BRITISH GEOLOGICAL SURVEY

# King Edward Point Observatory

# *Monthly Magnetic Bulletin*

## September 2019

## 19/09/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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Internet: www.geomag.bgs.ac.uk


## 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:* | *45° 24' 36" S* | *030° 33' 36" 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 2019.5. 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).’

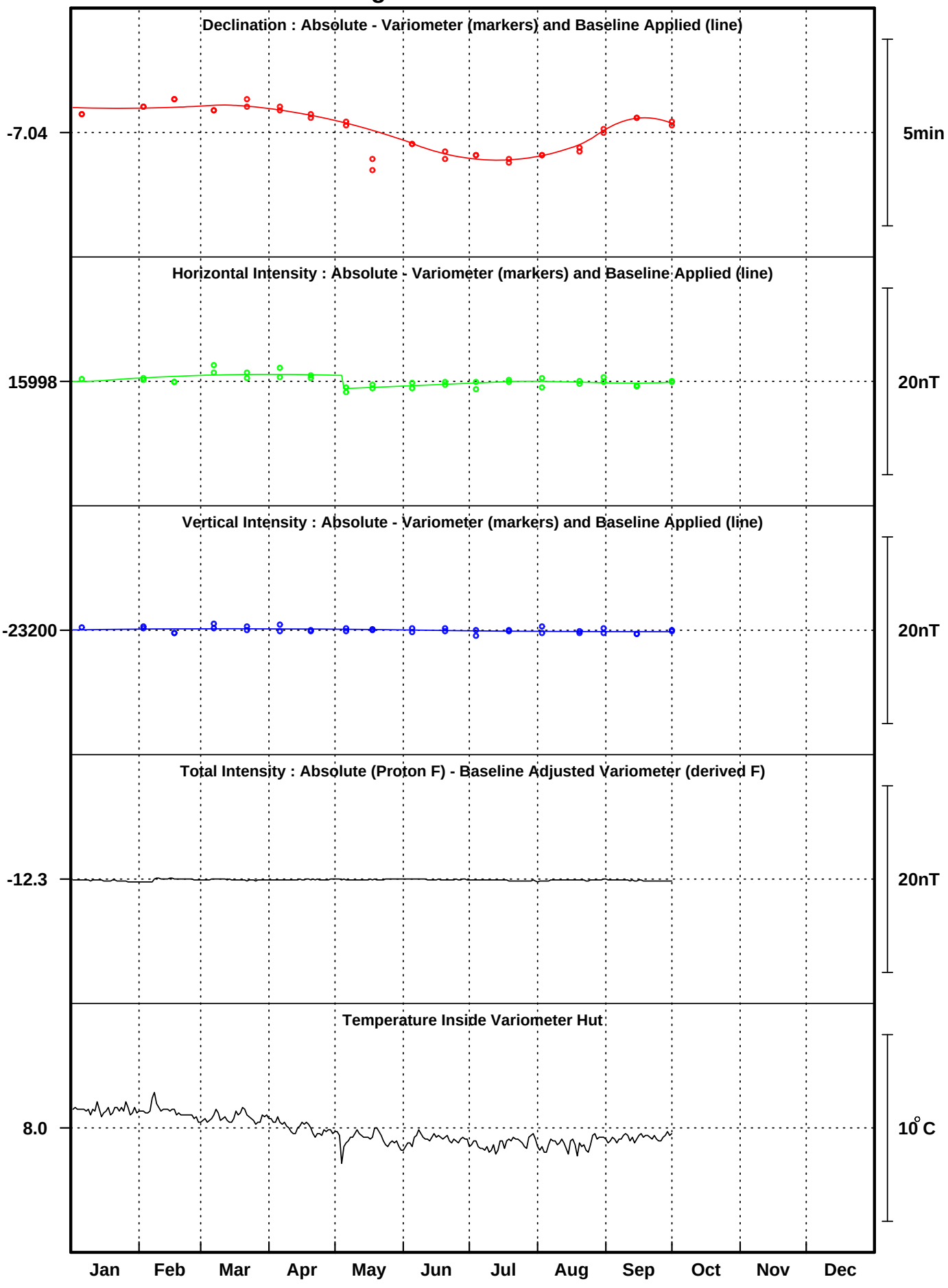
Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at www.geomag.bgs.ac.uk/contactus/staff

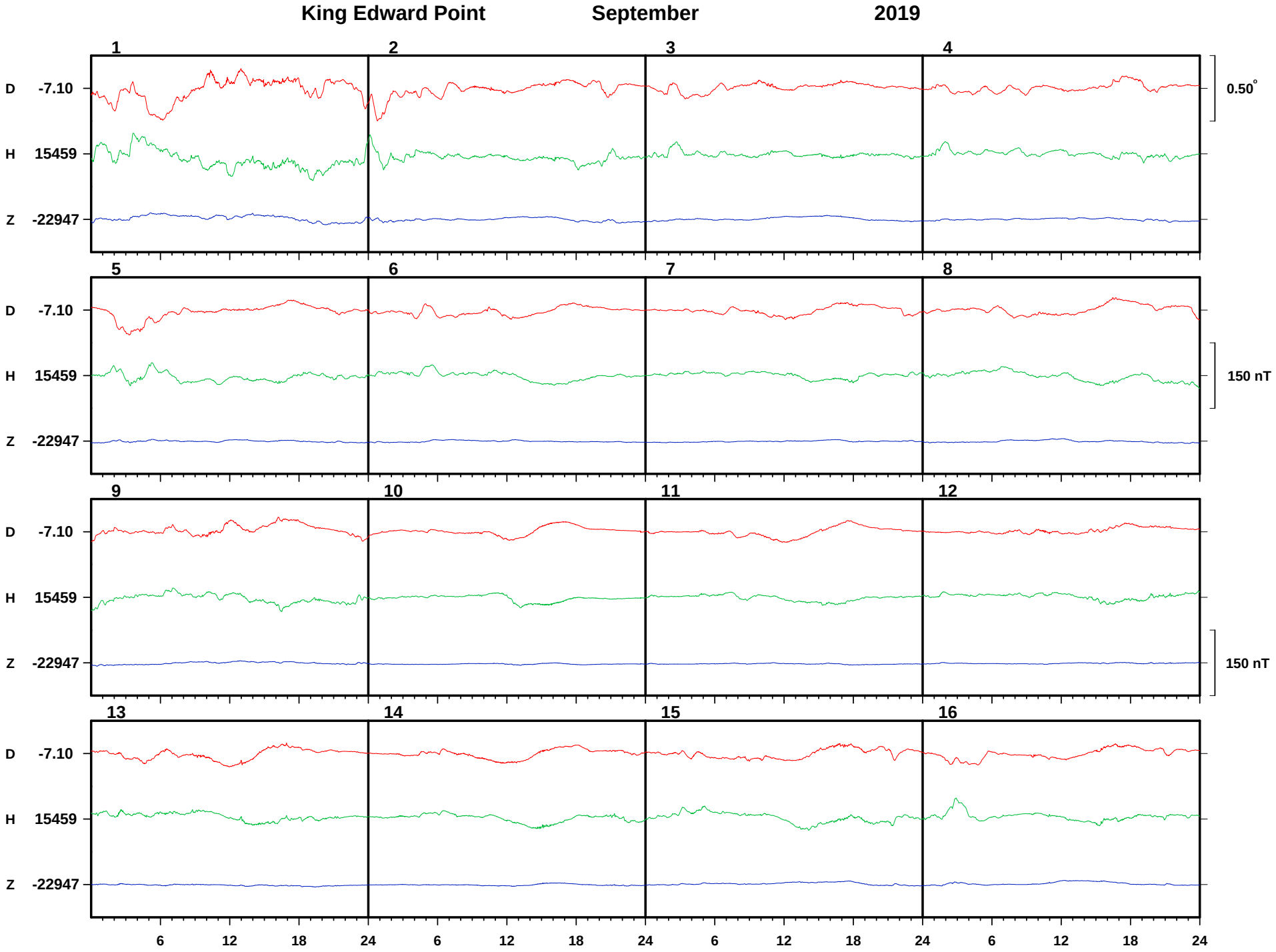
# KING EDWARD POINT OBSERVATORY

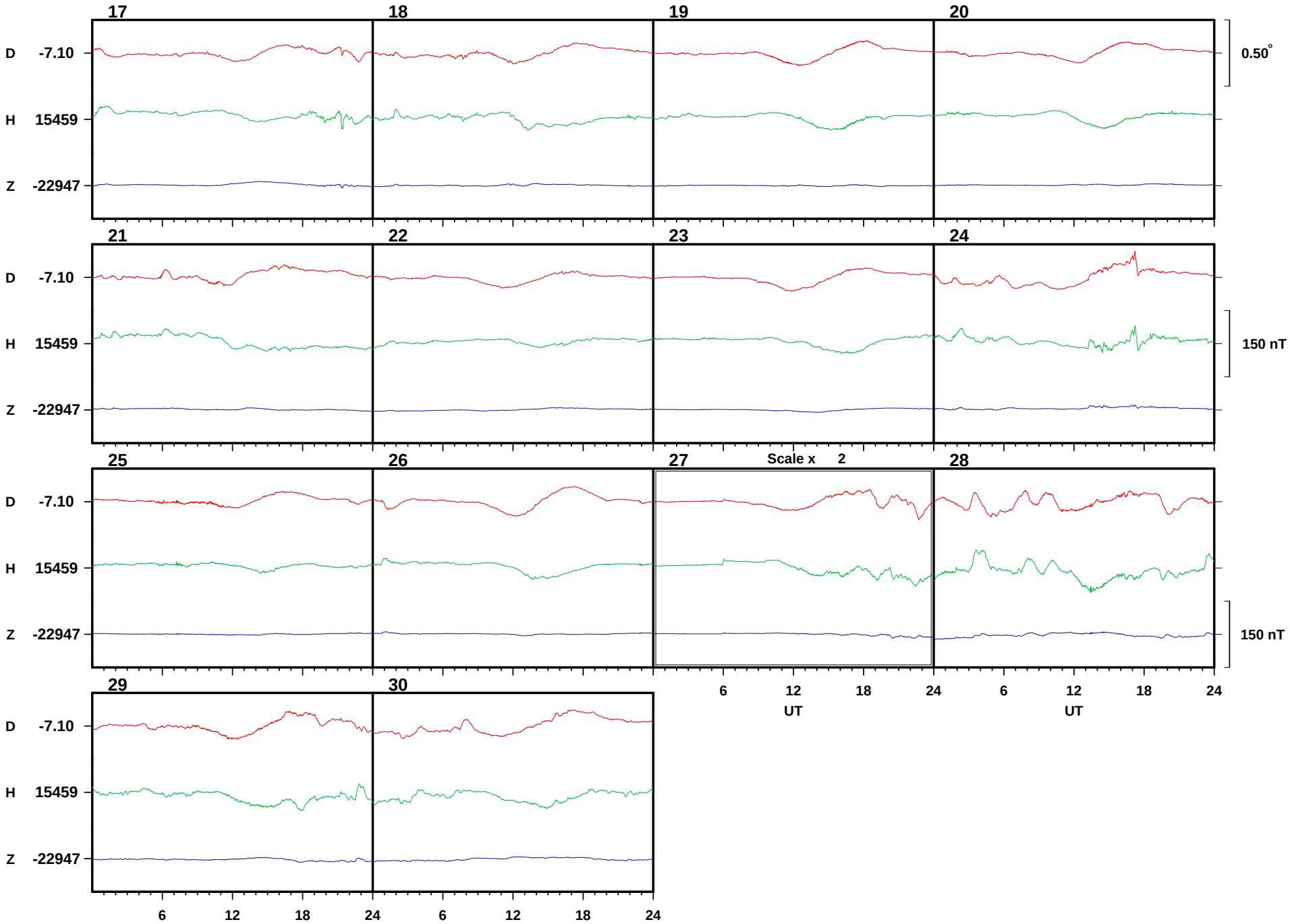
ABSOLUTE OBSERVATIONS

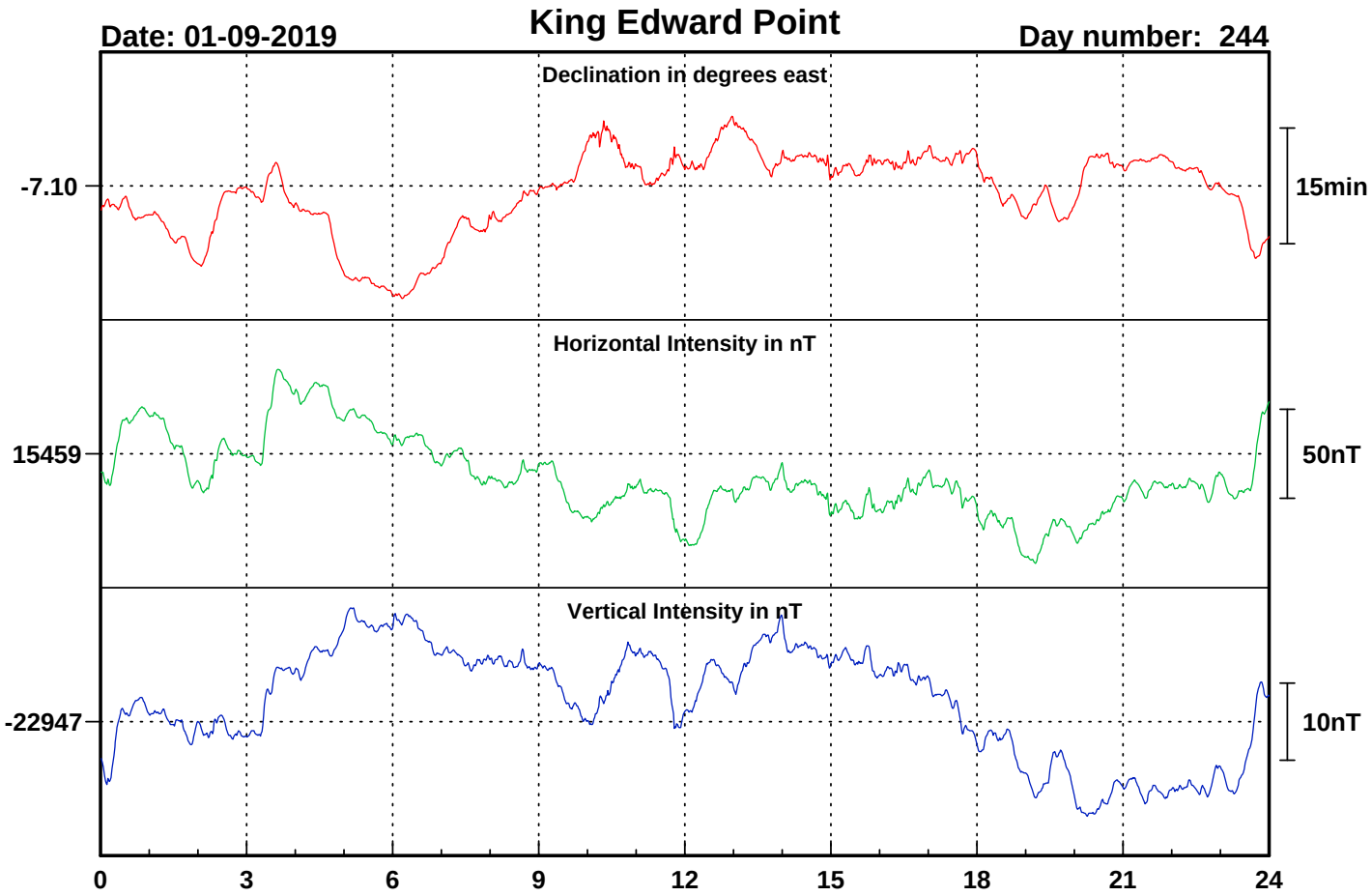
| | | Declination | | | Inclination | | Total Field | | Horizontal Intensity | | Vertical Intensity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date** | **Day Number** | **Time (UT)** | **Absolute (º)** | **Baseline (º)** | **Time (UT)** | **Absolute (º)** | **Site difference (nT)** | **Absolute corrected (nT)** | **Absolute (nT)** | **Baseline (nT)** | **Absolute (nT)** | **Baseline (nT)** | **Observer** |
| 14-Sep-19 | 257 | 16:01 | -7.0619 | -7.0317 | 16:09 | -56.0487 | 12.4 | 27659.2 | 15447.3 | 15997.3 | -22943.6 | -23200.0 | JD |
| 14-Sep-19 | 257 | 16:17 | -7.0533 | -7.0317 | 16:26 | -56.0443 | 12.4 | 27660.4 | 15449.8 | 15997.2 | -22943.4 | -23200.0 | JD |
| 30-Sep-19 | 273 | 14:22 | -7.0812 | -7.0333 | 14:32 | -56.0858 | 12.4 | 27648.4 | 15426.4 | 15997.8 | -22944.7 | -23199.6 | JD |
| 30-Sep-19 | 273 | 14:39 | -7.0616 | -7.0350 | 14:48 | -56.0908 | 12.4 | 27647.7 | 15424.1 | 15997.7 | -22945.5 | -23199.7 | JD |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

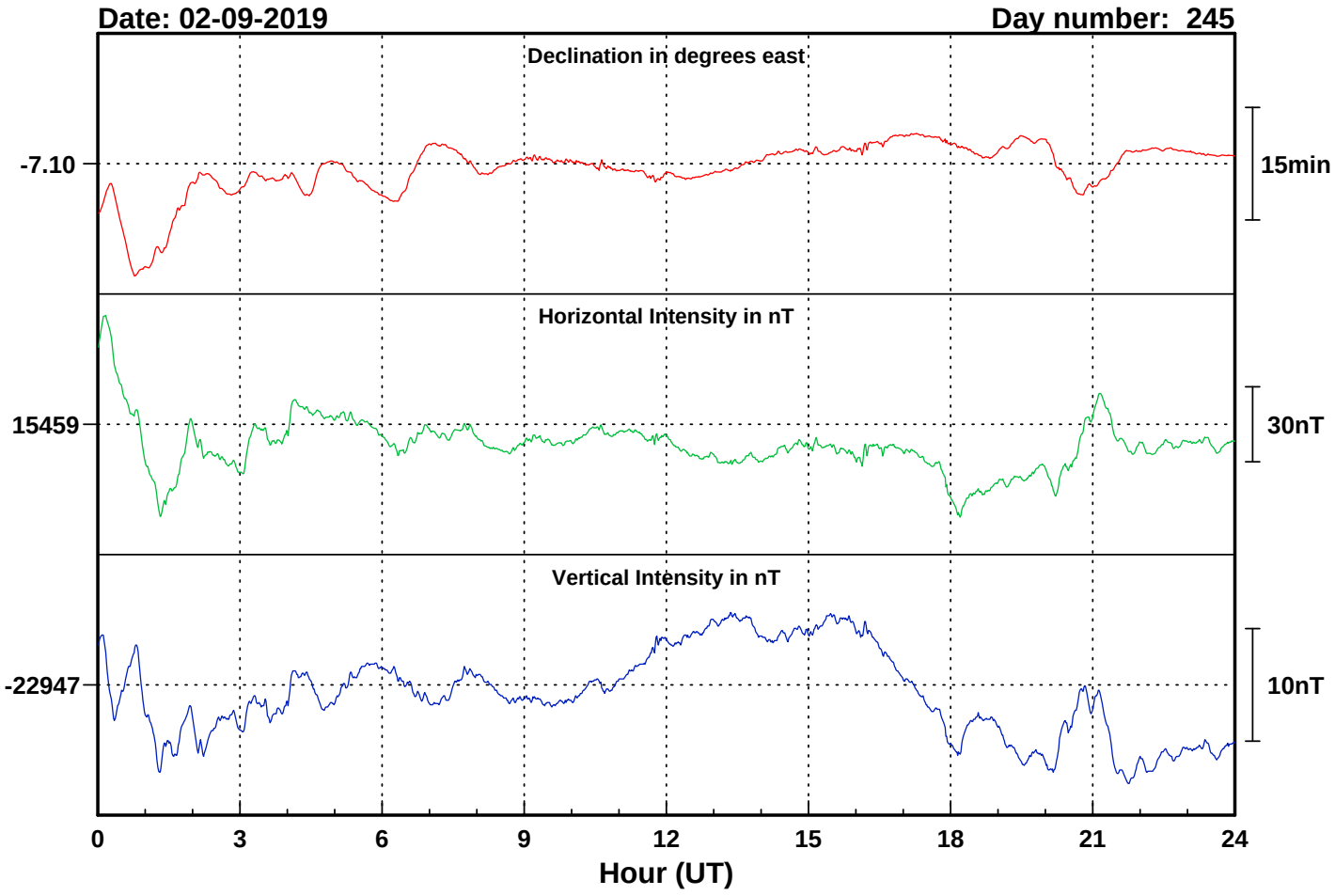
# King Edward Point 2019

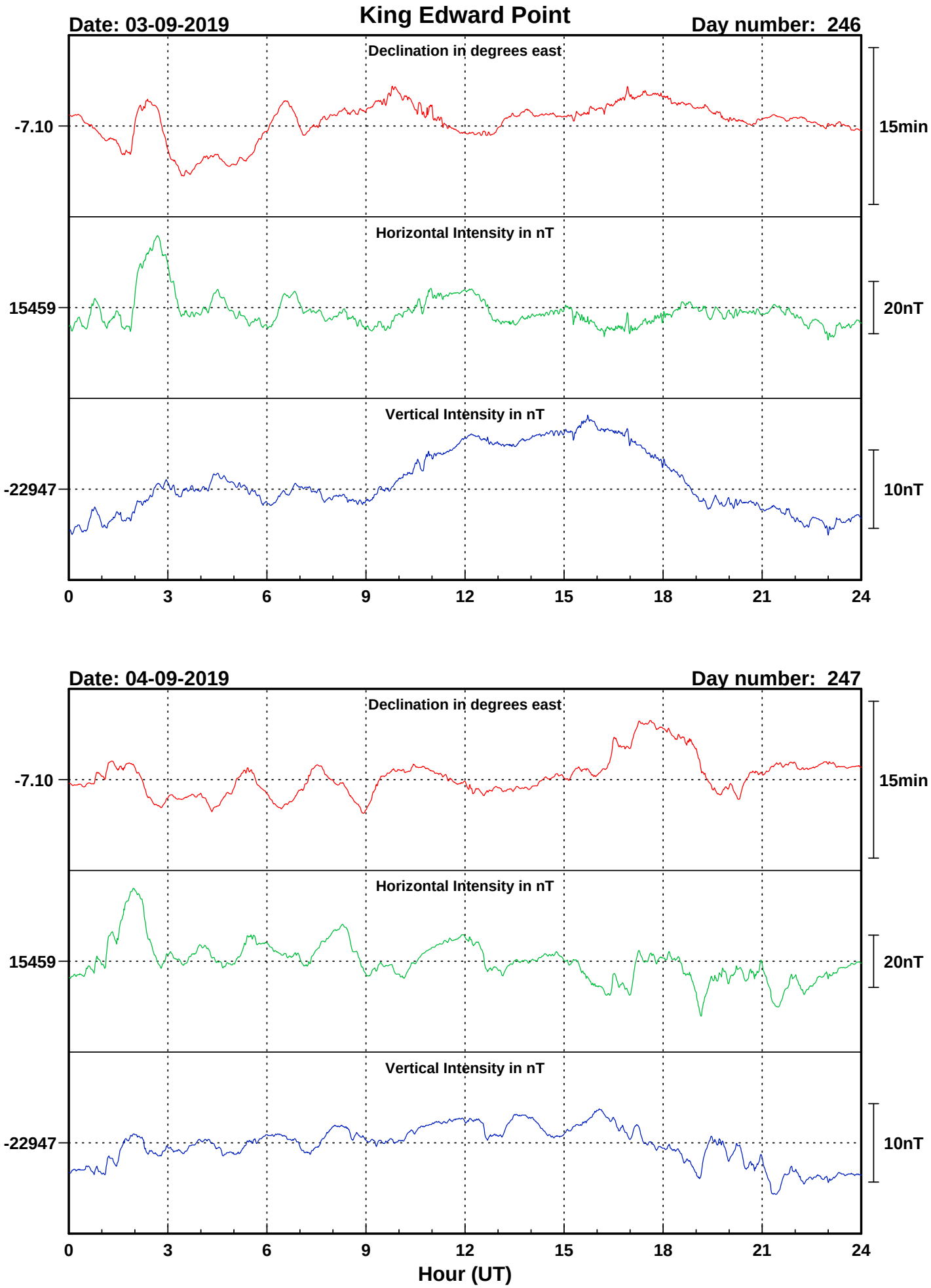


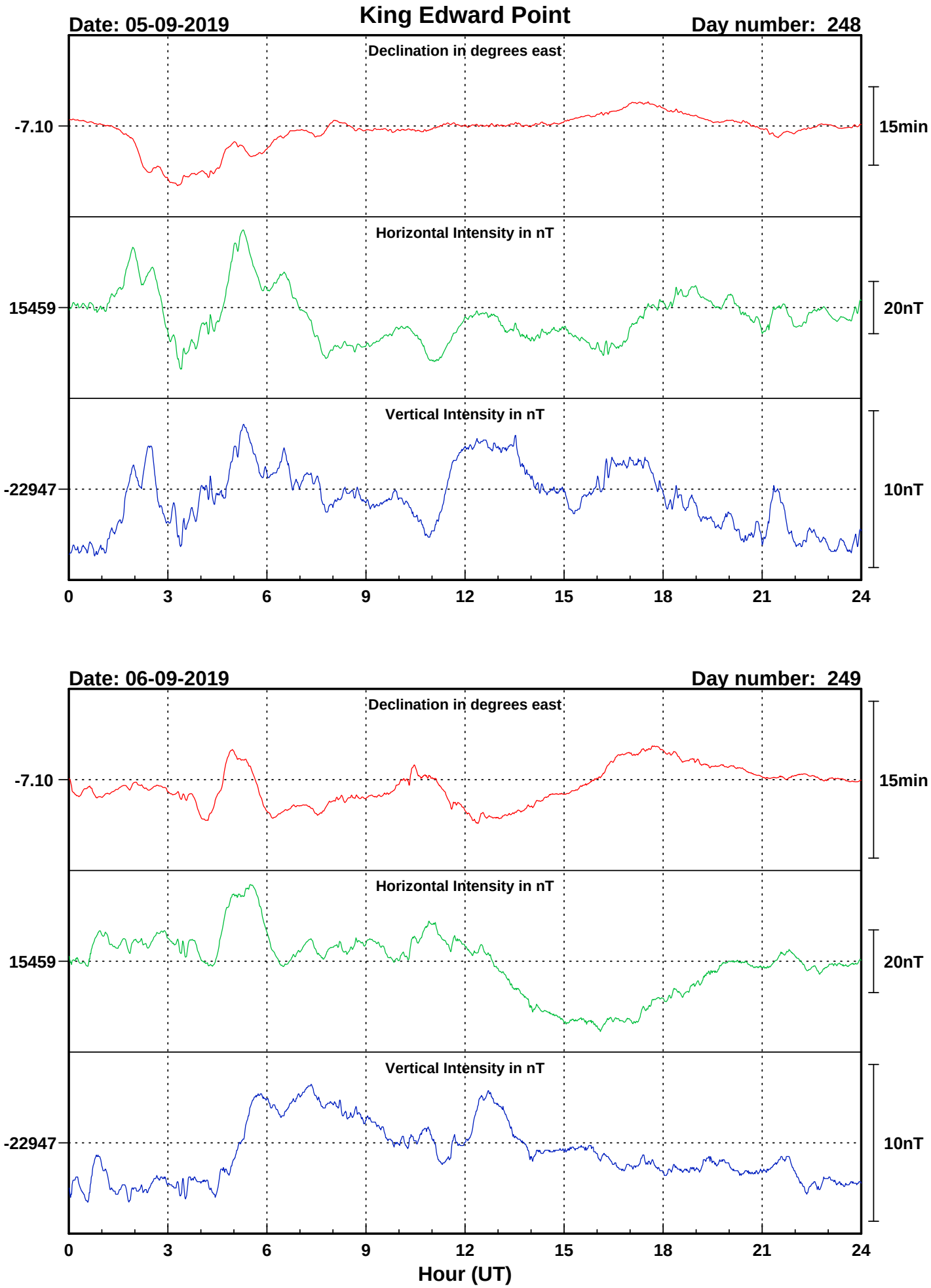

King Edward Point
September
2019
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
D
-7.10
H
15459
Z
-22947
0.50°
150 nT
150 nT
6
12
18
24


17
18
19
20
D -7.10
H 15459
Z -22947
0.50°
21
22
23
24
150 nT
25
26
27
Scale x 2
28
6 12 18 24 6 12 18 24
UT
UT
29
30
6 12 18 24 6 12 18 24
King Edward Point
September
2019


King Edward Point
Date: 01-09-2019
Day number: 244
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
50nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24


Date: 02-09-2019
Day number: 245
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 03-09-2019
Day number: 246
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Date: 04-09-2019
Day number: 247
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
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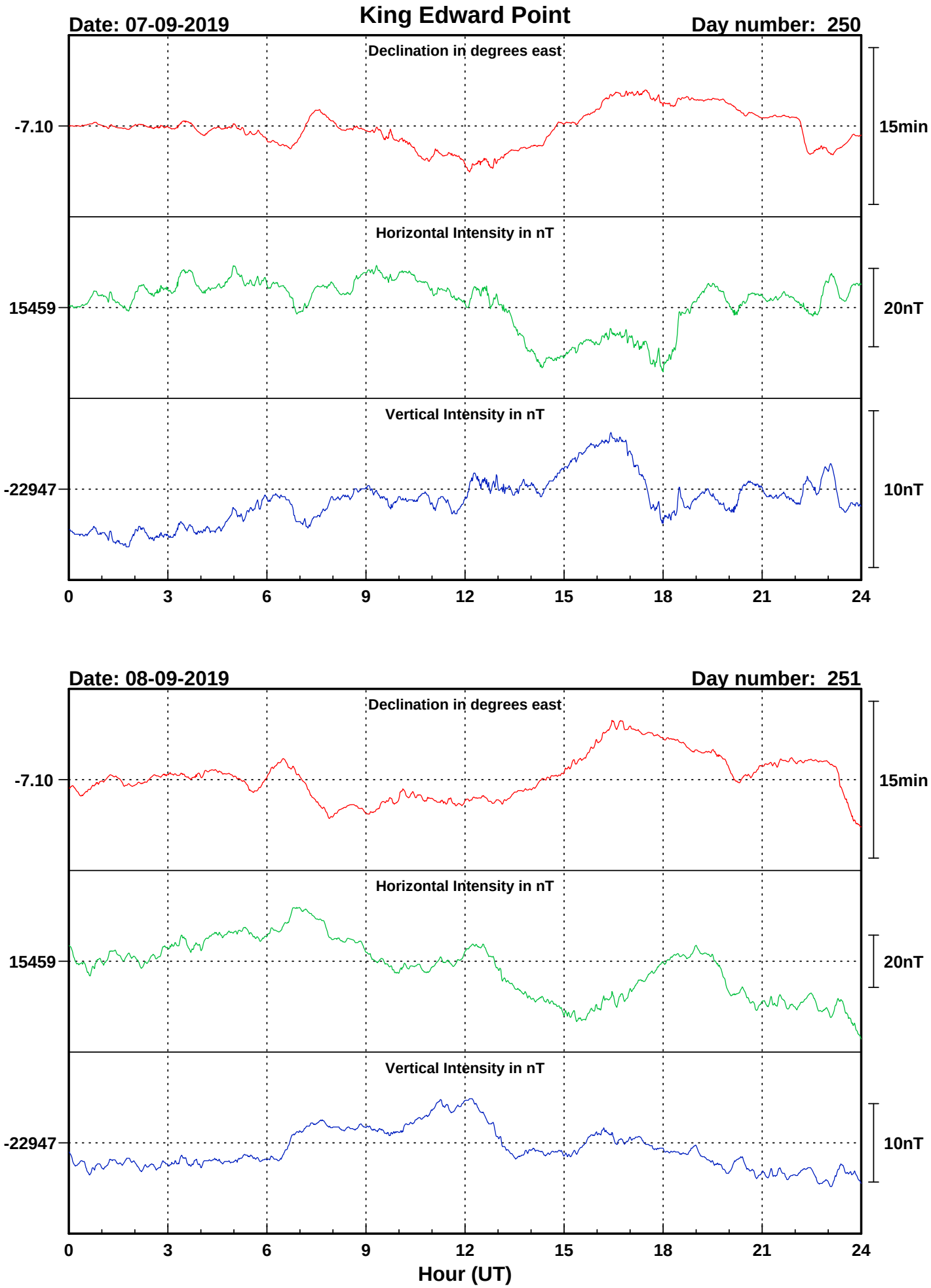
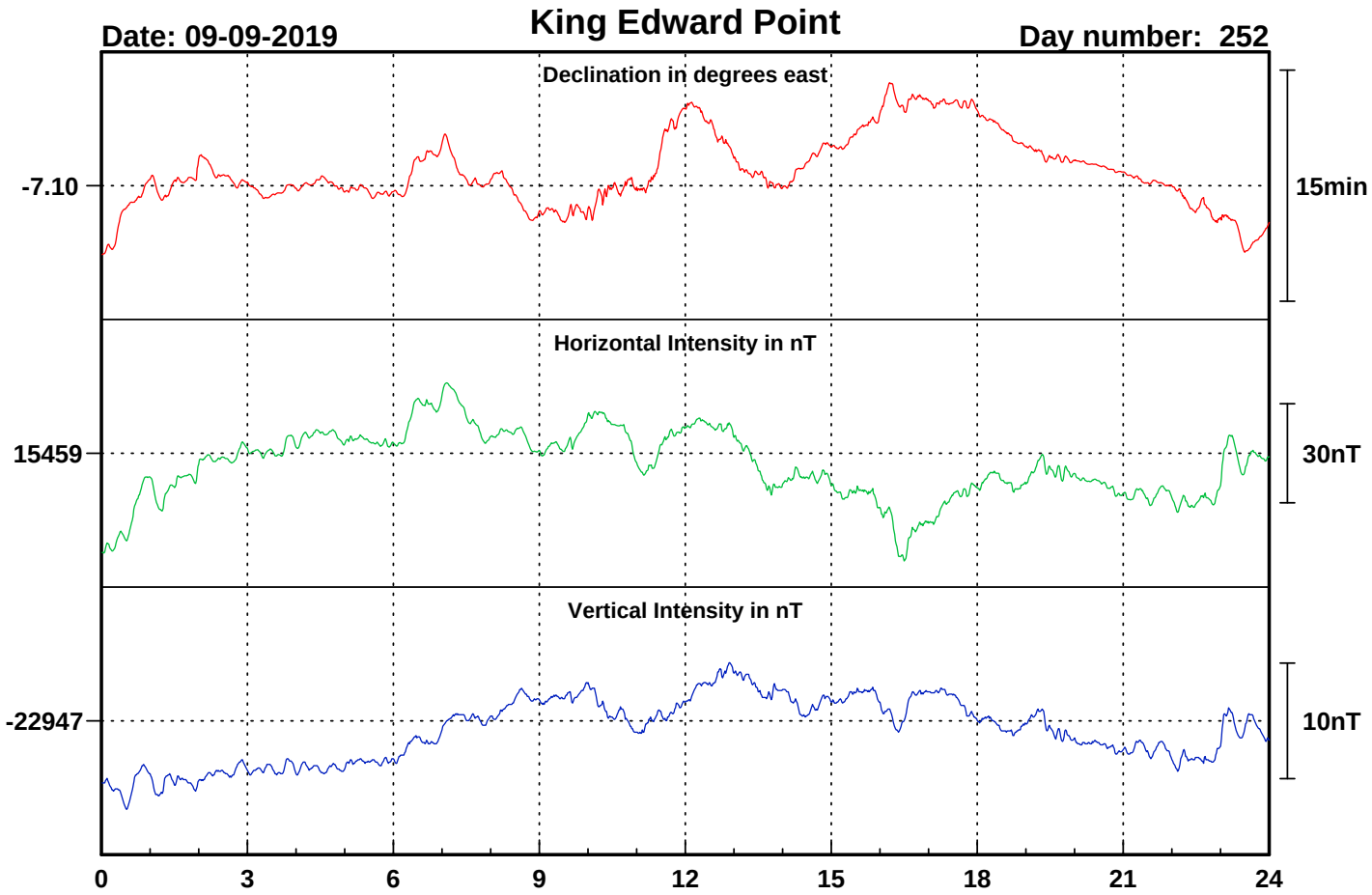
Day number: 248
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Date: 06-09-2019
Day number: 249
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 07-09-2019
Day number: 250
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Date: 08-09-2019
Day number: 251
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 09-09-2019
Day number: 252
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
-22947
10nT
0
3
6
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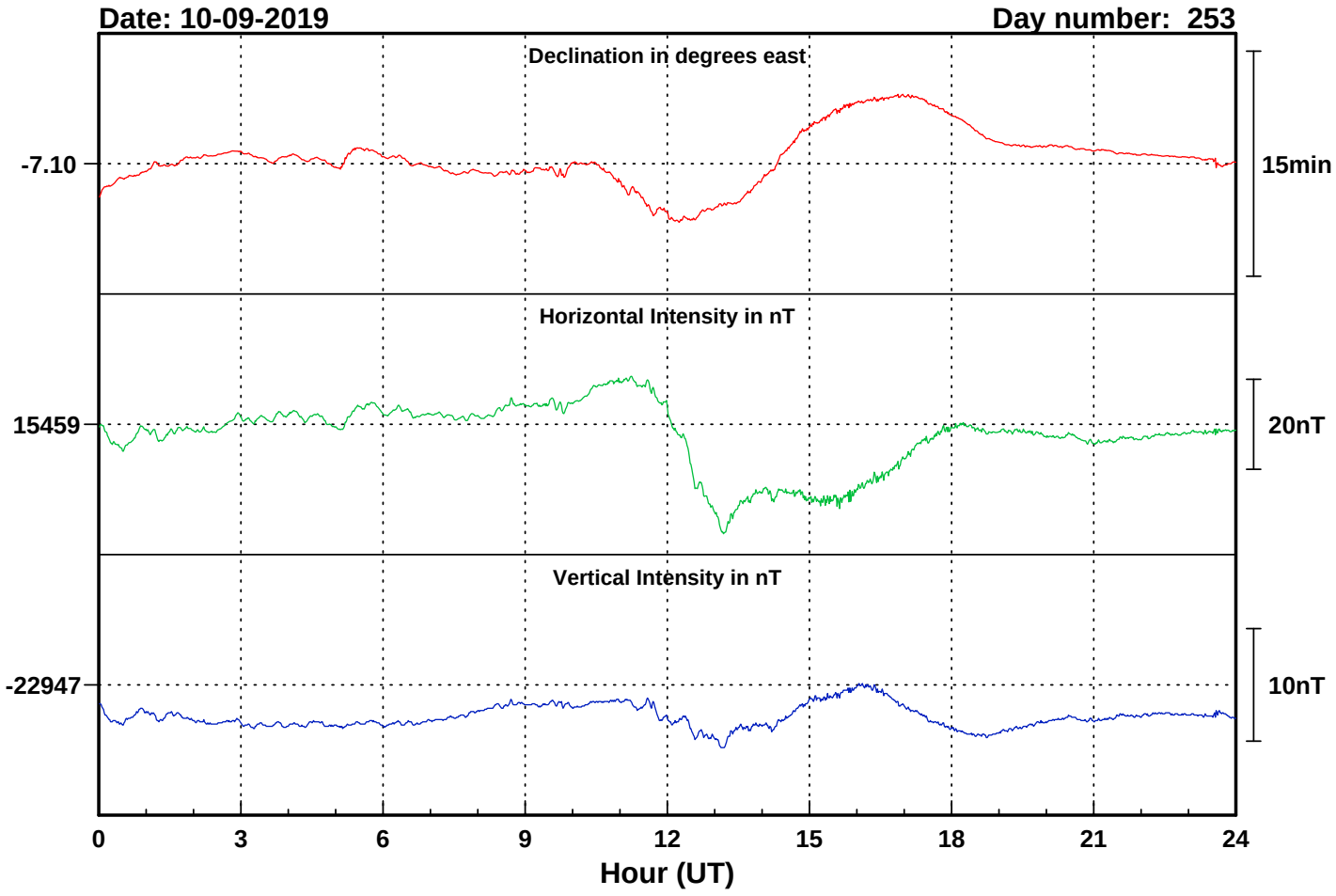
21
24


Date: 10-09-2019
Day number: 253
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
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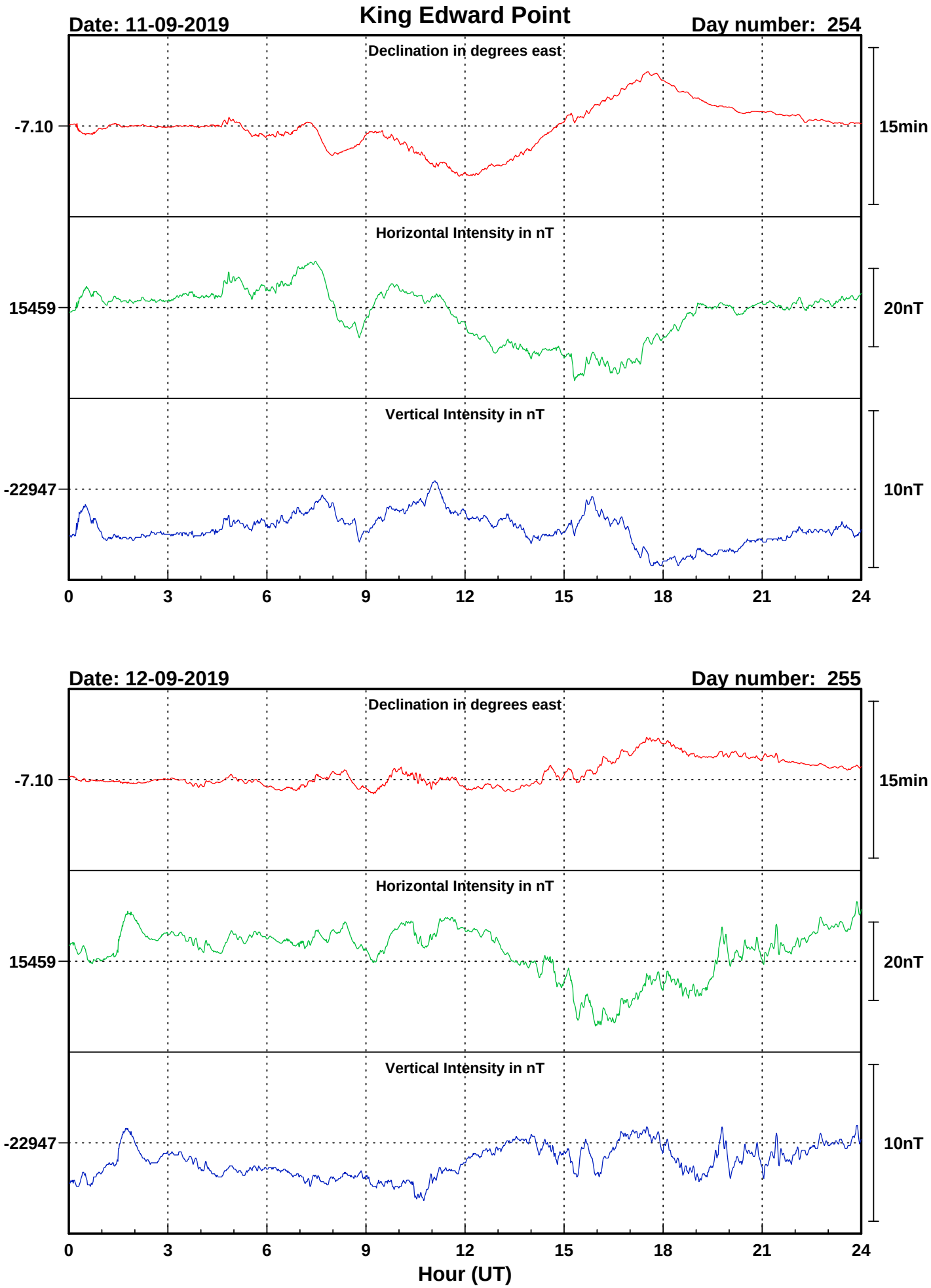
18
21
24
Hour (UT)


King Edward Point
Date: 11-09-2019
Day number: 254
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Date: 12-09-2019
Day number: 255
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
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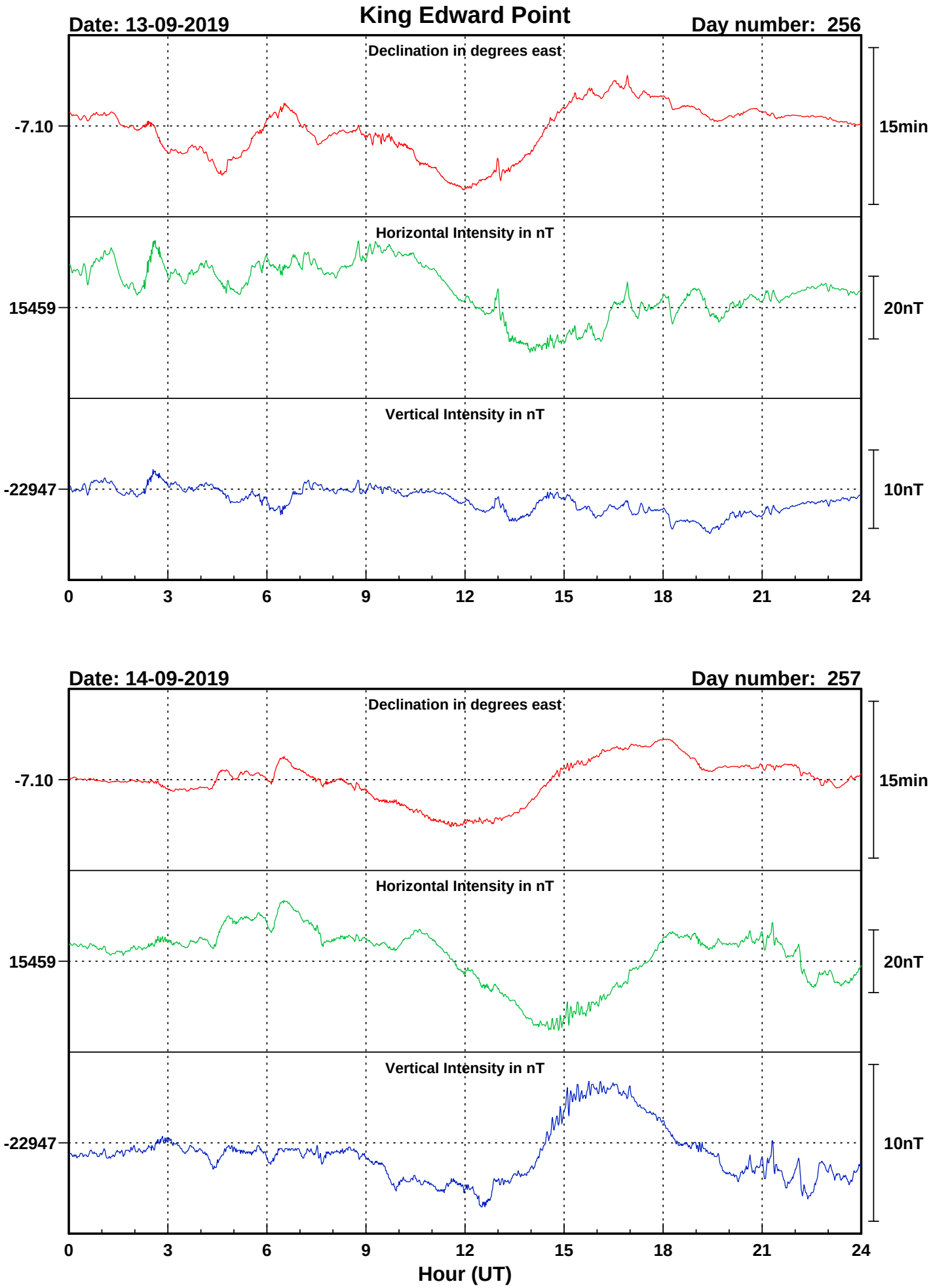
24
Hour (UT)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Date: 13-09-2019
Day number: 256
Declination in degrees east
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15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
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Date: 14-09-2019
Day number: 257
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
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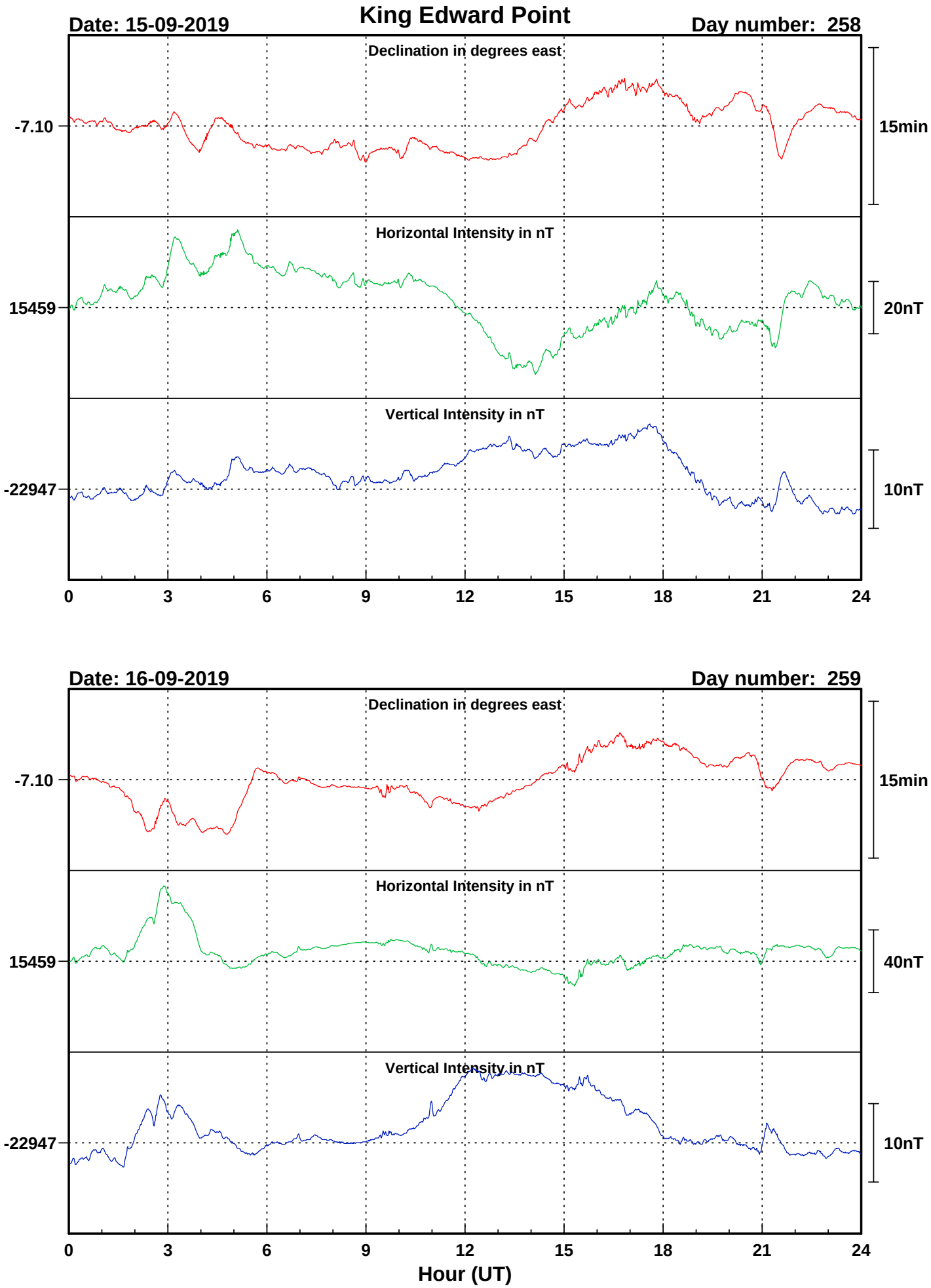
Hour (UT)


King Edward Point
Date: 15-09-2019
Day number: 258
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
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18
21
24
Date: 16-09-2019
Day number: 259
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
40nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
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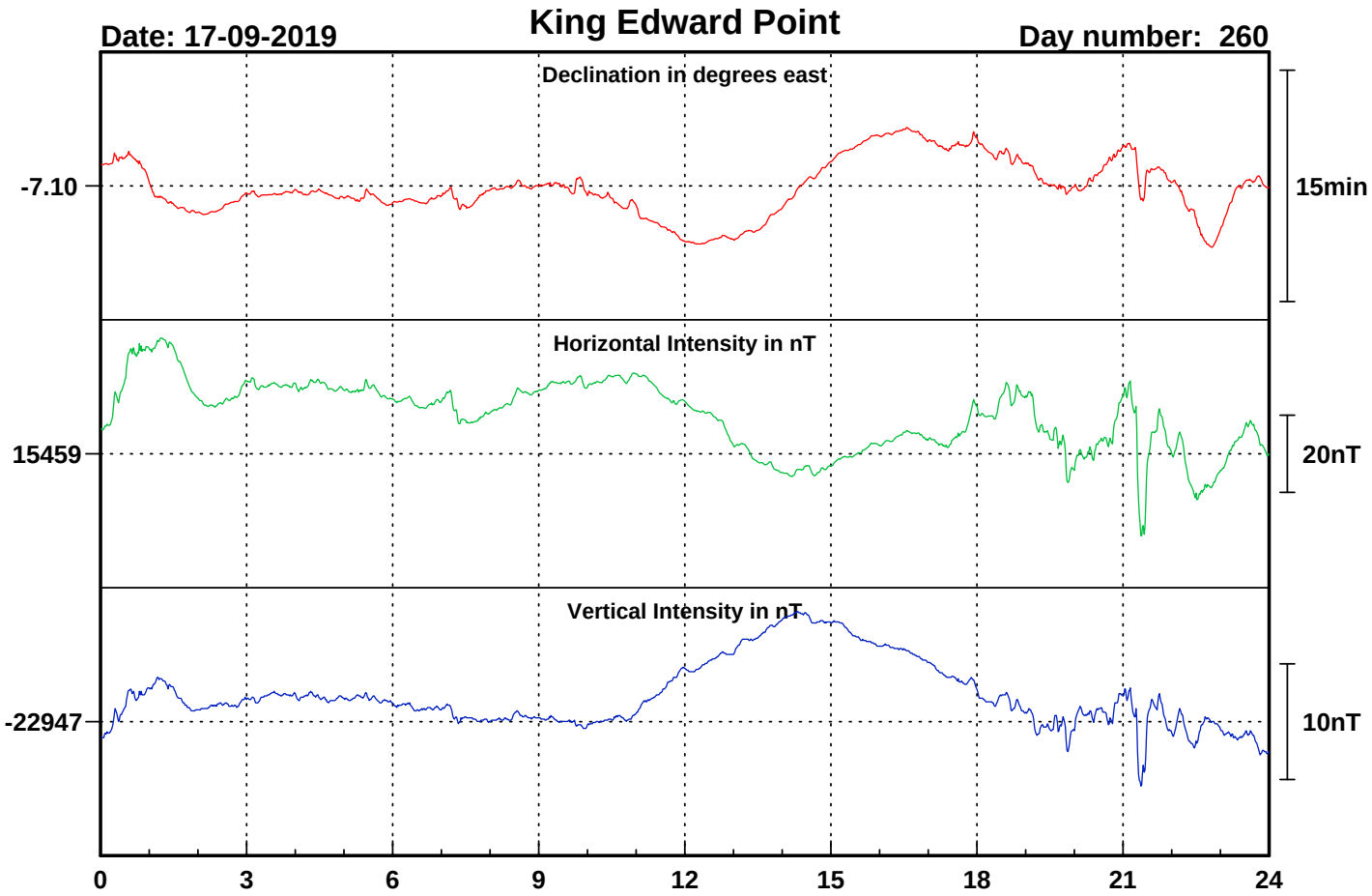
18
21
24
Hour (UT)


King Edward Point
Date: 17-09-2019
Day number: 260
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
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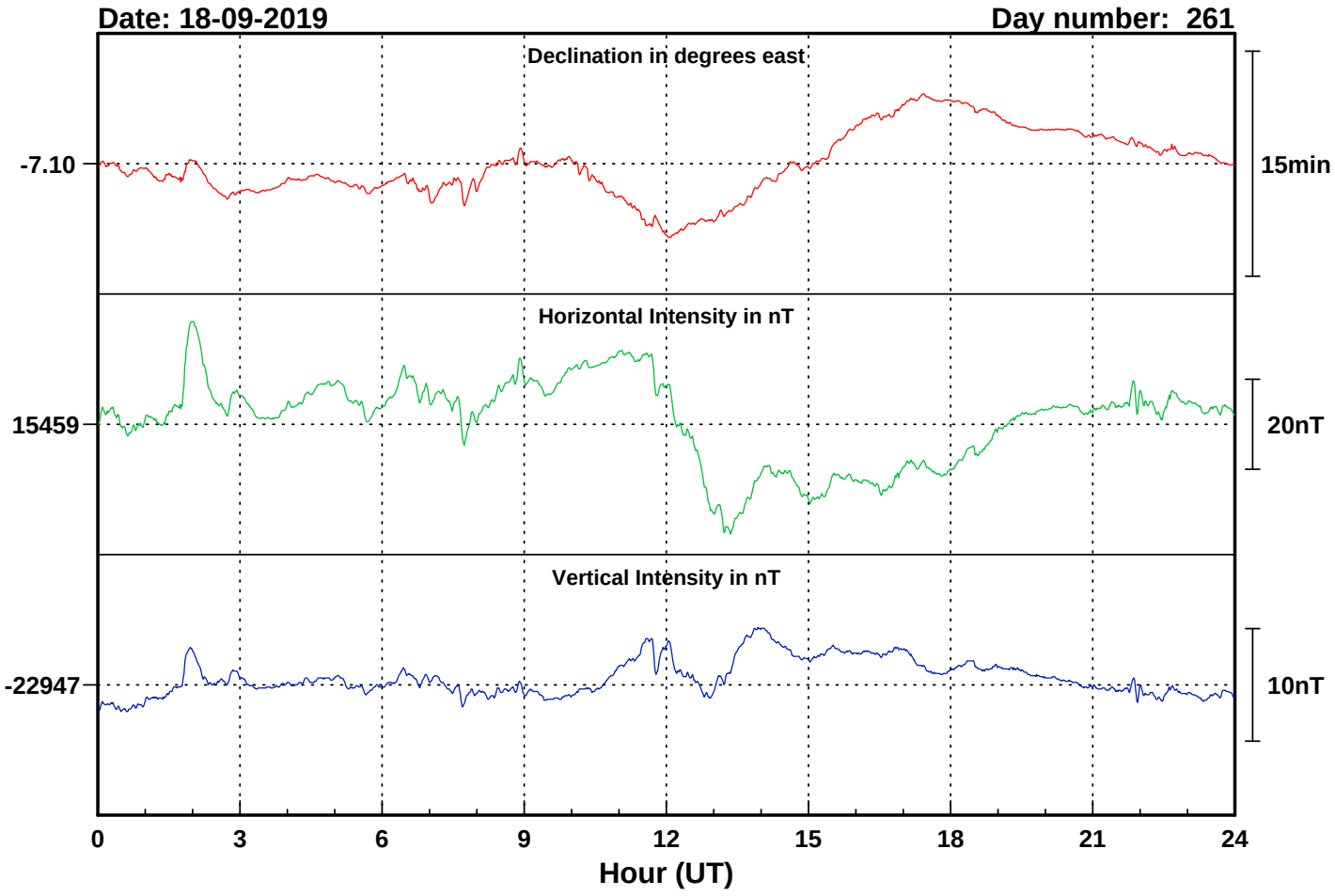
Date: 18-09-2019
Day number: 261
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
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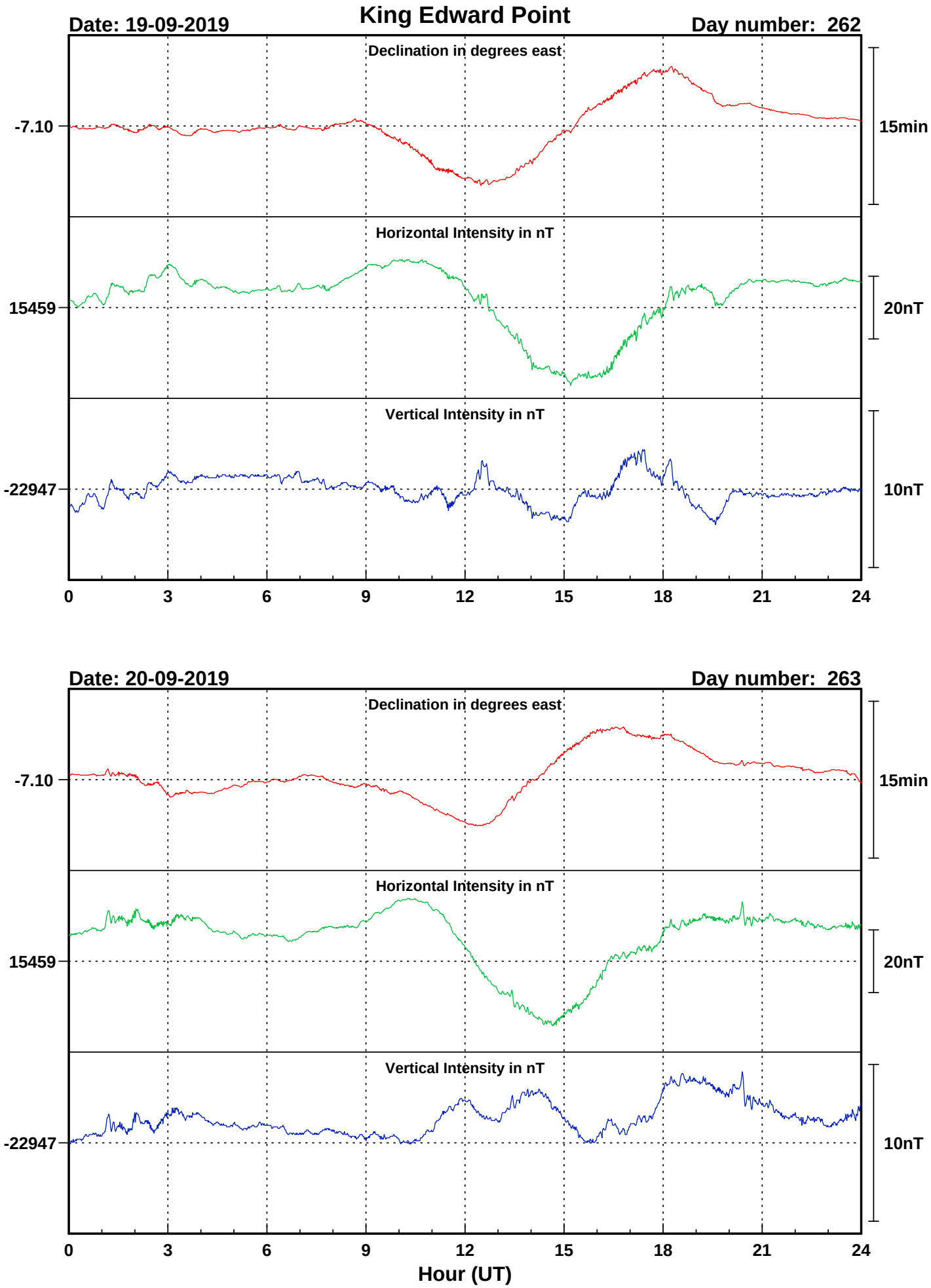
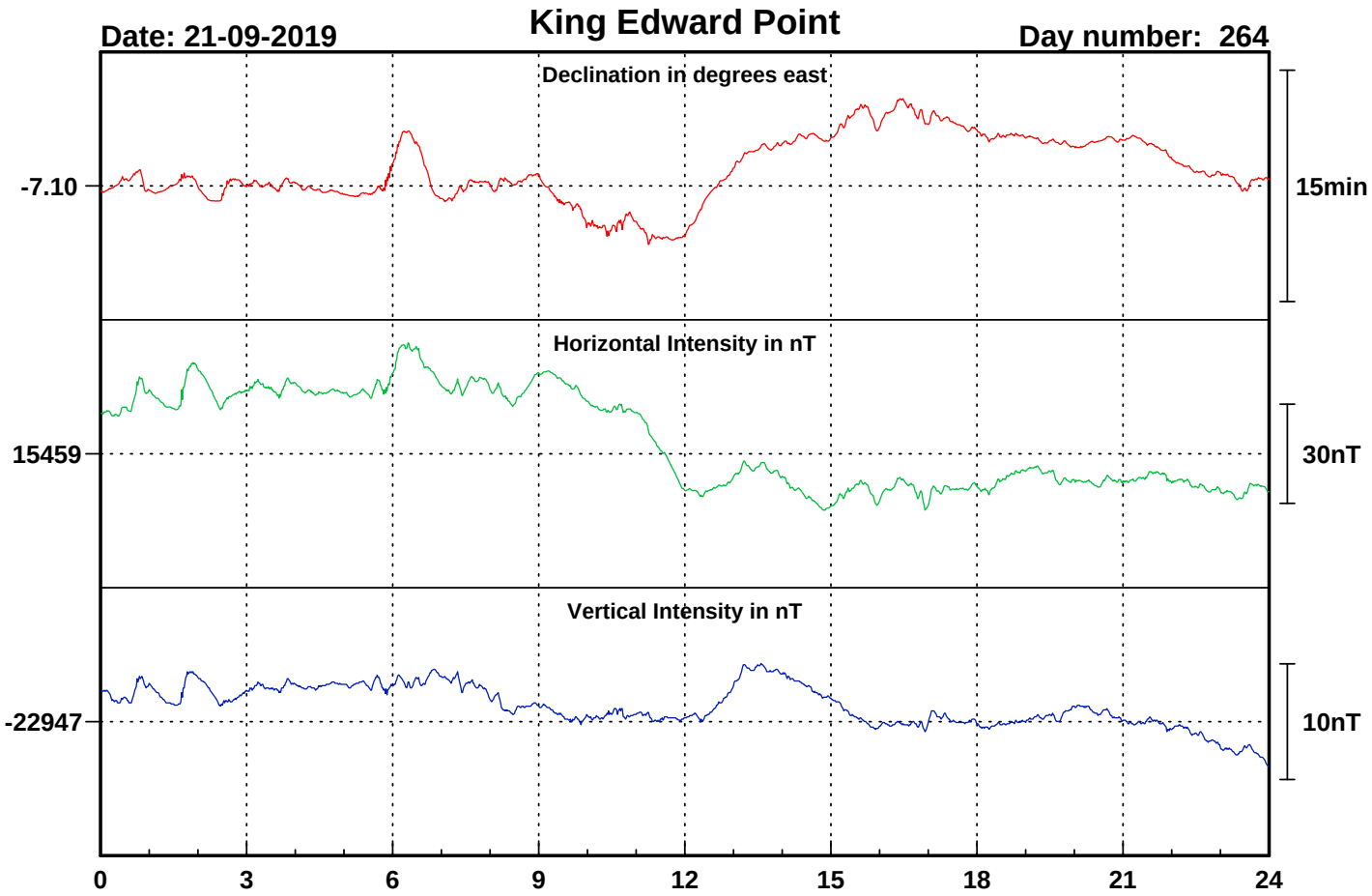
24
Hour (UT)


King Edward Point
Date: 19-09-2019
Day number: 262
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Date: 20-09-2019
Day number: 263
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 21-09-2019
Day number: 264
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
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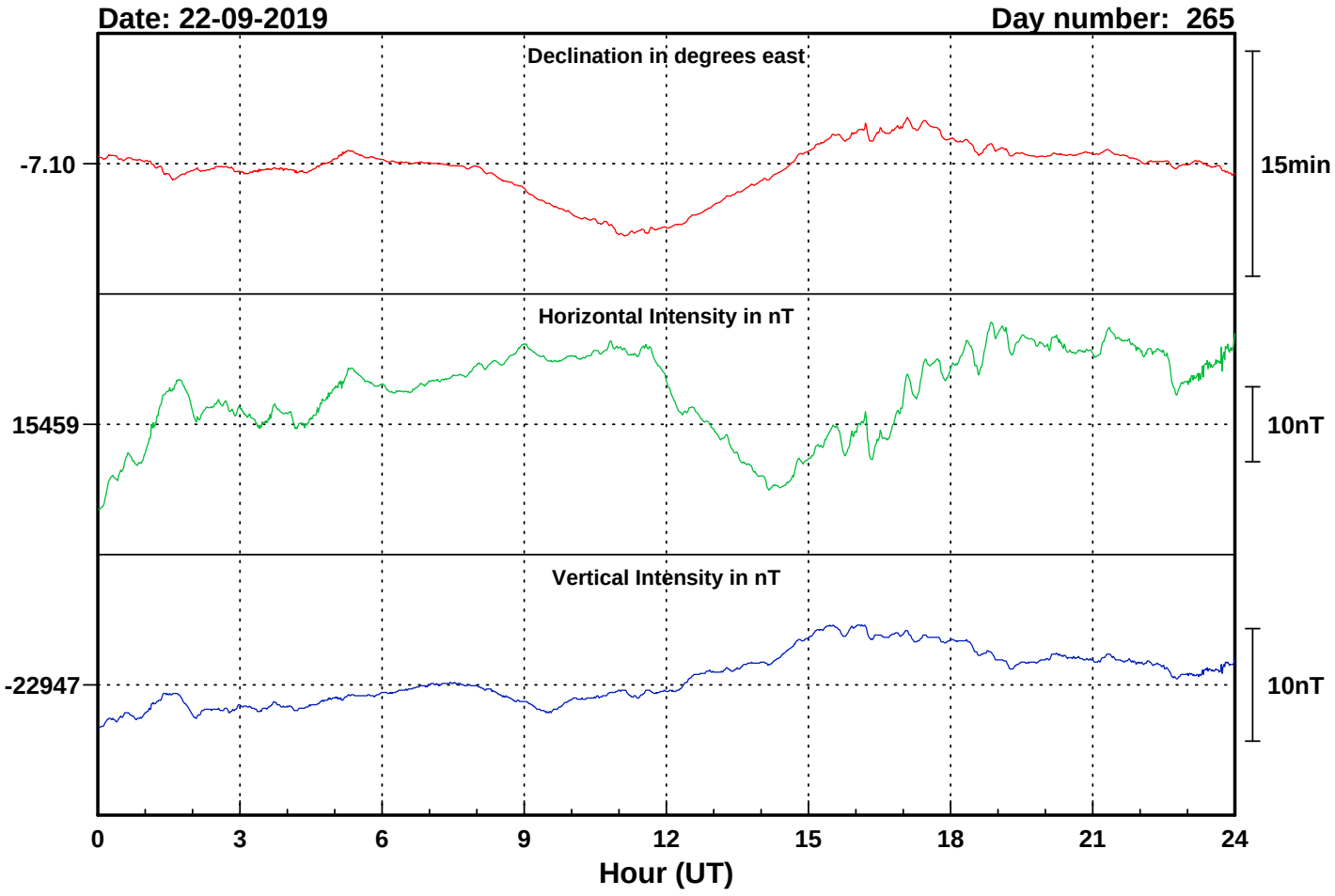
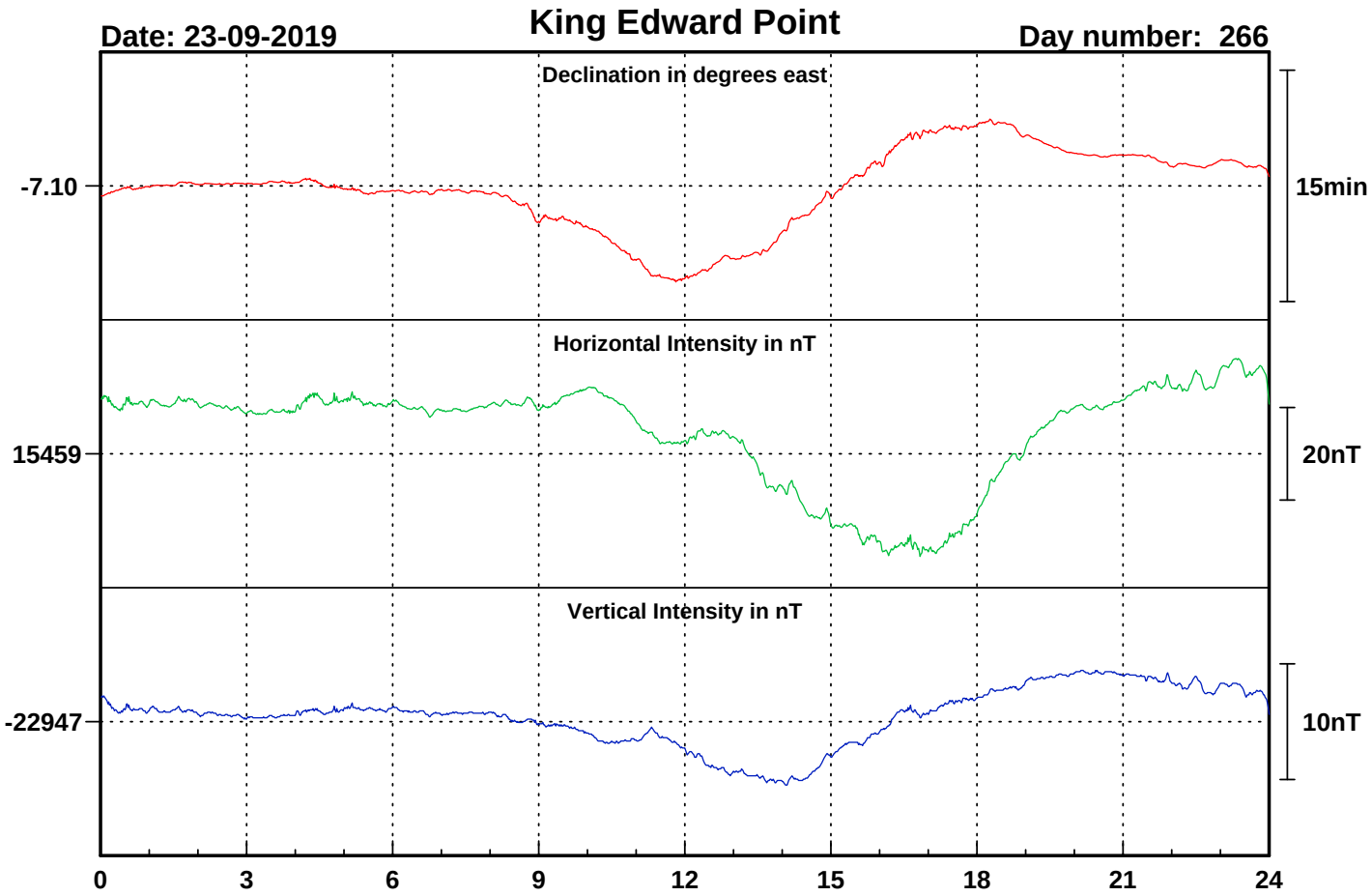

Date: 22-09-2019
Day number: 265
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
10nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


King Edward Point
Date: 23-09-2019
Day number: 266
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
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10nT
0
3
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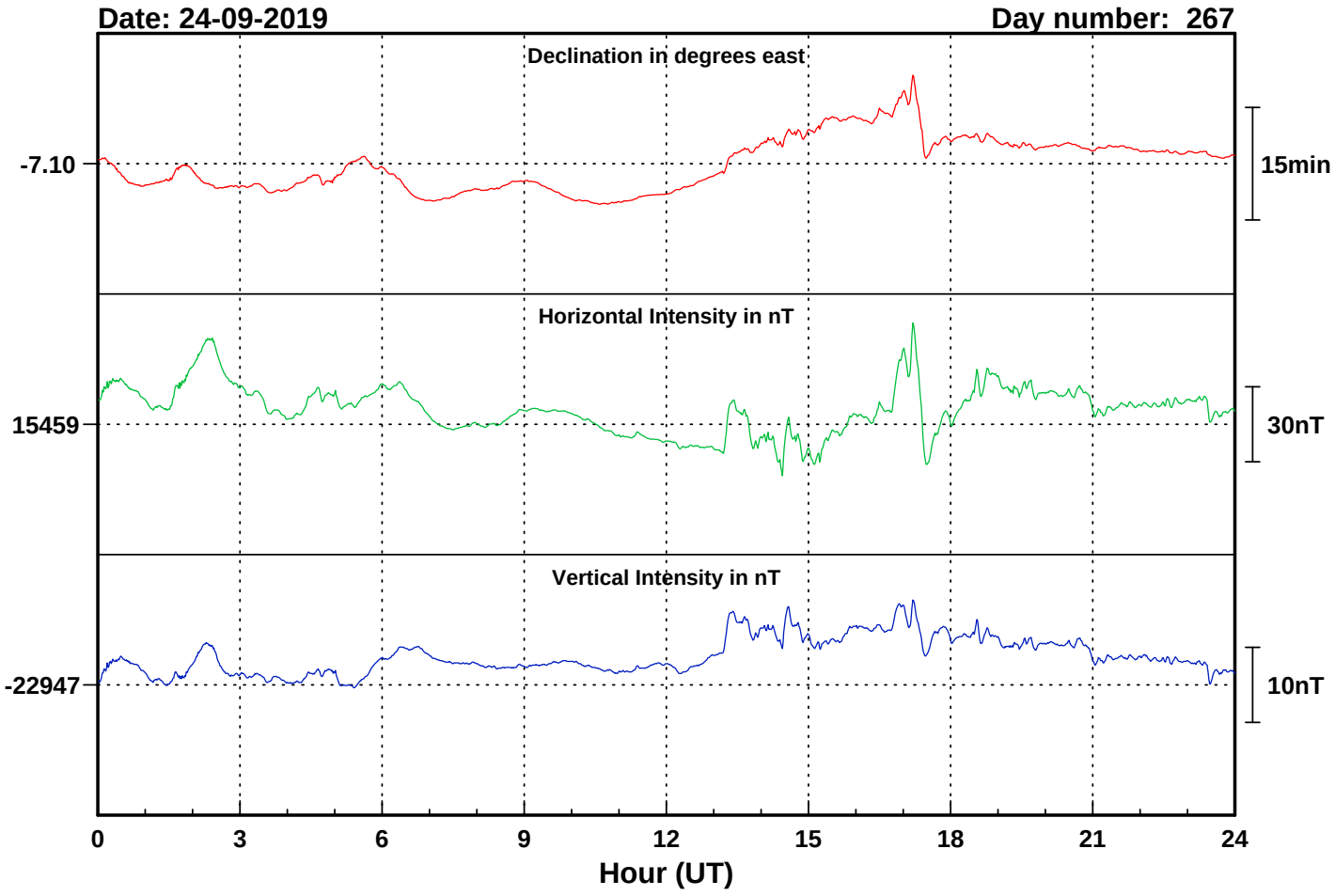
Date: 24-09-2019
Day number: 267
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
-22947
10nT
0
3
6
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12
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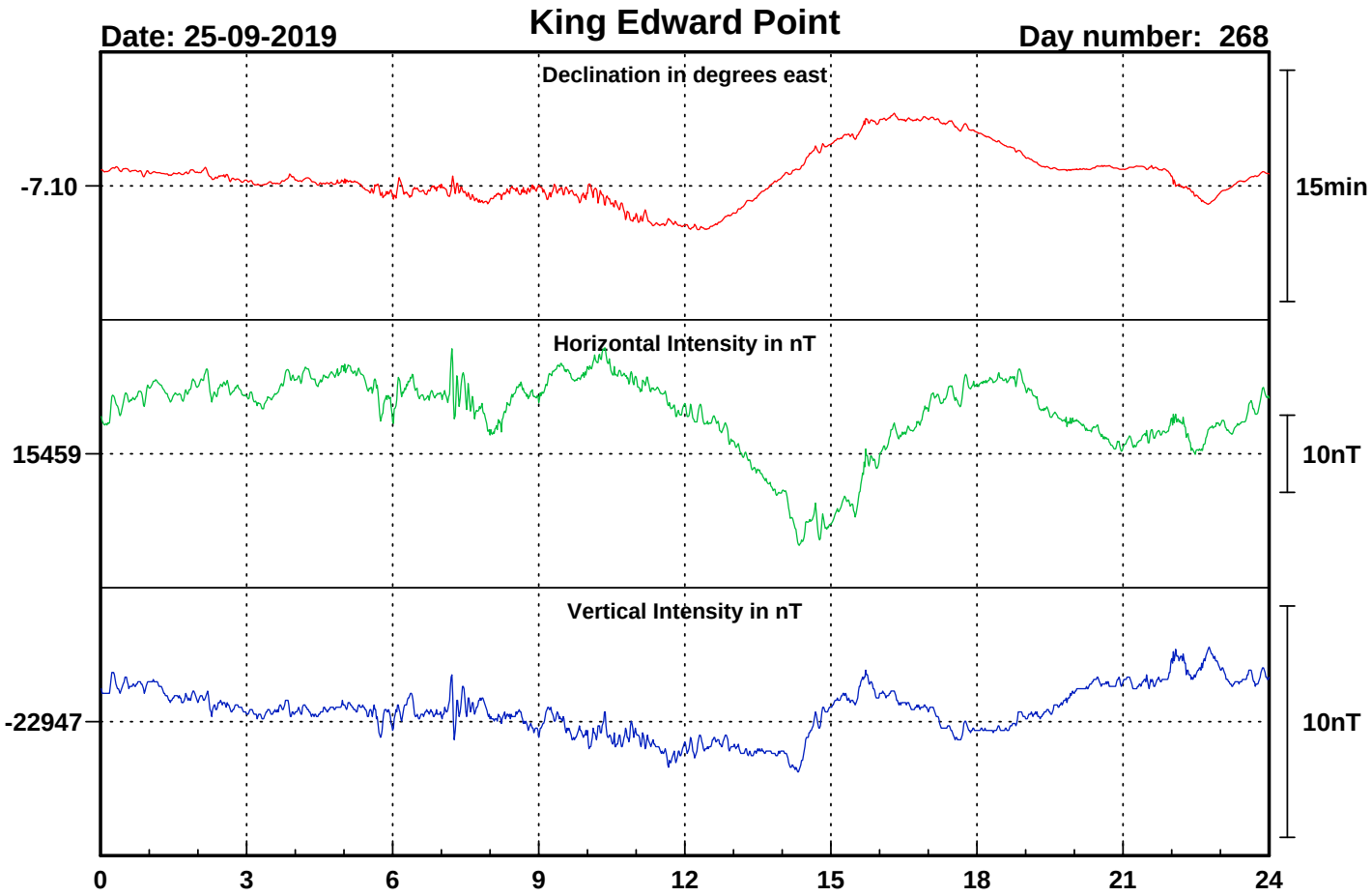
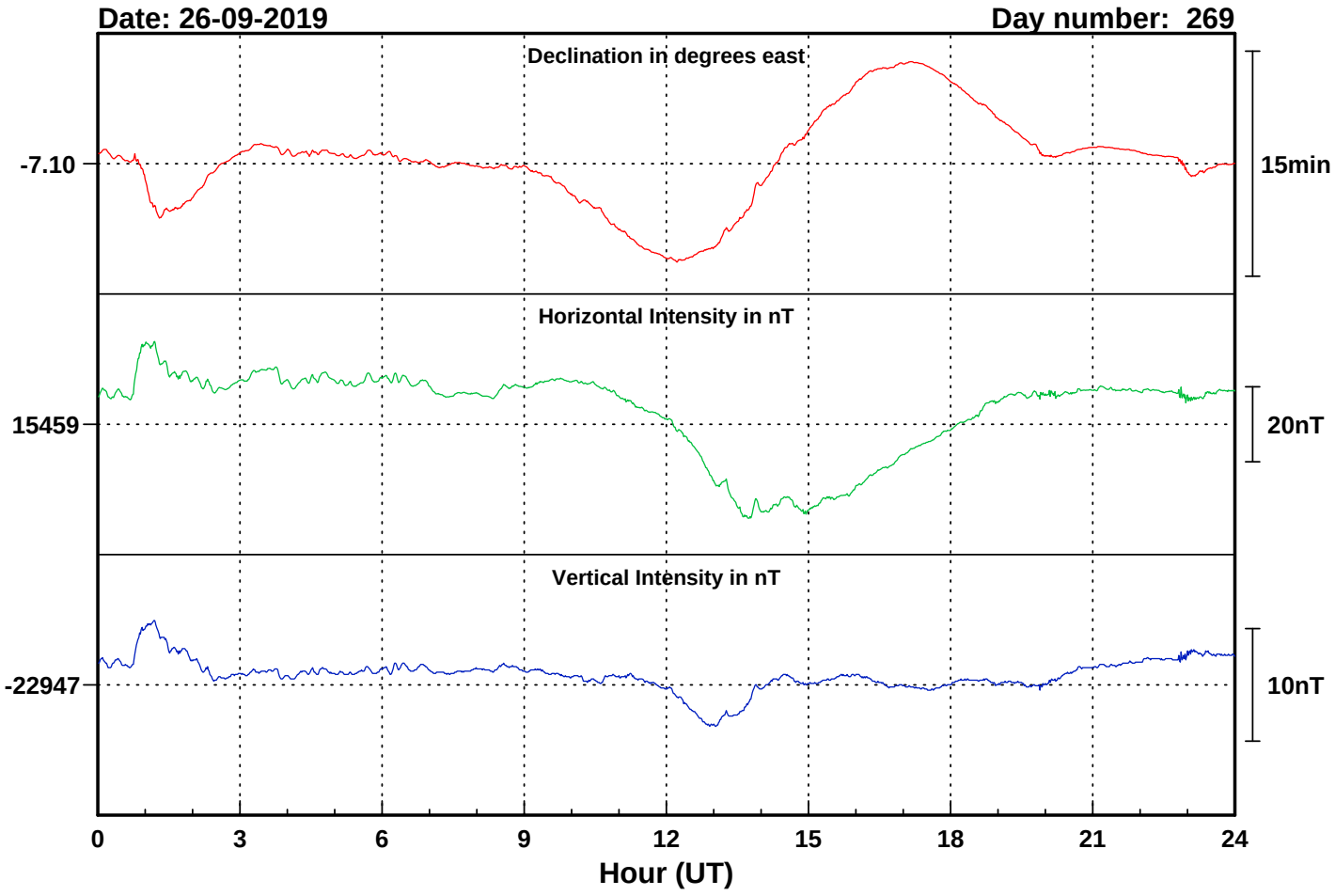
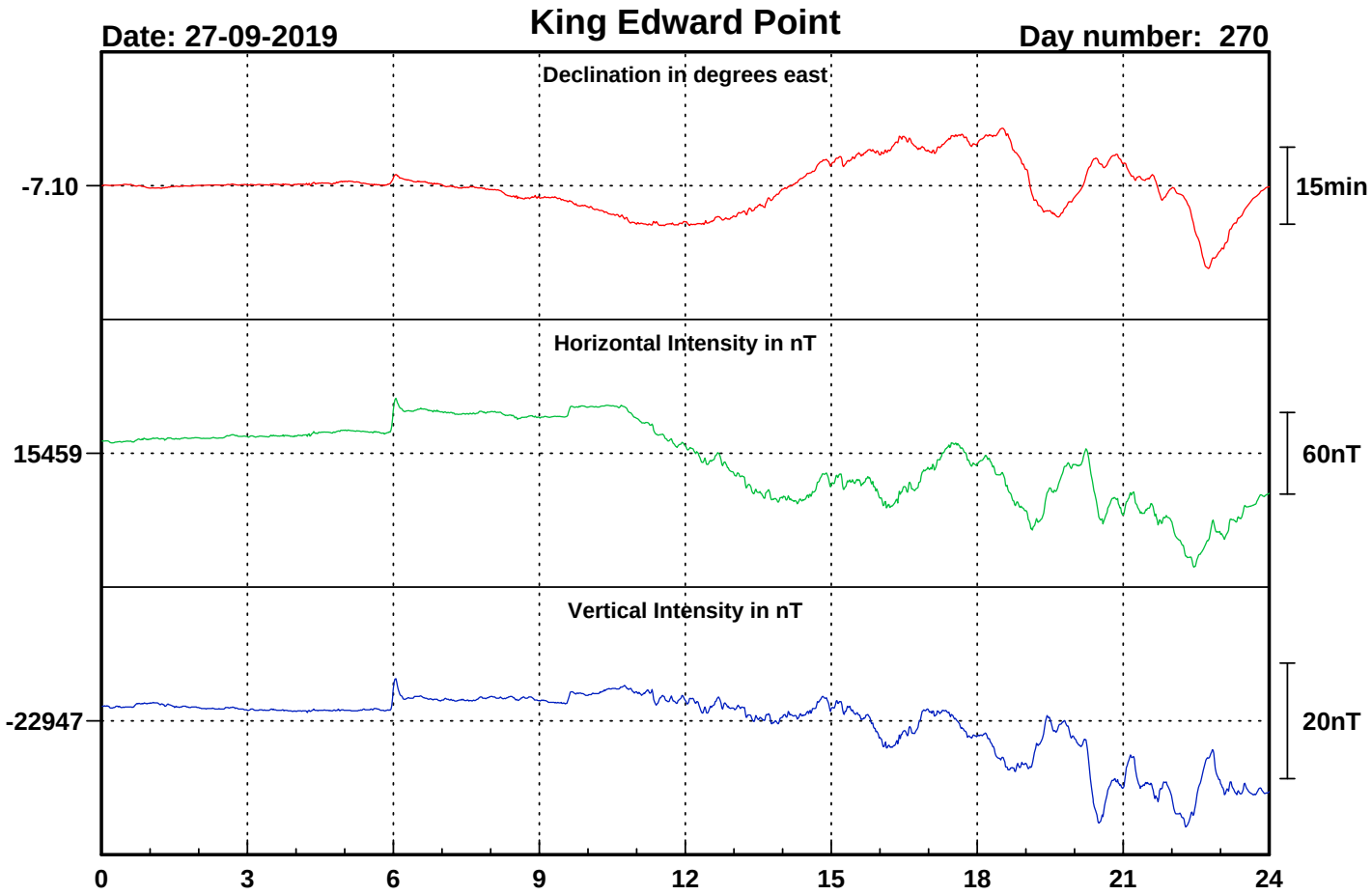
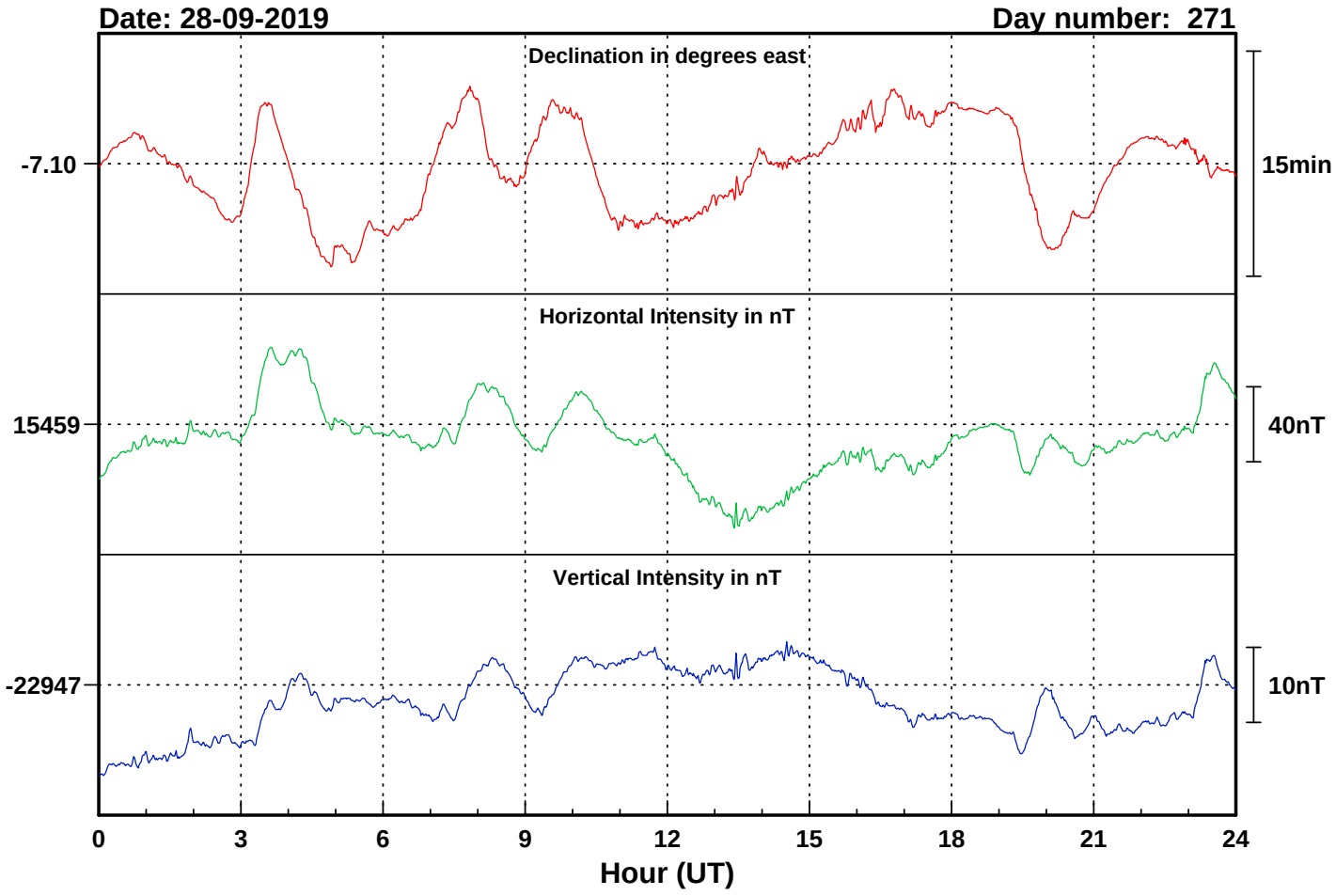
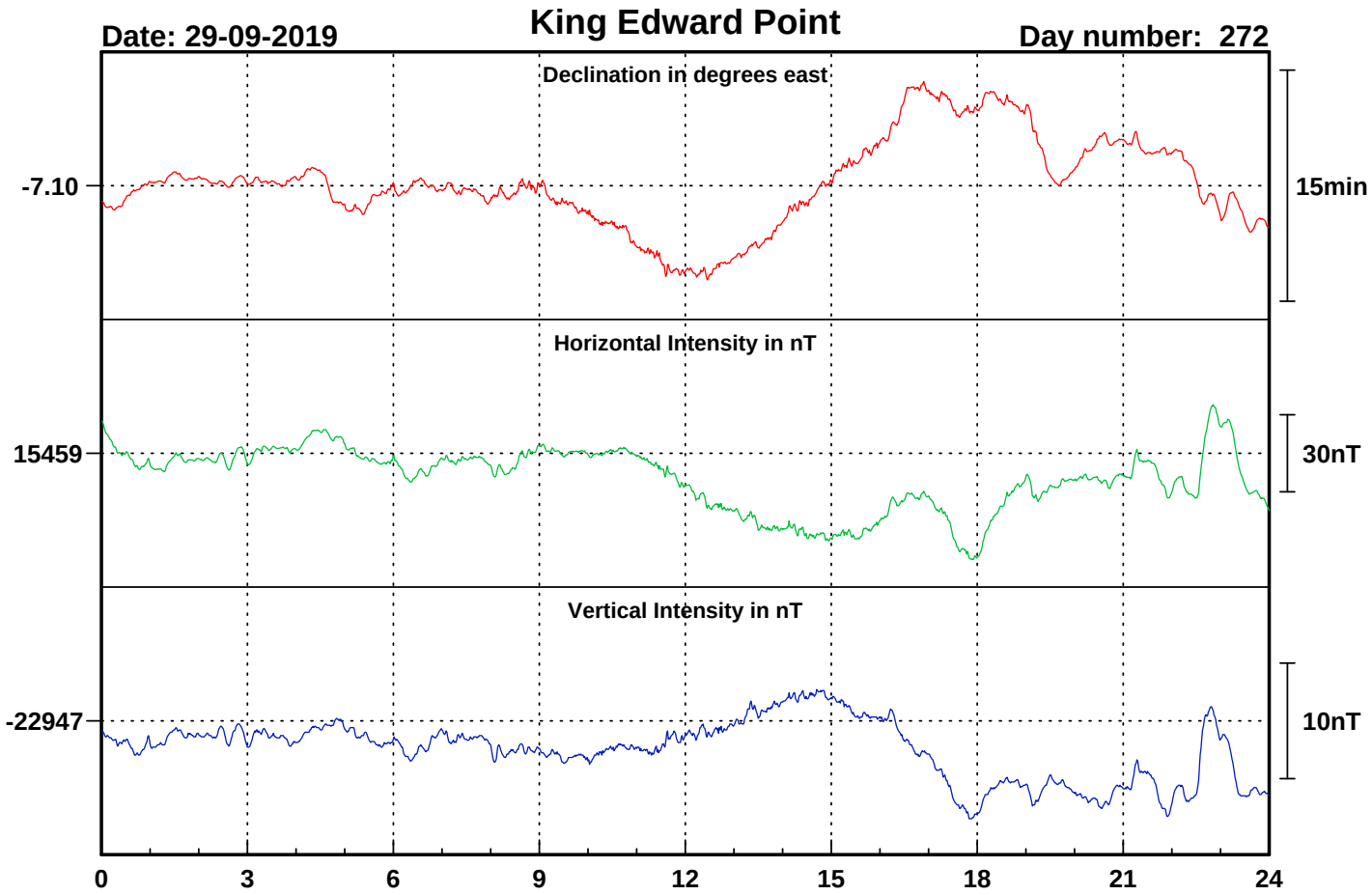
18
21
24
Hour (UT)

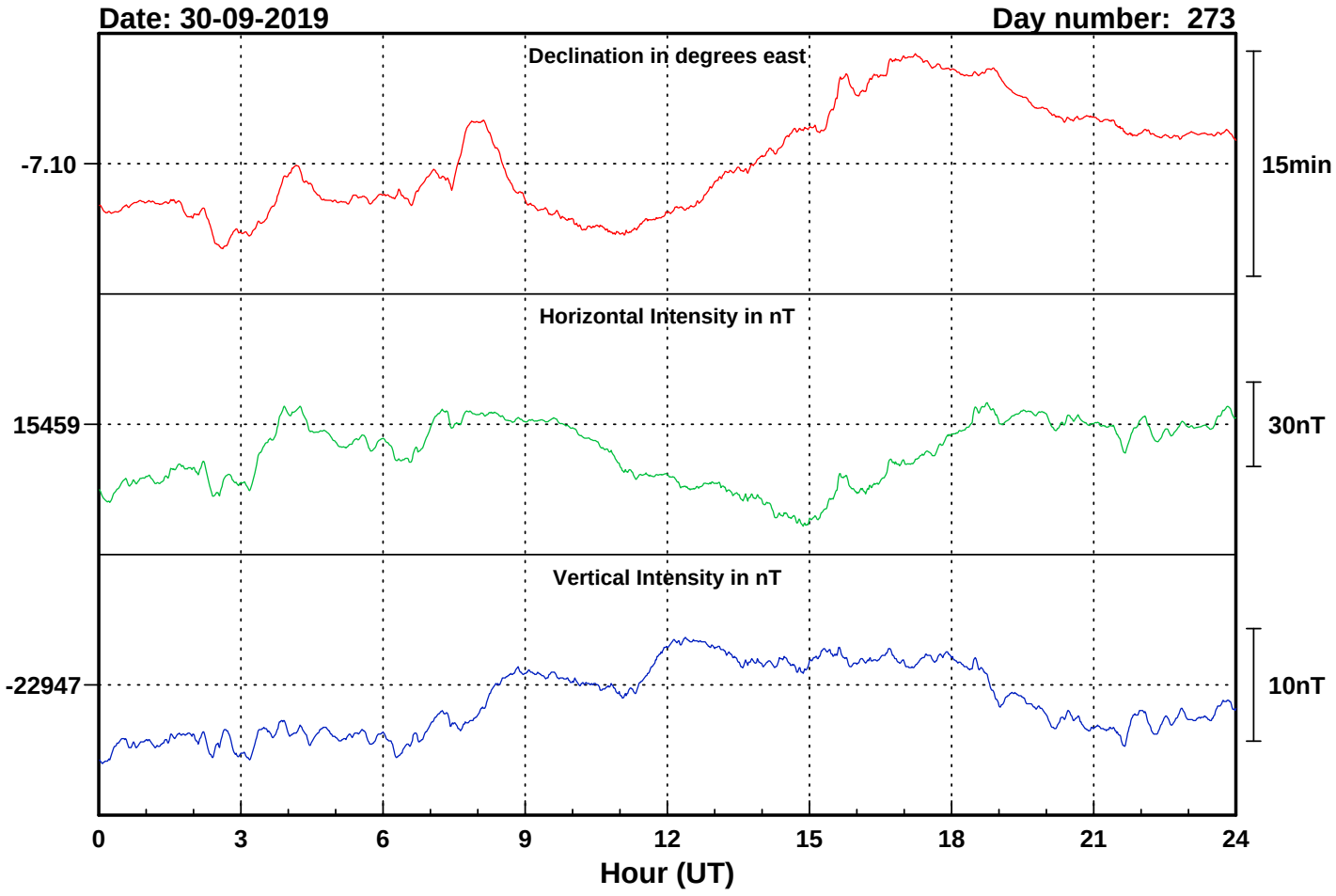

King Edward Point
Date: 25-09-2019
Day number: 268
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
10nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24


Date: 26-09-2019
Day number: 269
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
20nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

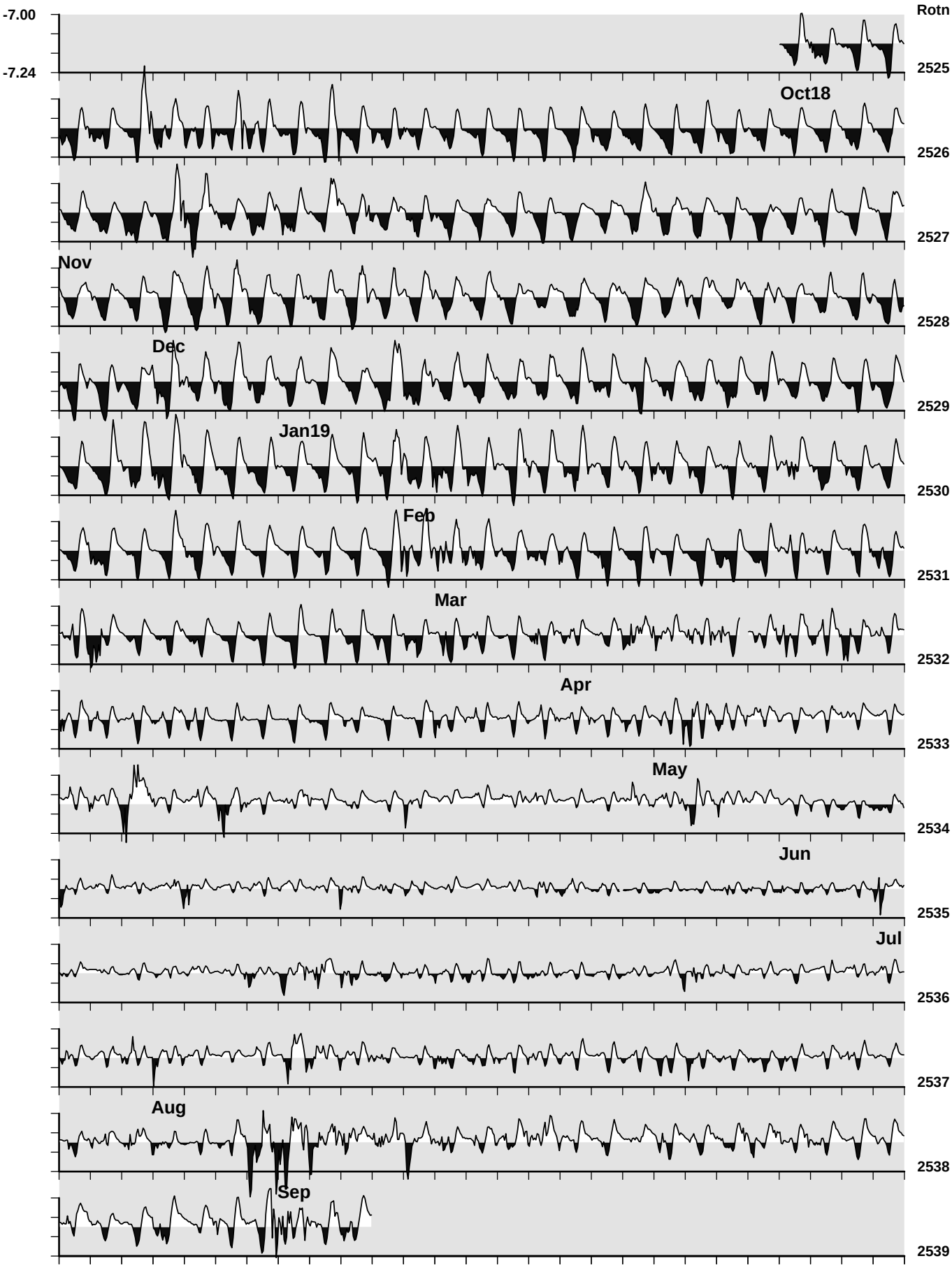

King Edward Point
Date: 27-09-2019
Day number: 270
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
60nT
Vertical Intensity in nT
-22947
20nT
0
3
6
9
12
15
18
21
24


Date: 28-09-2019
Day number: 271
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
40nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

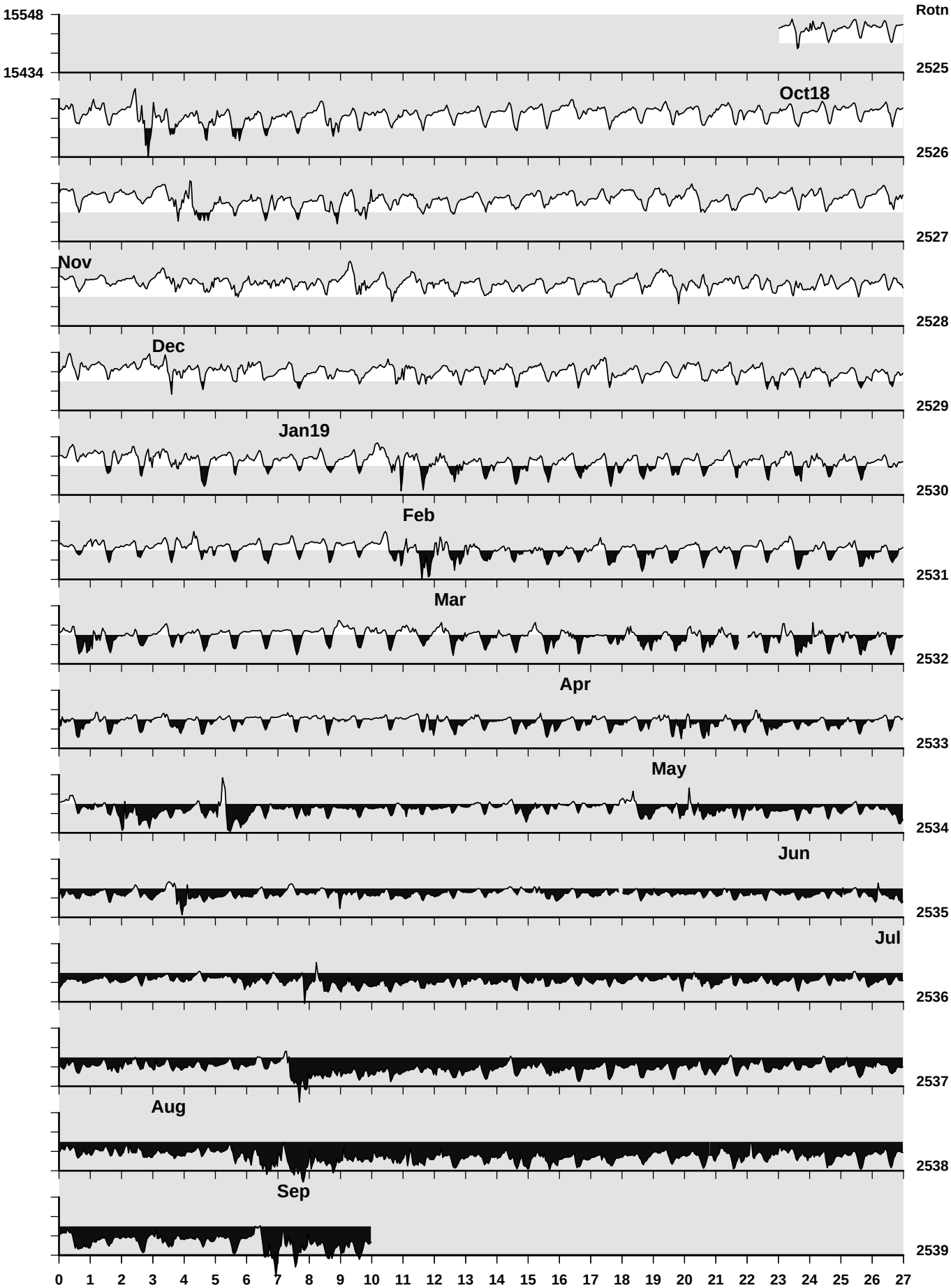

King Edward Point
Date: 29-09-2019
Day number: 272
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24


Date: 30-09-2019
Day number: 273
Declination in degrees east
-7.10
15min
Horizontal Intensity in nT
15459
30nT
Vertical Intensity in nT
-22947
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

# King Edward Point Observatory: Declination (degrees)

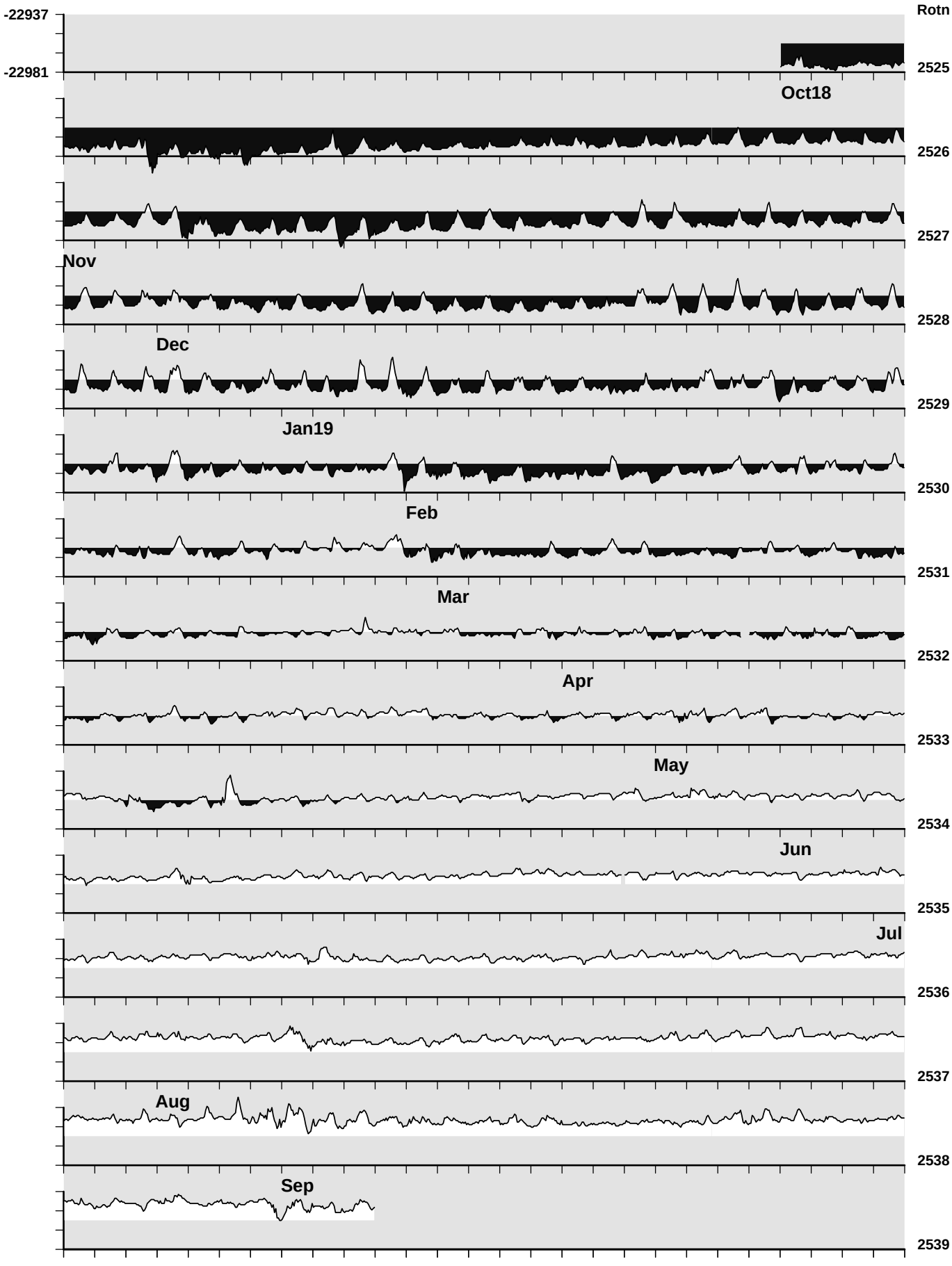


# King Edward Point Observatory: Horizontal Intensity (nT)



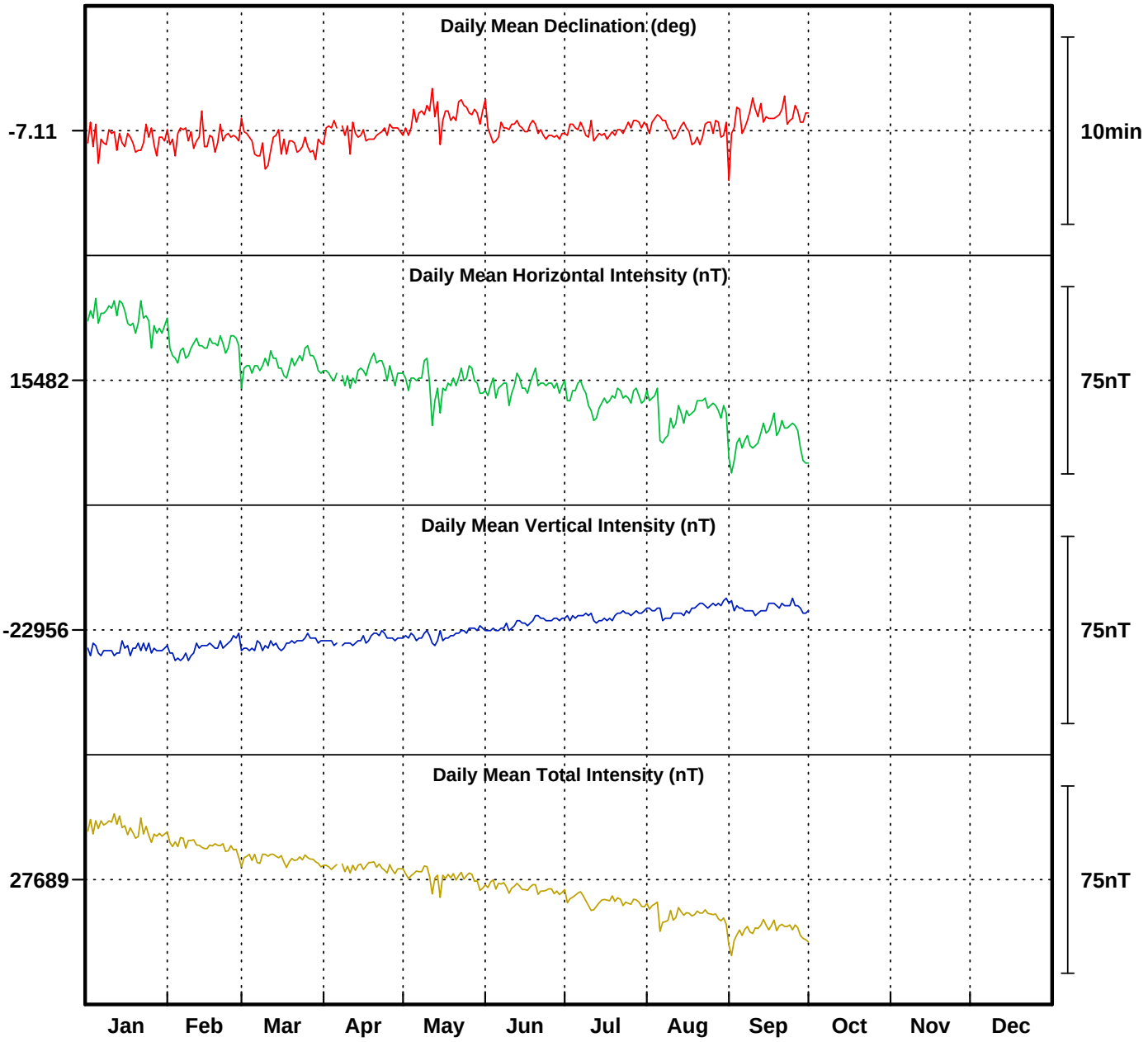

Hourly Mean Values Plotted By Bartels Solar Rotation Number

# King Edward Point Observatory: Vertical Intensity (nT)




Hourly Mean Values Plotted By Bartels Solar Rotation Number

# King Edward Point Observatory 2019



**Monthly Mean Values for King Edward Point Observatory 2019**

| Month | *D* | *H* | *I* | *X* | *Y* | *Z* | *F* |
|---|---|---|---|---|---|---|---|
| January | -7° 07.2′ | 15507 nT | -55° 58.1′ | 15388 nT | -1922 nT | -22963 nT | 27709 nT |
| February | -7° 07.1′ | 15495 nT | -55° 59.4′ | 15376 nT | -1920 nT | -22963 nT | 27702 nT |
| March | -7° 07.6′ | 15489 nT | -55° 59.9′ | 15369 nT | -1921 nT | -22961 nT | 27697 nT |
| April | -7° 06.8′ | 15485 nT | -56° 00.1′ | 15366 nT | -1918 nT | -22959 nT | 27694 nT |
| May | -7° 05.8′ | 15481 nT | -56° 00.4′ | 15362 nT | -1913 nT | -22958 nT | 27690 nT |
| June | -7° 06.8′ | 15480 nT | -56° 00.2′ | 15361 nT | -1917 nT | -22953 nT | 27685 nT |
| July | -7° 06.7′ | 15475 nT | -56° 00.5′ | 15356 nT | -1916 nT | -22950 nT | 27680 nT |
| August | -7° 06.7′ | 15469 nT | -56° 01.0′ | 15350 nT | -1915 nT | -22947 nT | 27674 nT |
| September | -7° 06.0′ | 15459 nT | -56° 02.0′ | 15340 nT | -1911 nT | -22947 nT | 27668 nT |

Note

i. The values shown here are provisional.