

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

# Observatory

# Monthly

# Magnetic

# Bulletin

**December 2019**

**19/12/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° 56' 56.4" S 345° 37' 26.4" E  
*Geomagnetic:* -2° 57' 36" S 057° 58' 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 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](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 0.1 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. 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

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.

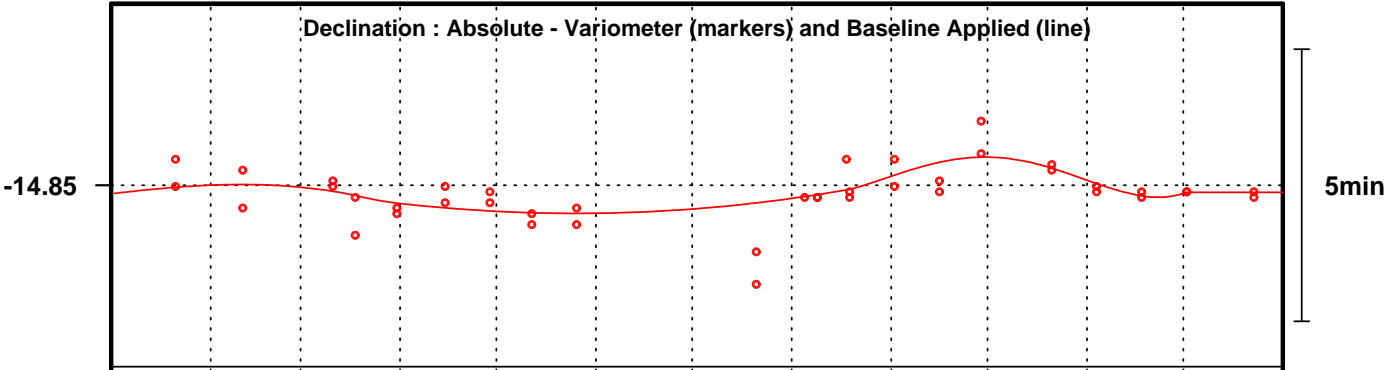
Reproduction of any part of this bulletin should be accompanied by the statement: 'Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved'. Publications making use of the data should include an acknowledgment statement of the form: 'The results presented in this paper rely on the data collected at Ascension Island magnetic observatory, operated by the British Geological Survey.'

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)

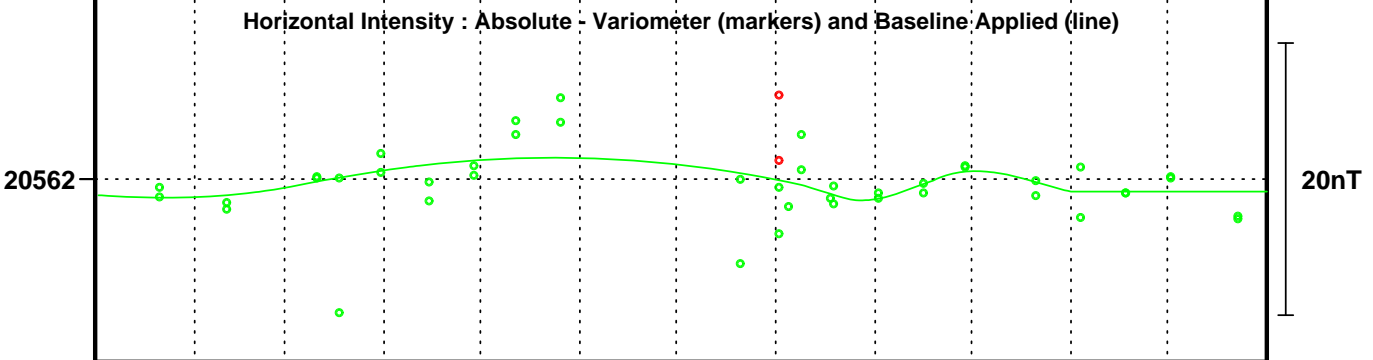


# Ascension Island 2019

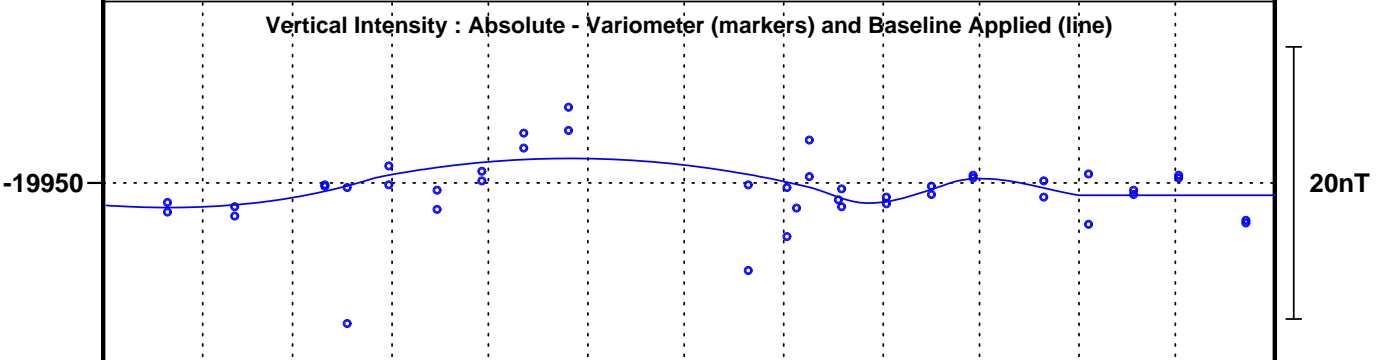
Declination : Absolute - Variometer (markers) and Baseline Applied (line)



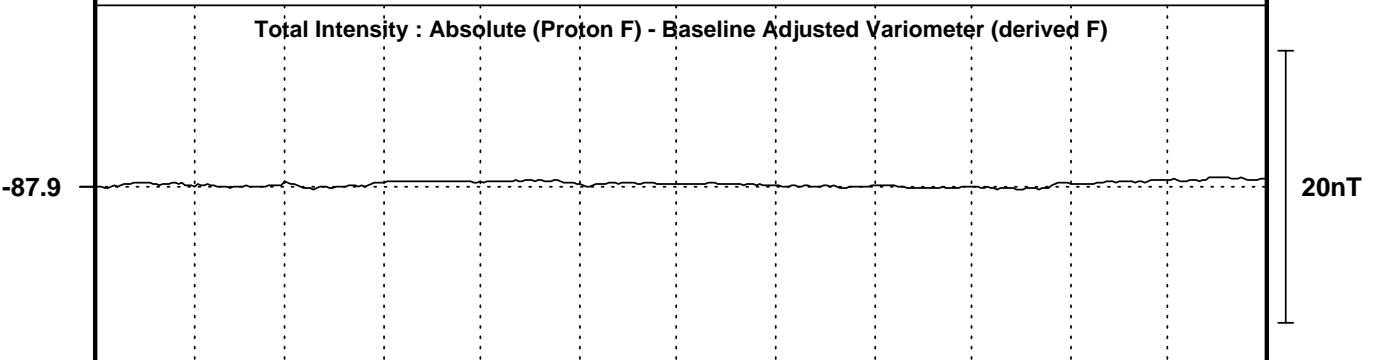
Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)



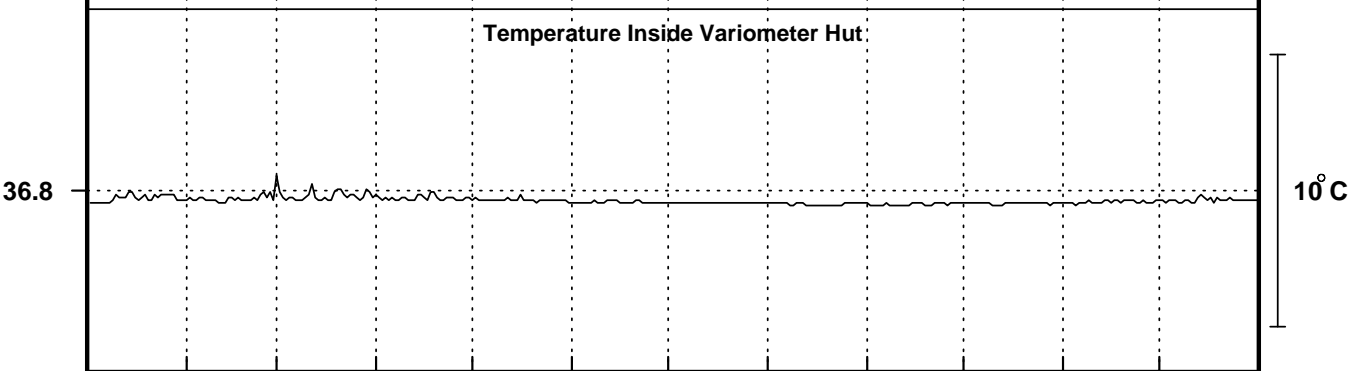
Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)



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



Temperature Inside Variometer Hut

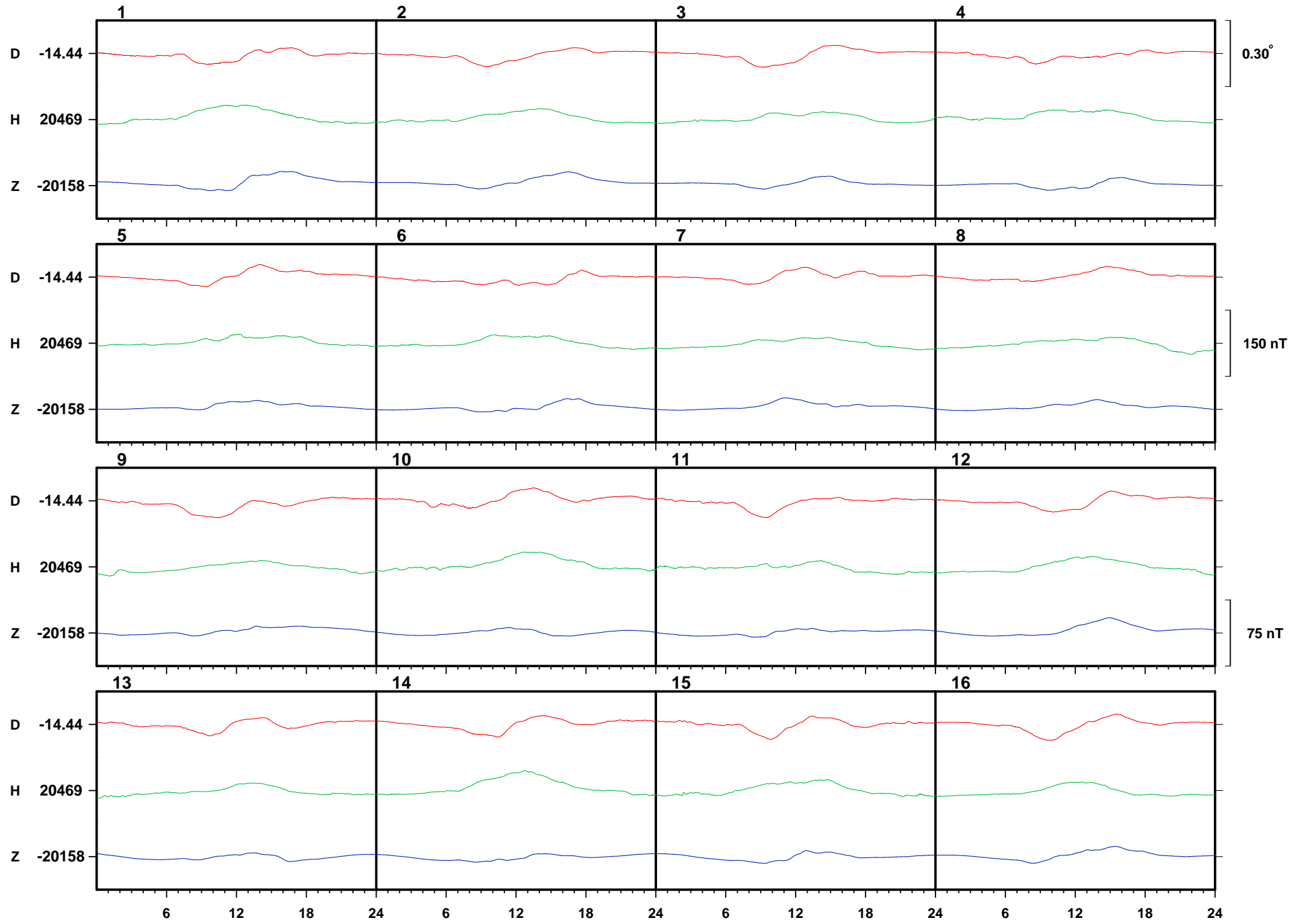


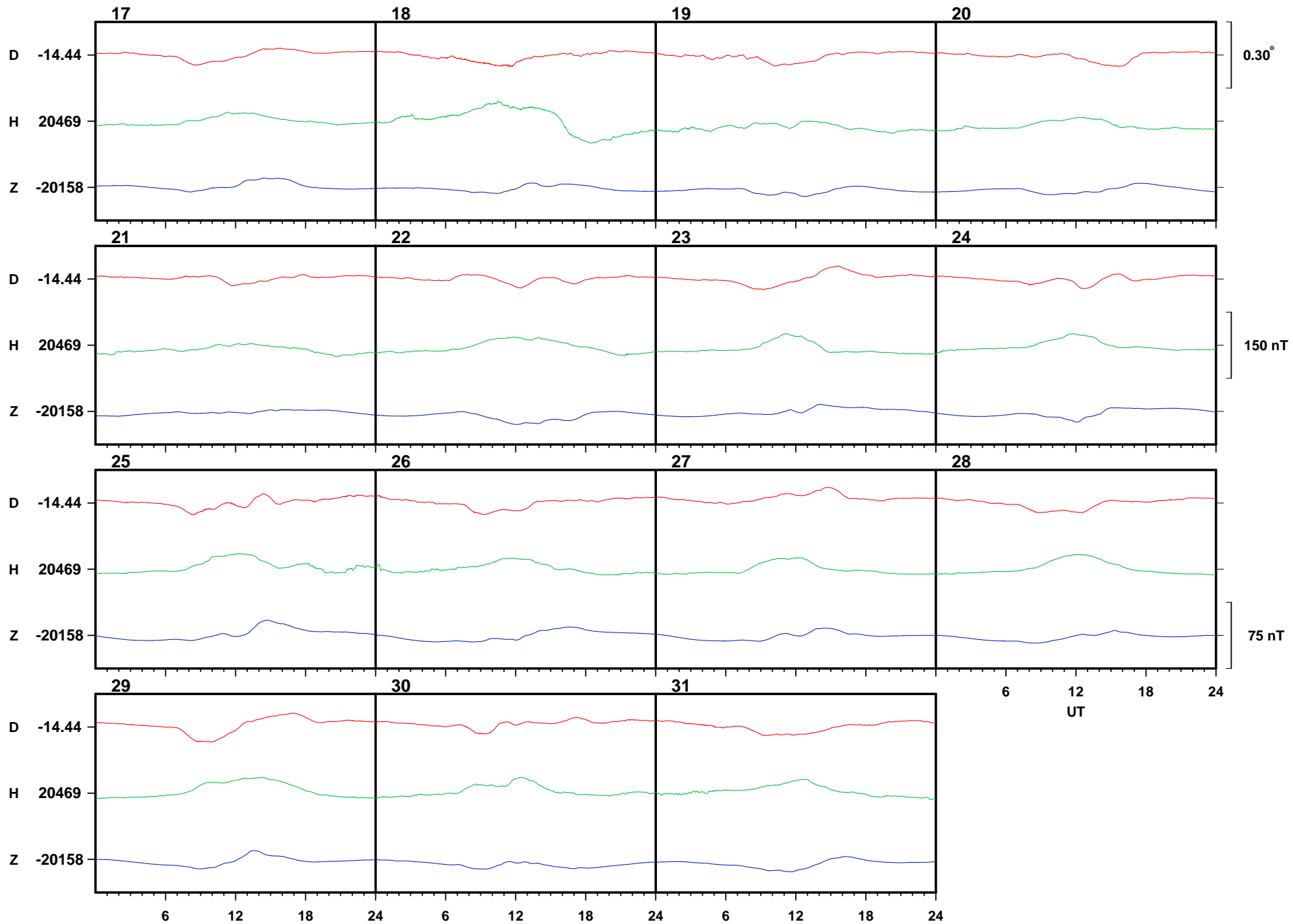
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Ascension Island

December

2019





Ascension Island

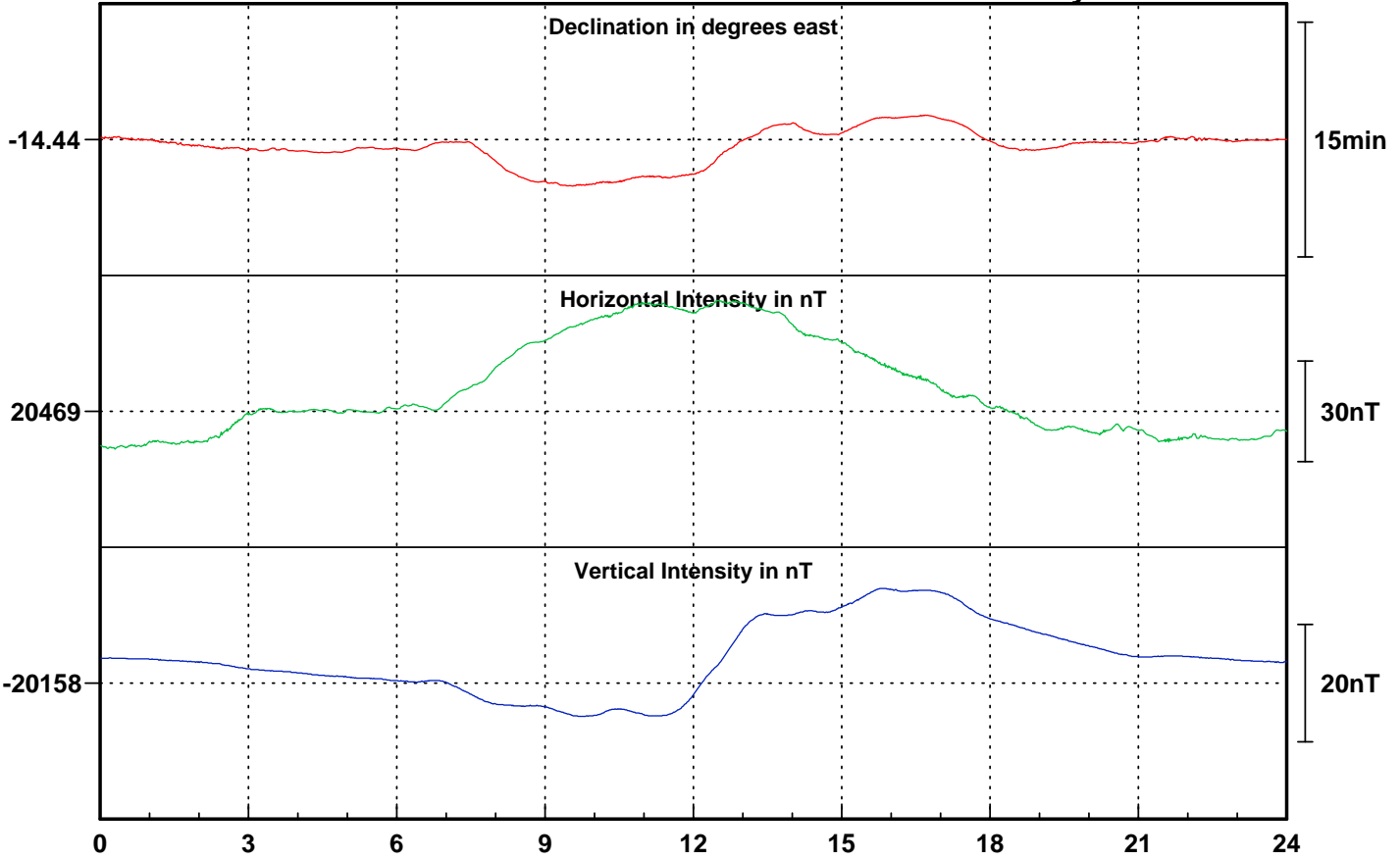
December

2019

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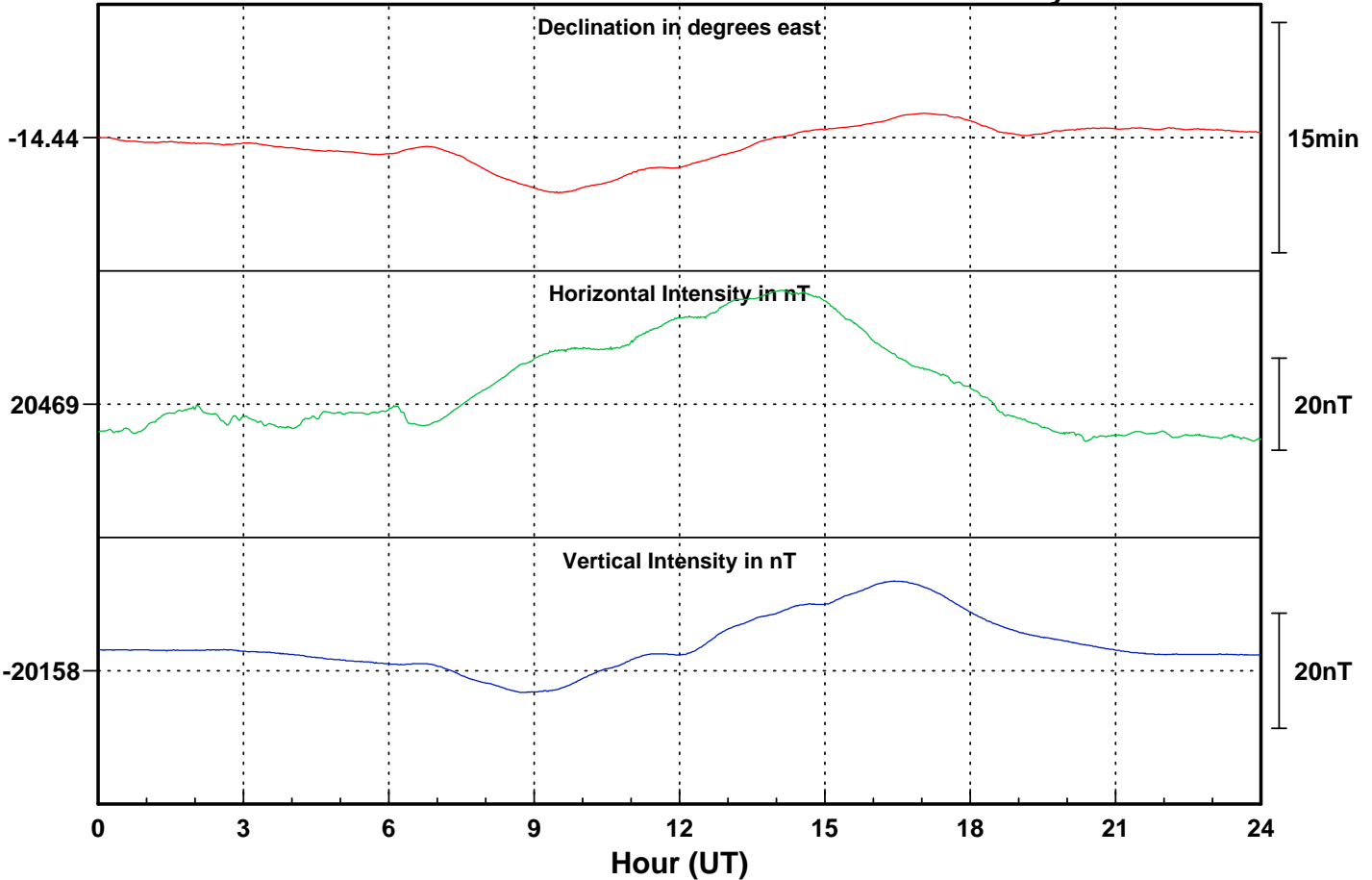
# Ascension Island

Day number: 335



Date: 02-12-2019

Day number: 336

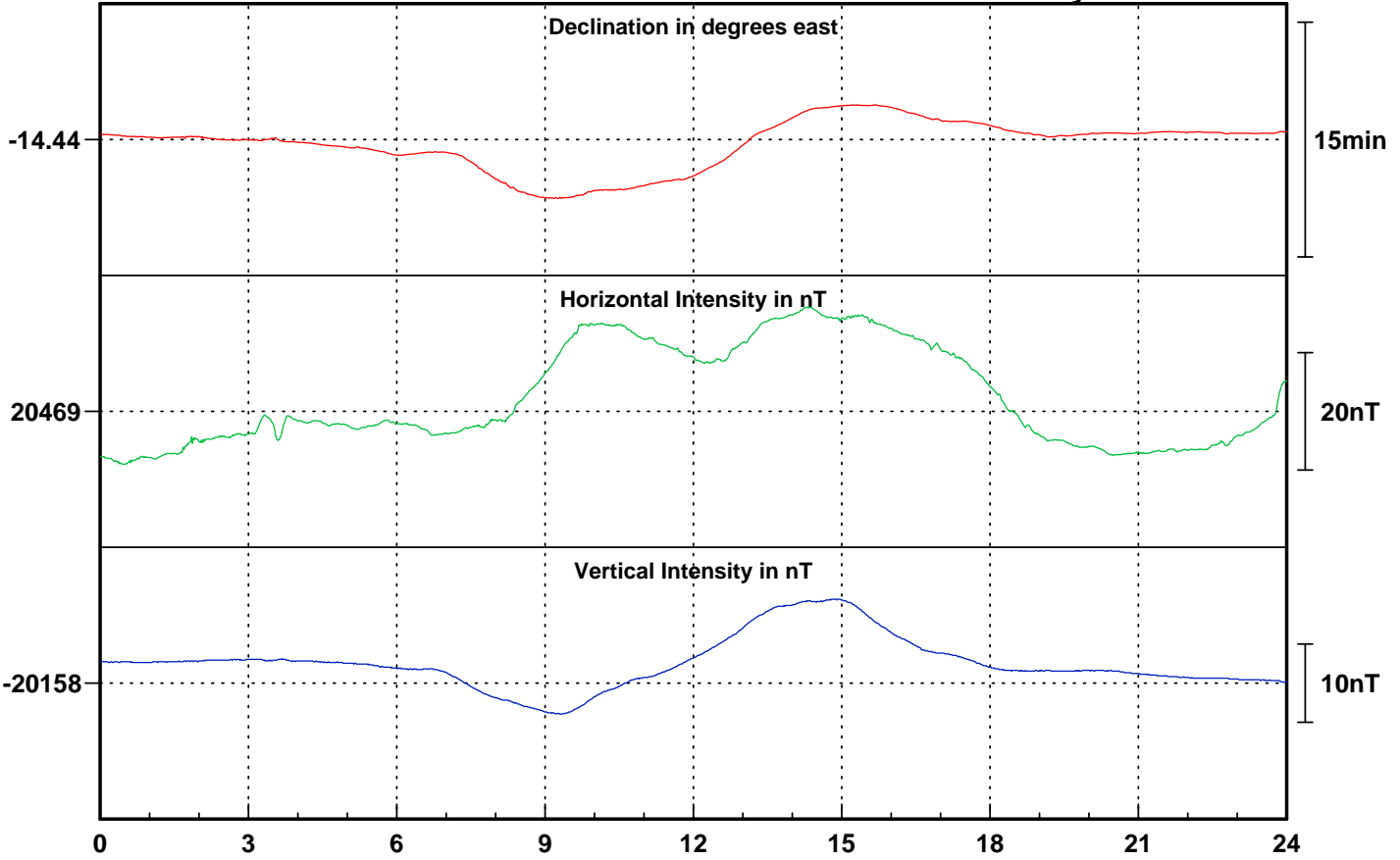




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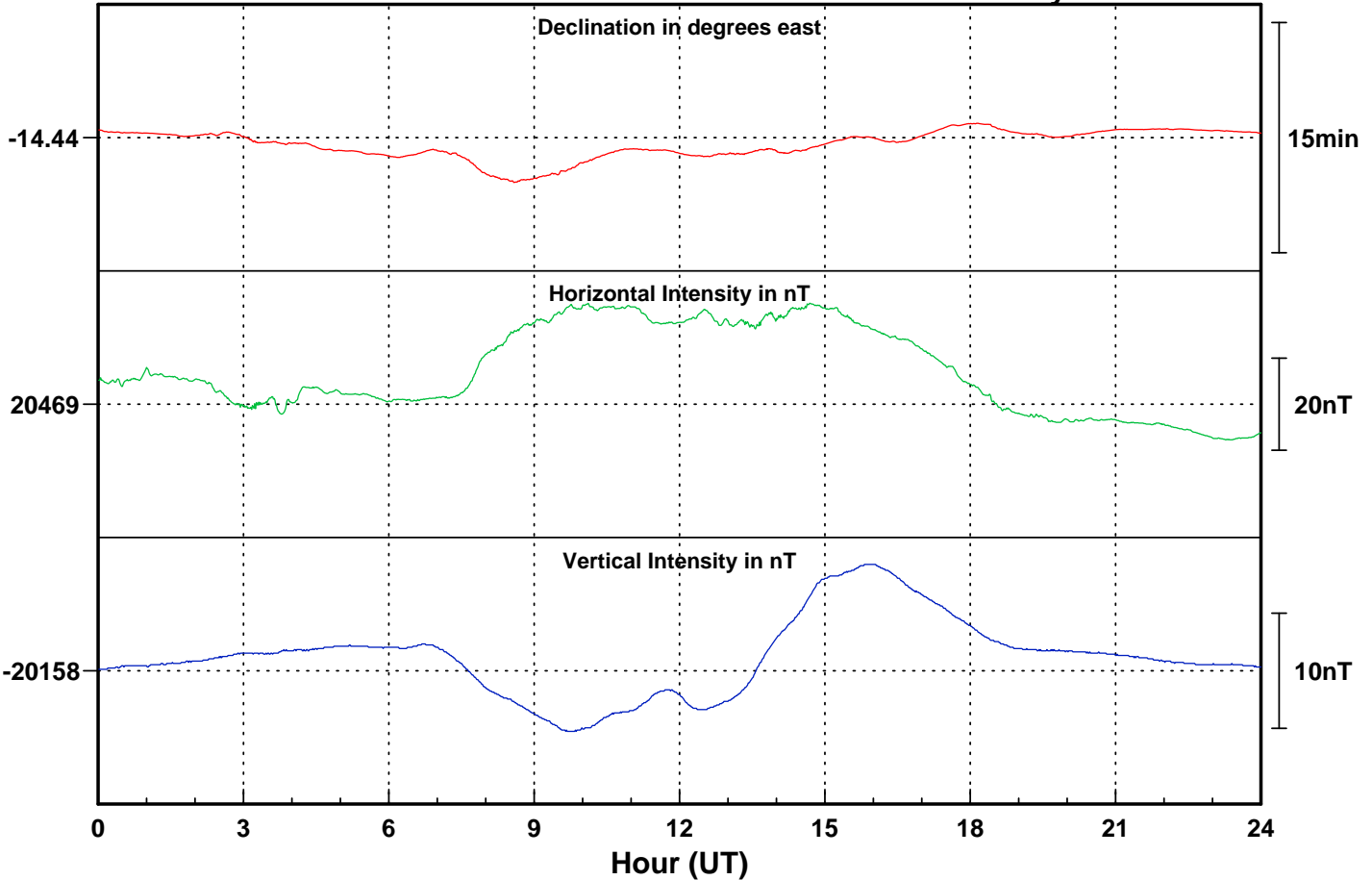
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Day number: 337



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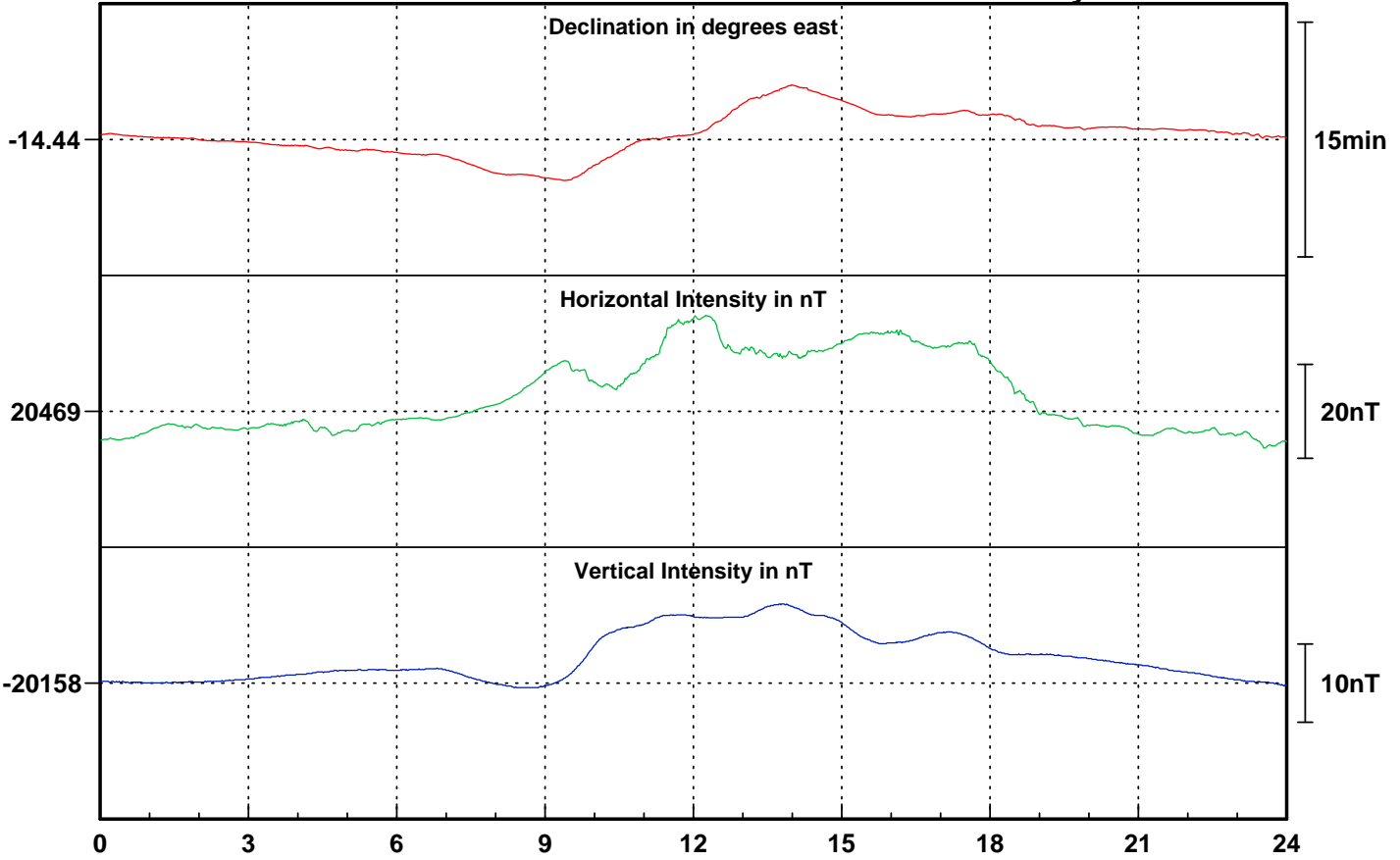
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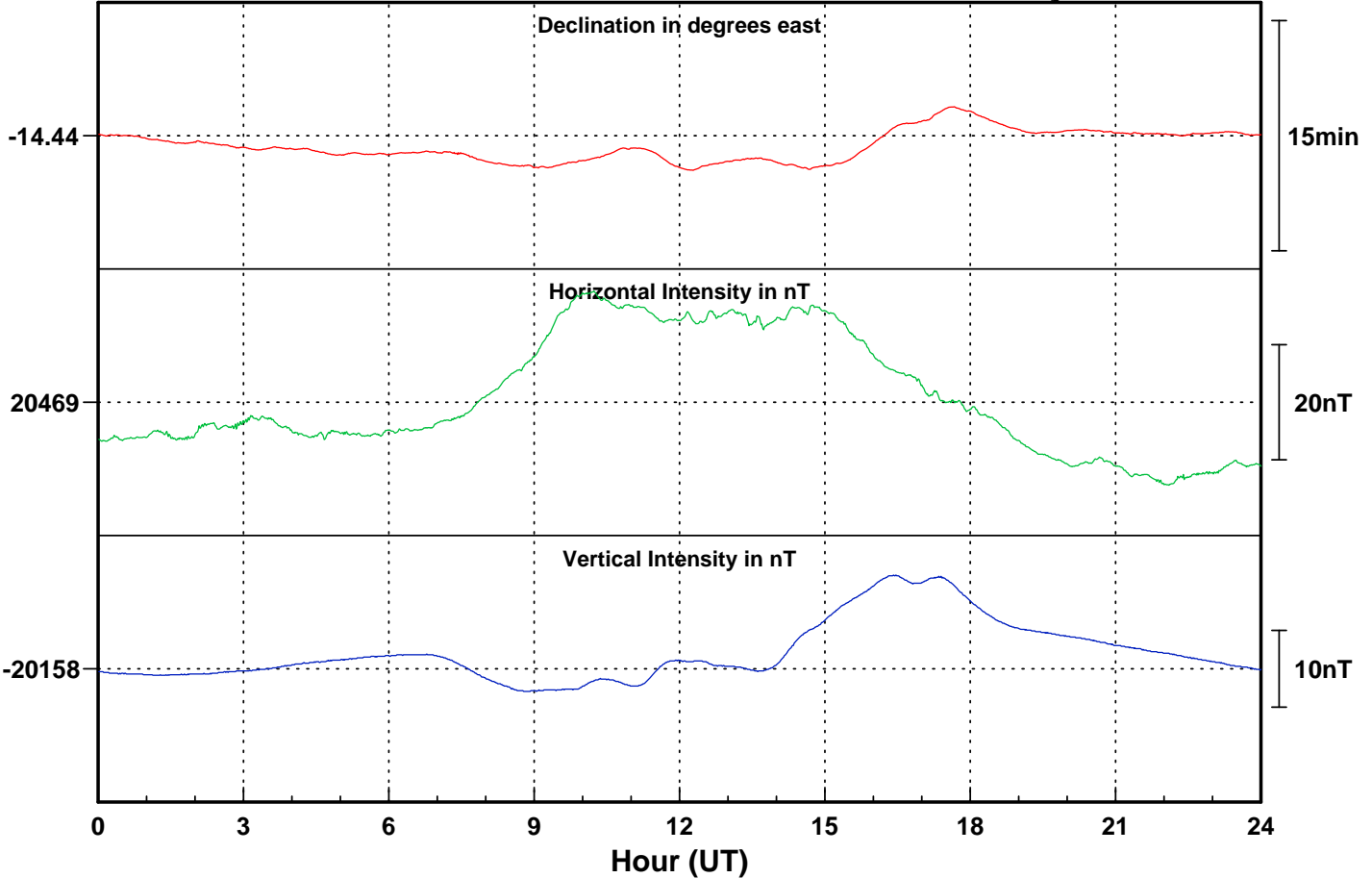
# Ascension Island

Day number: 339



Date: 06-12-2019

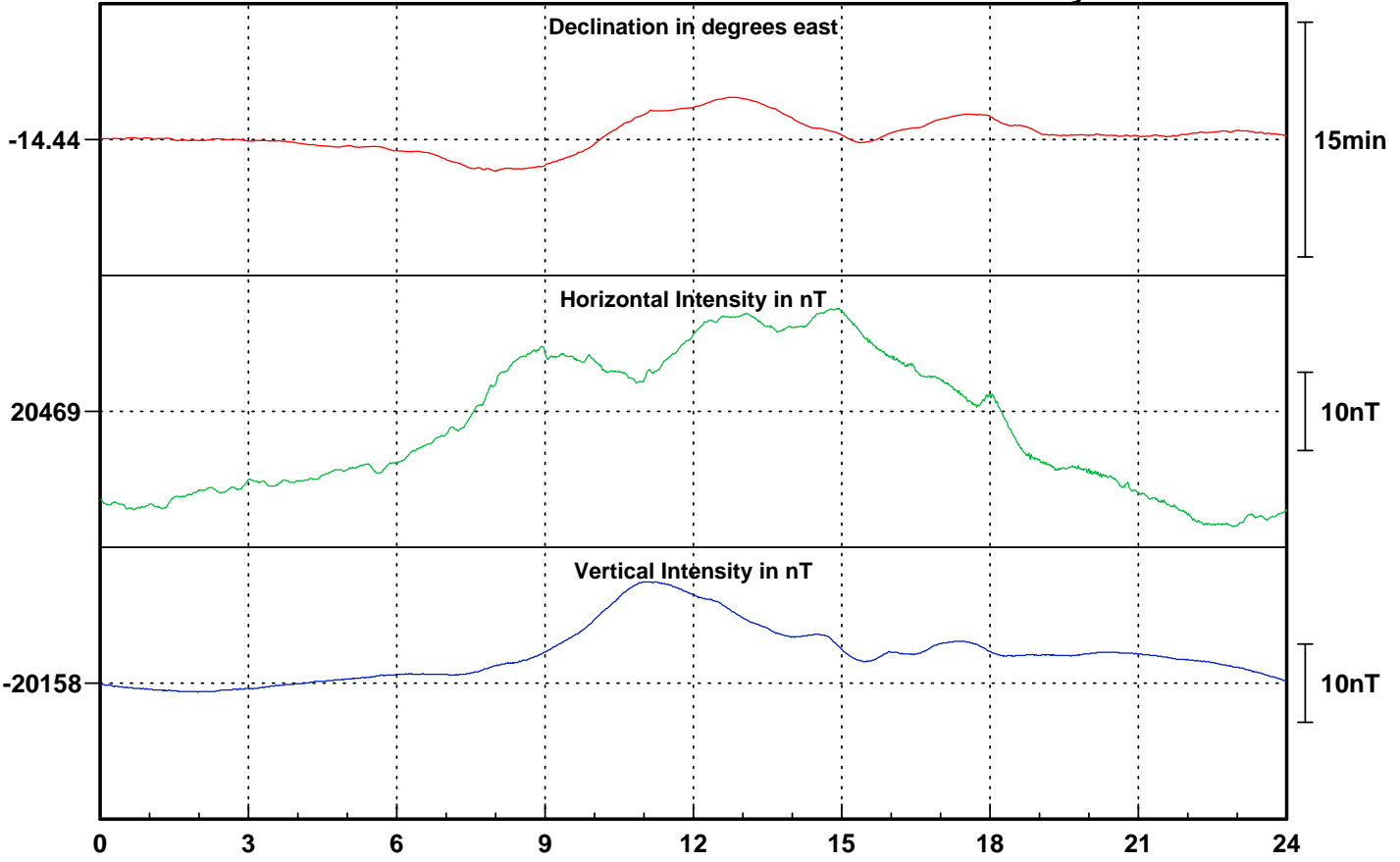
Day number: 340



Date: 07-12-2019

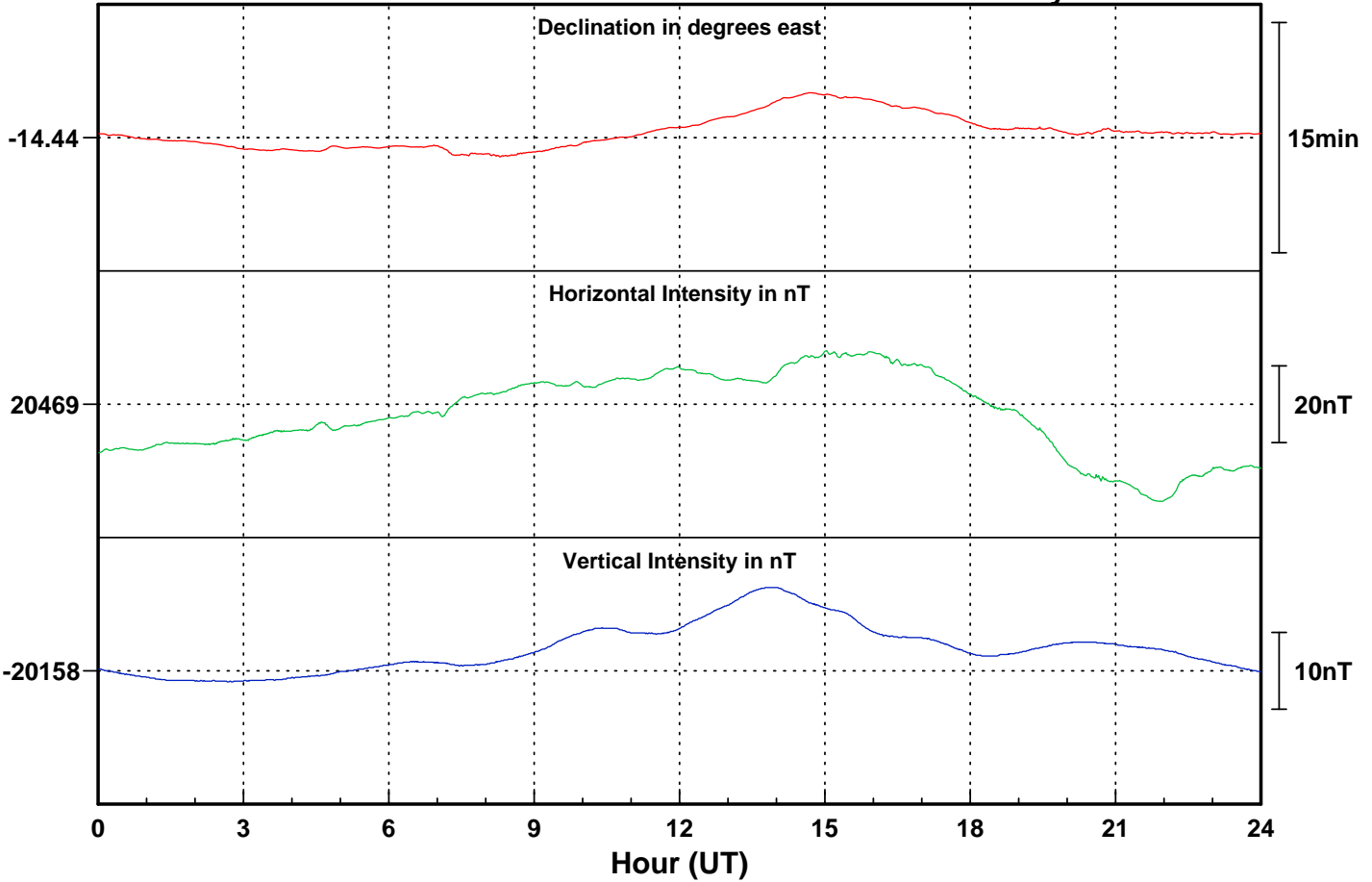
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Day number: 341



Date: 08-12-2019

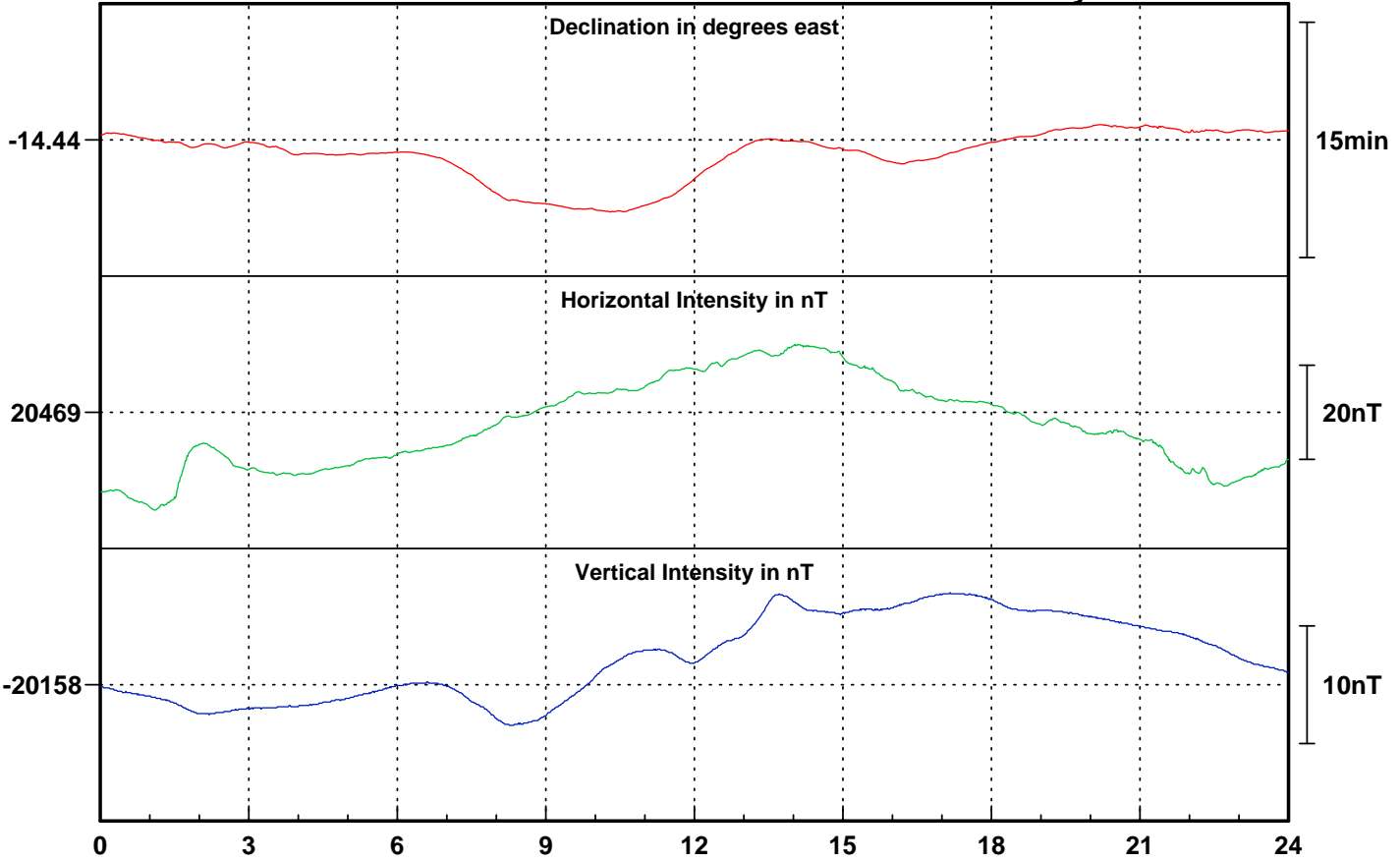
Day number: 342



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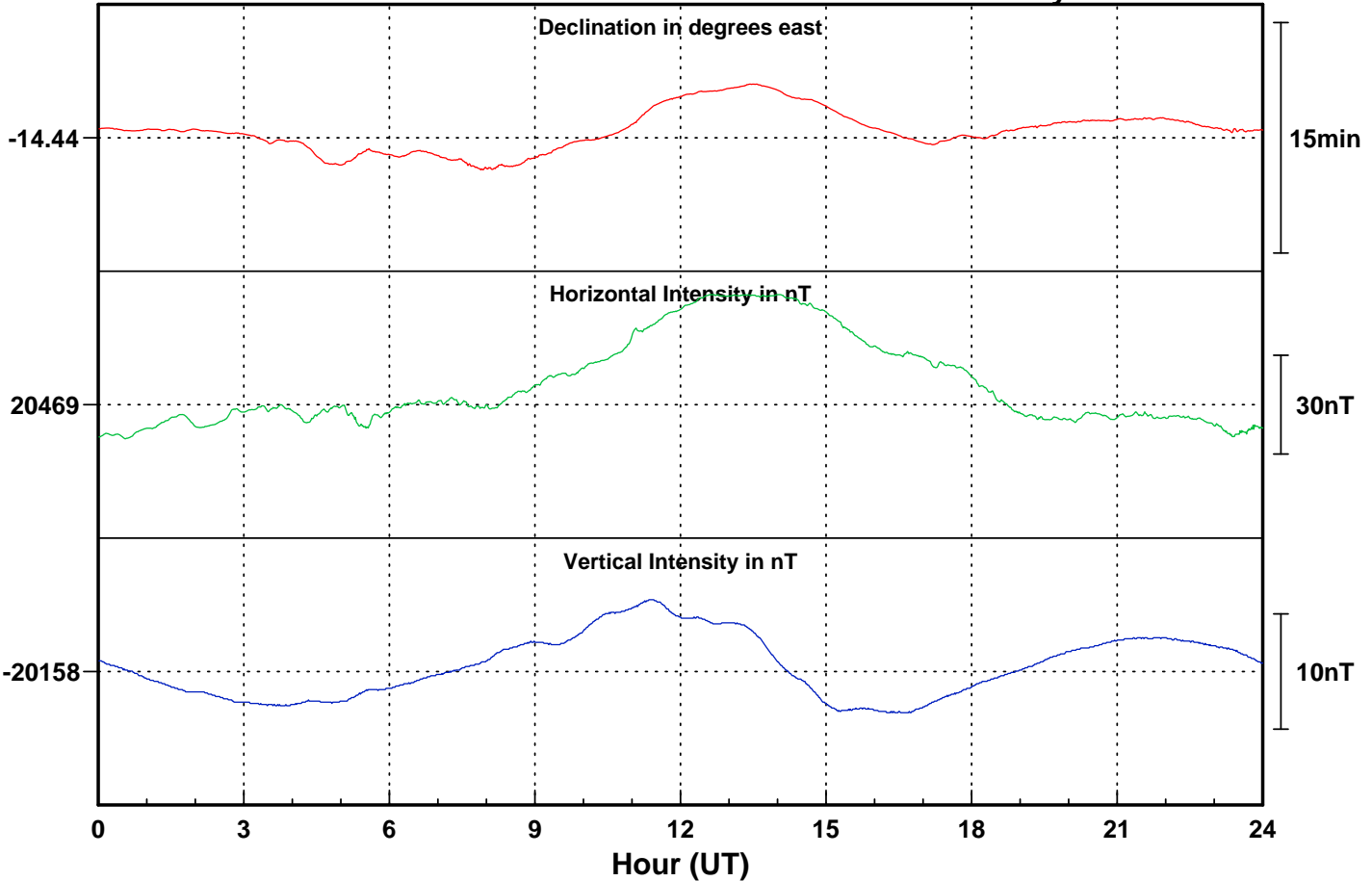
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Day number: 343



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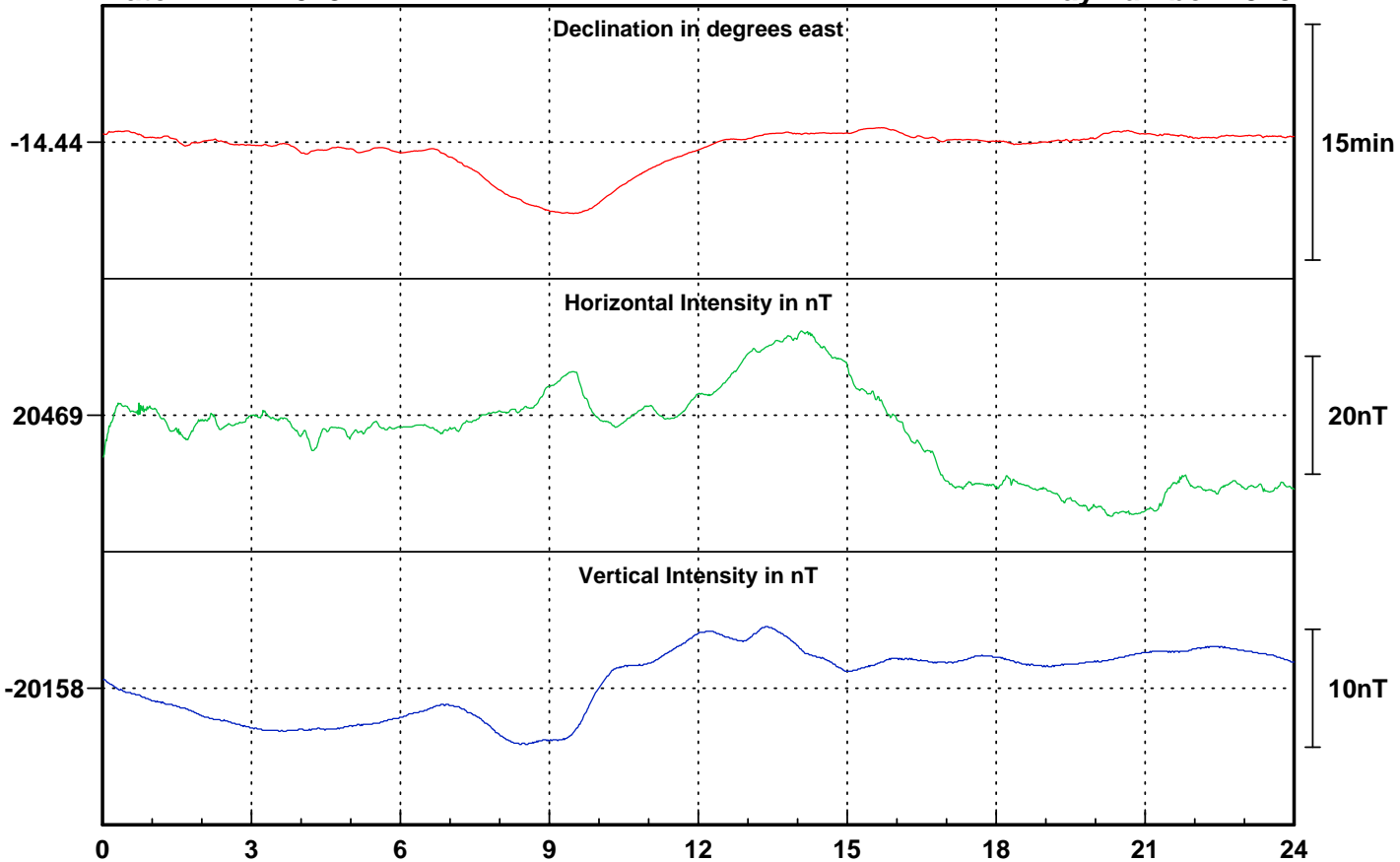
Day number: 344



Date: 11-12-2019

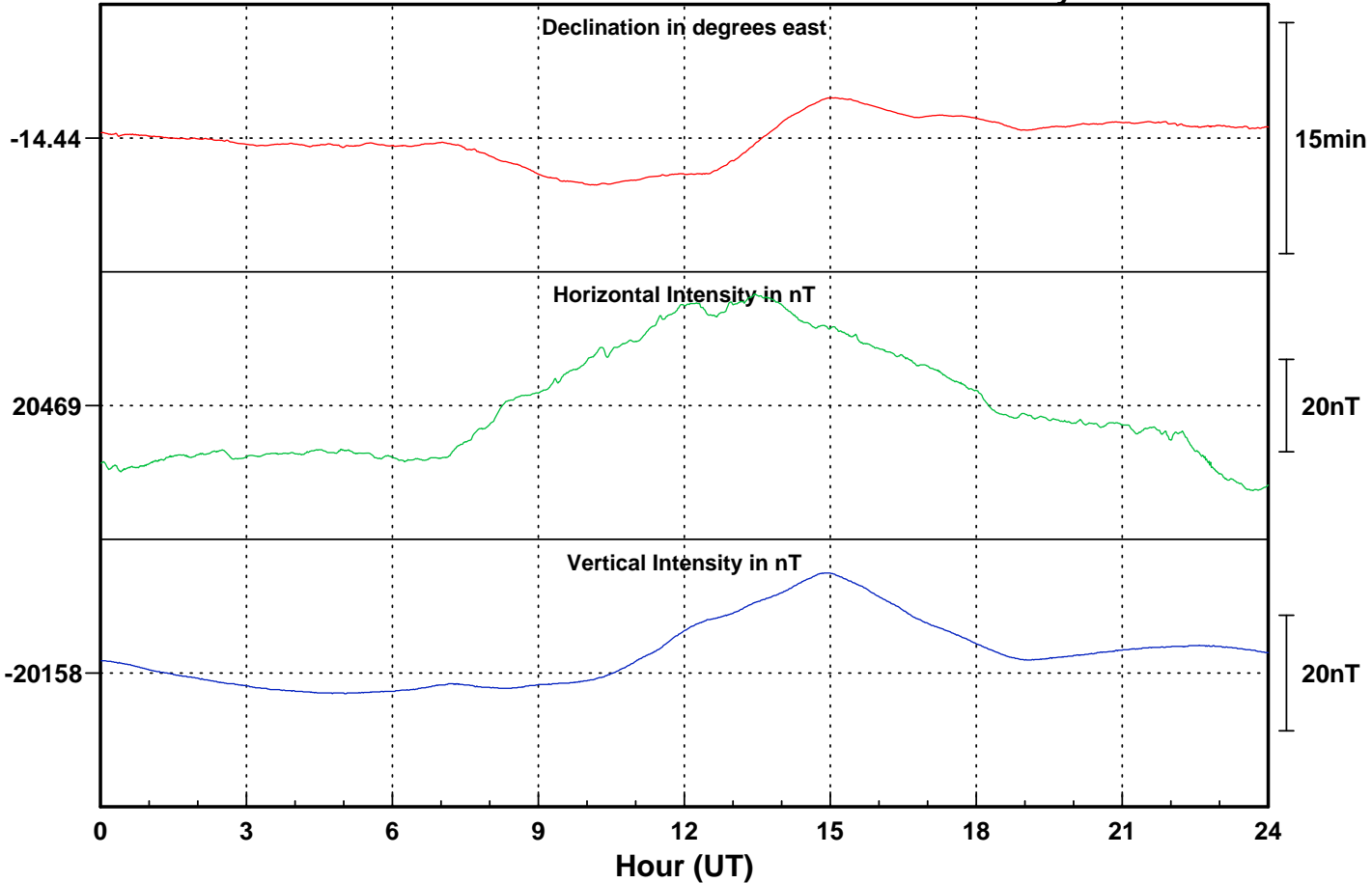
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Day number: 345



Date: 12-12-2019

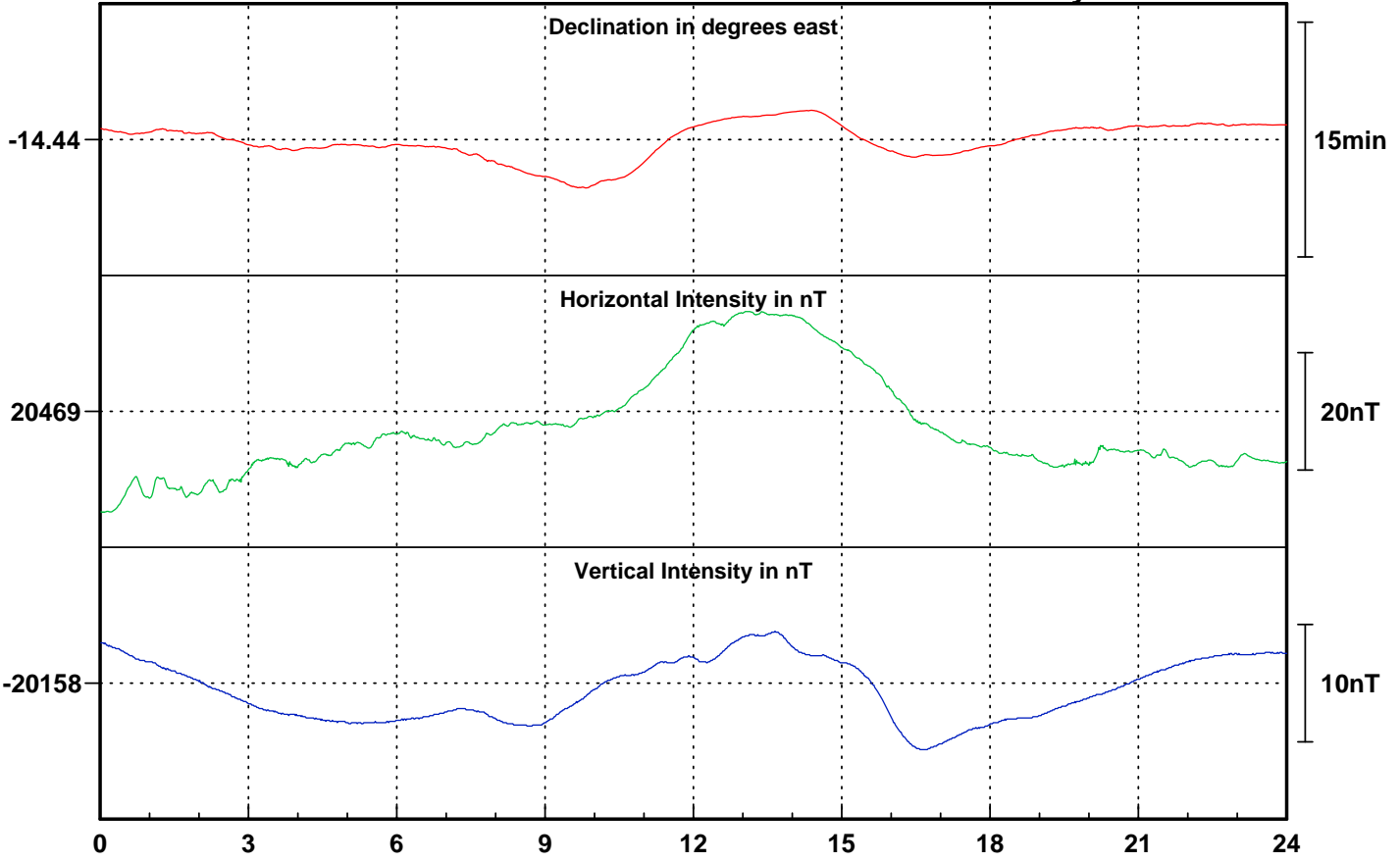
Day number: 346



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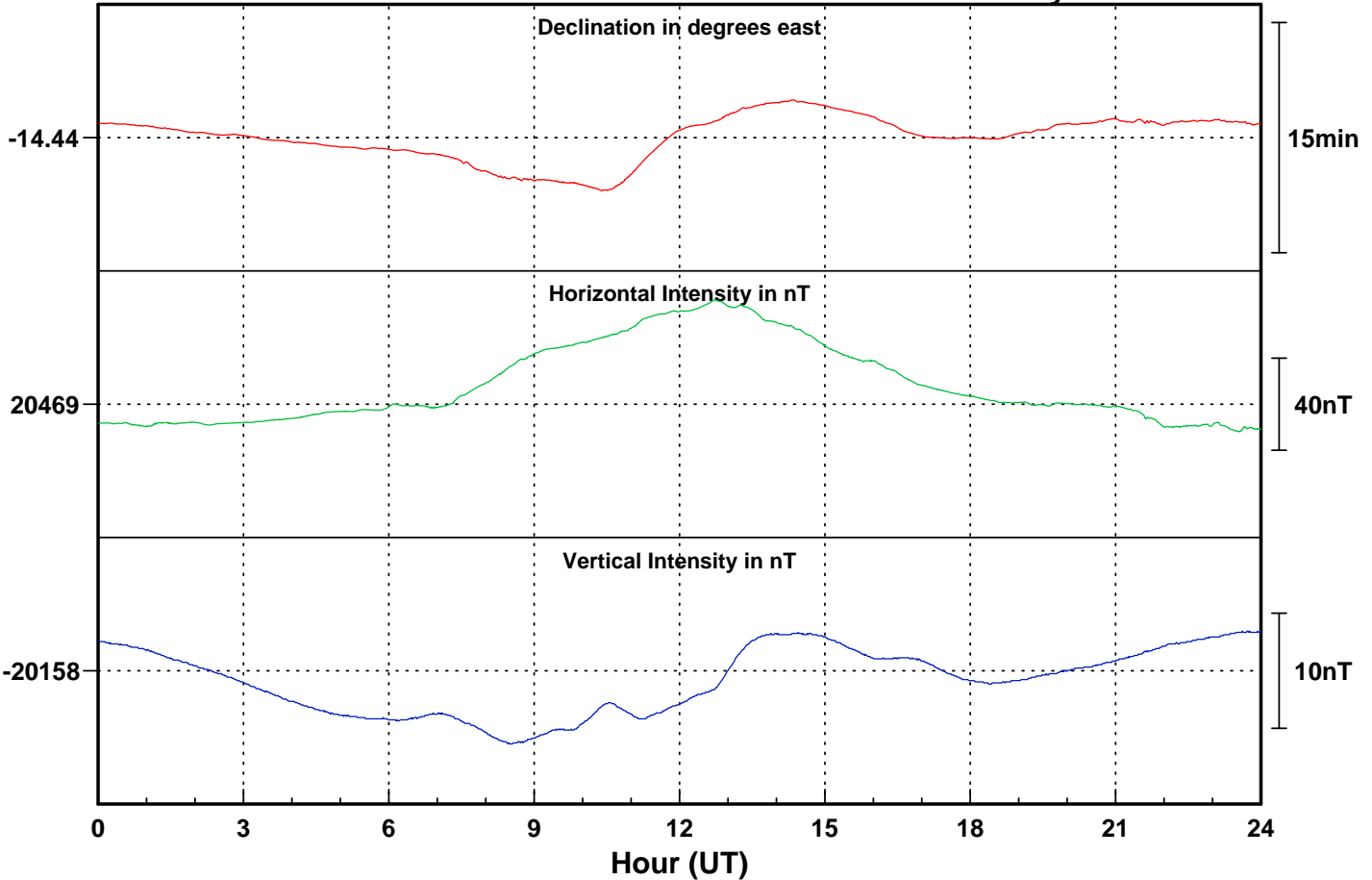
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Day number: 347



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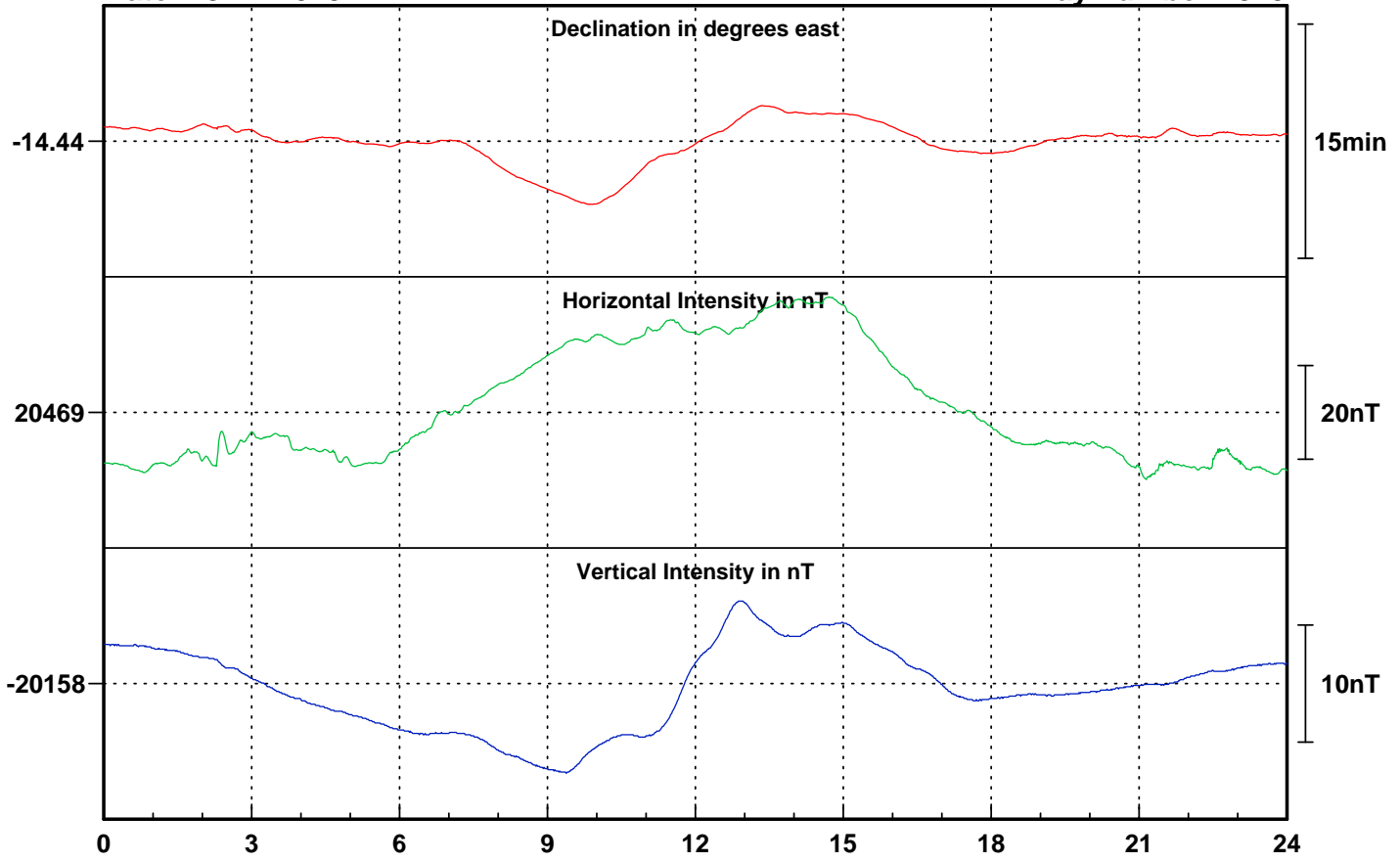
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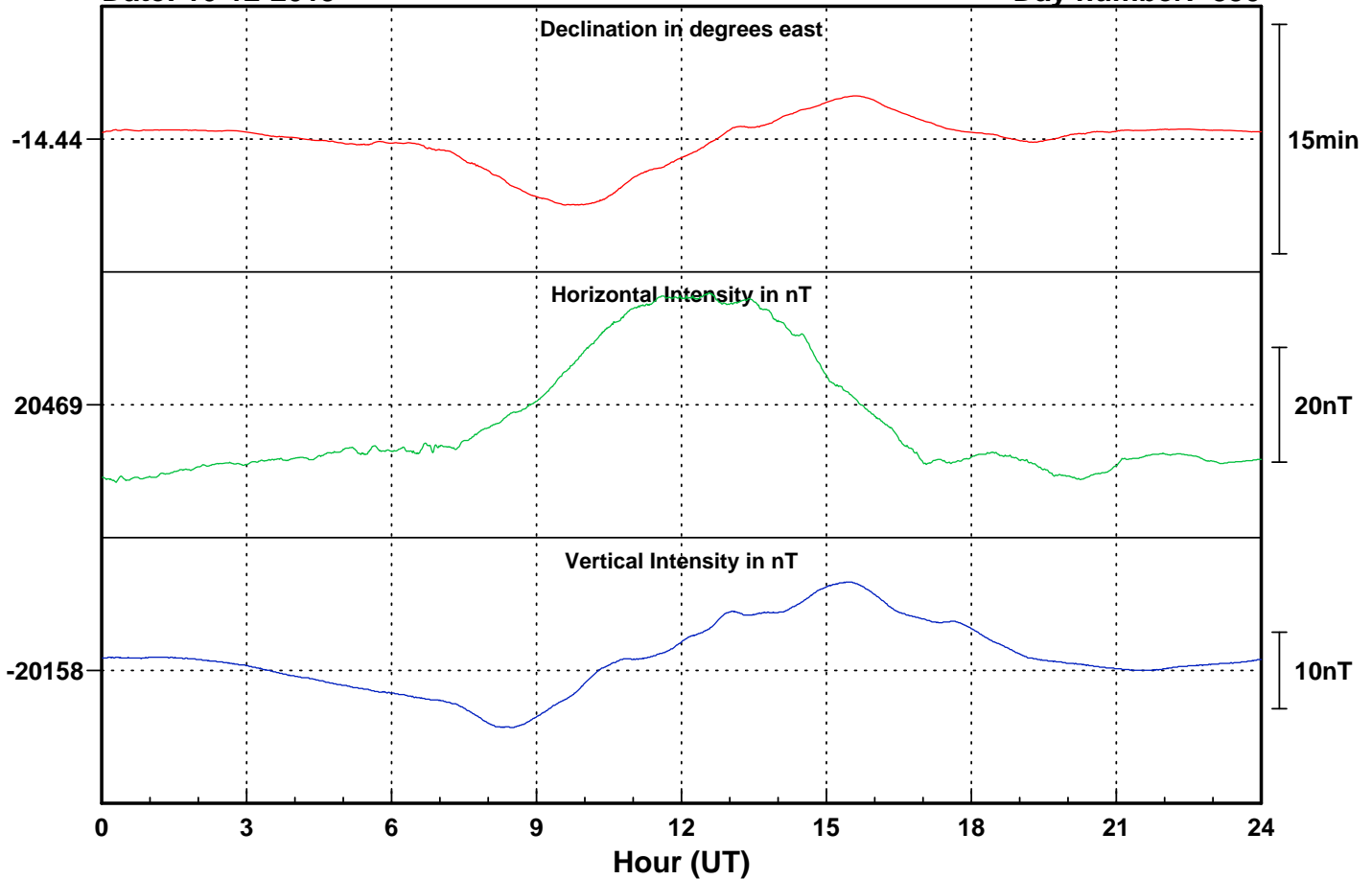
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Day number: 349



Date: 16-12-2019

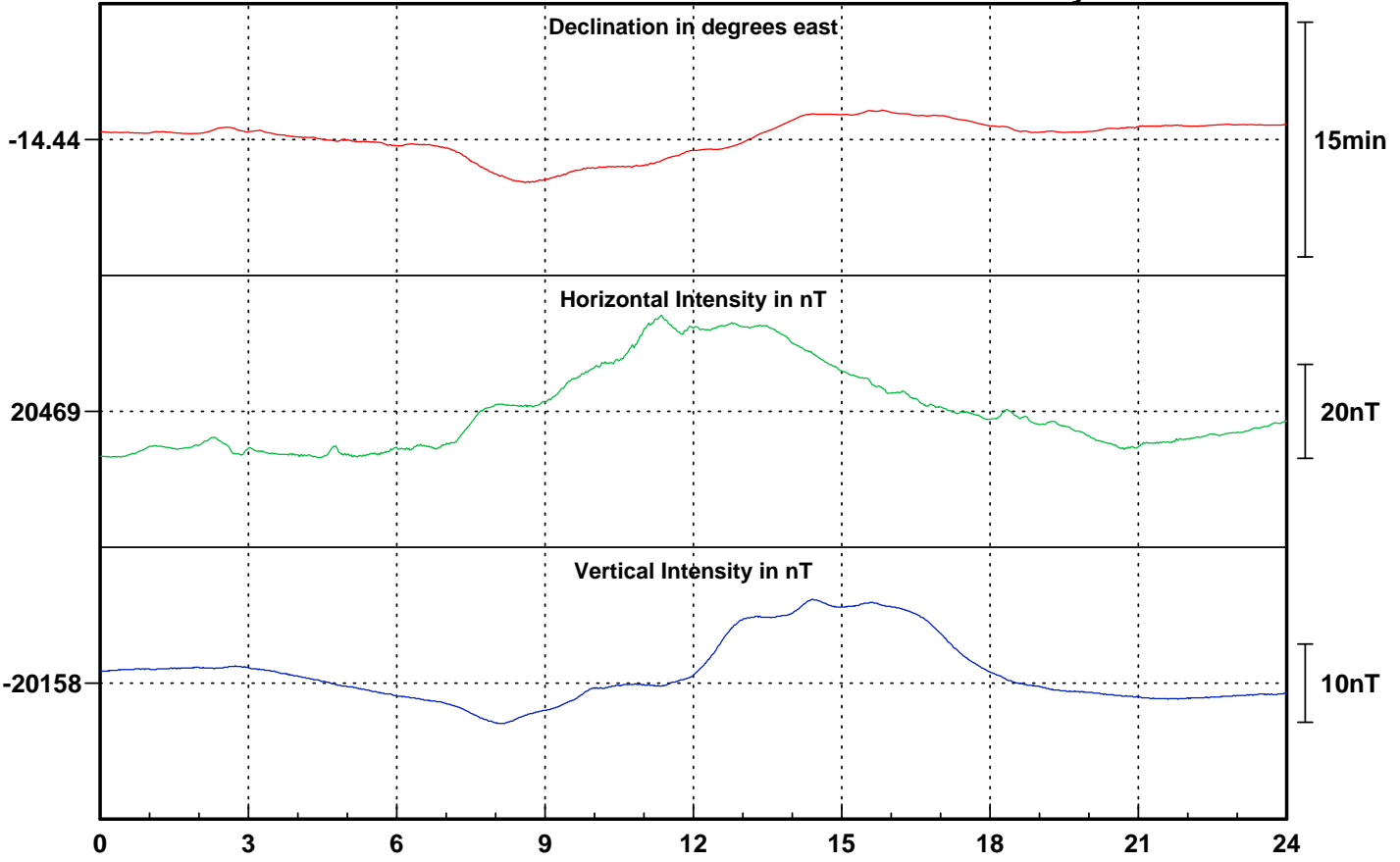
Day number: 350



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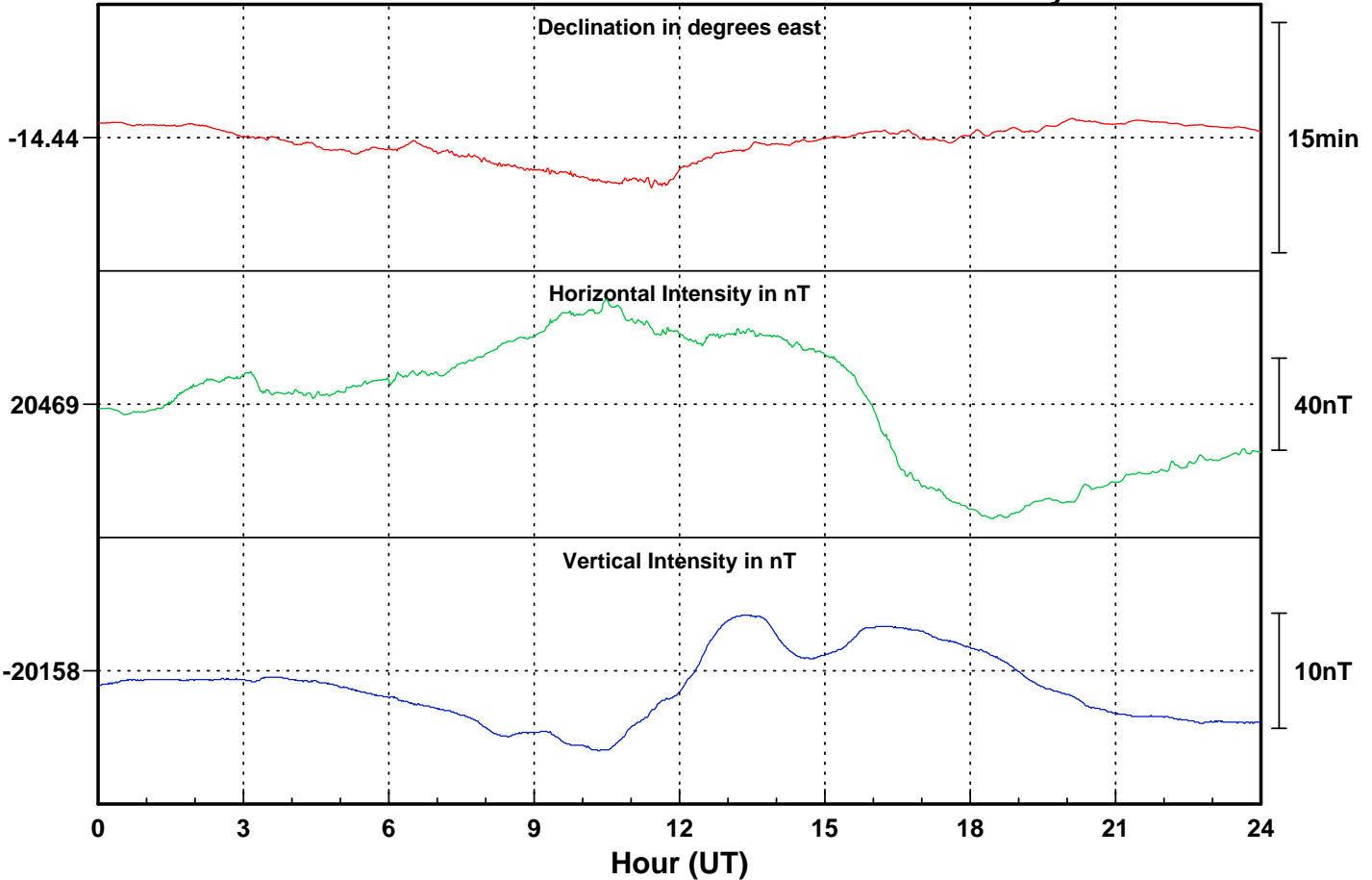
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Day number: 351



Date: 18-12-2019

Day number: 352

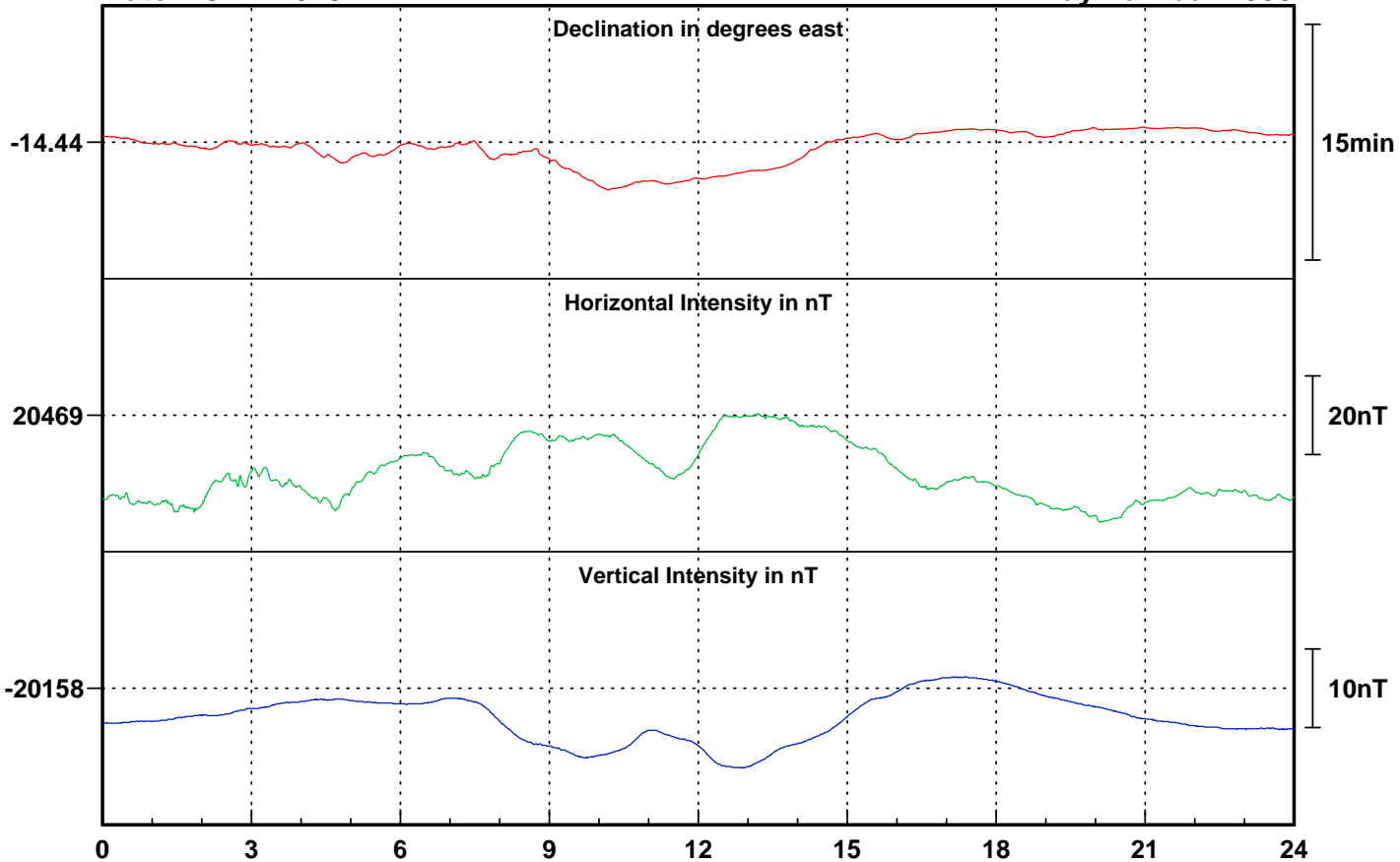




Date: 19-12-2019

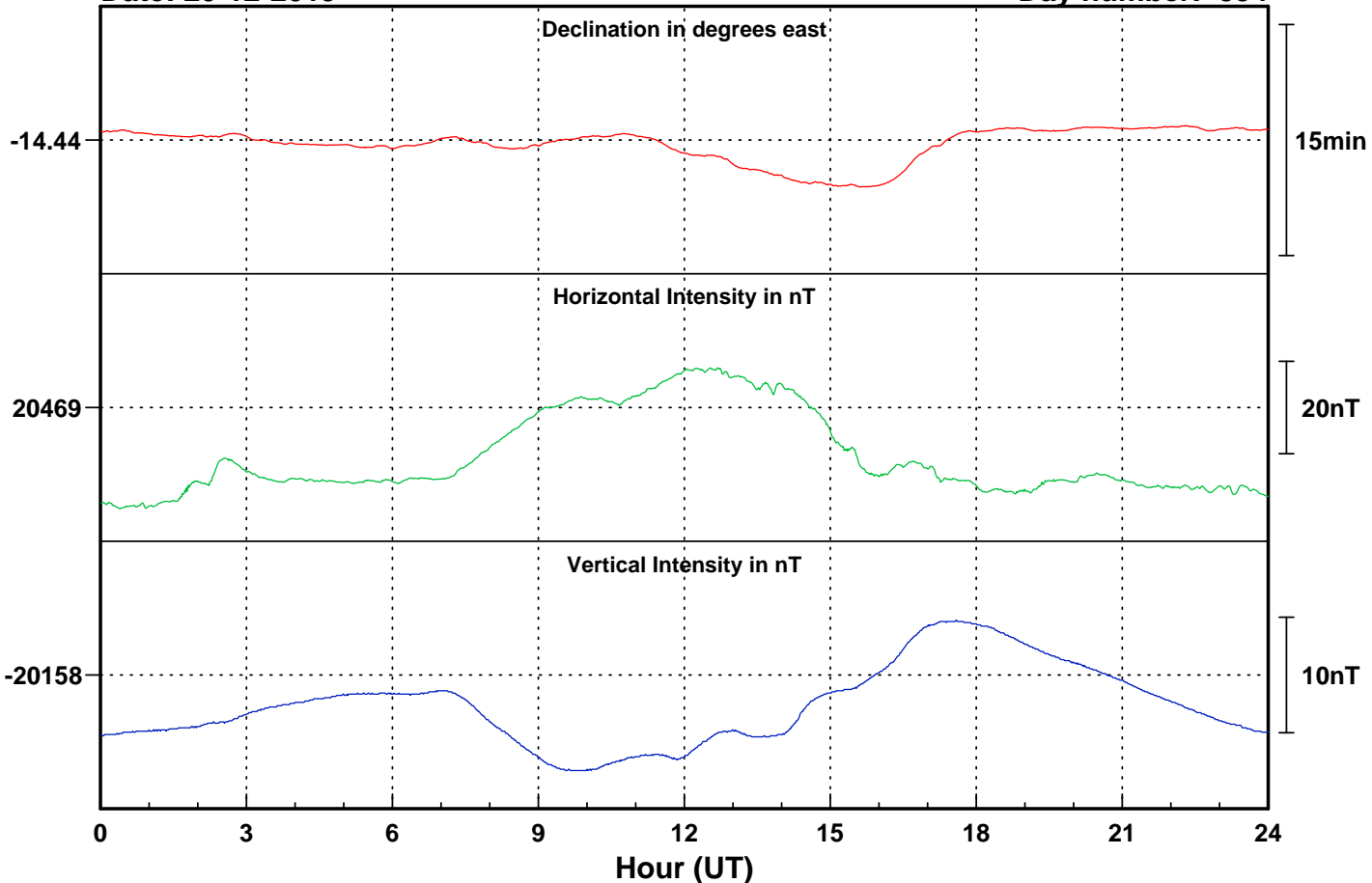
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Day number: 353



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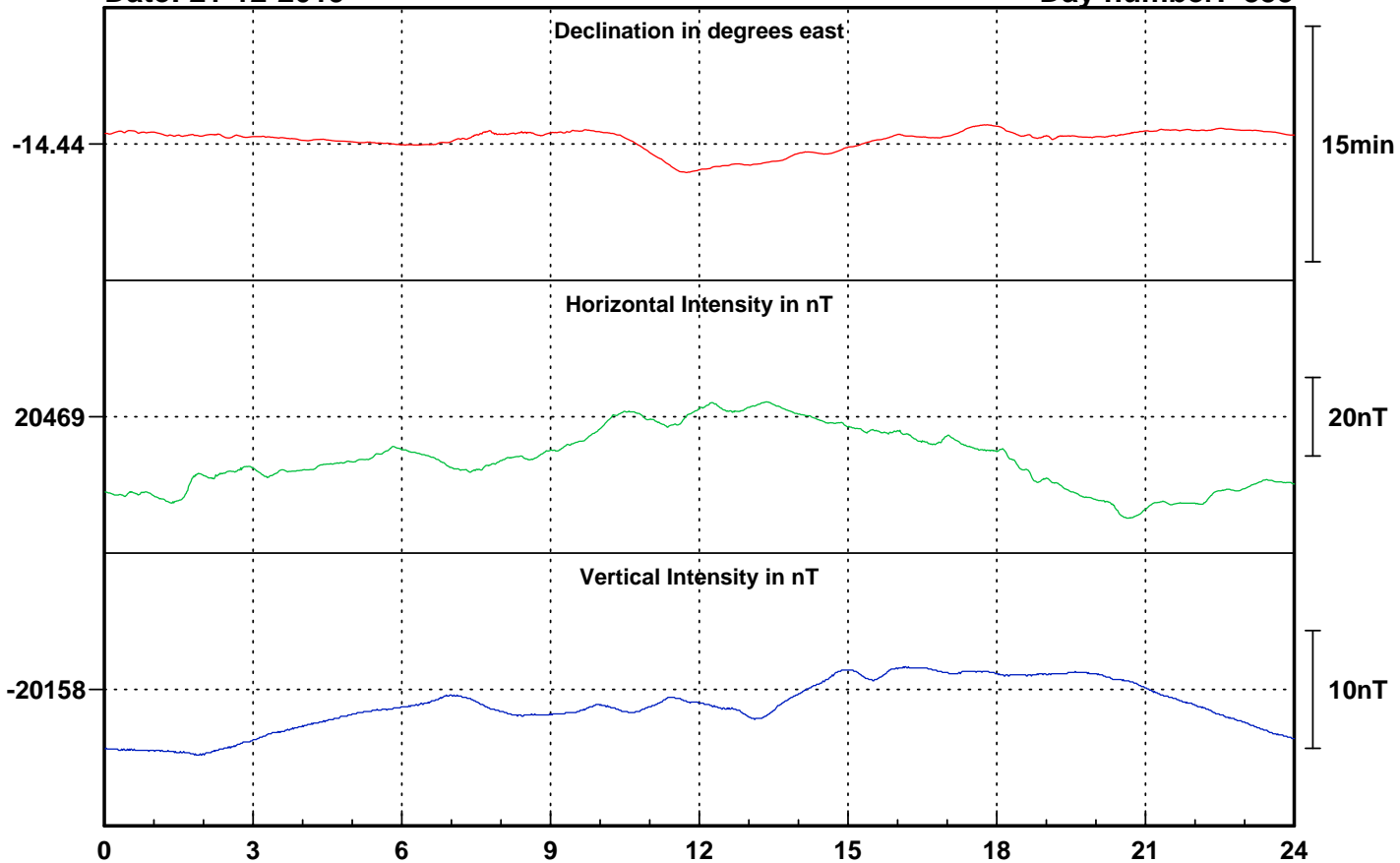
Day number: 354



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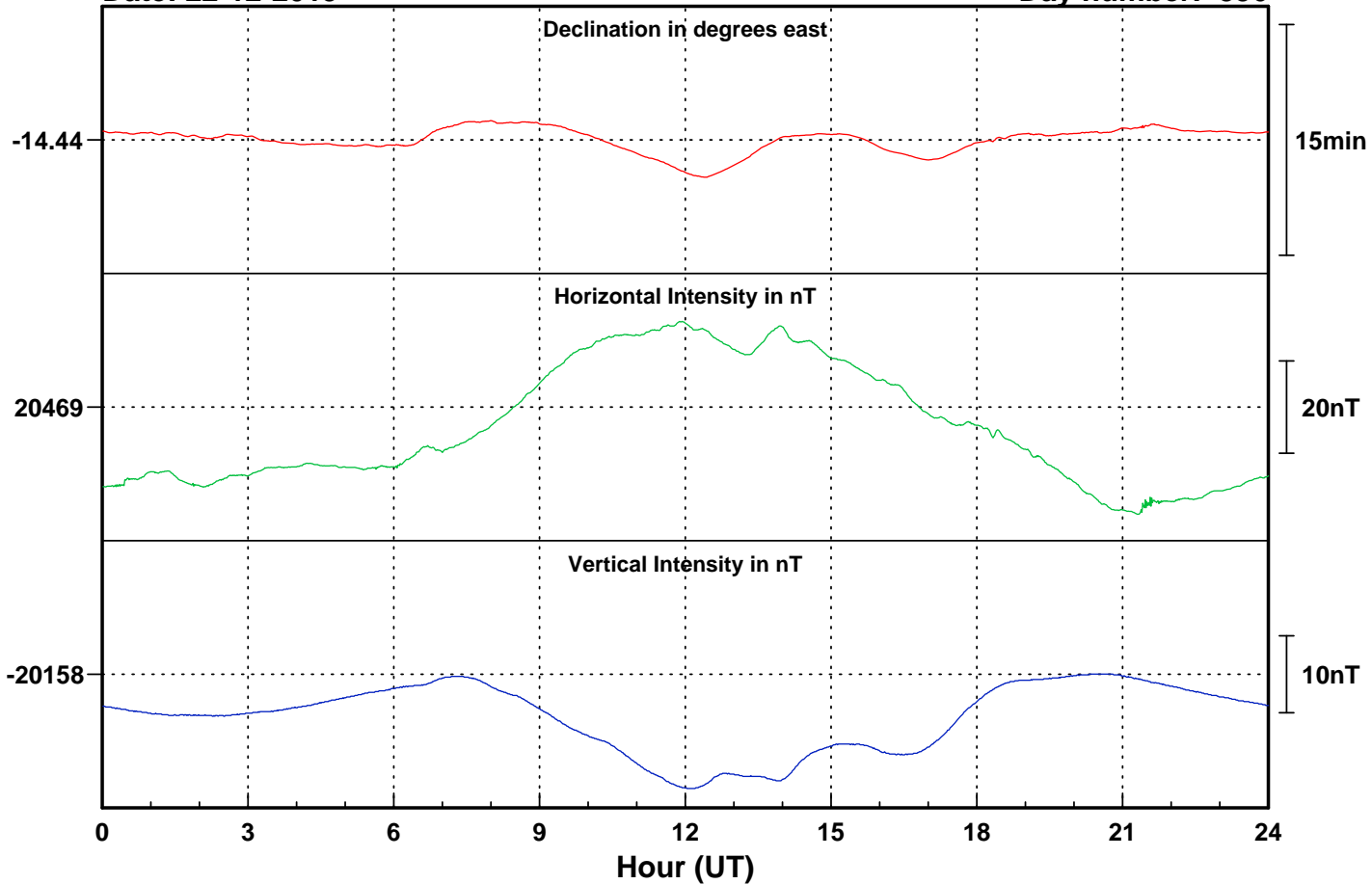
# Ascension Island

Day number: 355



Date: 22-12-2019

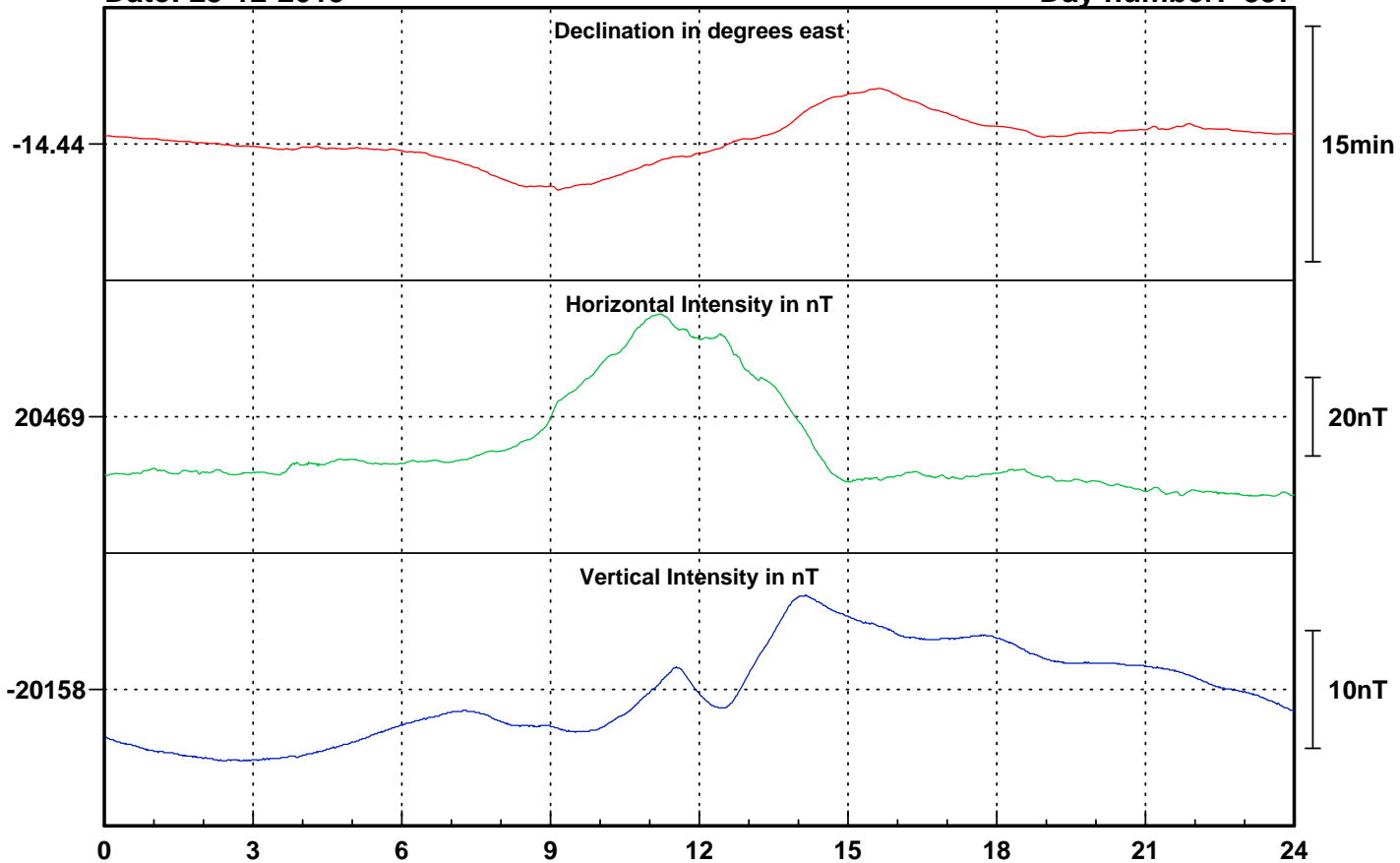
Day number: 356



Date: 23-12-2019

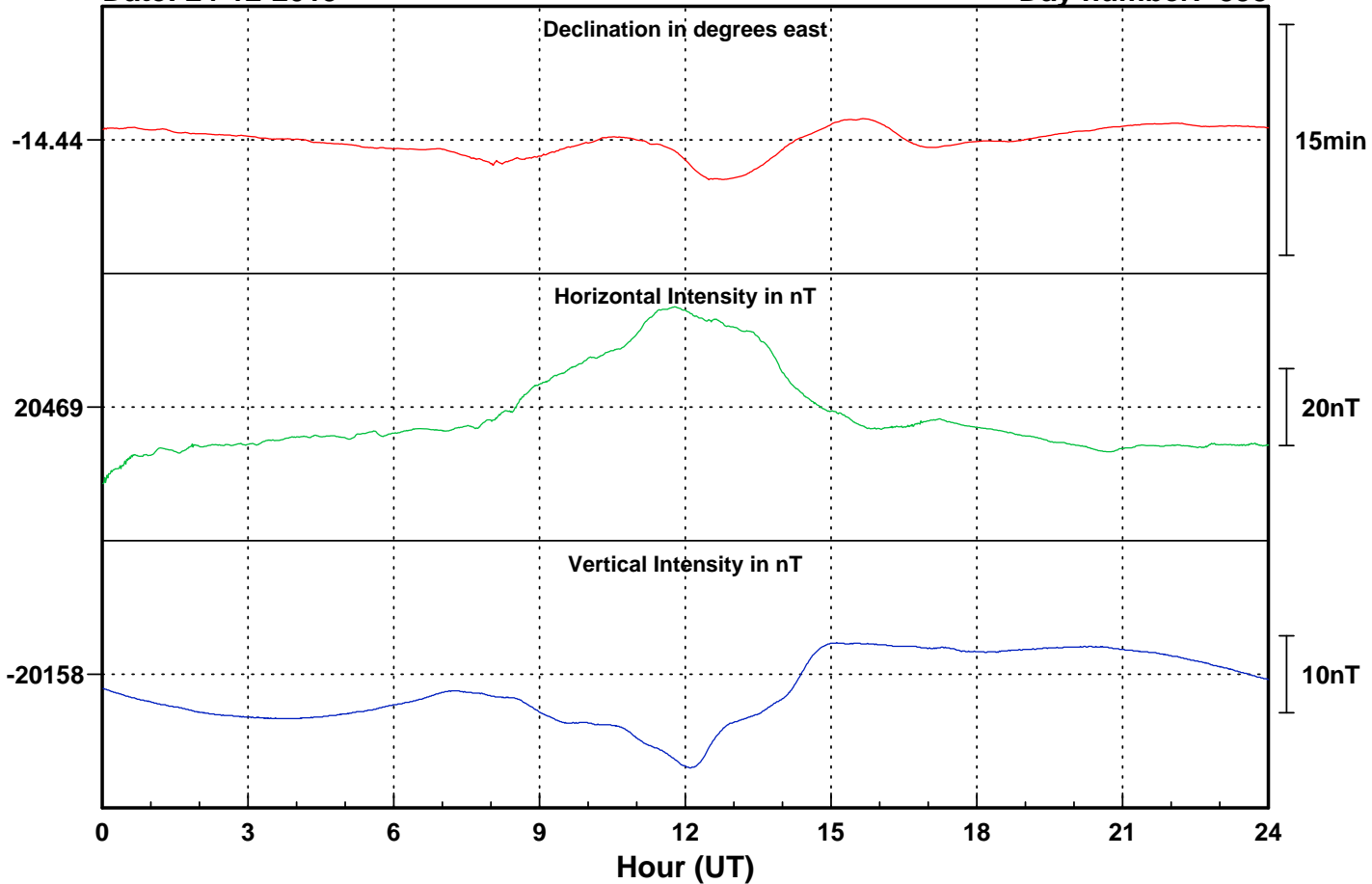
# Ascension Island

Day number: 357



Date: 24-12-2019

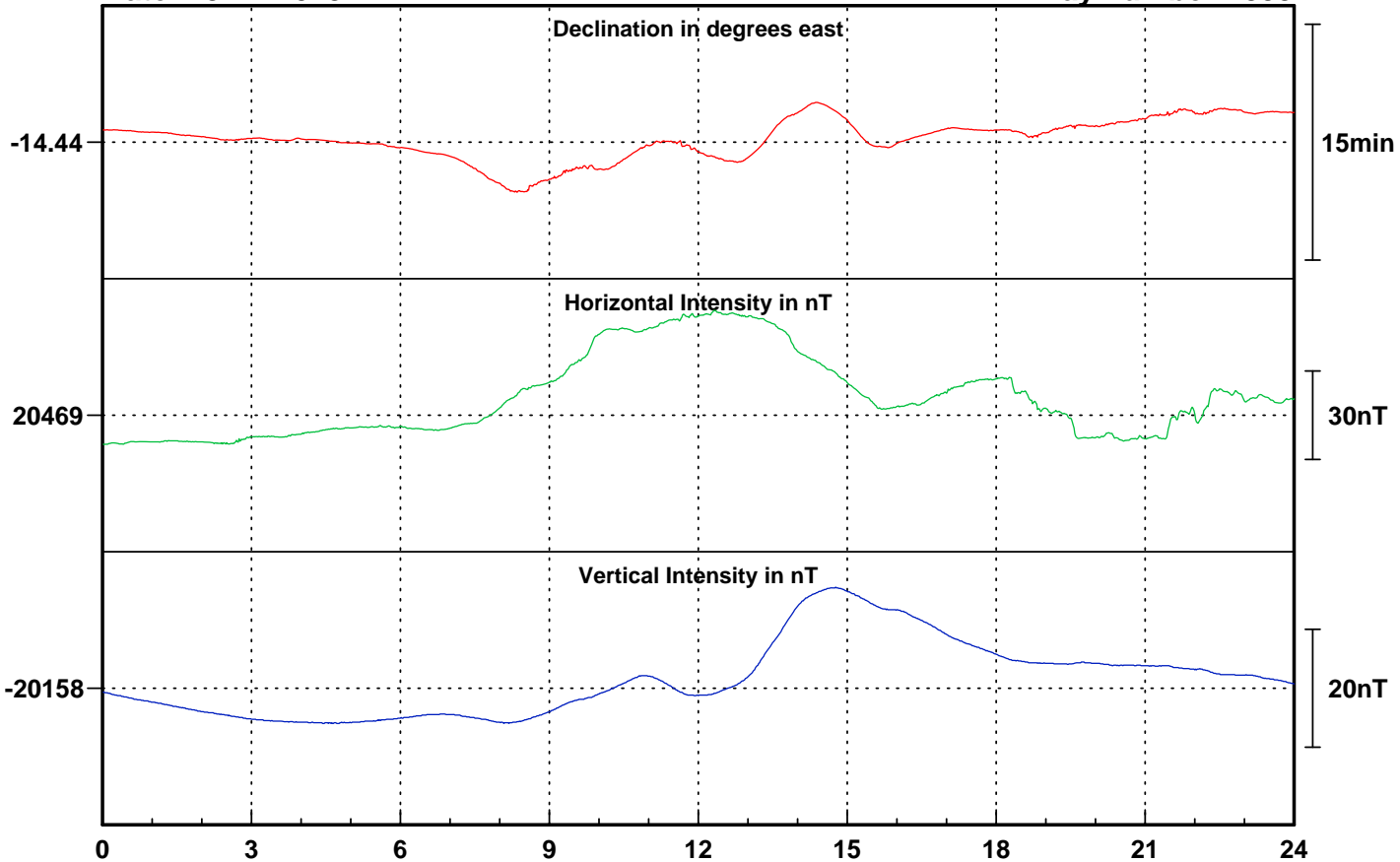
Day number: 358



Date: 25-12-2019

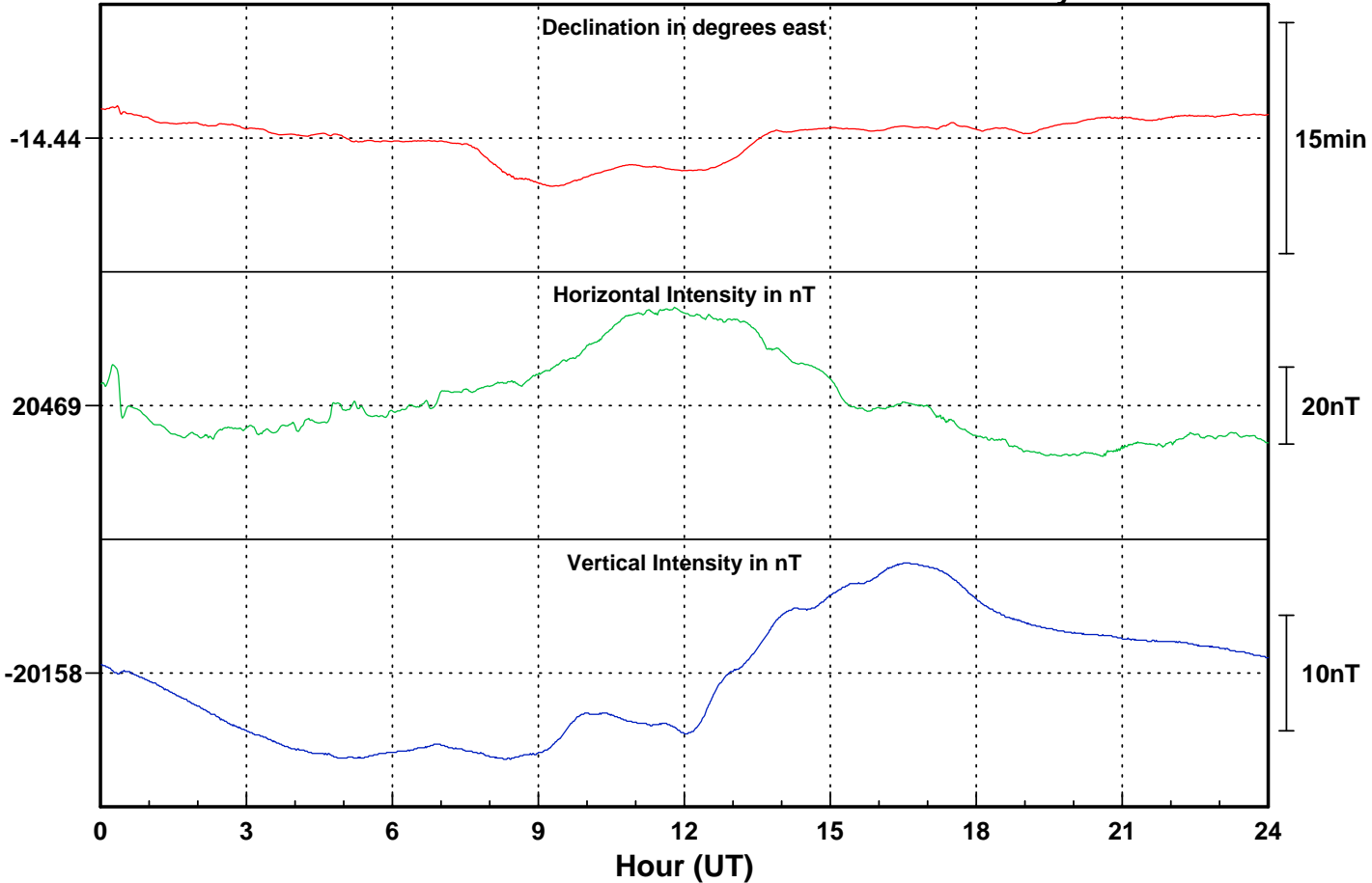
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Day number: 359



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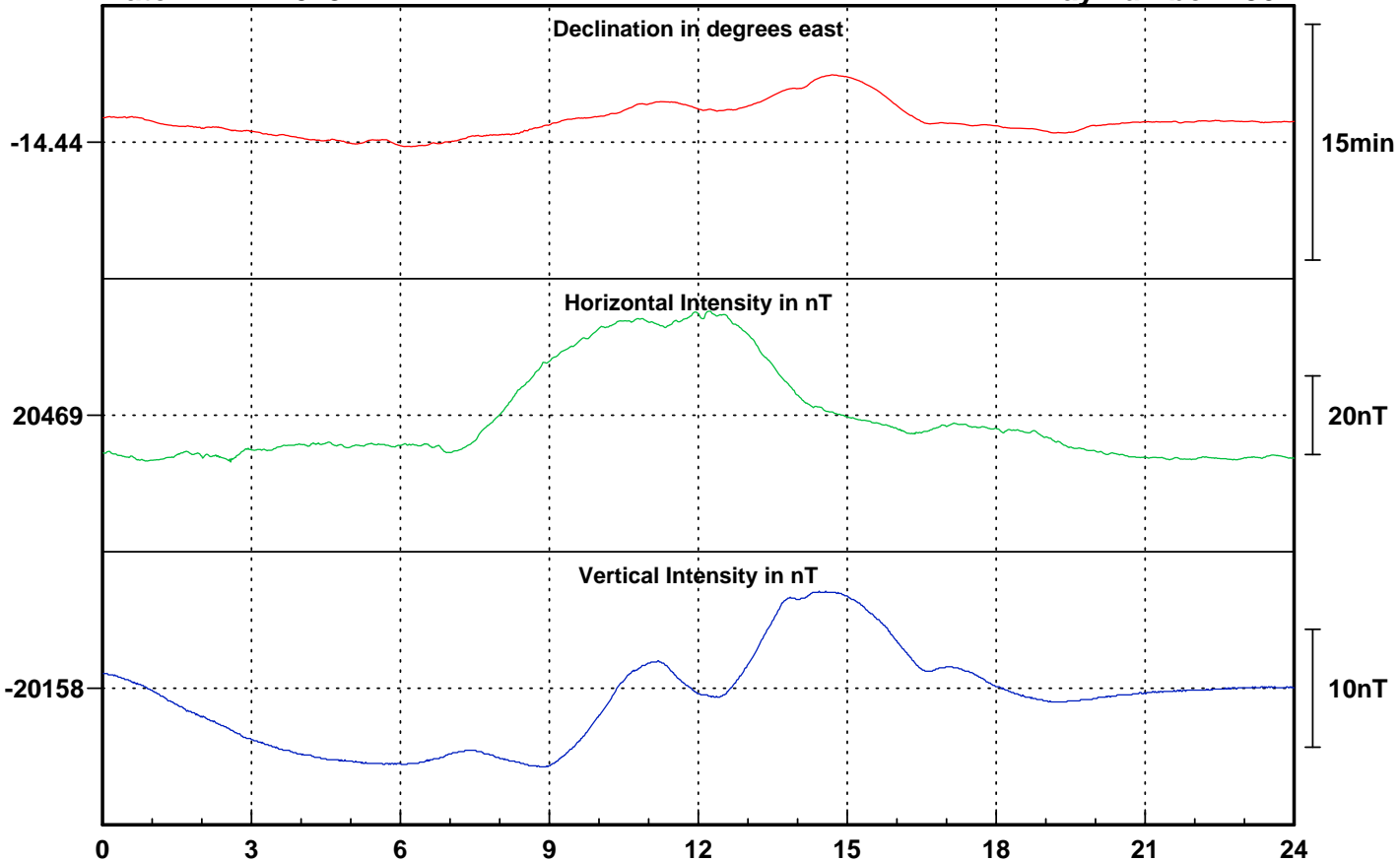
Day number: 360



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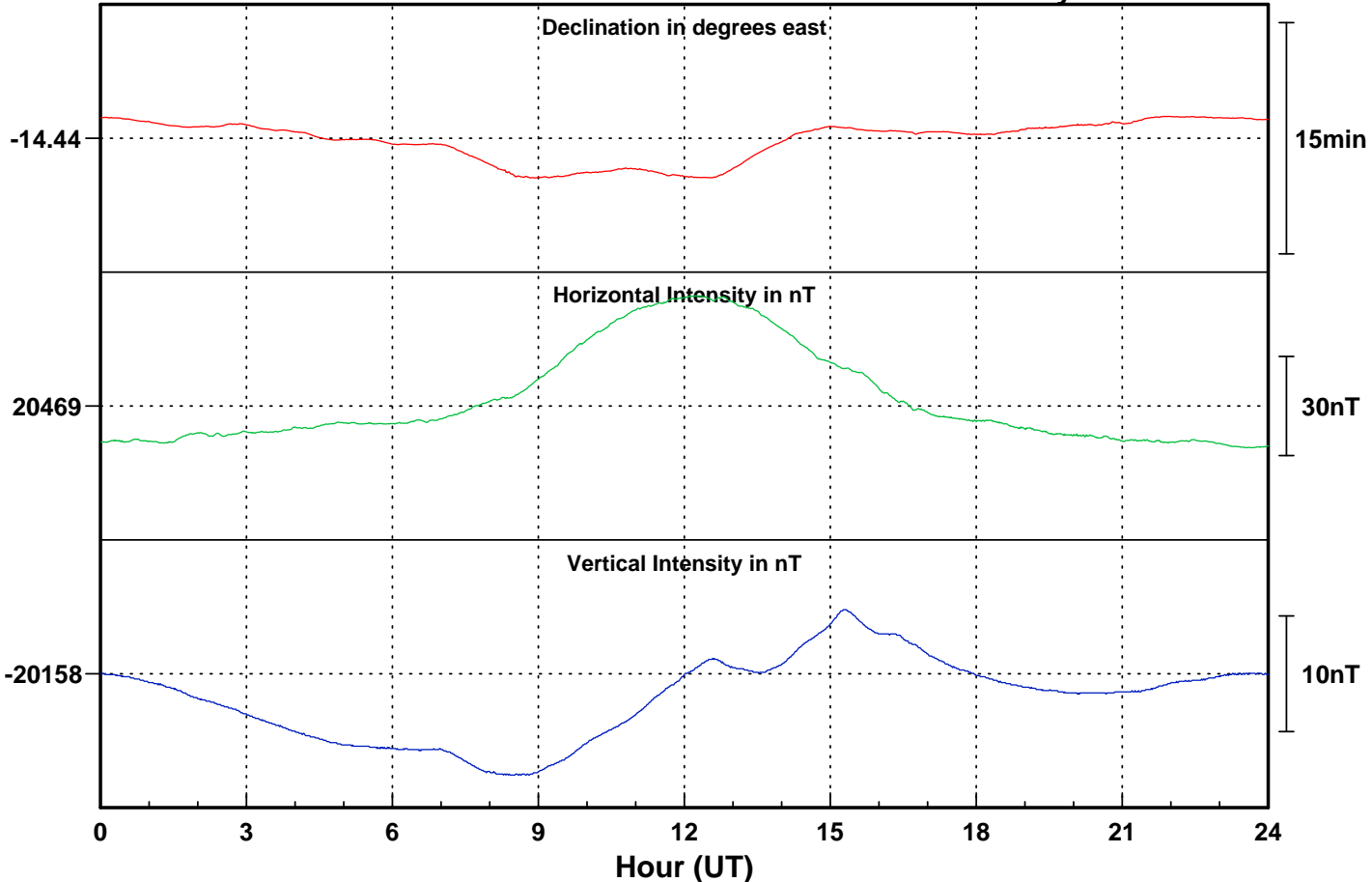
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Day number: 361



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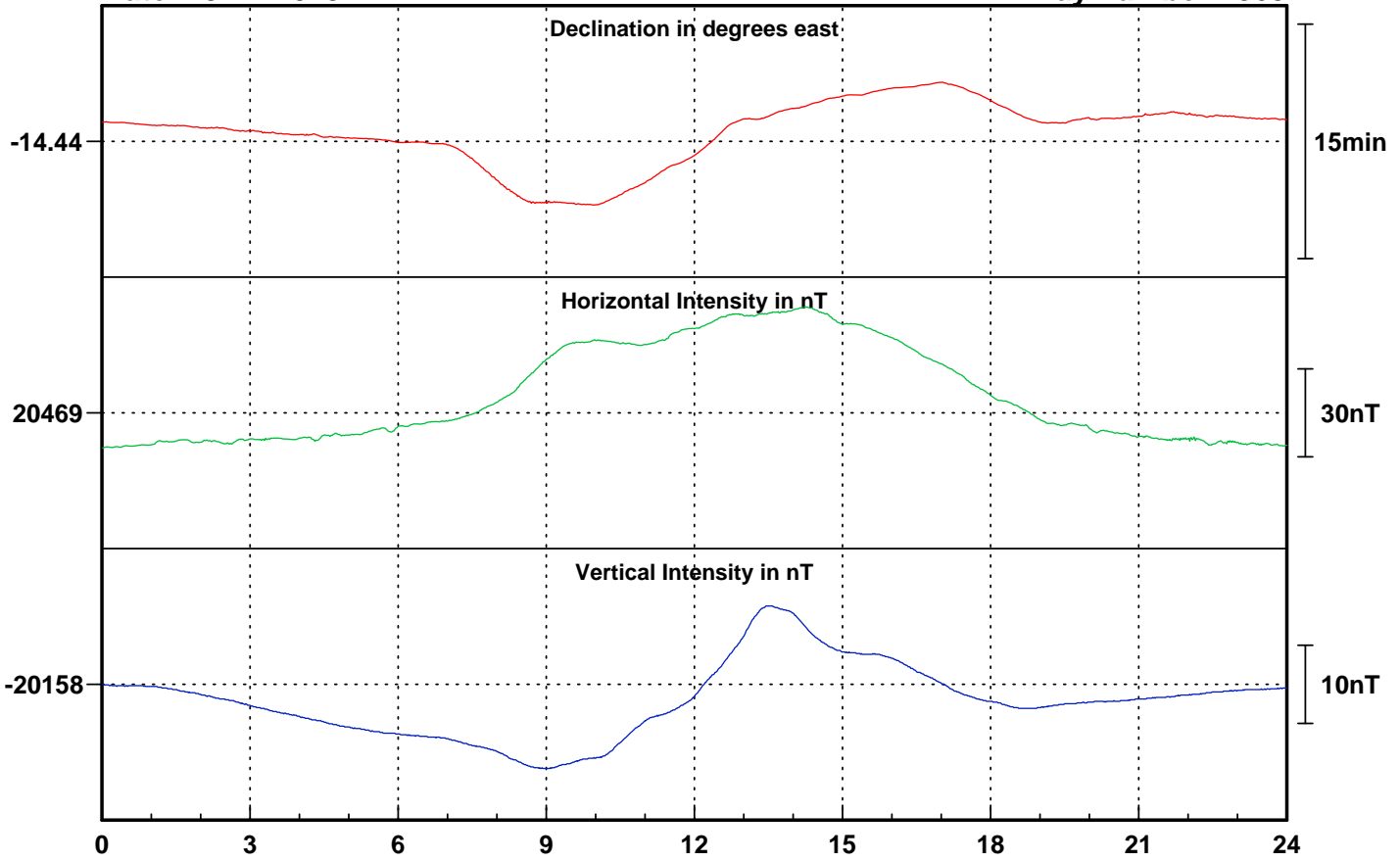
Day number: 362



Date: 29-12-2019

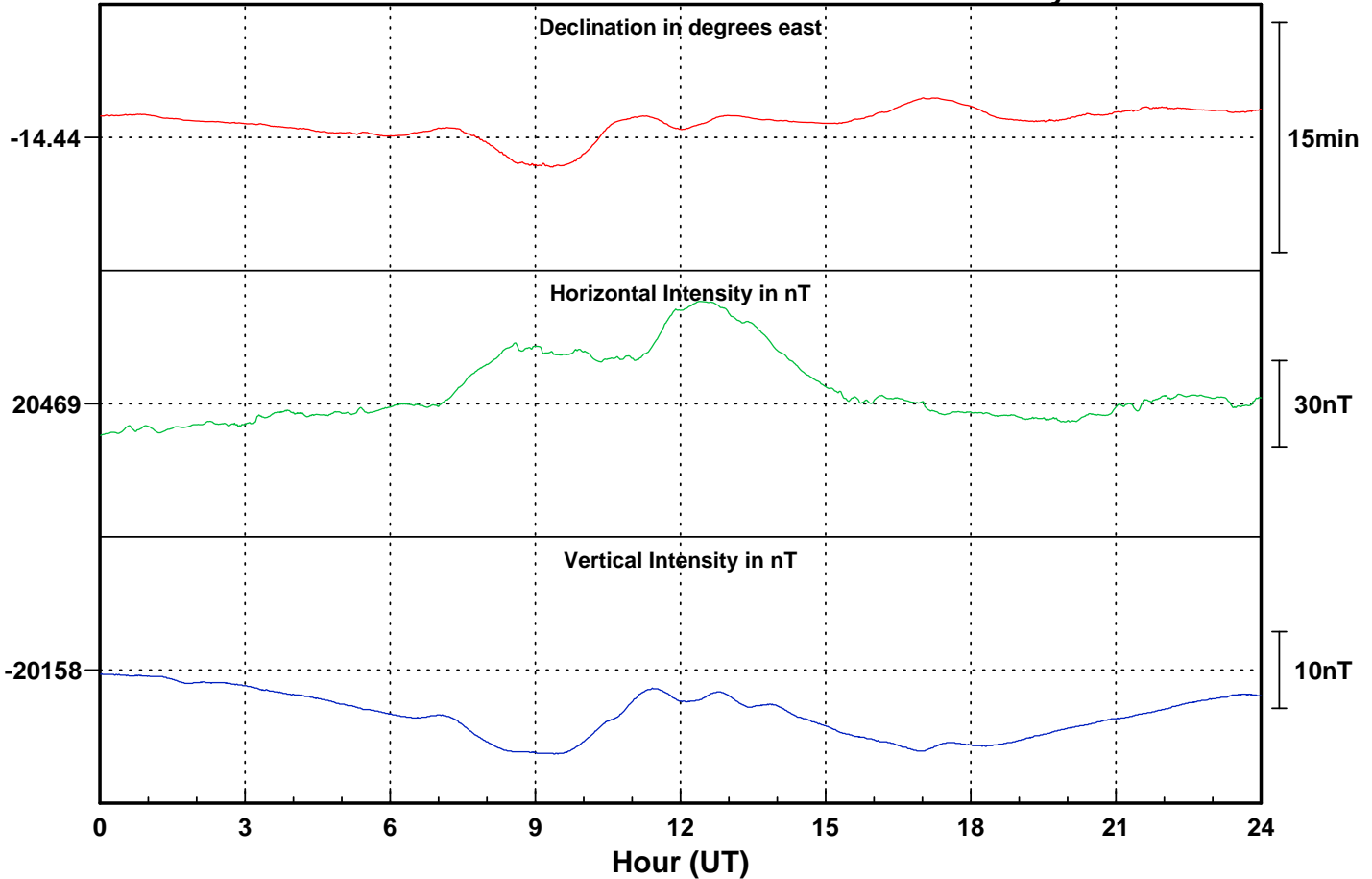
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Day number: 363



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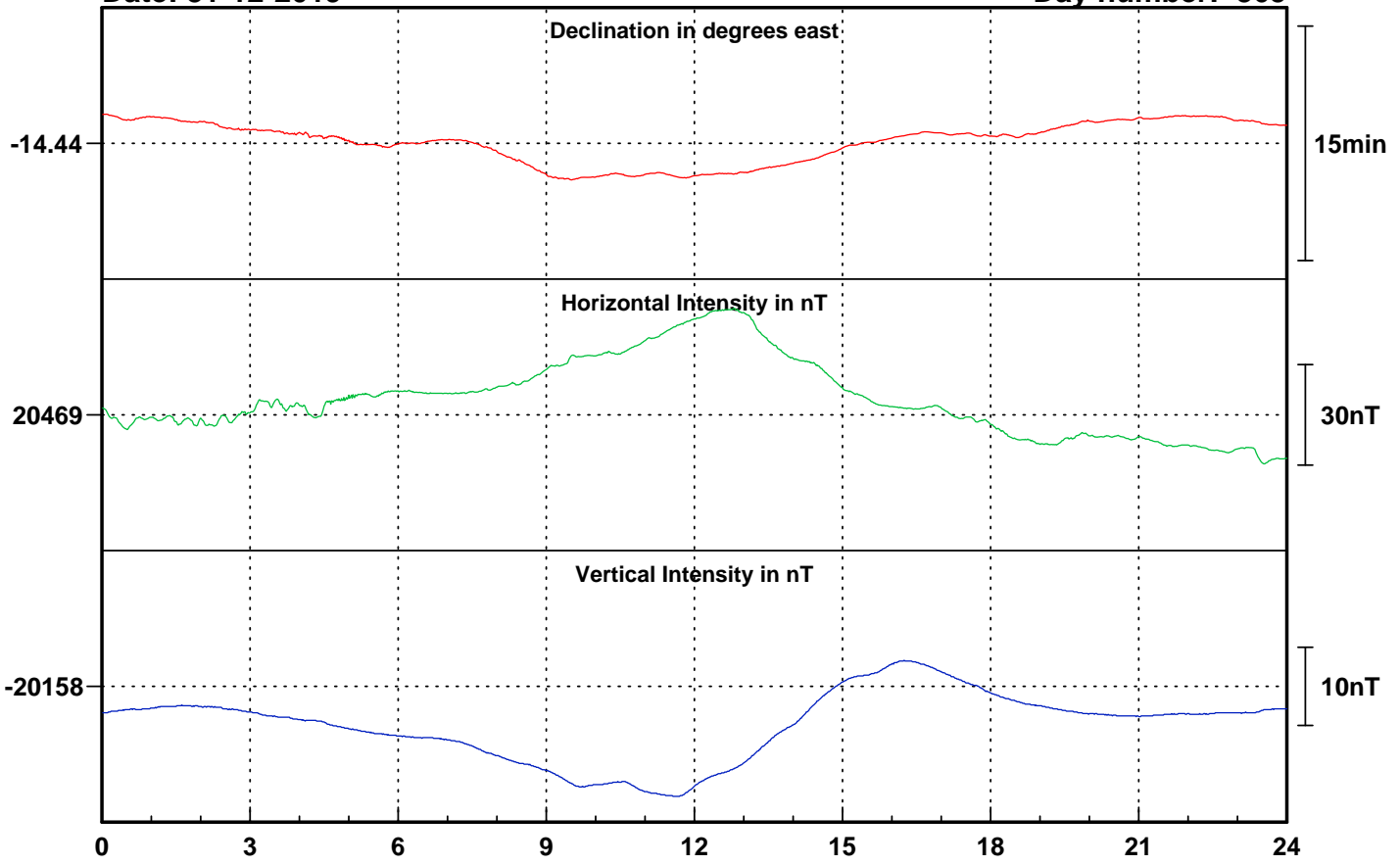
Day number: 364



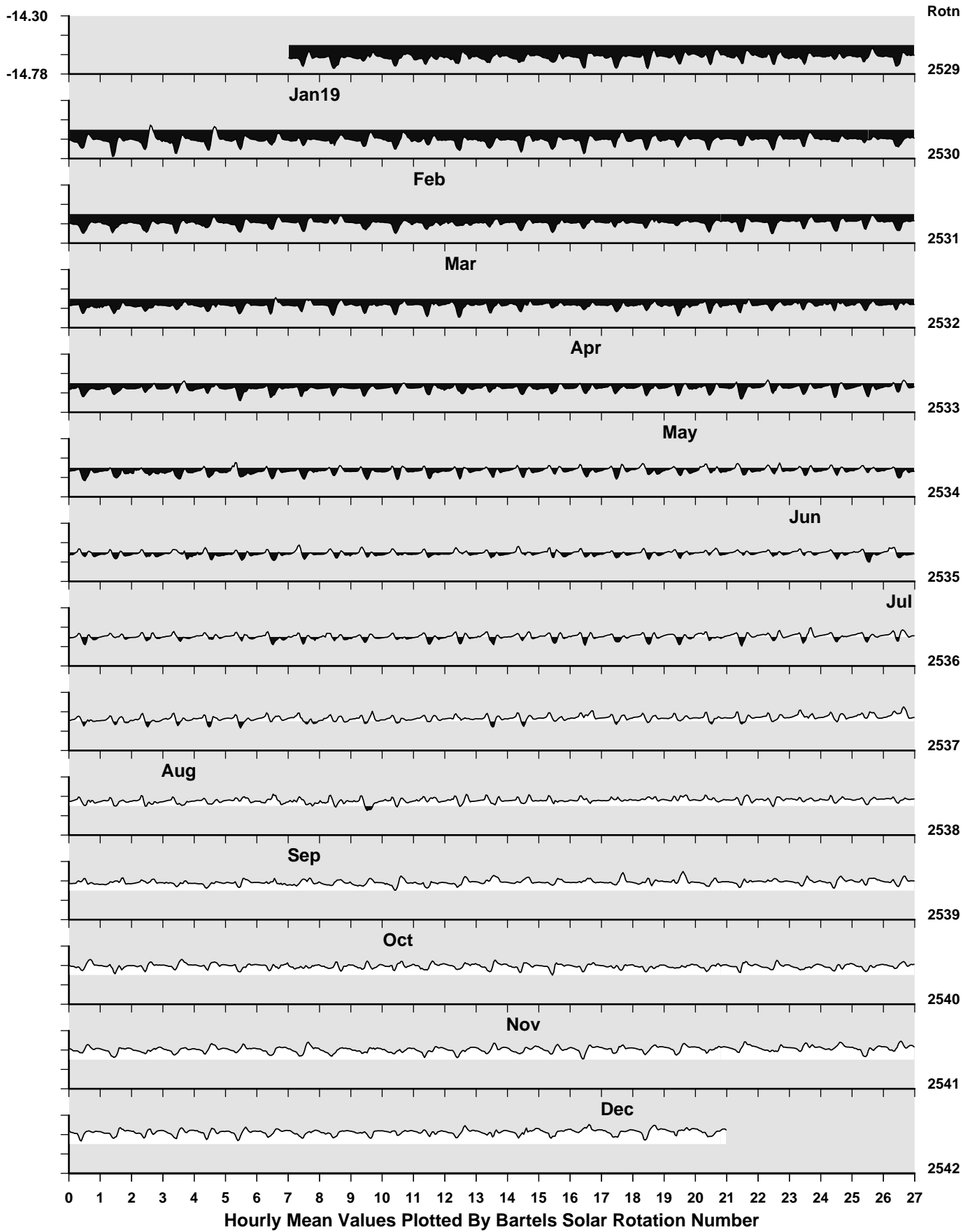
Date: 31-12-2019

# Ascension Island

Day number: 365



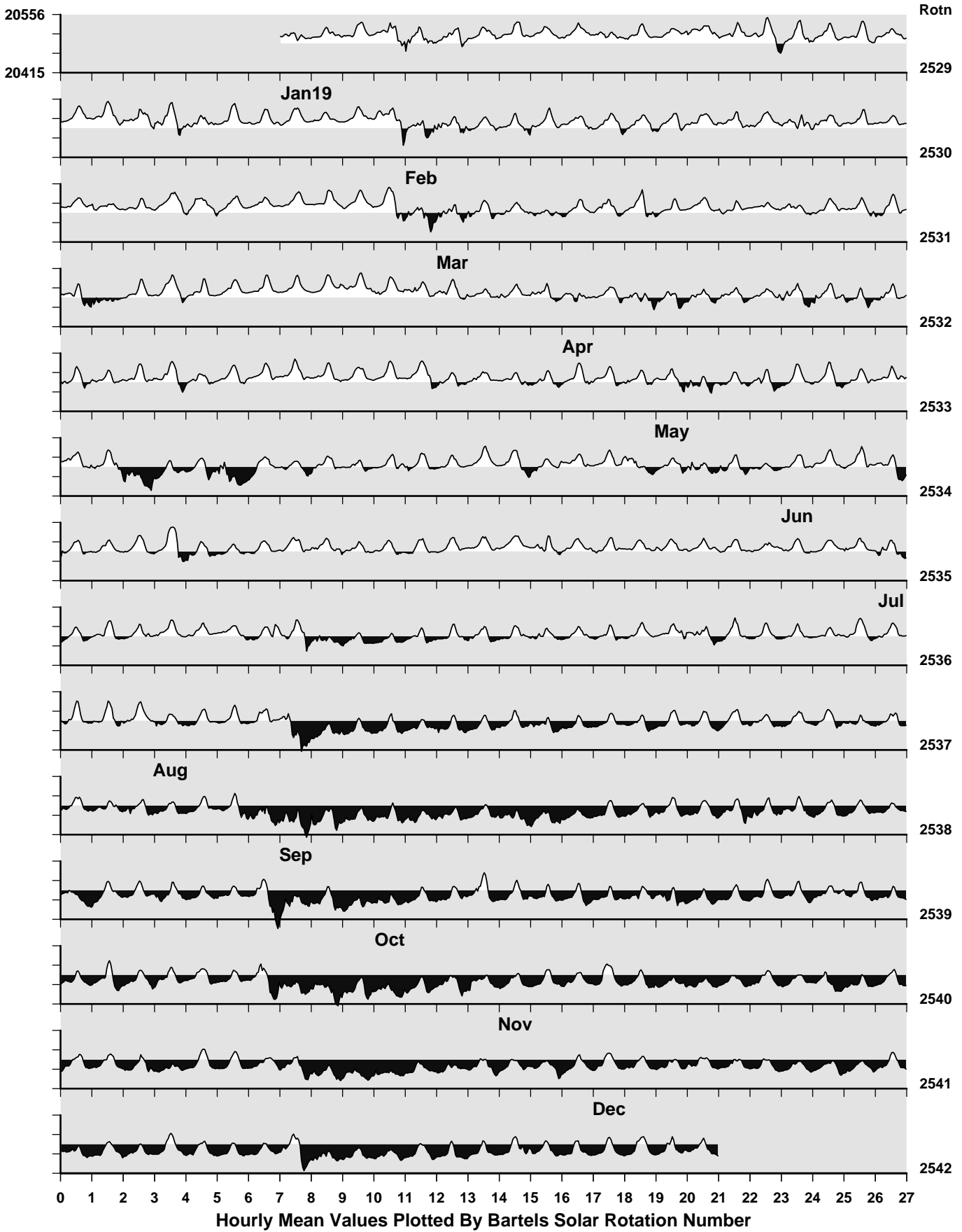
# Ascension Island Observatory: Declination (degrees)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

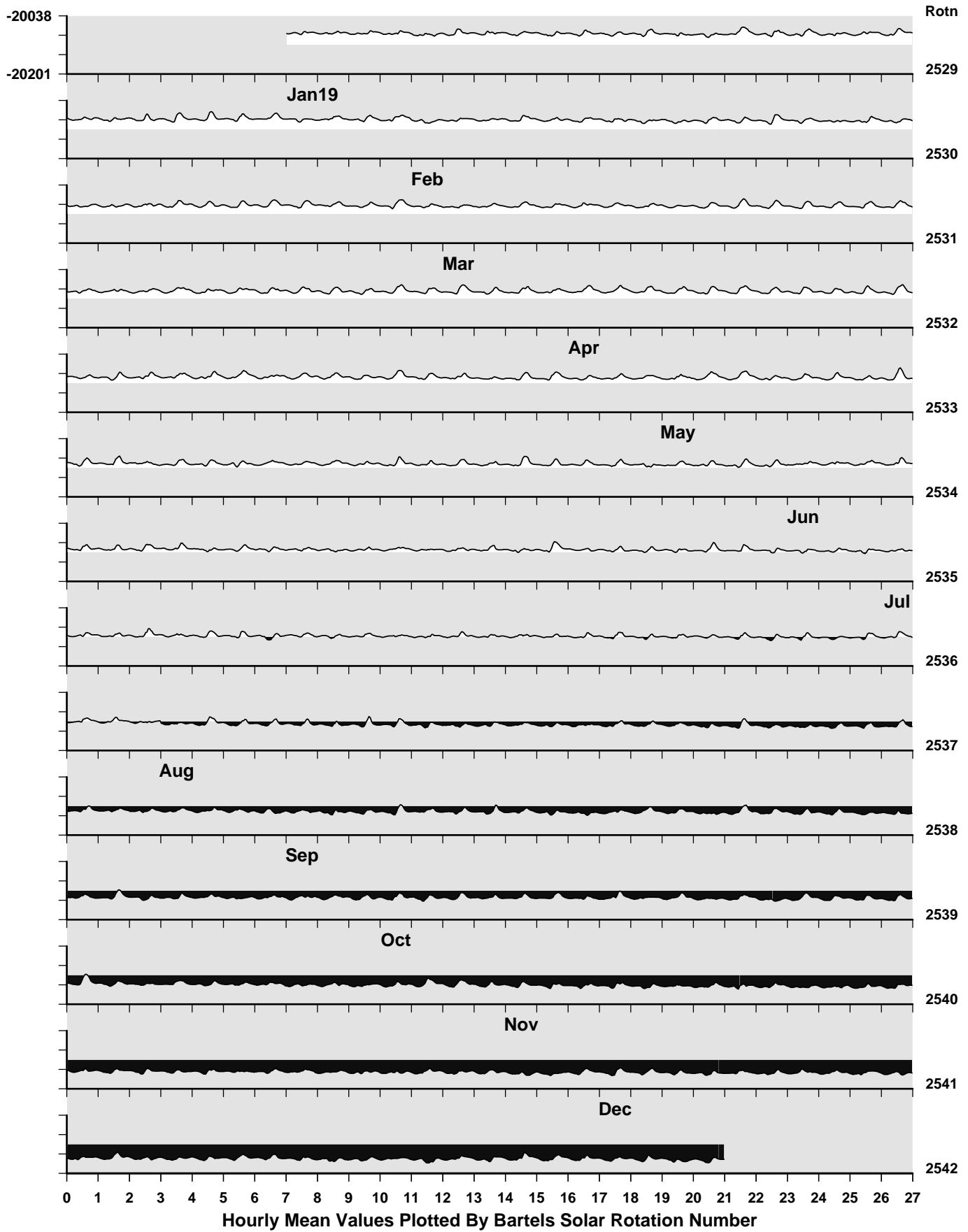


# Ascension Island Observatory: Horizontal Intensity (nT)

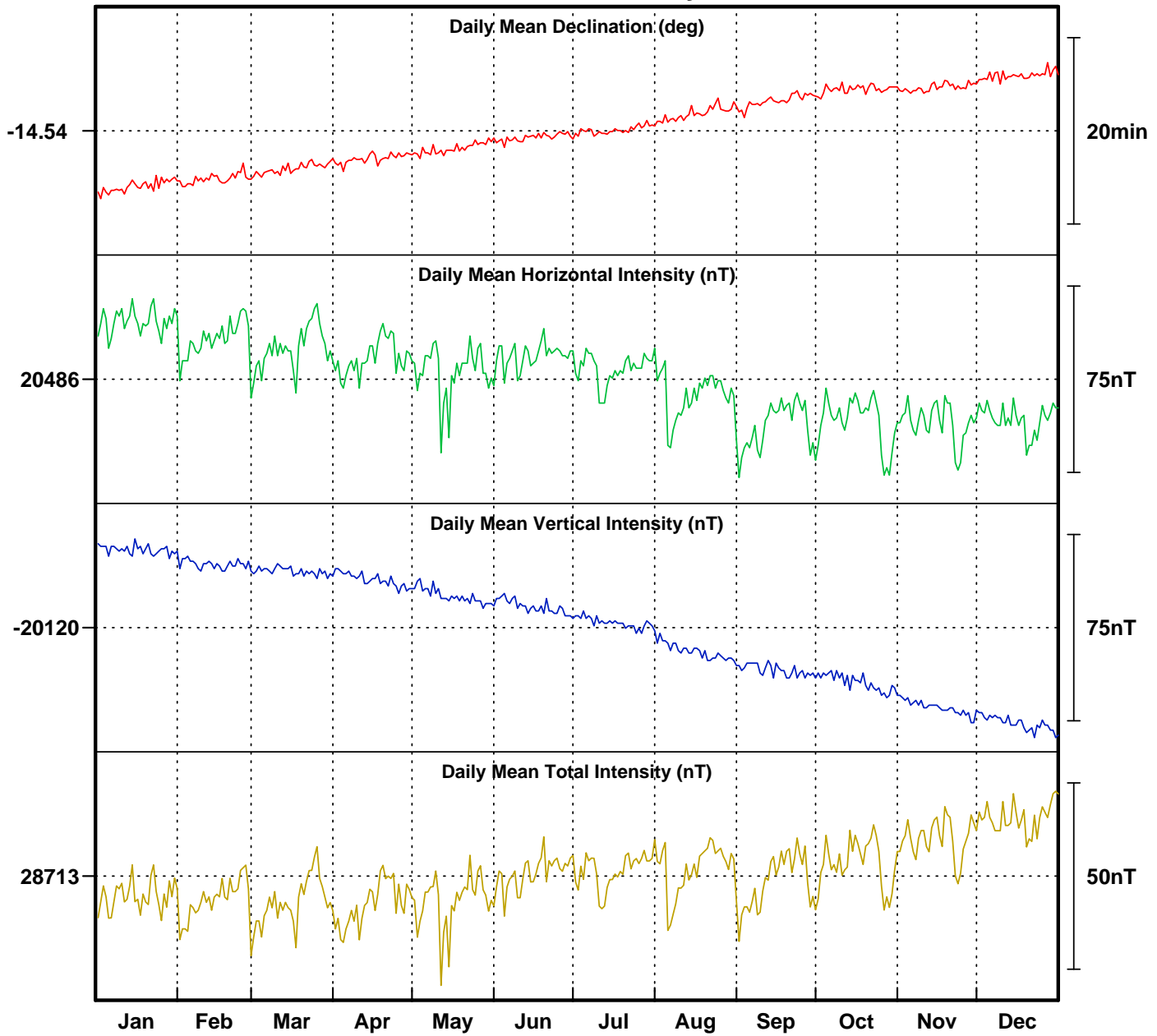


Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Island Observatory: Vertical Intensity (nT)



# Ascension Is Observatory 2019



### Monthly Mean Values for Ascension Island Observatory 2019

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-14° 38.2′	20509 nT	-44° 24.4′	19843 nT	-5182 nT	-20088 nT	28708 nT
February	-14° 37.4′	20501 nT	-44° 25.5′	19837 nT	-5176 nT	-20094 nT	28707 nT
March	-14° 36.2′	20498 nT	-44° 26.0′	19836 nT	-5168 nT	-20097 nT	28707 nT
April	-14° 35.2′	20494 nT	-44° 26.7′	19834 nT	-5161 nT	-20101 nT	28706 nT
May	-14° 34.1′	20488 nT	-44° 27.7′	19830 nT	-5153 nT	-20107 nT	28707 nT
June	-14° 32.9′	20495 nT	-44° 27.5′	19838 nT	-5149 nT	-20111 nT	28715 nT
July	-14° 32.1′	20490 nT	-44° 28.5′	19834 nT	-5142 nT	-20118 nT	28715 nT
August	-14° 30.3′	20478 nT	-44° 30.5′	19826 nT	-5129 nT	-20130 nT	28715 nT
September	-14° 29.0′	20467 nT	-44° 32.1′	19816 nT	-5119 nT	-20137 nT	28712 nT
October	-14° 27.7′	20469 nT	-44° 32.3′	19820 nT	-5112 nT	-20142 nT	28717 nT
November	-14° 27.6′	20468 nT	-44° 33.2′	19820 nT	-5111 nT	-20152 nT	28724 nT
December	-14° 26.3′	20469 nT	-44° 33.7′	19823 nT	-5104 nT	-20158 nT	28729 nT

#### Note

i. The values shown here are provisional.