

**BRITISH GEOLOGICAL SURVEY**

# Ascension Island

# Observatory

# Monthly

# Magnetic

# Bulletin

April 2016

**16/04/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:*  $7^{\circ}56'56.4''S$   $345^{\circ}37'26.4''E$   
*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

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 OBSERVATORY

## ABSOLUTE OBSERVATIONS

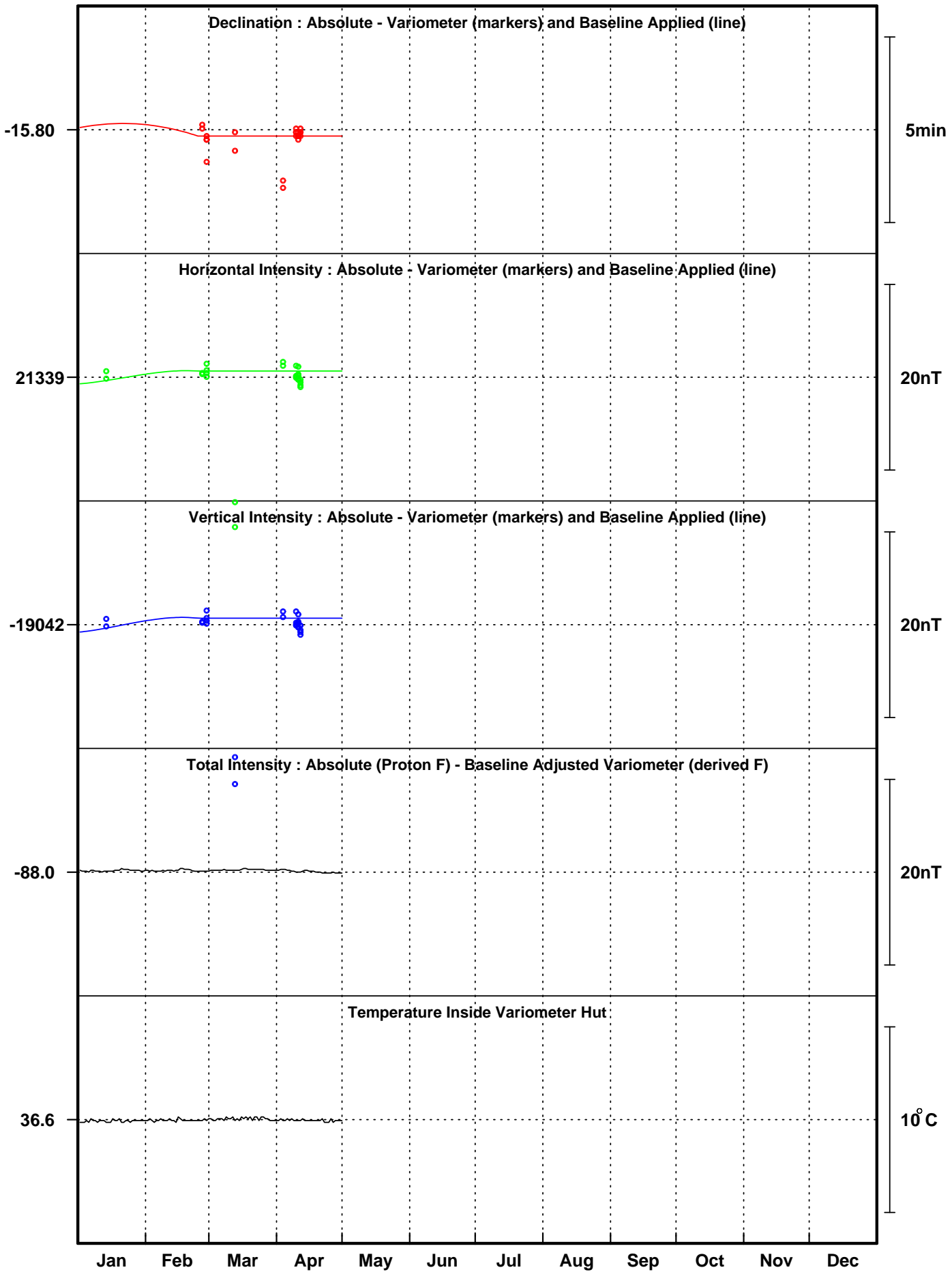
Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
03-Apr-16	94	10:26	-15.2004	-15.8267	10:36	-43.8749	88.0	28602.9	20618.6	21340.1	-19824.3	-19040.8	GA
03-Apr-16	94	10:45	-15.2011	-15.8233	10:57	-43.8665	88.0	28605.4	20623.2	21340.5	-19823.0	-19040.2	GA
09-Apr-16	100	10:00	-15.2414	-15.8017	10:17	-43.8592	88.0	28617.2	20634.3	21338.9	-19828.5	-19041.6	TT
09-Apr-16	100	10:46	-15.2573	-15.8033	11:03	-43.8416	88.0	28620.4	20642.7	21338.8	-19824.4	-19041.7	TT
09-Apr-16	100	11:53	-15.2245	-15.8000	12:05	-43.8049	88.0	28626.8	20660.0	21340.1	-19815.6	-19040.2	TT
09-Apr-16	100	12:23	-15.1970	-15.8017	12:34	-43.7973	88.0	28627.5	20663.1	21339.0	-19813.3	-19041.4	TT
10-Apr-16	101	08:31	-15.1614	-15.8017	08:48	-43.8537	88.0	28617.8	20636.6	21338.6	-19827.0	-19041.9	TT
10-Apr-16	101	09:01	-15.1722	-15.8033	09:14	-43.8483	88.0	28618.8	20639.2	21339.0	-19825.7	-19041.4	TT

# ASCENSION ISLAND OBSERVATORY

ABSOLUTE OBSERVATIONS (cont.)

Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
10-Apr-16	101	09:30	-15.1939	-15.8033	09:44	-43.8431	88.0	28620.7	20642.4	21339.1	-19825.2	-19041.5	TT
10-Apr-16	101	09:58	-15.2133	-15.8033	10:13	-43.8348	88.0	28623.8	20647.5	21339.2	-19824.3	-19041.3	TT
10-Apr-16	101	17:16	-15.1220	-15.8033	17:33	-43.8413	88.0	28604.5	20631.3	21340.0	-19813.3	-19040.5	TT
10-Apr-16	101	17:45	-15.1214	-15.8050	17:58	-43.8500	88.0	28605.2	20628.8	21338.6	-19816.9	-19041.9	TT
11-Apr-16	102	08:52	-15.1739	-15.8017	09:04	-43.8484	88.0	28623.4	20642.5	21338.6	-19828.9	-19041.7	TT
11-Apr-16	102	09:15	-15.1913	-15.8033	09:27	-43.8458	88.0	28627.2	20646.1	21338.3	-19830.6	-19042.2	TT
11-Apr-16	102	09:38	-15.2007	-15.8000	09:49	-43.8433	88.0	28629.7	20648.8	21337.8	-19831.4	-19042.7	TT
11-Apr-16	102	10:00	-15.2117	-15.8017	10:12	-43.8392	88.0	28631.3	20651.3	21338.0	-19831.0	-19042.4	TT

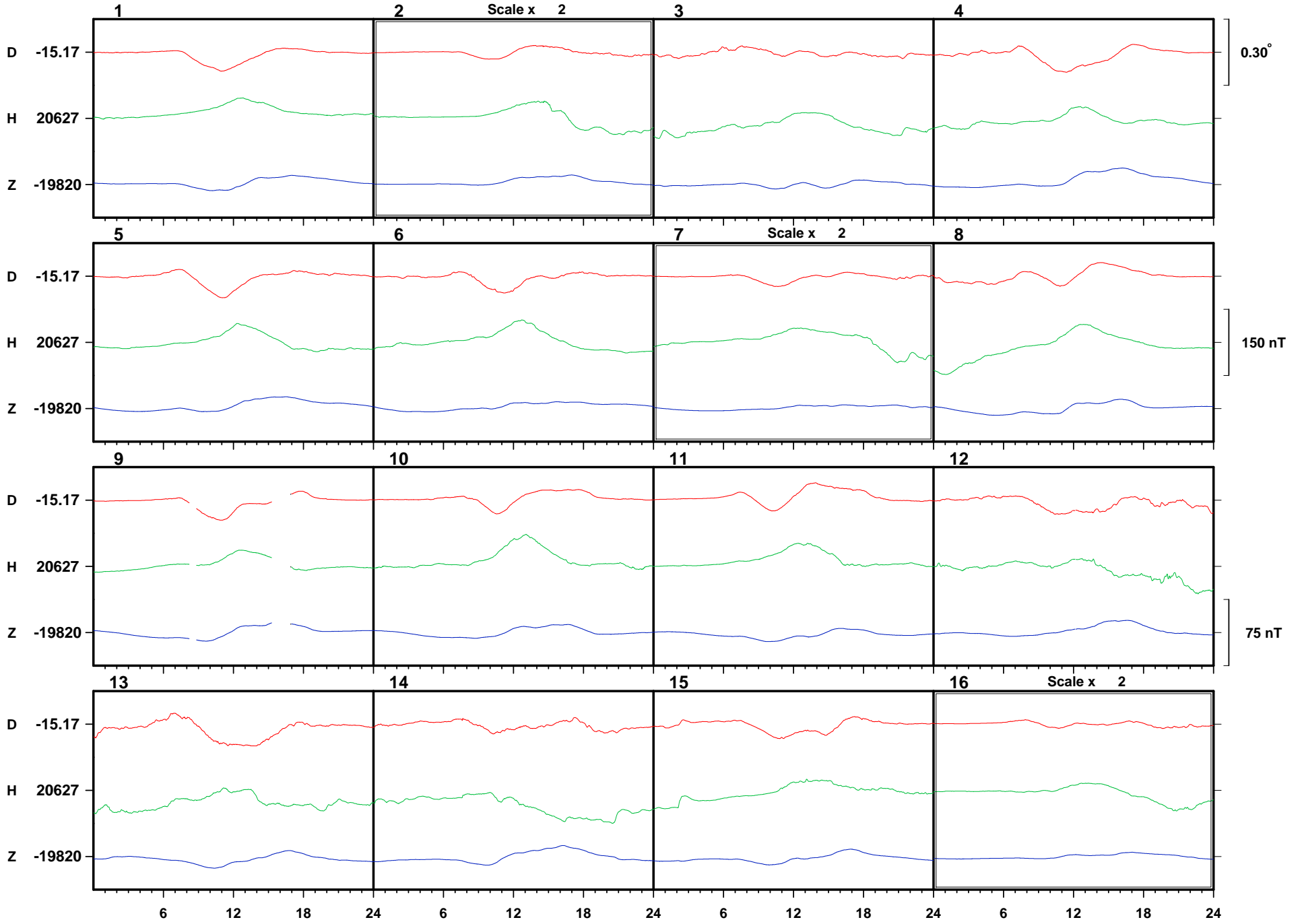
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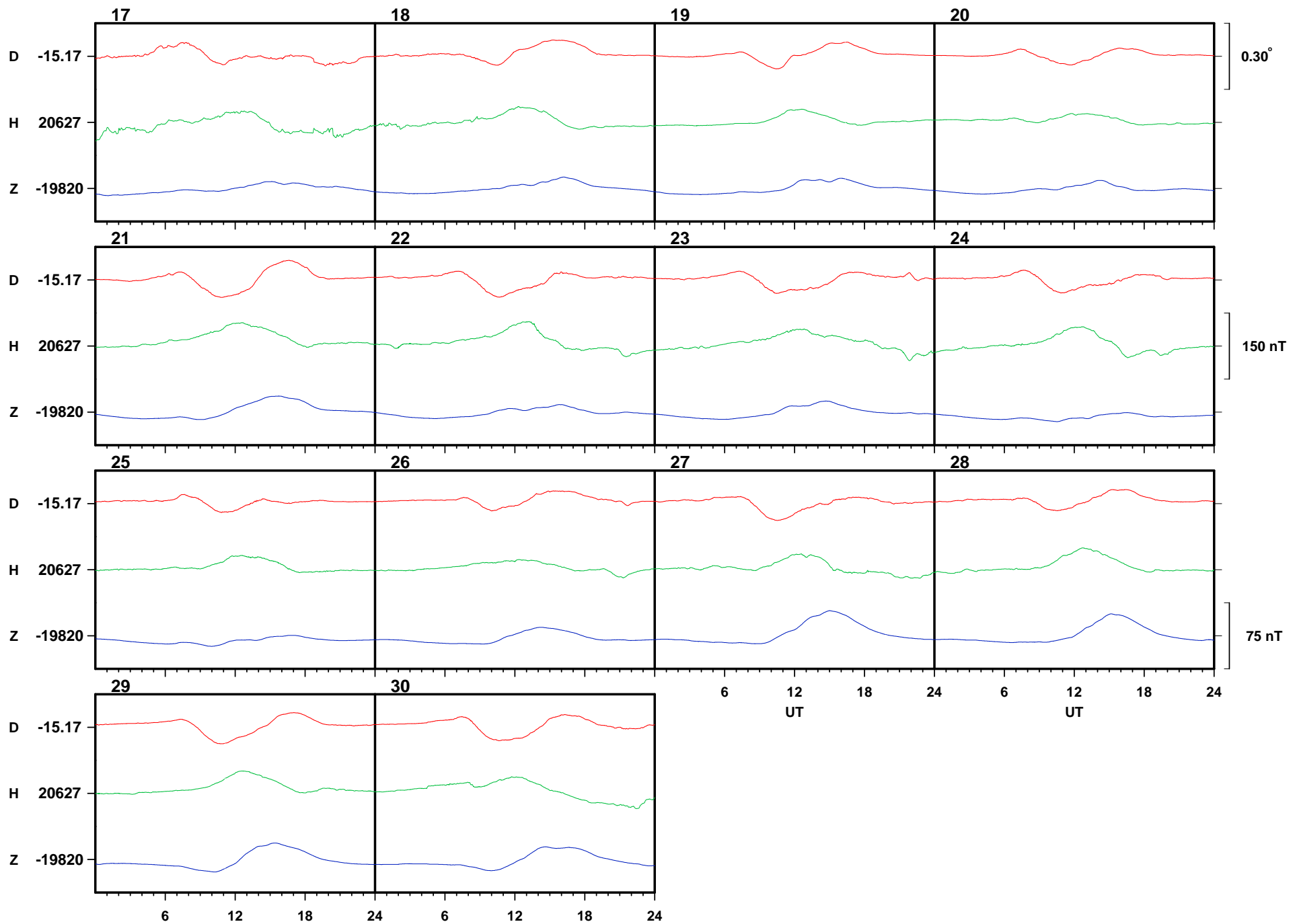


Ascension Island

April

2016



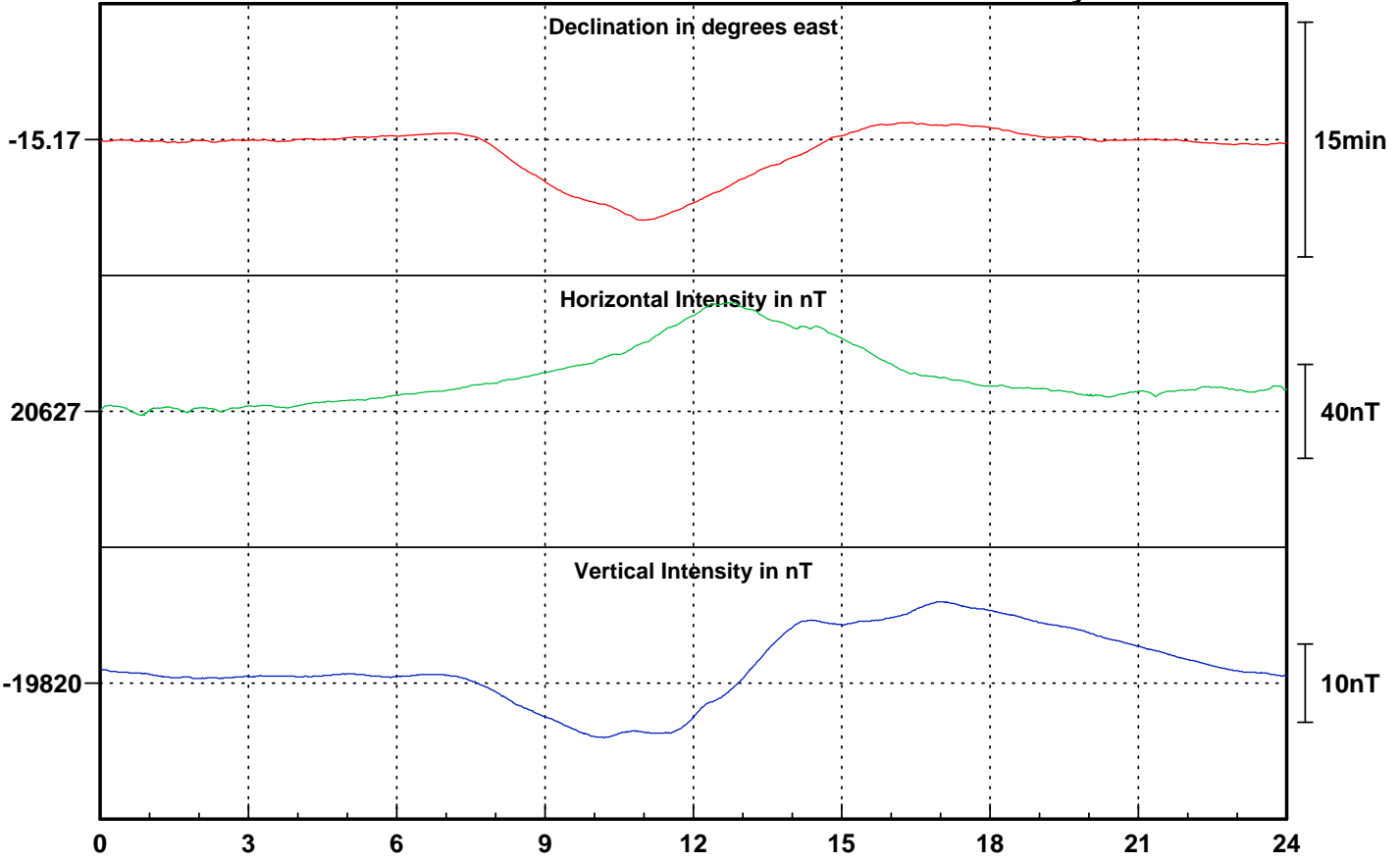




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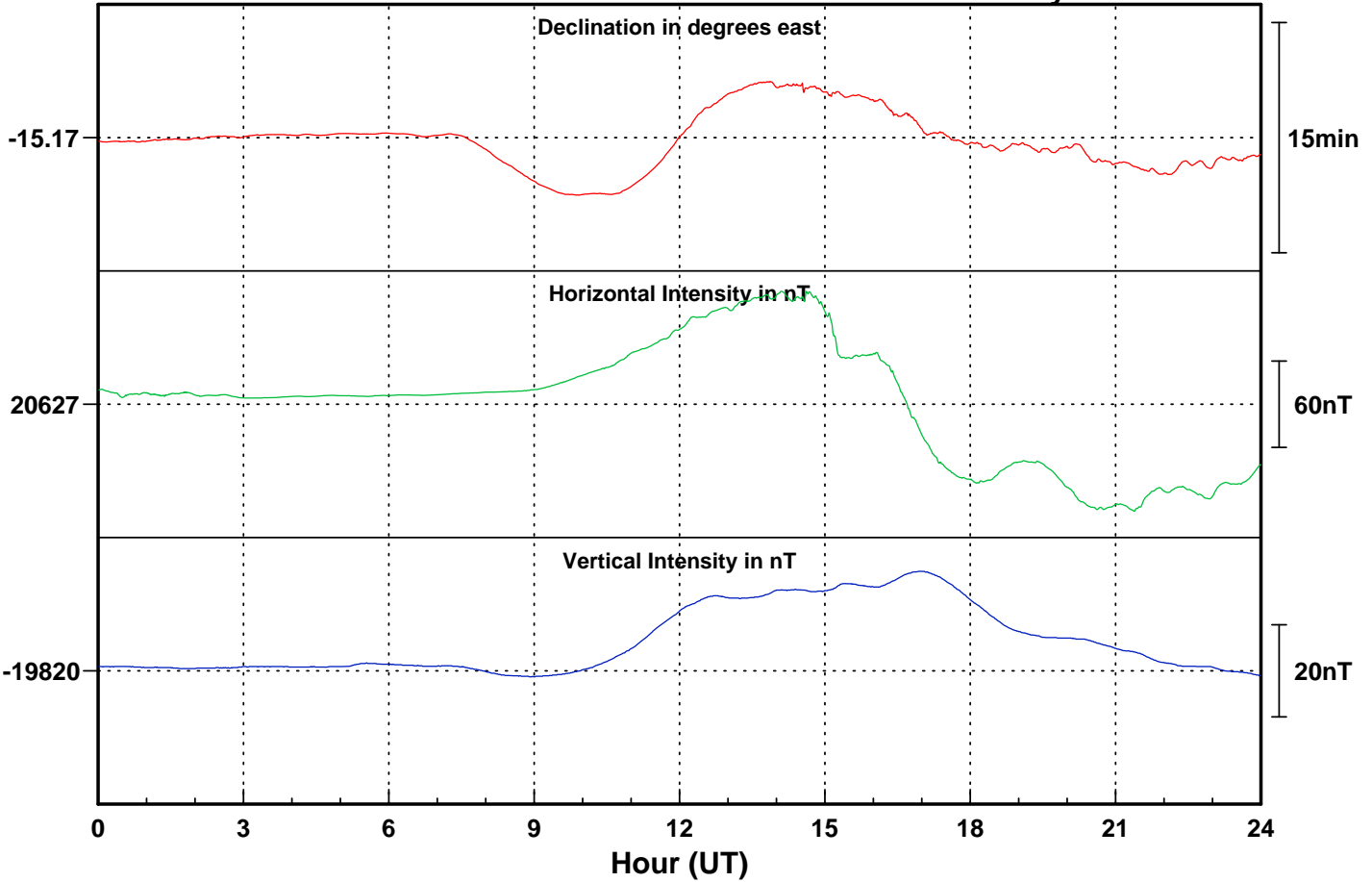
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Day number: 092



Date: 02-04-2016

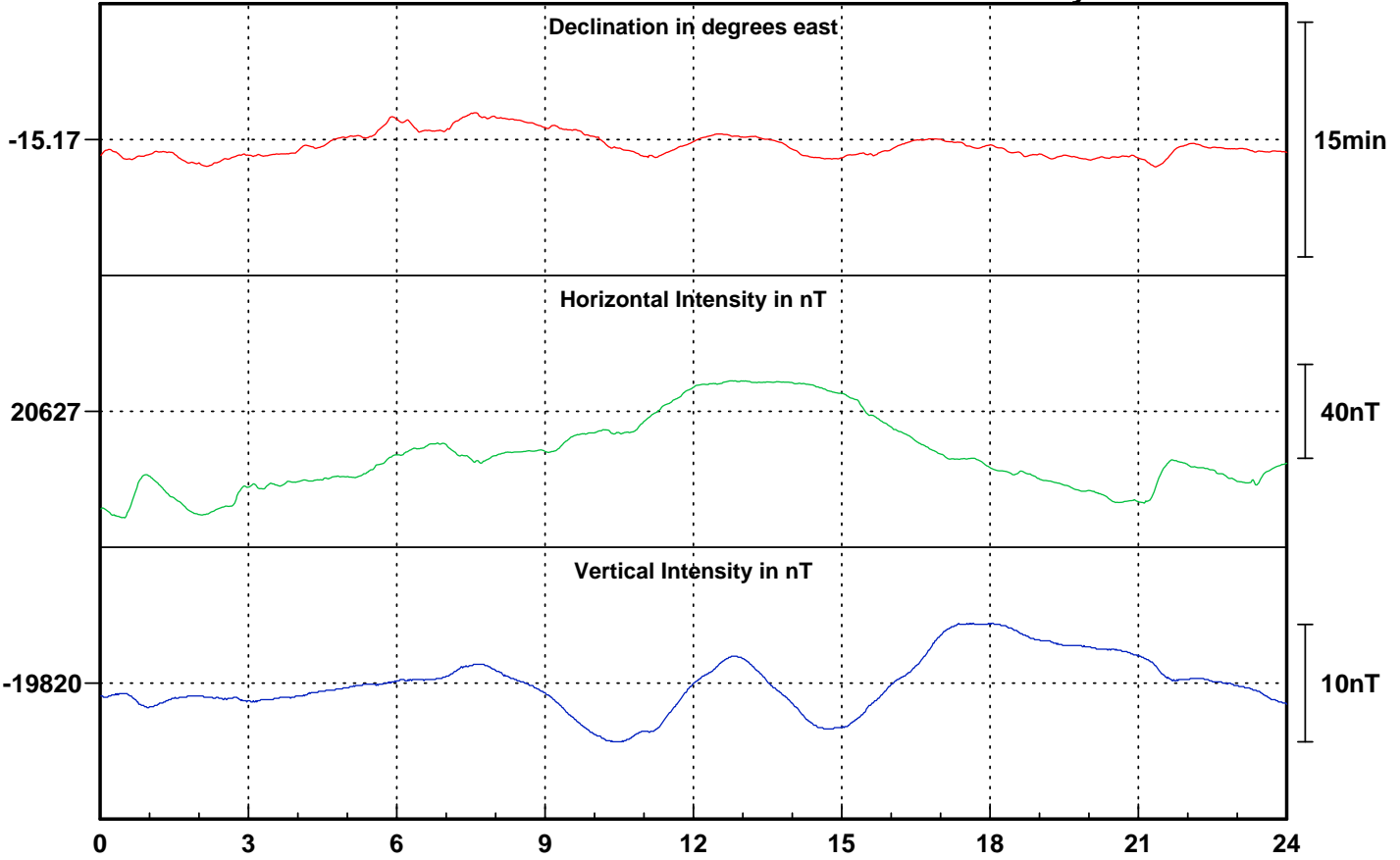
Day number: 093



Date: 03-04-2016

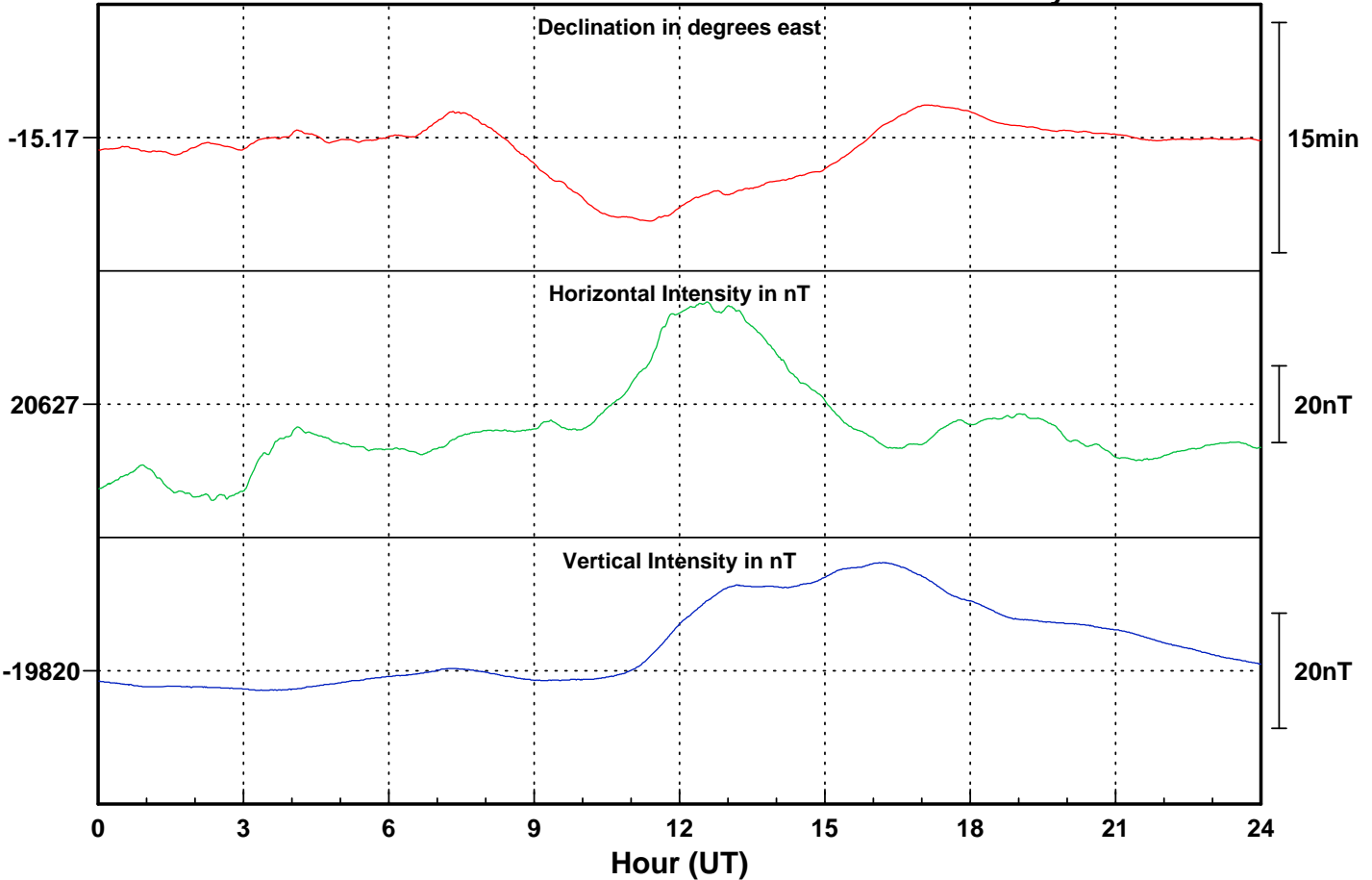
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Day number: 094



Date: 04-04-2016

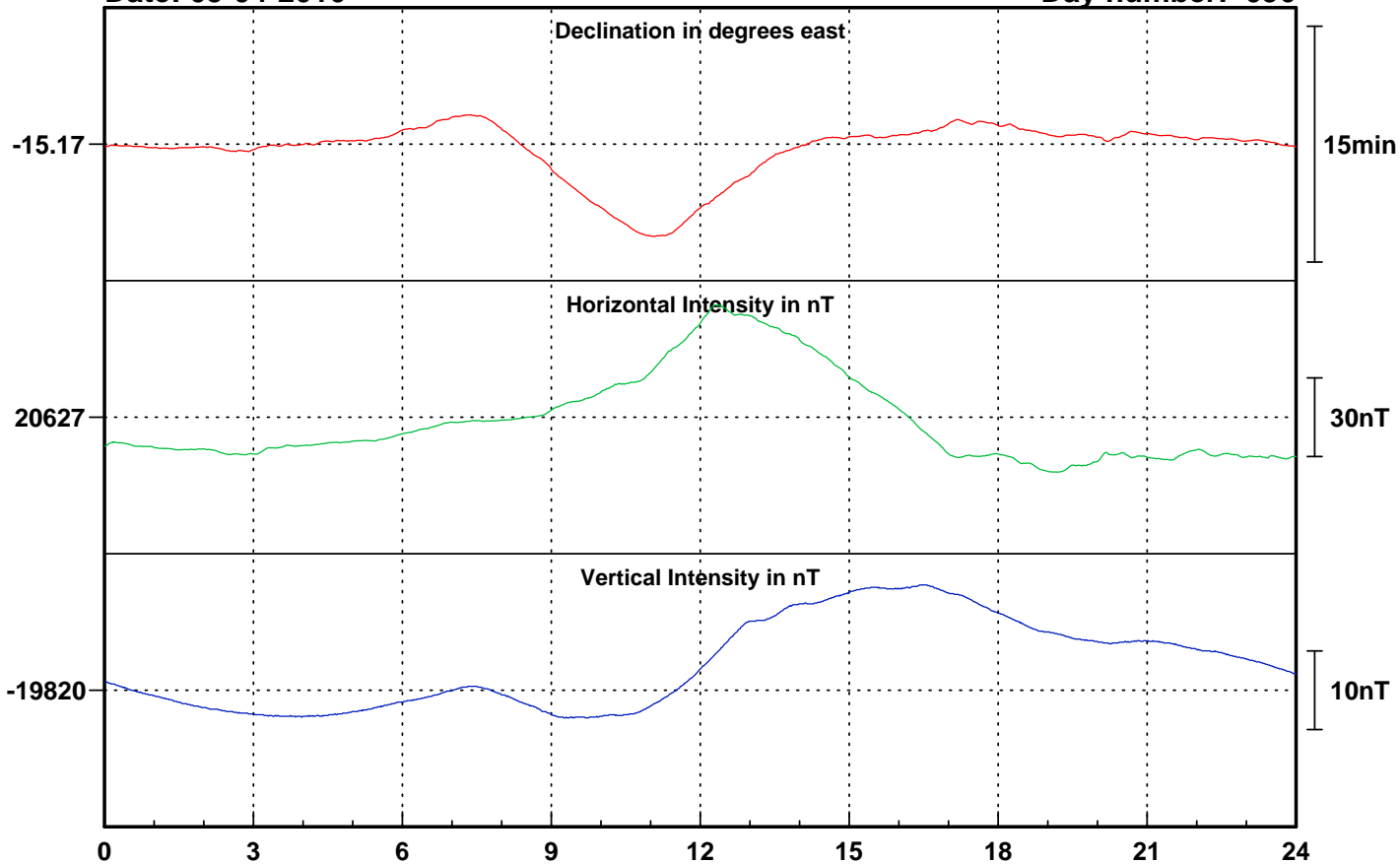
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Date: 05-04-2016

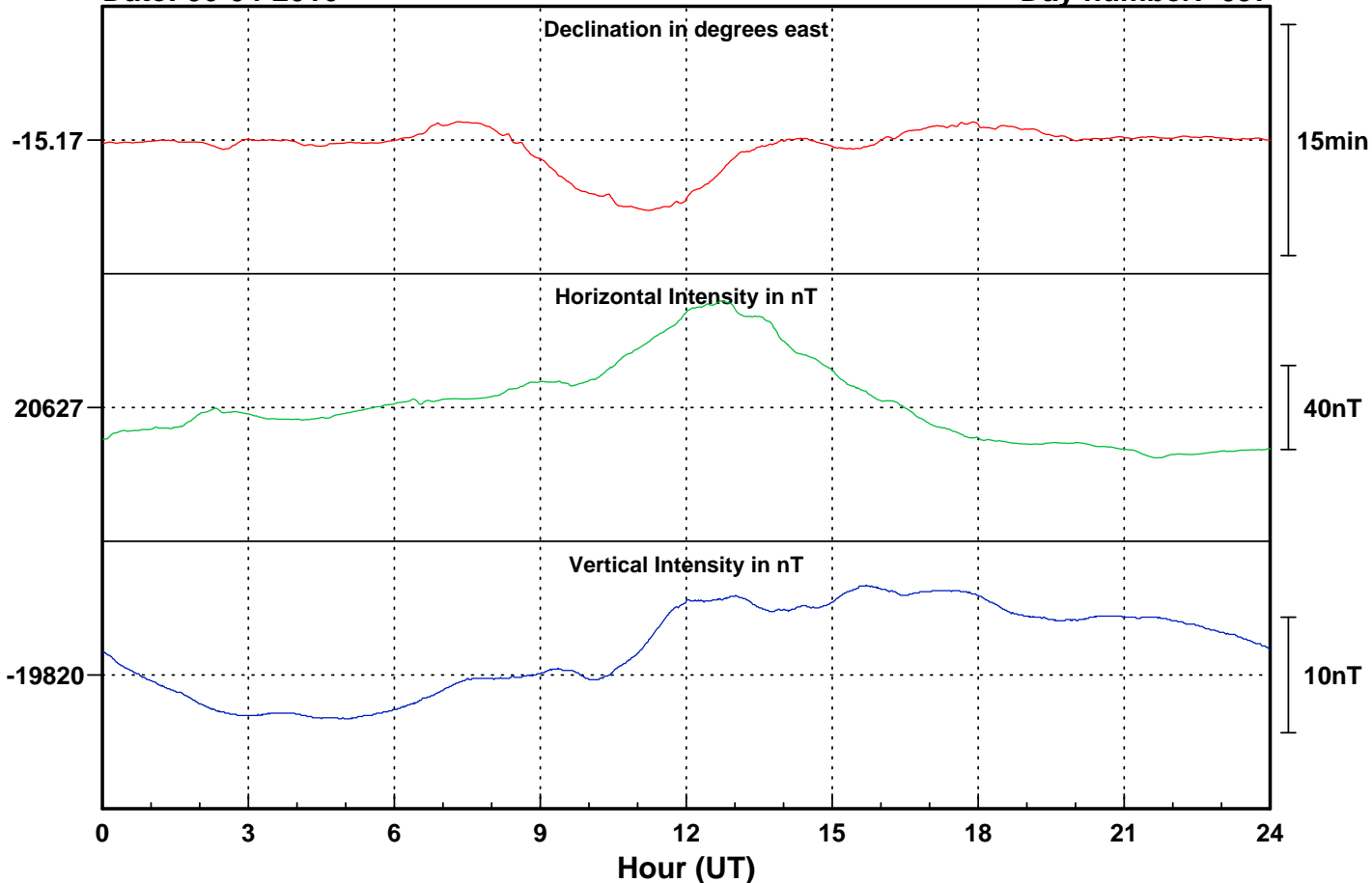
# Ascension Island

Day number: 096



Date: 06-04-2016

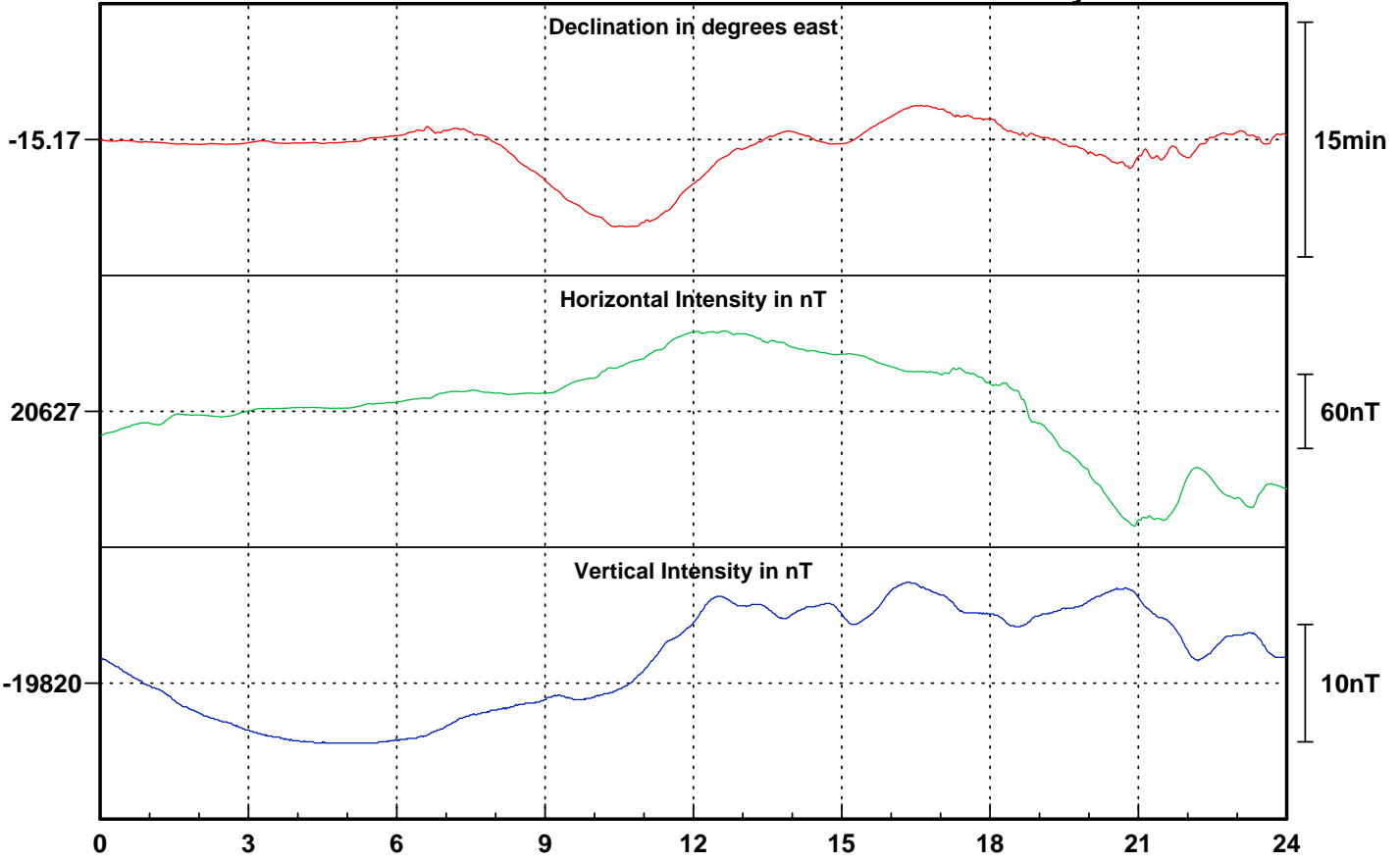
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Date: 07-04-2016

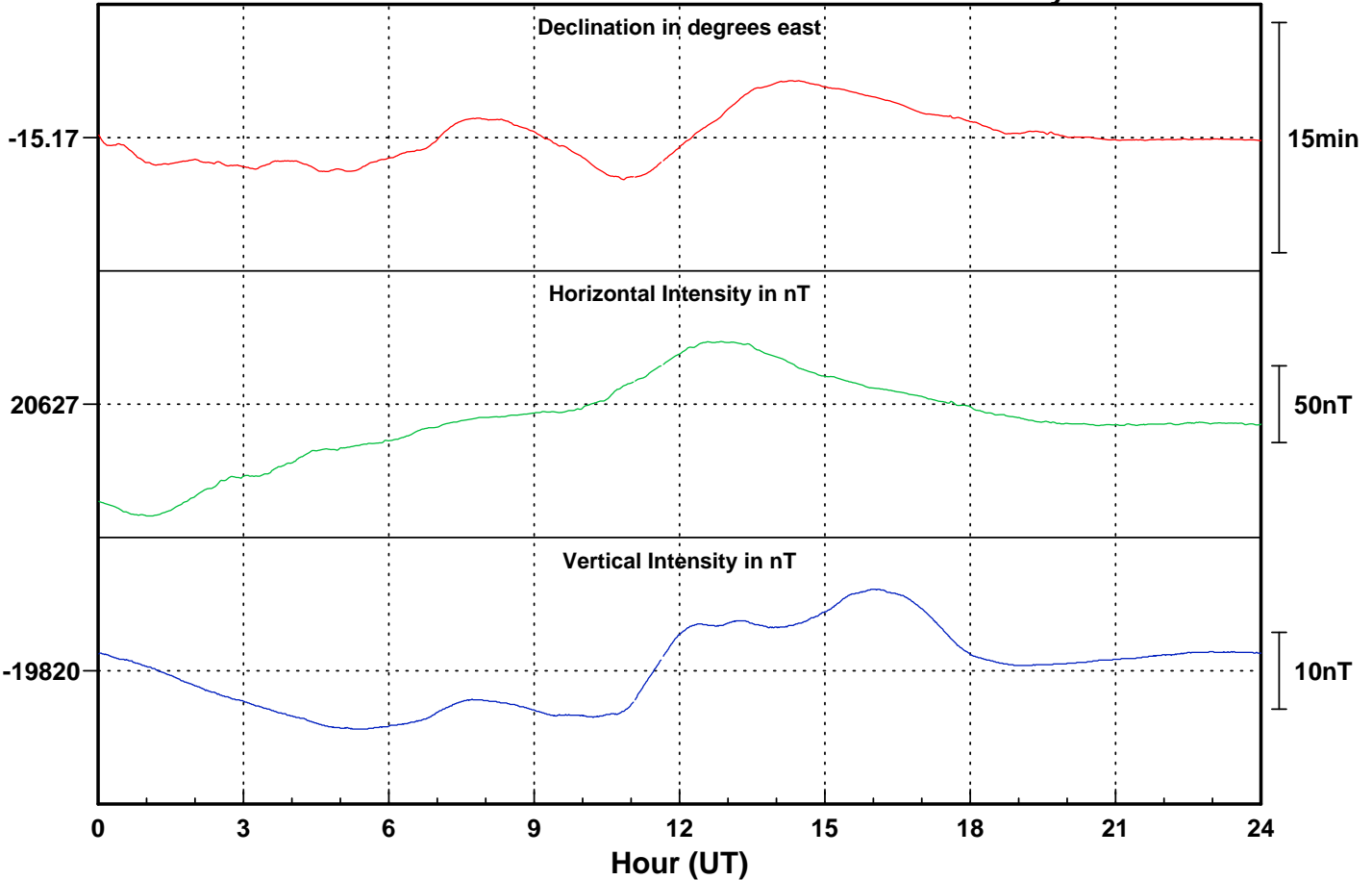
# Ascension Island

Day number: 098



Date: 08-04-2016

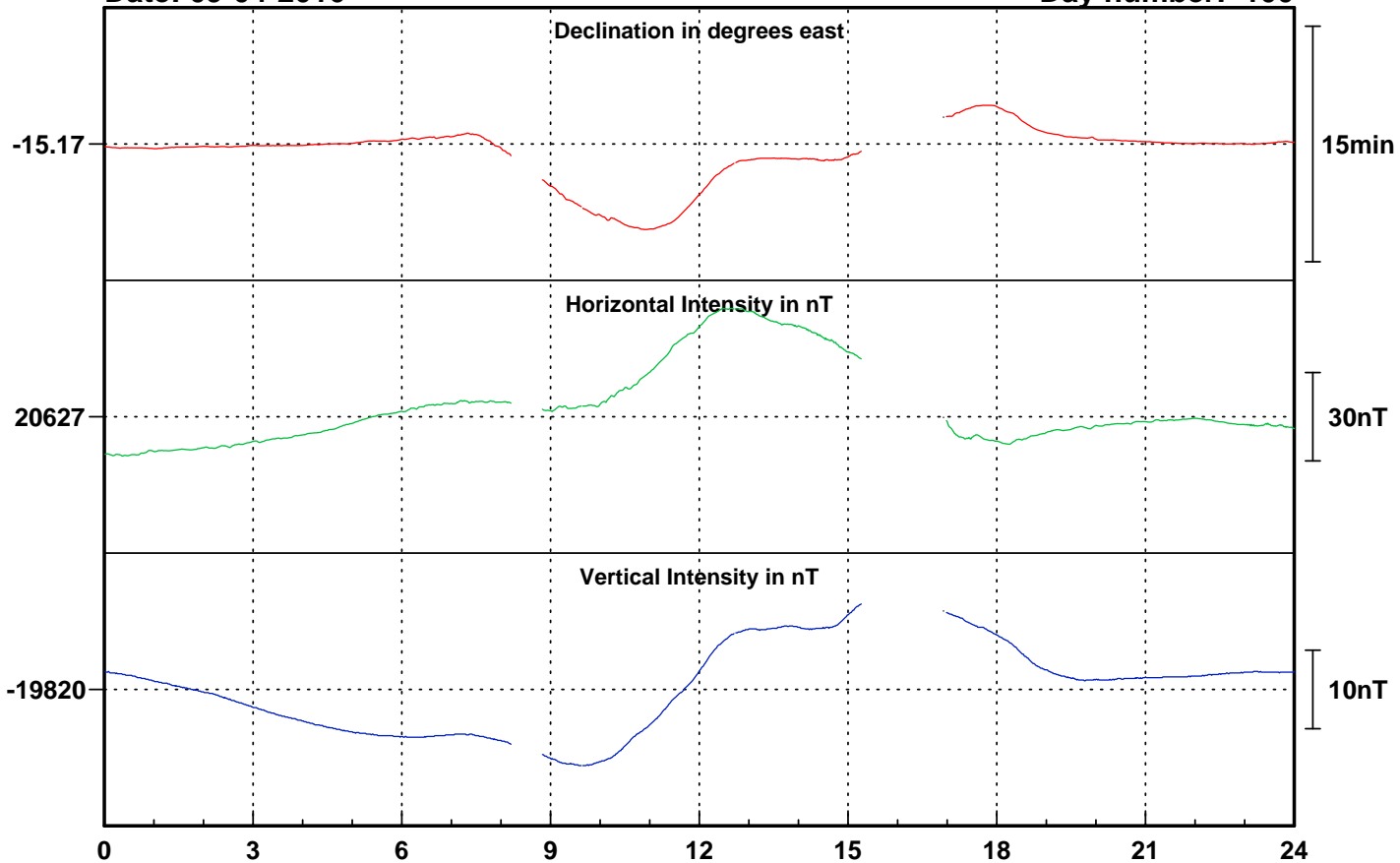
Day number: 099



Date: 09-04-2016

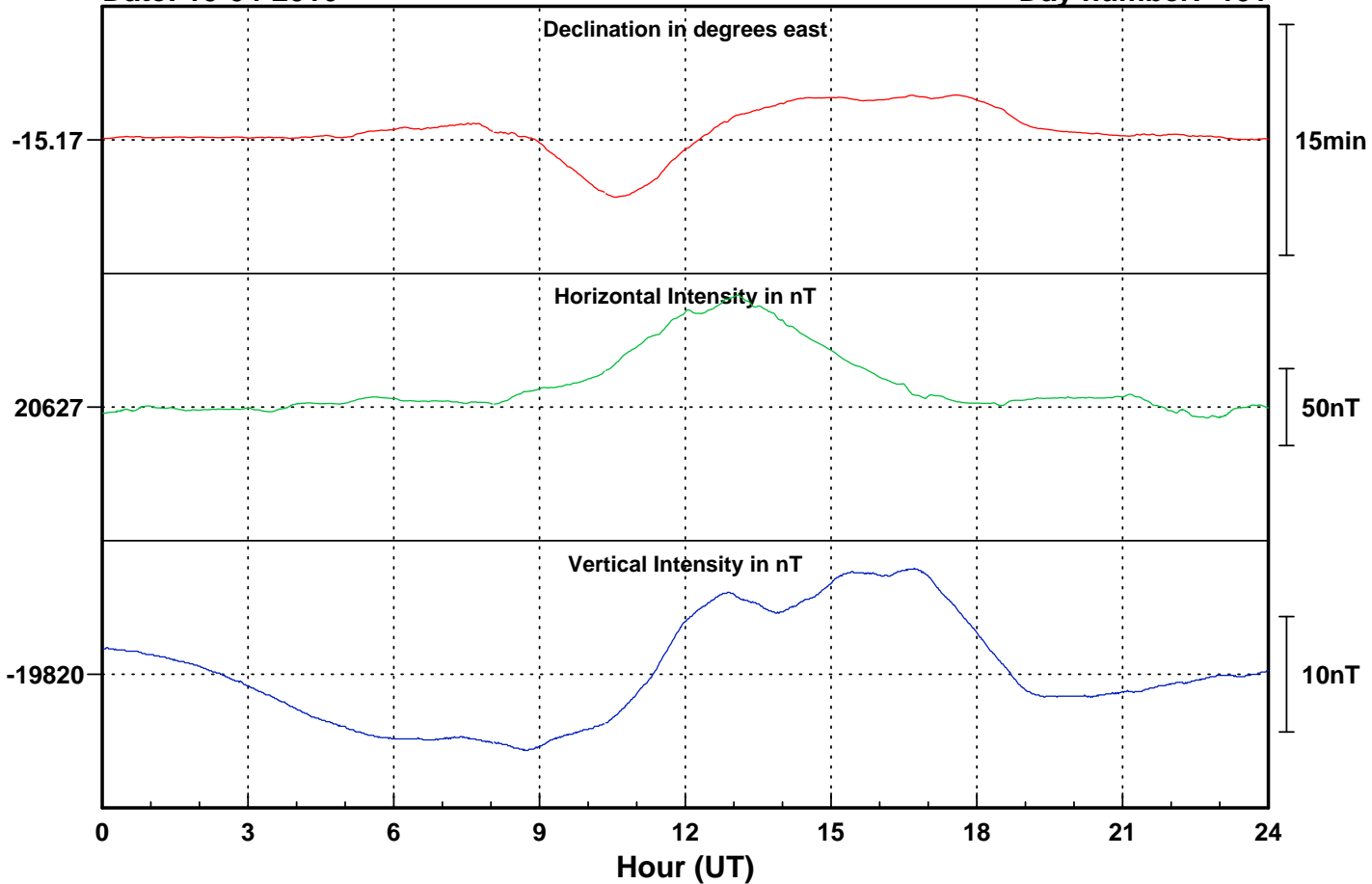
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Day number: 100



Date: 10-04-2016

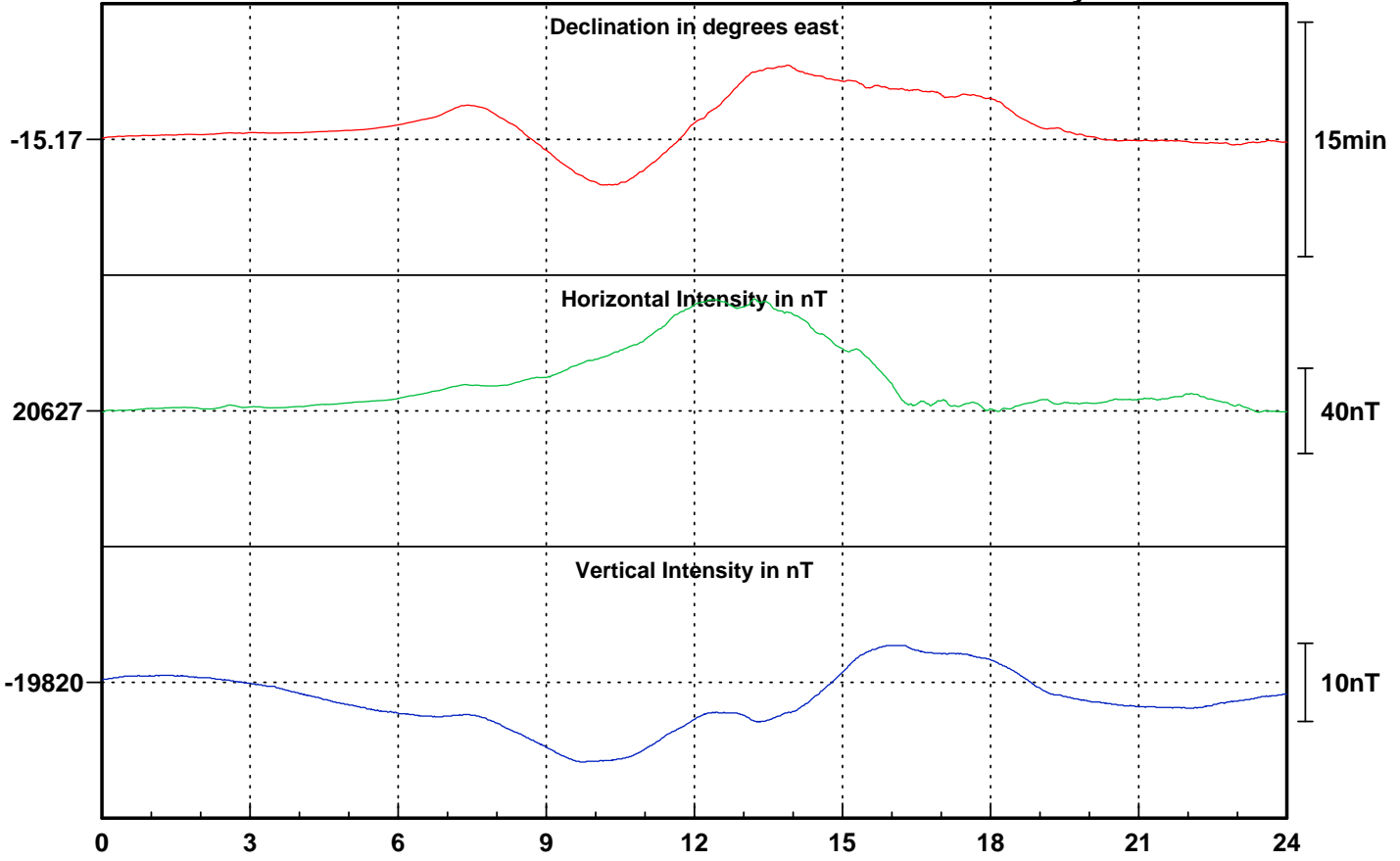
Day number: 101



Date: 11-04-2016

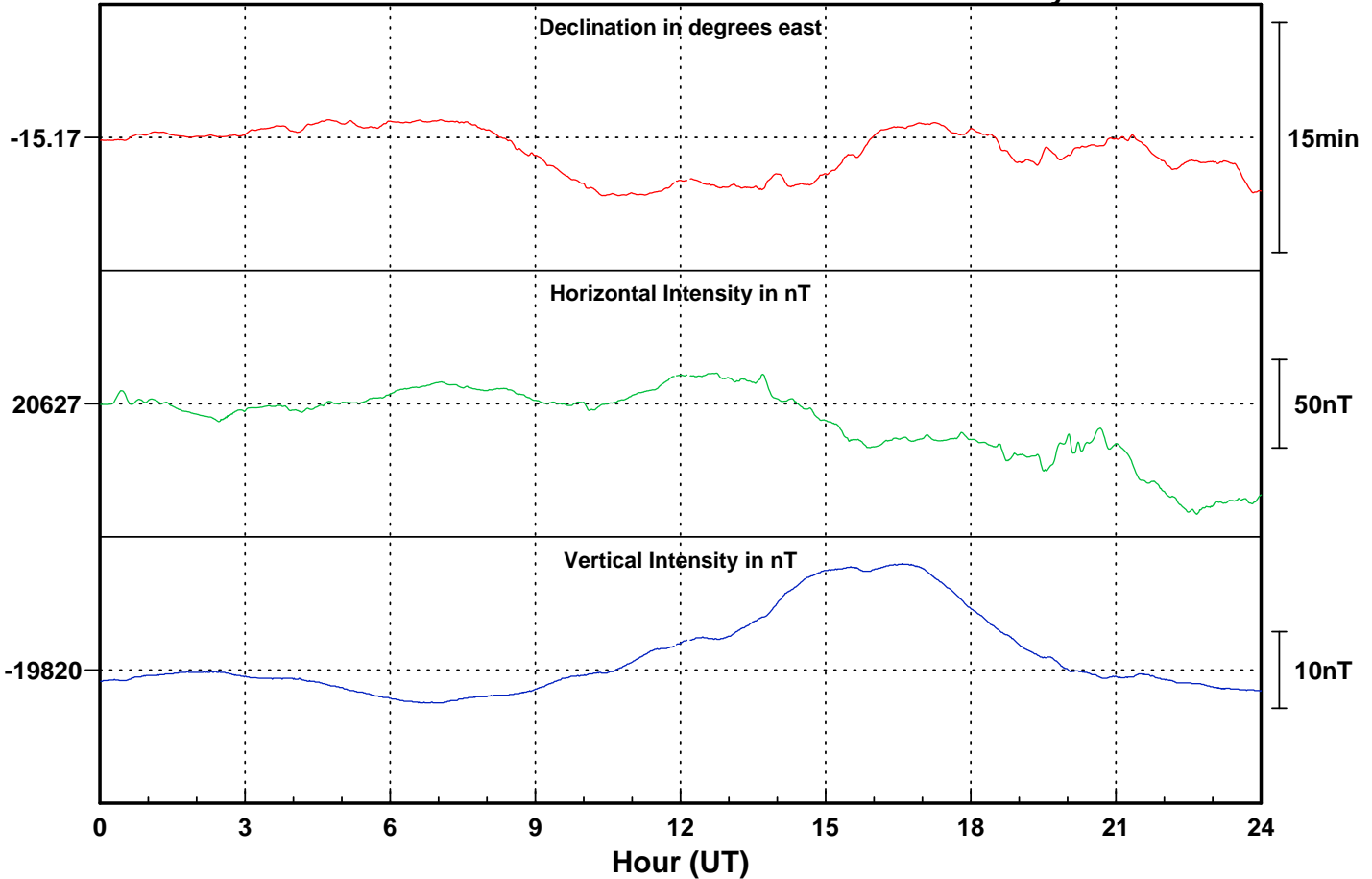
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Day number: 102



Date: 12-04-2016

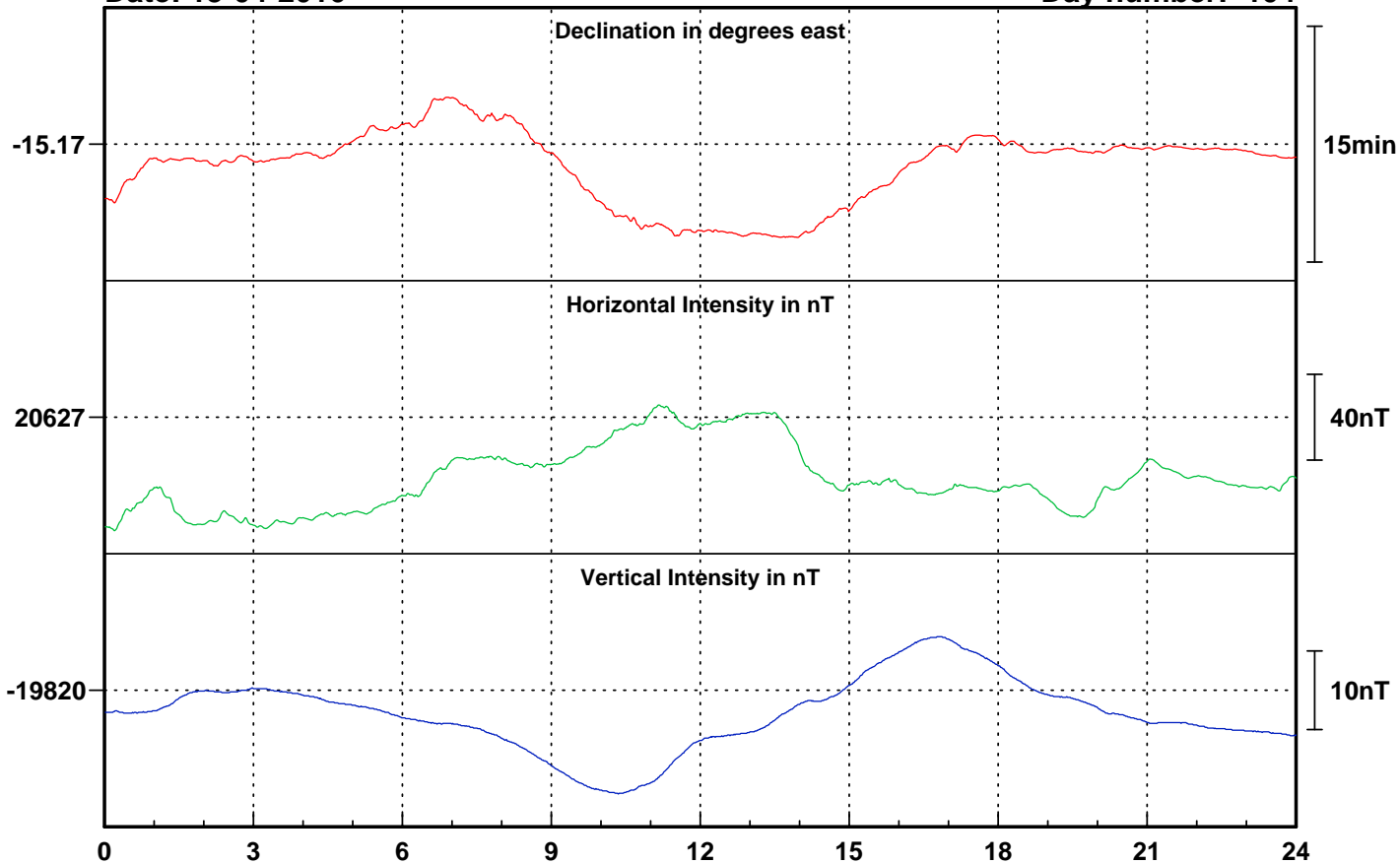
Day number: 103



Date: 13-04-2016

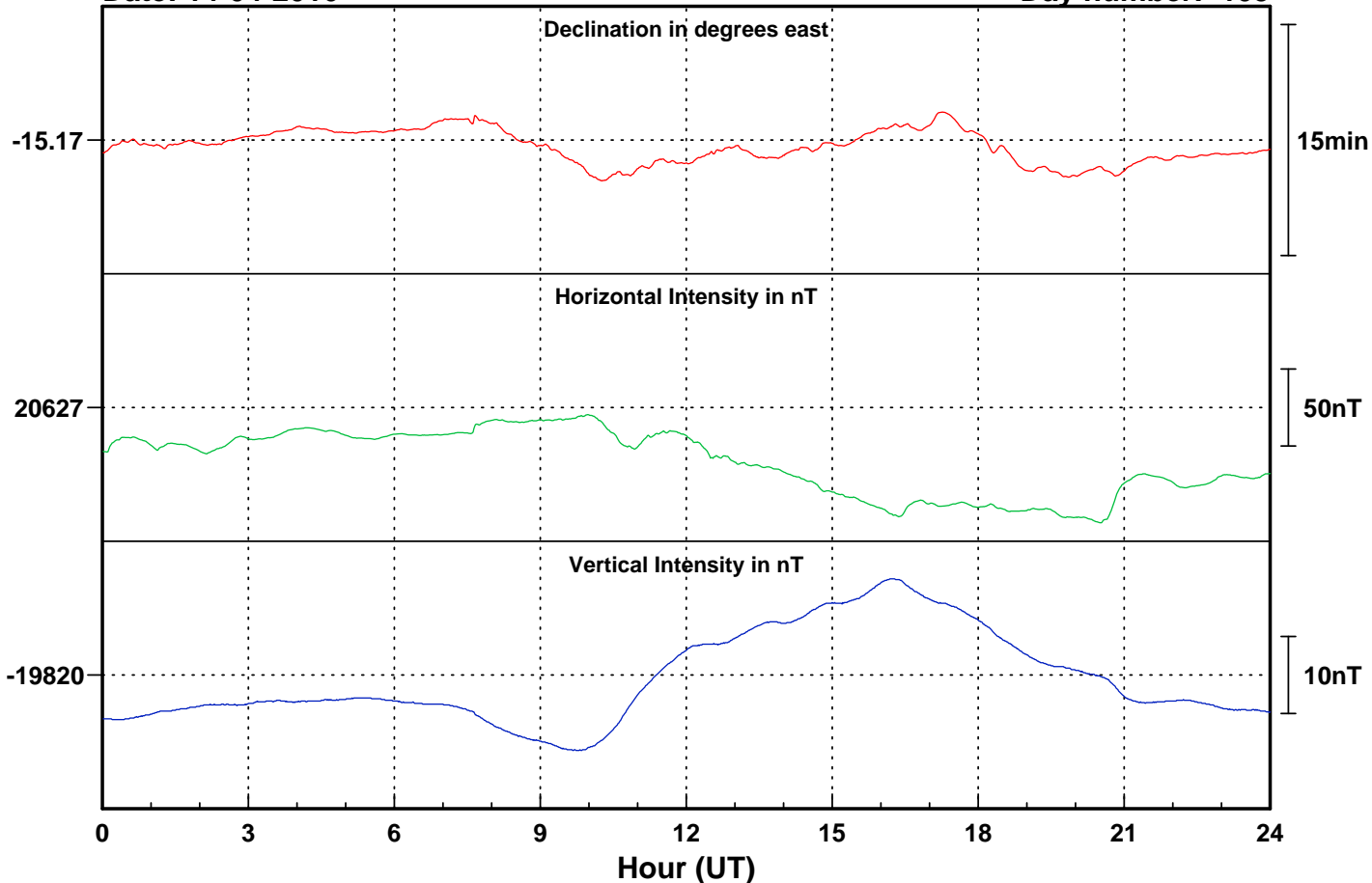
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Day number: 104



Date: 14-04-2016

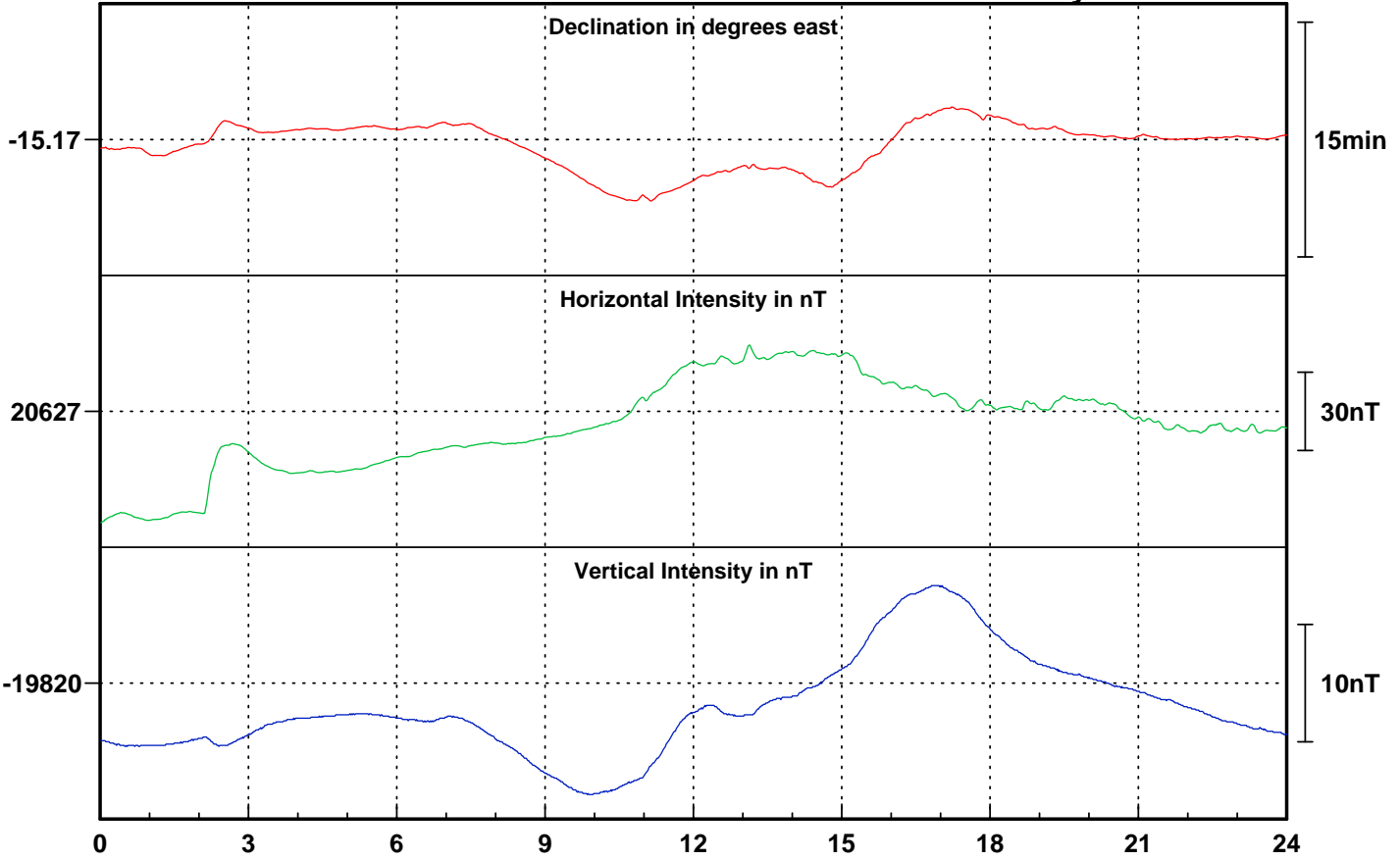
Day number: 105



Date: 15-04-2016

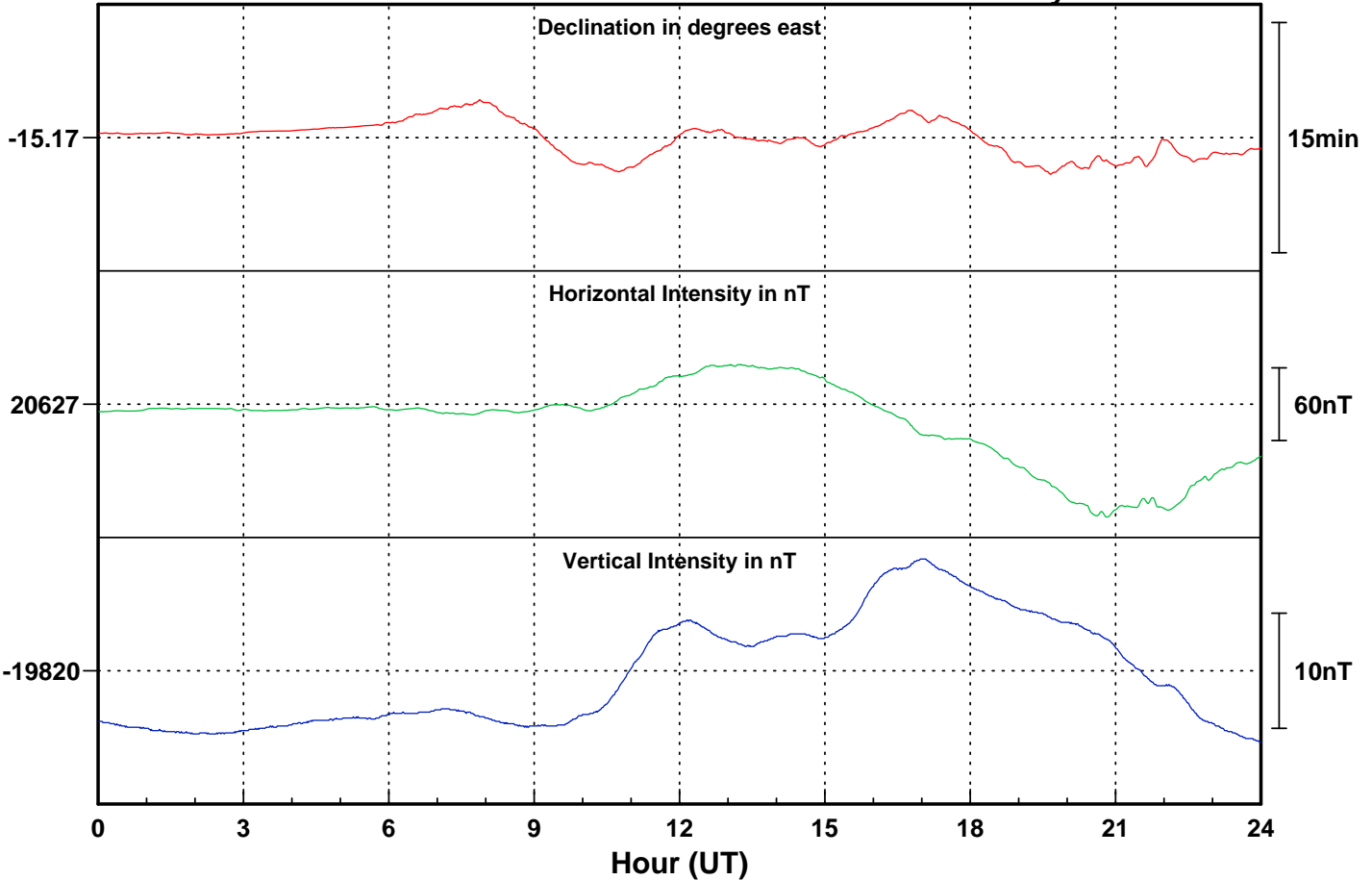
# Ascension Island

Day number: 106



Date: 16-04-2016

Day number: 107

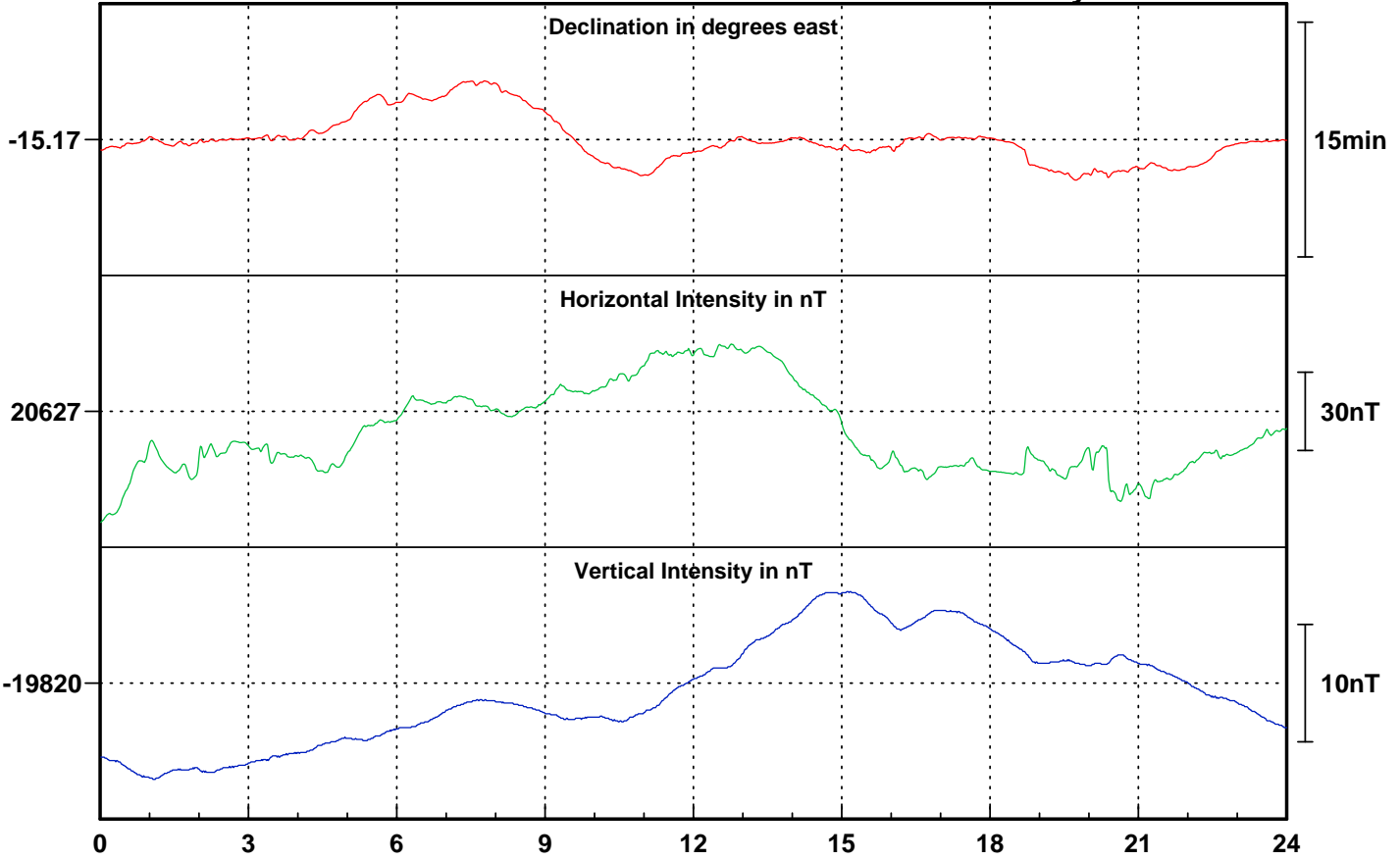




Date: 17-04-2016

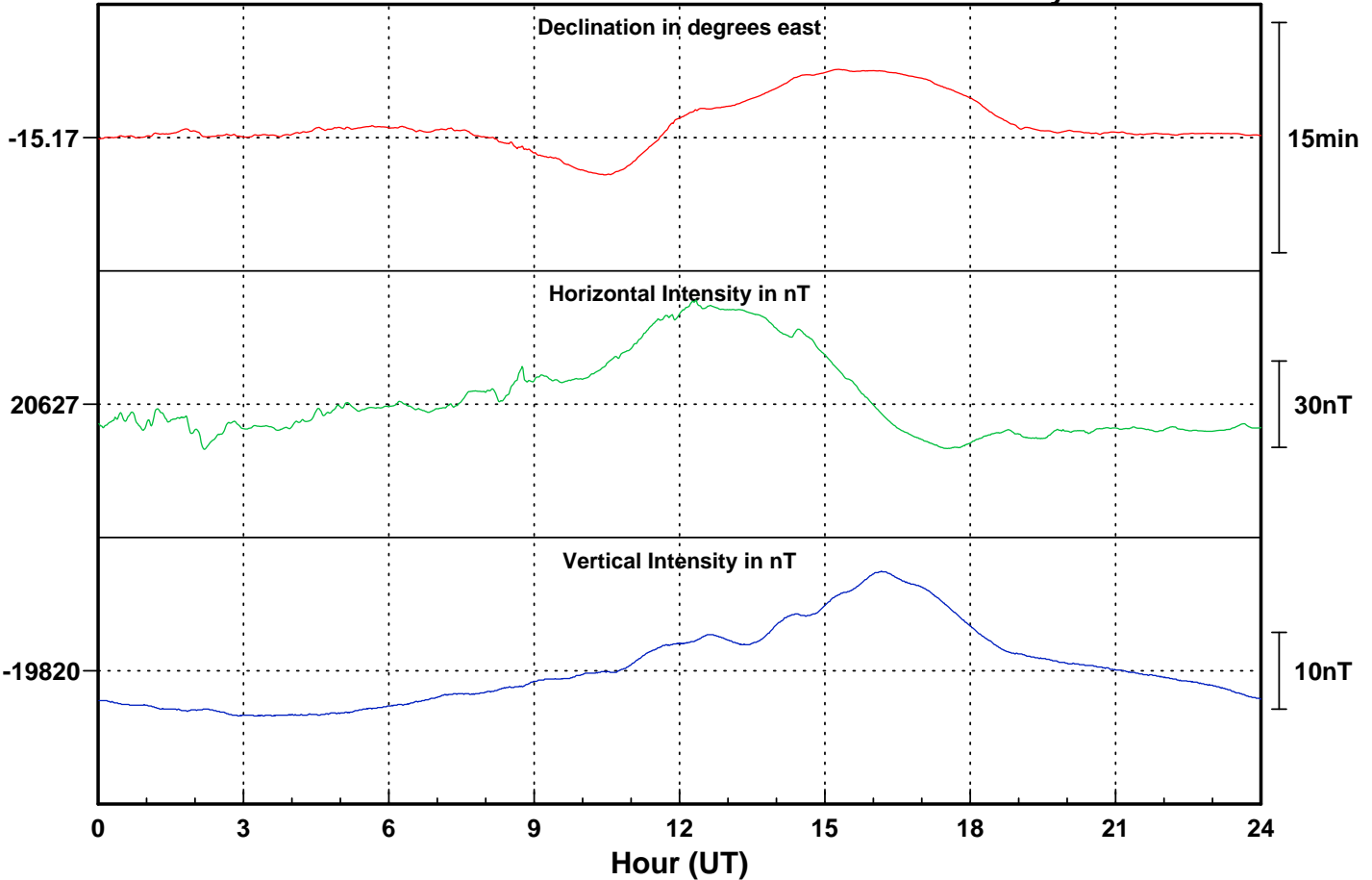
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Day number: 108



Date: 18-04-2016

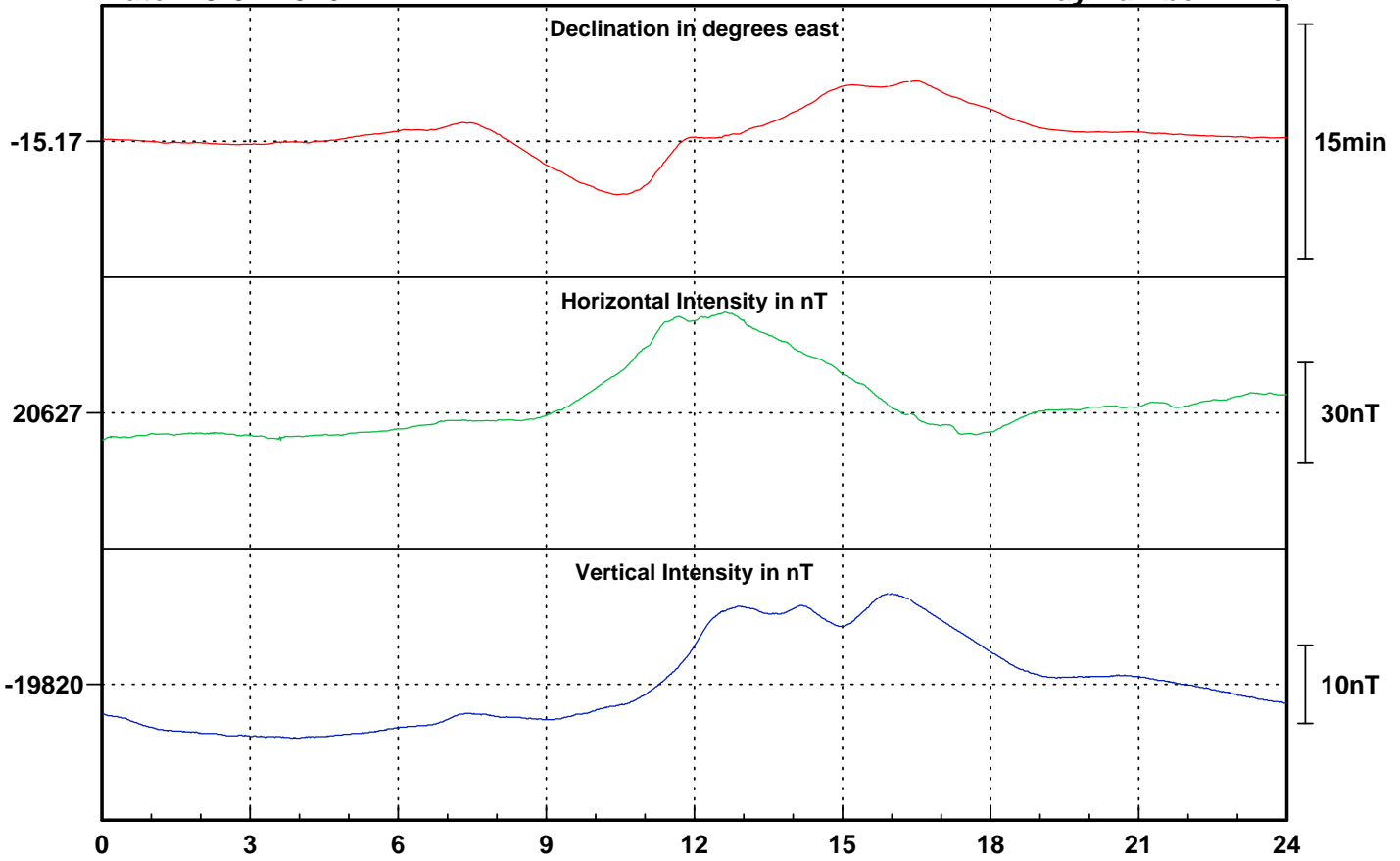
Day number: 109



Date: 19-04-2016

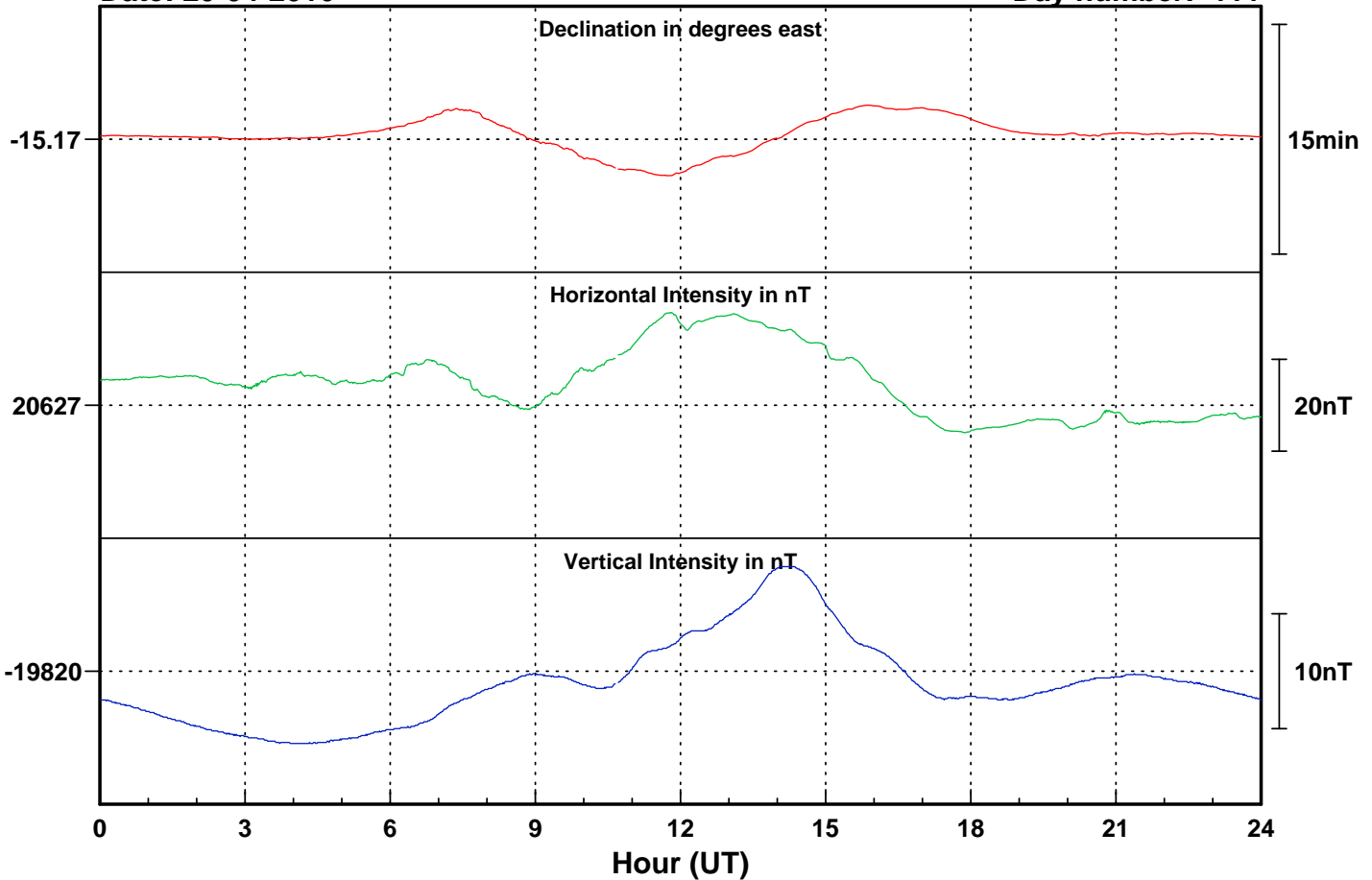
# Ascension Island

Day number: 110



Date: 20-04-2016

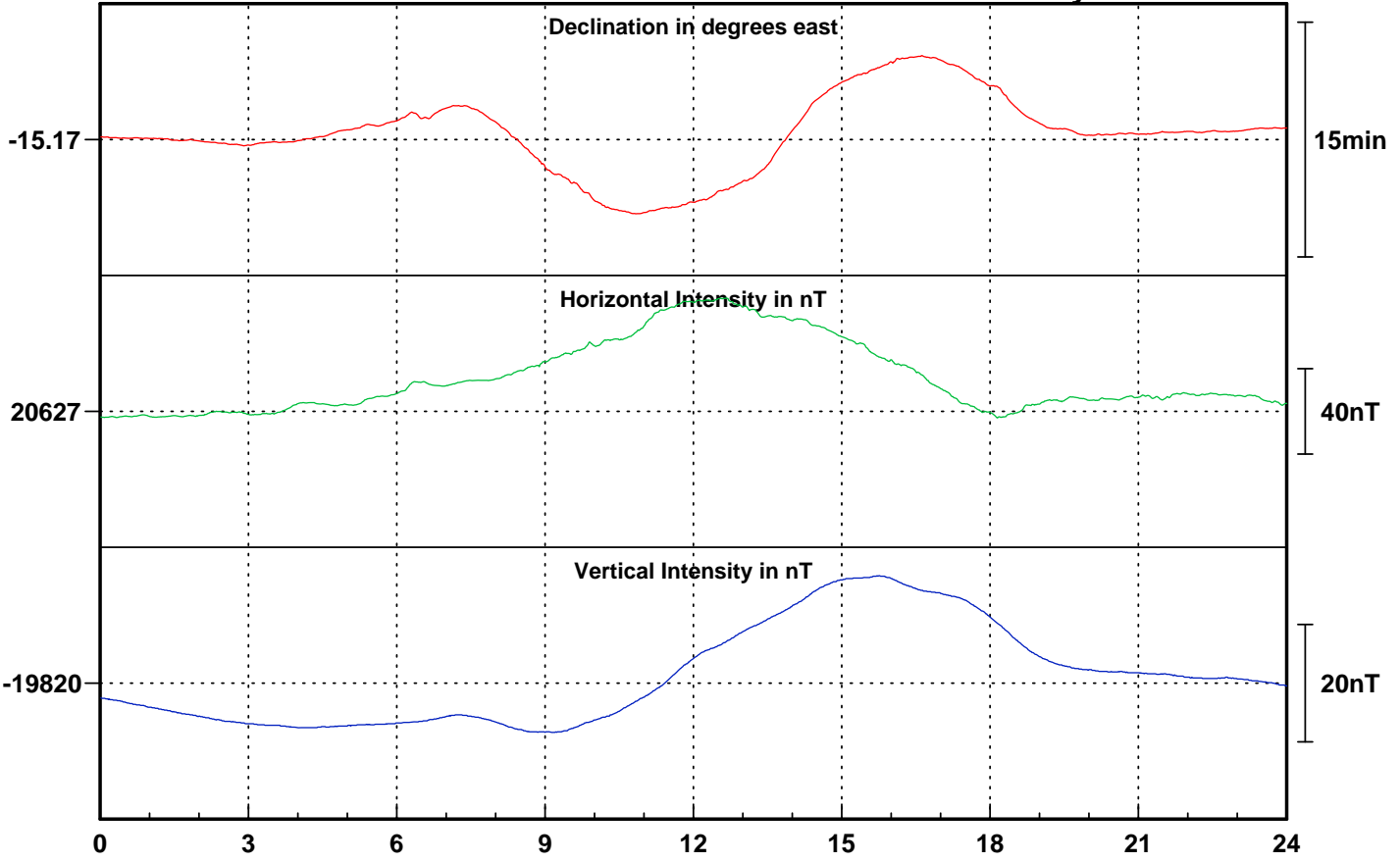
Day number: 111



Date: 21-04-2016

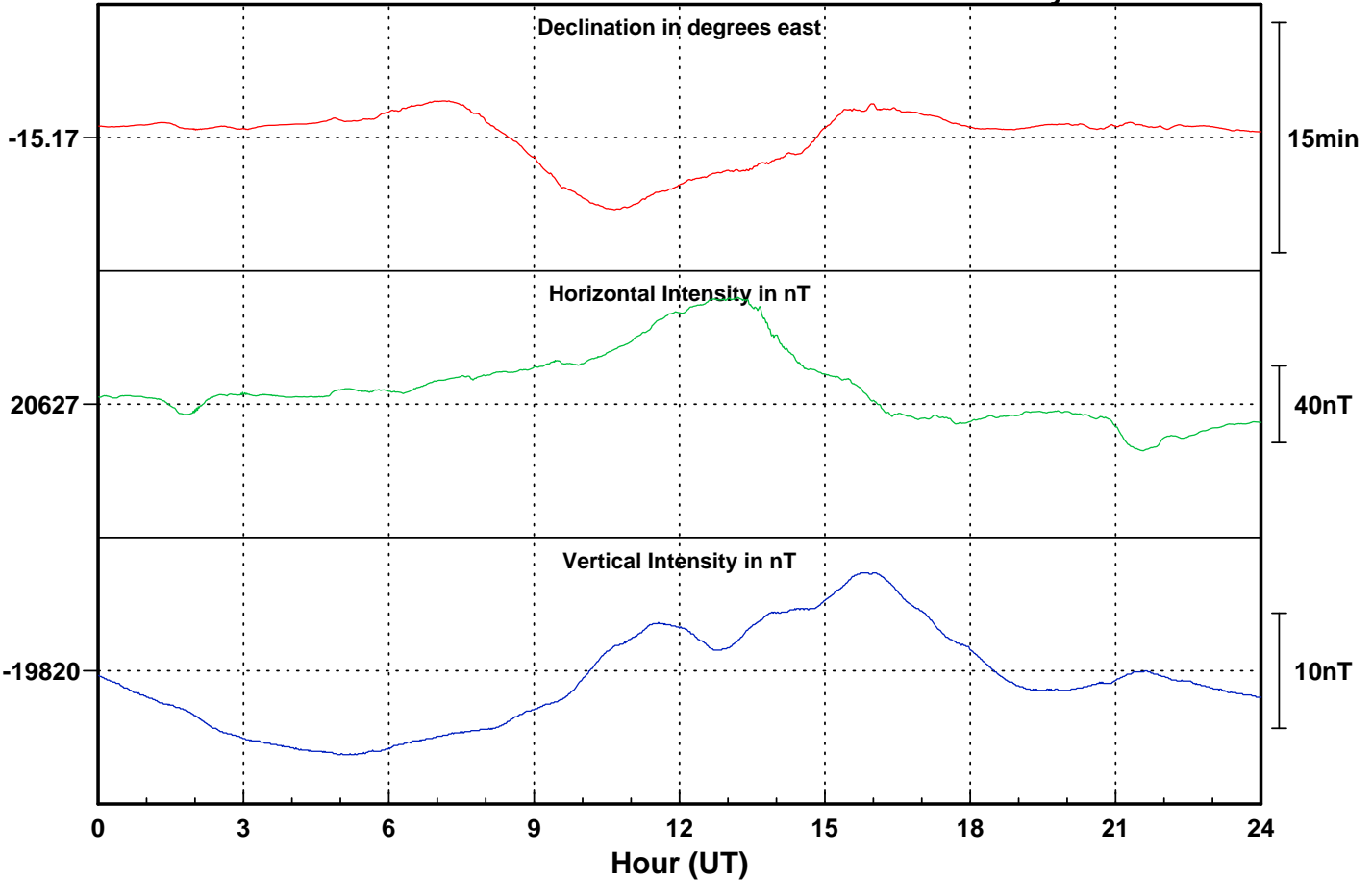
# Ascension Island

Day number: 112



Date: 22-04-2016

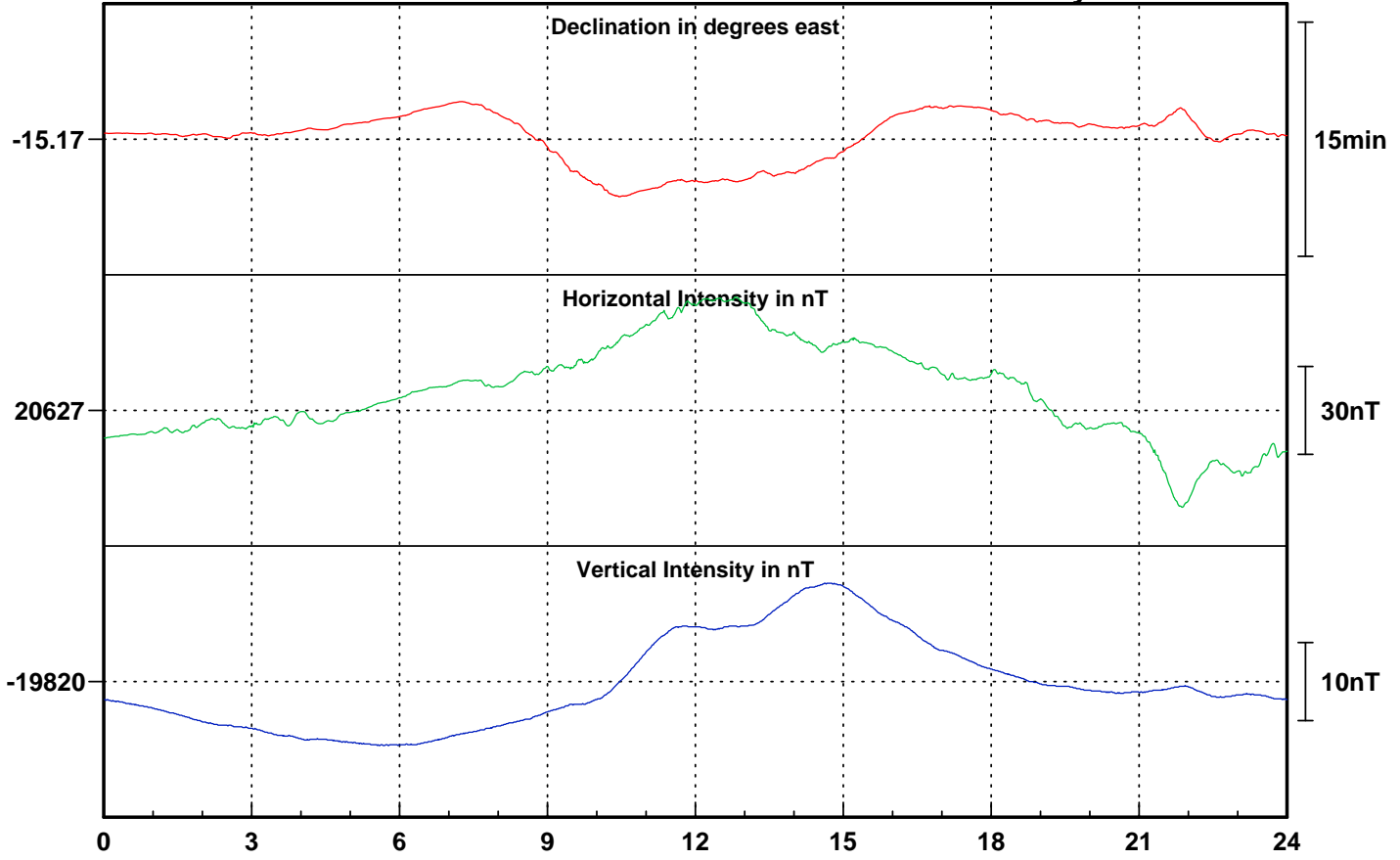
Day number: 113



Date: 23-04-2016

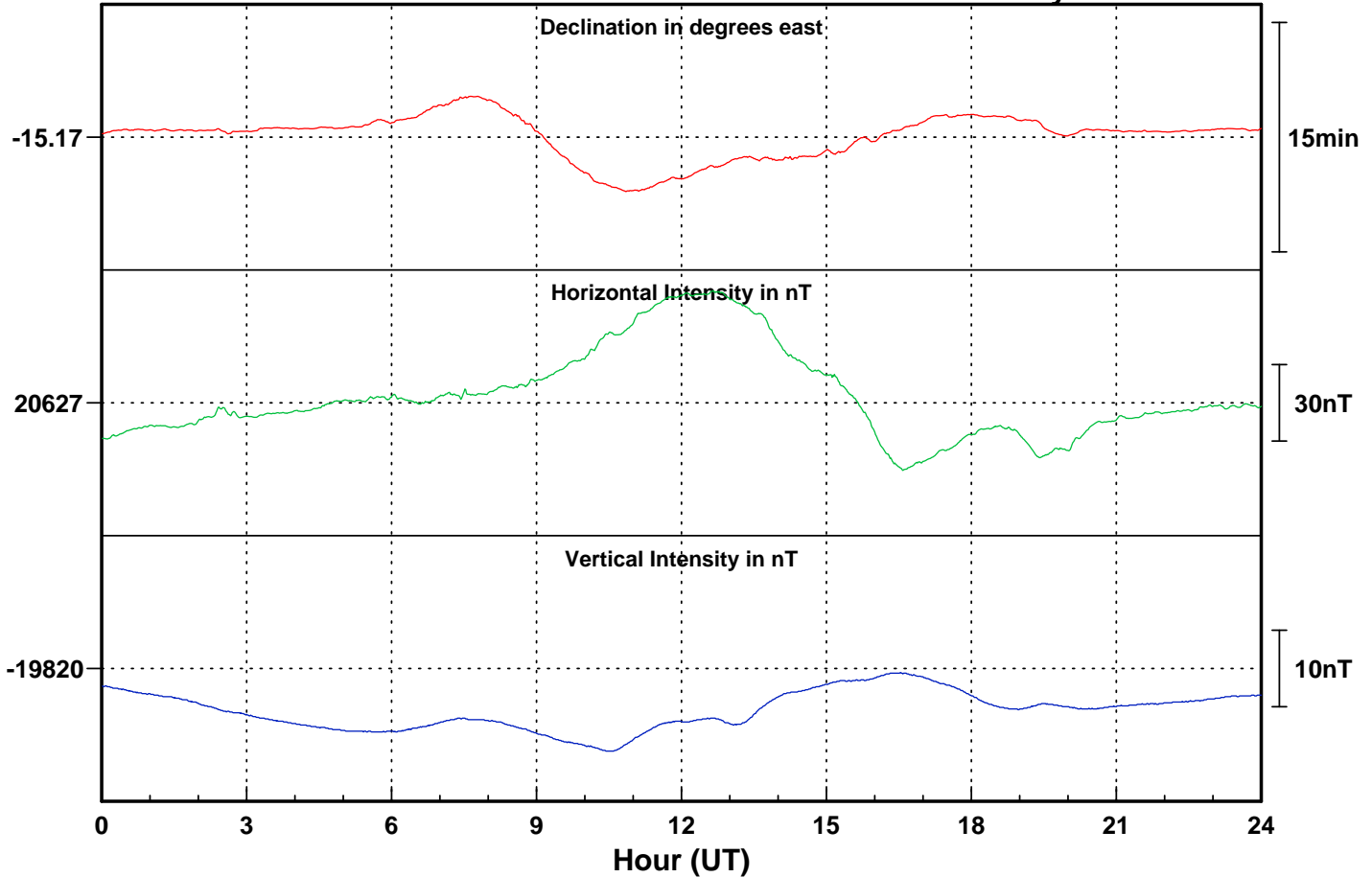
# Ascension Island

Day number: 114



Date: 24-04-2016

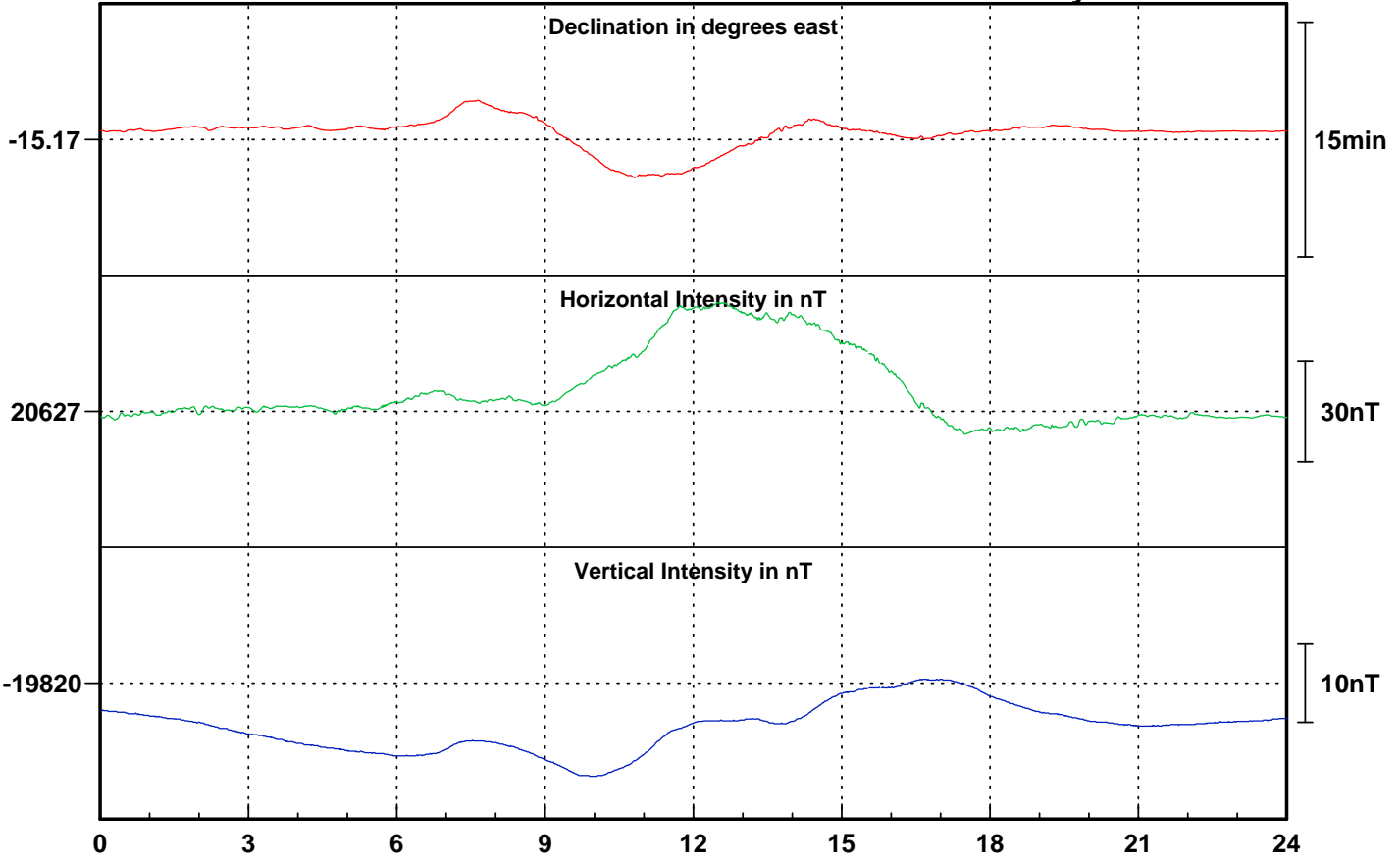
Day number: 115



Date: 25-04-2016

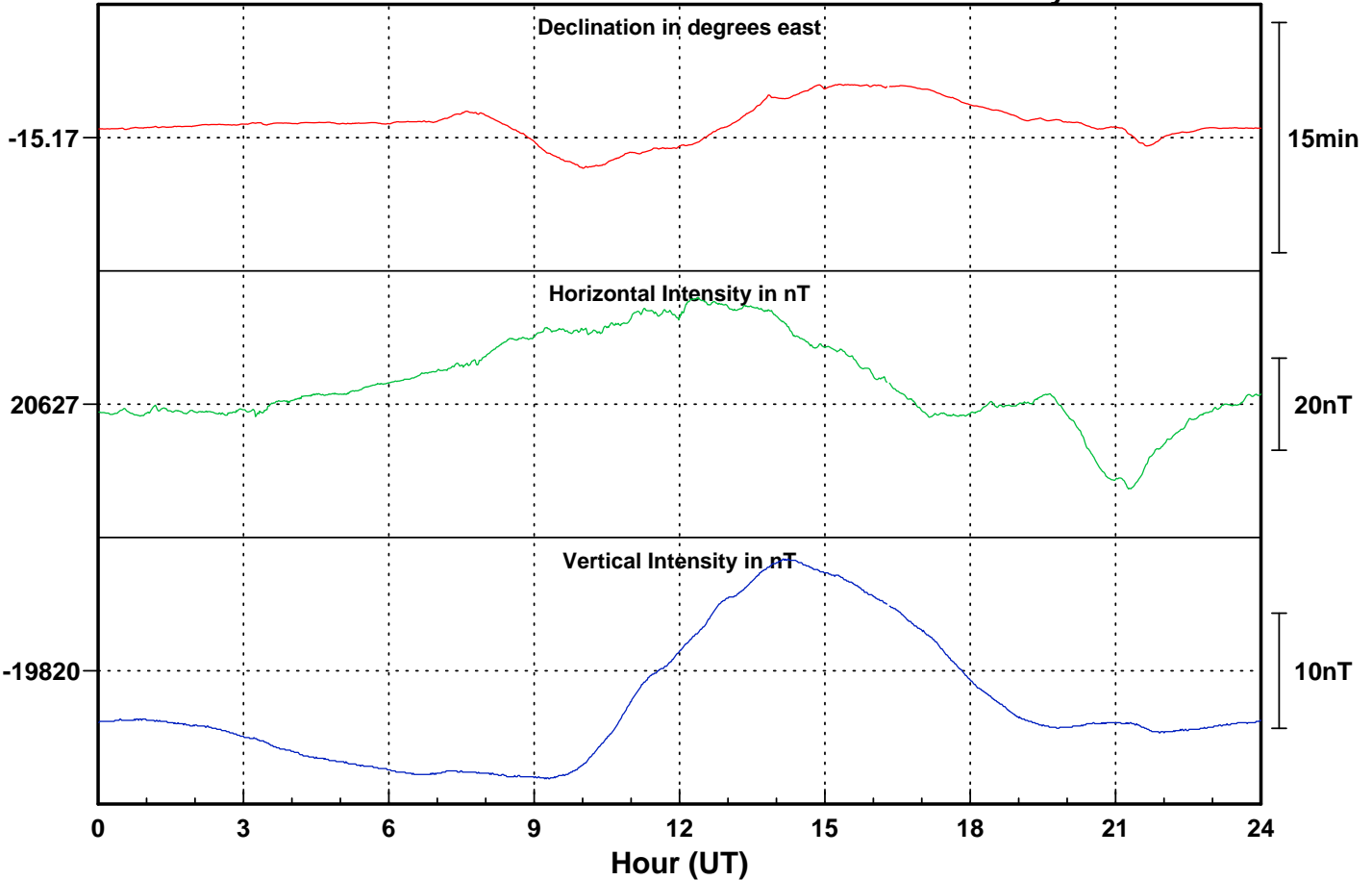
# Ascension Island

Day number: 116



Date: 26-04-2016

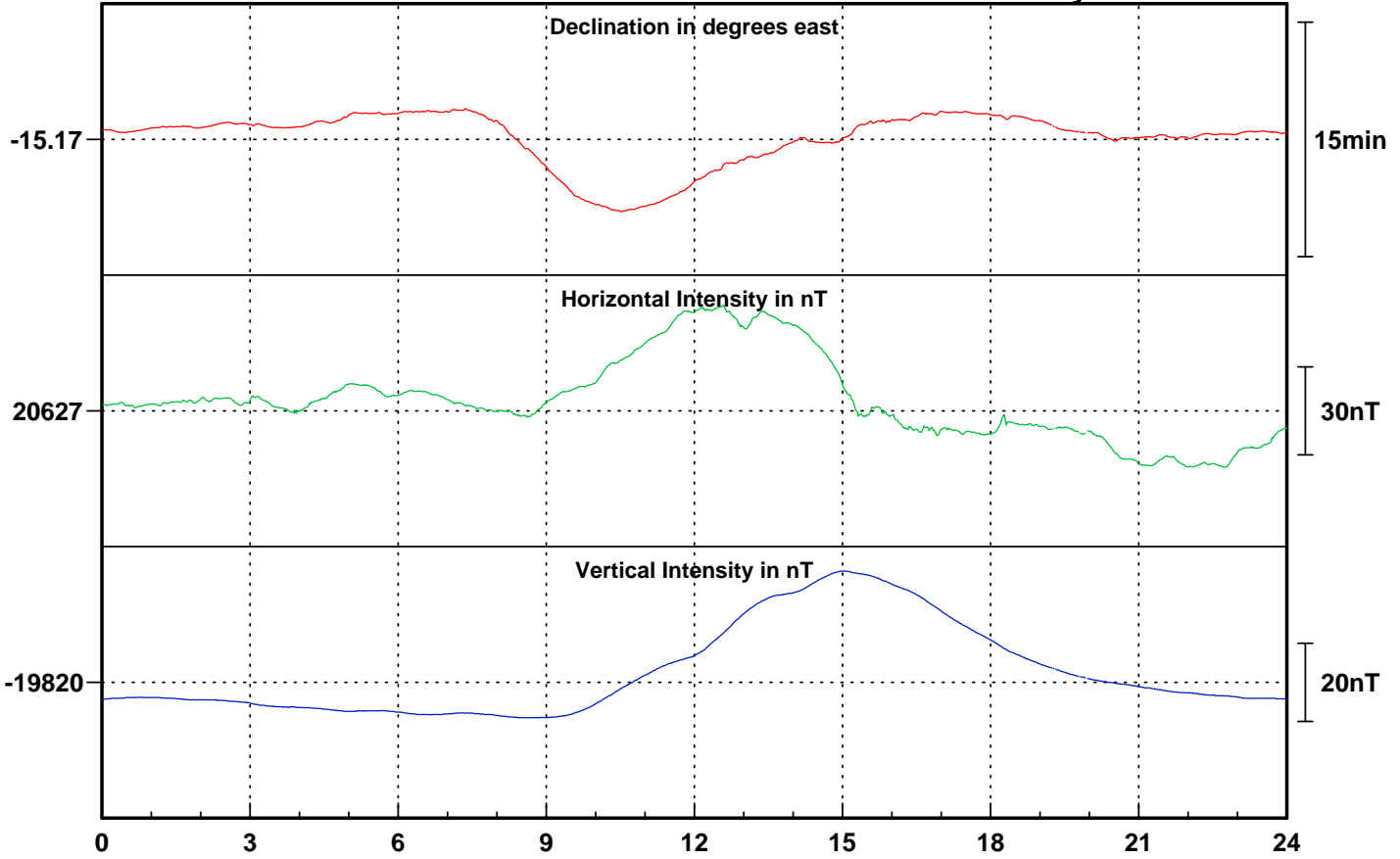
Day number: 117



Date: 27-04-2016

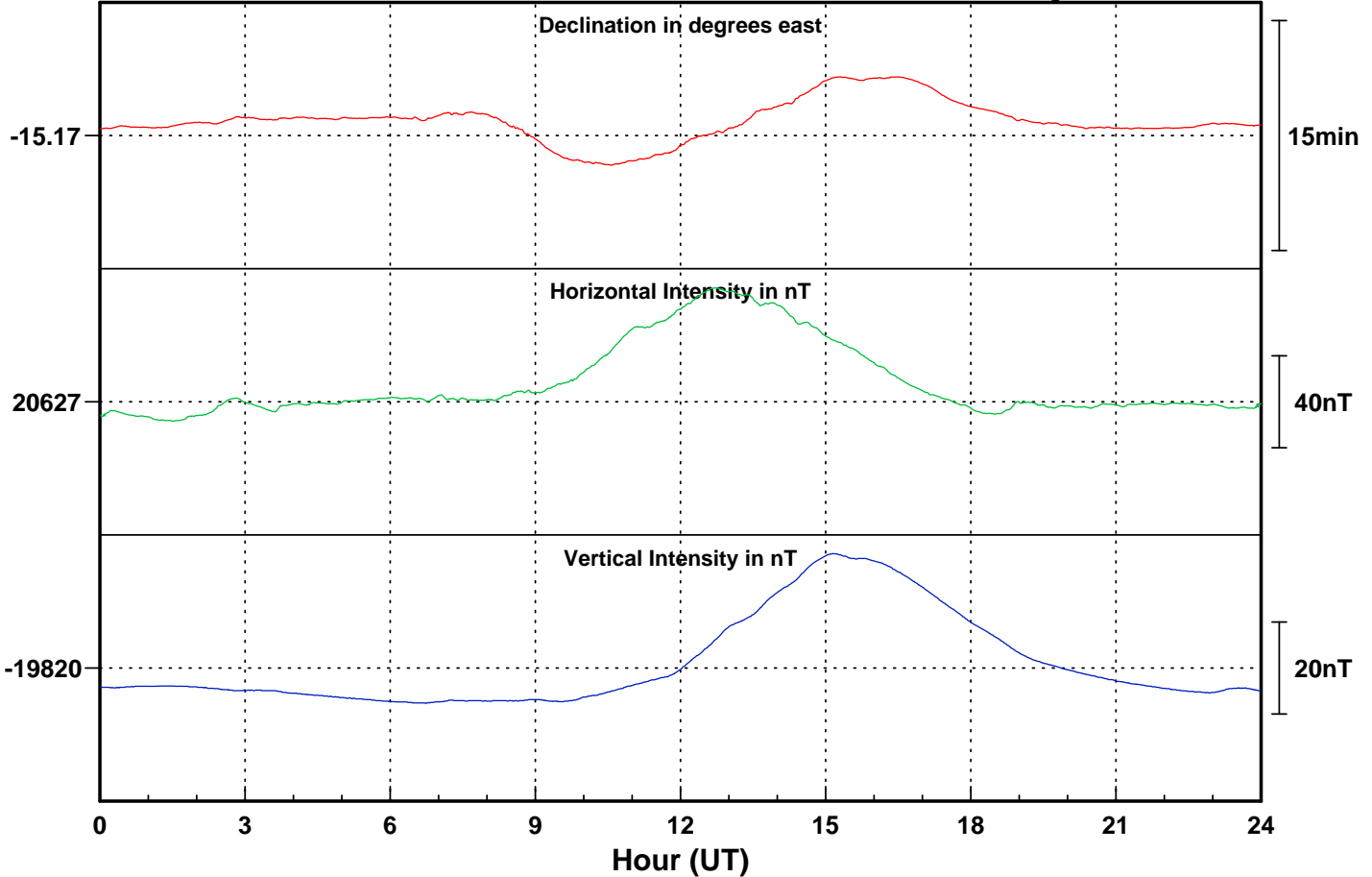
# Ascension Island

Day number: 118



Date: 28-04-2016

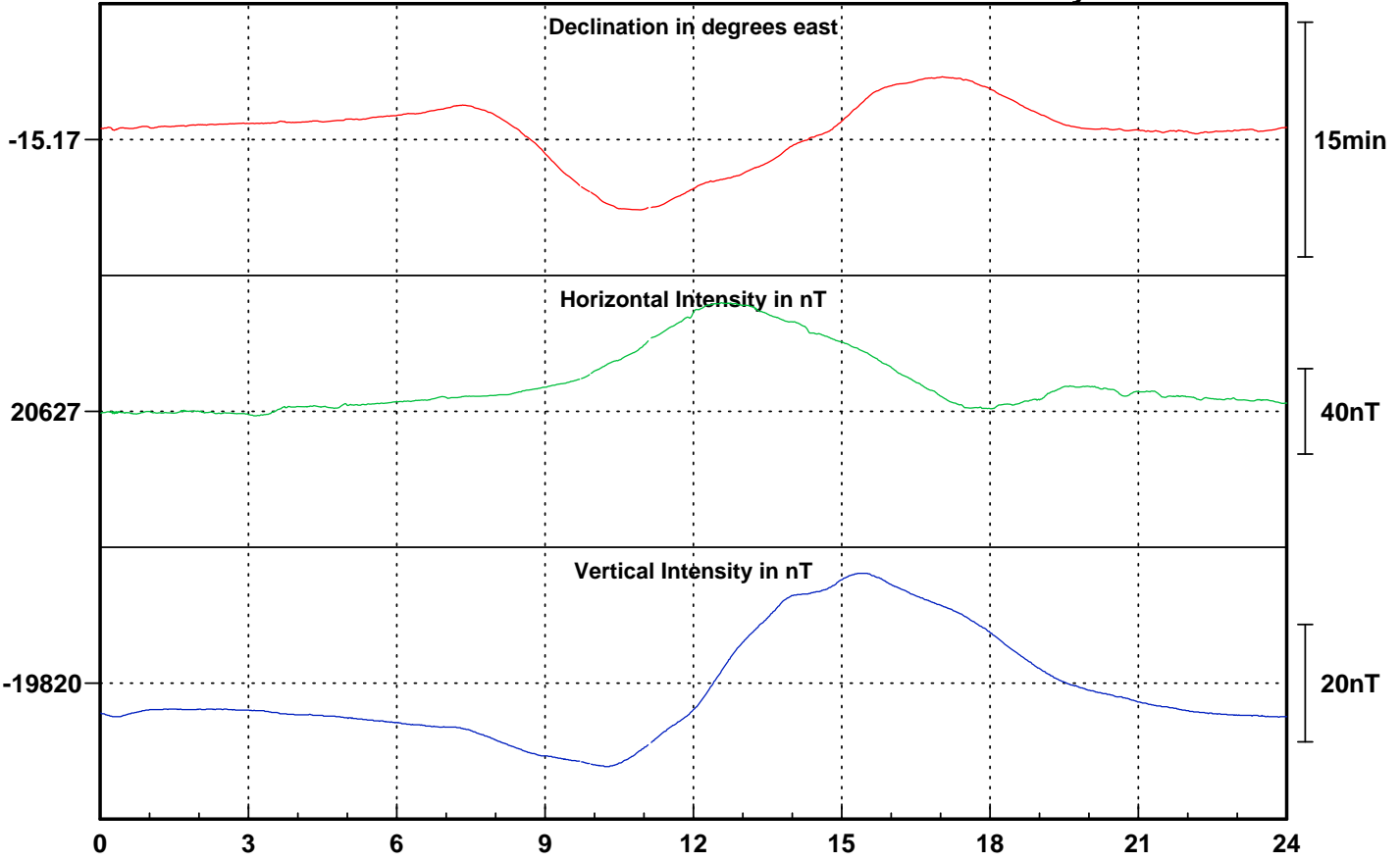
Day number: 119



Date: 29-04-2016

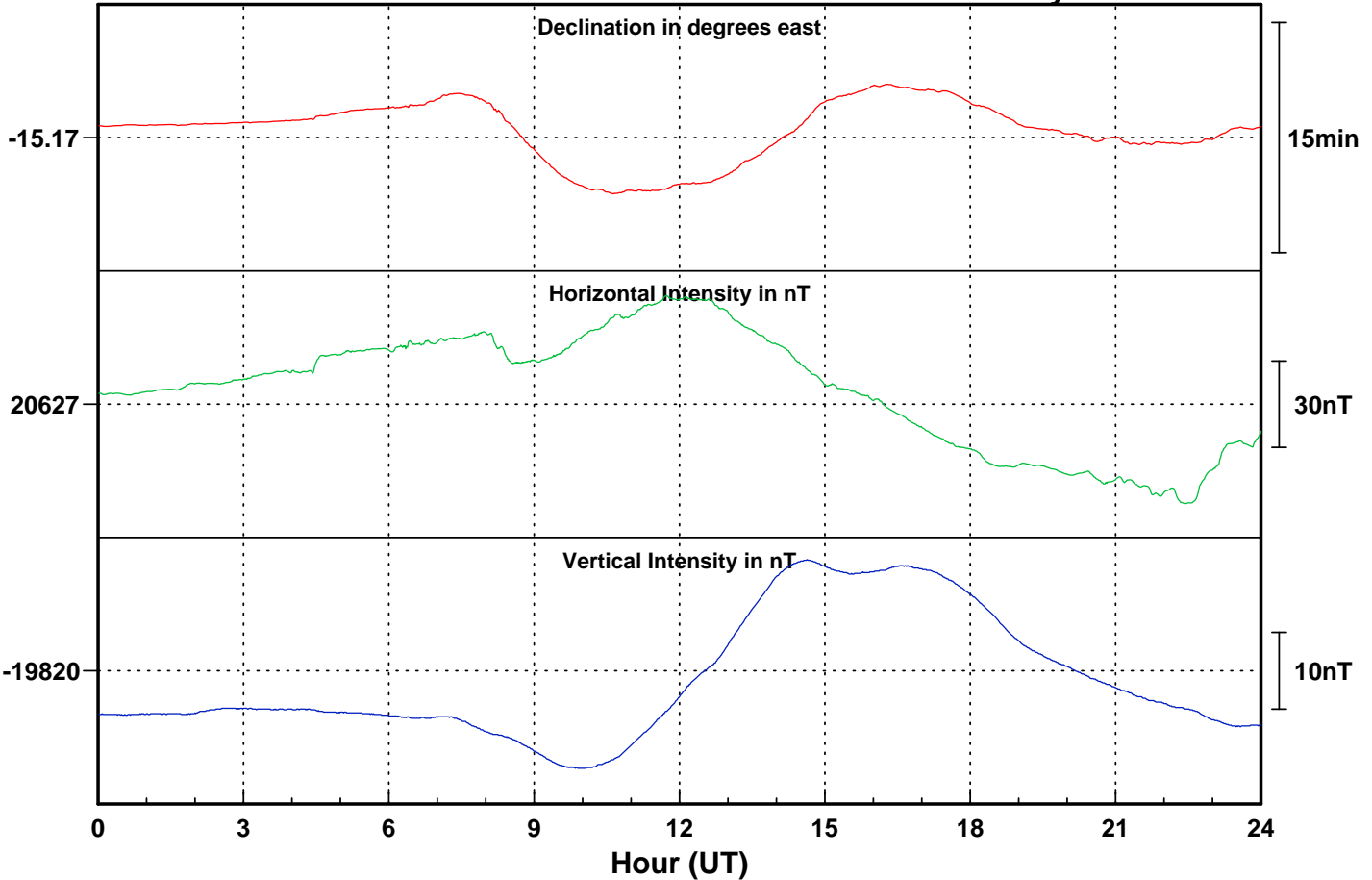
# Ascension Island

Day number: 120

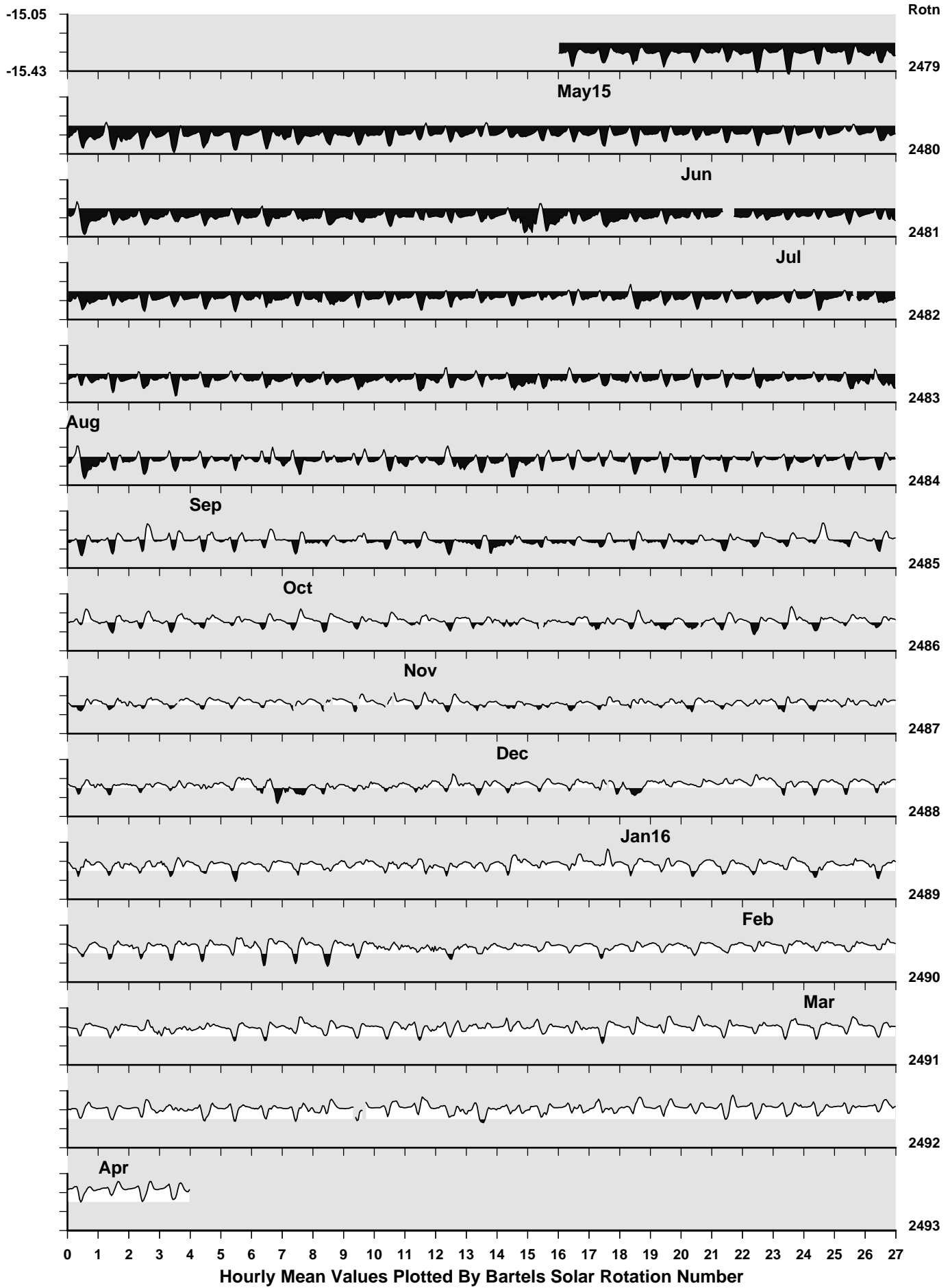


Date: 30-04-2016

Day number: 121



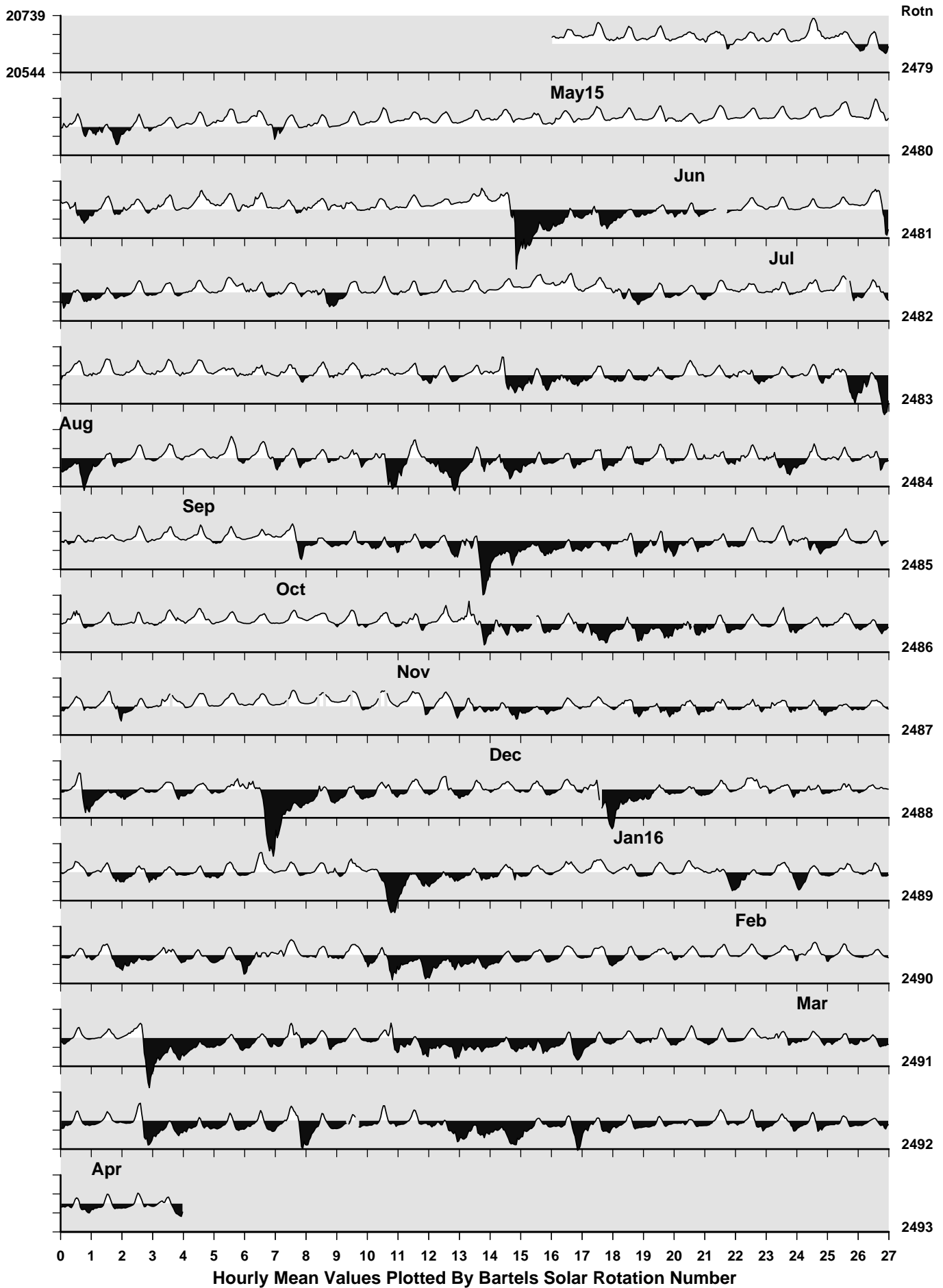
# Ascension Island Observatory: Declination (degrees)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

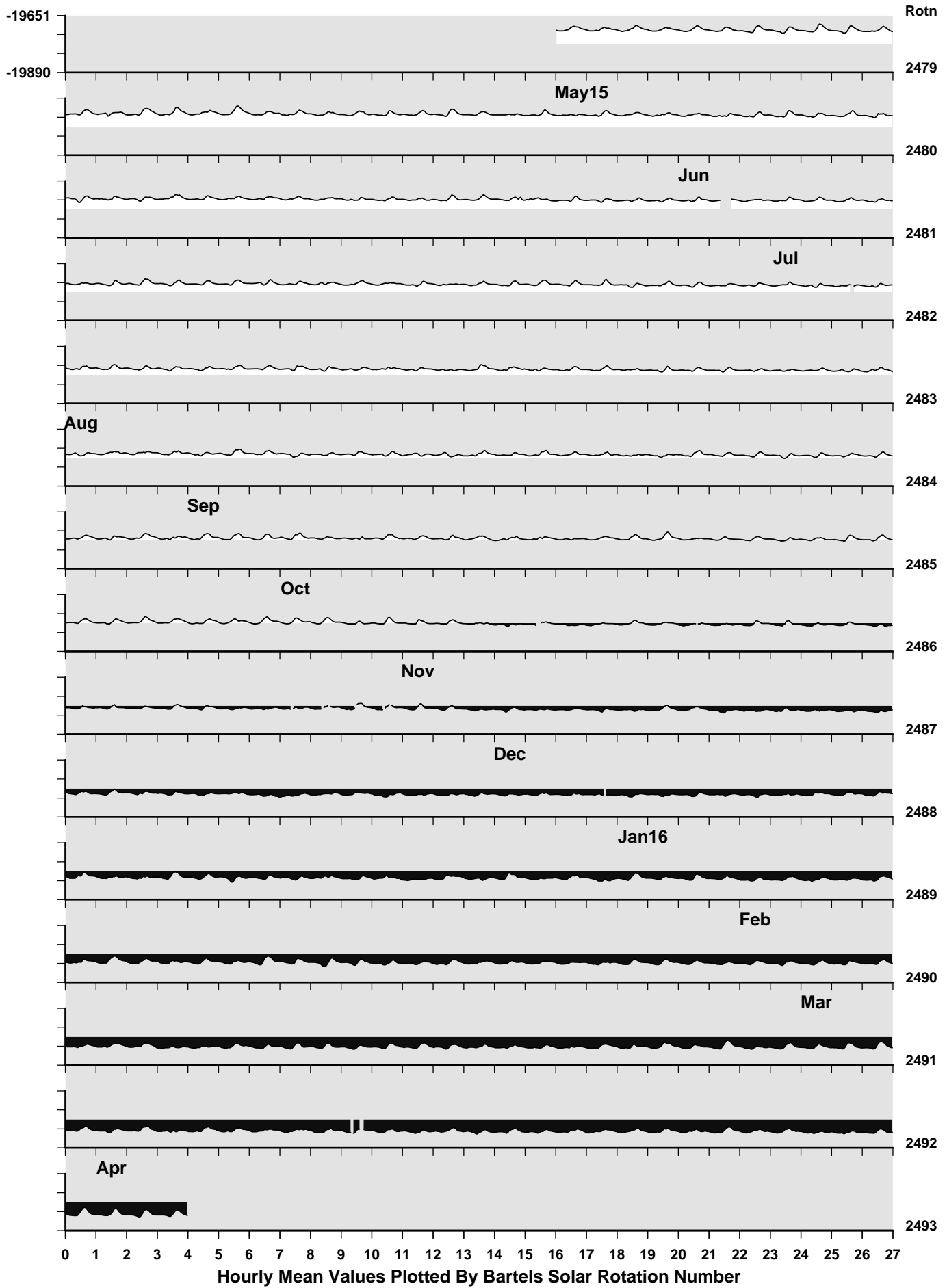


# Ascension Island Observatory: Horizontal Intensity fhTL

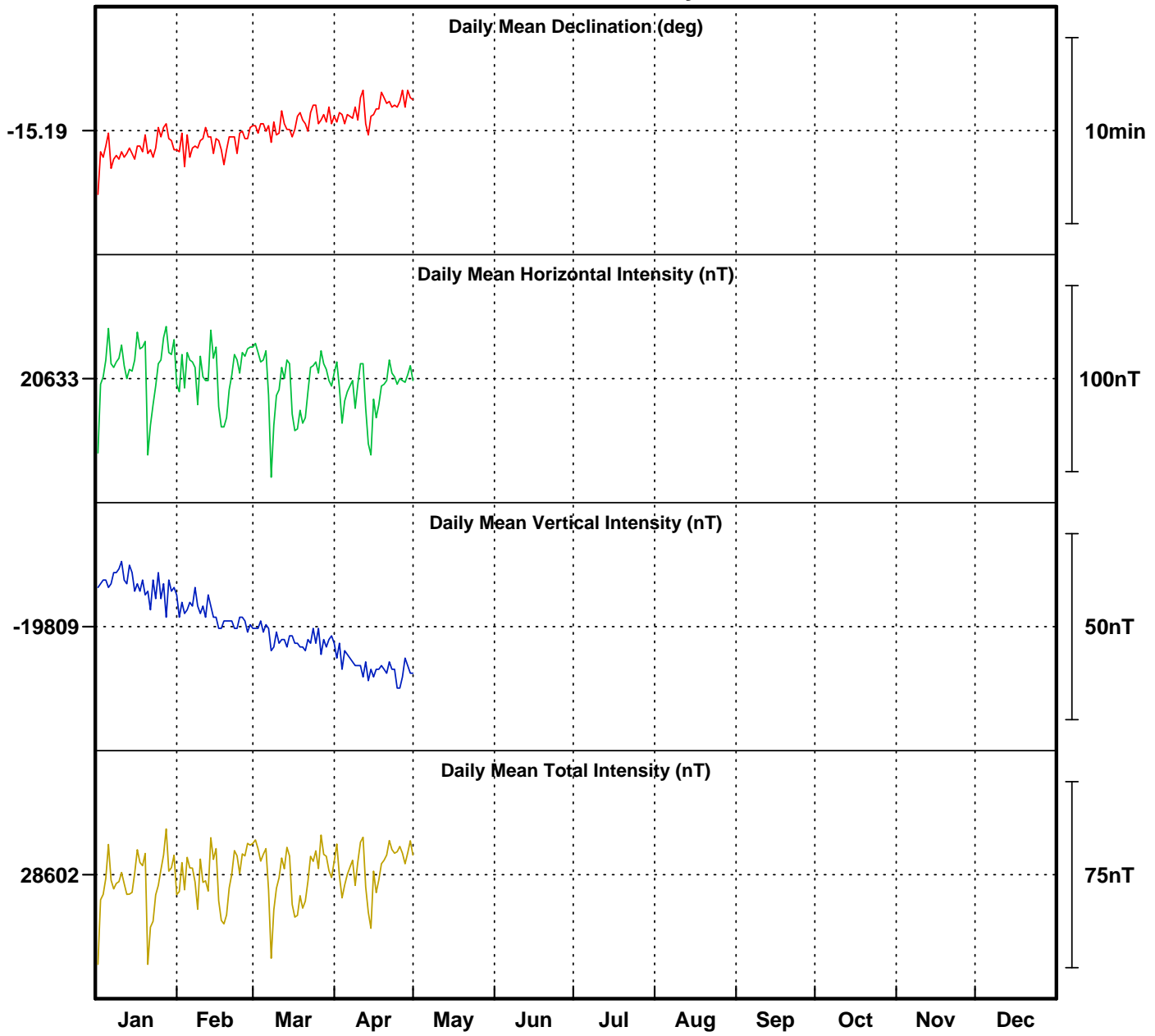


Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Ascension Island Observatory: Vertical Intensity (nT)



# 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

#### Note

i. The values shown here are provisional.