

**BRITISH GEOLOGICAL SURVEY**

# King Edward Point

## Observatory

# Monthly Magnetic Bulletin

**February 2016**

**16/02/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](http://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:*  $54^{\circ} 16' 55.7'' S$   $323^{\circ} 30' 25.6'' E$   
*Geomagnetic:*  $46^{\circ} 09' 47'' S$   $029^{\circ} 50' 42'' E$   
*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](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 0.1 Hz.

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](http://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](http://www.geomag.bgs.ac.uk/contactus/staff)



# King Edward Point 2016

Declination : Absolute - Variometer (markers) and Baseline Applied (line)

-7.04

5min

Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)

15998

20nT

Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)

-23199

20nT

Total Intensity : Absolute (Proton F) - Baseline Adjusted Variometer (derived F)

-12.3

20nT

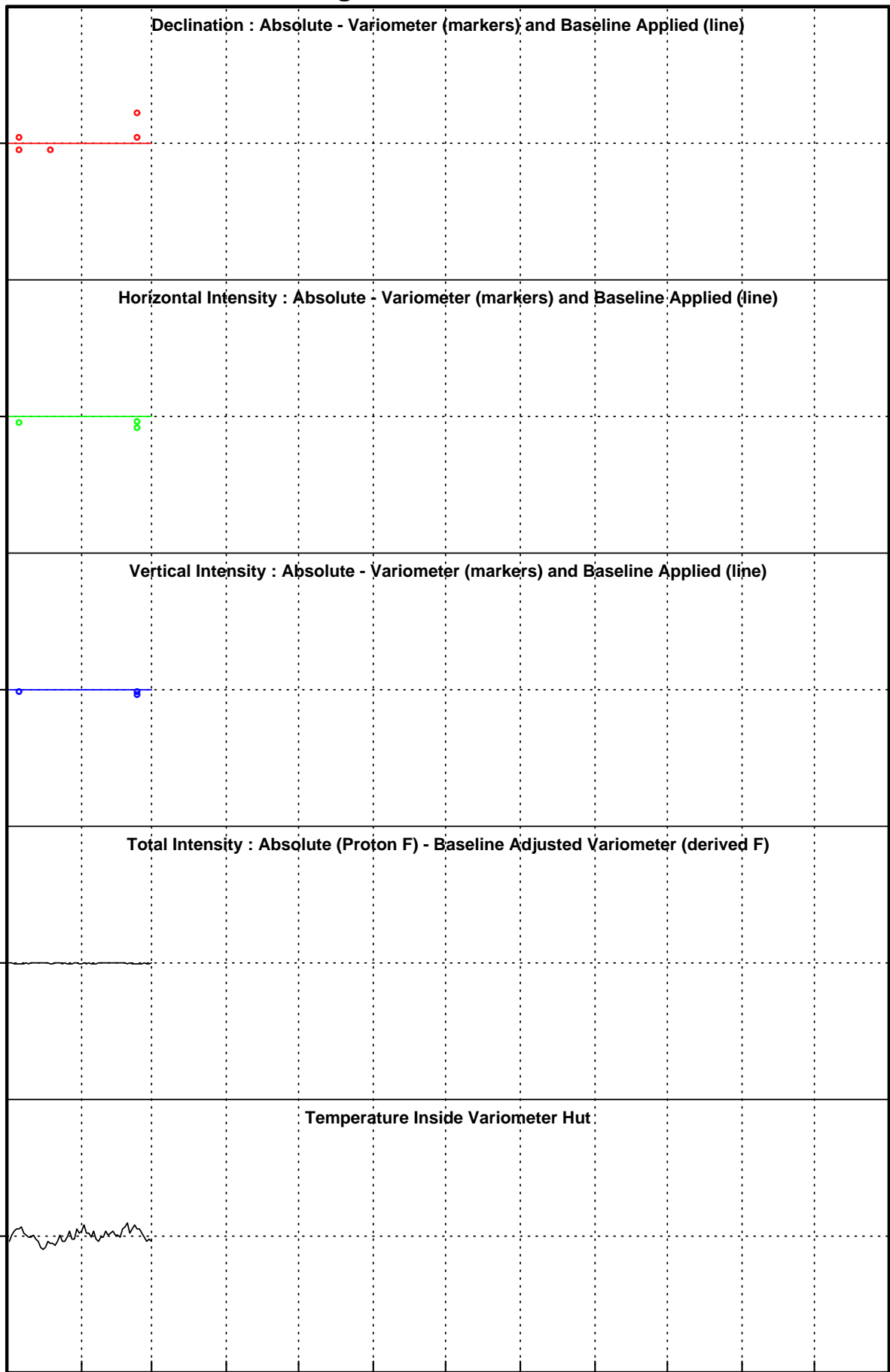
Temperature Inside Variometer Hut

8.8

10°C

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

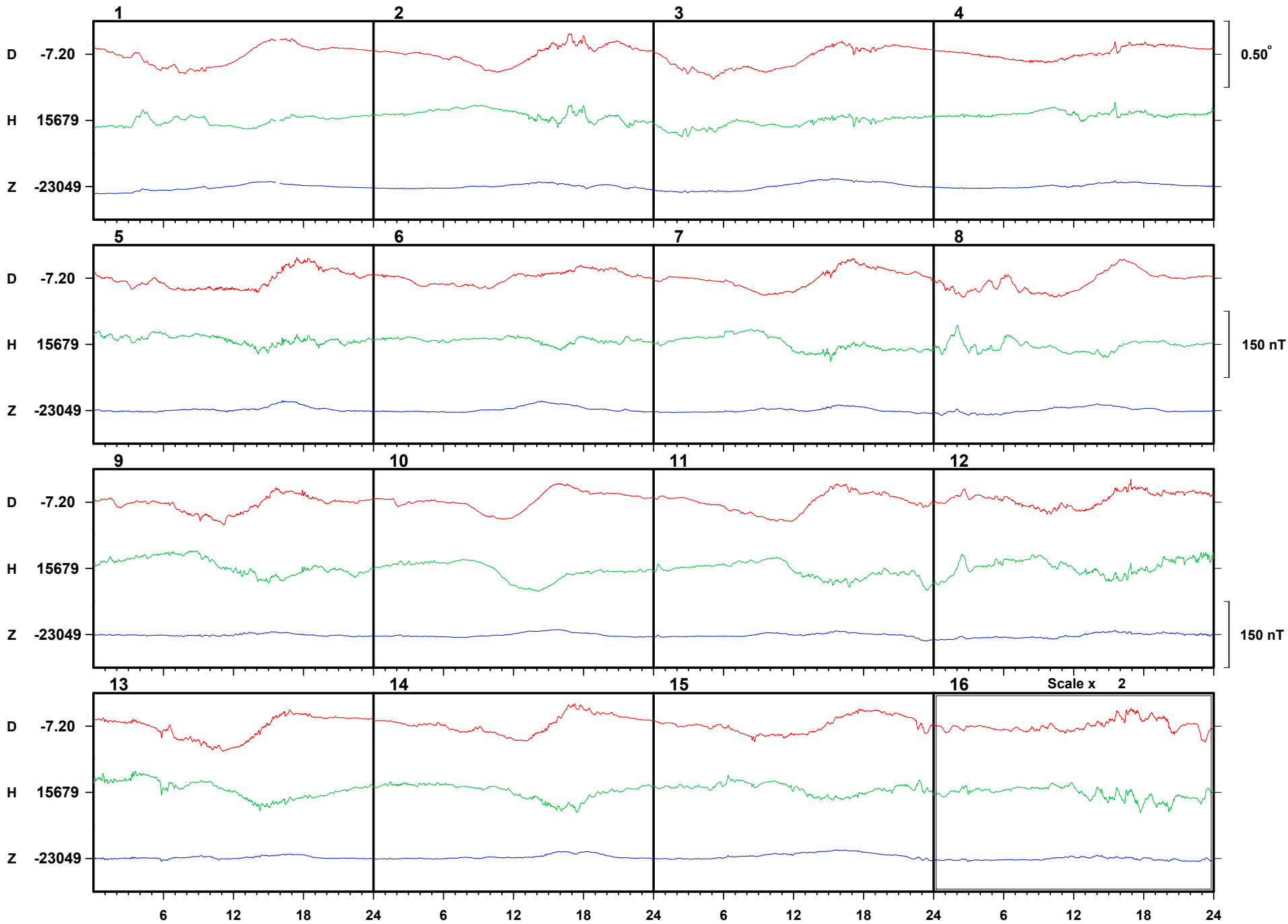
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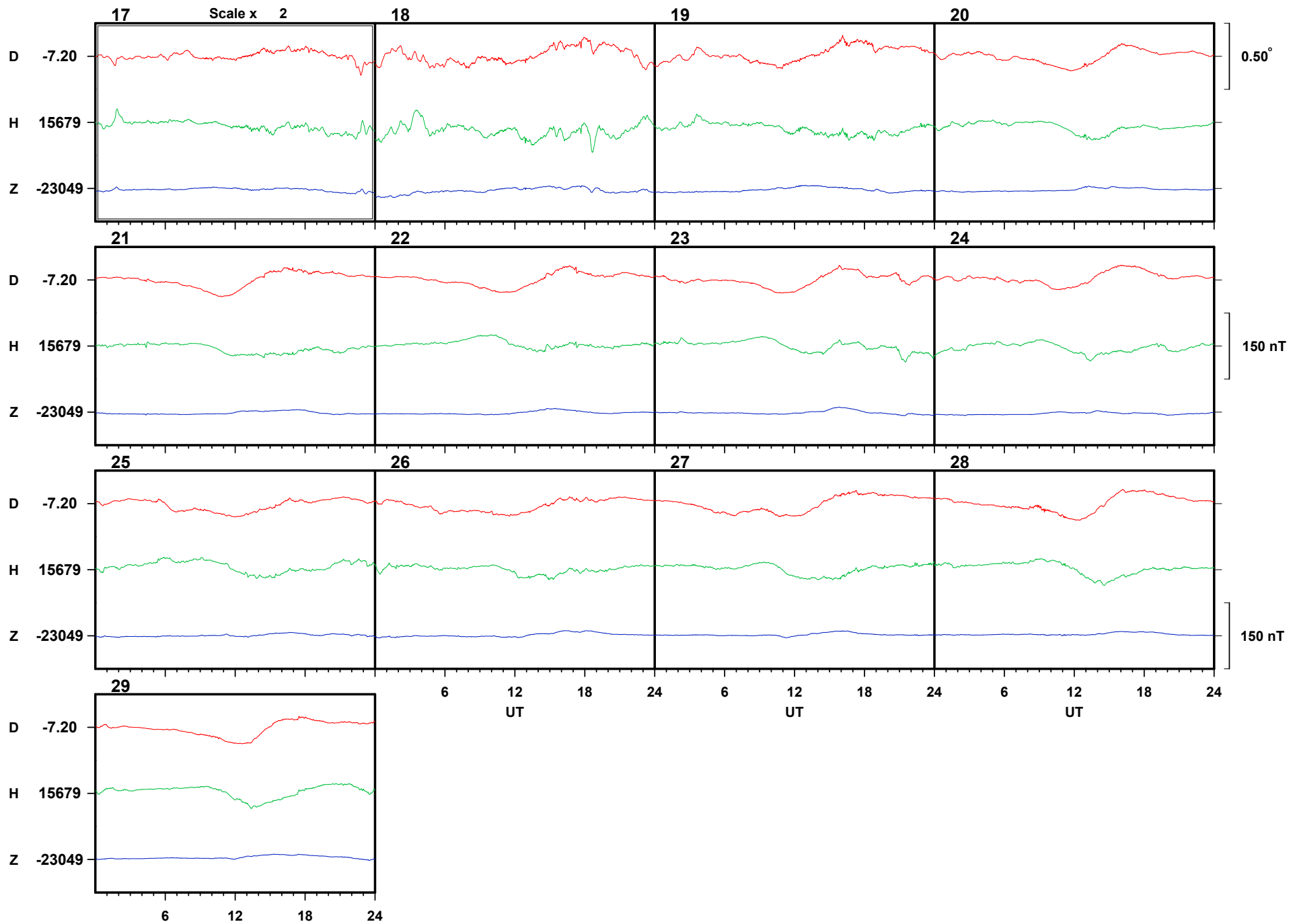


King Edward Point

February

2016





King Edward Point

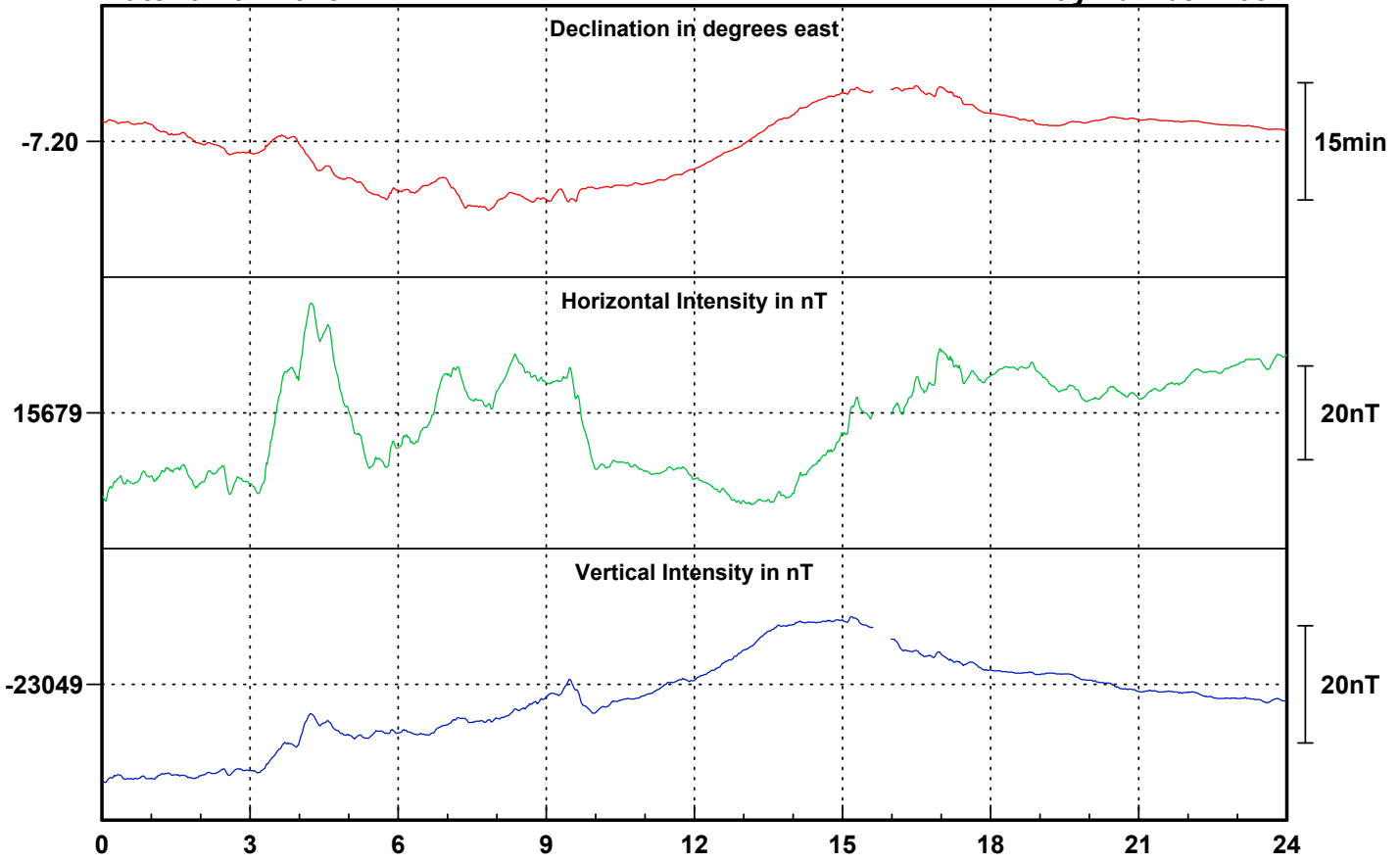
February

2016

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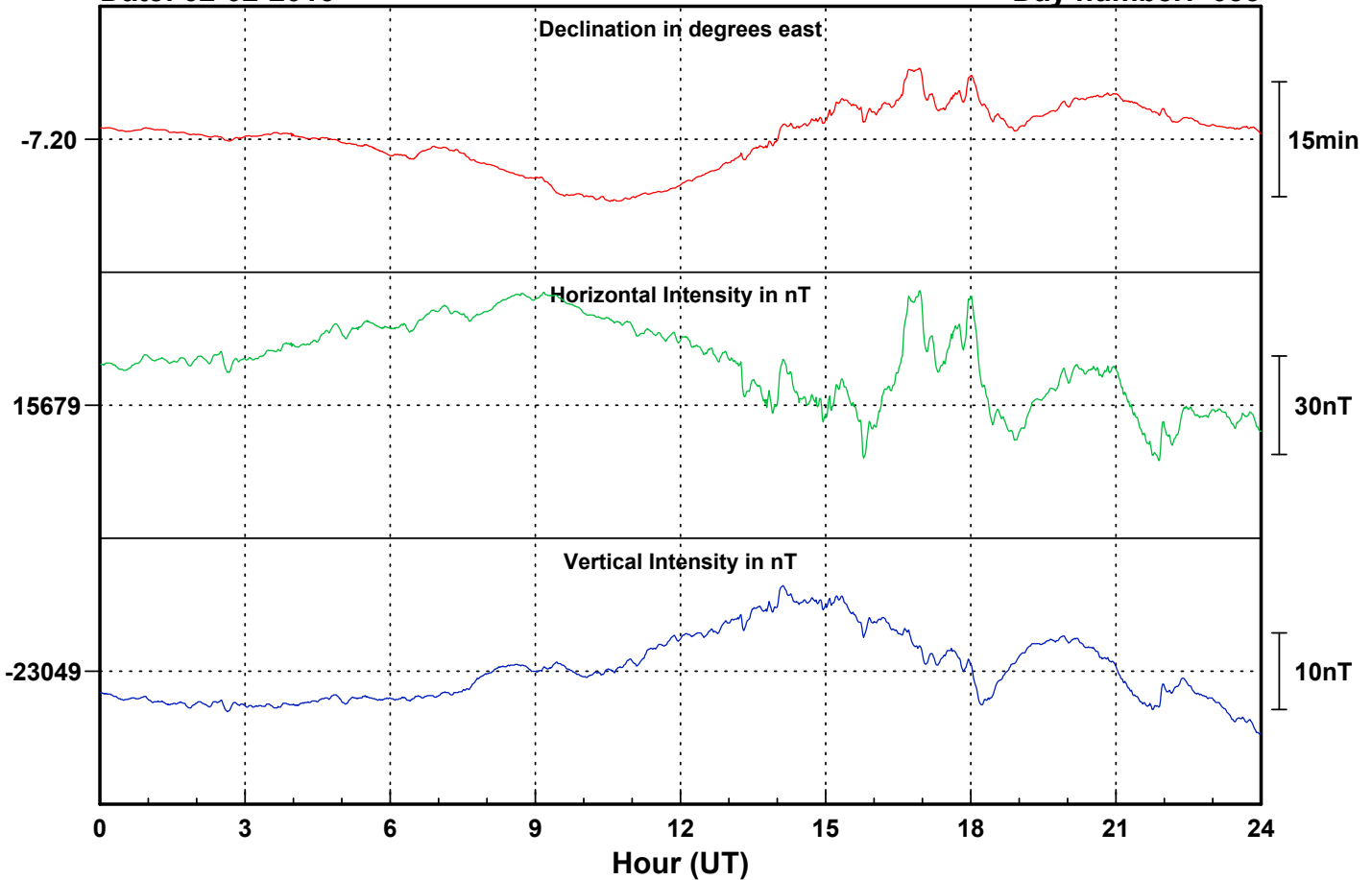
# King Edward Point

Day number: 032



Date: 02-02-2016

Day number: 033

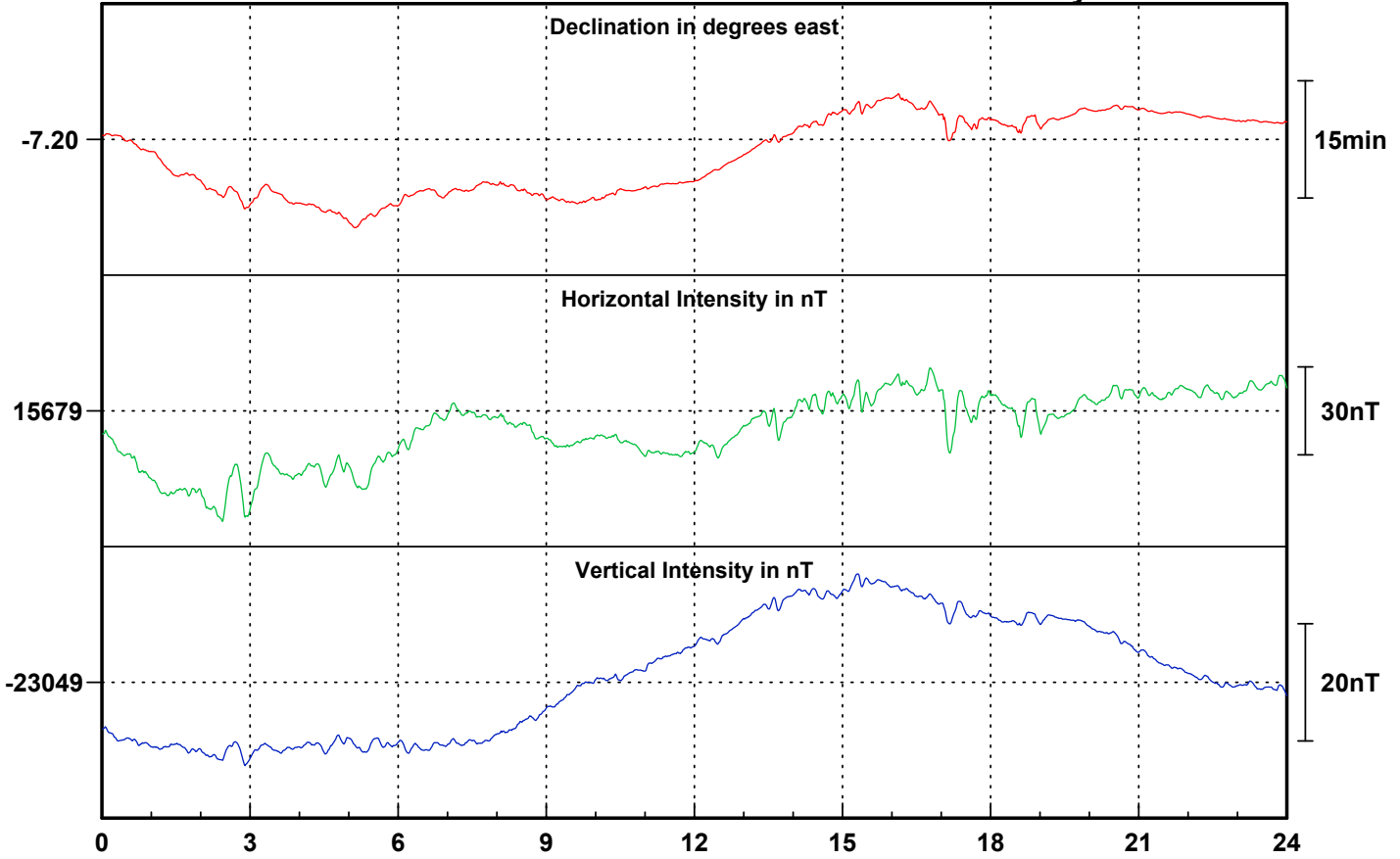




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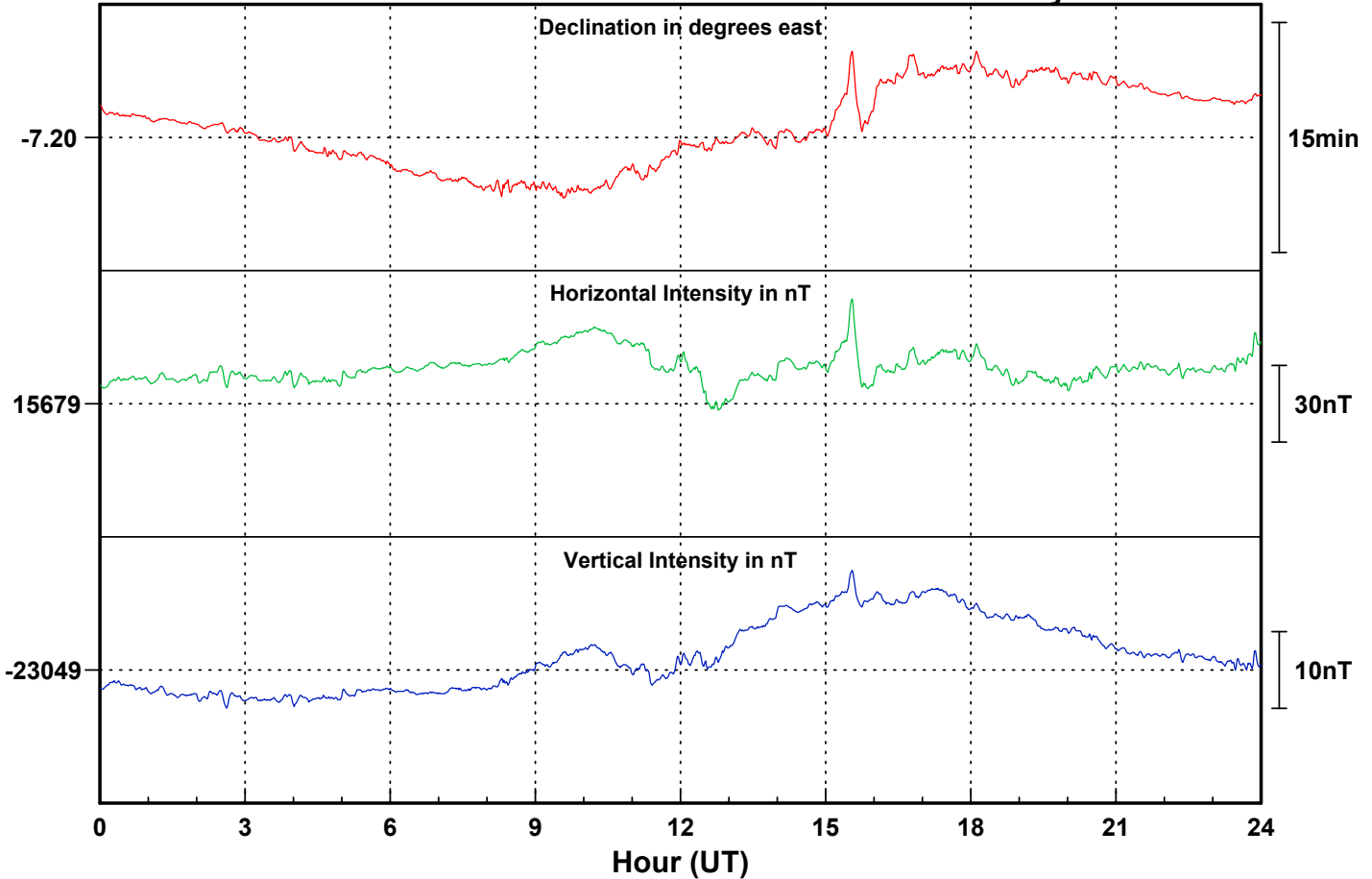
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Date: 04-02-2016

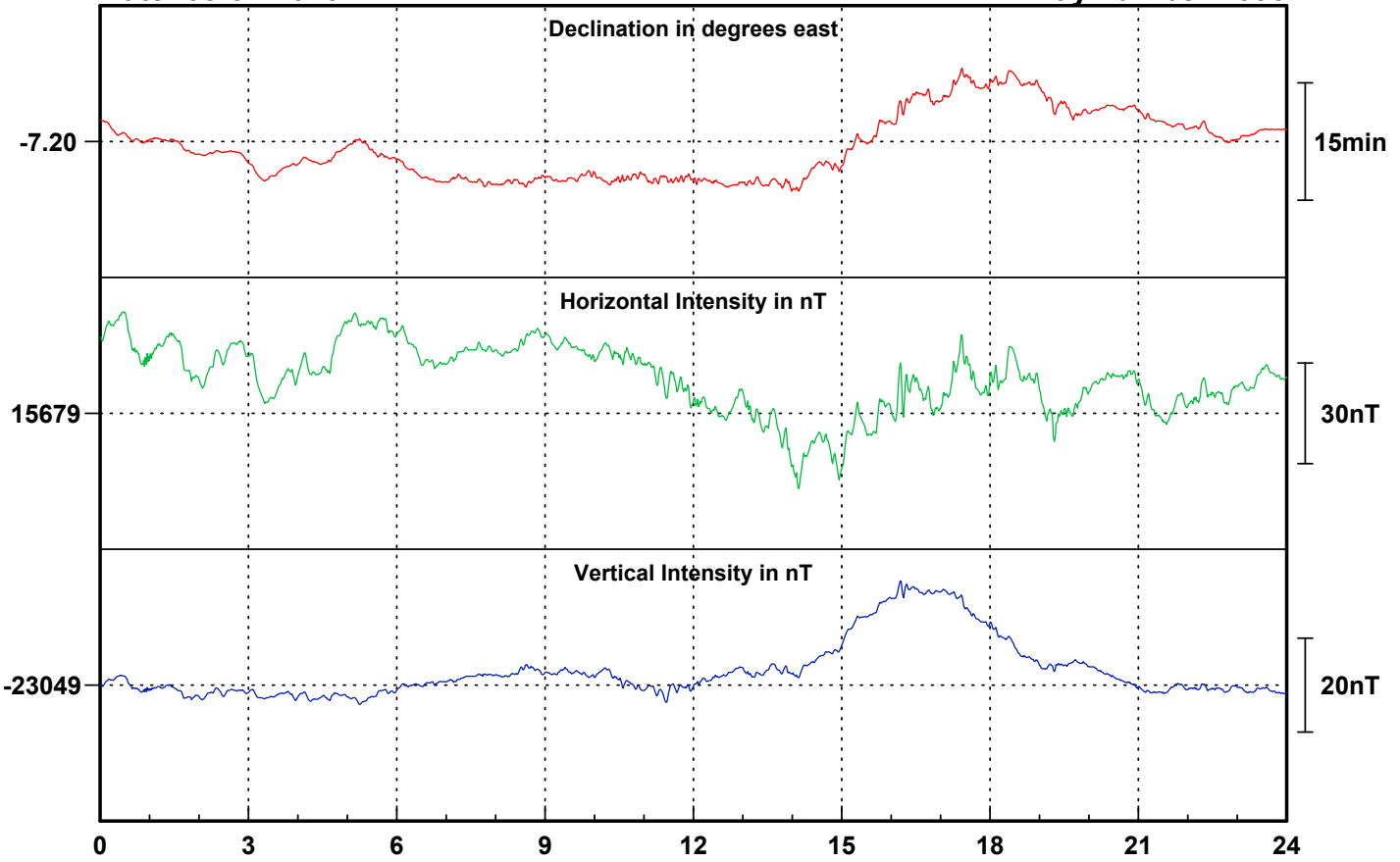
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Date: 05-02-2016

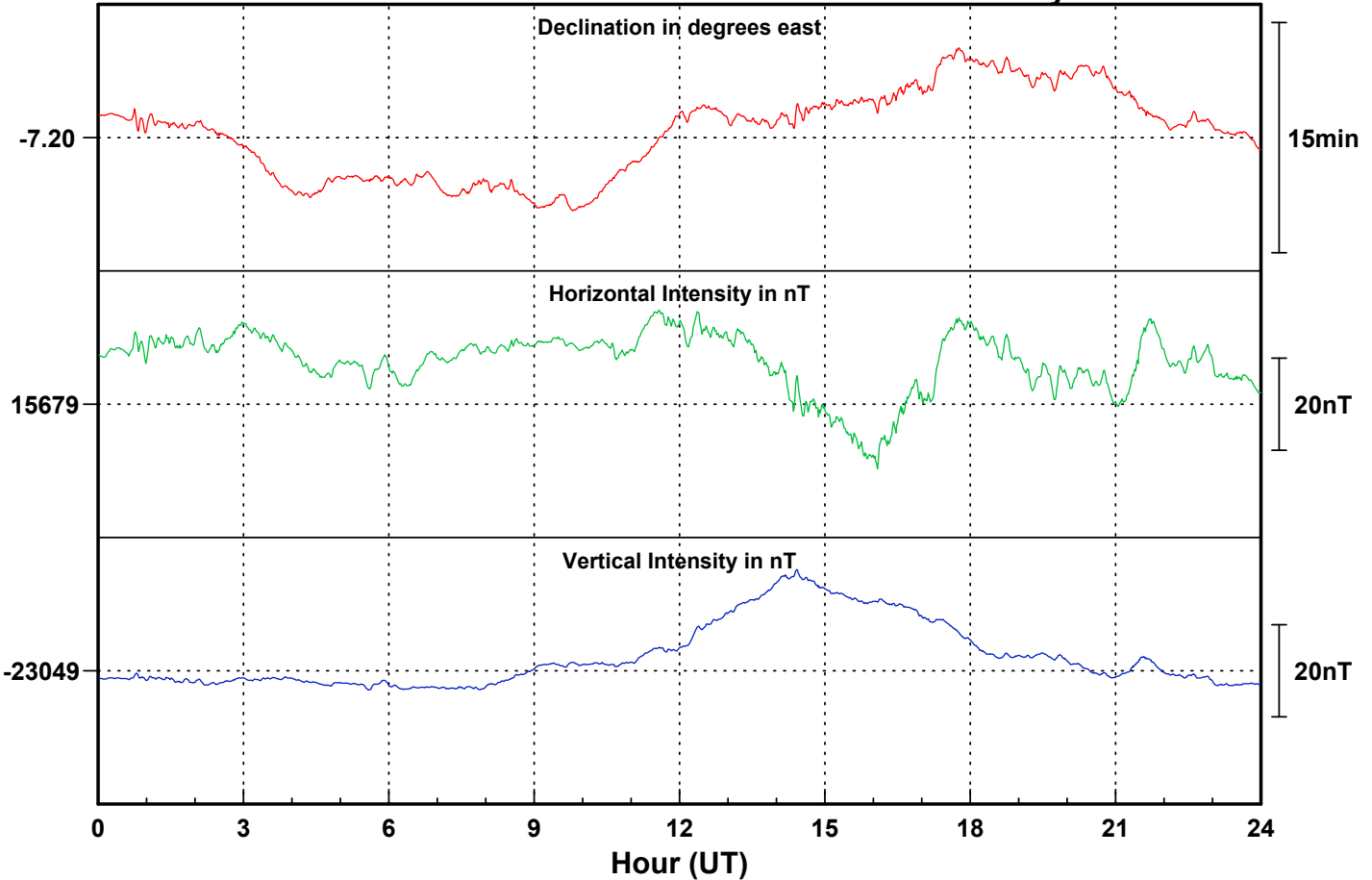
# King Edward Point

Day number: 036



Date: 06-02-2016

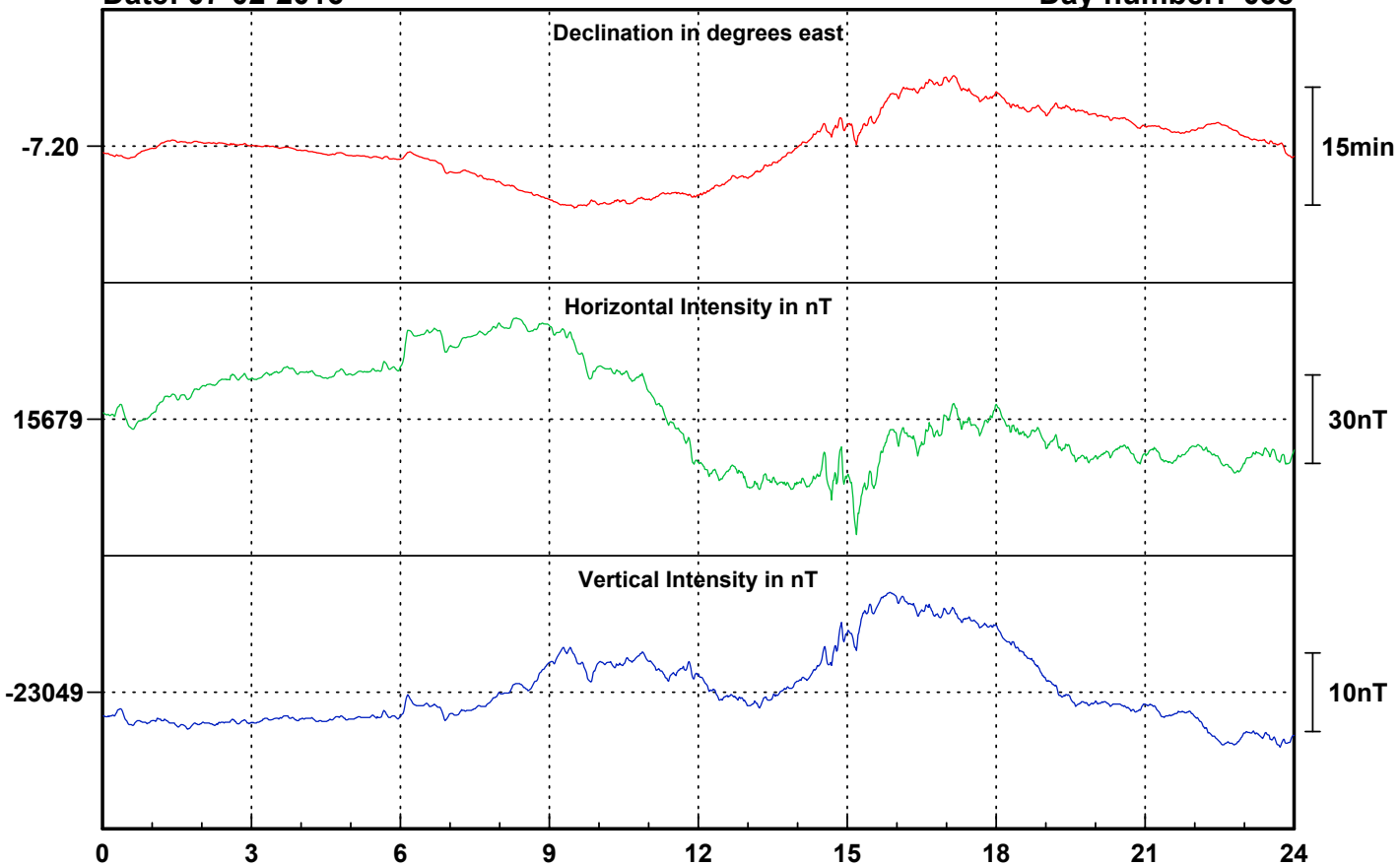
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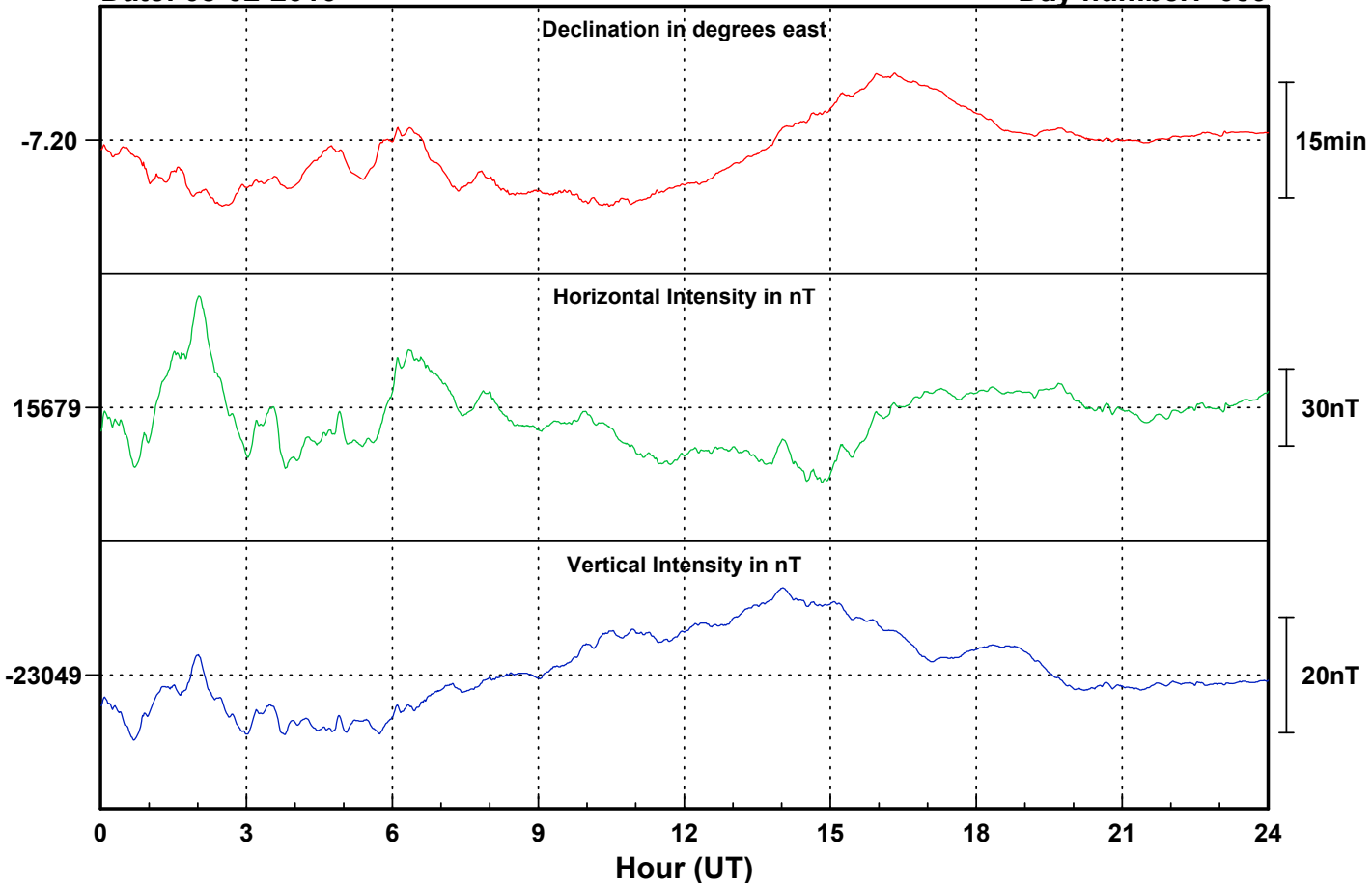
# King Edward Point

Day number: 038



Date: 08-02-2016

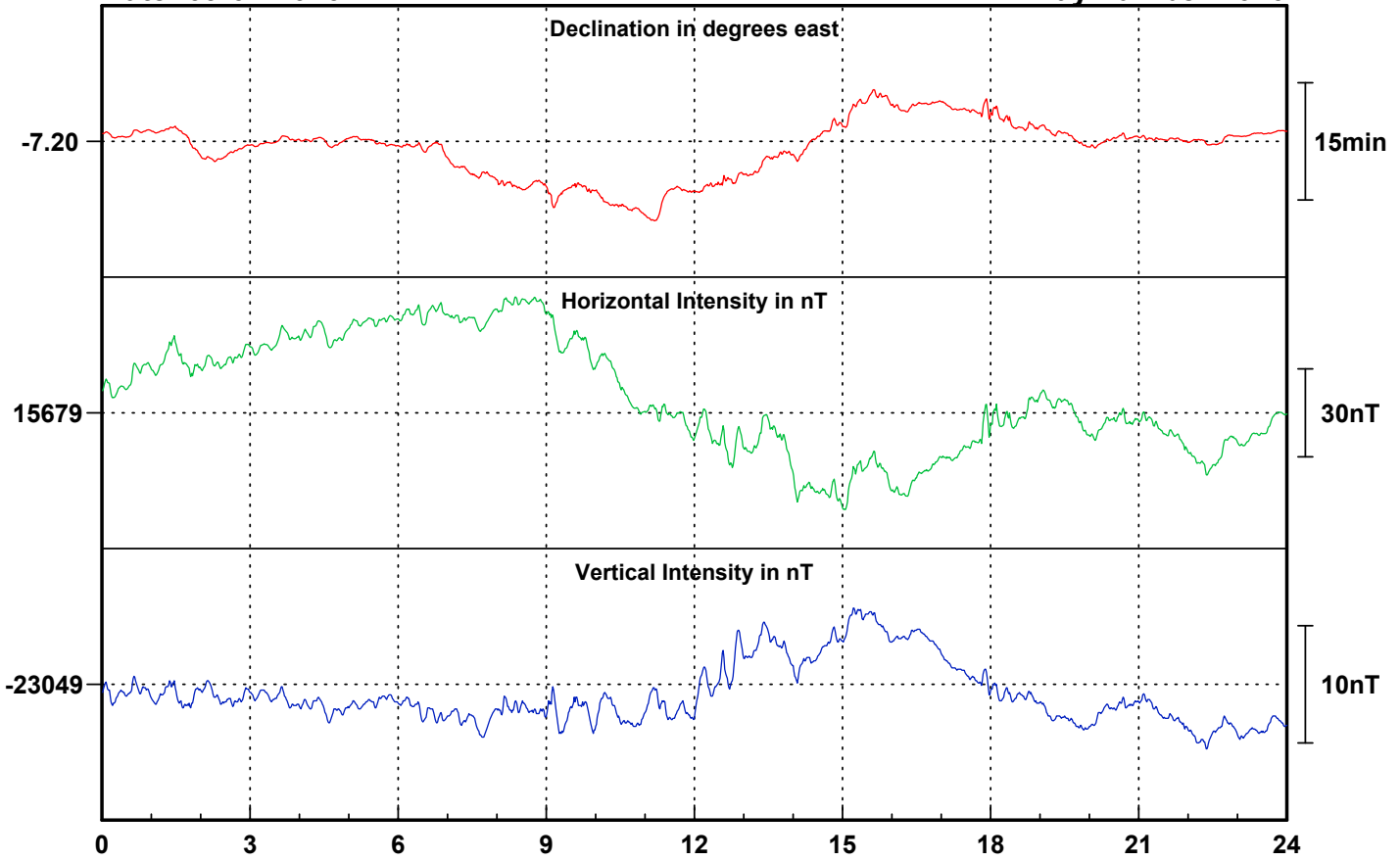
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Date: 09-02-2016

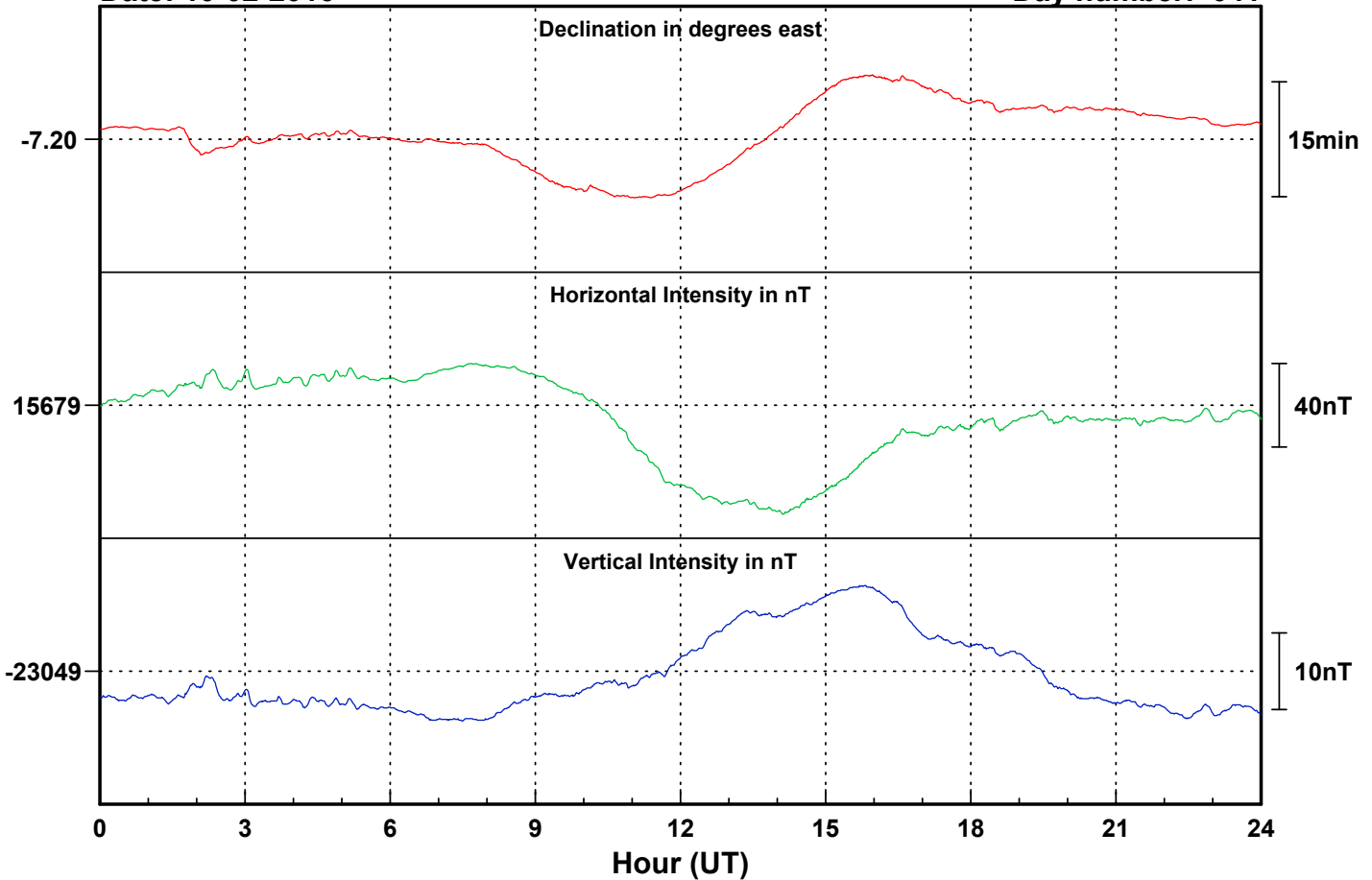
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Day number: 040



Date: 10-02-2016

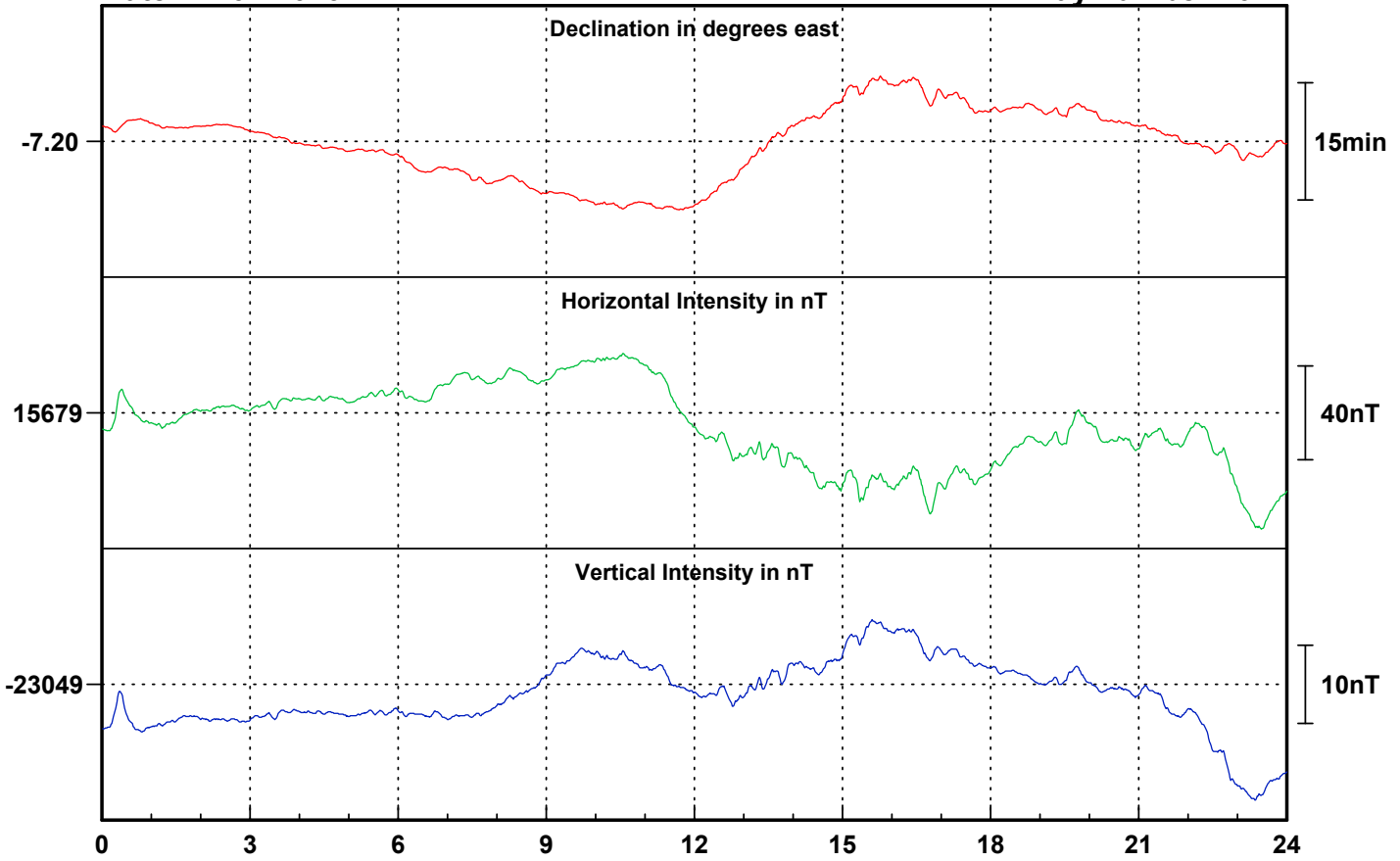
Day number: 041



Date: 11-02-2016

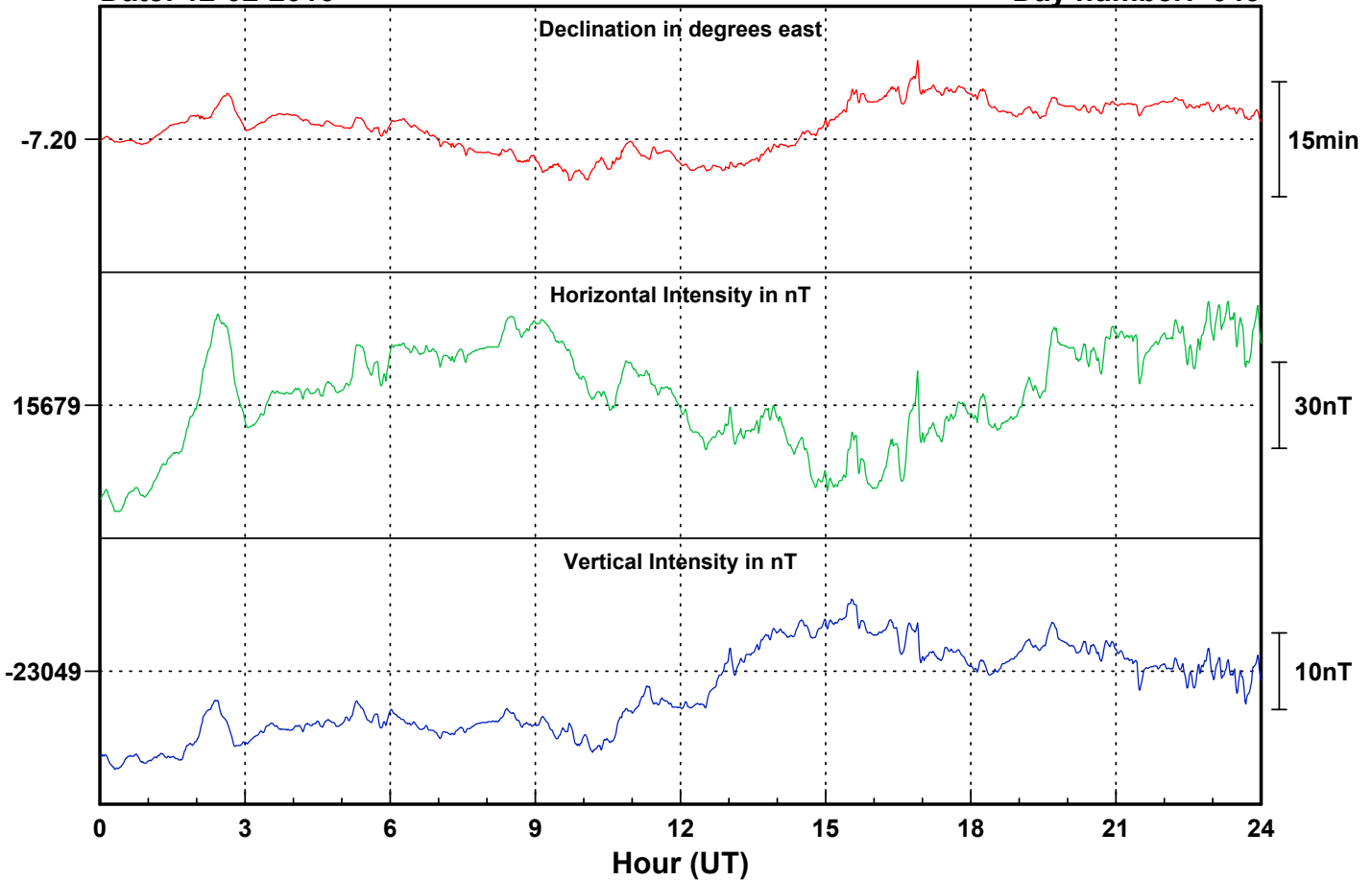
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Day number: 042



Date: 12-02-2016

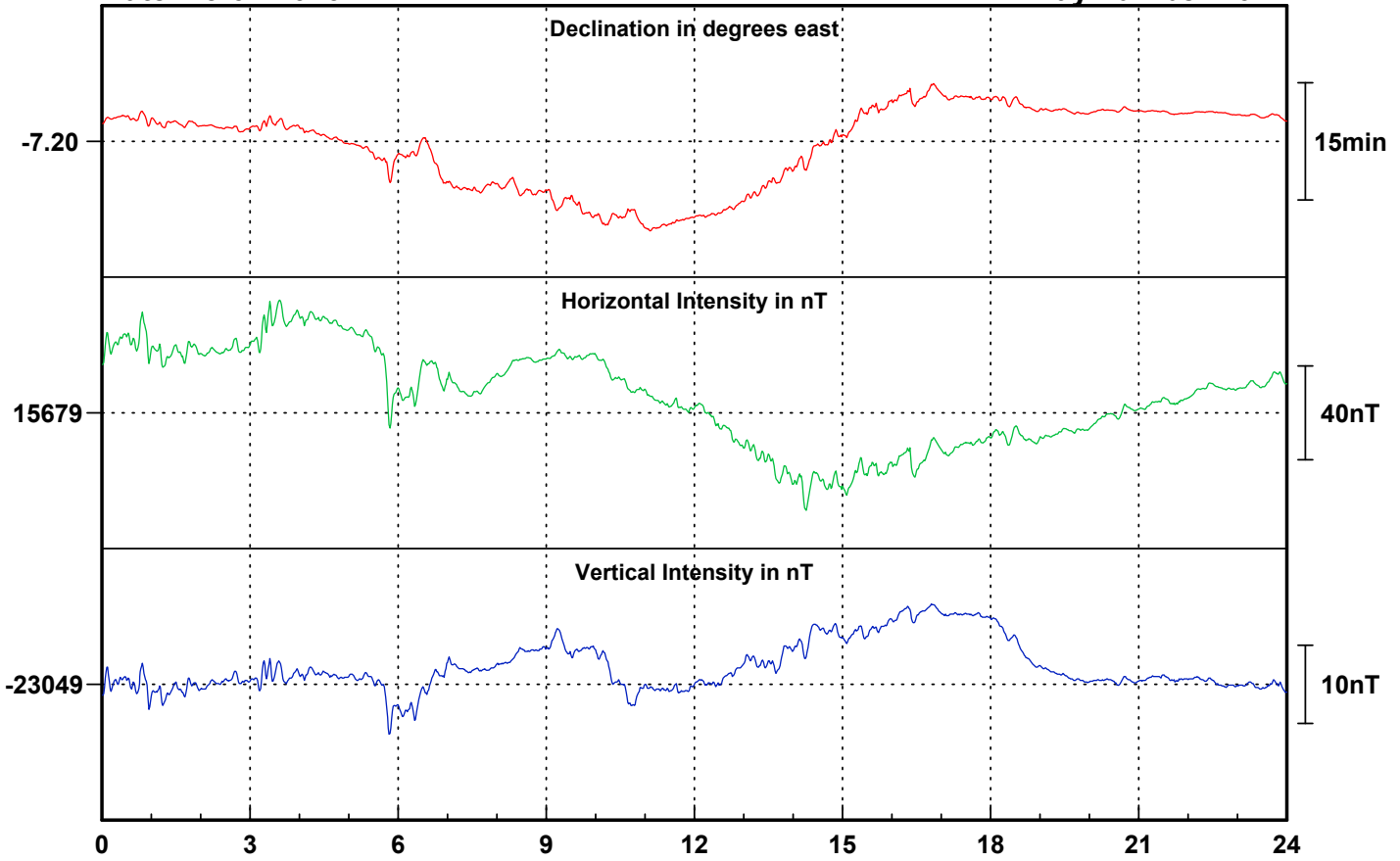
Day number: 043



Date: 13-02-2016

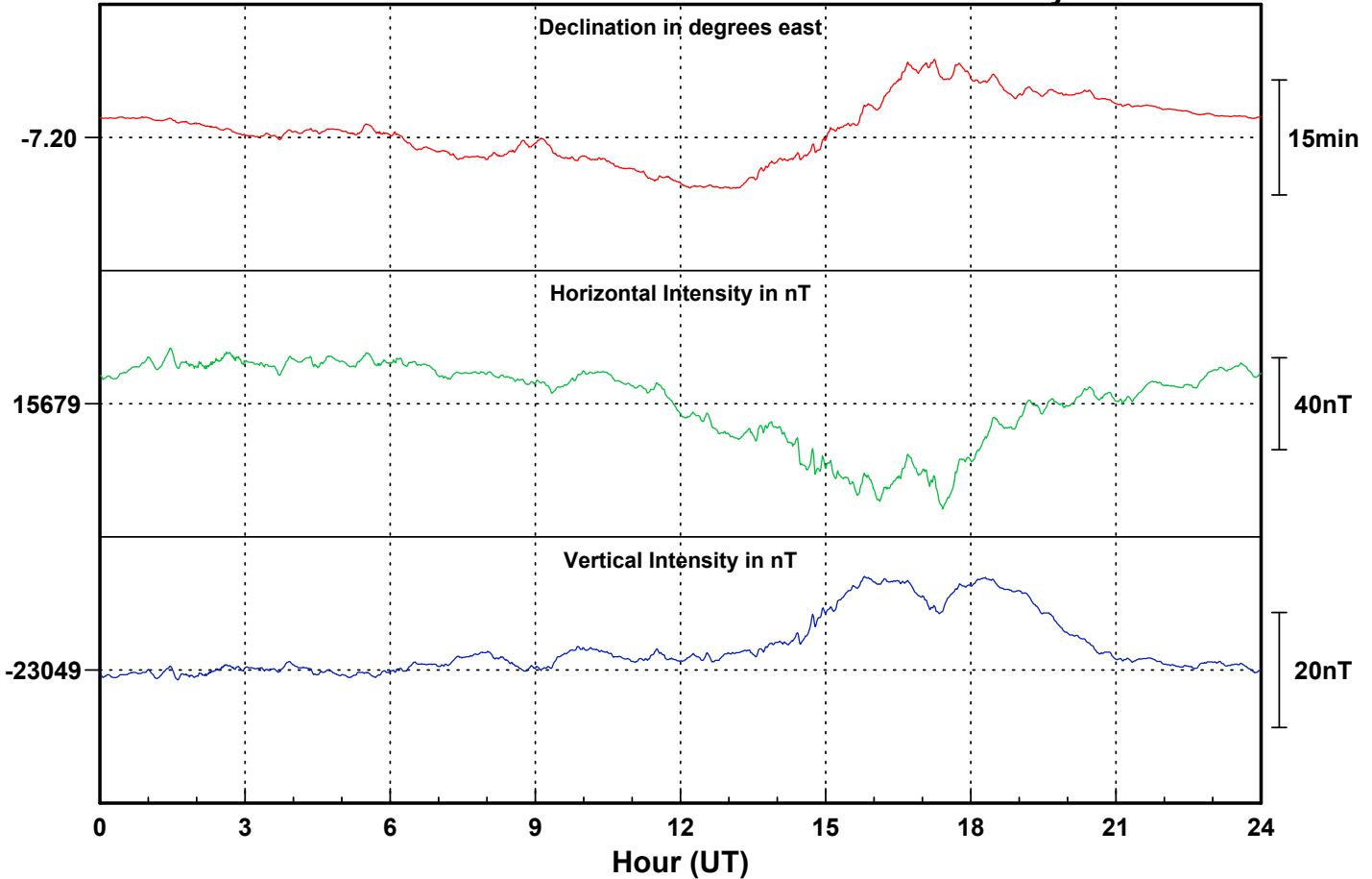
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Day number: 044



Date: 14-02-2016

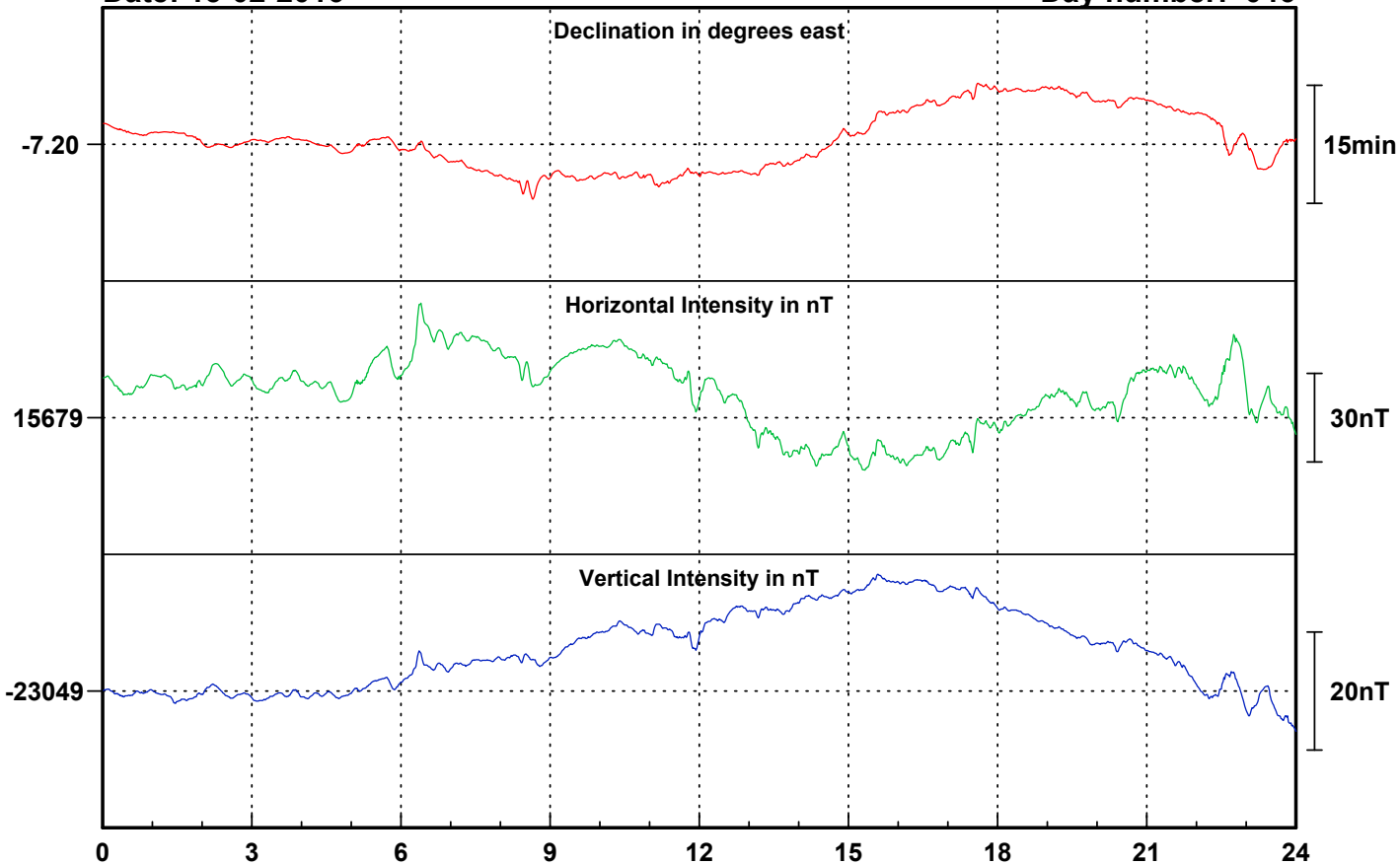
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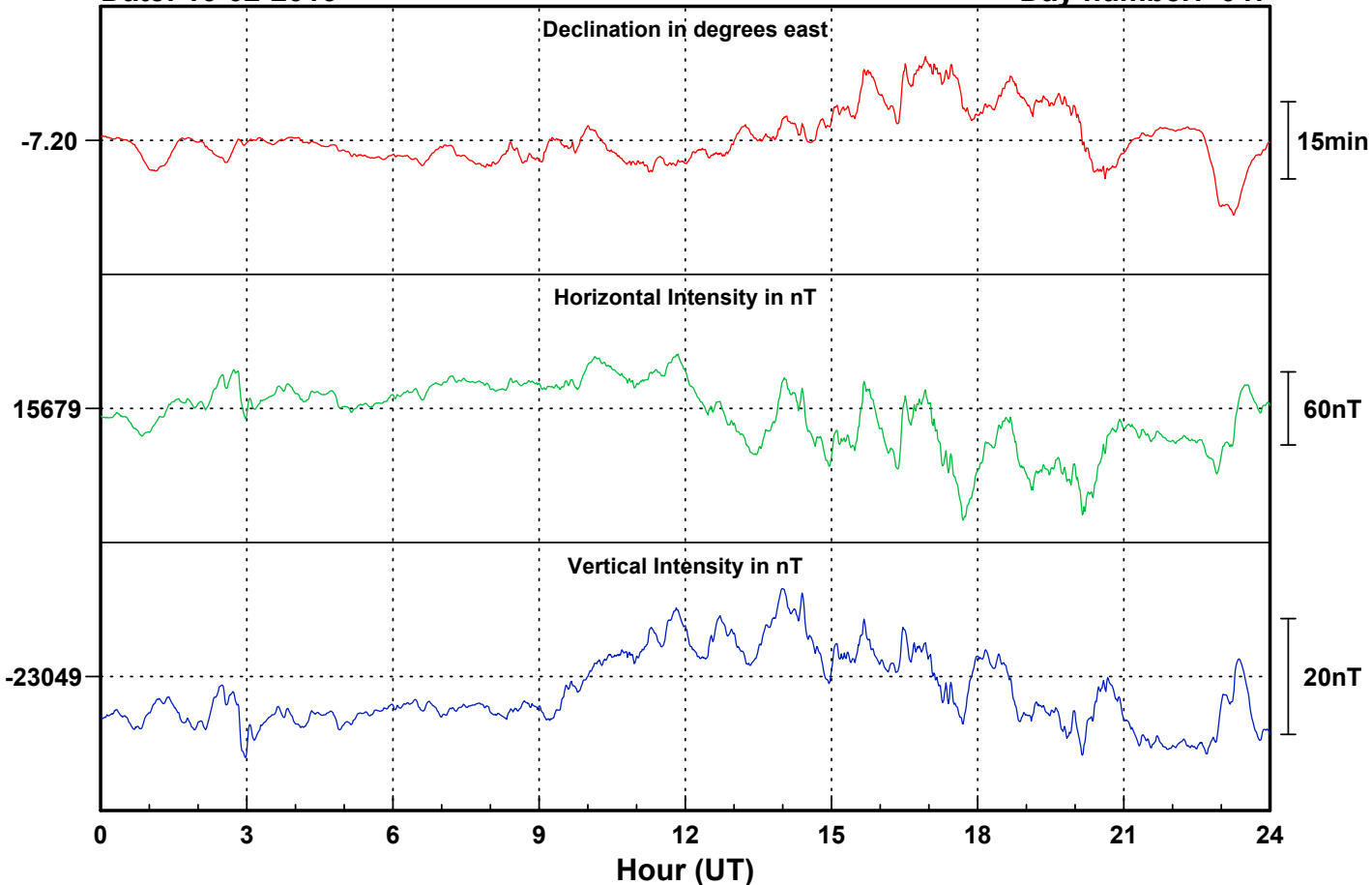
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Day number: 046



Date: 16-02-2016

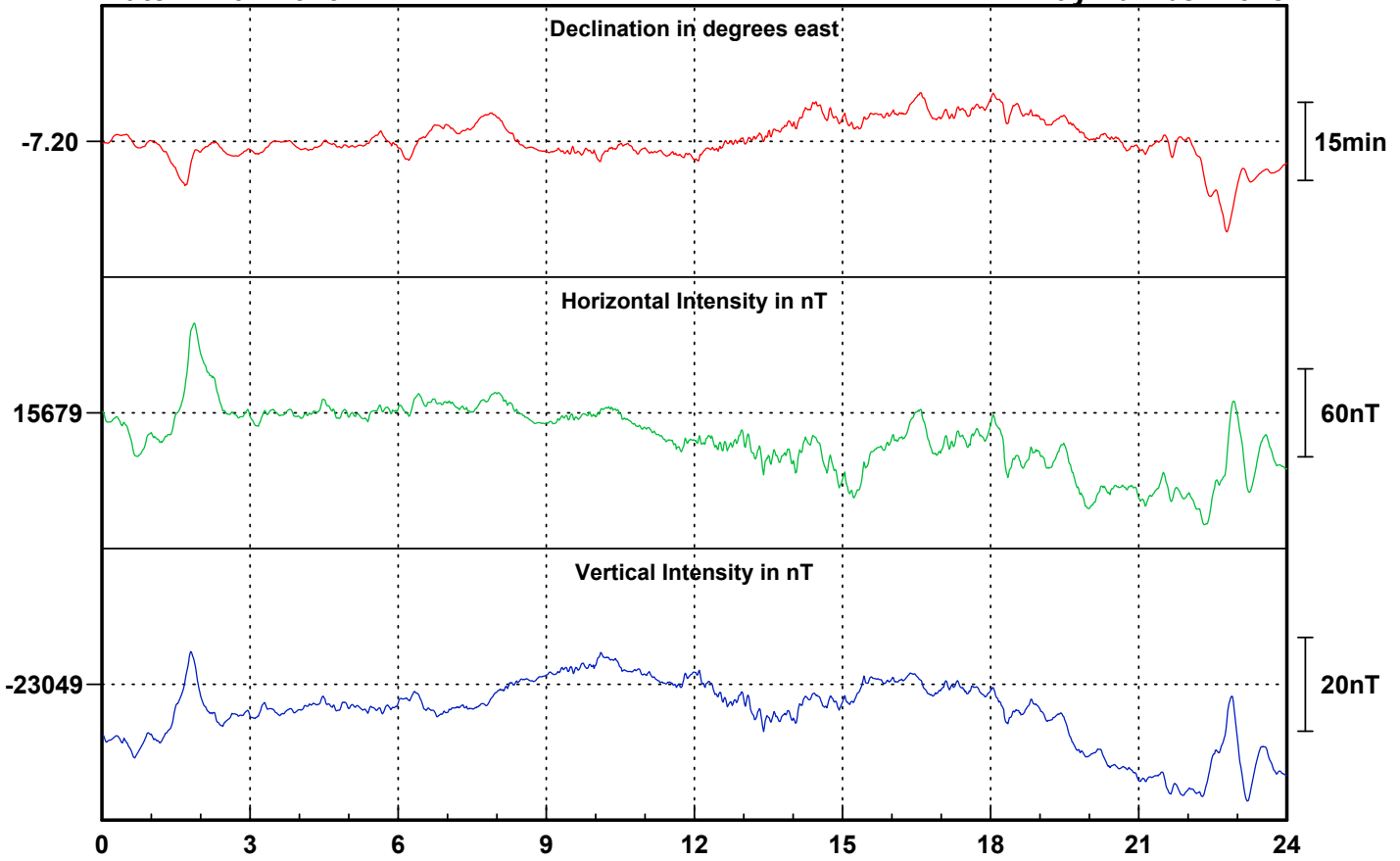
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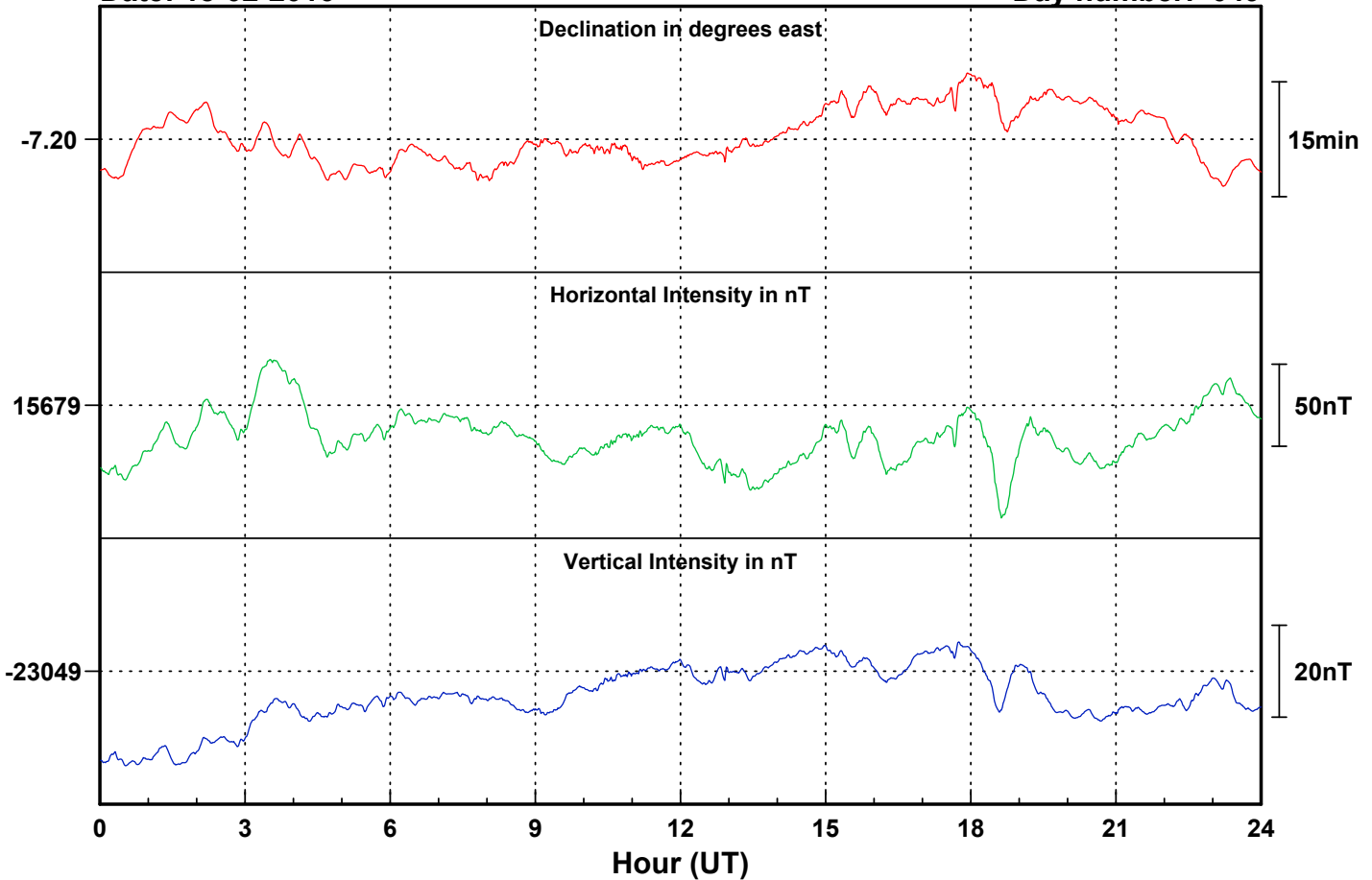
# King Edward Point

Day number: 048



Date: 18-02-2016

Day number: 049

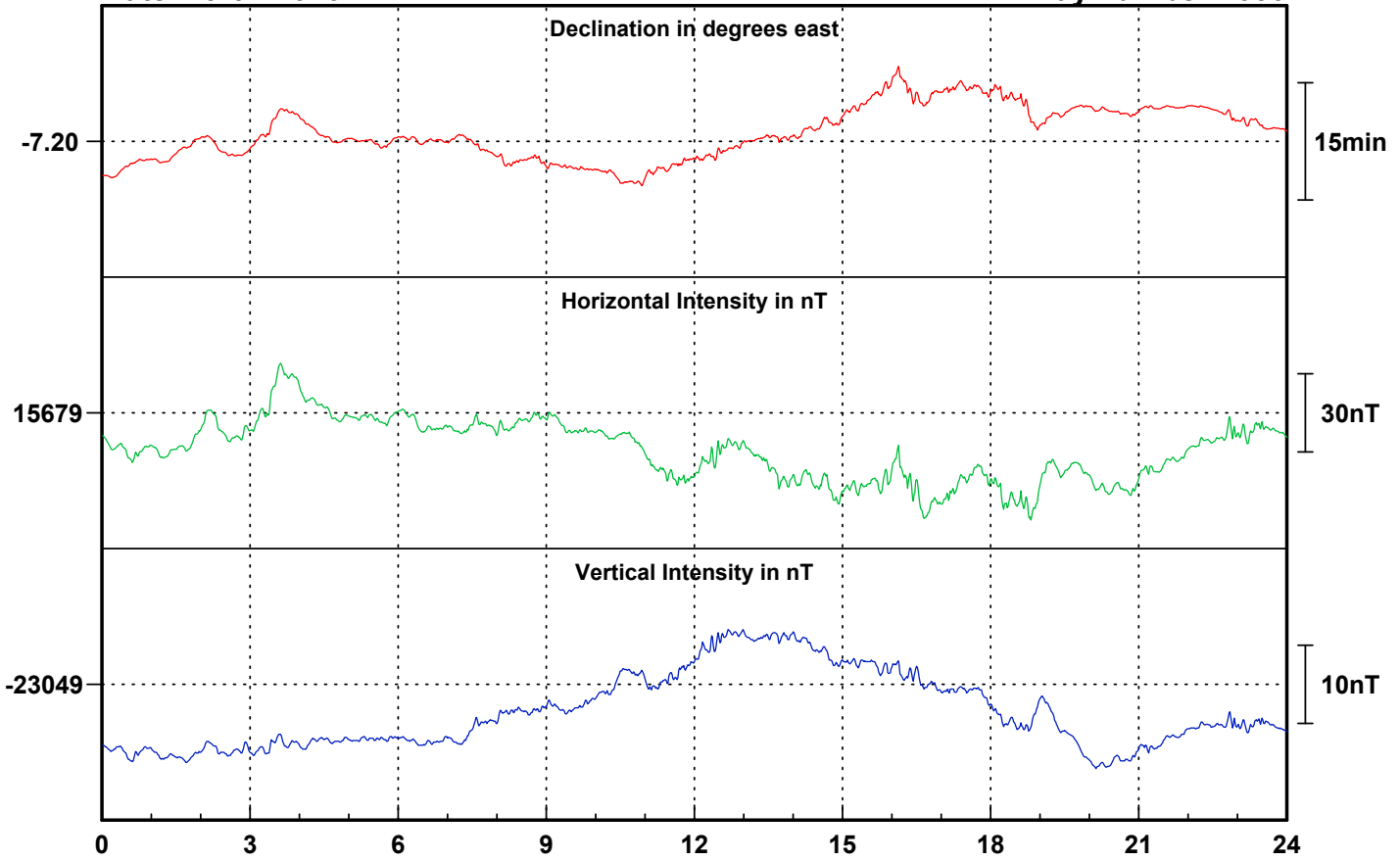




Date: 19-02-2016

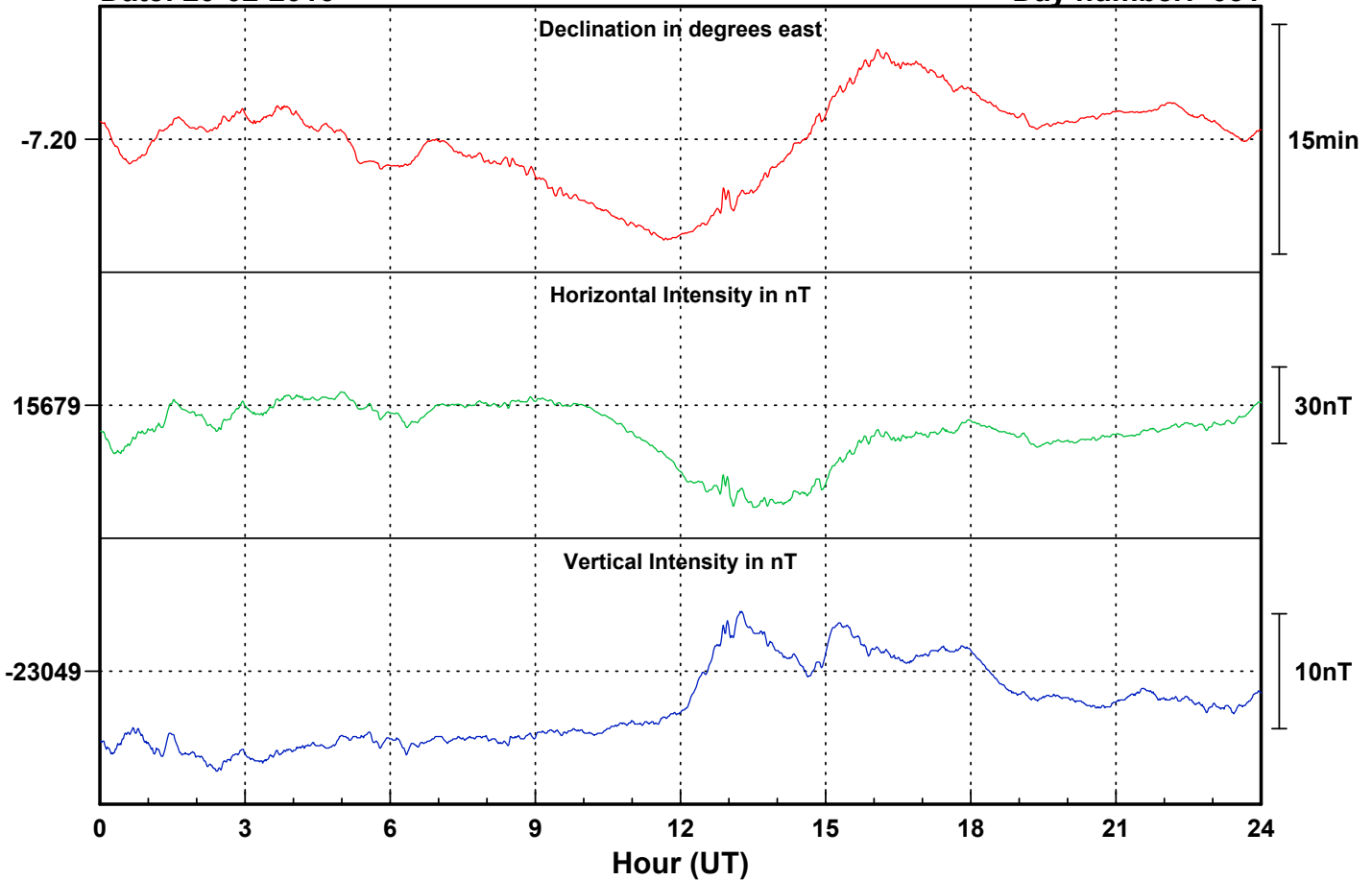
# King Edward Point

Day number: 050



Date: 20-02-2016

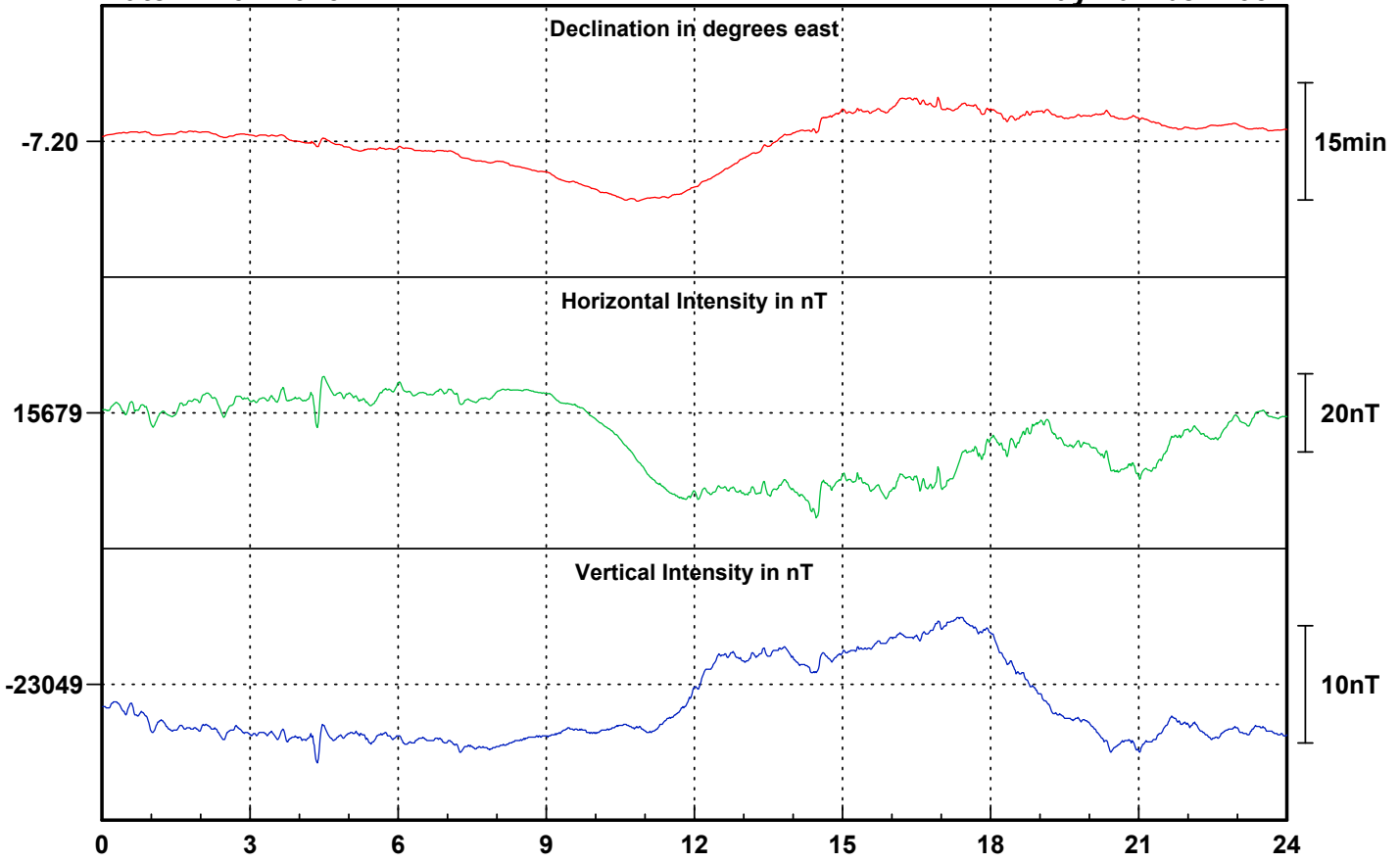
Day number: 051



Date: 21-02-2016

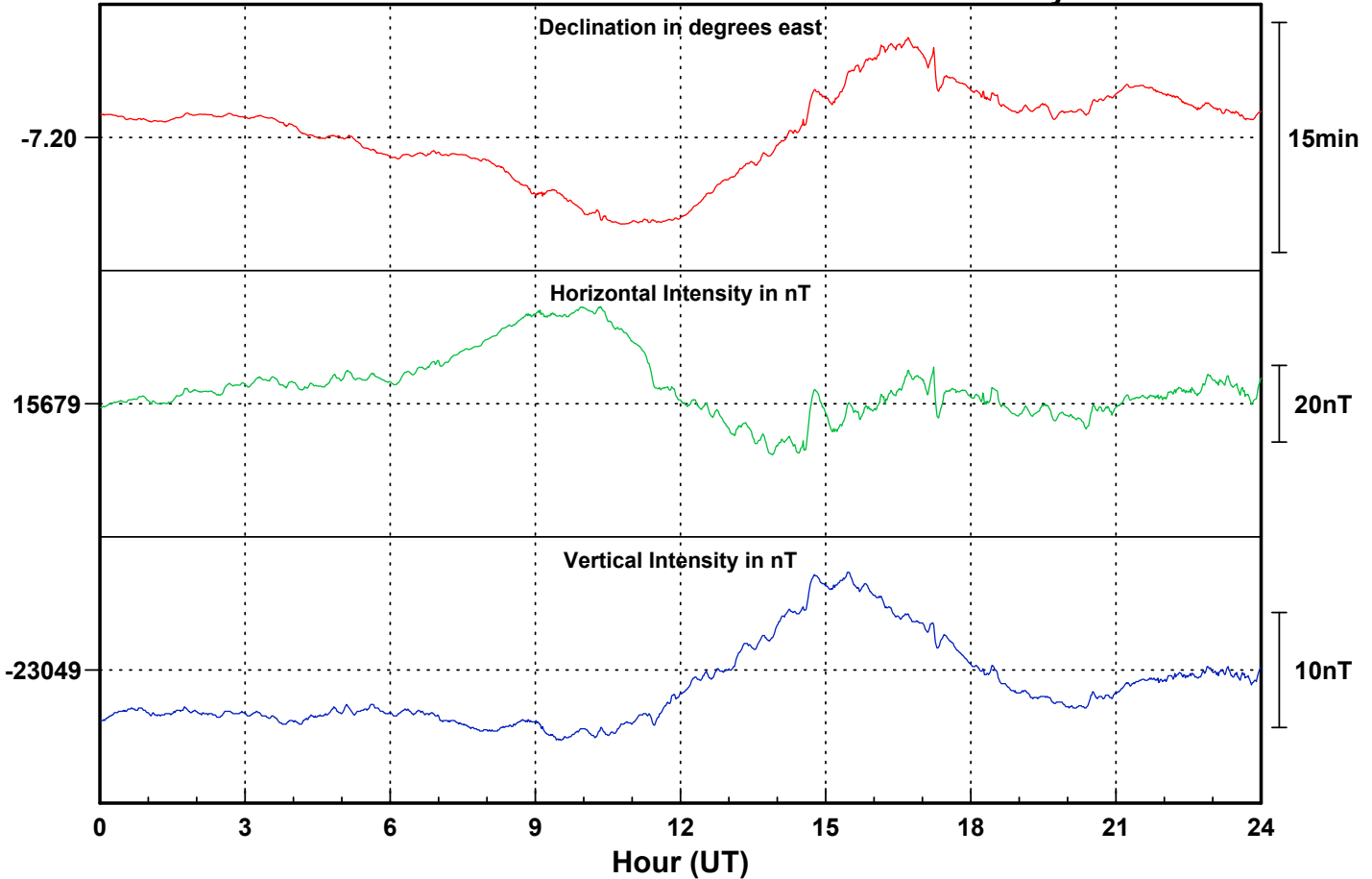
# King Edward Point

Day number: 052



Date: 22-02-2016

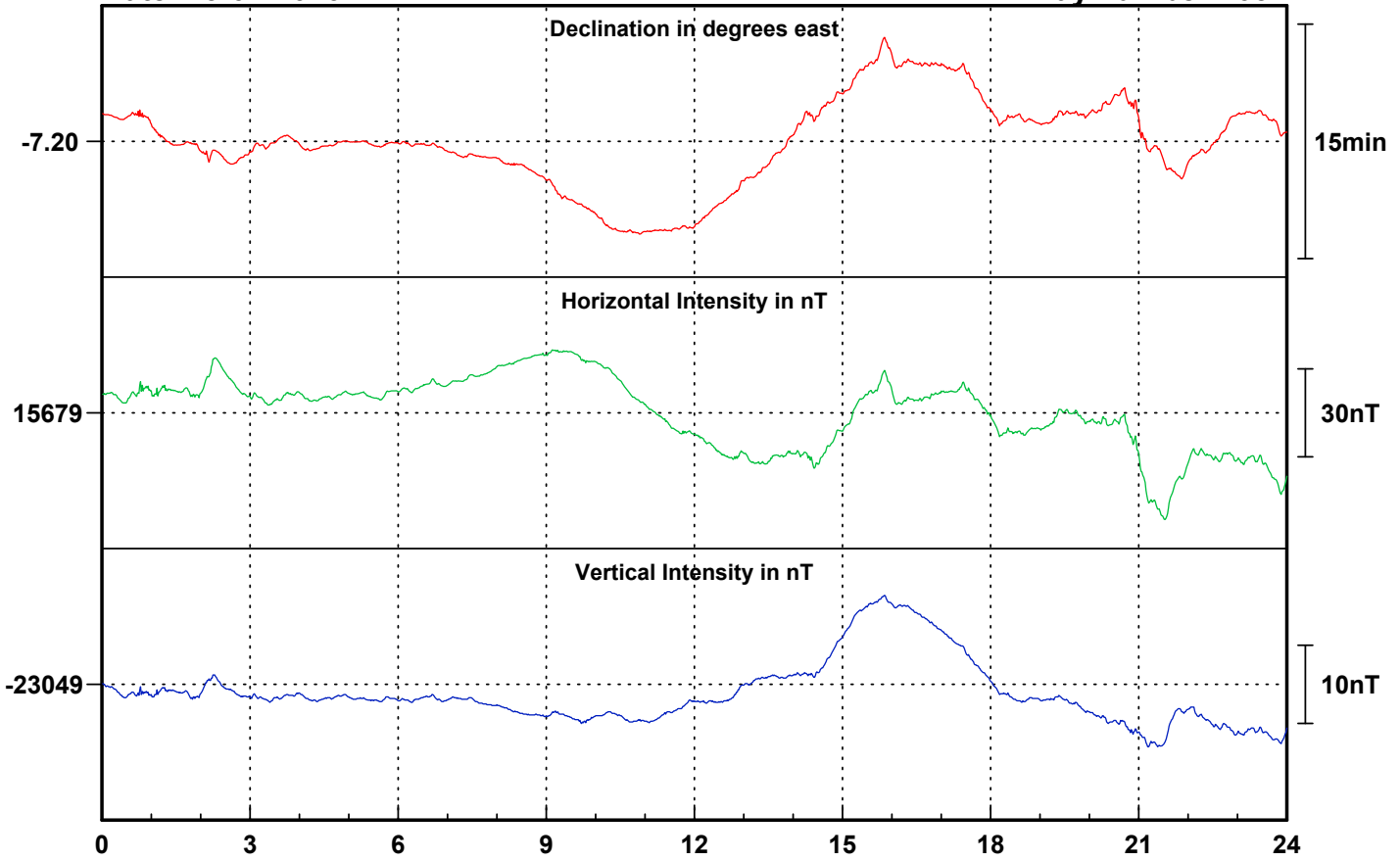
Day number: 053



Date: 23-02-2016

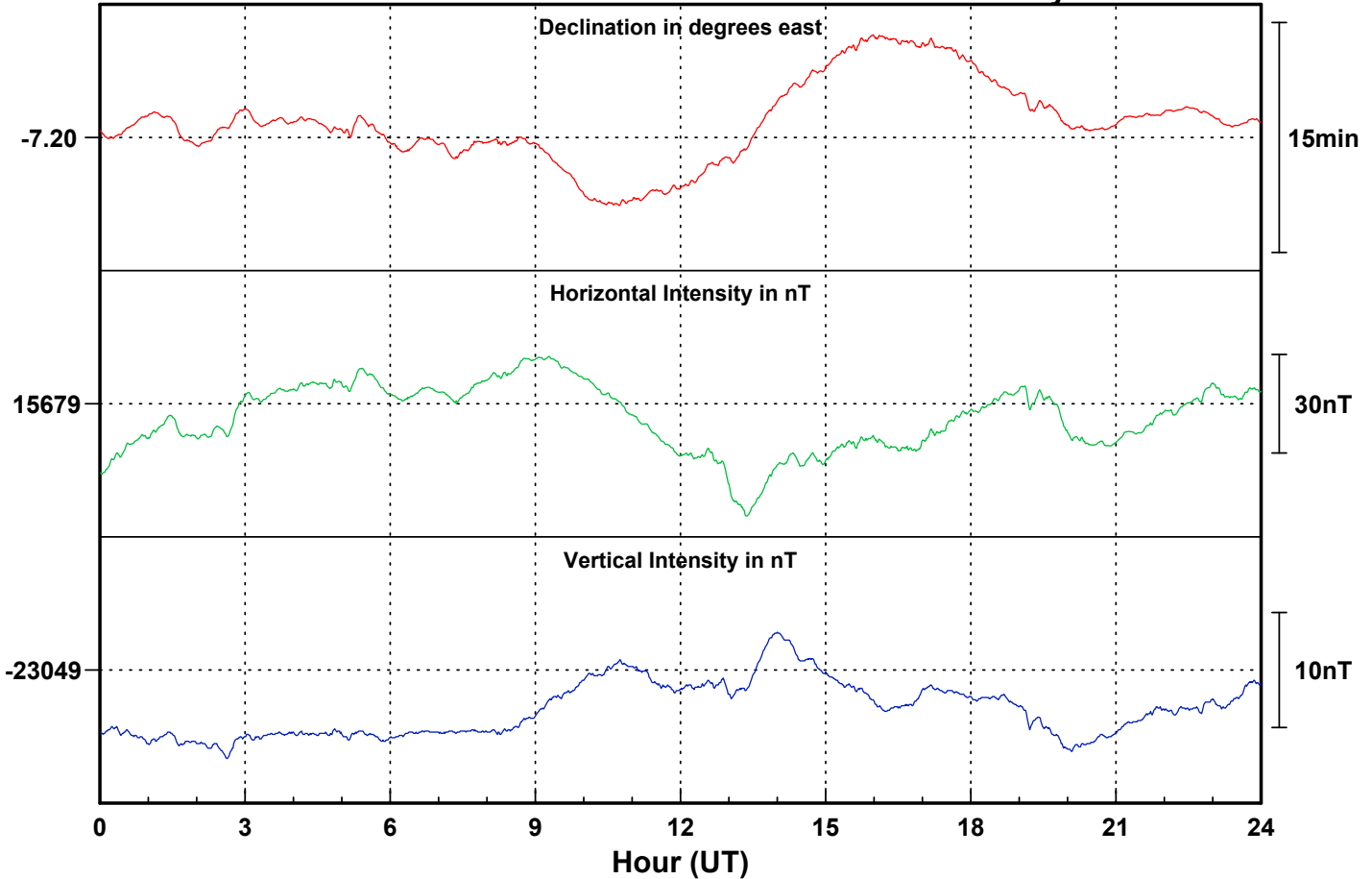
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Day number: 054



Date: 24-02-2016

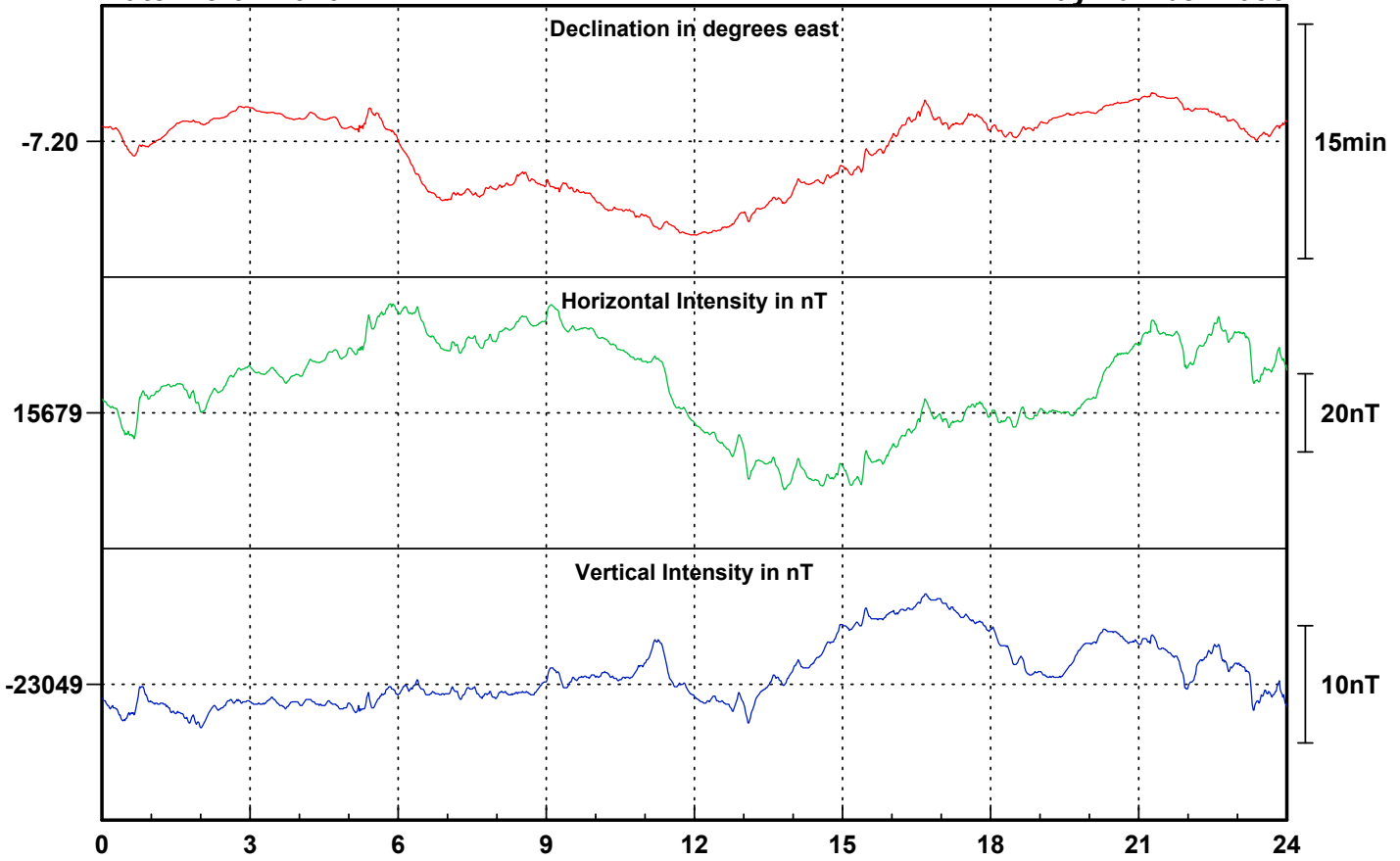
Day number: 055



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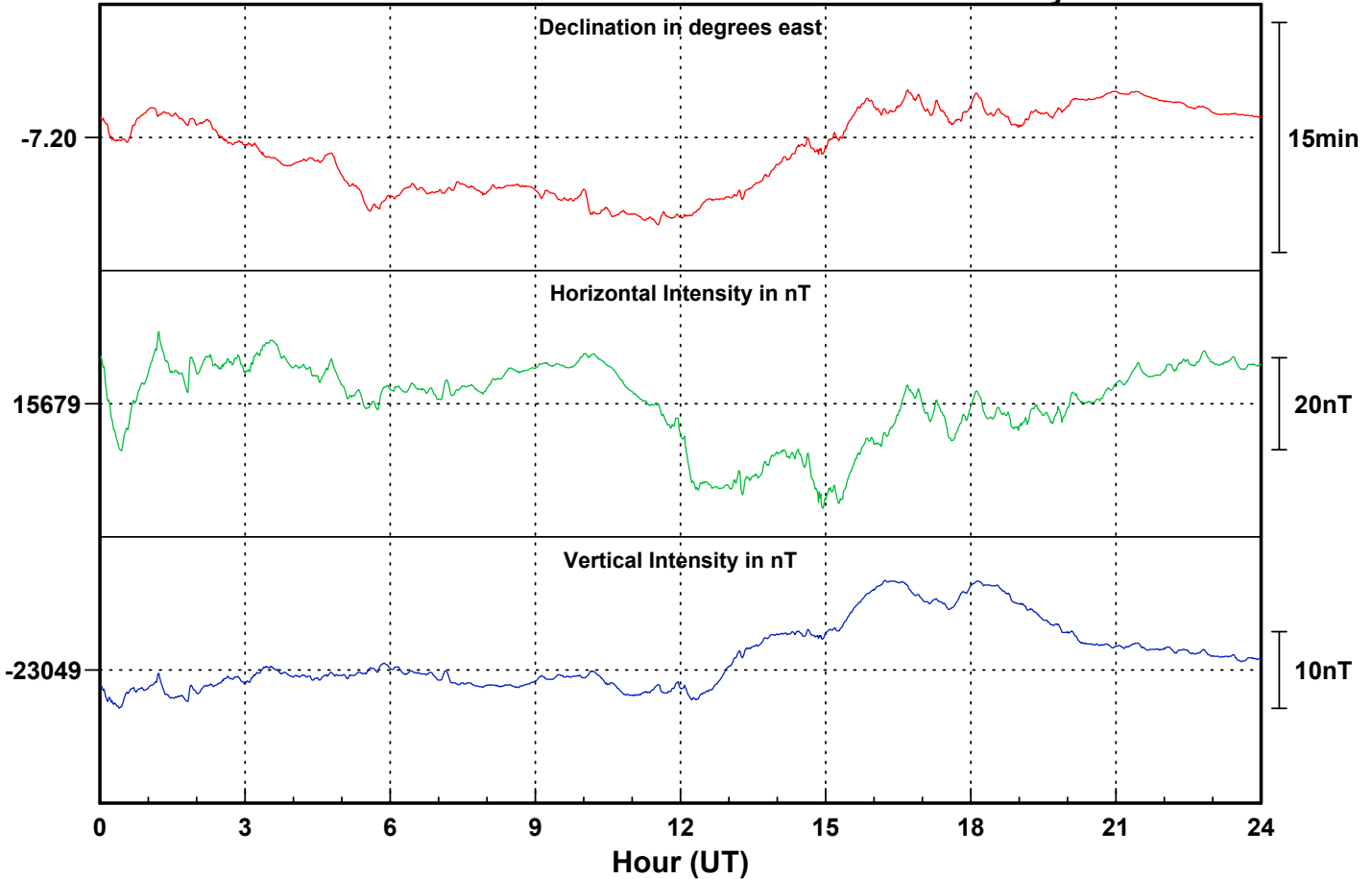
# King Edward Point

Day number: 056



Date: 26-02-2016

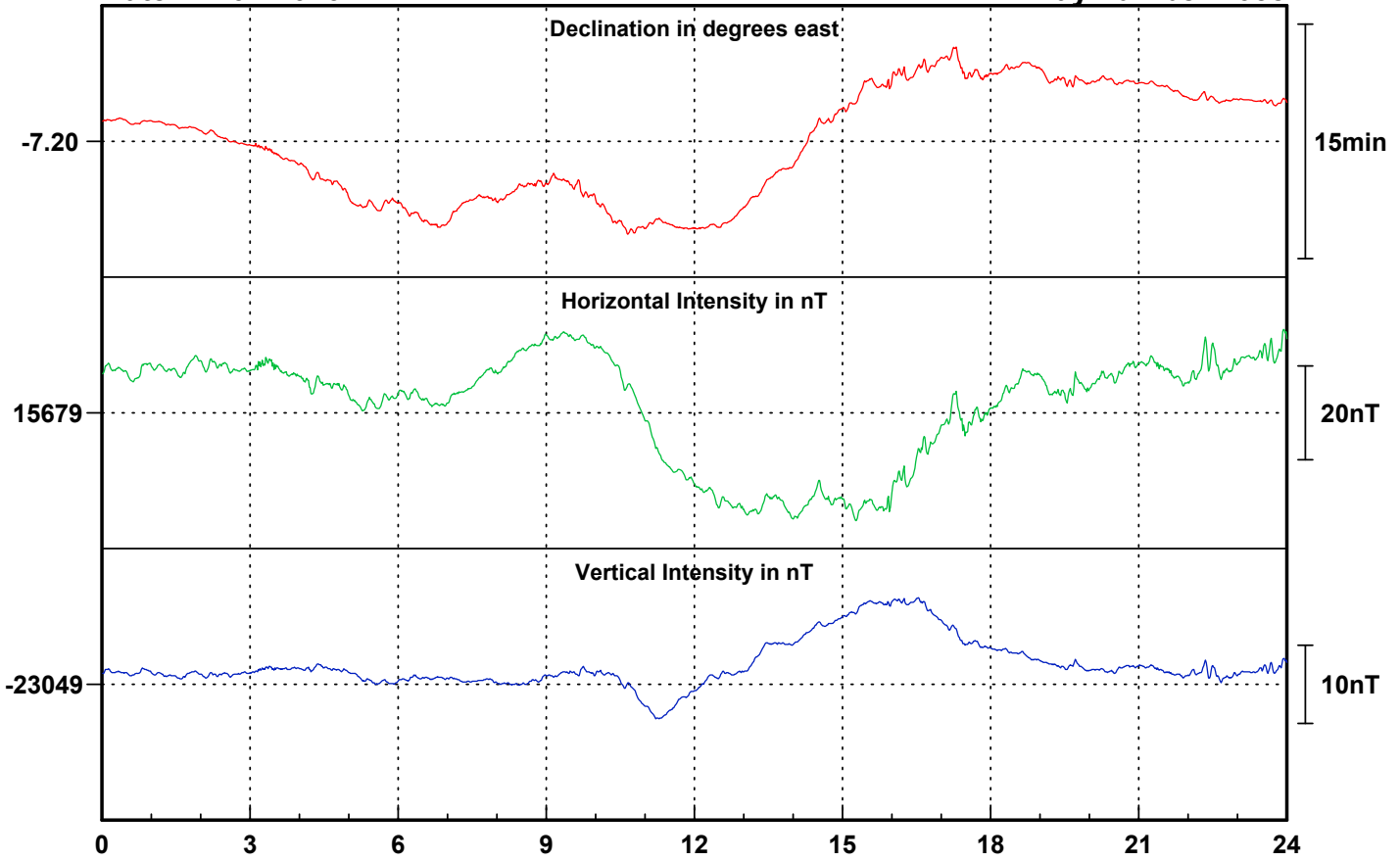
Day number: 057



Date: 27-02-2016

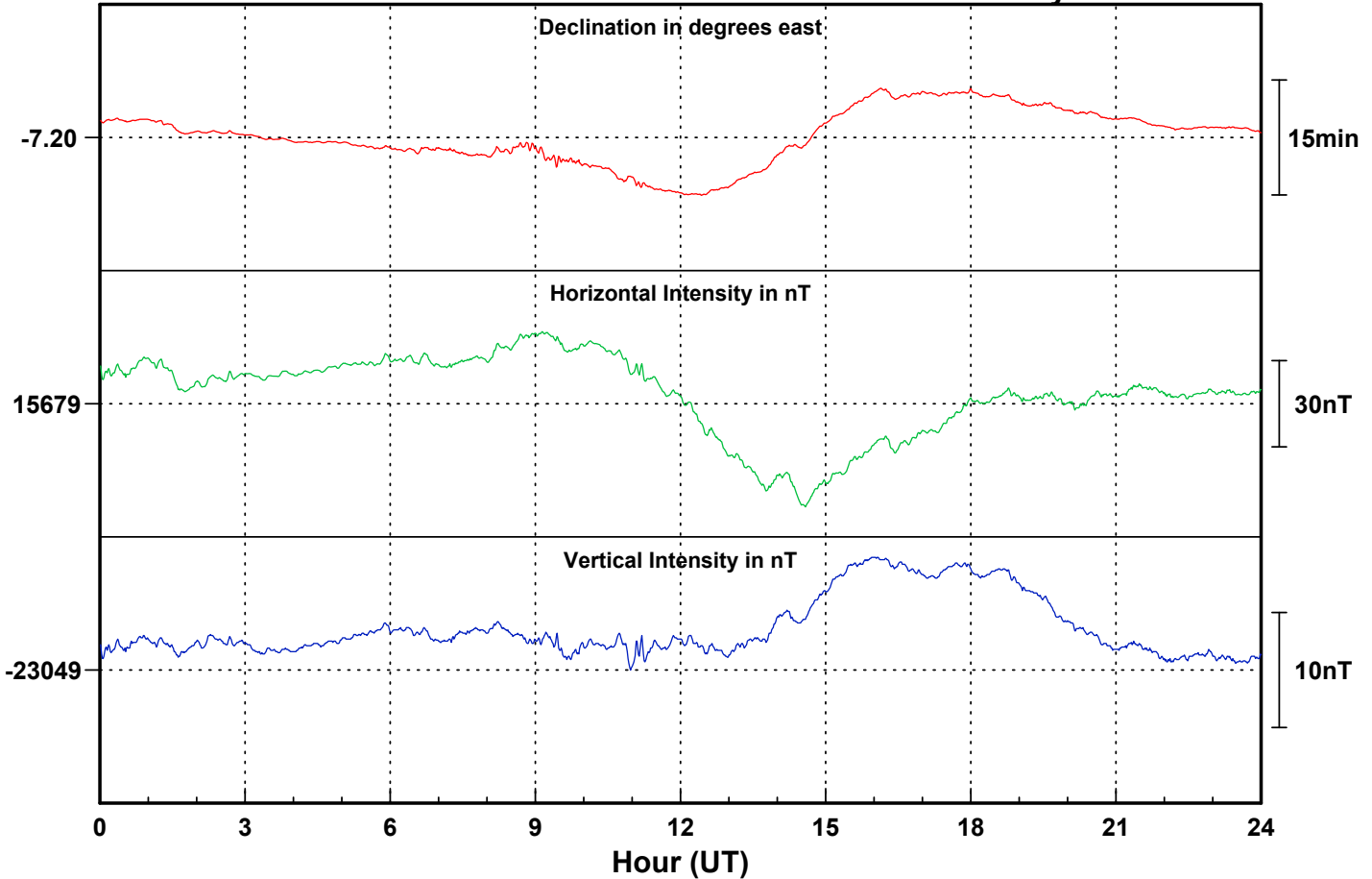
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Day number: 058



Date: 28-02-2016

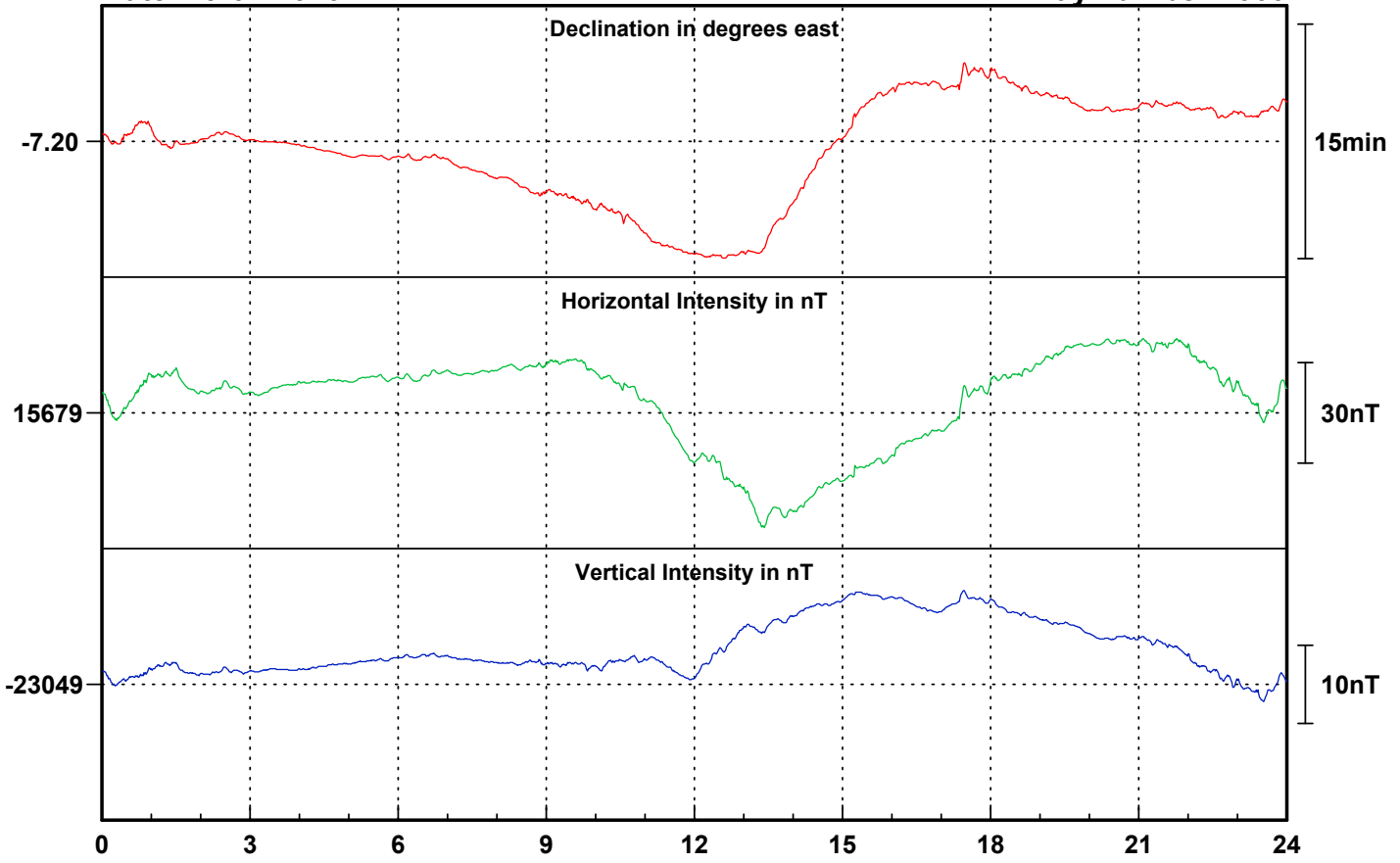
Day number: 059



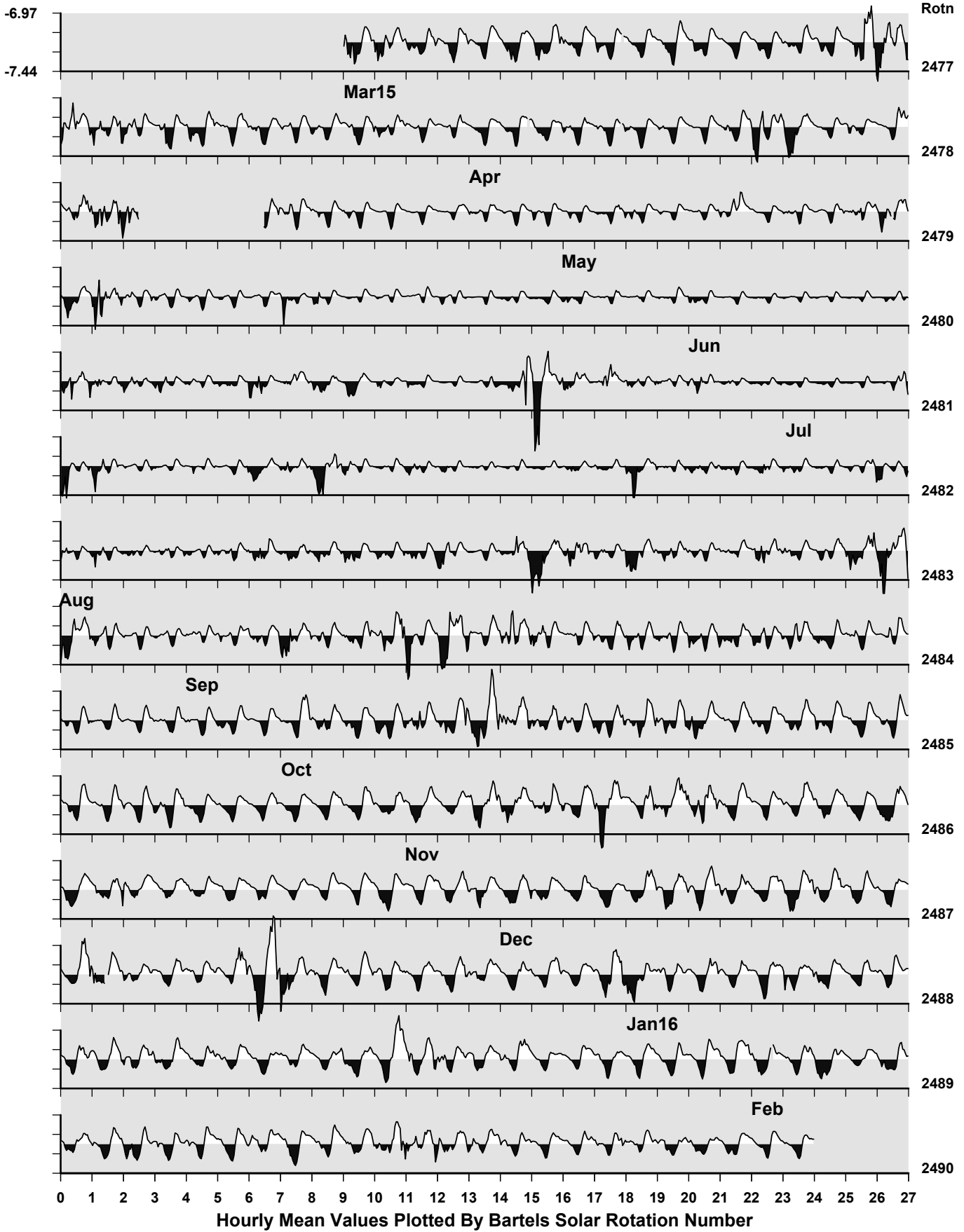
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# King Edward Point

Day number: 060

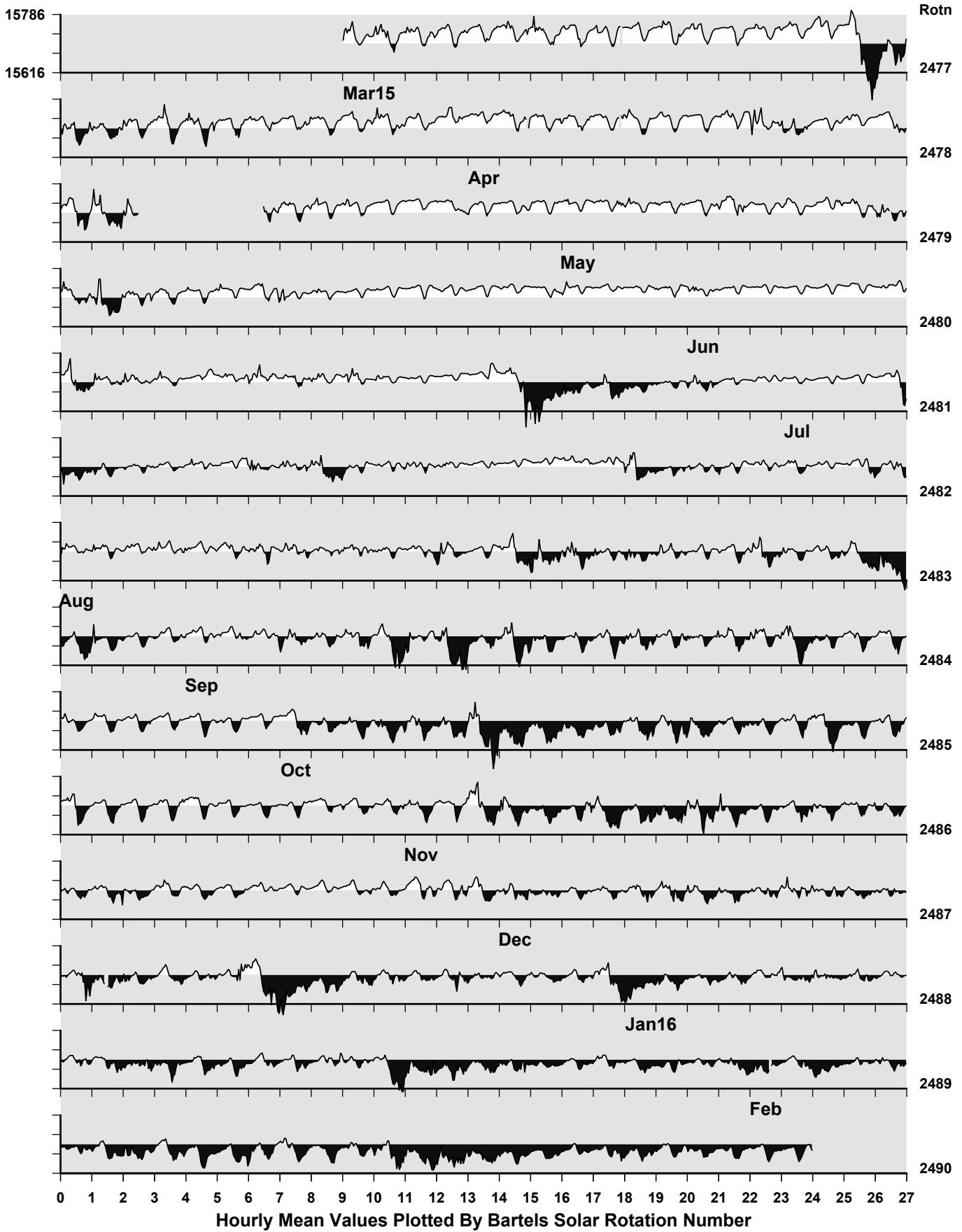


# King Edward Point Observatory: Declination (degrees)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

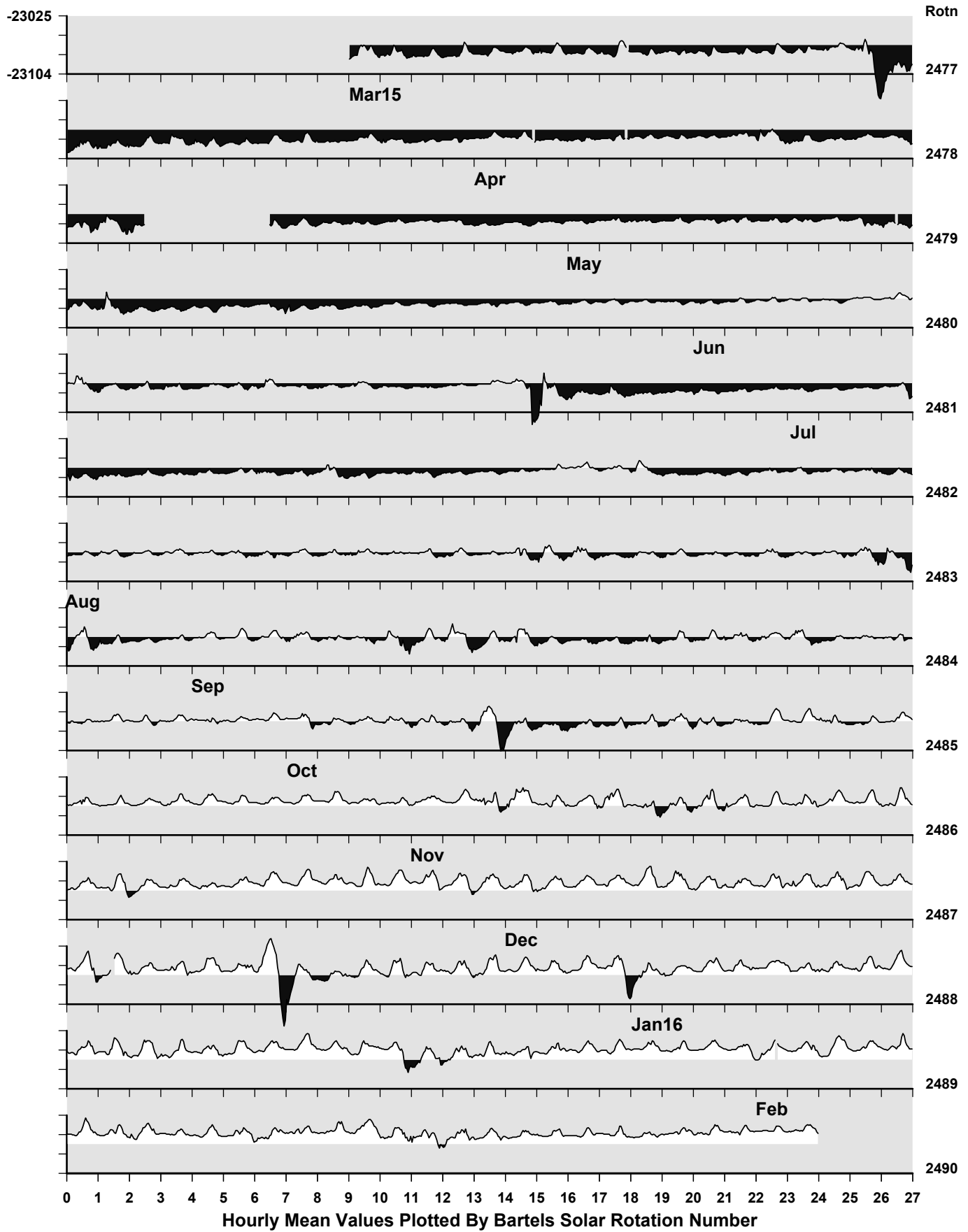
# King Edward Point Observatory: Horizontal Intensity (nT)



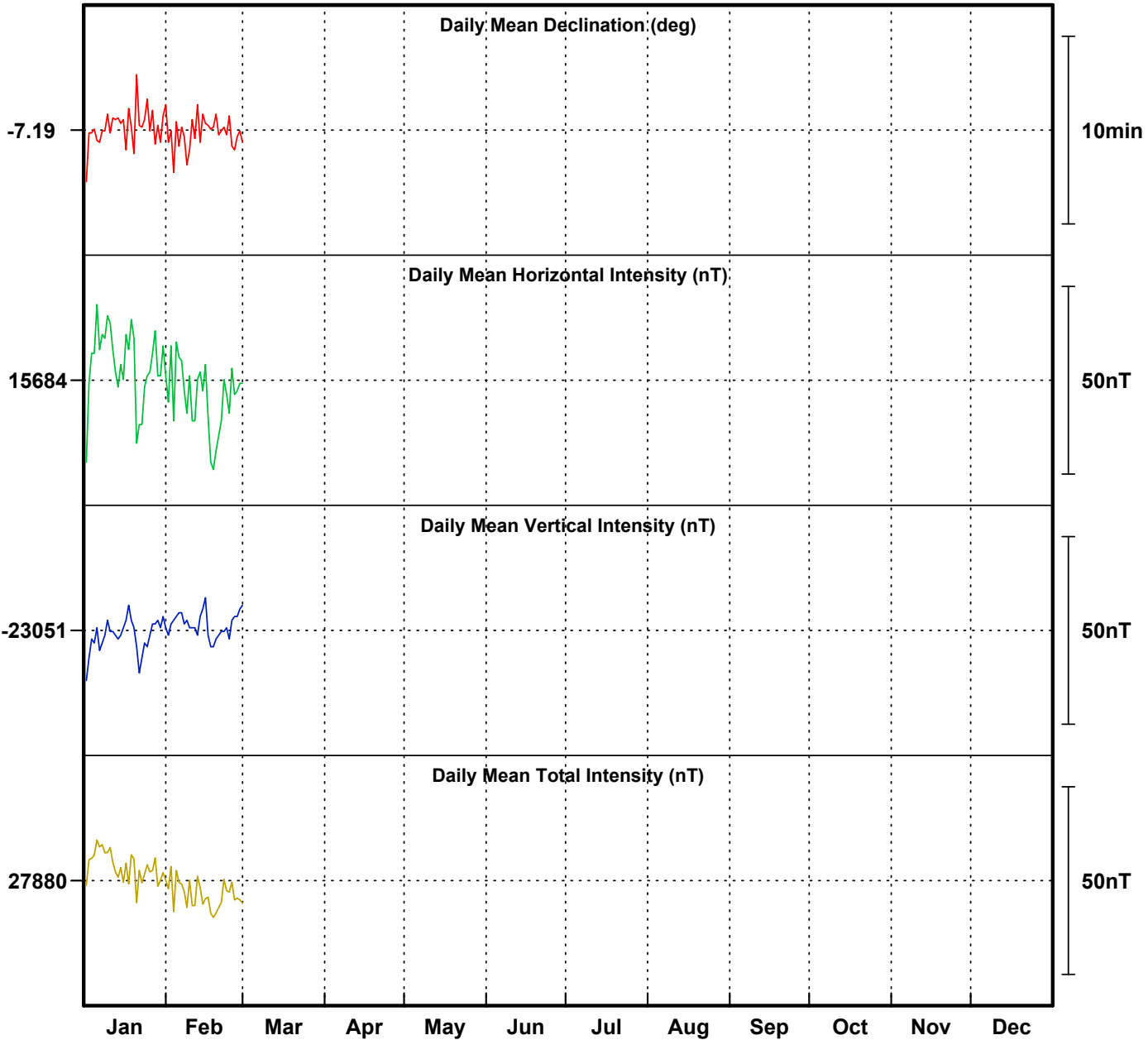
Hourly Mean Values Plotted By Bartels Solar Rotation Number



# King Edward Point Observatory: Vertical Intensity (nT)



# King Edward Point Observatory 2016



### Monthly Mean Values for King Edward Point Observatory 2016

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
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

#### Note

i. The values shown here are provisional.