

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

# Observatory

# Monthly

# Magnetic

# Bulletin

**December 2016**

**16/12/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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E-mail: [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk)  
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:*  $7^{\circ}56'56.4''S$   $345^{\circ}37'26.4''E$   
*Geomagnetic:*  $2^{\circ}51'14''S$   $057^{\circ}38'17''E$   
*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 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 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

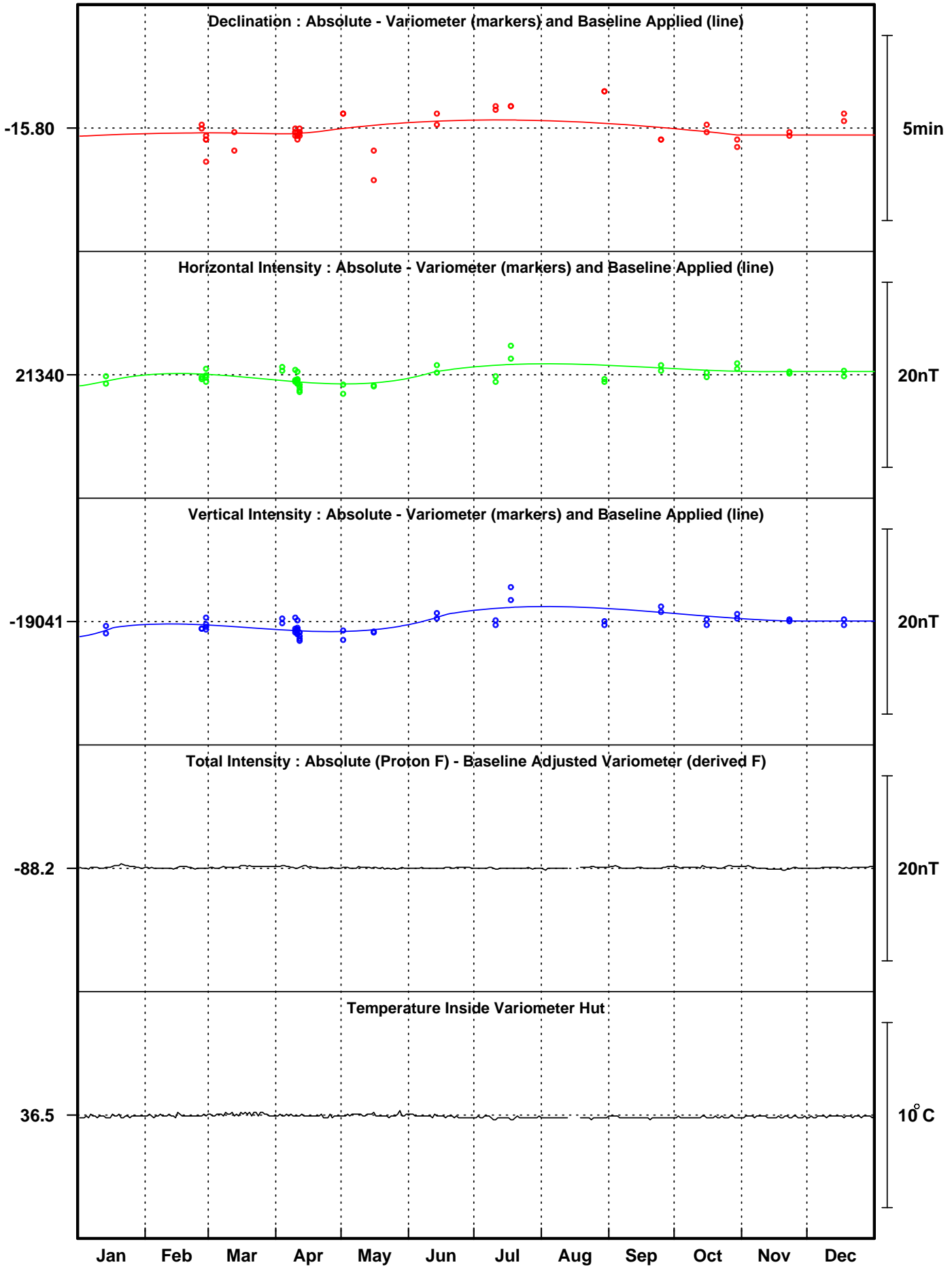
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Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at [www.geomag.bgs.ac.uk/contactus/staff](http://www.geomag.bgs.ac.uk/contactus/staff)



# Ascension Island 2016

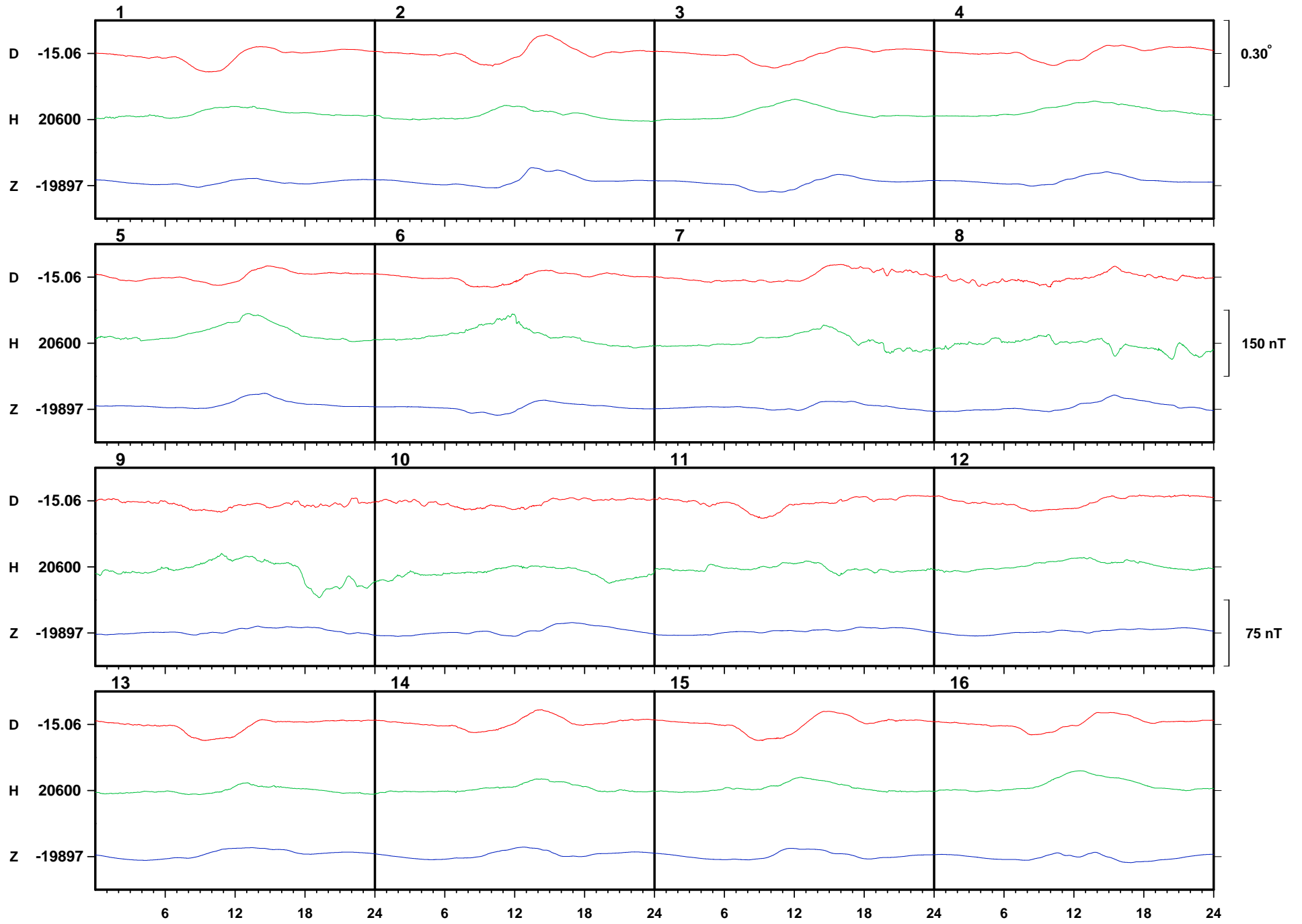


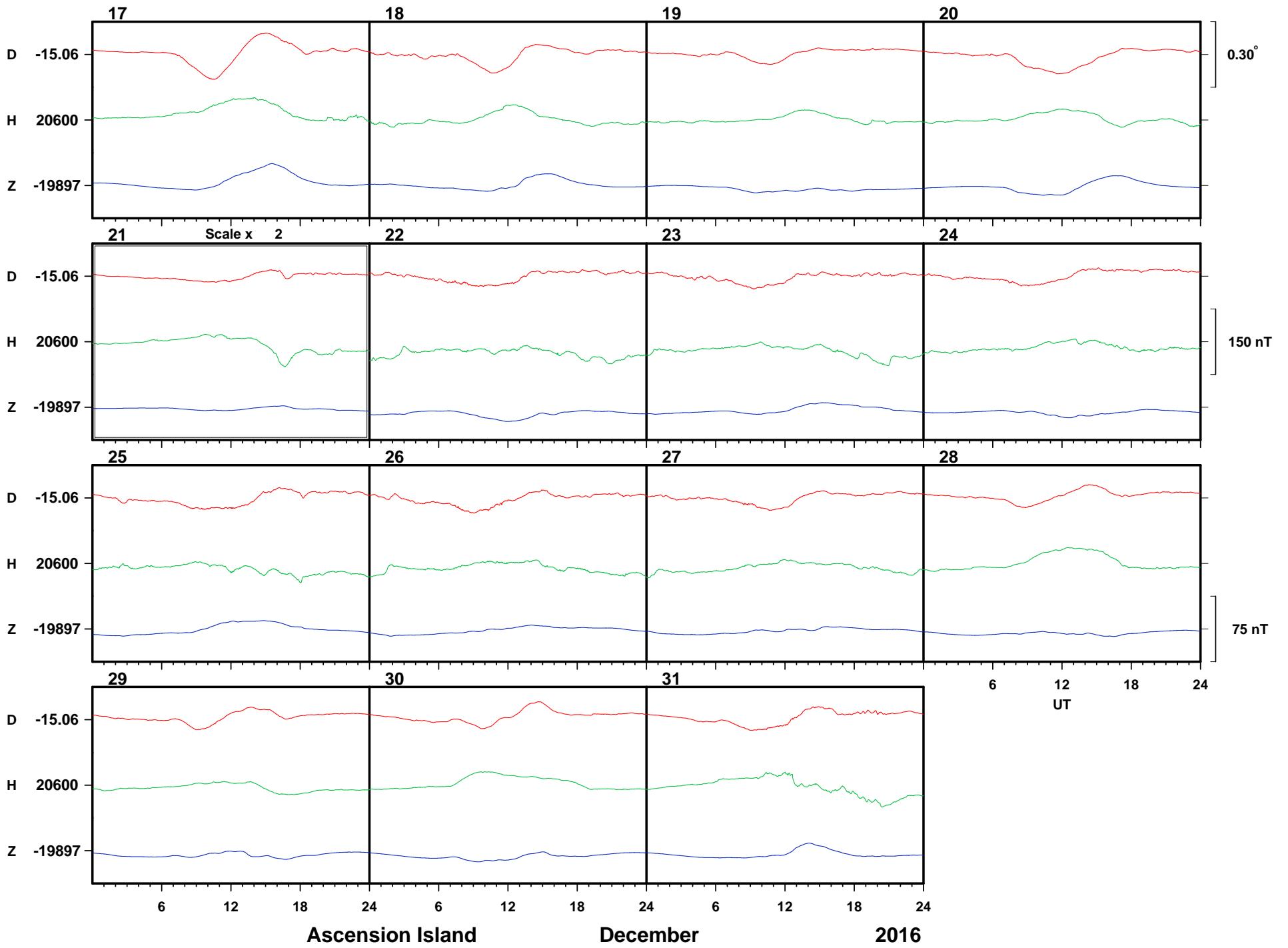


Ascension Island

December

2016





Ascension Island

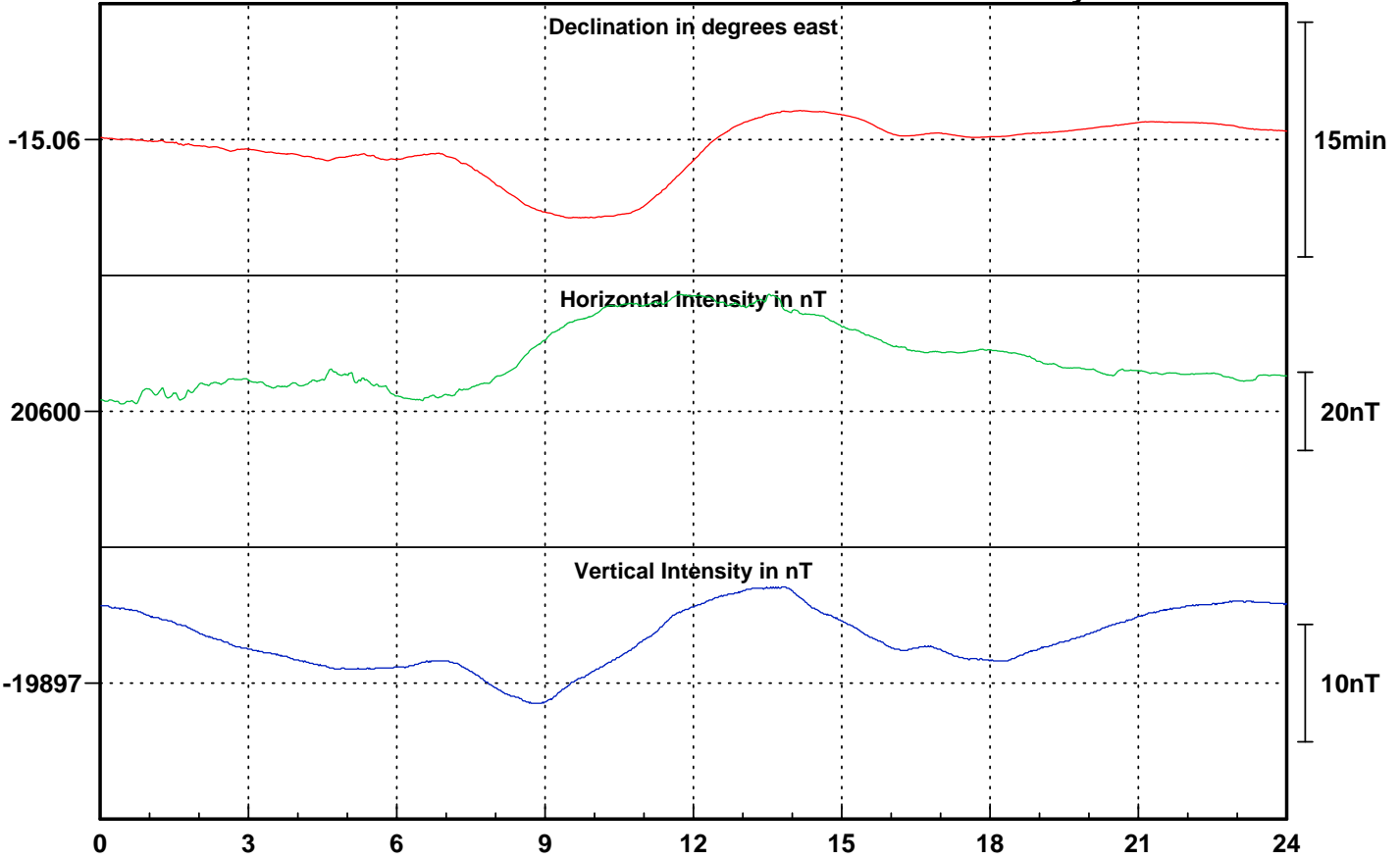
December

2016

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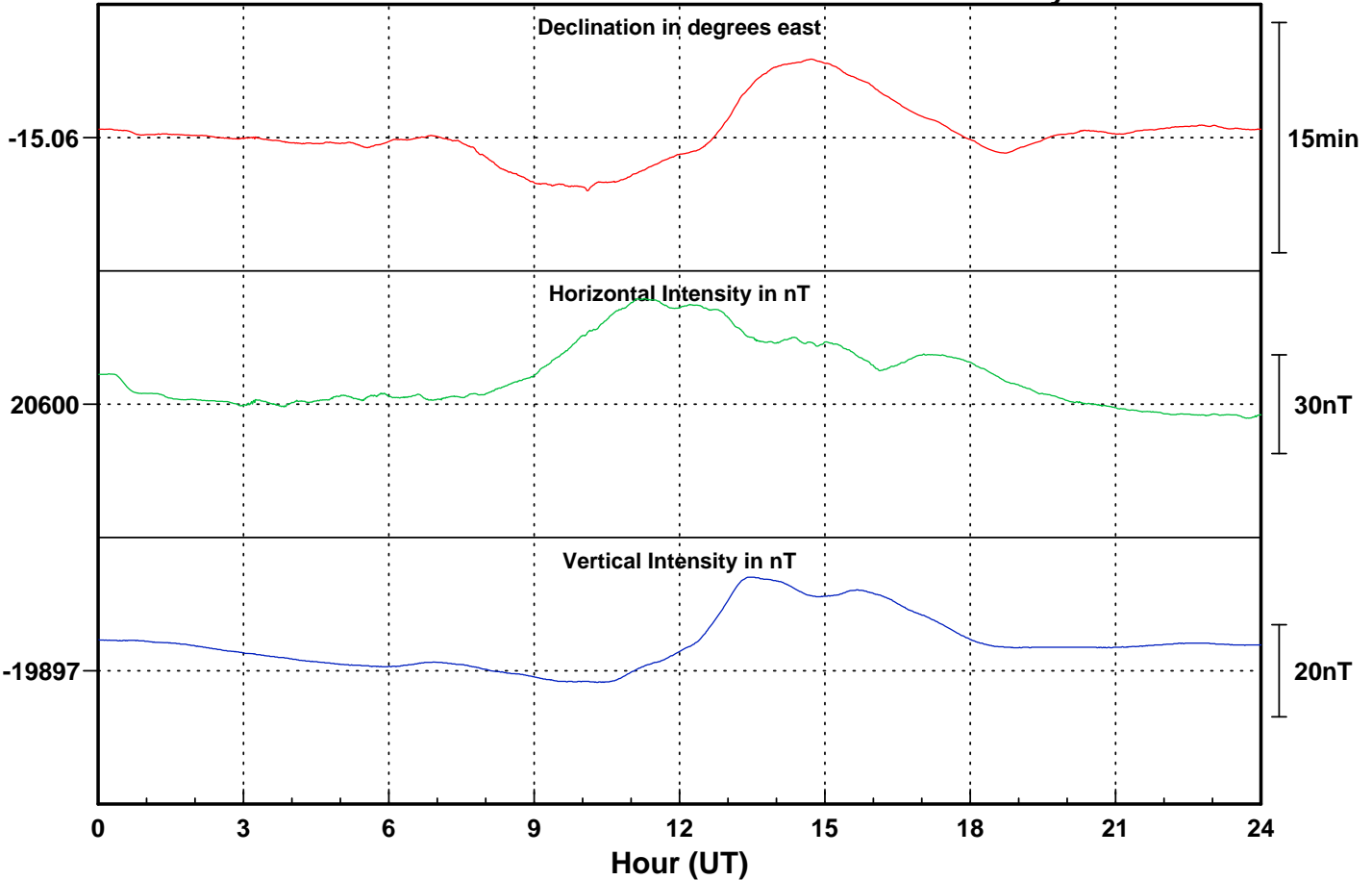
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Day number: 336



Date: 02-12-2016

Day number: 337

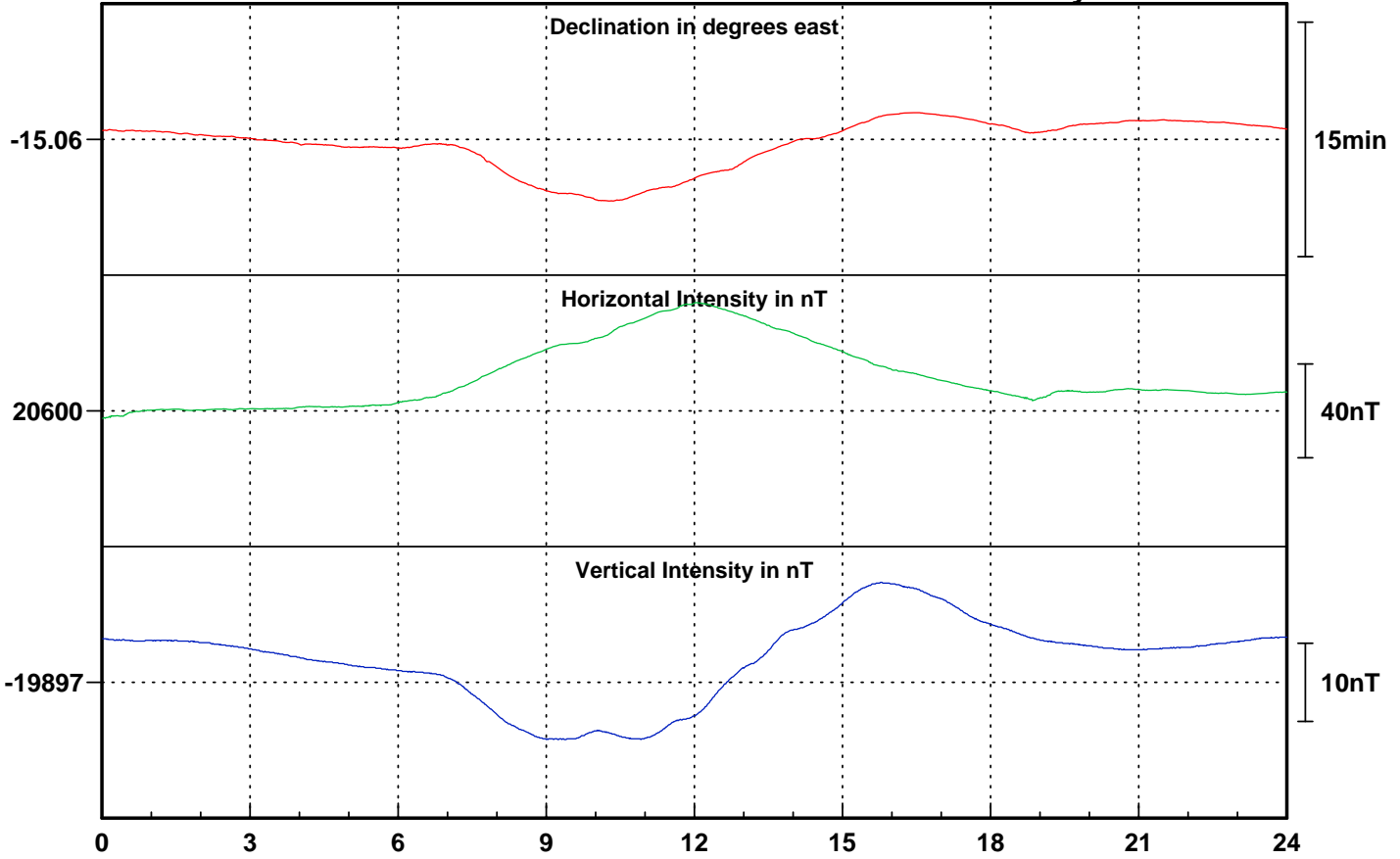




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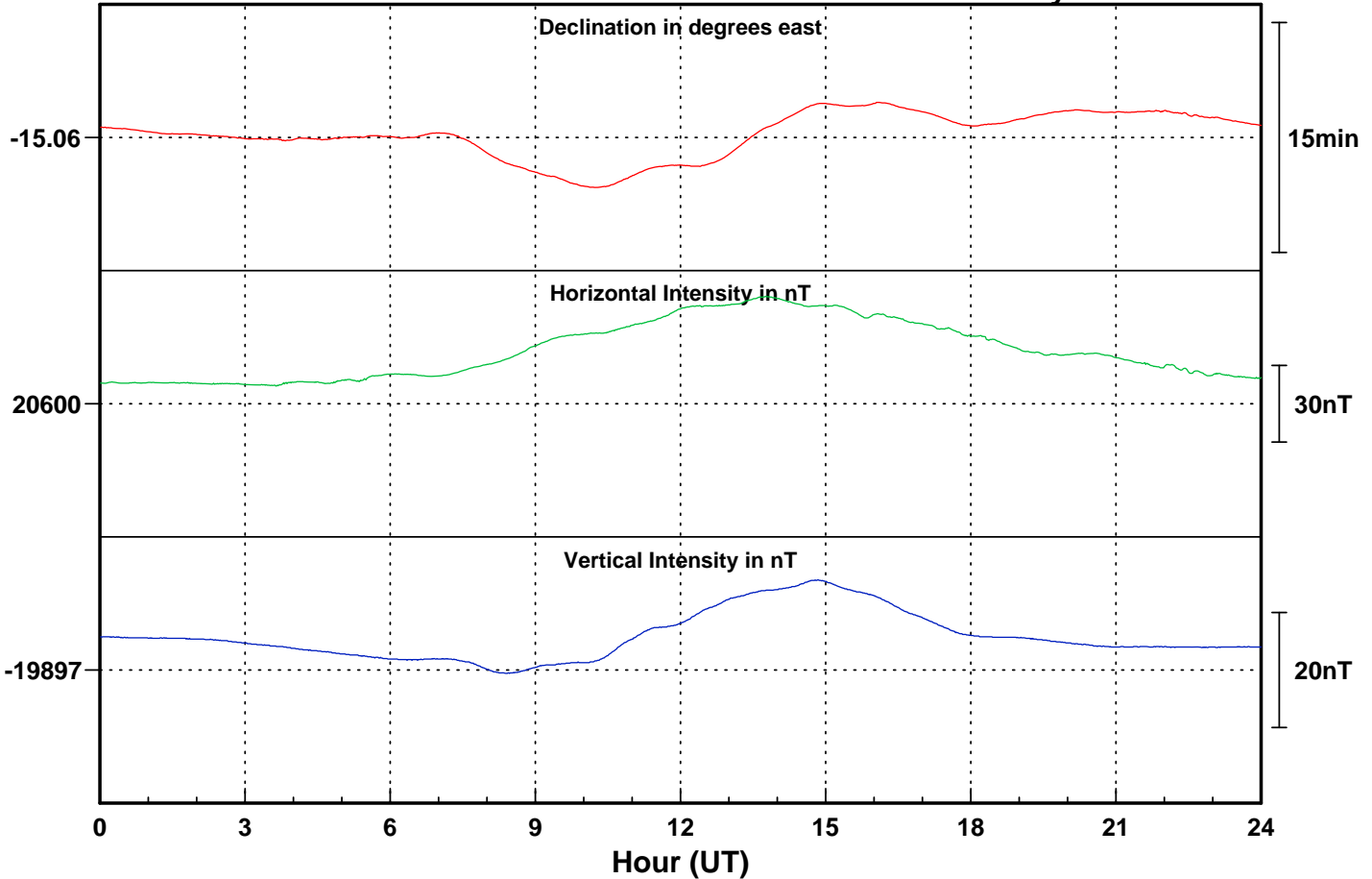
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Day number: 338



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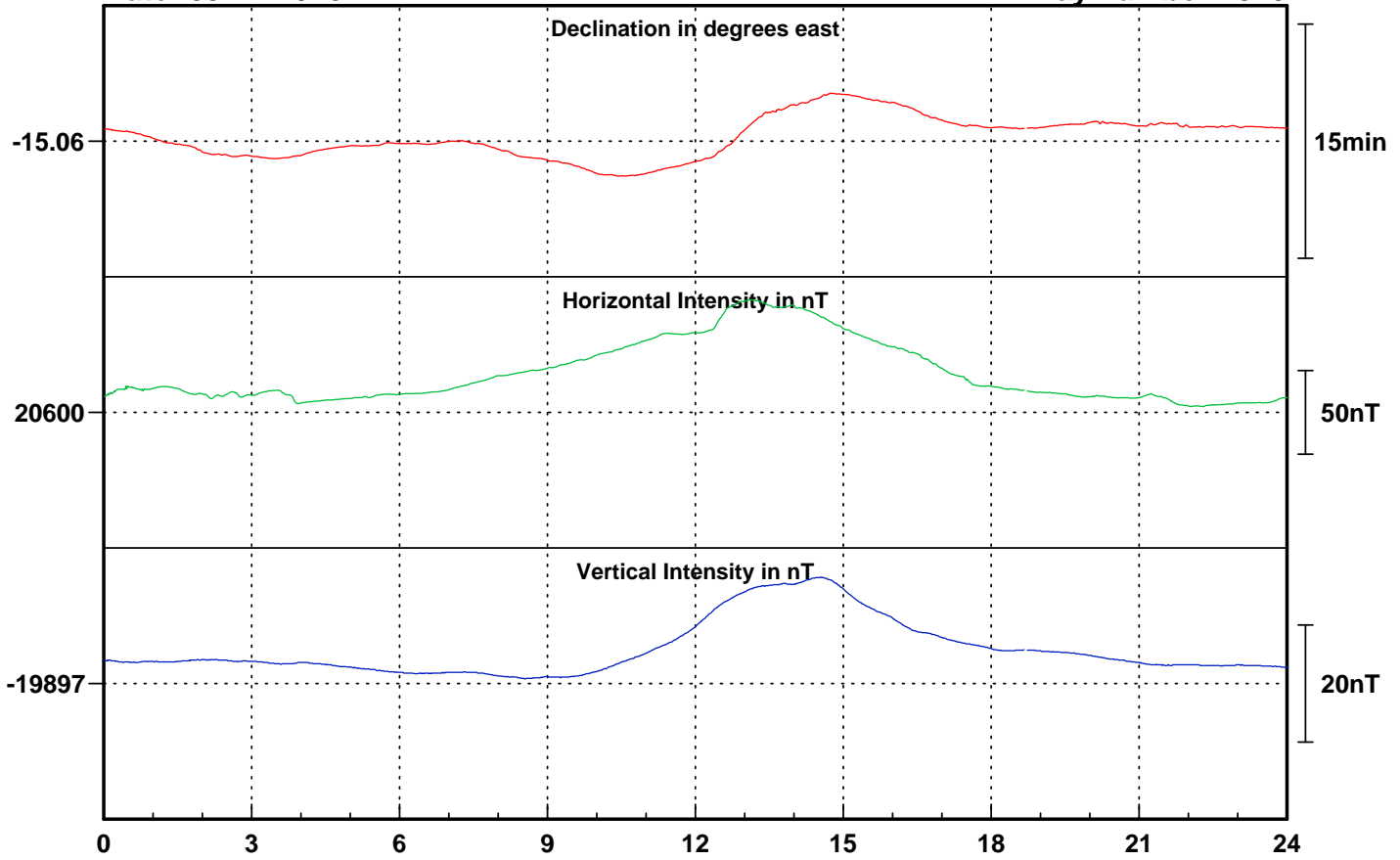
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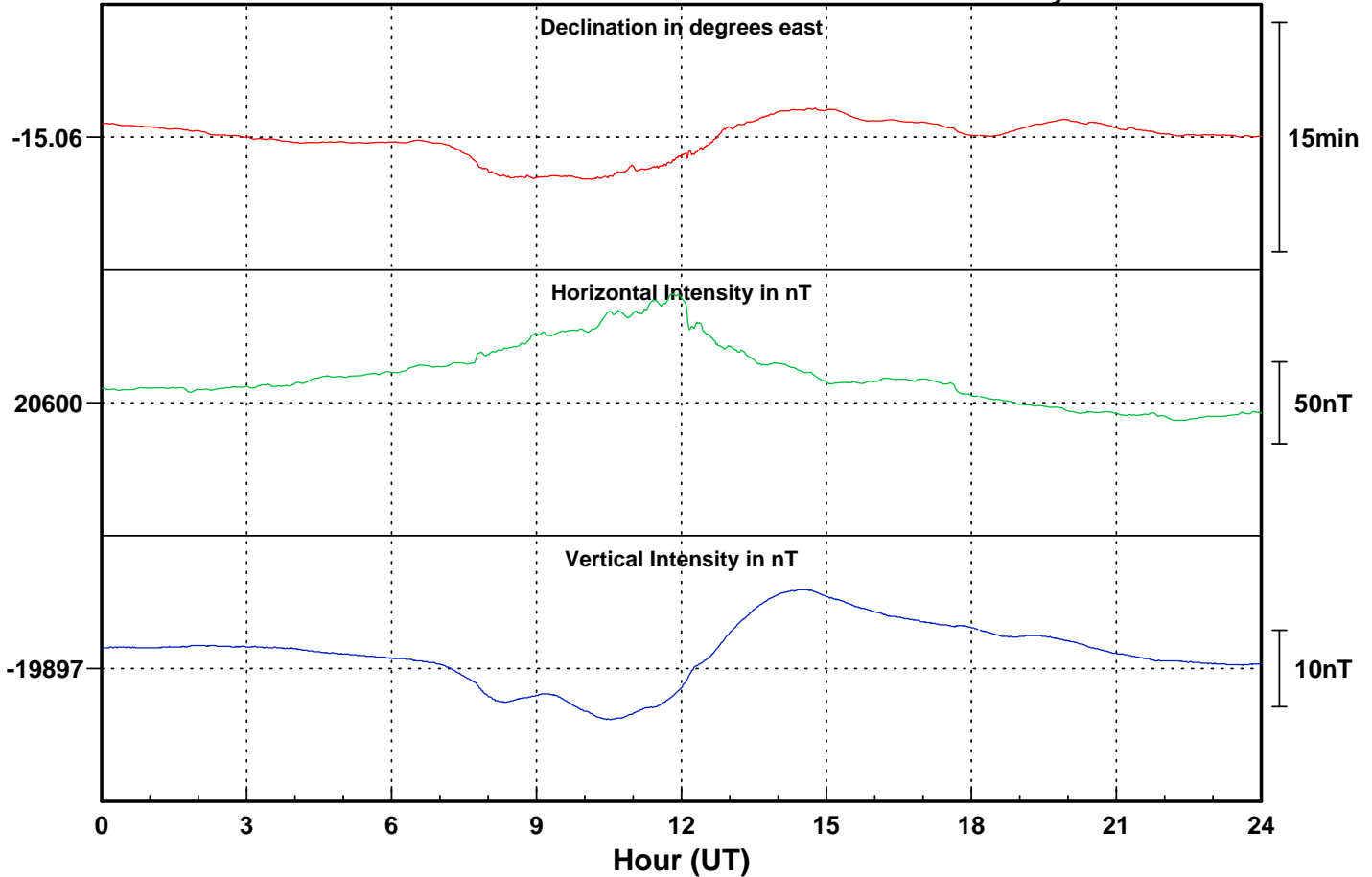
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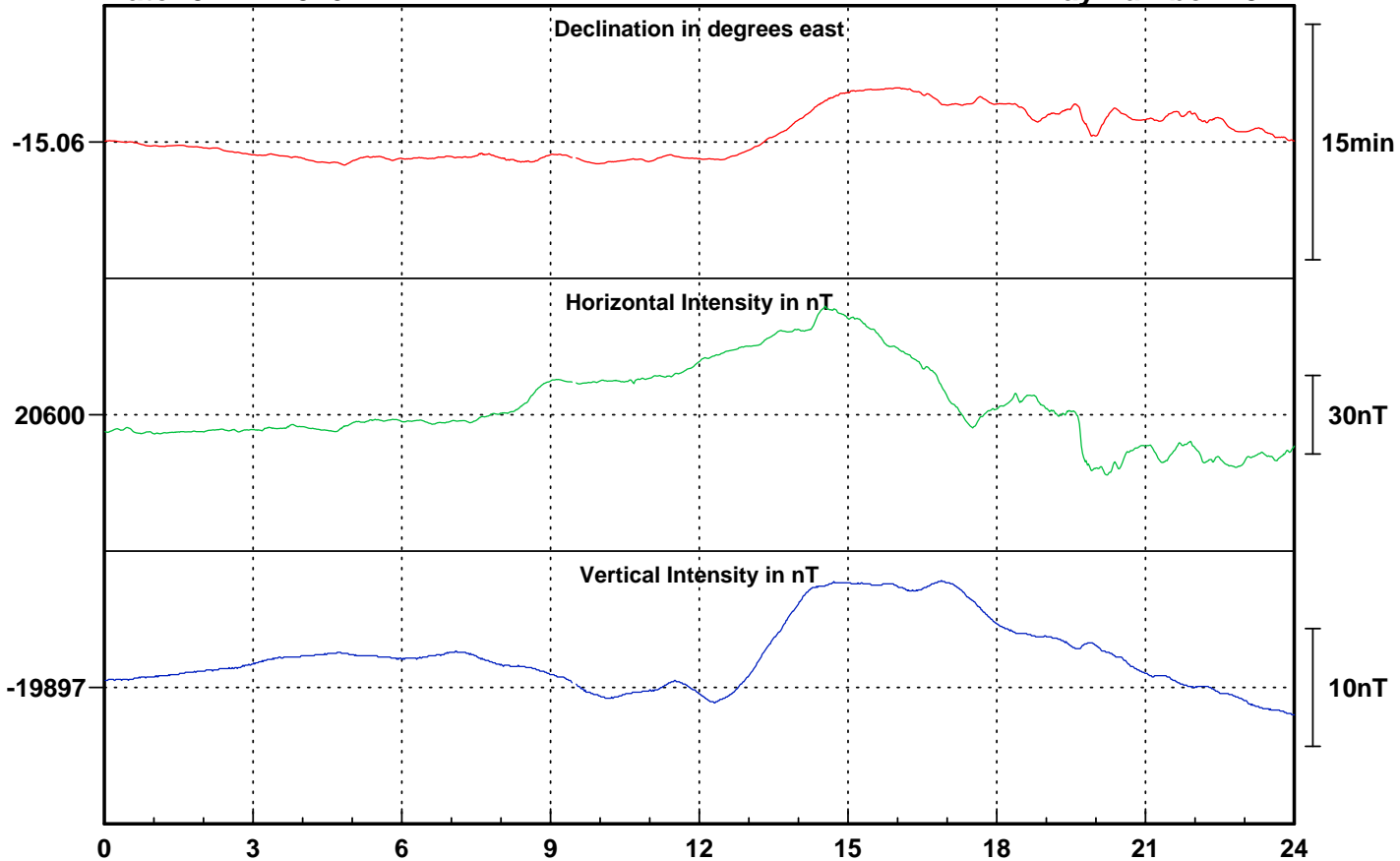
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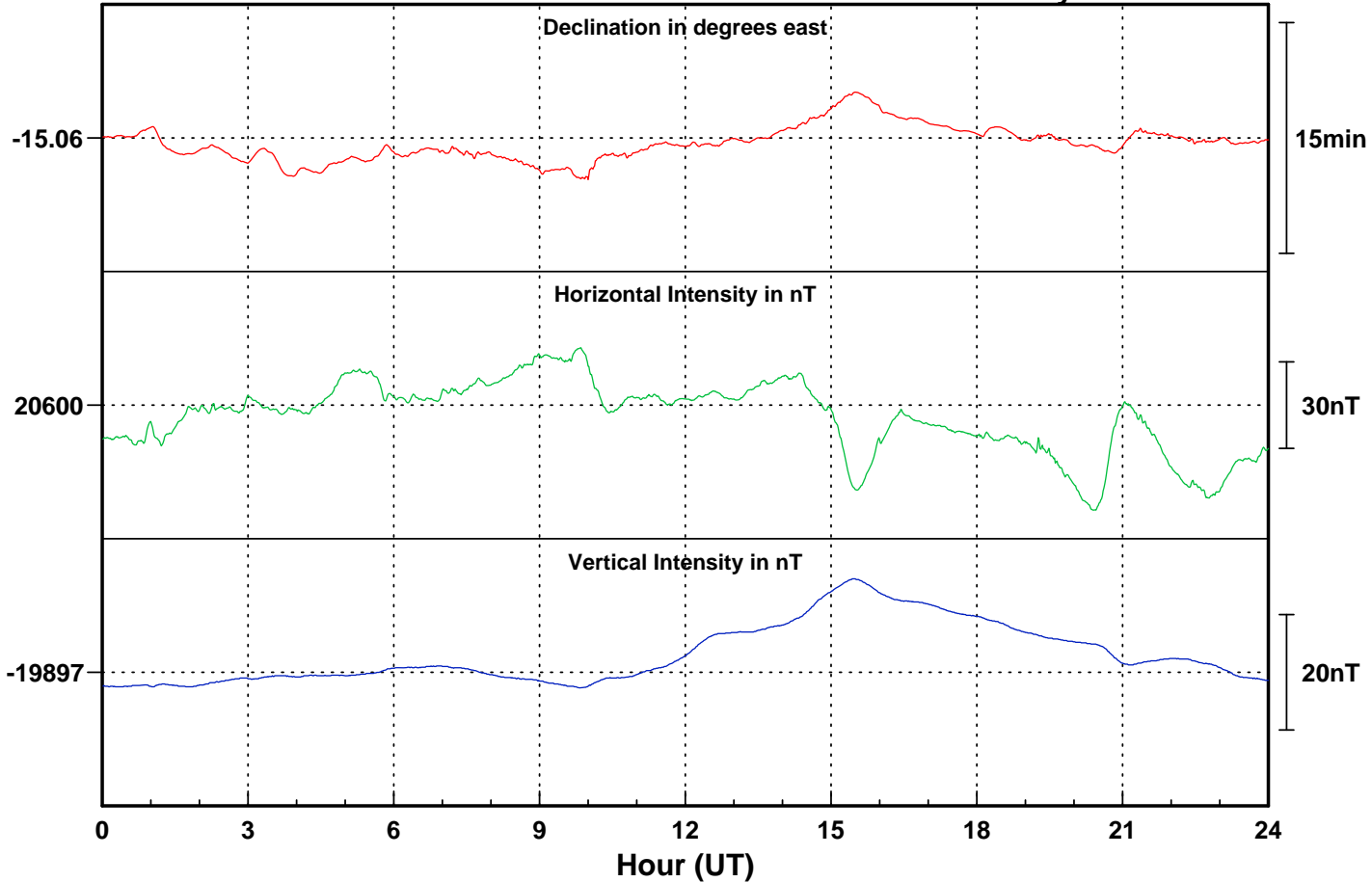
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Day number: 342



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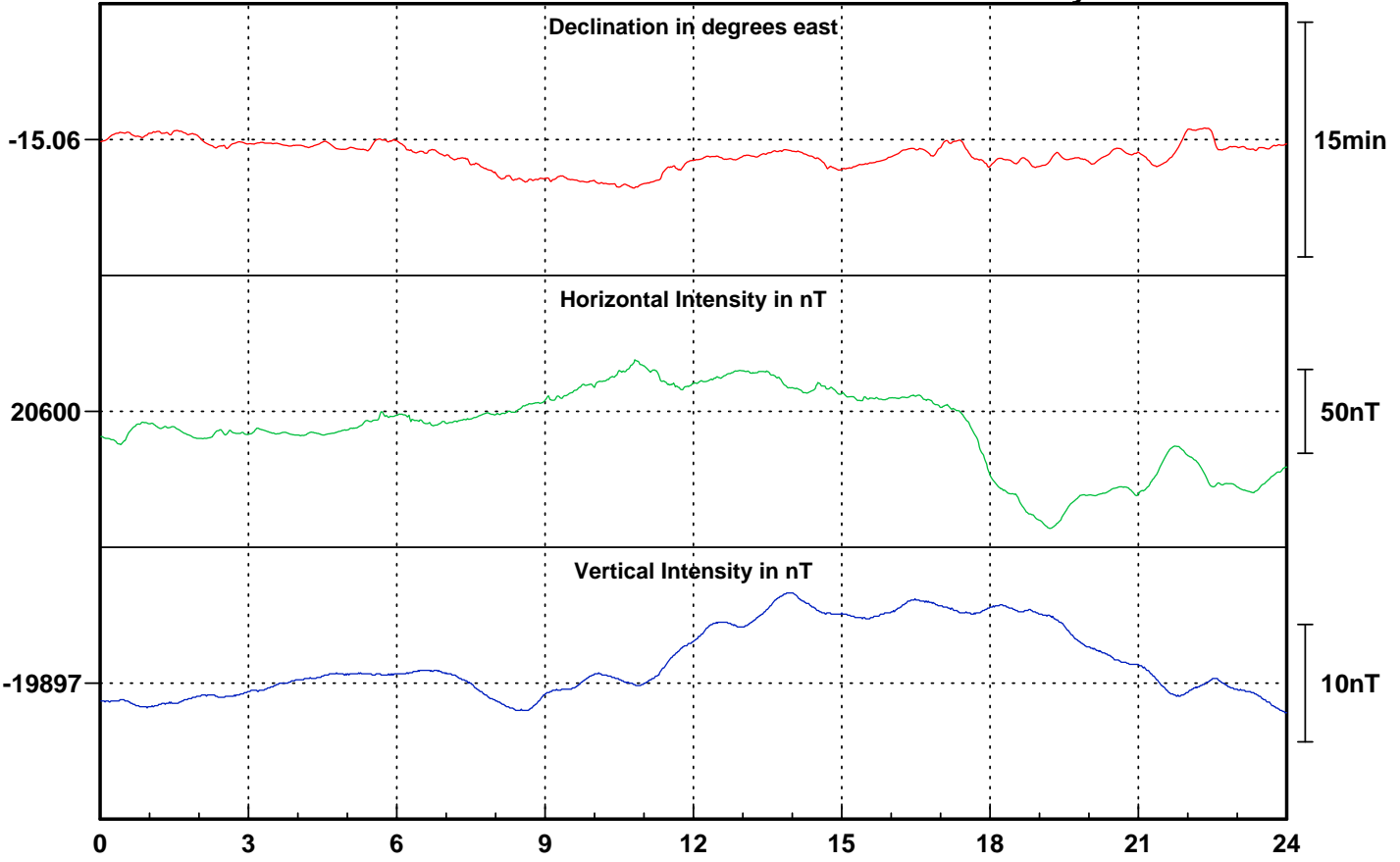
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Date: 09-12-2016

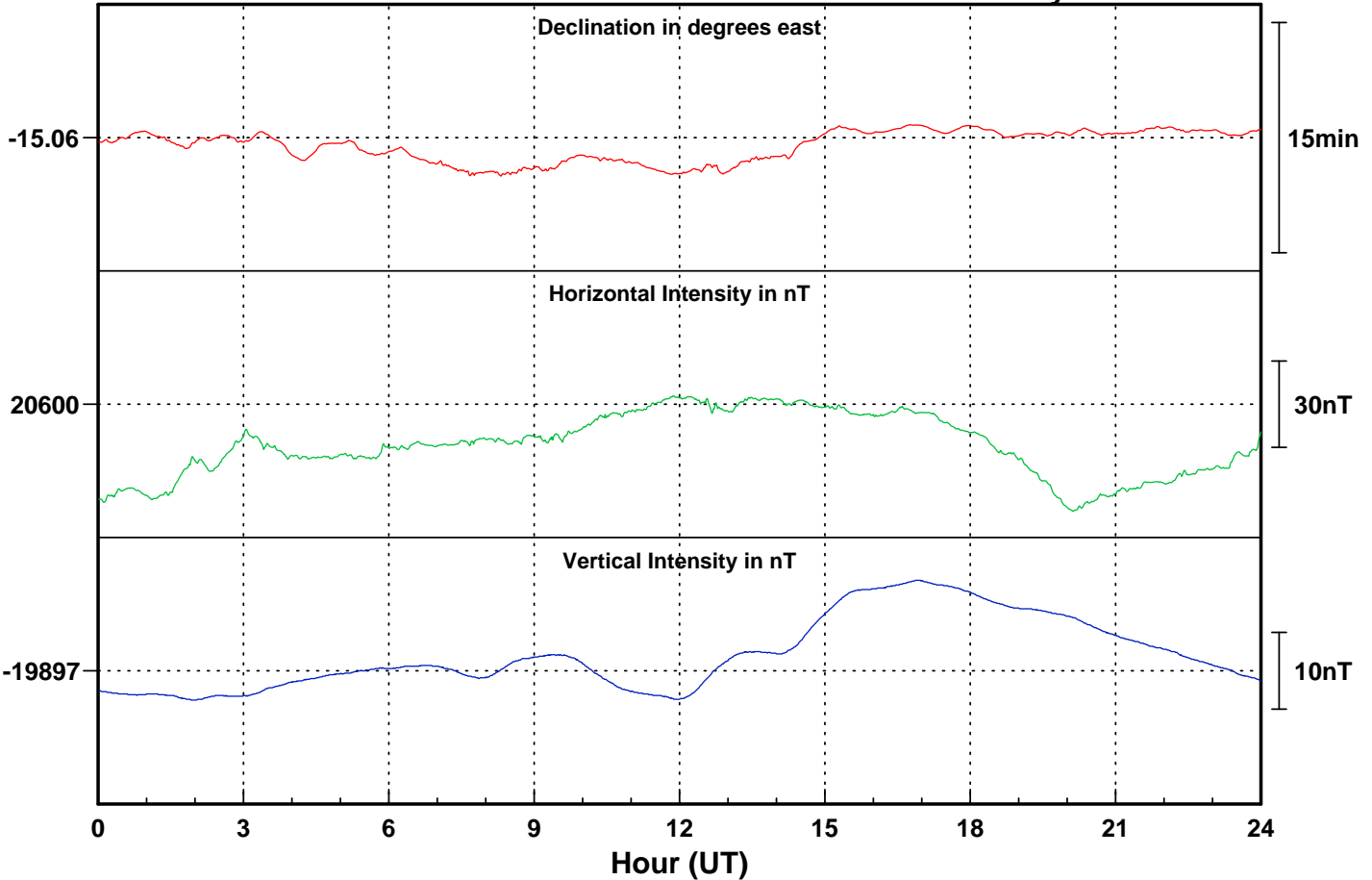
# Ascension Island

Day number: 344



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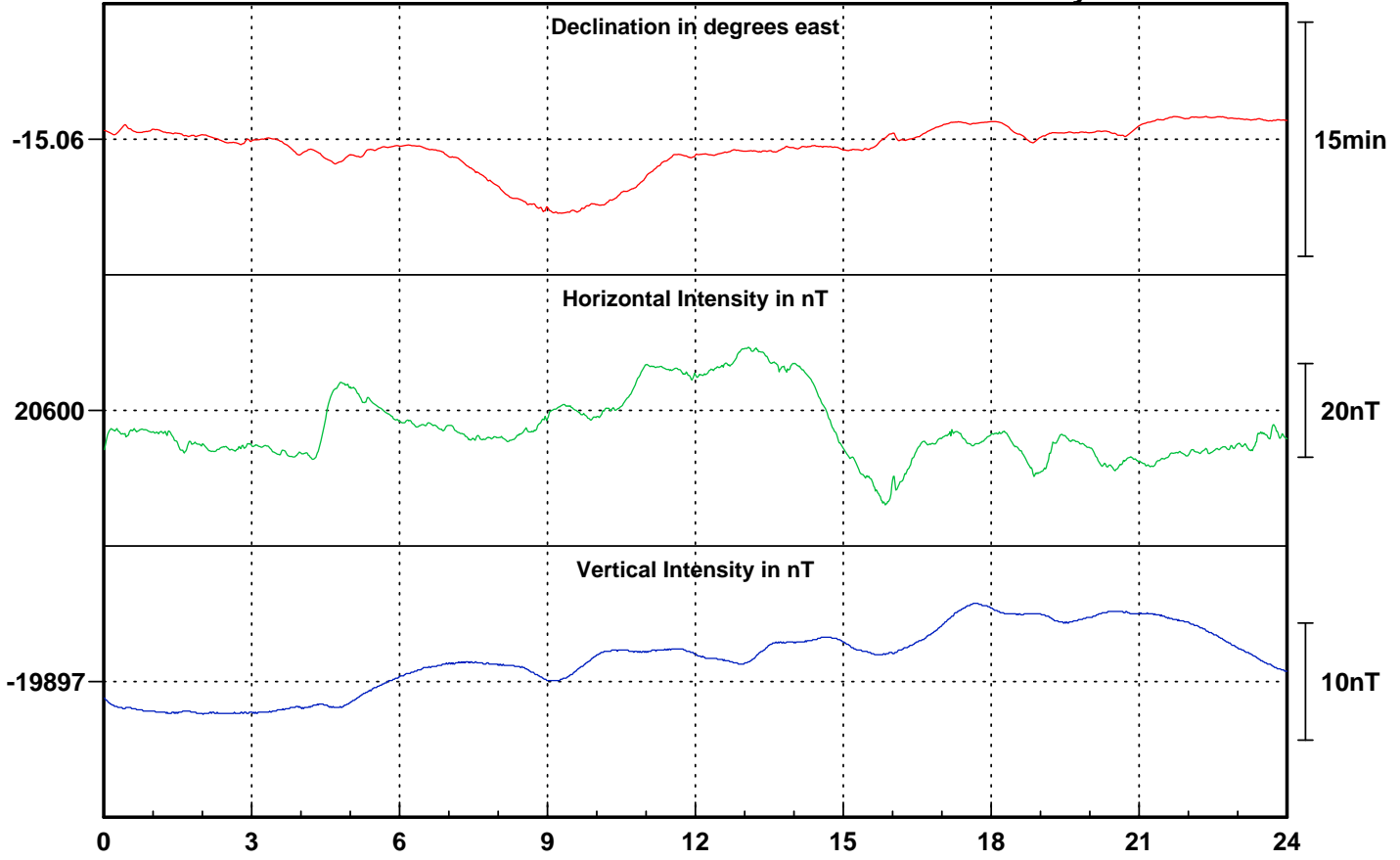
Day number: 345



Date: 11-12-2016

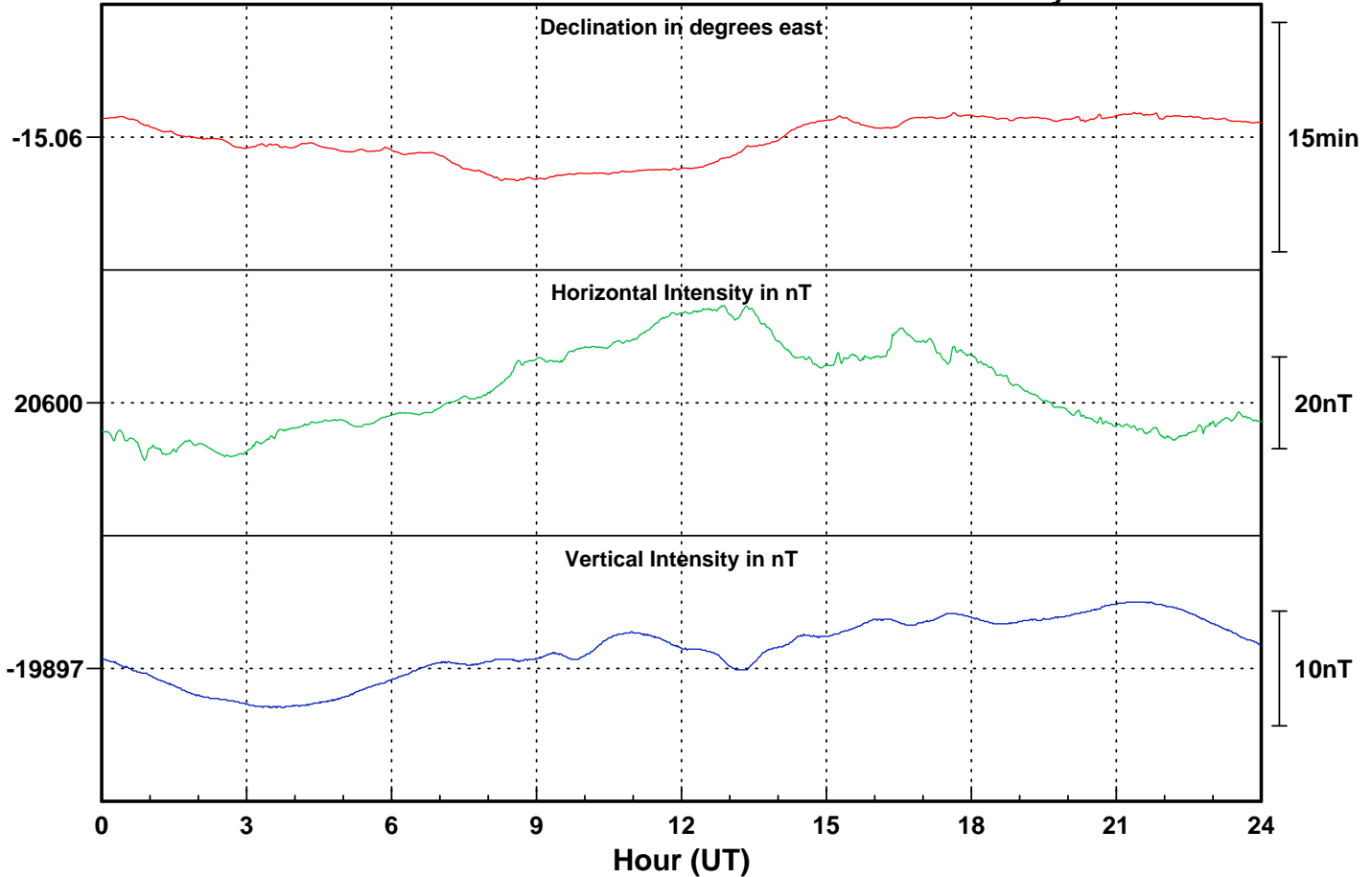
# Ascension Island

Day number: 346



Date: 12-12-2016

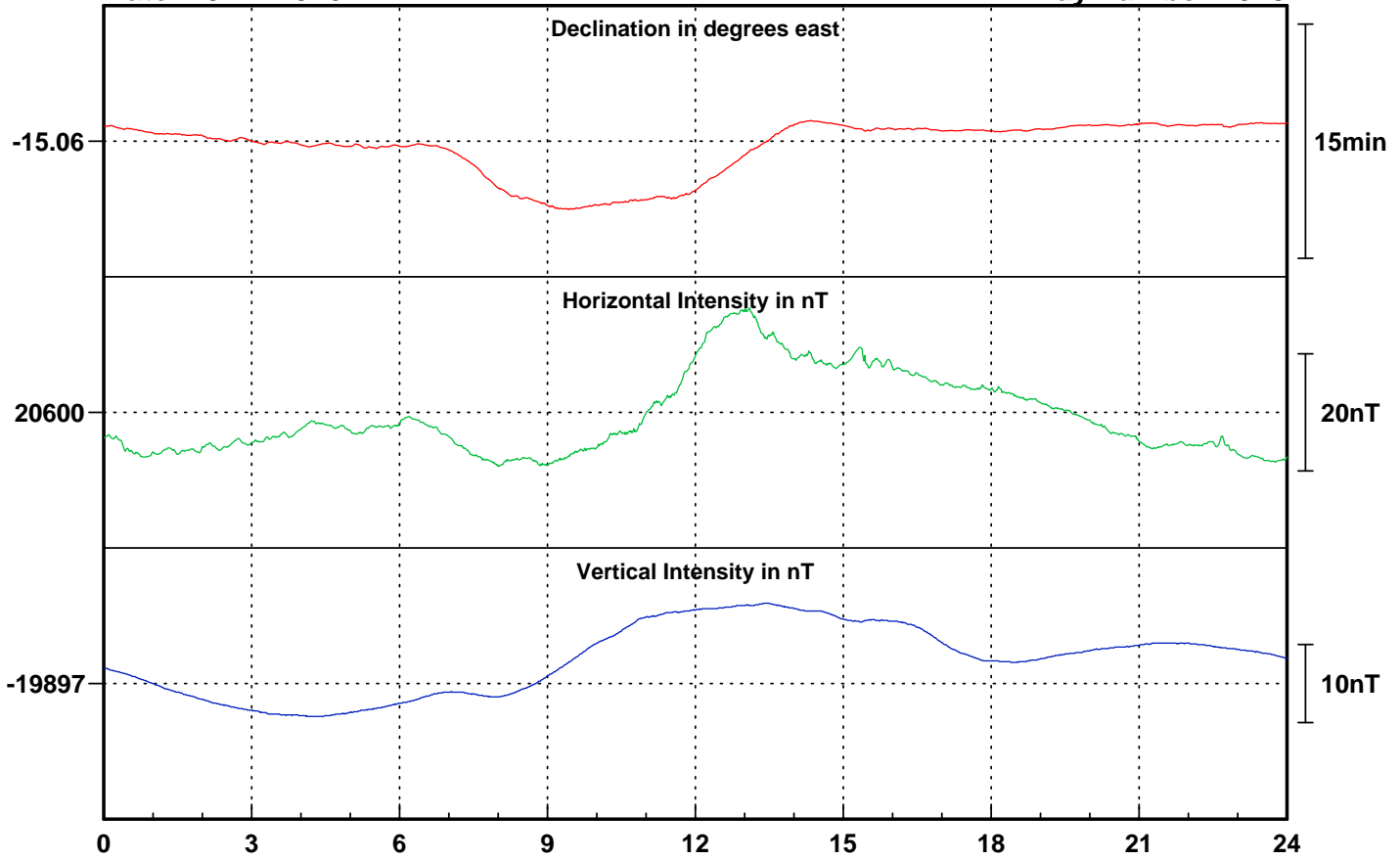
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Date: 13-12-2016

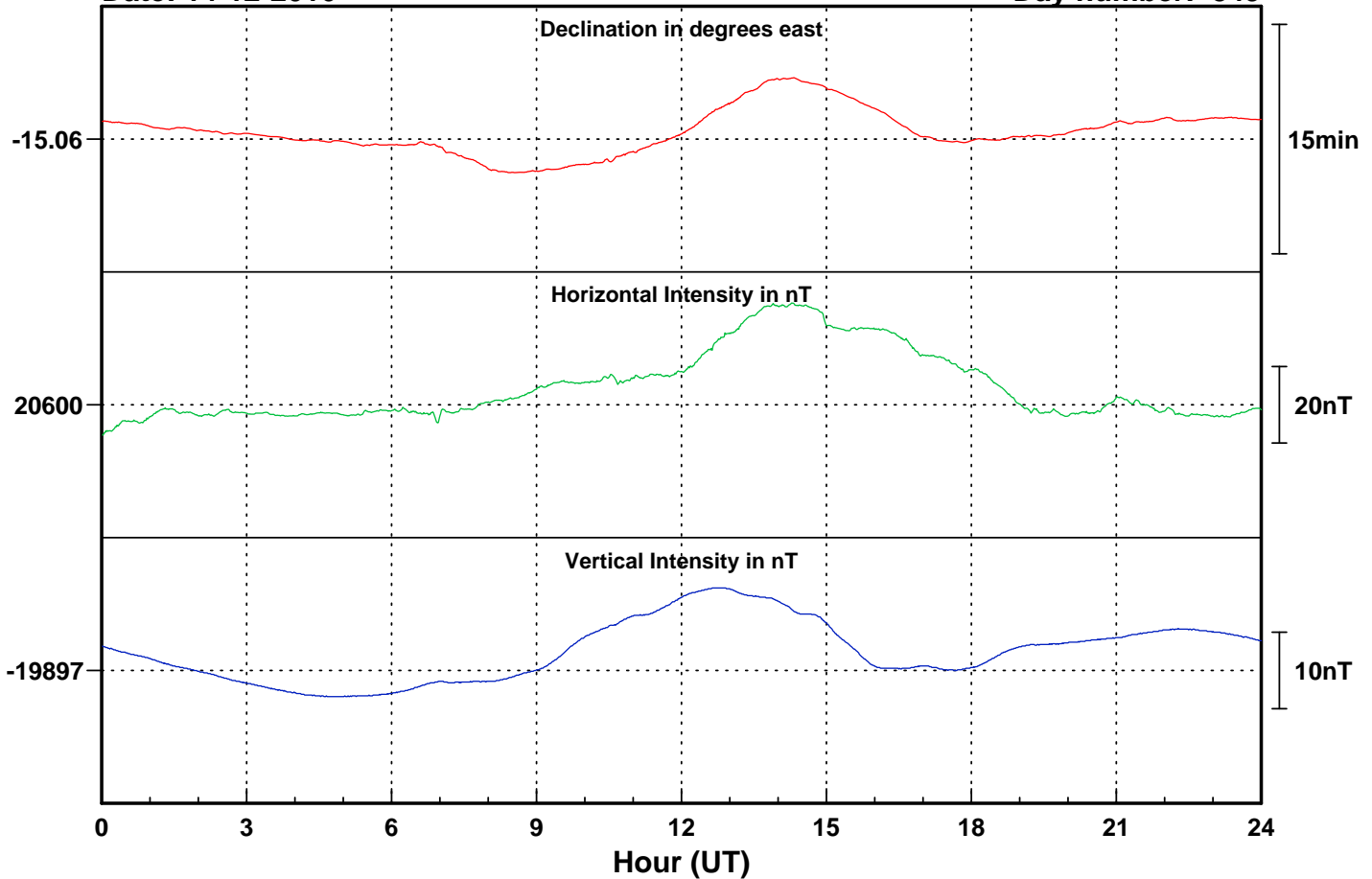
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Day number: 348



Date: 14-12-2016

Day number: 349

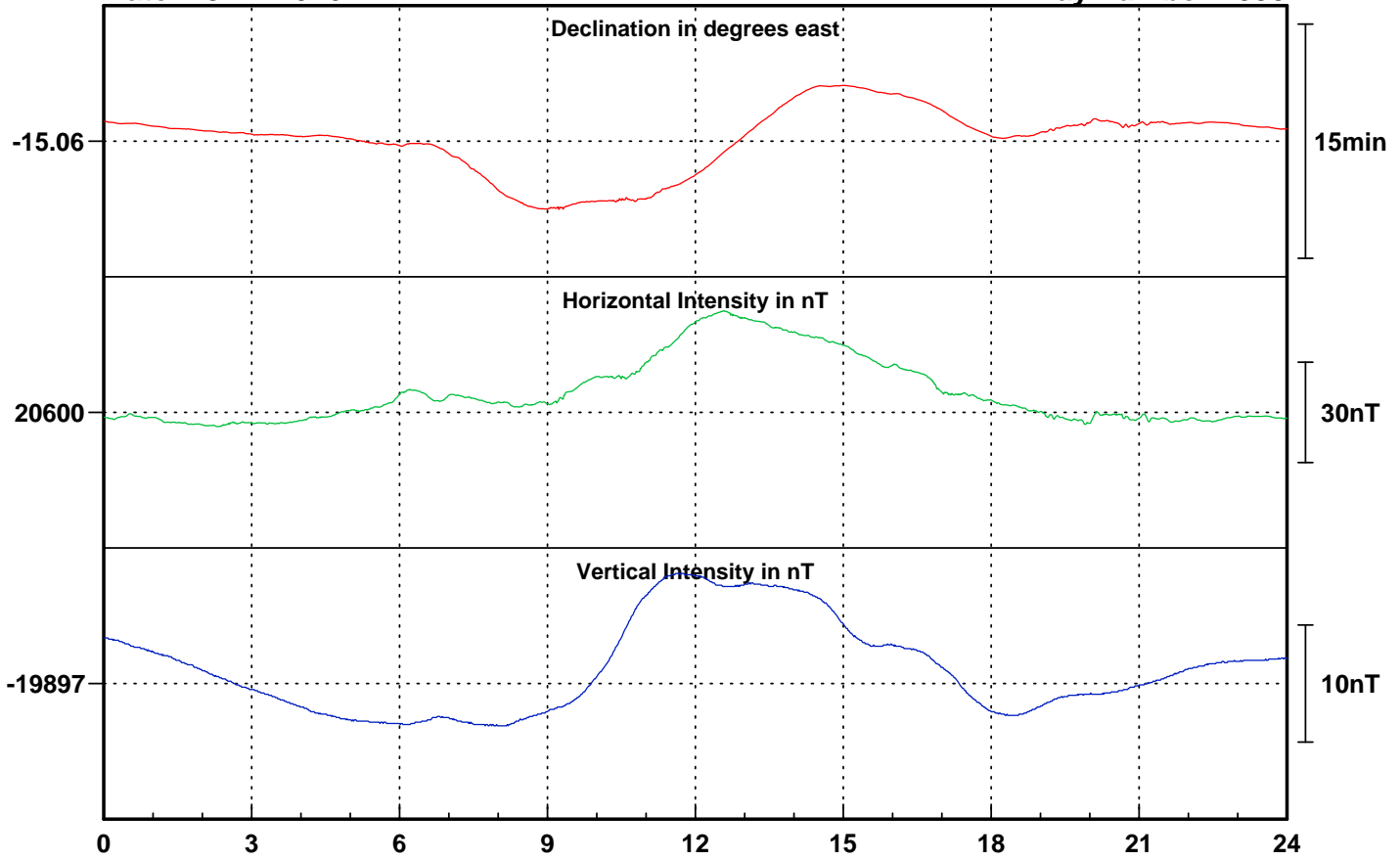




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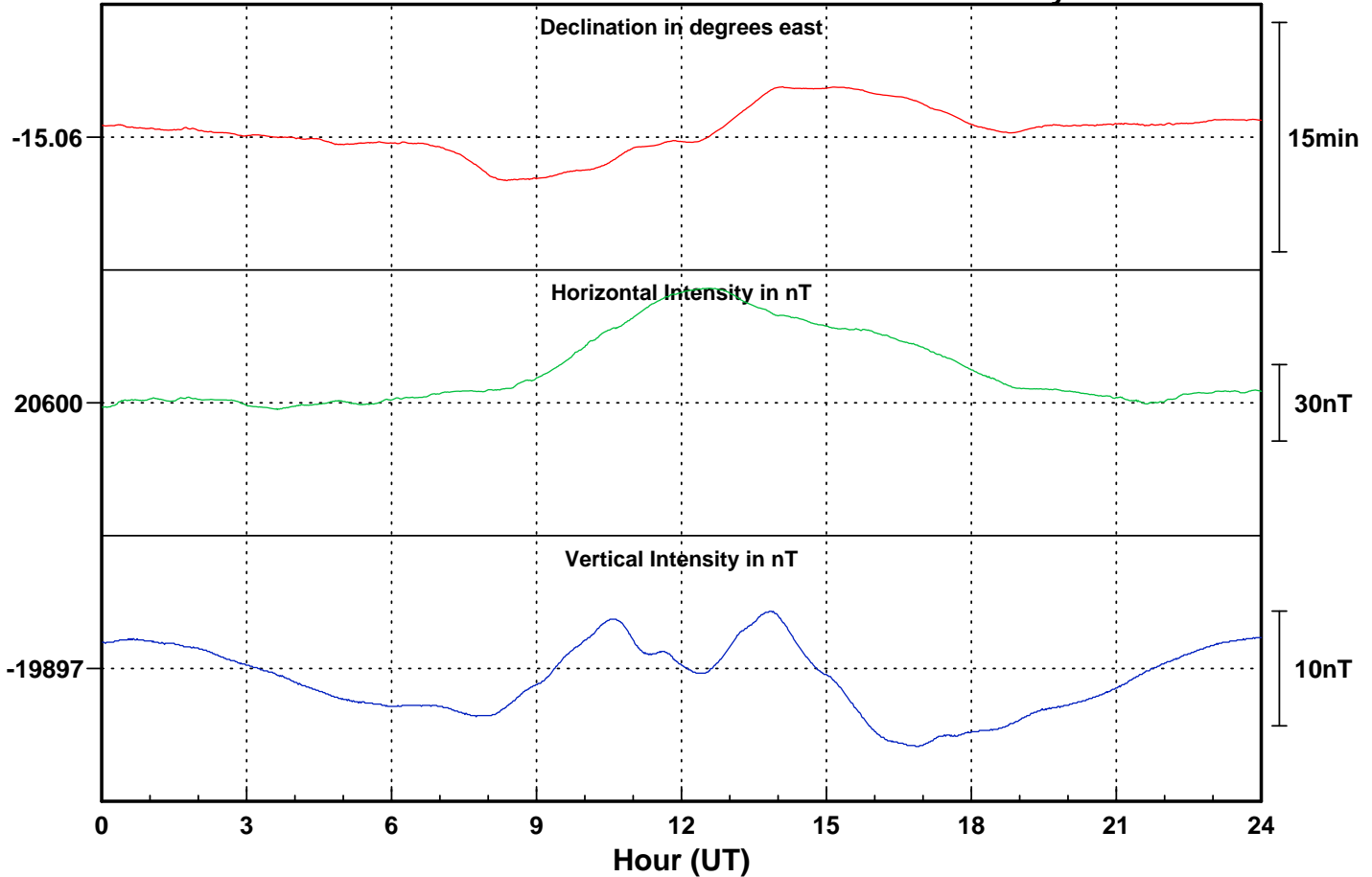
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Day number: 350



Date: 16-12-2016

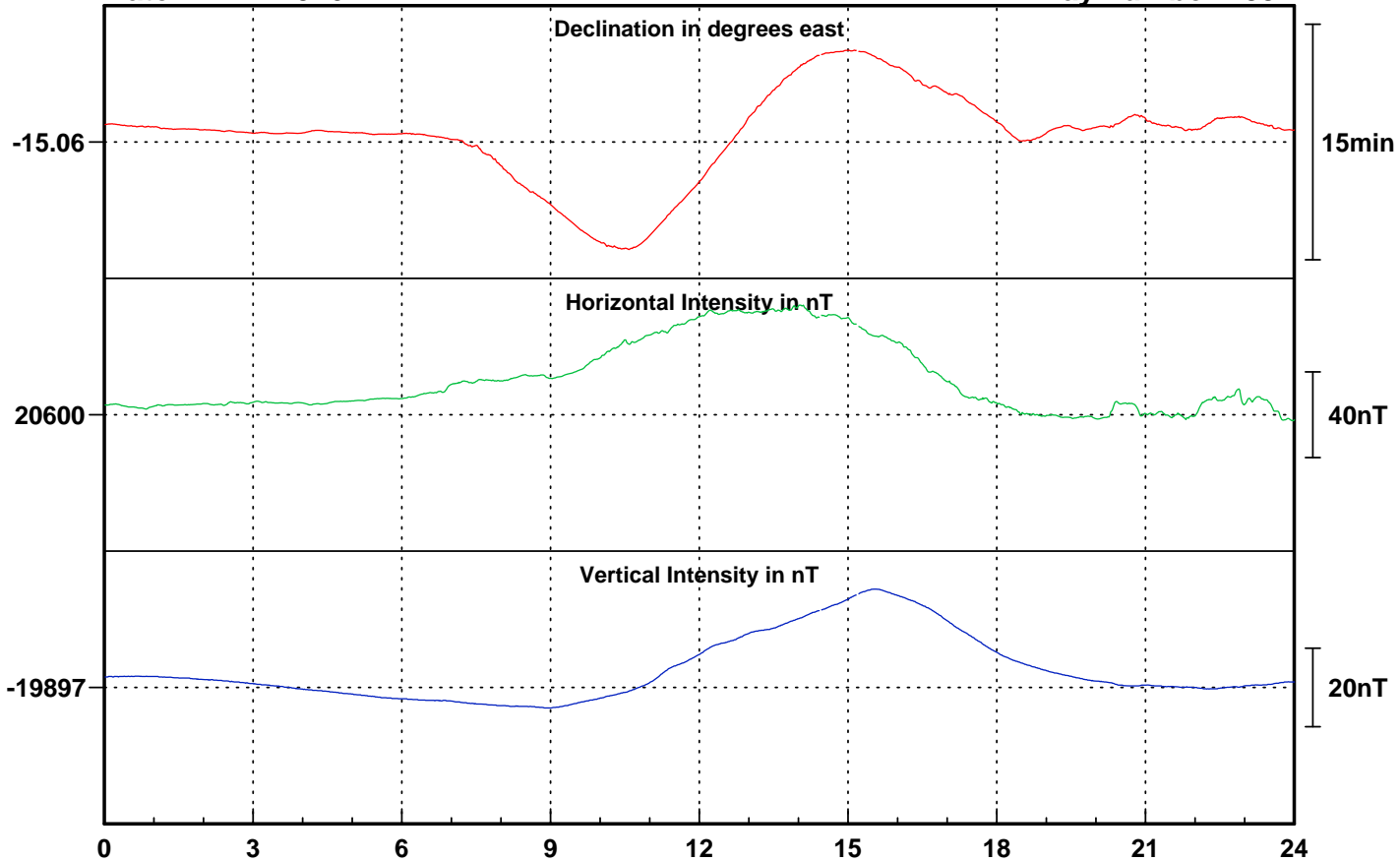
Day number: 351



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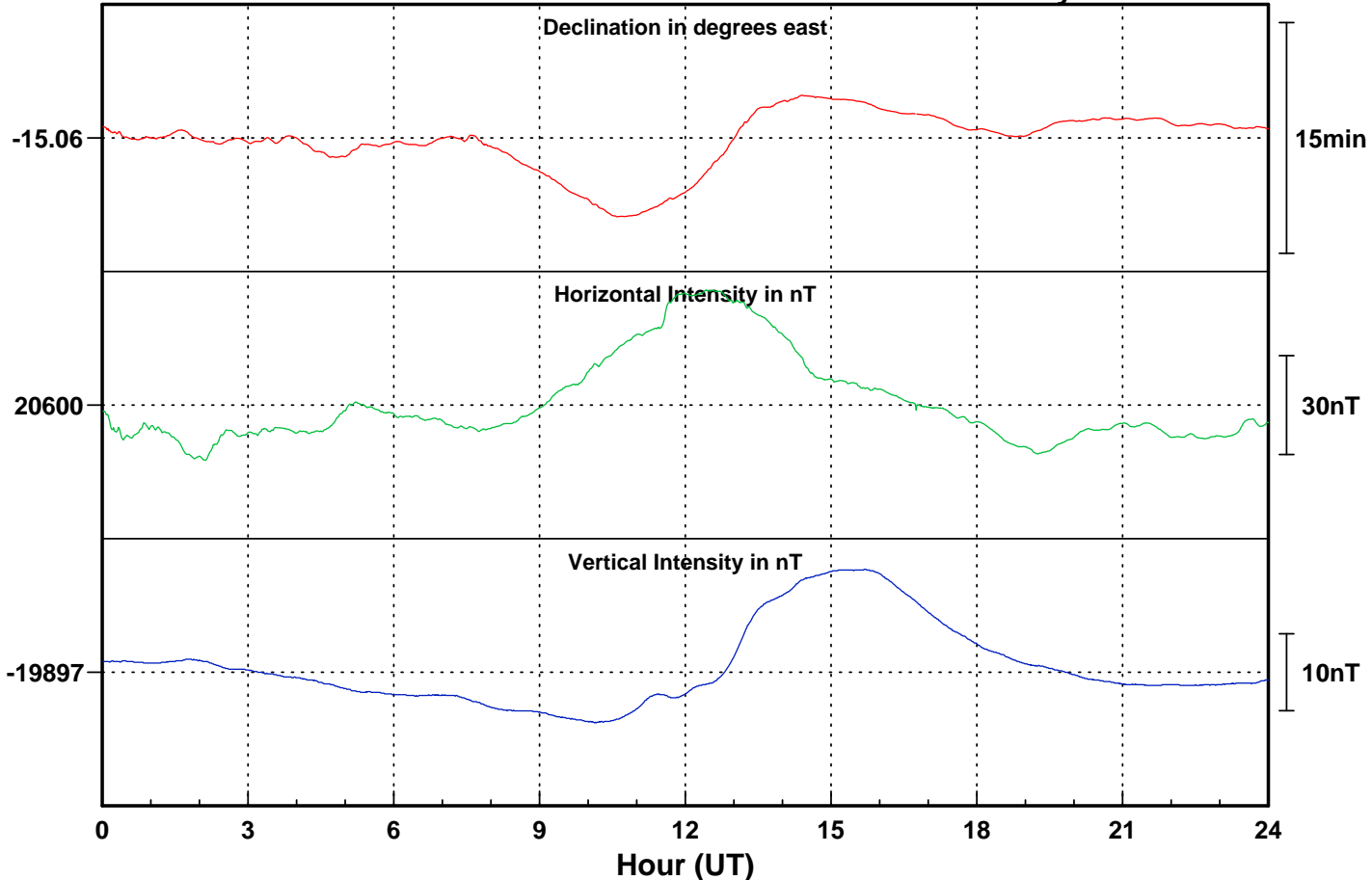
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Day number: 352



Date: 18-12-2016

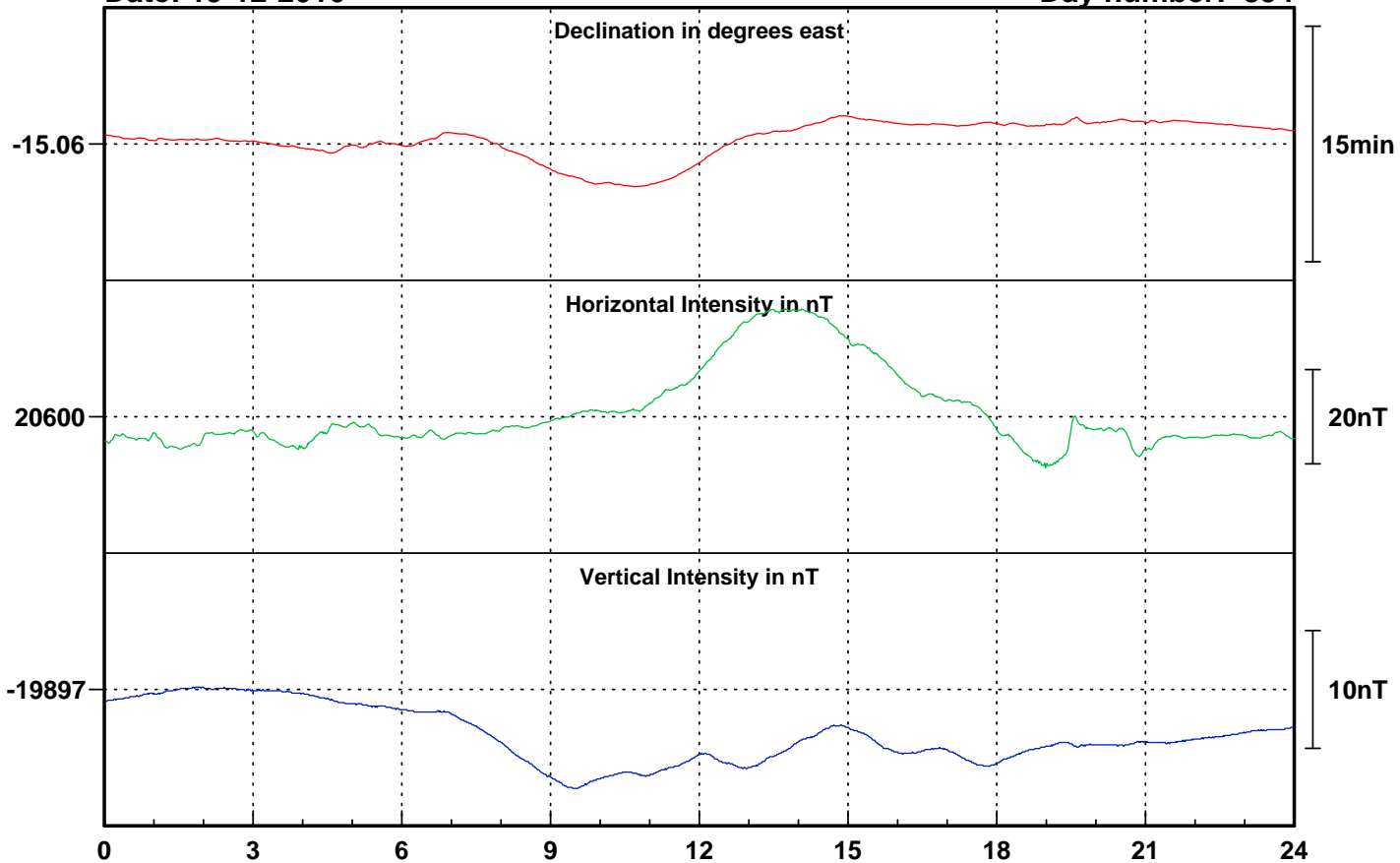
Day number: 353



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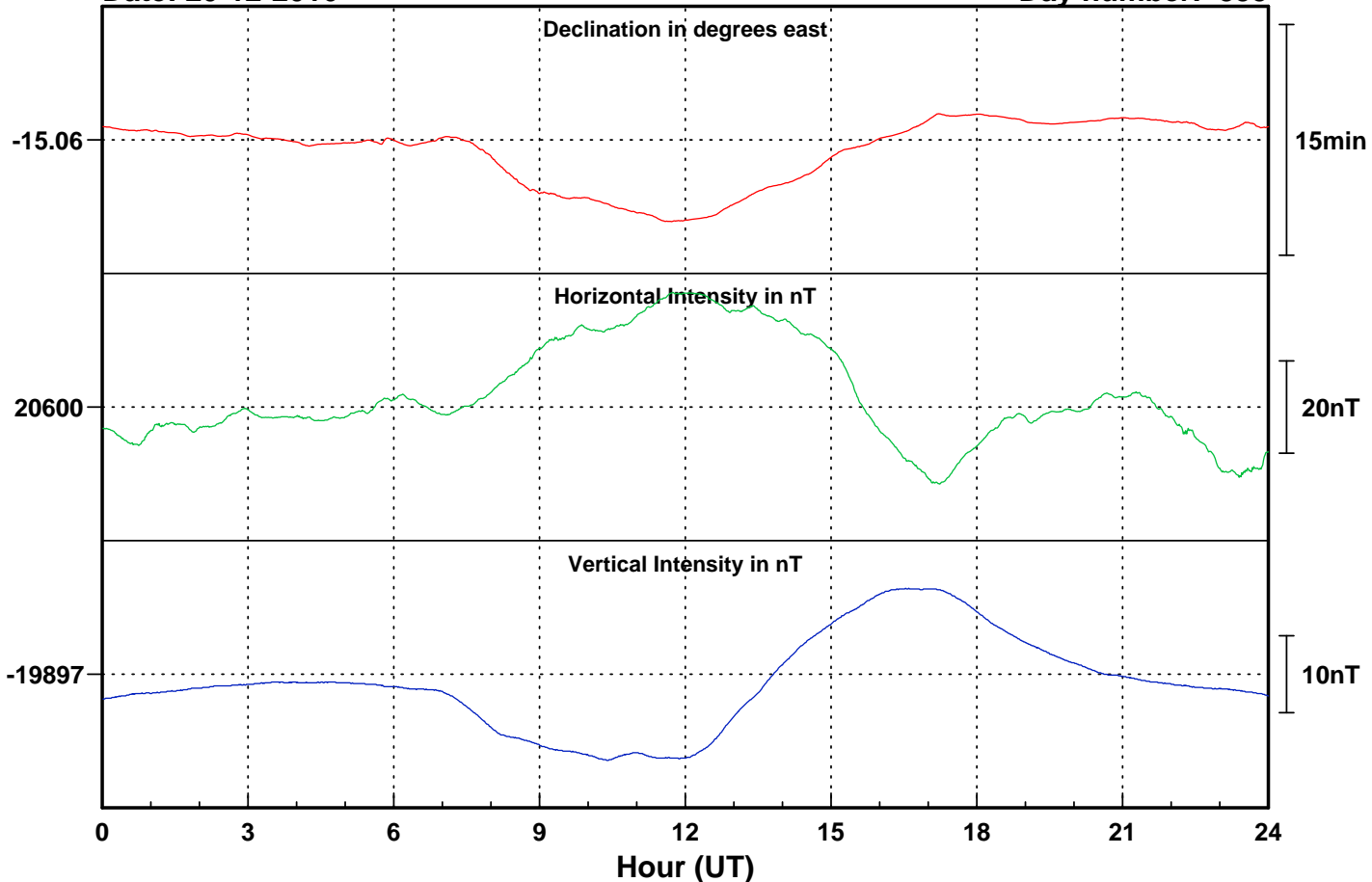
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Day number: 354



Date: 20-12-2016

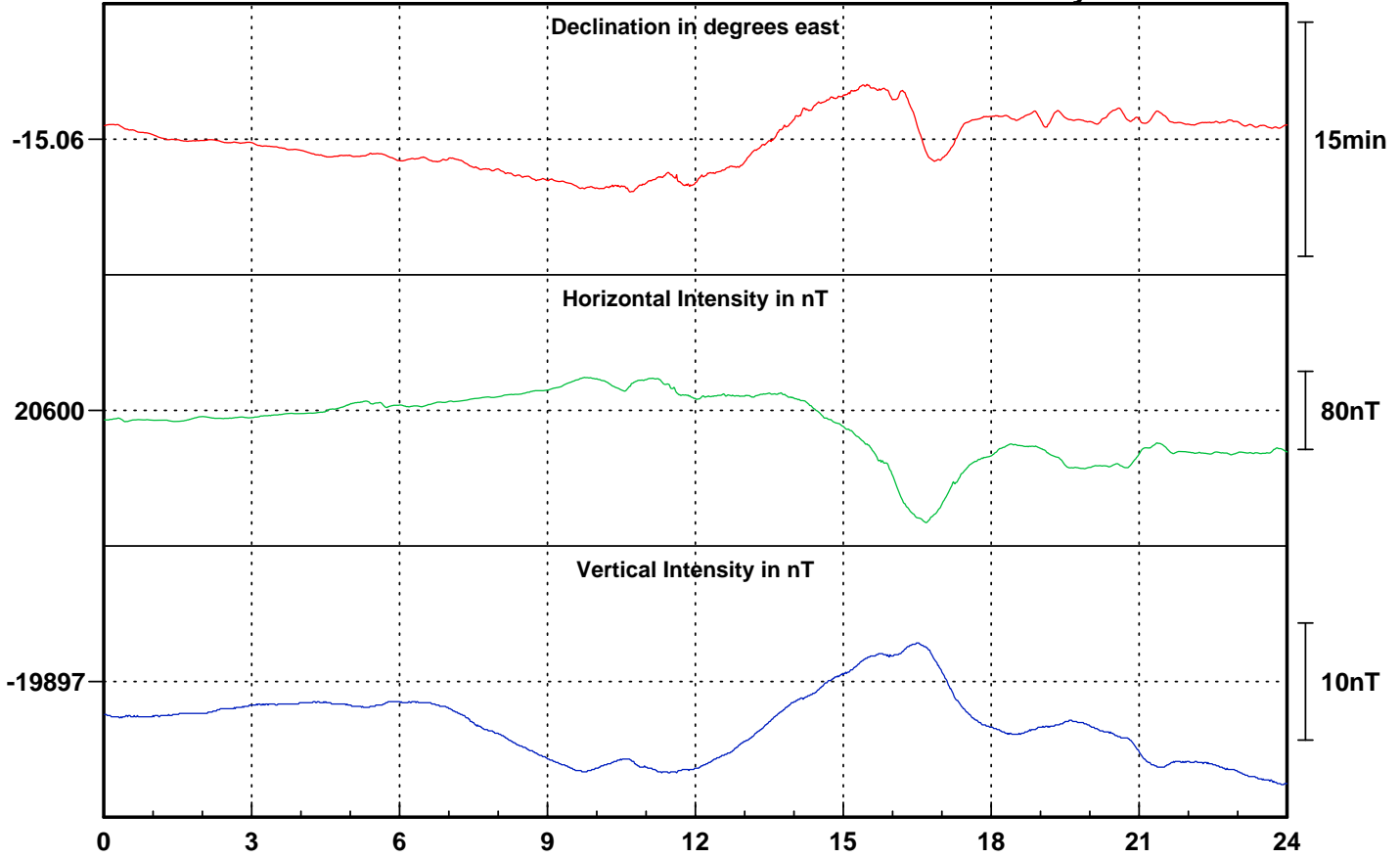
Day number: 355



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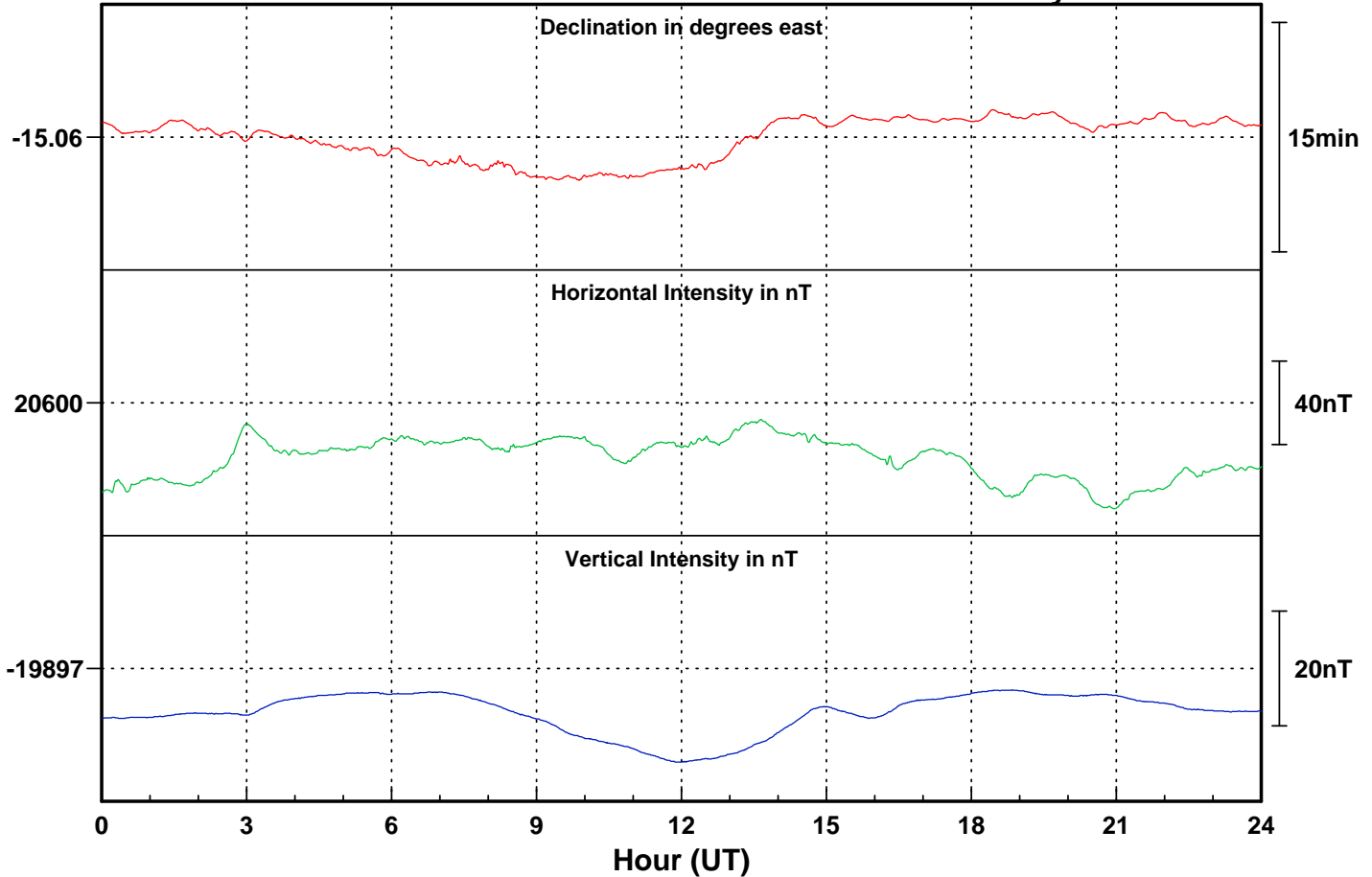
# Ascension Island

Day number: 356



Date: 22-12-2016

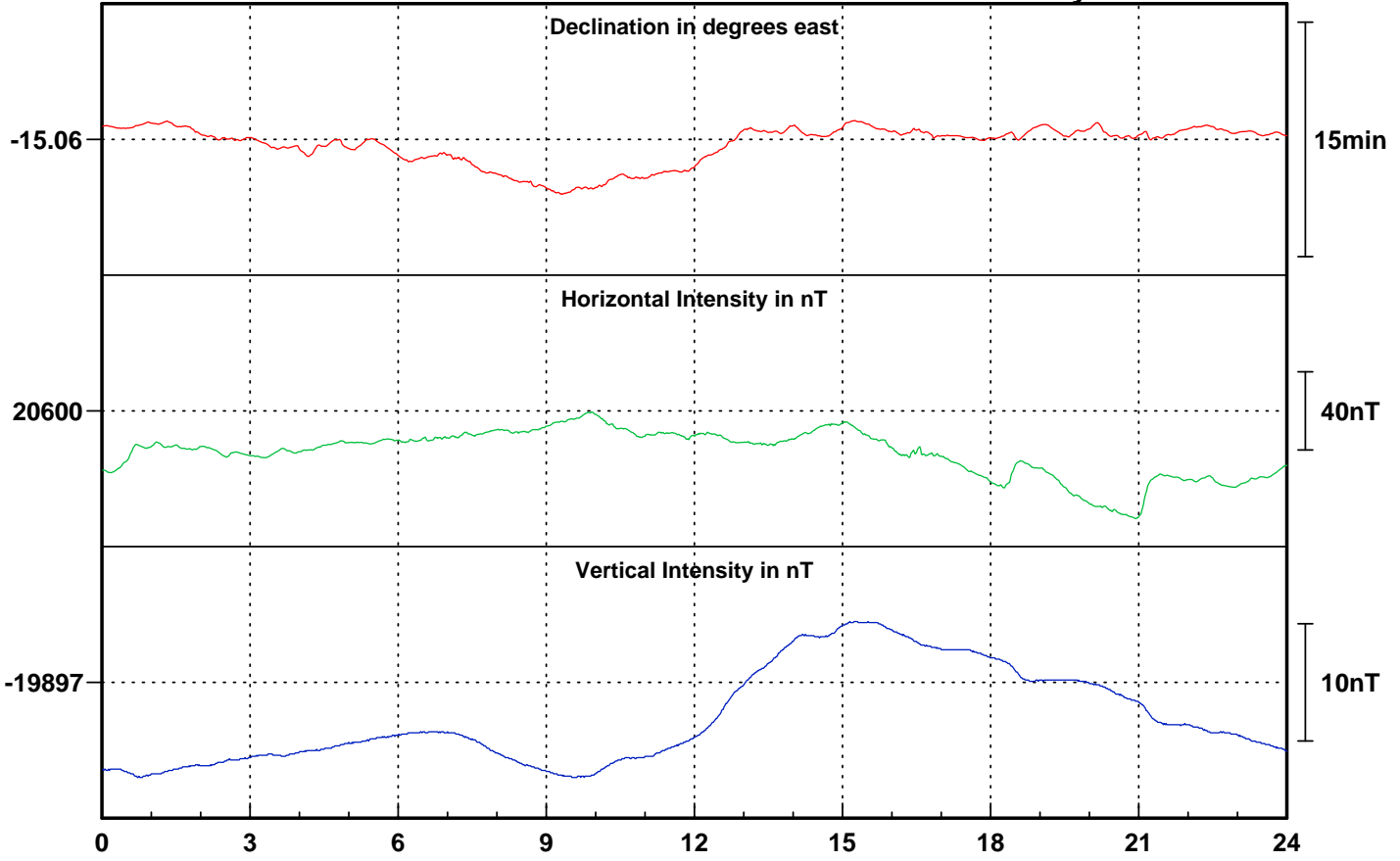
Day number: 357



Date: 23-12-2016

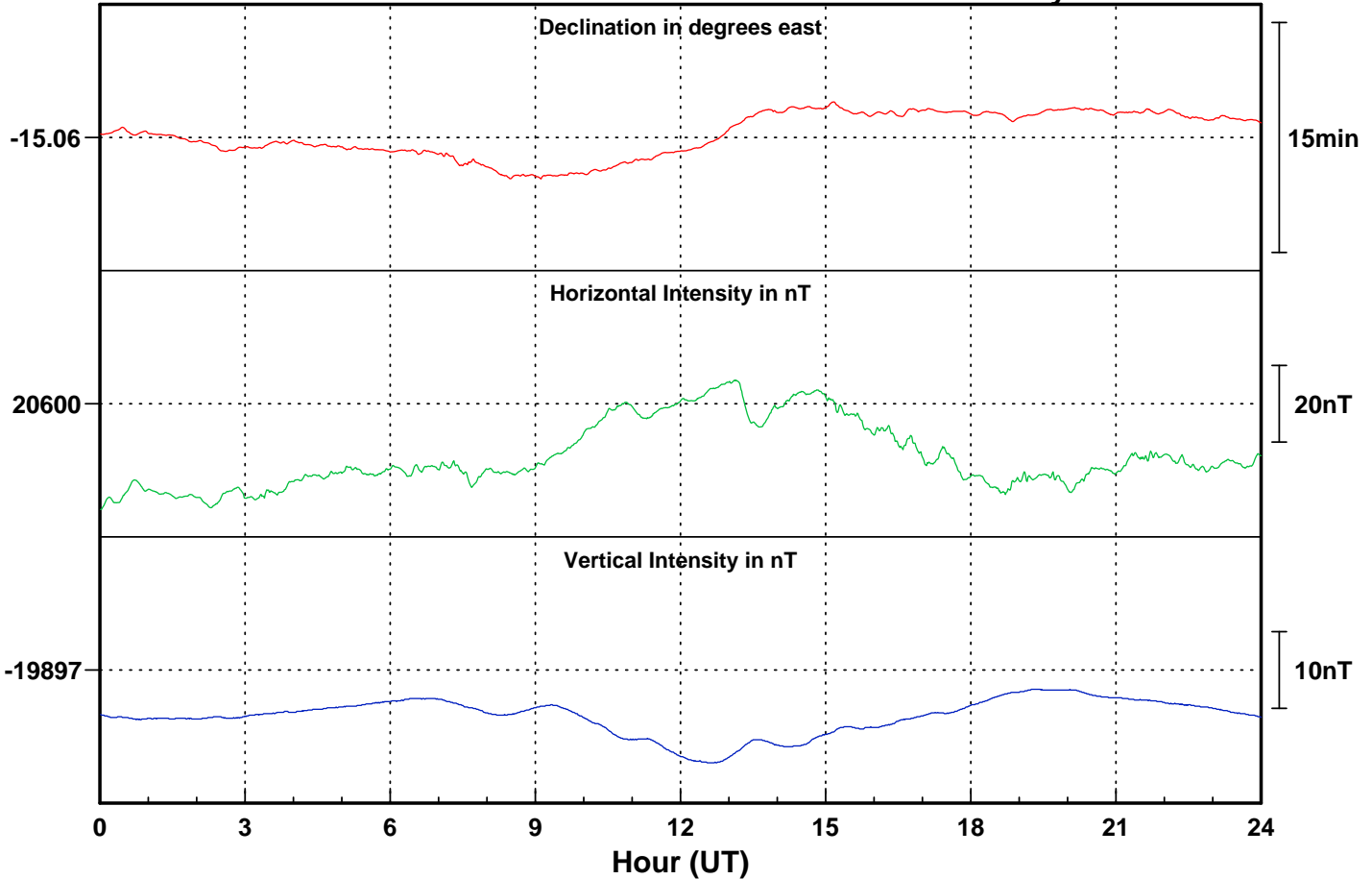
# Ascension Island

Day number: 358



Date: 24-12-2016

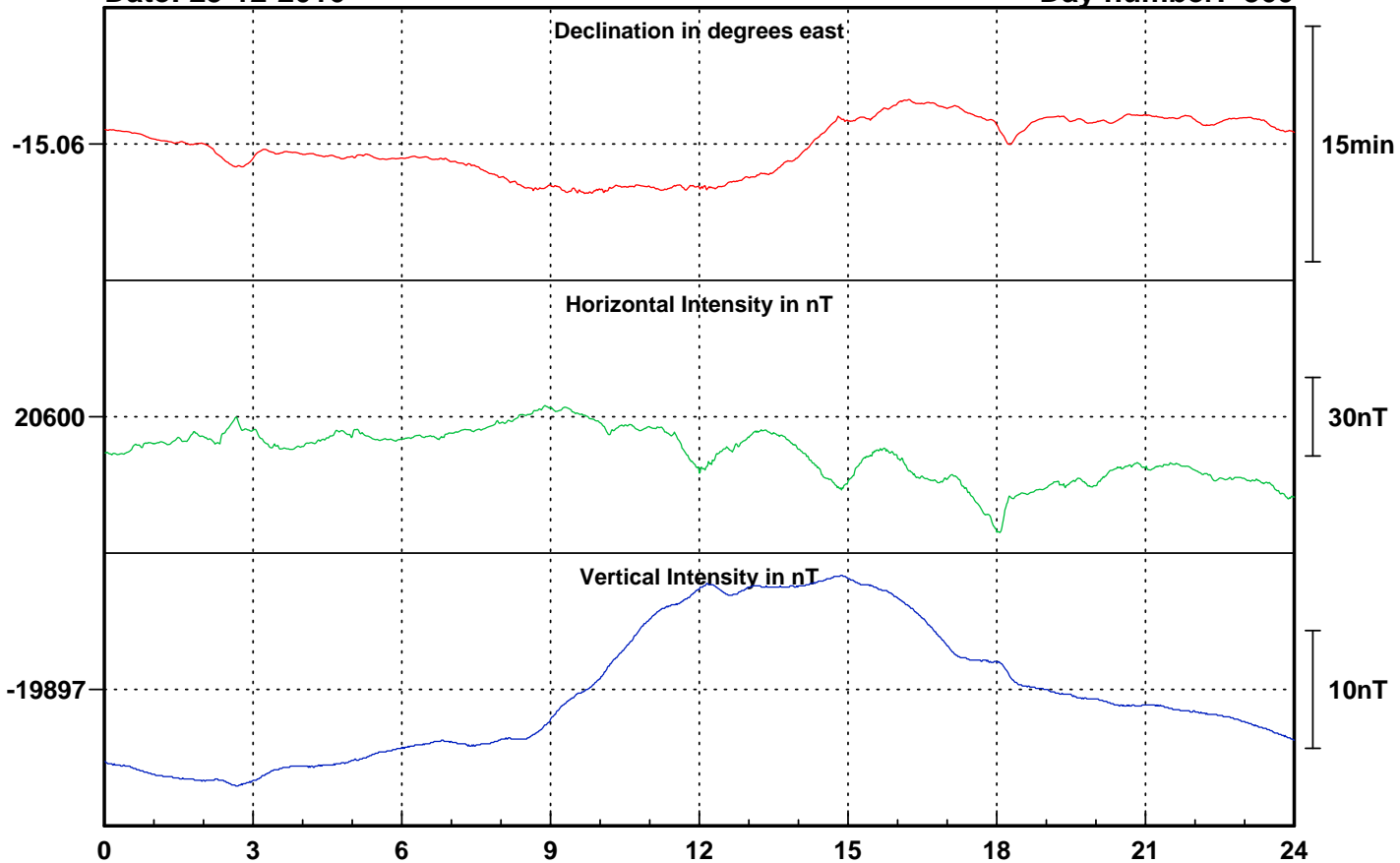
Day number: 359



Date: 25-12-2016

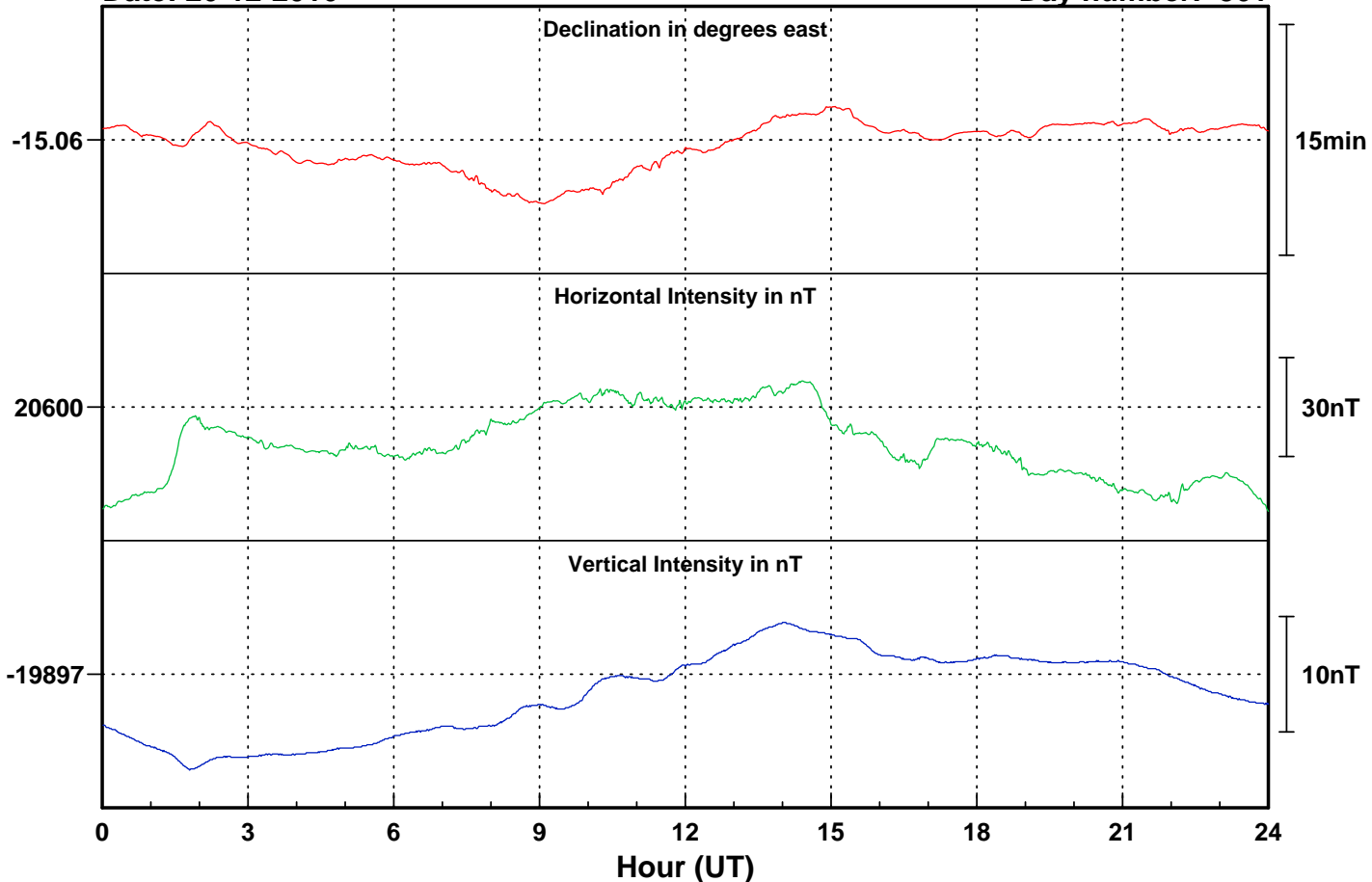
# Ascension Island

Day number: 360



Date: 26-12-2016

Day number: 361

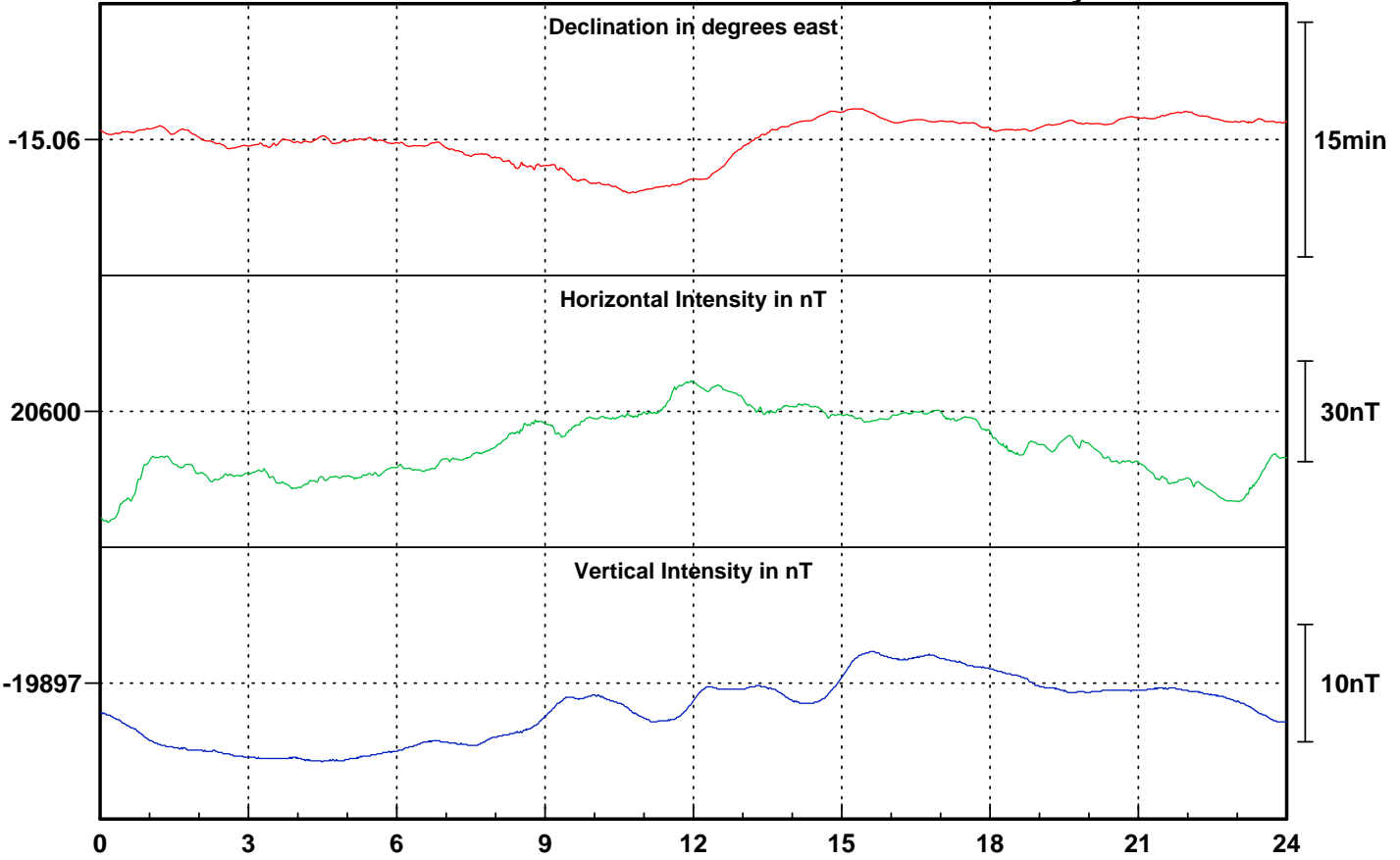




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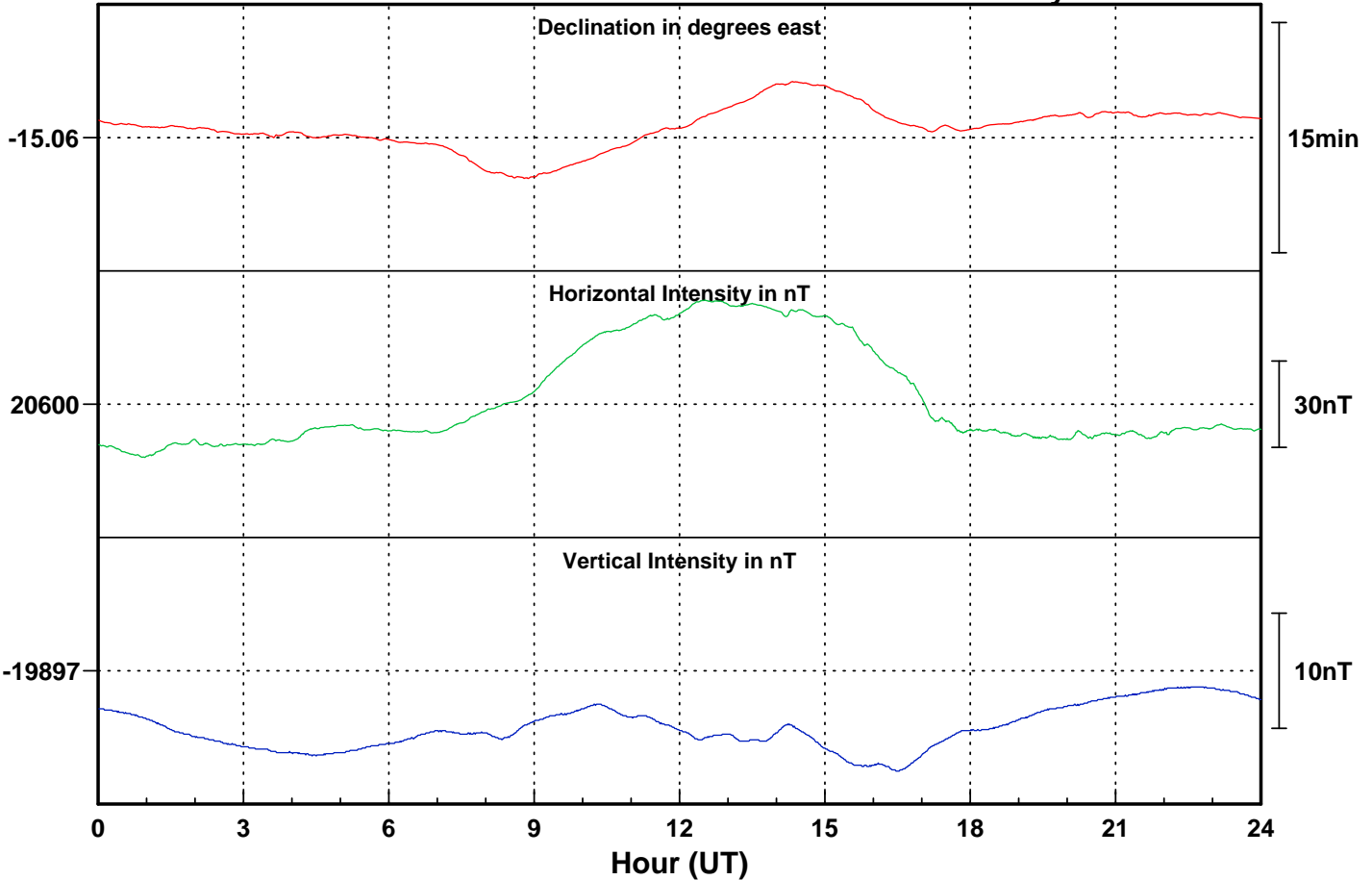
# Ascension Island

Day number: 362



Date: 28-12-2016

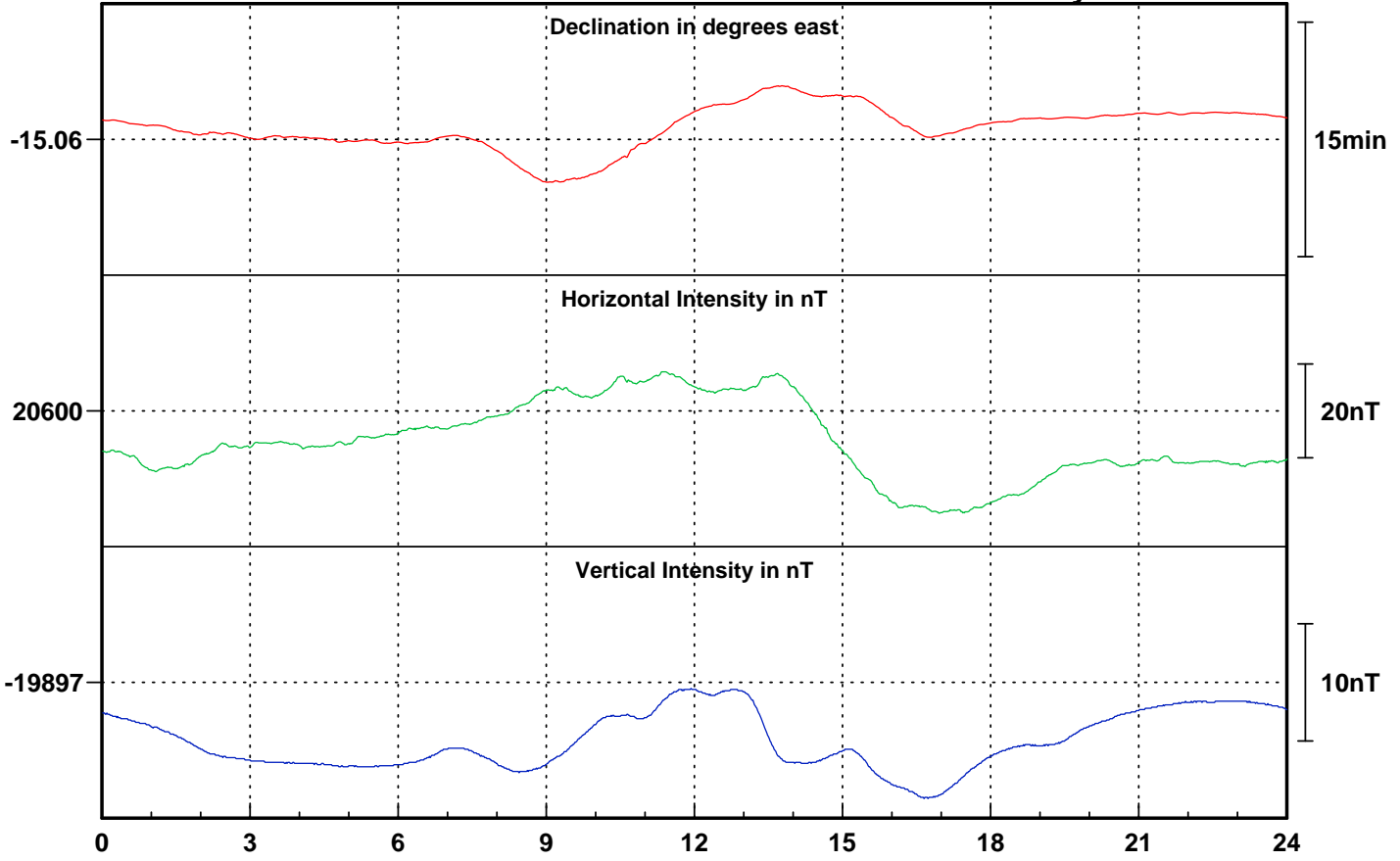
Day number: 363



Date: 29-12-2016

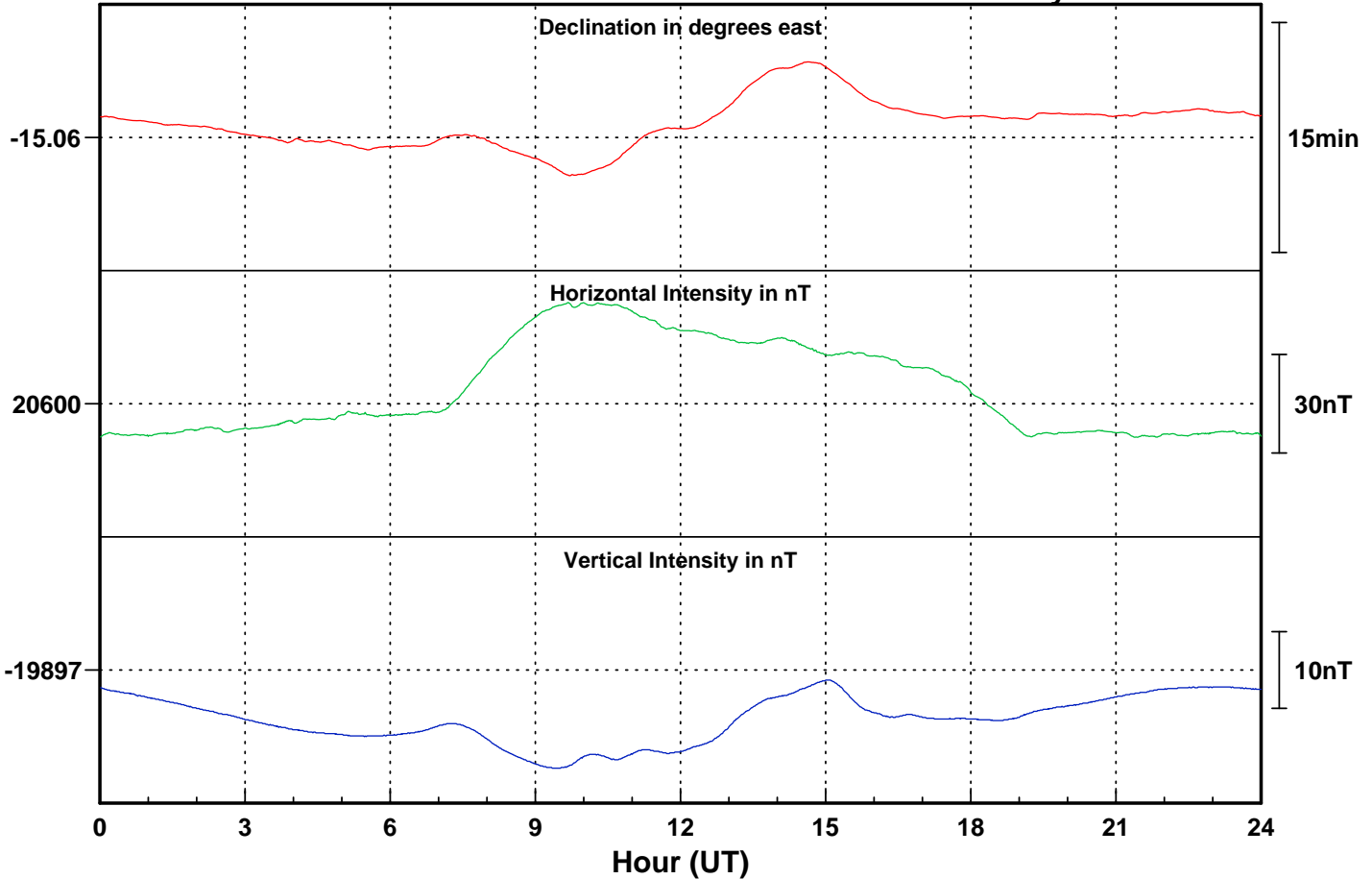
# Ascension Island

Day number: 364



Date: 30-12-2016

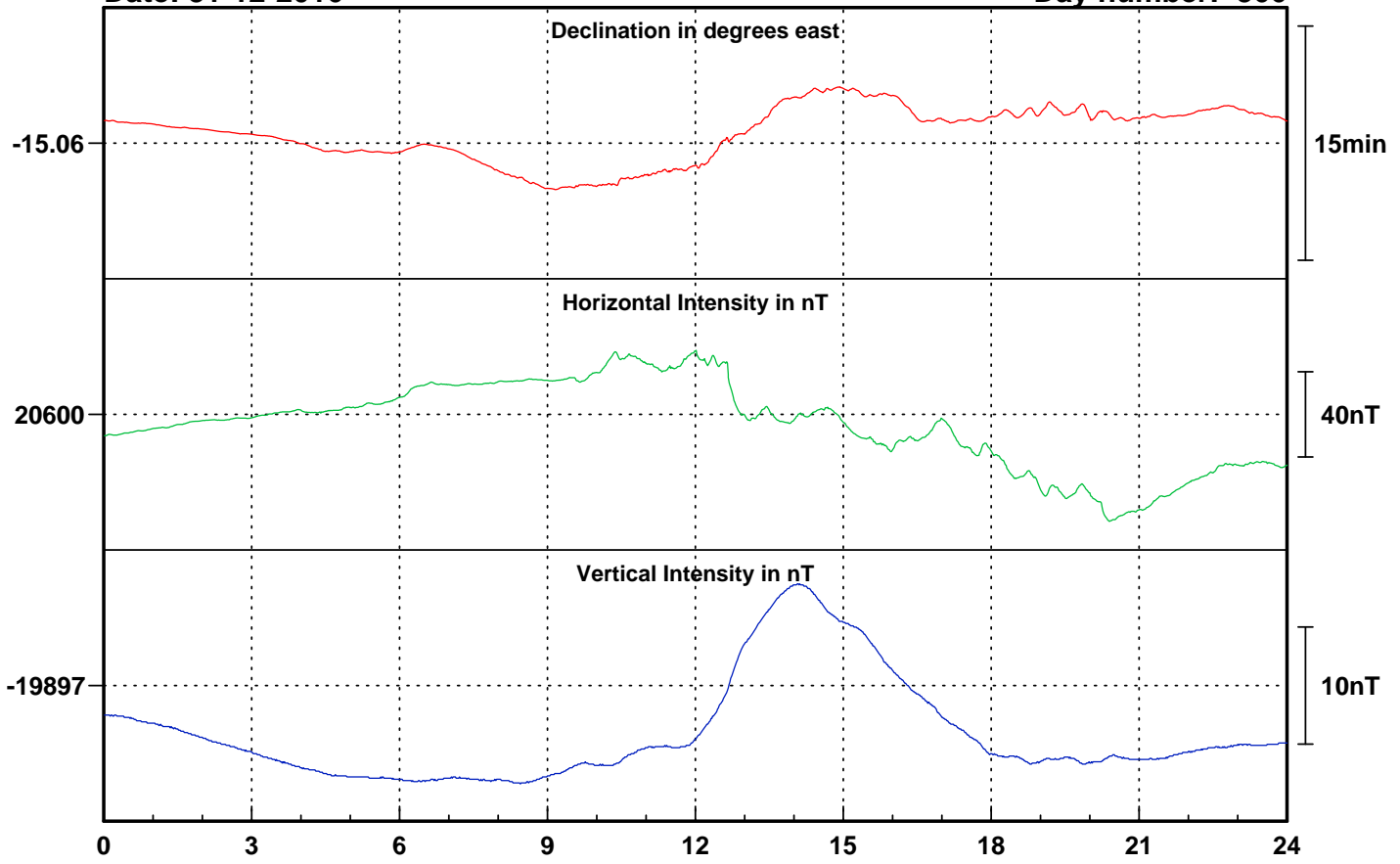
Day number: 365



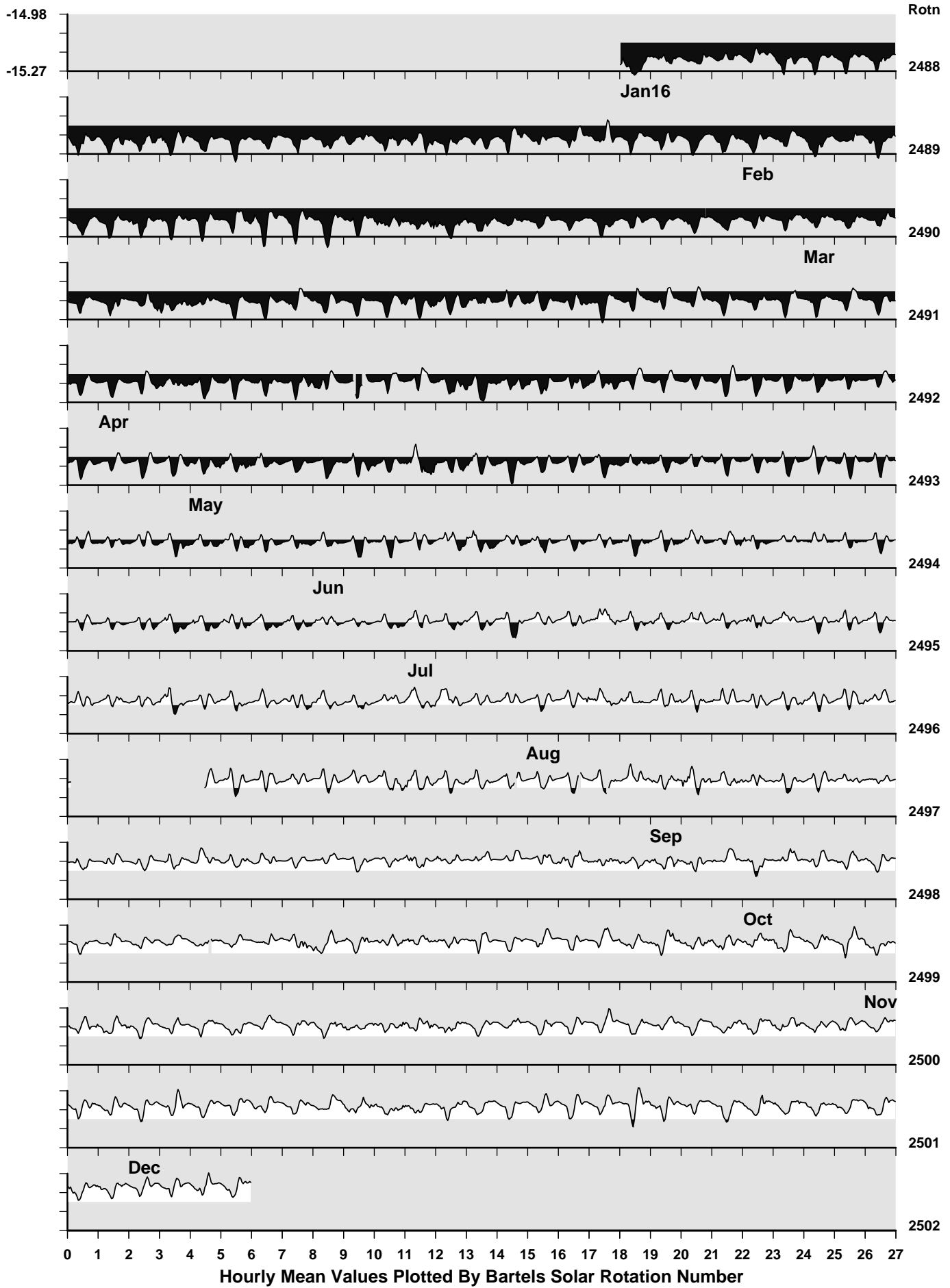
Date: 31-12-2016

# Ascension Island

Day number: 366

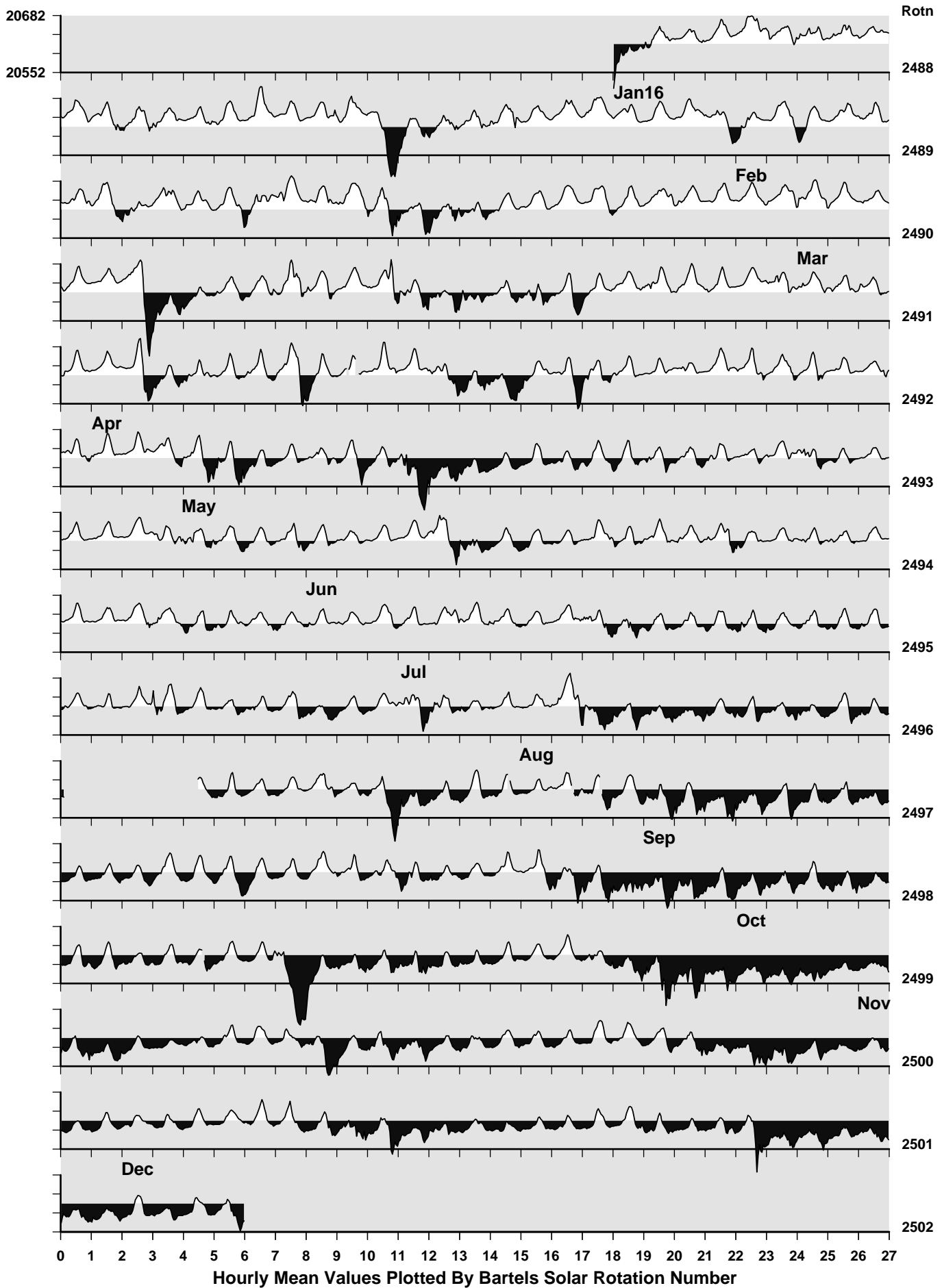


# Ascension Island Observatory: Declination (degrees)



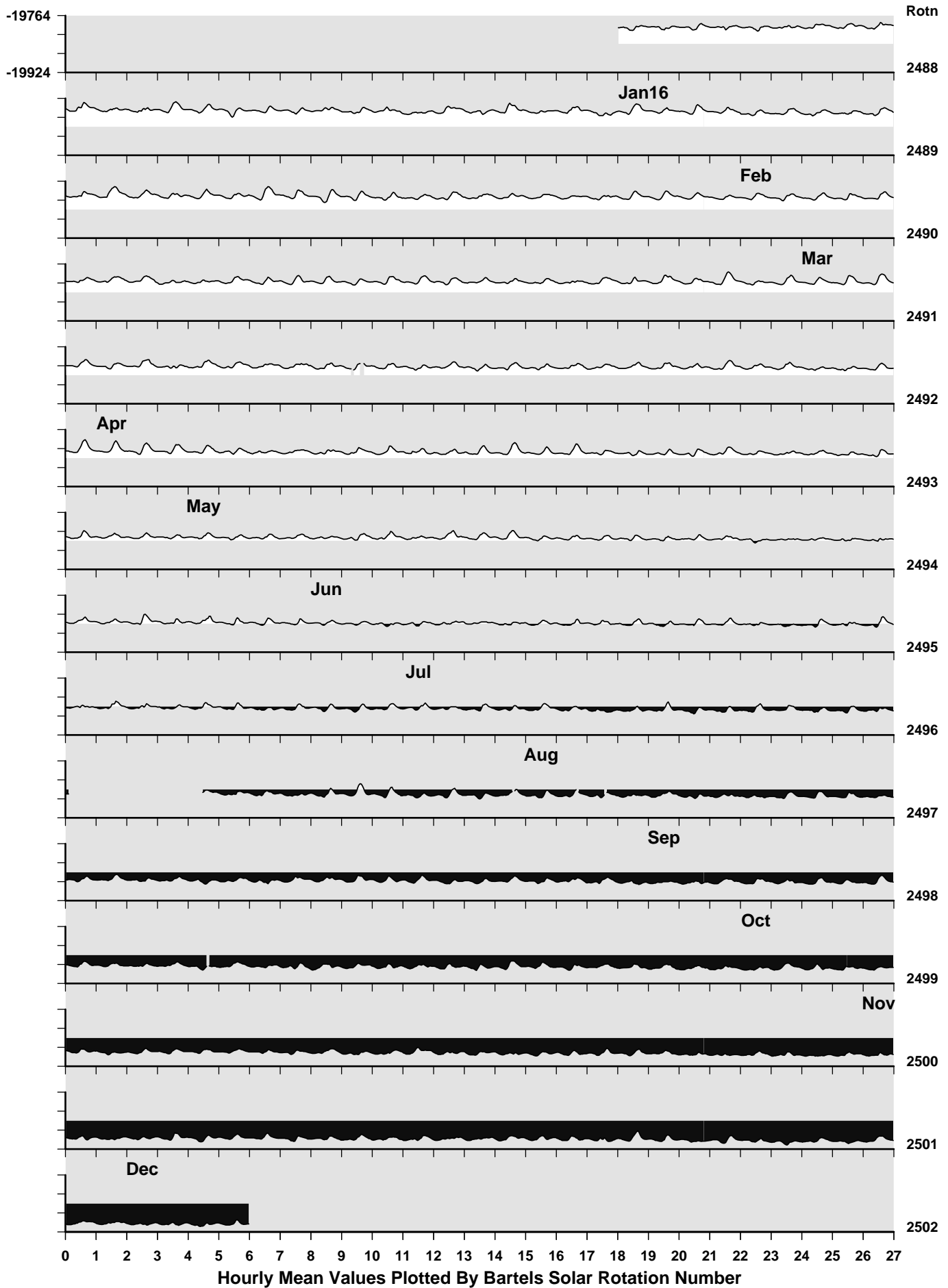
Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Island Observatory: Horizontal Intensity fhTL



Hourly Mean Values Plotted By Bartels Solar Rotation Number

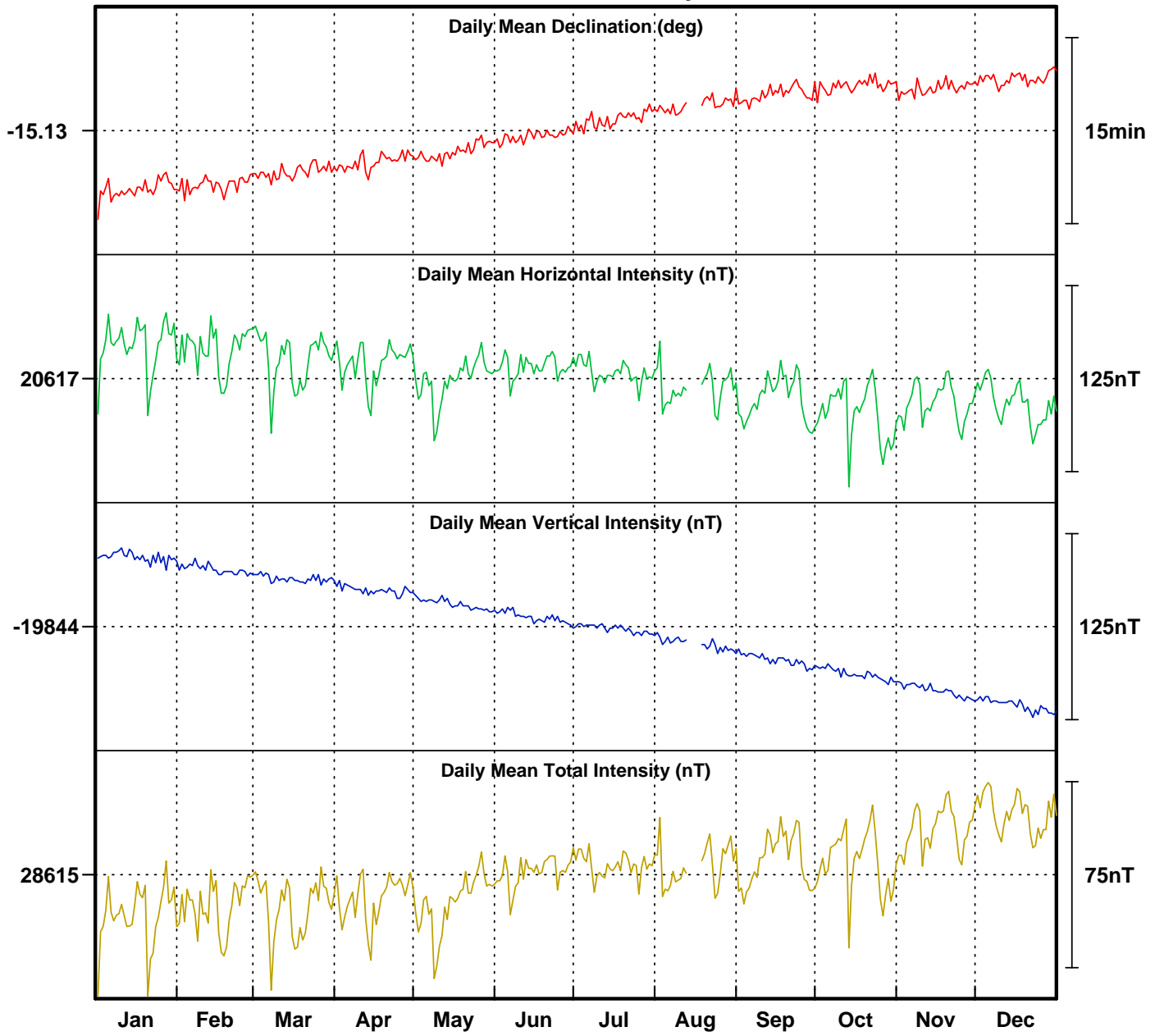
# Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number



# Ascension Is Observatory 2016



### Monthly Mean Values for Ascension Island 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	-15° 12.3′	20639 nT	-43° 48.5′	19916 nT	-5413 nT	-19797 nT	28599 nT
February	-15° 11.9′	20636 nT	-43° 49.4′	19915 nT	-5410 nT	-19806 nT	28603 nT
March	-15° 10.9′	20630 nT	-43° 50.5′	19910 nT	-5402 nT	-19812 nT	28602 nT
April	-15° 10.1′	20627 nT	-43° 51.4′	19908 nT	-5397 nT	-19820 nT	28606 nT
May	-15° 09.2′	20616 nT	-43° 53.1′	19899 nT	-5389 nT	-19829 nT	28604 nT
June	-15° 08.0′	20625 nT	-43° 53.2′	19909 nT	-5384 nT	-19838 nT	28617 nT
July	-15° 06.6′	20620 nT	-43° 54.2′	19908 nT	-5375 nT	-19845 nT	28619 nT
August	***° ***′	***** nT	***° ***′	***** nT	***** nT	***** nT	***** nT
September	-15° 04.6′	20603 nT	-43° 57.4′	19894 nT	-5359 nT	-19866 nT	28621 nT
October	-15° 03.9′	20593 nT	-43° 59.1′	19886 nT	-5353 nT	-19876 nT	28621 nT
November	-15° 04.1′	20601 nT	-43° 59.4′	19892 nT	-5356 nT	-19887 nT	28634 nT
December	-15° 03.3′	20600 nT	-44° 0.3′	19893 nT	-5351 nT	-19897 nT	28640 nT

Note

- i. The values shown here are provisional.
- ii. No data recorded from 13<sup>th</sup> August 0330 to 17<sup>th</sup> August 1100.