

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

# Observatory

# Monthly

# Magnetic

# Bulletin

**December 2015**

**15/12/AS**



**British Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

# ASCENSION ISLAND OBSERVATORY MAGNETIC DATA

## 1. Introduction

Ascension Island observatory was installed by the British Geological Survey (BGS) with financial support from a consortium of oil companies and became operational in September 1992.

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

Ascension Island Observatory, one of the geomagnetic observatories maintained and operated by BGS, is situated on a site adjacent to the Cable and Wireless Earth Station on Donkey Plain. The observatory co-ordinates are:

*Geographic:*  $7^{\circ}56'58''S$   $345^{\circ}37'27''E$   
*Geomagnetic:*  $2^{\circ}48'32''S$   $057^{\circ}31'48''E$   
*Height above mean sea level:* 177 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 2015.5. 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 August 2002. 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](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. Two sets 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

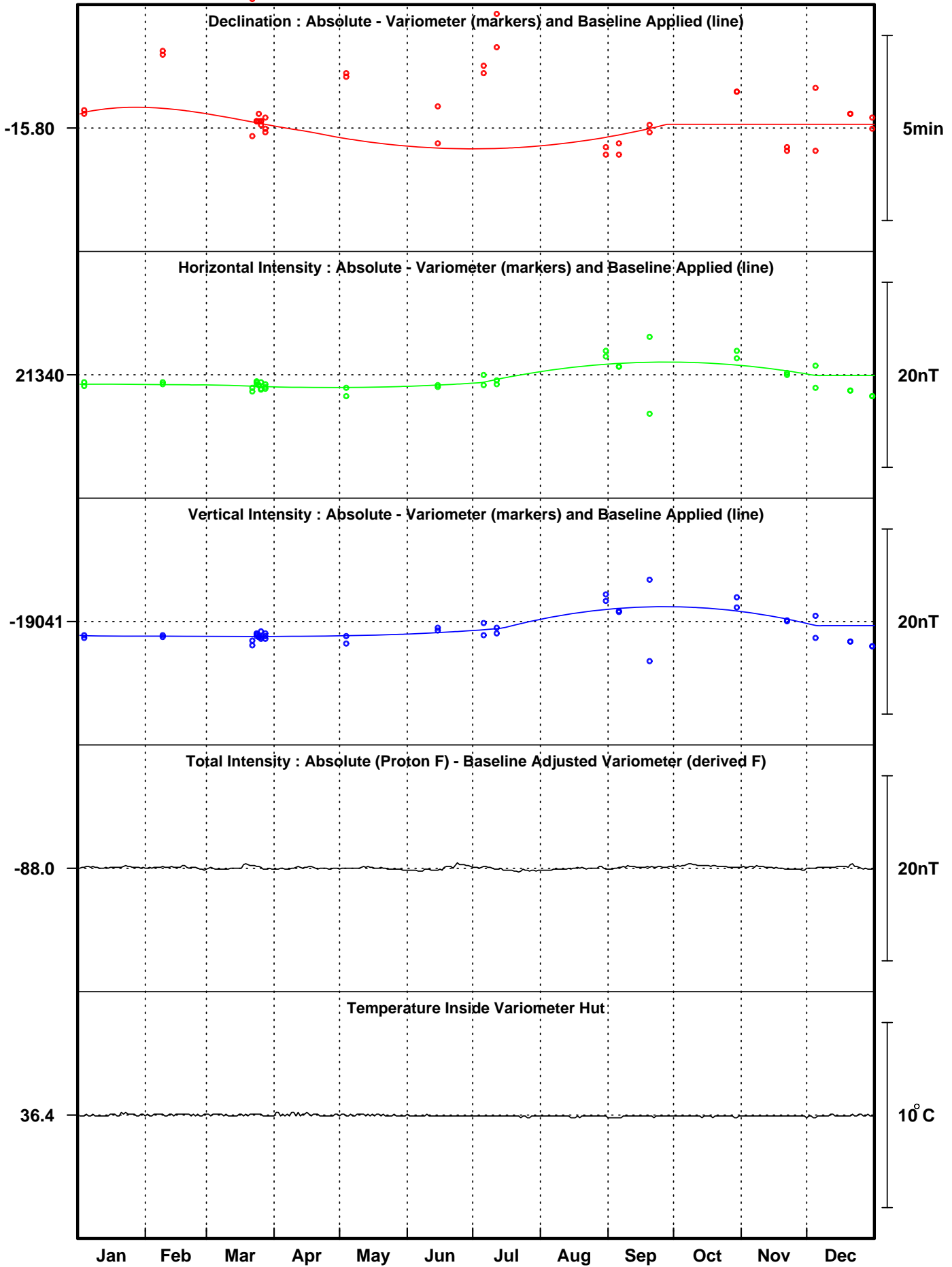
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Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at [www.geomag.bgs.ac.uk/contactus/staff](http://www.geomag.bgs.ac.uk/contactus/staff)



# Ascension Island 2015

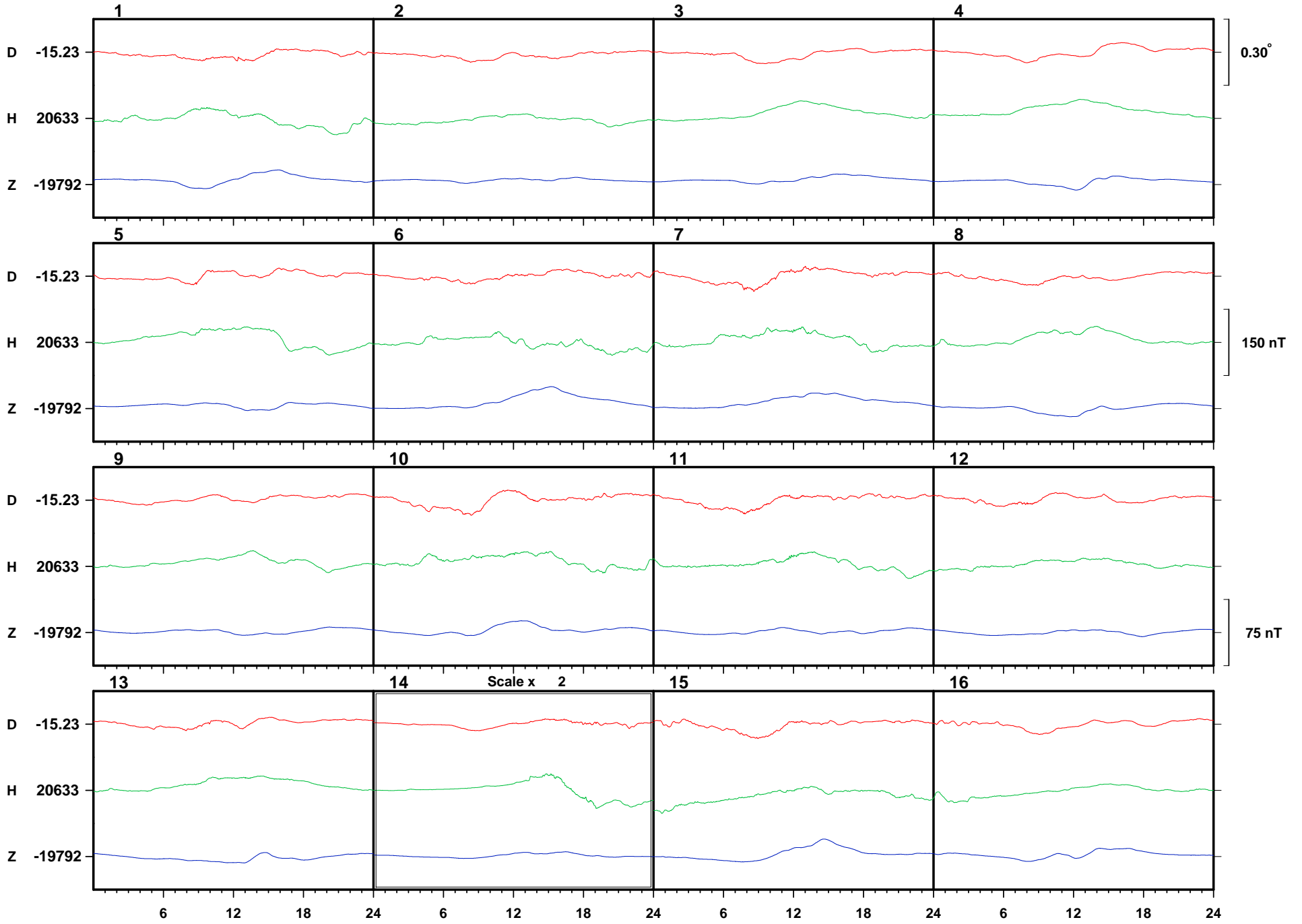


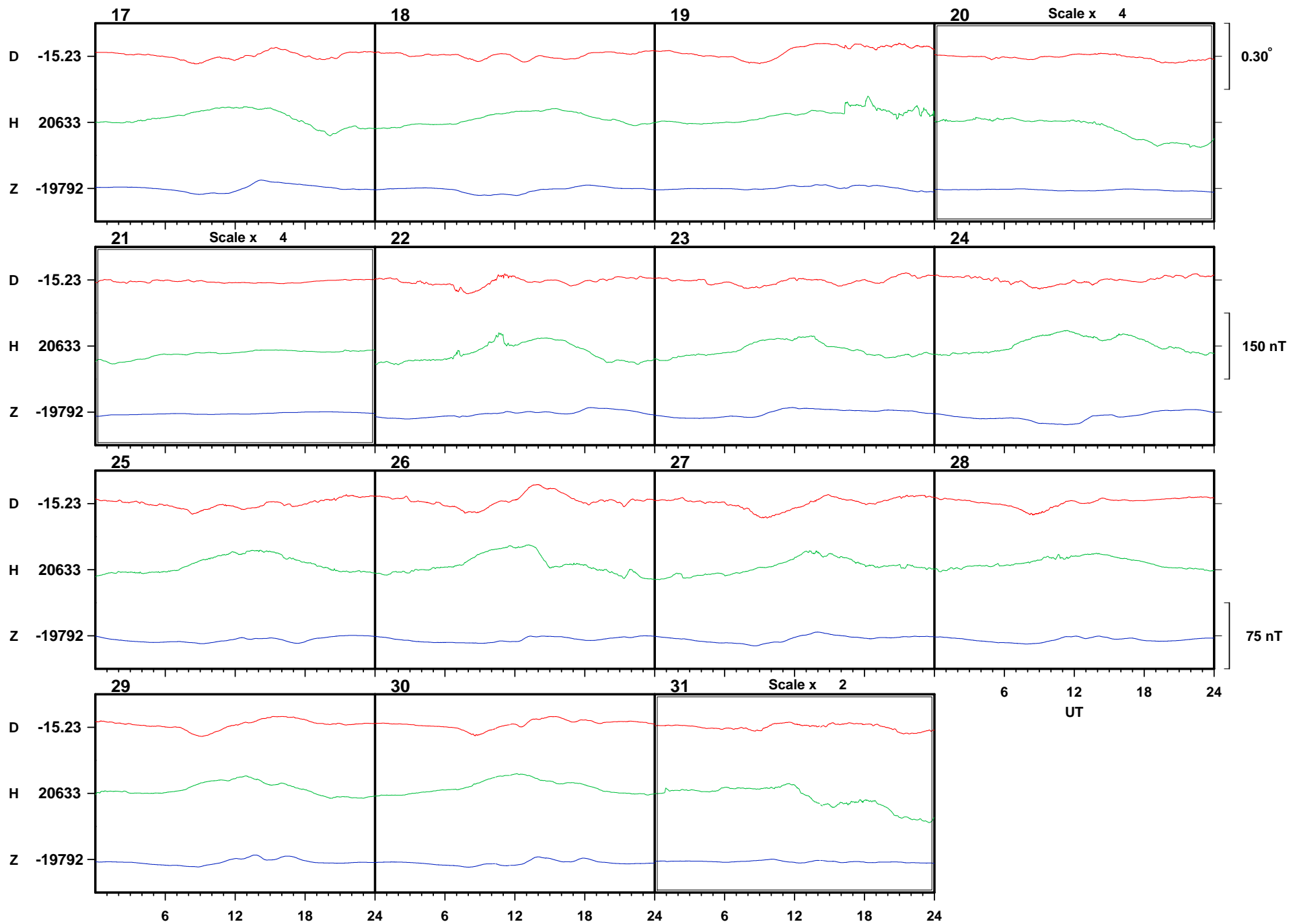


Ascension Island

December

2015





Ascension Island

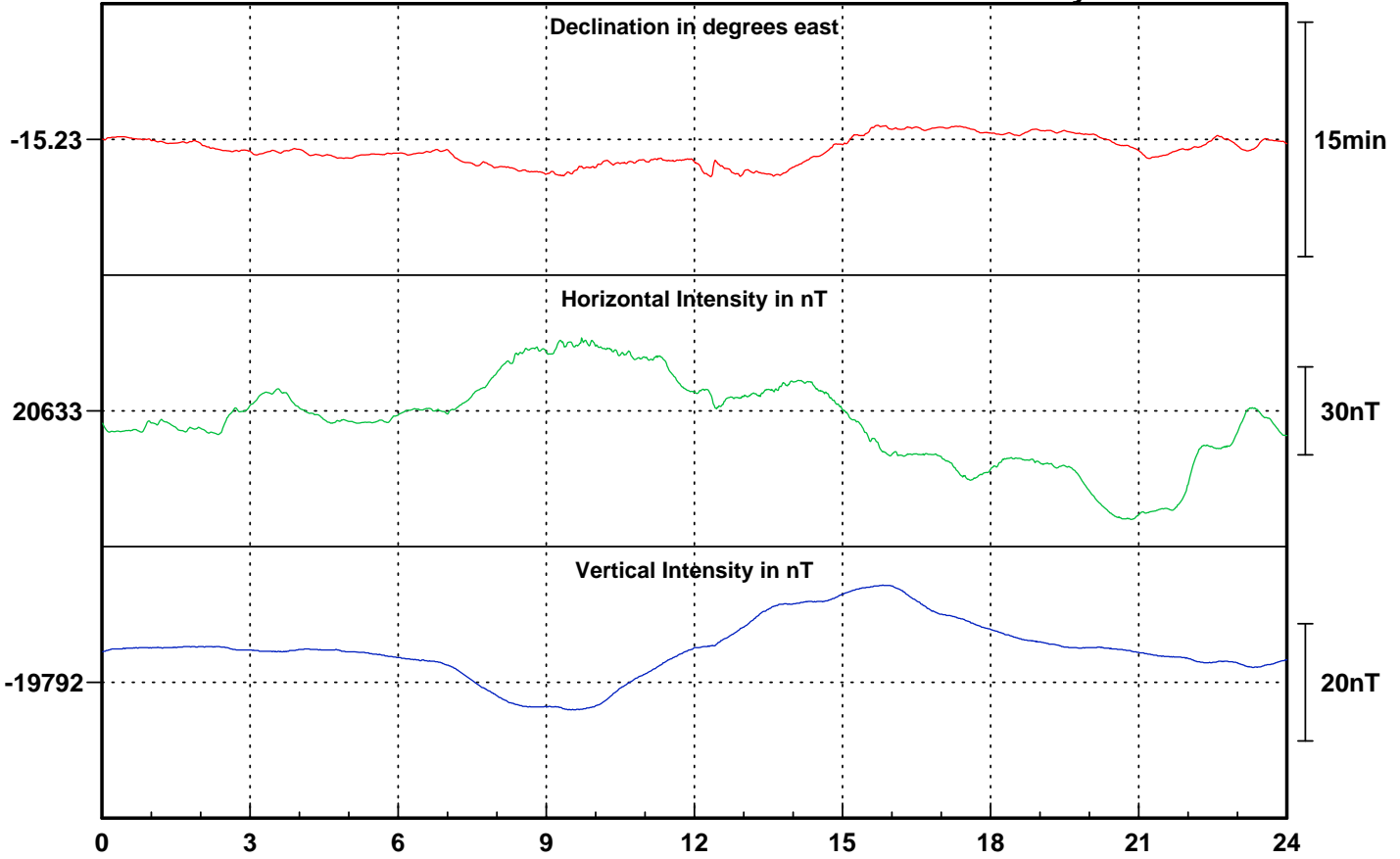
December

2015

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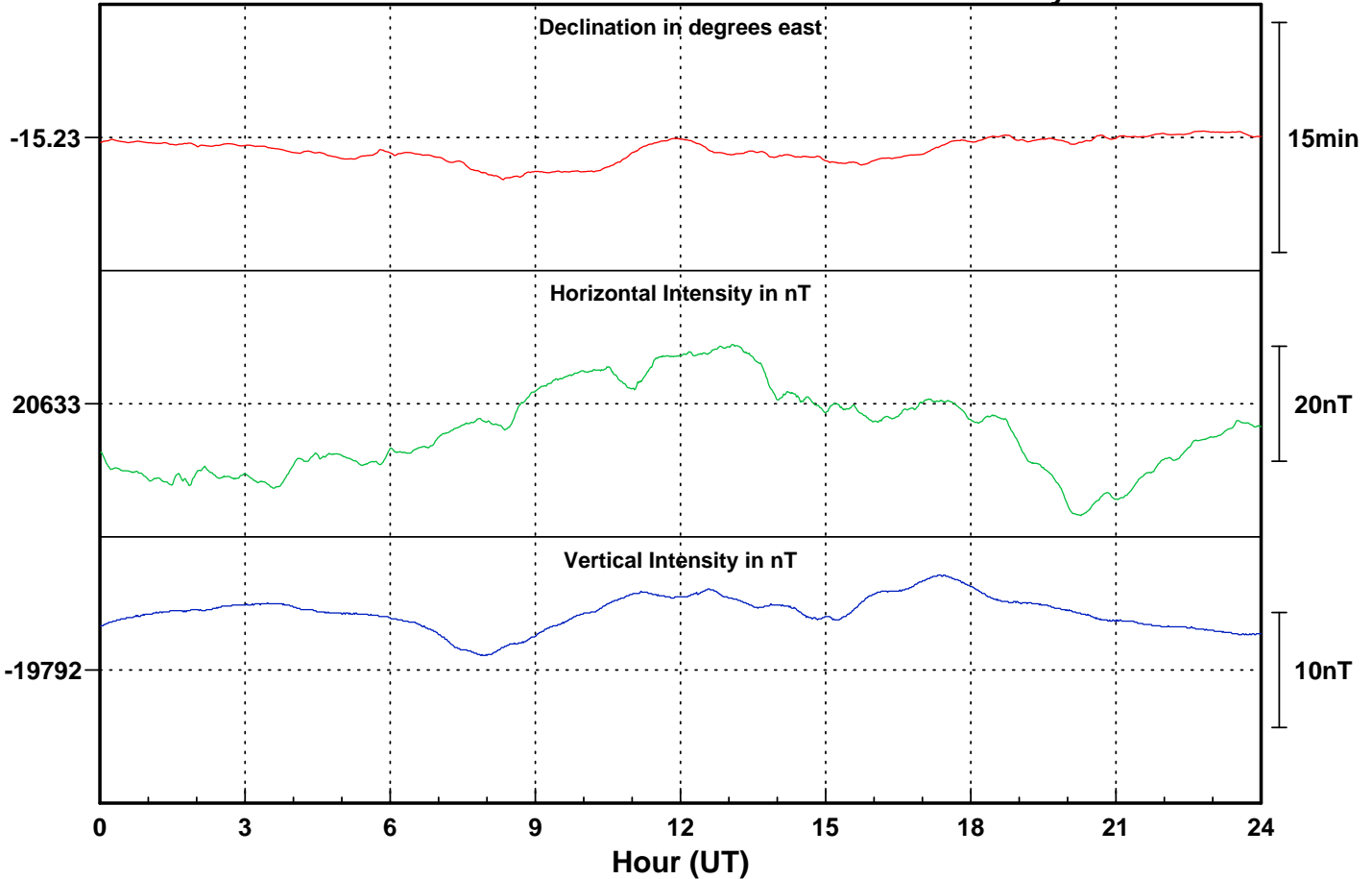
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Day number: 335



Date: 02-12-2015

Day number: 336

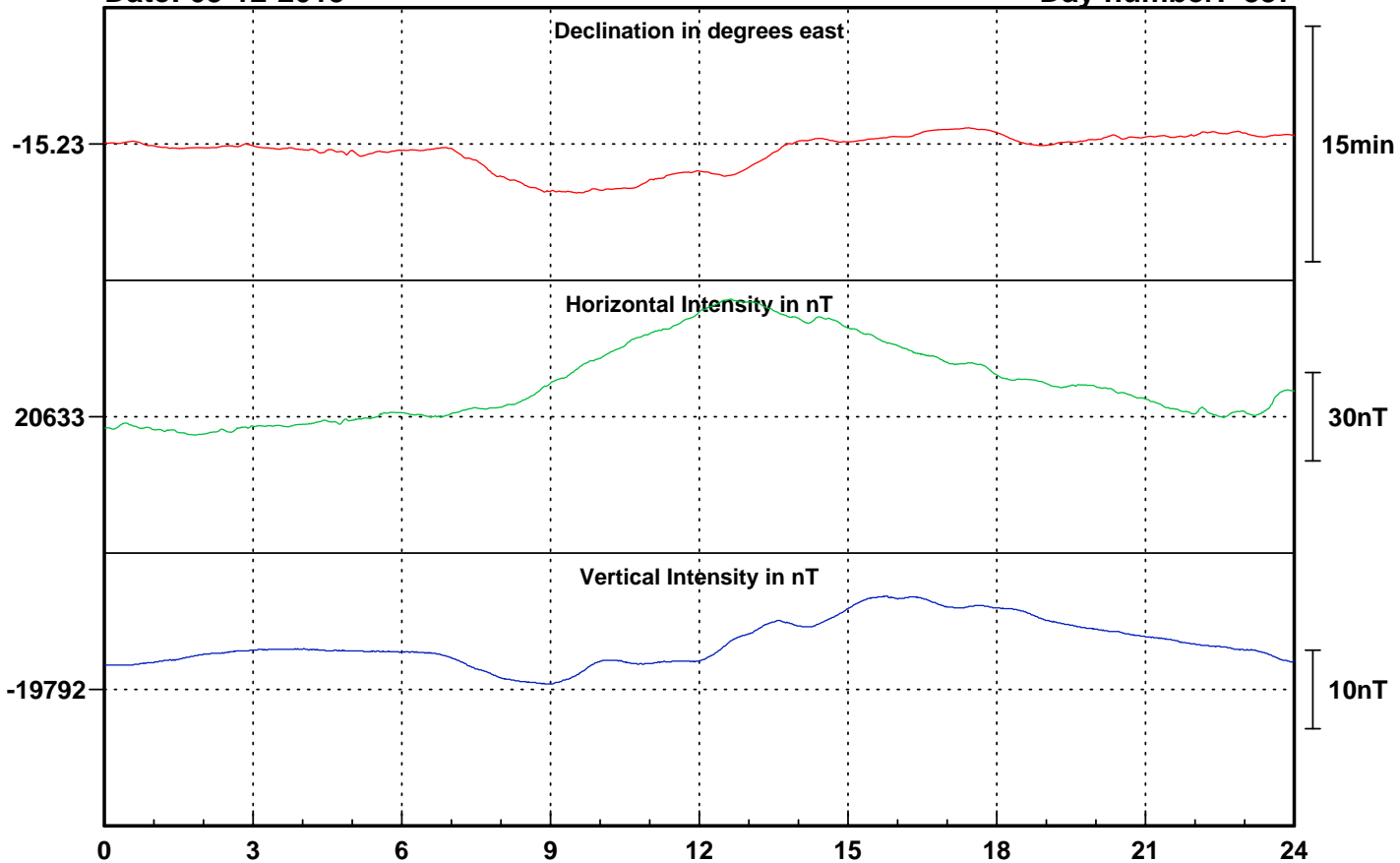




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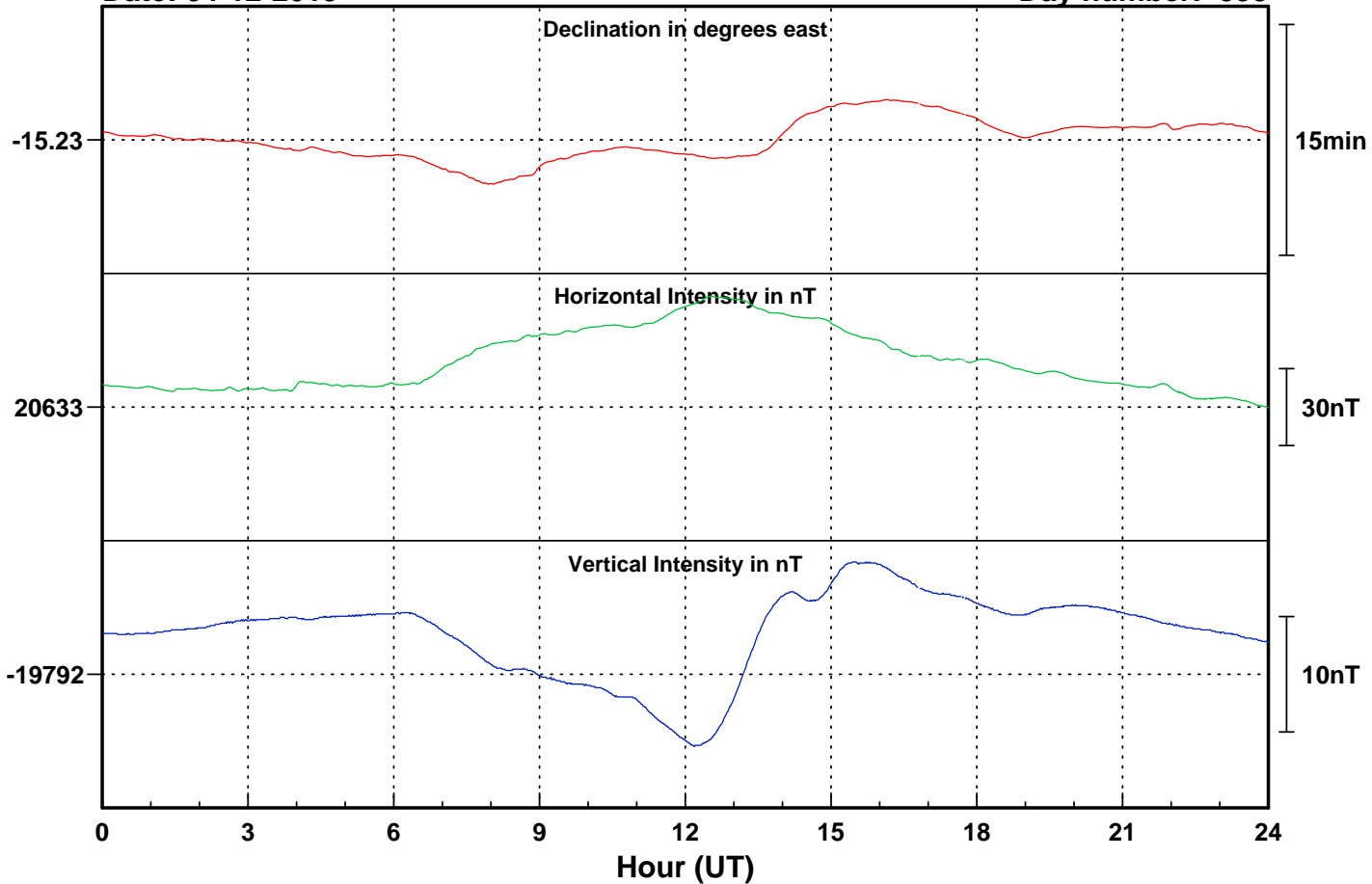
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Day number: 337



Date: 04-12-2015

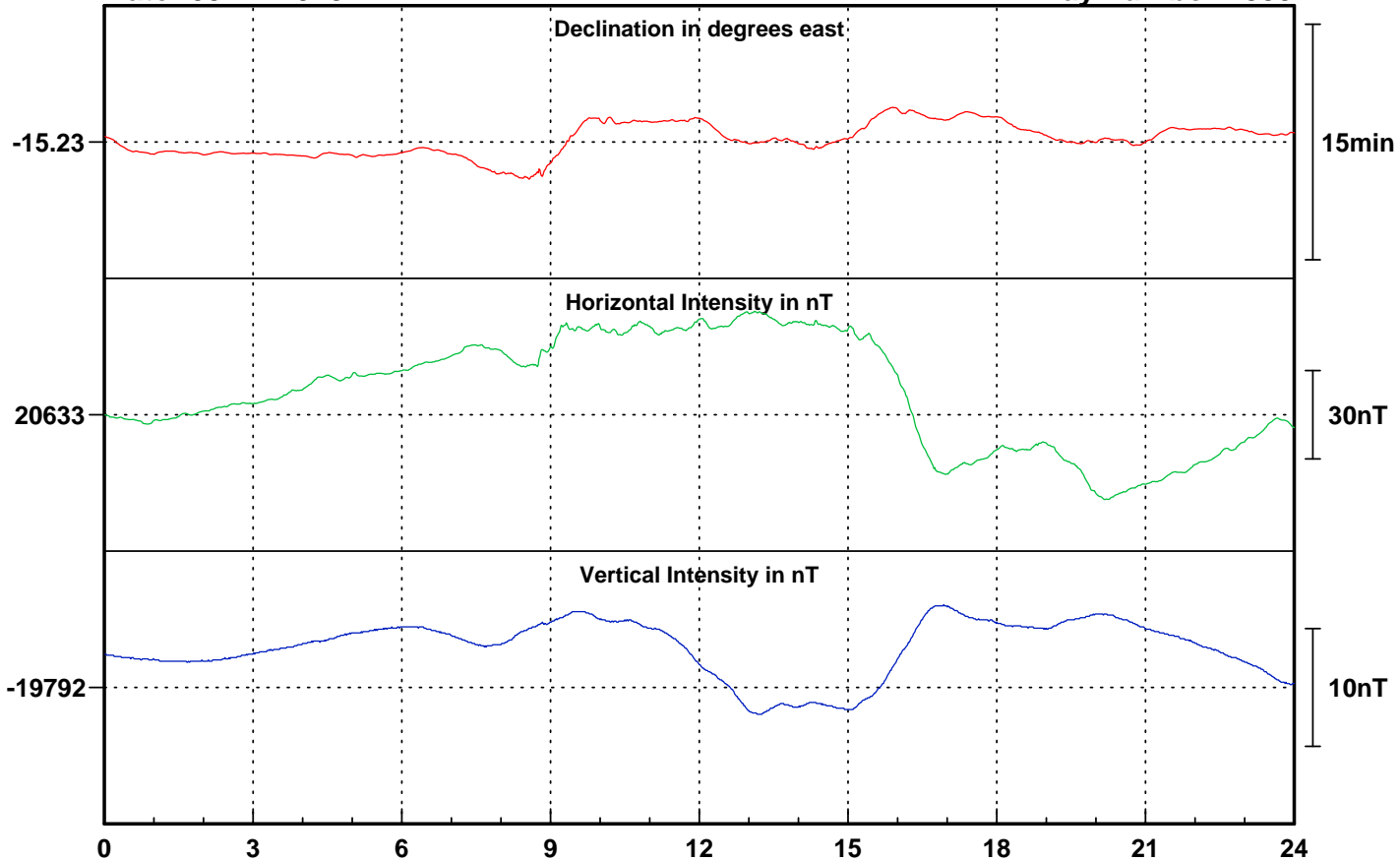
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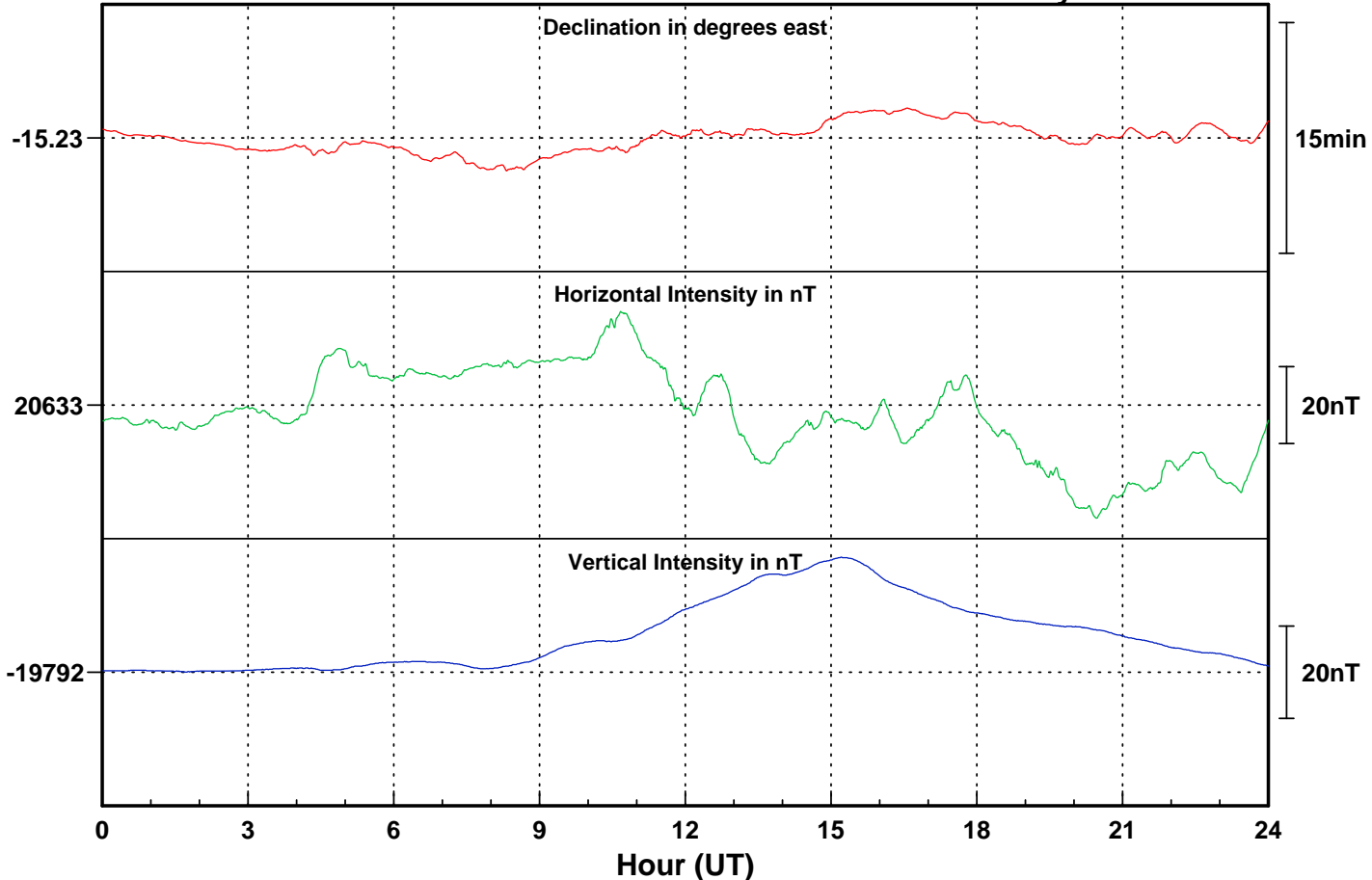
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Day number: 339



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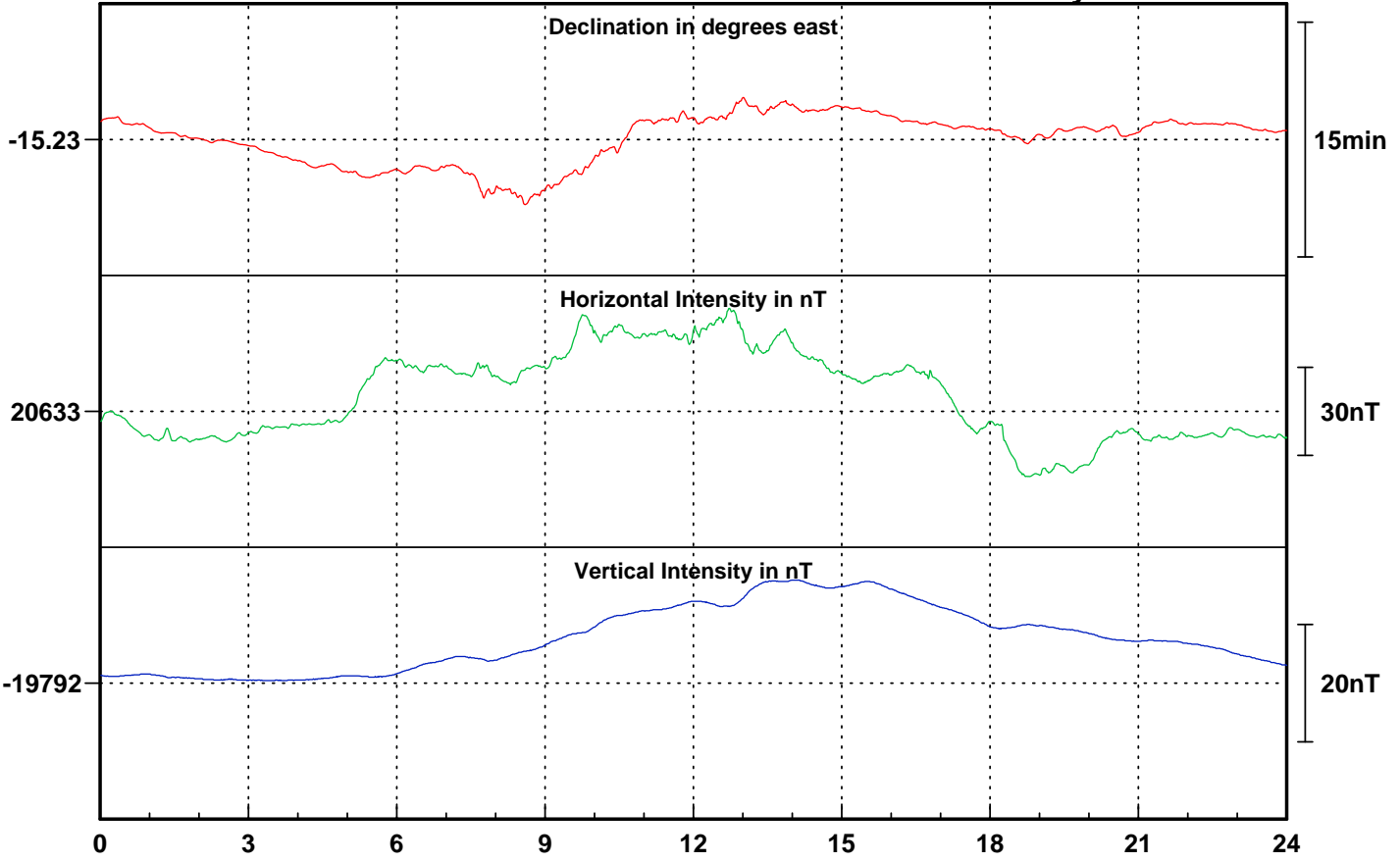
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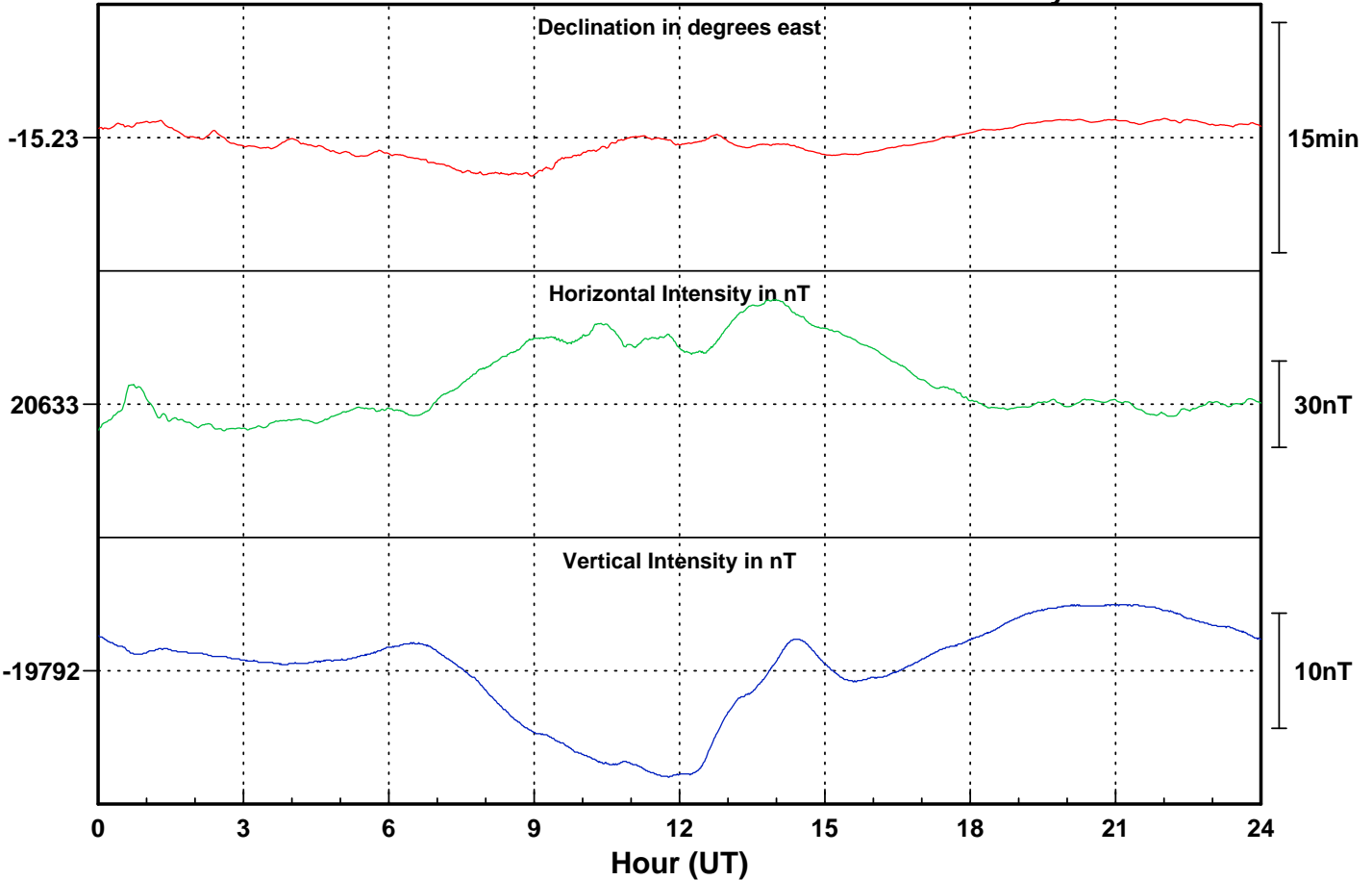
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Day number: 341



Date: 08-12-2015

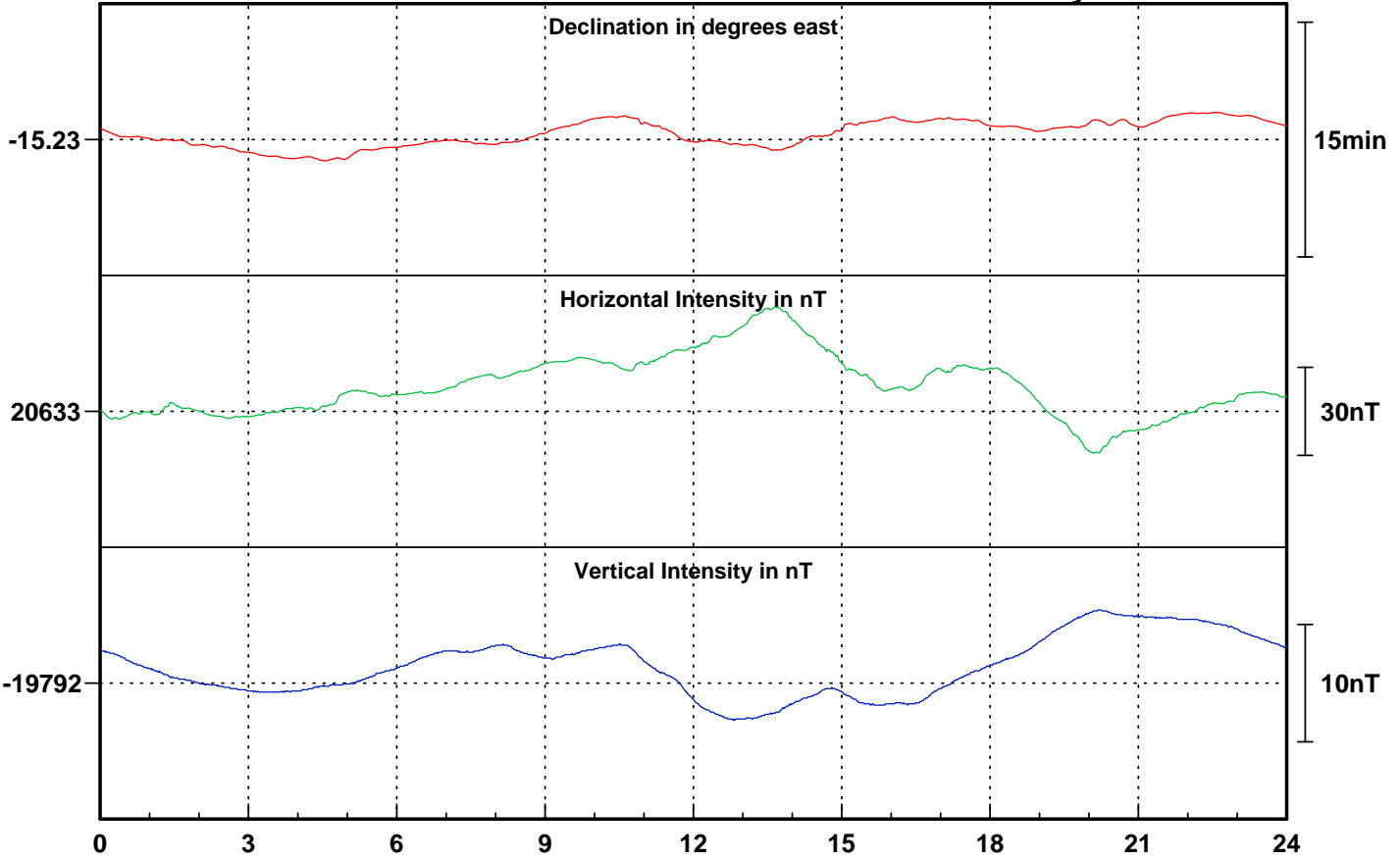
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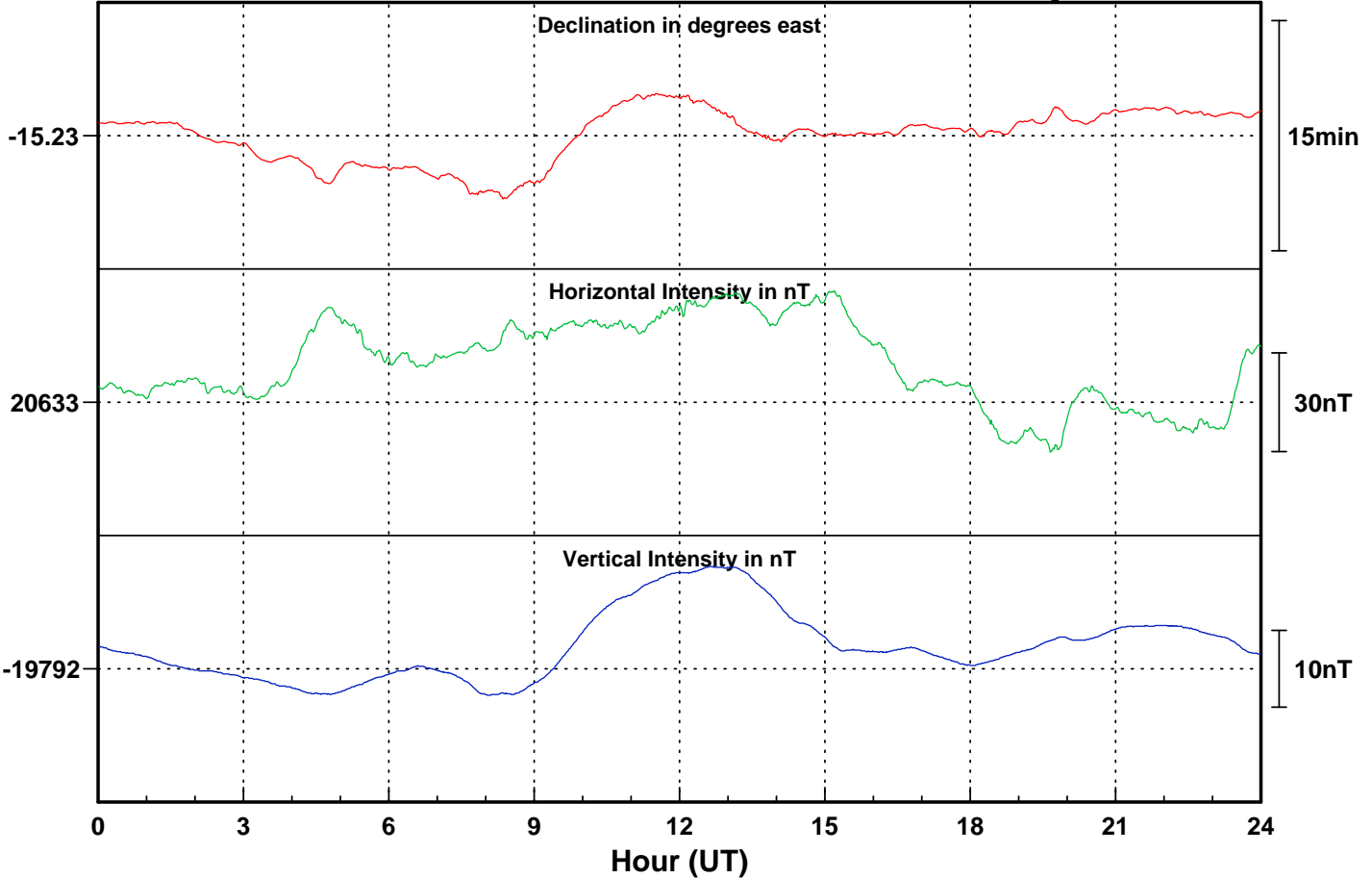
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Day number: 343



Date: 10-12-2015

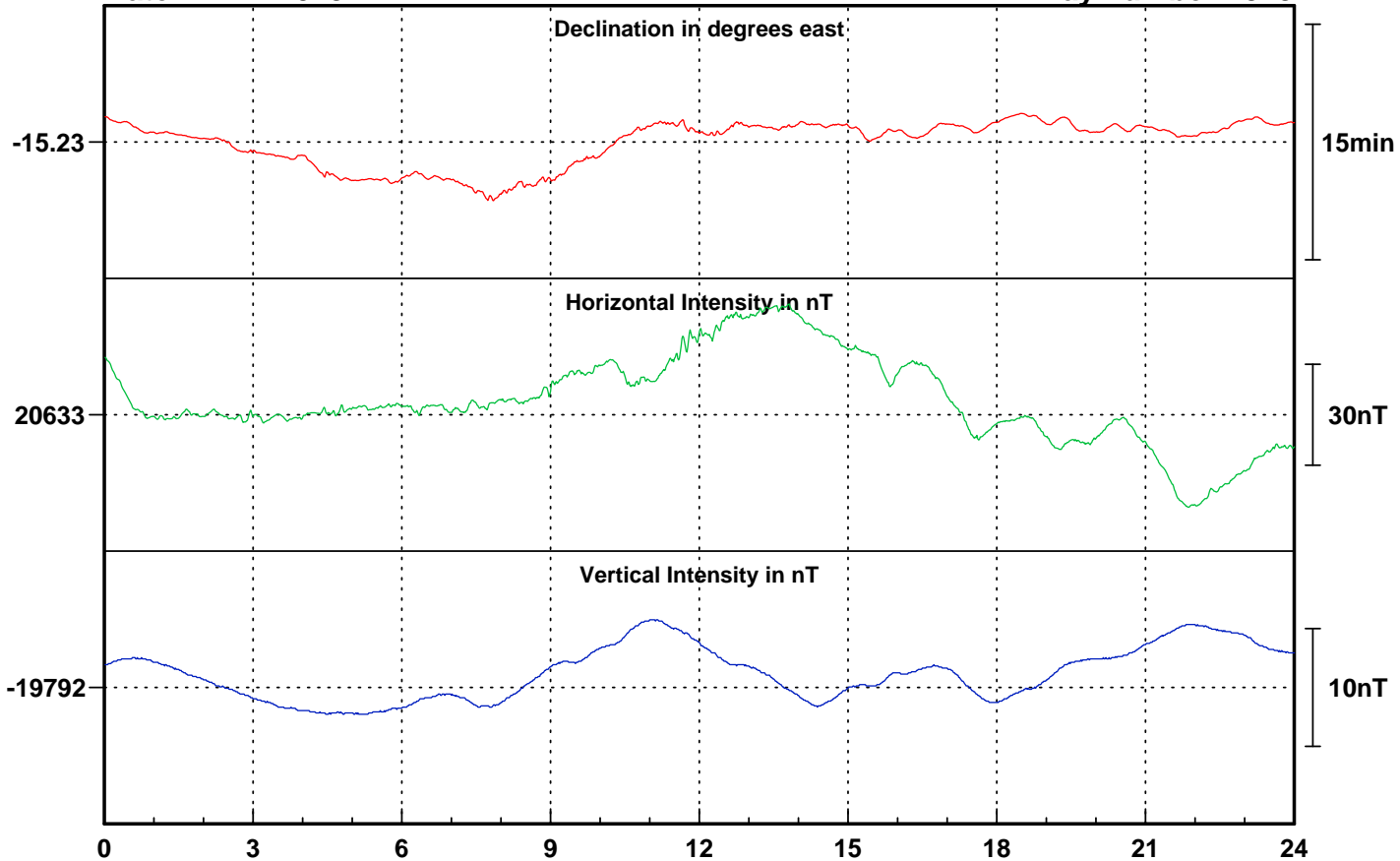
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Date: 11-12-2015

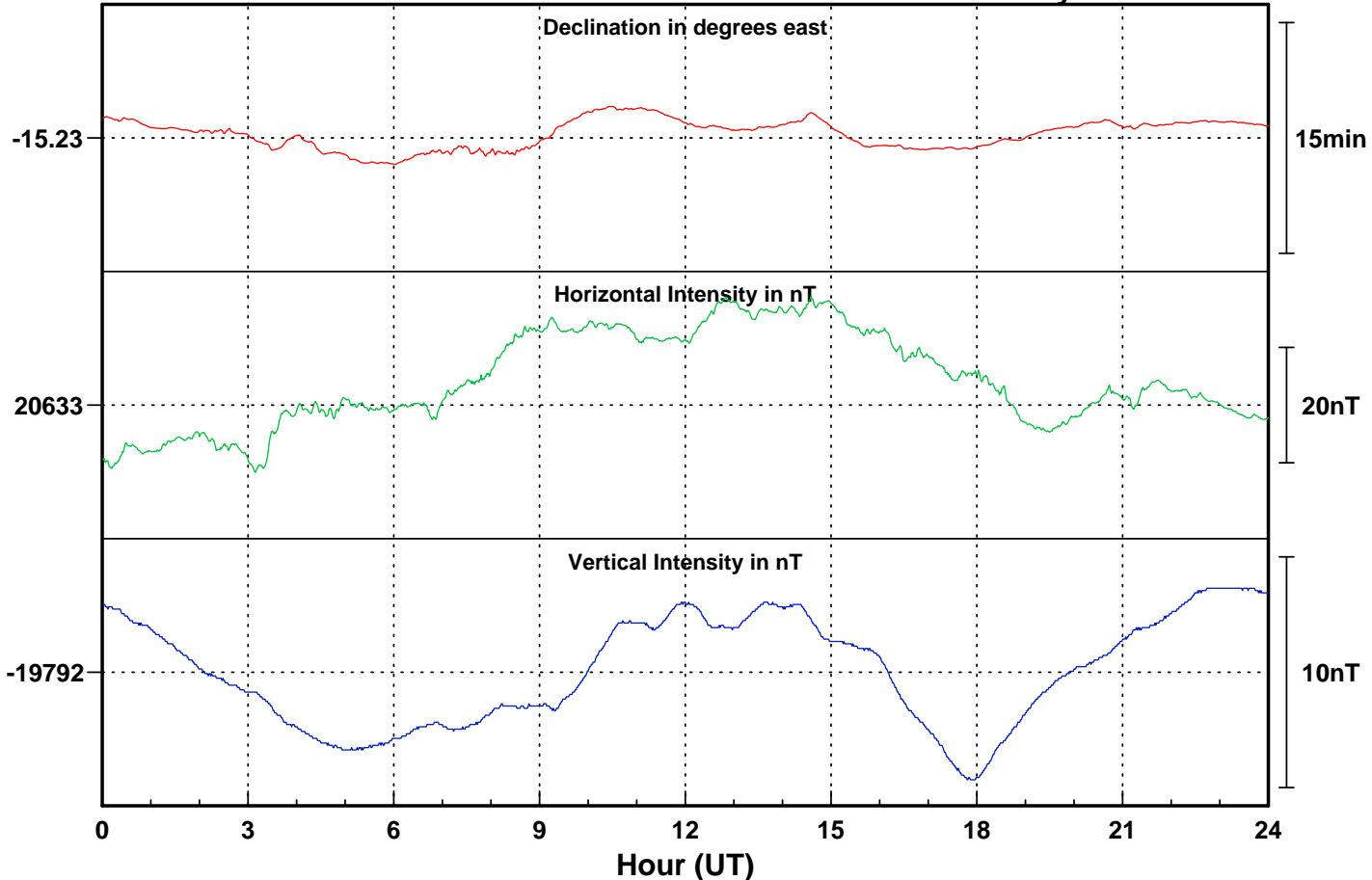
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Day number: 345



Date: 12-12-2015

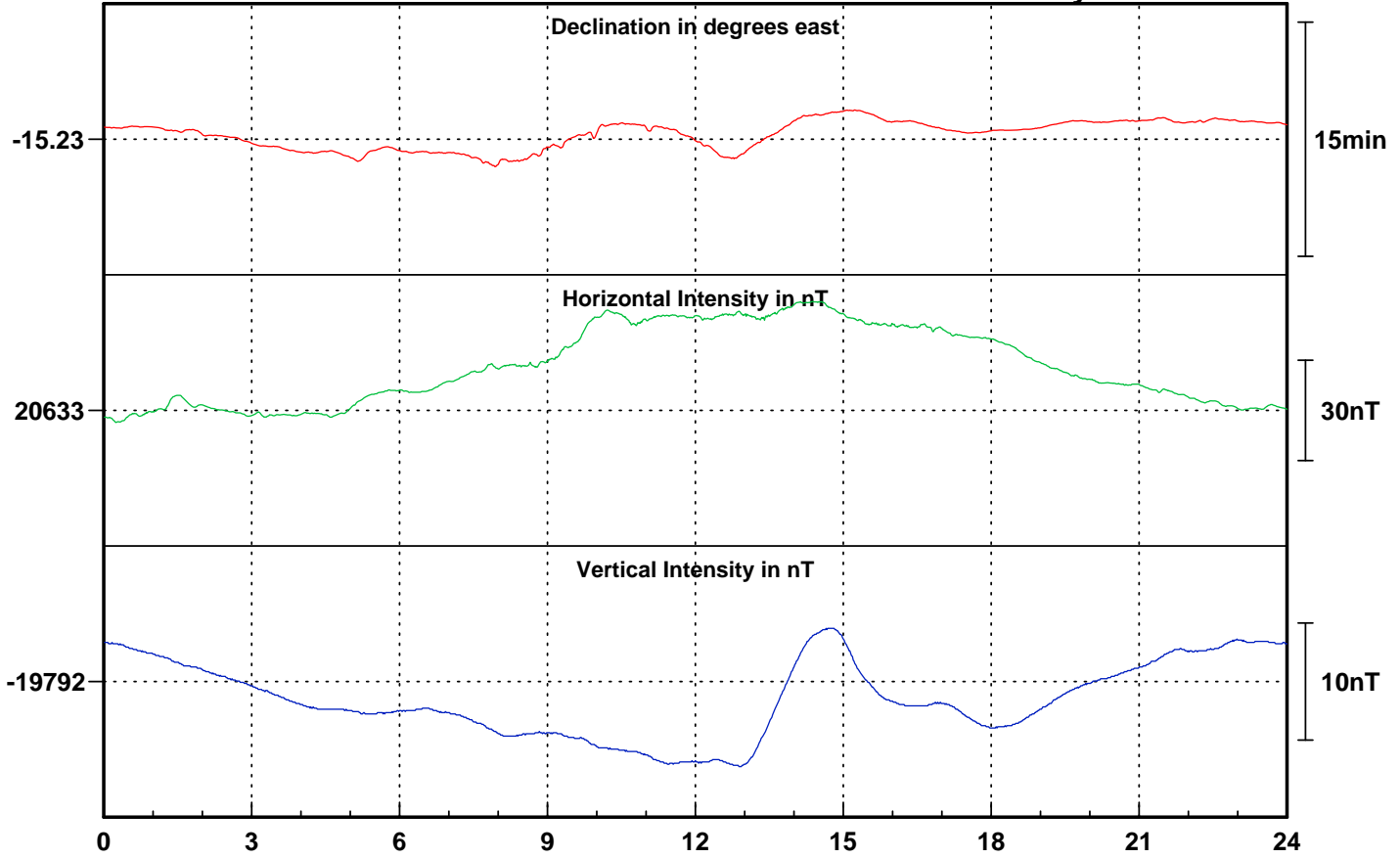
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Date: 13-12-2015

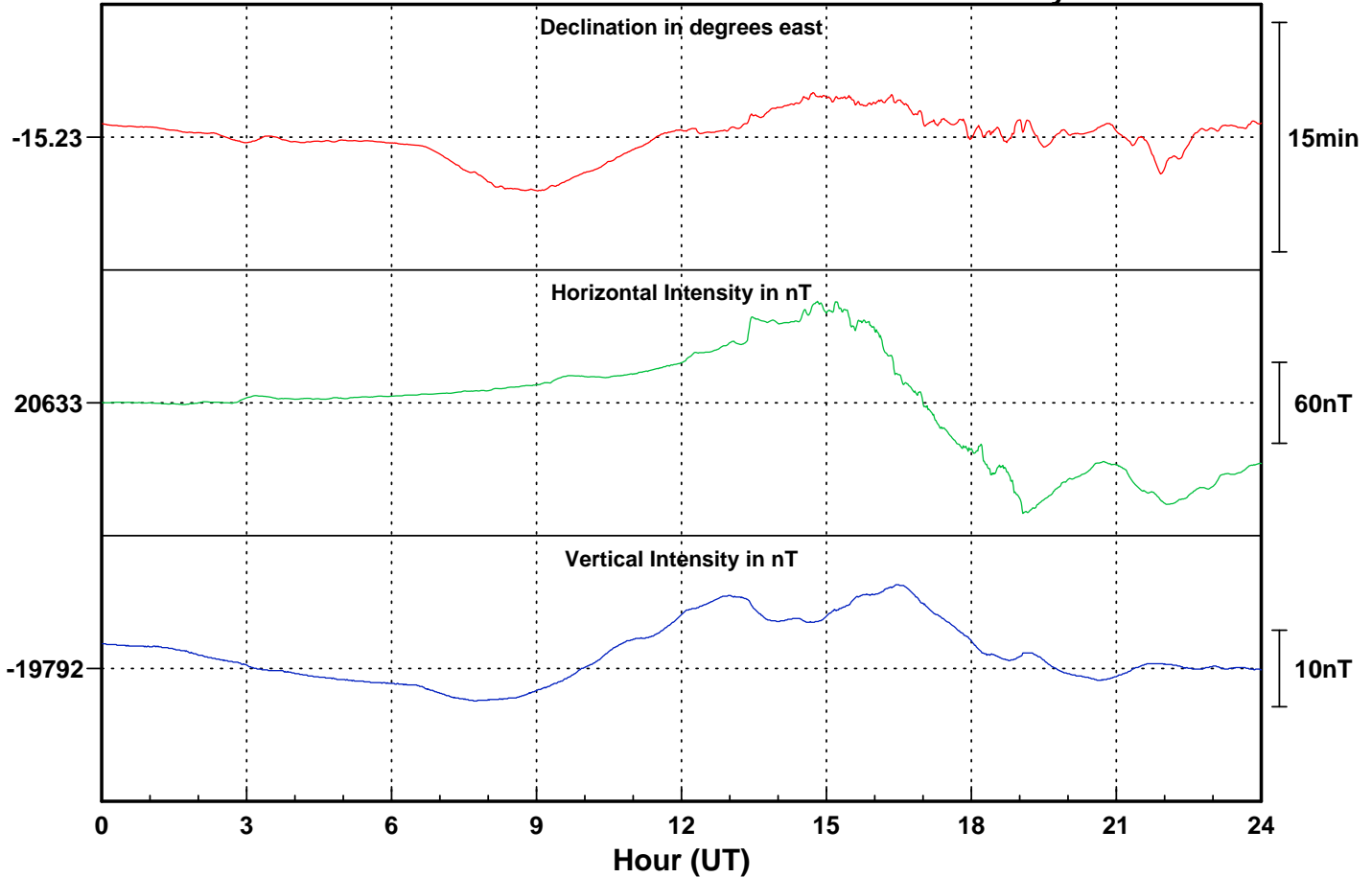
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Day number: 347



Date: 14-12-2015

Day number: 348

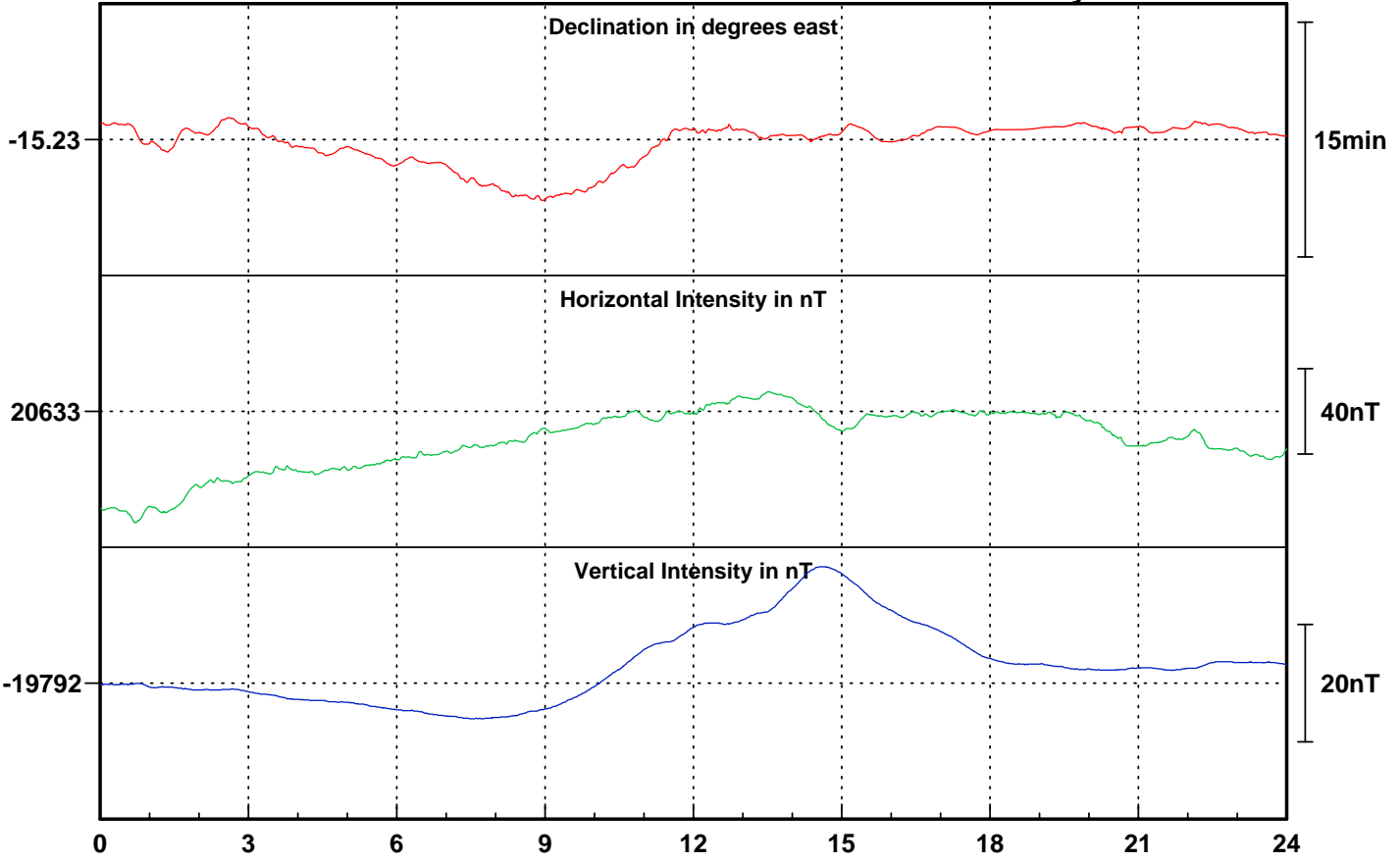




Date: 15-12-2015

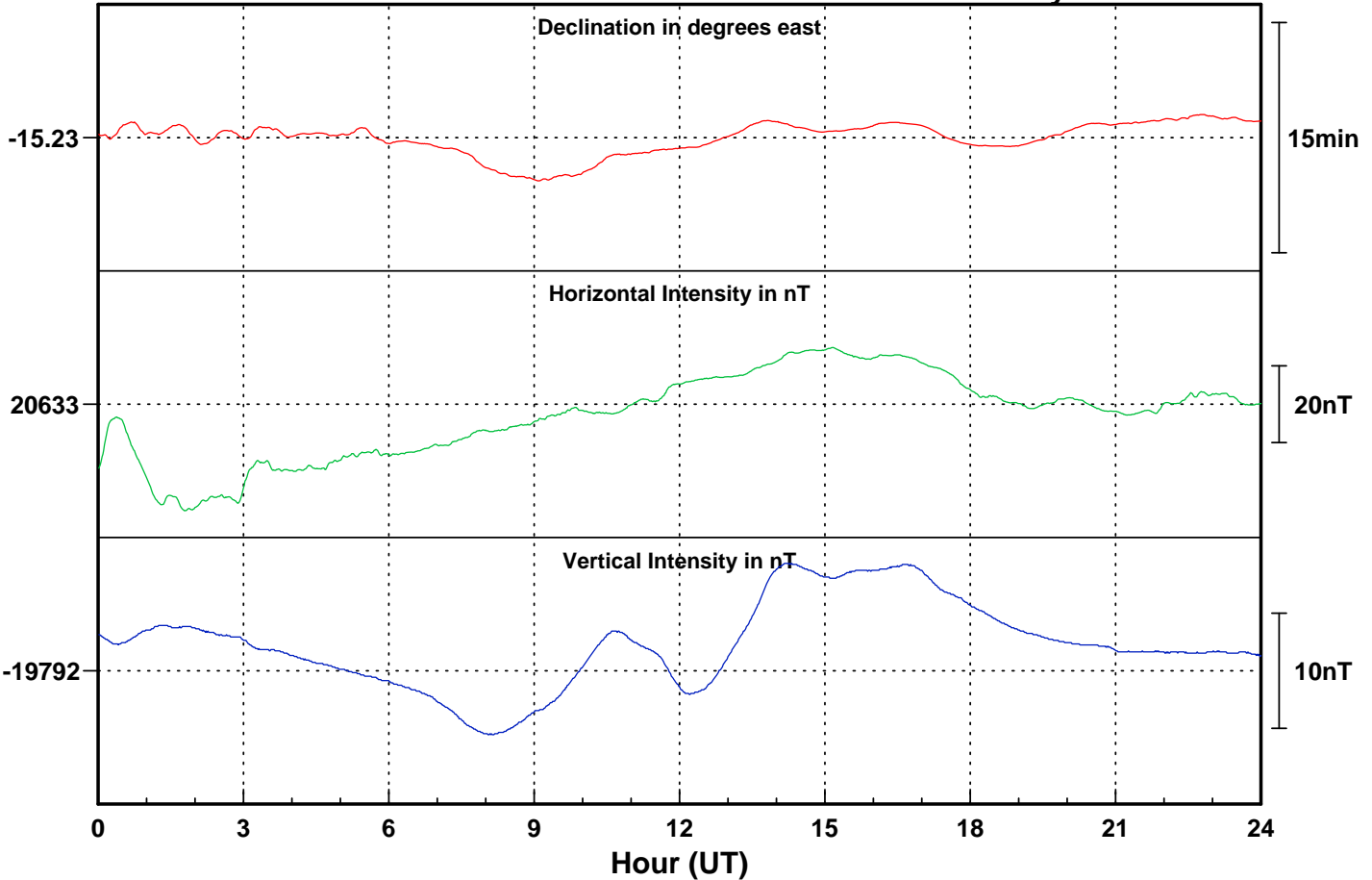
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Day number: 349



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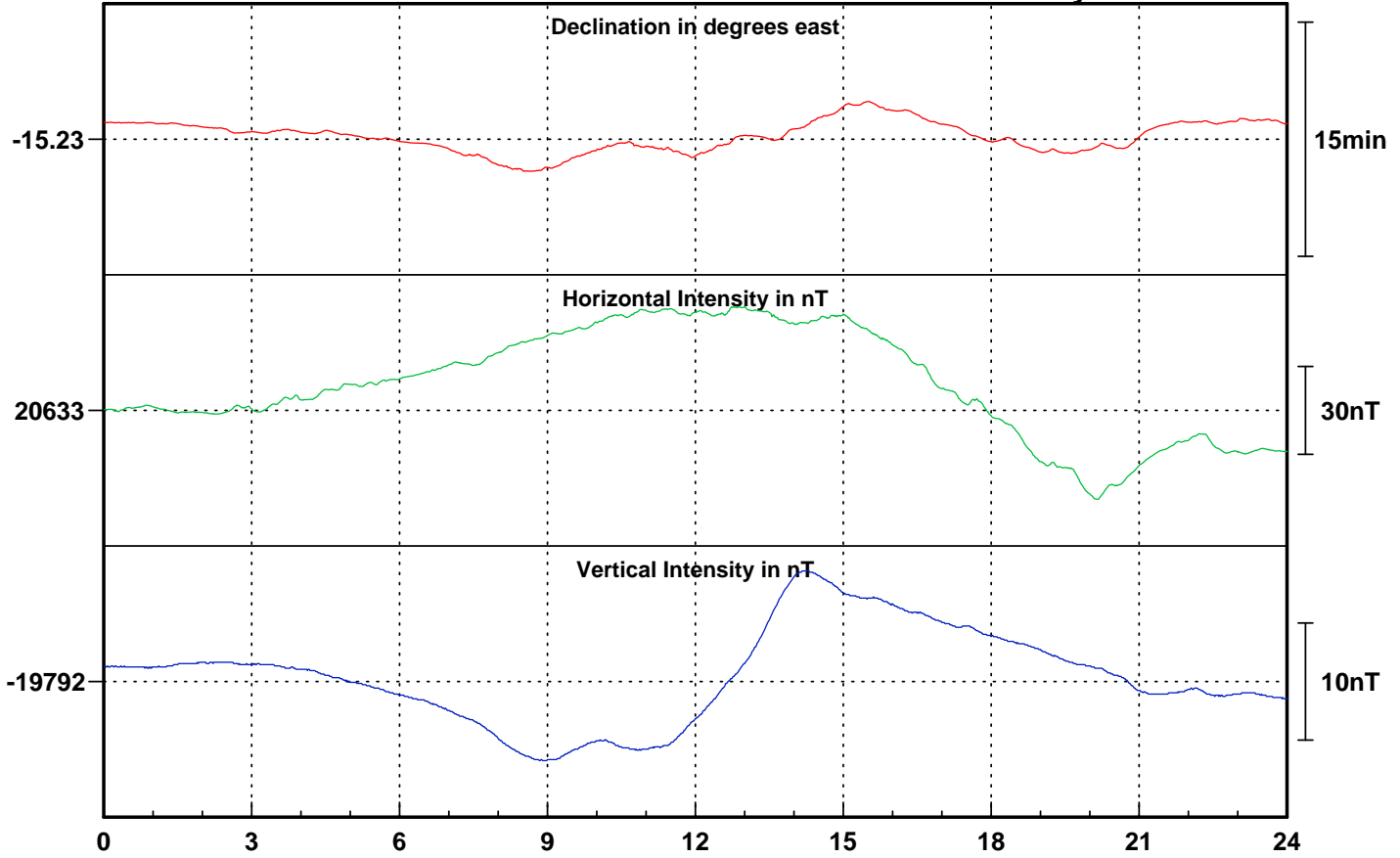
Day number: 350



Date: 17-12-2015

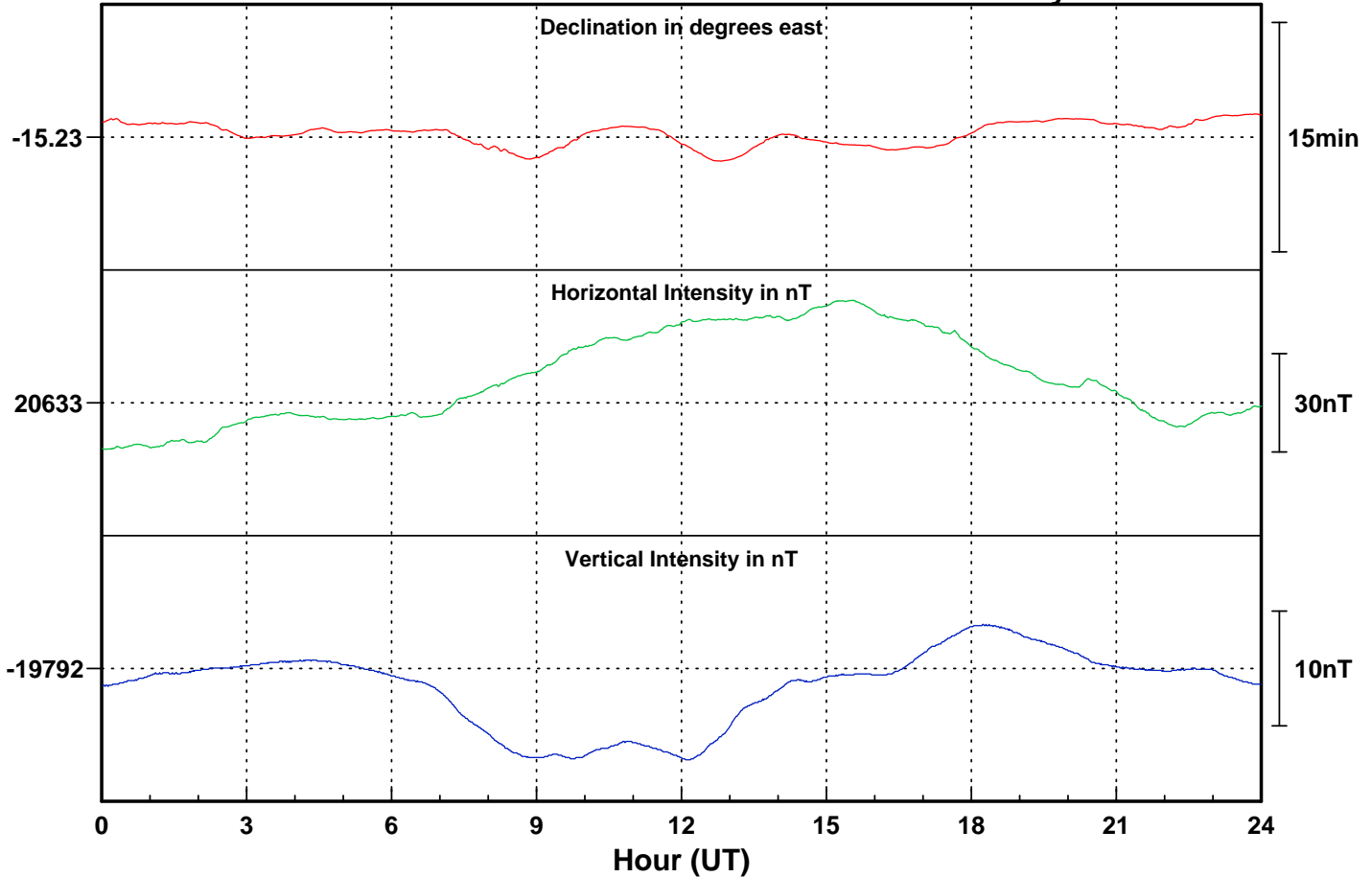
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Day number: 351



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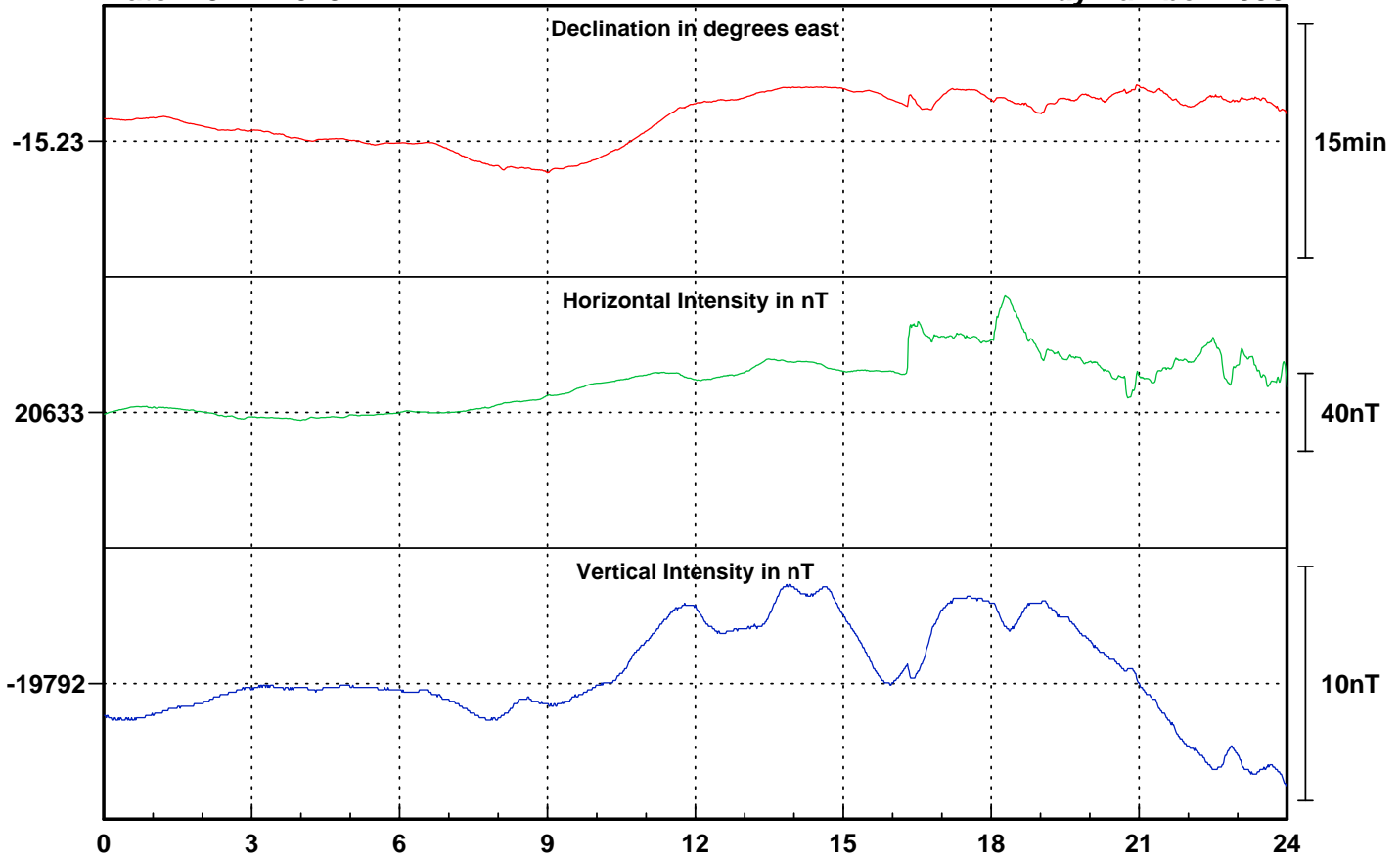
Day number: 352



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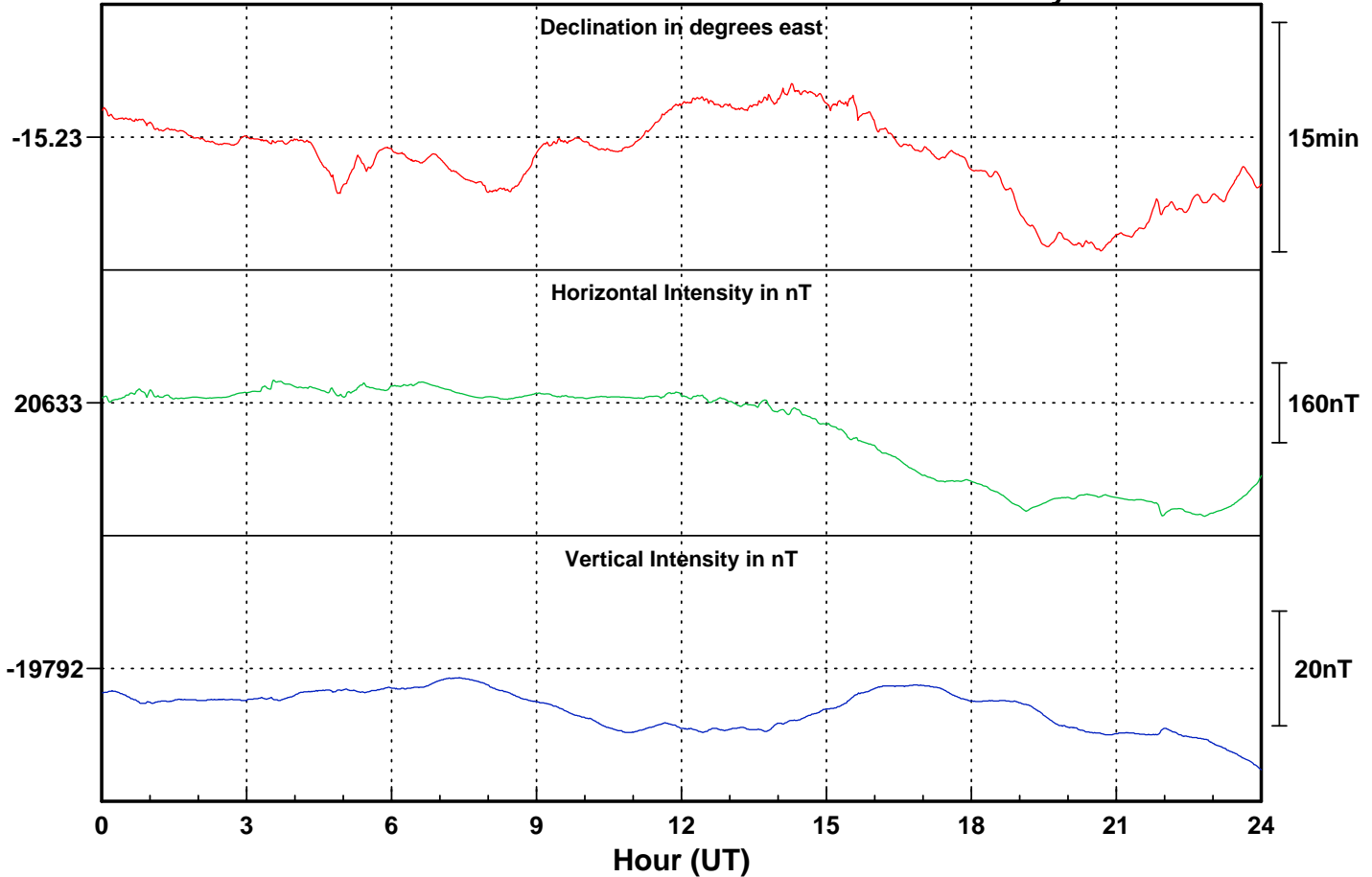
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Day number: 353



Date: 20-12-2015

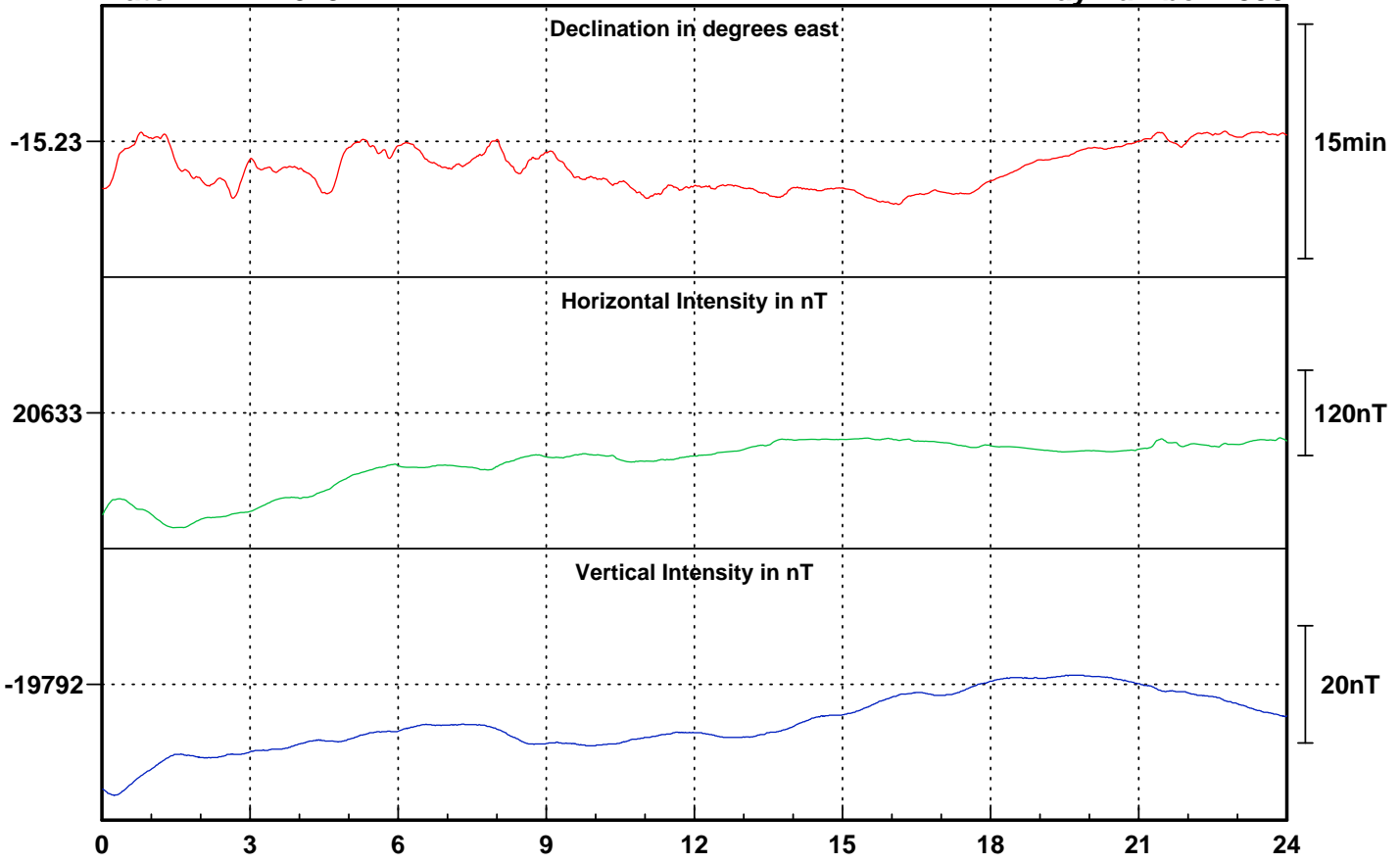
Day number: 354



Date: 21-12-2015

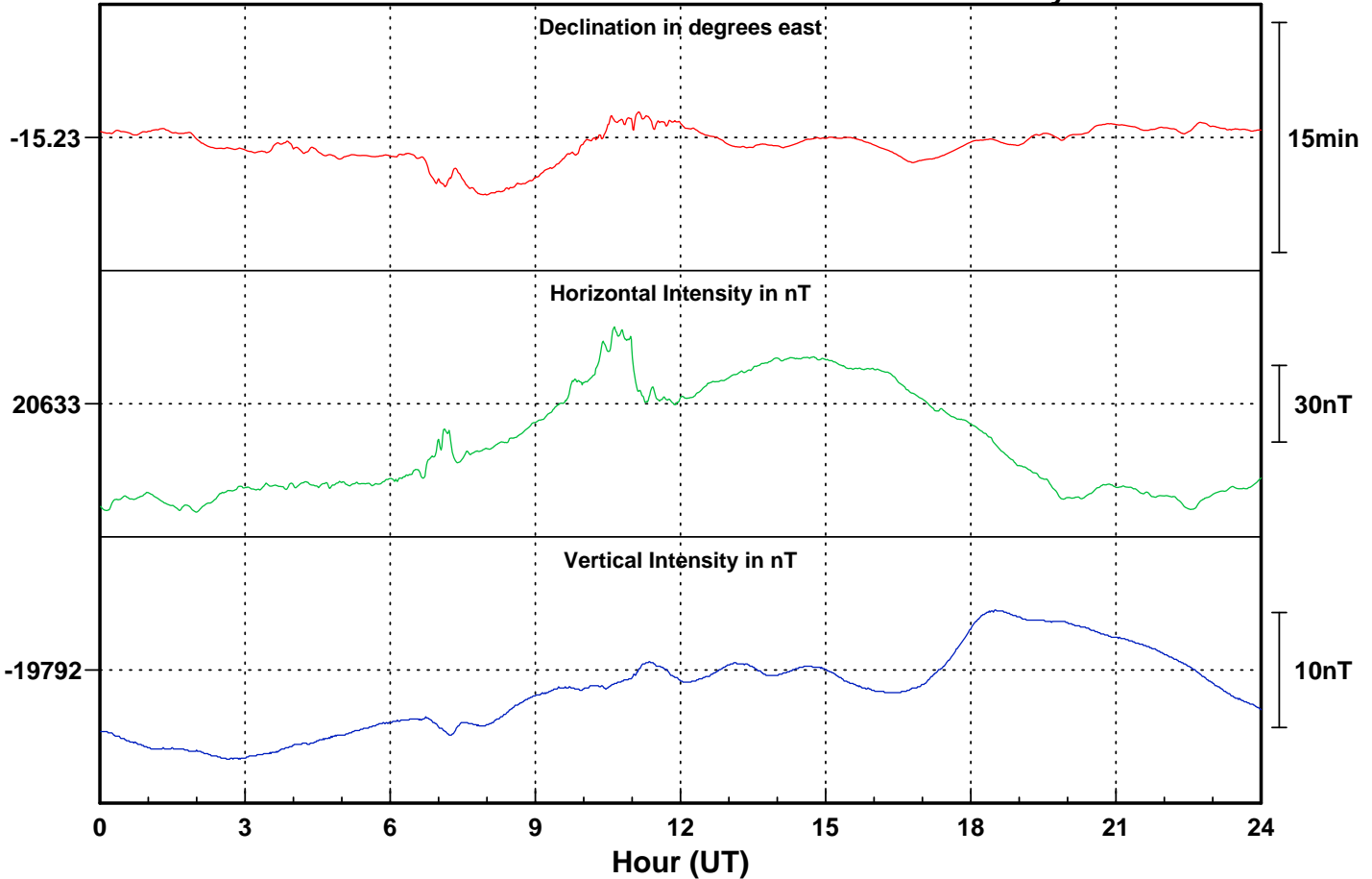
# Ascension Island

Day number: 355



Date: 22-12-2015

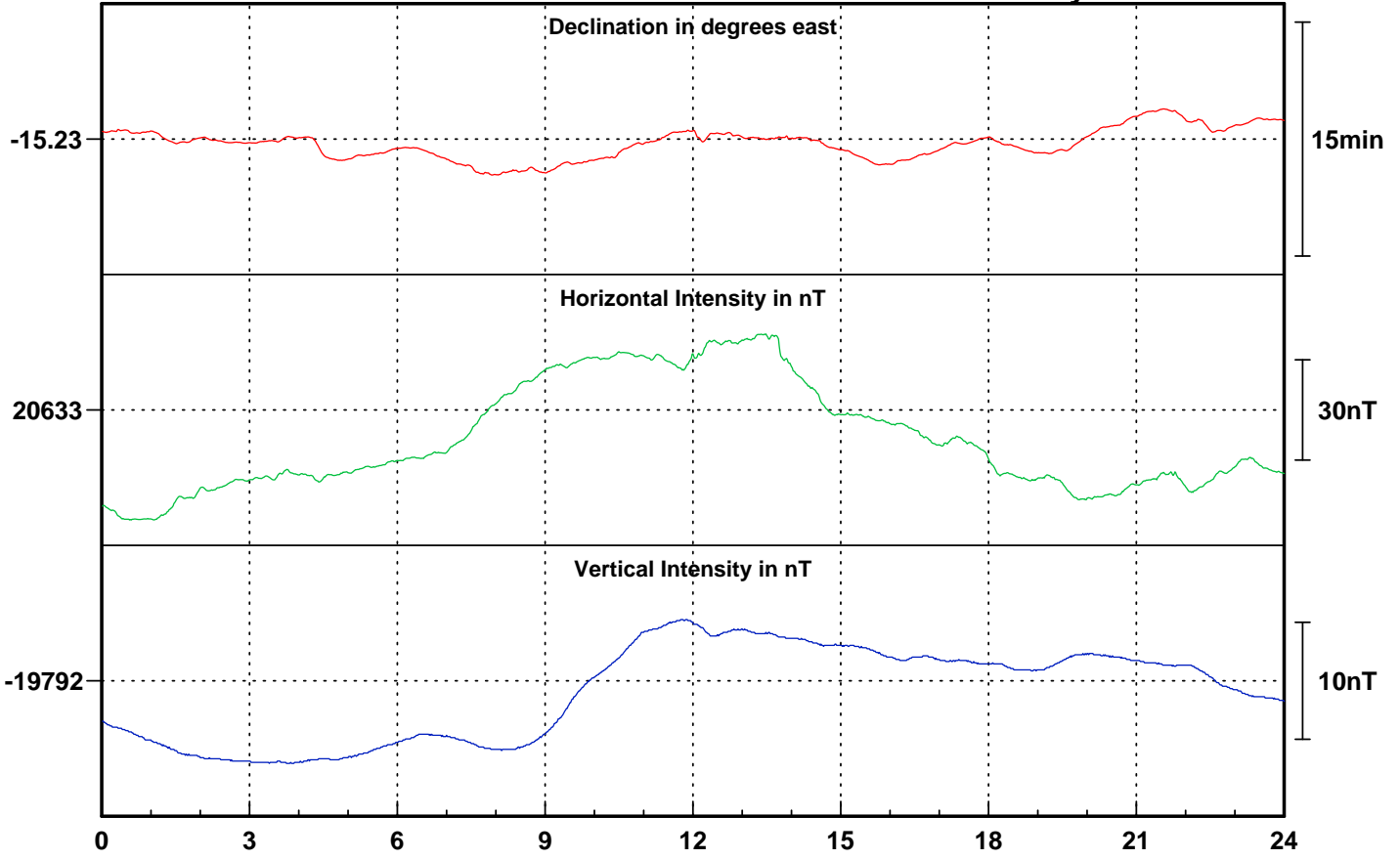
Day number: 356



Date: 23-12-2015

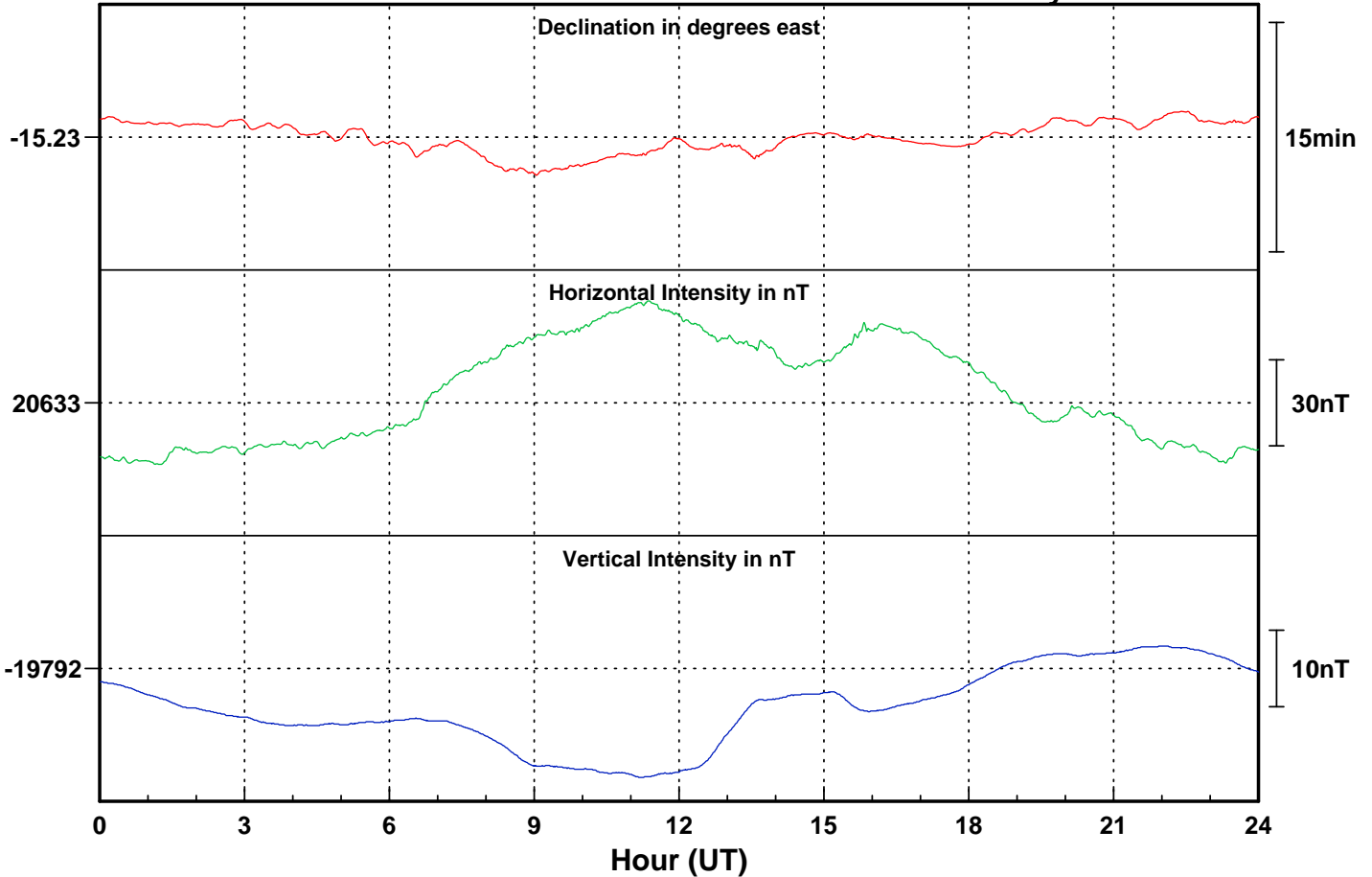
# Ascension Island

Day number: 357



Date: 24-12-2015

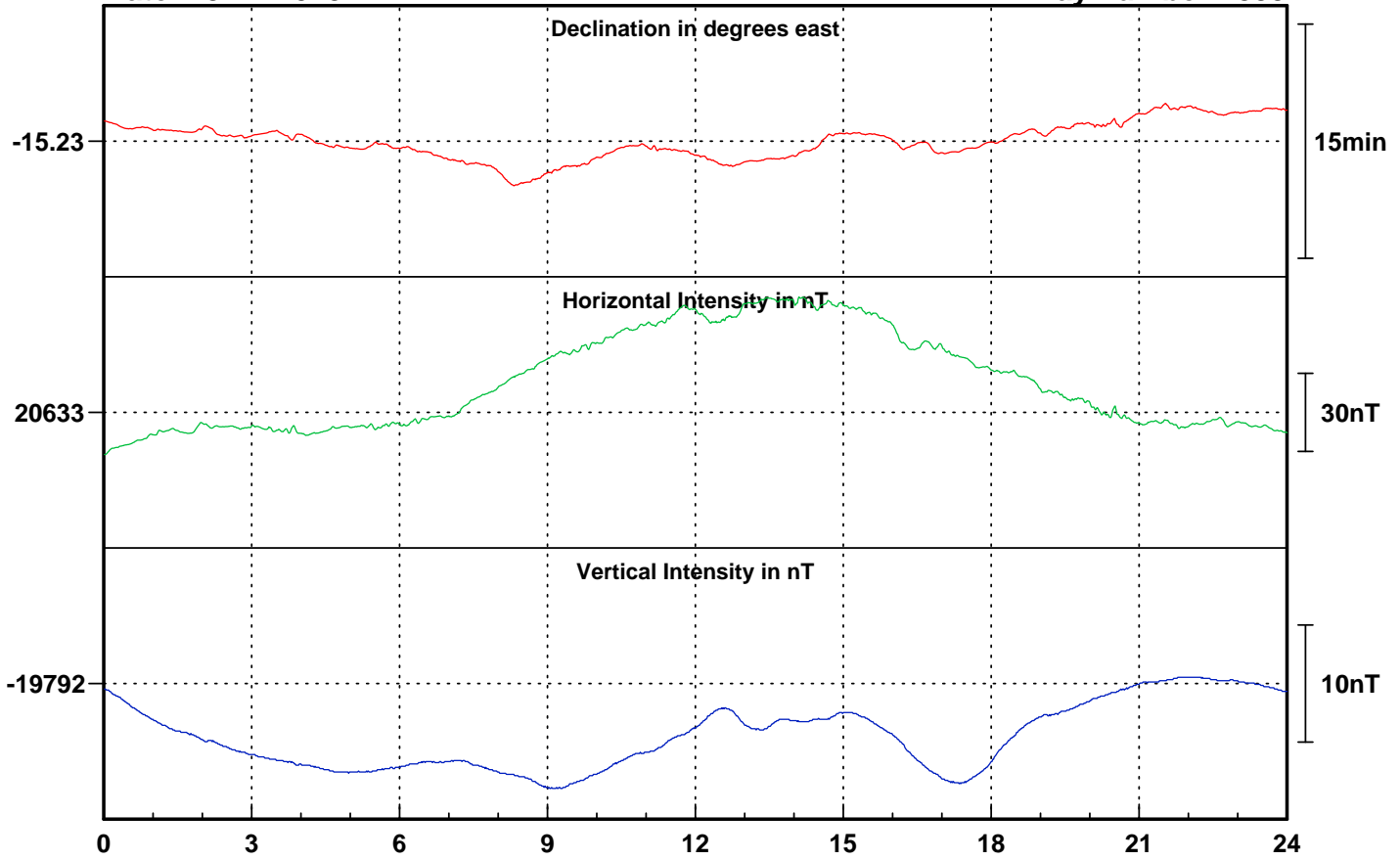
Day number: 358



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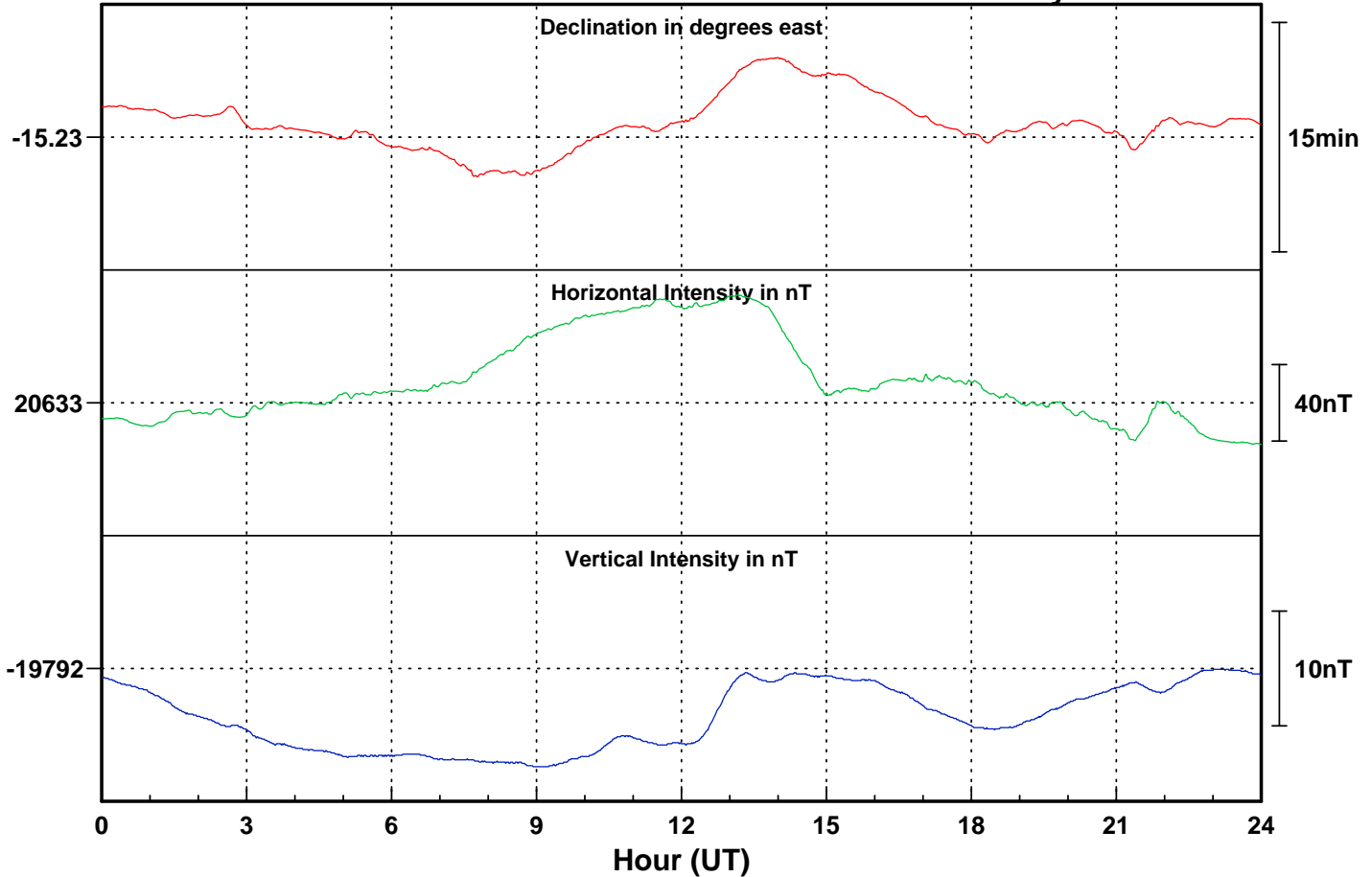
# Ascension Island

Day number: 359



Date: 26-12-2015

Day number: 360

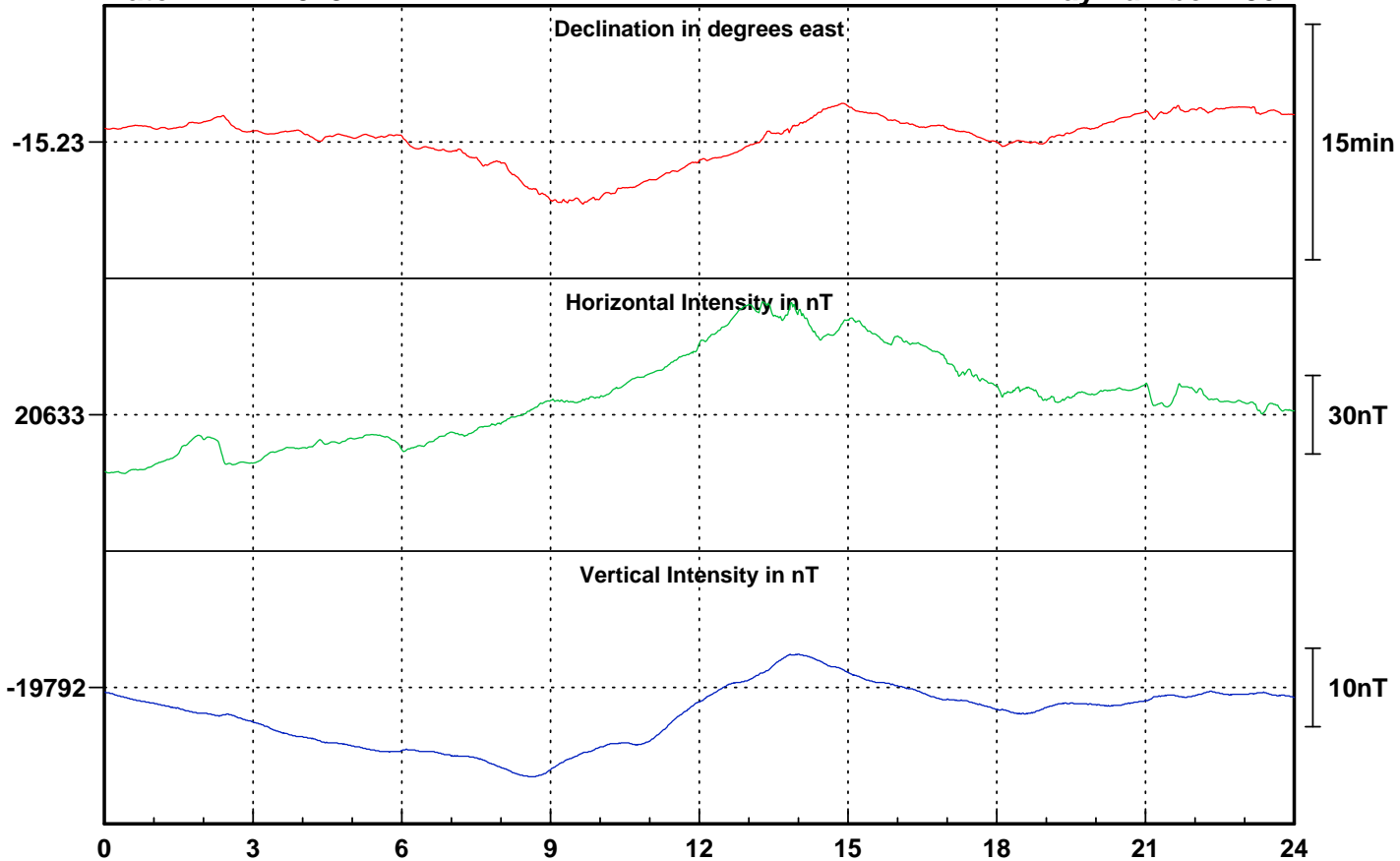




Date: 27-12-2015

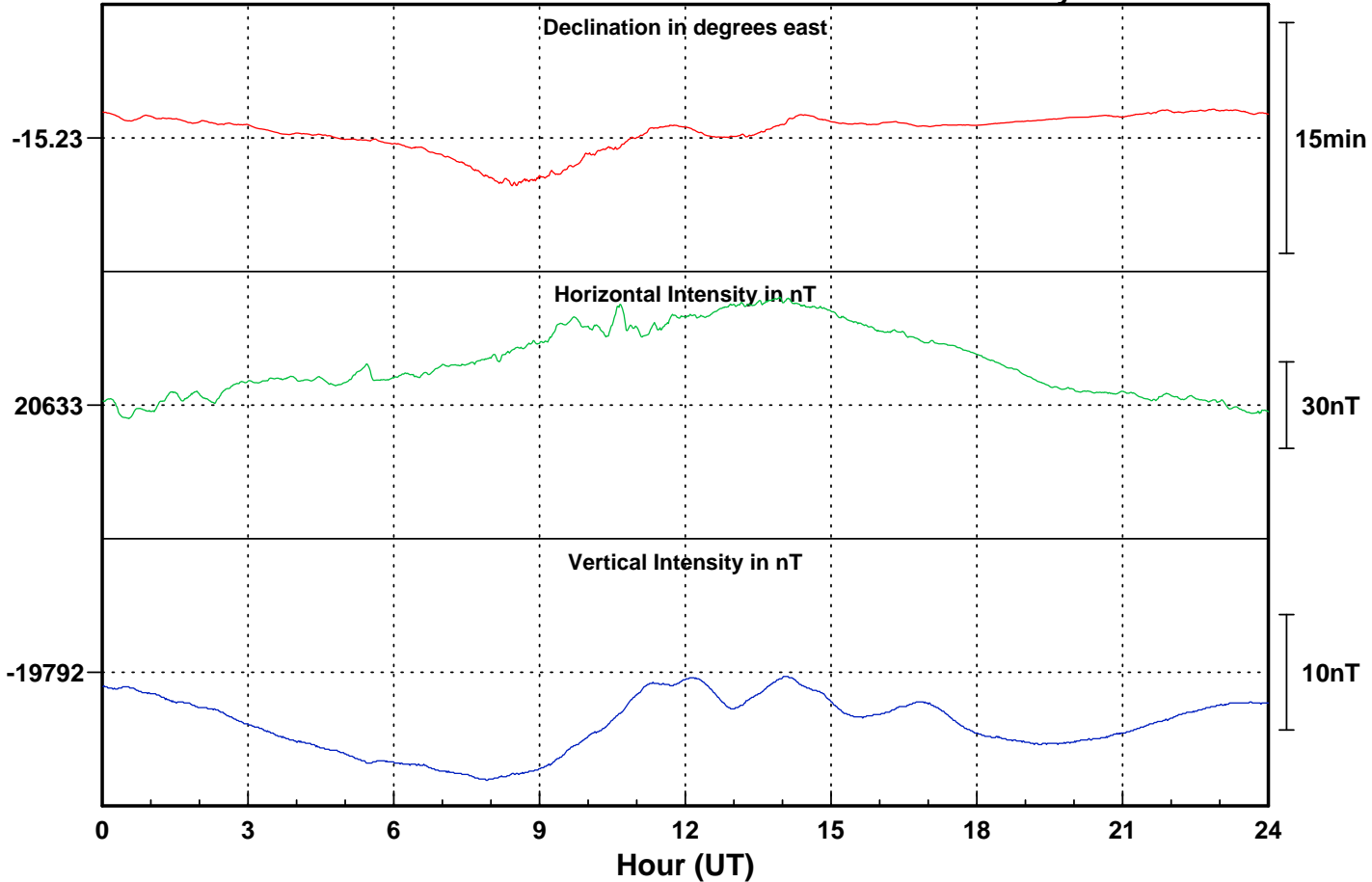
# Ascension Island

Day number: 361



Date: 28-12-2015

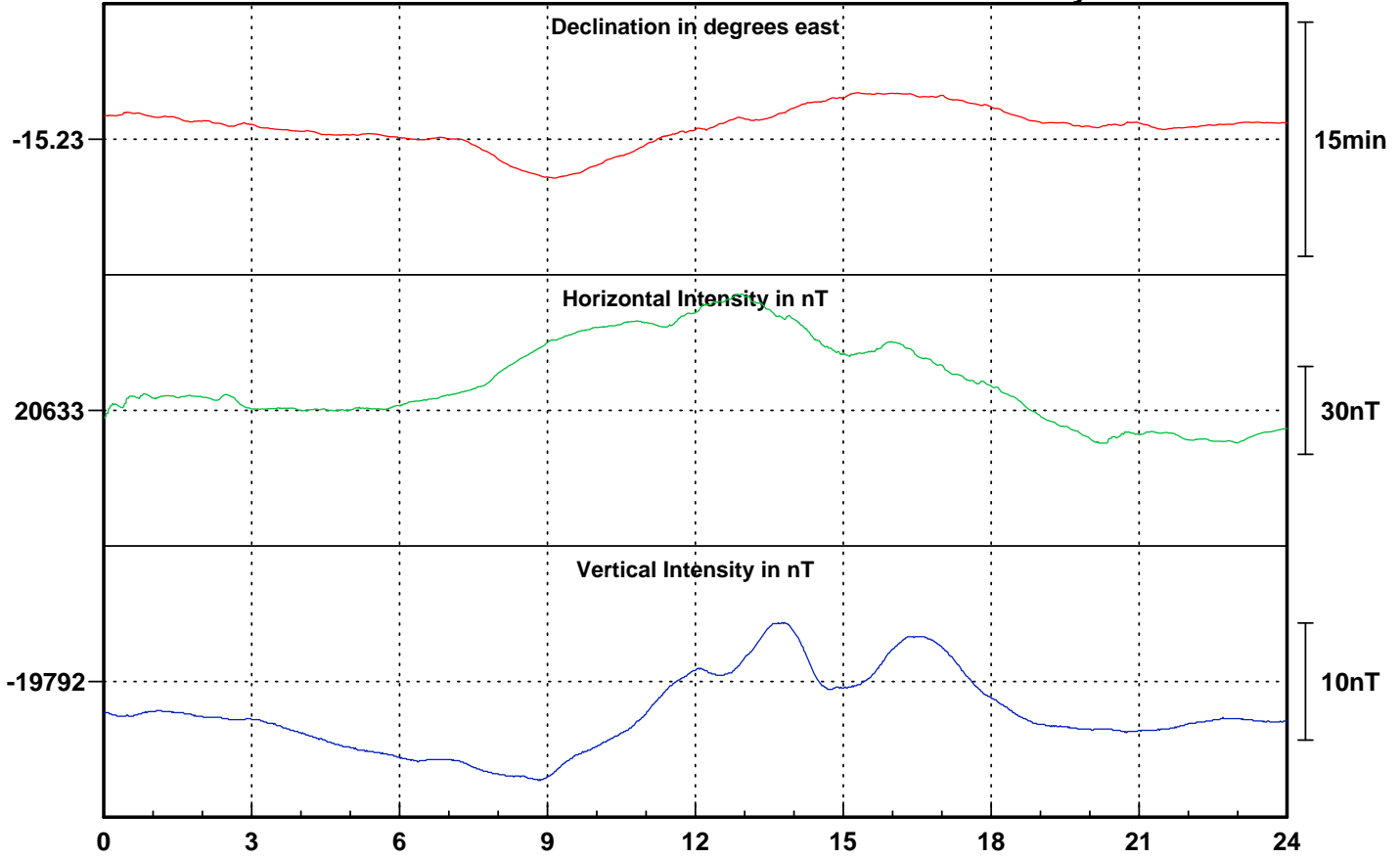
Day number: 362



Date: 29-12-2015

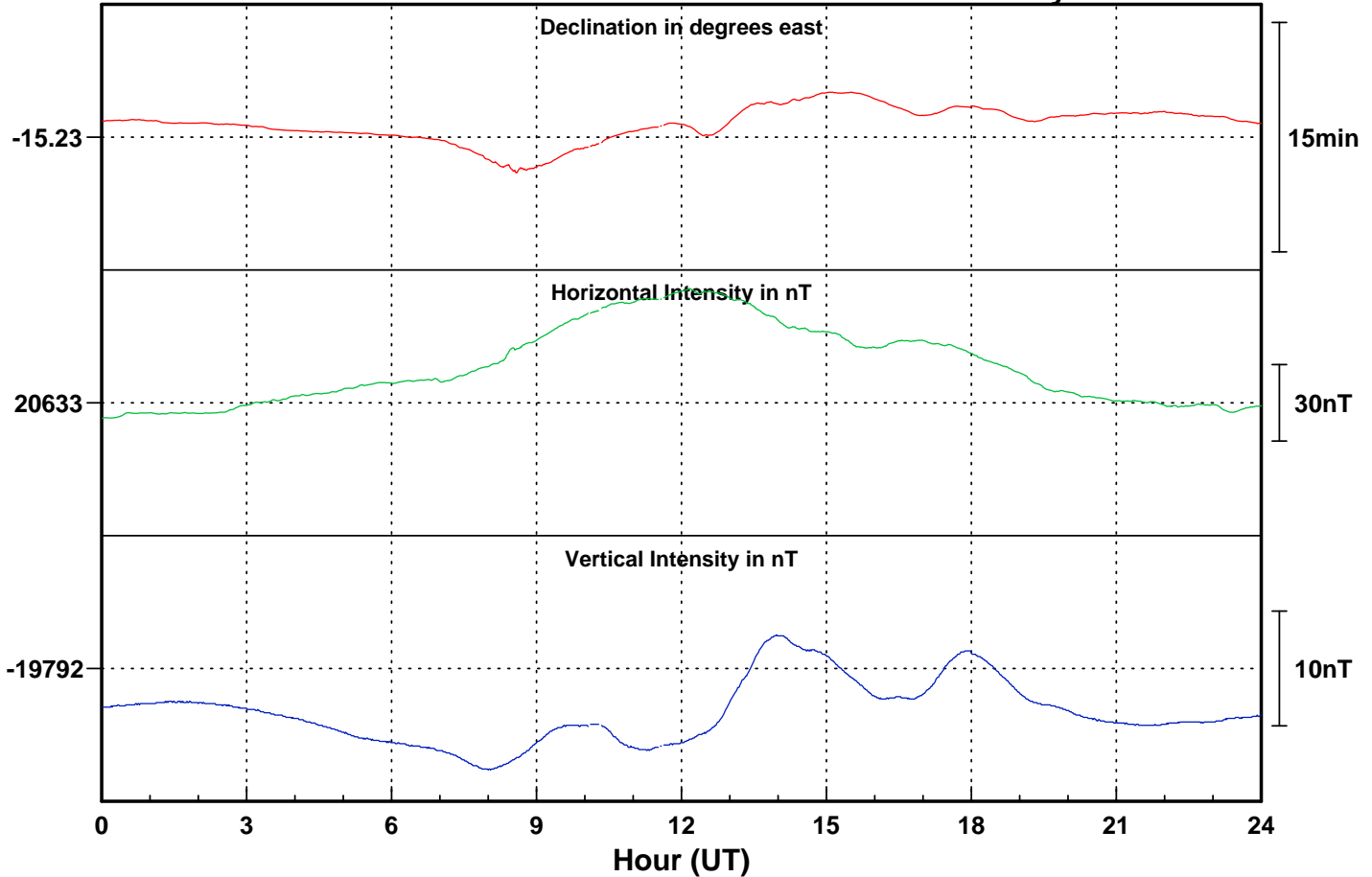
# Ascension Island

Day number: 363



Date: 30-12-2015

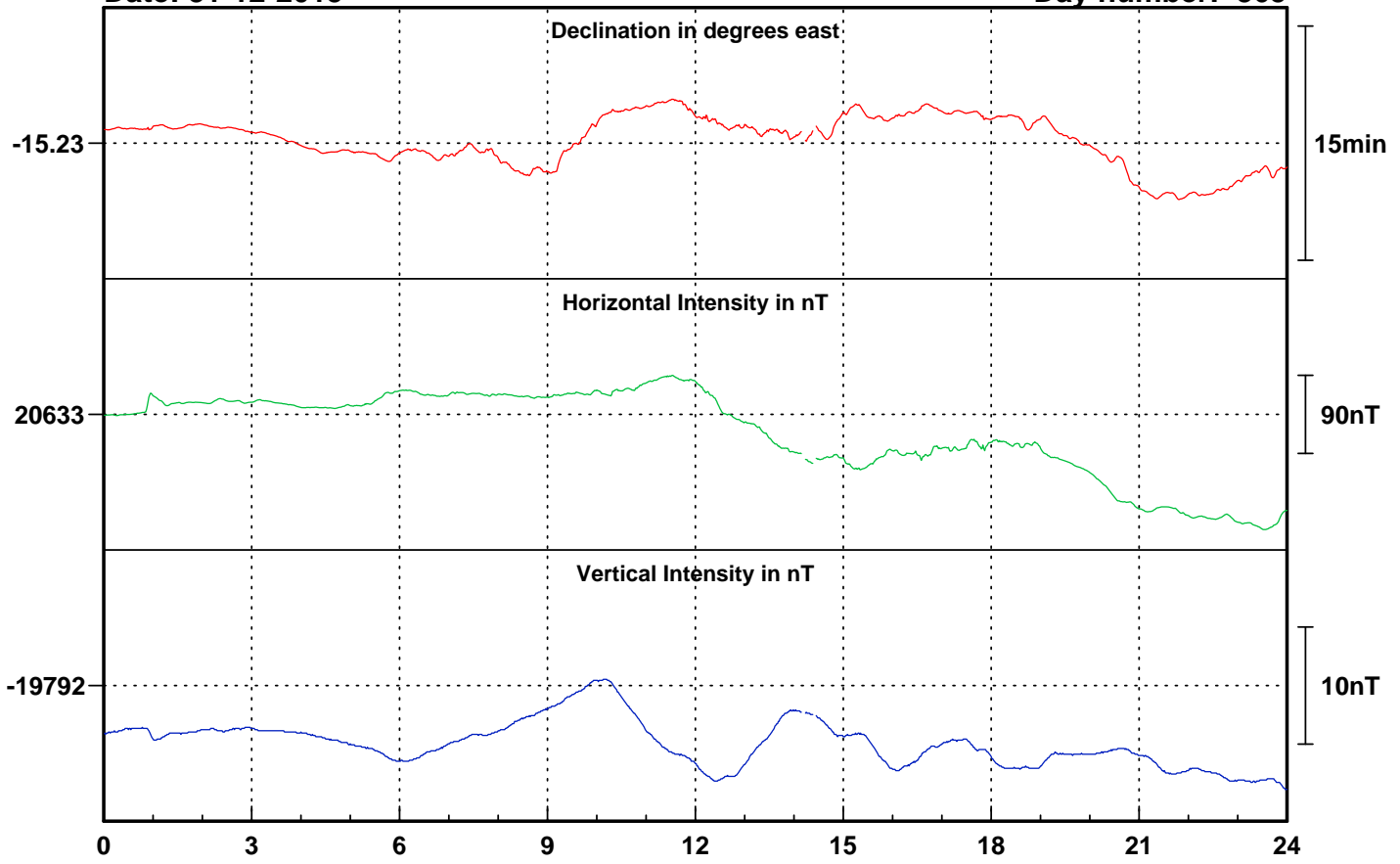
Day number: 364



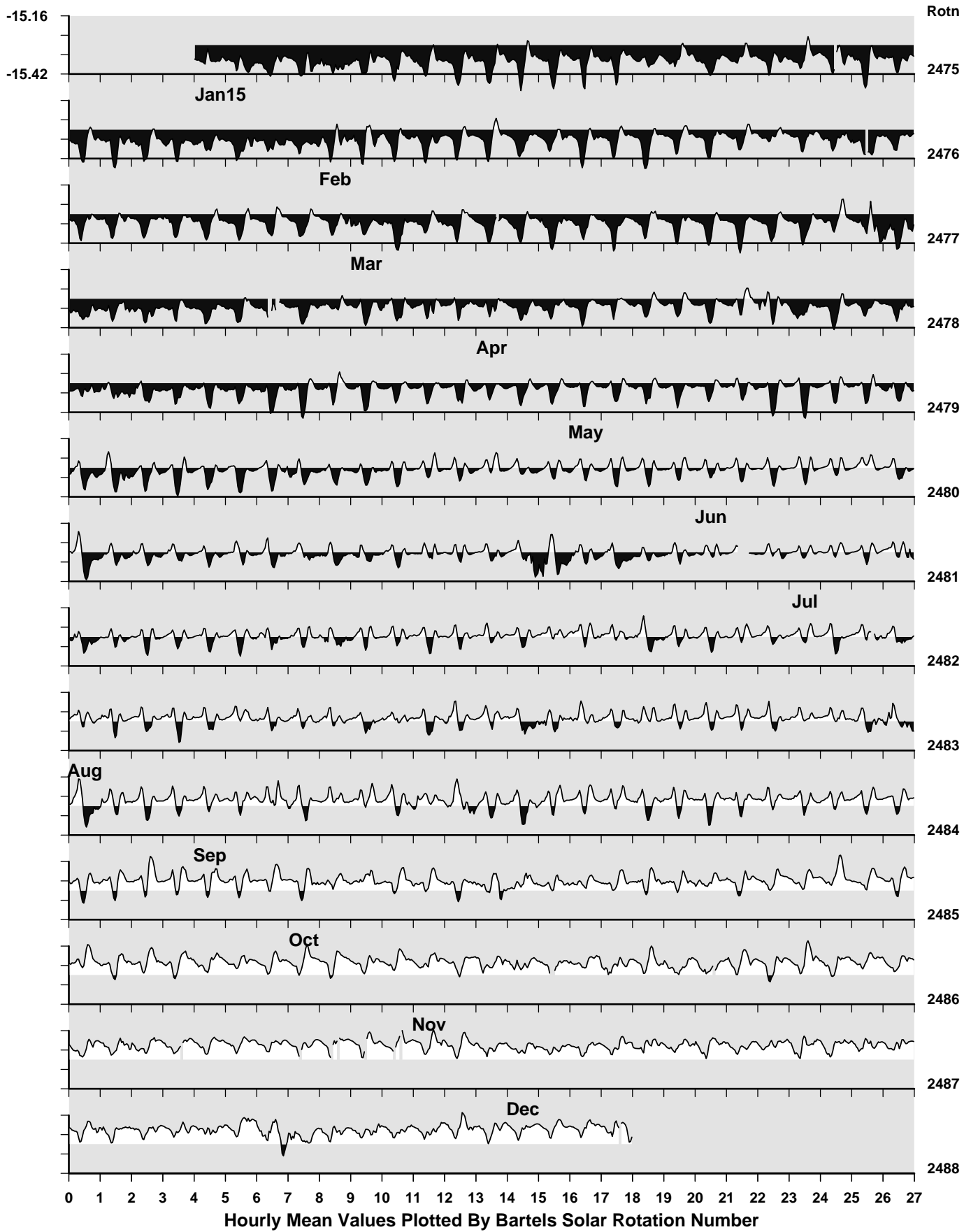
Date: 31-12-2015

# Ascension Island

Day number: 365

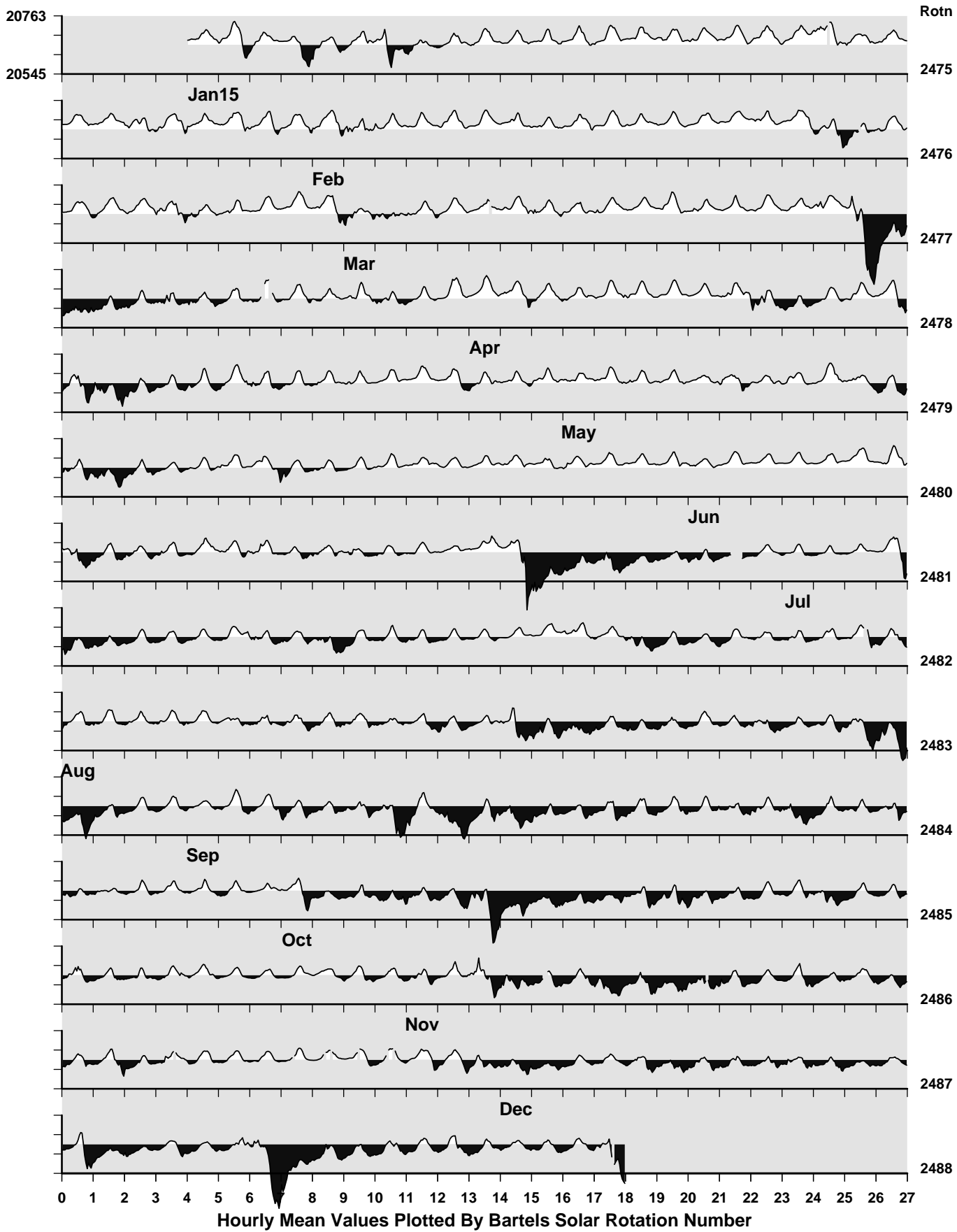


# Ascension Island Observatory: Declination (degrees)



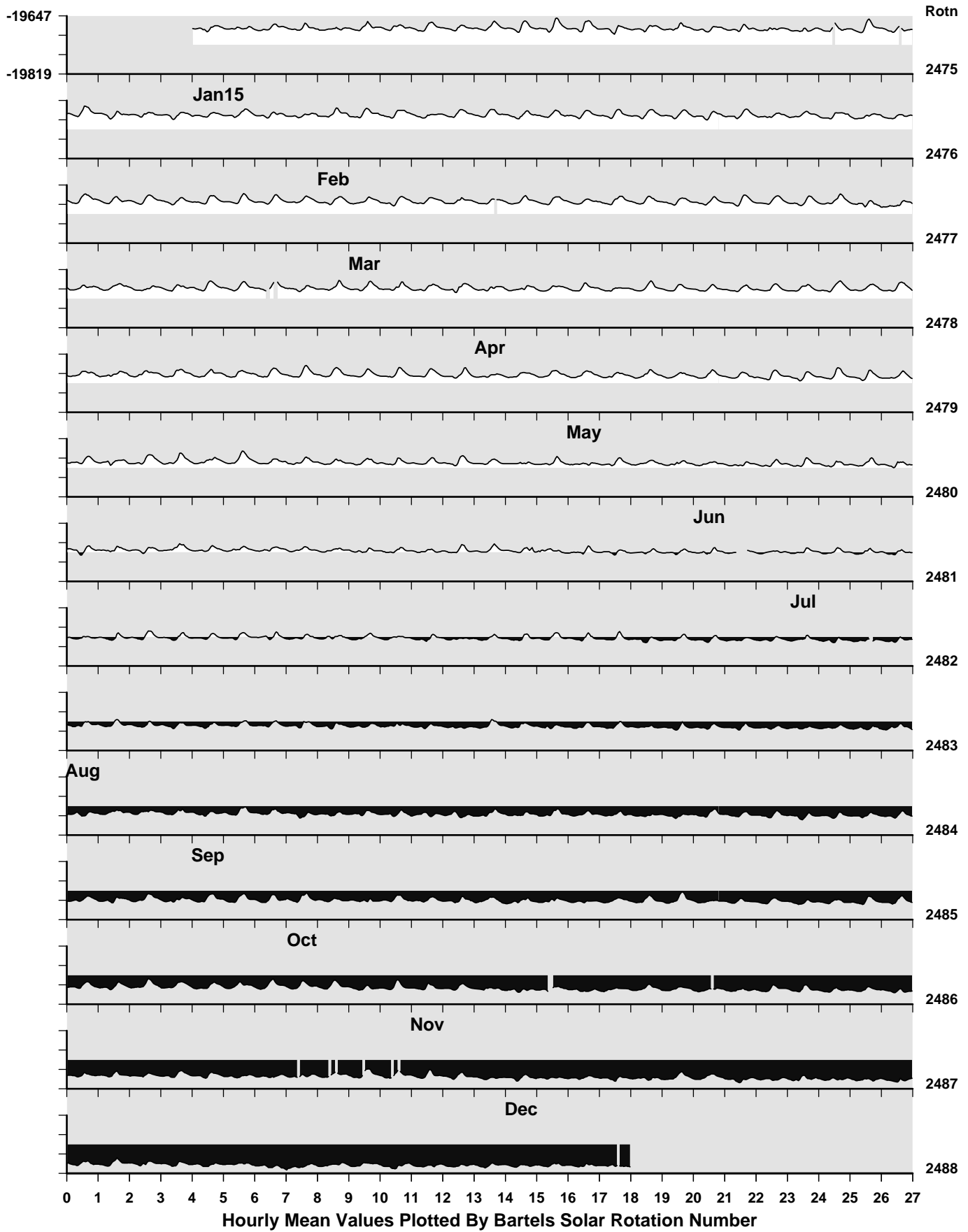
Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Island Observatory: Horizontal Intensity fhTL



Hourly Mean Values Plotted By Bartels Solar Rotation Number

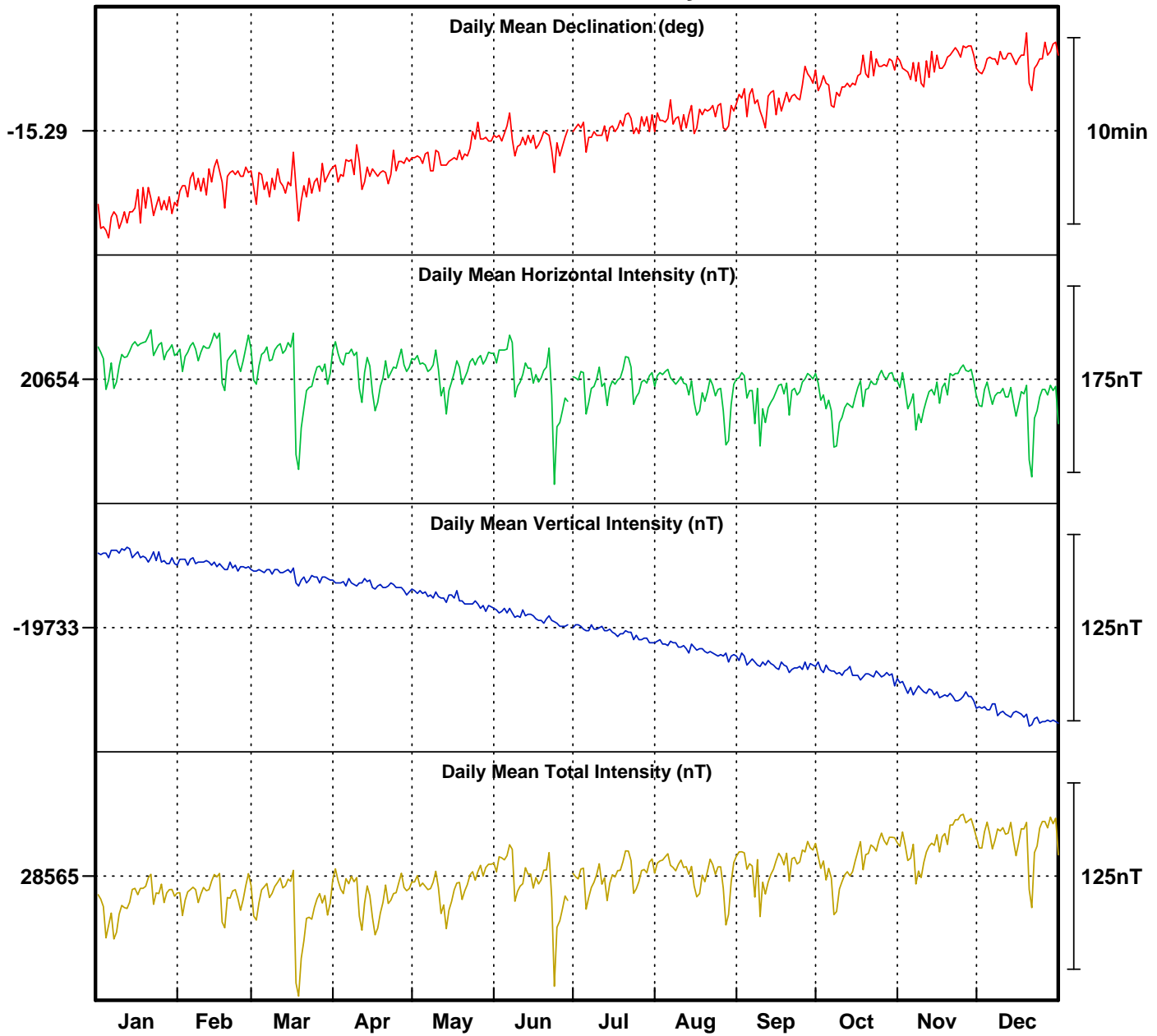
# Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number



# Ascension Is Observatory 2015



### Monthly Mean Values for Ascension Island Observatory 2015

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-15° 21.9′	20677 nT	-43° 35.5′	19938 nT	-5478 nT	-19685 nT	28549 nT
February	-15° 20.1′	20678 nT	-43° 35.9′	19942 nT	-5469 nT	-19690 nT	28553 nT
March	-15° 20.4′	20660 nT	-43° 38.0′	19924 nT	-5465 nT	-19698 nT	28545 nT
April	-15° 19.6′	20664 nT	-43° 38.3′	19929 nT	-5462 nT	-19704 nT	28553 nT
May	-15° 18.7′	20664 nT	-43° 39.1′	19930 nT	-5457 nT	-19714 nT	28559 nT
June	-15° 18.1′	20654 nT	-43° 41.1′	19921 nT	-5450 nT	-19726 nT	28560 nT
July	-15° 17.4′	20651 nT	-43° 42.2′	19920 nT	-5446 nT	-19736 nT	28565 nT
August	-15° 16.8′	20643 nT	-43° 43.8′	19913 nT	-5440 nT	-19748 nT	28567 nT
September	-15° 15.7′	20641 nT	-43° 44.9′	19913 nT	-5433 nT	-19758 nT	28573 nT
October	-15° 14.7′	20638 nT	-43° 45.6′	19912 nT	-5427 nT	-19764 nT	28575 nT
November	-15° 13.9′	20644 nT	-43° 46.3′	19919 nT	-5424 nT	-19777 nT	28589 nT
December	-15° 13.7′	20633 nT	-43° 48.5′	19908 nT	-5420 nT	-19792 nT	28591 nT

#### Note

i. The values shown here are provisional.