ZAMG

Conrad Observatory Magnetic Results 2019

GMO Bulletin 6

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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 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, 4 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 primary instruments used in determination of 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. A three-dimensional Merritt coil system with an axis length of 3 m for sensor calibration tests complements the portfolio.

Table 2.1. Operational instruments in 2019 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	2012-09
GP20S3EWS1	Potassium	111201									2015-07
GP20S3EWS2	Potassium	111201									2015-07
GP20S3EWS3	Potassium	111201									2015-07
GP20S3	Potassium	111201									2015-07
GP20S3NSS1	Potassium	012201									2015-07
GP20S3NSS2	Potassium	012201									2015-07
GP20S3NSS3	Potassium	012201									2015-07
GP20S3	Potassium	012201									2015-07
GP20S3VS1	Potassium	911005									2015-07
GP20S3VS2	Potassium	911005									2015-07
GP20S3VS3	Potassium	911005									2015-07
GP20S3	Potassium	911005									2015-07
GSM90	Overhauzer	14245	100000nT			$22pT/\sqrt{Hz}$	0.2nT		10 pT		2014-12
GSM90	Overhauzer	31968									2015-04
GSM90	Overhauzer	6107631									
LEMI025	Fluxgate	22	3000nT	<10ms	3.5Hz	$<10pT/\sqrt{Hz}$		<30min of arc	1 pT	HEZ	2015-08
LEMI025	Fluxgate	22	3000nT	<10ms	3.5Hz	$<10pT/\sqrt{Hz}$		<30min of arc	1 pT	HEZ	2017-12
LEMI036	Fluxgate	1	4000nT	<10ms	3.5Hz	$<10pT/\sqrt{Hz}$		<30min of arc	1 pT	HEZ	2015-12
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.

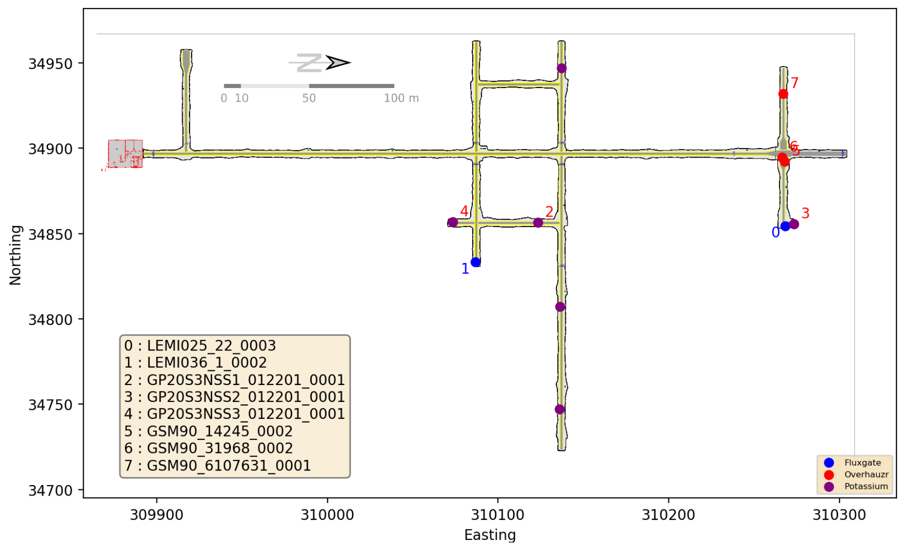

Figure 2.1 Location map of the Conrad Observatory with instrumentation

Chapter 3

Methods

3.1 Acquisition and data transmission

Variations in directional components of the Earth's magnetic field at the Conrad Observatory in 2019 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 one-second INTERMAGNET minimum requirements. The LEMI036 vector magnetometer samples the magnetic field and its data is digitally filtered to None. One-second and one-minute values are produced using the standard INTERMAGNET Gaussian filter [*St-Louis*, 2012]. A scalar magnetometer, which samples the field at , 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 using MQTT (Message Queuing Telemetry Transport). 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 near realtime. Adjusted 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 0.9.4 is available at https://github.com/geomagpy/magpy.

Table 3.1. Fluxgate theodolites used at pier A2 and their serial numbers

Theodolite (SN)	Fluxgate (SN)	Amount
T010B 160391 072018	MAG01H 504-0911H 032016	118
T010A 811643 042012	DTU DI0146 042012	19
T10B 154167 032019	MAG01H 378-0619H 032016	13
T010B 160391 072018	MAG01H 562-1024H 032016	8

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 0.35 nT per year for 2019), 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 T010B 160391 07-2018 equipped with a MAG01H 504-0911H 03-2016 fluxgate magnetometer. In addition, we also perform frequent measurements with other fluxgate theodolites as listed in table 3.1. Most 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. The primary, permanently recording F instrument, located on pier AS-O-40, is 100 m distant from the main absolute pier A2 and shows a total constant F difference of -1.57 nT. Magnetic field differences between all absolute piers are regularly measured by an additional scalar magnetometer, which is moved every week on another of the 16 piers. 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: 0.38 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 [*Lauridsen*, 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 discussed below.

Table 3.2. Delta values for all piers with respect to A2. These delta values need to be added to data from the respective pier to correct the measurements towards A2.

Pier	Distance to A2 [m]	δF [nT]	Epoch (F)	δD [ArcSec]	δI [ArcSec]	Epoch (Dir)
A1	1.75	-0.18	2019			
A10	4.38	-0.41	2019	-26.244	-0.684	2016
A11	7.38	-0.41	2019			
A12	7.47	-0.31	2019			
A13	2.38	-0.05	2019			
A14	2.65	0.41	2018			
A15	5.56	0.47	2019			
A16	5.73	0.83	2019	183.888	-10.944	2019
A3	2.20	-0.06	2019			
A4	3.96	0.87	2019	-2.952	-8.892	2019
A5	2.41	-0.29	2019	-12.888	0.000	2019
A6	1.75	-0.66	2019			
A7	2.69	-0.09	2019	0.000	-5.616	2019
A8	4.39	0.70	2019	33.912	0.000	2017
A9	4.22	-1.05	2019			
H1	353.89	1.08	2018	0.000	0.000	2019

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: adjusted data, quasi-definitive data and definitive data. Adjusted data sets are produced and published completely automatically every 5 minutes. The following analysis steps are routinely performed every 5 minute cycle:

1. Filter incoming MQTT data streams from all instruments to one-second IAGA/INTERMAGNET recommended products.
2. Check availability of data and define primary instruments according to a priority list.
3. An automatic outlier detection tool (MagPy) is checking and flagging the one-second data product.
4. Get primary one-second variometer data, apply the flags, apply compensation fields, eventually transform towards HEZ.
5. Read all existing basevalues and calculate a constant baseline approximation using the geometric mean of the last three months.
6. Perform baseline correction with adopted constant baseline.
7. Get one-second scalar data, apply flags, apply latest pier offset.
8. Merge variation data and scalar data.
9. Store distribution formats (ImagCDF, IAGA-2000) and submit data to Edinburgh GIN.
10. Filter final data set to one-minute and repeat storage and submission.
11. Special analysis: k-value determination, storm detection, gradient analysis, web page plots.

As the baseline is very stable at the Conrad Observatory, the constant baseline approach is a fast and reasonable approximation of the definitive values (Figure 4.1. The automated outlier identification method uses relatively weak criteria. Therefore some outliers and artificial disturbances are still present in this data set.

Quasi-definitive data sets are produced in a semi-automatic routine. Once a week an automated job checks for current flagging information for the primary systems within the database. Whenever an observer has finished the flagging procedure by inspecting the data of the primary instruments for a certain time range, these dates are updated within the database. The QD job now extractes all yet unanalyzed data prior to the last inspected data minus one week. The additional week makes sure that basevalues are available as they are determined in a weekly period. Then basevalues are obtained and a one-year baseline is calculated using the latest baseline function parameters (see below). All other steps follow the procedure of adjusted data production.

Definitive data is produced once a year using a manual iterative process. In a first step, we review all existing flagging information for the respective year starting in December the year before until end of January, thus covering 14 month. For flagging we consider obervatory notes and many additional sensors indicating traffic, environmental changes etc. We use difference analysis and gradients of individual instruments and analyse derivatives of signals. Any additional flag is added into the flagging database. Then we analyse one year of data using a constant baseline hypothesis (see next chapter for details). Step1 definitive data is calculated and the overall delta values are examined. For step 2 we eventually add any additional flagging information. The baseline is now calculated using optimal functional parameters. Step 2 data is used to obtain and analyze pier differences. In the final step 3 we finally consider all pier differences and produce the final result. All analyses steps are perfomed on high-resolution data, usually with one-second intervals, for all sensors and combinations. One-minute definitive data is a filtered product of these results. Please note that for one-seond data we do not fill gaps with data from other sensors as they might have different frequency characteristics. All final dissemniation products (IAF, ImagCDF, IAGA-2000) are obtained from the final step 3 results .Further 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 within 5 min on the ZAMG data distribution server and on the INTERMAGNET's website (www.intermagnet.org). Quasi-definitive data are produced following the methods described above and are usually provided within three weeks 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 INTERMAGNET's website or from the website of the Conrad Observatory, Zentralanstalt fuer Meteorologie und Geodynamik (http://www.conrad-observatory.at). After a final cross-check by specialists from other institutions participating in INTERMAGNET, definitive data are published on a DVD/USB medium together with the definitive data from the whole INTERMAGNET network.

Earth observation data from the Conrad Observatory are licensed under CC Attribution (CC-

BY-NC-4.0). Publications making use of the data should include an acknowledgement 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. 156 absolute measurements by the WIC observers on pier A2 were considered for the analysis of 2019 (each one represented by a gray point). On average, DI measurements were performed with a period of 7 days. In a first run, a constant baseline approximation based on a median value of all basevalues is used. This approach is depicted by the blue line in Figure 4.1. Making use of this approximation and calculating the difference between this baseline corrected directional data and a independently recording F value will result in a delta F value as shown in the blue curce in the lower plot of Figure 4.1. The here observed variation gives an indication about the actual complexity of the baseline. An optimal baseline was determined using MagPy's fitting function with a spline fit (knot parameter = 0.3, which is the normalized distance between spline knots) as shown by the red line in Figure 4.1. A more complex fitting function (e.g. magneta curve) does not improve the delta F value. 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 0.31 nT for H, 0.15 nT for Z and 5.6 arcsec for D, which are well within INTERMAGNET requirements. Calculated baseline curves have a maximum amplitude of 0.65 nT in the X and Z components, and 7.7 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 2019. The resulting δF (see section 4.2) and and variometer differences after baseline correction are virtually zero.

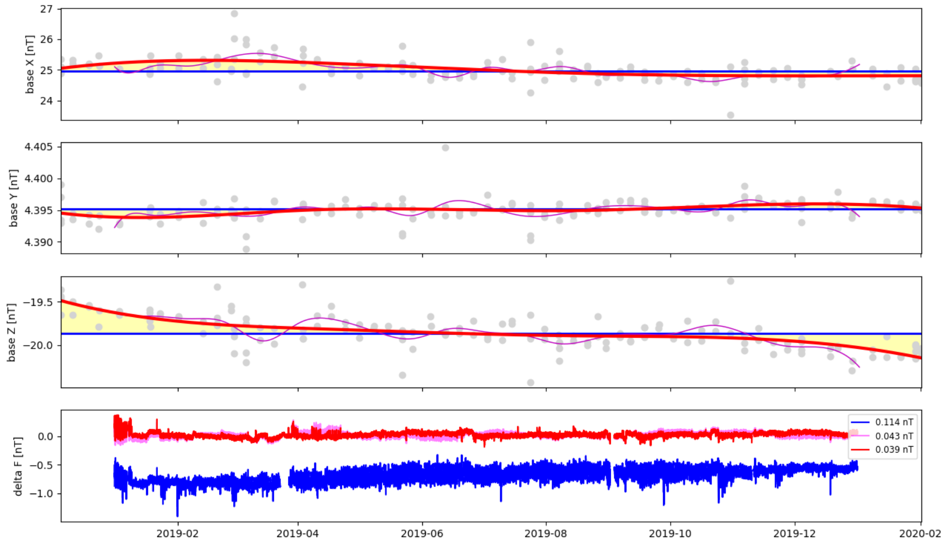

Figure 4.1 Basevalues for the primary vectorial system LEMI036 and iterative choice of optimal baseline. The first analysis step makes use of a constant baseline approximation (blue line). The resulting delta F values between baseline-corrected variometer and permanently recording F are depicted in the lower plot (also in blue) and show a considerable trend. According to this remaining trend a cubic spline fit (red) is choosen leading to a signifcantly improved delta F close to zero and characterized by a very low variance. Fiting small scale variations of basevalues (magenta) will not improve the delta F value. Actually the variance is getting larger again as expressed by the overall standard deviations given in the legend of the delta F plot. The red curve is therefore choosen as optimal baseline for definitive data.

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 standard deviation of the residuals as a measure of quality. The obtained standard deviations are 0.35 nT for H, 0.17 nT for Z and 8.2 arcsec for D. A maximum amplitude of 2.06 nT in the X and Z components, and 9.5 arcsec in the declination is obtained. In 2019 DI measurements have been performed on six piers, A2, A4, A5, A7, A16, and H1. Beside the main pier A2, where most manual measurements were done, we do monthly manual determinations on piers A7, H1 and non-periodical measurements on A4, A5. Automatic AutoDIF measurements on pier A16 are performed every hour and are available until June. Figure 4.2 shows the average daily basevalues of all piers analysed for the main variometer. All basevalues are almost identical and exhibit a very similar almost linear trend which underlines the high quality and stability of the chosen adopted baseline shown as red line in Figure 4.2. Please note that for this plot the piers delta values as given in table 3.2 have been taken into account. AutoDIF data is continuously available since until June 2019. The quality of these measurements is very good. After upgrading the system it will commence operations in 2019. In summary all tests support the high quality of the baseline of the Conrad Observatory.

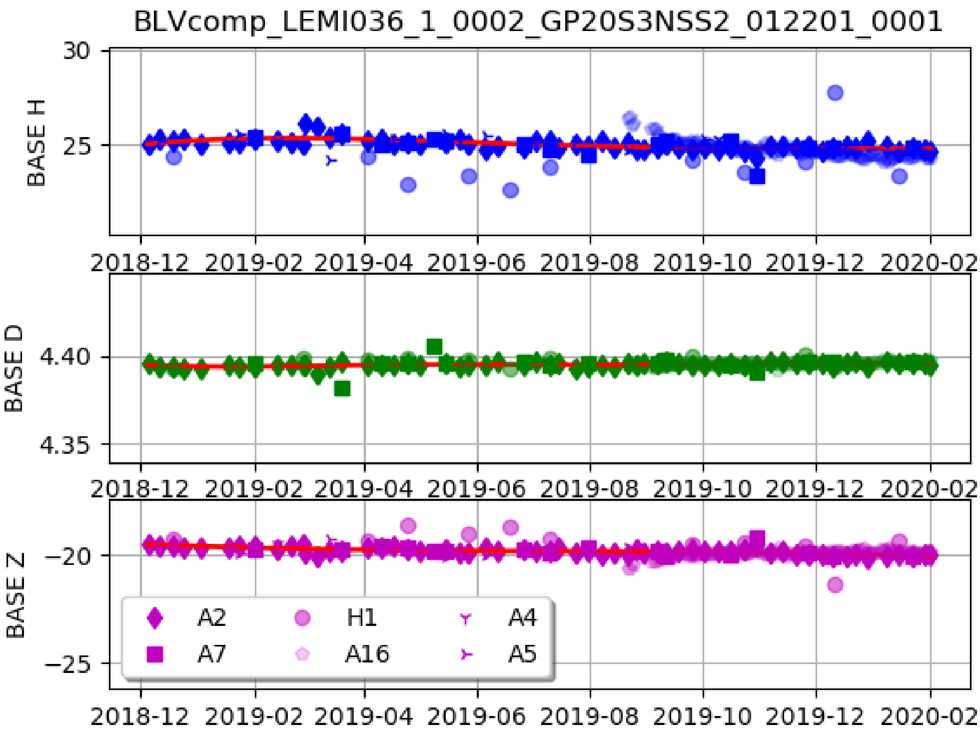

Figure 4.2 Combined plot of all basevalues for the LEMI036 variometer as determined on the piers given in the legend. Average pier differences as listed in Table 3.2 have been regarded for.

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 field strength derived from the vector measurement after drift correction with the baseline curve. As can be seen in Figure 4.3, the scalar residual of minute mean values corresponds to an average of 0.03 nT with a standard deviation of 0.04 nT. The maximum amplitude remains below 0.56 nT for the year 2019. 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 $\pm$ 0.35 nT for all components in 2019.This is well within INTERMAGNET's requirement of a 5 nT accuracy for definitive data [*St-Louis*, 2012].

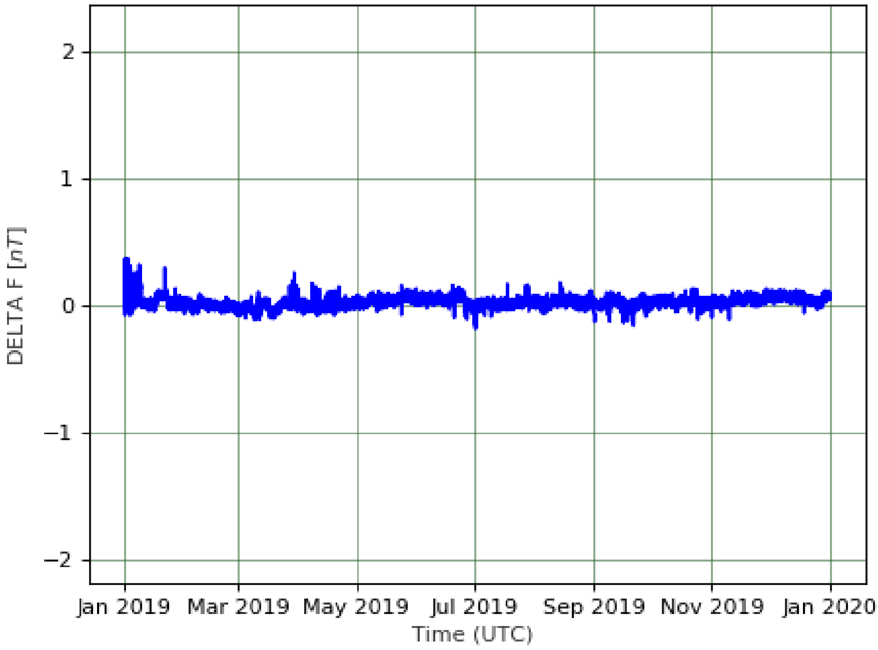

Figure 4.3 Delta F values between the scalar magnetometer and the field strength calculated from the baseline corrected vectorial data set. The scale of the figure is related to the INTERMAGNET 5 nT criteria.

4.3 Variometer differences

A third measure of quality comes from the comparison of records from different variometers 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 2019, variometer data from 2 independent systems are compared. In Figure 4.4, we depict these differences for each component and for each variometer relative to the primary variometer LEMI036. The scale of the figure is related to the INTERMAGNET 5 nT criteria, and the analysis makes use of filtered one-minute data. The average residual of the X component and its standard deviation is -0.02±0.05 nT. For the Y and Z component values of -0.00±0.06 nT and 0.01±0.06 nT are obtained. Variation data of two instruments is available for a, full records from a LEMI036 and a LEMI025. All variometers are set up in HEZ orientation. Due to secular variation, the magnetic reference system changes with time and all systems slightly deviate from "perfect" orientation of Y towards magnetic east. These angular differences are considered in basevalue determination and a detailed manuscript on significance and application is in preparation. 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 all periods; and 3) the combination of all accuracy tests

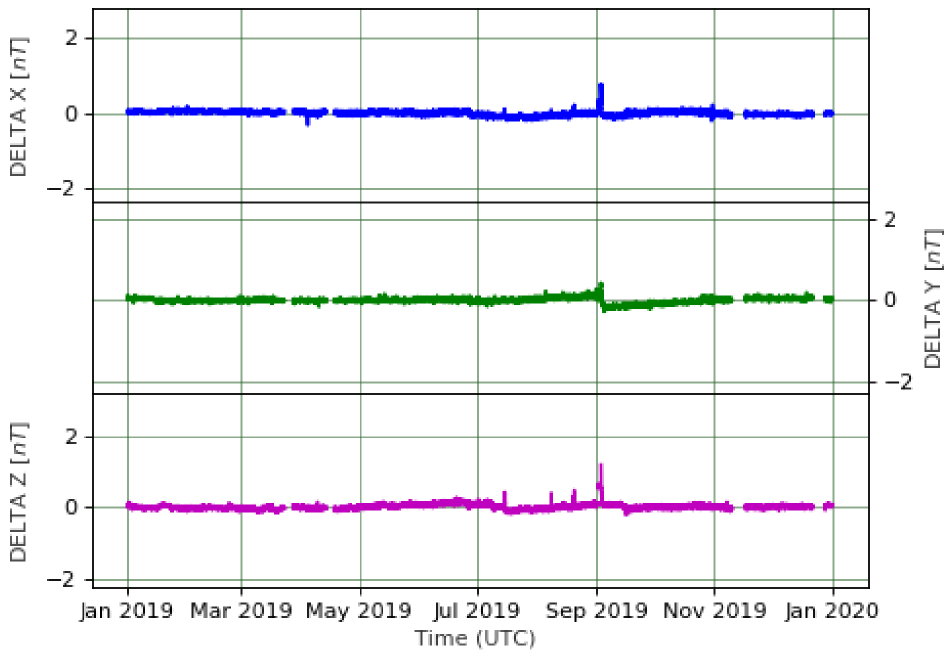

Figure 4.4 Delta values of vectorial components of baseline corrected variometer data.

underlines the very high quality of the geomagnetic field record.

4.4 Residuals between absolute DI and definitive data

Another internal quality check makes use of absolute DI measurements, by calculating the resiudal between these absolute values and the definitive data product. If all analysis steps are valid and correct, the resiudal between DI and definitive data needs to be almost zero. For difference analysis both measurements are transferred into an XYZ coordinate system and subtracted from each other. Please note, that we are using the minute resolution definitve data here, requiring some interplolation. The average residuals are -0.006 nT for X, 0.014 nT for Y and -0.008 nT for Z underlying the correctness and quality of our analysis procedure and our final data products.

4.5 Data coverage

A data coverage of 99.9 % of vectorial data in minute resolution was established for 2019. For filtering we use the recommended approach: minute means are only calculated if at least 90 % of one-second data is available within the filtering window. Therefore the relative recovery rate for one-second data is eventually higher. For scalar minute data, a data coverage of 98.8 % was obtained. One-second definitive data provided online consists solely of variation data from LEMI036 and scalar data from GP20S3NSS2 (see table 2.1). For minute data, gaps within the variation sequence were filled using secondary variometers. Gaps in the scalar one-minute record are filled by data from secondary scalar systems. For 2019 the composite minute data set consists of contributions from all instruments shown in figure 4.5. Yellow shaded regions indicates the availability of variation data, green shaded regions indicate the presence of scalar data. The lowermost plot indicates average differences between all scalar values. The basic reason for only using single 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

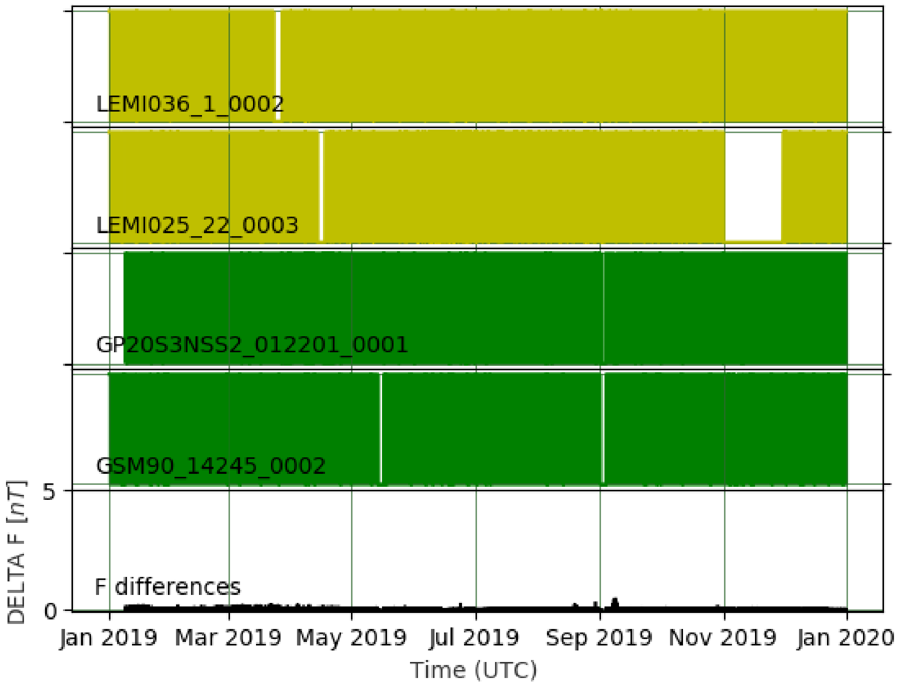

Figure 4.5 Contributions of each sensor for the analysis of 2019. Yellow shaded regions indicate time ranges of respective variometer data, green shaded regions mark scalar data which has been averaged for the composite one-minute record. The lowermost plot depicts the average difference between all scalar data.

for 2019. Minor gaps are mainly related to thunderstorms and disturbances due to wood work in the vicinity of the observatory. Thunderstorms occured frequently and produced a lot of spikes. Table 8.2 in appendix gives an overview about days with thunderstorms and an estimate of independent lightning events with magnetic signatures. The one-second data record consists solely from data of LEMI036. For minute values, the LEMI025 record was merged into LEMI036 data to fill gaps, a procedure which is abolutely valid looking at the similarity of both records after baseline correction. Scalar data was mainly recorded with three instruments in 2019. One-second data is based solely on GP20S3NS2. For minute data, gaps are filled. Minor gaps in the scalar record have the same reasons as listed above for the variometer.

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 $6.11 \pm 0.01\ ^{\circ}C$. 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 have similar characteristics. 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 increasing deviations from a perfect HEZ orientation for all variometers. The baseline correction technique of *Lauridsen* [1985], however, 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 December 2015. Since then, the east component has moved by an angle of -0.726 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. A few magnetic events are visible in 2019 (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

Adjusted and quasi-definitive (QD) data is available from December 2015 onwards, although QD datasets are regularly uploaded to the GIN in Edinburgh only since end of 2018. Since then these data sets are primarily based on LEMI036 variation data as this instrument is widely undisturbed. For 2019 both adjusted data and quasi-definitive data are wrongly calculated for almost 3 month between May and End of July. Therefore we are only discussing data outside this time range. Adjusted data show average differences of less than 0.14 nT in x, less than -0.15 nT in y, less than -0.14 nT in z and less than -0.08 nT in F. Overall, the deviations from quasi-definitive data to definitive data is slightly smaller with average differences of less than

0.04 nT in x, less than -0.25 nT in y, less than -0.12 nT in z and less than -0.08 nT in F. The differences are well within the 5 nT range for suitable quasi-definitive data for both, our adjusted and quasi-definitive data products.

5.3 Disturbances and anthropogenic signals

5.3.1 Temperature effects

Although the temperature within the tunnel is very stable and variations are very limited, once in a while maintenance work is necessary. Usually the tunnel temperature is not affected. However, electronic cabinets need to be opened, which usually contain sensor electronics, GPS equipment, and IPC's for data buffering. The temperature in the cabinets, which is slightly enhanced by up to 3 degrees due to the electronics, drops towards the tunnel temperature. By closely looking at such temperature variations it is observed that changes of the LEMI025 (and also LEMI036) electronics affect the stability of the variometer record. This is clearly expressed by comparing delta F values of the variometer with temperature variation (Figure 5.2). The variometer sensor, the F sensor and the F electronics used for delta F calculation remain at constant T. A small phase shift is observed between temperature and delta F variation of 4 minutes. By plotting normalized variations of temperature and delta F a linear dependency is observed (Figure 5.3) at ambient temperatures of about 8 degrees.

5.3.2 Frequency characteristics and noise levels

In the following we will investigate and discuss the spectral content of our data. Spectral content and signal-to-noise ratio are depened on instrument and site characteristics. Average daily spectra of definitive one-minute vector data are depicted in Figure 5.4. For periods $T < 10^4$s a typical decrease with $1/f$ can be observed for each component. Additionally, remarkable peaks are detected for the Z-component, which might correspond to a (potentially artificial) signal with a fundamental frequency (T=900s) and its first six overtones (with periods of 450, 300, 225, 180, 150 and 128.6s). The clarification of the physical origin of these features is subject of ongoing investigations.
Beside one-minute data we are also examining the frequency characteristics of one-second resolution. For this purpose, we limited our selection to identified quiet days (see section 6.2.2). The spectrum of the x component for the primary variometer-sensor LEMI036 is shown in Figure 5.6. The average noiselevel was calculated to 1.1 $p\mathrm{T}/\sqrt{Hz}$. The noiselevel of the spectral distribution is determined on the 5% shortest periods. A picewise derivation of interval maxima was done collecting a list of maxima. Finally, an 1.77 times - $\sqrt{\pi}$ - average maximum was derived from those maxima per period-interval. For 200s > T > 20s a superposition with a spectral broadband distribution is visible. Another small spectral broadband distribution is visible between ≈150s > T > 100s. Figure 5.7 shows the average quiet day spectrum of the primary F component as obtained from the GP20S3NSS2 potassium sensor. The average noiselevel was calculated to 227 $f\mathrm{T}/\sqrt{Hz}$. Spectral peaks can be seen at T = 300s, T≈75s, T=60 and T=50s. Additonally for 90s > T > 45s and 45s > T > 30s a superposition with some spectral broadband distributions are visible. A more prominent spectral broadband distribution is present between 300s > T > 2s.

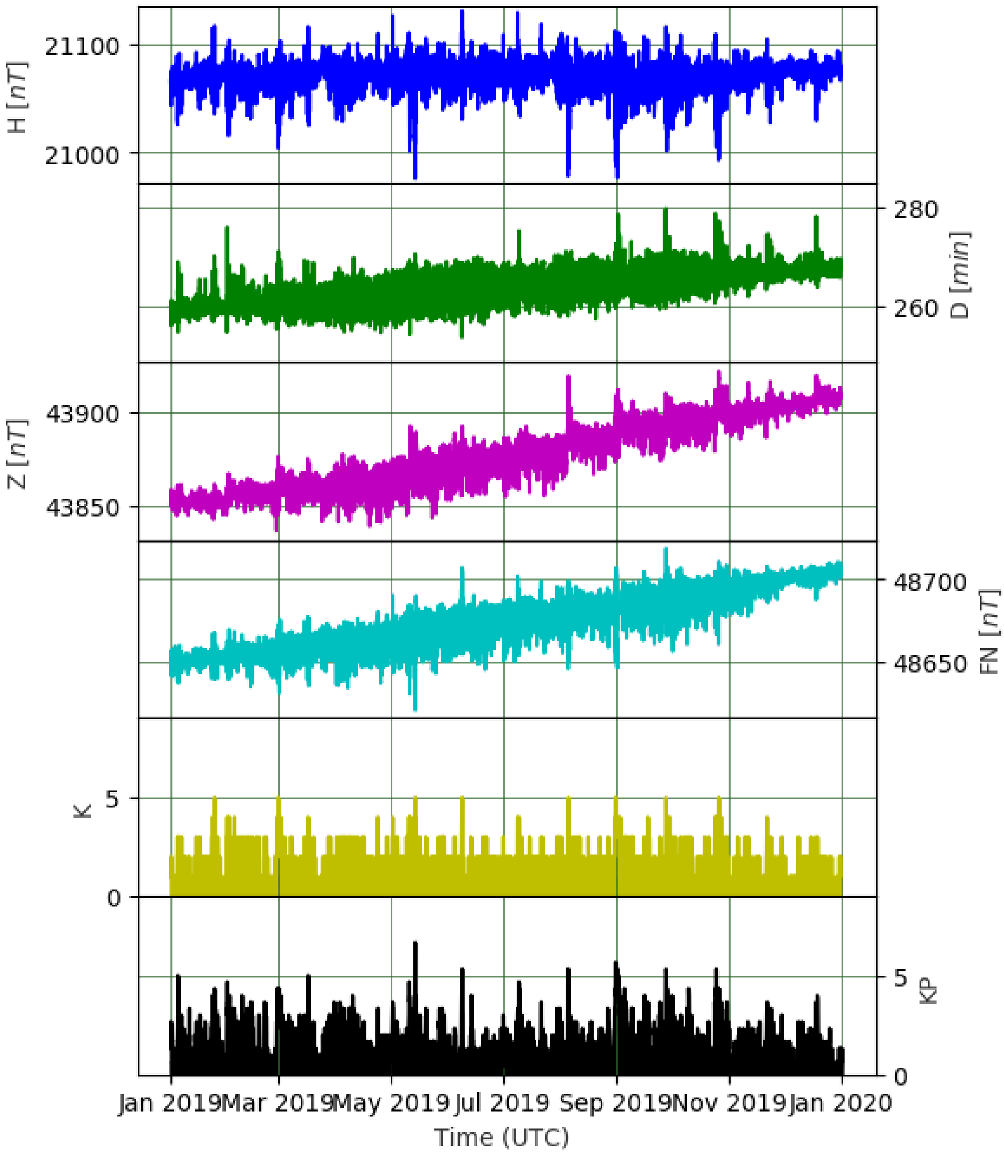

Figure 5.1 Definitive one-minute data of WIC. Shown are the three baseline corrected vectorial components, the independently determined F value and the temperature variation at the sensor position, as well as local K and global K_p indices.

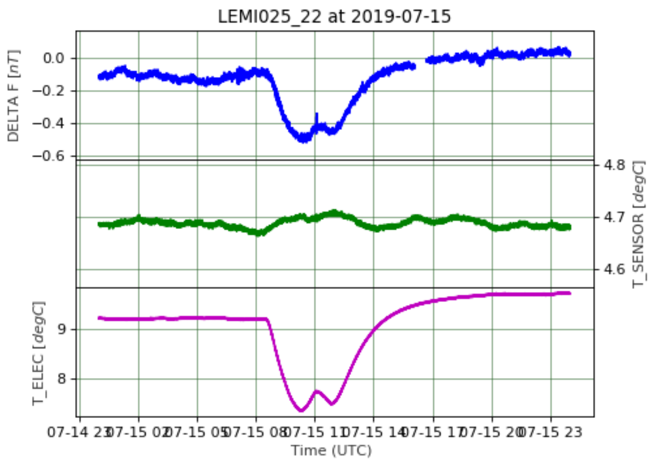

Figure 5.2 Delta F values of the definitive data from the secondary variometer LEMI025 (SN: 22) relative to the primary F sensor, as well as temperatures of the variometers sensor (Ts) and its electronics (Te) for a single day when the cabinet containing the electronics was opened. The effect on delta F is clearly visible.

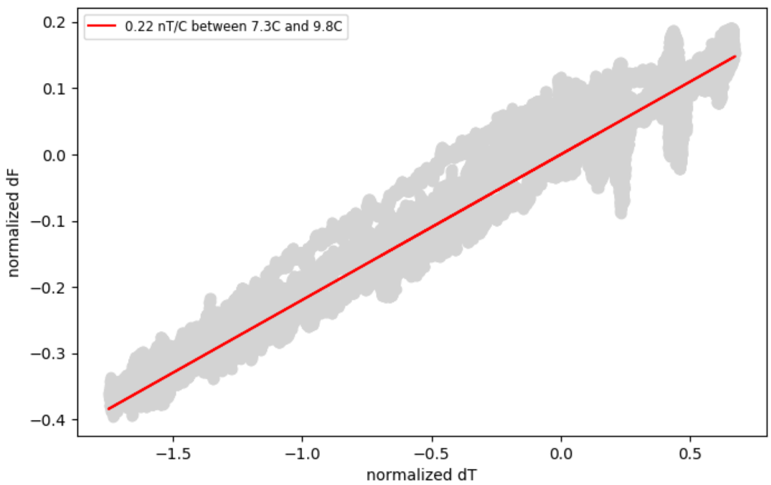

Figure 5.3 Cumulative plot of normalized temperature variations of the sensor electronics versus normalized delta F variations for altogether 5 days when the electronics cabinet was opened. Sensor temperature variations are negligble.

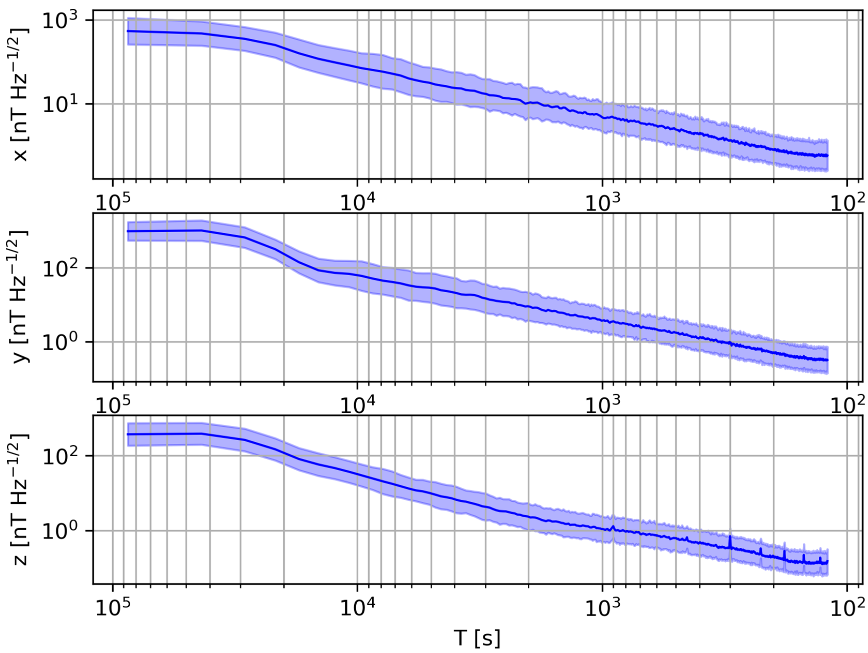

Figure 5.4 Mean of daily spectra and corresponding standard deviations (shaded areas) for the definitive one-minute vector data from 2019.

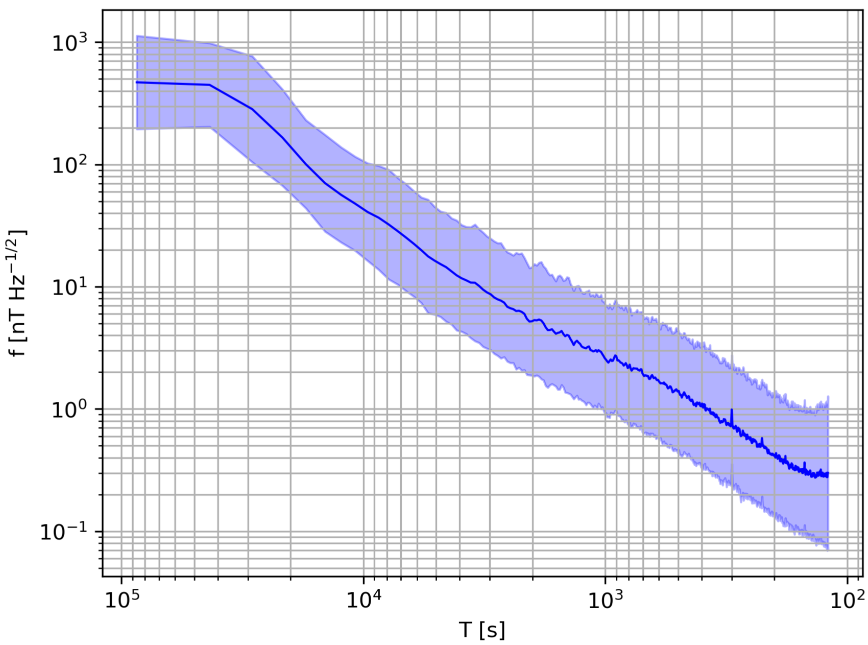

Figure 5.5 Representative quiet day powerspectrum of the primary scalar instrument.

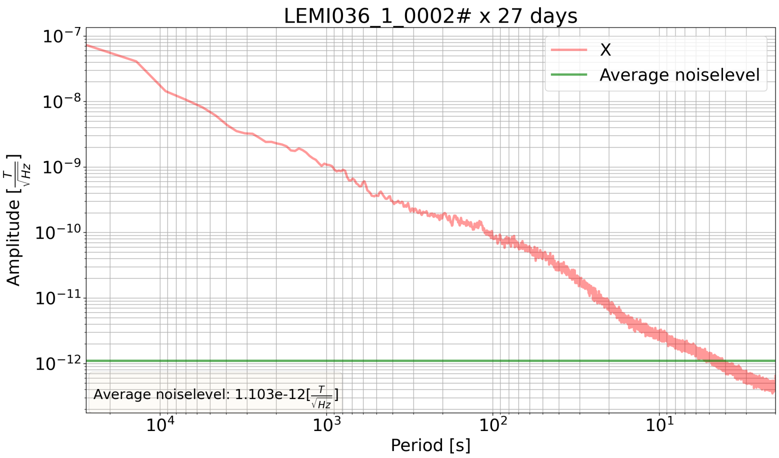

Figure 5.6 The spectrum of the x component for the primary variometer-sensor LEMI036.

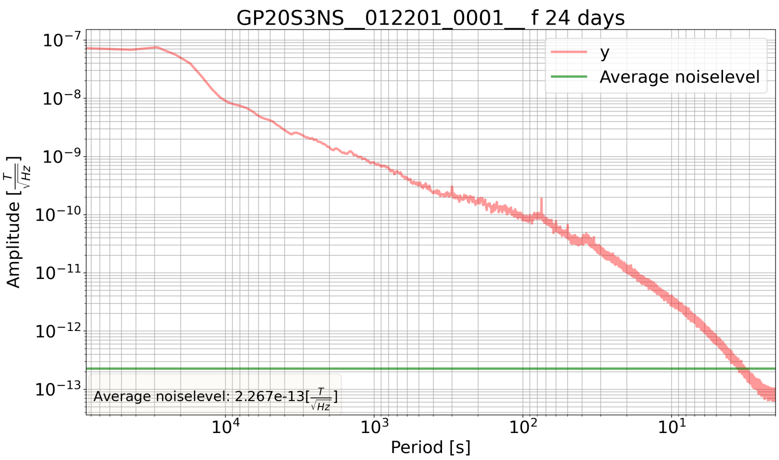

Figure 5.7 Spectrum of the primary F sensor, the GP20S3NSS2 North potassium magnetometer.

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 = 2.0 nT/year, dY = 54.0 nT/year and dZ = 59.0 nT/year is obtained. Fitting and extrapolating an average annual derivative curve using cubic splines results in the following predicted average field values for 2020: H = 21079 nT, D = 4.54 deg, Z = 43939 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 arithmetic 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]	Fn [nT]
2019-01	21008.105	1590.599	43852.752	48651.140
2019-02	21006.949	1595.470	43857.390	48654.991
2019-03	21009.783	1599.165	43861.135	48659.725
2019-04	21009.850	1603.388	43864.631	48663.076
2019-05	21010.565	1608.778	43870.249	48668.545
2019-06	21013.786	1612.462	43874.809	48674.169
2019-07	21014.205	1617.454	43879.365	48678.679
2019-08	21009.921	1621.802	43885.902	48682.877
2019-09	21001.791	1627.103	43894.032	48687.099
2019-10	21003.914	1630.411	43898.171	48691.574
2019-11	21008.332	1634.476	43902.159	48697.179
2019-12	21011.808	1637.765	43906.173	48702.413

Table 6.2. Yearly arithmetic 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
2017	20999.000	1507.000	43768.000	48568.000
2018	21007.000	1561.000	43820.000	48620.000
2019	21009.000	1615.000	43879.000	48676.000

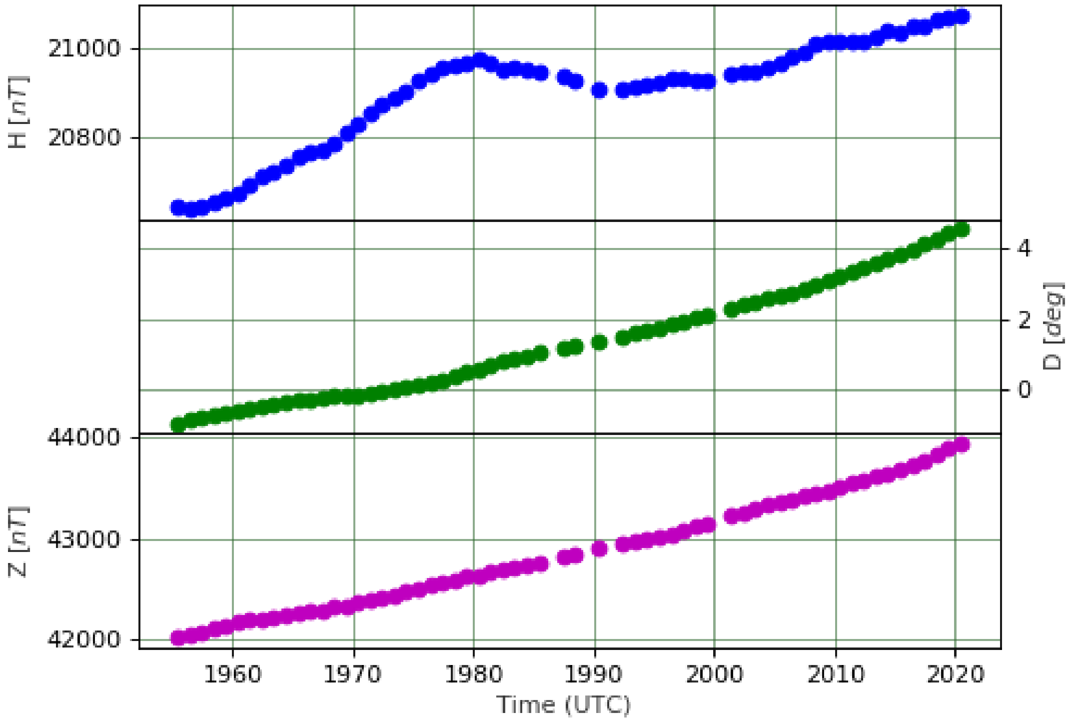

Figure 6.1 Yearly means since 1955. Data from 1955 until 2015 was obtained at the Cobenzl Observatory and corrected for the average offset of years 2014 and 2015 to the Conrad Observatory. Shown is also a predicted value for 2020.

ionospheric radio signal disturbances, and visible aurorae. The average local K for 2019 at Conrad Observatory corresponds to 1.3, which is in perfect agreement with the yearly average K_p of 1.3 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.

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 on the average daily A_p index, originating from eight a_p values which are the nT thresholds

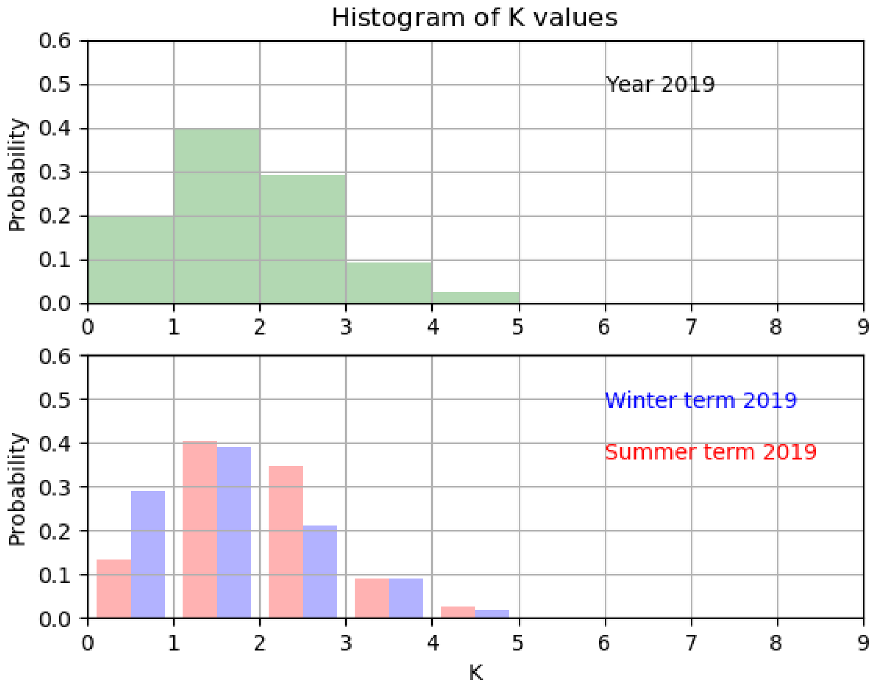

Figure 6.2 Distribution of K values.

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 10 days: 2019-02-28, 2019-03-01, 2019-05-11, 2019-05-14, 2019-08-05, 2019-08-31, 2019-09-01, 2019-09-02, 2019-09-28, 2019-10-25.
For quiet days the average daily K index needs to be below 0.5, and this was found for 29 days: 2019-01-02, 2019-01-12, 2019-01-13, 2019-01-28, 2019-01-29, 2019-01-30, 2019-02-19, 2019-03-11, 2019-03-22, 2019-03-23, 2019-03-24, 2019-06-11, 2019-10-13, 2019-10-23, 2019-11-02, 2019-11-18, 2019-11-19, 2019-11-20, 2019-11-26, 2019-12-02, 2019-12-03, 2019-12-05, 2019-12-07, 2019-12-08, 2019-12-14, 2019-12-24, 2019-12-27, 2019-12-28, 2019-12-29.

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, 3 storms were detected in the year 2019, at 2019-03-24, 2019-05-10 and 2019-07-08. The technique makes use of a combination of DSCOVR and ACE satellite data [**?**] 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.

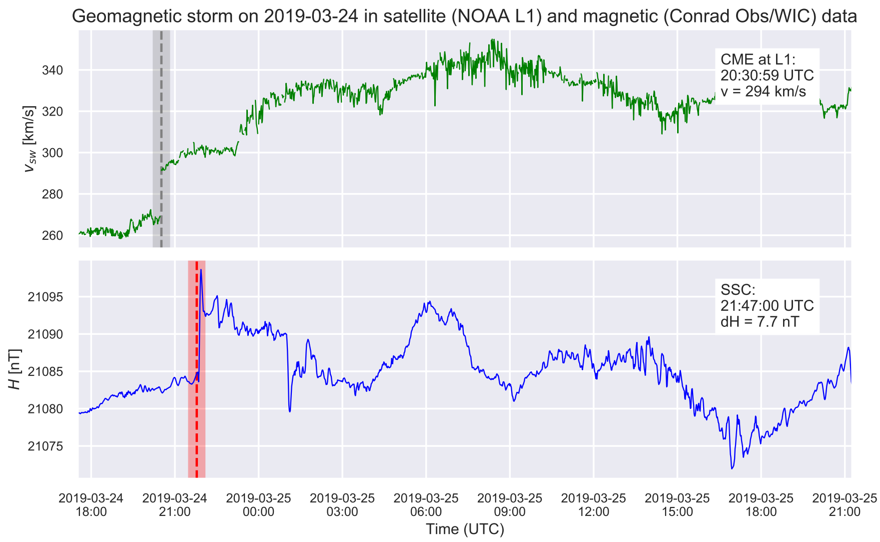

Figure 6.3 Most prominent geomagnetic storm in 2019. Shown are solar wind speed as determined at Lagrange point 1 (L1) by DSCOVR/ACE satellites and the horizontal component (H) of the geomagnetic field. Denoted are the times when shock front of the coronal mass ejection (CME) passed the satellite and initiated the sudden storm commencement (SSC) on earth.

Chapter 7

Publications and Presentations

In 2019 the geomagnetism group contributed to the following presentations and publications:

2019

Arneitz, P., R. Egli, R. Leonhardt, and K. Fabian, A Bayesian iterative geomagnetic model with universal data input: Self-consistent spherical harmonic evolution for the geomagnetic field over the last 4000 years, *Physics of the Earth and Planetary Interiors*, *290*, 57–75, 2019a.

Arneitz, P. and R. Leonhardt, *An archaeomagnetic study on a kiln from Gird-i Bazar*, vol. 4 of *Peshdar Plain Project Publications*, chap. The Dinka Settlement Complex 2018: Continuing the excavations at Qalat-i Dinka and the Lower Town, pp. 150–155, Gladbeck: PeWe-Verlag, 2019.

Arneitz, P., R. Leonhardt, K. Radner, F. J. Kreppner, R. Egli, E. Schnepp, A. Squitieri, A. Stone, and S. Amicone, Archeomagnetic dating of an Iron Age kiln from Gird-i Bazar, Iraq, in *EGU*, no. 7299, 2019b.

Bailey, R. and R. Leonhardt, Predicting GICs from L1 solar wind data using recurrent neural networks, in *EGU*, no. 2059, 2019.

Kompein, N., R. Egli, and R. Leonhardt, First analysis and classification of femtotesla scaled magnetic records of the earth, in *IUGG Montreal*, 2019.

Leonhardt, R., R. Bailey, B. Leichter, M. Miklavec, H. Shovanec, and J. Fee, Geomagnetic data production and dissemination using MagPy, in *IUGG Montreal*, 2019.

Papp, G., H. Ruotsalainen, B. Meurers, J. Benedek, R. Leonhardt, P. Hutchinson, and M. M. Szántó, Analysis of Environmental and Loading Effects in Tilt and SG Gravity Observations at Conrad (Austria) and Peters Seismological (Australia) Observatories, in *IUGG Montreal*, 2019.

Schnepp, E., P. Arneitz, R. Scholger, M. Ganerød, R. Egli, I. Fritz, and R. Leonhardt, Paleomagnetic Investigation of Pliocene Basalts in Styria (Austria): Evidence for Recorded Intermediate Field Directions, in *IUGG Montreal*, 2019.

Schwingenschuh, K., W. Magnes, S. Xuhui, J. Wang, A. Pollinger, C. Hagen, R. Lammegger, M. Ellmeier, G. Prattes, H.-U. Eichelberger, D. Wolbang, M. Y. Boudjada, B. P. Besser, A. A. Rozhnoi, T. Zhang, M. Delva, I. Jernej, Özer Aydogar, and R. Leonhardt, Seismo-magnetic events observed by the scalar Coupled Dark State Magnetometer (CDSM) aboard the China Seismo-Electromagnetic Satellite (CSES) mission, in *EGU*, no. 8314, 2019.

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Leonhardt, R., R. Bailey, M. Miklavec, and J. Matzka, GeomagPy, 2016.

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Menvielle, M., N. Papitashvili, L. Häkkinen, and C. Sucksdorff, Computer Production of K indices : Review and Comparison of Methods, *Geophysical Journal International*, *123*, 866–886, 1995, ISSN 0956540X.

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Sucksdorff, C., R. Pirjola, and L. Häkkinen, Computer production of K-values based on linear elimination, *Geophysical Transactions*, *36*, 333–345, 1991.

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Chapter 8

Appendix

Table 8.1. K indicies: Daily K indicies according to the FMI method as described in the text. Quiet and disturbed days are marked by Q and D respectively

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-01-01	1.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	
2019-01-02	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	Q
2019-01-03	0.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	
2019-01-04	1.0	0.0	1.0	2.0	2.0	3.0	3.0	2.0	
2019-01-05	3.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0	
2019-01-06	0.0	1.0	1.0	0.0	1.0	2.0	3.0	1.0	
2019-01-07	1.0	1.0	1.0	1.0	2.0	1.0	0.0	2.0	
2019-01-08	0.0	0.0	1.0	2.0	1.0	1.0	2.0	1.0	
2019-01-09	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2019-01-10	1.0	0.0	1.0	2.0	2.0	1.0	0.0	1.0	
2019-01-11	1.0	1.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-01-12	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	Q
2019-01-13	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	Q
2019-01-14	1.0	1.0	1.0	2.0	1.0	2.0	1.0	3.0	
2019-01-15	3.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	
2019-01-16	0.0	1.0	2.0	0.0	0.0	1.0	2.0	3.0	
2019-01-17	2.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	
2019-01-18	0.0	0.0	1.0	2.0	1.0	1.0	1.0	1.0	
2019-01-19	1.0	0.0	1.0	2.0	1.0	0.0	2.0	2.0	
2019-01-20	0.0	1.0	1.0	0.0	0.0	1.0	2.0	1.0	
2019-01-21	0.0	0.0	1.0	0.0	0.0	1.0	1.0	2.0	
2019-01-22	0.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	
2019-01-23	2.0	1.0	2.0	3.0	3.0	3.0	3.0	4.0	
2019-01-24	2.0	2.0	3.0	2.0	2.0	3.0	4.0	5.0	
2019-01-25	2.0	1.0	3.0	3.0	3.0	2.0	3.0	2.0	
2019-01-26	2.0	1.0	1.0	1.0	3.0	2.0	1.0	1.0	
2019-01-27	2.0	1.0	1.0	0.0	1.0	1.0	1.0	2.0	
2019-01-28	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	Q
2019-01-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-01-30	0.0	0.0	1.0	0.0	0.0	0.0	1.0	1.0	Q
2019-01-31	1.0	1.0	1.0	1.0	3.0	3.0	3.0	4.0	
2019-02-01	1.0	2.0	2.0	2.0	3.0	4.0	3.0	4.0	
2019-02-02	3.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	
2019-02-03	3.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0	
2019-02-04	1.0	0.0	0.0	1.0	2.0	2.0	4.0	2.0	
2019-02-05	3.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	
2019-02-06	1.0	1.0	1.0	2.0	2.0	1.0	2.0	3.0	
2019-02-07	1.0	1.0	2.0	0.0	1.0	2.0	2.0	3.0	
2019-02-08	1.0	1.0	1.0	1.0	1.0	2.0	2.0	3.0	
2019-02-09	2.0	1.0	1.0	2.0	2.0	2.0	3.0	1.0	
2019-02-10	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	
2019-02-11	1.0	0.0	2.0	1.0	3.0	3.0	2.0	3.0	
2019-02-12	2.0	1.0	0.0	1.0	1.0	1.0	0.0	2.0	
2019-02-13	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	
2019-02-14	1.0	2.0	2.0	3.0	1.0	1.0	2.0	2.0	
2019-02-15	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	
2019-02-16	0.0	0.0	0.0	0.0	1.0	2.0	3.0	2.0	
2019-02-17	0.0	1.0	0.0	1.0	0.0	0.0	2.0	3.0	
2019-02-18	3.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-02-19	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	Q
2019-02-20	0.0	0.0	1.0	1.0	1.0	1.0	2.0	2.0	
2019-02-21	2.0	2.0	3.0	2.0	2.0	2.0	1.0	3.0	
2019-02-22	1.0	0.0	2.0	1.0	1.0	0.0	0.0	2.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-02-23	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-02-24	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-02-25	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	
2019-02-26	0.0	0.0	1.0	1.0	0.0	2.0	1.0	1.0	
2019-02-27	0.0	0.0	1.0	1.0	2.0	3.0	4.0	4.0	
2019-02-28	3.0	3.0	2.0	3.0	4.0	3.0	5.0	3.0	D
2019-03-01	3.0	3.0	2.0	3.0	3.0	4.0	3.0	4.0	D
2019-03-02	3.0	2.0	3.0	1.0	1.0	2.0	2.0	2.0	
2019-03-03	1.0	2.0	1.0	0.0	1.0	0.0	1.0	3.0	
2019-03-04	2.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	
2019-03-05	2.0	0.0	1.0	2.0	1.0	1.0	1.0	2.0	
2019-03-06	1.0	1.0	2.0	2.0	2.0	1.0	2.0	2.0	
2019-03-07	0.0	0.0	1.0	1.0	3.0	3.0	3.0	3.0	
2019-03-08	2.0	0.0	1.0	2.0	1.0	0.0	0.0	2.0	
2019-03-09	1.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	
2019-03-10	2.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-03-11	0.0	0.0	0.0	1.0	1.0	1.0	0.0	1.0	
2019-03-12	1.0	2.0	2.0	1.0	1.0	0.0	2.0	2.0	
2019-03-13	1.0	1.0	2.0	1.0	0.0	1.0	2.0	1.0	
2019-03-14	0.0	0.0	0.0	1.0	2.0	2.0	2.0	3.0	
2019-03-15	2.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	
2019-03-16	1.0	2.0	2.0	3.0	3.0	2.0	3.0	4.0	
2019-03-17	4.0	2.0	3.0	3.0	1.0	2.0	1.0	0.0	
2019-03-18	0.0	1.0	0.0	1.0	1.0	1.0	0.0	0.0	
2019-03-19	0.0	1.0	1.0	2.0	2.0	1.0	3.0	3.0	
2019-03-20	1.0	0.0	1.0	1.0	2.0	1.0	0.0	1.0	
2019-03-21	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-03-22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-03-23	0.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	Q
2019-03-24	0.0	0.0	1.0	1.0	0.0	0.0	0.0	2.0	
2019-03-25	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	
2019-03-26	2.0	2.0	0.0	1.0	1.0	0.0	0.0	2.0	
2019-03-27	1.0	1.0	2.0	2.0	1.0	1.0	3.0	1.0	
2019-03-28	1.0	2.0	2.0	2.0	3.0	2.0	2.0	3.0	
2019-03-29	3.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0	
2019-03-30	2.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0	
2019-03-31	2.0	2.0	2.0	1.0	2.0	2.0	2.0	1.0	
2019-04-01	1.0	2.0	2.0	2.0	3.0	3.0	2.0	0.0	
2019-04-02	1.0	1.0	1.0	1.0	1.0	1.0	2.0	3.0	
2019-04-03	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	
2019-04-04	3.0	0.0	2.0	3.0	2.0	3.0	2.0	2.0	
2019-04-05	1.0	1.0	2.0	2.0	3.0	2.0	3.0	3.0	
2019-04-06	2.0	2.0	2.0	2.0	1.0	0.0	3.0	2.0	
2019-04-07	1.0	2.0	1.0	1.0	1.0	1.0	2.0	3.0	
2019-04-08	2.0	2.0	1.0	2.0	3.0	3.0	3.0	3.0	
2019-04-09	2.0	1.0	3.0	2.0	1.0	2.0	2.0	2.0	
2019-04-10	2.0	2.0	1.0	2.0	2.0	3.0	2.0	2.0	
2019-04-11	1.0	1.0	1.0	2.0	2.0	2.0	1.0	1.0	
2019-04-12	3.0	1.0	2.0	1.0	2.0	2.0	2.0	3.0	
2019-04-13	3.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	
2019-04-14	0.0	1.0	2.0	0.0	0.0	1.0	0.0	2.0	
2019-04-15	1.0	1.0	2.0	3.0	2.0	1.0	2.0	3.0	
2019-04-16	1.0	2.0	3.0	1.0	2.0	0.0	1.0	1.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-04-17	0.0	1.0	2.0	2.0	0.0	1.0	2.0	2.0	
2019-04-18	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	
2019-04-19	0.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	
2019-04-20	1.0	0.0	1.0	1.0	1.0	1.0	2.0	0.0	
2019-04-21	1.0	2.0	2.0	2.0	1.0	0.0	0.0	1.0	
2019-04-22	0.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0	
2019-04-23	1.0	1.0	1.0	1.0	2.0	3.0	4.0	4.0	
2019-04-24	3.0	0.0	2.0	2.0	2.0	2.0	1.0	2.0	
2019-04-25	1.0	2.0	1.0	2.0	2.0	0.0	1.0	1.0	
2019-04-26	0.0	0.0	1.0	0.0	1.0	1.0	1.0	2.0	
2019-04-27	1.0	0.0	2.0	2.0	2.0	1.0	1.0	2.0	
2019-04-28	0.0	1.0	2.0	2.0	1.0	2.0	2.0	3.0	
2019-04-29	1.0	1.0	2.0	2.0	1.0	1.0	0.0	1.0	
2019-04-30	1.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0	
2019-05-01	0.0	1.0	1.0	2.0	3.0	3.0	3.0	4.0	
2019-05-02	2.0	2.0	2.0	3.0	1.0	2.0	2.0	1.0	
2019-05-03	2.0	1.0	2.0	2.0	1.0	2.0	2.0	3.0	
2019-05-04	0.0	1.0	2.0	3.0	3.0	3.0	2.0	2.0	
2019-05-05	1.0	1.0	1.0	1.0	0.0	1.0	0.0	0.0	
2019-05-06	1.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	
2019-05-07	1.0	1.0	2.0	1.0	1.0	2.0	2.0	1.0	
2019-05-08	1.0	1.0	1.0	2.0	1.0	0.0	1.0	1.0	
2019-05-09	1.0	2.0	3.0	2.0	2.0	2.0	1.0	3.0	
2019-05-10	2.0	2.0	1.0	1.0	1.0	3.0	3.0	3.0	
2019-05-11	4.0	3.0	4.0	4.0	3.0	2.0	2.0	4.0	D
2019-05-12	1.0	2.0	2.0	2.0	0.0	2.0	2.0	1.0	
2019-05-13	1.0	0.0	2.0	2.0	1.0	1.0	2.0	2.0	
2019-05-14	3.0	4.0	5.0	2.0	2.0	4.0	3.0	1.0	
2019-05-15	1.0	1.0	2.0	1.0	2.0	3.0	3.0	1.0	
2019-05-16	1.0	1.0	1.0	2.0	2.0	2.0	3.0	2.0	
2019-05-17	2.0	2.0	2.0	2.0	2.0	1.0	0.0	1.0	
2019-05-18	1.0	2.0	2.0	2.0	1.0	0.0	1.0	0.0	
2019-05-19	0.0	1.0	1.0	1.0	0.0	1.0	0.0	2.0	
2019-05-20	3.0	2.0	2.0	2.0	1.0	2.0	0.0	1.0	
2019-05-21	0.0	1.0	2.0	2.0	2.0	1.0	1.0	1.0	
2019-05-22	0.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	
2019-05-23	1.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	
2019-05-24	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	
2019-05-25	0.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	
2019-05-26	1.0	1.0	1.0	0.0	2.0	1.0	0.0	3.0	
2019-05-27	2.0	2.0	2.0	1.0	1.0	3.0	2.0	1.0	
2019-05-28	0.0	0.0	2.0	2.0	3.0	2.0	3.0	3.0	
2019-05-29	3.0	3.0	2.0	3.0	3.0	2.0	3.0	2.0	
2019-05-30	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
2019-05-31	1.0	2.0	1.0	1.0	0.0	0.0	1.0	0.0	
2019-06-01	0.0	0.0	2.0	2.0	1.0	1.0	1.0	1.0	
2019-06-02	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	
2019-06-03	1.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	
2019-06-04	1.0	2.0	1.0	2.0	2.0	3.0	2.0	2.0	
2019-06-05	2.0	1.0	2.0	1.0	0.0	0.0	1.0	1.0	
2019-06-06	0.0	2.0	2.0	2.0	0.0	1.0	1.0	0.0	
2019-06-07	0.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	
2019-06-08	1.0	1.0	1.0	2.0	3.0	4.0	5.0	3.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-06-09	2.0	1.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-06-10	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	
2019-06-11	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	Q
2019-06-12	1.0	2.0	1.0	1.0	0.0	1.0	1.0	0.0	
2019-06-13	1.0	1.0	1.0	2.0	2.0	3.0	2.0	2.0	
2019-06-14	2.0	1.0	1.0	1.0	2.0	1.0	0.0	1.0	
2019-06-15	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	
2019-06-16	1.0	2.0	0.0	1.0	1.0	1.0	0.0	1.0	
2019-06-17	0.0	1.0	2.0	2.0	1.0	1.0	0.0	0.0	
2019-06-18	0.0	0.0	1.0	2.0	2.0	1.0	1.0	1.0	
2019-06-19	0.0	2.0	2.0	2.0	1.0	1.0	0.0	1.0	
2019-06-20	1.0	3.0	2.0	2.0	1.0	1.0	2.0	3.0	
2019-06-21	2.0	2.0	2.0	1.0	1.0	1.0	2.0	3.0	
2019-06-22	2.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-06-23	1.0	1.0	1.0	0.0	2.0	1.0	0.0	1.0	
2019-06-24	2.0	1.0	0.0	2.0	1.0	1.0	2.0	1.0	
2019-06-25	0.0	1.0	2.0	2.0	1.0	1.0	1.0	2.0	
2019-06-26	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	
2019-06-27	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	
2019-06-28	2.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	
2019-06-29	0.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	
2019-06-30	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	
2019-07-01	2.0	3.0	2.0	2.0	2.0	2.0	2.0	1.0	
2019-07-02	1.0	1.0	1.0	1.0	1.0	2.0	2.0	0.0	
2019-07-03	1.0	1.0	2.0	1.0	1.0	2.0	2.0	1.0	
2019-07-04	0.0	0.0	1.0	1.0	2.0	2.0	2.0	2.0	
2019-07-05	2.0	2.0	1.0	1.0	2.0	1.0	0.0	0.0	
2019-07-06	1.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	
2019-07-07	0.0	1.0	0.0	1.0	2.0	2.0	2.0	2.0	
2019-07-08	2.0	1.0	1.0	2.0	0.0	1.0	4.0	4.0	
2019-07-09	3.0	1.0	2.0	1.0	2.0	2.0	4.0	3.0	
2019-07-10	2.0	3.0	3.0	3.0	2.0	2.0	1.0	1.0	
2019-07-11	2.0	2.0	3.0	2.0	0.0	1.0	1.0	0.0	
2019-07-12	1.0	1.0	2.0	1.0	1.0	2.0	1.0	2.0	
2019-07-13	0.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0	
2019-07-14	2.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	
2019-07-15	2.0	1.0	2.0	3.0	3.0	2.0	2.0	0.0	
2019-07-16	0.0	1.0	1.0	2.0	1.0	2.0	2.0	1.0	
2019-07-17	2.0	1.0	2.0	1.0	2.0	2.0	1.0	2.0	
2019-07-18	0.0	0.0	1.0	1.0	2.0	2.0	1.0	1.0	
2019-07-19	1.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	
2019-07-20	0.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-07-21	0.0	1.0	1.0	1.0	2.0	2.0	3.0	3.0	
2019-07-22	1.0	2.0	1.0	3.0	3.0	2.0	2.0	2.0	
2019-07-23	1.0	1.0	2.0	2.0	2.0	1.0	0.0	2.0	
2019-07-24	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
2019-07-25	0.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0	
2019-07-26	0.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	
2019-07-27	1.0	0.0	0.0	2.0	2.0	1.0	2.0	1.0	
2019-07-28	2.0	1.0	1.0	2.0	2.0	2.0	1.0	1.0	
2019-07-29	1.0	2.0	2.0	1.0	1.0	2.0	1.0	0.0	
2019-07-30	1.0	1.0	1.0	1.0	3.0	3.0	2.0	3.0	
2019-07-31	2.0	2.0	3.0	2.0	1.0	2.0	2.0	2.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-08-01	3.0	2.0	3.0	2.0	2.0	1.0	2.0	3.0	
2019-08-02	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	
2019-08-03	1.0	1.0	2.0	1.0	1.0	0.0	1.0	0.0	
2019-08-04	0.0	1.0	2.0	1.0	0.0	1.0	1.0	2.0	
2019-08-05	1.0	3.0	4.0	4.0	4.0	5.0	3.0	4.0	D
2019-08-06	1.0	2.0	1.0	3.0	2.0	2.0	2.0	3.0	
2019-08-07	1.0	1.0	1.0	2.0	2.0	2.0	1.0	2.0	
2019-08-08	1.0	2.0	1.0	2.0	3.0	2.0	2.0	1.0	
2019-08-09	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	
2019-08-10	3.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	
2019-08-11	1.0	2.0	2.0	2.0	3.0	2.0	2.0	3.0	
2019-08-12	1.0	1.0	1.0	2.0	2.0	2.0	1.0	2.0	
2019-08-13	2.0	1.0	0.0	2.0	1.0	2.0	1.0	2.0	
2019-08-14	2.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	
2019-08-15	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	
2019-08-16	1.0	0.0	1.0	3.0	2.0	1.0	1.0	0.0	
2019-08-17	0.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	
2019-08-18	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0	
2019-08-19	1.0	1.0	2.0	1.0	1.0	2.0	0.0	1.0	
2019-08-20	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	
2019-08-21	1.0	1.0	2.0	2.0	1.0	1.0	2.0	0.0	
2019-08-22	2.0	2.0	2.0	2.0	1.0	1.0	3.0	2.0	
2019-08-23	0.0	1.0	2.0	2.0	1.0	1.0	2.0	1.0	
2019-08-24	1.0	1.0	1.0	2.0	2.0	1.0	1.0	0.0	
2019-08-25	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	
2019-08-26	2.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	
2019-08-27	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	
2019-08-28	2.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0	
2019-08-29	0.0	0.0	1.0	2.0	2.0	2.0	1.0	1.0	
2019-08-30	0.0	1.0	1.0	1.0	1.0	3.0	3.0	2.0	
2019-08-31	4.0	4.0	3.0	4.0	5.0	3.0	4.0	4.0	D
2019-09-01	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	D
2019-09-02	4.0	3.0	3.0	3.0	1.0	3.0	4.0	4.0	D
2019-09-03	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	
2019-09-04	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	
2019-09-05	3.0	3.0	2.0	3.0	1.0	2.0	2.0	3.0	
2019-09-06	1.0	3.0	1.0	3.0	1.0	0.0	2.0	1.0	
2019-09-07	1.0	2.0	3.0	1.0	2.0	2.0	2.0	2.0	
2019-09-08	2.0	2.0	1.0	2.0	1.0	2.0	3.0	3.0	
2019-09-09	3.0	2.0	2.0	3.0	3.0	3.0	2.0	3.0	
2019-09-10	2.0	1.0	1.0	2.0	2.0	0.0	0.0	0.0	
2019-09-11	1.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-09-12	1.0	1.0	1.0	2.0	1.0	2.0	1.0	1.0	
2019-09-13	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	
2019-09-14	0.0	2.0	1.0	2.0	1.0	1.0	2.0	1.0	
2019-09-15	1.0	2.0	2.0	2.0	1.0	2.0	2.0	3.0	
2019-09-16	1.0	2.0	2.0	1.0	1.0	2.0	2.0	3.0	
2019-09-17	2.0	1.0	2.0	2.0	0.0	1.0	2.0	4.0	
2019-09-18	2.0	2.0	3.0	2.0	3.0	2.0	2.0	1.0	
2019-09-19	0.0	2.0	2.0	1.0	1.0	1.0	1.0	0.0	
2019-09-20	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	
2019-09-21	1.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0	
2019-09-22	1.0	1.0	1.0	0.0	0.0	1.0	0.0	1.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-09-23	0.0	1.0	1.0	0.0	0.0	1.0	2.0	1.0	
2019-09-24	2.0	2.0	2.0	1.0	3.0	3.0	2.0	1.0	
2019-09-25	0.0	0.0	2.0	1.0	0.0	0.0	1.0	2.0	
2019-09-26	2.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	
2019-09-27	1.0	2.0	2.0	2.0	3.0	3.0	5.0	4.0	
2019-09-28	2.0	4.0	4.0	4.0	3.0	3.0	4.0	3.0	D
2019-09-29	2.0	1.0	2.0	1.0	1.0	3.0	4.0	2.0	
2019-09-30	3.0	3.0	3.0	3.0	2.0	3.0	2.0	2.0	
2019-10-01	2.0	3.0	1.0	2.0	1.0	0.0	1.0	1.0	
2019-10-02	2.0	1.0	1.0	2.0	3.0	1.0	0.0	3.0	
2019-10-03	1.0	2.0	1.0	1.0	0.0	0.0	2.0	1.0	
2019-10-04	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	
2019-10-05	1.0	0.0	1.0	2.0	2.0	2.0	2.0	3.0	
2019-10-06	1.0	1.0	1.0	2.0	1.0	1.0	0.0	1.0	
2019-10-07	0.0	1.0	1.0	1.0	1.0	2.0	3.0	3.0	
2019-10-08	2.0	1.0	2.0	0.0	0.0	0.0	2.0	1.0	
2019-10-09	1.0	2.0	1.0	3.0	1.0	2.0	2.0	2.0	
2019-10-10	1.0	3.0	2.0	2.0	2.0	3.0	2.0	1.0	
2019-10-11	1.0	1.0	2.0	1.0	2.0	3.0	2.0	2.0	
2019-10-12	2.0	1.0	1.0	1.0	1.0	0.0	1.0	0.0	
2019-10-13	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-10-14	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	
2019-10-15	2.0	0.0	1.0	1.0	1.0	1.0	2.0	2.0	
2019-10-16	2.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	
2019-10-17	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2019-10-18	0.0	1.0	2.0	1.0	2.0	1.0	1.0	3.0	
2019-10-19	0.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	
2019-10-20	0.0	1.0	1.0	1.0	0.0	1.0	2.0	3.0	
2019-10-21	3.0	1.0	0.0	2.0	1.0	0.0	1.0	1.0	
2019-10-22	0.0	0.0	1.0	1.0	1.0	1.0	2.0	1.0	
2019-10-23	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	Q
2019-10-24	0.0	1.0	2.0	3.0	2.0	4.0	3.0	4.0	
2019-10-25	3.0	3.0	3.0	3.0	3.0	4.0	3.0	2.0	
2019-10-26	1.0	2.0	2.0	3.0	4.0	5.0	4.0	2.0	
2019-10-27	2.0	2.0	2.0	2.0	2.0	3.0	4.0	3.0	
2019-10-28	1.0	2.0	2.0	2.0	1.0	2.0	3.0	3.0	
2019-10-29	2.0	2.0	1.0	1.0	0.0	2.0	2.0	2.0	
2019-10-30	1.0	2.0	2.0	1.0	3.0	2.0	3.0	3.0	
2019-10-31	3.0	0.0	1.0	2.0	0.0	1.0	2.0	2.0	
2019-11-01	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	
2019-11-02	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	Q
2019-11-03	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	
2019-11-04	0.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	
2019-11-05	0.0	1.0	0.0	2.0	2.0	2.0	2.0	3.0	
2019-11-06	2.0	1.0	1.0	0.0	2.0	1.0	2.0	2.0	
2019-11-07	2.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	
2019-11-08	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2019-11-09	1.0	2.0	0.0	0.0	0.0	1.0	1.0	3.0	
2019-11-10	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	
2019-11-11	0.0	0.0	1.0	2.0	2.0	3.0	3.0	2.0	
2019-11-12	2.0	2.0	1.0	1.0	1.0	1.0	1.0	0.0	
2019-11-13	0.0	0.0	1.0	1.0	1.0	0.0	1.0	2.0	
2019-11-14	2.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	

Table 8.1 (cont'd)

Date	1:30	4:30	7:30	10:30	13:30	16:30	19:30	22:30	Activity
2019-11-15	0.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	
2019-11-16	2.0	1.0	1.0	0.0	1.0	2.0	2.0	2.0	
2019-11-17	1.0	1.0	1.0	0.0	0.0	1.0	2.0	2.0	
2019-11-18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-11-19	0.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	Q
2019-11-20	0.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0	Q
2019-11-21	1.0	1.0	1.0	1.0	2.0	2.0	3.0	4.0	
2019-11-22	2.0	1.0	1.0	1.0	2.0	3.0	3.0	2.0	
2019-11-23	1.0	1.0	1.0	2.0	3.0	2.0	2.0	2.0	
2019-11-24	3.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	
2019-11-25	2.0	0.0	0.0	1.0	1.0	1.0	1.0	2.0	
2019-11-26	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-11-27	0.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	
2019-11-28	1.0	1.0	0.0	0.0	1.0	1.0	1.0	0.0	
2019-11-29	1.0	1.0	0.0	1.0	1.0	1.0	2.0	3.0	
2019-11-30	1.0	1.0	1.0	0.0	1.0	1.0	1.0	2.0	
2019-12-01	1.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	
2019-12-02	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-12-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	Q
2019-12-04	1.0	1.0	1.0	0.0	1.0	0.0	1.0	0.0	
2019-12-05	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	Q
2019-12-06	0.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0	
2019-12-07	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	Q
2019-12-08	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	
2019-12-09	3.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	
2019-12-10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
2019-12-11	2.0	1.0	1.0	1.0	1.0	2.0	1.0	2.0	
2019-12-12	0.0	0.0	1.0	1.0	1.0	0.0	0.0	2.0	
2019-12-13	1.0	1.0	1.0	1.0	0.0	0.0	2.0	0.0	
2019-12-14	1.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	
2019-12-15	1.0	1.0	1.0	1.0	0.0	0.0	1.0	3.0	
2019-12-16	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	
2019-12-17	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	
2019-12-18	2.0	1.0	1.0	3.0	3.0	3.0	3.0	2.0	
2019-12-19	2.0	3.0	3.0	2.0	1.0	2.0	1.0	1.0	
2019-12-20	1.0	0.0	0.0	0.0	1.0	2.0	2.0	2.0	
2019-12-21	0.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	
2019-12-22	1.0	0.0	1.0	0.0	1.0	0.0	1.0	2.0	
2019-12-23	0.0	1.0	1.0	2.0	1.0	0.0	0.0	0.0	
2019-12-24	2.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	Q
2019-12-25	0.0	0.0	0.0	1.0	1.0	1.0	2.0	2.0	
2019-12-26	2.0	1.0	1.0	0.0	1.0	1.0	2.0	2.0	
2019-12-27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-12-28	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	Q
2019-12-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Q
2019-12-30	0.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	

Table 8.2. Thunder and lightning: Date of thunder storms near the observatory and approximate amount of lightnings causing measureable spikes in our records.

Date	Amount
2019-04-30	12
2019-05-11	90
2019-06-06	30
2019-06-20	50
2019-07-01	227
2019-07-12	41
2019-07-27	116
2019-07-28	52
2019-08-07	72
2019-08-12	147
2019-08-24	53
2019-08-29	40
2019-09-01	16

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Jan01	105	105	108	110	112	112	100	93	89	87	98	106	104	113	107	104	101	102	103	104	105	104	105	104	103
Jan02	103	104	104	105	104	102	98	95	93	96	106	114	118	119	116	111	109	108	106	108	108	106	104	104	106
Jan03	105	105	105	107	109	111	111	106	101	98	104	112	114	118	116	113	112	112	111	108	106	107	109	108	109
Jan04	109	110	113	114	116	118	120	118	112	106	112	121	129	121	113	102	103	84	70	86	93	89	88	96	106
Jan05	82	90	101	99	96	106	105	104	100	90	97	91	92	99	104	101	89	89	104	102	101	111	110	98	98
Jan06	94	95	95	96	100	106	108	102	100	99	97	97	95	101	100	103	109	97	98	82	87	99	102	104	99
Jan07	105	104	104	105	102	105	109	107	101	103	105	104	107	106	104	106	104	106	106	108	108	104	105	102	105
Jan08	103	105	107	109	110	112	111	114	111	108	103	109	109	111	110	109	110	107	104	103	108	107	106	103	108
Jan09	103	103	109	112	113	118	119	118	114	111	117	119	123	120	114	110	109	109	109	108	105	104	103	104	111
Jan10	105	103	104	107	110	108	109	112	110	104	108	118	123	117	111	111	112	113	112	112	111	109	108	110	110
Jan11	108	109	112	111	112	115	112	105	110	104	108	111	111	113	113	109	108	106	101	104	107	106	105	105	109
Jan12	102	102	102	105	108	109	108	107	104	101	100	107	111	114	112	109	107	108	107	106	105	107	107	106	106
Jan13	106	105	105	104	106	107	109	109	108	108	108	112	115	117	118	117	115	113	111	110	113	110	110	112	110
Jan14	105	107	109	118	120	121	119	116	111	109	113	114	114	113	116	116	114	107	109	109	115	112	109	116	113
Jan15	103	102	106	109	110	108	105	107	106	105	107	114	115	117	119	116	114	110	108	111	104	107	109	107	109
Jan16	107	108	110	112	113	110	107	112	114	109	106	107	109	112	115	114	113	107	103	102	91	92	87	85	106
Jan17	80	88	94	99	99	104	106	110	118	121	120	117	117	113	113	105	95	97	99	106	103	96	102	101	104
Jan18	100	101	104	104	108	109	111	114	115	113	109	104	110	111	108	107	106	100	100	100	103	105	107	107	106
Jan19	107	106	104	107	108	110	113	118	119	113	121	126	123	118	113	109	106	100	94	93	98	100	102	108	109
Jan20	108	108	107	107	107	109	113	118	116	115	114	115	115	115	113	110	107	108	106	111	107	104	103	105	110
Jan21	105	106	107	108	109	110	113	118	122	121	121	121	121	119	115	112	110	108	112	112	115	114	112	111	113
Jan22	111	111	112	114	115	117	120	126	129	126	123	124	124	121	119	115	113	117	112	105	100	98	104	106	115
Jan23	118	113	109	109	108	114	119	118	123	123	112	99	109	110	99	92	100	104	113	109	103	106	98	127	110
Jan24	118	108	108	110	107	103	108	114	123	114	113	117	119	119	113	110	105	95	76	83	95	132	105	92	108
Jan25	102	103	98	100	101	100	104	106	104	105	115	116	103	89	99	89	94	92	106	110	103	101	105	107	102
Jan26	111	107	105	106	107	107	110	112	113	115	115	115	117	112	96	103	108	109	105	103	105	104	106	107	108
Jan27	111	113	106	106	104	105	105	105	104	105	108	111	116	119	116	108	105	104	101	102	106	112	110	107	108
Jan28	104	103	104	107	108	111	111	113	113	112	109	109	111	116	117	116	111	109	107	107	107	107	108	108	110
Jan29	108	108	112	111	113	111	113	112	112	114	119	120	121	120	117	112	110	111	111	110	109	109	109	108	113
Jan30	108	108	109	110	112	114	116	119	115	111	110	112	116	119	119	118	116	114	110	109	111	113	111	111	113
Jan31	113	113	119	122	126	125	120	120	122	...	125	129	134	119	114	106	102	97	102	112	105	92	106	80	...
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Jan01	89	89	90	91	91	90	89	83	73	72	67	74	90	98	93	92	91	90	89	90	91	92	92	94	87
Jan02	93	93	92	90	90	91	93	89	83	77	72	73	79	89	92	92	93	88	89	89	88	89	90	90	88
Jan03	87	88	87	87	87	88	92	95	93	89	80	76	83	90	92	92	91	90	89	90	90	91	90	88	89

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
Jan04	86	84	84	86	85	84	86	90	91	90	80	74	74	87	87	84	89	90	103	100	104	122	99	98	90
Jan05	126	72	92	107	89	91	95	95	93	93	83	72	76	83	88	88	85	93	93	95	94	108	102	94	92
Jan06	92	92	91	90	87	91	95	97	97	90	85	80	86	84	88	83	86	86	124	108	98	96	95	90	92
Jan07	93	91	88	88	85	86	88	90	92	93	84	82	83	83	87	87	89	90	92	93	92	96	96	93	89
Jan08	92	90	84	87	85	86	86	88	92	95	98	91	88	85	84	88	89	88	91	94	92	94	94	94	90
Jan09	95	94	90	89	87	87	86	86	87	86	82	81	81	86	88	90	90	90	90	92	95	97	94	91	89
Jan10	91	91	90	90	90	90	92	90	85	82	81	80	79	87	88	87	87	87	89	90	91	91	90	91	88
Jan11	94	91	91	89	89	90	91	82	75	76	77	82	86	91	90	88	88	88	90	90	91	93	93	94	88
Jan12	93	92	93	92	93	92	93	91	87	85	84	82	84	89	91	89	91	91	91	93	94	93	92	91	90
Jan13	90	91	90	90	93	94	93	91	86	81	80	80	84	86	89	87	86	87	89	91	96	93	92	93	89
Jan14	95	93	94	93	89	89	90	89	85	83	78	79	78	85	89	86	85	93	86	90	90	92	95	100	89
Jan15	99	92	88	89	89	88	90	91	85	82	80	78	86	86	86	85	86	85	86	89	93	93	93	91	88
Jan16	89	89	89	88	89	92	92	91	90	87	80	76	78	83	89	89	88	89	88	90	97	114	113	115	91
Jan17	105	95	94	96	93	93	94	93	90	87	85	85	87	90	89	84	85	84	92	92	93	98	96	101	92
Jan18	93	90	93	93	94	94	92	90	87	85	87	86	85	87	86	87	87	93	91	94	98	95	93	90	90
Jan19	90	92	92	92	92	94	95	94	93	92	86	82	87	92	93	91	88	88	91	89	93	98	102	111	92
Jan20	97	94	93	94	92	91	90	89	87	84	83	82	84	86	89	90	90	90	90	93	93	97	96	95	90
Jan21	94	95	94	92	90	90	90	90	94	94	93	92	92	92	87	84	86	91	89	91	96	95	92	90	91
Jan22	90	90	90	89	89	89	88	87	88	88	88	88	87	89	89	88	89	90	87	97	101	100	96	96	91
Jan23	94	98	98	95	95	94	91	90	91	92	91	88	82	89	89	88	87	88	87	90	93	114	101	123	94
Jan24	105	104	96	101	91	91	88	74	84	86	86	83	83	86	89	90	91	93	128	127	99	113	91	99	95
Jan25	93	92	94	96	95	90	90	88	88	92	89	89	93	102	98	112	104	96	102	99	96	96	95	94	95
Jan26	96	98	95	92	91	92	90	86	85	83	83	83	84	82	96	93	90	91	92	96	97	94	93	92	91
Jan27	87	93	94	92	96	96	96	95	94	91	86	86	87	89	92	92	91	91	93	96	95	94	95	95	92
Jan28	96	96	95	95	95	96	96	95	92	88	86	85	87	89	91	92	94	93	92	92	93	93	93	93	92
Jan29	92	90	88	93	93	93	95	97	96	92	88	87	90	92	94	91	90	92	93	93	94	94	93	93	92
Jan30	92	92	91	91	90	91	91	92	92	90	86	83	85	90	92	92	92	91	90	91	92	93	93	93	91
Jan31	93	90	87	84	84	86	88	90	91	...	87	84	83	79	78	76	73	75	85	89	95	117	180	129	...
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Jan01	51	51	51	50	50	51	52	53	56	54	56	58	58	55	51	51	52	53	53	53	53	53	52	52	53
Jan02	52	52	52	52	51	52	52	50	50	50	48	50	53	54	51	50	51	51	51	51	51	51	51	51	51
Jan03	51	51	51	51	51	51	51	51	51	50	49	51	56	57	53	51	51	51	51	51	51	52	52	50	51
Jan04	51	51	50	49	50	50	50	49	49	48	46	48	50	49	49	50	51	54	60	59	57	58	60	56	52
Jan05	55	58	52	51	52	52	51	50	49	48	48	53	56	56	55	54	56	58	57	55	55	53	51	52	53
Jan06	53	54	54	54	54	53	53	54	54	55	52	54	59	61	58	56	54	55	56	59	58	57	55	54	55
Jan07	53	53	53	53	53	53	53	52	54	55	53	52	53	53	51	53	53	53	53	53	53	53	52	52	53

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
Jan08	52	53	53	52	52	52	52	53	54	54	51	49	52	53	52	53	52	53	53	53	53	53	52	52	52
Jan09	52	52	52	51	51	51	50	52	53	53	52	49	48	49	50	51	52	53	53	53	53	53	53	52	52
Jan10	51	52	52	52	52	52	52	50	48	47	46	46	49	51	50	50	51	51	51	51	51	51	51	51	50
Jan11	50	50	50	51	51	51	50	50	50	54	54	53	52	50	50	51	53	54	55	55	54	53	53	53	52
Jan12	53	53	53	53	53	53	53	53	55	57	58	57	53	50	51	52	53	54	54	54	54	54	53	53	54
Jan13	53	53	53	53	53	53	54	54	54	55	55	56	56	55	53	51	52	52	53	53	53	53	52	51	53
Jan14	51	51	51	50	50	50	50	50	52	54	55	56	56	54	51	50	51	53	54	54	53	52	53	51	52
Jan15	52	52	52	52	52	52	53	51	50	51	52	53	52	52	50	49	51	52	53	53	54	54	54	53	52
Jan16	52	52	52	52	51	51	51	50	51	53	55	56	55	54	52	51	52	53	54	55	58	57	58	57	53
Jan17	59	58	58	56	56	56	54	53	50	48	47	51	55	55	53	53	55	56	57	57	57	58	57	56	55
Jan18	56	55	55	54	54	54	53	51	51	53	54	51	51	51	52	52	54	55	56	56	56	56	55	55	54
Jan19	54	54	54	54	54	53	52	52	51	49	49	50	51	52	51	51	54	55	56	57	58	58	58	56	53
Jan20	55	54	54	53	54	54	53	51	52	55	55	51	50	51	52	52	53	54	54	54	54	55	56	56	53
Jan21	55	55	55	54	54	54	52	51	49	47	48	48	47	49	50	50	52	53	53	53	53	53	53	53	52
Jan22	53	52	52	52	52	51	50	49	49	48	49	49	48	49	48	49	51	52	52	53	55	55	55	54	51
Jan23	52	52	53	53	53	52	51	50	49	47	46	47	48	50	52	54	55	56	55	55	56	55	57	50	52
Jan24	49	50	51	51	53	53	52	47	45	48	48	46	48	50	50	51	53	55	58	60	59	50	49	53	51
Jan25	54	53	54	55	55	55	55	54	53	53	53	50	50	53	54	55	59	58	57	56	56	56	56	55	54
Jan26	53	53	54	54	55	55	53	54	54	53	54	51	50	53	53	56	55	55	55	56	56	56	55	55	54
Jan27	55	53	53	54	54	55	55	55	55	56	56	56	53	51	50	52	54	55	56	57	57	55	54	53	54
Jan28	54	54	55	55	55	55	54	53	53	53	52	52	53	54	53	53	54	54	55	55	55	55	55	55	54
Jan29	54	54	54	54	54	54	53	52	51	49	46	47	49	49	51	52	53	54	54	54	55	55	55	54	52
Jan30	54	54	54	54	54	53	52	53	52	51	50	50	53	54	53	52	52	52	53	54	54	54	53	54	53
Jan31	53	53	52	50	50	49	49	51	50	...	47	46	48	50	50	51	54	57	58	57	58	58	55	59	...
2019, Field component: F, Base: 48600.0, Unit: nT																									
Jan01	48	48	49	50	50	51	47	45	45	43	49	54	54	55	49	48	47	48	49	49	50	49	49	48	49
Jan02	48	49	49	48	48	47	46	43	42	43	45	50	55	56	52	50	50	49	49	50	49	49	48	48	48
Jan03	48	48	48	49	50	51	51	48	46	44	46	50	56	59	55	52	51	51	50	49	48	49	50	49	50
Jan04	49	50	50	50	52	52	53	52	49	46	46	51	56	53	49	46	47	42	41	48	49	48	49	49	49
Jan05	43	47	47	46	45	49	49	47	44	39	42	43	47	50	51	49	46	47	53	51	50	53	51	46	47
Jan06	45	46	46	47	49	51	52	50	49	49	45	46	51	55	52	52	53	48	50	46	47	51	51	50	49
Jan07	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jan08	49	49	50	50	51	51	51	54	53	52	47	48	50	52	51	51	51	50	49	50	51	51	50	48	51
Jan09	48	49	51	51	52	53	54	54	54	53	54	52	53	53	51	50	51	51	52	51	50	50	49	48	51
Jan10	49	48	49	50	51	51	51	50	47	44	45	49	54	53	50	50	51	52	52	52	51	50	50	50	50
Jan11	48	49	51	51	51	52	51	48	49	50	52	52	52	51	51	50	51	51	50	51	52	51	50	50	51

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
Jan12	49	49	49	50	52	52	52	51	51	52	52	54	53	52	52	51	51	52	52	52	51	51	51	51	51
Jan13	50	50	49	49	50	52	52	52	53	53	53	56	57	57	56	53	53	53	53	52	53	52	51	51	53
Jan14	48	50	50	53	54	54	53	52	51	53	55	56	56	54	53	52	52	51	52	52	54	53	52	54	53
Jan15	48	48	50	51	51	51	50	49	48	48	49	53	54	54	53	51	52	51	51	53	51	52	52	51	51
Jan16	50	50	51	51	52	51	50	51	52	52	52	53	54	54	53	52	52	51	50	50	49	49	48	46	51
Jan17	45	48	50	51	51	52	52	52	53	52	51	54	57	55	53	50	47	49	51	54	53	51	53	52	51
Jan18	51	50	51	51	52	52	53	52	52	53	52	48	50	51	50	50	51	50	50	51	53	53	53	53	51
Jan19	52	51	51	52	52	53	53	54	54	50	53	56	56	55	51	50	51	49	48	49	51	53	53	54	52
Jan20	54	52	52	51	51	52	53	54	54	56	55	52	51	53	52	52	51	52	51	53	52	52	52	52	52
Jan21	52	52	52	52	52	53	53	54	54	52	52	52	52	52	52	50	51	51	53	53	55	54	53	52	52
Jan22	52	52	52	53	53	53	53	55	56	55	54	54	53	53	52	50	52	54	52	50	49	50	51	52	53
Jan23	55	52	52	52	51	53	54	53	54	52	47	42	46	50	46	45	50	52	55	54	52	53	50	58	51
Jan24	53	49	50	51	51	49	50	48	50	49	49	49	52	53	51	50	50	48	43	48	51	60	46	45	50
Jan25	49	49	48	49	50	50	51	51	49	50	54	52	47	44	48	45	51	49	55	55	52	51	53	53	50
Jan26	53	51	51	52	52	53	52	53	54	54	55	52	53	53	47	52	53	54	52	52	53	52	53	53	52
Jan27	54	53	51	51	51	52	52	52	52	53	54	55	55	54	52	51	51	51	51	52	54	55	53	51	53
Jan28	51	50	51	53	53	54	53	54	53	53	51	51	53	55	56	55	53	53	52	53	53	53	53	53	53
Jan29	53	53	53	53	54	54	53	53	52	51	50	51	53	53	53	52	52	53	54	53	53	53	53	53	53
Jan30	52	52	52	53	54	54	54	56	54	51	49	50	54	57	56	54	54	53	52	53	54	54	53	53	53
Jan31	54	54	55	55	56	55	53	54	55	54	53	54	57	53	51	48	49	50	53	57	54	50	55	46	53

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Feb01	87	89	92	99	101	104	107	106	101	108	104	105	106	98	81	67	77	74	88	90	104	95	126	101	96
Feb02	103	114	100	100	105	106	104	108	98	98	103	106	104	107	100	86	97	93	78	92	88	106	109	101	100
Feb03	98	103	98	100	100	98	103	99	104	106	105	107	110	107	102	102	100	101	105	99	98	102	102	98	102
Feb04	100	99	98	99	100	101	105	106	107	105	104	107	108	99	90	83	88	92	94	100	103	93	91	88	98
Feb05	106	108	99	98	98	101	103	107	107	107	107	110	114	114	110	105	106	103	103	98	97	100	104	106	105
Feb06	106	106	104	108	108	108	112	115	113	114	112	104	104	113	108	102	103	102	102	104	103	108	101	97	106
Feb07	98	98	98	101	100	101	105	111	115	115	117	119	123	119	110	104	103	103	106	106	100	92	89	105	106
Feb08	95	97	99	99	102	108	114	117	122	121	120	120	119	116	110	106	102	105	107	104	93	105	105	97	108
Feb09	99	100	96	99	104	109	111	112	113	111	116	115	117	117	107	112	107	96	102	94	92	99	105	106	106
Feb10	107	105	108	114	109	108	110	111	108	108	109	116	120	118	114	108	107	107	108	107	106	105	105	114	110
Feb11	109	110	107	106	110	112	113	120	119	116	115	113	118	119	104	82	89	95	96	99	101	107	105	112	107
Feb12	110	102	102	100	104	108	112	114	114	119	122	123	123	117	111	107	107	108	106	107	107	108	112	109	110
Feb13	102	105	106	109	111	109	115	118	115	108	108	91	81	104	106	104	90	86	104	110	110	107	103	106	104
Feb14	102	104	106	106	105	106	117	110	104	100	92	110	113	111	108	107	105	104	105	102	109	104	110	108	106
Feb15	109	108	104	110	109	108	109	110	108	108	102	99	104	106	109	106	105	106	106	107	109	108	109	109	107
Feb16	108	107	108	109	110	109	110	111	111	113	114	113	114	115	110	109	99	90	92	103	108	110	110	110	108
Feb17	110	110	110	110	110	113	115	112	109	107	106	108	112	113	113	112	111	111	113	108	111	112	113	122	111
Feb18	124	108	104	103	106	108	111	116	116	114	111	109	111	109	102	101	99	100	101	104	107	108	107	108	108
Feb19	108	106	107	108	109	111	112	113	113	111	108	110	114	118	115	111	107	107	107	110	109	107	107	107	110
Feb20	106	107	109	112	113	115	116	117	116	110	106	111	115	118	115	114	113	118	117	116	112	106	102	105	112
Feb21	103	107	109	108	111	117	123	118	121	119	116	111	100	99	106	106	97	104	107	107	106	107	121	107	110
Feb22	101	103	104	106	109	112	114	117	115	106	101	98	101	109	110	111	111	111	110	109	109	111	110	116	108
Feb23	113	111	112	113	115	117	115	112	108	101	98	101	110	118	121	118	110	112	112	110	112	113	114	114	112
Feb24	113	113	113	113	113	115	115	114	105	95	92	97	105	114	116	114	113	116	117	116	116	116	116	116	111
Feb25	116	115	114	117	117	120	119	116	107	96	92	97	103	115	121	122	118	115	117	117	116	114	114	113	113
Feb26	111	109	110	112	114	117	119	119	112	103	101	106	111	115	115	109	109	116	117	117	117	116	116	112	113
Feb27	114	114	113	114	116	118	121	123	126	123	126	125	118	112	114	114	96	76	74	96	104	120	122	104	112
Feb28	93	101	116	104	96	103	106	108	109	108	92	103	103	85	63	81	85	85	85	67	89	106	94	96	95
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Feb01	100	98	93	93	94	93	100	91	97	88	84	86	85	86	85	95	116	103	105	103	101	108	97	105	96
Feb02	107	90	102	108	93	100	96	92	93	90	93	89	88	91	86	100	94	90	120	104	107	102	99	107	98
Feb03	105	109	106	99	101	96	95	96	98	95	90	85	85	86	92	94	93	100	107	96	99	110	100	98	97
Feb04	98	99	97	97	97	95	93	95	97	96	91	84	83	88	93	89	90	90	92	106	105	102	113	115	96
Feb05	99	102	99	100	94	95	94	94	96	90	87	84	83	86	90	92	91	97	95	99	101	100	98	96	94
Feb06	97	97	97	96	97	98	97	95	96	94	82	78	82	89	91	89	94	91	107	98	108	106	105	107	95

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
Feb07	106	102	103	103	99	96	94	92	90	91	92	92	92	94	93	91	90	91	92	94	101	111	107	113	97
Feb08	111	103	103	103	102	102	100	96	91	87	90	91	90	91	94	91	88	91	92	93	104	115	116	110	98
Feb09	111	113	103	103	97	95	94	89	89	86	86	85	86	85	91	92	92	100	126	121	103	100	96	95	97
Feb10	96	99	95	94	99	95	94	96	98	91	85	79	82	88	91	91	92	93	94	95	99	97	98	97	93
Feb11	98	99	101	98	97	97	92	93	96	95	89	87	83	79	78	82	78	85	106	99	96	99	103	110	93
Feb12	107	106	102	103	100	98	96	96	96	95	90	84	80	82	85	89	91	91	92	94	97	99	109	108	95
Feb13	104	98	98	96	100	95	94	94	99	96	97	77	77	89	89	89	90	98	92	94	96	98	111	111	95
Feb14	102	95	94	102	101	92	95	94	94	91	94	88	87	87	91	93	92	94	93	102	106	98	97	95	95
Feb15	96	98	93	95	96	97	96	101	103	101	95	88	85	87	90	91	90	92	97	95	96	98	98	98	95
Feb16	98	97	96	96	97	97	95	98	98	96	90	83	82	85	88	91	89	92	97	98	97	98	96	97	94
Feb17	95	94	95	95	95	96	97	98	97	93	86	81	82	87	92	94	93	93	92	94	102	97	96	93	93
Feb18	99	111	105	105	107	97	98	101	100	96	90	85	82	85	89	88	84	88	93	95	97	98	98	98	95
Feb19	100	99	98	97	98	100	99	101	103	99	92	84	82	83	88	90	90	90	92	96	96	98	99	101	95
Feb20	102	99	97	97	97	97	98	99	100	98	86	75	76	81	86	84	79	81	85	90	94	101	107	107	92
Feb21	106	101	96	96	95	94	94	85	95	96	90	85	79	83	90	92	91	90	93	94	97	101	125	118	95
Feb22	104	97	97	96	95	95	96	102	106	106	96	86	82	80	85	91	93	93	94	97	99	97	98	97	95
Feb23	95	96	95	95	95	95	98	104	108	101	86	77	76	81	90	96	97	96	99	96	97	98	97	97	94
Feb24	97	97	97	97	97	99	103	113	118	110	91	78	74	75	80	89	93	93	94	94	95	96	96	97	95
Feb25	96	97	95	96	95	97	100	110	116	111	93	78	75	77	84	93	95	94	93	93	94	96	100	99	95
Feb26	100	99	96	96	97	98	101	108	115	111	94	82	76	78	86	91	92	92	93	94	95	96	100	99	95
Feb27	97	100	100	98	99	97	97	101	103	100	86	73	66	72	76	83	82	96	98	99	98	118	131	121	95
Feb28	111	113	103	116	109	105	101	98	94	81	76	76	69	89	96	88	112	94	122	143	125	115	115	107	102
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Feb01	59	57	57	56	54	54	53	53	52	52	53	56	55	58	61	64	66	66	64	63	61	61	56	54	58
Feb02	56	55	54	55	54	53	54	53	52	51	52	52	53	55	58	59	61	60	62	63	62	61	56	57	56
Feb03	58	57	57	58	57	57	56	56	55	54	54	55	54	55	57	58	58	59	59	59	59	59	59	59	57
Feb04	59	59	59	58	58	58	57	58	59	58	58	57	58	59	60	61	63	62	62	61	61	61	61	62	60
Feb05	61	56	57	58	58	58	57	57	57	58	56	55	55	56	55	56	58	58	59	59	60	60	59	58	58
Feb06	58	57	58	57	57	57	56	55	52	51	51	51	50	53	54	56	57	58	59	59	59	58	58	59	56
Feb07	60	60	59	59	59	58	56	56	56	58	57	54	54	55	55	56	57	58	58	58	59	61	62	60	58
Feb08	60	60	59	59	59	57	56	55	54	56	56	53	53	55	56	58	59	59	59	59	62	61	59	60	58
Feb09	59	59	60	59	59	57	56	57	58	60	61	57	54	55	56	57	58	59	59	60	61	60	60	59	58
Feb10	58	58	58	56	56	57	56	56	56	53	50	48	48	52	55	56	57	58	58	59	59	59	59	58	56
Feb11	57	57	57	57	57	57	57	57	56	54	53	54	56	55	57	59	61	62	63	64	63	61	61	59	58
Feb12	58	58	58	58	58	57	57	58	59	58	53	52	53	55	56	56	57	58	59	59	59	59	58	58	57
Feb13	59	58	58	58	57	57	55	55	52	52	49	51	55	56	59	59	61	64	62	61	60	60	60	60	57

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
Feb14	59	59	57	57	58	58	56	55	54	52	49	52	55	58	59	58	58	59	59	59	60	60	59	58	57
Feb15	58	58	58	56	56	57	59	60	62	60	56	57	59	60	60	60	60	60	60	60	59	59	59	59	59
Feb16	59	58	58	58	57	57	58	59	57	56	52	52	54	56	57	57	58	61	62	62	61	60	59	59	58
Feb17	58	58	58	58	58	58	58	60	61	58	55	53	56	57	55	55	56	57	57	58	58	58	58	57	57
Feb18	53	54	56	57	57	57	57	56	54	52	51	52	54	55	57	58	59	61	61	61	61	60	60	59	57
Feb19	59	59	59	59	58	57	57	58	57	56	52	49	49	53	57	58	58	59	59	59	59	59	59	59	57
Feb20	59	59	59	59	58	58	58	59	58	55	52	53	56	57	58	57	56	56	57	57	58	60	60	59	57
Feb21	60	59	58	59	58	58	58	60	59	58	56	57	57	57	59	58	60	61	60	60	60	60	56	56	58
Feb22	58	59	59	59	59	58	58	58	56	53	55	55	52	55	60	60	60	59	59	59	59	59	59	58	58
Feb23	57	58	58	58	58	58	59	61	58	54	54	57	58	58	59	58	57	59	59	59	58	58	58	58	58
Feb24	57	57	57	58	58	58	59	61	59	54	52	53	56	56	59	60	58	58	58	58	58	57	57	57	57
Feb25	57	57	57	57	57	57	59	61	62	58	53	48	51	55	56	58	56	58	57	57	57	57	57	57	57
Feb26	57	57	57	57	57	57	59	59	55	50	46	48	53	54	55	56	57	58	57	57	57	57	57	57	56
Feb27	57	57	57	57	57	56	56	58	54	51	44	40	39	43	49	55	58	65	69	67	64	61	55	56	55
Feb28	59	59	56	53	57	56	55	55	52	47	49	57	59	65	74	68	68	68	67	68	68	63	63	63	60
2019, Field component: F, Base: 48600.0, Unit: nT																									
Feb01	48	47	48	50	49	50	51	50	48	50	50	53	52	51	47	44	51	49	53	53	57	53	62	50	51
Feb02	53	56	49	50	51	51	51	52	46	45	49	49	50	53	52	47	54	51	48	54	51	58	55	52	51
Feb03	52	53	51	52	51	51	52	50	52	52	51	52	52	52	52	53	53	54	56	53	53	54	54	53	52
Feb04	53	53	52	53	53	53	54	56	57	55	54	54	56	53	50	48	51	53	54	56	56	52	52	52	53
Feb05	58	54	52	52	52	53	53	55	55	55	53	54	56	56	54	52	54	54	54	52	53	54	55	56	54
Feb06	55	55	54	55	55	55	56	56	53	52	51	47	47	53	53	51	53	53	54	55	55	56	54	53	53
Feb07	54	54	53	54	53	53	53	55	57	59	59	58	58	58	54	53	53	54	55	55	54	52	51	57	55
Feb08	53	53	54	53	54	56	57	57	58	60	60	56	56	57	55	55	53	55	56	55	53	58	56	53	56
Feb09	54	54	52	53	55	56	55	56	57	58	61	58	56	57	54	57	55	52	56	52	53	54	56	56	55
Feb10	56	55	56	57	55	55	55	56	54	52	49	50	52	55	56	54	55	56	56	56	56	56	56	58	55
Feb11	56	56	55	55	56	56	57	60	59	56	54	55	58	57	53	45	50	54	56	57	57	58	57	59	56
Feb12	57	54	54	53	54	55	56	58	60	61	58	57	57	57	55	54	54	56	55	56	56	57	58	57	56
Feb13	54	55	55	56	57	55	56	57	54	50	48	42	41	52	56	55	51	51	57	59	59	57	56	57	54
Feb14	55	55	54	54	55	55	58	54	50	47	41	51	55	56	57	55	55	55	56	55	58	56	57	56	54
Feb15	56	56	54	55	55	55	57	59	59	58	51	51	55	56	58	57	56	56	57	57	57	57	57	57	56
Feb16	57	56	56	56	57	56	57	58	56	56	53	52	55	57	56	55	52	51	53	57	58	58	58	58	56
Feb17	57	57	57	57	57	58	59	60	59	55	52	51	55	57	55	55	55	57	57	56	57	58	58	61	57
Feb18	58	53	53	53	55	55	57	58	56	53	51	50	53	54	53	53	53	54	56	57	58	58	57	57	55
Feb19	57	57	56	57	57	57	57	58	58	55	50	48	50	56	58	57	55	56	56	58	57	57	57	57	56
Feb20	57	57	57	58	58	59	60	61	60	54	49	53	57	59	59	57	56	58	58	59	58	57	56	56	57

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
Feb21	56	56	57	56	58	60	63	62	62	60	58	56	51	51	56	55	53	57	57	58	57	58	61	55	57
Feb22	53	55	55	56	57	58	59	60	58	51	50	48	47	53	58	59	59	58	58	57	58	58	57	59	56
Feb23	58	57	58	58	59	60	60	61	57	50	48	51	57	60	62	61	56	58	58	58	58	58	58	58	57
Feb24	58	57	58	58	58	59	61	62	56	47	44	46	52	56	59	60	58	59	59	59	59	59	59	58	57
Feb25	58	58	58	59	59	60	62	63	60	51	44	42	47	56	60	61	59	59	59	59	59	58	58	57	57
Feb26	56	56	56	57	58	59	62	62	56	47	42	46	52	55	56	54	55	59	59	59	59	59	58	57	56
Feb27	58	57	57	58	58	59	60	62	61	56	51	46	42	44	50	55	50	49	51	59	60	64	61	53	55
Feb28	51	55	58	51	50	53	53	53	51	45	41	52	55	52	51	54	55	55	55	49	58	60	55	56	53

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Mar01	100	114	99	91	96	96	107	106	87	84	72	77	96	107	106	81	85	91	90	107	86	118	100	112	96
Mar02	112	101	96	96	102	103	105	110	101	97	101	104	104	102	98	92	84	79	84	90	102	105	105	111	99
Mar03	104	102	106	98	101	109	106	108	106	106	106	108	109	108	107	107	103	104	105	102	105	106	103	119	106
Mar04	109	110	105	104	105	106	104	101	100	97	90	94	99	100	101	101	99	99	100	104	103	104	105	113	102
Mar05	102	105	98	99	101	104	105	105	105	99	94	95	104	106	104	104	102	106	108	108	108	111	109	106	104
Mar06	105	104	109	110	113	117	108	112	110	102	103	115	117	113	113	109	101	97	93	97	102	111	109	108	107
Mar07	109	109	110	112	116	116	117	116	113	106	103	107	112	118	103	89	78	89	103	101	111	122	113	110	108
Mar08	102	99	102	103	107	110	112	110	105	100	93	102	112	116	115	112	108	107	107	109	110	110	114	112	107
Mar09	111	110	110	113	117	119	118	116	113	103	102	107	111	110	107	109	107	108	108	110	108	109	110	113	110
Mar10	119	111	108	106	106	106	111	110	107	100	99	105	112	116	115	111	109	108	109	110	111	112	113	114	109
Mar11	113	113	114	116	117	118	119	118	117	116	115	116	120	121	124	117	112	112	111	109	109	111	109	110	115
Mar12	112	112	111	114	116	120	119	108	95	99	100	102	110	112	111	107	103	102	103	103	111	104	102	104	107
Mar13	105	104	104	107	107	109	112	110	100	104	108	111	118	122	120	114	109	111	108	106	106	111	114	112	110
Mar14	111	109	109	110	110	110	112	112	112	109	109	104	102	108	100	100	98	100	97	100	105	123	118	116	108
Mar15	109	110	113	111	110	108	104	110	113	107	105	109	112	116	119	112	108	105	107	106	108	110	109	111	110
Mar16	107	109	107	109	109	109	112	113	110	94	81	100	111	114	101	94	78	77	80	97	103	124	104	107	102
Mar17	129	107	99	101	103	100	104	100	75	78	69	75	84	91	92	82	89	97	100	102	104	107	108	107	96
Mar18	106	106	108	108	111	113	114	112	111	111	115	113	111	111	112	108	105	107	108	109	112	111	111	110	110
Mar19	110	110	109	110	112	116	120	119	114	108	107	112	112	120	118	117	116	114	114	112	109	107	107	106	112
Mar20	108	110	111	110	111	110	112	113	113	113	111	114	117	117	117	112	108	104	110	111	111	112	115	113	112
Mar21	111	110	111	110	114	116	113	111	109	104	102	104	111	120	123	118	113	113	113	114	114	115	115	116	112
Mar22	116	116	116	116	116	114	113	110	107	107	110	115	117	118	117	114	113	114	115	117	117	116	116	116	114
Mar23	116	116	116	117	119	121	123	120	112	109	113	117	121	125	122	117	112	114	116	117	117	117	116	116	117
Mar24	116	115	115	116	118	121	122	120	118	113	115	122	125	128	126	122	119	119	121	122	122	125	133	130	121
Mar25	130	125	123	123	125	130	132	127	122	122	126	127	127	128	126	122	118	116	117	120	123	124	121	120	124
Mar26	118	115	114	120	123	120	123	119	115	110	111	113	111	113	115	115	113	114	116	118	119	119	117	123	116
Mar27	122	123	124	121	121	122	127	134	121	120	128	118	121	122	118	113	109	107	103	114	112	112	114	116	118
Mar28	116	118	119	114	116	121	127	120	119	127	132	129	122	113	96	103	108	105	107	107	112	116	125	127	117
Mar29	117	107	106	109	108	111	117	115	107	111	113	111	115	112	109	107	105	98	108	110	113	114	114	109	110
Mar30	109	112	111	107	106	111	112	108	109	112	116	113	115	115	113	111	110	110	111	113	113	114	114	113	112
Mar31	115	119	118	113	112	112	126	116	113	117	121	121	116	100	89	93	102	105	106	112	105	106	107	109	111
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Mar01	102	95	113	109	98	97	109	106	98	90	78	77	83	86	89	120	91	90	105	128	111	110	111	99	100
Mar02	100	114	107	102	102	100	100	105	104	101	87	85	83	84	88	104	111	98	107	99	97	96	97	105	99
Mar03	108	104	109	105	103	104	104	105	105	98	88	84	84	88	95	98	95	97	97	96	97	98	101	103	99

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
Mar04	105	105	111	108	107	107	107	108	106	99	83	73	76	77	84	92	95	97	99	99	101	101	103	118	98
Mar05	108	104	105	104	104	104	108	113	114	107	87	72	71	73	82	91	94	96	99	99	103	105	103	98	98
Mar06	100	98	96	98	100	101	105	108	117	107	88	75	72	80	92	94	95	98	109	102	105	109	102	97	98
Mar07	96	96	97	98	99	100	105	114	118	112	101	88	81	74	77	89	85	88	96	101	104	112	116	118	99
Mar08	111	103	99	99	100	102	107	115	119	112	98	86	79	83	90	98	99	98	100	100	99	100	100	101	100
Mar09	100	100	99	97	96	97	102	113	120	119	100	82	72	71	86	97	98	96	98	100	105	102	101	99	98
Mar10	104	108	106	108	107	104	106	112	115	108	93	81	76	77	85	94	97	97	99	99	99	99	98	98	99
Mar11	98	98	98	98	98	99	104	111	114	109	94	84	78	82	91	98	98	96	97	97	98	98	100	99	97
Mar12	100	100	100	103	100	100	106	116	108	97	86	80	81	89	97	103	100	98	100	99	106	107	108	102	99
Mar13	102	104	104	105	104	102	109	114	114	105	92	83	81	86	95	99	97	94	94	96	98	98	100	99	99
Mar14	101	101	102	103	105	105	108	114	116	103	82	73	71	79	85	93	94	96	98	101	118	126	108	121	100
Mar15	126	114	119	121	121	116	113	116	115	105	92	81	79	84	89	92	94	96	107	108	99	99	101	101	104
Mar16	103	101	105	102	103	104	109	116	117	110	89	78	81	82	82	95	89	94	99	99	103	130	126	116	101
Mar17	120	123	116	105	117	118	120	114	102	88	79	69	78	85	96	113	101	99	100	105	101	100	100	102	102
Mar18	102	102	103	102	101	101	103	109	111	103	89	82	79	83	88	95	98	100	99	103	100	102	102	101	98
Mar19	102	103	104	104	105	105	110	116	116	106	89	73	71	73	82	90	93	95	98	102	109	131	110	104	100
Mar20	100	100	101	102	103	106	111	117	117	108	93	84	79	81	89	95	100	108	103	103	101	101	101	101	100
Mar21	100	100	100	100	99	102	108	115	113	104	92	80	74	75	84	95	98	97	98	99	99	99	99	98	97
Mar22	98	99	100	100	101	103	108	112	111	104	93	82	75	76	83	91	96	97	97	97	97	98	99	99	96
Mar23	99	99	99	99	99	102	110	117	117	109	95	85	82	86	93	97	100	97	97	98	98	99	99	100	99
Mar24	100	100	101	101	101	103	110	116	118	111	94	79	74	78	85	93	96	94	94	95	96	96	95	97	97
Mar25	100	99	99	98	96	94	101	107	111	107	97	89	81	79	82	87	91	91	91	94	96	96	102	109	96
Mar26	104	111	111	109	111	105	113	119	120	113	98	82	76	79	86	94	98	95	95	97	97	98	99	99	100
Mar27	101	100	100	102	102	101	106	113	114	102	86	71	69	75	85	94	96	95	100	107	104	104	102	102	97
Mar28	103	103	106	107	110	109	116	118	106	98	88	78	74	73	80	87	96	95	99	106	113	110	116	109	100
Mar29	110	105	106	108	105	104	109	114	111	102	94	92	90	89	92	100	104	105	111	101	102	104	104	108	103
Mar30	108	103	107	111	107	105	109	112	111	107	95	85	80	83	88	95	100	99	100	101	102	103	104	106	101
Mar31	105	107	107	109	99	103	112	121	115	106	95	84	69	68	72	83	95	99	103	129	113	105	105	105	100

2019, Field component: Z, Base: 43800.0, Unit: nT

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
Mar01	62	56	56	60	61	58	57	58	56	50	51	59	60	60	60	66	67	66	66	66	67	62	62	62	60
Mar02	56	58	60	61	60	60	61	62	60	56	57	61	63	64	64	67	67	69	69	69	66	65	64	62	63
Mar03	62	62	61	62	61	60	61	61	60	58	58	64	62	59	61	62	62	62	62	63	63	63	63	61	61
Mar04	60	60	60	60	60	59	62	65	62	56	57	57	60	63	63	63	62	64	64	63	63	63	63	61	61
Mar05	63	62	62	63	63	63	65	67	64	56	49	53	55	60	63	64	63	63	62	62	62	62	61	62	61
Mar06	62	62	62	61	61	61	64	66	64	55	49	51	56	59	62	64	64	65	66	67	66	64	63	63	62
Mar07	62	62	62	62	61	61	61	63	61	54	50	47	52	57	62	66	68	68	67	67	65	61	60	60	61

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
Mar08	61	63	63	63	63	63	65	66	64	56	52	52	54	58	62	63	62	63	63	63	63	62	62	61	61
Mar09	61	61	61	61	61	61	62	64	61	52	48	51	53	56	59	62	61	62	62	62	62	62	62	62	60
Mar10	59	58	59	60	60	61	62	64	64	59	55	54	54	55	58	61	61	62	62	62	62	61	61	61	60
Mar11	61	61	61	61	61	61	62	64	61	54	49	46	47	50	54	58	58	60	61	62	62	62	62	62	58
Mar12	61	61	61	60	60	59	61	62	61	54	54	58	60	59	61	62	62	63	64	65	64	64	64	64	61
Mar13	63	63	63	63	63	63	66	67	63	60	59	60	61	59	56	59	61	62	63	64	65	64	63	63	62
Mar14	62	62	62	62	61	62	65	67	61	54	51	53	54	58	64	65	65	66	67	68	66	64	62	60	62
Mar15	61	62	61	60	61	62	64	64	59	55	55	56	59	60	62	63	62	63	64	65	65	64	64	63	61
Mar16	63	63	63	63	62	62	64	65	62	56	56	57	58	59	62	68	72	74	75	73	71	66	62	64	64
Mar17	54	56	59	58	57	59	60	60	59	56	57	62	65	68	68	70	70	68	67	67	67	66	66	65	63
Mar18	66	65	65	65	63	63	65	66	64	61	61	60	62	63	65	65	64	64	65	65	65	64	64	64	64
Mar19	64	64	64	63	63	63	63	61	56	51	53	54	57	61	63	65	62	63	63	63	64	64	64	64	61
Mar20	65	64	64	64	64	64	64	63	60	57	54	52	54	58	60	63	64	65	65	65	64	64	63	63	62
Mar21	63	64	64	64	64	65	68	67	65	62	57	54	55	57	59	62	62	62	63	63	63	63	63	62	62
Mar22	63	63	63	63	62	64	66	66	63	60	56	53	53	54	59	63	63	62	63	63	62	62	62	62	61
Mar23	62	62	62	62	62	64	65	64	61	56	54	55	58	60	62	64	63	62	62	62	62	62	62	62	61
Mar24	62	62	62	62	62	62	63	61	55	49	45	42	44	50	55	59	60	59	60	61	61	61	60	59	57
Mar25	59	59	59	60	59	60	61	62	61	56	51	48	49	53	56	58	60	61	62	62	61	61	62	62	58
Mar26	62	61	61	61	60	62	63	62	59	54	50	46	46	50	56	60	61	60	61	62	62	62	62	62	58
Mar27	61	61	59	59	58	61	64	63	62	57	52	51	53	56	61	63	62	63	66	65	65	65	64	63	61
Mar28	63	62	62	61	61	61	60	60	57	52	48	49	54	59	63	64	64	65	65	66	66	64	61	59	60
Mar29	59	61	62	63	62	64	65	65	63	59	55	55	56	58	59	63	66	67	67	66	65	65	65	65	62
Mar30	65	64	63	63	63	64	66	66	62	57	52	52	52	56	61	63	63	63	64	64	64	64	64	64	62
Mar31	64	62	62	62	62	62	62	64	64	59	54	53	54	59	66	71	69	67	67	67	68	67	67	66	63
2019, Field component: F, Base: 48600.0, Unit: nT																									
Mar01	56	57	51	51	54	51	56	56	45	39	34	43	53	57	57	52	54	55	56	64	55	64	57	61	53
Mar02	56	54	53	53	56	56	58	60	55	50	52	57	58	58	57	57	54	54	56	58	61	61	60	61	56
Mar03	58	58	58	56	56	58	58	59	58	55	55	61	60	57	59	59	57	58	59	58	59	59	59	64	58
Mar04	58	59	57	57	57	57	58	59	57	50	47	48	54	57	57	57	56	57	58	59	58	59	60	62	57
Mar05	58	59	56	57	58	59	62	63	60	51	42	45	51	56	59	60	58	59	60	60	60	61	60	59	57
Mar06	58	58	60	60	61	63	62	65	63	51	46	52	57	59	62	62	58	57	58	60	61	64	61	60	59
Mar07	60	61	61	61	63	62	63	64	62	53	47	46	52	59	56	55	51	57	62	61	64	66	61	59	59
Mar08	57	57	58	59	60	62	64	65	61	51	44	48	53	59	63	62	60	60	60	61	61	61	62	61	59
Mar09	60	60	60	61	62	63	64	65	61	50	45	49	52	54	56	60	59	59	60	61	60	60	61	62	59
Mar10	62	58	57	57	58	58	61	63	62	54	49	50	53	56	59	60	59	59	60	61	61	61	61	61	58
Mar11	61	61	61	62	62	63	65	66	63	57	51	48	51	54	59	60	58	60	60	60	60	61	61	61	59

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
Mar12	61	60	60	61	62	63	63	61	53	48	49	53	58	58	60	59	57	58	60	60	63	60	59	60	59
Mar13	60	60	59	61	60	61	65	66	58	56	57	59	63	63	59	59	59	61	61	60	61	63	63	62	61
Mar14	61	60	60	61	60	61	64	66	61	53	50	49	49	55	57	59	58	60	60	61	63	69	64	62	59
Mar15	60	61	61	60	60	60	60	63	59	53	51	54	58	61	64	62	59	60	61	62	62	62	62	62	60
Mar16	61	61	60	61	60	60	64	65	61	49	42	51	57	58	56	59	55	57	59	65	66	72	59	61	59
Mar17	62	55	53	53	54	54	57	55	43	41	37	44	52	57	58	56	59	60	61	62	62	63	63	62	55
Mar18	62	62	63	62	63	63	65	66	63	60	62	60	60	62	63	62	60	62	63	63	64	63	63	62	62
Mar19	63	62	62	62	62	65	67	64	58	50	51	53	56	63	64	65	63	63	63	63	62	62	62	61	61
Mar20	62	62	62	62	63	63	64	63	61	57	53	53	56	59	62	62	62	61	64	64	63	64	64	63	61
Mar21	62	62	63	62	64	66	67	66	63	58	52	51	54	59	63	64	62	62	62	63	63	63	63	63	62
Mar22	64	64	64	64	64	65	66	64	61	57	55	54	55	56	61	63	63	63	63	64	64	63	63	63	62
Mar23	64	63	63	64	65	67	69	67	61	55	54	57	61	64	66	65	62	62	63	64	63	63	63	63	63
Mar24	63	63	63	63	64	66	67	65	59	51	47	47	51	57	61	63	62	62	64	64	65	66	68	67	61
Mar25	66	65	64	64	64	67	69	68	66	60	58	55	56	59	61	62	62	62	63	65	66	66	65	65	63
Mar26	64	62	62	64	64	65	68	66	61	54	50	47	46	50	57	61	61	61	63	63	64	64	64	66	60
Mar27	65	65	65	62	62	65	70	73	65	60	59	53	56	60	63	63	60	61	61	65	64	64	64	64	63
Mar28	64	64	64	62	63	65	67	64	60	58	57	57	58	58	55	59	62	61	63	63	65	65	66	66	62
Mar29	61	59	59	61	60	63	67	65	60	58	55	54	57	57	57	60	62	60	64	64	65	65	65	63	61
Mar30	63	64	62	61	60	63	65	63	60	58	54	52	53	57	60	61	62	62	63	64	64	64	64	64	61
Mar31	65	65	65	63	62	61	68	65	64	61	58	57	55	53	55	61	64	63	64	66	64	63	63	64	62

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Apr01	110	111	115	117	115	117	115	104	91	80	79	83	102	102	92	87	96	101	108	110	111	109	109	108	103
Apr02	109	106	106	107	109	110	107	102	100	96	97	98	102	99	99	103	108	108	106	106	111	102	110	117	105
Apr03	124	118	113	107	106	110	105	110	106	95	87	84	82	91	100	103	97	101	104	108	107	104	101	99	103
Apr04	102	115	101	106	108	110	108	108	105	96	89	93	106	116	119	106	85	80	100	102	108	107	104	105	103
Apr05	103	109	104	108	104	105	98	91	88	90	94	104	107	92	94	96	102	102	106	119	105	111	121	112	103
Apr06	112	107	106	109	103	107	108	101	90	90	100	105	107	109	109	111	109	110	108	104	110	104	105	106	105
Apr07	108	106	107	108	109	116	112	106	98	95	90	90	98	99	108	111	112	114	112	113	114	112	131	120	108
Apr08	115	108	112	111	123	122	120	115	113	108	104	111	118	100	104	111	105	95	92	99	95	97	109	111	108
Apr09	107	104	112	108	108	112	109	107	93	89	96	106	111	112	111	102	94	96	109	115	114	118	122	124	107
Apr10	119	117	110	103	111	108	106	109	102	100	103	110	110	107	98	93	94	95	98	95	104	105	115	110	105
Apr11	108	104	104	106	110	111	107	106	102	97	99	96	104	109	108	106	98	105	111	113	111	111	111	114	106
Apr12	117	114	105	112	108	106	102	93	90	95	97	103	100	96	97	105	107	103	99	108	111	110	112	124	105
Apr13	121	111	113	110	109	106	110	108	105	110	112	110	109	111	112	112	110	111	113	114	118	117	116	115	112
Apr14	113	112	111	110	112	114	115	107	99	103	105	112	116	119	119	114	111	115	116	116	117	116	121	122	113
Apr15	117	118	114	113	115	111	107	102	100	94	102	106	110	112	110	112	115	112	105	112	107	100	109	111	109
Apr16	112	112	115	115	115	115	107	98	93	105	109	110	108	102	107	107	111	114	116	116	116	114	111	111	110
Apr17	111	111	112	113	114	110	105	100	98	102	115	125	127	124	120	118	117	112	112	120	116	110	115	117	113
Apr18	117	116	116	117	116	113	110	108	106	108	112	119	125	123	120	119	119	114	115	119	121	122	120	121	116
Apr19	120	120	120	121	121	116	114	113	114	119	127	125	114	110	111	115	116	116	114	119	122	120	120	120	118
Apr20	122	119	119	119	121	119	119	114	109	113	114	113	116	116	115	110	113	114	117	120	116	117	116	116	116
Apr21	115	116	118	118	118	118	113	104	96	101	111	116	118	118	119	119	117	119	119	119	119	119	120	117	115
Apr22	116	115	115	116	115	113	111	107	107	107	109	112	111	110	116	114	116	116	120	121	119	119	118	120	114
Apr23	118	116	117	118	121	123	120	115	111	114	119	125	120	115	110	107	110	120	121	123	103	105	109	128	116
Apr24	120	108	113	112	109	106	100	97	95	101	110	112	115	117	113	104	101	108	111	112	113	113	116	120	109
Apr25	117	118	114	114	118	114	106	102	101	99	98	105	103	113	115	115	114	113	116	117	117	117	114	113	111
Apr26	114	113	113	115	114	113	111	105	101	101	105	107	108	110	109	108	112	111	115	117	115	115	113	117	111
Apr27	111	109	109	110	112	113	113	111	98	91	92	102	111	107	105	107	110	110	113	115	117	107	112	116	108
Apr28	112	113	112	114	115	109	105	99	92	99	110	121	121	118	114	112	112	113	115	122	115	117	127	115	113
Apr29	116	117	114	114	116	116	114	110	105	111	123	124	122	116	109	107	109	111	112	112	113	114	117	117	114
Apr30	111	111	118	113	117	113	109	103	100	109	123	127	124	116	111	110	109	113	115	116	115	113	115	116	114
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Apr01	106	104	106	106	109	111	122	125	119	109	90	86	83	75	84	89	98	99	100	102	102	104	104	104	102
Apr02	105	106	107	106	106	110	119	124	124	116	98	82	73	73	81	91	99	98	96	102	123	116	105	108	103
Apr03	111	114	113	112	107	115	113	113	110	103	86	72	70	74	88	93	98	101	106	113	109	116	127	117	103
Apr04	106	110	113	109	108	112	119	123	118	104	79	67	71	81	84	88	92	106	110	108	112	109	108	107	102

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
Apr05	110	106	105	103	104	114	121	117	110	99	81	70	61	70	79	90	99	104	111	119	115	115	114	105	101
Apr06	104	102	99	103	104	108	118	123	117	104	91	78	73	78	88	97	102	105	108	115	110	111	107	105	102
Apr07	105	106	108	108	109	114	124	129	127	117	102	87	77	78	85	93	99	102	102	106	107	105	106	113	104
Apr08	121	118	114	115	106	110	111	115	116	108	99	87	78	75	85	89	100	113	108	110	114	116	103	113	105
Apr09	113	118	104	110	114	116	119	120	120	113	98	75	64	66	73	82	92	102	111	100	102	102	100	106	101
Apr10	112	114	122	115	118	115	123	123	117	107	93	81	72	75	81	90	101	123	131	110	101	105	105	109	106
Apr11	110	108	110	113	104	112	116	121	122	115	93	82	76	77	89	98	109	105	103	104	104	105	105	105	104
Apr12	109	116	112	109	114	118	124	125	112	96	90	81	75	78	85	96	101	104	110	104	103	104	105	104	103
Apr13	115	116	114	114	106	110	117	124	119	113	105	97	91	91	95	99	101	101	101	111	111	107	108	106	107
Apr14	106	107	108	108	108	114	123	130	125	114	99	82	74	78	86	94	100	103	104	102	103	105	109	103	104
Apr15	104	105	111	115	121	128	134	130	116	101	86	75	72	78	88	97	100	103	106	105	113	115	112	109	105
Apr16	107	108	110	114	117	120	123	123	115	109	100	87	75	78	88	96	104	106	105	105	114	109	103	103	105
Apr17	105	106	108	109	113	118	124	123	115	102	89	79	77	84	94	102	104	106	102	109	114	105	101	102	104
Apr18	104	107	109	111	116	120	125	125	112	98	87	82	77	82	90	96	100	102	102	102	105	103	103	106	103
Apr19	107	108	108	108	109	114	123	124	117	105	85	70	72	79	91	96	99	102	103	103	100	101	100	103	101
Apr20	105	109	108	109	109	111	116	117	110	104	90	79	76	82	87	95	97	100	104	110	108	107	107	106	102
Apr21	104	105	101	108	111	114	117	115	106	95	85	78	78	85	95	101	104	103	101	102	104	104	105	105	101
Apr22	105	106	109	109	114	120	124	125	119	108	89	72	65	72	79	89	98	101	101	102	104	105	105	106	101
Apr23	107	109	108	110	111	113	117	119	115	106	96	79	71	74	81	89	95	101	102	110	122	115	110	121	103
Apr24	127	113	108	111	116	120	126	127	119	104	90	77	72	77	87	102	108	103	100	103	103	106	107	110	105
Apr25	110	111	112	111	114	120	124	123	117	100	84	63	62	72	81	91	99	102	103	103	105	107	105	106	101
Apr26	104	107	107	109	113	120	126	127	119	104	87	75	71	78	89	97	104	102	100	102	105	111	113	108	103
Apr27	112	113	109	108	113	119	126	129	125	106	89	81	77	81	91	100	105	109	107	108	125	120	114	114	108
Apr28	112	110	108	110	116	124	131	134	123	102	85	72	69	74	82	88	96	101	102	103	110	108	112	111	103
Apr29	109	104	104	107	116	123	129	131	123	111	97	86	75	76	84	91	108	105	104	106	106	107	110	110	105
Apr30	110	107	108	119	125	127	127	121	113	101	89	82	80	86	91	94	97	101	101	105	118	108	105	105	105
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Apr01	66	66	63	62	63	65	65	66	63	58	55	57	61	64	68	72	70	69	68	68	67	67	67	66	65
Apr02	66	66	66	66	66	68	69	67	64	54	43	43	51	58	64	66	67	67	67	68	67	69	68	66	63
Apr03	64	62	63	63	63	62	61	60	59	54	52	52	58	65	65	68	69	69	69	70	69	70	70	69	64
Apr04	68	64	65	66	67	68	67	65	58	53	54	52	56	60	63	69	74	77	77	74	72	70	70	69	66
Apr05	69	68	68	66	66	67	68	64	57	50	50	50	53	61	70	70	70	70	70	69	69	68	65	66	64
Apr06	66	66	67	66	67	68	68	66	57	51	46	50	53	57	61	64	65	66	68	69	68	67	67	67	63
Apr07	67	67	67	67	68	69	70	70	64	54	47	46	50	57	60	63	65	65	66	67	66	67	64	63	63
Apr08	63	65	65	65	63	61	64	66	64	58	50	43	46	55	59	64	70	75	74	73	74	72	71	67	64
Apr09	68	67	67	64	66	67	68	68	64	61	53	51	54	59	65	71	74	75	73	71	70	69	68	66	66

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
Apr10	65	64	64	64	62	64	65	67	67	62	52	48	53	61	68	70	73	74	76	74	72	71	69	68	66
Apr11	68	68	68	68	68	70	71	70	64	56	50	51	58	65	68	68	70	69	69	69	68	68	68	68	66
Apr12	67	66	67	65	66	69	70	66	63	60	57	59	64	71	71	68	70	73	73	72	70	70	70	68	67
Apr13	64	65	66	67	68	68	69	68	64	60	57	53	56	62	69	70	68	67	68	68	68	67	67	67	65
Apr14	67	67	67	67	68	70	71	70	68	62	55	51	54	62	67	68	68	67	67	68	68	68	67	66	65
Apr15	66	65	65	66	67	68	68	65	61	57	54	54	59	64	66	66	66	68	70	71	72	73	73	72	66
Apr16	70	70	68	67	68	69	68	64	61	59	59	57	59	64	68	69	67	66	66	67	67	67	67	68	66
Apr17	68	68	68	68	69	71	70	64	56	52	50	52	55	60	65	67	67	67	68	67	67	69	68	67	64
Apr18	67	67	67	68	68	67	66	61	60	56	50	48	52	59	64	65	64	63	65	66	66	66	66	66	63
Apr19	66	66	66	66	65	66	67	67	64	54	42	42	48	57	61	64	64	65	66	67	66	66	66	66	62
Apr20	66	66	66	67	67	67	67	65	60	52	47	47	54	58	62	66	66	65	65	66	67	67	67	67	63
Apr21	67	67	67	66	67	69	67	64	61	56	54	54	57	61	65	67	66	65	66	66	67	67	67	67	64
Apr22	67	67	67	68	70	71	70	65	62	57	52	51	57	61	63	65	65	66	66	66	66	66	66	66	64
Apr23	66	66	66	67	68	69	72	70	64	55	45	44	50	54	60	65	67	67	67	67	70	71	70	67	64
Apr24	65	67	67	67	69	70	71	68	64	56	50	49	54	59	62	69	72	70	69	70	70	71	70	68	65
Apr25	68	68	68	68	69	69	71	70	66	56	45	44	47	51	55	61	66	67	68	69	69	69	68	68	63
Apr26	68	67	68	68	70	69	68	66	63	59	54	51	54	59	66	69	69	70	69	69	69	70	70	69	66
Apr27	69	69	70	70	72	72	74	72	70	65	58	56	61	65	65	67	69	69	69	70	70	72	71	70	68
Apr28	69	69	69	70	72	72	71	70	65	58	50	48	53	58	63	65	68	69	69	70	71	71	67	68	66
Apr29	68	68	68	68	69	68	67	65	60	53	47	45	50	57	64	69	71	71	70	70	70	70	69	68	65
Apr30	69	69	67	68	69	66	67	65	61	58	54	50	56	61	64	67	67	68	69	70	70	70	69	69	65

2019, Field component: F, Base: 48600.0, Unit: nT

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
Apr01	64	65	64	64	64	67	66	62	54	44	41	44	56	58	58	59	62	63	65	66	66	65	64	64	60
Apr02	64	63	63	63	64	66	66	63	59	48	38	38	46	51	57	61	64	64	64	64	67	64	66	68	60
Apr03	69	65	63	61	60	61	58	59	57	47	42	39	44	54	59	63	61	63	65	67	66	66	65	63	59
Apr04	63	65	60	63	65	66	65	63	55	47	44	44	53	61	65	65	60	61	70	68	69	67	65	65	61
Apr05	65	66	64	63	62	63	61	54	47	41	42	46	50	51	60	61	65	64	67	71	65	67	69	65	60
Apr06	65	63	63	64	62	65	66	61	49	42	42	47	50	55	59	63	63	65	65	64	66	63	64	64	60
Apr07	65	64	64	65	66	70	69	67	58	48	39	37	44	51	58	61	64	65	66	66	66	66	71	66	61
Apr08	64	63	65	64	67	65	68	67	64	57	47	44	49	50	55	62	65	66	64	66	65	65	68	66	62
Apr09	65	63	66	62	64	66	66	65	56	51	46	48	53	58	63	65	65	66	70	71	70	71	71	70	63
Apr10	68	66	63	60	62	62	63	65	62	56	48	47	52	58	60	61	64	66	69	66	67	67	69	66	62
Apr11	65	64	64	65	66	68	68	67	60	50	45	44	54	62	64	65	63	65	68	68	67	67	67	68	63
Apr12	69	66	63	65	64	66	65	57	53	52	50	55	58	62	63	63	67	67	66	69	69	68	68	72	63
Apr13	67	64	66	66	65	65	68	66	61	59	57	52	54	61	68	68	66	65	67	68	70	69	68	67	65
Apr14	67	67	66	66	67	70	72	67	62	58	52	51	55	63	68	68	66	67	68	69	69	69	70	69	65

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
Apr15	67	67	66	66	69	68	66	61	55	49	49	51	57	62	64	65	66	67	66	70	69	67	70	70	64
Apr16	69	69	68	68	69	70	65	58	53	56	57	55	56	58	64	65	66	66	67	68	68	67	66	66	64
Apr17	67	67	67	67	69	69	67	59	51	48	51	57	61	64	67	69	68	66	67	70	68	67	68	69	64
Apr18	68	68	68	69	69	68	65	60	57	54	50	51	57	63	66	67	67	63	66	68	69	69	68	69	64
Apr19	69	69	69	69	68	67	68	67	65	57	50	49	49	55	60	64	65	66	66	69	70	69	69	69	64
Apr20	70	68	69	69	70	70	70	66	58	53	48	48	55	59	62	65	66	65	67	69	68	68	68	68	64
Apr21	67	68	69	68	69	71	67	60	54	51	53	55	59	63	67	69	68	67	68	68	69	69	70	68	65
Apr22	68	67	67	69	70	70	69	63	60	55	51	50	55	59	64	65	66	67	68	69	68	69	68	69	64
Apr23	68	67	68	69	71	73	74	70	63	56	49	50	54	55	58	61	65	69	70	71	65	67	68	74	65
Apr24	68	65	67	67	67	66	65	61	56	52	49	49	55	60	61	64	66	67	68	69	70	70	71	71	63
Apr25	70	69	68	69	71	69	67	65	61	51	...	41	43	51	56	61	66	67	68	69	70	70	68	68	...
Apr26	68	67	67	69	70	69	67	63	58	54	51	48	52	57	63	66	68	68	69	70	70	70	70	70	64
Apr27	67	67	67	68	71	72	73	71	63	55	48	51	59	61	61	64	67	67	69	71	72	69	70	71	66
Apr28	69	69	69	70	72	70	68	64	56	52	50	51	56	60	62	64	67	68	69	73	71	72	73	69	65
Apr29	69	69	68	68	70	69	68	64	58	54	53	51	54	58	62	65	69	69	69	69	70	70	70	70	65
Apr30	68	68	69	68	71	67	65	61	56	57	59	57	60	61	63	65	64	67	69	70	70	70	70	69	65

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
May01	117	117	116	115	115	117	115	114	118	117	117	128	128	120	114	108	117	118	110	113	111	119	142	116	118
May02	107	104	111	114	112	101	101	99	87	93	110	114	113	116	111	107	112	107	105	108	111	113	115	120	108
May03	116	112	109	107	107	102	98	93	99	109	124	128	124	124	117	116	117	114	121	122	116	124	120	108	114
May04	111	112	114	117	114	104	97	94	92	99	108	127	129	120	99	92	102	106	102	104	104	108	108	113	107
May05	112	107	104	105	105	98	91	88	89	97	109	116	114	113	111	111	114	114	113	116	113	112	111	109	107
May06	110	113	113	111	110	106	99	96	97	102	108	113	120	125	118	119	117	111	105	109	113	113	108	109	110
May07	115	114	114	116	114	110	105	95	90	99	106	109	110	112	110	113	117	115	114	117	120	122	120	120	112
May08	120	121	120	120	121	121	120	114	106	98	104	115	121	123	122	123	122	121	122	126	126	123	120	124	119
May09	124	124	123	126	128	130	125	111	101	107	109	115	120	116	111	114	119	117	118	118	117	115	119	129	118
May10	118	119	112	111	116	116	109	103	99	98	101	102	103	106	115	112	114	118	130	126	121	132	131	121	114
May11	114	120	106	131	109	107	102	86	64	54	71	76	65	66	67	61	64	72	...	...	85	85	112	102	...
May12	100	103	100	97	99	100	97	90	77	77	88	96	102	106	105	105	108	111	109	107	109	111	110	112	101
May13	109	105	107	108	109	107	104	104	105	101	96	102	107	108	106	99	97	97	102	109	111	115	113	115	106
May14	119	116	121	114	108	87	54	45	82	79	76	73	72	72	71	74	81	91	96	110	97	93	94	94	88
May15	93	96	98	101	104	101	102	103	98	98	106	113	118	117	116	122	119	123	121	118	115	117	117	118	110
May16	115	118	113	109	110	109	104	106	110	110	109	114	113	108	99	101	107	118	121	107	107	112	114	116	110
May17	114	120	116	115	119	116	109	101	101	108	120	135	137	126	119	113	109	112	113	117	118	116	115	117	116
May18	117	116	115	117	119	115	108	99	92	93	108	118	115	111	113	110	107	106	112	113	114	113	113	115	111
May19	114	114	112	115	116	112	106	101	96	95	102	108	111	110	110	108	105	108	116	121	125	128	126	126	112
May20	130	140	122	119	118	115	108	96	85	80	86	101	108	116	116	112	108	110	111	113	115	113	113	115	110
May21	112	113	112	114	112	108	100	94	89	95	107	120	120	112	112	109	110	114	115	117	116	116	117	117	110
May22	117	117	117	119	121	114	107	105	109	116	121	124	127	126	124	125	124	124	124	127	125	122	120	121	120
May23	121	118	119	119	120	120	112	107	105	109	117	118	115	117	114	122	115	118	118	117	115	109	105	103	115
May24	112	111	110	113	111	110	108	99	101	106	106	105	109	109	106	111	118	118	120	121	117	119	125	128	112
May25	125	124	124	124	125	120	110	104	98	96	103	111	117	119	117	116	118	122	119	125	121	119	116	117	116
May26	117	118	117	118	119	114	107	101	100	105	110	115	121	122	117	118	115	117	118	119	120	119	130	133	116
May27	136	132	127	134	133	130	123	109	109	108	116	119	121	116	111	111	112	119	114	114	117	110	110	112	119
May28	111	113	113	113	110	107	105	106	104	102	114	125	125	123	114	126	123	125	127	120	114	115	122	130	116
May29	131	124	116	125	121	120	108	105	95	83	91	98	94	92	100	100	97	105	106	117	124	113	115	115	108
May30	122	128	111	110	108	101	96	87	85	87	97	108	103	106	109	112	116	115	119	113	116	110	113	117	108
May31	117	115	114	115	113	103	95	89	92	98	100	106	105	105	103	105	104	109	111	114	114	111	111	111	107
2019, Field component: Y, Base: 1500.0, Unit: nT																									
May01	106	107	111	115	123	127	126	123	111	103	98	87	85	89	94	95	98	99	123	108	122	128	112	117	109
May02	113	110	103	117	128	120	126	130	116	99	85	75	77	85	96	109	113	118	124	108	106	107	107	111	108
May03	110	107	105	111	122	128	128	126	118	102	83	70	72	79	90	95	98	100	106	105	108	122	123	110	105

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
May04	109	110	111	115	125	132	129	122	114	95	88	81	78	85	90	101	104	106	118	113	109	109	111	108	107
May05	106	108	111	115	125	130	128	123	114	99	86	78	76	80	91	102	104	104	104	104	107	106	108	110	105
May06	110	111	114	120	129	132	133	126	113	99	86	77	72	73	83	95	102	104	104	103	105	108	111	110	105
May07	110	113	112	119	124	123	132	132	123	107	91	78	75	79	88	96	103	104	108	103	102	105	107	110	106
May08	110	109	109	112	120	127	133	134	125	110	95	84	76	78	85	94	101	102	102	101	104	107	108	109	106
May09	111	110	110	111	119	128	136	139	125	108	95	91	81	79	85	93	99	104	106	106	108	108	106	112	107
May10	114	114	116	113	115	122	126	125	120	107	96	88	80	80	82	89	97	101	96	99	109	116	128	130	107
May11	141	138	127	130	138	139	142	141	126	105	92	83	63	76	85	97	107	112	...	...	129	136	125	111	...
May12	113	116	116	121	127	128	126	125	116	106	96	90	90	97	105	108	106	106	106	110	106	106	107	115	110
May13	117	115	116	121	127	133	134	128	118	106	90	83	82	84	86	92	101	119	112	108	107	106	114	111	109
May14	111	120	110	121	128	84	102	117	113	111	94	93	92	90	98	107	114	115	115	120	122	120	120	122	110
May15	121	121	122	125	134	139	137	130	118	107	96	84	76	81	91	97	102	101	104	106	109	109	111	112	110
May16	113	115	117	120	127	132	131	131	129	120	112	103	98	94	102	104	108	108	114	117	123	121	114	121	116
May17	121	118	119	121	127	131	129	122	113	102	87	80	81	91	100	105	107	107	106	107	107	107	106	107	108
May18	107	109	110	114	122	132	137	132	121	106	94	83	77	82	93	108	116	116	111	110	109	108	108	107	109
May19	107	107	108	114	123	134	135	131	120	101	86	80	80	88	97	106	111	109	106	105	105	108	105	107	107
May20	101	109	129	127	134	140	142	144	137	122	107	88	82	83	89	95	104	110	108	109	110	110	111	111	113
May21	110	110	111	115	131	139	143	142	131	112	93	83	83	89	92	98	102	103	104	107	109	110	110	110	110
May22	111	110	112	115	124	129	127	127	119	106	92	80	76	77	85	94	101	100	101	110	111	110	110	111	106
May23	113	114	114	119	126	129	130	131	117	96	83	74	76	81	88	94	101	105	105	112	117	121	124	123	108
May24	119	119	120	125	136	134	130	126	118	107	94	85	85	85	88	97	104	105	106	107	110	109	107	108	109
May25	110	113	114	118	127	134	134	132	123	111	96	83	77	80	87	95	105	109	109	107	108	109	111	112	108
May26	113	111	112	119	130	140	136	129	121	105	93	83	80	84	90	99	105	105	106	108	110	112	109	108	109
May27	109	108	118	122	130	137	137	135	115	108	96	86	81	81	85	97	103	100	105	110	112	116	118	119	110
May28	120	118	117	122	131	140	139	135	124	109	91	81	85	86	95	99	101	101	102	110	119	111	115	127	112
May29	122	119	124	104	117	128	131	132	121	102	88	85	78	83	94	101	110	115	110	118	111	112	108	113	109
May30	109	115	119	125	133	134	133	125	116	102	95	81	73	73	81	98	104	106	109	116	129	116	113	109	109
May31	108	112	116	122	133	141	143	142	129	109	96	87	87	93	98	104	110	112	114	113	113	110	110	111	113
2019, Field component: Z, Base: 43800.0, Unit: nT																									
May01	68	68	69	70	71	66	64	62	62	60	54	49	52	60	64	68	67	72	74	74	73	72	65	65	65
May02	68	69	68	66	65	65	65	64	60	56	57	55	56	60	66	70	70	72	74	73	71	71	70	69	66
May03	69	69	69	70	72	72	71	67	62	59	56	55	56	62	65	69	70	69	70	70	71	70	68	70	67
May04	70	71	71	72	73	74	74	69	63	60	55	55	58	61	69	75	73	74	74	75	74	72	72	71	69
May05	70	70	71	73	74	72	70	64	57	55	55	53	57	63	66	69	69	69	70	70	70	71	71	71	67
May06	72	71	71	73	75	74	70	65	56	51	53	58	60	62	68	72	76	75	74	74	74	73	73	73	68
May07	72	72	72	73	75	74	72	74	69	57	54	55	59	67	70	73	75	74	74	74	72	72	71	71	70

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
May08	71	70	71	72	72	71	74	75	69	62	55	52	57	64	65	68	70	69	69	69	70	69	70	70	68
May09	69	69	70	71	73	71	71	69	63	55	50	46	50	57	61	67	69	69	70	71	71	72	72	67	66
May10	67	67	68	70	68	69	71	67	60	54	50	47	49	53	60	67	70	71	73	72	74	72	70	70	65
May11	70	68	68	60	63	66	67	66	64	65	68	64	69	75	86	89	92	91	...	...	84	81	74	70	...
May12	73	73	75	77	78	76	77	75	73	69	62	60	62	69	72	72	70	72	75	75	75	75	75	75	72
May13	75	75	75	76	76	74	73	70	66	64	60	56	58	68	73	77	81	85	83	80	78	77	76	76	73
May14	75	73	70	71	75	70	70	72	71	69	69	69	74	77	80	88	89	87	85	84	82	83	82	82	77
May15	81	81	81	82	82	78	74	69	65	62	57	57	58	62	66	67	69	72	73	74	75	75	75	75	71
May16	75	74	75	77	78	76	76	72	68	64	57	55	56	62	66	69	71	74	76	77	77	77	76	73	71
May17	72	73	74	74	74	72	70	66	61	57	55	56	61	68	74	75	75	74	74	74	74	74	74	74	70
May18	74	75	75	77	78	77	76	72	65	60	60	64	67	70	74	77	79	78	75	75	75	75	75	75	73
May19	75	75	76	77	77	74	74	75	70	64	57	60	67	73	77	79	78	77	75	74	74	74	74	74	73
May20	74	67	68	74	74	75	78	80	79	72	67	66	66	68	75	79	79	78	77	76	76	75	75	75	74
May21	75	75	76	78	80	79	74	73	66	60	56	57	61	62	70	73	73	73	74	74	74	74	74	74	71
May22	74	74	75	76	77	76	74	70	63	59	59	54	55	60	67	72	72	71	71	72	73	73	73	73	69
May23	73	73	74	75	77	75	73	69	66	58	50	45	50	57	62	68	70	73	74	75	76	77	77	77	69
May24	75	75	75	77	76	74	75	74	68	65	65	61	54	58	64	69	73	72	73	75	75	75	73	73	71
May25	73	72	71	72	73	73	75	72	66	57	48	50	54	60	65	70	71	74	74	74	73	73	73	74	68
May26	73	73	73	74	75	75	76	73	68	64	57	54	55	61	70	76	76	74	73	74	73	72	71	70	70
May27	70	69	71	73	73	70	69	69	69	68	68	67	66	71	77	81	79	80	79	80	79	79	78	77	73
May28	76	75	75	74	72	69	69	71	70	68	62	60	63	65	63	67	71	71	72	76	79	79	78	75	71
May29	73	73	74	74	69	67	67	70	68	66	66	63	67	70	76	81	82	81	79	78	75	76	76	75	73
May30	74	69	72	76	77	77	80	81	77	73	67	66	66	68	74	75	76	76	76	77	78	77	77	76	74
May31	75	75	76	78	80	78	78	81	78	67	62	56	55	63	72	76	77	77	76	76	76	76	76	76	73

2019, Field component: F, Base: 48600.0, Unit: nT

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
May01	70	70	69	70	71	68	65	63	64	62	56	56	59	63	64	65	68	73	72	73	71	74	78	67	67
May02	65	65	66	66	65	60	60	59	49	48	55	55	56	61	64	67	70	69	70	69	69	70	71	72	63
May03	70	68	67	67	69	67	65	59	57	57	61	61	60	66	66	69	70	69	73	74	72	74	71	67	67
May04	69	69	71	73	73	70	66	61	54	54	53	62	64	63	62	64	68	70	69	70	69	69	69	70	66
May05	69	67	67	69	70	66	61	54	47	49	53	55	57	62	65	67	68	69	69	71	70	70	69	69	64
May06	69	71	70	71	73	70	64	58	50	48	51	57	62	66	69	74	76	73	70	71	72	72	70	70	67
May07	73	71	72	74	74	72	69	66	59	52	51	53	57	65	67	72	75	73	73	74	74	74	74	74	68
May08	73	73	73	74	75	75	77	75	66	56	51	54	60	67	68	71	73	72	72	74	74	73	72	74	70
May09	73	73	73	76	79	79	77	68	58	54	49	48	54	58	60	66	71	70	71	73	73	72	73	73	68
May10	69	70	67	68	69	70	70	63	55	48	45	43	45	51	61	65	70	73	79	77	76	80	77	73	65
May11	71	72	65	69	62	64	63	55	44	39	48	48	46	53	63	64	68	71	69	70	71	68	73	65	62

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
May12	67	68	69	69	71	70	69	64	57	53	51	52	57	65	68	67	67	70	72	72	72	73	73	73	66
May13	72	71	71	73	74	72	69	66	63	58	53	51	55	64	69	69	72	76	76	77	76	76	75	75	69
May14	77	74	73	71	72	57	44	42	58	54	52	51	54	58	60	69	73	75	76	81	74	73	72	73	65
May15	71	72	73	76	77	73	69	65	59	55	54	57	59	63	66	70	71	75	75	75	74	76	76	76	69
May16	75	76	74	74	76	74	72	69	67	63	56	56	56	60	59	63	68	75	78	74	74	75	75	74	69
May17	73	75	74	75	76	73	68	61	56	55	58	65	71	72	75	74	72	72	73	74	75	74	74	75	70
May18	75	75	75	78	80	77	74	66	56	52	57	65	67	67	73	74	75	74	73	74	74	74	74	74	71
May19	74	74	74	77	78	73	71	69	63	56	53	57	65	69	74	76	74	73	75	77	78	79	78	78	72
May20	80	78	72	76	76	76	76	72	66	58	55	60	63	68	74	76	75	76	74	74	75	74	74	75	72
May21	74	74	75	77	79	76	68	65	56	52	54	60	64	61	68	70	71	72	74	75	74	74	74	74	69
May22	74	75	75	78	80	76	71	66	61	60	62	59	61	65	70	76	76	75	75	77	77	76	75	75	72
May23	76	74	75	77	79	77	73	67	62	56	53	48	51	59	62	71	70	75	75	76	76	74	72	72	69
May24	74	73	73	76	75	72	72	68	63	62	61	57	52	56	61	67	74	74	75	77	76	76	78	78	70
May25	77	76	76	76	78	76	74	68	60	50	44	50	56	62	66	70	73	77	76	78	76	74	74	75	69
May26	74	74	74	75	77	75	73	67	62	60	55	55	59	64	70	77	76	74	74	75	75	74	78	79	71
May27	79	77	77	82	81	78	74	68	67	65	69	69	68	70	74	78	77	80	78	79	79	76	76	76	75
May28	75	74	74	74	71	67	66	68	66	63	62	65	68	68	63	72	74	75	77	77	78	79	80	82	72
May29	80	77	74	78	72	70	65	67	60	53	56	56	58	59	68	74	73	76	75	78	79	75	75	75	70
May30	77	75	71	74	74	71	72	69	64	60	59	63	60	63	71	73	76	75	77	76	78	75	75	77	71
May31	76	75	75	78	79	73	70	70	68	60	56	53	52	60	67	71	72	74	74	76	75	74	74	74	70

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Jun01	110	112	109	110	108	104	99	98	94	96	106	115	116	111	109	108	112	114	117	118	119	120	119	119	110
Jun02	125	119	118	120	121	115	100	88	83	86	99	112	117	117	114	112	112	119	119	120	122	121	119	118	112
Jun03	115	116	119	124	124	117	107	102	101	113	121	123	119	119	119	121	121	125	119	121	122	121	120	121	118
Jun04	124	122	121	123	126	117	111	104	97	96	104	114	119	118	117	117	106	98	100	104	101	99	102	106	110
Jun05	108	118	116	115	115	109	101	92	87	86	93	99	100	103	106	109	113	117	118	120	117	115	115	116	108
Jun06	113	114	115	117	118	113	102	96	92	95	105	109	106	104	102	107	115	119	120	120	118	116	115	115	110
Jun07	113	114	115	120	120	114	105	100	94	95	98	106	115	119	118	124	123	122	116	117	116	117	118	115	113
Jun08	116	117	118	123	122	118	110	104	100	99	115	121	121	126	132	130	124	142	112	108	121	123	123	115	118
Jun09	109	105	110	120	112	105	97	87	84	85	92	99	98	99	98	99	104	109	111	115	113	112	112	113	104
Jun10	113	111	112	115	116	110	104	95	86	82	85	89	98	103	108	113	115	117	117	117	115	115	115	115	107
Jun11	114	114	114	116	115	107	99	99	99	100	106	111	113	113	112	113	115	117	118	122	121	121	121	121	113
Jun12	122	121	120	126	127	121	112	105	104	109	112	114	114	115	116	118	120	119	118	121	122	119	118	119	117
Jun13	124	124	123	126	124	121	117	107	98	90	90	101	106	110	102	105	117	119	124	128	127	129	130	137	116
Jun14	124	119	121	124	123	114	103	99	100	101	103	107	111	102	104	109	109	111	117	120	124	120	121	120	113
Jun15	120	120	121	124	122	119	106	100	98	97	104	110	112	108	101	103	103	109	114	117	119	120	118	117	112
Jun16	115	116	111	111	113	106	103	103	102	104	103	105	111	109	108	109	108	114	115	119	121	119	115	114	110
Jun17	112	113	114	117	117	113	109	98	84	80	89	100	105	108	111	113	115	119	122	123	124	125	124	125	111
Jun18	124	122	122	124	122	118	112	106	99	96	98	111	118	123	119	119	120	118	118	120	118	123	126	126	117
Jun19	123	124	125	127	132	132	123	115	105	103	112	117	118	119	123	121	119	122	126	128	129	128	127	125	122
Jun20	125	123	121	124	129	133	119	103	99	98	90	91	101	103	111	114	117	122	122	125	124	121	117	124	115
Jun21	124	125	126	134	133	125	111	100	91	87	92	97	102	105	112	118	119	119	121	125	129	135	131	120	116
Jun22	123	120	116	117	121	122	122	112	101	94	96	103	111	116	119	120	120	119	121	124	124	122	120	120	116
Jun23	121	119	120	123	124	122	117	110	103	97	94	93	93	95	105	111	113	117	119	120	121	122	123	126	113
Jun24	128	127	123	123	124	127	128	120	110	104	92	89	92	100	106	113	114	116	121	120	122	123	122	121	115
Jun25	117	116	117	121	122	119	114	109	110	109	101	96	103	109	114	115	113	113	117	123	127	130	127	124	115
Jun26	117	115	116	119	119	114	110	111	105	93	92	97	103	112	117	113	115	115	119	121	121	121	125	121	113
Jun27	118	117	115	119	119	115	110	109	102	100	107	114	116	115	117	118	120	121	124	127	129	127	126	125	117
Jun28	122	118	114	118	117	112	109	108	107	107	104	103	113	118	118	121	120	118	117	116	117	116	118	116	114
Jun29	116	116	115	118	119	114	105	99	107	114	115	116	120	120	122	120	119	120	121	123	123	123	123	122	117
Jun30	120	120	120	121	122	120	115	111	113	117	125	128	128	125	126	125	122	119	119	120	120	122	123	125	121
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Jun01	112	112	114	118	127	133	130	125	115	105	98	97	100	101	101	102	104	105	108	108	109	109	110	113	111
Jun02	116	114	114	120	127	137	134	127	114	98	84	77	76	80	90	101	108	110	109	107	107	113	113	116	108
Jun03	117	120	122	129	135	139	140	138	129	111	97	83	80	81	86	93	101	108	109	108	108	109	110	109	111
Jun04	110	113	115	122	129	136	131	122	113	105	93	82	74	74	86	96	104	112	119	118	120	117	117	118	109

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
Jun05	115	108	118	126	135	145	146	145	136	119	107	94	88	88	92	100	108	113	113	110	111	111	113	114	115
Jun06	116	115	116	120	127	137	133	123	115	107	95	83	80	83	89	97	106	112	114	113	113	111	112	114	110
Jun07	116	116	119	121	129	140	144	141	131	119	103	89	83	83	86	89	95	108	111	111	112	114	120	123	113
Jun08	122	121	119	122	125	132	134	135	128	113	92	75	66	63	63	60	79	87	119	112	113	127	141	129	107
Jun09	130	131	123	123	128	133	136	138	131	119	106	91	86	82	83	94	105	115	114	114	113	113	112	115	114
Jun10	119	119	120	123	128	136	138	139	135	126	110	94	85	81	83	94	106	111	114	116	115	112	113	116	114
Jun11	117	118	119	120	126	135	141	142	131	117	101	88	82	83	86	93	101	106	109	113	113	112	113	113	112
Jun12	115	120	122	129	139	145	140	137	131	120	108	98	94	89	92	102	108	114	114	112	110	111	112	111	116
Jun13	110	109	112	118	134	141	138	135	130	114	100	85	73	73	82	100	111	112	110	108	106	105	110	129	110
Jun14	122	119	121	123	132	134	133	136	126	107	92	84	80	81	90	98	106	109	109	108	111	110	112	113	111
Jun15	112	115	118	125	134	147	149	143	130	117	99	88	85	87	95	102	110	113	115	114	114	112	113	114	115
Jun16	114	119	121	126	134	140	132	132	127	111	94	90	88	86	92	101	108	112	113	114	115	114	113	111	113
Jun17	114	114	116	120	130	138	146	151	141	122	103	90	85	86	93	99	106	109	109	108	110	110	111	110	113
Jun18	110	113	114	121	131	136	134	132	125	106	85	73	76	80	90	99	106	109	112	113	109	109	109	110	108
Jun19	113	115	119	124	131	139	145	150	146	129	106	94	88	86	90	96	102	104	106	107	109	111	112	113	114
Jun20	114	117	120	128	131	131	134	138	130	118	99	82	71	69	73	84	95	105	112	109	112	116	117	119	109
Jun21	124	126	128	133	138	140	139	140	131	119	108	96	87	87	91	96	99	103	105	106	108	109	111	115	114
Jun22	113	113	117	121	132	140	145	143	133	119	100	85	79	84	93	101	106	110	110	108	109	110	111	112	112
Jun23	114	115	116	120	128	135	138	141	137	125	111	96	87	89	93	96	101	107	108	109	110	111	114	116	113
Jun24	116	117	124	130	130	134	141	144	143	133	114	98	88	88	93	101	106	107	110	110	114	112	114	117	116
Jun25	118	118	118	123	128	133	136	142	143	133	118	109	103	99	101	105	108	106	105	106	106	106	110	116	116
Jun26	116	120	121	123	132	133	135	134	133	122	109	99	91	90	93	98	106	113	112	110	111	113	117	121	115
Jun27	121	122	119	122	131	139	139	135	127	118	104	95	89	93	98	101	103	103	105	105	108	108	111	114	113
Jun28	116	121	121	123	131	134	135	132	127	117	105	91	85	90	100	109	113	113	112	113	113	114	116	119	115
Jun29	121	123	123	125	129	134	133	131	124	116	107	95	87	92	95	99	105	108	107	110	112	114	116	117	114
Jun30	120	112	120	121	126	135	139	138	131	119	108	100	92	92	98	104	108	111	111	111	111	114	116	119	115
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Jun01	76	76	77	78	79	76	77	76	70	62	61	62	63	68	72	75	72	74	75	76	76	76	76	76	73
Jun02	75	73	75	76	75	75	78	83	78	65	59	54	54	62	69	75	76	77	76	76	75	75	76	76	72
Jun03	76	76	77	78	78	75	71	75	72	66	57	57	61	66	68	73	74	74	76	75	75	75	75	75	72
Jun04	74	74	75	76	76	75	77	78	75	66	59	58	62	67	69	78	84	87	88	86	85	84	82	81	76
Jun05	80	78	76	78	78	77	75	72	71	69	65	62	61	65	72	75	78	79	78	77	76	77	76	76	74
Jun06	76	76	77	79	82	80	78	78	72	64	60	61	62	66	69	72	75	79	78	77	77	77	76	76	74
Jun07	76	77	77	78	79	77	74	76	72	70	67	65	67	71	76	80	82	82	80	79	78	78	77	77	76
Jun08	77	76	76	76	77	80	81	84	79	73	57	58	61	66	71	77	74	83	89	85	82	80	77	76	76
Jun09	75	76	78	76	78	77	78	82	78	70	68	69	67	68	70	75	78	81	82	81	79	79	79	78	76

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
Jun10	77	77	79	81	81	79	79	84	83	77	72	71	69	70	77	83	83	81	80	79	79	79	78	77	78
Jun11	77	77	78	79	80	79	76	75	72	66	61	59	64	65	68	75	79	79	79	78	78	77	77	76	74
Jun12	76	77	78	79	77	74	73	72	69	67	64	59	58	61	63	72	78	78	76	75	75	76	76	76	72
Jun13	76	76	77	79	78	75	74	72	72	73	68	65	63	68	74	76	79	80	78	77	77	76	76	72	74
Jun14	72	74	76	77	77	78	76	76	71	65	57	61	63	65	70	74	79	80	79	79	79	77	78	78	73
Jun15	78	78	79	82	85	82	78	76	74	71	70	66	65	71	76	77	76	77	78	79	78	77	78	77	76
Jun16	78	77	76	78	76	74	77	77	74	69	60	57	62	68	70	73	75	79	79	80	79	77	77	77	74
Jun17	77	77	77	79	81	80	75	72	70	64	64	63	64	70	77	80	80	79	77	77	77	76	76	76	74
Jun18	77	77	78	79	77	72	71	74	72	67	58	58	63	69	74	76	77	80	78	77	78	78	77	77	73
Jun19	77	77	77	77	76	78	80	82	80	69	62	63	65	69	74	77	77	76	75	74	75	76	75	76	74
Jun20	76	76	77	77	74	73	75	76	71	70	68	69	69	70	75	81	84	82	81	79	78	78	79	78	76
Jun21	76	76	77	77	74	71	71	72	66	58	58	62	63	71	77	79	79	79	78	77	77	77	77	77	73
Jun22	77	77	78	78	74	71	74	78	78	70	67	65	66	68	74	79	79	79	78	77	78	77	77	77	75
Jun23	77	77	78	78	77	79	76	75	72	71	70	70	68	71	75	78	80	80	79	79	79	78	78	78	76
Jun24	77	75	76	75	76	78	78	79	78	72	71	67	66	72	74	76	78	78	78	78	77	77	77	77	75
Jun25	77	78	78	79	80	81	82	78	75	70	70	72	71	67	72	79	80	78	77	77	77	77	78	78	76
Jun26	78	78	79	80	79	78	80	82	82	76	71	68	70	74	79	82	82	83	81	79	78	78	77	77	78
Jun27	78	78	79	80	81	80	76	75	73	71	69	67	71	73	77	78	75	75	76	78	77	77	78	78	76
Jun28	77	77	79	79	80	80	78	77	78	81	80	75	66	72	79	81	81	80	80	79	79	79	78	78	78
Jun29	78	78	79	78	75	72	73	72	72	68	69	68	66	71	77	81	79	77	77	77	77	77	77	77	75
Jun30	78	78	77	80	80	77	73	74	71	70	68	71	71	75	77	78	78	78	77	77	77	77	77	78	76
2019, Field component: F, Base: 48600.0, Unit: nT																									
Jun01	74	75	74	75	76	72	71	69	62	54	58	62	64	67	69	71	71	73	75	77	77	78	77	77	71
Jun02	79	75	76	78	78	76	72	70	64	53	52	54	55	63	69	73	75	78	77	78	78	78	77	77	71
Jun03	76	76	78	81	82	77	69	70	67	65	61	62	63	68	69	74	76	79	77	77	77	77	77	77	73
Jun04	78	77	77	79	81	76	75	73	67	59	55	58	63	67	70	77	79	78	80	80	78	76	76	76	73
Jun05	77	78	76	78	78	75	70	63	60	57	56	56	55	60	67	72	76	79	79	79	77	76	76	76	71
Jun06	75	76	77	79	83	79	73	70	63	56	56	59	58	61	63	68	75	80	80	79	78	77	76	76	71
Jun07	76	76	77	80	81	77	71	70	64	62	60	62	67	72	76	82	84	84	80	79	78	78	79	77	75
Jun08	77	76	77	80	81	81	78	79	72	66	58	61	63	70	77	82	77	93	87	81	84	83	81	77	77
Jun09	73	72	75	78	77	73	71	70	65	57	58	62	59	60	62	67	72	78	79	80	78	77	77	76	71
Jun10	76	75	77	80	81	77	74	75	71	63	59	60	61	65	73	80	82	81	80	79	78	78	78	77	74
Jun11	77	76	78	79	80	76	70	69	66	60	58	58	63	64	66	73	78	79	80	80	80	79	79	79	73
Jun12	79	79	80	83	83	78	73	69	65	65	63	60	59	62	64	73	79	80	77	77	78	78	77	77	73
Jun13	79	79	80	83	82	78	75	69	66	62	58	59	59	65	68	71	79	81	82	82	81	82	82	83	74
Jun14	76	76	79	81	81	78	71	69	65	59	53	58	61	60	65	71	75	77	80	81	82	79	80	80	72

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
Jun15	79	79	81	86	88	84	75	70	67	63	65	64	64	67	70	71	70	75	77	79	79	79	78	78	75
Jun16	77	77	74	76	75	71	72	72	69	64	56	54	61	65	67	70	72	78	78	81	81	79	76	76	72
Jun17	75	76	77	79	82	79	73	66	58	50	53	56	59	66	74	78	79	79	80	80	80	80	79	80	73
Jun18	80	80	81	83	80	...	...	...	...	59	51	56	64	72	...	...	...	81	79	79	79	81	81	81	...
Jun19	80	80	81	82	84	85	84	83	76	65	61	64	66	70	77	79	78	78	79	80	81	81	80	80	77
Jun20	80	80	79	81	80	82	77	72	65	63	57	59	62	63	72	79	84	84	83	83	82	80	79	81	75
Jun21	80	81	82	85	83	76	71	67	58	48	49	55	57	66	75	79	80	80	80	81	83	85	83	79	73
Jun22	80	79	78	79	77	76	78	78	72	62	59	60	63	68	75	80	81	80	80	81	81	80	79	79	75
Jun23	79	78	79	82	81	82	77	74	68	64	61	60	58	62	70	75	78	80	80	80	81	81	81	82	75
Jun24	83	80	79	78	80	83	84	82	76	68	61	56	56	65	70	75	77	78	80	79	80	80	80	79	75
Jun25	78	78	79	82	83	82	81	76	73	69	64	64	66	65	72	78	79	77	78	80	82	83	82	81	76
Jun26	79	78	79	81	81	78	78	81	77	67	62	60	65	72	79	80	81	83	82	81	81	80	81	79	77
Jun27	79	79	79	81	83	80	75	73	68	65	66	66	71	72	77	79	77	78	80	82	83	82	82	82	77
Jun28	80	78	78	80	80	79	75	74	75	78	75	69	65	73	79	83	82	81	80	79	80	79	79	78	78
Jun29	78	79	79	80	77	72	69	66	69	69	69	68	68	73	80	82	80	79	79	80	81	81	81	80	76
Jun30	80	80	79	82	83	79	74	73	71	71	73	76	76	78	81	81	80	80	79	79	79	80	81	82	78

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Jul01	127	125	117	117	118	140	127	117	99	95	93	97	98	92	103	102	101	107	114	117	114	112	111	112	111
Jul02	117	115	115	118	116	109	100	94	88	92	99	104	114	117	113	104	98	105	117	111	114	118	119	119	109
Jul03	120	119	120	123	119	112	101	95	101	109	116	117	121	120	121	117	119	110	108	111	114	115	115	113	114
Jul04	113	114	116	117	118	115	111	107	102	101	108	116	119	115	112	110	106	112	122	131	126	123	121	122	115
Jul05	123	125	122	124	131	131	122	114	105	102	106	113	118	118	124	120	118	118	121	120	119	118	117	116	119
Jul06	118	119	122	123	122	122	122	122	116	110	105	108	113	117	121	123	120	119	121	122	123	123	124	125	119
Jul07	125	127	127	129	131	129	123	115	107	100	94	92	94	104	115	121	121	117	118	124	123	122	121	114	116
Jul08	115	123	119	119	120	122	113	106	93	84	87	92	96	105	110	113	114	114	115	140	158	158	162	146	118
Jul09	133	132	137	132	129	121	112	105	94	95	97	103	105	106	101	112	111	122	128	125	114	113	114	118	115
Jul10	119	119	119	124	115	94	97	80	88	88	97	82	85	83	88	90	103	110	113	117	116	113	111	112	103
Jul11	118	113	111	116	114	104	106	107	93	102	110	104	103	102	99	100	102	106	108	109	107	109	108	106	107
Jul12	108	105	107	109	108	103	97	102	98	105	110	114	110	111	111	107	...	102	105	109	111	114	115	110	...
Jul13	112	113	115	119	120	118	113	106	98	91	101	110	108	105	107	105	101	104	116	120	115	118	119	122	111
Jul14	123	114	114	114	114	109	101	97	100	106	112	116	118	118	116	116	116	113	113	119	123	122	118	116	114
Jul15	117	122	122	118	115	115	109	107	116	122	115	111	127	121	110	105	105	103	108	117	115	113	113	112	114
Jul16	113	116	116	117	117	117	113	106	104	106	107	106	105	110	112	112	110	112	118	123	123	124	123	121	114
Jul17	117	121	121	118	116	116	120	112	113	110	108	110	103	104	114	117	113	114	115	117	115	119	118	115	114
Jul18	115	113	114	115	115	114	109	104	107	111	113	113	117	127	125	119	112	116	119	120	119	118	115	115	115
Jul19	113	112	112	115	117	113	106	104	105	105	105	108	118	124	122	120	121	117	117	118	118	122	117	115	114
Jul20	113	113	115	117	120	116	106	100	99	108	118	122	124	124	122	120	120	118	117	119	118	117	118	120	116
Jul21	118	120	121	122	124	124	120	115	108	101	105	111	115	117	110	115	117	118	123	138	130	126	143	147	120
Jul22	138	135	132	130	125	118	107	108	108	102	107	111	98	102	116	114	115	111	109	112	106	112	111	110	114
Jul23	109	109	110	113	112	111	110	113	121	121	119	123	121	110	110	109	113	116	117	119	121	120	121	118	115
Jul24	117	112	113	114	121	118	111	103	101	107	119	126	123	118	116	112	111	115	123	118	118	114	116	113	115
Jul25	113	115	115	117	118	117	112	105	102	103	111	120	120	113	105	106	108	113	119	119	118	117	118	116	113
Jul26	114	114	114	116	115	115	112	111	114	110	110	111	117	118	116	115	114	119	122	122	122	121	119	120	116
Jul27	118	115	114	115	116	112	109	111	109	116	114	...	...	...	...	120	123	123	117	123	116	112	116	118	...
Jul28	121	125	126	124	120	114	109	107	108	113	120	126	125	126	124	126	125	118	119	...	...	121	121	123	...
Jul29	124	123	124	120	121	112	108	102	105	113	120	123	119	117	113	107	109	112	116	119	117	114	115	115	115
Jul30	116	118	116	116	116	109	100	93	94	104	113	126	130	125	118	120	111	116	115	113	117	117	128	122	115
Jul31	124	121	119	122	124	119	114	100	86	95	103	105	109	114	115	120	120	123	127	131	130	127	128	122	117
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Jul01	125	128	134	138	141	136	138	142	140	130	117	104	90	88	92	101	115	113	111	111	116	117	116	115	119
Jul02	122	123	125	130	137	141	139	140	132	121	111	102	95	92	94	99	102	103	118	110	109	110	114	116	116
Jul03	118	120	122	127	132	134	136	139	136	128	112	101	94	96	98	105	109	112	115	114	115	114	114	115	117

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
Jul04	117	117	119	125	133	143	144	144	137	127	114	102	92	92	97	104	108	110	109	109	116	112	114	117	117
Jul05	117	119	121	122	124	130	132	136	129	114	103	98	91	92	94	102	109	111	111	113	115	117	118	119	114
Jul06	118	119	121	127	132	137	137	137	131	120	106	95	88	83	82	92	103	110	112	112	113	114	115	117	113
Jul07	117	116	118	121	127	137	136	133	130	124	110	96	88	82	80	86	99	109	118	114	113	118	128	125	113
Jul08	122	124	134	133	135	137	138	138	134	126	116	107	100	92	91	98	108	113	115	106	100	106	114	123	117
Jul09	121	116	116	122	130	138	142	146	141	133	121	106	94	84	89	94	96	104	104	113	160	124	122	120	118
Jul10	126	126	126	127	132	118	114	125	127	124	121	113	110	105	105	110	116	116	115	116	114	116	122	124	119
Jul11	133	123	125	131	140	139	140	130	121	119	116	110	105	101	102	109	112	110	112	116	116	117	117	118	119
Jul12	120	120	121	124	129	138	128	124	115	107	103	97	99	105	111	118	...	119	116	115	116	120	120	118	...
Jul13	118	120	122	126	135	138	137	137	130	115	105	94	88	93	100	110	118	115	115	123	115	112	114	118	117
Jul14	121	121	123	127	133	136	136	133	126	117	113	108	101	98	104	116	118	115	112	112	116	123	117	117	118
Jul15	115	112	119	126	132	137	134	127	119	108	96	90	88	90	97	106	111	112	115	126	120	116	115	117	114
Jul16	118	117	117	121	132	138	137	137	129	119	104	96	94	99	105	109	115	113	108	110	112	115	117	120	116
Jul17	121	122	126	128	127	130	136	141	137	130	118	102	96	97	101	108	115	116	116	117	119	121	122	119	119
Jul18	119	123	123	126	132	132	129	123	117	114	105	100	98	101	107	111	115	113	113	115	116	117	118	118	116
Jul19	120	120	121	126	135	140	144	148	138	126	111	97	89	91	98	109	118	119	119	116	116	119	120	122	119
Jul20	123	124	125	126	128	129	131	132	127	122	108	98	96	94	95	106	112	112	112	114	115	117	119	121	116
Jul21	122	123	125	129	135	138	137	138	136	132	113	97	89	88	98	110	113	119	115	107	110	119	136	135	119
Jul22	135	133	130	132	139	141	138	136	131	118	105	93	92	91	87	98	106	108	114	118	126	124	122	122	118
Jul23	124	125	127	130	139	141	140	137	130	117	119	105	98	106	105	106	108	107	110	111	114	121	122	123	119
Jul24	125	126	125	130	128	132	132	133	129	123	118	112	105	102	105	108	109	110	110	112	120	116	121	123	119
Jul25	124	125	127	125	126	126	128	131	131	120	109	98	85	84	97	111	115	116	115	116	117	120	123	121	116
Jul26	121	122	123	127	131	133	135	139	136	129	118	105	98	96	98	106	112	114	114	115	118	118	119	120	119
Jul27	123	125	126	128	130	132	136	142	143	139	124	...	...	...	...	98	102	105	111	120	128	126	122	125	...
Jul28	125	130	126	126	131	134	134	135	130	117	105	100	98	95	99	104	106	110	110	...	...	117	119	119	...
Jul29	120	119	125	133	137	146	150	152	140	122	107	94	88	91	99	109	116	117	115	116	117	118	118	118	119
Jul30	116	116	120	125	134	142	144	144	136	121	106	95	89	92	98	99	116	116	116	120	117	119	117	120	117
Jul31	122	125	125	124	132	139	147	152	139	129	113	96	82	81	91	103	113	116	113	112	116	120	126	122	118
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Jul01	77	76	77	79	79	74	76	75	71	68	62	59	63	64	77	84	85	84	82	80	81	82	82	81	76
Jul02	79	80	81	83	83	80	76	73	72	68	64	59	57	61	75	83	85	85	85	84	83	82	81	81	77
Jul03	80	80	80	81	79	77	77	79	74	72	73	68	63	64	71	82	85	84	81	81	81	81	81	81	77
Jul04	81	81	82	84	86	84	80	80	72	65	62	61	64	68	74	82	82	81	81	80	80	81	80	80	77
Jul05	80	79	80	80	79	79	80	80	79	75	67	65	72	71	76	79	80	79	79	79	79	79	79	79	77
Jul06	79	79	78	80	80	74	73	78	78	77	70	65	63	63	69	75	78	79	78	78	78	78	78	78	75
Jul07	78	78	78	79	78	74	77	81	80	76	70	65	61	64	70	78	82	82	81	81	80	80	79	80	76

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
Jul08	80	78	78	81	82	82	84	85	84	82	79	76	73	74	75	81	82	81	80	81	80	80	79	78	80
Jul09	79	79	78	77	75	80	83	80	77	74	69	65	60	66	72	79	80	81	81	84	86	85	84	83	77
Jul10	81	82	83	84	84	87	84	85	81	77	75	78	80	81	85	88	90	90	89	86	84	85	85	84	84
Jul11	82	81	82	84	85	84	81	80	77	75	71	71	73	73	82	88	87	86	87	86	86	85	85	84	81
Jul12	84	84	85	87	88	83	80	78	78	76	73	78	81	80	84	89	...	86	84	85	86	85	84	84	...
Jul13	84	84	85	86	87	84	80	79	80	76	67	69	74	79	83	89	92	88	88	86	85	84	84	84	82
Jul14	82	83	84	86	87	85	82	84	84	79	77	71	67	73	78	84	83	83	82	82	83	83	83	83	81
Jul15	83	80	81	83	84	84	81	77	74	75	70	62	60	68	76	82	87	88	87	85	84	83	83	83	79
Jul16	83	84	84	86	85	83	81	80	77	74	72	72	75	78	79	81	86	84	82	83	83	83	83	82	81
Jul17	82	82	83	86	86	84	82	82	80	75	75	82	79	78	81	85	85	85	84	83	83	83	82	82	82
Jul18	82	83	83	84	86	83	79	79	76	75	73	71	69	72	74	78	78	80	81	82	81	82	82	82	79
Jul19	82	83	83	85	86	82	81	80	78	71	67	65	68	73	76	80	83	83	82	82	82	81	81	81	79
Jul20	82	82	83	84	84	82	82	84	79	72	66	67	72	75	79	82	83	83	81	81	82	82	82	82	80
Jul21	81	81	82	83	84	82	81	81	79	75	72	71	76	80	78	80	83	84	82	82	83	83	81	77	80
Jul22	78	79	79	81	82	81	83	83	81	82	78	76	74	73	76	79	83	85	85	86	86	85	84	83	81
Jul23	84	84	84	85	84	84	82	82	73	62	56	60	58	68	78	77	78	80	82	82	82	82	82	82	77
Jul24	80	81	82	83	82	82	83	84	84	81	76	74	73	73	78	83	79	79	82	84	84	84	83	83	81
Jul25	83	83	83	83	83	83	86	87	83	71	64	66	67	73	80	85	82	79	81	81	82	82	82	82	80
Jul26	82	82	82	84	83	80	81	80	79	78	74	68	66	70	73	77	78	79	79	81	81	81	82	82	78
Jul27	81	82	82	83	84	83	78	79	74	70	68	...	...	...	...	77	79	80	81	82	82	83	83	83	...
Jul28	83	82	81	81	82	83	84	84	79	70	62	61	70	76	79	81	80	80	80	...	...	82	82	82	...
Jul29	82	82	80	81	84	83	82	80	76	71	70	68	70	73	78	82	84	83	82	83	83	83	83	83	79
Jul30	83	82	82	84	86	84	85	85	77	72	70	65	66	73	77	85	85	85	85	87	87	87	86	85	81
Jul31	83	83	83	84	84	86	87	87	84	79	77	72	71	75	80	85	87	83	80	81	82	82	83	84	82
2019, Field component: F, Base: 48600.0, Unit: nT																									
Jul01	83	81	78	81	81	85	82	77	66	61	54	52	56	55	71	77	78	80	80	80	80	80	79	79	74
Jul02	80	79	81	84	83	78	71	65	61	59	59	56	57	63	73	77	76	79	84	81	82	82	82	82	74
Jul03	81	81	82	84	81	76	72	71	69	70	73	69	66	67	73	82	86	80	77	78	80	80	80	80	77
Jul04	79	80	82	84	86	84	79	77	68	61	60	62	66	68	73	79	77	79	83	86	84	83	82	82	77
Jul05	83	84	82	83	86	86	83	80	75	69	63	64	73	72	79	80	80	80	81	81	80	80	80	79	79
Jul06	79	80	81	84	84	78	77	82	79	75	...	...	63	64	71	78	79	80	80	80	81	81	81	82	...
Jul07	82	83	83	85	85	81	81	81	76	70	61	56	52	59	69	79	84	82	82	84	83	83	82	79	77
Jul08	80	81	80	82	84	85	83	81	74	68	66	66	64	69	72	78	81	80	80	91	97	97	99	92	80
Jul09	86	86	87	84	81	83	82	76	68	66	62	60	57	62	66	77	78	84	86	87	86	83	83	84	77
Jul10	83	83	84	88	84	77	75	69	69	66	67	63	66	66	72	76	83	86	86	85	84	83	82	82	78
Jul11	83	80	80	84	84	79	77	77	67	70	69	66	67	67	74	80	80	81	82	83	81	81	81	80	77

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
Jul12	80	80	81	84	84	78	72	72	70	71	71	76	77	77	81	84	81	80	79	81	83	84	83	81	79
Jul13	82	83	84	88	89	85	79	75	72	66	62	67	70	73	79	83	84	82	87	87	83	84	85	86	80
Jul14	85	82	83	85	86	83	76	76	77	75	75	72	68	74	78	84	83	82	80	83	85	86	84	83	80
Jul15	83	82	84	84	83	84	78	74	74	78	69	60	66	70	73	77	81	81	83	86	84	82	81	81	78
Jul16	82	84	84	86	86	84	81	77	72	70	69	68	70	75	77	79	82	82	83	85	85	86	86	84	80
Jul17	83	84	85	87	85	84	84	81	79	73	72	78	73	72	80	85	84	84	83	83	82	84	83	82	81
Jul18	82	81	82	84	86	83	76	75	72	73	72	70	70	77	78	79	77	80	82	83	83	82	81	81	79
Jul19	80	81	81	84	86	81	77	75	74	68	63	62	69	76	78	82	85	83	82	83	82	83	81	81	78
Jul20	80	81	82	85	86	82	78	77	72	69	68	70	75	78	81	83	84	84	81	82	82	82	83	83	80
Jul21	82	83	84	86	88	86	83	81	76	69	68	69	75	80	75	80	83	84	85	91	88	87	94	91	82
Jul22	89	88	87	88	86	83	80	80	78	76	74	74	66	66	75	78	82	83	82	83	82	83	82	81	80
Jul23	81	81	81	83	82	82	80	82	76	66	60	64	62	66	75	74	77	79	83	83	84	84	84	83	77
Jul24	81	79	81	82	85	83	81	78	78	77	78	78	76	74	78	81	77	79	85	84	85	83	83	82	80
Jul25	82	82	82	83	84	83	84	82	77	66	63	69	69	71	75	80	78	78	82	82	82	82	83	82	78
Jul26	81	81	81	83	83	80	80	79	78	76	72	67	67	71	73	77	77	80	82	84	84	83	83	84	79
Jul27	82	81	81	82	84	81	76	77	73	72	68	70	73	73	73	78	81	83	81	85	82	82	83	84	79
Jul28	85	86	86	85	84	83	81	81	76	69	65	67	74	80	82	85	83	81	81	84	83	84	84	85	81
Jul29	85	85	83	83	86	82	79	75	73	71	72	71	71	74	76	78	80	81	82	84	83	82	82	83	79
Jul30	83	83	82	84	86	81	78	75	68	68	69	71	72	76	77	86	83	84	84	85	87	87	91	87	80
Jul31	87	85	85	86	87	88	86	80	71	70	72	67	68	74	78	86	87	86	85	87	87	87	88	86	82

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Aug01	137	115	115	119	119	117	107	92	84	83	95	114	123	122	119	118	115	116	116	122	119	120	131	123	114
Aug02	115	113	113	113	114	110	106	99	95	91	91	100	109	112	114	116	116	118	119	122	123	124	123	122	112
Aug03	121	118	118	118	119	114	106	96	86	86	96	110	118	121	120	118	116	115	114	117	119	120	120	119	113
Aug04	121	121	122	123	122	116	108	111	113	107	109	115	116	116	114	113	112	118	123	124	125	127	126	129	118
Aug05	131	130	135	140	131	128	132	105	85	65	55	76	41	70	74	77	36	76	85	88	104	118	102	95	95
Aug06	99	100	96	97	95	90	85	85	79	65	71	88	90	103	98	98	100	100	107	109	107	105	115	113	96
Aug07	103	100	99	99	101	98	99	98	97	94	90	93	99	100	97	98	102	99	...	107	110	114	104	104	...
Aug08	103	106	106	107	109	105	95	91	92	94	99	105	106	102	87	89	97	103	104	111	106	105	108	108	102
Aug09	108	106	108	110	112	108	102	96	96	98	105	106	113	112	107	104	103	107	115	115	115	118	120	131	109
Aug10	123	114	108	110	108	110	103	99	99	93	103	111	112	109	101	102	104	107	110	112	110	111	107	111	107
Aug11	109	110	111	112	111	112	102	96	96	104	112	106	93	96	100	108	111	110	111	113	114	127	114	114	108
Aug12	115	118	118	119	120	116	114	107	102	98	105	111	118	117	116	110	109	112	115	114	117	...	127	128	...
Aug13	123	118	112	115	116	114	108	103	101	100	97	97	115	117	118	114	114	107	108	108	105	110	114	118	111
Aug14	117	111	108	109	108	104	98	94	92	94	98	102	110	112	111	106	107	109	113	115	115	115	114	115	107
Aug15	113	111	110	110	112	109	102	98	95	99	106	111	115	120	126	125	122	118	118	120	121	121	123	125	114
Aug16	125	121	116	115	114	113	108	104	104	93	98	111	118	116	111	107	103	102	105	109	113	111	112	111	110
Aug17	113	115	117	119	123	124	114	106	98	94	110	124	124	123	119	113	114	113	118	118	120	120	120	123	116
Aug18	123	119	128	119	117	120	112	106	95	84	89	101	104	107	108	106	110	113	117	114	112	117	111	112	110
Aug19	113	114	114	115	114	111	114	111	101	101	106	111	115	117	118	116	115	118	117	117	118	120	120	117	114
Aug20	121	118	122	122	121	119	111	102	89	92	104	114	112	111	109	109	112	115	117	117	118	117	117	118	113
Aug21	117	120	117	118	117	113	104	94	91	90	95	106	109	106	108	113	118	121	125	121	121	122	121	121	112
Aug22	122	120	116	117	120	116	106	98	96	103	111	115	115	115	114	116	117	118	112	114	121	124	129	127	115
Aug23	123	123	123	120	118	116	109	101	92	90	100	108	110	109	106	107	109	112	118	121	118	119	120	120	112
Aug24	118	118	115	114	117	116	113	103	97	96	101	116	117	115	113	...	117	115	115	115	116	117	118	117	...
Aug25	116	117	117	117	115	111	109	115	111	110	109	112	109	112	115	114	116	116	117	120	118	117	119	118	115
Aug26	121	123	116	119	123	120	117	107	100	93	98	97	110	114	115	113	114	118	128	127	126	128	129	123	116
Aug27	124	121	127	129	124	111	107	101	90	90	88	79	88	98	107	109	108	111	109	108	115	115	114	123	108
Aug28	121	112	110	112	113	112	107	103	98	97	96	98	98	101	102	106	108	109	110	112	113	114	112	112	107
Aug29	110	111	111	110	108	103	98	93	96	103	112	115	118	118	120	118	118	117	...	...	121	122	121	121	...
Aug30	121	120	119	117	114	114	113	108	106	109	115	119	120	119	113	106	109	99	92	108	116	121	125	126	114
Aug31	129	142	139	126	107	100	83	90	95	87	65	89	59	100	87	89	84	84	122	106	99	114	134	116	102
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Aug01	120	131	118	124	136	143	142	139	126	107	90	81	83	93	103	114	118	118	122	124	117	119	124	123	117
Aug02	123	124	126	126	134	142	148	151	145	132	120	104	95	97	106	113	117	117	115	116	118	118	119	121	122
Aug03	122	122	122	124	129	133	132	133	131	121	100	87	87	94	100	108	114	116	115	114	115	117	119	121	116

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
Aug04	122	123	124	127	135	143	148	153	143	127	118	109	103	98	100	104	109	110	110	112	115	116	118	119	120
Aug05	121	122	122	125	128	123	124	127	130	118	102	96	84	89	93	104	123	121	114	118	134	135	132	120	117
Aug06	127	128	126	126	139	145	147	149	140	125	111	97	92	98	102	115	123	123	119	121	121	123	120	119	122
Aug07	134	132	129	133	141	143	151	156	148	135	124	112	102	100	107	116	123	128	...	123	120	133	129	125	...
Aug08	126	129	131	132	135	143	145	142	140	128	113	99	93	89	104	106	114	120	126	122	122	123	124	125	122
Aug09	125	127	128	130	136	141	141	138	133	124	112	102	102	105	108	113	114	120	115	117	118	120	124	132	122
Aug10	126	139	120	126	131	139	141	137	128	117	115	113	110	108	111	115	123	124	121	121	127	132	125	123	124
Aug11	125	125	127	128	132	137	142	140	135	129	117	103	96	98	104	110	115	117	119	121	123	124	123	121	121
Aug12	122	121	126	131	139	144	148	147	137	124	108	97	92	102	111	118	123	121	119	118	117	...	119	117	...
Aug13	123	128	130	127	134	138	139	139	135	121	108	101	101	104	106	112	129	136	122	121	122	125	122	125	123
Aug14	123	125	127	128	132	135	141	147	140	123	111	103	100	100	105	115	122	124	121	122	122	122	123	123	122
Aug15	124	125	126	129	130	132	137	140	137	129	118	104	97	100	105	111	117	116	116	117	120	121	122	121	121
Aug16	124	127	127	130	134	136	141	146	137	128	114	103	100	104	108	118	123	124	122	125	122	122	122	122	123
Aug17	122	121	119	118	123	132	137	137	128	112	94	87	92	97	104	110	119	122	120	120	120	121	122	122	117
Aug18	122	116	119	130	136	145	149	153	144	129	111	96	94	100	108	116	123	131	125	124	128	133	135	133	125
Aug19	129	127	124	124	128	135	146	154	150	136	115	98	94	95	98	104	115	118	118	119	120	122	122	124	121
Aug20	127	123	122	128	132	133	136	140	134	119	98	82	78	87	96	109	116	121	120	121	120	123	123	122	117
Aug21	125	125	131	132	139	144	147	145	135	123	109	98	92	95	99	104	112	117	112	117	119	121	123	125	120
Aug22	127	128	127	129	136	144	147	142	132	119	109	102	100	100	107	111	118	117	120	117	121	124	121	122	122
Aug23	126	125	129	129	133	137	140	139	134	124	116	106	98	99	104	111	117	121	118	120	121	121	121	123	121
Aug24	124	119	128	126	129	134	143	147	140	123	111	104	102	106	110	...	117	120	118	120	120	121	122	123	...
Aug25	125	125	126	131	136	139	141	139	136	126	118	107	101	100	104	110	114	116	117	120	121	125	126	127	122
Aug26	133	137	133	130	133	136	140	145	139	129	111	98	96	102	105	109	115	116	114	116	120	130	137	136	123
Aug27	138	141	141	137	139	145	139	138	137	124	109	90	87	90	96	101	107	111	120	123	121	123	127	123	121
Aug28	131	132	134	130	135	140	143	145	141	133	122	113	106	103	106	111	117	120	123	125	125	126	127	128	126
Aug29	130	128	128	130	134	138	142	142	135	121	110	104	101	103	108	109	112	113	...	...	123	124	125	128	...
Aug30	128	129	131	134	135	136	138	138	136	128	114	99	100	99	106	114	122	124	126	118	118	120	136	144	124
Aug31	139	146	151	151	139	135	130	131	135	117	108	97	108	106	107	133	120	130	149	131	134	134	152	145	130
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Aug01	80	81	83	83	84	82	84	85	83	76	70	72	77	80	83	86	86	85	85	85	83	83	82	80	81
Aug02	82	83	84	86	85	83	83	81	74	71	66	65	71	77	80	82	84	82	81	81	82	82	82	82	79
Aug03	82	83	83	84	85	83	85	87	85	82	74	67	73	78	79	82	84	84	84	84	84	84	83	83	82
Aug04	83	83	83	85	86	84	85	82	80	74	73	72	69	73	74	79	83	83	82	83	82	82	82	82	80
Aug05	81	81	81	82	86	85	84	85	84	83	84	86	93	94	97	106	116	108	101	99	95	91	88	89	91
Aug06	87	88	89	89	90	89	87	86	85	82	83	85	87	95	97	101	101	96	92	90	90	91	90	85	90
Aug07	86	89	90	92	93	94	94	94	94	88	82	80	82	85	91	94	95	93	...	89	89	88	89	89	...

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
Aug08	89	88	89	90	91	87	86	87	83	82	78	75	80	86	91	91	90	90	90	90	90	90	90	89	87
Aug09	90	89	89	90	92	88	89	89	88	89	82	78	80	84	84	89	93	90	89	89	89	89	88	85	88
Aug10	85	84	87	87	86	87	88	90	85	81	80	83	83	86	90	93	93	91	90	90	89	90	90	89	87
Aug11	89	89	88	89	90	87	89	92	89	85	88	88	83	82	84	87	89	90	89	88	88	86	87	88	88
Aug12	88	87	87	88	90	87	86	87	89	87	80	75	80	84	87	91	90	88	87	88	88	...	86	85	...
Aug13	85	86	87	89	90	87	86	86	83	82	80	77	81	83	83	88	92	92	92	90	91	90	89	88	86
Aug14	86	86	88	89	90	91	92	91	87	78	76	79	80	84	86	86	86	87	87	87	87	87	87	87	86
Aug15	87	88	88	88	89	86	86	88	86	78	73	74	77	78	81	83	86	86	86	86	87	87	87	86	84
Aug16	85	85	86	87	88	89	89	87	85	84	84	84	84	84	89	92	91	88	88	89	88	88	88	89	87
Aug17	89	88	88	88	87	87	90	90	90	86	78	79	79	78	82	85	87	87	87	88	87	86	87	87	86
Aug18	87	88	85	86	89	89	90	90	88	82	76	76	82	84	86	89	90	89	88	89	88	88	88	88	87
Aug19	88	88	88	89	89	88	85	85	83	75	68	71	74	77	80	82	84	84	85	86	86	86	86	86	83
Aug20	85	85	85	85	87	87	90	91	93	87	81	79	81	81	85	88	89	87	87	87	88	88	88	87	86
Aug21	86	85	85	87	89	89	93	92	88	84	83	81	80	80	80	81	83	84	85	86	86	86	86	86	85
Aug22	86	86	86	87	89	89	90	89	89	78	73	70	74	80	82	84	84	85	87	89	89	88	86	85	84
Aug23	86	86	86	87	87	86	89	89	83	76	74	76	76	83	85	86	88	88	88	88	87	87	87	87	85
Aug24	87	87	87	87	87	89	92	90	83	74	72	74	75	78	81	...	87	86	87	87	88	88	87	87	...
Aug25	88	87	86	87	88	88	89	84	78	72	70	72	76	82	85	86	87	86	87	88	88	89	89	88	84
Aug26	87	87	87	87	88	89	89	89	89	84	83	80	80	83	84	86	87	87	86	86	87	88	86	86	86
Aug27	85	86	85	84	86	88	92	92	89	86	82	79	82	83	84	87	89	89	90	92	92	92	92	89	87
Aug28	86	88	88	89	88	89	90	91	92	89	84	82	83	87	90	91	90	89	89	88	89	89	90	90	88
Aug29	90	90	89	89	90	90	91	89	87	84	80	78	80	81	82	83	85	86	...	...	87	87	87	87	...
Aug30	87	88	88	87	87	86	86	87	86	87	84	83	80	82	81	87	91	96	97	94	92	92	89	89	88
Aug31	88	82	78	77	83	87	89	89	88	83	80	88	94	97	100	105	101	100	96	93	94	93	85	82	90

2019, Field component: F, Base: 48600.0, Unit: nT

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
Aug01	89	81	82	84	85	83	81	75	69	62	61	70	79	82	83	86	84	84	84	87	84	85	89	83	81
Aug02	81	82	82	84	84	81	80	75	66	61	57	60	68	75	79	82	83	83	82	83	84	85	85	85	78
Aug03	84	84	84	85	86	82	81	78	72	69	65	65	73	79	81	83	84	83	82	84	85	85	85	84	80
Aug04	85	85	86	87	88	85	82	81	79	72	71	72	70	73	73	77	81	84	85	86	86	87	86	87	81
Aug05	88	87	90	93	93	90	91	80	70	61	56	67	58	...	...	86	79	88	85	85	89	91	82	80	...
Aug06	80	81	80	80	81	78	74	73	69	60	63	71	75	87	87	91	93	87	87	86	86	85	88	84	80
Aug07	81	82	82	84	86	86	86	86	85	78	70	70	73	77	81	85	88	84	84	84	86	87	83	83	82
Aug08	83	84	84	86	87	82	78	77	73	73	70	71	75	78	76	77	81	84	84	87	85	85	86	85	80
Aug09	85	84	85	87	89	85	83	80	79	80	77	73	78	81	80	83	86	85	88	88	88	89	89	92	84
Aug10	88	83	83	84	83	84	82	82	78	71	74	80	81	82	83	86	87	87	86	87	86	87	85	87	83
Aug11	85	86	86	87	87	85	83	84	80	79	86	82	72	72	76	82	86	86	86	86	87	90	85	86	84

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
Aug12	87	87	87	89	91	88	86	84	82	78	75	72	80	83	86	87	86	85	86	86	87	87	90	90	85
Aug13	87	86	85	88	90	86	83	81	77	75	72	69	80	83	83	86	90	88	88	86	85	87	88	88	84
Aug14	86	84	84	86	87	85	84	81	76	69	69	73	77	81	83	81	82	84	86	86	86	86	86	86	82
Aug15	85	85	85	85	87	83	80	80	77	72	70	72	76	79	84	87	88	86	86	87	88	88	89	90	83
Aug16	89	87	86	86	87	87	85	82	79	74	76	81	84	83	86	87	84	81	83	86	86	86	86	86	84
Aug17	87	87	87	88	90	90	89	86	81	76	75	81	82	80	83	83	86	85	87	88	88	88	88	89	85
Aug18	89	89	89	87	89	91	89	86	79	68	65	69	76	79	82	84	86	87	88	88	86	88	86	86	84
Aug19	86	86	86	88	87	85	85	84	77	70	65	69	74	77	81	82	83	85	85	86	87	87	87	86	82
Aug20	87	86	88	88	89	88	87	85	81	76	75	77	78	77	80	83	86	86	87	87	88	88	88	88	84
Aug21	86	86	85	87	90	88	87	82	77	73	73	76	76	74	76	80	83	86	88	88	88	88	88	88	83
Aug22	88	87	86	87	91	89	86	82	80	73	71	70	74	79	80	83	84	86	85	87	90	91	91	89	84
Aug23	88	88	88	88	88	86	85	83	73	65	67	73	74	79	80	82	84	85	88	89	88	88	88	88	83
Aug24	87	87	86	86	87	89	90	85	76	66	66	74	75	77	79	83	87	85	86	86	87	87	88	87	83
Aug25	87	87	87	87	88	85	86	84	77	70	68	70	73	80	83	85	86	86	87	89	88	88	89	88	83
Aug26	89	90	87	88	91	91	90	85	81	74	74	71	76	81	83	84	85	87	90	90	91	93	92	89	86
Aug27	89	88	90	90	90	86	87	85	78	74	70	63	69	74	79	83	85	86	86	88	90	91	90	92	83
Aug28	88	86	86	86	87	87	86	85	83	81	74	73	75	79	82	85	86	85	85	86	87	88	87	88	84
Aug29	87	87	87	86	86	84	83	79	78	78	78	77	80	82	83	83	85	85	88	88	88	89	89	89	84
Aug30	89	89	89	88	86	85	85	83	82	83	83	83	81	82	79	82	87	87	85	89	91	93	93	93	86
Aug31	94	94	89	83	80	80	75	77	78	70	58	75	68	88	85	92	85	84	98	88	86	91	93	83	83

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Sep01	91	112	100	94	100	108	98	65	65	41	42	45	38	67	74	60	78	88	114	113	79	88	100	120	83
Sep02	142	109	92	90	91	94	85	73	69	66	80	89	88	88	89	89	93	86	93	87	120	109	98	100	93
Sep03	101	100	96	102	103	104	92	78	68	62	70	78	88	97	110	108	104	105	104	99	105	106	105	107	95
Sep04	108	102	109	105	107	97	96	78	75	69	83	98	100	107	109	100	97	98	97	116	109	100	106	106	99
Sep05	108	110	131	128	112	89	89	81	83	83	75	76	88	92	96	98	102	109	107	106	108	117	104	103	100
Sep06	107	108	108	108	106	102	112	106	99	85	77	89	94	97	101	101	100	98	97	104	102	107	106	105	101
Sep07	105	104	102	104	106	107	99	84	89	94	100	97	104	104	103	103	104	100	106	106	107	110	120	118	103
Sep08	110	106	106	107	110	109	98	96	90	91	93	97	94	89	88	88	96	98	104	106	100	93	100	110	99
Sep09	103	99	96	101	103	99	90	81	93	103	94	82	79	90	90	83	91	86	88	102	104	104	101	119	95
Sep10	103	100	101	103	104	99	96	96	93	91	91	95	84	87	95	98	100	102	104	105	106	104	104	104	99
Sep11	106	105	106	107	107	104	91	84	77	80	89	96	101	105	104	100	100	104	106	107	109	108	109	108	101
Sep12	106	108	110	111	109	108	101	87	84	79	79	90	102	109	111	108	103	107	104	106	113	113	118	120	104
Sep13	118	114	115	122	126	116	106	101	91	89	89	90	99	103	106	107	107	108	108	108	111	112	112	111	107
Sep14	110	108	108	111	108	109	101	96	93	89	93	98	103	107	109	111	112	113	111	110	107	110	107	107	106
Sep15	107	108	110	115	111	116	115	107	92	87	85	92	101	105	110	115	111	112	106	100	99	130	114	109	107
Sep16	109	109	109	112	118	105	108	105	97	92	92	98	106	110	113	109	103	102	107	111	115	127	115	115	108
Sep17	111	121	118	119	120	119	115	104	92	85	86	94	99	103	107	110	112	110	116	112	114	110	131	114	109
Sep18	108	106	111	113	114	112	104	88	77	81	93	101	92	93	106	107	104	104	105	112	110	111	110	109	103
Sep19	108	108	109	112	114	112	104	92	83	86	90	91	99	107	113	116	114	115	114	115	115	113	112	112	106
Sep20	113	114	114	116	116	112	107	100	91	88	88	92	98	109	112	115	118	117	117	117	119	117	117	113	109
Sep21	117	119	118	120	120	117	110	102	81	75	74	80	84	94	95	97	98	100	98	100	99	101	110	105	101
Sep22	102	107	106	106	106	107	103	98	93	91	94	97	100	106	111	117	118	121	120	119	118	116	114	113	108
Sep23	113	112	111	109	111	112	109	101	94	87	90	93	102	109	112	110	108	103	109	116	118	120	119	119	108
Sep24	120	116	117	114	108	102	109	101	94	92	90	91	93	101	103	104	110	112	117	123	123	116	115	111	108
Sep25	109	110	110	111	112	114	113	113	107	98	94	98	104	110	115	116	116	115	116	114	112	111	117	112	110
Sep26	109	122	115	113	115	117	119	115	111	113	115	118	117	116	113	110	110	111	112	113	113	114	114	115	114
Sep27	112	114	113	113	116	119	126	120	112	110	118	113	103	91	85	77	82	84	102	130	83	80	74	80	102
Sep28	82	88	95	93	115	110	96	66	70	47	76	79	62	65	76	89	91	105	102	125	120	102	100	110	90
Sep29	105	102	103	101	100	98	96	95	84	79	82	87	92	98	101	100	98	88	83	110	93	99	106	108	96
Sep30	103	97	112	103	97	102	95	75	76	79	71	67	75	75	74	81	86	97	110	108	108	113	109	106	92
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Sep01	117	142	146	123	100	108	120	139	146	139	125	113	115	104	103	119	137	147	162	172	153	137	131	128	130
Sep02	134	142	136	138	136	142	149	153	144	127	115	103	101	110	114	117	124	133	157	146	146	136	132	132	132
Sep03	127	126	119	127	131	139	143	145	145	143	132	116	106	106	105	112	122	122	125	130	128	129	131	133	127
Sep04	134	126	123	129	131	132	133	137	130	129	117	107	104	107	109	113	113	120	135	141	133	137	135	132	125

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
Sep05	132	124	124	141	128	125	146	153	154	137	120	116	105	110	108	113	123	124	121	123	128	129	130	130	127
Sep06	127	130	134	133	130	124	138	136	135	131	119	110	107	109	115	122	128	130	130	128	126	125	129	128	126
Sep07	129	131	131	130	132	137	139	138	131	117	111	113	110	110	119	121	123	127	129	126	126	126	125	129	125
Sep08	135	134	136	134	137	140	136	132	134	131	126	118	108	105	103	112	133	123	126	134	142	141	140	147	129
Sep09	161	143	130	131	138	138	139	138	138	127	103	94	97	104	104	114	142	126	126	127	129	132	133	130	127
Sep10	132	131	132	131	134	139	145	148	141	127	113	103	103	108	113	122	126	125	127	128	128	129	128	127	127
Sep11	124	127	127	127	130	135	141	138	133	118	109	101	103	107	115	125	126	127	133	134	133	130	128	127	125
Sep12	127	126	128	129	133	140	147	147	135	120	101	97	98	102	108	117	126	125	126	127	127	128	126	128	124
Sep13	128	129	127	127	128	138	148	149	148	141	123	106	99	99	107	118	127	124	127	130	130	128	127	126	127
Sep14	125	125	124	124	126	131	137	141	143	138	122	108	98	97	105	114	121	123	127	136	131	131	133	134	125
Sep15	130	128	125	122	125	133	146	145	146	142	127	110	103	104	109	115	122	121	125	144	139	140	134	134	128
Sep16	130	133	117	108	128	136	143	146	143	133	120	107	96	96	104	117	121	125	127	127	134	131	132	132	124
Sep17	123	115	128	129	130	140	154	160	156	142	118	100	94	97	106	116	121	122	120	125	130	127	130	132	126
Sep18	133	129	123	133	132	142	154	156	147	138	120	100	93	99	104	115	122	127	132	134	129	127	127	126	127
Sep19	126	126	124	125	128	137	149	154	147	130	110	97	94	99	112	122	125	123	124	132	129	126	127	126	125
Sep20	126	127	127	126	129	137	149	155	153	135	111	97	92	97	109	121	124	122	123	124	124	126	129	126	125
Sep21	122	122	123	123	127	139	148	153	148	129	108	97	95	100	111	121	127	128	128	132	134	136	143	140	126
Sep22	135	122	125	128	129	135	146	151	149	139	125	111	105	103	108	115	121	120	121	123	126	126	129	128	126
Sep23	129	129	129	131	132	137	148	155	152	140	116	100	94	95	106	117	122	123	125	125	126	125	127	127	125
Sep24	127	132	127	137	137	137	135	147	151	141	125	109	102	92	99	108	117	113	120	118	123	128	129	131	124
Sep25	131	130	131	130	131	133	142	152	154	141	123	109	103	106	114	122	121	121	122	124	127	128	133	135	128
Sep26	133	129	133	130	129	130	137	141	137	123	105	100	105	112	120	126	125	124	126	127	127	127	127	130	125
Sep27	130	130	130	130	128	130	135	143	144	134	114	105	102	99	94	102	147	120	181	146	157	165	194	165	134
Sep28	139	138	132	120	105	126	130	140	135	139	129	122	118	127	111	120	137	144	130	139	143	140	136	119	130
Sep29	134	135	133	129	127	130	143	152	154	147	134	118	107	106	115	124	131	159	153	152	141	137	134	151	135
Sep30	145	141	131	133	124	135	148	149	149	138	121	109	99	99	111	124	138	126	127	127	129	138	134	131	129

2019, Field component: Z, Base: 43800.0, Unit: nT

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
Sep01	86	80	85	89	83	80	83	87	90	88	90	93	100	100	107	111	110	105	100	95	95	97	97	91	93
Sep02	80	79	85	91	95	96	97	100	102	96	92	93	98	102	104	104	101	100	101	100	94	91	94	95	95
Sep03	96	95	95	93	96	98	102	103	101	93	89	88	92	95	97	97	97	96	95	97	96	96	96	94	96
Sep04	93	95	92	93	92	95	96	98	97	94	91	94	95	96	95	98	97	99	99	96	95	96	95	96	95
Sep05	95	95	88	84	86	91	92	95	95	93	93	94	95	93	95	96	97	97	96	96	96	93	94	95	94
Sep06	95	93	93	94	95	94	91	93	92	88	85	85	90	95	95	97	98	97	98	97	96	96	95	95	94
Sep07	95	94	94	95	96	98	97	97	93	85	83	84	87	90	91	94	94	96	96	96	96	96	94	91	93
Sep08	91	93	93	94	95	95	96	97	96	94	91	89	90	90	95	99	99	98	98	97	97	99	98	95	95
Sep09	93	93	95	95	96	96	97	97	94	86	85	90	92	96	102	103	105	105	103	101	100	99	99	95	97

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
Sep10	94	95	96	97	99	101	99	96	94	86	83	90	97	98	97	97	97	97	97	97	97	97	97	96	96
Sep11	96	95	95	96	97	98	97	99	96	89	88	93	96	96	98	100	99	98	98	98	96	96	95	96	96
Sep12	96	96	95	95	97	99	98	100	98	91	90	92	94	92	96	96	96	97	99	99	99	98	97	95	96
Sep13	95	94	95	94	93	95	95	95	94	89	82	82	87	90	94	95	95	94	94	95	95	95	95	95	93
Sep14	95	95	95	95	95	94	93	93	95	94	89	84	84	89	92	96	95	94	95	95	95	95	95	95	93
Sep15	95	95	95	95	96	96	93	91	88	82	78	83	85	92	97	97	96	95	97	99	99	93	93	94	93
Sep16	95	94	94	91	90	93	94	92	91	89	85	82	83	89	92	95	96	95	96	96	95	91	93	93	92
Sep17	94	90	90	91	93	96	97	97	94	91	88	89	93	95	96	96	95	94	95	96	97	96	92	91	94
Sep18	92	94	93	92	95	98	100	99	95	91	89	90	90	92	95	96	97	97	97	96	95	95	95	95	95
Sep19	95	95	95	95	96	99	100	95	88	81	78	81	85	88	92	94	93	94	94	93	93	93	93	94	92
Sep20	93	93	93	93	94	98	99	97	92	84	80	83	85	88	93	96	93	92	94	94	94	94	93	92	92
Sep21	92	92	92	92	94	96	96	93	90	86	82	82	85	90	94	96	96	98	99	99	99	99	96	95	93
Sep22	96	96	95	95	97	100	101	96	89	81	80	83	85	89	91	92	92	92	92	93	93	94	94	95	92
Sep23	94	94	94	94	94	96	98	97	92	84	80	79	80	86	92	94	94	95	96	95	94	94	93	93	92
Sep24	93	92	91	90	92	95	97	92	88	80	75	75	80	86	90	92	92	95	95	95	95	96	96	96	90
Sep25	96	96	95	95	94	95	97	92	84	78	75	78	86	92	93	93	91	92	93	94	94	95	94	94	91
Sep26	95	93	92	92	92	93	95	92	87	82	79	82	86	89	91	92	91	93	94	94	94	94	94	94	91
Sep27	94	94	94	94	94	97	98	97	96	90	83	83	86	91	97	103	107	106	105	98	97	96	94	97	95
Sep28	100	101	100	100	96	97	103	106	104	101	96	97	100	105	105	102	103	101	101	97	93	95	97	95	100
Sep29	93	96	97	97	98	101	105	102	97	94	91	88	90	94	98	100	99	100	103	99	99	100	98	91	97
Sep30	90	93	91	90	95	99	103	105	99	92	90	93	96	101	106	106	105	104	101	100	100	99	99	99	98
2019, Field component: F, Base: 48600.0, Unit: nT																									
Sep01	74	79	79	79	75	76	75	65	68	55	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sep02	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sep03	...	...	...	...	...	...	...	...	...	...	...	...	...	85	92	92	90	90	89	88	91	91	90	90	...
Sep04	89	88	88	87	88	86	87	80	78	72	76	84	86	90	90	89	88	89	90	95	91	88	90	90	87
Sep05	91	91	94	90	84	79	80	80	81	78	74	75	81	81	85	87	90	92	91	90	91	93	88	88	86
Sep06	90	89	89	89	89	87	89	88	84	74	68	73	79	85	88	89	89	88	88	91	89	91	90	89	86
Sep07	89	88	88	88	91	93	89	82	80	74	76	75	81	84	84	87	88	87	91	90	90	92	94	91	86
Sep08	88	88	88	90	91	92	87	87	84	82	81	80	79	77	81	84	89	89	91	91	89	87	90	92	87
Sep09	88	85	85	88	90	88	85	81	83	80	75	73	74	83	88	86	92	89	89	93	93	93	91	95	86
Sep10	87	87	89	90	93	92	89	86	83	75	72	80	81	83	86	88	89	89	90	91	91	90	90	90	87
Sep11	90	89	90	90	91	91	85	84	78	73	76	83	88	89	90	91	91	91	92	93	92	91	91	91	88
Sep12	90	91	91	92	93	95	91	87	83	74	73	79	86	87	92	91	89	92	92	94	96	95	96	96	89
Sep13	95	93	94	95	97	94	90	88	83	77	70	70	78	83	88	90	90	89	90	90	92	92	92	91	88
Sep14	91	90	90	91	90	90	86	84	84	81	79	75	78	83	88	92	92	91	91	91	90	91	90	90	88

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
Sep15	90	90	91	93	93	95	92	87	78	70	66	72	78	86	92	95	93	92	91	91	91	98	91	90	88
Sep16	91	90	89	88	90	88	90	87	83	78	74	74	78	85	89	91	89	88	91	93	94	95	91	91	87
Sep17	91	91	90	92	94	96	96	92	84	77	74	78	84	87	90	92	92	91	94	93	95	92	98	89	90
Sep18	88	89	90	90	93	96	94	86	77	76	78	82	78	80	88	91	90	90	91	93	92	92	91	91	88
Sep19	90	90	91	92	94	96	94	84	74	68	67	69	76	83	89	93	91	92	92	92	92	91	91	91	87
Sep20	91	91	91	92	93	95	94	89	81	72	68	71	76	84	90	94	93	92	93	93	94	93	92	90	88
Sep21	92	92	92	93	94	96	93	87	75	68	63	65	70	79	83	86	87	89	90	90	91	91	93	90	85
Sep22	89	90	89	90	91	95	94	88	80	71	71	74	77	83	88	91	92	93	93	93	93	93	92	92	88
Sep23	92	91	90	90	91	93	95	90	82	72	68	69	73	81	89	90	89	89	92	94	94	94	93	93	87
Sep24	94	91	91	89	88	88	92	86	78	70	64	64	69	79	83	85	89	91	94	96	97	95	95	93	86
Sep25	92	92	91	91	92	93	95	91	81	71	66	70	80	87	91	92	90	91	92	92	92	92	94	92	88
Sep26	91	95	91	90	91	93	96	91	84	80	78	82	85	88	89	89	88	90	91	91	91	92	92	92	89
Sep27	91	92	92	92	93	96	101	99	93	87	84	81	79	78	81	83	91	90	98	103	82	81	78	81	89
Sep28	85	87	90	89	93	93	93	83	82	70	78	79	74	80	85	88	90	95	93	100	94	88	89	91	87
Sep29	87	89	90	90	90	92	95	93	83	78	76	75	78	84	90	92	90	88	88	95	88	91	92	87	87
Sep30	85	85	89	84	85	91	93	86	81	76	70	70	77	81	85	89	90	94	97	95	95	96	94	93	87

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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Oct01	107	107	112	116	116	116	108	95	83	74	69	68	86	91	92	94	95	97	100	102	103	102	104	105	98
Oct02	115	108	102	105	108	111	109	102	93	83	81	80	85	91	93	98	103	104	106	107	110	115	111	107	101
Oct03	107	107	108	108	113	112	105	95	87	77	80	89	98	106	108	108	108	108	108	111	117	116	114	113	104
Oct04	112	114	114	116	120	127	130	110	108	101	104	110	111	111	110	100	92	99	108	103	107	109	107	106	110
Oct05	109	109	109	111	112	110	109	106	99	91	88	92	97	102	100	104	105	99	102	111	112	121	128	118	106
Oct06	115	115	110	111	110	111	110	105	97	87	80	84	85	89	94	96	104	106	106	105	107	108	110	109	102
Oct07	107	108	109	111	113	115	116	109	100	94	92	96	98	101	97	89	90	92	93	107	105	106	110	117	103
Oct08	113	109	109	113	114	115	114	102	96	98	101	104	108	108	109	107	105	107	109	110	118	111	114	111	108
Oct09	107	108	112	112	112	121	118	105	94	85	68	82	91	101	108	113	115	115	118	118	111	112	113	118	106
Oct10	115	114	118	117	119	107	118	108	108	103	91	92	92	93	92	81	77	101	107	106	106	106	105	105	103
Oct11	104	103	105	107	110	112	114	104	105	94	97	97	101	98	90	87	98	103	103	99	102	109	111	114	103
Oct12	112	109	109	112	113	114	110	106	100	94	95	93	94	98	101	105	106	108	107	106	107	108	108	107	105
Oct13	107	107	111	113	114	115	112	106	98	94	94	100	104	110	112	112	113	112	112	112	112	112	111	112	109
Oct14	111	114	113	116	118	118	113	106	100	93	92	100	108	114	109	101	105	102	107	110	103	101	104	109	107
Oct15	112	114	113	115	116	117	117	115	109	102	97	101	110	117	119	117	117	120	120	119	120	124	125	130	115
Oct16	125	119	117	115	114	112	110	107	98	98	101	109	113	117	112	112	112	111	110	110	108	106	110	112	111
Oct17	109	108	109	115	115	112	111	109	102	93	95	94	100	106	113	110	108	109	112	111	112	110	111	111	108
Oct18	108	112	112	116	115	117	114	111	99	96	96	99	105	107	103	109	112	109	109	109	108	114	107	106	108
Oct19	108	111	111	113	116	119	120	116	108	99	88	90	96	105	101	99	101	98	97	93	100	104	106	107	104
Oct20	105	108	109	111	113	116	118	109	103	95	92	95	96	99	102	105	109	112	115	111	112	113	99	102	106
Oct21	105	115	116	117	119	119	117	115	111	101	108	108	115	118	114	113	112	112	110	111	112	113	116	114	113
Oct22	114	114	116	117	119	120	119	114	111	104	95	94	100	108	112	113	112	109	105	108	111	112	111	111	110
Oct23	111	111	113	112	112	113	111	106	105	103	103	107	113	115	115	114	115	114	113	115	115	116	115	115	112
Oct24	115	114	115	117	118	122	130	130	136	129	100	100	95	94	90	81	90	75	75	91	86	91	106	138	106
Oct25	113	100	101	106	108	101	91	72	72	57	71	59	76	75	83	74	85	103	95	93	109	103	100	105	90
Oct26	101	100	106	116	114	114	109	102	89	73	62	42	59	64	56	66	88	98	86	80	88	94	100	98	88
Oct27	103	99	96	92	94	94	93	84	82	85	82	75	79	89	92	94	94	85	91	97	91	96	108	97	91
Oct28	96	99	100	102	107	103	96	100	90	85	79	82	83	78	83	82	84	81	98	83	88	92	95	108	91
Oct29	100	96	98	95	103	105	103	95	87	80	83	91	94	97	97	91	81	80	86	99	102	104	106	105	95
Oct30	105	105	107	106	106	110	115	104	97	92	93	100	106	105	95	95	89	84	85	86	101	109	105	104	100
Oct31	100	100	114	116	117	115	113	111	107	101	99	103	105	107	107	106	105	108	108	106	109	111	107	105	108
2019, Field component: Y, Base: 1500.0, Unit: nT																									
Oct01	129	126	118	106	122	127	129	148	151	138	117	106	101	109	120	129	131	132	134	132	134	133	132	129	126
Oct02	121	129	128	127	128	133	144	155	158	150	129	106	99	102	116	123	125	128	131	133	130	137	133	135	129
Oct03	128	125	126	127	128	132	145	155	152	137	117	102	99	103	116	127	127	128	131	135	131	130	131	129	128

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
Oct04	127	126	128	126	128	131	141	151	149	140	122	105	95	98	111	122	125	128	137	135	132	132	132	131	127
Oct05	130	128	130	130	131	133	142	151	152	141	123	110	105	106	112	118	119	130	135	128	130	137	131	133	129
Oct06	130	129	130	130	129	132	141	152	152	140	130	117	109	111	119	131	130	129	130	132	131	130	130	132	130
Oct07	130	132	132	133	132	133	140	151	148	132	114	104	99	105	113	122	135	129	140	145	140	132	132	123	129
Oct08	130	133	133	133	130	129	136	146	147	135	121	114	112	115	123	129	128	130	130	133	134	130	134	132	130
Oct09	130	127	128	129	125	128	138	143	145	128	112	104	100	104	113	121	121	123	125	127	131	132	133	134	125
Oct10	130	132	132	132	133	121	116	133	148	141	137	126	120	119	125	129	139	134	133	130	130	131	139	138	131
Oct11	135	134	134	134	134	133	138	147	145	141	127	112	107	112	121	140	128	130	148	139	135	131	132	127	132
Oct12	132	134	133	130	131	132	137	144	145	141	128	113	112	114	121	126	127	129	129	136	135	136	136	137	131
Oct13	135	134	131	131	130	130	137	146	148	138	121	108	106	110	120	127	126	127	128	130	131	132	131	132	129
Oct14	131	130	130	129	129	126	136	150	156	144	123	110	106	109	113	117	117	118	123	138	138	136	137	135	128
Oct15	132	131	130	129	127	130	137	146	152	142	123	110	106	109	120	126	126	126	127	128	129	128	129	129	128
Oct16	129	130	130	130	129	131	135	143	143	129	116	109	105	110	121	127	128	130	131	131	140	137	134	133	128
Oct17	132	132	128	131	131	133	140	148	149	141	124	111	106	113	121	127	133	129	130	131	136	133	135	136	130
Oct18	133	129	129	129	129	128	138	149	153	139	121	111	103	109	121	125	127	131	131	132	136	147	139	134	130
Oct19	131	129	130	130	131	133	140	150	156	145	123	106	98	106	116	126	129	128	134	140	145	138	134	133	130
Oct20	134	132	131	132	131	131	136	145	149	141	124	110	107	113	121	126	126	127	130	133	146	150	149	141	132
Oct21	142	139	134	131	130	132	136	142	146	138	120	109	106	114	126	129	129	130	130	133	134	134	133	133	130
Oct22	133	132	131	129	130	132	139	147	147	137	124	115	113	114	121	125	125	130	132	129	132	134	134	134	130
Oct23	133	132	131	132	132	133	137	139	136	127	116	110	112	120	128	129	128	129	131	131	131	132	132	132	129
Oct24	132	132	132	130	131	132	135	140	139	123	116	105	102	105	111	131	171	130	150	194	162	149	132	127	134
Oct25	142	129	116	114	111	117	115	114	126	108	115	112	111	132	137	131	158	152	138	140	145	142	137	128	128
Oct26	136	133	118	129	132	128	133	135	138	130	118	111	122	120	122	155	133	156	170	170	179	145	134	146	137
Oct27	143	123	126	133	130	130	134	143	147	136	124	118	118	124	130	132	133	148	156	163	150	141	133	138	136
Oct28	137	134	131	133	138	138	128	139	145	128	122	117	120	124	133	140	135	139	152	146	148	154	138	135	136
Oct29	143	141	138	133	136	137	143	151	150	141	125	112	112	118	123	124	140	136	141	142	140	138	139	137	135
Oct30	136	135	134	135	136	136	139	148	148	138	119	108	106	112	116	117	118	128	134	144	145	150	161	148	133
Oct31	147	134	131	131	130	131	135	139	141	136	125	117	117	123	128	128	129	133	132	135	142	144	142	139	133

2019, Field component: Z, Base: 43800.0, Unit: nT

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
Oct01	98	99	97	93	92	95	97	93	88	85	82	83	89	97	102	102	100	100	100	100	100	100	99	99	95
Oct02	96	94	96	97	98	100	103	101	97	89	81	82	87	93	98	99	99	100	99	99	98	97	97	96	96
Oct03	97	97	97	97	97	100	102	100	94	88	83	83	82	88	93	95	96	97	98	98	98	97	96	96	95
Oct04	96	95	95	95	95	96	99	99	94	88	86	84	82	85	91	96	97	99	99	98	98	98	98	98	94
Oct05	97	97	96	96	97	100	102	98	90	85	85	86	88	92	95	96	97	99	101	100	99	98	96	95	95
Oct06	96	96	96	96	97	99	103	103	100	92	90	92	94	97	99	100	100	99	98	98	98	98	98	97	97
Oct07	98	97	97	97	97	98	102	103	99	88	83	87	92	96	99	100	102	103	104	102	101	101	99	98	98

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
Oct08	96	96	97	97	97	99	103	103	98	93	91	91	92	95	98	97	97	98	98	98	97	97	97	96	97
Oct09	97	97	97	97	97	98	100	100	94	87	85	90	93	93	96	96	96	96	96	97	97	98	98	98	96
Oct10	97	97	96	96	95	100	97	97	93	85	83	86	89	94	98	102	104	103	101	100	100	99	99	99	96
Oct11	99	99	99	99	99	100	100	97	93	89	89	93	95	100	104	103	103	101	100	101	100	100	98	98	98
Oct12	96	97	98	97	97	99	103	102	98	91	88	90	94	98	101	100	99	99	99	99	99	99	99	99	98
Oct13	99	98	98	97	97	98	100	101	98	91	87	86	90	93	97	98	97	97	97	97	97	97	98	97	96
Oct14	98	97	97	96	96	97	101	103	98	86	83	87	89	92	97	97	99	100	100	100	102	102	101	101	97
Oct15	100	98	98	97	97	98	101	101	97	89	84	87	91	94	95	95	96	96	96	96	96	96	96	96	95
Oct16	95	96	96	96	97	99	100	99	96	89	85	87	90	91	94	95	96	97	97	98	97	98	97	97	95
Oct17	97	97	98	97	97	98	101	102	97	91	90	90	93	97	99	99	99	99	99	99	98	98	98	97	97
Oct18	98	98	98	97	98	100	102	100	91	82	81	83	86	93	98	99	98	99	99	99	99	98	98	98	95
Oct19	98	98	98	98	98	98	99	99	95	87	83	85	88	93	98	99	102	103	104	105	104	103	102	101	97
Oct20	100	100	99	99	99	100	102	103	100	93	91	94	96	99	101	100	101	100	99	100	100	100	101	101	99
Oct21	100	99	97	97	96	97	99	101	96	88	85	87	92	97	98	97	98	98	99	99	99	99	98	98	97
Oct22	98	97	97	97	97	98	100	99	96	95	94	94	95	98	98	97	98	99	100	100	100	100	99	99	98
Oct23	99	98	98	98	98	98	101	102	97	91	90	93	93	96	98	98	98	98	98	98	98	98	98	98	97
Oct24	97	97	97	96	96	95	96	95	88	81	84	90	95	99	101	103	110	110	110	108	108	105	101	89	98
Oct25	92	96	96	93	94	95	99	101	98	99	100	103	106	107	110	109	109	107	105	106	103	102	102	102	101
Oct26	101	102	102	97	98	98	99	100	101	100	100	103	111	114	118	120	114	109	107	108	105	104	99	99	105
Oct27	99	98	97	100	102	103	105	105	102	99	101	106	108	110	110	106	107	109	107	106	105	104	101	102	104
Oct28	104	104	104	103	103	104	108	104	98	96	100	105	107	113	112	110	111	111	110	109	109	108	108	104	106
Oct29	103	104	104	104	103	105	106	105	98	96	98	100	103	107	109	108	110	111	111	109	107	106	105	104	105
Oct30	104	104	103	103	103	103	104	103	99	91	91	96	101	105	108	107	108	111	113	113	111	109	108	107	104
Oct31	106	107	104	103	102	102	103	104	101	94	95	98	101	104	105	104	105	104	104	104	104	103	103	103	103
2019, Field component: F, Base: 48600.0, Unit: nT																									
Oct01	93	93	93	91	91	94	92	83	74	67	62	62	75	84	90	91	90	91	92	92	92	92	92	92	86
Oct02	94	89	89	91	93	97	99	94	87	75	66	66	72	81	86	90	92	93	94	94	94	95	93	91	88
Oct03	92	92	92	92	95	97	96	91	82	71	67	70	74	83	88	91	91	93	93	94	97	96	95	94	88
Oct04	93	93	93	94	95	100	104	96	91	82	81	81	79	82	87	88	85	90	94	92	93	94	93	92	90
Oct05	93	93	92	93	94	96	98	93	83	74	73	75	79	85	87	89	91	90	94	96	96	99	100	94	90
Oct06	94	94	92	93	93	96	99	98	90	79	73	77	79	83	88	90	93	93	93	92	93	93	94	93	90
Oct07	93	93	93	94	94	96	100	99	91	78	73	77	82	87	89	87	89	91	92	97	95	95	95	97	91
Oct08	93	92	93	94	95	98	100	96	88	84	83	85	87	90	93	92	90	93	94	94	96	93	95	93	92
Oct09	92	92	94	94	94	98	99	94	84	73	64	74	80	85	90	93	94	94	96	96	94	95	95	97	90
Oct10	96	95	96	95	96	94	97	93	89	80	73	75	78	83	86	85	85	95	95	94	94	93	93	93	90
Oct11	92	92	93	94	95	97	98	91	87	80	80	83	87	90	90	89	93	94	94	93	93	95	95	96	91

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
Oct12	93	93	94	94	94	97	99	97	90	81	79	79	83	88	93	93	93	94	93	93	94	94	94	94	92
Oct13	94	93	95	95	95	96	98	96	90	81	77	78	83	89	94	94	94	94	94	94	94	94	94	94	92
Oct14	94	95	94	95	96	97	98	98	91	77	73	79	84	90	92	89	92	92	95	96	95	93	95	96	91
Oct15	96	96	96	96	96	97	99	100	93	82	75	79	87	93	95	95	95	96	97	96	97	98	99	100	94
Oct16	98	96	95	95	95	96	96	94	87	80	77	83	87	90	91	92	93	94	94	94	93	92	94	94	92
Oct17	93	93	93	95	95	95	97	97	90	81	80	79	84	91	95	94	94	95	95	95	95	94	95	94	92
Oct18	93	94	94	96	96	98	99	96	84	73	72	75	80	88	91	94	95	95	95	95	94	96	93	93	91
Oct19	93	94	94	95	96	98	99	98	91	80	71	73	78	86	89	90	94	93	94	93	95	96	96	96	91
Oct20	94	95	95	96	97	98	101	98	94	83	80	83	86	90	93	94	96	97	97	97	97	98	93	93	94
Oct21	94	98	96	96	97	97	98	99	93	82	81	83	90	96	95	95	95	95	95	96	96	96	97	96	94
Oct22	95	95	96	96	96	98	100	97	93	88	83	83	86	92	95	95	95	94	94	95	96	96	96	95	94
Oct23	95	95	95	95	95	96	98	96	91	84	83	87	90	94	96	95	95	95	95	96	96	97	96	96	94
Oct24	95	95	95	96	96	97	101	100	96	86	77	82	84	87	87	86	97	89	90	97	94	93	96	98	92
Oct25	90	88	88	87	89	87	87	80	77	71	79	76	86	87	93	89	94	100	94	94	99	95	94	95	88
Oct26	93	94	95	96	95	96	95	93	88	80	75	69	83	89	88	96	99	100	93	92	92	93	91	90	91
Oct27	92	89	87	88	90	92	93	90	86	84	85	86	89	95	97	95	95	94	95	97	92	94	96	92	91
Oct28	93	95	95	95	97	97	96	95	86	81	82	87	90	94	95	93	95	94	101	93	95	96	97	98	93
Oct29	95	94	95	93	96	98	99	94	85	80	82	87	91	96	98	95	92	92	95	100	99	99	99	98	94
Oct30	97	97	97	97	97	99	102	97	90	80	80	87	94	98	96	96	94	94	97	98	103	104	102	100	96
Oct31	98	98	101	101	101	100	100	100	95	86	86	91	94	98	99	98	98	99	99	98	99	99	97	97	97

Table 8.13. 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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Nov01	101	103	104	108	110	113	112	106	103	100	94	94	97	104	108	108	108	107	107	107	108	108	108	107	105
Nov02	106	106	108	109	110	111	112	110	108	103	98	100	106	111	114	114	113	111	111	111	110	111	110	109	109
Nov03	107	103	107	111	115	116	114	108	103	101	100	103	108	113	115	115	115	115	114	113	113	112	112	113	110
Nov04	110	108	108	112	112	115	119	126	116	108	101	99	103	108	110	109	109	110	109	110	109	106	109	109	110
Nov05	108	109	111	112	113	115	116	114	107	100	96	101	105	103	98	96	97	102	96	103	105	107	108	125	106
Nov06	114	110	105	107	109	111	111	107	100	96	94	96	101	103	99	104	108	107	112	113	111	113	109	120	107
Nov07	112	109	111	113	112	109	110	108	105	102	98	102	104	102	101	103	104	105	105	104	106	108	107	108	106
Nov08	108	108	109	110	112	116	118	117	109	101	97	99	107	109	110	109	107	108	103	103	103	108	111	110	108
Nov09	110	112	114	110	115	118	112	109	103	97	95	97	100	101	105	107	109	112	112	112	110	108	115	120	108
Nov10	109	108	107	110	111	114	113	110	109	103	98	97	101	107	114	116	115	114	114	114	114	114	113	113	110
Nov11	112	111	112	115	119	124	127	123	114	106	96	82	86	88	90	84	80	85	104	105	102	110	108	105	104
Nov12	104	104	102	105	106	111	110	105	100	94	96	100	105	108	110	115	116	112	109	109	110	109	109	110	107
Nov13	109	109	108	110	111	114	115	112	106	96	91	97	105	108	110	112	112	111	107	110	112	111	112	106	108
Nov14	105	111	115	115	116	117	117	115	113	106	100	105	107	109	114	113	113	113	113	112	113	112	112	112	112
Nov15	113	113	112	112	115	119	120	120	115	106	101	106	113	118	122	121	122	121	116	113	113	114	112	111	114
Nov16	111	109	116	110	112	116	118	116	112	104	103	105	106	111	110	107	103	110	104	104	111	112	107	110	110
Nov17	111	107	105	105	108	112	113	114	113	109	107	109	110	110	110	106	110	112	111	110	114	115	114	110	110
Nov18	109	110	111	112	112	113	113	112	109	106	106	109	112	115	117	116	116	115	113	114	112	111	110	110	112
Nov19	111	110	111	111	114	114	116	114	111	107	103	106	110	113	115	116	117	116	112	112	111	111	112	112	112
Nov20	112	111	111	114	118	121	121	121	118	117	114	113	114	115	117	120	122	123	123	122	119	114	110	109	117
Nov21	111	110	113	114	119	121	127	124	122	121	124	118	111	110	99	95	95	88	98	85	97	98	124	126	110
Nov22	105	100	108	103	103	103	105	106	104	101	95	96	96	94	84	91	85	92	99	92	110	97	94	98	98
Nov23	97	98	101	109	109	112	113	112	108	105	93	96	96	84	69	66	77	82	87	91	96	99	101	102	96
Nov24	114	112	107	107	106	109	105	107	108	106	107	108	103	88	88	93	91	100	97	99	100	102	109	104	103
Nov25	108	104	105	109	111	111	110	109	109	110	107	106	109	107	103	102	103	105	106	109	110	107	107	110	107
Nov26	105	102	104	106	106	107	110	109	106	104	103	106	110	113	114	111	107	107	109	113	113	113	112	109	108
Nov27	107	108	110	113	116	118	117	114	112	112	110	108	112	113	108	99	104	112	106	100	97	98	101	106	108
Nov28	109	112	110	112	114	117	117	117	114	112	111	113	114	113	110	108	112	111	108	108	112	114	113	113	112
Nov29	112	113	110	111	113	118	119	118	112	110	105	106	110	112	112	112	111	109	111	109	99	89	99	112	110
Nov30	103	102	104	107	108	114	115	120	118	119	119	118	117	116	111	111	115	116	115	112	111	111	110	109	113
2019, Field component: Y, Base: 1600.0, Unit: nT																									
Nov01	38	35	34	30	33	32	37	45	46	35	25	18	18	22	27	29	29	29	32	33	35	36	36	36	32
Nov02	35	35	33	33	33	34	38	43	45	40	26	17	19	25	30	31	31	32	33	34	36	36	38	41	33
Nov03	39	38	34	32	31	32	38	44	41	31	21	16	17	22	28	30	30	31	32	33	34	34	34	36	32
Nov04	35	34	32	34	34	34	37	44	44	37	23	13	8	11	21	25	27	30	32	34	35	37	37	37	31

Table 8.13 (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	34	32	30	31	31	32	38	46	47	40	30	18	14	20	26	27	38	35	34	39	38	37	38	33	33
Nov06	39	39	35	32	32	33	37	45	46	38	25	18	18	20	33	38	31	33	38	37	35	35	42	50	35
Nov07	45	42	35	34	32	33	38	46	49	39	28	19	19	25	31	31	32	36	38	37	37	39	39	36	35
Nov08	35	34	32	32	32	33	38	46	50	37	23	19	20	25	29	31	32	33	36	41	42	44	37	35	34
Nov09	34	27	34	34	33	36	41	47	48	39	25	16	14	18	23	29	31	32	33	34	36	38	37	42	33
Nov10	39	35	33	33	34	35	39	47	48	42	30	23	20	23	28	31	33	34	35	35	35	35	34	34	34
Nov11	33	31	31	29	29	31	33	40	43	34	23	18	6	6	9	2	13	24	37	39	41	53	59	46	30
Nov12	45	40	38	35	35	35	40	46	47	42	29	23	21	23	28	29	31	34	35	36	37	38	38	37	35
Nov13	36	35	34	33	34	34	38	44	46	39	25	15	15	23	30	32	33	33	34	35	37	39	45	37	34
Nov14	39	40	37	33	33	35	38	42	43	38	29	19	15	22	28	30	32	33	35	37	36	37	37	36	33
Nov15	34	34	33	32	33	34	36	43	48	40	31	24	22	26	29	29	29	30	34	35	35	36	36	35	33
Nov16	34	35	32	35	35	36	36	42	44	40	33	26	25	25	29	29	31	35	40	44	38	39	40	44	35
Nov17	44	41	40	36	34	35	37	40	42	39	33	29	29	30	33	32	33	33	34	35	44	49	45	37	37
Nov18	35	35	34	35	35	36	37	40	37	30	26	24	23	26	30	31	32	33	33	36	37	38	38	37	33
Nov19	36	37	34	34	35	36	39	43	42	36	29	25	25	28	31	32	31	32	34	38	36	38	38	37	34
Nov20	36	36	36	33	34	35	34	35	35	33	31	29	27	29	32	33	32	32	32	33	34	37	40	40	34
Nov21	41	37	33	33	32	31	33	36	34	29	19	15	23	26	27	32	27	40	63	55	59	51	50	55	37
Nov22	50	32	23	34	36	38	40	43	45	37	37	34	27	30	33	46	41	56	50	61	61	61	54	52	43
Nov23	41	35	29	34	34	37	36	36	32	26	26	23	28	37	32	34	40	46	40	55	53	43	42	44	37
Nov24	42	29	40	36	32	25	32	34	33	31	29	30	29	32	40	32	45	44	38	45	44	44	48	39	36
Nov25	33	37	36	36	37	36	38	38	33	26	23	23	27	33	35	36	38	39	41	40	39	39	41	35	35
Nov26	40	37	34	34	37	40	41	41	40	33	27	25	27	32	34	34	36	37	38	39	39	39	38	38	36
Nov27	36	35	33	33	33	36	39	40	40	34	27	24	24	26	30	34	35	36	37	48	51	51	45	40	36
Nov28	36	34	34	33	33	35	37	39	40	36	31	28	25	26	31	34	36	36	46	42	40	40	40	38	35
Nov29	35	34	34	32	33	34	35	35	37	36	32	27	23	25	31	32	33	35	42	36	41	49	49	48	35
Nov30	46	40	39	37	37	37	38	38	38	35	34	29	25	24	26	28	30	33	35	37	38	42	41	39	35
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Nov01	103	103	103	103	103	103	103	101	96	91	94	97	101	103	103	103	103	103	103	103	103	103	103	103	101
Nov02	103	103	103	102	102	102	103	102	97	91	88	91	97	101	101	100	101	101	102	102	102	102	102	102	100
Nov03	102	102	102	102	102	102	102	99	95	91	92	93	97	100	101	100	101	101	101	101	102	102	101	101	100
Nov04	101	101	101	101	101	101	102	100	96	91	92	91	96	99	100	101	101	101	102	102	102	103	103	102	100
Nov05	102	101	101	101	101	101	102	102	99	96	95	95	98	101	103	104	104	105	105	105	105	104	103	100	101
Nov06	99	99	100	101	101	102	102	103	97	91	92	94	100	105	105	104	103	103	102	102	102	102	102	100	101
Nov07	99	99	100	100	100	101	101	100	94	87	87	90	97	102	103	103	103	103	103	103	103	103	103	103	100
Nov08	102	102	102	102	102	101	100	99	93	89	89	90	94	99	102	102	102	102	103	103	104	104	103	103	100
Nov09	102	102	100	101	101	101	103	102	98	94	95	98	102	105	106	104	104	103	102	102	102	102	102	99	101

Table 8.13 (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	100	101	102	102	102	102	103	101	97	98	101	102	105	107	106	104	103	102	102	102	101	101	101	101	102
Nov11	101	101	101	101	101	100	99	98	97	94	93	98	104	108	109	111	113	114	111	109	108	107	105	106	104
Nov12	104	104	104	104	104	103	103	104	101	99	98	101	105	105	104	103	103	103	103	103	103	103	103	103	103
Nov13	103	103	103	102	102	102	102	104	101	94	94	97	101	105	105	104	104	104	104	104	104	103	103	103	102
Nov14	103	103	102	102	101	101	102	104	101	98	99	99	100	103	104	103	103	103	103	103	103	102	102	102	102
Nov15	102	102	102	102	102	101	101	101	98	95	97	97	100	101	100	100	100	100	101	102	103	102	102	102	100
Nov16	102	102	101	101	102	102	102	103	101	99	100	101	103	103	102	103	104	104	105	106	105	104	103	103	103
Nov17	101	102	102	103	103	103	101	100	98	97	98	98	99	101	101	103	104	104	103	103	103	102	101	102	101
Nov18	102	102	102	102	102	102	101	98	95	95	98	101	102	103	103	102	102	102	102	102	103	103	103	103	101
Nov19	102	102	102	102	102	102	103	103	102	99	99	99	102	105	104	103	102	102	103	103	103	103	103	102	102
Nov20	102	102	102	101	101	101	100	100	100	98	99	101	102	103	103	102	101	101	100	100	101	101	102	102	101
Nov21	102	102	101	101	101	100	98	98	92	88	88	92	96	101	103	105	106	107	108	108	107	107	101	96	100
Nov22	99	101	99	100	103	104	103	102	100	98	97	100	104	106	107	109	110	109	108	108	105	105	105	104	104
Nov23	105	105	105	104	104	103	102	100	98	100	102	105	107	111	114	115	115	114	113	111	111	110	108	107	107
Nov24	105	103	103	104	104	104	102	102	103	103	104	106	109	111	111	110	108	109	109	108	108	108	106	106	106
Nov25	104	105	105	105	105	105	103	102	100	99	101	105	108	108	107	107	107	107	106	106	106	105	105	105	105
Nov26	104	105	106	106	106	105	104	102	99	96	97	102	104	105	105	105	105	105	105	105	105	104	104	104	104
Nov27	104	104	104	104	104	104	103	103	100	96	92	95	99	102	104	106	107	106	106	106	107	107	106	106	103
Nov28	105	104	104	104	104	104	103	103	102	100	100	100	103	104	105	106	106	106	106	107	105	104	103	103	104
Nov29	103	103	103	104	104	104	102	102	102	102	103	102	103	104	105	105	106	106	106	106	108	110	109	106	105
Nov30	106	106	106	106	105	105	103	102	100	99	100	100	100	101	104	105	105	105	105	105	105	105	104	104	104
2019, Field component: F, Base: 48600.0, Unit: nT																									
Nov01	95	96	96	98	98	100	100	96	90	83	83	86	91	96	98	97	98	98	97	98	98	98	98	97	95
Nov02	97	97	98	98	98	98	100	99	93	85	79	83	90	96	99	98	98	98	98	99	98	99	98	97	95
Nov03	96	95	97	98	100	100	100	95	88	84	84	86	91	97	99	98	99	99	99	98	98	98	98	98	96
Nov04	97	96	96	97	98	99	101	104	96	87	84	83	88	93	96	96	96	97	97	98	98	97	98	97	95
Nov05	97	97	97	97	98	99	100	100	94	88	85	87	91	93	94	93	94	97	95	98	98	99	98	102	95
Nov06	97	95	94	96	97	98	99	98	90	82	81	84	92	97	95	97	98	97	99	99	98	99	98	101	95
Nov07	96	95	97	97	97	96	97	96	89	81	79	83	90	94	95	95	96	97	97	97	97	98	98	97	94
Nov08	97	97	97	98	98	99	100	98	90	82	81	81	89	95	97	97	97	97	96	96	97	99	99	98	95
Nov09	98	99	98	97	99	100	99	98	92	85	85	87	93	96	99	98	99	99	99	98	98	97	100	99	96
Nov10	96	96	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nov11	98	97	98	99	100	101	102	100	95	89	84	81	88	93	95	93	94	98	103	102	100	103	101	99	96
Nov12	98	97	96	97	98	99	99	97	93	89	88	92	97	100	100	101	101	99	98	99	99	99	99	98	97
Nov13	98	98	97	98	98	100	101	101	96	85	82	87	94	99	100	100	100	100	98	100	100	99	100	98	97
Nov14	97	99	100	99	100	100	101	102	99	93	90	92	94	98	101	100	100	100	100	99	100	99	99	99	98

Table 8.13 (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	99	99	98	98	100	101	101	102	96	90	89	91	96	100	101	100	101	101	99	99	99	99	99	98	98
Nov16	98	98	100	97	99	100	101	101	98	93	93	94	97	99	97	97	96	100	98	100	101	100	98	99	98
Nov17	98	97	96	96	98	99	98	98	96	93	92	93	95	97	97	97	100	100	99	99	100	100	99	97	97
Nov18	98	98	98	99	99	99	98	96	91	90	92	96	98	100	101	100	100	100	99	100	99	99	98	98	98
Nov19	98	98	98	98	99	100	101	101	99	94	92	93	97	101	101	101	101	100	99	100	99	99	100	99	99
Nov20	99	98	98	99	100	101	101	101	99	97	97	98	99	101	102	102	102	102	102	101	100	99	98	98	100
Nov21	98	98	98	99	101	101	102	100	94	90	91	92	93	96	93	94	95	93	99	93	98	98	103	100	97
Nov22	93	92	94	93	95	96	97	97	94	90	87	90	94	95	92	96	94	97	99	96	101	96	95	95	94
Nov23	95	95	96	99	99	99	99	97	93	93	90	94	96	95	91	91	95	97	98	98	100	100	100	99	96
Nov24	102	99	97	98	98	98	95	97	98	96	98	100	101	96	96	98	96	100	98	99	99	100	102	99	98
Nov25	99	98	99	101	101	101	99	98	95	94	96	99	103	102	99	99	99	100	100	101	101	100	99	100	99
Nov26	98	97	99	99	99	100	99	97	93	90	90	95	100	102	102	100	99	99	101	102	102	101	100	99	98
Nov27	98	99	99	101	102	103	101	100	97	93	89	91	95	98	99	96	100	102	100	98	97	98	98	99	98
Nov28	100	100	99	100	102	103	102	102	99	96	96	97	100	101	101	100	102	102	101	101	102	102	101	100	100
Nov29	100	100	99	99	101	103	102	101	99	98	97	96	99	100	101	102	102	101	102	101	98	96	100	102	100
Nov30	98	98	99	100	100	102	101	102	99	99	100	99	99	99	100	101	102	103	103	101	101	101	100	99	100

Table 8.14. 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
2019, Field component: X, Base: 20900.0, Unit: nT																									
Dec01	107	108	110	115	116	117	119	120	117	114	112	112	113	112	111	108	108	110	113	111	113	111	115	110	113
Dec02	112	114	113	112	114	116	115	116	116	116	117	120	121	120	117	116	115	114	113	111	110	111	110	110	115
Dec03	109	111	113	114	116	117	117	118	121	122	122	120	119	118	115	112	111	112	111	111	109	110	112	114	115
Dec04	118	117	114	115	118	120	121	123	125	121	118	116	112	112	113	114	114	112	111	113	113	113	111	110	116
Dec05	111	112	111	113	113	116	118	118	116	115	114	119	121	122	122	121	119	118	115	111	112	112	111	110	115
Dec06	109	111	114	117	116	118	117	118	116	115	115	114	112	108	109	114	114	110	110	108	109	106	108	110	112
Dec07	107	108	109	109	110	112	115	118	117	113	112	115	115	114	113	111	112	112	111	111	111	108	106	105	111
Dec08	108	109	110	111	112	113	113	115	114	115	116	119	120	117	118	115	115	114	112	108	98	98	103	106	112
Dec09	104	107	115	111	108	111	112	114	115	116	118	116	115	115	114	112	114	115	115	115	113	109	103	105	112
Dec10	108	110	110	115	117	115	118	120	116	112	111	113	118	121	119	118	118	117	113	110	112	113	112	110	114
Dec11	113	110	110	116	116	117	115	117	117	115	113	116	117	116	108	105	101	100	105	106	107	116	114	110	112
Dec12	107	107	109	109	110	111	109	112	115	114	114	116	116	115	113	113	112	112	112	115	115	114	110	106	112
Dec13	104	105	106	114	113	117	117	116	116	110	111	116	117	116	112	110	109	108	109	112	116	112	110	111	112
Dec14	110	111	108	110	113	117	121	120	116	110	111	116	118	119	118	117	117	117	117	116	116	113	111	113	115
Dec15	115	112	111	110	111	109	114	118	116	112	110	112	114	115	118	116	114	113	110	112	109	118	114	114	113
Dec16	107	107	109	110	112	114	113	114	112	105	103	107	108	108	111	110	108	108	111	110	109	113	113	111	110
Dec17	111	112	112	111	111	111	111	113	108	102	105	113	118	119	118	114	114	114	115	115	112	113	113	114	113
Dec18	113	116	121	120	122	124	125	122	117	118	116	103	80	95	106	102	74	72	73	85	97	99	100	104	104
Dec19	108	106	101	110	111	104	116	99	94	94	93	87	94	98	96	99	98	106	100	100	100	104	103	102	101
Dec20	102	103	108	108	108	109	108	108	104	104	104	104	100	100	101	98	105	102	100	108	107	104	111	106	105
Dec21	103	103	107	108	110	114	116	111	104	98	103	105	104	107	109	106	105	106	105	103	101	102	104	106	106
Dec22	107	108	107	110	112	113	114	116	113	112	109	107	103	105	107	110	110	109	108	106	99	103	107	108	109
Dec23	108	109	109	110	115	118	117	116	112	113	115	111	102	97	97	99	102	104	105	106	106	105	105	104	108
Dec24	111	111	111	113	115	118	120	124	120	115	111	109	107	110	108	107	110	112	112	112	110	111	111	112	112
Dec25	111	112	112	114	117	120	121	121	121	117	118	116	111	112	111	110	111	119	118	113	113	118	121	119	116
Dec26	116	111	109	110	112	116	118	121	116	115	117	117	119	116	116	115	111	104	104	106	110	117	114	112	113
Dec27	109	109	109	112	113	114	114	114	111	110	108	110	111	111	113	115	114	112	112	112	111	111	110	109	111
Dec28	109	109	111	112	114	116	117	119	115	113	114	114	113	113	114	117	116	114	113	112	113	111	110	108	113
Dec29	109	110	110	112	113	114	116	117	113	110	110	113	116	117	120	119	118	117	116	116	114	112	112	111	114
Dec30	111	110	111	114	117	119	122	128	128	123	122	123	123	122	122	119	118	116	115	114	115	118	120	118	119
Dec31	115	114	115	119	119	125	127	127	115	109	109	110	112	111	116	117	116	112	104	111	114	114	112	110	115
2019, Field component: Y, Base: 1600.0, Unit: nT																									
Dec01	38	36	34	33	35	38	38	37	37	32	28	27	27	30	33	32	35	35	39	37	38	40	43	39	35
Dec02	37	35	36	36	34	36	37	36	36	31	31	29	31	33	34	34	34	36	37	38	39	38	39	39	35
Dec03	41	40	38	38	38	37	36	35	35	33	31	30	33	36	36	37	36	37	37	38	38	38	39	37	36

Table 8.14 (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	35	34	38	36	34	35	35	35	35	32	31	31	32	31	32	33	33	34	37	40	37	38	39	39	35
Dec05	38	36	35	35	35	36	37	38	38	33	29	28	30	33	34	34	36	35	37	38	39	39	38	37	35
Dec06	36	34	34	34	35	35	36	37	35	34	30	29	29	34	35	37	34	36	37	38	39	40	44	43	36
Dec07	42	39	39	38	37	38	37	36	35	33	31	26	29	35	38	38	38	38	39	39	41	42	45	42	37
Dec08	39	37	36	35	37	38	38	37	35	33	31	30	32	37	37	37	37	38	38	42	42	47	44	43	37
Dec09	44	38	37	43	40	40	40	39	39	33	30	28	29	31	34	35	36	37	39	39	39	47	46	41	38
Dec10	39	38	37	35	34	36	36	35	31	23	21	24	29	33	36	36	36	35	35	39	39	40	39	38	34
Dec11	32	36	36	36	39	40	41	43	41	31	29	30	34	34	34	38	37	40	40	43	42	41	42	41	37
Dec12	40	37	37	37	38	41	42	42	41	34	29	31	31	31	34	35	37	39	39	40	41	42	45	52	38
Dec13	41	41	38	37	37	38	38	36	37	34	30	31	31	32	35	36	38	38	40	42	42	42	41	41	37
Dec14	41	40	38	36	35	36	37	40	43	38	32	29	30	32	35	36	37	37	37	38	39	41	44	47	37
Dec15	54	45	42	37	39	39	40	42	44	38	30	25	26	30	35	37	36	37	40	39	39	51	44	45	39
Dec16	42	39	39	38	37	38	39	39	40	35	30	27	29	32	35	35	36	38	39	40	41	40	41	40	37
Dec17	39	39	40	38	38	38	40	42	40	32	27	27	29	33	36	36	38	39	39	39	41	41	40	39	37
Dec18	40	36	34	34	33	33	36	41	41	33	28	29	22	26	35	37	71	51	54	53	57	45	42	41	40
Dec19	43	46	34	37	41	32	30	33	20	26	25	34	34	36	46	41	50	46	42	46	45	43	43	44	38
Dec20	44	40	35	39	38	39	40	43	42	35	31	29	31	36	37	49	41	40	43	43	42	43	50	44	40
Dec21	42	39	37	39	40	41	42	44	43	38	32	31	30	33	37	39	41	41	41	46	50	46	44	41	40
Dec22	39	42	39	41	41	41	40	43	41	35	34	34	32	32	37	38	39	40	40	42	44	43	44	41	39
Dec23	40	39	38	36	37	41	42	44	43	38	37	34	33	30	32	36	39	41	42	43	43	44	44	43	39
Dec24	39	40	38	38	38	39	41	44	45	41	37	30	31	33	37	39	40	40	40	41	41	41	41	41	39
Dec25	39	37	36	37	38	39	41	43	44	40	37	31	30	33	37	41	40	37	37	42	44	44	39	39	39
Dec26	40	40	37	37	36	37	39	41	40	35	33	31	31	34	36	37	36	39	41	41	44	47	43	43	38
Dec27	44	39	38	38	39	41	42	45	47	44	36	32	30	33	37	39	40	41	41	42	43	43	44	43	40
Dec28	42	39	40	39	37	39	40	42	44	42	41	38	31	31	35	38	40	40	41	41	42	44	44	44	40
Dec29	42	40	38	37	38	39	42	45	48	42	33	29	30	33	37	38	39	40	41	42	43	45	46	48	40
Dec30	44	41	39	38	38	39	39	37	38	37	35	32	32	36	38	39	40	40	41	41	41	43	39	40	39
Dec31	41	40	37	36	36	34	38	42	42	37	33	29	28	32	38	38	39	39	45	44	44	45	46	44	39
2019, Field component: Z, Base: 43800.0, Unit: nT																									
Dec01	104	104	104	104	104	103	102	102	100	100	101	102	103	105	105	105	105	106	105	105	105	104	104	104	104
Dec02	104	103	103	103	104	103	102	102	101	102	101	102	103	103	103	103	103	104	105	105	105	104	104	105	103
Dec03	105	104	104	103	103	103	101	99	97	96	99	101	105	105	104	104	105	105	105	105	105	105	105	104	103
Dec04	103	102	102	103	102	102	101	101	100	100	101	101	104	105	105	105	105	105	105	105	104	104	104	104	103
Dec05	104	104	104	103	103	103	102	103	102	101	102	103	105	106	103	103	103	103	104	104	104	104	104	104	103
Dec06	104	104	104	104	104	103	103	104	105	106	106	108	110	109	108	107	106	106	106	106	106	106	106	106	106
Dec07	106	105	105	105	105	104	103	103	103	104	105	104	106	107	106	106	106	106	105	105	106	106	106	106	105

Table 8.14 (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	106	106	105	105	105	104	103	102	103	103	103	103	103	104	104	105	105	105	105	106	108	108	108	107	105
Dec09	106	107	104	104	105	105	104	103	100	99	100	101	105	106	106	106	105	105	105	105	105	105	107	106	104
Dec10	106	105	105	105	105	104	103	102	101	104	108	109	109	107	106	106	105	105	106	106	106	105	105	105	105
Dec11	105	104	104	104	103	104	103	102	98	99	102	105	105	105	105	105	107	108	108	107	107	106	105	105	104
Dec12	106	106	106	106	106	106	104	103	102	101	101	103	103	105	106	106	106	106	106	106	105	105	105	106	105
Dec13	106	106	106	105	105	105	103	103	102	100	102	105	104	106	106	107	107	107	107	106	106	105	105	105	105
Dec14	105	105	105	105	105	105	104	105	104	104	104	102	103	107	107	106	106	106	106	105	105	105	106	105	105
Dec15	105	105	105	105	105	106	105	104	102	99	100	104	106	107	106	105	106	106	106	106	107	105	105	104	105
Dec16	104	105	105	106	106	105	104	105	106	105	105	107	106	107	107	107	107	108	107	107	107	107	106	106	106
Dec17	106	106	105	106	106	106	106	105	104	105	108	108	108	108	106	106	107	107	106	106	106	106	106	105	106
Dec18	105	104	103	103	104	104	103	103	101	101	104	106	110	111	110	109	112	118	118	116	114	112	111	110	108
Dec19	108	107	108	107	106	108	107	107	107	110	113	112	116	115	113	112	111	111	111	111	111	110	110	110	110
Dec20	109	109	108	108	108	108	108	108	105	106	108	109	111	113	112	111	111	111	111	110	110	109	108	109	109
Dec21	108	109	108	108	108	108	107	107	105	106	108	110	111	113	112	111	110	110	110	110	111	111	110	109	109
Dec22	109	108	108	108	109	109	108	107	106	108	108	109	111	113	112	111	110	109	109	109	110	110	110	109	109
Dec23	109	109	109	109	109	108	107	105	103	105	105	103	106	111	113	112	111	111	110	110	110	110	109	110	109
Dec24	109	108	108	108	108	107	106	103	100	102	105	107	111	112	112	110	110	109	109	108	108	108	108	108	108
Dec25	108	108	108	108	107	107	106	106	104	105	106	107	111	114	112	110	109	108	107	108	108	108	107	106	108
Dec26	105	106	106	106	106	106	105	104	105	110	111	107	106	108	109	108	108	109	110	110	109	108	107	107	107
Dec27	107	107	107	107	107	107	106	106	105	107	108	106	106	109	110	109	109	109	109	109	109	108	108	108	108
Dec28	107	108	108	108	108	107	107	105	103	105	105	105	110	112	111	109	108	108	108	108	108	108	107	107	108
Dec29	107	107	108	108	108	107	107	106	104	102	104	107	109	110	109	108	108	108	107	107	108	107	108	107	107
Dec30	107	107	107	107	107	106	105	104	105	106	106	105	107	109	109	108	108	108	108	109	108	108	107	106	107
Dec31	106	106	106	105	105	105	104	105	105	107	109	108	109	112	112	110	109	109	109	110	109	108	108	108	108

2019, Field component: F, Base: 48600.0, Unit: nT

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
Dec01	99	99	100	101	102	102	102	102	100	98	97	98	100	101	101	100	100	101	102	101	101	101	102	100	100
Dec02	100	101	100	100	101	102	100	100	100	100	100	101	103	103	101	101	101	102	101	101	100	100	100	100	101
Dec03	100	100	101	101	102	102	100	99	97	98	100	101	104	104	102	101	101	101	101	101	100	100	101	101	101
Dec04	102	101	100	101	102	102	102	102	102	100	100	100	101	101	102	102	102	101	101	102	102	101	100	100	101
Dec05	100	100	100	100	100	102	101	102	101	99	99	102	105	106	104	103	102	102	101	100	101	101	100	100	101
Dec06	99	100	101	102	102	102	101	103	103	103	103	104	106	104	103	104	103	102	101	101	101	100	101	101	102
Dec07	100	100	100	100	100	101	101	102	101	101	101	102	104	104	102	102	102	102	102	101	102	101	100	100	101
Dec08	100	101	101	101	102	101	100	100	100	101	101	103	103	103	103	103	103	102	102	100	98	98	100	100	101
Dec09	99	101	101	100	100	101	101	100	98	98	99	100	102	104	103	102	102	103	103	103	102	101	99	100	101
Dec10	100	101	101	102	103	102	102	102	100	100	103	105	107	107	105	105	104	104	102	102	103	102	102	101	103
Dec11	101	100	100	102	102	102	101	101	98	97	99	103	104	103	100	99	99	99	101	101	101	104	102	101	101

Table 8.14 (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	100	100	101	101	101	101	100	100	100	98	99	101	101	103	103	102	102	103	103	103	103	102	101	100	101
Dec13	100	100	100	103	102	104	102	101	100	96	98	103	103	104	102	102	102	102	102	102	104	102	101	101	101
Dec14	101	101	100	101	102	103	104	105	102	100	100	101	102	106	106	104	104	104	104	103	103	102	102	102	103
Dec15	103	102	101	100	101	101	102	103	100	96	96	100	103	104	105	103	103	103	102	102	102	104	103	101	102
Dec16	99	99	101	101	102	102	102	102	102	98	97	100	100	101	103	103	102	102	103	103	102	103	103	102	101
Dec17	102	102	102	101	102	102	102	102	99	97	101	104	106	107	105	103	104	104	104	104	103	103	103	103	103
Dec18	102	102	104	103	104	105	105	105	100	100	102	98	91	99	103	101	93	96	97	100	104	102	102	102	101
Dec19	103	101	100	102	102	100	104	98	95	98	100	97	103	104	102	102	101	105	102	101	102	103	102	102	101
Dec20	101	101	103	102	103	103	103	102	98	99	100	101	102	103	103	101	104	102	102	105	104	102	104	102	102
Dec21	100	101	102	102	103	105	105	103	98	97	101	102	103	106	106	104	103	103	103	103	102	103	103	103	103
Dec22	103	102	102	104	105	105	105	105	103	104	103	102	103	105	106	106	105	104	104	103	101	103	104	104	104
Dec23	103	104	104	104	106	106	105	103	100	102	103	99	98	101	102	102	103	103	104	103	103	103	103	102	103
Dec24	105	104	104	105	105	106	106	105	101	100	101	102	104	107	106	104	105	105	105	104	104	104	104	104	104
Dec25	104	104	104	105	106	107	106	106	105	104	105	105	106	109	107	105	105	107	106	104	105	107	107	105	106
Dec26	104	102	101	102	102	104	104	105	104	107	108	105	105	106	107	106	104	102	103	103	105	107	105	103	104
Dec27	102	102	103	103	104	104	104	103	101	103	102	101	102	105	106	106	106	105	105	105	105	104	103	103	104
Dec28	102	103	103	104	105	105	105	105	101	102	102	103	106	108	107	108	106	105	105	105	105	104	103	102	104
Dec29	102	103	103	104	104	105	105	105	101	98	100	103	106	108	109	107	106	106	106	105	105	104	104	104	104
Dec30	103	102	103	104	105	106	106	108	108	107	107	106	108	110	109	107	107	107	106	106	106	107	106	105	106
Dec31	104	103	104	105	105	107	107	108	103	102	103	103	105	107	109	108	106	105	102	105	106	105	104	104	105

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