



British
Geological
Survey



MONTHLY MAGNETIC BULLETIN

Ascension Island Observatory

December 2022



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.

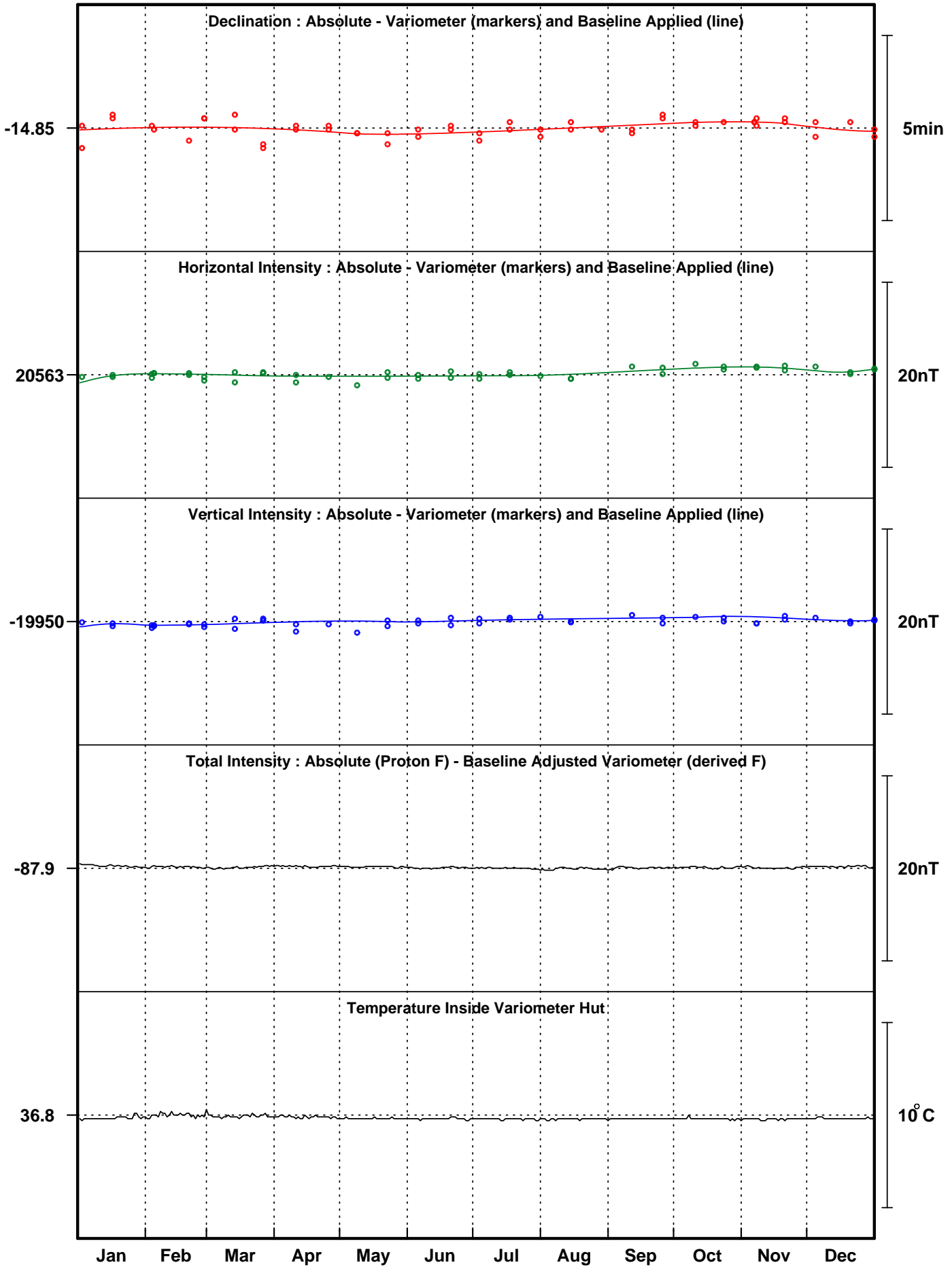
5. Conditions of use

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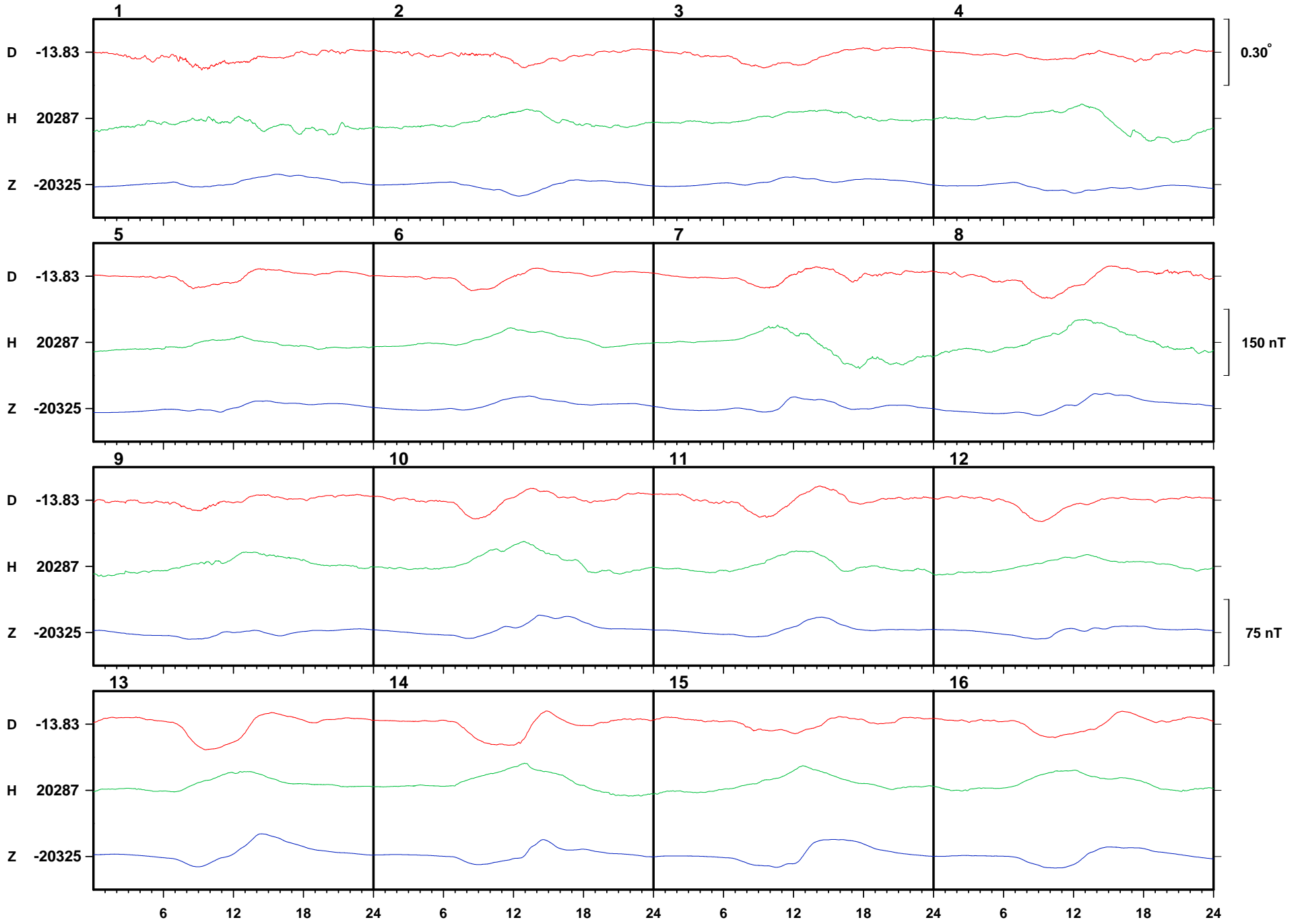
Ascension Island 2022

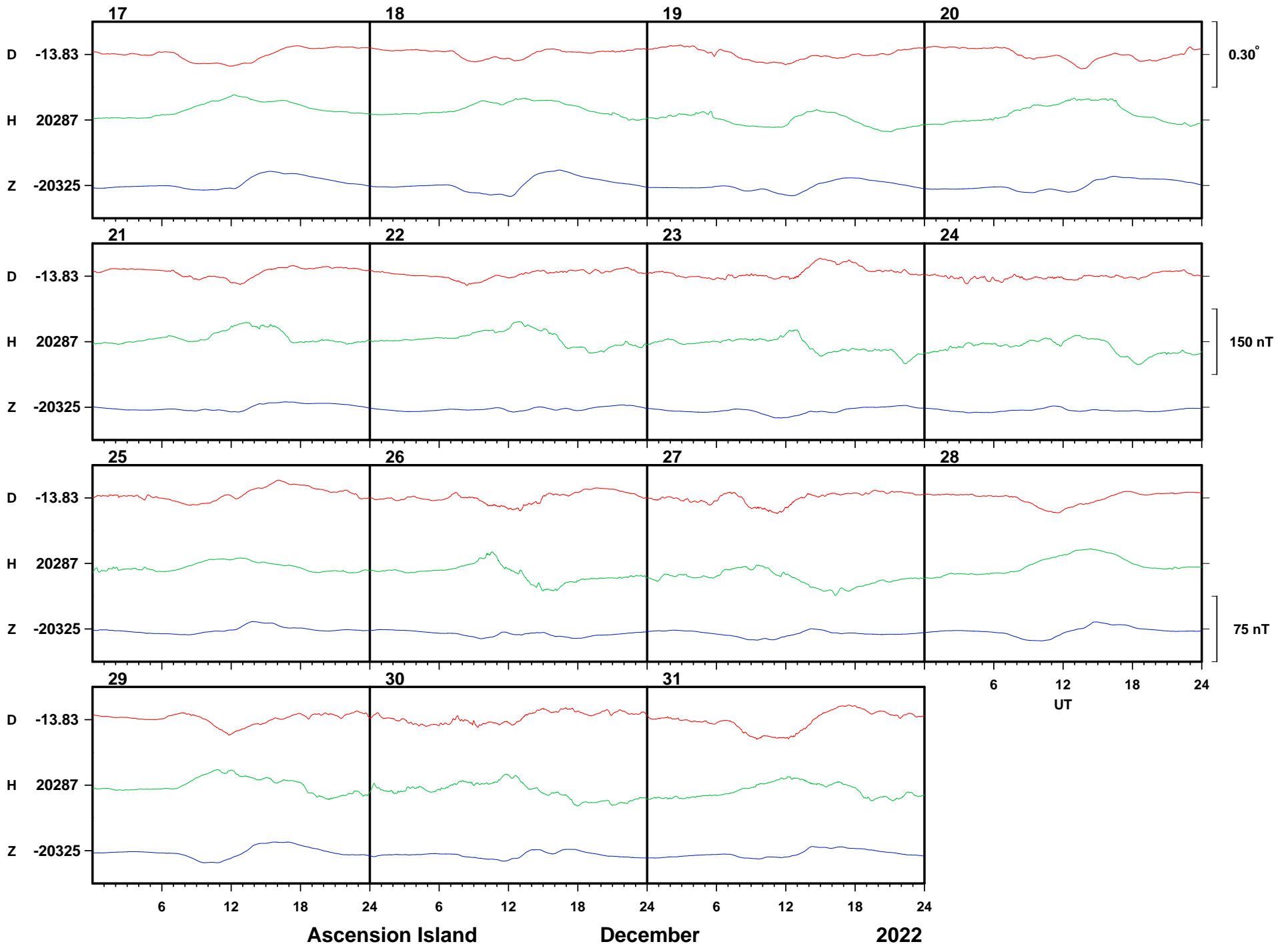


Ascension Island

December

2022

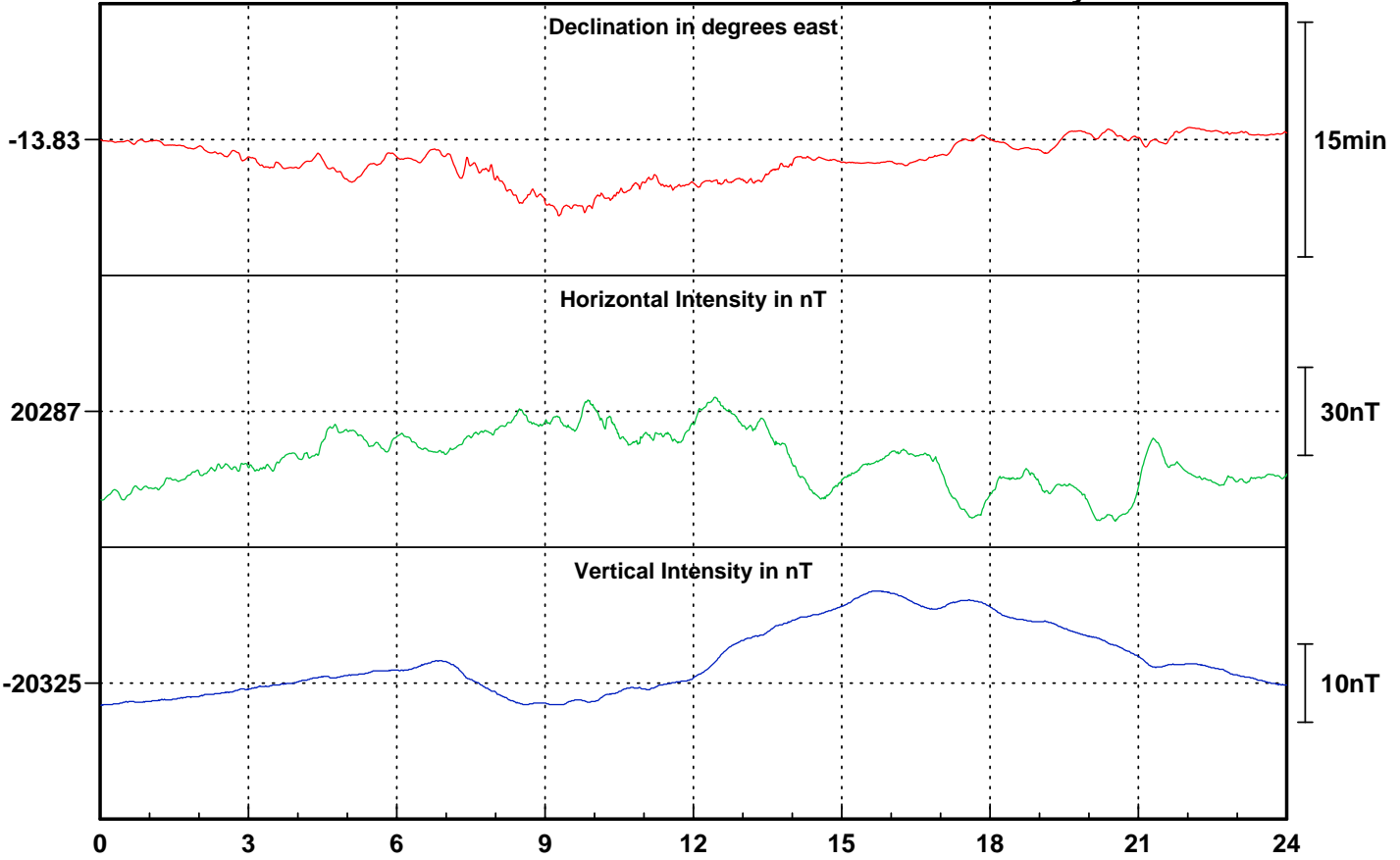




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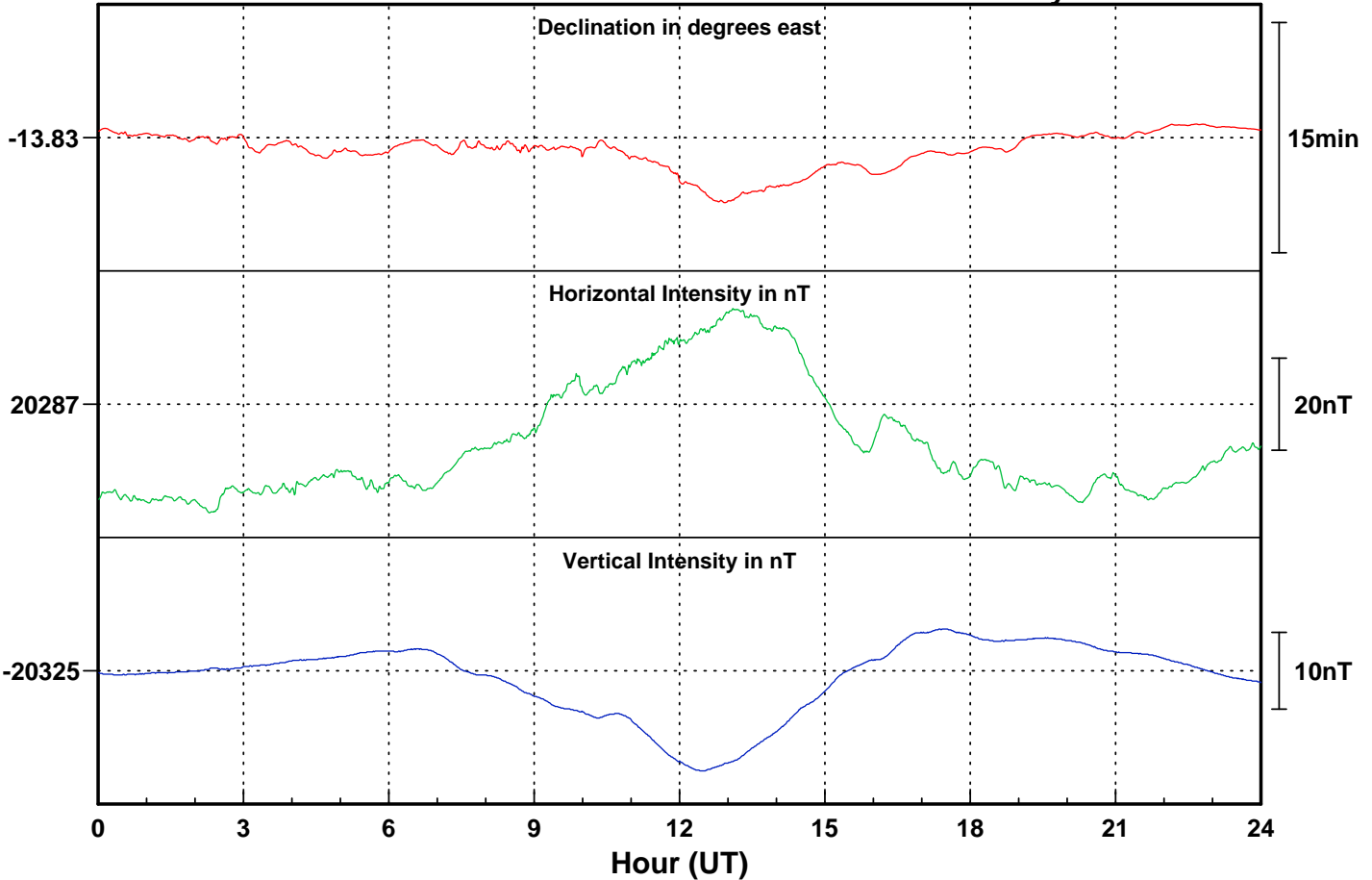
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Day number: 335



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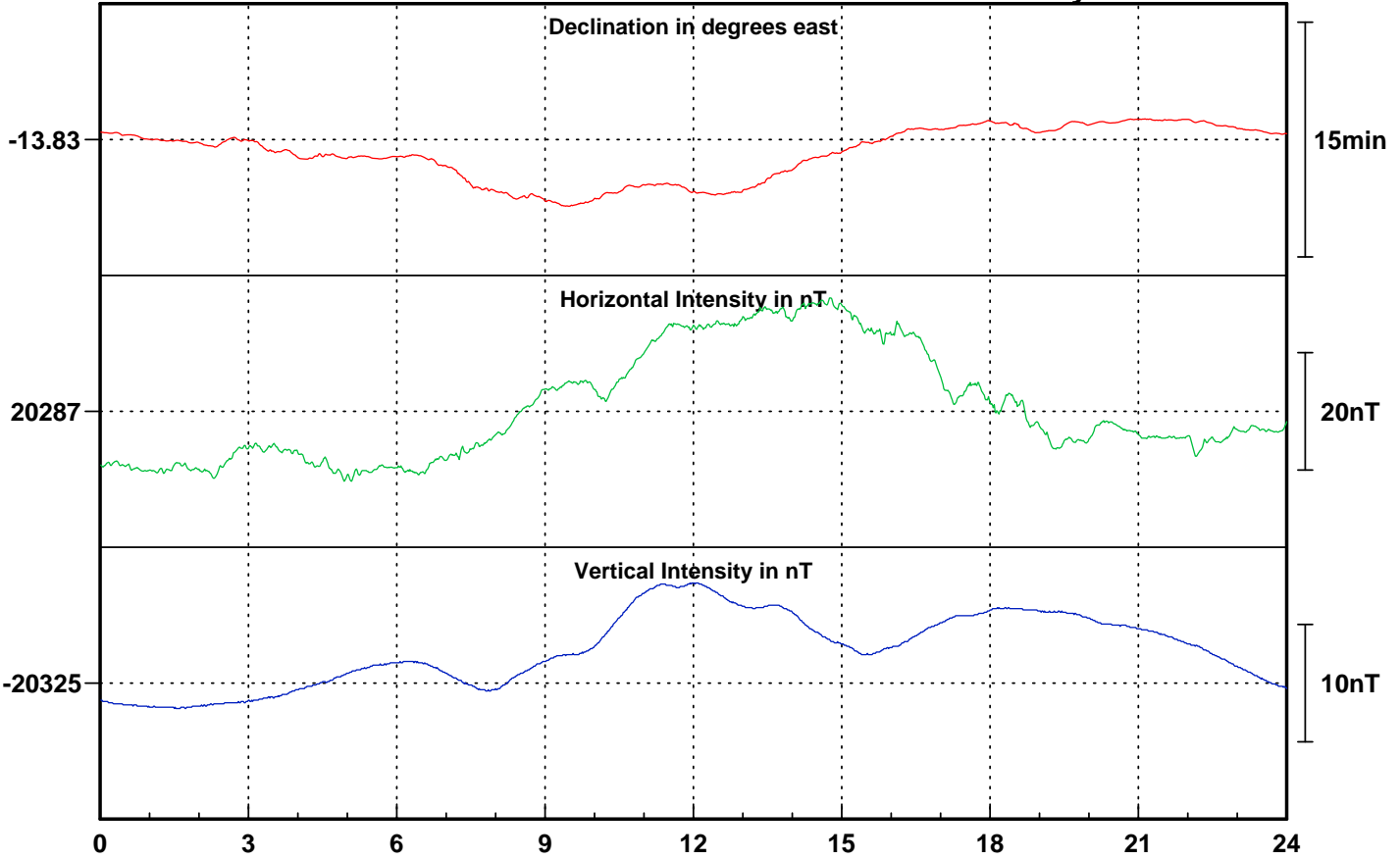
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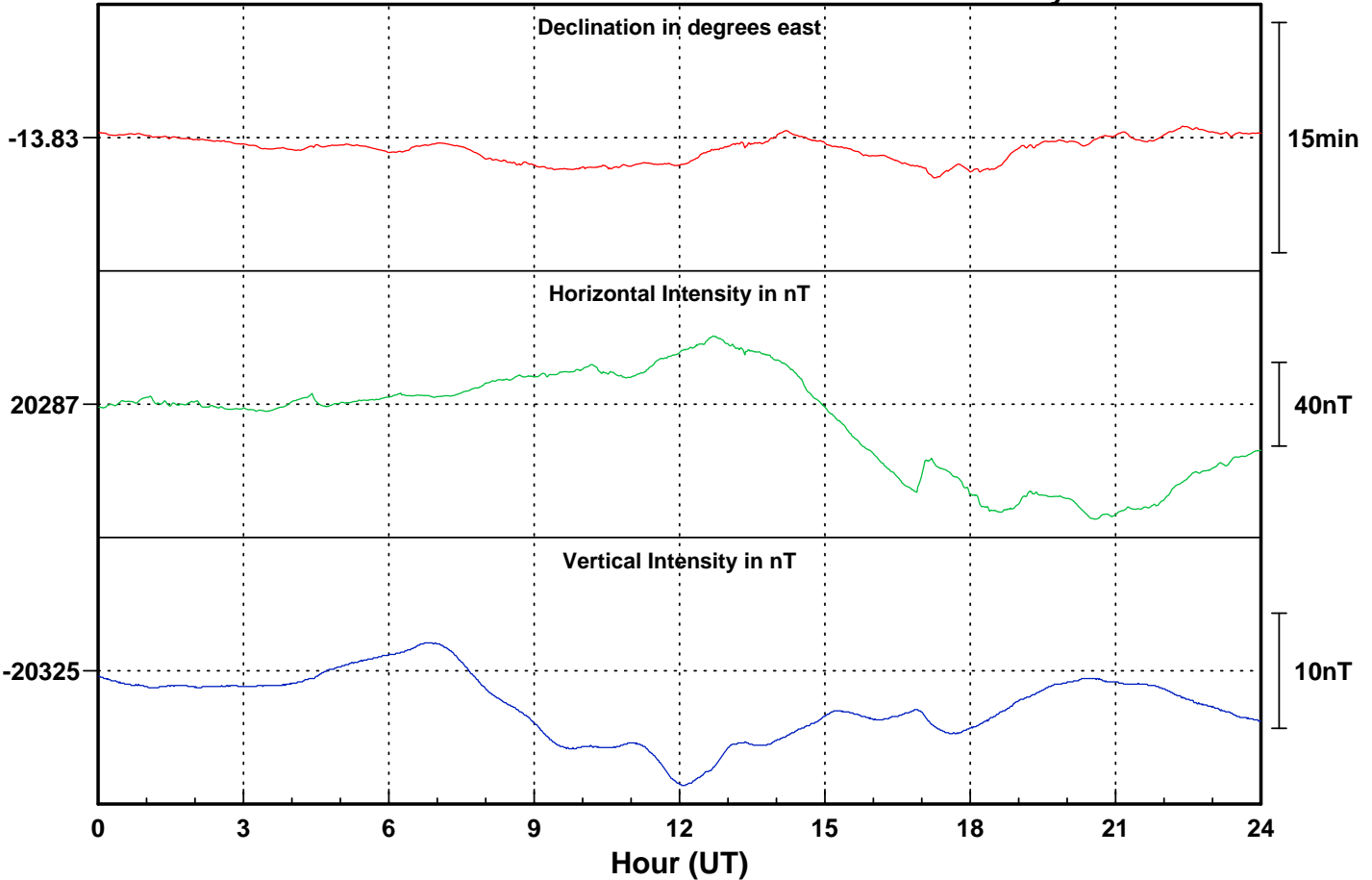
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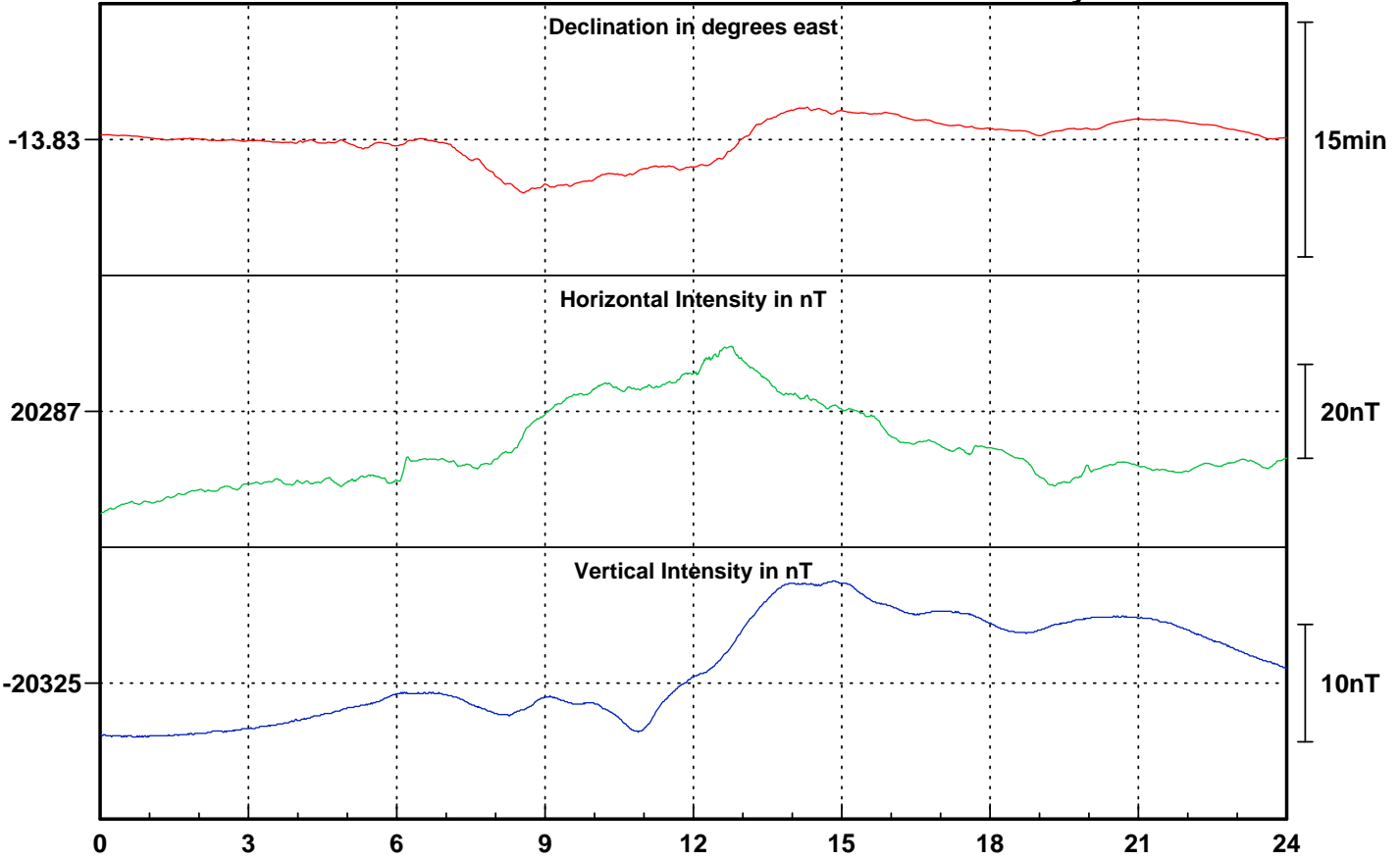
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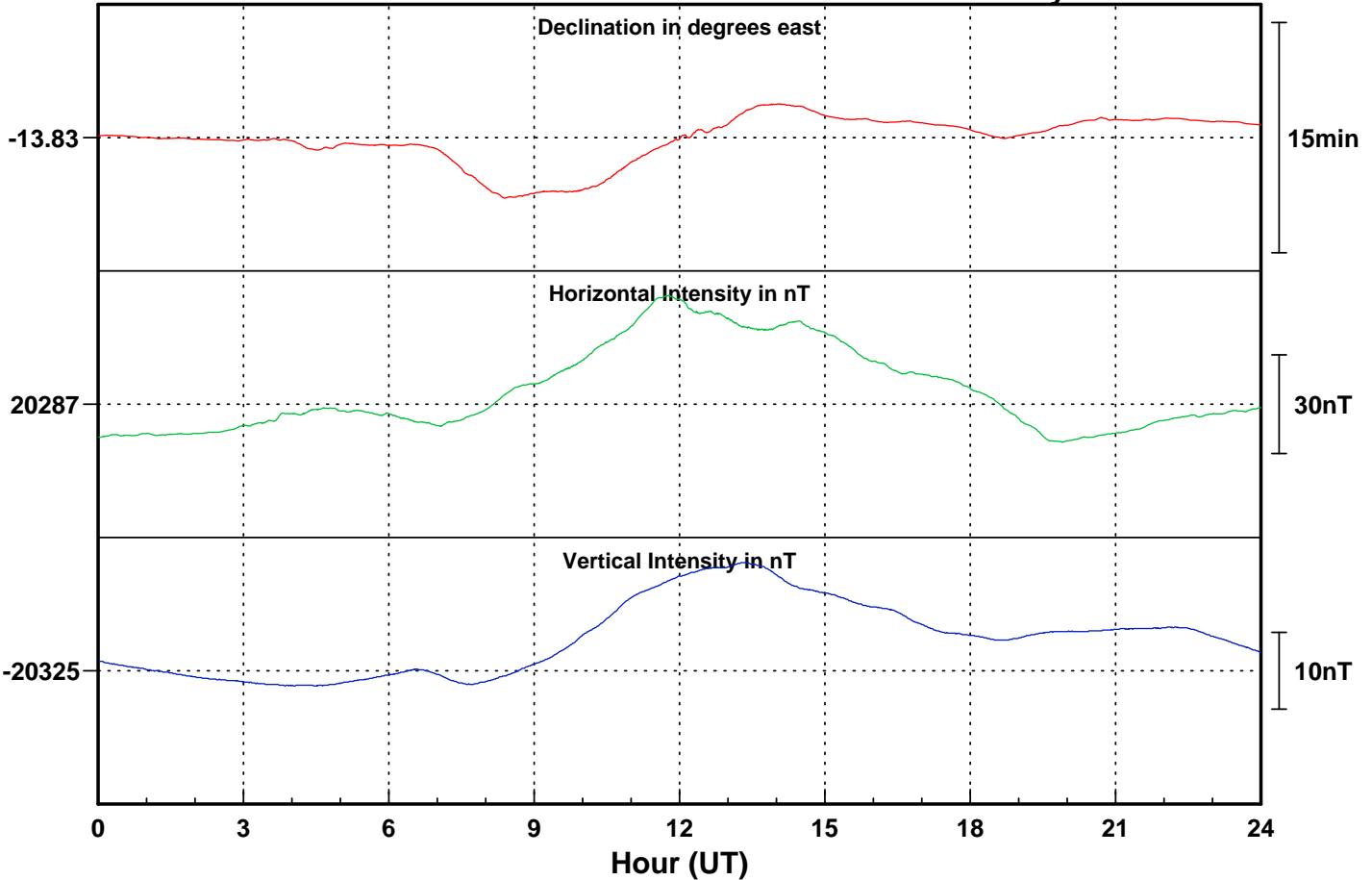
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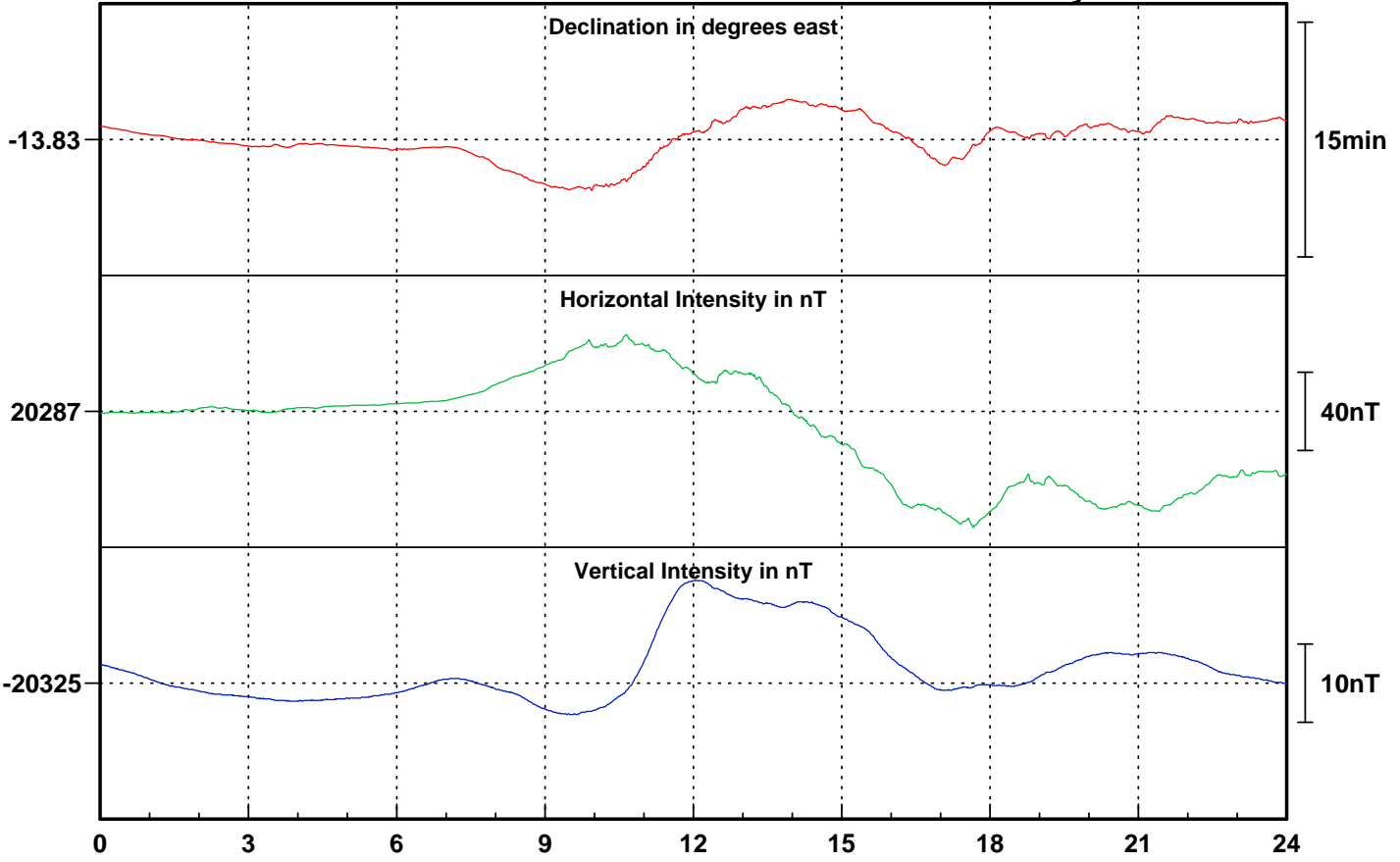
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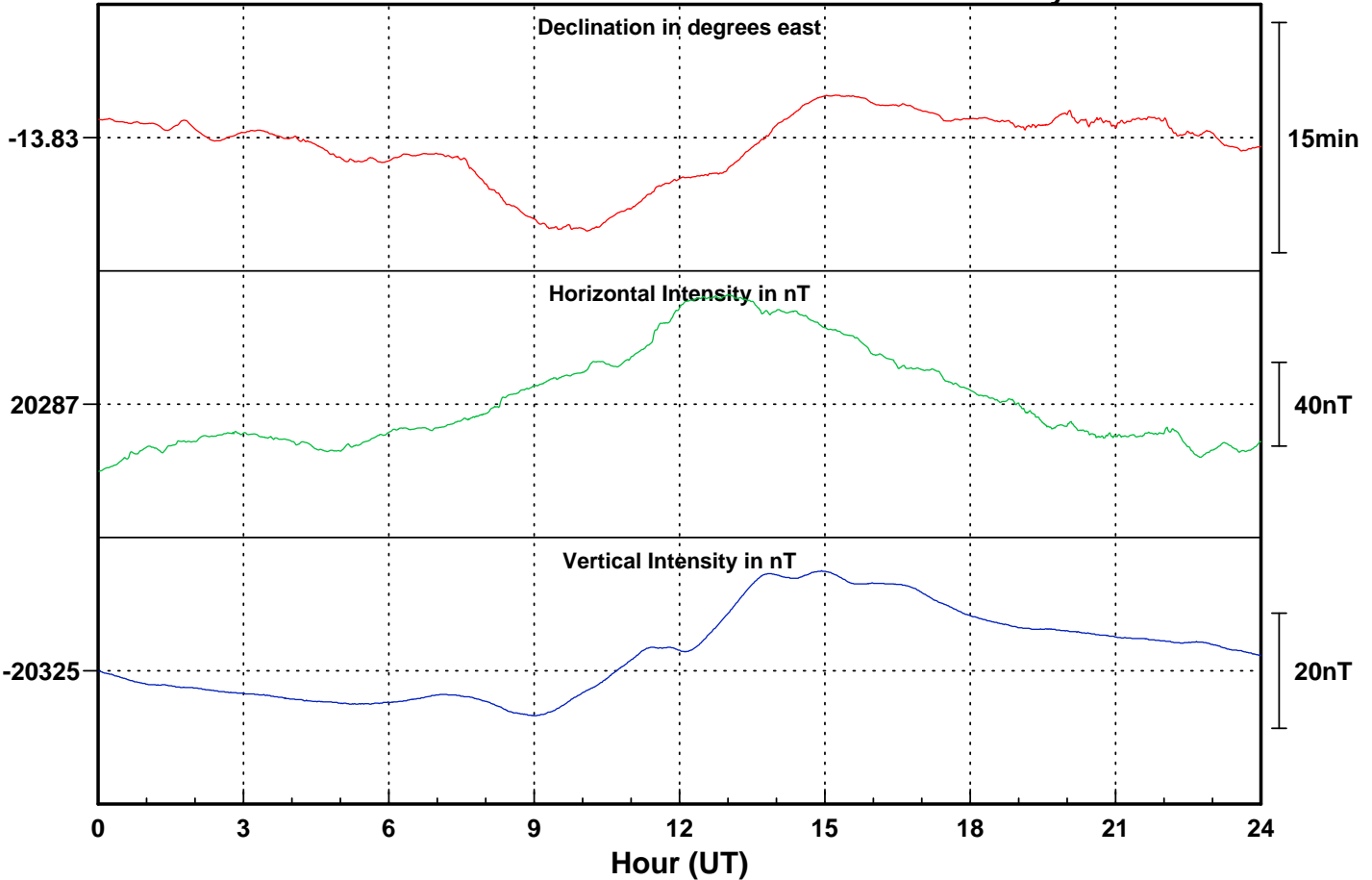
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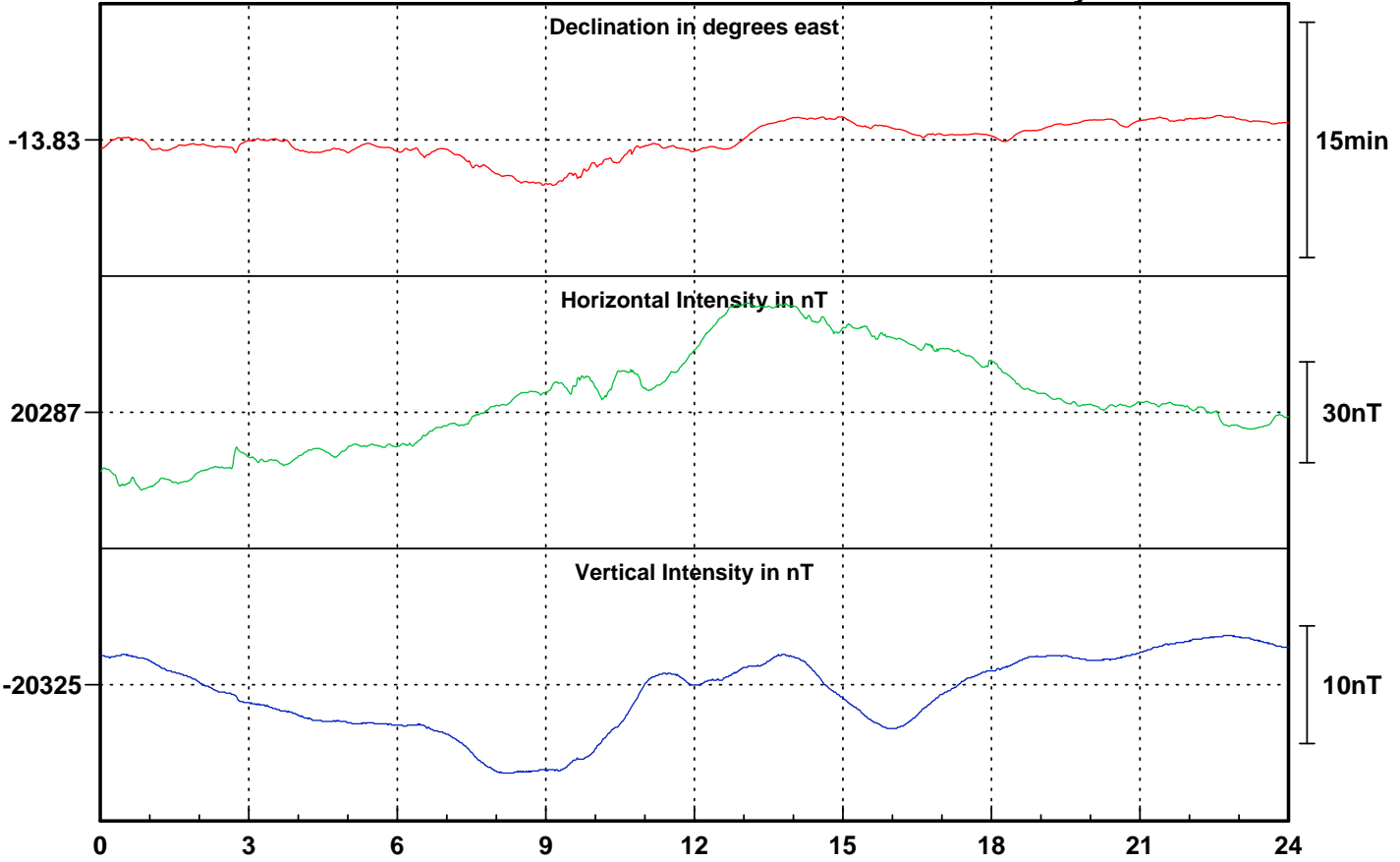
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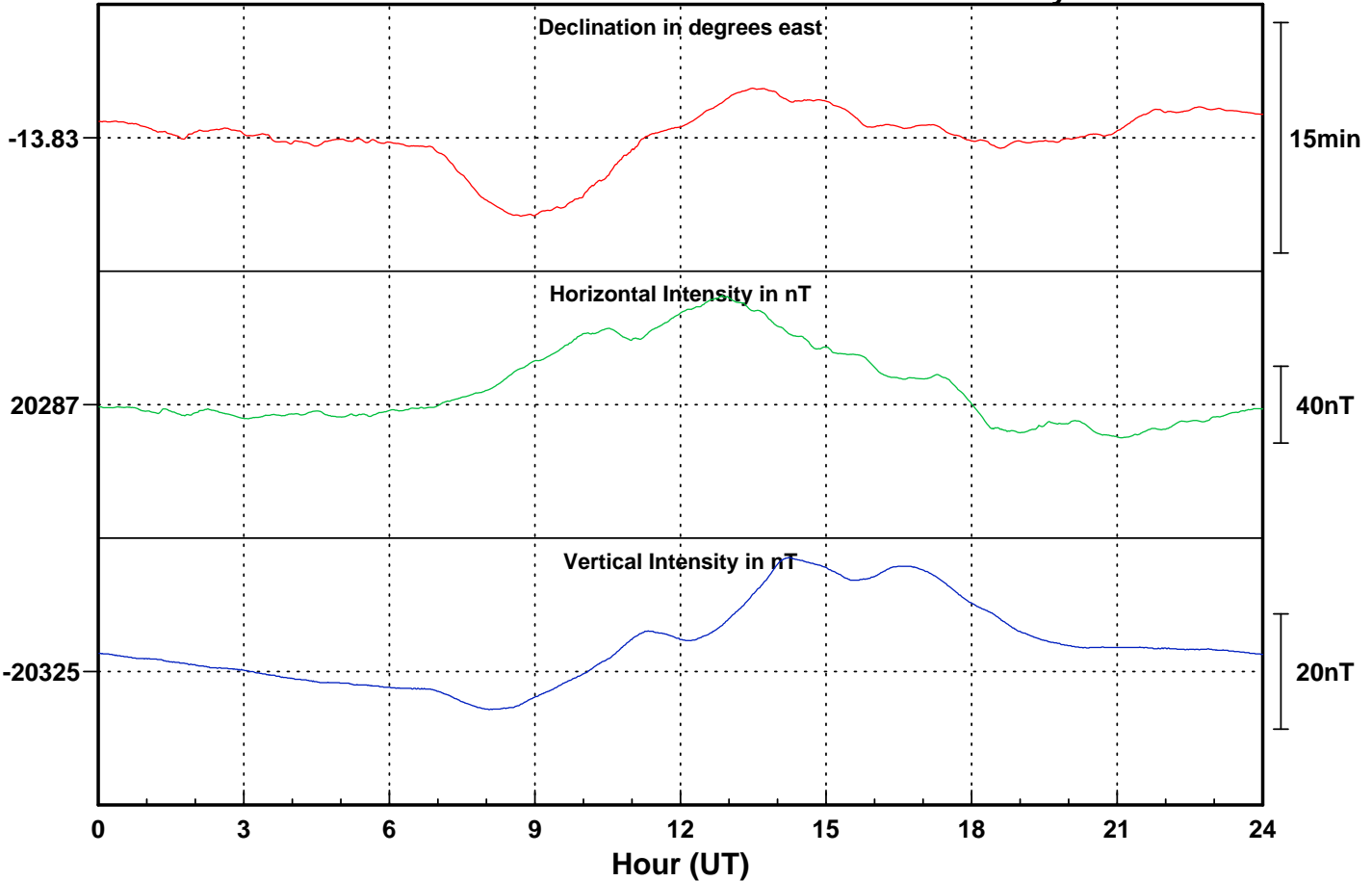
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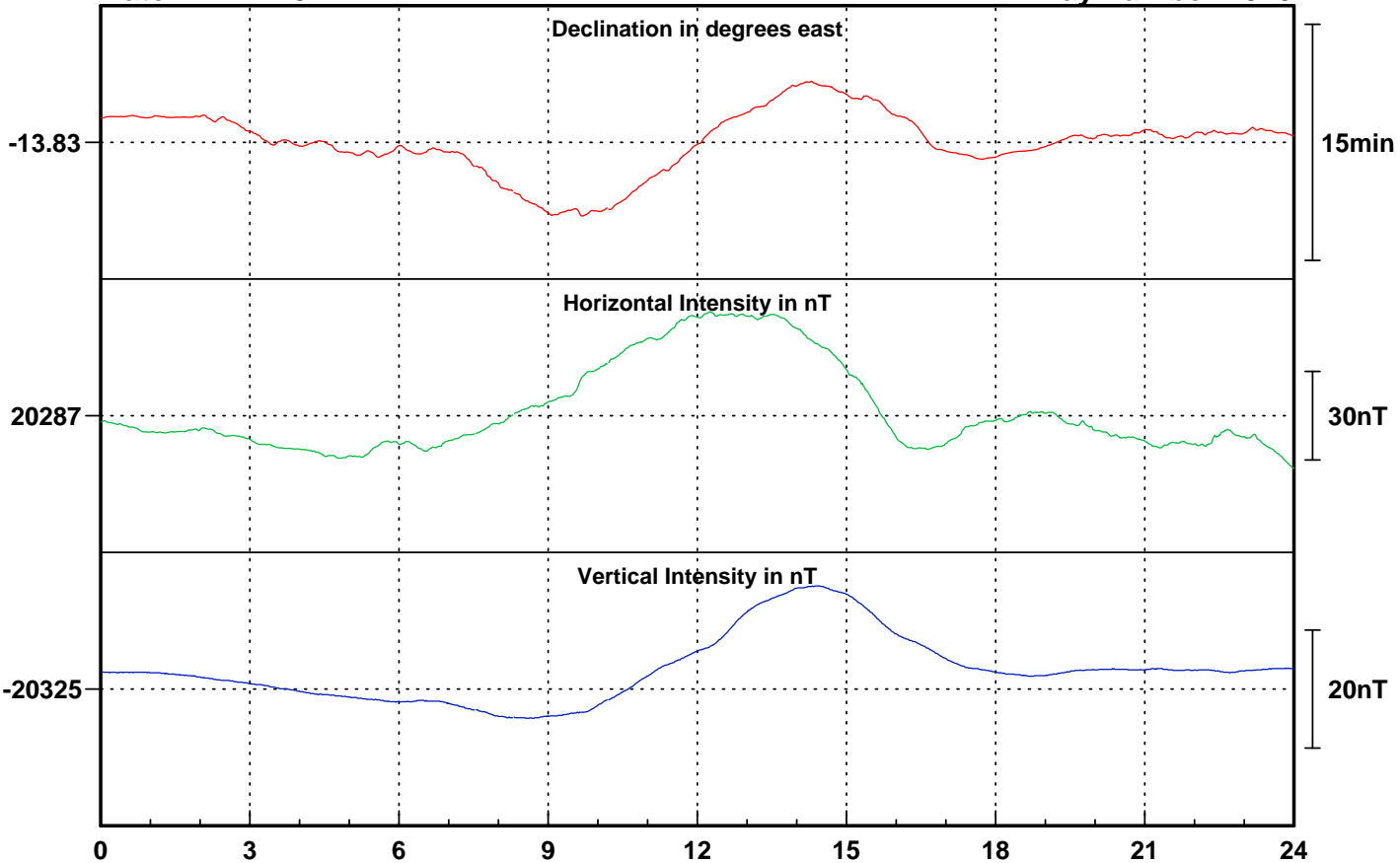
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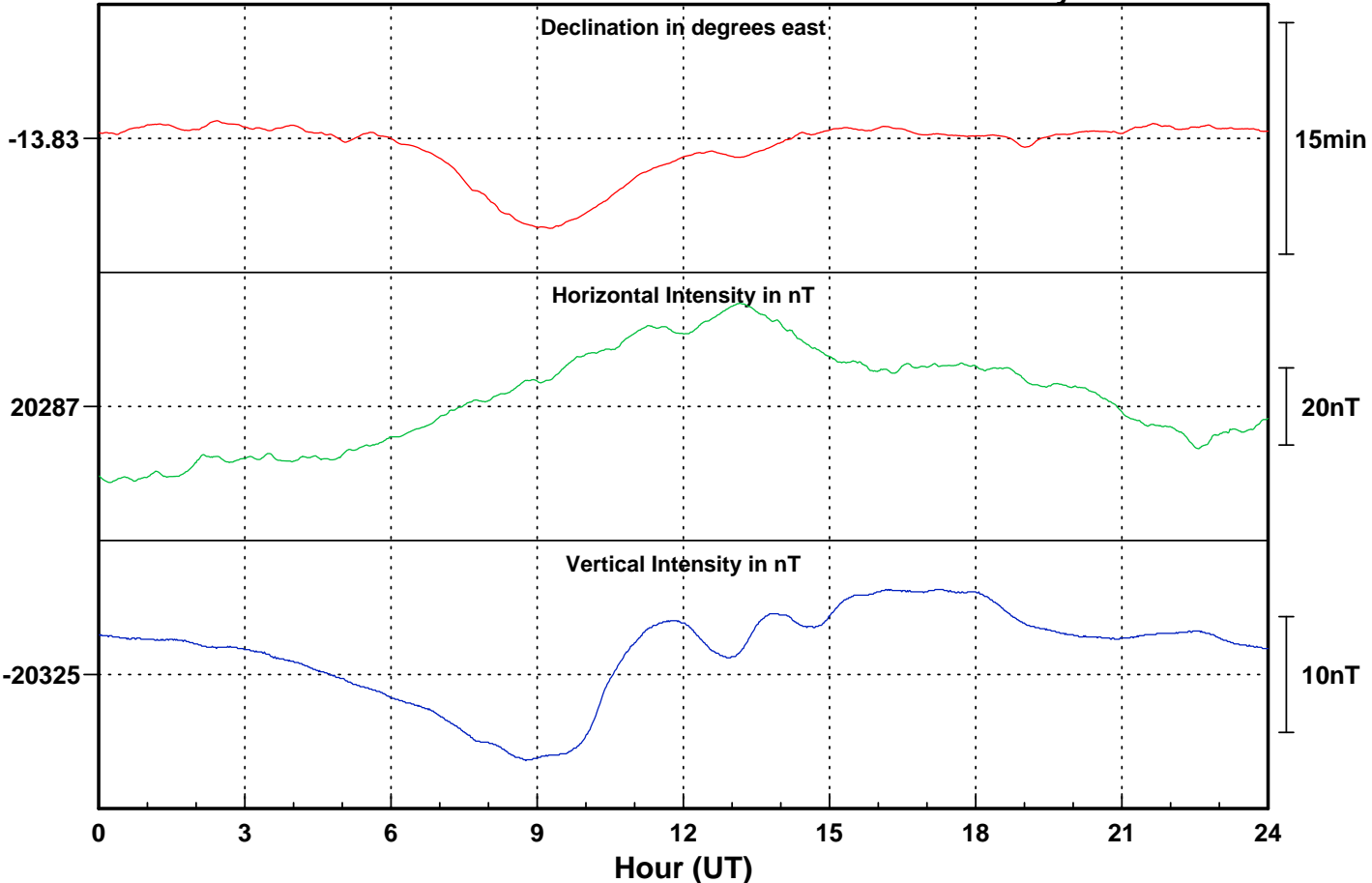
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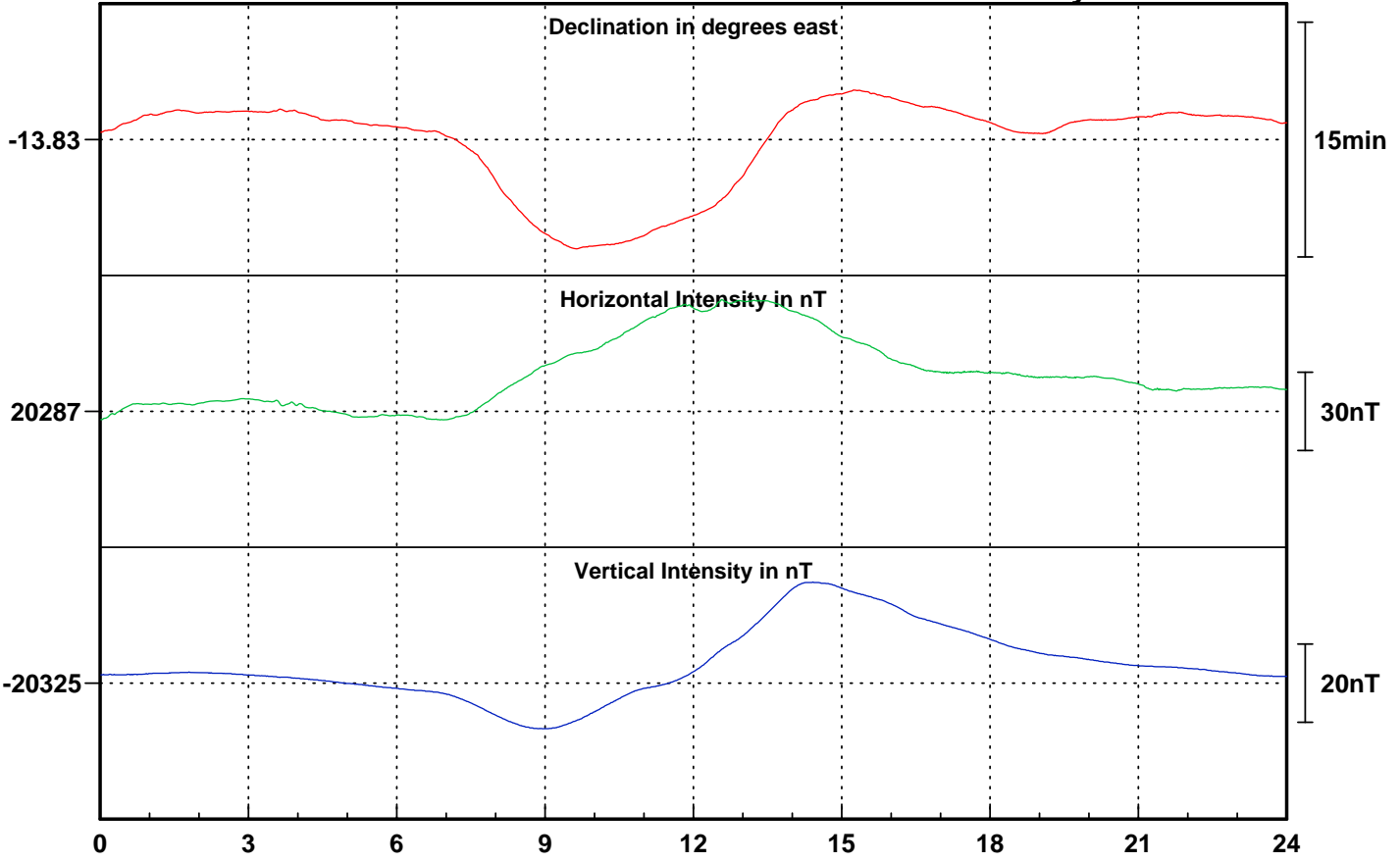
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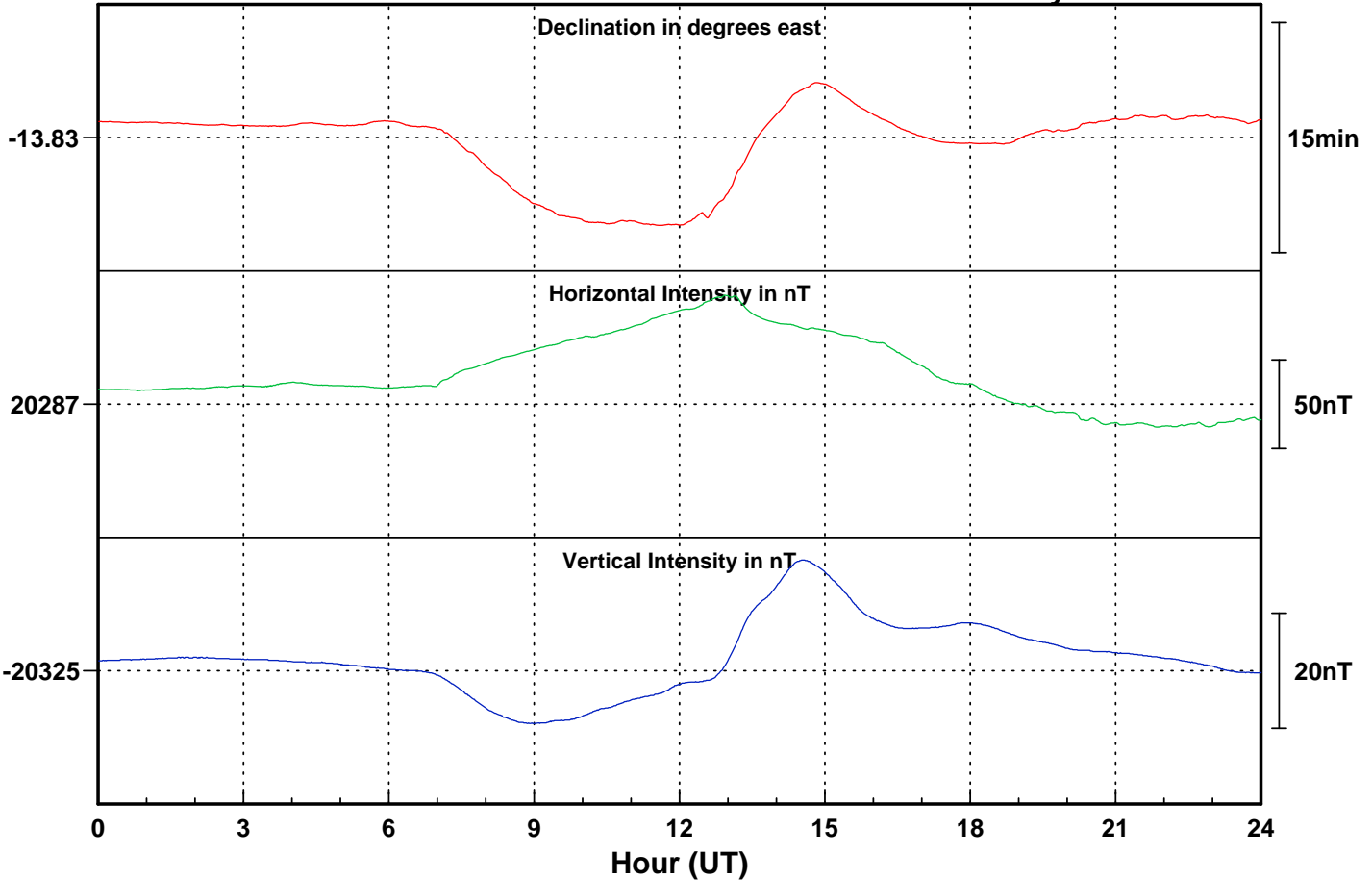
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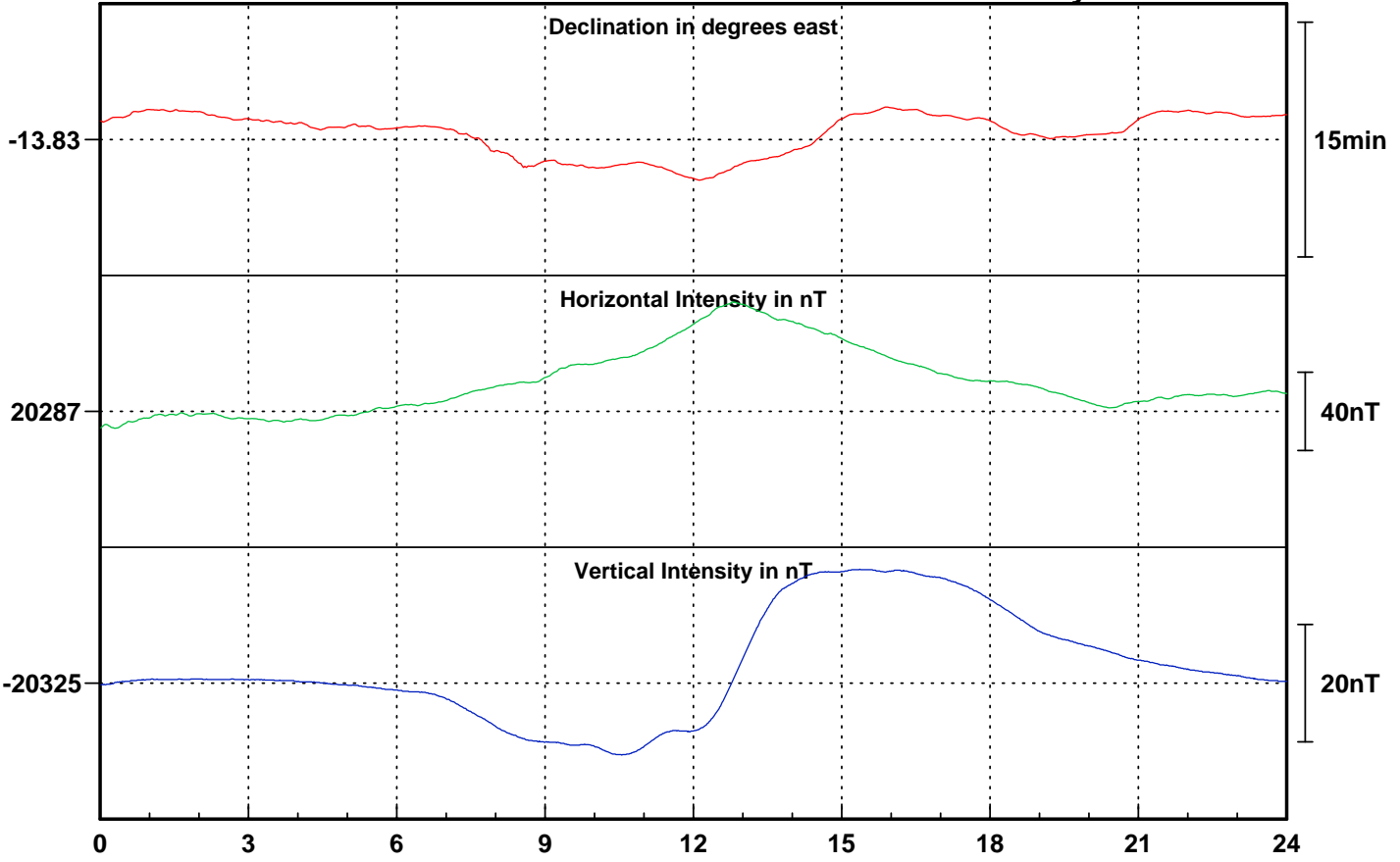
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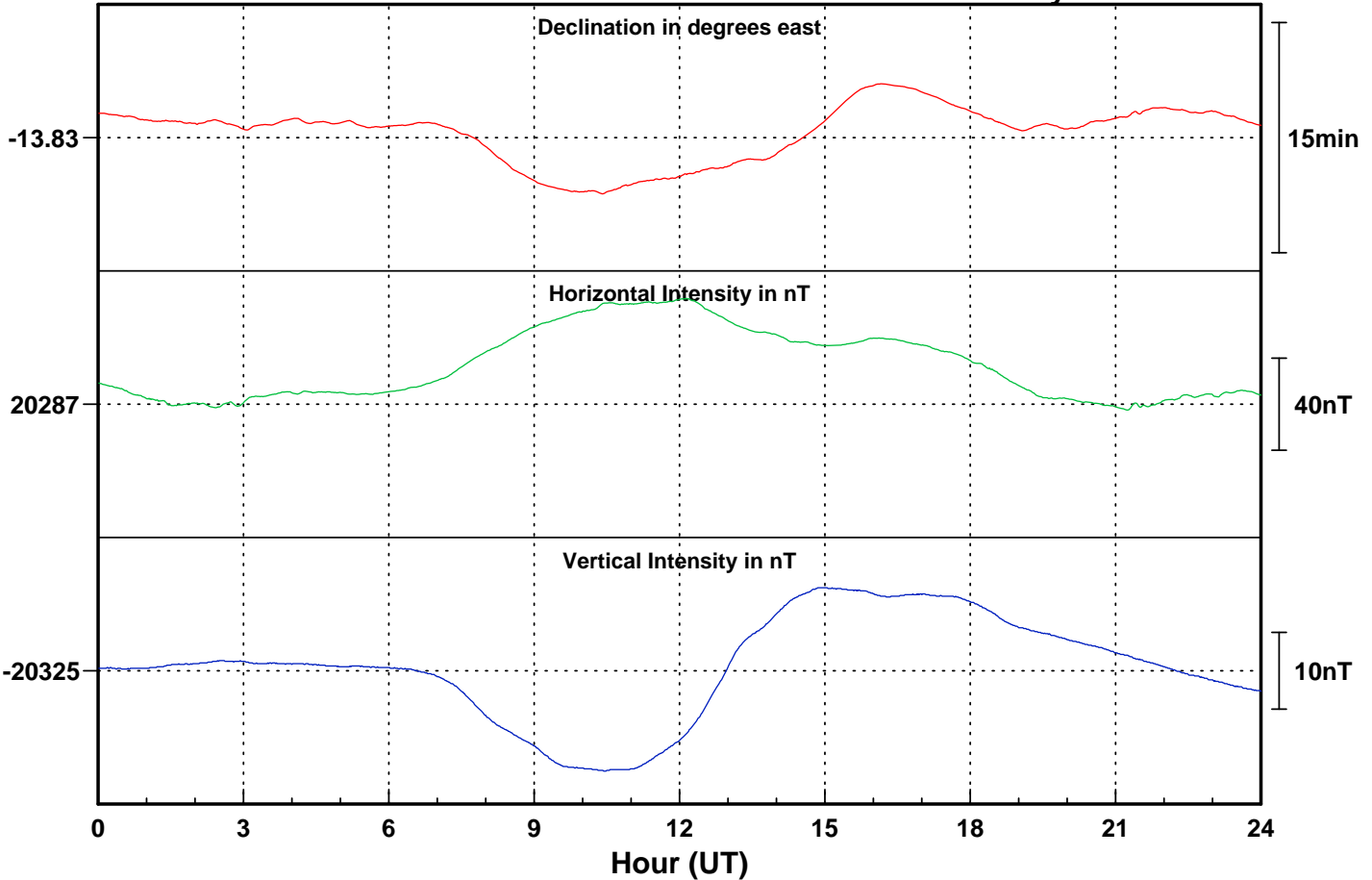
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Day number: 349



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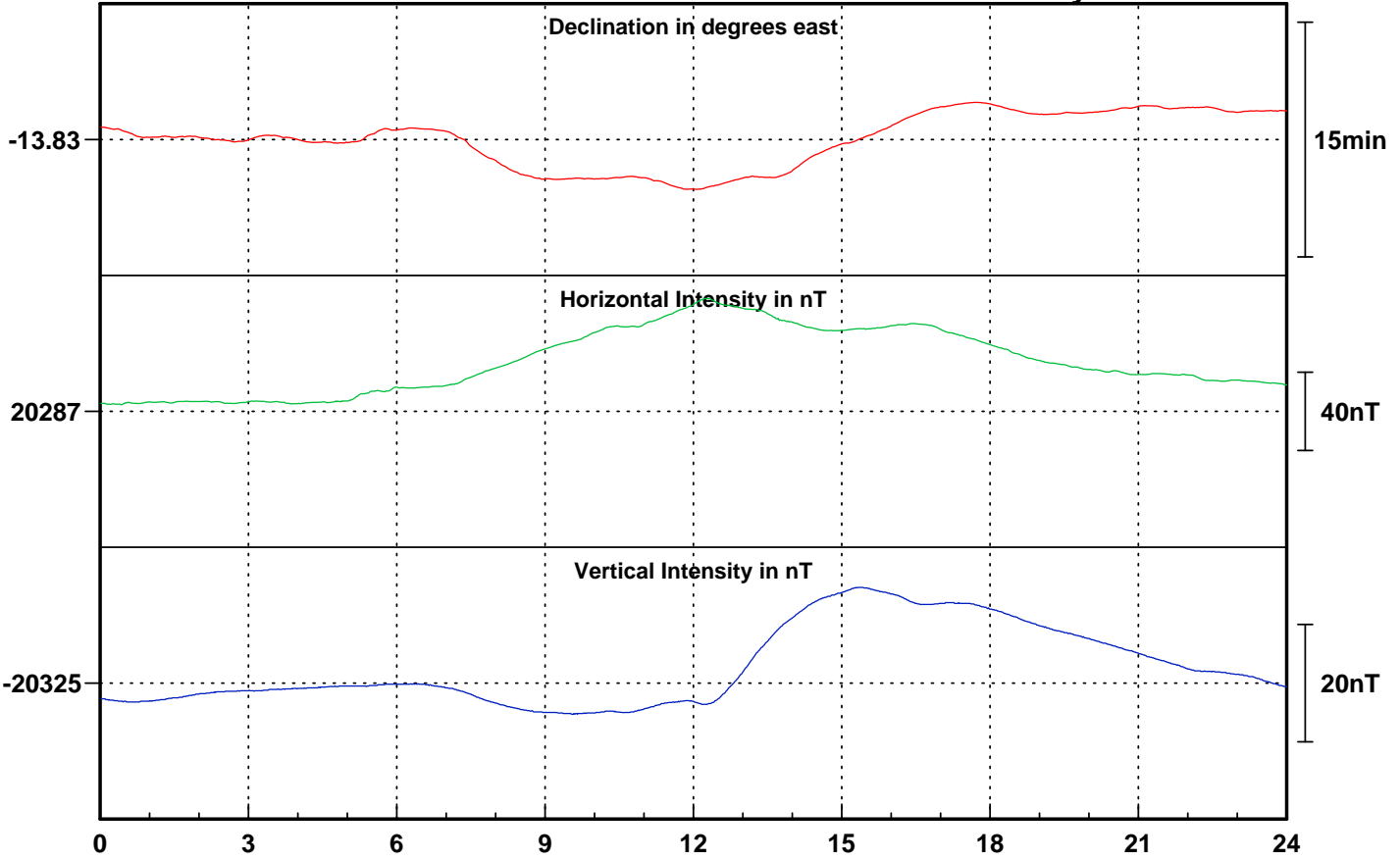
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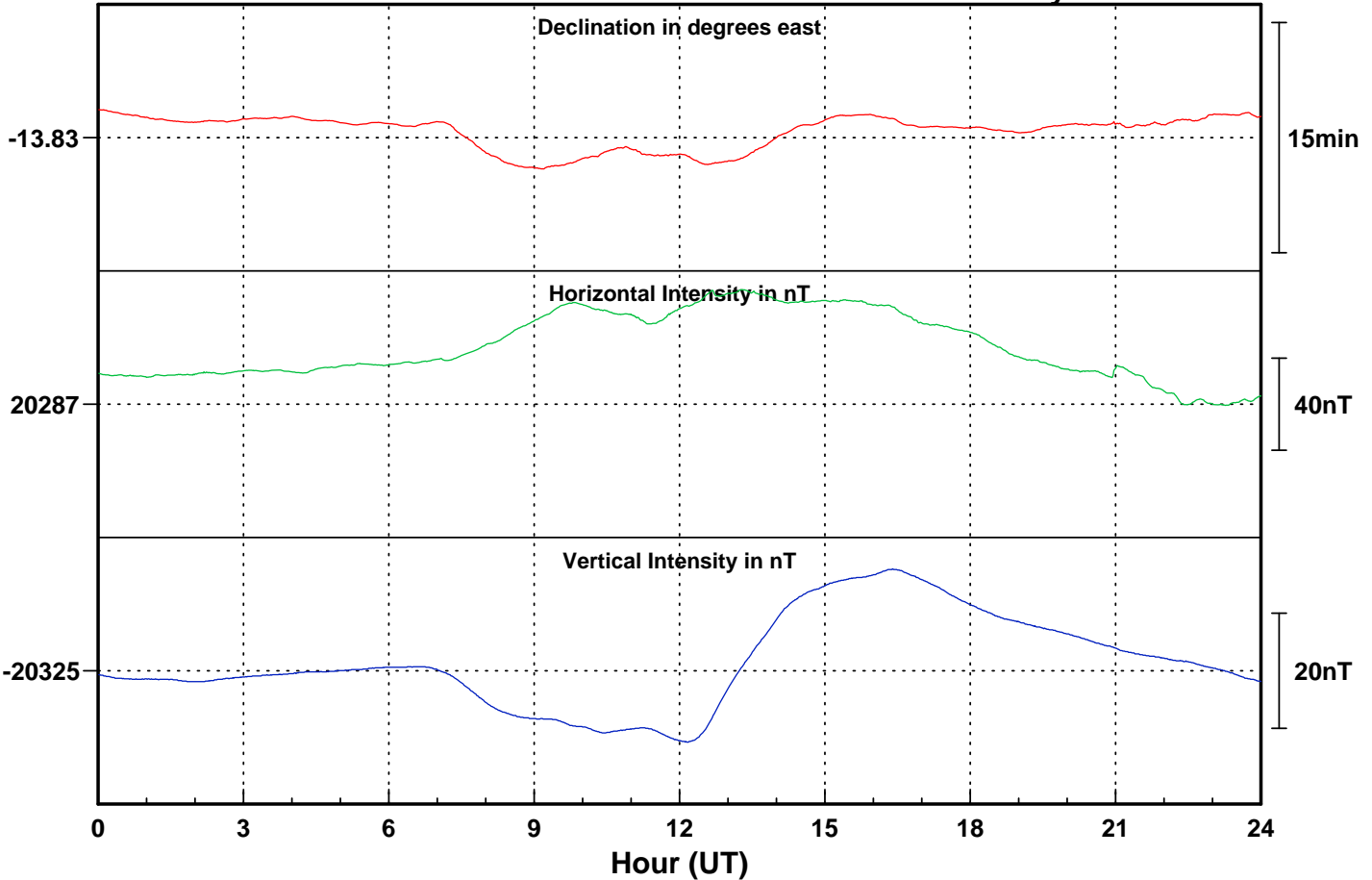
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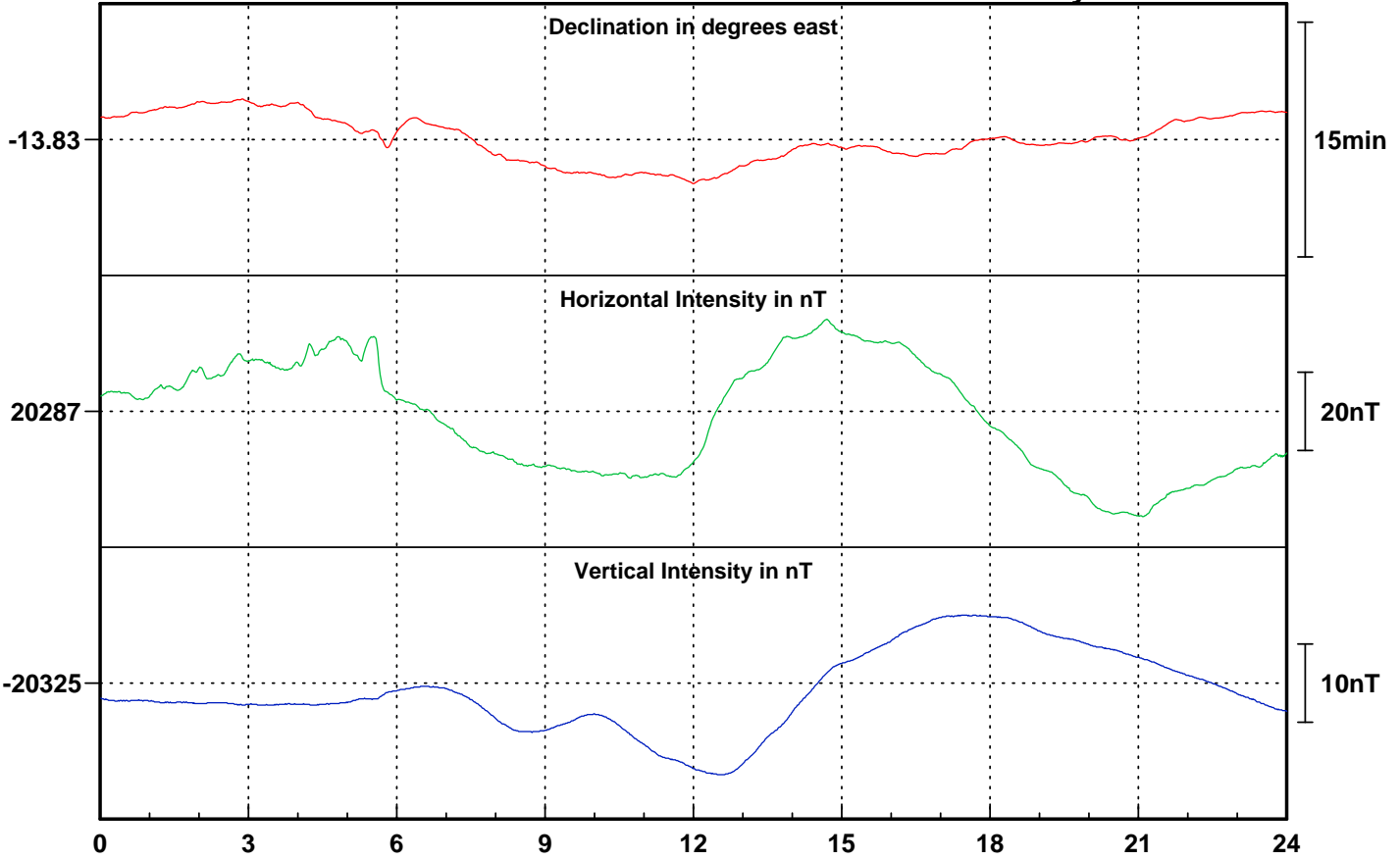
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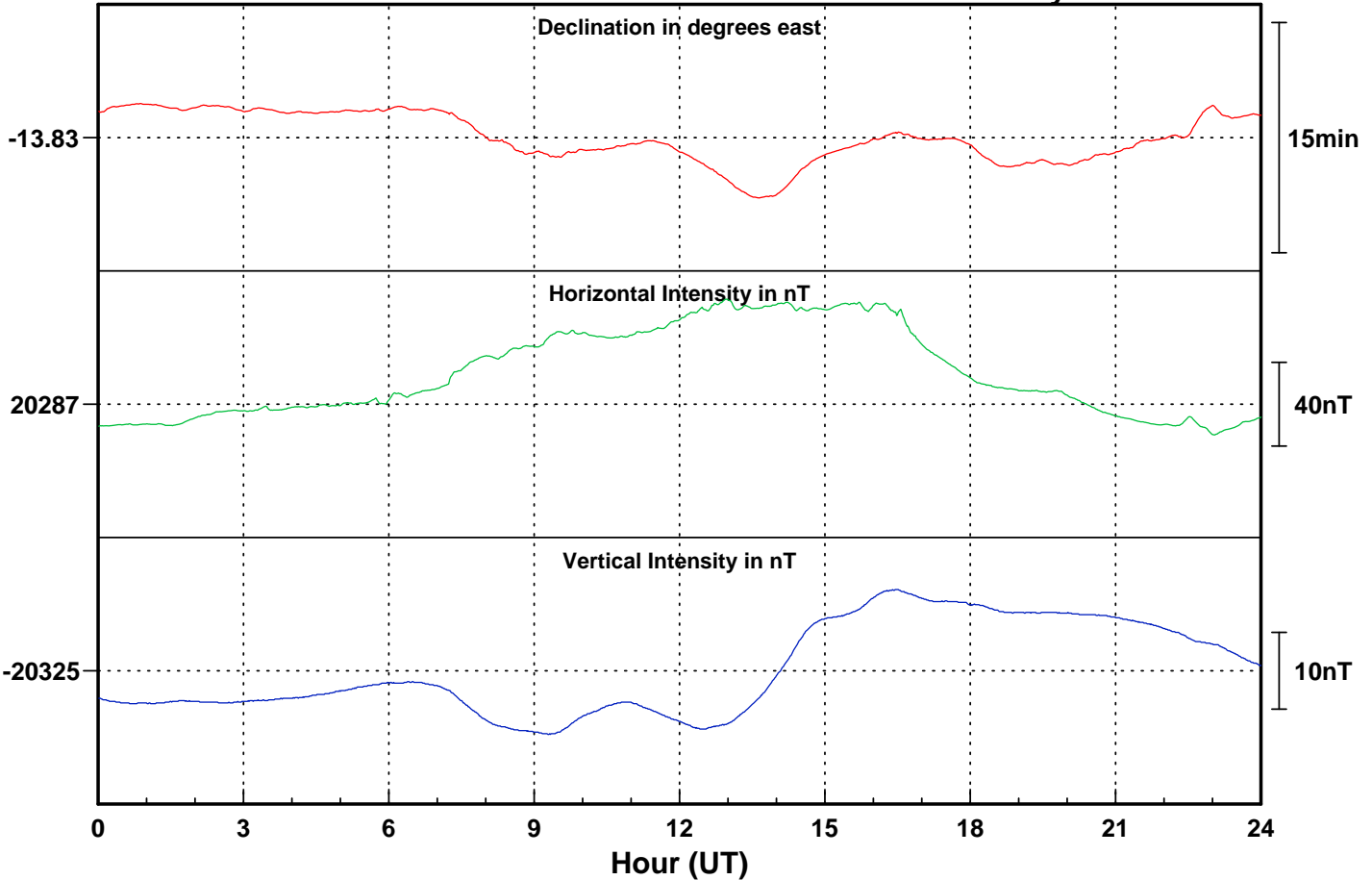
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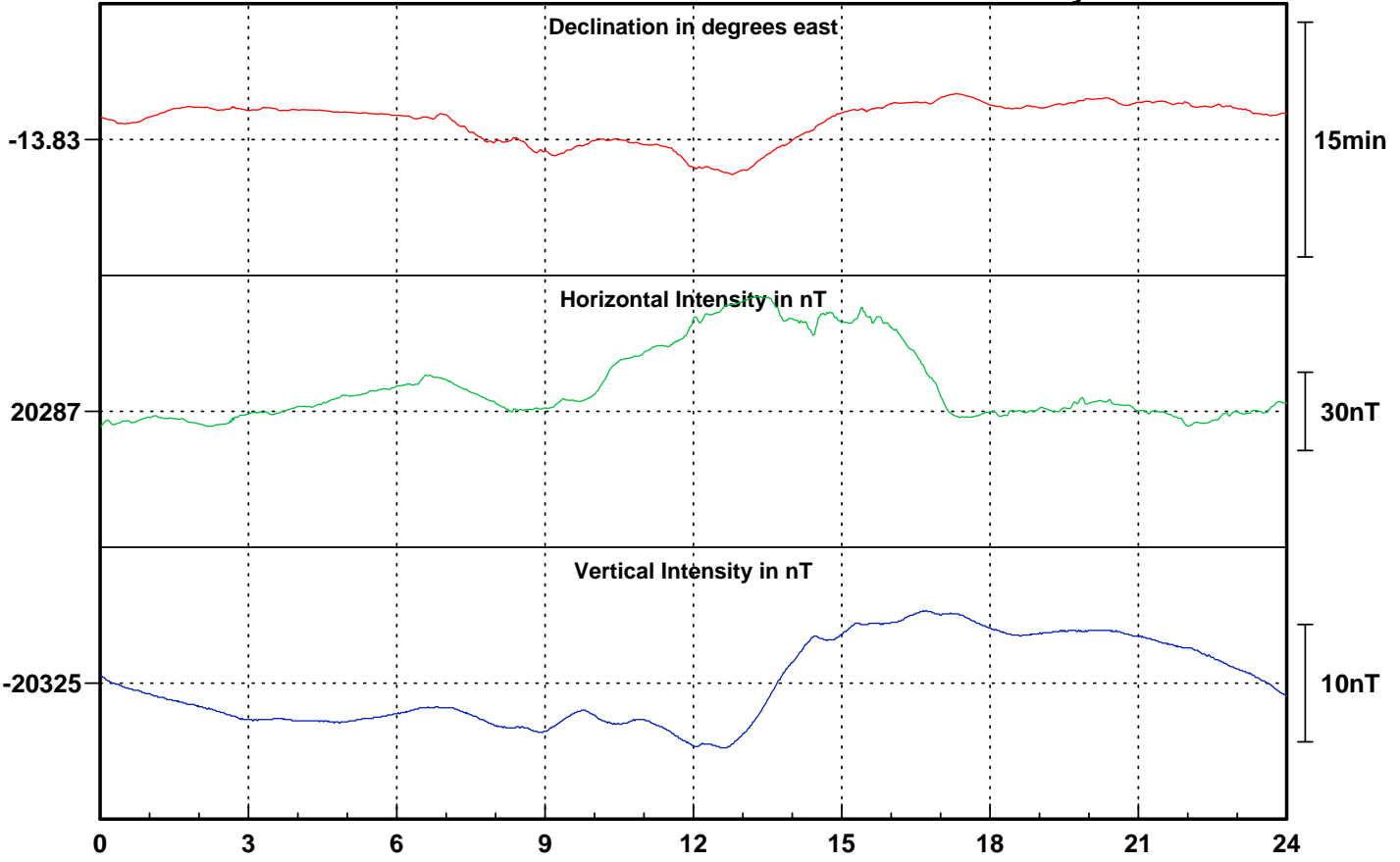
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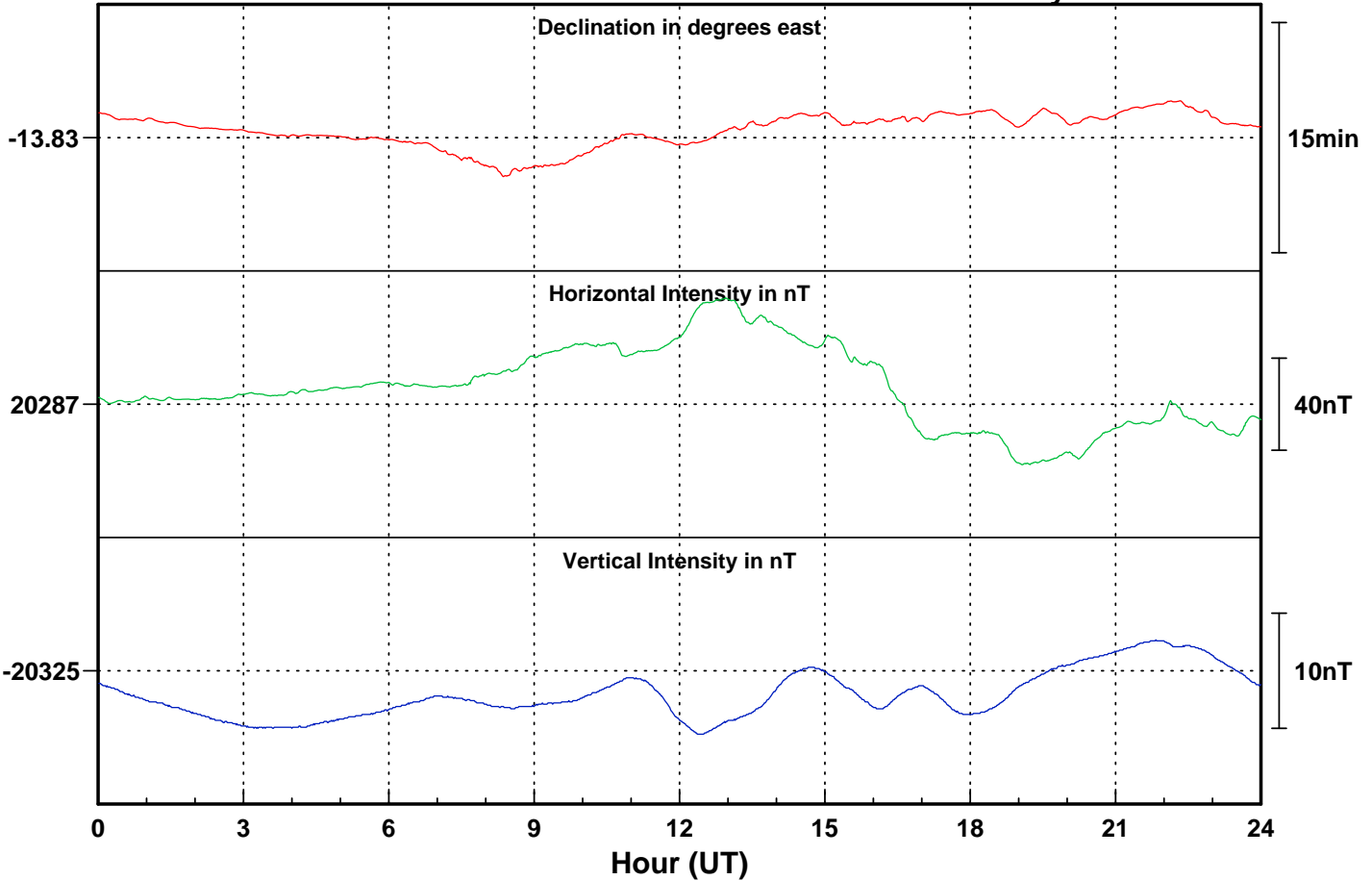
Ascension Island

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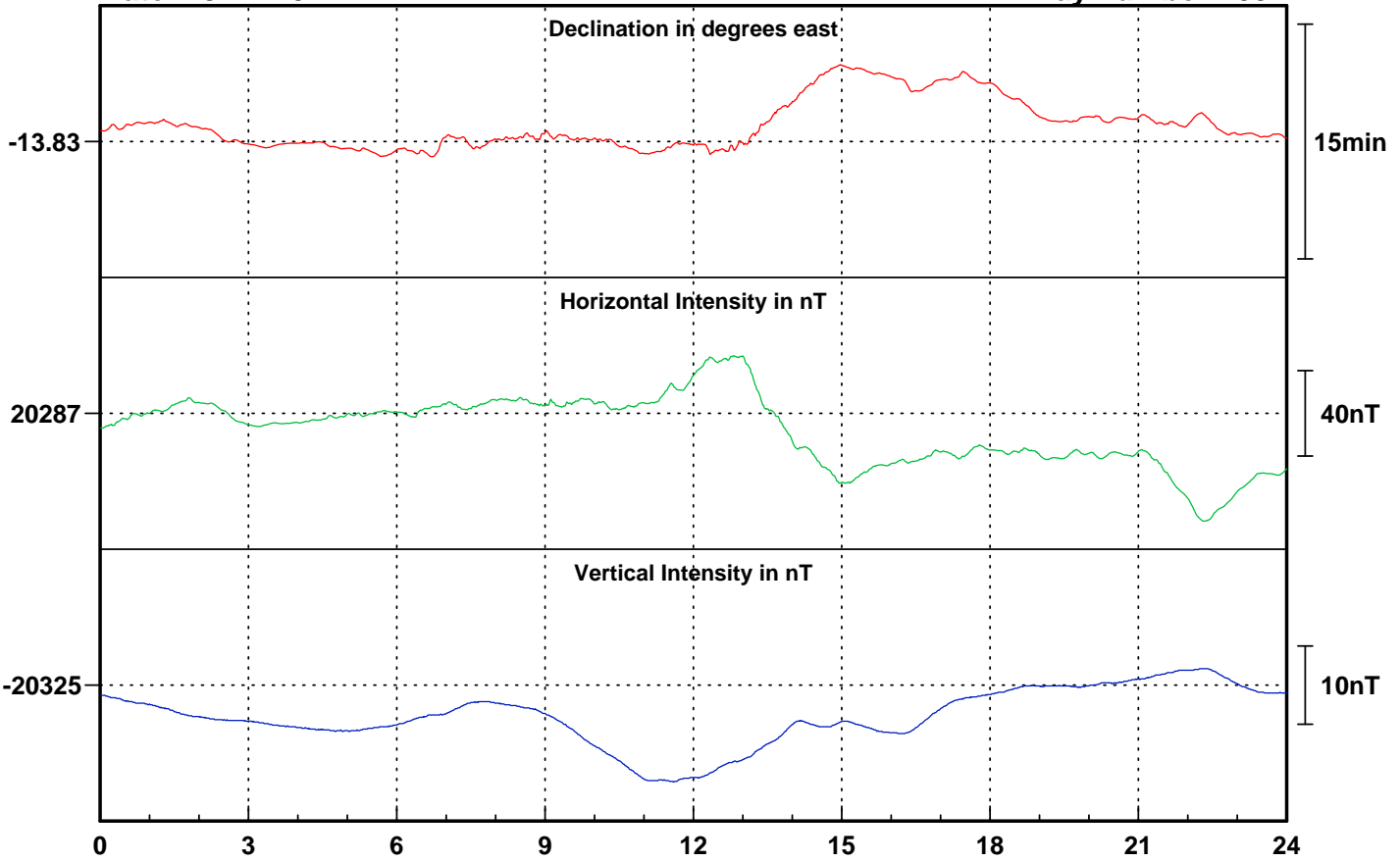
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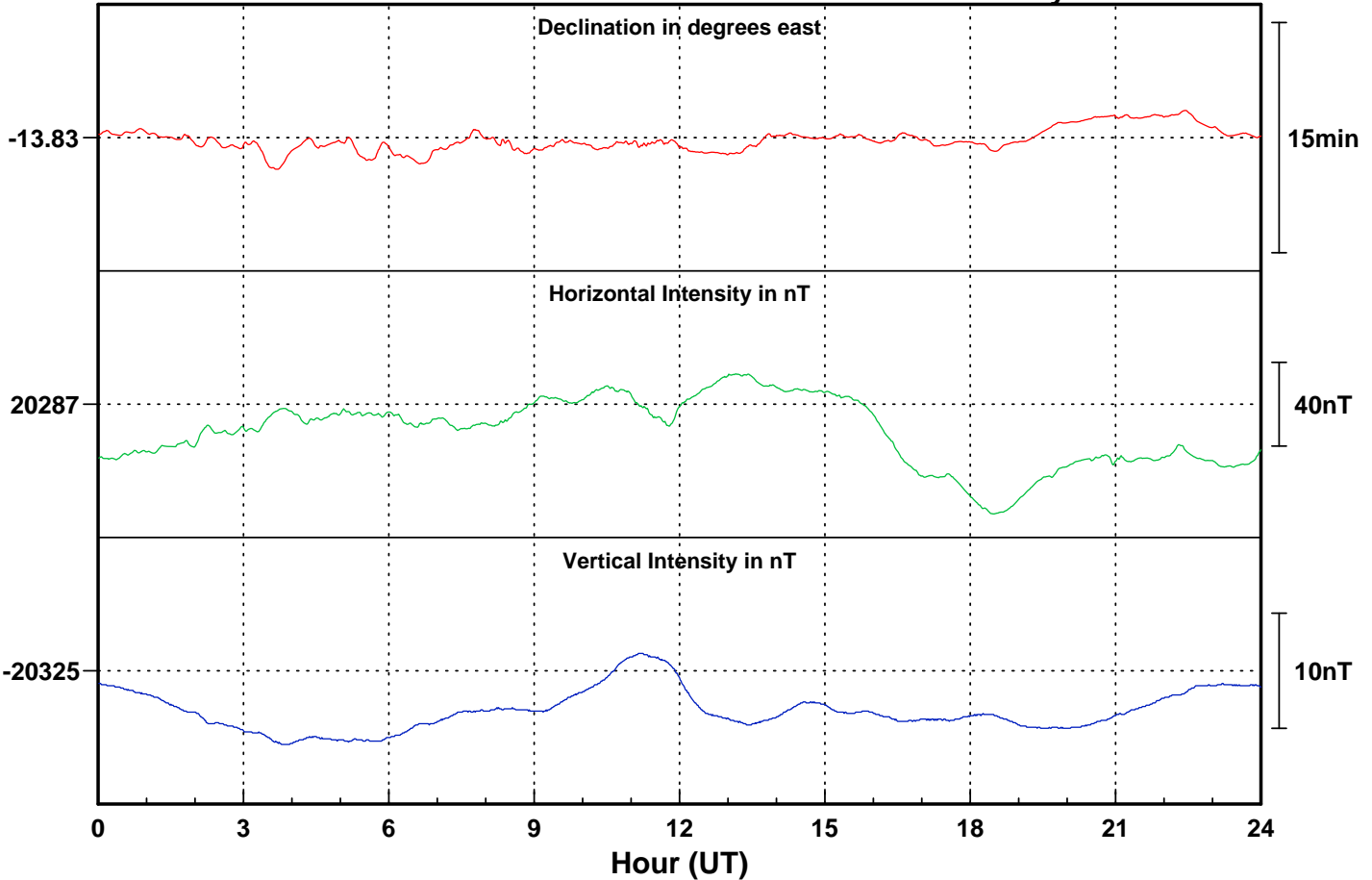
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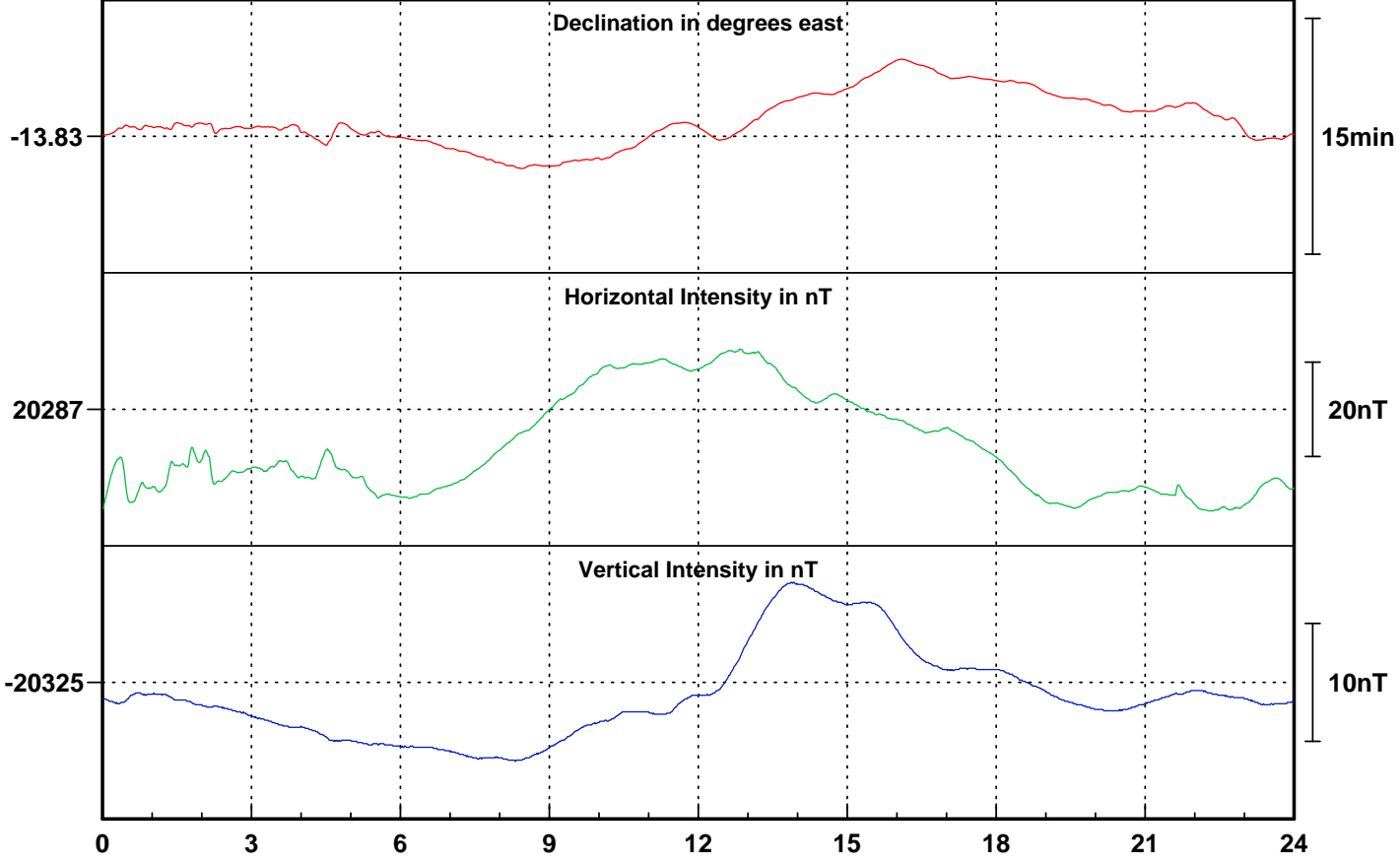
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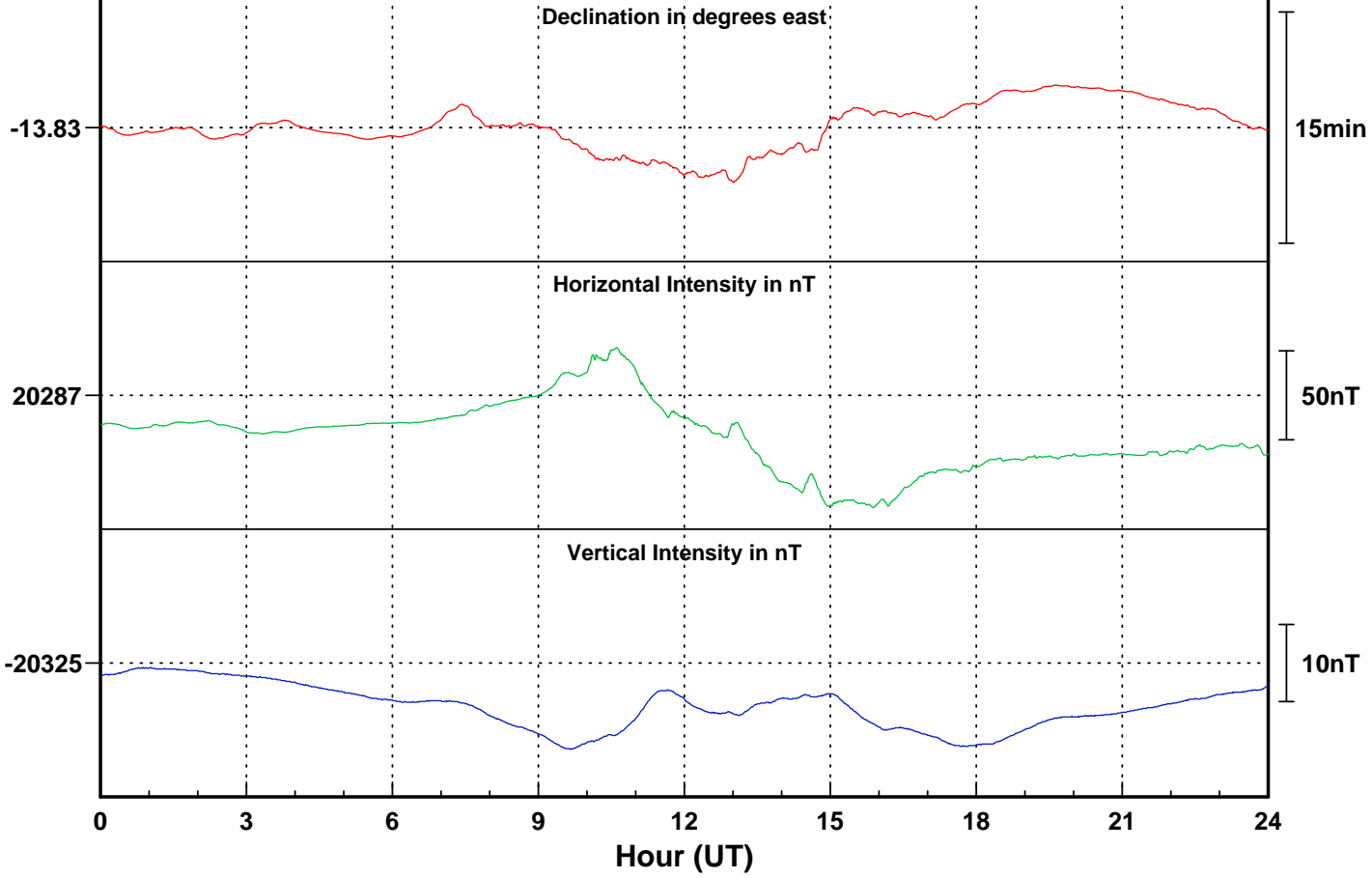
Ascension Island

Day number: 359



Date: 26-12-2022

Day number: 360

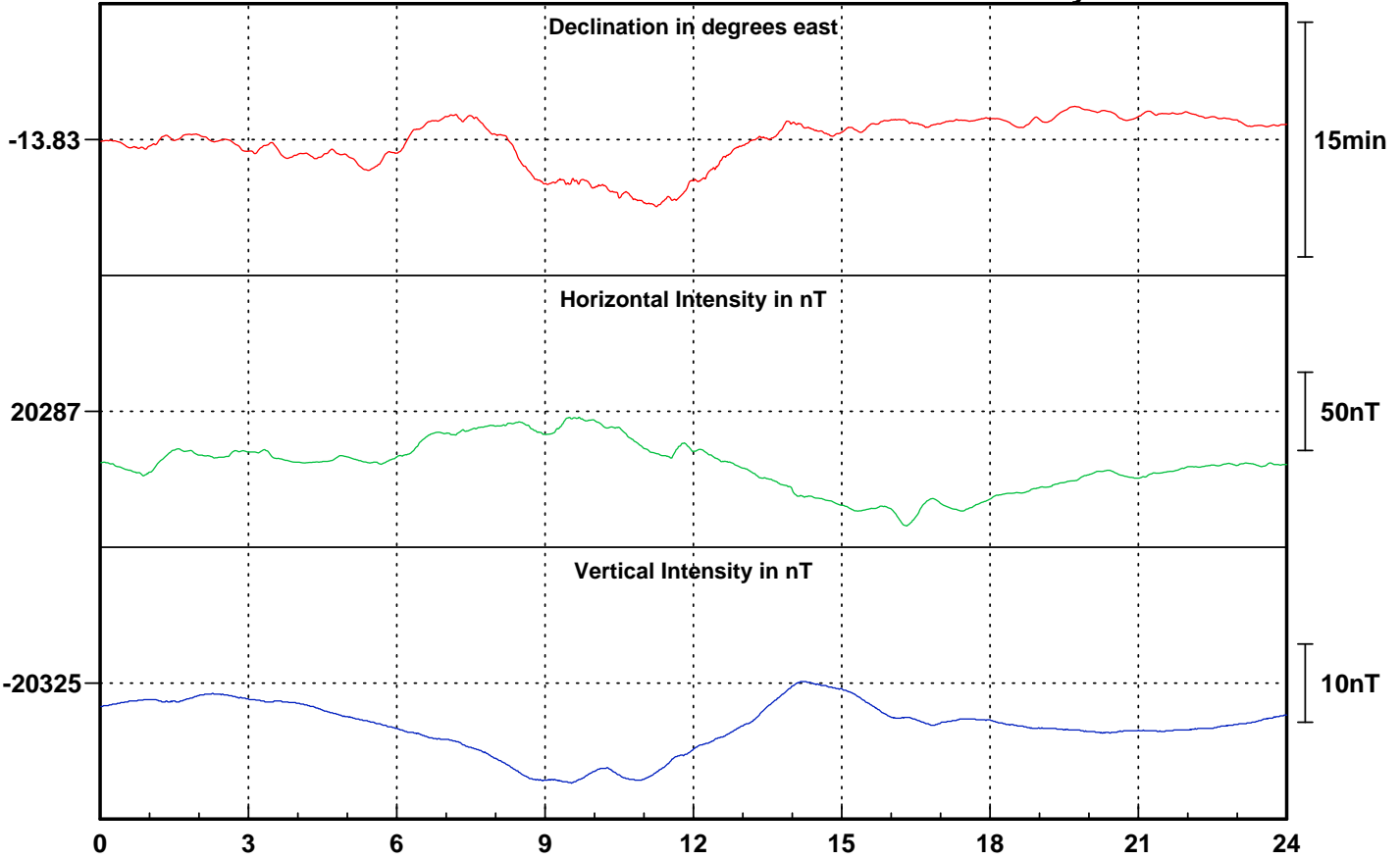


Hour (UT)

Date: 27-12-2022

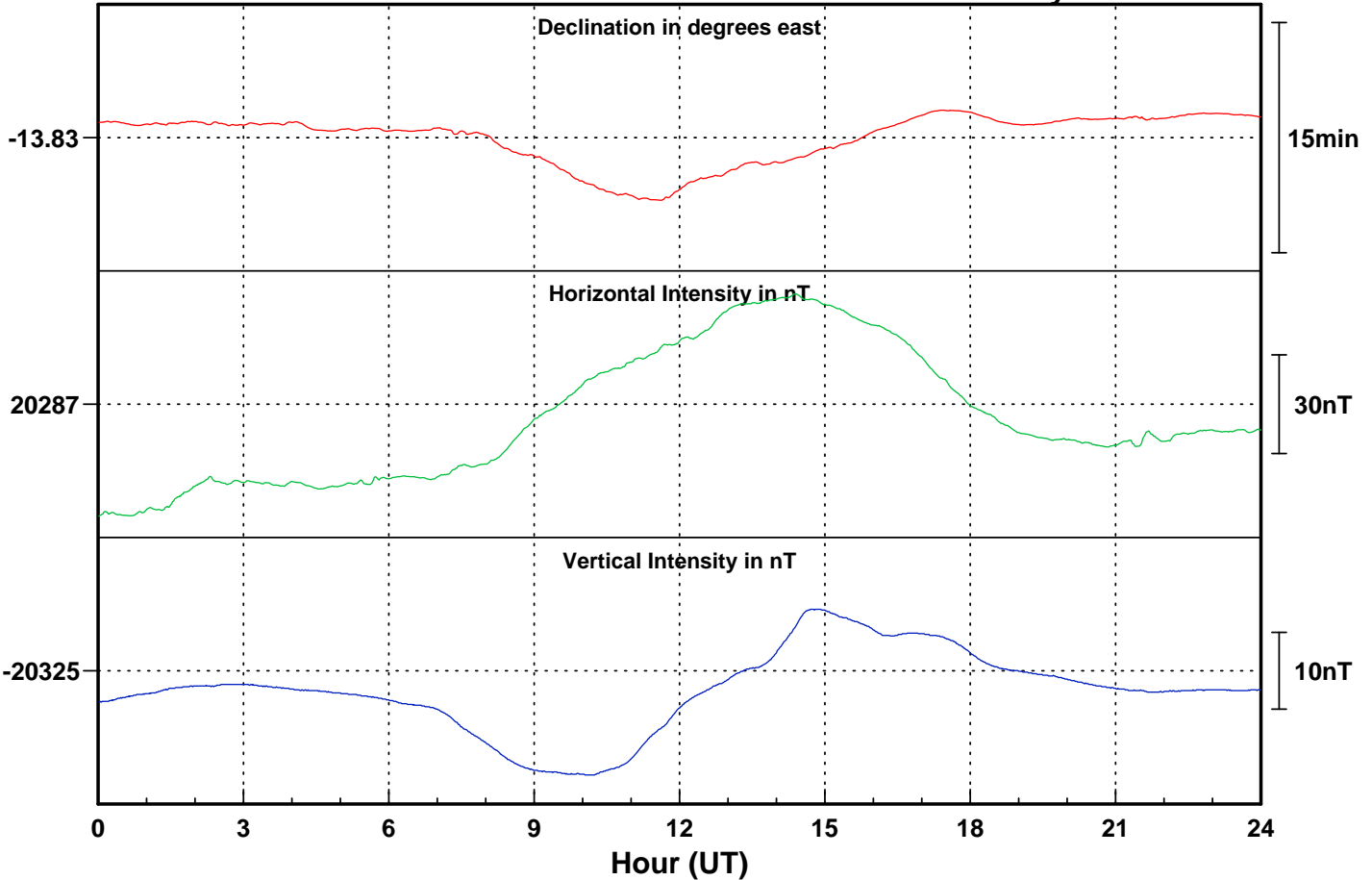
Ascension Island

Day number: 361



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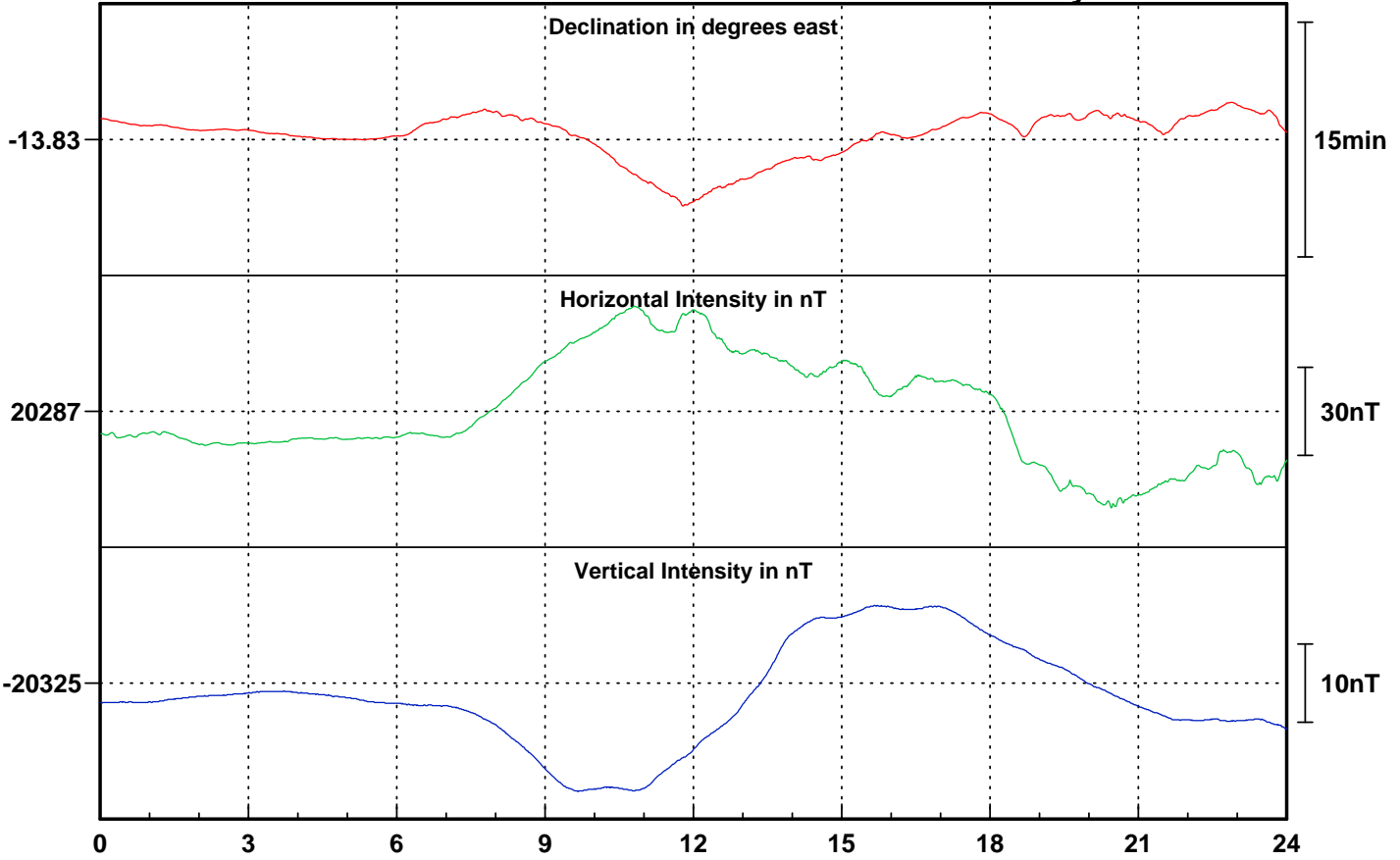
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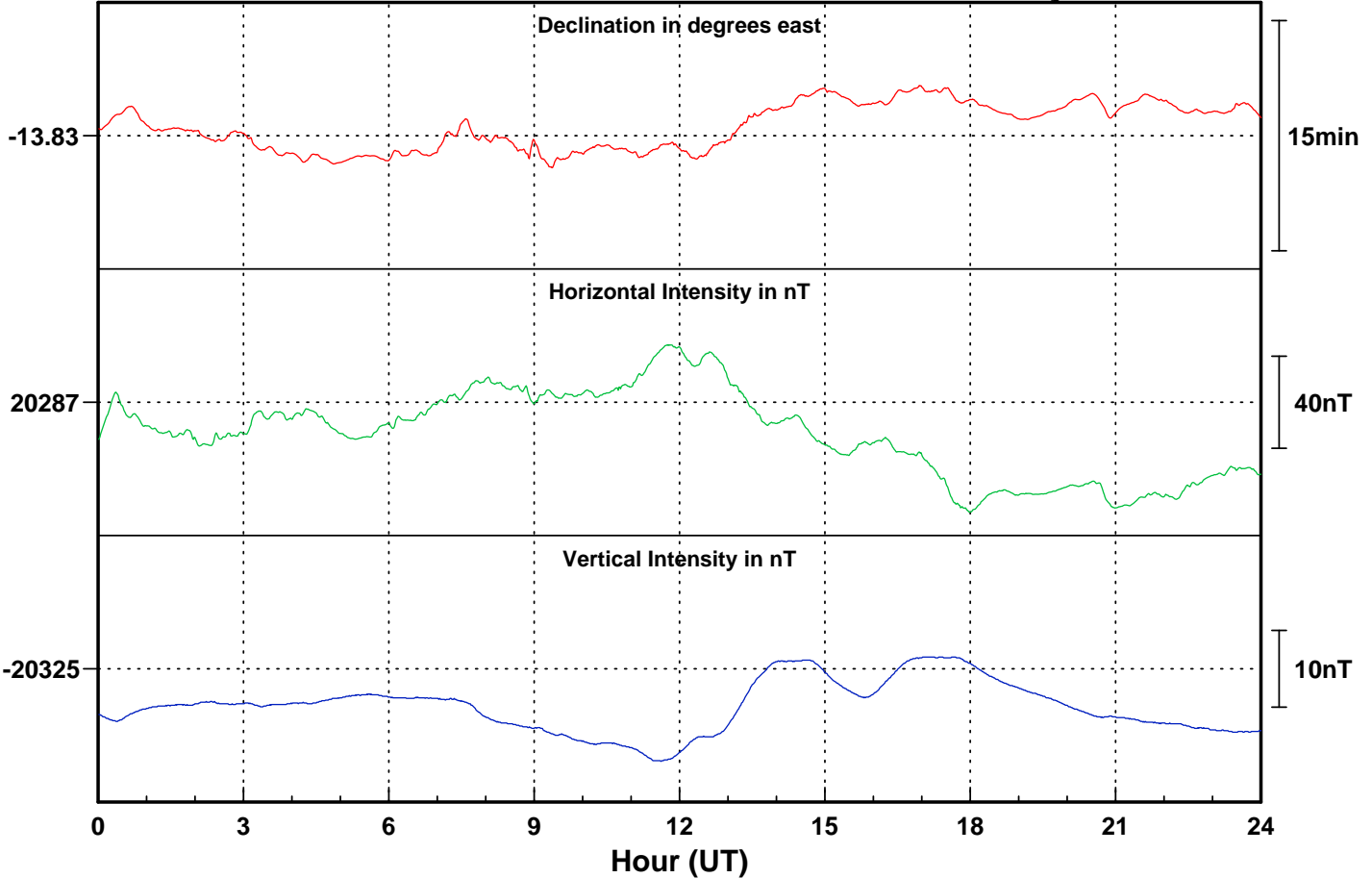
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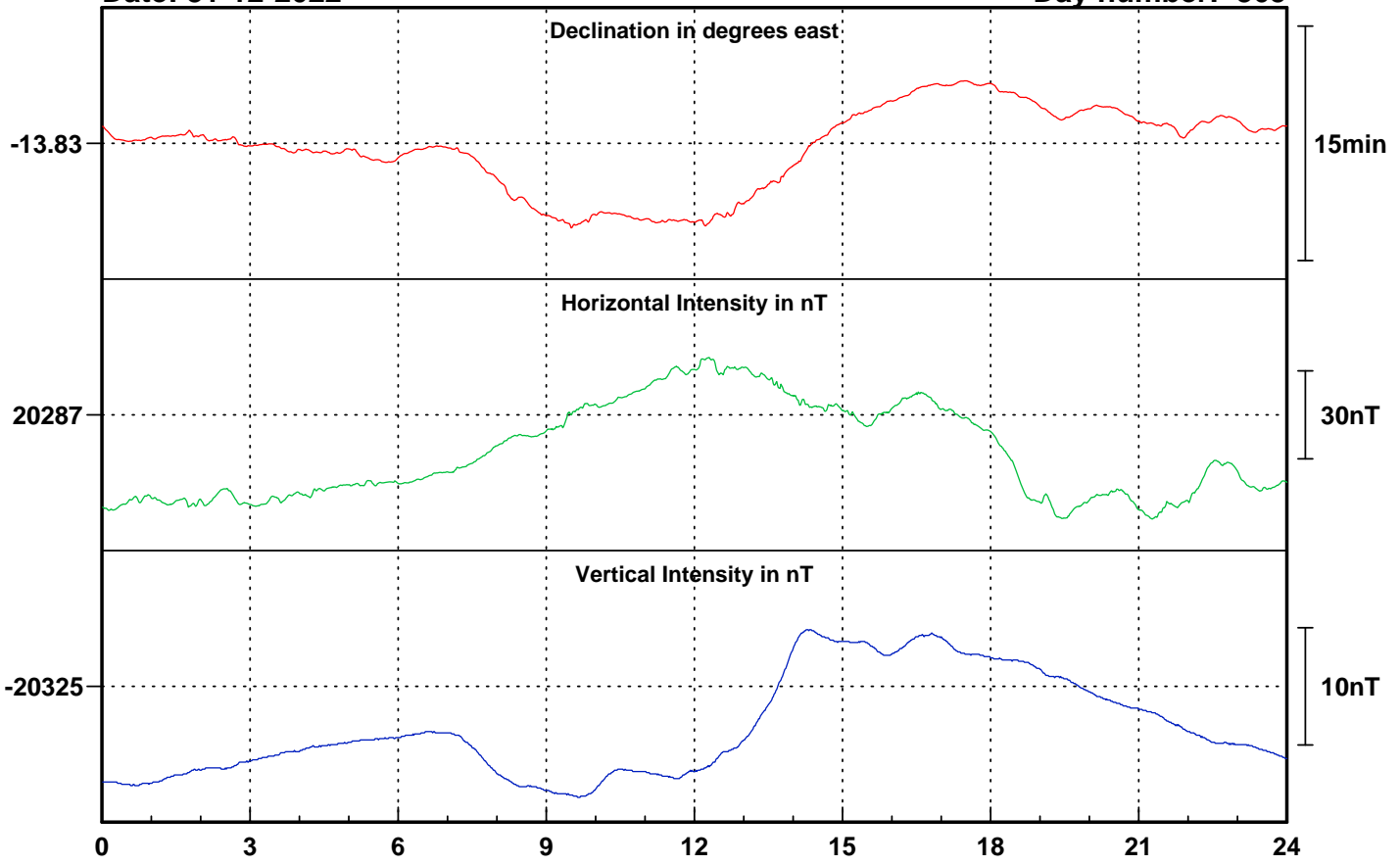
Day number: 364



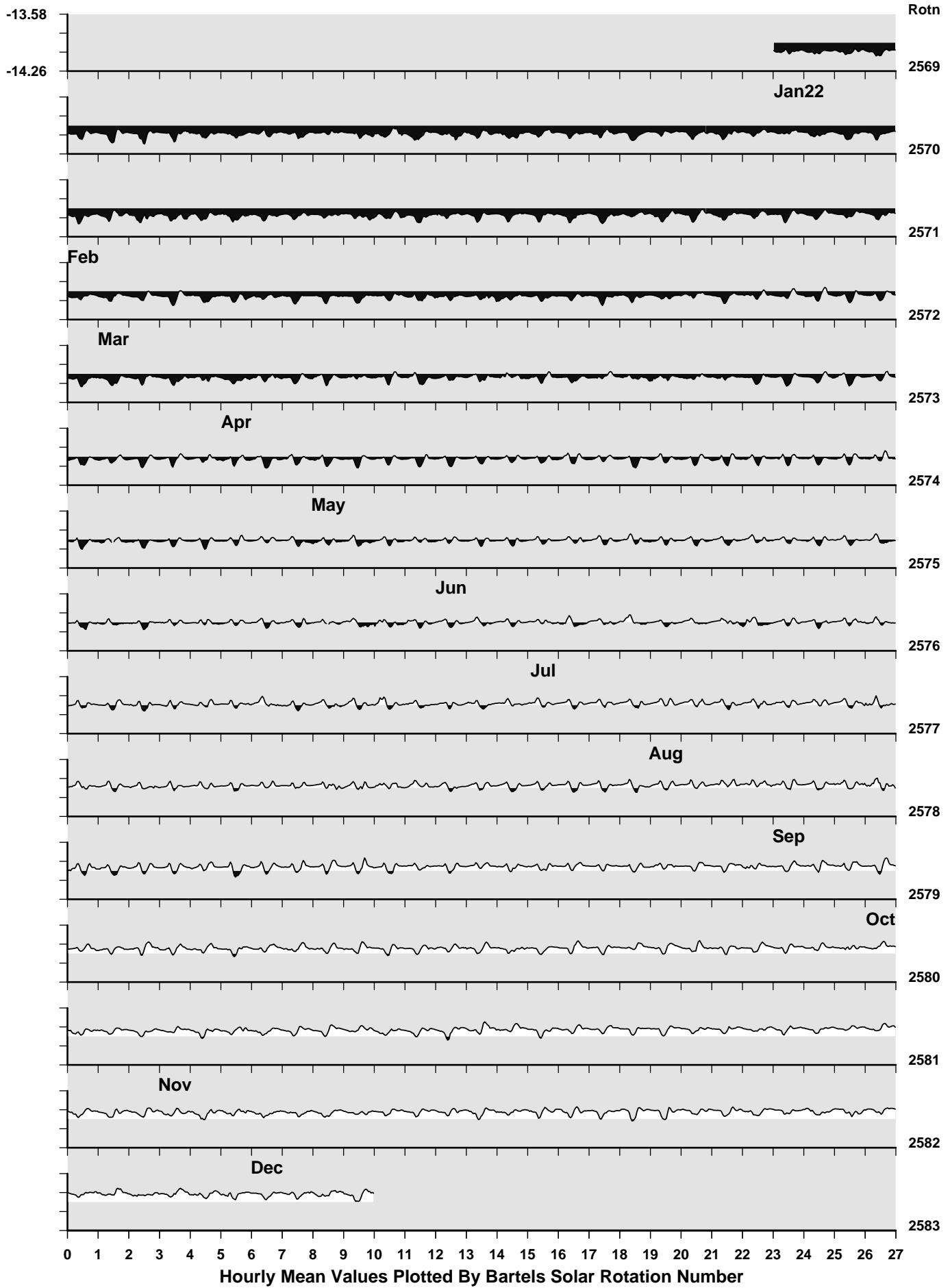
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Ascension Island

Day number: 365

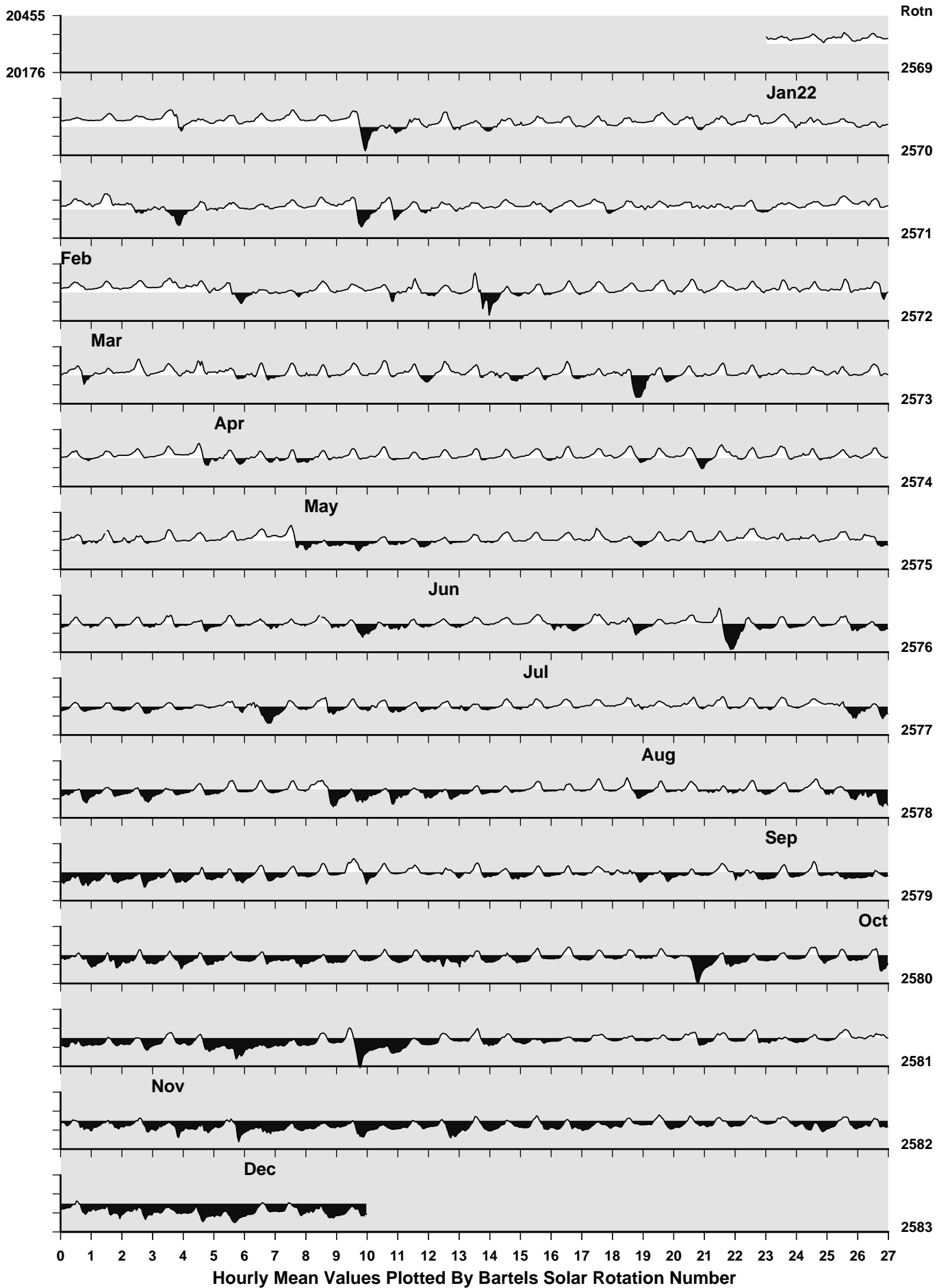


Ascension Island Observatory: Declination (degrees)

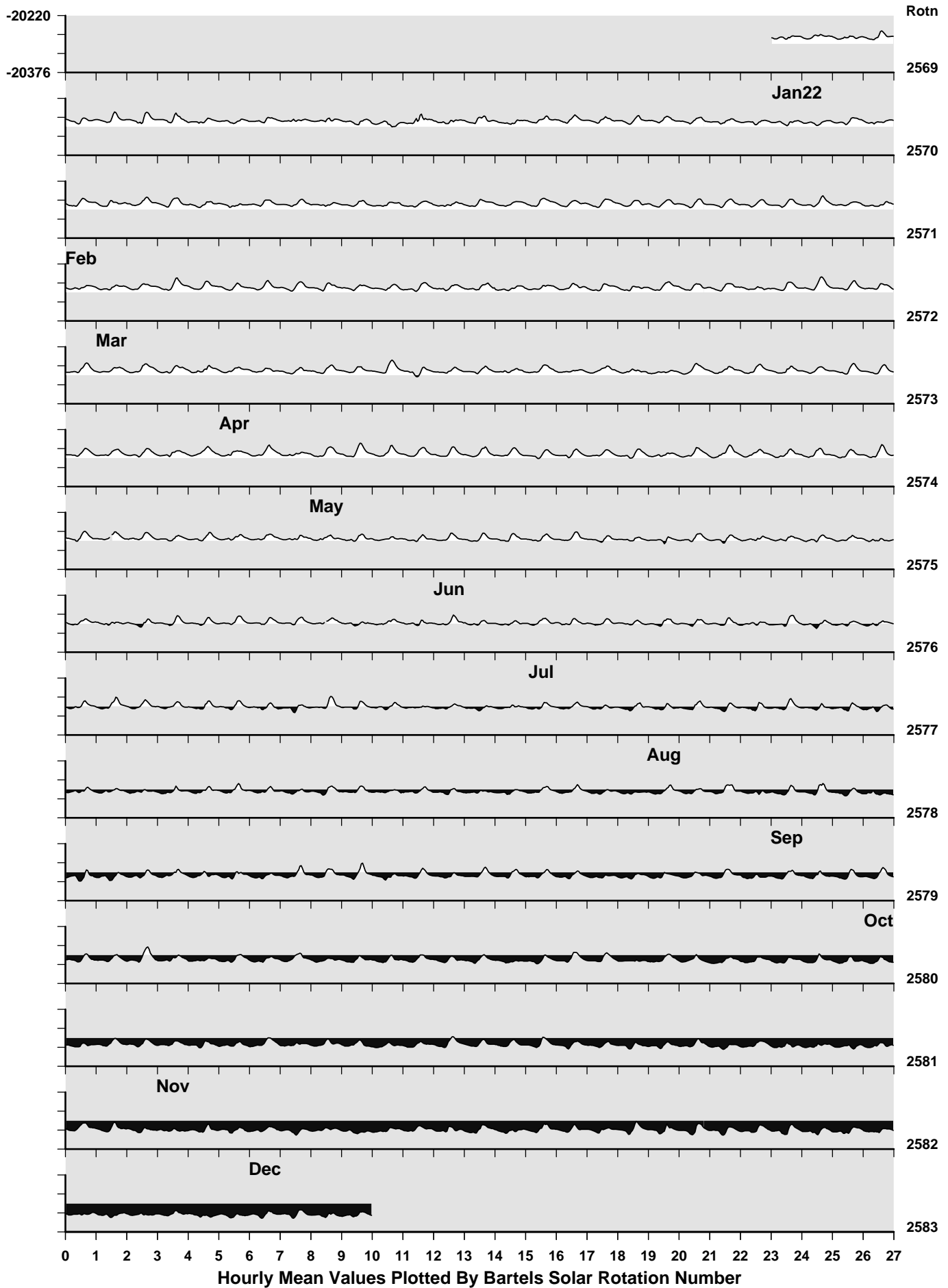


Hourly Mean Values Plotted By Bartels Solar Rotation Number

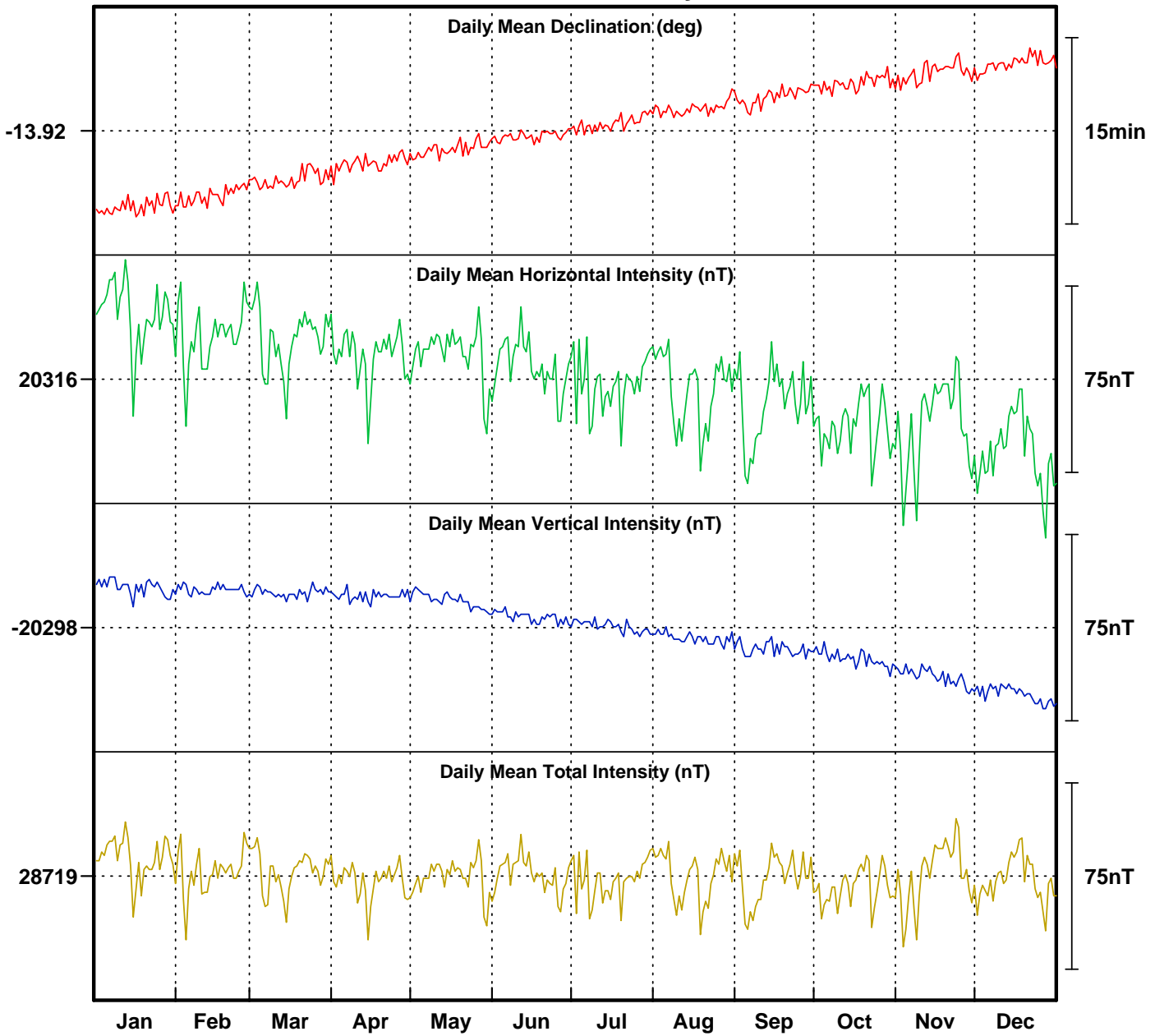
Ascension Island Observatory: Horizontal Intensity (nT)



Ascension Island Observatory: Vertical Intensity (nT)



Ascension Is Observatory 2022



Monthly mean values for Ascension Island Observatory 2022

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-14° 1.3'	20343 nT	-44° 54.8'	19736 nT	-4929 nT	-20281 nT	28725 nT
February	-14° 0.4'	20334 nT	-44° 55.6'	19729 nT	-4921 nT	-20282 nT	28720 nT
March	-13° 59.0'	20333 nT	-44° 55.8'	19730 nT	-4913 nT	-20284 nT	28720 nT
April	-13° 57.7'	20325 nT	-44° 56.6'	19725 nT	-4904 nT	-20285 nT	28716 nT
May	-13° 56.7'	20326 nT	-44° 56.8'	19727 nT	-4898 nT	-20288 nT	28718 nT
June	-13° 55.7'	20321 nT	-44° 57.7'	19724 nT	-4891 nT	-20294 nT	28719 nT
July	-13° 54.7'	20314 nT	-44° 58.6'	19718 nT	-4884 nT	-20298 nT	28717 nT
August	-13° 53.6'	20311 nT	-44° 59.3'	19717 nT	-4877 nT	-20303 nT	28718 nT
September	-13° 52.4'	20305 nT	-45° 0.1'	19713 nT	-4869 nT	-20307 nT	28717 nT
October	-13° 51.3'	20297 nT	-45° 1.2'	19706 nT	-4861 nT	-20311 nT	28714 nT
November	-13° 50.4'	20297 nT	-45° 1.8'	19708 nT	-4856 nT	-20318 nT	28719 nT
December	-13° 49.7'	20287 nT	-45° 3.3'	19698 nT	-4849 nT	-20325 nT	28717 nT

Note:

i. The values shown here are provisional.