BRITISH GEOLOGICAL SURVEY

Port Stanley Observatory *Monthly Magnetic Bulletin*

December 2010

10/12/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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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. The observatory co-ordinates are:

Geographic:	*51.704 °S*	*302.107 °E*
Geomagnetic:	*42.005 °S*	*11.942 °E*
Height above mean sea level:	*135 m*	

The geomagnetic co-ordinates are approximations, calculated using the 11th generation International Geomagnetic Reference Field (IGRF) at epoch 2010.5. On-line access to models (including IGRF), charts and navigational data are available at www.geomag.bgs.ac.uk/navigation.html

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 in the Geomagnetism Information and Forecast Service (GIFS), available on-line at www.geomag.bgs.ac.uk/on_line_gifs.html

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.’

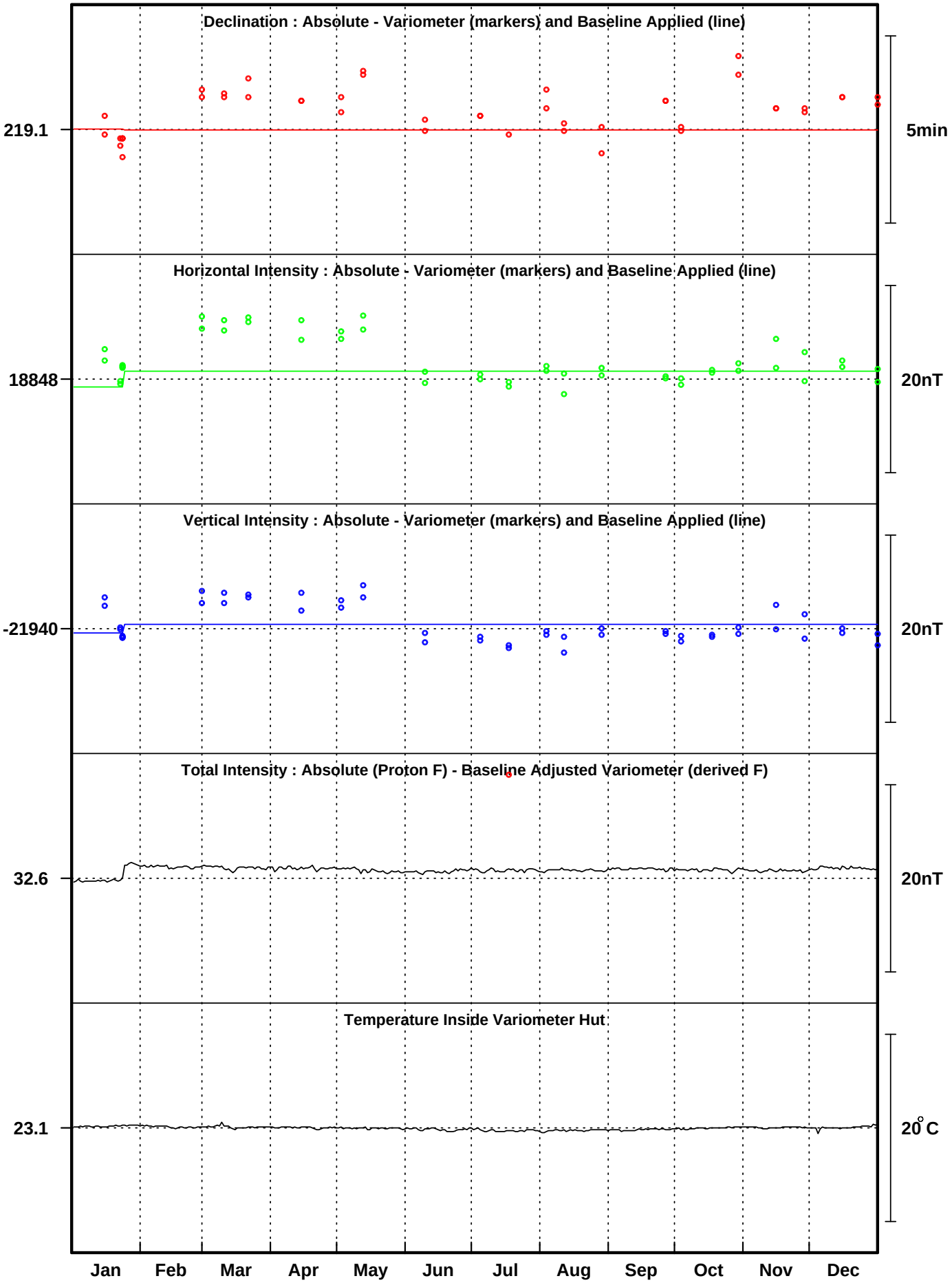
Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at www.geomag.bgs.ac.uk/staff.html.

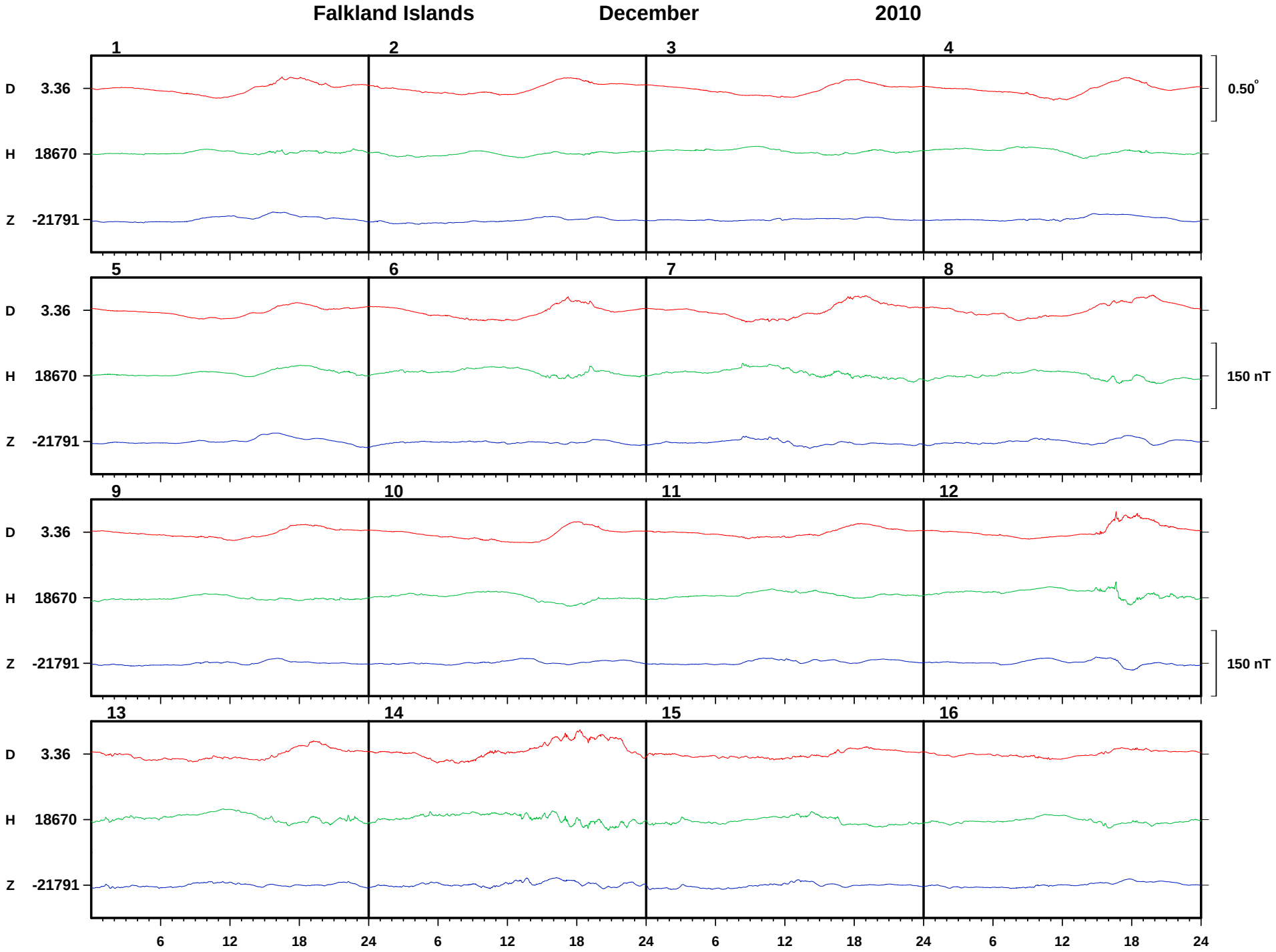
PORT STANLEY OBSERVATORY

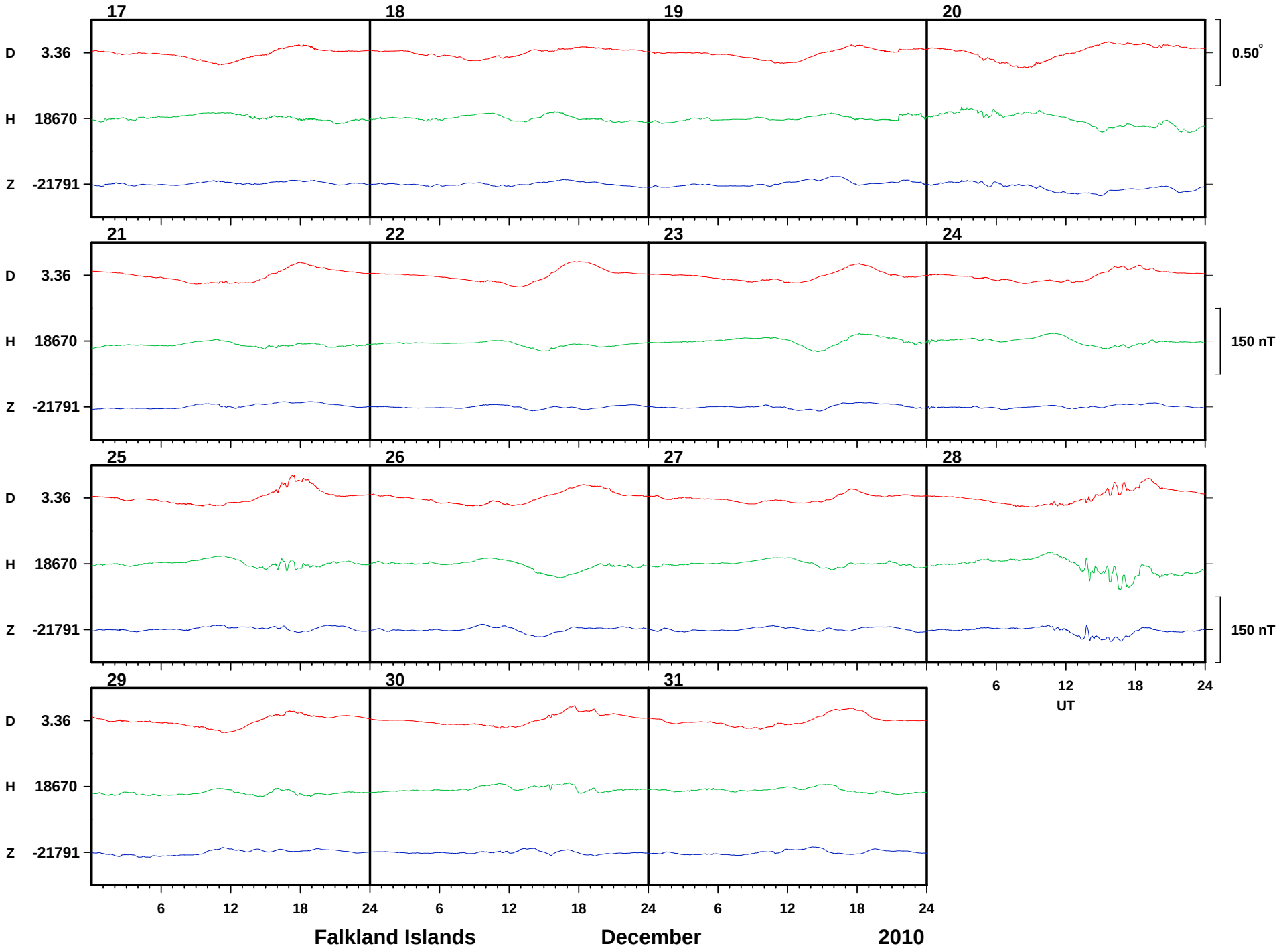
ABSOLUTE OBSERVATIONS

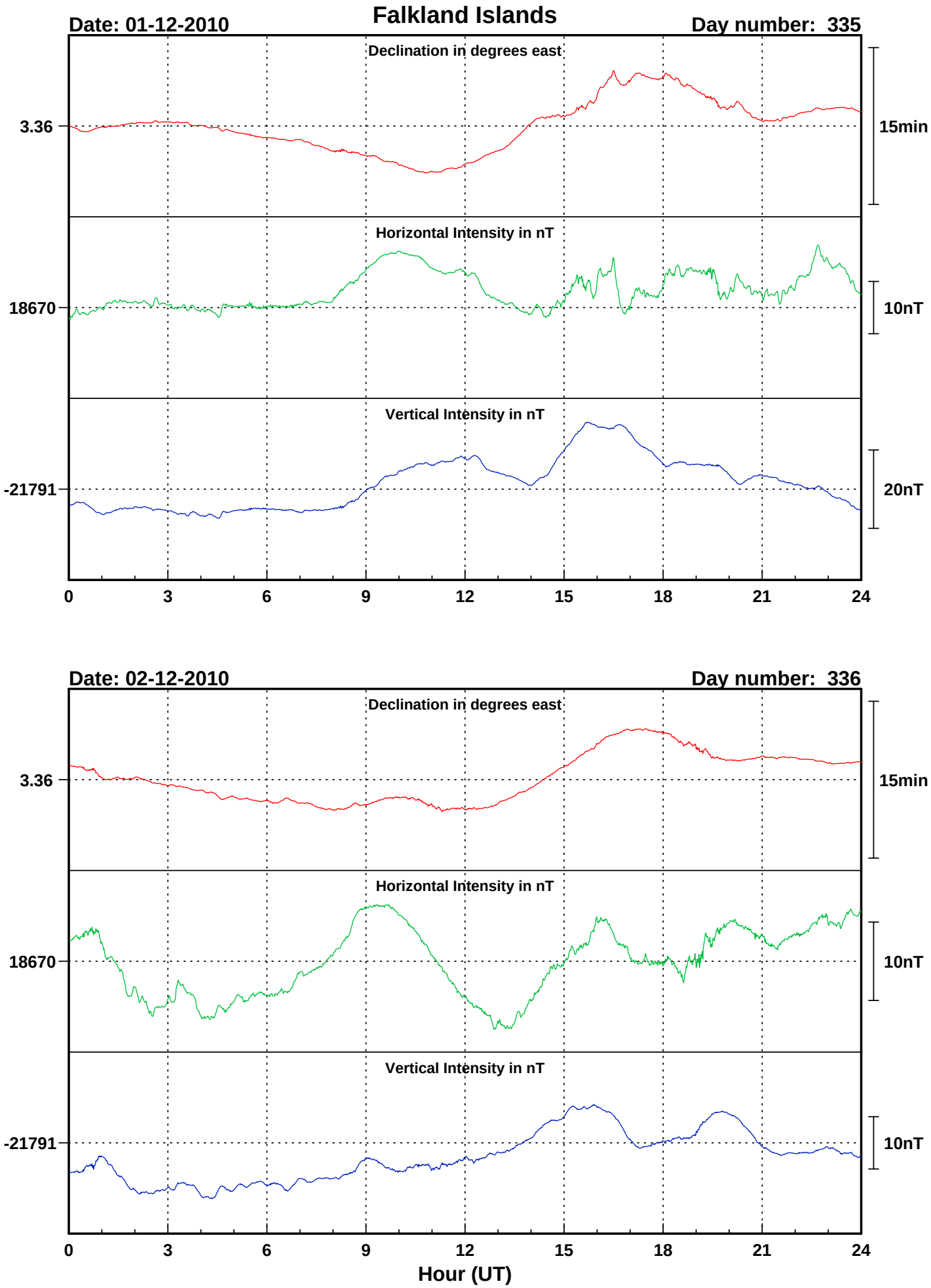
		Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Absolute (º)**	**Site difference (nT)**	**Absolute corrected (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Observer**
15-Dec-10	349	18:07	3.4130	3.6667	18:14	-49.4269	-32.6	28689.3	18660.0	18849.5	-21791.7	-21939.6	NB
15-Dec-10	349	18:21	3.4125	3.6667	18:28	-49.4289	-32.6	28689.5	18659.4	18848.8	-21792.5	-21940.1	NB
31-Dec-10	365	22:36	3.3736	3.6667	22:44	-49.4331	-32.6	28685.5	18655.2	18848.6	-21790.8	-21940.2	NB
31-Dec-10	365	22:51	3.3713	3.6633	22:59	-49.4353	-32.6	28687.3	18655.5	18847.2	-21793.0	-21941.4	NB

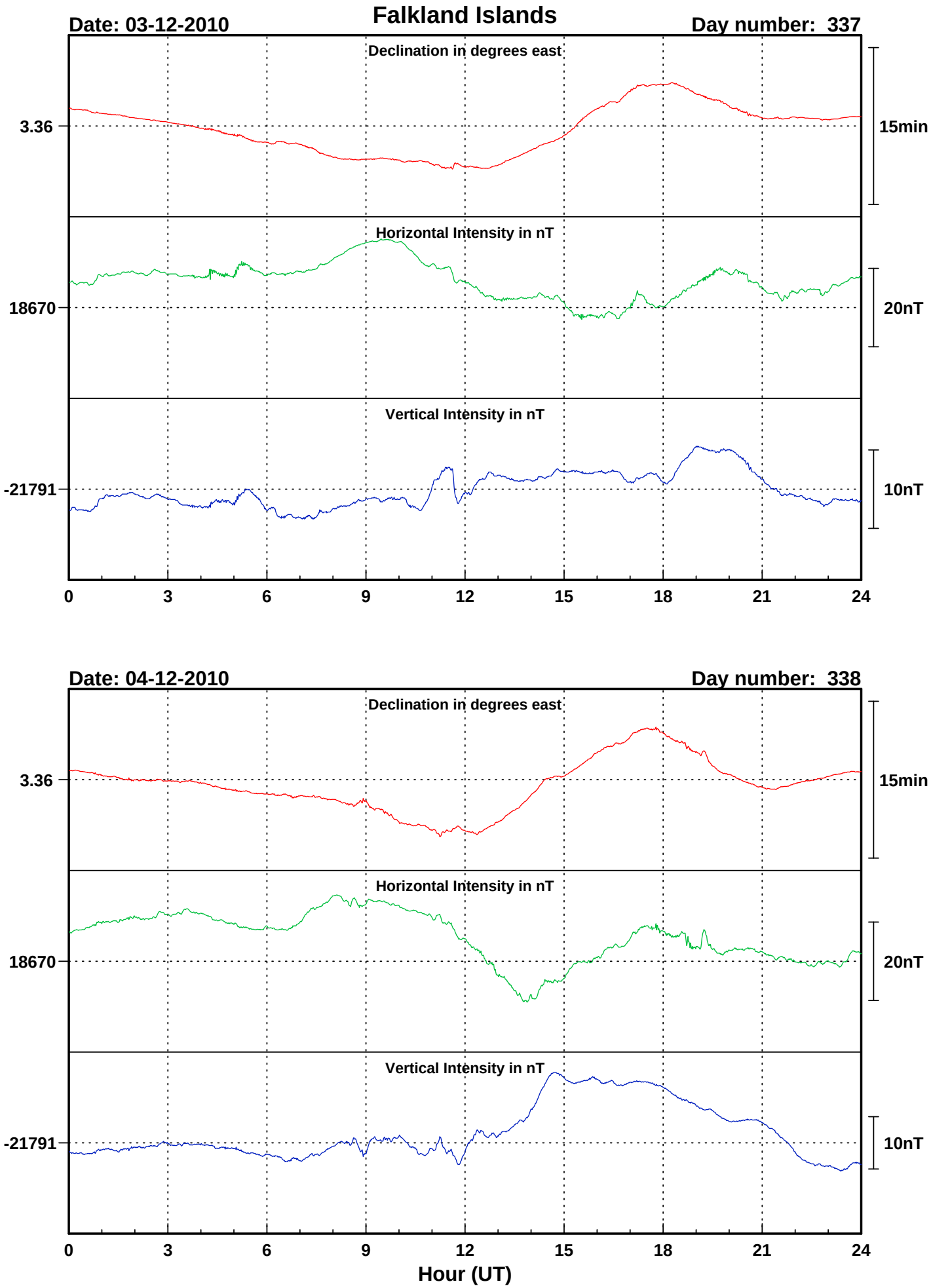
Falkland Island 2010




Falkland Islands
December
2010
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
D
3.36
H
18670
Z
-21791
0.50°
150 nT
150 nT
6
12
18
24


17
18
19
20
D 3.36
H 18670
Z -21791
0.50°
21
22
23
24
D 3.36
H 18670
Z -21791
150 nT
25
26
27
28
D 3.36
H 18670
Z -21791
150 nT
29
30
31
D 3.36
H 18670
Z -21791
6
12
18
24
UT
Falkland Islands
December
2010


Falkland Islands
Date: 01-12-2010
Day number: 335
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
10nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Date: 02-12-2010
Day number: 336
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
10nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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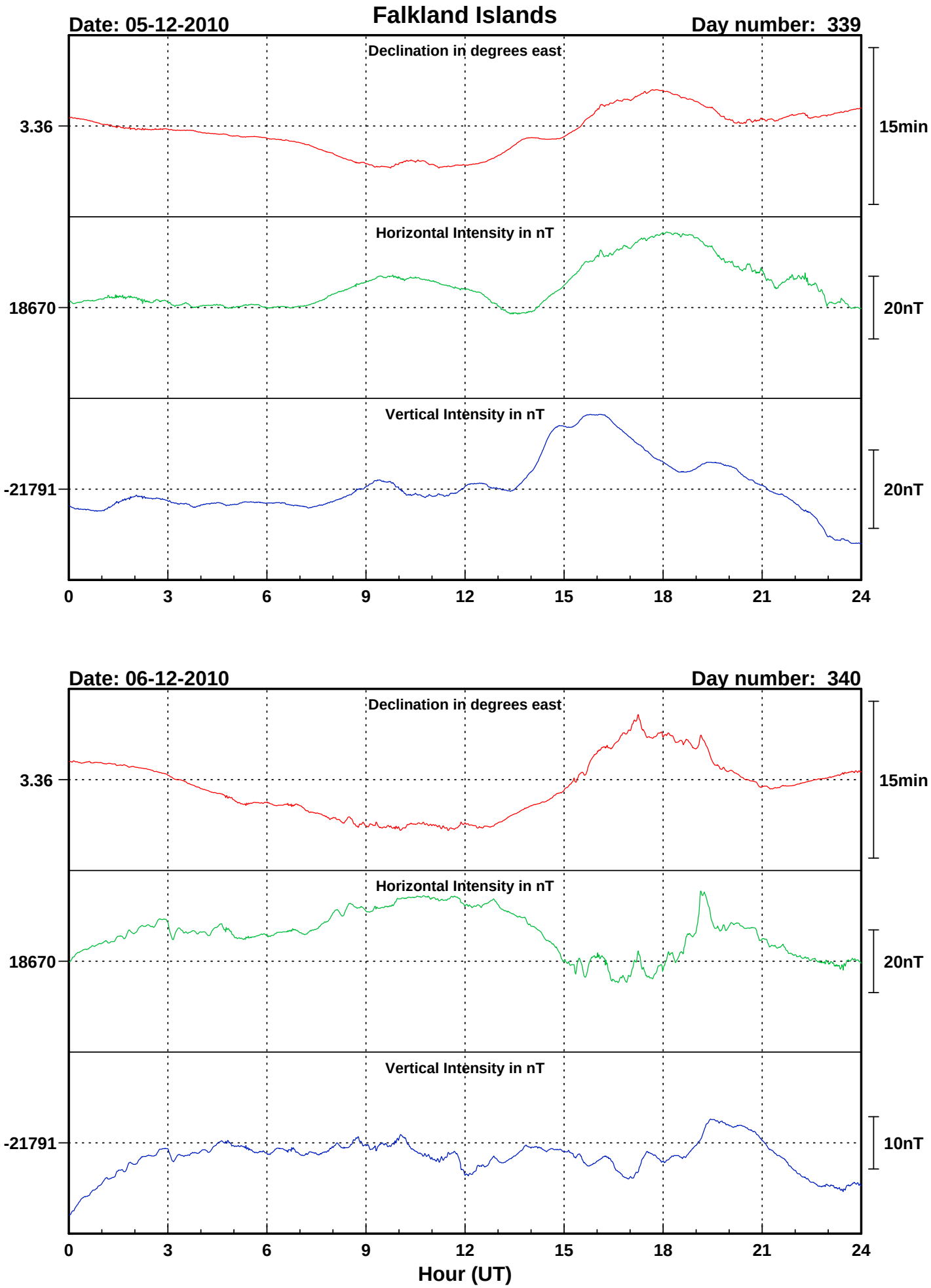
Date: 03-12-2010
Day number: 337
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Date: 04-12-2010
Day number: 338
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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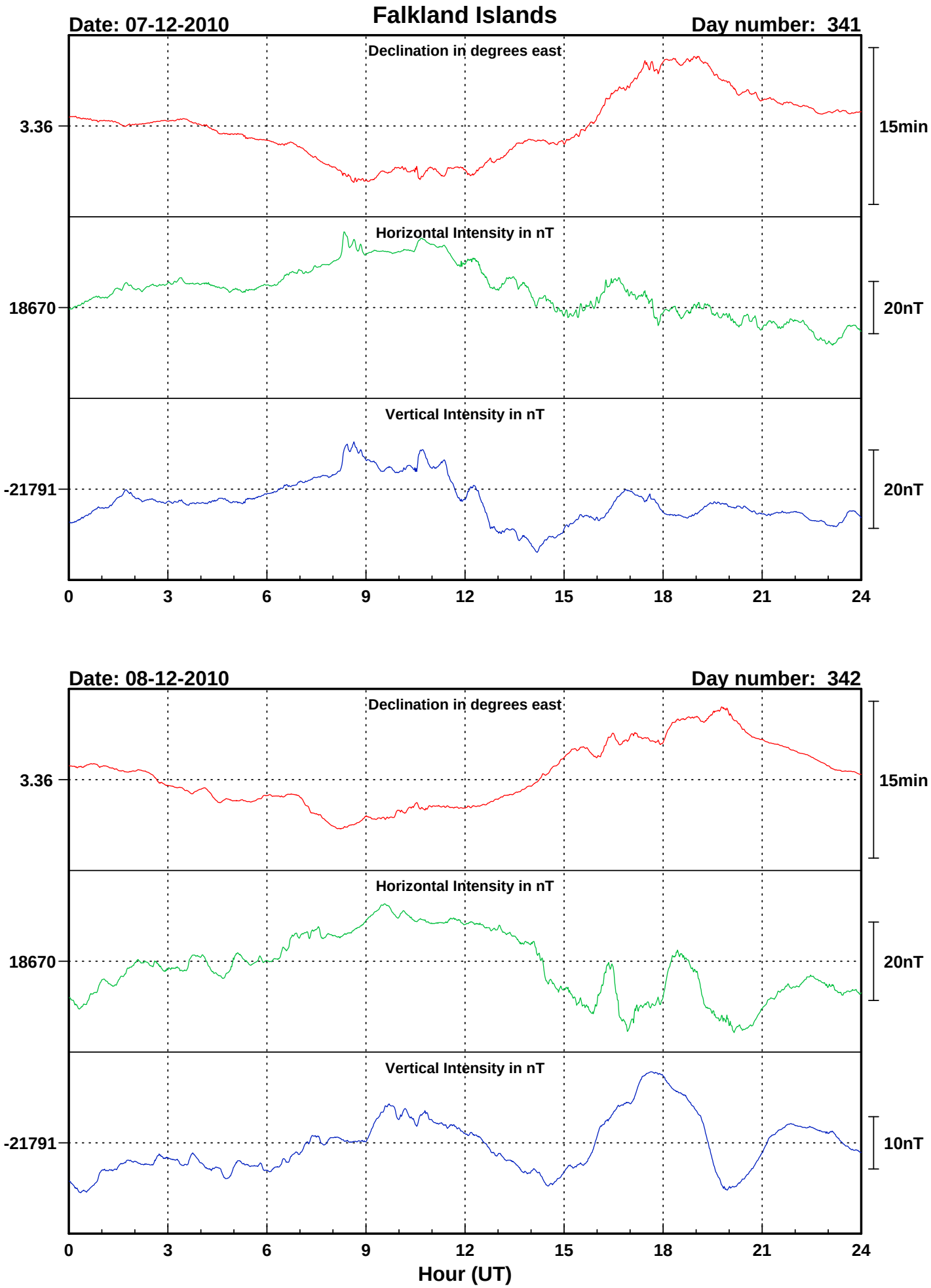
Day number: 339
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Date: 06-12-2010
Day number: 340
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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Day number: 341
Declination in degrees east
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15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Date: 08-12-2010
Day number: 342
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
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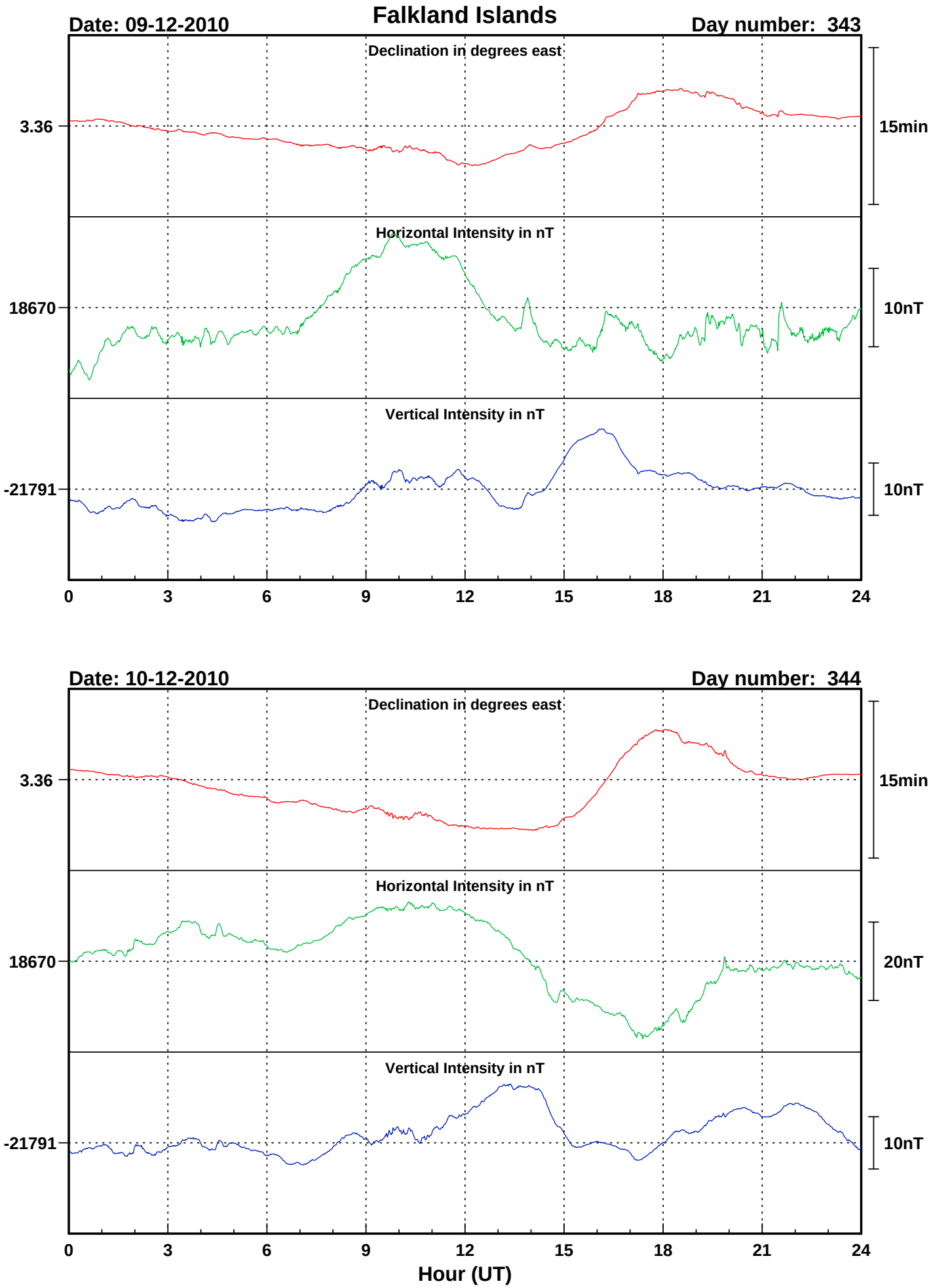
24
Hour (UT)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Day number: 343
Declination in degrees east
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15min
Horizontal Intensity in nT
18670
10nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Date: 10-12-2010
Day number: 344
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
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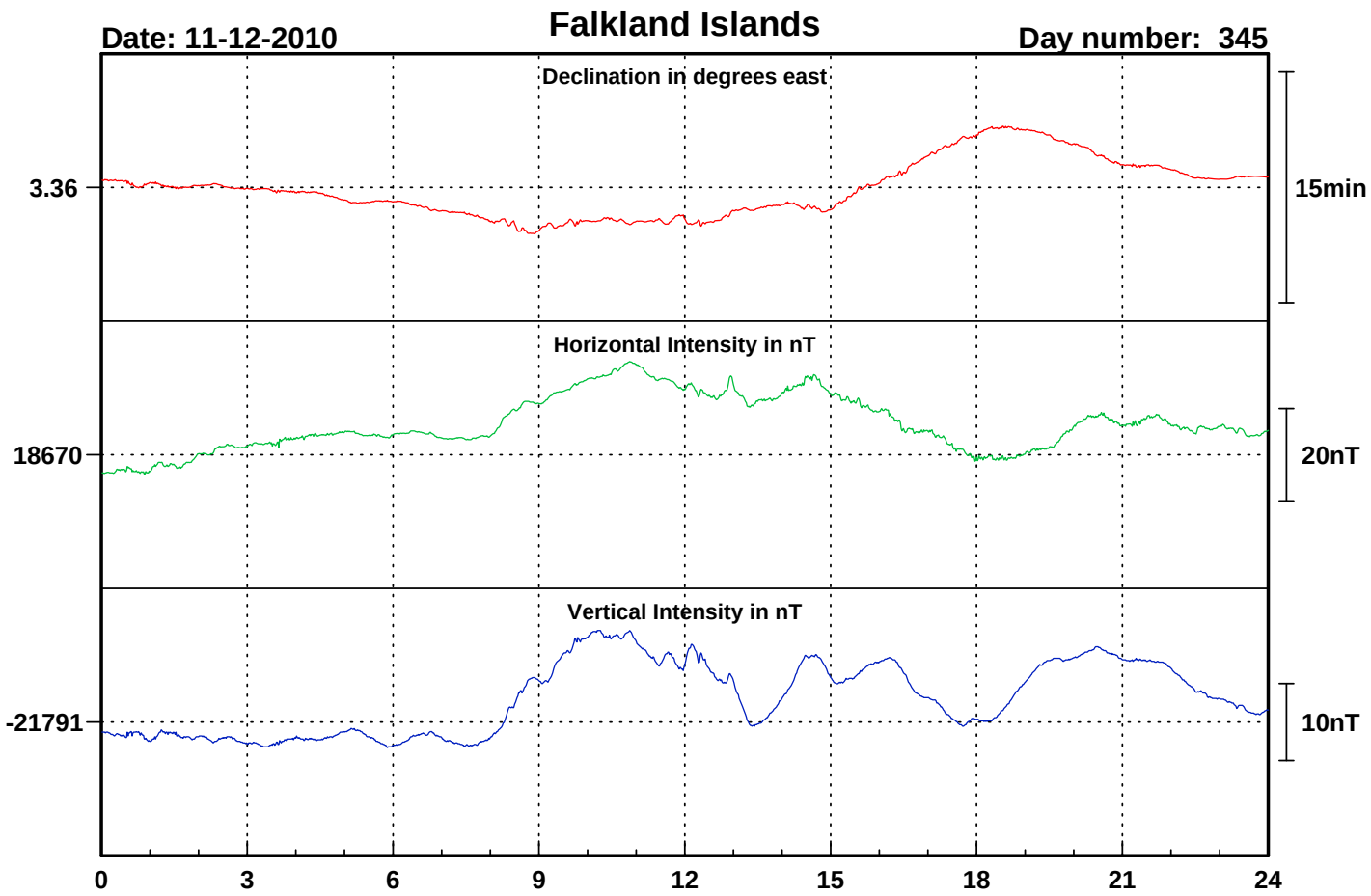
18
21
24
Hour (UT)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Date: 11-12-2010
Day number: 345
Declination in degrees east
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15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
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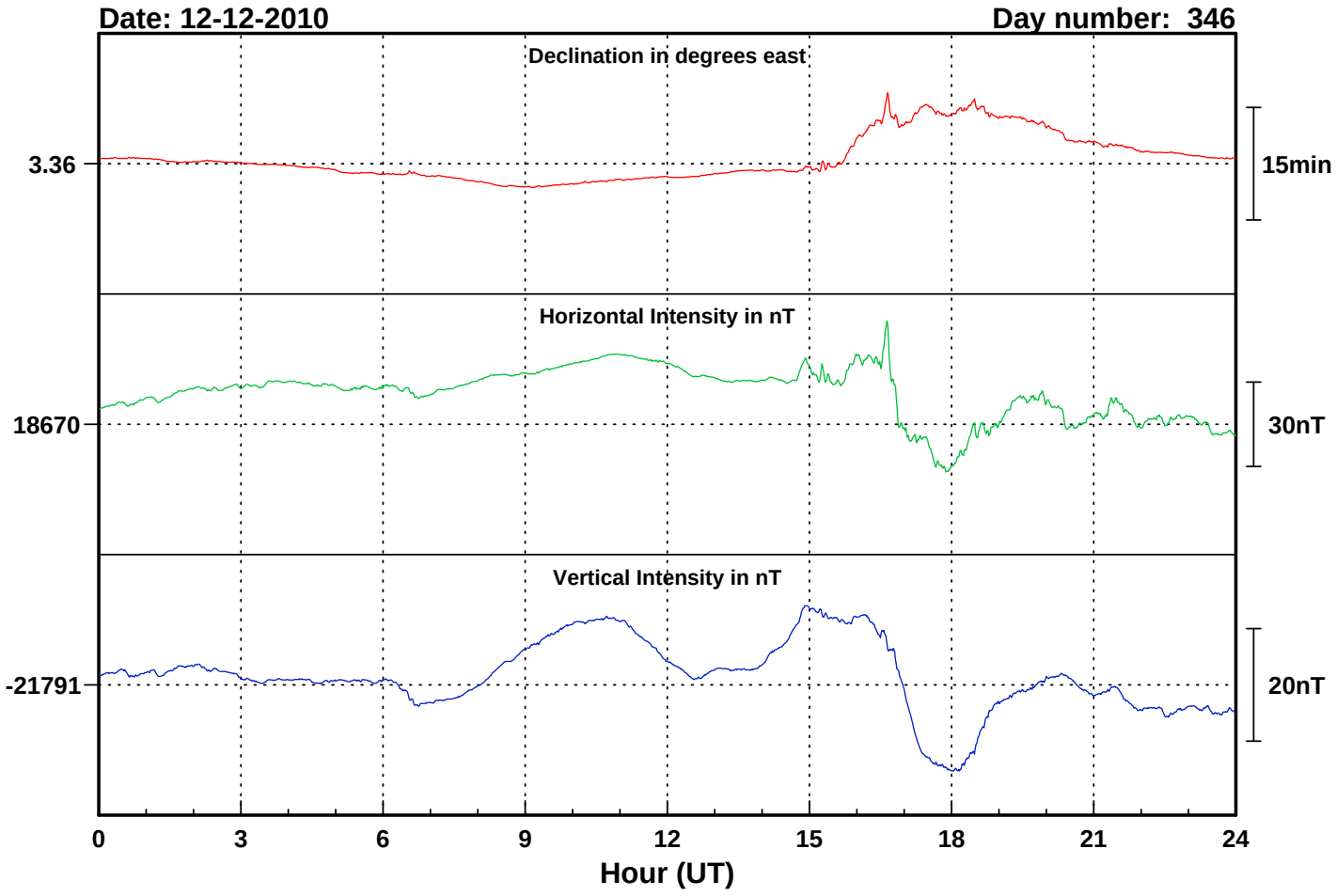
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15min
Horizontal Intensity in nT
18670
30nT
Vertical Intensity in nT
-21791
20nT
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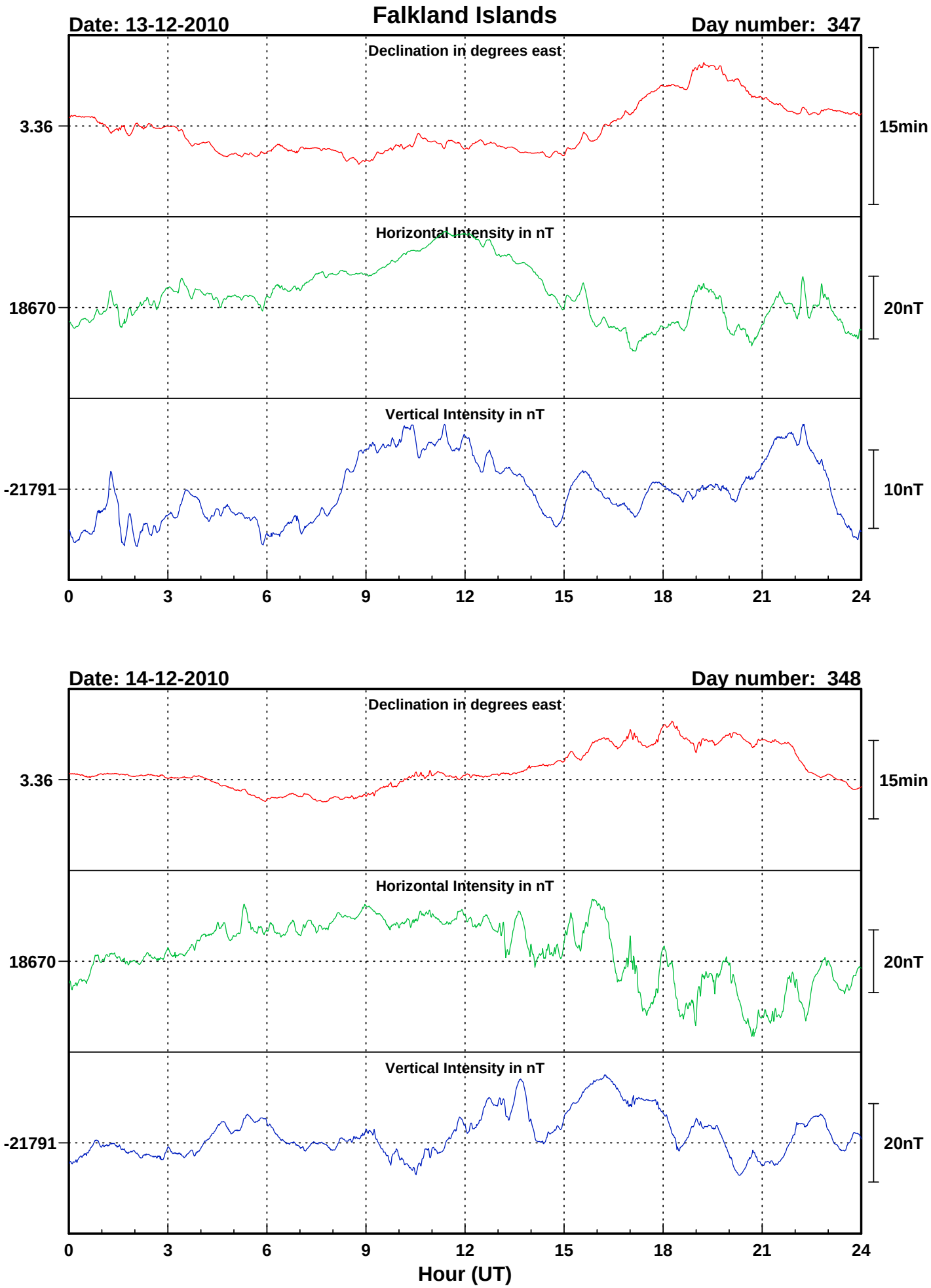
Hour (UT)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15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
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21
24
Date: 14-12-2010
Day number: 348
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
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20nT
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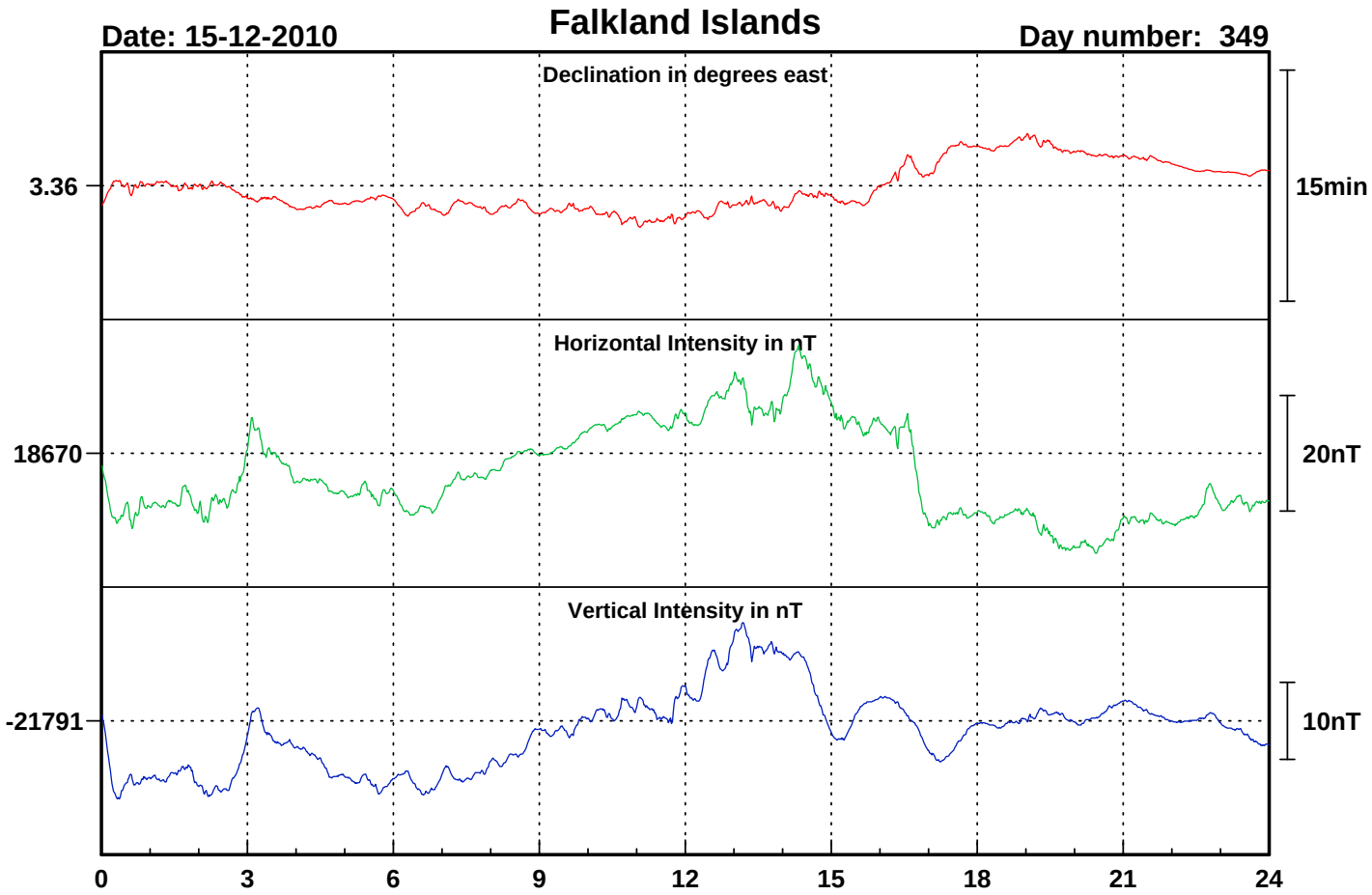
18
21
24
Hour (UT)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15min
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18670
20nT
Vertical Intensity in nT
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10nT
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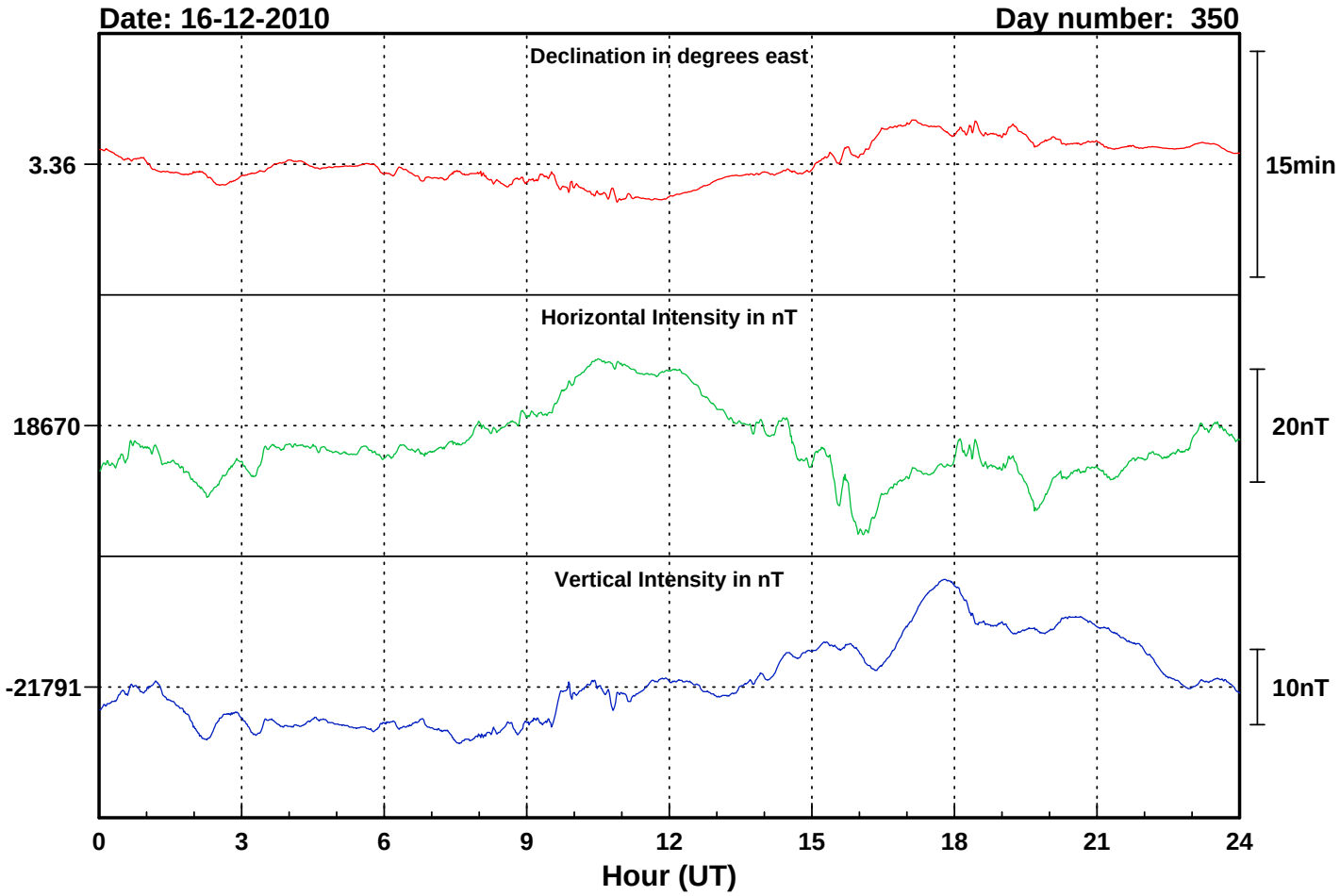
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Day number: 350
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15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
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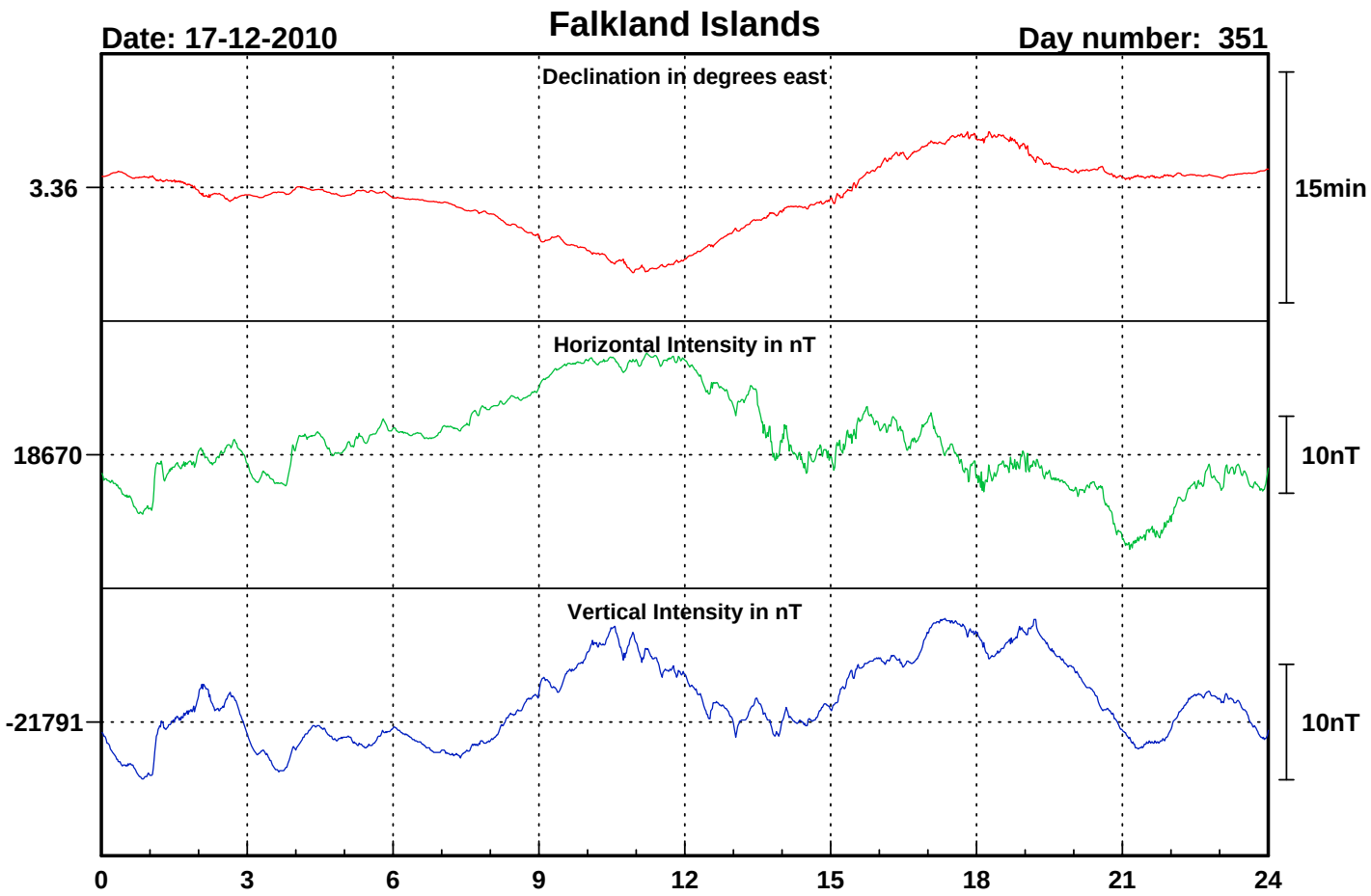
Hour (UT)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Day number: 351
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15min
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18670
10nT
Vertical Intensity in nT
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0
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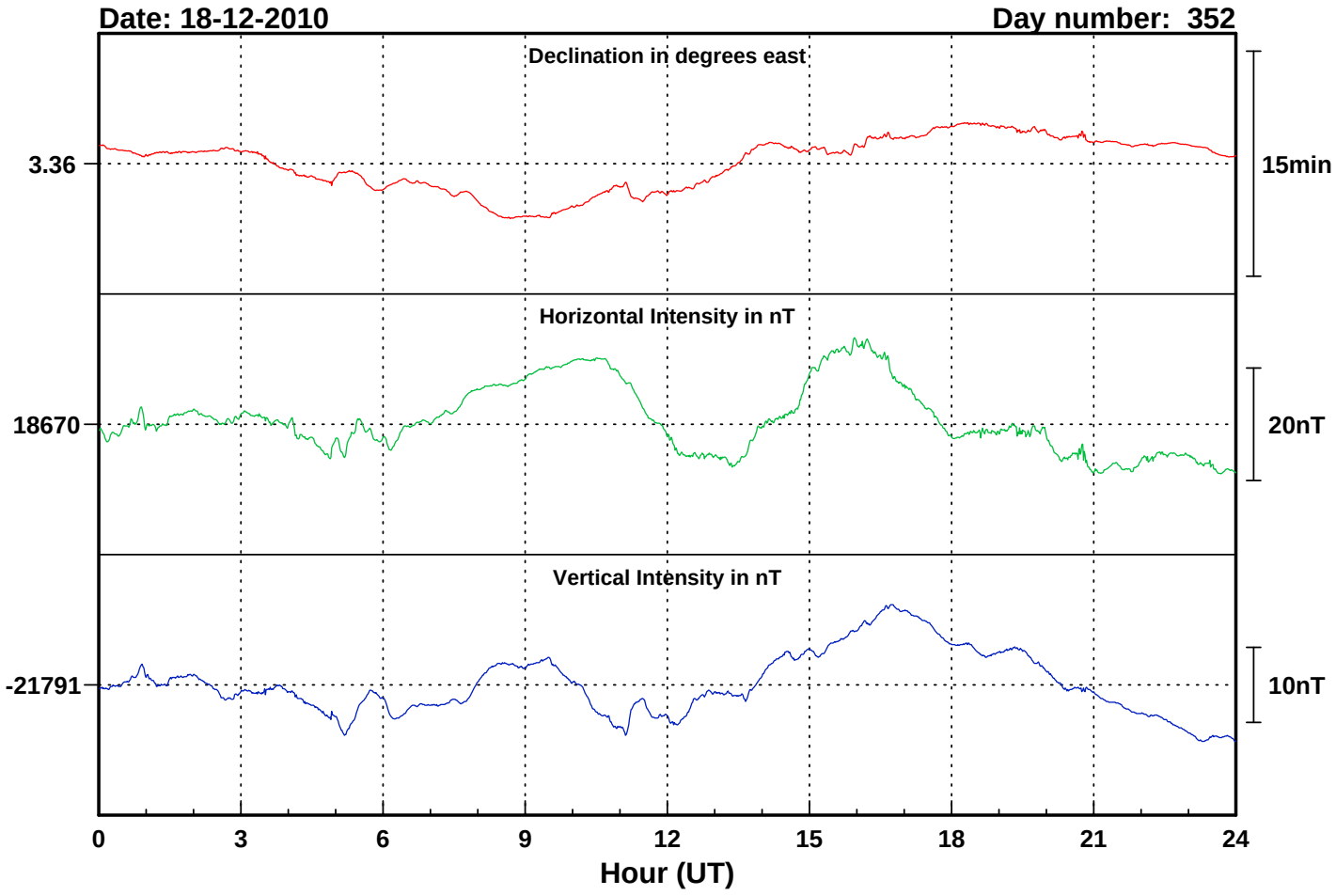
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15min
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18670
20nT
Vertical Intensity in nT
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10nT
0
3
6
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18
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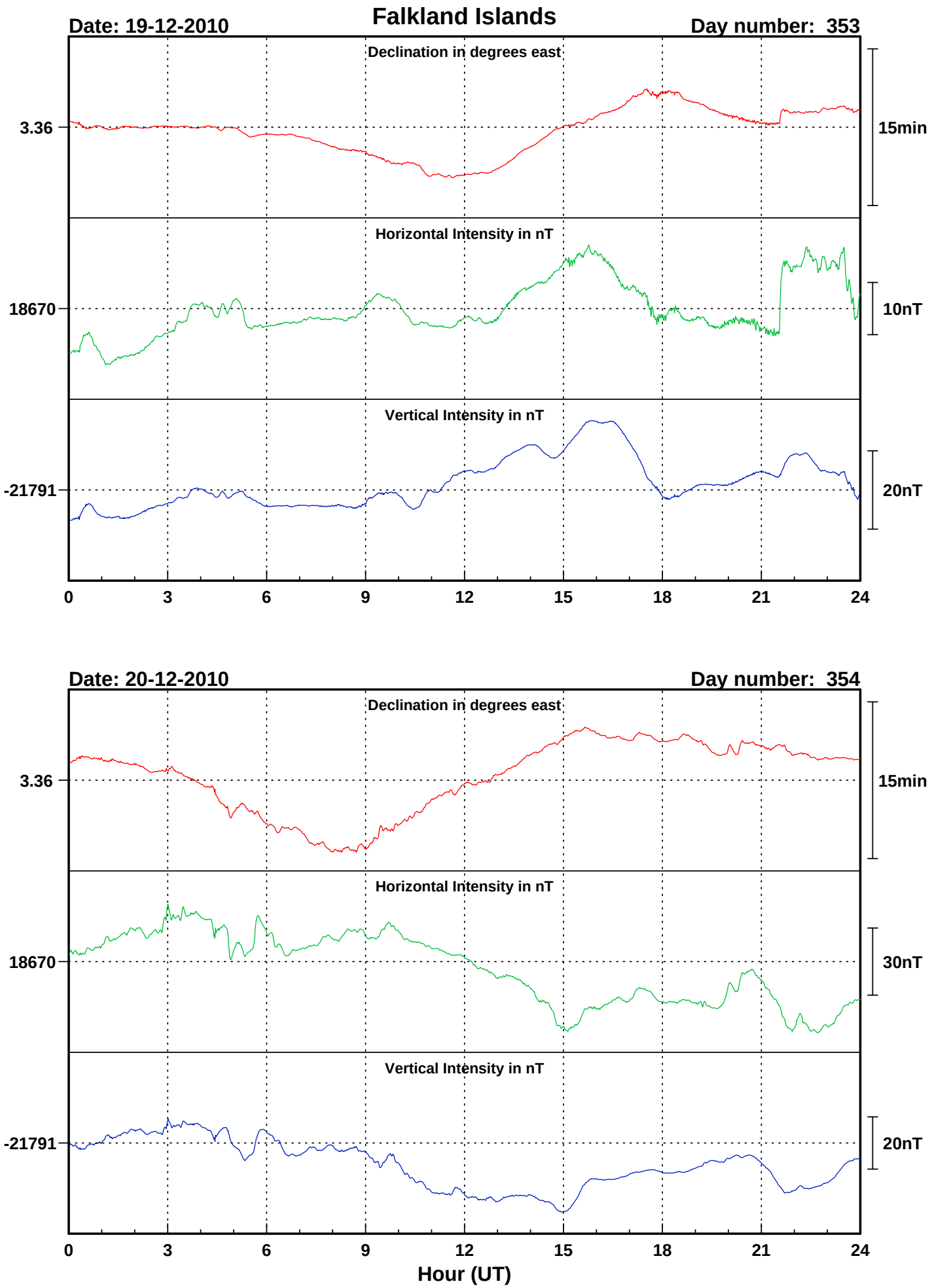
24
Hour (UT)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15min
Horizontal Intensity in nT
18670
10nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Date: 20-12-2010
Day number: 354
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
30nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
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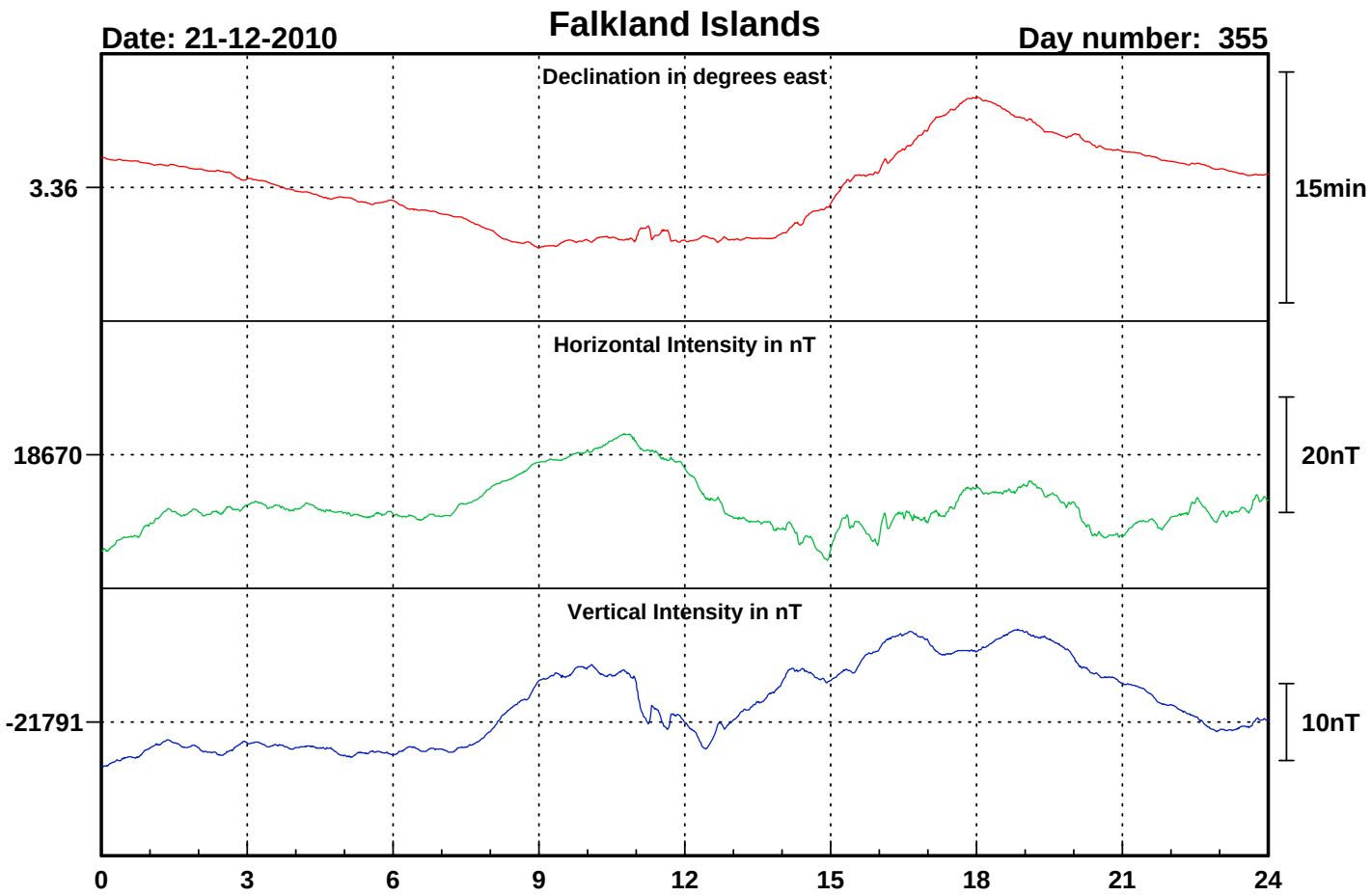
18
21
24
Hour (UT)


Falkland Islands
Date: 21-12-2010
Day number: 355
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
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10nT
0
3
6
9
12
15
18
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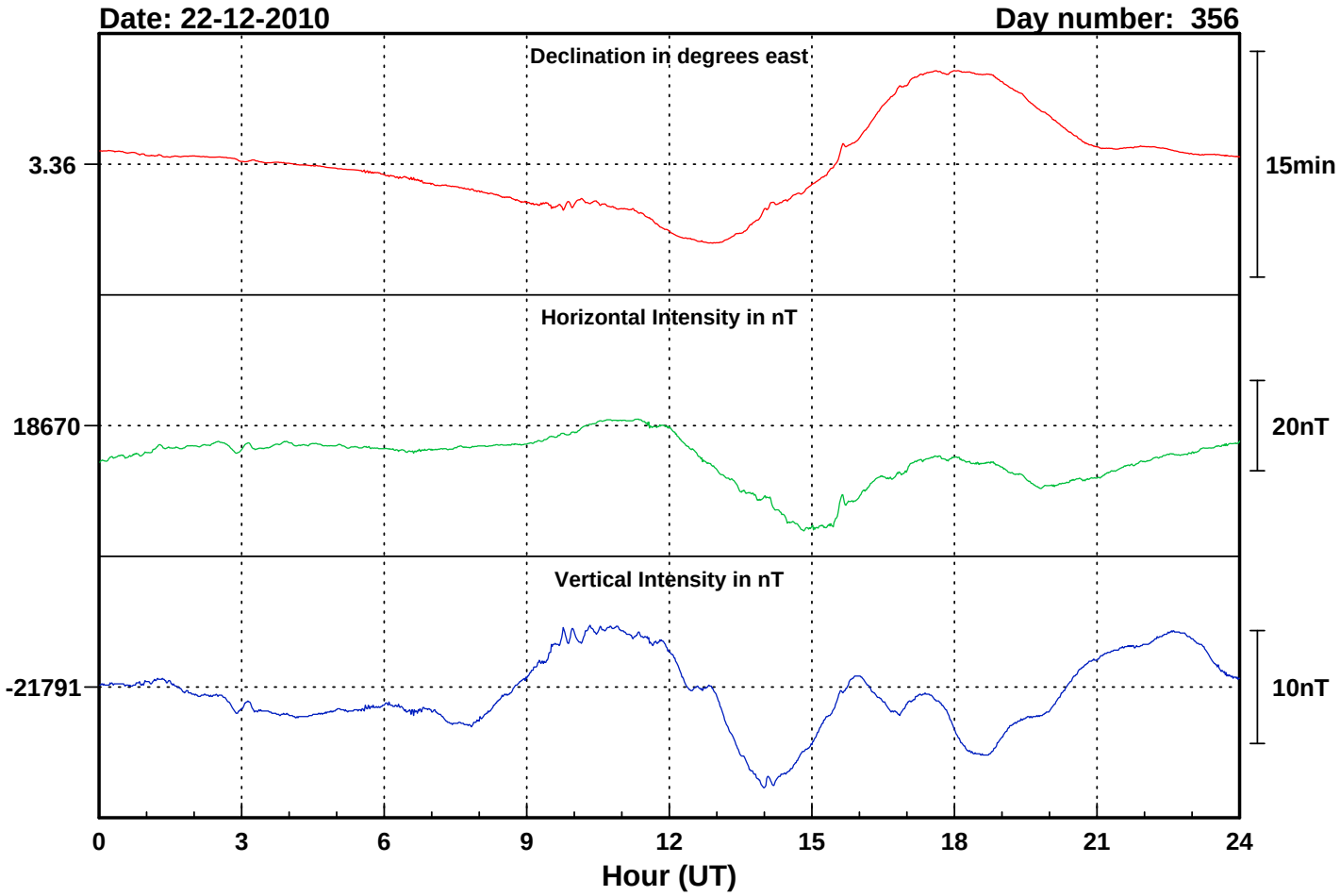
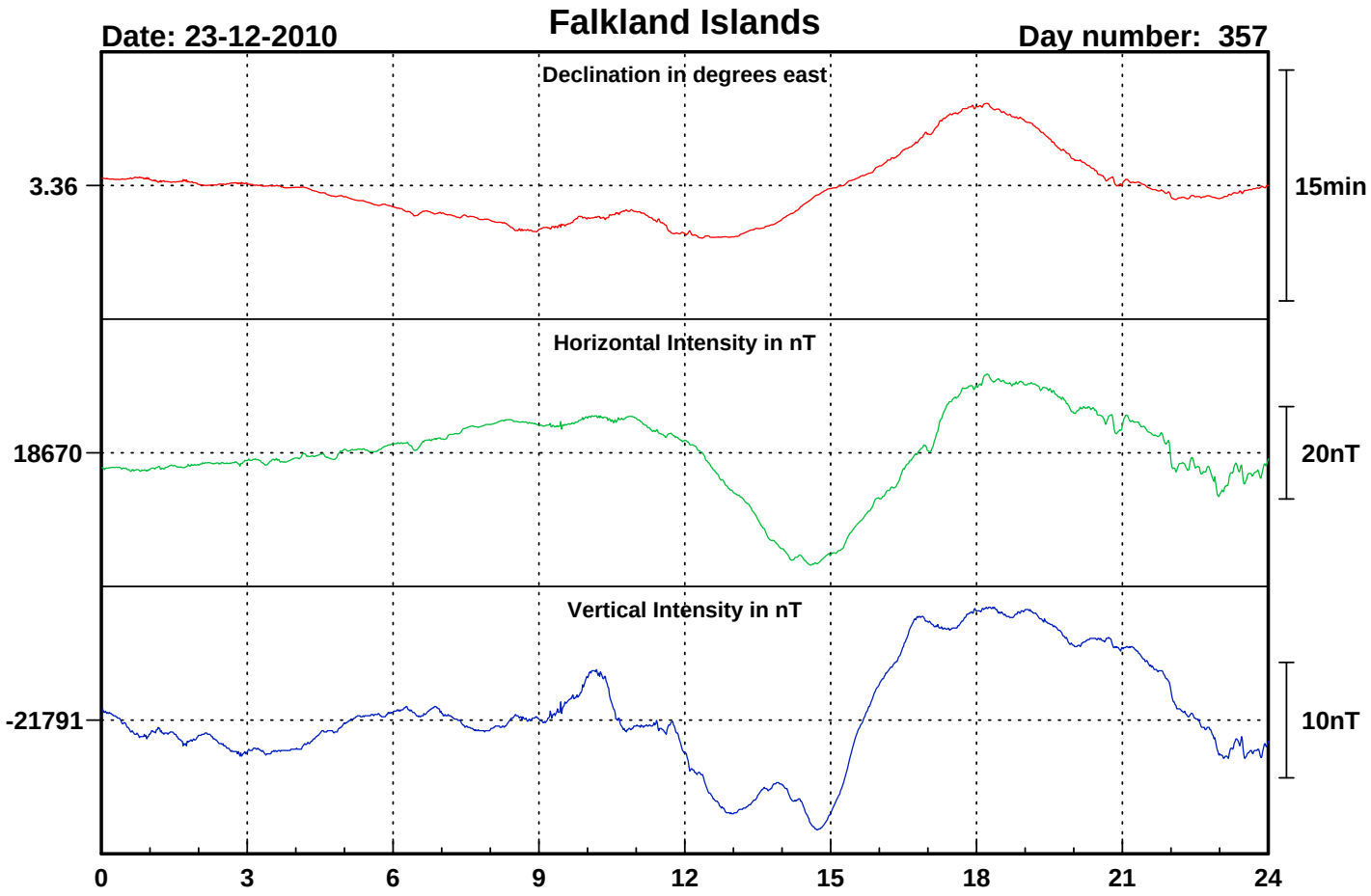
24


Date: 22-12-2010
Day number: 356
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 23-12-2010
Day number: 357
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
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0
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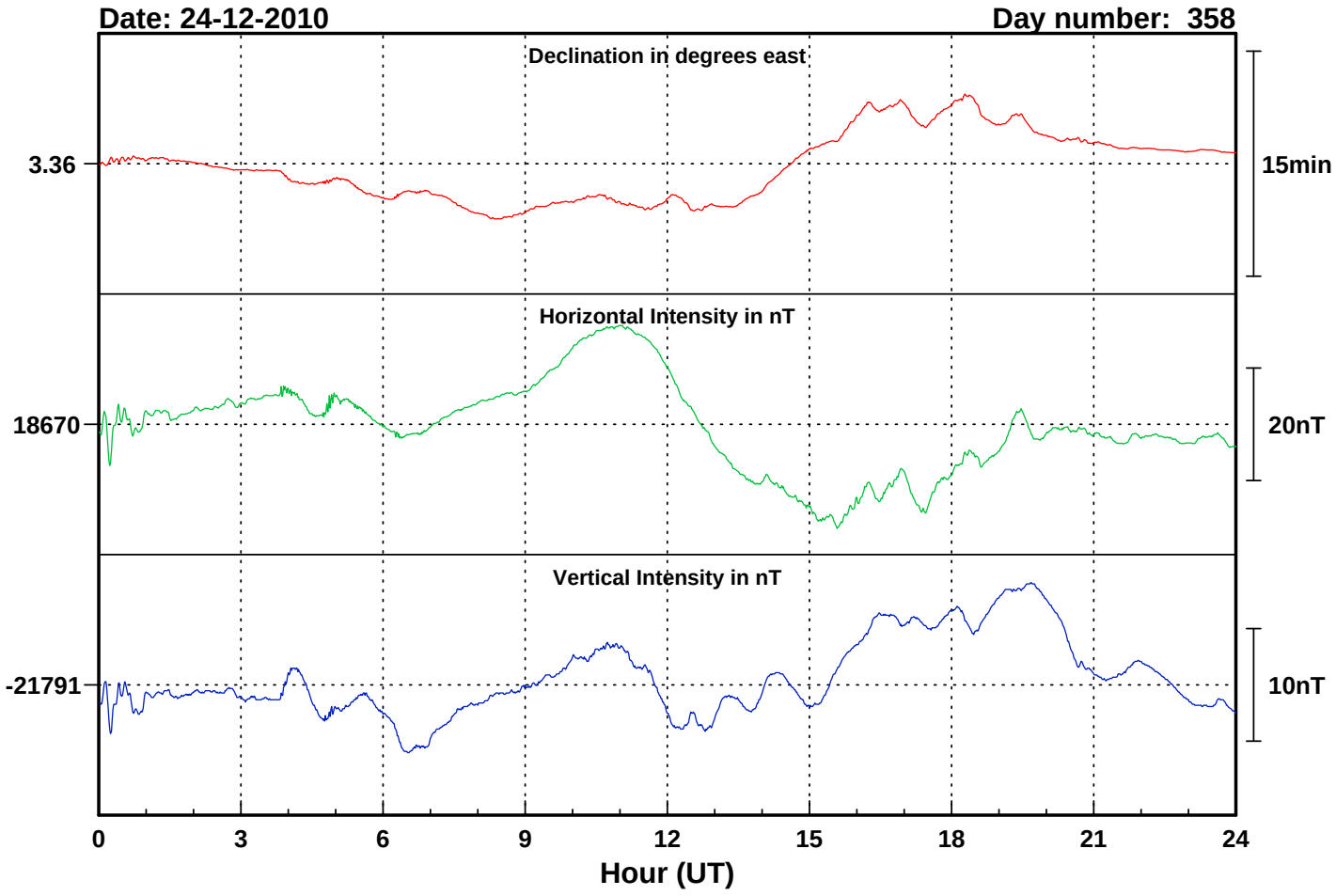
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Day number: 358
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15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
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10nT
0
3
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9
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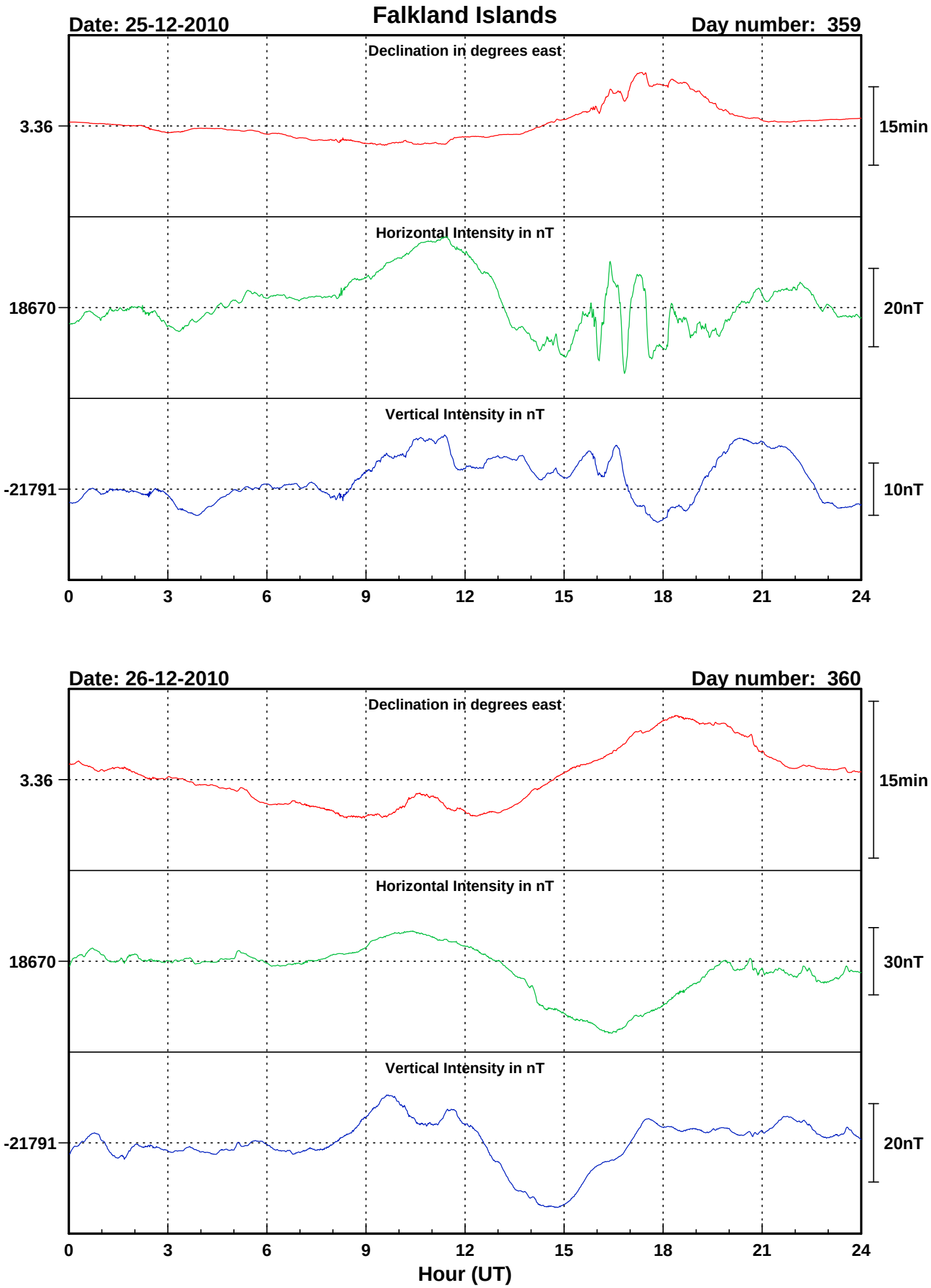
Hour (UT)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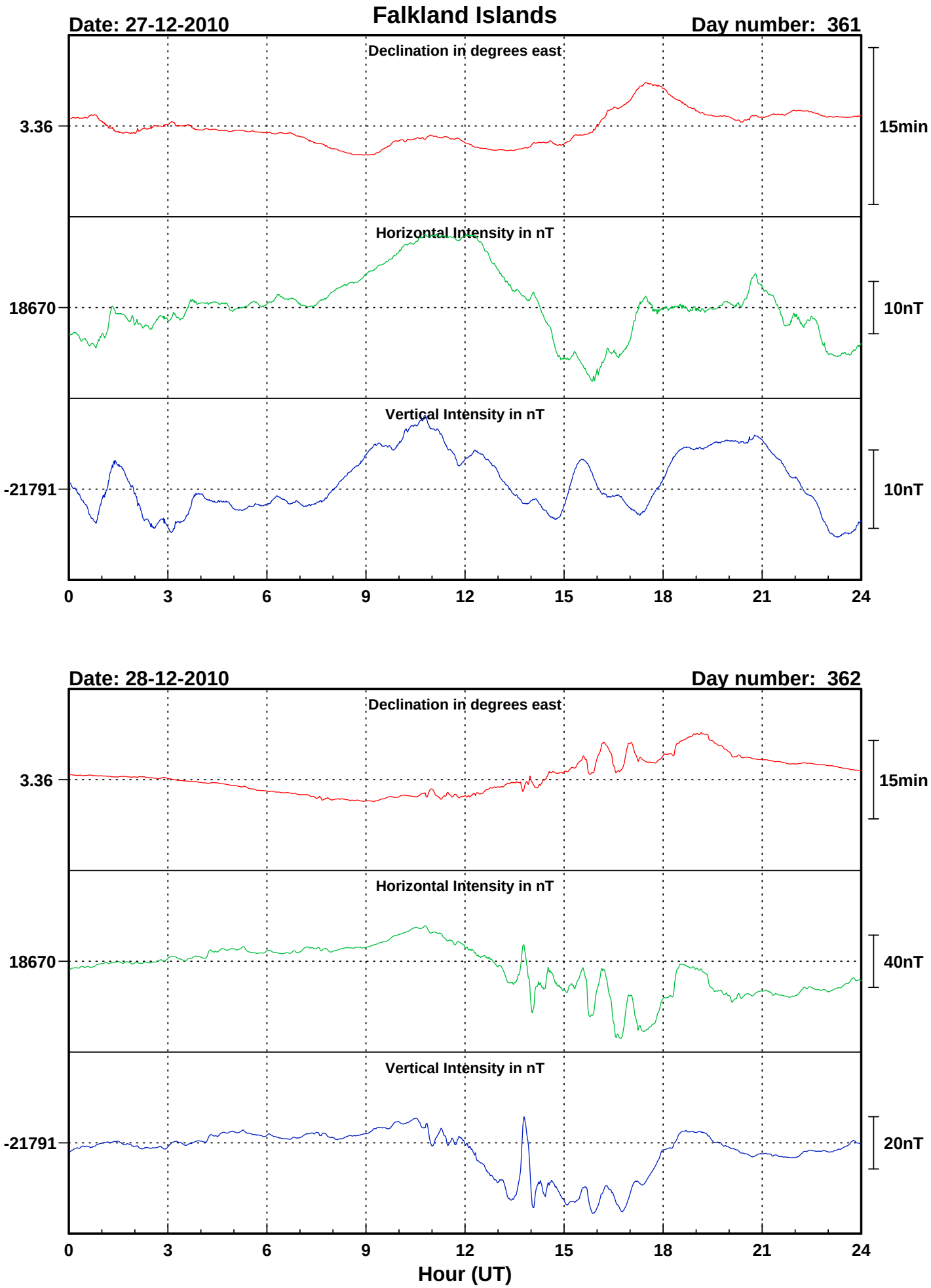
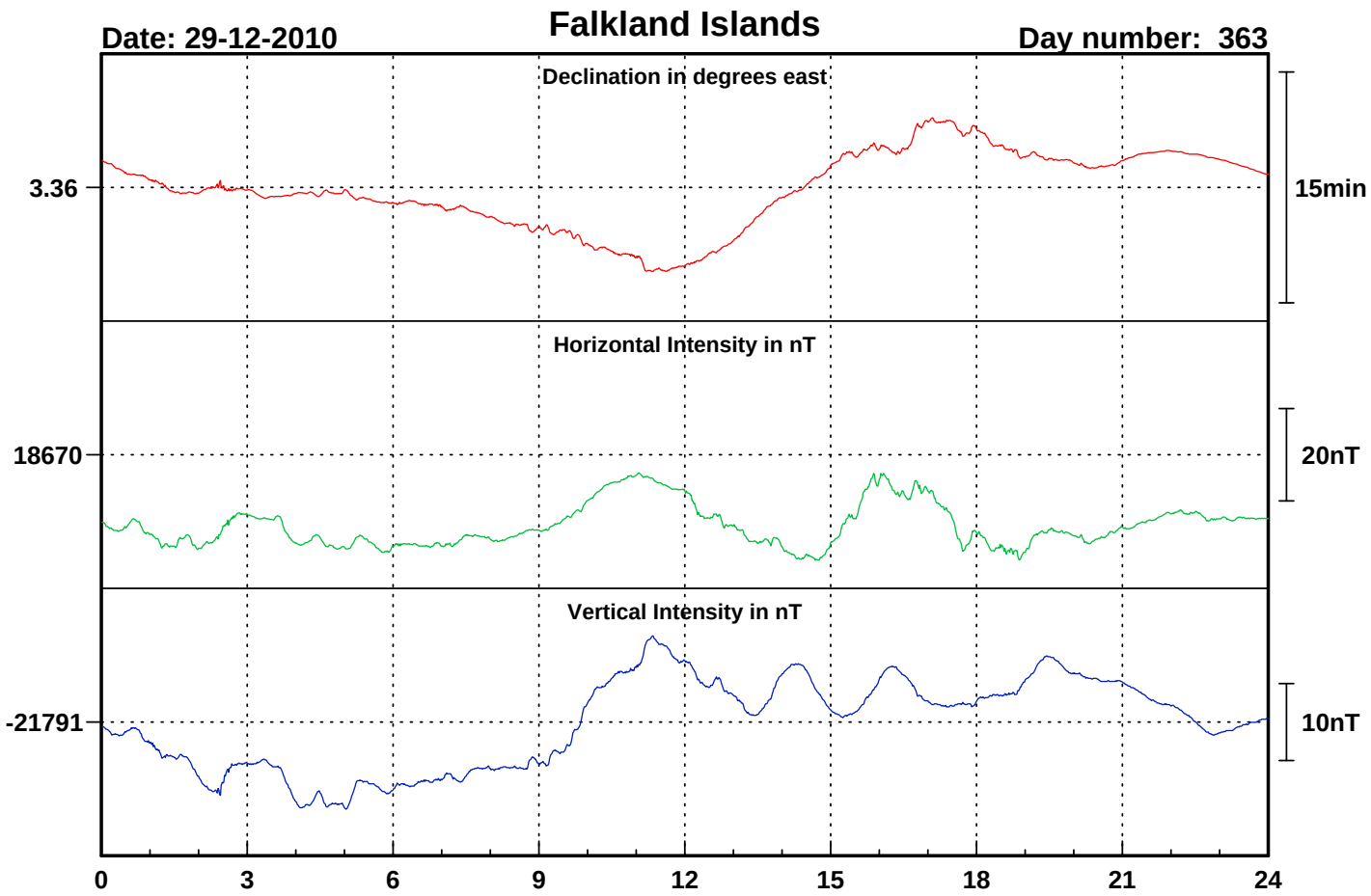
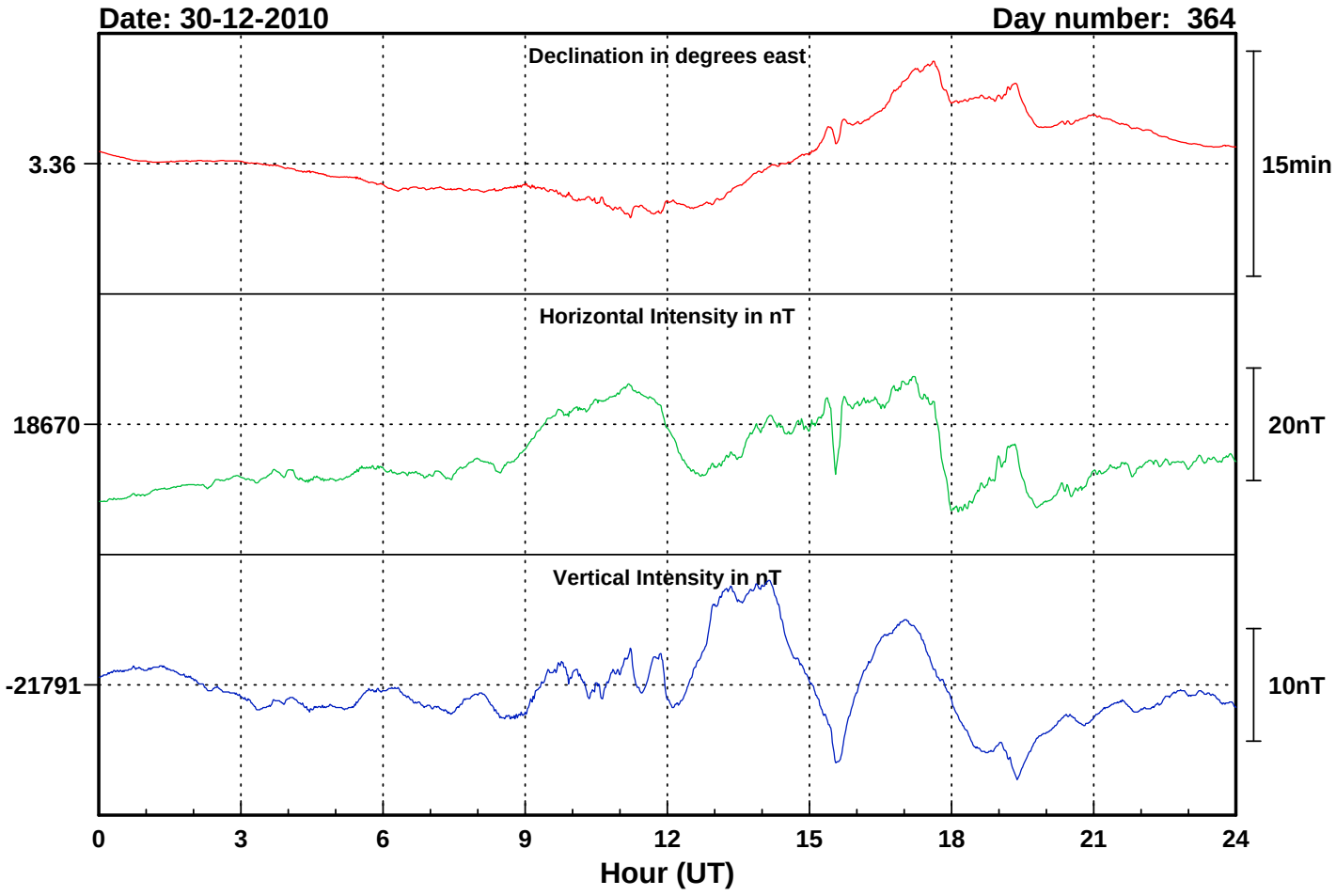
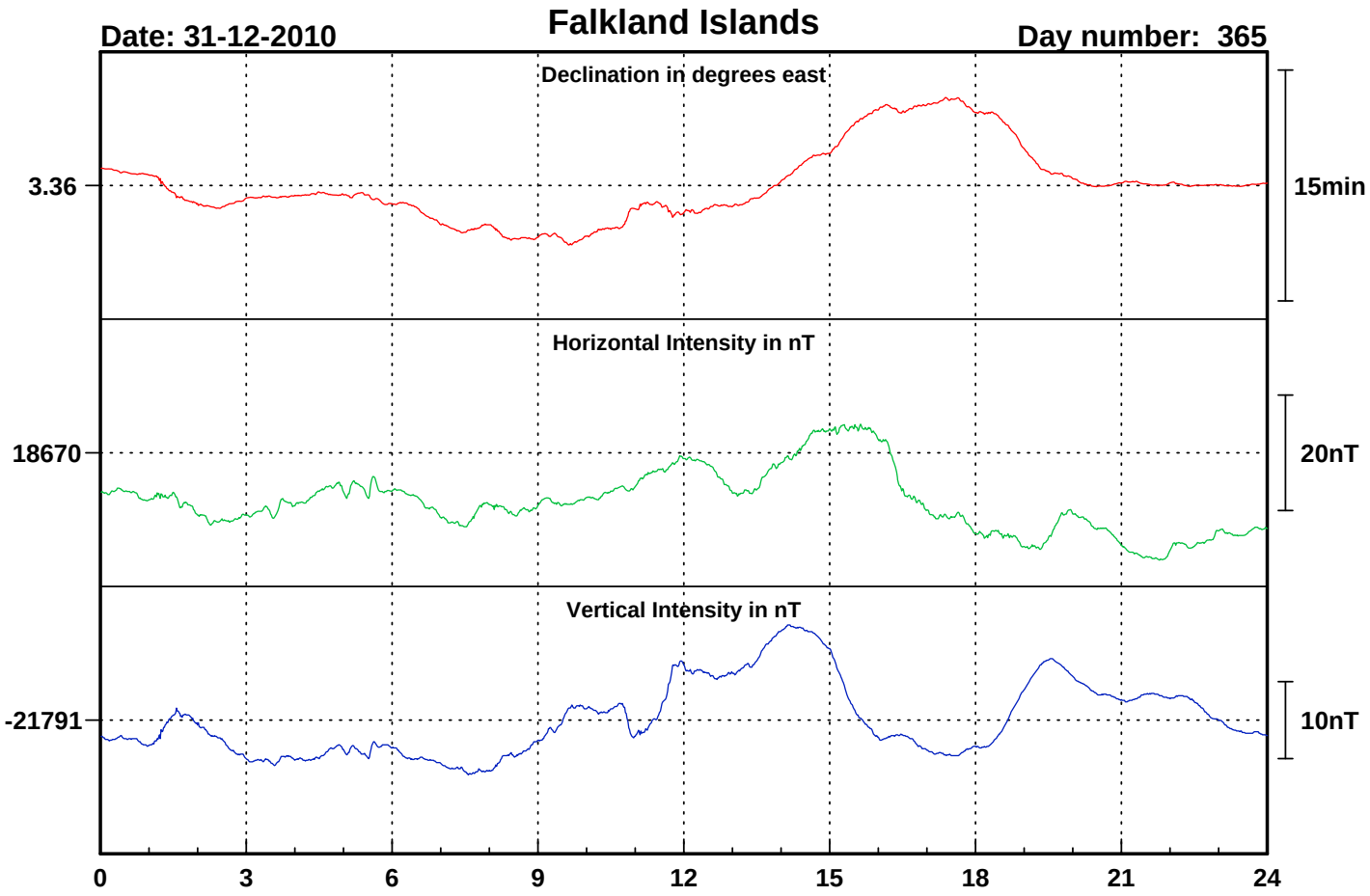
Day number: 359
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Date: 26-12-2010
Day number: 360
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
30nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

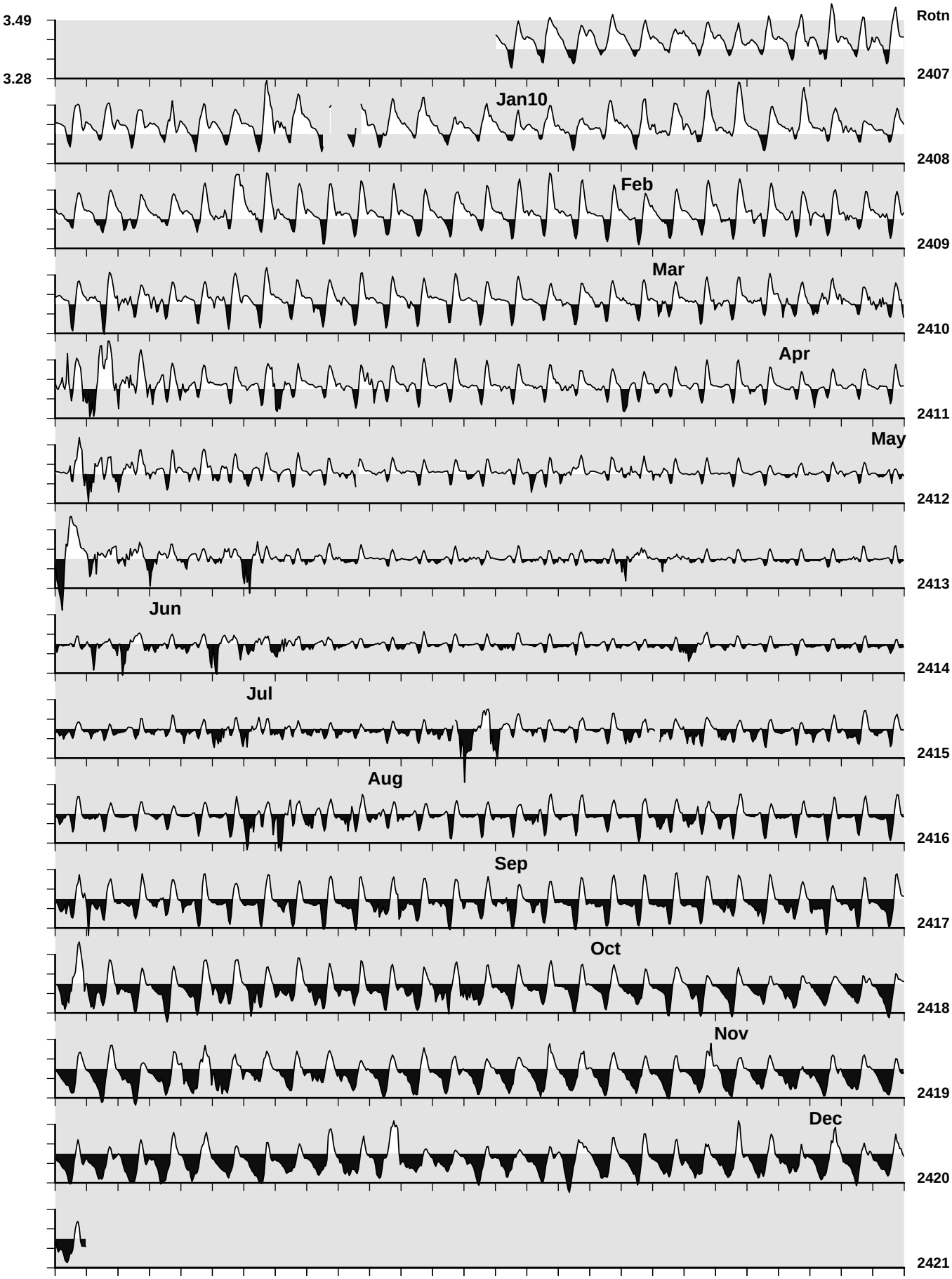

Falkland Islands
Date: 27-12-2010
Day number: 361
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
10nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Date: 28-12-2010
Day number: 362
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
40nT
Vertical Intensity in nT
-21791
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 29-12-2010
Day number: 363
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24


Date: 30-12-2010
Day number: 364
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

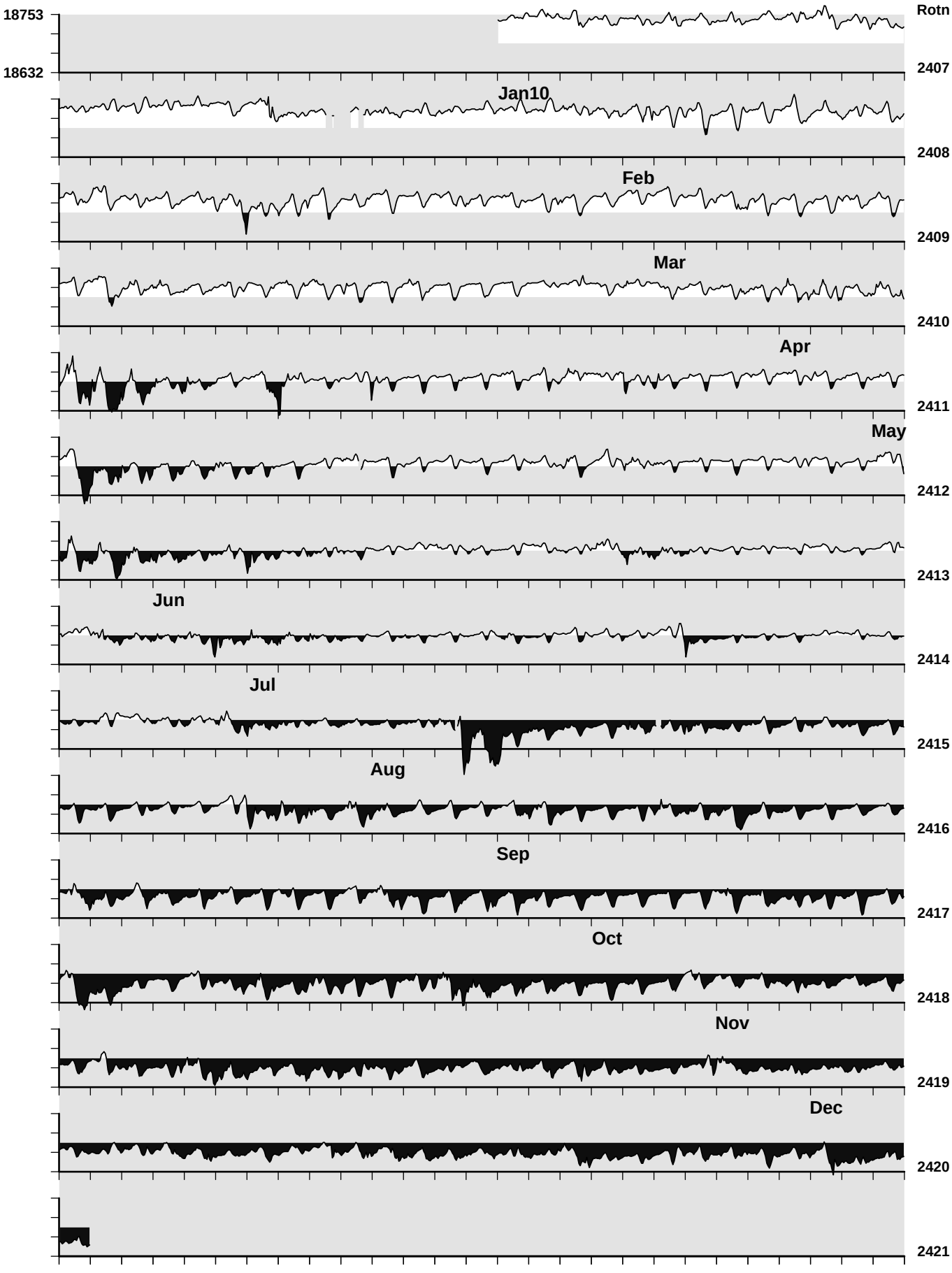

Falkland Islands
Date: 31-12-2010
Day number: 365
Declination in degrees east
3.36
15min
Horizontal Intensity in nT
18670
20nT
Vertical Intensity in nT
-21791
10nT
0
3
6
9
12
15
18
21
24

Falkland Islands Observatory: Declination (degrees)



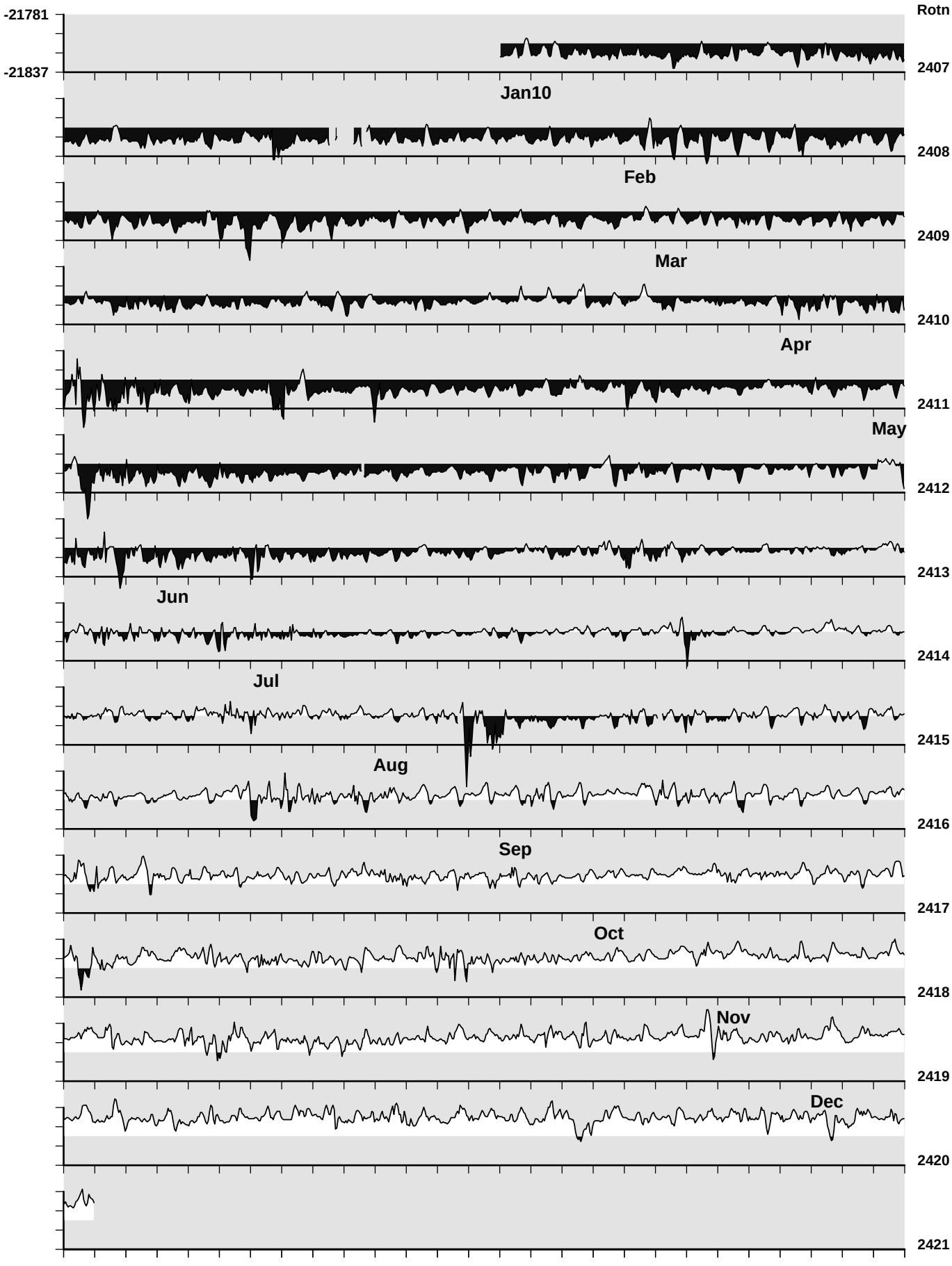
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Horizontal Intensity (nT)



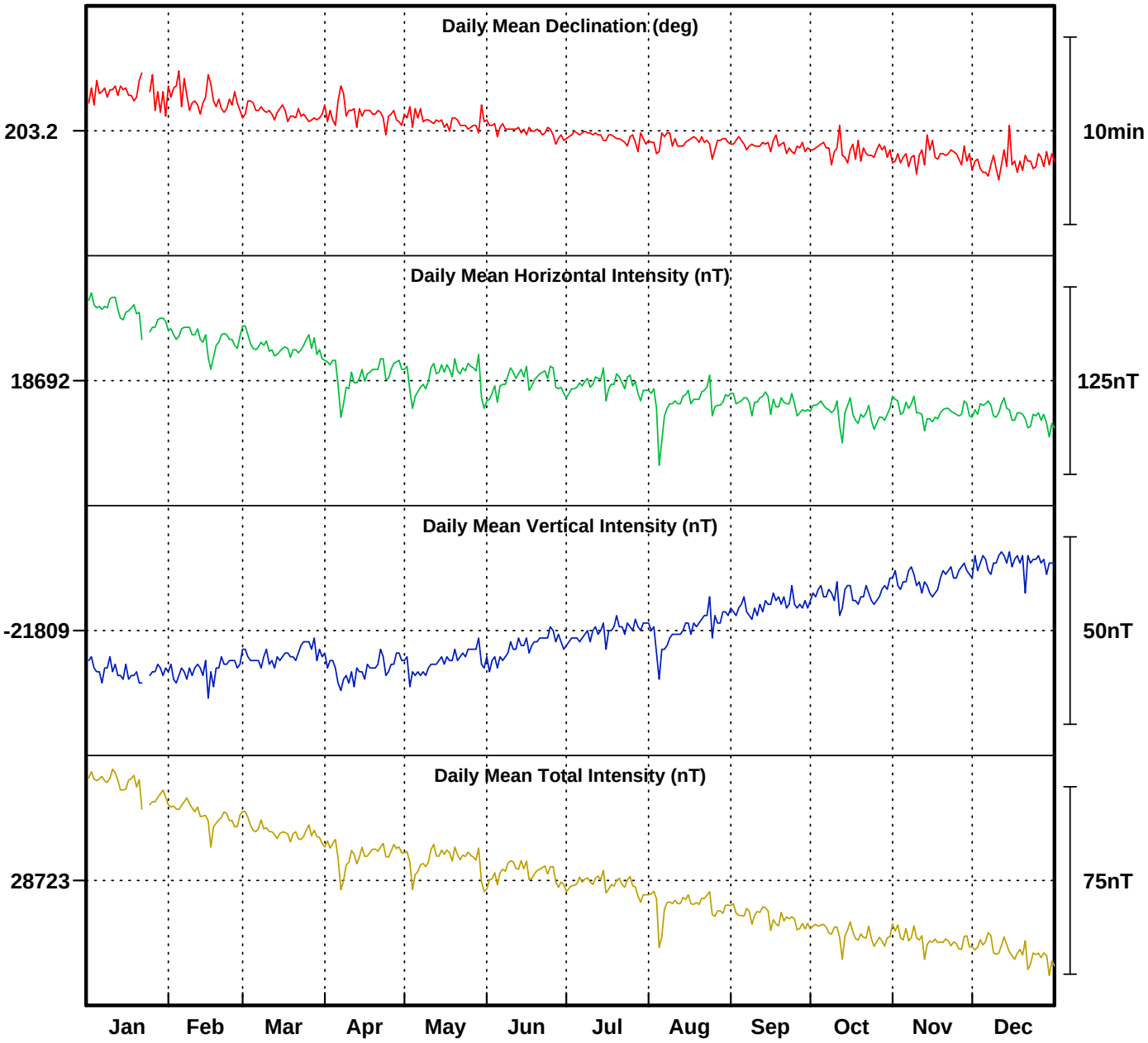
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falklands Is Observatory 2010



Monthly Mean Values for Port Stanley Observatory 2010

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	3° 25.2′	18738 nT	-49° 20.7′	18704 nT	1118 nT	-21820 nT	28761 nT
February	3° 24.9′	18721 nT	-49° 22.3′	18687 nT	1115 nT	-21819 nT	28750 nT
March	3° 24.2′	18715 nT	-49° 22.5′	18682 nT	1111 nT	-21815 nT	28743 nT
April	3° 24.1′	18697 nT	-49° 24.4′	18664 nT	1110 nT	-21819 nT	28734 nT
May	3° 23.7′	18695 nT	-49° 24.4′	18662 nT	1107 nT	-21817 nT	28731 nT
June	3° 23.2′	18692 nT	-49° 24.4′	18660 nT	1104 nT	-21813 nT	28727 nT
July	3° 22.9′	18690 nT	-49° 24.3′	18657 nT	1102 nT	-21809 nT	28722 nT
August	3° 22.6′	18678 nT	-49° 25.3′	18645 nT	1100 nT	-21808 nT	28714 nT
September	3° 22.4′	18677 nT	-49° 24.9′	18645 nT	1099 nT	-21802 nT	28709 nT
October	3° 22.1′	18671 nT	-49° 25.2′	18639 nT	1097 nT	-21799 nT	28702 nT
November	3° 21.9′	18672 nT	-49° 24.8′	18639 nT	1096 nT	-21795 nT	28699 nT
December	3° 21.5′	18670 nT	-49° 24.6′	18638 nT	1094 nT	-21791 nT	28695 nT

Note

i. The values shown here are provisional.