

**BRITISH GEOLOGICAL SURVEY**

# **Port Stanley Observatory Monthly Magnetic Bulletin**

**December 2015**

**15/12/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.

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## 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°42'16.2"S 302°06'24.9"E  
*Geomagnetic:* 42°18'36"S 012°20'56"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 12th generation International Geomagnetic Reference Field (IGRF) at epoch 2015.5. 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 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

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 Port Stanley 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)



# Port Stanley 2015

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

2.96 5min

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

18454 20nT

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

-21700 20nT

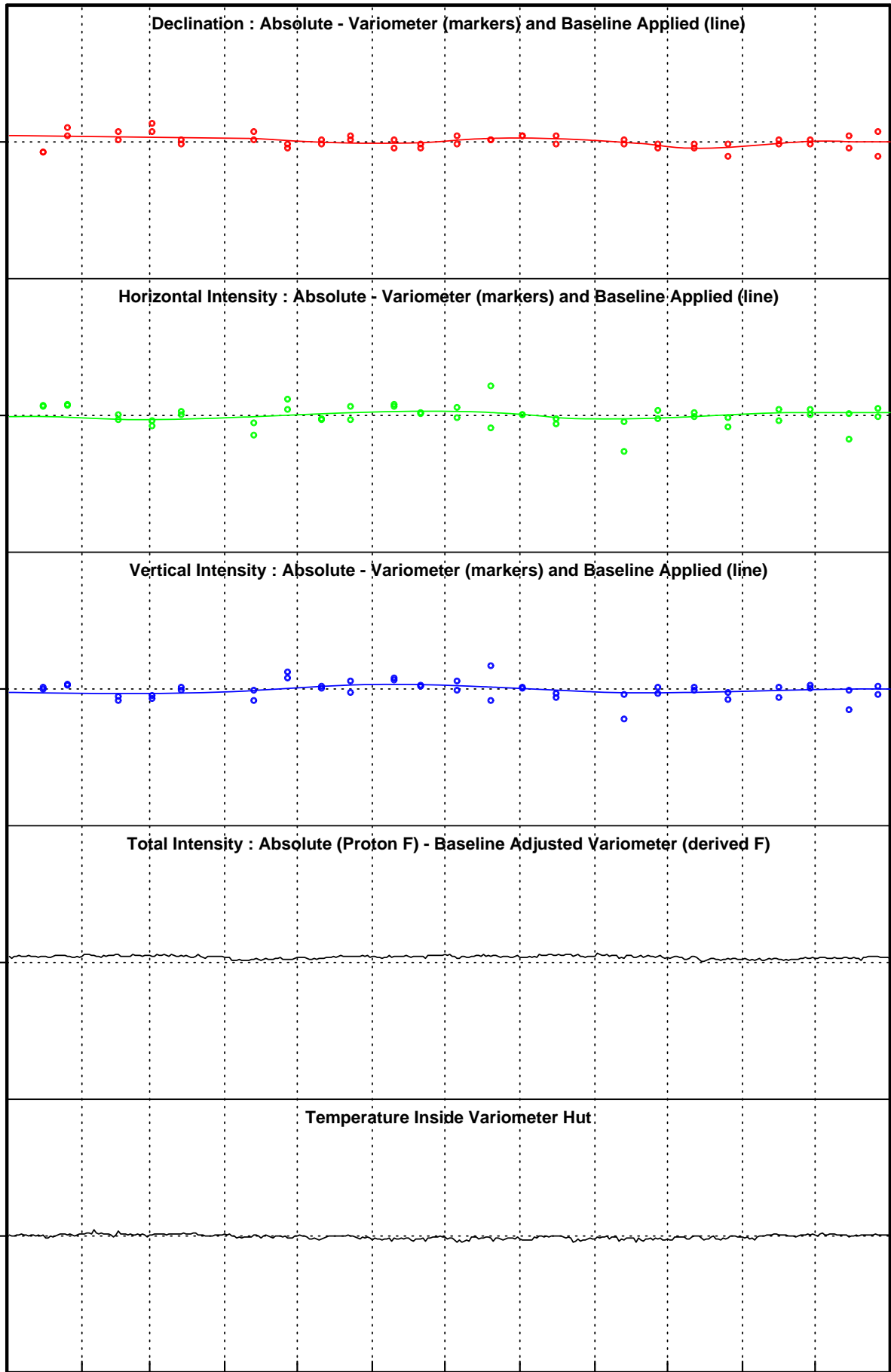
Total Intensity : Absolute (Proton F) - Baseline Adjusted Variometer (derived F)

9.1 20nT

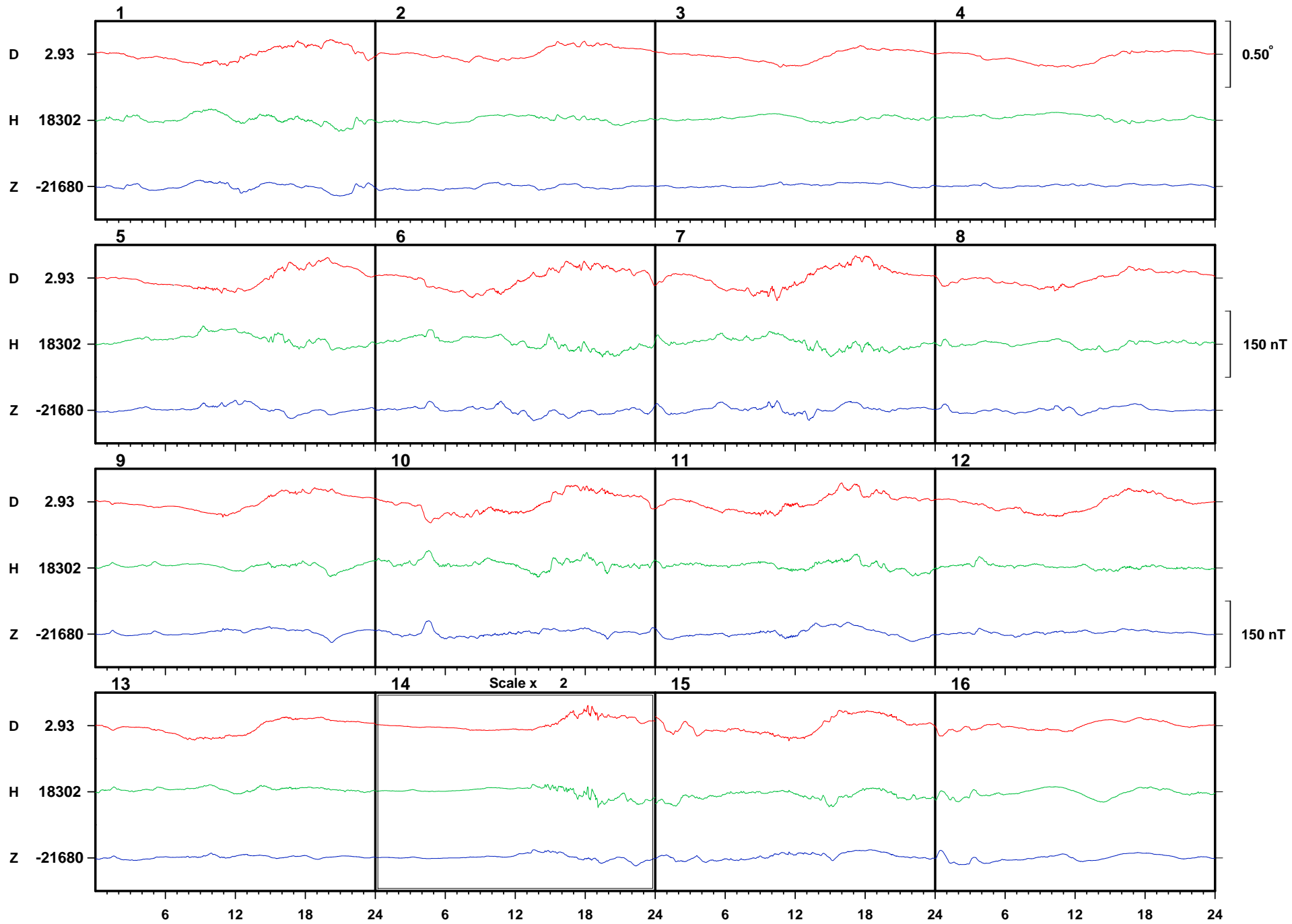
Temperature Inside Variometer Hut

23.1 20°C

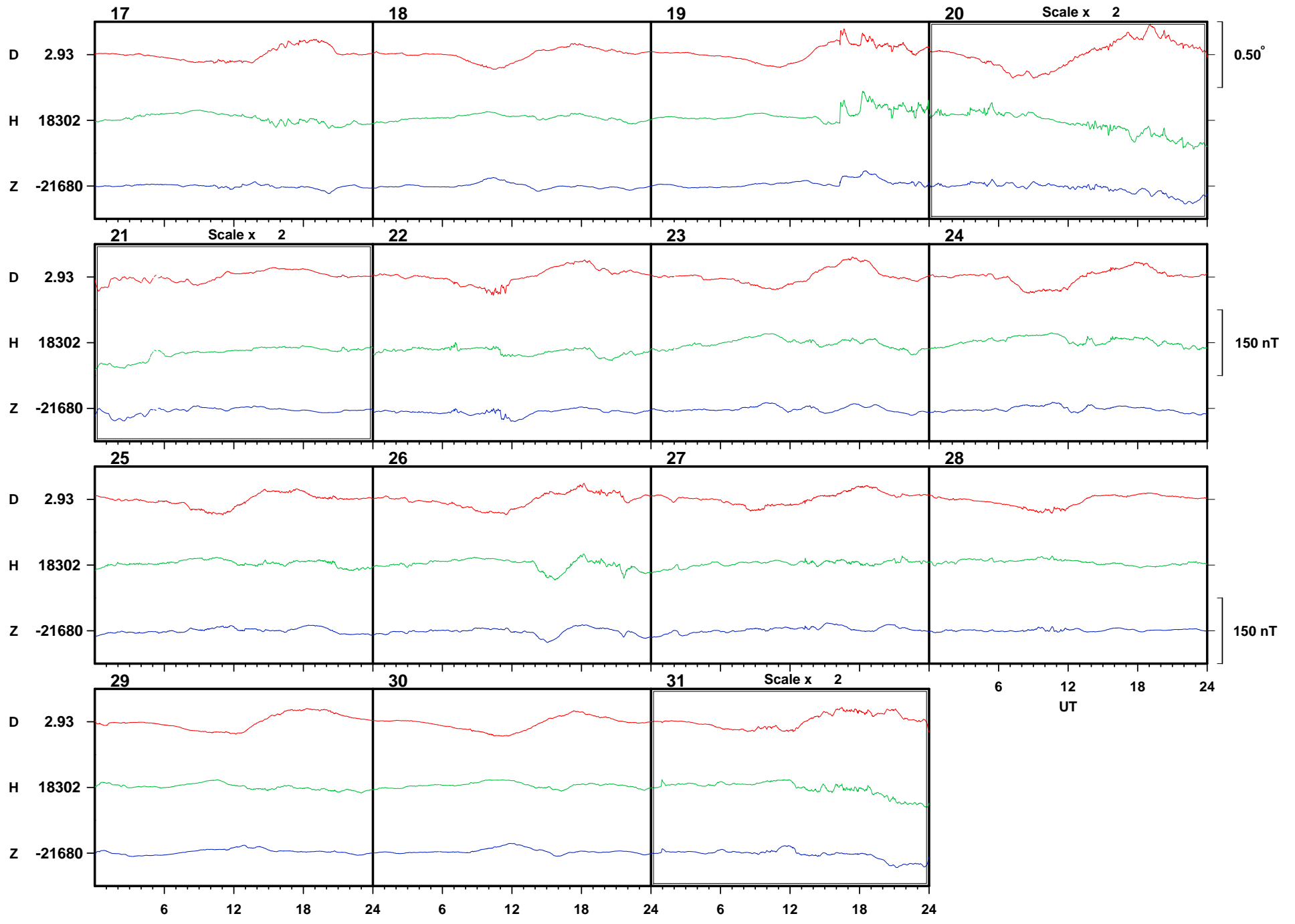
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



Falkland Islands December 2015





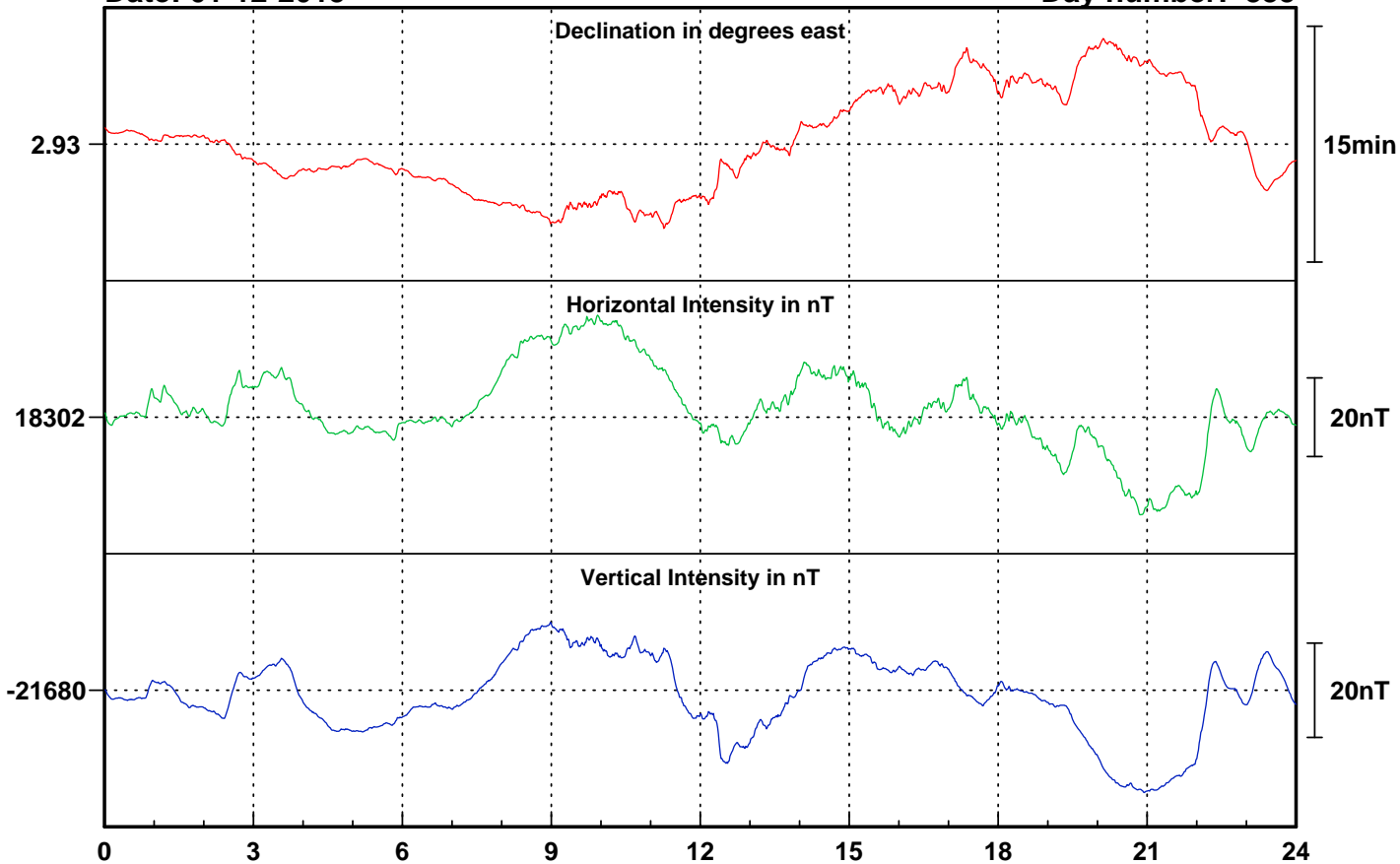


Falkland Islands December 2015

# Falkland Islands

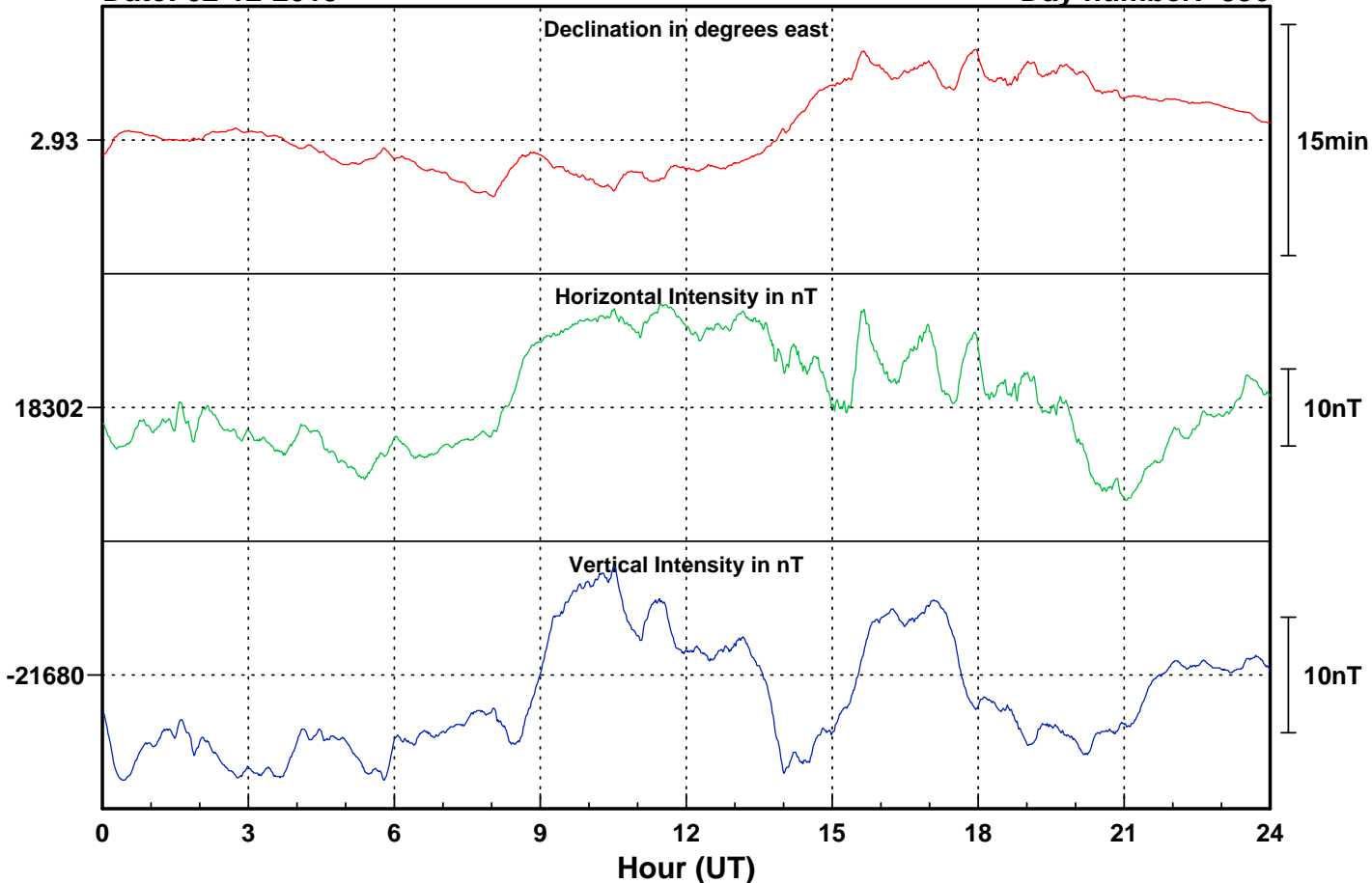
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Day number: 335



Date: 02-12-2015

Day number: 336

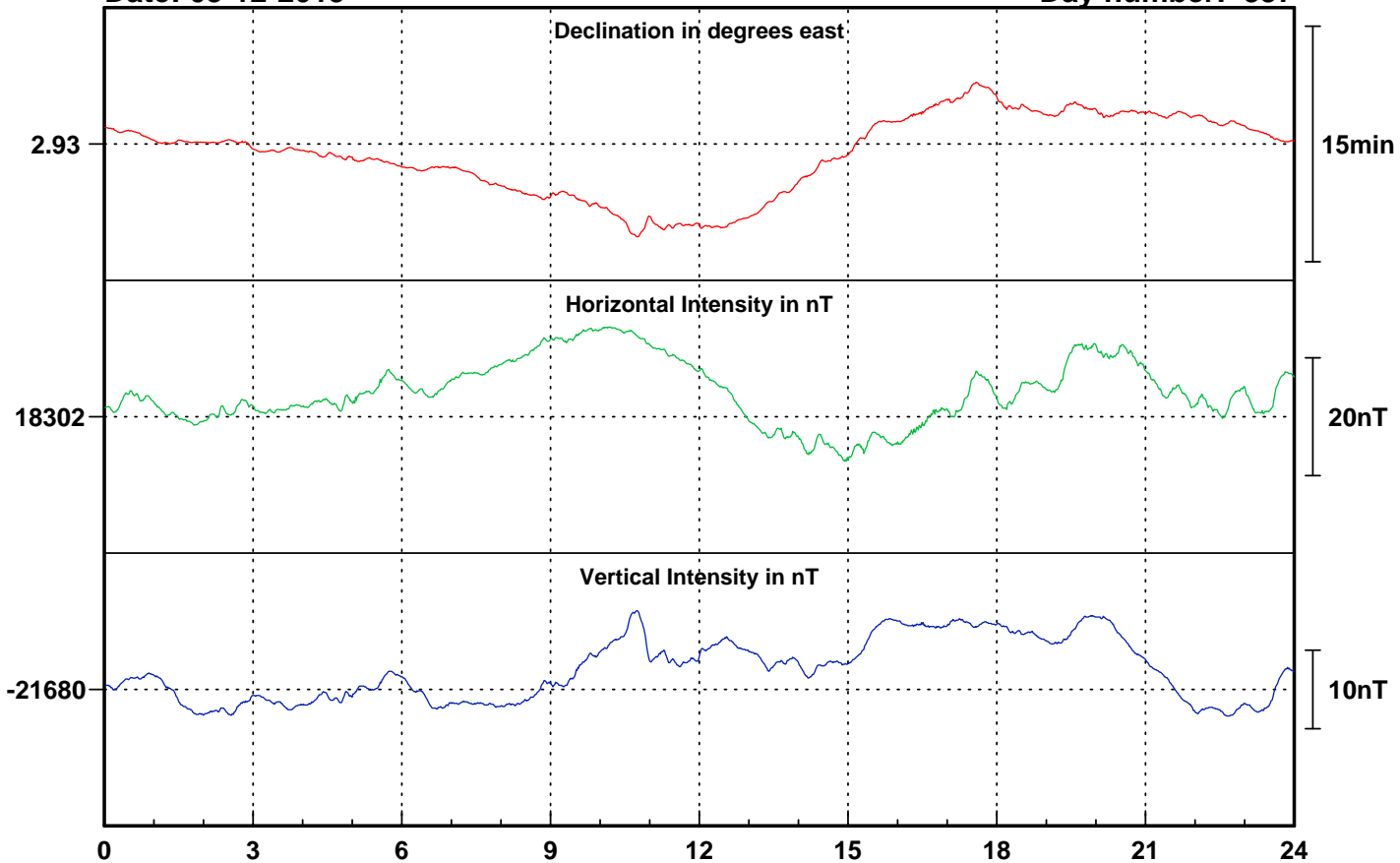




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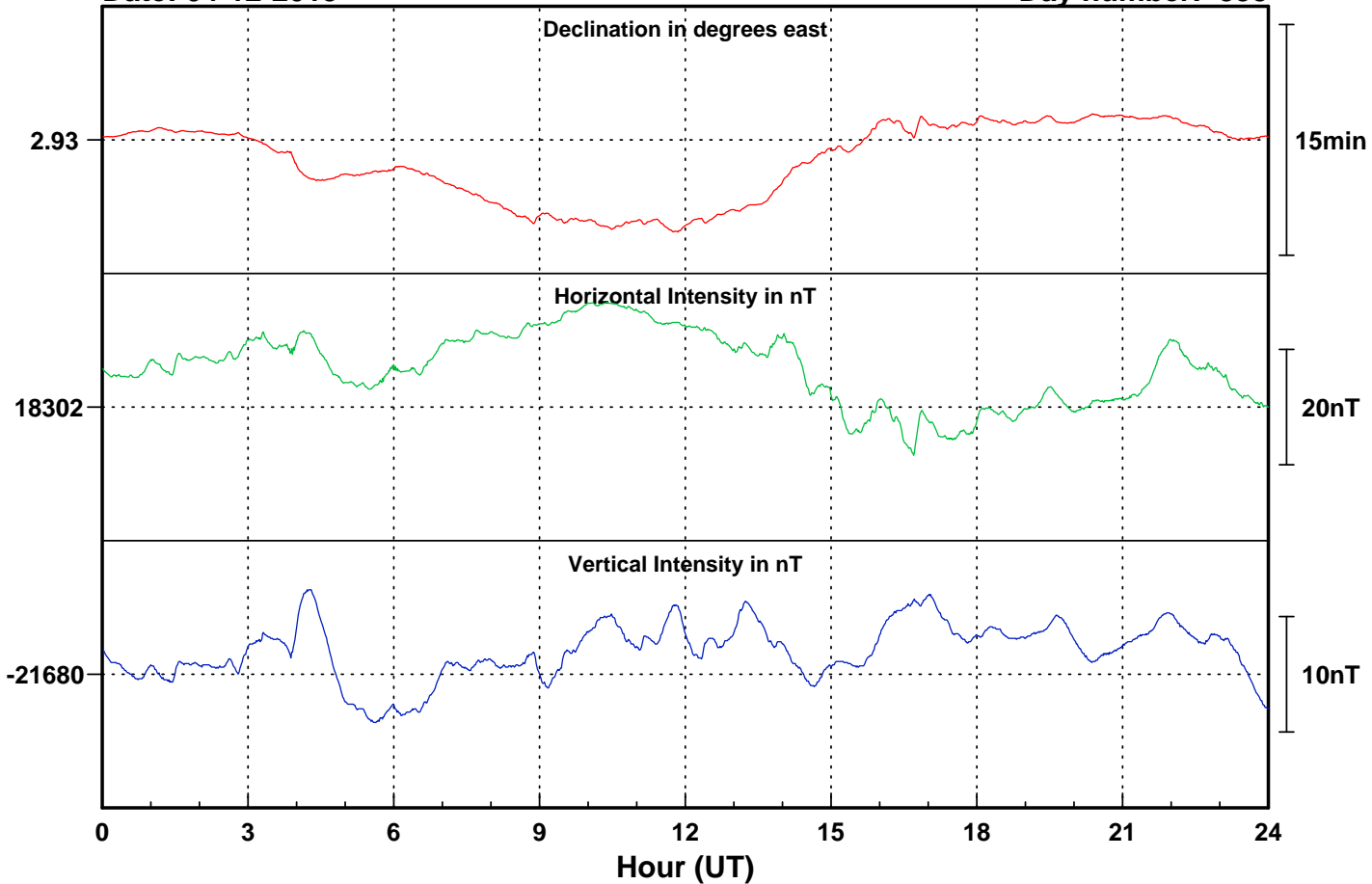
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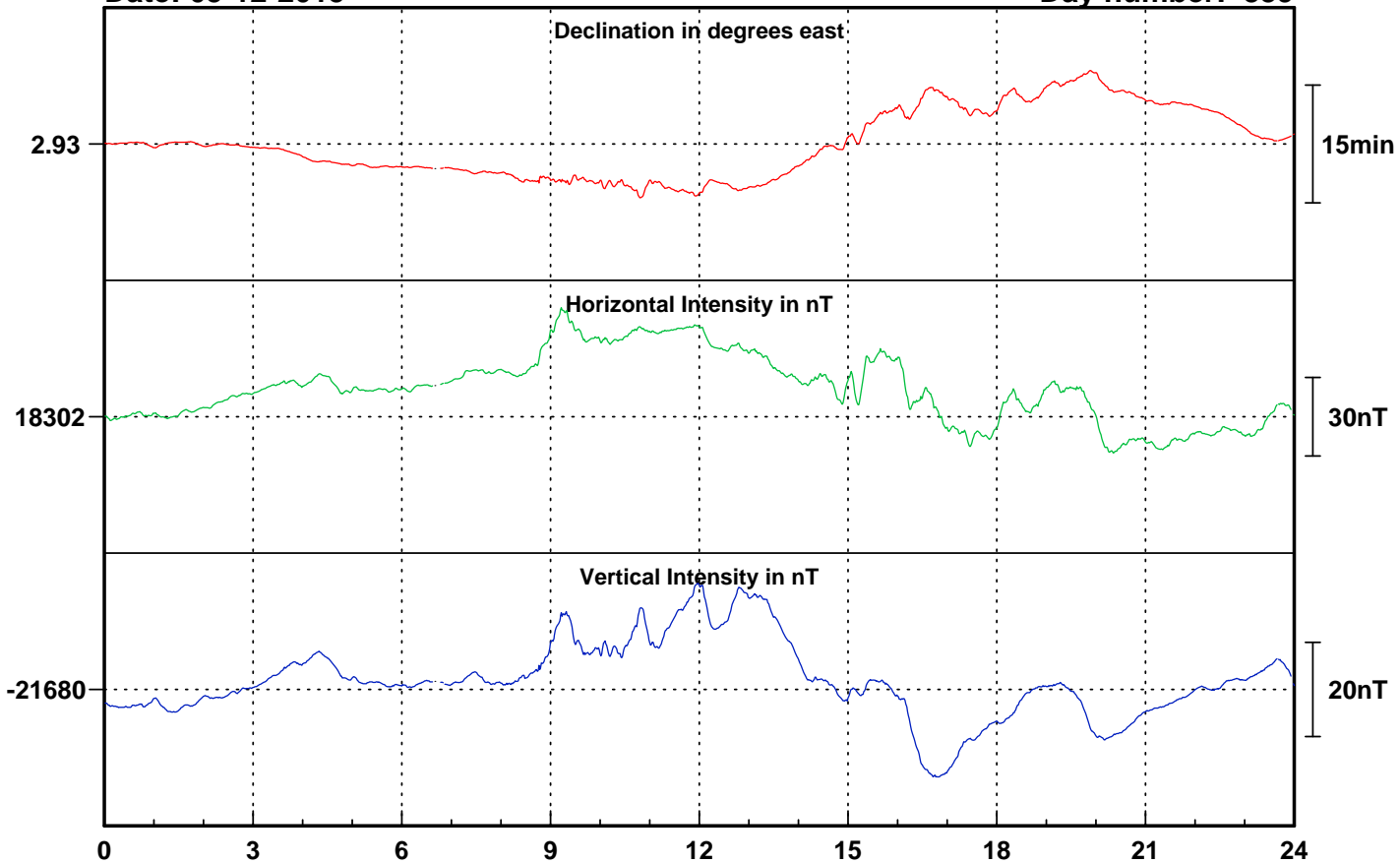
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# Falkland Islands

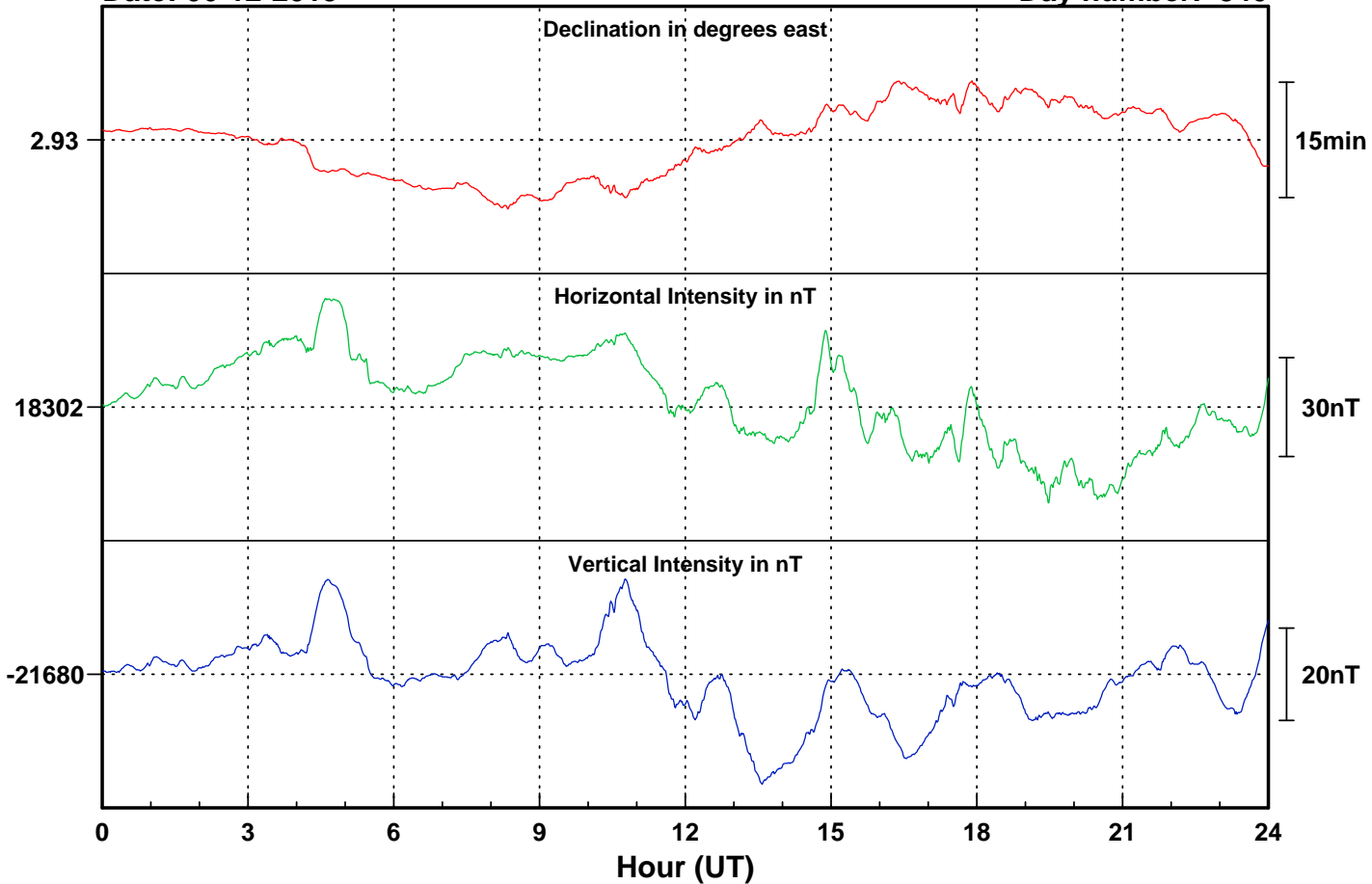
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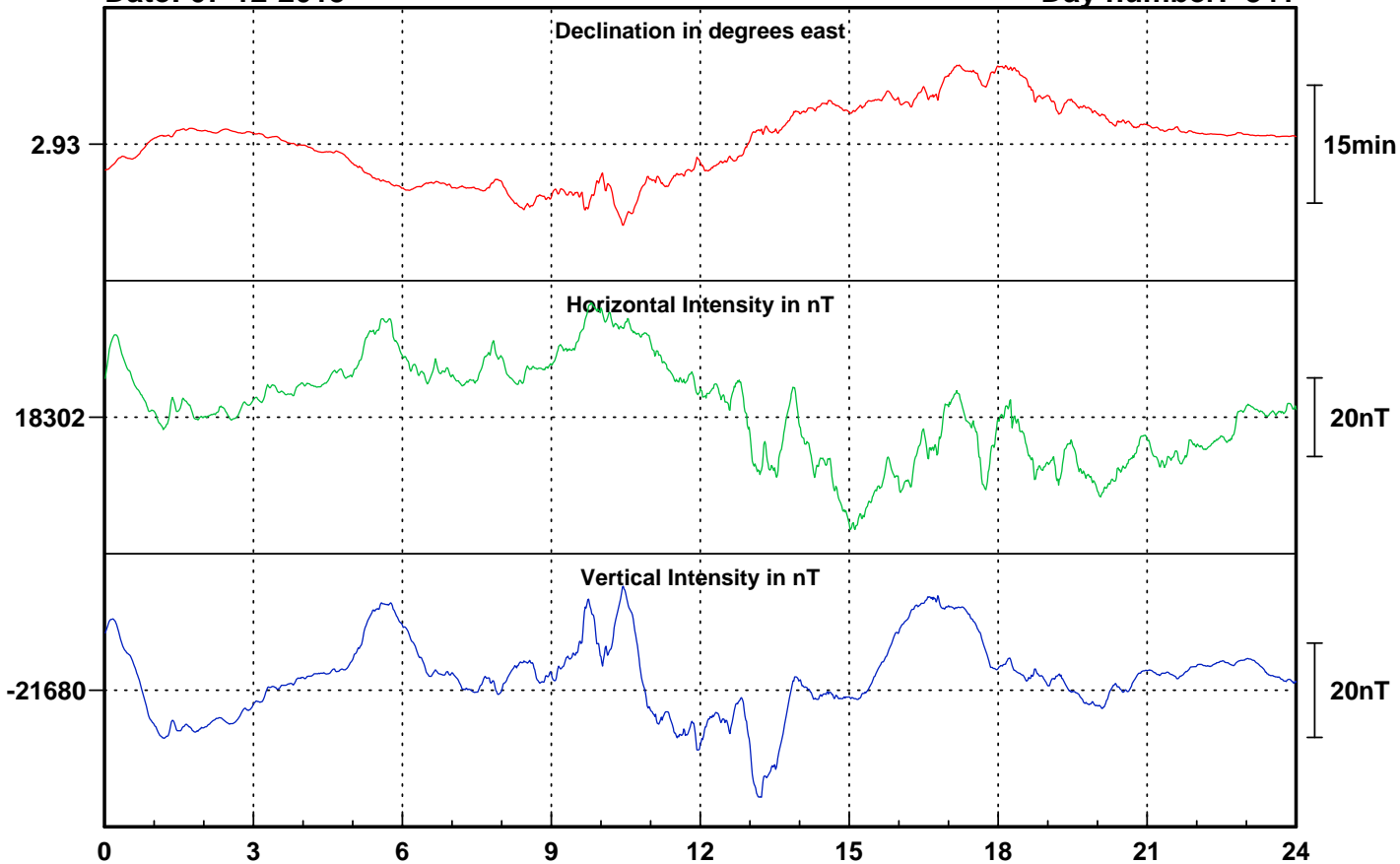
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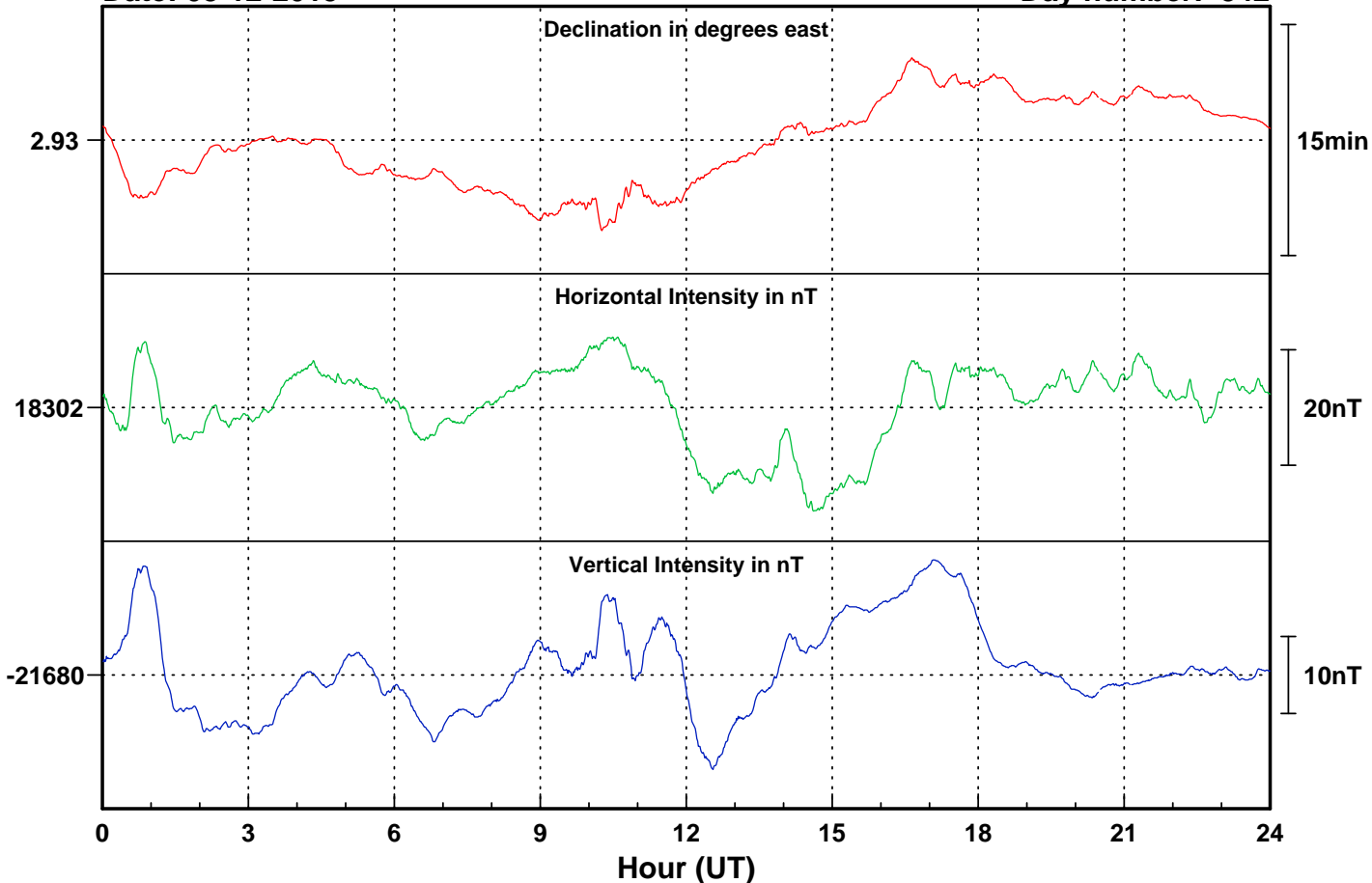
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Day number: 341



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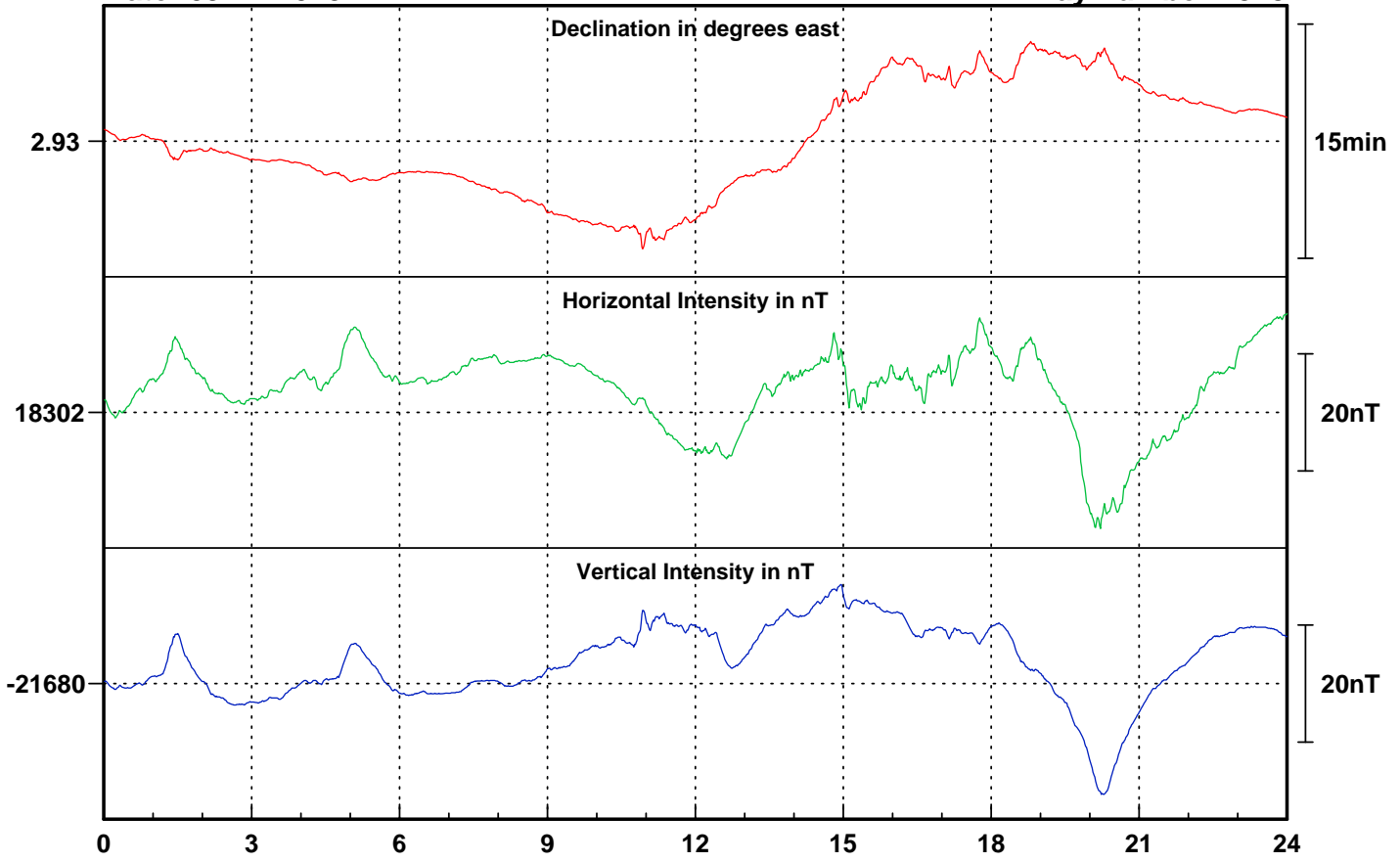
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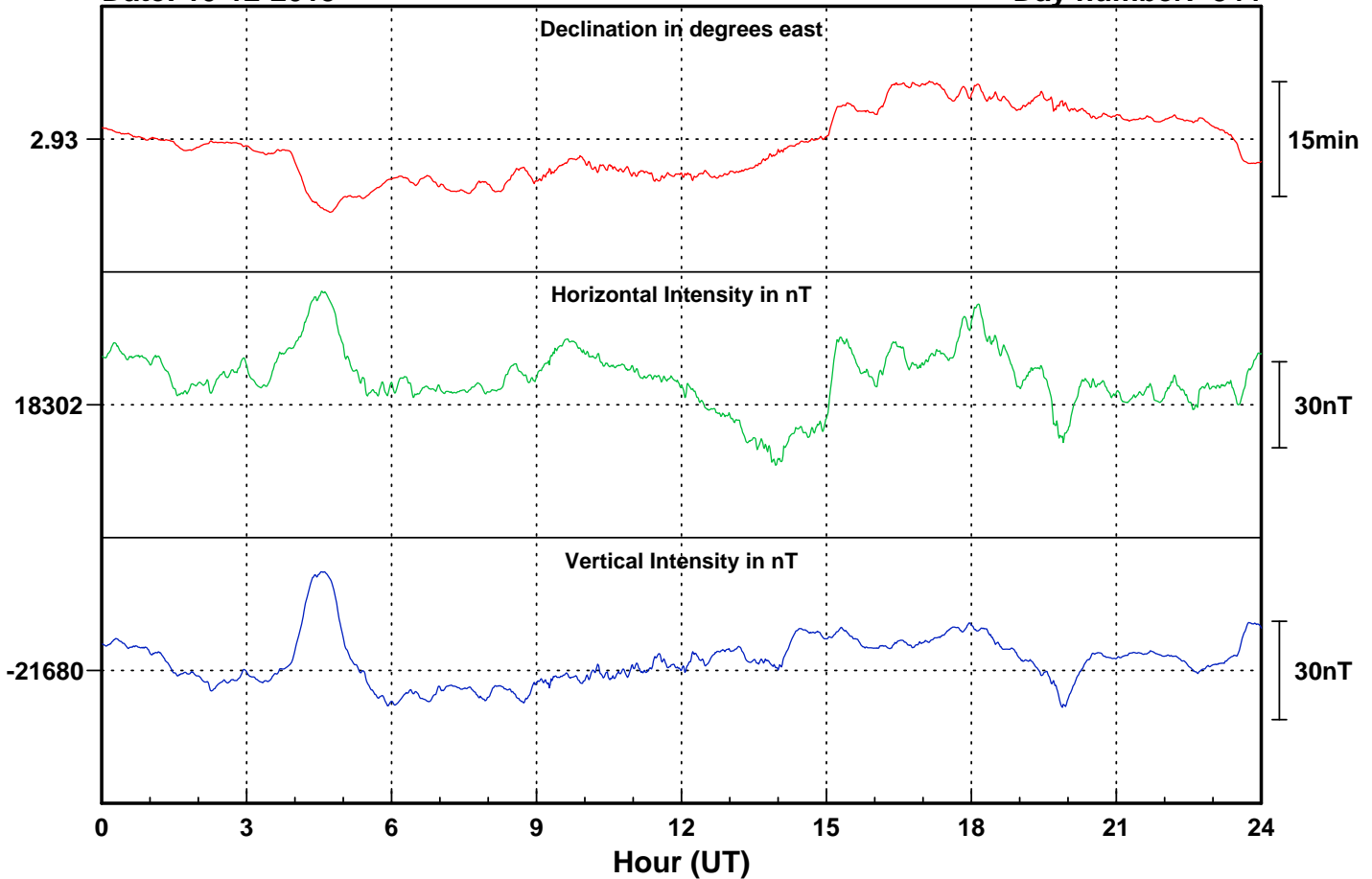
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Day number: 343



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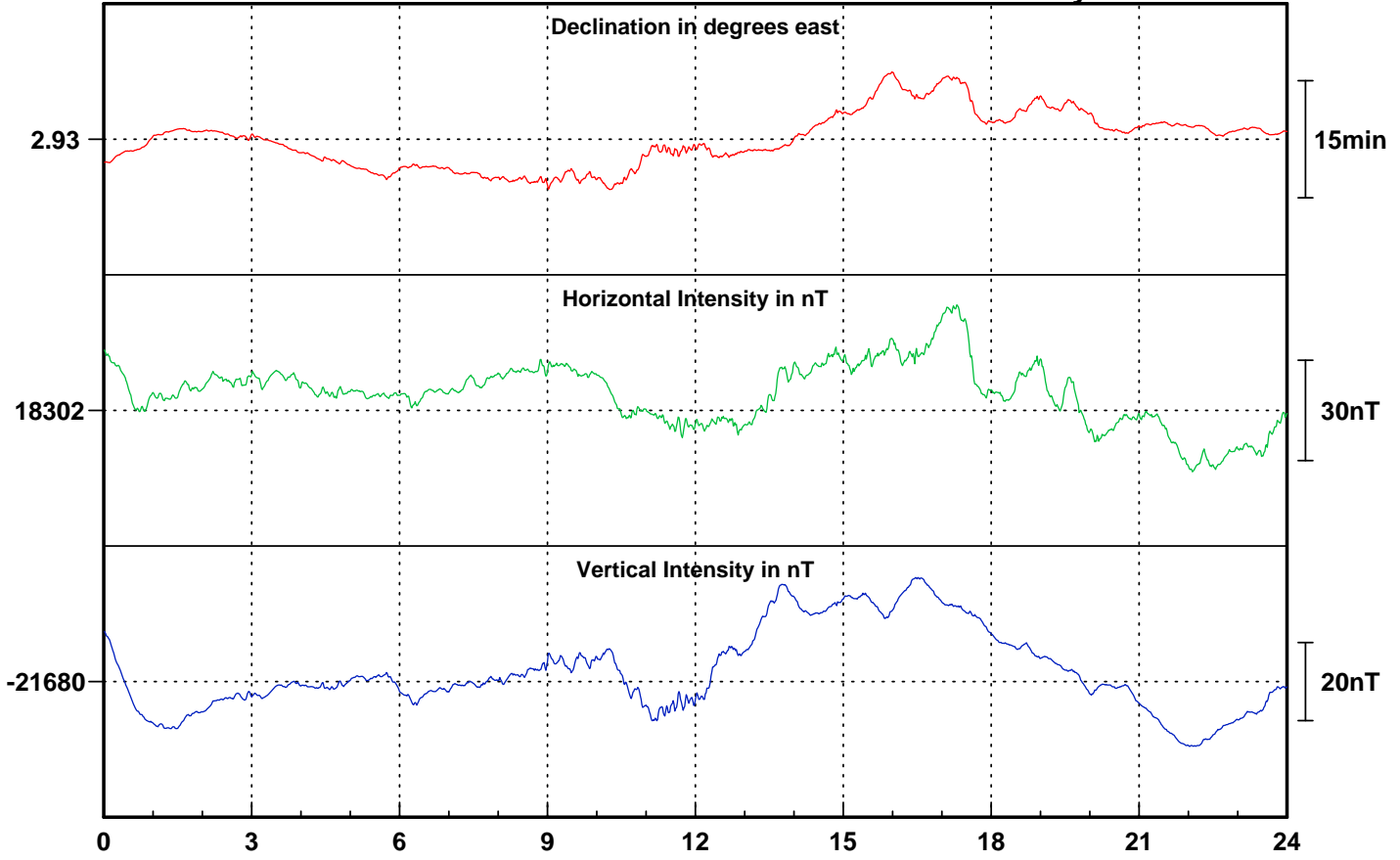
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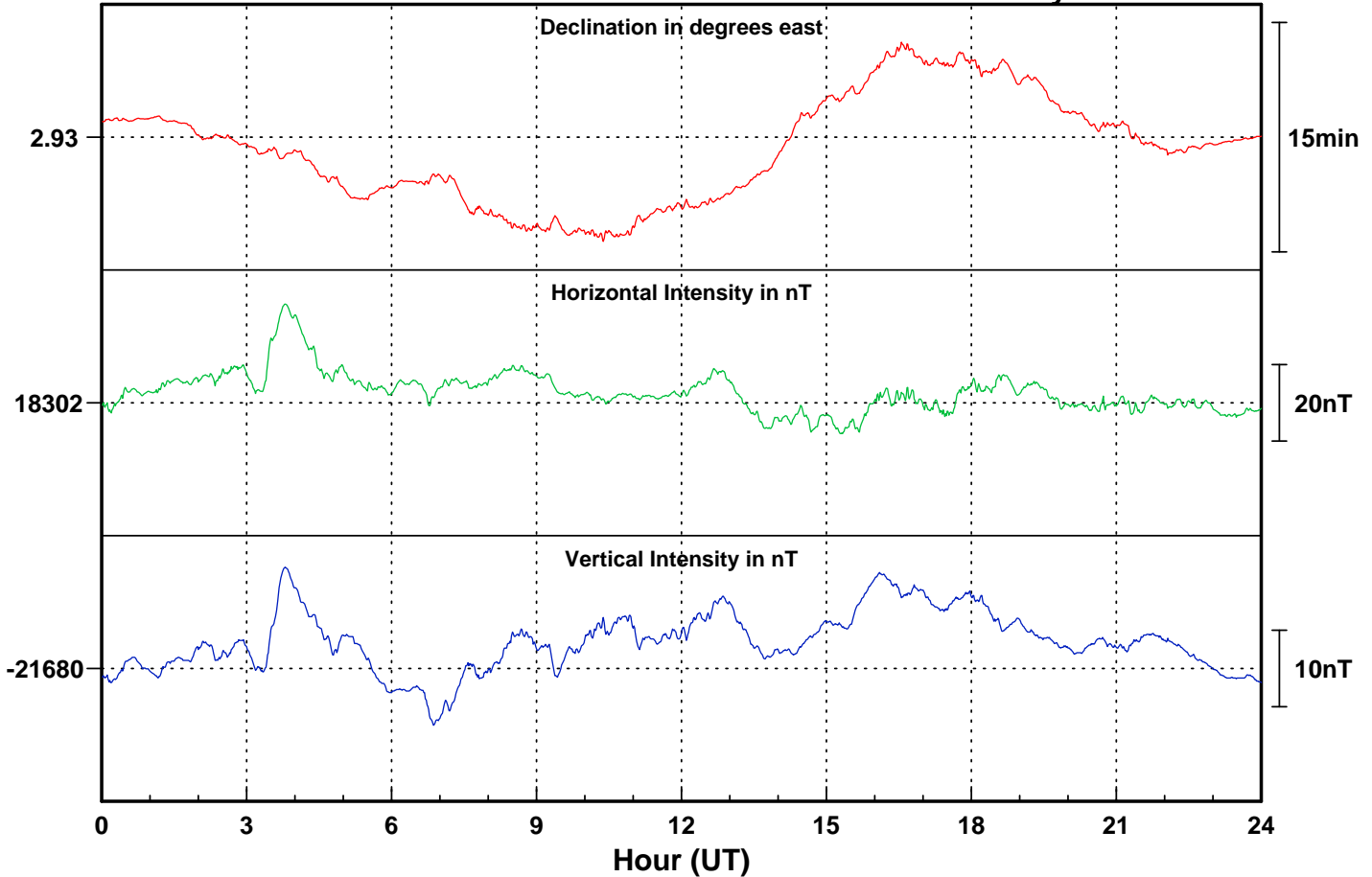
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Day number: 345



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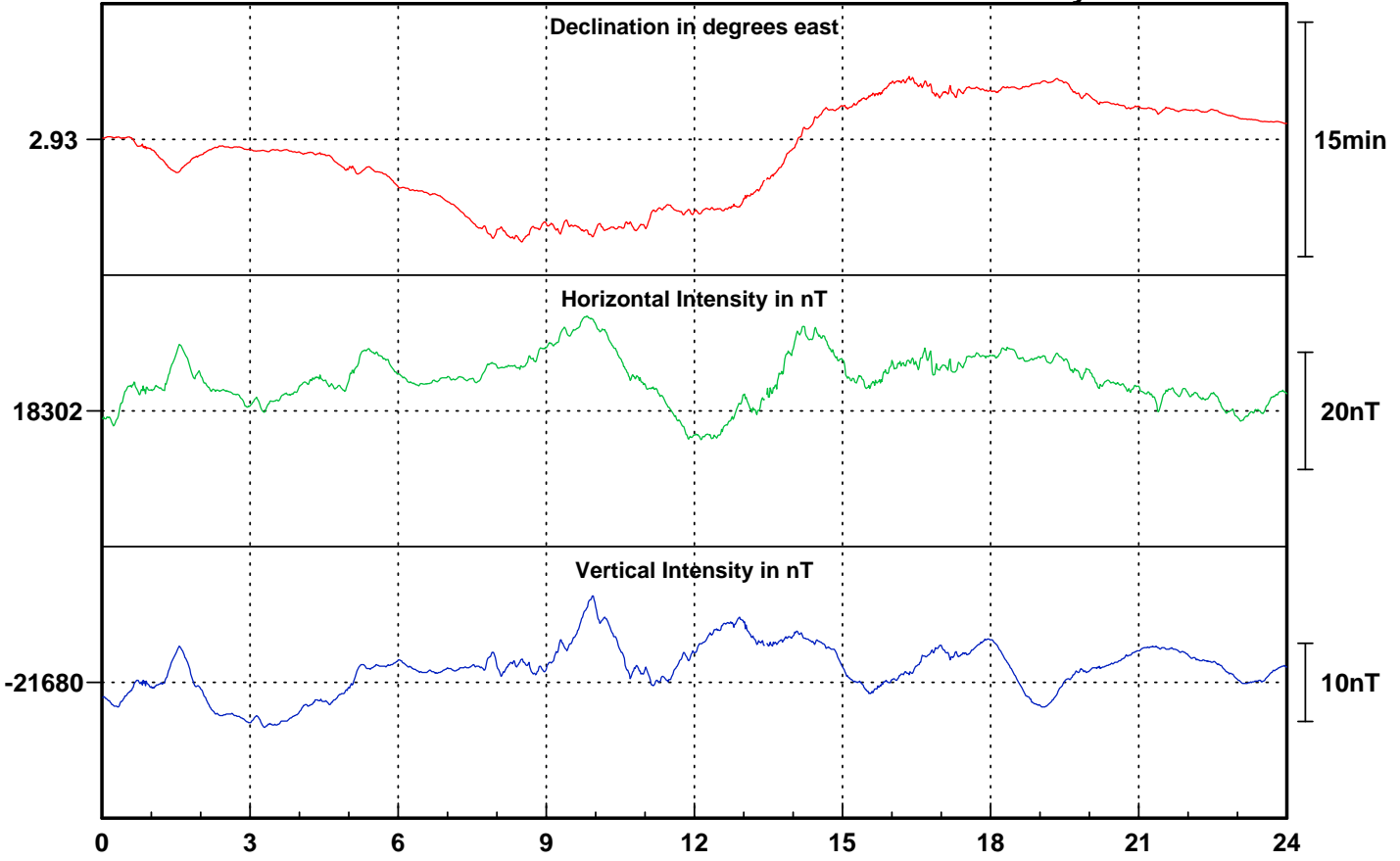
Day number: 346



Date: 13-12-2015

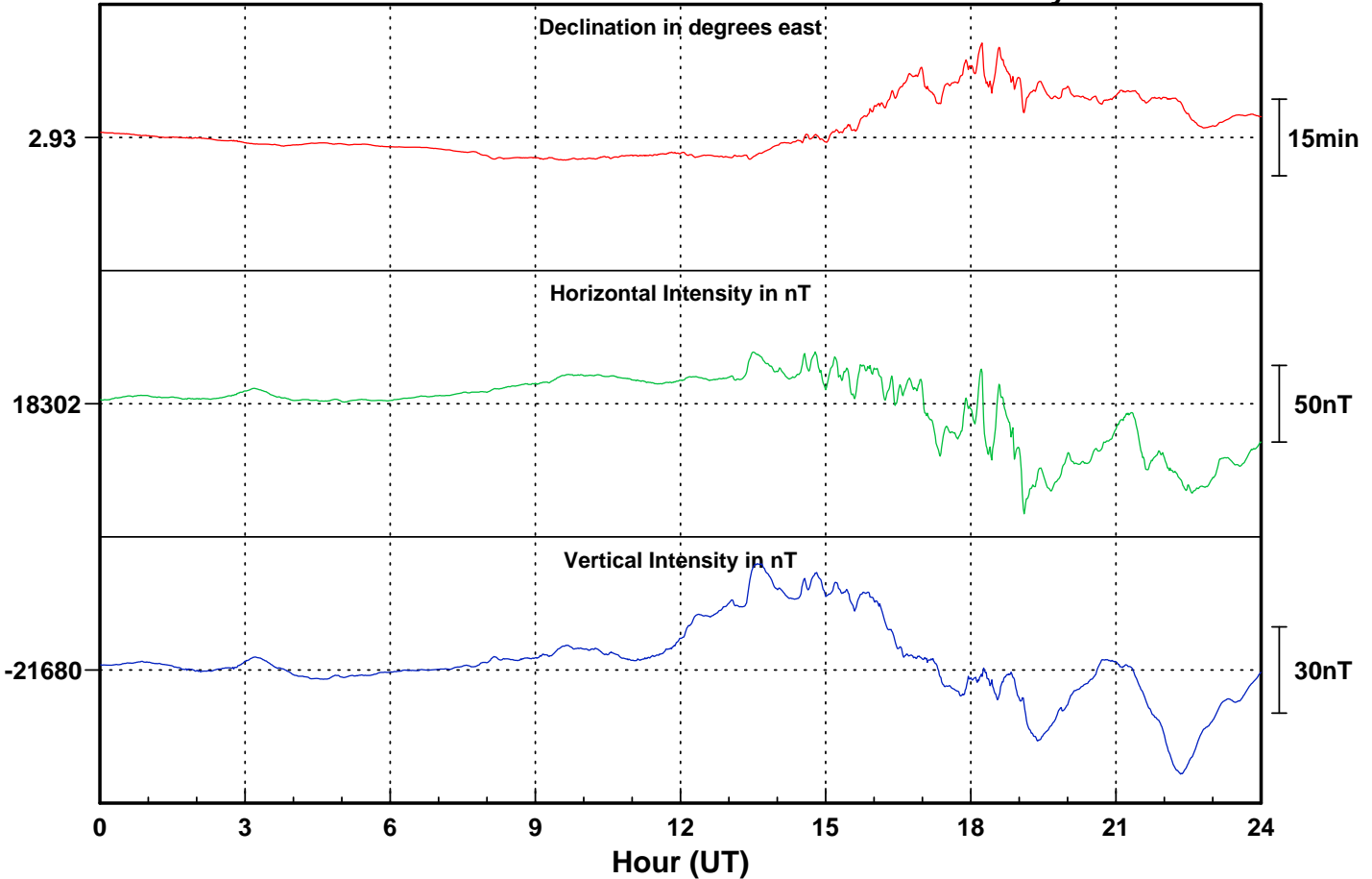
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Day number: 347



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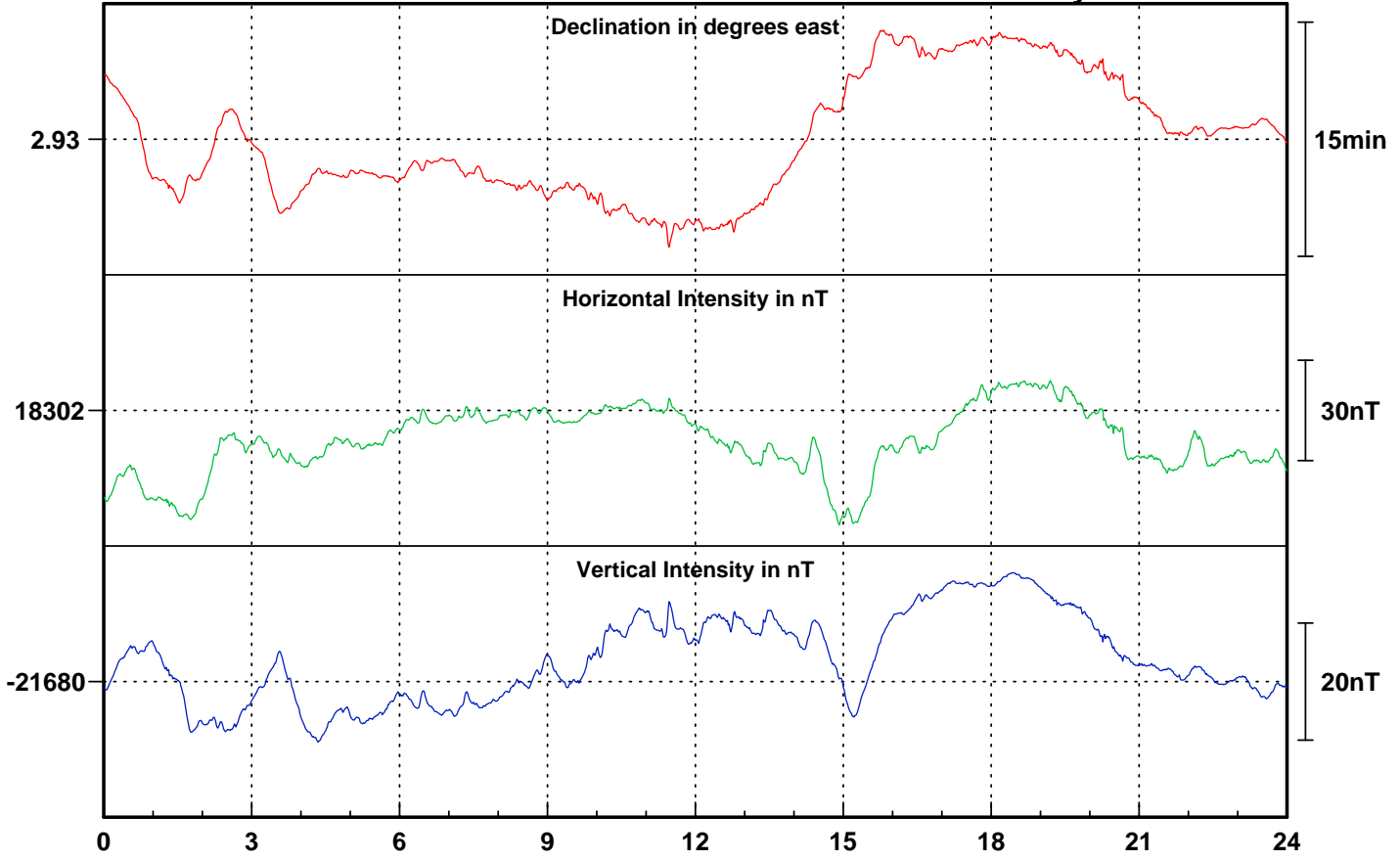
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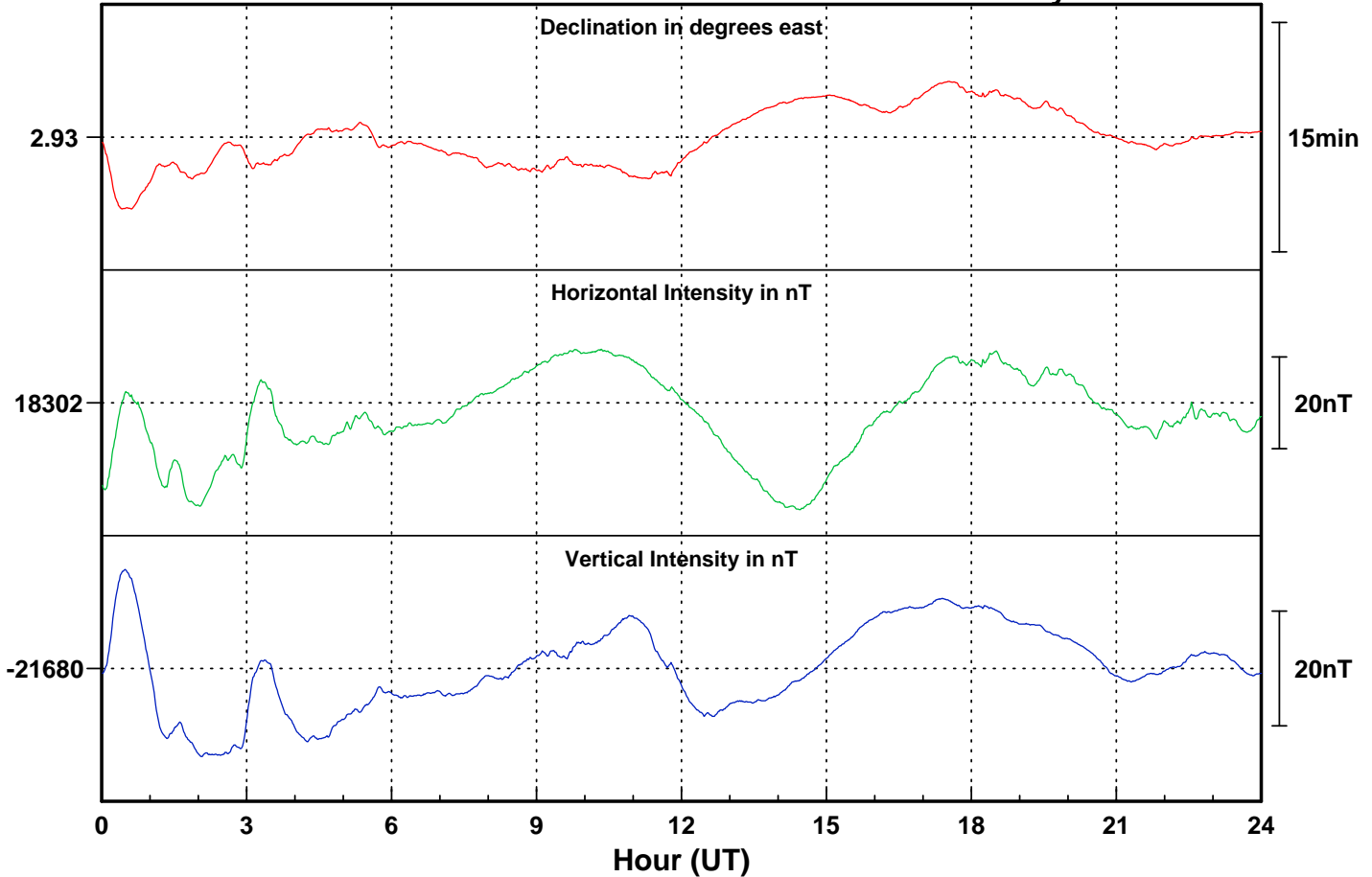
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Day number: 349



Date: 16-12-2015

Day number: 350

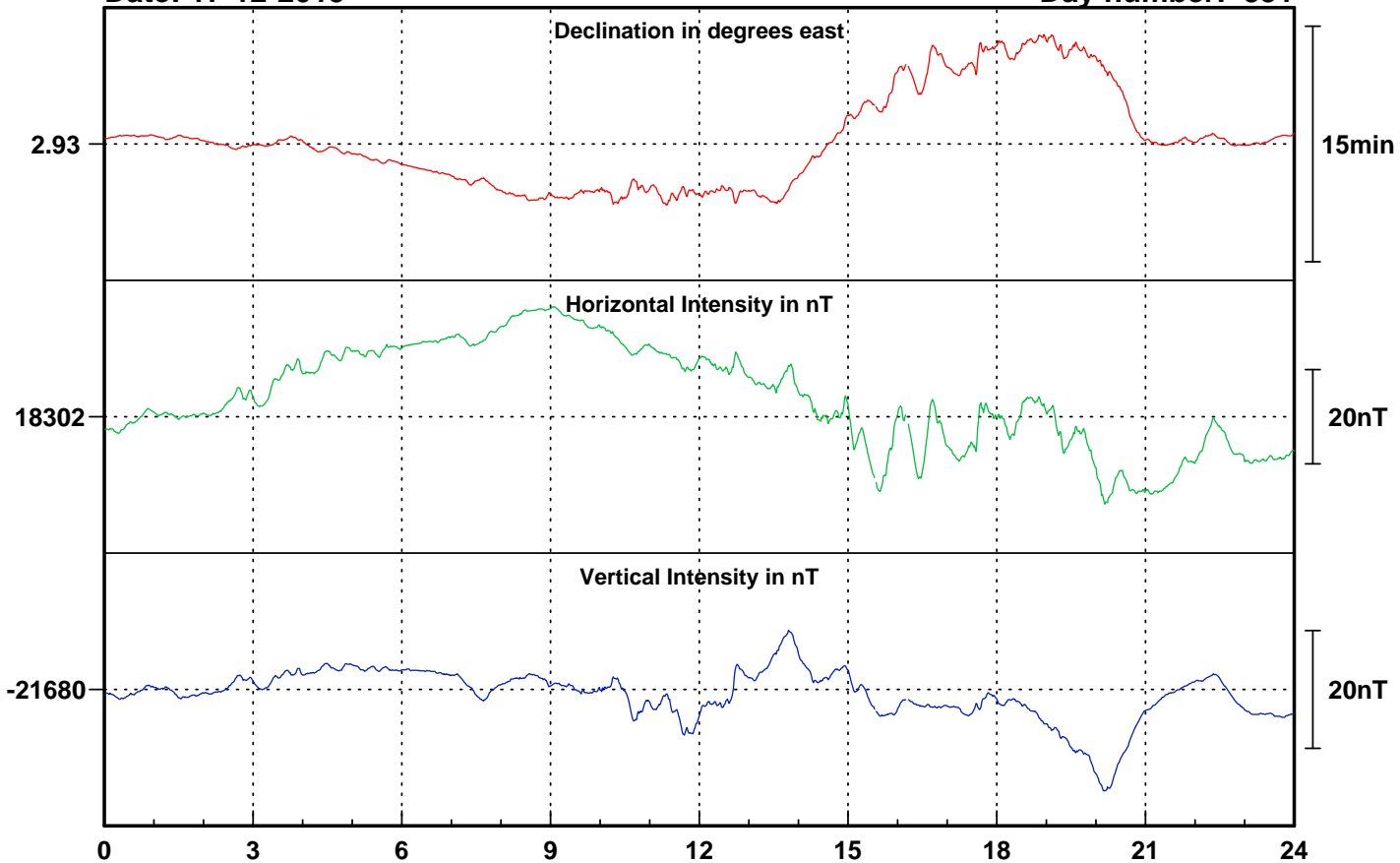




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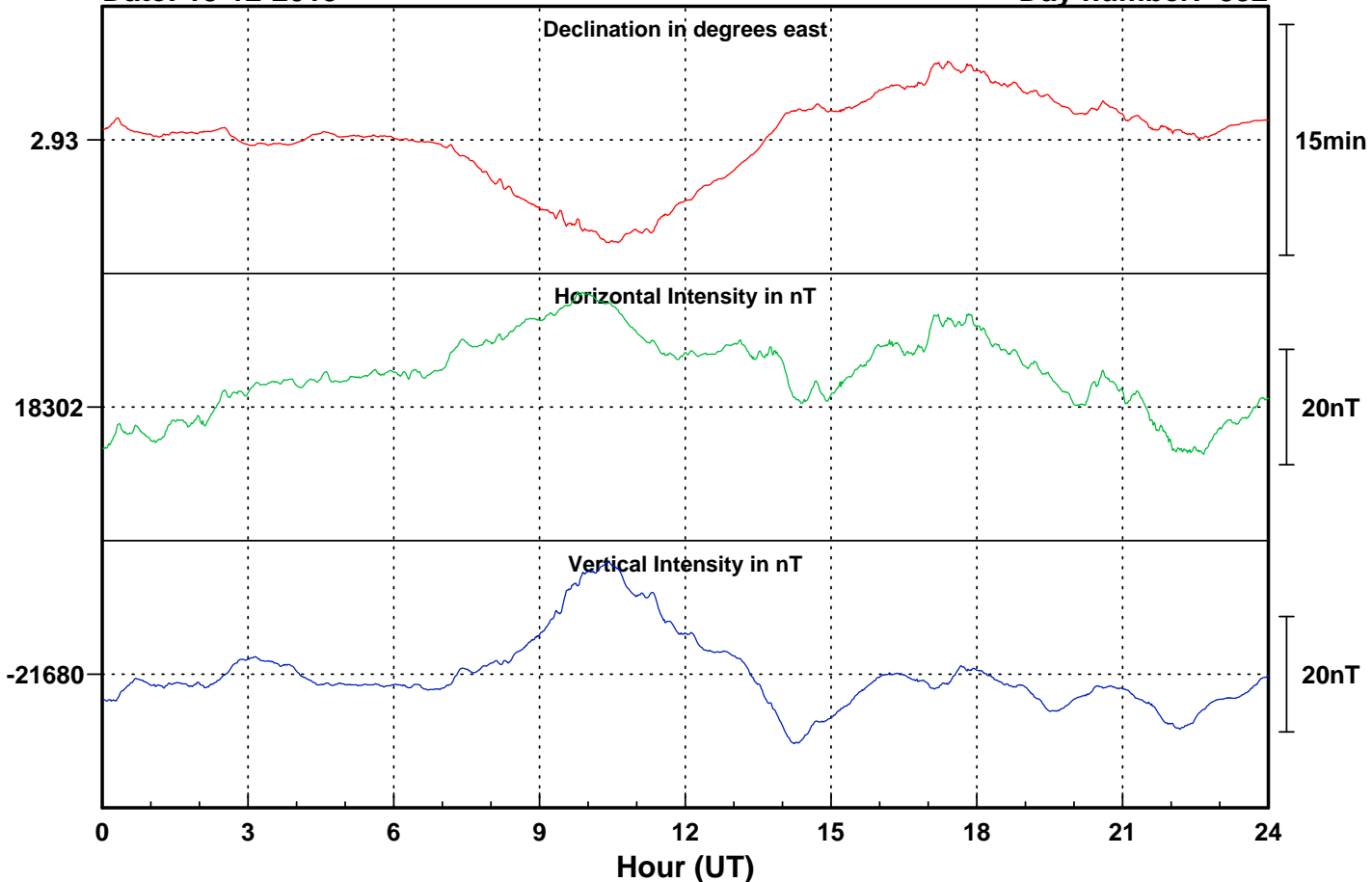
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Day number: 351



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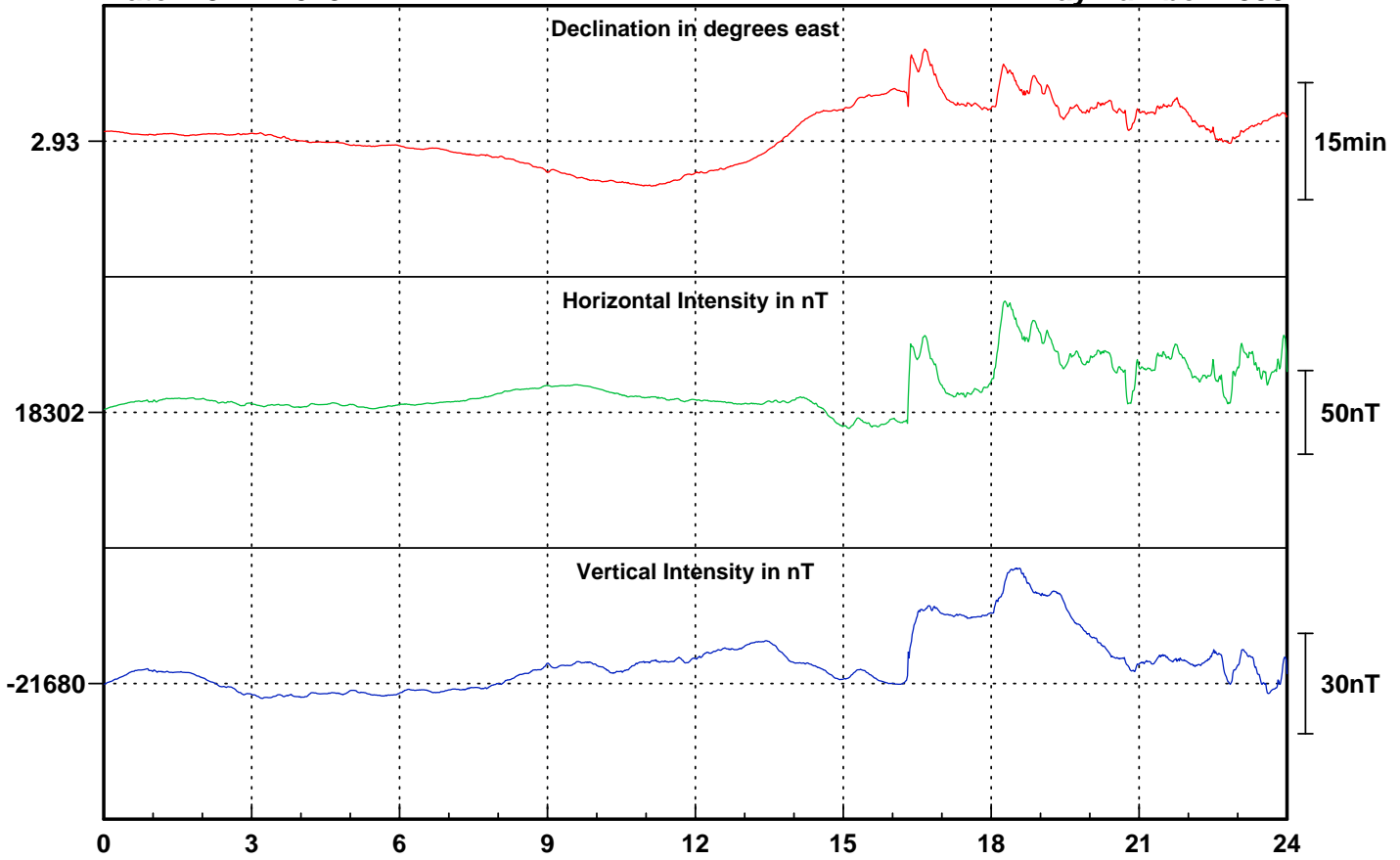
Day number: 352



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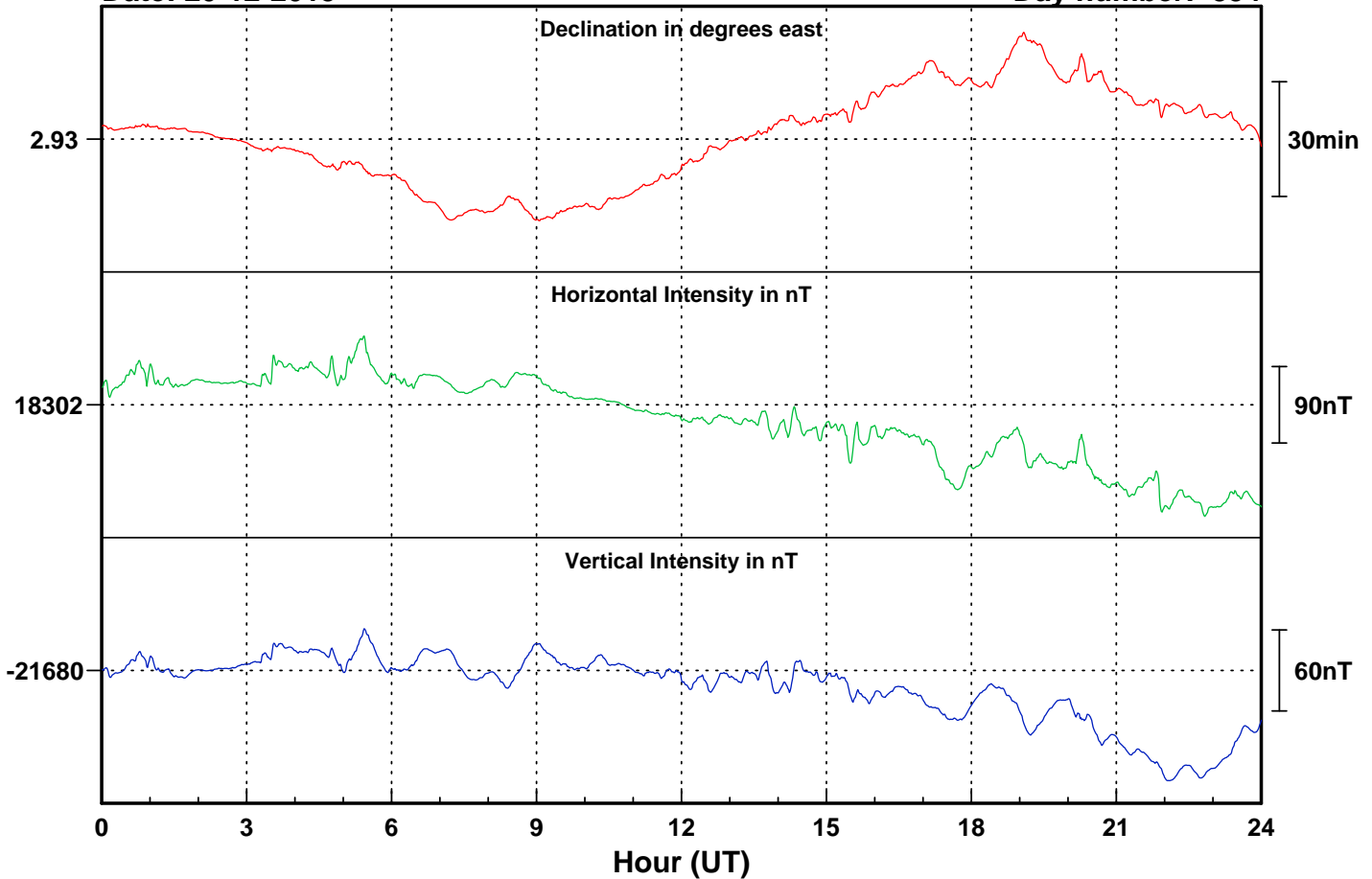
# Falkland Islands

Day number: 353



Date: 20-12-2015

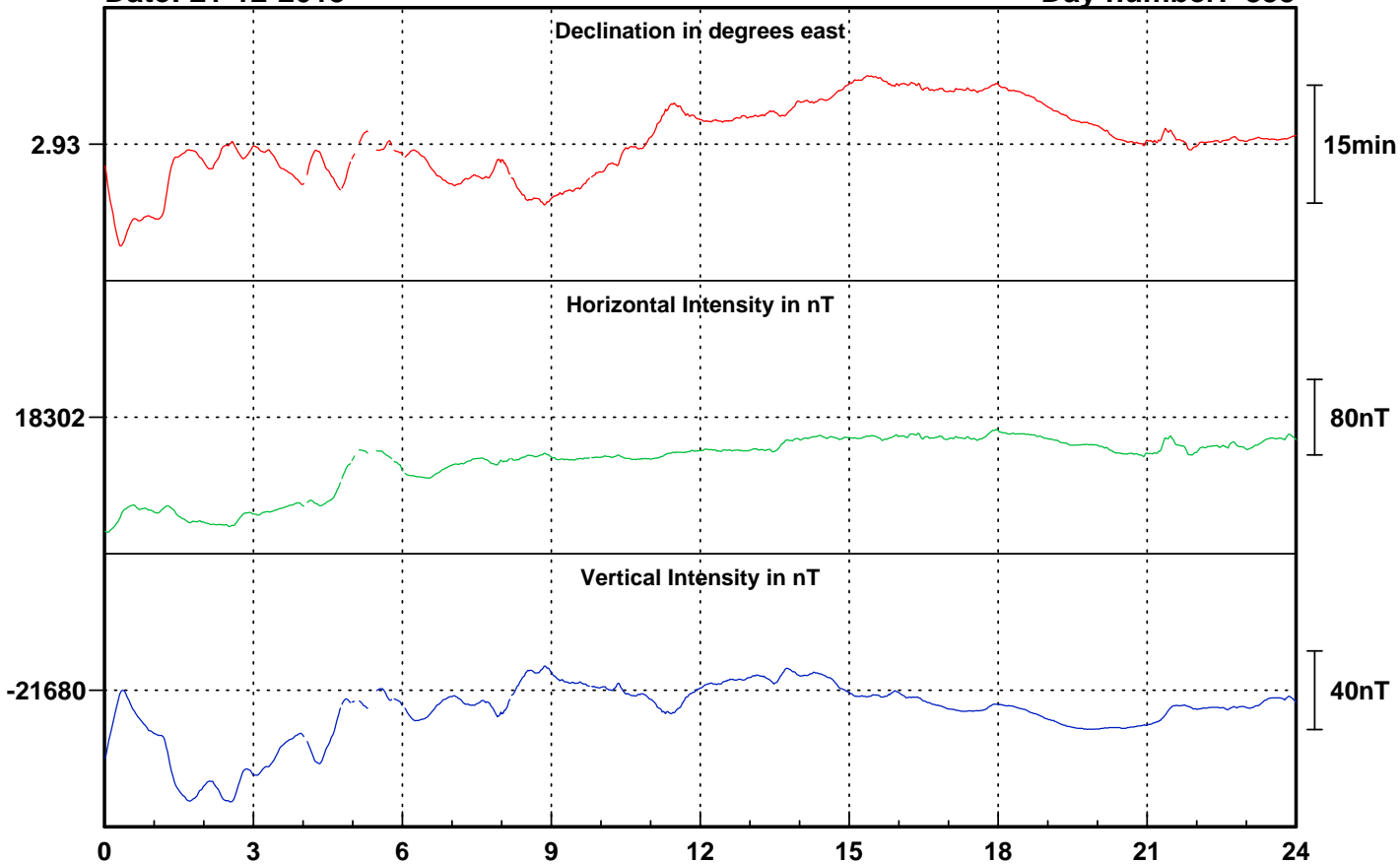
Day number: 354



Date: 21-12-2015

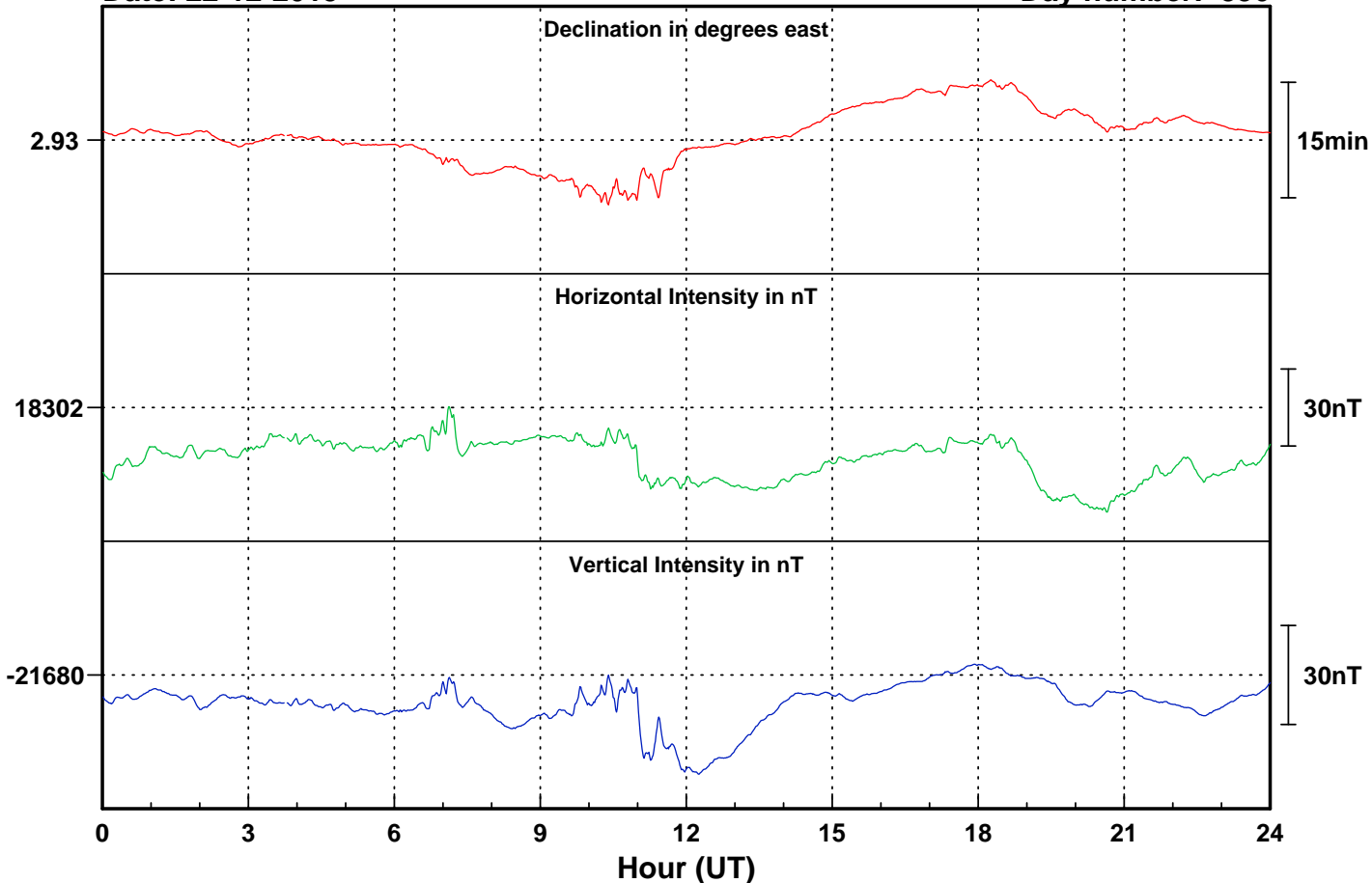
# Falkland Islands

Day number: 355



Date: 22-12-2015

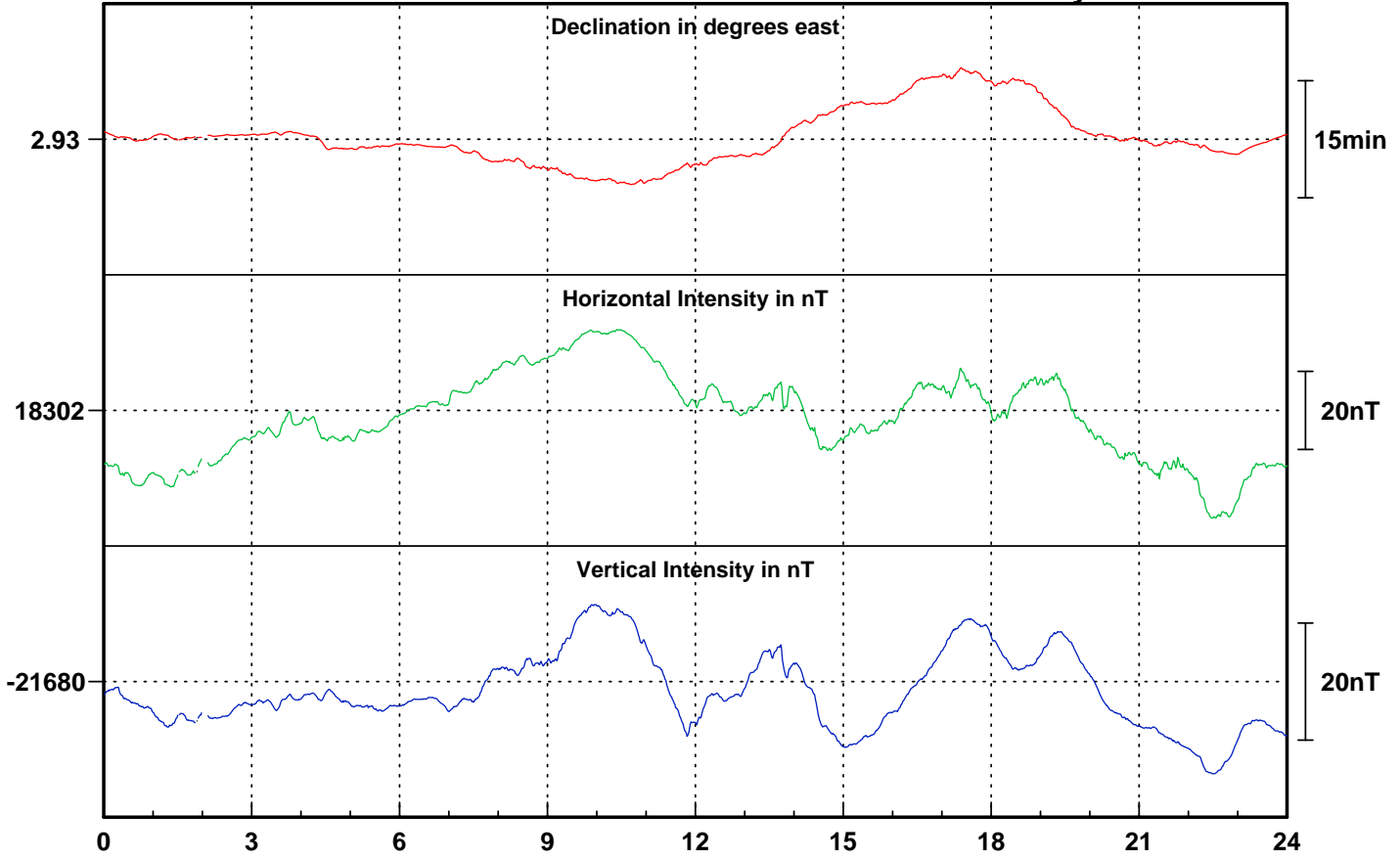
Day number: 356



Date: 23-12-2015

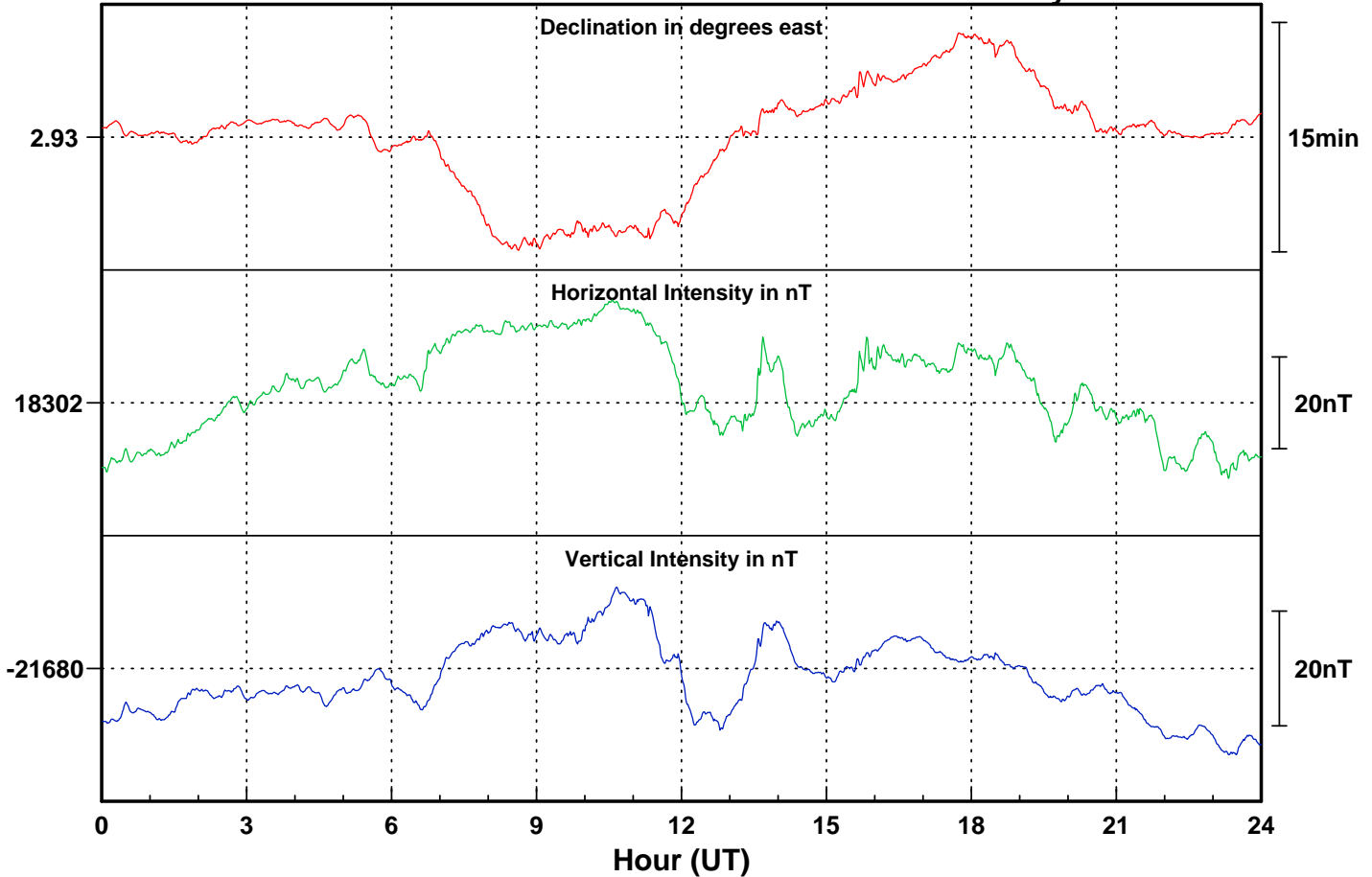
# Falkland Islands

Day number: 357



Date: 24-12-2015

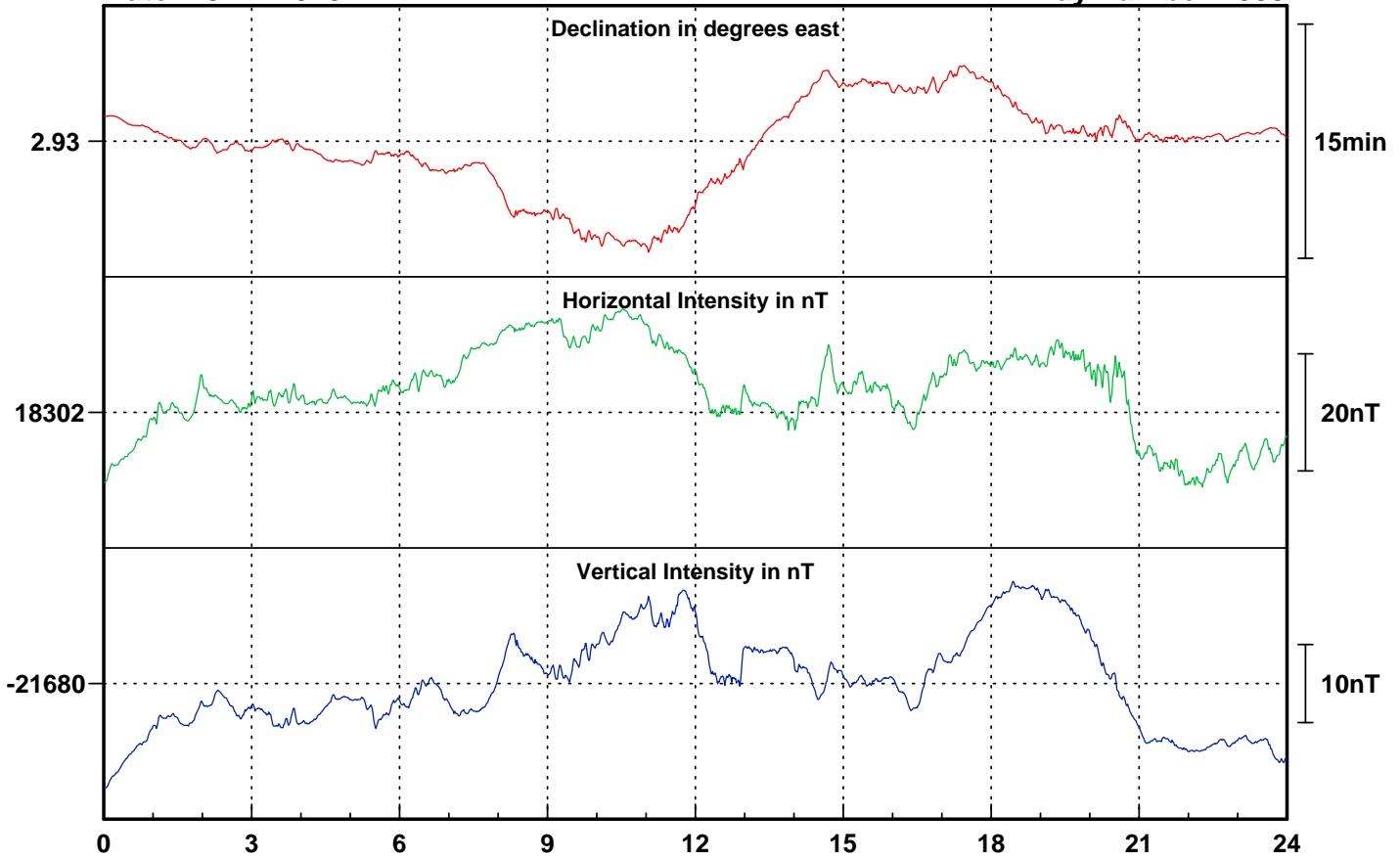
Day number: 358



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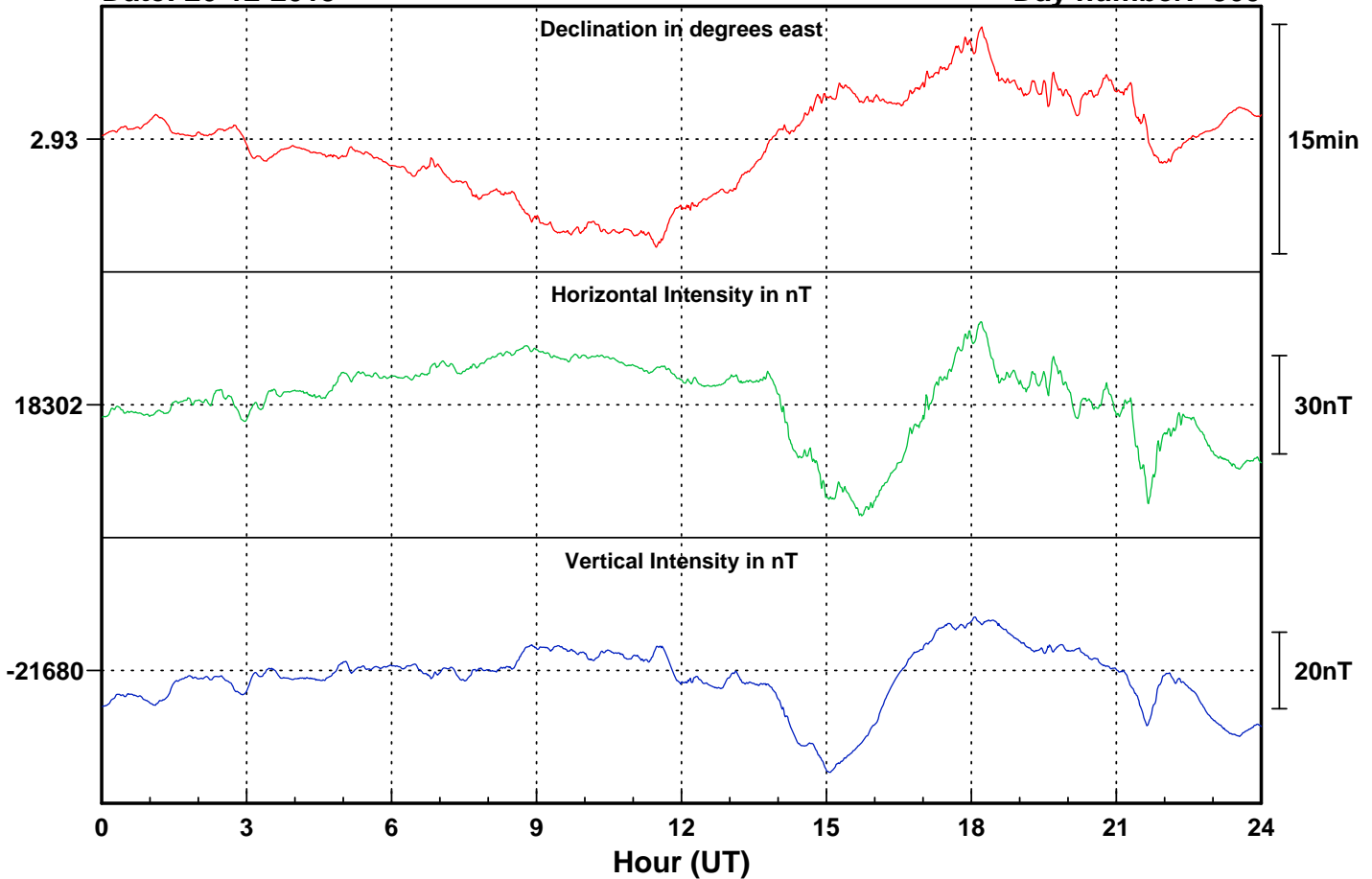
# Falkland Islands

Day number: 359



Date: 26-12-2015

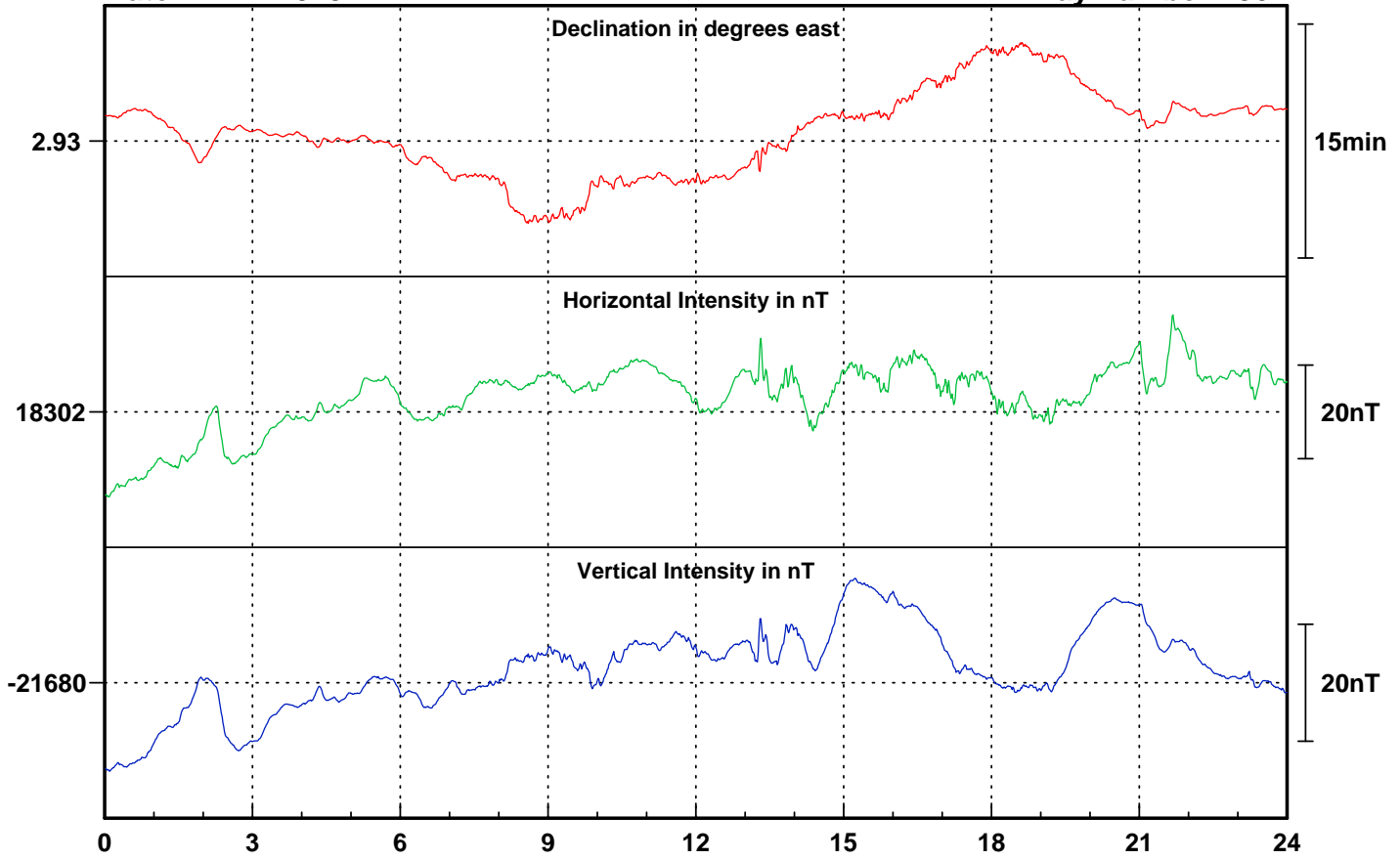
Day number: 360



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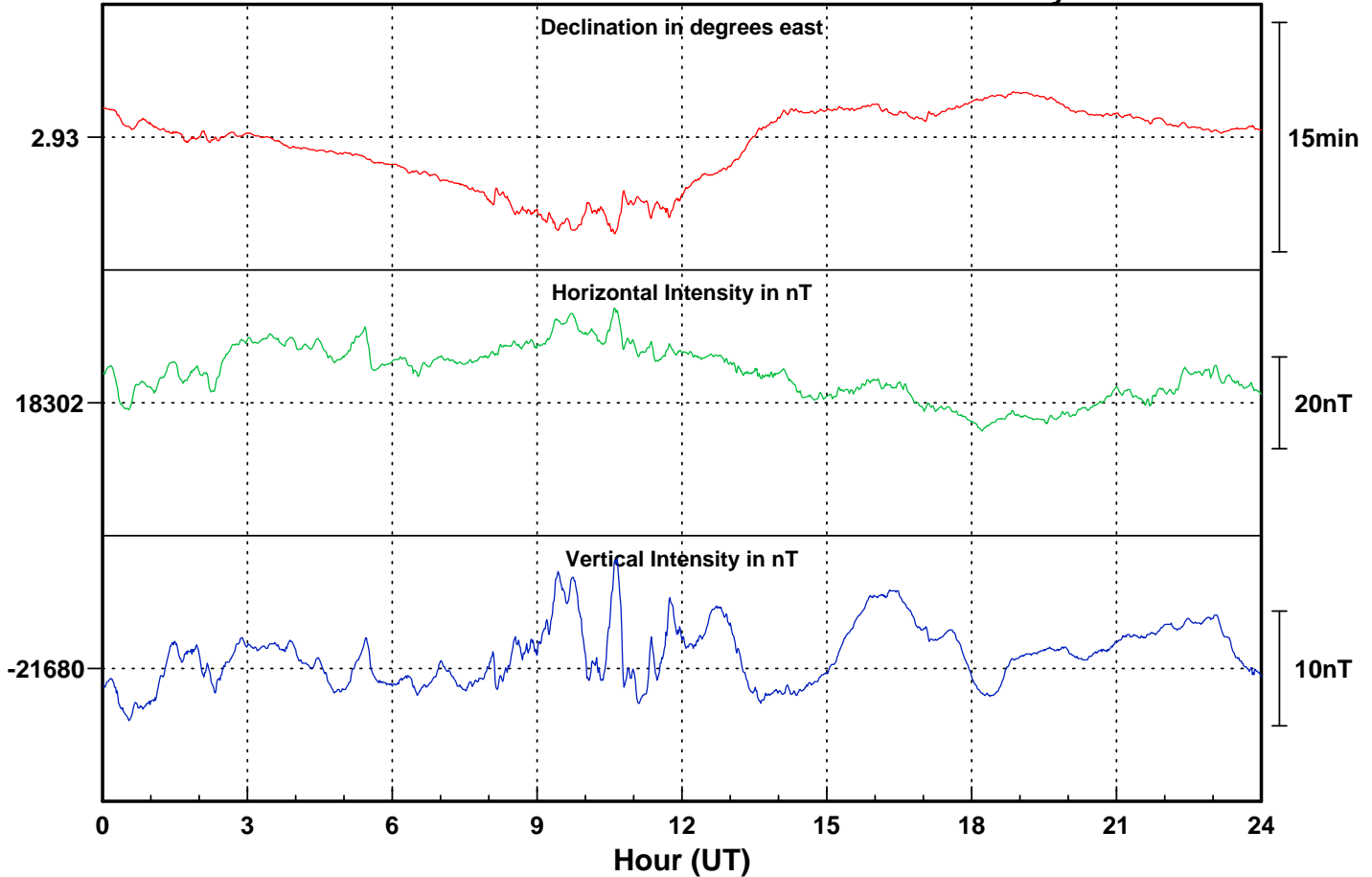
# Falkland Islands

Day number: 361



Date: 28-12-2015

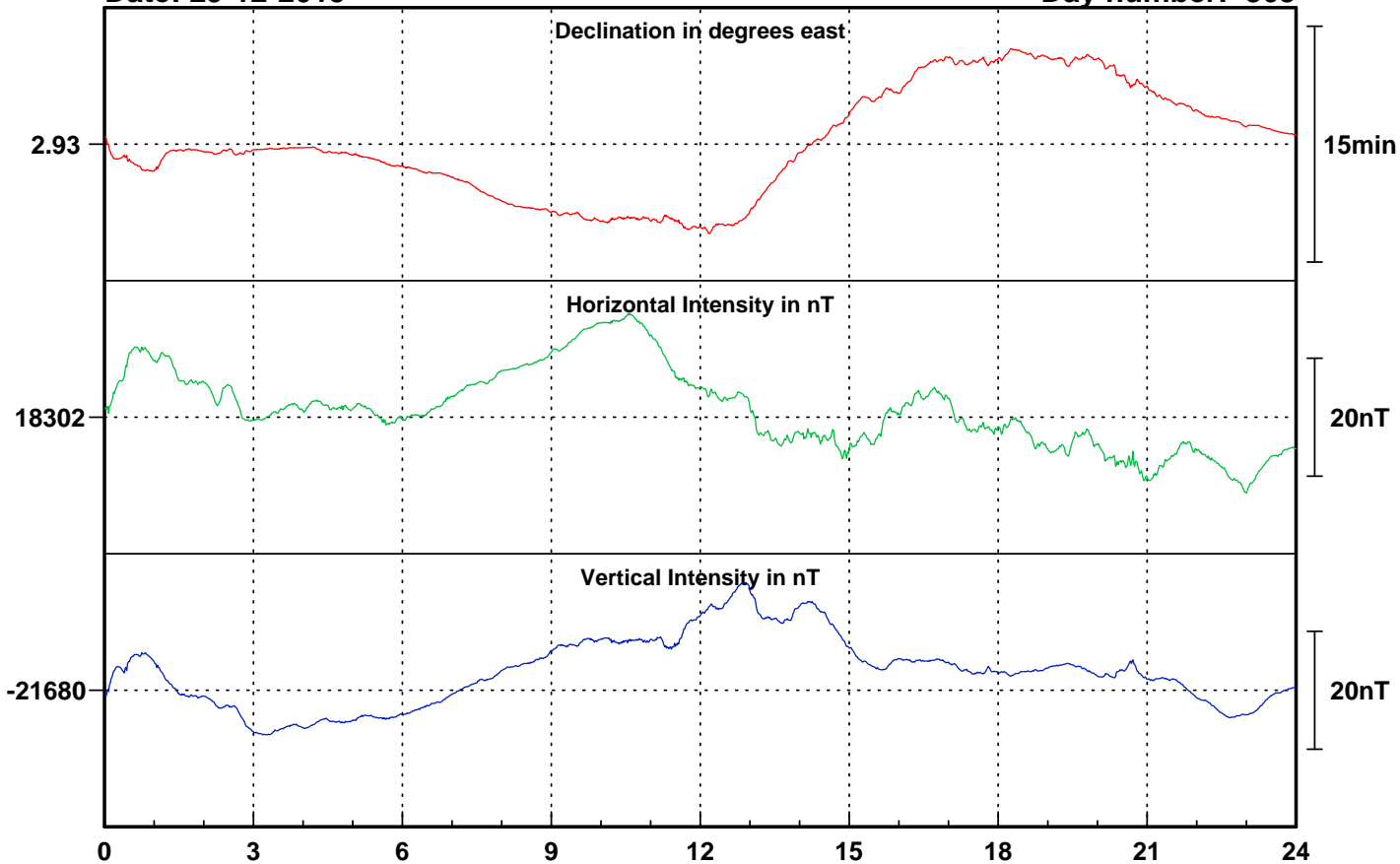
Day number: 362



Date: 29-12-2015

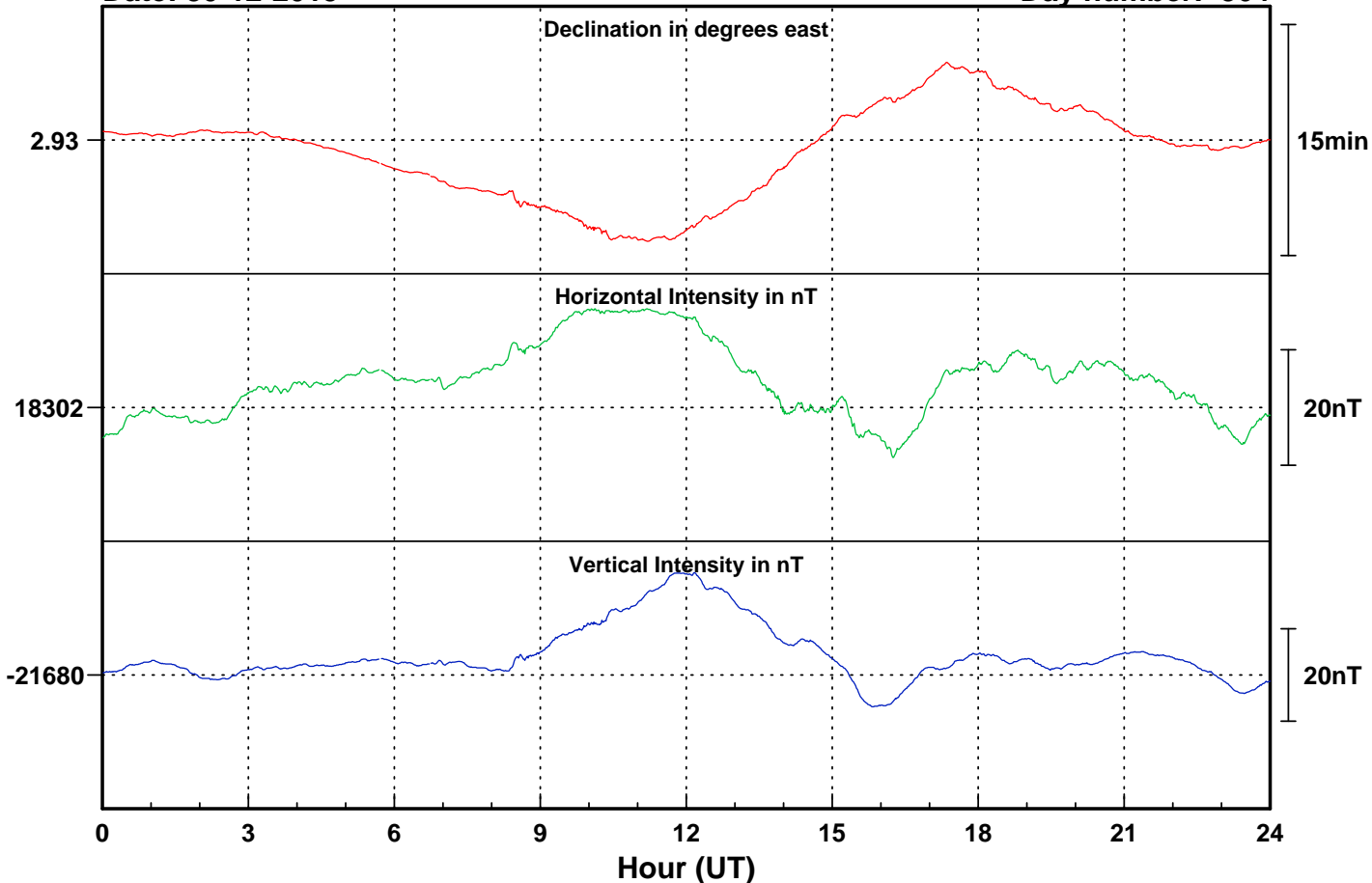
# Falkland Islands

Day number: 363



Date: 30-12-2015

Day number: 364

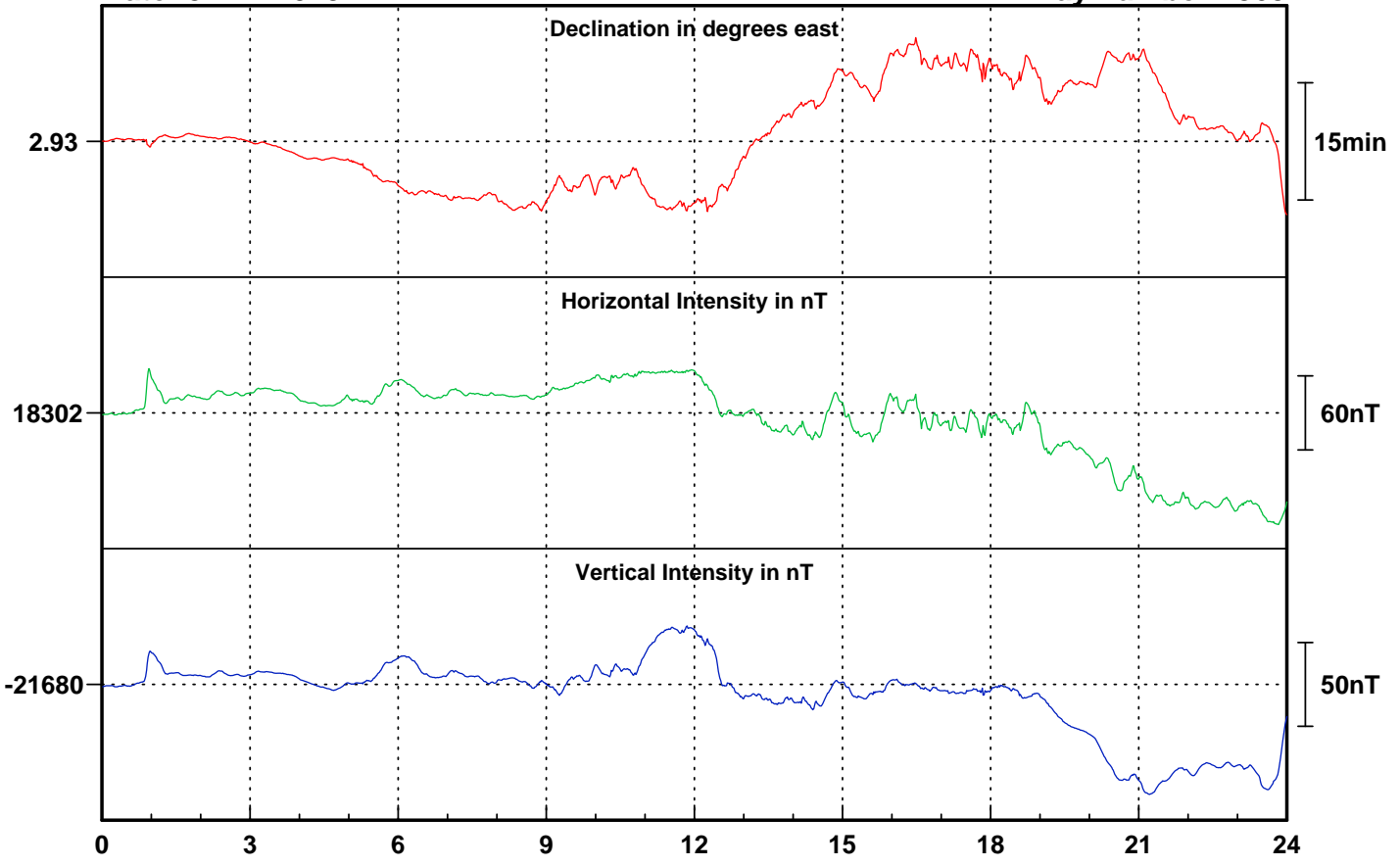




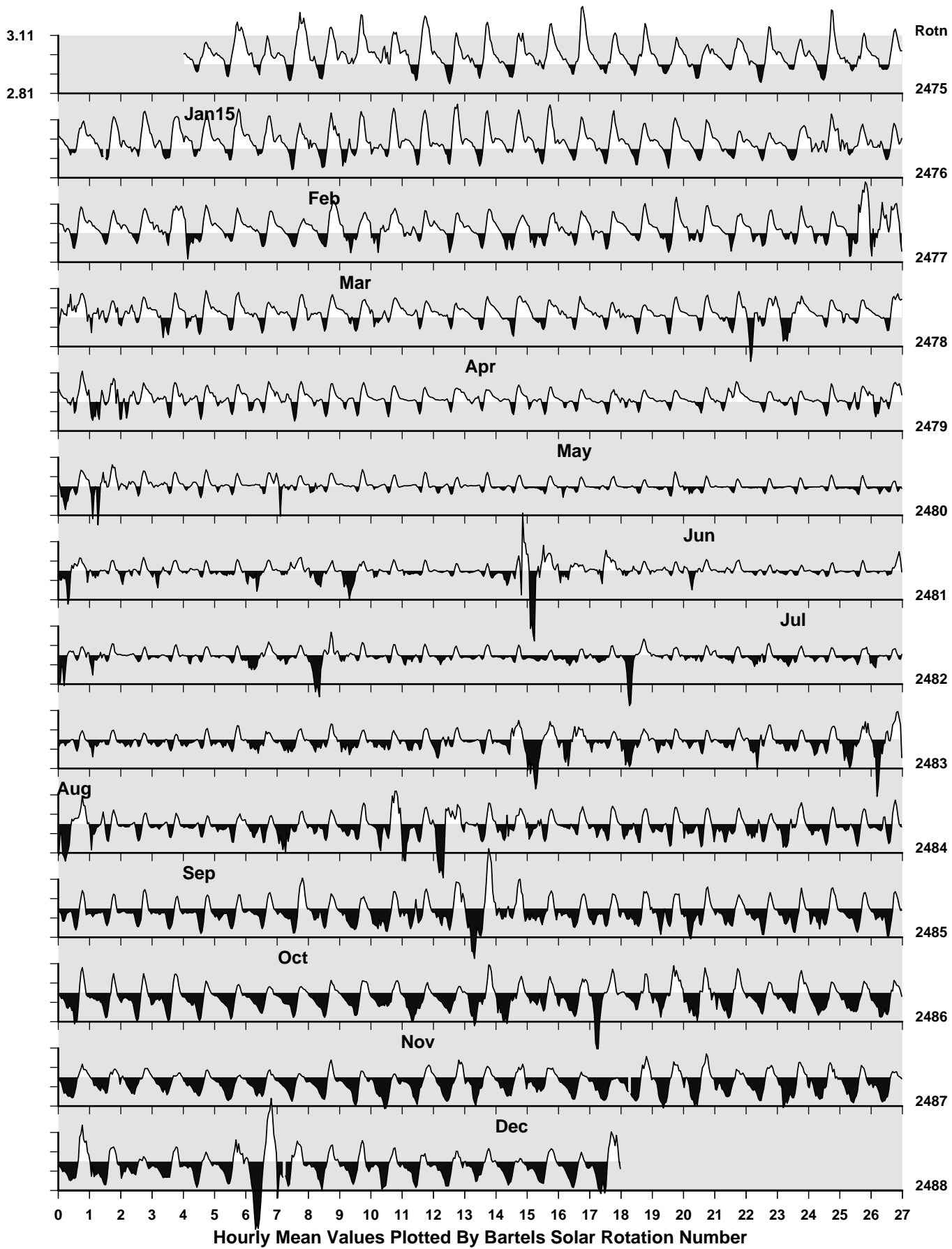
Date: 31-12-2015

# Falkland Islands

Day number: 365

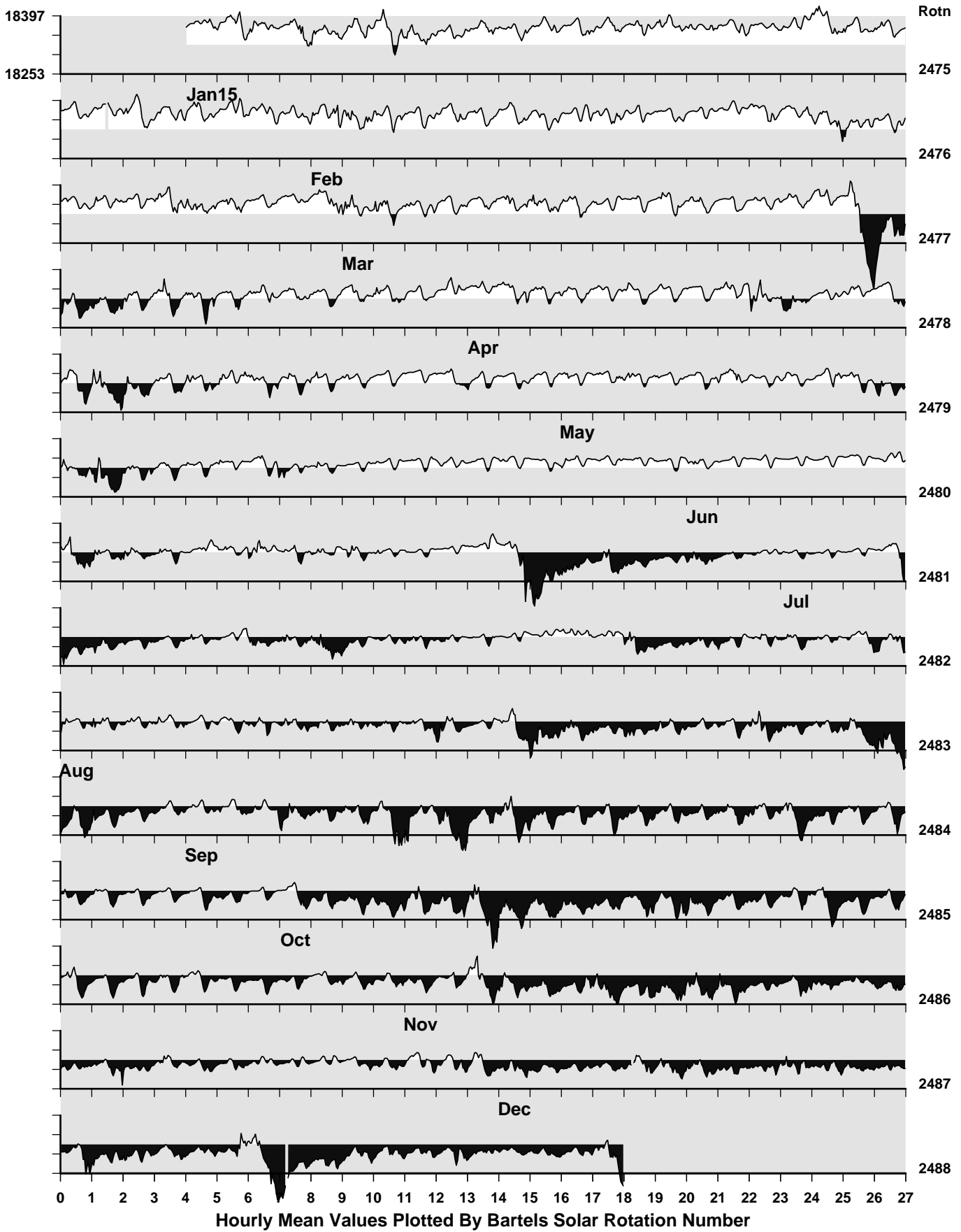


# Falkland Islands Observatory: Declination (degrees)



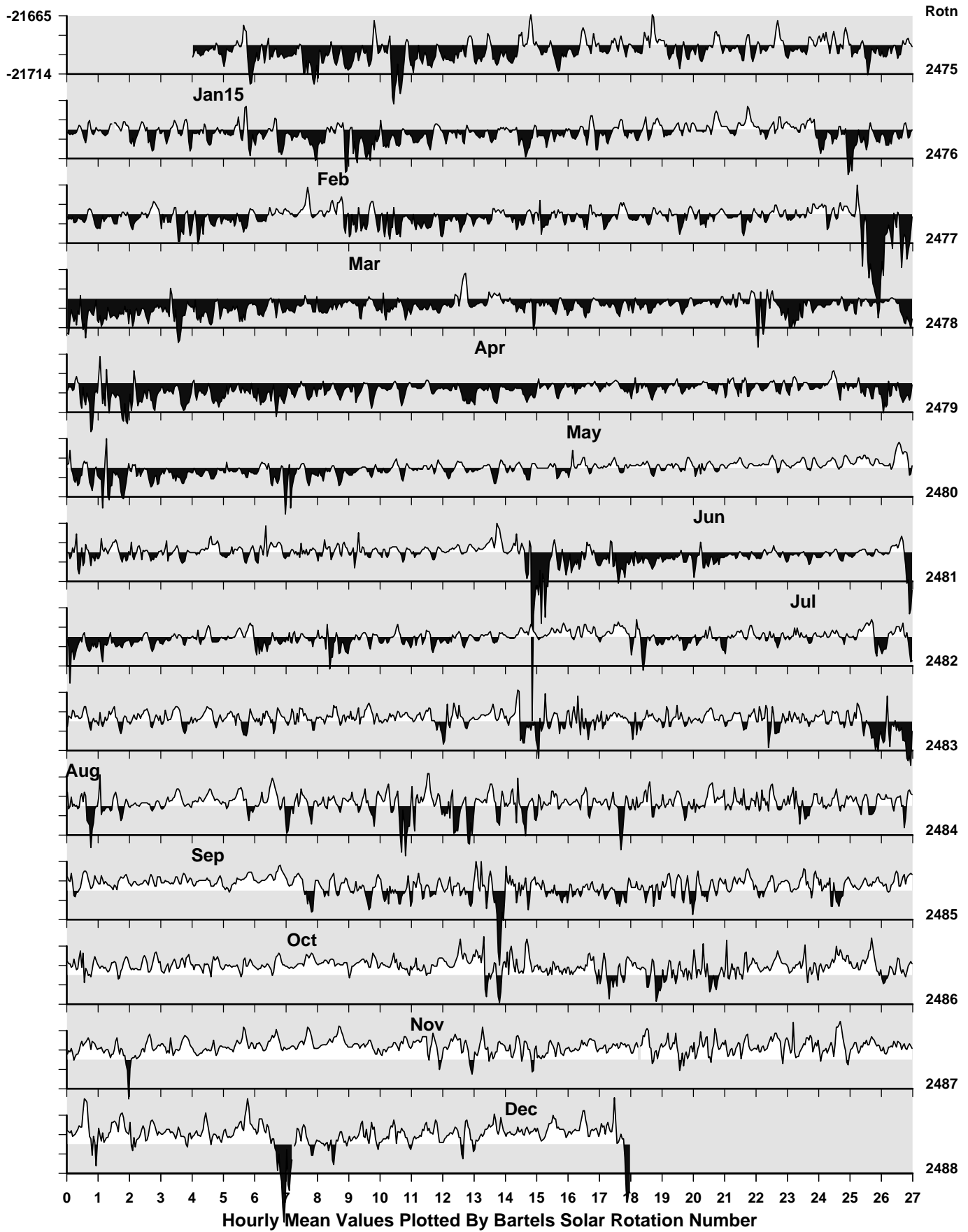
Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Falkland Islands Observatory: Horizontal Intensity fhT $\perp$

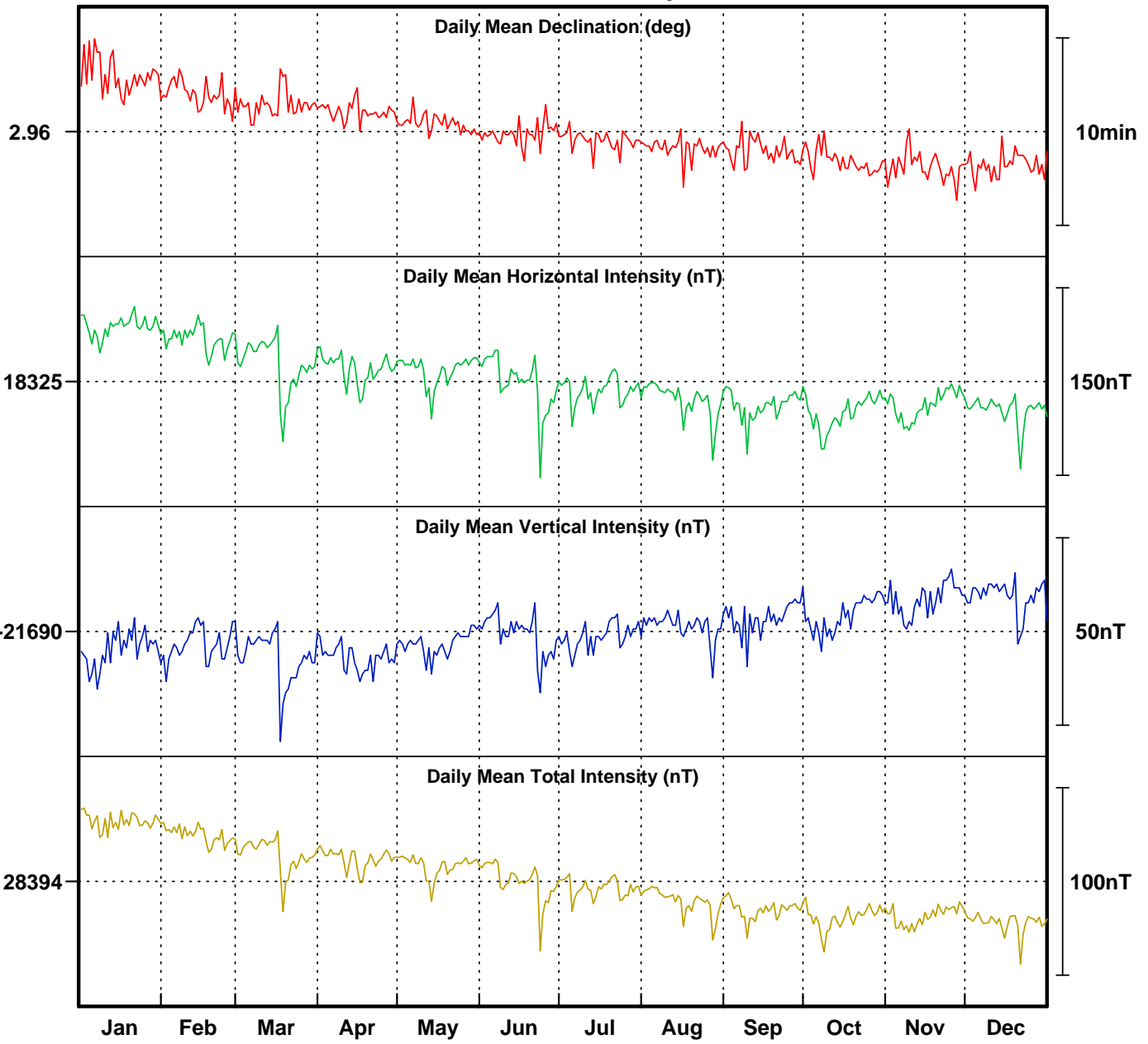


Hourly Mean Values Plotted By Bartels Solar Rotation Number

# Falkland Islands Observatory: Vertical Intensity (nT)



# Falklands Is Observatory 2015



### Monthly Mean Values for Port Stanley Observatory 2015

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	3° 0.6'	18369 nT	-49° 44.7'	18344 nT	965 nT	-21695 nT	28427 nT
February	2° 59.7'	18359 nT	-49° 45.5'	18334 nT	959 nT	-21693 nT	28419 nT
March	2° 59.1'	18338 nT	-49° 47.7'	18314 nT	955 nT	-21697 nT	28409 nT
April	2° 58.7'	18335 nT	-49° 48.0'	18310 nT	953 nT	-21697 nT	28406 nT
May	2° 58.1'	18334 nT	-49° 47.8'	18309 nT	949 nT	-21693 nT	28403 nT
June	2° 57.5'	18324 nT	-49° 48.5'	18299 nT	946 nT	-21690 nT	28394 nT
July	2° 57.2'	18318 nT	-49° 49.2'	18293 nT	944 nT	-21691 nT	28391 nT
August	2° 56.8'	18310 nT	-49° 49.6'	18286 nT	941 nT	-21688 nT	28384 nT
September	2° 56.6'	18306 nT	-49° 49.9'	18282 nT	940 nT	-21686 nT	28379 nT
October	2° 56.1'	18300 nT	-49° 50.3'	18276 nT	937 nT	-21685 nT	28375 nT
November	2° 55.8'	18306 nT	-49° 49.4'	18282 nT	936 nT	-21681 nT	28376 nT
December	2° 55.9'	18302 nT	-49° 49.8'	18278 nT	936 nT	-21680 nT	28372 nT

Note

i. The values shown here are provisional.