity H
nanoTesla per year
40
20
0
-20
-40
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Mean Values (All Days) of the Vertical Intensity Z
COP and RSV
BFE
nanoTesla
46800
46600
46400
46200
46000
45800
45600
45400
45200
45000
44800
44600
44400
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Copenhagen (COP), Rude Skov (RSV) and Brorfelde (BFE)
Annual Change of the Vertical Intensity Z
nanoTesla per year
60
40
20
0
-20
-40
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

SECTION III

Qeqertarsuaq (Godhavn) Geomagnetic Observatory 2001.

OBSERVATORY DETAILS.

A magnetic observatory was established in Qeqertarsuaq (Godhavn) in 1926 by the Danish Meteorological Institute. But due to artificial disturbances from the surrounding settlement it was getting more and more difficult to keep the observatory measurements at the wanted standard. During 1975 the observatory was therefore moved from the old position (69°14.4'N, 306°28.7'E) to a new site as shown in the table below. A detailed description of the observatory and its location during the first 50 years of operation is given in the observatory report for 1926. A description of the new observatory is given in the observatory yearbooks for 1976 and for 1985-90.

The following coordinates etc. are valid for the observatory:

Acronym (IAGA-code)	GDH
Elevation (top of absolute pillar)	24 m
Geographic latitude	69°15.1'N
Geographic longitude	306°28.0'E
Geographic longitude	53°32.0'W
Geomagnetic latitude	78.77°N
Geomagnetic longitude	34.36°E
Invariant geomagnetic latitude	75.79°N
Magnetic local noon	14 UT

The geomagnetic coordinates are based on the IGRF 2000.0 magnetic field model in which the geomagnetic north pole position is 79.5°N, 288.4°E.
The invariant geomagnetic latitude is based on the IGRF 2000.0 magnetic field model valid for Epoch 2000.0 and a height of 105 km.

STAFF.

The routine absolute measurements were made by Mr. Hans Jørgen Andersen who also supervised the buildings and the equipment.

DIARY.

JAN	12	A heater in the laboratory was replaced.
APR	30	The data logger of the supplementary variometer system was replaced.
MAY	21	and again on May 28 and October 08 the data logger of the primary variometer system was replaced due to problems with the ZIP-disks.

During August/September the roof of the corridors between the four houses of the observatory was repaired, and in October the inside of the corridors was painted.

The gap in the absolute measurements in September is due to Mr. Andersens vacation, while the gap in the measurements in October is due to a defective watch in the absolute house.

MISSING DATA.

Intervals of missing primary variometer data were, if possible, replaced by data from the supplementary recorder.

The hourly mean values are complete.

OBSERVED AND ADOPTED BASELINE VALUES.

Tables of adopted baseline values are shown below, while graphs of the observed and adopted baseline values are shown section VII.

Adopted baseline values for the primary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	8744.5 nT	319°17.1'	56132.0 nT
JAN	11	00:00 UT	8747.0 nT	319°17.5'	56133.0 nT
JAN	26	00:00 UT			56134.0 nT
FEB	01	00:00 UT		319°17.2'	
FEB	24	00:00 UT	8746.5 nT		
MAR	16	00:00 UT	8746.0 nT		
MAR	23	00:00 UT			56134.5 nT
APR	13	00:00 UT	8745.0 nT		
APR	27	00:00 UT			56134.0 nT
MAY	01	00:00 UT		319°17.0'	
MAY	11	00:00 UT	8744.0 nT		
JUN	01	00:00 UT			56133.5 nT
JUN	09	00:00 UT			56132.5 nT
JUL	06	00:00 UT			56131.5 nT
JUL	28	00:00 UT			56131.0 nT
AUG	01	00:00 UT	8745.0 nT		
SEP	11	00:00 UT	8746.0 nT		
OCT	08	12:00 UT		319°16.5'	56132.0 nT
NOV	01	00:00 UT		319°16.9'	56133.0 nT
DEC	01	00:00 UT			56133.5 nT

Adopted baseline values for the supplementary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	not adopted	not adopted	not adopted
MAY	21	00:00 UT	8555.0 nT	319°38.0'	55965.5 nT
MAY	29	00:00 UT	not adopted	not adopted	not adopted
OCT	08	00:00 UT	8556.0 nT	319°38.5'	55964.0 nT
OCT	09	00:00 UT	not adopted	not adopted	not adopted

Baseline values for the supplementary variometer system have only been adopted when they were used in connection with data supplementation.

Monthly Mean Values, GDH 2001, All Days, Quiet Days and Disturbed Days.

Year	D		I		H	X	Y	Z	F	*	ELE
2001	°	'	°	'	nT	nT	nT	nT	nT		
JAN	319	01.4	81	12.7	8659	6537	-5678	56007	56672	A	DHZ
FEB	319	05.0	81	12.1	8669	6551	-5678	56007	56674	A	DHZ
MAR	319	07.8	81	12.1	8670	6556	-5673	56009	56676	A	DHZ
APR	319	13.4	81	12.1	8671	6566	-5663	56025	56692	A	DHZ
MAY	319	18.9	81	10.0	8702	6599	-5673	56003	56675	A	DHZ
JUN	319	20.0	81	09.8	8704	6602	-5672	55985	56658	A	DHZ
JUL	319	23.5	81	10.0	8700	6605	-5663	55987	56659	A	DHZ
AUG	319	24.8	81	10.5	8692	6601	-5655	55984	56655	A	DHZ
SEP	319	24.6	81	10.5	8691	6600	-5655	55985	56656	A	DHZ
OCT	319	26.1	81	11.7	8677	6592	-5643	56019	56687	A	DHZ
NOV	319	25.9	81	11.8	8675	6590	-5642	56018	56686	A	DHZ
DEC	319	29.6	81	11.7	8675	6596	-5635	56004	56672	A	DHZ
WINTER	319	15.4	81	12.1	8669	6568	-5658	56009	56676	A	DHZ
EQUINOX	319	17.7	81	11.6	8677	6578	-5659	56009	56677	A	DHZ
SUMMER	319	21.5	81	10.1	8699	6601	-5666	55990	56662	A	DHZ
YEAR	319	18.4	81	11.2	8682	6583	-5661	56003	56672	A	DHZ
JAN	319	02.2	81	12.0	8670	6547	-5684	56007	56674	Q	DHZ
FEB	319	05.7	81	11.6	8676	6557	-5681	56000	56668	Q	DHZ
MAR	319	09.1	81	11.2	8681	6567	-5678	55995	56664	Q	DHZ
APR	319	17.2	81	10.1	8705	6598	-5678	56026	56698	Q	DHZ
MAY	319	18.2	81	09.8	8706	6601	-5677	55999	56672	Q	DHZ
JUN	319	19.5	81	09.5	8710	6606	-5677	55992	56665	Q	DHZ
JUL	319	22.3	81	10.0	8702	6604	-5666	55996	56668	Q	DHZ
AUG	319	25.7	81	10.0	8701	6609	-5659	55992	56664	Q	DHZ
SEP	319	23.4	81	10.4	8694	6600	-5659	55990	56661	Q	DHZ
OCT	319	24.5	81	11.2	8685	6595	-5651	56012	56681	Q	DHZ
NOV	319	27.8	81	11.1	8686	6601	-5645	56009	56678	Q	DHZ
DEC	319	29.3	81	11.3	8682	6601	-5640	56008	56677	Q	DHZ
WINTER	319	16.5	81	11.5	8678	6577	-5662	56006	56674	Q	DHZ
EQUINOX	319	18.7	81	10.8	8691	6590	-5666	56006	56676	Q	DHZ
SUMMER	319	21.4	81	09.8	8705	6605	-5670	55995	56668	Q	DHZ
YEAR	319	18.9	81	10.7	8692	6591	-5666	56002	56672	Q	DHZ
JAN	318	59.6	81	13.7	8641	6521	-5670	56005	56668	D	DHZ
FEB	319	05.1	81	12.9	8657	6542	-5670	56019	56684	D	DHZ
MAR	319	07.3	81	14.7	8627	6523	-5646	56022	56682	D	DHZ
APR	319	04.6	81	15.5	8615	6509	-5643	56029	56687	D	DHZ
MAY	319	19.6	81	10.3	8697	6596	-5668	55998	56669	D	DHZ
JUN	319	20.3	81	09.7	8703	6602	-5671	55973	56646	D	DHZ
JUL	319	24.2	81	09.9	8703	6608	-5663	55991	56663	D	DHZ
AUG	319	29.5	81	09.8	8704	6618	-5654	55993	56666	D	DHZ
SEP	319	18.4	81	12.1	8664	6569	-5649	55979	56645	D	DHZ
OCT	319	23.8	81	12.9	8660	6575	-5636	56036	56701	D	DHZ
NOV	319	19.3	81	13.5	8651	6561	-5639	56044	56708	D	DHZ
DEC	319	27.2	81	12.6	8661	6581	-5630	56012	56678	D	DHZ
WINTER	319	12.8	81	13.2	8652	6551	-5652	56020	56684	D	DHZ
EQUINOX	319	13.4	81	13.8	8642	6544	-5644	56016	56679	D	DHZ
SUMMER	319	23.4	81	10.0	8702	6606	-5664	55989	56661	D	DHZ
YEAR	319	16.6	81	12.3	8665	6567	-5653	56008	56674	D	DHZ

*A = All days
*Q = Q-days
*D = D-days
ELE = Elements recorded

Annual Mean Values, All Days.

YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1926.5	301 15.0		8242	4276	-7046	55775		I	DHZ
1927.5	301 31.5	81 34.8	8255	4316	-7037	55764	56372	A	DHZ
1928.5	301 48.5	81 34.2	8252	4349	-7013	55686	56294	A	DHZ
1929.5	302 03.5	81 34.1	8243	4375	-6986	55604	56212	A	DHZ
1930.5	302 19.0	81 34.7	8227	4398	-6953	55564	56170	A	DHZ
1931.5	302 36.0	81 33.9	8228	4433	-6932	55484	56091	A	DHZ
1932.5	302 52.5	81 34.1	8218	4461	-6902	55442	56048	A	DHZ
1933.5	303 12.0	81 33.6	8219	4500	-6877	55389	55995	A	DHZ
1934.5	303 29.5	81 33.8	8207	4529	-6844	55334	55939	A	DHZ
1935.5	303 46.0	81 34.2	8194	4554	-6812	55284	55888	A	DHZ
1936.5	304 02.5	81 34.1	8187	4583	-6784	55235	55838	A	DHZ
1937.5	304 19.5	81 34.1	8183	4614	-6758	55205	55808	A	DHZ
1938.5	304 32.0	81 34.5	8174	4634	-6734	55193	55795	A	DHZ
1939.5	304 46.0	81 34.5	8171	4659	-6712	55171	55773	A	DHZ
1940.5	304 57.5	81 34.9	8163	4677	-6690	55162	55763	A	DHZ
1941.5	305 07.5	81 35.0	8162	4696	-6676	55158	55759	A	DHZ
1942.5	305 17.0	81 34.7	8163	4715	-6664	55131	55732	A	DHZ
1943.5	305 28.0	81 34.6	8163	4736	-6648	55127	55728	A	DHZ
1944.5	305 38.0	81 34.2	8166	4757	-6637	55103	55705	A	DHZ
1945.5	305 49.0	81 34.1	8166	4779	-6622	55085	55687	A	DHZ
1946.5	305 59.5	81 34.2	8163	4797	-6605	55085	55687	A	DHZ
1947.5	306 11.0	81 33.6	8171	4824	-6595	55067	55670	A	DHZ
1948.5	306 18.0	81 33.9	8166	4834	-6581	55072	55674	A	DHZ
1949.5	306 27.0	81 33.9	8167	4852	-6569	55072	55674	A	DHZ
1950.5	306 32.5	81 34.5	8161	4859	-6557	55103	55704	A	DHZ
1951.5	306 40.5	81 35.0	8158	4873	-6543	55135	55735	A	DHZ
1952.5	306 51.5	81 35.2	8160	4895	-6529	55166	55766	A	DHZ
1953.5	307 01.0	81 34.3	8173	4921	-6526	55160	55762	A	DHZ
1954.5	307 13.0	81 33.7	8184	4950	-6517	55165	55769	A	DHZ
1955.5	307 22.5	81 33.7	8189	4971	-6508	55195	55799	A	DHZ
1956.5	307 33.0	81 33.7	8194	4994	-6496	55236	55840	A	DHZ
1957.5	307 38.5	81 34.5	8186	4999	-6482	55271	55874	A	DHZ
1958.5	307 47.0	81 34.0	8199	5023	-6480	55306	55910	A	DHZ
1959.5	307 55.5	81 34.2	8204	5042	-6471	55356	55961	A	DHZ
1960.5	308 06.0	81 33.9	8216	5070	-6465	55408	56014	A	DHZ
1961.5	308 14.5	81 34.1	8218	5087	-6454	55441	56047	A	DHZ
1962.5	308 22.0	81 34.2	8221	5103	-6446	55475	56081	A	DHZ
1963.5	308 30.0	81 34.1	8231	5124	-6442	55523	56130	A	DHZ
1964.5	308 36.0	81 33.6	8244	5143	-6443	55556	56164	A	DHZ
1965.5	308 43.0	81 33.0	8257	5165	-6443	55581	56191	A	DHZ
1966.5	308 49.0	81 33.0	8263	5180	-6438	55626	56236	A	DHZ
1967.5	308 54.0	81 33.1	8270	5193	-6436	55679	56290	A	DHZ
1968.5	308 59.0	81 33.0	8280	5209	-6436	55741	56353	A	DHZ
1969.5	309 05.0	81 32.7	8294	5229	-6438	55799	56412	A	DHZ

continues next page...

Annual Mean Values, All Days, continued.

YEAR	*D* ° '	*I* ° '	*H* nT	*X* nT	*Y* nT	*Z* nT	*F* nT	*	ELE
1970.5	309 12.0	81 32.6	8307	5250	-6437	55871	56485	A	DHZ
1971.5	309 19.5	81 32.5	8318	5271	-6435	55939	56554	A	DHZ
1972.5	309 29.0	81 31.8	8337	5301	-6435	55986	56603	A	DHZ
1973.5	309 41.5	81 31.6	8350	5333	-6425	56045	56664	A	DHZ
1974.5	309 56.0	81 31.2	8363	5368	-6413	56090	56710	A	DHZ
1975.5	310 13.5	81 29.7	8391	5419	-6407	56116	56740	A	DHZ
1976.0	-0 03.0	0 00.7	-53	-40	36	-275	-280	J	DHZ
1976.5	310 35.0	81 27.9	8465	5507	-6429	56403	57035	A	DHZ
1977.5	310 55.5	81 26.6	8487	5560	-6413	56403	57038	A	DHZ
1978.5	311 15.5	81 25.6	8505	5609	-6394	56410	57048	A	DHZ
1979.5	311 34.5	81 24.4	8522	5655	-6375	56390	57030	A	DHZ
1980.5	311 51.0	81 23.2	8537	5696	-6359	56362	57005	A	DHZ
1981.5	312 07.0	81 22.6	8547	5732	-6340	56359	57003	I	DHZ
1982.5	312 23.0	81 22.4	8548	5762	-6314	56348	56993	A	DHZ
1983.5	312 38.5	81 22.1	8551	5793	-6290	56327	56972	A	DHZ
1984.5	312 54.0	81 22.0	8549	5819	-6263	56308	56953	A	DHZ
1985.5	313 09.5	81 21.8	8549	5848	-6236	56279	56925	A	DHZ
1986.5	313 26.5	81 21.5	8550	5879	-6208	56258	56904	A	DHZ
1987.5	313 45.5	81 21.0	8554	5916	-6178	56229	56876	A	DHZ
1988.5	314 02.5	81 21.0	8552	5945	-6148	56215	56862	A	DHZ
1989.5	314 21.5	81 20.8	8554	5981	-6116	56205	56852	A	DHZ
1990.0	0 00.0	-0 00.2	6	4	-4	15	16	J	DHZ
1990.5	314 41.0	81 20.6	8552	6014	-6080	56172	56819	A	DHZ
1991.5	315 00.0	81 20.4	8553	6048	-6048	56158	56806	A	DHZ
1992.5	315 19.5	81 19.8	8561	6088	-6019	56144	56793	A	DHZ
1993.5	315 38.5	81 19.7	8561	6121	-5985	56126	56775	A	DHZ
1994.5	316 00.5	81 19.6	8562	6160	-5947	56124	56773	A	DHZ
1995.5	316 25.5	81 18.5	8576	6213	-5912	56096	56748	A	DHZ
1996.5	316 51.0	81 17.3	8592	6268	-5876	56069	56723	A	DHZ
1997.5	317 19.5	81 16.3	8606	6327	-5834	56051	56708	A	DHZ
1998.5	317 48.0	81 15.2	8622	6387	-5792	56045	56704	A	DHZ
1999.5	318 18.0	81 13.9	8643	6453	-5750	56031	56694	A	DHZ
2000.5	318 47.5	81 12.4	8665	6519	-5709	56019	56685	A	DHZ
2001.5	319 18.5	81 11.2	8682	6583	-5661	56003	56672	A	DHZ

*A = All days
*I = Incomplete:
1. The annual means for 1926 are based on data from February to December for the magnetic elements *D, H, X* and *Y*, and June through December for *Z*. The values for *I* and *F* have been omitted from the list as the values for *H* and *Z* does not correspond to the same period.
2. The annual means for 1981 are based on data from the periods JAN 01 - JUL 08 and NOV 03 - DEC 31.

*J = Jumps:
1. The jump in the values on 1976.0 is due to movement of the observatory during 1975.
2. The jump on 1990.0 is due to the establishment of a new absolute pier during 1989.

REMARK: jump value = old site value - new site value.

ELE = Elements recorded.

Annual Mean Values, Quiet Days.

YEAR	D	I	H	X	Y	Z	F	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1926.5	301 16.5		8253	4285	-7054	55770		I	DHZ
1927.5	301 32.5	81 34.1	8265	4324	-7044	55762	56371	Q	DHZ
1928.5	301 48.5	81 33.8	8260	4354	-7019	55685	56294	Q	DHZ
1929.5	302 04.5	81 33.5	8252	4382	-6992	55598	56207	Q	DHZ
1930.5	302 21.5	81 33.6	8243	4412	-6963	55548	56156	Q	DHZ
1931.5	302 38.0	81 33.2	8238	4442	-6938	55478	56086	Q	DHZ
1932.5	302 54.0	81 33.4	8228	4469	-6908	55432	56039	Q	DHZ
1933.5	303 12.5	81 33.1	8226	4505	-6883	55382	55990	Q	DHZ
1934.5	303 30.0	81 33.5	8211	4532	-6847	55327	55933	Q	DHZ
1935.5	303 46.5	81 33.7	8201	4559	-6817	55277	55882	Q	DHZ
1936.5	304 03.5	81 33.4	8198	4591	-6792	55232	55837	Q	DHZ
1937.5	304 20.0	81 33.7	8190	4619	-6763	55206	55810	Q	DHZ
1938.5	304 31.5	81 34.1	8180	4636	-6739	55184	55787	Q	DHZ
1939.5	304 47.5	81 33.8	8183	4669	-6720	55167	55771	Q	DHZ
1940.5	304 58.5	81 34.1	8176	4687	-6699	55153	55756	Q	DHZ
1941.5	305 08.5	81 34.2	8173	4704	-6683	55148	55750	Q	DHZ
1942.5	305 19.5	81 33.9	8175	4727	-6670	55123	55726	Q	DHZ
1943.5	305 29.0	81 33.8	8175	4745	-6657	55116	55719	Q	DHZ
1944.5	305 39.0	81 33.7	8174	4764	-6642	55095	55698	Q	DHZ
1945.5	305 50.0	81 33.4	8175	4786	-6628	55076	55679	Q	DHZ
1946.5	305 59.5	81 33.6	8173	4803	-6613	55077	55680	Q	DHZ
1947.5	306 07.5	81 33.6	8170	4817	-6599	55064	55667	Q	DHZ
1948.5	306 18.0	81 33.6	8171	4837	-6585	55067	55670	Q	DHZ
1949.5	306 26.0	81 33.5	8173	4854	-6576	55066	55669	Q	DHZ
1950.5	306 34.5	81 33.7	8174	4871	-6564	55096	55699	Q	DHZ
1951.5	306 40.5	81 34.3	8167	4878	-6550	55122	55724	Q	DHZ
1952.5	306 52.5	81 34.1	8174	4905	-6539	55148	55750	Q	DHZ
1953.5	307 01.5	81 33.7	8180	4926	-6531	55145	55748	Q	DHZ
1954.5	307 11.5	81 33.2	8191	4951	-6525	55157	55762	Q	DHZ
1955.5	307 22.5	81 33.1	8196	4975	-6513	55186	55791	Q	DHZ
1956.5	307 33.0	81 33.1	8203	4999	-6504	55228	55834	Q	DHZ
1957.5	307 39.5	81 33.7	8199	5009	-6491	55264	55869	Q	DHZ
1958.5	307 49.0	81 33.0	8216	5038	-6490	55301	55908	Q	DHZ
1959.5	307 54.0	81 33.7	8210	5043	-6478	55347	55953	Q	DHZ
1960.5	308 05.0	81 33.5	8222	5071	-6472	55401	56008	Q	DHZ
1961.5	308 13.5	81 33.7	8224	5089	-6461	55435	56042	Q	DHZ
1962.5	308 22.5	81 33.6	8231	5110	-6453	55471	56078	Q	DHZ
1963.5	308 30.0	81 33.4	8240	5130	-6449	55513	56121	Q	DHZ
1964.5	308 37.0	81 33.0	8253	5151	-6448	55552	56162	Q	DHZ
1965.5	308 43.0	81 32.7	8262	5168	-6446	55578	56189	Q	DHZ
1966.5	308 50.0	81 32.4	8274	5188	-6445	55623	56235	Q	DHZ
1967.5	308 55.0	81 32.4	8281	5202	-6443	55676	56288	Q	DHZ
1968.5	309 00.0	81 32.3	8291	5218	-6443	55735	56348	Q	DHZ
1969.5	309 06.0	81 32.2	8303	5237	-6444	55796	56410	Q	DHZ

continues next page...

Annual Mean Values, Quiet Days, continued.

YEAR	*D* ° '	*I* ° '	*H* nT	*X* nT	*Y* nT	*Z* nT	*F* nT	*	ELE
1970.5	309 11.0	81 32.3	8310	5250	-6441	55863	56478	Q	DHZ
1971.5	309 20.0	81 31.9	8327	5278	-6441	55931	56547	Q	DHZ
1972.5	309 29.0	81 31.3	8345	5306	-6441	55983	56602	Q	DHZ
1973.5	309 43.0	81 30.7	8363	5344	-6433	56034	56655	Q	DHZ
1974.5	309 58.0	81 30.1	8379	5382	-6422	56077	56700	Q	DHZ
1975.5	310 15.0	81 28.9	8403	5429	-6413	56106	56732	Q	DHZ
1976.0	-0 03.0	0 00.7	-53	-40	36	-275	-280	J	DHZ
1976.5	310 36.0	81 27.2	8475	5515	-6435	56393	57026	Q	DHZ
1977.5	310 56.0	81 26.0	8495	5566	-6418	56394	57030	Q	DHZ
1978.5	311 16.0	81 25.0	8513	5615	-6399	56402	57041	Q	DHZ
1979.5	311 34.0	81 24.1	8527	5658	-6380	56388	57029	Q	DHZ
1980.5	311 51.0	81 22.9	8542	5699	-6363	56363	57007	Q	DHZ
1981.5	312 07.0	81 22.0	8558	5739	-6348	56360	57006	I	DHZ
1982.5	312 24.0	81 21.7	8558	5771	-6320	56337	56983	Q	DHZ
1983.5	312 41.0	81 21.0	8567	5808	-6298	56318	56966	Q	DHZ
1984.5	312 55.0	81 21.2	8561	5829	-6270	56299	56946	Q	DHZ
1985.5	313 10.0	81 20.9	8562	5857	-6245	56270	56918	Q	DHZ
1986.5	313 28.0	81 20.8	8560	5889	-6213	56249	56897	Q	DHZ
1987.5	313 45.0	81 20.5	8562	5921	-6185	56221	56869	Q	DHZ
1988.5	314 02.5	81 20.4	8561	5951	-6154	56209	56857	Q	DHZ
1989.5	314 23.0	81 20.1	8565	5991	-6121	56201	56850	Q	DHZ
1990.0	0 00.0	-0 00.2	6	4	-4	15	16	J	DHZ
1990.5	314 41.0	81 20.2	8558	6018	-6085	56166	56814	Q	DHZ
1991.5	314 59.0	81 20.0	8558	6050	-6053	56150	56798	Q	DHZ
1992.5	315 19.0	81 19.4	8567	6091	-6024	56139	56789	Q	DHZ
1993.5	315 40.0	81 18.9	8571	6131	-5990	56118	56769	Q	DHZ
1994.5	316 02.5	81 18.4	8579	6175	-5955	56110	56762	Q	DHZ
1995.5	316 25.5	81 17.6	8588	6222	-5920	56086	56740	Q	DHZ
1996.5	316 51.5	81 16.8	8599	6275	-5880	56065	56721	Q	DHZ
1997.5	317 19.0	81 15.8	8613	6332	-5839	56045	56703	Q	DHZ
1998.5	317 48.0	81 14.7	8631	6394	-5798	56041	56702	Q	DHZ
1999.5	318 18.5	81 13.5	8649	6458	-5753	56025	56689	Q	DHZ
2000.5	318 47.5	81 12.1	8670	6522	-5712	56013	56680	Q	DHZ
2001.5	319 19.0	81 10.7	8692	6591	-5666	56002	56672	Q	DHZ

Q = Quiet days
*I = Incomplete:
1. The annual means for1926 are based on data from February to December for the magnetic elements *D, H, X* and *Y*, and June through December for *Z*. The values for *I* and *F* have been omitted from the list as the values for *H* and *Z* does not correspond to the same period.
2. The annual means for1981 are based on data from the periods JAN 01 - JUL 08 and NOV 03 - DEC 31.

*J = Jumps:
1. The jump in the values on1976.0 is due to movement of the observatory during1975.
2. The jump on1990.0 is due to the establishment of a new absolute pier during1989.

REMARK: jump value = old site value - new site value.

ELE = Elements recorded.

Annual Mean Values, Disturbed Days.

YEAR	D	I	H	X	Y	Z	F	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1926.5	301 10.0		8214	4251	-7028	55789		I	DHZ
1927.5	301 30.5	81 36.2	8233	4303	-7019	55775	56379	D	DHZ
1928.5	301 46.5	81 35.5	8233	4335	-6999	55695	56300	D	DHZ
1929.5	302 01.0	81 35.2	8225	4361	-6974	55615	56220	D	DHZ
1930.5	302 16.0	81 35.9	8211	4384	-6943	55589	56192	D	DHZ
1931.5	302 35.0	81 34.6	8218	4426	-6925	55494	56099	D	DHZ
1932.5	302 50.5	81 35.2	8203	4449	-6892	55459	56062	D	DHZ
1933.5	303 09.0	81 34.6	8203	4486	-6868	55397	56001	D	DHZ
1934.5	303 28.5	81 34.7	8194	4520	-6835	55346	55949	D	DHZ
1935.5	303 45.0	81 35.2	8179	4544	-6801	55296	55898	D	DHZ
1936.5	303 58.0	81 35.5	8167	4563	-6773	55246	55846	D	DHZ
1937.5	304 16.5	81 35.1	8168	4600	-6750	55209	55810	D	DHZ
1938.5	304 30.5	81 35.7	8157	4621	-6722	55206	55805	D	DHZ
1939.5	304 45.5	81 35.7	8154	4649	-6699	55184	55783	D	DHZ
1940.5	304 56.5	81 36.1	8147	4666	-6678	55179	55777	D	DHZ
1941.5	305 06.5	81 36.3	8144	4684	-6662	55180	55778	D	DHZ
1942.5	305 13.0	81 36.1	8141	4695	-6651	55147	55745	D	DHZ
1943.5	305 25.5	81 36.1	8142	4719	-6635	55149	55747	D	DHZ
1944.5	305 37.0	81 35.4	8149	4746	-6625	55120	55719	D	DHZ
1945.5	305 47.5	81 35.3	8148	4765	-6609	55103	55702	D	DHZ
1946.5	305 59.5	81 35.4	8146	4787	-6591	55097	55696	D	DHZ
1947.5	306 11.5	81 34.1	8164	4821	-6589	55078	55680	D	DHZ
1948.5	306 18.5	81 34.8	8154	4828	-6571	55090	55690	D	DHZ
1949.5	306 26.5	81 34.9	8153	4843	-6559	55087	55687	D	DHZ
1950.5	306 29.5	81 35.4	8149	4846	-6551	55120	55719	D	DHZ
1951.5	306 40.0	81 35.9	8147	4865	-6535	55156	55754	D	DHZ
1952.5	306 48.5	81 36.0	8136	4875	-6514	55092	55690	D	DHZ
1953.5	307 00.0	81 35.5	8158	4910	-6515	55188	55788	D	DHZ
1954.5	307 11.5	81 34.4	8174	4941	-6512	55181	55783	D	DHZ
1955.5	307 19.0	81 35.0	8170	4953	-6498	55213	55814	D	DHZ
1956.5	307 35.0	81 34.6	8183	4991	-6485	55257	55860	D	DHZ
1957.5	307 36.5	81 36.0	8165	4983	-6468	55291	55891	D	DHZ
1958.5	307 44.0	81 35.2	8182	5007	-6471	55320	55922	D	DHZ
1959.5	307 52.5	81 36.2	8175	5019	-6453	55379	55979	D	DHZ
1960.5	308 02.0	81 35.5	8194	5048	-6454	55429	56031	D	DHZ
1961.5	308 14.5	81 35.1	8205	5079	-6444	55459	56063	D	DHZ
1962.5	308 19.5	81 35.4	8203	5087	-6435	55485	56088	D	DHZ
1963.5	308 30.0	81 34.9	8220	5117	-6433	55547	56152	D	DHZ
1964.5	308 34.0	81 34.5	8230	5131	-6435	55563	56169	D	DHZ
1965.5	308 43.0	81 33.5	8250	5160	-6437	55593	56202	D	DHZ
1966.5	308 48.0	81 34.3	8245	5166	-6426	55641	56249	D	DHZ
1967.5	308 52.0	81 34.0	8257	5181	-6429	55694	56303	D	DHZ
1968.5	308 58.0	81 34.2	8264	5197	-6425	55762	56371	D	DHZ
1969.5	309 04.0	81 33.8	8278	5217	-6427	55814	56425	D	DHZ

continues next page...

Annual Mean Values, Disturbed Days, continued.

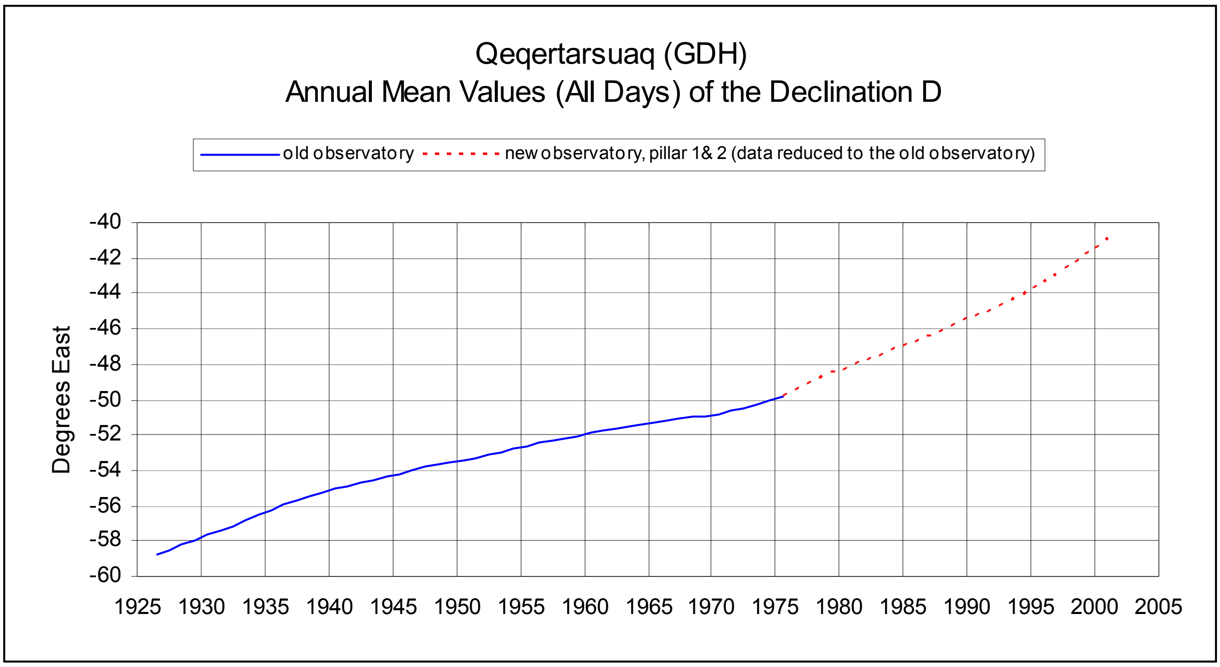
YEAR	*D* ° '	*I* ° '	*H* nT	*X* nT	*Y* nT	*Z* nT	*F* nT	*	ELE
1970.5	309 14.0	81 33.5	8294	5246	-6424	55886	56498	D	DHZ
1971.5	309 18.0	81 33.8	8300	5257	-6423	55955	56567	D	DHZ
1972.5	309 29.0	80 32.9	8324	5293	-6425	50003	50691	D	DHZ
1973.5	309 39.0	81 32.9	8331	5316	-6415	56065	56681	D	DHZ
1974.5	309 56.0	81 32.3	8348	5359	-6401	56111	56729	D	DHZ
1975.5	310 12.0	81 31.0	8372	5404	-6395	56135	56756	D	DHZ
1976.0	-0 03.0	0 00.7	-53	-40	36	-275	-280	J	DHZ
1976.5	310 33.0	81 29.4	8443	5489	-6415	56427	57055	D	DHZ
1977.5	310 54.0	81 27.8	8470	5546	-6402	56422	57054	D	DHZ
1978.5	311 17.0	81 26.5	8493	5604	-6382	56432	57068	D	DHZ
1979.5	311 34.0	81 25.3	8507	5644	-6365	56399	57037	D	DHZ
1980.5	311 51.0	81 24.2	8522	5686	-6348	56369	57010	D	DHZ
1981.5	312 06.0	81 24.1	8524	5715	-6325	56371	57012	I	DHZ
1982.5	312 23.0	81 23.7	8530	5750	-6301	56373	57015	D	DHZ
1983.5	312 37.0	81 23.7	8526	5773	-6274	56347	56988	D	DHZ
1984.5	312 52.0	81 23.7	8524	5799	-6248	56332	56973	D	DHZ
1985.5	313 08.0	81 23.3	8526	5829	-6222	56299	56941	D	DHZ
1986.5	313 24.0	81 22.9	8530	5861	-6198	56278	56921	D	DHZ
1987.5	313 45.0	81 22.1	8537	5903	-6167	56241	56885	D	DHZ
1988.5	314 02.5	81 22.2	8535	5933	-6135	56229	56873	D	DHZ
1989.5	314 19.0	81 22.2	8534	5962	-6106	56226	56870	D	DHZ
1990.0	0 00.0	-0 00.2	6	4	-4	15	16	J	DHZ
1990.5	314 42.5	81 21.8	8535	6004	-6066	56187	56832	D	DHZ
1991.5	315 01.0	81 21.8	8533	6035	-6032	56171	56815	D	DHZ
1992.5	315 22.5	81 20.7	8548	6084	-6005	56162	56809	D	DHZ
1993.5	315 36.0	81 21.4	8535	6098	-5971	56142	56787	D	DHZ
1994.5	315 58.0	81 21.4	8535	6136	-5933	56147	56792	D	DHZ
1995.5	316 24.0	81 19.7	8558	6197	-5902	56110	56759	D	DHZ
1996.5	316 49.5	81 18.2	8578	6256	-5869	56081	56733	D	DHZ
1997.5	317 17.5	81 17.5	8587	6310	-5824	56061	56715	D	DHZ
1998.5	317 49.0	81 16.2	8609	6379	-5781	56065	56722	D	DHZ
1999.5	318 18.0	81 14.9	8628	6442	-5740	56047	56707	D	DHZ
2000.5	318 47.0	81 13.3	8653	6509	-5702	56032	56696	D	DHZ
2001.5	319 16.5	81 12.3	8665	6567	-5653	56008	56674	D	DHZ

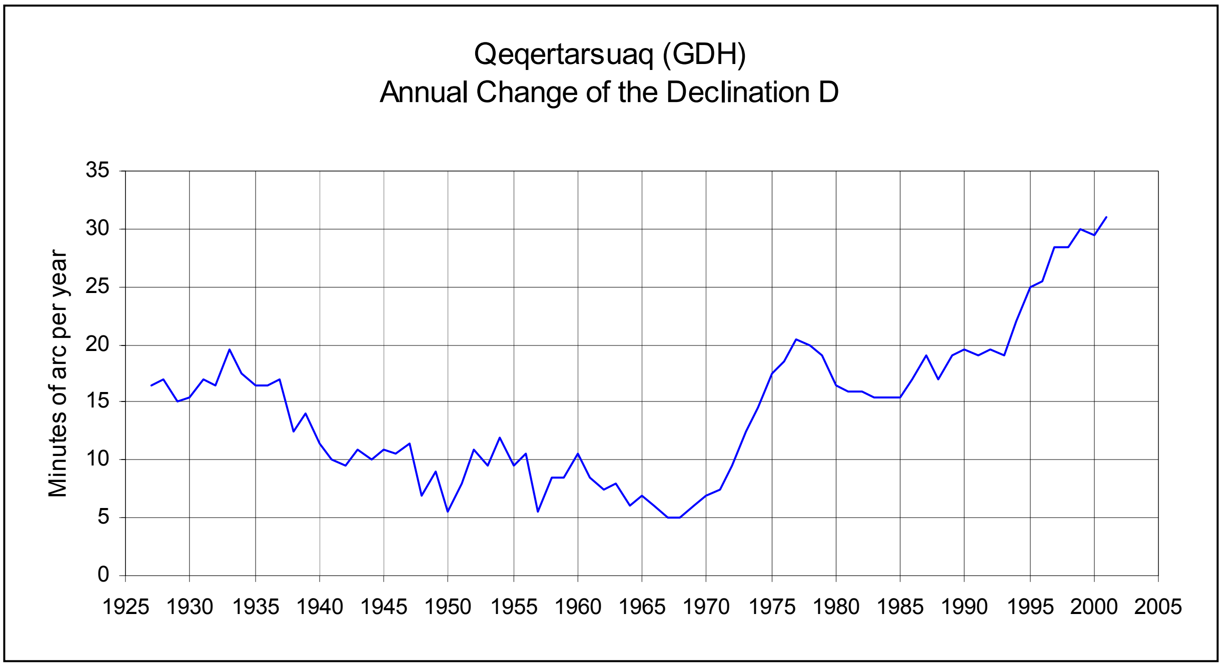
*D = Disturbed days
*I = Incomplete:
1. The annual means for1926 are based on data from February to December for the magnetic elements *D, H, X* and *Y*, and June through December for *Z*. The values for *I* and *F* have been omitted from the list as the values for *H* and *Z* does not correspond to the same period.
2. The annual means for1981 are based on data from the periods JAN 01 - JUL 08 and NOV 03 - DEC 31.

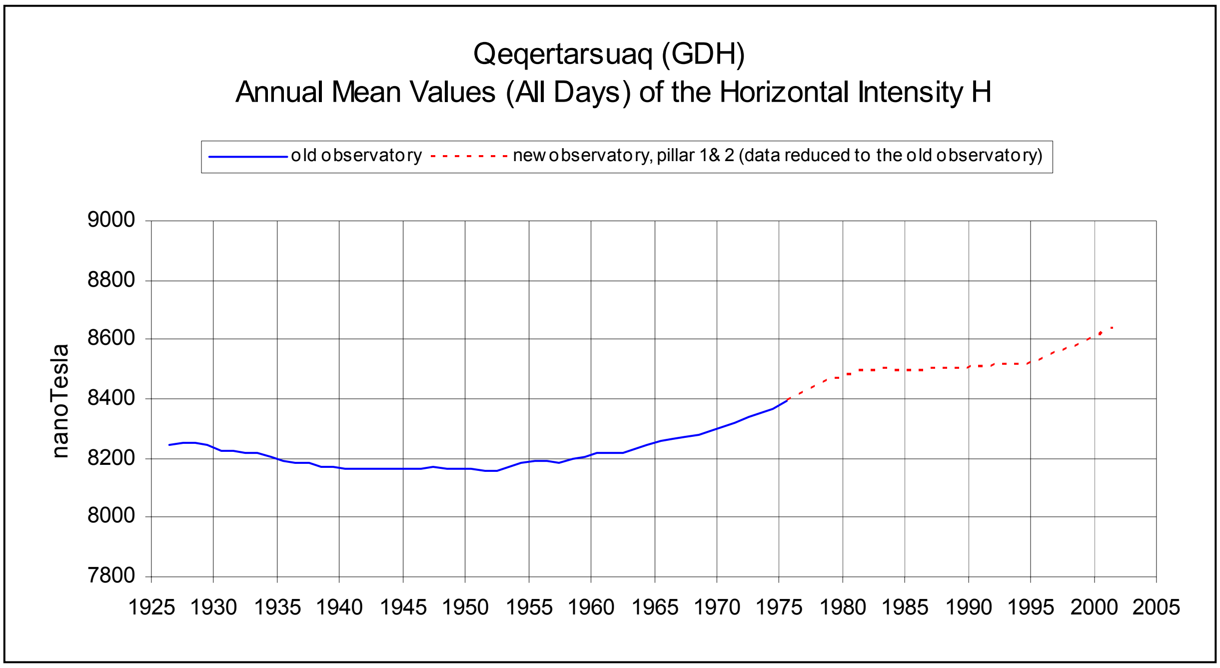
*J = Jumps:
1. The jump in the values on1976.0 is due to movement of the observatory during1975.
2. The jump on1990.0 is due to the establishment of a new absolute pier during1989.

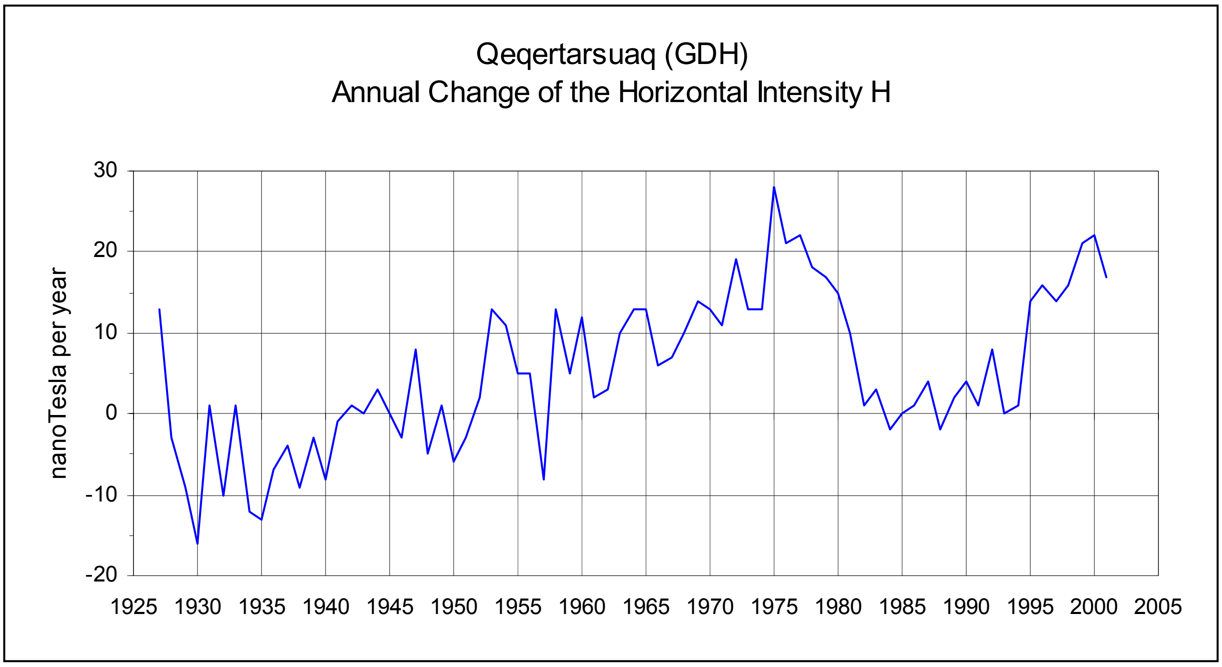
REMARK: jump value = old site value - new site value.

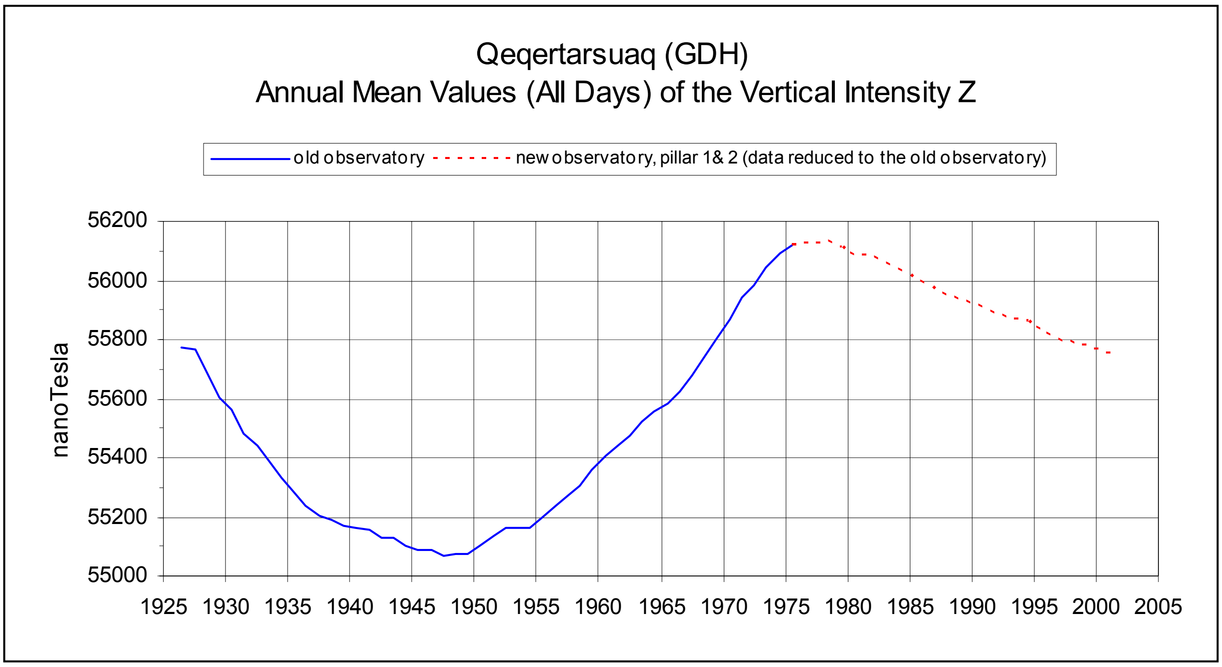
ELE = Elements recorded.

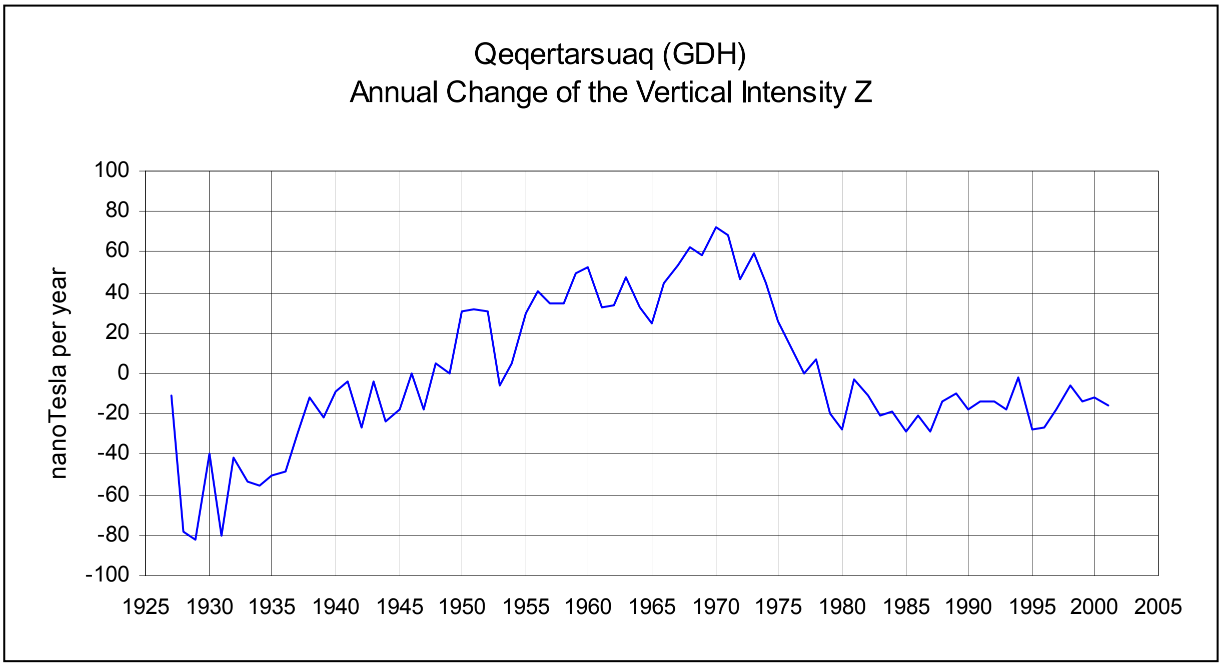

Qeqertarsuaq (GDH)
Annual Mean Values (All Days) of the Declination D
old observatory
new observatory, pillar 1& 2 (data reduced to the old observatory)
Degrees East
-40
-42
-44
-46
-48
-50
-52
-54
-56
-58
-60
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Qeqertarsuaq (GDH)
Annual Change of the Declination D
Minutes of arc per year
35
30
25
20
15
10
5
0
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Qeqertarsuaq (GDH)
Annual Mean Values (All Days) of the Horizontal Intensity H
old observatory
new observatory, pillar 1& 2 (data reduced to the old observatory)
nanoTesla
9000
8800
8600
8400
8200
8000
7800
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Qeqertarsuaq (GDH)
Annual Change of the Horizontal Intensity H
nanoTesla per year
30
20
10
0
-10
-20
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Qeqertarsuaq (GDH)
Annual Mean Values (All Days) of the Vertical Intensity Z
old observatory
new observatory, pillar 1& 2 (data reduced to the old observatory)
nanoTesla
56200
56000
55800
55600
55400
55200
55000
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Qeqertarsuaq (GDH)
Annual Change of the Vertical Intensity Z
nanoTesla per year
100
80
60
40
20
0
-20
-40
-60
-80
-100
1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005

SECTION IV

Qaanaaq (Thule) Geomagnetic Observatory 2001.

OBSERVATORY DETAILS.

A magnetic observatory was established at Thule (76°32.3'N, 290°56.5'E) in January 1947 by the Danish Meteorological Institute. In August 1952 however, the magnetic recordings had to be discontinued due to artificial disturbances from the nearby air base. During 1955 the observatory was re-established at Qaanaaq (77°29'N, 290°50'E) and the geomagnetic observations were resumed in September 1955. A description of the observatory and its location is given in the observatory yearbooks for 1955-56 and for 1985-90.

The following coordinates etc. are valid for the observatory:

Acronym (IAGA-code)	THL
Elevation (top of absolute pillar)	57 m
Geographic latitude	77°28.2'N
Geographic longitude	290°46.4'E
Geographic longitude	69°13.6'W
Geomagnetic latitude	87.92°N
Geomagnetic longitude	14.28°E
Invariant geomagnetic latitude	85.21°N
Magnetic local noon	14 UT

The geomagnetic coordinates are based on the IGRF 2000.0 magnetic field model in which the geomagnetic north pole position is 79.5°N, 288.4°E.
The invariant geomagnetic latitude is based on the IGRF 2000.0 magnetic field model valid for Epoch 2000.0 and a height of 105 km.

STAFF.

The only person employed at the observatory during 2001 was Mr. Svend Erik Ascanius.

DIARY.

MAR 08 The data logger of the supplementary variometer system was replaced.
MAR 10 The data logger of the primary variometer system was replaced by a new type (PCD v.7.0).
MAR 13 An extra heater in the laboratory was turned off.
NOV 14 An extra heater in the laboratory was turned on.

MISSING DATA.

Intervals of missing primary variometer data were, if possible, replaced by data from the supplementary recorder.

The hourly mean values are complete.

OBSERVED AND ADOPTED BASELINE VALUES.

Tables of adopted baseline values are shown below, while graphs of the observed and adopted baseline values are shown in section VII.

Adopted baseline values for the primary variometer system.

Interval beginning		H_0	D_0	Z_0
JAN 01	00:00 UT	3763.0 nT	294°11.5'	56163.5 nT
MAR 10	16:30 UT	3760.5 nT	294°10.0'	56161.5 nT
MAY 06	00:00 UT	3761.0 nT		
JUL 14	00:00 UT		294°10.5'	
AUG 06	00:00 UT		294°11.0'	
SEP 05	00:00 UT		294°10.5'	56160.5 nT
OCT 13	00:00 UT		294°10.0'	
NOV 01	00:00 UT			56161.0 nT
NOV 25	00:00 UT		294°09.5'	

Adopted baseline values for the supplementary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	not adopted	not adopted	not adopted
MAR	05	00:00 UT	3781.0 nT	294°07.5'	56123.5 nT
MAR	16	00:00 UT	not adopted	not adopted	not adopted
JUL	02	00:00 UT	3781.0 nT	294°08.0'	56124.5 nT
JUL	03	00:00 UT	not adopted	not adopted	not adopted

Baseline values for the supplementary variometer system have only been adopted when they were used in connection with data supplementation.

Monthly Mean Values, THL 2001, All Days, Quiet Days and Disturbed Days.

Year	*D*		*I*		*H*	*X*	*Y*	*Z*	*F*	*	ELE
2001	°	'	°	'	nT	nT	nT	nT	nT		
JAN	297	15.1	86	03.5	3881	1777	-3450	56310	56444	A	DHZ
FEB	297	22.2	86	03.2	3885	1786	-3450	56307	56441	A	DHZ
MAR	297	28.9	86	03.1	3885	1793	-3447	56304	56438	A	DHZ
APR	297	46.3	86	02.9	3889	1812	-3441	56306	56440	A	DHZ
MAY	298	03.1	86	01.2	3913	1840	-3453	56239	56375	A	DHZ
JUN	298	00.6	86	01.9	3903	1833	-3446	56260	56395	A	DHZ
JUL	298	06.2	86	02.1	3900	1837	-3440	56257	56392	A	DHZ
AUG	298	07.2	86	02.7	3891	1834	-3432	56281	56415	A	DHZ
SEP	298	00.0	86	02.7	3892	1827	-3436	56288	56422	A	DHZ
OCT	298	06.8	86	02.9	3890	1833	-3431	56320	56454	A	DHZ
NOV	298	05.4	86	02.6	3897	1835	-3438	56340	56475	A	DHZ
DEC	298	14.2	86	02.7	3893	1842	-3430	56324	56458	A	DHZ
WINTER	297	44.3	86	03.0	3889	1810	-3442	56320	56454	A	DHZ
EQUINOX	297	50.2	86	02.9	3889	1816	-3439	56305	56439	A	DHZ
SUMMER	298	04.1	86	02.0	3902	1836	-3443	56259	56394	A	DHZ
YEAR	297	53.3	86	02.6	3893	1821	-3441	56295	56429	A	DHZ
JAN	297	16.6	86	03.0	3888	1782	-3456	56306	56440	Q	DHZ
FEB	297	22.2	86	03.2	3885	1786	-3450	56308	56442	Q	DHZ
MAR	297	29.3	86	03.0	3887	1794	-3448	56296	56430	Q	DHZ
APR	297	60.0	86	01.2	3913	1837	-3455	56243	56379	Q	DHZ
MAY	298	05.5	86	00.1	3929	1850	-3466	56216	56353	Q	DHZ
JUN	298	01.5	86	00.9	3916	1840	-3457	56223	56359	Q	DHZ
JUL	298	09.5	86	01.6	3907	1844	-3445	56247	56383	Q	DHZ
AUG	298	13.5	86	01.6	3908	1848	-3443	56257	56393	Q	DHZ
SEP	298	00.3	86	02.2	3900	1831	-3443	56281	56416	Q	DHZ
OCT	298	05.0	86	02.3	3900	1836	-3441	56324	56459	Q	DHZ
NOV	298	09.0	86	02.5	3898	1839	-3437	56329	56464	Q	DHZ
DEC	298	14.8	86	02.3	3900	1846	-3436	56318	56453	Q	DHZ
WINTER	297	45.8	86	02.8	3892	1813	-3444	56315	56449	Q	DHZ
EQUINOX	297	53.1	86	02.2	3900	1824	-3447	56286	56421	Q	DHZ
SUMMER	298	07.8	86	01.0	3915	1846	-3453	56236	56372	Q	DHZ
YEAR	297	55.9	86	02.0	3903	1828	-3448	56279	56414	Q	DHZ
JAN	297	09.3	86	04.4	3865	1764	-3439	56313	56445	D	DHZ
FEB	297	23.0	86	03.5	3881	1785	-3446	56313	56447	D	DHZ
MAR	297	35.9	86	04.3	3868	1792	-3428	56332	56465	D	DHZ
APR	297	35.4	86	05.8	3848	1782	-3410	56392	56523	D	DHZ
MAY	297	48.3	86	02.9	3887	1813	-3438	56262	56396	D	DHZ
JUN	297	52.5	86	02.8	3890	1819	-3439	56288	56422	D	DHZ
JUL	298	13.1	86	01.7	3906	1847	-3442	56250	56385	D	DHZ
AUG	298	20.0	86	01.9	3900	1851	-3433	56231	56366	D	DHZ
SEP	297	49.5	86	03.3	3884	1813	-3435	56323	56457	D	DHZ
OCT	298	04.3	86	03.8	3876	1824	-3420	56325	56458	D	DHZ
NOV	297	54.2	86	02.4	3904	1827	-3450	56389	56524	D	DHZ
DEC	298	11.3	86	03.3	3885	1835	-3424	56335	56469	D	DHZ
WINTER	297	38.8	86	03.4	3883	1802	-3440	56338	56472	D	DHZ
EQUINOX	297	46.6	86	04.3	3869	1803	-3423	56343	56476	D	DHZ
SUMMER	298	03.9	86	02.3	3896	1833	-3438	56258	56393	D	DHZ
YEAR	297	49.9	86	03.3	3883	1813	-3434	56313	56447	D	DHZ

*A = All days
*Q = Q-days
*D = D-days
ELE = Elements recorded

Annual Mean Values, All Days.

YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1956.5	280 04.0	85 49.3	4082	714	-4019	55870	56019	A	DHZ
1957.5	280 14.0	85 50.4	4068	723	-4003	55927	56075	A	DHZ
1958.5	280 27.0	85 51.0	4059	736	-3992	55949	56096	A	DHZ
1959.5	280 39.0	85 51.9	4048	748	-3978	55983	56129	A	DHZ
1960.5	280 53.0	85 52.6	4038	762	-3965	56014	56159	A	DHZ
1961.5	281 05.0	85 53.6	4025	774	-3950	56049	56193	A	DHZ
1962.5	281 14.0	85 54.0	4019	783	-3942	56074	56218	A	DHZ
1963.5	281 25.0	85 54.7	4010	794	-3931	56113	56256	A	DHZ
1964.5	281 33.0	85 55.2	4005	802	-3924	56149	56292	A	DHZ
1965.5	281 40.0	85 55.8	3998	808	-3915	56180	56322	A	DHZ
1966.5	281 44.0	85 56.6	3987	811	-3904	56225	56366	A	DHZ
1967.5	281 44.0	85 57.6	3975	808	-3892	56277	56417	A	DHZ
1968.5	281 49.0	85 58.2	3967	812	-3883	56318	56458	A	DHZ
1969.5	281 51.0	85 58.8	3960	813	-3876	56349	56488	A	DHZ
1970.5	281 53.0	85 59.6	3951	814	-3866	56412	56550	A	DHZ
1971.5	281 55.0	86 00.5	3941	814	-3856	56470	56607	A	DHZ
1972.5	282 07.0	86 00.9	3937	826	-3849	56513	56650	A	DHZ
1973.5	282 22.0	86 01.5	3931	842	-3840	56564	56700	A	DHZ
1974.5	282 42.0	86 02.0	3926	863	-3830	56621	56757	A	DHZ
1975.5	283 03.0	86 02.3	3923	886	-3822	56641	56777	A	DHZ
1976.5	283 34.0	86 02.4	3923	920	-3814	56663	56799	A	DHZ
1977.5	284 06.0	86 02.4	3924	956	-3806	56674	56810	A	DHZ
1978.5	284 35.0	86 02.5	3922	988	-3796	56684	56820	A	DHZ
1979.5	285 04.0	86 02.5	3921	1019	-3786	56671	56806	A	DHZ
1980.5	285 28.0	86 02.2	3925	1047	-3783	56649	56785	A	DHZ
1981.5	285 51.0	86 02.2	3924	1072	-3775	56631	56767	A	DHZ
1982.5	286 10.0	86 02.4	3919	1091	-3764	56622	56757	A	DHZ
1983.5	286 29.0	86 02.7	3913	1110	-3752	56593	56728	A	DHZ
1984.5	286 48.0	86 03.0	3906	1129	-3739	56567	56702	A	DHZ
1985.5	287 07.0	86 03.5	3896	1147	-3723	56538	56672	A	DHZ
1986.5	287 27.0	86 04.0	3885	1165	-3706	56506	56639	A	DHZ
1987.5	287 52.0	86 04.3	3877	1189	-3690	56464	56597	A	DHZ
1988.5	288 17.0	86 04.8	3868	1214	-3673	56448	56580	A	DHZ
1989.5	288 45.0	86 05.3	3859	1240	-3654	56433	56565	A	DHZ
1990.5	289 10.0	86 05.7	3850	1264	-3637	56410	56541	A	DHZ
1991.5	289 40.0	86 06.1	3843	1294	-3619	56389	56520	A	DHZ
1992.5	290 12.0	86 06.0	3842	1327	-3606	56362	56493	A	DHZ
1993.5	290 46.0	86 06.0	3842	1362	-3592	56344	56475	A	DHZ
1994.5	291 26.0	86 06.1	3840	1403	-3574	56342	56473	A	DHZ
1995.5	292 11.0	86 06.1	3838	1449	-3554	56321	56452	A	DHZ
1996.5	293 01.0	86 05.9	3840	1501	-3534	56302	56433	A	DHZ
1997.5	293 54.0	86 05.7	3843	1557	-3514	56295	56426	A	DHZ
1998.5	294 51.0	86 05.2	3852	1619	-3495	56297	56429	A	DHZ
1999.5	295 51.0	86 04.4	3864	1685	-3477	56292	56424	A	DHZ
2000.5	296 50.0	86 03.6	3877	1750	-3460	56298	56431	A	DHZ
2001.5	297 53.0	86 02.6	3893	1821	-3441	56295	56429	A	DHZ

*A = All days
ELE = Elements recorded.

Annual Mean Values, Quiet Days.

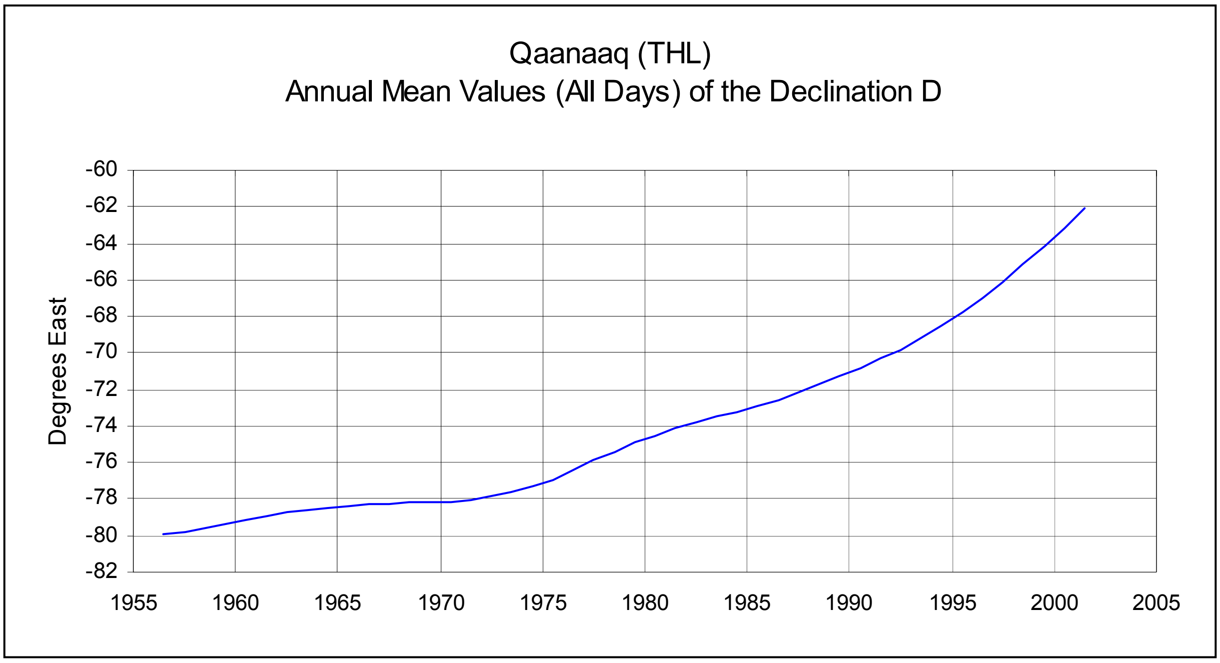
YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1956.5	280 02.0	85 48.9	4087	712	-4024	55862	56011	Q	DHZ
1957.5	280 14.0	85 50.0	4074	724	-4009	55921	56069	Q	DHZ
1958.5	280 27.0	85 50.4	4068	738	-4001	55935	56083	Q	DHZ
1959.5	280 36.0	85 51.5	4054	746	-3985	55985	56132	Q	DHZ
1960.5	280 56.0	85 52.1	4046	767	-3973	56005	56151	Q	DHZ
1961.5	281 03.0	85 53.2	4031	773	-3956	56043	56188	Q	DHZ
1962.5	281 16.0	85 53.7	4024	786	-3946	56063	56207	Q	DHZ
1963.5	281 24.0	85 54.5	4014	793	-3935	56108	56251	Q	DHZ
1964.5	281 34.0	85 54.9	4009	804	-3928	56142	56285	Q	DHZ
1965.5	281 39.0	85 55.6	4000	808	-3918	56178	56320	Q	DHZ
1966.5	281 46.0	85 56.1	3994	814	-3910	56208	56350	Q	DHZ
1967.5	281 44.0	85 57.2	3981	810	-3898	56267	56408	Q	DHZ
1968.5	281 49.0	85 57.8	3974	814	-3890	56310	56450	Q	DHZ
1969.5	281 50.0	85 58.5	3964	813	-3880	56341	56480	Q	DHZ
1970.5	281 49.0	85 59.4	3954	810	-3870	56415	56553	Q	DHZ
1971.5	281 55.0	86 00.2	3945	815	-3860	56461	56599	Q	DHZ
1972.5	282 09.0	86 00.5	3943	830	-3855	56503	56640	Q	DHZ
1973.5	282 22.0	86 01.1	3936	843	-3845	56549	56686	Q	DHZ
1974.5	282 44.0	86 01.6	3931	866	-3834	56601	56737	Q	DHZ
1975.5	283 04.0	86 02.0	3927	888	-3825	56636	56772	Q	DHZ
1976.5	283 35.0	86 02.1	3927	922	-3817	56651	56787	Q	DHZ
1977.5	284 05.0	86 02.3	3925	955	-3807	56670	56806	Q	DHZ
1978.5	284 36.0	86 02.2	3927	990	-3800	56674	56810	Q	DHZ
1979.5	285 03.0	86 02.2	3927	1020	-3792	56670	56806	Q	DHZ
1980.5	285 27.0	86 02.0	3929	1047	-3787	56650	56786	Q	DHZ
1981.5	285 51.0	86 01.5	3934	1074	-3784	56619	56756	Q	DHZ
1982.5	286 11.0	86 02.2	3923	1093	-3768	56614	56750	Q	DHZ
1983.5	286 32.0	86 02.2	3920	1116	-3758	56581	56717	Q	DHZ
1984.5	286 50.0	86 02.6	3911	1133	-3743	56556	56691	Q	DHZ
1985.5	287 06.0	86 03.1	3901	1147	-3729	56524	56658	Q	DHZ
1986.5	287 30.0	86 03.7	3889	1169	-3709	56494	56628	Q	DHZ
1987.5	287 51.0	86 04.1	3880	1189	-3693	56460	56593	Q	DHZ
1988.5	288 17.0	86 04.4	3873	1215	-3678	56443	56576	Q	DHZ
1989.5	288 45.0	86 05.0	3863	1242	-3658	56425	56557	Q	DHZ
1990.5	289 08.0	86 05.6	3853	1263	-3640	56413	56544	Q	DHZ
1991.5	289 36.0	86 06.0	3845	1290	-3622	56394	56525	Q	DHZ
1992.5	290 10.0	86 05.7	3848	1327	-3612	56361	56492	Q	DHZ
1993.5	290 48.0	86 05.6	3847	1366	-3596	56334	56465	Q	DHZ
1994.5	291 29.0	86 05.7	3844	1408	-3577	56325	56456	Q	DHZ
1995.5	292 11.0	86 05.8	3842	1451	-3558	56312	56443	Q	DHZ
1996.5	293 03.0	86 05.6	3844	1505	-3537	56295	56426	Q	DHZ
1997.5	293 52.0	86 05.5	3846	1556	-3517	56291	56422	Q	DHZ
1998.5	294 51.0	86 04.7	3858	1622	-3501	56286	56418	Q	DHZ
1999.5	295 52.0	86 04.1	3869	1688	-3481	56287	56420	Q	DHZ
2000.5	296 46.0	86 03.5	3880	1747	-3464	56300	56434	Q	DHZ
2001.5	297 56.0	86 02.0	3903	1828	-3448	56279	56414	Q	DHZ

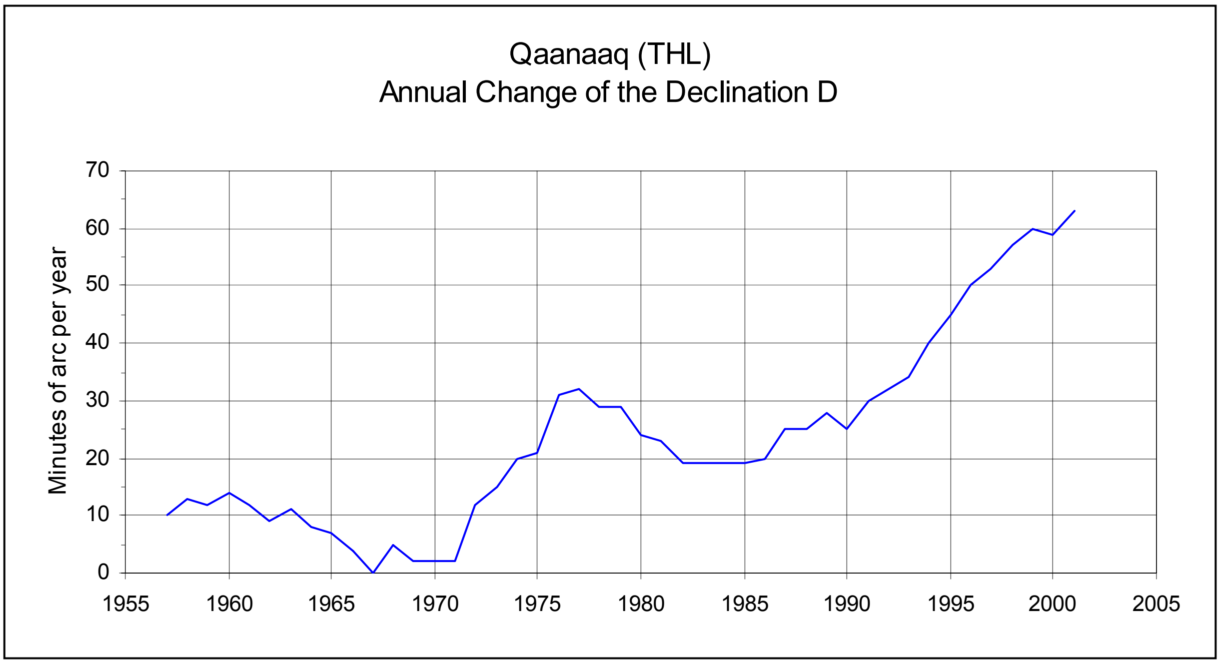
*Q = Quiet days
ELE = Elements recorded.

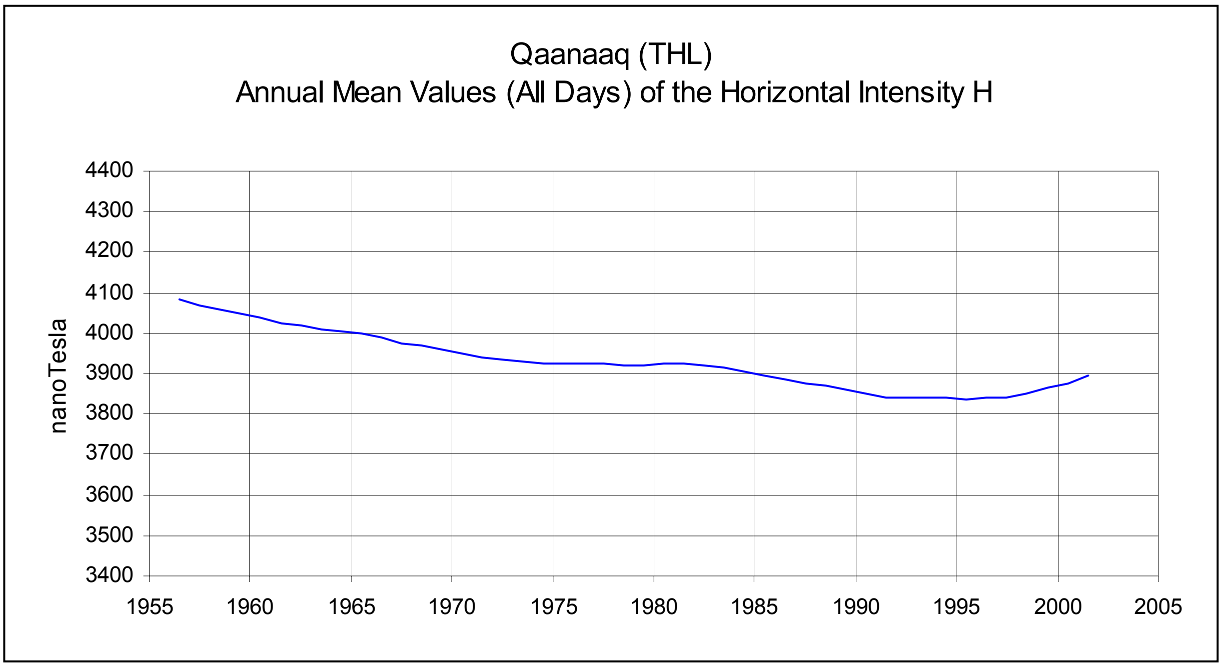
Annual Mean Values, Disturbed Days.

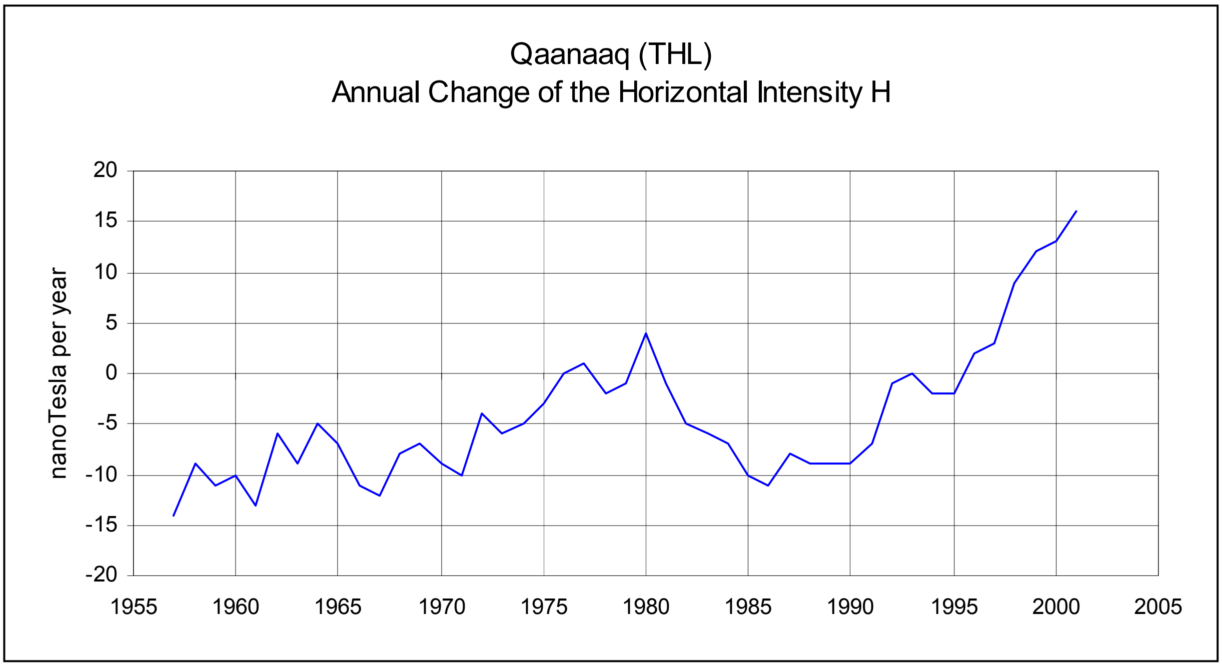
YEAR	*D*	*I*	*H*	*X*	*Y*	*Z*	*F*	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1956.5	280 11.0	85 49.5	4079	721	-4015	55878	56027	D	DHZ
1957.5	280 15.0	85 50.7	4064	723	-3999	55943	56090	D	DHZ
1958.5	280 26.0	85 51.5	4052	734	-3985	55965	56111	D	DHZ
1959.5	280 37.0	85 52.6	4038	744	-3969	56010	56155	D	DHZ
1960.5	280 49.0	85 53.3	4029	756	-3957	56039	56184	D	DHZ
1961.5	281 06.0	85 54.1	4016	773	-3941	56058	56202	D	DHZ
1962.5	281 11.0	85 54.5	4012	778	-3936	56085	56228	D	DHZ
1963.5	281 25.0	85 54.9	4008	793	-3929	56120	56263	D	DHZ
1964.5	281 32.0	85 55.5	4000	800	-3919	56157	56299	D	DHZ
1965.5	281 39.0	85 56.0	3995	807	-3913	56185	56327	D	DHZ
1966.5	281 42.0	85 57.5	3974	806	-3891	56236	56376	D	DHZ
1967.5	281 42.0	85 57.9	3971	805	-3888	56283	56423	D	DHZ
1968.5	281 51.0	85 58.7	3960	813	-3876	56328	56467	D	DHZ
1969.5	281 52.0	85 59.2	3954	813	-3869	56358	56497	D	DHZ
1970.5	281 58.0	86 00.0	3945	818	-3859	56417	56555	D	DHZ
1971.5	281 55.0	86 00.9	3935	813	-3850	56483	56620	D	DHZ
1972.5	282 08.0	86 01.1	3934	827	-3846	56523	56660	D	DHZ
1973.5	282 19.0	86 01.9	3925	837	-3835	56581	56717	D	DHZ
1974.5	282 43.0	86 02.5	3919	863	-3823	56632	56767	D	DHZ
1975.5	283 02.0	86 02.8	3915	883	-3814	56656	56791	D	DHZ
1976.5	283 34.0	86 02.7	3919	919	-3810	56681	56816	D	DHZ
1977.5	284 07.0	86 02.8	3918	956	-3800	56685	56820	D	DHZ
1978.5	284 40.0	86 02.8	3918	992	-3790	56693	56828	D	DHZ
1979.5	285 03.0	86 03.0	3914	1016	-3780	56682	56817	D	DHZ
1980.5	285 28.0	86 02.8	3916	1044	-3774	56663	56798	D	DHZ
1981.5	285 55.0	86 02.9	3913	1073	-3763	56644	56779	D	DHZ
1982.5	286 13.0	86 02.9	3912	1093	-3756	56631	56766	D	DHZ
1983.5	286 27.0	86 03.4	3902	1105	-3742	56617	56751	D	DHZ
1984.5	286 47.0	86 03.6	3898	1126	-3732	56586	56720	D	DHZ
1985.5	287 07.0	86 04.0	3888	1144	-3716	56556	56689	D	DHZ
1986.5	287 23.0	86 04.5	3879	1159	-3702	56529	56662	D	DHZ
1987.5	287 52.0	86 04.7	3871	1188	-3684	56473	56606	D	DHZ
1988.5	288 18.0	86 05.5	3858	1211	-3663	56462	56594	D	DHZ
1989.5	288 43.0	86 05.6	3855	1237	-3651	56445	56576	D	DHZ
1990.5	289 14.0	86 05.8	3849	1268	-3634	56417	56548	D	DHZ
1991.5	289 44.0	86 06.6	3835	1295	-3610	56397	56527	D	DHZ
1992.5	290 18.0	86 06.5	3835	1330	-3597	56367	56497	D	DHZ
1993.5	290 43.0	86 06.7	3832	1356	-3584	56369	56499	D	DHZ
1994.5	291 26.0	86 06.6	3833	1401	-3568	56361	56491	D	DHZ
1995.5	292 09.0	86 06.6	3831	1444	-3548	56332	56462	D	DHZ
1996.5	292 59.0	86 06.1	3837	1498	-3533	56312	56443	D	DHZ
1997.5	293 52.0	86 06.1	3837	1553	-3509	56308	56439	D	DHZ
1998.5	294 55.0	86 05.5	3846	1620	-3488	56303	56434	D	DHZ
1999.5	295 54.0	86 04.8	3858	1685	-3471	56301	56433	D	DHZ
2000.5	296 48.0	86 04.0	3872	1746	-3456	56308	56441	D	DHZ
2001.5	297 50.0	86 03.3	3883	1813	-3434	56313	56447	D	DHZ

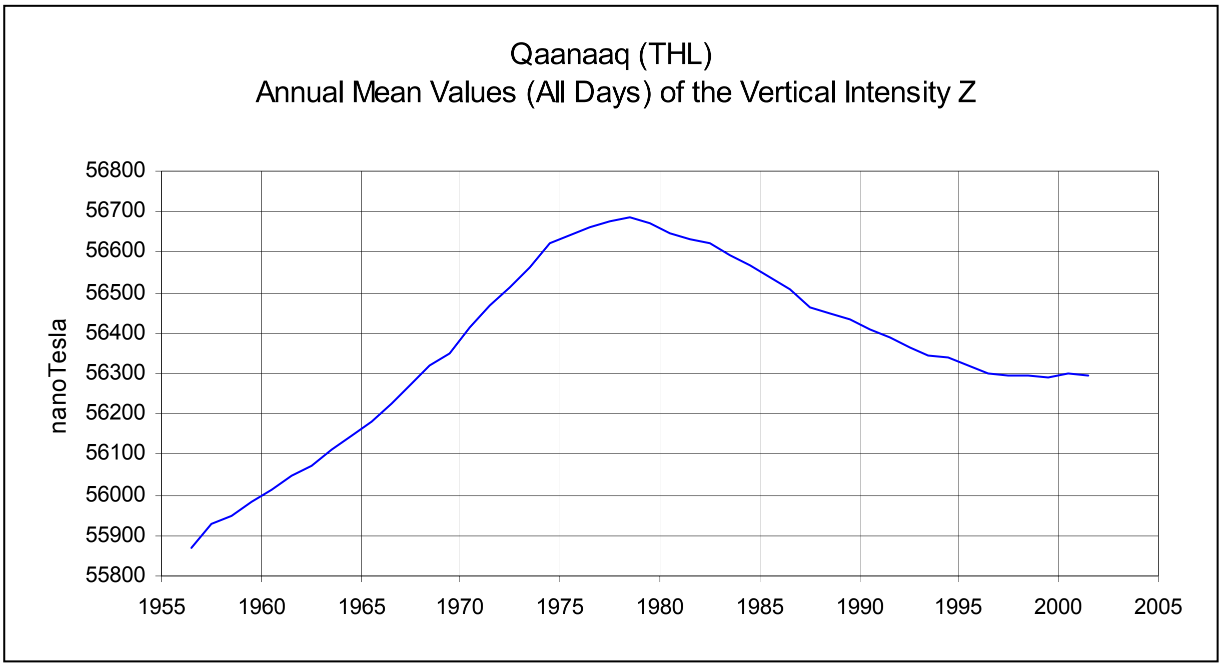
*D = Disturbed days
ELE = Elements recorded.

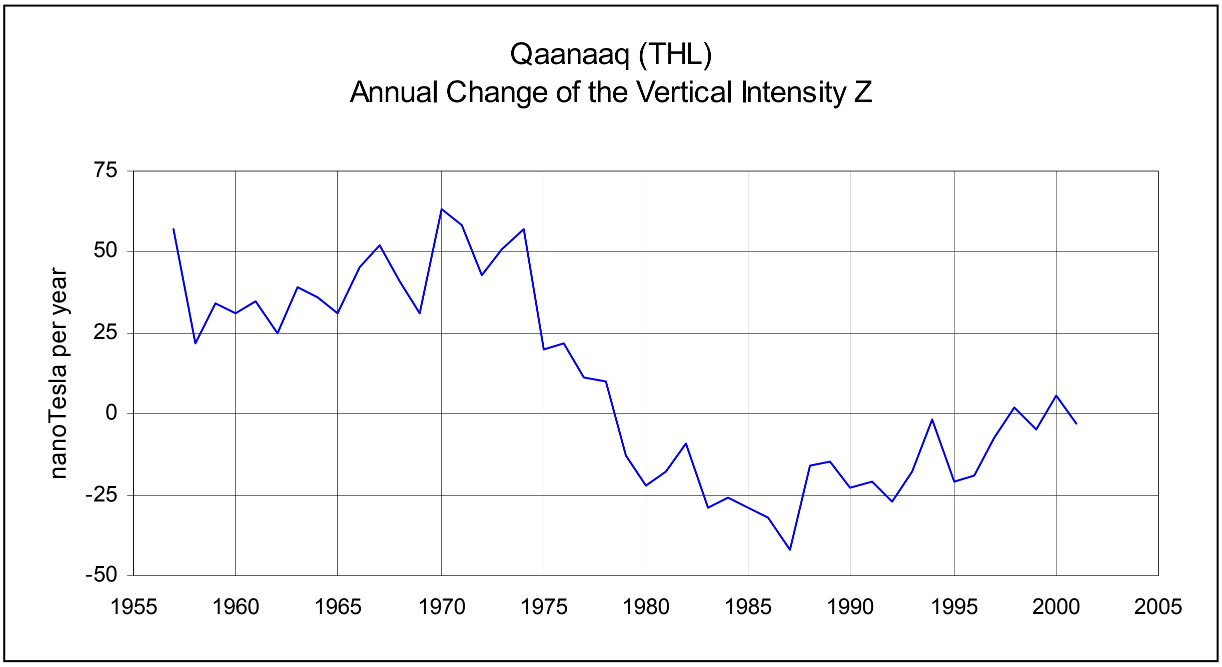

Qaanaaq (THL)
Annual Mean Values (All Days) of the Declination D
Degrees East
-60
-62
-64
-66
-68
-70
-72
-74
-76
-78
-80
-82
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005


Qaanaaq (THL)
Annual Change of the Declination D
Minutes of arc per year
70
60
50
40
30
20
10
0
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005


Qaanaaq (THL)
Annual Mean Values (All Days) of the Horizontal Intensity H
nanoTesla
4400
4300
4200
4100
4000
3900
3800
3700
3600
3500
3400
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005


Qaanaaq (THL)
Annual Change of the Horizontal Intensity H
nanoTesla per year
20
15
10
5
0
-5
-10
-15
-20
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005


Qaanaaq (THL)
Annual Mean Values (All Days) of the Vertical Intensity Z
nanoTesla
56800
56700
56600
56500
56400
56300
56200
56100
56000
55900
55800
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005


Qaanaaq (THL)
Annual Change of the Vertical Intensity Z
nanoTesla per year
75
50
25
0
-25
-50
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005

SECTION V

Narsarsuaq Geomagnetic Observatory 2001.

OBSERVATORY DETAILS.

A magnetic observatory was established at Narsarsuaq (61°11'N, 314°34'E) during 1967 by the Danish Meteorological Institute as a successor for the temporary IGY/IQSY-observatory at Qaqortoq (Julianehaab), 70 km SW of Narsarsuaq. A description of the observatory and its location is given in the observatory yearbooks for 1968-70, 1980-82 and for 1985-90.

The following coordinates etc. are valid for the observatory:

Acronym (IAGA-code)	NAQ
Elevation (top of absolute pillar)	4 m
Geographic latitude	61°09.6'N
Geographic longitude	314°33.5'E
Geographic longitude	45°26.5'W
Geomagnetic latitude	70.09°N
Geomagnetic longitude	38.63°E
Invariant geomagnetic latitude	66.50°N
Magnetic local noon	14 UT

The geomagnetic coordinates are based on the IGRF 2000.0 magnetic field model in which the geomagnetic north pole position is 79.5°N, 288.4°E.
The invariant geomagnetic latitude is based on the IGRF 2000.0 magnetic field model valid for Epoch 2000.0 and a height of 105 km.

STAFF.

Employees from the Ice Patrol in Narsarsuaq supervised the buildings and the equipment. From September and the rest of the year they also made absolute measurements. See the diary below.

DIARY.

No absolute measurements were made during January 01 to June 10 and again from June 18 to September 12.

During June 11 to June 18 Mr. Ole Rasmussen (DMI) visited the observatory in order to make some absolute measurements and to replace parts of the two variometer systems such as data loggers and printers.
He also replaced the DI-flux sensor and electronics by a new and better type ("Model G").
Finally he renewed the cables in the variometer house and the absolute house.

During two periods (September 12-19 and October 10-17) Mr. Børge Pedersen (DMI) visited the observatory in order to teach Mr. Carl Plesner and Mr. Erik Vestergaard from the Ice Patrol to make absolute measurements. Theodolite type 020B was introduced to be used in the routine DI-flux measurements instead of type 010B because it is more convenient to handle for the two new observers.

MISSING DATA.

Intervals of missing primary variometer data were, if possible, replaced by data from the supplementary recorder.

The hourly mean values are missing on June 13 (09-10 UT) and on August 23 (13-14 UT).

OBSERVED AND ADOPTED BASELINE VALUES.

Tables of adopted baseline values are shown below, while graphs of the observed and adopted baseline values are shown in section VII.

Regular absolute measurements stopped temporarily at the end of August 2000 when the observer Mr. Larsen broke his right arm just a month before retirement. The measurements were resumed medio June 2001. In the intervening period the baseline values have been adopted by linear interpolation.

Adopted baseline values for the primary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	12465.5 nT	330°52.3'	53442.5 nT
FEB	01	00:00 UT			53443.0 nT
APR	01	00:00 UT			53443.5 nT
JUN	13	12:30 UT	12465.0 nT	330°51.9'	53442.5 nT
SEP	01	00:00 UT	12465.5 nT	330°52.1'	
OCT	10	00:00 UT	12466.0 nT	330°52.3'	53443.0 nT
DEC	05	00:00 UT	12666.5 nT		

Adopted baseline values for the supplementary variometer system.

Interval beginning			H_0	D_0	Z_0
JAN	01	00:00 UT	not adopted	not adopted	not adopted
FEB	09	00:00 UT	12420.0 nT	330°26.8'	53408.0 nT
FEB	14	00:00 UT	not adopted	not adopted	not adopted
JUN	08	00:00 UT	12421.0 nT	330°26.8'	53408.0 nT
JUN	09	00:00 UT	not adopted	not adopted	not adopted
JUN	13	00:00 UT	12419.0 nT	330°26.4'	53406.5 nT
JUN	14	00:00 UT	not adopted	not adopted	not adopted
OCT	06	00:00 UT	12419.5 nT	330°26.5'	53406.0 nT
OCT	12	00:00 UT	not adopted	not adopted	not adopted

Baseline values for the supplementary variometer system have only been adopted when they were used in connection with data supplementation.

Monthly Mean Values, NAQ 2001, All Days, Quiet Days and Disturbed Days.

Year	D		I		H	X	Y	Z	F	*	ELE
2001	°	'	°	'	nT	nT	nT	nT	nT		
JAN	331	50.8	76	46.3	12526	11044	-5910	53283	54736	A	DHZ
FEB	331	52.9	76	46.7	12519	11041	-5900	53279	54730	A	DHZ
MAR	331	53.8	76	47.3	12510	11035	-5893	53286	54735	A	DHZ
APR	331	56.6	76	47.3	12510	11040	-5884	53291	54740	A	DHZ
MAY	332	00.1	76	45.6	12536	11069	-5885	53282	54737	A	DHZ
JUN	332	01.5	76	45.3	12539	11074	-5882	53273	54729	A	DHZ
JUL	332	03.1	76	45.3	12539	11077	-5877	53271	54727	A	DHZ
AUG	332	04.5	76	45.3	12537	11077	-5871	53264	54719	A	DHZ
SEP	332	05.9	76	45.5	12535	11078	-5866	53271	54726	A	DHZ
OCT	332	06.0	76	47.2	12510	11056	-5854	53282	54731	A	DHZ
NOV	332	07.9	76	46.5	12523	11071	-5854	53288	54740	A	DHZ
DEC	332	11.0	76	44.8	12545	11095	-5854	53263	54720	A	DHZ
WINTER	332	00.6	76	46.0	12529	11063	-5880	53278	54731	A	DHZ
EQUINOX	332	00.6	76	46.8	12516	11052	-5874	53282	54732	A	DHZ
SUMMER	332	02.5	76	45.4	12537	11074	-5878	53273	54728	A	DHZ
YEAR	332	01.3	76	46.1	12527	11063	-5877	53278	54731	A	DHZ
JAN	331	51.1	76	46.4	12525	11044	-5909	53288	54740	Q	DHZ
FEB	331	52.8	76	46.4	12524	11046	-5903	53285	54737	Q	DHZ
MAR	331	54.8	76	46.3	12525	11050	-5897	53284	54736	Q	DHZ
APR	331	58.0	76	46.5	12526	11056	-5887	53298	54750	Q	DHZ
MAY	331	59.7	76	45.3	12542	11073	-5889	53283	54739	Q	DHZ
JUN	332	01.7	76	44.7	12549	11083	-5886	53274	54732	Q	DHZ
JUL	332	02.9	76	45.0	12542	11079	-5879	53264	54721	Q	DHZ
AUG	332	04.7	76	45.5	12535	11076	-5870	53269	54724	Q	DHZ
SEP	332	05.2	76	45.2	12539	11080	-5870	53268	54724	Q	DHZ
OCT	332	07.3	76	45.9	12530	11076	-5859	53279	54733	Q	DHZ
NOV	332	09.2	76	45.5	12539	11087	-5857	53283	54739	Q	DHZ
DEC	332	10.7	76	45.0	12543	11093	-5854	53268	54725	Q	DHZ
WINTER	332	01.1	76	45.9	12532	11067	-5880	53281	54735	Q	DHZ
EQUINOX	332	01.3	76	46.0	12529	11065	-5878	53282	54735	Q	DHZ
SUMMER	332	02.2	76	45.1	12542	11078	-5881	53272	54729	Q	DHZ
YEAR	332	01.5	76	45.6	12535	11070	-5880	53278	54733	Q	DHZ
JAN	331	51.0	76	45.1	12542	11058	-5917	53266	54723	D	DHZ
FEB	331	52.3	76	47.3	12506	11029	-5896	53271	54719	D	DHZ
MAR	331	54.0	76	49.4	12475	11005	-5876	53289	54730	D	DHZ
APR	331	51.9	76	48.3	12491	11015	-5890	53274	54719	D	DHZ
MAY	332	01.0	76	45.9	12533	11068	-5881	53291	54745	D	DHZ
JUN	332	01.8	76	46.2	12526	11063	-5875	53281	54734	D	DHZ
JUL	332	02.6	76	46.4	12521	11060	-5870	53272	54724	D	DHZ
AUG	332	04.3	76	44.9	12542	11081	-5874	53252	54709	D	DHZ
SEP	332	05.2	76	45.0	12541	11082	-5871	53258	54715	D	DHZ
OCT	332	03.1	76	50.3	12460	11007	-5840	53288	54725	D	DHZ
NOV	332	05.3	76	50.1	12472	11021	-5838	53322	54761	D	DHZ
DEC	332	10.8	76	45.1	12537	11088	-5851	53252	54708	D	DHZ
WINTER	331	60.0	76	46.9	12514	11049	-5875	53277	54727	D	DHZ
EQUINOX	331	58.7	76	48.2	12492	11028	-5869	53277	54722	D	DHZ
SUMMER	332	02.4	76	45.8	12531	11068	-5875	53274	54728	D	DHZ
YEAR	332	00.3	76	47.0	12512	11048	-5873	53276	54726	D	DHZ

*A = All days
*Q = Q-days
*D = D-days
ELE = Elements recorded

Annual Mean Values, Quiet Winter Days, All Days, Quiet Days and Disturbed Days.

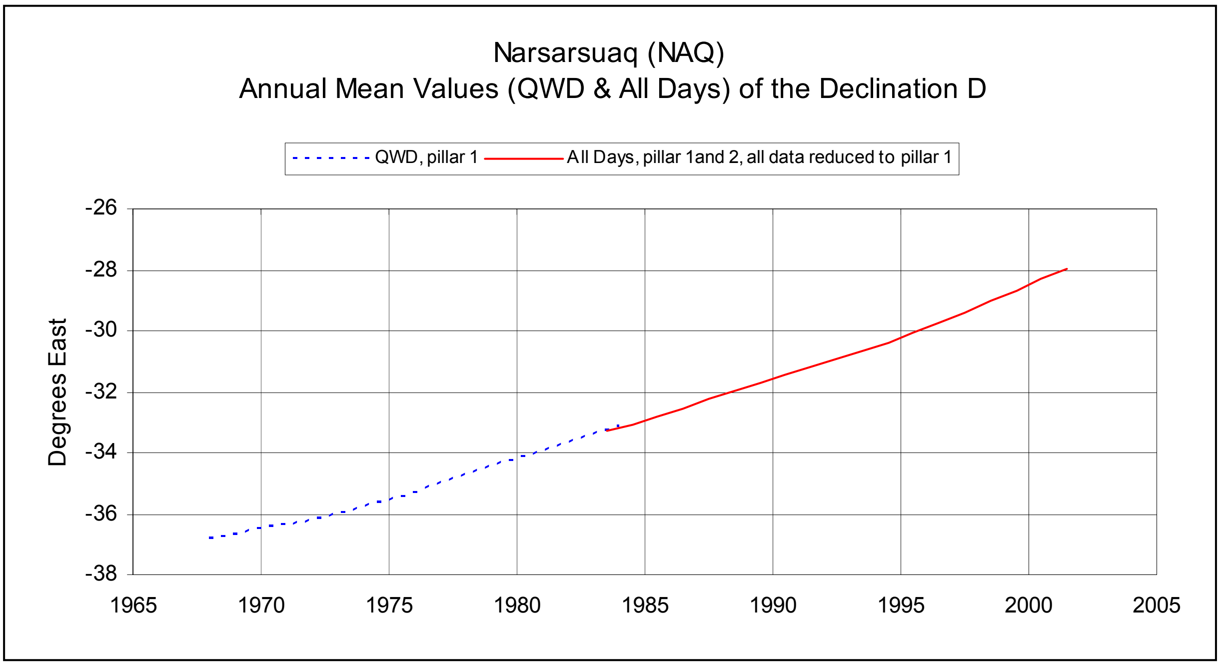
YEAR	D	I	H	X	Y	Z	F	*	ELE
	° '	° '	nT	nT	nT	nT	nT		
1968.0	323 10.0	77 46.3	11617	9298	-6964	53600	54844	W	DHZ
1969.0	323 19.0	77 44.9	11652	9344	-6961	53656	54907	W	DHZ
1970.0	323 29.0	77 43.2	11692	9397	-6957	53713	54971	W	DHZ
1971.0	323 38.0	77 41.4	11733	9448	-6957	53767	55032	W	DHZ
1972.0	323 48.0	77 39.5	11775	9502	-6954	53815	55088	W	DHZ
1973.0	323 59.0	77 37.5	11816	9557	-6948	53856	55137	W	DHZ
1974.0	324 12.0	77 35.4	11859	9618	-6937	53890	55179	W	DHZ
1975.0	324 27.0	77 33.2	11900	9682	-6919	53912	55210	W	DHZ
1976.0	324 43.0	77 30.6	11942	9748	-6898	53914	55221	W	DHZ
1977.0	325 01.0	77 28.4	11978	9814	-6867	53907	55222	W	DHZ
1978.0	325 17.0	77 26.1	12012	9874	-6841	53895	55217	W	DHZ
1979.0	325 33.0	77 23.7	12048	9935	-6815	53877	55208	W	DHZ
1980.0	325 48.0	77 21.4	12078	9989	-6789	53845	55183	W	DHZ
1981.0	326 04.0	77 19.2	12108	10046	-6759	53818	55163	W	DHZ
1982.0	326 20.0	77 17.1	12138	10102	-6729	53793	55145	W	DHZ
1983.0	326 35.0	77 16.0	12153	10144	-6693	53780	55136	W	DHZ
1984.0	326 50.0	77 14.0	12178	10194	-6662	53746	55108	W	DHZ
1983.5	326 41.6	77 15.8	12152	10156	-6673	53764	55120	A	DHZ
1984.5	326 55.7	77 14.3	12171	10199	-6642	53736	55097	A	DHZ
1985.5	327 11.1	77 12.9	12187	10242	-6604	53706	55071	A	DHZ
1986.5	327 26.8	77 11.7	12201	10284	-6565	53679	55048	A	DHZ
1987.5	327 44.5	77 09.9	12223	10336	-6524	53647	55022	A	DHZ
1988.5	328 00.5	77 09.0	12235	10377	-6482	53633	55011	A	DHZ
1989.0	0 02.6	0 00.7	-4	2	10	30	28	J	DHZ
1989.5	328 13.8	77 07.2	12254	10418	-6452	53592	54975	A	DHZ
1990.5	328 29.9	77 05.9	12271	10463	-6412	53571	54959	A	DHZ
1991.5	328 45.6	77 04.9	12284	10503	-6371	53555	54946	A	DHZ
1992.5	329 01.3	77 03.4	12302	10547	-6332	53525	54920	A	DHZ
1993.5	329 17.9	77 01.6	12323	10596	-6292	53495	54896	A	DHZ
1994.0	0 00.0	0 00.0	-1	-1	0	-2	-3	J	DHZ
1994.5	329 34.3	77 00.7	12335	10636	-6247	53476	54880	A	DHZ
1995.5	329 53.6	76 58.3	12366	10698	-6203	53444	54856	A	DHZ
1996.5	330 13.6	76 56.0	12395	10759	-6155	53409	54828	A	DHZ
1997.5	330 33.9	76 54.0	12423	10819	-6105	53381	54807	A	DHZ
1998.5	330 55.6	76 52.2	12446	10878	-6048	53361	54793	A	DHZ
1999.5	331 17.3	76 50.2	12473	10939	-5992	53332	54771	A	DHZ
2000.5	331 39.0	76 48.4	12497	10998	-5934	53311	54756	A	DHZ
2001.5	332 01.3	76 46.1	12527	11063	-5877	53278	54731	A	DHZ
1983.5	326 42.3	77 15.1	12164	10167	-6677	53765	55124	Q	DHZ
1984.5	326 56.3	77 13.3	12186	10213	-6648	53734	55098	Q	DHZ
1985.5	327 11.6	77 12.0	12202	10256	-6611	53704	55073	Q	DHZ
1986.5	327 27.4	77 10.8	12215	10297	-6571	53676	55048	Q	DHZ
1987.5	327 44.9	77 09.4	12232	10345	-6527	53648	55025	Q	DHZ
1988.5	328 00.8	77 08.2	12246	10387	-6487	53631	55011	Q	DHZ
1989.0	0 02.6	0 00.7	-4	2	10	30	28	J	DHZ
1989.5	328 14.4	77 06.6	12263	10427	-6455	53591	54976	Q	DHZ
1990.5	328 30.0	77 05.3	12279	10470	-6416	53567	54956	Q	DHZ

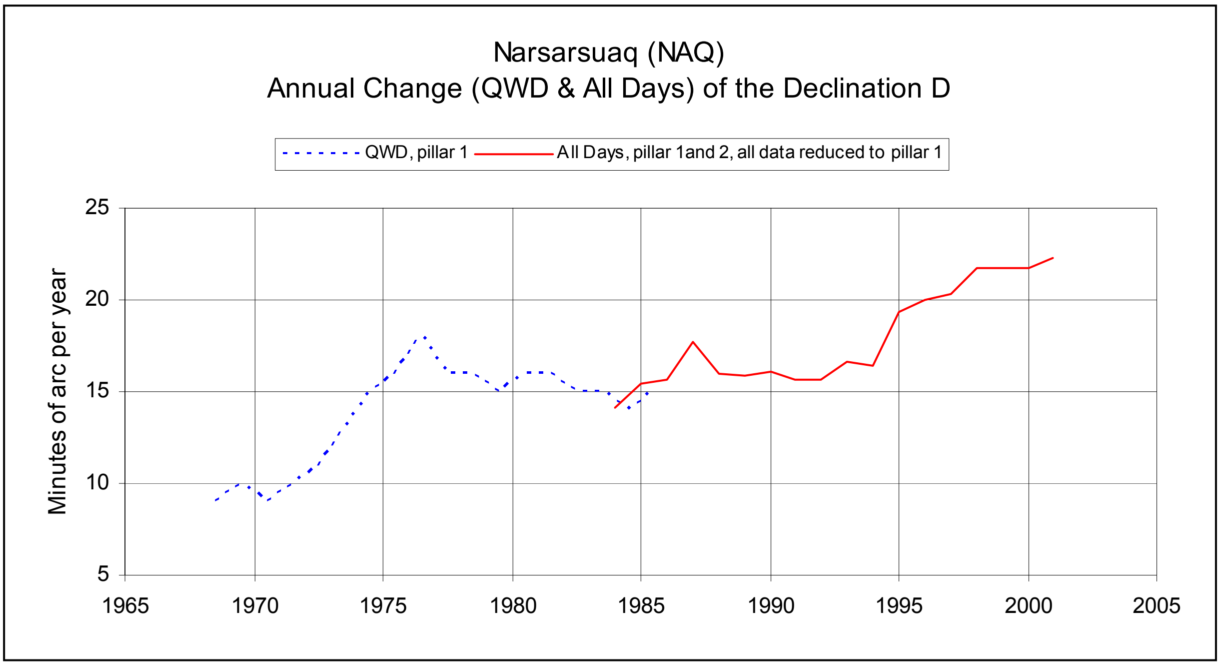
continues...

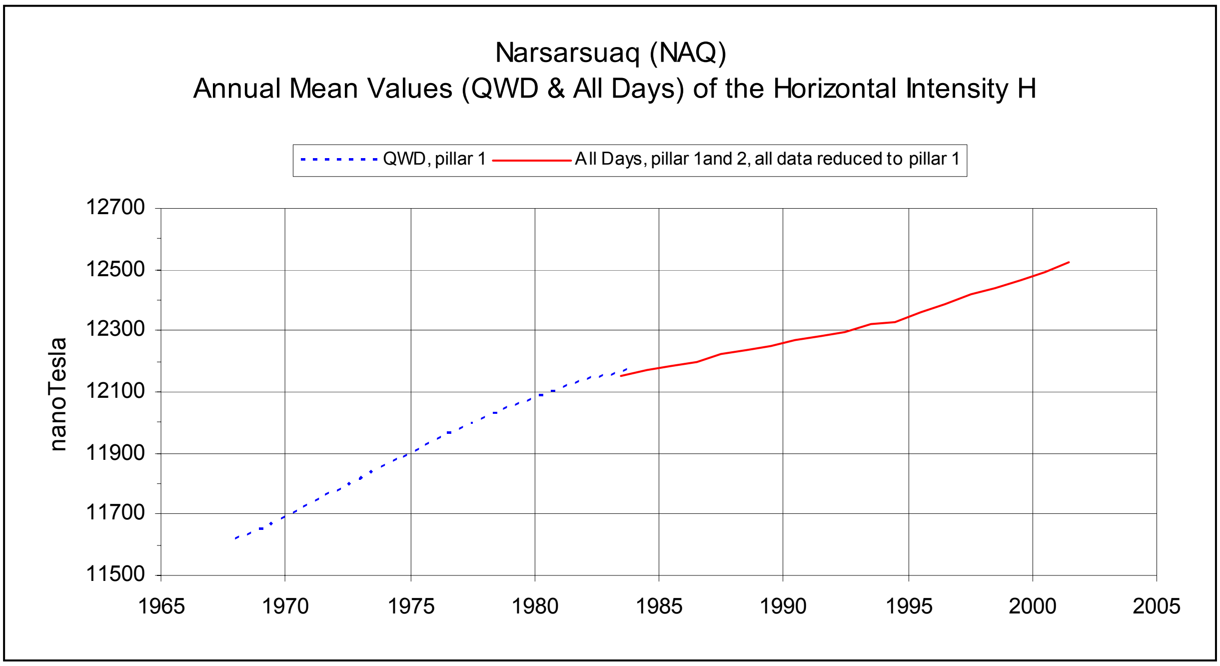
Annual Mean Values, continued.

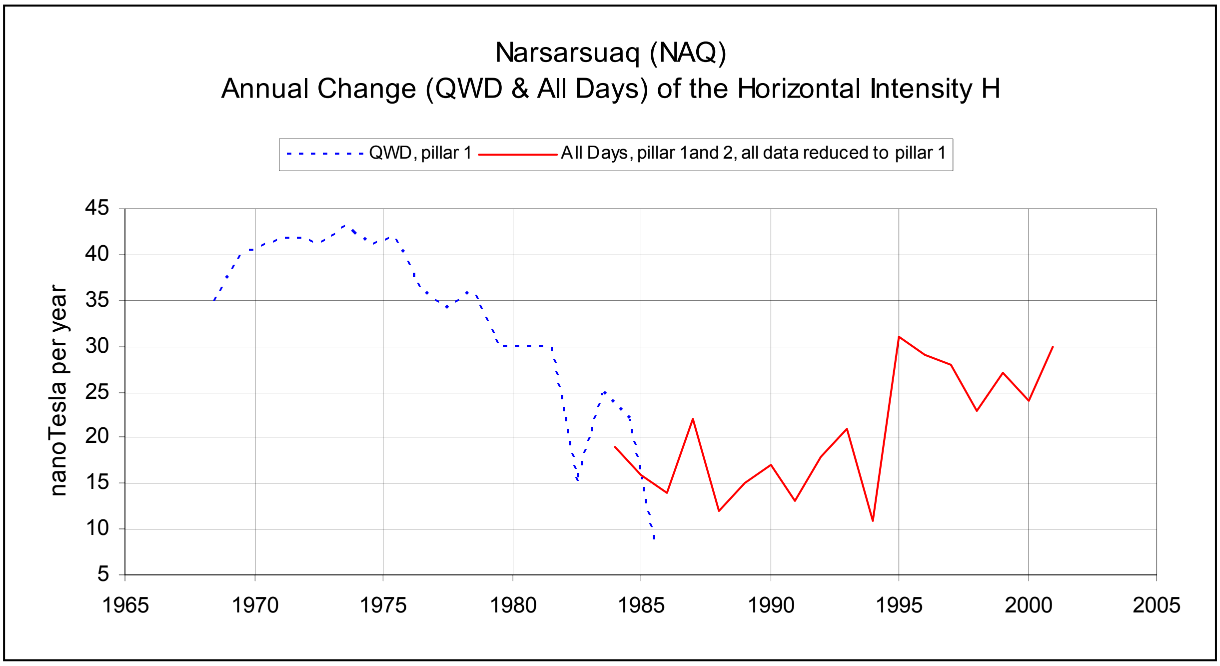
YEAR	D ° '	I ° '	H nT	X nT	Y nT	Z nT	F nT	*	ELE
1991.5	328 46.1	77 04.0	12297	10515	-6376	53551	54945	Q	DHZ
1992.5	329 01.6	77 02.7	12312	10556	-6336	53521	54919	Q	DHZ
1993.5	329 18.2	77 00.9	12335	10607	-6297	53491	54895	Q	DHZ
1994.0	0 00.0	0 00.0	-1	-1	0	-2	-3	J	DHZ
1994.5	329 35.4	76 59.2	12357	10657	-6255	53470	54879	Q	DHZ
1995.5	329 54.2	76 57.5	12380	10711	-6208	53443	54858	Q	DHZ
1996.5	330 13.6	76 55.5	12403	10766	-6159	53407	54828	Q	DHZ
1997.5	330 34.2	76 53.4	12431	10827	-6108	53380	54808	Q	DHZ
1998.5	330 55.5	76 51.6	12456	10886	-6053	53359	54793	Q	DHZ
1999.5	331 17.9	76 49.6	12483	10949	-5995	53330	54771	Q	DHZ
2000.5	331 39.3	76 47.8	12507	11007	-5938	53308	54755	Q	DHZ
2001.5	332 01.5	76 45.6	12535	11070	-5880	53278	54733	Q	DHZ
1983.5	326 40.4	77 17.7	12121	10128	-6659	53763	55112	D	DHZ
1984.5	326 54.6	77 16.5	12136	10168	-6626	53744	55097	D	DHZ
1985.5	327 10.1	77 14.7	12158	10216	-6592	53707	55066	D	DHZ
1986.5	327 25.6	77 13.7	12169	10255	-6552	53683	55045	D	DHZ
1987.5	327 43.9	77 11.0	12205	10320	-6516	53645	55016	D	DHZ
1988.5	327 59.5	77 10.9	12204	10349	-6469	53636	55007	D	DHZ
1989.0	0 02.6	0 00.7	-4	2	10	30	28	J	DHZ
1989.5	328 12.2	77 08.9	12228	10393	-6443	53598	54975	D	DHZ
1990.5	328 30.0	77 07.3	12249	10444	-6400	53577	54959	D	DHZ
1991.5	328 45.1	77 06.5	12258	10480	-6359	53560	54945	D	DHZ
1992.5	329 00.8	77 05.6	12268	10517	-6316	53539	54927	D	DHZ
1993.5	329 16.8	77 03.5	12295	10570	-6281	53502	54897	D	DHZ
1994.0	0 00.0	0 00.0	-1	-1	0	-2	-3	J	DHZ
1994.5	329 33.2	77 02.9	12300	10604	-6233	53481	54877	D	DHZ
1995.5	329 52.6	76 59.7	12344	10677	-6195	53445	54852	D	DHZ
1996.5	330 12.9	76 57.1	12378	10743	-6149	53411	54827	D	DHZ
1997.5	330 33.7	76 54.8	12409	10807	-6099	53382	54805	D	DHZ
1998.5	330 54.7	76 54.2	12416	10850	-6036	53371	54796	D	DHZ
1999.5	331 17.0	76 51.9	12446	10915	-5980	53336	54769	D	DHZ
2000.5	331 37.8	76 50.1	12472	10974	-5926	53317	54756	D	DHZ
2001.5	332 00.3	76 47.0	12512	11048	-5873	53276	54726	D	DHZ

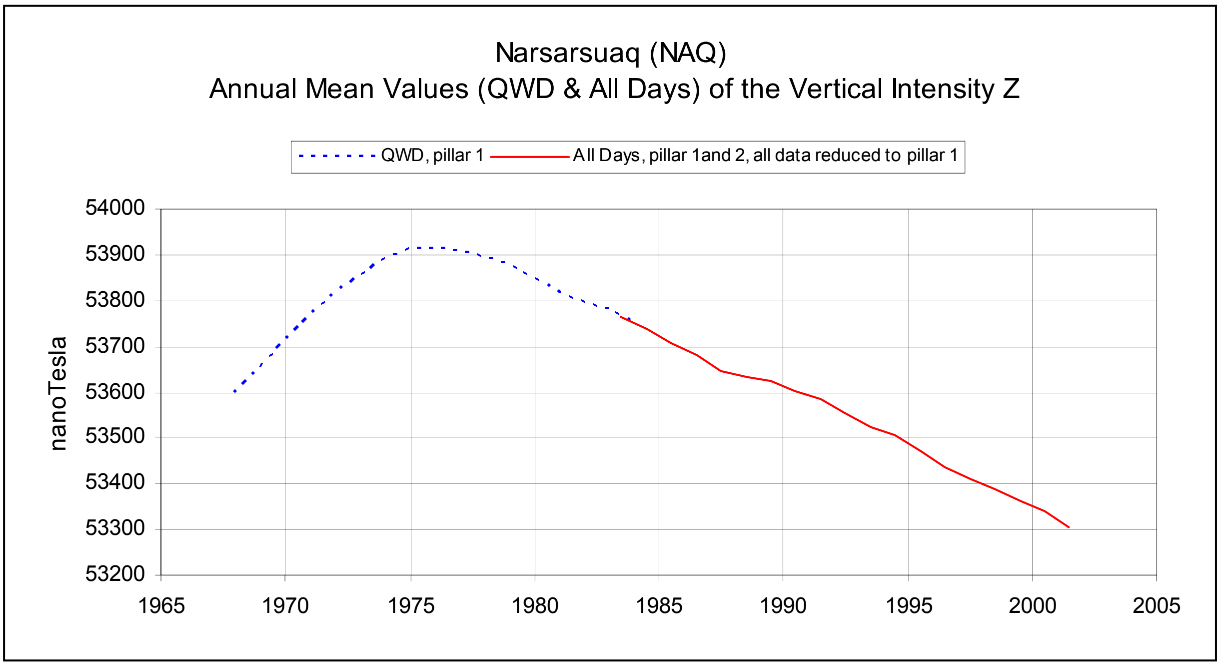
*W = Quiet winter days (QWD, cf. Section I, chapter 5)
*A = All days
*Q = Quiet days
*D = Disturbed days
*J = Jumps:
1. The jump in the values from 1988 to 1989 is due to establishment of a new absolute pillar during 1988.
2. The jump in the values from 1993 to 1994 is due to a change in the difference Δ*F* between the PPM-pillar and the absolute pillar.
The change happened between spring 1989 and autumn 1993. Why and when is unknown.
REMARK: jump value = old site value - new site value.
ELE = Elements recorded.

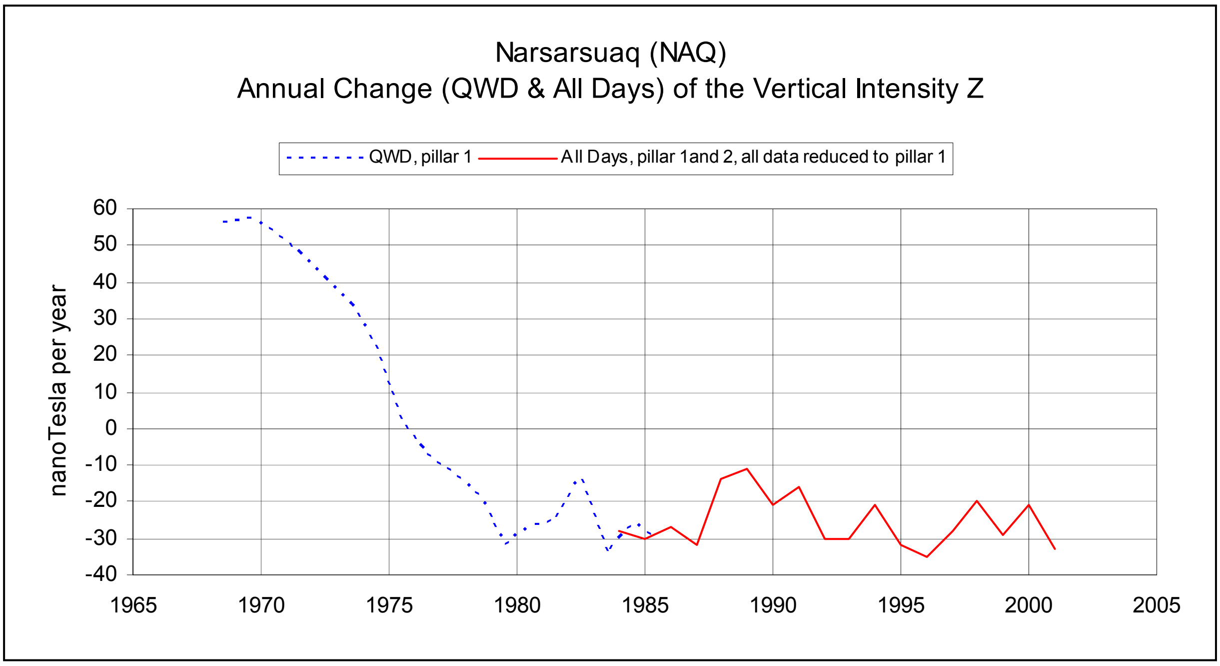

Narsarsuaq (NAQ)
Annual Mean Values (QWD & All Days) of the Declination D
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
Degrees East
-26
-28
-30
-32
-34
-36
-38
1965
1970
1975
1980
1985
1990
1995
2000
2005


Narsarsuaq (NAQ)
Annual Change (QWD & All Days) of the Declination D
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
Minutes of arc per year
25
20
15
10
5
1965
1970
1975
1980
1985
1990
1995
2000
2005


Narsarsuaq (NAQ)
Annual Mean Values (QWD & All Days) of the Horizontal Intensity H
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
nanoTesla
12700
12500
12300
12100
11900
11700
11500
1965
1970
1975
1980
1985
1990
1995
2000
2005


Narsarsuaq (NAQ)
Annual Change (QWD & All Days) of the Horizontal Intensity H
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
nanoTesla per year
45
40
35
30
25
20
15
10
5
1965
1970
1975
1980
1985
1990
1995
2000
2005


Narsarsuaq (NAQ)
Annual Mean Values (QWD & All Days) of the Vertical Intensity Z
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
nanoTesla
54000
53900
53800
53700
53600
53500
53400
53300
53200
1965
1970
1975
1980
1985
1990
1995
2000
2005


Narsarsuaq (NAQ)
Annual Change (QWD & All Days) of the Vertical Intensity Z
QWD, pillar 1
All Days, pillar 1and 2, all data reduced to pillar 1
nanoTesla per year
60
50
40
30
20
10
0
-10
-20
-30
-40
1965
1970
1975
1980
1985
1990
1995
2000
2005

SECTION VI

Maps of the Magnetic Declination.

Isogonic maps for Denmark, Faeroe Islands and Greenland showing lines of equal magnetic declination based on the IGRF 2000 magnetic field model and valid for Epoch 2001.5 are shown on page 62, 63 and 64.

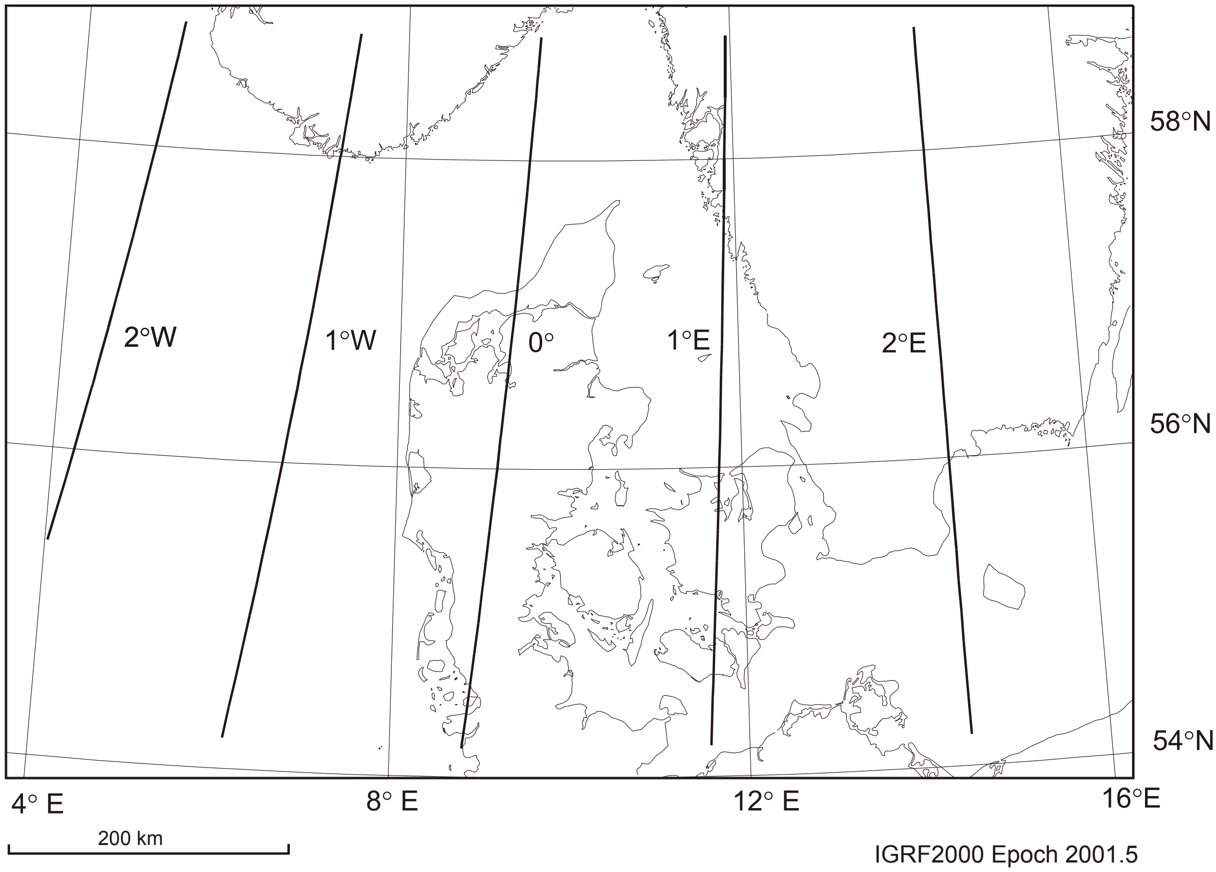
The measured secular variation of the magnetic declination, i.e. the annual change in *D*, valid for the Danish and Greenlandic observatories since 1950[1], is shown on the graph on page 66. The data are first differences of the calculated annual means.

The predicted secular variation can also be calculated from the IGRF 2000 magnetic field model, and we find that it is 8 minutes of arc per year eastwards for Denmark, and 11 minutes of arc per year eastwards for Faeroe Islands.
The secular variation for Greenland is shown on the iso-variational map, or isoporic map, on page 65. The map is also based on the IGRF 2000 magnetic field model, and shows the lines of equal change in *D* (in minutes of arc per year) for the period 2000-2005.

[1]The annual change i *D* for BFE and GDH since the start of the two observatories are shown on graphs i section II and III respectfully.

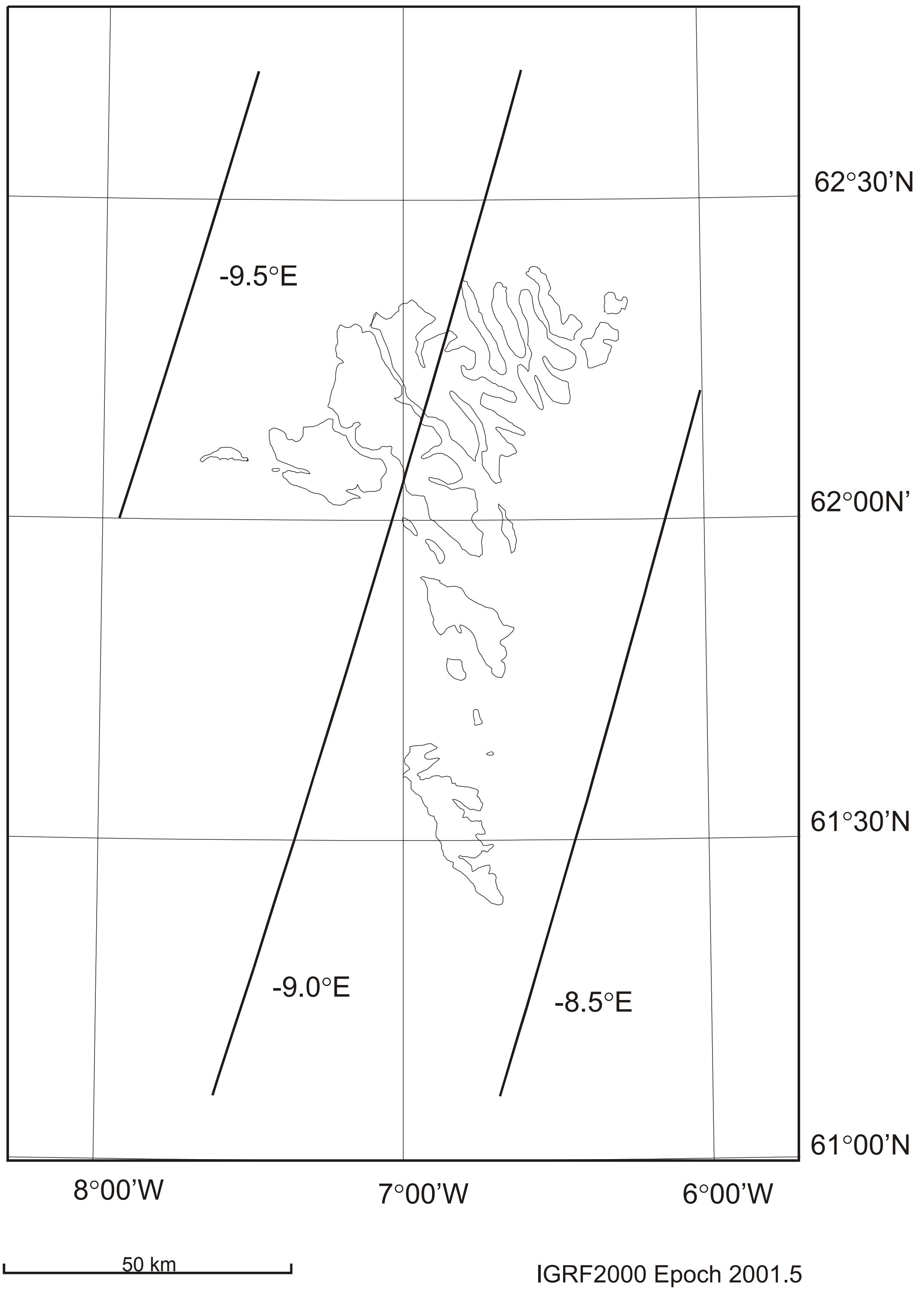
Denmark

Magnetic Declination 2001



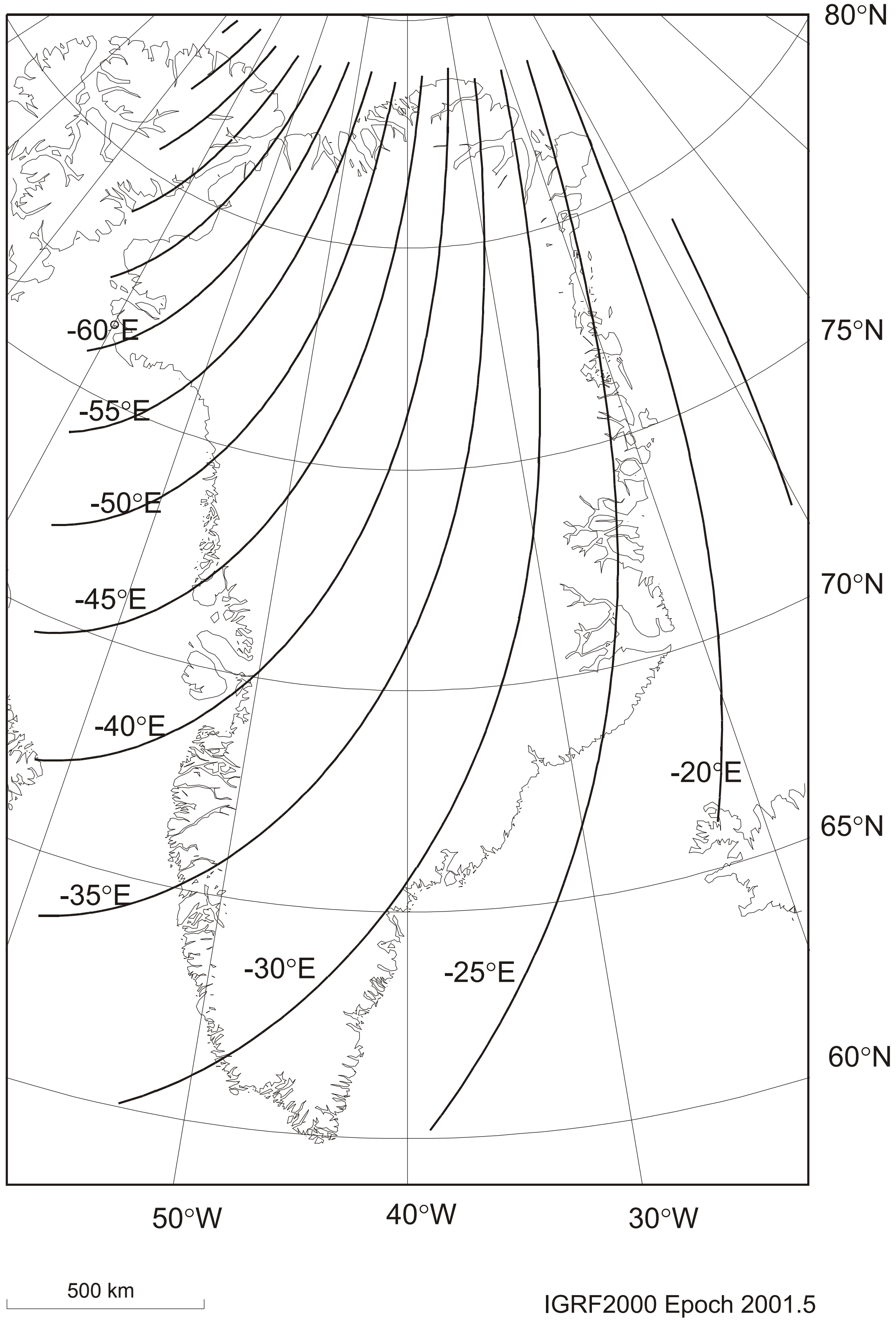
Faeroe Islands

Magnetic Declination 2001



Greenland

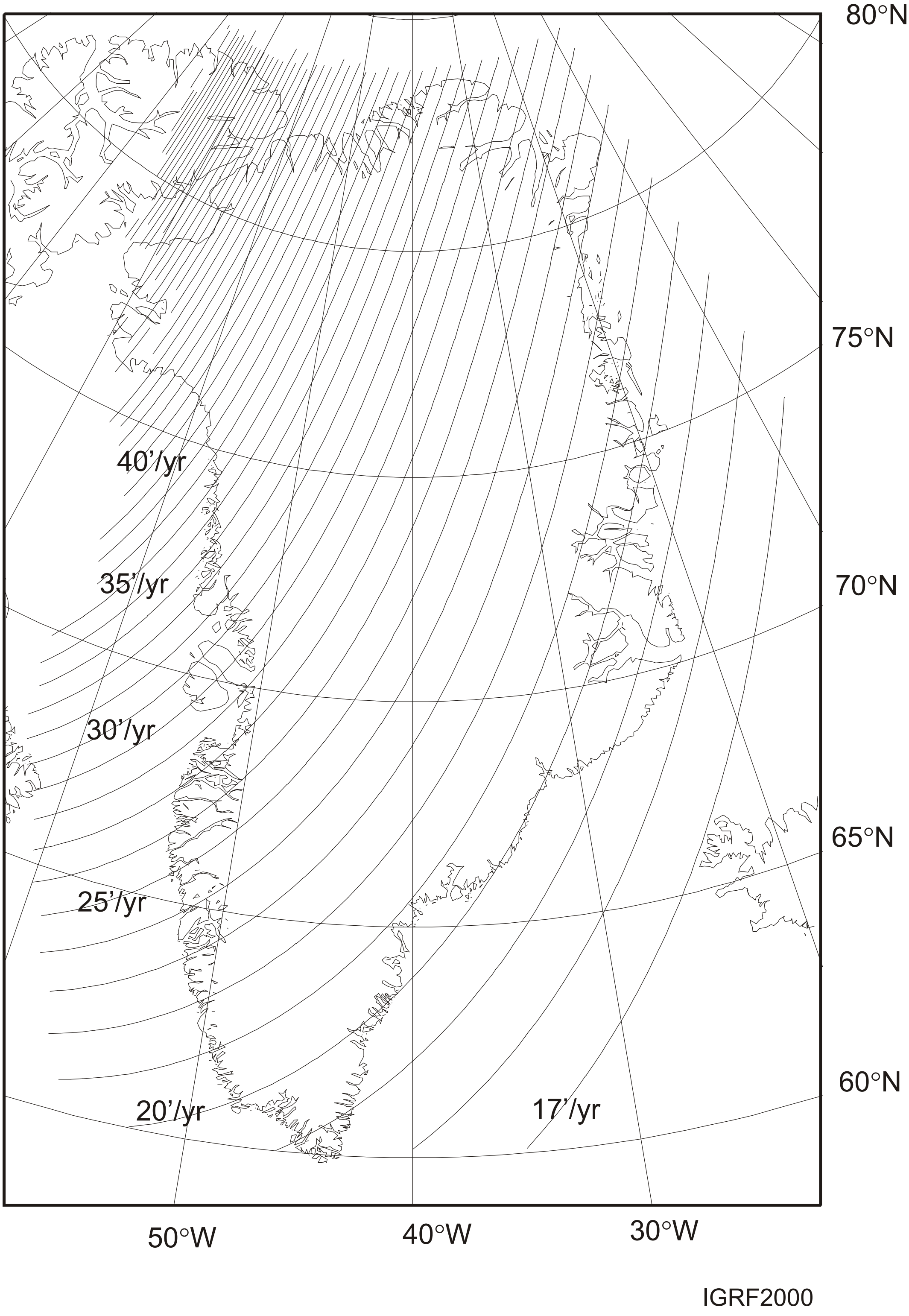
Magnetic Declination 2001



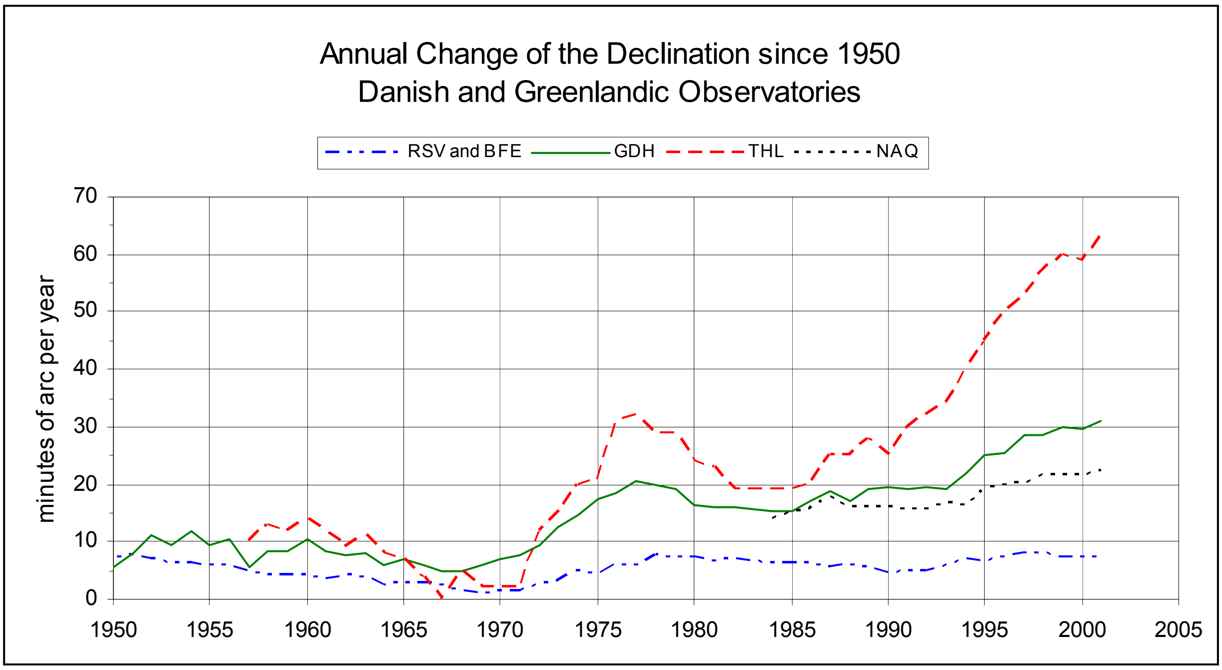
IGRF2000 Epoch 2001.5

Greenland

Annual Change in Magnetic Declination 2000-2005



IGRF2000


Annual Change of the Declination since 1950
Danish and Greenlandic Observatories
RSV and BFE
GDH
THL
NAQ
minutes of arc per year
0
10
20
30
40
50
60
70
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005

SECTION VII

Annual plots.

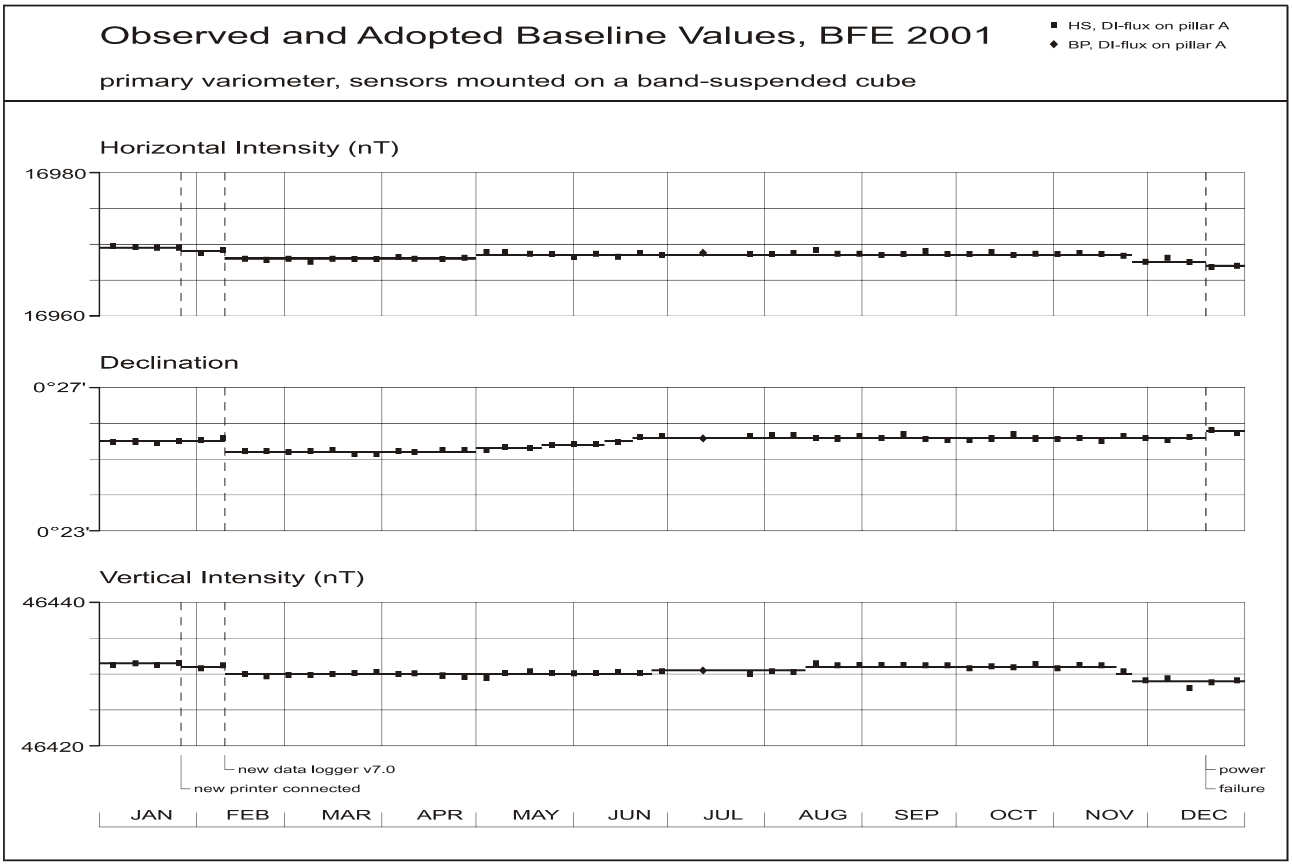
In this section the following plots are presented:

1. Plots of observed and adopted baseline values.
2. Plots of differences between observed and calculated absolute values *D, H* and *Z*.
3. Plots of hourly and daily mean values of *X*, *Y* and *Z*.

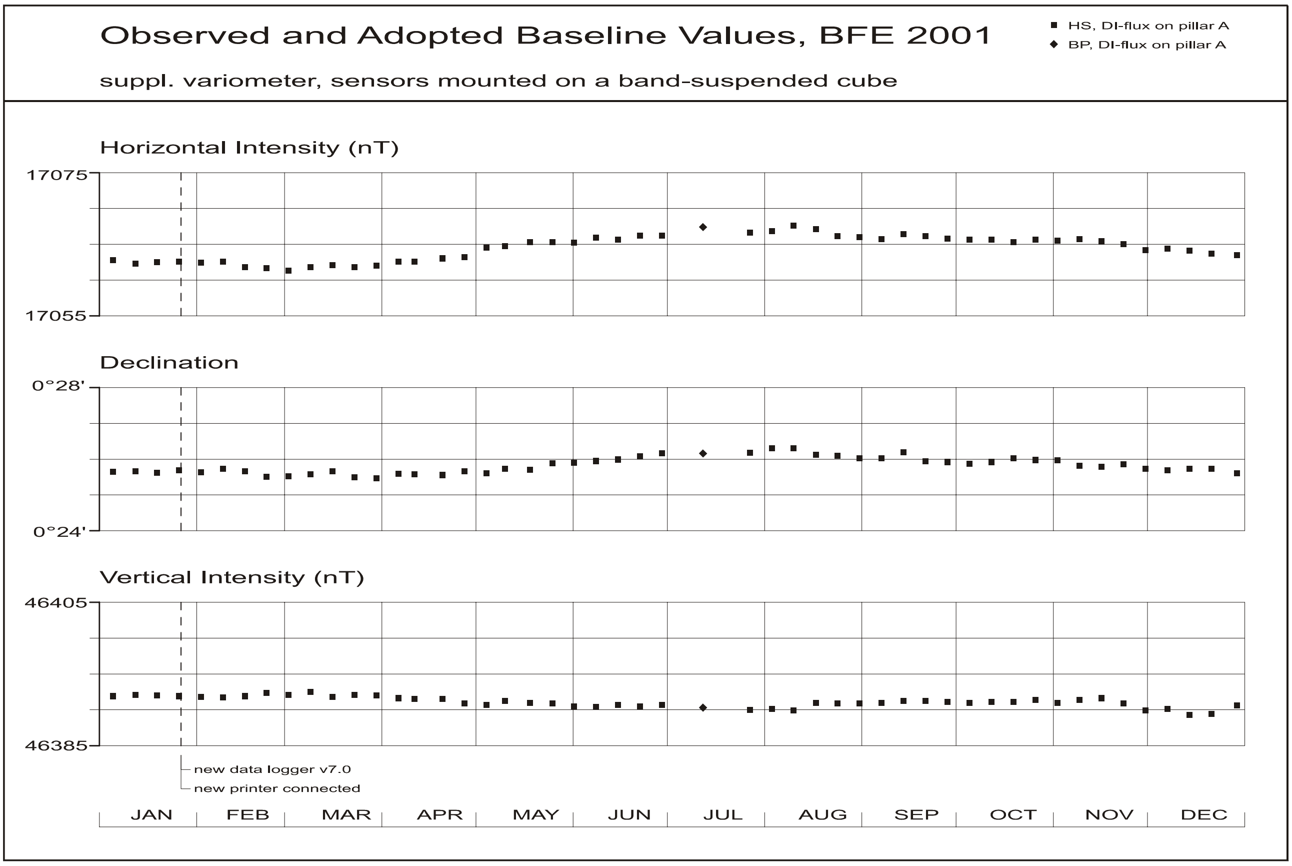
1. In the plots the observed baseline values are shown as dots, one dot representing the mean of all baseline measurements on one day. The solid lines which shift in steps are the final baseline values which are adopted by a graphical smoothing process, cf. Wienert (reference 5, page 176). Normally one value is adopted for at least the whole of one UT day except for known instrumental discontinuities. Tables of adopted baseline values are presented in section II-V.

2. The plots of the differences between the observed and the calculated absolute values, converted to nT, shows the differences between the weekly absolute measurements of *DHZ* and the corresponding final 1-minute values calculated from variometer output and adopted baseline values.

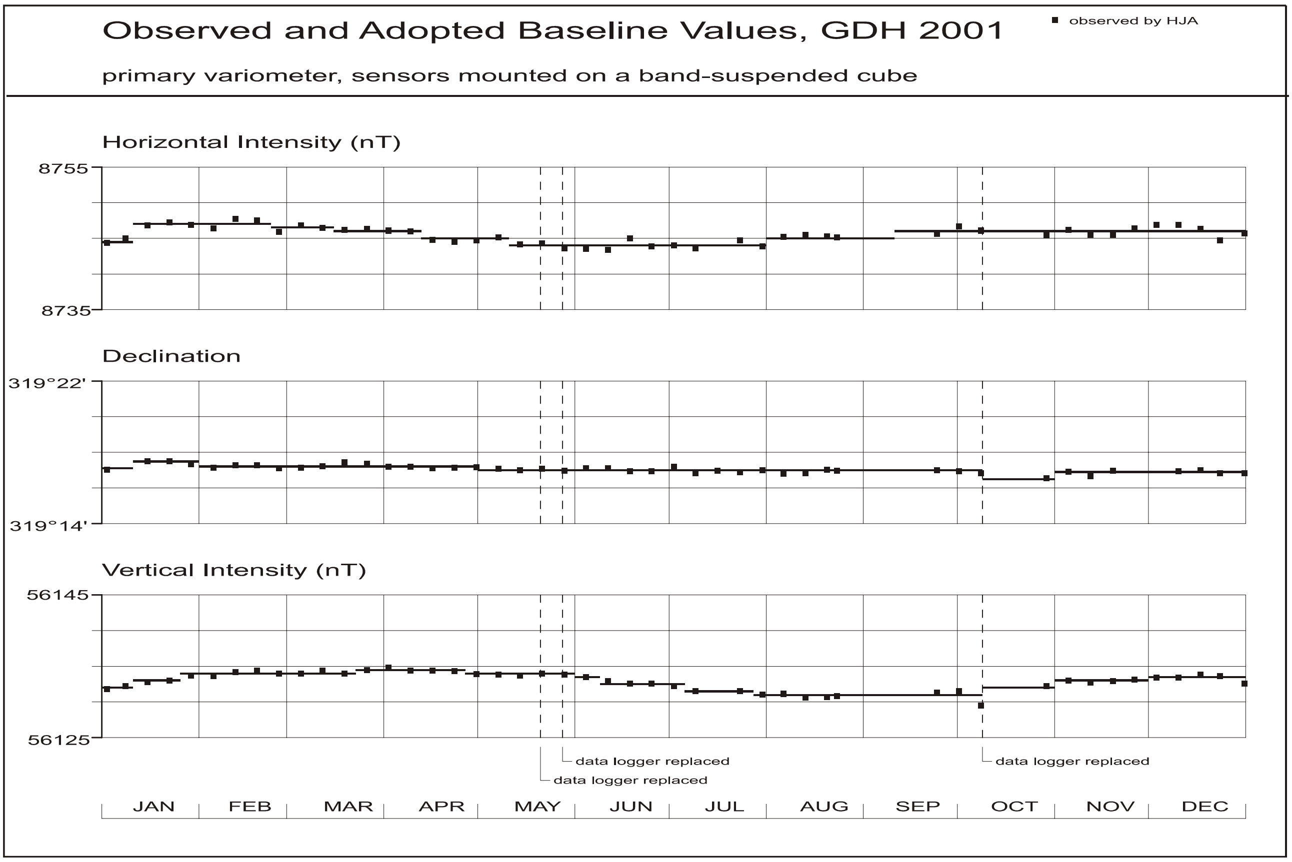
3. The plots of hourly and daily mean values show a number of features of geomagnetic field variations, such as diurnal variation, seasonal changes in its magnitude, and periods of geomagnetic disturbance.

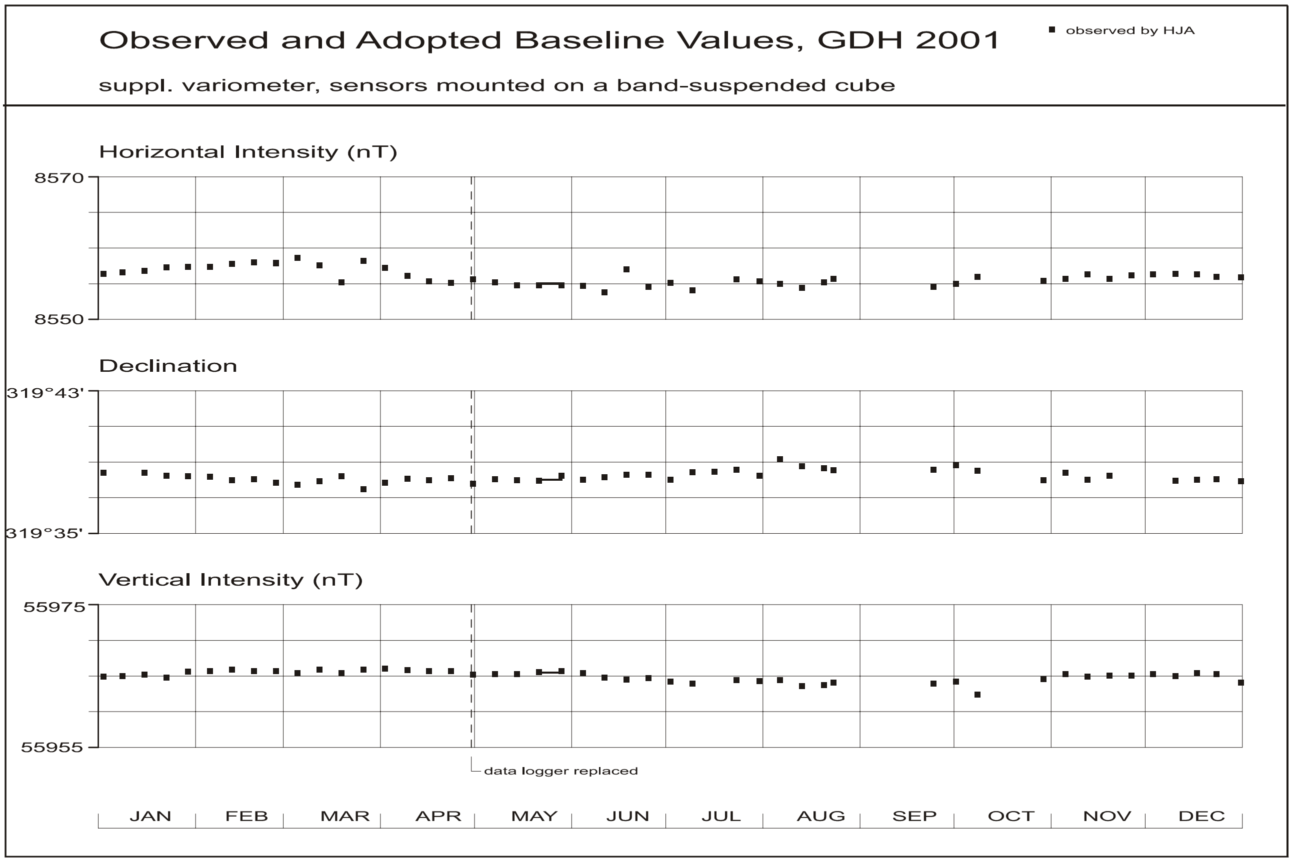


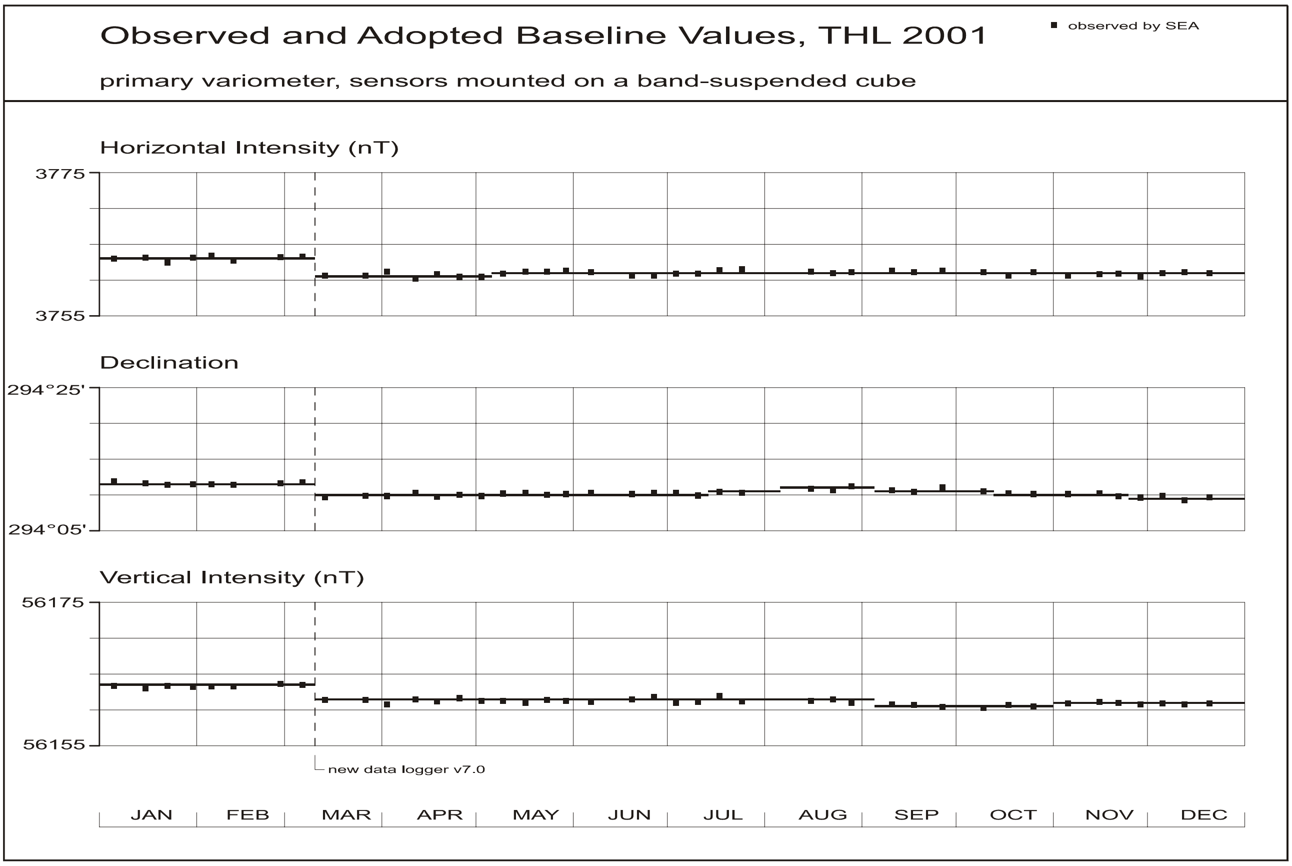
Observed and Adopted Baseline Values, BFE 2001
HS, DI-flux on pillar A
BP, DI-flux on pillar A
primary variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
16980
16960
Declination
0°27'
0°23'
Vertical Intensity (nT)
46440
46420
new data logger v7.0
new printer connected
power
failure
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

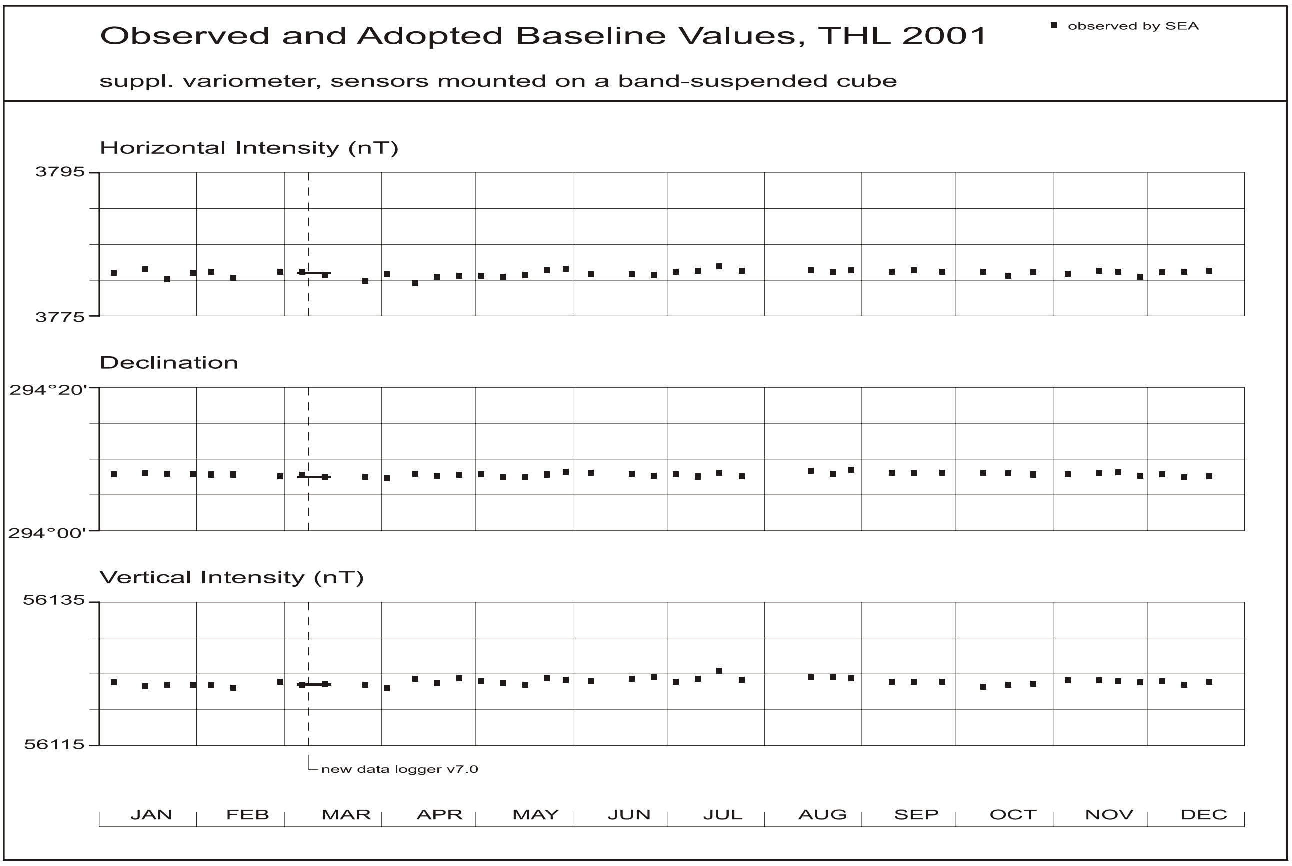


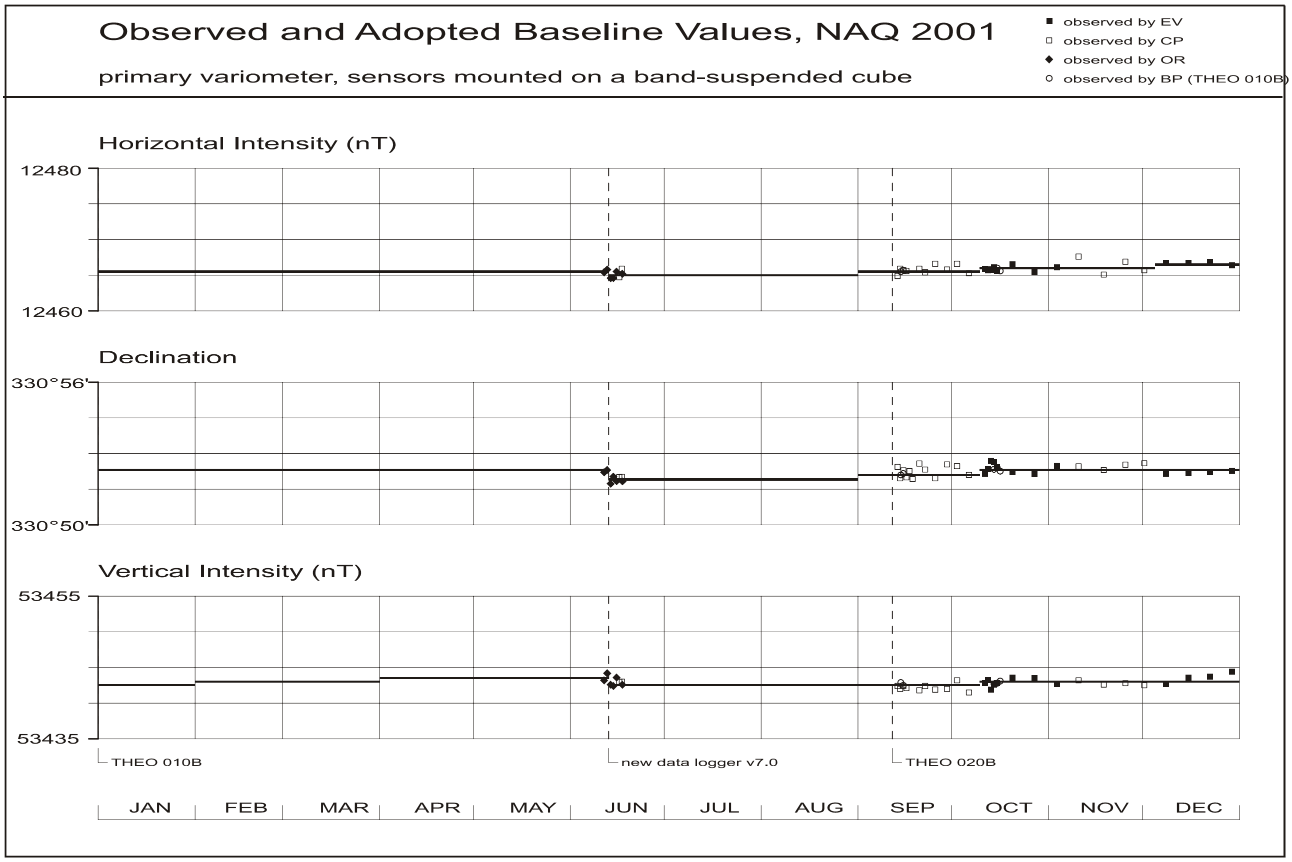
Observed and Adopted Baseline Values, BFE 2001
HS, DI-flux on pillar A
BP, DI-flux on pillar A
suppl. variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
17075
17055
Declination
0°28'
0°24'
Vertical Intensity (nT)
46405
46385
new data logger v7.0
new printer connected
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

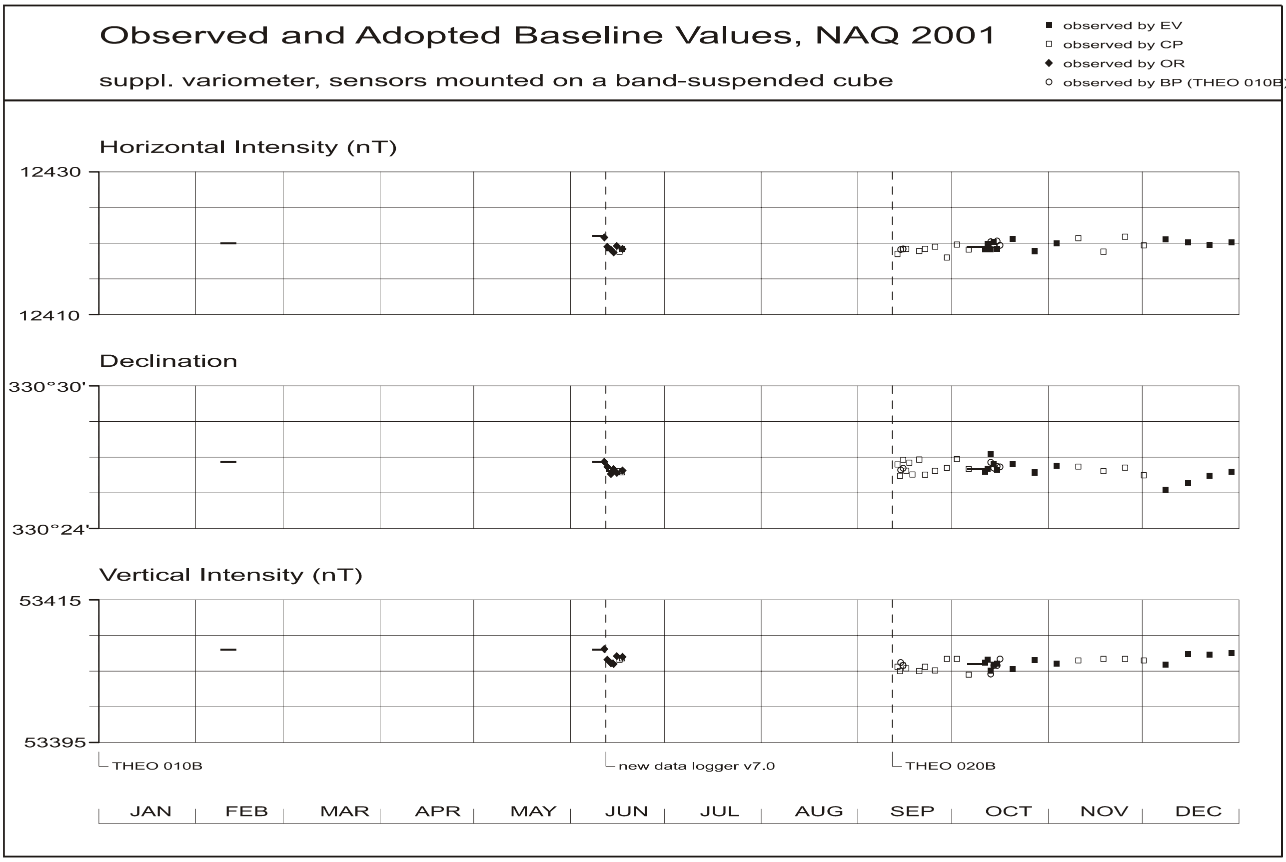

Observed and Adopted Baseline Values, GDH 2001
observed by HJA
primary variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
8755
8735
Declination
319°22'
319°14'
Vertical Intensity (nT)
56145
56125
data logger replaced
data logger replaced
data logger replaced
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

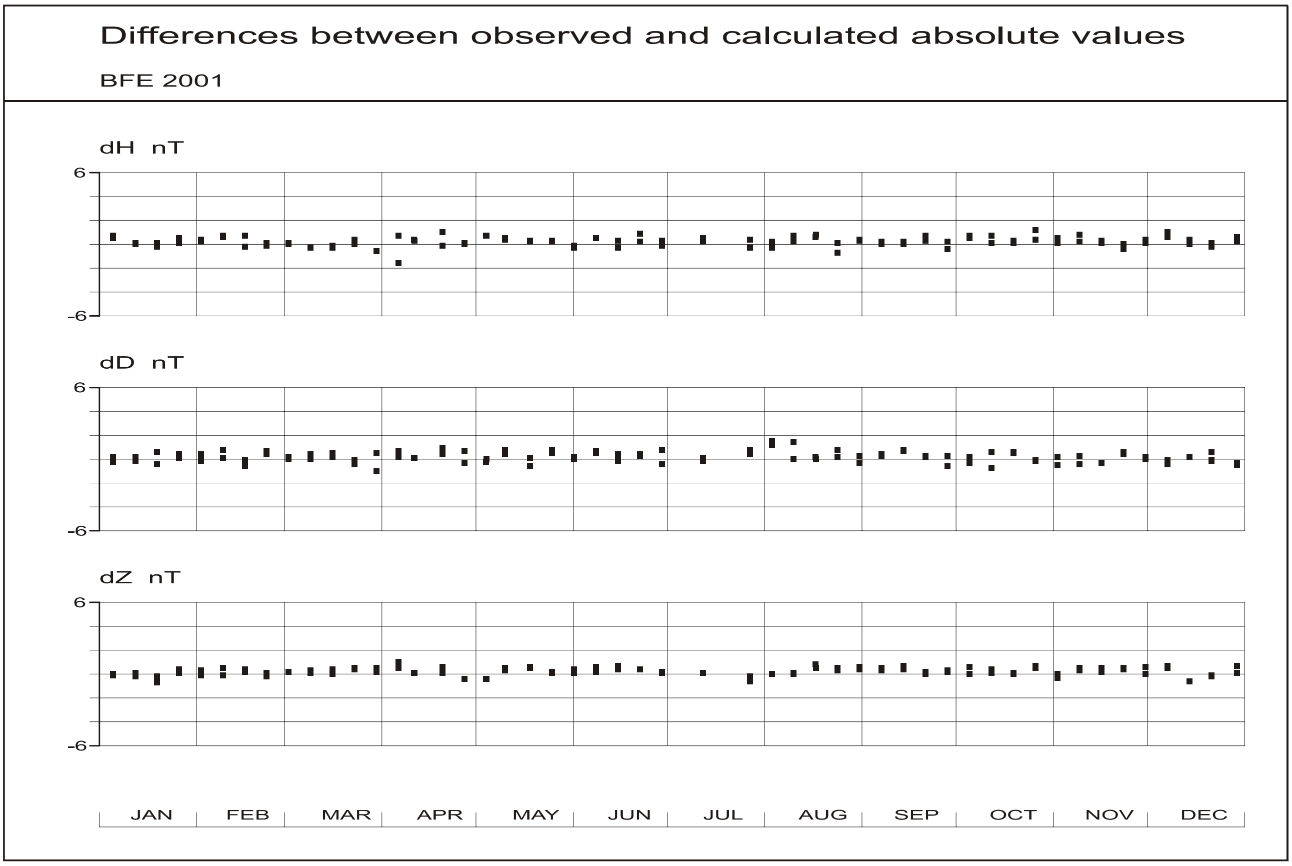

Observed and Adopted Baseline Values, GDH 2001
observed by HJA
suppl. variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
8570
8550
Declination
319°43'
319°35'
Vertical Intensity (nT)
55975
55955
data logger replaced
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

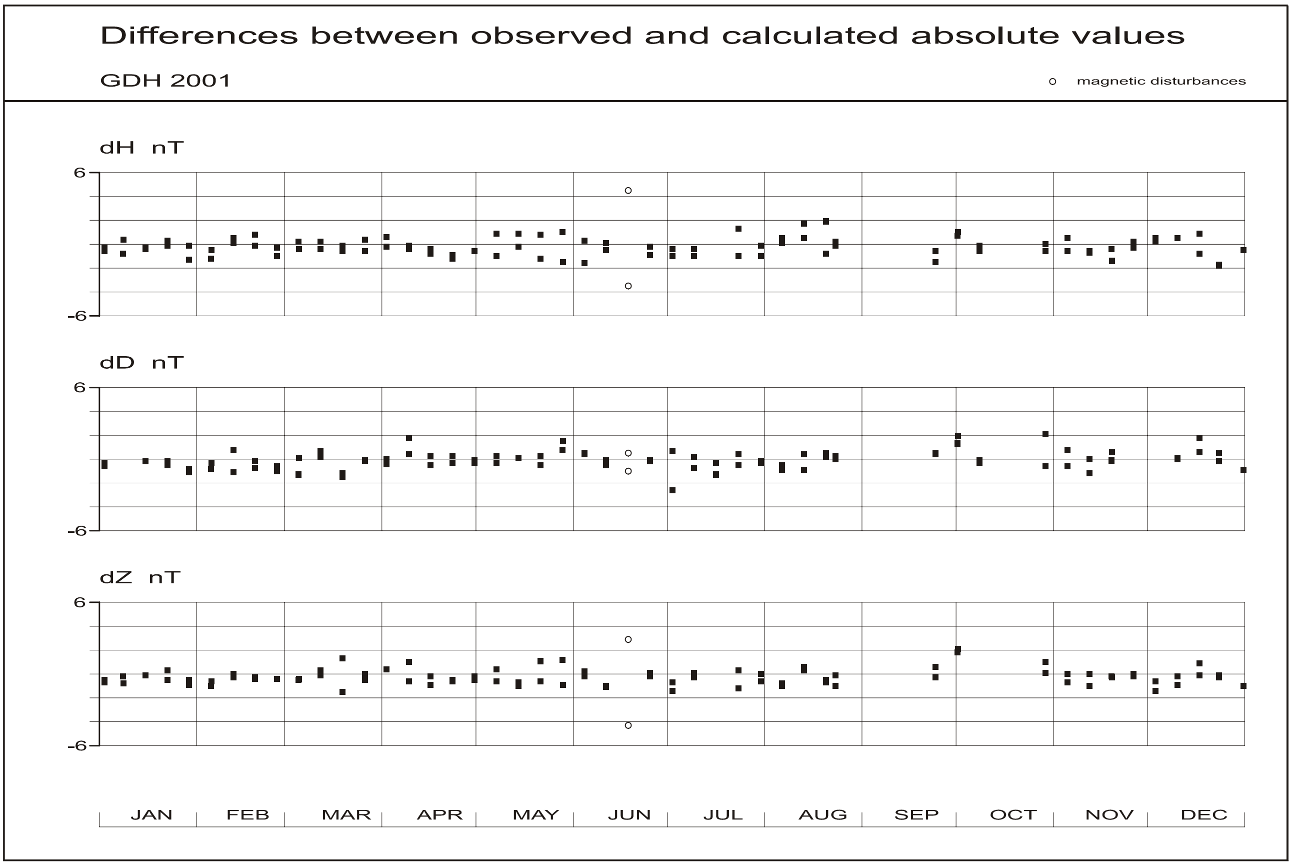

Observed and Adopted Baseline Values, THL 2001
observed by SEA
primary variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
3775
3755
Declination
294°25'
294°05'
Vertical Intensity (nT)
56175
56155
new data logger v7.0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

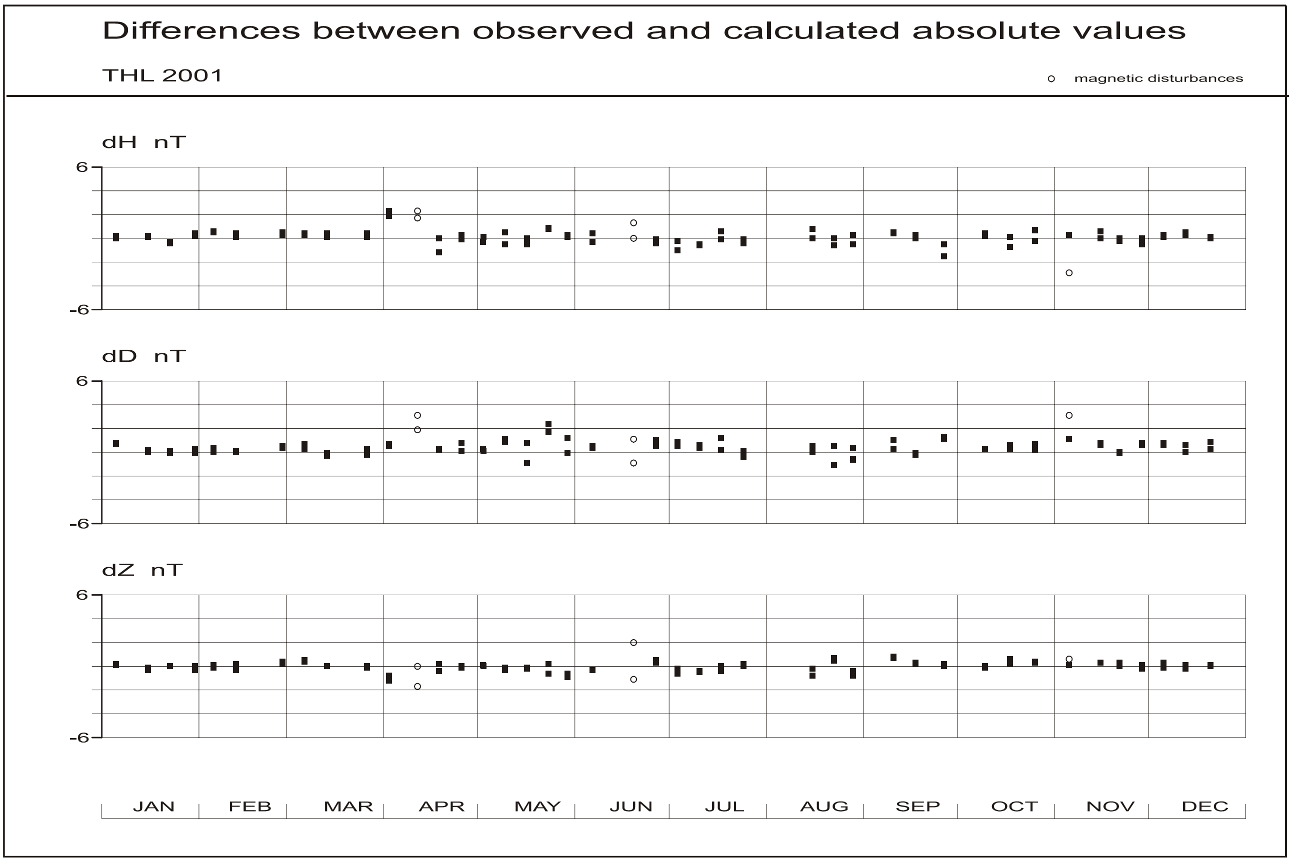

Observed and Adopted Baseline Values, THL 2001
observed by SEA
suppl. variometer, sensors mounted on a band-suspended cube
Horizontal Intensity (nT)
3795
3775
Declination
294°20'
294°00'
Vertical Intensity (nT)
56135
56115
new data logger v7.0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

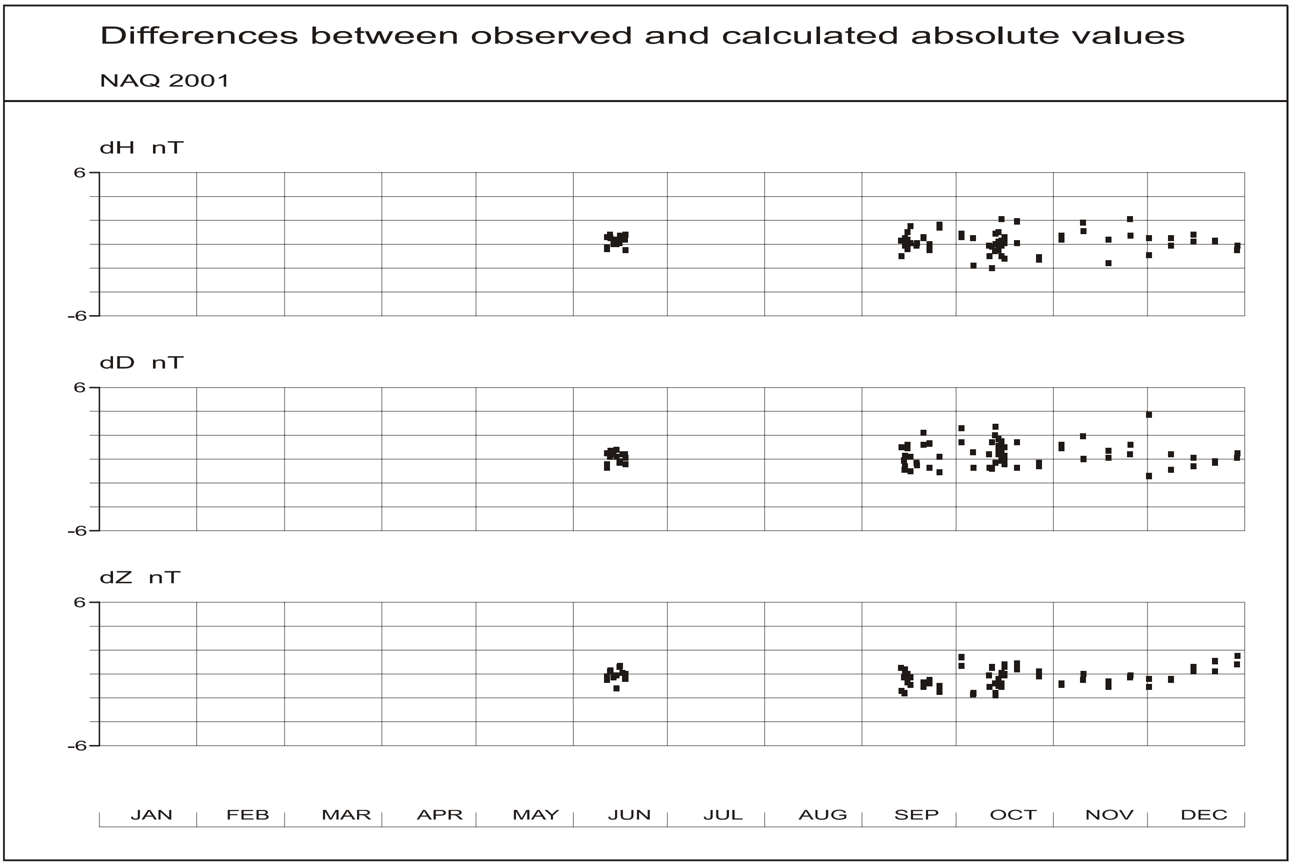

Observed and Adopted Baseline Values, NAQ 2001
primary variometer, sensors mounted on a band-suspended cube
observed by EV
observed by CP
observed by OR
observed by BP (THEO 010B)
Horizontal Intensity (nT)
12480
12460
Declination
330°56'
330°50'
Vertical Intensity (nT)
53455
53435
THEO 010B
new data logger v7.0
THEO 020B
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


Observed and Adopted Baseline Values, NAQ 2001
suppl. variometer, sensors mounted on a band-suspended cube
observed by EV
observed by CP
observed by OR
observed by BP (THEO 010B)
Horizontal Intensity (nT)
12430
12410
Declination
330°30'
330°24'
Vertical Intensity (nT)
53415
53395
THEO 010B
new data logger v7.0
THEO 020B
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


Differences between observed and calculated absolute values
BFE 2001
dH nT
6
-6
dD nT
6
-6
dZ nT
6
-6
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Differences between observed and calculated absolute values
GDH 2001
magnetic disturbances
dH nT
6
-6
dD nT
6
-6
dZ nT
6
-6
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Differences between observed and calculated absolute values
THL 2001
magnetic disturbances
dH nT
dD nT
dZ nT
6
-6
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Differences between observed and calculated absolute values
NAQ 2001
dH nT
dD nT
dZ nT
6
-6
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Hourly Mean Values

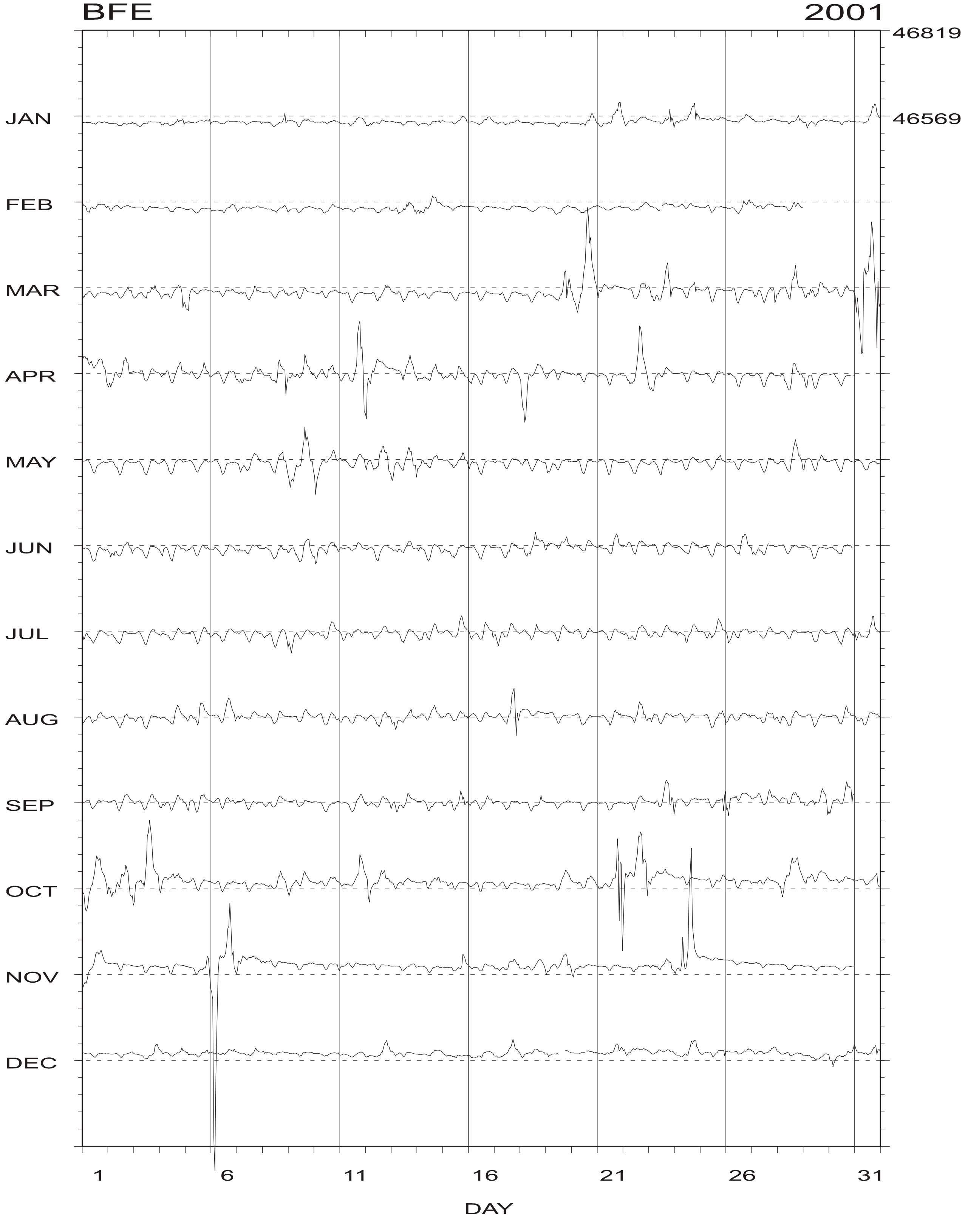
Horizontal Component X (nT)

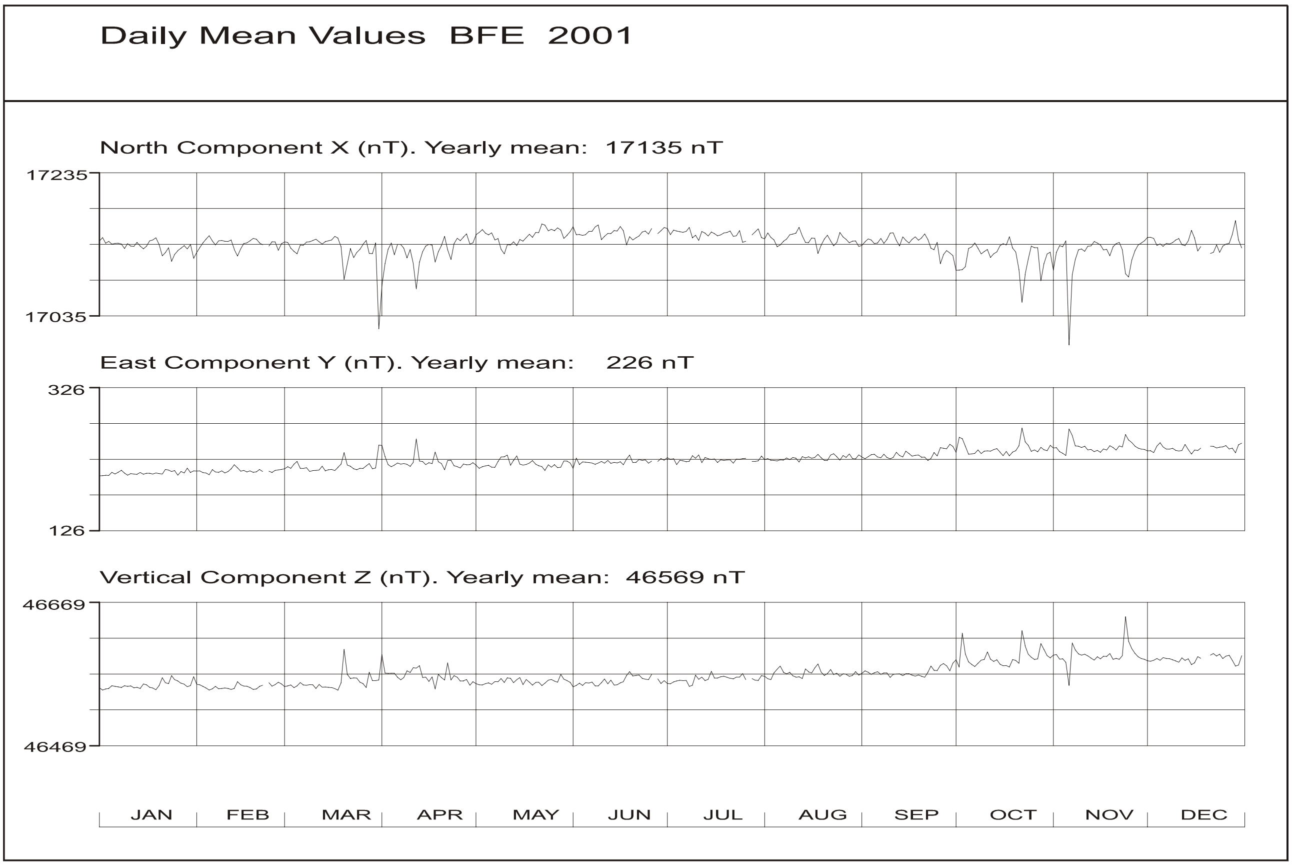
Hourly Mean Values

Horizontal Component Y (nT)

Hourly Mean Values

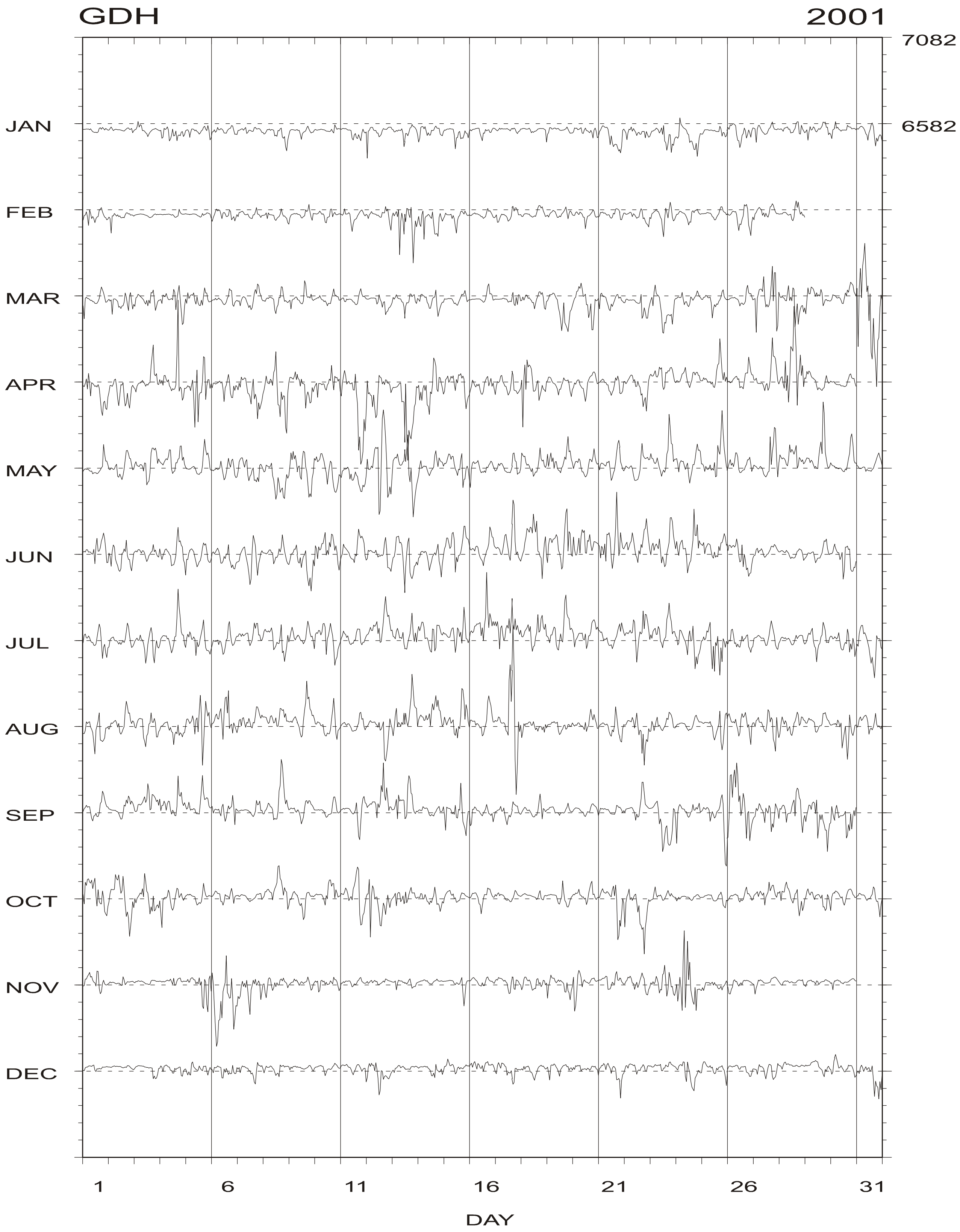
Vertical Component Z (nT)




Daily Mean Values BFE 2001
North Component X (nT). Yearly mean: 17135 nT
17235
17035
East Component Y (nT). Yearly mean: 226 nT
326
126
Vertical Component Z (nT). Yearly mean: 46569 nT
46669
46469
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Hourly Mean Values

Horizontal Component X (nT)

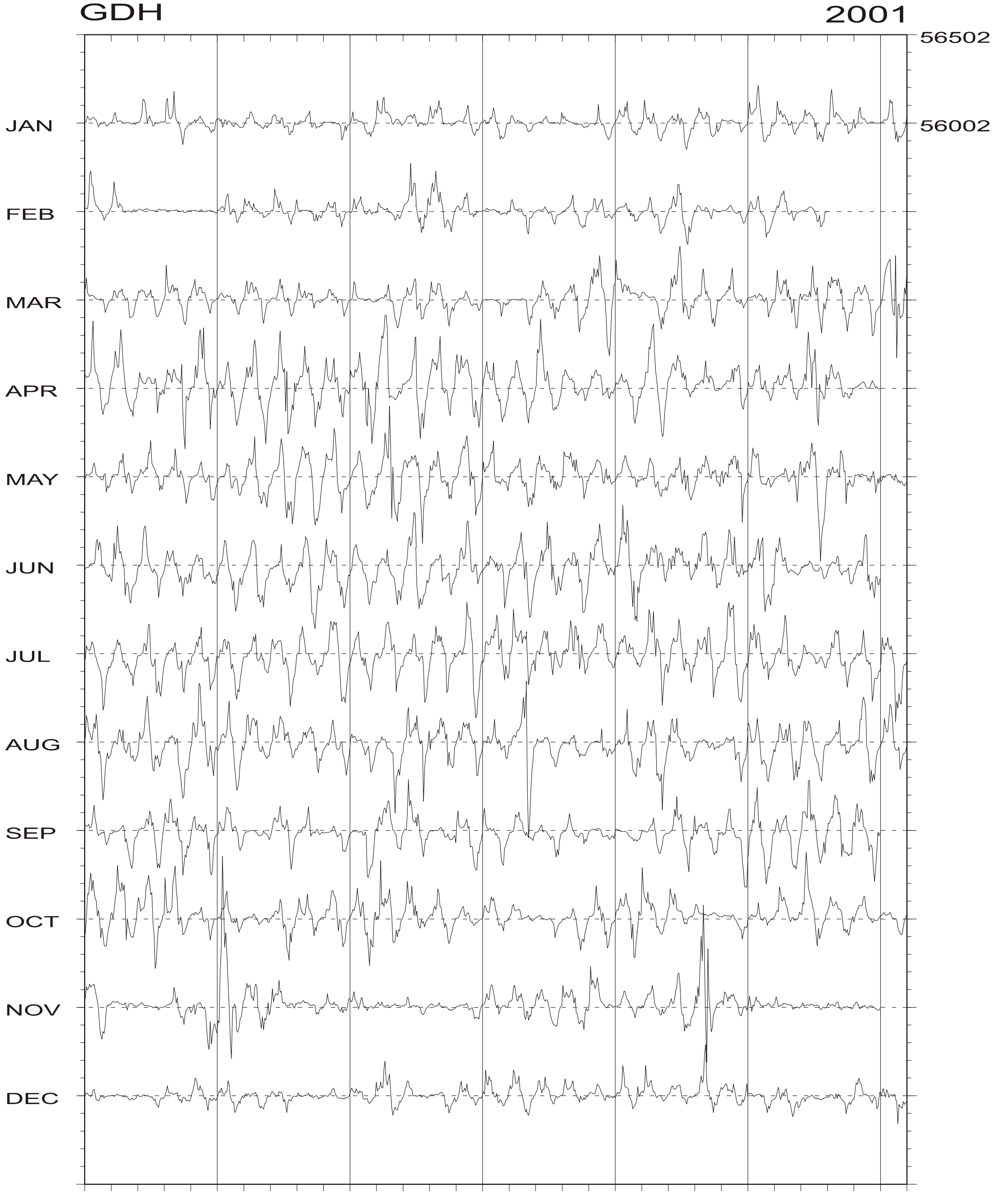


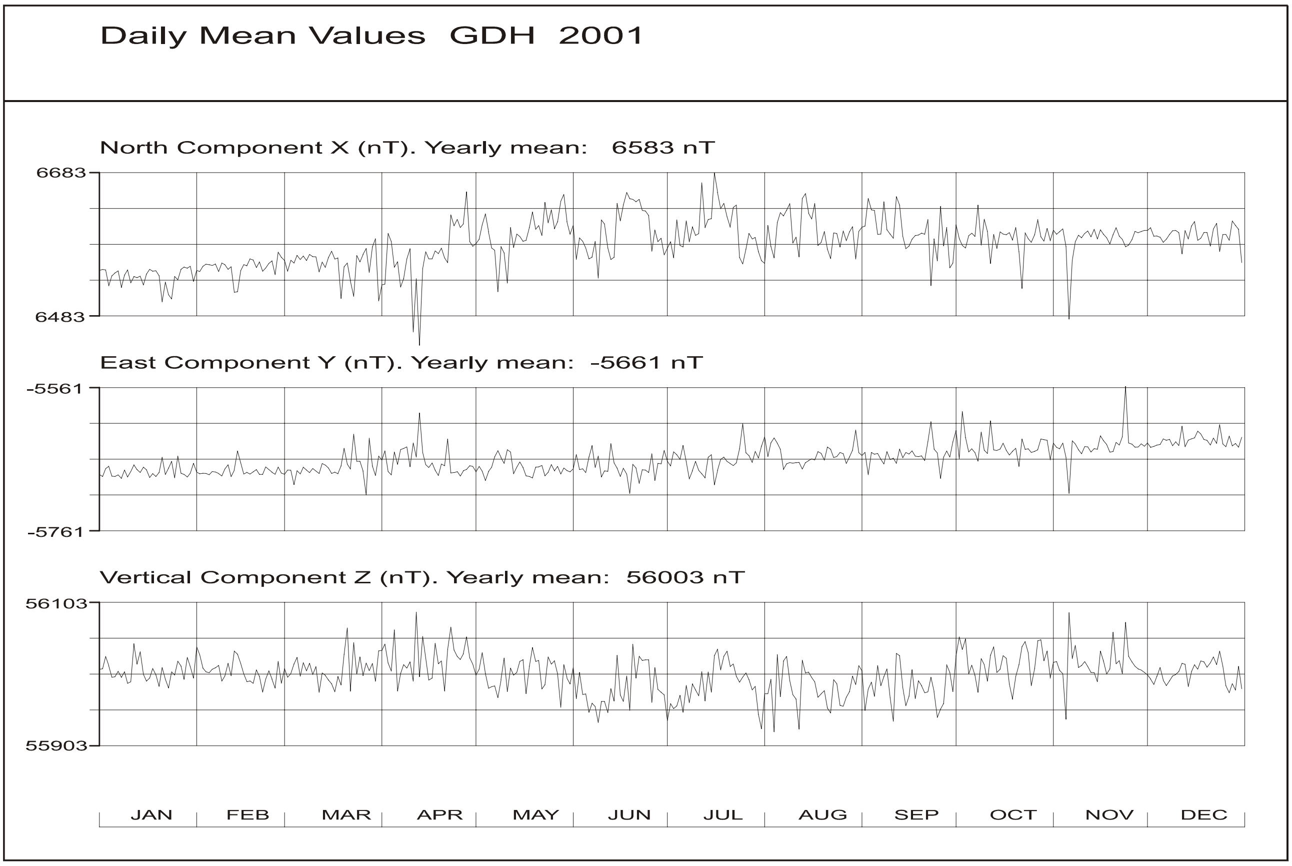
Hourly Mean Values

Horizontal Component Y (nT)

Hourly Mean Values

Vertical Component Z (nT)





Daily Mean Values GDH 2001
North Component X (nT). Yearly mean: 6583 nT
6683
6483
East Component Y (nT). Yearly mean: -5661 nT
-5561
-5761
Vertical Component Z (nT). Yearly mean: 56003 nT
56103
55903
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Hourly Mean Values

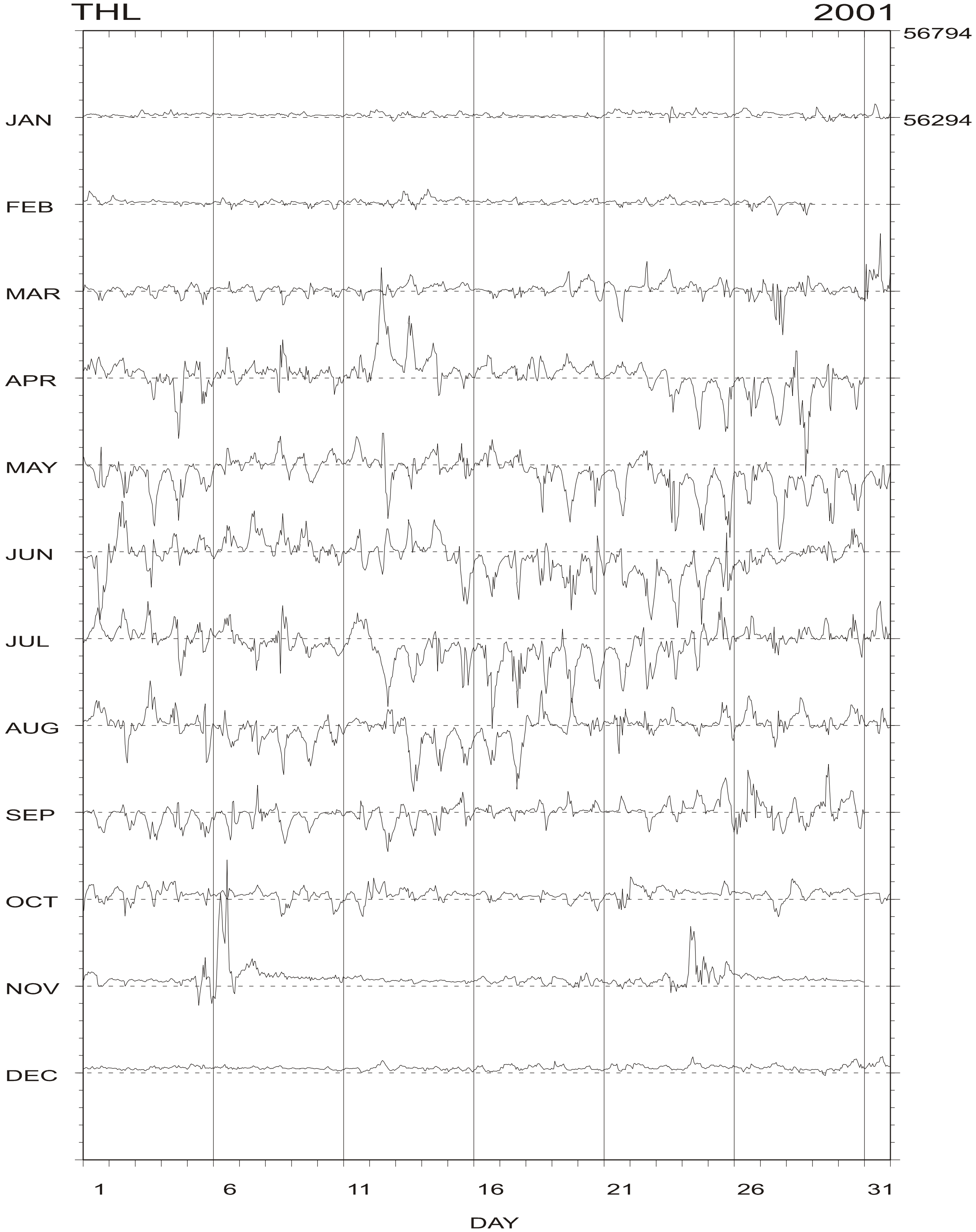
Horizontal Component X (nT)

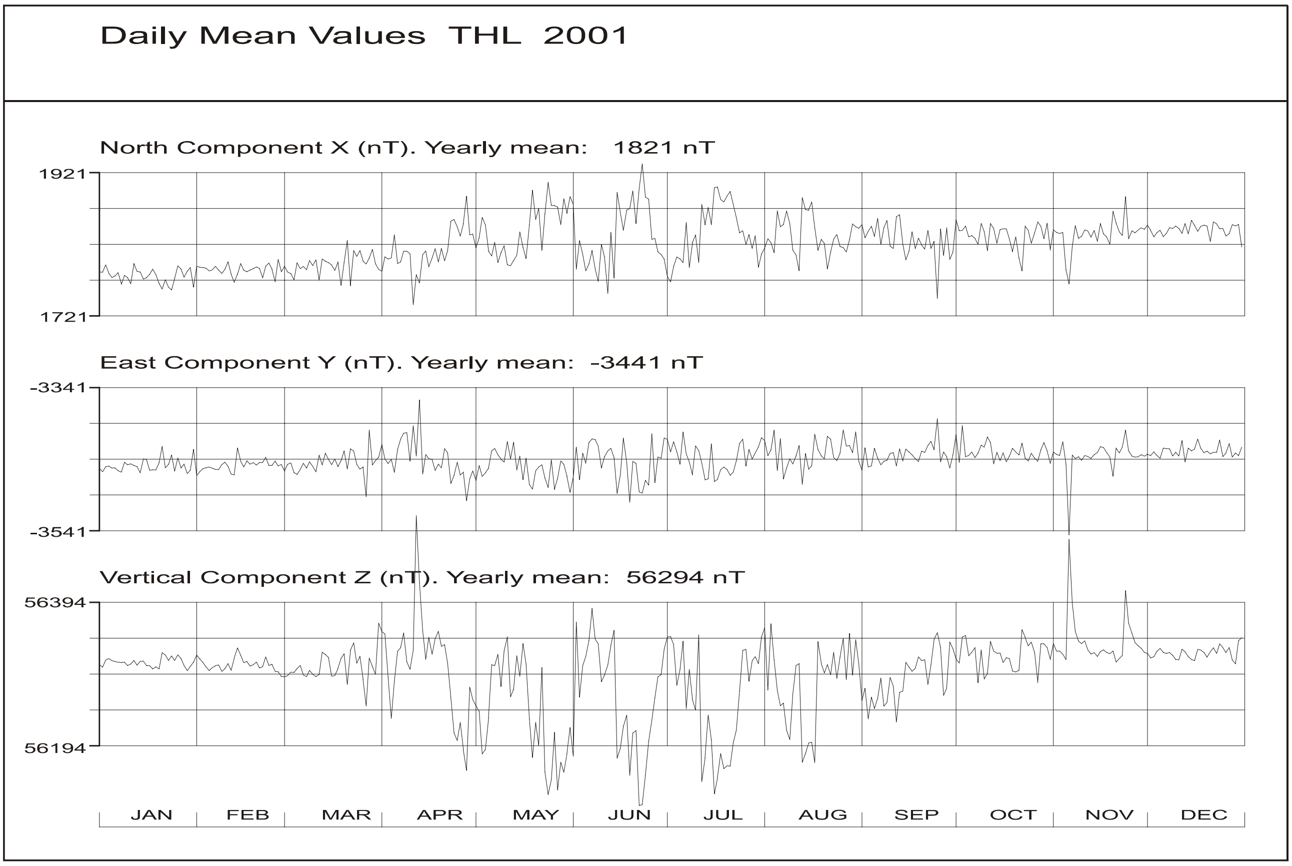
Hourly Mean Values

Horizontal Component Y (nT)

Hourly Mean Values

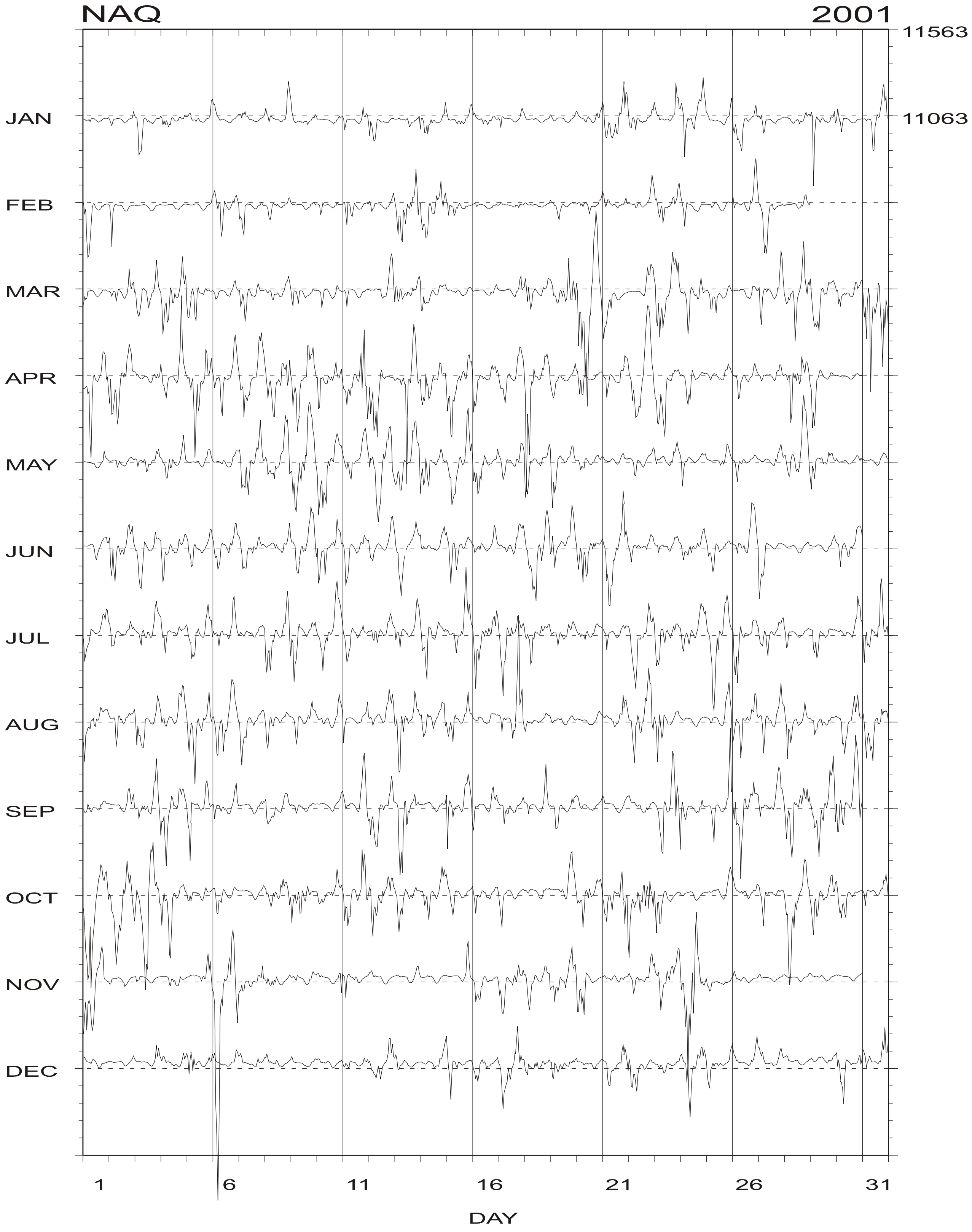
Vertical Component Z (nT)




Daily Mean Values THL 2001
North Component X (nT). Yearly mean: 1821 nT
1921
1721
East Component Y (nT). Yearly mean: -3441 nT
-3341
-3541
Vertical Component Z (nT). Yearly mean: 56294 nT
56394
56194
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

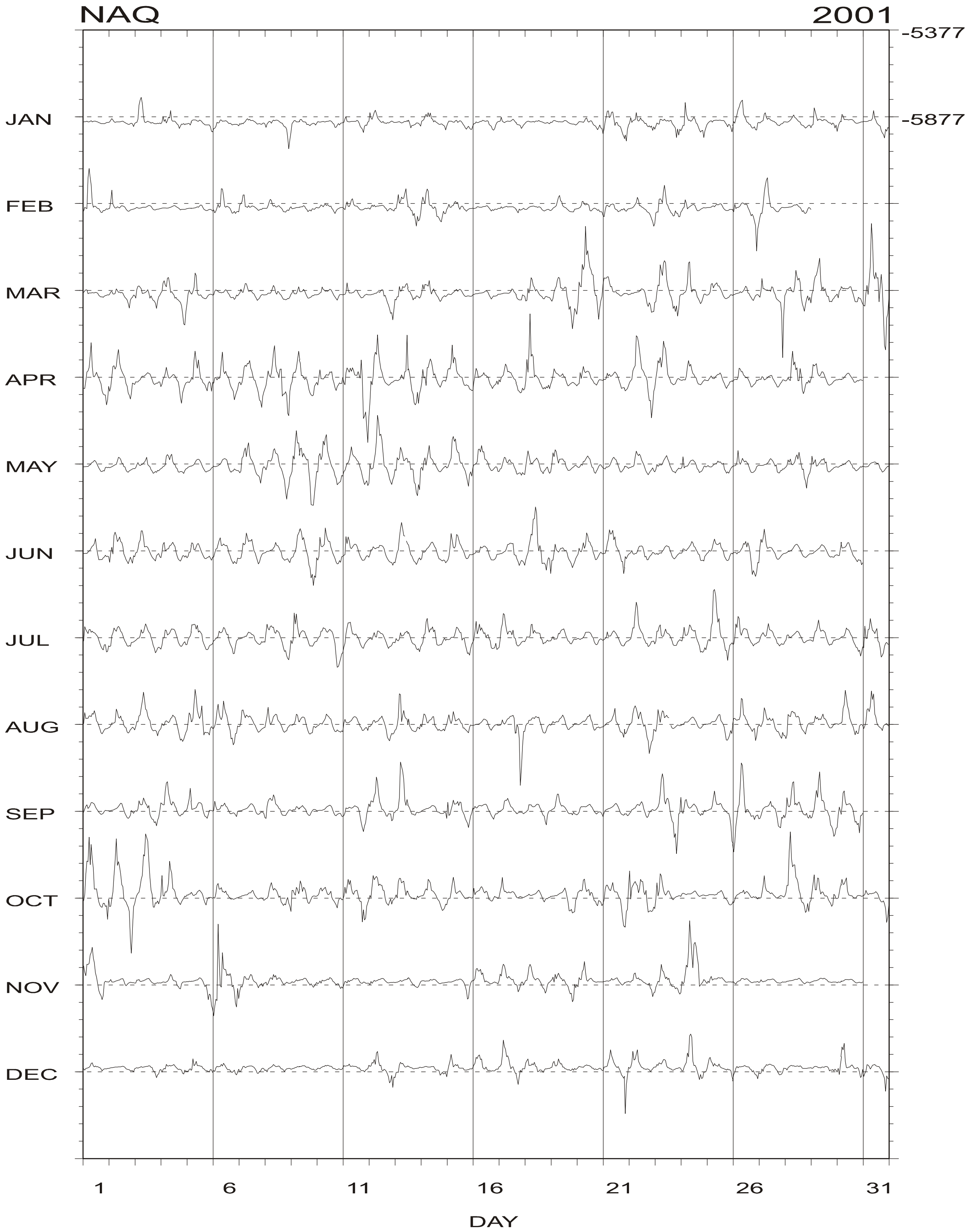
Hourly Mean Values

Horizontal Component X (nT)



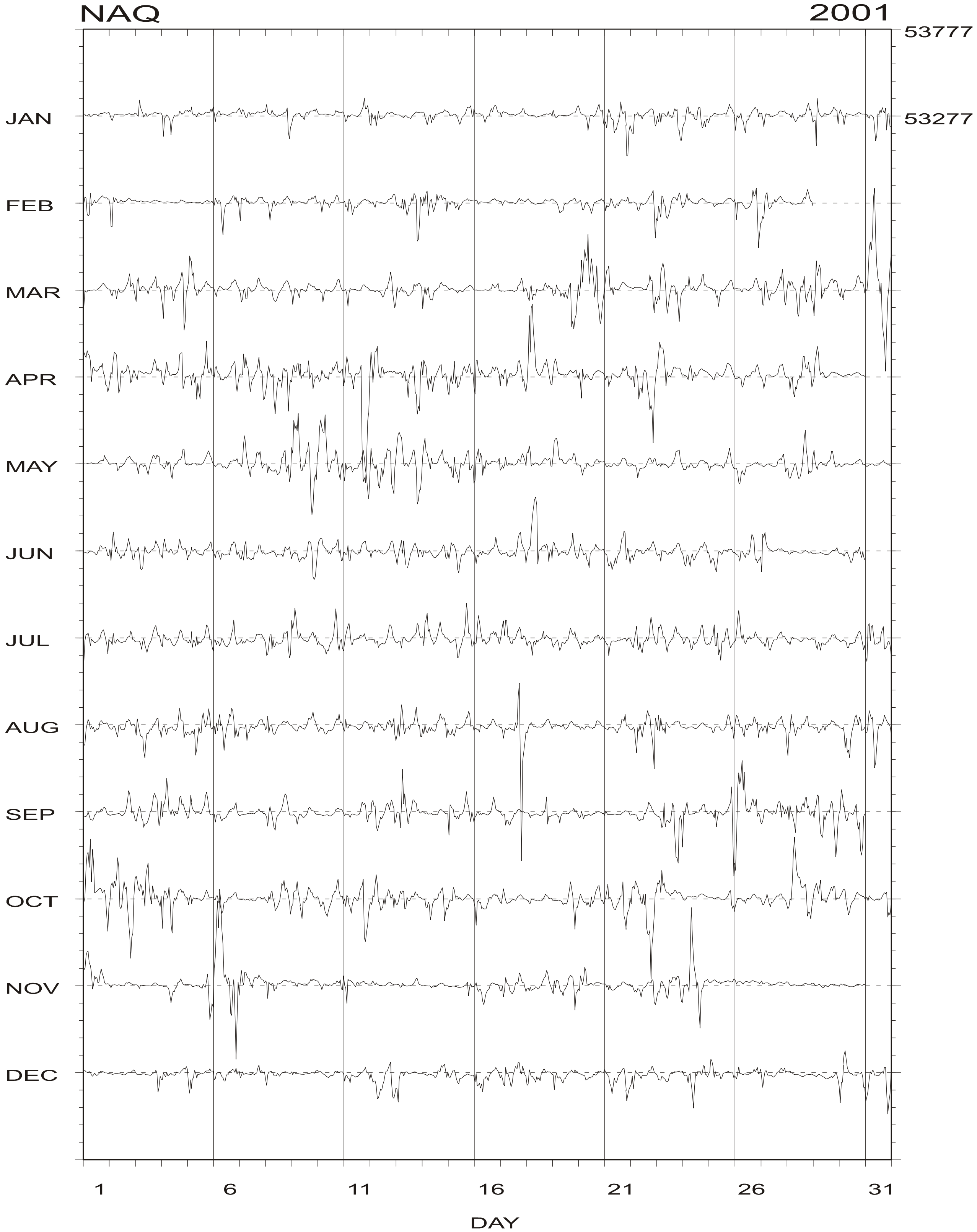
Hourly Mean Values

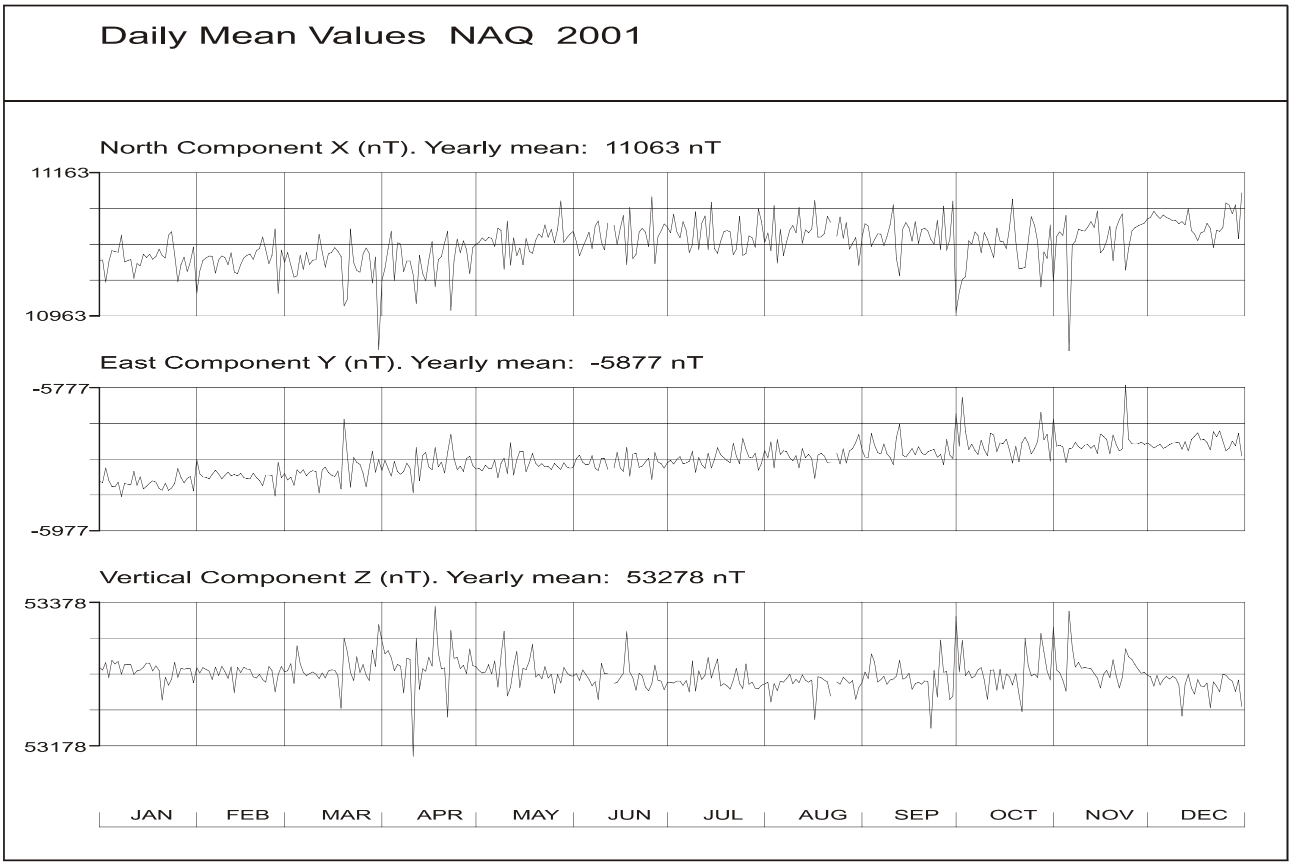
Horizontal Component Y (nT)



Hourly Mean Values

Vertical Component Z (nT)




Daily Mean Values NAQ 2001
North Component X (nT). Yearly mean: 11063 nT
11163
10963
East Component Y (nT). Yearly mean: -5877 nT
-5777
-5977
Vertical Component Z (nT). Yearly mean: 53278 nT
53378
53178
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC