

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

# Observatory

# Monthly

# Magnetic

# Bulletin

November 2013

**13/11/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:*  $7^{\circ} 56' 56'' S$   $345^{\circ} 37' 26'' E$   
*Geomagnetic:*  $2^{\circ} 43' 05'' S$   $057^{\circ} 20' 56'' E$   
*Height above mean sea level:* 177 m

The geomagnetic co-ordinates are approximations, calculated using the 11th generation International Geomagnetic Reference Field (IGRF) at epoch 2013.5. 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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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 2013

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

-15.81

5min

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

21339

20nT

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

-19038

20nT

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

-87.3

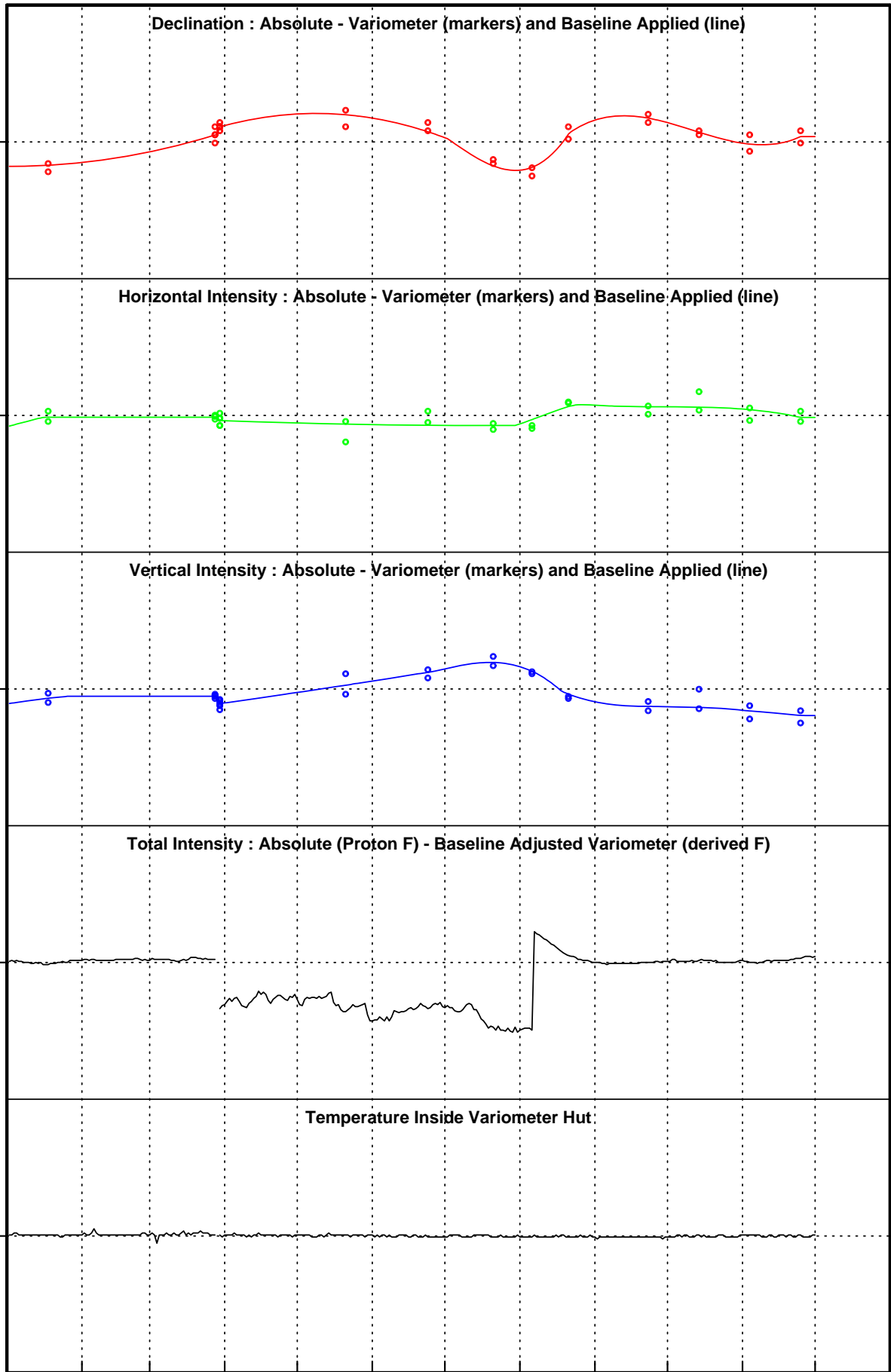
20nT

Temperature Inside Variometer Hut

36.3

10°C

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

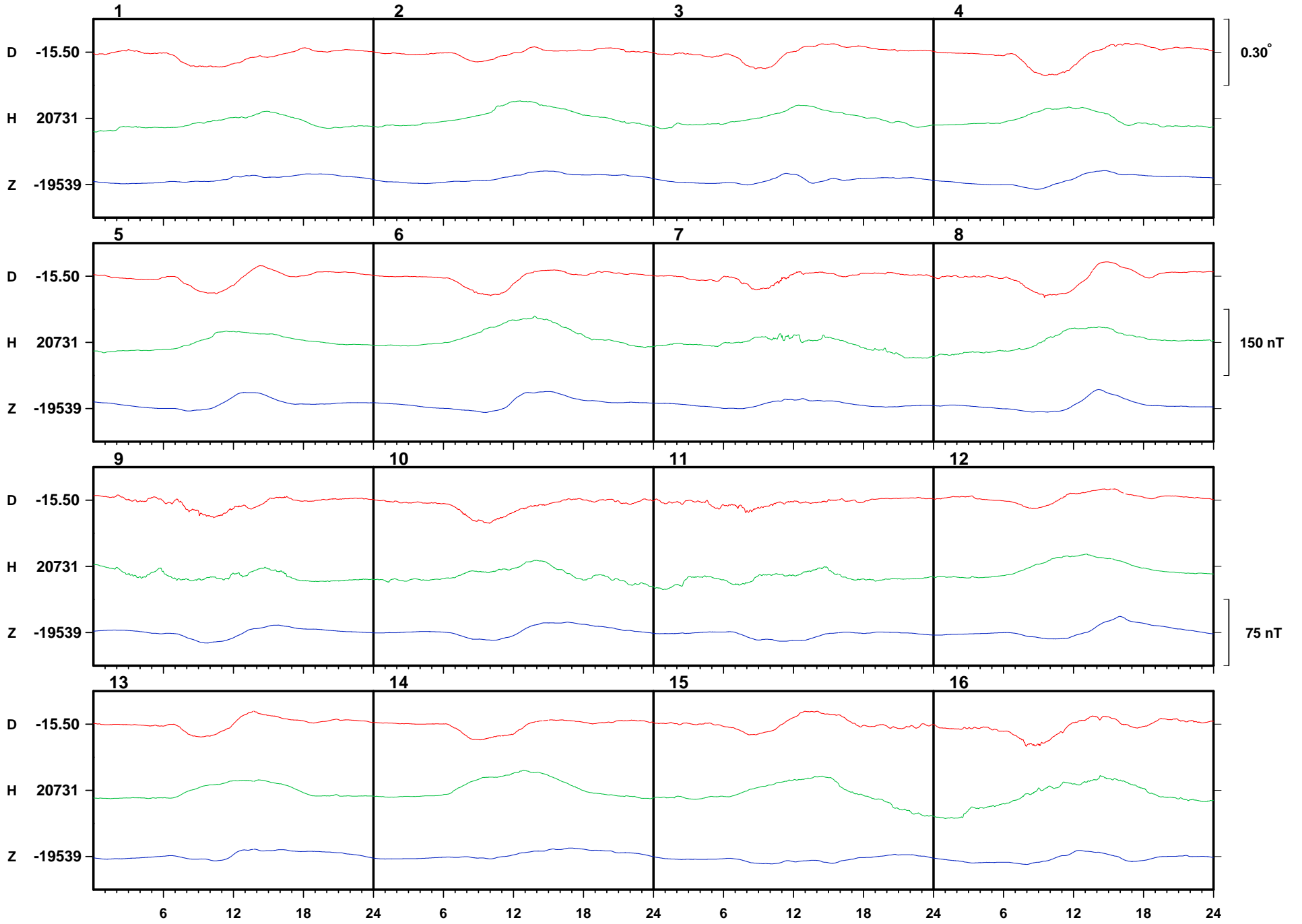


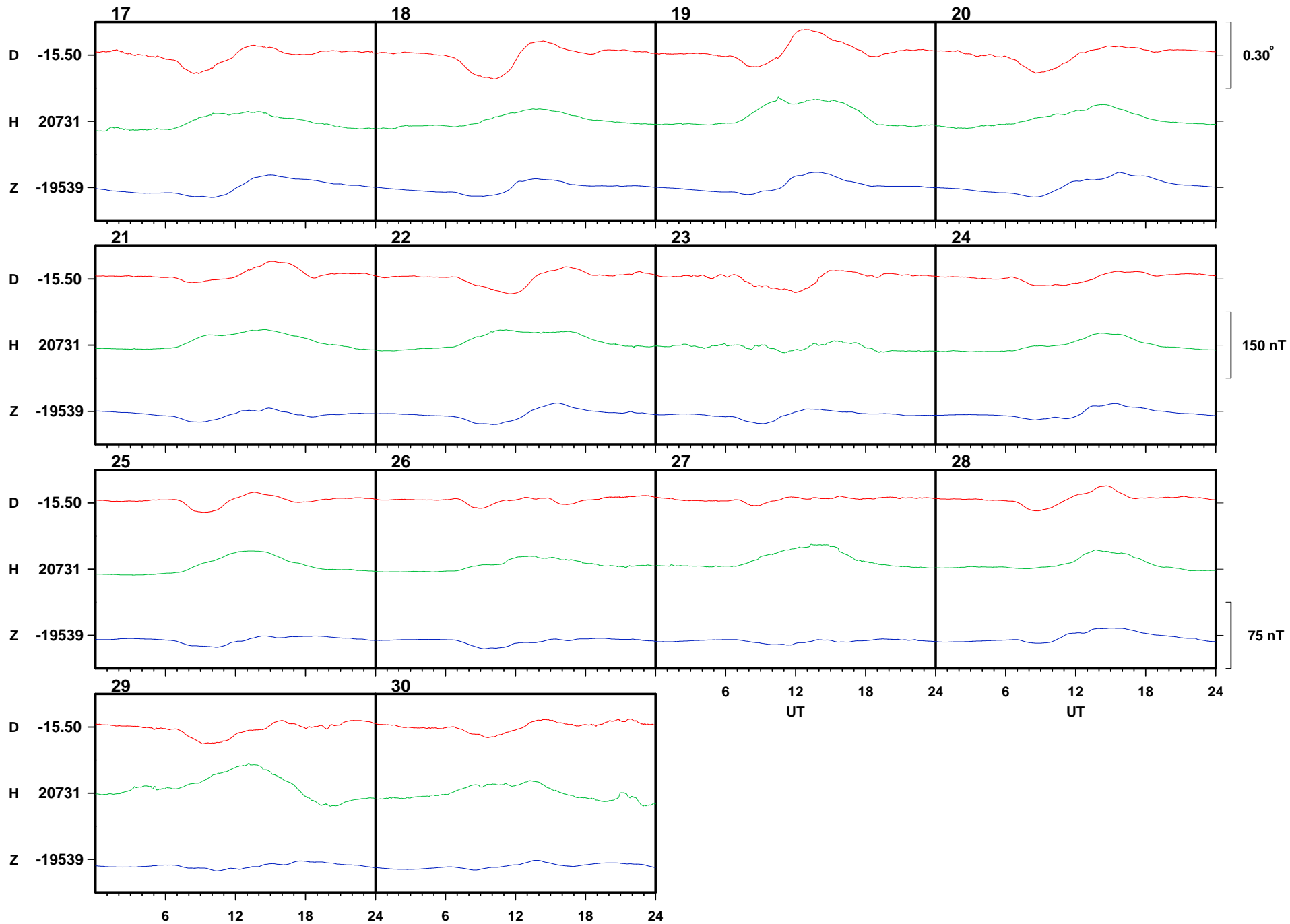


Ascension Island

November

2013





Ascension Island

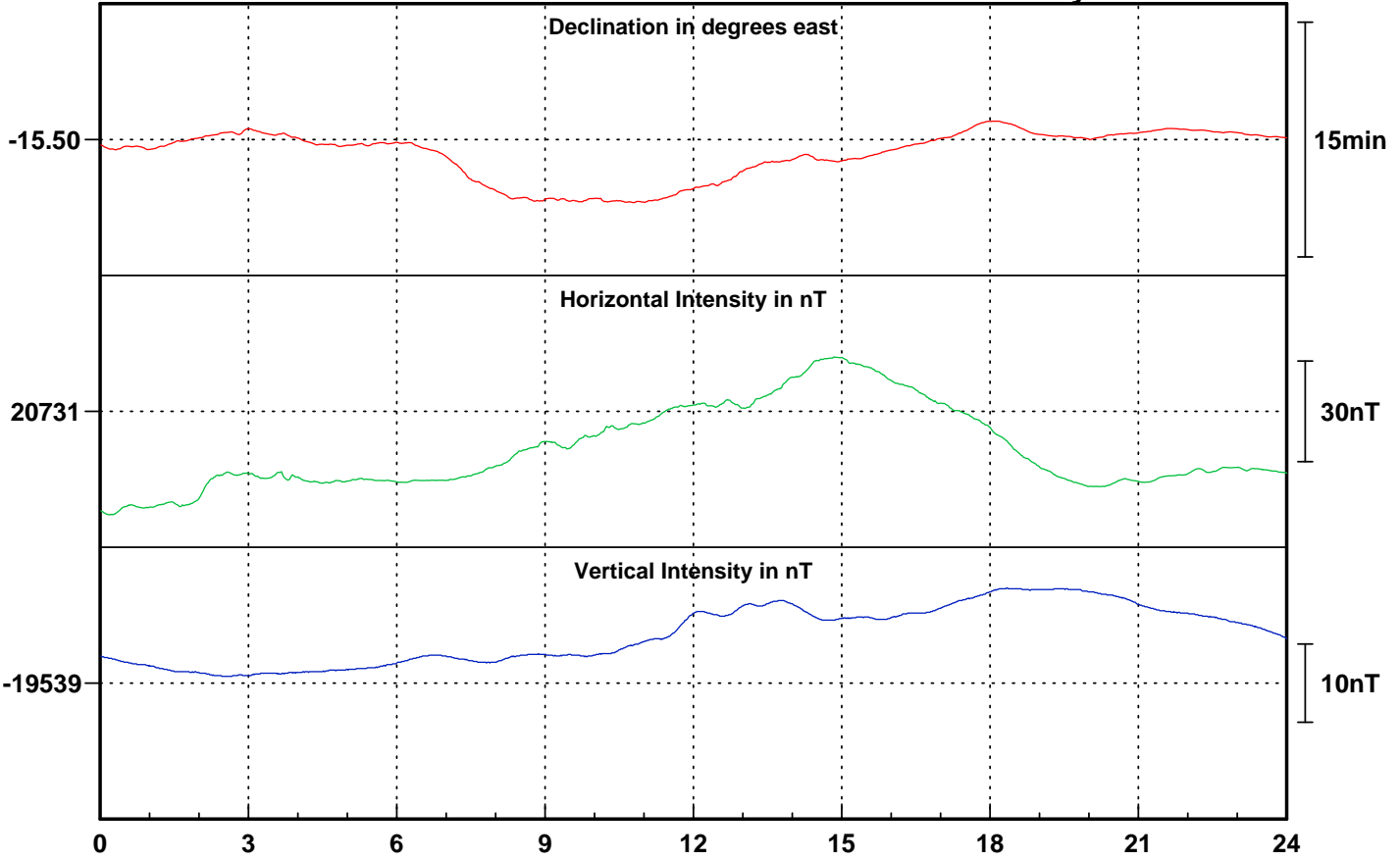
November

2013

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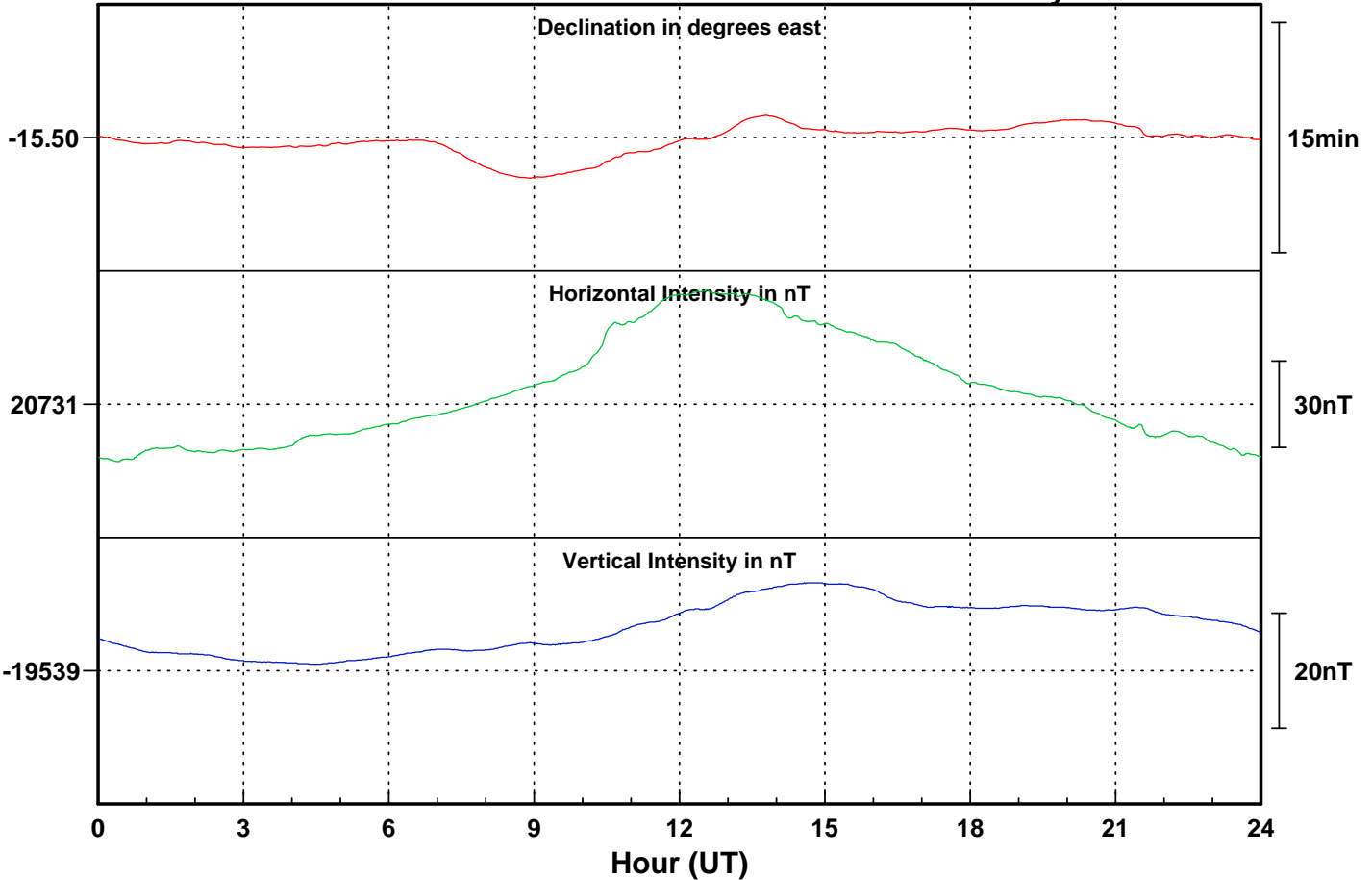
# Ascension Island

Day number: 305



Date: 02-11-2013

Day number: 306

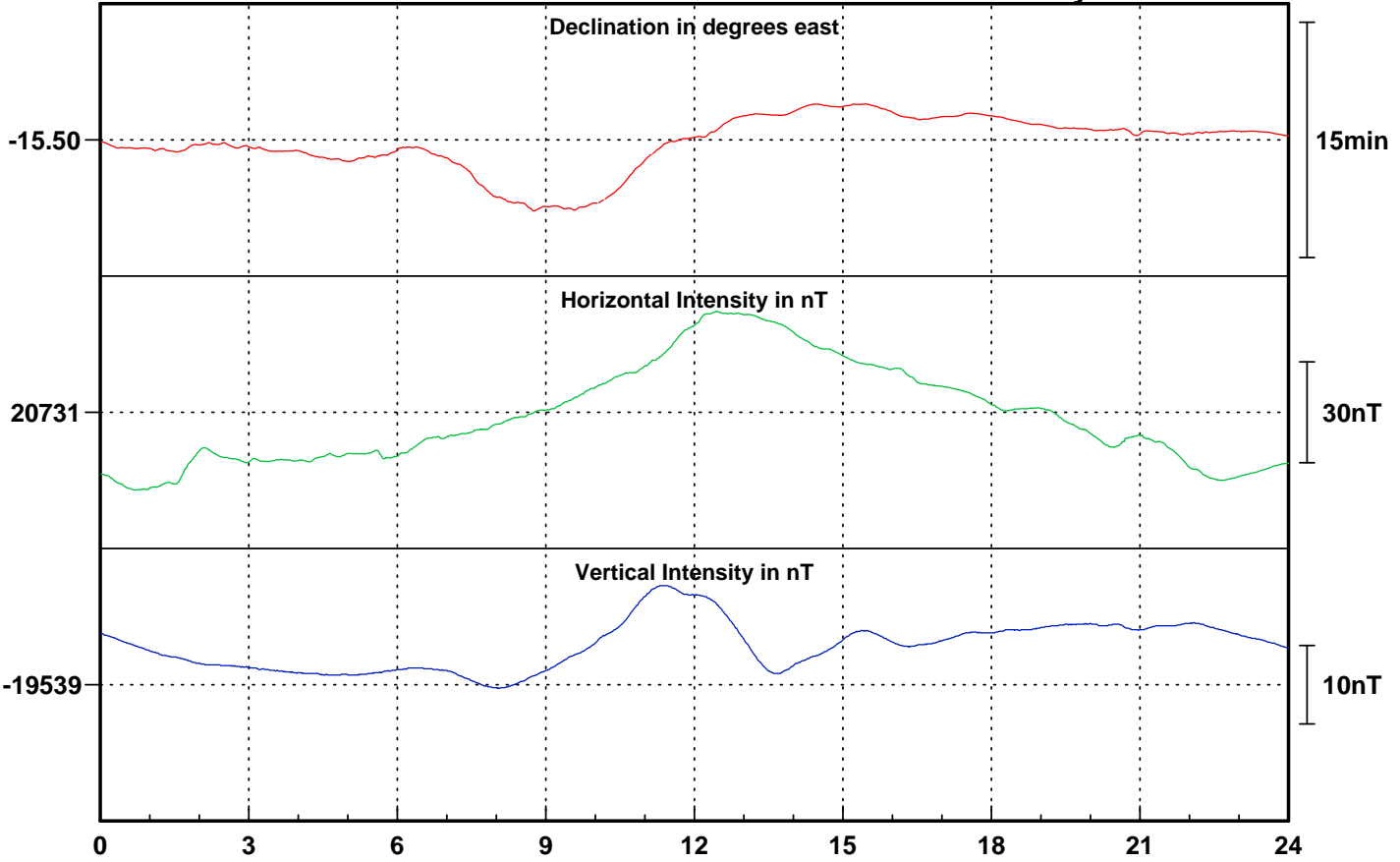




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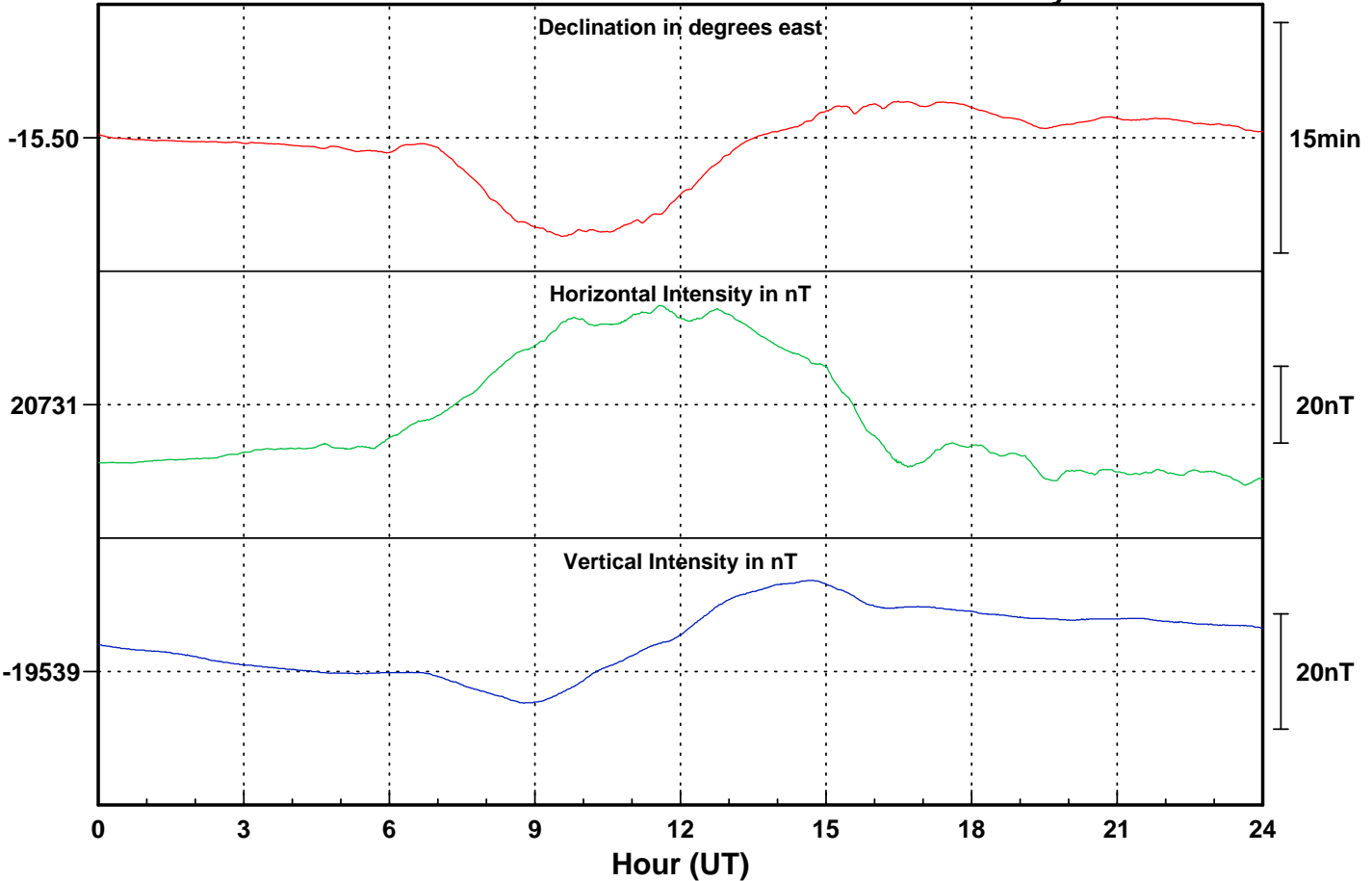
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Day number: 307



Date: 04-11-2013

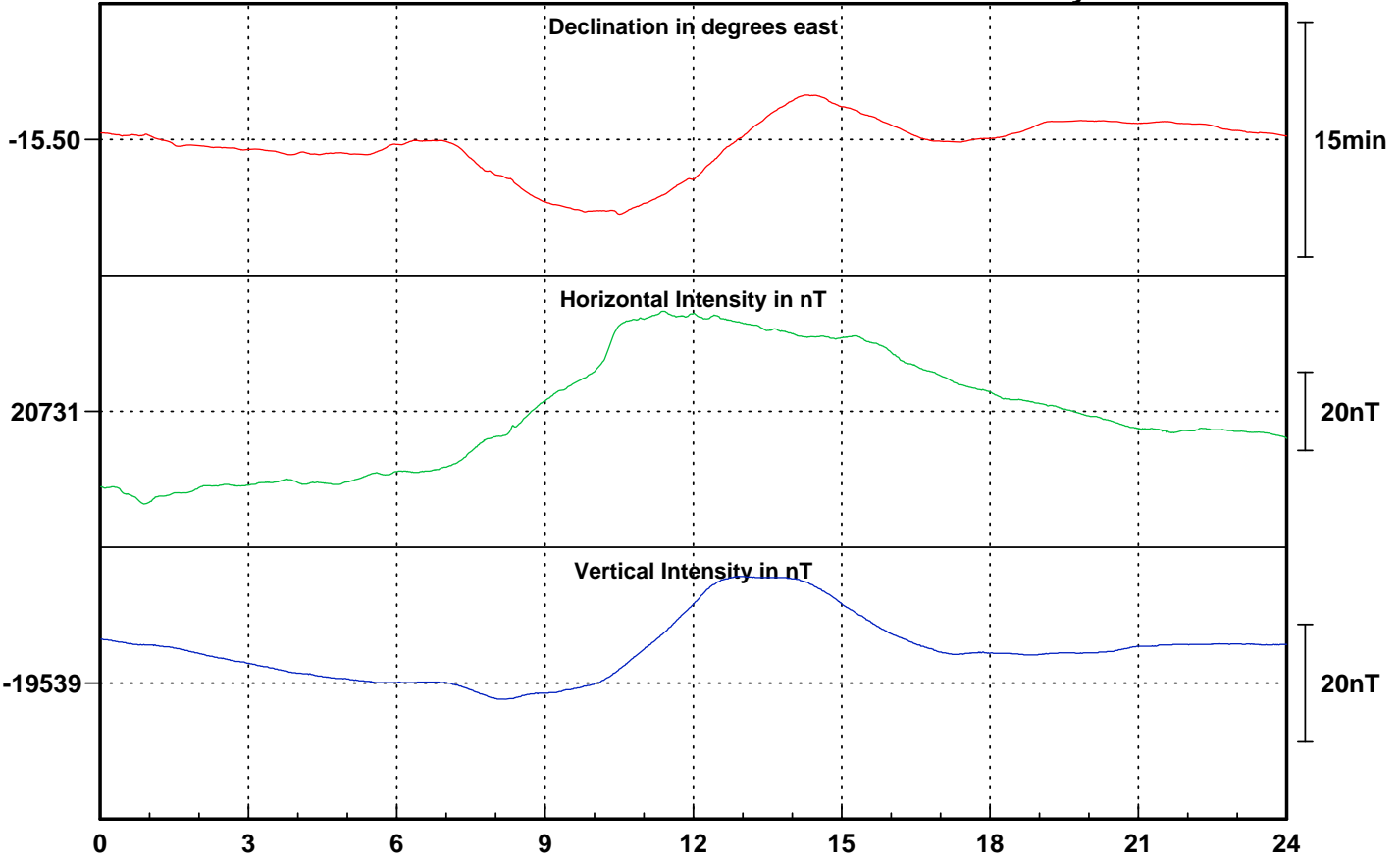
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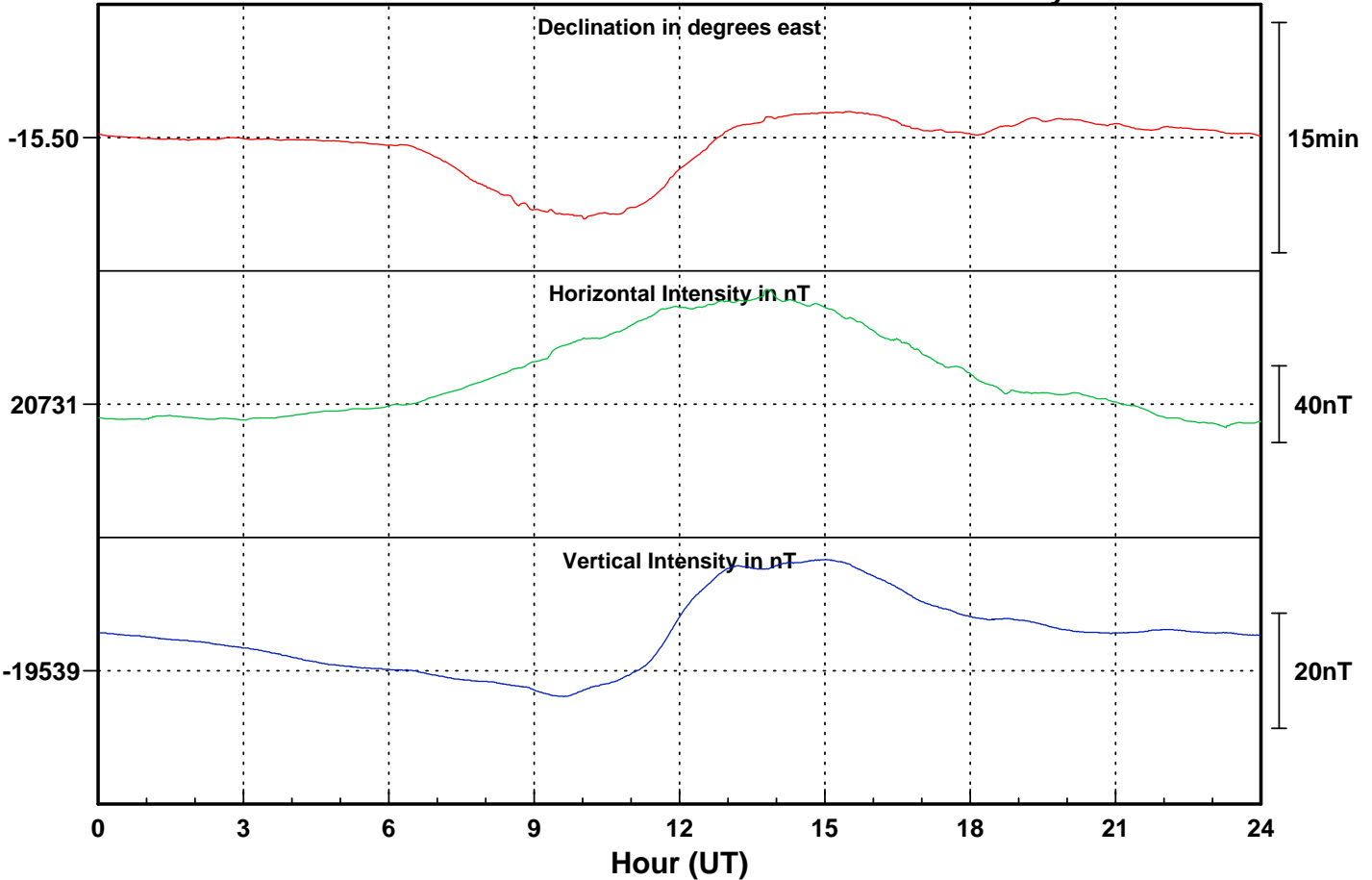
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Day number: 309



Date: 06-11-2013

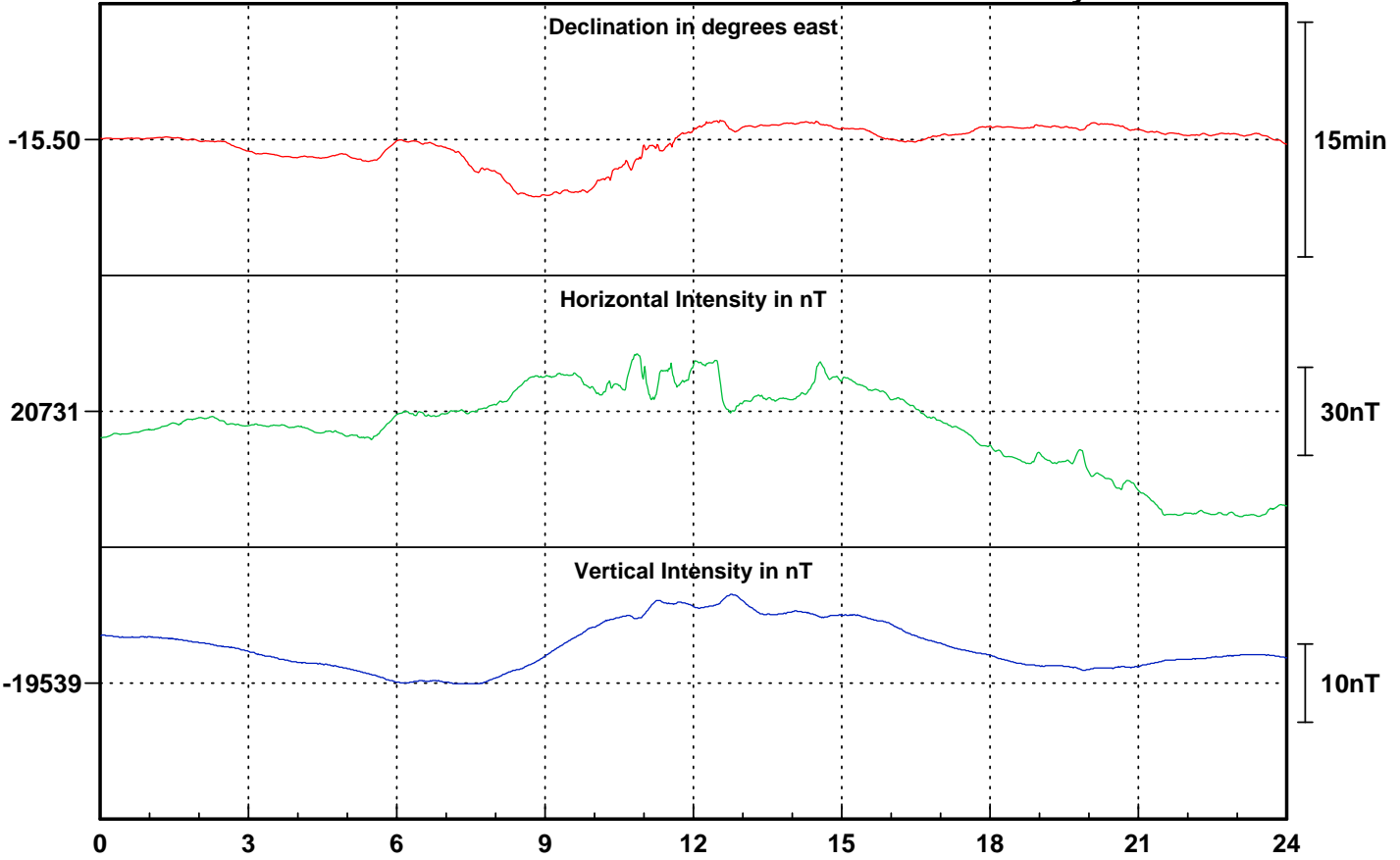
Day number: 310



Date: 07-11-2013

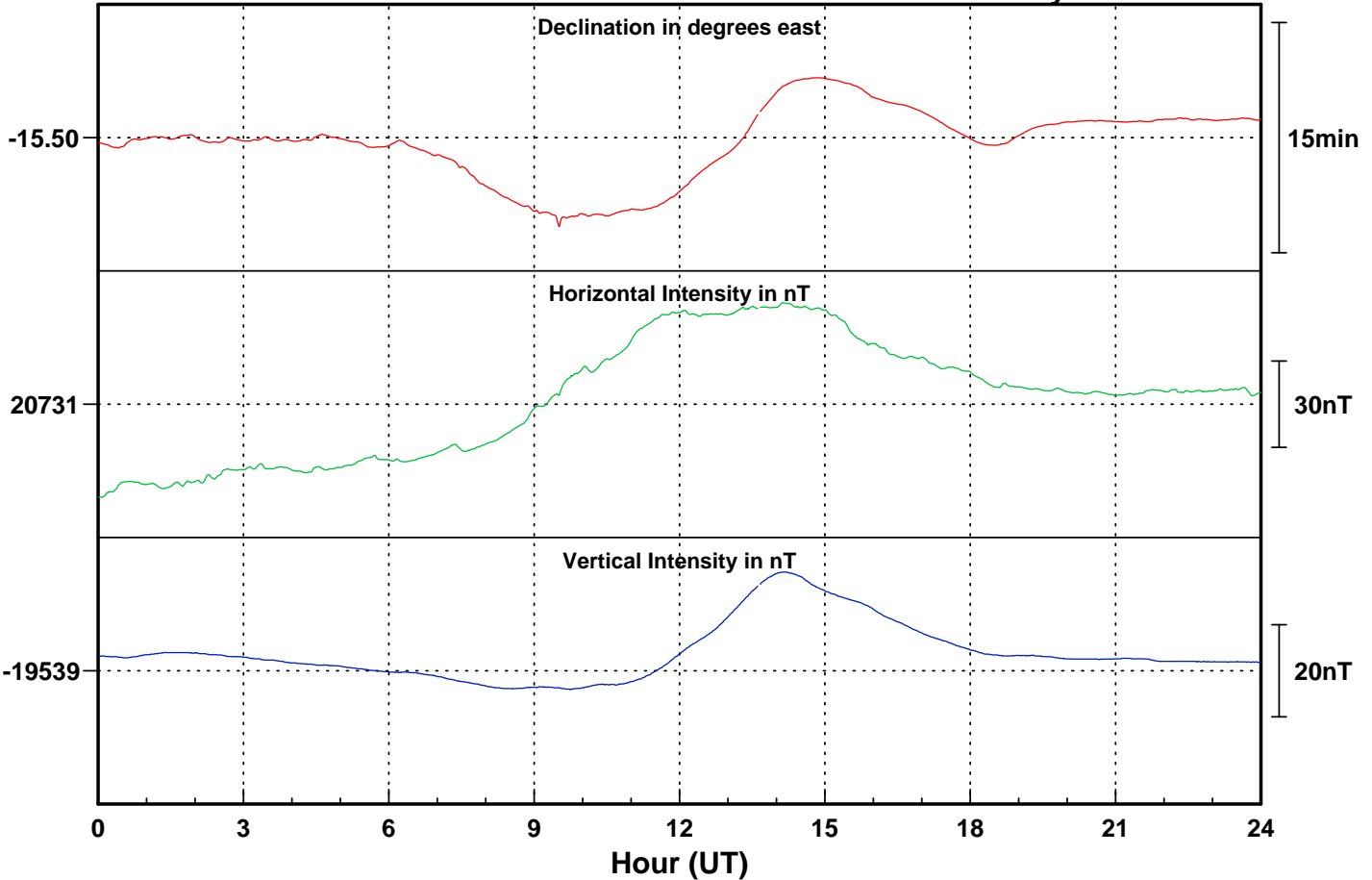
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Day number: 311



Date: 08-11-2013

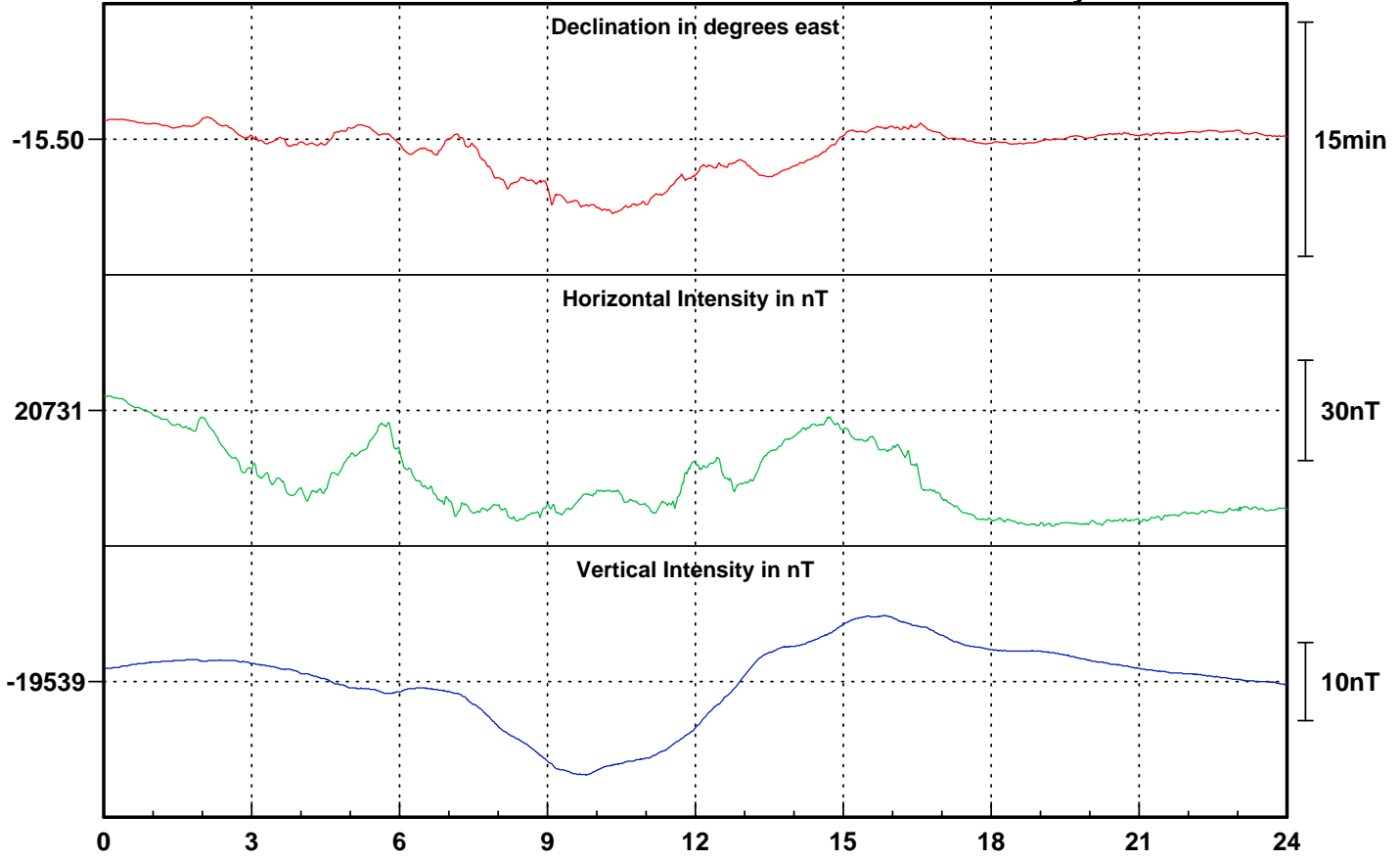
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Date: 09-11-2013

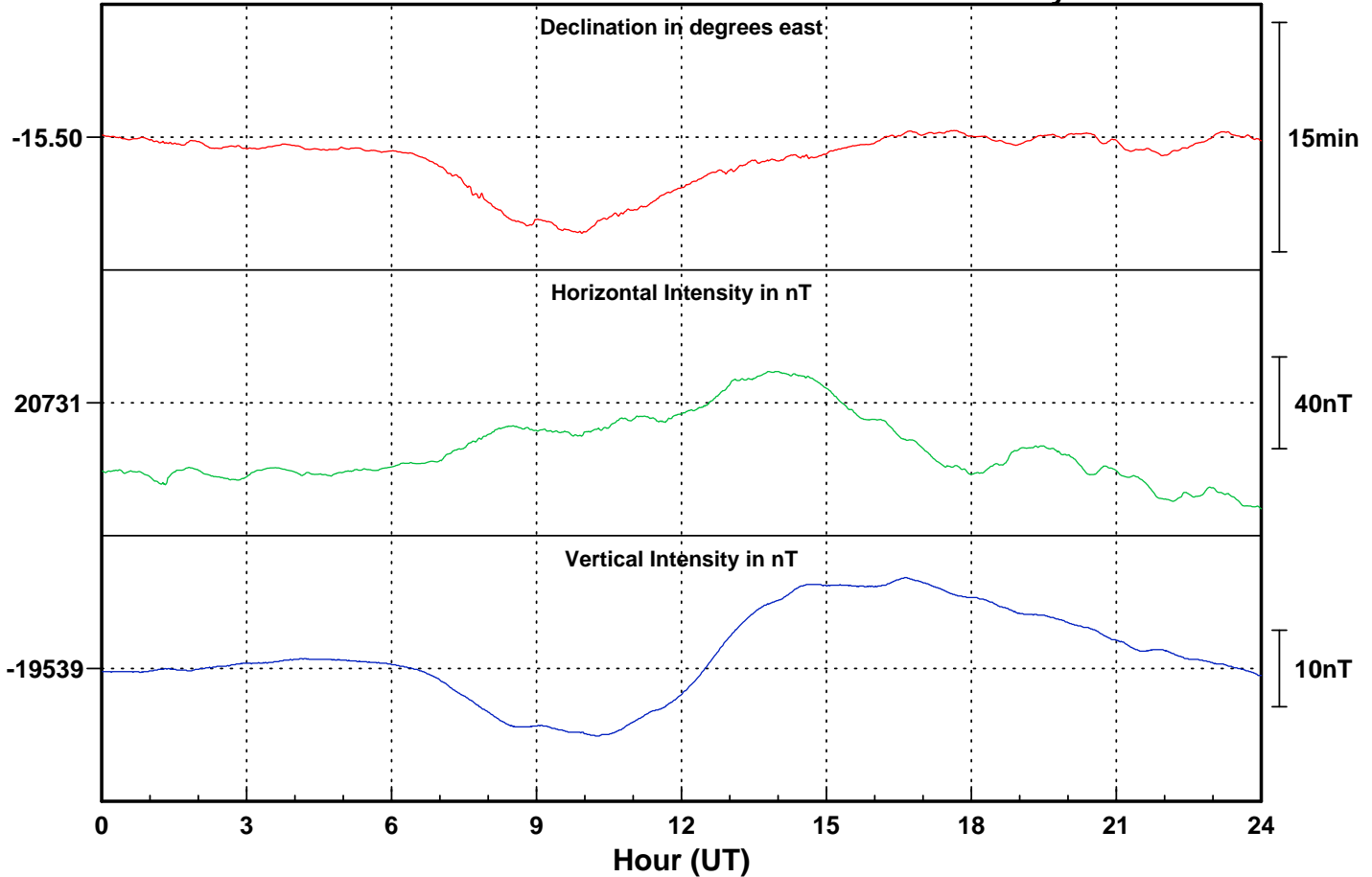
# Ascension Island

Day number: 313



Date: 10-11-2013

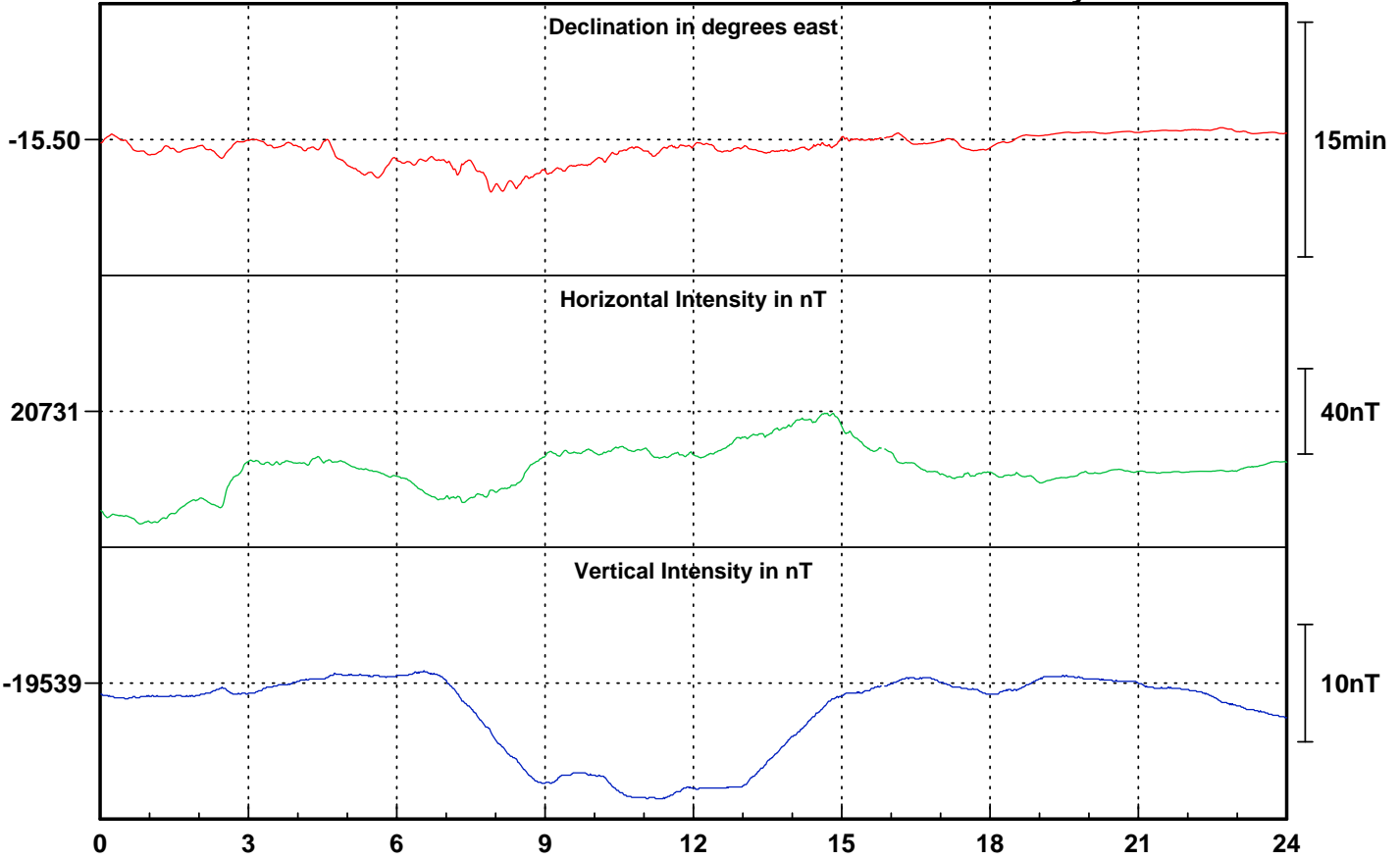
Day number: 314



Date: 11-11-2013

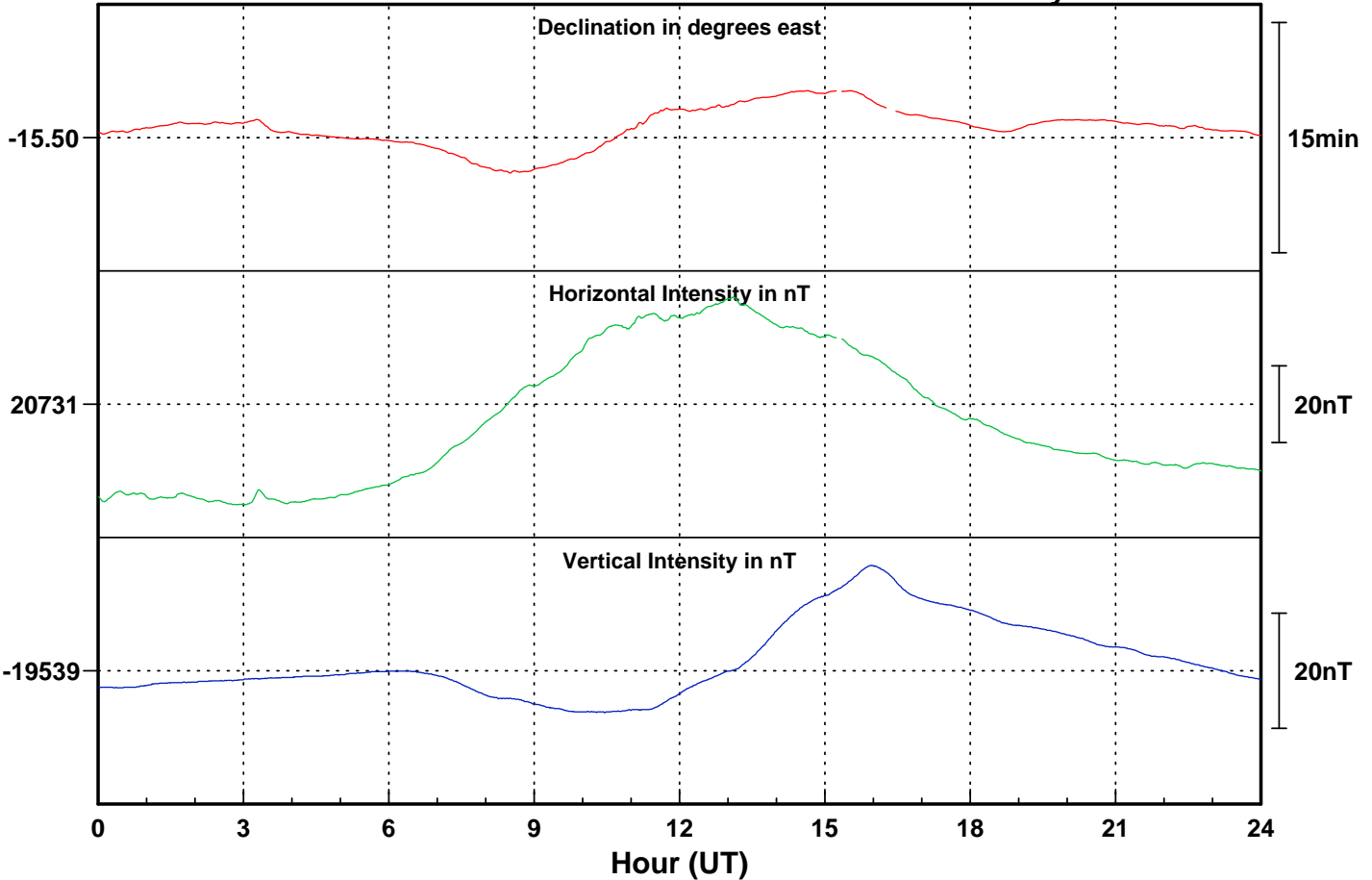
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Day number: 315



Date: 12-11-2013

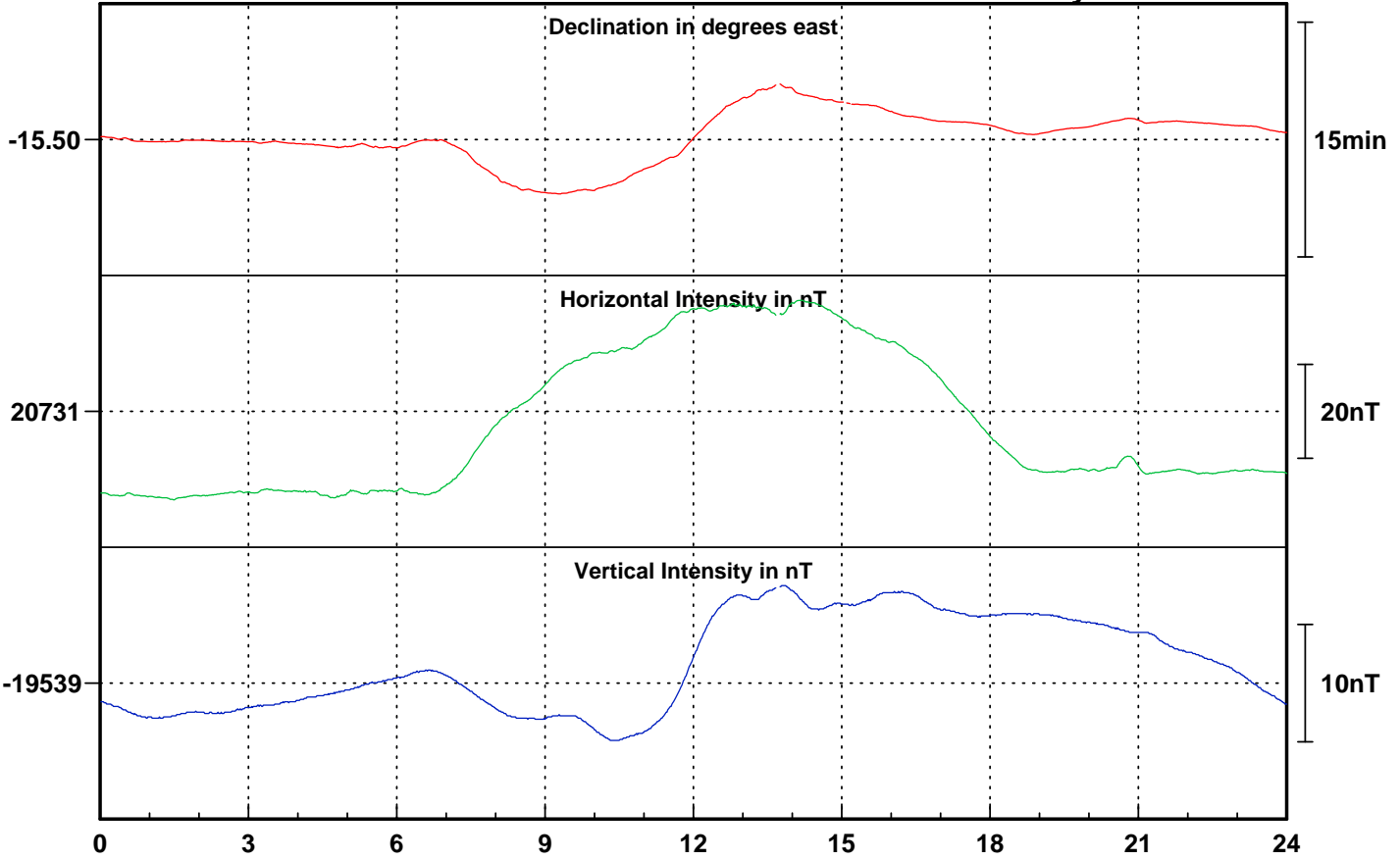
Day number: 316



Date: 13-11-2013

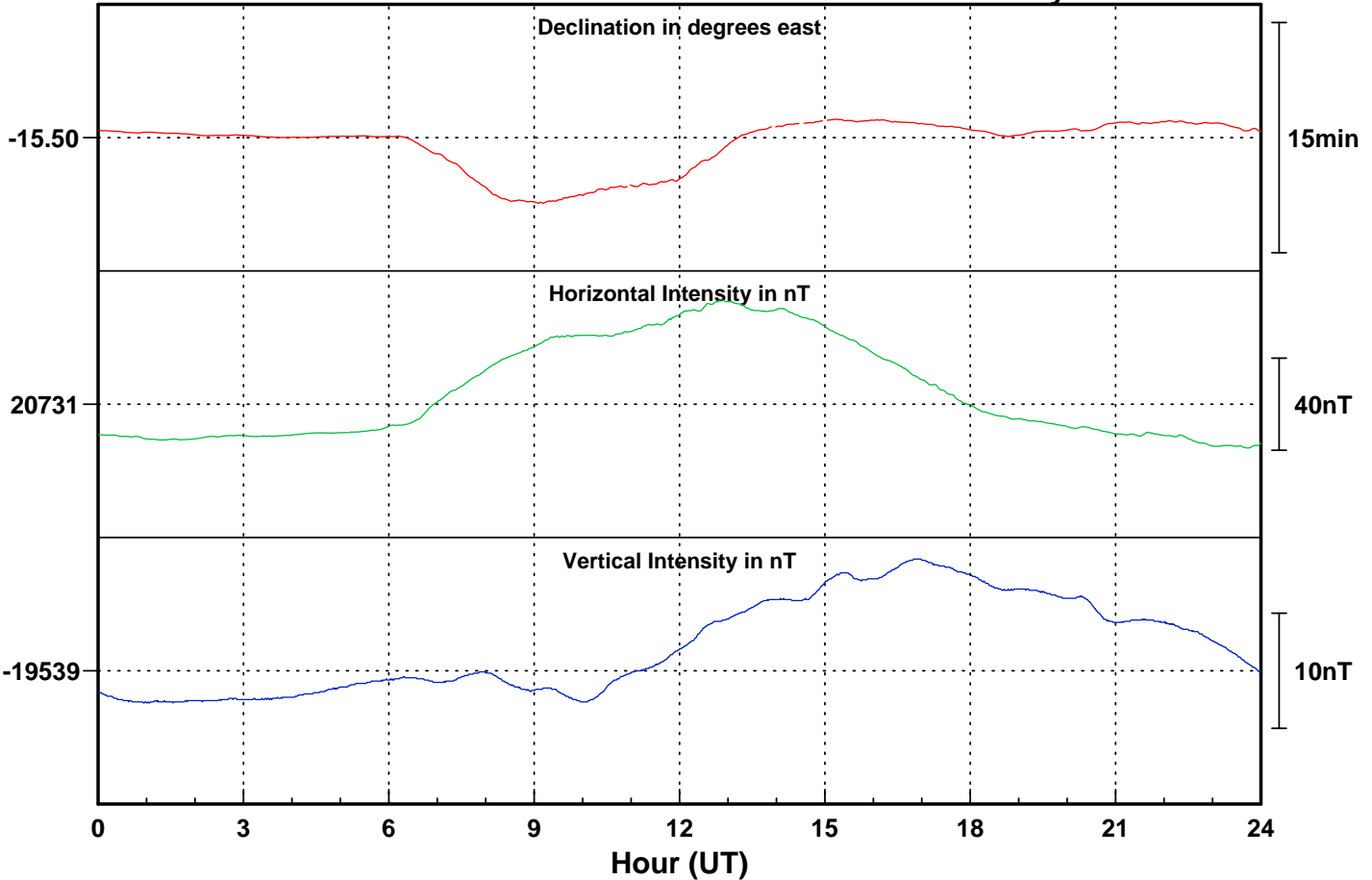
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Day number: 317



Date: 14-11-2013

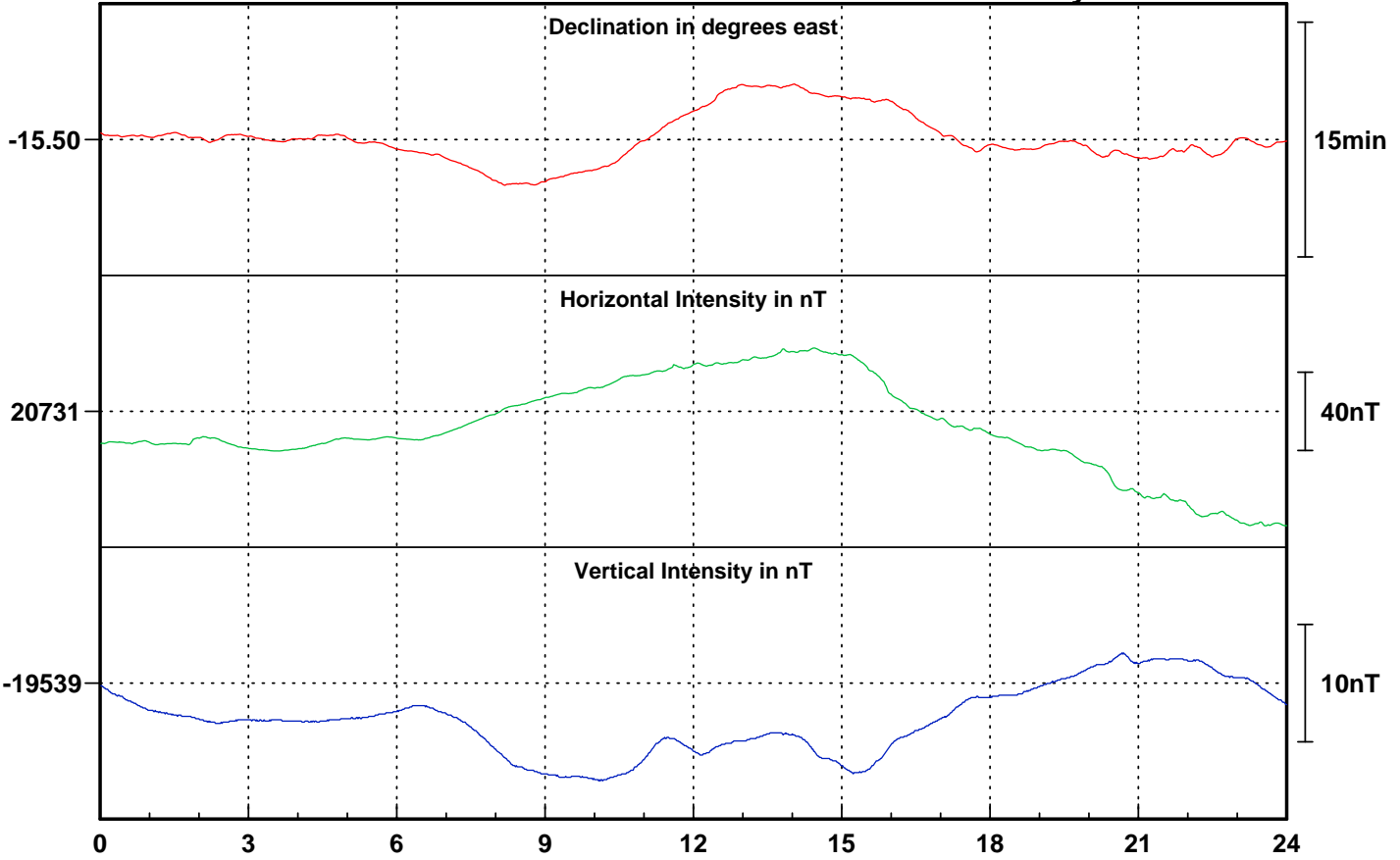
Day number: 318



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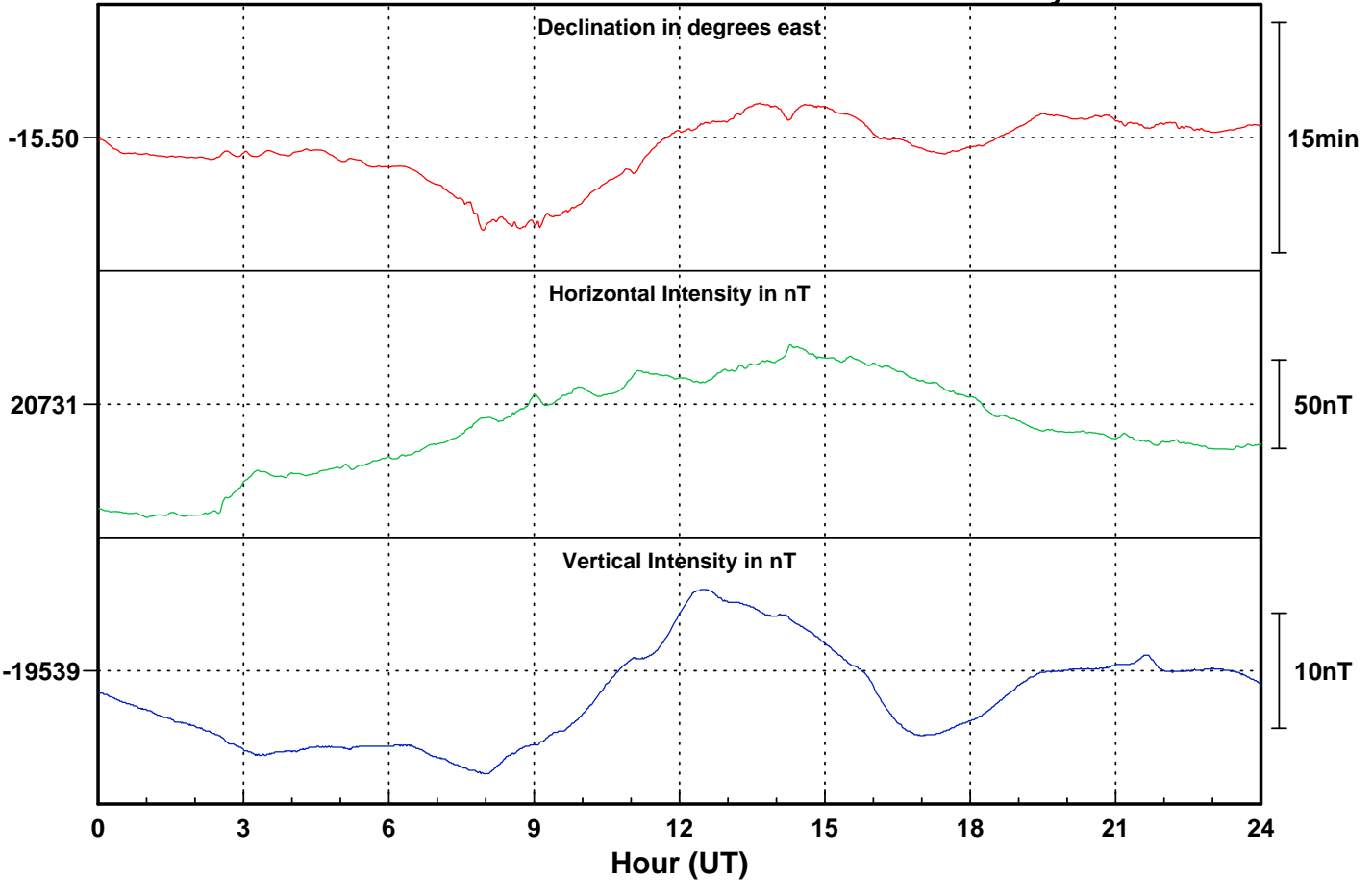
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Day number: 319



Date: 16-11-2013

Day number: 320

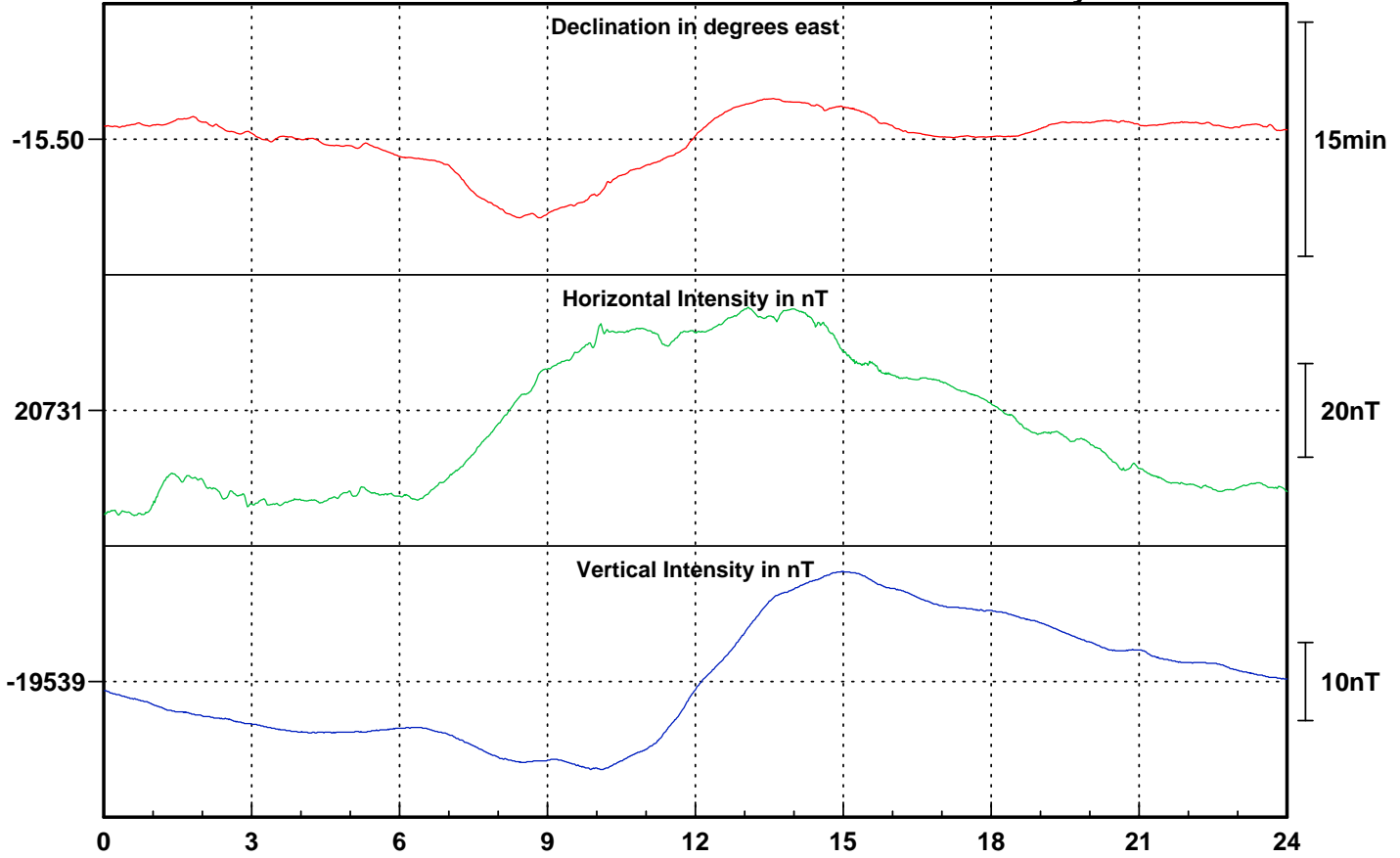




Date: 17-11-2013

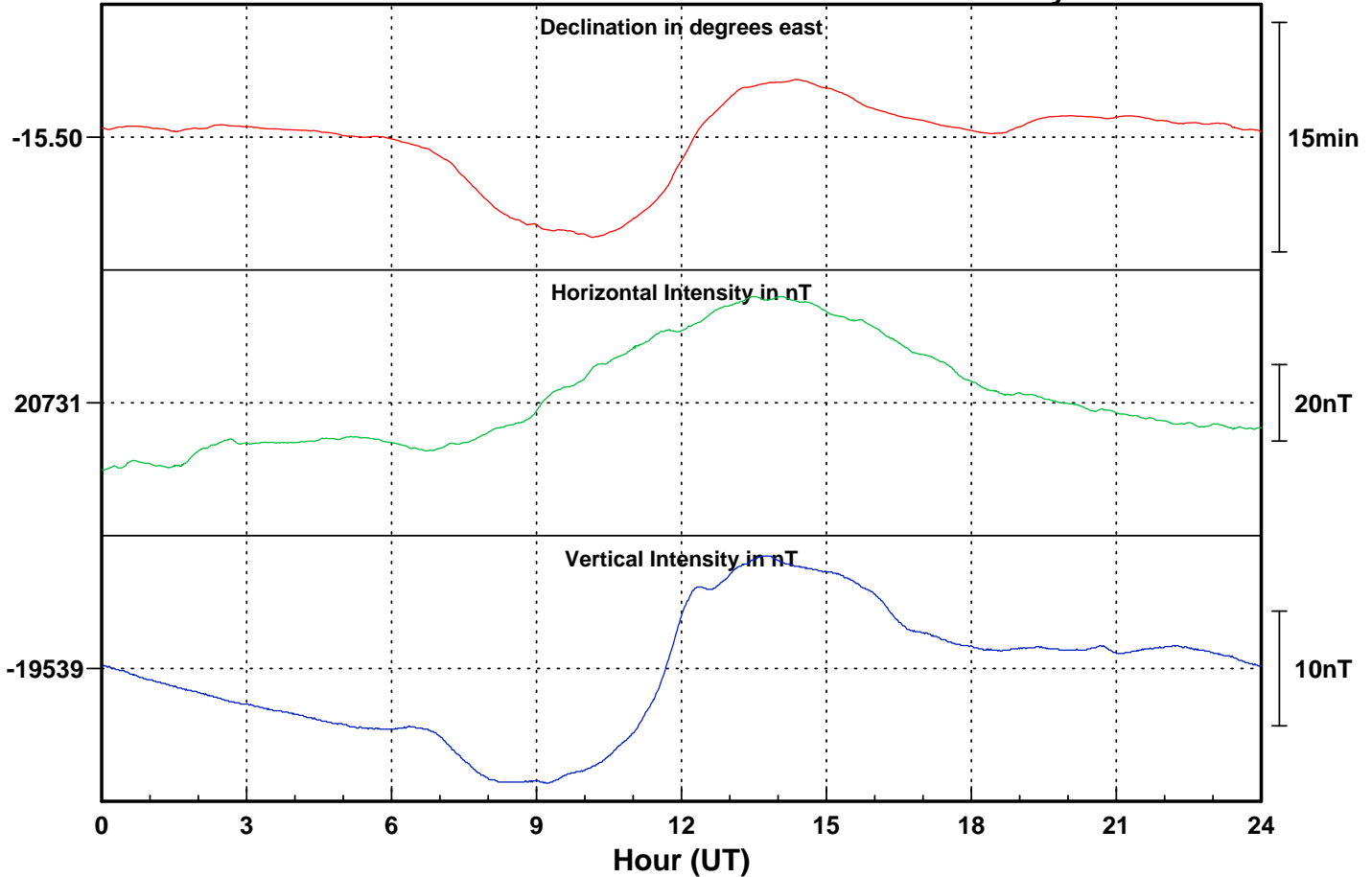
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Day number: 321



Date: 18-11-2013

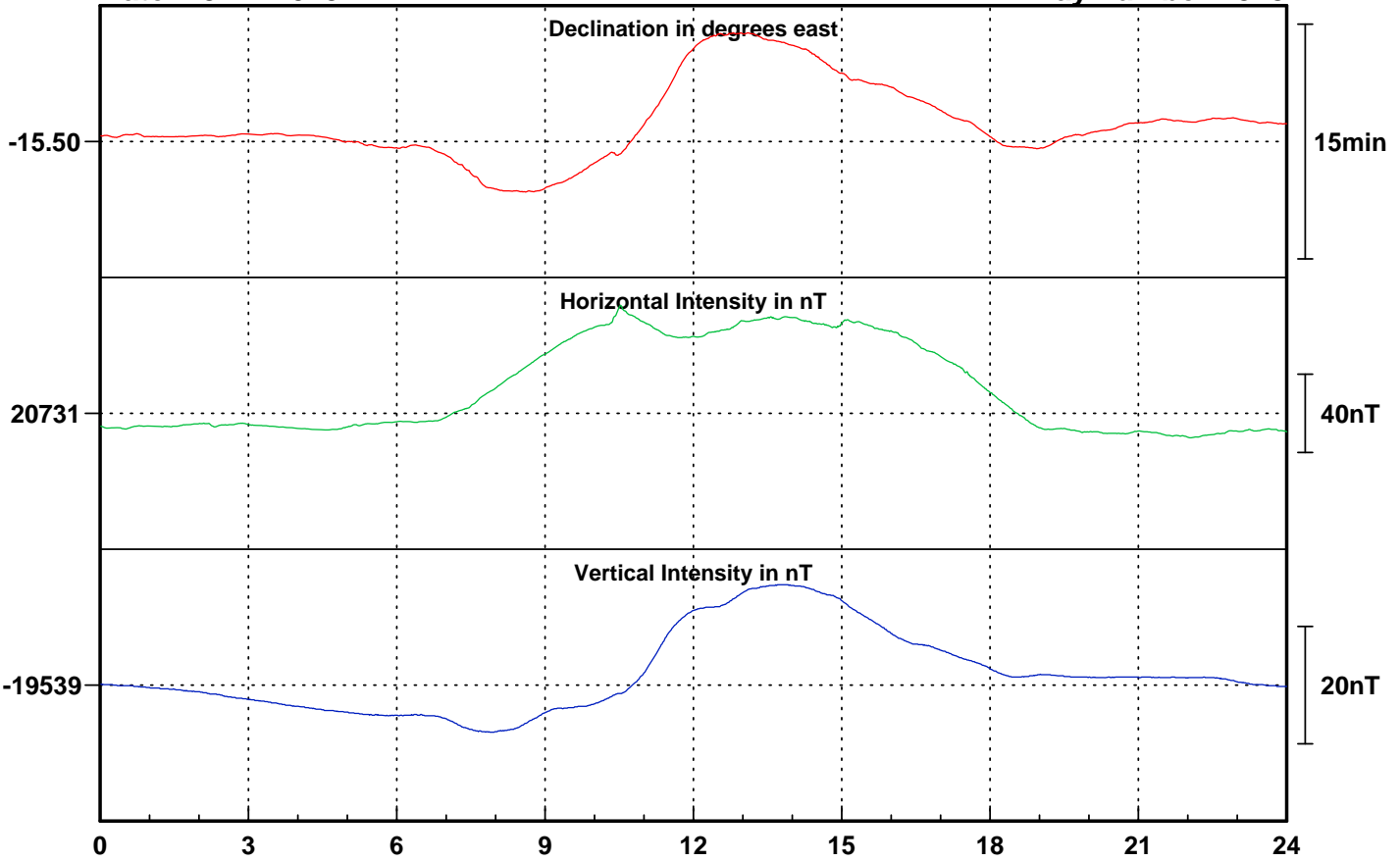
Day number: 322



Date: 19-11-2013

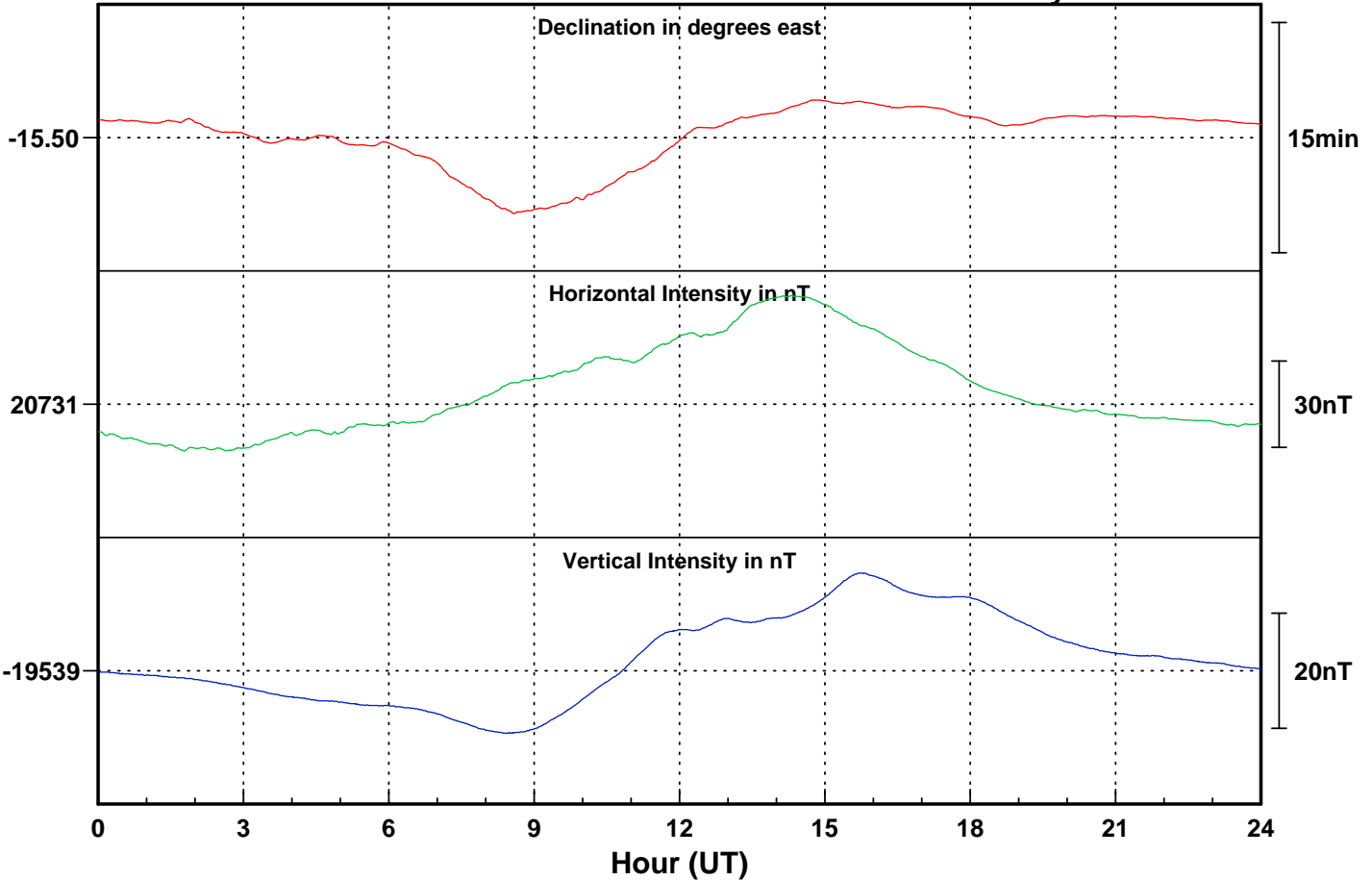
# Ascension Island

Day number: 323



Date: 20-11-2013

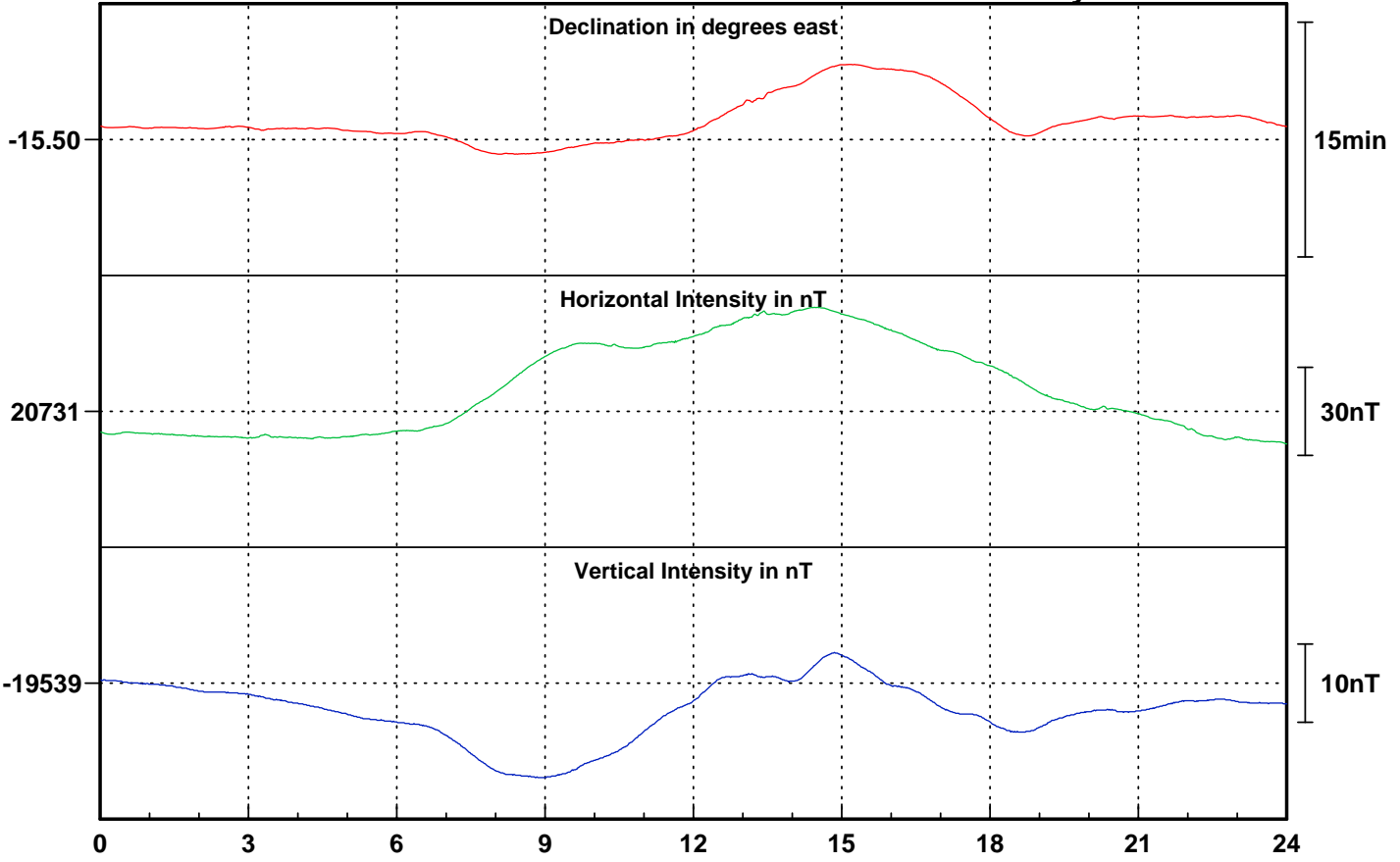
Day number: 324



Date: 21-11-2013

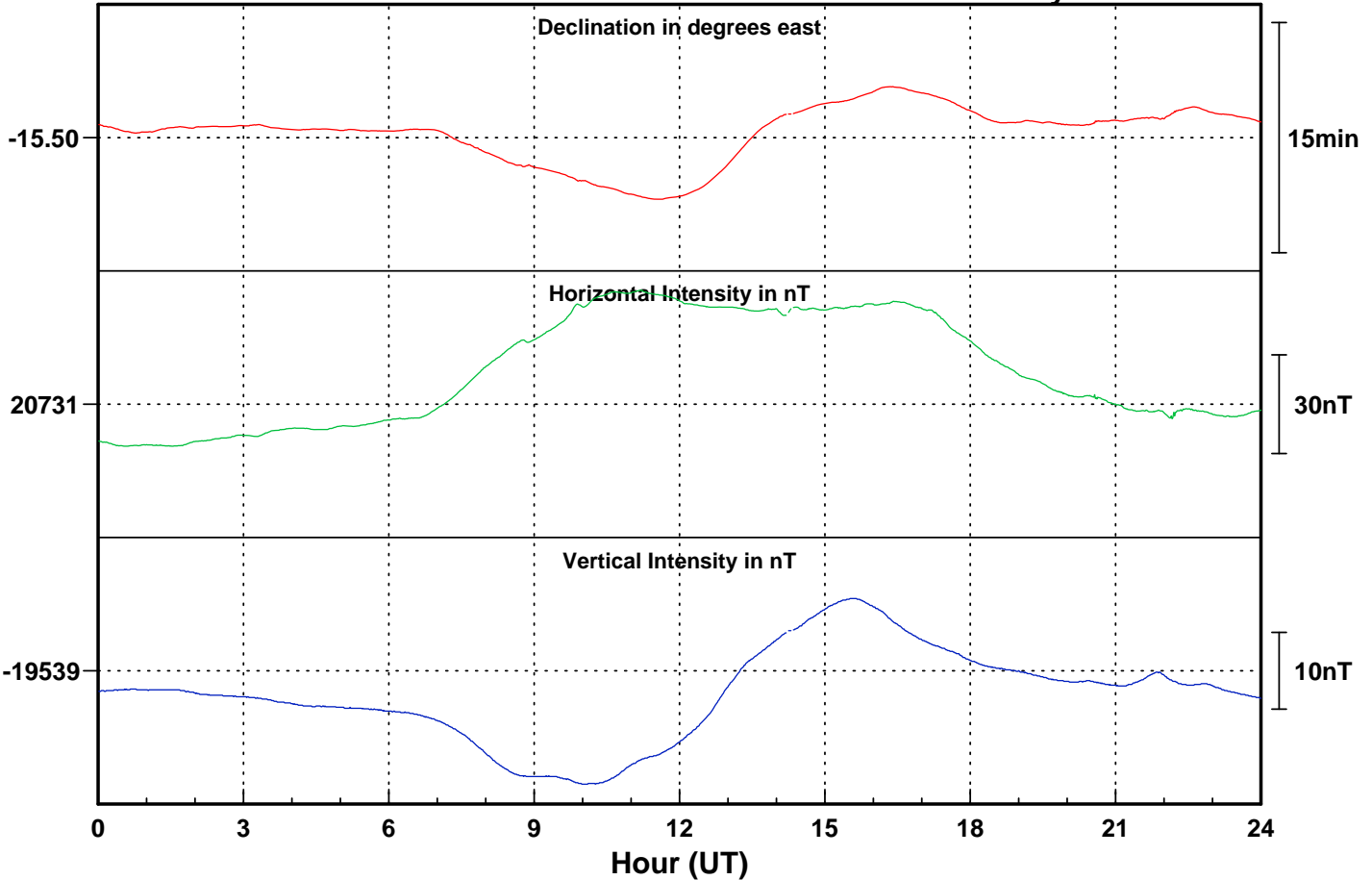
# Ascension Island

Day number: 325



Date: 22-11-2013

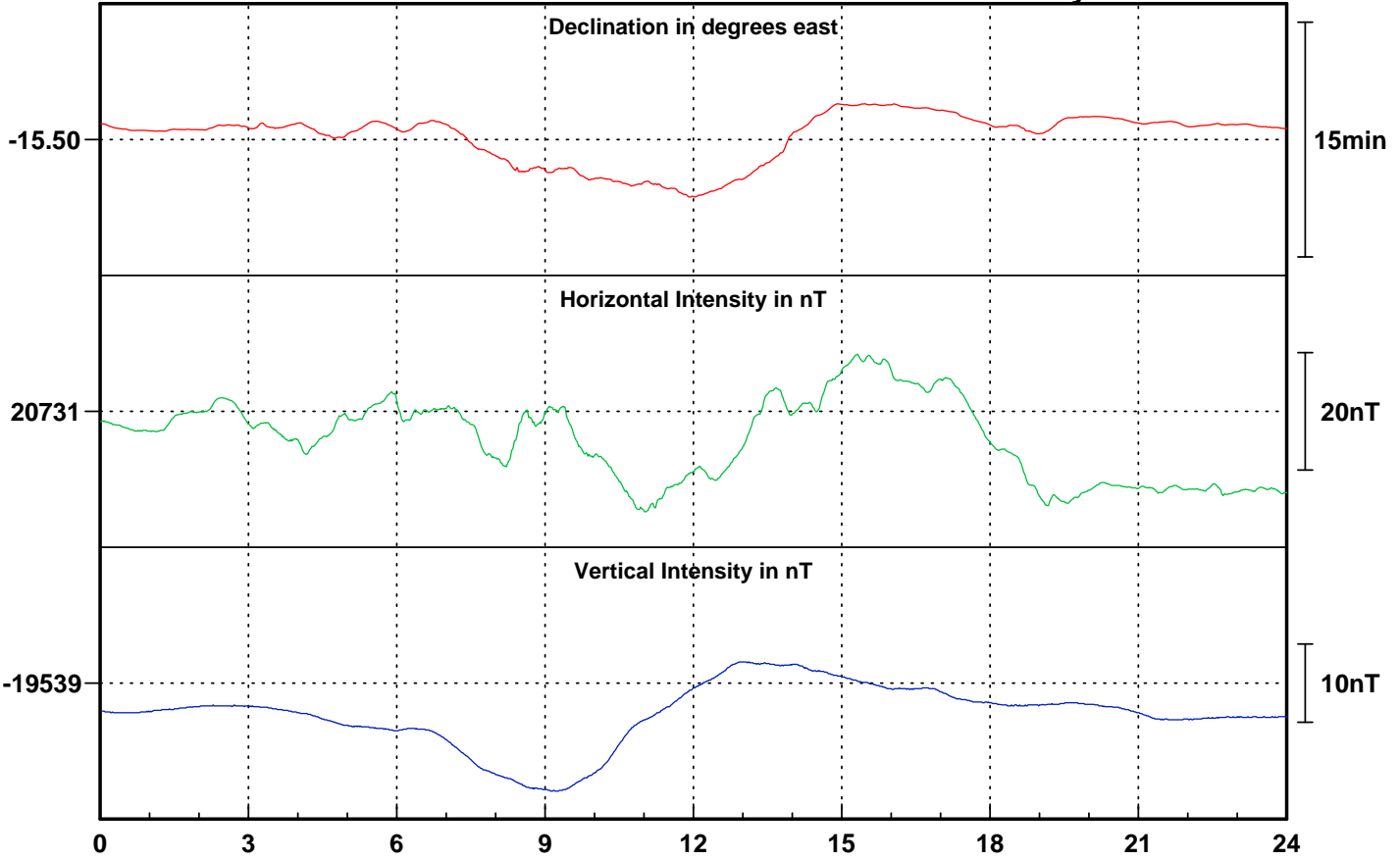
Day number: 326



Date: 23-11-2013

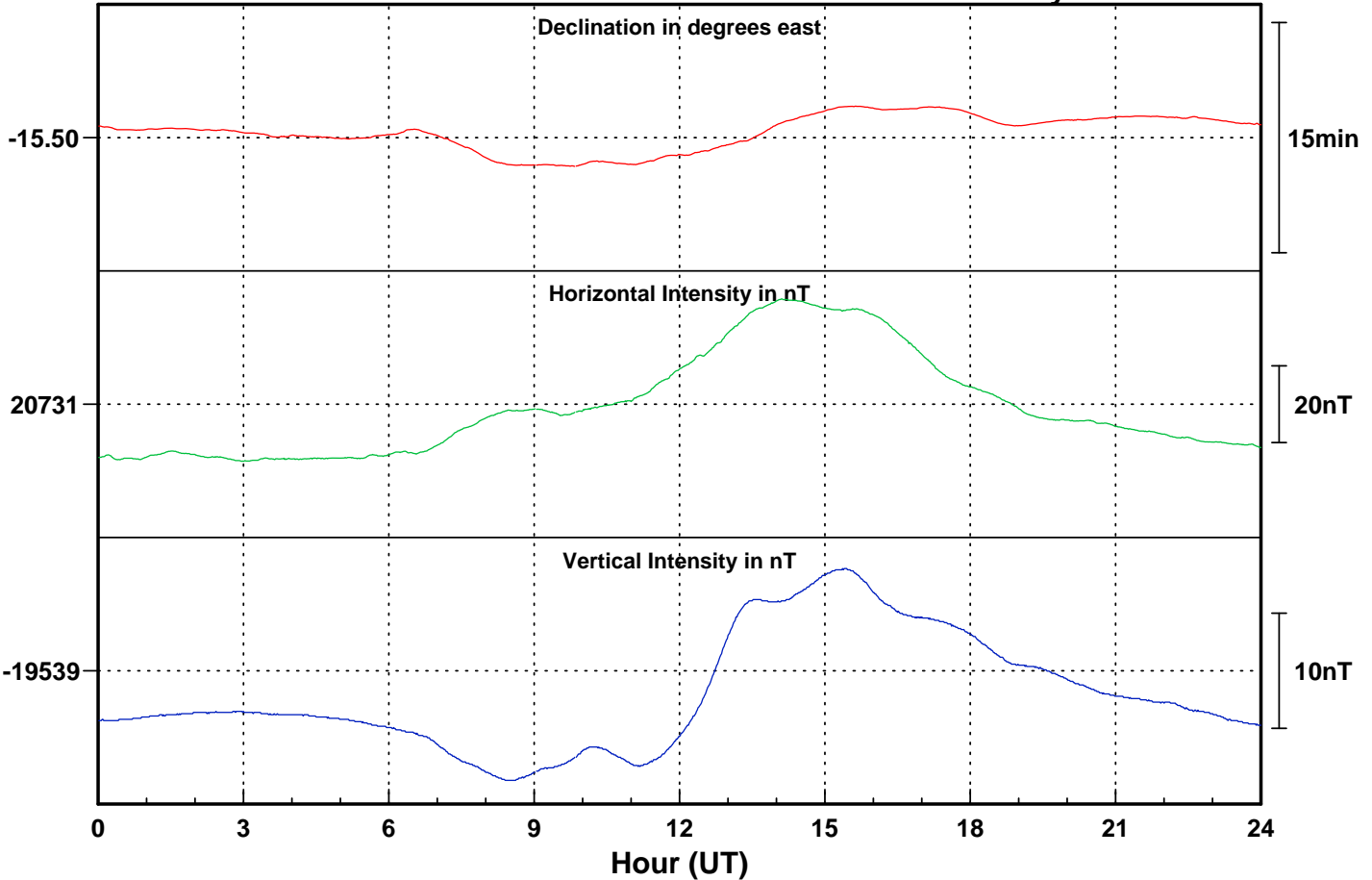
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Day number: 327



Date: 24-11-2013

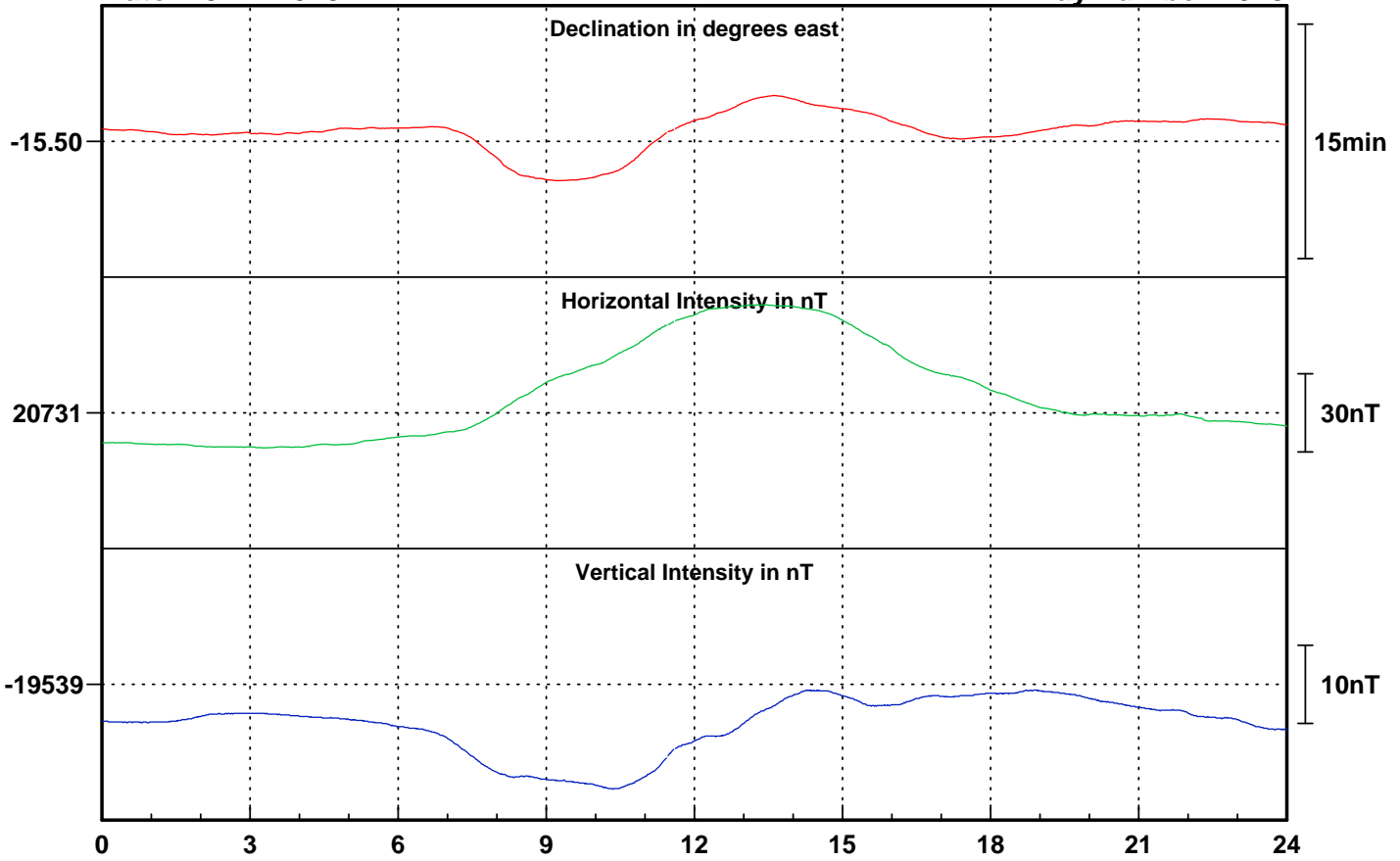
Day number: 328



Date: 25-11-2013

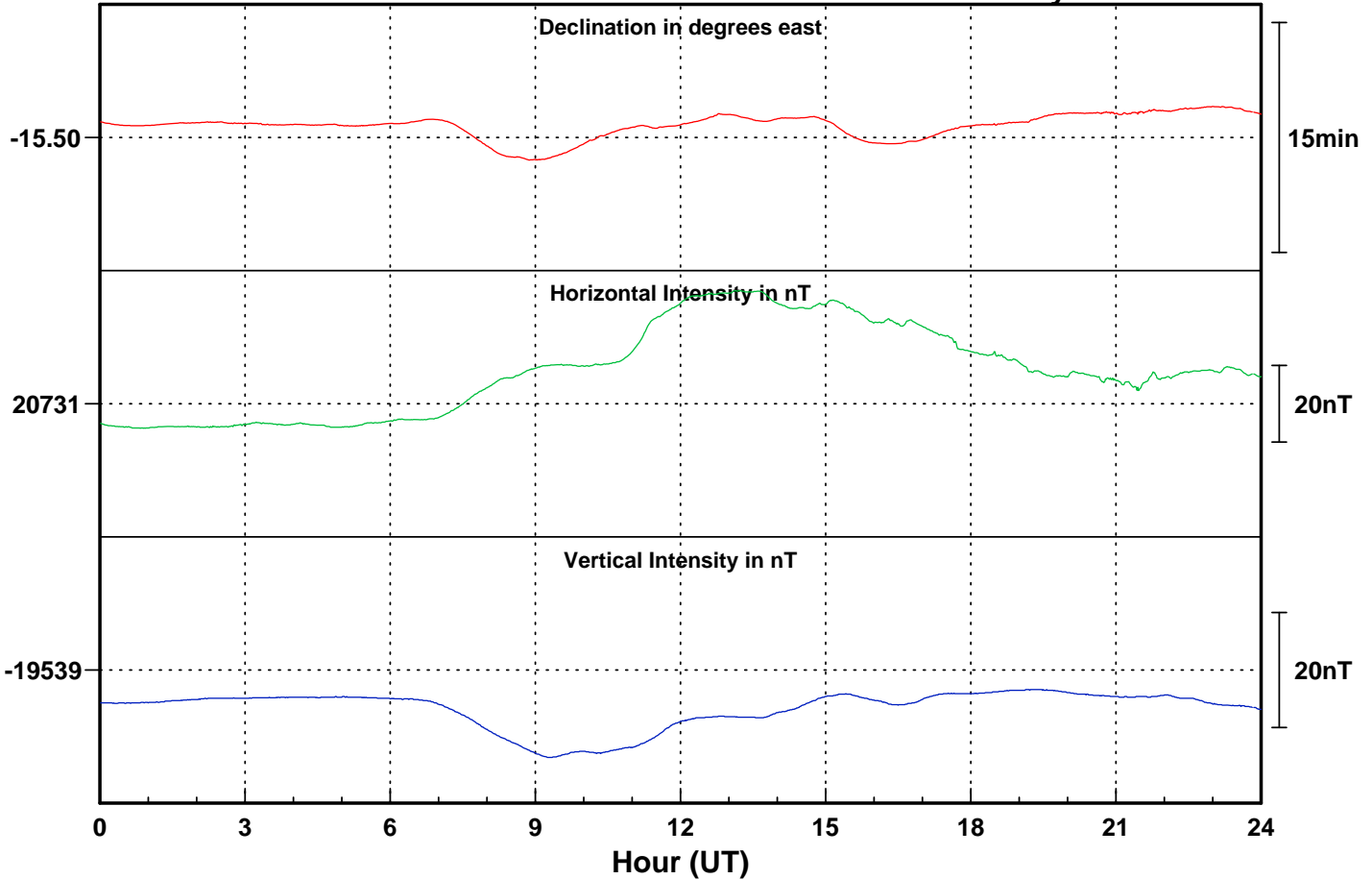
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Day number: 329



Date: 26-11-2013

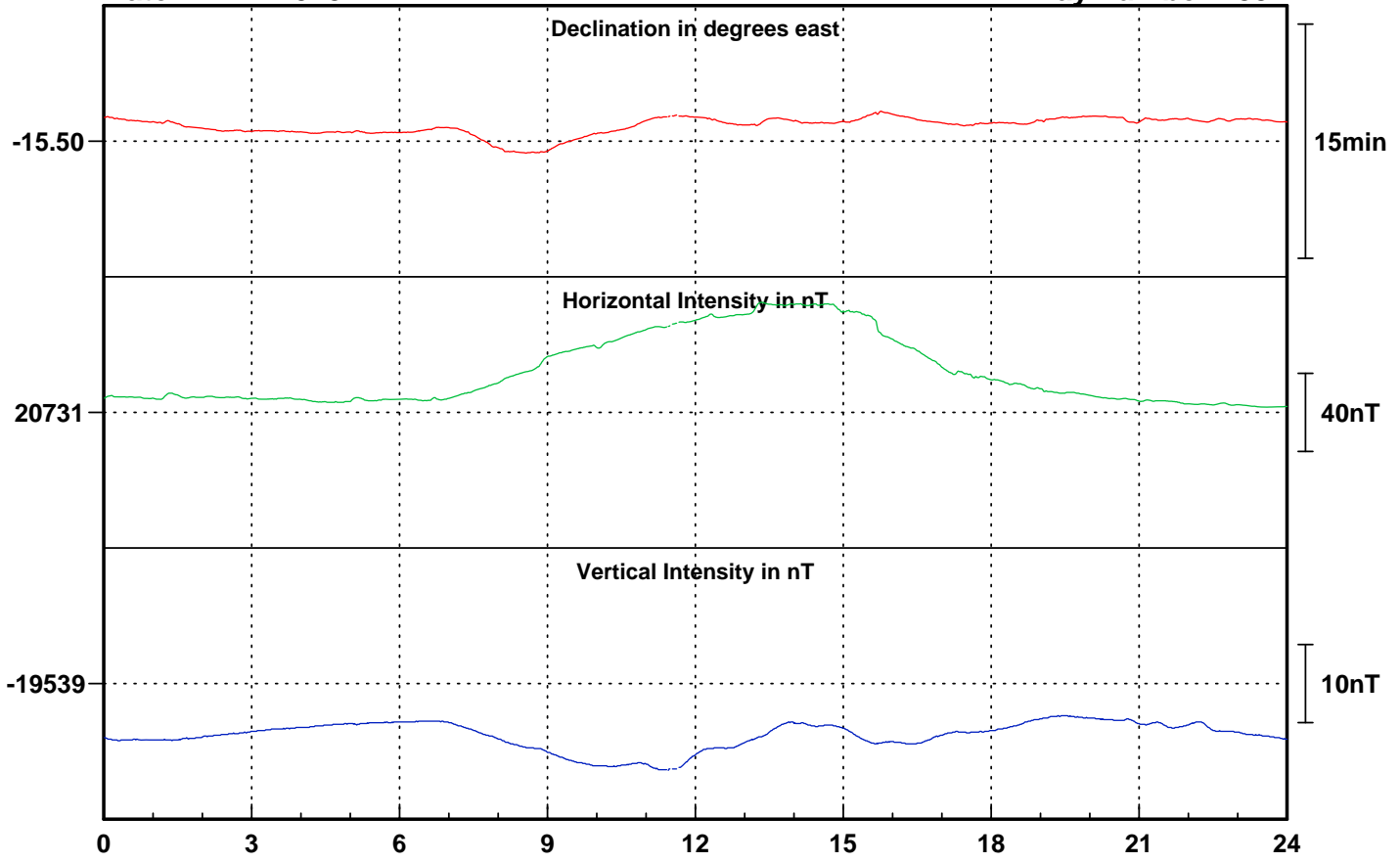
Day number: 330



Date: 27-11-2013

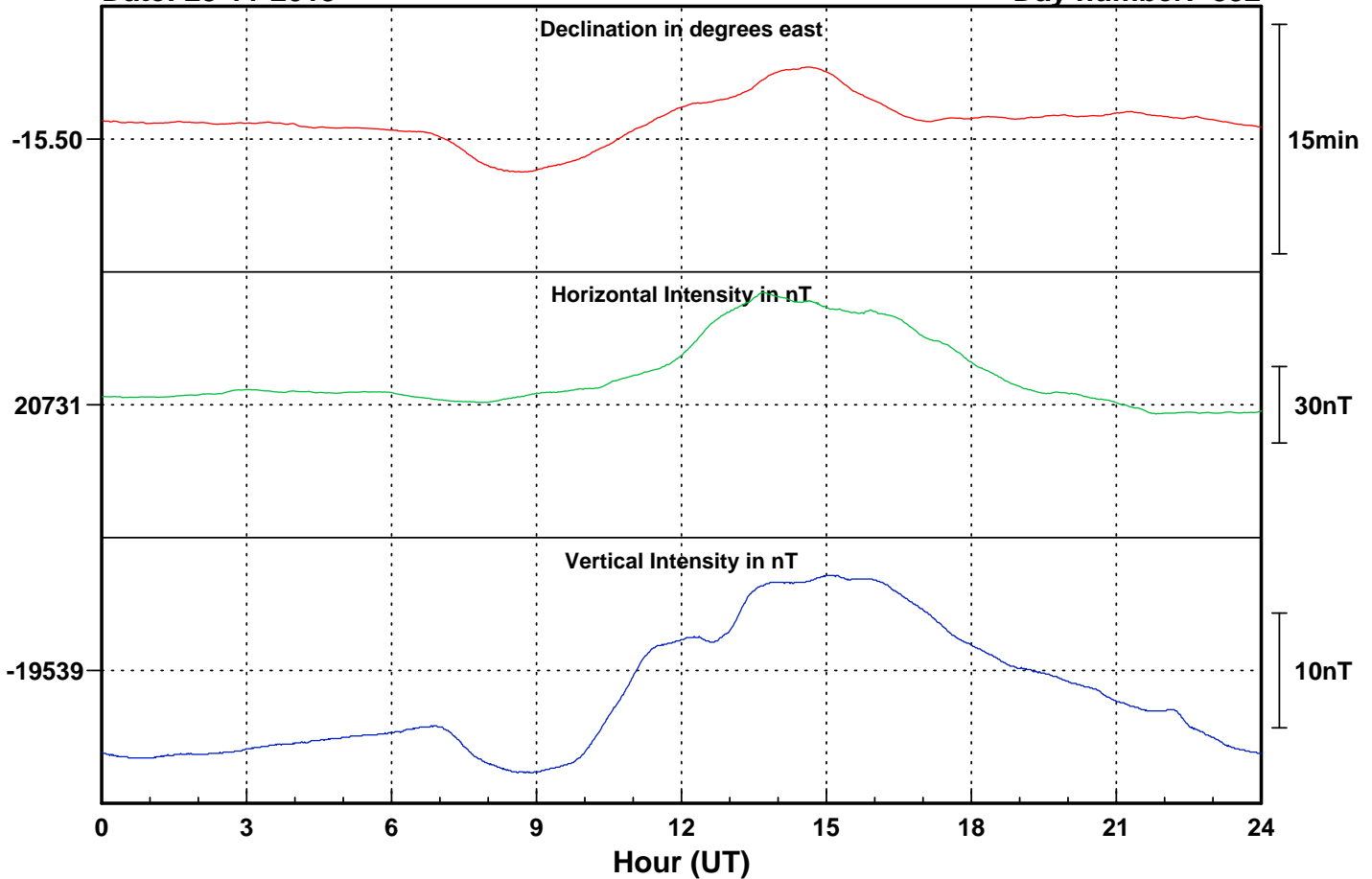
# Ascension Island

Day number: 331



Date: 28-11-2013

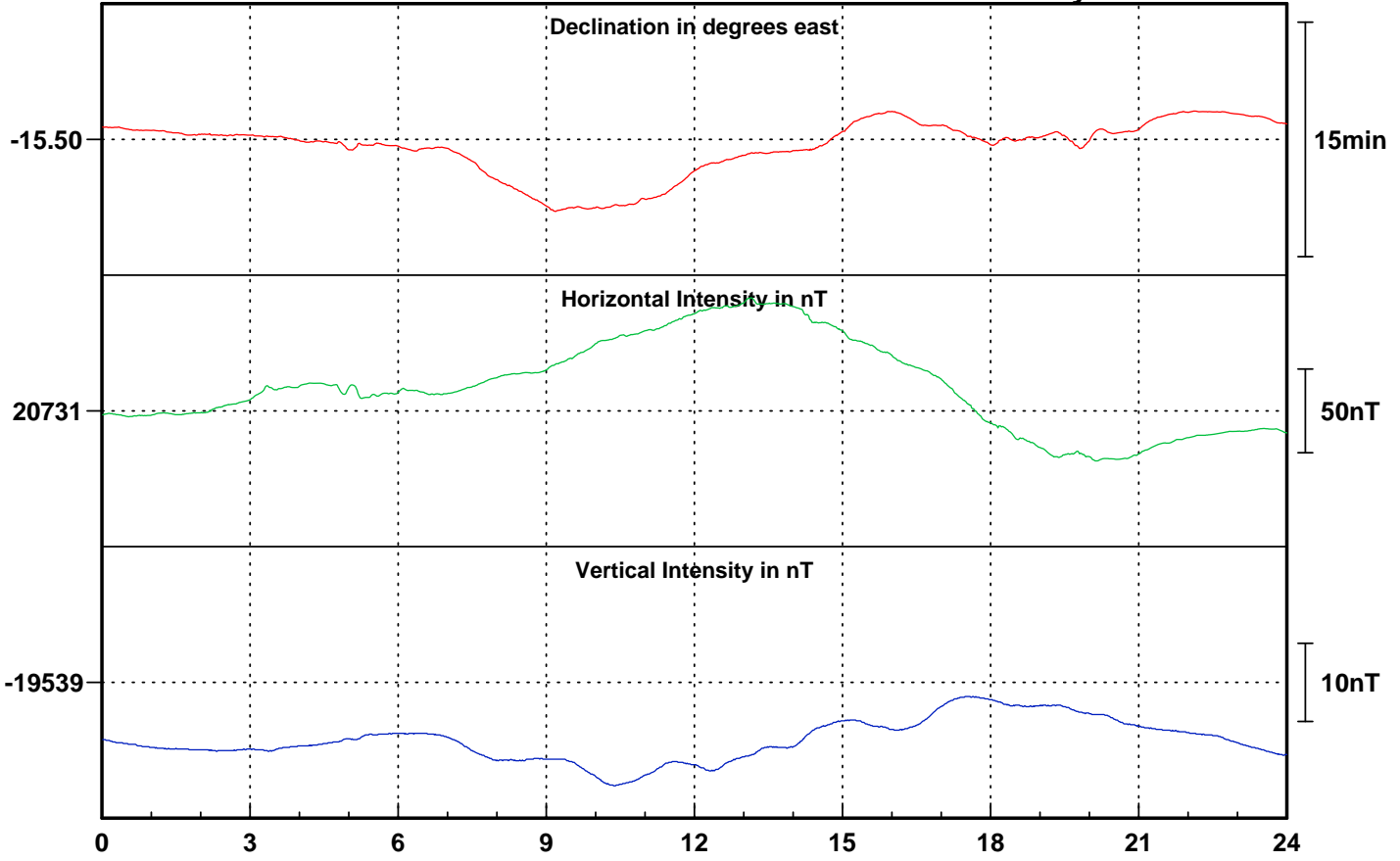
Day number: 332



Date: 29-11-2013

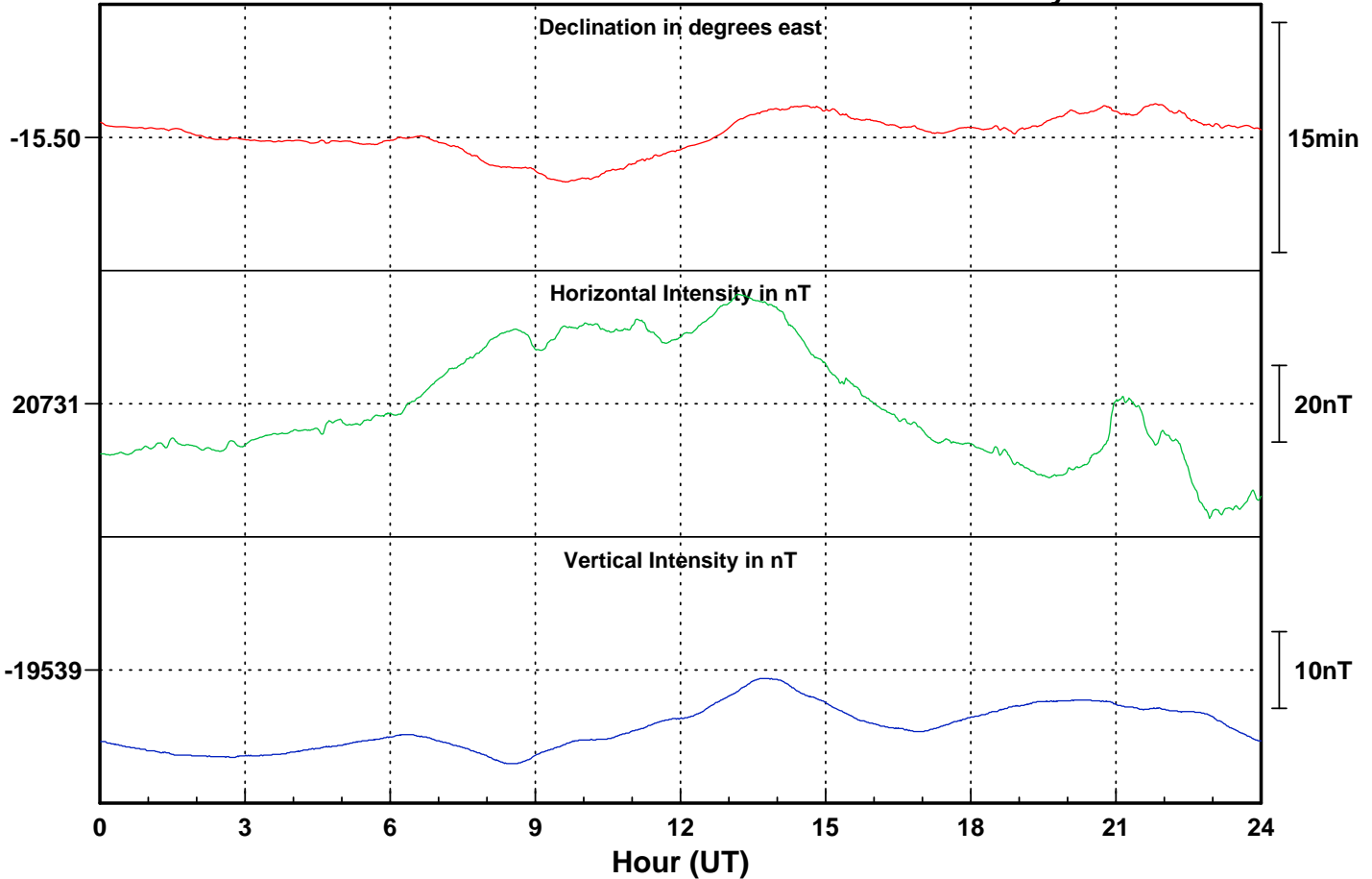
# Ascension Island

Day number: 333



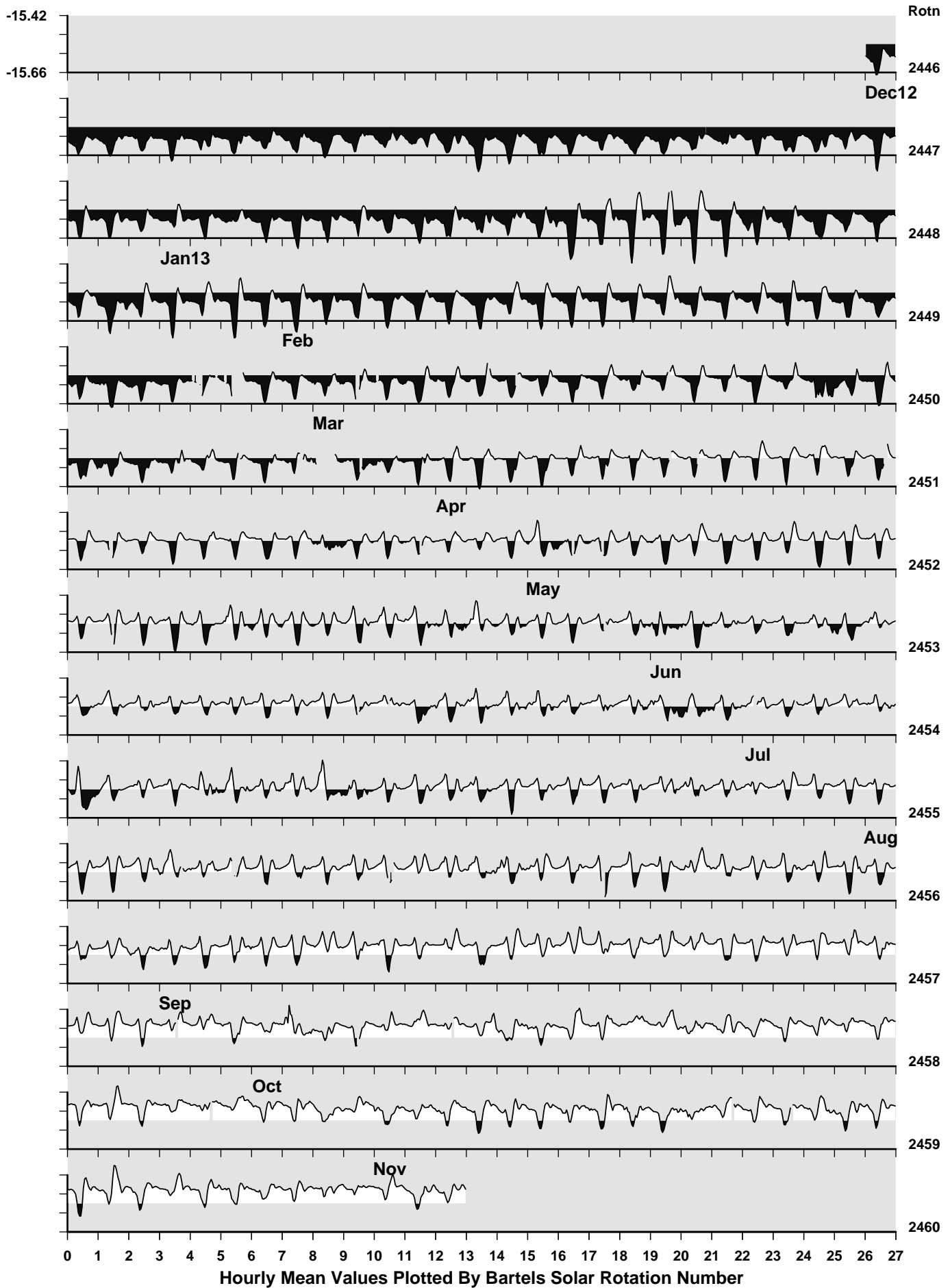
Date: 30-11-2013

Day number: 334



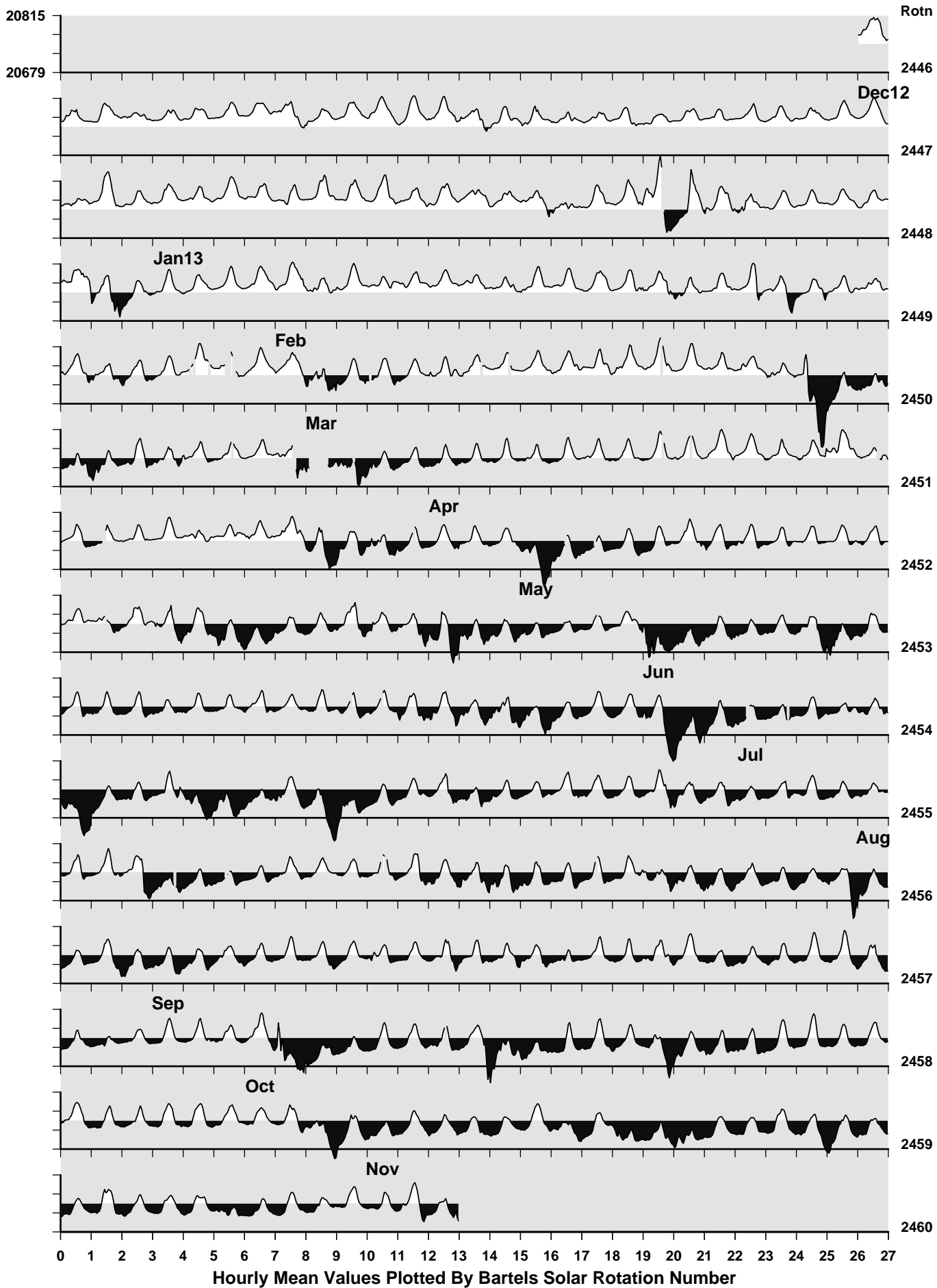


# Ascension Island Observatory: Declination (degrees)

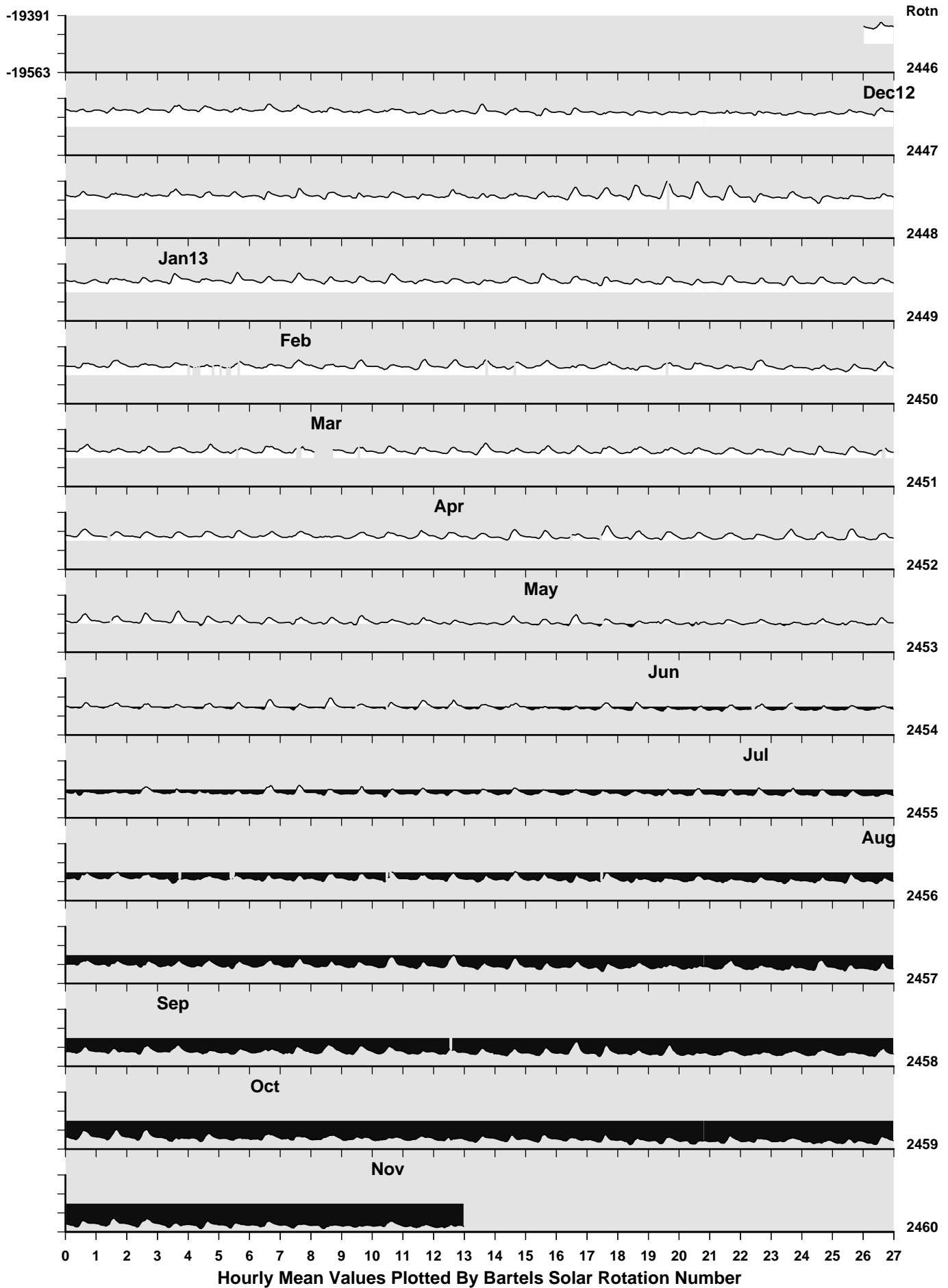


Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Island Observatory: Horizontal Intensity fhT<sub>L</sub>

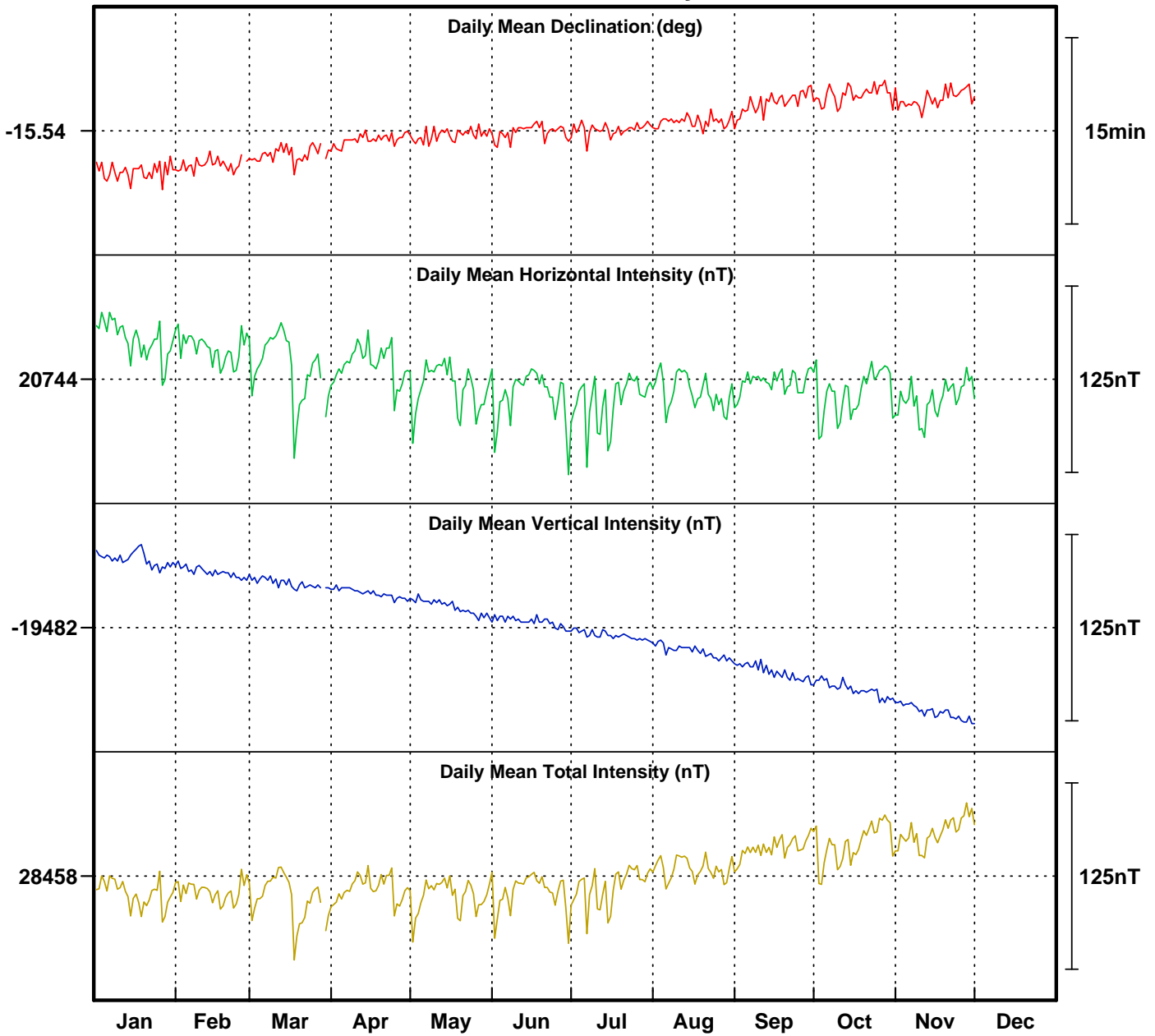


# Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Is Observatory 2013



### Monthly Mean Values for Ascension Island Observatory 2013

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-15° 35.6′	20771 nT	-43° 5.9′	20007 nT	-5584 nT	-19436 nT	28446 nT
February	-15° 35.1′	20765 nT	-43° 7.2′	20001 nT	-5579 nT	-19444 nT	28448 nT
March	-15° 34.2′	20751 nT	-43° 9.0′	19989 nT	-5570 nT	-19452 nT	28442 nT
April	-15° 33.0′	20755 nT	-43° 9.3′	19995 nT	-5564 nT	-19459 nT	28450 nT
May	-15° 32.7′	20739 nT	-43° 11.4′	19980 nT	-5558 nT	-19468 nT	28445 nT
June	-15° 32.5′	20732 nT	-43° 12.8′	19974 nT	-5555 nT	-19478 nT	28446 nT
July	-15° 32.2′	20730 nT	-43° 13.8′	19973 nT	-5553 nT	-19487 nT	28452 nT
August	-15° 31.6′	20736 nT	-43° 14.3′	19979 nT	-5551 nT	-19498 nT	28463 nT
September	-15° 30.0′	20743 nT	-43° 14.9′	19988 nT	-5543 nT	-19512 nT	28478 nT
October	-15° 29.4′	20735 nT	-43° 16.6′	19981 nT	-5538 nT	-19523 nT	28480 nT
November	-15° 29.8′	20731 nT	-43° 18.2′	19978 nT	-5539 nT	-19539 nT	28488 nT

#### Note

i. The values shown here are provisional.