ZAMG

Conrad Observatory Magnetic Results 2016

GMO Bulletin 3

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Chapter 1

Introduction

The Conrad Observatory, a geophysical observatory, monitors the physical parameters of our planet. It is named after the Austrian geophysicist Victor Conrad (1876 - 1962), who for many years worked at the Zentralanstalt für Meteorologie und Geodynamik (ZAMG) in Vienna. The observatory is almost entirely underground and guarantees constant temperature for all applied techniques. With its range of supported measurement techniques, instrumentation and the layout of the underground facilities, the Conrad Observatory represents a unique research and development location for earth scientists of all disciplines. The Conrad Observatory includes two main facilities: (1) The seismo-gravimetric observatory (SGO), which was opened in 2002, and (2) the geomagnetic observatory (GMO), officially opened in 2014. The basic task for earth observatories is the observation of temporal and spatial variations of physically relevant parameters, which are crucial to our understanding of processes on earth. At the Conrad Observatory, earthquake activity (seismology), changes in gravity and mass distribution, geomagnetic field variations, geodetic parameters, atmospheric conditions and meteorological data are all continuously monitored.
This yearbook provides an overview of geomagnetic measurements performed at the Conrad Observatory. It also contains detailed descriptions of data treatment, analytical methods, quality assessment and results. Long- and short-term variations of the geomagnetic field, e.g, secular variation and geomagnetic activity, are analysed and discussed. The yearbook of the Conrad Observatory is published every year and made available online following the links provided on the title page. The printed version comes along with a DVD containing the electronic appendix which includes all data products. The electronic data from the Conrad Observatory can also be requested online.

Chapter 2

Location and Instrumentation

The geomagnetic part of the Conrad Observatory is located at Trafelberg, Lower Austria, about 50 km south-west of Vienna. Three different geological formations are found in the vicinity of the Conrad Observatory: the Gutenstein Formation, Reifling Formation, and Wetterstein Limestone. All of them are dominated by very weakly magnetic limestones and dolomites of predominantly Middle Triassic age (247.1 - 237 Ma) [*Wessely*, 2006]. The observatory is part of a large underground installation covering the full geophysical monitoring program including seismology, gravity, meteorology and geomagnetism. The geomagnetic section consists of a 1 km long tunnel system, which includes several adits dedicated to electric and magnetic measurement systems. A location map indicating the positions of various instruments described below is shown in Figure 2.1. Absolute determinations, also referred to as DI measurements, are conducted within the absolute area at the northern end of the main tunnel. The main azimuth mark is located at the southern end of the main tunnel in a distance of 380 m. A further azimuth mark is located northwards (not shown) on a mountain at a distance of $\approx$ 2.5 km.
The following instruments are deployed at the Observatory for magnetic measurements: 4 Fluxgate sensors, 3 Overhauser sensors, and several other magnetic sensors. Auxiliary temperature measurements have been performed at all Fluxgate sensor positions, at their electronics and at several other positions in the tunnel. As will be shown below, temperature variations and magnetic gradients are extremely small throughout the observatory. Details on instrumentation are provided in Table 2.1. The instruments used in determination of the definitive data are printed in bold. Beside the above mentioned permanently running instruments, the Conrad Observatory additionally operates several DI Theodolite/Fluxgate combinations including an automated version (AutoDIF) for base value determination. There are several measurement systems for magnetic remanence measurements and rock magnetism as well as mobile sensors for field work and prospection.

Table 2.1. Instruments and their parameters.

Name	Type	Serial Number	Dynamic Range	Timestep Accuracy	Passband	Spectral Noise	Absolute Error	Orthogonality	Resolution	Setup	Operational
FGE	Fluxgate	S0252	3200nT	<10ms	1Hz	60pT/$\sqrt{Hz}$		<2mrad	100 pT	HEZ	
GP20S3	Potassium	012201									
GP20S3	Potassium	911005									
GSM90	Overhauzer	14245	100000nT			22pT/$\sqrt{Hz}$	0.2nT		10 pT		
GSM90	Overhauzer	31968									
LEMI025	Fluxgate	22	3000nT	<10ms	3.5Hz	<10pT/$\sqrt{Hz}$		<30min of arc	1 pT	HEZ	
LEMI025	Fluxgate	22									
LEMI036	Fluxgate	1	4000nT	<10ms	3.5Hz	<10pT/$\sqrt{Hz}$		<30min of arc	1 pT	HEZ	
POS1	Overhauzer	N432	80000nT				0.5nT		1 pT		2013-06

Note. — Spectral noise is determined at 0.3 Hz. Bold printed instruments are the primary source of high resolution data.

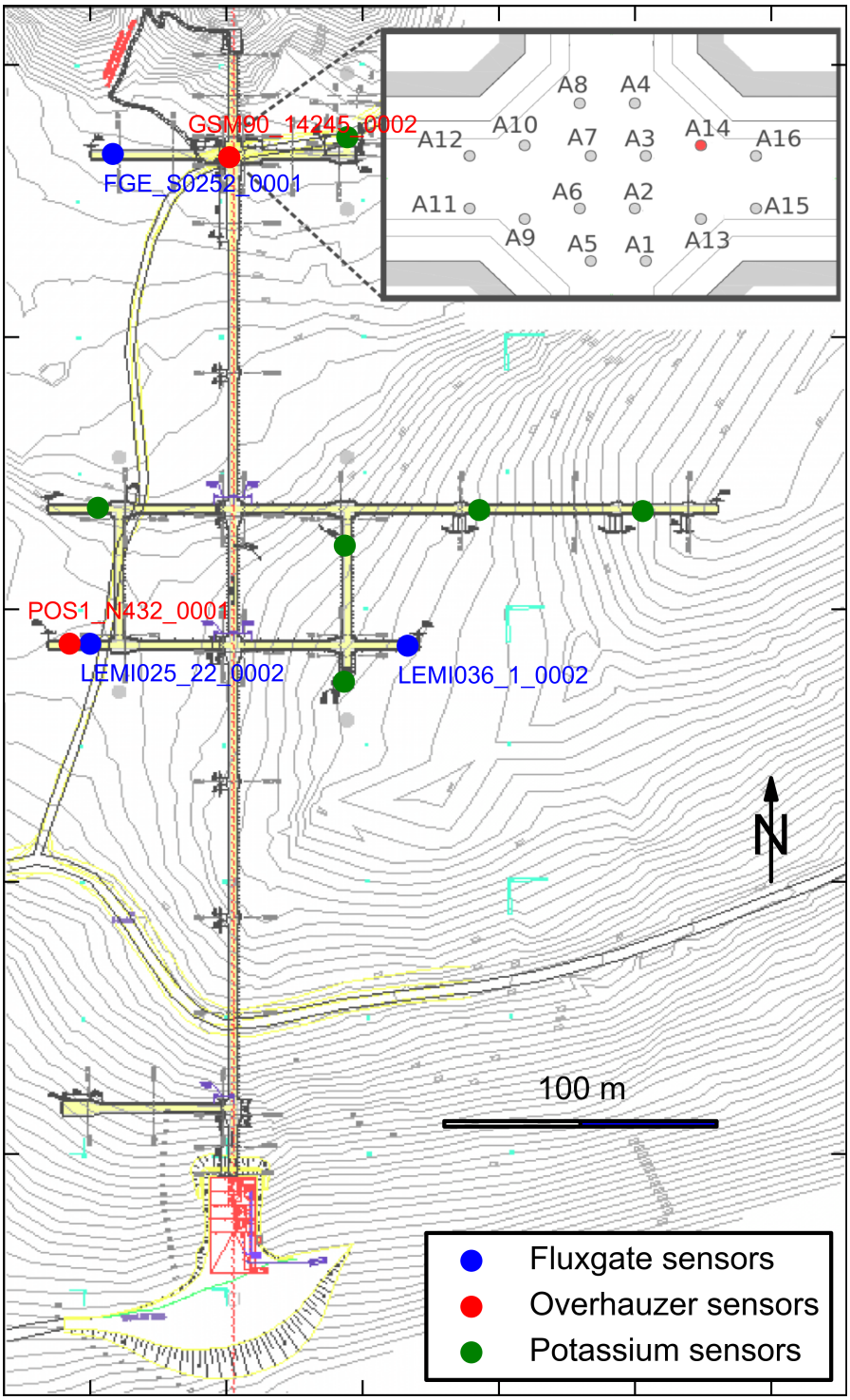

Figure 2.1 Location map of the Conrad Observatory with instrumentation

Chapter 3

Methods

3.1 Acquisition and data transmission

Variations in directional components of the Earth's magnetic field at the Conrad Observatory for year 2016 are mainly based on measurements from a LEMI036 sensor. This instrument is installed in hdz orientation within the tunnel system of the geomagnetic observatory (Figure 2.1). It fullly satisfies the current 1 second INTERMAGNET minimum requirements. The LEMI036 vector magnetometer samples the magnetic field and its data is digitally filtered to 10 Hz. 1 second and 1 minute values are produced using the standard INTERMAGNET Gaussian filter [*St-Louis*, 2012]. A GSM90 scalar magnetometer, which samples the field at 0.2 Hz, is used to determine the geomagnetic field intensity. As with vector measurements, filtered values are produced using a Gaussian filter. Most measurement systems at the Conrad Observatory are connected to a *Magpy Automated Realtime Acquisition System* (MARTAS) [*Leonhardt et al.*, 2013], which reads e.g. serial communication data and buffers field records. Any data is then continuously streamed on a WebSocket port. A *Magpy Automated Realtime Collection and Organisation System* (MARCOS) registers on ports of several MARTAS and collects all data and the related metadata within a MySQL database. An independent analysis process frequently checks the contents of the database and produces all data products. Preliminary data sets are then forwarded on to our FTP server and the INTERMAGNET gins every 5 minutes. GPS signals are used to ensure exact timestamps. As all measurements are performed underground, the GPS signal is transferred by optical fibres to the cabinets in the tunnel, which house the sensor electronics and the MARTAS. The time delay, conservatively estimated making use of the manufacturer's data as well as distance considerations between outside GPS antenna and cabinet, is about 10^{-6} seconds. Each setup of sensor and acquisition unit is equipped with an independent lightning protection system and a local uninterruptible power supply facilitating approximately 72 hours of service after power loss. An observatory wide uninterruptible power supply with roughly 40 hours of power adds to this two-step protection system and primarily secures data transfer towards the two redundant MARCOS servers. Data acquisition is therefore safe for about 5 days in the case of a full power loss. Data acquisition as well as all analyses including filtering procedures, baseline calculations, format conversions, and others discussed here, are performed using MagPy packages [*Leonhardt et al.*, 2016]. Version v0.3.97 is available at *https://github.com/geomagpy/magpy*.

Table 3.1. Fluxgate theodolites and serial numbers

Theodolite (SN)	Fluxgate (SN)
MinGeo-6814-5255	DTU-DI0146
T10B-160391	MAG01H-504-0619H
T10B-154167	MAG01H-378-0619H
WILD-231067	MAG01H-562-1024H

3.2 Baseline adoption

Magnetic observatories record the geomagnetic field from very high frequencies, which is of particular interest for the study of externally triggered field variations such as pulsations and geomagnetic storms, up to long term variations covering months and years, which mainly have internal sources and are required to analyse secular variation over decades and centuries. However, vector magnetometers tend to drift over such long time scales, due in part to temperature variation, ageing of the device and slow pillar movements. The drift of the instruments deployed at the Conrad Observatory is rather small (less than 0.48 nT per year for 2016), nevertheless it is necessary to perform DI measurements, which precisely determine the declination and inclination using a fluxgate theodolite [*Jankowski and Sucksdorff*, 1996]. The vector value is then reconstructed by additionally using independent measurements of a scalar magnetometer. Their drift, which is usually assumed to be negligible, is tested by comparing independent records of several instruments. For absolute measurements we use several different types of fluxgate theodolites. The primary instrument is a MinGeo (-SN:6814-5255) equipped with a DTU-DI0146 fluxgate magnetometer. In addition, we also perform frequent measurements with other fluxgate theodolites as listed in table 3.1. All measurements are conducted on the absolute pier A2. The primary azimuth mark is 380 m away at the southern end of the tunnel, which ensures the absence of any thermal fluctuations when aiming. Magnetic field differences between all absolute piers are regularly measured by an additional scalar magnetometer, which is moved every two weeks on another of the 16 piers. The primary, permanently recording F instrument, located on pier A14, is 2.65 m distant from the main absolute pier A2 and shows a total constant F difference of 0.26 nT. Table 3.2 summarizes all delta values within the absolute area of the Conrad Observatory. Overall the horizontal gradients within this area of the tunnel system at pier height are on average less than 0.12 nT/m (maximum: 0.42 nT/m), indicating perfect measurement conditions by international standards [*Jankowski and Sucksdorff*, 1996]. Since the opening of the observatory, absolute measurements have been made on average every 7.0 days, which is sufficient to monitor expected variation/drift signals at this location. Measurements make use of the 'residual' technique [*Lauridson*, 1985]. DI values are measured, typed into an online form, automatically analysed using MagPy and stored within the observatory databases. It should be noted here that the analysis algorithm requires variation data in a magnetic coordinate system (HDZ, HEZ). Beside routine measurements on pier A2, automatic measurements are periodically performed on pier A16 using an AutoDIF system [*Rasson and Gonsette*, 2011]. Furthermore, DI measurements are conducted once a month in a wooden hut (pier H1) outside the tunnel approximately 350 m south-west of A2 using a mire perpendicular to the two main azimuth marks of A2 for stability control. These measurements are available in the electronic appendix.

Table 3.2. Delta values for all piers with respect to A2. Please note that the delta value for D and I of A8, A10 and A16 are only preliminary due to the small amount of measurements.

Pier	Distance to A2 [m]	δF [nT]	Epoch (F)	δD [ArcSec]	δI [ArcSec]	Epoch (Dir)
A1	1.75	-0.06	2016			2016
A10	4.38	-1.33	2016	-26.2	-0.7	2016
A11	7.38	-0.5	2016			2016
A12	7.47	-0.35	2016			2016
A13	2.38	-0.14	2016			2016
A14	2.65	0.47	2016			2016
A15	5.56	-0.11	2015			2015
A16	5.73	0.07	2015	82.9	-24.8	2016
A3	2.2	-0.1	2016			2016
A4	3.96	0.8	2016			2016
A5	2.41	-0.39	2016	0.0	-7.4	2016
A6	1.75	-0.73	2016			2016
A7	2.69	-0.03	2016	0.0	-8.6	2016
A8	4.39	0.49	2016	54.7	15.2	2016
A9	4.22	-1.12	2016			2016
H1	353.89		2015	0.0	-10.1	2016

3.3 Data analysis and products

Principally we publish and submit three types of data sets, which are distinguished by their information content and speed of availability: preliminary data, quasi-definitive data and definitive data. Preliminary data sets are calculated and published in real-time, which means that the time delay is only affected by calculation time (seconds) and type of data provision (FTP: minutes, WebSocket: seconds). Preliminary data is already baseline corrected by applying a median value of baseline parameters from the past 100 days. As the baseline is very stable at the Conrad Observatory, this is a very good approximation of the definitive values (Figure 4.1. An automated outlier identification method based on median absolute deviations provided by MagPy is applied to this data in order to mark prominent outliers. Some outliers and artificial disturbances are, however, eventually still present in this data set. Quasi-definitive data sets are determined approximately once a week. For this purpose, the raw data set is subjected to a flagging procedure. All data sets are visually inspected by an observer and suspicious, disturbed and biased records are marked using MagPy's flagging routine. For quasi-definitive submission, flagged data is removed and the remaining data is baseline corrected using the same function as for definitive data. The baseline is calculated always for one year going backwards from the last measurement. If extrapolation towards the current date is required, then the last measurement is duplicated one day ahead before fitting the basevalues. Definitive data is almost determined in an almost identical manner as the quasi-definitive data with one difference: the angular difference between the current sensor orientation and the true magnetic coordinate system is analysed and corrected for. Such quasi-definitive data has been available since December 2015. Details are depicted in chapter 5.
K values are calculated according to the FMI approach [*Sucksdorff et al.*, 1991], which is one of the IAGA recommended routines [*Menvielle et al.*, 1995]. The method uses three major steps: in the first run, K values are calculated by simply determining the maximum-minimum difference of the minute variation data within three hour segments. This is done for both horizontal components and the maximum difference is selected. Using a transformation table related to the

Niemegk scale and a $K9$ level of 500 nT, the K values are then calculated. Based on this step, a first estimate of the quiet daily variation (S_r) is obtained. Finally, hourly means with extended time ranges (30min + m + n) are obtained for each half hour. m refers to 120 minutes (0-3a.m., 21-24p.m.), 60 minutes (3-6, 18-21) or 0 minutes. n is determined by $K^{3.3}$. Using these newly obtained hourly means, the final K values are calculated.
Preliminary data are made publicly available on the ZAMG data distribution server (ftp://www.zamg.ac.at) within 5 minutes. Quasi-definitive data are usually provided within one week after acquisition on the same servers. Definitive data for each year are prepared within a couple of months after the end of the year. They can be retrieved from the website of the Conrad Observatory, Zentralanstalt fuer Meteorologie und Geodynamik (http://www.conrad-observatory.at).
The Conrad Observatory provides data which is free for scientific, public and educational purposes. Data made available are provided for your use and are not for commercial use or sale or distribution to third parties without the written permission of the Conrad Observatory. Publications making use of the data should include an acknowledgment statement of this form: The results presented rely on data collected at the Conrad Observatory, Austria. We thank the Zentralanstalt fuer Meteorologie and Geodynamik (ZAMG) for supporting its operation.

Chapter 4

Accuracy and Coverage

4.1 Basevalues and Baseline

4.1.1 Primary baseline adoption

One measure of the accuracy of geomagnetic data is the quality of the baseline, i.e. the calibration curves that are used to correct the slow drift in time of the vector magnetometer in order to produce definitive data. Baselines for the Conrad Observatory are obtained for H (horizontal), D (declination) and Z (downward vertical) components by fitting a cubic spline curve to the correction values deduced from the absolute measurements. Each year the spline curve is calculated using data from mid-December of the previous year to mid-January of the following year in order to avoid discontinuities from one year to the next.
Base values and the corresponding best fitting baseline are shown in Figure 4.1. 0 absolute measurements were conducted on pier A2 in 2016 by the WIC observers (each one represented by a coloured point). On average, DI measurements were performed with a period of 7 days. The baseline was determined using MagPy's fitting function with a spline fit (knot parameter = 0.3, which is the normalized distance between spline knots). For each component, a measure of quality of the absolute measurements was assessed by calculating the standard deviation of the residuals between all measurements and the baseline curve. The obtained standard deviations are 0.43 nT for H, 0.20 nT for Z and 6.3 arcsec for D, which are well within INTERMAGNET requirements. Calculated baseline curves have a maximum amplitude of 1.63 nT in the X and Z components, and 22.5 arcsec in the declination. Base values indicate a long term variation of the baseline with signal periods larger than half a year, therefore the typical frequency of one absolute measurement per week is sufficient to observe and correct these trends. Baseline variations are very limited throughout 2016. This conclusion is underlined by DI measurements on all other piers. The A2 baseline as shown in Figure 4.1 was taken as reference and the resulting δF (see section 4.2) is virtually zero.

4.1.2 Consistency between measurement piers

Beside manual DI determination, an automatic DI measurement system (AutoDIF) [*Rasson and Gonsette*, 2011] is in operation at Conrad Observatory. The system is located on pier A16 (Figure 2.1). This automatic unit is configured to measure base values every 60 minutes. For analysis of this data, the site differences between A16 and the main pier A2, as listed in Table 3.2, are accounted for. As done for the manual measurements at pier A2 we also calculated the

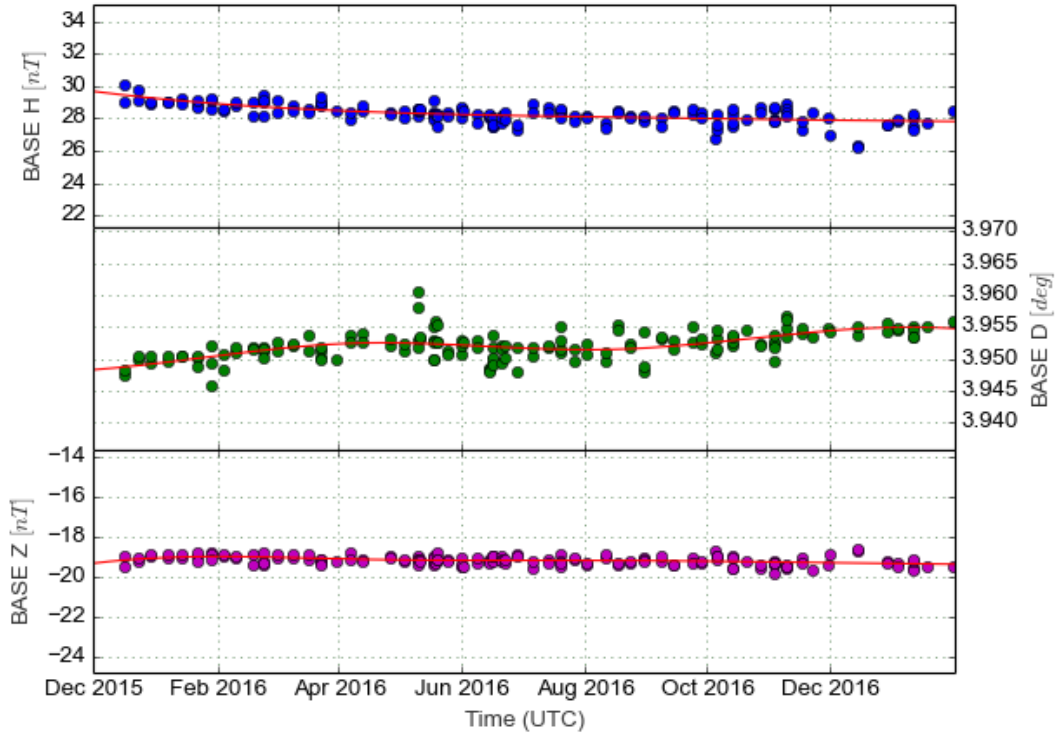

Figure 4.1 Baseline for the primary vectorial system LEMI036

standard deviation of the residuals as a measure of quality. The obtained standard deviations are 0.46 nT for H, 0.22 nT for Z and 11.6 arcsec for D. A maximum amplitude of 1.56 nT in the X and Z components, and 30.1 arcsec in the declination is obtained. In 2016 DI measurements have been performed on six piers. Only very few measurements were performed on piers A8 and A10, therefore the determined delta values for D and I are only preliminary. Beside the main pier A2, where most manual measurements were done, we do monthly manual determinations on pier H1 and automatic AutoDIF measurements on pier A16. Figure 4.3 shows the average daily basevalues of all piers analysed for the main variometer together. All baselines exhibit very similar almost linear trends. Please note that for this calcualtion the delta values have been taken into account. AutoDIF data is unfortunately no fully available for 2016 as we had problems with sensor cables. These problems could finally be solved and since August 2016 we have a contiuous measurement series up to now (October 2017). The available measurements support the adopted baseline shown as red line in Figure 4.3. In summary all tests support the high quality of the baseline of the Conrad Observatory.

4.2 Delta F

The quality of the measurements can further be assessed by looking at the scalar residual, which is the difference between the field strength directly measured by a scalar magnetometer and the

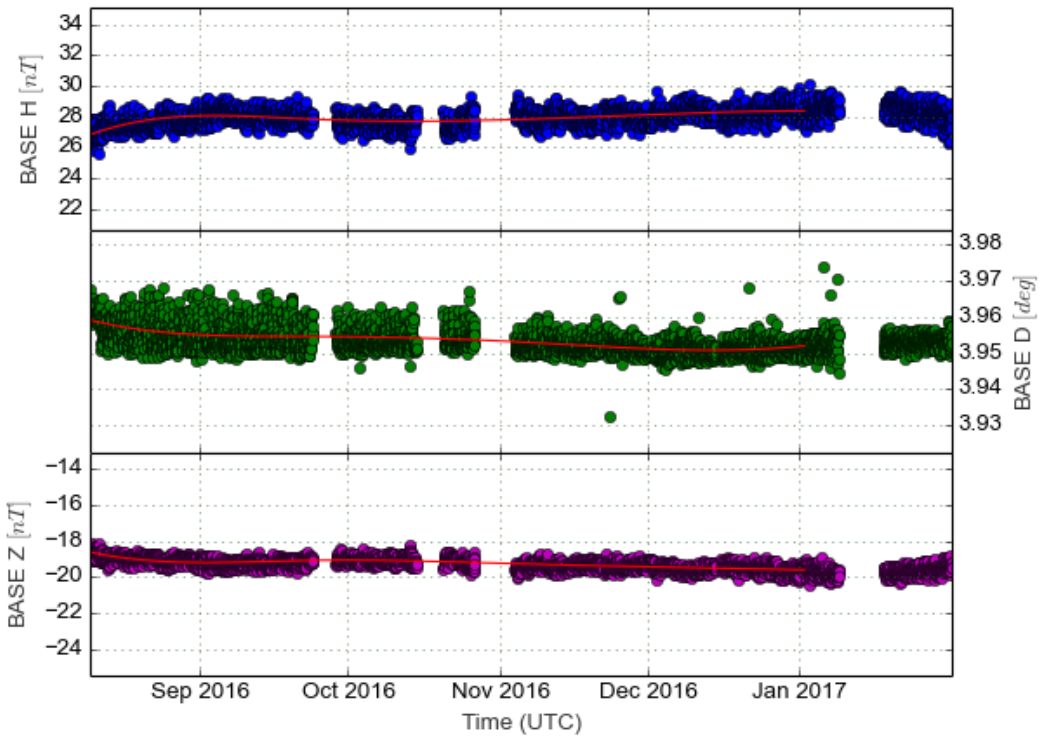

Figure 4.2 Baseline for the primary vectorial system LEMI036 based on AutoDIF measurements. Please note that AutoDIF measurements refer to pier A16.

field strength derived from the vector measurement after drift correction with the baseline curve. As can be seen in Figure 4.4, the scalar residual of minute mean values corresponds to an average of 0.02 nT with a standard deviation of 0.05 nT. The maximum amplitude remains below 1.06 nT for the year 2016. Taking baseline and delta F uncertainty estimates into consideration by combining the scalar residual and statistical variation of absolute measurements results in a 2-σ uncertainty scenario with maximum values of $\pm$ 0.48 nT for all components in 2016.This is well within INTERMAGNET's requirement of a 5 nT accuracy for definitive data [*St-Louis*, 2012].

4.3 Variometer differences

A third measure of quality comes from the comparison of records from different nearby variometer after baseline correction. Additionally this test also provides an independent check of correctness of adopted baseline algorithms, especially if the the two instruments are not identically oriented. For difference analysis, the orthogonal X, Y, and Z components of available variometer records after baseline correction are subtracted from each other. In 2016, variometer data from 3 independent systems is compared. In Figure 4.5, we depict these differences for each component and for each variometer relative to the primary variometer LEMI036. The scale of the figure is again related to the INTERMAGNET 5 nT criteria, and the analysis makes use of filtered one minute

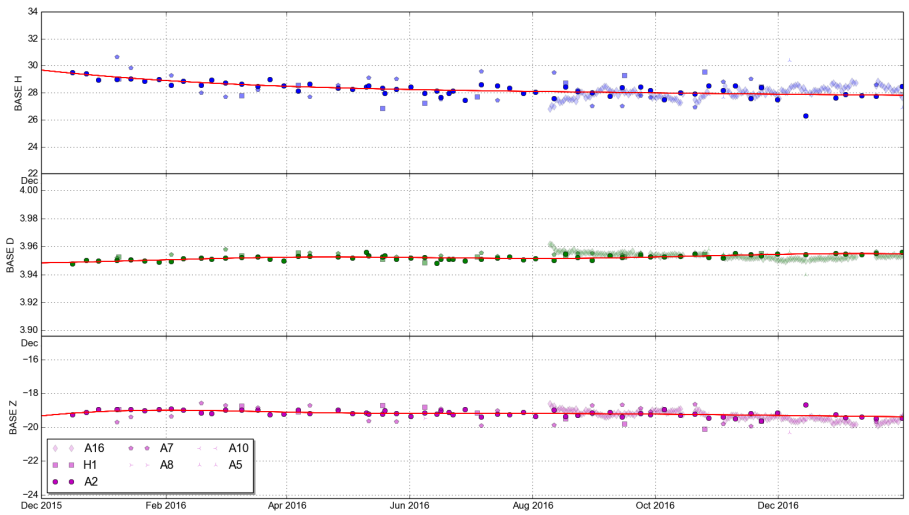

Figure 4.3 Combined plot of all basevalues for the LEMI036 variometer as determined on the piers given in the legend. Average pier differences as listed in Table 3.2 have been regarded for.

data. The average residual of the X component and its standard deviation is -0.03±0.13 nT. For the Y and Z component values of 0.34±0.09 nT and 0.00±0.09 nT are obtained. Variation data of three instruments is available for 2016. All variometers are set up in HDZ orientation. As the LEMI025 and LEMI036 were installed 3 years after the FGE, both systems have a small angular difference of about 0.4 deg in the horizontal components. After baseline adoption, the differences of all instruments is negligibly small, supporting the following three conclusions: 1) the algorithms and the calculation of adopted baselines, as depicted in section 3.2, are correct; 2) all instruments record an identical geomagnetic field at periods of one minute and above; and 3) the combination of all accuracy tests underlines the very high quality of the geomagnetic field record.

4.4 Data coverage

A data coverage of 97.2 % of vectorial data in minute resolution was established for 2016. Please note that for filtering we use a very conservative approach: minute means are only calculated if 100 % of 1 second data is available within the filtering window, therefore the relative recovery rate for one second data is usually higher. For scalar minute data, a data coverage of 97.2 % was obtained. One second definitive data provided within the electronic appendix consists solely of variation data from LEMI036 and scalar data from GSM90 (see table 2.1). For minute data, gaps within the variation sequence were filled using secondary variometers. The scalar one minute record corresponds to an average value of all available scalar data. For 2016 the composite minute data set consists of contributions from all instruments shown in figure 4.6. Yellow shaded regions indicate variation data used from respective instruments, green shaded regions indicate scalar data used to calculate average intensity. The lowermost plot indicates average differences between the contributing scalar values. The basic reason for only using single

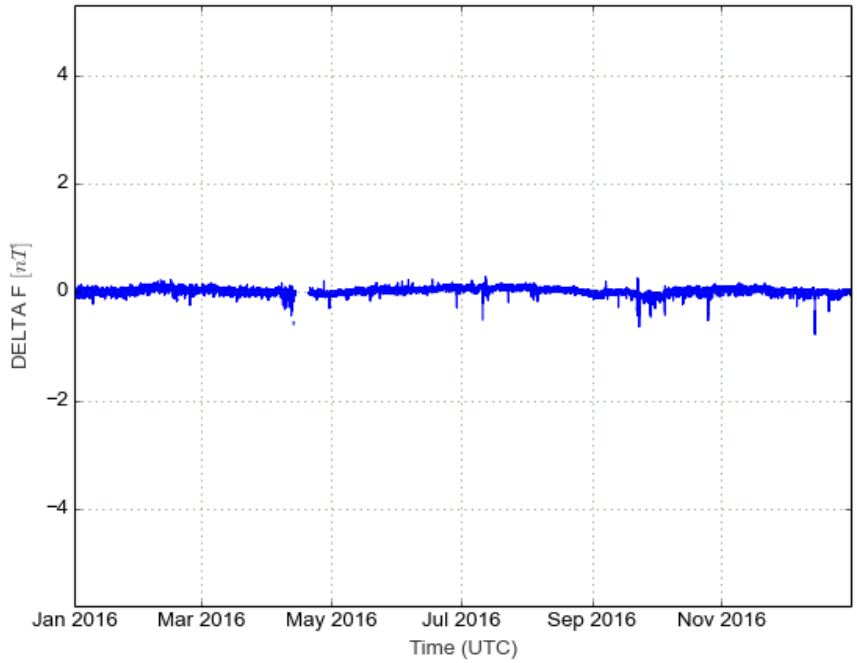

Figure 4.4 Delta F values between the scalar magnetometer and the field strength calculated from the baseline corrected vectorial data set. The scale of the figure is related to the INTERMAGNET 5 nT criteria.

instrument records for our definitive one second data is to maintain the frequency characteristics of the underlying instruments. For filtered one minute data and longer periods, all instruments have widely similar characteristics within the frequency domain, which means an averaging and gap filling procedure is justified. Variation data is available almost continuously for 2016. Minor gaps are mainly related to disturbances due to the fire protection radio communication system, and some wood work in summer 2016 in the forest above the sensor. Scalar data was mainly recorded with two instruments in 2016. Due to the averaging procedure any individual gaps could be filled. The differences of all scalar instruments are very small, supporting the validity of the averaging process. Larger data gaps of the individual instruments are related to the removal of POS1 end of 2016 and a data logger upgrade of GP20S3. Minor gaps have the same reasons as listed for the variometer.

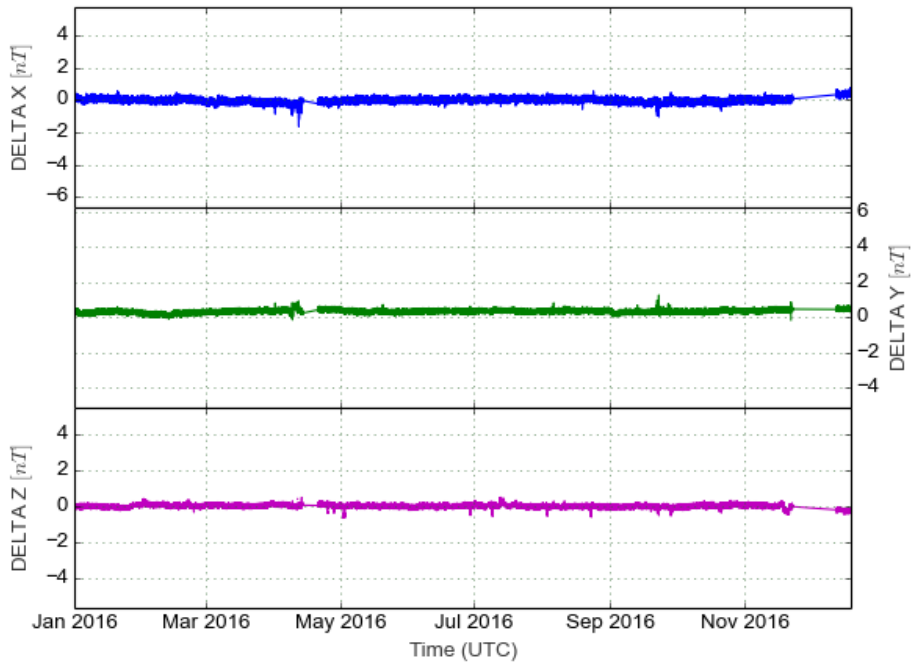

Figure 4.5 Delta values of vectorial components of baseline corrected variometer data.

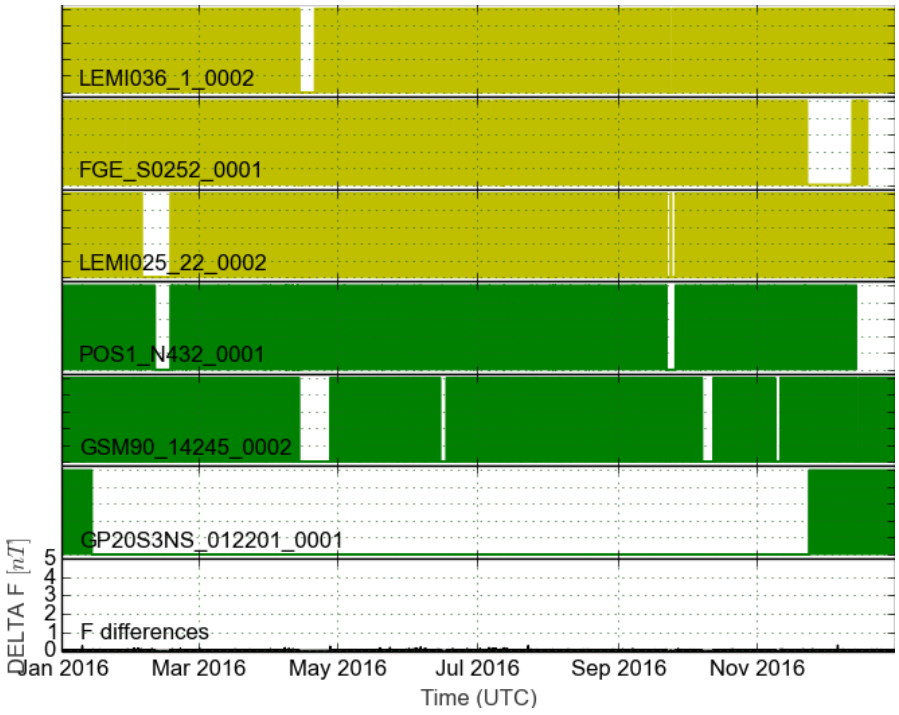

Figure 4.6 Contributions of each sensor for the analysis of 2016. Yellow shaded regions indicate time ranges of respective variometer data, green shaded regions mark scalar data which has been averaged for the composite one minute record. The lowermost plot depicts the average difference between all scalar data.

Chapter 5

Definitive Data

5.1 Definitive data production

A compilation of all results is shown in Figure 5.1. Vectorial components, after baseline correction, comprise the upper three plots. An independently measured value of the field strength F is shown below. Temperature variation is very small. The average temperature corresponds to 5.86 $\pm$ 0.03 $°C$. Please note that the absolute value of temperature is not accurately known; its variation, however, is very precise and almost negligible. The lower two plots show the locally determined K value and the global index K_p provided by the GFZ Potsdam, which show very similar characteristics. For definitive data preparation, variation data is analysed slightly differently in comparison to quasi-definitive values. All variometers located at the Conrad Observatory were set up in HEZ direction at the time of installation. Due to secular variation, the magnetic coordinate system is slowly moving in time. This will lead to growing deviations from a perfect HEZ orientation for all variometers, however the baseline correction technique of *Lauridson* [1985] requires HEZ orientation. Even slight deviations from this boundary condition will lead to an improper variation correction which can result in slight offsets of δF, as an example. The LEMI036 variometer was set up in 2012. Since then, the east component has moved by an angle of -0.29 degrees, which can be easily tested with reasonable accuracy by rotating the yearly average HEZ so that the average E component results in zero. For definitive data production, all calculations are performed on such coordinate-transformed data. This transformation is not used for quasi-definitive data (see section 5.2 for differences). A few magnetic events are visible in 2016 (Figure 5.1), marked by large vectorial deviations and high K indices. The events correspond to geomagnetic storms, in particular to coronal-mass ejections hitting earth. Throughout the year a gradual increase of Z and a west-ward trend in declination is visible, as also found in the long-term trend in central Europa (see next chapter).

5.2 Comparison to preliminary and quasi-definitive data

Preliminary and quasi-definitive (QD) data is available from December 2015 onwards. These data sets will, as well as future definitive data, be primarily based on LEMI036 data as this instrument is characterized by the smallest noise level. For 2016 quasi-definitive data has been created using LEMI025, definitive data originates from LEMI036. Generally, quasi-definitive data and definitive data show very good aggreements in particular for the second half of 2016, when data checking was intensified. Before, a number of spikes went undetected into the QD

data set. Overall, both data sets agree very well with average differences of less than 0 nT in x, less than 0 nT in y and less than 0 nT in z. Please note that Definitive and QD data originate from different instruments. The differences are well within the 5 nT range for suitable quasi-definitive data. Nevertheless, there is room for improvements in particular using the same instrument and more accurate data checking. Beginning in September 2017, quasi-definitive data will be obtained from LEMI036 and submitted to INTERMAGNET.

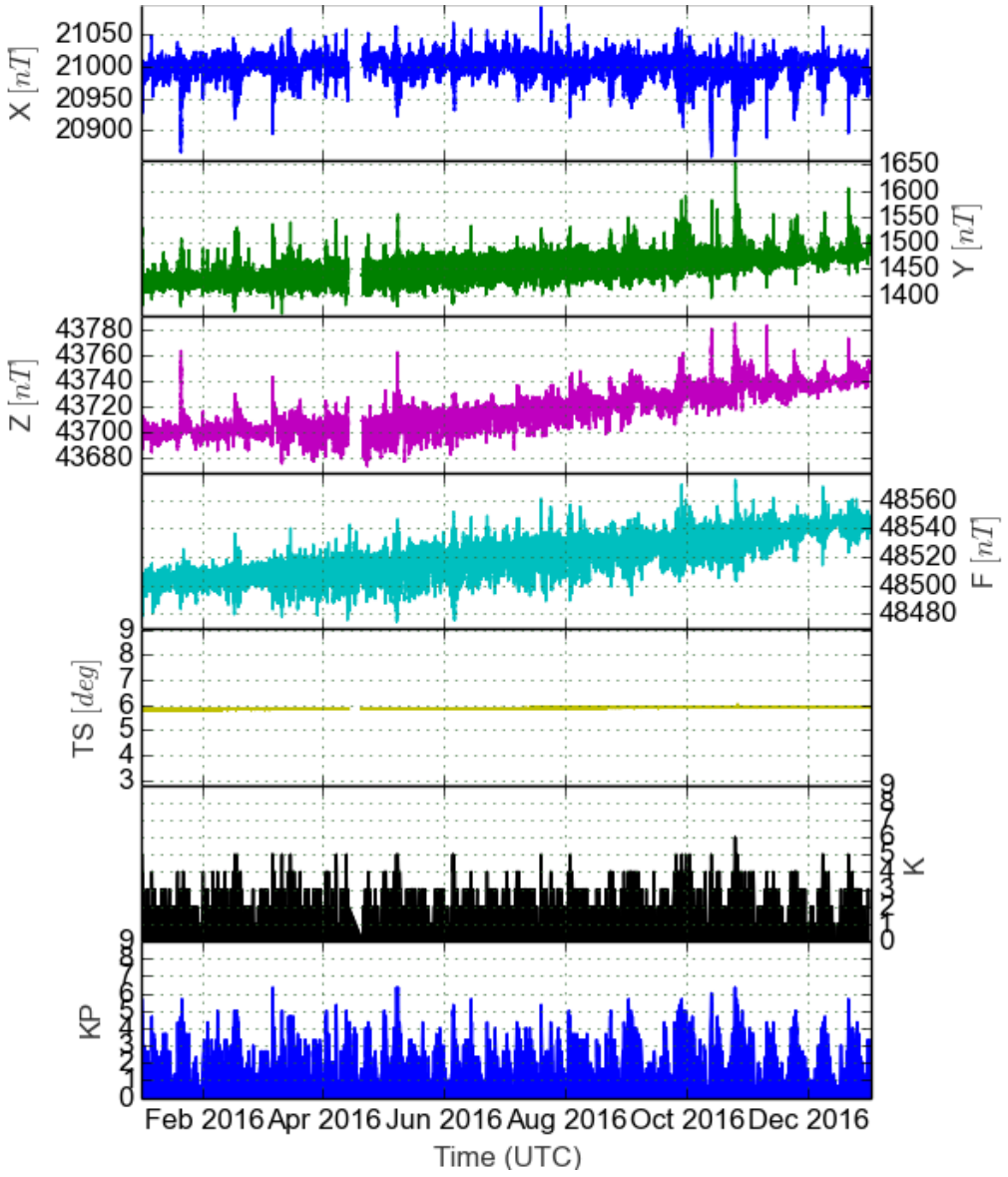

Figure 5.1 Definitive 1 minute data of WIC. Shown are the three baseline corrected vectorial components, the independently determined F value and the temperature variation at the sensor position, as well as local K and global K_p indices.

Chapter 6

Geomagnetic Characteristics

6.1 Secular Variation

Geomagnetic secular variation originates in the dynamo processes of the Earth's outer core, where fluid flows generate the main magnetic field. In order to reduce geomagnetic contributions of external origin such as the interaction of the Sun's magnetic field with the Earth's magnetosphere, monthly and annual means are calculated. It should be mentioned that this procedure does not completely remove external field contributions. The monthly and yearly mean data for Conrad Observatory are provided in tables 6.1 and 6.2, respectively. After combining yearly means of the two Vienna observatories Cobenzl, WIK (running from 1955 to 2015), and the Conrad Observatory, WIC (from 2014 onwards), a secular variation diagram as shown in Figure 6.1 has been obtained. In the combination of both data sets, the Cobenzl annual means have been corrected towards the Conrad Observatory values using the average differences of years 2014 and 2015. Fortunately, the location difference ($\approx$ 50 km) and thus the averaged difference in each component is not large and constant in time between the two years of overlapping records (diff X = 169 $\pm$ 2 nT, diff Y = -30 $\pm$ 1 nT, diff Z = -272 $\pm$ 1 nT).
As can be seen in Figure 6.1, field strength F and vertical component Z have been gradually increasing since 1955. Declination has been monotonously moving westwards and the magnetic meridian (Declination = 0 deg) passed the Conrad Observatory in 1973. The H component has also increased since the beginning of observation, but has shown minimal variation since 1980. Considering the last two years, a secular variation rate of dX = 10.0 nT/year, dY = 52.0 nT/year and dZ = 40.0 nT/year is obtained. Fitting and extrapolating an average annual derivative curve using cubic splines results in the following predicted average field values for 2017: H = 21062 nT, D = 4.11 deg, Z = 43762 nT. Please note that for this approximation it is assumed that the 50 km distant locations WIK and WIC have exhibited the same secular variation pattern in the past, as the WIK data has been corrected using constant offsets.

6.2 Geomagnetic Activity

6.2.1 Local K values and K_p

The K-index (K) and the planetary K-index (K_p) are used to characterize the magnitude of geomagnetic activity. K_p is an excellent indicator of disturbances in the Earth's magnetic field and is used by many space weather prediction centres. Geomagnetic storms typically result in DC fluctuations in power grids, interruptions to spacecraft operations and GNSS due to

Table 6.1. Monthly arithmetric means at the Conrad Observatory. These mean values are deduced from minute data sets. If less then 90% of data is available then averages are not calculated.

Date	X [nT]	Y [nT]	Z [nT]	F [nT]
2016-01	20993.402	1427.919	43701.660	48503.565
2016-02	20998.003	1432.228	43701.914	48505.900
2016-03	20999.679	1436.205	43703.474	48508.194
2016-04	...	...	...	48511.713
2016-05	21001.319	1445.747	43709.480	48514.560
2016-06	21007.957	1448.367	43711.767	48519.524
2016-07	21005.986	1453.910	43716.298	48522.834
2016-08	21000.500	1458.007	43722.140	48525.960
2016-09	20994.984	1463.721	43727.859	48528.998
2016-10	20989.661	1468.985	43734.557	48532.770
2016-11	20996.923	1472.020	43737.634	48538.813
2016-12	20999.488	1476.339	43740.017	48542.228

Table 6.2. Yearly arithmetric means at the Conrad Observatory. These mid-year mean values are deduced from the yearly hourly data sets and therefore are not necessarily exactly equal to an average of the monthly means.

Date	x [nT]	y [nT]	z [nT]	f [nT]
2014	20995.000	1353.000	43633.000	48440.000
2015	20991.000	1402.000	43678.000	48480.000
2016	20999.000	1452.000	43718.000	48521.000

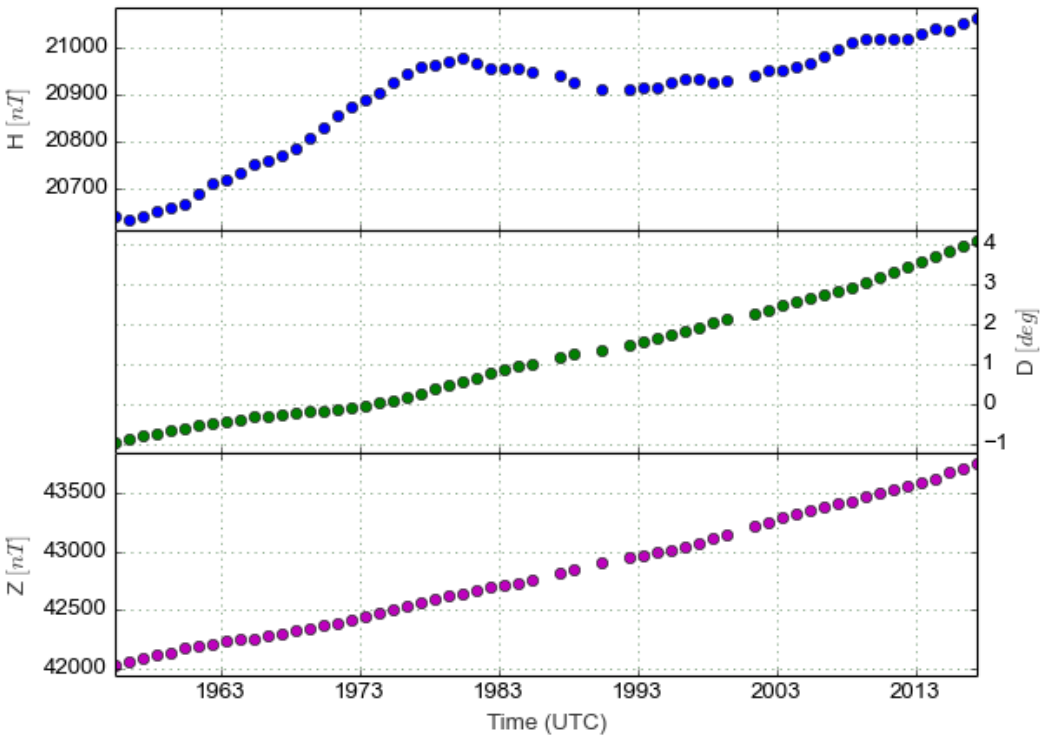

Figure 6.1 Yearly means since 1955. Data from 1955 until 2015 was obtained at the Cobenzl Observatory and corrected for the average offset of years 2014 and 2015 to the Conrad Observatory. Shown is also a predicted value for 2017.

ionospheric radio signal disturbances, and visible aurorae. The average local K for 2016 at Conrad Observatory corresponds to 1.8, which is in perfect agreement with the yearly average K_p of 1.8 provided by the GFZ Potsdam (http://www.gfz-potsdam.de/kp-index/). Figure 6.2 depicts the yearly and seasonal distribution of K values. As to be expected because of the orbital distance, the summer term is characterized by slightly higher average activity. A table with all K values can be found in the electronic appendix (file: /IAF/WIC16K.DKA).

6.2.2 Quiet and disturbed days

On a global scale, quiet and disturbed days are identified based on three characteristics which each are used to define a single yearly or monthly ordering number (see http://www.gfz-potsdam.de/sektion/erdmagnetfeld/daten-produkte-dienste/kp-index/erklaerung/qd-days/). These parameters include (a) the sum of all K_p values of one day, (b) the sum of squares of all K_p, and (c) the maximum values of K_p. The three ordering numbers are then averaged and lowest and highest averages are selected. Is has to be noted that this measure is purely relative and is not representative for classifying and comparing disturbance levels of different time periods. Therefore additional notes and codes are used based

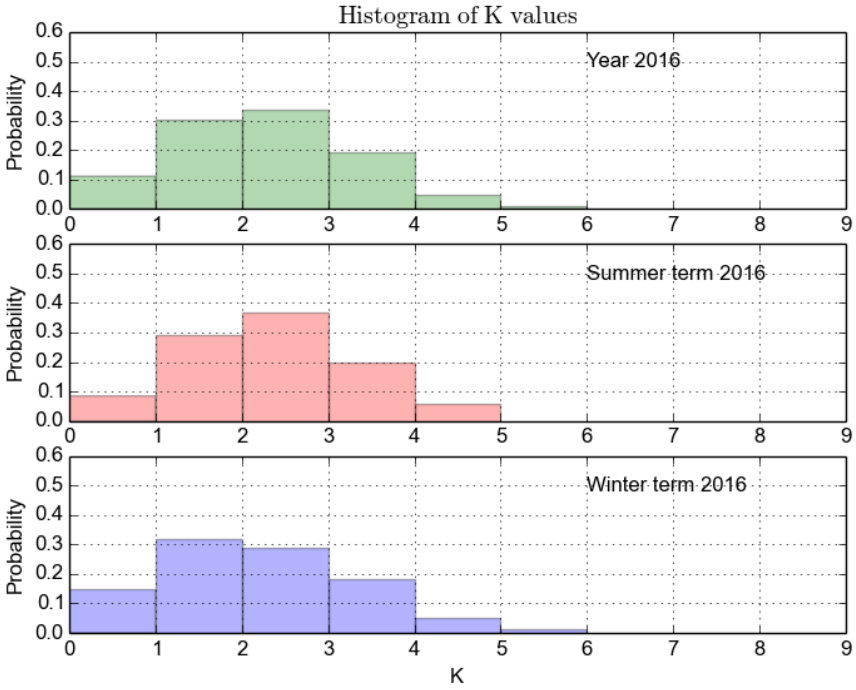

Figure 6.2 Distribution of K values.

on the average daily A_p index, originating from eight a_p values which are the nT thresholds for each K_p. Detail can be found in the link above. For describing quiet and disturbed days at the Conrad Observatory, and to assure that data from all time periods is comparable, we prefer to use solely the average daily K index. Disturbed days are defined as days in which the average daily K index exceeds a value of 3.0. Such values were found for the following 27 days: 2016-01-21, 2016-02-16, 2016-02-17, 2016-03-07, 2016-03-17, 2016-05-08, 2016-05-09, 2016-06-05, 2016-07-08, 2016-08-03, 2016-09-01, 2016-09-02, 2016-09-03, 2016-09-04, 2016-09-26, 2016-09-27, 2016-09-28, 2016-09-29, 2016-10-13, 2016-10-25, 2016-10-26, 2016-10-27, 2016-10-29, 2016-11-13, 2016-11-25, 2016-12-08, 2016-12-09.
For quiet days the average daily K index needs to be below 0.5, and this was found for 14 days: 2016-01-25, 2016-01-29, 2016-02-22, 2016-03-13, 2016-04-01, 2016-08-28, 2016-10-21, 2016-11-05, 2016-11-17, 2016-11-19, 2016-11-30, 2016-12-01, 2016-12-03, 2016-12-04.

6.2.3 Geomagnetic Storms

Using an automated storm detection method [*Bailey and Leonhardt*, 2016], which aims to detect storms likely to cause geomagnetically induced currents, 6 storm alerts were issued in the year 2016. In the previous year, a total of 15 storms were detected, showing a decline in solar activity. All detections have been published on the Conrad Observatory website (http://www.conrad-observatory.at). The technique makes use of a combination of DSCOVR and ACE satellite data [*Stone et al.*, 1990] along with geomagnetic recordings from the Observatory. An example of an automated storm detection using both sets of data is shown in Figure 6.3.

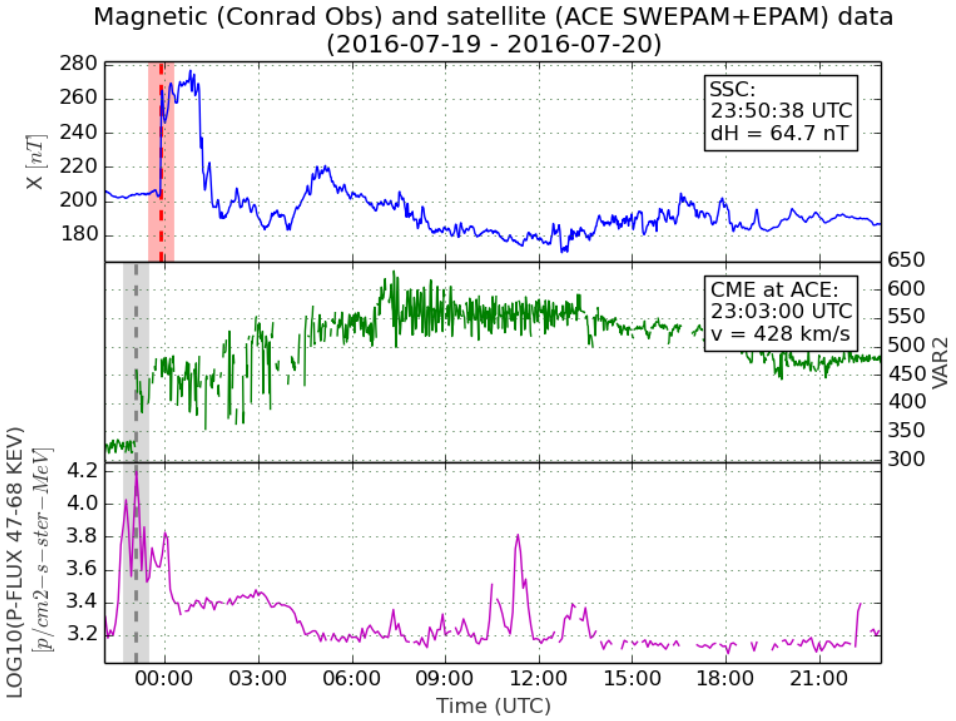

Figure 6.3 Most prominent geomagnetic storm in 2016. Shown are solar wind speed as determined by the ACE satellite and the horizontal component (H) of the geomagnetic field. Denoted are the times when shock front of the coronal mass ejection (CME) passed the satellite and initiated the sudden storm commencement (SSC) on earth.

Chapter 7

Publications and Presentations

In 2016 the geomagnetism group contributed to the following presentations and publications:

- Arneitz, P. and Draxler, A. and Leonhardt, R., *Wurden Kirchen mit dem magnetischen Kompass orientiert?*, Jahrestagung der Gesellschaft für Archäoastronomie, Wien, *2016*
- Arneitz, P. and Egli, R. and Leonhardt, R., *Unbiased analysis of geomagnetic data sets and comparison of historical data with paleomagnetic and archeomagnetic records*, Reviews of Geophysics, 54, Doi 10.1002/2016RG000527, *2016*
- Arneitz, P. and Leonhardt, R., *HISTMAG - Database for historical geomagnetic data*, Conrad Observatory Journal, Scientific Contributions 2014-2015, *2016*
- Arneitz P. and Leonhardt R. and Fabian K., *A new global geomagnetic model based on archeomagnetic, volcanic and historical records*, EGU General Assembly, *2016*
- Arneitz, P. and Leonhardt, R. and Heilig, B. and Schnepp, E. and Mayrhofer, F. and Hejda, P. and Vadasz, G. and Kovács, P. and Valach, F. and Hammerl, C. and Egli, R. and Fabian, K. *HISTMAG: A database that combines historical, archeomagnetic, and paleomagnetic data - structure and applications*, 15th Castle Meeting, Dinant, Belgium, *2016*
- Bailey, R. and Leonhardt, R., *Automated geomagnetic storm detection at the Conrad Observatory*, Conrad Observatory Journal, Scientific Contributions 2014-2015, *2016*
- Bailey, R. and Leonhardt, R., *Modelling Geomagnetically Induced Currents in Austria at the Conrad Observatory*, IAGA Workshop 2016, *2016*
- Bailey, R. and Leonhardt, R., *Automated detection of geomagnetic storms with heightened risk of GIC*, Earth, Planets, Space, 68, 99ff, Doi 10.1186/s40623-016-0477-2, *2016*
- Halbedl, T. and Renner, H. and Bailey, R. and Leonhardt, R. and Achleitner, G., *Analysis of the Impact of Geomagnetic Disturbances on the Austrian Transmission Grid*, 19th Power Systems Computation Conference, *2016*
- Kompein, N. and Egli, R. and Leichter, B. and Leonhardt, R., *Anthropogenic signals in magnetic timeseries*, Conrad Observatory Journal, Scientific Contributions 2014-2015, *2016*

- Kompein, N. and Pleschberger, R. and Egli, R. and Leichter, B. and Leonhardt, R., *A comparison between Conrad Observatory and the old Wien Cobenzl observatory: Insights into anthropogenic ground currents*, IAGA Workshop 2016, *2016*
- Leonhardt, R. and Bailey, R. and Miklavec, M., *Working with IAGA and INTERMAGNET one-second standard data sets: The MagPy Python package*, IAGA Workshop 2016, *2016*
- Leonhardt, R. and Egli, R. and Leichter, B. and Herzog, I. and Kornfeld, R. and Bailey, R. and Kompein, N. and Arneitz, P. and Draxler, A. and Mandl, R. and Steiner, R., *Conrad Observatory: Magnetic Results 2015*, GMO Bulletin 2, *2016*
- Schnepp, E. and Leonhardt, R. and Korte, M. and Klett-Drechsel, J., *Validity of archaeomagnetic field recording: an experimental pottery kiln at Coppengrave, Germany*, Geophysical Journal International, 205, 622-635, Doi 10.1093/gji/ggw043, *2016*
- Shah, J. and Koppers, A.A.P. and Leitner M. and Leonhardt, R. and Muxworthy, A. R. and Heunemann, C: and Bachtadse, V. and Ashley J.A.D. and Matzka, J., *Palaeomagnetic evidence for the persistence or recurrence of geomagnetic main field anomalies in the South Atlantic*, Earth and Planetary Science Letters, 441, 113-124, *2016*

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Chapter 8

Appendix

Table 8.1. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20800.0, Unit: nT																									
Jan01	134	160	186	202	194	189	183	163	147	138	144	154	158	162	165	172	174	177	176	180	181	180	181	179	170
Jan02	178	188	179	177	176	185	195	200	199	191	187	185	187	189	193	185	180	185	189	188	192	196	194	192	188
Jan03	190	192	193	195	197	201	203	201	193	182	181	184	185	192	196	190	183	186	184	183	187	187	198	189	191
Jan04	188	190	192	193	198	199	202	201	196	188	188	191	192	195	197	200	197	192	196	195	198	200	197	196	195
Jan05	198	200	201	204	208	214	218	219	220	211	201	198	196	202	210	214	215	208	200	196	199	206	207	209	206
Jan06	215	231	196	189	196	205	209	209	197	172	158	161	173	180	183	186	197	199	198	195	189	189	191	204	193
Jan07	195	191	196	205	203	205	203	201	197	198	182	188	189	187	190	190	196	187	192	188	187	192	197	198	194
Jan08	197	195	199	199	203	204	203	203	193	182	183	185	180	186	186	195	197	194	195	196	195	202	203	201	195
Jan09	196	195	198	201	205	208	213	215	204	192	187	181	182	187	190	194	194	198	200	201	204	205	203	205	198
Jan10	206	203	200	207	210	212	214	217	210	199	188	190	185	190	197	196	198	198	200	201	207	195	189	194	200
Jan11	198	201	202	206	211	216	211	208	201	198	191	187	184	187	191	188	182	...	183	182	189	189	185	180	...
Jan12	194	182	185	189	191	198	205	199	198	192	188	186	186	198	203	198	195	199	194	198	188	179	187	193	193
Jan13	201	201	184	204	197	197	198	204	201	200	197	194	187	183	183	188	190	193	200	193	197	196	197	196	195
Jan14	196	196	198	199	200	205	205	208	200	193	200	203	197	186	185	184	179	176	181	193	190	202	203	192	195
Jan15	193	194	194	196	198	200	201	203	194	189	190	190	187	188	193	193	197	199	195	196	195	199	198	196	195
Jan16	196	197	199	203	203	206	205	204	199	197	199	203	206	209	205	204	204	203	205	205	208	205	202	201	203
Jan17	202	203	205	206	208	210	213	212	200	194	196	198	192	188	194	195	189	182	184	190	197	197	199	200	198
Jan18	201	201	203	204	207	208	211	209	202	194	190	193	191	190	194	195	188	183	193	200	202	203	214	207	199
Jan19	228	211	196	192	194	201	204	207	205	203	205	203	194	191	198	202	202	201	203	204	204	204	206	204	203
Jan20	206	208	210	212	215	219	221	219	196	173	159	148	147	133	113	88	89	75	89	98	95	111	132	149	154
Jan21	154	165	171	164	173	184	199	188	177	167	157	164	164	161	170	165	174	168	159	171	188	194	203	174	173
Jan22	168	182	175	178	189	182	187	196	190	179	174	173	171	173	181	184	183	189	187	187	191	193	185	186	183
Jan23	187	189	190	193	199	207	206	202	182	184	179	181	178	169	185	185	183	175	185	185	188	191	193	191	188
Jan24	200	199	193	189	194	194	198	195	188	184	180	185	189	189	193	193	194	202	183	187	201	199	198	197	193
Jan25	196	196	196	196	197	199	201	198	191	184	180	182	188	191	198	203	203	202	201	201	201	201	200	200	196
Jan26	200	203	205	206	208	210	213	209	201	194	192	198	200	202	203	209	209	208	208	207	206	205	203	204	204
Jan27	204	203	205	209	211	216	216	217	210	200	194	198	201	201	199	199	201	205	207	207	207	206	205	204	205
Jan28	203	205	207	211	213	217	218	222	211	195	187	180	180	184	190	194	196	189	187	189	192	196	200	199	199
Jan29	198	199	199	203	203	205	207	211	206	197	194	194	194	195	195	195	194	193	195	196	198	200	202	199	199
Jan30	201	202	204	206	207	211	217	222	221	216	212	209	207	203	199	200	200	206	208	210	208	206	206	205	208
Jan31	210	210	208	208	210	213	220	221	209	206	199	191	185	182	179	178	169	164	161	163	155	158	179	173	190
2016, Field component: Y, Base: 1300.0, Unit: nT																									
Jan01	221	185	174	146	114	100	108	138	133	122	137	130	119	115	124	123	123	125	128	128	128	133	133	136	134
Jan02	136	125	133	134	128	129	126	130	128	124	122	120	110	117	120	122	124	126	127	131	134	133	129	127	126
Jan03	126	123	124	126	126	128	125	131	136	132	125	114	106	111	119	123	124	135	130	132	136	137	132	128	126

Table 8.1 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jan04	127	125	125	124	124	127	129	132	138	135	124	113	107	110	116	121	124	132	128	129	131	131	127	126	125
Jan05	125	122	123	122	122	121	122	127	130	128	121	113	107	108	114	120	121	123	123	130	130	127	124	120	122
Jan06	111	128	136	127	123	124	127	131	138	135	124	110	115	114	121	132	120	121	124	128	141	150	133	131	127
Jan07	127	126	118	129	128	128	127	129	130	123	127	125	119	118	124	135	124	123	147	142	135	131	130	128	128
Jan08	128	128	125	122	116	126	130	135	136	133	126	115	118	114	130	122	123	124	131	129	130	133	131	134	127
Jan09	130	126	125	124	124	124	126	132	140	136	128	123	113	112	114	122	124	127	125	126	127	129	128	127	125
Jan10	128	129	124	122	121	123	127	132	137	133	128	117	112	114	115	123	122	122	125	129	148	154	136	130	127
Jan11	127	125	123	120	118	118	123	130	137	134	128	122	114	117	114	115	117	...	121	150	136	139	169	161	...
Jan12	147	143	125	126	124	126	130	134	139	139	132	118	116	115	117	115	118	119	121	149	145	157	143	147	131
Jan13	135	153	135	132	123	128	128	133	138	135	134	126	117	120	123	122	122	134	148	136	130	132	131	129	131
Jan14	130	127	126	122	124	124	127	133	134	136	133	126	121	117	120	121	121	123	127	132	136	141	136	133	128
Jan15	132	133	138	132	129	129	130	131	126	116	114	113	114	117	119	122	126	128	127	127	130	132	129	129	126
Jan16	128	126	125	125	127	128	128	130	129	124	121	119	117	117	121	124	125	126	127	128	127	128	129	130	125
Jan17	129	128	128	127	127	127	129	134	138	129	123	117	114	117	114	118	121	122	128	131	131	131	128	128	126
Jan18	127	125	125	124	125	127	130	135	138	132	127	123	119	113	115	120	123	122	126	127	128	127	126	130	126
Jan19	142	145	135	127	127	127	128	130	134	128	120	118	115	113	116	122	124	124	124	125	125	125	126	125	126
Jan20	122	120	119	120	121	124	120	123	126	130	126	124	115	102	101	90	91	116	166	159	173	196	177	169	130
Jan21	159	169	162	140	143	134	133	139	136	124	129	111	120	116	122	111	141	124	127	140	144	141	171	151	137
Jan22	151	135	128	131	134	131	127	142	139	138	135	118	119	121	119	118	126	129	129	133	134	139	145	137	132
Jan23	131	133	130	129	117	122	129	132	140	137	129	117	110	116	123	123	131	140	128	133	136	135	136	134	129
Jan24	123	132	134	128	130	129	134	140	142	138	127	115	104	106	109	105	119	124	142	169	136	133	132	131	128
Jan25	129	127	126	126	127	128	133	140	141	135	125	116	111	113	118	125	128	128	129	130	131	131	131	129	127
Jan26	128	125	124	123	125	128	134	142	144	137	126	117	114	113	118	122	123	126	127	127	128	129	132	134	127
Jan27	132	129	127	124	125	125	128	135	138	134	127	121	117	113	114	119	122	123	125	126	127	130	130	131	126
Jan28	130	128	127	126	126	127	130	138	143	137	129	123	117	116	116	121	125	127	132	133	134	134	137	133	129
Jan29	130	128	126	126	129	131	133	137	142	139	131	126	121	116	117	123	127	127	129	131	131	132	133	132	129
Jan30	130	127	126	125	125	126	129	134	137	129	121	118	116	116	119	121	126	124	126	126	128	130	131	131	126
Jan31	128	129	128	127	125	123	124	132	136	127	123	121	111	102	108	113	111	121	132	139	155	162	181	163	130
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Jan01	107	104	93	89	89	90	90	96	101	103	106	107	107	111	110	110	109	109	110	110	109	108	107	107	103
Jan02	106	105	104	104	105	104	102	101	100	99	99	95	98	105	107	107	106	106	106	107	106	105	103	103	104
Jan03	102	103	103	103	103	103	103	105	104	103	101	95	100	103	104	104	104	105	106	106	105	105	100	101	103
Jan04	102	102	103	103	102	102	102	103	103	99	97	95	97	100	103	103	103	103	103	103	103	101	100	100	101
Jan05	100	100	100	100	99	99	98	99	98	96	96	95	95	98	99	99	98	98	99	100	100	98	97	97	98
Jan06	96	86	92	96	97	98	98	98	95	91	96	99	100	102	105	105	104	102	102	102	103	104	103	97	99
Jan07	98	99	97	95	97	97	97	96	94	91	91	93	97	101	102	104	102	103	102	104	103	102	101	100	99

Table 8.1 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jan08	100	100	100	100	100	99	98	98	96	96	95	95	98	102	104	104	102	101	102	102	102	100	99	99	100
Jan09	99	100	100	100	99	99	98	98	93	90	89	90	95	99	102	102	102	102	101	101	100	99	99	98	98
Jan10	97	96	98	98	98	97	96	95	91	93	95	97	98	101	101	100	101	101	100	100	98	98	100	99	98
Jan11	99	98	98	98	98	96	95	96	95	94	96	98	99	100	102	103	104	...	107	108	106	106	105	107	...
Jan12	103	103	103	102	102	102	101	101	98	97	98	99	101	105	104	102	102	102	103	104	105	106	105	103	102
Jan13	102	96	100	99	98	99	100	99	96	94	94	94	99	102	104	105	104	104	103	103	102	102	101	101	100
Jan14	100	100	100	100	100	100	99	100	100	103	101	97	96	101	104	105	106	107	107	107	106	104	102	102	102
Jan15	101	101	101	101	101	101	100	98	95	99	104	104	103	103	104	104	103	103	103	103	103	102	102	101	102
Jan16	101	101	101	100	100	99	99	100	100	102	103	101	97	97	99	99	99	99	100	99	99	99	99	99	100
Jan17	99	98	98	98	98	98	98	98	95	97	100	100	100	103	103	101	102	104	105	105	104	103	102	101	100
Jan18	100	100	99	99	99	99	99	100	97	93	94	96	98	101	103	102	102	104	103	102	101	101	99	98	100
Jan19	90	89	92	94	96	97	97	97	94	93	93	93	96	101	100	99	99	99	99	99	99	99	99	98	96
Jan20	98	97	97	97	97	97	97	96	99	99	104	109	112	118	127	136	145	156	156	148	145	140	137	126	118
Jan21	122	114	111	112	110	108	101	103	101	102	105	107	109	113	115	115	114	115	116	116	114	105	101	104	110
Jan22	107	106	106	108	107	107	107	107	105	106	109	111	110	112	113	111	110	109	108	109	109	106	107	108	108
Jan23	107	106	106	105	104	101	102	102	105	106	104	102	99	105	108	109	109	111	110	109	109	108	107	106	106
Jan24	105	102	102	104	104	105	104	103	102	101	101	101	106	107	106	107	106	105	106	109	107	104	104	103	104
Jan25	103	103	103	104	104	104	104	104	103	100	100	101	103	107	107	107	105	104	103	103	103	102	102	102	103
Jan26	102	101	101	101	101	101	100	100	98	98	98	97	96	98	100	100	101	100	100	100	100	100	100	100	100
Jan27	100	100	100	99	99	99	98	99	95	92	95	97	96	96	98	101	101	101	100	100	100	100	100	100	99
Jan28	99	99	99	99	99	99	97	94	89	87	92	92	91	96	99	102	103	103	104	104	104	103	102	101	98
Jan29	101	101	101	101	101	101	100	100	97	93	95	96	95	98	101	103	102	103	103	103	102	102	101	101	100
Jan30	100	100	100	100	100	99	97	96	93	89	92	96	97	99	101	102	101	100	100	99	99	99	99	99	98
Jan31	98	96	97	97	98	98	97	98	97	93	93	94	97	100	103	106	108	110	112	113	114	114	107	107	102
2016, Field component: F, Base: 48400.0, Unit: nT																									
Jan01	86	93	94	97	92	90	88	86	83	81	87	91	93	98	99	102	102	103	103	105	105	104	103	102	95
Jan02	101	104	99	99	99	103	104	106	105	100	98	94	97	104	108	104	102	104	105	106	107	108	106	104	103
Jan03	103	104	104	105	106	108	108	110	106	100	98	93	98	104	106	104	101	103	103	103	104	104	104	101	103
Jan04	101	102	104	105	106	107	107	108	106	99	97	96	98	102	106	107	106	104	106	106	106	106	104	103	104
Jan05	104	104	105	106	108	110	111	112	112	106	102	99	98	104	108	109	109	106	104	103	105	106	106	106	106
Jan06	108	106	96	96	101	105	107	107	99	85	83	87	93	97	102	104	107	106	106	105	103	104	104	104	101
Jan07	101	100	100	102	104	105	104	101	98	96	89	93	98	100	102	104	105	102	104	104	102	103	105	104	101
Jan08	103	103	105	104	106	106	105	104	99	94	93	93	94	101	103	106	105	103	105	105	105	106	106	105	102
Jan09	102	102	104	105	107	107	109	110	101	93	90	88	92	98	102	104	104	106	106	106	106	106	105	105	102
Jan10	105	102	103	106	108	108	108	108	101	98	95	97	97	101	105	103	104	104	105	106	107	102	101	102	103
Jan11	103	103	104	105	107	108	105	104	101	99	97	98	97	99	103	102	100	99	104	105	106	106	105	104	103

Table 8.1 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jan12	106	100	101	102	103	105	108	106	103	100	99	98	100	108	110	106	104	106	105	108	105	102	105	105	104
Jan13	107	102	98	106	102	103	104	106	102	100	98	97	98	99	101	104	104	105	108	105	105	105	105	104	103
Jan14	103	103	104	104	105	107	107	108	105	105	106	104	100	99	102	102	101	101	104	108	106	110	108	103	104
Jan15	103	103	104	104	105	106	106	105	98	99	104	104	101	102	105	105	106	107	105	106	106	106	105	105	104
Jan16	104	104	105	106	106	107	107	106	105	105	107	107	104	106	106	106	106	106	106	107	108	107	105	105	106
Jan17	105	105	106	106	106	107	108	109	101	99	103	104	101	102	105	104	102	100	102	105	107	106	106	106	104
Jan18	105	105	105	106	107	107	109	109	103	96	96	98	99	101	105	105	102	100	105	107	107	107	110	106	104
Jan19	109	100	96	96	99	103	104	105	102	99	101	99	98	101	104	105	104	104	105	106	106	106	106	105	103
Jan20	105	106	106	107	109	110	111	110	102	92	91	91	92	91	91	88	97	101	109	106	102	105	110	107	102
Jan21	105	104	103	101	102	105	105	103	96	92	91	95	97	100	105	103	107	105	102	108	113	108	108	98	102
Jan22	98	103	100	103	107	103	105	110	106	101	102	102	101	104	108	108	106	108	107	108	109	108	106	106	105
Jan23	106	106	106	107	108	109	109	108	102	103	100	98	95	95	105	106	106	104	107	107	108	108	108	107	105
Jan24	109	106	104	104	106	107	108	106	102	99	97	99	105	106	107	108	107	110	104	109	112	109	108	107	106
Jan25	107	106	106	107	107	108	109	109	104	98	96	97	102	107	111	113	111	109	108	108	108	107	107	107	106
Jan26	106	107	108	109	109	110	111	109	104	101	99	101	101	103	106	109	109	109	109	108	108	108	107	107	107
Jan27	107	106	107	108	108	111	111	111	105	97	98	101	101	101	103	105	106	108	108	108	108	107	107	106	106
Jan28	106	106	107	109	110	111	111	109	100	91	92	89	88	94	100	104	105	103	103	104	105	106	107	106	103
Jan29	105	106	106	107	107	108	108	110	105	98	98	98	98	100	103	105	104	104	105	106	106	106	107	106	104
Jan30	106	106	106	107	108	109	110	111	108	102	102	105	105	105	105	106	106	108	108	108	108	107	107	106	107
Jan31	107	106	105	106	107	109	110	112	106	101	98	95	95	96	98	100	98	98	99	101	99	101	104	101	102

Table 8.2. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Feb01	80	81	89	91	97	108	103	99	99	103	95	90	83	79	82	87	90	95	98	98	98	97	97	98	93
Feb02	98	99	100	99	101	105	110	118	116	113	106	103	103	105	108	98	101	94	89	99	102	87	86	82	101
Feb03	86	95	101	95	101	103	98	97	94	90	89	87	86	90	96	99	97	94	95	96	97	100	99	99	95
Feb04	99	100	101	103	106	109	109	108	104	101	96	93	83	88	95	97	99	106	106	104	106	107	107	108	102
Feb05	106	105	109	108	107	103	108	110	108	98	90	92	95	92	89	99	94	92	87	110	100	99	102	104	100
Feb06	101	101	102	107	105	106	109	106	103	96	90	91	95	99	100	99	104	104	99	96	100	110	106	101	101
Feb07	104	99	102	106	109	113	121	122	121	114	107	104	99	91	88	86	76	73	71	67	74	81	82	86	96
Feb08	91	94	122	96	88	92	88	97	92	87	88	89	90	86	82	86	89	92	93	94	94	95	96	96	92
Feb09	100	102	109	108	111	117	123	124	114	94	83	82	97	104	96	96	95	98	101	98	98	95	99	95	102
Feb10	92	93	109	102	101	102	104	107	105	102	96	95	96	95	97	95	96	97	98	97	93	94	91	90	98
Feb11	94	95	97	101	109	115	118	117	112	104	96	97	94	92	90	86	80	84	92	99	98	100	83	64	96
Feb12	71	69	84	84	83	91	100	105	111	111	91	88	92	102	100	101	104	100	99	110	117	117	115	113	98
Feb13	111	108	110	118	123	121	114	117	118	110	99	89	91	97	106	107	104	103	104	105	105	106	106	105	107
Feb14	103	102	105	108	107	108	113	112	103	92	85	86	90	95	97	95	85	76	98	102	100	100	104	106	99
Feb15	108	106	110	106	107	106	116	121	111	101	96	94	93	96	103	105	104	107	109	105	104	101	107	110	105
Feb16	87	102	88	87	94	101	107	106	101	77	89	92	65	61	57	68	51	65	35	42	113	85	75	98	81
Feb17	75	77	84	84	84	94	88	74	82	86	77	66	58	54	56	77	82	85	91	85	88	53	74	86	77
Feb18	59	58	65	65	77	88	79	84	77	54	69	74	70	74	85	79	73	88	95	84	71	86	99	109	77
Feb19	93	82	83	79	88	91	93	93	91	91	87	70	81	78	78	69	85	71	91	83	74	84	87	89	84
Feb20	100	90	87	90	92	92	88	87	83	81	85	89	91	89	88	88	85	88	93	93	94	94	96	101	90
Feb21	98	96	98	97	98	100	103	99	91	88	90	93	95	92	93	94	93	95	94	90	91	102	100	100	95
Feb22	99	100	101	101	102	106	110	110	109	108	107	108	109	106	104	102	103	104	106	107	106	105	105	105	105
Feb23	104	109	110	105	107	109	112	112	112	114	115	115	111	108	103	103	102	103	97	101	96	101	90	95	106
Feb24	99	98	97	97	97	98	106	104	96	94	95	99	101	100	105	103	99	97	104	105	98	98	100	100	100
Feb25	108	107	103	104	108	112	119	116	112	104	100	100	100	102	105	108	110	110	108	111	118	120	113	105	108
Feb26	115	102	104	111	114	113	112	108	102	100	102	105	105	110	105	101	102	104	104	104	102	106	107	107	106
Feb27	108	108	108	110	112	115	117	109	101	98	97	96	101	106	110	109	106	104	104	105	106	109	109	109	107
Feb28	110	111	110	110	112	118	121	118	111	108	106	108	107	104	99	103	105	108	108	107	106	105	101	101	108
Feb29	105	110	107	109	112	114	116	115	109	102	101	109	110	109	116	114	113	114	118	121	122	115	105	96	111
2016, Field component: Y, Base: 1300.0, Unit: nT																									
Feb01	162	148	144	140	121	126	127	132	134	136	137	130	124	120	120	122	127	127	128	129	131	131	131	130	132
Feb02	129	128	126	128	127	127	126	131	134	129	128	121	111	111	113	116	122	120	127	130	132	147	143	150	127
Feb03	175	179	166	160	136	127	131	139	140	133	126	116	107	106	115	125	130	129	128	130	130	131	131	129	134
Feb04	128	127	126	126	127	128	131	138	140	134	128	121	115	119	119	120	123	124	127	132	131	129	128	126	127
Feb05	129	121	126	127	127	131	132	137	128	125	123	123	116	110	118	126	126	130	135	146	136	136	134	131	128

Table 8.2 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Feb06	129	128	125	122	130	136	138	140	135	122	117	115	119	120	123	125	128	131	129	134	138	136	135	138	129
Feb07	139	131	128	127	127	128	129	131	129	123	116	116	113	113	115	126	148	122	129	147	149	153	159	163	132
Feb08	174	147	158	160	145	150	137	135	148	141	134	130	121	122	124	127	129	131	131	132	134	134	133	132	138
Feb09	133	134	131	134	132	130	130	134	135	134	126	114	111	114	121	118	123	126	127	129	134	138	158	146	130
Feb10	141	139	137	142	140	140	138	140	140	137	133	127	119	118	122	123	126	128	134	133	134	141	142	142	134
Feb11	146	144	140	139	140	136	131	133	137	130	123	115	111	107	105	109	106	124	128	132	137	143	165	173	131
Feb12	172	158	150	149	141	134	134	137	136	129	136	123	119	116	118	118	120	118	117	123	128	132	132	136	132
Feb13	136	133	132	129	127	127	130	133	142	137	131	121	110	107	111	120	127	128	128	130	131	133	135	134	128
Feb14	132	131	125	128	134	134	131	135	138	132	125	115	109	111	118	124	132	146	129	130	134	138	135	134	129
Feb15	136	134	130	135	135	131	130	133	140	132	125	111	111	116	119	122	122	123	123	126	135	141	147	162	130
Feb16	156	144	141	145	146	145	150	150	144	141	130	107	92	106	90	138	111	182	135	152	185	160	158	136	139
Feb17	154	144	129	139	136	141	142	142	148	146	127	124	111	120	108	133	122	126	155	167	198	180	170	200	144
Feb18	157	131	138	127	140	146	151	155	147	144	132	121	115	125	127	127	146	131	173	149	144	141	132	136	139
Feb19	149	145	137	129	135	140	145	154	157	154	137	129	120	115	123	127	157	135	156	151	149	149	140	140	141
Feb20	137	133	135	134	132	132	142	147	150	143	131	121	118	118	124	128	127	128	132	133	136	137	137	135	133
Feb21	135	133	134	137	135	135	141	147	148	141	131	124	118	117	122	123	126	127	132	136	143	155	147	138	134
Feb22	134	134	135	135	135	134	135	140	141	136	124	116	110	109	113	119	124	128	130	132	134	134	135	136	129
Feb23	137	136	133	132	132	131	132	138	143	138	127	118	113	112	117	119	120	122	128	129	138	175	160	160	133
Feb24	156	149	147	142	142	140	143	146	145	137	124	115	105	110	111	117	119	122	125	128	139	135	139	140	132
Feb25	146	146	139	138	138	134	137	147	150	148	140	127	117	113	114	118	120	119	121	126	128	128	131	138	132
Feb26	150	136	128	126	134	132	135	140	142	139	132	123	120	121	123	126	125	127	129	134	139	135	134	133	132
Feb27	132	131	129	128	129	131	133	137	136	130	120	118	114	114	116	121	124	125	127	129	133	135	135	133	128
Feb28	132	131	132	132	133	134	137	141	141	132	118	111	107	113	118	124	127	129	131	133	135	136	139	137	129
Feb29	135	129	132	132	133	134	135	137	137	131	119	109	106	115	122	128	126	125	126	126	127	129	142	145	128
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Feb01	103	103	101	101	101	99	101	102	102	99	99	99	99	102	103	104	104	104	103	103	103	102	102	102	102
Feb02	101	101	101	100	100	99	99	99	97	94	95	94	96	100	102	102	102	102	104	105	104	105	106	105	101
Feb03	101	98	94	94	96	96	99	102	100	98	97	95	97	102	104	103	102	102	102	103	102	102	102	102	100
Feb04	102	102	102	101	101	100	101	101	101	102	103	103	104	106	105	104	103	101	101	101	101	101	100	100	102
Feb05	99	99	98	99	99	100	99	96	94	95	98	99	98	98	99	101	102	103	105	103	102	102	101	100	99
Feb06	100	100	100	99	98	99	98	96	94	95	96	97	98	102	102	100	101	100	101	102	102	100	98	99	99
Feb07	98	100	100	100	99	99	97	98	98	97	98	100	101	102	104	104	106	109	110	111	111	109	108	106	103
Feb08	102	100	88	94	97	99	102	98	98	97	95	95	95	99	103	104	104	104	104	104	104	103	103	103	100
Feb09	102	102	100	100	99	97	95	94	96	96	97	98	100	103	105	103	104	104	104	105	104	105	104	104	101
Feb10	104	103	100	99	100	99	98	98	98	100	101	98	96	99	100	100	103	103	103	103	104	104	104	104	101
Feb11	103	103	102	101	100	99	98	98	95	97	100	98	95	98	99	102	105	107	106	106	105	106	105	108	101

Table 8.2 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Feb12	108	109	107	105	105	105	104	102	100	97	96	94	94	101	100	103	102	104	106	106	105	103	102	101	102
Feb13	100	100	100	99	98	97	99	100	97	91	86	86	88	92	96	98	98	100	101	101	101	101	101	100	97
Feb14	100	100	100	99	99	99	99	100	101	99	99	98	100	102	104	104	105	108	106	105	104	104	103	102	102
Feb15	101	100	99	99	100	101	101	100	98	98	99	101	102	103	103	102	100	101	101	101	102	103	101	92	100
Feb16	97	91	96	98	99	99	99	101	100	97	98	101	103	104	115	118	120	124	127	128	115	109	110	104	106
Feb17	104	107	102	103	105	105	106	108	107	106	104	105	112	118	121	117	114	112	112	112	111	112	109	101	109
Feb18	105	109	109	108	103	105	107	107	106	104	106	106	108	111	112	112	113	111	110	111	113	110	109	101	108
Feb19	102	105	106	107	106	106	108	106	104	98	98	99	104	107	111	114	116	116	113	112	113	112	111	109	108
Feb20	106	106	106	107	107	107	109	109	104	101	100	101	102	107	109	110	111	110	109	109	108	108	108	107	107
Feb21	106	106	106	106	106	105	105	103	100	98	96	96	97	101	105	106	107	108	107	109	109	108	106	106	104
Feb22	105	105	105	104	104	103	102	99	95	89	87	89	92	95	100	103	103	104	103	103	103	103	103	103	100
Feb23	103	102	101	101	101	101	102	102	97	90	86	88	90	92	96	100	102	103	104	105	106	104	105	104	99
Feb24	103	103	102	103	103	102	103	102	101	98	98	98	99	100	103	103	104	105	104	104	106	106	105	105	102
Feb25	104	102	103	102	102	102	102	102	100	98	100	97	97	98	100	102	102	102	102	103	102	101	101	102	101
Feb26	99	101	101	100	100	101	102	101	101	98	98	99	98	96	98	101	102	102	102	102	103	102	102	101	100
Feb27	101	101	101	101	101	100	99	100	99	96	96	99	100	101	103	102	101	102	102	102	102	101	101	101	100
Feb28	100	100	100	100	100	100	101	102	100	96	94	96	96	100	103	102	101	102	102	102	102	102	102	102	100
Feb29	101	100	100	100	100	100	100	101	99	97	94	97	101	103	103	100	99	100	100	99	99	99	101	102	100
2016, Field component: F, Base: 48400.0, Unit: nT																									
Feb01	100	100	102	102	105	107	106	106	107	105	102	100	96	98	100	103	105	106	107	107	107	106	106	106	104
Feb02	105	105	106	105	105	107	108	112	110	105	103	101	102	107	110	106	107	104	104	109	109	105	105	102	106
Feb03	101	103	101	98	102	103	103	105	102	98	98	94	96	102	106	107	106	104	105	106	106	107	106	106	103
Feb04	106	106	107	107	108	109	110	110	108	108	106	105	101	105	107	...	...	109	108	108	109	108	108	108	...
Feb05	107	106	107	107	107	106	108	106	103	99	99	100	100	100	100	105	104	104	104	113	106	106	107	107	105
Feb06	106	106	106	107	106	107	107	104	101	99	96	98	101	106	107	105	107	107	105	105	107	110	106	104	105
Feb07	105	104	106	107	108	109	111	113	113	108	105	106	105	102	103	102	101	102	101	101	104	106	105	105	105
Feb08	104	102	104	99	97	101	101	102	100	97	96	95	96	98	100	102	104	105	106	106	106	106	106	106	102
Feb09	107	108	109	108	109	110	110	110	107	98	95	95	103	108	107	106	106	108	109	108	108	108	109	107	106
Feb10	105	105	109	106	105	106	105	107	106	106	104	101	99	102	103	103	106	...	...	107	105	106	105	105	...
Feb11	106	106	106	107	109	110	111	111	106	103	103	101	98	99	99	100	100	104	107	110	109	111	103	98	105
Feb12	101	101	105	103	102	105	109	109	110	107	98	94	96	106	105	107	108	108	110	114	116	115	113	111	106
Feb13	110	109	109	112	113	111	110	112	111	101	92	87	90	96	104	106	105	106	107	108	109	108	108	107	106
Feb14	106	106	107	108	107	107	109	111	107	100	97	97	100	104	107	106	103	102	110	110	109	109	110	109	106
Feb15	109	108	108	107	108	108	112	114	109	104	102	103	103	106	109	108	107	108	109	108	109	108	109	103	108
Feb16	97	98	97	98	102	105	108	109	106	92	98	102	91	91	99	108	101	113	101	106	125	107	104	108	103
Feb17	98	102	99	101	103	107	105	101	104	105	98	95	98	101	104	110	109	109	112	110	112	97	103	102	104

Table 8.2 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Feb18	93	95	99	97	99	105	103	105	101	89	...	99	...	104	109	107	106	110	113	109	104	109	112	111	...
Feb19	104	102	103	102	105	107	109	108	105	100	97	91	100	101	105	104	114	107	114	109	107	109	109	109	105
Feb20	111	106	105	107	108	108	108	108	102	98	98	101	102	106	108	109	108	108	110	110	110	110	111	112	107
Feb21	109	109	109	109	109	110	111	108	101	98	97	98	100	102	106	108	108	109	109	109	109	113	111	110	107
Feb22	109	110	110	110	109	111	111	109	105	99	96	98	101	103	106	109	109	110	110	111	110	110	110	110	107
Feb23	109	111	110	108	109	109	112	112	107	102	99	100	100	101	102	106	107	109	107	110	109	111	106	108	107
Feb24	108	107	106	106	107	106	110	...	104	101	101	102	...	105	109	108	107	108	110	111	110	110	110	110	...
Feb25	112	110	109	109	110	112	115	114	110	106	105	103	102	104	106	110	111	111	110	112	115	115	111	109	110
Feb26	111	107	108	110	111	111	112	110	107	103	104	106	105	106	105	106	107	109	109	109	109	110	110	109	108
Feb27	109	109	109	110	111	111	112	109	105	101	99	102	105	108	111	111	108	108	108	109	110	110	110	110	108
Feb28	110	109	109	109	110	113	115	115	109	105	102	104	104	106	107	108	108	110	110	110	109	109	108	108	109
Feb29	109	109	108	109	111	111	112	112	109	103	100	105	110	112	115	111	109	111	113	113	113	111	108	106	110

Table 8.3. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Mar01	99	115	110	113	118	117	118	116	116	112	106	100	100	104	107	109	103	103	105	107	110	110	109	107	109
Mar02	103	103	106	109	111	117	120	114	110	103	104	101	105	107	104	90	97	99	104	108	110	111	110	109	106
Mar03	111	113	109	108	109	114	113	117	109	101	97	101	101	97	93	100	103	107	107	109	107	106	108	105	106
Mar04	114	111	106	99	103	108	110	111	110	106	103	104	104	102	100	98	99	102	107	110	110	109	110	109	106
Mar05	111	111	112	113	115	118	121	120	112	111	102	96	92	102	104	107	107	107	107	110	110	113	114	114	110
Mar06	116	117	118	120	122	125	125	128	120	116	116	119	121	123	128	122	89	37	33	25	26	20	60	38	94
Mar07	44	59	50	58	71	59	59	58	50	56	61	68	83	87	81	64	61	77	71	65	70	69	101	82	67
Mar08	76	84	75	75	81	86	81	74	70	65	69	75	78	80	71	78	83	86	93	98	92	95	94	92	81
Mar09	90	91	96	98	94	95	93	89	79	78	78	81	83	83	86	84	91	95	97	95	84	84	85	90	88
Mar10	100	90	92	94	96	102	112	103	92	81	76	77	85	94	93	95	96	96	95	93	91	101	117	114	95
Mar11	105	99	96	96	101	109	118	116	109	100	104	118	117	92	70	93	102	103	107	110	87	97	101	102	102
Mar12	109	111	105	100	101	100	107	110	103	98	106	105	105	105	105	102	94	76	73	76	96	99	104	102	100
Mar13	102	102	102	104	106	109	104	104	104	106	111	112	113	112	110	106	105	105	107	107	108	108	109	107	107
Mar14	105	109	105	106	110	110	109	109	105	101	105	105	104	105	108	108	107	120	142	133	98	108	110	87	109
Mar15	93	108	97	105	102	99	82	92	85	75	84	85	85	92	95	98	94	84	83	77	114	92	82	90	91
Mar16	119	97	91	92	91	88	86	88	85	93	89	87	85	91	95	95	95	97	97	84	74	85	103	89	92
Mar17	87	82	111	111	91	85	84	93	92	73	65	75	90	98	94	88	81	91	89	89	105	108	91	90	90
Mar18	91	92	92	91	92	93	86	88	95	96	93	91	87	81	86	91	82	88	87	81	81	91	110	104	90
Mar19	96	90	91	93	95	90	94	72	64	57	71	91	93	85	70	76	74	75	83	86	85	89	92	93	83
Mar20	92	93	93	96	96	97	94	91	87	88	89	89	96	99	102	88	65	59	88	64	66	71	77	82	86
Mar21	88	96	90	92	95	99	102	97	96	89	89	93	99	104	109	107	100	103	108	109	108	106	111	109	100
Mar22	105	105	108	111	112	114	114	111	106	101	103	102	98	101	104	104	104	105	106	107	107	107	110	108	106
Mar23	107	112	113	116	121	111	114	118	105	99	99	101	106	106	106	107	107	110	111	107	105	100	105	118	109
Mar24	113	105	102	106	110	113	114	107	108	107	106	106	108	113	109	108	106	107	109	111	111	110	109	106	109
Mar25	113	117	103	99	103	107	107	105	104	100	103	105	105	107	102	99	104	105	106	109	110	108	107	108	106
Mar26	108	108	109	110	114	117	119	113	107	105	109	113	115	117	118	116	113	113	116	115	116	119	122	124	114
Mar27	121	120	124	119	120	122	124	134	127	105	117	120	114	111	109	103	103	77	91	106	110	109	111	110	113
Mar28	108	109	107	109	122	119	117	114	107	104	107	112	116	115	116	113	112	112	112	106	108	100	107	109	111
Mar29	109	107	106	106	107	108	110	102	103	99	93	87	94	104	109	105	94	92	105	106	105	104	109	108	103
Mar30	112	124	...	108	112	116	114	106	97	98	98	100	86	91	99	96	91	91	98	115	108	102	104	108	...
Mar31	107	100	99	99	105	108	110	102	102	103	104	104	104	102	101	102	102	104	108	107	108	108	105	106	104
2016, Field component: Y, Base: 1300.0, Unit: nT																									
Mar01	139	123	135	133	132	132	135	140	146	139	127	119	112	115	119	121	120	122	125	128	129	130	133	150	129
Mar02	149	139	138	137	137	136	142	147	149	144	129	117	108	109	118	123	124	134	130	131	131	132	133	132	132
Mar03	132	134	135	135	132	133	136	141	140	131	124	118	111	109	119	126	127	129	132	131	133	135	137	137	130

Table 8.3 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Mar04	134	141	143	140	138	138	142	146	146	140	132	123	116	111	116	125	128	128	132	131	132	132	132	132	133
Mar05	133	133	132	132	132	132	136	143	142	133	122	112	110	108	115	126	127	126	128	131	133	133	133	132	129
Mar06	132	133	133	134	134	135	138	142	147	141	125	112	102	99	97	94	90	94	128	149	195	208	191	175	134
Mar07	174	153	154	151	167	158	156	155	142	129	118	120	117	128	130	137	151	150	141	164	185	162	173	157	149
Mar08	159	150	148	147	150	153	158	164	158	142	124	115	112	116	119	133	137	136	149	145	141	138	138	139	140
Mar09	138	136	135	141	140	146	155	162	163	144	124	107	102	104	116	121	133	135	136	138	149	147	145	142	136
Mar10	144	142	143	145	145	141	149	154	153	145	130	114	105	107	111	122	123	125	131	134	139	145	141	146	135
Mar11	146	148	148	142	145	144	149	161	157	148	131	114	104	98	108	120	120	126	128	133	155	160	141	139	136
Mar12	130	129	139	138	134	132	139	149	153	151	139	127	120	117	122	130	139	160	154	142	137	138	140	138	137
Mar13	137	136	136	135	136	138	147	151	150	143	132	120	117	117	120	126	128	127	130	131	133	134	135	137	133
Mar14	137	134	140	137	136	138	145	148	147	136	125	119	114	115	116	122	124	119	108	114	130	169	171	165	134
Mar15	157	129	144	149	159	153	134	125	142	135	124	114	112	115	121	128	130	136	131	151	185	158	158	180	140
Mar16	156	170	153	147	150	151	144	146	147	131	113	106	108	120	122	131	135	131	137	142	159	175	170	171	142
Mar17	150	142	117	143	153	156	147	149	145	130	115	115	124	133	142	142	143	161	145	133	136	139	139	139	139
Mar18	139	141	139	140	145	153	159	154	148	136	126	117	114	110	120	128	133	135	134	144	144	144	145	152	138
Mar19	151	148	146	147	152	150	159	160	140	133	122	126	122	117	129	130	138	171	142	142	147	146	140	138	142
Mar20	139	140	144	136	144	152	159	163	161	147	126	109	110	110	115	124	131	144	177	154	150	155	156	149	142
Mar21	147	145	140	138	139	145	155	161	157	150	135	114	102	100	108	120	126	132	141	141	139	140	144	140	136
Mar22	136	133	129	131	137	141	150	157	158	150	133	113	110	114	120	130	135	136	137	138	137	142	141	138	135
Mar23	136	135	135	133	139	144	137	154	162	154	140	125	117	119	126	133	134	132	133	138	146	146	139	142	137
Mar24	150	142	137	136	141	148	159	166	163	152	135	121	112	110	116	126	129	128	132	134	136	136	136	139	137
Mar25	136	141	147	142	141	145	156	164	163	154	136	120	113	112	120	133	134	135	135	138	139	137	137	137	138
Mar26	137	137	137	135	134	137	147	155	157	150	136	118	109	109	117	123	126	125	126	129	130	131	134	137	132
Mar27	136	134	132	140	137	138	143	150	151	146	131	111	103	104	111	120	126	138	136	134	133	134	143	146	132
Mar28	140	139	140	133	124	135	146	157	158	146	130	118	112	111	116	126	132	129	133	147	148	144	136	137	135
Mar29	136	133	136	145	144	145	148	161	158	145	125	112	100	108	116	129	138	149	134	135	141	142	141	138	136
Mar30	135	128	...	142	145	149	157	164	163	151	138	120	108	116	123	129	134	138	139	148	148	141	138	141	...
Mar31	146	142	143	133	140	144	149	152	149	138	128	117	113	114	123	130	136	140	136	137	136	137	138	138	136
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Mar01	102	100	98	99	99	100	103	103	100	95	95	96	94	94	98	99	100	102	102	102	101	101	101	99	99
Mar02	100	101	101	101	100	100	100	101	100	96	95	95	94	98	102	103	102	103	103	103	102	102	101	101	100
Mar03	101	99	99	100	100	100	102	101	99	97	99	102	103	106	107	106	103	103	102	102	102	102	101	102	102
Mar04	100	98	98	100	101	101	103	105	103	101	101	100	100	101	103	103	102	103	102	101	101	101	101	101	101
Mar05	100	100	100	100	100	100	103	103	100	97	98	98	97	97	102	101	100	101	101	101	101	101	101	100	100
Mar06	100	99	99	98	97	97	98	98	98	94	90	93	93	91	95	97	103	120	130	139	137	128	112	110	105
Mar07	114	113	115	114	107	112	115	111	109	105	107	110	115	118	118	118	120	120	119	119	118	117	111	108	114

Table 8.3 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Mar08	109	109	110	112	112	115	117	116	111	107	109	112	112	111	115	113	112	112	112	110	109	109	109	109	111
Mar09	109	109	108	107	107	108	109	106	99	93	93	97	101	103	107	110	107	108	108	108	110	111	111	109	106
Mar10	107	107	108	108	108	108	108	105	101	99	96	96	99	103	107	107	107	108	110	111	112	110	106	103	106
Mar11	102	104	105	106	106	107	106	102	98	88	83	79	78	89	103	104	103	104	104	105	106	109	107	107	100
Mar12	106	102	102	104	104	107	108	108	104	100	92	89	87	91	98	103	105	109	113	113	111	109	107	106	103
Mar13	105	105	105	105	105	106	108	107	101	94	88	87	89	95	99	101	101	103	104	104	104	104	104	104	101
Mar14	104	103	103	103	103	104	104	103	96	89	83	85	89	93	98	99	100	101	99	99	105	107	104	105	99
Mar15	105	104	100	98	98	99	100	96	93	93	94	94	96	100	104	105	106	108	111	114	109	105	108	106	102
Mar16	101	96	101	104	104	106	108	107	107	101	96	98	102	107	108	108	107	106	108	111	114	112	104	103	105
Mar17	105	105	101	93	97	102	107	107	105	104	108	111	112	111	110	110	110	111	113	112	109	106	107	108	107
Mar18	109	108	108	108	109	111	112	110	104	102	102	102	106	107	107	108	110	112	112	114	115	114	110	106	109
Mar19	106	108	108	108	109	111	110	109	106	99	102	100	104	109	111	111	113	117	117	115	115	114	113	111	109
Mar20	111	110	109	110	108	110	112	110	104	98	91	93	98	102	107	111	117	123	120	120	121	120	120	118	110
Mar21	116	113	112	112	111	112	112	110	103	98	95	91	93	98	102	105	107	108	108	109	108	108	107	106	106
Mar22	106	106	106	104	105	107	107	104	96	88	83	85	88	93	100	105	105	105	106	106	106	106	105	105	101
Mar23	106	105	105	104	104	107	110	107	103	96	91	92	96	98	103	105	104	104	105	106	106	108	107	104	103
Mar24	102	103	104	104	105	107	109	107	100	93	87	85	88	93	100	102	104	104	105	105	105	105	105	105	101
Mar25	104	101	100	103	104	107	108	106	101	95	88	87	90	95	101	105	106	105	105	105	104	104	104	104	101
Mar26	104	104	104	104	104	106	108	107	100	90	80	79	85	91	97	100	101	101	102	103	103	103	103	102	99
Mar27	102	102	99	99	100	102	106	106	101	93	81	79	87	96	104	105	108	111	112	110	107	106	105	105	101
Mar28	105	104	104	105	103	104	107	105	96	89	85	86	90	95	99	101	101	101	103	104	104	107	106	104	100
Mar29	104	103	100	101	103	105	106	105	99	89	82	83	90	94	99	104	108	107	107	106	106	106	105	104	101
Mar30	103	101	...	100	103	106	109	109	104	95	89	89	94	95	100	108	111	110	110	108	106	106	106	106	...
Mar31	104	104	105	106	104	106	106	103	97	91	87	86	89	94	99	104	104	104	105	105	105	105	105	105	101
2016, Field component: F, Base: 48400.0, Unit: nT																									
Mar01	107	111	108	110	111	112	116	115	112	106	103	101	99	101	106	108	106	107	109	109	111	111	110	108	108
Mar02	107	107	109	110	110	112	114	112	110	103	102	101	102	106	109	104	105	107	110	111	111	111	110	110	108
Mar03	110	110	108	109	109	111	112	114	108	103	103	106	108	108	108	110	109	110	110	110	110	110	110	109	109
Mar04	111	108	106	105	107	109	112	115	113	109	107	106	106	106	107	107	106	108	110	110	110	110	110	110	109
Mar05	110	110	110	110	111	113	117	117	111	107	104	101	98	103	108	109	108	109	109	110	111	112	112	111	109
Mar06	112	111	112	112	112	113	115	116	112	107	103	106	107	106	112	111	102	95	103	109	108	98	100	89	107
Mar07	95	100	98	100	100	99	101	97	92	91	94	100	111	115	113	106	107	114	110	108	110	108	117	105	104
Mar08	103	107	104	105	108	113	113	109	102	96	100	104	106	106	105	108	109	110	113	114	110	111	111	110	107
Mar09	109	110	110	111	110	111	111	106	96	89	89	94	98	100	105	106	108	110	111	111	108	109	109	109	105
Mar10	112	108	109	110	111	114	117	111	103	96	91	91	97	105	107	109	110	111	112	113	112	115	118	114	108
Mar11	110	108	108	109	111	116	118	115	108	95	91	94	92	91	94	105	109	110	112	113	106	112	112	112	106

Table 8.3 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Mar12	114	111	109	109	110	111	116	117	111	105	101	98	96	99	105	108	107	104	106	107	113	112	113	111	108
Mar13	111	111	110	111	112	115	114	114	109	103	99	98	100	105	108	109	109	110	111	112	112	112	112	112	109
Mar14	111	112	110	111	112	114	113	112	...	96	92	93	96	100	106	107	108	114	122	118	109	116	114	105	...
Mar15	108	112	104	106	105	105	98	98	92	88	92	93	94	101	106	109	108	106	108	109	121	107	105	107	103
Mar16	115	101	103	105	105	106	106	107	106	102	96	97	99	107	110	110	110	110	111	109	108	111	112	105	106
Mar17	104	102	110	104	99	101	105	109	106	97	96	104	112	114	112	109	106	112	112	111	116	114	107	108	107
Mar18	109	110	109	108	110	113	111	109	107	105	104	103	104	103	105	109	107	111	111	110	111	114	119	112	109
Mar19	109	108	109	110	111	111	112	102	95	86	94	101	106	106	102	105	105	111	113	113	113	113	113	112	107
Mar20	111	111	111	112	111	114	114	111	104	98	92	93	101	106	112	110	105	108	119	109	110	112	114	114	108
Mar21	115	116	112	112	113	116	117	113	106	99	96	94	98	104	110	112	111	113	116	117	116	115	116	114	111
Mar22	113	113	114	114	115	118	118	115	105	95	91	92	93	99	106	111	112	112	113	113	114	113	114	114	109
Mar23	113	115	115	116	118	116	121	119	111	102	96	98	103	106	110	113	112	113	115	114	114	112	114	117	112
Mar24	113	110	110	112	114	117	120	116	110	102	96	94	97	104	108	111	111	111	114	114	114	114	113	112	110
Mar25	114	113	107	107	110	114	116	114	109	101	96	95	98	103	106	109	112	112	112	113	113	113	112	113	109
Mar26	112	112	112	113	115	118	120	118	109	99	91	92	97	103	109	112	111	111	114	114	115	116	117	118	110
Mar27	116	116	115	113	114	116	121	126	118	101	95	94	99	106	112	111	113	105	112	116	116	115	115	114	112
Mar28	113	113	112	114	117	117	119	116	106	97	95	97	102	107	110	112	111	111	113	112	113	112	114	113	110
Mar29	113	111	108	109	111	114	116	112	107	95	86	83	92	101	108	110	109	108	114	113	113	112	114	113	107
Mar30	113	116	111	108	113	118	120	117	109	100	...	95	93	96	104	110	111	111	113	119	114	112	113	114	...
Mar31	112	109	109	110	111	114	115	110	104	99	95	94	96	100	105	109	110	111	113	113	113	113	112	112	108

Table 8.4. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Apr01	108	106	106	108	109	110	110	110	109	109	111	109	109	109	109	109	111	112	113	112	114	115	117	118	111
Apr02	119	118	114	111	112	112	111	110	107	105	109	117	125	132	136	120	113	68	69	77	69	76	99	87	105
Apr03	93	85	81	82	83	82	87	82	86	84	75	81	94	98	98	92	88	87	86	88	90	117	95	89	89
Apr04	97	97	94	95	105	102	97	93	92	92	99	108	111	106	101	103	102	104	108	107	101	101	100	100	101
Apr05	99	99	96	98	100	101	101	95	88	91	96	107	112	107	109	107	101	99	99	100	109	101	105	100	101
Apr06	98	100	107	106	106	108	105	94	91	87	95	110	118	115	104	104	98	100	99	99	101	100	100	100	102
Apr07	103	110	107	110	111	111	115	111	99	105	114	120	125	127	124	123	124	128	112	93	65	96	91	83	109
Apr08	100	74	84	89	95	99	...	...	...	...	...	...	102	106	105	103	101	100	103	105	103	103	102	101	...
Apr09	100	101	101	103	107	110	109	101	91	86	92	102	110	112	113	111	106	105	106	108	110	110	109	109	105
Apr10	110	110	109	107	110	114	111	101	88	98	108	117	122	121	114	110	109	111	113	115	115	115	110	113	111
Apr11	109	110	...	110	109	...	101	98	100	104	105	108	109	107	103	104	97	109	112	116	118	121	122	117	...
Apr12	112	107	105	110	110	113	116	109	101	95	101	109	108	100	103	88	93	96	98	95	98	94	97	91	102
Apr13	120	109	92	81	86	74	74	70	68	...	...	...	76	...	...	64	...	...	...	...	...	...	...	...	...
Apr14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr21	...	112	113	113	115	113	111	104	107	117	119	126	130	124	120	118	115	112	112	116	118	119	120	118	...
Apr22	115	111	115	112	110	109	103	105	105	111	120	132	131	121	97	103	93	109	111	112	114	123	105	104	111
Apr23	105	106	109	110	109	114	111	102	99	103	114	123	127	113	110	115	115	115	119	110	112	134	124	105	113
Apr24	108	106	109	110	110	109	106	102	101	109	116	121	118	115	101	100	85	99	110	103	110	110	112	112	108
Apr25	113	113	112	111	112	111	111	104	95	94	96	103	109	107	101	102	103	104	109	113	113	113	111	110	107
Apr26	109	109	108	109	111	112	113	107	100	100	97	100	102	105	106	110	110	108	112	117	111	115	110	113	108
Apr27	114	114	113	114	111	111	107	105	100	101	105	110	104	102	104	98	106	113	118	111	109	104	100	106	108
Apr28	109	107	107	110	113	114	112	110	104	101	109	117	120	117	113	112	112	113	112	113	111	112	112	110	111
Apr29	113	111	109	111	112	113	113	110	109	109	113	117	120	120	124	123	122	120	121	123	120	120	120	122	116
Apr30	120	118	120	122	125	128	128	126	117	112	119	127	122	116	109	112	117	112	105	105	104	105	103	118	116
2016, Field component: Y, Base: 1300.0, Unit: nT																									
Apr01	137	137	139	142	143	145	150	153	151	143	128	115	109	114	121	127	132	132	131	133	139	135	134	136	134
Apr02	137	136	141	142	141	145	153	158	155	144	135	123	111	107	106	120	135	158	141	143	181	164	180	168	143
Apr03	157	158	153	148	156	159	153	155	154	135	128	120	117	119	124	132	137	134	137	142	148	162	150	148	143
Apr04	146	154	156	142	148	155	163	169	168	156	142	126	123	120	127	134	136	136	137	137	139	143	141	141	143

Table 8.4 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Apr05	142	145	147	148	151	155	161	161	154	138	125	115	108	118	123	129	133	137	145	154	160	147	148	144	141
Apr06	141	140	138	146	146	152	161	164	157	144	131	114	104	112	122	140	139	142	142	144	146	148	146	145	140
Apr07	139	134	137	140	146	152	160	160	152	135	118	109	106	111	119	125	127	127	126	143	183	196	176	170	141
Apr08	189	170	150	154	153	159	...	...	...	...	...	...	111	114	124	132	136	138	138	140	140	141	141	142	...
Apr09	141	142	143	144	146	153	163	170	169	157	135	118	108	113	121	131	140	141	139	138	138	137	137	140	140
Apr10	139	141	142	142	144	151	159	162	153	147	132	114	103	103	118	130	137	136	135	134	136	136	143	143	137
Apr11	142	142	...	144	148	...	162	165	161	148	133	119	108	107	114	124	143	138	128	129	131	138	135	139	...
Apr12	139	142	144	147	156	158	161	165	163	152	133	115	100	92	95	110	124	120	135	147	139	150	191	171	139
Apr13	173	189	164	164	167	167	166	154	153	...	...	...	106	...	...	137	...	...	...	...	...	...	...	...	...
Apr14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr21	...	138	137	139	148	158	166	167	156	141	126	110	103	109	119	128	134	137	141	137	137	137	139	140	...
Apr22	142	144	140	146	153	159	165	163	151	135	128	115	107	108	121	131	128	136	137	139	143	174	148	143	140
Apr23	140	141	142	143	154	163	168	169	158	141	125	114	101	105	119	128	133	130	132	140	143	178	164	151	141
Apr24	142	142	142	147	150	153	157	158	154	144	125	106	99	105	117	130	148	141	140	152	152	139	139	140	138
Apr25	140	142	142	145	147	151	156	165	164	155	136	118	106	104	113	124	132	139	140	143	139	138	140	140	138
Apr26	140	141	143	143	149	153	160	164	159	147	139	122	113	114	121	132	135	135	135	139	152	159	144	142	141
Apr27	142	143	145	144	145	148	151	156	156	151	141	125	116	118	118	135	132	132	136	140	153	151	147	142	140
Apr28	140	143	140	147	151	154	159	161	153	145	134	124	115	117	120	127	135	139	140	142	141	141	142	142	139
Apr29	142	144	147	149	155	159	160	160	156	149	138	122	110	110	112	122	130	135	135	135	138	138	139	141	139
Apr30	145	144	145	147	154	159	163	165	163	157	148	130	116	113	119	130	131	133	138	141	146	152	153	151	143
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Apr01	104	104	104	104	104	107	107	106	101	96	91	90	92	96	101	102	102	102	103	103	103	103	103	104	101
Apr02	104	103	102	103	103	105	106	103	99	89	82	82	87	89	92	96	107	121	121	119	120	119	109	106	103
Apr03	102	101	106	108	110	111	112	109	109	104	96	97	99	102	106	109	113	114	115	115	115	109	108	110	107
Apr04	110	109	109	110	108	111	113	111	110	105	100	99	99	101	105	108	108	107	108	108	108	109	109	109	107
Apr05	109	108	109	109	108	111	112	109	106	102	96	95	96	98	101	106	108	109	110	110	109	109	108	107	106
Apr06	108	108	107	106	108	110	109	106	98	91	86	87	90	96	105	109	109	109	110	111	111	110	110	109	104
Apr07	109	107	106	106	107	108	108	103	97	89	86	85	86	91	95	98	100	102	105	111	116	111	100	100	101
Apr08	94	103	106	108	110	112	...	...	...	...	...	...	91	96	102	107	107	107	108	109	109	109	109	109	...
Apr09	109	109	108	109	110	112	111	109	102	94	88	84	88	94	100	105	106	104	106	107	106	106	106	106	103

Table 8.4 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Apr10	107	106	106	107	108	111	111	110	107	99	89	82	81	88	97	103	105	104	105	105	105	105	105	105	102
Apr11	105	106	...	106	108	...	112	110	104	95	86	83	86	93	99	105	109	110	109	107	107	106	106	105	...
Apr12	105	106	107	106	107	108	109	105	104	101	92	90	92	96	103	111	114	116	117	120	117	115	110	110	107
Apr13	104	97	101	105	106	107	108	107	105	...	...	...	98	...	...	125	...	...	...	...	...	...	...	...	...
Apr14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Apr21	...	108	109	109	110	111	110	107	102	95	86	82	85	91	94	100	104	105	107	107	107	107	106	107	...
Apr22	107	107	108	107	108	107	105	101	98	95	90	82	78	87	98	105	105	105	106	107	107	104	106	107	101
Apr23	107	108	108	108	108	109	109	107	101	91	78	74	81	91	98	103	103	103	104	107	109	103	102	105	101
Apr24	106	106	107	107	107	108	108	106	101	90	81	79	85	93	101	111	118	113	111	111	111	109	108	108	104
Apr25	108	107	107	108	108	107	108	107	105	98	92	89	91	97	101	105	109	109	108	109	108	108	108	108	104
Apr26	108	108	108	108	109	109	109	109	105	102	94	91	89	93	99	103	105	106	106	107	108	108	108	107	104
Apr27	107	107	107	108	109	106	108	107	105	100	93	89	87	89	100	110	110	108	108	109	109	110	110	109	104
Apr28	108	108	108	108	110	110	111	110	107	102	94	87	87	91	96	101	105	105	105	106	108	108	108	108	104
Apr29	107	107	107	109	110	110	111	107	104	100	93	88	86	86	91	96	101	102	103	105	105	106	106	106	102
Apr30	105	105	106	107	107	105	105	101	98	95	88	81	84	91	100	105	107	109	111	112	113	113	112	107	103
2016, Field component: F, Base: 48400.0, Unit: nT																									
Apr01	113	112	112	112	113	116	117	116	111	106	101	100	101	105	109	111	111	112	113	113	114	115	116	116	111
Apr02	117	116	114	113	113	115	116	113	108	98	92	96	103	108	113	109	117	111	111	113	111	113	114	106	110
Apr03	105	101	103	105	107	108	111	106	108	101	91	94	101	106	110	110	112	112	112	114	115	122	111	109	107
Apr04	113	112	111	112	115	117	116	113	111	107	105	108	109	108	109	114	114	113	115	115	113	113	114	113	112
Apr05	113	112	112	112	113	116	117	112	106	103	100	103	106	106	109	113	113	113	114	115	118	114	114	112	111
Apr06	112	113	114	114	115	118	116	109	100	92	90	97	103	108	111	115	113	114	114	115	116	115	114	113	110
Apr07	115	116	114	115	116	118	119	113	102	98	98	100	103	108	111	113	115	119	115	112	106	116	103	99	110
Apr08	101	98	105	108	113	116	117	114	108	100	97	96	98	103	108	113	112	112	113	115	115	115	114	114	109
Apr09	113	114	114	115	117	121	120	115	104	95	90	91	99	105	111	114	113	111	113	115	115	116	115	115	110
Apr10	115	115	115	115	117	121	121	115	107	104	99	96	96	102	108	113	114	114	115	117	116	116	115	116	112
Apr11	114	115	115	115	117	117	117	114	110	...	95	93	96	101	105	111	112	118	118	118	119	120	120	117	...
Apr12	115	113	114	115	116	119	121	115	110	105	98	99	100	100	108	109	115	117	120	121	119	117	114	111	112
Apr13	118	108	103	102	106	101	102	99	97	...	89	83	92	101	100	112	112	118	122	117	122	115	112	113	...
Apr14	111	...	...	...	...	...	...	...	...	...	...	87	93	108	109	111	127	120	118	118	119	121	113	114	...

Table 8.4 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Apr15	115	114	112	111	113	115	113	108	102	99	96	95	96	100	103	108	111	114	118	120	119	120	120	118	110
Apr16	116	115	115	115	116	117	116	110	107	110	107	104	108	111	112	115	117	126	123	118	112	114	112	116	114
Apr17	119	111	117	117	115	111	110	110	104	99	92	89	95	98	105	110	115	118	124	131	127	126	125	123	112
Apr18	121	119	116	117	119	120	118	113	110	105	99	97	97	104	109	111	112	113	116	117	117	116	116	116	113
Apr19	117	117	116	116	117	119	118	112	107	104	102	108	113	113	115	115	114	114	115	116	117	117	118	118	114
Apr20	118	119	119	120	123	124	122	115	110	105	105	106	108	113	113	113	112	113	115	117	117	118	118	117	115
Apr21	117	118	119	119	121	121	120	114	111	108	101	99	104	107	108	113	115	114	116	118	119	119	120	119	114
Apr22	118	117	118	117	117	116	112	109	106	105	105	102	98	102	102	111	107	113	115	117	118	120	113	113	111
Apr23	114	115	116	117	117	120	119	114	107	98	91	91	99	102	107	114	114	114	117	116	118	124	118	112	111
Apr24	114	114	115	116	117	117	115	112	107	101	94	95	99	105	106	115	115	117	119	117	120	118	118	118	112
Apr25	118	117	117	117	118	117	118	114	108	101	96	96	100	104	106	110	114	115	117	119	119	118	117	116	112
Apr26	116	116	116	117	119	119	120	117	111	107	98	96	96	101	106	112	114	114	116	119	117	120	117	118	113
Apr27	118	118	117	119	118	116	116	114	110	106	101	99	95	96	107	113	117	118	120	118	117	116	114	116	112
Apr28	117	116	116	117	120	120	121	119	114	108	103	100	102	104	107	111	114	115	115	117	117	117	118	117	114
Apr29	117	116	116	119	120	121	121	117	113	110	104	101	100	101	107	111	115	116	117	119	118	119	119	120	114
Apr30	119	118	119	121	123	123	122	118	112	107	103	99	100	104	109	115	119	119	118	119	119	119	118	120	115

Table 8.5. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
May01114	111	108	112	111	104	105	101	105	113	117	122	123	113	108	102	92	99	99	79	88	108	100	101	106	
May0295	119	106	105	105	100	98	89	81	80	84	97	107	102	88	87	85	74	85	98	93	91	109	80	94	
May0390	92	84	85	81	83	85	72	78	86	93	93	91	91	98	101	99	106	104	100	100	108	104	100	93	
May04100	100	100	100	99	95	90	88	90	93	96	100	104	104	102	98	101	102	104	103	104	107	105	105	100	
May05105	106	107	107	106	106	108	106	104	94	94	101	107	96	90	97	104	99	104	109	108	108	108	117	104	
May06105	105	105	105	106	101	95	89	97	97	106	110	108	94	82	91	83	99	97	92	91	94	99	105	98	
May07125	97	91	95	96	93	93	89	83	80	87	95	96	101	101	97	91	97	106	110	110	110	114	119	99	
May08118	127	144	155	109	76	90	45	57	73	64	38	54	55	69	51	41	58	55	52	44	63	90	106	77	
May09102	76	98	80	76	61	63	57	46	47	70	81	86	89	94	83	82	83	95	118	92	86	89	110	82	
May1083	86	79	86	88	69	72	62	58	78	88	82	78	78	80	82	88	91	91	93	96	92	92	93	83	
May1196	93	88	88	89	90	89	84	81	85	93	101	101	96	94	94	99	97	96	94	96	100	99	105	94	
May1296	93	93	94	95	94	89	87	89	103	115	111	99	91	87	92	97	101	103	103	104	102	100	106	98	
May13106	99	99	99	100	97	94	83	80	90	103	112	105	100	92	91	95	105	102	104	104	102	100	103	99	
May14107	117	108	100	94	95	92	92	100	103	103	105	110	108	98	106	111	112	113	119	123	129	129	110	108	
May15112	107	112	112	111	108	101	93	102	102	105	109	109	95	86	81	96	101	111	103	108	111	111	112	104	
May16111	106	108	107	119	110	103	85	94	98	80	78	88	81	79	84	86	85	93	103	109	111	112	114	98	
May17110	109	109	108	106	96	92	79	84	101	94	109	106	95	99	104	105	108	103	107	105	107	108	104	102	
May18105	106	109	103	109	109	100	99	92	97	106	107	105	104	102	109	111	108	111	111	111	111	114	114	106	
May19111	112	111	111	112	109	99	94	85	90	105	114	...	...	...	...	112	110	107	108	109	110	113	115	...	
May20119	116	119	118	121	114	100	93	92	98	113	119	118	117	110	109	112	114	115	121	123	122	124	130	114	
May21137	129	127	124	123	127	92	72	87	98	111	111	118	102	102	77	94	107	102	105	104	104	104	106	107	
May22108	108	108	109	107	100	90	85	75	87	95	108	103	103	111	107	100	101	108	110	110	108	108	107	102	
May23107	108	110	112	111	106	100	97	89	88	102	103	104	106	106	107	107	108	108	108	108	...	107	107	...	
May24109	108	110	110	114	110	106	104	103	102	102	95	108	111	109	111	109	106	110	115	115	114	114	112	109	
May25112	112	112	113	112	106	102	101	102	107	110	111	107	102	102	104	107	108	113	115	115	115	114	114	109	
May26114	114	116	120	120	113	105	103	103	104	106	111	115	113	113	115	118	117	125	128	128	128	127	128	116	
May27127	126	123	127	120	120	111	104	99	96	105	100	98	97	...	104	111	108	121	126	120	125	...	...	...	
May28...	117	110	112	109	111	102	86	107	113	119	116	113	104	97	105	107	104	106	110	114	110	119	117	...	
May29110	107	105	105	106	101	97	95	87	81	92	96	96	92	97	102	104	110	114	111	115	109	104	101	102	
May30117	124	103	102	104	98	88	80	91	99	106	106	104	102	105	106	100	106	117	115	114	112	111	113	105	
May31114	109	107	109	107	102	103	97	90	101	...	...	108	105	102	94	91	109	115	123	117	114	108	103	...	
2016, Field component: Y, Base: 1300.0, Unit: nT																									
May01150	149	150	146	154	158	158	157	153	143	131	117	108	109	109	125	126	136	155	171	160	173	163	182	145	
May02165	153	160	130	165	178	177	174	163	144	126	112	106	103	113	129	141	149	157	172	164	158	151	166	148	
May03152	154	153	154	166	167	168	173	163	150	138	128	125	130	134	137	144	152	147	144	145	153	148	146	149	

Table 8.5 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
May04149	150	151	154	160	165	167	166	158	146	134	126	118	119	129	136	141	146	143	141	142	144	143	143	145	
May05146	147	148	150	153	154	158	163	161	143	123	120	116	112	125	131	137	146	143	139	140	141	142	155	141	
May06162	156	157	158	163	163	168	168	158	141	117	104	92	101	103	113	129	138	153	168	152	143	143	152	142	
May07148	147	151	157	163	166	170	167	162	147	129	114	106	113	122	134	148	149	146	145	144	146	154	144	145	
May08151	133	141	153	141	154	128	172	163	148	124	104	89	98	122	110	135	163	179	172	174	192	166	193	146	
May09230	161	166	170	167	172	173	166	159	137	127	118	115	129	130	140	149	151	157	171	179	166	166	160	157	
May10152	156	153	148	153	160	155	164	161	151	133	123	118	124	126	134	140	144	145	145	157	158	152	149	146	
May11151	144	148	152	164	172	174	170	158	144	132	119	113	116	125	135	142	145	149	150	150	151	154	152	146	
May12152	152	153	155	161	166	167	160	147	138	127	117	117	120	126	134	141	146	148	149	150	150	147	150	145	
May13151	151	151	153	159	163	168	163	153	137	132	120	111	111	116	122	134	142	147	147	155	153	146	146	143	
May14148	162	169	174	181	176	168	164	148	134	128	114	106	107	113	122	127	134	138	141	147	157	156	160	145	
May15160	158	157	155	166	169	164	158	156	147	134	122	121	120	123	128	135	140	143	157	141	137	137	141	145	
May16140	146	148	145	154	170	175	172	166	150	134	117	111	114	121	134	139	152	145	140	143	141	145	150	144	
May17152	146	148	155	161	172	172	171	168	157	141	130	119	124	126	137	141	149	155	154	152	154	155	148	149	
May18149	149	148	140	144	155	168	170	162	153	133	120	108	109	119	130	138	143	145	144	145	145	145	148	142	
May19148	147	150	154	162	170	173	167	158	140	129	121	...	...	...	...	139	146	155	150	145	143	143	143	...	
May20142	141	142	152	166	177	173	164	151	137	125	115	114	118	127	138	145	147	143	140	139	140	142	140	142	
May21143	145	150	159	161	173	186	168	143	136	120	105	107	116	123	133	148	152	153	145	146	143	142	142	143	
May22143	142	142	145	152	165	167	162	154	139	123	110	100	116	130	140	147	153	150	146	146	145	144	144	142	
May23144	144	145	151	161	171	179	178	168	154	141	127	123	126	132	140	146	150	149	148	147	...	147	144	...	
May24141	144	149	152	168	175	179	174	162	147	133	127	129	125	126	133	142	146	146	145	146	144	146	145	147	
May25145	146	148	153	166	172	173	167	155	143	133	124	121	120	121	129	135	138	137	140	143	142	141	141	143	
May26140	142	148	156	165	172	174	173	165	150	135	120	110	111	119	129	136	139	139	138	136	140	138	141	142	
May27144	148	144	155	167	169	167	170	168	158	144	126	112	107	...	119	127	129	134	148	139	140	...	...	...	
May28...	169	164	162	163	167	172	175	164	159	141	132	118	110	116	125	133	141	150	145	145	149	145	144	...	
May29152	153	153	157	161	166	166	162	156	148	143	137	127	122	123	128	137	140	142	143	154	166	167	171	149	
May30162	177	169	156	169	175	179	173	165	158	150	141	132	125	124	127	131	140	140	143	148	149	148	147	151	
May31146	152	154	157	158	166	171	174	162	150	...	...	117	115	113	119	129	133	150	147	145	161	173	161	...	
2016, Field component: Z, Base: 43600.0, Unit: nT																									
May01105	106	106	107	107	105	103	104	102	95	92	90	91	96	107	117	117	117	118	120	118	111	110	108	106	
May02108	102	102	102	99	102	101	98	94	93	90	86	89	97	108	117	127	130	126	122	115	114	105	107	106	
May03108	108	110	110	110	111	110	108	105	97	96	96	100	106	108	112	114	115	115	113	113	112	111	111	108	
May04112	112	112	112	112	109	108	103	97	95	93	89	95	104	106	106	107	110	111	110	110	110	110	111	106	
May05111	111	110	110	109	106	105	103	96	89	87	86	92	98	103	105	109	113	113	111	111	110	110	109	104	
May06109	109	109	111	111	110	111	109	107	99	90	86	91	100	105	110	117	123	128	126	124	121	118	115	110	
May07109	108	111	114	116	115	115	109	97	91	88	87	95	98	102	109	114	115	111	112	112	113	111	110	107	

Table 8.5 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
May08109	110	99	86	92	95	93	99	102	98	101	105	116	132	138	154	159	153	146	139	136	124	119	102	117	
May0998	99	100	108	115	118	122	119	112	109	104	107	110	114	119	123	130	131	127	121	118	117	114	110	114	
May10111	113	116	117	116	119	119	114	110	106	100	101	109	115	124	125	121	120	119	119	119	119	118	117	115	
May11115	114	115	118	119	119	115	113	110	109	105	102	100	104	108	111	115	118	119	119	119	118	117	115	113	
May12114	115	116	117	118	118	116	112	102	84	77	80	85	93	102	108	111	114	115	115	115	114	115	114	107	
May13113	113	114	116	116	114	111	108	102	96	93	92	93	99	109	114	117	120	121	119	118	117	116	115	110	
May14114	109	109	112	113	107	107	105	99	91	84	84	85	94	100	103	109	112	113	115	114	112	110	111	105	
May15111	112	111	112	109	109	109	107	102	100	96	90	89	97	110	110	116	116	118	119	117	116	116	115	109	
May16114	113	114	117	115	115	114	107	102	104	102	100	104	108	116	120	124	126	121	119	118	118	117	115	113	
May17115	115	115	117	119	117	112	107	102	95	91	90	96	99	108	113	114	116	116	118	117	117	115	115	110	
May18114	114	115	116	113	111	109	107	103	97	95	92	94	100	105	110	112	113	113	113	113	113	113	113	108	
May19113	113	113	114	117	115	110	105	98	94	91	93	...	...	...	...	113	113	115	116	114	114	114	113	...	
May20113	113	112	113	113	112	111	108	102	91	87	86	89	97	102	106	109	112	111	111	111	112	112	111	106	
May21107	107	109	110	112	112	112	110	100	96	97	103	106	108	118	122	121	119	119	116	115	115	115	114	111	
May22114	114	116	118	117	116	115	113	107	105	104	99	99	103	111	114	117	118	117	116	115	114	113	113	112	
May23114	114	116	118	121	121	120	114	103	94	89	90	95	103	107	112	115	114	113	113	113	...	113	113	...	
May24113	112	113	115	114	112	114	116	106	96	93	93	94	101	108	112	113	114	113	112	113	113	112	112	109	
May25112	112	113	116	118	117	116	113	108	104	101	101	104	107	110	114	116	114	113	112	112	111	111	111	111	
May26112	112	113	115	115	115	113	110	103	99	94	92	97	101	106	109	111	111	111	112	111	111	110	110	108	
May27110	110	110	109	109	108	112	113	109	102	90	88	94	97	...	108	113	116	115	114	113	113	...	...	...	
May28...	108	110	111	112	115	115	114	109	104	103	91	94	99	101	107	112	117	117	116	116	115	114	110	...	
May29110	111	112	113	113	113	114	114	113	113	107	104	105	107	110	112	114	115	117	117	118	117	115	114	112	
May30113	108	108	111	109	107	108	110	111	105	96	90	93	97	104	110	112	114	115	114	114	114	114	112	108	
May31112	111	113	113	113	113	112	110	107	105	...	...	97	102	109	112	114	115	119	117	114	114	114	114	...	
2016, Field component: F, Base: 48400.0, Unit: nT																									
May01116	115	115	117	117	112	111	109	110	107	105	105	106	107	114	121	116	120	122	115	117	119	115	114	114	
May02111	116	110	109	107	109	107	100	92	90	89	91	97	102	106	115	123	122	123	125	117	114	114	104	108	
May03109	110	108	108	107	109	108	101	101	97	99	98	101	106	111	117	117	122	120	117	117	120	118	116	110	
May04116	116	116	117	116	112	109	103	99	98	97	95	102	110	112	110	113	115	117	116	116	118	117	117	111	
May05117	118	118	117	116	113	114	112	104	93	91	92	100	101	103	108	116	117	119	119	118	118	118	121	111	
May06116	116	116	118	119	116	114	110	110	103	98	96	100	102	101	110	113	126	129	126	123	122	122	121	114	
May07125	111	112	117	118	116	116	110	96	89	88	90	98	103	107	112	114	118	118	120	121	121	122	123	111	
May08121	126	123	117	102	91	95	82	89	92	90	82	98	113	126	132	133	136	129	121	114	113	119	111	111	
May09107	95	105	105	109	106	111	105	94	91	95	102	107	113	119	119	125	126	128	133	120	115	114	119	111	
May10108	112	111	115	115	110	111	103	97	102	100	98	103	109	118	120	119	120	119	119	121	120	119	118	112	
May11117	115	114	116	119	119	115	111	106	107	107	107	105	107	110	113	118	120	121	120	121	122	120	121	115	

Table 8.5 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
May12	116	116	117	119	121	119	116	111	103	92	91	91	91	95	101	108	114	118	120	120	121	119	119	121	111
May13	120	117	118	119	120	118	113	106	99	97	100	103	100	103	109	114	118	126	125	125	123	122	120	120	114
May14	121	121	118	117	116	111	109	107	104	98	92	93	95	103	104	110	118	121	122	127	128	129	127	120	113
May15	121	120	121	122	119	118	115	109	109	107	103	100	99	100	108	106	118	120	126	124	124	124	124	124	115
May16	123	120	121	124	128	124	120	106	106	108	98	95	102	103	110	116	121	122	121	123	125	126	126	125	116
May17	123	123	123	125	126	120	114	104	101	101	95	100	104	102	112	118	120	123	121	125	123	123	122	120	115
May18	120	121	122	121	121	119	114	112	105	102	103	101	101	106	110	118	121	121	122	122	122	122	123	123	116
May19	122	122	122	124	126	124	115	108	98	95	99	105	106	103	114	117	122	122	122	123	122	122	123	124	116
May20	125	124	124	125	127	123	116	110	103	96	99	100	103	109	111	115	119	122	122	124	125	125	126	128	117
May21	128	124	125	125	126	128	114	103	99	101	107	112	117	112	121	115	122	126	123	122	121	121	120	121	118
May22	121	122	123	125	124	120	115	111	102	104	106	107	104	109	119	121	120	122	125	124	123	122	121	120	117
May23	121	121	124	127	129	127	124	117	104	95	96	97	102	110	114	119	122	122	121	120	120	121	120	120	116
May24	121	120	121	123	125	122	122	122	112	102	99	97	103	111	116	120	121	121	121	123	123	123	122	122	117
May25	121	122	123	125	128	124	121	118	114	112	110	110	111	112	115	120	122	122	123	123	123	122	122	122	119
May26	122	122	124	127	128	126	120	117	110	106	102	102	108	111	116	120	123	123	126	128	127	127	126	126	119
May27	126	126	124	125	123	122	...	119	113	106	99	95	98	100	106	114	121	123	128	130	126	128	126	129	...
May28	124	121	119	121	121	124	121	113	117	115	116	104	105	105	104	113	119	122	123	125	126	124	126	121	118
May29	118	118	119	120	120	118	118	117	112	109	108	107	108	107	112	117	119	123	126	126	128	125	121	119	117
May30	125	124	115	117	116	112	109	107	112	109	104	99	100	103	111	117	116	121	126	125	124	123	123	123	115
May31	122	120	120	121	120	118	118	114	108	110	108	107	106	108	113	113	113	123	129	131	126	125	122	120	117

Table 8.6. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Jun01	102	100	101	108	109	103	97	94	91	95	...	...	107	106	103	107	107	104	108	114	111	108	110	112	...
Jun02	110	107	105	107	107	106	103	101	101	106	113	115	112	110	107	105	104	107	110	110	109	109	109	110	108
Jun03	112	105	106	109	110	106	99	98	103	111	116	117	113	107	104	104	108	110	112	113	115	113	114	117	109
Jun04	114	111	111	113	113	109	98	95	96	99	107	108	109	114	114	113	113	115	119	119	117	120	122	130	112
Jun05	131	131	130	128	132	126	125	125	120	102	86	107	113	116	113	92	86	105	124	154	114	93	116	106	116
Jun06	134	125	117	115	89	70	80	68	63	74	74	45	77	91	88	87	89	92	109	106	100	105	106	107	92
Jun07	110	112	107	108	111	107	98	94	91	94	93	93	99	103	96	104	103	102	108	106	114	110	107	104	103
Jun08	105	101	98	97	101	95	86	81	84	87	93	96	103	99	103	104	102	102	103	106	107	107	106	106	99
Jun09	106	104	105	104	108	106	99	94	89	88	90	...	93	92	102	112	110	107	107	110	111	110	110	111	...
Jun10	109	110	111	115	117	115	109	102	97	98	103	106	110	107	111	112	119	121	121	127	129	117	123	125	113
Jun11	124	115	110	113	119	121	113	105	95	91	96	93	102	113	115	109	100	100	111	110	120	125	124	112	110
Jun12	114	113	113	117	121	116	114	111	112	117	115	125	130	120	102	102	107	120	104	114	117	120	119	120	115
Jun13	119	119	116	110	123	118	111	103	100	96	92	94	98	101	107	109	112	113	115	114	114	113	113	115	109
Jun14	116	116	115	114	114	111	113	116	119	115	115	114	113	110	108	112	122	129	141	137	125	107	112	116	117
Jun15	102	108	112	106	104	103	105	100	93	89	85	82	89	97	106	110	112	108	110	114	115	115	115	115	104
Jun16	113	113	112	117	116	111	104	98	98	97	103	99	100	99	102	96	102	109	109	112	115	119	116	114	107
Jun17	113	112	114	118	122	113	106	103	101	91	92	97	101	108	104	105	107	114	...	...	114	114	115	116	...
Jun18	114	116	118	115	112	110	103	95	96	97	87	83	91	97	103	98	106	110	113	116	118	119	115	111	106
Jun19	111	115	113	114	110	103	100	92	89	94	102	102	101	105	107	109	114	110	112	116	117	117	115	114	108
Jun20	114	113	111	114	116	109	109	108	109	108	100	95	99	103	109	112	112	113	114	113	116	113	112	112	110
Jun21	113	113	113	114	118	117	109	100	93	95	96	102	107	111	113	113	114	114	115	117	119	116	114	115	110
Jun22	115	114	114	116	119	118	111	108	106	110	110	117	117	121	123	133	132	127	122	117	133	112	114	109	118
Jun23	112	112	113	113	122	122	116	114	107	106	105	105	105	103	107	114	122	118	109	119	119	119	124	128	114
Jun24	119	122	112	126	116	112	91	84	85	78	78	92	100	107	100	100	111	104	101	106	106	110	108	110	103
Jun25	109	106	104	108	111	110	103	90	85	85	84	87	93	99	102	101	99	105	111	121	118	118	125	123	104
Jun26	110	108	110	112	114	112	110	103	89	81	81	85	101	103	107	110	109	119	116	123	127	116	114	127	108
Jun27	123	103	104	104	103	102	94	76	75	82	86	94	92	91	97	104	110	112	115	115	116	117	121	116	102
Jun28	111	112	113	111	104	99	96	95	92	91	100	101	96	106	104	108	110	113	116	115	115	114	113	112	106
Jun29	114	112	110	112	109	104	101	100	96	98	106	113	112	107	106	108	108	110	109	115	119	113	111	110	108
Jun30	110	111	112	114	114	107	105	106	109	111	118	123	121	117	113	...	...	...	...	122	112	114	112	114	...
2016, Field component: Y, Base: 1300.0, Unit: nT																									
Jun01	158	157	153	157	163	172	174	170	161	144	...	...	116	122	128	136	142	146	146	146	150	145	144	143	...
Jun02	144	148	150	156	166	171	168	162	149	135	121	117	120	120	130	136	142	146	147	148	148	147	147	148	144
Jun03	152	149	151	153	158	166	171	175	170	154	134	116	111	111	117	129	142	149	149	147	147	145	145	146	145
Jun04	149	150	151	155	162	173	179	178	172	153	134	121	115	115	121	130	138	143	145	149	145	144	145	145	146

Table 8.6 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jun05	149	150	153	161	163	177	180	179	171	156	135	112	99	91	87	94	107	121	139	150	151	177	161	165	143
Jun06	152	167	171	187	182	163	167	174	170	160	139	133	135	123	124	137	143	144	145	145	142	145	149	151	152
Jun07	150	155	161	167	171	174	177	175	167	155	139	127	117	112	125	133	138	143	150	150	148	153	163	163	151
Jun08	161	157	160	159	159	169	170	169	158	144	131	123	115	110	118	127	137	142	146	148	148	148	148	148	146
Jun09	151	149	151	159	167	172	169	168	164	158	148	...	126	121	123	130	140	146	150	151	148	148	149	150	...
Jun10	150	149	151	157	165	174	176	173	169	163	149	127	109	106	109	113	125	134	134	140	146	143	142	140	144
Jun11	146	168	172	167	170	170	174	174	166	161	147	136	128	122	122	130	146	149	148	148	145	159	164	149	153
Jun12	146	152	157	157	162	171	168	172	166	151	135	118	108	108	114	129	136	144	142	142	139	141	144	145	144
Jun13	144	155	156	156	158	173	180	181	171	155	140	129	122	119	125	133	139	142	145	144	152	147	146	147	148
Jun14	148	145	147	155	164	172	169	170	167	159	152	137	128	124	124	128	128	124	128	183	163	157	175	166	150
Jun15	164	163	171	171	174	173	173	175	173	165	150	140	126	120	115	122	130	140	141	144	146	147	148	151	151
Jun16	150	153	155	159	169	176	175	171	165	154	139	131	125	125	124	130	137	142	141	143	145	147	145	145	148
Jun17	148	150	149	153	159	159	166	168	165	155	142	134	132	132	130	134	135	144	...	...	145	143	143	144	...
Jun18	147	148	147	147	161	169	169	170	169	159	144	127	118	119	125	134	142	146	146	148	155	149	145	149	147
Jun19	147	148	152	159	169	175	177	175	168	155	136	121	118	120	125	137	144	146	146	145	145	146	147	149	148
Jun20	151	153	153	159	166	172	172	174	173	160	144	130	119	122	129	137	141	143	147	146	146	144	146	149	149
Jun21	149	148	152	159	165	173	177	176	168	157	143	132	126	125	130	139	147	150	149	147	144	144	146	146	150
Jun22	148	150	156	161	166	175	174	172	166	150	135	116	106	103	110	118	128	136	135	143	145	151	150	151	144
Jun23	153	157	158	161	158	167	174	176	169	160	143	127	117	117	122	130	133	137	140	142	145	146	154	175	148
Jun24	174	170	177	172	158	162	168	178	176	168	154	135	118	113	117	122	128	138	146	147	148	152	157	150	151
Jun25	151	156	147	148	151	163	170	179	181	172	156	137	122	113	118	128	135	142	146	155	149	146	148	160	149
Jun26	157	159	162	168	176	188	185	183	170	156	144	136	127	120	118	127	134	141	143	149	157	152	158	155	153
Jun27	169	162	158	166	165	168	173	170	168	161	148	137	133	134	128	127	132	138	143	146	147	149	157	160	152
Jun28	159	155	151	164	172	177	176	174	170	164	151	133	129	126	127	131	134	143	150	145	144	147	149	150	151
Jun29	151	151	157	164	175	179	172	172	165	157	145	135	128	126	127	128	130	131	137	144	152	151	149	151	149
Jun30	153	153	153	159	166	168	169	171	167	157	141	134	132	129	128	...	...	...	...	153	149	148	150	150	...
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Jun01	113	112	114	113	114	116	115	115	113	106	...	...	107	107	110	115	115	116	115	113	114	114	114	114	...
Jun02	113	113	115	116	115	112	110	109	107	103	98	93	91	94	99	108	112	114	113	113	113	113	112	112	108
Jun03	111	112	113	115	116	116	113	110	110	107	102	100	99	100	102	109	111	113	112	112	113	113	113	112	110
Jun04	111	112	113	115	118	116	113	110	104	98	87	83	89	98	107	111	112	111	111	112	112	112	111	111	107
Jun05	110	110	109	111	113	111	105	99	92	88	88	88	90	98	116	122	128	127	124	116	111	117	114	114	108
Jun06	104	101	102	103	107	109	108	107	106	101	99	99	102	108	116	122	126	129	125	121	120	119	119	118	111
Jun07	117	115	116	118	117	116	117	114	107	103	94	90	98	108	113	117	117	116	119	120	116	116	115	115	112
Jun08	114	114	115	115	114	112	111	110	107	101	97	97	99	99	105	111	114	116	115	114	114	115	114	114	110
Jun09	114	114	115	116	116	115	114	112	107	104	102	...	97	99	104	109	110	116	116	116	116	114	114	114	...

Table 8.6 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jun10	114	114	116	116	115	113	113	114	110	106	102	97	96	96	105	110	110	113	113	114	115	116	115	114	110
Jun11	114	111	112	115	114	115	119	118	109	105	108	106	101	103	105	109	116	121	121	119	117	115	114	114	113
Jun12	114	114	114	116	118	117	114	115	111	106	101	96	99	106	113	115	118	121	121	119	118	117	117	116	113
Jun13	115	114	117	119	115	113	112	111	106	102	98	98	96	98	103	109	111	114	115	115	115	115	115	115	110
Jun14	115	115	112	112	113	111	111	111	109	103	100	101	101	102	108	109	111	114	115	115	116	117	116	115	111
Jun15	113	108	110	111	111	112	115	116	113	109	104	99	101	103	112	115	117	118	116	115	116	116	116	116	112
Jun16	115	115	116	117	118	116	114	112	111	111	105	99	97	102	111	118	117	117	116	115	116	115	114	114	113
Jun17	114	115	116	118	119	120	116	115	111	107	103	106	111	118	121	120	119	123	...	...	118	117	116	116	...
Jun18	116	116	116	116	114	114	116	116	114	112	105	101	100	105	115	120	119	118	116	116	116	115	115	116	114
Jun19	116	113	114	117	116	116	112	111	111	111	103	99	100	105	115	115	117	117	115	115	115	115	115	116	112
Jun20	115	115	116	117	119	119	117	116	114	110	105	105	107	105	109	114	113	111	114	115	114	115	116	115	113
Jun21	116	115	115	119	121	119	114	113	110	111	106	104	103	105	111	116	117	116	115	114	113	113	114	114	113
Jun22	114	114	115	118	116	114	110	111	109	103	94	94	95	102	106	113	120	121	121	120	119	118	117	116	112
Jun23	115	115	115	116	113	110	113	110	106	103	103	103	105	106	107	113	117	121	120	119	117	117	115	113	112
Jun24	110	106	106	104	107	109	112	112	113	107	105	103	100	102	109	113	118	120	120	119	119	118	115	115	111
Jun25	113	113	114	113	116	120	127	126	120	118	115	113	111	113	122	127	124	122	121	118	116	115	115	112	118
Jun26	113	114	116	117	118	115	110	113	112	107	99	101	98	97	103	116	119	118	120	117	115	116	116	114	112
Jun27	108	112	115	116	112	111	113	116	119	113	109	104	102	107	110	112	114	118	117	116	117	117	115	115	113
Jun28	115	115	115	116	116	114	113	114	107	104	102	100	101	107	110	113	114	116	118	117	116	116	115	115	112
Jun29	115	114	114	115	116	114	114	108	109	108	101	97	97	102	106	111	112	114	115	116	116	116	116	115	111
Jun30	115	116	117	118	119	117	115	114	109	106	104	101	104	106	111	...	...	...	...	117	118	118	118	118	...
2016, Field component: F, Base: 48400.0, Unit: nT																									
Jun01	118	117	118	121	123	122	119	117	114	109	104	111	114	114	115	121	122	121	122	123	123	122	122	123	118
Jun02	121	120	121	123	123	120	116	114	112	110	109	105	102	104	107	115	118	121	121	121	121	121	121	121	116
Jun03	121	119	120	123	125	123	117	115	117	117	114	112	109	108	109	115	119	121	121	122	123	123	124	123	118
Jun04	122	121	122	125	128	125	118	113	108	103	96	93	99	109	117	121	121	122	124	124	124	125	125	128	117
Jun05	128	128	127	128	132	128	122	117	108	96	88	96	101	109	124	120	124	131	138	143	122	118	125	121	120
Jun06	124	117	115	116	108	101	105	98	96	96	93	80	97	108	114	120	124	128	132	127	123	125	125	125	112
Jun07	125	124	123	126	127	124	121	116	108	106	97	93	102	113	115	122	122	121	126	126	126	124	122	121	118
Jun08	120	119	118	118	119	114	110	107	105	101	99	100	105	103	110	117	118	120	120	121	122	122	121	121	114
Jun09	120	120	121	122	123	122	118	114	107	104	103	100	100	101	109	118	119	123	123	125	125	123	122	123	116
Jun10	122	122	125	127	126	125	122	120	114	111	109	105	105	104	114	119	122	126	126	129	131	127	129	129	120
Jun11	128	123	122	126	127	129	129	125	112	107	111	108	107	113	116	117	120	125	129	127	130	130	129	124	121
Jun12	124	124	124	128	131	128	125	124	121	118	112	112	117	119	117	120	124	133	126	129	129	130	129	128	124
Jun13	128	127	128	127	129	125	122	118	112	106	100	101	100	104	110	117	121	124	125	125	125	125	124	125	119
Jun14	125	125	123	123	124	121	121	123	123	115	112	112	112	111	116	118	124	130	136	136	131	124	126	126	123

Table 8.6 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jun15	119	116	120	119	118	118	122	121	115	109	103	97	101	106	118	123	126	125	...	125	126	126	127	126	...
Jun16	125	125	125	129	129	125	121	116	115	114	111	104	102	106	115	119	122	125	124	124	126	127	125	125	120
Jun17	124	124	126	130	133	129	123	121	116	108	104	109	116	125	126	126	125	132	127	129	128	127	126	126	123
Jun18	125	127	128	127	124	123	122	119	117	115	104	99	101	108	119	122	125	126	126	127	128	127	126	125	120
Jun19	125	124	124	127	125	122	117	113	111	113	109	105	105	111	121	123	127	125	125	126	127	126	126	126	120
Jun20	125	124	125	127	130	127	125	124	123	119	110	107	111	111	116	123	122	121	124	124	125	125	125	124	122
Jun21	125	124	125	129	132	131	123	118	112	114	109	110	110	114	121	125	127	126	125	125	125	124	124	125	122
Jun22	125	124	125	129	129	127	120	120	116	112	104	106	107	115	120	131	137	136	134	131	137	127	127	124	123
Jun23	125	125	125	126	127	125	125	121	114	111	110	109	111	111	114	122	130	132	127	131	129	129	129	130	122
Jun24	123	121	117	121	119	119	113	110	112	103	101	104	104	109	113	117	126	125	124	126	125	126	123	124	117
Jun25	121	120	120	121	125	128	131	126	117	116	113	111	111	116	125	130	127	127	129	131	127	127	130	127	123
Jun26	122	122	125	127	129	125	120	120	112	104	96	99	103	103	110	124	126	130	130	131	131	127	126	130	120
Jun27	123	117	121	122	118	116	115	110	113	110	107	106	104	108	112	117	122	127	127	127	127	128	129	126	118
Jun28	124	124	125	125	122	119	116	116	109	106	107	106	104	114	115	120	123	125	129	127	126	125	125	124	119
Jun29	125	123	123	125	124	121	119	114	112	113	109	108	108	110	113	118	119	122	122	127	129	125	124	123	119
Jun30	123	125	126	128	130	125	121	121	117	116	117	115	118	117	120	125	123	...	135	130	127	128	127	128	...

Table 8.7. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Jul01	119	121	121	119	121	115	112	108	97	96	111	108	113	114	113	109	108	109	113	114	115	114	112	111	112
Jul02	110	112	113	117	121	115	109	102	102	104	110	111	111	...	...	106	108	118	133	140	147	150	144	127	...
Jul03	135	126	114	119	114	112	110	109	111	100	99	108	114	119	119	114	111	110	116	115	124	123	121	129	116
Jul04	113	113	112	116	117	114	112	101	102	105	105	112	118	114	113	113	111	113	114	118	117	116	112	111	112
Jul05	109	111	111	114	117	113	104	94	92	97	102	106	112	117	120	117	111	110	112	116	117	117	114	113	110
Jul06	113	114	117	118	119	117	119	115	106	101	108	115	124	128	126	122	118	118	120	123	127	130	131	130	119
Jul07	136	142	128	134	128	135	128	118	114	108	99	96	92	90	89	112	103	96	114	126	118	119	112	110	114
Jul08	120	115	118	120	120	116	106	94	77	58	62	67	67	100	80	75	98	95	96	118	113	112	114	116	98
Jul09	115	119	122	113	111	111	109	88	83	86	96	97	98	92	95	88	96	97	101	111	115	111	111	110	103
Jul10	110	111	113	114	114	107	98	95	92	89	82	92	93	95	108	114	114	106	109	108	111	114	117	115	105
Jul11	113	105	102	109	108	112	108	102	94	90	88	80	...	...	111	118	110	104	107	109	113	124	112	...	...
Jul12	108	105	107	111	112	121	98	92	83	70	81	76	78	85	...	97	99	105	110	...	117	120	115	109	...
Jul13	116	116	105	108	105	100	96	91	91	88	90	89	87	89	91	97	101	110	113	114	116	113	120	117	103
Jul14	111	109	107	109	112	115	93	105	95	74	89	100	99	100	95	103	94	105	108	110	116	113	115	113	104
Jul15	118	115	121	117	107	105	101	87	79	85	77	86	82	85	90	99	105	100	103	109	111	111	116	114	101
Jul16	108	116	115	114	108	99	90	84	82	85	95	102	97	89	105	109	109	110	108	115	111	110	108	107	103
Jul17	105	106	111	116	121	116	106	94	84	85	86	91	99	104	100	95	99	105	115	119	120	113	111	111	105
Jul18	110	110	111	114	115	110	102	95	93	95	95	100	106	109	107	103	105	108	110	114	114	111	109	108	106
Jul19	110	107	109	111	110	107	103	95	94	94	95	103	110	109	103	101	104	107	114	117	118	122	120	128	108
Jul20	182	128	114	103	117	126	114	111	100	98	97	96	97	102	108	107	113	110	104	102	108	107	105	104	111
Jul21	104	108	108	109	108	103	92	78	71	68	77	85	91	96	97	109	107	106	107	108	110	108	113	112	99
Jul22	108	104	105	110	110	105	94	84	73	68	72	82	87	89	94	88	107	101	93	103	110	...	109	114	...
Jul23	117	121	115	112	116	107	104	97	89	85	83	83	94	99	99	101	103	104	108	114	114	112	108	105	104
Jul24	105	109	110	111	115	113	107	103	103	101	102	98	105	112	116	121	137	136	125	101	110	119	119	108	112
Jul25	125	136	131	100	103	99	85	91	80	73	71	52	...	...	68	79	81	79	96	98	102	108	107	103	...
Jul26	104	104	107	106	106	104	97	90	81	75	77	80	82	91	93	92	99	107	111	111	108	106	106	105	98
Jul27	106	107	105	104	104	102	100	98	94	91	90	97	98	100	104	110	113	116	118	123	125	123	119	127	107
Jul28	127	134	129	126	115	122	125	112	101	101	102	106	100	95	102	104	111	96	87	84	96	109	112	113	109
Jul29	108	111	110	108	115	108	112	104	90	74	80	93	90	99	104	105	99	109	105	110	115	109	109	107	103
Jul30	106	119	106	108	101	97	99	95	91	89	88	95	104	103	98	99	107	108	113	112	113	112	110	109	103
Jul31	115	108	105	109	111	111	109	100	90	85	89	99	109	110	108	102	106	106	111	113	115	113	112	111	106
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Jul01	45	56	63	70	75	73	70	68	62	49	39	29	25	27	33	38	44	47	47	48	48	49	49	51	50
Jul02	54	52	54	58	65	75	75	76	73	61	42	32	27	...	...	26	29	34	34	32	30	39	54	59	...
Jul03	51	54	55	69	74	78	77	73	60	47	31	20	18	19	20	33	40	42	42	46	51	56	55	58	49

Table 8.7 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jul04	61	56	59	57	68	81	82	75	69	60	49	42	33	28	30	36	45	47	49	49	62	58	58	60	55
Jul05	58	57	60	68	78	78	74	78	73	63	45	26	20	20	26	33	43	50	49	48	49	54	51	50	52
Jul06	52	54	57	62	70	78	81	83	77	64	47	29	22	11	15	23	33	38	37	42	44	45	58	48	49
Jul07	47	54	56	59	61	64	73	85	76	60	46	29	14	5	7	19	22	40	48	54	85	70	74	76	51
Jul08	49	53	53	64	73	84	84	85	77	61	44	28	27	24	21	37	43	49	55	69	46	49	48	50	53
Jul09	54	44	58	70	78	84	83	78	68	65	57	44	28	30	34	32	40	48	54	44	46	50	52	54	54
Jul10	53	54	48	57	71	81	78	78	76	67	52	38	31	27	30	35	43	47	53	47	47	52	56	57	53
Jul11	64	66	66	61	60	70	88	90	89	85	67	48	...	...	29	33	39	47	52	50	52	67	62	...	...
Jul12	58	71	60	56	30	50	63	69	69	54	39	31	30	26	...	38	42	45	46	...	56	67	61	61	...
Jul13	49	52	62	67	75	81	81	82	80	73	65	54	45	34	34	31	38	44	48	48	49	50	52	56	56
Jul14	56	58	54	51	60	75	81	85	79	67	54	43	28	22	23	34	42	48	47	53	56	49	48	53	53
Jul15	52	57	54	51	60	73	81	80	75	62	50	42	29	26	30	37	48	51	49	49	51	51	57	60	53
Jul16	54	46	60	65	78	88	87	82	66	52	32	17	12	23	30	36	46	49	50	56	52	50	51	53	52
Jul17	54	56	54	54	65	73	77	75	65	52	39	27	22	21	25	36	46	51	50	50	49	50	51	53	50
Jul18	57	58	60	66	75	80	77	72	60	57	50	43	36	36	39	46	55	57	54	53	50	49	49	49	55
Jul19	52	54	56	60	70	81	81	77	72	63	48	30	20	18	24	35	43	46	48	48	49	50	51	48	51
Jul20	49	76	79	102	103	81	96	105	90	75	54	31	11	4	7	20	34	46	55	59	58	57	57	57	59
Jul21	57	57	59	63	72	81	85	84	70	57	45	34	25	21	26	33	44	55	59	58	57	58	54	55	55
Jul22	59	58	60	67	81	93	93	86	75	61	45	31	21	24	20	35	44	49	61	61	51	...	51	56	...
Jul23	52	54	59	64	68	65	66	80	71	70	61	46	33	21	23	34	45	55	58	55	58	58	57	57	55
Jul24	59	63	70	70	75	81	81	79	73	64	53	39	27	23	25	30	33	58	74	50	49	61	59	62	57
Jul25	72	92	92	73	76	70	73	73	74	65	52	34	...	...	20	27	38	58	56	59	64	67	59	58	...
Jul26	56	54	54	58	64	68	74	80	81	71	53	36	26	22	25	31	41	46	50	53	61	60	57	56	53
Jul27	57	58	60	63	71	76	79	82	77	68	53	39	33	31	34	37	41	45	48	48	49	52	56	63	55
Jul28	61	71	73	76	83	77	83	85	74	59	43	32	19	27	26	27	32	45	77	82	62	58	67	63	58
Jul29	54	62	74	80	77	81	76	74	69	55	41	31	28	27	36	43	57	59	51	53	51	51	52	55	56
Jul30	57	51	58	66	72	74	73	73	66	58	44	36	33	34	41	50	54	56	58	55	54	53	54	56	55
Jul31	54	61	63	69	76	83	84	83	74	58	46	39	33	36	40	47	52	57	57	53	53	55	55	57	58
2016, Field component: Z, Base: 43600.0, Unit: nT																									
Jul01	118	114	115	116	116	113	111	107	107	104	102	105	106	109	111	117	119	118	117	117	117	116	116	116	113
Jul02	116	116	117	120	118	118	119	117	114	110	105	107	106	...	...	118	117	117	115	114	113	112	113	115	...
Jul03	113	113	115	116	115	112	113	112	106	103	100	101	102	102	106	113	115	119	118	117	116	115	116	111	111
Jul04	113	114	115	117	116	115	110	109	108	106	105	105	109	111	116	119	119	118	116	115	116	116	115	115	113
Jul05	116	116	116	117	115	114	115	115	111	103	102	105	106	108	112	116	120	119	115	114	115	115	115	115	113
Jul06	115	115	116	117	118	116	111	111	107	99	93	90	87	93	102	110	115	116	115	115	115	115	113	114	109
Jul07	114	111	113	113	115	116	116	115	112	105	100	106	111	113	111	121	133	132	126	123	124	120	120	117	116

Table 8.7 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jul08	116	114	116	117	118	117	117	113	116	119	112	110	111	116	124	129	133	134	132	126	122	121	121	120	120
Jul09	120	119	113	116	117	116	115	117	112	108	107	105	108	114	123	126	125	126	126	124	122	120	121	121	117
Jul10	120	120	121	120	120	118	119	116	109	104	107	108	109	108	114	118	120	122	122	121	120	120	119	118	116
Jul11	117	114	116	119	121	121	121	119	113	109	107	107	...	...	114	122	125	126	125	122	121	118	117	...	...
Jul12	116	114	115	116	113	111	113	112	106	106	107	113	112	114	...	119	124	127	126	...	122	121	119	118	...
Jul13	115	112	116	120	120	122	119	114	109	101	98	105	110	113	115	119	119	120	120	119	119	119	119	117	115
Jul14	117	117	118	120	117	117	117	114	108	101	98	99	102	106	114	120	123	123	122	121	121	120	120	119	115
Jul15	117	115	116	116	117	118	118	119	120	118	113	113	111	110	114	118	121	126	123	123	121	120	118	117	118
Jul16	118	118	115	118	118	114	110	112	110	102	100	97	99	103	103	108	116	120	120	119	119	118	118	119	112
Jul17	119	119	119	119	120	120	120	120	120	115	113	111	109	114	119	124	126	126	125	120	117	118	119	119	119
Jul18	119	120	120	122	123	123	123	121	115	113	111	111	105	102	108	114	118	117	116	116	117	118	118	119	116
Jul19	117	118	119	120	120	120	125	125	122	121	109	105	104	108	112	118	121	120	119	117	118	117	117	117	117
Jul20	111	110	115	116	118	115	120	120	116	111	105	103	97	101	110	117	121	120	119	119	119	119	119	119	114
Jul21	120	120	120	122	124	123	124	118	111	108	101	100	103	108	116	124	122	121	120	120	119	118	118	118	117
Jul22	117	118	119	122	124	123	119	114	108	103	98	105	109	111	119	120	127	131	129	127	125	...	121	120	...
Jul23	120	118	119	121	122	125	124	124	126	122	117	113	113	116	118	125	128	126	123	122	121	120	120	120	121
Jul24	120	120	119	122	123	120	119	119	119	117	112	107	105	105	112	118	123	127	134	130	128	126	126	122	120
Jul25	117	112	111	116	118	118	119	120	117	118	118	116	...	...	127	131	134	135	132	128	126	125	124	123	...
Jul26	123	122	122	123	123	122	124	124	120	117	110	107	109	115	118	123	125	124	124	124	124	124	122	122	120
Jul27	122	122	122	124	124	124	124	126	122	116	111	107	104	107	113	116	118	118	118	118	118	119	119	117	118
Jul28	117	115	116	117	119	117	110	108	110	107	102	103	103	107	112	117	121	127	131	133	132	129	127	126	117
Jul29	124	120	119	119	118	113	114	112	113	110	108	109	109	110	114	120	123	125	125	124	122	120	120	121	117
Jul30	121	118	118	121	123	123	121	120	117	112	107	108	111	113	116	117	119	119	119	120	120	120	120	120	118
Jul31	119	119	120	122	123	121	117	113	113	111	106	104	104	107	114	118	120	119	...	119	118	118	118	118	...
2016, Field component: F, Base: 48400.0, Unit: nT																									
Jul01	130	128	128	128	130	125	121	115	110	107	112	113	116	119	120	124	126	125	126	127	127	126	125	125	122
Jul02	124	126	127	131	131	129	127	123	120	117	114	116	114	115	120	124	123	128	133	135	137	138	137	131	126
Jul03	133	129	125	128	126	123	122	121	116	108	104	109	112	115	119	123	124	126	128	127	131	129	129	128	122
Jul04	123	124	124	128	128	127	121	114	114	113	112	115	121	121	125	128	127	127	126	127	127	127	125	124	123
Jul05	124	125	125	128	127	124	122	117	113	108	108	112	116	119	124	127	128	127	124	125	127	126	125	125	122
Jul06	125	125	127	129	130	128	125	123	115	106	102	102	103	110	118	123	126	128	127	129	130	131	131	131	122
Jul07	134	134	130	132	131	135	133	128	123	113	105	108	111	112	110	129	136	132	135	137	136	133	129	126	126
Jul08	128	124	127	130	131	129	124	116	111	105	100	100	101	120	118	120	134	135	133	138	131	130	130	131	123
Jul09	130	131	127	126	126	126	124	116	110	107	110	109	111	115	124	124	126	128	129	131	131	129	129	128	123
Jul10	128	128	130	130	130	126	122	119	111	105	104	109	110	110	121	127	130	128	130	127	128	129	130	128	123
Jul11	127	121	121	127	129	130	129	124	116	111	107	104	101	106	122	132	132	131	131	130	130	133	127	125	123

Table 8.7 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Jul12	124	121	122	125	122	125	117	114	104	98	103	106	106	111	115	121	126	132	133	133	133	133	130	126	120
Jul13	126	123	122	127	126	126	122	115	110	102	100	105	109	112	114	121	123	128	129	129	129	129	131	129	120
Jul14	126	125	125	127	127	128	119	122	111	96	99	104	106	110	115	125	124	129	129	129	131	130	130	129	121
Jul15	128	125	129	128	124	125	124	118	115	115	108	111	107	107	113	121	127	129	128	130	129	128	129	127	122
Jul16	126	129	126	129	126	119	111	110	107	101	103	103	102	102	110	116	124	127	127	129	127	126	126	125	118
Jul17	125	126	128	130	133	131	127	122	117	113	111	111	113	119	122	125	128	131	134	132	130	128	127	127	125
Jul18	127	128	129	132	134	131	128	123	117	115	113	115	113	111	115	119	124	125	124	126	127	126	126	126	123
Jul19	126	125	127	128	128	128	131	126	123	122	112	111	113	116	117	122	126	127	129	128	129	130	130	133	124
Jul20	151	128	125	123	131	131	131	130	121	116	109	106	100	106	116	123	129	128	124	124	126	125	125	125	123
Jul21	125	127	127	129	131	129	125	113	104	99	96	98	103	111	118	130	128	127	127	127	127	125	127	127	120
Jul22	125	123	125	130	132	130	122	113	102	95	92	101	107	110	119	118	133	133	129	131	132	130	128	130	120
Jul23	131	131	129	130	132	132	129	127	125	119	114	110	114	119	120	128	132	131	130	132	131	129	127	126	126
Jul24	126	128	128	130	133	130	127	125	125	122	117	110	112	115	122	131	142	146	148	133	135	137	137	130	129
Jul25	133	133	130	120	123	122	117	120	113	110	109	99	102	109	115	123	127	129	133	130	130	132	130	128	122
Jul26	128	127	128	129	130	128	127	124	116	110	104	103	105	114	118	123	127	130	132	132	131	130	128	128	123
Jul27	128	128	128	129	130	129	128	129	124	117	111	110	108	111	119	124	127	129	129	132	132	132	131	133	125
Jul28	133	134	133	133	130	131	126	119	115	113	108	110	107	109	117	122	129	128	129	130	133	136	135	135	125
Jul29	131	129	128	128	129	121	124	118	113	103	104	110	108	113	120	126	127	132	130	131	132	128	128	127	123
Jul30	127	130	125	128	128	126	125	122	117	111	106	110	116	118	119	120	126	127	128	129	129	128	128	127	123
Jul31	129	126	126	129	132	130	125	118	113	109	107	108	112	116	122	122	126	126	127	129	129	128	127	127	123

Table 8.8. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Aug01	110	109	110	110	110	109	102	95	89	88	89	99	103	106	110	108	110	111	111	116	117	...	115	114	...
Aug02	120	113	113	115	116	121	110	110	109	114	121	124	128	130	133	121	126	119	126	133	138	137	110	117	121
Aug03	121	133	128	131	121	110	93	85	85	42	42	55	70	49	61	56	70	90	91	92	97	102	109	104	89
Aug04	110	103	108	104	99	87	92	80	72	66	72	75	73	74	69	73	99	77	77	94	96	104	108	107	88
Aug05	106	106	104	107	104	89	95	97	84	71	72	76	69	76	85	83	...	...	100	101	109	116	104	111	...
Aug06	105	101	99	100	100	99	93	77	72	71	64	80	84	96	93	90	87	95	102	106	112	111	108	102	94
Aug07	102	113	108	101	105	103	94	85	74	72	78	92	99	92	89	90	86	102	109	109	109	116	116	119	98
Aug08	112	117	111	105	107	99	92	78	75	84	91	94	102	109	99	98	105	87	90	103	107	107	108	108	100
Aug09	107	108	105	107	109	104	97	92	87	74	75	84	94	88	90	89	92	92	102	108	107	110	108	100	97
Aug10	110	114	112	103	107	98	81	66	58	52	69	87	96	90	86	81	97	98	100	111	124	108	103	99	94
Aug11	98	101	104	107	107	103	96	93	90	89	90	92	100	106	106	108	108	97	91	101	101	108	117	106	101
Aug12	102	108	124	114	107	92	87	85	82	76	82	85	81	76	84	86	97	102	106	108	106	103	104	105	96
Aug13	105	103	104	104	105	98	92	86	79	82	98	103	101	103	102	100	100	100	104	104	103	102	102	102	99
Aug14	103	106	108	108	105	100	97	91	94	102	105	105	99	101	106	109	111	109	108	106	110	110	110	110	105
Aug15	110	109	106	109	109	103	95	86	89	94	104	110	112	110	106	105	103	105	107	110	111	113	109	109	105
Aug16	108	109	109	108	109	105	96	89	88	90	99	107	113	109	102	100	101	107	112	119	124	121	114	110	106
Aug17	115	120	117	110	116	117	104	92	89	90	92	97	95	103	109	109	109	110	116	114	...	112	103	110	...
Aug18	104	103	105	116	109	104	101	92	87	83	88	93	98	104	103	105	105	107	111	109	110	107	105	108	102
Aug19	106	105	106	107	108	104	96	87	81	86	95	101	103	101	100	98	97	101	100	105	108	110	110	113	101
Aug20	119	111	113	108	105	105	100	88	80	80	90	95	102	104	107	107	109	110	113	114	116	115	111	111	105
Aug21	110	110	111	112	115	120	116	107	106	106	118	128	131	135	134	113	114	119	115	121	123	124	109	110	117
Aug22	113	108	109	108	109	110	105	94	90	89	97	99	103	106	108	107	108	106	105	112	113	113	113	109	106
Aug23	105	108	109	114	117	114	108	104	100	103	108	...	107	87	84	73	83	84	75	75	60	61	74	79	...
Aug24	85	95	110	94	89	86	78	72	70	72	66	57	61	84	92	90	86	87	93	97	94	120	99	93	86
Aug25	94	102	103	96	98	91	83	73	58	59	76	88	87	92	88	94	93	102	114	102	105	108	126	108	93
Aug26	103	104	103	98	102	96	90	85	84	90	99	98	99	99	101	95	94	99	103	105	111	106	109	111	99
Aug27	106	102	105	106	101	99	100	99	99	94	96	93	104	107	105	106	105	107	107	106	107	108	108	108	103
Aug28	108	108	107	105	103	99	95	92	91	92	97	100	103	107	109	111	112	110	109	110	114	118	118	120	106
Aug29	117	115	117	113	112	111	107	97	92	100	118	124	118	113	...	104	107	105	105	109	110	123	117	119	...
Aug30	118	114	122	116	112	106	105	85	71	77	86	93	85	74	75	63	74	87	95	95	100	104	112	115	95
Aug31	109	105	103	104	104	98	91	82	73	74	80	86	90	92	99	107	108	110	110	110	99	107	108	103	98
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Aug01	57	58	60	65	73	82	87	88	77	58	37	24	20	24	34	44	51	54	50	51	50	...	56	56	...
Aug02	58	59	61	64	73	80	81	75	67	49	29	16	9	12	13	23	33	43	46	46	45	42	71	105	50
Aug03	90	32	58	63	73	67	52	52	73	64	40	33	39	33	47	42	55	86	67	61	59	60	66	63	57

Table 8.8 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Aug04	45	61	64	71	69	77	84	75	67	59	50	33	28	33	29	50	67	57	78	73	59	52	53	52	58
Aug05	55	61	63	67	71	66	63	74	66	59	47	38	27	37	36	47	...	...	56	57	61	75	72	58	...
Aug06	64	55	57	61	73	82	87	86	68	58	42	34	34	33	36	48	63	57	54	57	63	65	71	65	59
Aug07	44	41	68	66	74	82	91	91	80	64	47	35	33	33	37	42	53	61	55	55	53	54	67	71	58
Aug08	52	51	66	64	72	81	94	95	85	67	49	34	32	29	32	46	76	66	51	48	49	50	54	58	58
Aug09	60	62	61	62	68	80	92	90	76	63	46	37	30	26	31	52	61	53	49	48	50	61	76	69	58
Aug10	44	62	68	62	69	85	86	80	62	46	31	35	31	32	43	58	67	55	56	60	60	60	60	55	57
Aug11	64	64	66	68	76	85	91	91	81	66	50	36	31	31	39	46	58	67	66	57	56	54	66	63	61
Aug12	64	58	47	74	76	83	89	93	82	65	55	44	37	43	48	49	53	51	53	51	52	55	57	59	60
Aug13	62	64	65	64	74	78	80	80	71	58	46	36	31	37	42	48	55	54	60	52	53	54	56	57	57
Aug14	60	57	61	65	72	79	81	80	70	59	48	39	33	38	41	46	53	53	53	53	55	56	55	56	57
Aug15	57	60	61	64	71	76	80	75	61	50	44	39	41	43	47	52	56	53	52	53	52	59	57	55	57
Aug16	56	57	61	64	67	68	73	73	68	58	42	31	25	29	33	41	50	50	48	49	52	57	68	73	54
Aug17	71	64	68	72	65	69	76	79	69	56	42	27	24	31	41	49	56	56	52	53	...	65	65	68	...
Aug18	70	70	74	70	73	76	82	84	80	68	53	39	31	31	33	45	58	59	58	57	57	64	60	63	61
Aug19	63	62	63	64	71	76	81	82	74	62	50	34	31	36	42	45	55	56	58	55	55	54	56	56	58
Aug20	66	64	67	68	73	81	86	81	73	62	47	36	28	26	30	39	49	55	54	55	57	59	59	61	57
Aug21	61	62	63	65	70	78	83	82	71	51	33	23	22	26	22	27	37	44	46	50	51	69	75	63	53
Aug22	65	65	66	69	71	78	82	78	70	59	44	32	25	28	33	42	49	52	54	59	57	62	68	70	57
Aug23	68	69	71	65	68	71	75	79	70	53	39	...	19	21	23	35	42	53	57	83	91	99	98	71	...
Aug24	72	81	55	85	89	92	91	86	70	50	31	20	24	44	48	54	62	59	58	60	61	71	65	65	62
Aug25	65	64	70	72	78	83	87	85	69	56	49	39	34	37	46	54	59	72	64	59	57	63	87	81	64
Aug26	85	77	82	69	74	81	84	82	69	53	44	38	31	34	40	47	51	57	61	57	58	59	57	63	61
Aug27	67	66	65	70	78	77	73	75	70	58	42	38	39	38	39	47	53	52	54	55	58	58	59	60	58
Aug28	63	63	64	66	73	76	77	73	66	56	44	40	43	48	49	53	53	52	53	55	55	54	56	57	58
Aug29	59	61	62	67	70	73	76	77	72	60	41	25	21	30	...	48	55	57	64	60	62	71	56	54	...
Aug30	56	57	57	67	73	78	85	86	83	67	44	25	17	18	25	27	45	55	79	84	71	83	49	63	58
Aug31	64	66	68	69	75	82	89	89	82	64	40	26	24	31	42	49	56	55	53	61	67	72	76	76	61

2016, Field component: Z, Base: 43600.0, Unit: nT

Aug01	119	119	119	120	121	122	119	116	112	109	107	105	106	113	116	123	124	119	117	118	118	117	118	119	116
Aug02	118	118	119	121	122	117	116	116	114	108	107	106	105	103	106	108	110	112	115	116	115	116	117	114	113
Aug03	111	110	107	114	119	123	124	121	118	119	119	119	123	133	135	136	137	140	133	130	129	127	125	124	124
Aug04	122	119	120	123	125	121	122	123	118	109	104	106	114	122	131	138	142	137	136	133	130	127	127	125	124
Aug05	125	124	125	127	128	129	124	121	117	116	118	117	118	121	127	130	...	...	129	128	126	124	124	118	...
Aug06	119	121	123	126	128	125	124	124	122	116	117	118	117	116	120	126	130	128	127	127	125	125	123	123	123
Aug07	124	115	117	122	122	126	128	128	125	116	111	110	115	115	122	133	133	132	129	127	124	124	123	119	123

Table 8.8 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Aug08	118	115	115	120	120	124	131	134	129	119	111	109	112	118	125	138	146	144	137	131	128	127	126	125	125
Aug09	125	124	125	126	127	126	124	126	121	111	108	107	109	118	123	128	135	131	128	127	126	125	125	125	123
Aug10	123	120	120	125	127	126	130	129	127	122	118	116	117	118	123	128	134	133	130	128	125	123	122	123	124
Aug11	124	125	125	126	129	128	126	124	123	118	112	107	108	115	118	121	128	134	136	132	130	127	124	123	123
Aug12	124	125	120	117	123	121	119	119	117	111	109	112	115	121	128	132	130	130	127	126	126	126	126	125	122
Aug13	125	124	125	127	128	126	125	120	112	106	102	107	113	120	123	129	131	128	128	127	126	125	125	125	122
Aug14	125	126	125	126	127	126	124	126	123	121	120	117	119	120	120	122	124	123	122	122	123	122	122	123	123
Aug15	123	122	123	125	127	126	125	123	117	111	109	109	111	116	119	124	124	122	123	123	123	123	123	123	121
Aug16	123	123	123	124	126	127	127	124	123	116	107	105	110	116	119	120	123	124	123	122	122	122	122	124	121
Aug17	122	123	122	124	125	122	125	127	124	116	113	114	114	117	122	123	123	122	122	123	123	123	125	123	122
Aug18	123	123	123	123	122	123	122	126	124	120	117	119	119	121	124	125	127	125	124	124	123	124	124	124	123
Aug19	123	124	124	125	126	124	122	119	115	112	111	115	121	123	124	125	125	125	126	126	125	124	124	124	122
Aug20	122	122	121	123	124	124	124	124	120	114	114	115	118	117	119	121	122	120	120	122	122	122	122	122	121
Aug21	122	122	122	122	122	121	119	116	110	105	100	100	108	115	117	117	114	120	122	122	122	120	123	123	117
Aug22	121	121	122	122	123	121	119	118	116	109	104	109	111	114	118	121	123	123	124	123	124	122	121	122	119
Aug23	122	122	122	122	122	123	125	124	121	114	105	...	110	119	124	124	133	137	141	138	136	136	133	134	...
Aug24	134	129	123	124	128	127	125	123	118	115	115	120	125	124	125	126	129	128	128	130	131	126	125	126	125
Aug25	128	127	125	128	129	129	129	126	124	123	121	120	120	127	131	133	133	132	130	129	128	128	124	123	127
Aug26	123	124	124	126	127	126	126	123	122	120	117	119	119	119	122	126	126	126	128	128	126	126	126	125	124
Aug27	125	125	125	125	125	128	128	124	119	118	117	117	118	119	122	124	123	123	124	125	125	125	124	125	123
Aug28	124	124	124	125	126	126	127	128	125	123	124	126	124	118	116	118	117	119	121	122	122	122	122	122	123
Aug29	122	122	122	123	123	122	119	116	115	108	103	102	108	113	...	120	121	122	124	125	124	123	123	122	...
Aug30	122	123	120	119	123	125	127	127	125	116	108	106	110	117	127	133	135	133	132	135	131	128	127	122	124
Aug31	124	125	126	127	129	131	131	130	127	120	112	111	116	120	121	123	123	122	124	124	127	125	123	123	123
2016, Field component: F, Base: 48400.0, Unit: nT																									
Aug01	127	127	127	128	130	130	125	119	112	109	106	109	111	119	124	129	131	128	125	129	129	129	129	128	123
Aug02	130	128	129	131	133	131	125	125	123	119	121	120	121	121	124	121	125	124	130	134	136	136	126	127	127
Aug03	126	129	124	133	132	131	124	118	116	98	97	102	113	113	121	119	126	138	132	130	130	131	132	130	123
Aug04	130	124	128	129	129	120	123	118	110	99	97	100	106	114	119	128	144	129	129	134	131	132	133	131	122
Aug05	130	130	131	134	134	127	125	124	115	108	109	110	108	114	123	125	128	130	132	131	133	135	129	127	125
Aug06	125	125	126	129	131	129	125	118	114	107	105	112	113	118	120	125	127	129	130	133	134	133	131	128	124
Aug07	128	125	125	126	129	131	129	126	118	108	106	111	119	115	120	131	129	135	136	133	131	134	133	131	125
Aug08	127	127	125	126	128	127	131	128	122	117	112	111	117	125	127	139	150	140	135	135	134	133	132	132	128
Aug09	131	131	130	132	134	132	128	127	120	105	102	105	111	116	121	126	134	130	132	133	132	132	133	129	125
Aug10	130	130	129	130	134	130	126	118	112	105	108	113	119	117	120	123	136	135	133	136	138	130	127	126	125
Aug11	126	129	130	133	135	133	...	125	123	118	113	108	112	122	124	128	134	136	135	135	133	133	135	129	...

Table 8.8 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Aug12	128	131	134	128	130	122	118	117	114	106	106	110	111	114	124	128	132	133	133	133	131	131	131	131	124
Aug13	131	129	130	132	134	129	126	118	108	103	107	113	117	124	127	132	134	131	133	131	130	129	129	129	125
Aug14	130	131	132	133	133	130	127	126	124	125	126	123	122	124	126	129	132	130	129	128	131	130	130	131	128
Aug15	131	130	130	132	134	131	127	121	116	113	115	117	120	124	125	129	128	128	129	130	131	132	130	130	127
Aug16	130	130	130	132	133	132	129	124	121	116	111	113	120	124	123	123	127	130	131	134	136	135	132	132	127
Aug17	133	135	133	132	135	133	131	128	122	115	113	116	115	122	129	130	130	130	132	133	...	132	130	131	...
Aug18	128	128	129	134	130	128	127	126	123	117	116	119	122	126	127	130	132	132	132	131	131	130	130	131	128
Aug19	130	129	130	131	133	129	124	118	112	110	113	119	125	126	127	127	127	128	129	131	132	132	131	133	126
Aug20	134	130	131	130	130	131	128	123	116	110	114	117	122	122	125	128	129	128	130	132	133	132	130	130	126
Aug21	130	130	130	131	133	134	131	124	118	113	113	117	126	133	135	126	124	131	131	134	135	135	130	131	128
Aug22	130	129	130	130	131	130	126	120	116	109	108	112	116	120	125	128	130	129	129	132	133	131	131	130	125
Aug23	128	129	130	132	133	133	132	130	125	120	113	117	117	116	120	115	127	132	132	130	122	123	126	128	125
Aug24	130	130	131	125	127	126	120	115	109	107	104	104	110	120	125	125	126	126	128	131	131	138	129	127	123
Aug25	129	131	130	130	131	129	125	118	110	109	114	118	118	126	128	133	133	136	139	133	133	134	139	131	127
Aug26	129	129	129	129	132	129	126	121	119	119	120	122	122	122	126	127	126	129	133	133	134	132	133	133	127
Aug27	131	130	131	131	130	131	132	128	123	120	119	117	124	126	127	129	129	129	131	131	131	131	131	132	128
Aug28	131	131	131	131	131	130	129	128	125	123	126	128	128	125	124	126	127	127	129	130	132	133	133	134	129
Aug29	133	132	133	132	132	131	126	120	116	113	116	117	119	122	125	125	128	128	130	132	133	137	134	134	127
Aug30	134	133	134	131	132	132	133	125	116	111	107	107	107	109	118	118	126	129	133	136	134	134	135	132	125
Aug31	131	131	130	132	134	134	131	126	119	113	107	109	115	119	124	130	130	130	131	132	130	132	130	128	126

Table 8.9. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Sep01	105	111	126	117	116	109	82	68	72	71	79	91	93	80	62	79	93	102	94	98	127	96	87	104	94
Sep02	111	124	87	99	85	85	86	73	63	67	75	80	82	82	75	82	68	61	82	88	93	113	98	89	85
Sep03	102	113	105	116	92	100	87	67	54	42	50	51	65	70	82	78	70	68	71	95	94	74	80	108	81
Sep04	101	85	92	96	91	97	83	78	61	57	52	60	72	59	81	83	85	96	97	90	114	88	88	101	84
Sep05	93	92	90	93	93	86	81	80	64	57	62	81	96	101	99	99	85	73	69	80	89	92	91	98	85
Sep06	90	90	92	90	90	91	84	67	58	72	80	81	84	94	94	91	90	91	95	107	124	95	98	101	90
Sep07	109	95	99	99	100	101	94	89	81	77	78	68	65	84	96	80	73	76	86	92	98	98	100	102	89
Sep08	113	110	103	109	102	101	102	92	85	81	74	70	84	86	81	77	77	82	97	98	99	98	102	100	93
Sep09	103	103	101	101	103	105	103	96	94	94	95	96	100	103	104	104	100	98	101	101	102	106	105	112	101
Sep10	109	106	107	107	110	109	112	105	98	87	80	83	88	97	103	104	102	102	104	104	103	102	100	113	101
Sep11	104	103	103	106	108	109	112	107	102	94	95	99	98	95	94	93	92	94	97	100	97	96	100	103	100
Sep12	108	111	111	112	113	115	107	101	92	92	101	108	113	114	110	108	107	107	108	110	110	105	105	108	107
Sep13	106	112	107	109	112	110	100	87	84	86	90	95	101	103	103	103	102	103	105	108	107	107	103	101	102
Sep14	101	100	105	105	111	112	106	107	97	91	95	96	103	96	92	88	86	95	104	113	89	78	85	88	98
Sep15	95	96	97	108	112	113	108	95	92	91	91	93	97	100	100	99	99	102	106	108	109	106	108	105	101
Sep16	104	103	103	103	100	99	100	99	97	98	102	108	114	116	115	113	109	105	109	104	104	103	105	103	105
Sep17	104	108	111	112	115	116	110	107	105	114	113	113	118	120	116	113	113	113	114	115	113	113	117	113	113
Sep18	108	112	109	113	114	111	111	111	109	105	94	100	111	115	100	78	85	92	94	101	108	109	113	109	105
Sep19	109	111	107	106	110	113	111	100	80	78	85	97	103	100	87	88	94	110	115	117	121	126	115	113	104
Sep20	114	119	113	90	93	91	87	72	78	83	73	90	93	95	95	95	91	97	102	103	111	111	105	103	96
Sep21	121	120	100	105	104	100	94	90	90	78	90	96	95	98	100	106	106	109	108	112	112	112	112	112	103
Sep22	114	105	104	104	107	106	102	95	85	87	93	96	101	104	104	106	106	107	109	108	109	109	109	108	103
Sep23	108	108	109	110	112	110	107	105	103	101	98	101	108	113	116	116	116	114	116	116	116	115	115	...	...
Sep24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sep25	...	113	110	98	123	104	101	98	97	105	106	87	89	99	99	95	98	106	83	73	78	86	89	132	...
Sep26	111	97	92	89	100	106	101	84	85	94	100	97	81	71	69	58	60	60	67	72	75	92	99	108	86
Sep27	128	100	91	97	93	89	88	85	61	47	55	80	64	61	52	59	78	88	86	95	103	102	104	117	84
Sep28	106	106	94	101	94	98	90	77	79	81	59	56	74	65	67	52	56	45	102	66	114	96	77	86	81
Sep29	87	87	96	112	110	89	81	53	56	41	55	56	53	42	40	24	58	67	97	88	86	93	100	110	74
Sep30	91	90	91	97	86	90	81	70	74	62	67	80	82	87	84	76	78	65	97	75	78	78	80	85	81
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Sep01	71	55	64	76	74	73	76	74	61	51	47	40	30	31	47	57	58	60	65	96	125	120	95	66	67
Sep02	97	85	66	78	72	64	87	83	79	61	42	24	17	17	65	73	65	84	62	58	68	60	83	76	65
Sep03	61	59	71	70	42	59	74	74	69	60	41	31	25	53	42	73	72	95	69	78	93	88	77	63	64
Sep04	83	63	56	67	59	64	75	88	80	70	52	38	35	46	51	55	62	90	70	65	113	73	64	65	66

Table 8.9 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Sep05	60	57	61	65	64	66	77	83	78	62	51	39	37	38	46	56	70	97	85	96	77	67	68	73	66
Sep06	66	66	64	61	69	81	85	83	73	68	51	39	45	42	50	57	63	67	62	72	68	67	64	66	64
Sep07	69	68	65	56	69	73	79	84	83	74	55	40	29	24	31	47	64	57	58	60	59	62	64	64	60
Sep08	57	64	63	69	71	61	72	72	67	65	60	53	38	29	32	43	50	58	74	65	62	61	67	65	59
Sep09	61	62	65	66	67	70	73	79	82	76	64	50	41	40	43	49	59	62	60	61	61	61	61	68	62
Sep10	65	64	65	63	63	63	72	80	82	77	62	47	39	36	39	50	57	59	60	62	65	67	68	68	62
Sep11	64	62	62	63	65	73	81	84	81	72	57	41	38	41	51	57	56	61	62	65	67	71	71	69	63
Sep12	68	74	70	67	64	68	77	82	80	67	48	37	32	34	41	45	50	55	58	60	61	65	69	67	60
Sep13	63	68	71	65	66	74	85	92	88	71	49	32	24	28	39	51	57	58	57	59	60	67	66	70	61
Sep14	69	69	71	69	72	81	88	90	84	72	51	36	26	22	33	41	45	49	77	95	86	88	91	90	66
Sep15	95	87	79	70	69	63	65	68	66	58	44	34	32	33	41	49	52	52	56	58	60	63	63	61	59
Sep16	62	63	65	67	68	71	77	82	80	68	53	40	34	39	46	51	54	54	57	60	60	63	63	64	60
Sep17	68	72	72	68	67	71	78	81	77	65	52	41	36	39	45	50	53	54	56	58	60	61	64	65	61
Sep18	68	70	66	65	69	76	78	83	81	70	53	37	35	33	36	46	47	51	58	61	61	63	68	68	60
Sep19	67	68	69	69	68	71	79	83	75	58	41	22	24	17	16	19	31	38	45	48	55	60	70	73	53
Sep20	80	88	112	87	75	79	85	82	73	64	56	51	47	44	44	46	50	65	57	61	68	66	68	70	67
Sep21	72	75	75	74	69	70	75	80	79	73	63	53	43	43	43	49	53	55	59	59	60	62	66	71	63
Sep22	75	75	70	67	66	68	73	76	76	73	62	50	41	42	45	48	52	55	58	60	61	62	63	64	62
Sep23	64	64	65	66	66	66	72	81	82	75	63	47	37	33	38	46	50	53	56	58	59	60	62	...	...
Sep24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sep25	...	91	110	85	74	69	74	79	76	63	40	29	45	49	54	56	57	53	59	69	119	80	76	74	...
Sep26	80	91	85	70	62	64	71	75	71	62	48	37	35	45	36	43	56	56	88	85	101	78	67	87	66
Sep27	87	88	61	71	72	75	82	81	71	65	65	47	47	58	45	104	50	55	71	81	66	69	78	63	69
Sep28	66	66	54	67	68	70	74	77	73	68	57	56	47	65	55	106	86	88	132	86	91	95	84	61	75
Sep29	68	72	50	44	38	54	67	59	59	56	68	59	52	62	67	116	84	70	103	80	69	72	74	70	67
Sep30	71	63	66	67	67	68	72	84	78	66	60	45	48	50	63	70	75	95	120	83	94	89	85	85	74
2016, Field component: Z, Base: 43700.0, Unit: nT																									
Sep01	22	24	15	16	20	21	25	26	21	16	11	17	21	25	31	32	30	28	31	30	25	21	23	19	23
Sep02	10	10	10	13	21	17	25	26	22	14	8	9	18	30	34	39	43	44	38	35	32	28	19	24	24
Sep03	24	20	18	17	18	20	26	28	27	25	17	18	29	42	40	42	46	44	40	35	27	28	28	19	28
Sep04	18	21	23	26	28	30	33	34	32	30	29	31	34	40	38	36	35	34	35	33	29	30	30	27	31
Sep05	28	28	29	30	32	35	40	42	41	37	29	25	24	26	27	28	34	39	42	39	34	32	32	31	33
Sep06	31	31	32	31	32	34	33	31	31	28	25	26	31	31	30	31	33	33	34	32	27	28	30	30	31
Sep07	27	28	28	28	28	32	34	35	35	29	26	26	27	30	34	39	43	40	37	36	34	33	32	31	32
Sep08	28	25	26	24	25	27	26	29	30	24	17	15	16	17	26	36	38	38	37	35	34	32	31	31	28
Sep09	30	30	29	30	30	31	32	31	28	23	18	16	21	25	28	29	30	31	31	30	30	29	29	28	28

Table 8.9 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Sep10	27	27	27	27	27	29	29	31	31	29	22	22	25	27	29	32	31	29	29	29	28	29	29	26	28
Sep11	26	27	27	27	28	30	29	29	26	21	15	20	24	28	31	34	34	32	32	32	32	32	31	30	28
Sep12	29	27	27	26	26	26	28	28	25	20	15	17	22	22	22	23	24	24	26	26	27	28	28	26	25
Sep13	27	25	26	26	26	29	31	30	29	24	19	19	21	22	25	27	28	27	28	27	27	27	27	27	26
Sep14	28	28	28	27	27	28	28	27	26	26	25	22	22	25	25	28	28	30	30	29	29	32	32	31	28
Sep15	28	28	27	26	25	24	26	28	29	24	23	23	23	24	26	27	28	28	28	28	28	28	28	28	27
Sep16	28	28	28	28	27	28	29	29	27	23	18	17	18	18	17	21	24	26	27	27	27	28	28	29	25
Sep17	28	28	27	26	26	26	26	27	26	19	15	13	15	15	17	22	23	23	24	24	25	25	25	25	23
Sep18	26	25	25	25	24	24	25	24	23	18	11	12	18	22	25	30	31	32	32	31	30	29	28	28	25
Sep19	28	26	26	26	26	27	28	29	30	24	14	16	21	26	28	32	31	30	29	28	28	27	29	29	27
Sep20	28	26	20	26	26	26	29	32	29	26	23	22	21	23	26	28	29	31	31	30	29	28	28	28	27
Sep21	26	21	24	24	25	28	30	30	26	20	17	18	22	23	25	25	26	27	27	27	27	27	27	26	25
Sep22	26	26	26	26	26	28	30	31	29	22	13	13	17	18	21	24	26	26	27	27	26	27	27	27	24
Sep23	27	26	26	26	25	27	28	28	24	19	15	14	15	15	19	22	23	24	24	24	24	25	25	...	...
Sep24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sep25	...	27	24	26	20	22	24	24	17	10	7	12	13	19	23	25	27	29	32	35	34	36	34	24	...
Sep26	20	22	25	27	26	25	26	27	26	18	15	17	21	26	31	36	40	43	43	42	39	37	35	31	29
Sep27	22	20	20	19	26	30	34	35	33	29	34	38	37	41	47	53	45	39	38	38	36	34	33	28	34
Sep28	25	23	26	18	24	28	30	31	30	28	28	32	34	39	39	45	51	48	42	38	29	24	30	33	32
Sep29	32	33	32	26	24	27	33	36	35	33	35	39	41	46	52	56	57	48	41	39	39	37	34	31	38
Sep30	31	30	30	31	33	35	36	38	35	31	31	31	30	33	37	38	38	41	38	37	36	36	36	34	34
2016, Field component: F, Base: 48400.0, Unit: nT																									
Sep01	129	132	131	129	132	129	121	115	113	108	107	117	121	119	117	125	130	132	131	133	142	125	122	125	124
Sep02	121	126	109	117	119	115	123	119	111	105	102	105	113	124	125	134	131	129	133	132	132	137	123	123	121
Sep03	128	129	125	128	118	124	124	117	111	103	99	100	116	131	134	135	134	133	130	136	129	121	123	127	123
Sep04	123	119	124	127	127	132	129	128	119	114	111	116	124	124	132	131	131	136	136	132	140	128	128	130	127
Sep05	128	127	128	130	132	131	134	136	128	121	115	119	125	129	129	130	131	130	132	134	133	132	131	133	129
Sep06	130	130	131	129	130	133	130	120	116	119	119	120	126	130	130	130	132	133	134	138	141	130	132	133	129
Sep07	134	129	131	131	132	135	134	133	130	122	119	115	114	125	134	132	133	131	133	135	136	135	135	135	130
Sep08	136	133	131	132	129	130	131	...	127	120	110	106	113	114	121	128	130	132	138	137	136	134	135	135	...
Sep09	135	135	133	133	135	136	137	133	129	124	120	119	124	129	132	133	133	133	134	133	134	135	134	136	132
Sep10	134	133	133	133	135	136	137	136	133	127	117	119	123	128	133	136	135	133	134	134	133	133	132	135	132
Sep11	131	131	132	133	135	137	138	136	130	123	117	123	126	129	131	133	133	132	134	135	134	133	134	135	131
Sep12	136	136	135	135	135	137	135	132	125	121	120	124	131	131	129	129	130	131	133	134	134	133	134	133	131
Sep13	133	134	133	133	135	137	134	129	126	122	118	120	124	126	129	131	131	132	133	134	134	134	132	131	130
Sep14	132	131	133	133	136	137	135	134	129	125	125	124	126	126	124	125	125	130	135	139	128	126	129	129	130

Table 8.9 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Sep15	131	130	130	133	134	134	133	129	128	124	122	123	124	127	129	129	130	132	134	135	135	134	135	133	130
Sep16	133	133	133	132	131	131	133	132	130	126	123	124	128	128	127	130	131	131	134	132	133	133	134	133	131
Sep17	134	135	135	135	136	136	135	134	132	129	124	123	126	127	128	131	132	132	134	134	134	134	135	134	132
Sep18	133	134	133	134	134	133	134	133	131	124	113	116	126	131	128	123	127	131	132	134	136	136	137	135	130
Sep19	135	135	133	133	134	136	137	133	125	117	111	118	125	128	124	128	131	137	138	138	140	142	139	138	131
Sep20	138	138	132	126	126	126	127	123	123	122	115	121	122	124	127	129	128	133	134	134	137	136	134	133	129
Sep21	139	134	127	131	131	131	131	129	126	115	117	120	123	125	128	131	132	134	134	135	135	135	136	135	130
Sep22	135	132	132	132	133	134	...	132	126	121	115	115	121	123	127	130	131	132	134	133	134	134	134	134	...
Sep23	133	133	133	133	134	135	135	134	130	124	119	119	122	125	129	132	133	133	135	135	135	135	135	135	131
Sep24	134	134	133	134	134	...	138	136	130	120	112	113	122	129	129	130	130	133	135	133	130	132	132	133	...
Sep25	136	137	134	129	134	128	128	127	120	117	114	110	112	122	126	127	130	134	127	126	129	134	132	142	127
Sep26	129	125	126	126	130	132	130	124	123	120	119	119	116	117	120	120	124	127	132	133	131	136	137	138	126
Sep27	139	125	120	122	126	129	132	132	119	109	117	131	123	126	127	138	137	135	135	139	140	138	138	139	130
Sep28	131	130	126	123	125	130	129	125	125	123	113	116	125	126	127	128	134	127	147	127	139	127	124	129	127
Sep29	129	131	133	134	131	125	128	118	118	110	119	122	123	123	127	126	140	135	142	137	135	136	137	138	129
Sep30	131	129	130	133	129	133	131	128	127	118	120	125	125	129	132	131	131	129	141	129	130	130	130	131	129

Table 8.10. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20800.0, Unit: nT																									
Oct01	187	188	189	192	186	194	189	184	179	179	176	175	180	183	186	191	194	206	199	176	184	190	195	217	188
Oct02	200	197	193	195	201	201	189	183	174	167	167	170	165	157	183	186	189	193	197	189	216	182	192	195	187
Oct03	197	198	199	198	198	186	187	190	183	178	178	180	185	185	190	189	190	192	197	200	185	197	206	203	191
Oct04	217	217	213	202	197	205	198	190	168	141	147	161	171	179	200	193	190	191	189	200	196	194	192	210	190
Oct05	202	192	198	210	199	203	199	185	182	171	173	182	190	189	187	185	194	194	197	204	202	202	210	203	194
Oct06	204	201	198	198	200	203	202	196	191	187	185	189	197	203	203	199	189	182	189	198	204	210	204	204	197
Oct07	200	199	199	194	197	201	199	189	...	...	175	...	191	195	192	187	187	190	186	190	203	204	204	202	...
Oct08	204	212	205	204	204	210	209	203	194	182	175	180	180	183	191	193	193	194	194	198	200	212	208	205	197
Oct09	210	202	201	201	206	208	203	198	190	183	179	185	189	186	180	188	193	201	202	204	206	207	208	203	197
Oct10	209	208	212	208	209	215	213	207	194	192	190	183	179	181	187	186	179	176	182	211	196	198	200	200	196
Oct11	201	200	202	205	209	212	210	204	195	189	183	186	192	197	201	202	205	208	208	209	208	207	206	207	202
Oct12	207	207	205	206	208	209	208	206	203	198	194	194	197	201	204	203	203	204	205	205	209	210	...	220	...
Oct13	214	210	218	216	216	224	220	182	168	164	166	153	150	133	120	110	112	85	77	100	114	110	111	128	154
Oct14	169	182	198	184	178	176	174	173	...	169	171	174	174	176	177	173	179	190	193	196	201	197	197	199	...
Oct15	199	193	196	205	201	198	195	191	185	190	190	186	192	196	198	198	197	184	191	192	190	192	194	207	194
Oct16	203	193	194	193	197	196	192	193	192	184	192	197	199	192	185	187	198	196	203	204	186	228	208	198	196
Oct17	197	204	206	198	192	193	185	176	159	173	169	...	192	197	189	185	182	194	192	222	209	193	186	202	...
Oct18	198	193	196	196	195	192	188	175	174	173	178	192	200	201	195	191	194	195	197	199	198	206	201	204	193
Oct19	209	201	202	198	201	198	200	190	179	174	175	181	192	198	197	195	193	199	199	202	206	203	201	202	196
Oct20	203	201	202	201	204	206	206	202	192	182	184	189	195	199	202	204	204	206	206	204	209	208	208	208	201
Oct21	207	207	207	206	207	207	203	196	186	177	179	188	195	201	203	205	206	208	208	208	209	208	209	209	202
Oct22	206	207	210	211	213	216	217	213	200	191	191	196	203	203	200	194	204	209	207	210	208	211	209	209	206
Oct23	209	207	209	213	216	225	221	210	200	192	186	185	186	186	189	191	195	200	207	198	198	202	210	216	202
Oct24	204	198	206	208	204	208	205	193	192	191	190	191	177	155	175	163	147	163	188	189	185	187	184	193	187
Oct25	201	207	199	212	192	201	209	203	185	182	176	160	155	113	110	147	141	139	166	140	151	187	204	194	174
Oct26	168	166	170	175	189	188	173	176	170	164	123	167	178	168	124	122	121	174	147	153	184	181	...	181	...
Oct27	198	196	179	182	187	184	174	172	160	150	145	153	155	153	160	147	170	154	167	174	183	193	179	174	170
Oct28	181	177	181	182	184	188	191	181	173	174	170	173	174	174	171	181	174	195	189	189	197	181	172	180	180
Oct29	195	203	231	192	182	183	177	179	170	169	160	173	176	162	153	171	164	166	158	164	180	186	184	186	178
Oct30	186	184	193	201	192	194	...	185	167	166	169	163	150	141	152	181	179	167	175	187	207	191	190	190	...
Oct31	192	196	195	197	199	193	200	195	181	174	179	187	186	188	187	180	180	184	...	190	192	194	194	192	...
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Oct01	69	63	70	74	61	63	78	85	89	74	63	57	53	51	56	61	69	98	121	88	71	68	71	68	72
Oct02	63	67	76	67	64	65	73	75	76	64	56	50	46	62	51	57	62	77	67	75	109	86	69	69	68
Oct03	67	68	68	68	66	66	59	73	77	74	63	52	42	48	53	58	74	66	84	76	71	69	69	70	66

Table 8.10 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Oct04	80	86	86	87	68	53	70	68	66	69	65	52	52	52	56	57	60	57	65	93	74	75	81	64	68
Oct05	71	73	69	63	64	64	71	80	82	82	66	54	45	47	49	59	59	58	61	72	66	69	72	71	65
Oct06	64	66	65	66	66	68	74	85	89	86	72	60	52	48	51	54	60	62	65	70	69	67	71	67	66
Oct07	69	62	69	65	64	69	78	88	...	...	66	...	37	36	43	52	57	56	64	70	71	68	70	68	...
Oct08	63	60	62	61	61	54	68	84	96	89	75	60	52	50	53	57	61	66	70	68	70	74	71	68	66
Oct09	72	71	66	64	64	66	74	83	89	78	58	48	44	43	52	52	59	63	65	76	68	65	65	69	65
Oct10	66	60	73	68	67	70	79	85	92	83	64	50	41	39	45	55	57	70	91	82	76	71	67	67	67
Oct11	67	67	66	66	66	69	80	90	93	83	68	51	42	40	46	55	58	60	62	63	64	64	65	68	65
Oct12	69	69	66	65	64	65	72	84	92	87	68	52	39	39	48	55	58	62	64	65	68	68	...	66	...
Oct13	70	68	70	70	72	72	70	83	78	65	50	47	52	58	66	65	49	65	92	144	117	118	134	159	81
Oct14	98	32	63	47	52	60	53	75	...	88	87	69	66	67	69	70	69	68	66	66	65	68	68	70	...
Oct15	71	77	74	77	74	74	77	85	82	62	50	46	51	50	61	63	55	61	62	62	72	73	81	71	67
Oct16	78	78	76	70	69	71	76	77	78	68	53	45	45	37	54	63	60	59	112	96	76	82	71	77	70
Oct17	73	69	74	73	74	69	75	77	67	56	39	...	53	54	56	62	76	76	73	77	95	86	63	54	...
Oct18	72	69	66	66	63	68	71	76	76	70	51	45	44	49	57	59	62	66	68	70	73	75	74	68	65
Oct19	66	71	70	68	67	68	73	78	79	74	57	47	42	47	56	60	60	62	64	68	72	71	70	68	65
Oct20	68	70	68	68	68	69	75	84	88	78	58	46	44	47	55	59	60	63	63	65	70	68	68	68	65
Oct21	68	68	67	67	66	68	77	90	90	73	55	46	44	49	56	59	61	63	65	65	67	68	68	69	65
Oct22	70	70	70	69	68	68	73	82	85	72	57	49	46	46	52	59	63	64	63	72	68	76	72	71	66
Oct23	67	67	66	66	65	65	71	79	86	74	61	47	45	48	55	57	59	71	80	72	71	73	68	74	66
Oct24	84	74	62	80	69	64	76	80	77	64	52	42	47	47	59	50	55	63	65	66	76	84	100	79	67
Oct25	82	84	56	85	72	66	65	70	76	70	56	56	34	68	71	51	71	206	110	115	96	78	103	101	81
Oct26	90	68	59	43	48	58	65	74	78	79	88	65	58	58	88	95	107	138	77	84	71	105	...	65	...
Oct27	62	82	66	47	60	68	73	79	77	73	68	61	50	59	68	85	109	115	80	81	108	108	106	88	78
Oct28	82	72	71	72	69	73	78	86	81	74	61	54	53	63	67	69	72	78	70	84	96	111	105	88	76
Oct29	106	91	74	80	56	63	54	64	71	68	57	59	54	67	66	64	81	83	84	99	98	91	79	73	74
Oct30	72	63	47	68	67	72	...	92	89	77	64	65	61	71	86	69	69	85	87	85	89	82	72	70	...
Oct31	68	57	65	70	71	68	76	82	76	67	59	52	53	64	68	74	75	73	...	79	77	76	77	73	...
2016, Field component: Z, Base: 43700.0, Unit: nT																									
Oct01	34	33	34	34	35	36	40	39	33	29	25	27	29	32	35	36	35	34	32	36	36	36	35	31	33
Oct02	29	30	31	32	33	35	40	40	38	32	28	30	36	42	40	37	37	37	37	36	30	33	33	33	35
Oct03	33	33	33	33	34	37	38	37	35	28	22	21	21	24	32	35	37	37	36	34	35	34	31	32	32
Oct04	26	23	19	22	24	27	30	35	36	34	32	31	36	34	34	36	36	36	36	36	35	35	35	34	32
Oct05	29	31	31	27	28	33	36	38	37	33	30	25	22	26	32	34	36	35	35	34	34	33	32	31	32
Oct06	31	30	31	32	32	34	36	37	33	26	20	15	17	22	26	29	32	36	37	35	34	33	32	32	30
Oct07	32	32	31	32	33	35	39	40	...	...	23	...	26	28	32	35	36	36	37	37	36	34	33	33	...

Table 8.10 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Oct08	33	30	30	30	32	32	35	38	36	30	24	24	25	28	31	34	34	35	35	34	34	32	30	30	31
Oct09	29	29	30	31	31	34	39	39	34	27	20	20	24	29	33	34	35	34	34	33	34	33	32	32	31
Oct10	30	31	27	29	30	32	36	36	31	27	24	23	26	28	32	35	39	41	41	35	35	36	35	34	32
Oct11	33	33	33	32	32	32	35	36	33	28	25	25	25	28	31	32	31	31	31	31	32	32	32	32	31
Oct12	31	31	31	30	30	31	34	35	32	23	16	13	15	20	26	30	30	31	31	31	30	30	...	27	...
Oct13	27	28	27	27	26	27	29	30	32	29	33	36	42	49	55	62	65	73	77	66	56	52	51	49	44
Oct14	44	32	21	28	34	41	47	49	...	44	44	40	38	39	42	42	41	40	39	39	39	38	38	37	...
Oct15	37	36	36	33	33	33	35	35	29	22	20	25	28	30	33	34	36	37	38	38	39	40	39	38	34
Oct16	34	35	36	36	36	36	36	34	27	22	23	28	30	34	35	37	37	37	36	36	37	31	30	31	33
Oct17	34	33	30	32	33	34	35	33	24	15	19	28	32	33	35	36	39	40	39	33	30	32	36	33	32
Oct18	32	34	34	33	33	34	36	35	30	22	22	26	31	34	36	36	36	36	36	36	36	35	33	34	33
Oct19	31	32	32	33	33	35	38	40	32	22	21	23	26	29	33	35	36	36	36	36	35	35	35	34	32
Oct20	34	34	33	33	34	34	37	37	30	22	22	24	28	32	34	34	33	34	34	34	33	33	33	32	32
Oct21	32	32	32	32	33	34	38	37	32	23	22	23	25	28	31	31	32	32	32	31	31	32	32	32	31
Oct22	31	31	31	30	30	29	30	29	24	20	21	23	25	30	33	34	33	33	33	33	33	33	32	32	30
Oct23	32	31	31	31	30	30	32	34	28	20	19	22	26	31	33	34	35	34	34	34	34	34	33	27	30
Oct24	28	31	29	28	30	31	32	34	35	32	30	34	36	42	39	42	47	49	44	42	42	41	40	38	37
Oct25	31	28	27	23	30	32	35	38	39	33	25	31	40	60	74	58	55	62	54	51	52	42	25	27	41
Oct26	33	38	37	35	34	34	41	45	46	45	45	44	42	44	51	60	62	55	54	53	45	40	...	41	...
Oct27	33	32	36	35	35	38	39	41	40	35	34	37	43	49	48	53	51	51	51	47	45	42	40	41	41
Oct28	40	41	41	40	41	41	43	41	36	28	30	35	38	42	44	45	45	44	43	41	40	38	38	36	40
Oct29	30	30	21	23	31	34	36	35	33	29	27	30	35	44	49	46	47	48	49	49	46	44	43	42	38
Oct30	41	42	38	33	35	38	...	45	42	35	35	38	44	51	53	49	47	46	48	45	40	38	39	39	...
Oct31	39	38	36	38	38	39	41	42	41	36	36	38	39	39	39	40	42	43	...	41	41	41	40	40	...
2016, Field component: F, Base: 48500.0, Unit: nT																									
Oct01	31	30	32	33	32	36	38	34	27	23	18	19	23	27	31	35	35	41	37	29	32	34	36	41	31
Oct02	32	32	31	33	36	38	37	35	29	21	16	20	23	25	35	33	35	37	38	35	42	28	32	34	32
Oct03	34	35	35	35	36	33	34	35	30	22	16	16	18	21	30	33	36	36	38	36	32	35	37	36	31
Oct04	38	34	30	27	26	32	33	33	25	12	12	17	26	27	37	35	34	34	34	39	36	36	34	40	31
Oct05	33	31	33	35	31	37	38	34	32	24	22	21	21	24	29	31	36	35	36	39	38	37	39	35	32
Oct06	36	34	33	34	35	38	40	39	33	25	18	14	19	27	30	31	30	30	34	37	39	40	37	37	32
Oct07	35	34	33	32	34	38	41	38	30	20	16	18	25	28	31	32	33	34	33	35	40	38	38	37	32
Oct08	37	38	35	35	36	39	41	42	37	26	17	19	19	24	30	33	34	35	35	36	37	40	37	36	33
Oct09	37	34	34	34	37	40	43	41	34	23	15	17	22	25	27	31	34	37	37	38	39	38	38	36	33
Oct10	37	37	36	36	37	42	45	42	32	28	23	19	20	23	29	31	31	33	36	43	36	37	38	37	34
Oct11	36	36	36	37	38	41	42	41	35	27	22	22	24	30	34	36	36	37	38	38	38	38	37	37	35

Table 8.10 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Oct12	37	37	36	36	37	38	41	41	37	27	18	15	17	24	31	34	34	35	36	36	38	38	...	39	...
Oct13	37	36	38	37	37	41	41	26	21	17	20	18	22	21	21	23	26	22	23	25	21	16	16	22	26
Oct14	33	26	24	24	27	33	37	39	35	33	33	31	29	31	34	32	34	38	38	39	41	39	39	39	34
Oct15	39	36	37	38	37	36	36	34	26	22	19	22	27	31	34	35	37	33	36	37	37	39	39	43	34
Oct16	38	35	36	36	37	37	35	34	28	19	23	29	32	32	31	34	39	38	41	41	33	46	36	34	34
Oct17	36	37	36	34	32	34	31	25	10	8	9	22	31	34	32	31	34	39	38	46	38	33	32	36	31
Oct18	34	33	35	35	34	33	34	27	22	14	16	26	33	37	36	34	36	37	37	38	38	40	37	38	33
Oct19	38	35	36	35	36	37	40	38	26	15	14	18	25	31	34	35	35	38	38	39	41	39	38	38	33
Oct20	38	37	37	37	38	39	42	41	30	19	19	22	28	34	...	38	38	39	39	39	40	39	39	39	...
Oct21	38	38	38	38	39	40	42	39	29	17	17	21	26	31	35	...	...	38	38	38	38	38	39	38	...
Oct22	37	37	38	38	39	40	41	38	28	21	20	25	30	33	35	34	38	39	38	40	39	40	39	39	35
Oct23	38	38	38	39	40	44	45	42	32	21	17	19	23	27	30	33	35	37	40	36	37	38	40	37	34
Oct24	34	33	35	35	35	37	38	34	34	31	29	32	28	23	31	28	25	34	41	39	37	38	36	38	34
Oct25	34	34	30	33	30	36	42	42	34	28	18	17	22	23	34	35	30	41	42	27	32	39	31	29	32
Oct26	23	26	27	26	31	32	31	37	35	32	14	32	34	32	20	28	29	47	32	33	39	35	36	35	31
Oct27	35	33	29	30	31	33	30	31	25	16	12	19	25	29	32	32	40	34	38	37	41	42	34	32	31
Oct28	34	33	35	35	36	38	41	35	28	21	20	25	28	32	33	38	36	43	40	39	42	34	30	31	34
Oct29	32	35	39	24	26	29	28	29	23	18	13	21	27	30	30	35	33	35	33	36	40	40	38	38	30
Oct30	37	37	37	36	34	37	41	41	30	23	24	25	24	27	34	42	39	34	39	42	46	37	37	37	35
Oct31	38	38	37	39	40	38	43	42	35	27	29	34	35	36	35	34	36	38	41	39	40	40	40	39	37

Table 8.11. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20800.0, Unit: nT																									
Nov01	192	192	194	197	196	197	198	192	179	172	166	162	162	157	147	167	180	189	198	200	198	200	199	201	185
Nov02	202	210	193	189	193	194	193	191	191	189	189	194	175	150	156	170	176	177	182	194	196	191	182	212	187
Nov03	187	189	199	204	201	200	191	184	171	150	158	159	169	171	167	166	171	166	166	173	180	186	200	222	180
Nov04	200	189	191	192	195	201	201	197	193	186	188	196	198	196	195	196	197	198	198	198	197	197	198	199	196
Nov05	200	199	200	199	201	203	202	196	192	189	191	198	203	206	205	203	203	205	205	205	205	205	205	204	201
Nov06	207	206	204	206	210	213	211	202	190	182	183	190	193	200	199	197	198	199	198	197	200	205	199	201	199
Nov07	210	206	204	206	208	211	213	212	201	188	190	192	197	204	207	205	205	206	206	207	207	206	206	206	204
Nov08	204	204	203	204	207	210	211	205	197	186	185	187	184	185	190	199	204	207	208	209	208	206	207	209	201
Nov09	205	205	207	209	212	216	...	234	227	208	197	192	192	194	196	196	204	206	206	207	216	206	205	206	...
Nov10	205	203	204	211	210	214	218	216	207	197	185	179	174	170	160	118	99	120	151	167	174	179	178	196	181
Nov11	185	189	180	184	189	190	193	195	193	190	187	193	196	201	200	202	201	191	198	196	200	197	201	215	194
Nov12	209	199	198	202	201	198	211	209	208	203	196	181	179	193	191	182	186	184	187	172	181	204	207	204	195
Nov13	204	203	209	199	200	191	201	204	195	178	176	182	173	189	188	190	182	201	197	198	224	181	184	189	193
Nov14	191	194	195	197	199	203	203	197	188	180	183	188	191	194	187	196	193	195	201	203	198	197	211	204	195
Nov15	192	194	201	202	199	199	202	198	195	191	187	189	191	184	190	199	200	203	205	205	202	202	202	202	197
Nov16	204	202	200	201	202	205	206	202	202	201	204	206	208	207	206	206	207	208	205	199	207	201	199	203	204
Nov17	204	201	203	206	206	207	207	205	204	204	205	207	208	208	206	203	200	199	197	199	201	202	202	203	204
Nov18	203	203	198	203	204	205	207	207	204	201	200	201	203	207	207	205	202	203	203	206	207	206	207	206	204
Nov19	206	206	206	206	207	208	210	214	217	218	219	218	216	213	212	213	212	208	207	207	205	206	206	210	210
Nov20	210	209	209	209	211	215	218	222	224	222	219	221	217	212	206	206	206	210	211	211	208	208	207	204	212
Nov21	203	203	205	206	206	208	215	217	213	...	219	223	219	219	217	213	209	197	186	182	186	200	200	202	...
Nov22	...	...	...	...	...	...	...	...	...	...	208	212	214	207	196	194	188	172	182	189	200	208	196	195	...
Nov23	198	211	198	206	200	201	196	190	195	194	197	198	197	196	190	186	188	186	181	193	191	198	200	199	195
Nov24	217	210	203	206	208	209	205	199	196	189	187	172	169	144	136	154	158	171	158	179	184	182	185	182	183
Nov25	206	195	191	180	187	175	175	191	191	184	183	183	148	184	175	166	162	166	173	191	185	183	190	195	182
Nov26	193	188	186	194	194	195	197	196	194	188	191	194	195	201	201	185	183	177	176	184	196	200	195	195	192
Nov27	195	195	194	201	201	202	201	200	203	201	195	200	196	190	191	186	188	190	203	195	194	197	197	210	197
Nov28	198	197	197	200	201	204	208	209	202	201	204	203	199	204	201	200	193	191	195	196	200	198	198	205	200
Nov29	199	198	199	200	201	202	206	212	212	209	205	202	200	198	200	200	202	201	200	198	199	209	208	201	203
Nov30	198	198	199	201	205	208	212	212	210	204	207	208	206	205	202	201	199	199	199	201	200	202	205	205	204
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Nov01	72	65	63	68	69	71	81	89	90	79	60	58	55	63	69	65	71	69	69	71	73	73	80	79	71
Nov02	91	63	75	75	73	73	77	80	78	68	63	51	50	59	62	51	63	65	70	72	73	81	93	76	70
Nov03	95	81	74	74	70	69	69	71	72	72	63	61	58	65	79	67	71	73	78	80	90	90	92	85	75
Nov04	91	80	76	70	70	69	67	72	80	83	71	60	59	64	68	66	67	69	70	71	73	73	73	71	71

Table 8.11 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Nov05	72	70	69	69	67	67	71	79	81	75	66	62	59	63	67	67	66	68	69	70	71	72	71	70	69
Nov06	71	71	69	67	68	69	75	83	84	75	68	56	54	58	62	65	67	69	71	75	81	85	76	75	70
Nov07	71	69	67	67	68	68	72	79	82	77	65	55	52	56	61	64	67	68	69	70	71	71	72	73	68
Nov08	72	72	70	69	68	69	72	79	81	69	56	47	46	46	52	63	68	69	70	71	71	74	73	75	67
Nov09	71	69	69	68	67	67	...	72	76	75	68	55	44	46	52	59	62	64	66	83	97	83	75	73	...
Nov10	74	72	68	66	67	68	67	76	79	73	54	51	44	37	45	29	50	79	87	86	98	91	94	99	69
Nov11	94	79	67	69	70	72	73	75	76	69	64	56	54	61	64	61	60	63	66	72	73	76	81	93	70
Nov12	86	89	75	74	76	78	74	77	76	70	57	56	64	62	62	72	63	84	88	86	90	80	81	92	76
Nov13	73	67	71	77	76	74	75	80	82	78	63	55	61	61	68	72	77	75	70	98	122	106	83	73	77
Nov14	69	70	67	68	69	72	76	81	81	78	68	58	54	55	71	63	72	67	75	75	76	80	81	86	71
Nov15	84	73	70	73	74	75	78	81	82	75	65	60	55	63	67	67	67	71	73	75	76	76	77	76	72
Nov16	76	75	72	73	71	72	73	78	76	68	59	56	56	61	64	66	68	70	69	78	83	77	79	77	71
Nov17	81	76	70	70	71	72	73	79	80	77	71	65	61	63	65	65	64	67	69	75	75	76	76	75	72
Nov18	77	80	77	74	71	72	73	75	74	71	65	58	57	61	65	65	72	73	68	71	73	75	76	76	71
Nov19	74	73	72	71	70	70	70	72	72	69	63	58	57	60	61	61	64	66	70	71	73	77	75	73	68
Nov20	71	70	70	69	68	68	69	70	68	63	57	53	57	60	63	63	67	69	69	70	72	76	82	79	68
Nov21	75	71	70	70	70	72	72	70	68	...	58	56	58	59	64	65	65	67	70	73	82	94	79	72	...
Nov22	...	...	...	...	...	...	...	...	...	...	59	54	54	59	62	63	64	88	78	76	78	121	81	78	...
Nov23	87	85	70	68	75	71	71	72	73	66	59	59	62	66	66	68	70	72	77	99	84	79	76	79	73
Nov24	81	80	89	82	75	75	71	78	74	61	64	67	60	71	94	66	86	81	114	89	90	126	106	103	83
Nov25	87	90	81	74	76	45	39	75	71	79	80	68	74	69	74	84	110	106	82	116	103	88	81	73	80
Nov26	77	68	66	67	73	71	69	77	76	79	74	67	65	66	69	76	96	91	95	86	84	83	82	77	76
Nov27	72	68	68	63	63	70	75	76	75	71	67	59	63	72	73	71	76	80	88	83	82	84	80	71	73
Nov28	78	70	68	68	69	71	73	75	74	68	61	58	66	68	70	71	78	94	79	78	91	87	79	79	74
Nov29	75	74	73	72	74	75	75	75	78	76	68	65	65	62	66	70	73	75	77	83	82	82	82	78	74
Nov30	76	73	73	71	72	70	71	75	74	72	68	65	65	67	70	70	70	74	73	76	76	75	74	72	72
2016, Field component: Z, Base: 43700.0, Unit: nT																									
Nov01	40	40	39	39	40	41	44	44	41	37	39	42	45	48	51	50	48	46	43	42	41	41	40	40	43
Nov02	35	32	33	36	38	39	42	41	38	30	28	35	41	48	53	51	49	49	48	45	43	43	43	36	41
Nov03	36	39	37	35	36	36	39	41	40	39	41	42	44	45	48	49	48	49	50	50	49	47	43	36	43
Nov04	36	37	37	39	39	39	41	40	31	24	22	25	29	35	37	38	39	39	40	40	39	39	39	39	36
Nov05	38	38	38	38	38	39	41	42	40	36	35	33	33	35	35	35	37	37	38	38	38	38	38	37	37
Nov06	36	36	36	36	36	37	41	43	38	34	33	32	34	36	36	36	38	38	38	39	39	38	38	37	37
Nov07	35	34	35	35	35	36	37	37	30	27	26	29	33	36	36	36	36	35	36	36	36	36	36	35	34
Nov08	35	35	35	35	35	35	36	38	32	24	24	28	35	41	41	39	37	36	36	36	36	36	36	35	35
Nov09	35	35	34	34	34	33	...	31	30	25	25	27	31	35	36	38	38	37	38	38	37	36	36	36	...

Table 8.11 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Nov10	35	35	36	35	35	35	34	34	32	26	25	28	36	43	48	57	71	76	69	62	57	54	51	44	44
Nov11	43	38	40	41	41	40	39	38	35	33	36	40	41	42	41	40	41	41	42	43	43	42	42	38	40
Nov12	36	36	38	37	36	37	36	35	33	29	30	34	38	39	41	42	44	44	45	46	46	44	38	36	38
Nov13	37	34	31	33	35	37	37	35	33	33	36	37	43	45	44	43	43	42	41	40	37	39	41	40	38
Nov14	40	39	40	39	38	38	38	40	37	36	34	32	37	42	44	43	41	43	41	40	40	40	39	36	39
Nov15	38	39	38	36	37	38	37	38	35	29	28	31	37	41	43	41	40	40	39	39	39	39	38	38	37
Nov16	37	37	38	38	38	37	37	35	29	26	26	31	35	38	38	38	38	37	37	38	37	38	38	37	36
Nov17	36	37	37	37	36	36	35	36	32	28	28	30	34	37	36	36	38	39	39	39	39	39	38	37	36
Nov18	37	36	37	37	37	36	35	34	31	27	23	26	31	34	35	36	37	38	38	37	37	37	36	36	34
Nov19	36	36	36	36	36	36	34	33	29	26	27	27	30	32	33	33	34	35	36	36	37	36	36	35	34
Nov20	34	34	34	34	34	33	31	31	28	25	21	23	27	30	32	33	34	35	35	35	35	35	35	35	32
Nov21	35	35	35	35	35	34	32	31	31	...	26	25	29	32	31	31	33	35	38	41	41	38	38	37	...
Nov22	...	...	...	...	...	...	...	...	...	...	27	25	29	33	34	36	38	40	43	41	40	34	36	36	...
Nov23	34	32	34	30	33	35	36	36	35	34	34	35	38	39	40	40	41	42	44	42	41	40	39	38	37
Nov24	35	30	32	33	34	35	36	35	33	32	33	37	43	49	60	56	52	51	50	50	45	42	41	40	41
Nov25	34	31	35	38	40	43	39	37	39	38	39	39	44	45	44	47	48	49	49	43	44	43	42	41	41
Nov26	40	40	40	39	40	41	41	40	39	37	38	38	39	39	40	41	42	44	46	45	43	41	40	39	41
Nov27	39	40	39	39	38	38	38	37	35	33	31	34	38	41	42	43	43	43	41	41	41	40	40	37	39
Nov28	37	38	38	39	39	39	38	38	35	35	35	35	37	38	38	40	39	42	41	41	40	39	39	36	38
Nov29	37	38	38	39	39	39	37	37	36	34	32	33	36	37	38	40	40	40	40	40	40	38	36	37	38
Nov30	38	38	39	39	39	38	37	37	36	34	33	34	36	37	37	38	39	39	39	39	39	38	38	38	37
2016, Field component: F, Base: 48500.0, Unit: nT																									
Nov01	39	38	39	40	40	42	45	43	35	27	26	27	30	31	29	37	41	43	44	44	43	43	42	43	38
Nov02	40	39	33	34	37	39	41	39	37	28	26	34	32	27	34	38	40	40	42	44	43	41	38	44	37
Nov03	34	37	39	40	39	39	38	36	29	20	25	26	32	34	36	36	37	35	37	40	42	44	46	49	36
Nov04	39	35	36	37	39	41	43	41	31	22	21	26	31	36	38	38	40	40	41	41	40	40	41	41	37
Nov05	40	40	40	40	41	42	44	43	39	34	34	35	37	40	40	39	41	42	42	42	42	42	42	42	40
Nov06	42	41	40	41	43	45	48	46	36	29	29	31	33	38	38	37	39	40	40	40	41	43	40	40	39
Nov07	42	40	39	40	41	43	45	45	34	25	25	28	34	39	41	40	40	41	41	42	42	41	41	41	39
Nov08	40	39	39	40	41	42	43	43	34	21	21	25	30	35	38	41	42	42	42	43	42	42	...	42	...
Nov09	40	39	40	40	42	42	44	49	45	32	27	26	30	35	36	38	42	42	42	43	47	42	41	41	39
Nov10	40	39	40	42	42	44	45	44	38	28	22	22	26	31	31	21	26	41	47	48	47	46	43	45	37
Nov11	39	36	34	36	38	38	38	38	35	31	33	38	41	44	43	43	43	39	43	43	45	43	44	48	40
Nov12	43	39	39	40	39	39	43	42	40	34	31	28	31	38	39	36	40	39	42	36	40	48	44	41	39
Nov13	42	38	38	36	38	35	40	40	34	27	28	31	33	42	41	41	37	45	42	42	52	34	36	38	38
Nov14	38	39	40	40	40	41	42	41	35	30	29	30	35	41	40	43	40	42	44	44	42	41	47	41	39

Table 8.11 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Nov15	37	39	41	40	40	40	41	40	36	29	26	29	35	36	40	42	43	43	44	43	42	42	42	41	39
Nov16	42	41	40	41	41	42	42	39	33	30	31	36	41	43	43	42	43	43	42	40	43	41	40	41	40
Nov17	40	40	41	42	42	42	41	41	36	33	33	36	40	42	41	40	41	40	40	41	42	42	41	41	40
Nov18	41	40	38	40	41	41	41	40	35	31	27	29	35	39	41	41	41	42	41	42	43	42	42	42	39
Nov19	41	41	41	41	42	42	41	42	39	37	38	38	39	40	41	41	42	41	41	42	41	42	41	43	41
Nov20	41	41	40	40	41	42	42	43	42	38	33	35	37	38	37	38	40	42	42	42	41	41	41	40	40
Nov21	39	39	40	40	40	41	41	42	39	37	37	38	40	42	41	40	40	36	34	35	38	41	41	41	39
Nov22	40	41	41	42	42	43	43	42	36	32	34	33	38	38	35	36	35	31	37	39	42	42	37	36	38
Nov23	37	40	35	36	36	38	37	34	36	34	35	36	39	39	37	36	38	38	37	42	40	41	41	40	38
Nov24	46	38	37	39	41	41	40	37	34	30	30	28	31	26	33	36	36	40	34	43	40	38	38	35	36
Nov25	40	33	34	32	36	33	29	36	37	34	34	34	23	40	35	34	34	37	39	43	40	38	40	41	36
Nov26	39	37	36	38	39	41	41	41	39	34	36	38	39	42	42	37	38	37	38	41	44	43	41	40	39
Nov27	39	40	39	41	41	42	41	40	39	37	32	36	38	38	40	39	40	40	45	41	41	42	41	44	40
Nov28	39	39	39	41	42	43	44	45	39	38	39	39	39	42	41	42	39	41	41	41	43	41	40	41	41
Nov29	39	39	40	41	42	42	42	45	44	41	37	37	38	38	41	42	43	43	42	42	42	45	43	40	41
Nov30	40	40	41	42	43	44	45	45	43	39	38	40	41	42	41	41	41	41	41	42	41	42	43	43	42

Table 8.12. Hourly and daily means of field components X,Y,Z and independently measured F from the Conrad Observatory. Please note: if data is missing within one hour/day, then means are not calculated.

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
2016, Field component: X, Base: 20900.0, Unit: nT																									
Dec01	108	109	111	113	115	116	116	121	120	116	112	113	111	112	111	110	110	111	111	110	110	110	110	109	112
Dec02	108	105	103	105	108	109	110	110	110	111	115	116	114	109	102	94	93	99	101	101	104	101	100	101	105
Dec03	103	104	105	106	107	107	109	112	108	103	103	105	108	112	110	108	107	105	104	110	109	109	108	108	107
Dec04	108	108	109	109	111	111	112	113	111	110	111	113	114	115	115	115	117	118	117	114	114	111	109	107	112
Dec05	109	113	112	113	110	111	109	107	102	99	101	108	114	117	117	115	113	...	108	109	109	108	106	106	...
Dec06	108	108	109	112	115	117	119	122	120	116	116	114	95	72	83	96	107	106	101	98	97	106	99	99	106
Dec07	100	101	102	106	109	112	113	103	94	101	100	102	105	105	103	93	82	72	94	92	88	90	87	89	98
Dec08	105	115	113	110	100	111	...	107	104	102	90	90	93	96	91	53	90	87	92	89	111	112	88	97	...
Dec09	86	92	90	93	96	101	105	100	97	102	104	84	97	103	102	99	103	83	52	72	66	114	89	72	92
Dec10	82	86	96	104	92	93	96	102	98	87	99	104	90	82	82	82	97	95	99	87	83	85	89	95	92
Dec11	102	100	99	103	101	105	109	112	110	100	88	95	94	97	89	78	99	97	105	114	93	96	99	103	100
Dec12	101	98	100	98	101	105	107	109	110	109	111	111	107	104	101	103	106	106	105	102	101	101	104	105	104
Dec13	98	96	97	99	104	104	105	103	102	99	98	100	108	108	104	106	105	105	104	103	101	104	102	99	102
Dec14	100	101	102	103	103	105	104	107	109	108	107	105	107	109	110	108	110	107	104	101	103	104	102	103	105
Dec15	103	102	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dec16	...	106	106	105	107	108	110	109	105	105	110	115	115	114	112	110	110	109	107	107	107	109	108	106	...
Dec17	105	106	107	107	107	106	105	106	103	102	109	112	112	113	114	112	105	97	102	100	103	110	120	105	107
Dec18	106	103	94	101	105	112	112	107	99	99	104	107	106	97	97	104	95	94	90	93	98	99	98	104	101
Dec19	104	103	104	105	105	109	101	99	94	91	98	105	105	101	95	89	87	93	96	109	102	104	102	101	100
Dec20	99	101	104	106	107	109	108	101	95	93	96	105	106	105	103	91	84	88	104	106	106	103	108	97	101
Dec21	103	98	98	104	110	115	113	110	106	106	96	93	90	88	66	38	17	50	78	60	70	90	75	80	86
Dec22	77	78	107	91	94	93	89	88	75	75	71	82	82	84	83	72	71	79	79	87	70	81	94	89	83
Dec23	85	90	93	88	80	91	96	99	83	74	65	70	78	82	86	79	82	75	90	78	81	86	82	86	83
Dec24	91	92	94	88	94	97	97	96	90	90	92	96	99	84	95	92	91	100	84	90	97	102	98	93	94
Dec25	95	101	114	105	104	108	107	107	105	94	86	73	77	83	71	82	85	74	92	86	97	103	97	90	93
Dec26	88	97	95	100	101	102	96	97	97	94	90	84	88	90	81	79	78	94	97	91	91	97	108	108	93
Dec27	85	98	93	89	89	93	97	101	100	94	92	97	98	94	98	94	98	97	100	104	94	95	90	99	95
Dec28	97	95	95	96	100	106	106	106	101	99	96	96	100	101	100	98	95	93	99	98	101	104	104	102	100
Dec29	101	102	109	105	104	107	108	111	110	103	98	101	98	94	87	82	76	80	91	98	99	99	98	99	98
Dec30	100	102	104	102	104	106	107	112	115	112	111	111	112	108	105	107	105	101	96	95	98	98	100	105	105
Dec31	104	104	106	109	111	114	121	124	120	110	106	98	...	80	80	64	71	71	67	73	69	87	95	92	...
2016, Field component: Y, Base: 1400.0, Unit: nT																									
Dec01	72	70	68	69	69	68	71	72	75	74	69	67	66	67	69	70	70	71	72	73	74	74	73	73	71
Dec02	73	72	71	71	71	71	70	68	71	71	71	69	68	68	69	69	69	69	72	74	83	79	78	77	72
Dec03	74	74	73	72	72	73	74	73	72	69	66	62	60	64	68	70	70	71	75	79	75	75	74	73	71

Table 8.12 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Dec04	72	71	71	71	73	74	74	73	71	67	64	62	64	67	69	69	70	71	71	71	73	73	74	73	70
Dec05	67	68	74	70	72	72	72	72	68	64	62	61	61	64	66	68	68	...	73	75	76	76	76	74	...
Dec06	74	73	70	71	71	72	72	73	70	65	61	52	61	49	62	73	74	75	75	76	85	86	88	80	71
Dec07	77	74	72	70	70	71	74	75	72	62	60	58	63	67	65	68	63	67	73	96	85	82	89	82	72
Dec08	87	78	87	81	68	68	...	74	71	65	70	66	57	67	67	81	71	75	88	83	84	77	93	72	...
Dec09	69	69	75	77	77	75	78	76	68	67	55	59	63	60	63	68	67	62	93	116	85	85	112	97	76
Dec10	84	81	72	80	80	79	77	74	73	68	64	64	65	73	77	75	90	81	87	93	97	85	83	79	78
Dec11	65	73	76	78	60	69	77	74	77	73	72	64	68	68	68	71	84	73	87	83	76	80	80	82	74
Dec12	87	81	77	71	71	72	71	71	72	71	71	69	70	72	73	73	74	74	74	77	78	81	83	78	75
Dec13	77	76	78	76	76	77	77	75	73	70	68	66	66	69	73	72	74	75	76	76	79	85	78	80	75
Dec14	77	74	75	75	74	76	76	75	73	71	69	72	74	74	73	73	73	73	76	79	77	77	78	78	75
Dec15	77	76	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dec16	...	75	73	74	72	74	75	76	74	69	66	67	72	74	74	73	73	73	75	75	76	81	76	76	...
Dec17	76	74	73	73	75	75	75	72	69	66	64	64	66	68	71	68	67	72	80	77	80	84	79	84	73
Dec18	86	89	81	83	80	80	80	78	77	75	69	66	65	72	79	75	73	75	79	87	80	81	81	82	78
Dec19	79	77	75	77	74	78	77	76	73	67	62	63	65	69	69	68	71	78	81	85	81	79	78	76	74
Dec20	76	73	75	75	74	77	79	82	80	71	63	62	65	73	74	76	76	78	78	77	77	78	97	91	76
Dec21	78	79	73	72	71	71	73	76	78	68	62	67	72	78	84	96	165	82	83	103	116	94	102	102	85
Dec22	87	88	68	72	76	68	72	72	77	71	73	72	70	85	89	89	96	84	127	106	102	98	93	83	84
Dec23	73	69	72	75	72	80	75	81	83	74	81	70	82	93	75	75	103	93	104	105	123	99	91	82	85
Dec24	70	73	72	76	78	78	79	81	83	76	69	71	72	90	86	74	79	107	93	85	90	86	83	76	80
Dec25	74	73	64	83	76	74	75	77	74	71	69	68	84	71	93	80	110	94	91	83	86	90	95	95	81
Dec26	84	65	65	68	69	73	77	80	82	80	74	68	68	79	83	102	87	80	85	82	85	98	92	99	80
Dec27	86	74	73	75	79	79	81	84	86	82	77	73	74	84	83	80	79	82	87	88	85	91	91	77	81
Dec28	78	77	77	76	75	77	76	77	80	76	70	70	69	70	74	79	82	84	80	81	82	83	81	80	77
Dec29	79	76	74	76	77	76	77	81	83	82	79	76	77	76	79	82	77	78	82	80	81	82	82	81	79
Dec30	79	76	75	72	72	72	76	79	80	81	77	74	73	73	76	77	76	77	80	81	82	83	83	85	77
Dec31	81	76	74	73	70	71	73	74	75	74	71	69	...	63	72	80	83	80	93	109	104	102	95	86	...
2016, Field component: Z, Base: 43700.0, Unit: nT																									
Dec01	37	37	36	36	36	36	35	35	36	35	34	31	31	31	33	35	36	36	36	36	36	36	36	36	35
Dec02	36	36	37	37	37	37	35	35	32	31	29	31	33	34	35	38	39	39	39	39	38	39	38	37	36
Dec03	37	37	37	37	37	37	35	33	33	33	31	31	32	33	35	36	36	37	37	37	37	36	36	36	35
Dec04	35	35	35	36	36	36	34	33	31	32	33	35	35	35	34	35	35	35	35	35	34	34	34	35	34
Dec05	35	33	34	34	35	35	34	34	35	34	34	35	37	37	35	35	35	36	37	36	36	36	36	36	35
Dec06	35	35	34	34	34	33	31	30	29	26	28	32	36	45	43	41	39	38	38	38	38	37	36	37	35
Dec07	37	37	37	37	37	36	36	36	35	35	36	39	39	39	38	38	41	44	44	43	45	43	43	42	39

Table 8.12 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Dec08	38	34	33	33	35	34	...	35	33	34	37	39	39	39	42	45	45	44	44	44	42	33	36	36	...
Dec09	37	36	38	39	39	38	37	39	39	38	38	41	44	42	40	39	41	43	50	52	51	44	37	43	41
Dec10	43	44	41	36	38	39	38	39	38	39	43	45	46	46	45	46	44	44	43	43	45	44	44	42	42
Dec11	39	37	38	38	39	36	35	36	37	39	43	43	43	42	43	45	44	43	41	40	41	41	41	39	40
Dec12	38	39	39	40	39	39	37	36	35	35	34	32	33	36	38	39	39	39	39	39	39	39	39	38	38
Dec13	38	39	39	39	39	39	38	37	37	39	39	38	38	37	38	39	39	39	39	39	39	38	39	39	38
Dec14	39	38	39	39	39	39	38	39	40	40	40	40	42	43	41	40	39	39	39	40	40	39	39	38	39
Dec15	38	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dec16	...	37	38	38	39	38	39	39	39	40	40	40	37	35	35	36	37	38	38	38	38	38	38	38	...
Dec17	38	37	37	37	37	38	38	37	38	38	36	35	36	36	34	35	37	39	39	41	40	38	34	35	37
Dec18	35	34	37	37	39	37	38	39	39	38	37	38	38	39	40	40	40	41	42	43	42	41	41	40	39
Dec19	39	38	38	38	39	39	39	39	38	37	40	43	43	42	41	42	43	43	43	41	41	40	40	39	40
Dec20	39	39	39	39	39	39	39	39	35	35	35	39	41	42	41	42	43	44	42	41	40	40	38	39	40
Dec21	37	38	39	39	39	38	39	38	36	34	34	39	43	45	47	55	63	63	54	53	52	45	44	43	44
Dec22	44	43	40	36	40	42	43	41	38	39	41	44	46	48	49	49	50	49	47	49	47	46	43	42	44
Dec23	43	42	41	41	43	43	44	44	43	46	47	53	52	51	51	49	49	50	48	46	45	43	43	44	46
Dec24	43	42	41	42	43	43	43	41	40	41	42	44	46	46	47	46	46	45	47	47	45	44	43	43	44
Dec25	43	42	40	37	40	40	40	39	38	39	43	47	51	52	51	52	50	51	50	49	47	44	43	43	45
Dec26	44	42	38	39	41	40	41	41	...	38	36	37	43	46	48	51	50	49	47	47	47	45	43	38	...
Dec27	42	40	41	42	43	44	43	43	43	42	42	43	44	46	47	47	46	45	44	44	44	43	43	43	43
Dec28	42	43	43	44	43	43	42	41	41	39	38	39	43	44	45	45	45	45	45	44	44	43	42	42	43
Dec29	42	42	40	40	41	41	41	41	40	39	40	40	41	44	46	48	49	49	47	46	45	44	44	44	43
Dec30	43	43	42	42	42	42	41	40	39	38	36	35	37	38	40	42	42	42	43	44	43	43	42	41	41
Dec31	41	41	41	41	41	40	39	38	37	36	37	37	39	45	48	50	52	51	53	54	54	51	48	46	44
2016, Field component: F, Base: 48500.0, Unit: nT																									
Dec01	43	43	44	44	45	45	44	47	47	45	42	40	39	40	41	42	43	43	43	43	43	43	43	43	43
Dec02	42	41	41	41	43	43	42	41	40	39	39	41	42	40	39	37	38	41	42	42	43	42	41	40	41
Dec03	41	41	42	42	43	43	42	41	39	37	35	36	38	41	42	42	42	41	41	44	43	42	42	42	41
Dec04	41	42	42	42	43	43	42	42	39	39	41	43	44	44	43	44	45	46	45	43	43	42	41	40	42
Dec05	41	42	42	43	42	42	41	40	39	36	37	40	46	47	45	44	43	41	42	43	43	42	41	41	42
Dec06	41	41	41	42	43	44	43	43	41	37	38	40	36	34	37	41	45	43	41	40	40	42	39	39	40
Dec07	39	40	41	42	43	44	44	40	35	38	39	42	43	43	41	37	35	34	43	43	42	41	40	40	40
Dec08	43	44	42	41	37	42	39	41	38	38	35	37	38	40	40	27	43	41	43	41	50	41	34	37	40
Dec09	34	35	37	39	40	41	42	41	40	41	42	36	44	45	43	41	44	38	31	42	38	52	37	34	40
Dec10	38	39	41	40	38	38	39	42	40	36	45	49	43	40	39	40	45	44	45	40	40	40	41	42	41
Dec11	42	40	40	42	42	41	42	44	44	42	39	43	42	43	40	37	46	43	46	48	40	42	43	43	42

Table 8.12 (cont'd)

day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	mean
Dec12	42	41	42	41	42	44	43	43	42	42	41	39	39	41	41	43	44	44	44	43	42	43	44	43	42
Dec13	40	39	40	42	43	43	43	41	41	41	41	40	44	43	42	44	44	44	43	42	42	43	42	41	42
Dec14	41	42	42	42	42	43	43	44	46	45	45	44	47	49	47	46	46	45	43	43	43	43	42	42	44
Dec15	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Dec16	44	43	43	43	44	44	45	45	44	44	47	49	46	44	43	44	44	44	44	44	44	44	44	43	44
Dec17	42	43	43	43	43	43	43	42	41	41	43	43	44	45	43	42	41	40	43	43	44	46	46	40	43
Dec18	41	39	37	41	43	45	46	44	41	40	41	44	43	40	41	44	40	41	40	42	44	43	43	44	42
Dec19	44	43	43	43	44	45	42	41	38	36	41	46	47	44	41	39	39	42	44	48	44	44	43	42	43
Dec20	41	42	43	44	45	46	45	42	36	34	36	43	45	47	45	40	38	41	46	46	45	44	44	41	42
Dec21	41	40	41	43	46	47	47	45	42	39	35	38	41	42	34	30	30	42	45	37	42	44	37	37	40
Dec22	36	36	45	35	40	41	40	38	30	31	30	39	40	43	44	39	39	42	41	46	37	41	43	39	39
Dec23	39	40	40	38	36	41	44	46	38	36	34	41	44	46	46	41	44	41	46	40	40	40	38	40	41
Dec24	41	41	41	39	42	44	44	42	39	39	40	44	48	41	47	44	44	48	43	45	46	47	44	43	43
Dec25	43	45	48	42	44	46	45	45	42	39	39	37	43	45	41	45	46	42	48	44	47	48	45	42	44
Dec26	41	43	39	41	43	43	42	42	41	38	35	33	39	44	42	44	42	48	48	45	45	47	49	45	42
Dec27	38	41	40	40	41	43	44	46	45	42	41	44	45	45	49	46	47	46	47	48	44	43	42	45	44
Dec28	43	43	43	44	46	47	47	46	44	41	39	39	45	47	47	46	45	44	46	46	46	47	46	45	45
Dec29	45	45	46	45	45	46	47	48	47	43	41	43	43	43	42	42	40	42	45	47	47	46	45	45	45
Dec30	45	46	46	45	46	47	46	48	49	46	43	42	45	44	44	48	47	45	43	44	45	45	45	46	45
Dec31	45	45	46	47	48	48	51	51	48	43	42	39	40	38	41	36	41	40	40	44	43	48	48	44	44

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