

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

## Observatory

## Monthly

## Magnetic

## Bulletin

**December 2009**

**09/12/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 meet the needs of users of geomagnetic data. Magnetic observatory data is presented as a series of plots of one-minute, hourly and daily values, followed by a tabulation 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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Scotland, UK

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Fax: +4 (0) 131 650 0265  
E-mail: [orba@bgs.ac.uk](mailto:orba@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, Ascension Island.

The observatory co-ordinates are:

*Geographic:*      $7^{\circ}56.94' S$       $345^{\circ}37.44' E$   
*Geomagnetic:*    $2^{\circ}20.34' S$       $56^{\circ}33.66' E$   
*Height above mean sea level:*     177 m

The geomagnetic co-ordinates are calculated using the 10th generation International Geomagnetic Reference Field at epoch 2009.5.

## 3. The Observatory Operation

### 3.1 GDAS

The observatory operates under the control of the Geomagnetic Data Acquisition System (GDAS), developed by BGS, which was installed in August 2002. The system operates under the control of data acquisition software running on QNX computers, which control the data logging and communications.

There are two sets of sensors used for making magnetic measurements. A triaxial 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 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 whilst the total field intensity samples are filtered using a 7-point cosine filter.

### 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. Data Presentation

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 a page and show the 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 on the surface of the Sun may recur after 27 days; the same is true for geomagnetically quiet intervals. Plotting the data in this way highlights this recurrence, and also illustrates seasonal and diurnal variations throughout the year.

### **4.5 Daily and Monthly Mean Values**

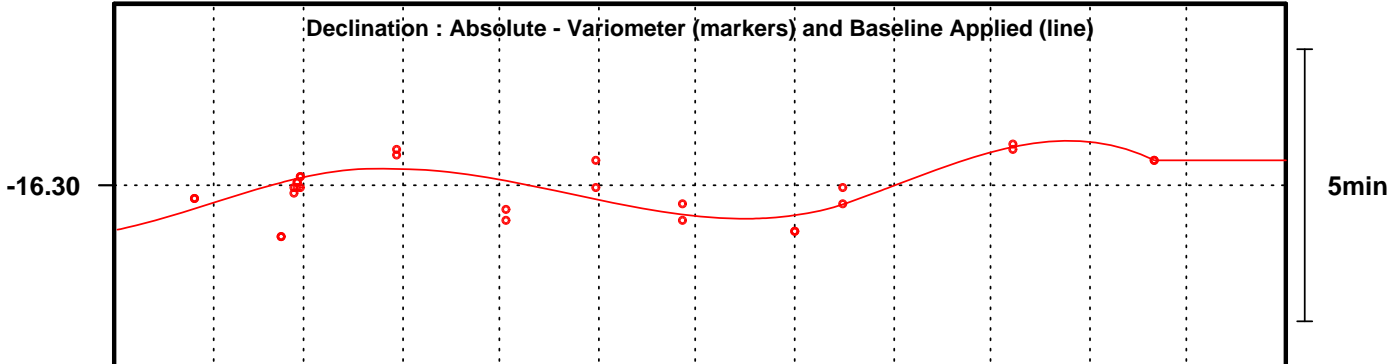
Daily mean values of  $D$ ,  $H$ ,  $Z$  and  $F$  are plotted throughout the year. In addition, a table of monthly mean values of all the geomagnetic elements is provided. These values depend on accurate specification of the fluxgate sensor baselines. This data is provisional. It is anticipated that provisional values will not be altered by more than a few nT or tenths of arcminutes before being made definitive.



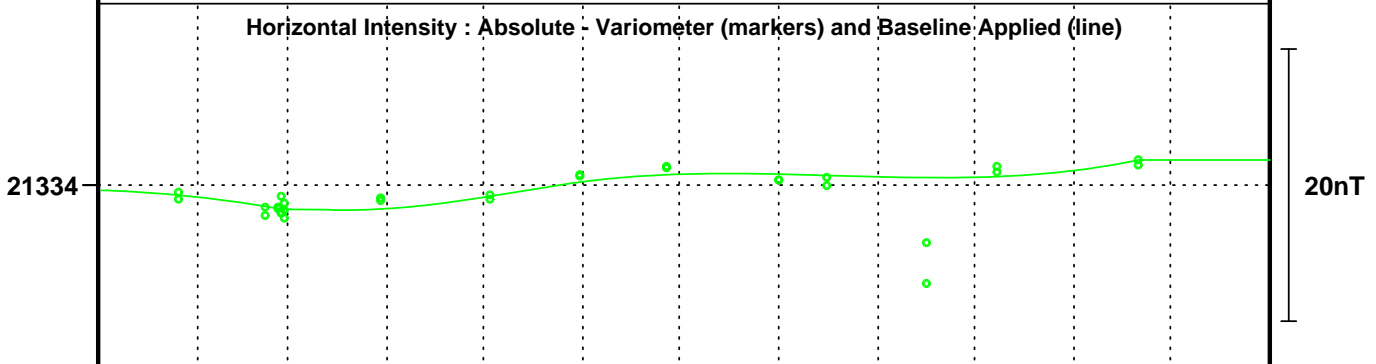


# Ascension Island 2009

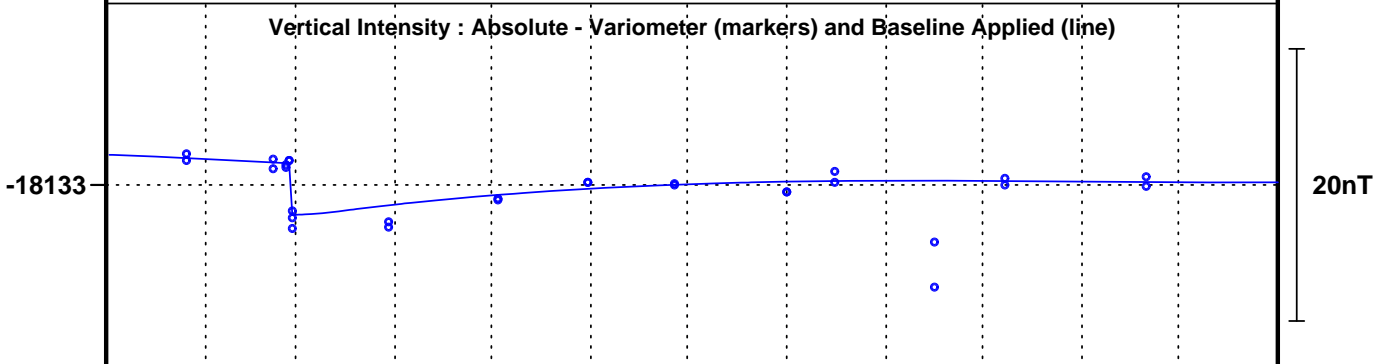
Declination : Absolute - Variometer (markers) and Baseline Applied (line)



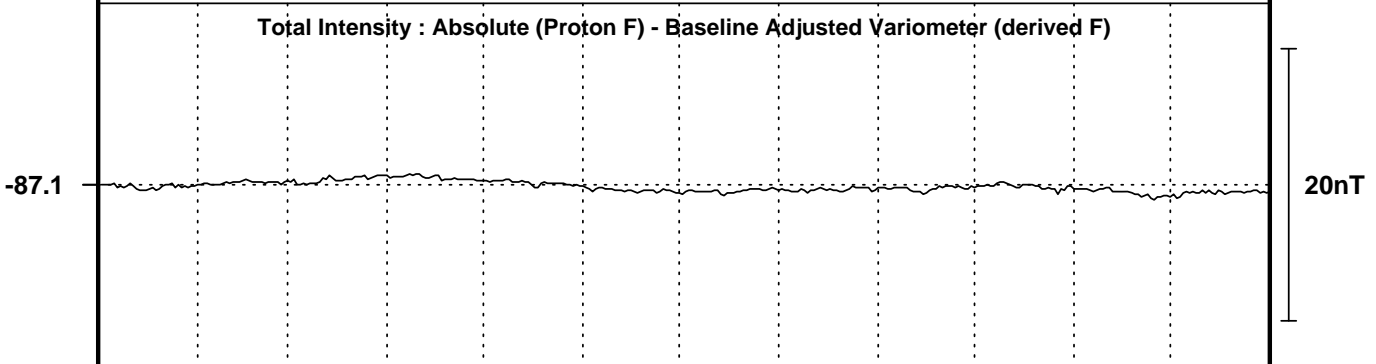
Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)



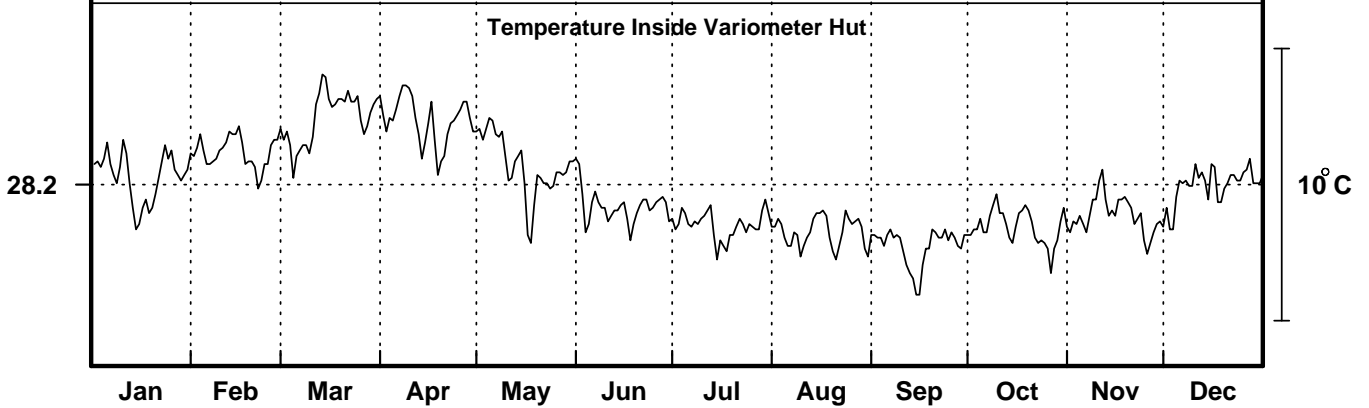
Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)



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



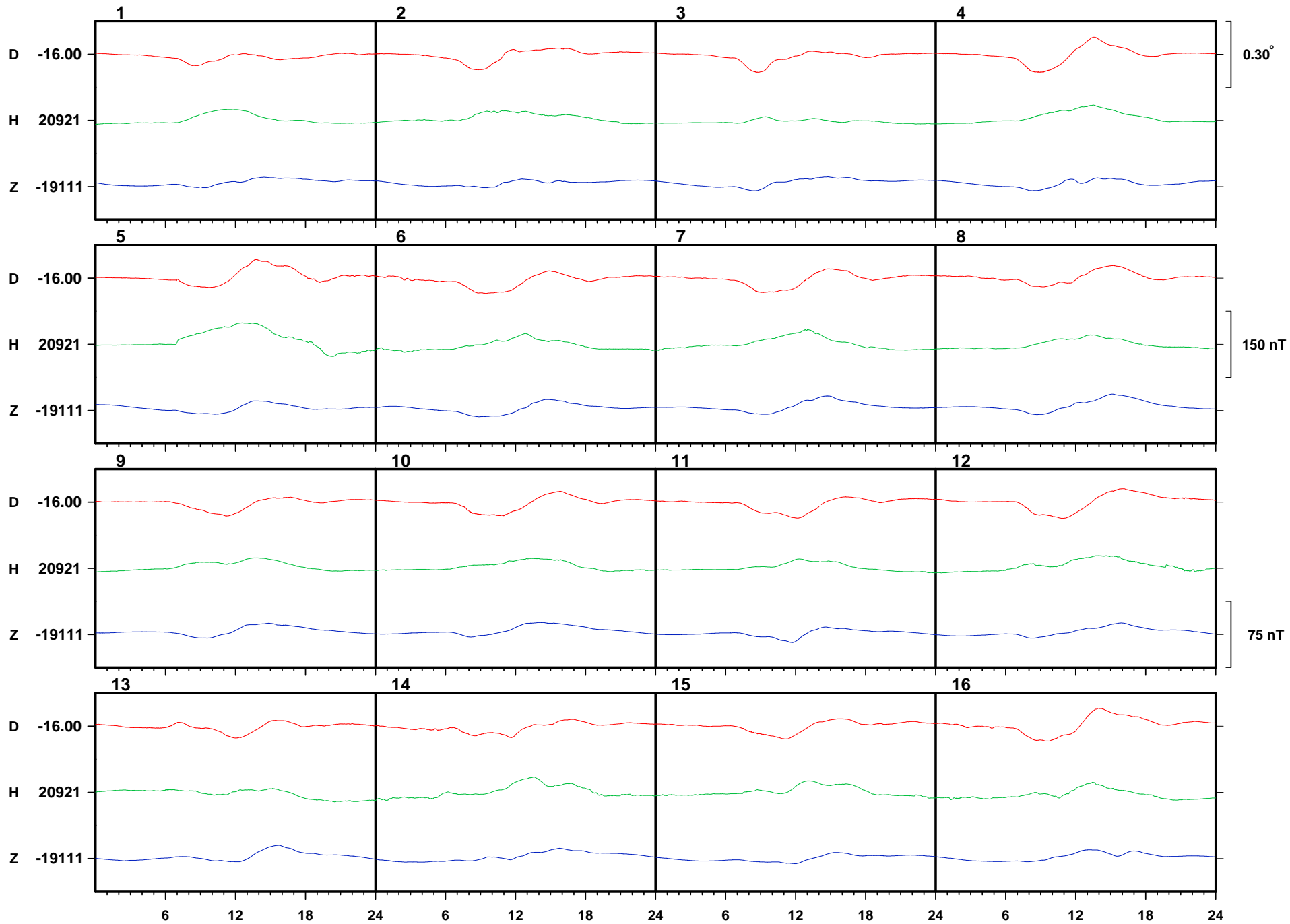
Temperature Inside Variometer Hut

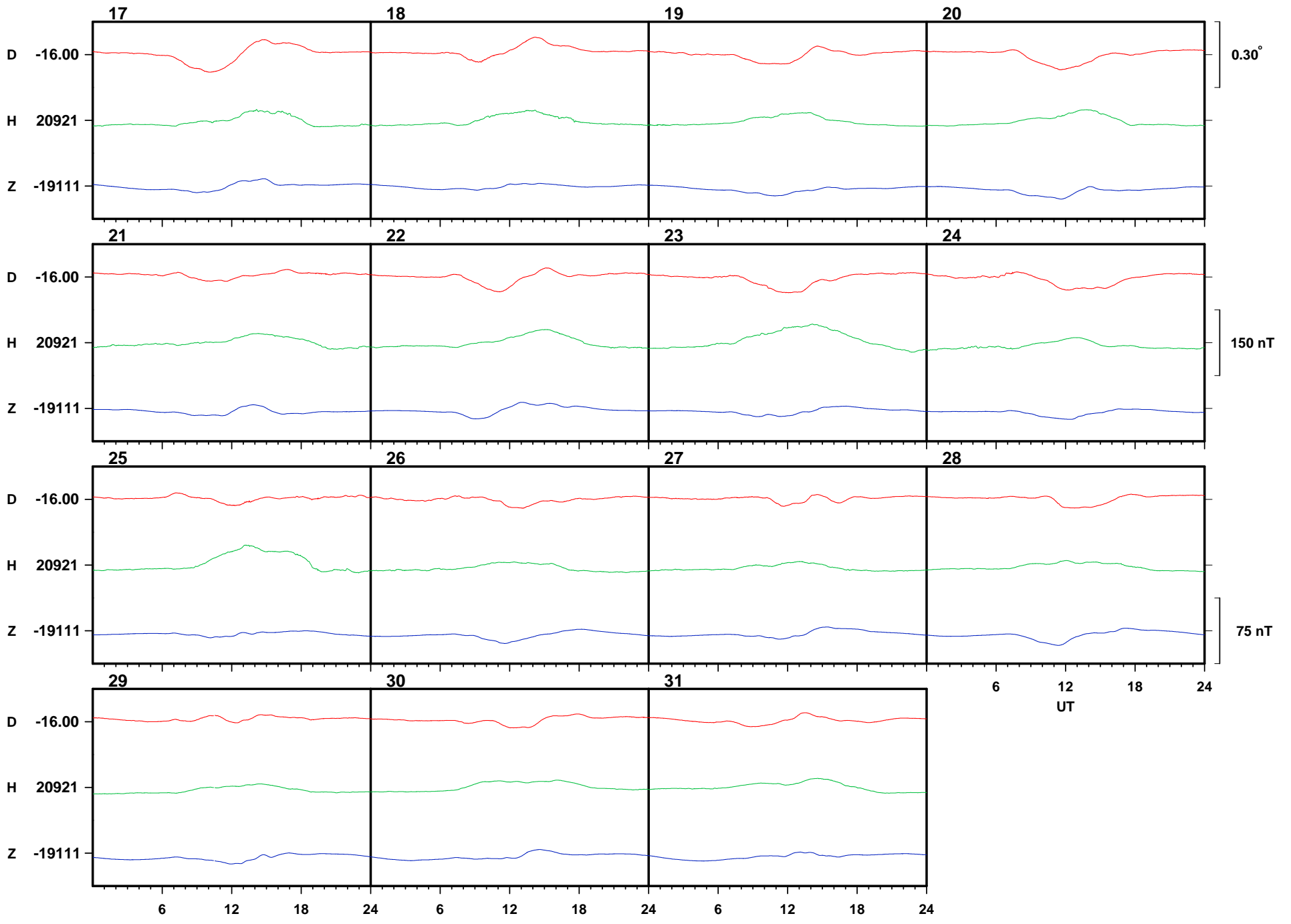


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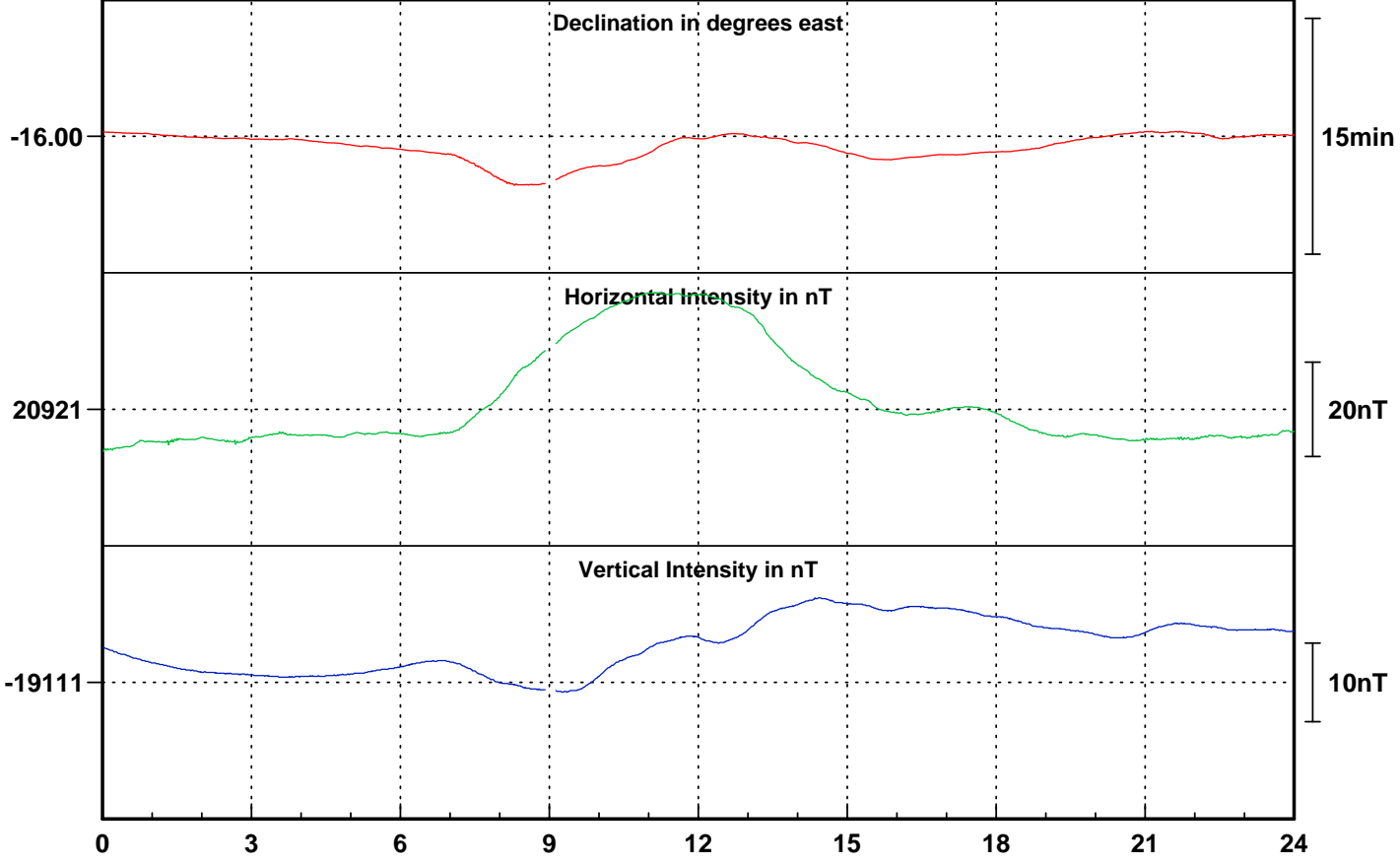
2009



Date: 01-12-2009

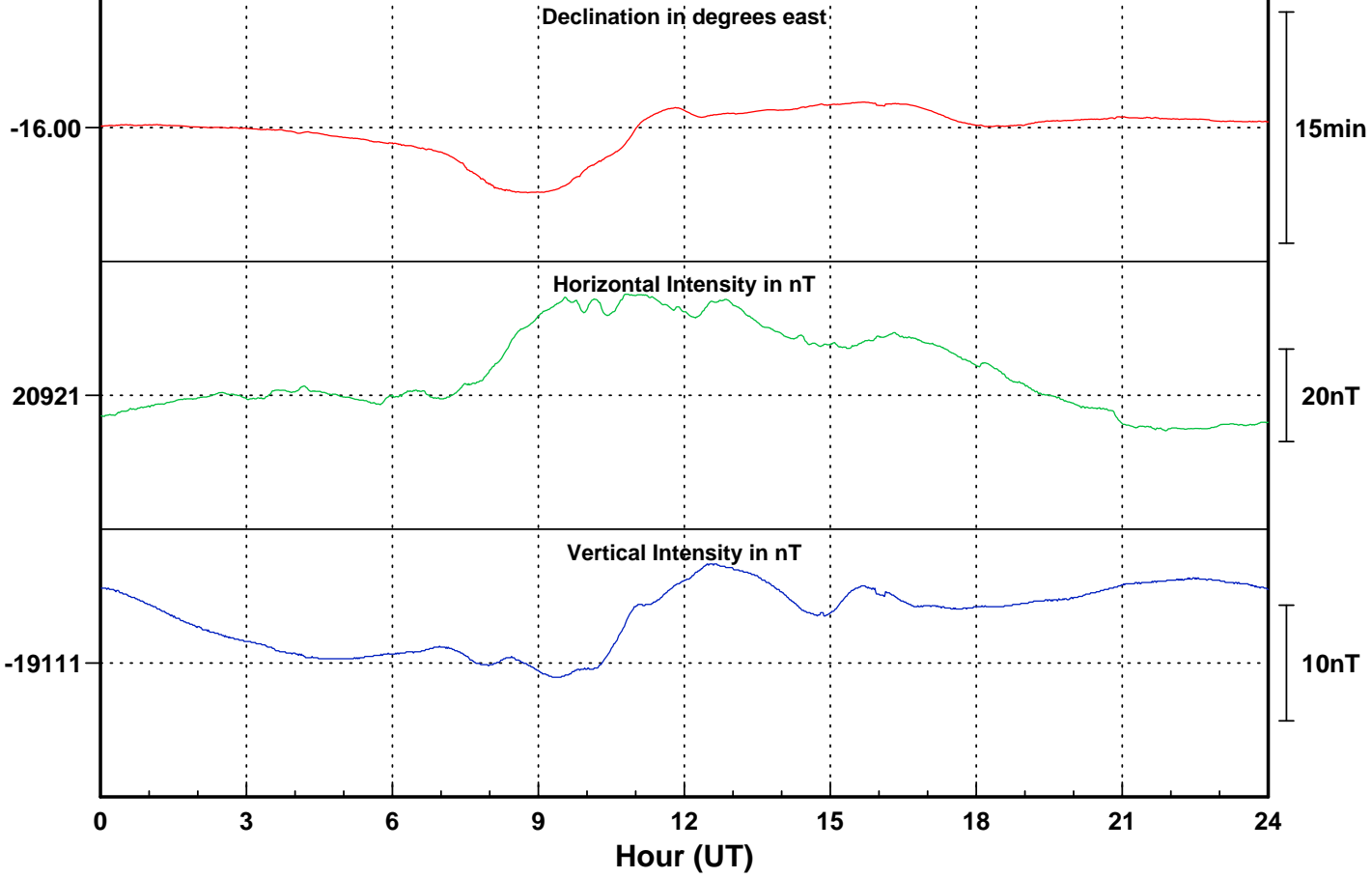
# Ascension Island

Day number: 335



Date: 02-12-2009

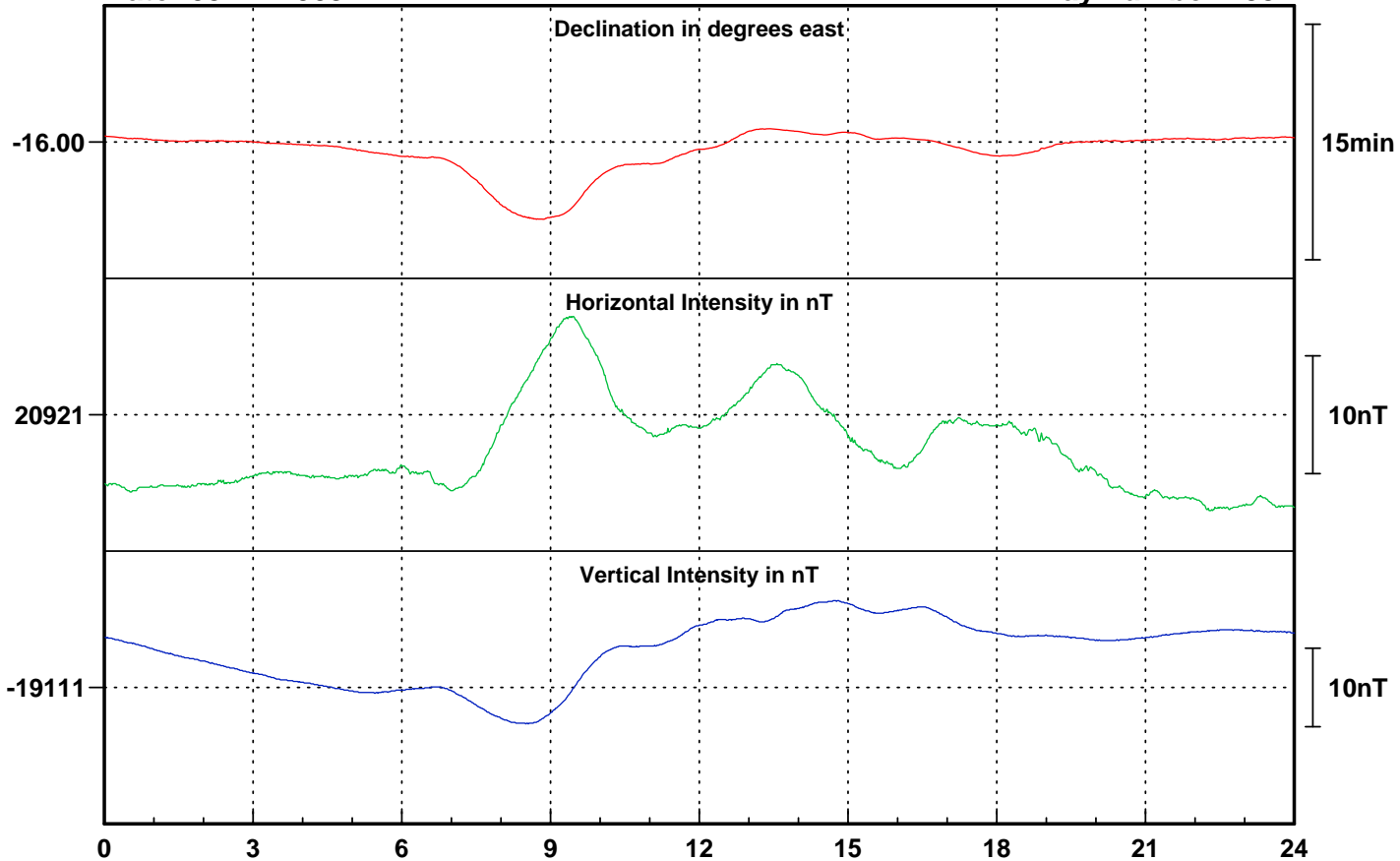
Day number: 336



Date: 03-12-2009

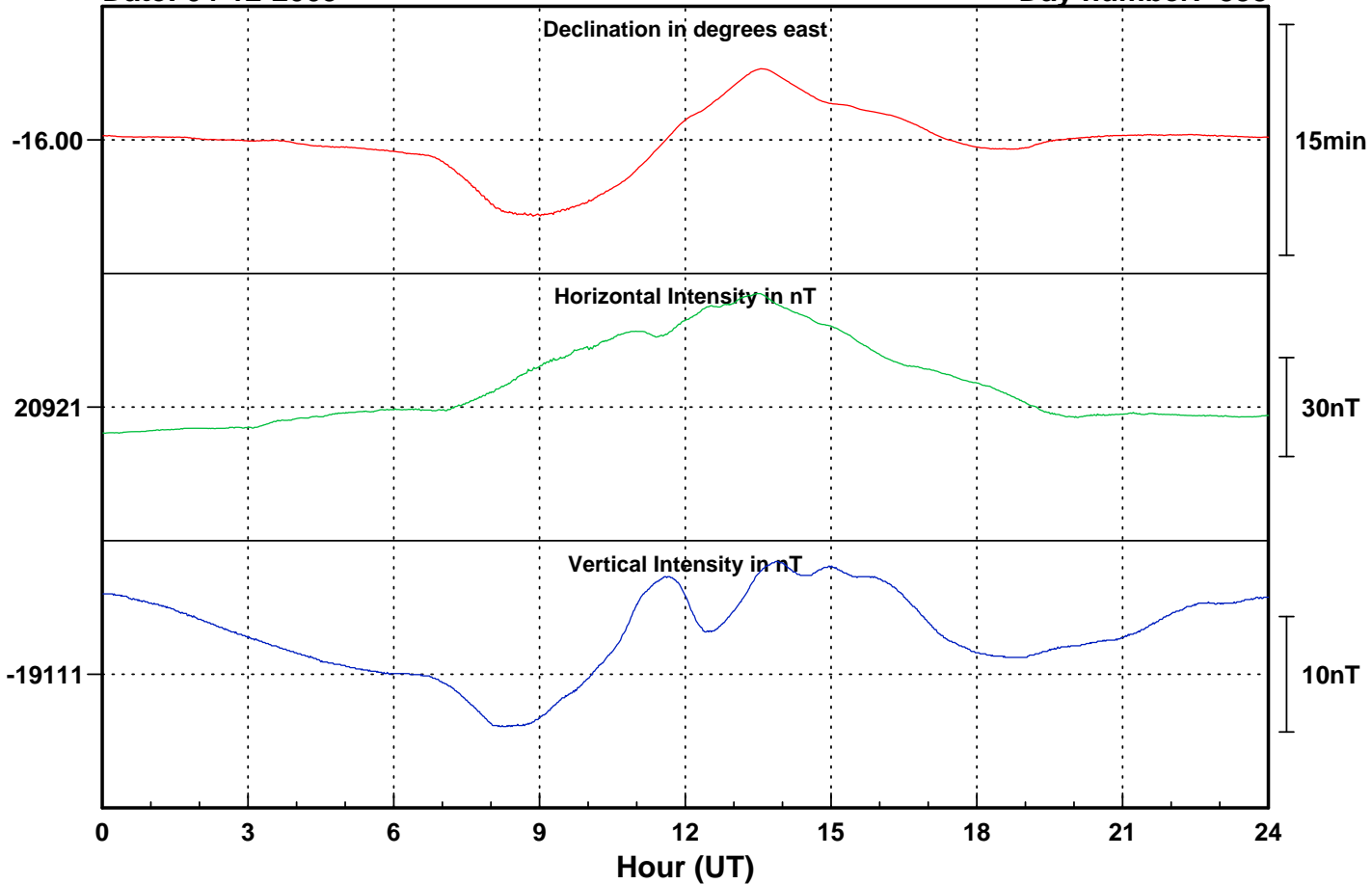
# Ascension Island

Day number: 337



Date: 04-12-2009

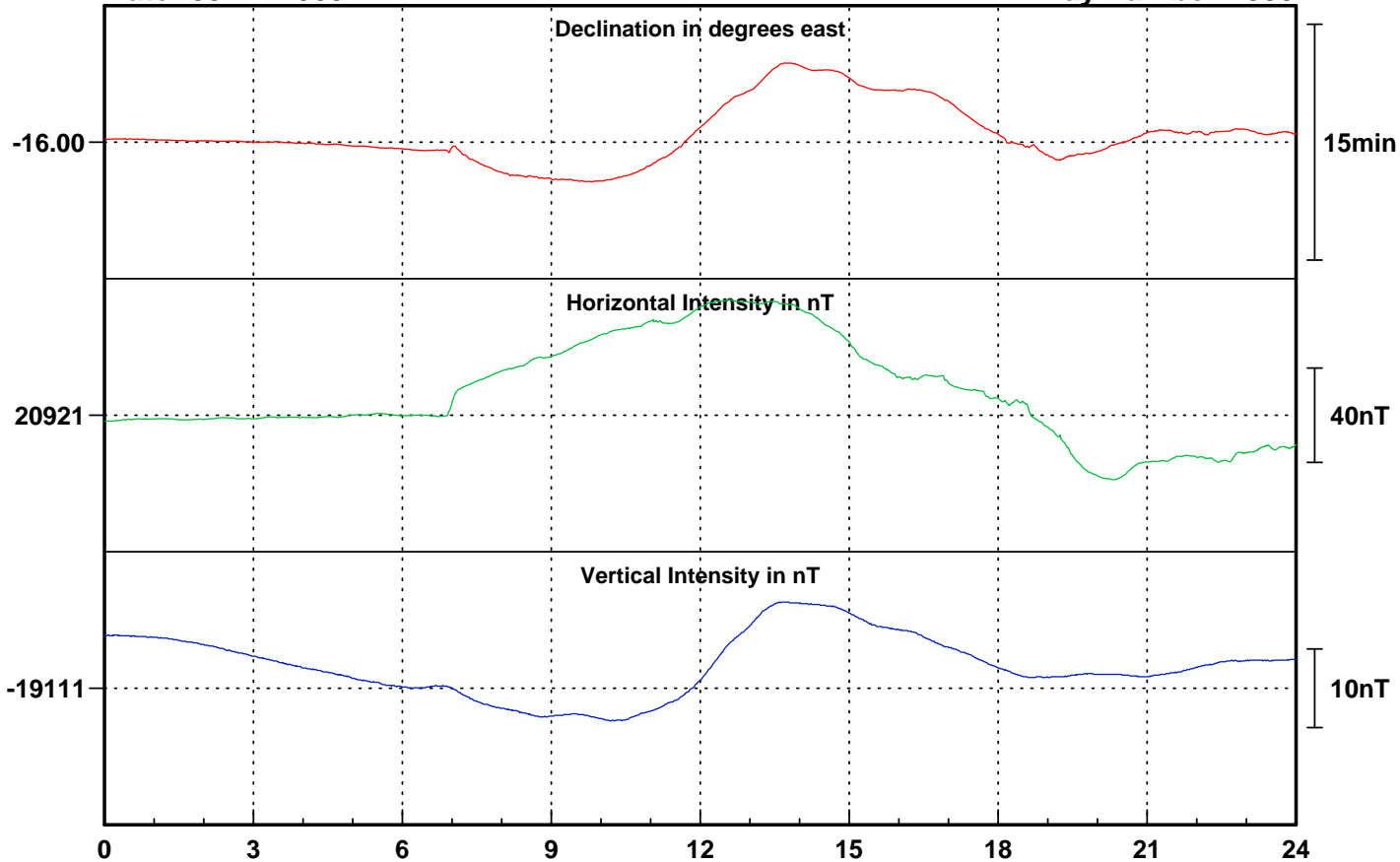
Day number: 338



Date: 05-12-2009

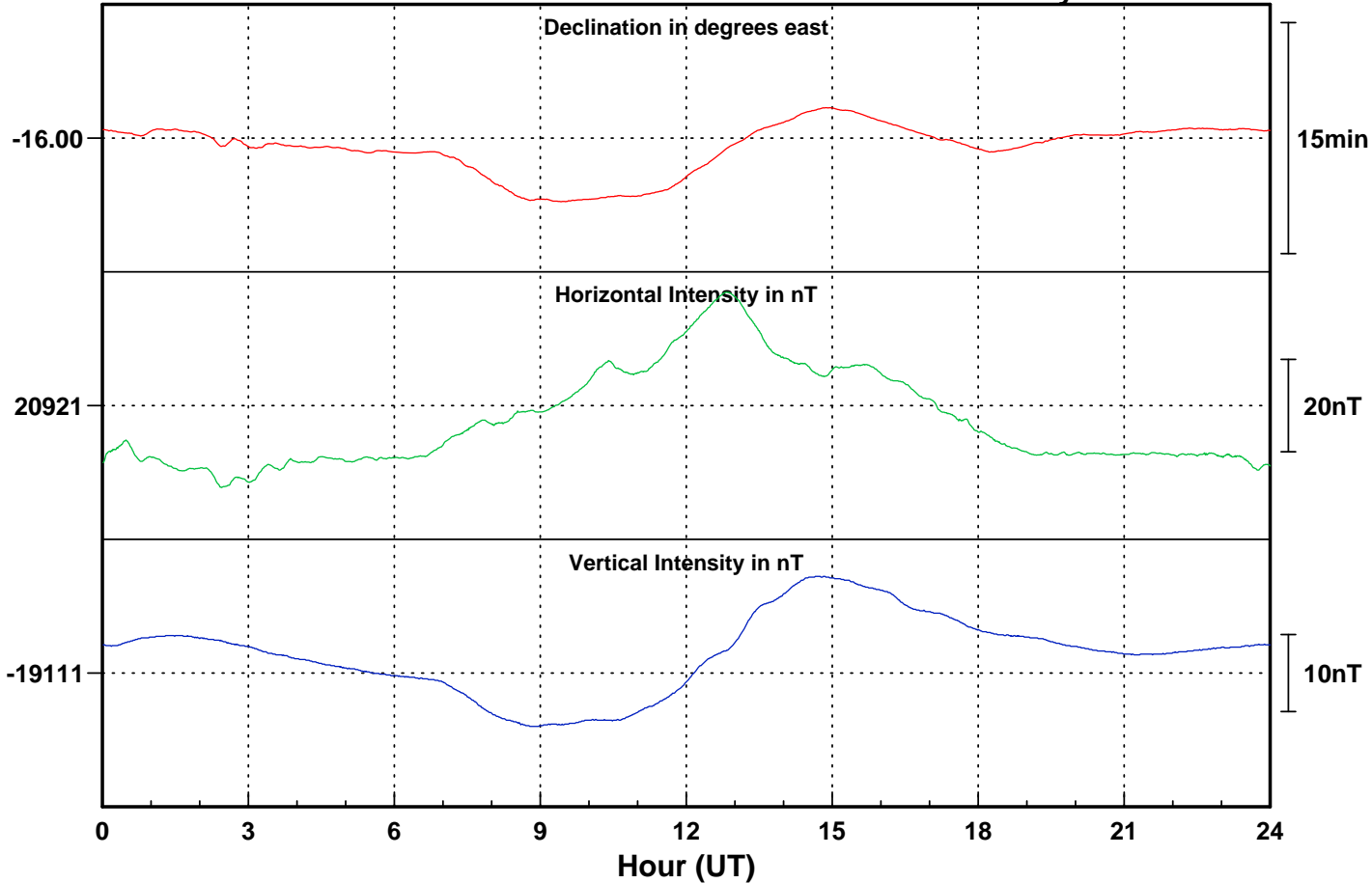
# Ascension Island

Day number: 339



Date: 06-12-2009

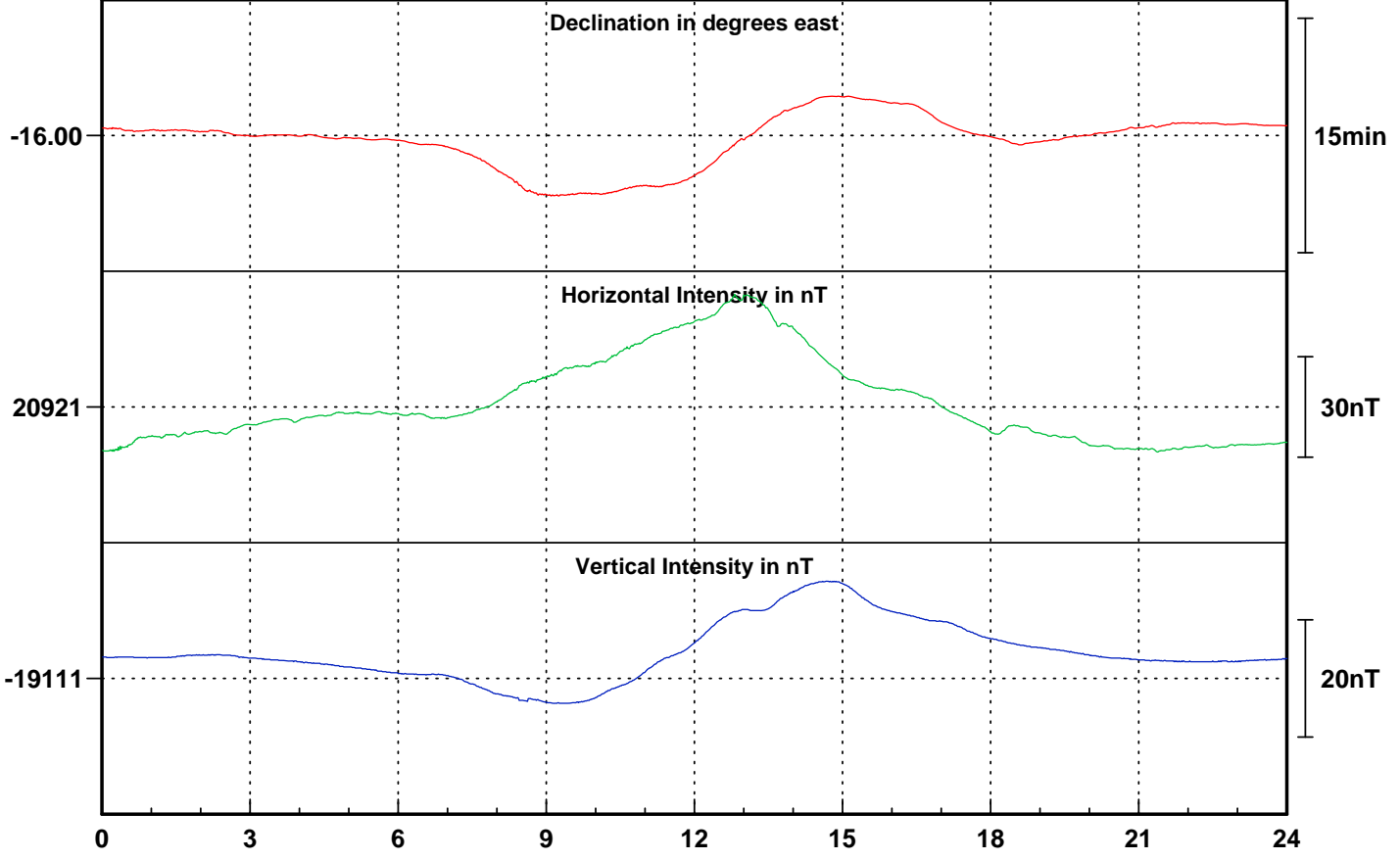
Day number: 340



Date: 07-12-2009

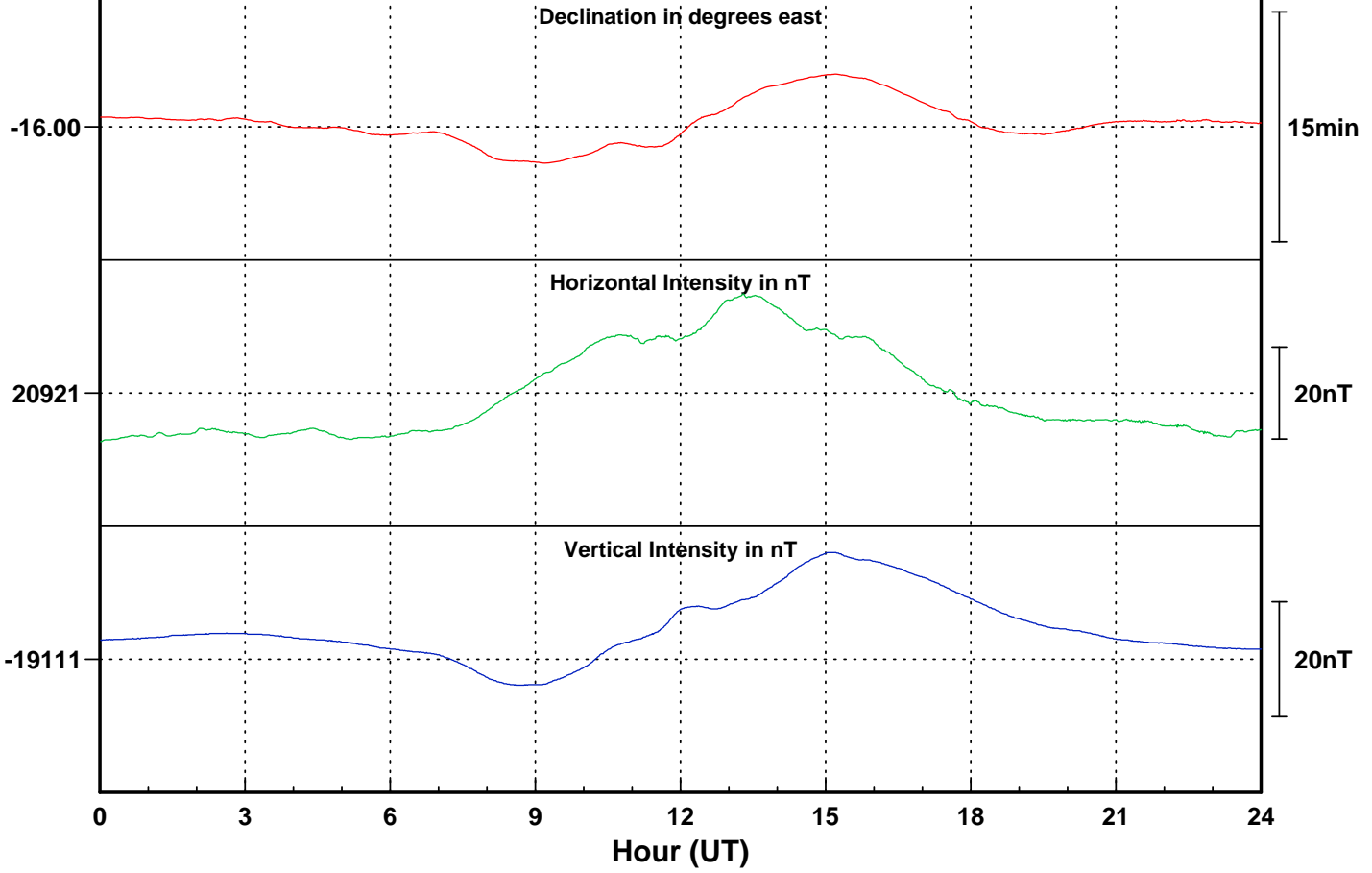
# Ascension Island

Day number: 341



Date: 08-12-2009

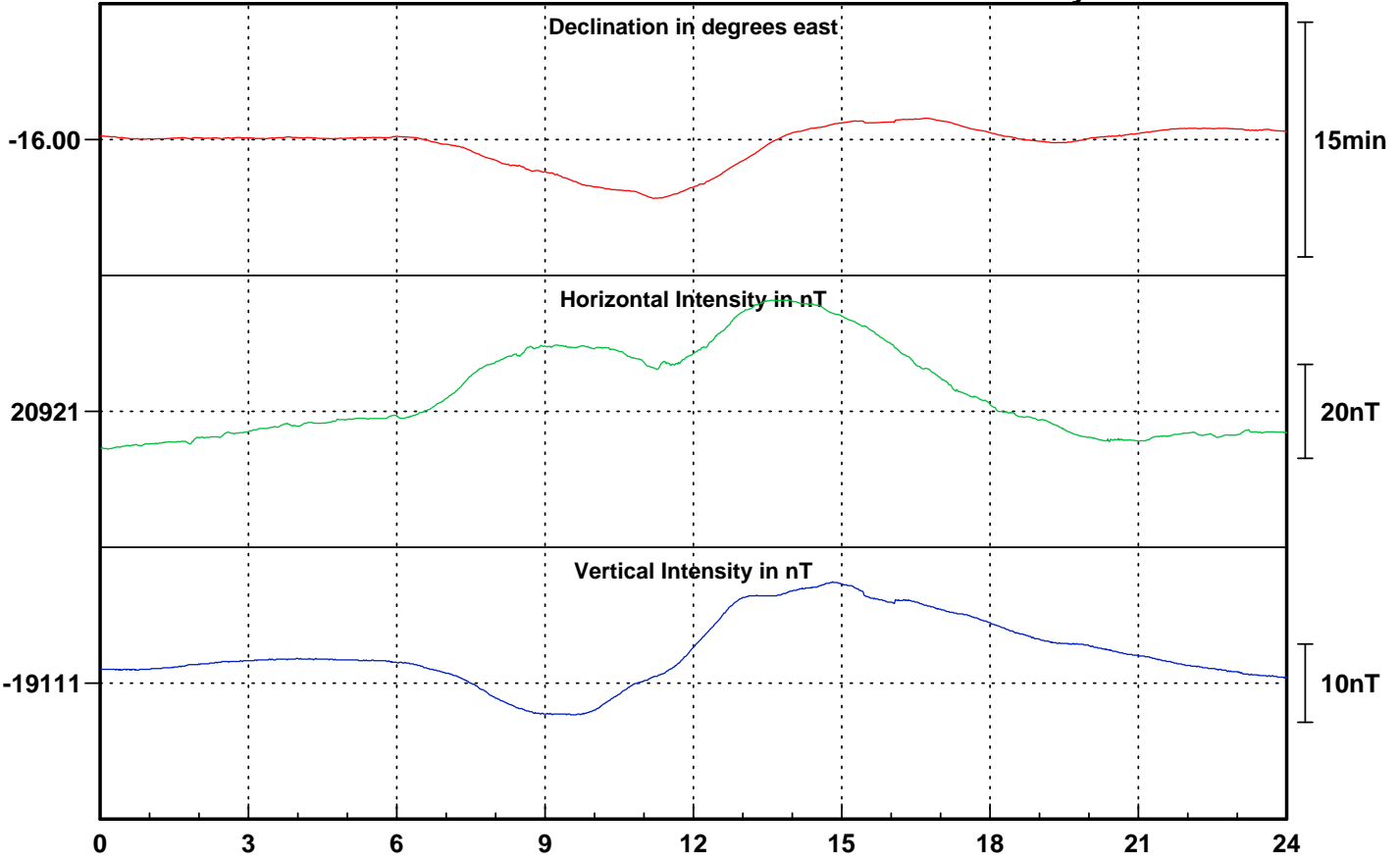
Day number: 342



Date: 09-12-2009

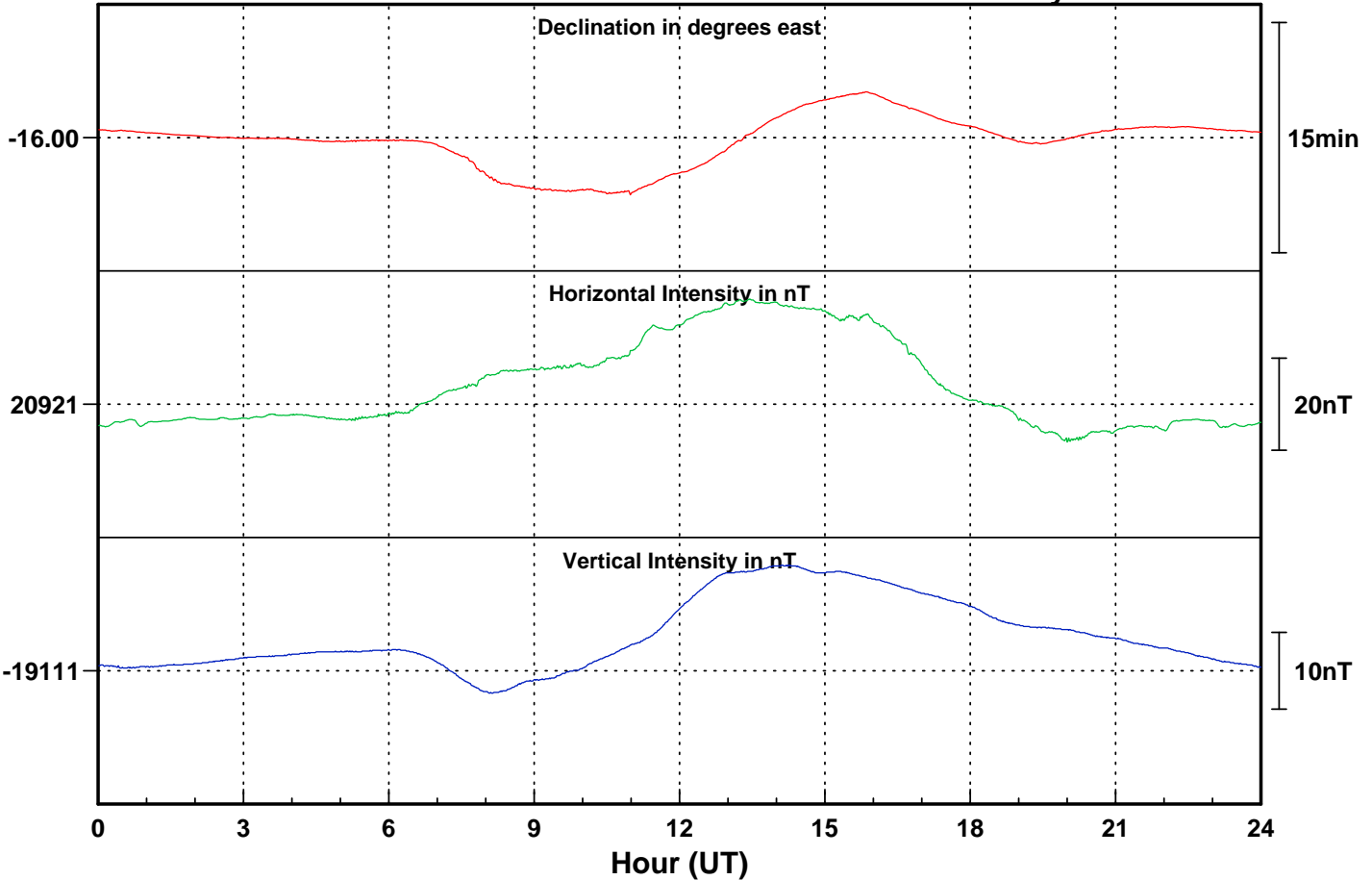
# Ascension Island

Day number: 343



Date: 10-12-2009

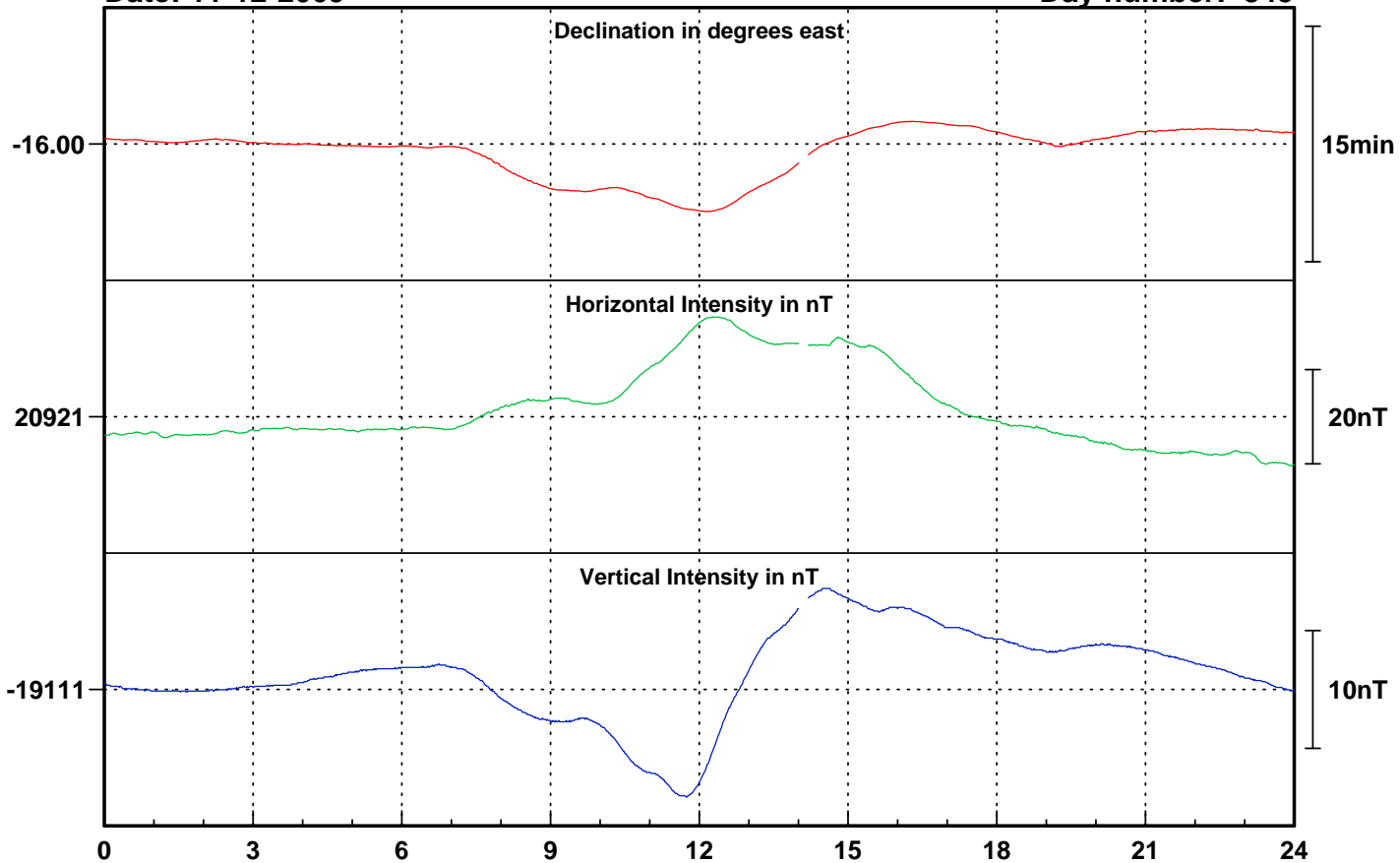
Day number: 344



Date: 11-12-2009

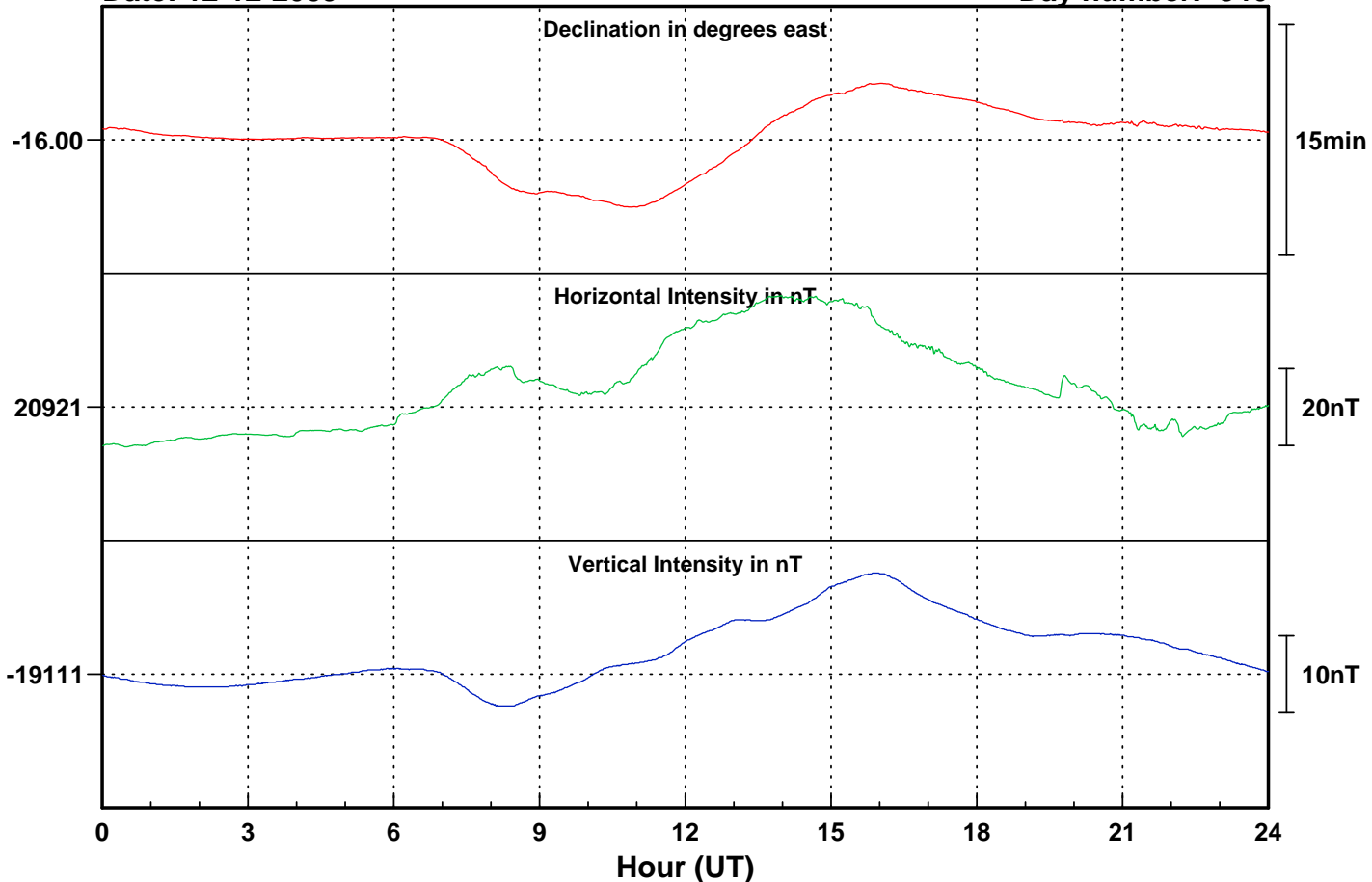
# Ascension Island

Day number: 345



Date: 12-12-2009

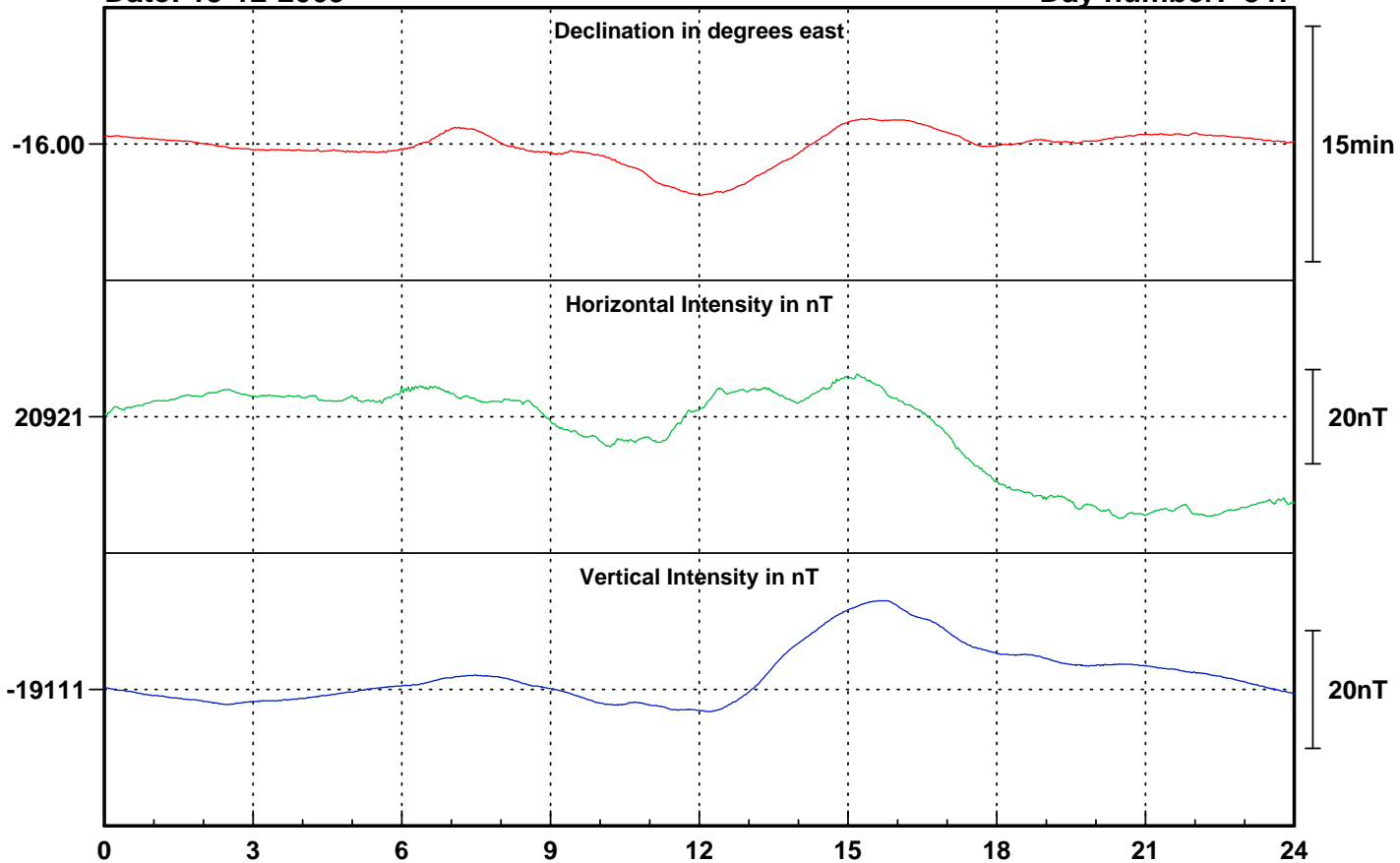
Day number: 346



Date: 13-12-2009

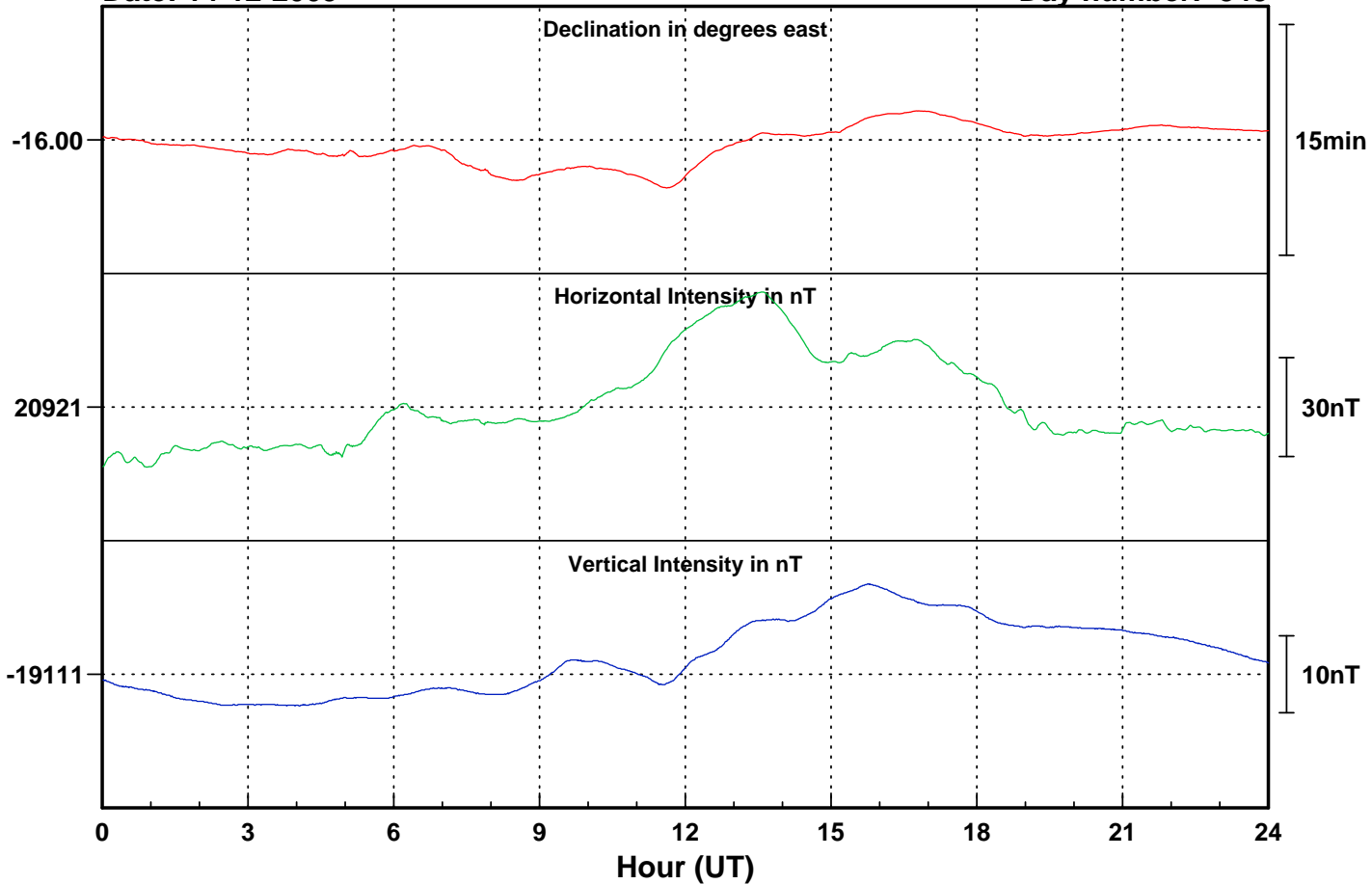
# Ascension Island

Day number: 347



Date: 14-12-2009

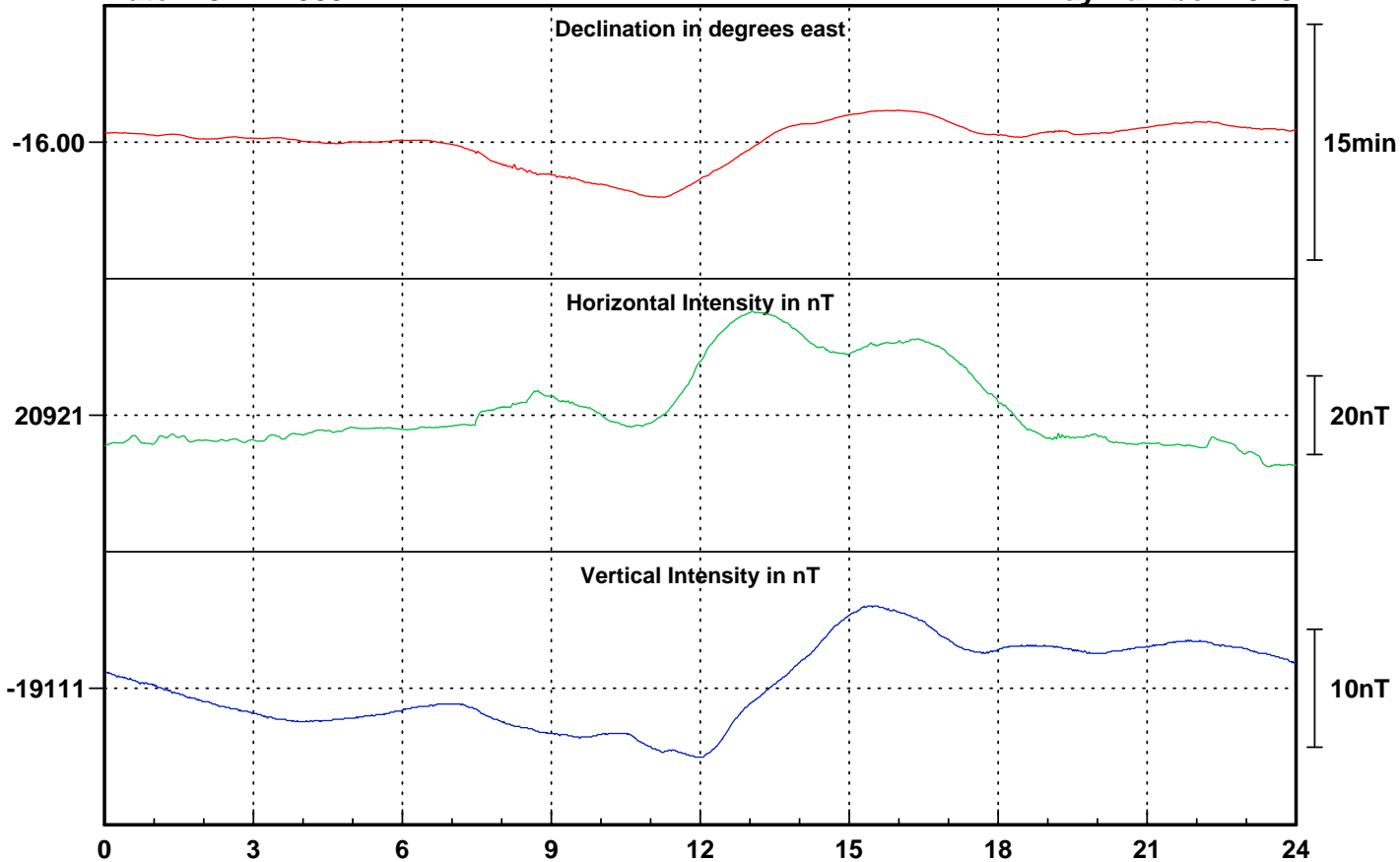
Day number: 348



Date: 15-12-2009

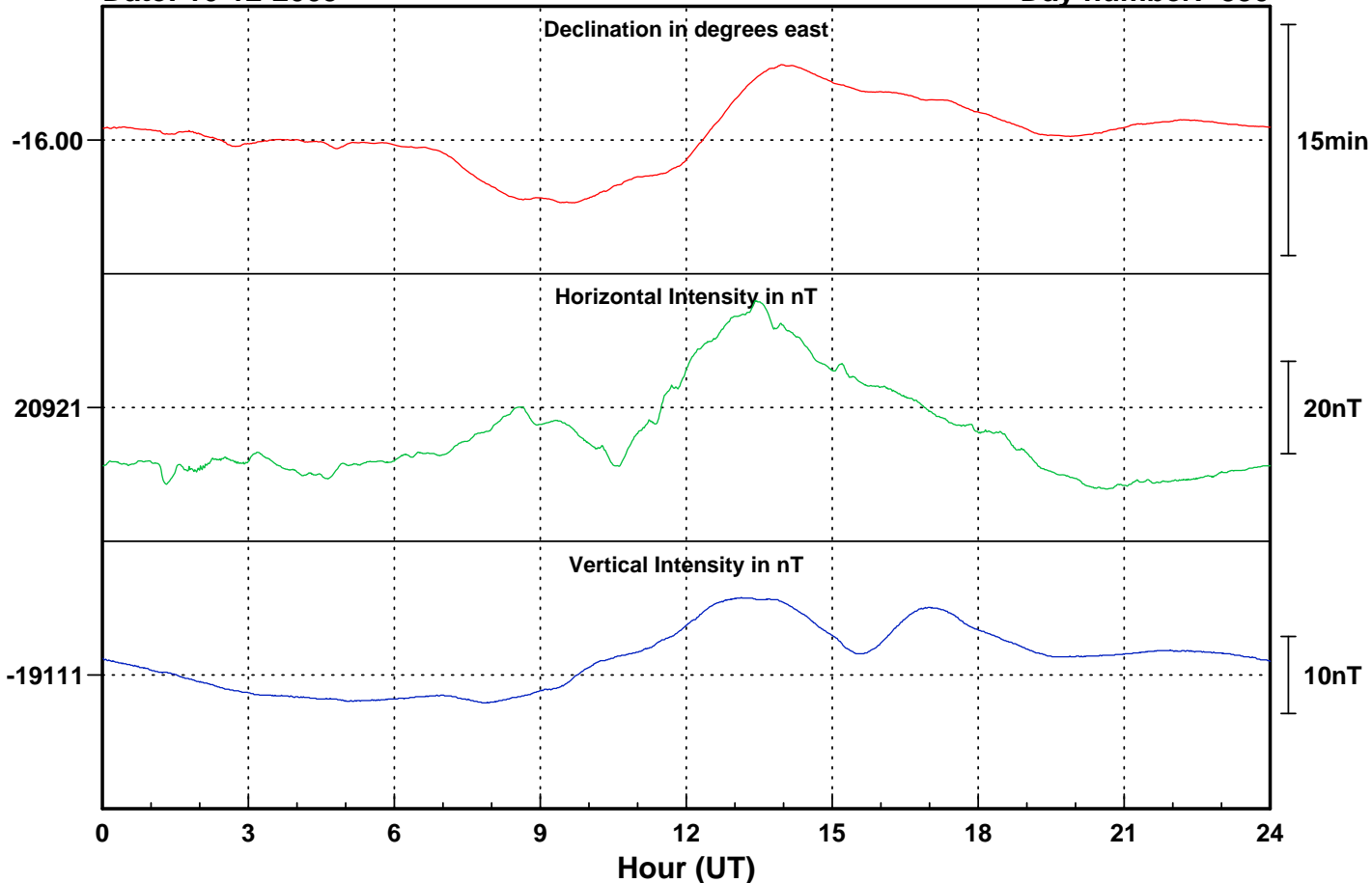
# Ascension Island

Day number: 349



Date: 16-12-2009

Day number: 350

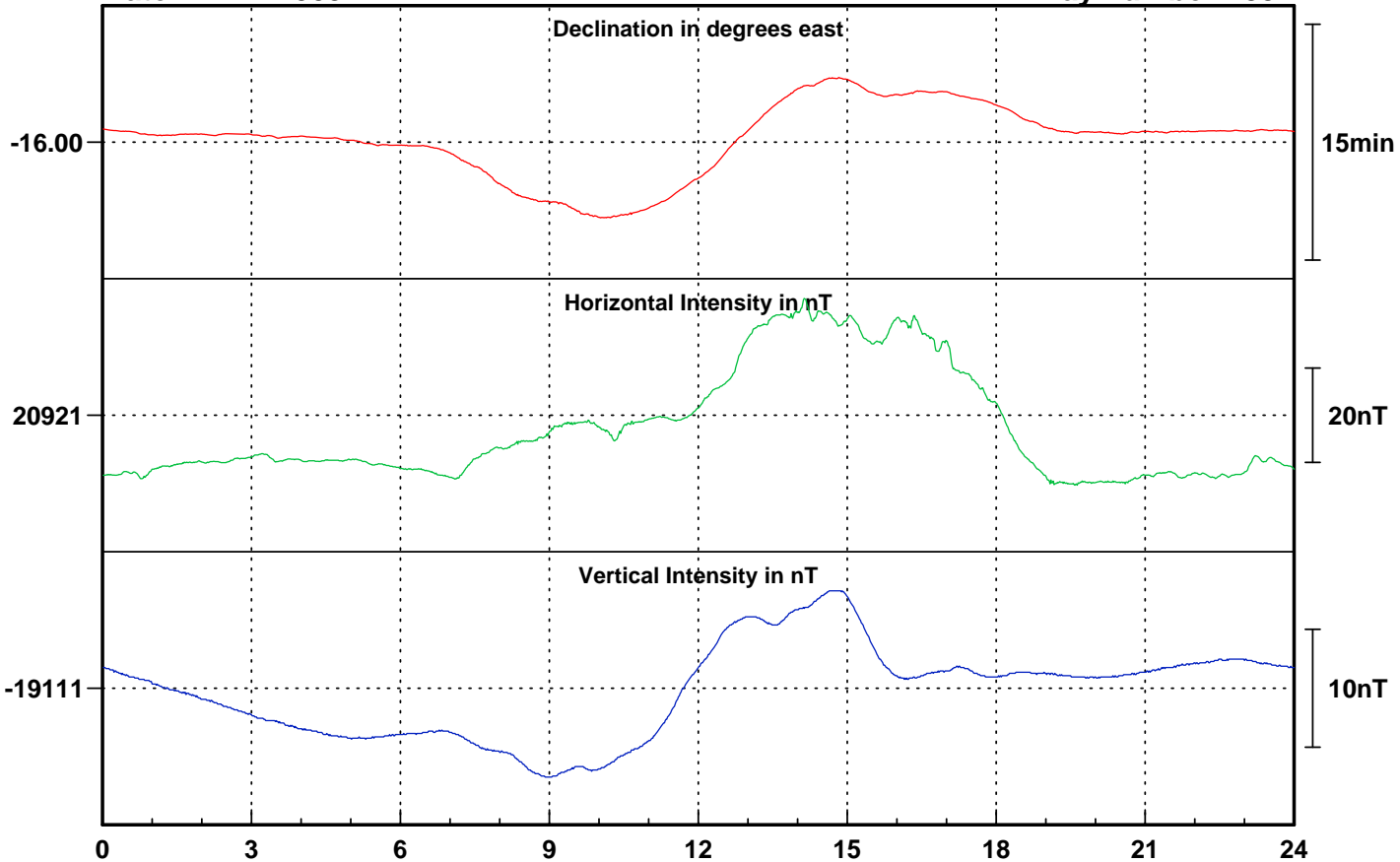




Date: 17-12-2009

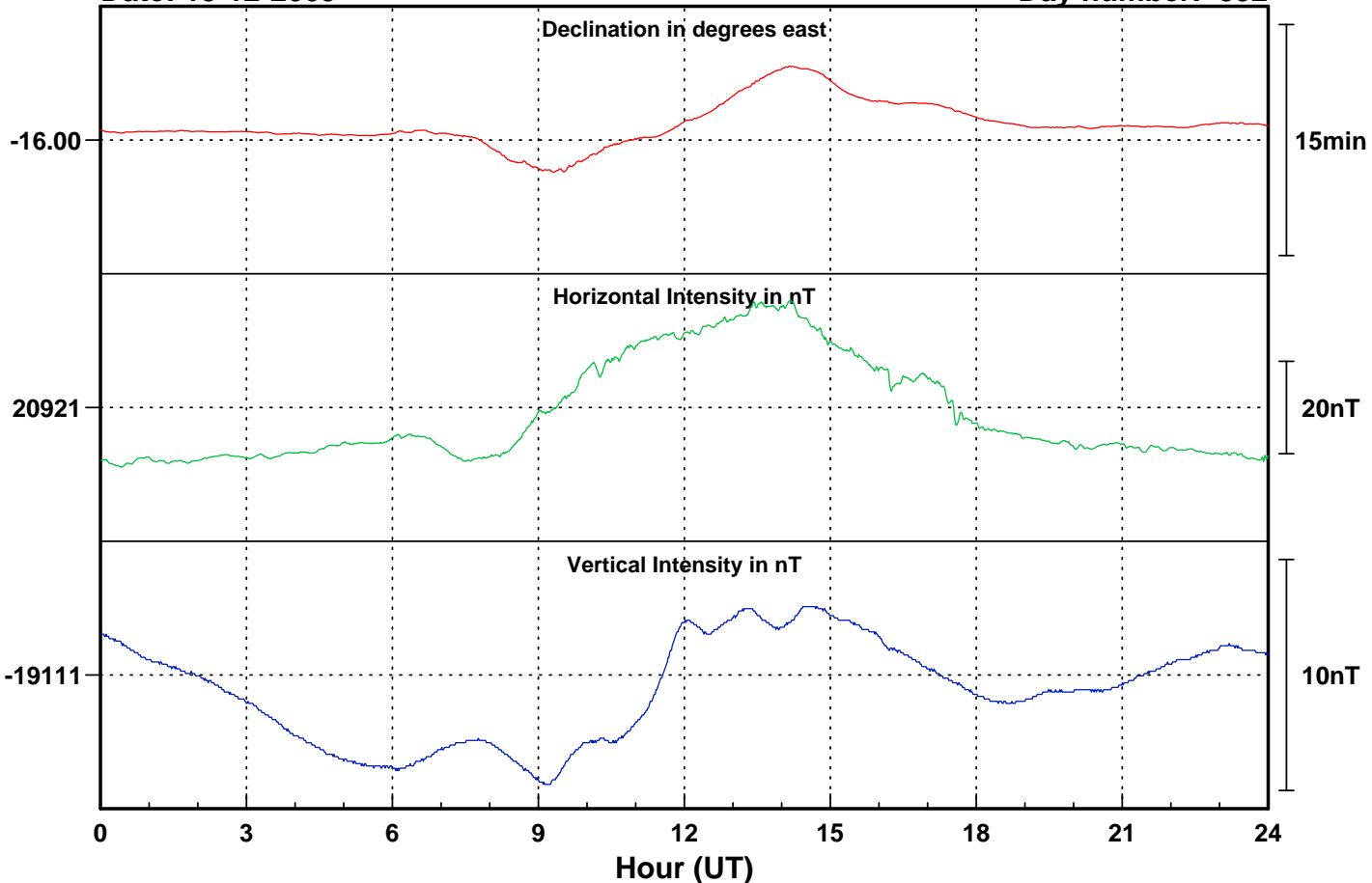
# Ascension Island

Day number: 351



Date: 18-12-2009

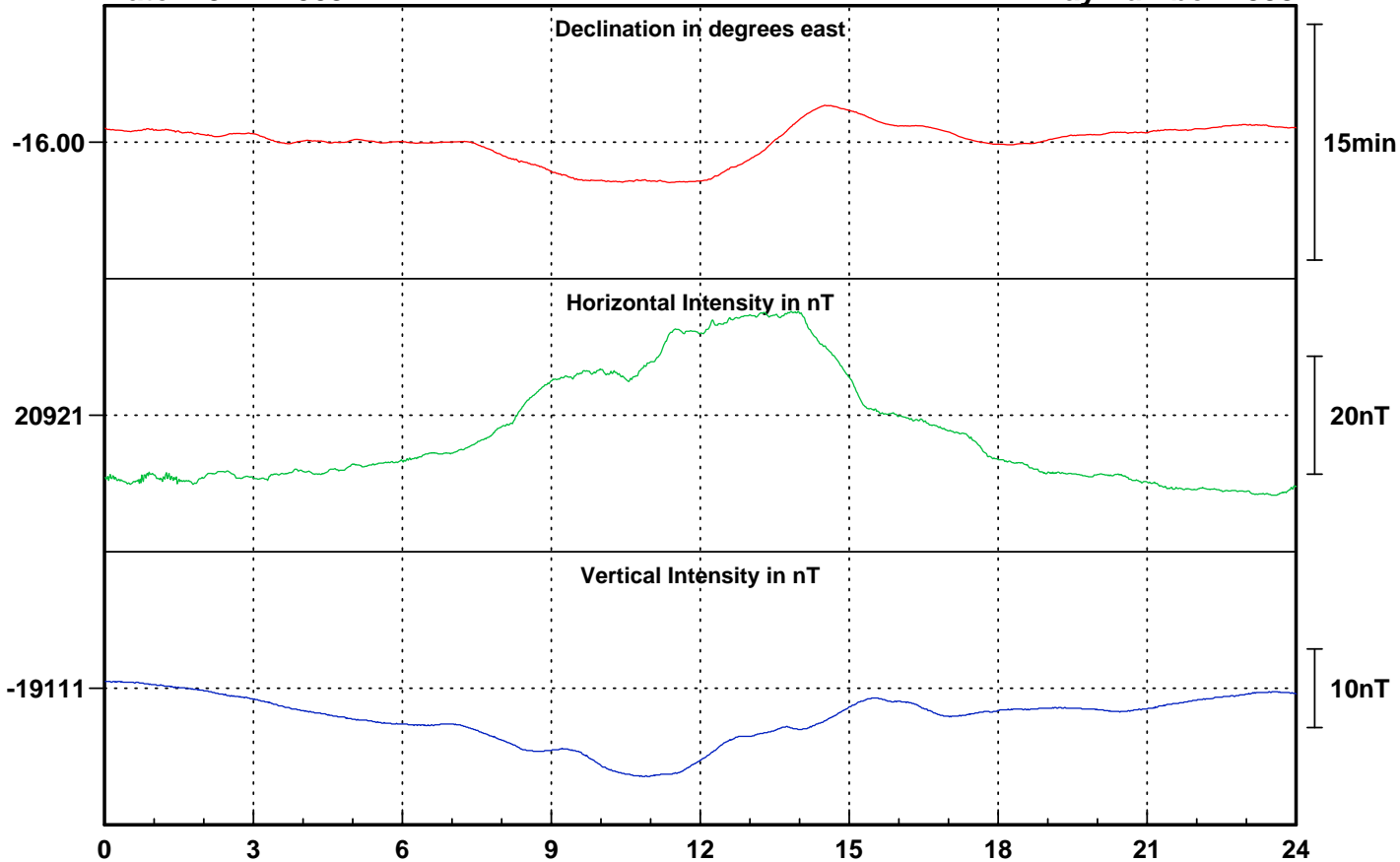
Day number: 352



Date: 19-12-2009

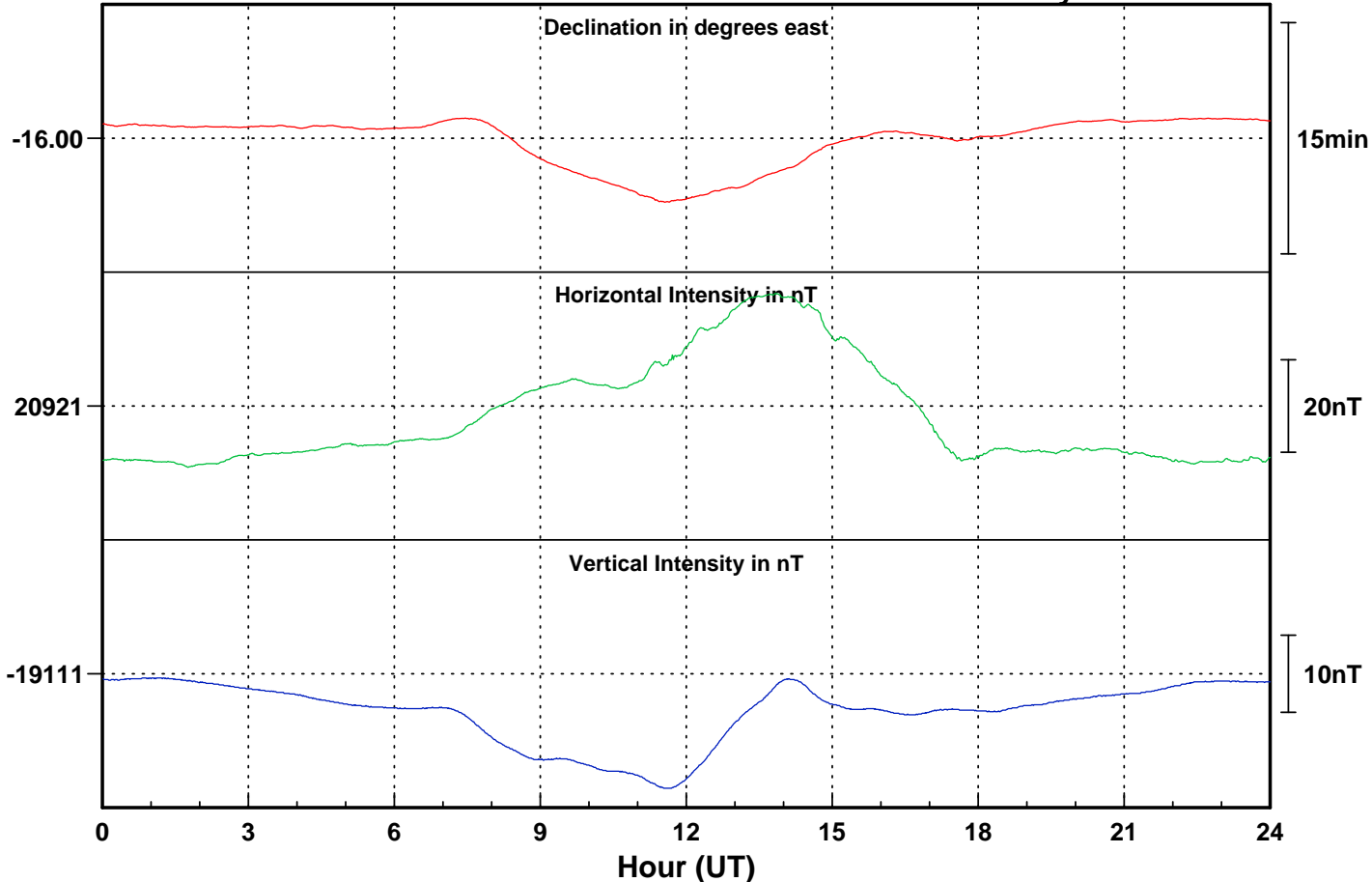
# Ascension Island

Day number: 353



Date: 20-12-2009

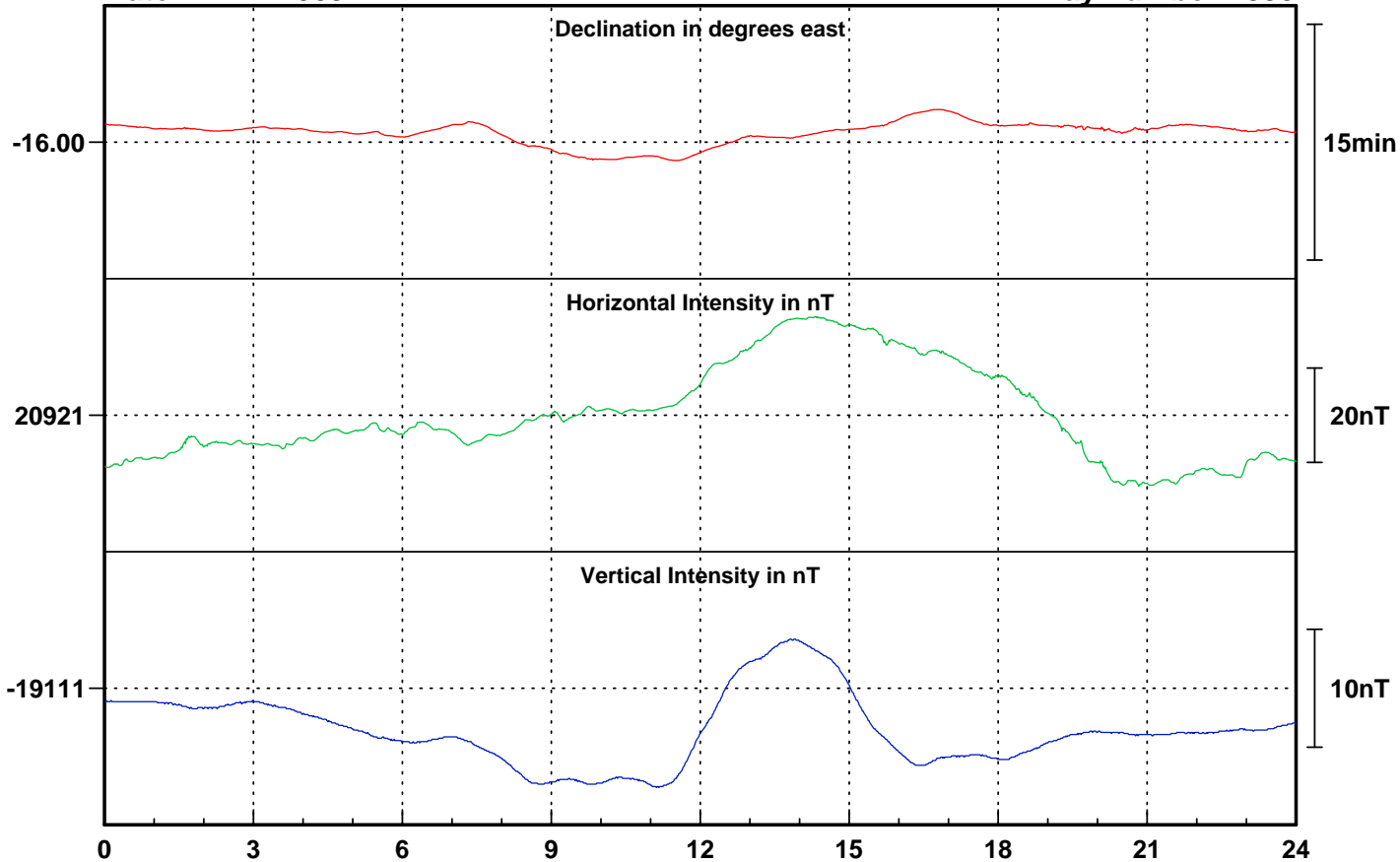
Day number: 354



Date: 21-12-2009

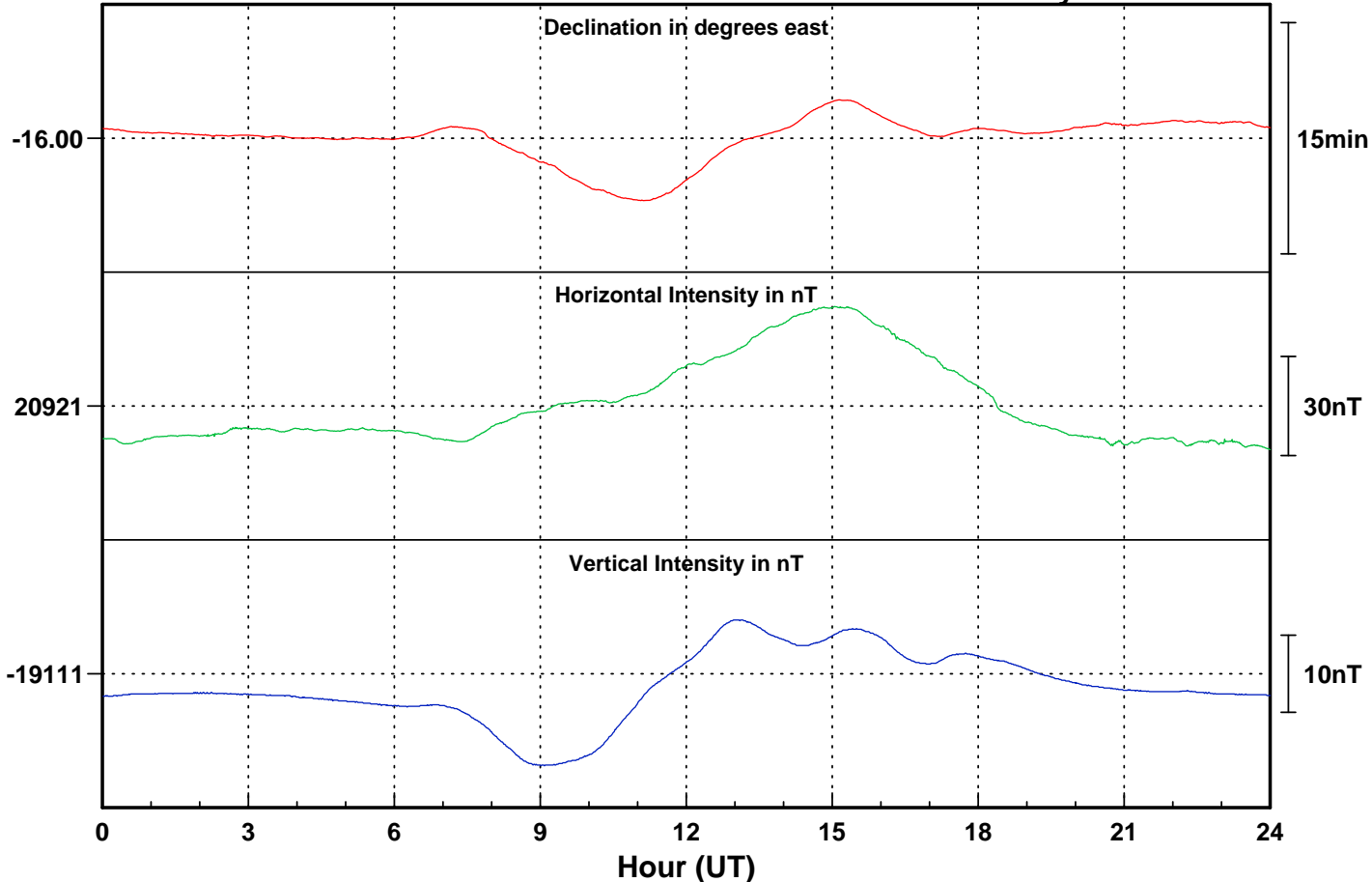
# Ascension Island

Day number: 355



Date: 22-12-2009

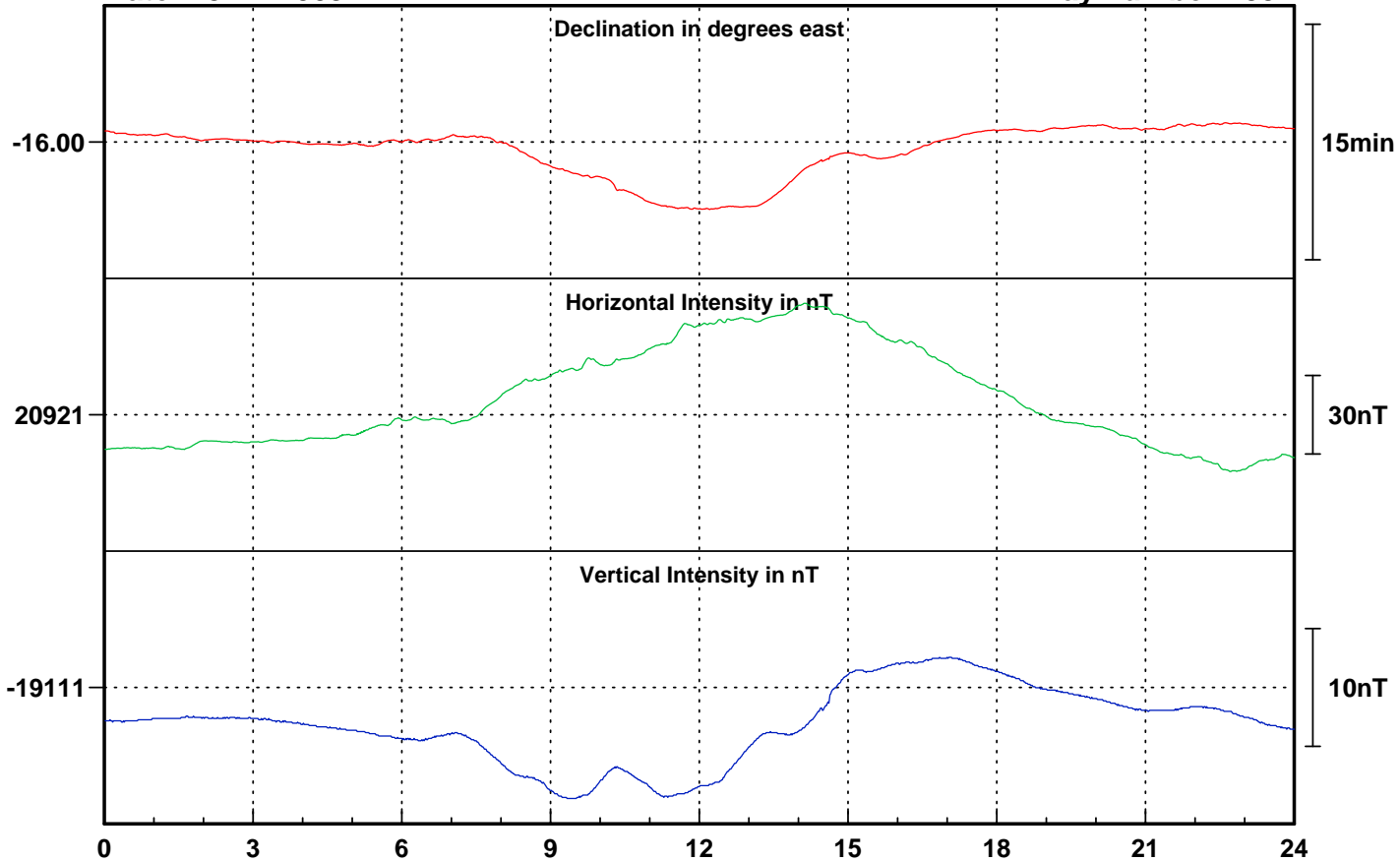
Day number: 356



Date: 23-12-2009

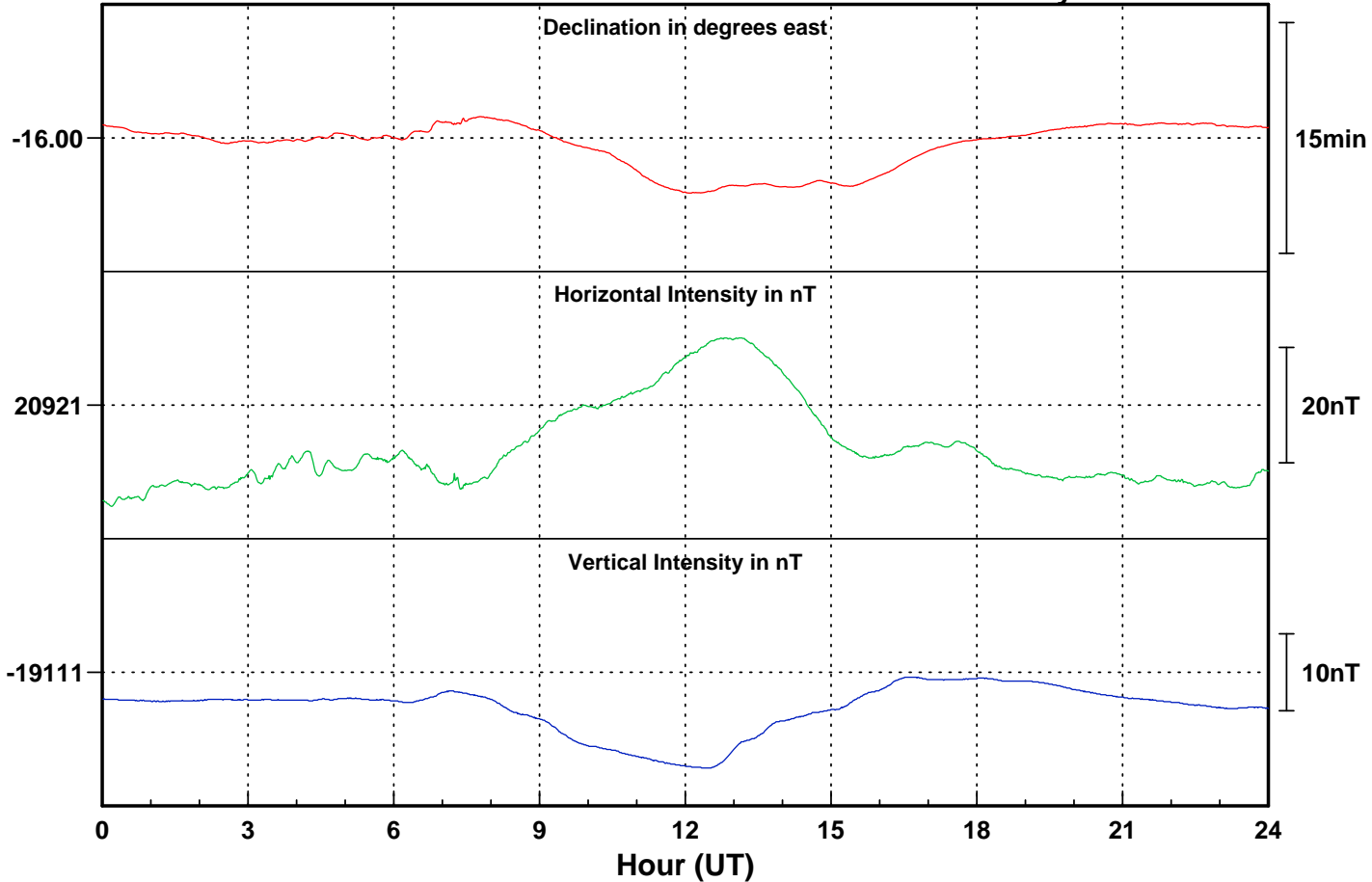
# Ascension Island

Day number: 357



Date: 24-12-2009

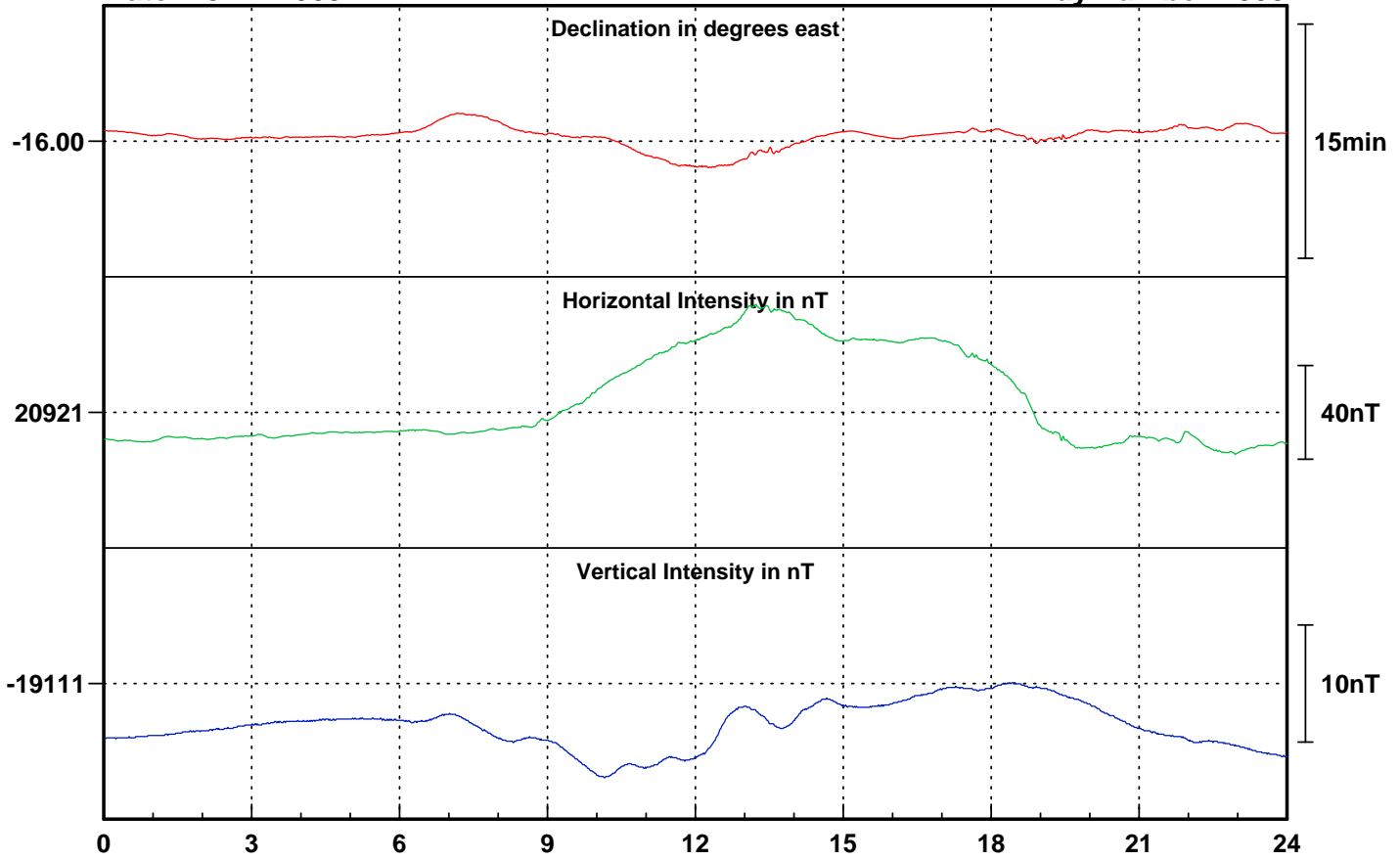
Day number: 358



Date: 25-12-2009

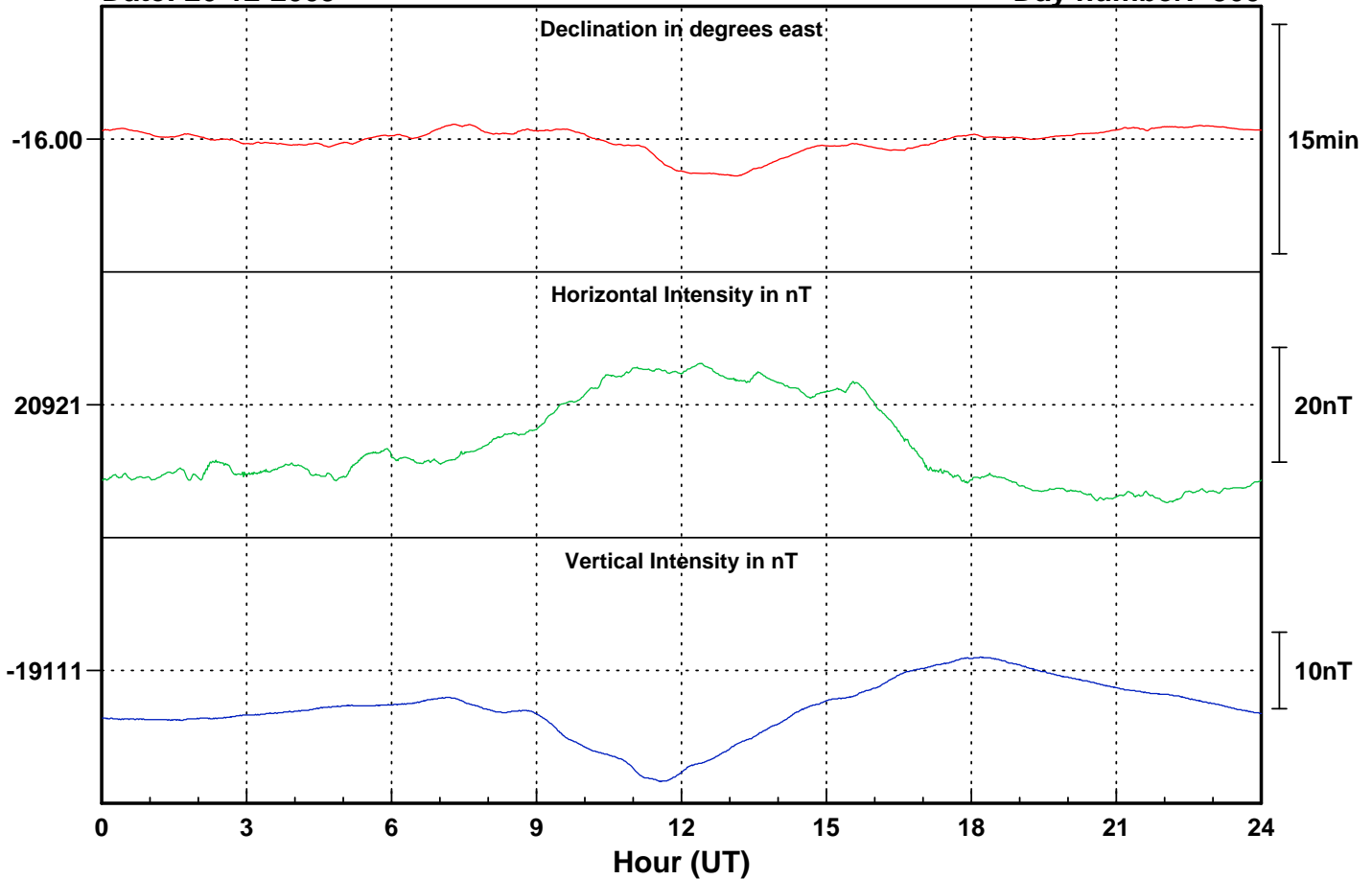
# Ascension Island

Day number: 359



Date: 26-12-2009

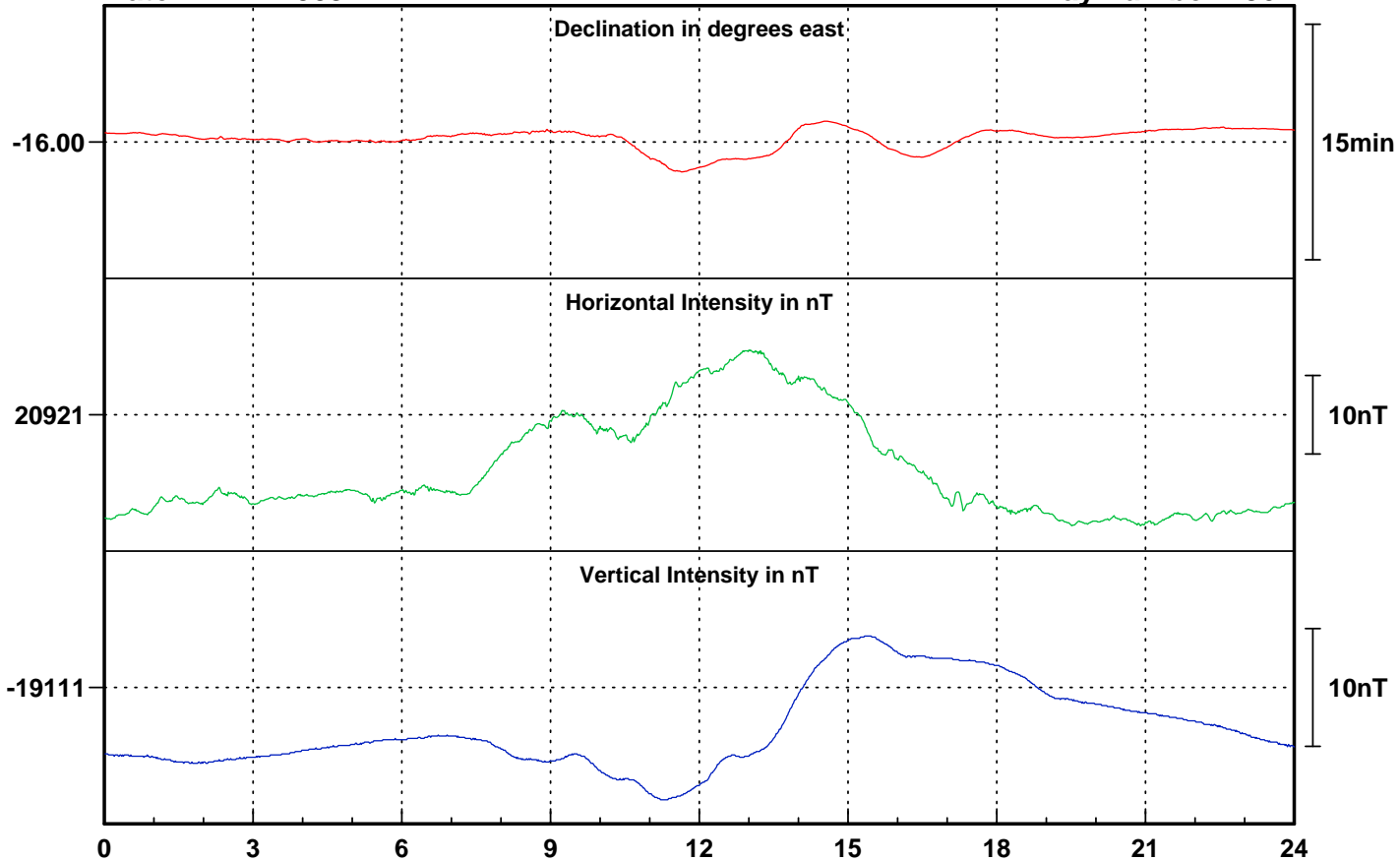
Day number: 360



Date: 27-12-2009

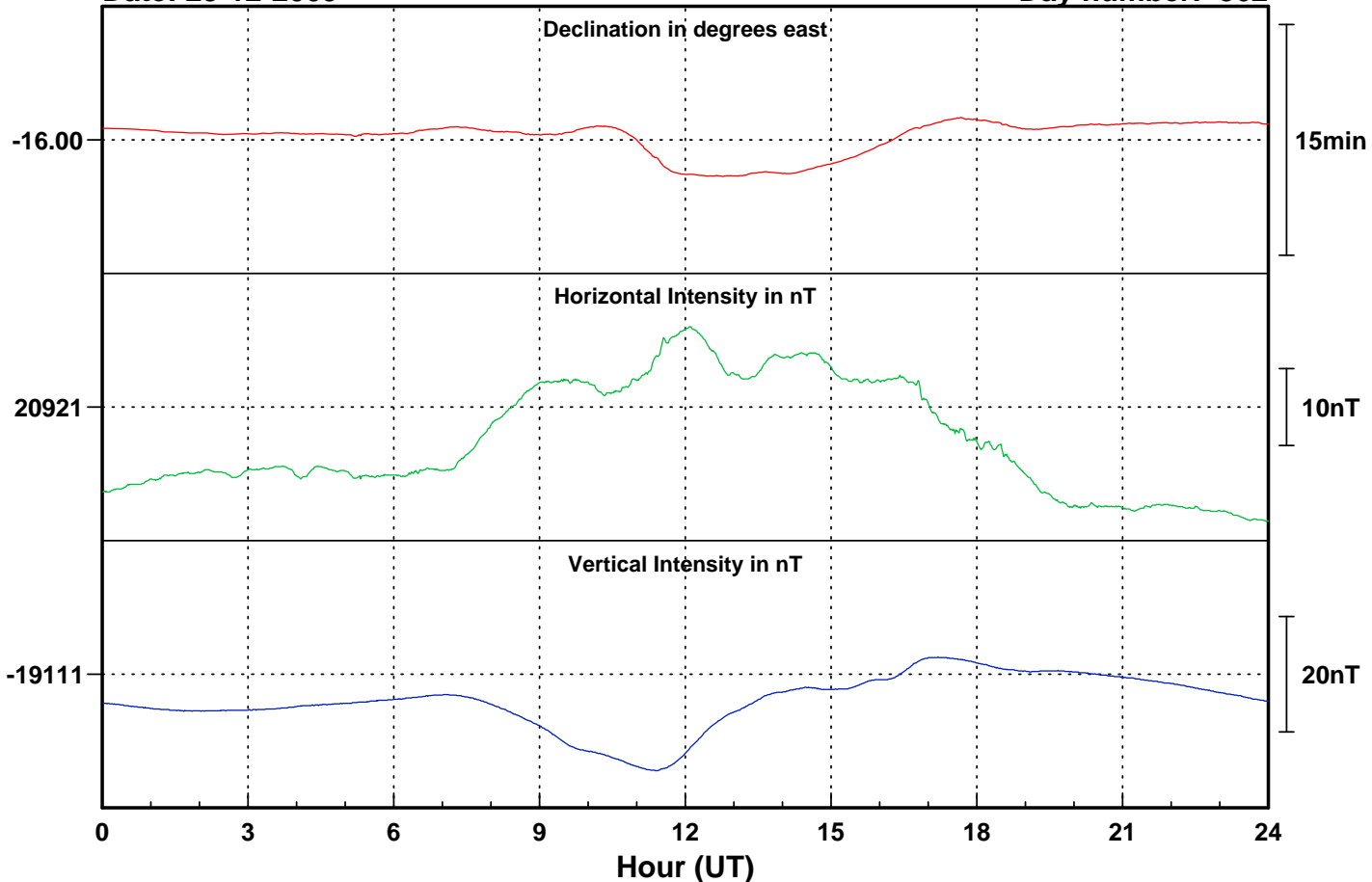
# Ascension Island

Day number: 361



Date: 28-12-2009

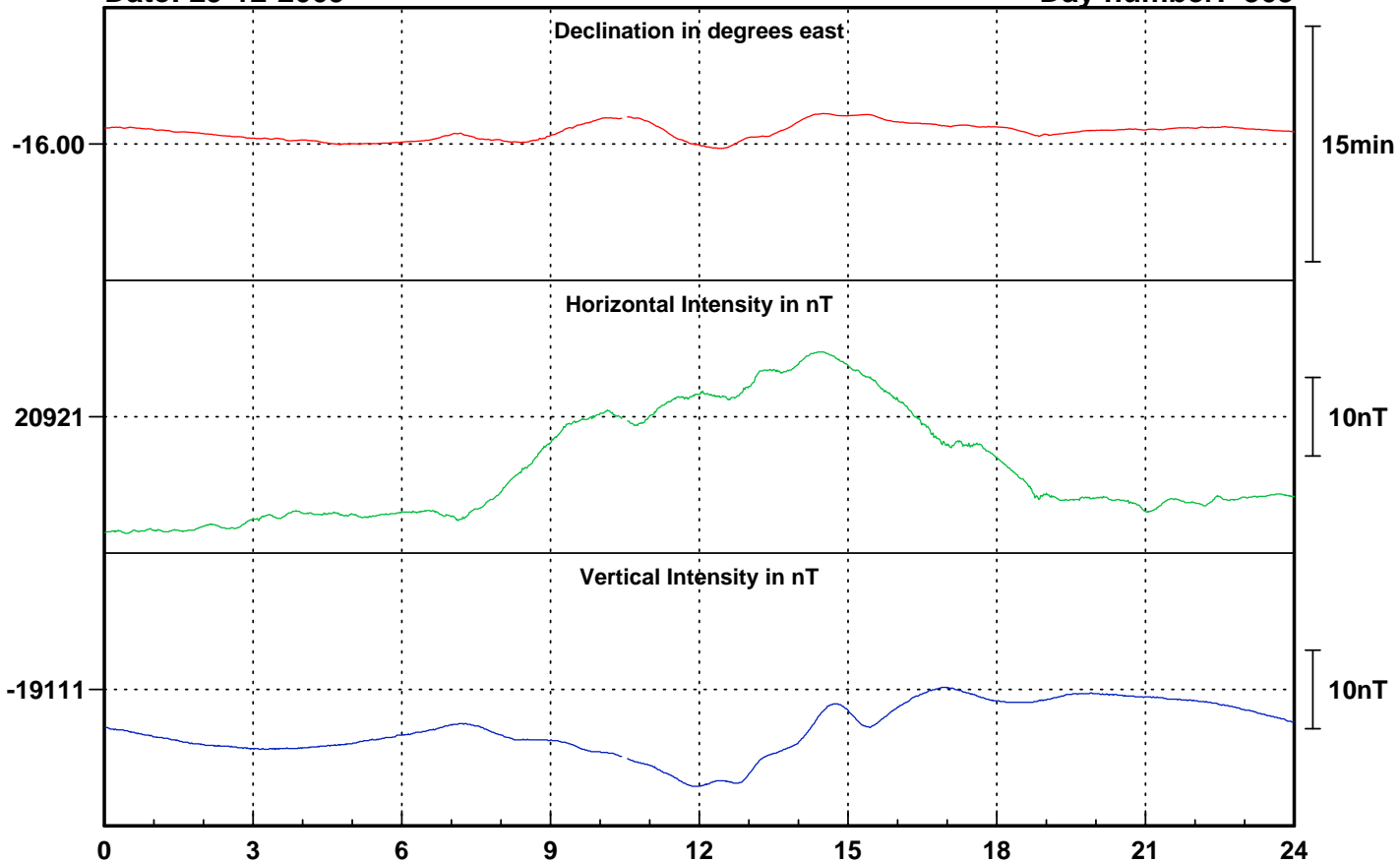
Day number: 362



Date: 29-12-2009

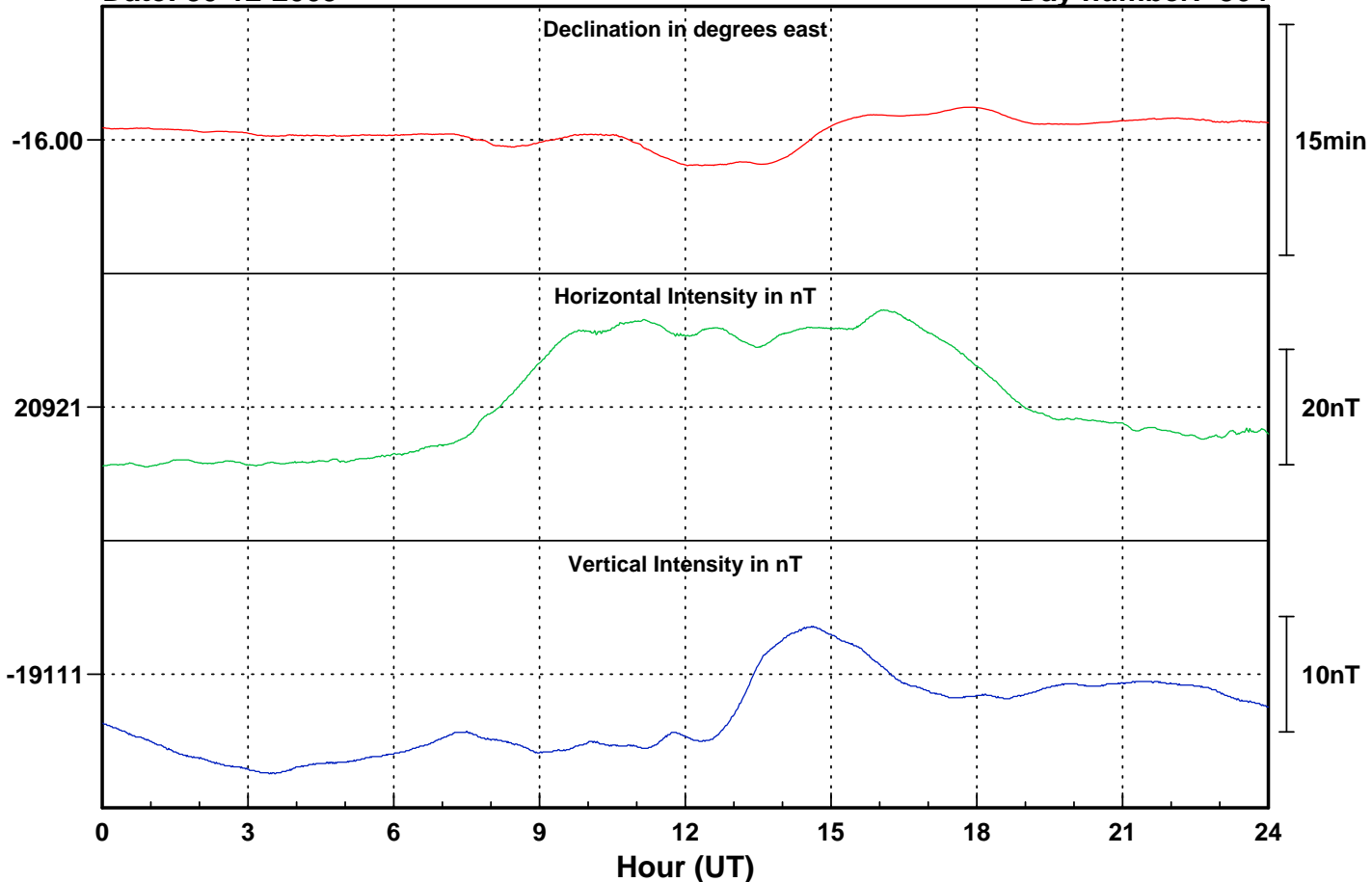
# Ascension Island

Day number: 363



Date: 30-12-2009

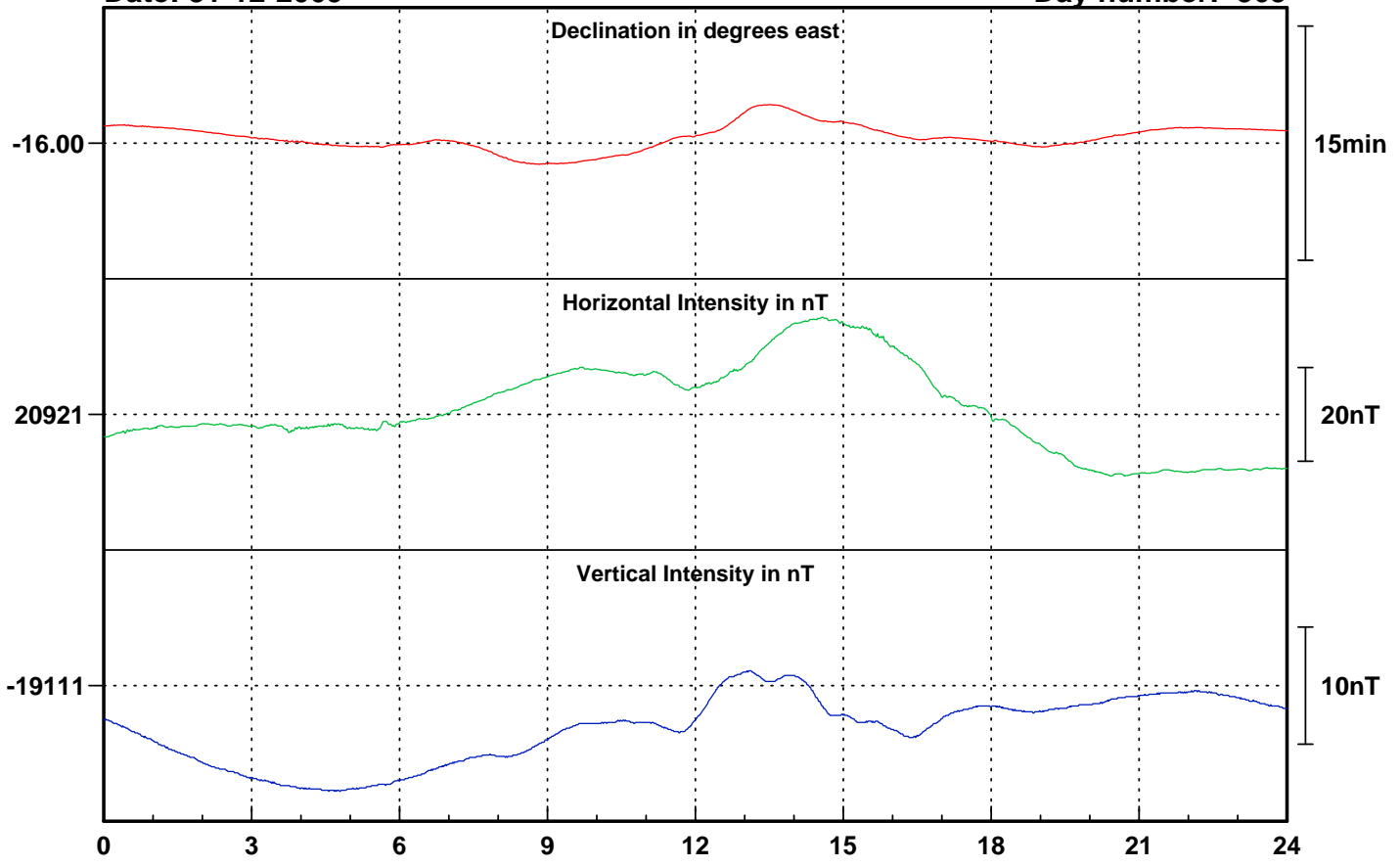
Day number: 364



Date: 31-12-2009

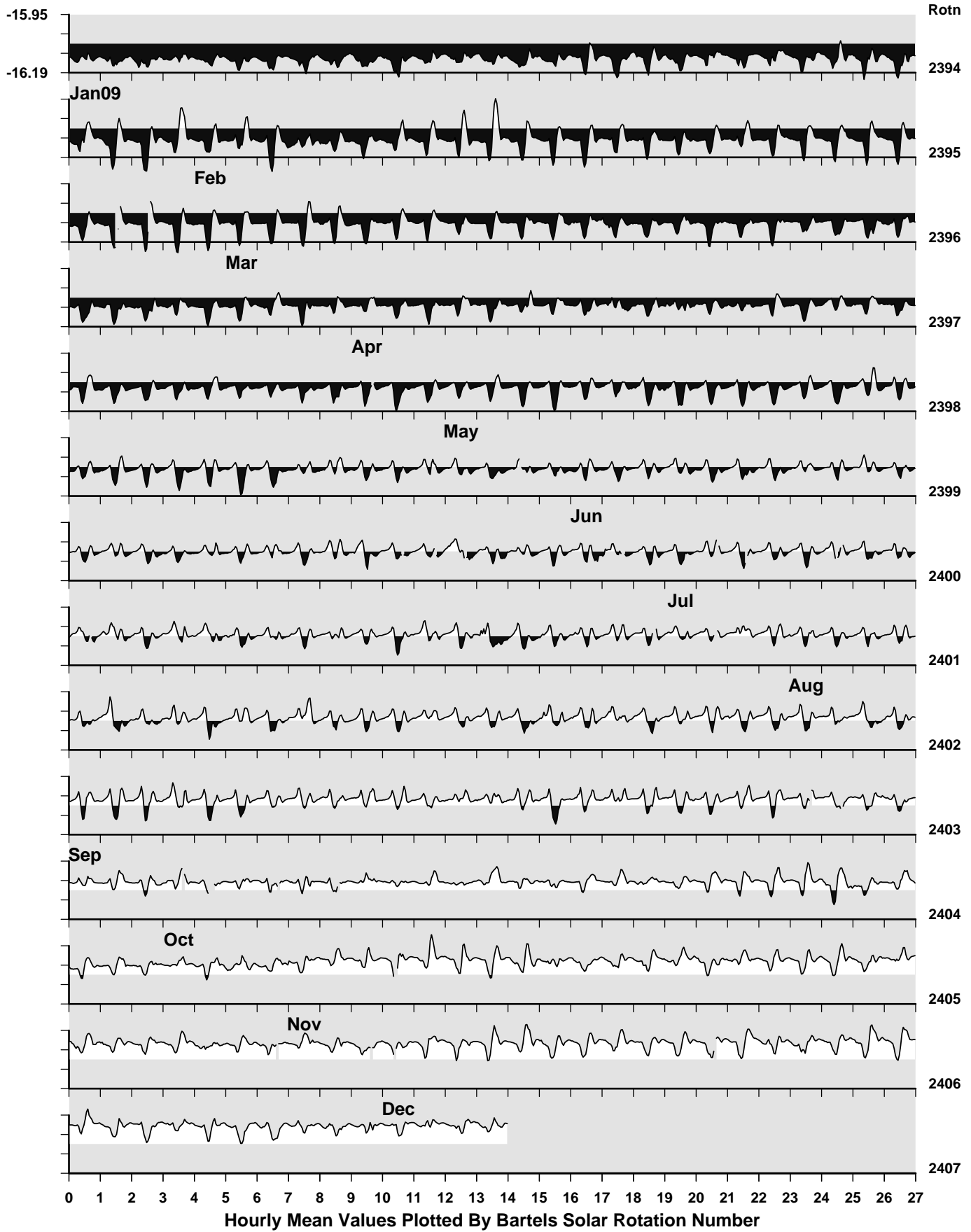
# Ascension Island

Day number: 365

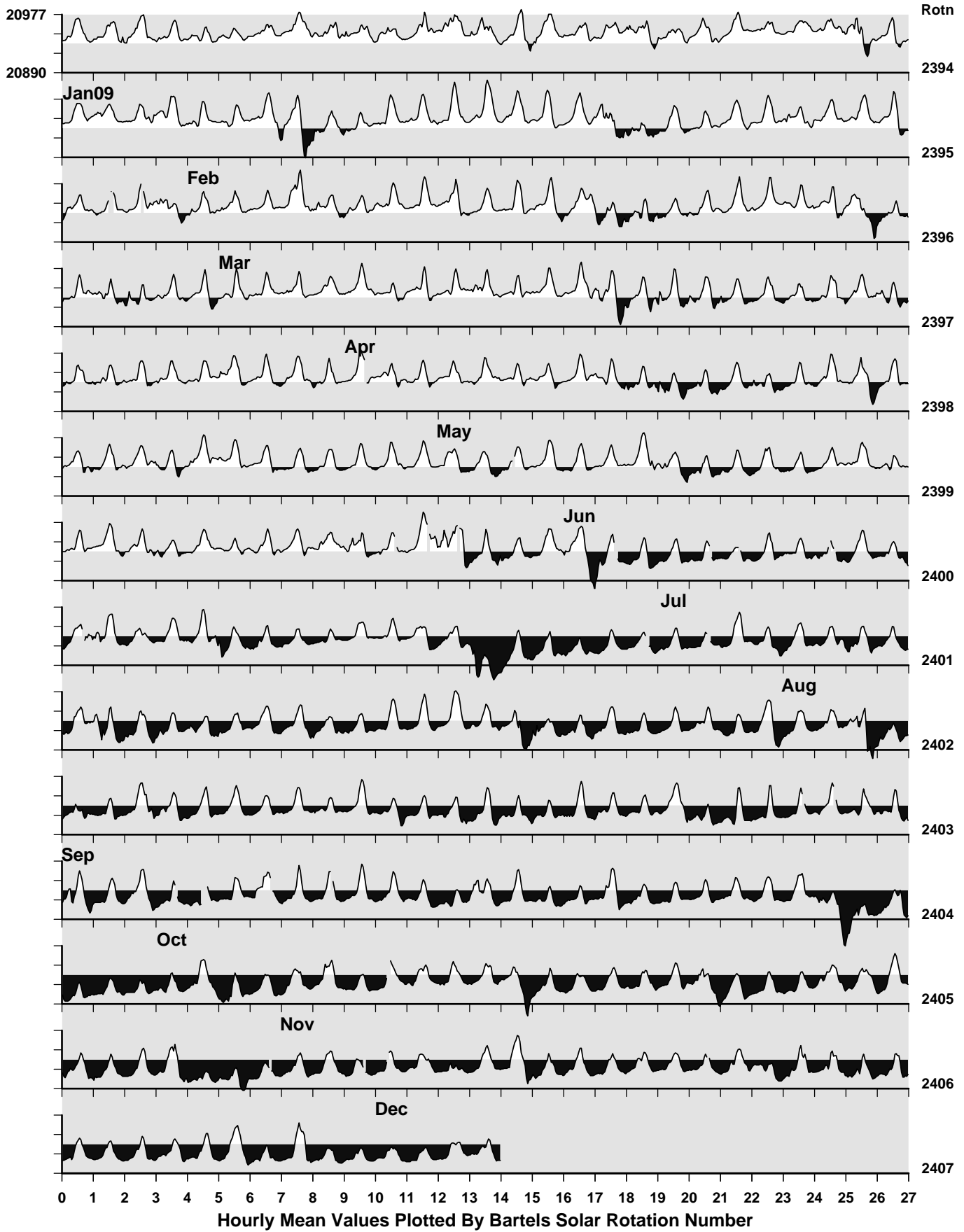




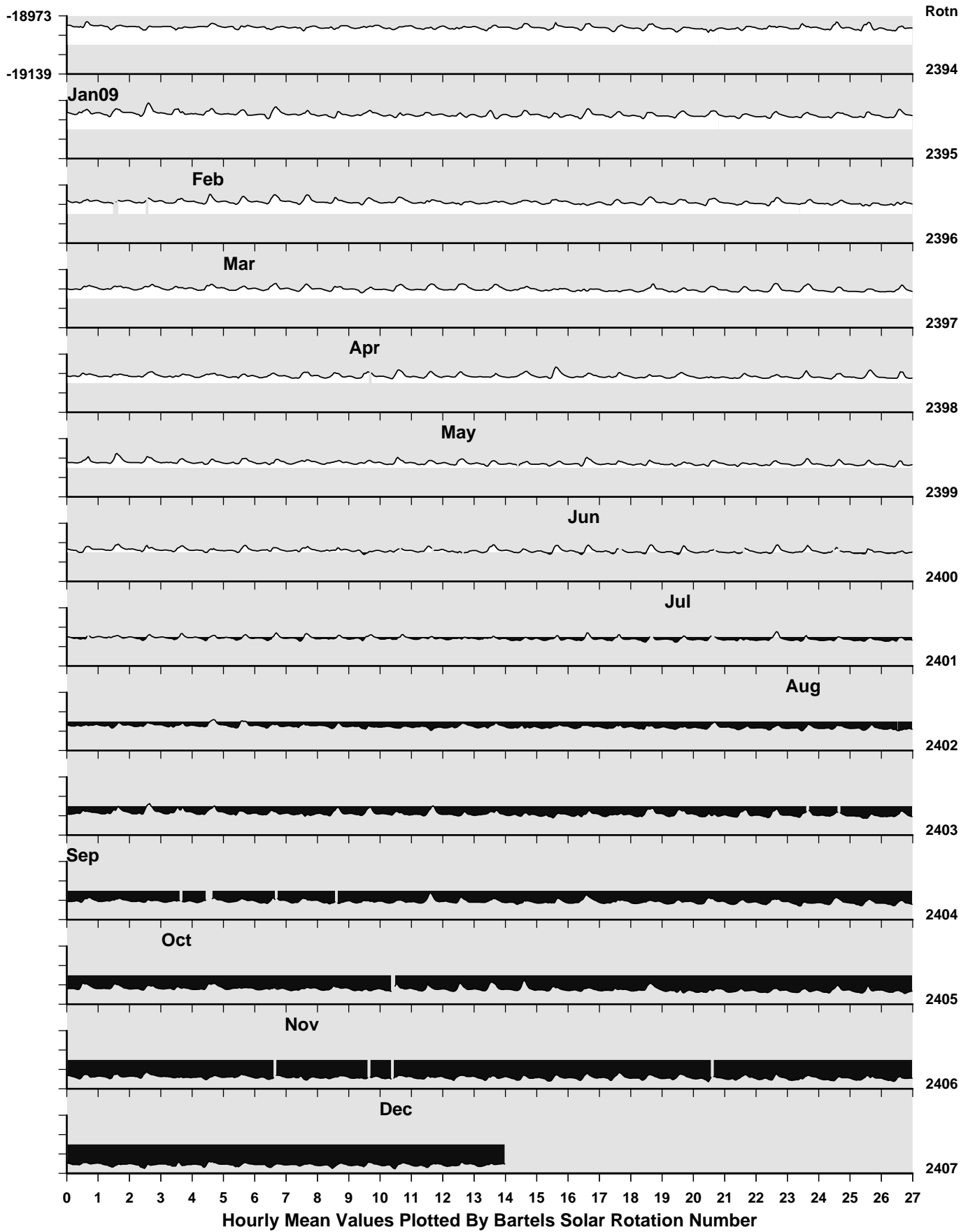
# Ascension Island Observatory: Declination (degrees)



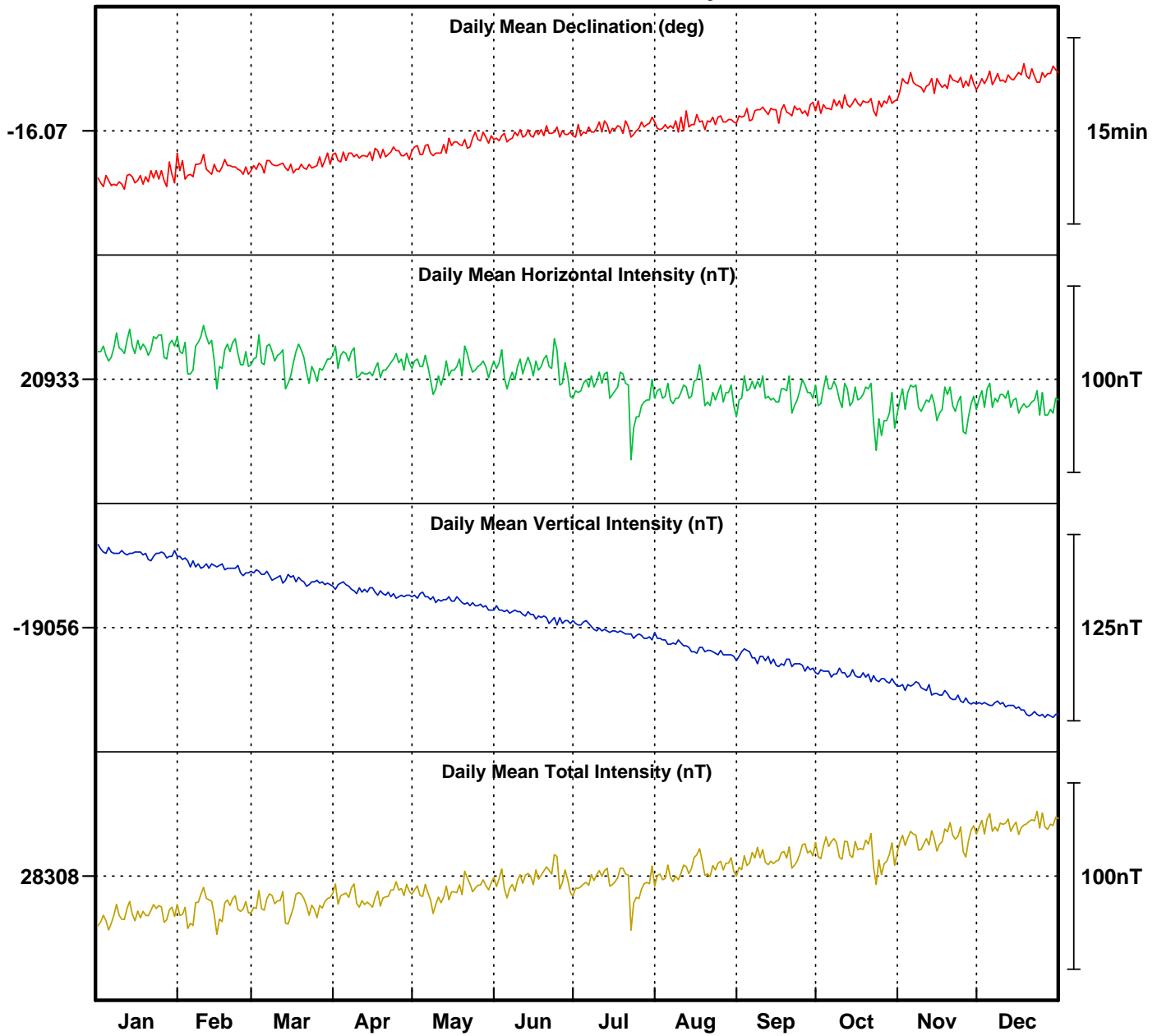
# Ascension Island Observatory: Horizontal Intensity (nT)



# Ascension Island Observatory: Vertical Intensity (nT)



# Ascension Is Observatory 2009



### Monthly Mean Values for Ascension Island Observatory 2009

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-16° 7.9′	20951 nT	-42° 12.8′	20126 nT	-5821 nT	-19006 nT	28287 nT
February	-16° 7.1′	20947 nT	-42° 14.0′	20123 nT	-5815 nT	-19015 nT	28290 nT
March	-16° 6.9′	20943 nT	-42° 15.0′	20120 nT	-5813 nT	-19023 nT	28293 nT
April	-16° 6.0′	20941 nT	-42° 15.9′	20120 nT	-5807 nT	-19032 nT	28297 nT
May	-16° 5.2′	20939 nT	-42° 16.7′	20119 nT	-5802 nT	-19038 nT	28300 nT
June	-16° 4.4′	20938 nT	-42° 17.6′	20120 nT	-5797 nT	-19048 nT	28306 nT
July	-16° 3.9′	20926 nT	-42° 19.5′	20109 nT	-5791 nT	-19058 nT	28304 nT
August	-16° 3.5′	20925 nT	-42° 20.6′	20109 nT	-5788 nT	-19070 nT	28311 nT
September	-16° 2.6′	20926 nT	-42° 21.3′	20112 nT	-5783 nT	-19078 nT	28318 nT
October	-16° 1.9′	20921 nT	-42° 22.7′	20107 nT	-5778 nT	-19088 nT	28321 nT
November	-16° 0.3′	20920 nT	-42° 23.7′	20109 nT	-5768 nT	-19100 nT	28328 nT
December	-15° 59.7′	20921 nT	-42° 24.6′	20111 nT	-5765 nT	-19111 nT	28336 nT

#### Note

i. The values shown here are provisional.