BRITISH GEOLOGICAL SURVEY

Port Stanley Observatory *Monthly Magnetic Bulletin*

September 2013

13/09/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. The observatory co-ordinates are:

Geographic:	*51°42'14"S*	*302°06'25"E*
Geomagnetic:	*42°10'59"S*	*012° 10'30"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 2013.5. 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

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.

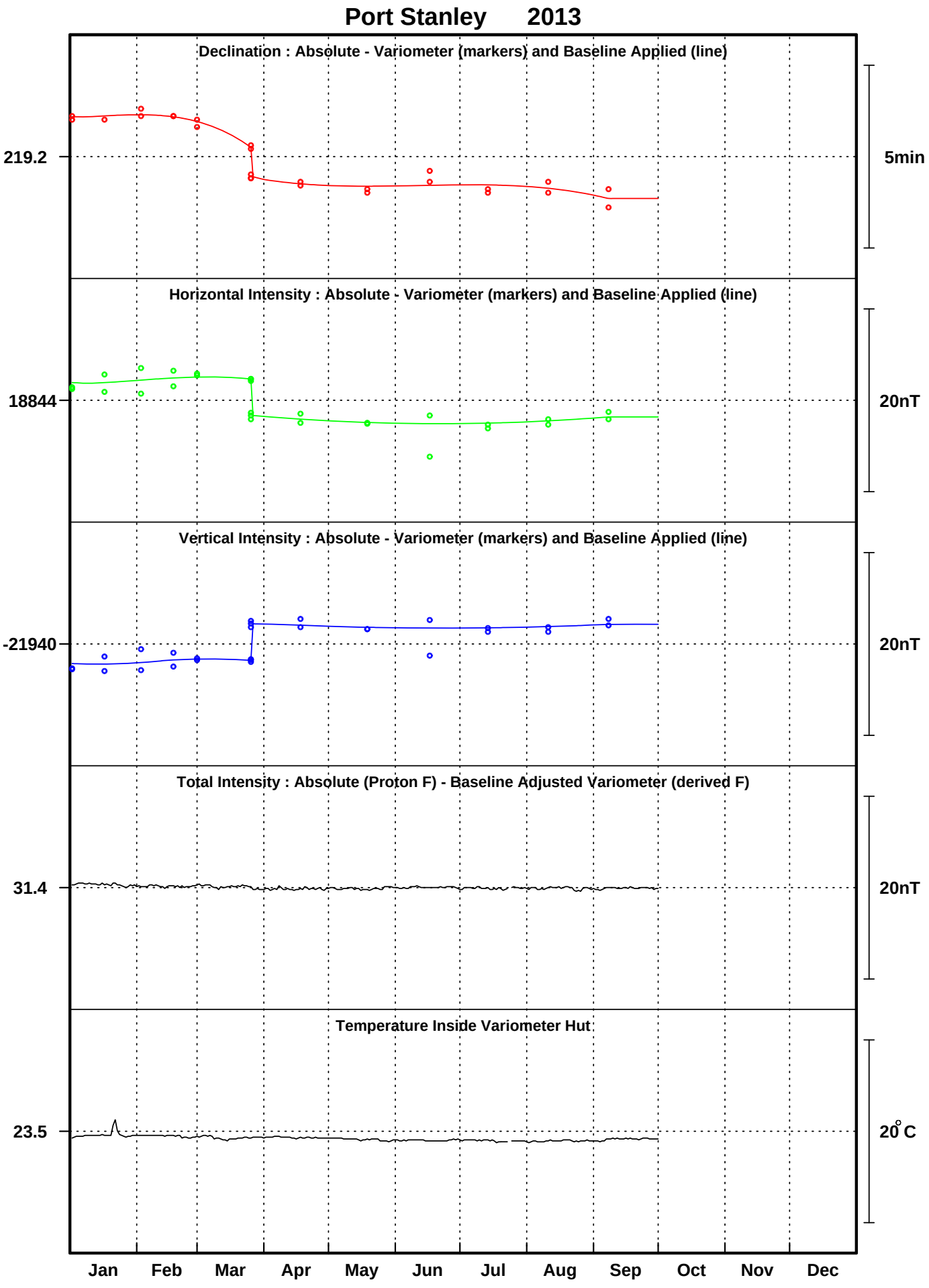
Reproduction of any part of this bulletin should be accompanied by the statement: 'Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved'. Publications making use of the data should include an acknowledgment statement of the form: ‘The results presented in this paper rely on the data collected at Port Stanley magnetic observatory, operated by the British Geological Survey.’

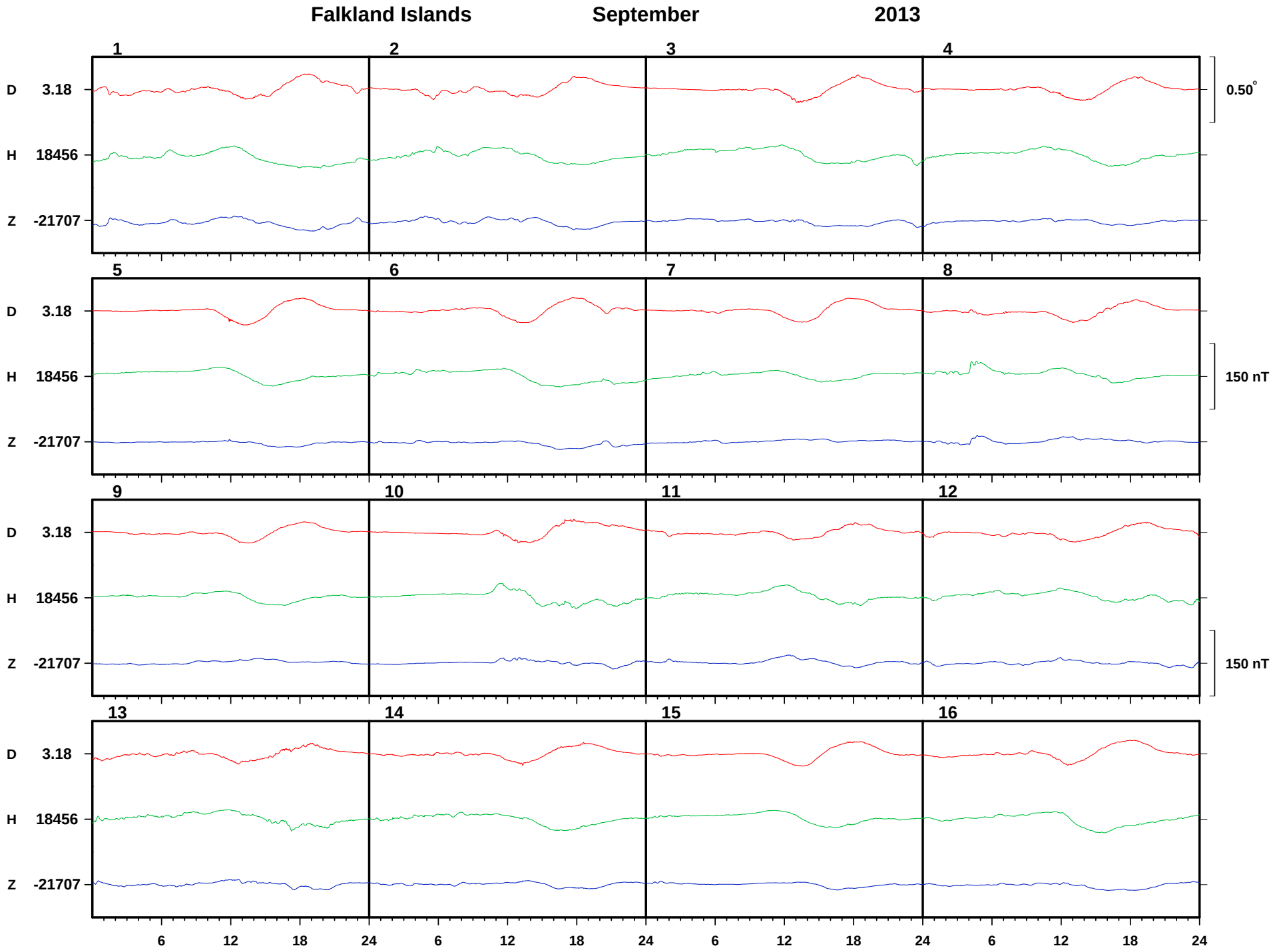
Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at www.geomag.bgs.ac.uk/contactus/staff

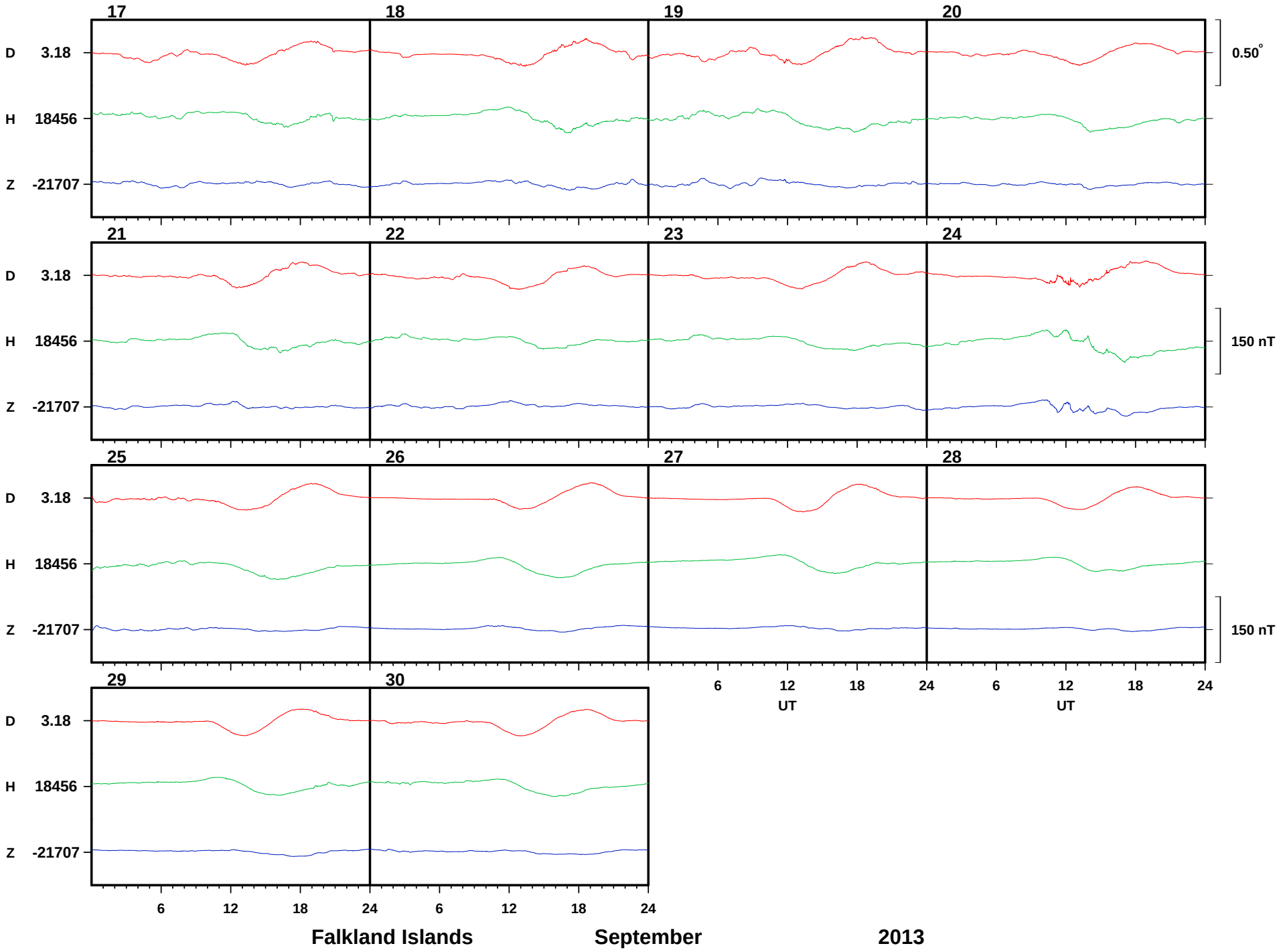
PORT STANLEY OBSERVATORY

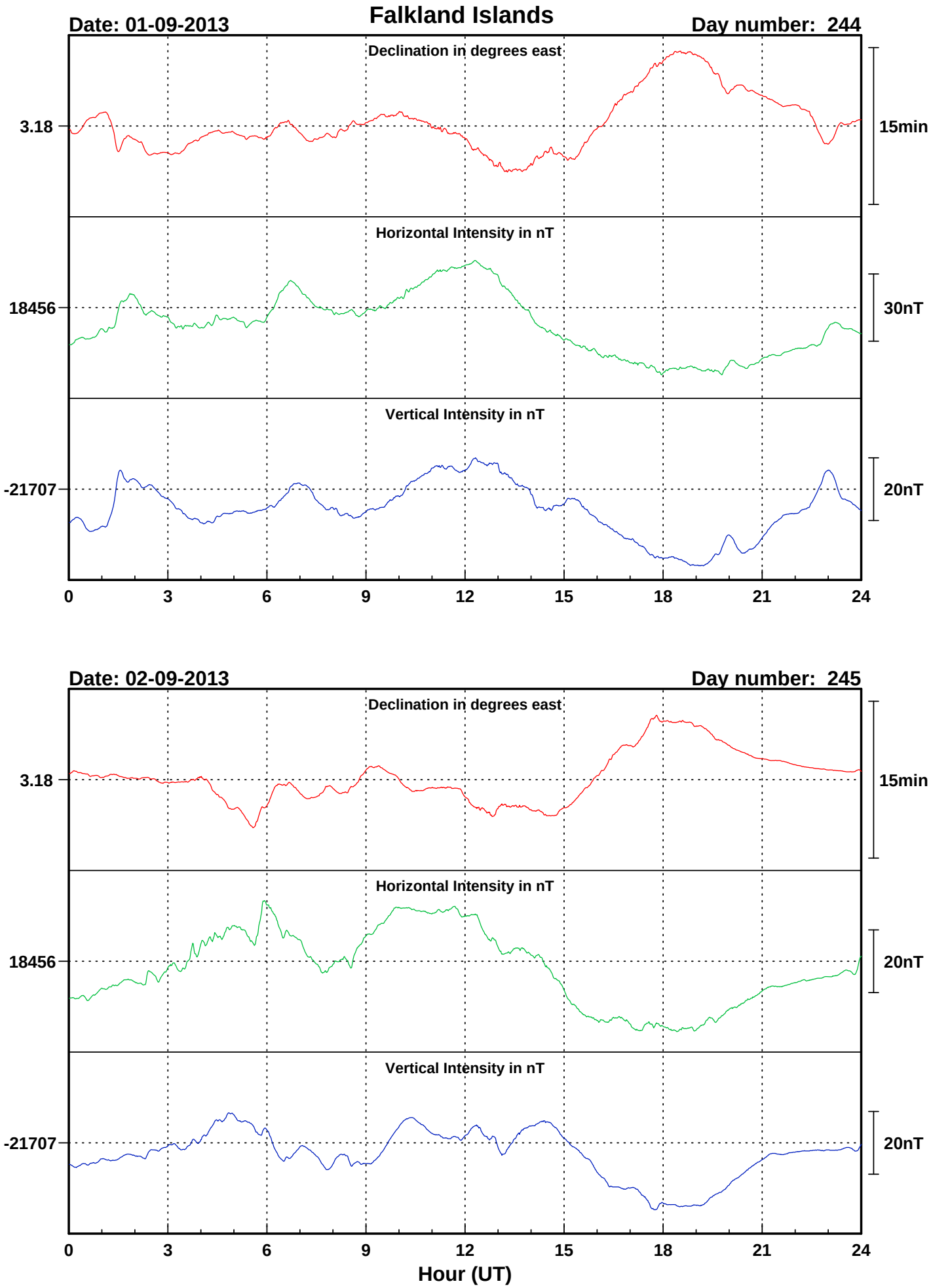
ABSOLUTE OBSERVATIONS

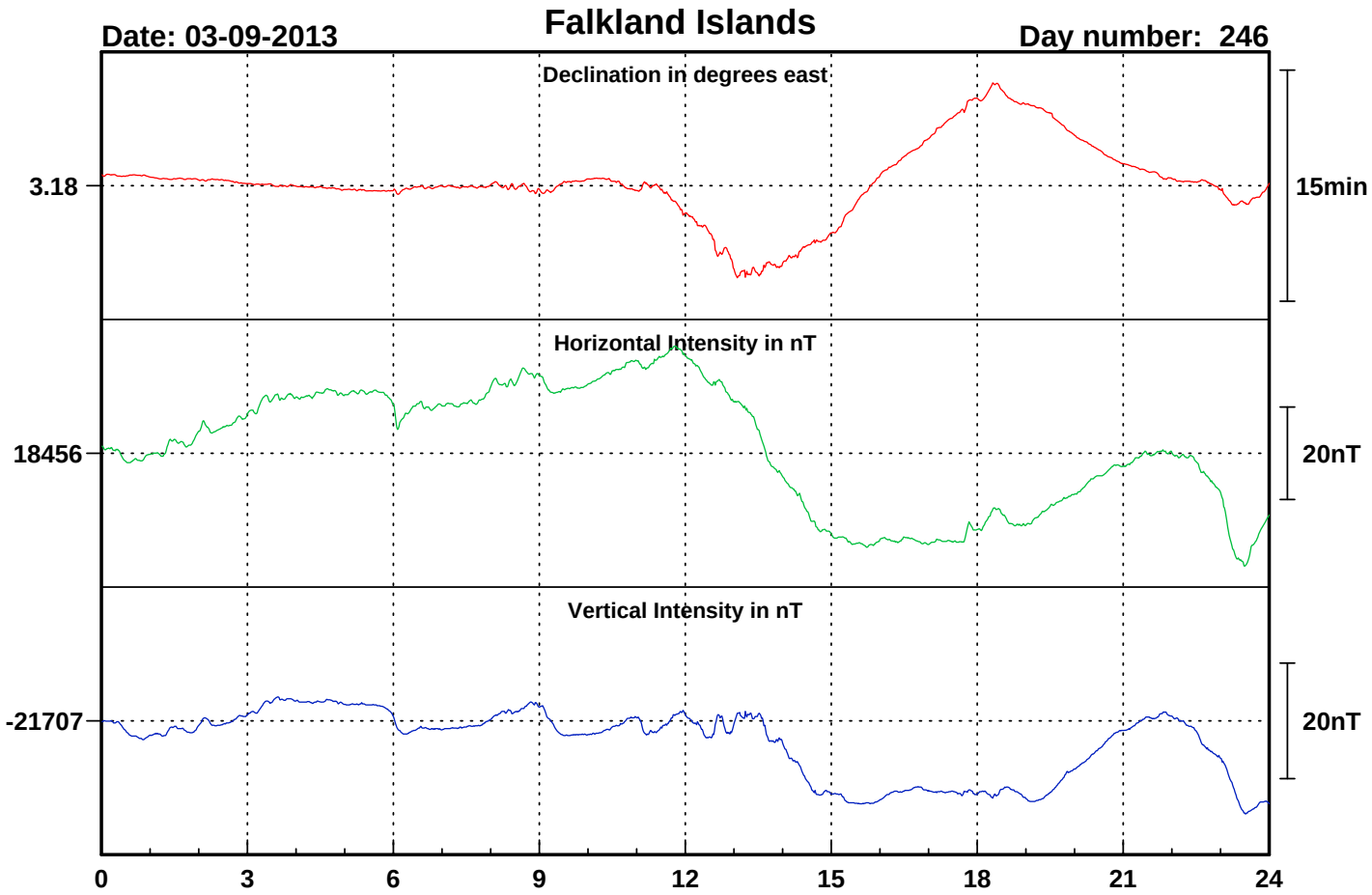
		Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Absolute (º)**	**Site difference (nT)**	**Absolute corrected (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Observer**
07-Sep-13	250	17:51	3.2715	3.0500	17:58	-49.6333	-31.4	28487.3	18450.6	18448.5	-21704.9	-21677.4	NB
07-Sep-13	250	18:04	3.2769	3.0583	18:10	-49.6300	-31.4	28487.7	18452.1	18449.3	-21704.1	-21676.7	NB

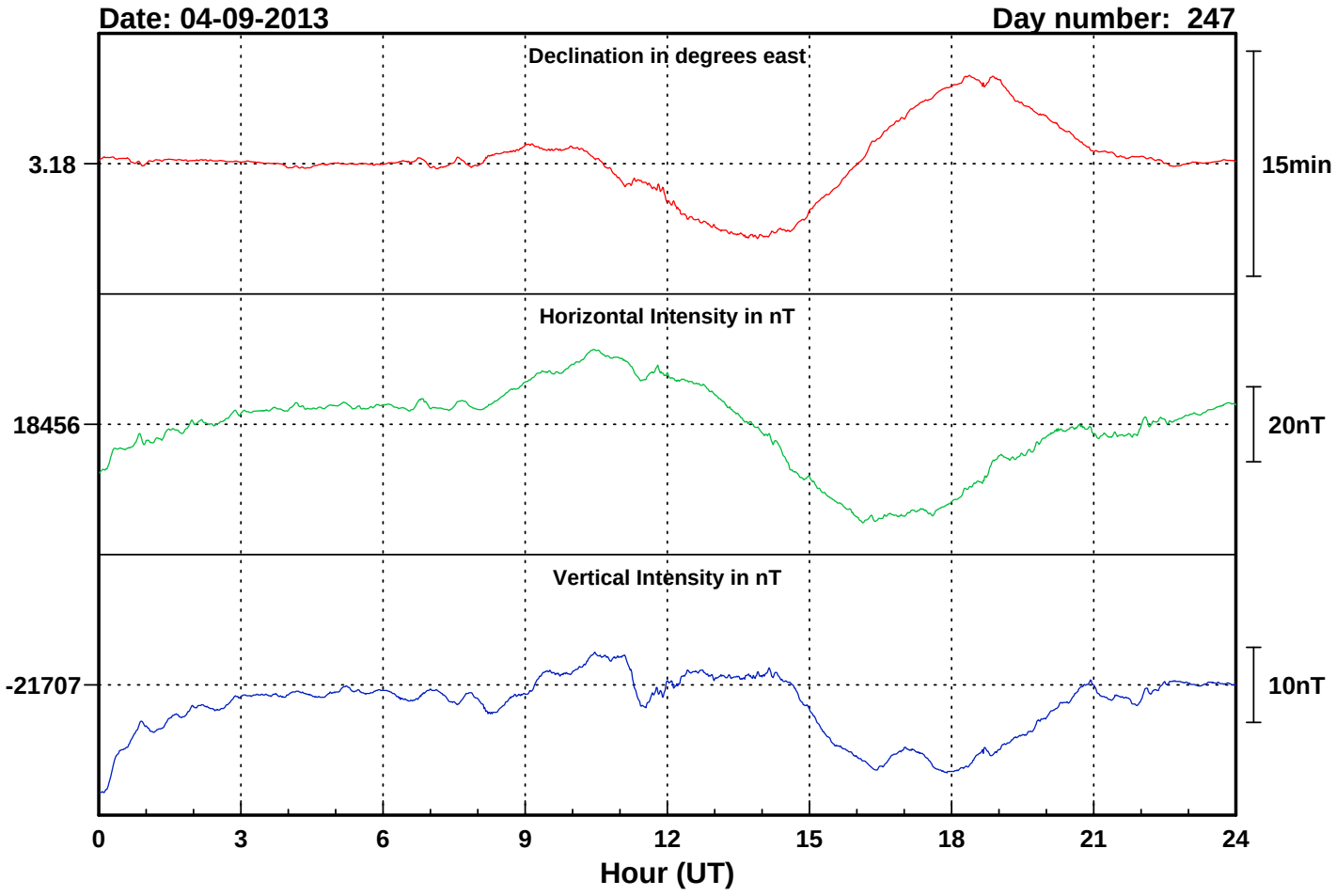

Port Stanley 2013
Declination : Absolute - Variometer (markers) and Baseline Applied (line)
219.2
5min
Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)
18844
20nT
Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)
-21940
20nT
Total Intensity : Absolute (Proton F) - Baseline Adjusted Variometer (derived F)
31.4
20nT
Temperature Inside Variometer Hut
23.5
20°C
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

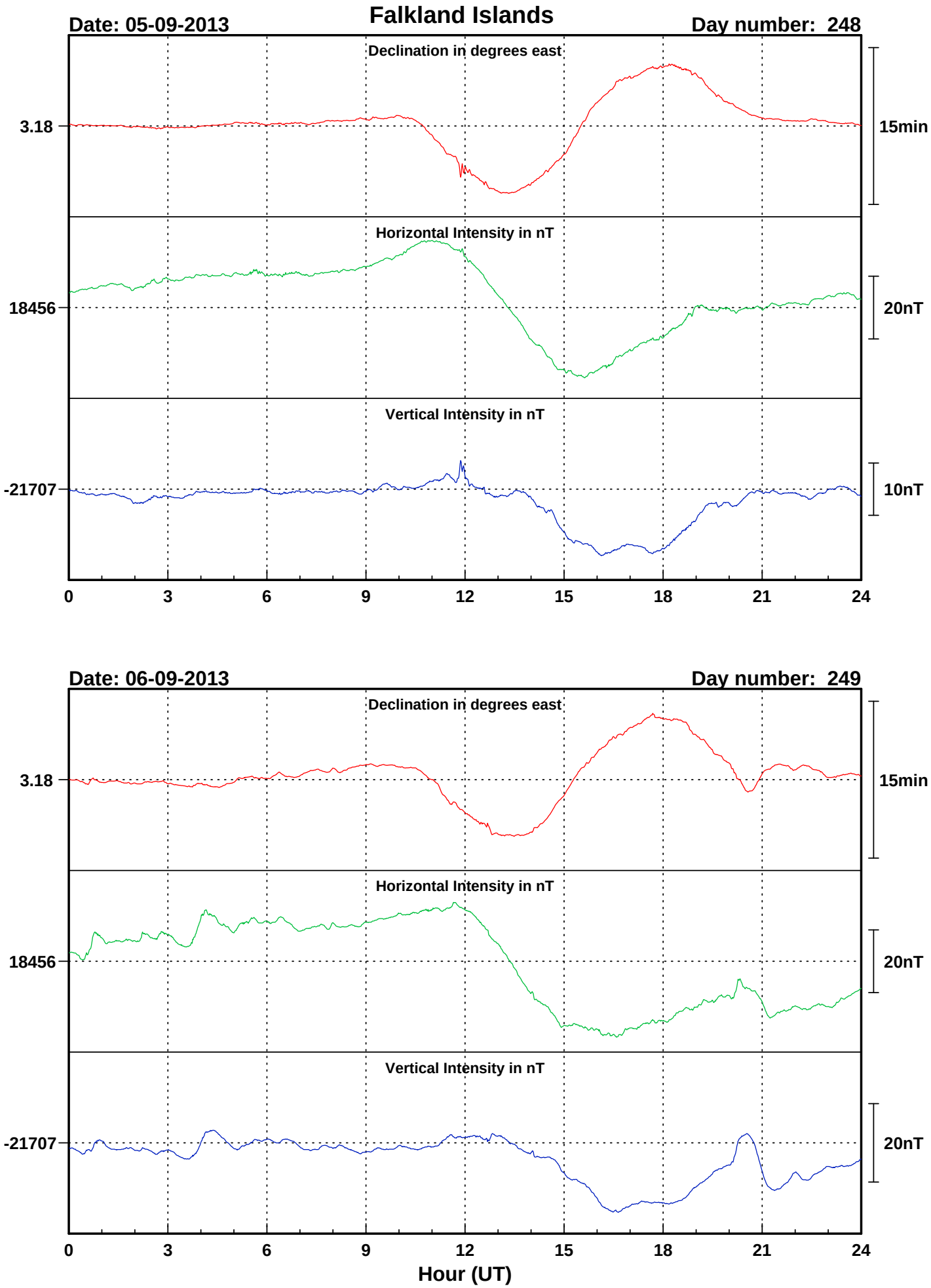

Falkland Islands
September
2013
1
2
3
4
D 3.18
H 18456
Z -21707
0.50°
5
6
7
8
D 3.18
H 18456
Z -21707
150 nT
9
10
11
12
D 3.18
H 18456
Z -21707
150 nT
13
14
15
16
D 3.18
H 18456
Z -21707
6
12
18
24
6
12
18
24
6
12
18
24
6
12
18
24


17
18
19
20
D 3.18
H 18456
Z -21707
0.50°
21
22
23
24
150 nT
25
26
27
28
29
30
6
12
18
24
UT
Falkland Islands
September
2013


Falkland Islands
Date: 01-09-2013
Day number: 244
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24
Date: 02-09-2013
Day number: 245
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 03-09-2013
Day number: 246
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24


Date: 04-09-2013
Day number: 247
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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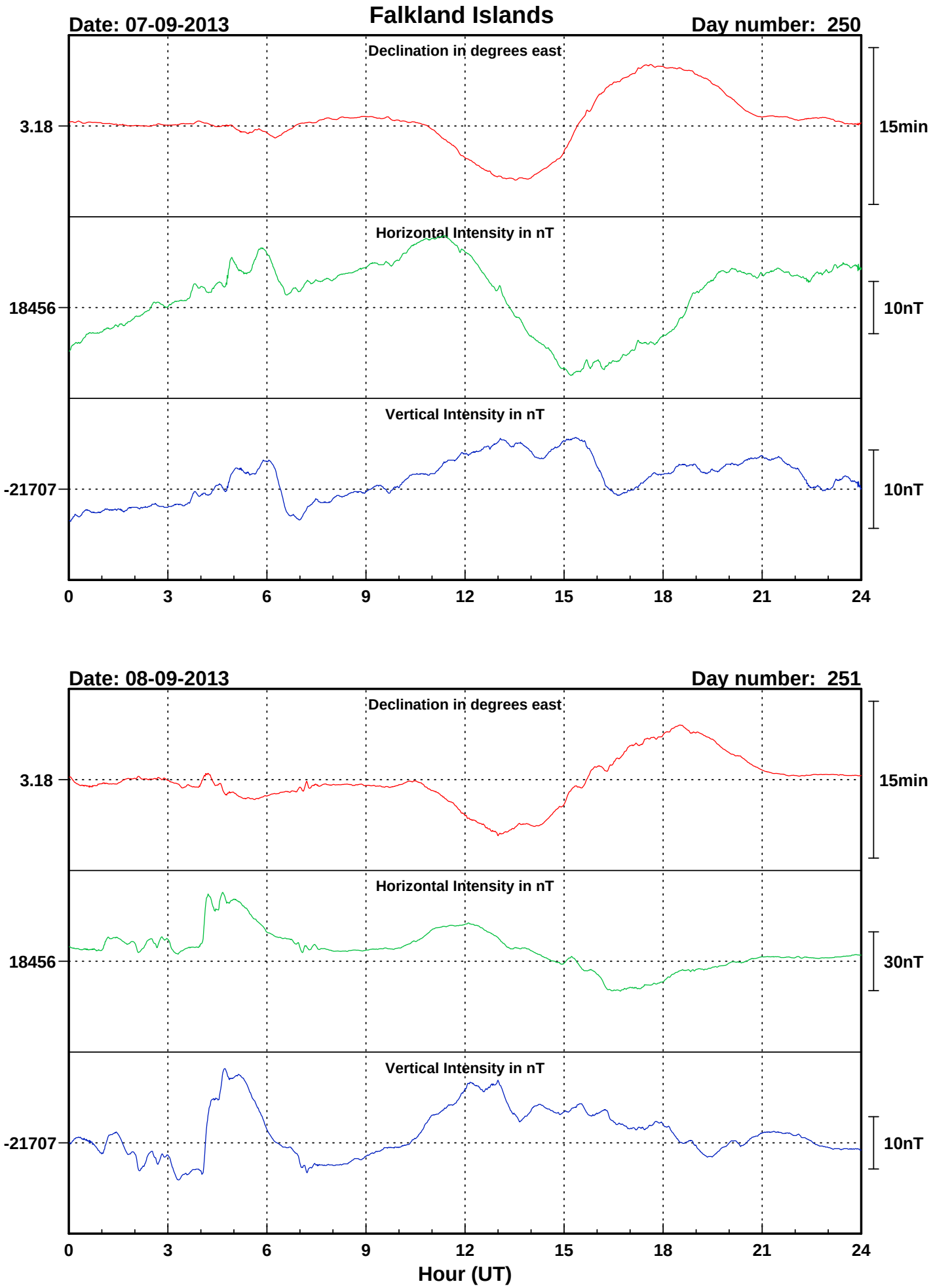
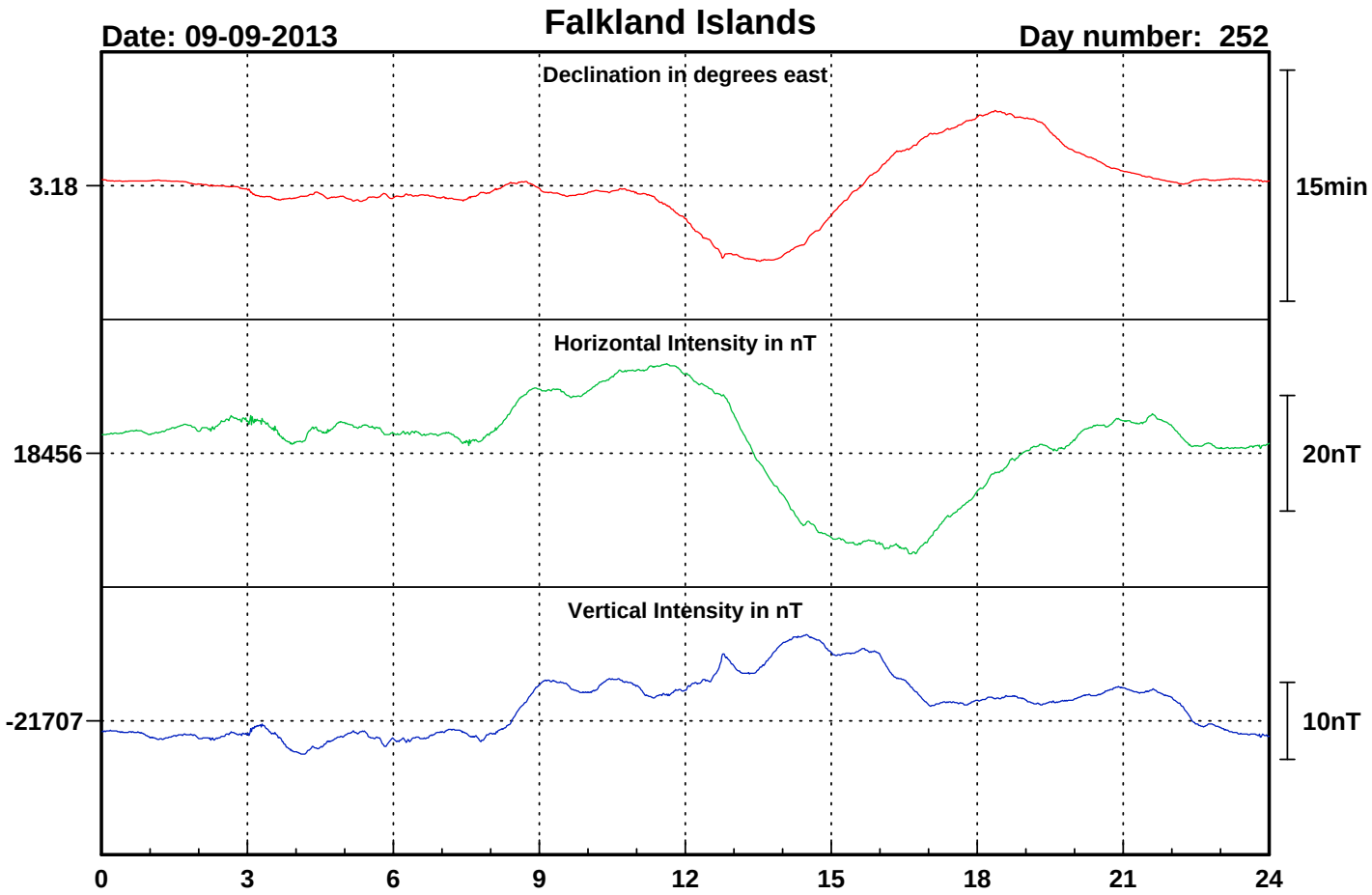
Day number: 248
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 06-09-2013
Day number: 249
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 07-09-2013
Day number: 250
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
10nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 08-09-2013
Day number: 251
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 09-09-2013
Day number: 252
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
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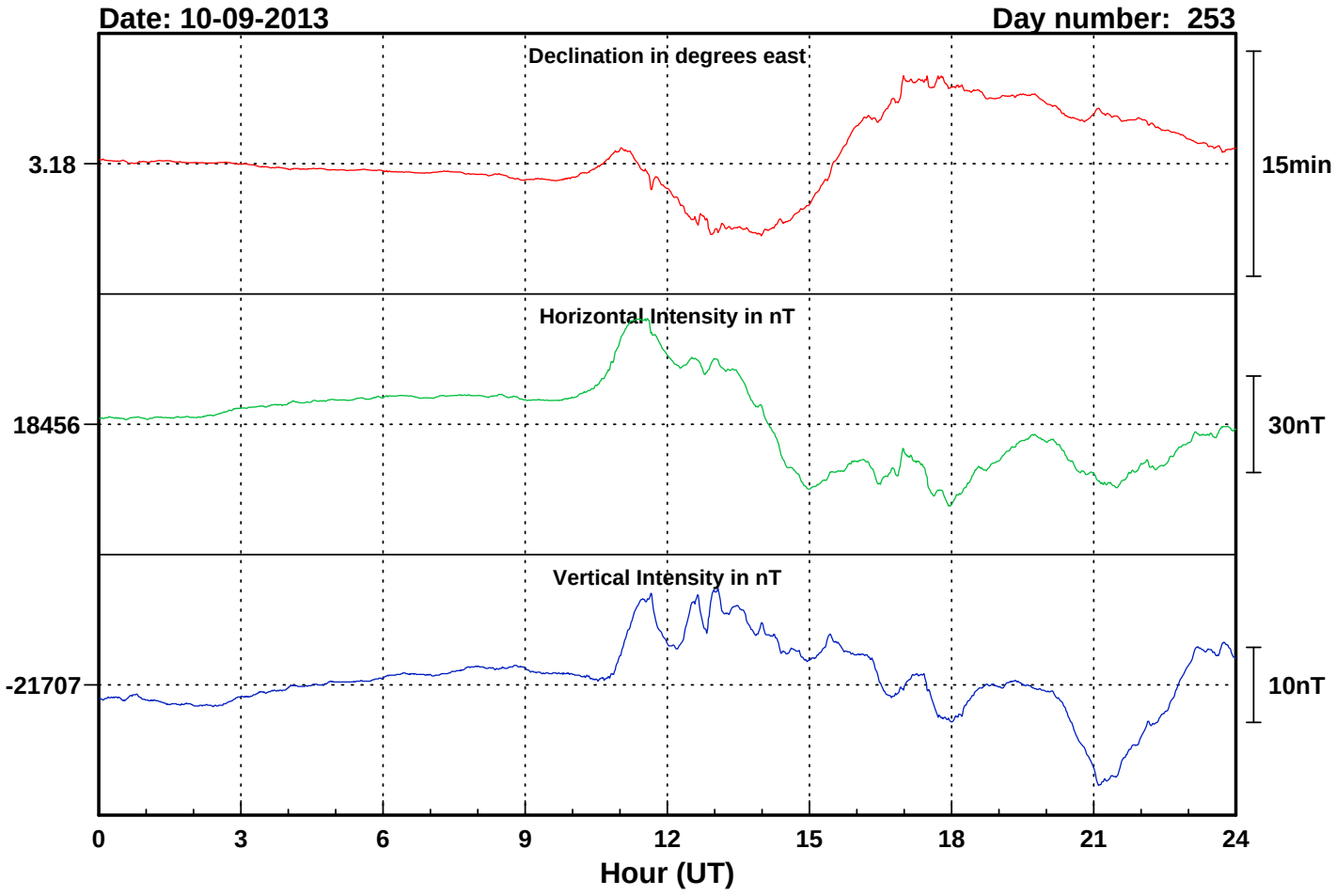
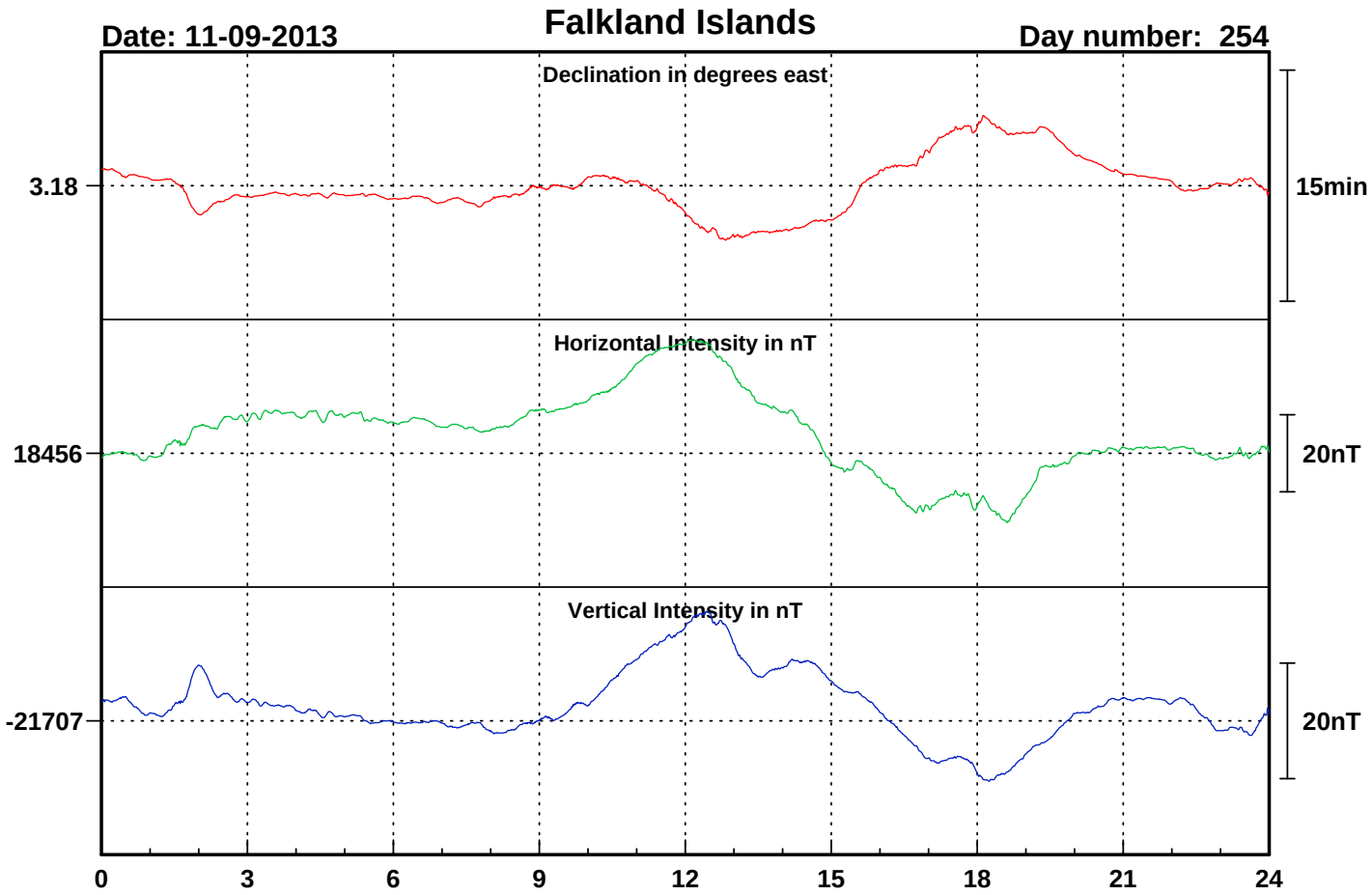
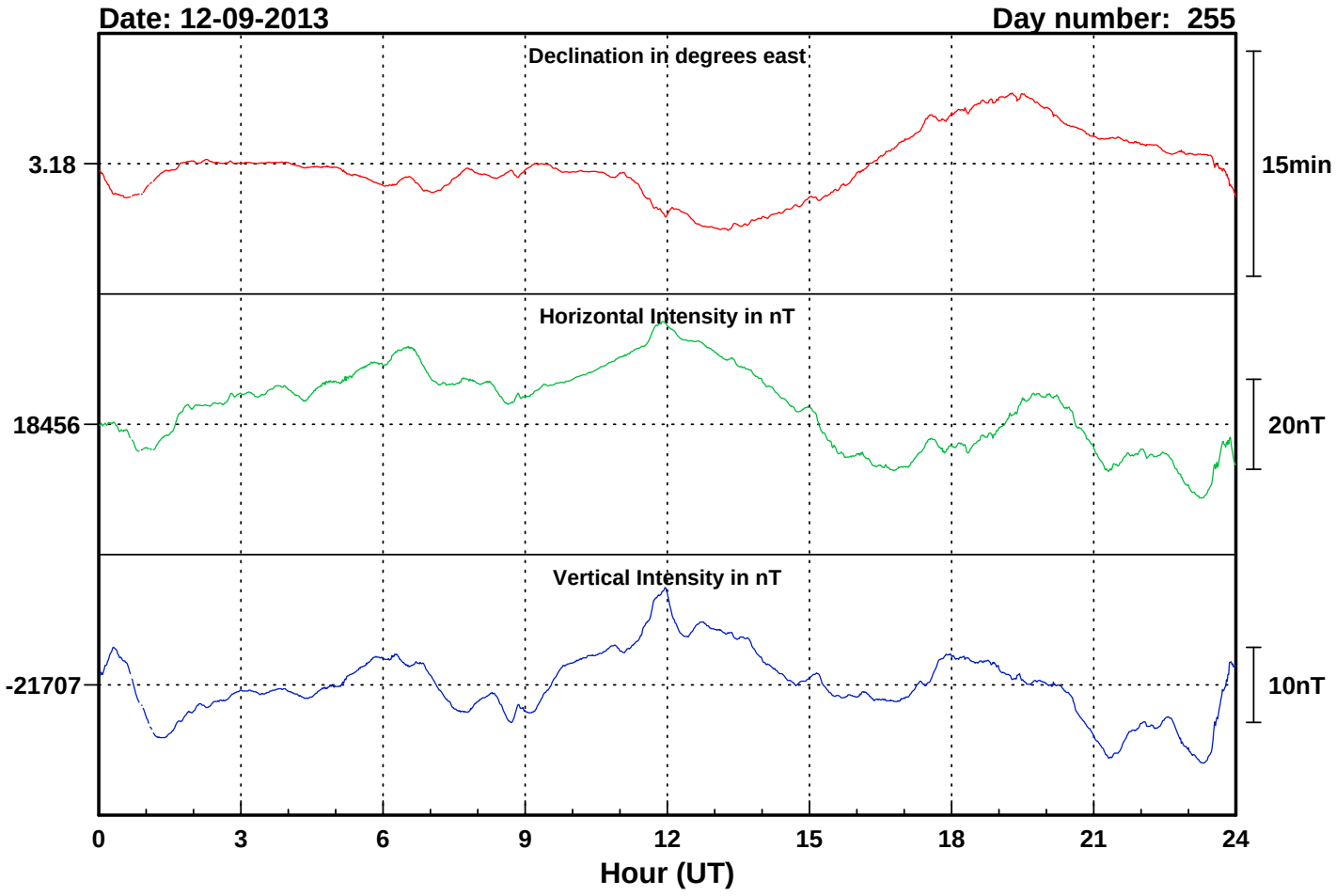
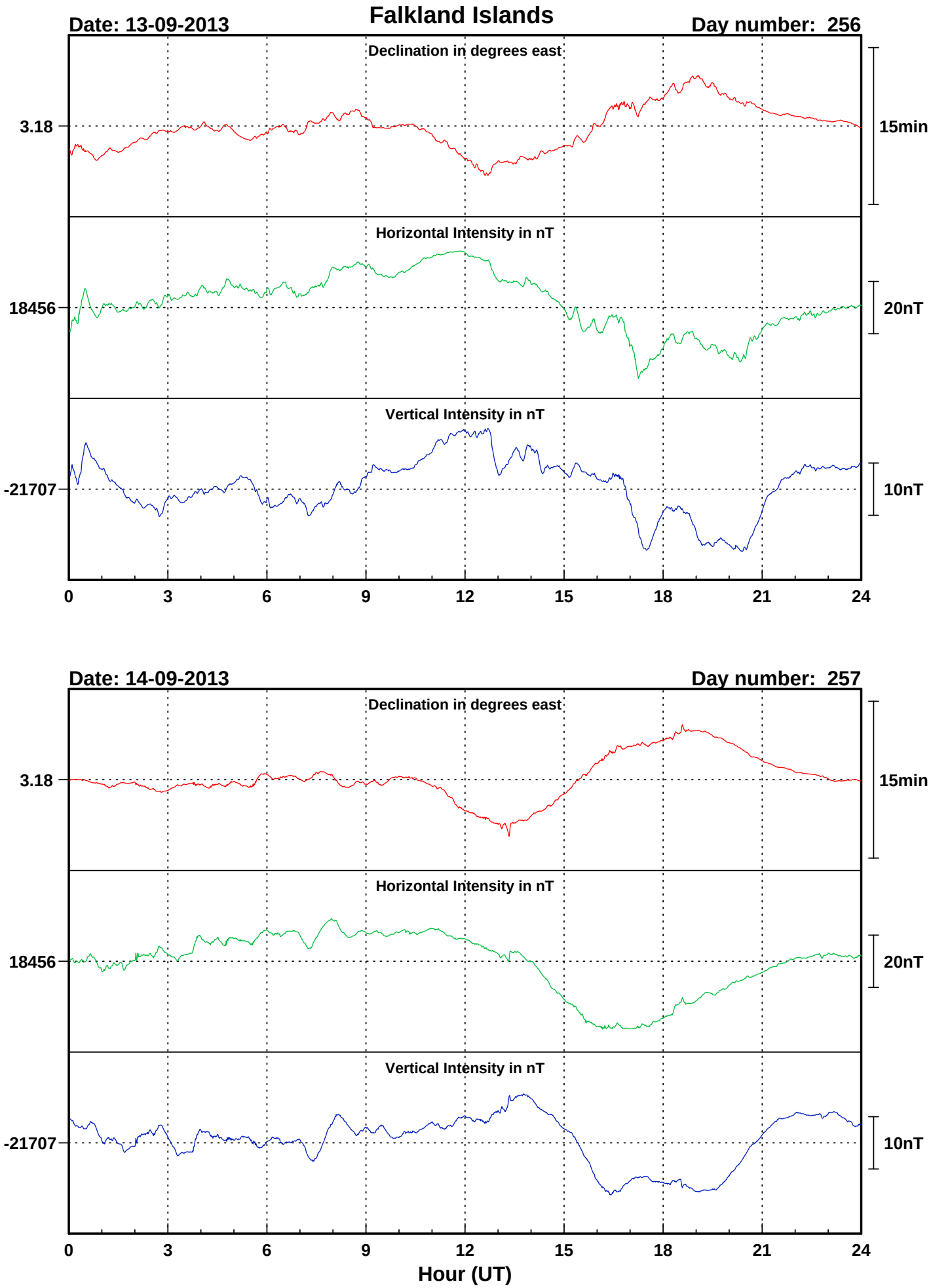
10nT
0
3
6
9
12
15
18
21
24


Date: 10-09-2013
Day number: 253
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 11-09-2013
Day number: 254
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24


Date: 12-09-2013
Day number: 255
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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Date: 13-09-2013
Day number: 256
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 14-09-2013
Day number: 257
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
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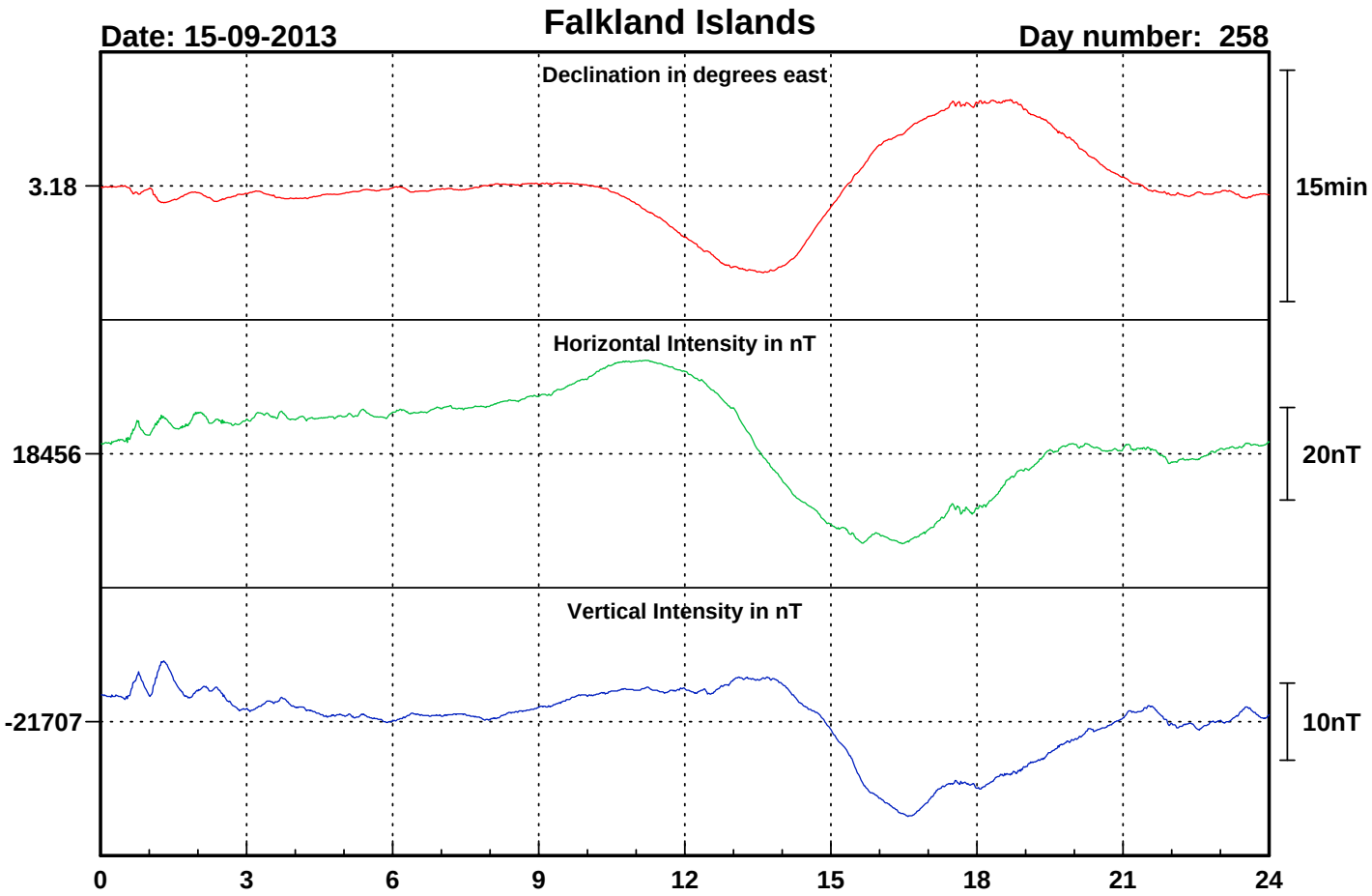
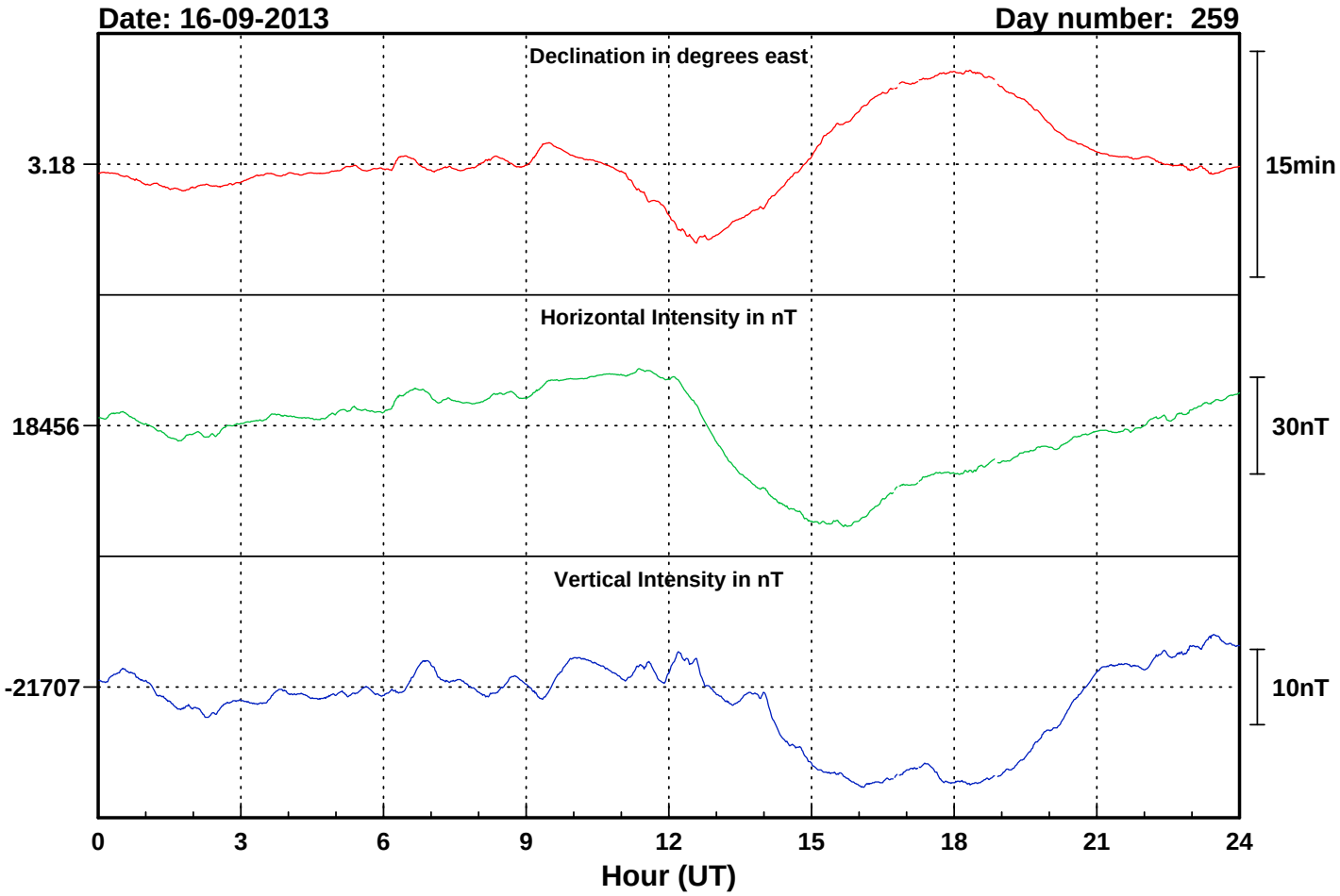
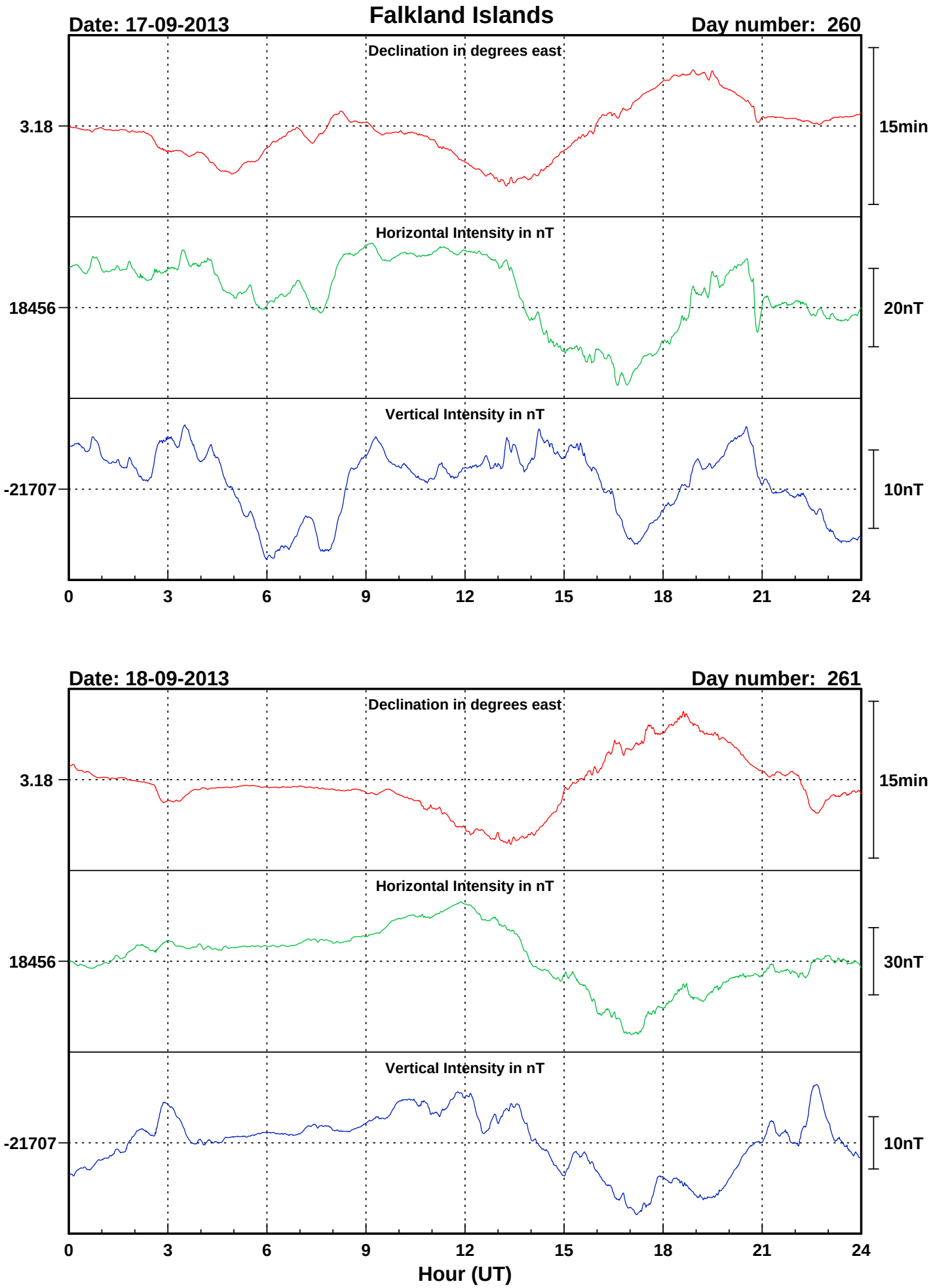
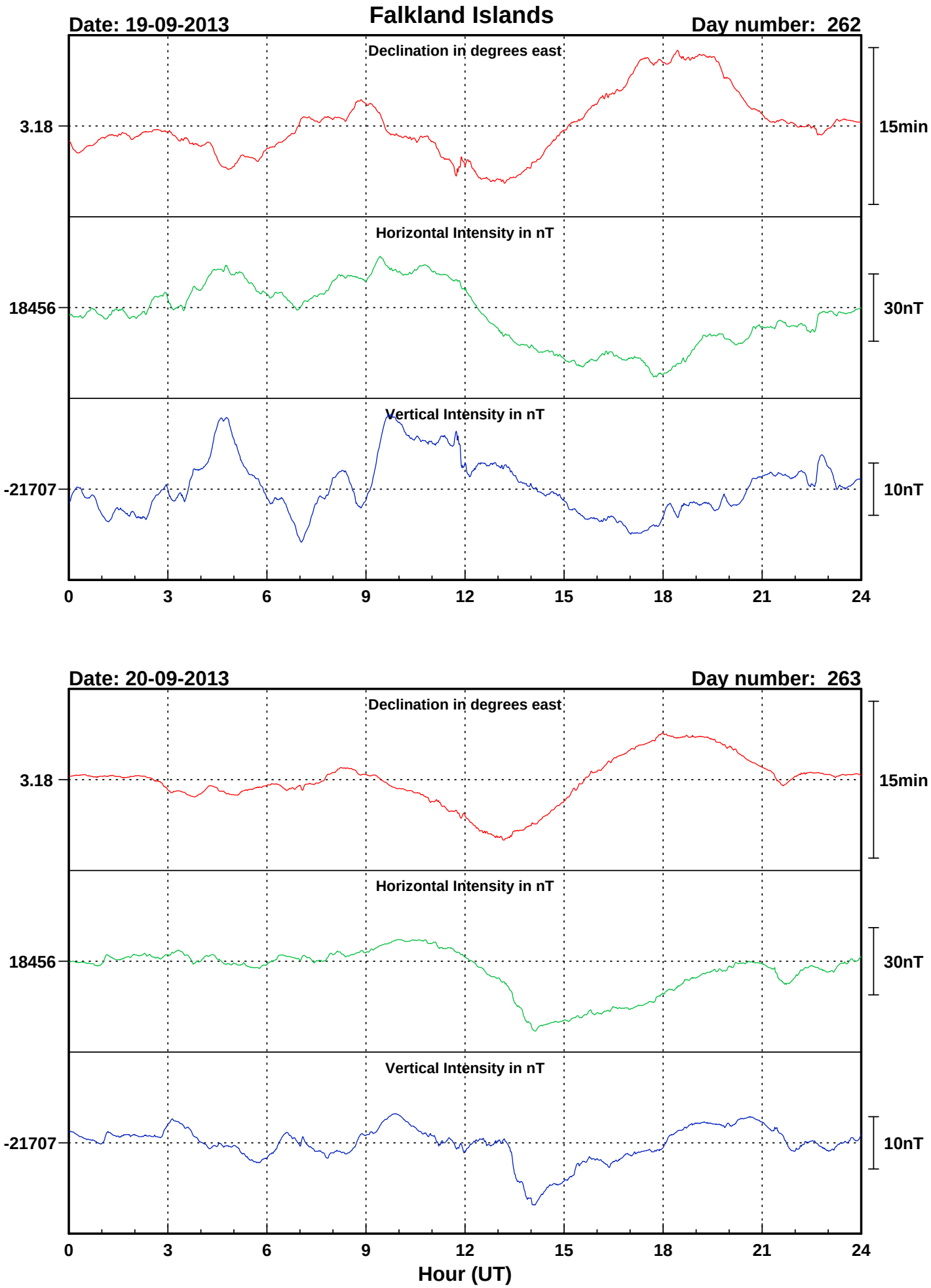
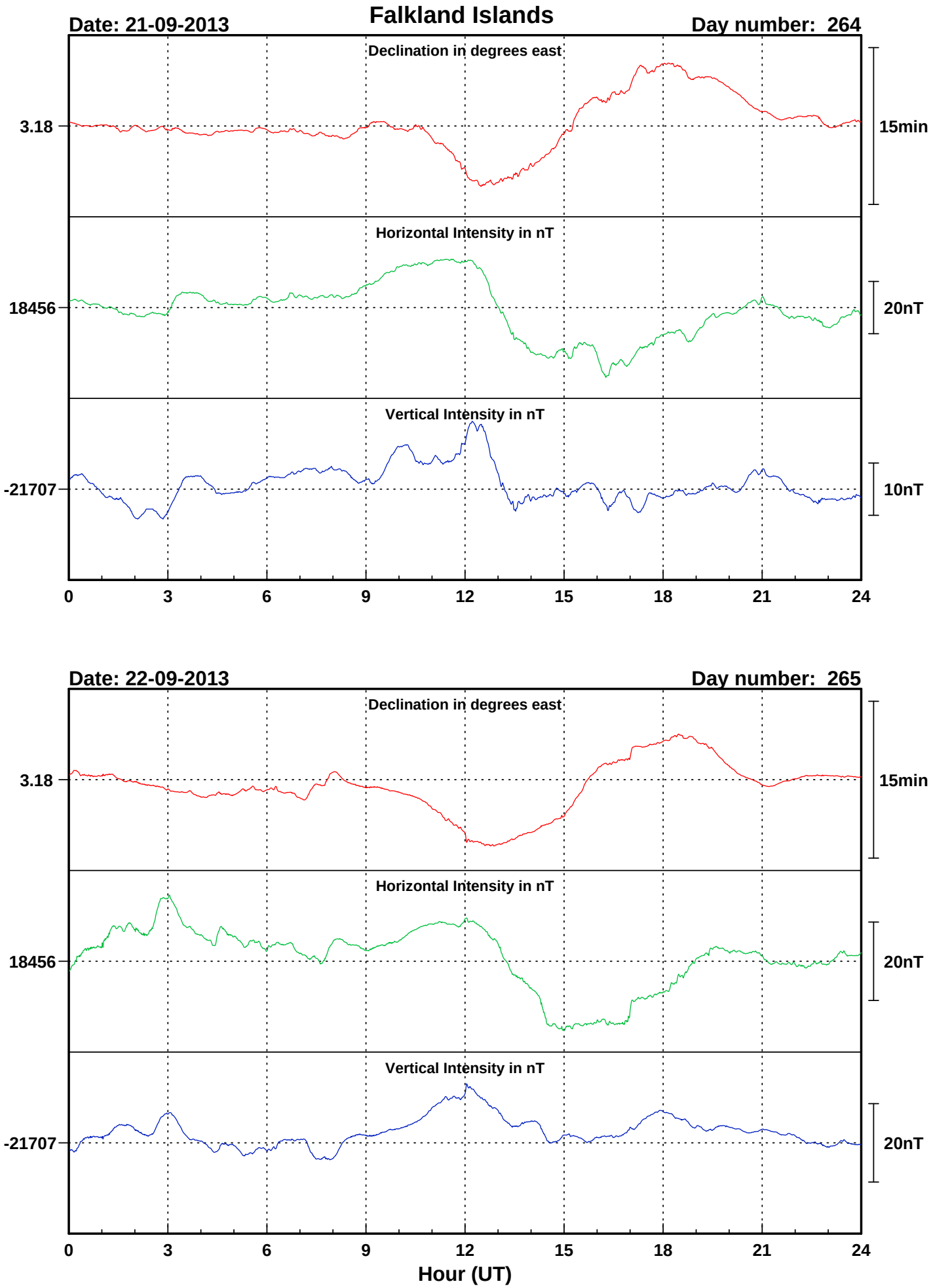
6
9
12
15
18
21
24
Hour (UT)

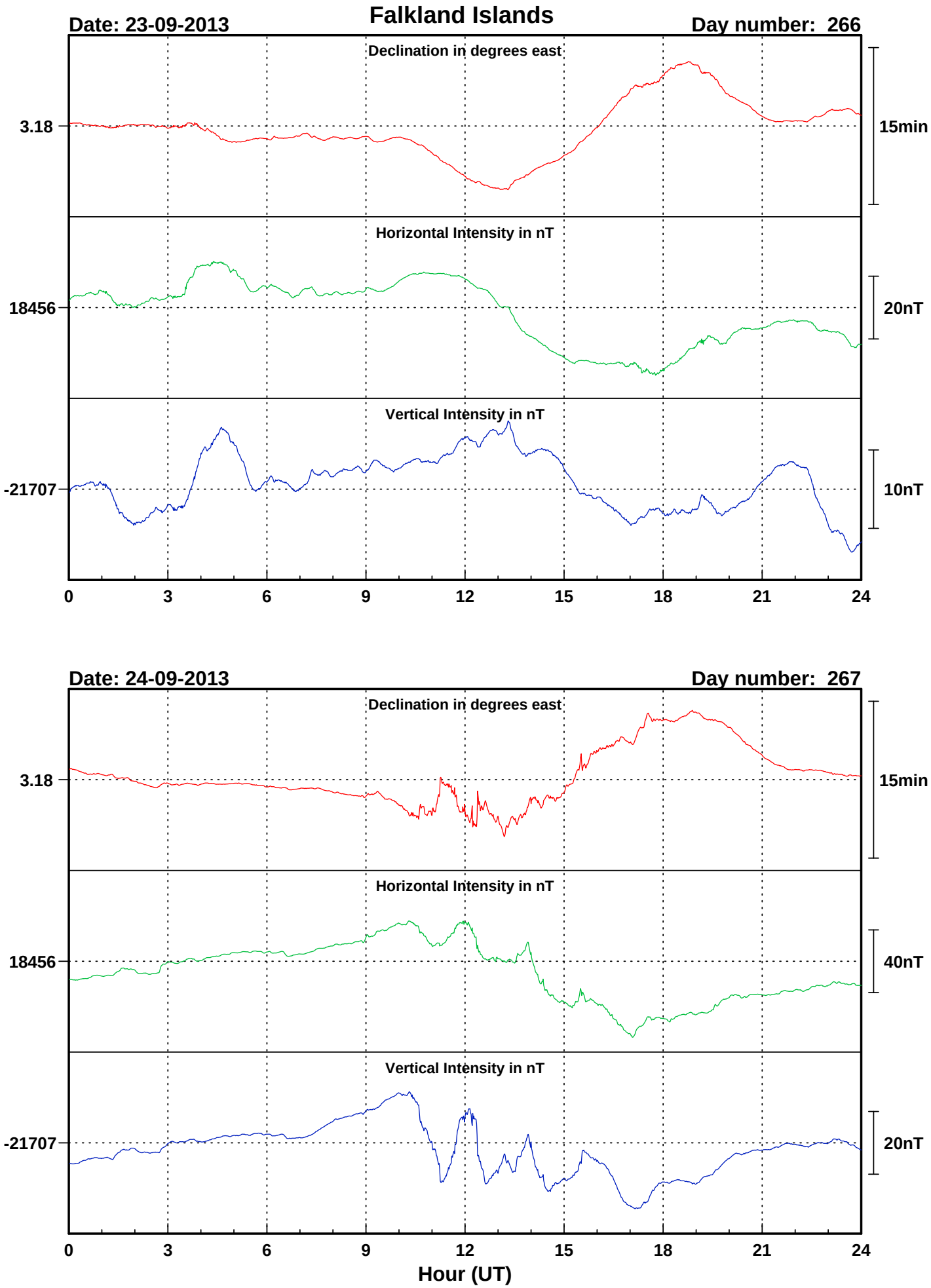

Falkland Islands
Date: 15-09-2013
Day number: 258
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24

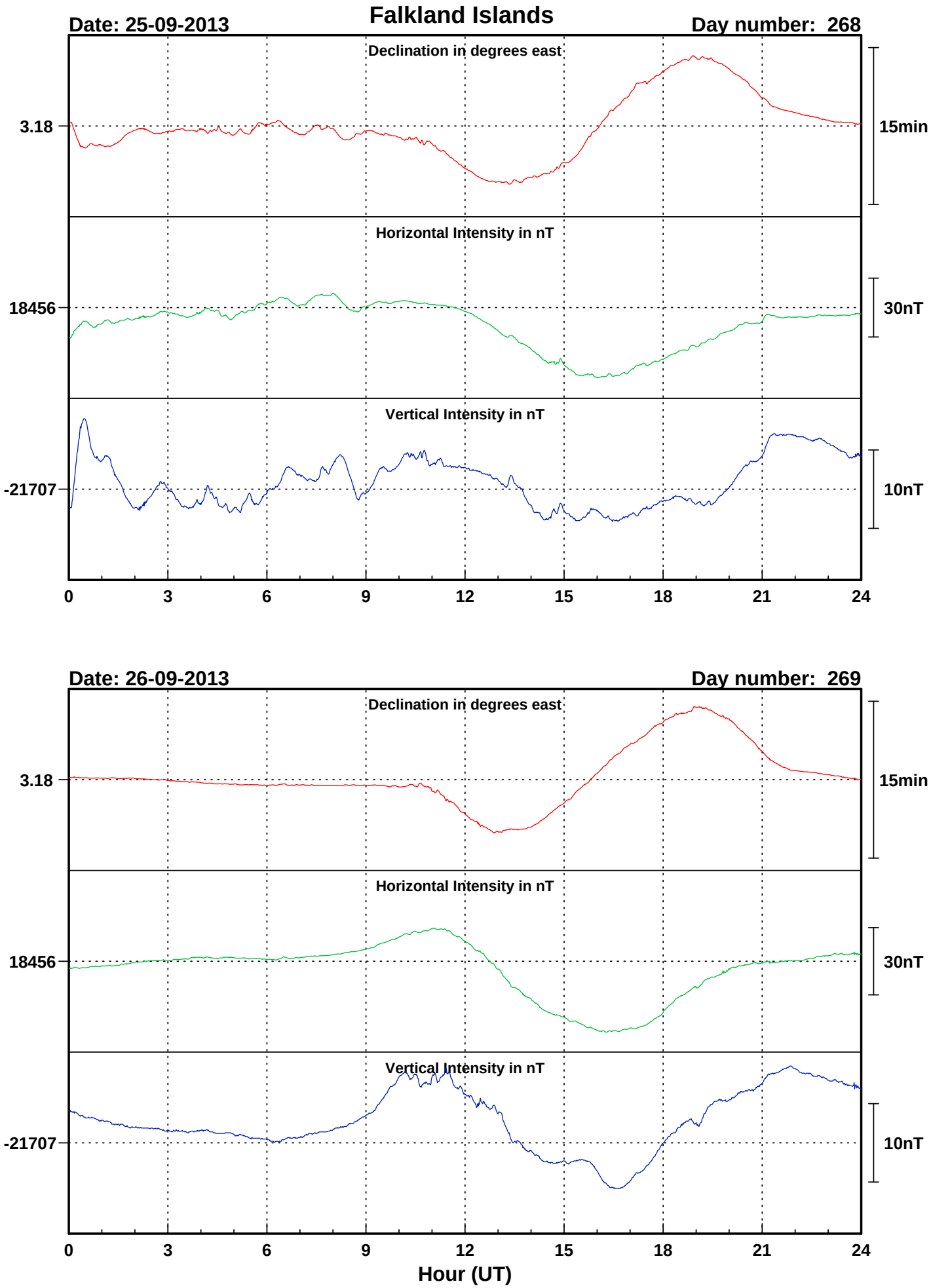

Date: 16-09-2013
Day number: 259
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

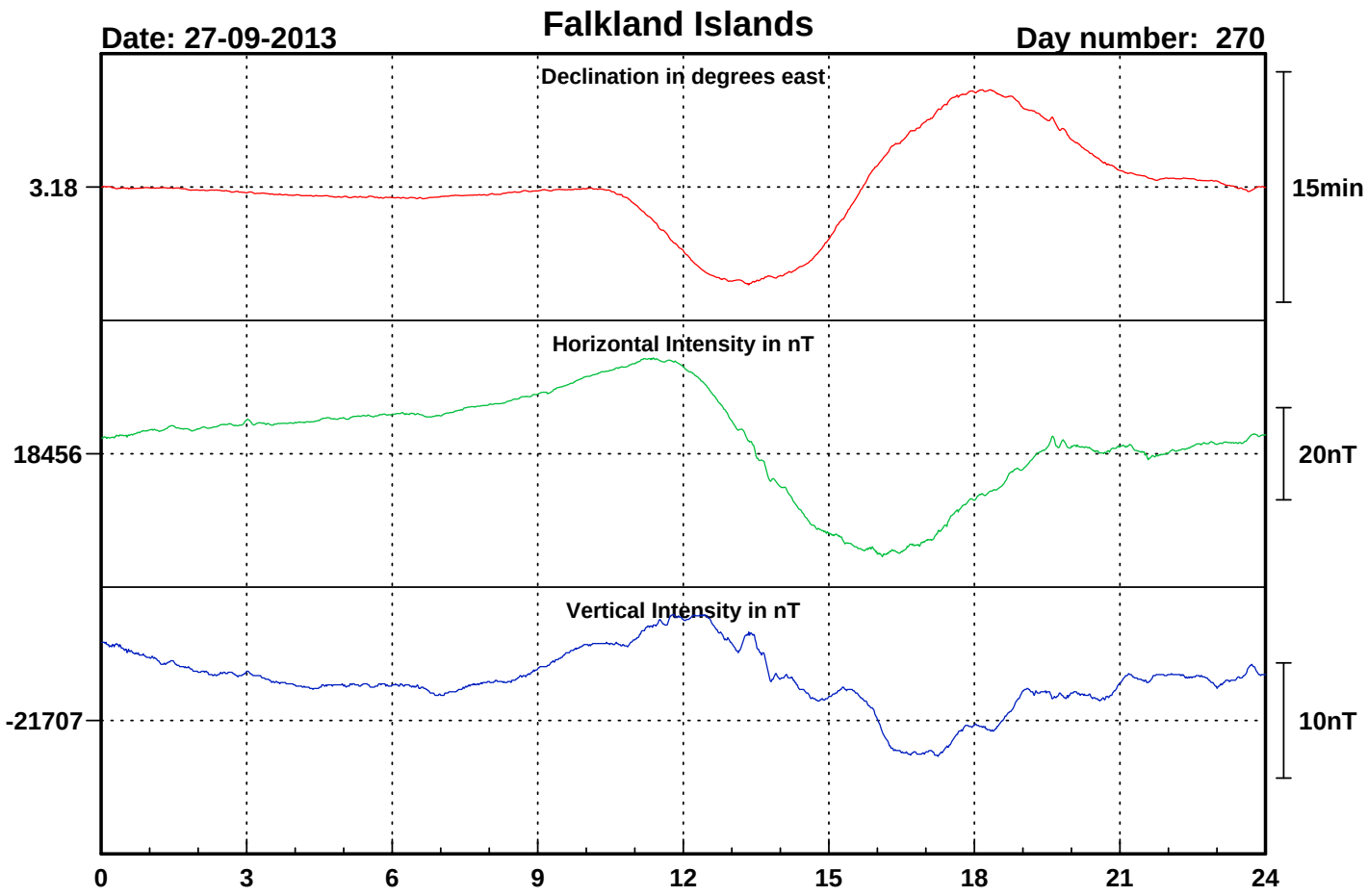

Falkland Islands
Date: 17-09-2013
Day number: 260
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 18-09-2013
Day number: 261
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

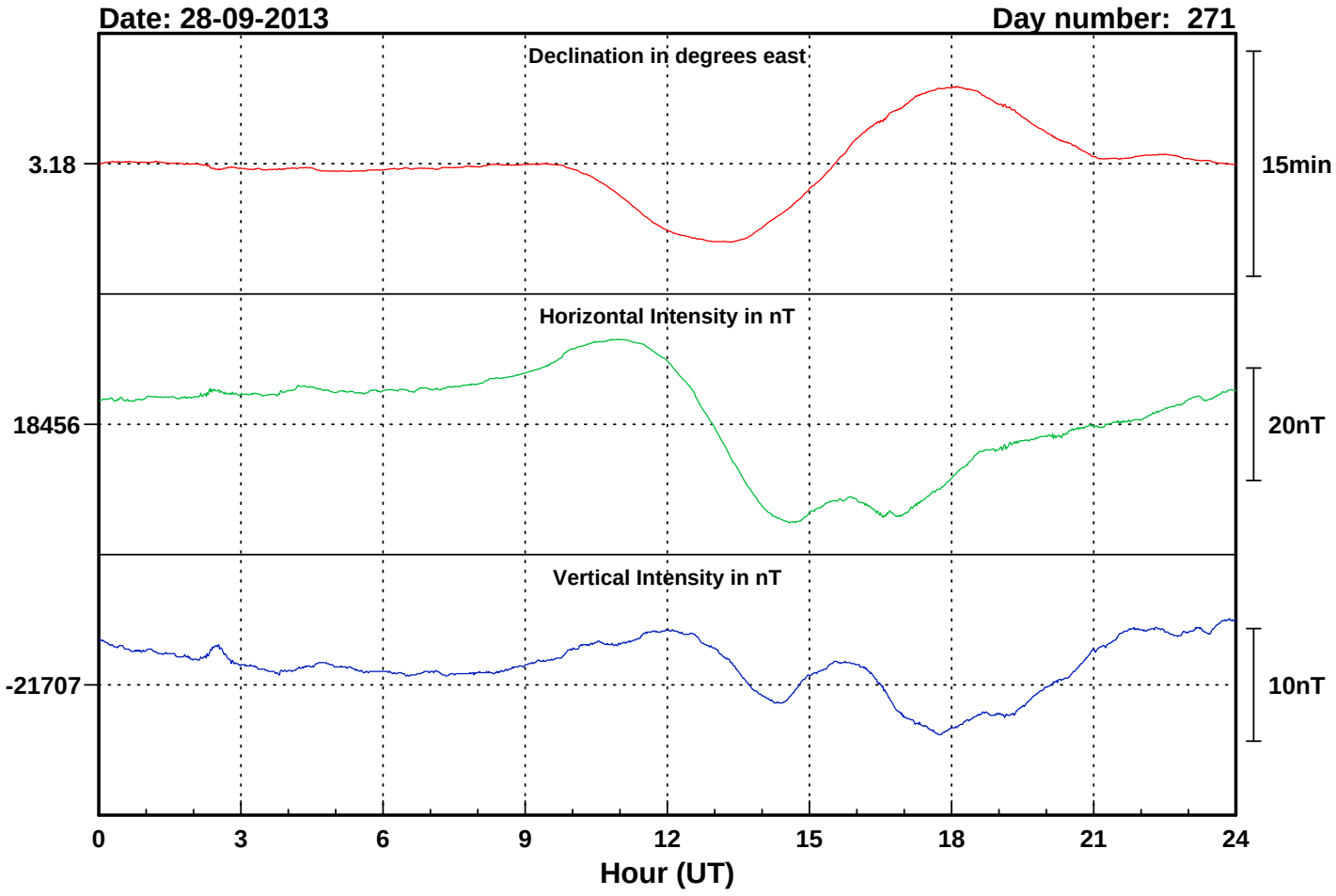

Falkland Islands
Date: 19-09-2013
Day number: 262
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 20-09-2013
Day number: 263
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

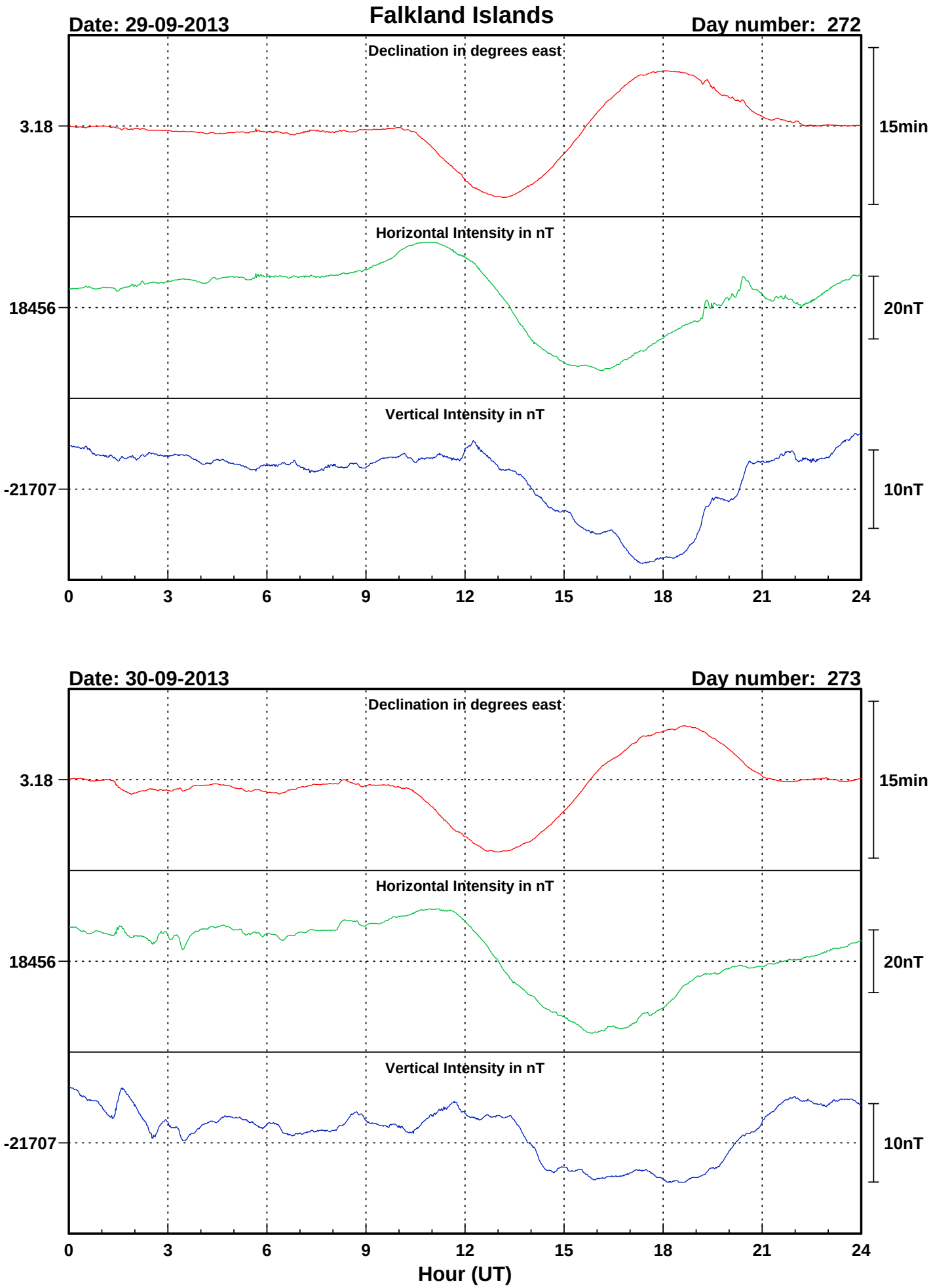

Falkland Islands
Date: 21-09-2013
Day number: 264
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 22-09-2013
Day number: 265
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 23-09-2013
Day number: 266
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 24-09-2013
Day number: 267
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
40nT
Vertical Intensity in nT
-21707
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

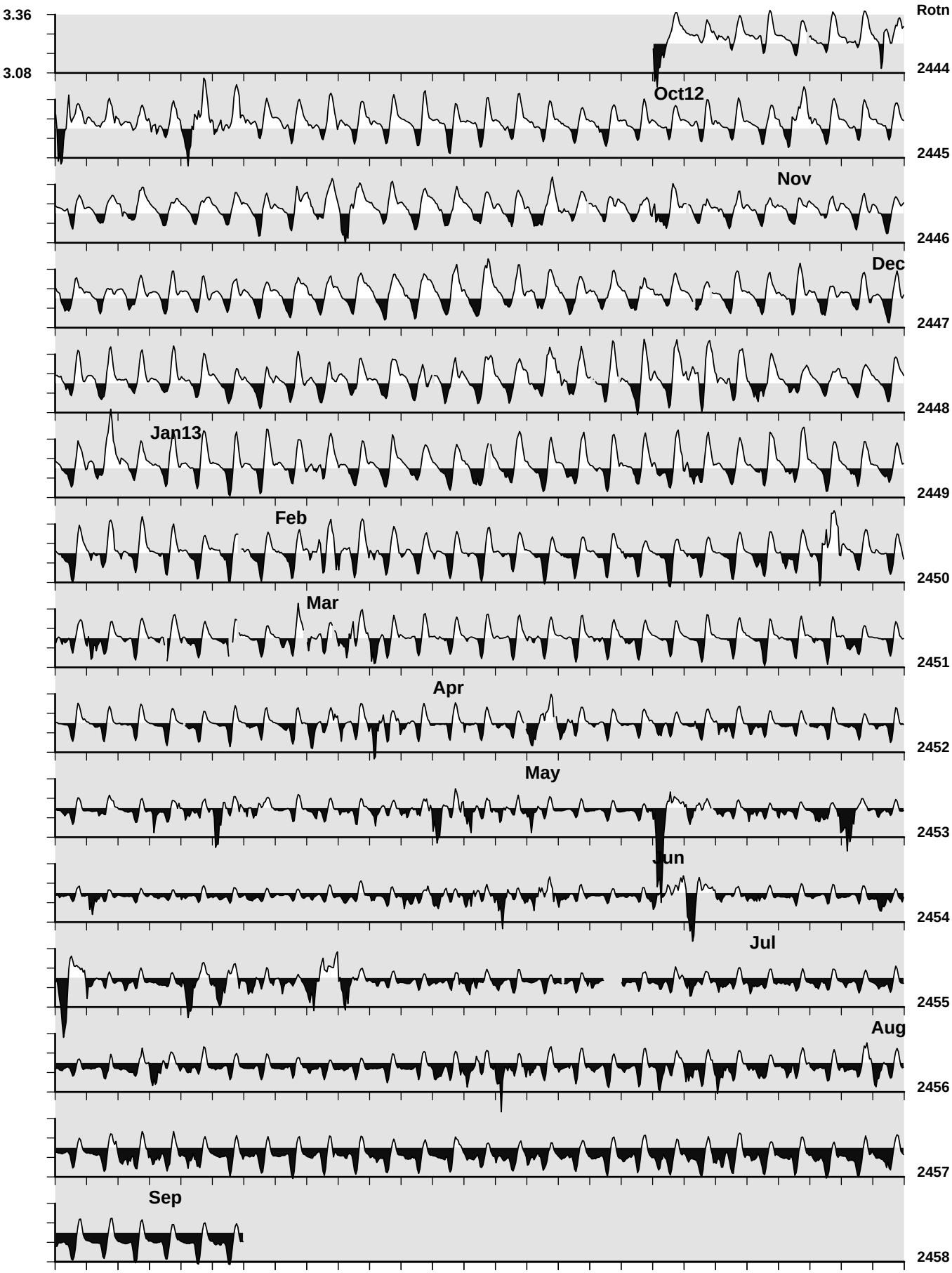

Falkland Islands
Date: 25-09-2013
Day number: 268
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 26-09-2013
Day number: 269
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
30nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Falkland Islands
Date: 27-09-2013
Day number: 270
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24


Date: 28-09-2013
Day number: 271
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

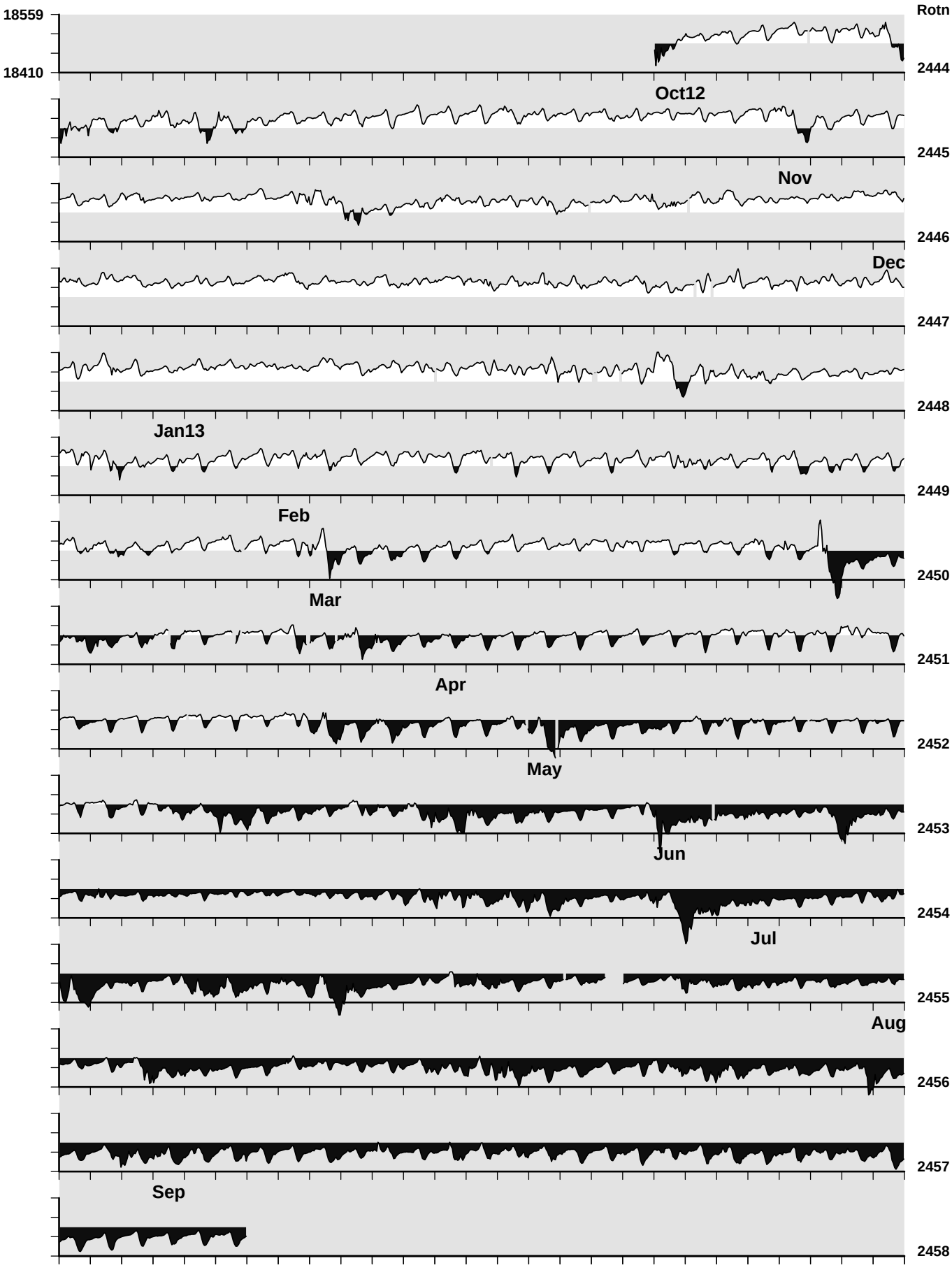

Falkland Islands
Date: 29-09-2013
Day number: 272
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Date: 30-09-2013
Day number: 273
Declination in degrees east
3.18
15min
Horizontal Intensity in nT
18456
20nT
Vertical Intensity in nT
-21707
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

Falkland Islands Observatory: Declination (degrees)



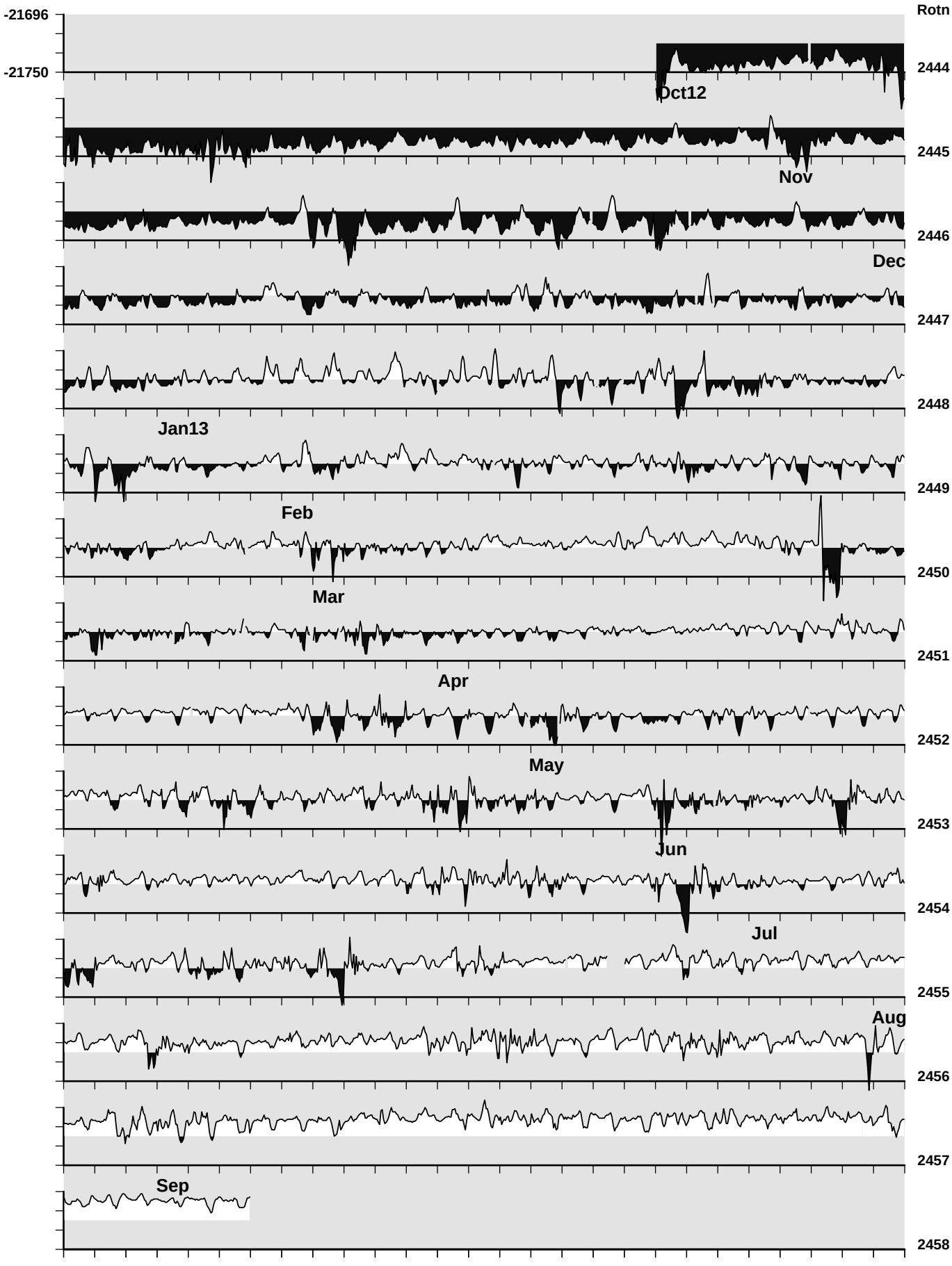
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Horizontal Intensity (nT)

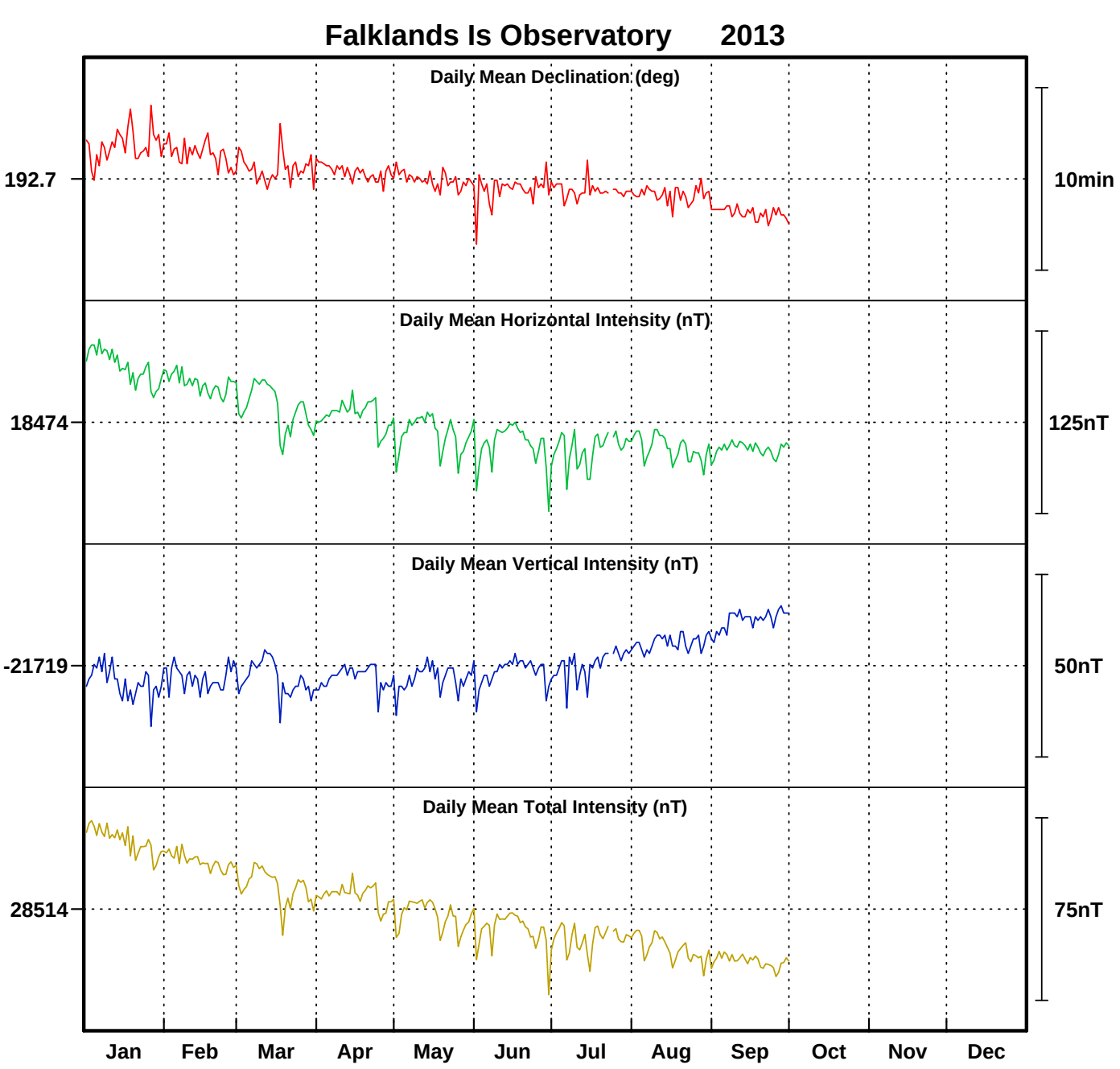


Hourly Mean Values Plotted By Bartels Solar Rotation Number

Falkland Islands Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number


Falklands Is Observatory 2013
Daily Mean Declination (deg)
192.7
10min
Daily Mean Horizontal Intensity (nT)
18474
125nT
Daily Mean Vertical Intensity (nT)
-21719
50nT
Daily Mean Total Intensity (nT)
28514
75nT
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Monthly Mean Values for Port Stanley Observatory 2013

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	3° 14.5′	18512 nT	-49° 33.8′	18482 nT	1047 nT	-21724 nT	28542 nT
February	3° 14.0′	18501 nT	-49° 34.8′	18471 nT	1044 nT	-21723 nT	28533 nT
March	3° 13.3′	18484 nT	-49° 36.4′	18454 nT	1039 nT	-21723 nT	28522 nT
April	3° 13.0′	18479 nT	-49° 36.7′	18450 nT	1037 nT	-21722 nT	28519 nT
May	3° 12.6′	18466 nT	-49° 38.0′	18437 nT	1034 nT	-21723 nT	28511 nT
June	3° 12.1′	18458 nT	-49° 38.6′	18429 nT	1031 nT	-21721 nT	28504 nT
July	3° 12.0′	18456 nT	-49° 38.6′	18427 nT	1030 nT	-21719 nT	28502 nT
August	3° 11.8′	18456 nT	-49° 38.1′	18427 nT	1029 nT	-21713 nT	28497 nT
September	3° 10.8′	18456 nT	-49° 37.6′	18428 nT	1024 nT	-21707 nT	28492 nT

Note

i. The values shown here are provisional.