BRITISH GEOLOGICAL SURVEY

King Edward Point Observatory *Monthly Magnetic Bulletin*

December 2016

16/12/KE

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

KING EDWARD POINT OBSERVATORY MAGNETIC DATA

1. Introduction

King Edward Point observatory was installed by the British Geological Survey (BGS), with the permission of the Government of South Georgia and the South Sandwich Islands (GSGSSI), in collaboration with British Antarctic Survey (BAS), and became operational in February 2011.

This bulletin is published to provide rapid access to the provisional geomagnetic observatory results. The information is freely available for personal, academic, educational and non-commercial research or use. Magnetic observatory data are presented as a series of plots of one-minute, hourly and daily values, followed by tabulations of monthly values. The operation of the observatory and presentation of data are described in the rest of this section.

Enquiries about the data should be addressed to:

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2. Position

King Edward Point Observatory, one of the geomagnetic observatories maintained and operated by the British Geological Survey (BGS), is situated on a site adjacent to the Government of South Georgia and the South Sandwich Islands (GSGSSI) research station at King Edward Point, Cumberland East Bay, South Georgia. The observatory co-ordinates are:

Geographic: *54° 16'55.2"S* *323° 30'25.2"E*
Geomagnetic: *46° 13'12"S* *029° 57'47"E*
Height above mean sea level: *7 m*

The geographical coordinates are measured by a handheld GPS device, which uses WGS84 as the reference coordinate system. The height above MSL is determined from the best available contour maps. The geomagnetic co-ordinates are approximations, calculated using the 12th generation International Geomagnetic Reference Field (IGRF) at epoch 2016.5. On-line access to models (including IGRF), charts and navigational data are available at http://www.geomag.bgs.ac.uk/data_service/models_compass/home

3. The Observatory Operation

3.1 GDAS

The observatory operates under the control of the Geomagnetic Data Acquisition System (GDAS), which was developed by BGS staff, installed and became operational in February 2011. The data acquisition software, running on QNX operated computers, controls the data logging and the communications.

There are two sets of sensors used for making magnetic measurements. A tri-axial linear-core fluxgate magnetometer, manufactured by the Danish Meteorological Institute, is used to measure the variations in the horizontal (*H*) and vertical (*Z*) components of the field. The third sensor is oriented perpendicular to these, and measures variations, which are proportional to the changes in declination (*D*). Measurements are made at a rate of 1 Hz.

In addition to the fluxgate sensors there is a proton precession magnetometer (PPM) making measurements of the absolute total field intensity (*F*) at a rate of 0.1Hz.

The raw unfiltered data are retrieved automatically via Internet connections to the BGS office in Edinburgh in near real-time. The fluxgate data are filtered to produce one-minute values using a 61-point cosine filter and the total field intensity samples are filtered using a 7-point cosine filter. The one-minute values provide input for various data products, available on-line at www.geomag.bgs.ac.uk/data_service/home

3.2 Absolute Observations

The GDAS fluxgate magnetometers accurately measure variations in the components of the geomagnetic field, but not the absolute magnitudes. One set of absolute measurements of the field are made manually once per month. A fluxgate sensor mounted on a theodolite is used to determine *D* and inclination (*I*); the GDAS PPM measurements, with a site difference correction applied, are used for *F*. The absolute observations are used in conjunction with the GDAS variometer measurements to produce a continuous record of

the absolute values of the geomagnetic field elements as if they had been measured at the observatory reference pillar.

4. Observatory Results

The data presented in the bulletin are in the form of plots and tabulations described in the following sections.

4.1 Absolute Observations

The absolute observation measurements made during the month are tabulated. Also included are the corresponding baseline values, which are the differences between the absolute measurements and the variometer measurements of *D*, *H* and *Z* (in the sense absolute−variometer). These are also plotted (markers) along with the derived preliminary daily baseline values (line) throughout the year. Daily mean differences between the measured absolute *F* and the *F* computed from the baseline corrected *H* and *Z* values are plotted in the fourth panel (in the sense measured−derived). The bottom panel shows the daily mean temperature in the fluxgate chamber.

4.2 Summary magnetograms

Small-scale magnetograms are plotted which allow the month's data to be viewed at a glance. They are plotted 16 days to a page and show the one-minute variations in *D*, *H* and Z. The scales are shown on the right-hand side of the page. On disturbed days the scales are multiplied by a factor, which is indicated above the panel for that day. The variations are centred on the monthly mean value, shown on the left side of the page.

4.3 Magnetograms

The daily magnetograms are plotted using one-minute values of *D*, *H* and *Z* from the fluxgate sensors, with any gaps filled using back-up data. The magnetograms are plotted to a variable scale; scale bars are shown to the right of each plot. The absolute level (the monthly mean value) is indicated on the left side of the plots.

4.4 Hourly Mean Value Plots

Hourly mean values of *D*, *H* and *Z* for the past 12 months are plotted in 27-day segments corresponding to the Bartels solar rotation number. Magnetic disturbances associated with active regions and/or coronal holes on the Sun may recur after 27 days: the same is true for geomagnetically quiet intervals. Plotting the data in this way highlights this recurrence. Diurnal variations are also clear in these plots and the amplitude changes throughout the year highlight the seasonal changes. Longer term secular variation is also illustrated.

4.5 Daily and Monthly Mean Values

Daily mean values of *D*, *H*, *Z* and *F* are plotted throughout the year. In addition, a table of monthly mean values of all the geomagnetic elements is provided. These values depend on accurate specification of the fluxgate sensor baselines. It is anticipated that these provisional values will not be altered by more than a few nT or tenths of arcminutes before being made definitive at the end of the year.

5. Conditions of Use

The data presented in this bulletin are provided for personal, academic, educational, non-commercial research or other non-commercial use and are not for sale or distribution to third parties without written permission from BGS.

Reproduction of any part of this bulletin should be accompanied by the statement: 'Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved'. Publications making use of the data should include an acknowledgment statement of the form: ‘The results presented in this paper rely on the data collected at King Edward Point magnetic observatory, South Georgia operated by the British Geological Survey in co-operation with the British Antarctic Survey and the Government of South Georgia and the South Sandwich Islands (GSGSSI).’

Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at www.geomag.bgs.ac.uk/contactus/staff

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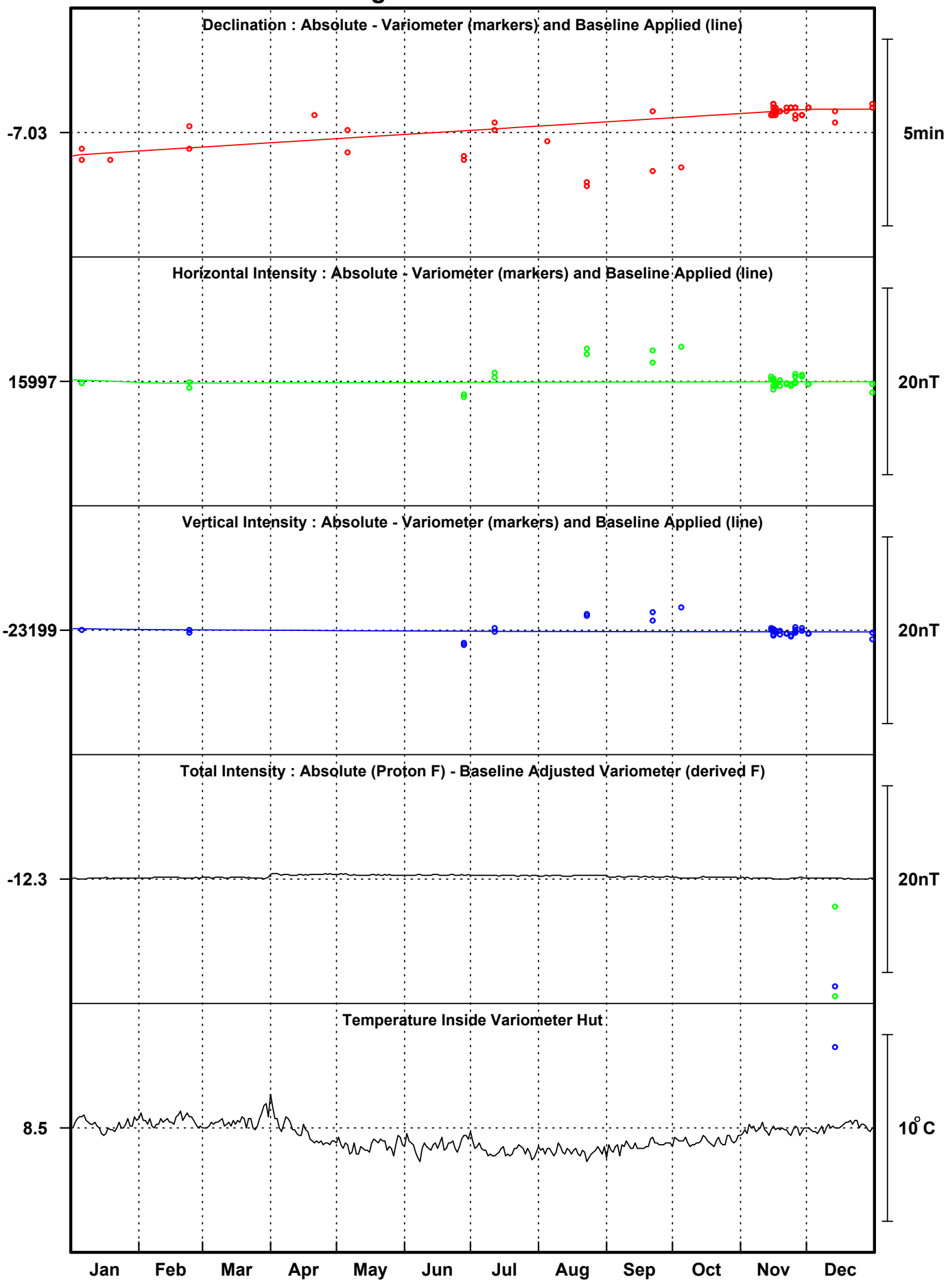
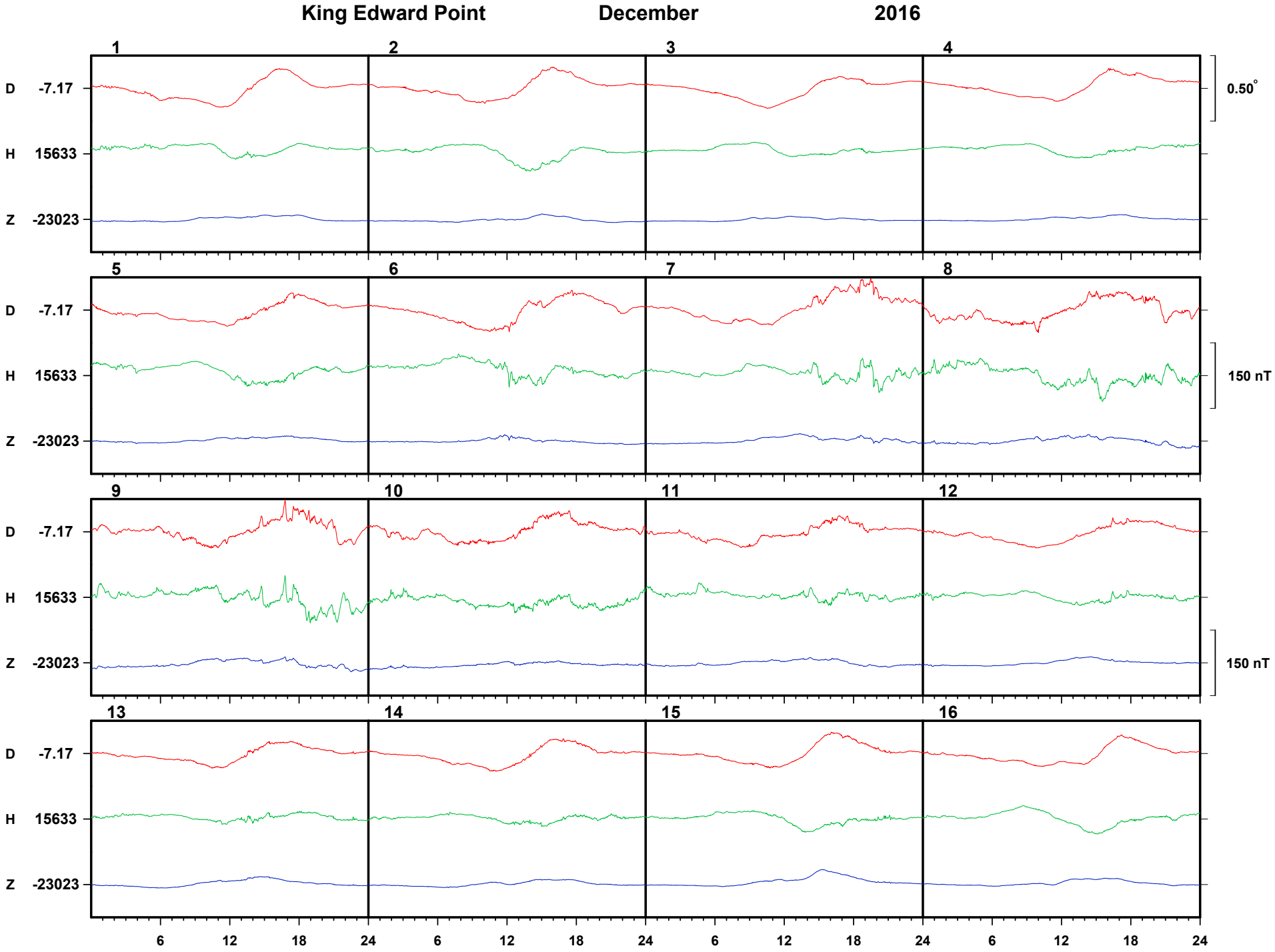
KING EDWARD POINT OBSERVATORY

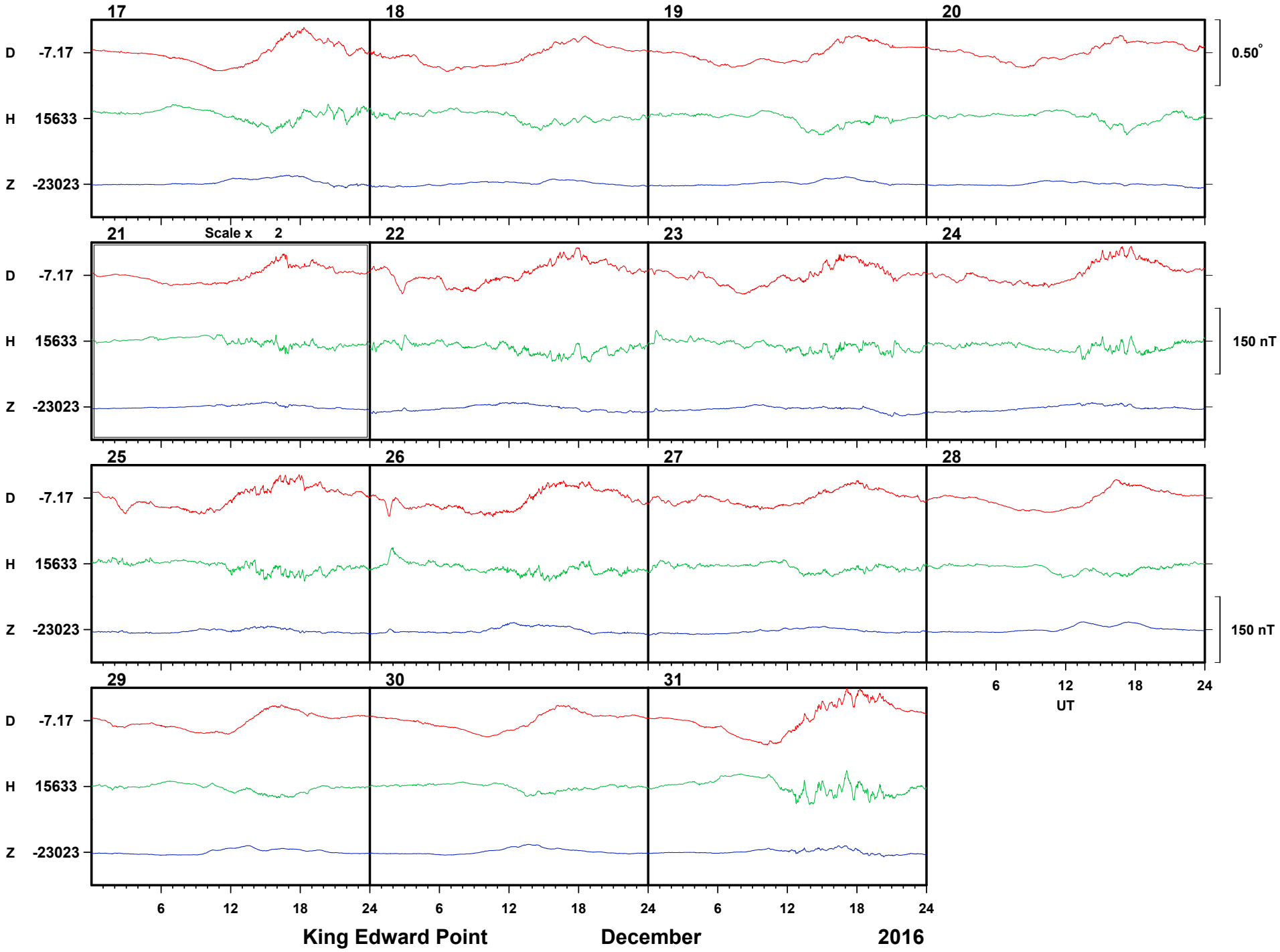
ABSOLUTE OBSERVATIONS

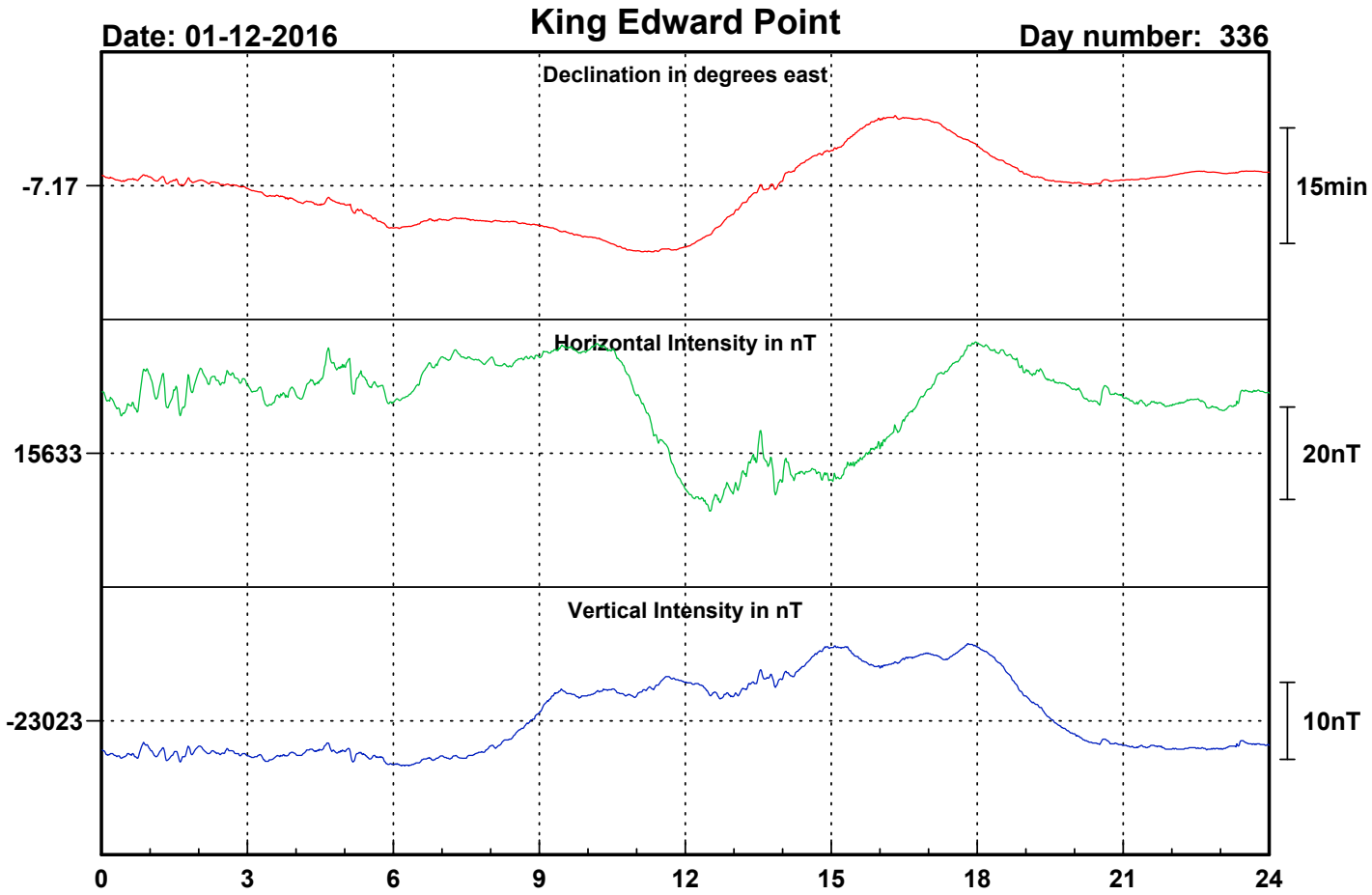
		Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Absolute (º)**	**Site difference (nT)**	**Absolute corrected (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Observer**
01-Dec-16	336	11:16	-7.3132	-7.0183	11:24	-55.8131	12.3	27826.9	15635.8	15997.1	-23018.6	-23199.7	TT
01-Dec-16	336	11:33	-7.3072	-7.0183	11:40	-55.8188	12.3	27823.7	15631.7	15997.1	-23017.6	-23199.7	TT
13-Dec-16	348	17:43	-7.0973	-7.0250	18:02	-55.9283	12.3	27832.8	15592.8	15941.1	-23055.0	-23237.5	VF
13-Dec-16	348	18:15	-7.1139	-7.0200	18:28	-55.9578	12.3	27833.4	15581.2	15931.5	-23063.5	-23244.0	VF
30-Dec-16	365	12:58	-7.2149	-7.0167	13:39	-55.8415	12.3	27802.2	15610.5	15996.2	-23006.0	-23200.3	KL
30-Dec-16	365	14:12	-7.1675	-7.0183	14:35	-55.8247	12.3	27809.8	15621.5	15997.1	-23007.7	-23199.6	KL

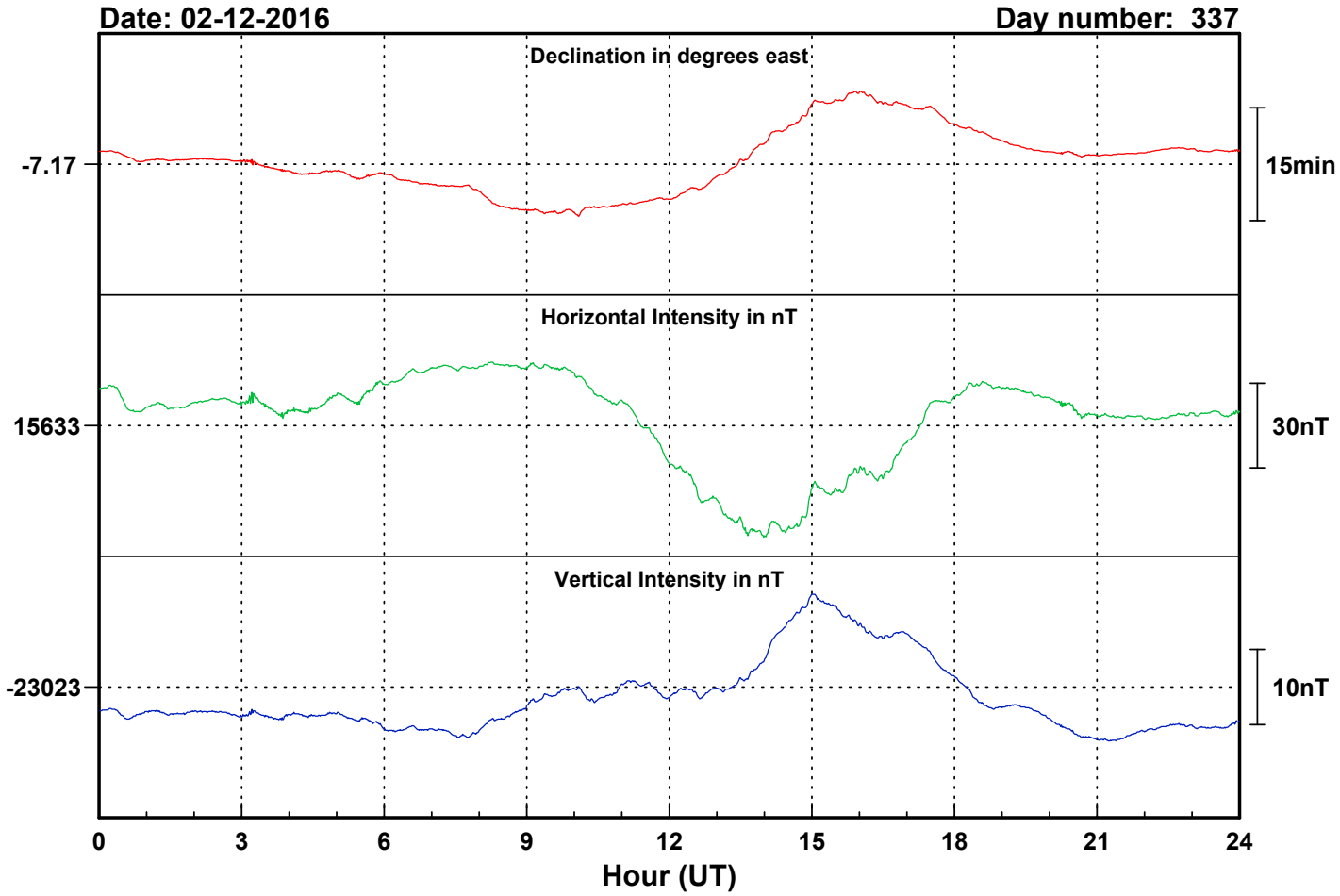
King Edward Point 2016




King Edward Point
December
2016
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
D -7.17
H 15633
Z -23023
0.50°
150 nT
150 nT
6
12
18
24


17
18
19
20
D -7.17
H 15633
Z -23023
0.50°
21
Scale x 2
22
23
24
150 nT
25
26
27
28
29
30
31
6
12
18
24
UT
King Edward Point
December
2016


King Edward Point
Date: 01-12-2016
Day number: 336
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
10nT
0
3
6
9
12
15
18
21
24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Declination in degrees east
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15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
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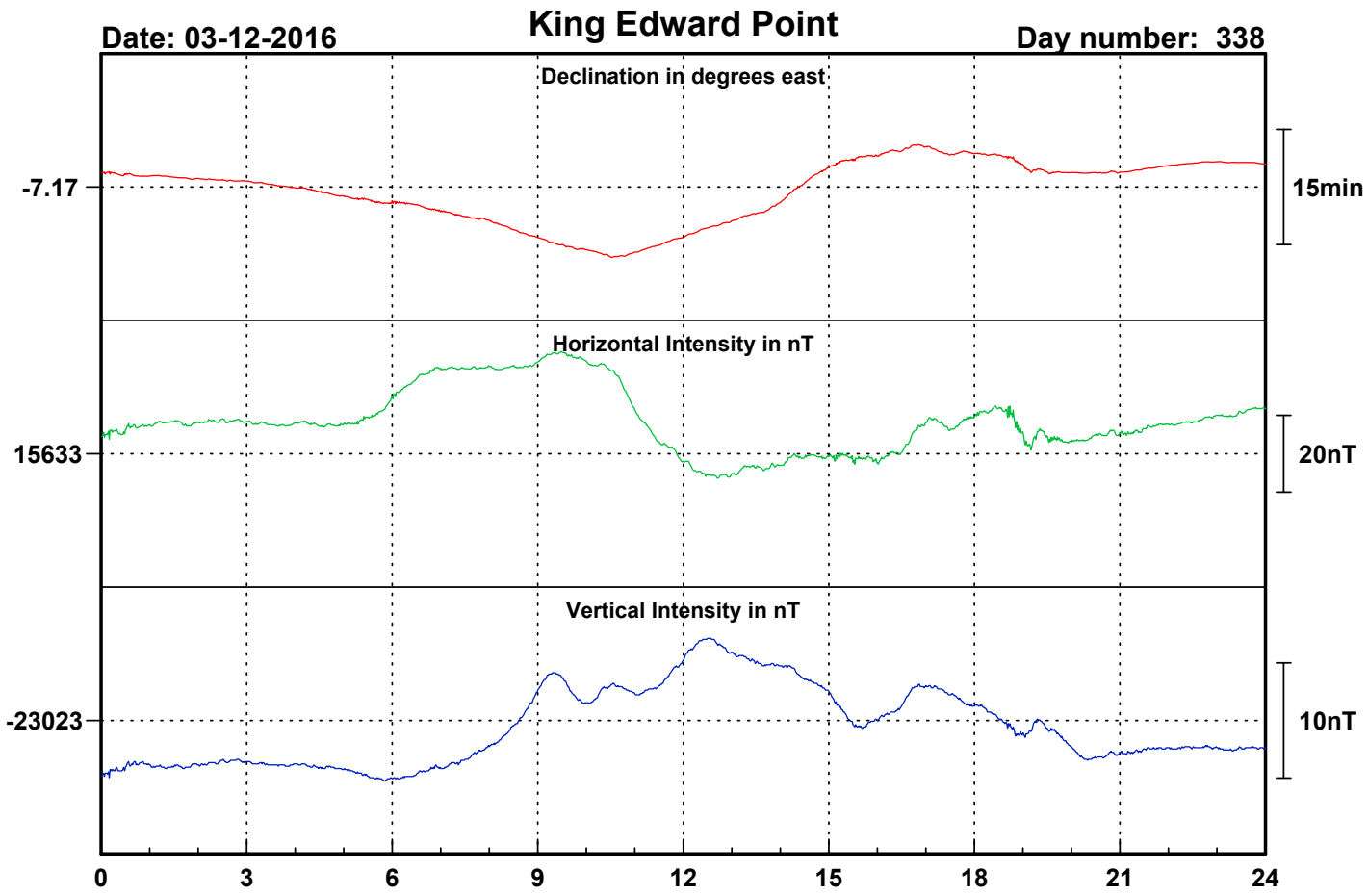
21
24
Hour (UT)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Day number: 338
Declination in degrees east
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15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
10nT
0
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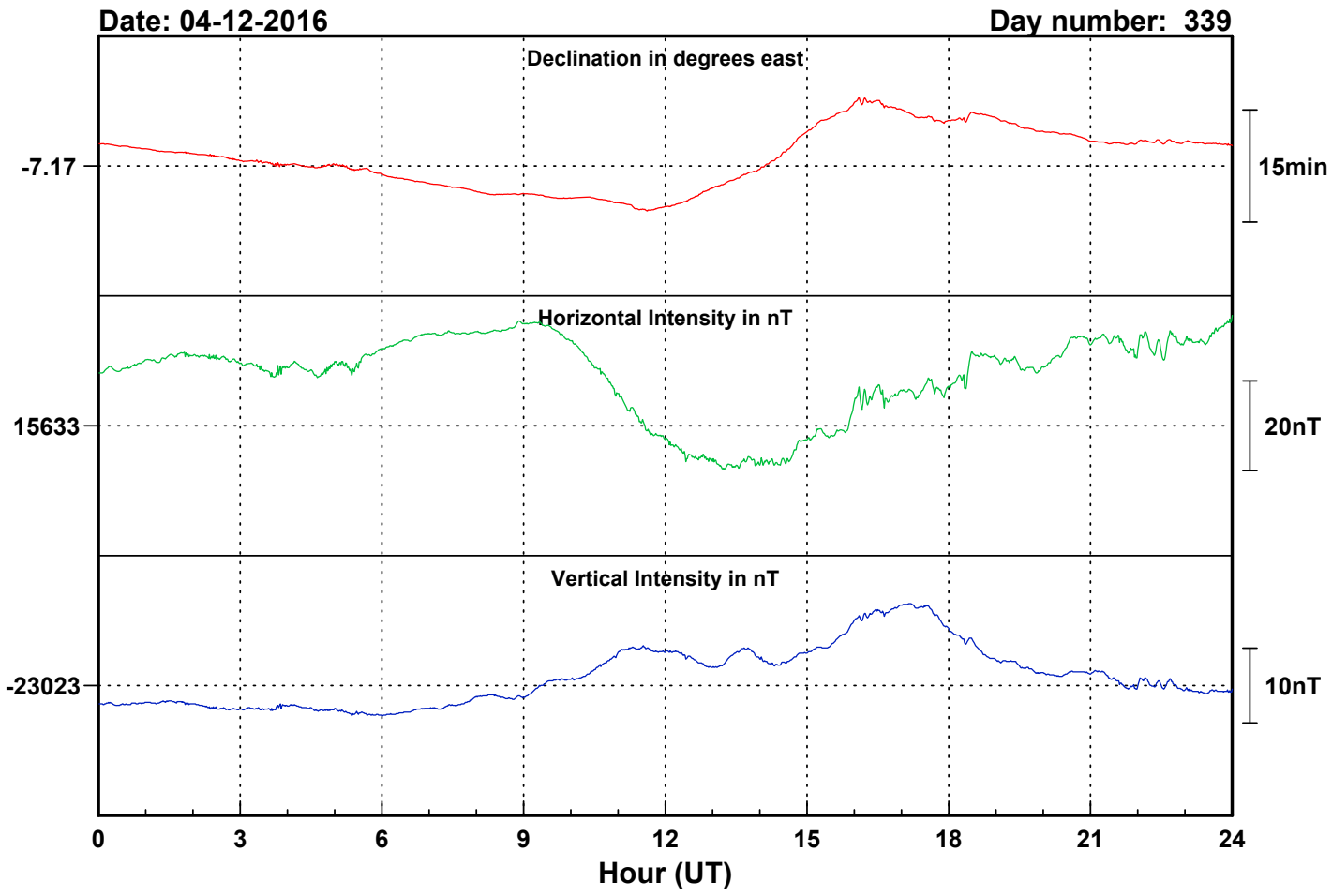
24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15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
10nT
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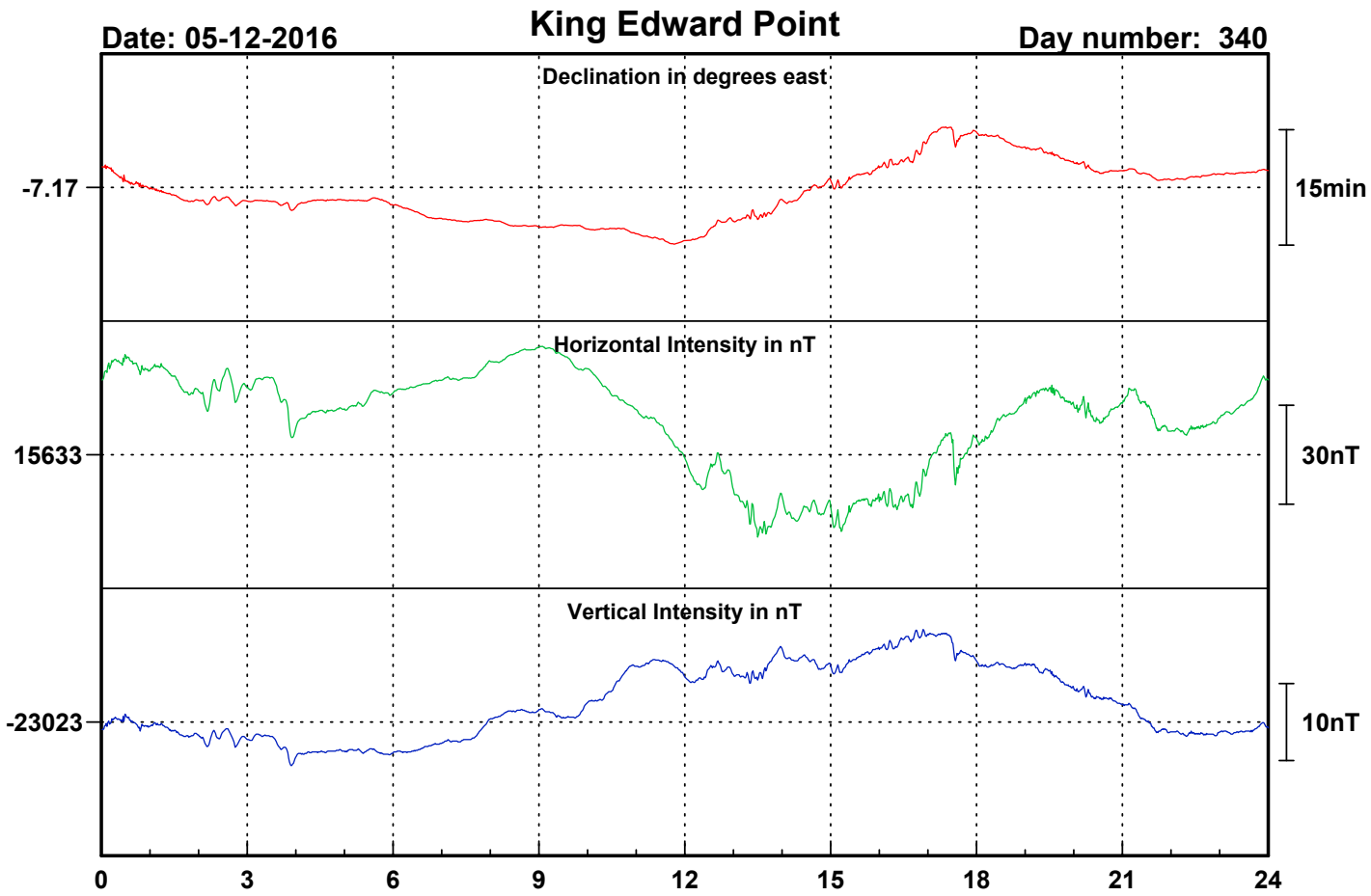
Hour (UT)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Day number: 340
Declination in degrees east
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15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
10nT
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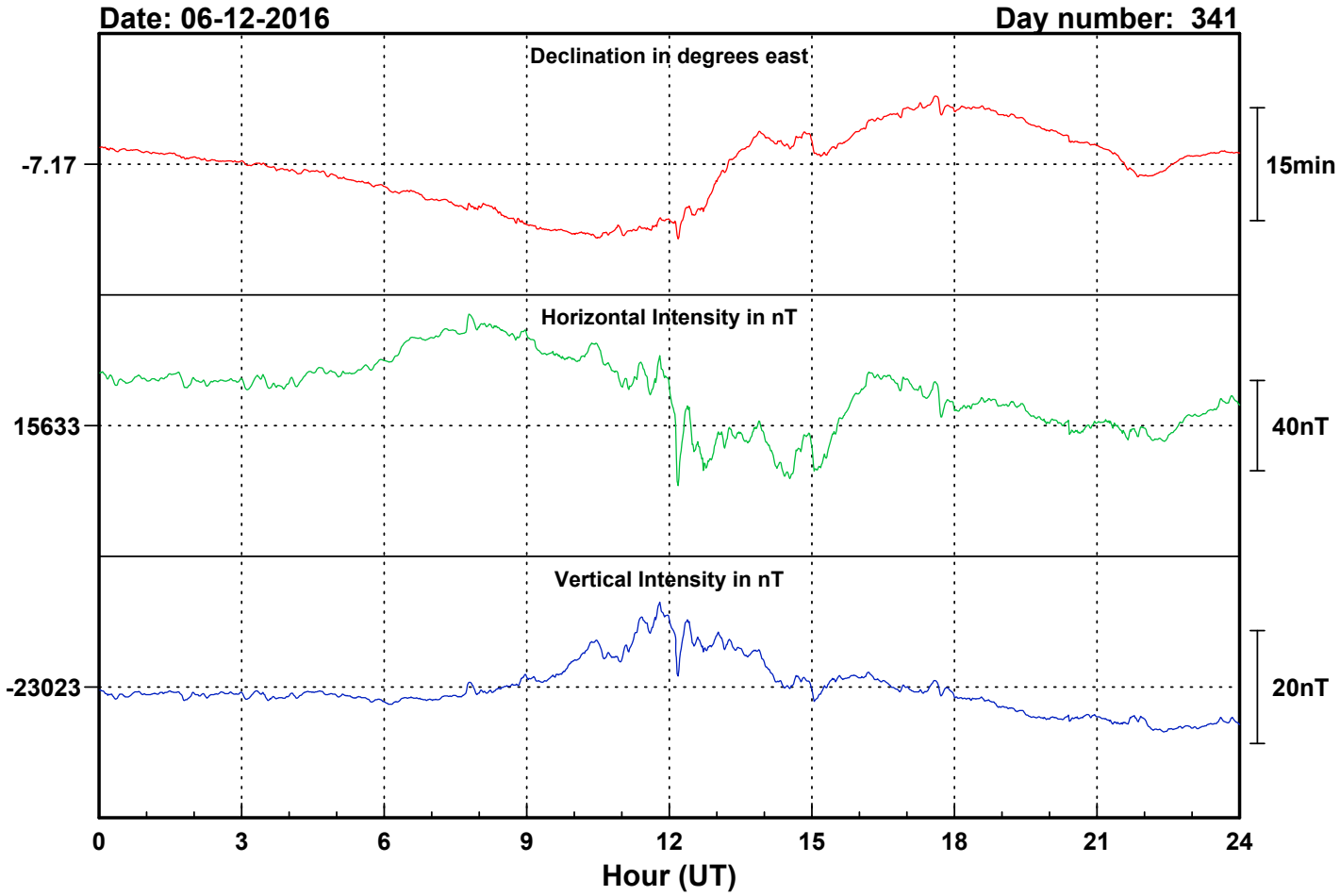
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15min
Horizontal Intensity in nT
15633
40nT
Vertical Intensity in nT
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20nT
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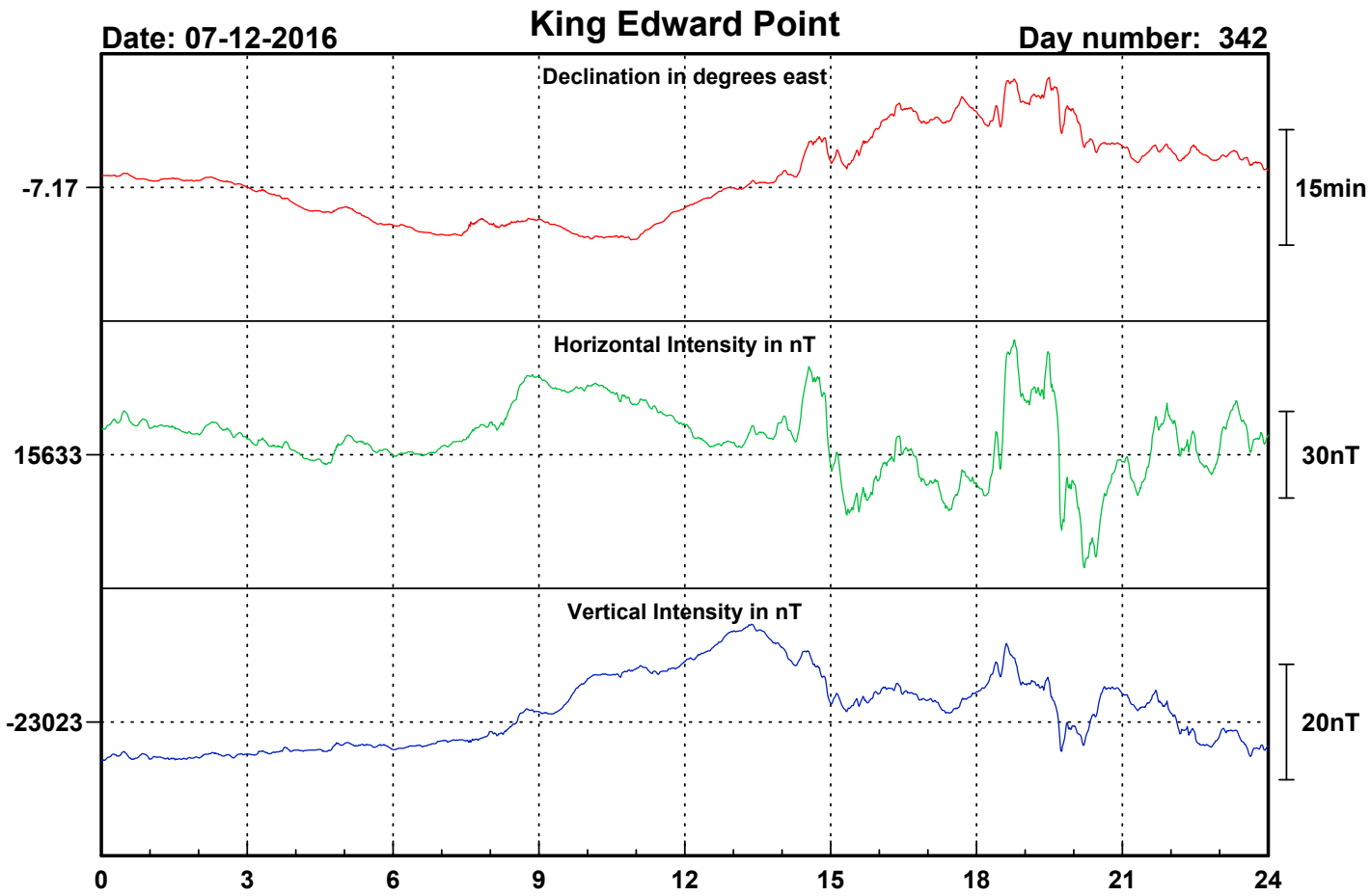
Hour (UT)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Day number: 342
Declination in degrees east
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15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
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20nT
0
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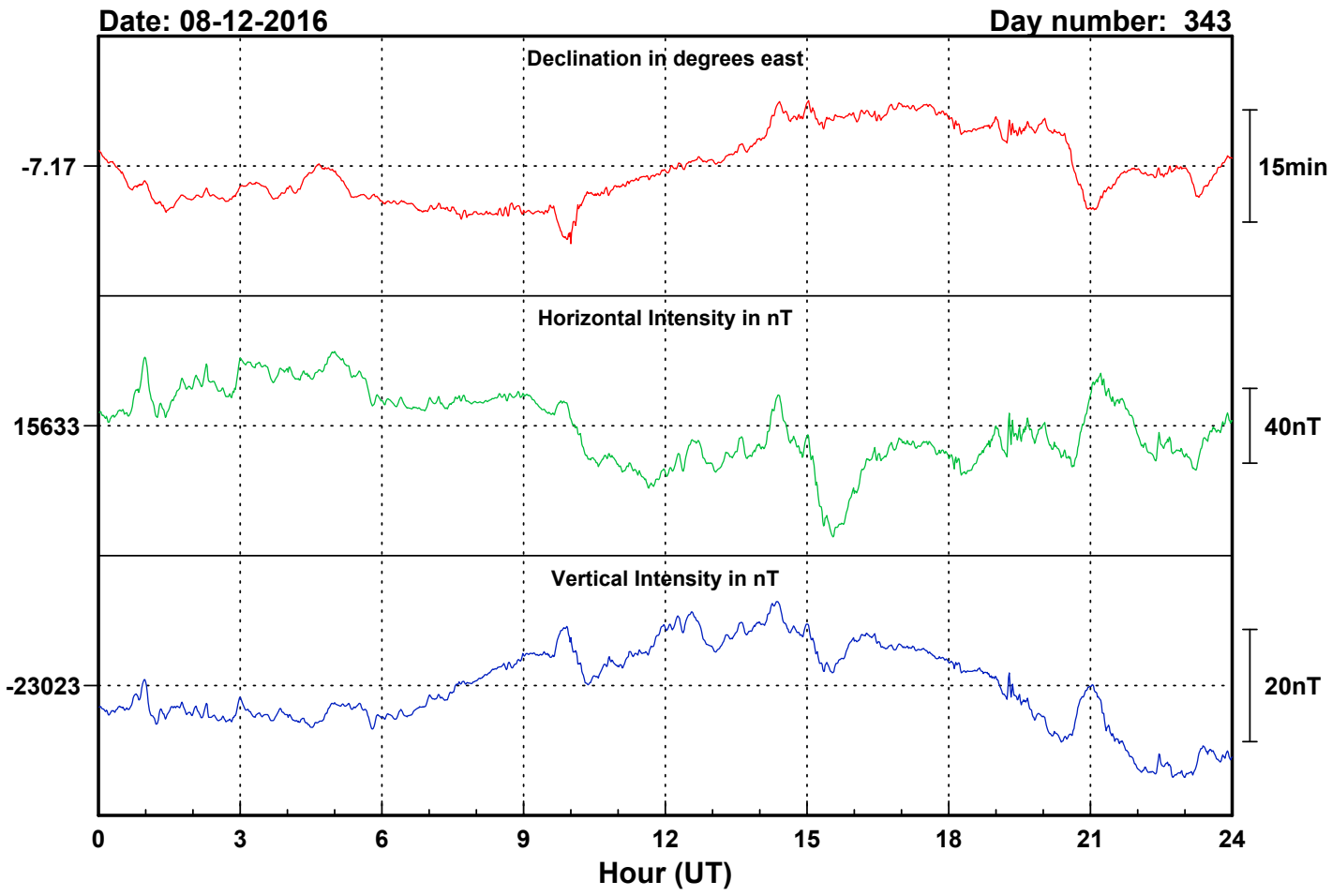
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15min
Horizontal Intensity in nT
15633
40nT
Vertical Intensity in nT
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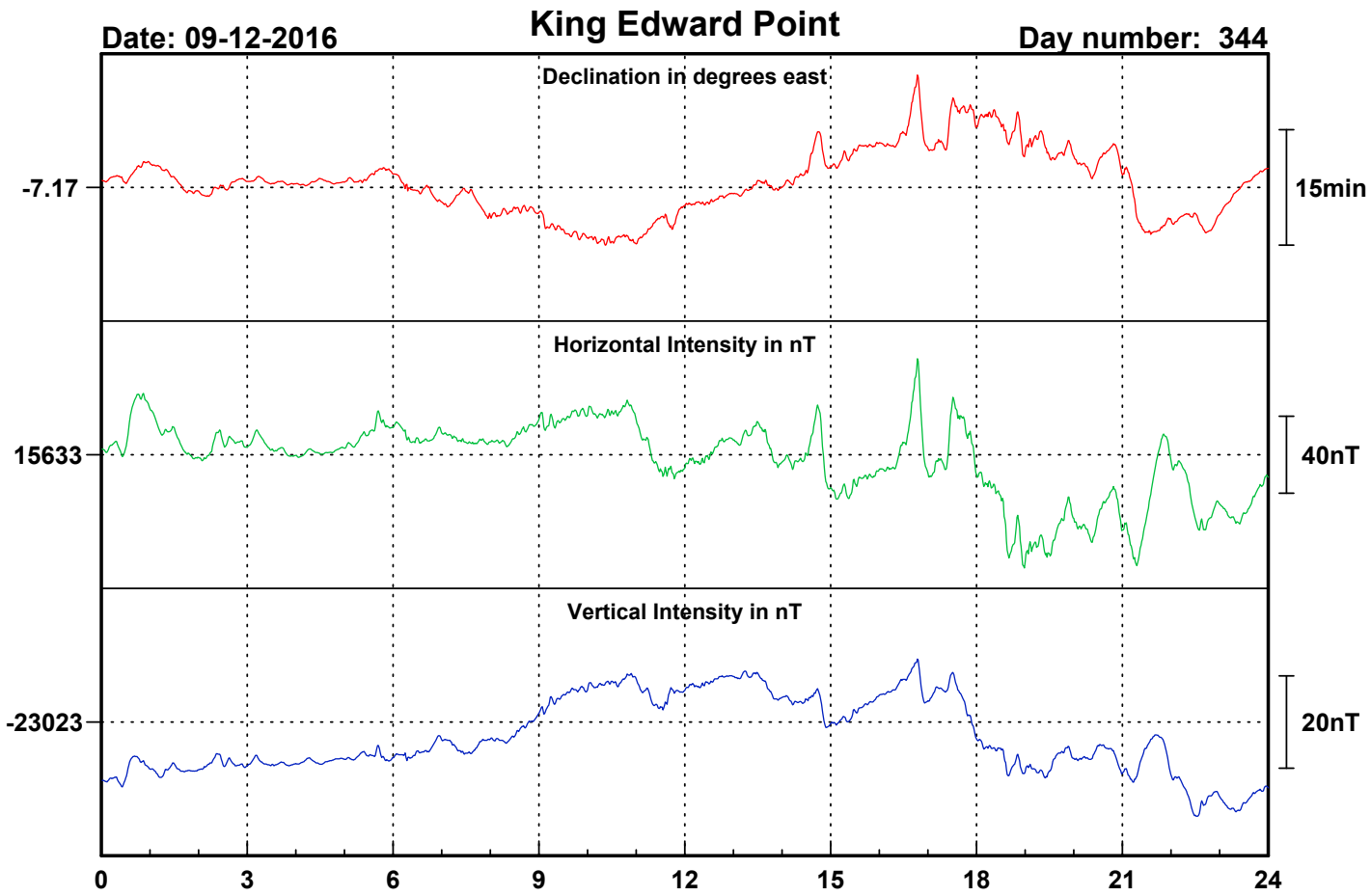
Hour (UT)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Day number: 344
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15min
Horizontal Intensity in nT
15633
40nT
Vertical Intensity in nT
-23023
20nT
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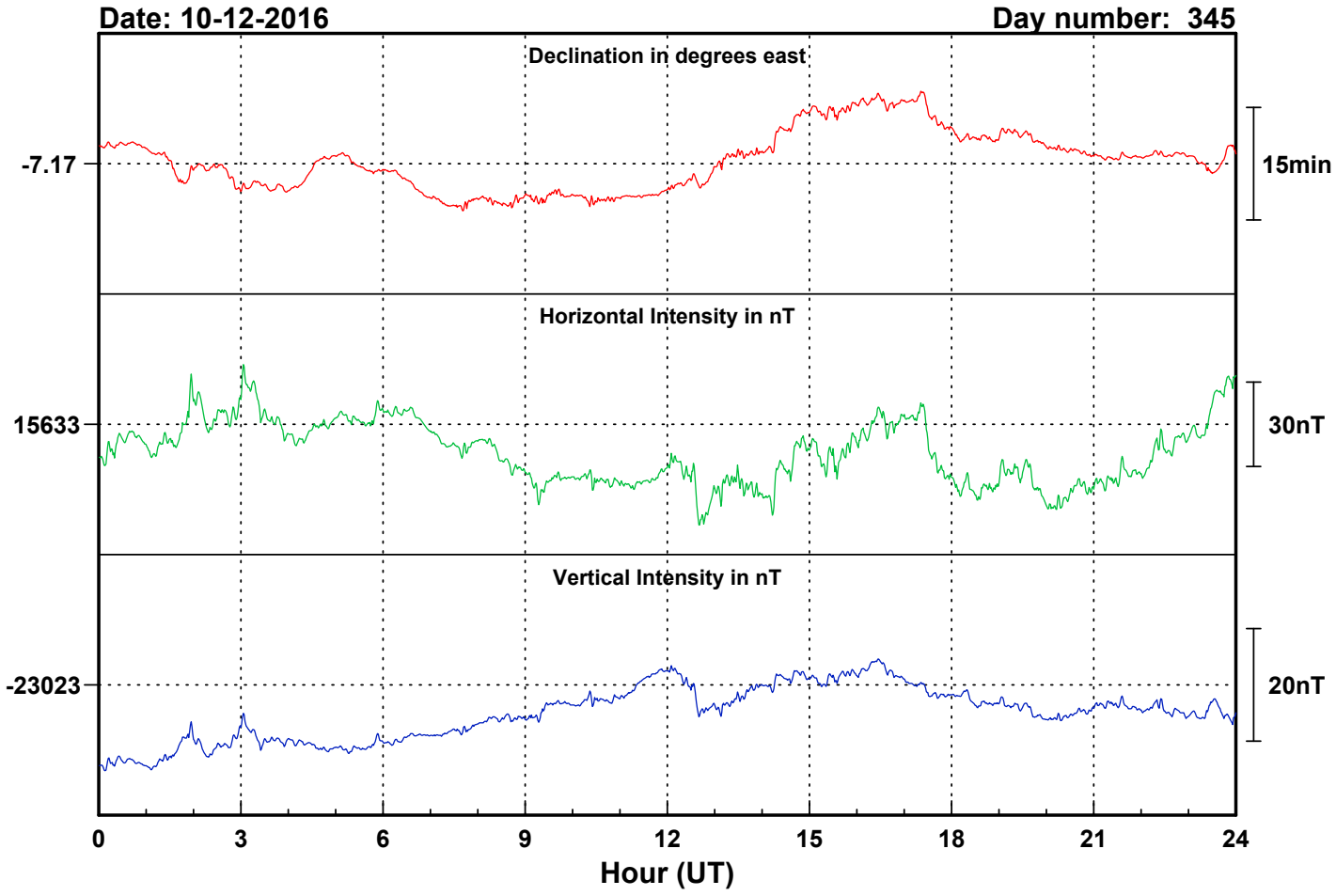
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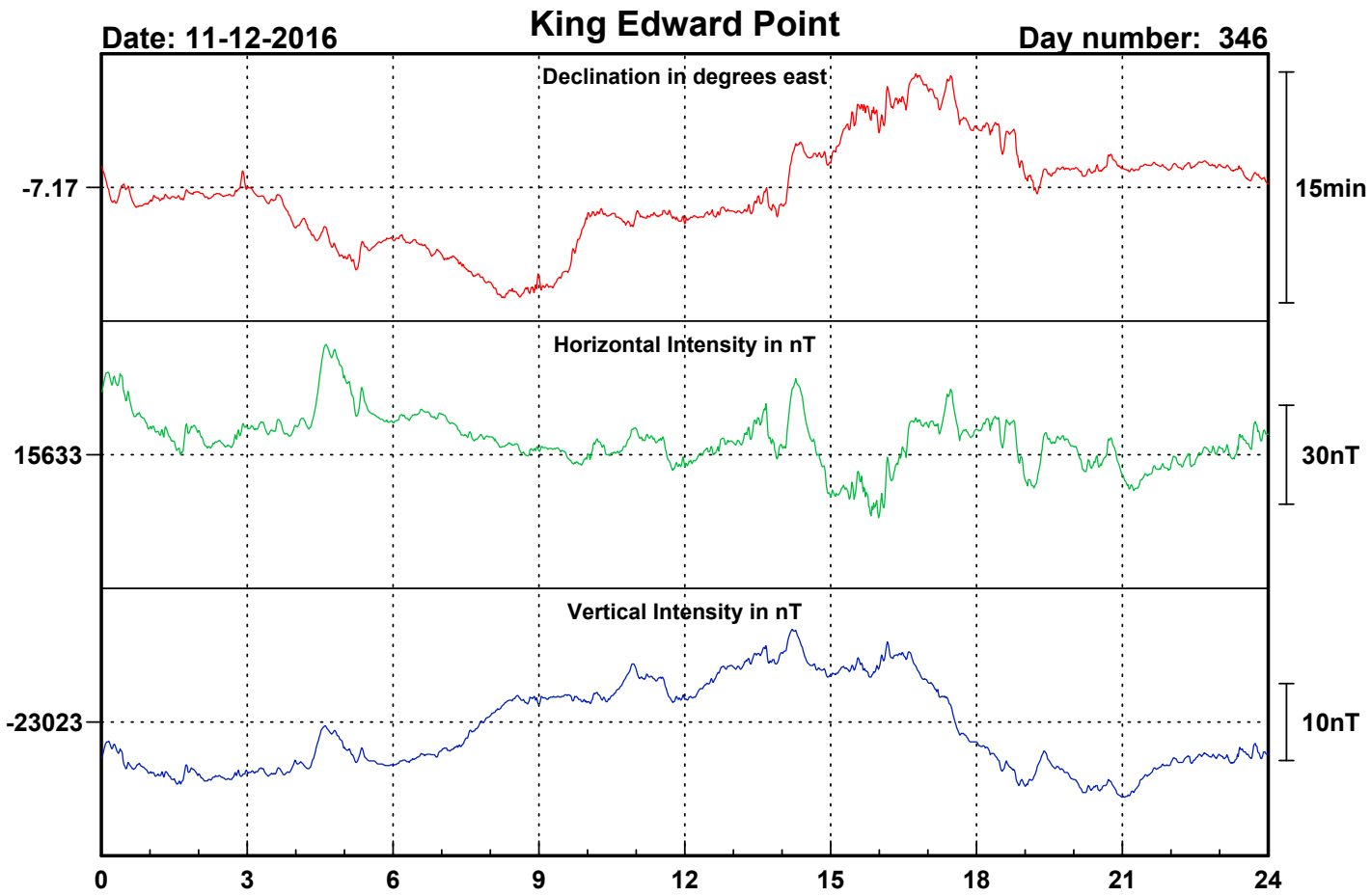
Hour (UT)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15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
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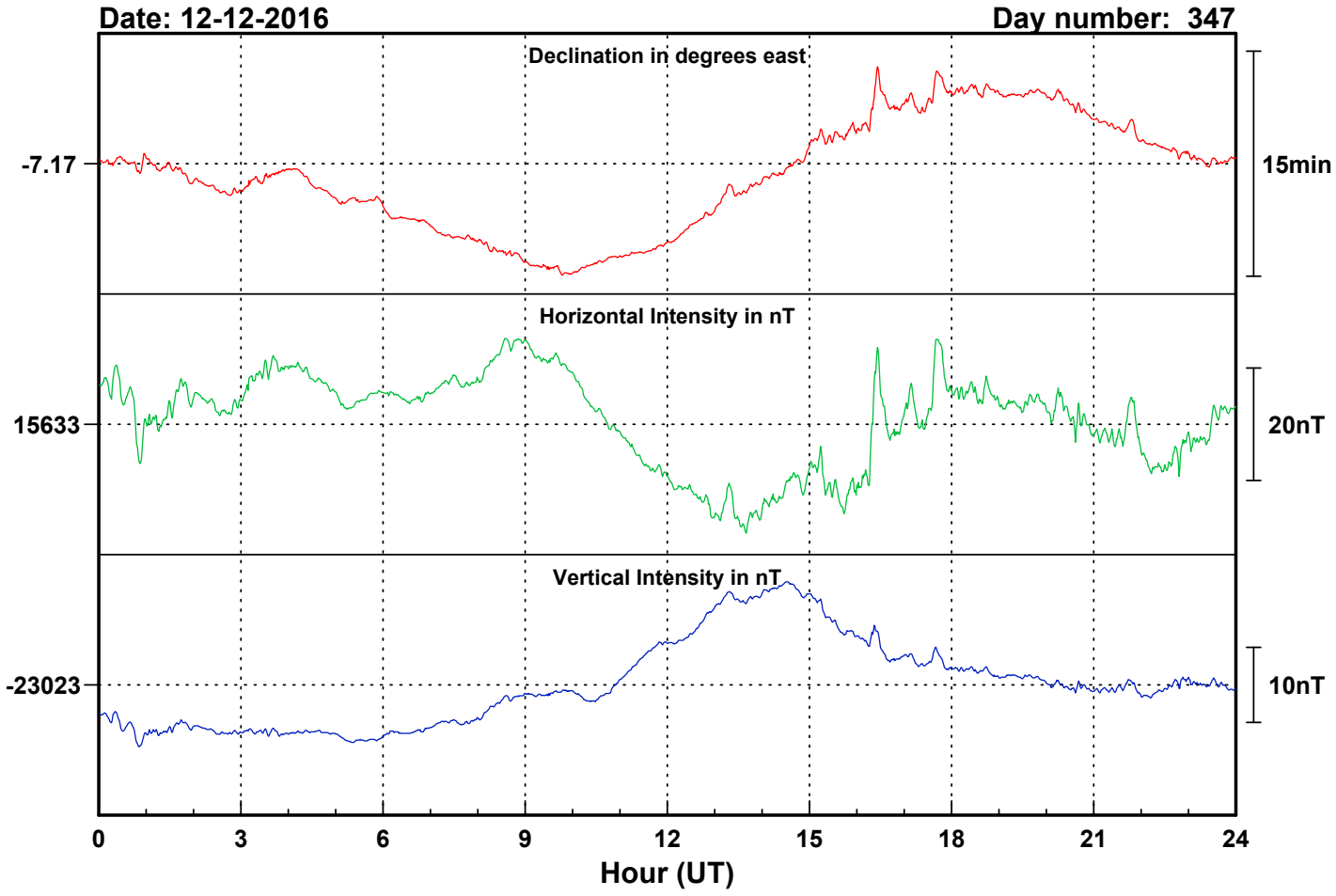
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15min
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20nT
Vertical Intensity in nT
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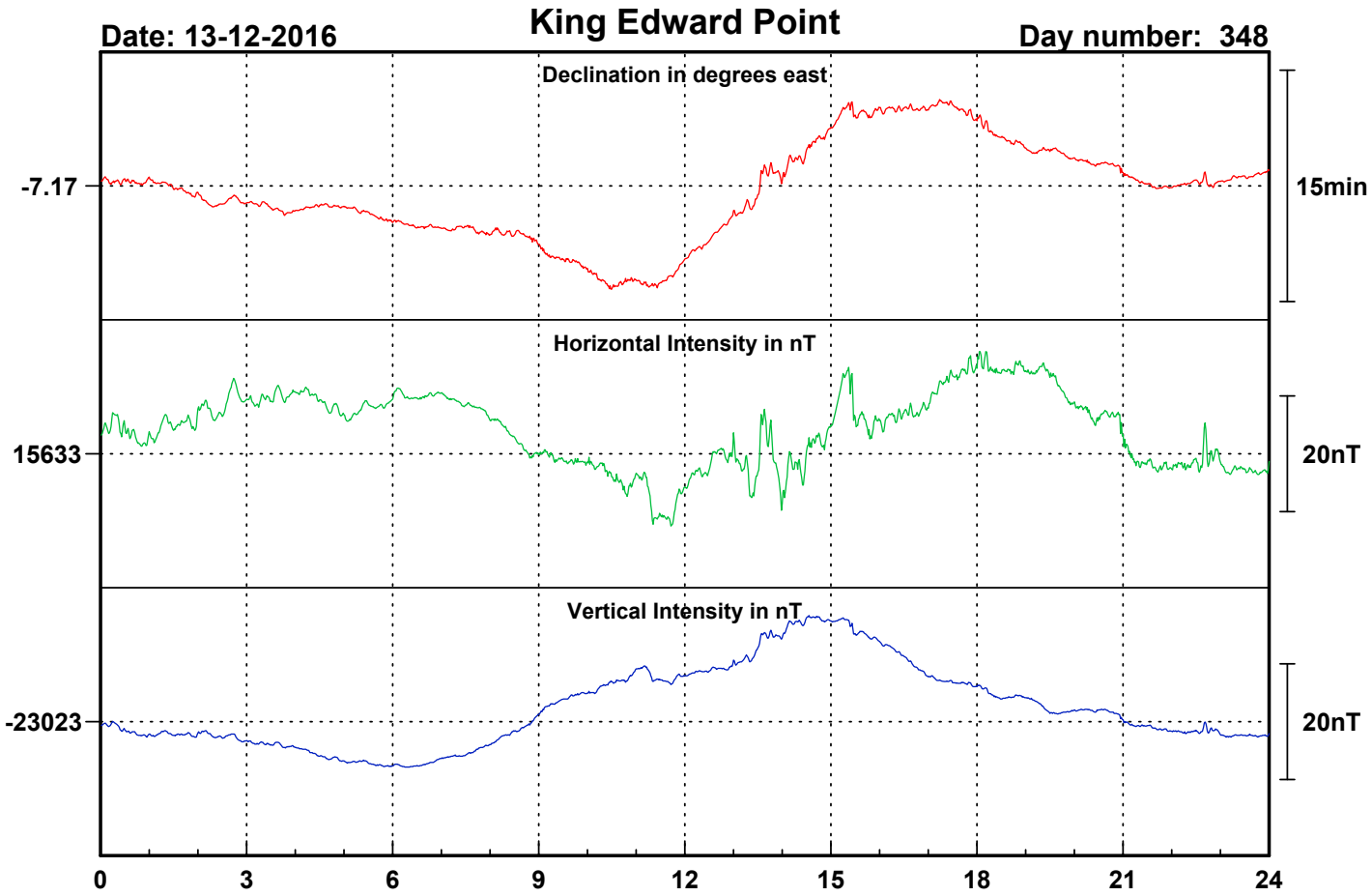
Hour (UT)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Vertical Intensity in nT
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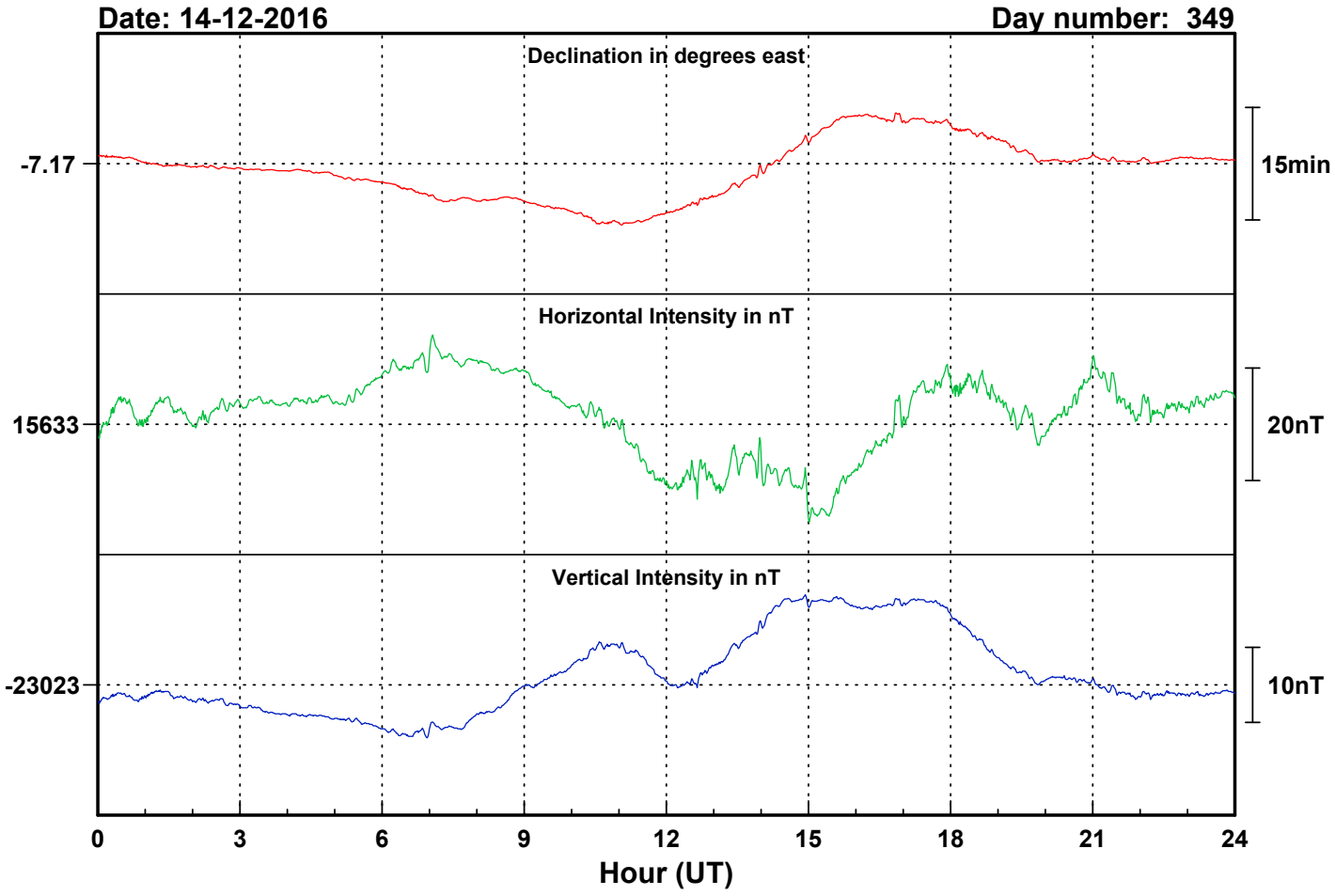
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15min
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20nT
Vertical Intensity in nT
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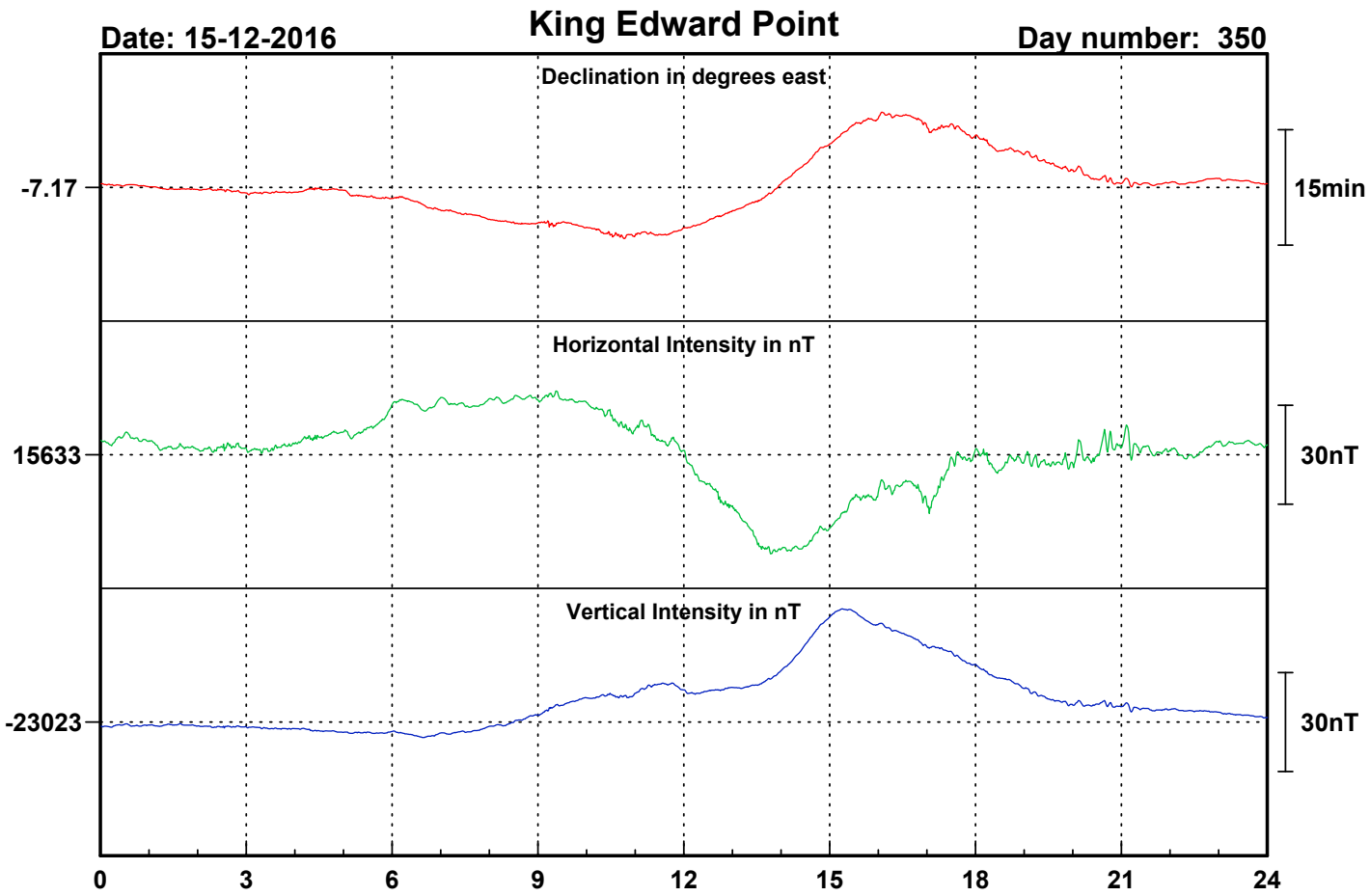
Hour (UT)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Day number: 350
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15min
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15633
30nT
Vertical Intensity in nT
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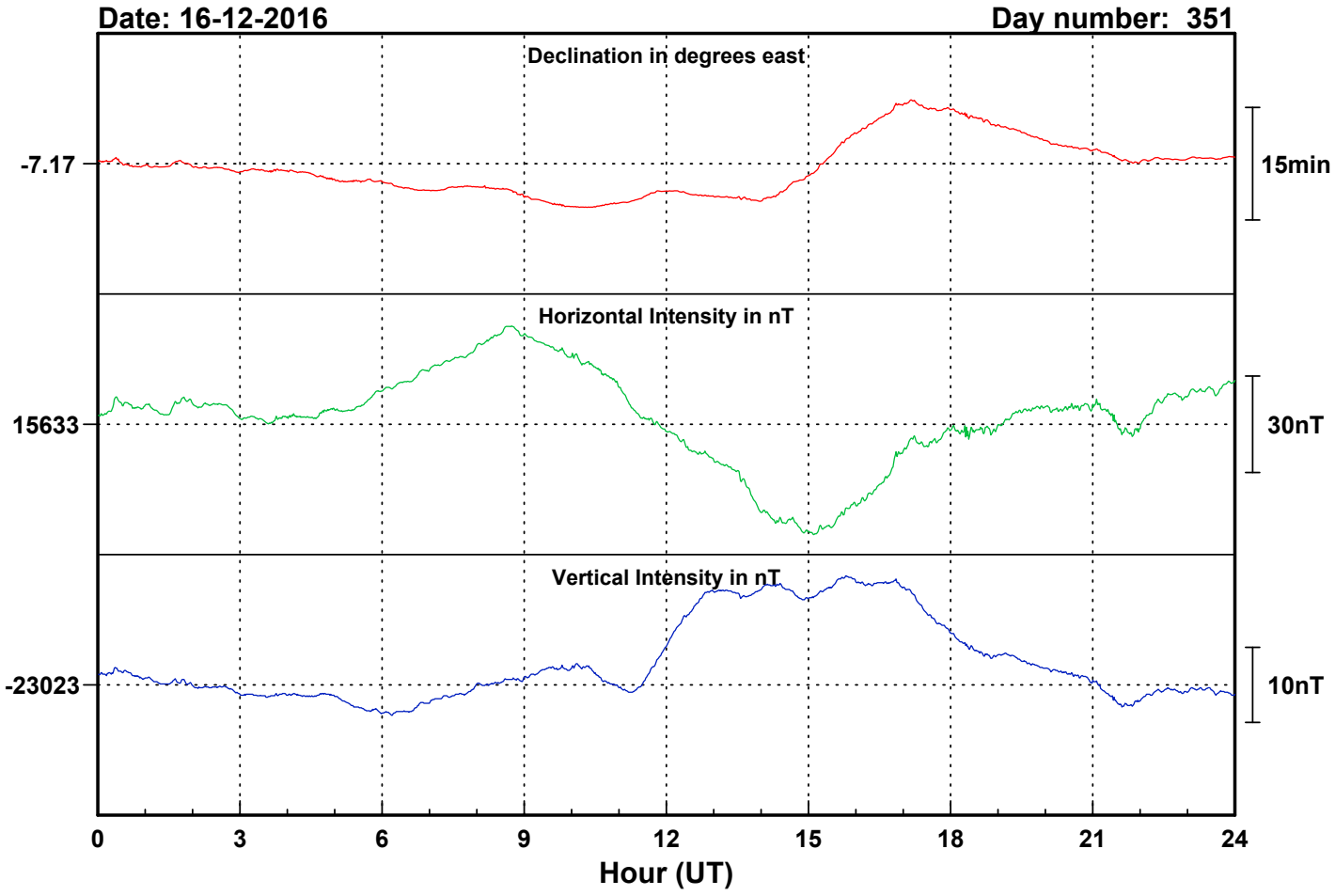
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15min
Horizontal Intensity in nT
15633
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Vertical Intensity in nT
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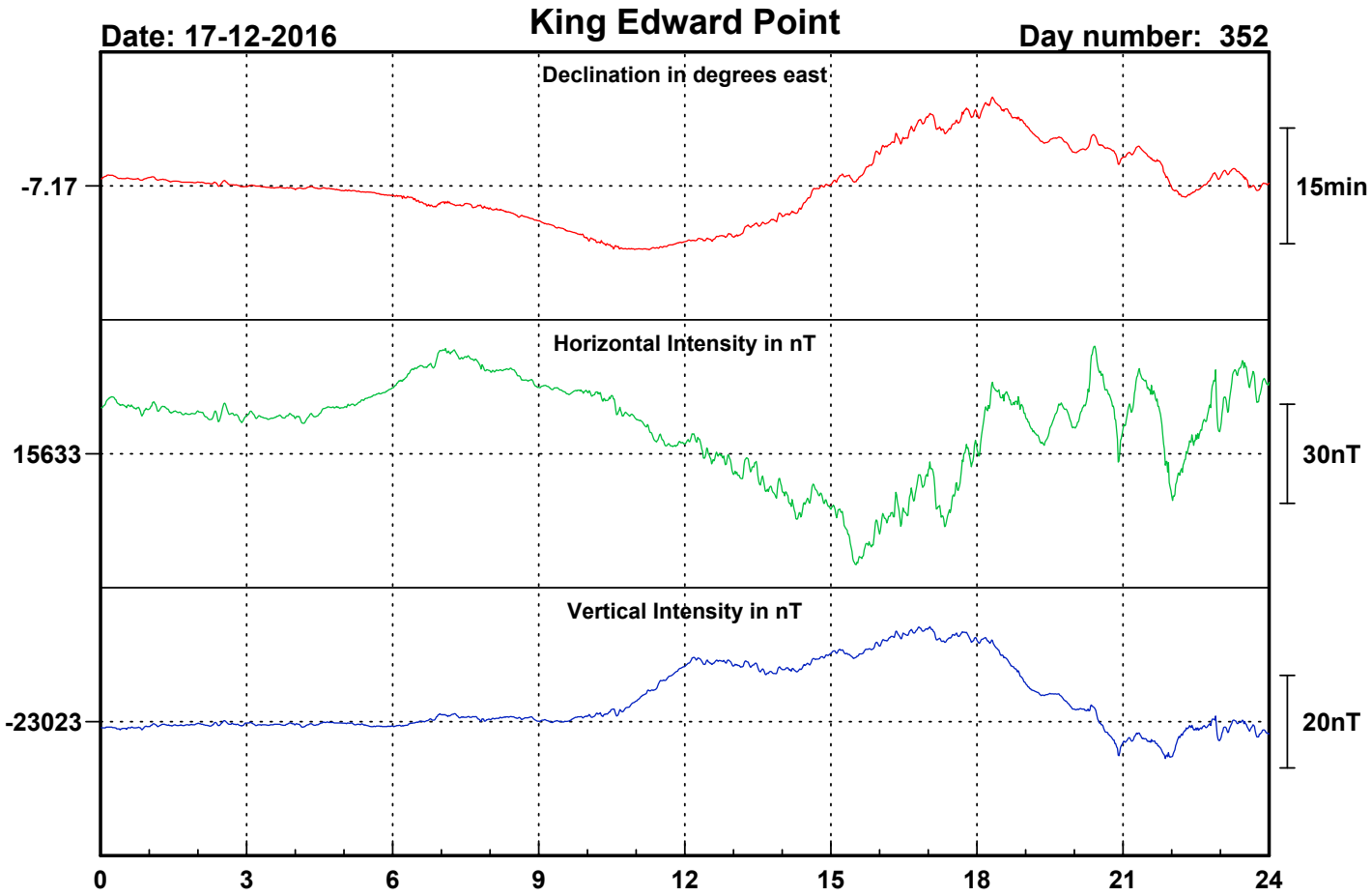
Hour (UT)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15min
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30nT
Vertical Intensity in nT
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20nT
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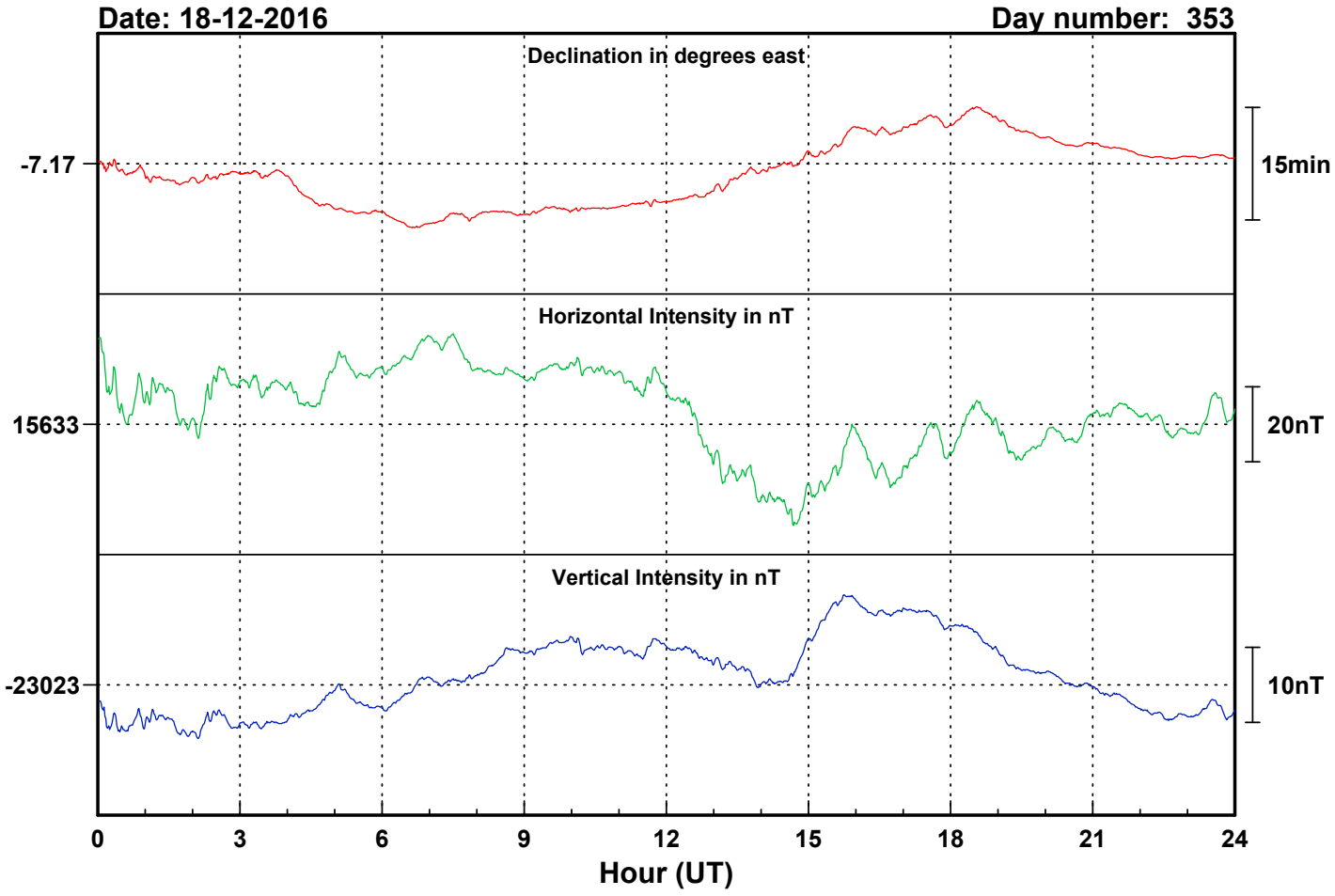
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15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
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10nT
0
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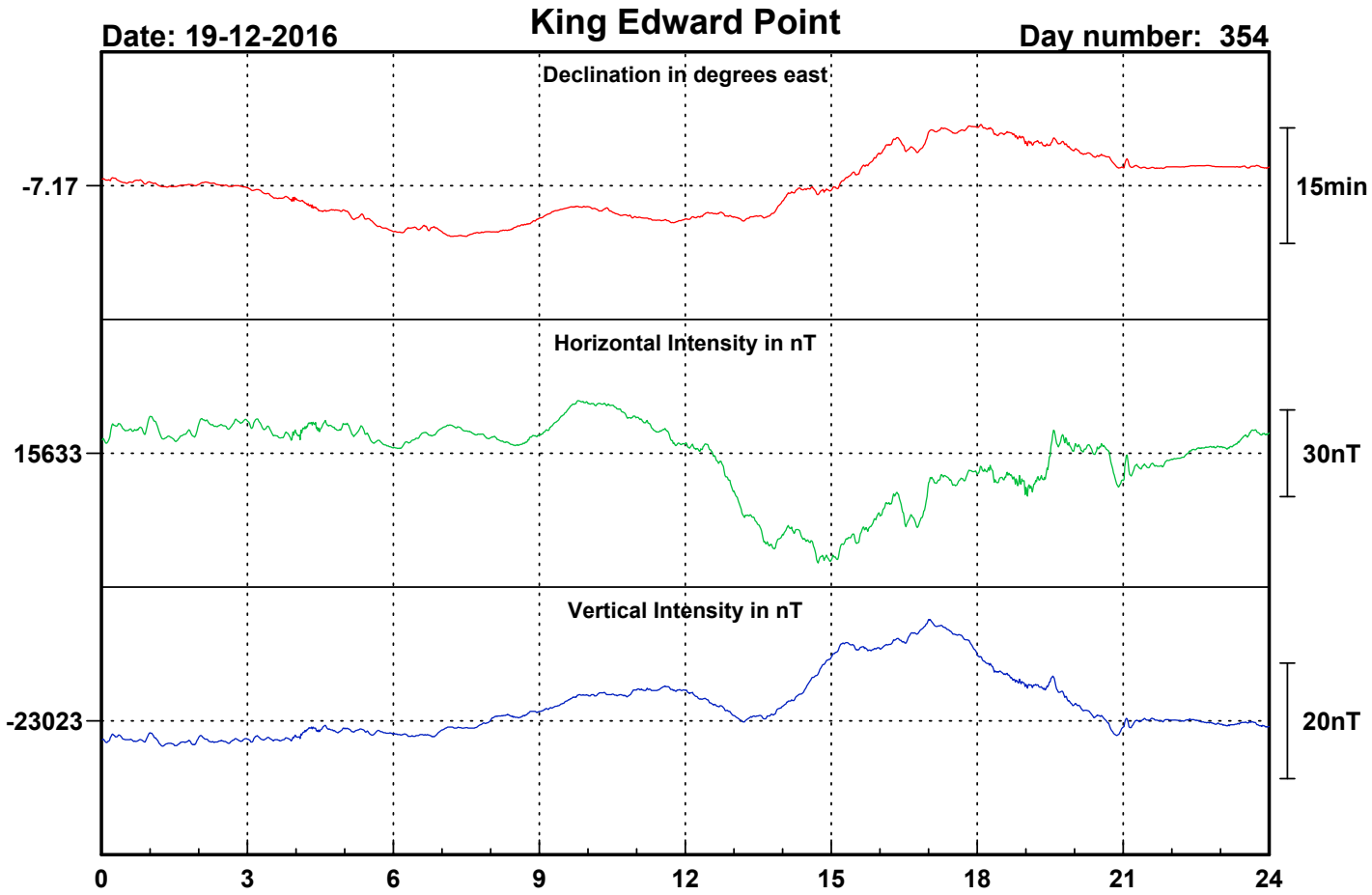
24
Hour (UT)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15min
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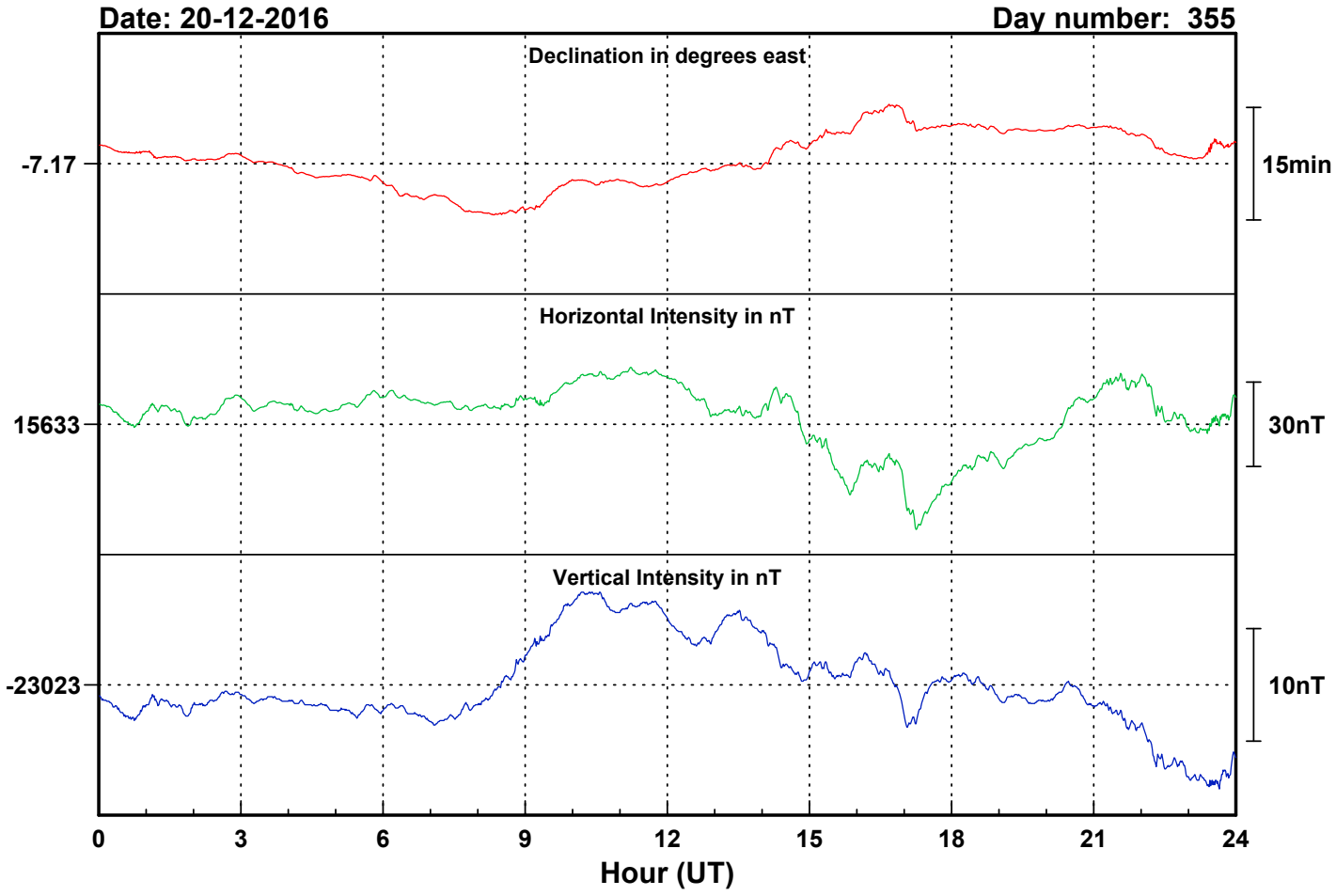
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15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
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9
12
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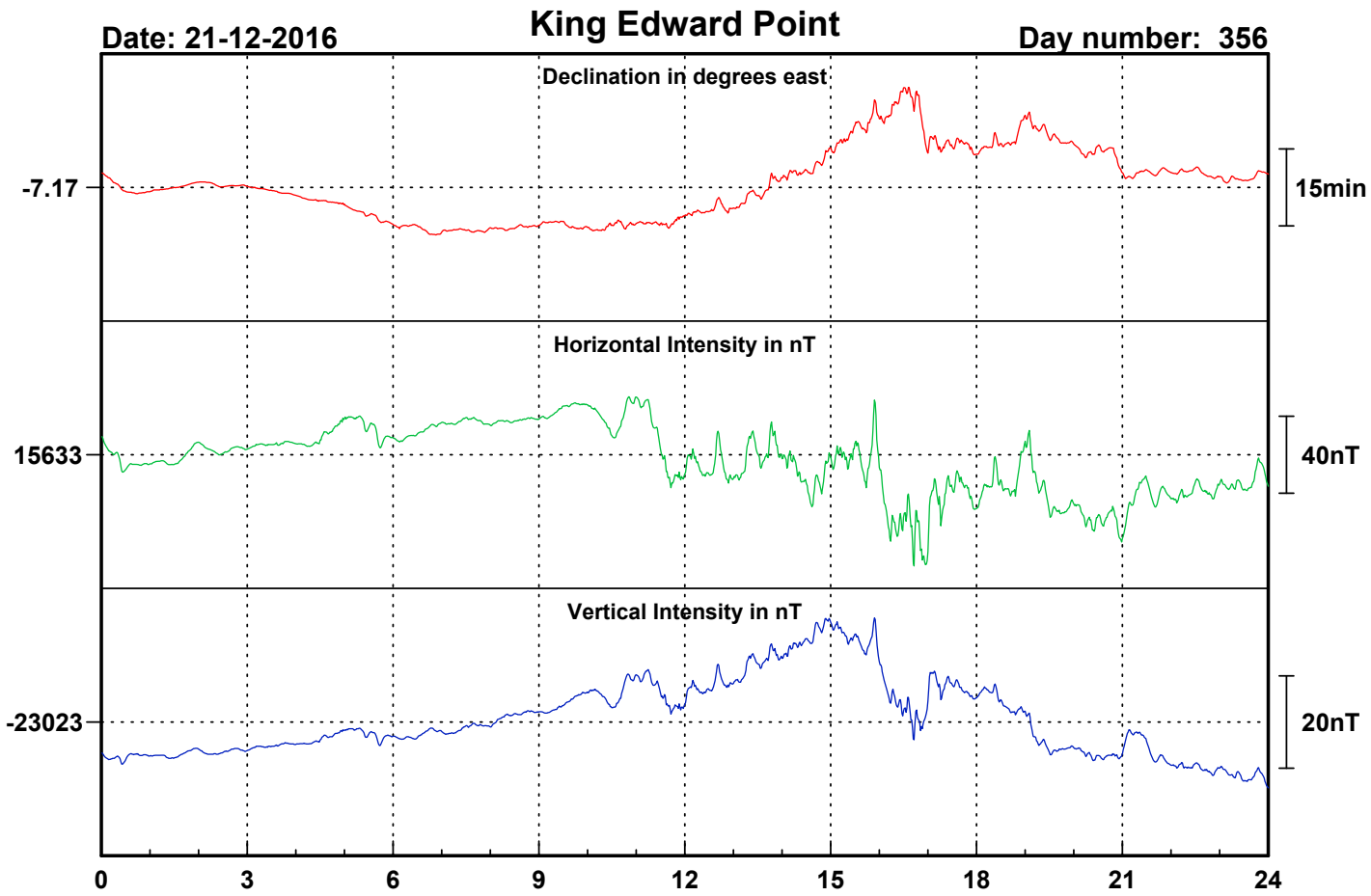
18
21
24
Hour (UT)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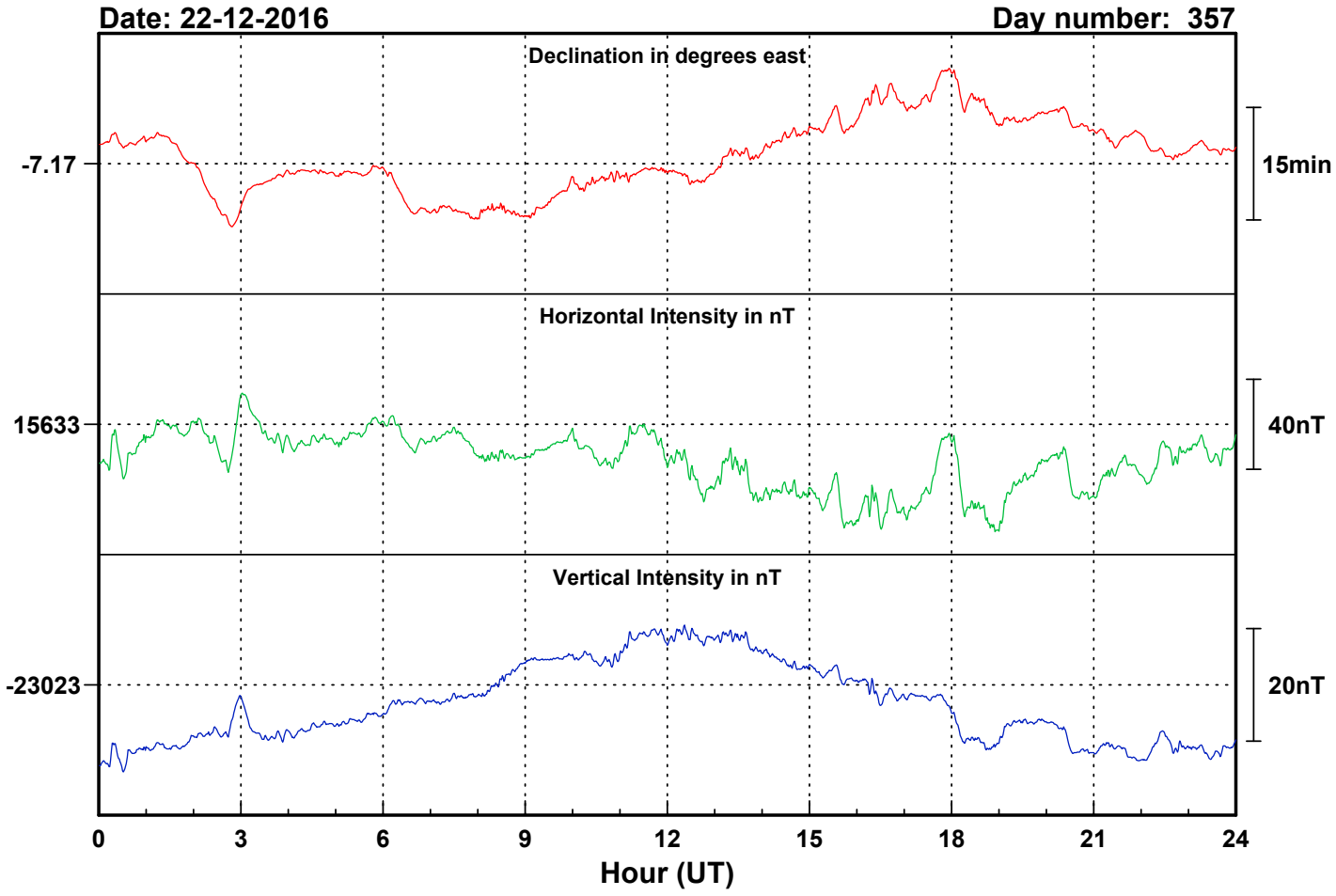
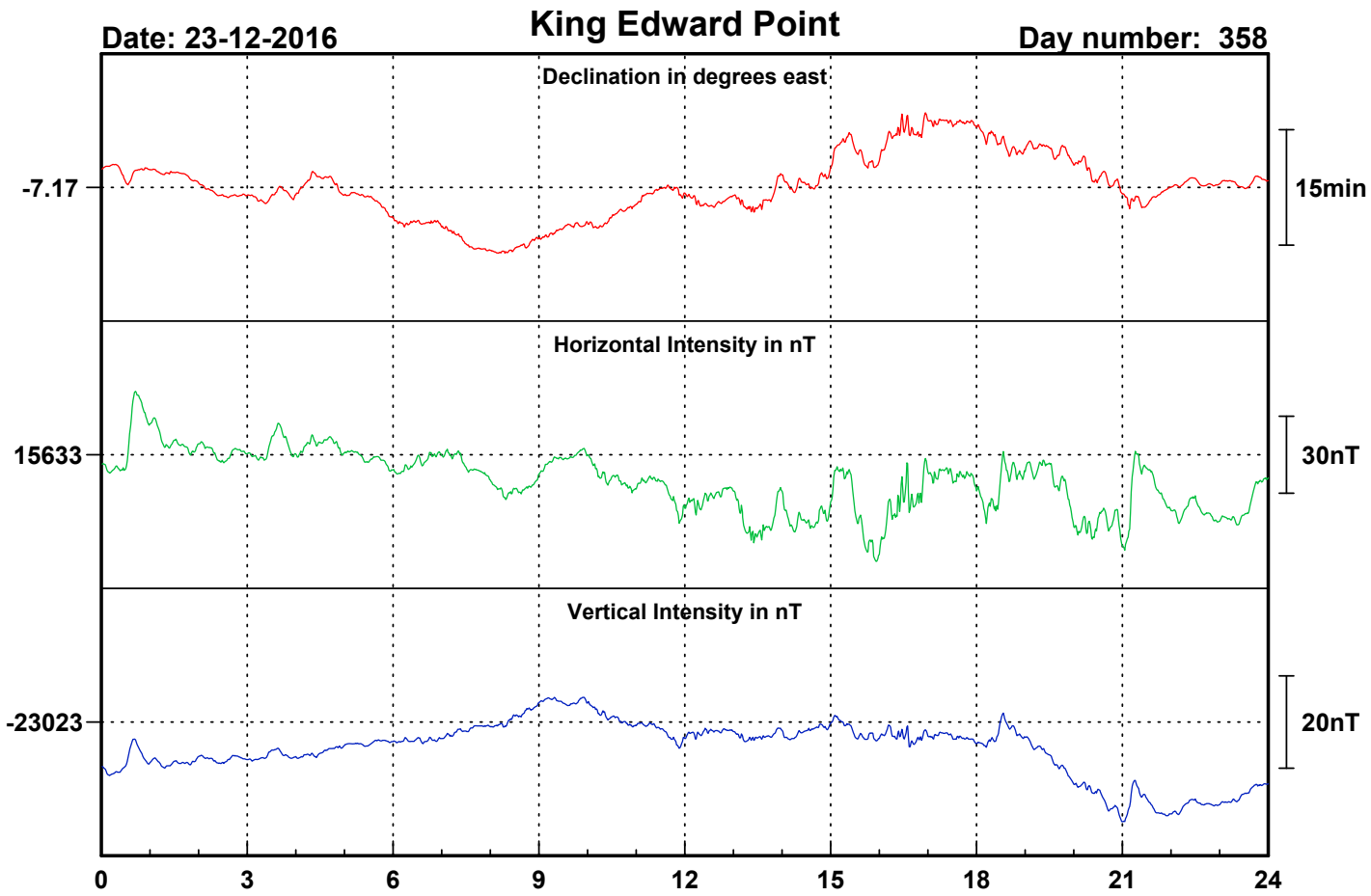
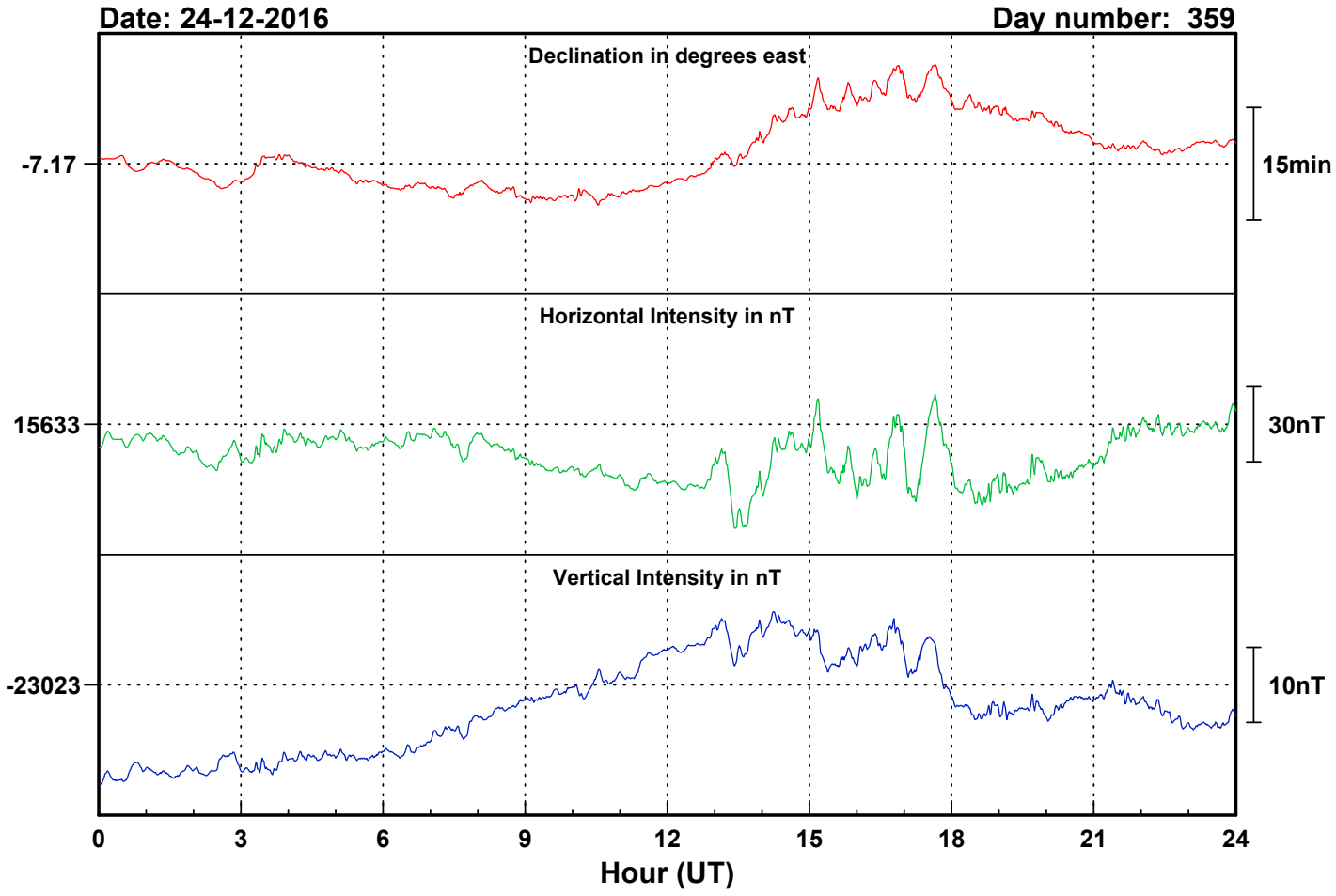
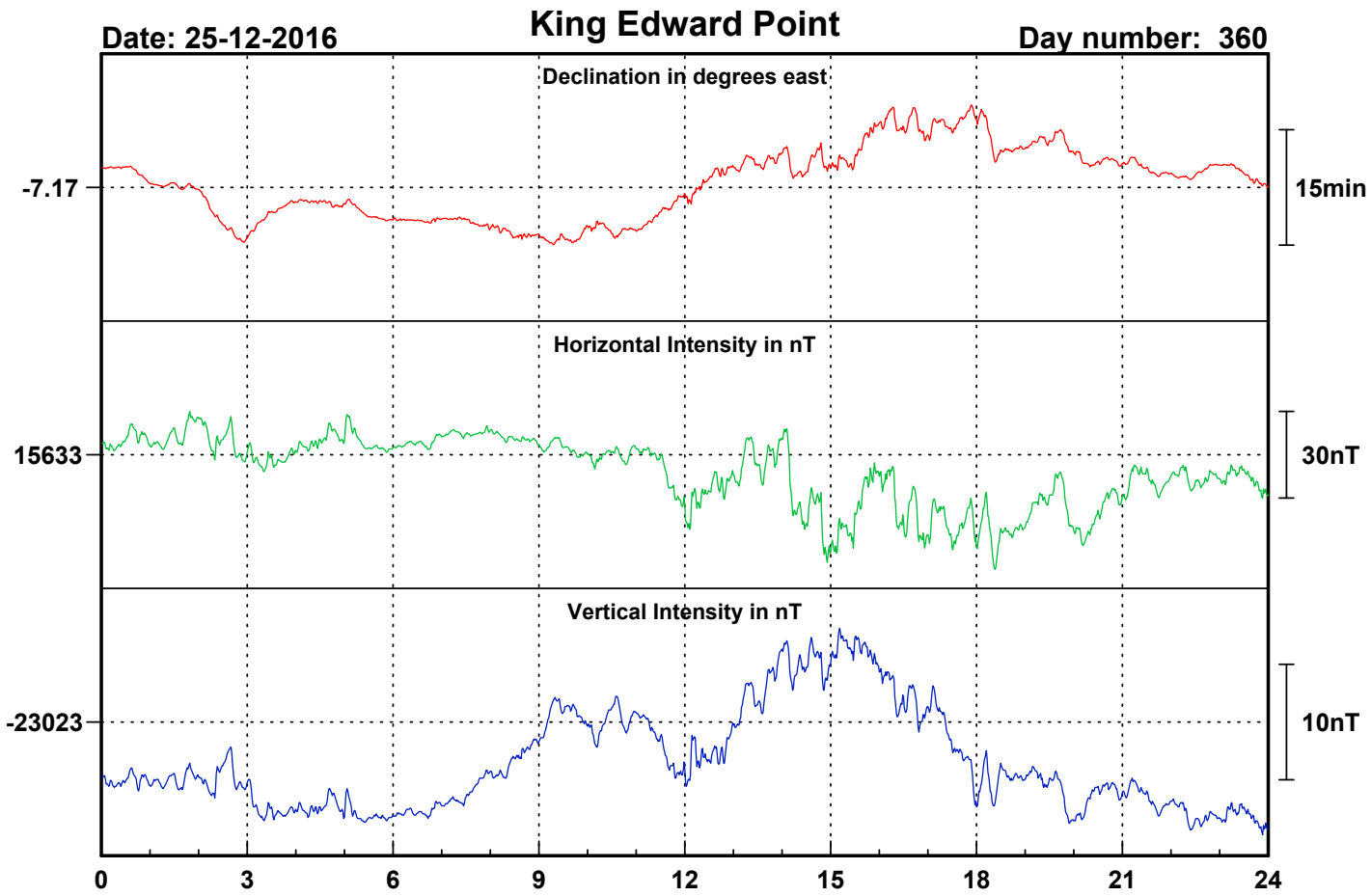
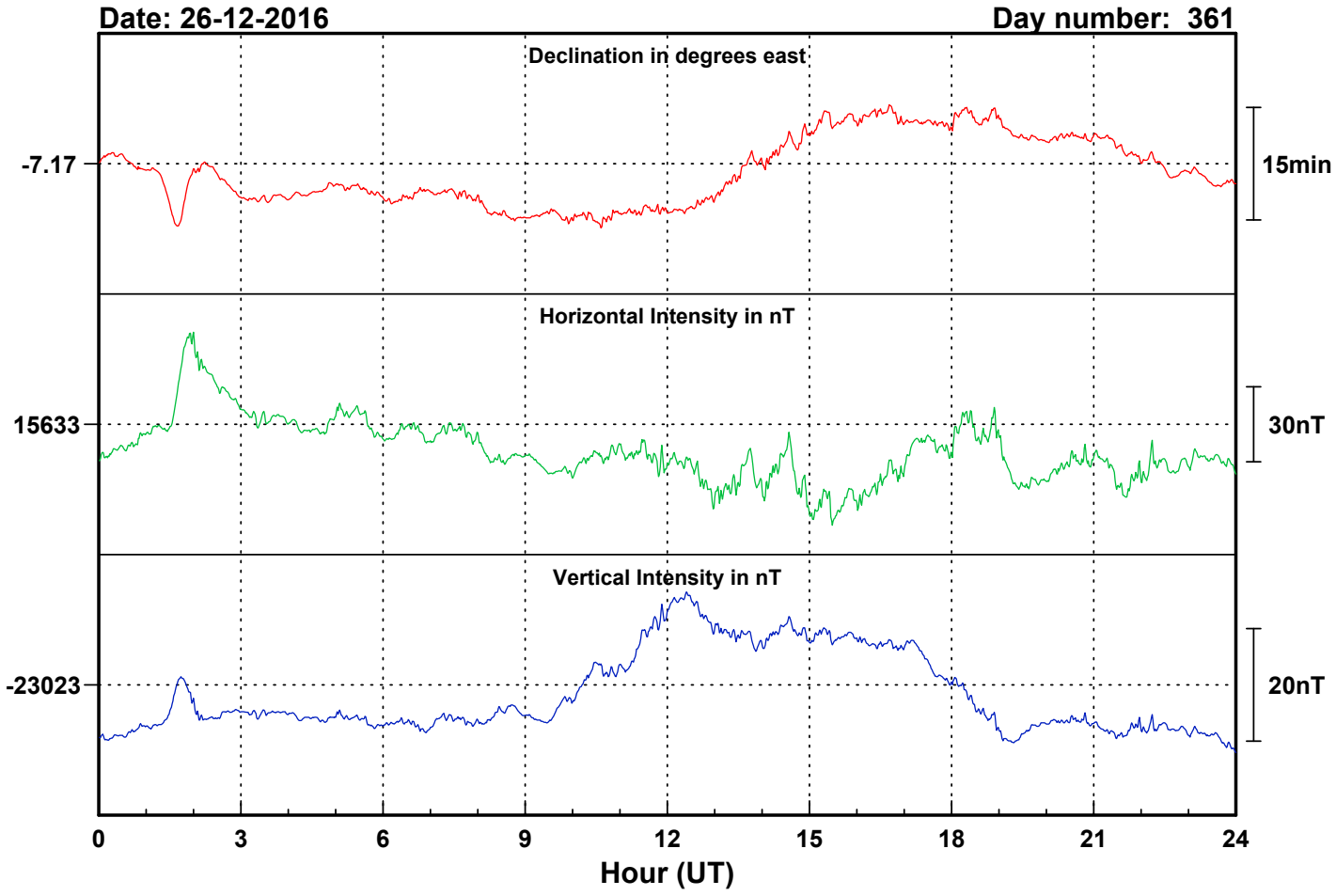
Date: 21-12-2016
Day number: 356
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
40nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24

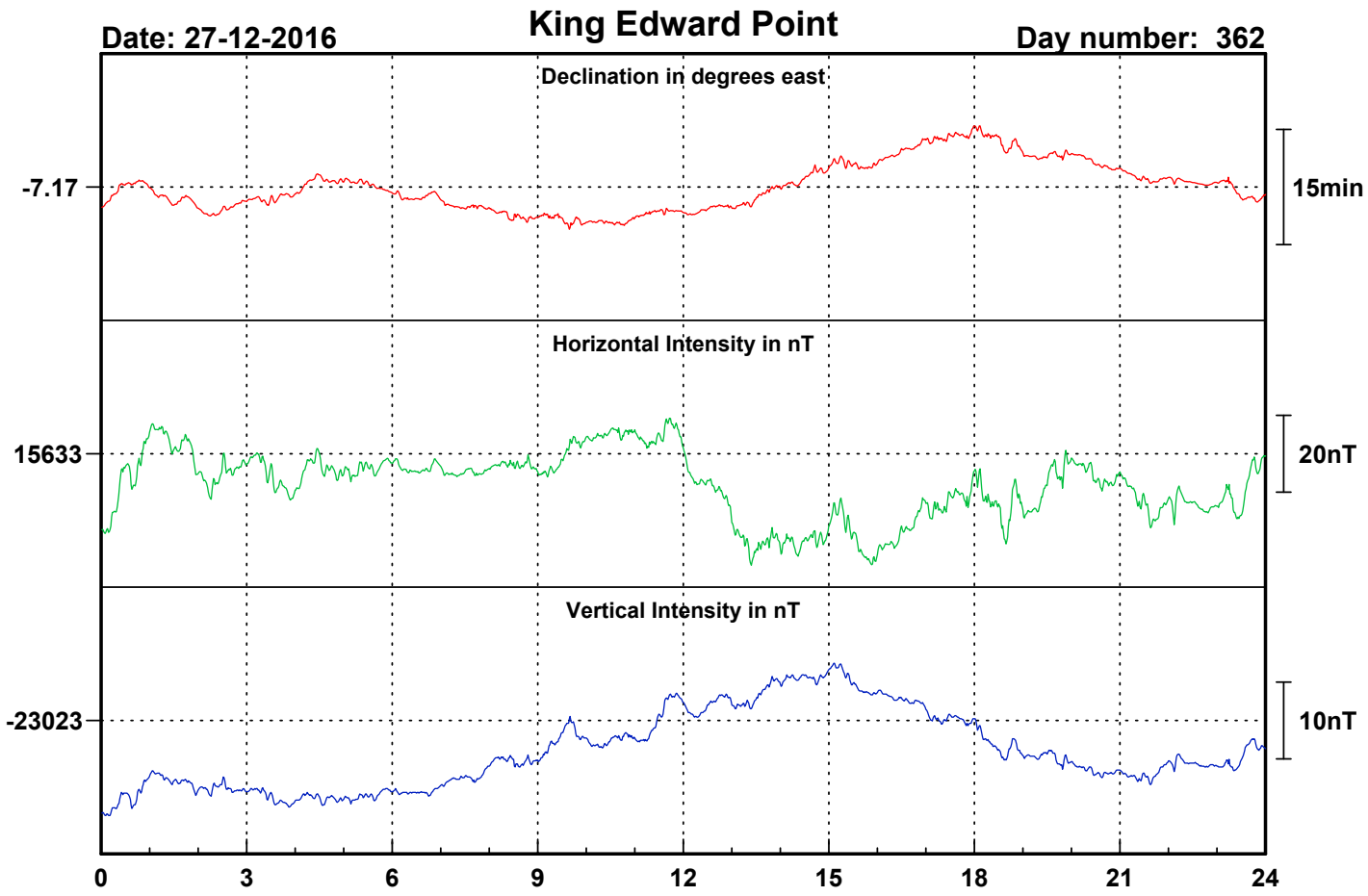

Date: 22-12-2016
Day number: 357
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
40nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

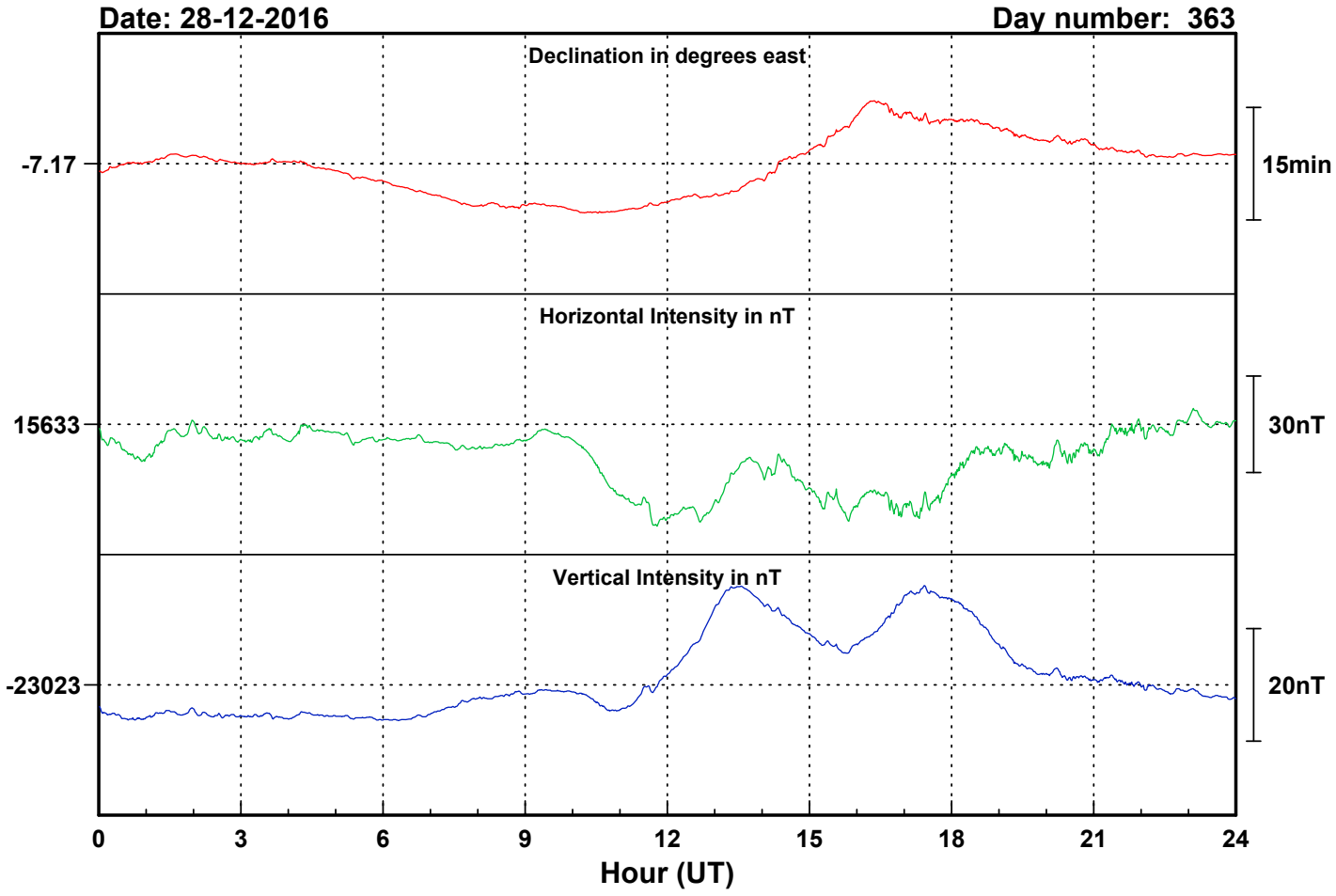

King Edward Point
Date: 23-12-2016
Day number: 358
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24

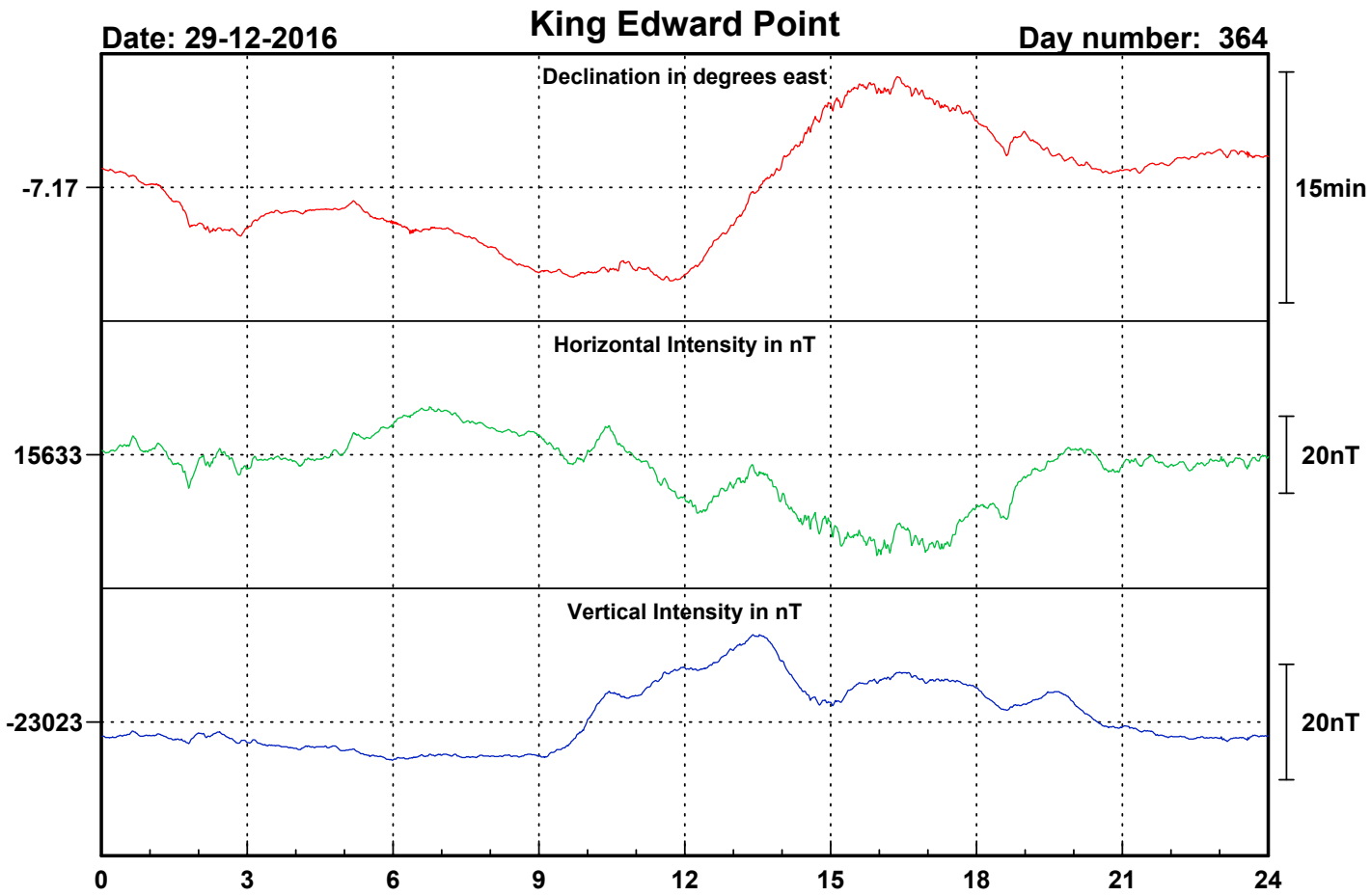

Date: 24-12-2016
Day number: 359
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

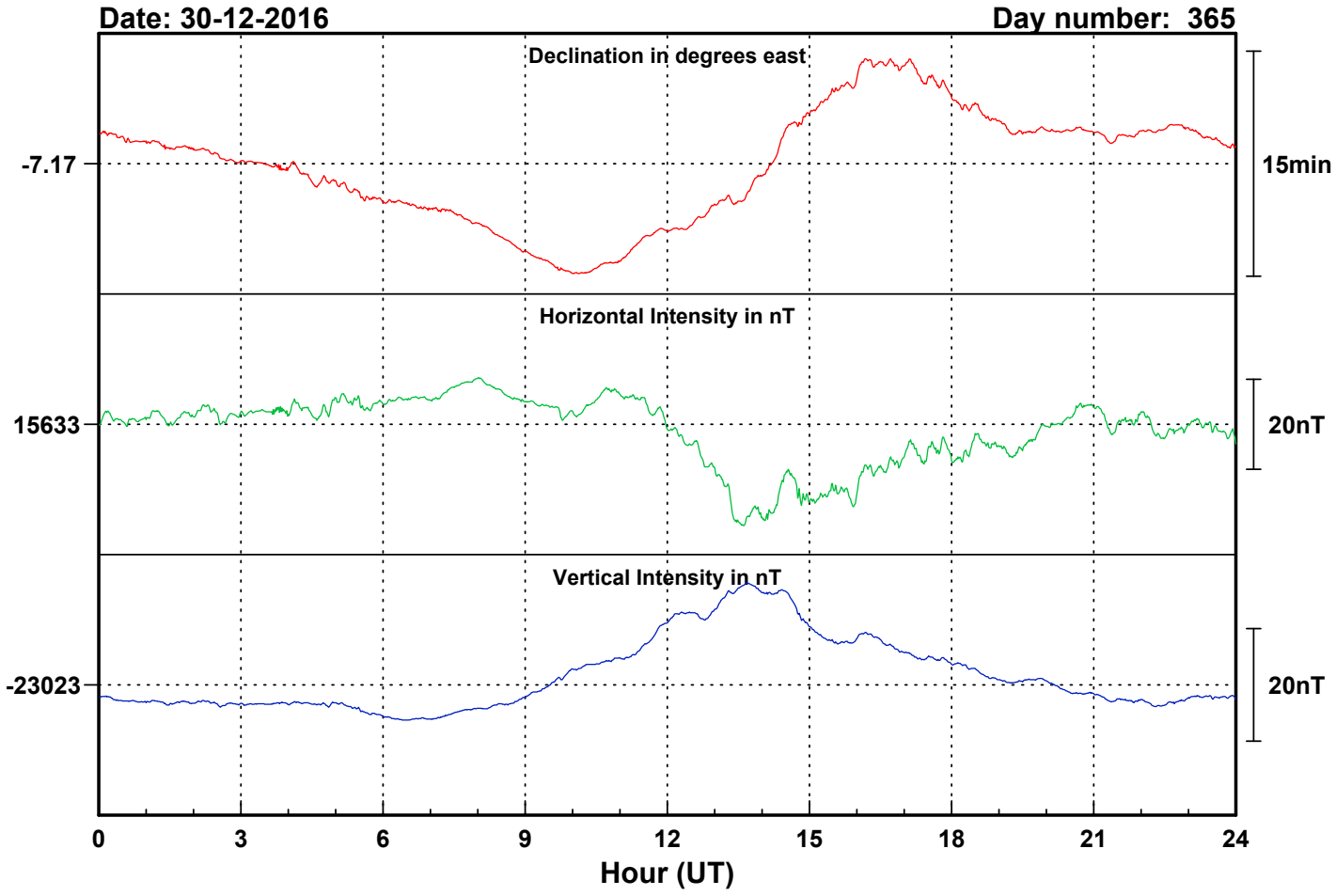

King Edward Point
Date: 25-12-2016
Day number: 360
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
10nT
0
3
6
9
12
15
18
21
24

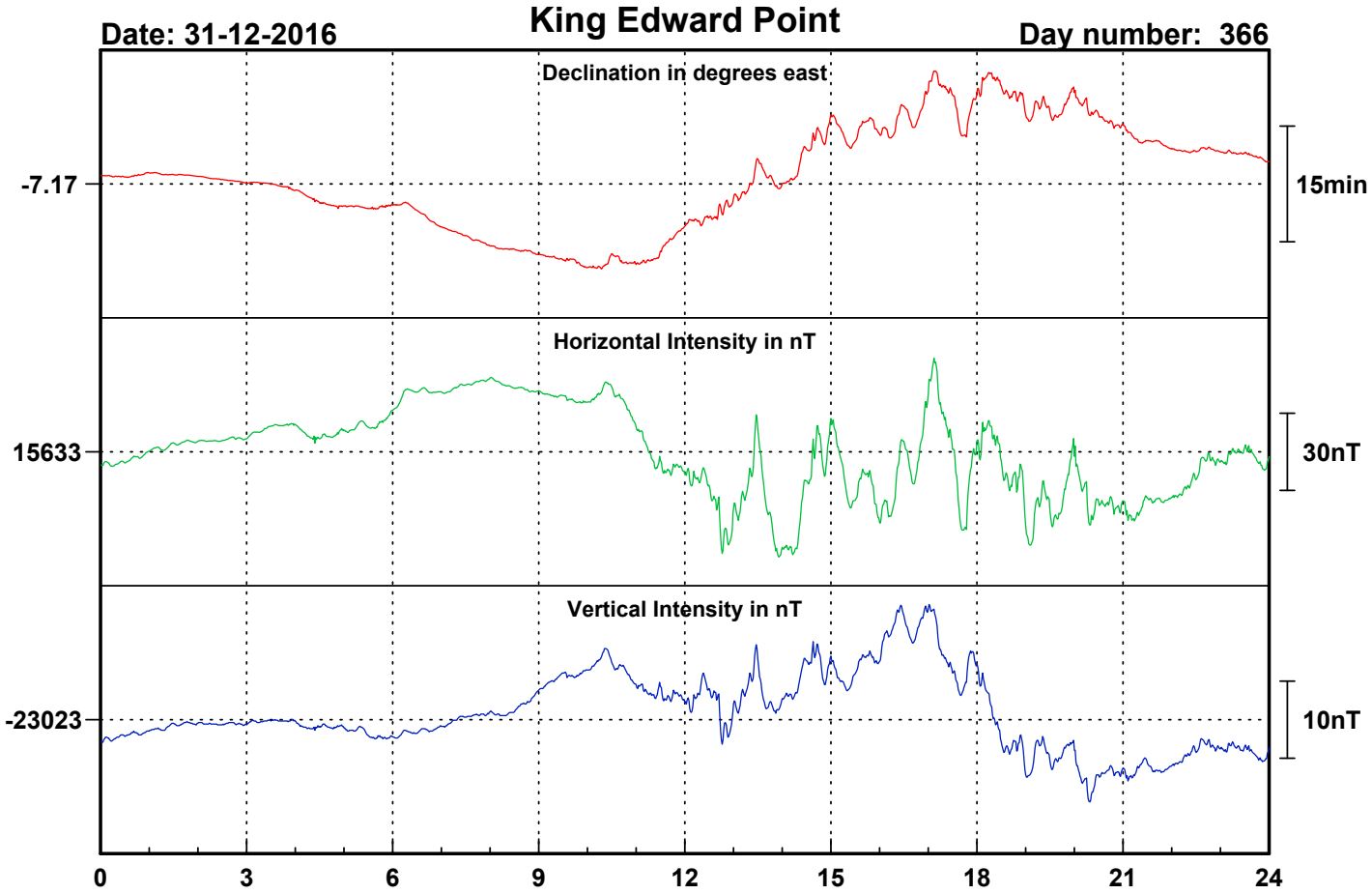

Date: 26-12-2016
Day number: 361
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 27-12-2016
Day number: 362
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
10nT
0
3
6
9
12
15
18
21
24

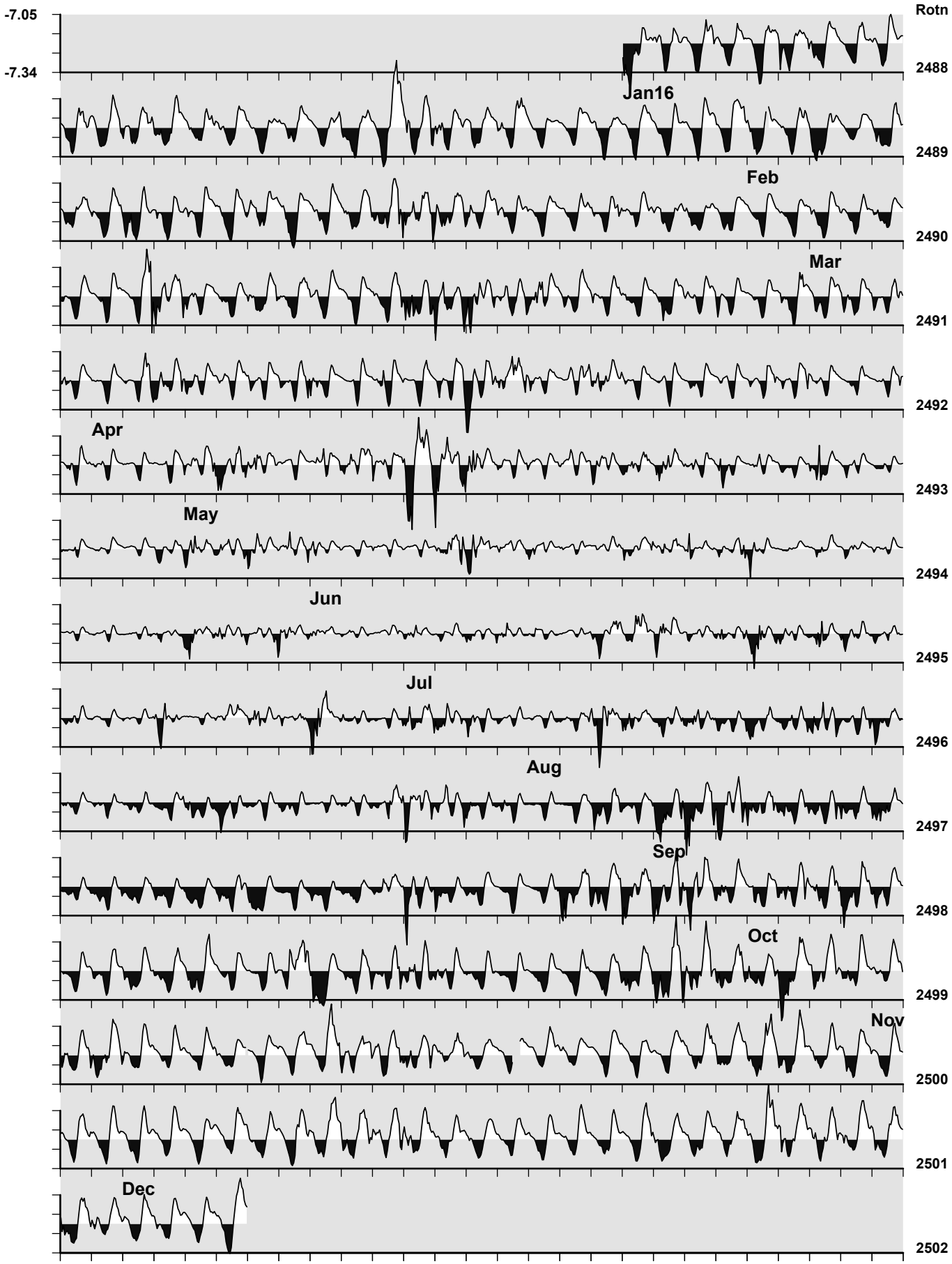

Date: 28-12-2016
Day number: 363
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 29-12-2016
Day number: 364
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24


Date: 30-12-2016
Day number: 365
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
20nT
Vertical Intensity in nT
-23023
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

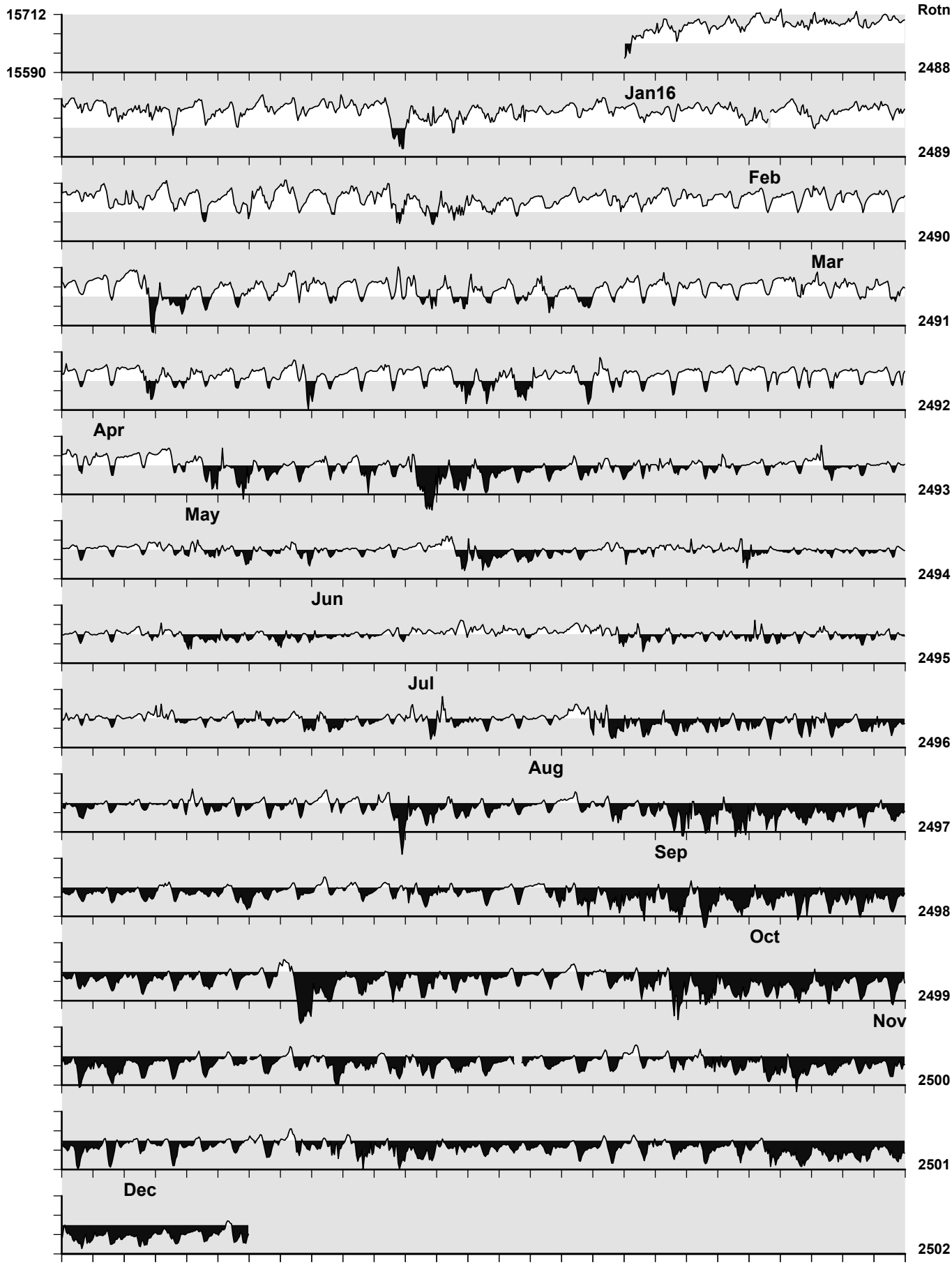

King Edward Point
Date: 31-12-2016
Day number: 366
Declination in degrees east
-7.17
15min
Horizontal Intensity in nT
15633
30nT
Vertical Intensity in nT
-23023
10nT
0
3
6
9
12
15
18
21
24

King Edward Point Observatory: Declination (degrees)



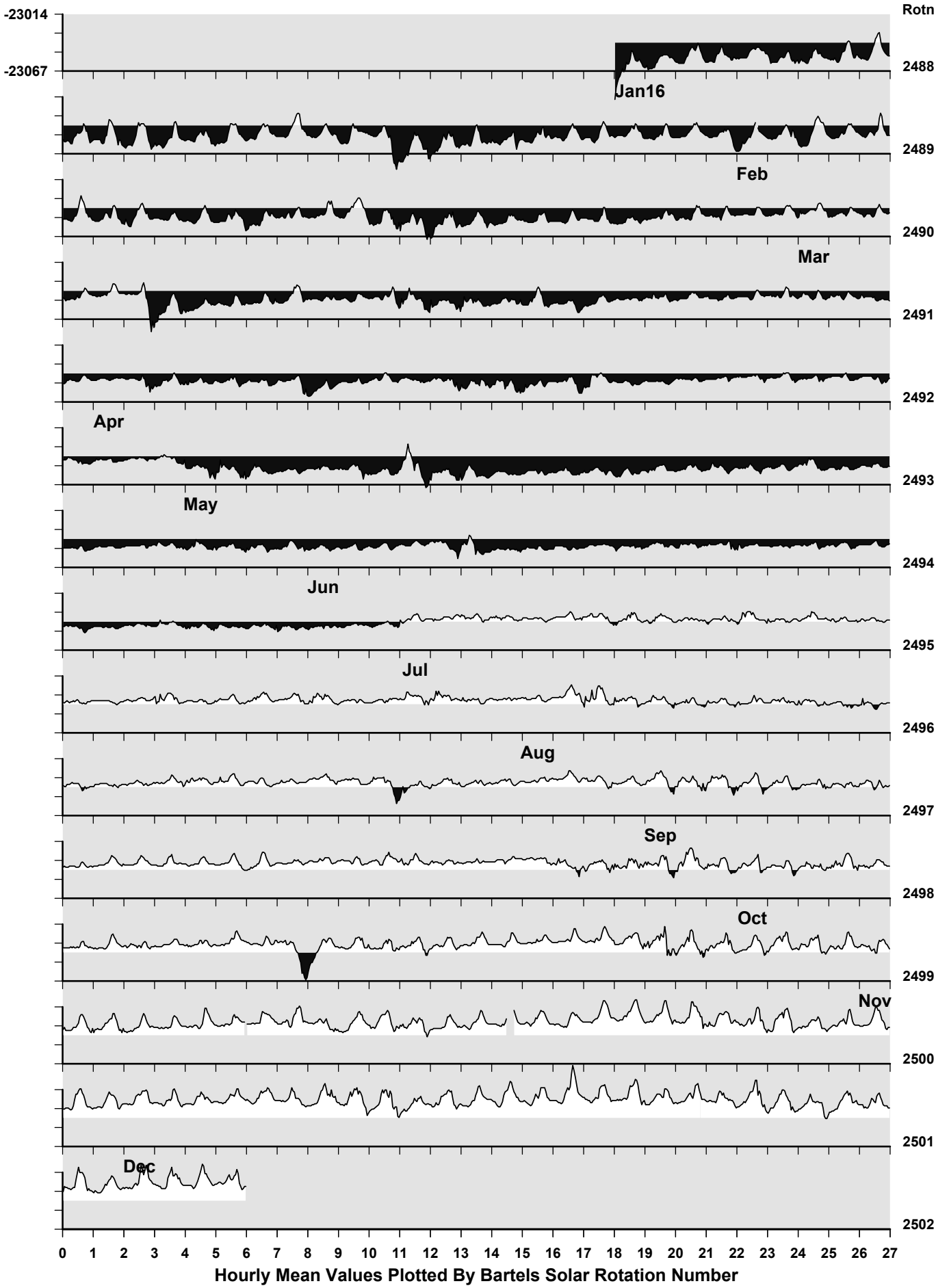
Hourly Mean Values Plotted By Bartels Solar Rotation Number

King Edward Point Observatory: Horizontal Intensity (nT)



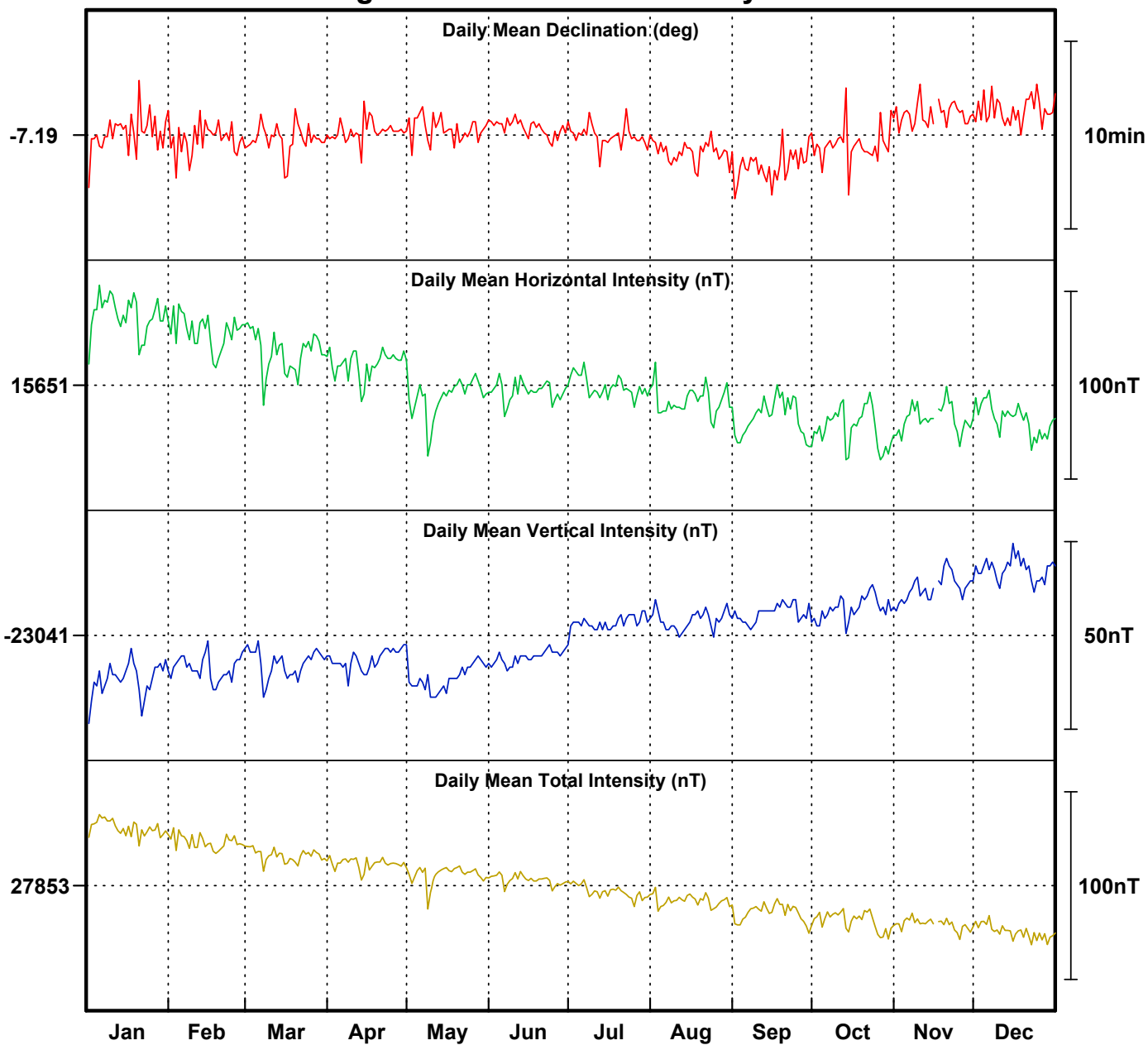
Hourly Mean Values Plotted By Bartels Solar Rotation Number

King Edward Point Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

King Edward Point Observatory 2016



Monthly Mean Values for King Edward Point Observatory 2016

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	-7° 11.5′	15688 nT	-55° 45.8′	15565 nT	-1964 nT	-23052 nT	27884 nT
February	-7° 11.8′	15679 nT	-55° 46.5′	15556 nT	-1964 nT	-23049 nT	27877 nT
March	-7° 11.8′	15668 nT	-55° 47.5′	15545 nT	-1963 nT	-23048 nT	27870 nT
April	-7° 11.4′	15662 nT	-55° 48.1′	15539 nT	-1960 nT	-23047 nT	27865 nT
May	-7° 11.3′	15644 nT	-55° 50.2′	15521 nT	-1957 nT	-23052 nT	27859 nT
June	-7° 11.2′	15648 nT	-55° 49.5′	15525 nT	-1958 nT	-23046 nT	27857 nT
July	-7° 11.7′	15650 nT	-55° 48.6′	15527 nT	-1960 nT	-23037 nT	27850 nT
August	-7° 12.5′	15642 nT	-55° 49.4′	15519 nT	-1963 nT	-23036 nT	27845 nT
September	-7° 13.2′	15633 nT	-55° 50.2′	15509 nT	-1965 nT	-23035 nT	27839 nT
October	-7° 12.1′	15628 nT	-55° 50.6′	15505 nT	-1959 nT	-23033 nT	27835 nT
November	-7° 10.5′	15633 nT	-55° 49.7′	15511 nT	-1953 nT	-23028 nT	27833 nT
December	-7° 10.3′	15633 nT	-55° 49.4′	15510 nT	-1951 nT	-23023 nT	27829 nT

Note

i. The values shown here are provisional.