

BRITISH GEOLOGICAL SURVEY

Port Stanley Observatory Monthly Magnetic Bulletin December 2020

20/12/PS



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

PORT STANLEY OBSERVATORY MAGNETIC DATA

1. Introduction

Port Stanley observatory was installed by the British Geological Survey (BGS) with financial support from a consortium of oil companies and became operational in February 1994.

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

2. Position

Port Stanley Observatory, one of the geomagnetic observatories maintained and operated by the British Geological Survey (BGS), is situated on a site at Sapper Hill near Port Stanley in the Falkland Islands. In 2013 it was necessary to establish a new position for the observatory absolute pillar due to degradation in the quality of absolute observations caused by anthropogenic noise. Following an overlap period of at least six months, the observatory results relate to the new position from 1 January 2014.

Old observatory co-ordinates are (Feb 1994 to Dec 2013):

Geographic: 51°42'15"S 302°06'24"E
Height above mean sea level: 135 m

New observatory co-ordinates are (Jan 2014 to present):

Geographic: 51°42'18.0"S 302°06'25.2"E
Geomagnetic: 42°34'41"S 012°24'00"E
Height above mean sea level: 130 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 2020.5. 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

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

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 twice 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.

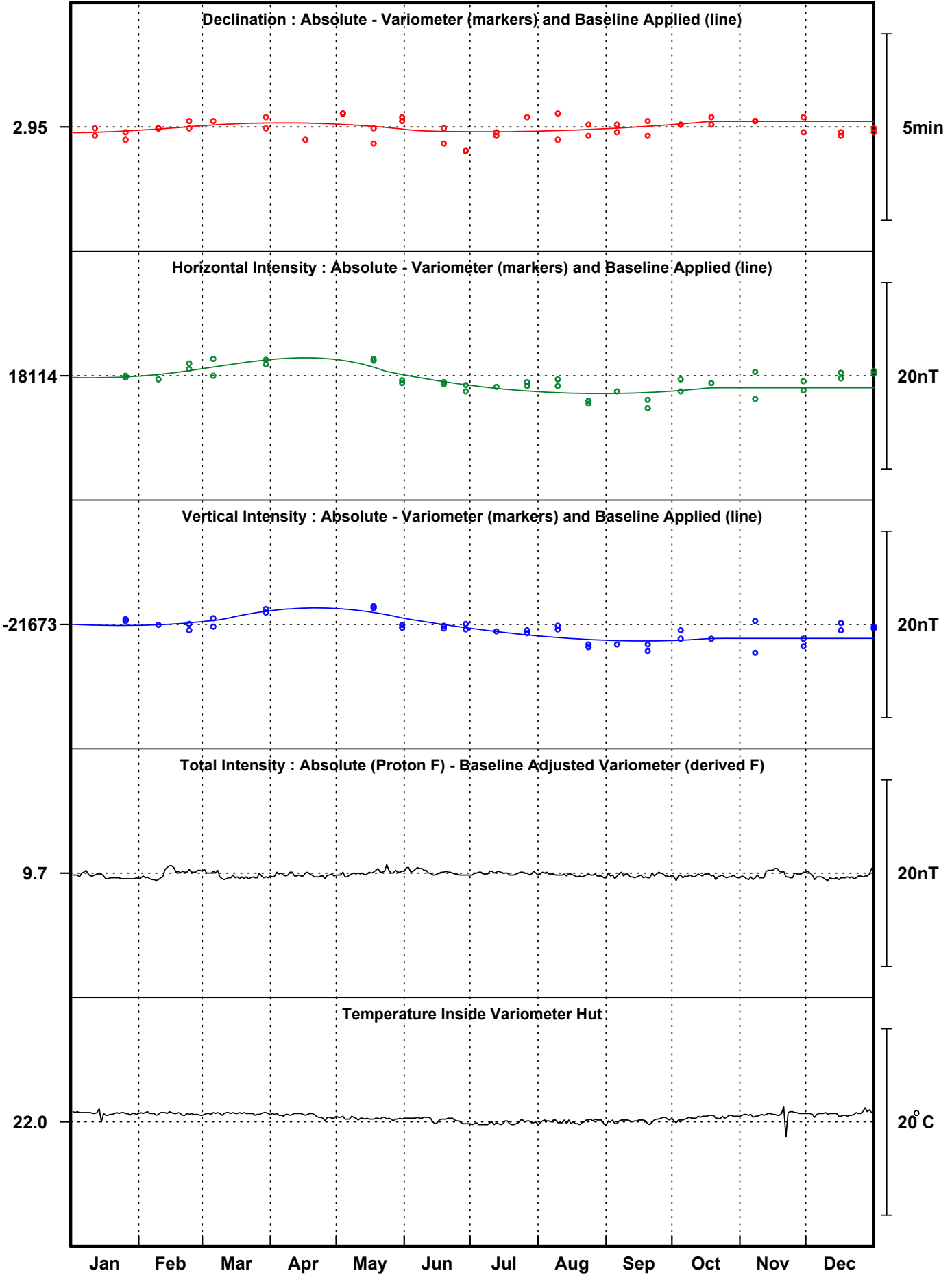
5. Conditions of Use

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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

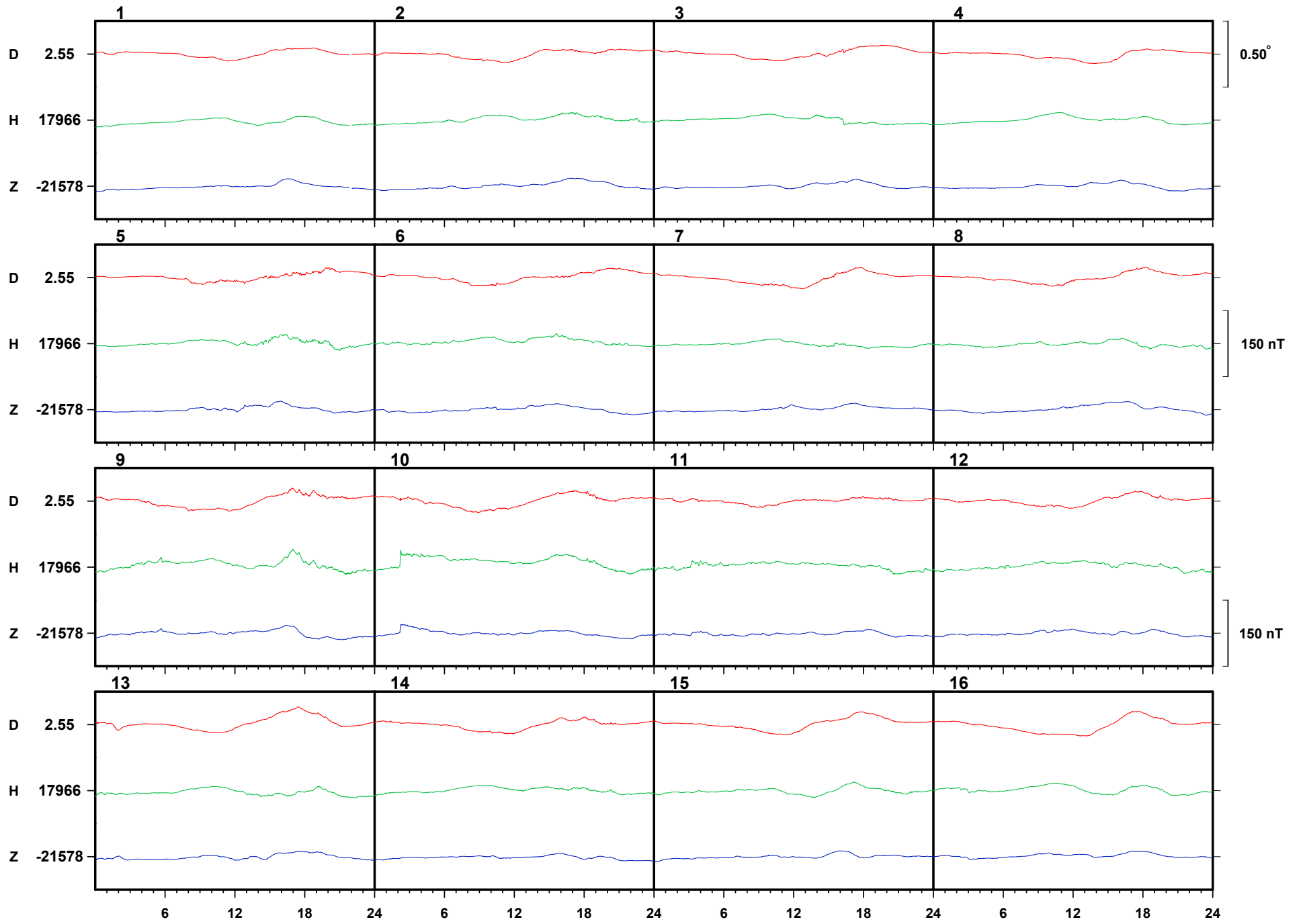
Port Stanley 2020

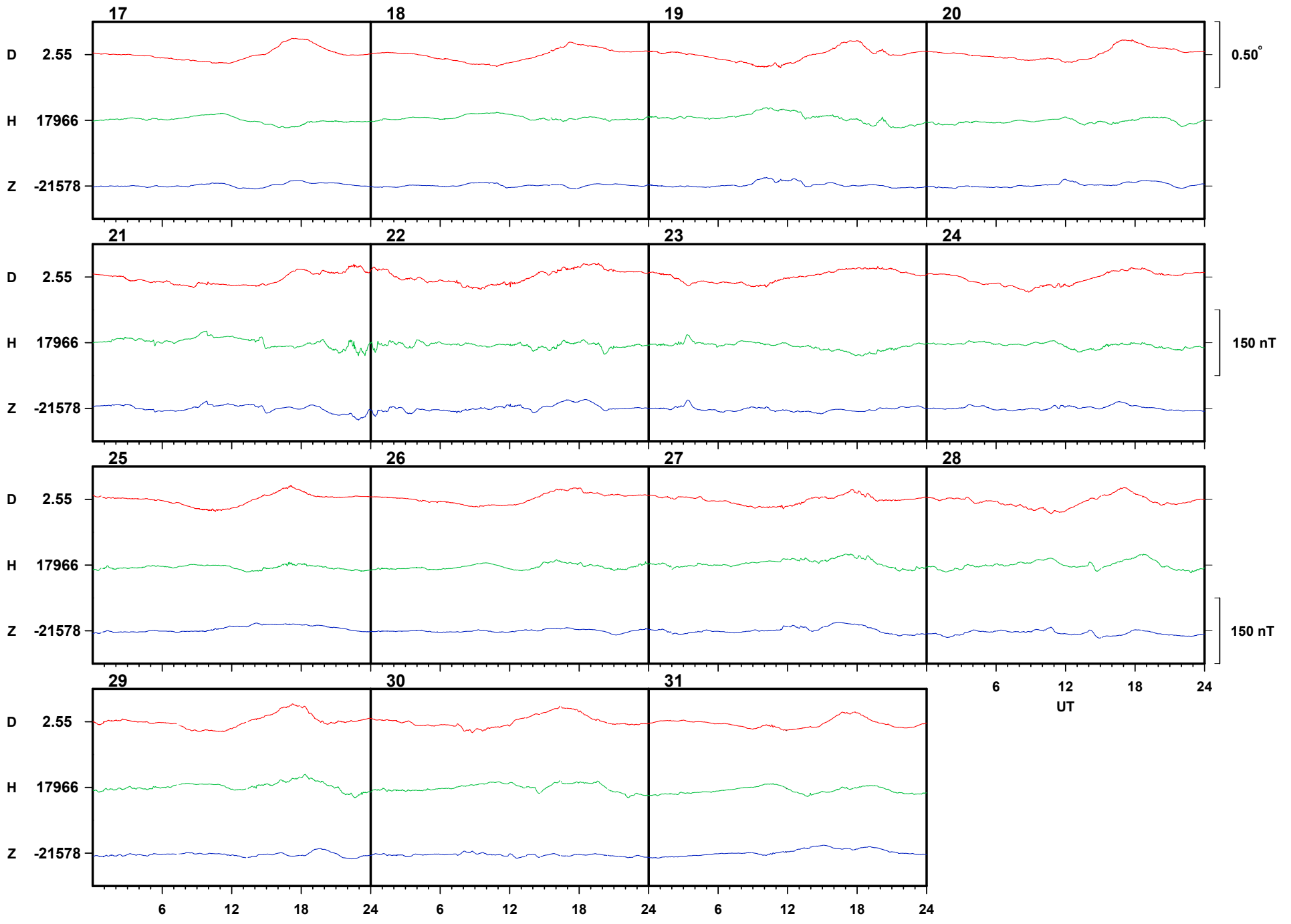


Falkland Islands

December

2020



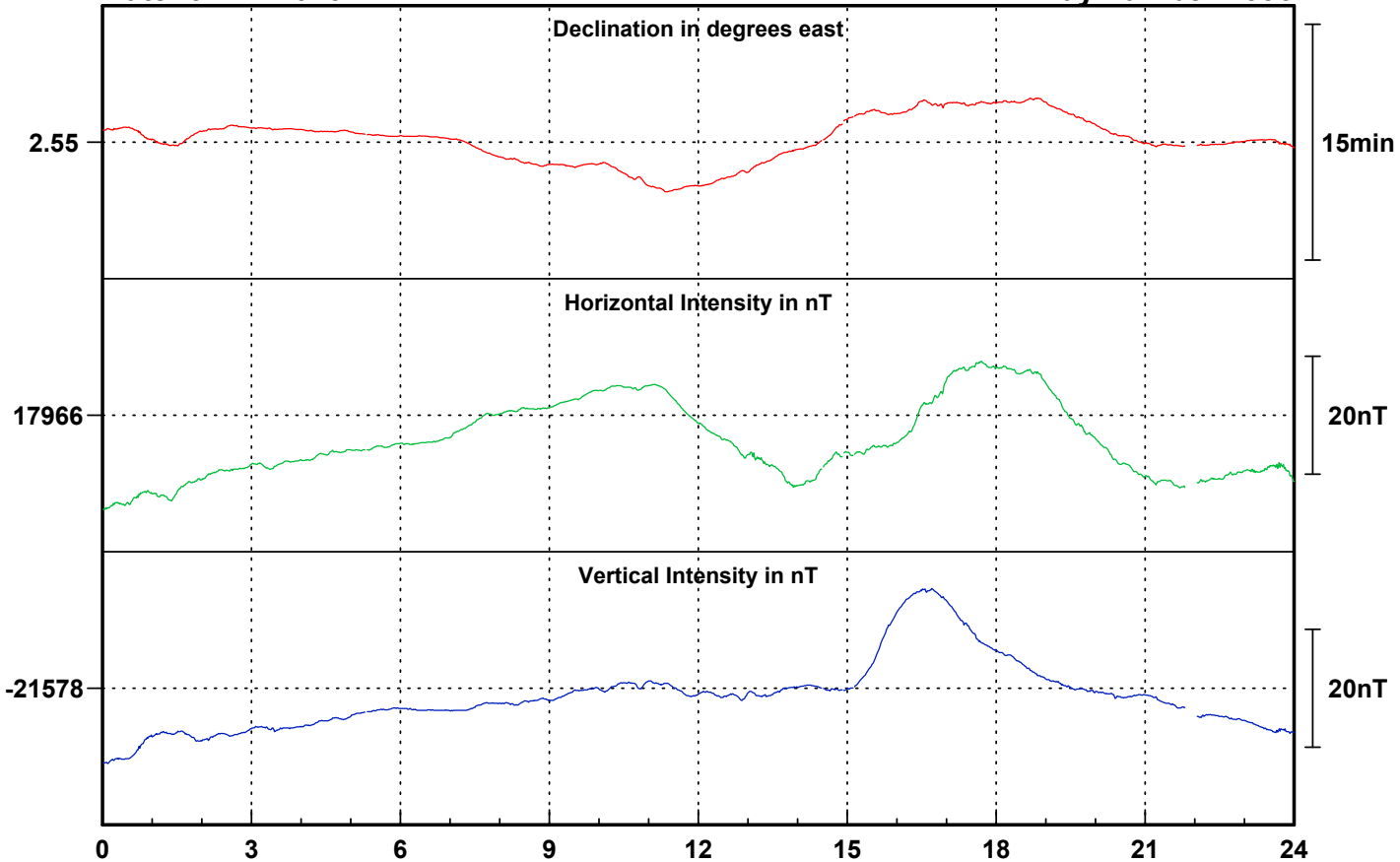


Falkland Islands December 2020

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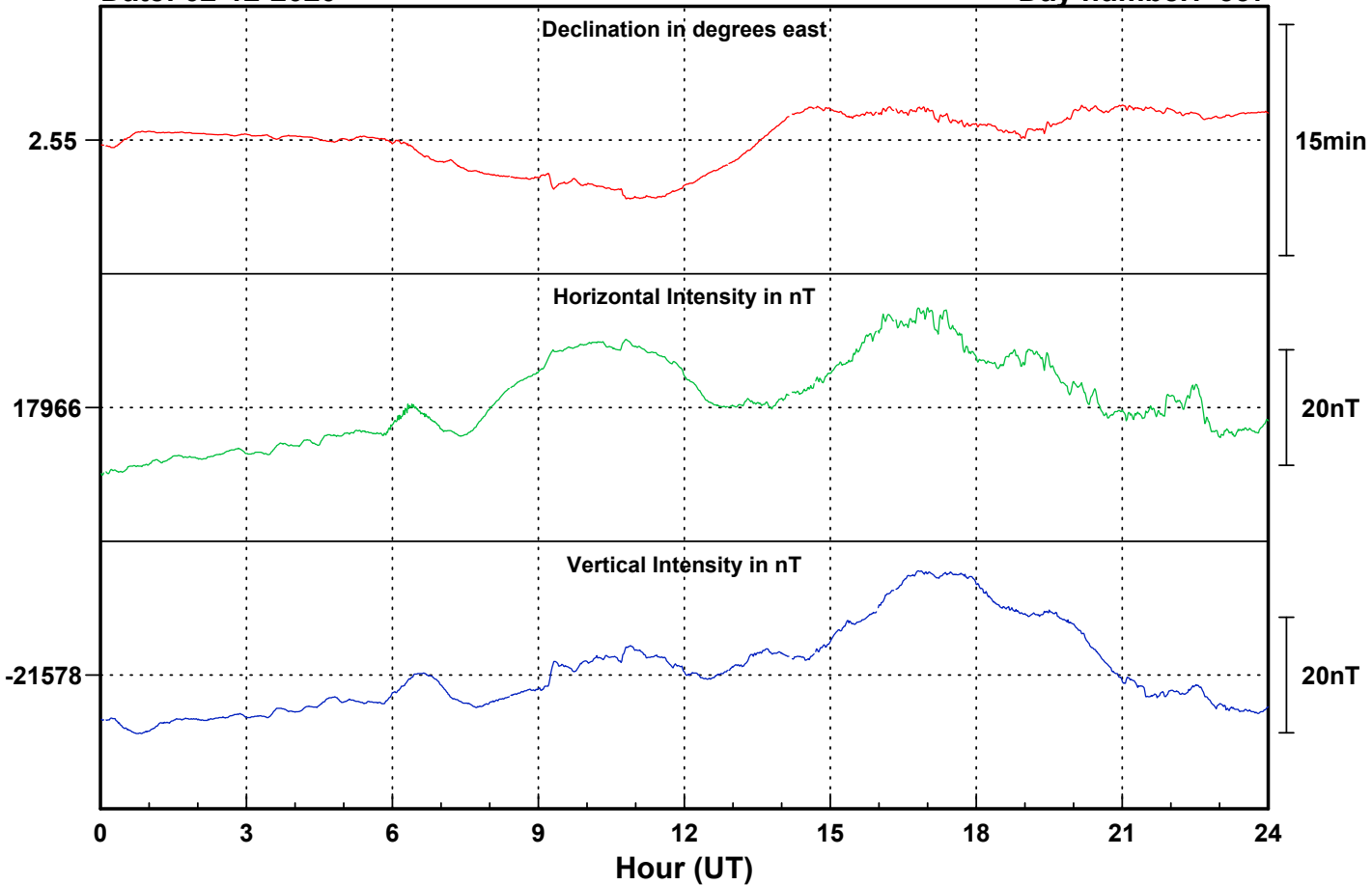
Falkland Islands

Day number: 336



Date: 02-12-2020

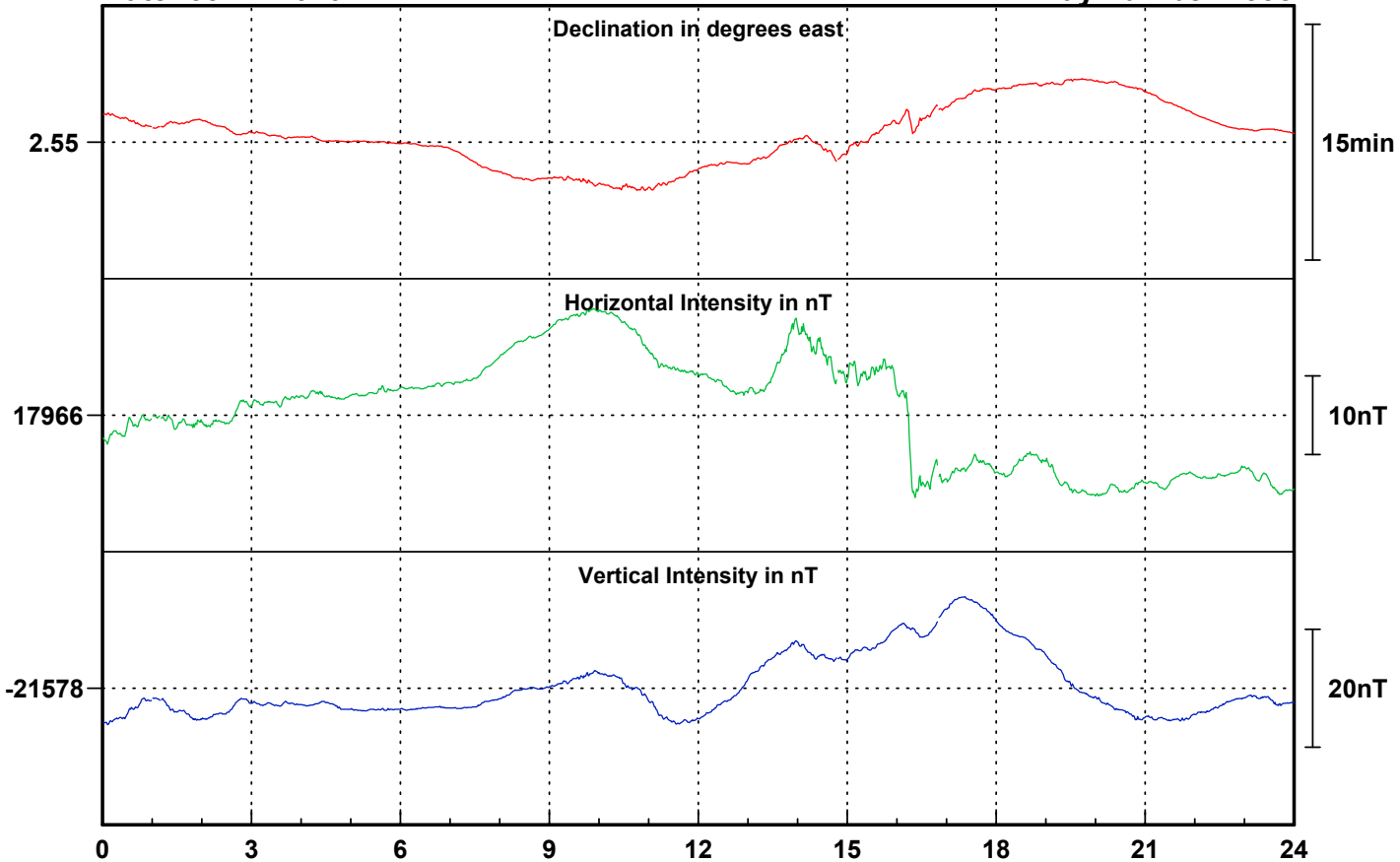
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Date: 03-12-2020

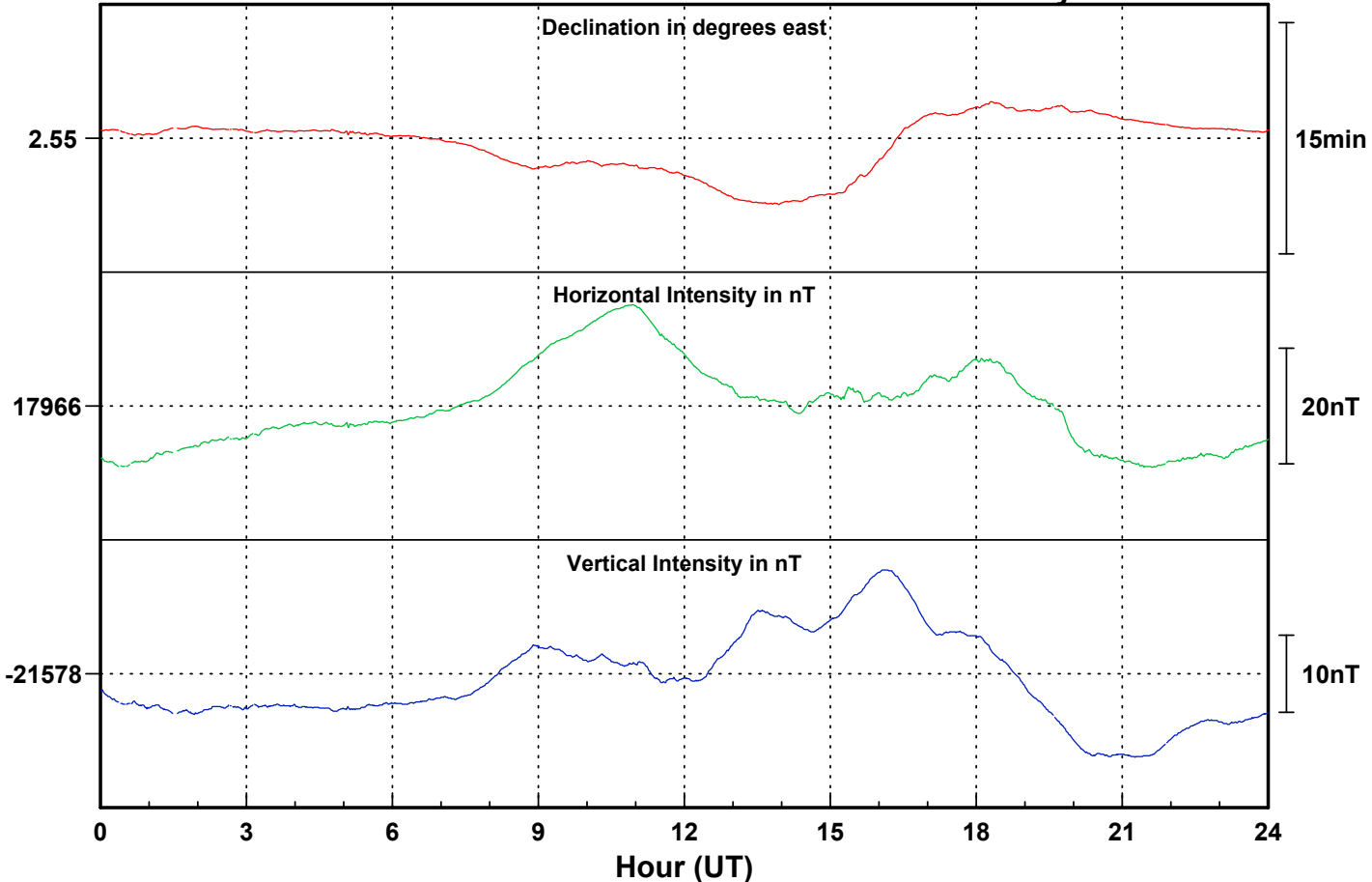
Falkland Islands

Day number: 338



Date: 04-12-2020

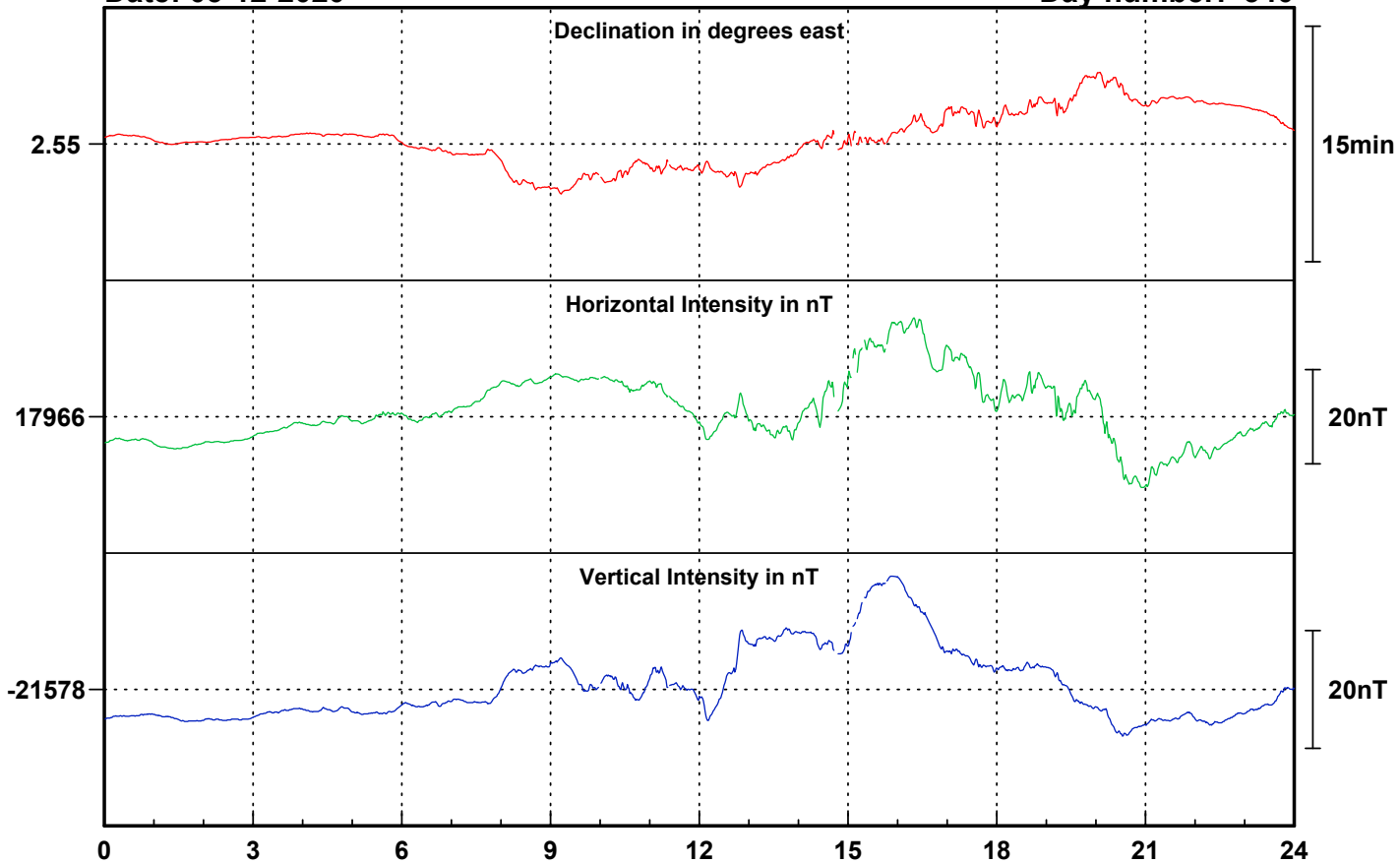
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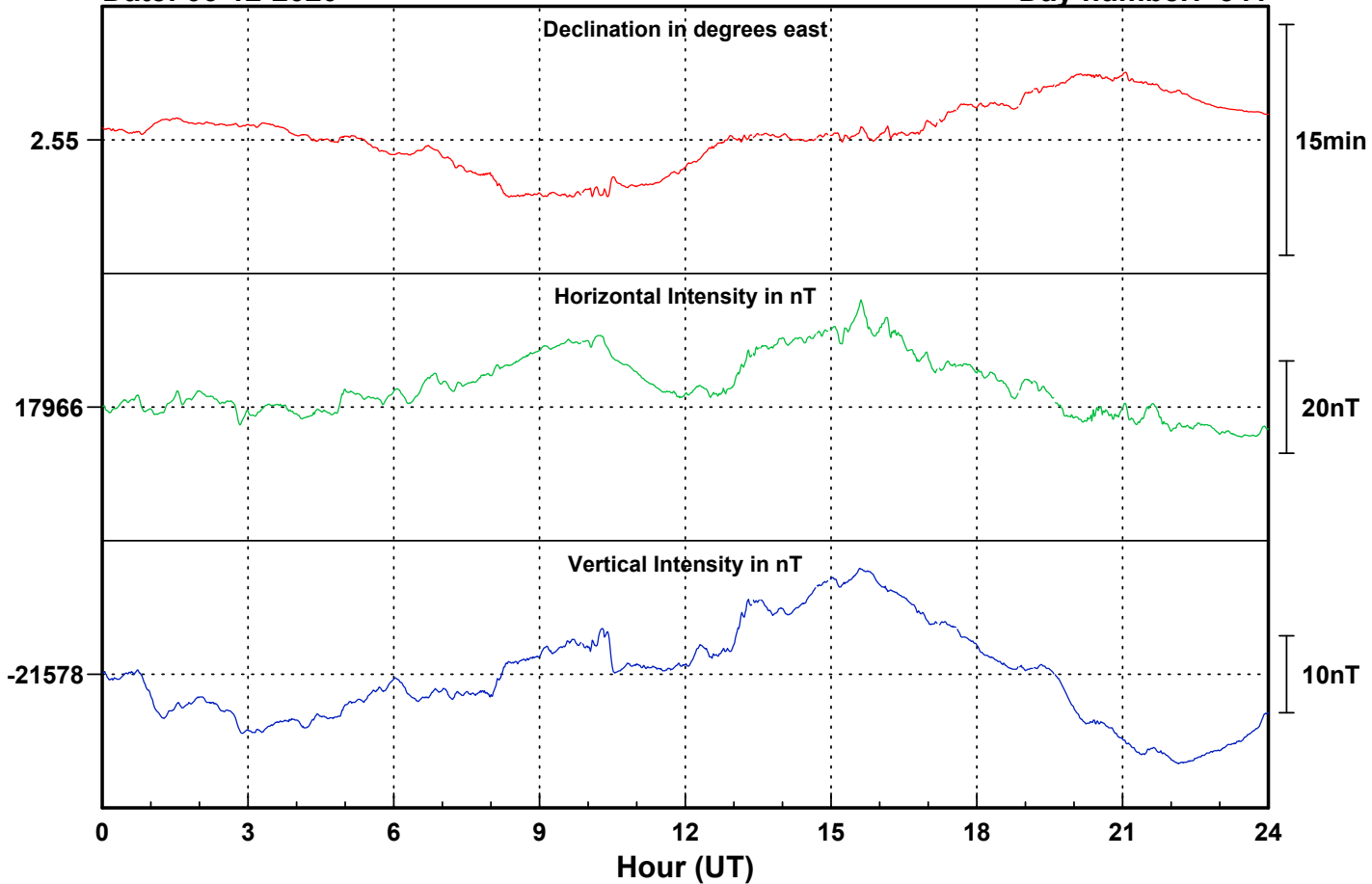
Falkland Islands

Day number: 340



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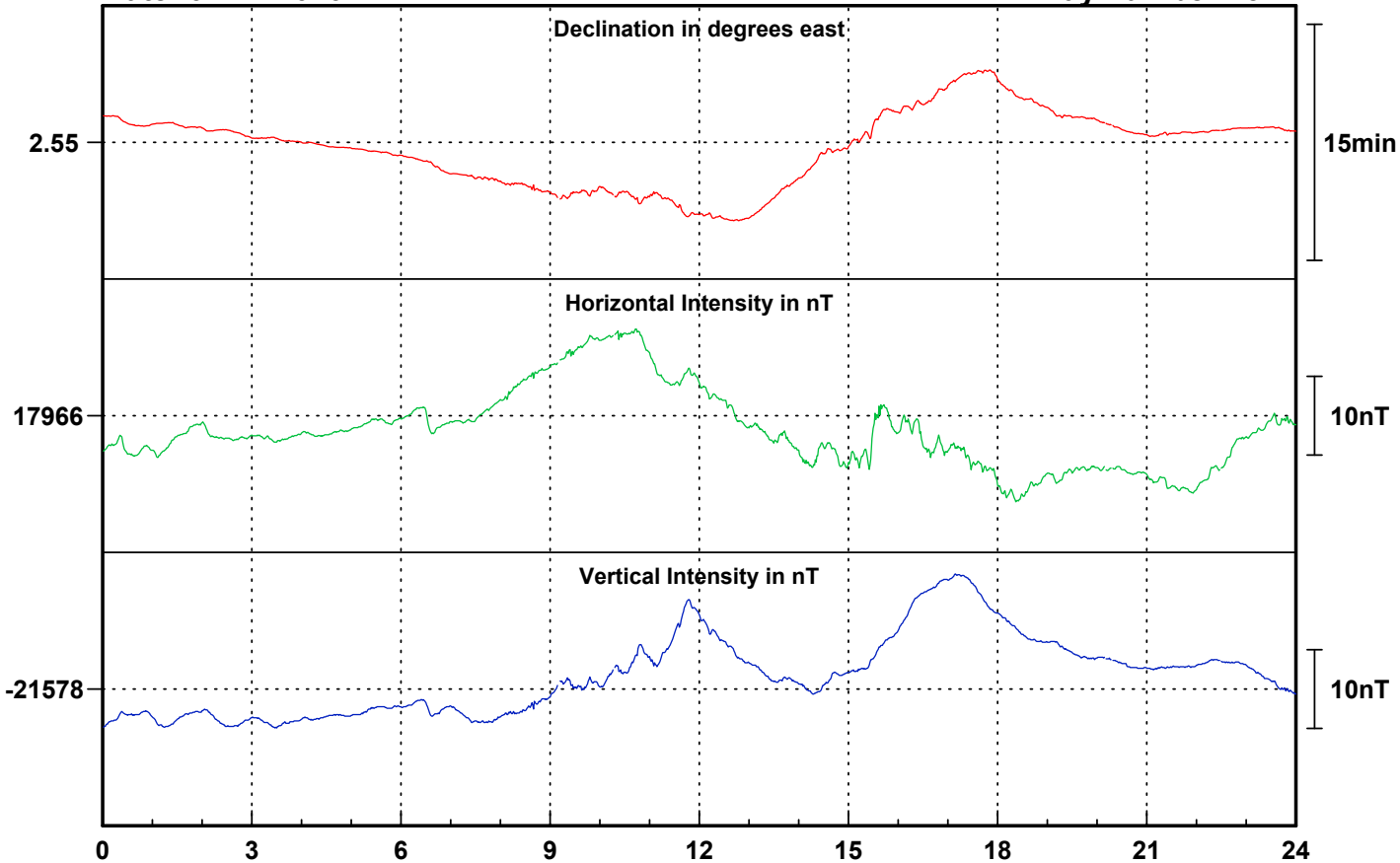
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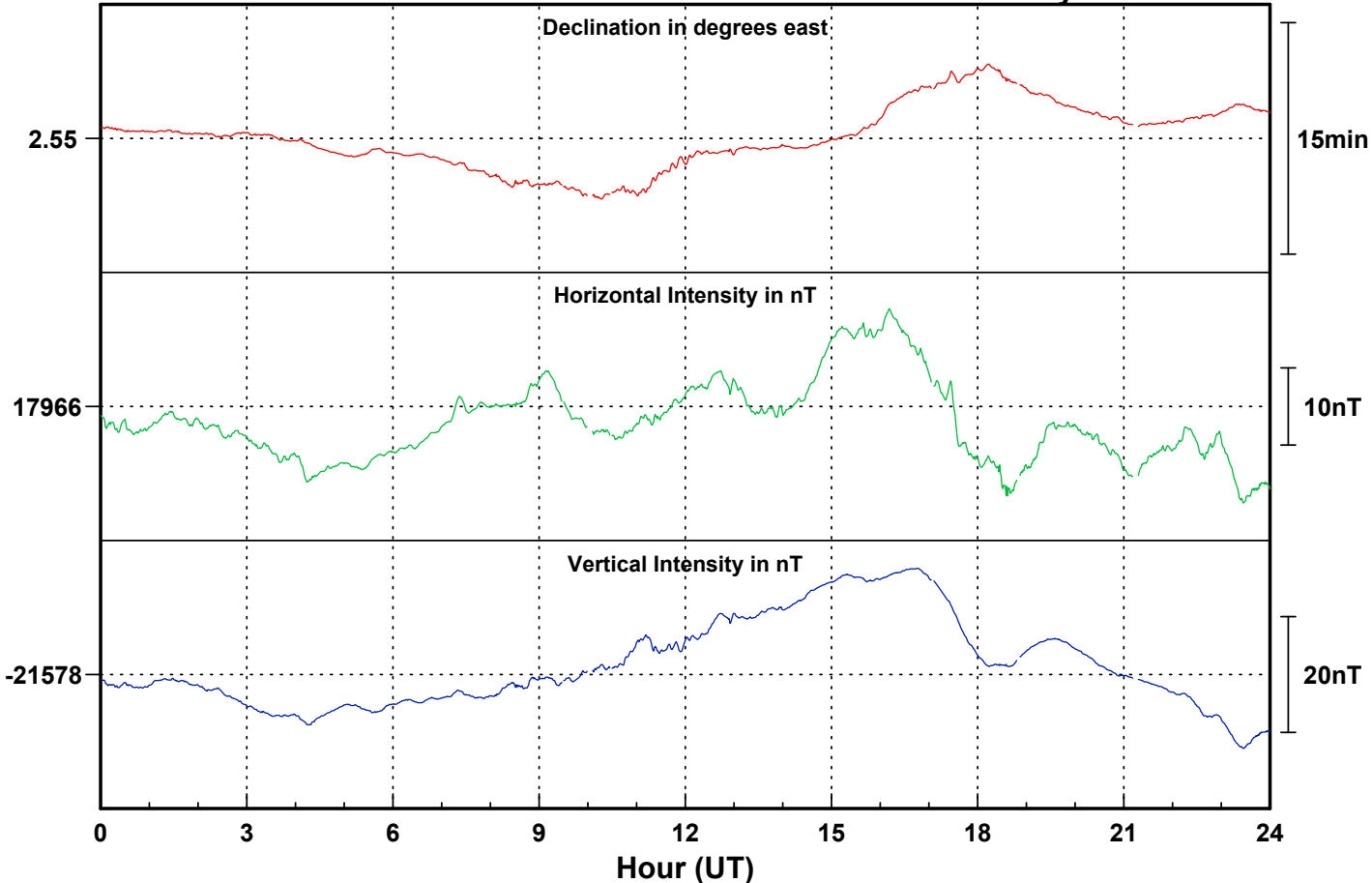
Falkland Islands

Day number: 342



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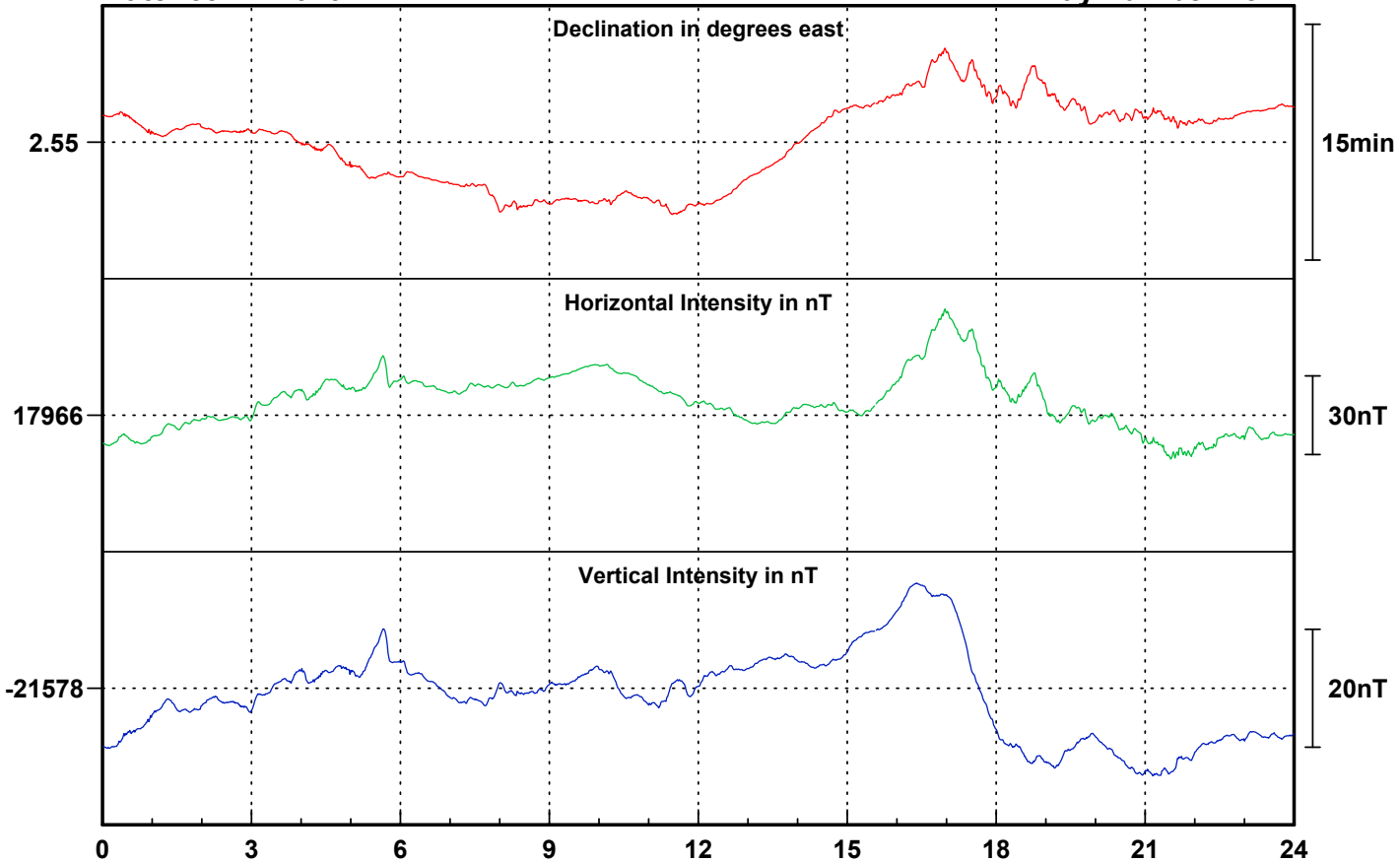
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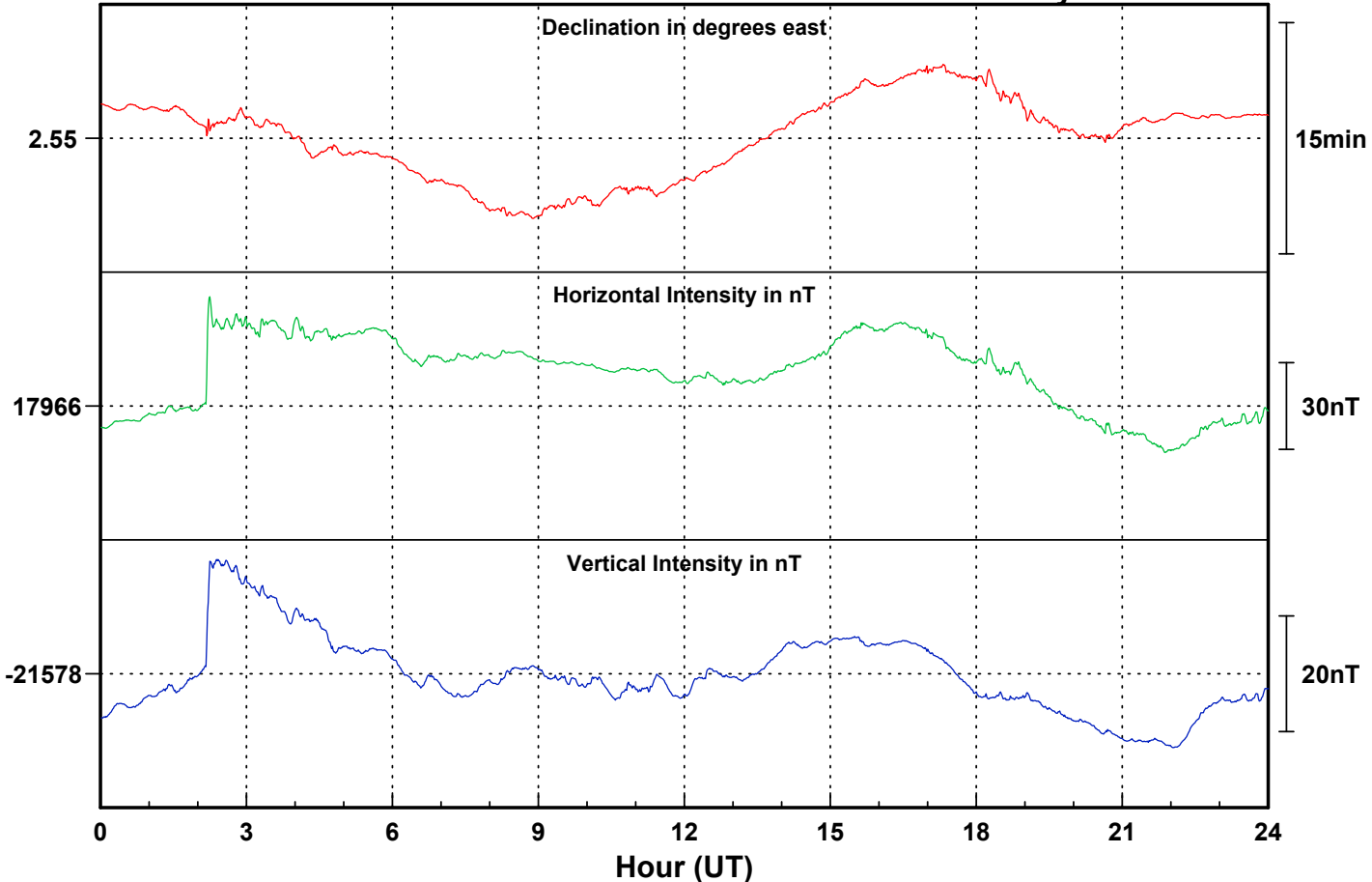
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Day number: 344



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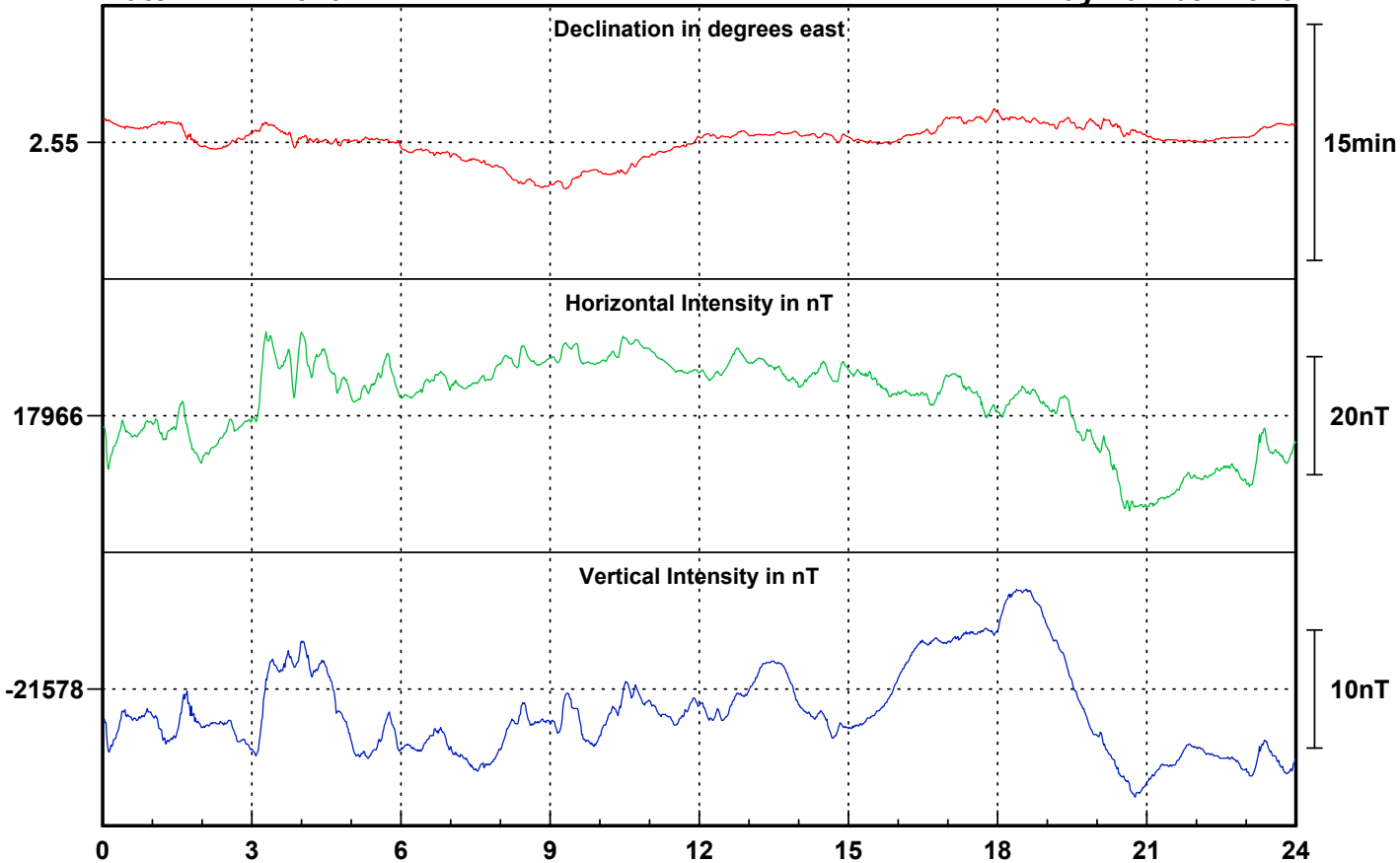
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Date: 11-12-2020

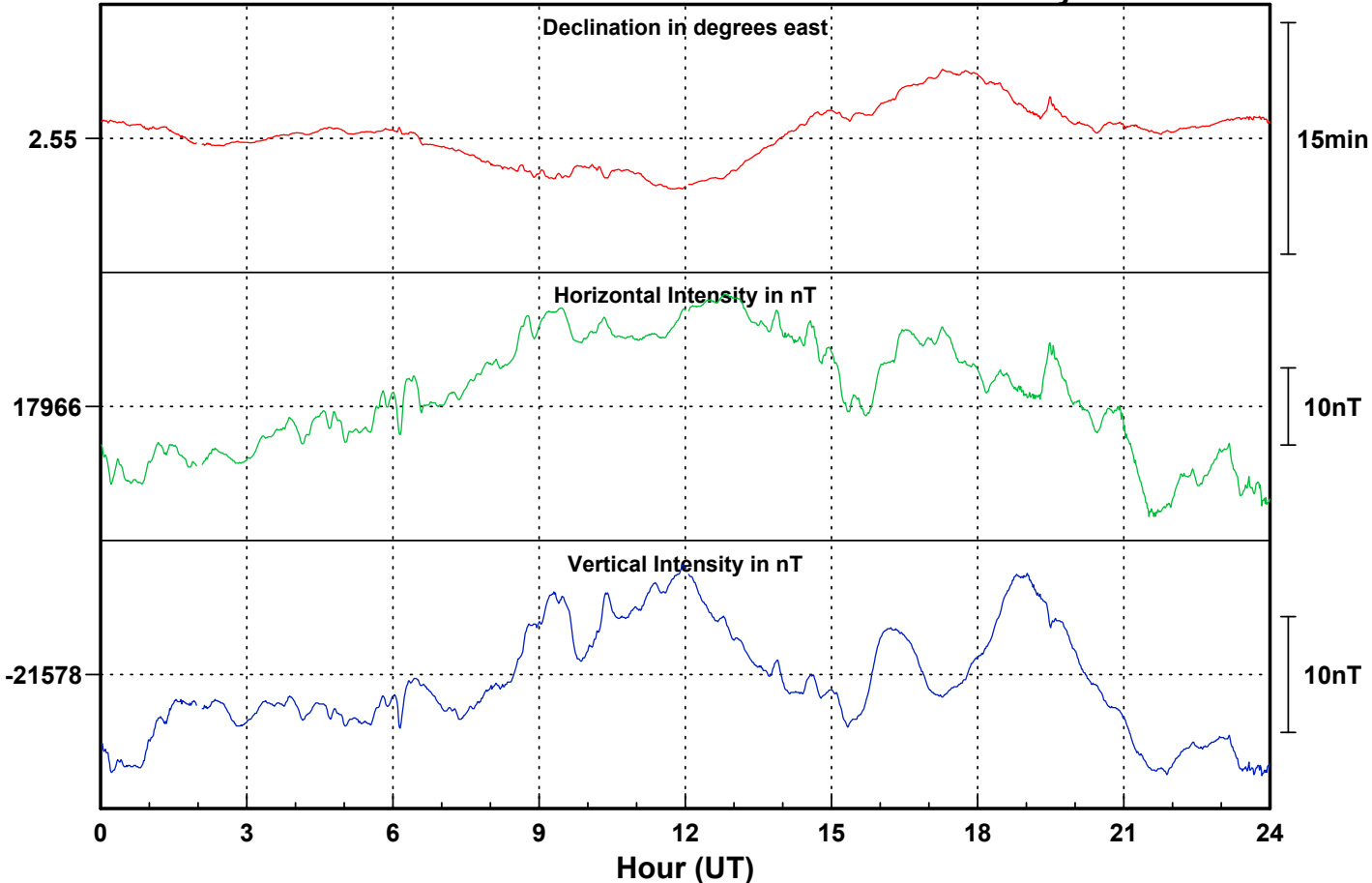
Falkland Islands

Day number: 346



Date: 12-12-2020

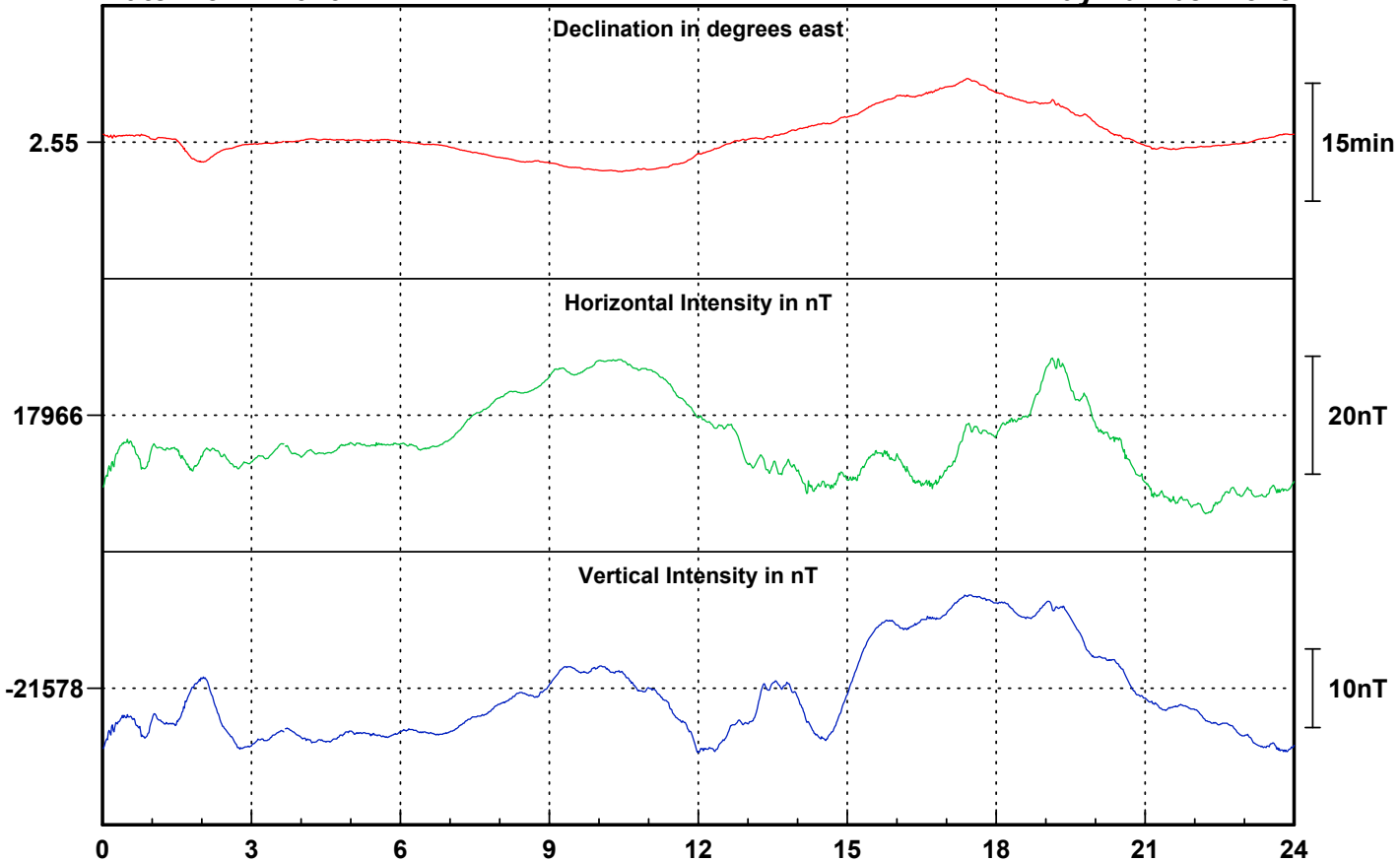
Day number: 347



Date: 13-12-2020

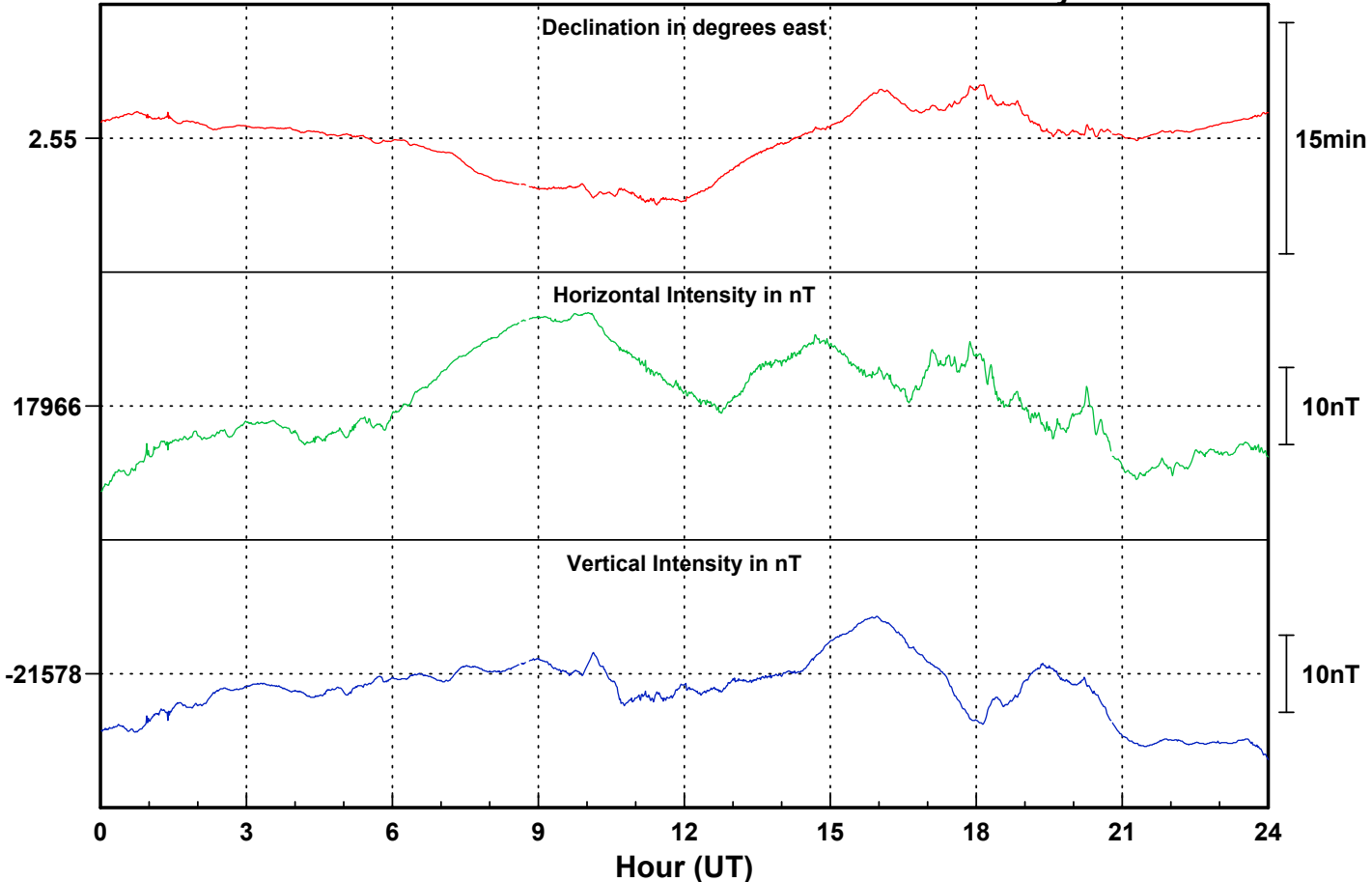
Falkland Islands

Day number: 348



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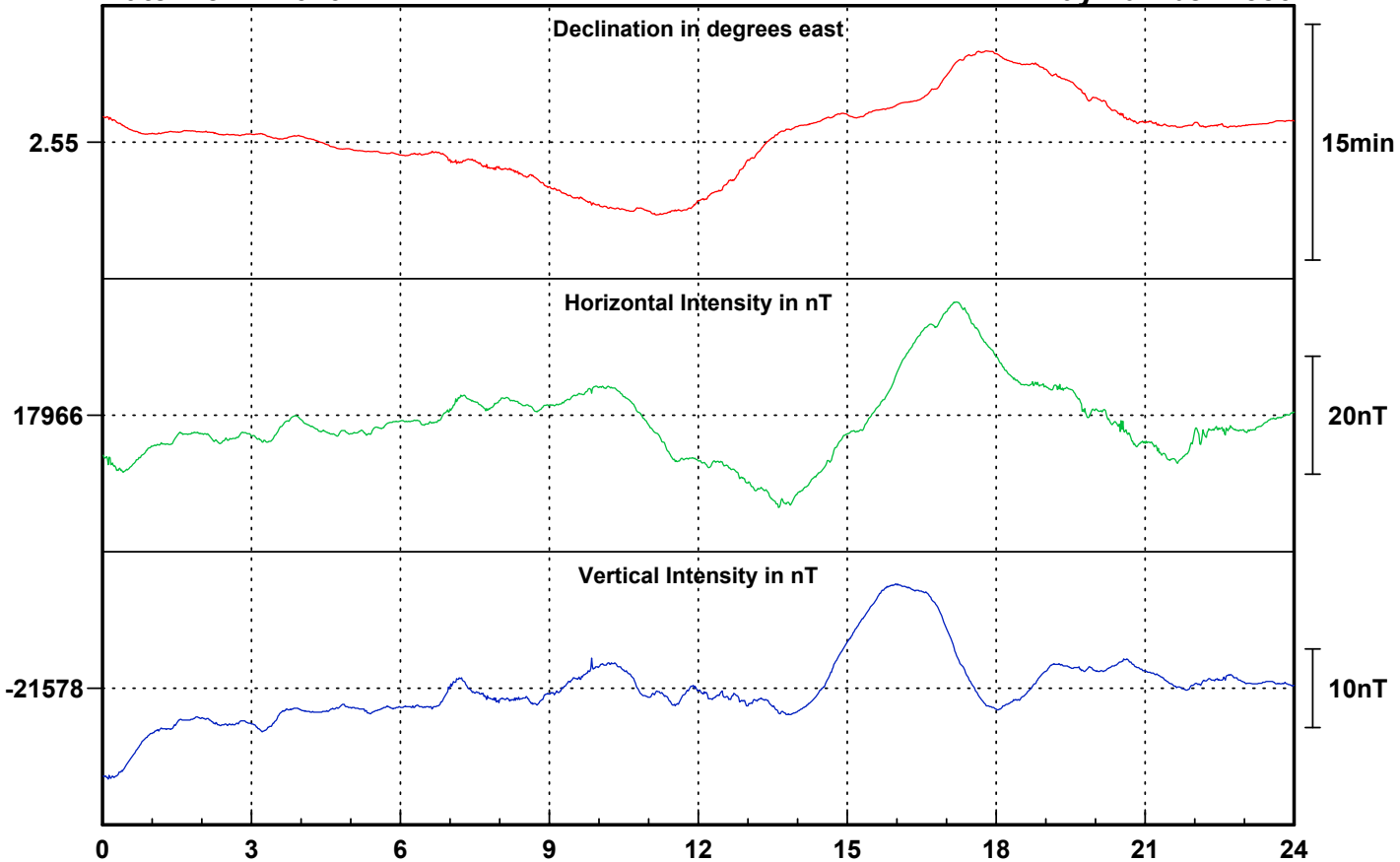
Day number: 349



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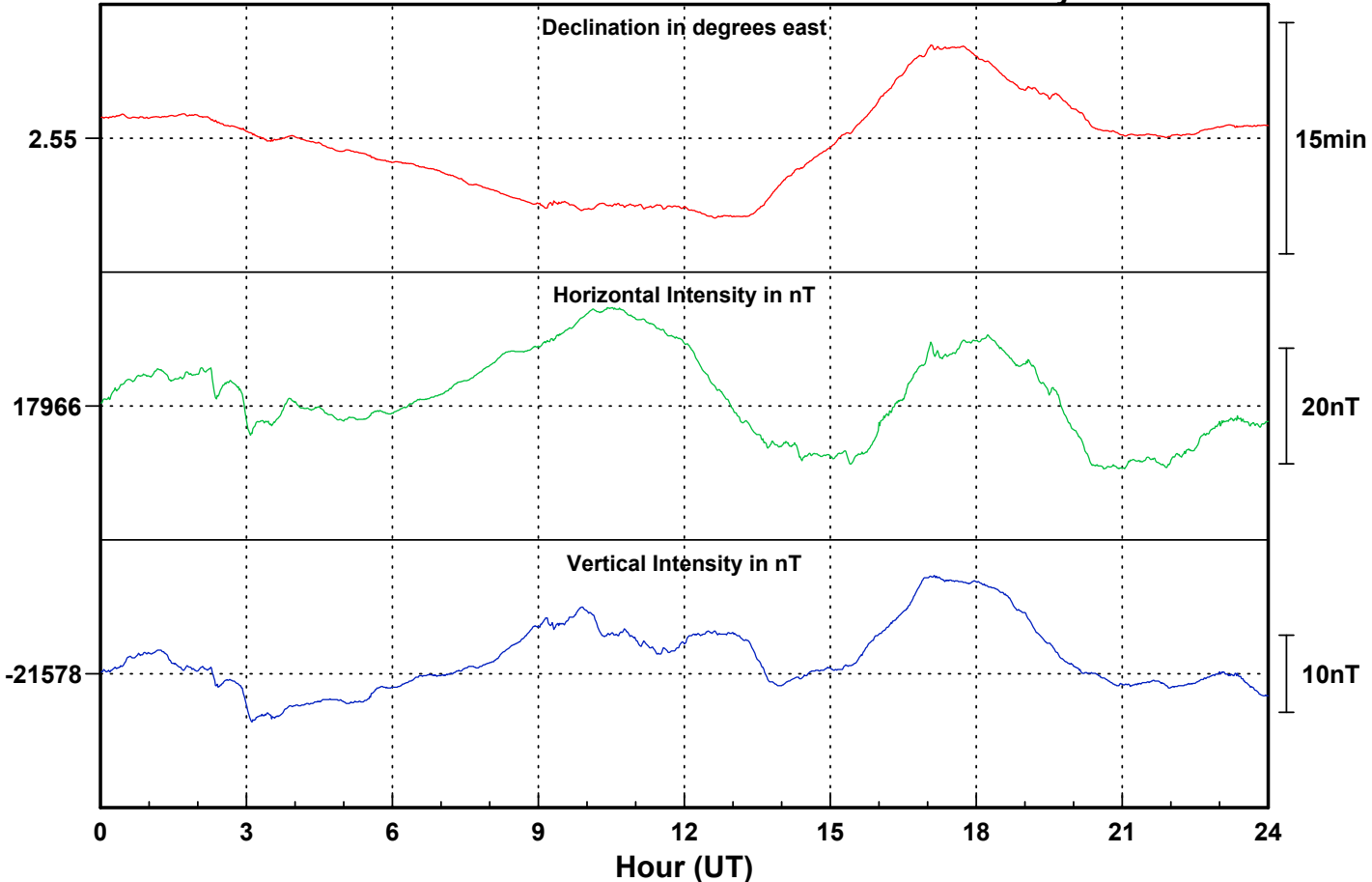
Falkland Islands

Day number: 350



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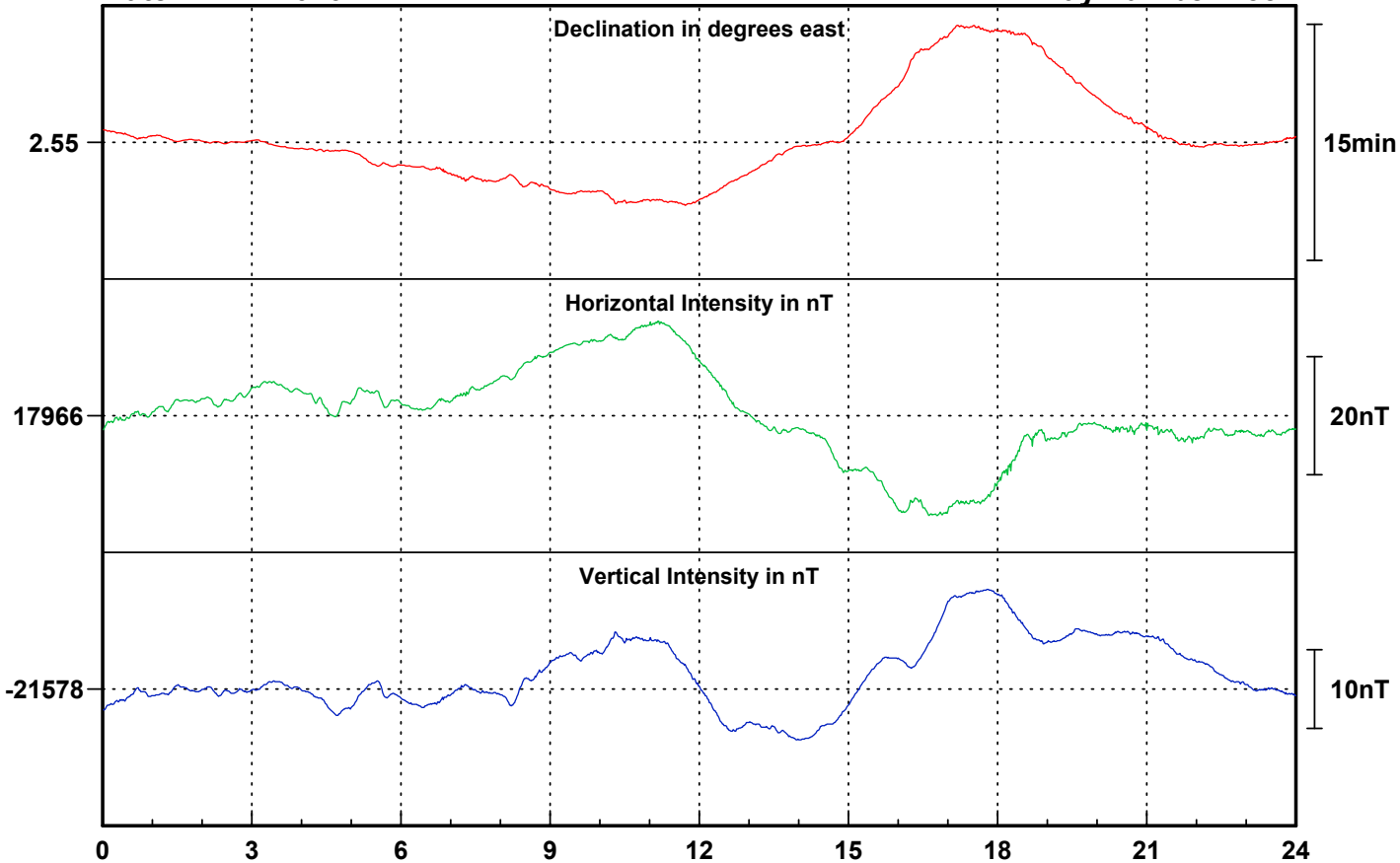
Day number: 351



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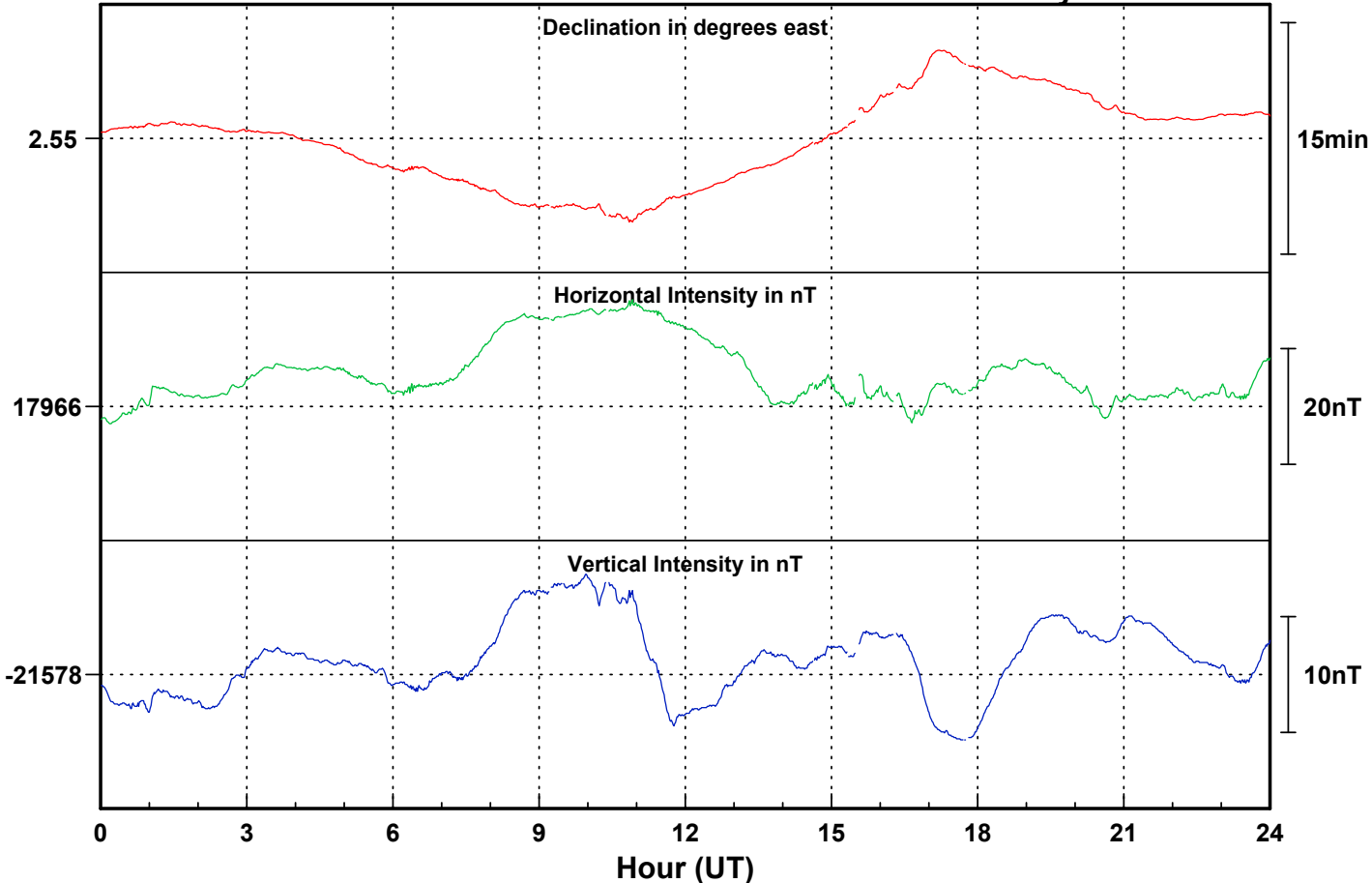
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Day number: 352



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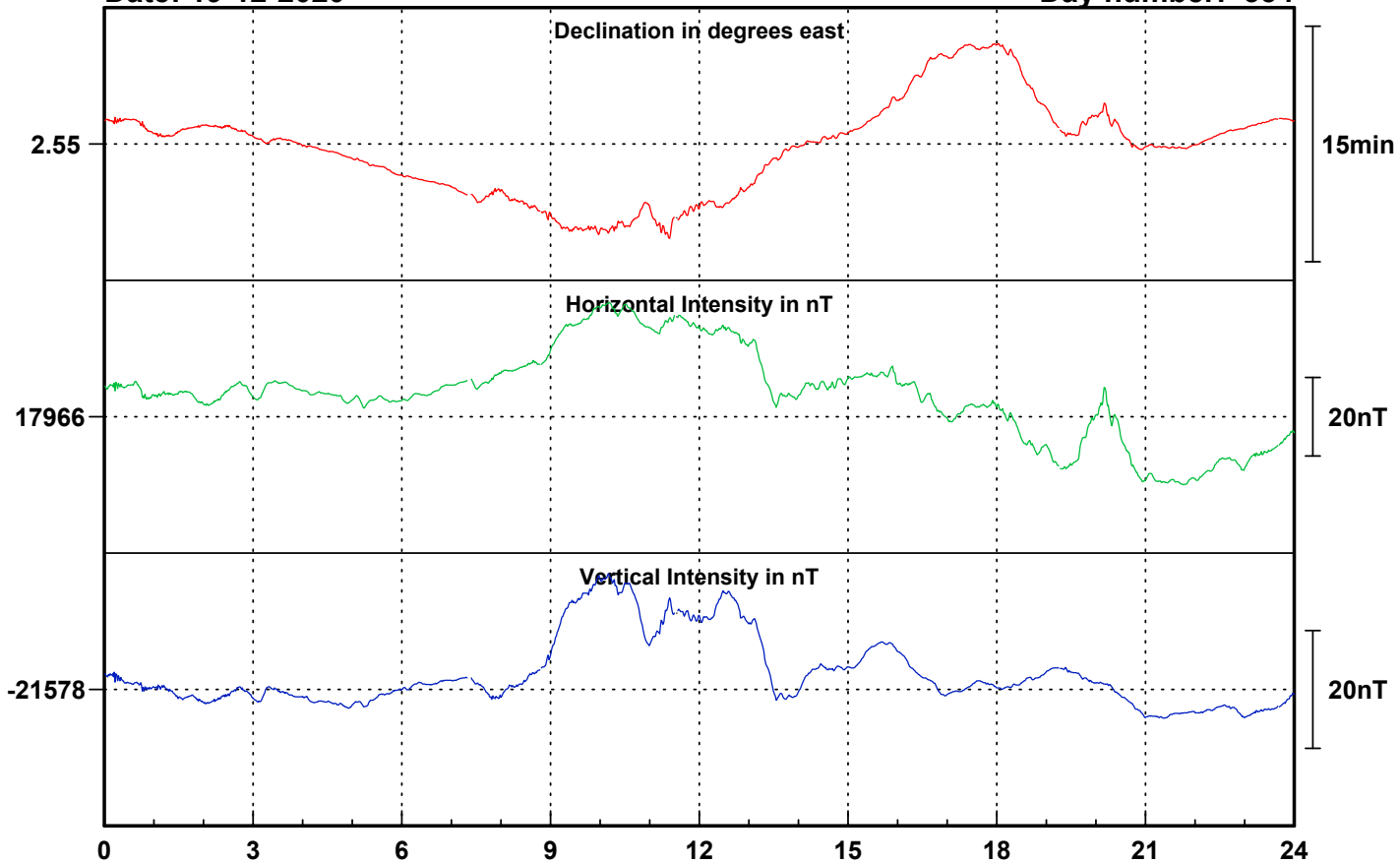
Day number: 353



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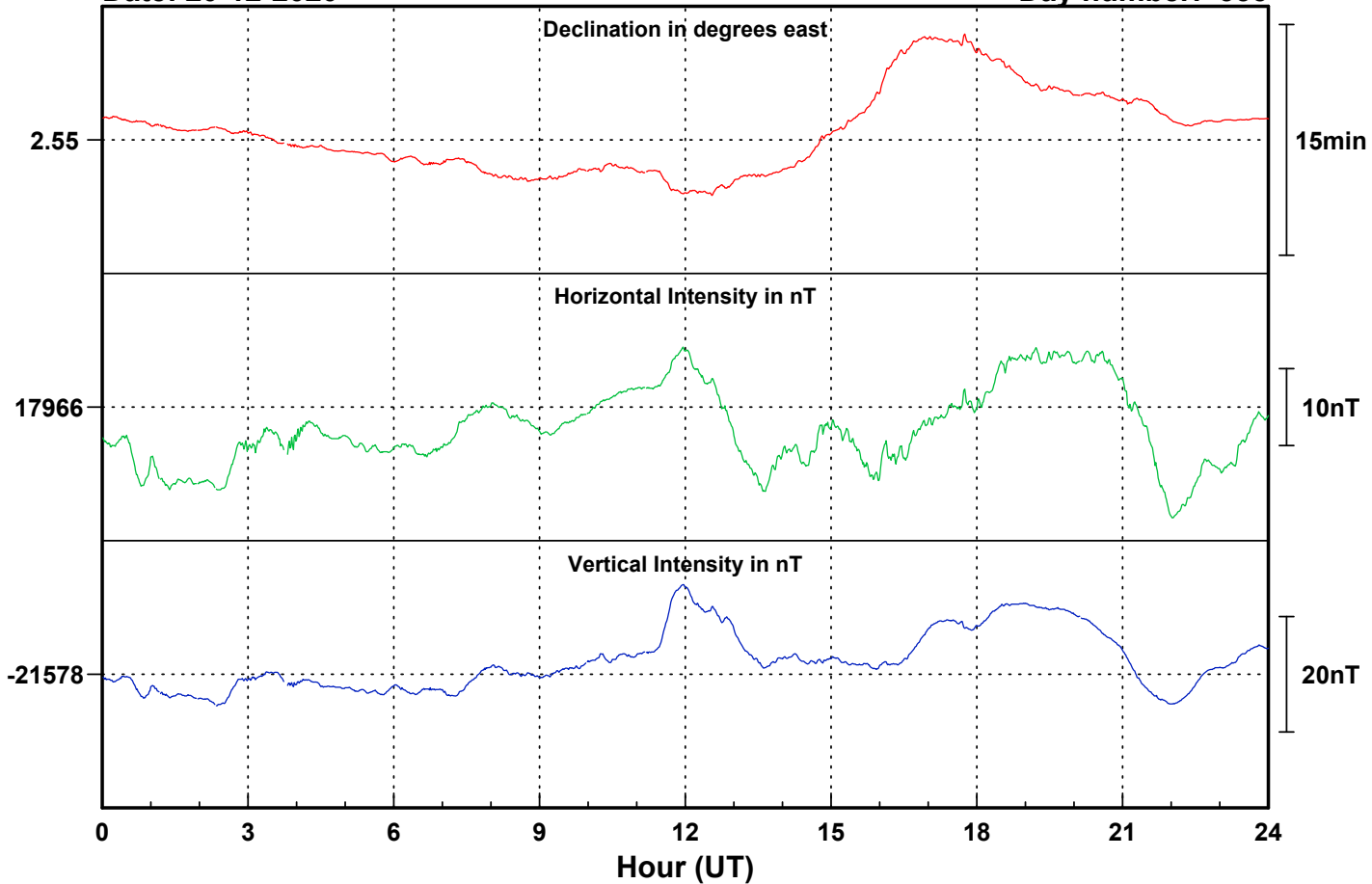
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Day number: 354



Date: 20-12-2020

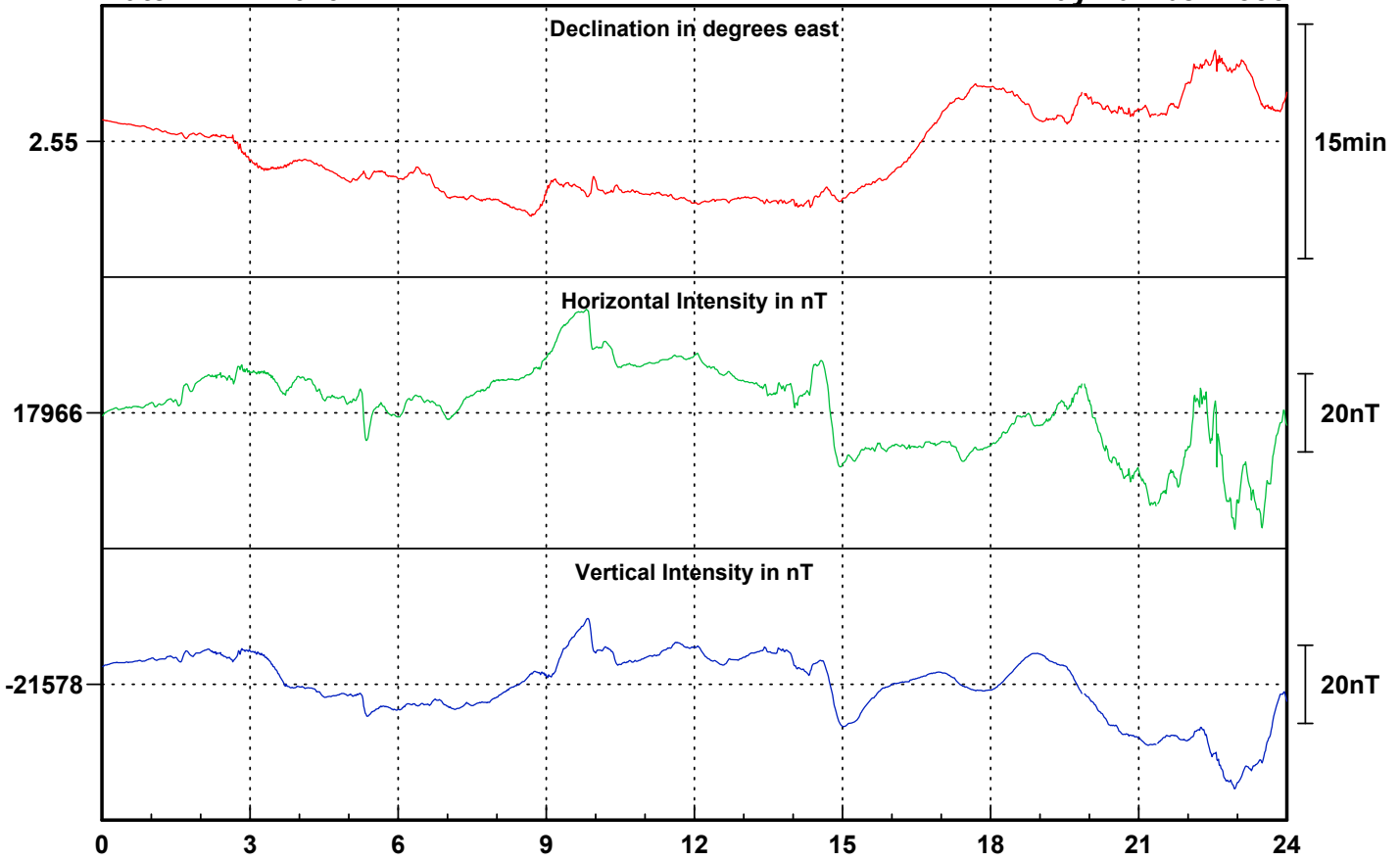
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Date: 21-12-2020

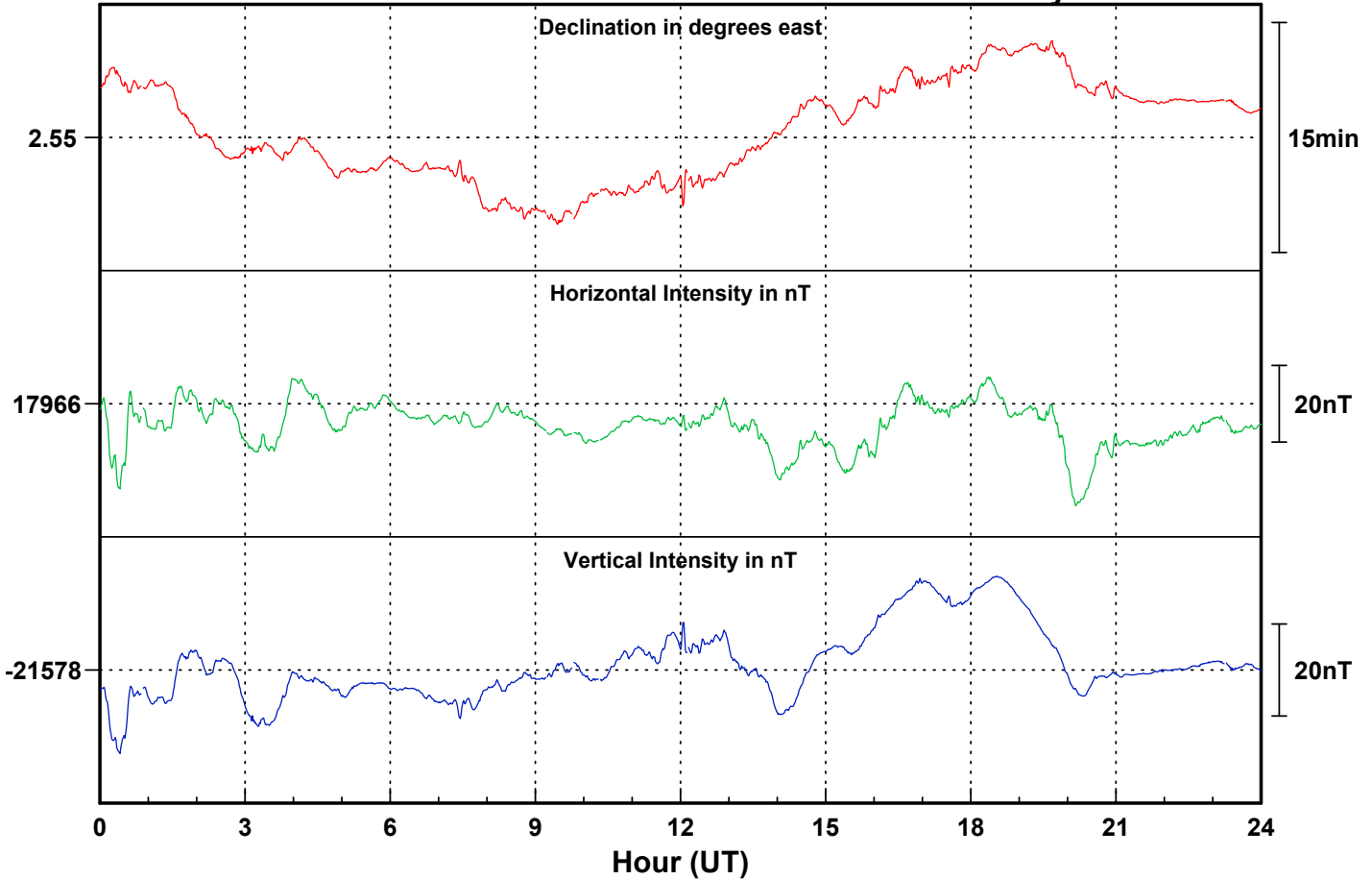
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Day number: 356



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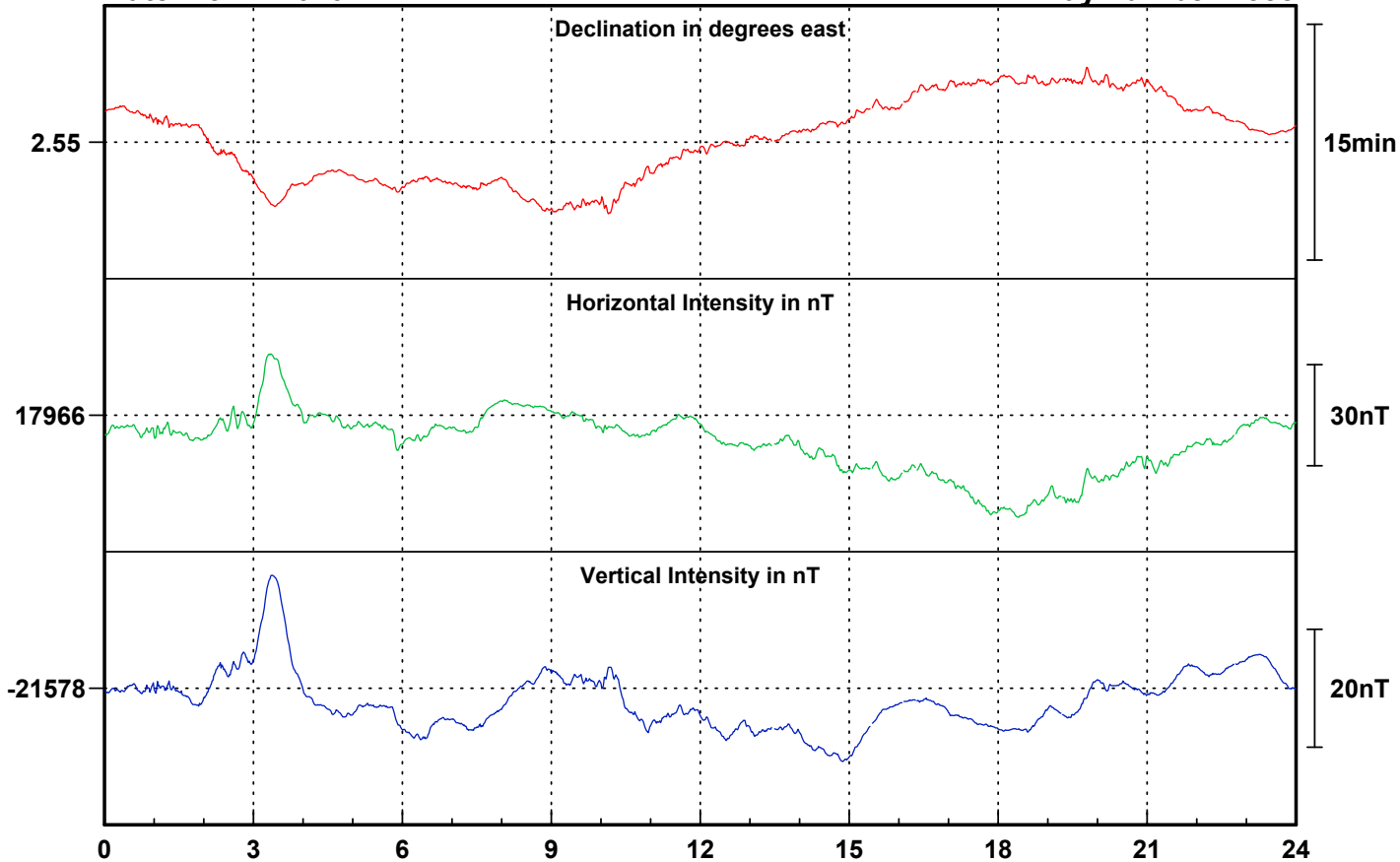
Day number: 357



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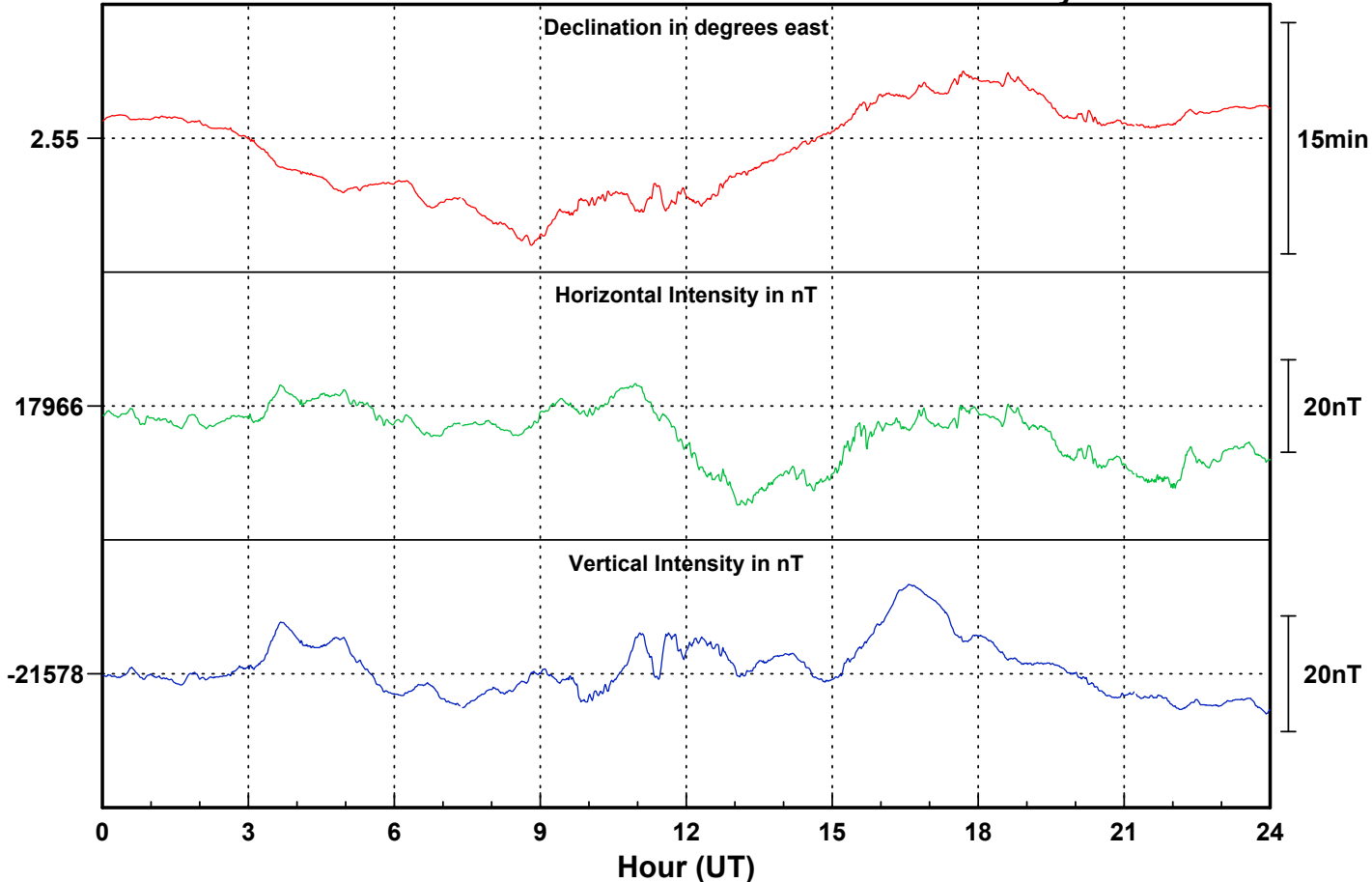
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Day number: 358



Date: 24-12-2020

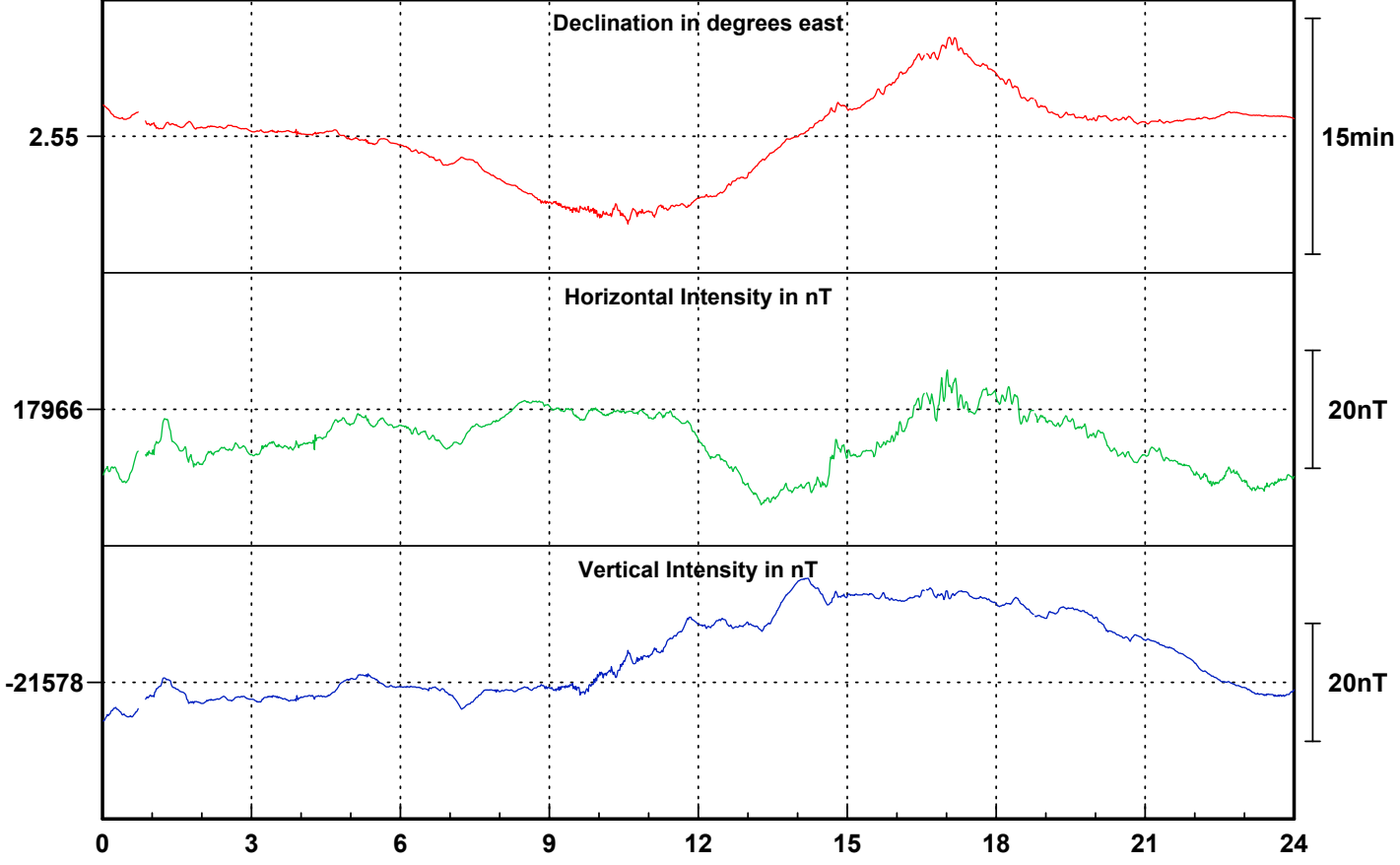
Day number: 359



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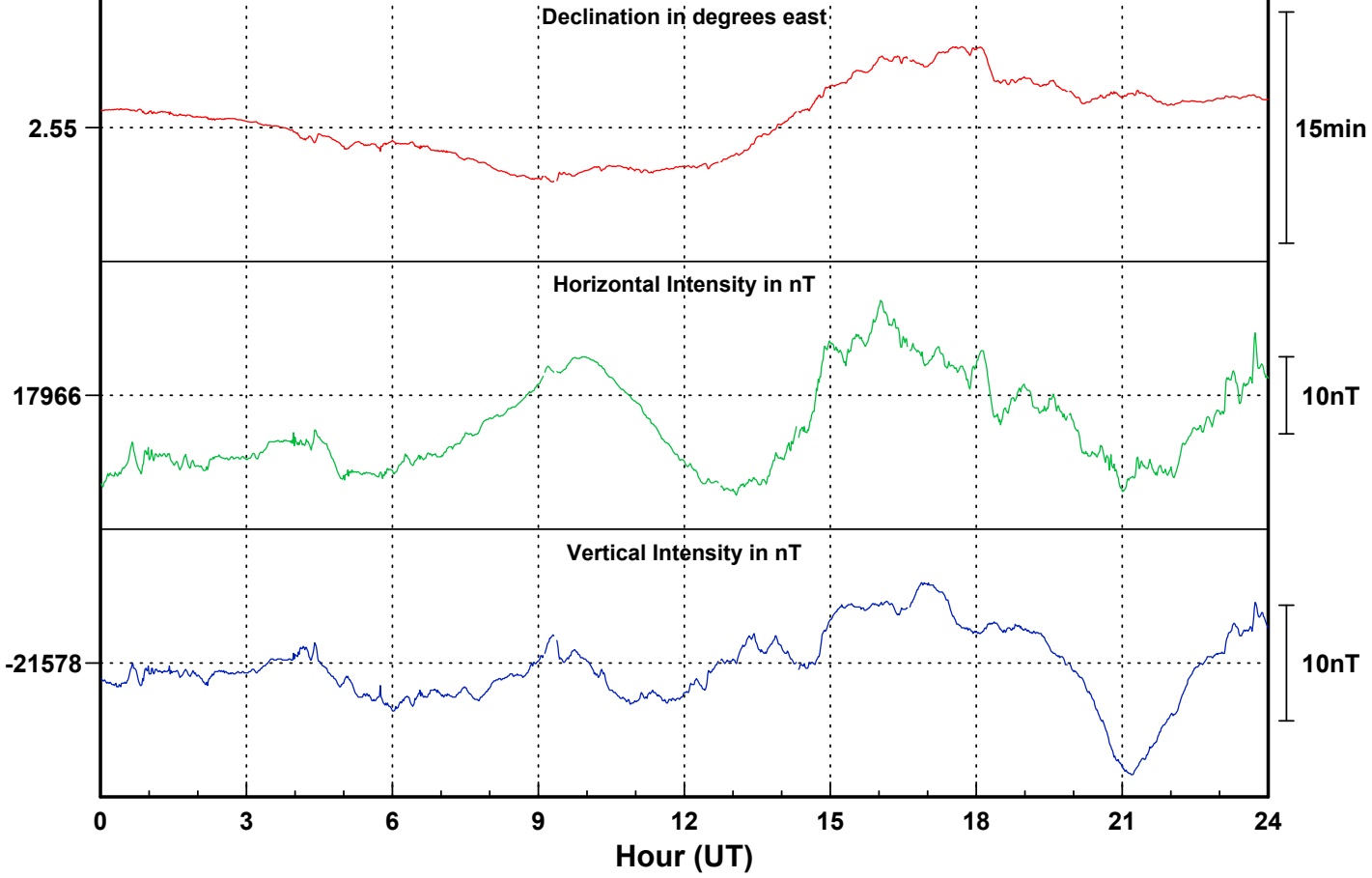
Falkland Islands

Day number: 360



Date: 26-12-2020

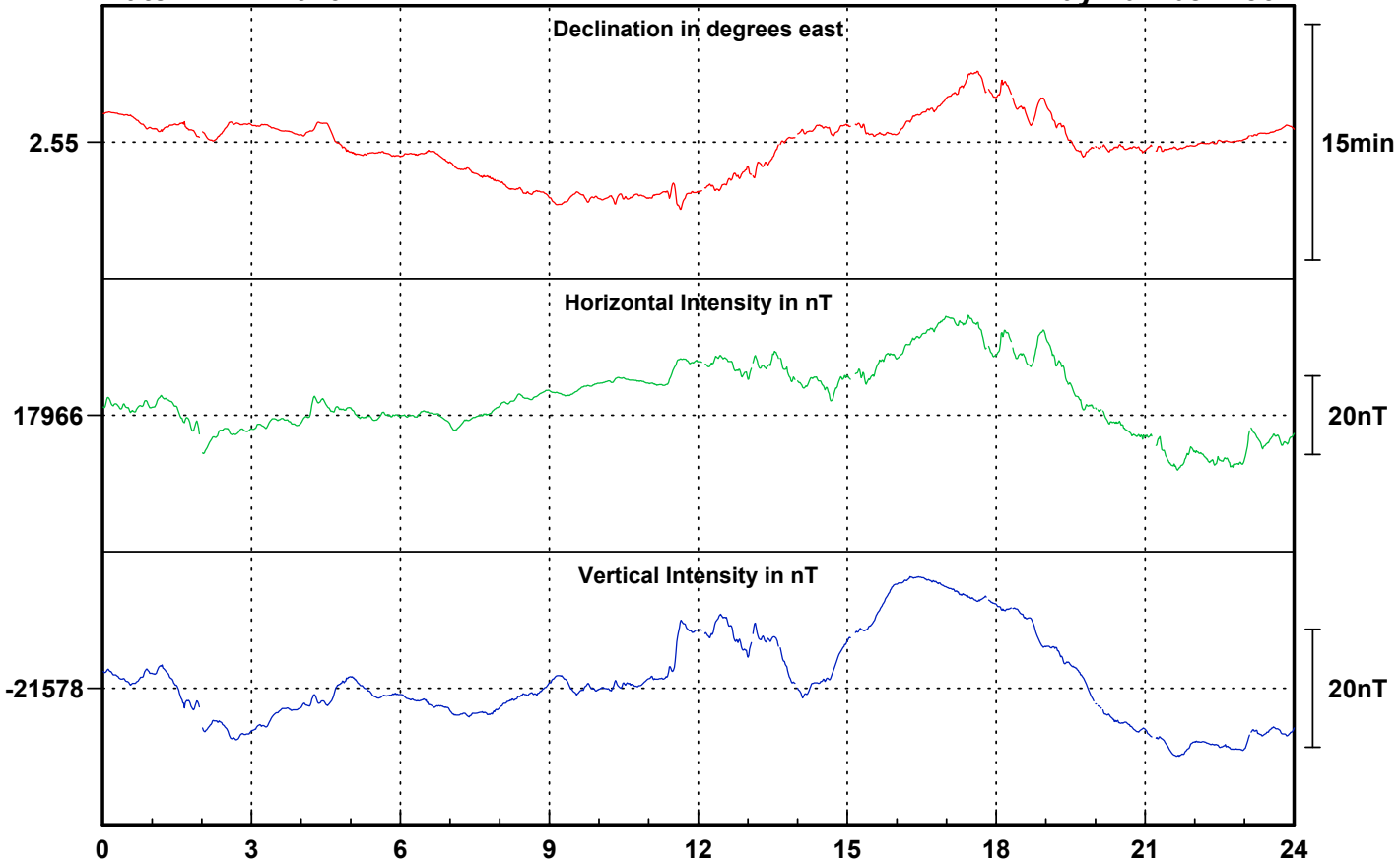
Day number: 361



Date: 27-12-2020

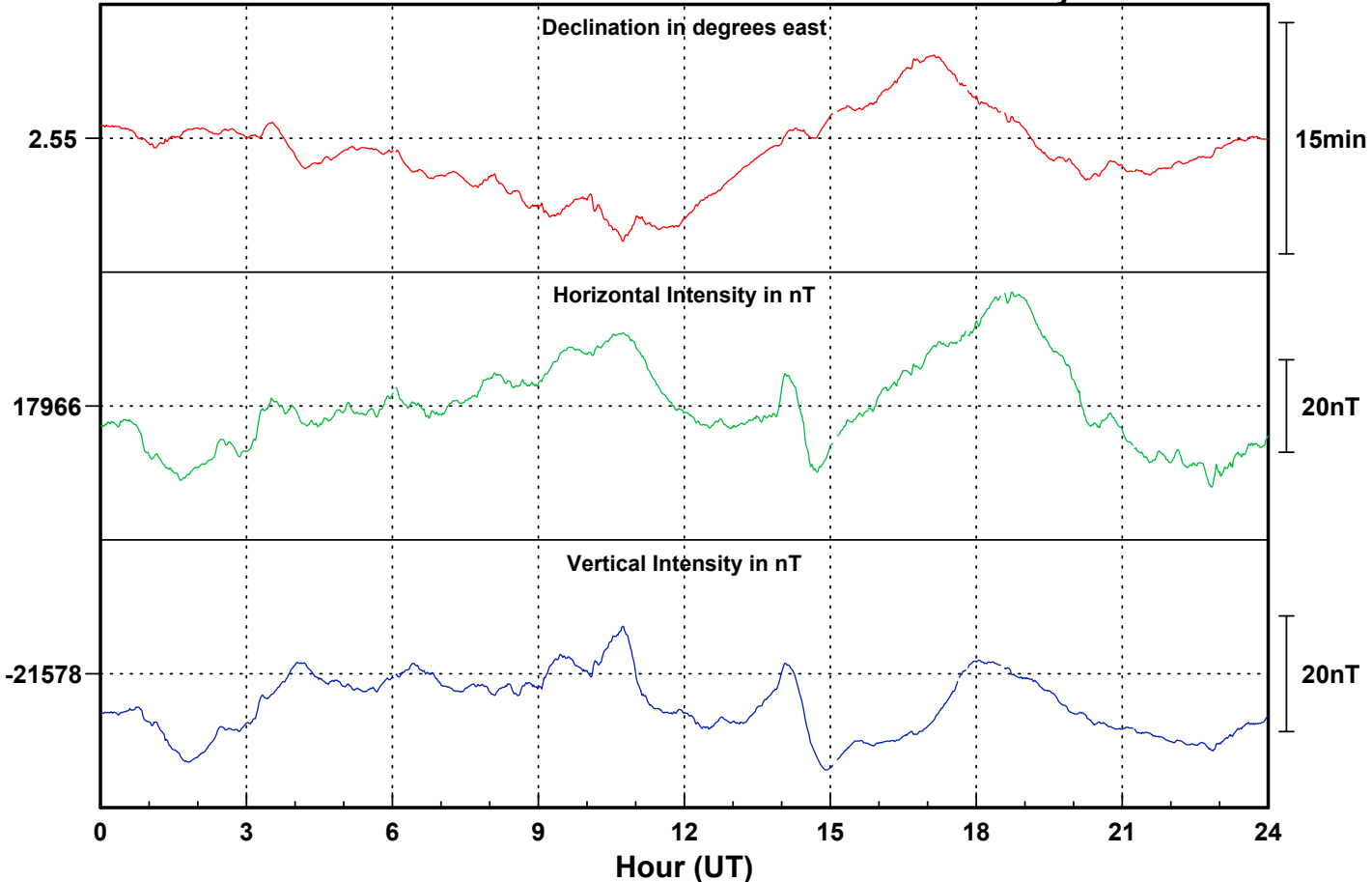
Falkland Islands

Day number: 362



Date: 28-12-2020

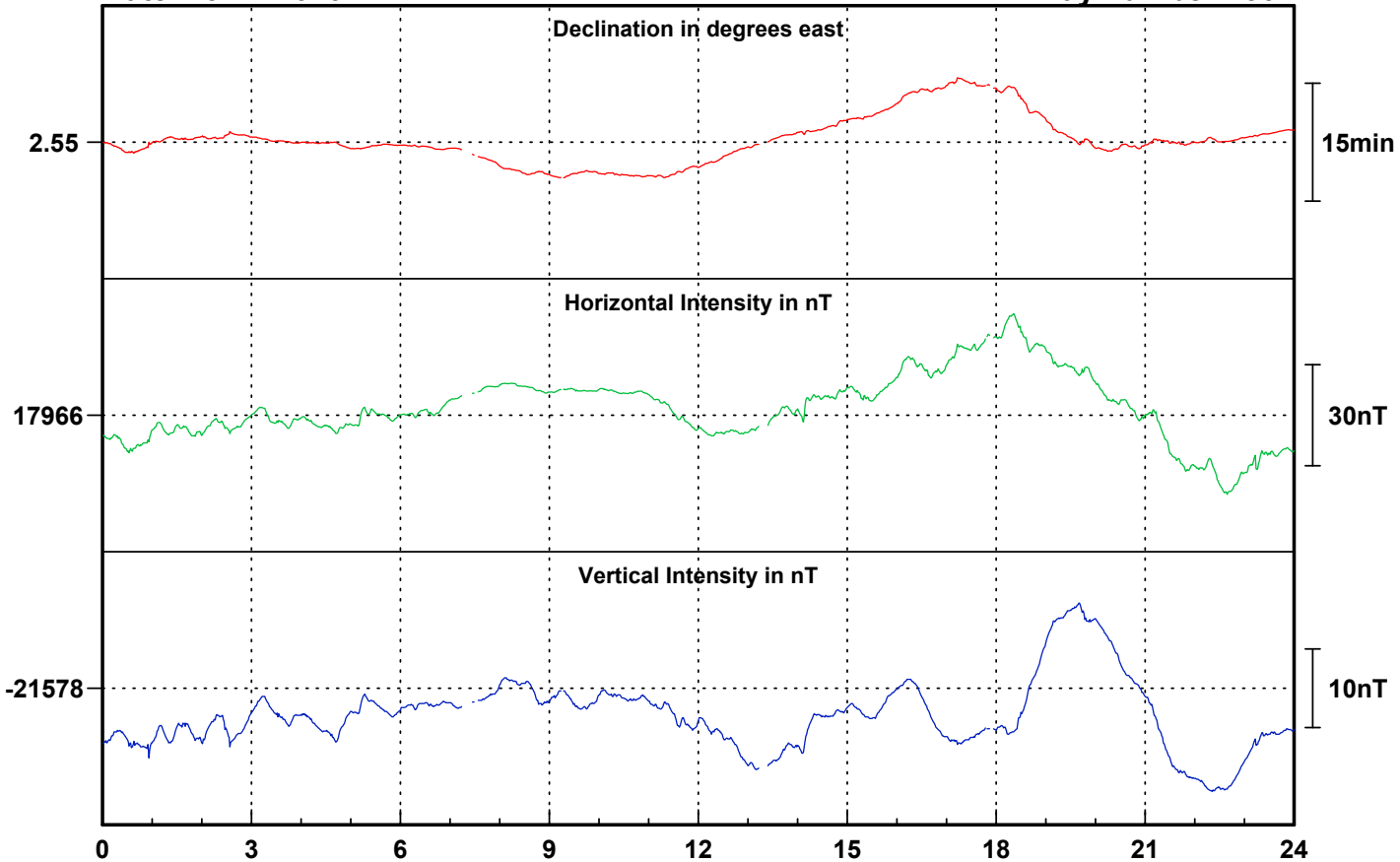
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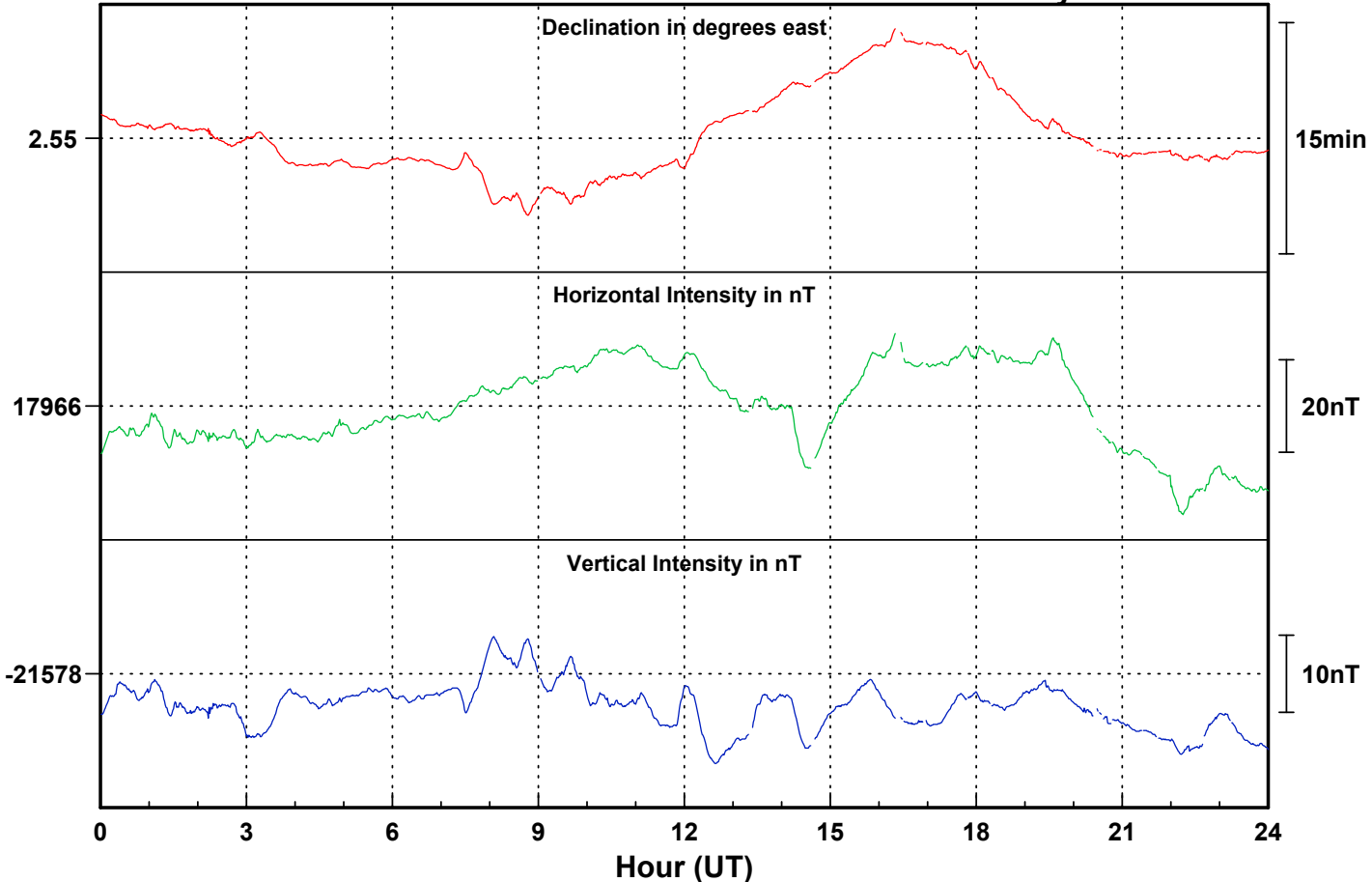
Falkland Islands

Day number: 364



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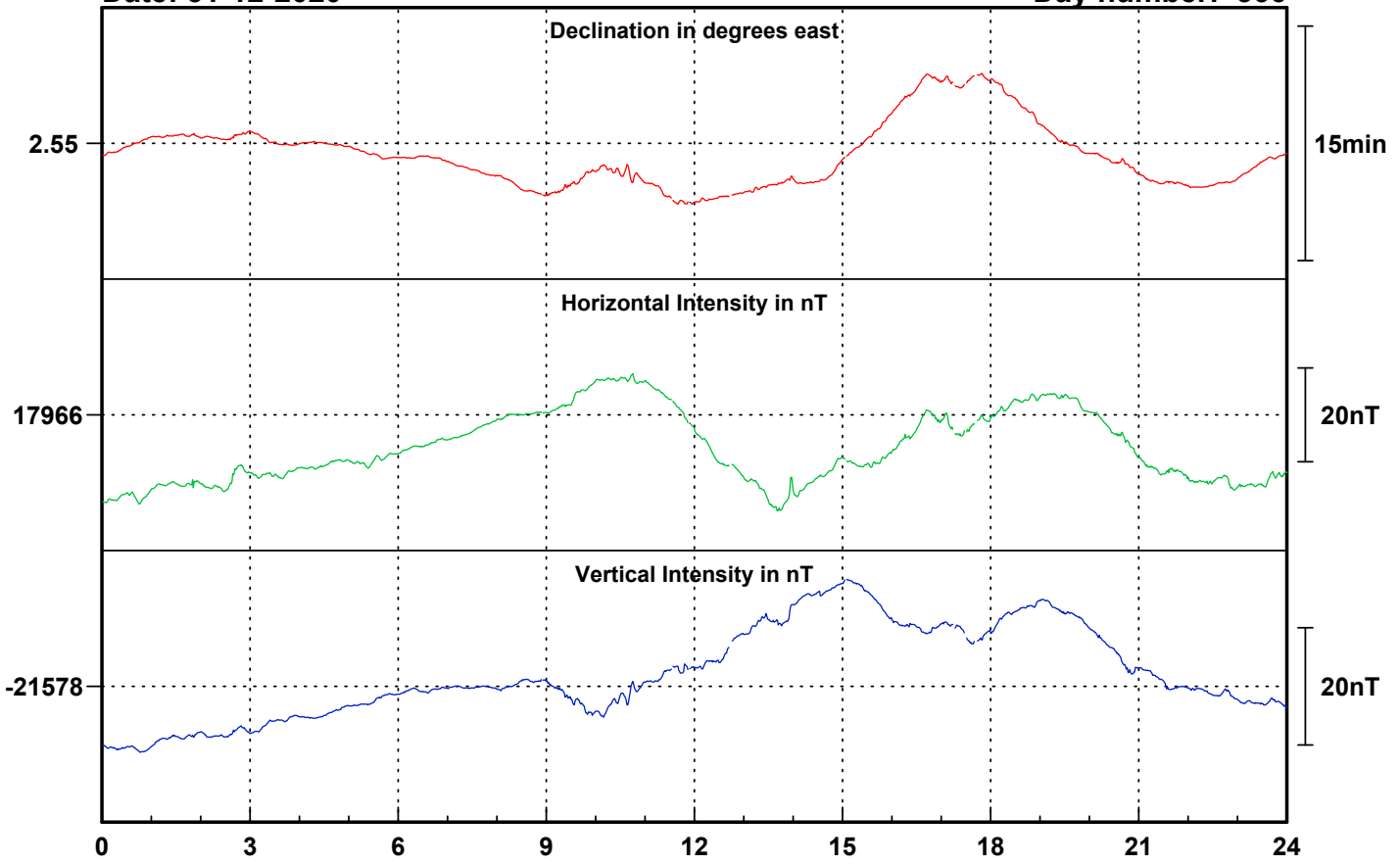
Day number: 365



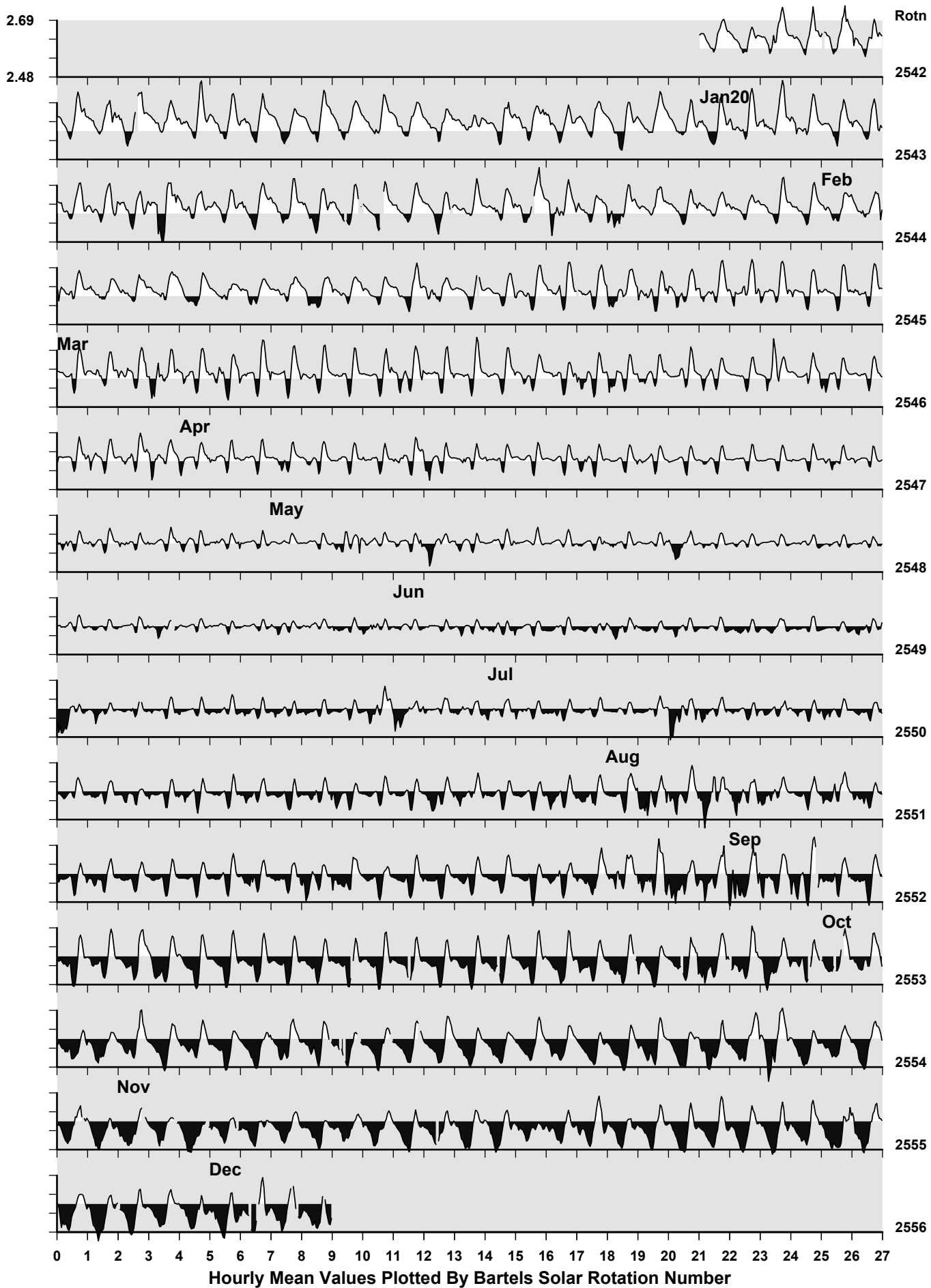
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Falkland Islands

Day number: 366

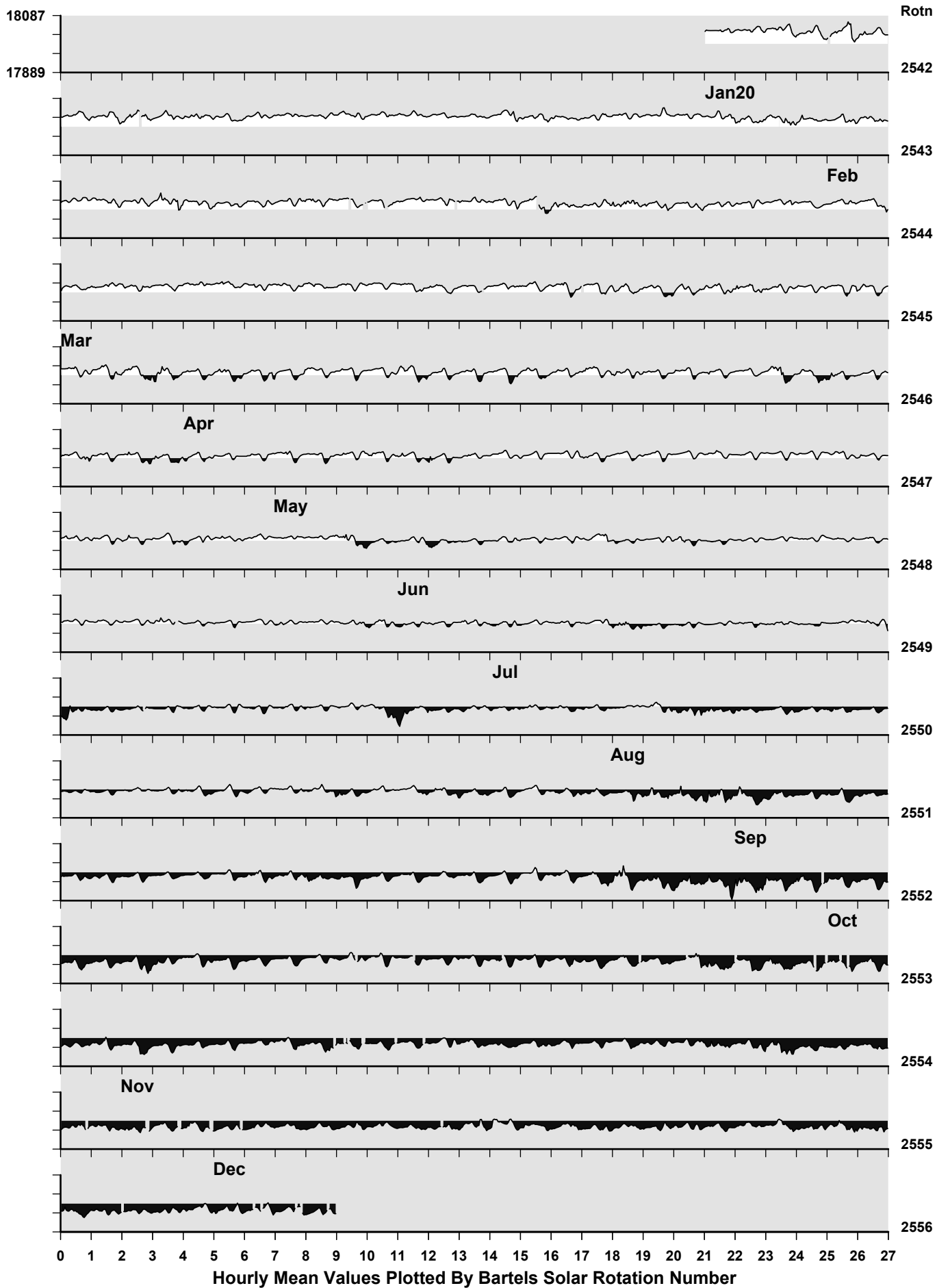


Falkland Islands Observatory: Declination (degrees)



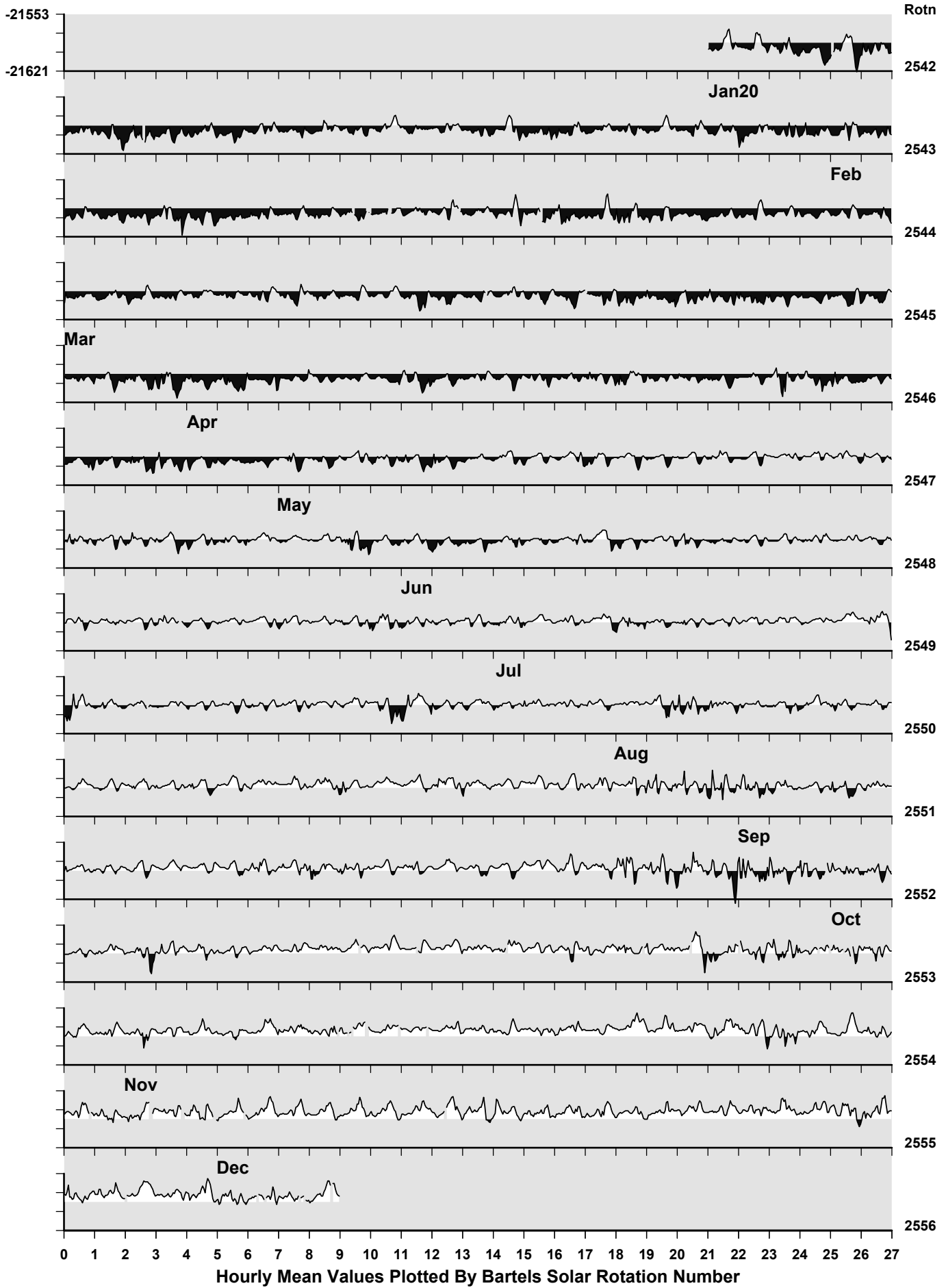
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Horizontal Intensity (nT)



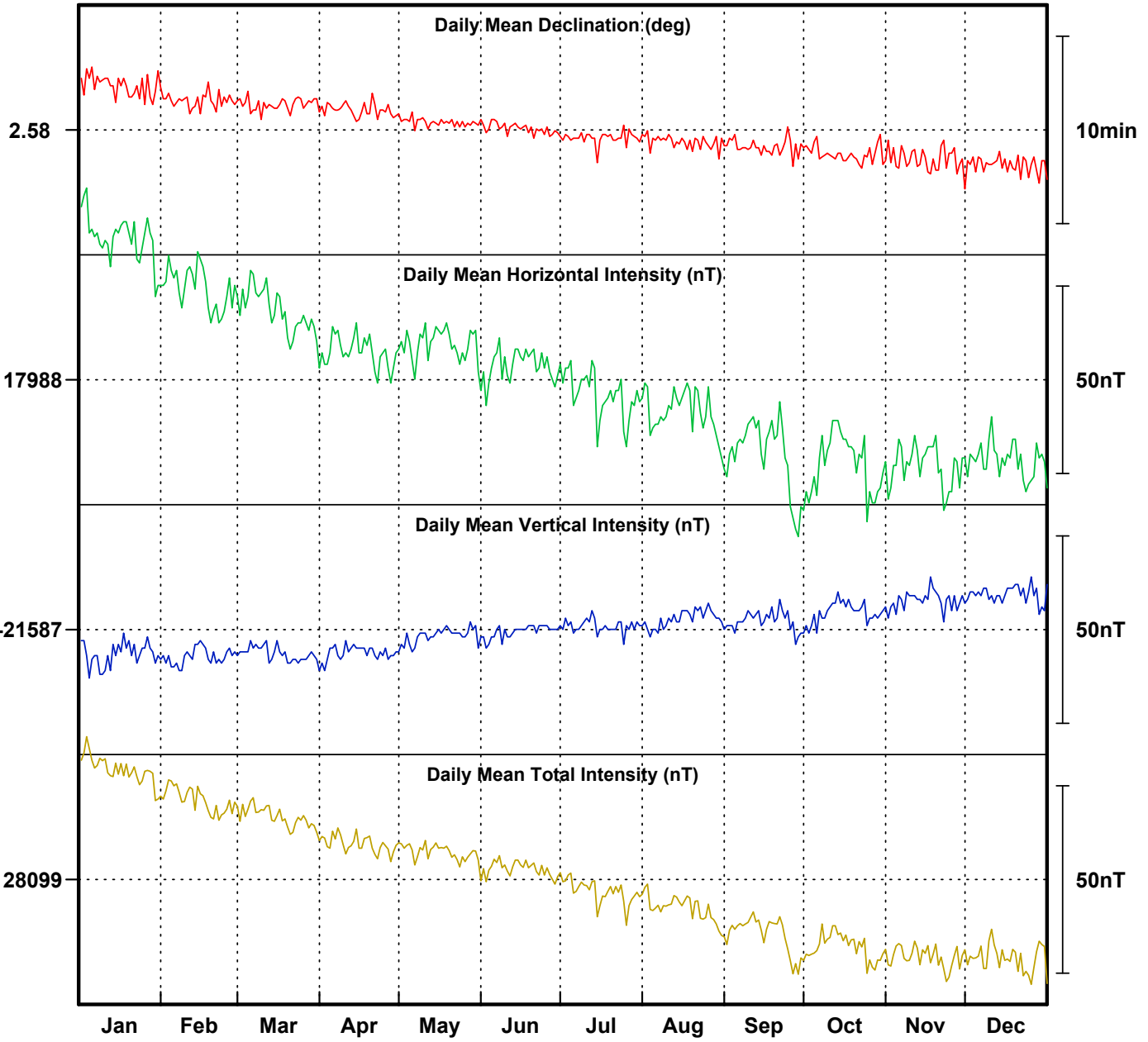
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falklands Is Observatory 2020



Monthly Mean Values for Port Stanley Observatory 2020

| Month | <i>D</i> | <i>H</i> | <i>I</i> | <i>X</i> | <i>Y</i> | <i>Z</i> | <i>F</i> |
|-----------|----------|----------|------------|----------|----------|-----------|----------|
| January | 2° 37.4′ | 18026 nT | -50° 08.8′ | 18007 nT | 825 nT | -21594 nT | 28128 nT |
| February | 2° 36.6′ | 18012 nT | -50° 10.1′ | 17994 nT | 820 nT | -21594 nT | 28120 nT |
| March | 2° 36.4′ | 18006 nT | -50° 10.6′ | 17987 nT | 819 nT | -21594 nT | 28116 nT |
| April | 2° 36.1′ | 17995 nT | -50° 11.6′ | 17977 nT | 817 nT | -21593 nT | 28109 nT |
| May | 2° 35.5′ | 17997 nT | -50° 11.1′ | 17979 nT | 814 nT | -21589 nT | 28106 nT |
| June | 2° 35.1′ | 17992 nT | -50° 11.5′ | 17973 nT | 812 nT | -21587 nT | 28102 nT |
| July | 2° 34.6′ | 17984 nT | -50° 12.1′ | 17966 nT | 809 nT | -21586 nT | 28096 nT |
| August | 2° 34.4′ | 17979 nT | -50° 12.4′ | 17961 nT | 807 nT | -21584 nT | 28091 nT |
| September | 2° 34.1′ | 17968 nT | -50° 13.5′ | 17950 nT | 805 nT | -21585 nT | 28084 nT |
| October | 2° 33.7′ | 17966 nT | -50° 13.5′ | 17948 nT | 803 nT | -21582 nT | 28081 nT |
| November | 2° 33.5′ | 17965 nT | -50° 13.3′ | 17947 nT | 802 nT | -21579 nT | 28079 nT |
| December | 2° 33.2′ | 17966 nT | -50° 13.1′ | 17948 nT | 800 nT | -21578 nT | 28078 nT |

Note

i. The values shown here are provisional.