



British
Geological
Survey



MONTHLY MAGNETIC BULLETIN

King Edward Point Observatory

December 2023



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"N 323° 30'25.2"E
Geomagnetic: 46° 29'6.0"N 030° 01'30.0"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 13th generation International Geomagnetic Reference Field (IGRF) at epoch 2022.5. On-line access to models (including IGRF), charts and navigational data are available at 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 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.

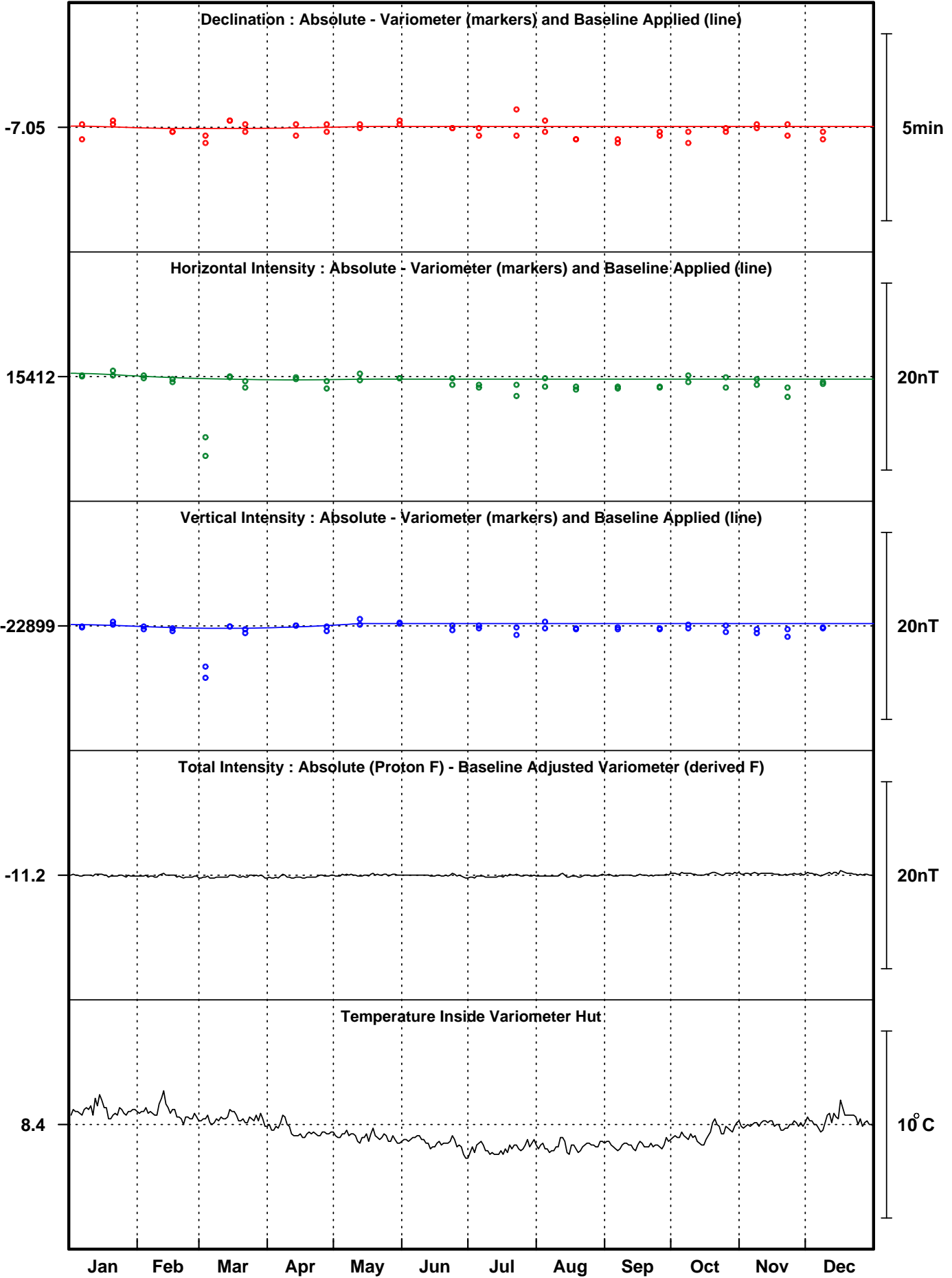
5. Conditions of use

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Reproduction of any part of this bulletin should be accompanied by the statement: 'Reproduced with the permission of the British Geological Survey ©UKRI. 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 geomag.bgs.ac.uk/contactus/staff

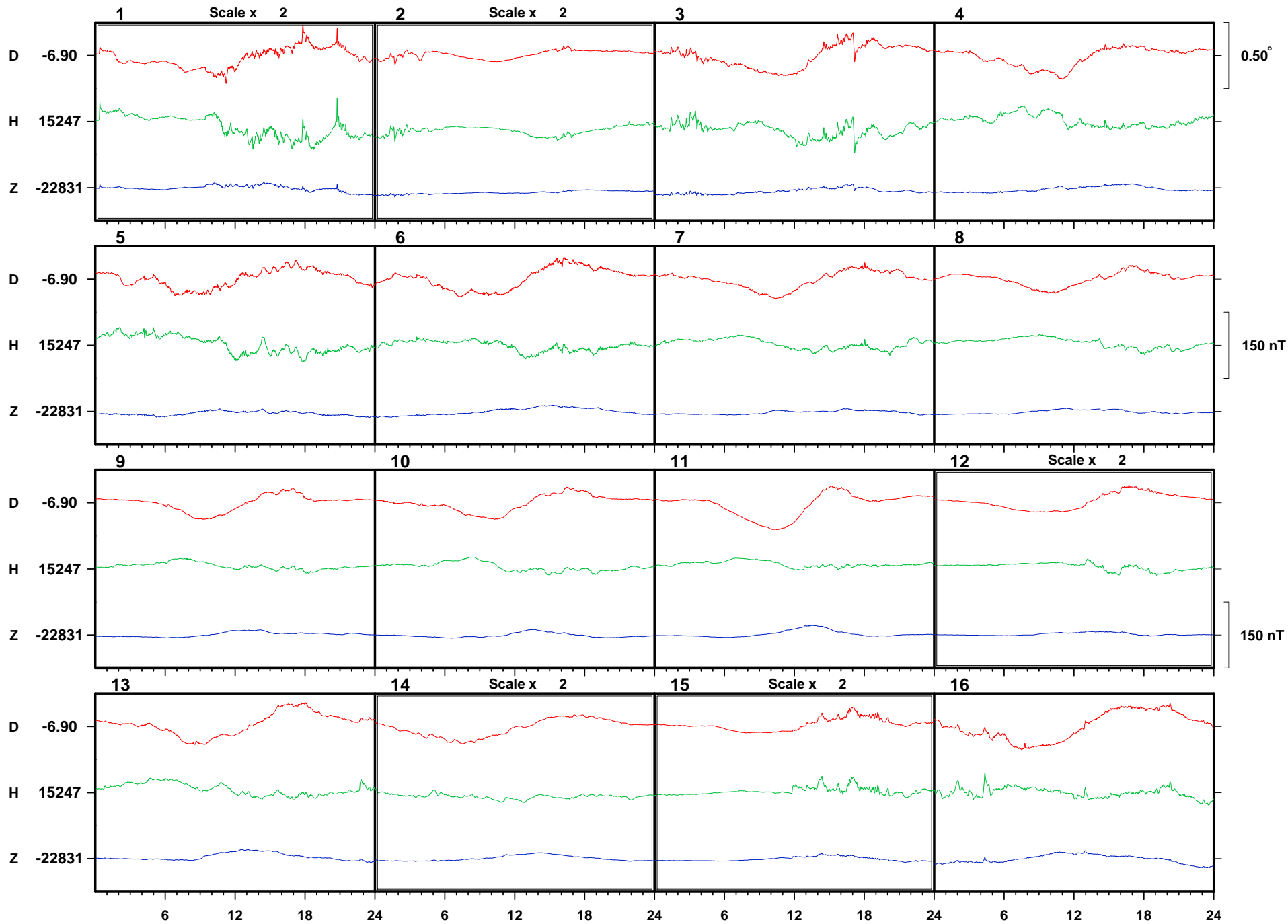
King Edward Point 2023

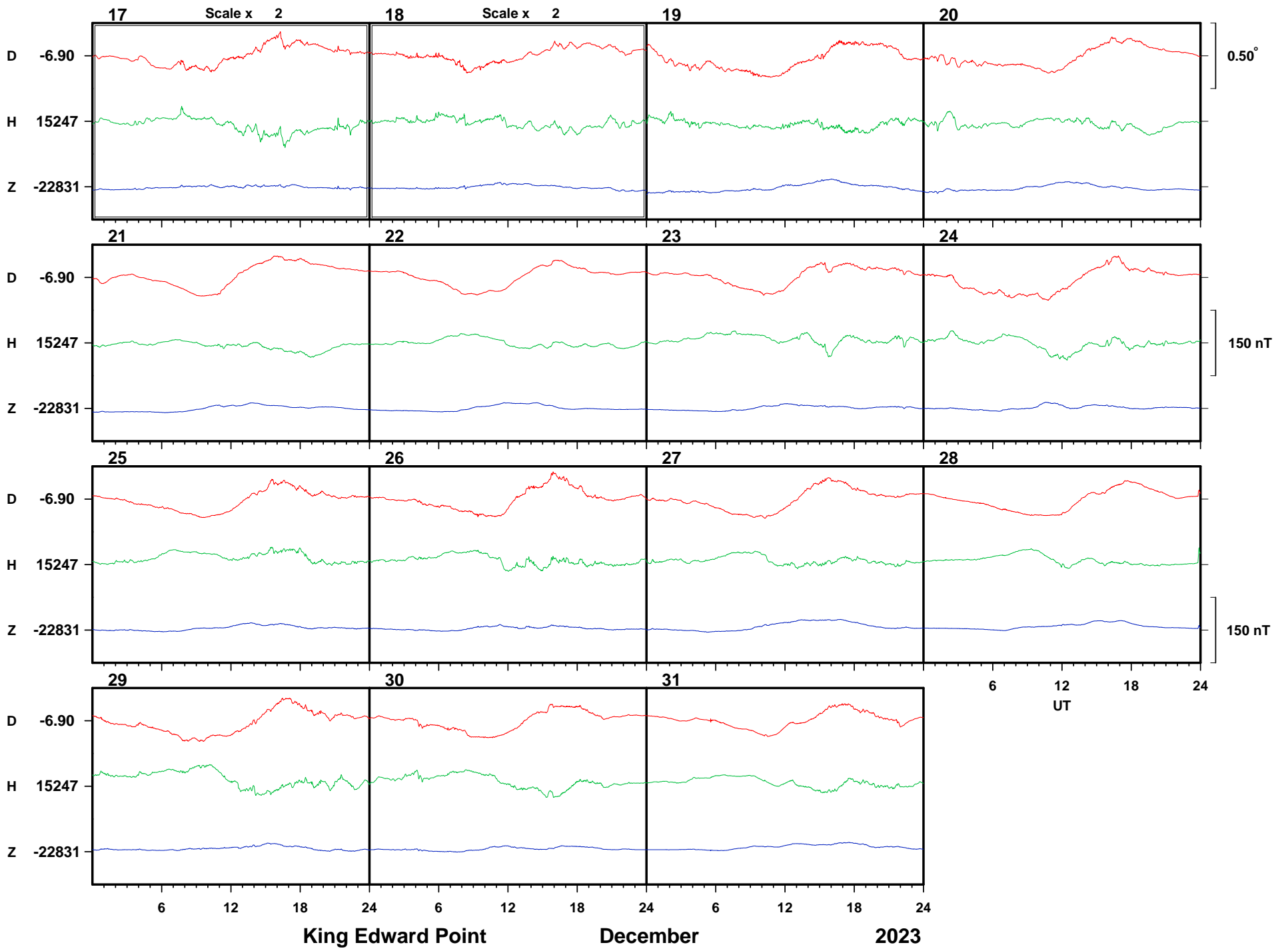


King Edward Point

December

2023



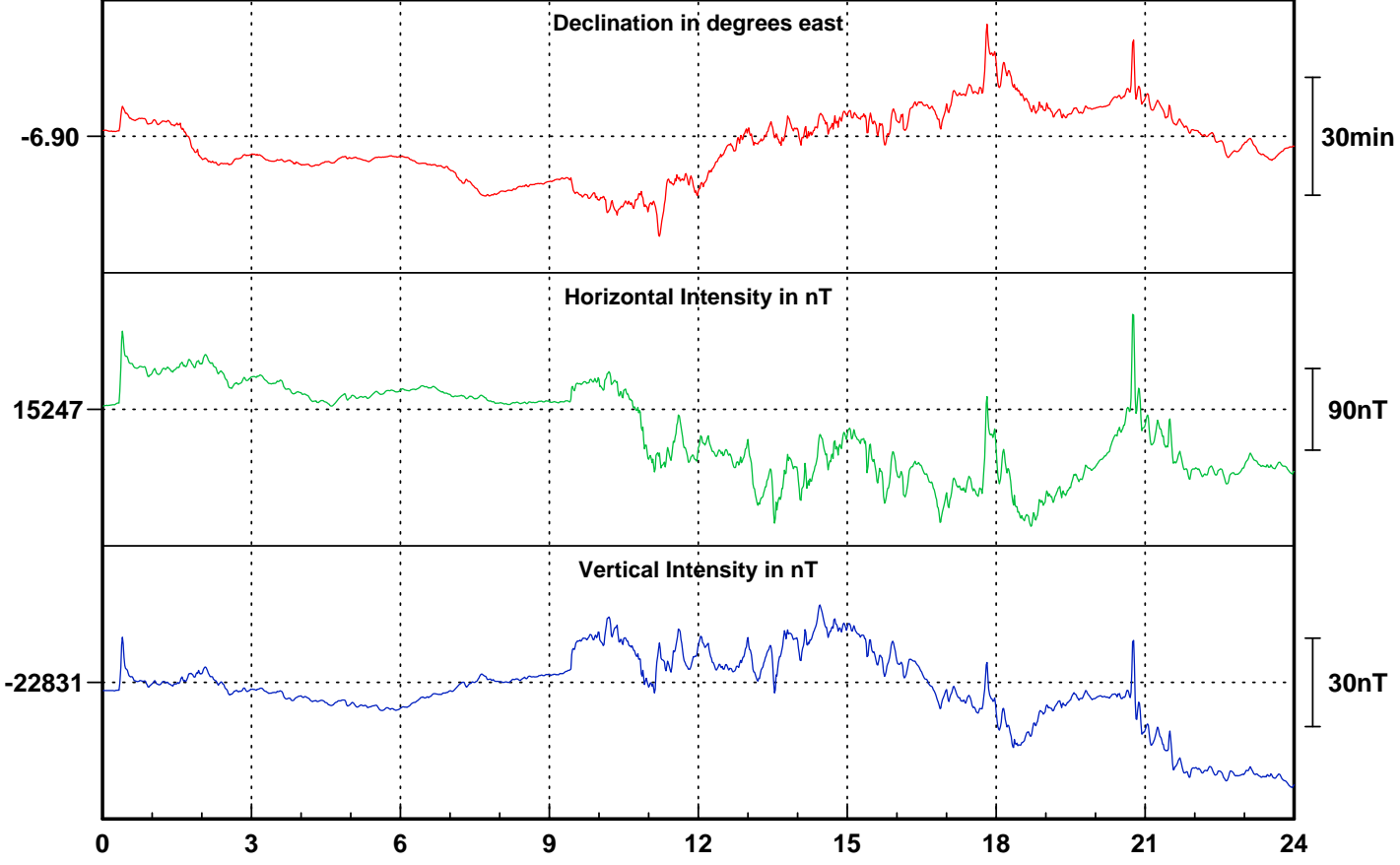


King Edward Point December 2023

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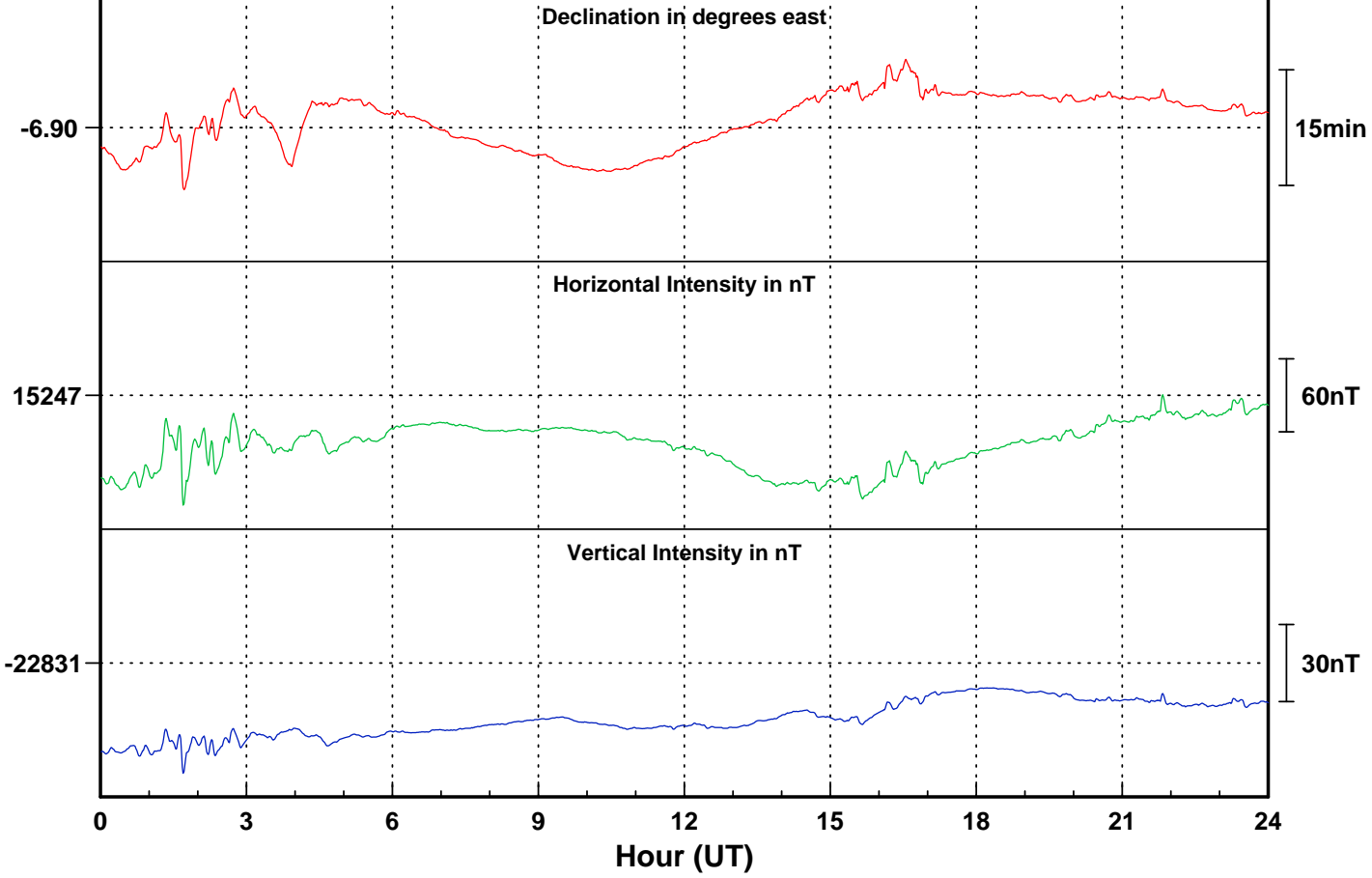
King Edward Point

Day number: 335



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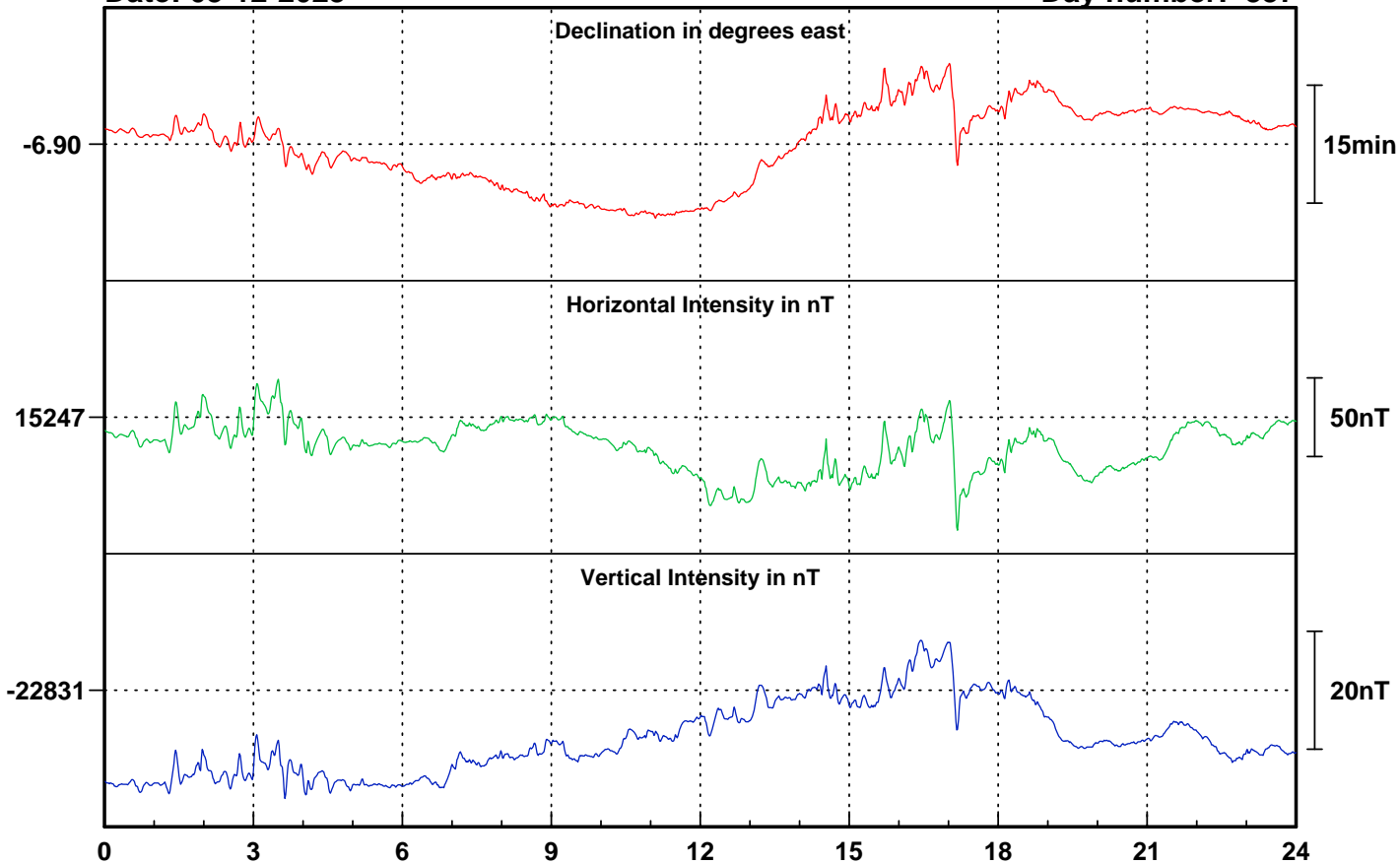
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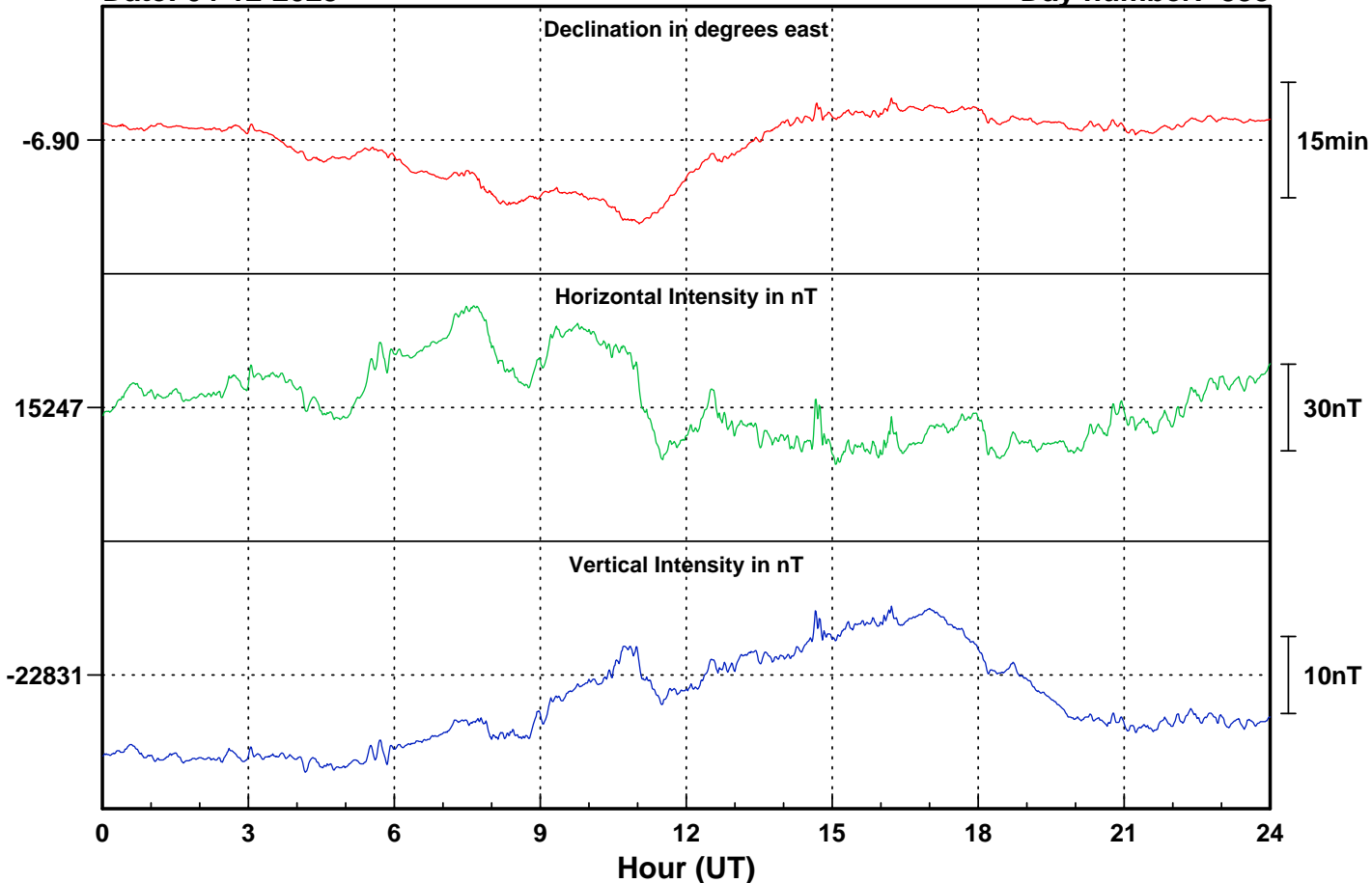
King Edward Point

Day number: 337



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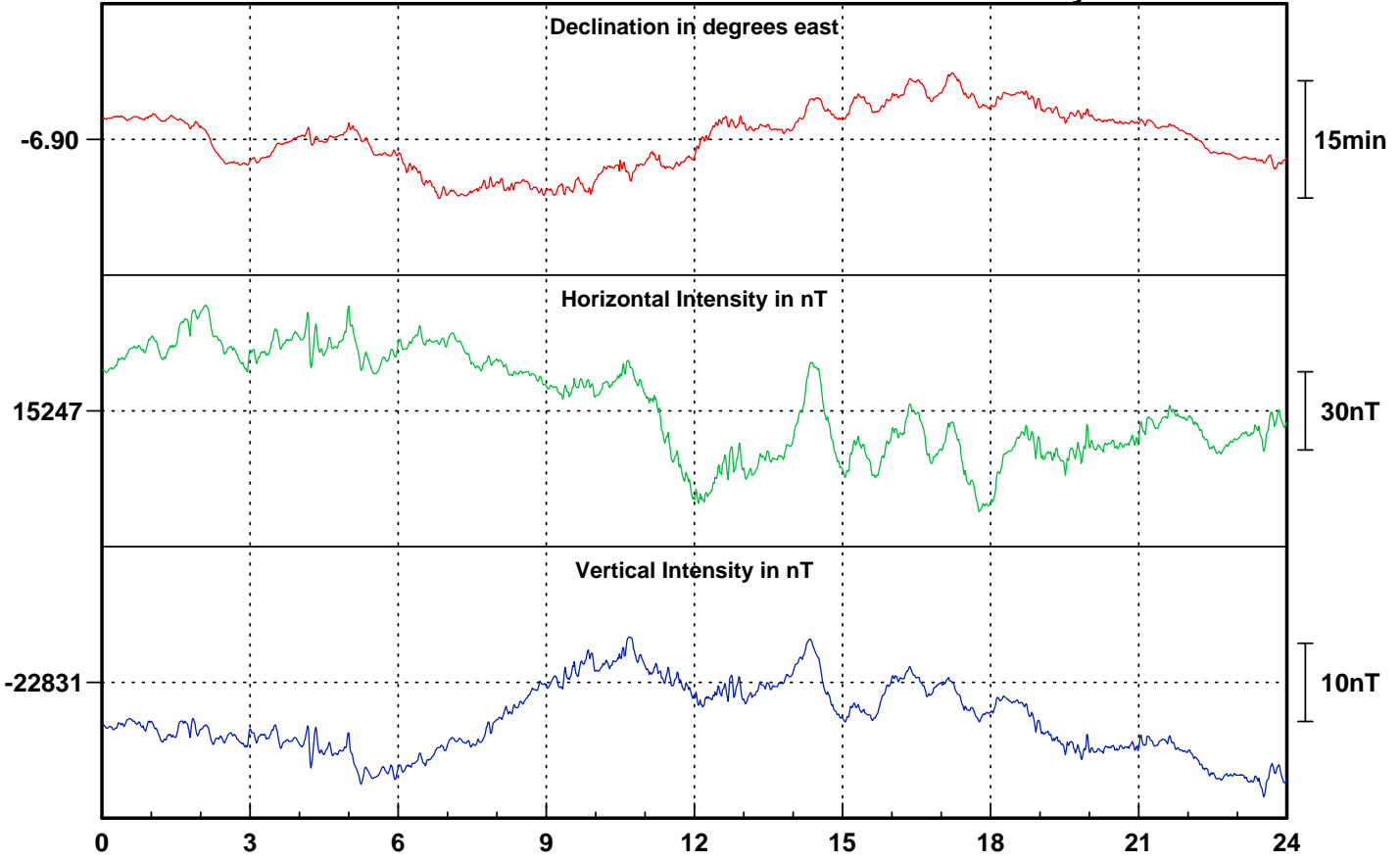
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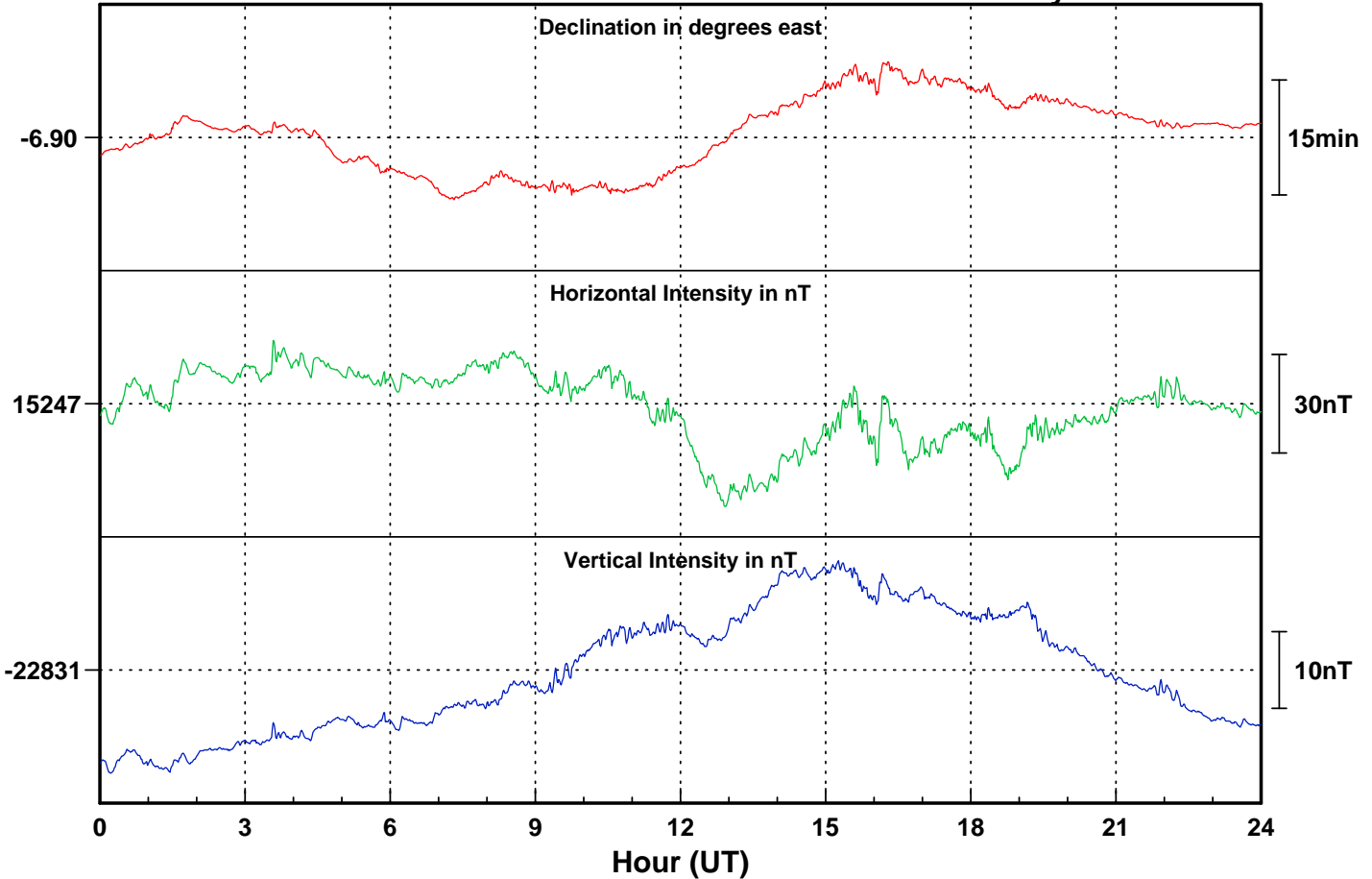
King Edward Point

Day number: 339



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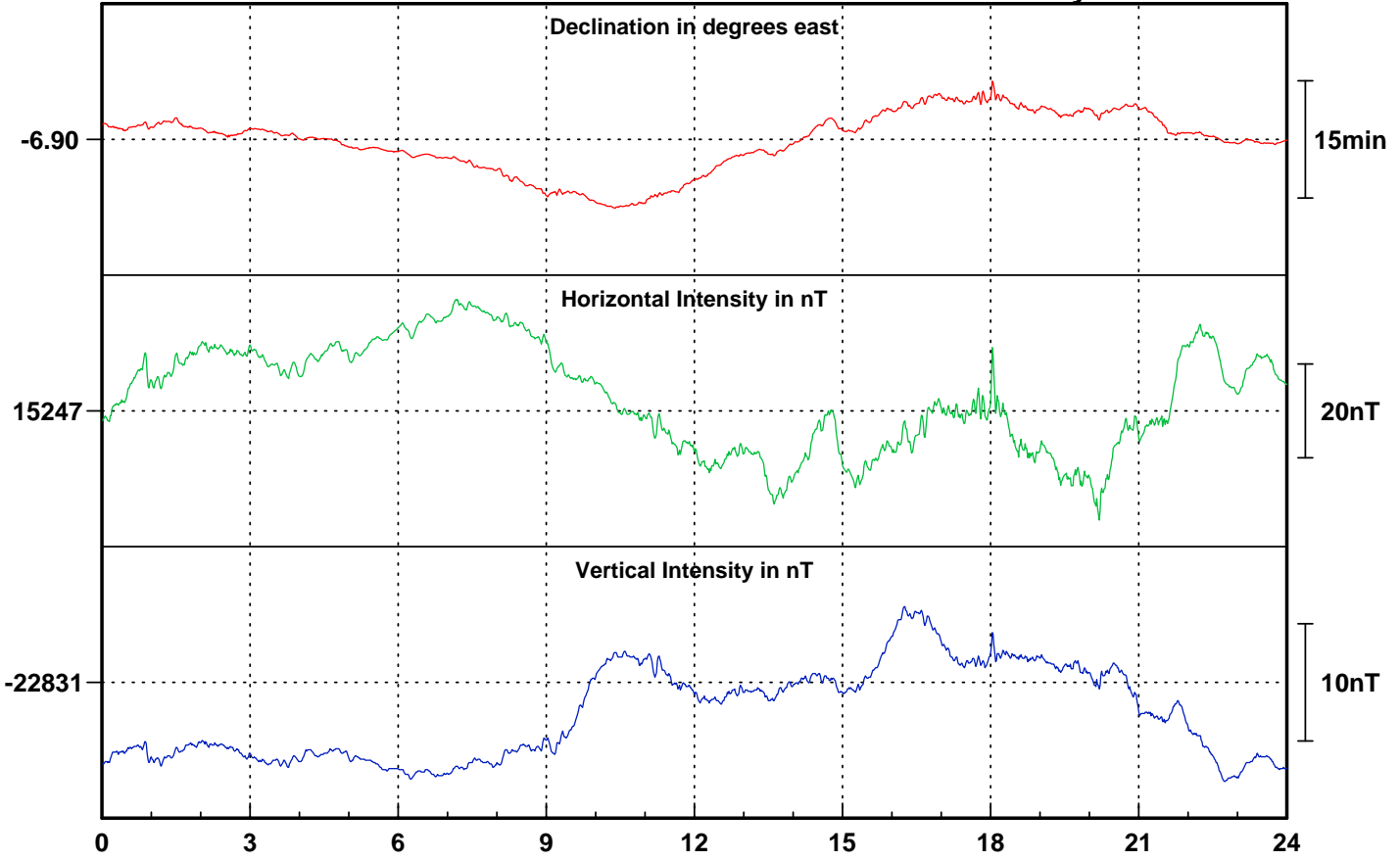
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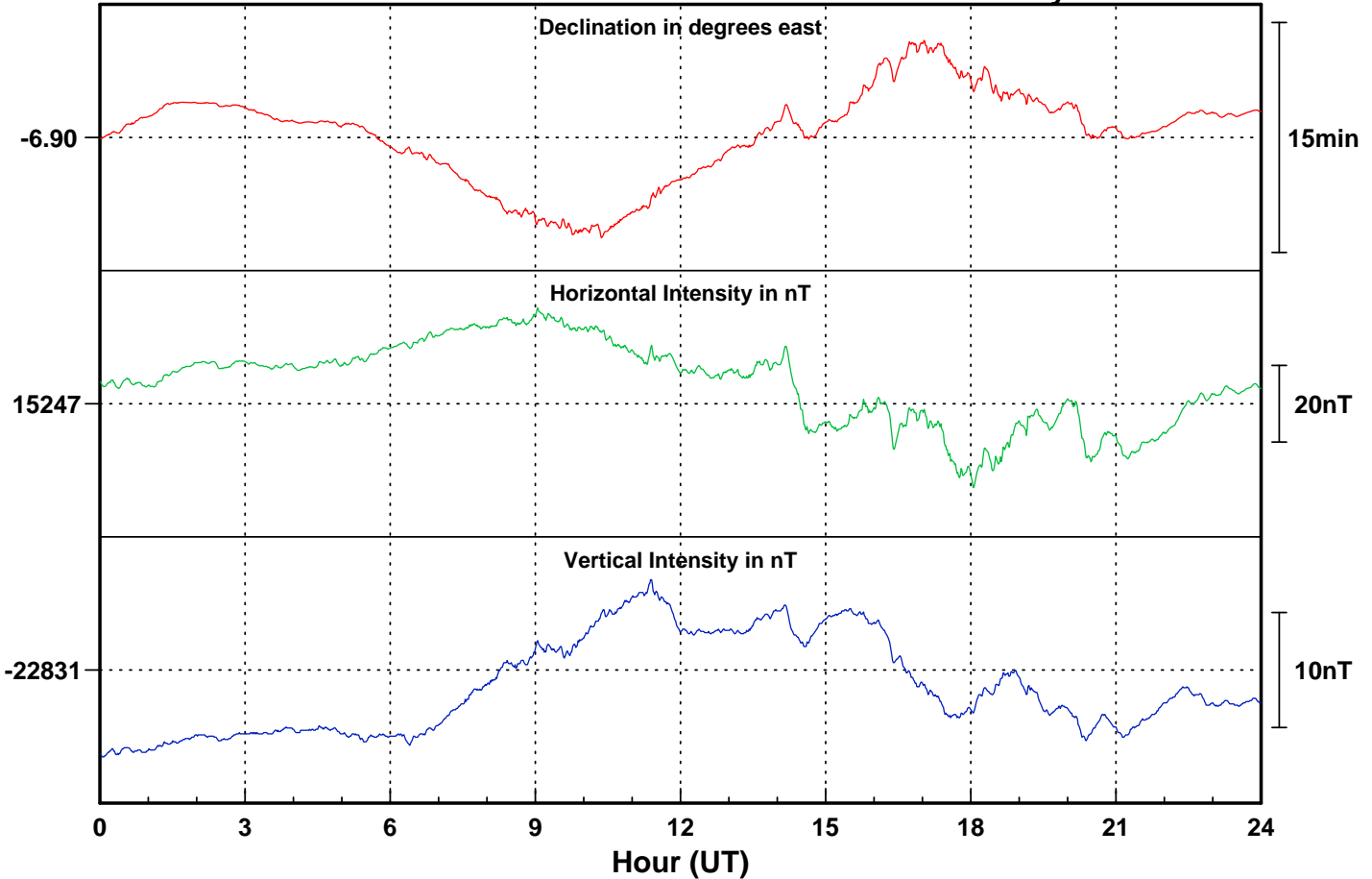
King Edward Point

Day number: 341



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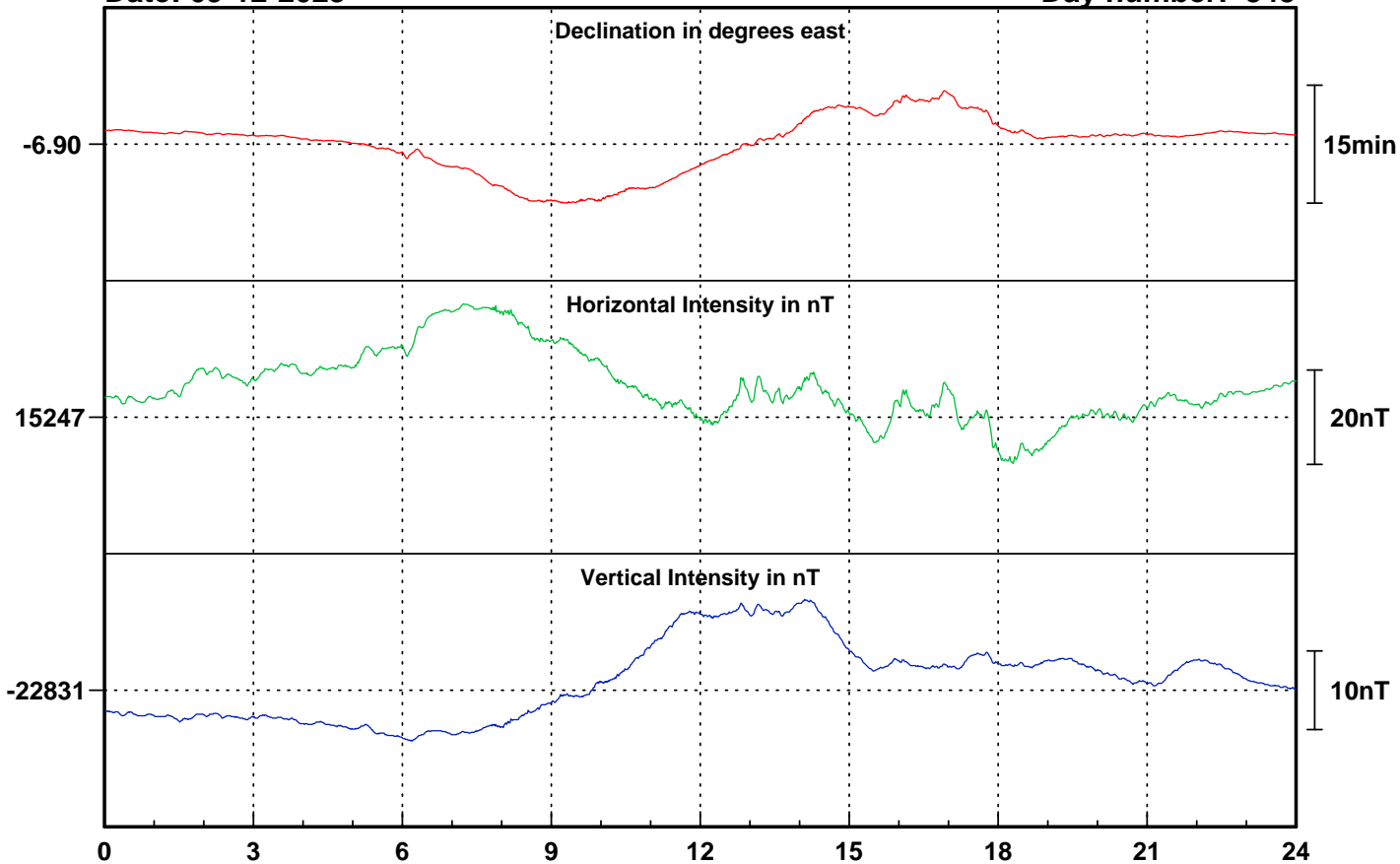
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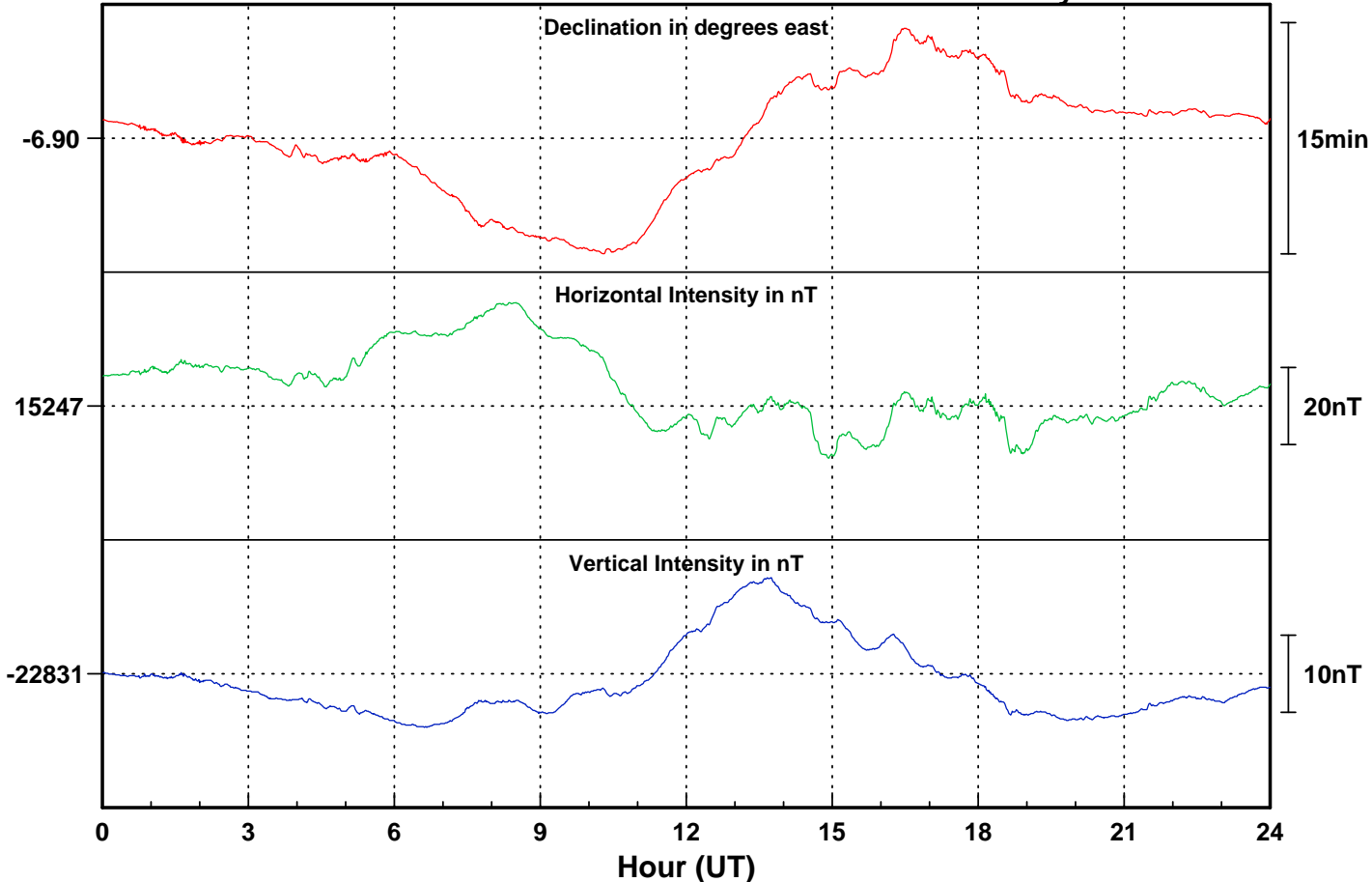
King Edward Point

Day number: 343



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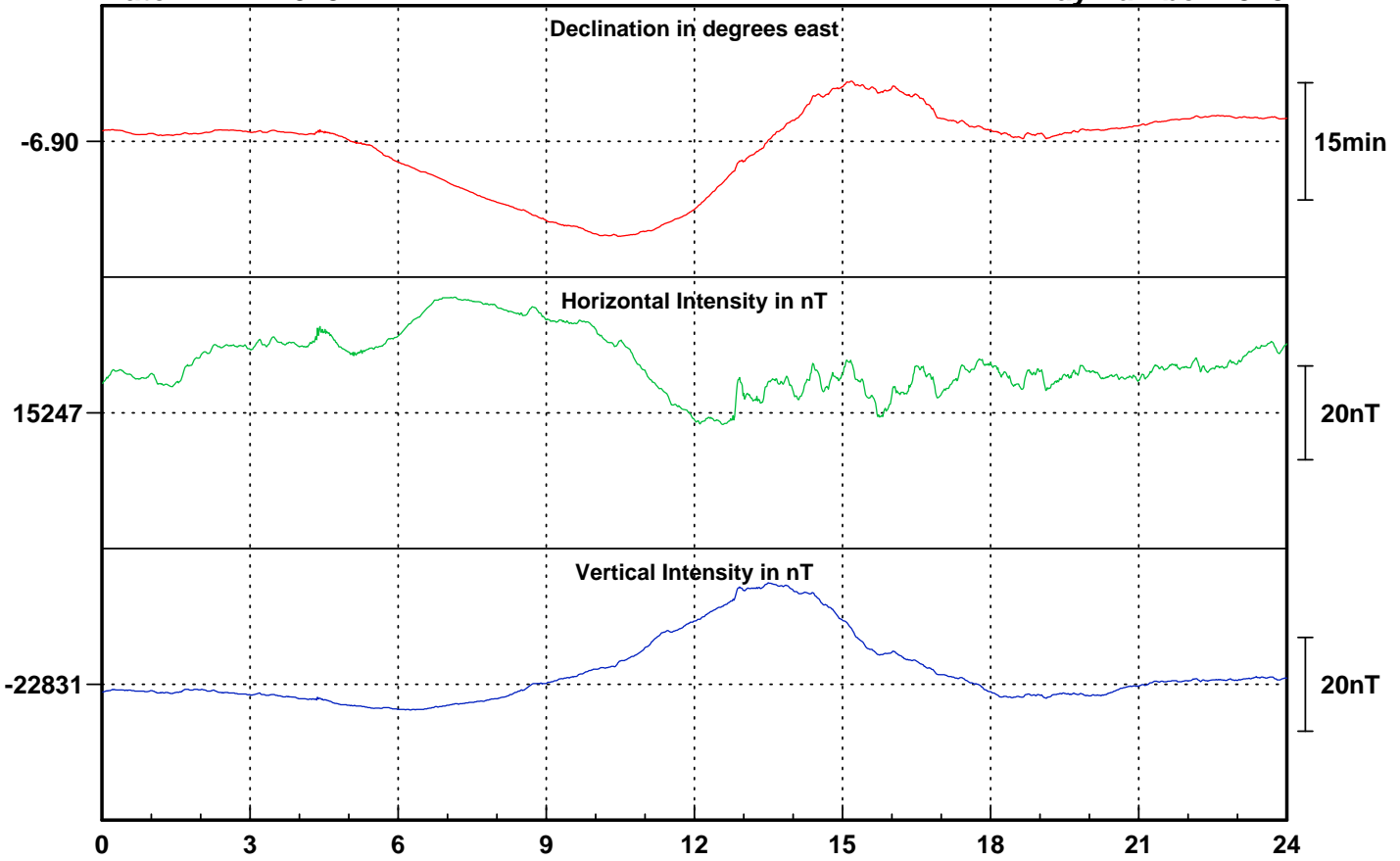
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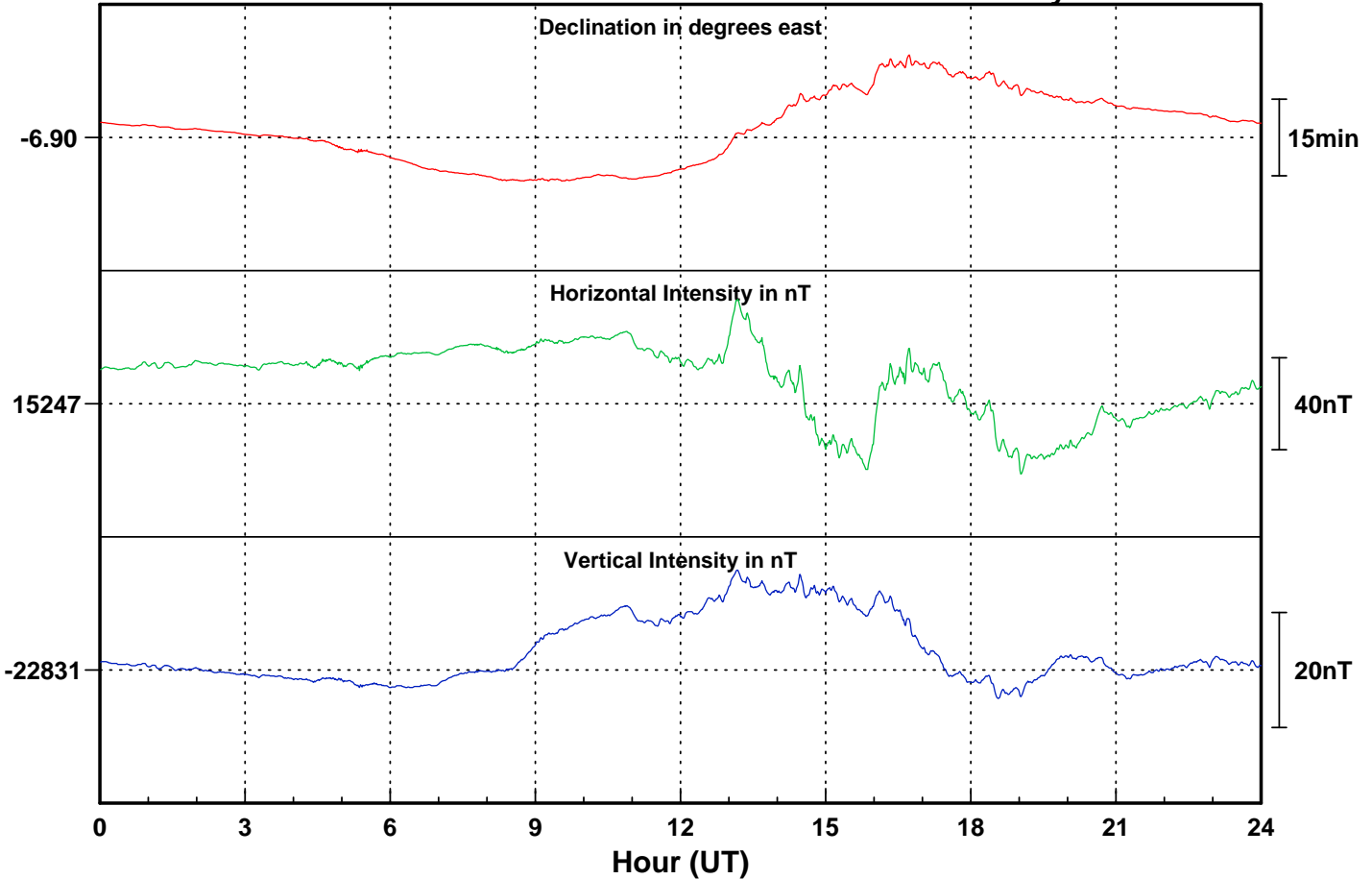
King Edward Point

Day number: 345



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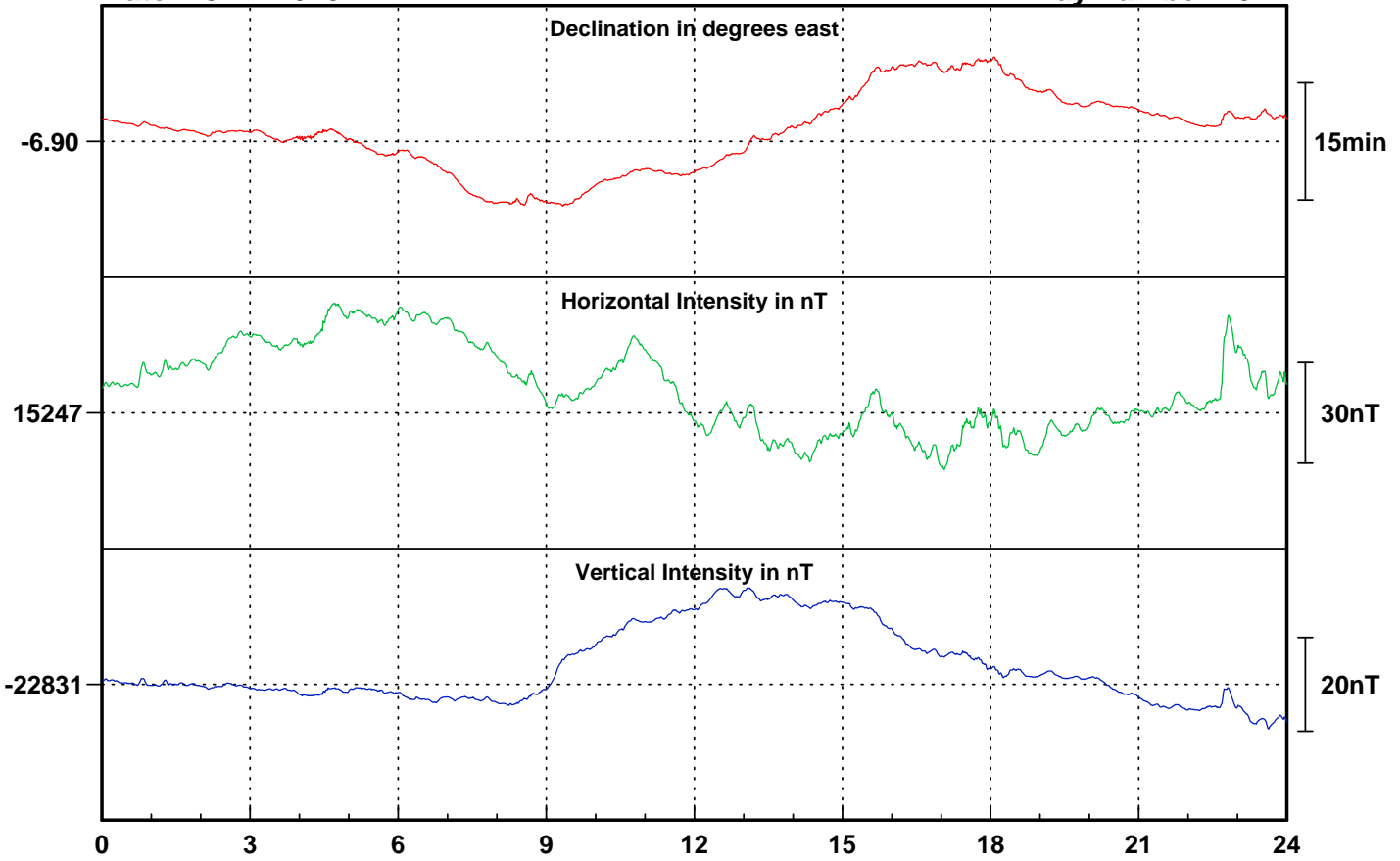
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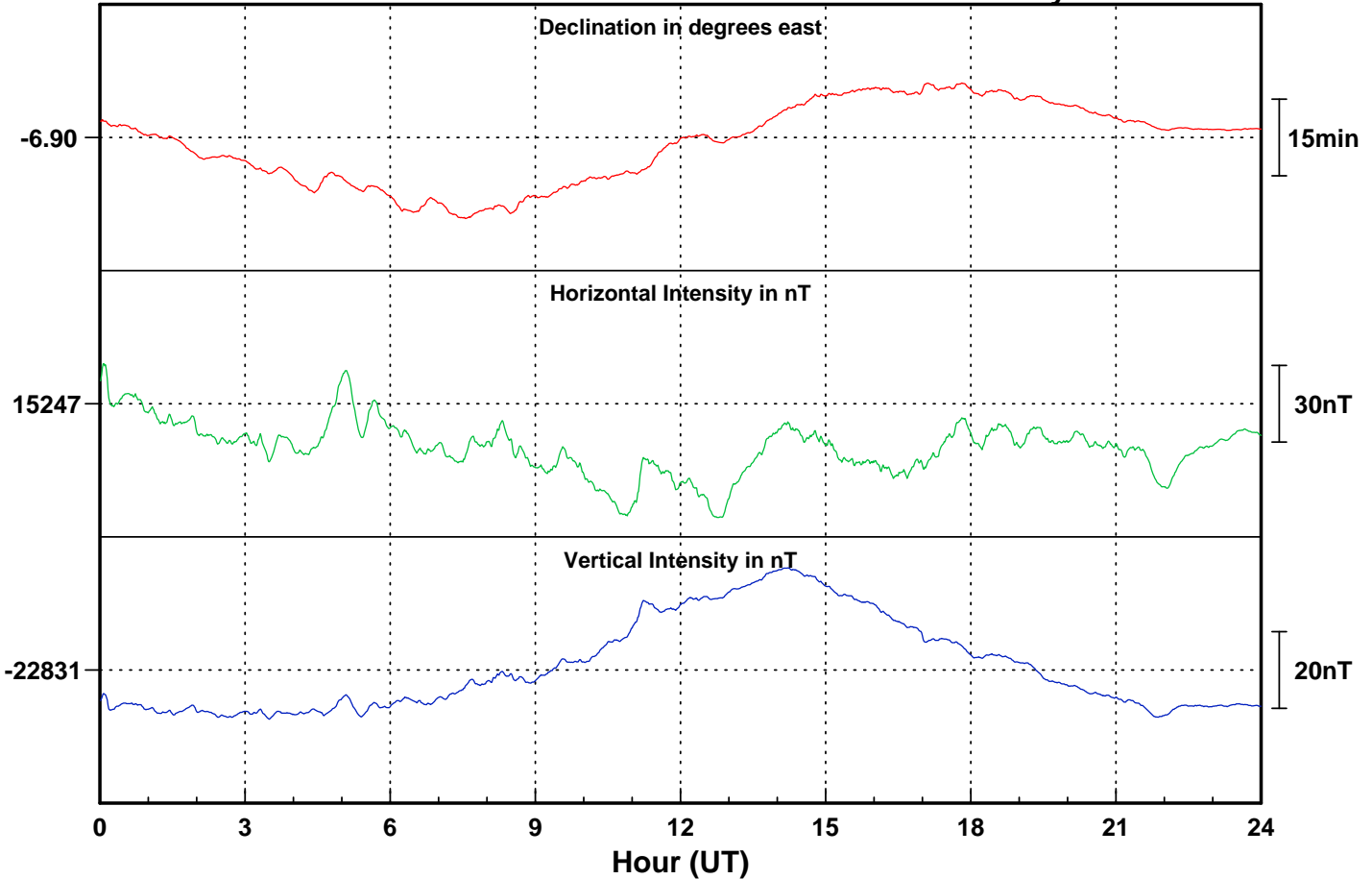
King Edward Point

Day number: 347



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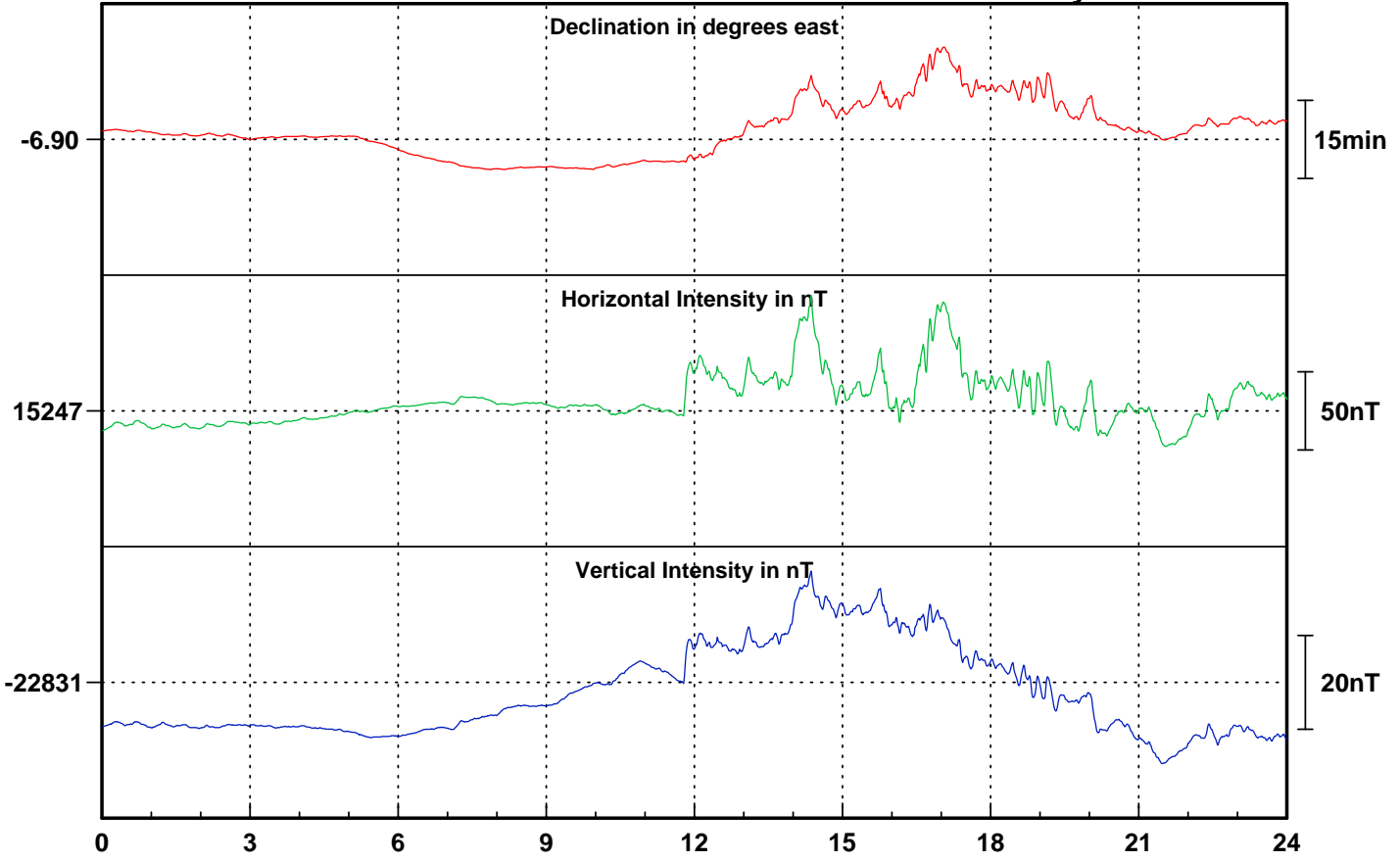
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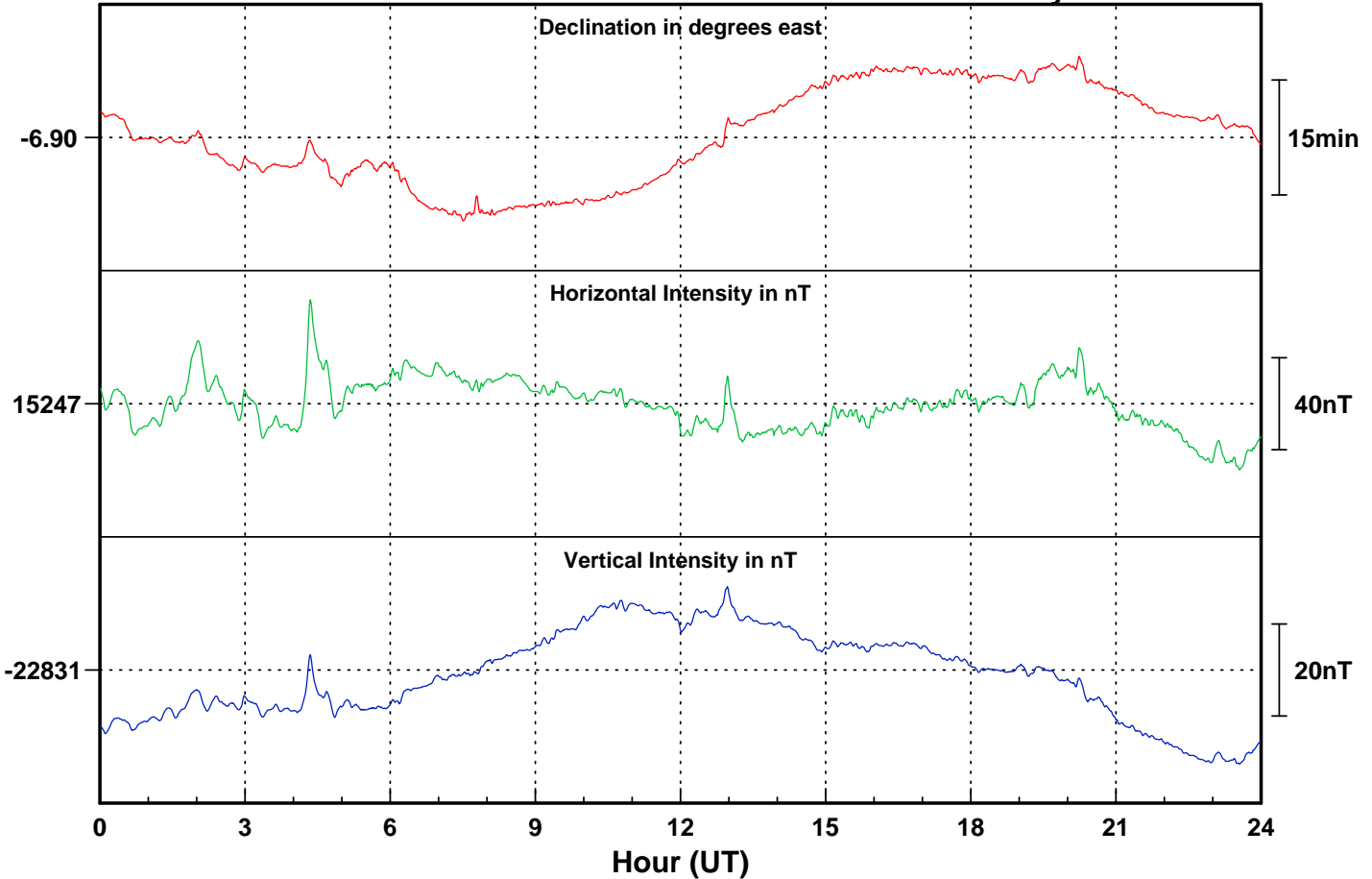
King Edward Point

Day number: 349



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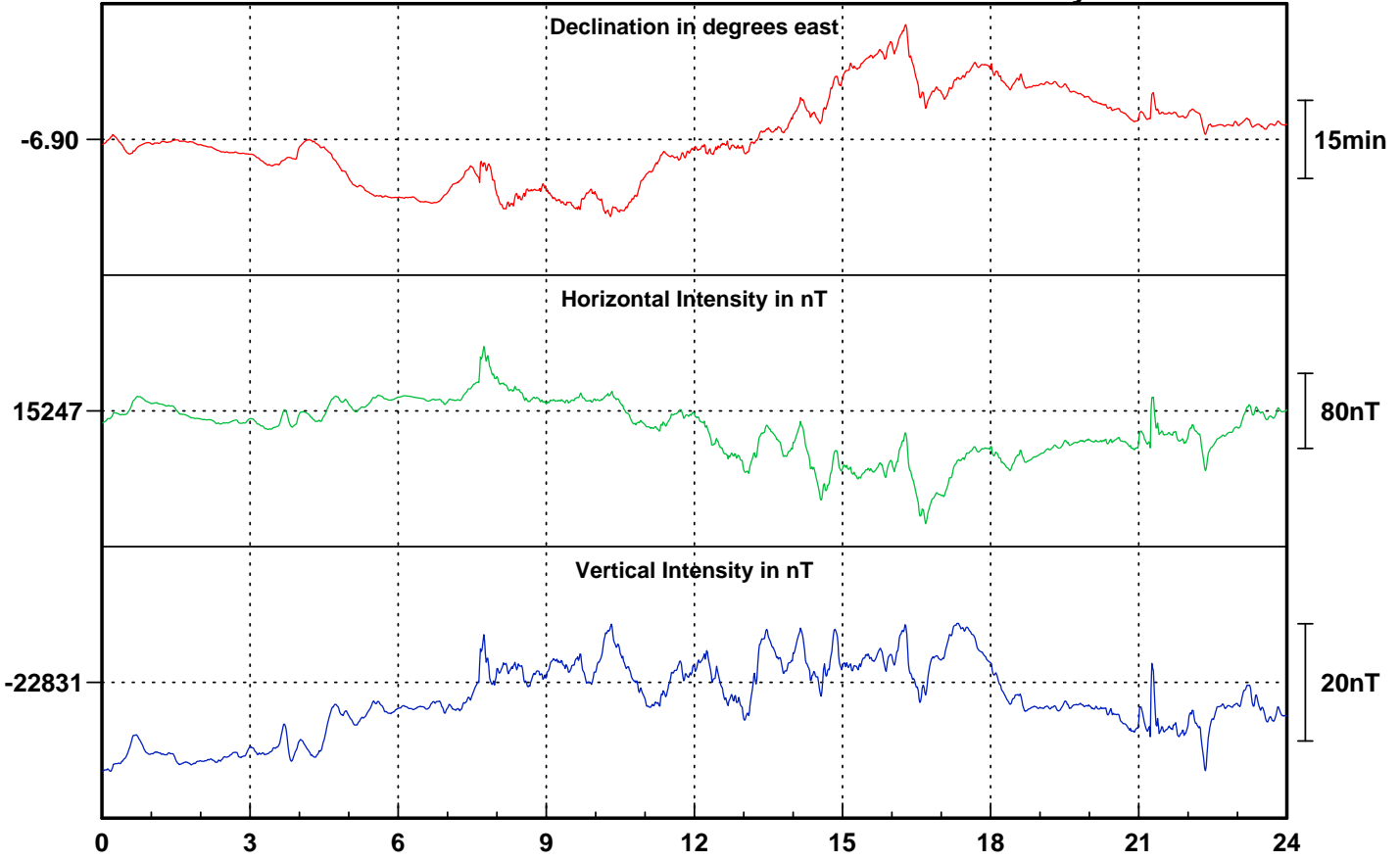
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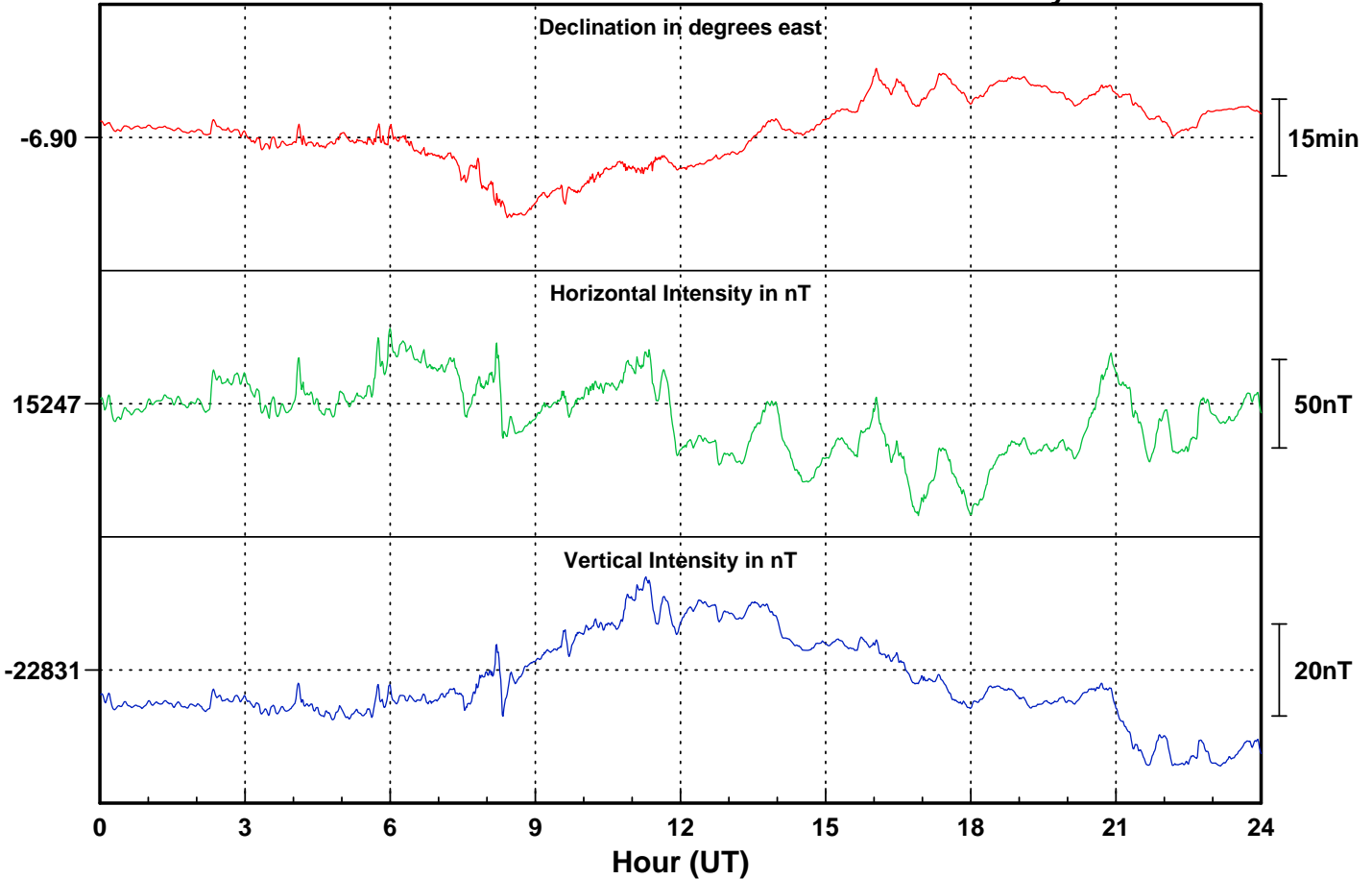
King Edward Point

Day number: 351



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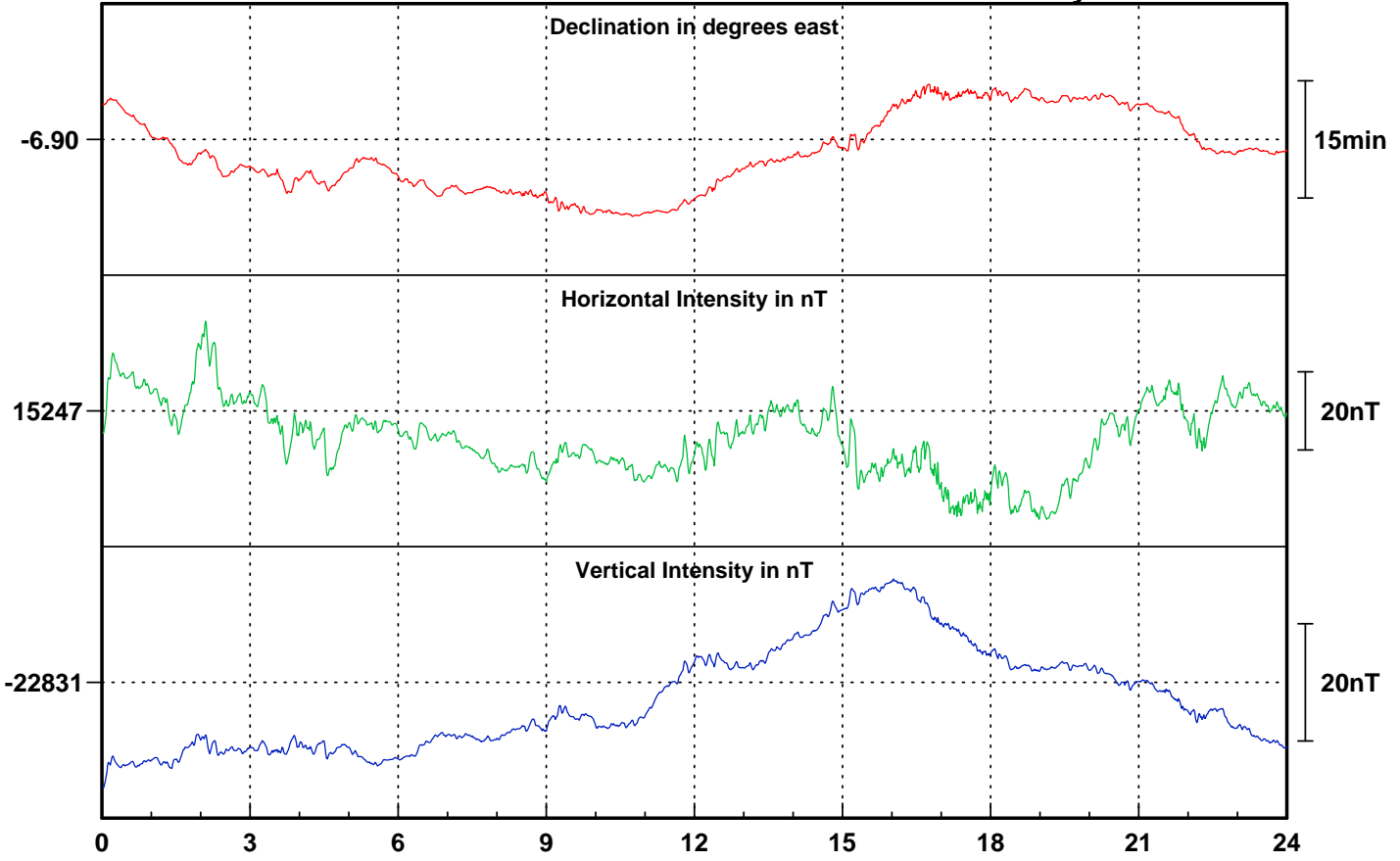
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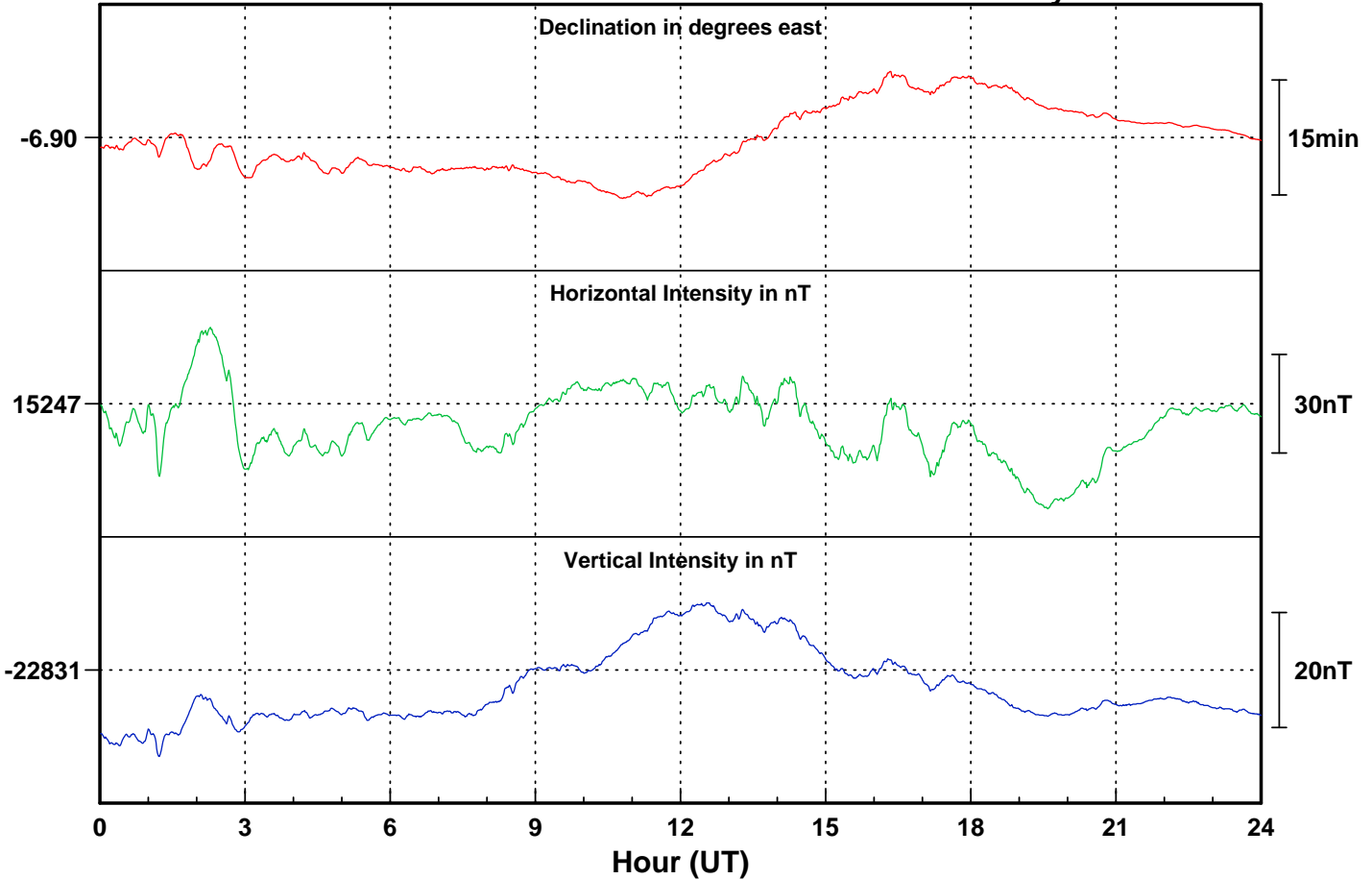
King Edward Point

Day number: 353



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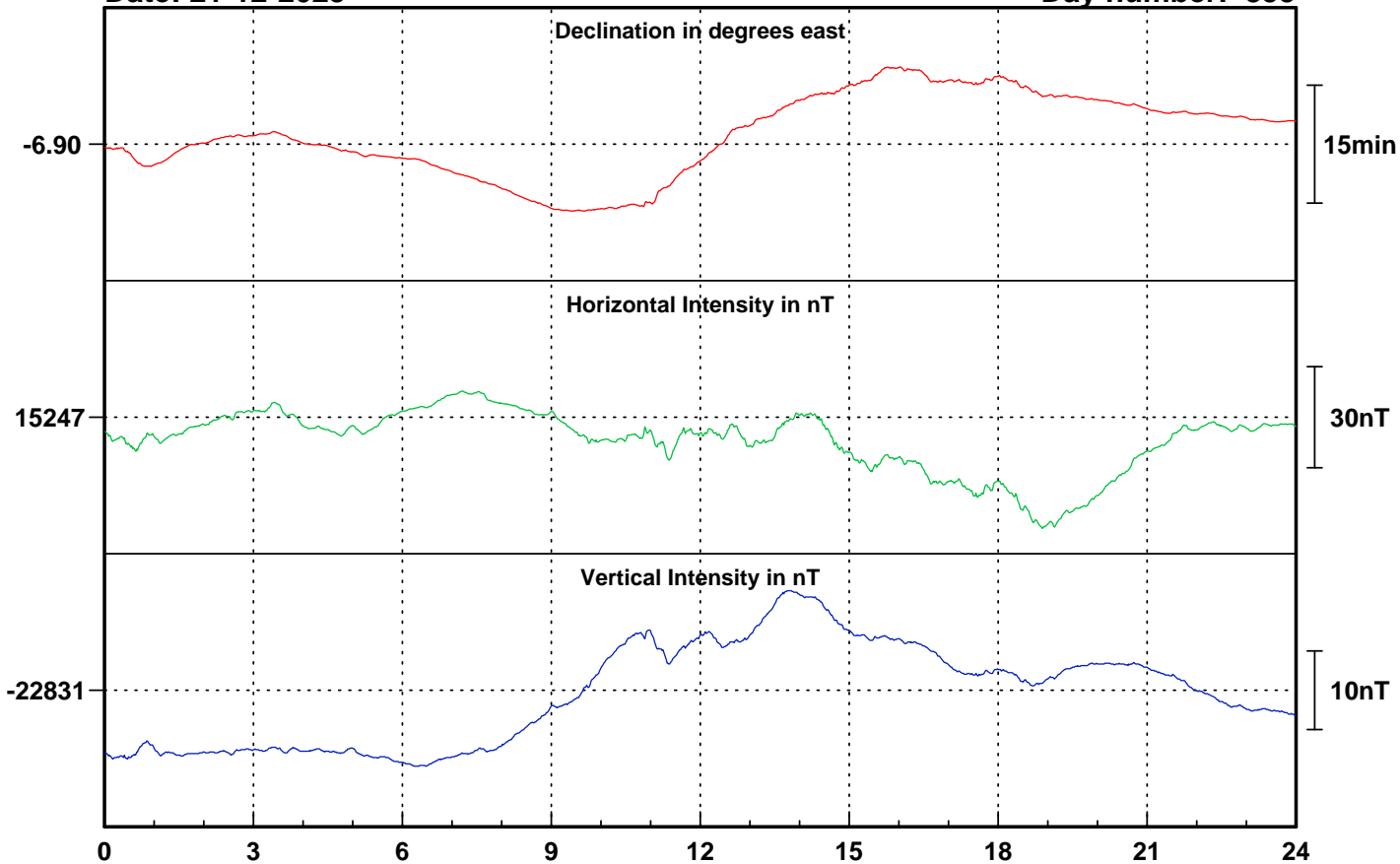
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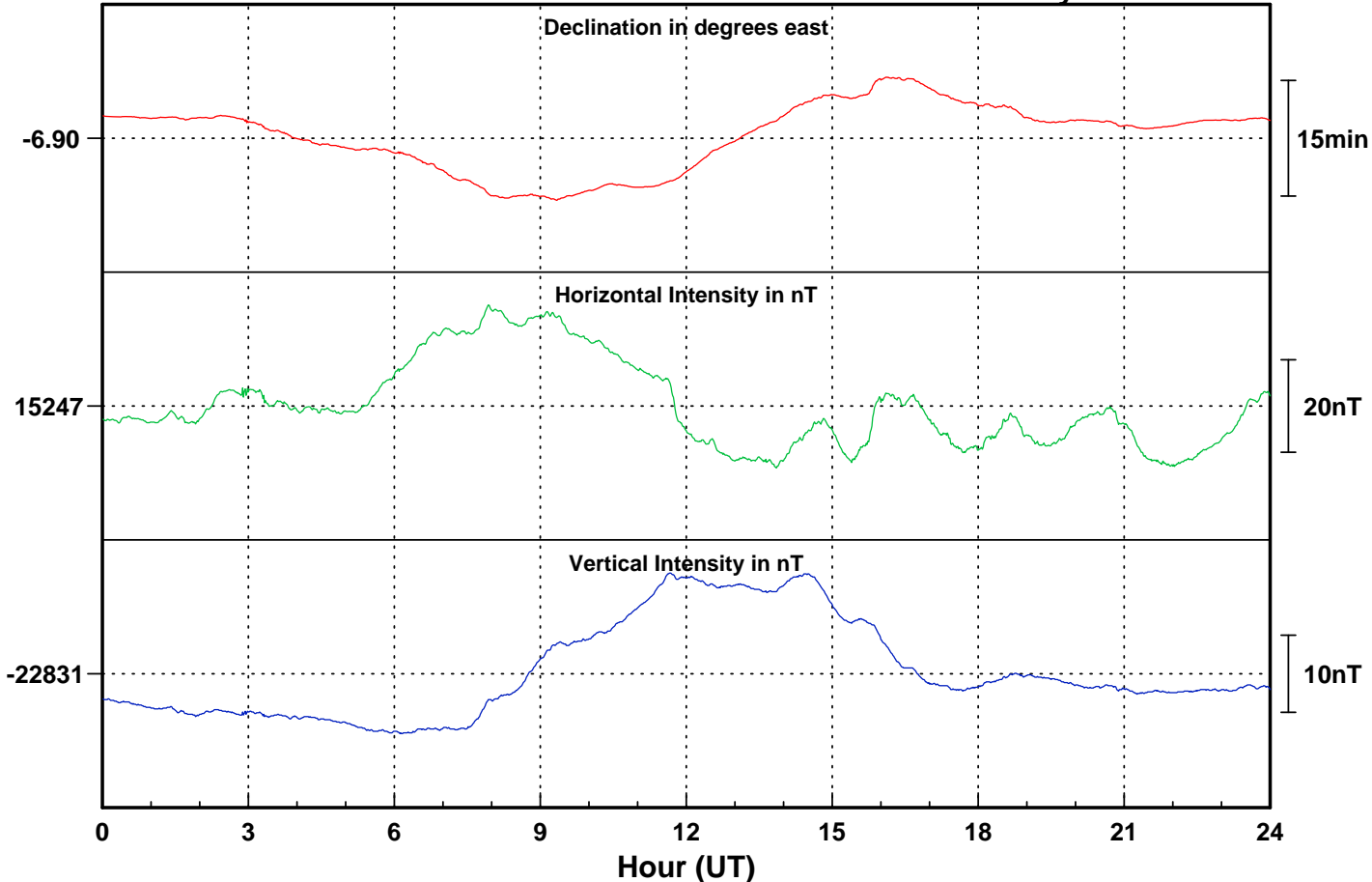
King Edward Point

Day number: 355



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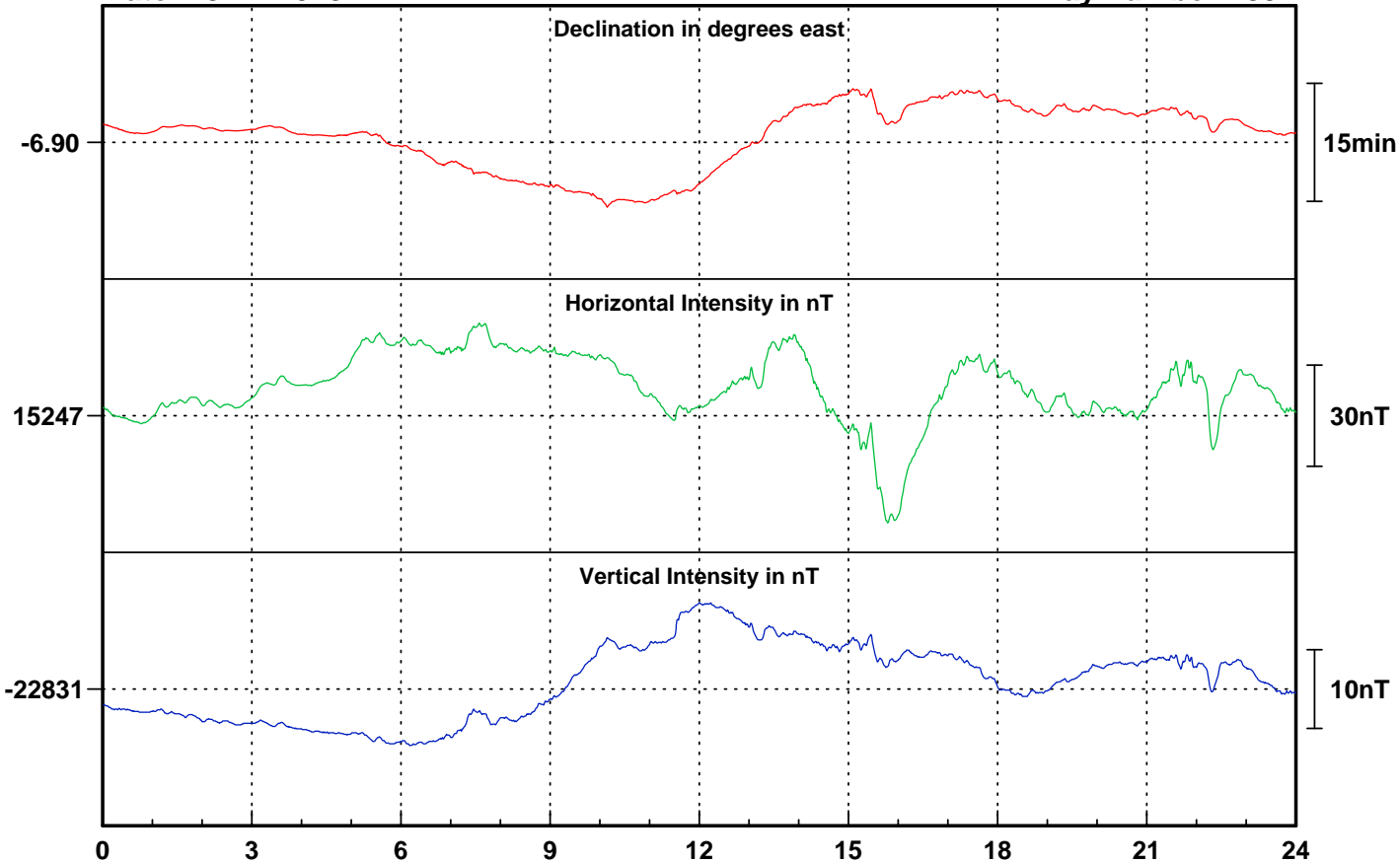
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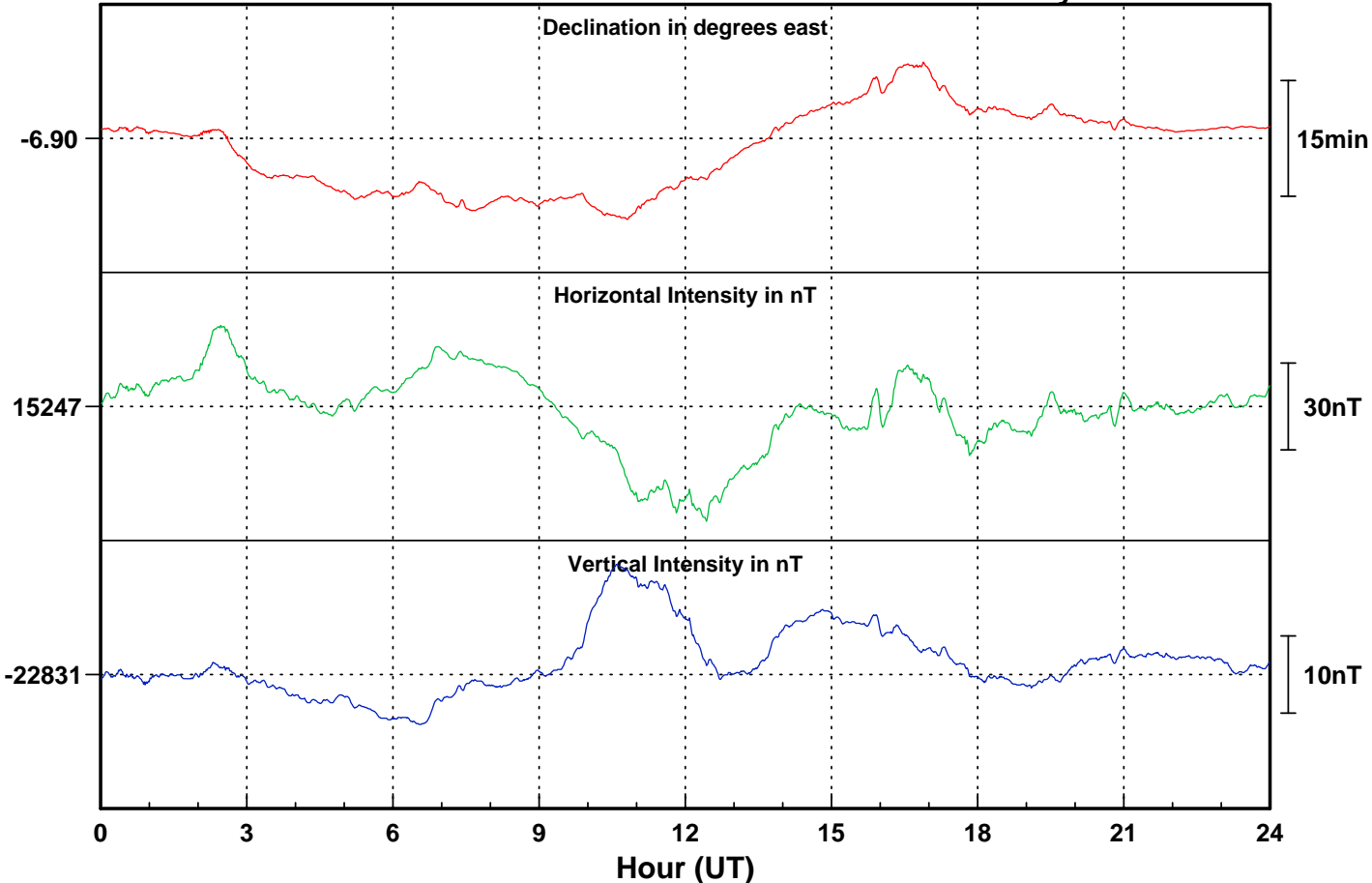
King Edward Point

Day number: 357



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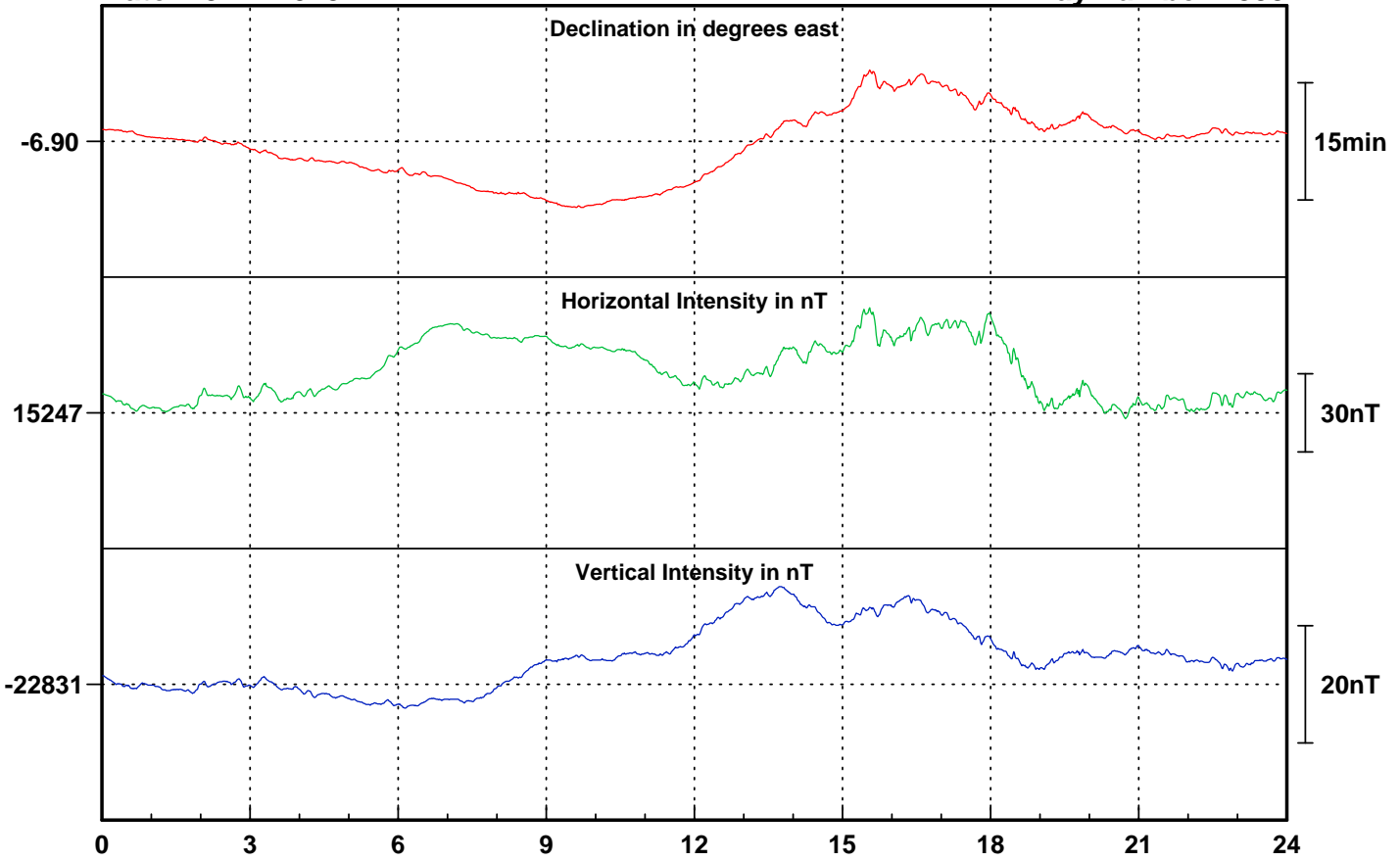
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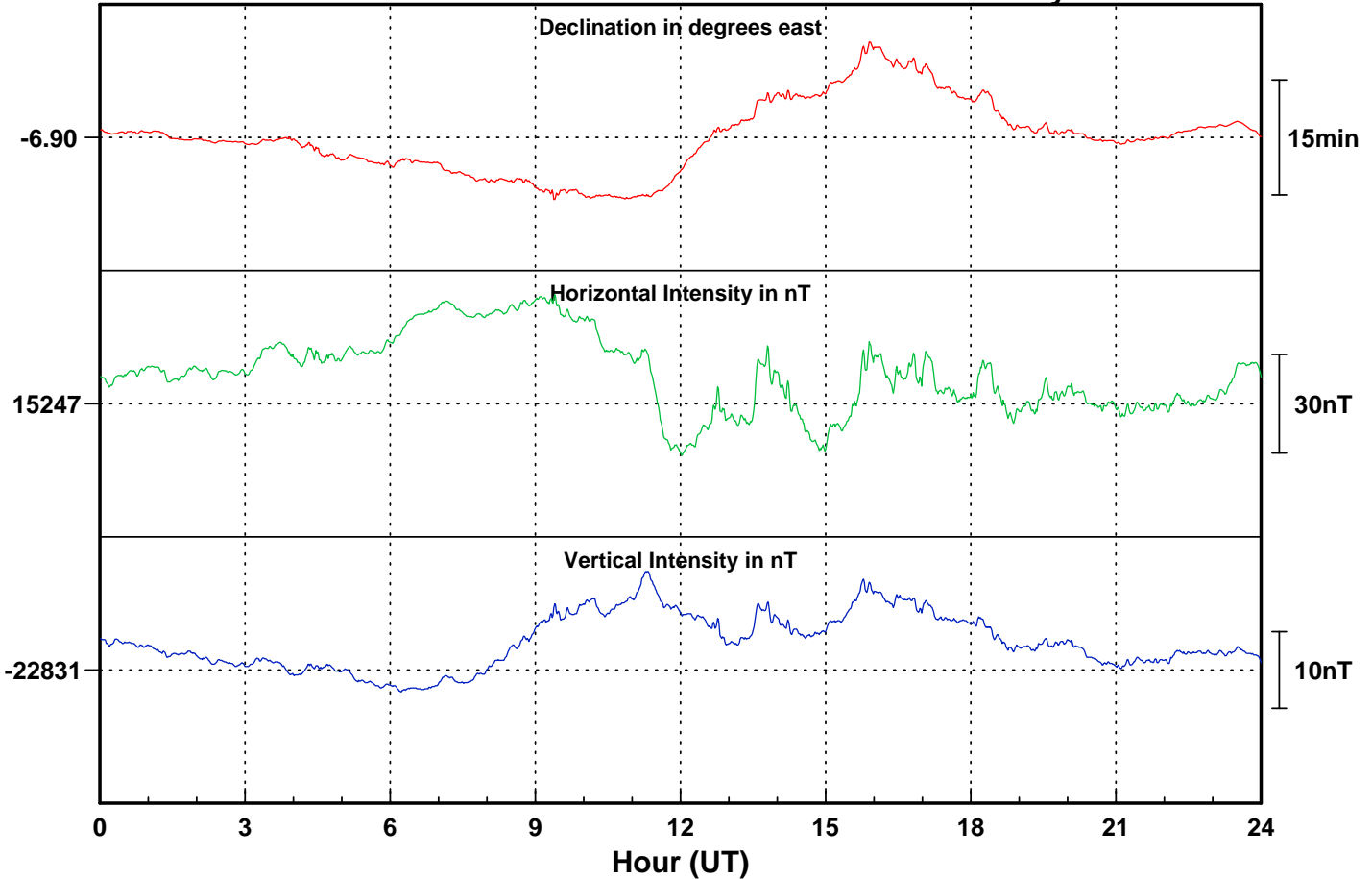
King Edward Point

Day number: 359



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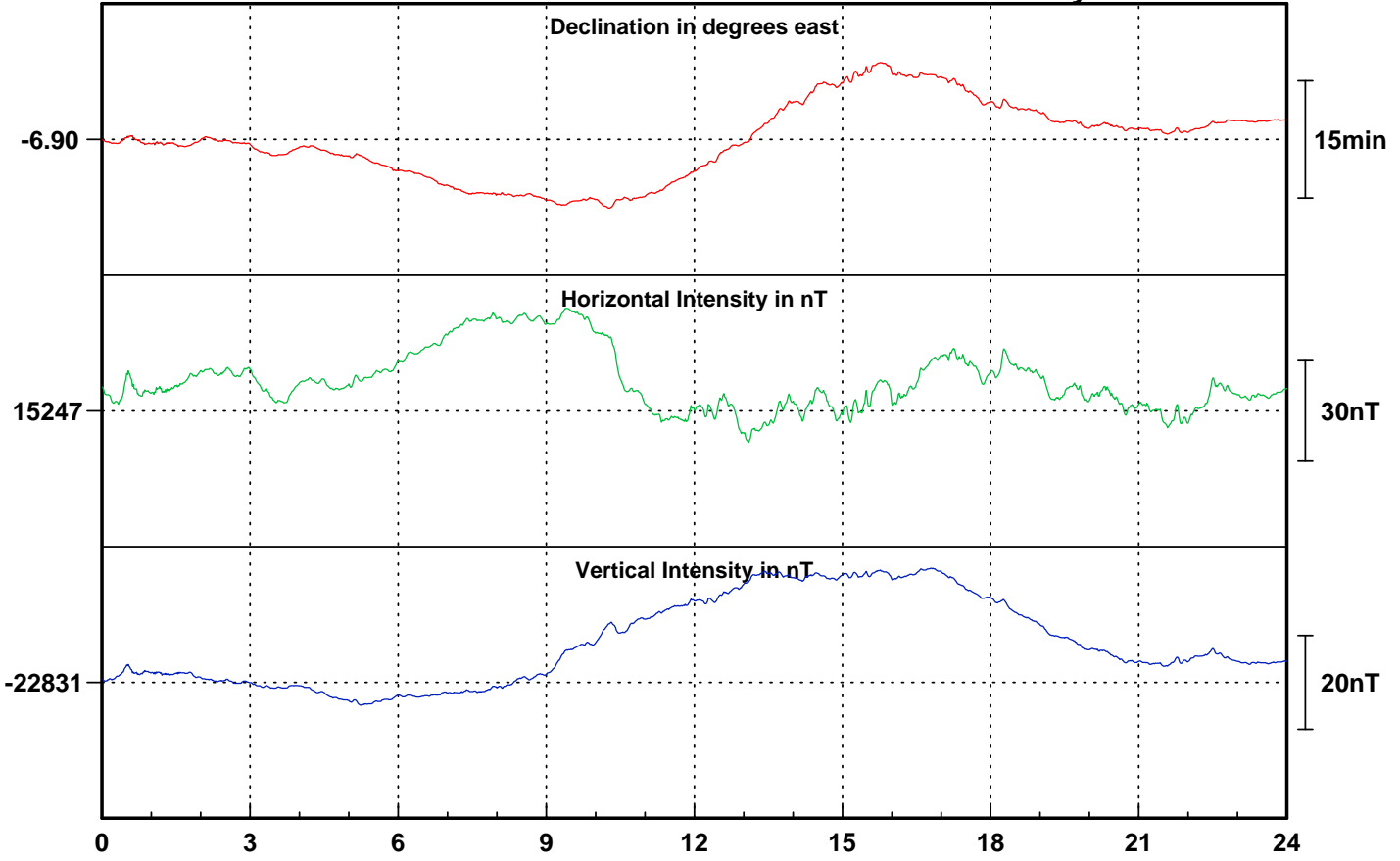
Day number: 360



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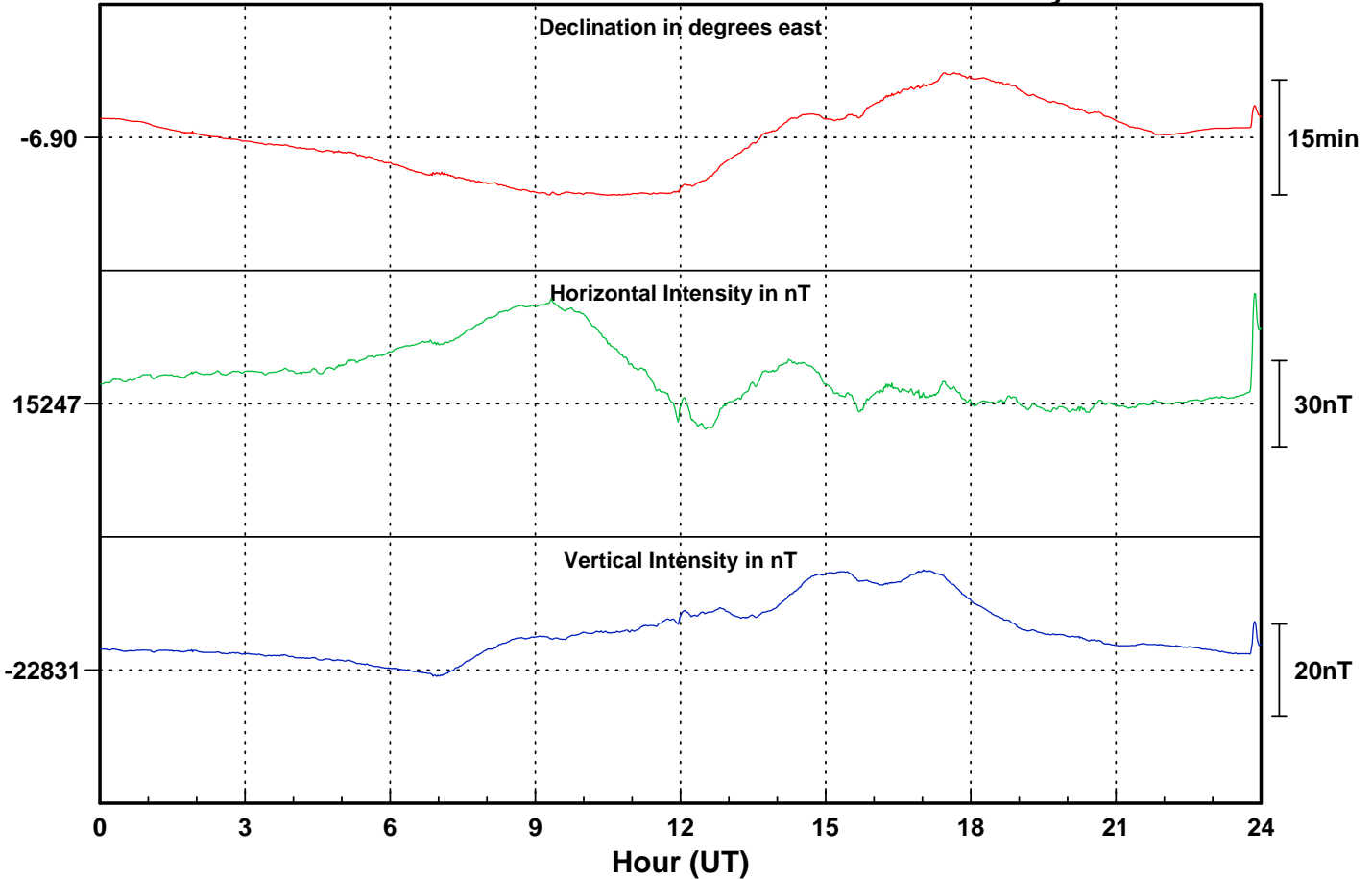
King Edward Point

Day number: 361



Date: 28-12-2023

Day number: 362

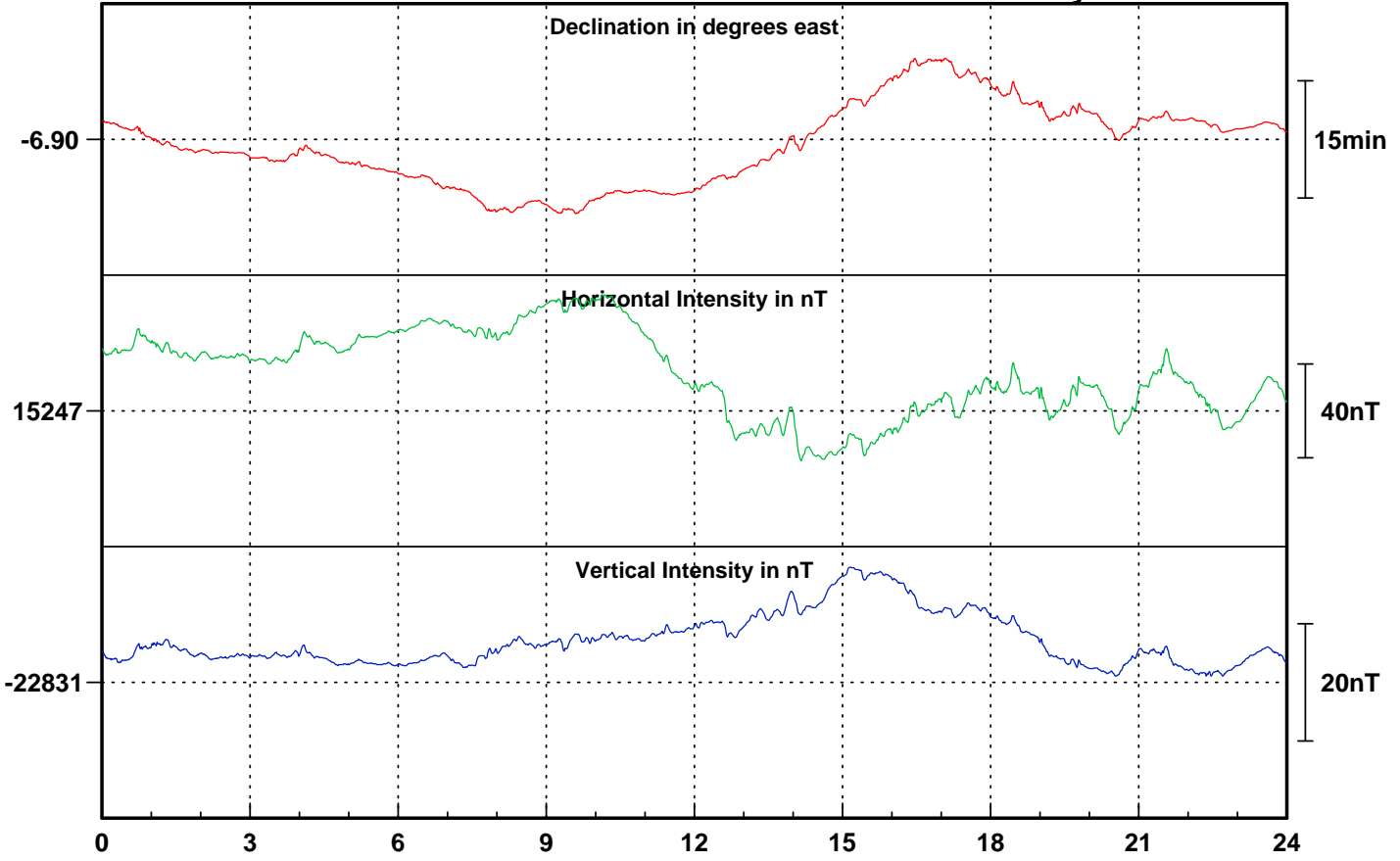


Hour (UT)

Date: 29-12-2023

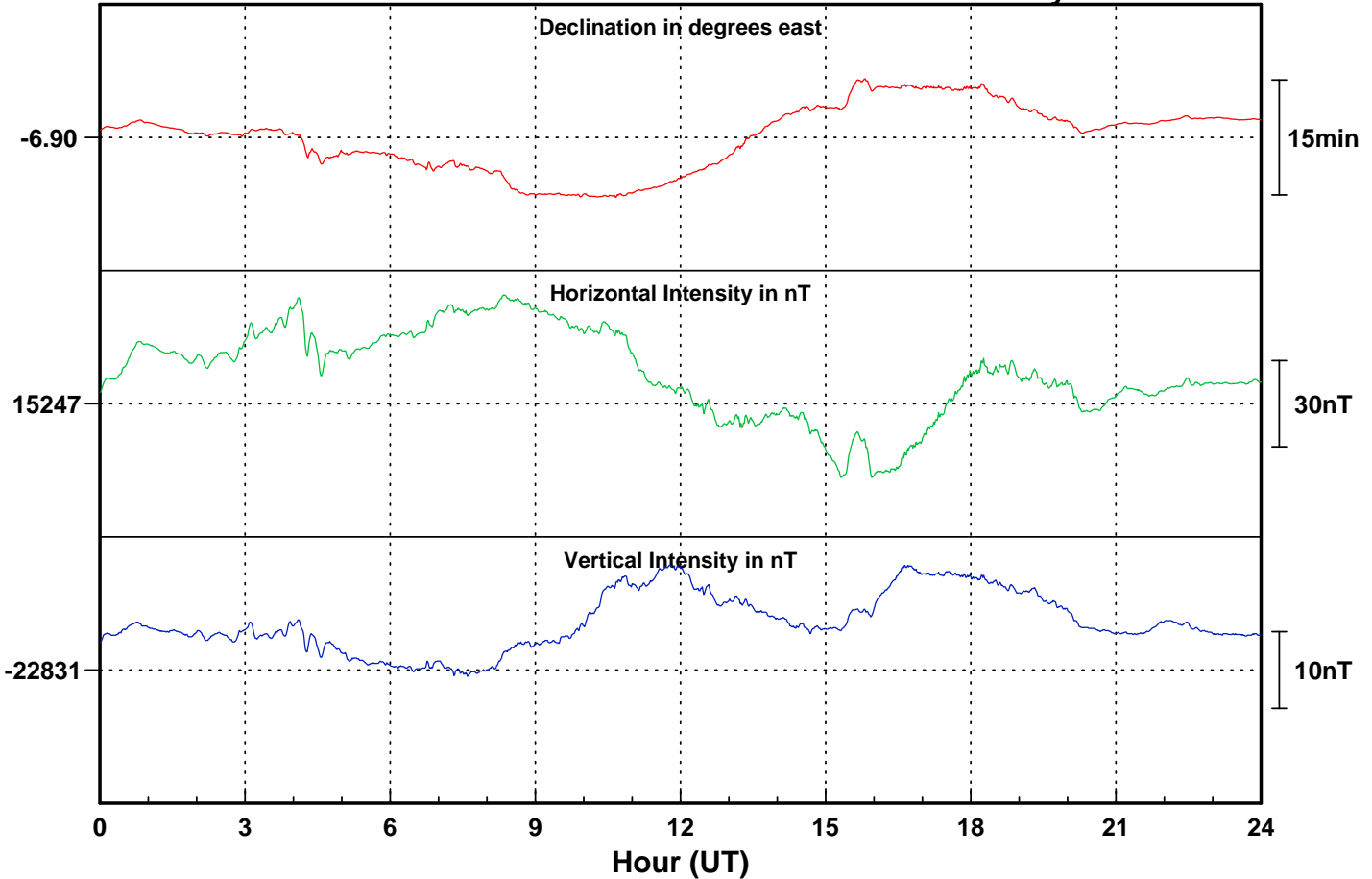
King Edward Point

Day number: 363



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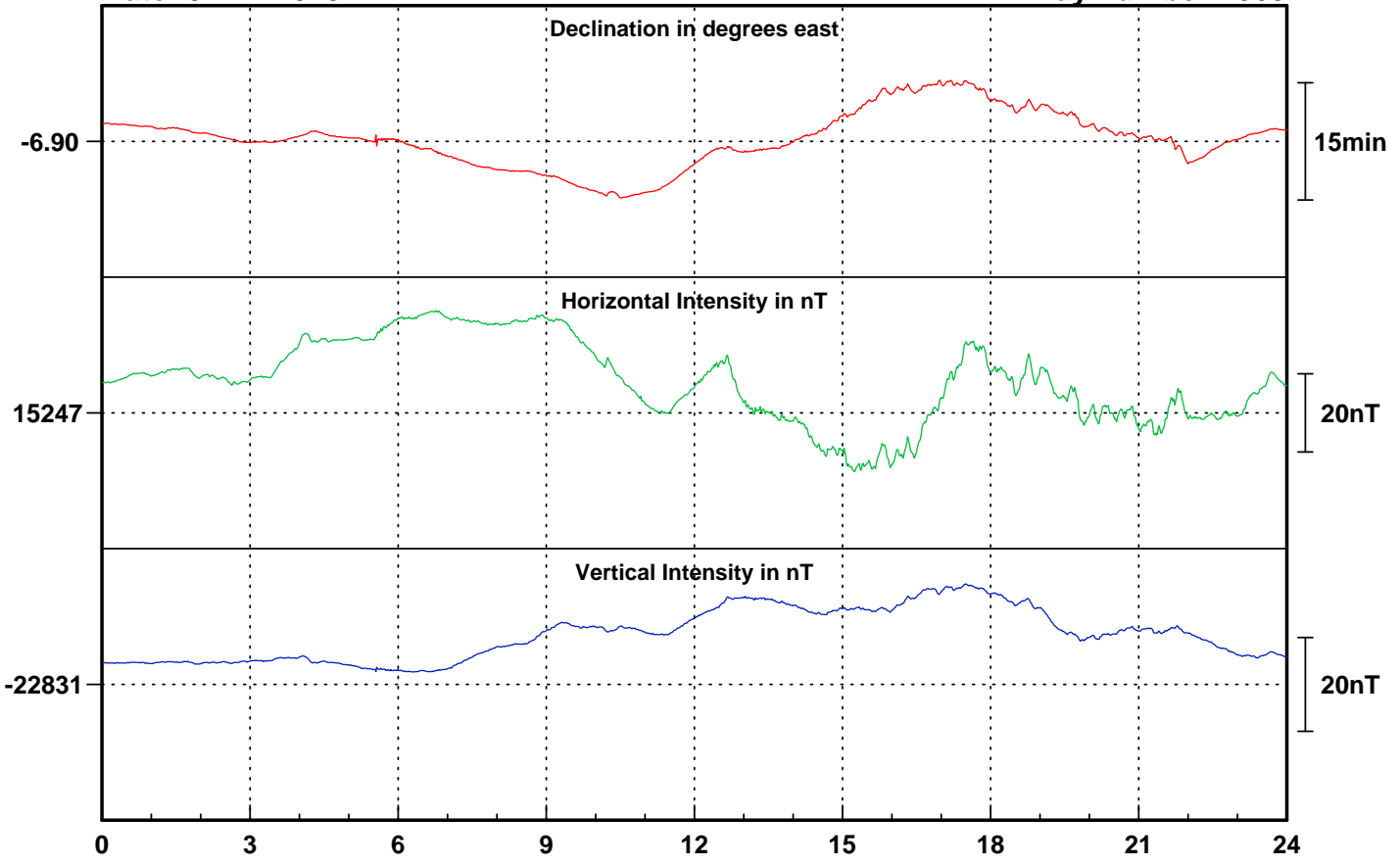
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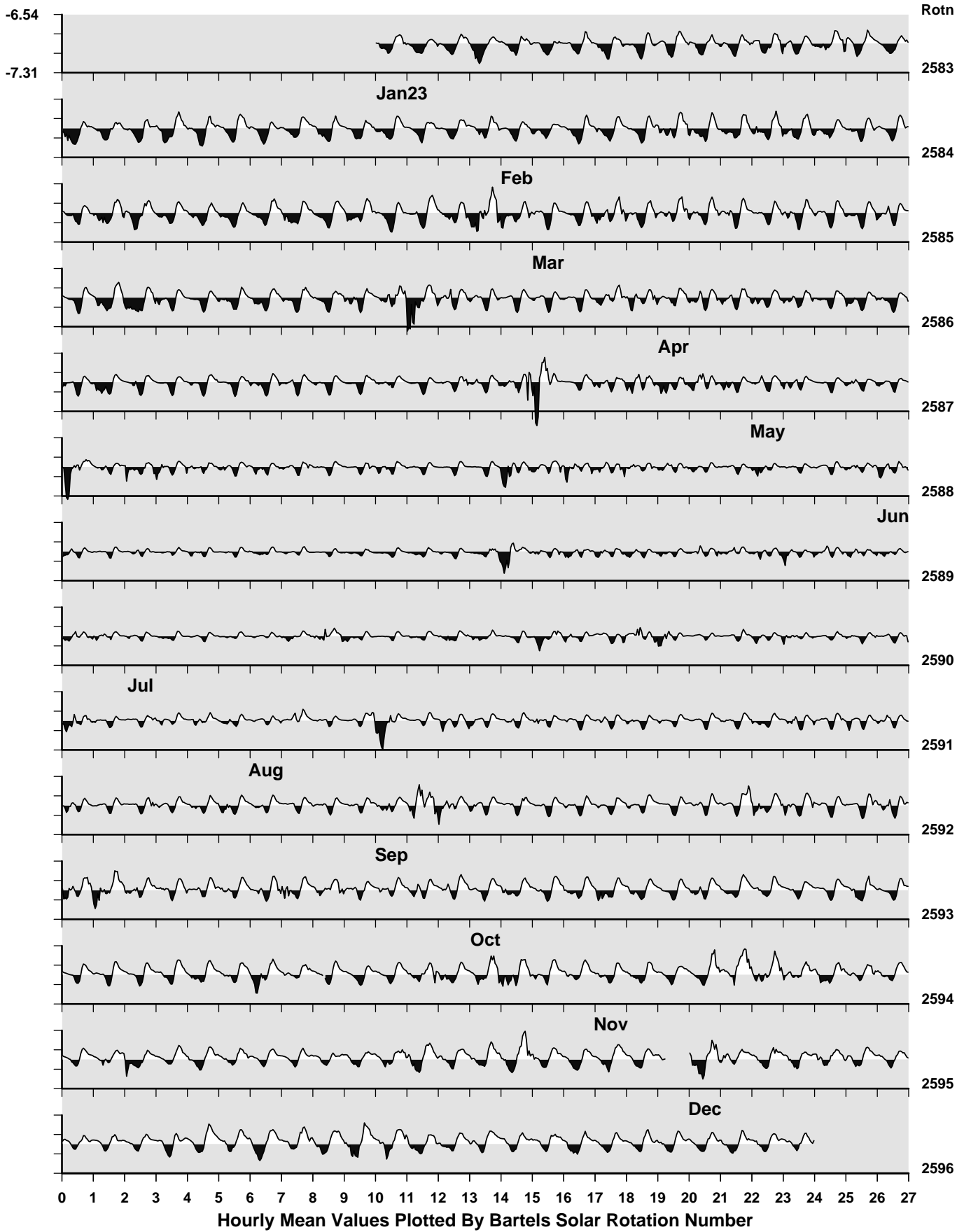
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King Edward Point

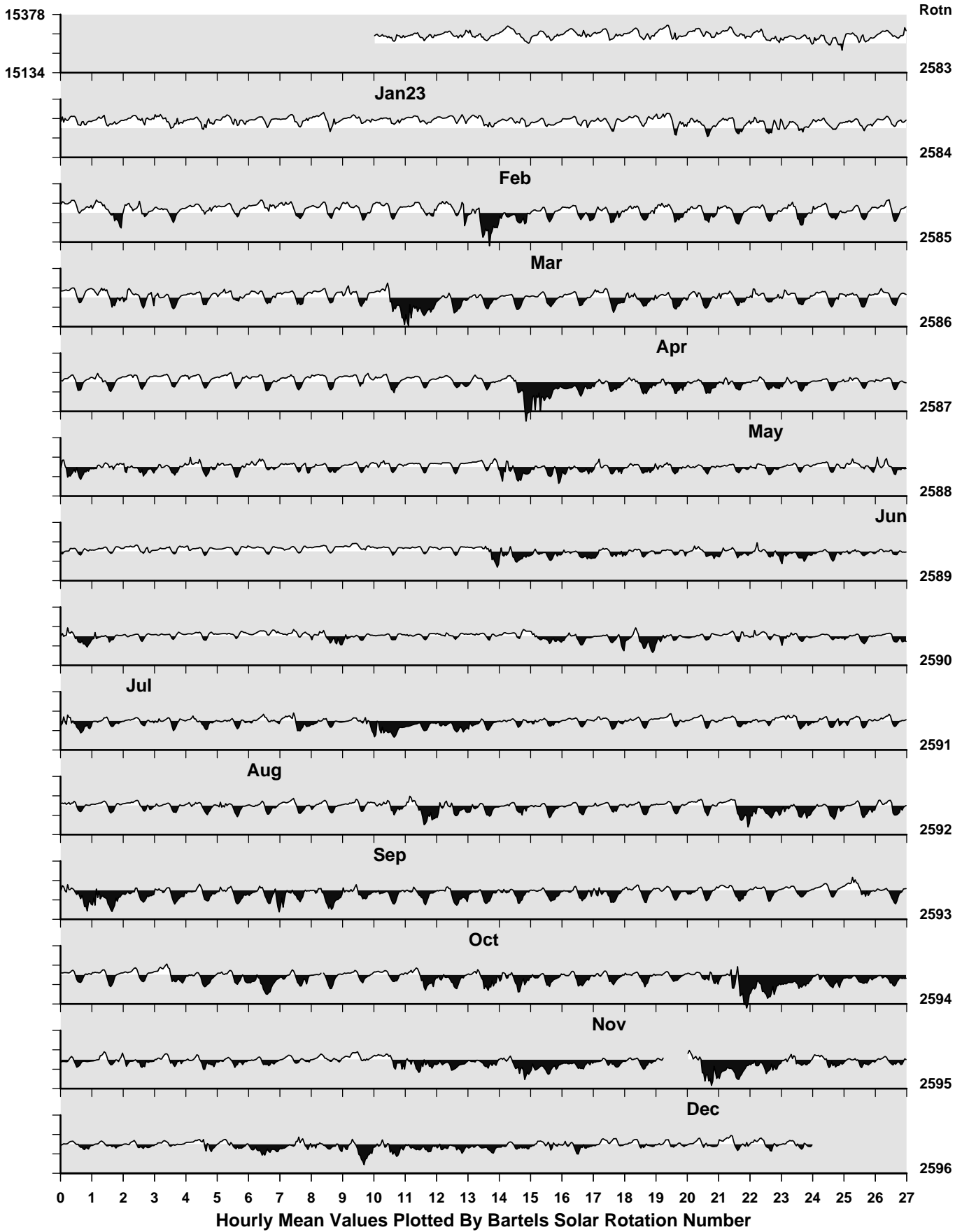
Day number: 365



King Edward Point Observatory: Declination (degrees)

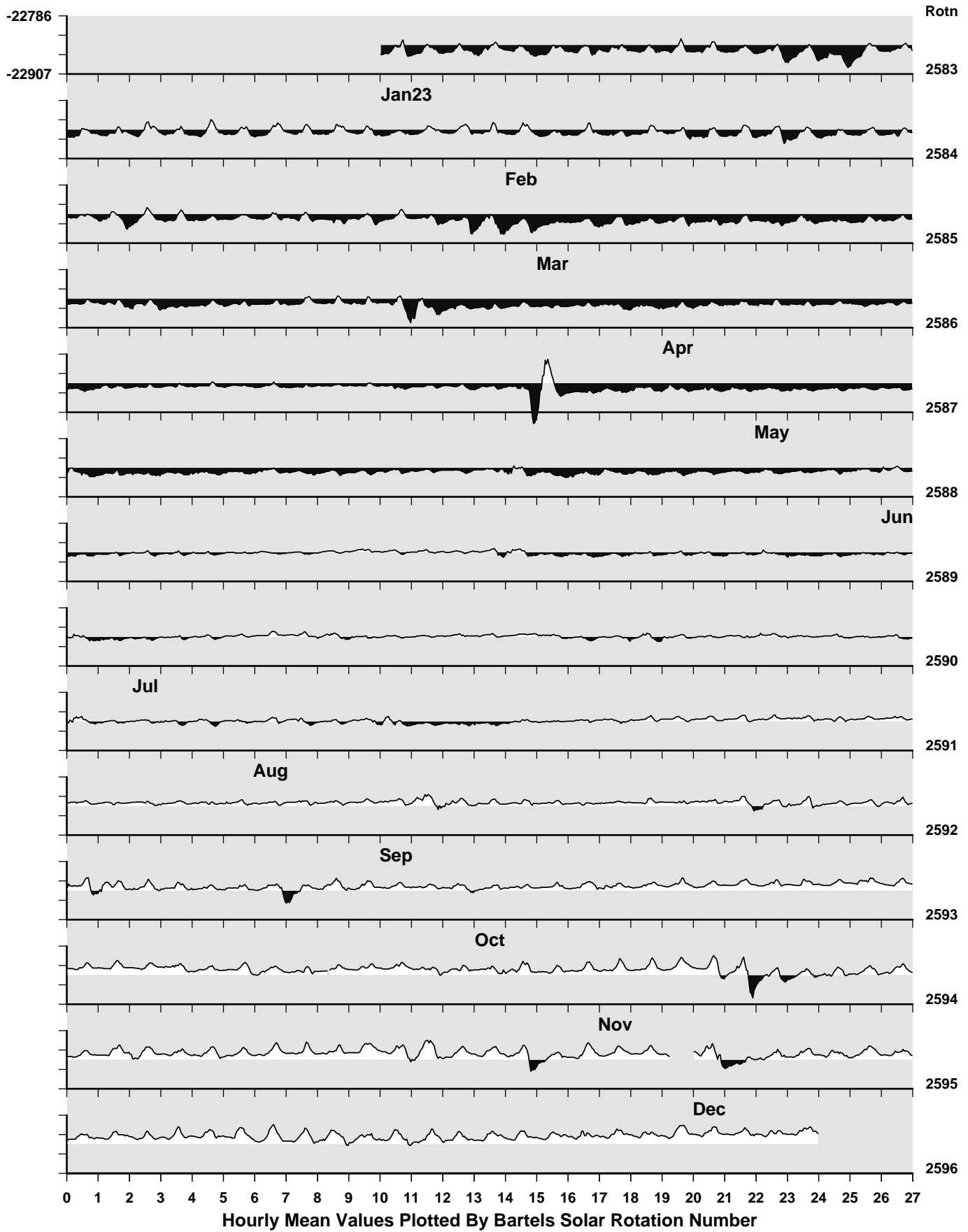


King Edward Point Observatory: Horizontal Intensity (nT)



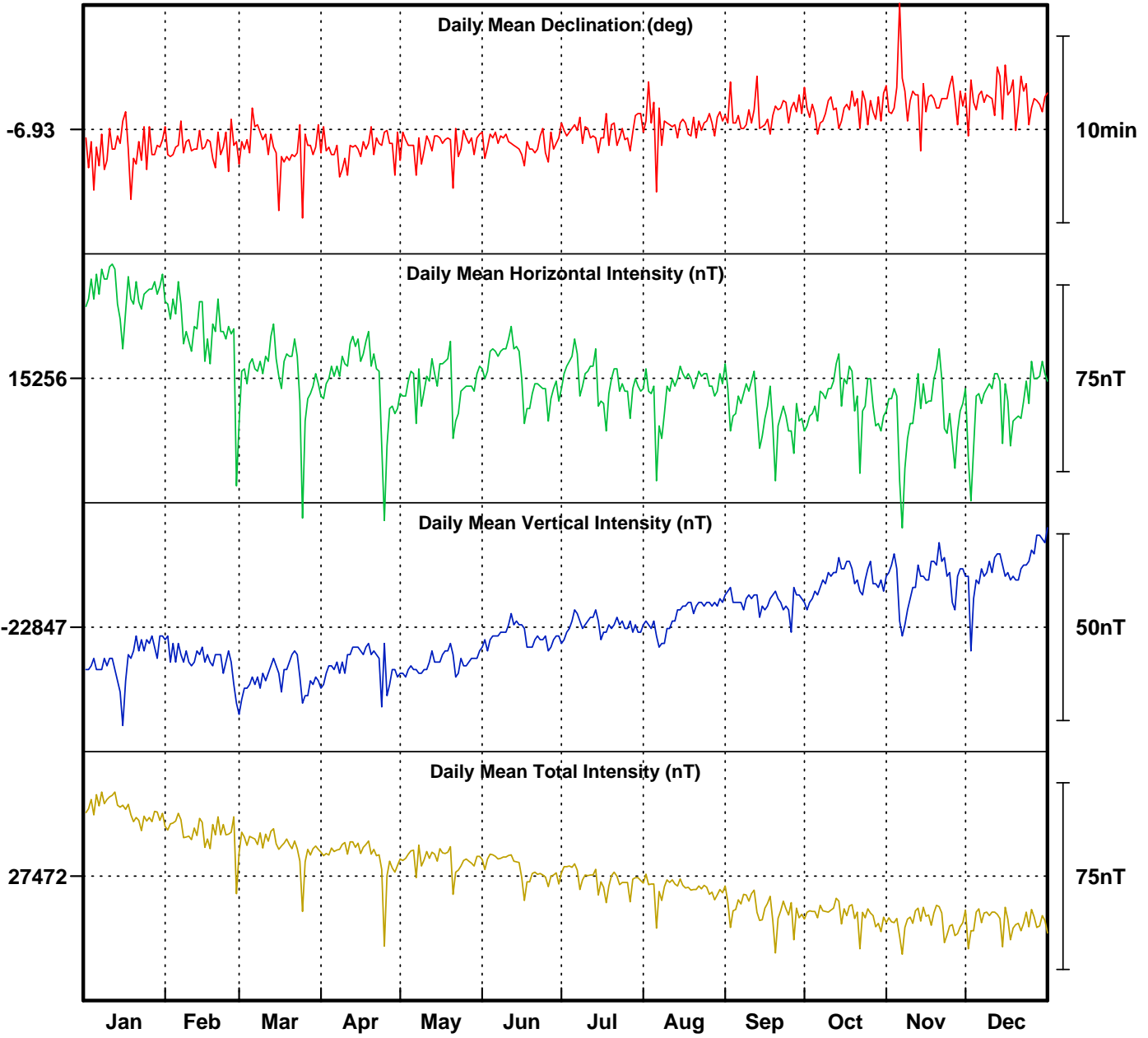
Hourly Mean Values Plotted By Bartels Solar Rotation Number

King Edward Point Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

King Edward Point Observatory 2023



Monthly mean values for King Edward Point Observatory 2023

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-6° 56.7′	15291 nT	-56° 13.0′	15179 nT	-1849 nT	-22855 nT	27499 nT
February	-6° 56.6′	15274 nT	-56° 14.8′	15162 nT	-1846 nT	-22856 nT	27490 nT
March	-6° 56.7′	15258 nT	-56° 16.8′	15146 nT	-1845 nT	-22860 nT	27484 nT
April	-6° 56.7′	15256 nT	-56° 16.7′	15144 nT	-1845 nT	-22856 nT	27480 nT
May	-6° 56.4′	15254 nT	-56° 16.9′	15142 nT	-1843 nT	-22856 nT	27479 nT
June	-6° 56.4′	15258 nT	-56° 16.0′	15146 nT	-1844 nT	-22849 nT	27475 nT
July	-6° 55.8′	15255 nT	-56° 16.1′	15144 nT	-1841 nT	-22846 nT	27471 nT
August	-6° 55.4′	15252 nT	-56° 16.2′	15141 nT	-1838 nT	-22843 nT	27467 nT
September	-6° 54.8′	15242 nT	-56° 17.0′	15131 nT	-1834 nT	-22840 nT	27458 nT
October	-6° 54.6′	15247 nT	-56° 16.0′	15136 nT	-1834 nT	-22834 nT	27457 nT
November	-6° 53.9′	15242 nT	-56° 16.6′	15132 nT	-1831 nT	-22834 nT	27454 nT
December	-6° 54.0′	15247 nT	-56° 15.8′	15137 nT	-1832 nT	-22831 nT	27454 nT

Note:

i. The values shown here are provisional.