



British
Geological
Survey



MONTHLY MAGNETIC BULLETIN

Ascension Island Observatory

December 2021



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:

Geomagnetism Team
British Geological Survey
The Lyell Centre
Research Avenue South
Edinburgh EH14 4AP
Scotland, UK

Tel: +44 (0) 131 667 1000
Email: enquiries@bgs.ac.uk
Internet: 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: $2^{\circ} 58'55.2''S$ $057^{\circ} 32'02.4''E$
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 2021.5. 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 2021

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

-14.86

5min

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

20562

20nT

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

-19951

20nT

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

-87.9

20nT

Temperature Inside Variometer Hut

36.8

10°C

Jan

Feb

Mar

Apr

May

Jun

Jul

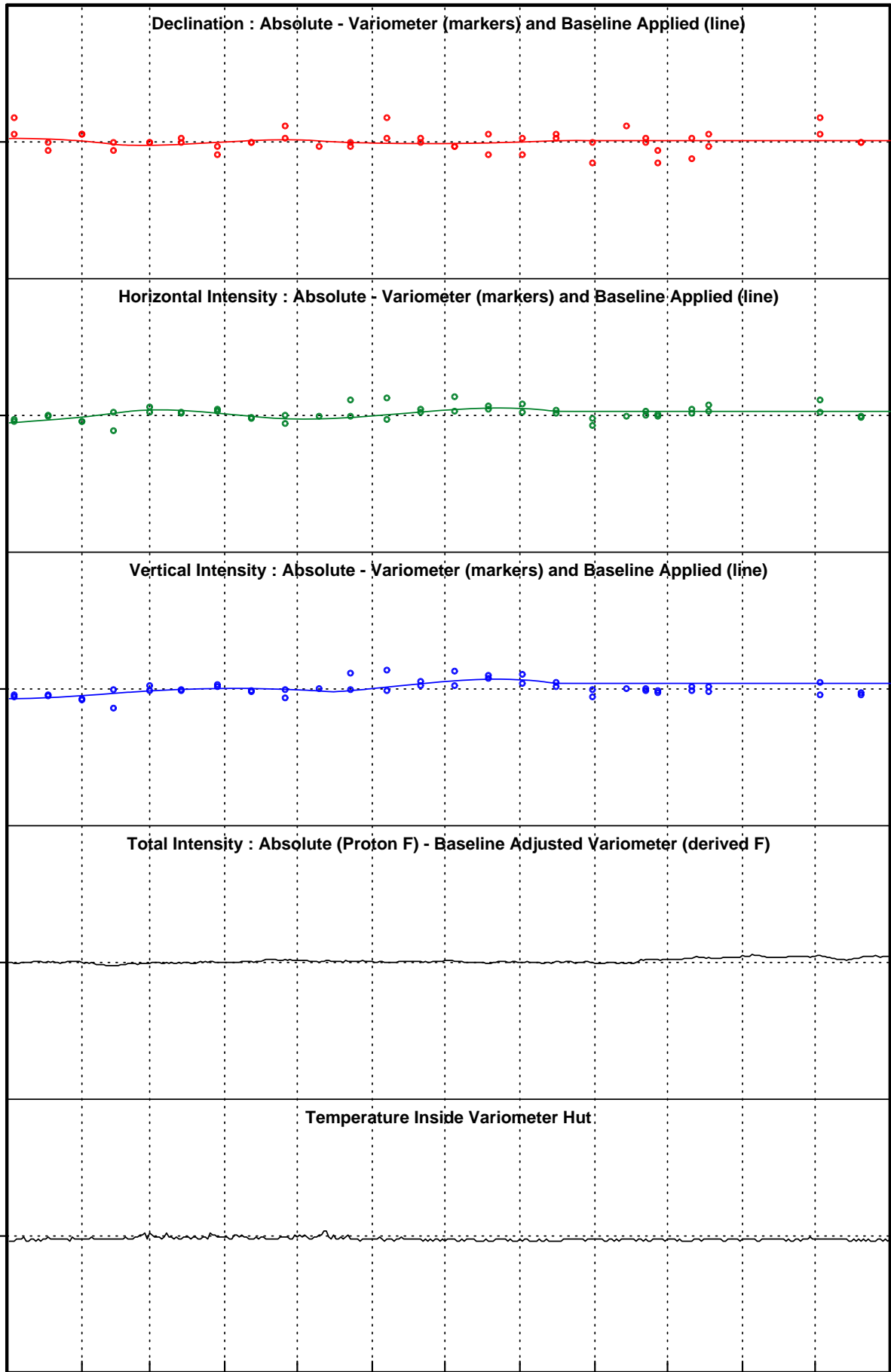
Aug

Sep

Oct

Nov

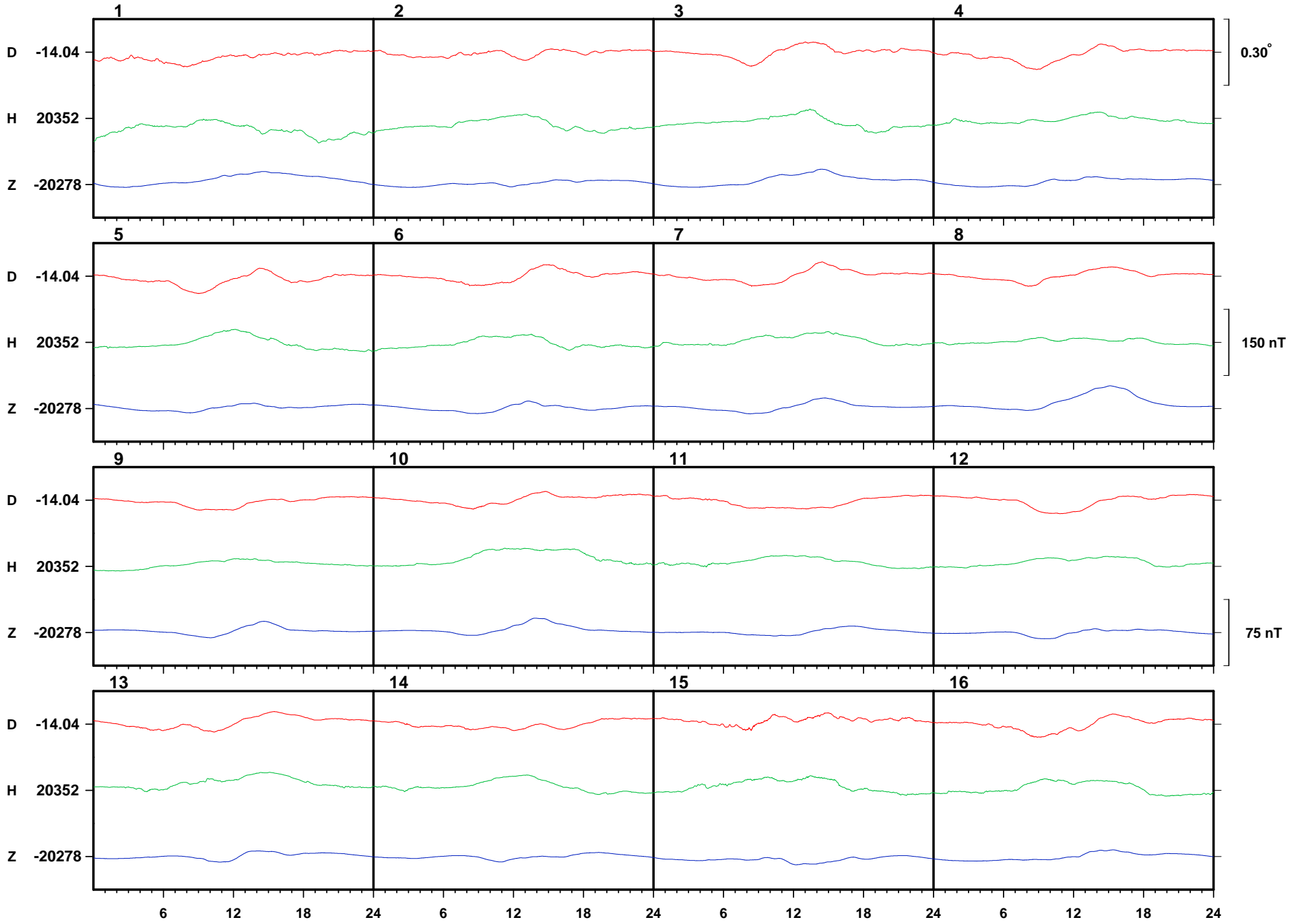
Dec

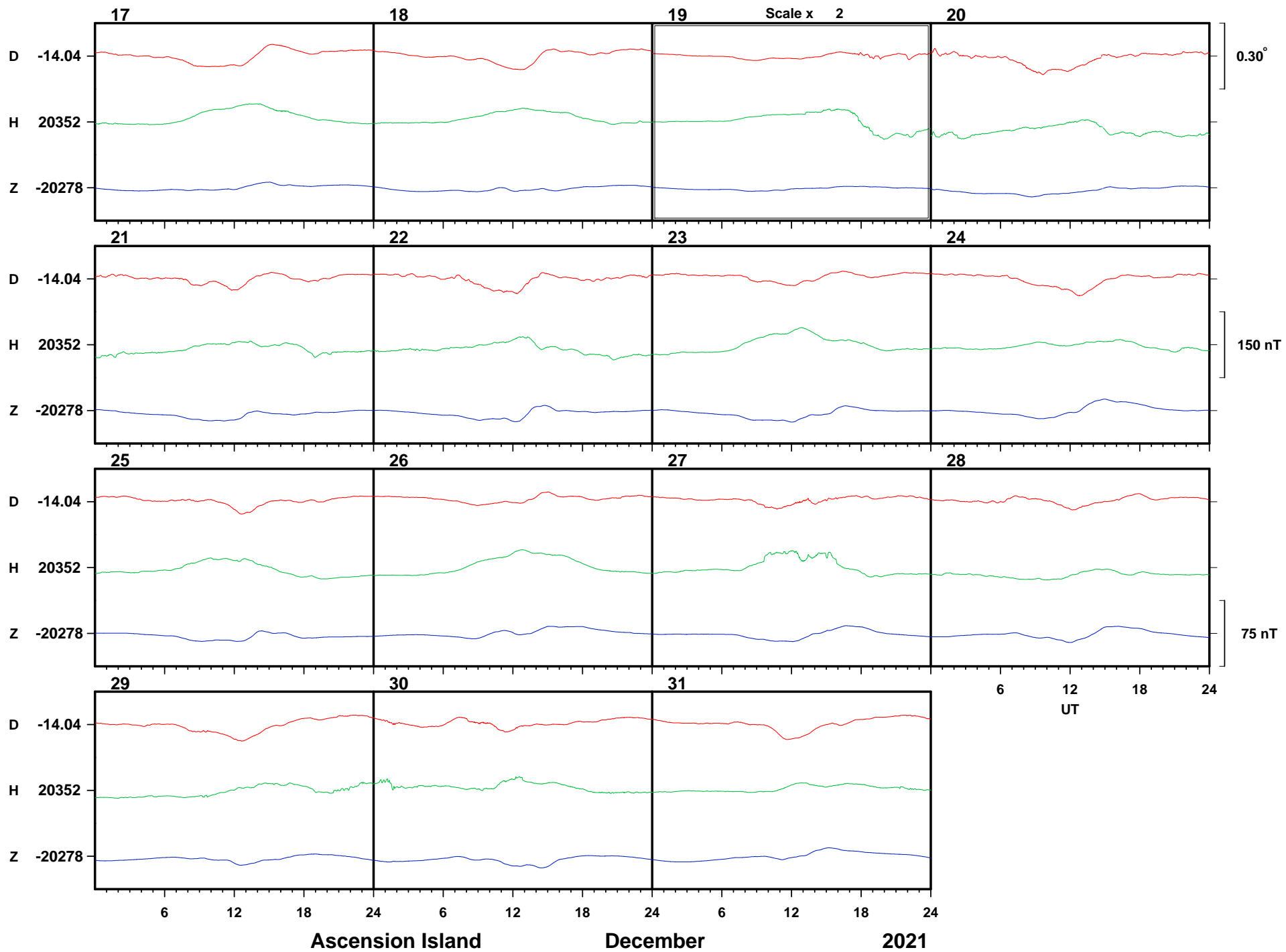


Ascension Island

December

2021

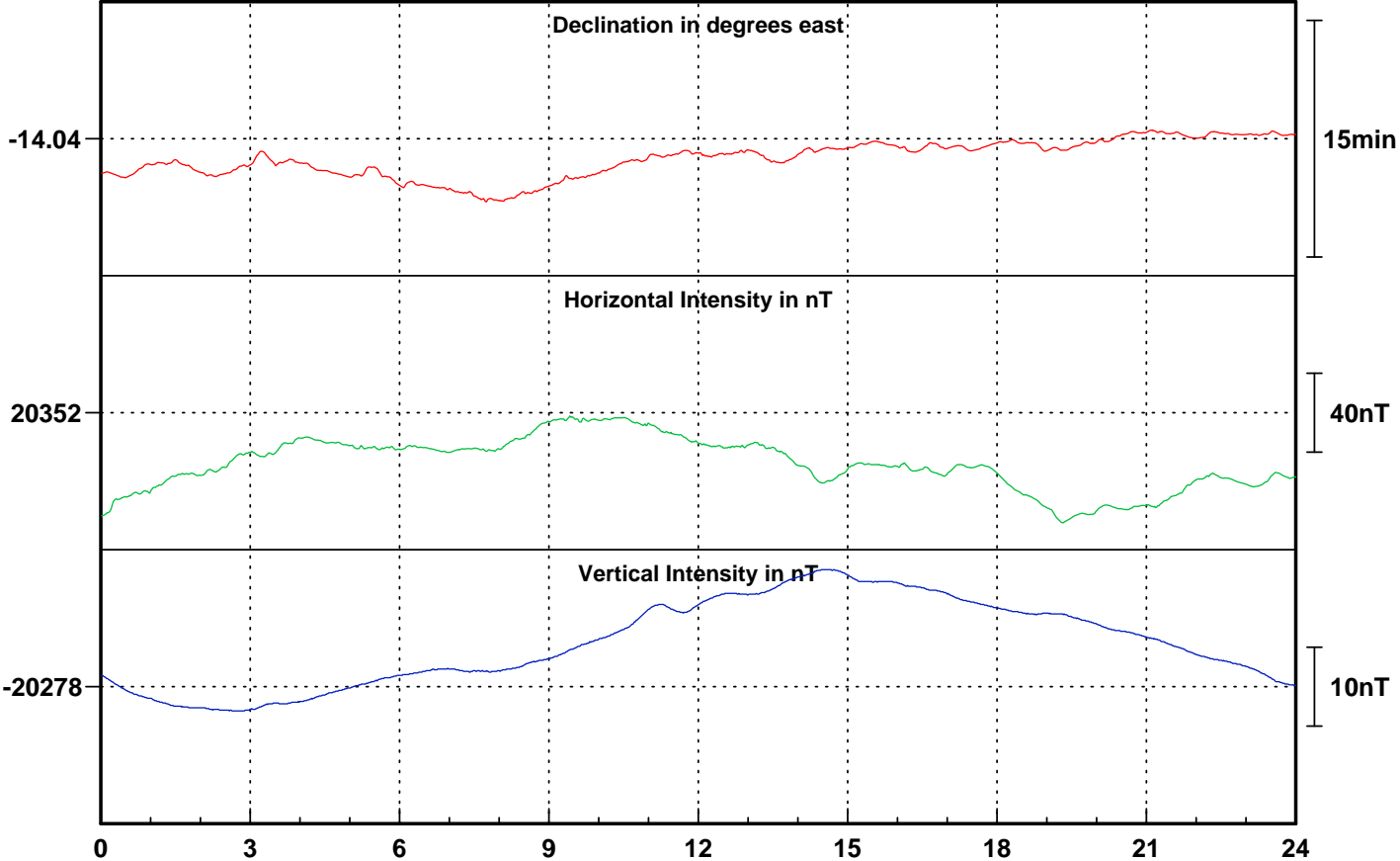




Date: 01-12-2021

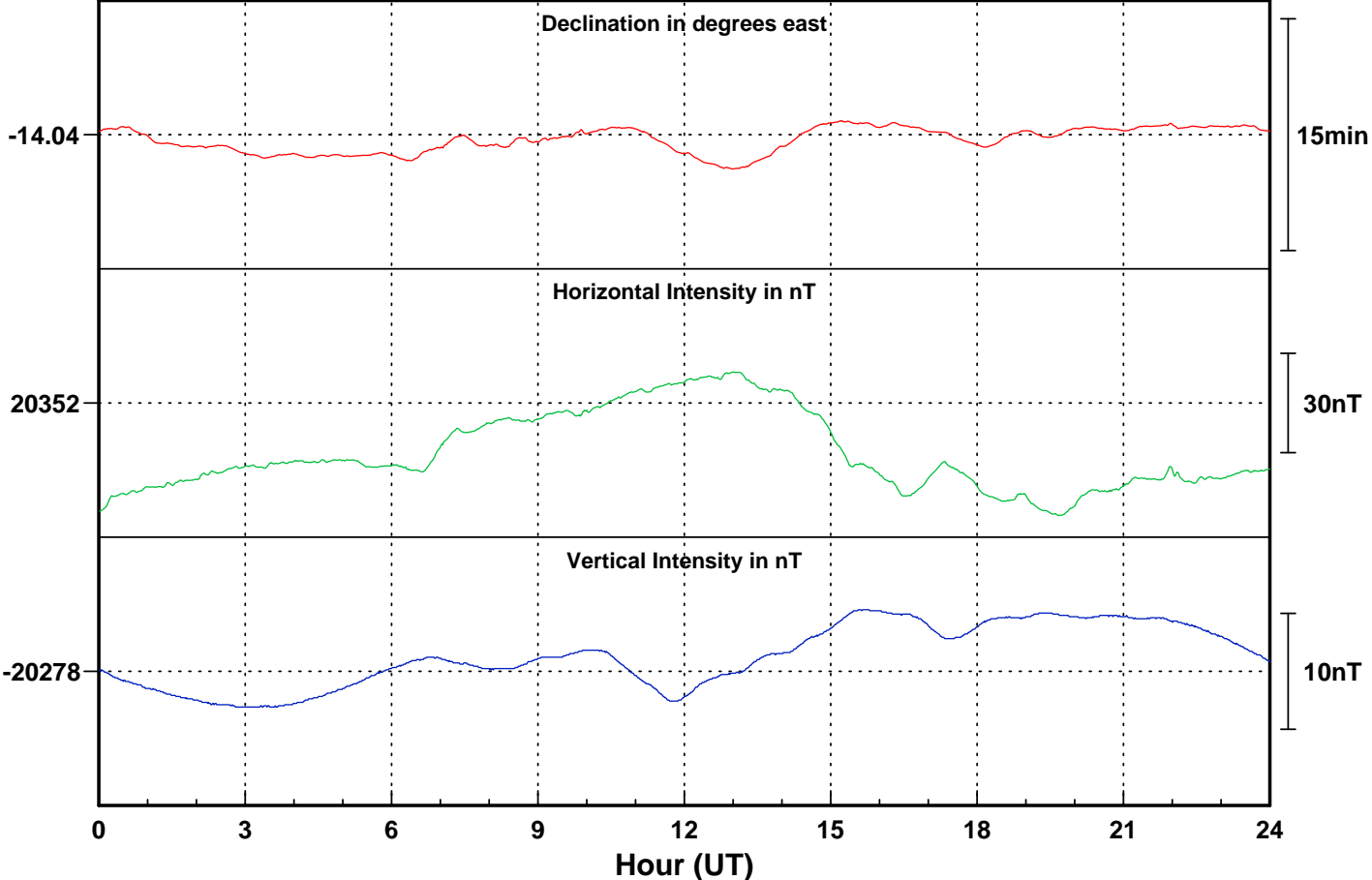
Ascension Island

Day number: 335



Date: 02-12-2021

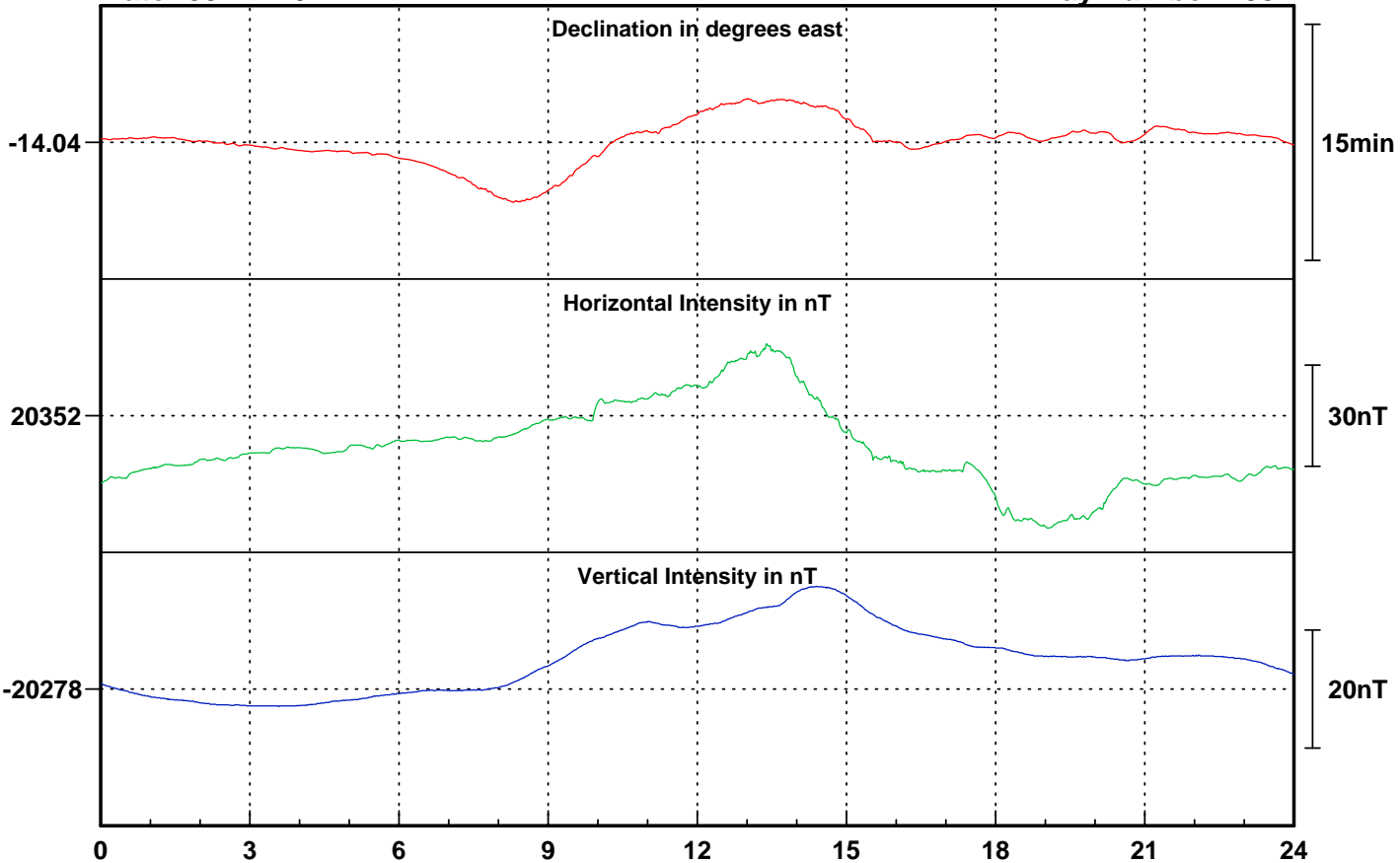
Day number: 336



Date: 03-12-2021

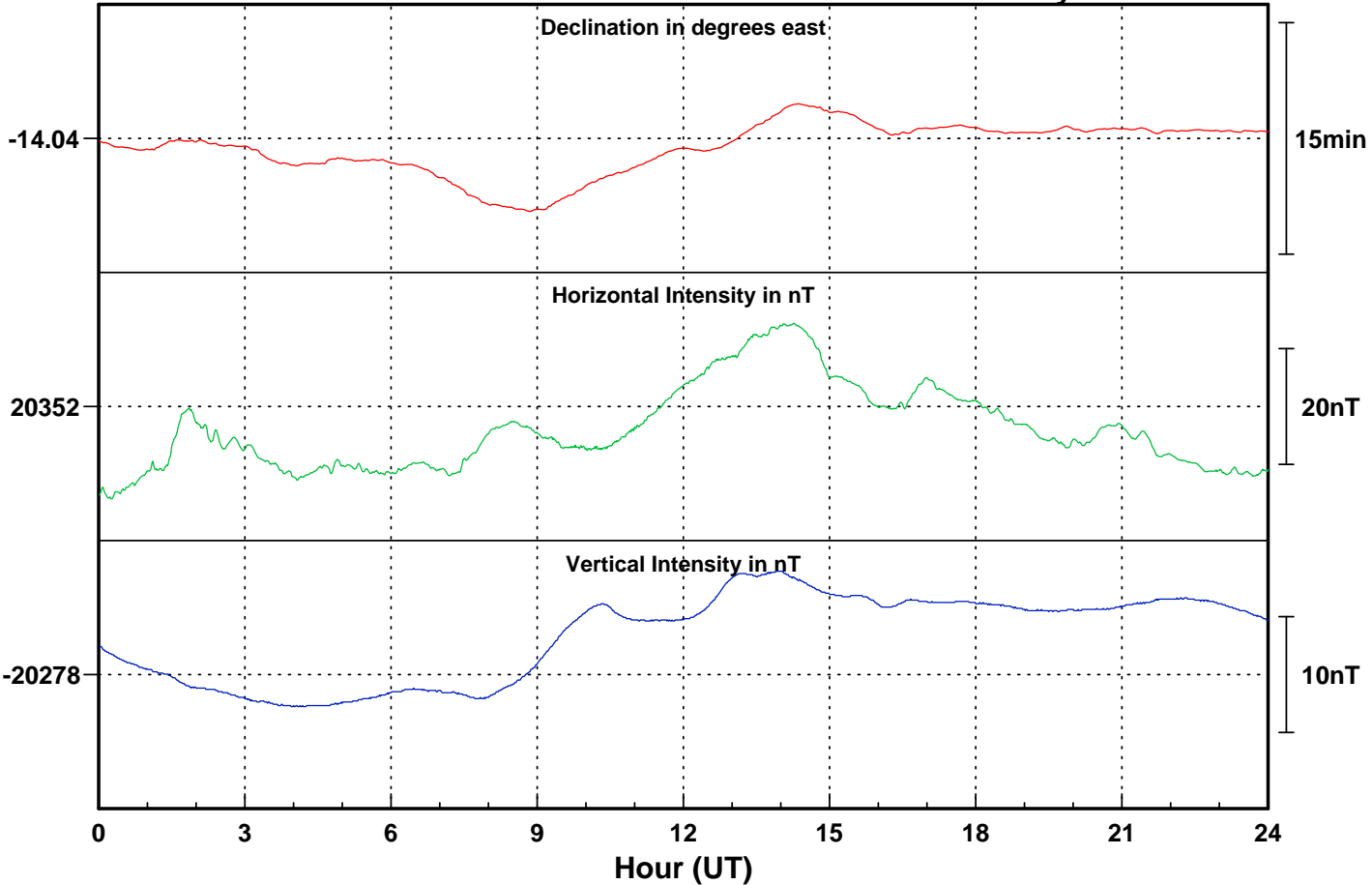
Ascension Island

Day number: 337



Date: 04-12-2021

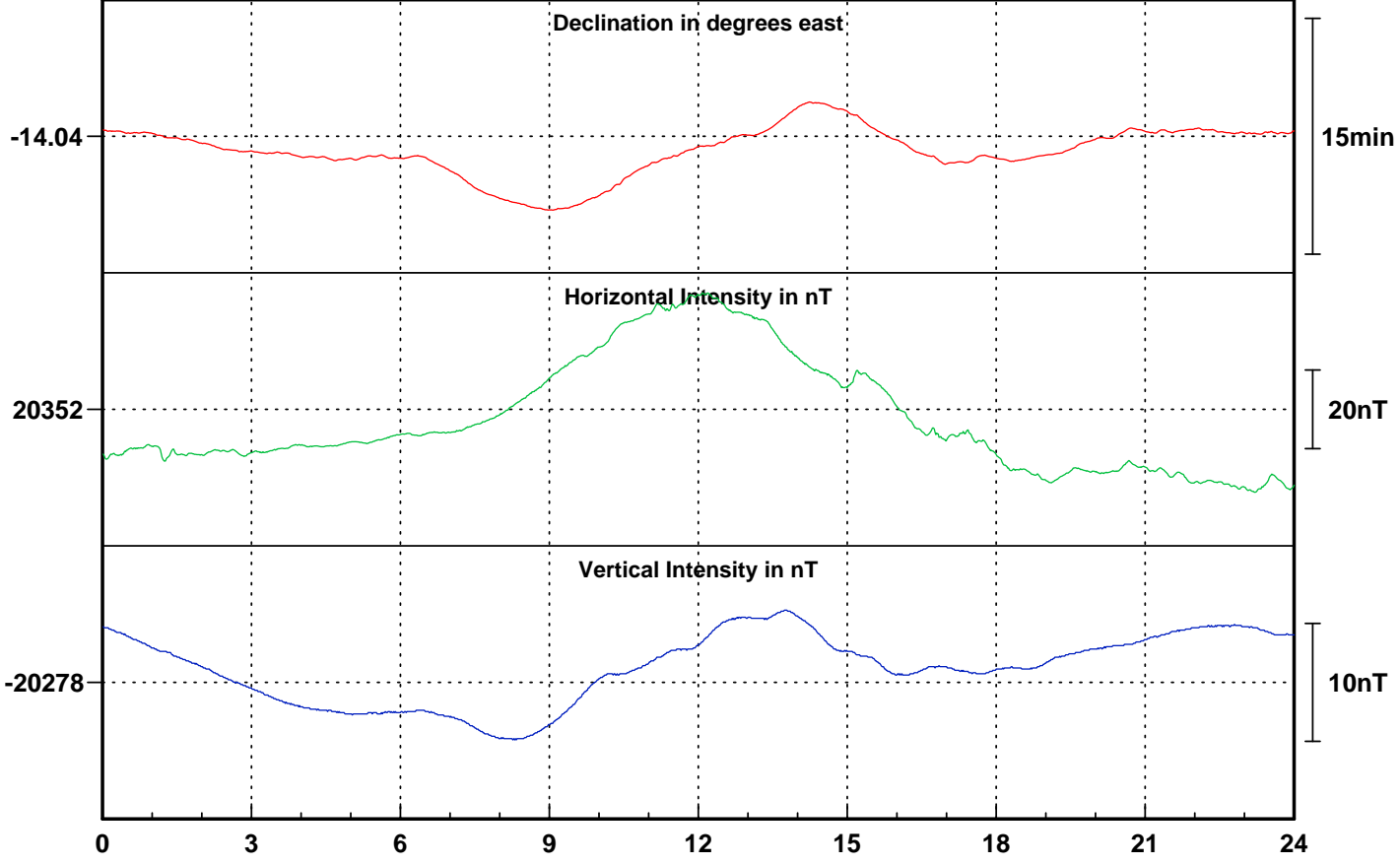
Day number: 338



Date: 05-12-2021

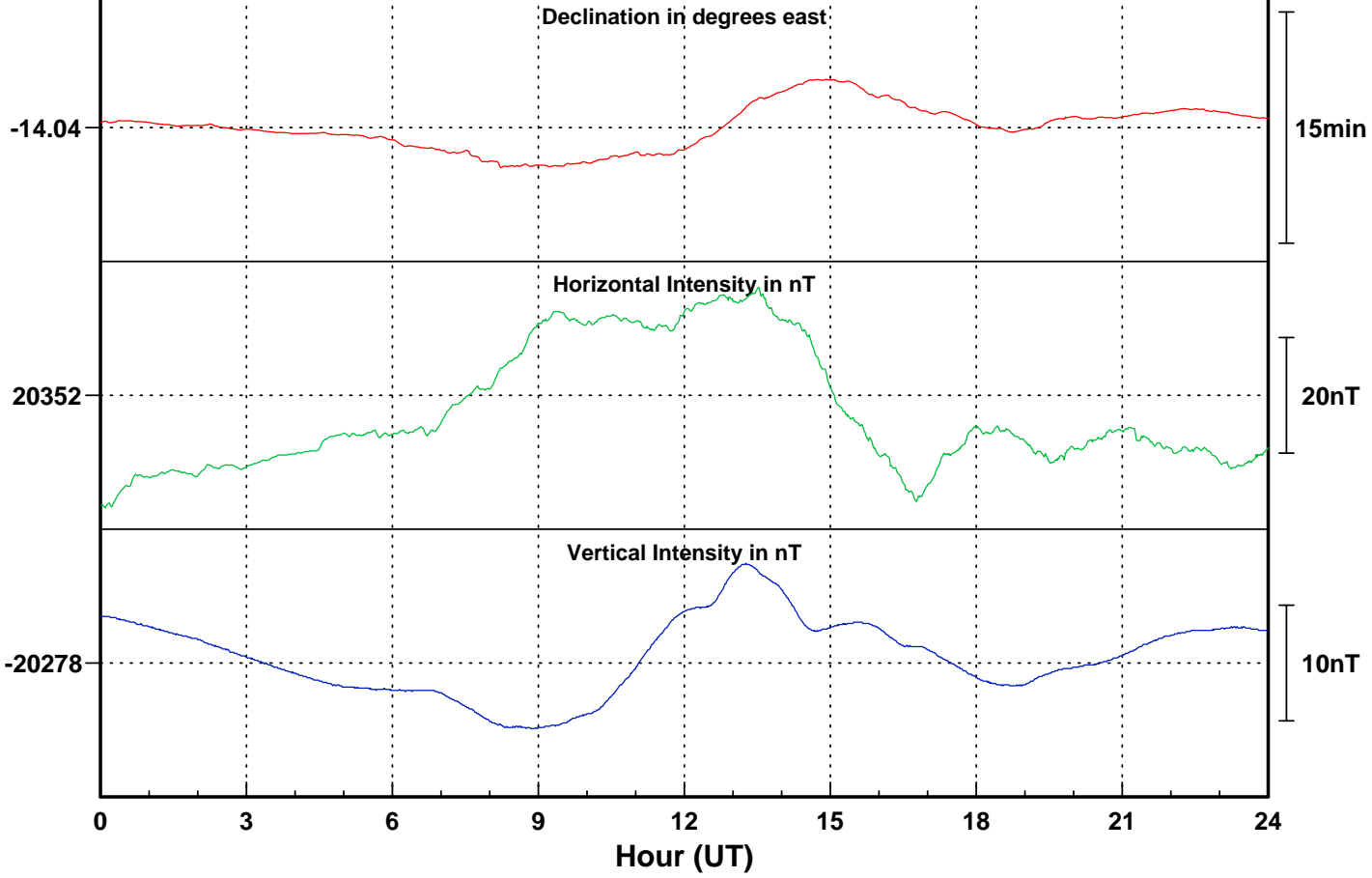
Ascension Island

Day number: 339



Date: 06-12-2021

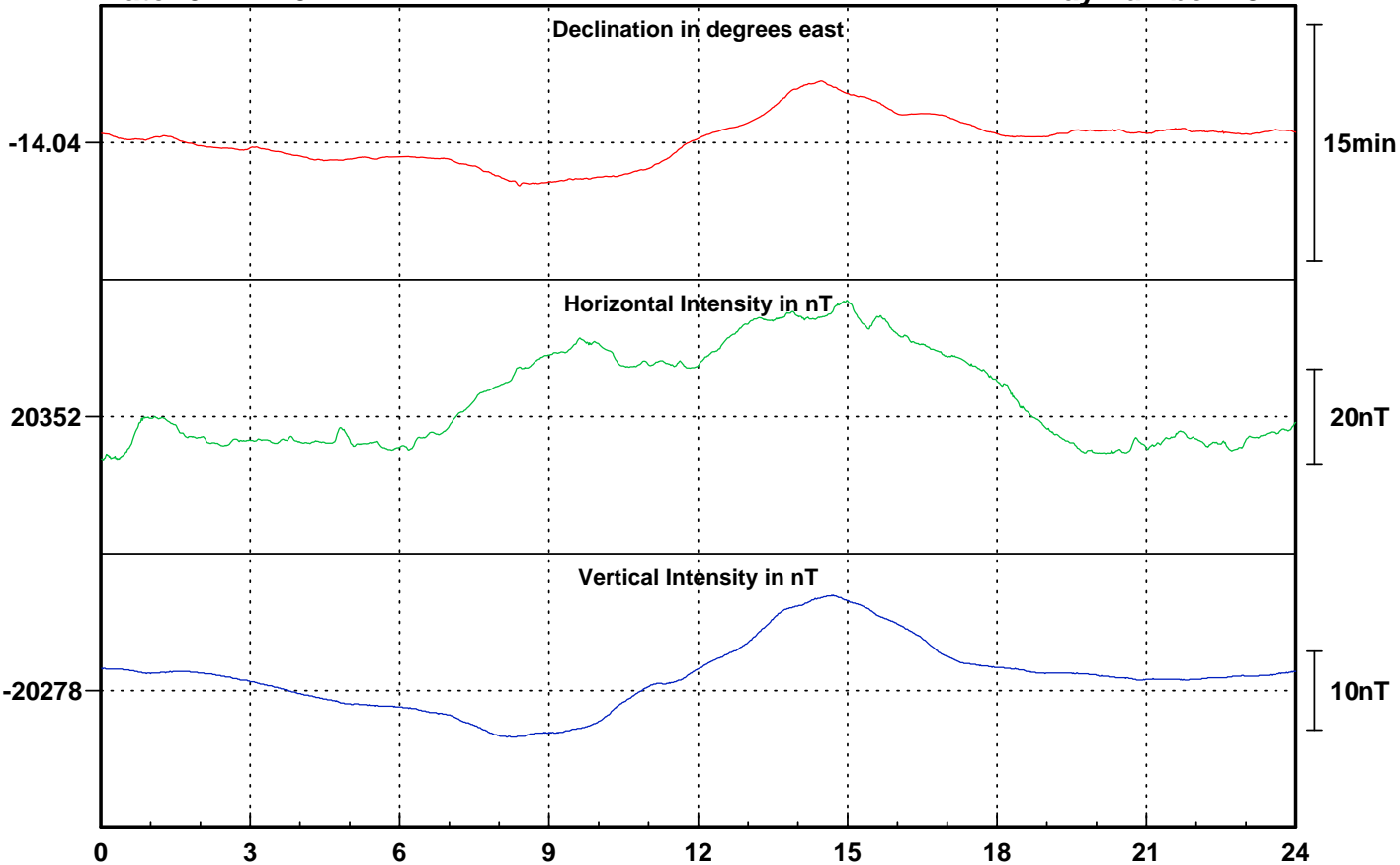
Day number: 340



Date: 07-12-2021

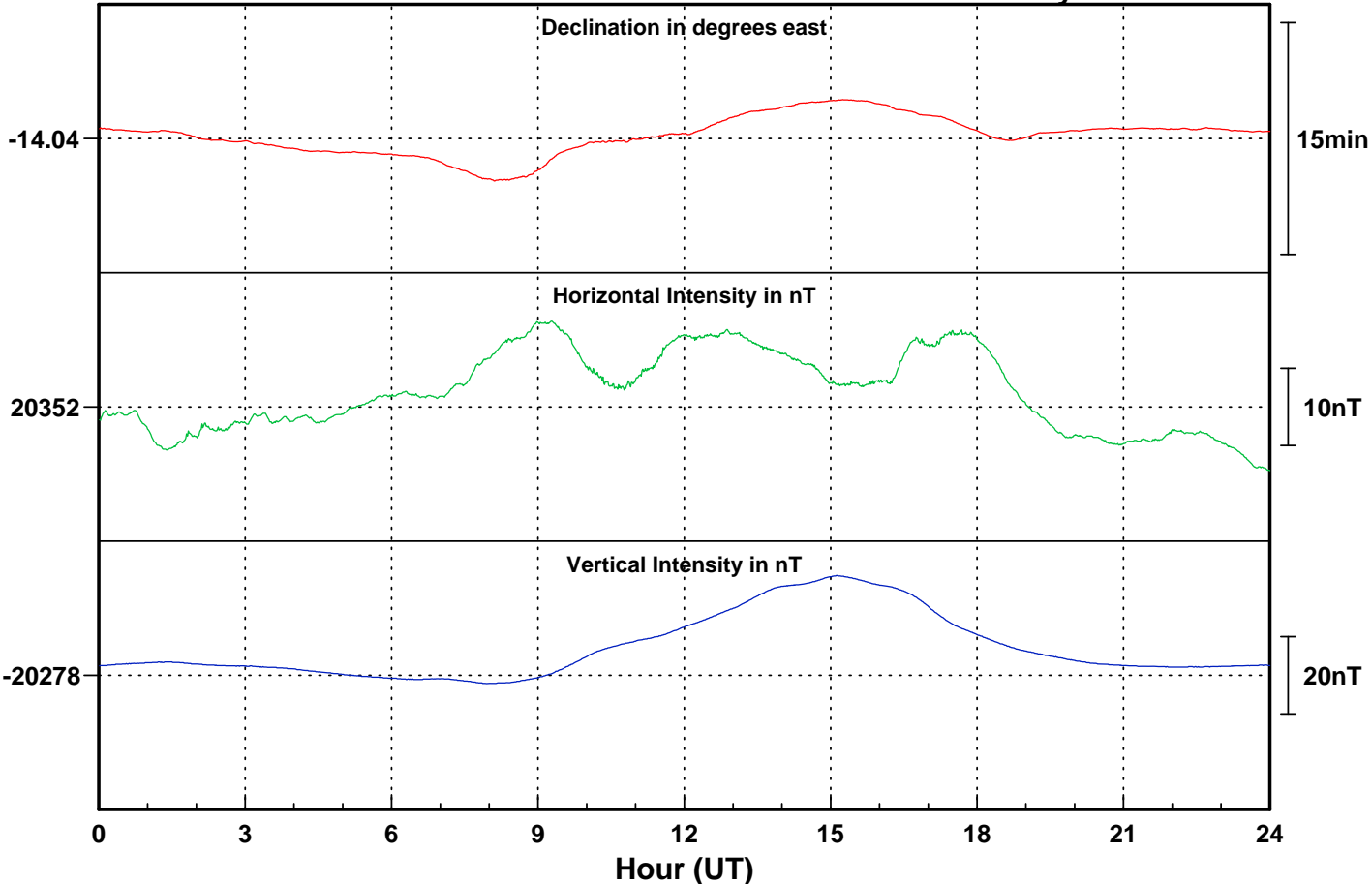
Ascension Island

Day number: 341



Date: 08-12-2021

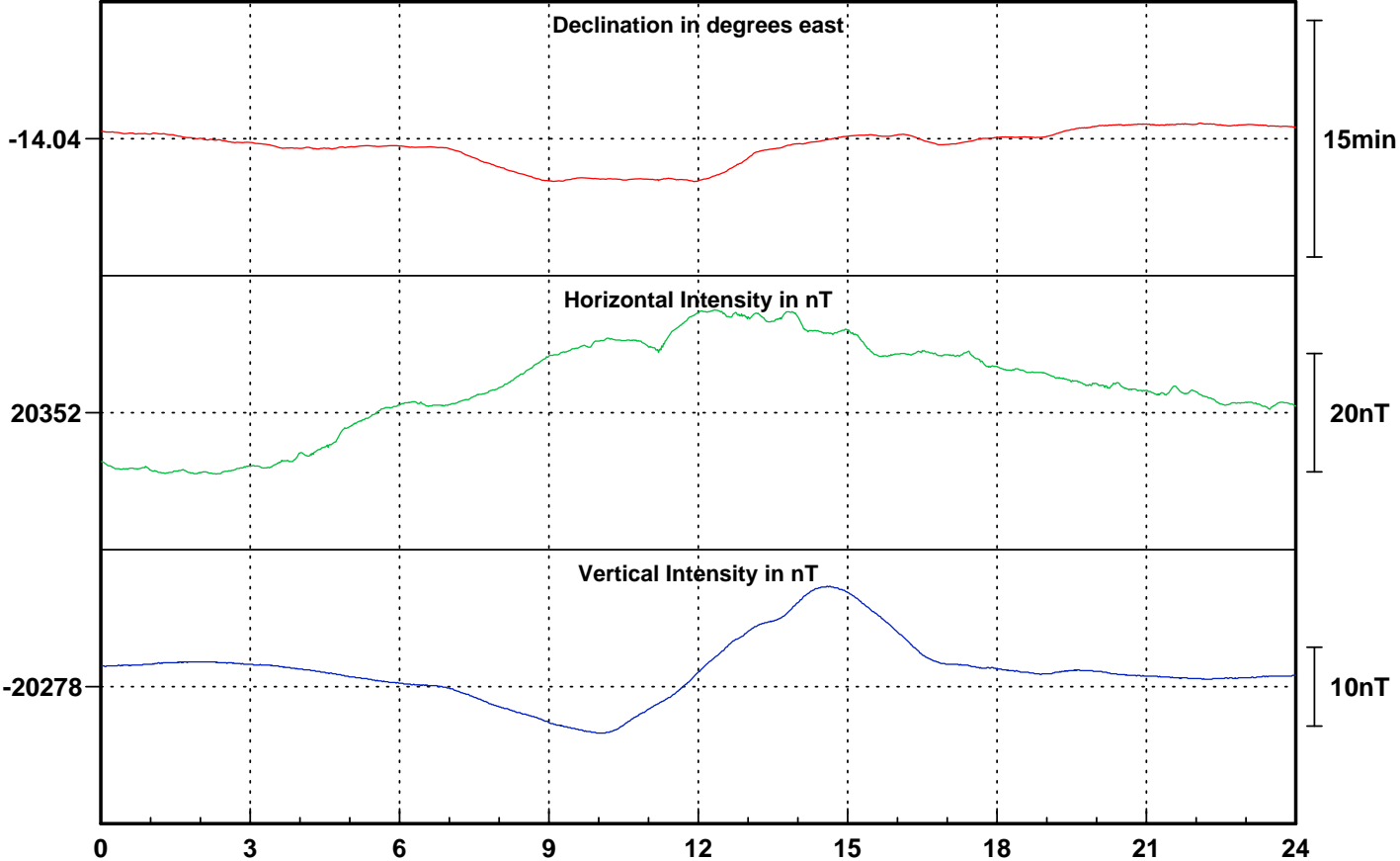
Day number: 342



Date: 09-12-2021

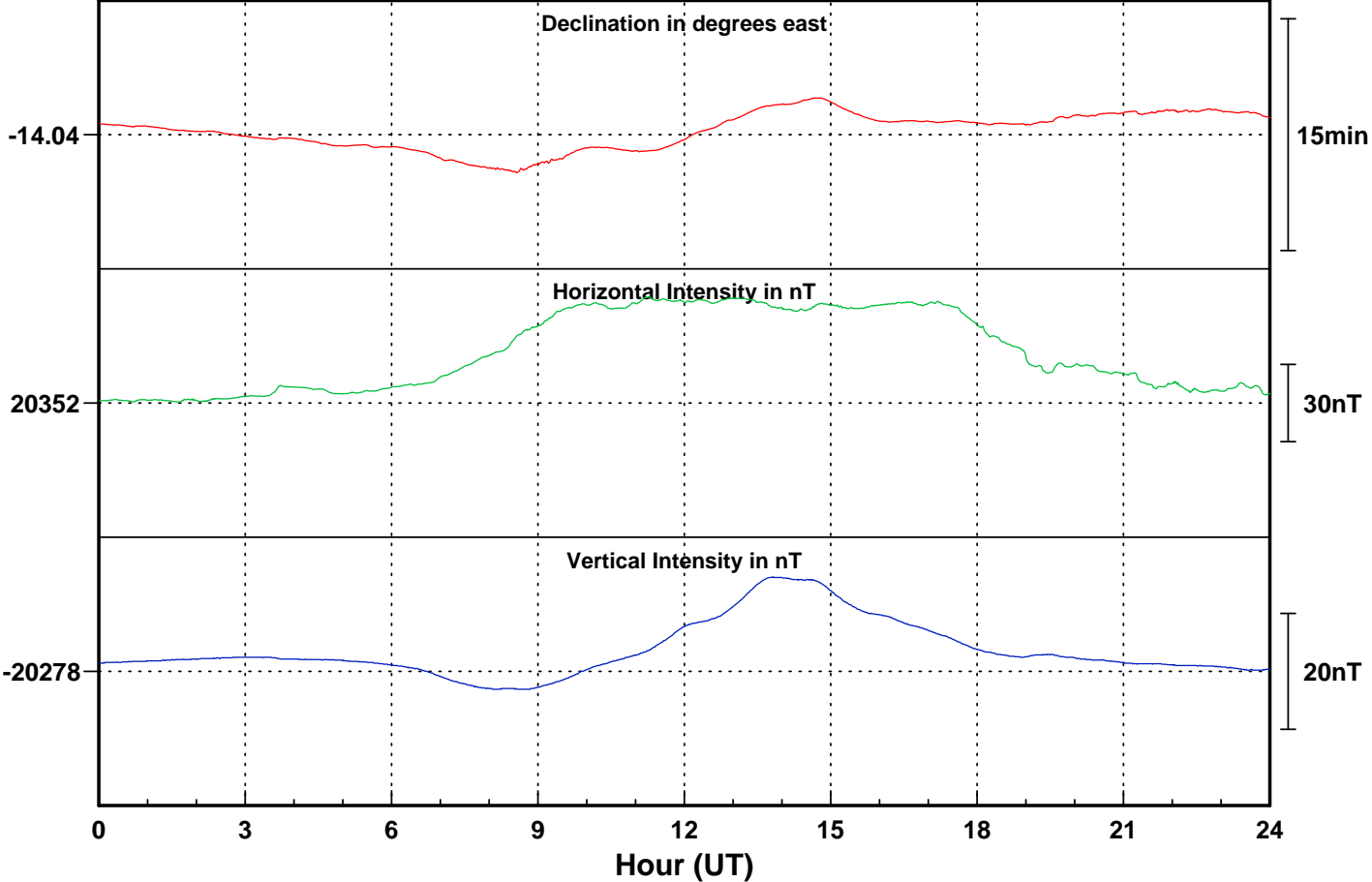
Ascension Island

Day number: 343



Date: 10-12-2021

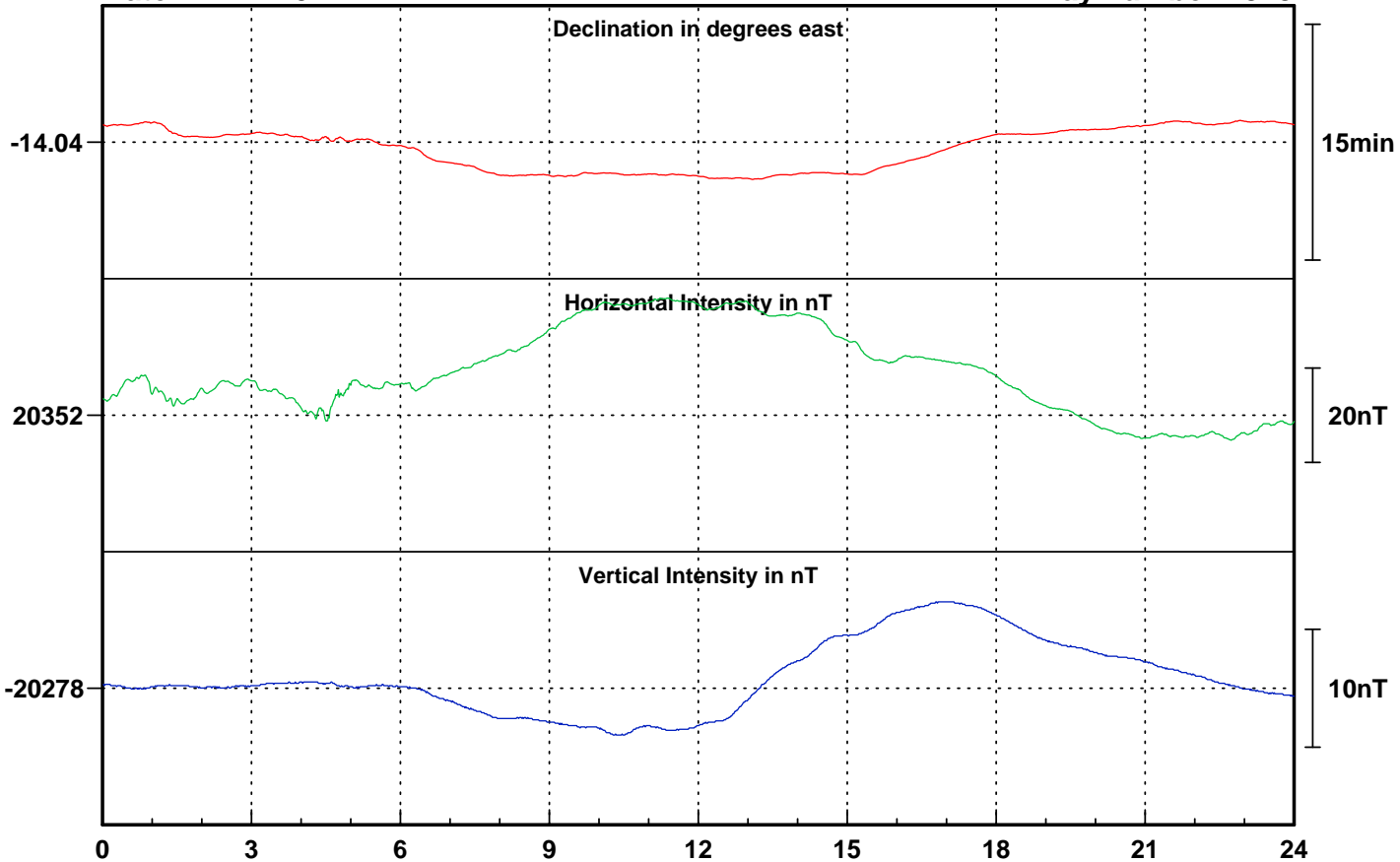
Day number: 344



Date: 11-12-2021

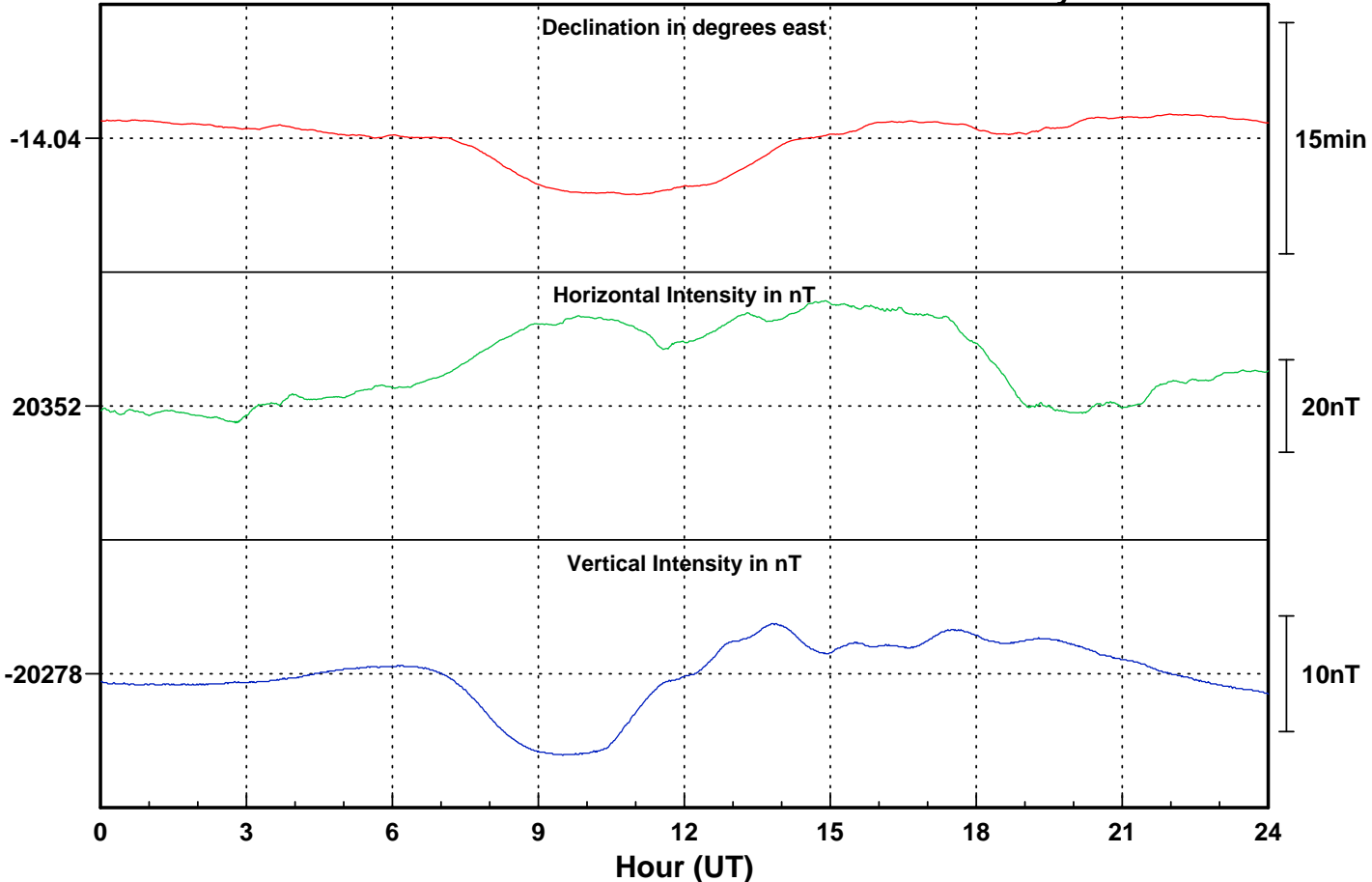
Ascension Island

Day number: 345



Date: 12-12-2021

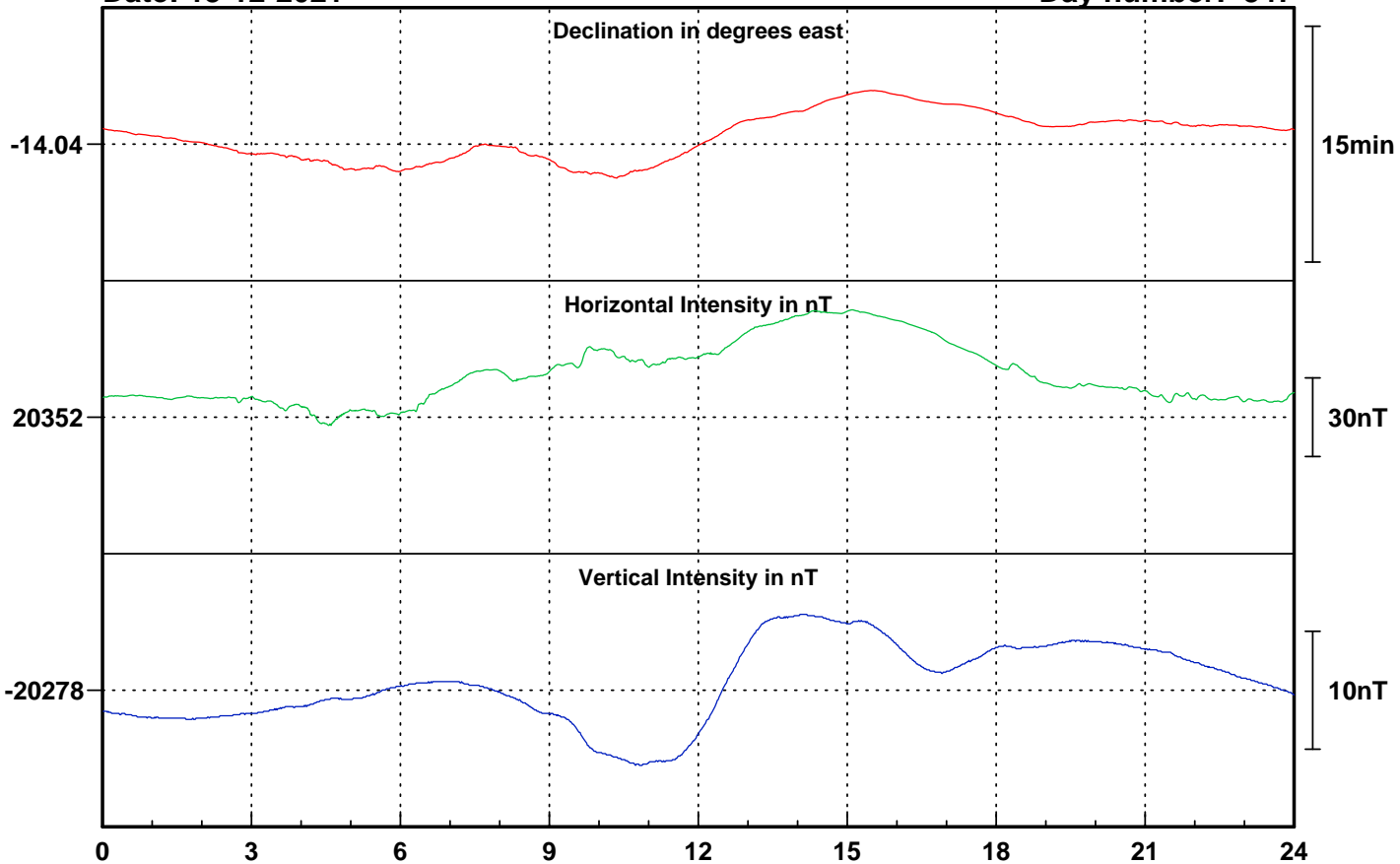
Day number: 346



Date: 13-12-2021

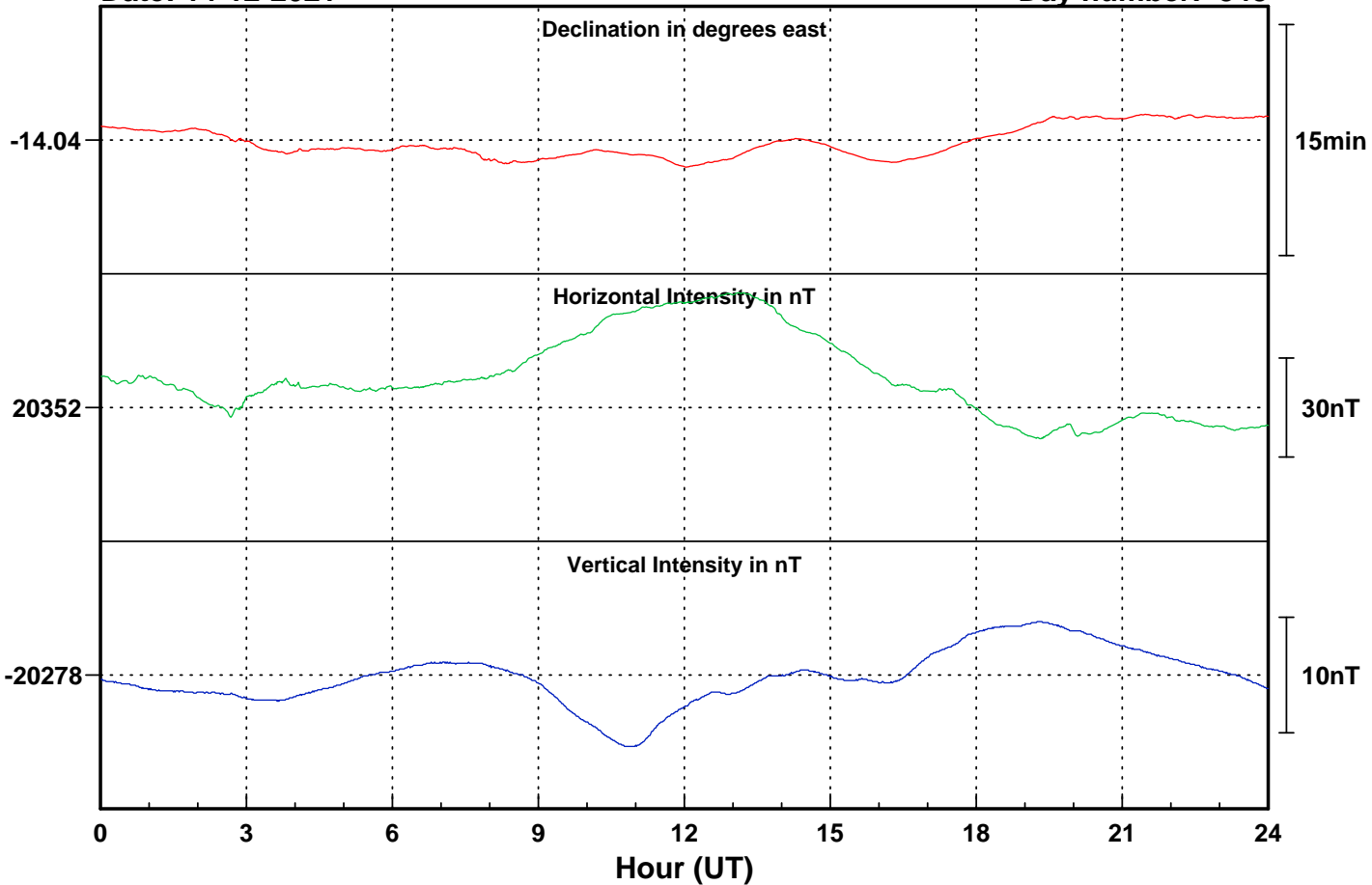
Ascension Island

Day number: 347



Date: 14-12-2021

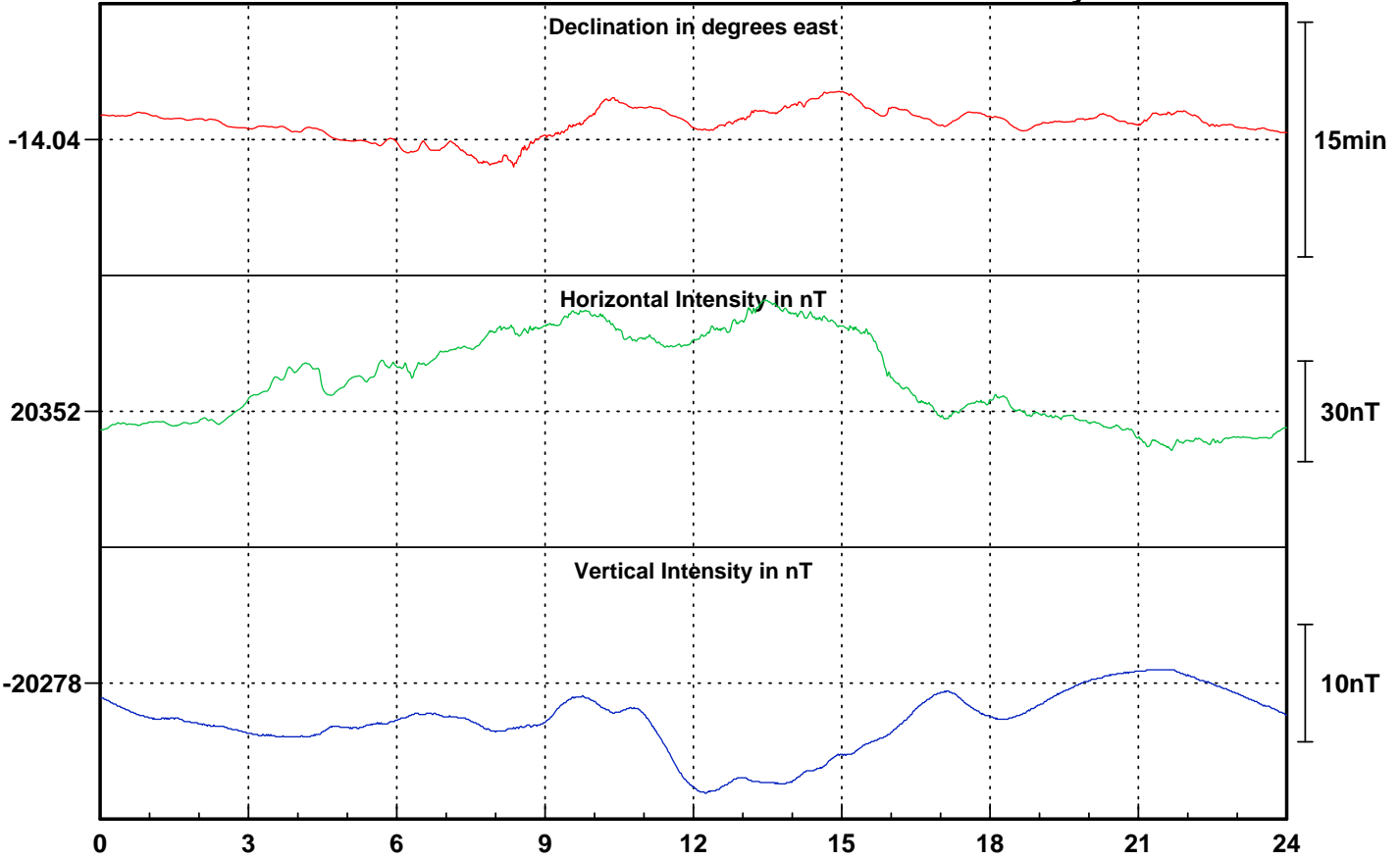
Day number: 348



Date: 15-12-2021

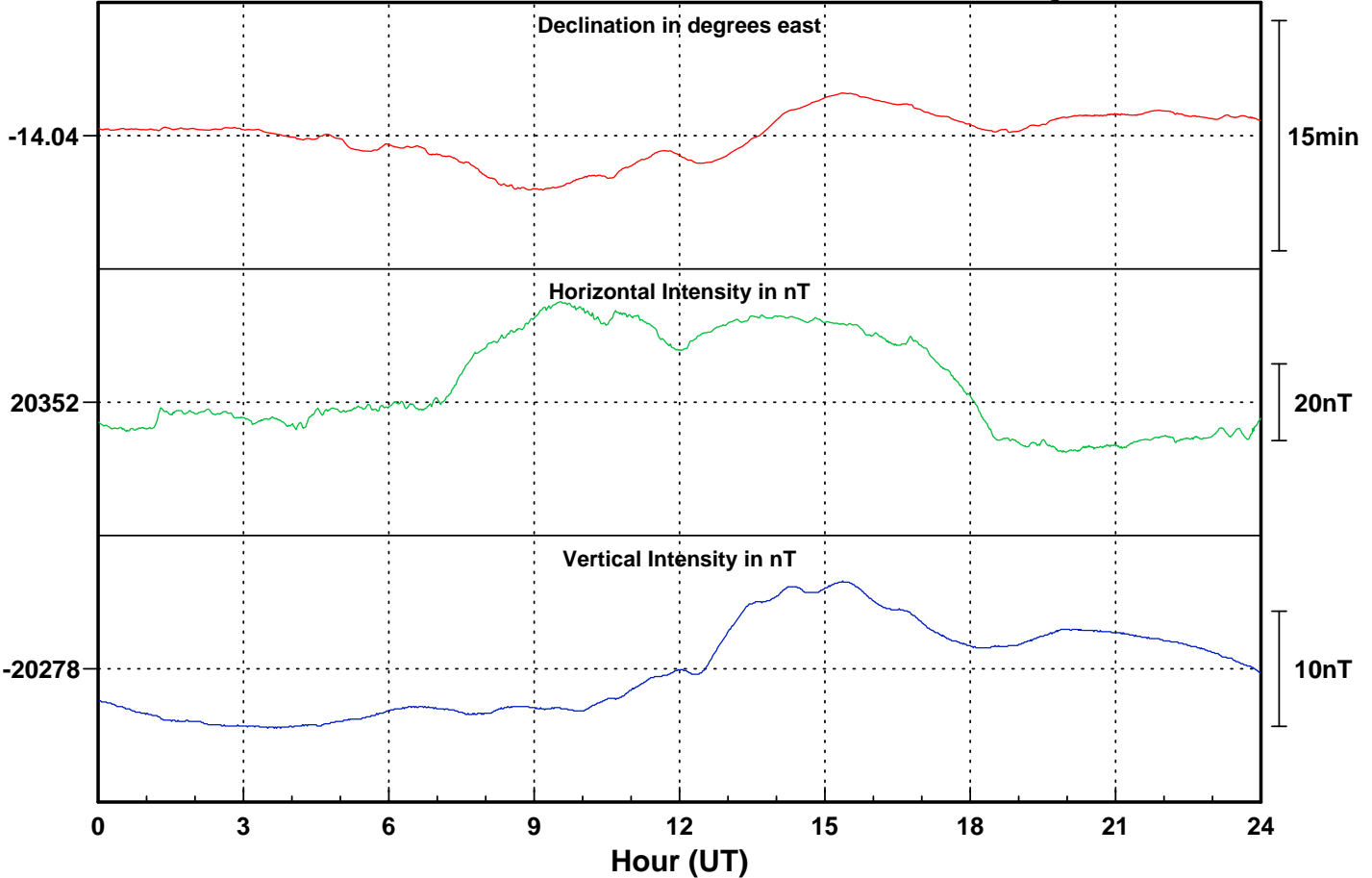
Ascension Island

Day number: 349



Date: 16-12-2021

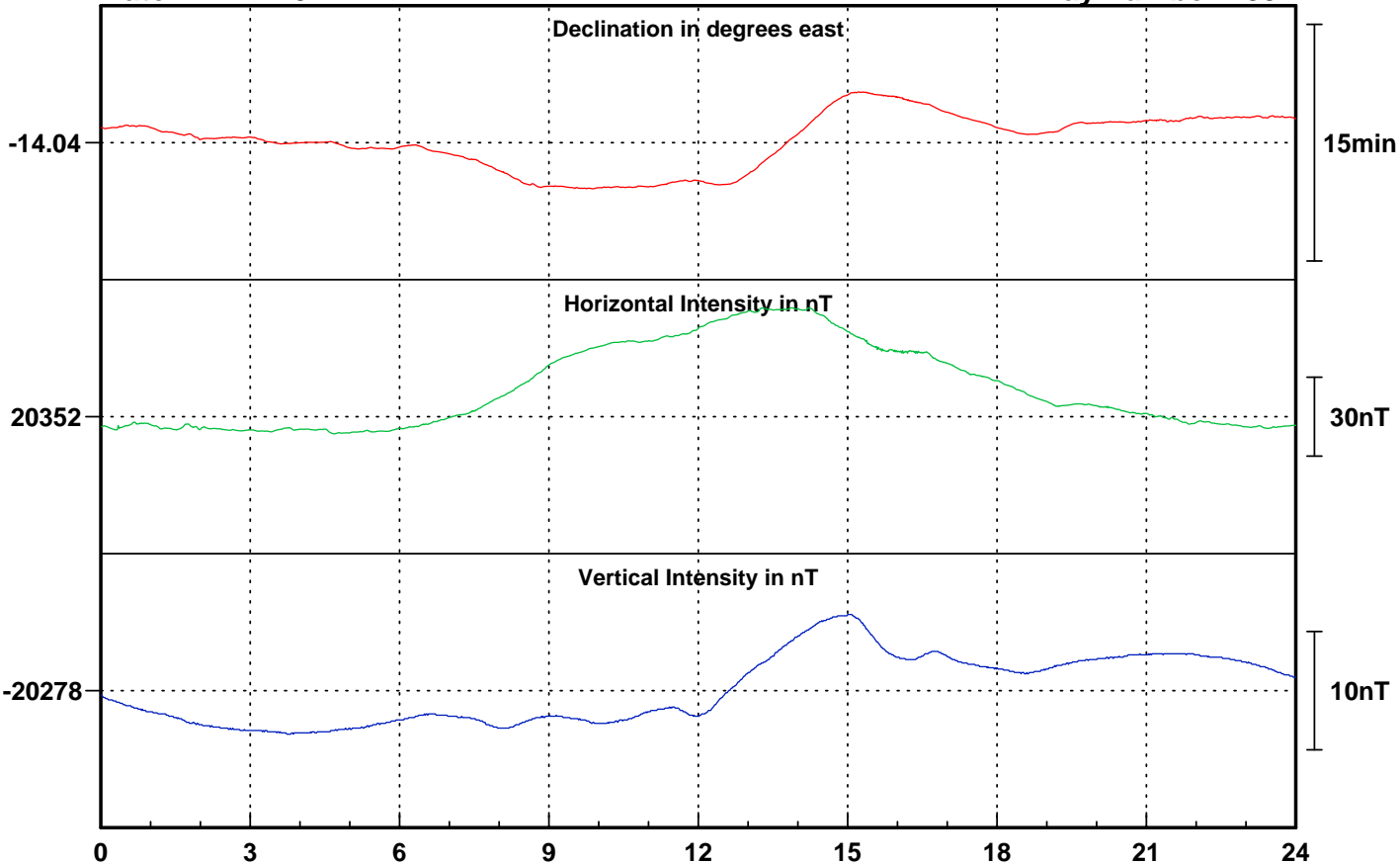
Day number: 350



Date: 17-12-2021

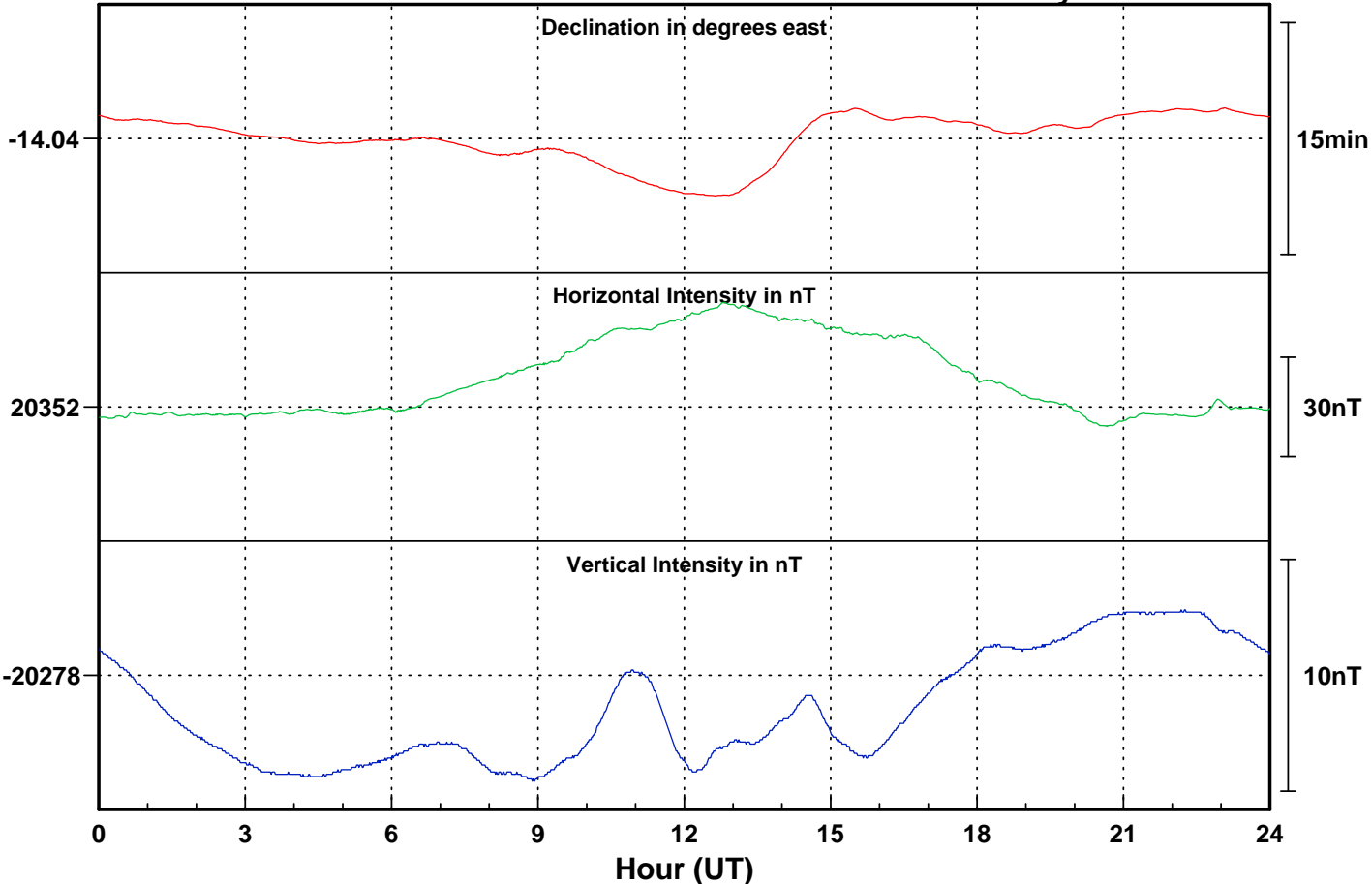
Ascension Island

Day number: 351



Date: 18-12-2021

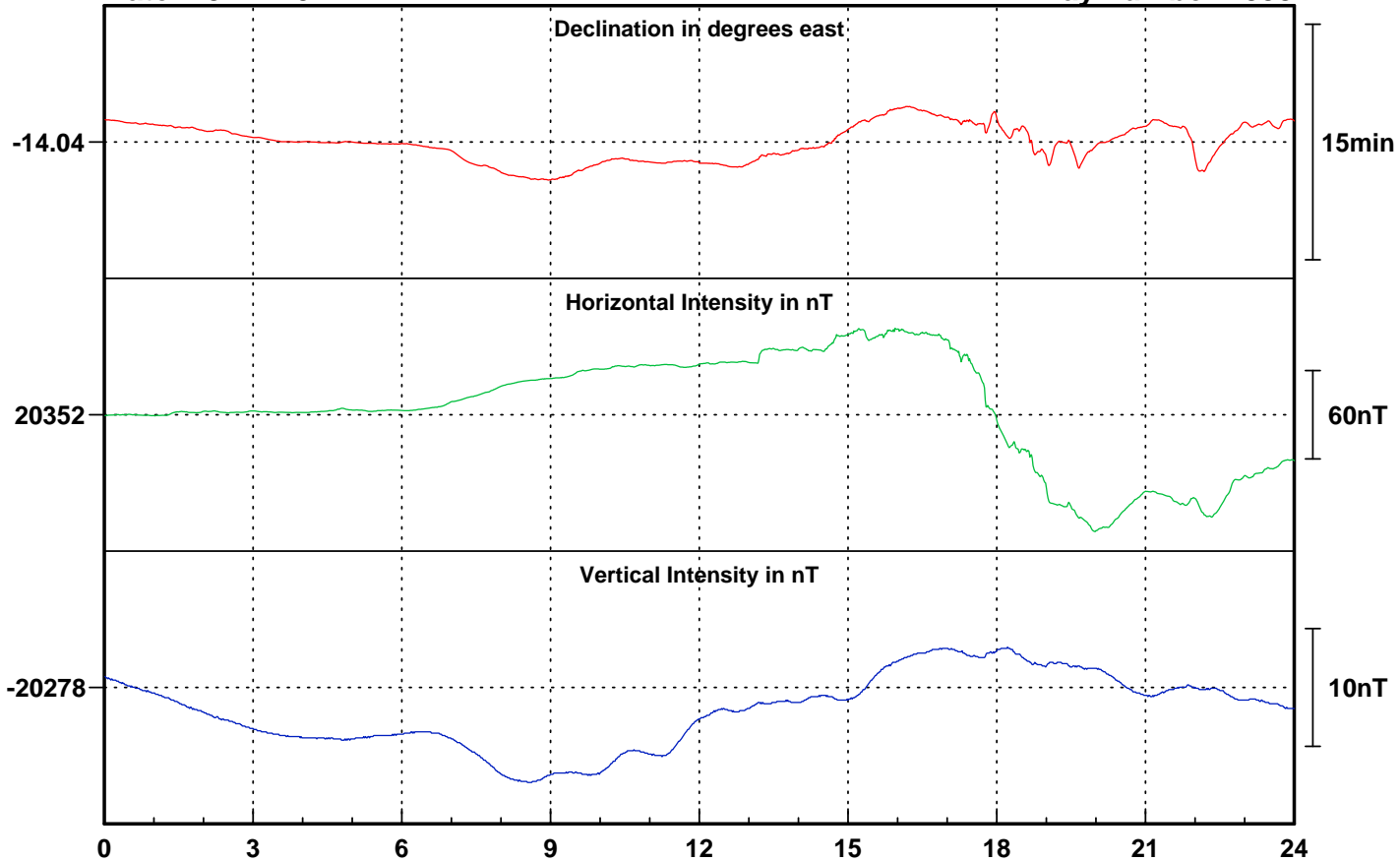
Day number: 352



Date: 19-12-2021

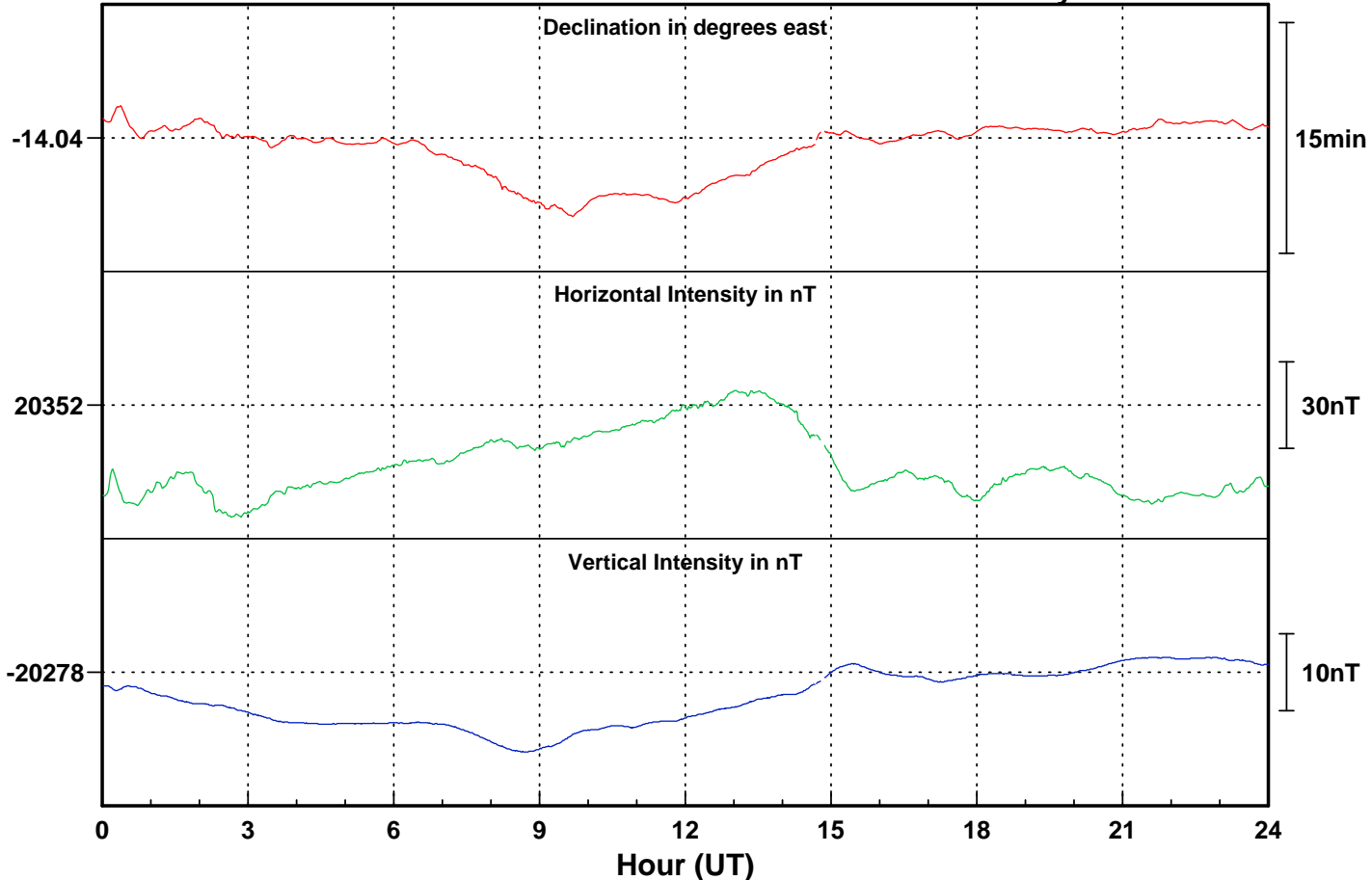
Ascension Island

Day number: 353



Date: 20-12-2021

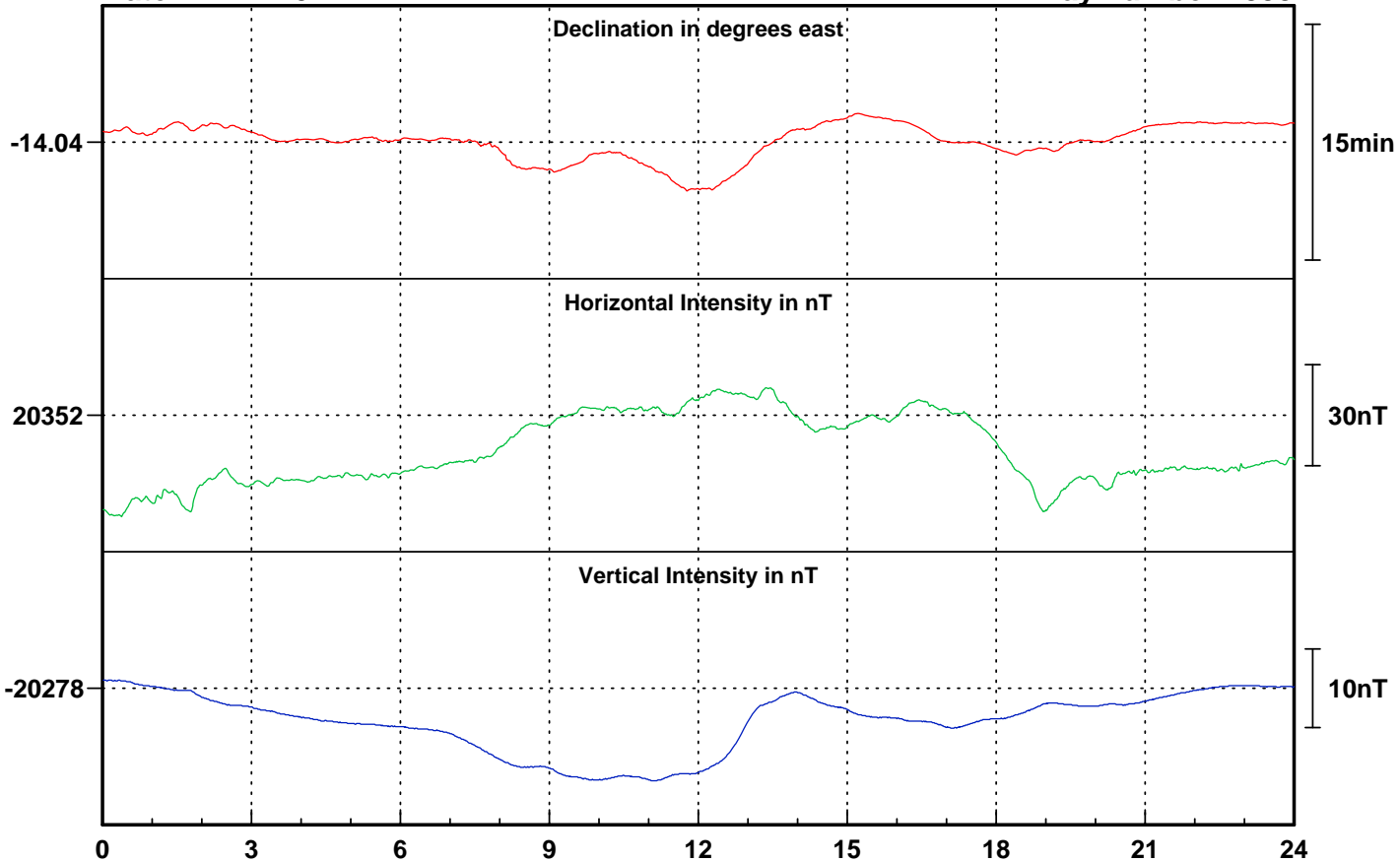
Day number: 354



Date: 21-12-2021

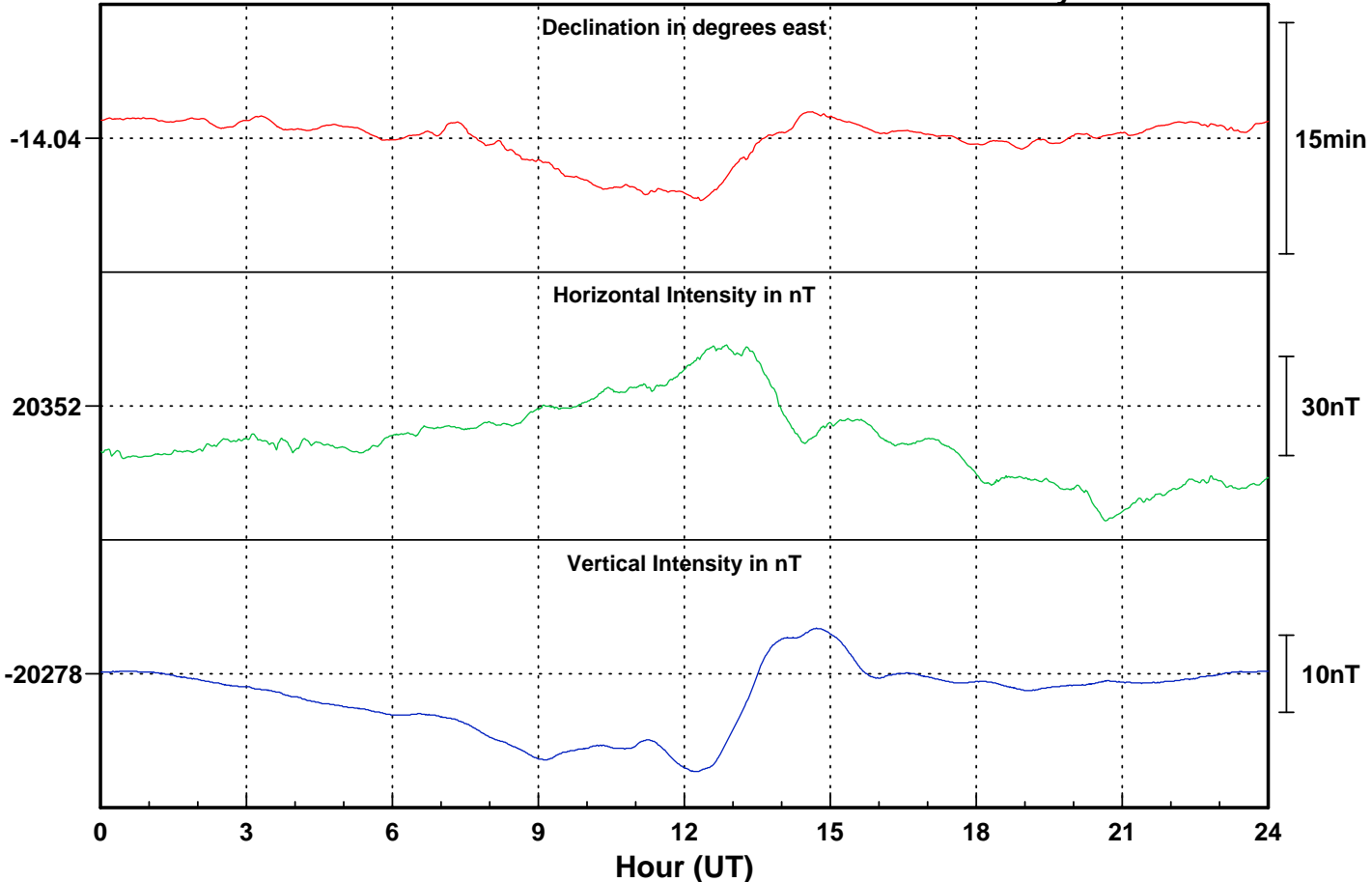
Ascension Island

Day number: 355



Date: 22-12-2021

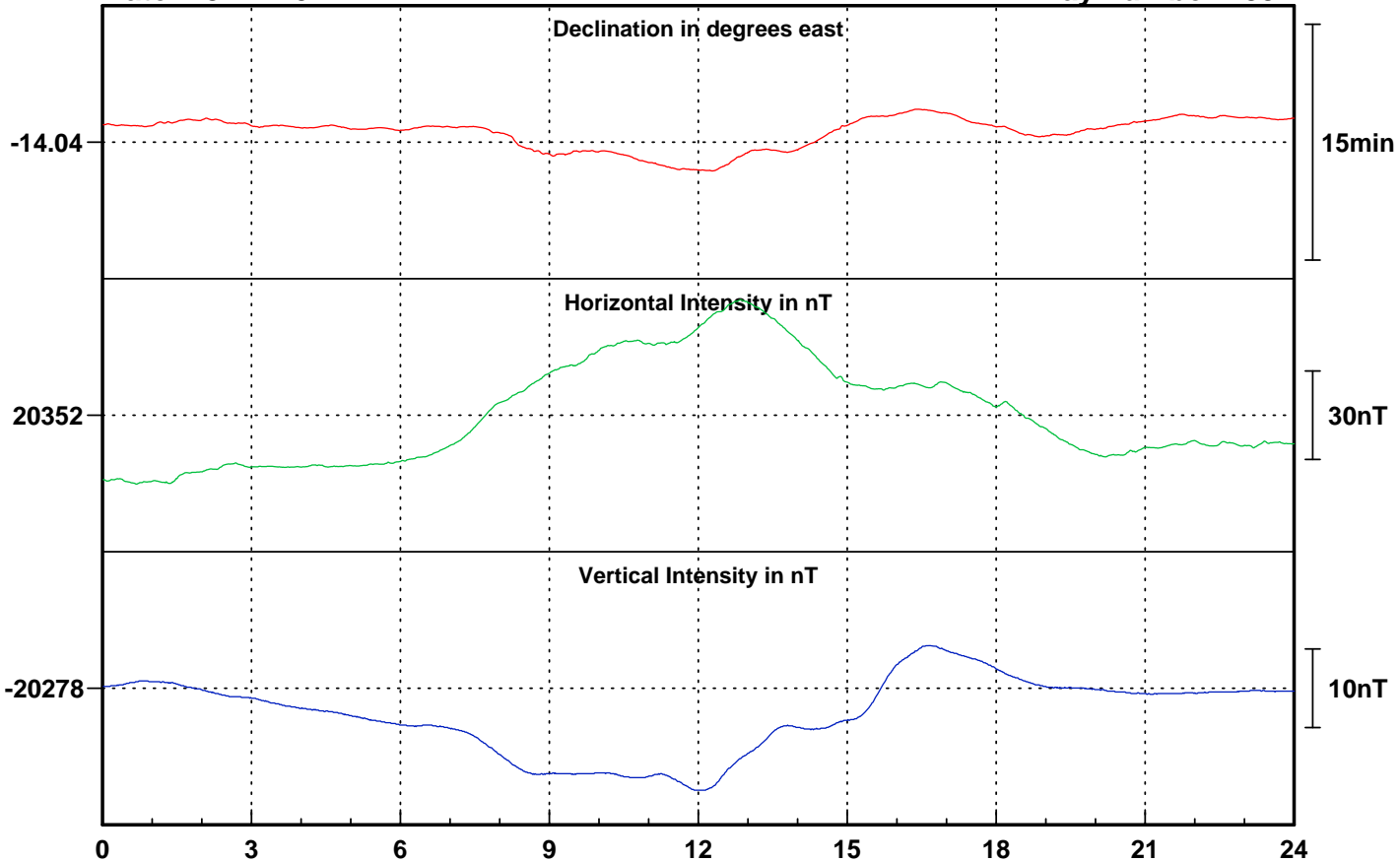
Day number: 356



Date: 23-12-2021

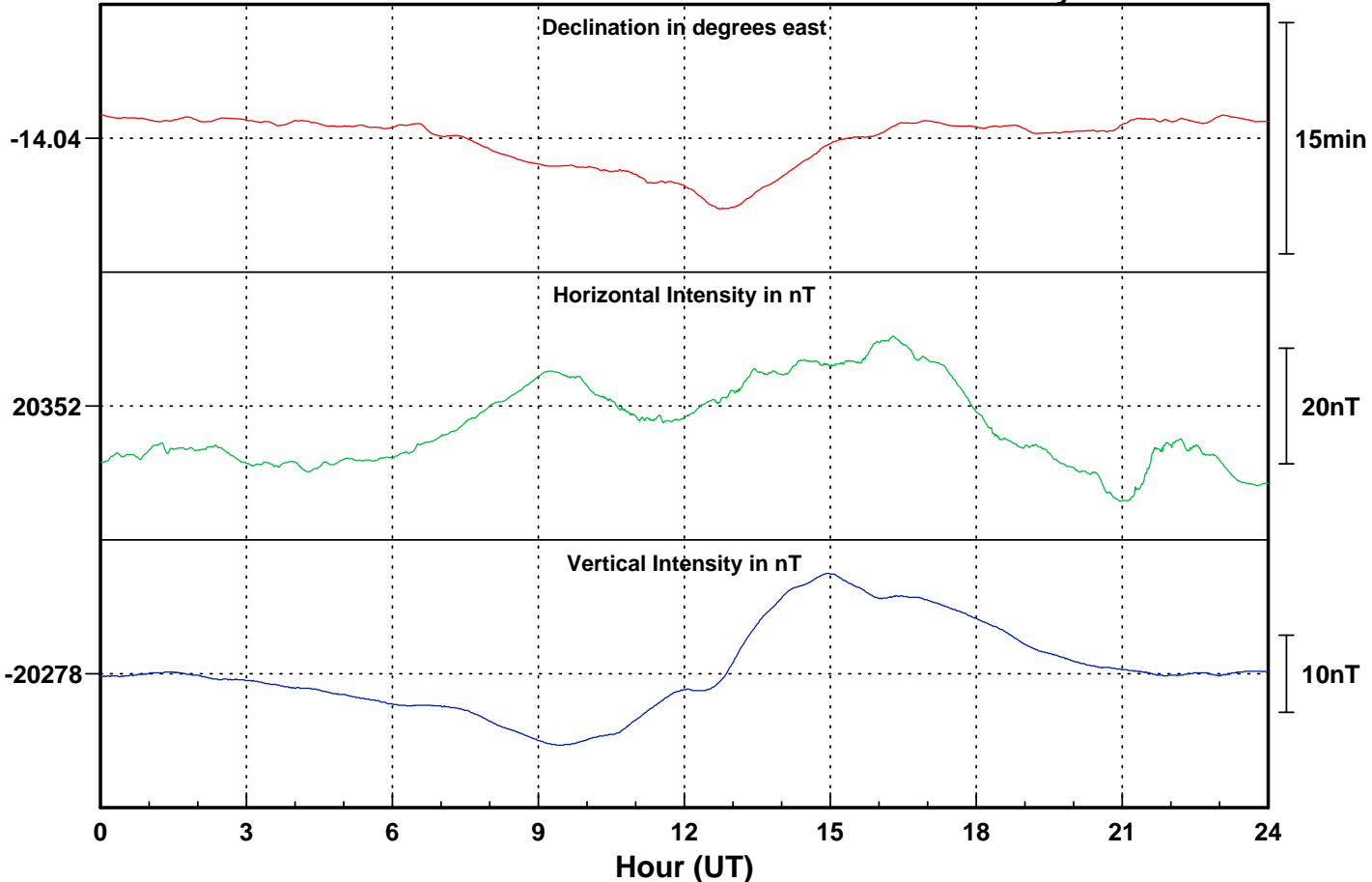
Ascension Island

Day number: 357



Date: 24-12-2021

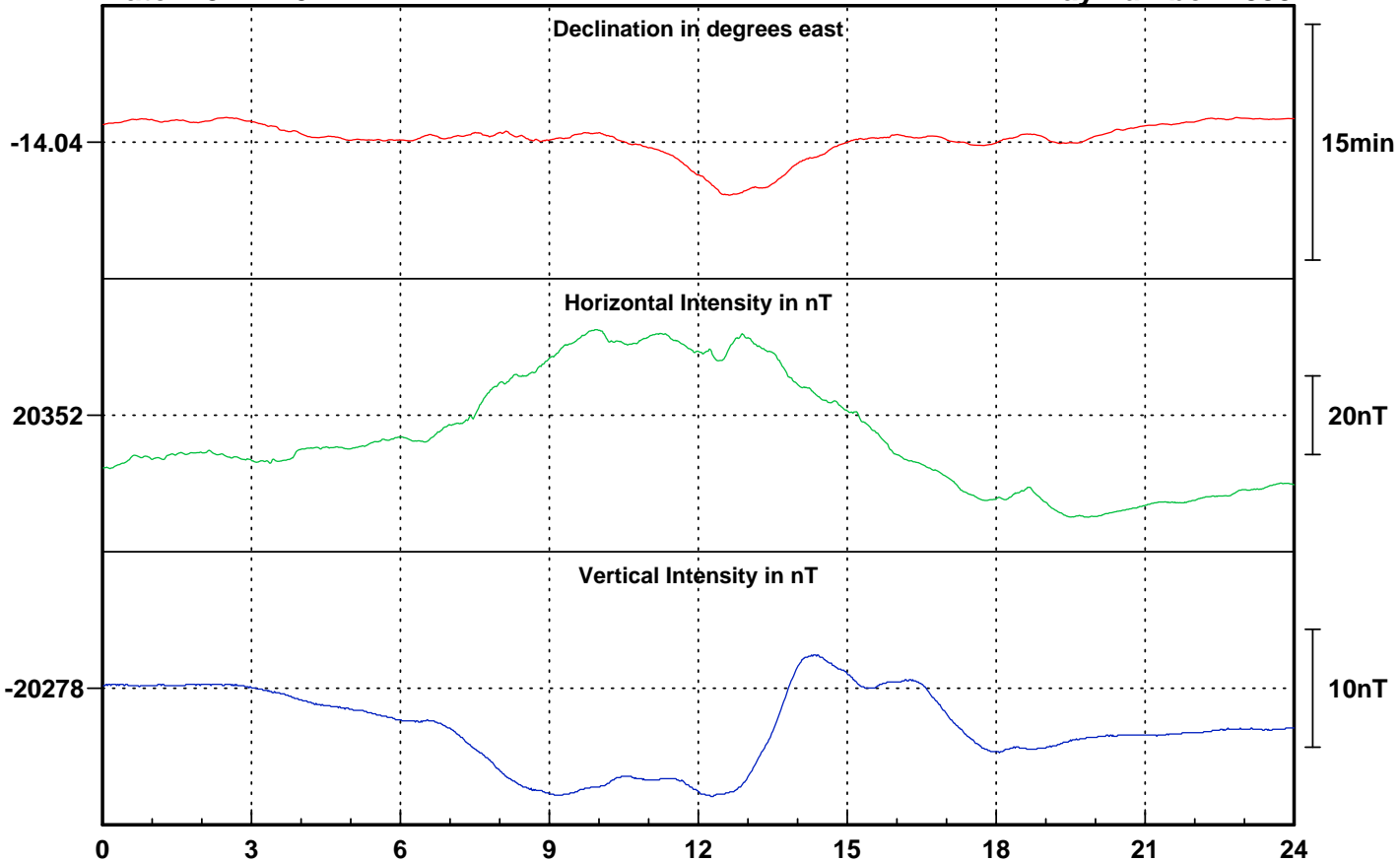
Day number: 358



Date: 25-12-2021

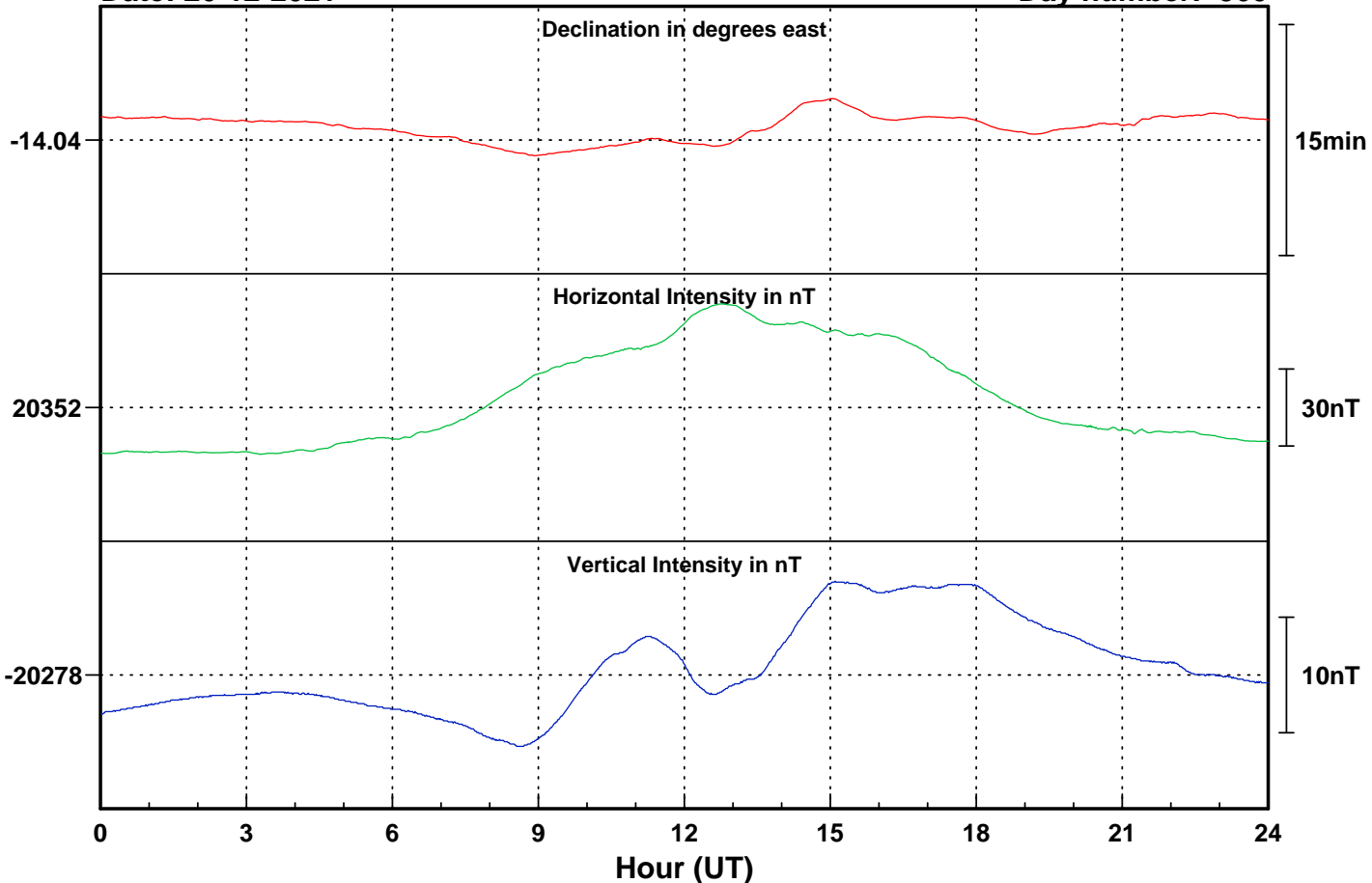
Ascension Island

Day number: 359



Date: 26-12-2021

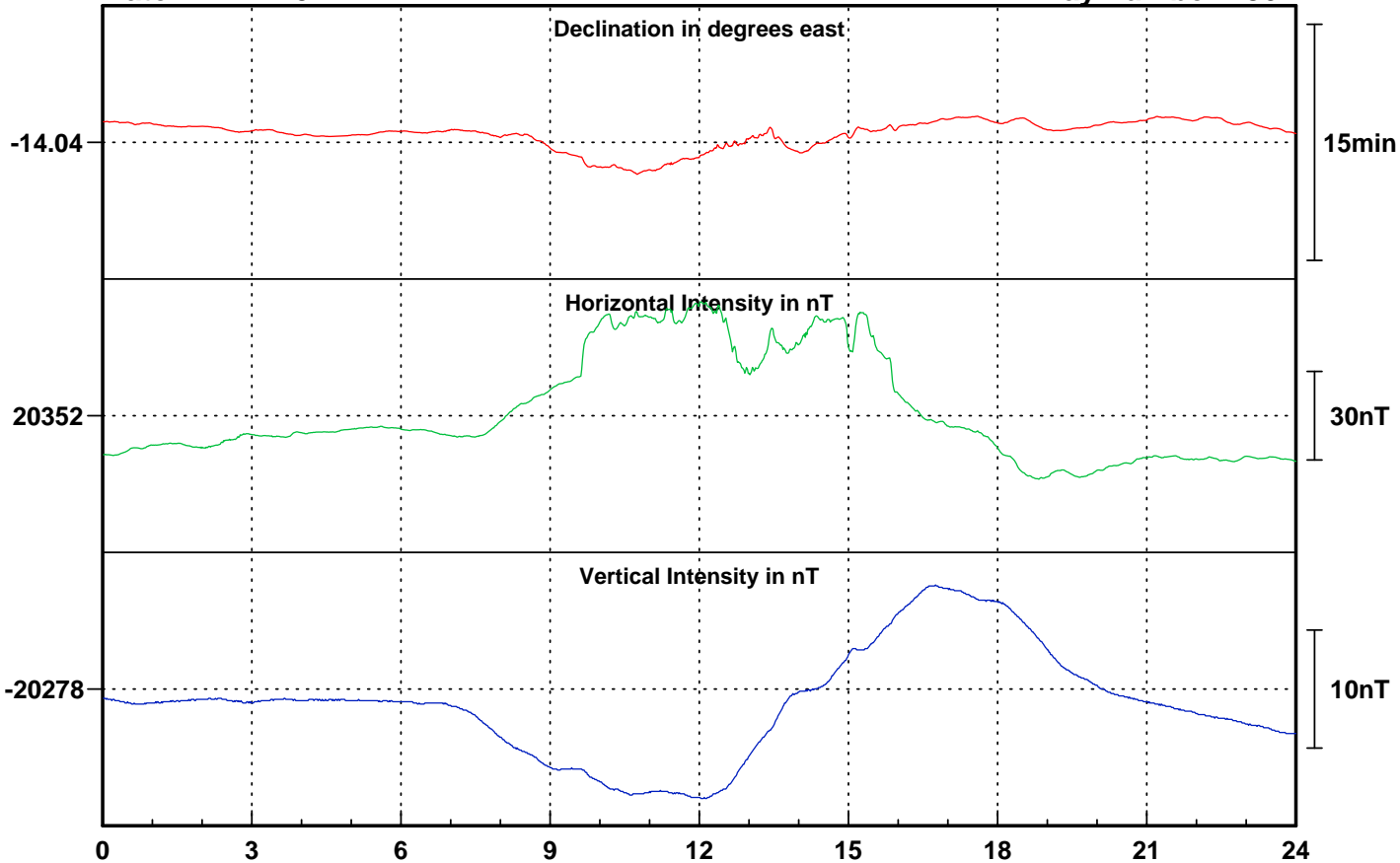
Day number: 360



Date: 27-12-2021

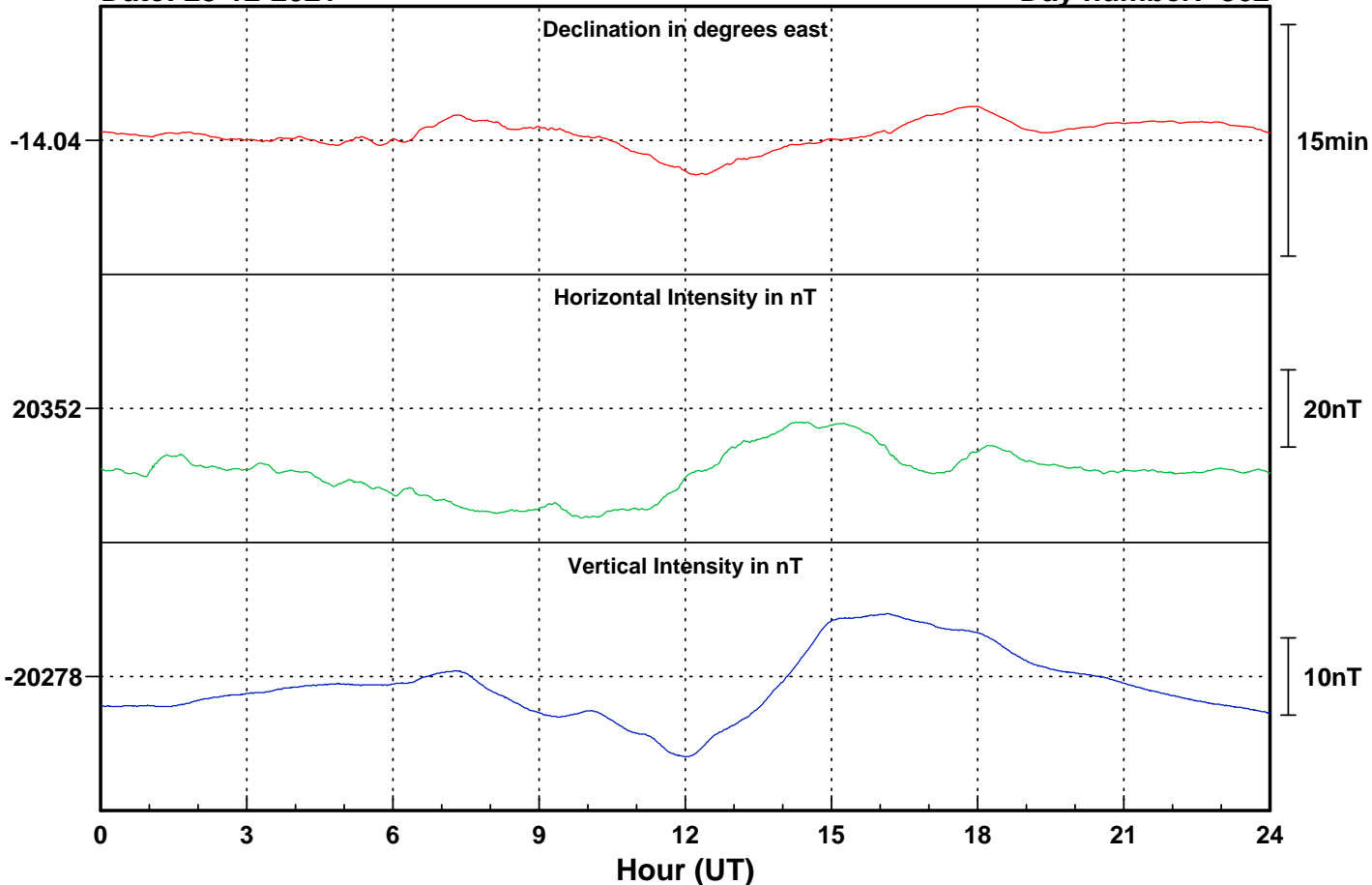
Ascension Island

Day number: 361



Date: 28-12-2021

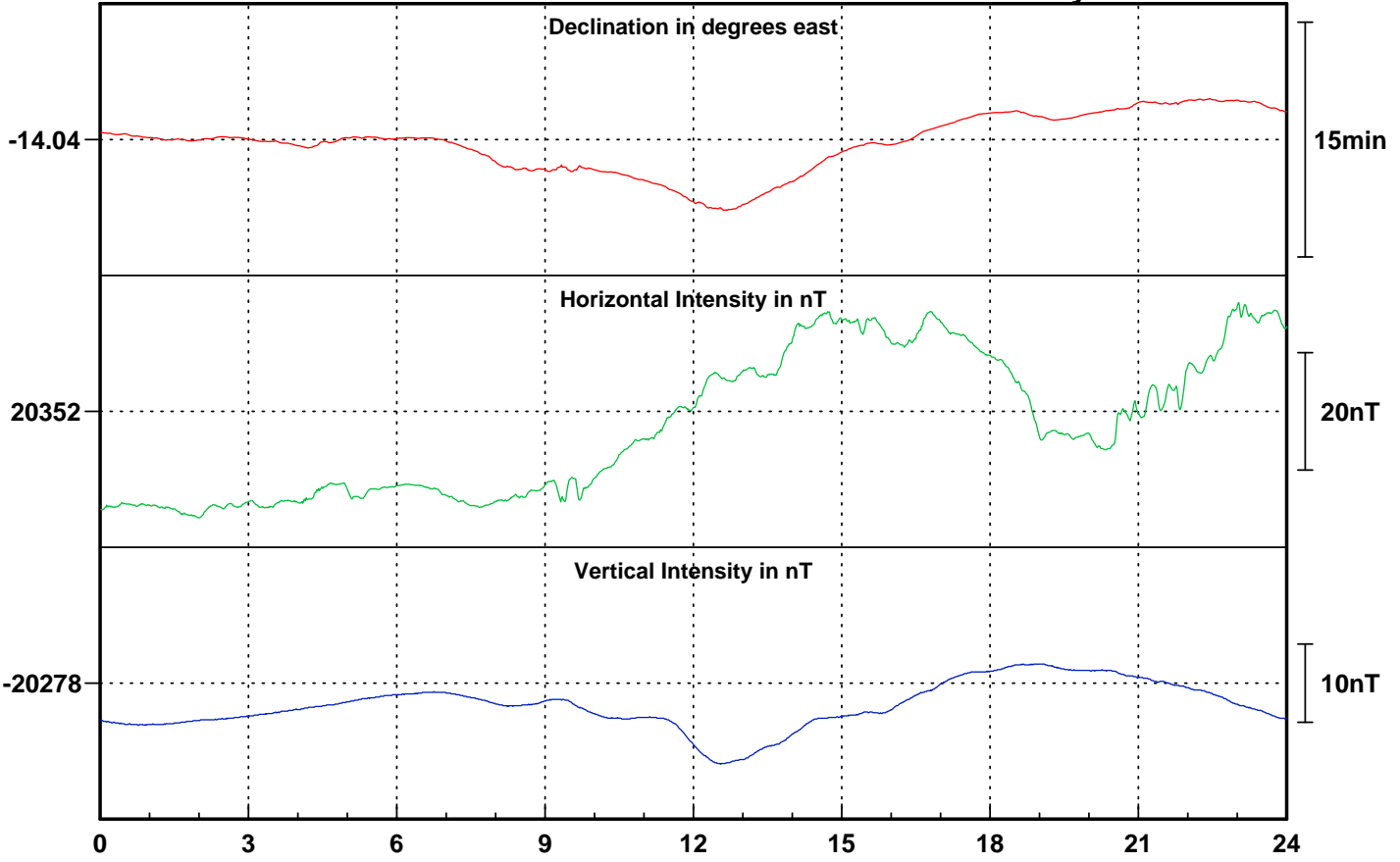
Day number: 362



Date: 29-12-2021

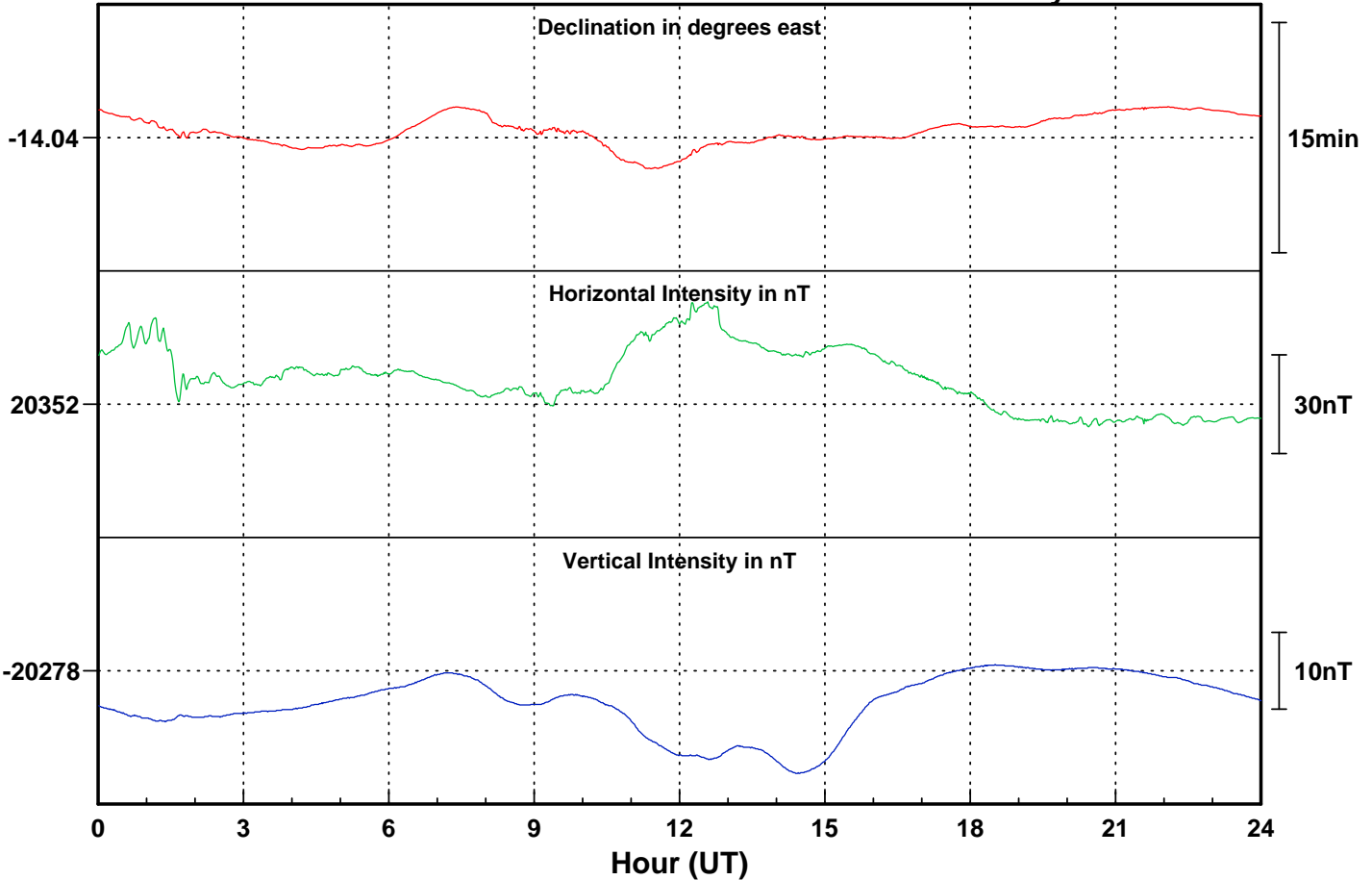
Ascension Island

Day number: 363



Date: 30-12-2021

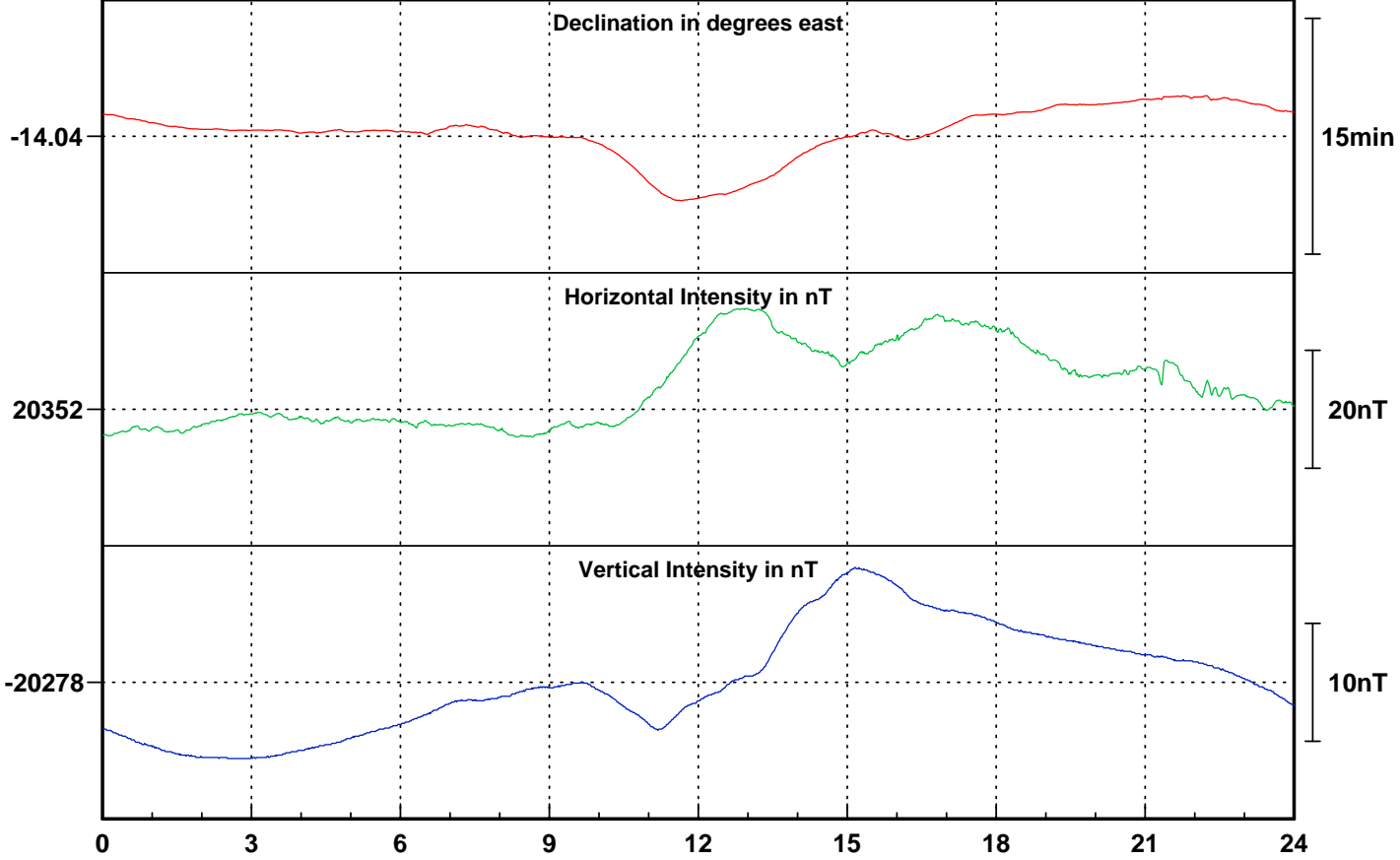
Day number: 364



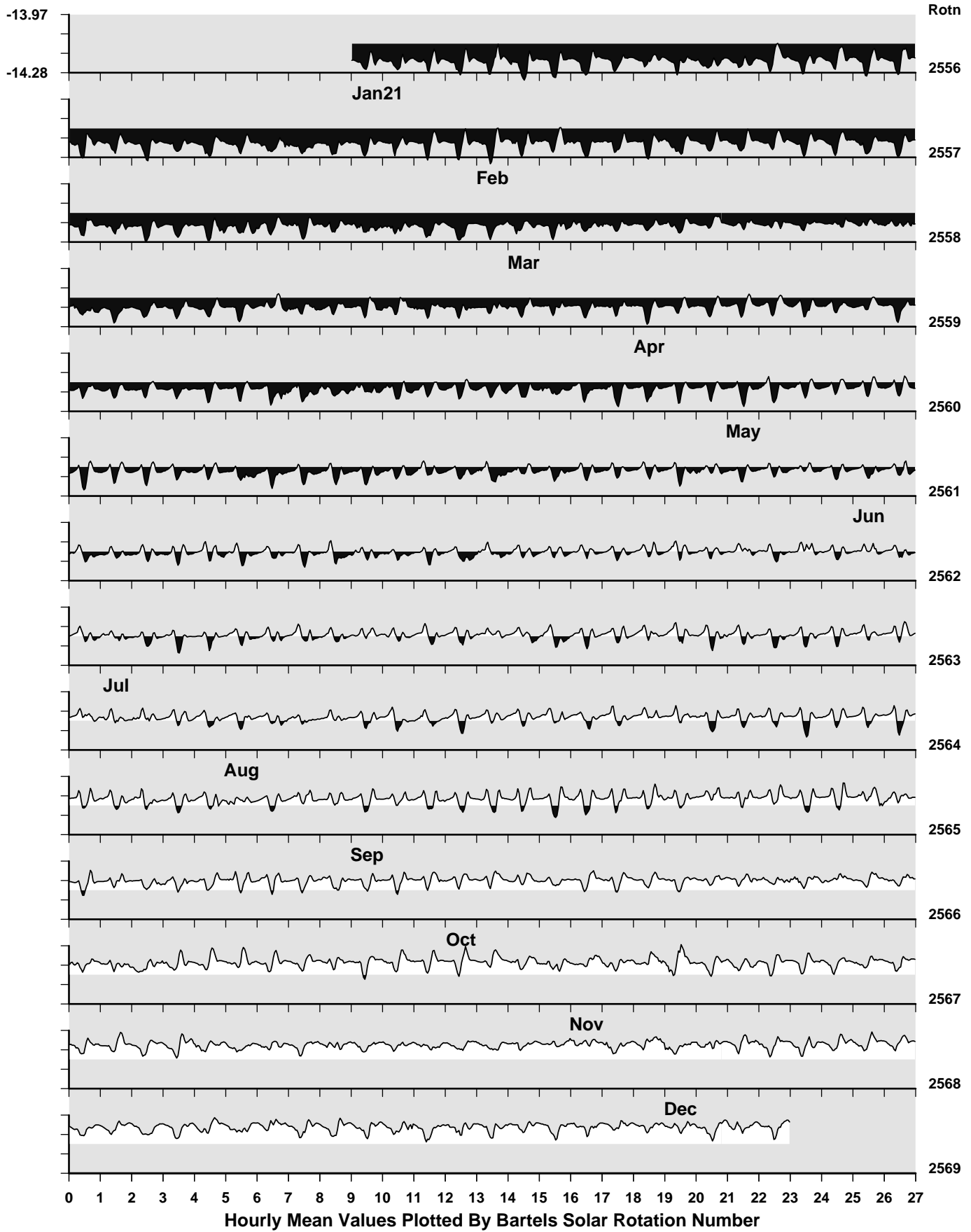
Date: 31-12-2021

Ascension Island

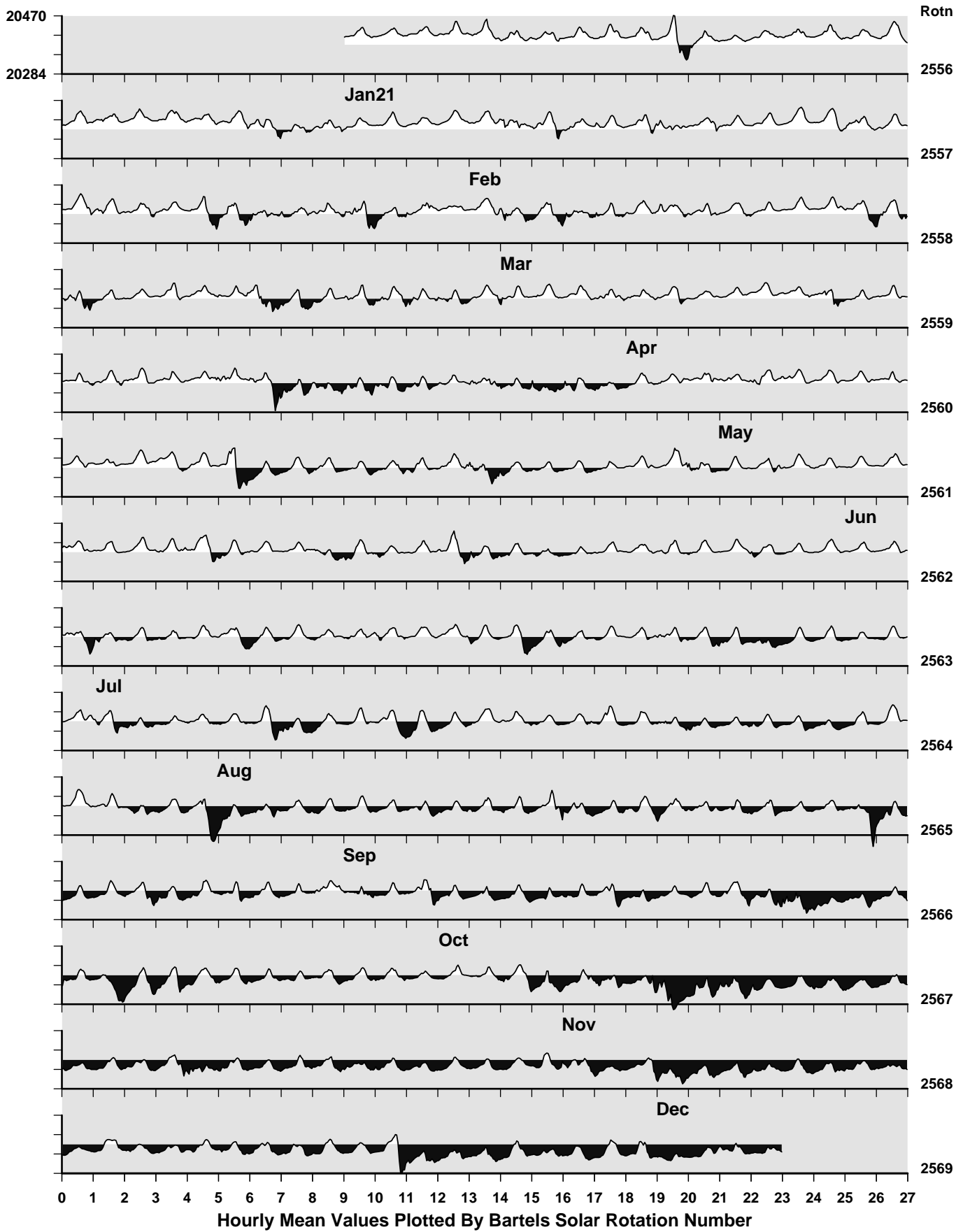
Day number: 365



Ascension Island Observatory: Declination (degrees)

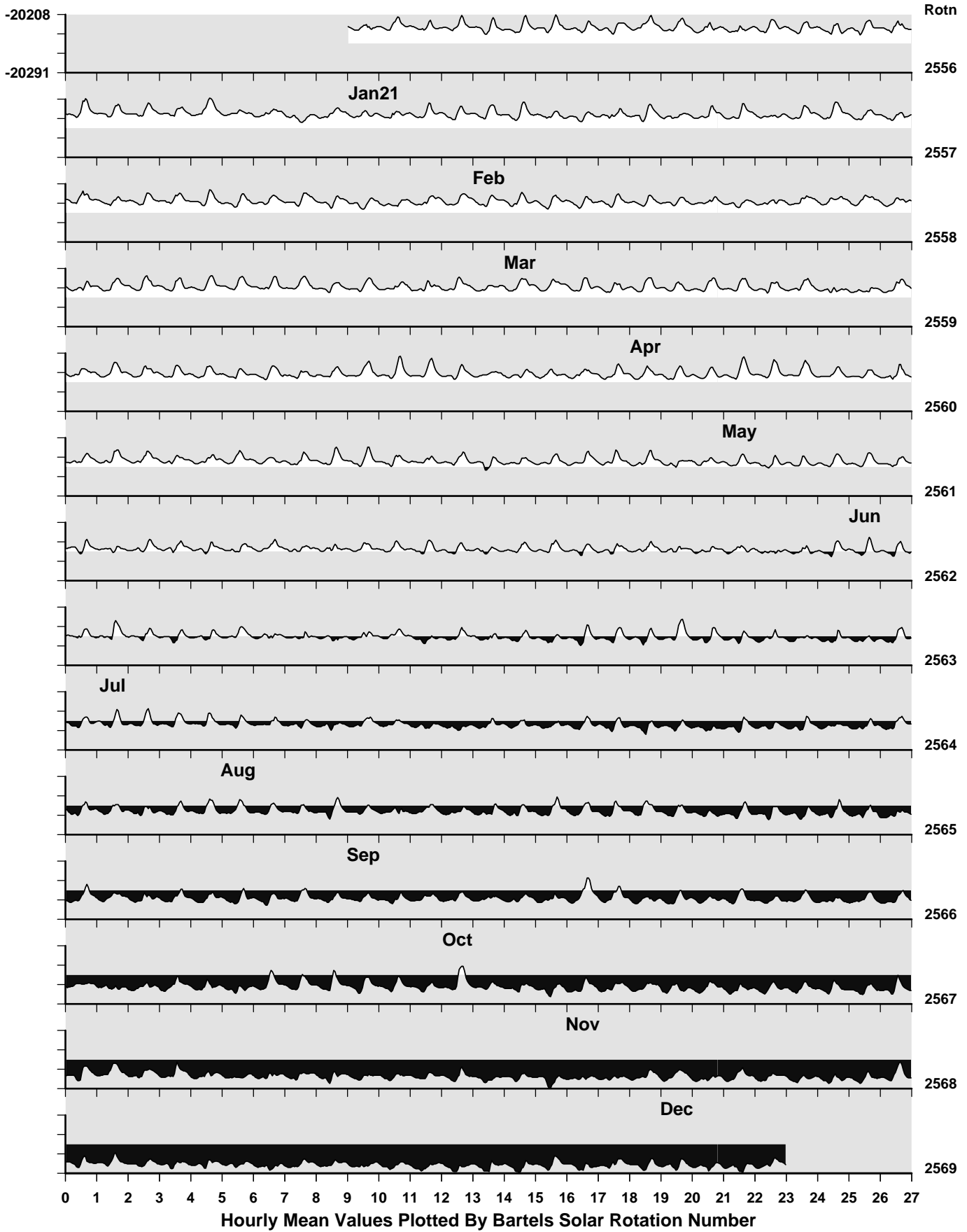


Ascension Island Observatory: Horizontal Intensity (nT)



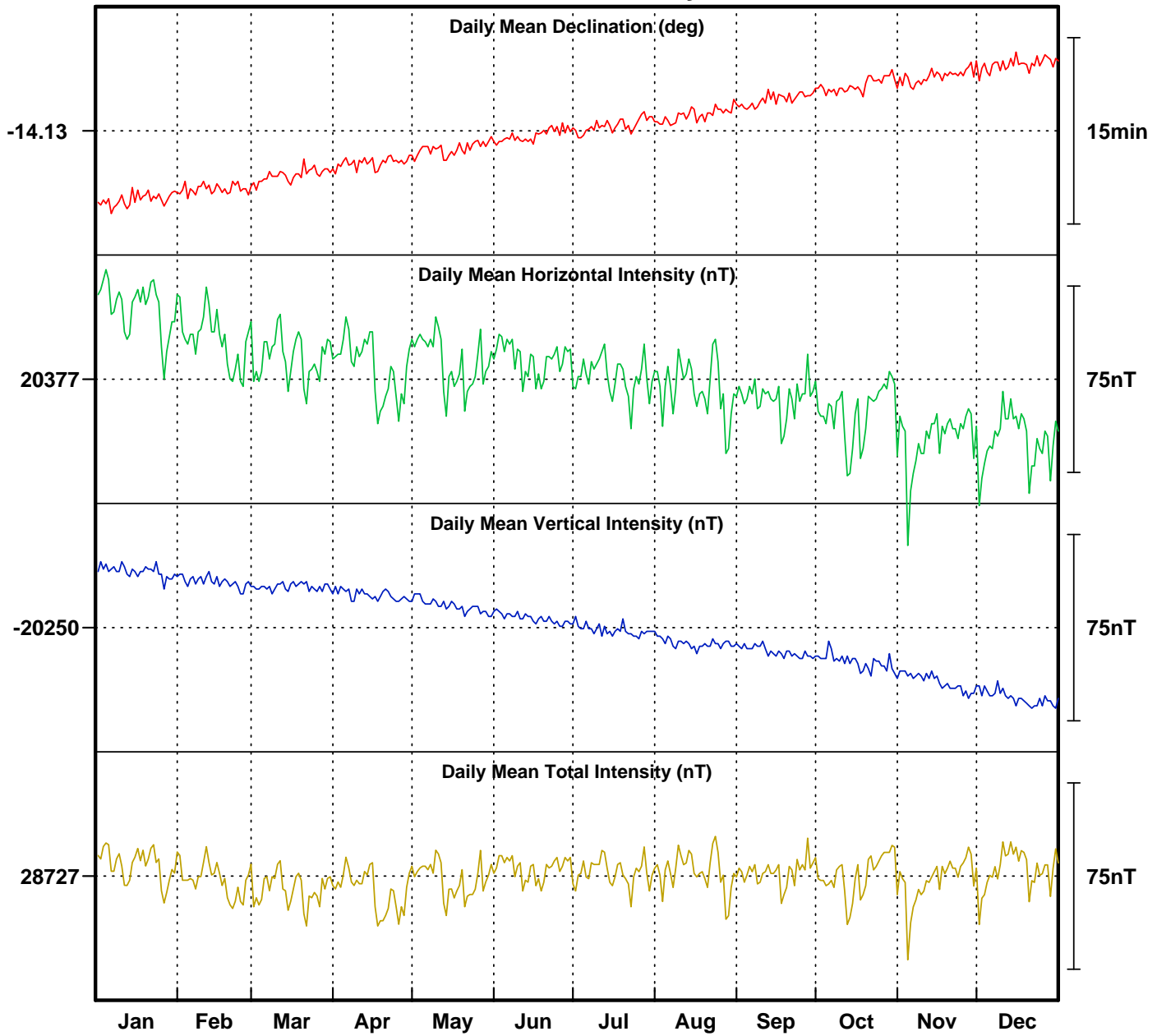
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Is Observatory 2021



Monthly mean values for Ascension Island Observatory 2021

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-14° 13.0'	20406 nT	-44° 44.9'	19781 nT	-5012 nT	-20227 nT	28732 nT
February	-14° 12.2'	20393 nT	-44° 46.3'	19770 nT	-5004 nT	-20231 nT	28726 nT
March	-14° 11.1'	20385 nT	-44° 47.1'	19764 nT	-4995 nT	-20233 nT	28722 nT
April	-14° 10.1'	20382 nT	-44° 47.7'	19762 nT	-4989 nT	-20236 nT	28722 nT
May	-14° 9.1'	20385 nT	-44° 47.8'	19766 nT	-4984 nT	-20240 nT	28726 nT
June	-14° 7.9'	20385 nT	-44° 48.2'	19768 nT	-4977 nT	-20246 nT	28730 nT
July	-14° 7.1'	20378 nT	-44° 49.2'	19762 nT	-4971 nT	-20251 nT	28729 nT
August	-14° 6.2'	20373 nT	-44° 50.1'	19759 nT	-4965 nT	-20256 nT	28729 nT
September	-14° 5.0'	20370 nT	-44° 50.7'	19757 nT	-4957 nT	-20259 nT	28729 nT
October	-14° 3.9'	20363 nT	-44° 51.6'	19753 nT	-4948 nT	-20263 nT	28727 nT
November	-14° 3.1'	20353 nT	-44° 53.1'	19744 nT	-4942 nT	-20271 nT	28726 nT
December	-14° 2.2'	20352 nT	-44° 53.7'	19745 nT	-4936 nT	-20278 nT	28730 nT

Note:

i. The values shown here are provisional.