



British
Geological
Survey



MONTHLY MAGNETIC BULLETIN

Ascension Island Observatory

December 2023



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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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: 3° 0'25.2"S 057° 31'40.8"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 13th generation International Geomagnetic Reference Field (IGRF) at epoch 2022.5. On-line access to models (including IGRF), charts and navigational data are available at 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 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 ©UKRI. 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 geomag.bgs.ac.uk/contactus/staff

Ascension Island 2023

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

-14.85

5min

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

20564

20nT

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

-19950

20nT

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

-87.9

20nT

Temperature Inside Variometer Hut

36.7

10°C

Jan

Feb

Mar

Apr

May

Jun

Jul

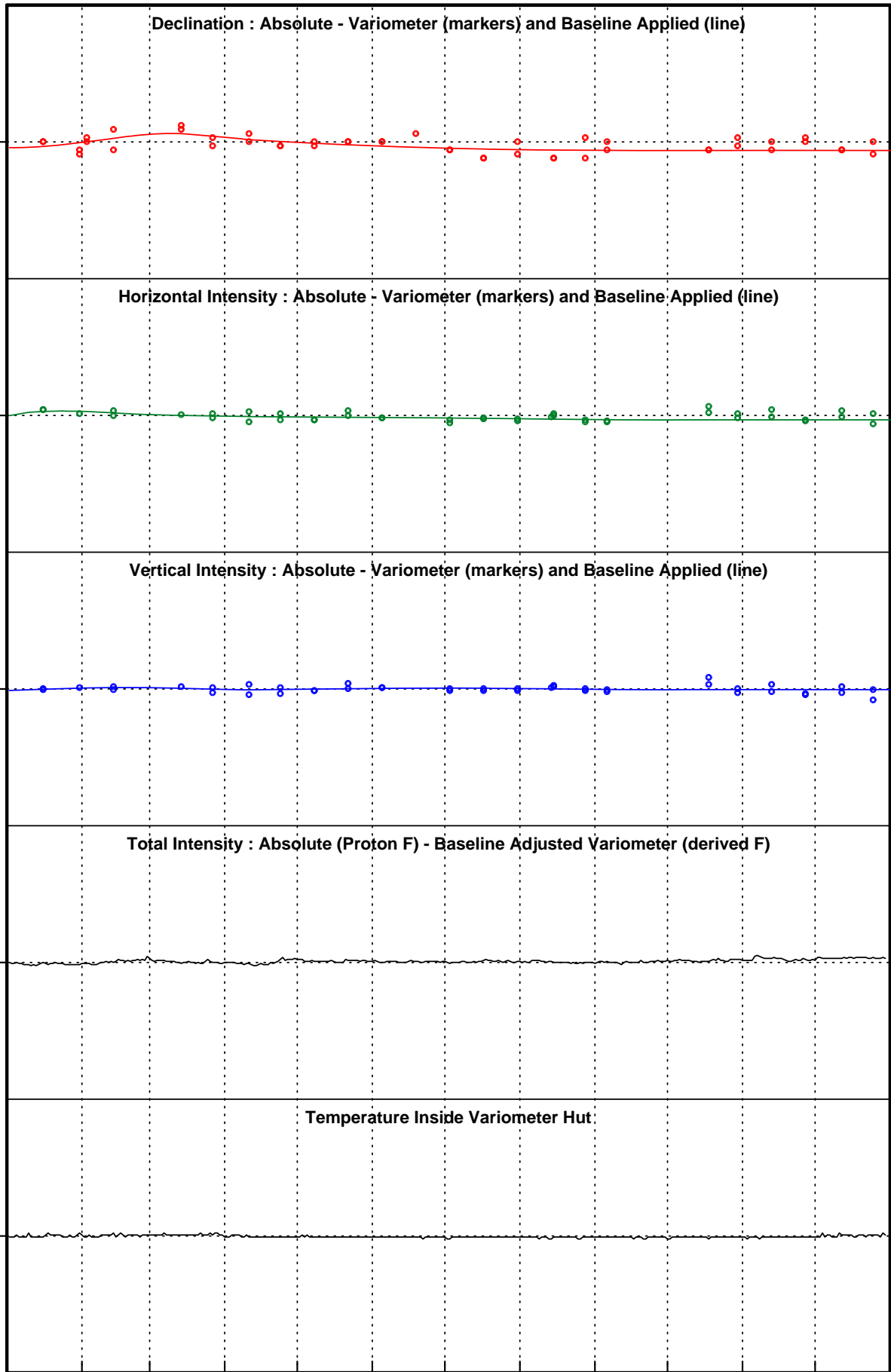
Aug

Sep

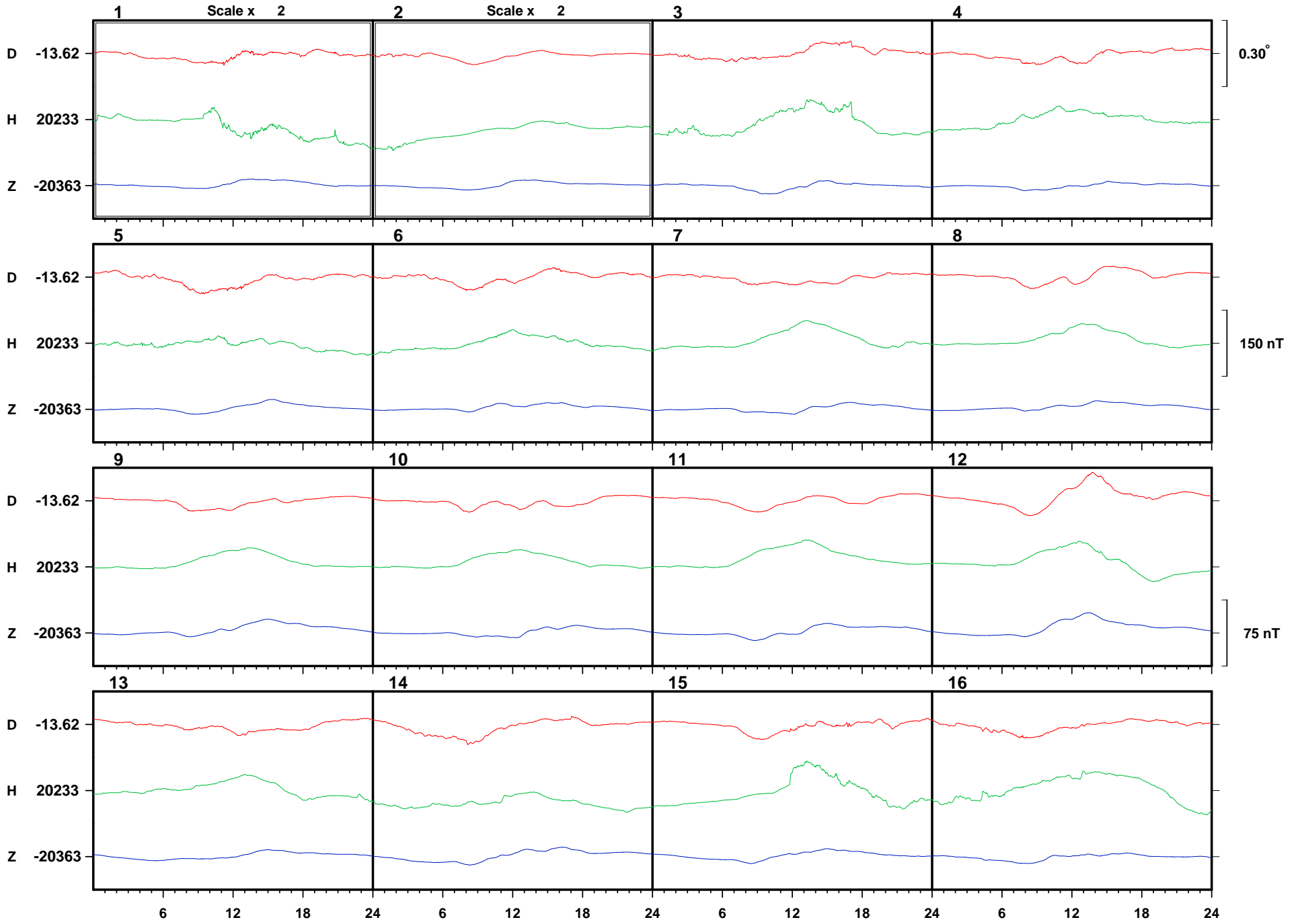
Oct

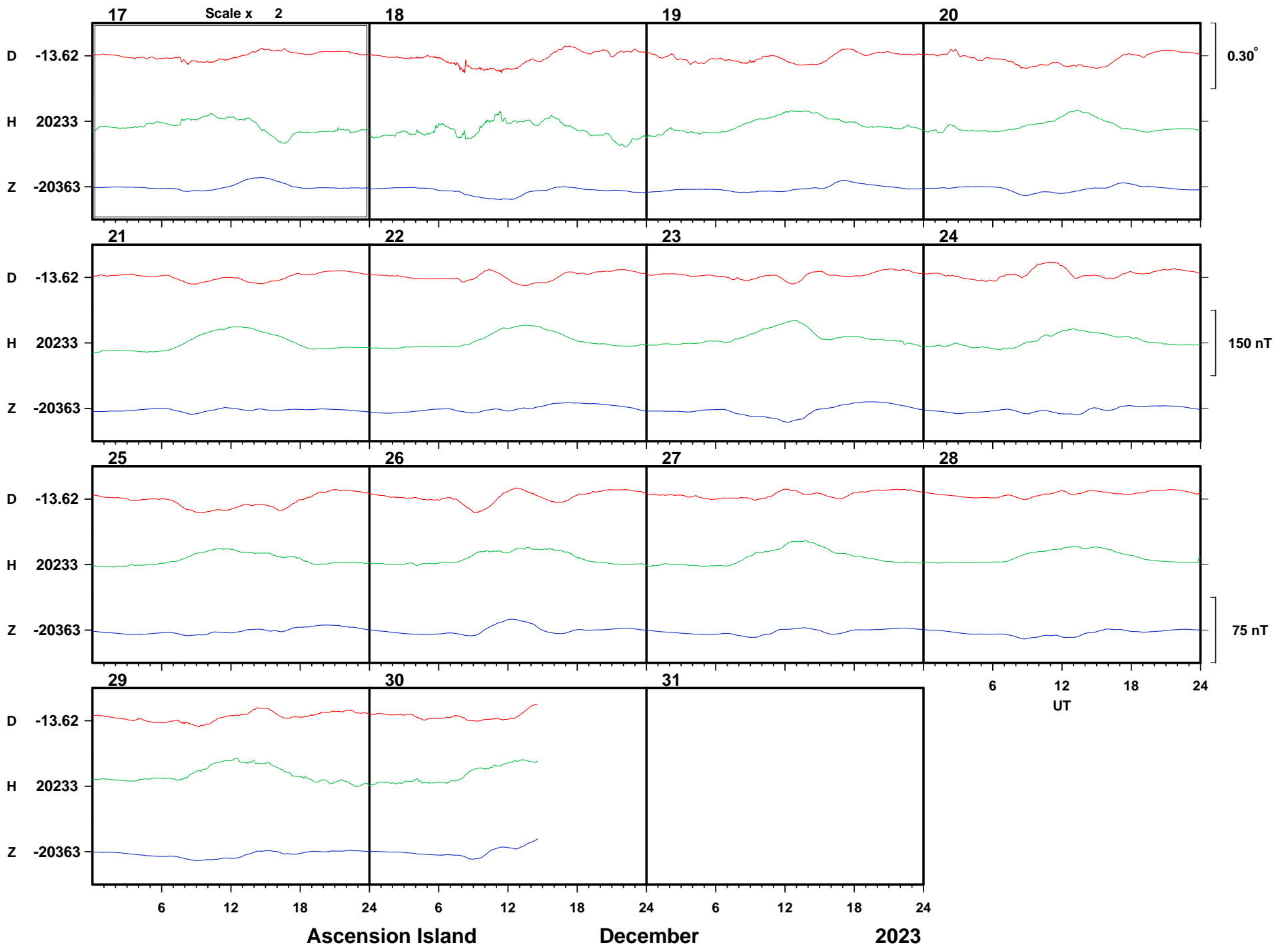
Nov

Dec



Ascension Island December 2023

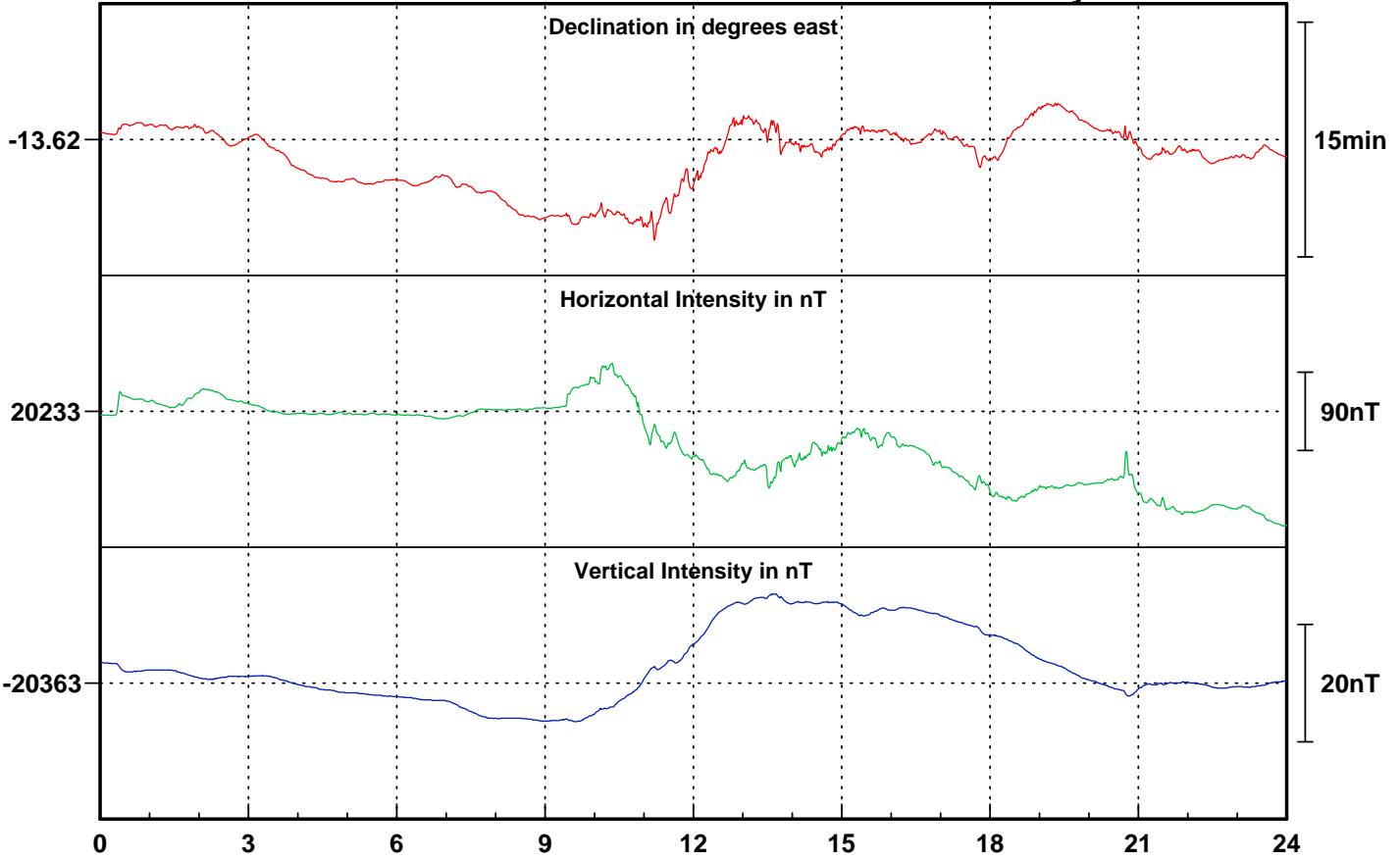




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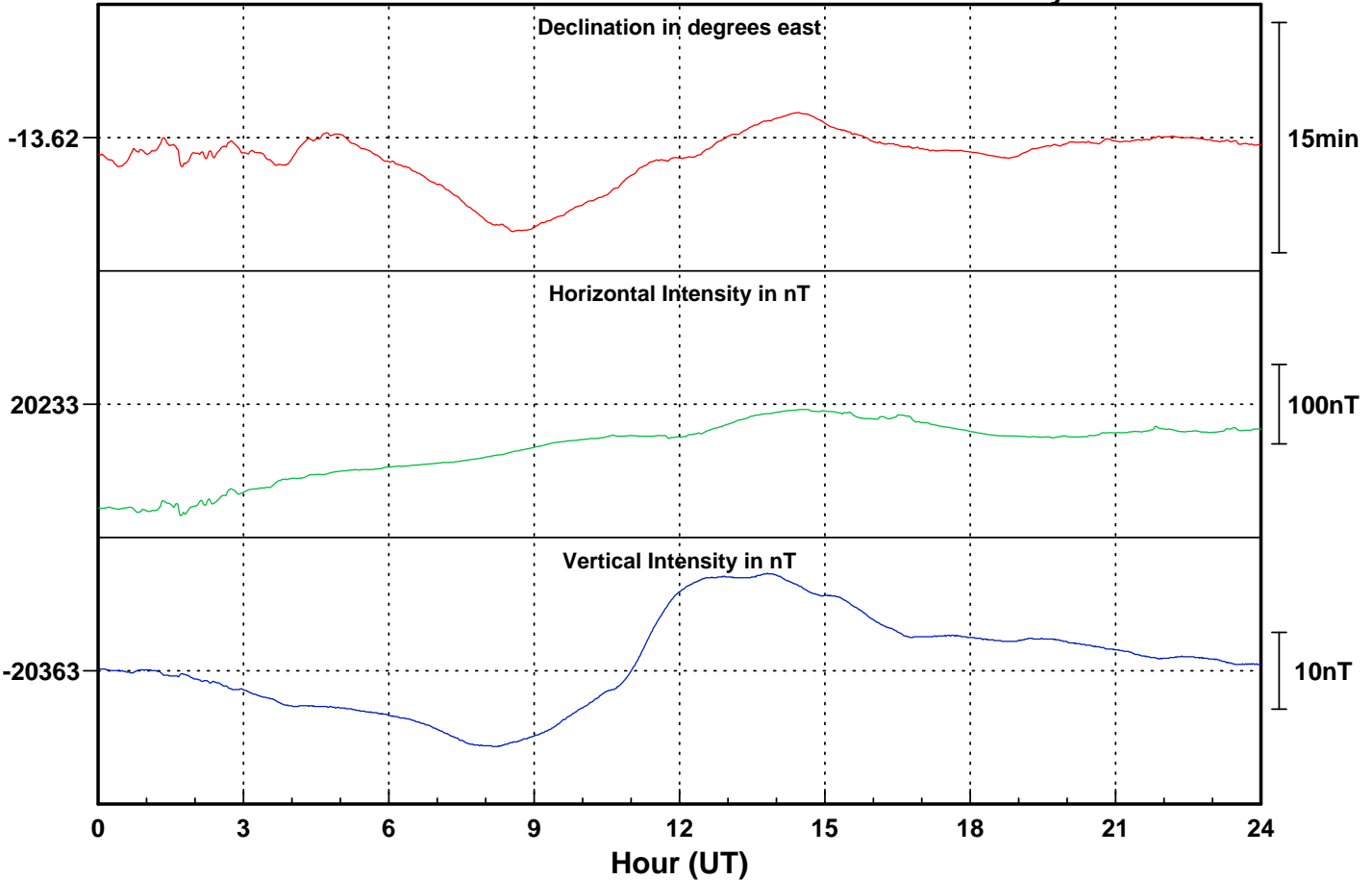
Ascension Island

Day number: 335



Date: 02-12-2023

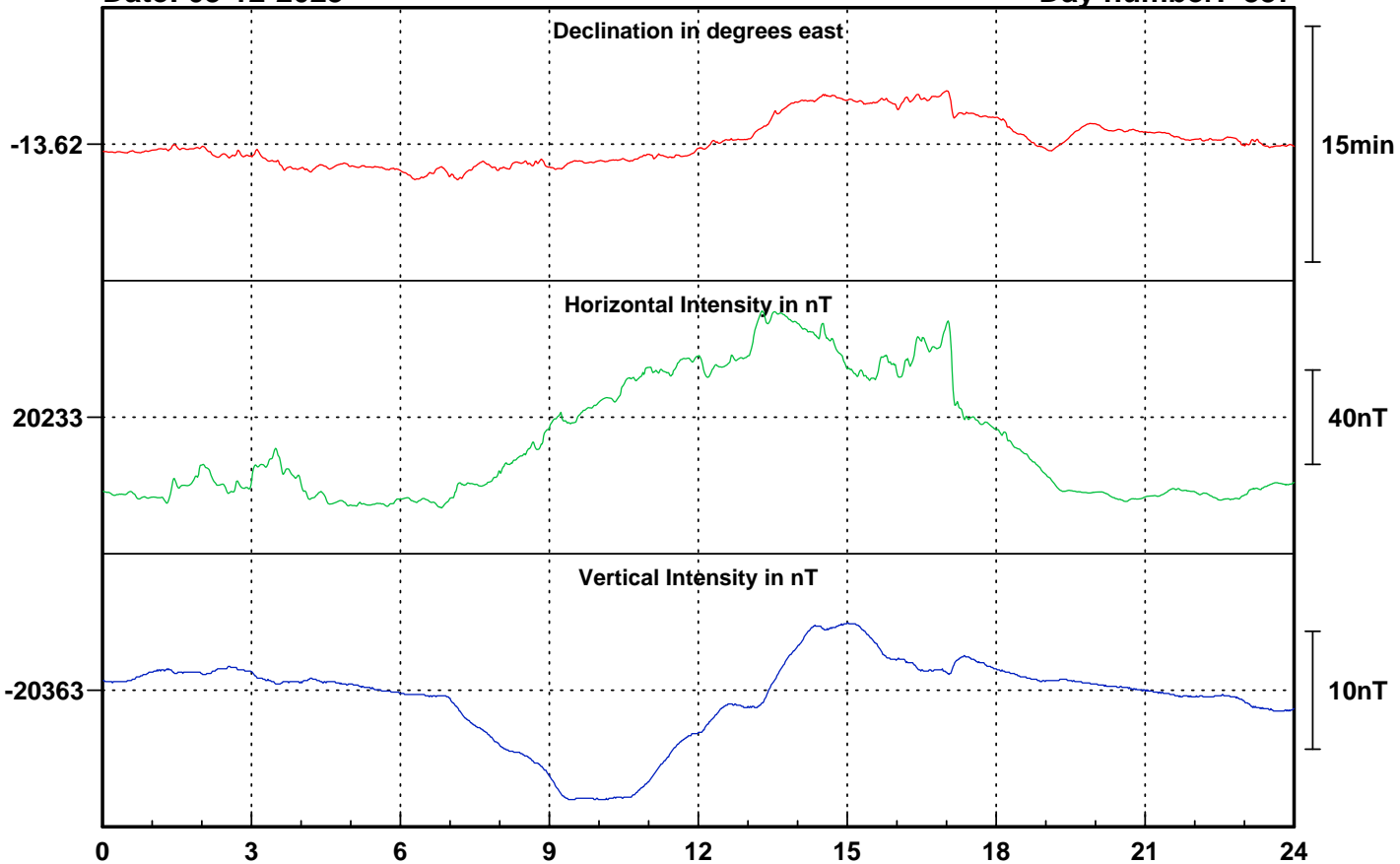
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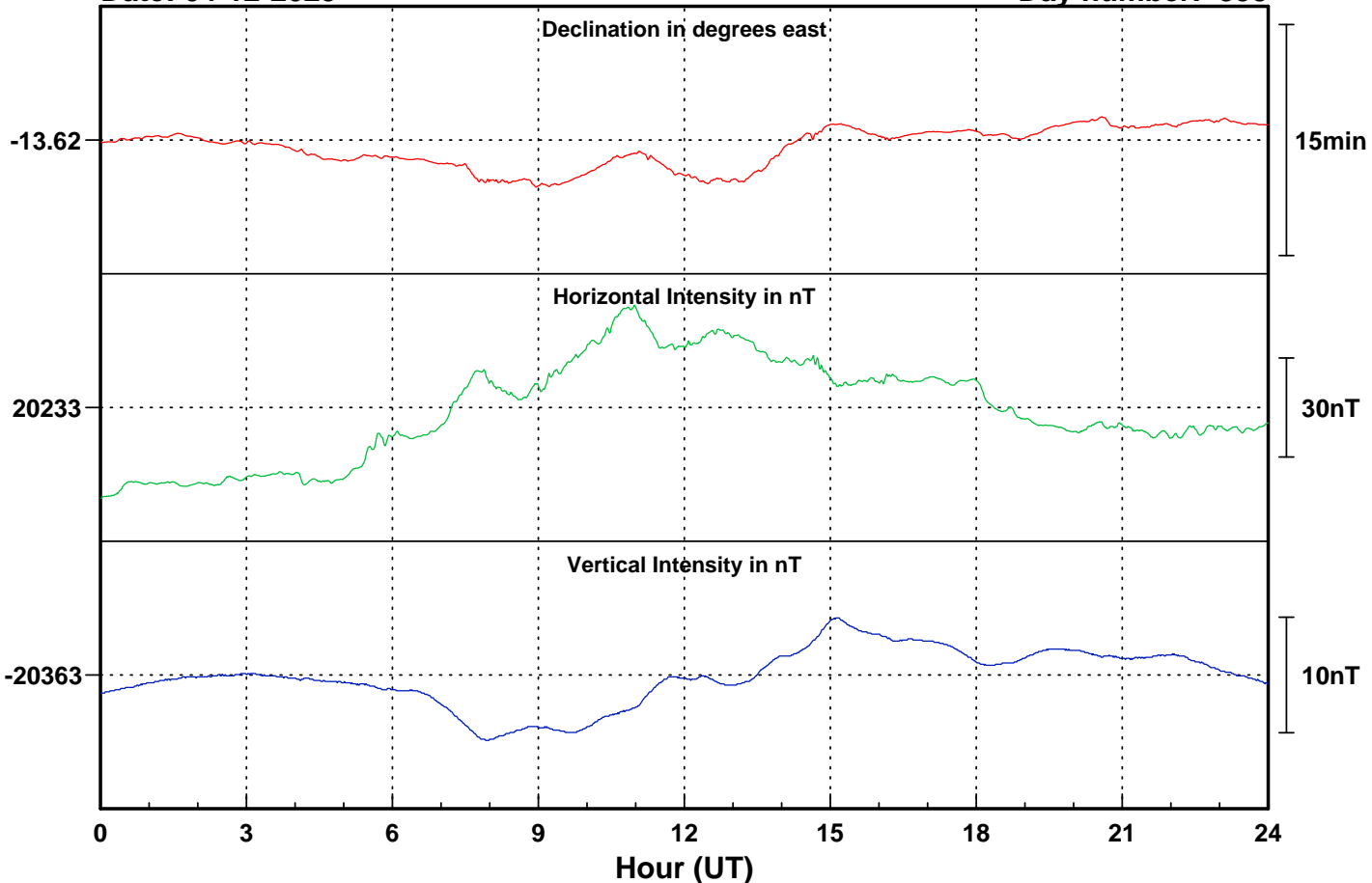
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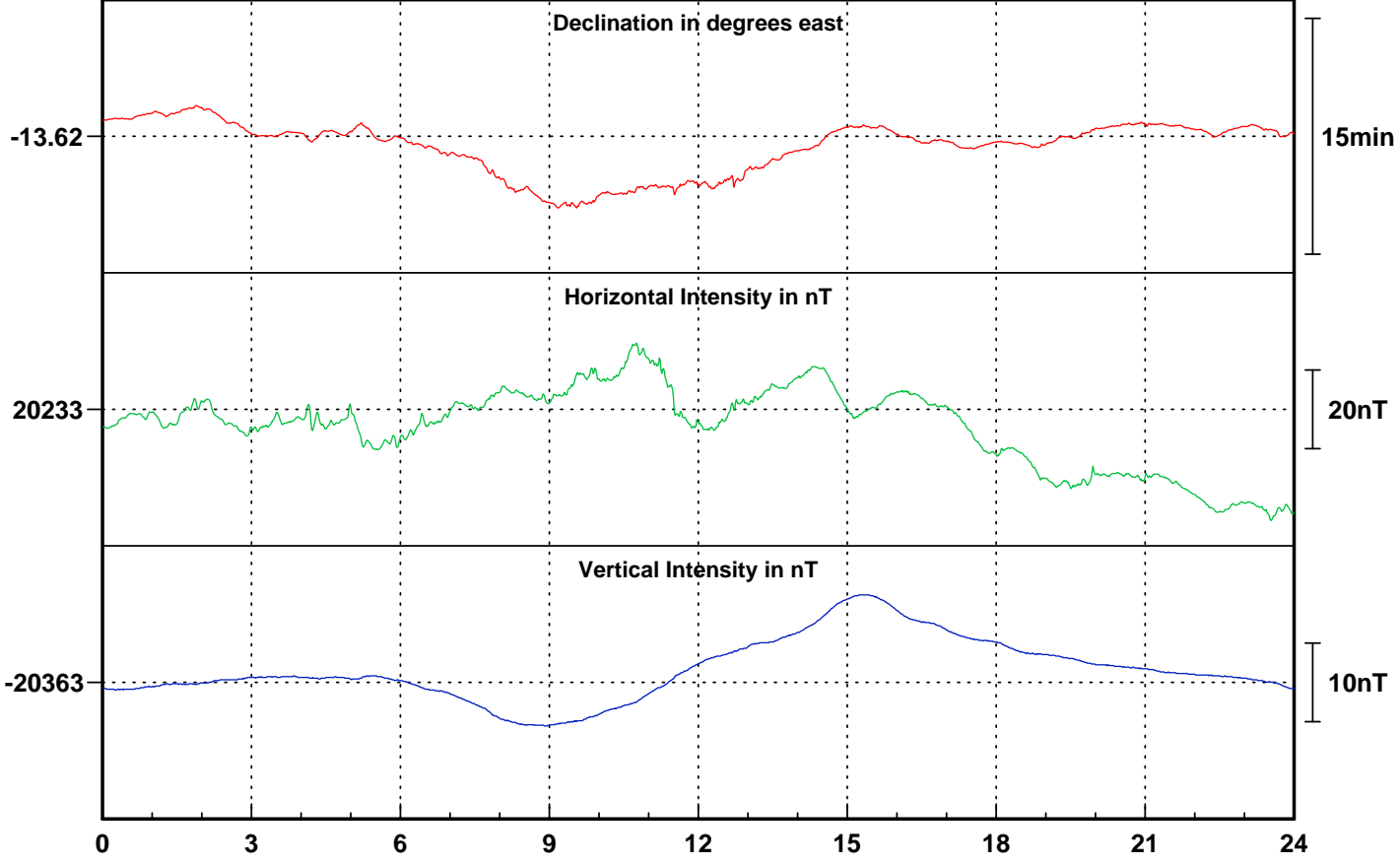
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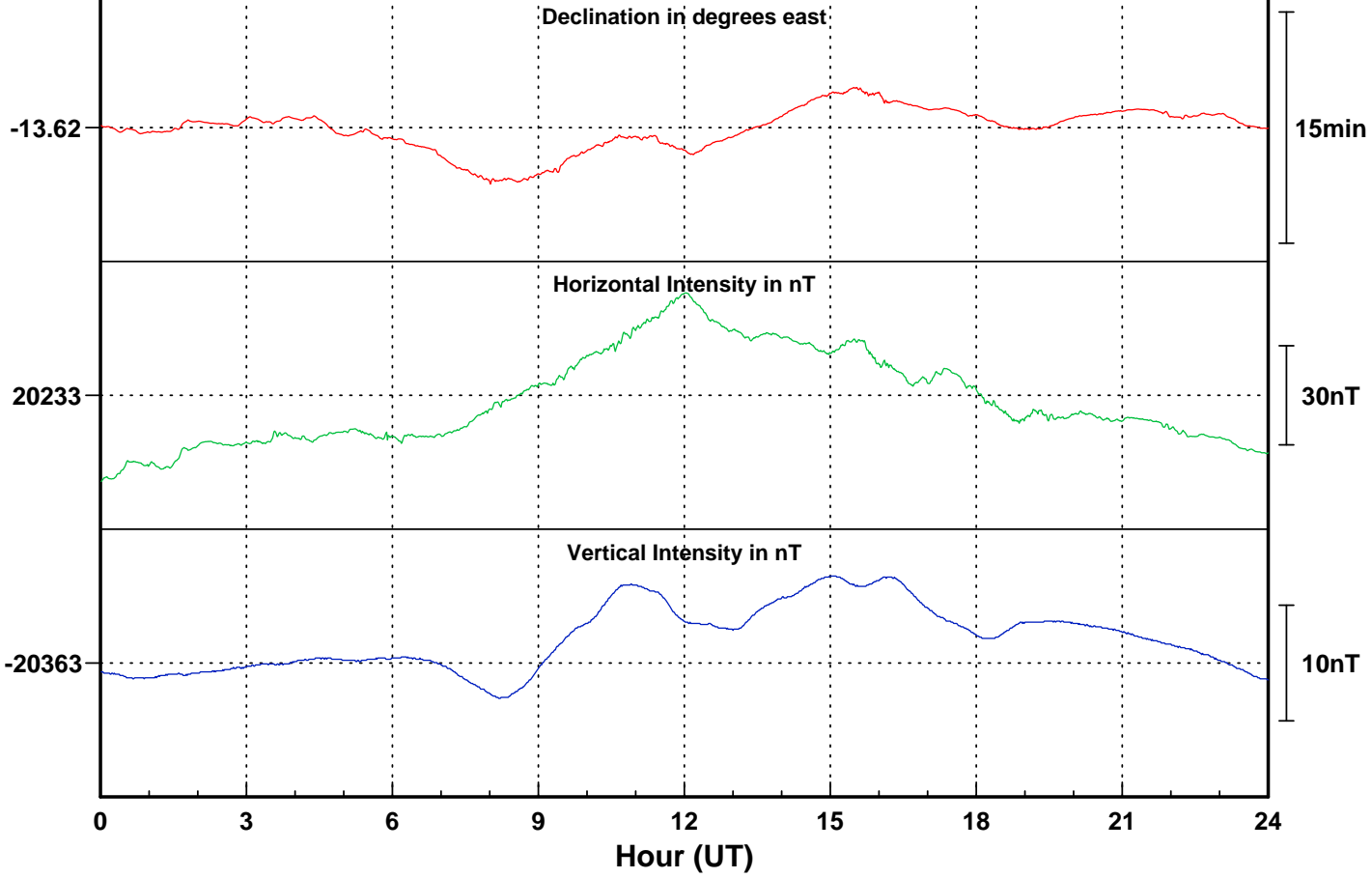
Ascension Island

Day number: 339



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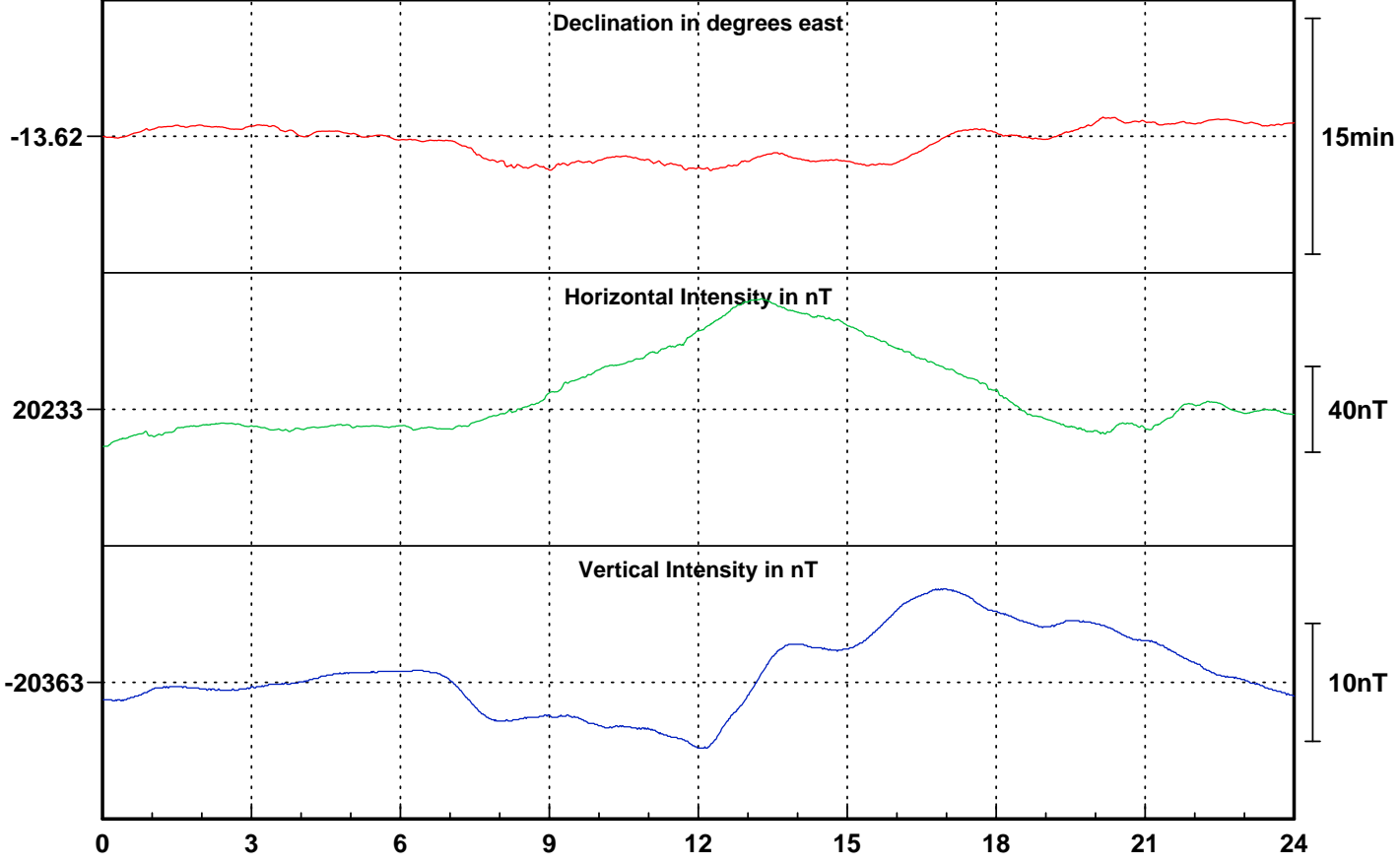
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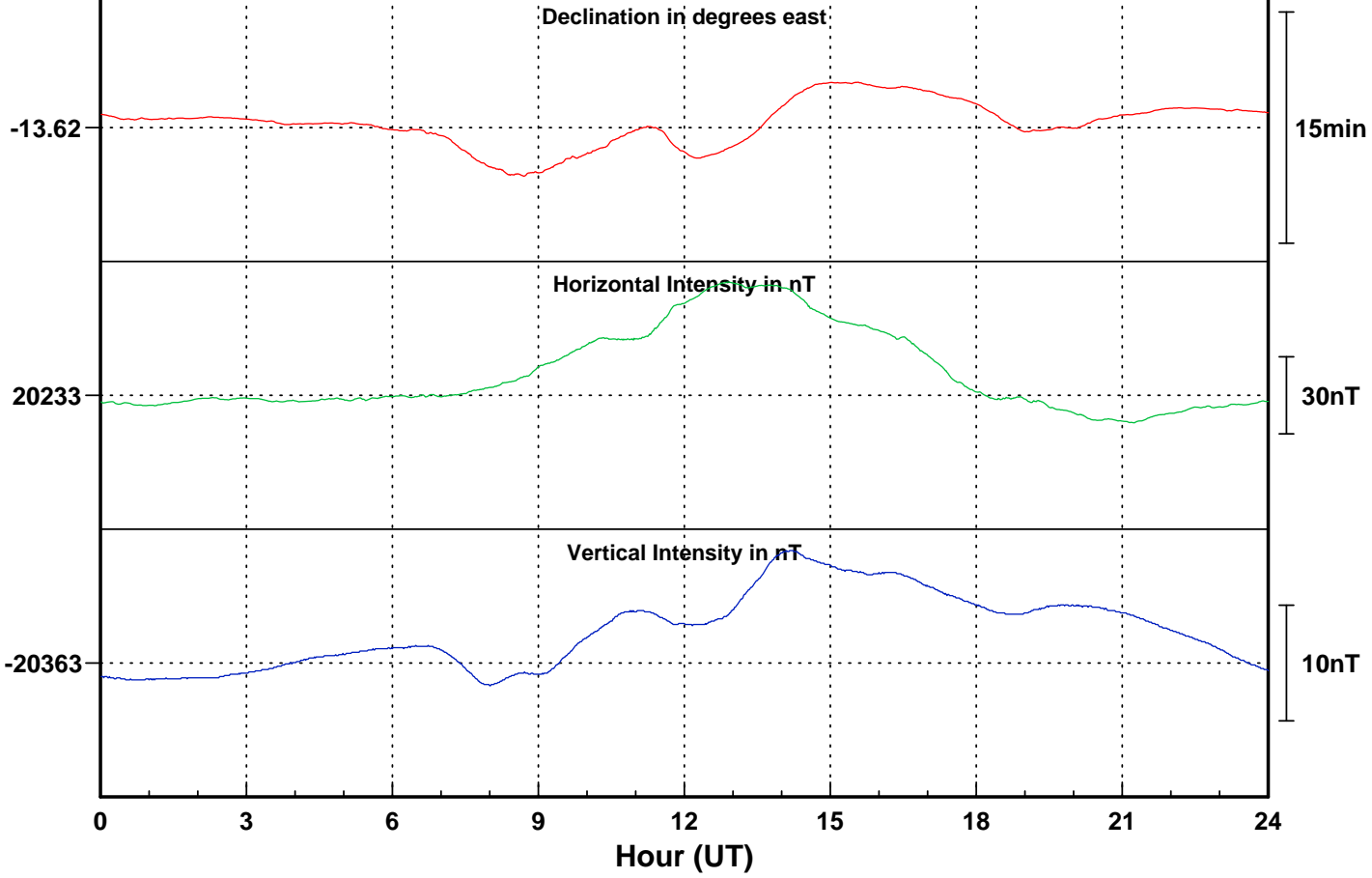
Ascension Island

Day number: 341



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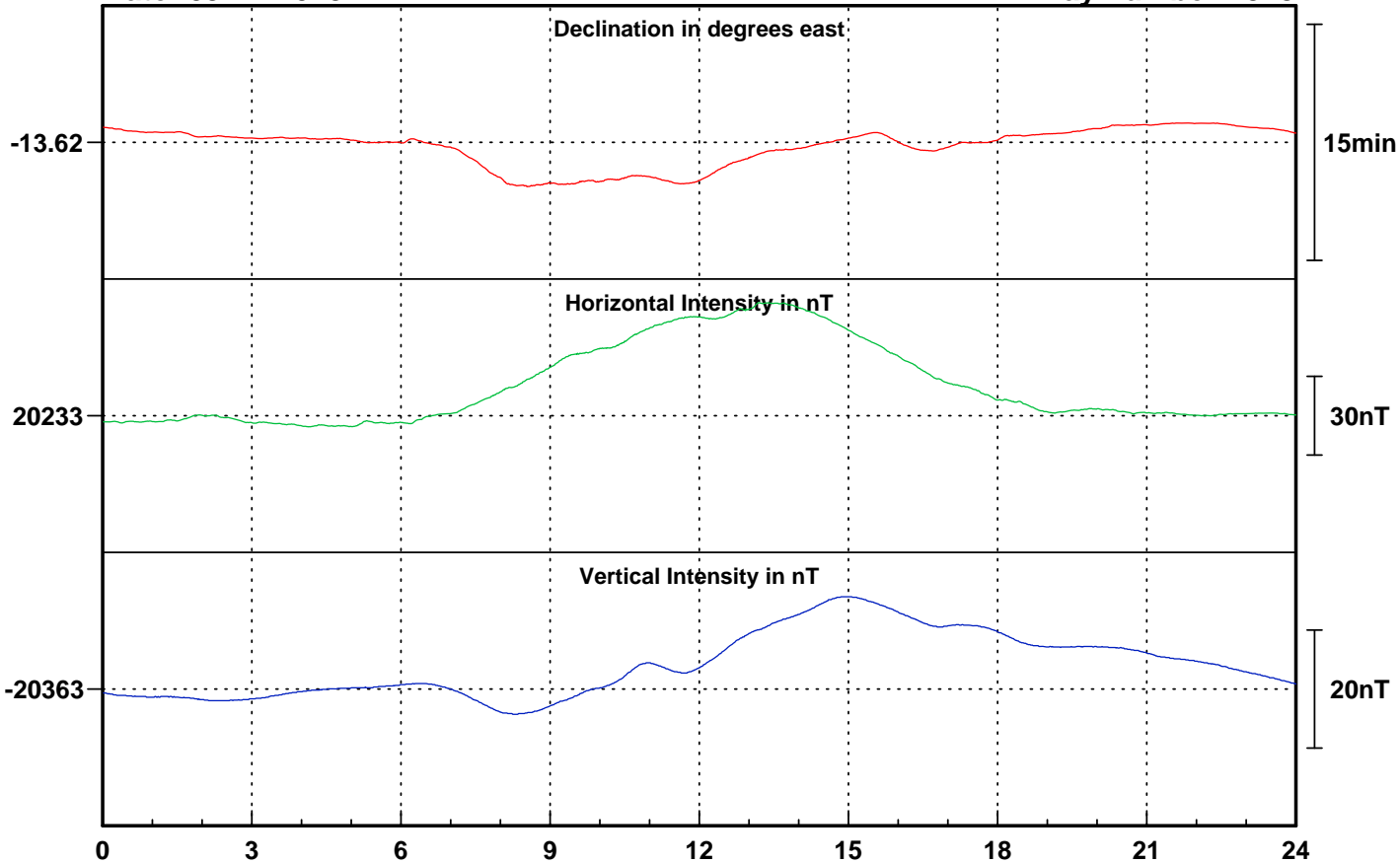
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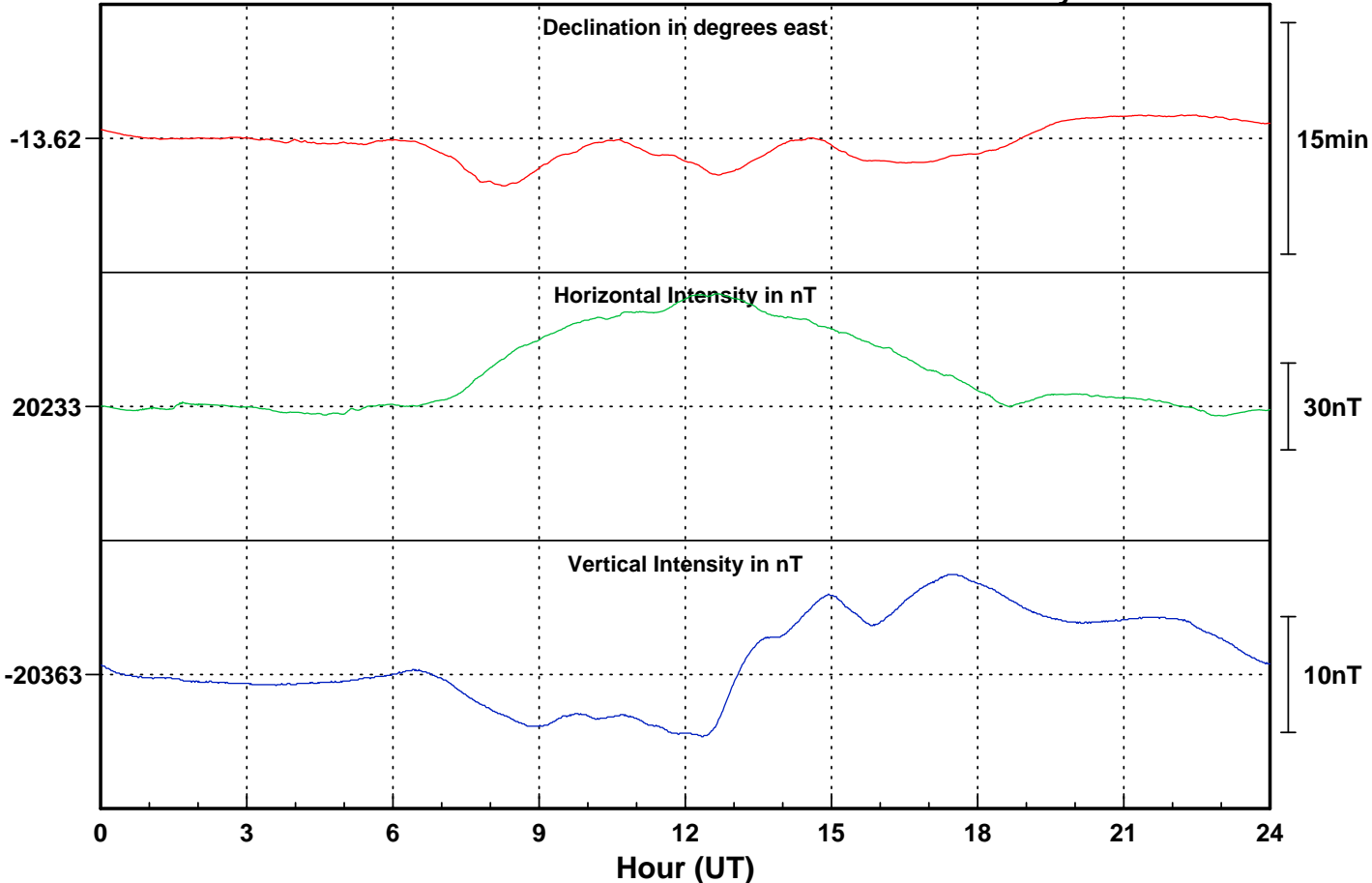
Ascension Island

Day number: 343



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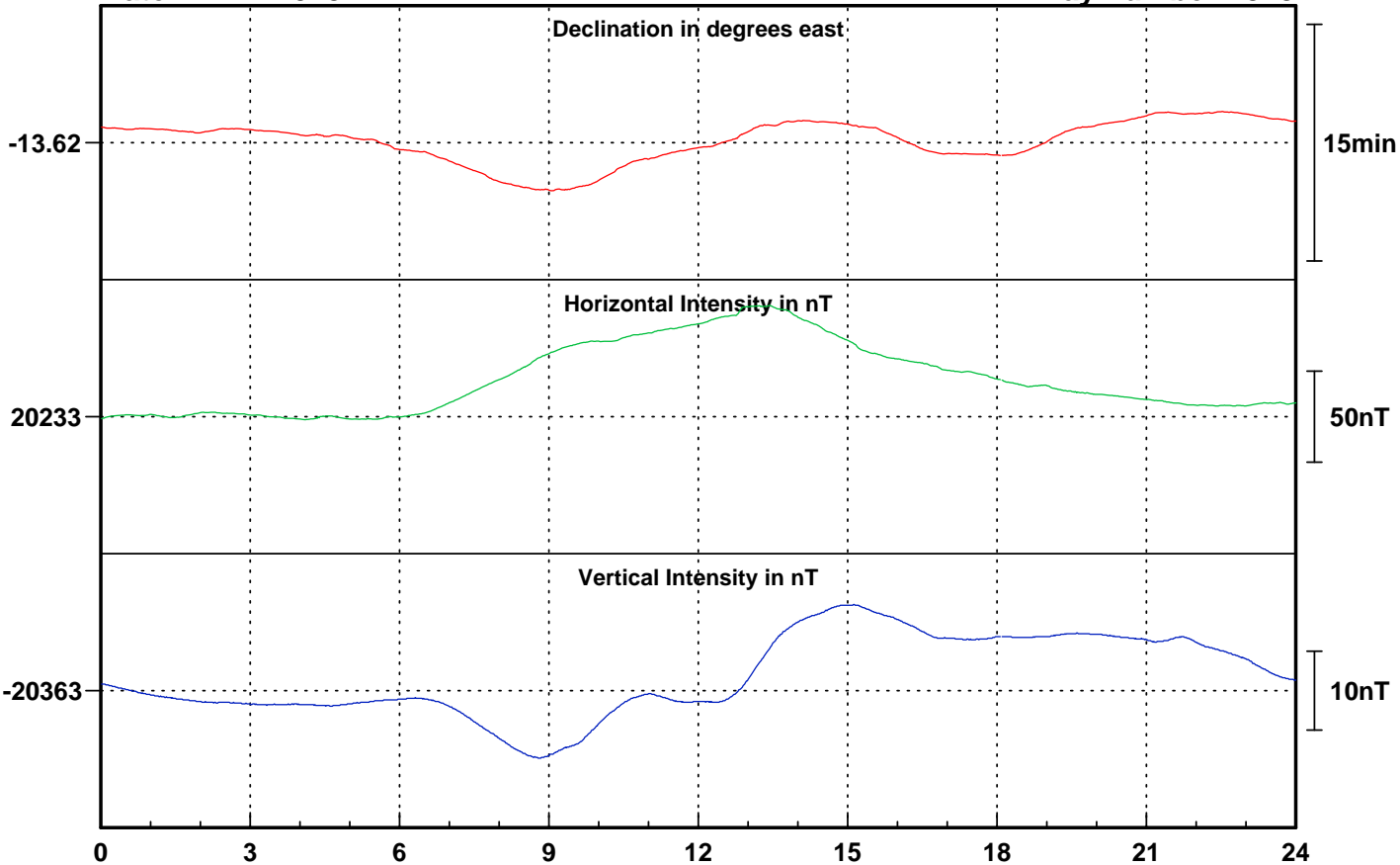
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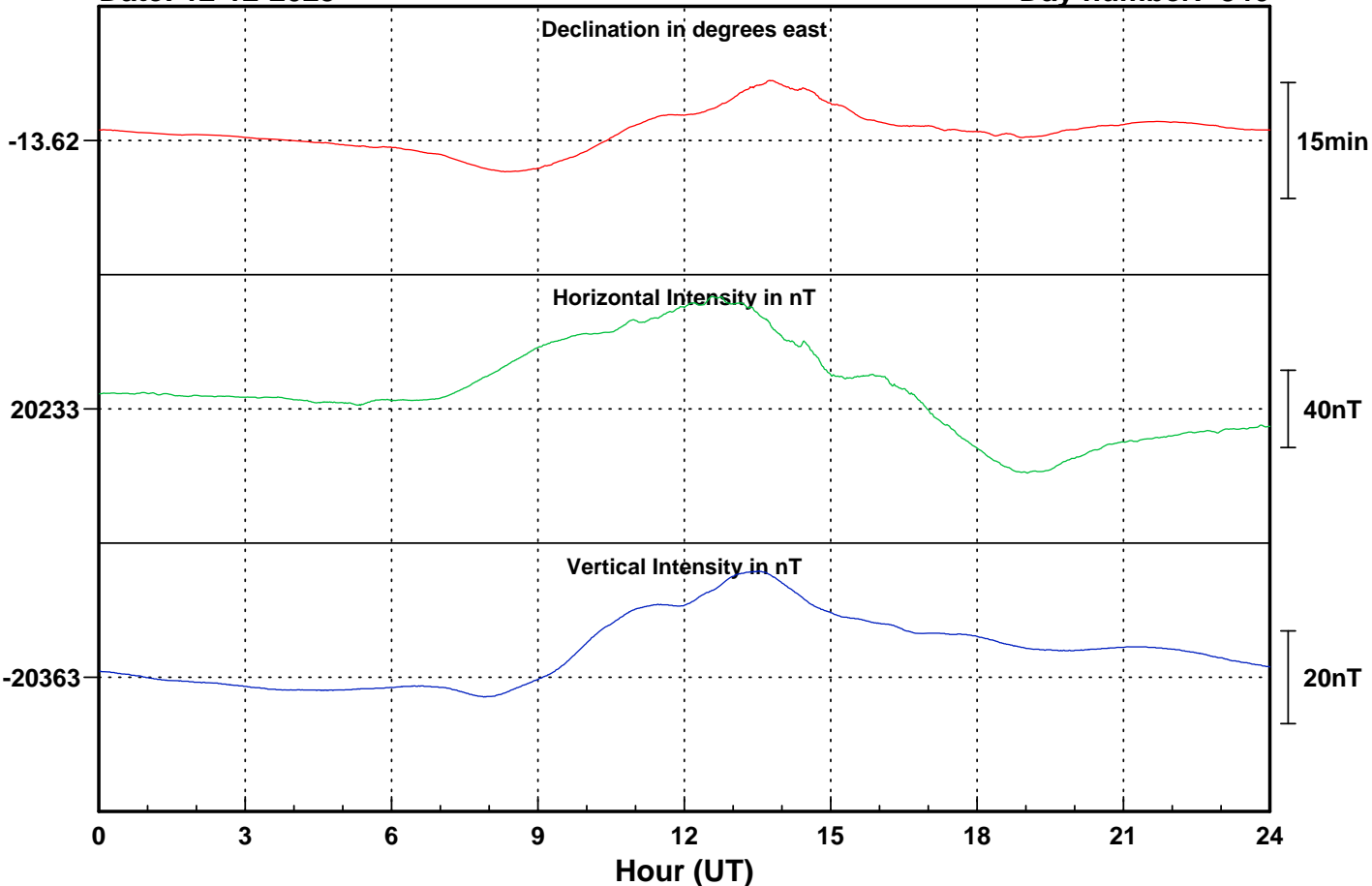
Ascension Island

Day number: 345



Date: 12-12-2023

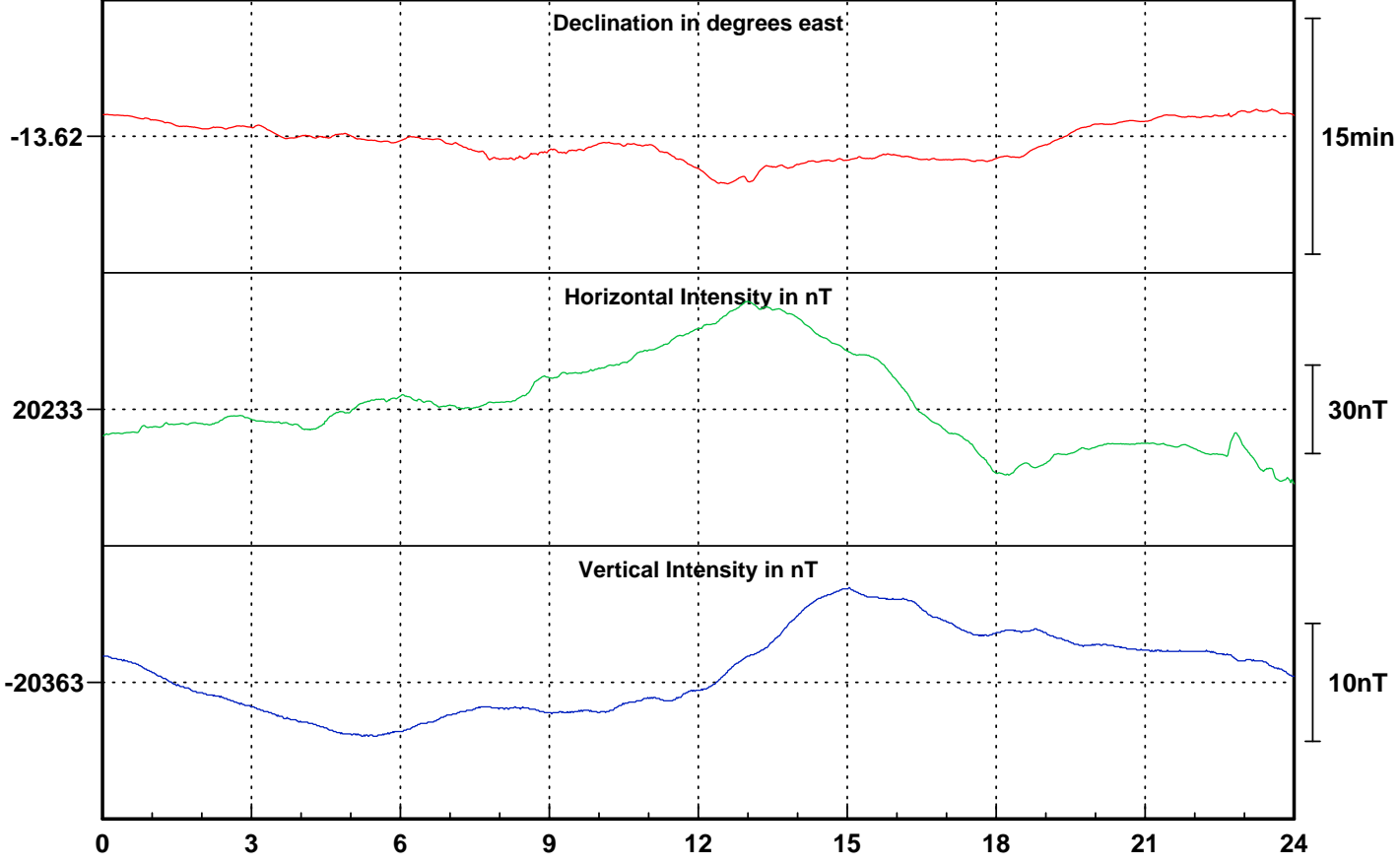
Day number: 346



Date: 13-12-2023

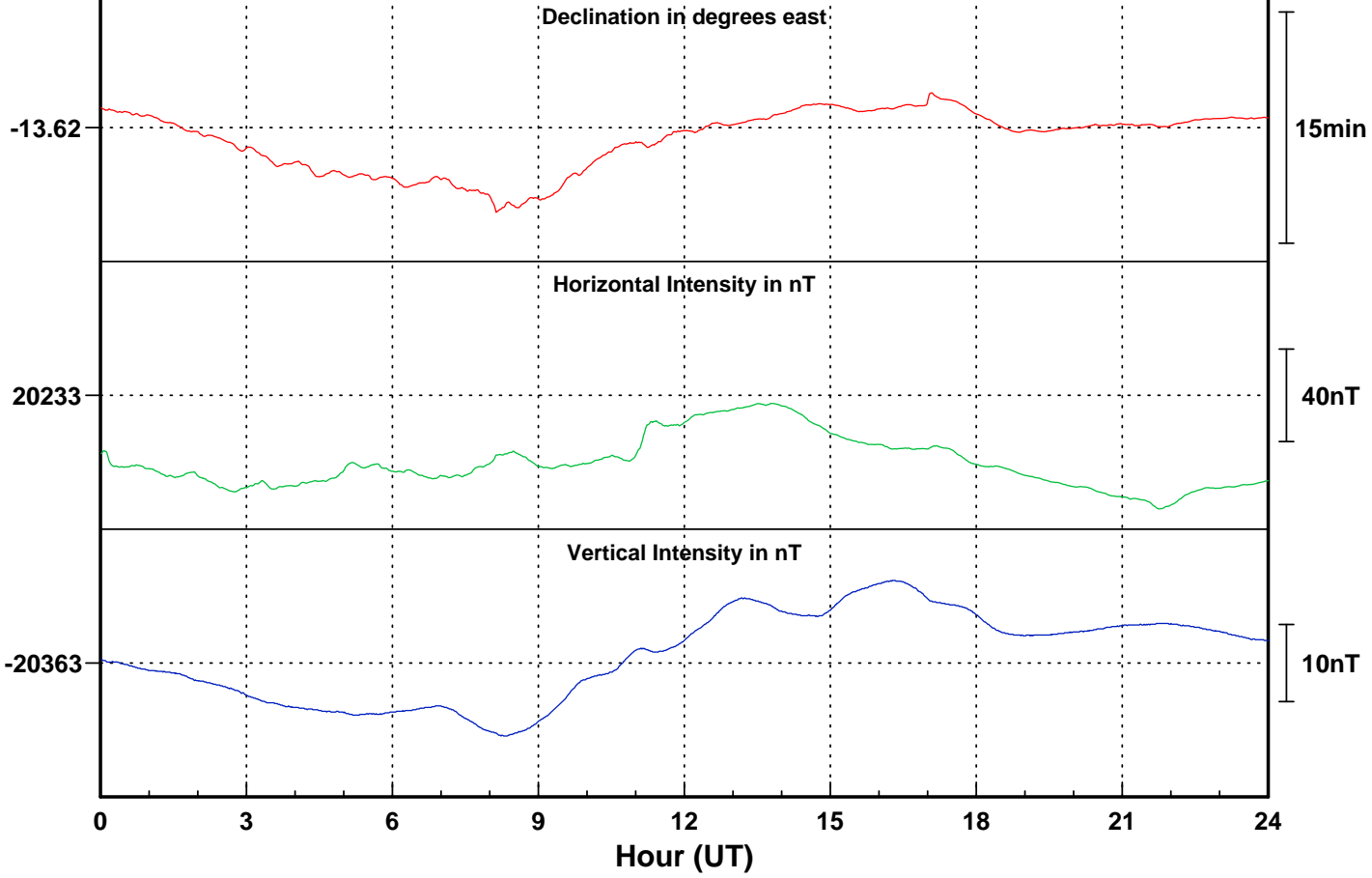
Ascension Island

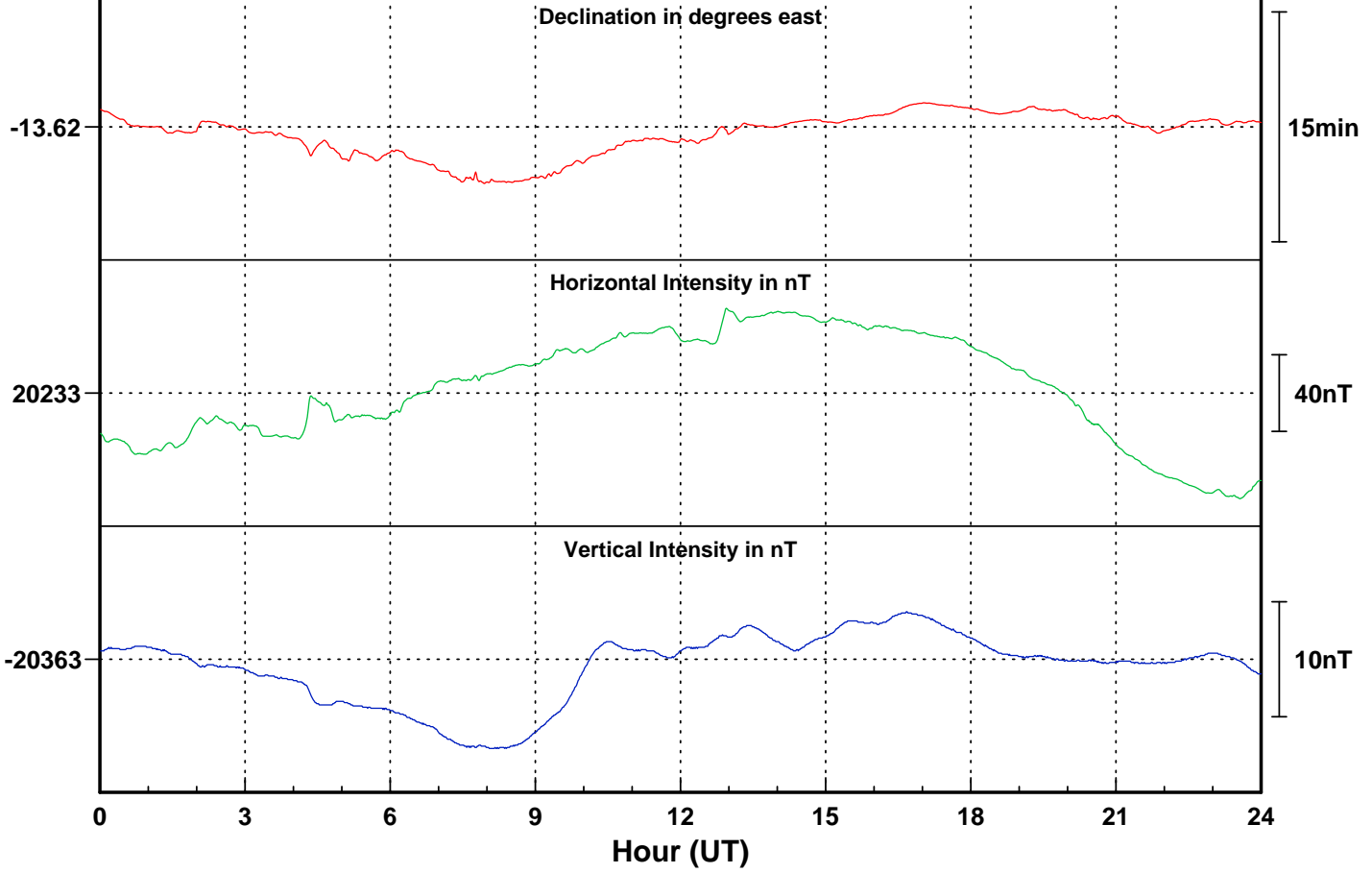
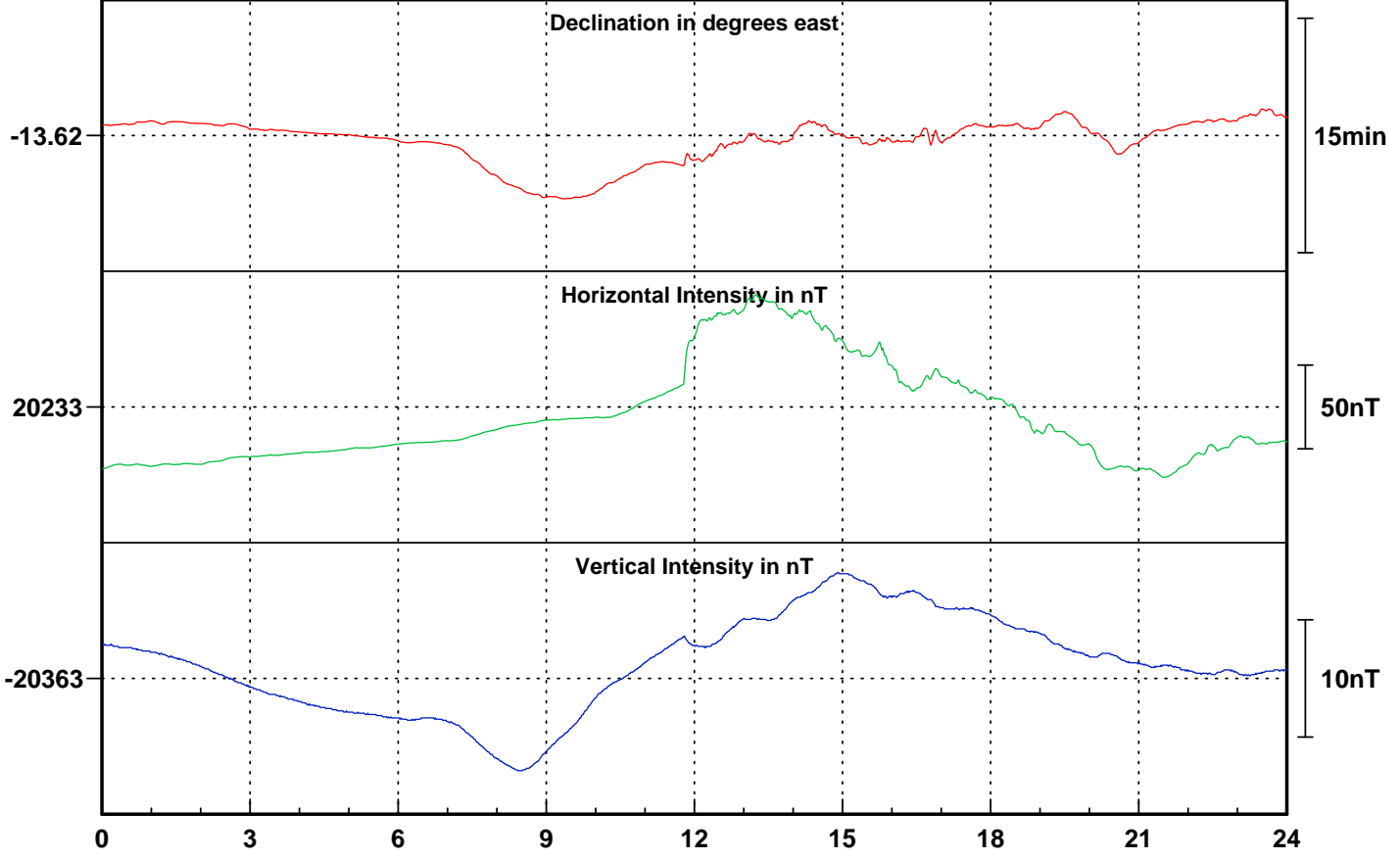
Day number: 347



Date: 14-12-2023

Day number: 348

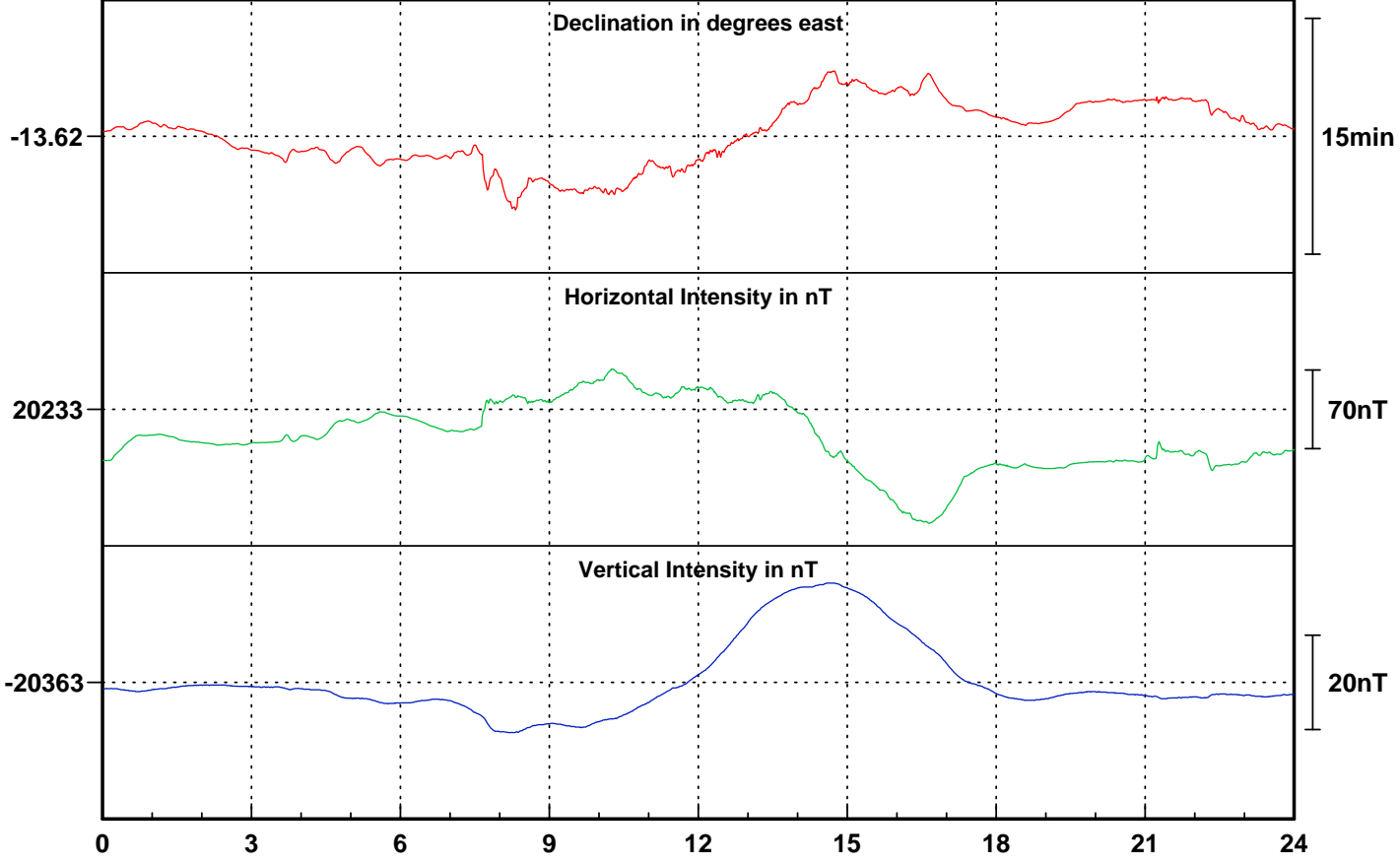




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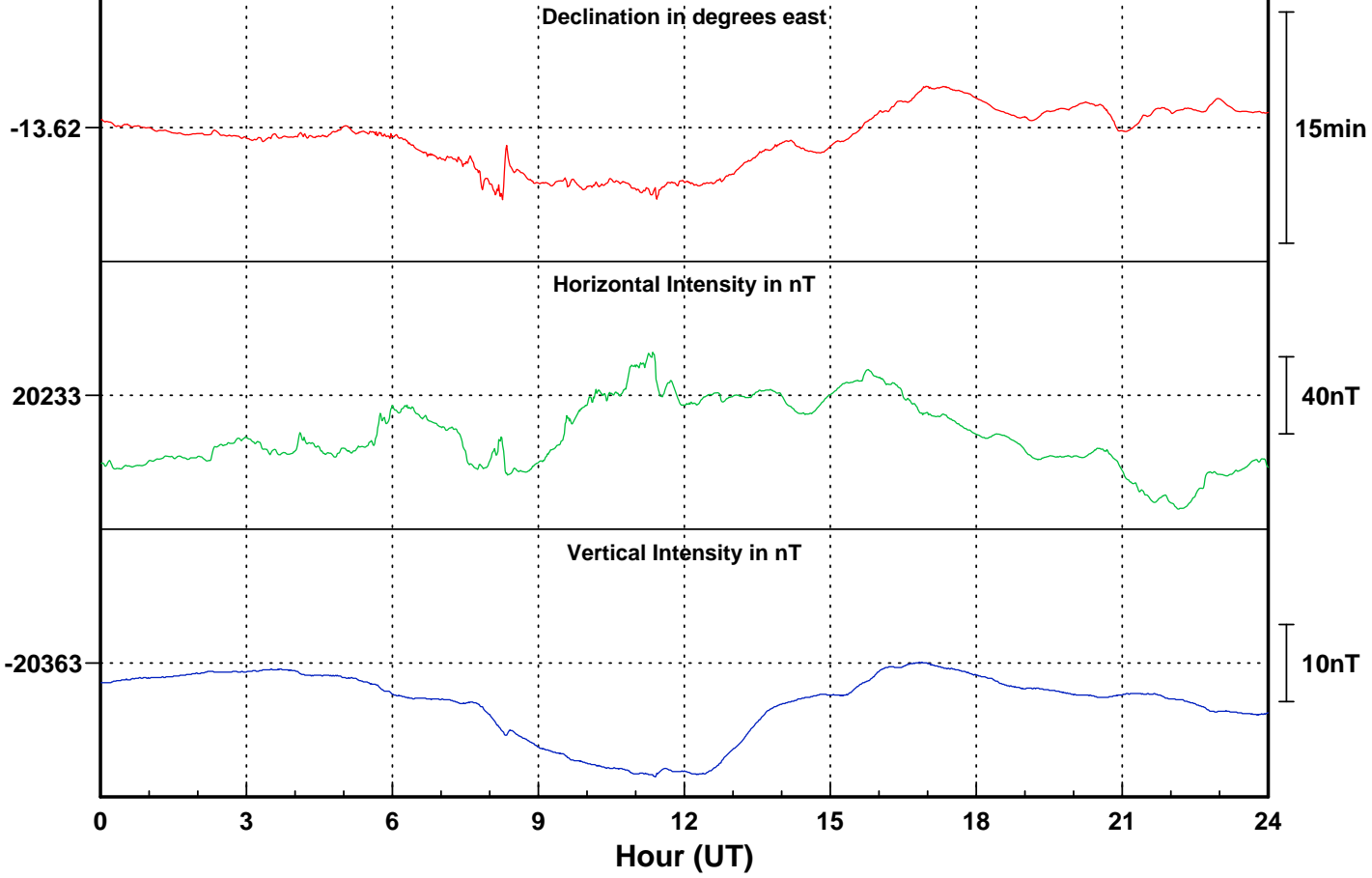
Ascension Island

Day number: 351



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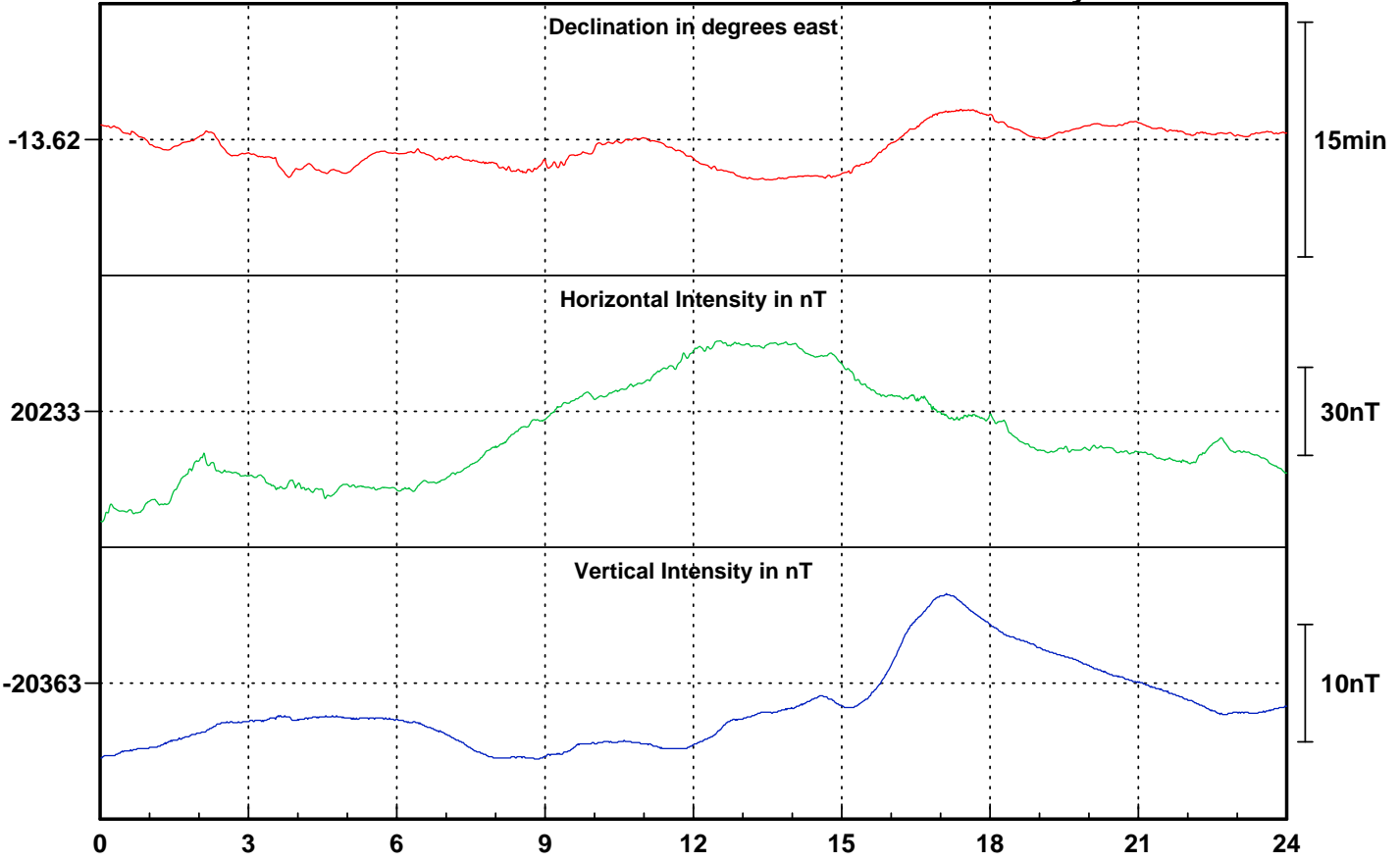
Day number: 352



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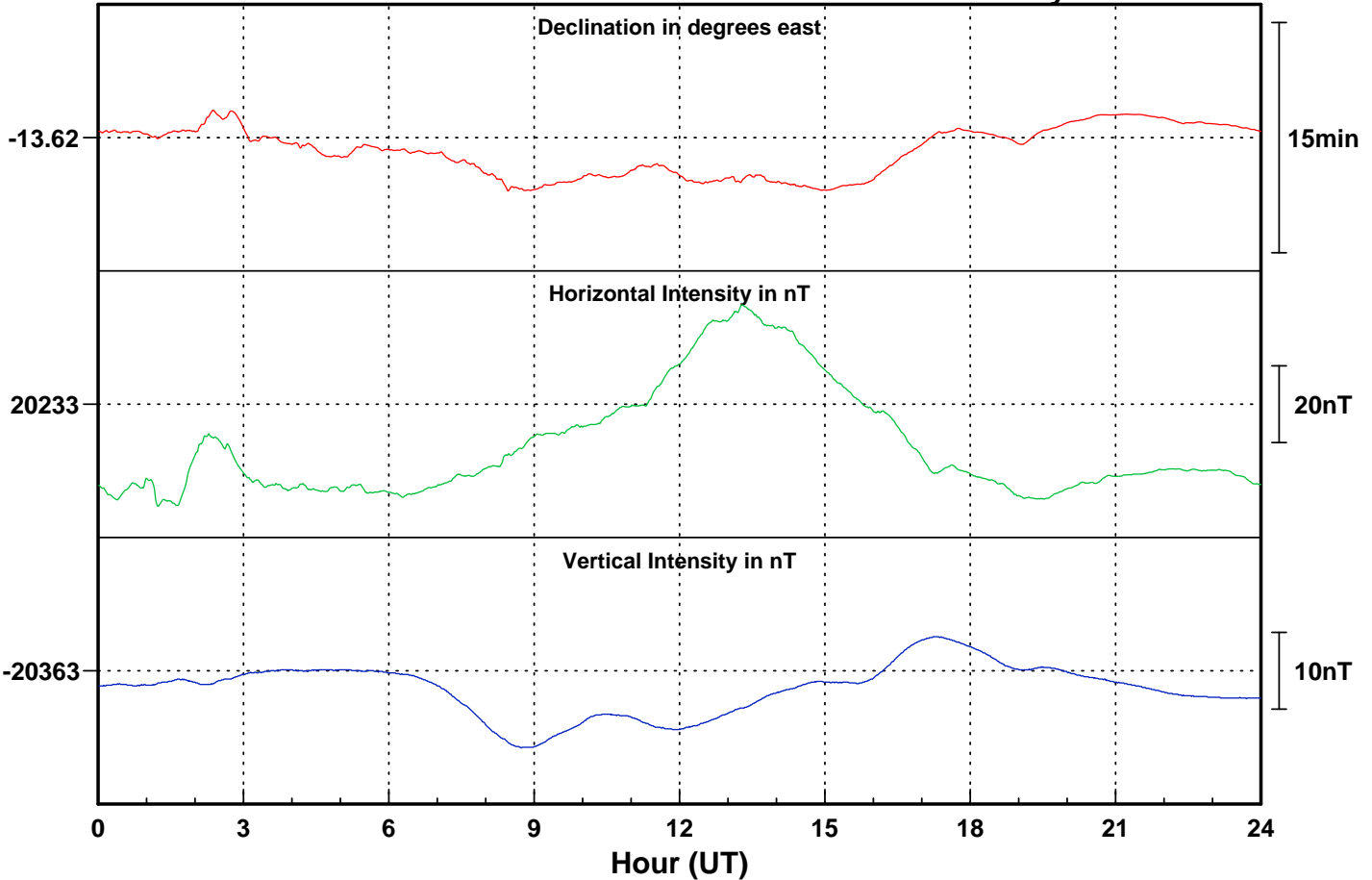
Ascension Island

Day number: 353



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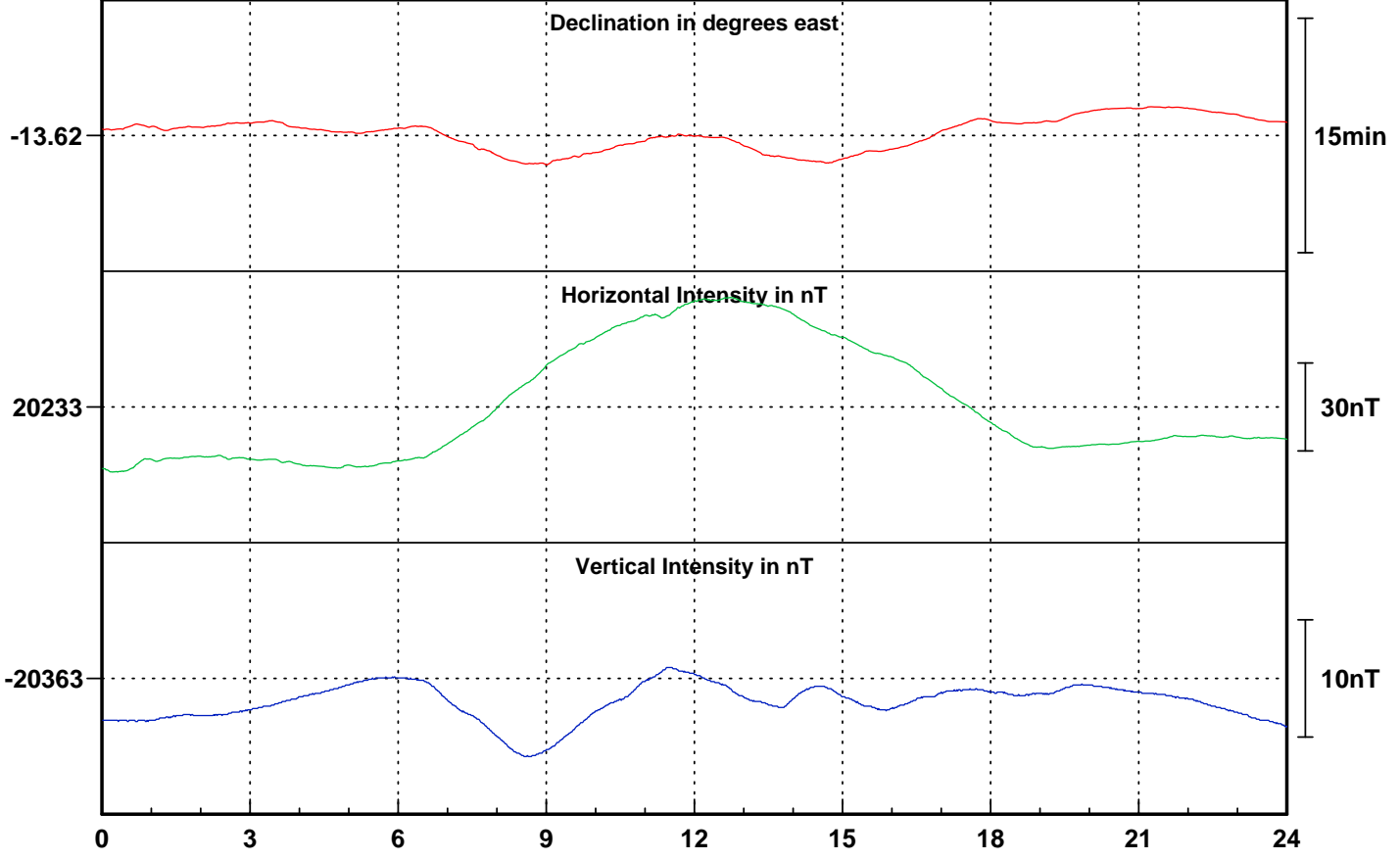
Day number: 354



Date: 21-12-2023

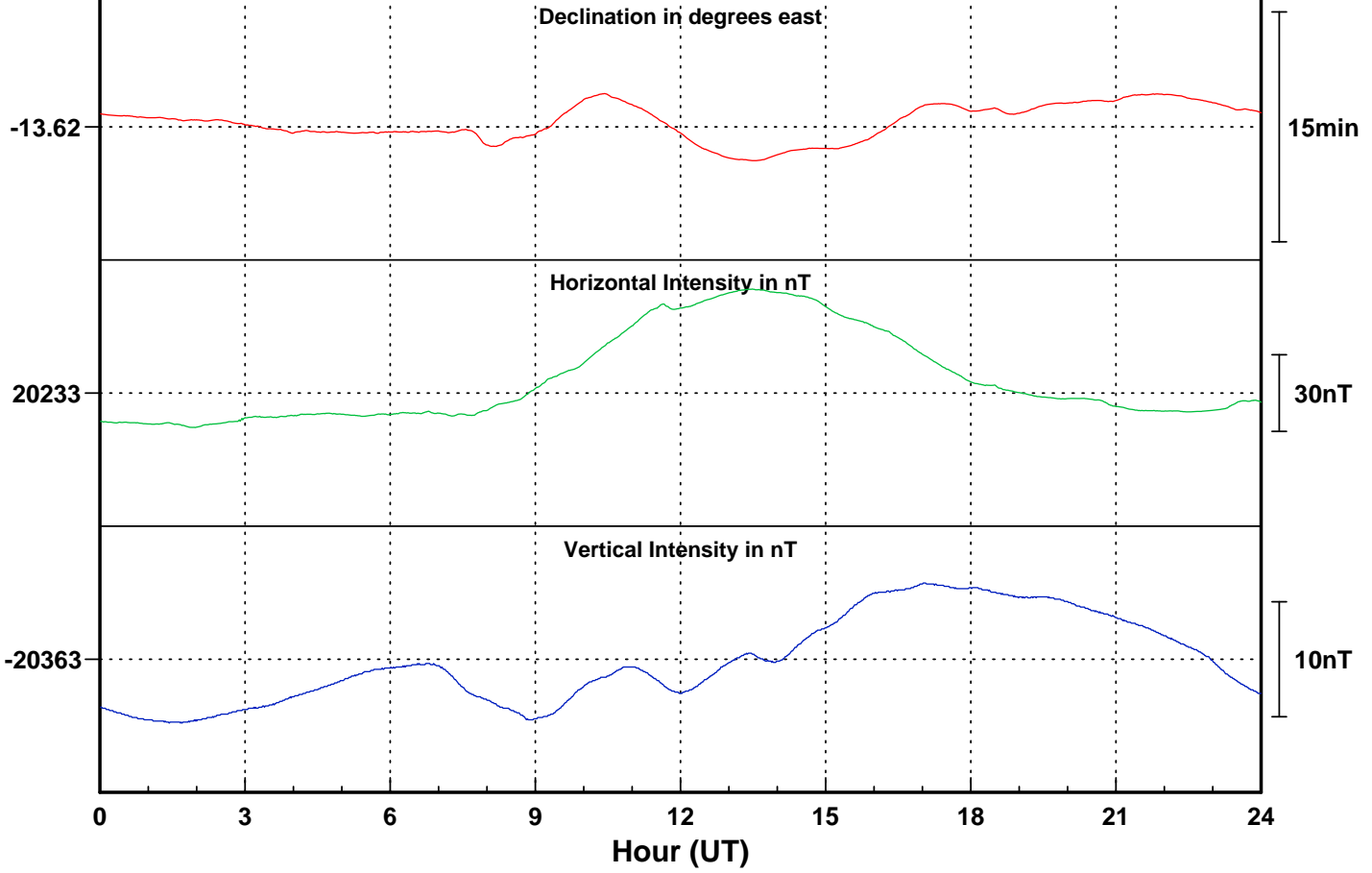
Ascension Island

Day number: 355



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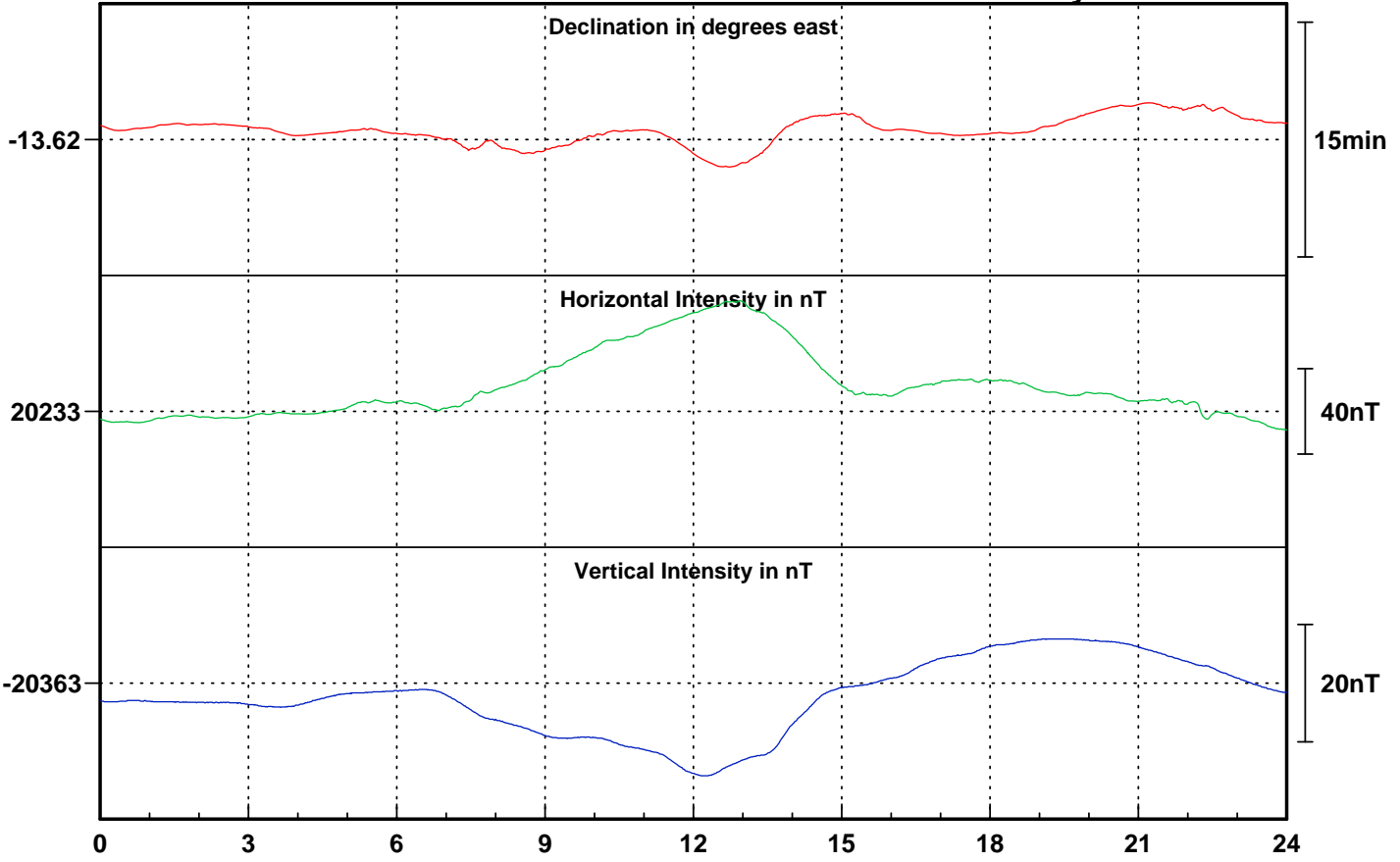
Day number: 356



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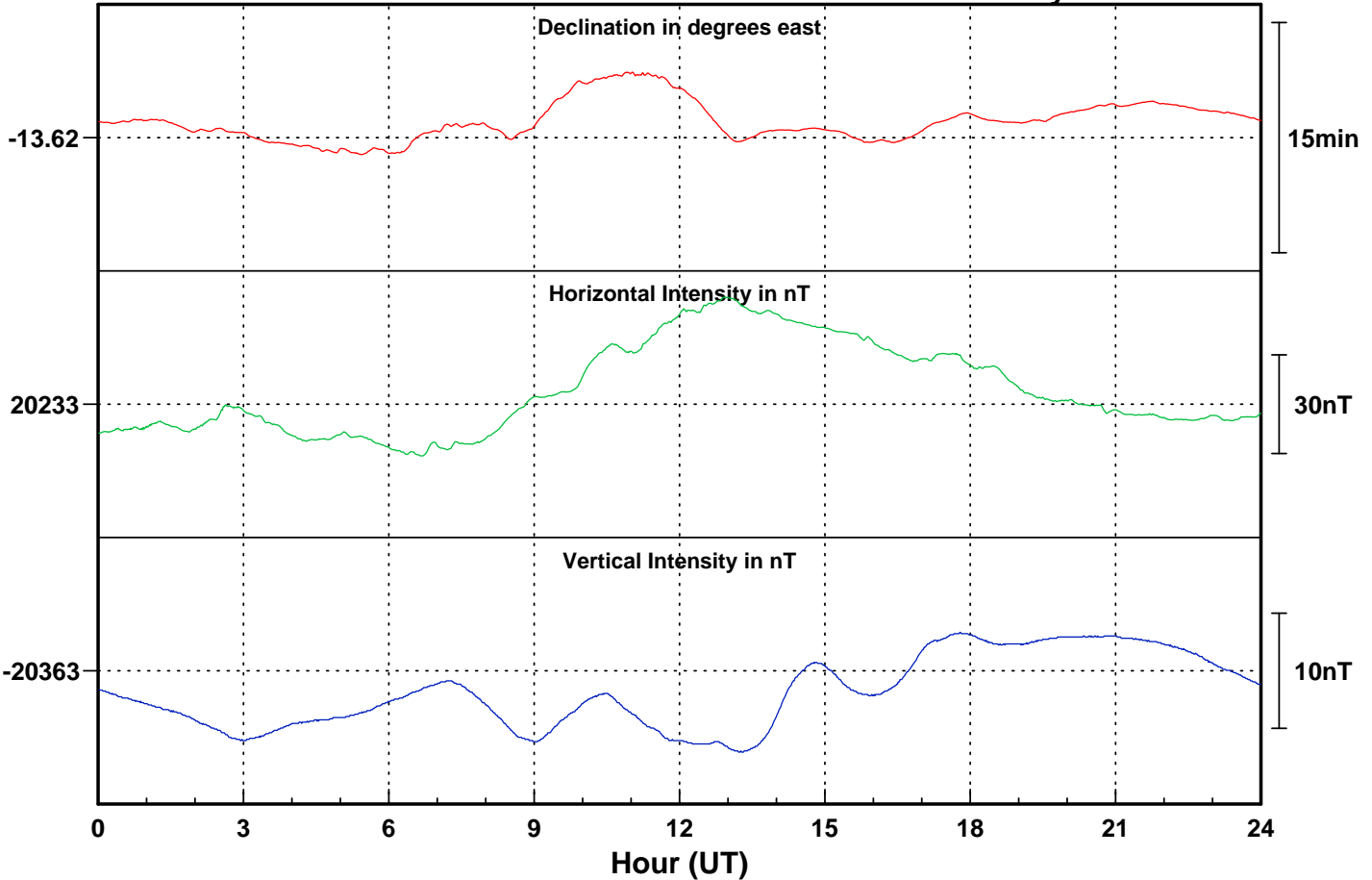
Ascension Island

Day number: 357



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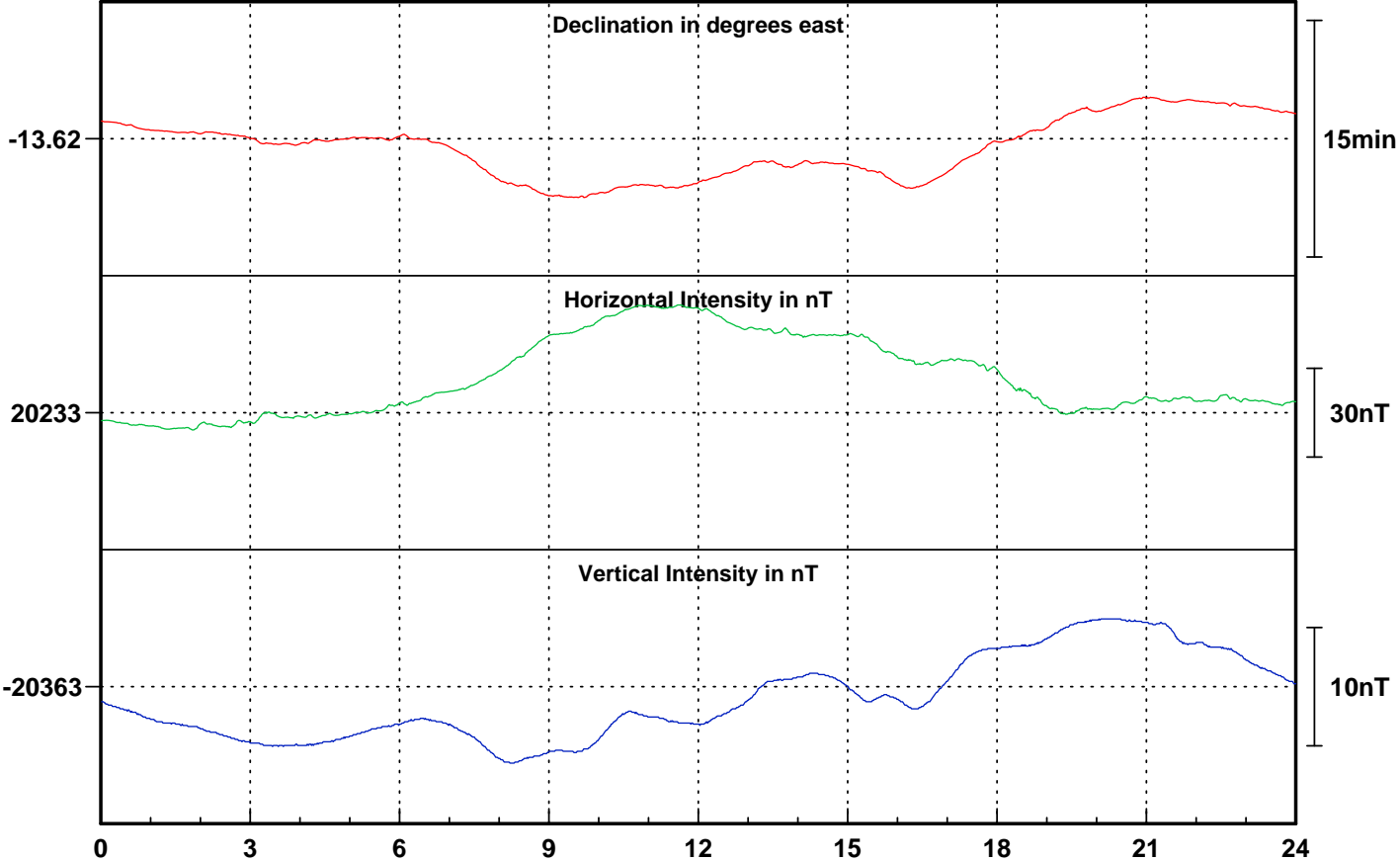
Day number: 358



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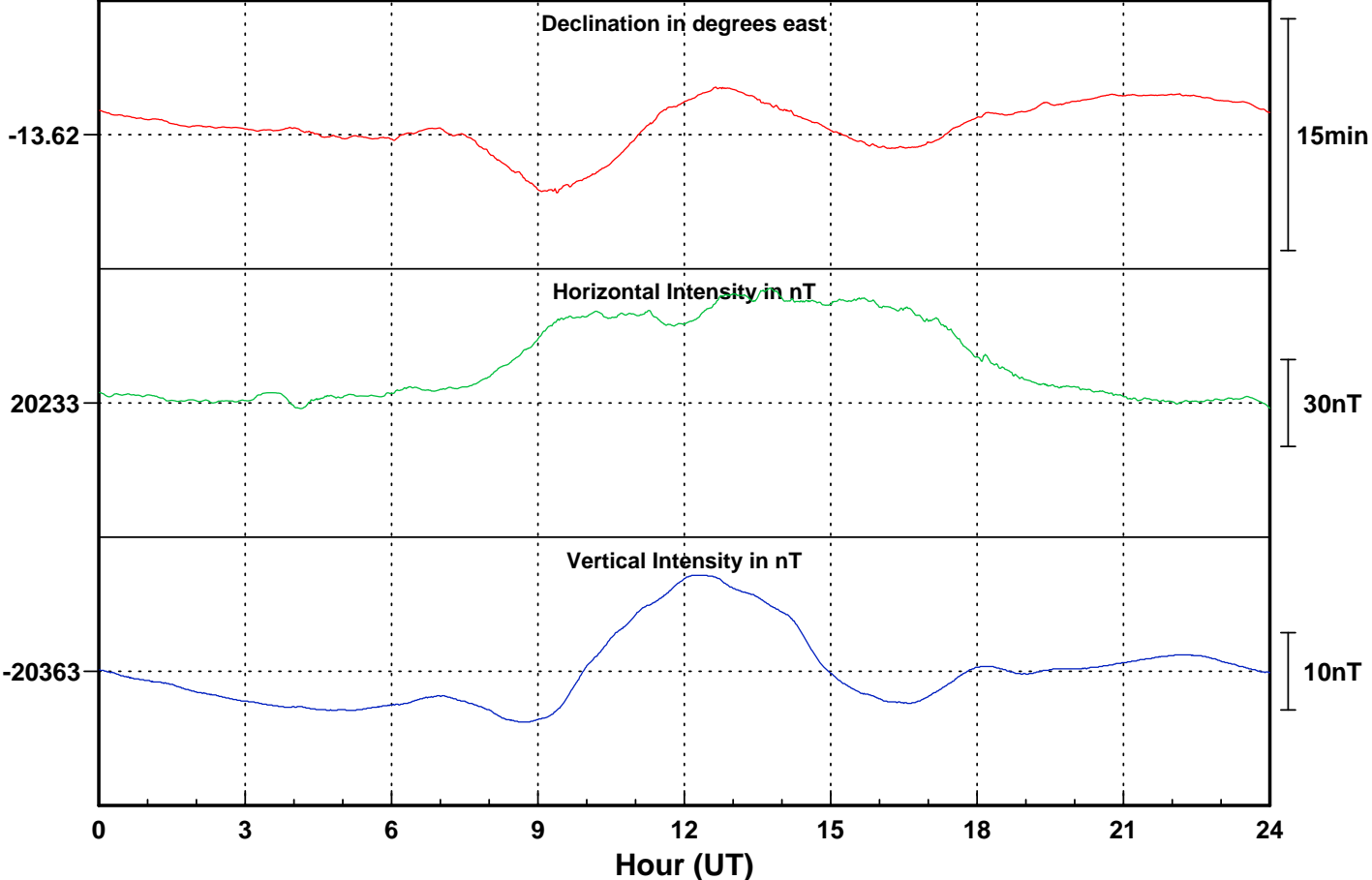
Ascension Island

Day number: 359



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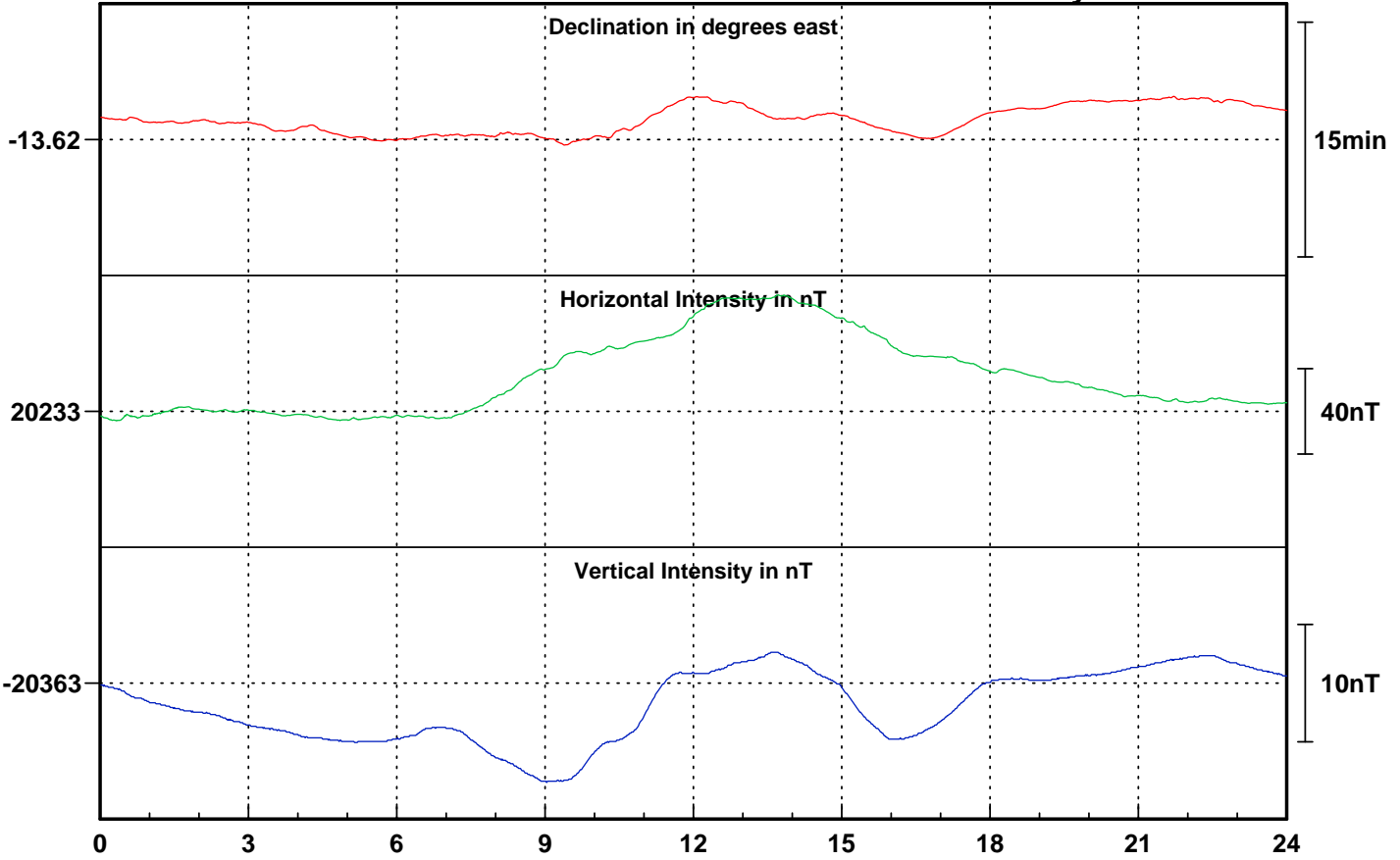
Day number: 360



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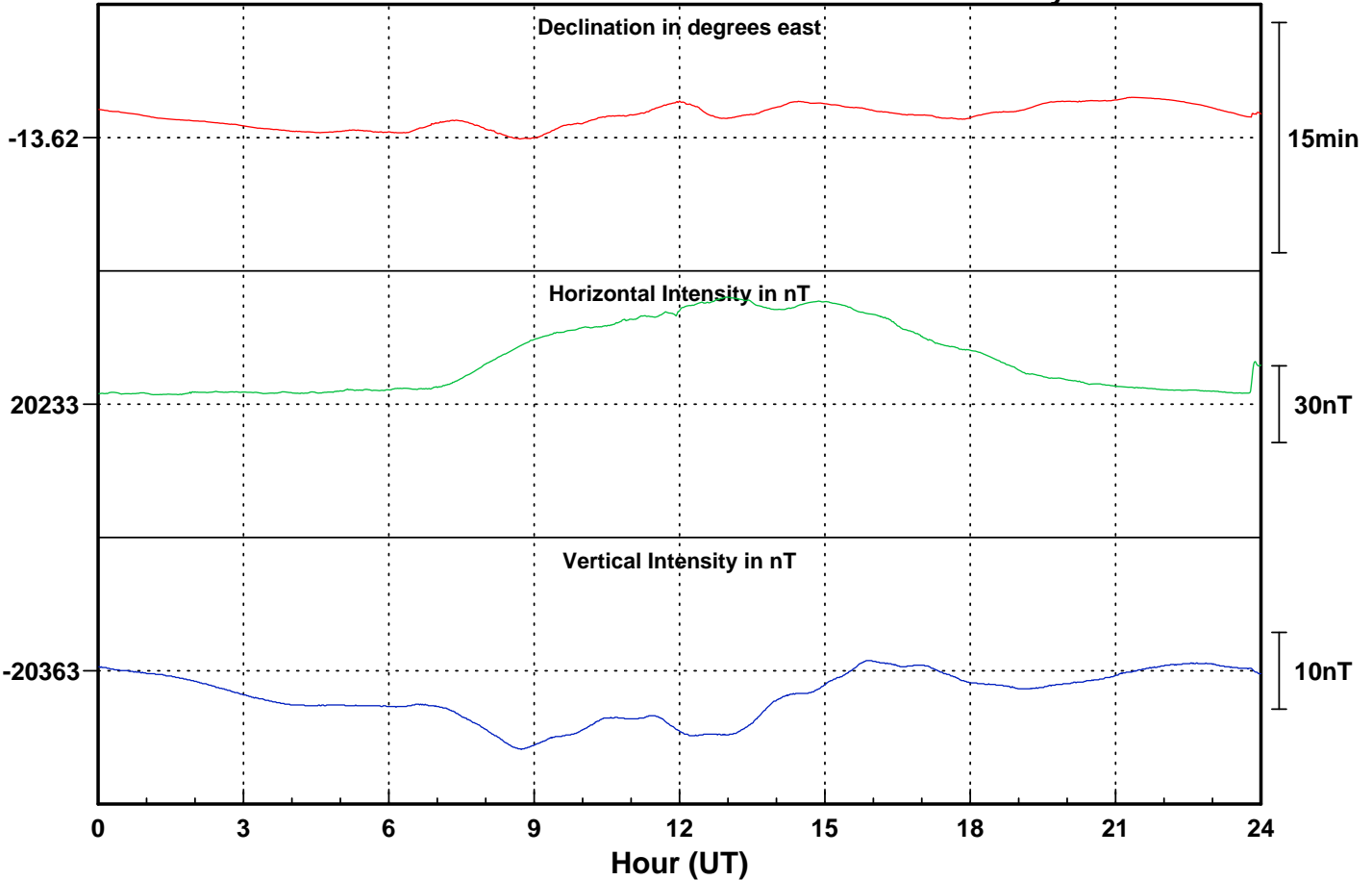
Ascension Island

Day number: 361



Date: 28-12-2023

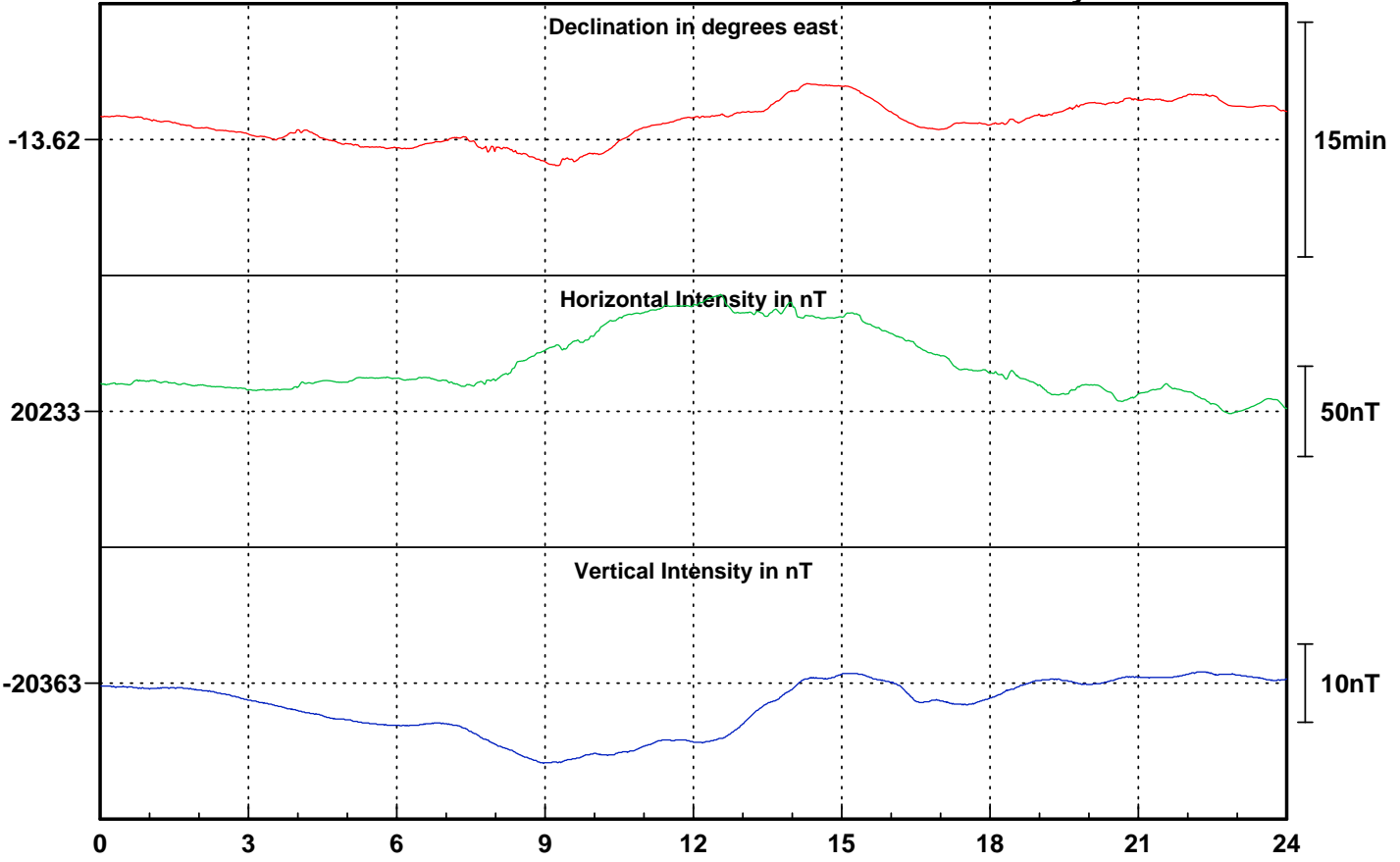
Day number: 362



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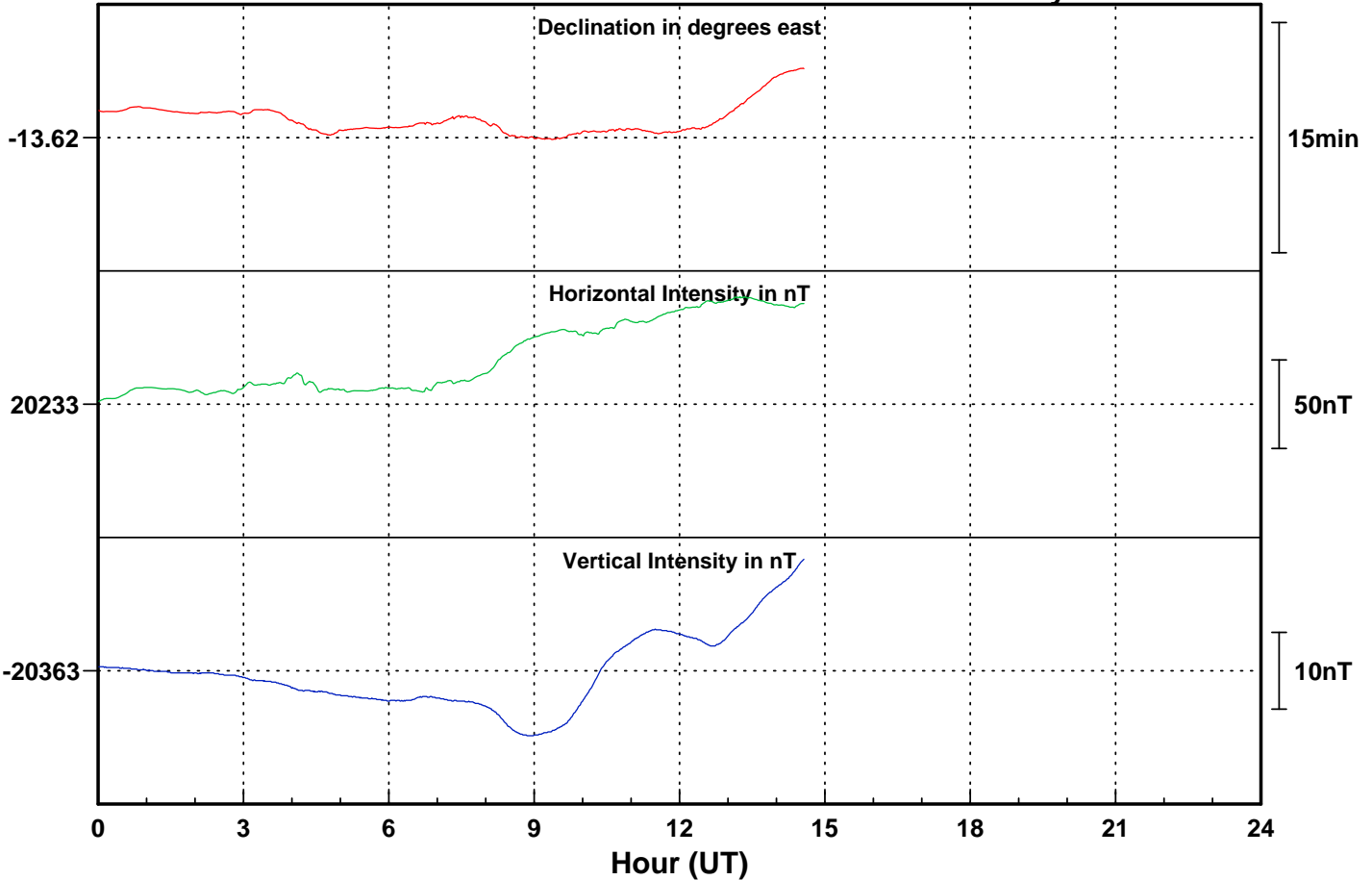
Ascension Island

Day number: 363



Date: 30-12-2023

Day number: 364

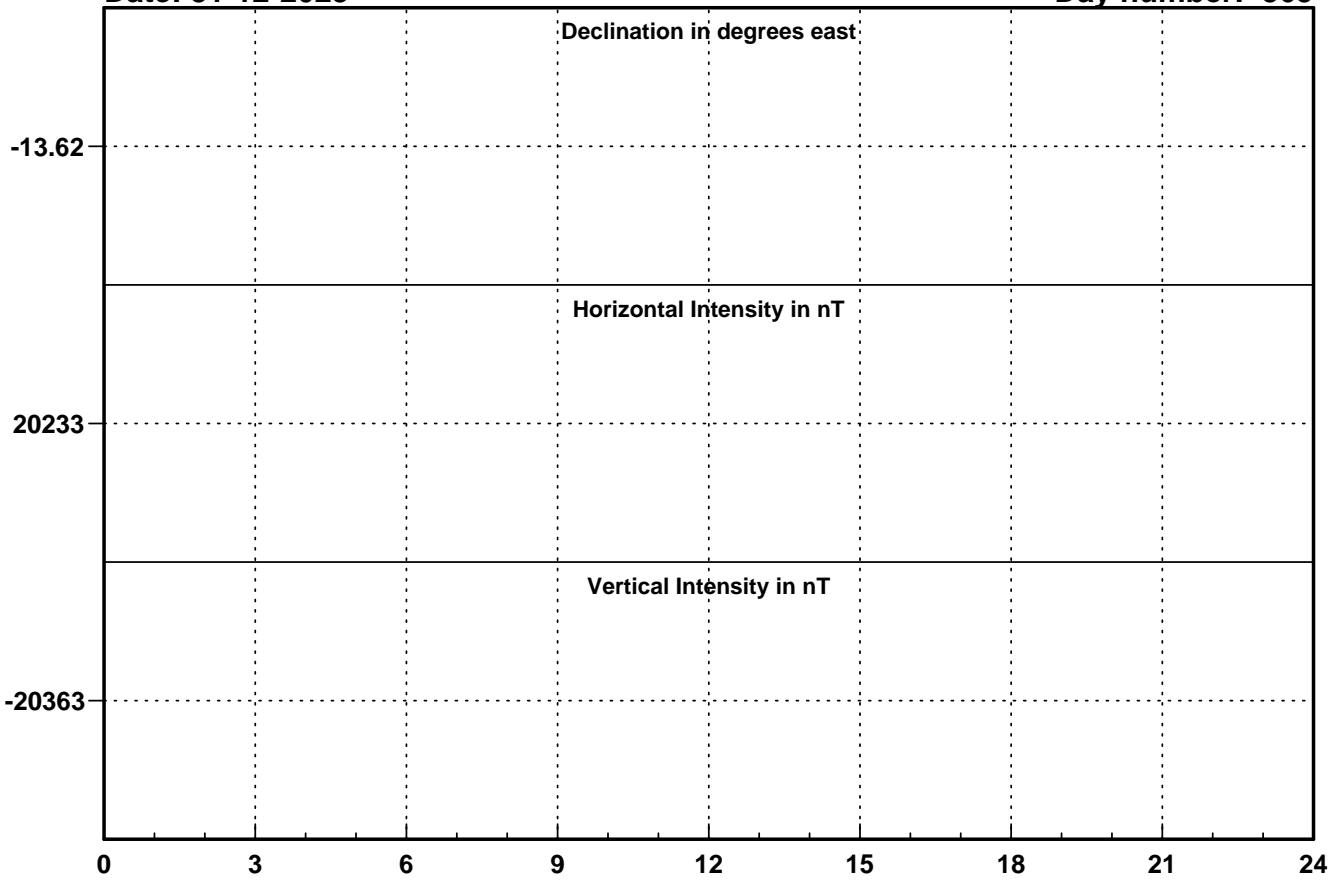


Hour (UT)

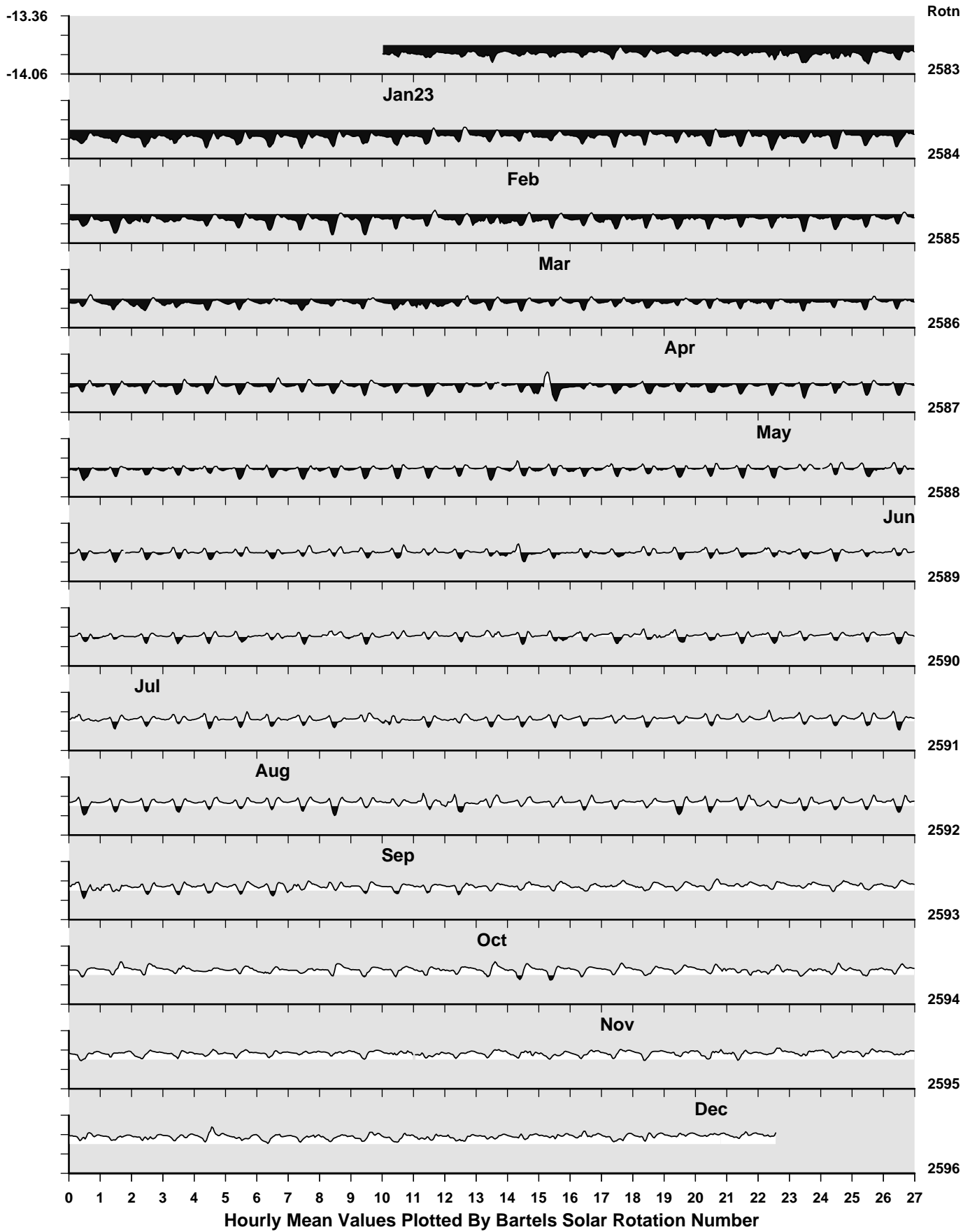
Date: 31-12-2023

Ascension Island

Day number: 365

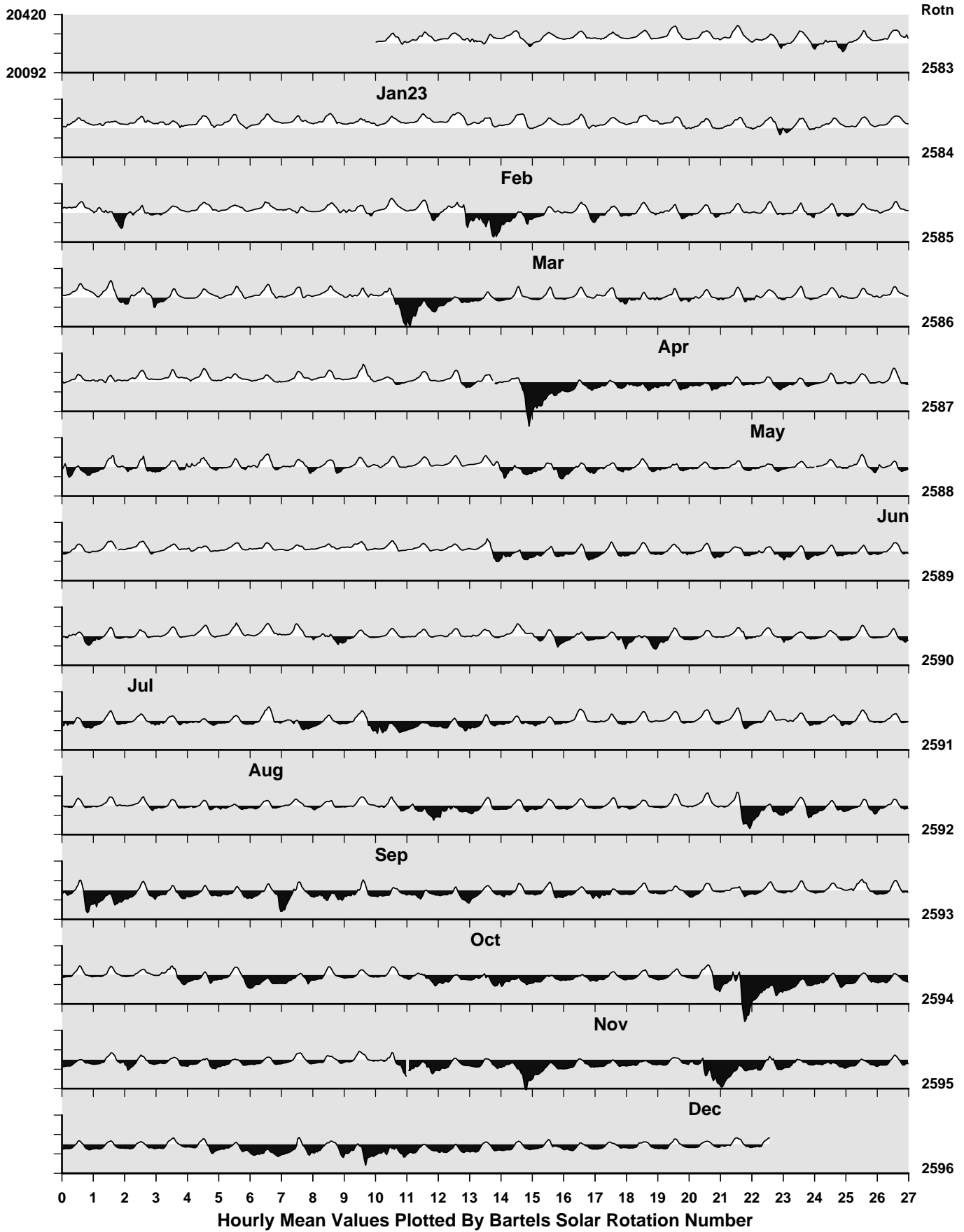


Ascension Island Observatory: Declination (degrees)



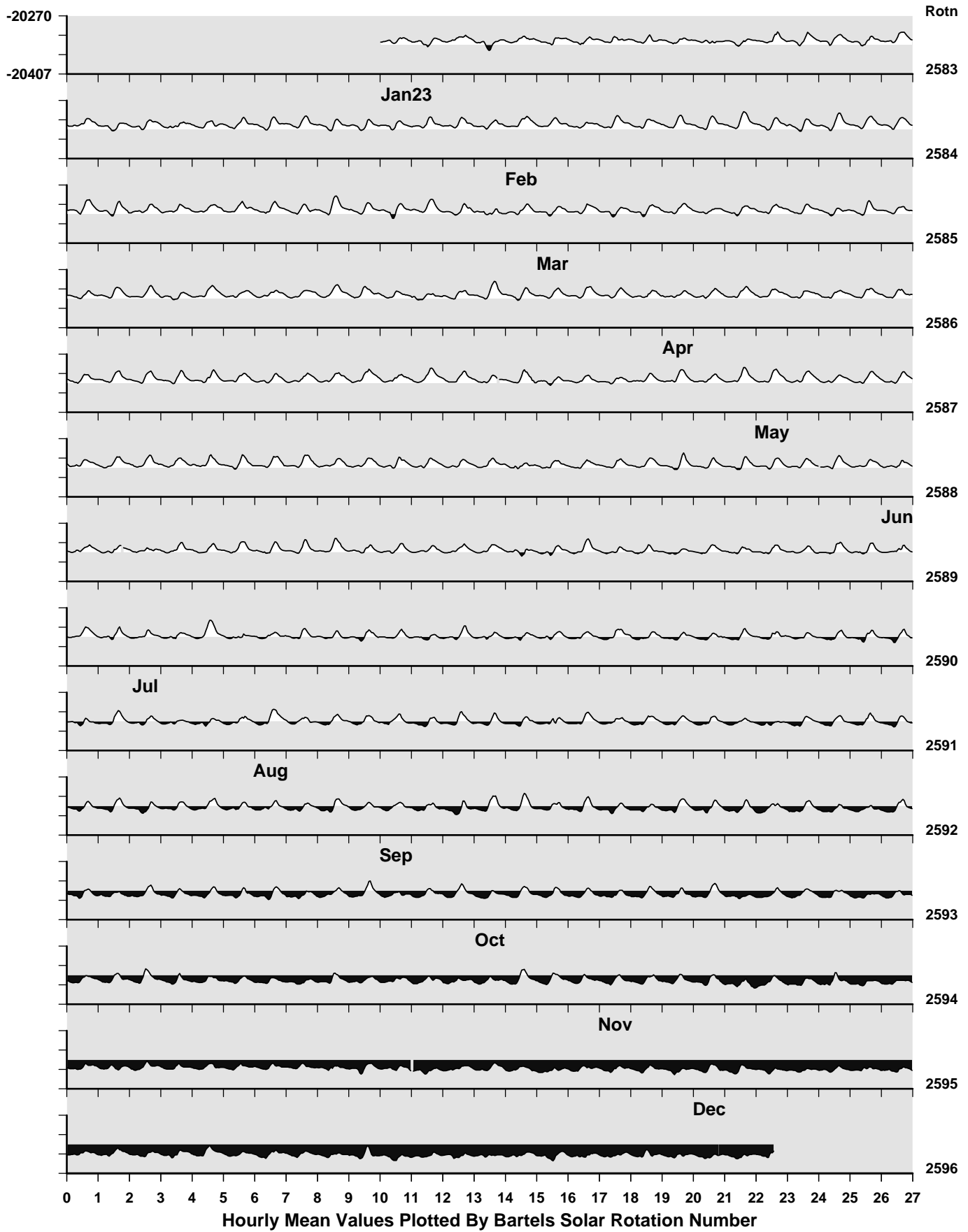
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Horizontal Intensity (nT)



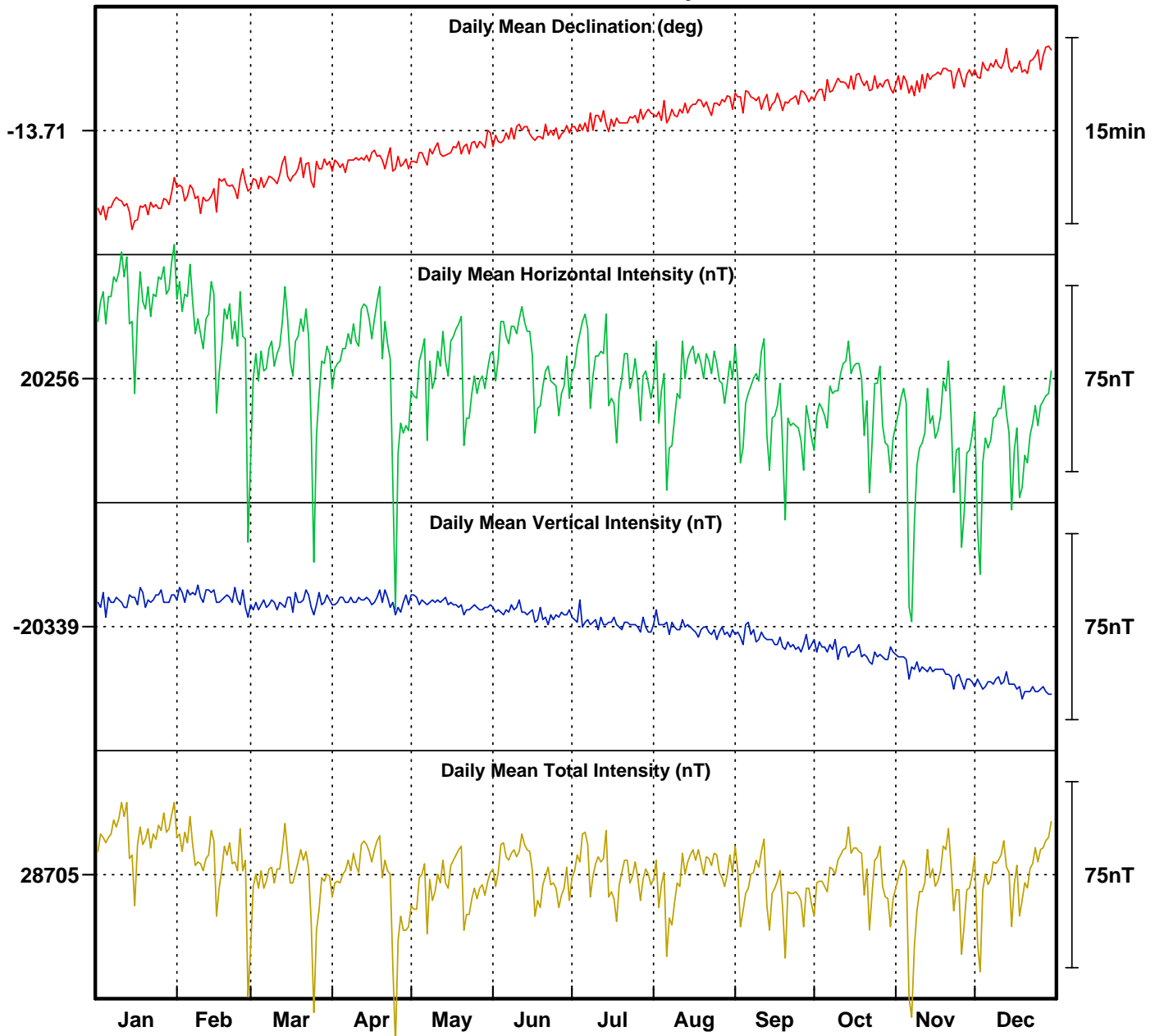
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Is Observatory 2023



Monthly mean values for Ascension Island Observatory 2023

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-13° 48.7'	20290 nT	-45° 3.2'	19704 nT	-4844 nT	-20328 nT	28722 nT
February	-13° 47.5'	20274 nT	-45° 4.4'	19690 nT	-4833 nT	-20327 nT	28709 nT
March	-13° 46.1'	20263 nT	-45° 5.6'	19680 nT	-4822 nT	-20329 nT	28703 nT
April	-13° 45.1'	20261 nT	-45° 5.7'	19680 nT	-4816 nT	-20328 nT	28701 nT
May	-13° 44.1'	20259 nT	-45° 6.0'	19680 nT	-4810 nT	-20330 nT	28701 nT
June	-13° 42.8'	20263 nT	-45° 6.0'	19685 nT	-4804 nT	-20333 nT	28706 nT
July	-13° 41.8'	20259 nT	-45° 6.6'	19683 nT	-4797 nT	-20338 nT	28706 nT
August	-13° 41.0'	20255 nT	-45° 7.2'	19680 nT	-4792 nT	-20340 nT	28705 nT
September	-13° 40.1'	20240 nT	-45° 8.8'	19667 nT	-4783 nT	-20344 nT	28698 nT
October	-13° 38.9'	20246 nT	-45° 8.7'	19675 nT	-4778 nT	-20349 nT	28705 nT
November	-13° 38.4'	20228 nT	-45° 10.9'	19658 nT	-4770 nT	-20357 nT	28698 nT
December	-13° 37.2'	20233 nT	-45° 11.0'	19664 nT	-4764 nT	-20363 nT	28706 nT

Note:

i. The values shown here are provisional.