BRITISH GEOLOGICAL SURVEY

Sable Island Observatory *Monthly Magnetic Bulletin*

October 2007

07/10/SB

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

SABLE ISLAND OBSERVATORY MAGNETIC DATA

1. Introduction

Sable Island is the third overseas geomagnetic observatory to be established by BGS. The installation, funded by a joint venture between BGS, Sperry Drilling Services and Sable Offshore Energy, was completed in May 1999 and the observatory became operational from 8th May 1999.

Magnetic observatory data is presented as a series of plots of one-minute, hourly and daily values, followed by a tabulation 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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British Geological Survey
Murchison House, West Mains Road
Edinburgh EH9 3LA
Scotland, UK

Tel:	+44 (0) 131 667 1000
Fax:	+44 (0) 131 668 4368
E-mail:	orba@bgs.ac.uk
Internet:	*www.geomag.bgs.ac.uk*

2. Position

The Island is a sandbank formed by the meeting of currents from the St. Lawrence Delta and the Gulf Stream and is located approximately 290km southeast of Halifax, Nova Scotia.
The observatory co-ordinates are:-

Geographic*:*	*43° 55.9′N*	*299°0.4′E*
Geomagnetic*:*	*53° 56.0′N*	*14° 24.42′E*
Height above mean sea level:	*5m (approx)*	

The geomagnetic co-ordinates are calculated using the 10th generation International Geomagnetic Reference Field (IGRF) at epoch 2007.5

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 in April 2004 and became fully operational from 13th May 2004. The system operates under the control of data acquisition software running on QNX computers, which control the data logging and communications.

There are two sets of sensors used for making magnetic measurements. A triaxial 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 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 whilst the total field intensity samples are filtered using a 7-point cosine filter.

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 week. 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. Data Presentation

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 a page and show the 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 on the surface of the Sun may recur after 27 days: the same is true for geomagnetically quiet intervals. Plotting the data in this way highlights this recurrence, and also illustrates seasonal and diurnal variations throughout the year.

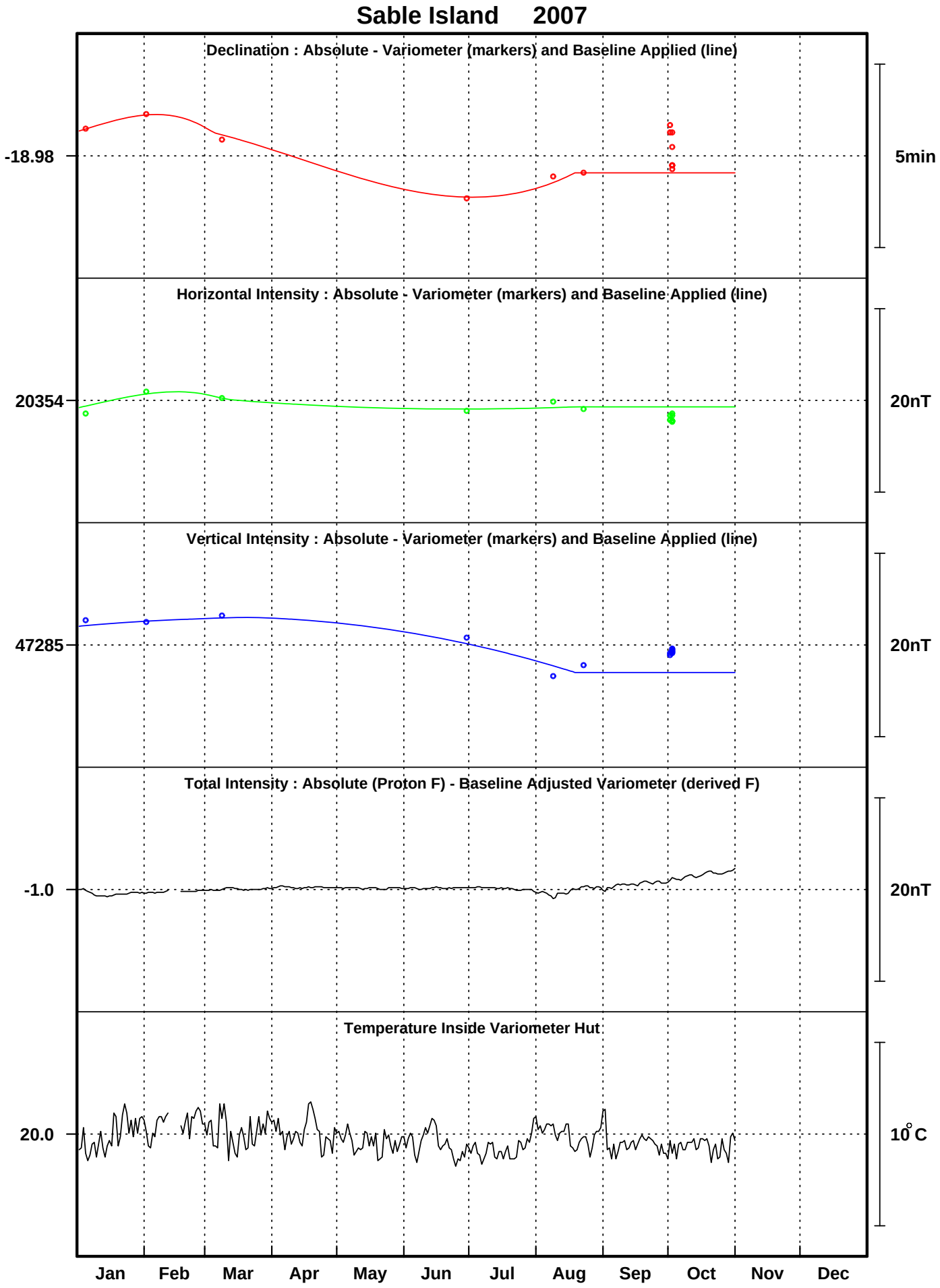
4.5 Daily and Monthly Mean Values

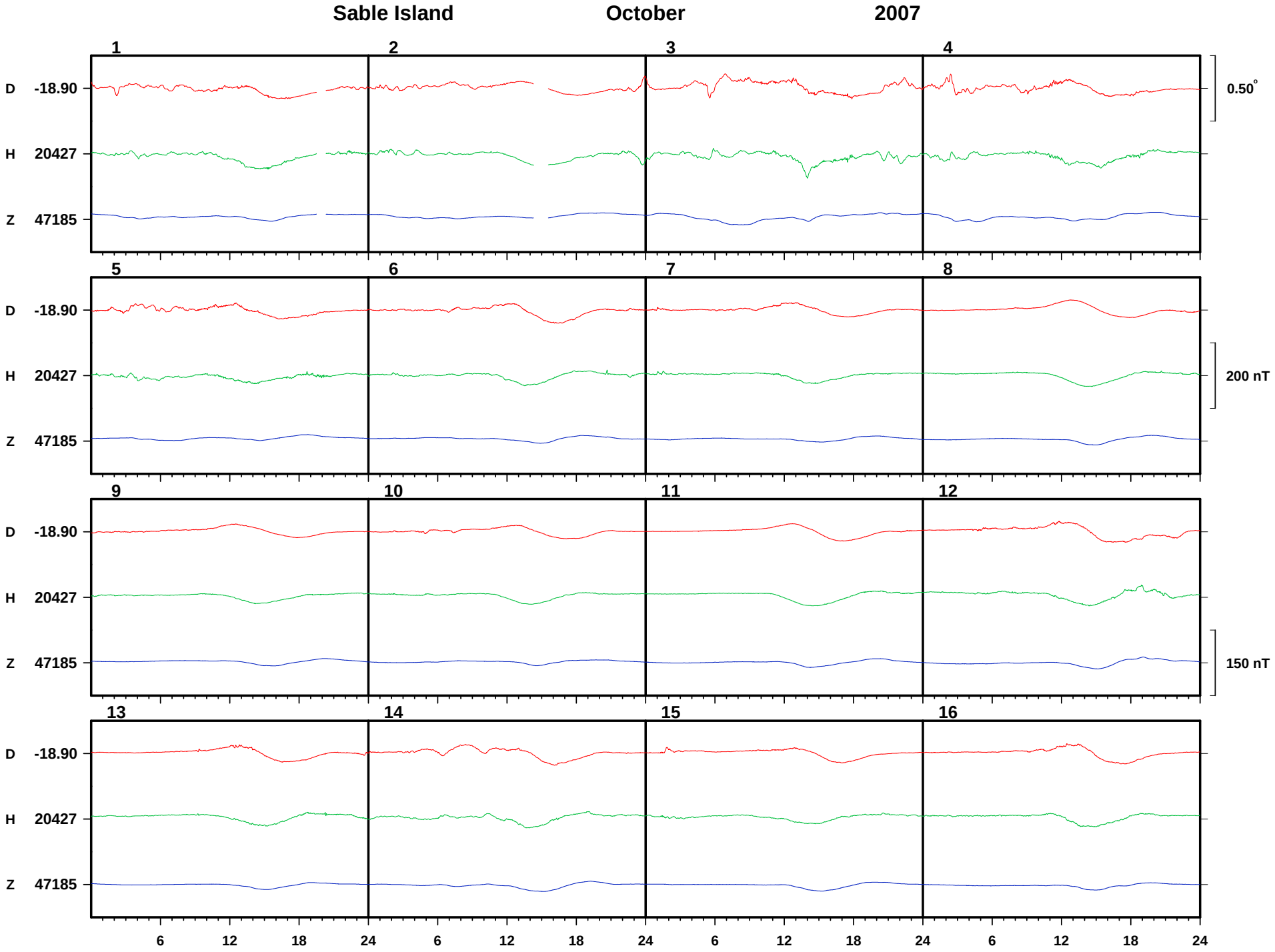
Daily mean values of *D*, *H*, *Z* and *F* are plotted throughout the year. In addition, a table of monthly mean values of all the geomagnetic elements is provided. These values depend on accurate specification of the fluxgate sensor baselines. It is anticipated that provisional values will not be altered by more than a few nT or tenths of arcminutes before being made definitive.

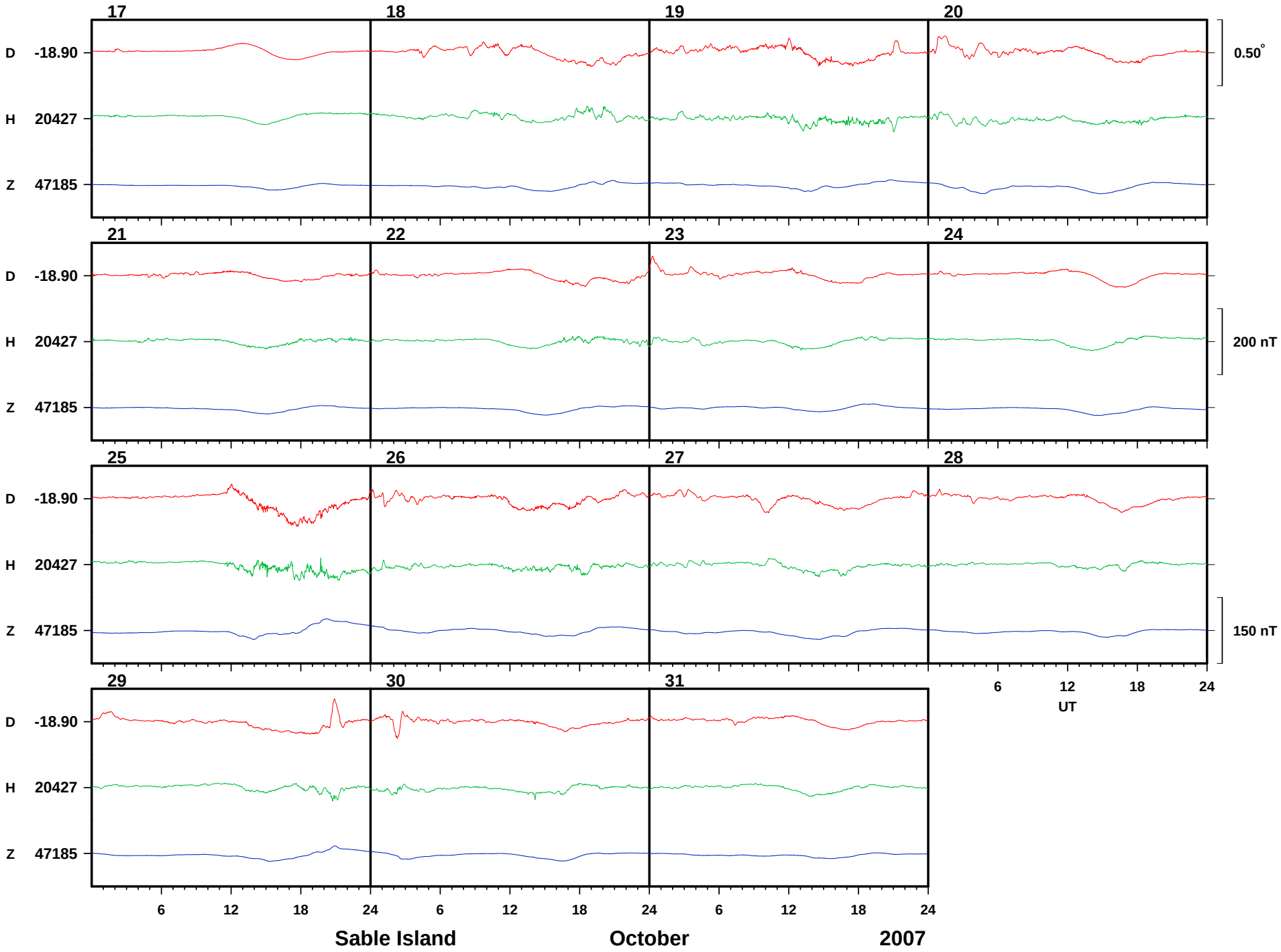
SABLE ISLAND OBSERVATORY

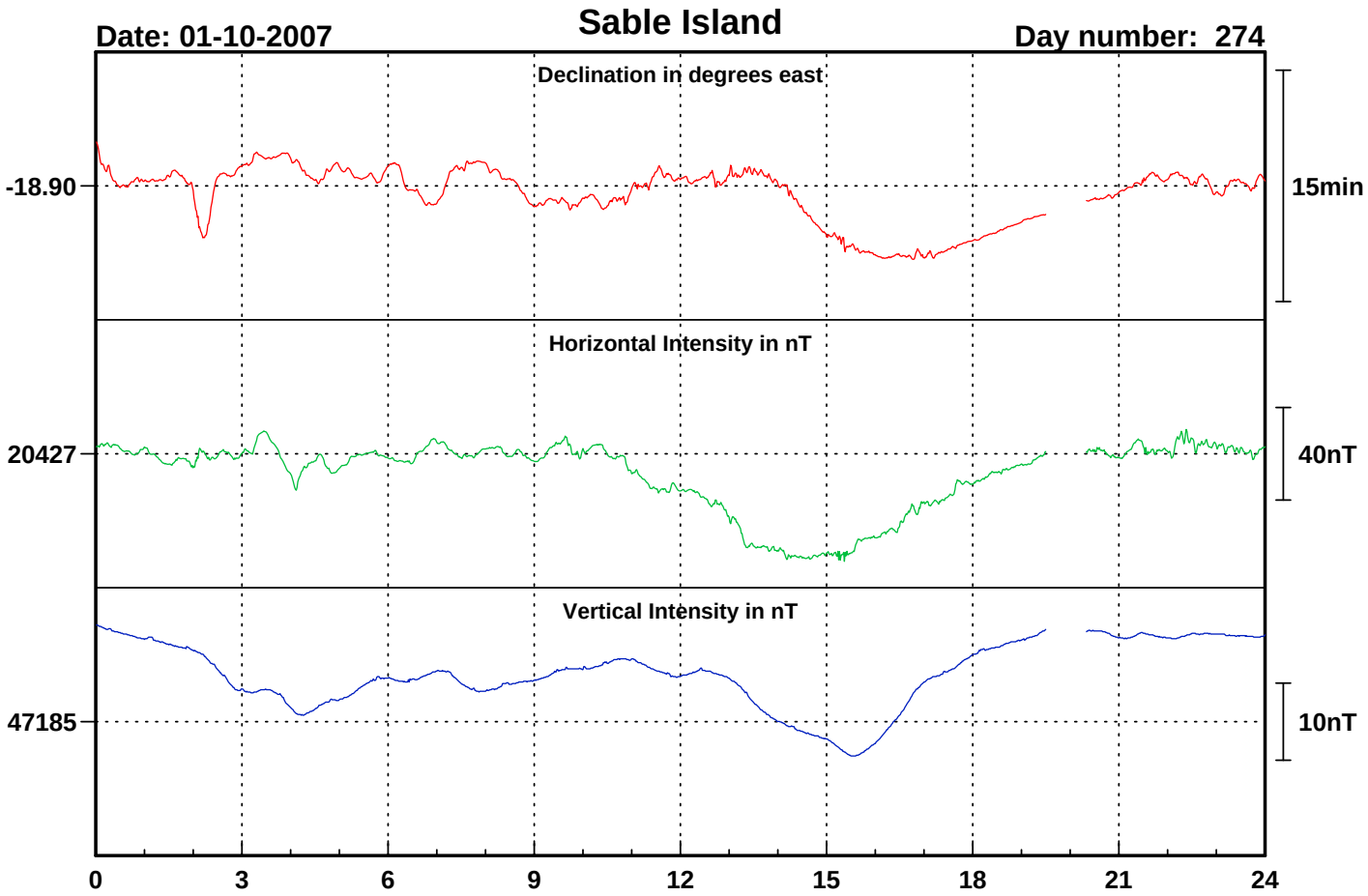
ABSOLUTE OBSERVATIONS

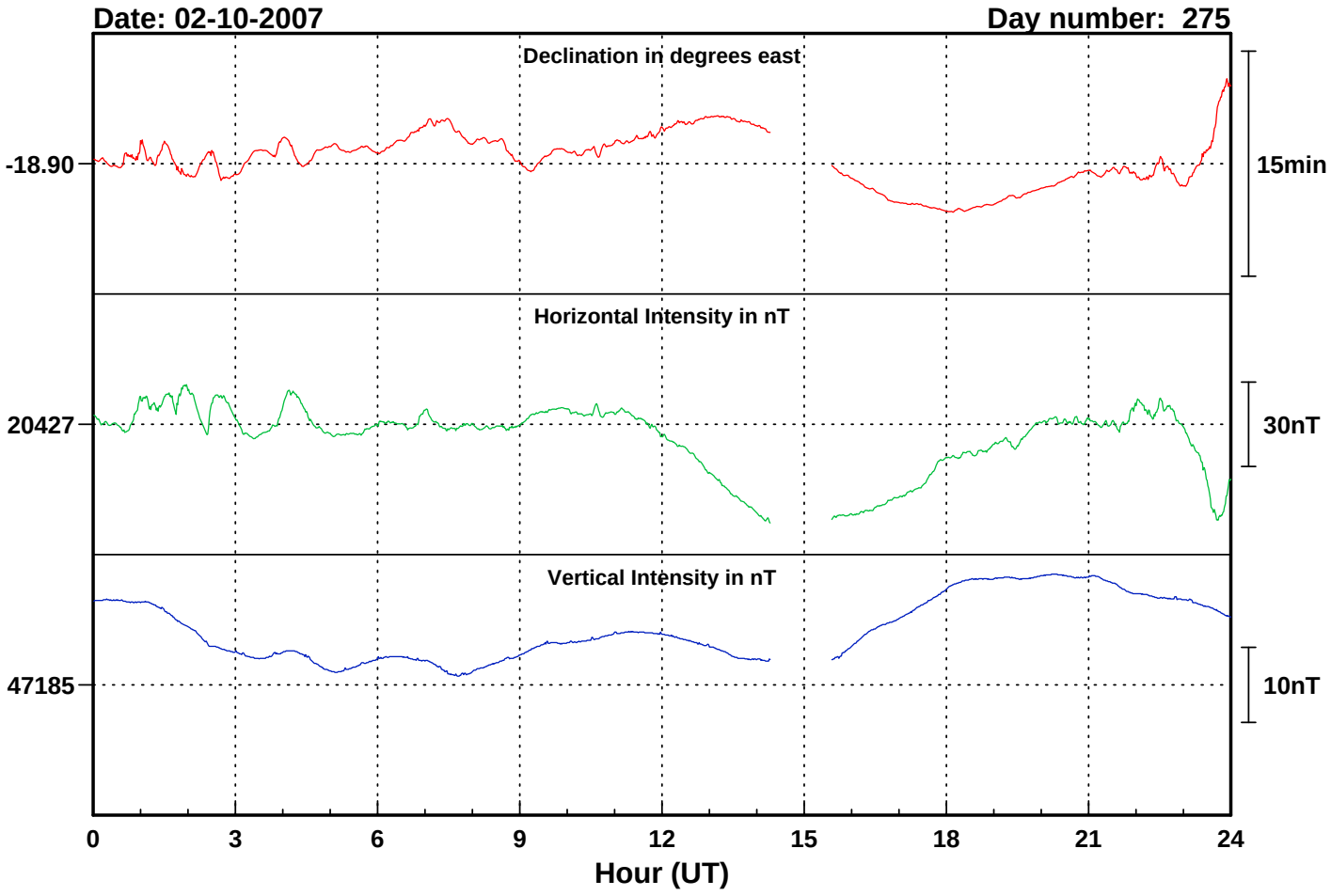
		DECLINATION			INCLINATION							
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Inclination (º)**	**Total Field Intensity (nT)**	**H Absolute (nT)**	**H Baseline (nT)**	**Z Absolute (nT)**	**Z Baseline (nT)**	**Observer**
01-Oct-07	274	17:06	-18.9540	-18.9633	17:44	66.6092	51420.4	20414.0	20351.9	47194.6	47284.1	TS
01-Oct-07	274	17:51	-18.9436	-18.9667	17:56	66.6108	51421.0	20412.9	20351.4	47195.6	47284.3	TS
02-Oct-07	275	13:02	-18.8313	-18.9667	13:21	66.6193	51413.6	20403.0	20351.3	47191.9	47284.8	TS
02-Oct-07	275	13:29	-18.8395	-18.9733	13:34	66.6209	51411.8	20400.9	20352.1	47190.8	47284.4	TS
02-Oct-07	275	18:10	-18.9497	-18.9817	18:18	66.6106	51426.8	20415.4	20351.9	47200.9	47284.3	TS
02-Oct-07	275	18:25	-18.9501	-18.9817	18:30	66.6105	51427.3	20415.6	20351.3	47201.4	47284.5	TS
02-Oct-07	275	18:54	-18.9453	-18.9833	18:59	66.6072	51428.8	20419.0	20351.3	47201.6	47284.6	TS
02-Oct-07	275	19:04	-18.9407	-18.9817	19:08	66.6066	51429.3	20419.7	20351.2	47201.8	47284.7	TS


Sable Island 2007
Declination : Absolute - Variometer (markers) and Baseline Applied (line)
-18.98
5min
Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)
20354
20nT
Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)
47285
20nT
Total Intensity : Absolute (Proton F) - Baseline Adjusted Variometer (derived F)
-1.0
20nT
Temperature Inside Variometer Hut
20.0
10°C
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Sable Island
October
2007
1
2
3
4
D -18.90
H 20427
Z 47185
0.50°
5
6
7
8
D -18.90
H 20427
Z 47185
200 nT
9
10
11
12
D -18.90
H 20427
Z 47185
150 nT
13
14
15
16
D -18.90
H 20427
Z 47185
6
12
18
24
6
12
18
24
6
12
18
24
6
12
18
24


17
18
19
20
D -18.90
H 20427
Z 47185
0.50°
21
22
23
24
200 nT
25
26
27
28
150 nT
29
30
31
6
12
18
24
UT
Sable Island
October
2007


Sable Island
Date: 01-10-2007
Day number: 274
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
40nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
15
18
21
24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Day number: 275
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
10nT
0
3
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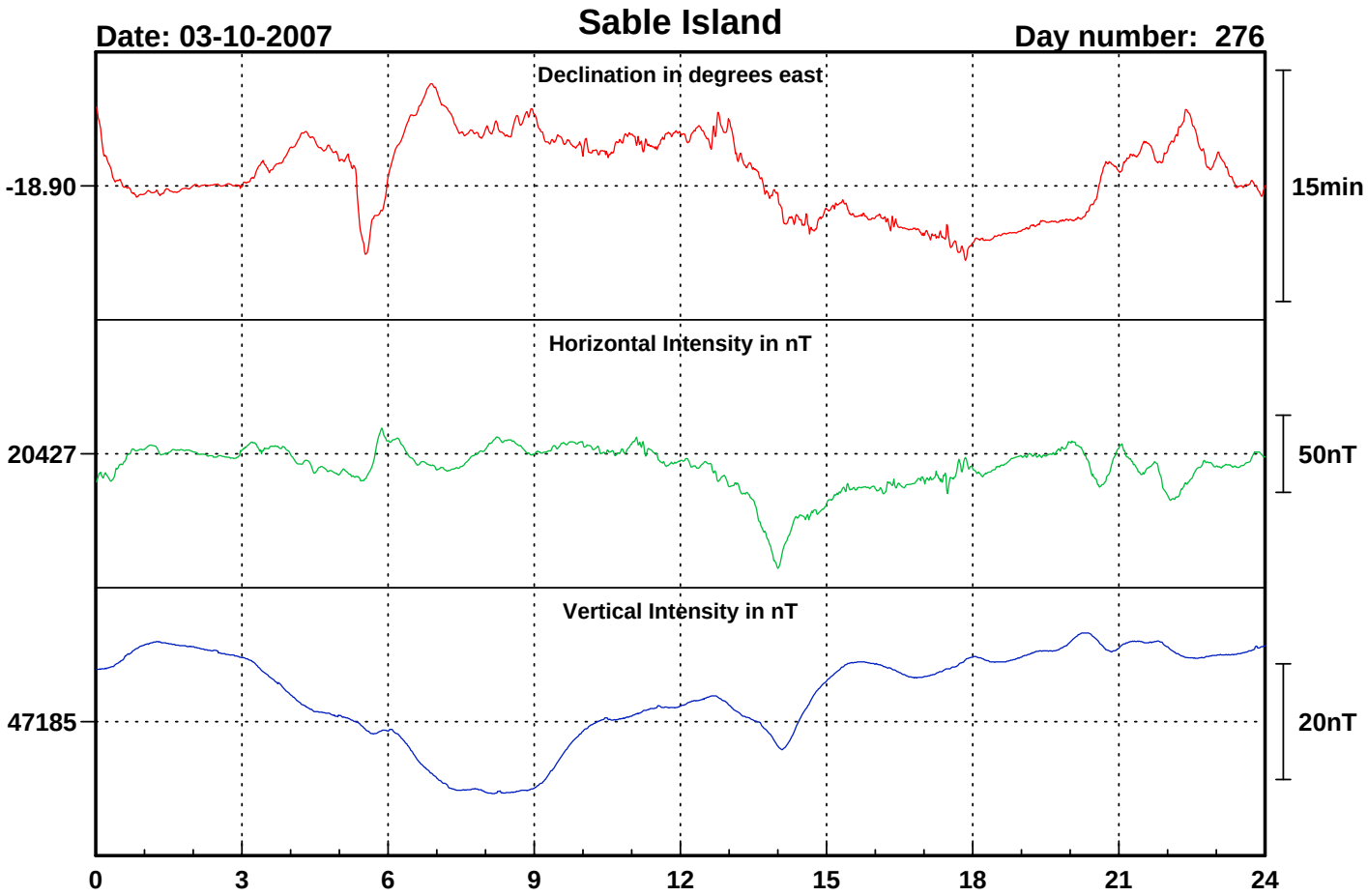
24
Hour (UT)


Sable Island
Date: 03-10-2007
Day number: 276
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
50nT
Vertical Intensity in nT
47185
20nT
0
3
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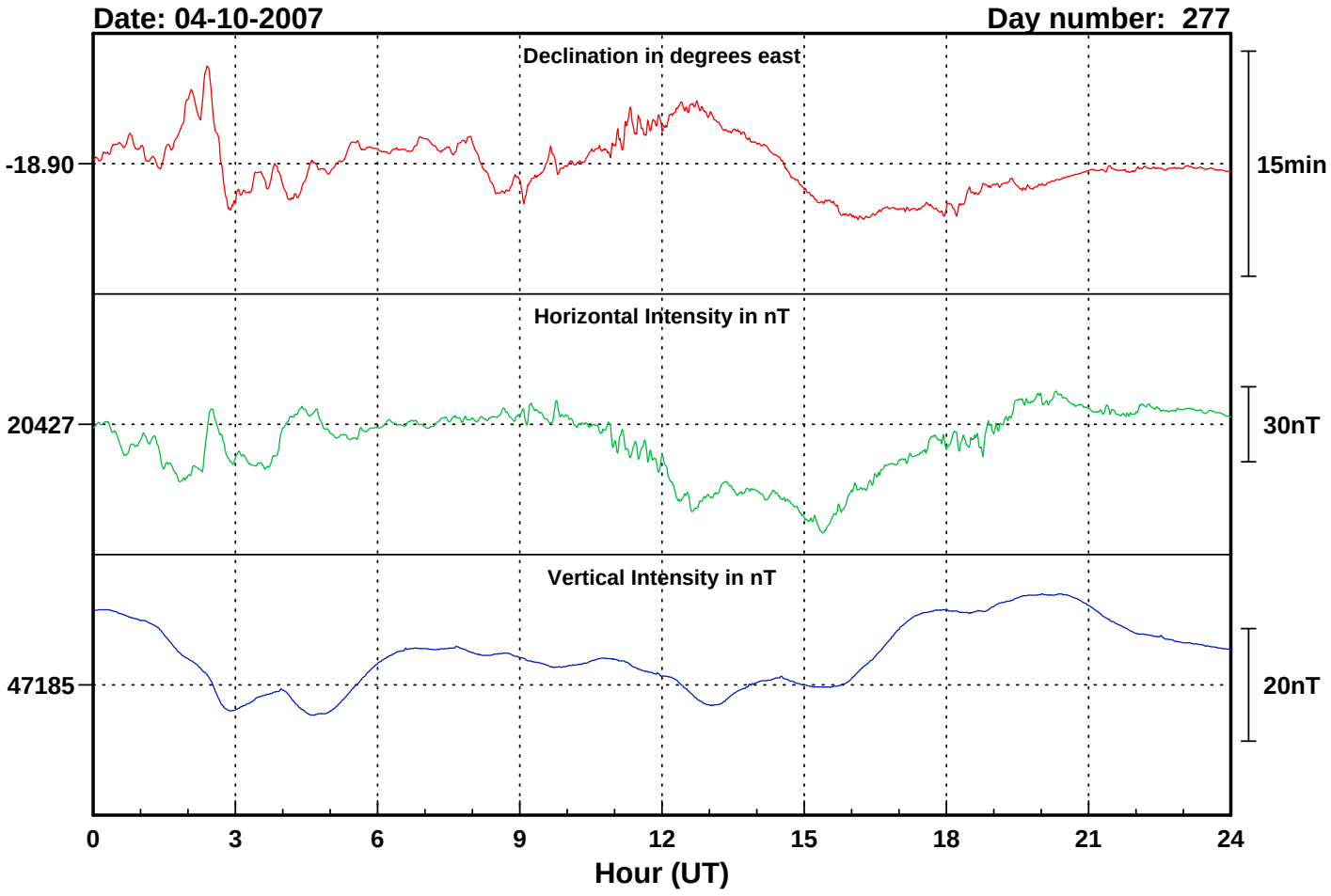
24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Day number: 277
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
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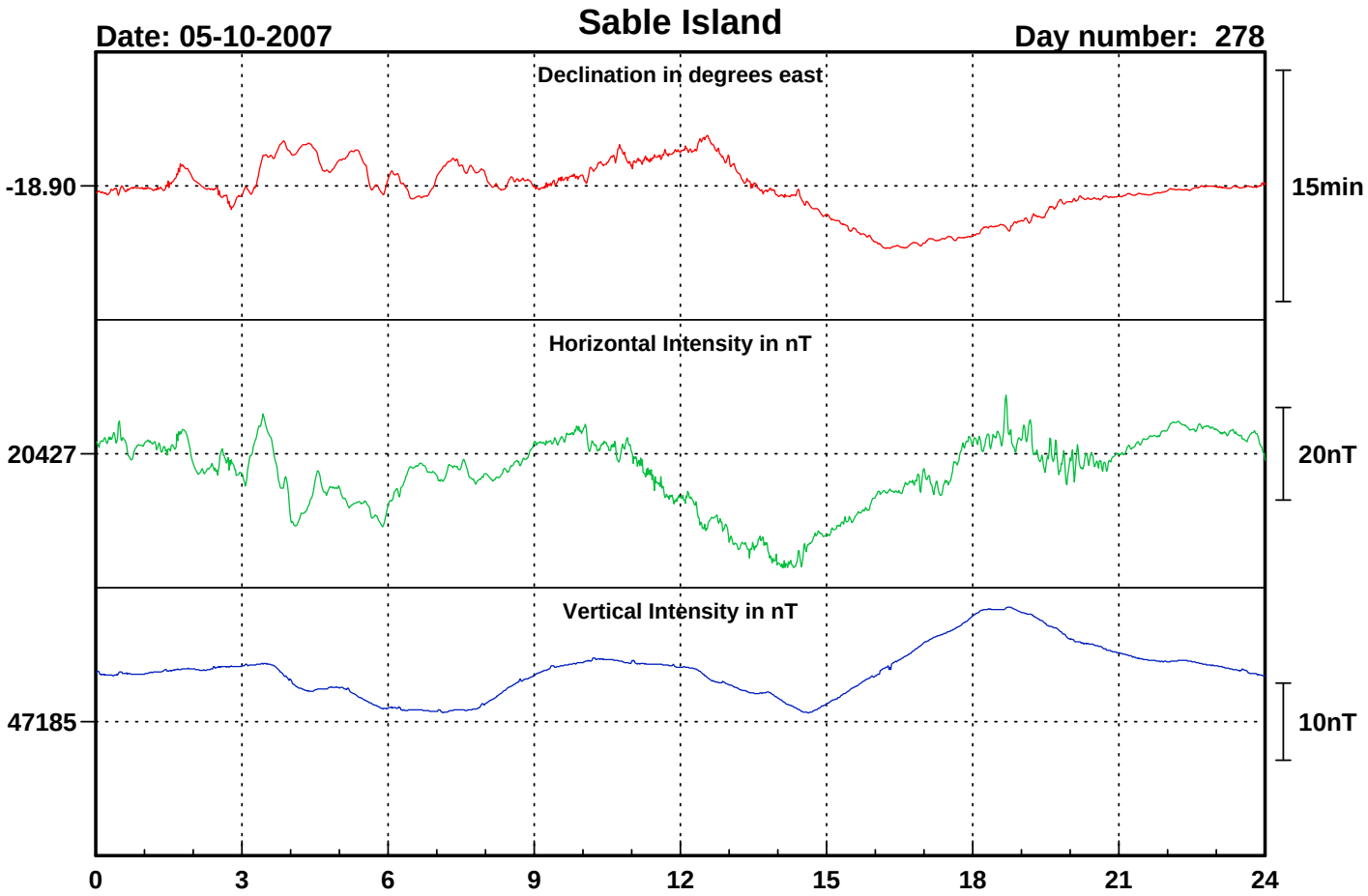
Hour (UT)


Sable Island
Date: 05-10-2007
Day number: 278
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
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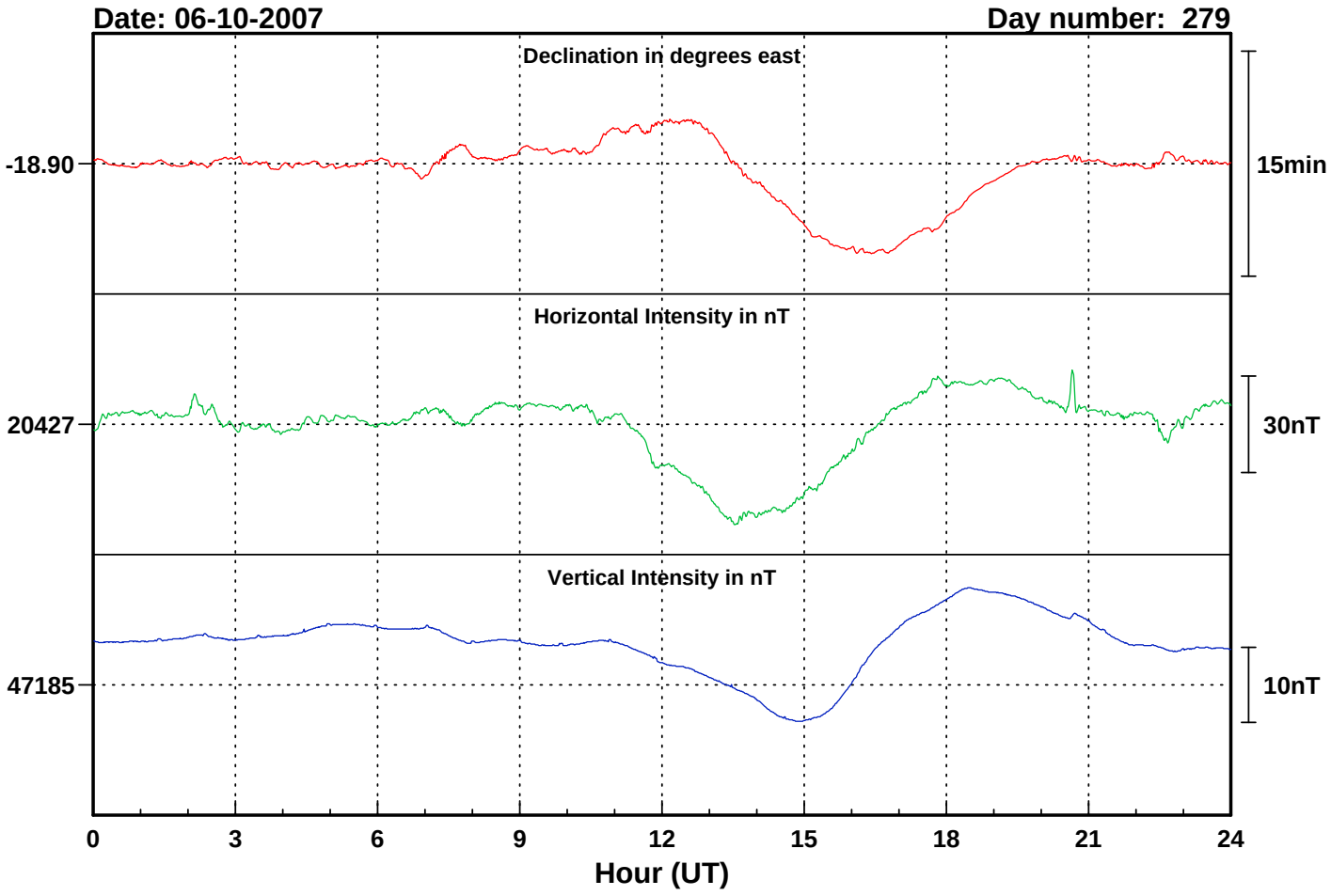
Date: 06-10-2007
Day number: 279
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
10nT
0
3
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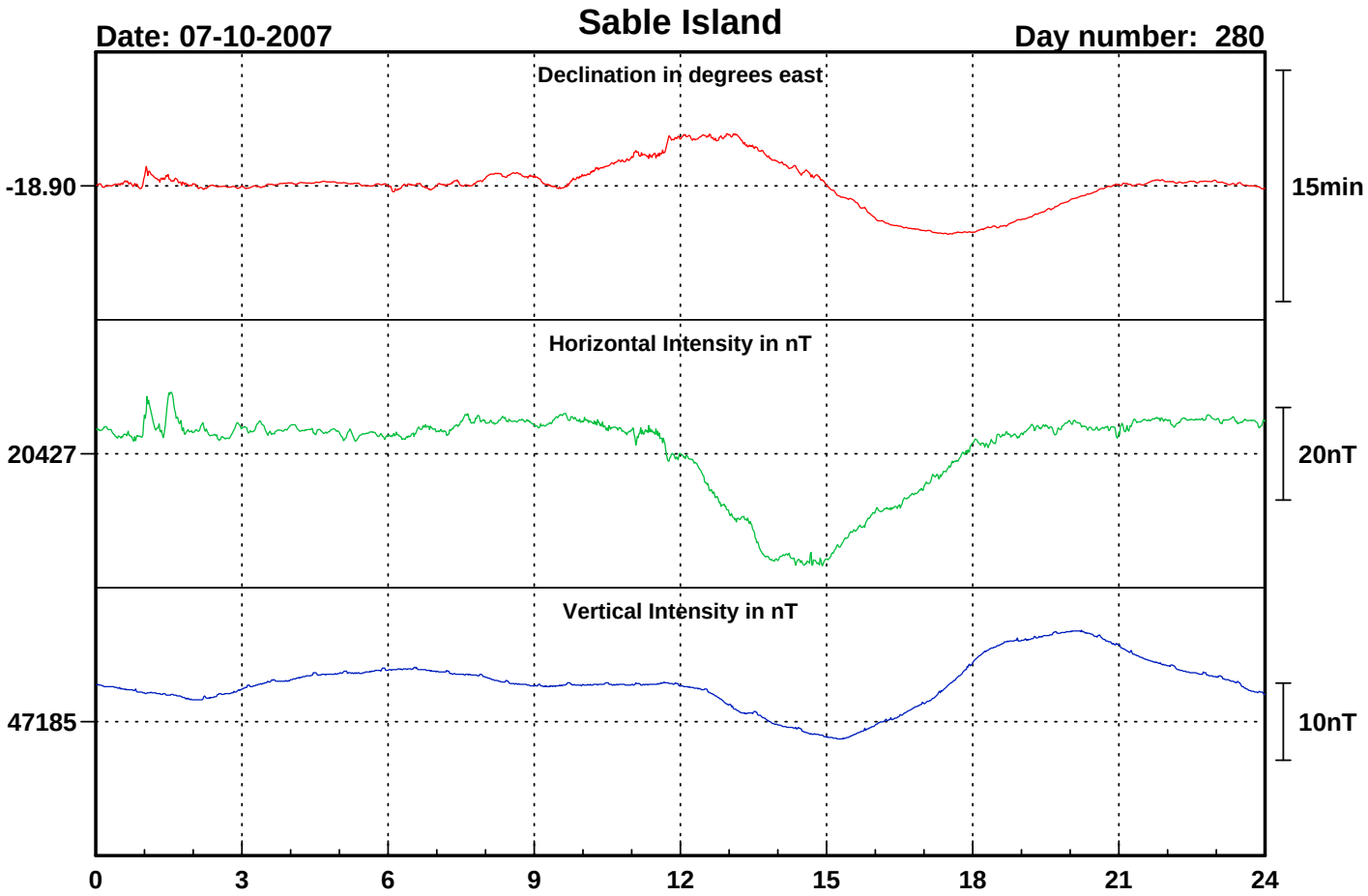
Hour (UT)


Sable Island
Date: 07-10-2007
Day number: 280
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
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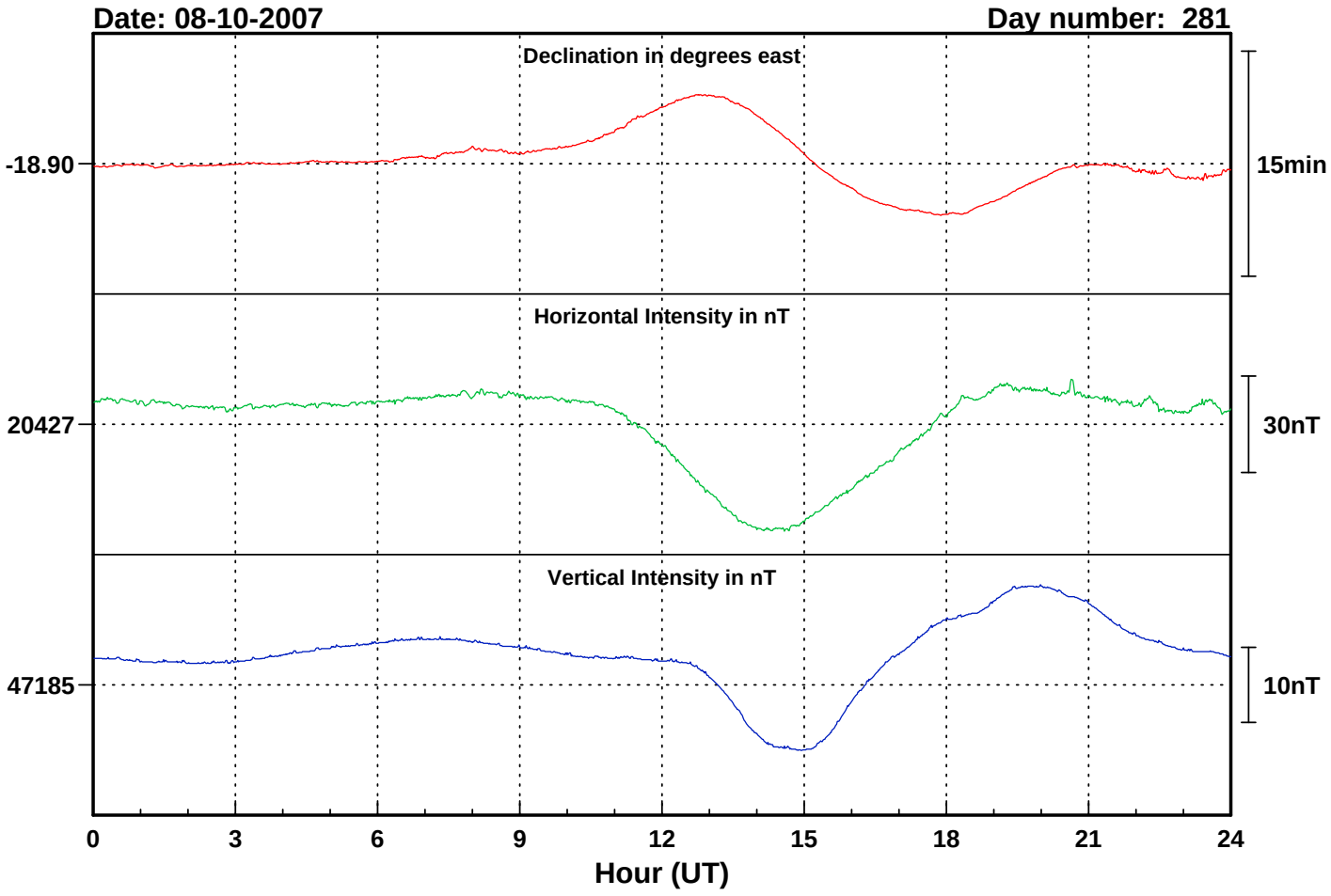
Date: 08-10-2007
Day number: 281
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
10nT
0
3
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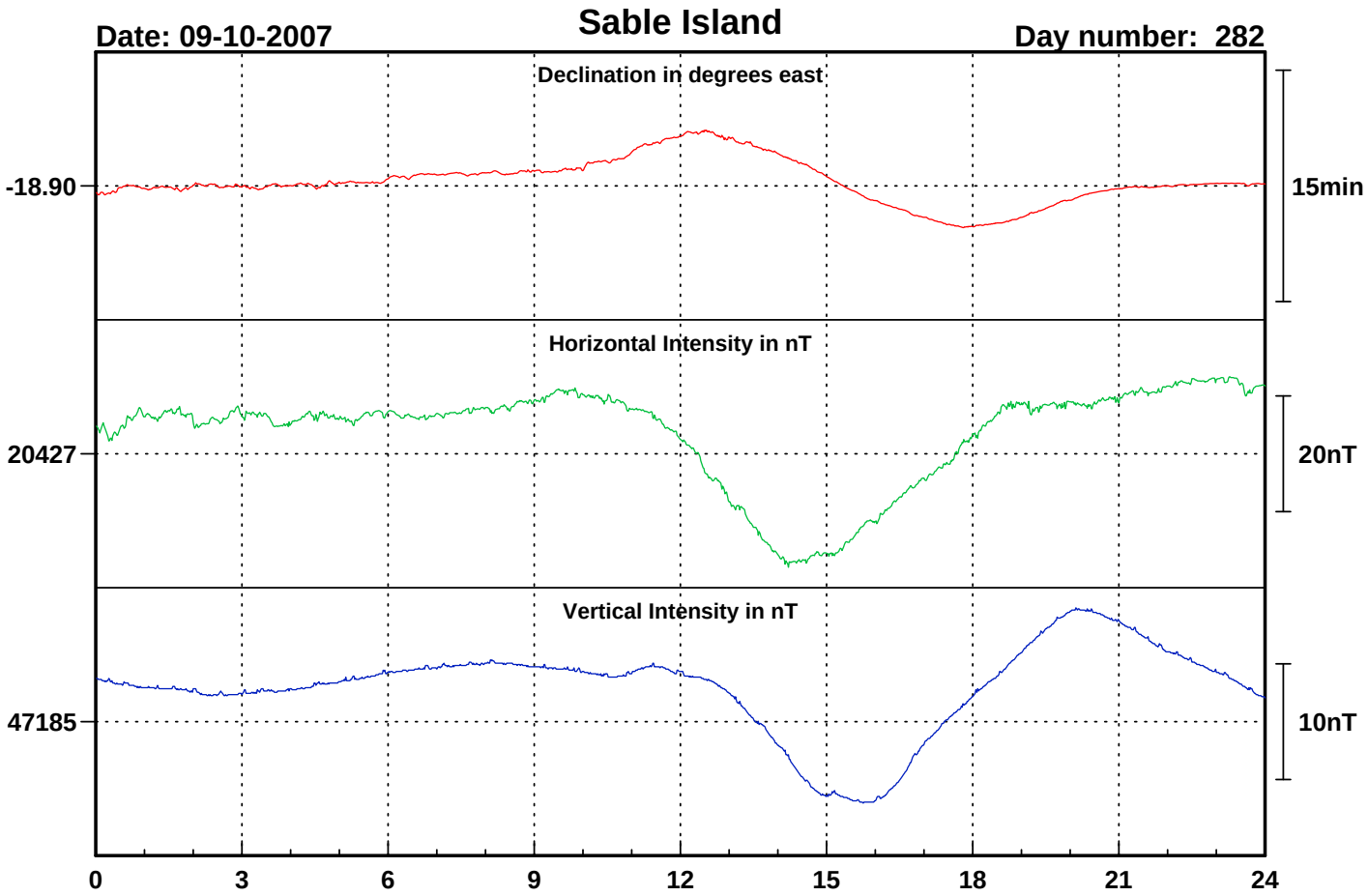
Hour (UT)


Sable Island
Date: 09-10-2007
Day number: 282
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
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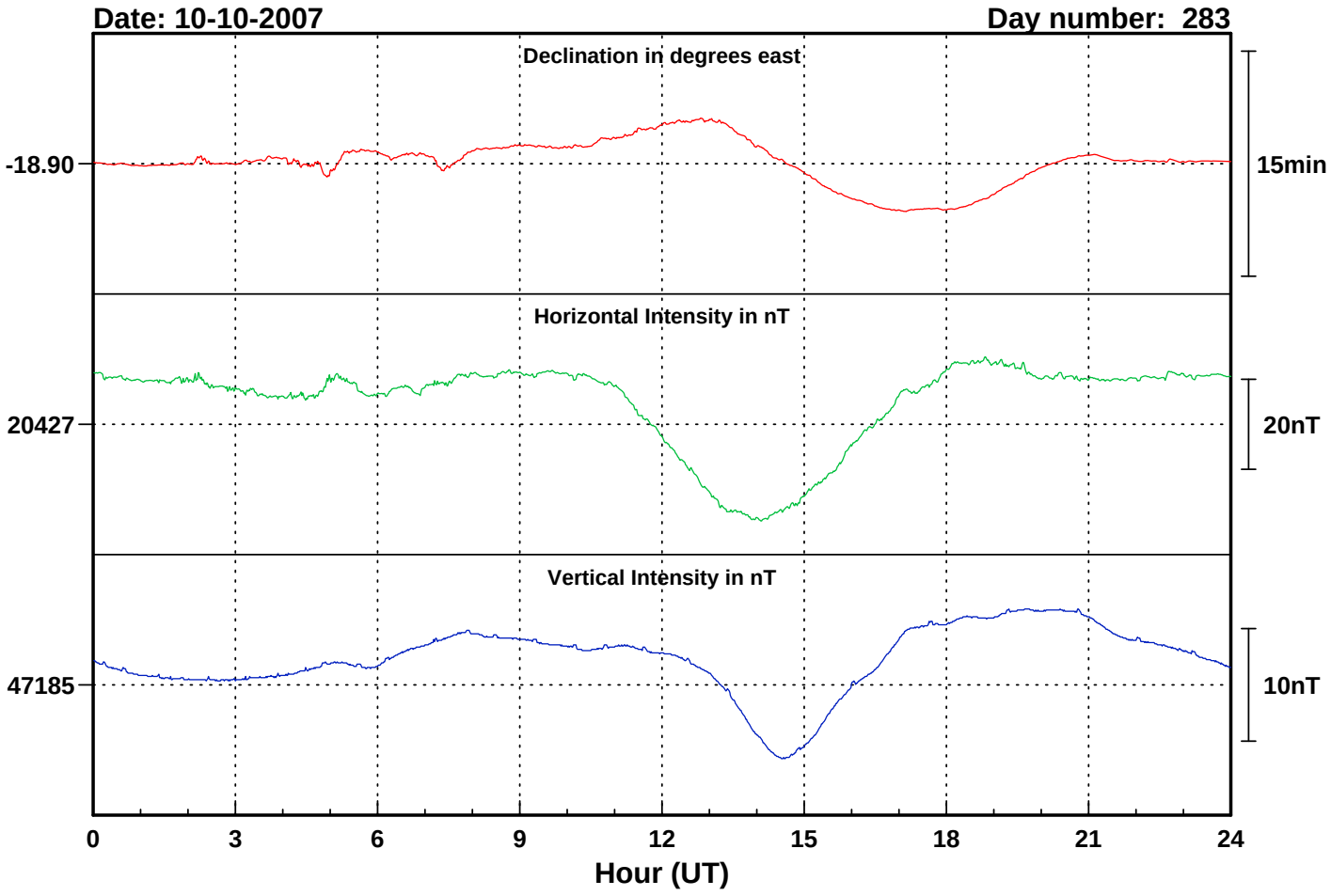
Date: 10-10-2007
Day number: 283
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
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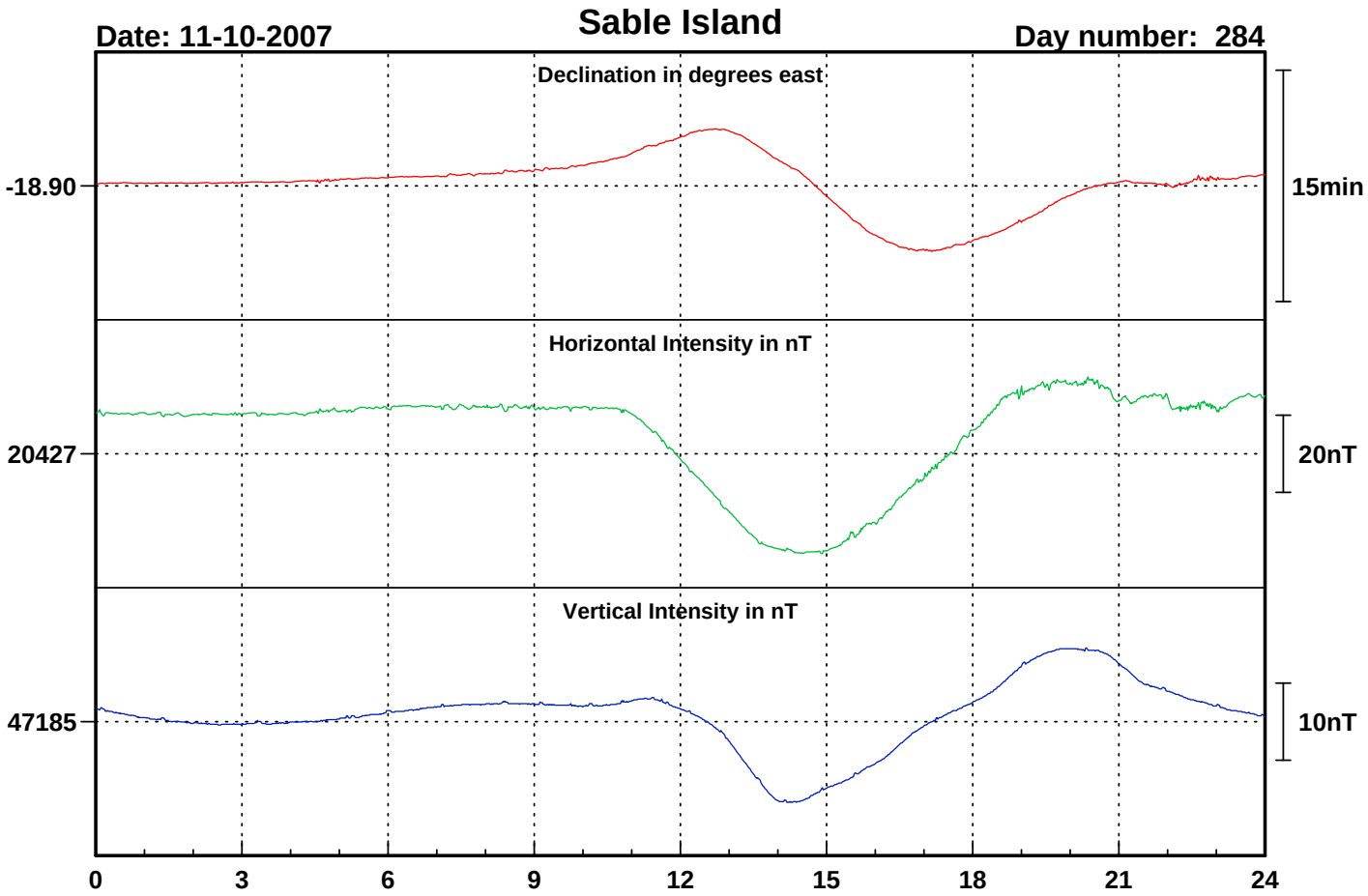
Hour (UT)


Sable Island
Date: 11-10-2007
Day number: 284
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
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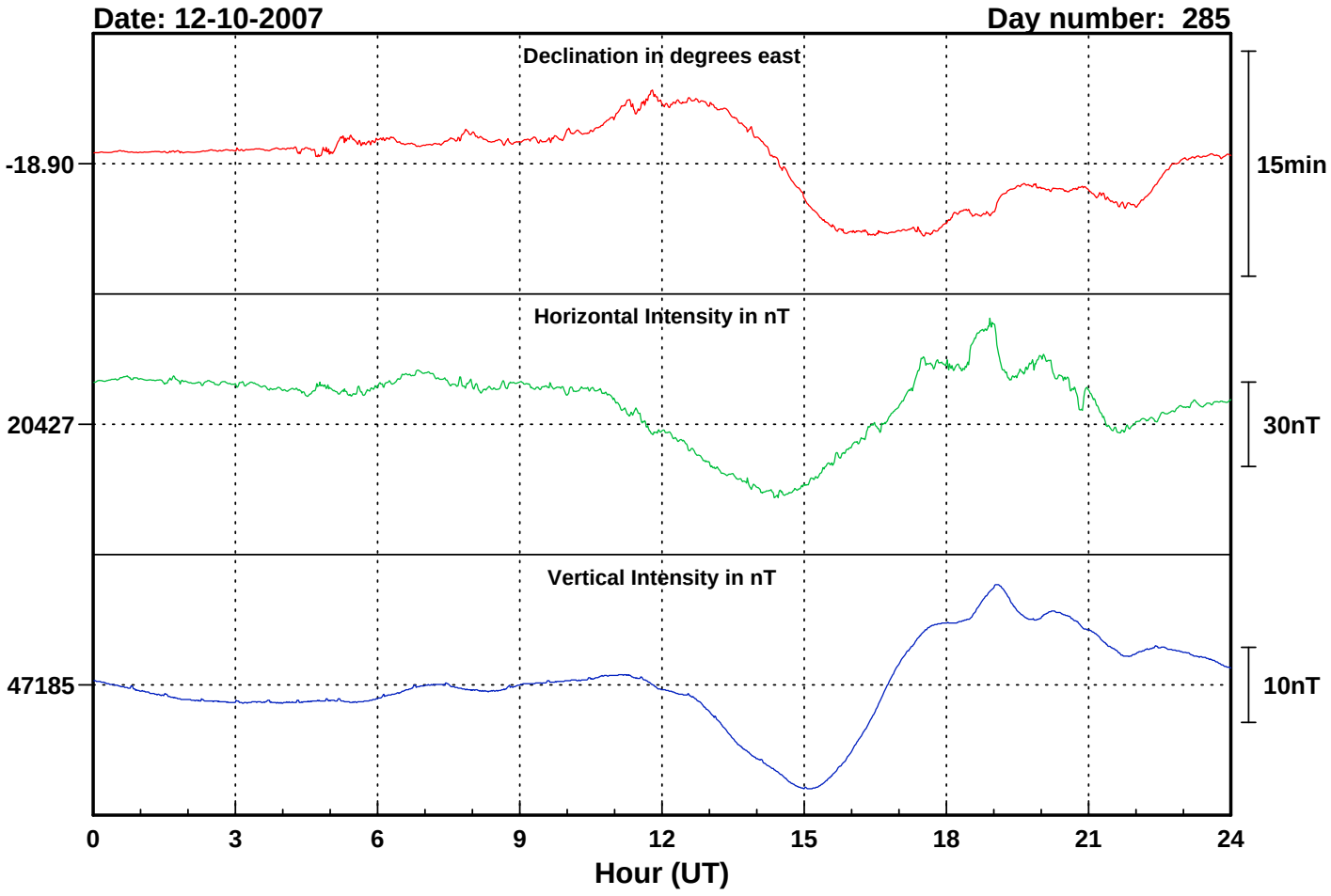
Date: 12-10-2007
Day number: 285
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
10nT
0
3
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9
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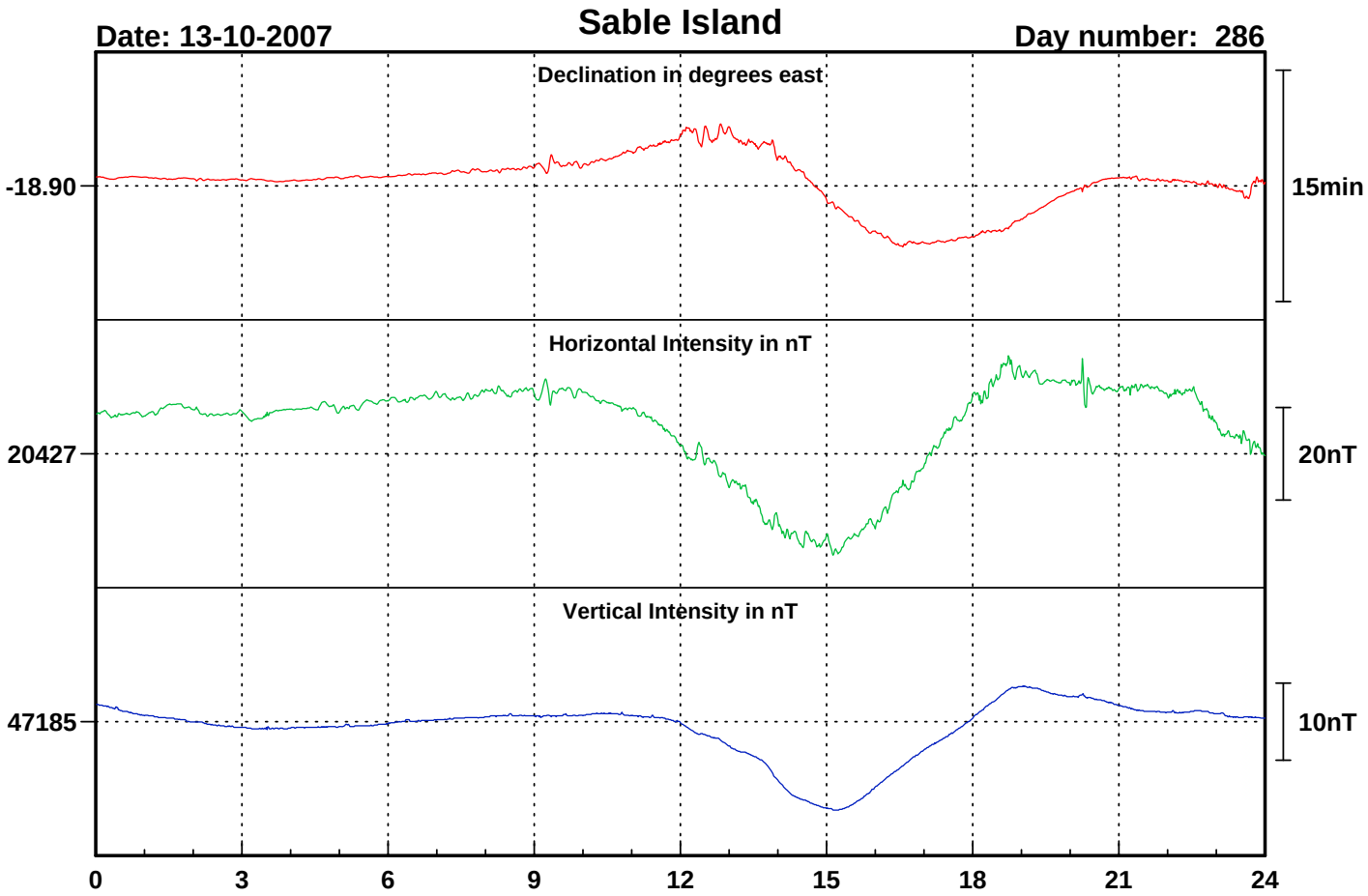
Hour (UT)


Sable Island
Date: 13-10-2007
Day number: 286
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
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18
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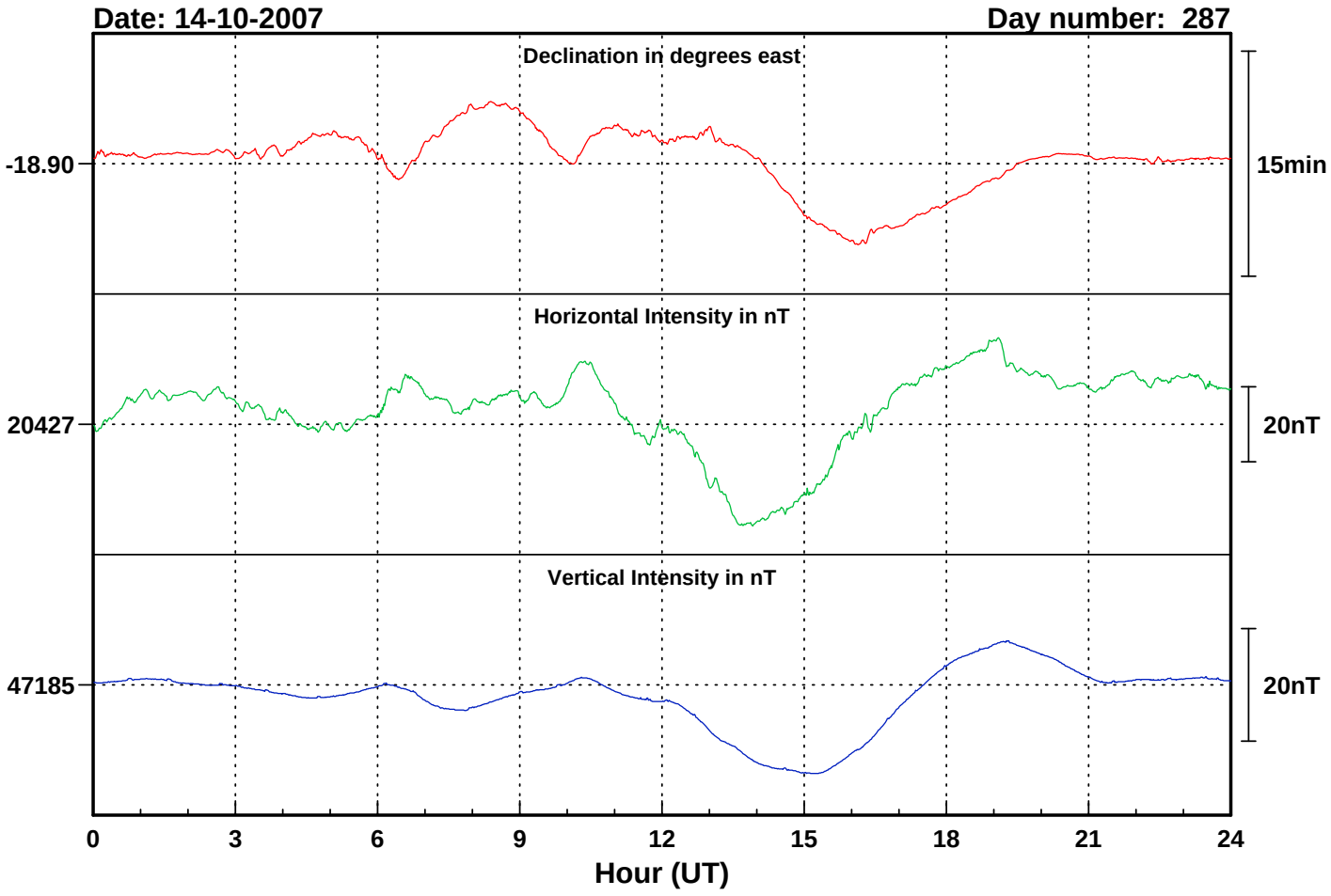
24


Date: 14-10-2007
Day number: 287
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
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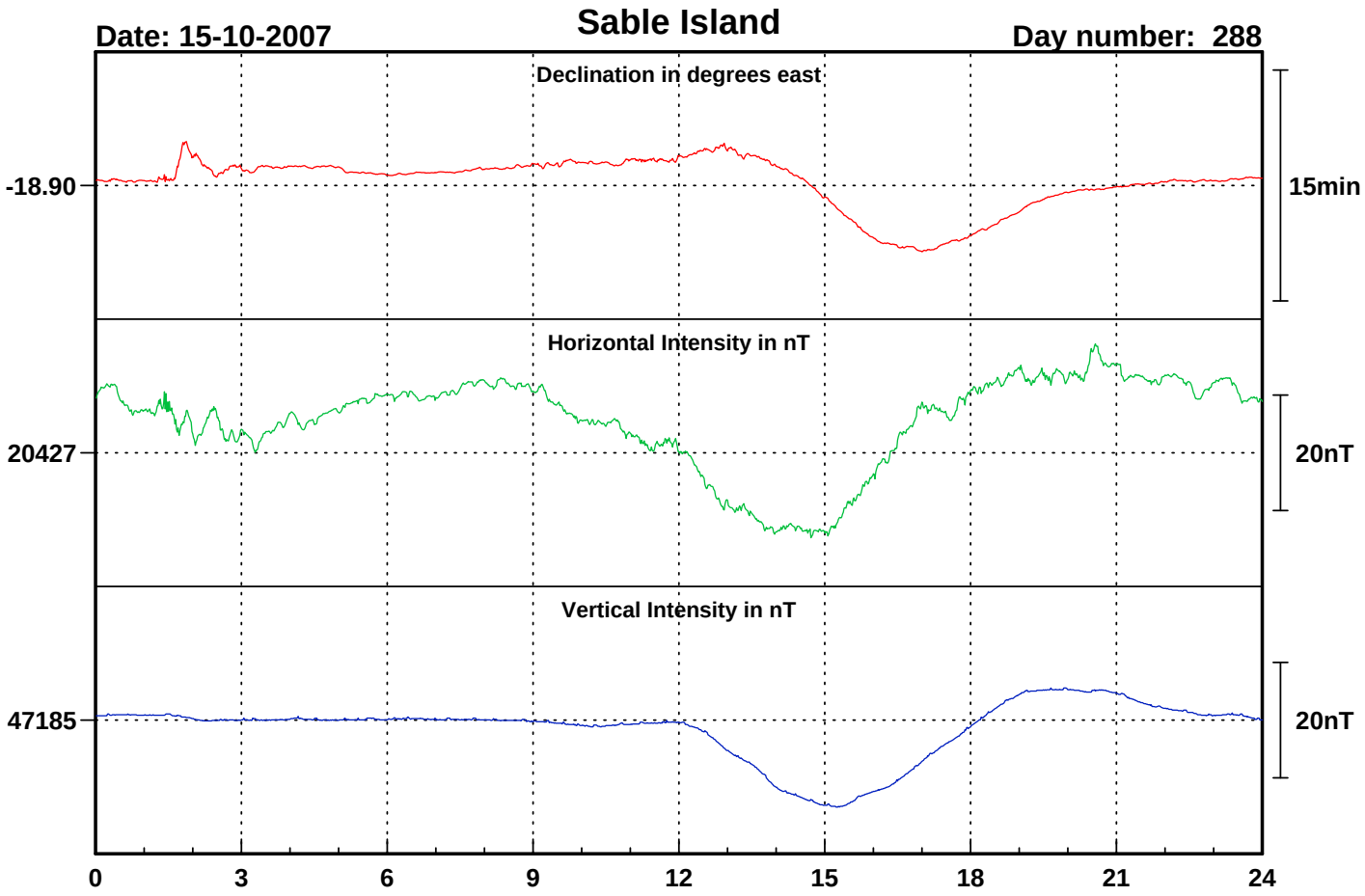
24
Hour (UT)


Sable Island
Date: 15-10-2007
Day number: 288
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
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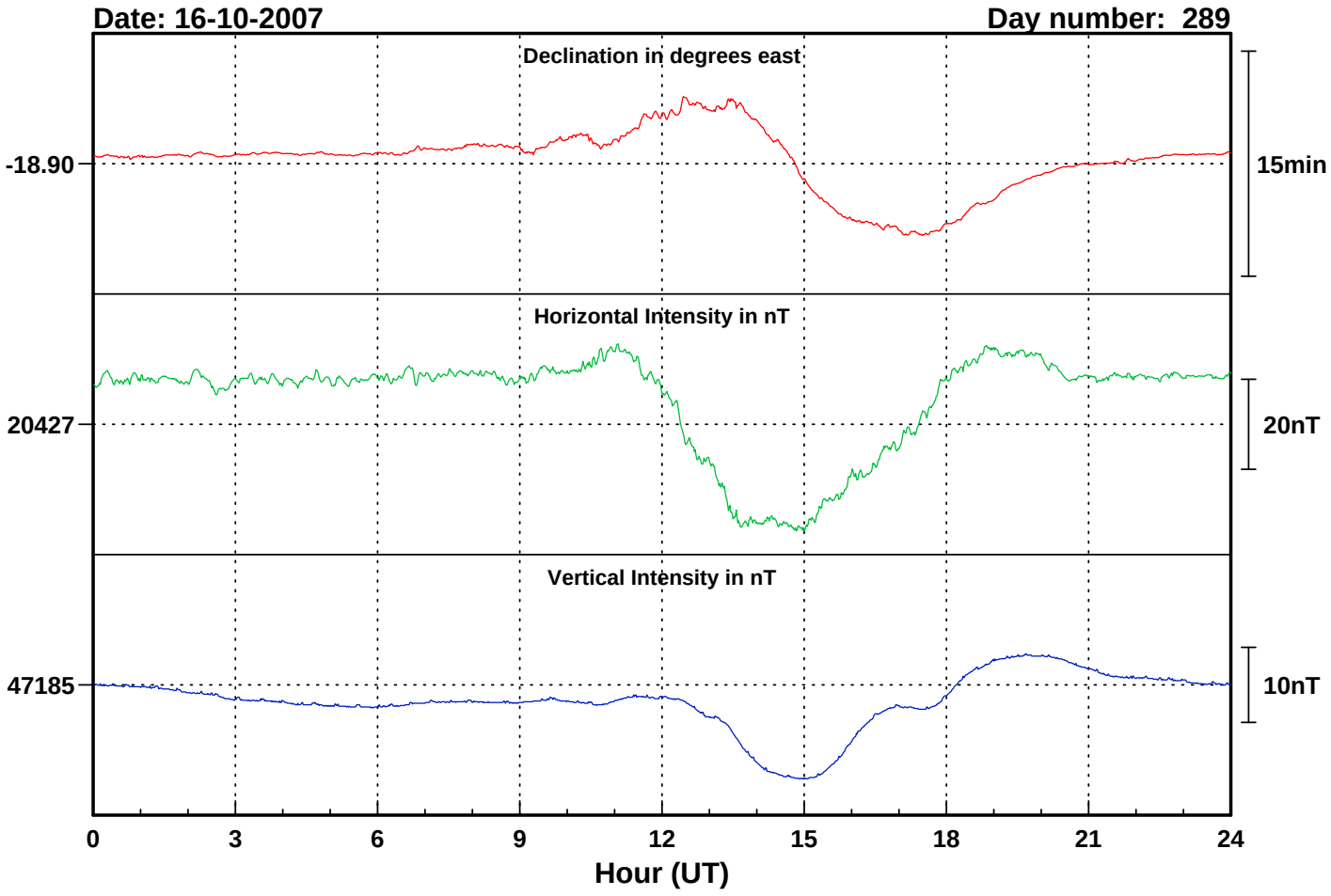
24


Date: 16-10-2007
Day number: 289
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
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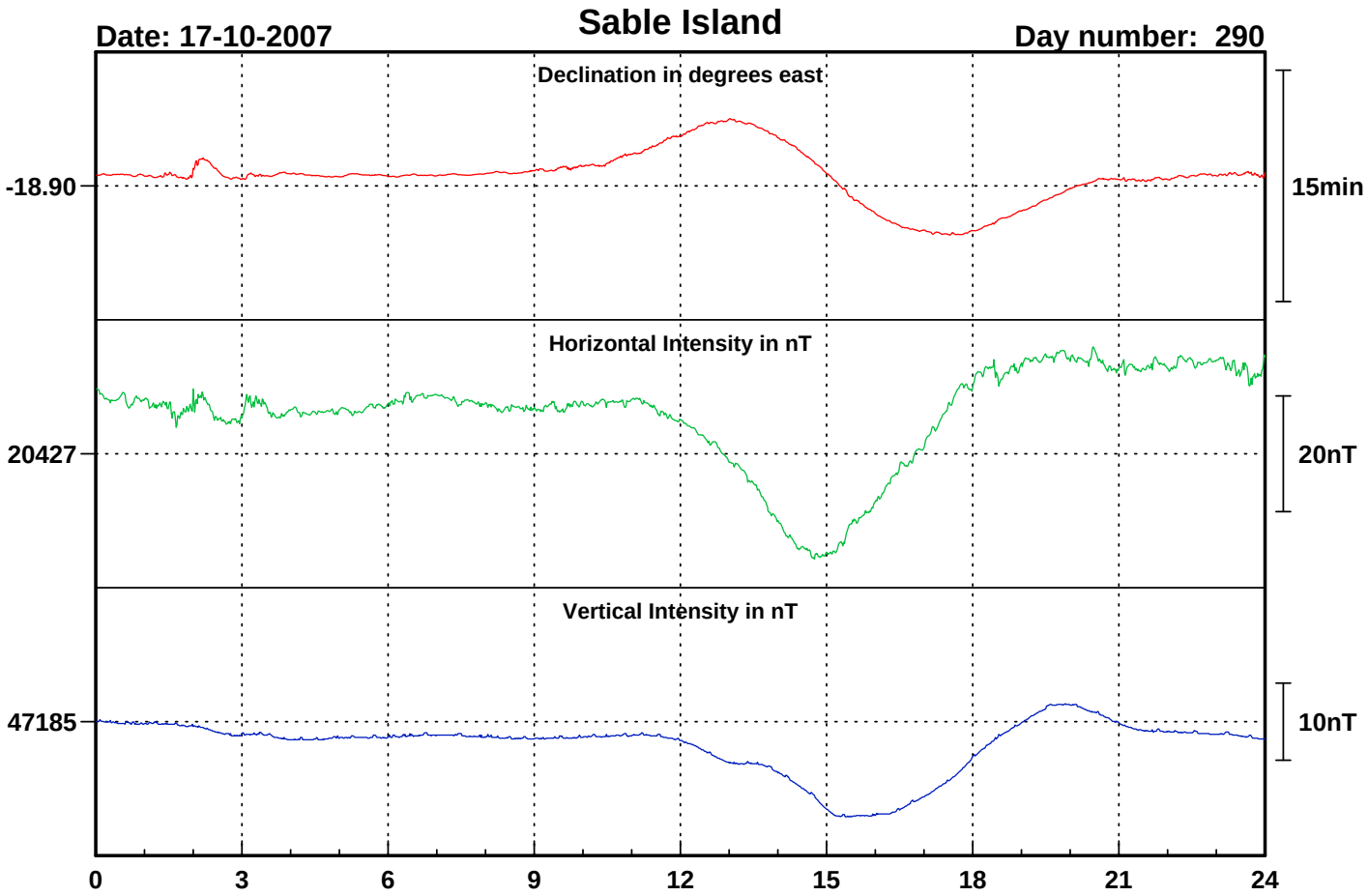
18
21
24
Hour (UT)


Sable Island
Date: 17-10-2007
Day number: 290
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
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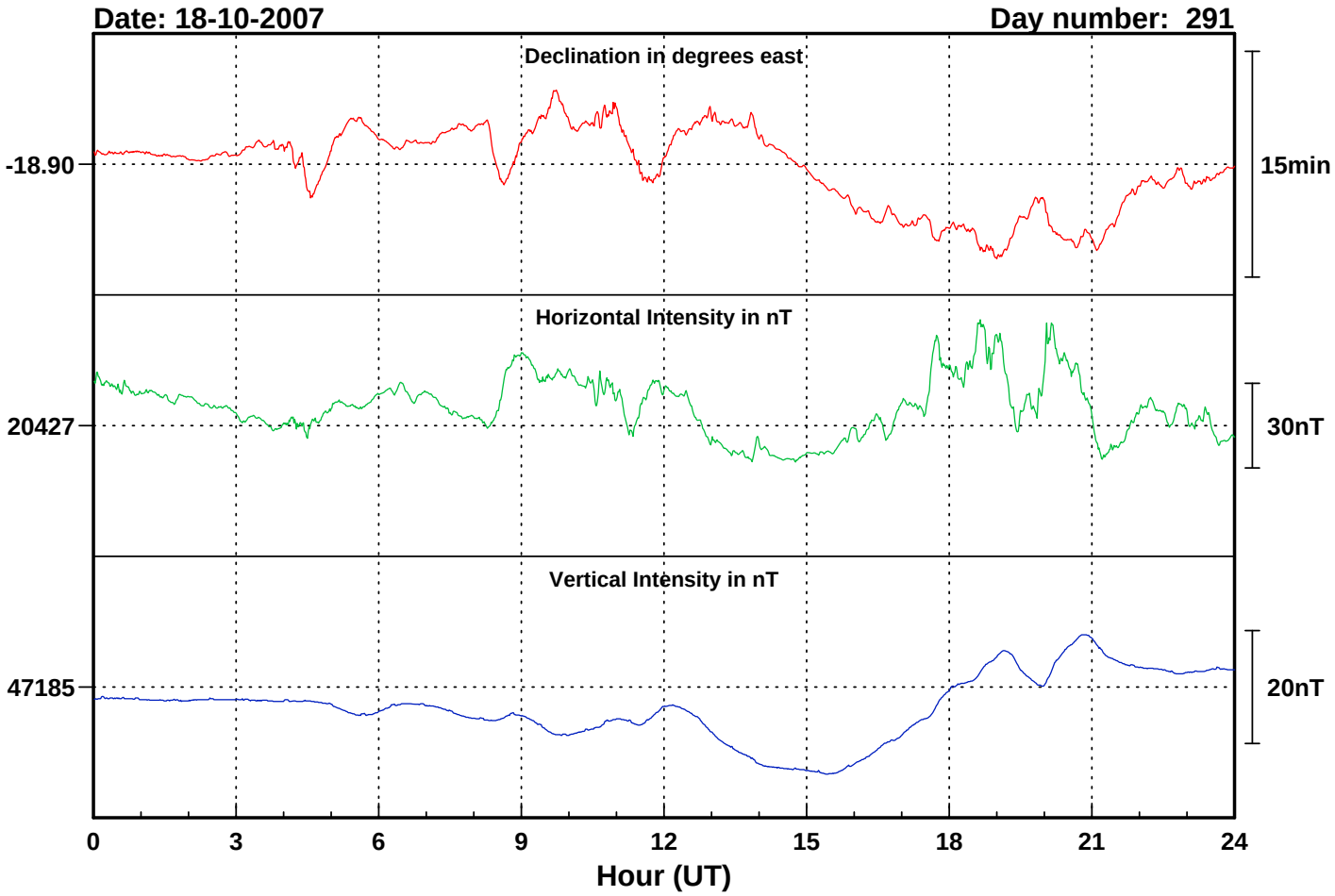
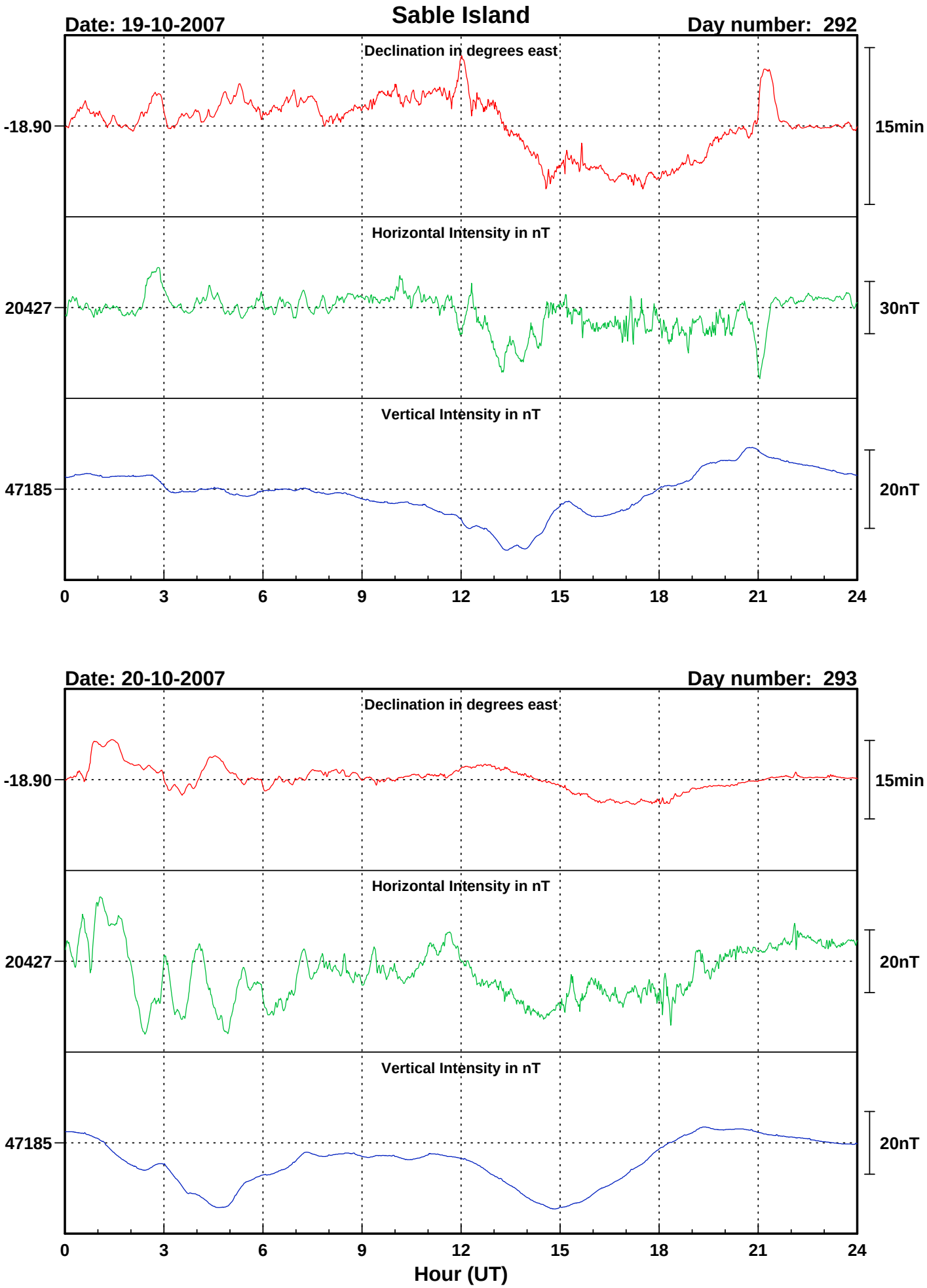

Date: 18-10-2007
Day number: 291
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Sable Island
Date: 19-10-2007
Day number: 292
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Date: 20-10-2007
Day number: 293
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
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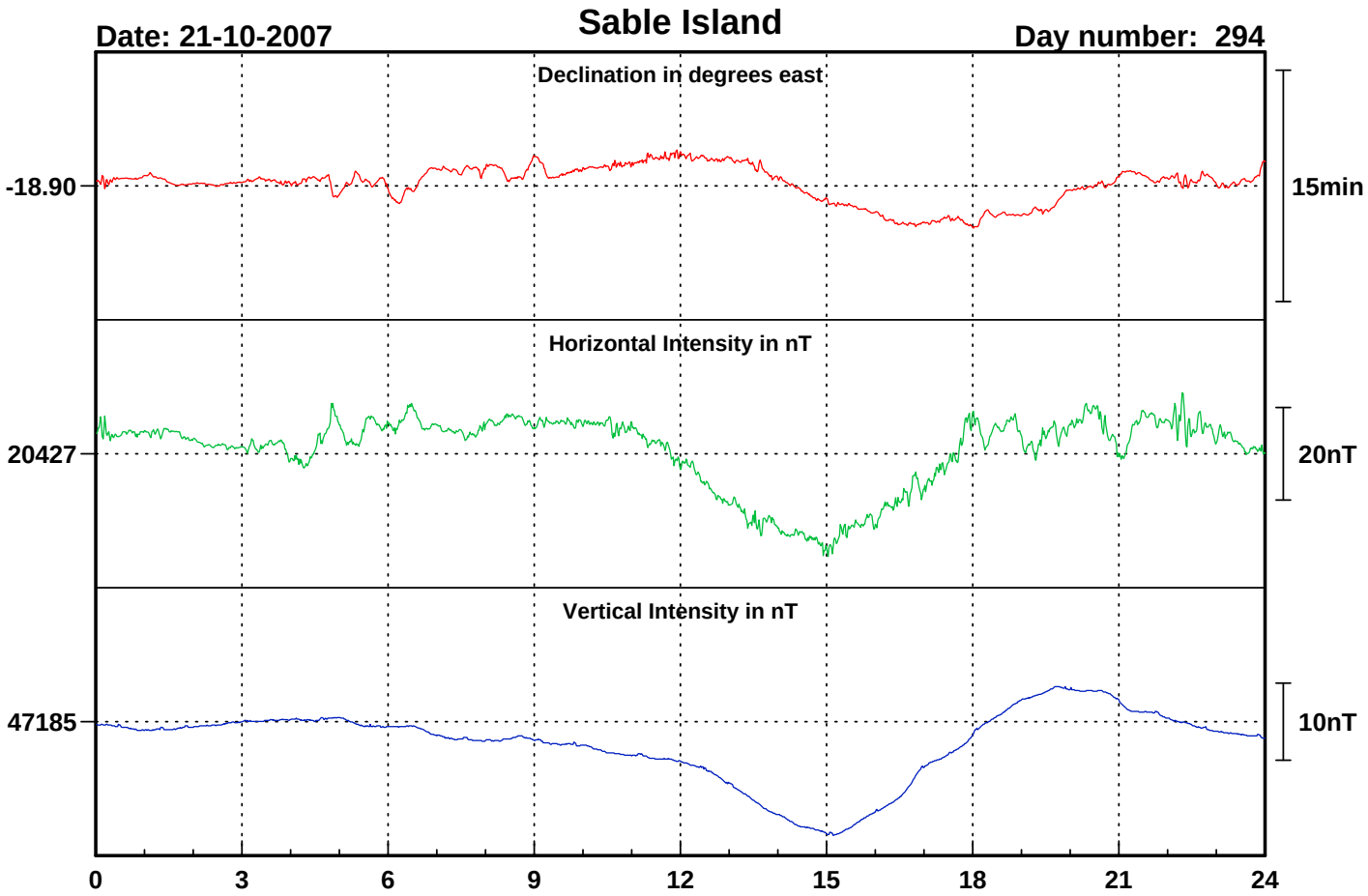
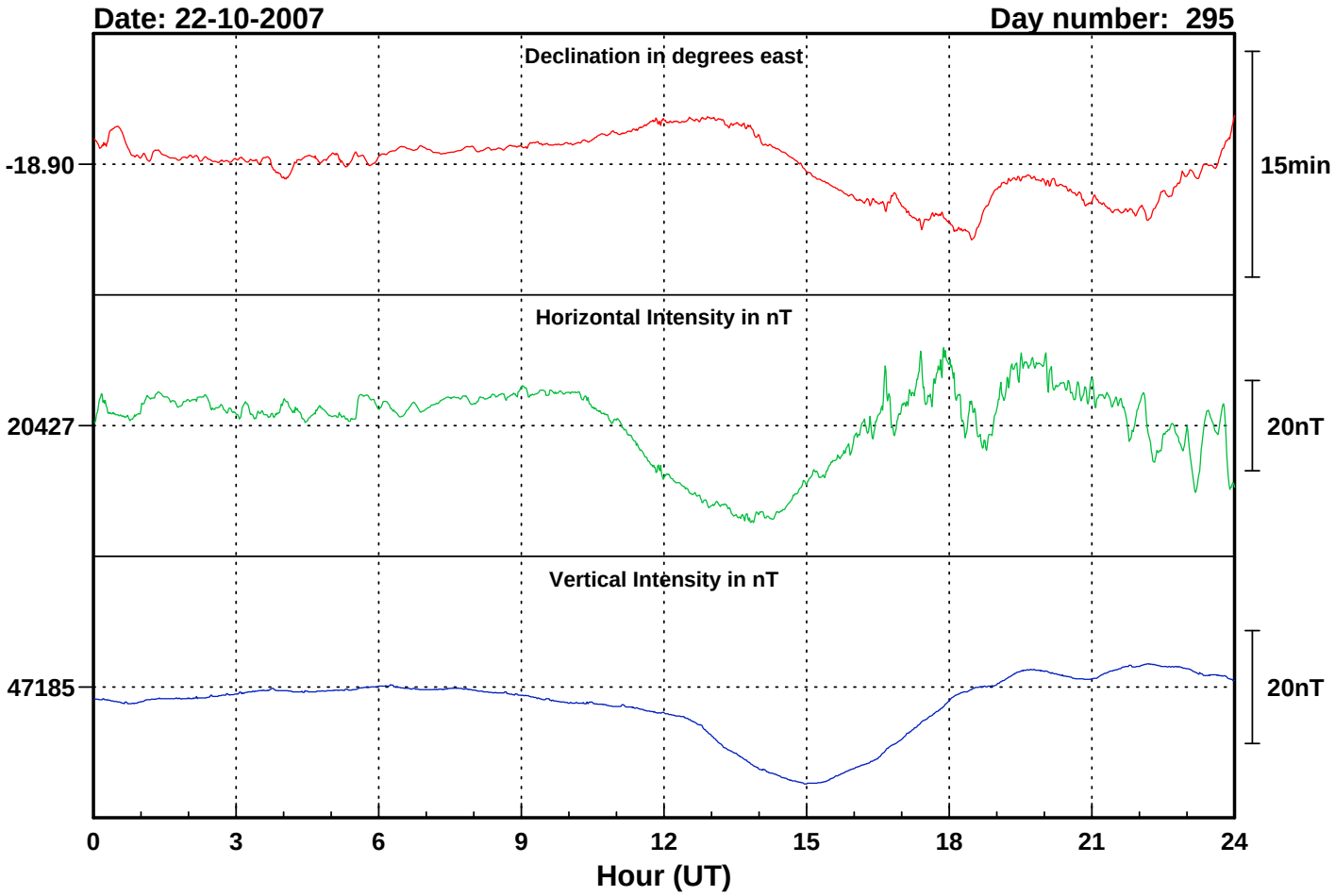
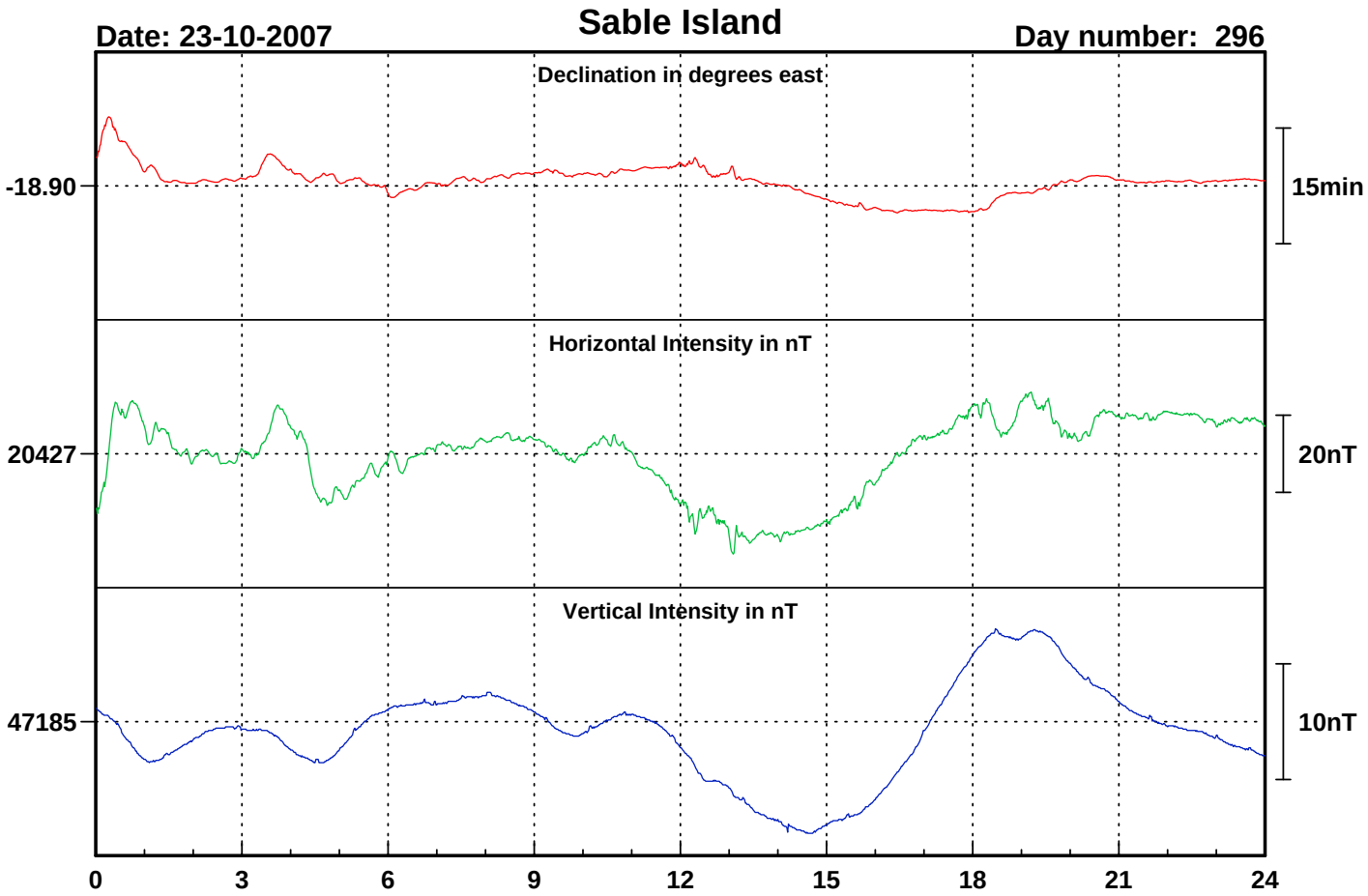
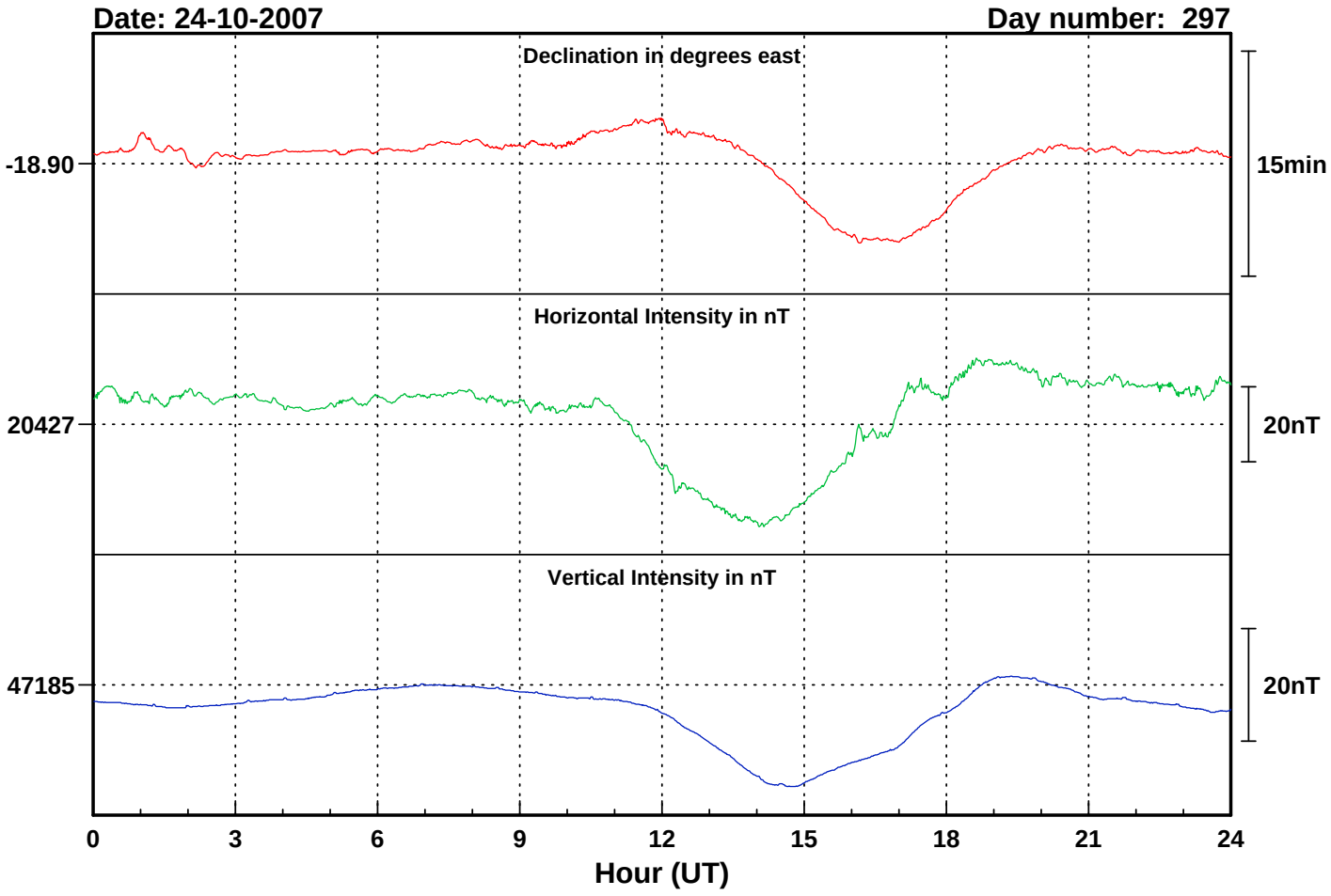
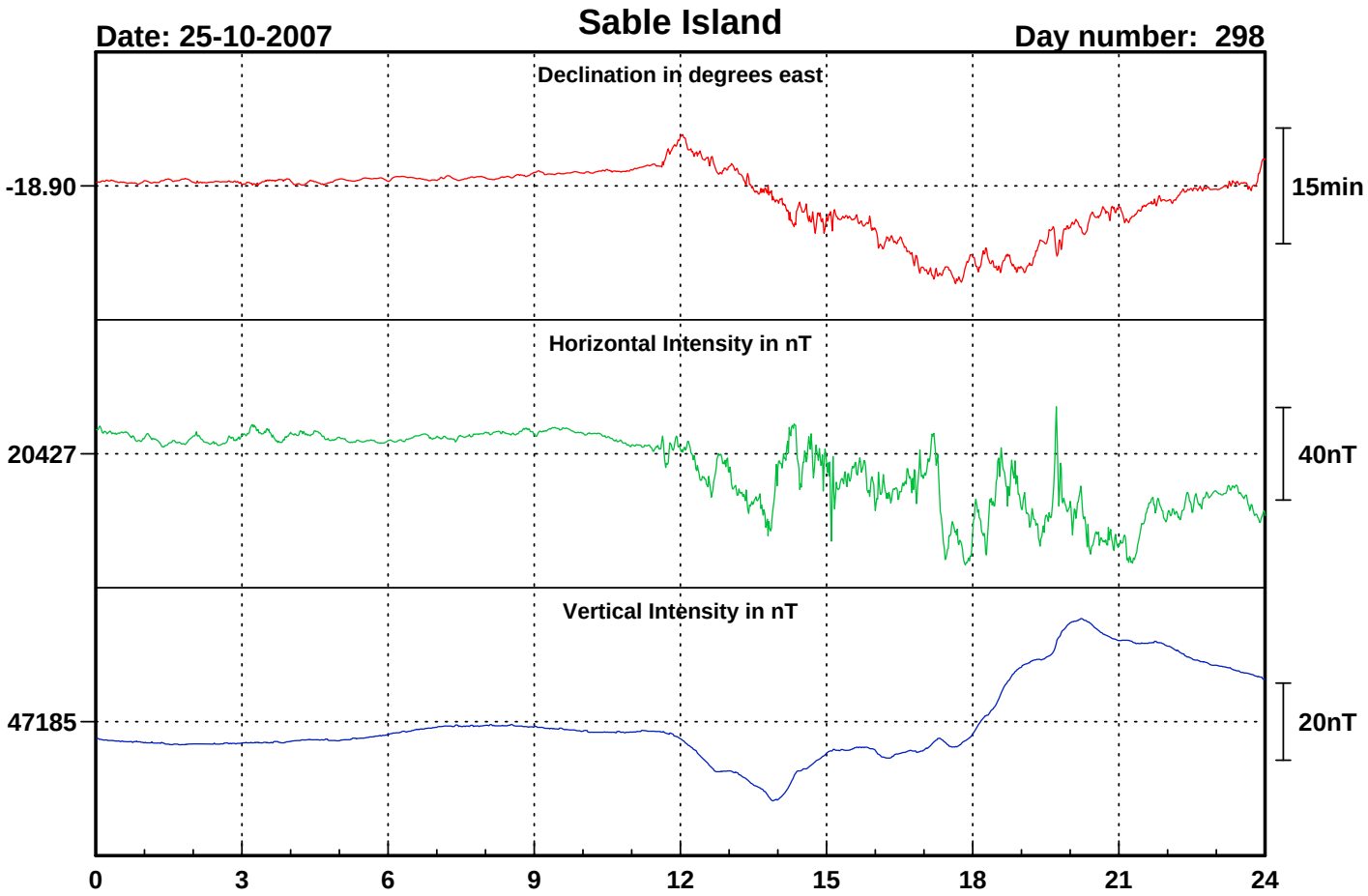
18
21
24
Hour (UT)

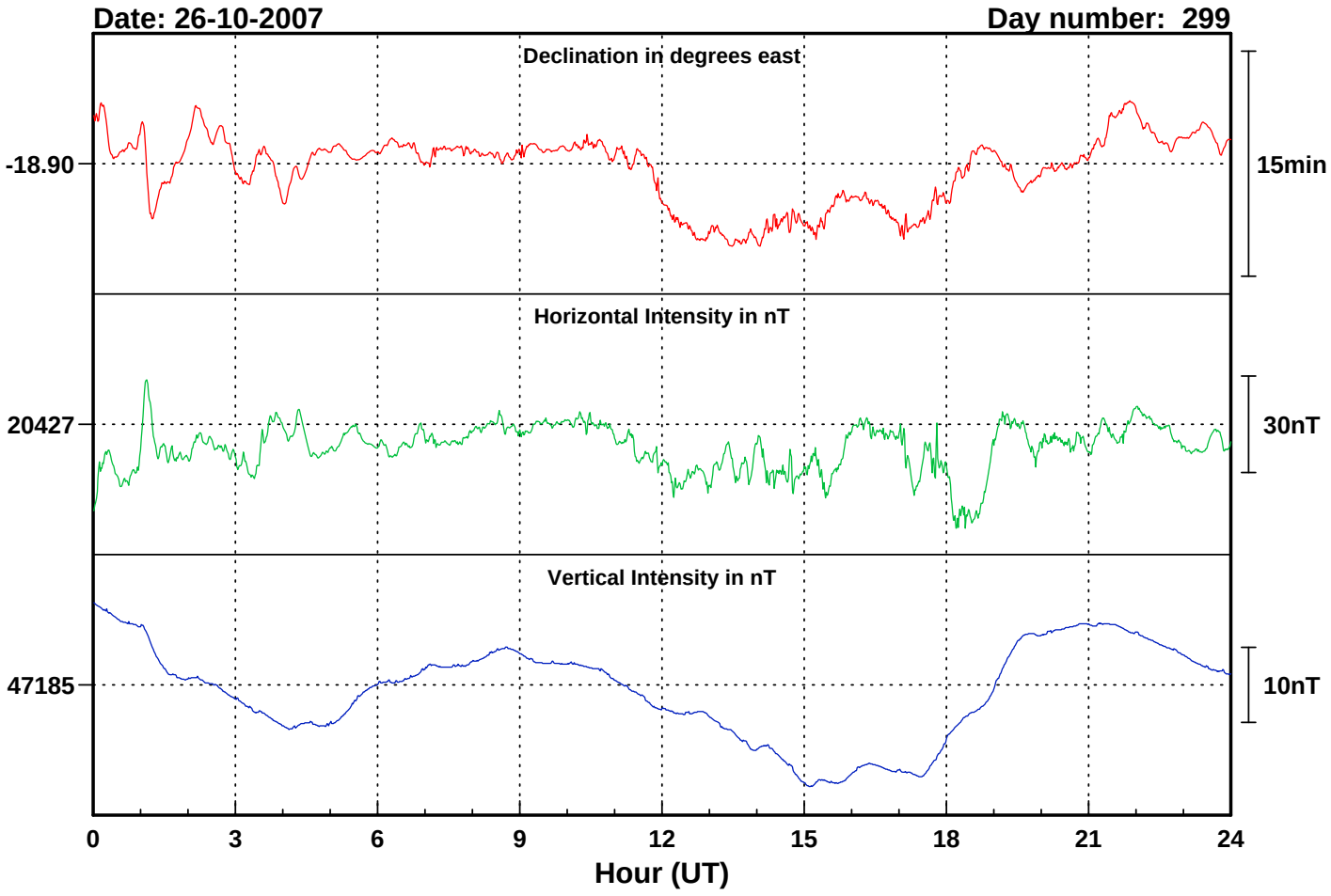

Sable Island
Date: 21-10-2007
Day number: 294
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
15
18
21
24

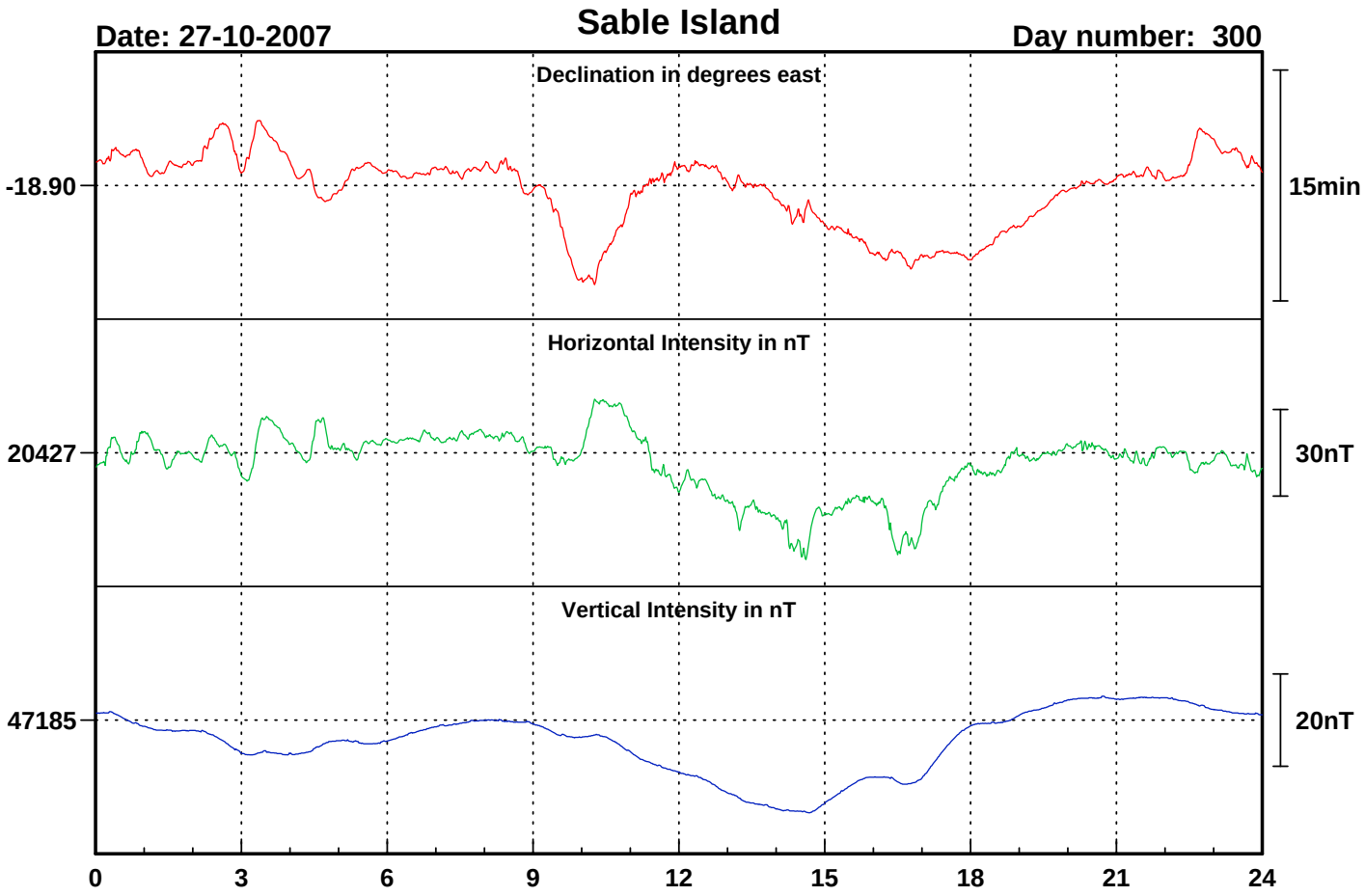

Date: 22-10-2007
Day number: 295
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

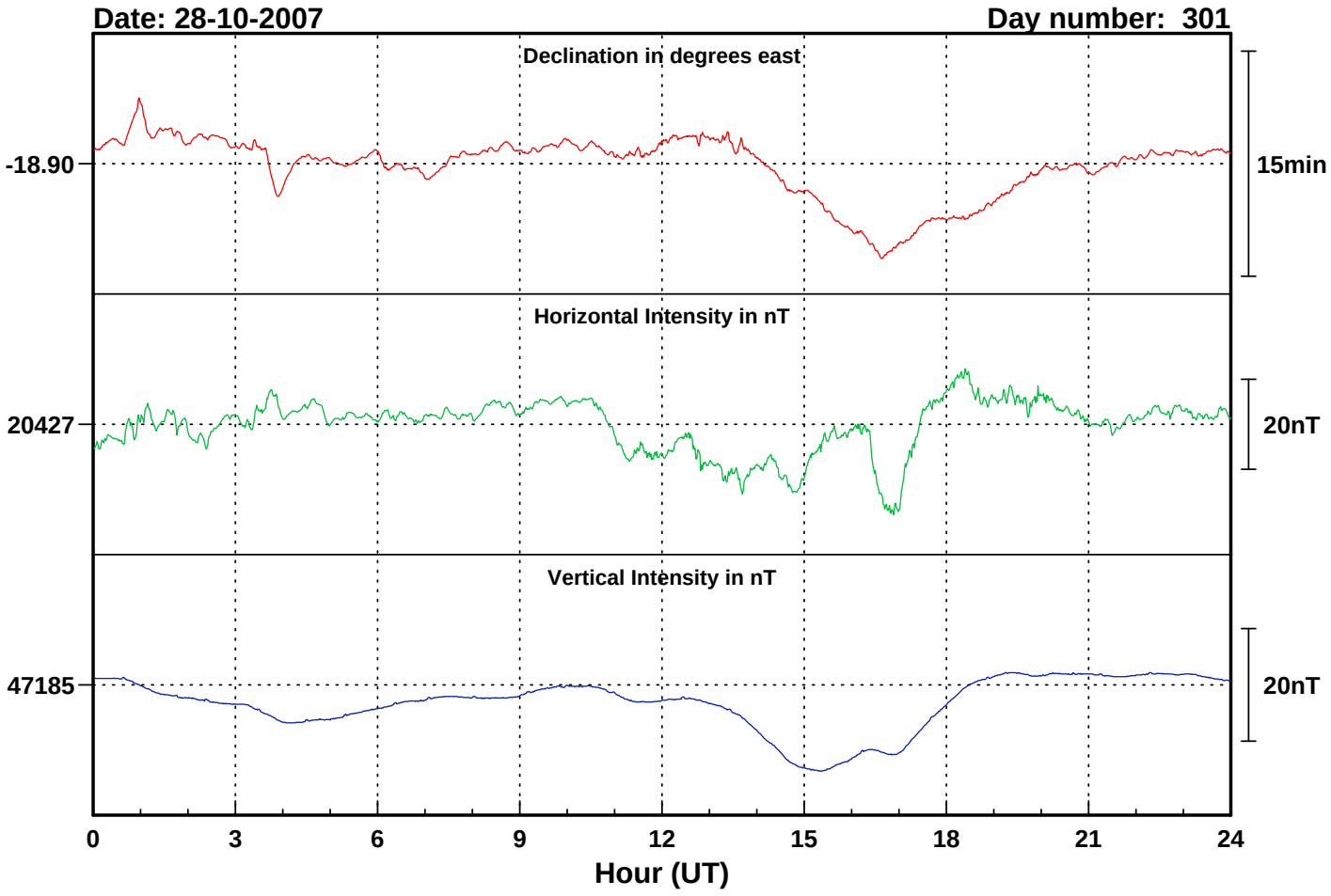

Sable Island
Date: 23-10-2007
Day number: 296
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
15
18
21
24

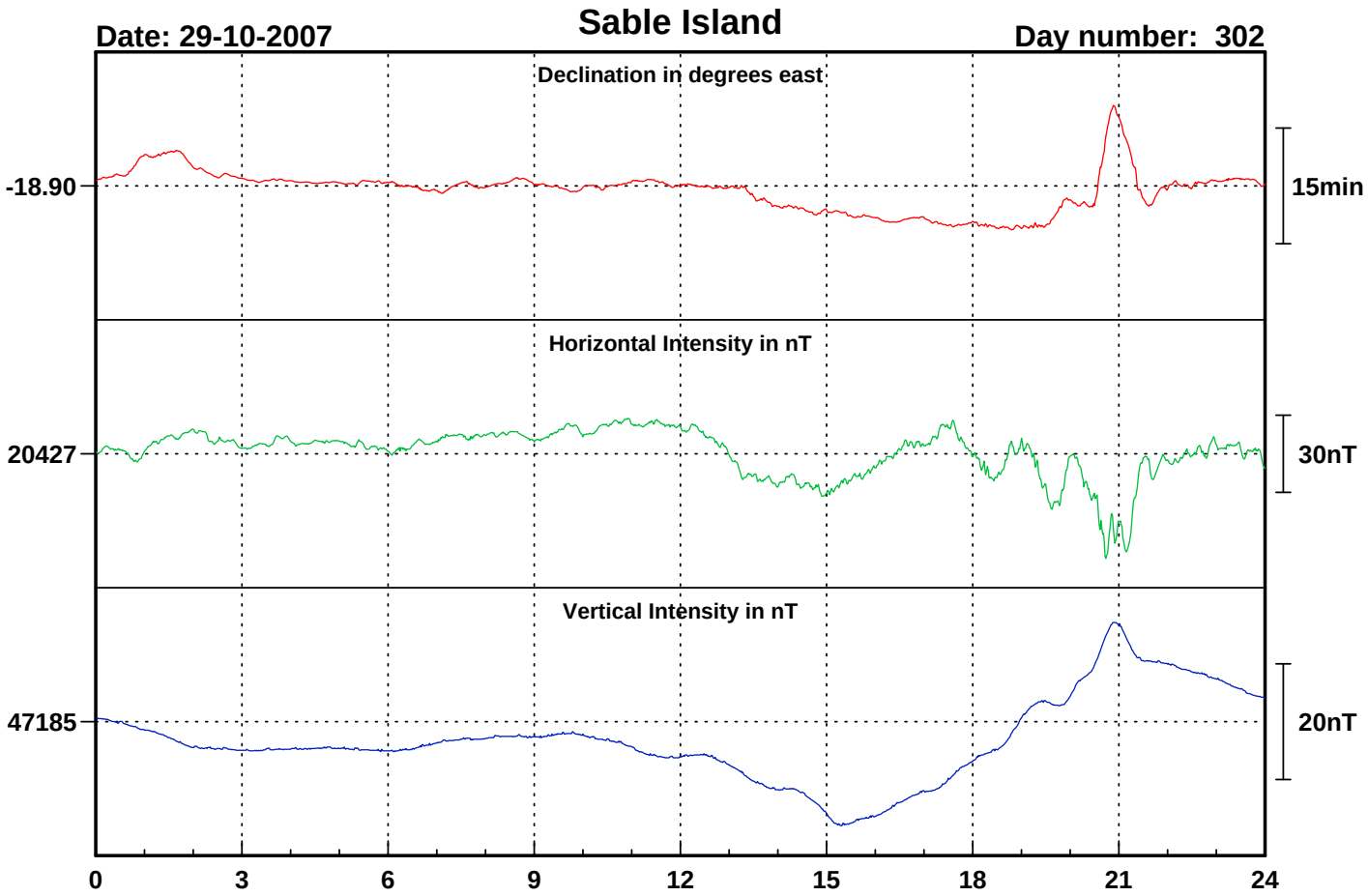

Date: 24-10-2007
Day number: 297
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

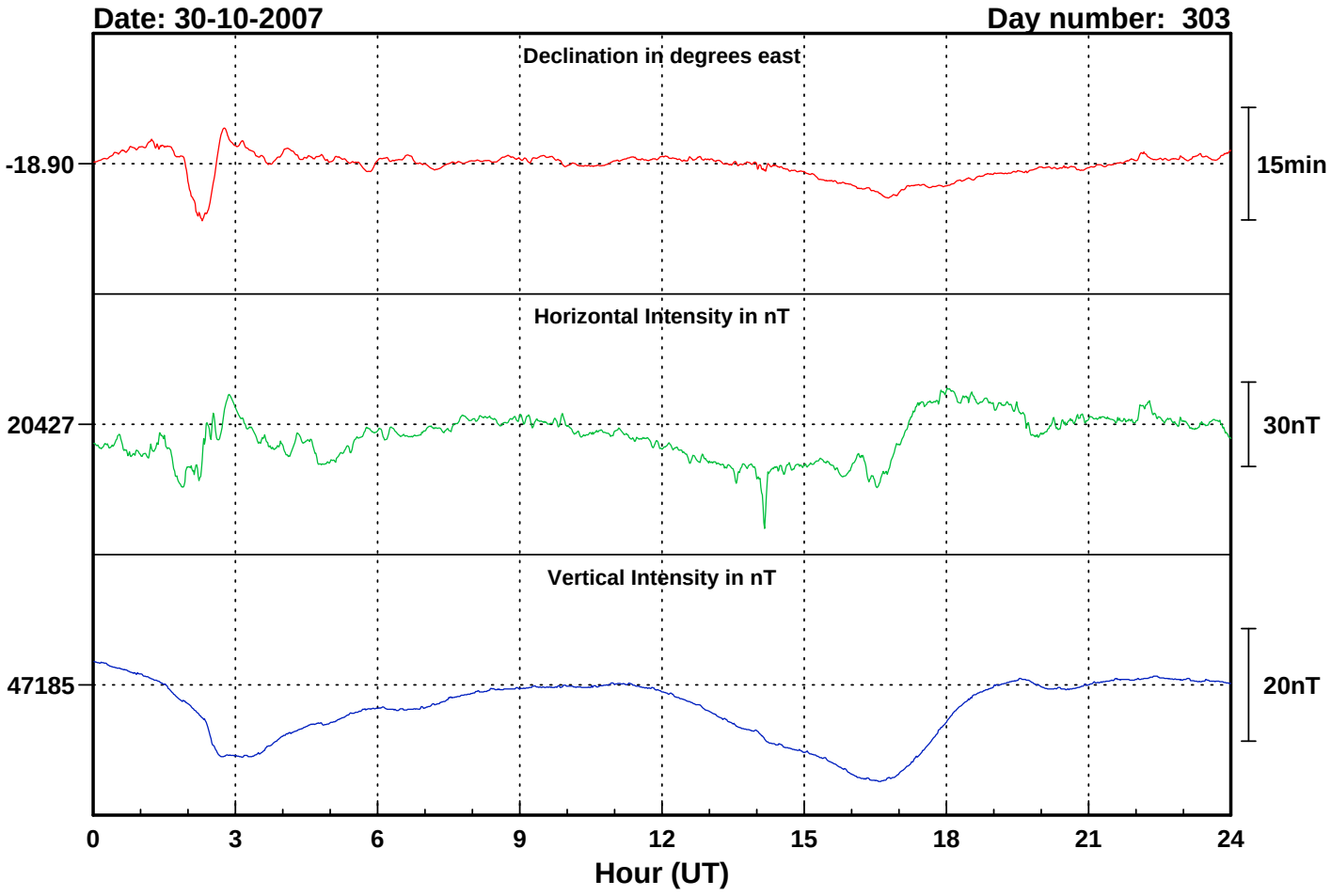

Sable Island
Date: 25-10-2007
Day number: 298
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
40nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24

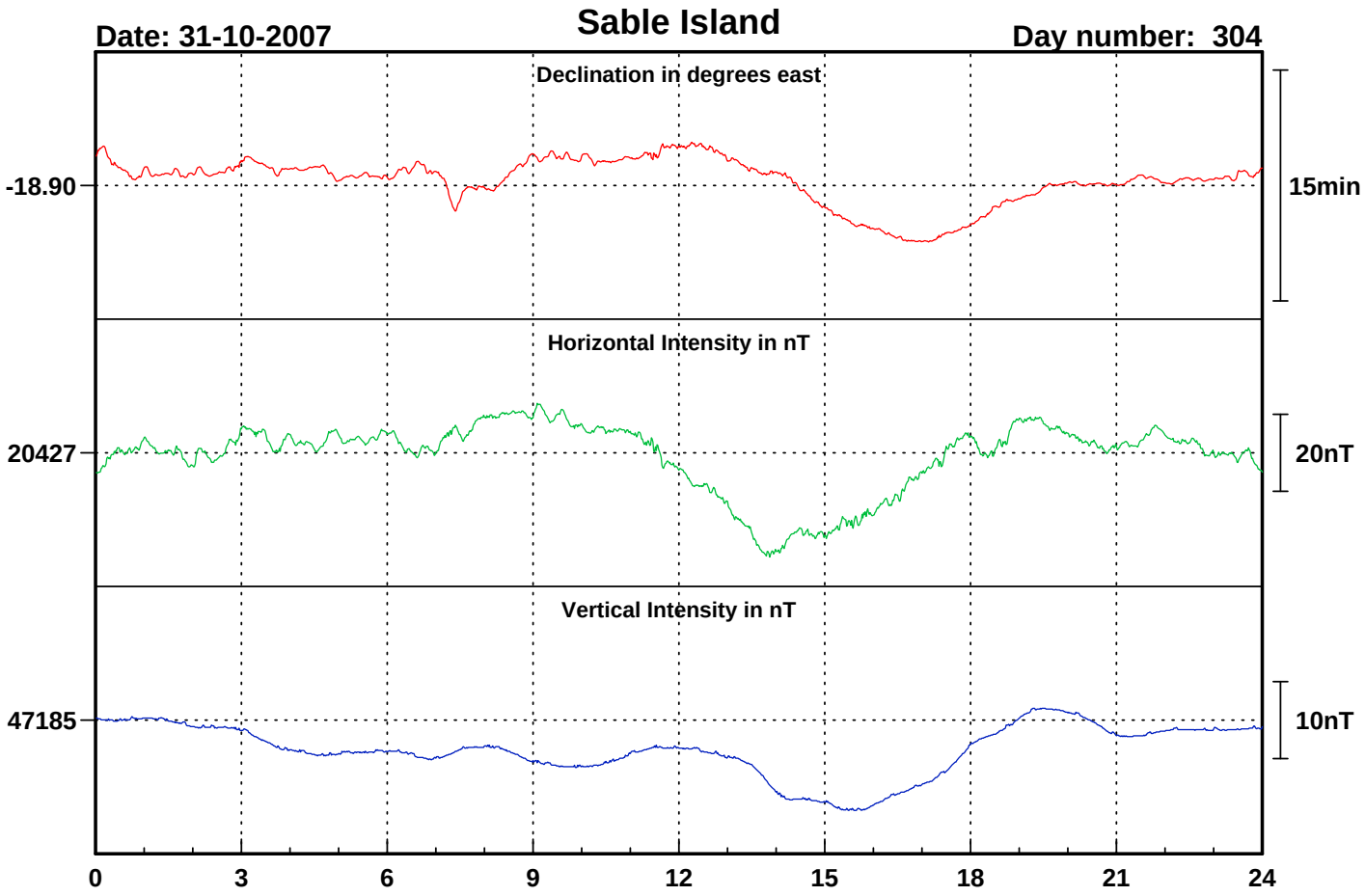

Date: 26-10-2007
Day number: 299
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Sable Island
Date: 27-10-2007
Day number: 300
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24

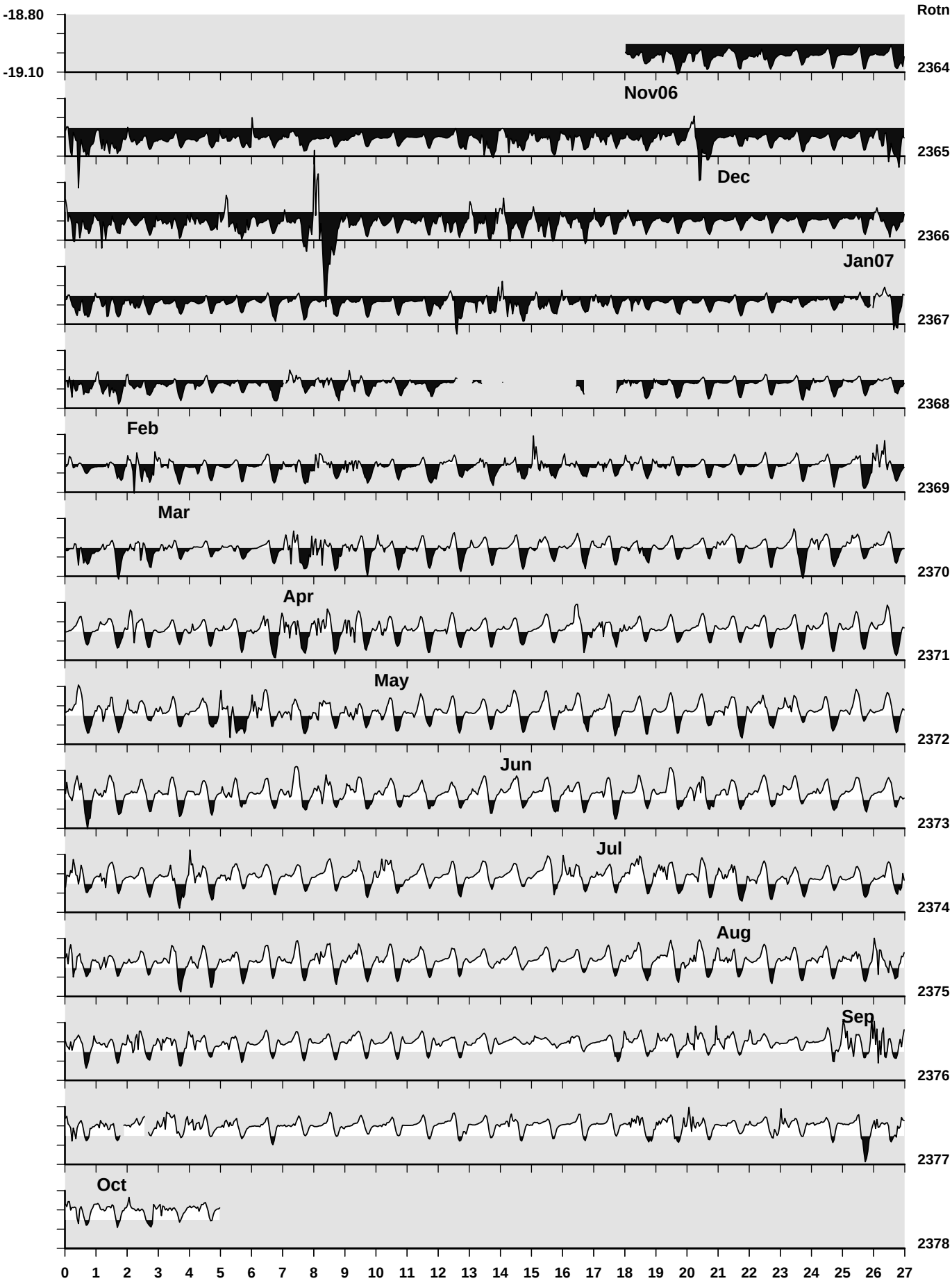

Date: 28-10-2007
Day number: 301
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Sable Island
Date: 29-10-2007
Day number: 302
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24


Date: 30-10-2007
Day number: 303
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
30nT
Vertical Intensity in nT
47185
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

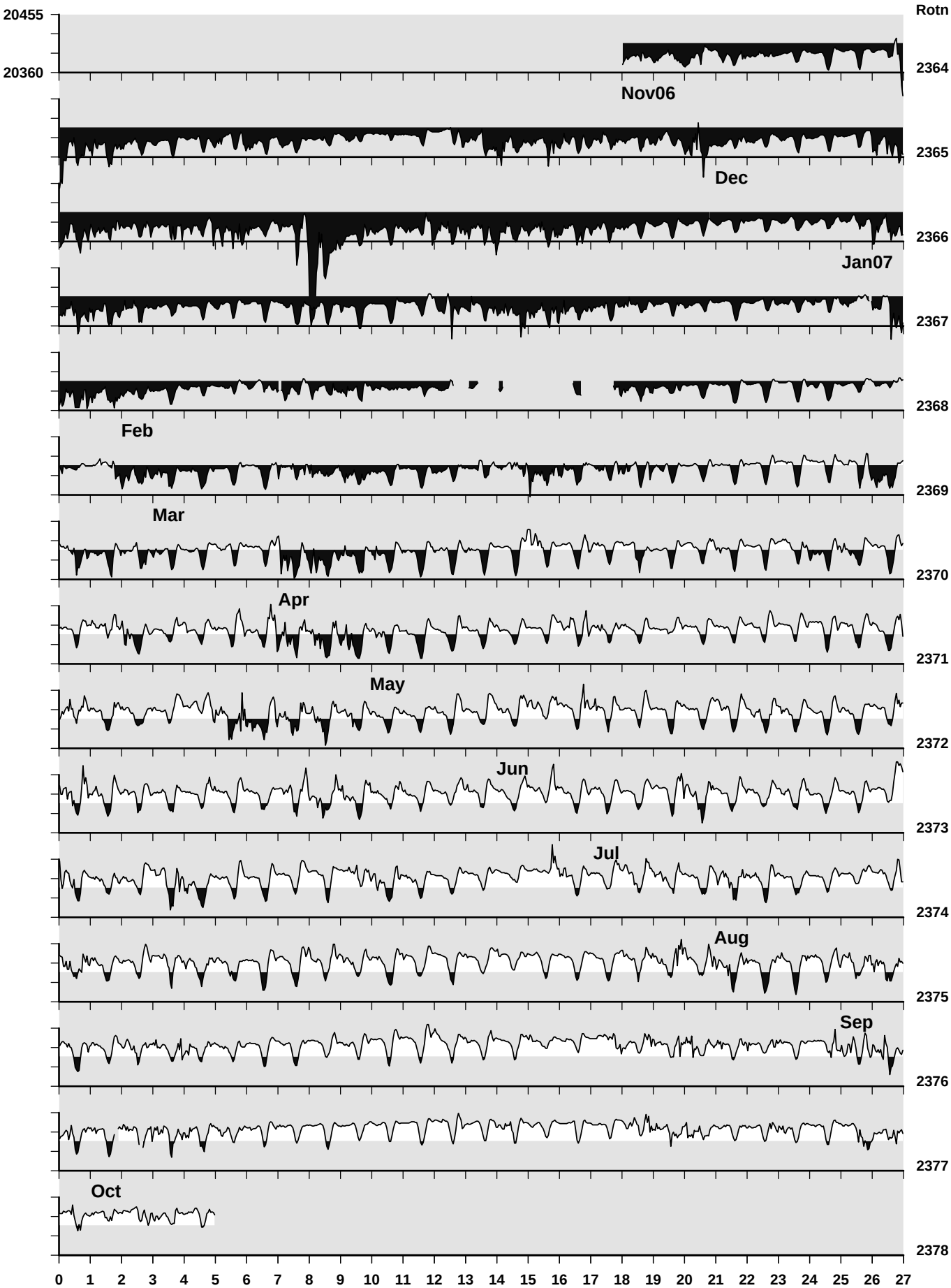

Sable Island
Date: 31-10-2007
Day number: 304
Declination in degrees east
-18.90
15min
Horizontal Intensity in nT
20427
20nT
Vertical Intensity in nT
47185
10nT
0
3
6
9
12
15
18
21
24

Sable Island Observatory: Declination (degrees)



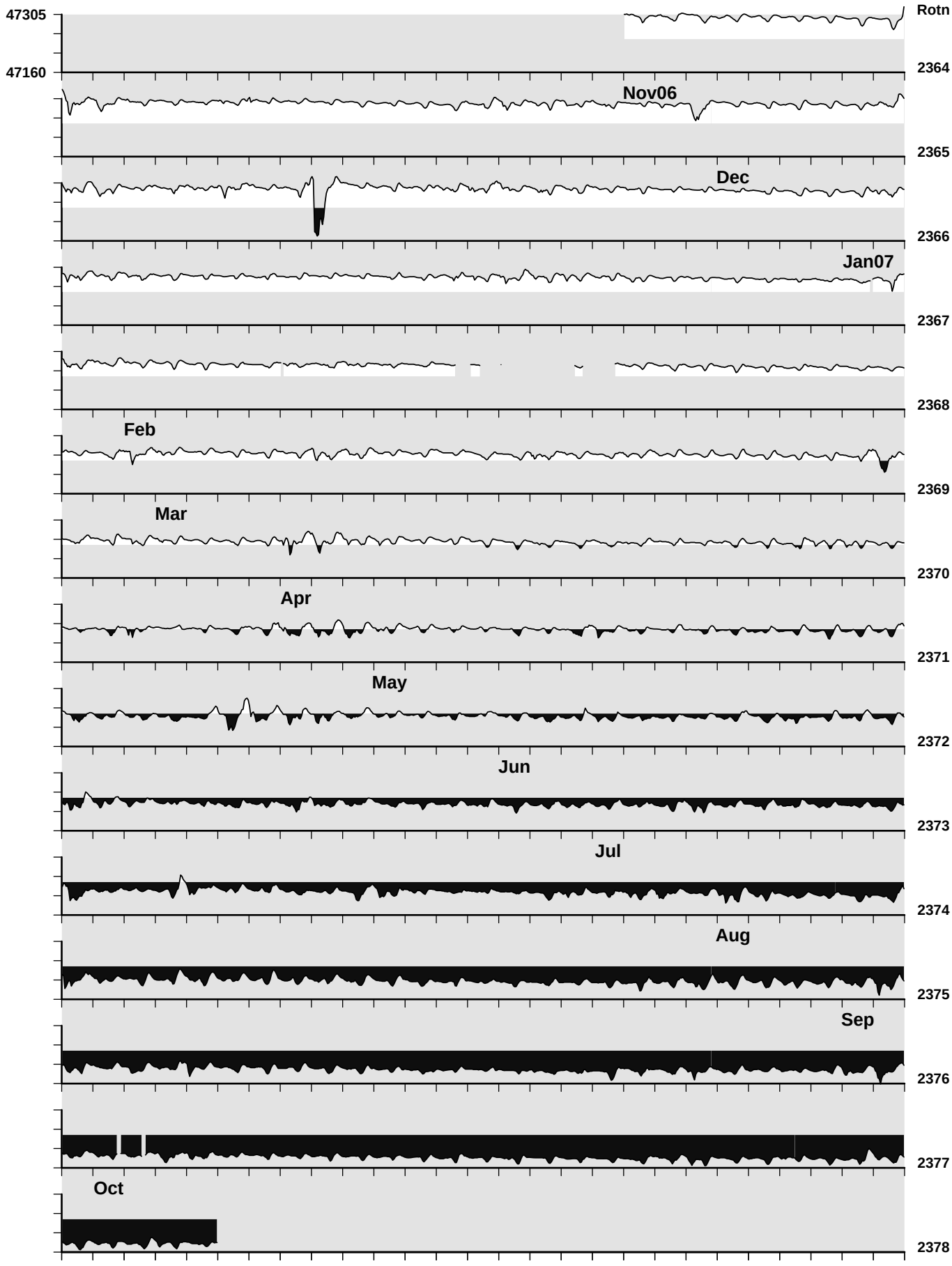
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Sable Island Observatory: Horizontal Intensity (nT)



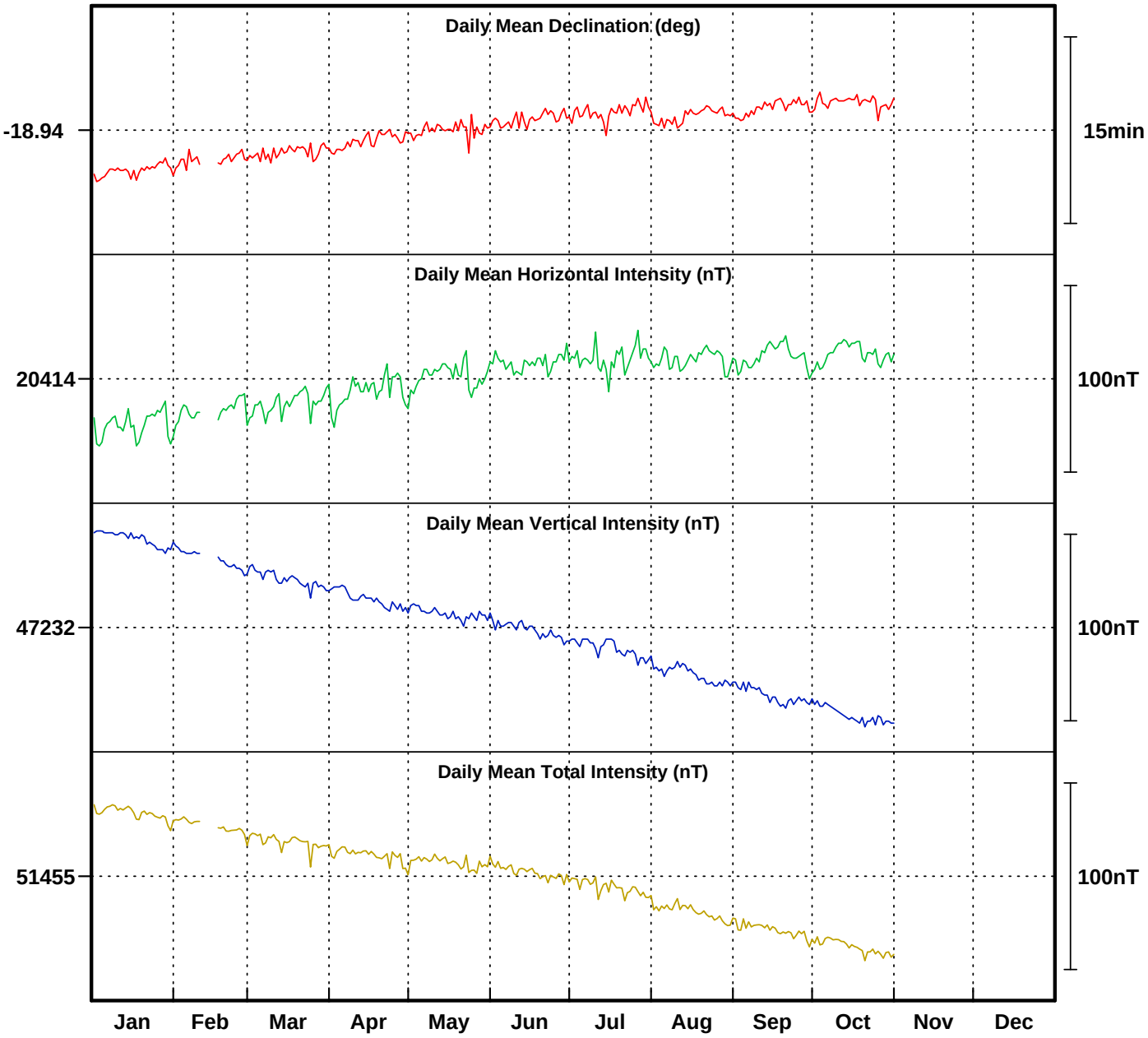
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Sable Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Sable Island Observatory 2007



Monthly Mean Values for Sable Island Observatory 2007

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	-18° 59.6′	20389 nT	66° 40.3′	19279 nT	-6636 nT	47280 nT	51489 nT
February	-18° 58.7′	20397 nT	66° 39.5′	19288 nT	-6634 nT	47269 nT	51482 nT
March	-18° 58.1′	20401 nT	66° 39.0′	19293 nT	-6632 nT	47258 nT	51473 nT
April	-18° 57.2′	20407 nT	66° 38.4′	19301 nT	-6628 nT	47247 nT	51466 nT
May	-18° 56.3′	20416 nT	66° 37.6′	19311 nT	-6626 nT	47240 nT	51462 nT
June	-18° 55.5′	20423 nT	66° 37.0′	19319 nT	-6623 nT	47231 nT	51457 nT
July	-18° 54.9′	20425 nT	66° 36.6′	19322 nT	-6621 nT	47221 nT	51449 nT
August	-18° 55.2′	20424 nT	66° 36.2′	19321 nT	-6623 nT	47207 nT	51436 nT
September	-18° 54.6′	20426 nT	66° 35.8′	19323 nT	-6619 nT	47196 nT	51426 nT
October	-18° 54.1′	20427 nT	66° 35.5′	19326 nT	-6617 nT	47185 nT	51417 nT

Note

i. The values shown here are provisional.