BRITISH GEOLOGICAL SURVEY

Ascension Island Observatory Monthly Magnetic Bulletin

December 2011

II/12/AS

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

ASCENSION ISLAND OBSERVATORY MAGNETIC DATA

1. Introduction

Ascension Island observatory was installed by the British Geological Survey (BGS) with financial support from a consortium of oil companies and became operational in September 1992.

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

Ascension Island Observatory, one of the geomagnetic observatories maintained and operated by BGS, is situated on a site adjacent to the Cable and Wireless Earth Station on Donkey Plain. The observatory co-ordinates are:

Geographic:	*7.949 °S*	*345.624 °E*
Geomagnetic:	*2.632 °S*	*57.186 °E*
Height above mean sea level:	*177 m*	

The geomagnetic co-ordinates are approximations, calculated using the 11th generation International Geomagnetic Reference Field (IGRF) at epoch 2011.5. 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 once 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 Ascension Island 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

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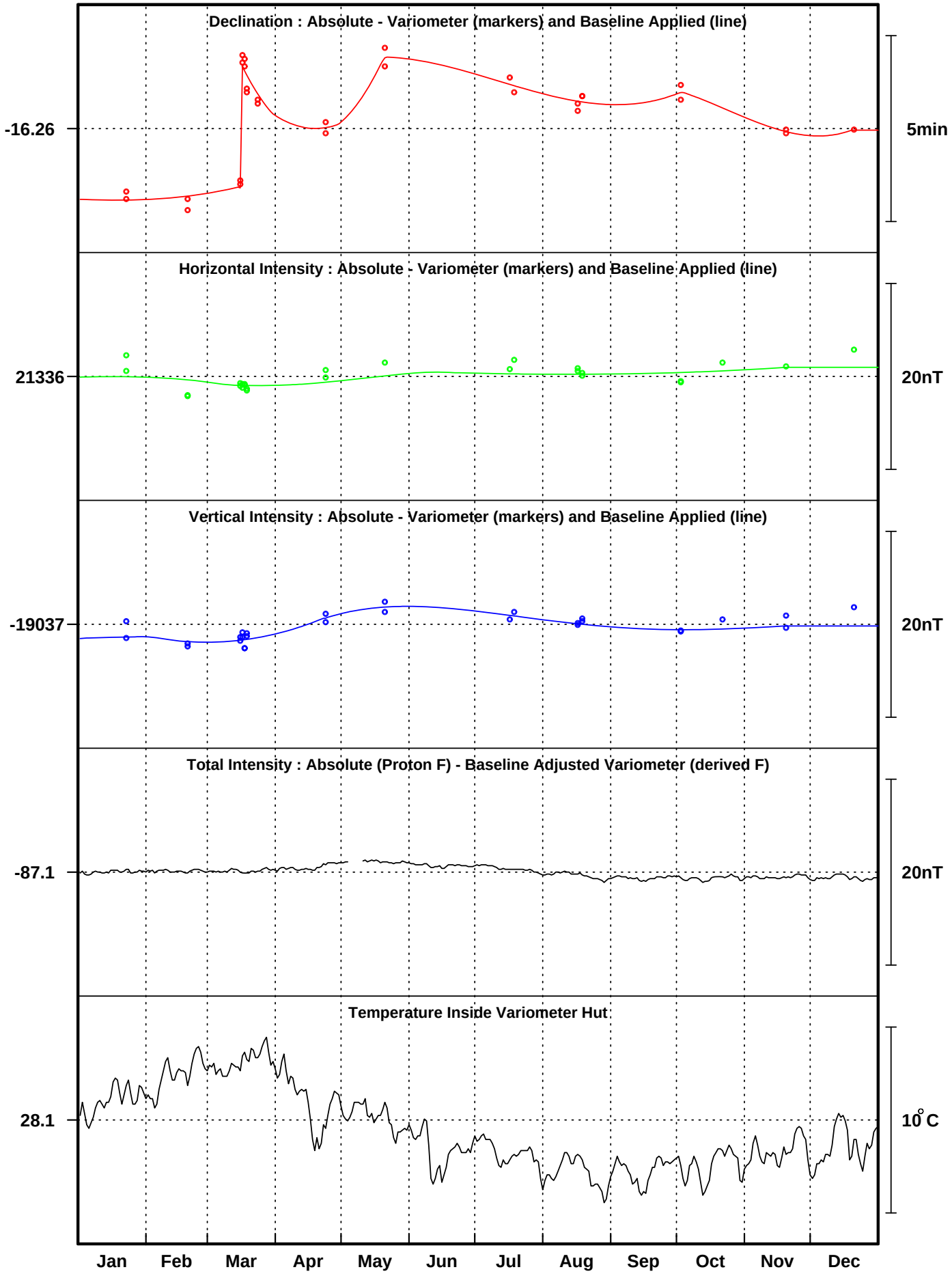
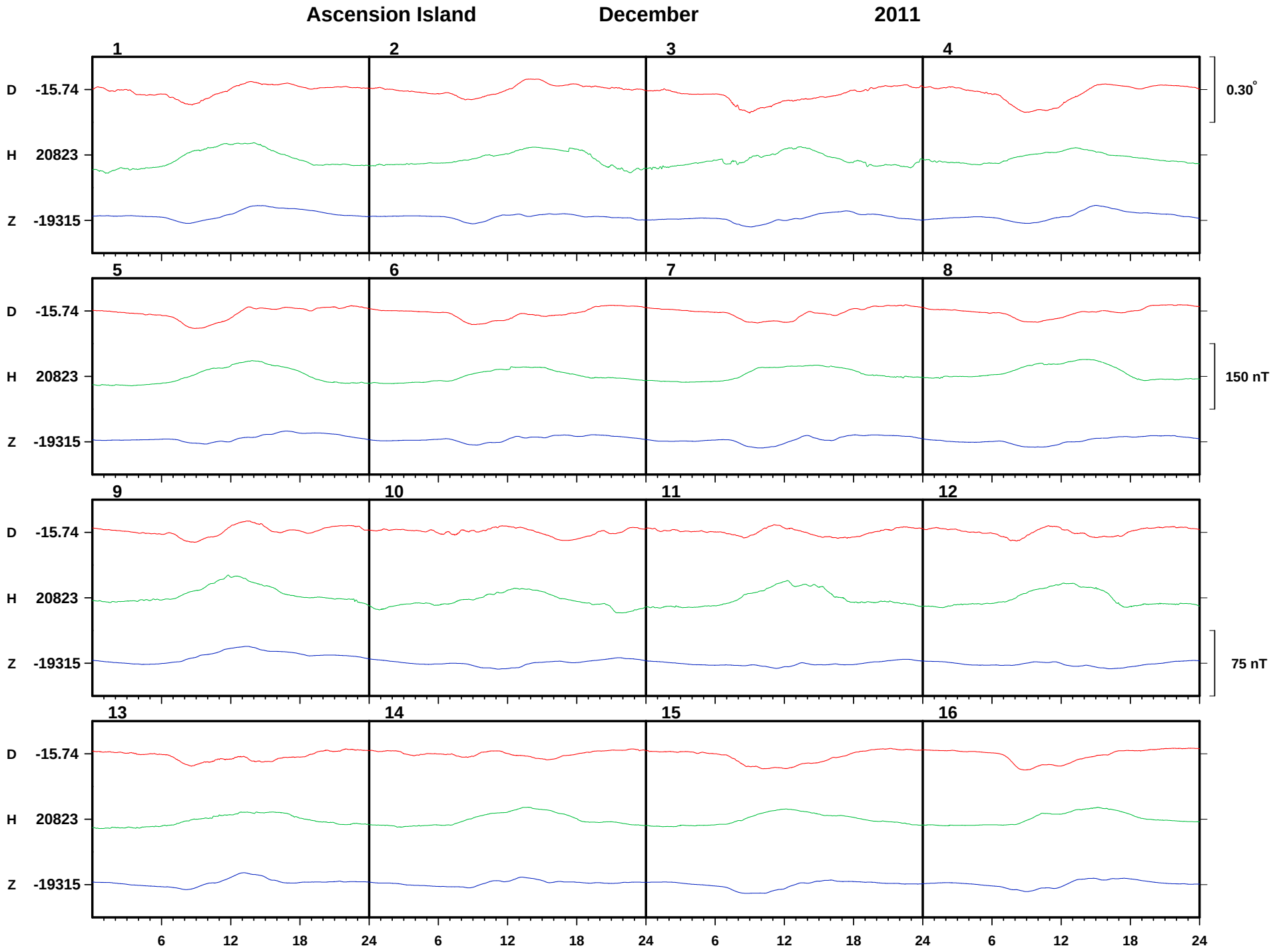
ASCENSION ISLAND OBSERVATORY

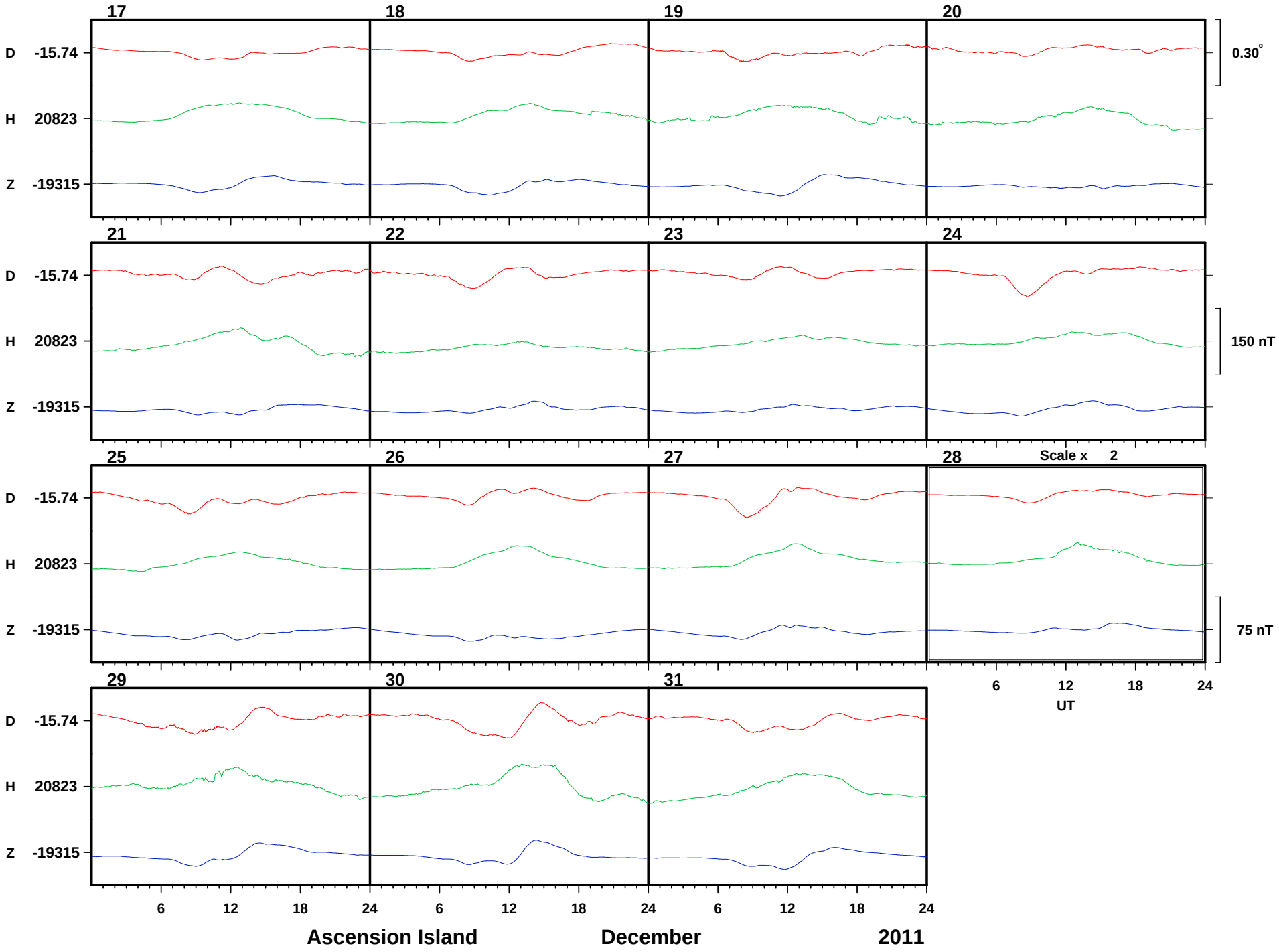
ABSOLUTE OBSERVATIONS

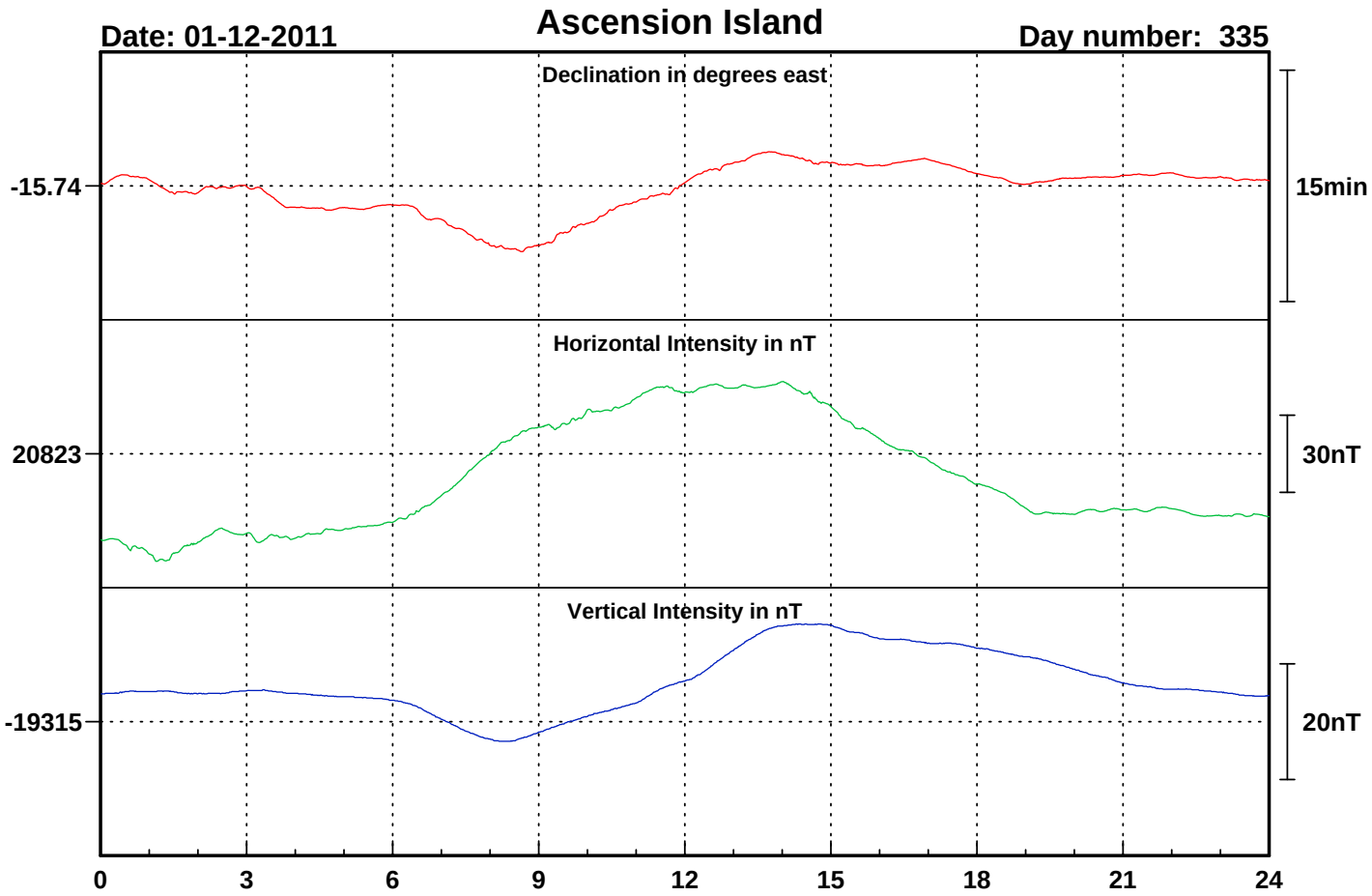
		Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Absolute (º)**	**Site difference (nT)**	**Absolute corrected (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Observer**
20-Dec-11	354	16:59	-15.7264	-15.8400	17:11	-42.8298	87.1	28412.8	20837.3	21338.4	-19315.7	-19035.6	GA

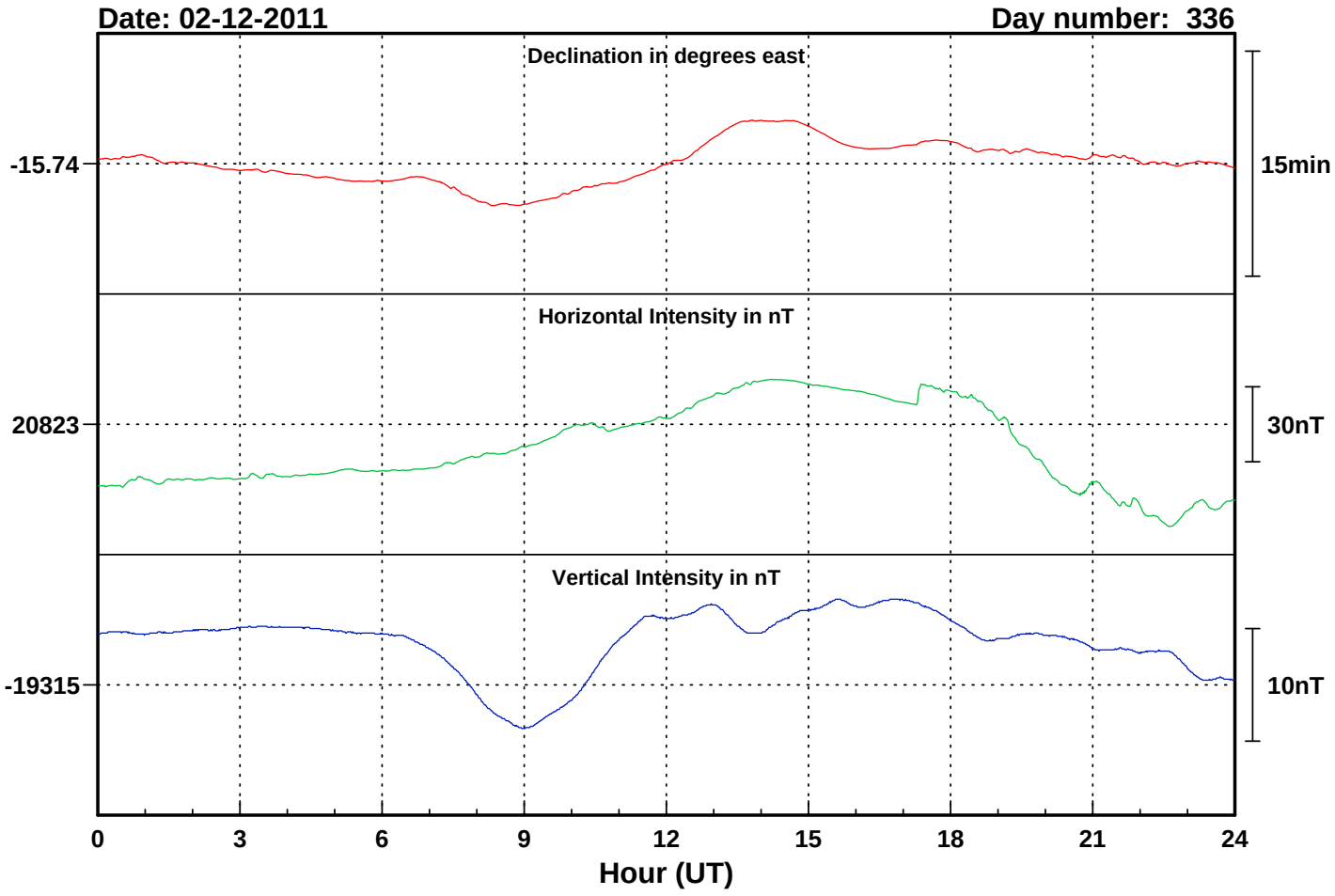
Ascension Island 2011




Ascension Island
December
2011
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
D -15.74
H 20823
Z -19315
0.30°
150 nT
75 nT
6
12
18
24


17
18
19
20
D -15.74
H 20823
Z -19315
0.30°
21
22
23
24
150 nT
25
26
27
28
Scale x 2
75 nT
29
30
31
6
12
18
24
UT
Ascension Island
December
2011


Ascension Island
Date: 01-12-2011
Day number: 335
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
20nT
0
3
6
9
12
15
18
21
24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Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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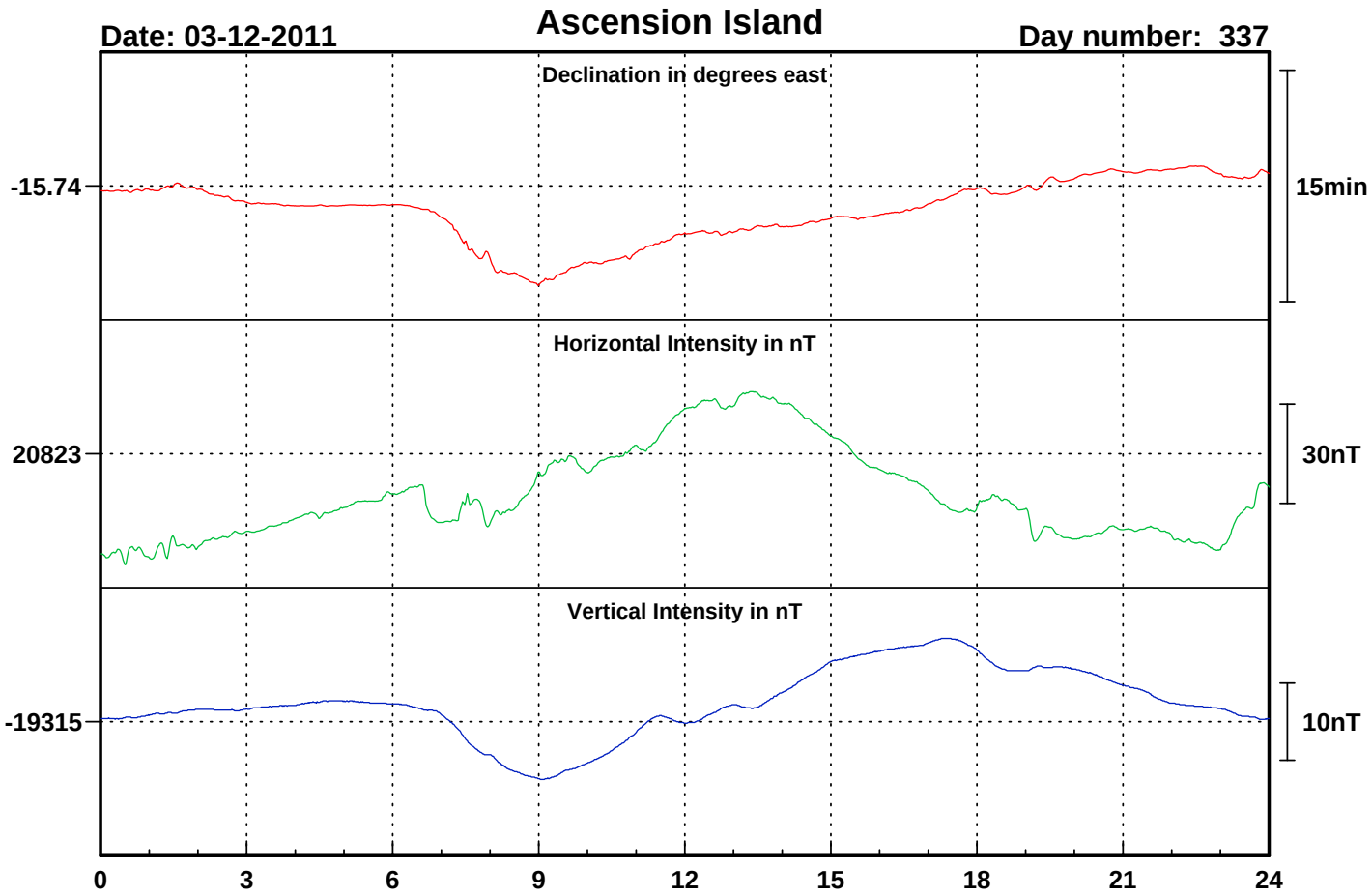
21
24
Hour (UT)


Ascension Island
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Day number: 337
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
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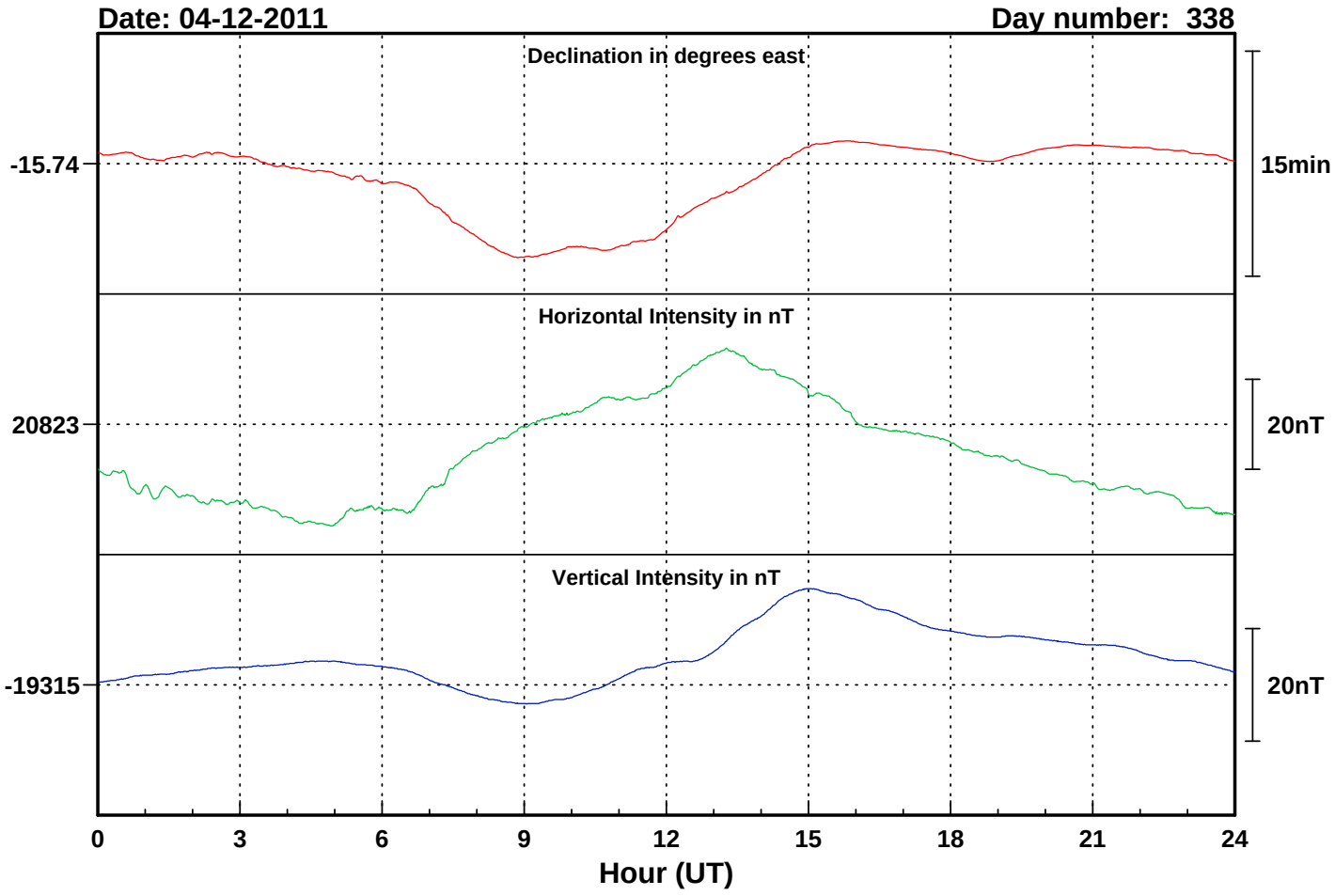
24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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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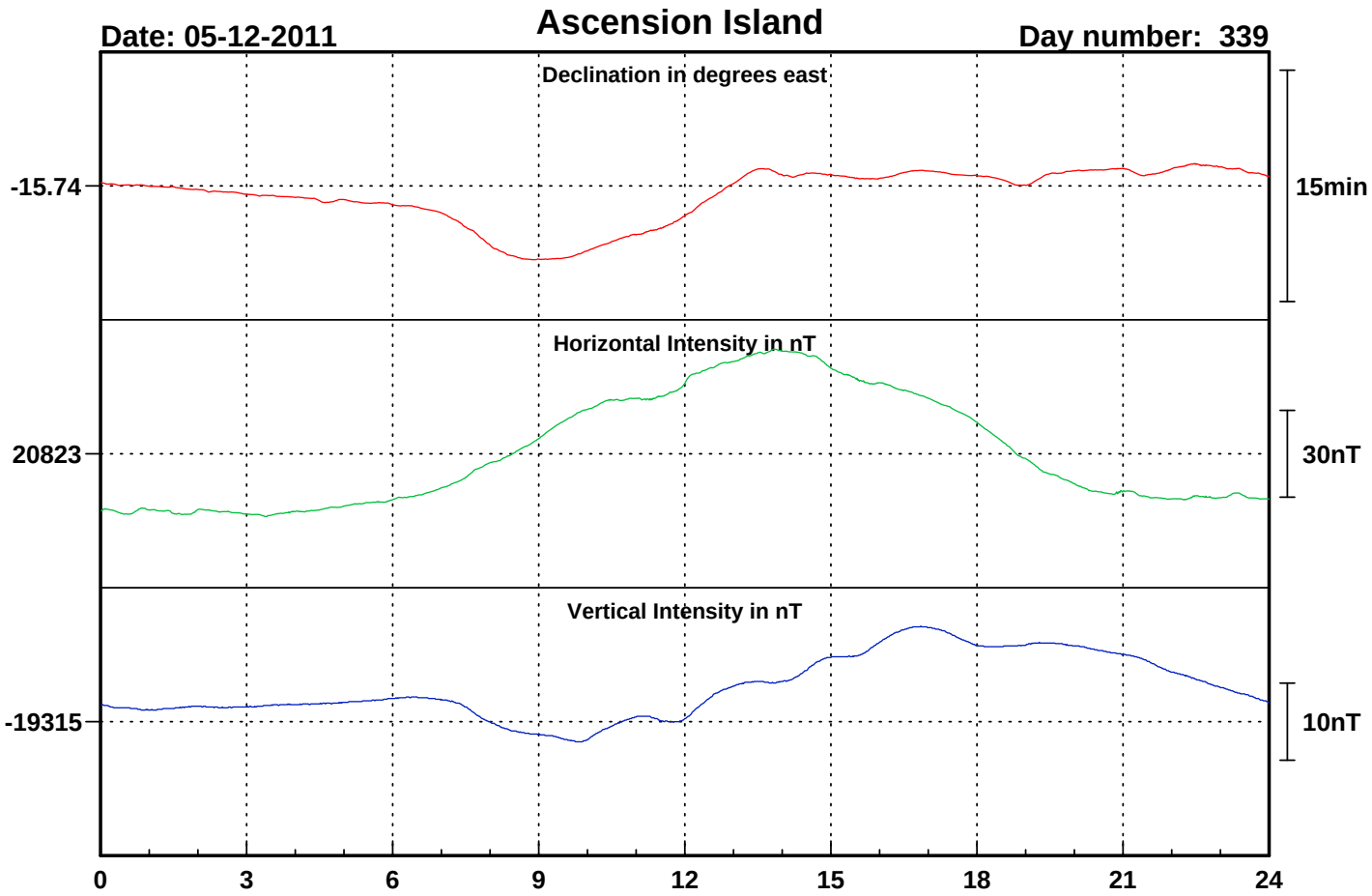
24
Hour (UT)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Day number: 339
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
10nT
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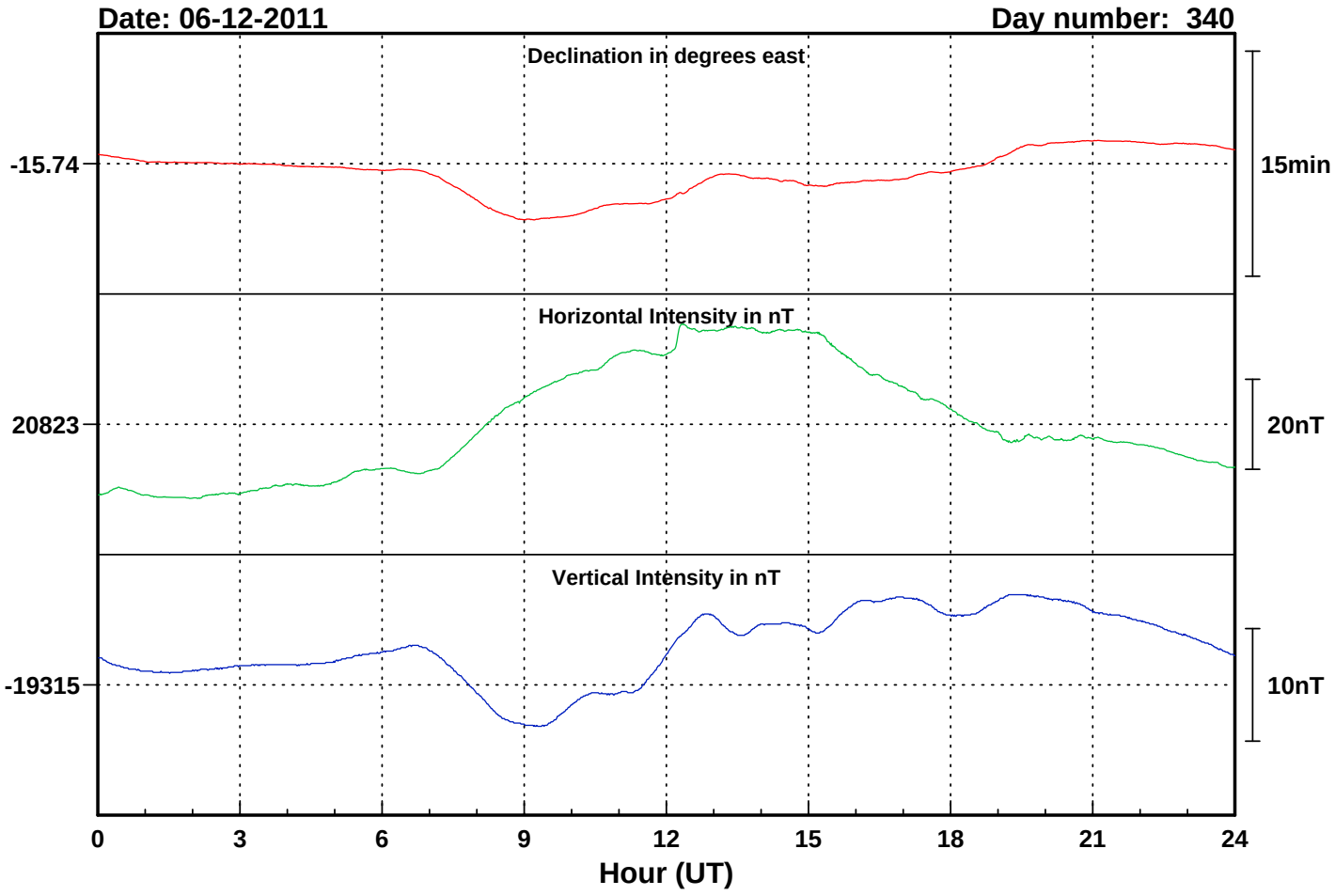
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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0
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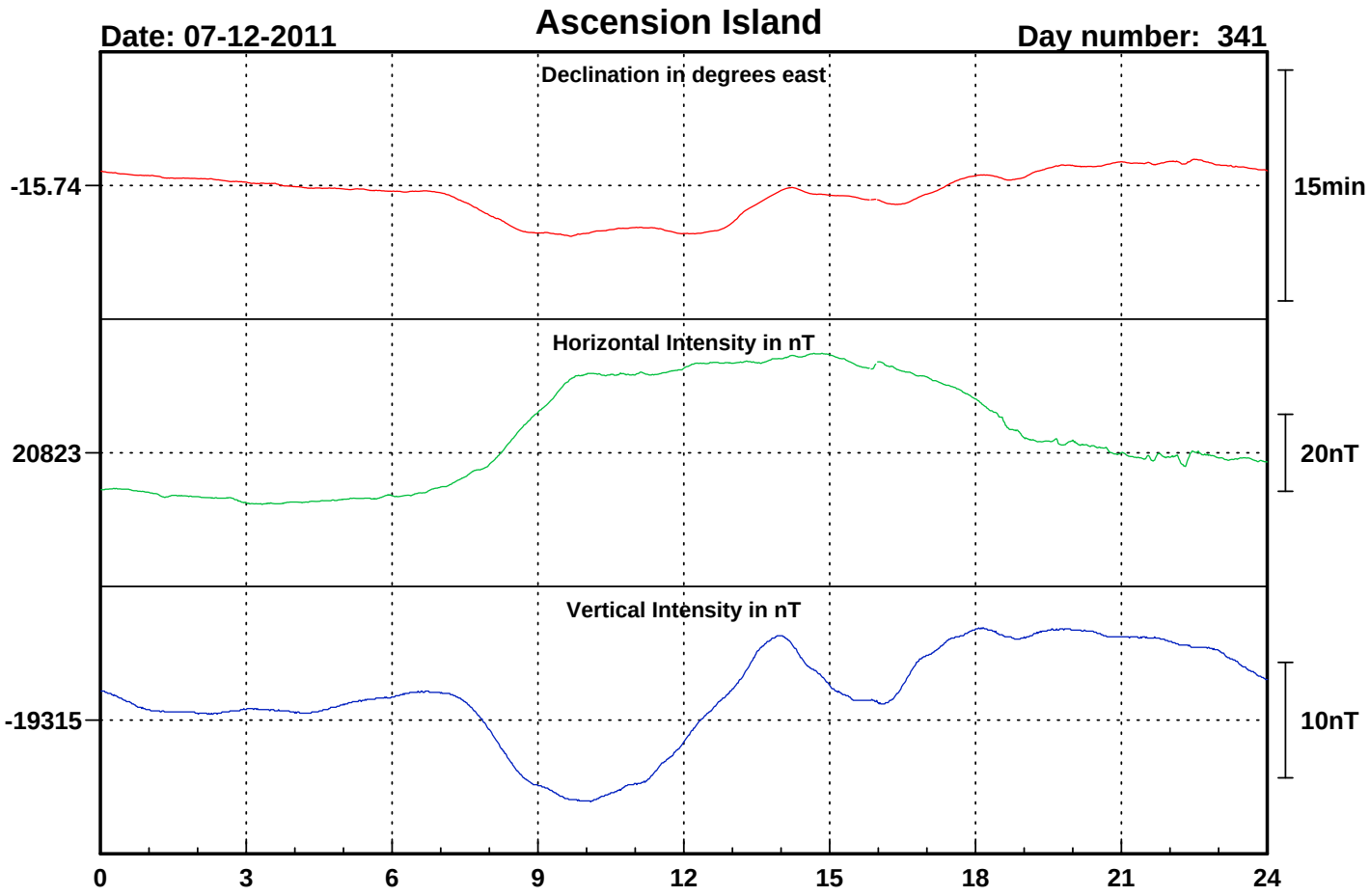
21
24
Hour (UT)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Day number: 341
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
-19315
10nT
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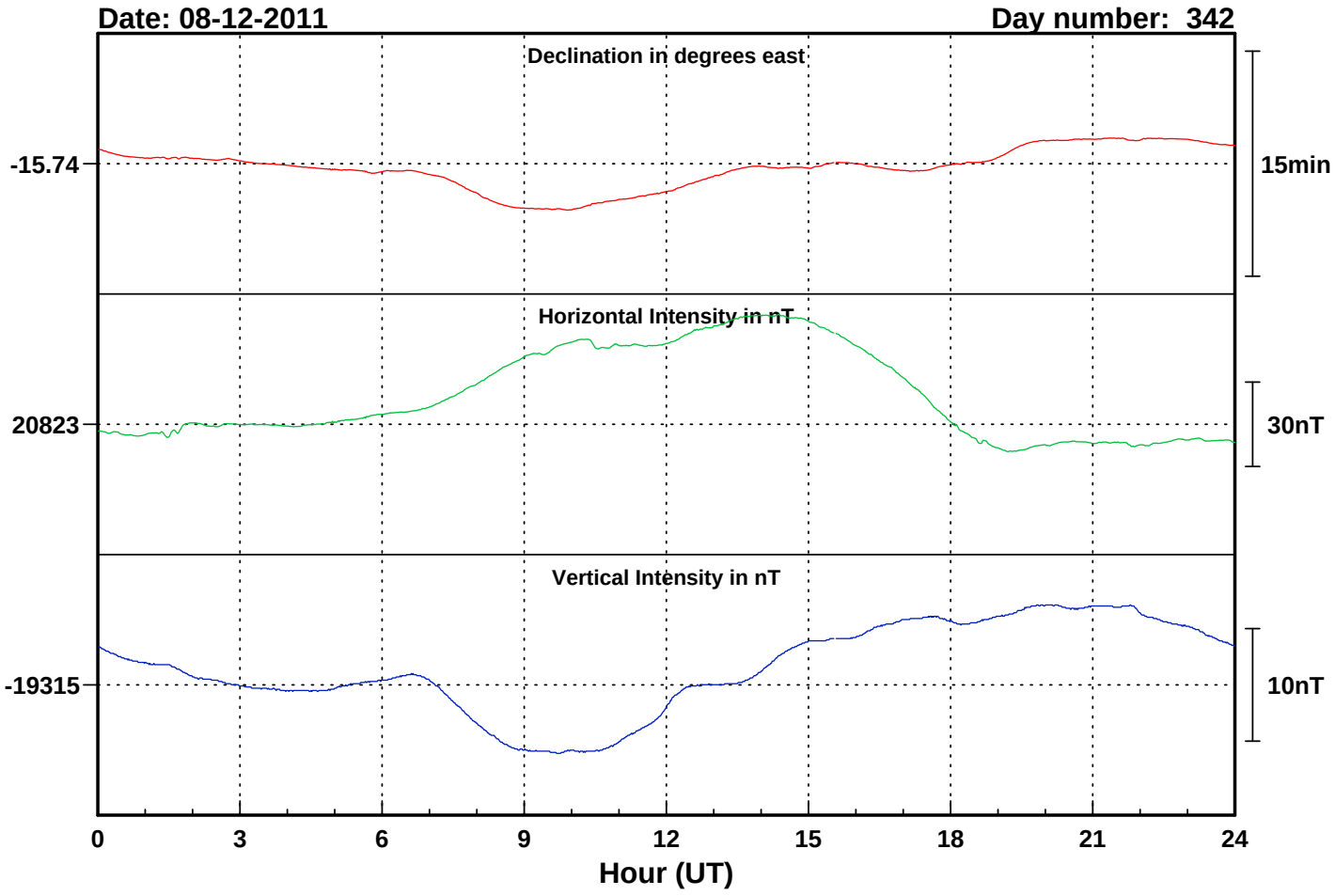
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Day number: 342
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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10nT
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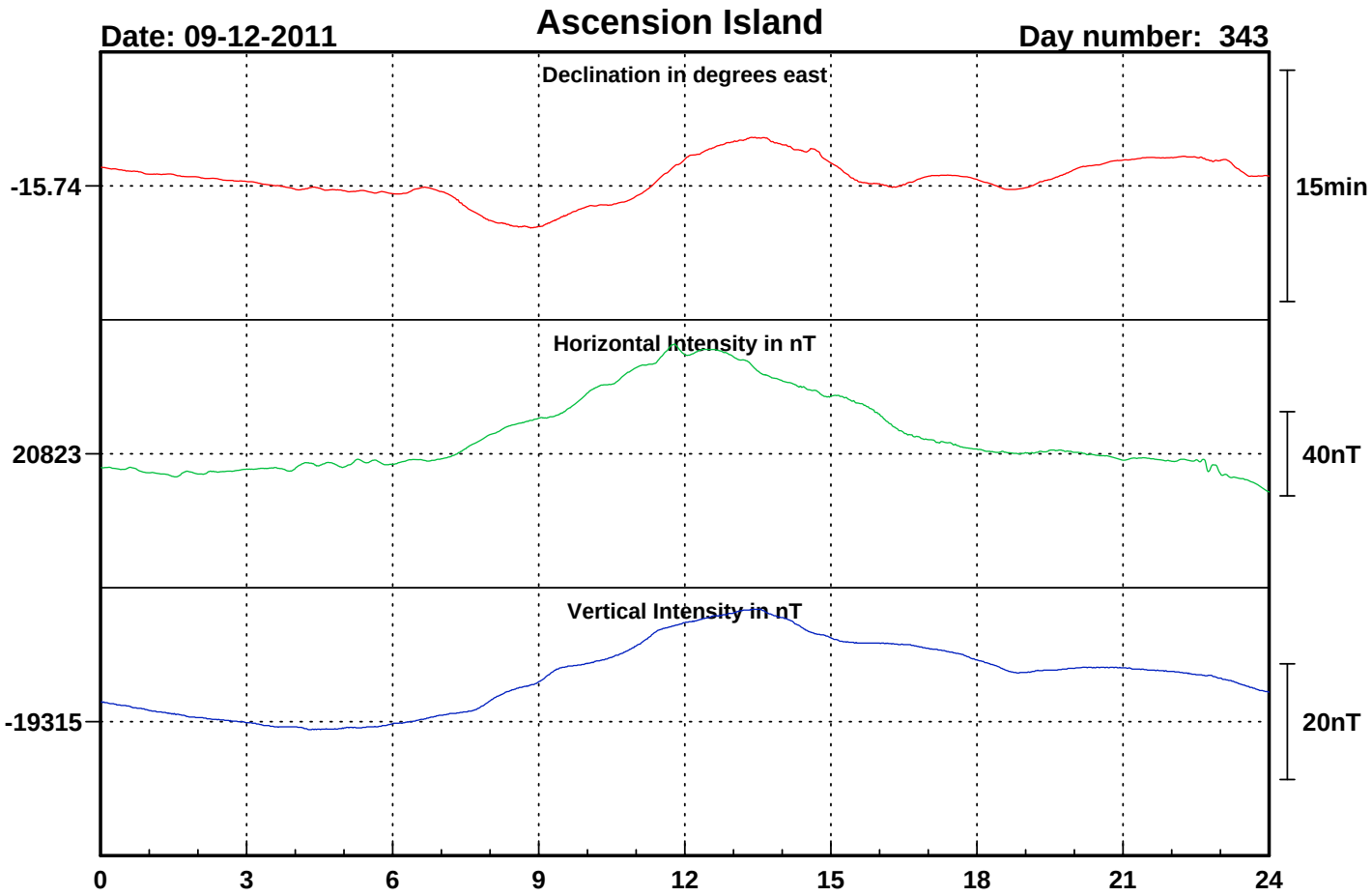
Hour (UT)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Day number: 343
Declination in degrees east
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15min
Horizontal Intensity in nT
20823
40nT
Vertical Intensity in nT
-19315
20nT
0
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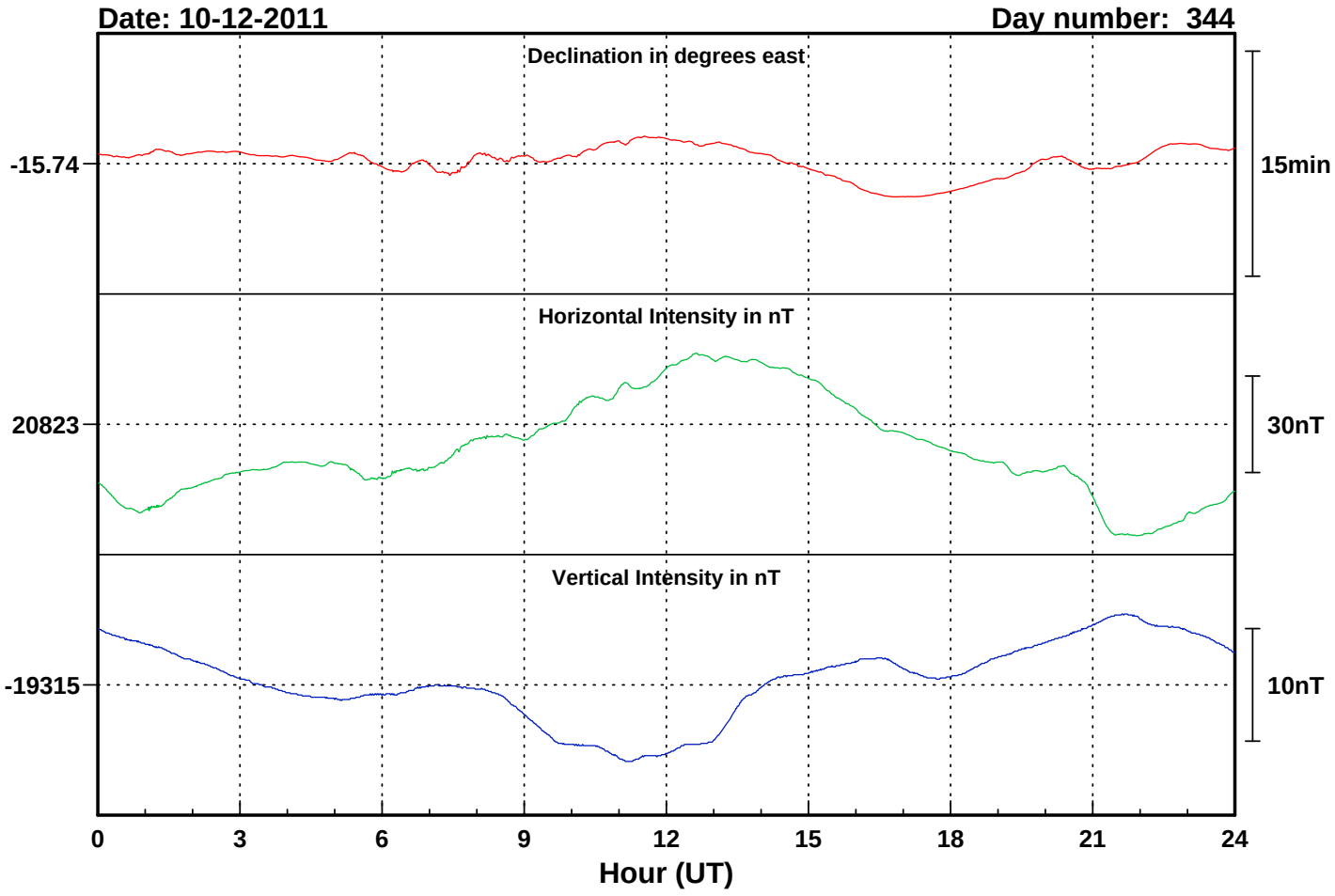
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15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
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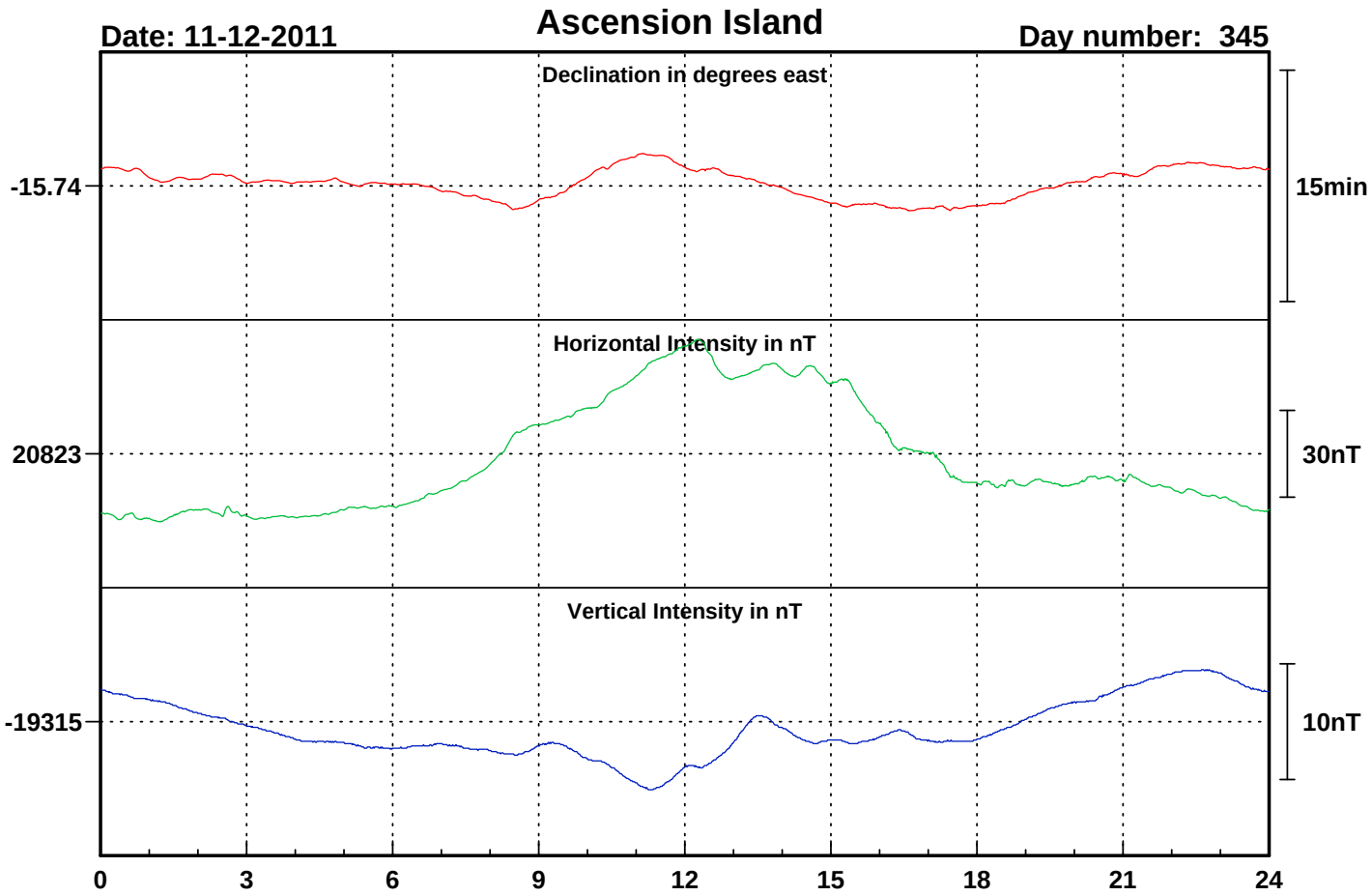
Hour (UT)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15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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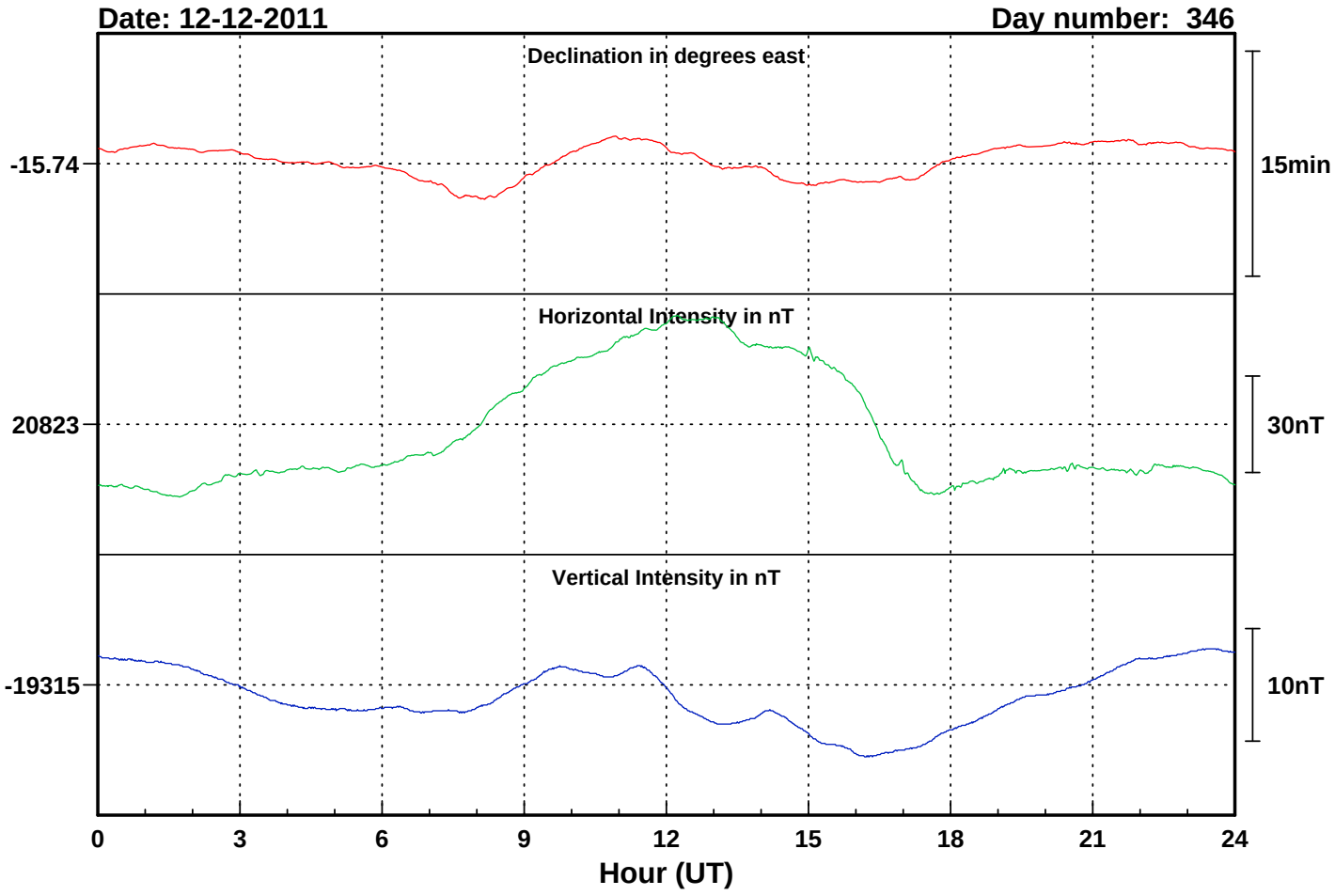
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Day number: 346
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15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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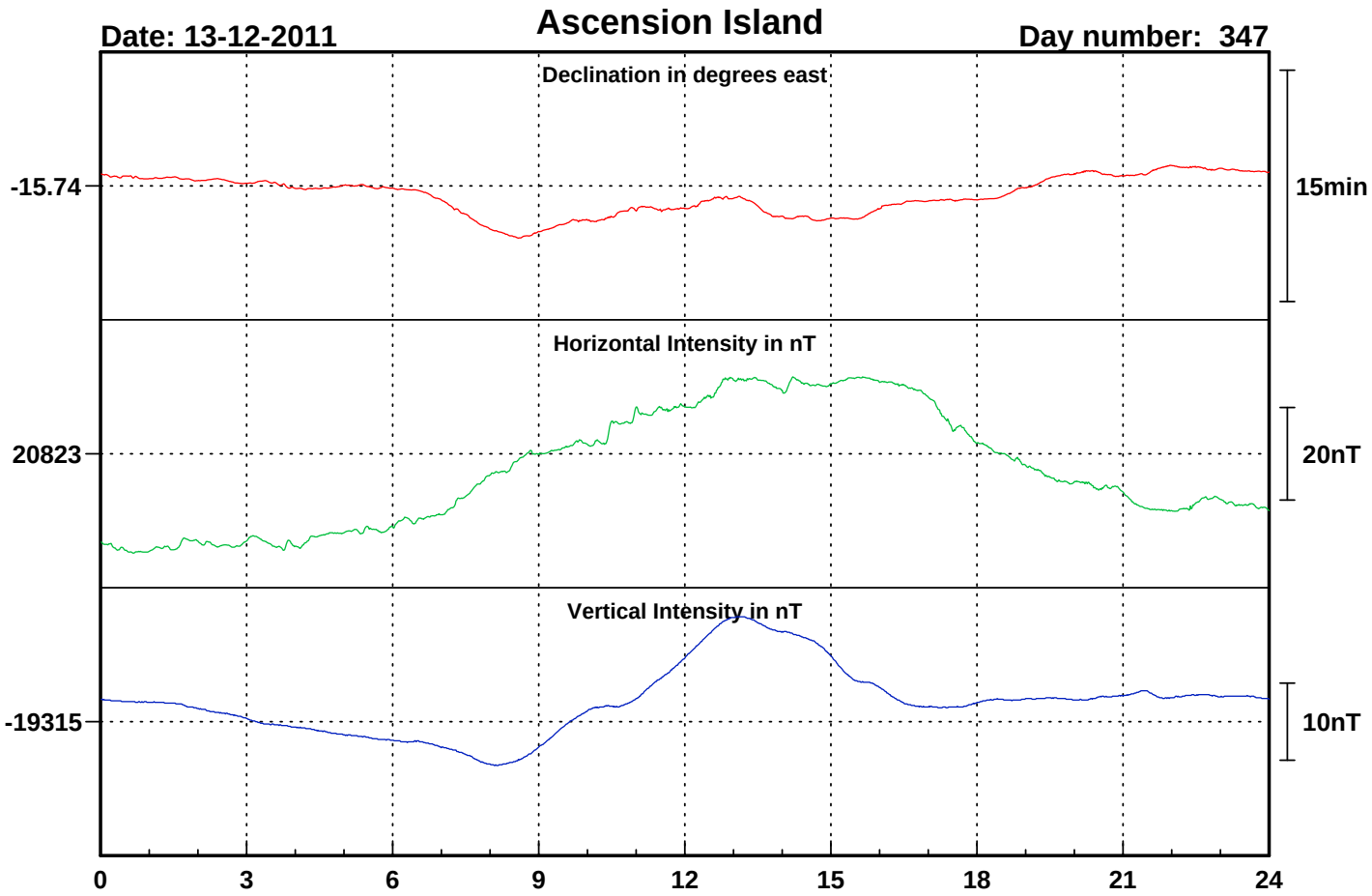
Hour (UT)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Day number: 347
Declination in degrees east
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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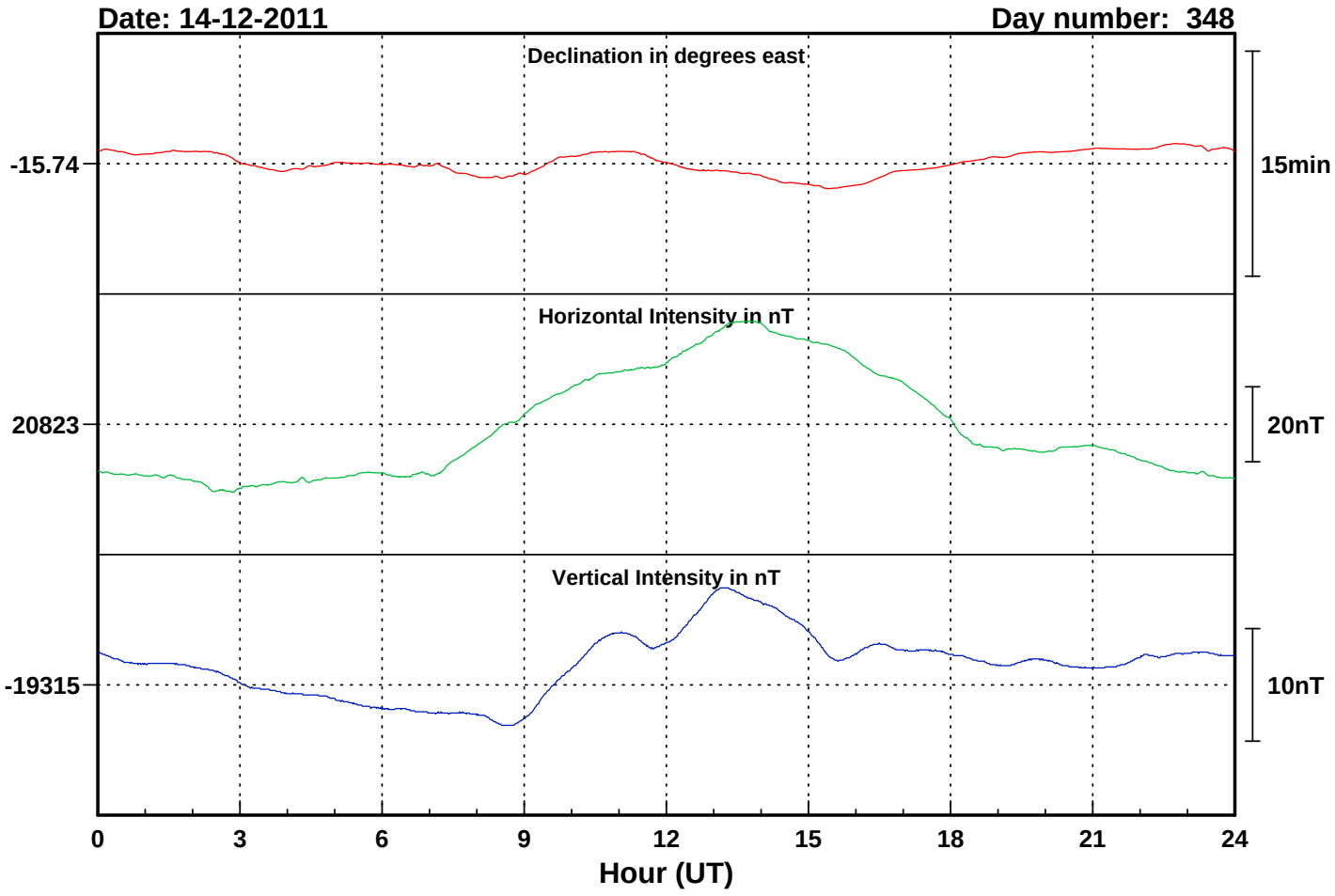
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Declination in degrees east
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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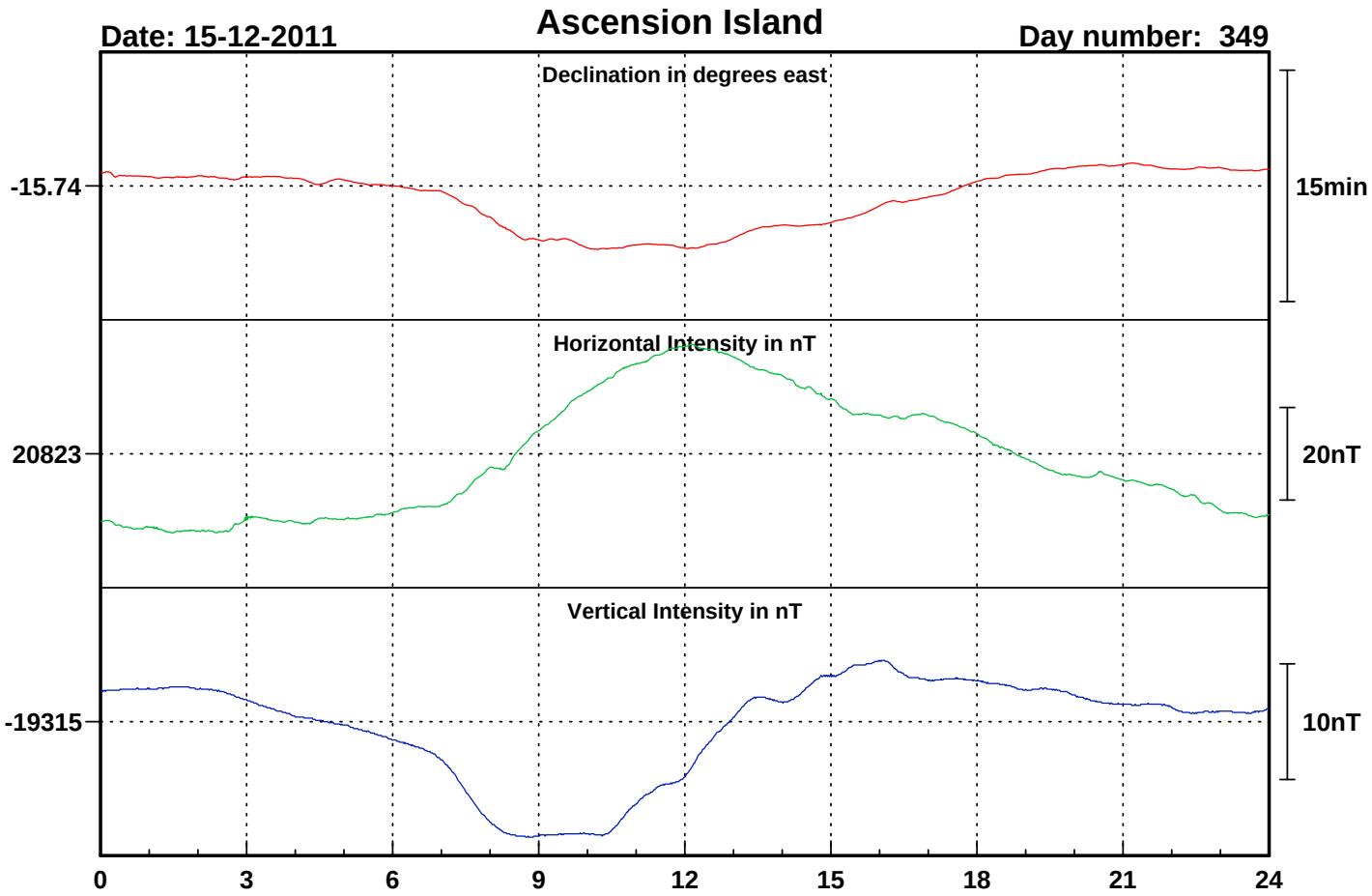
24
Hour (UT)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Day number: 349
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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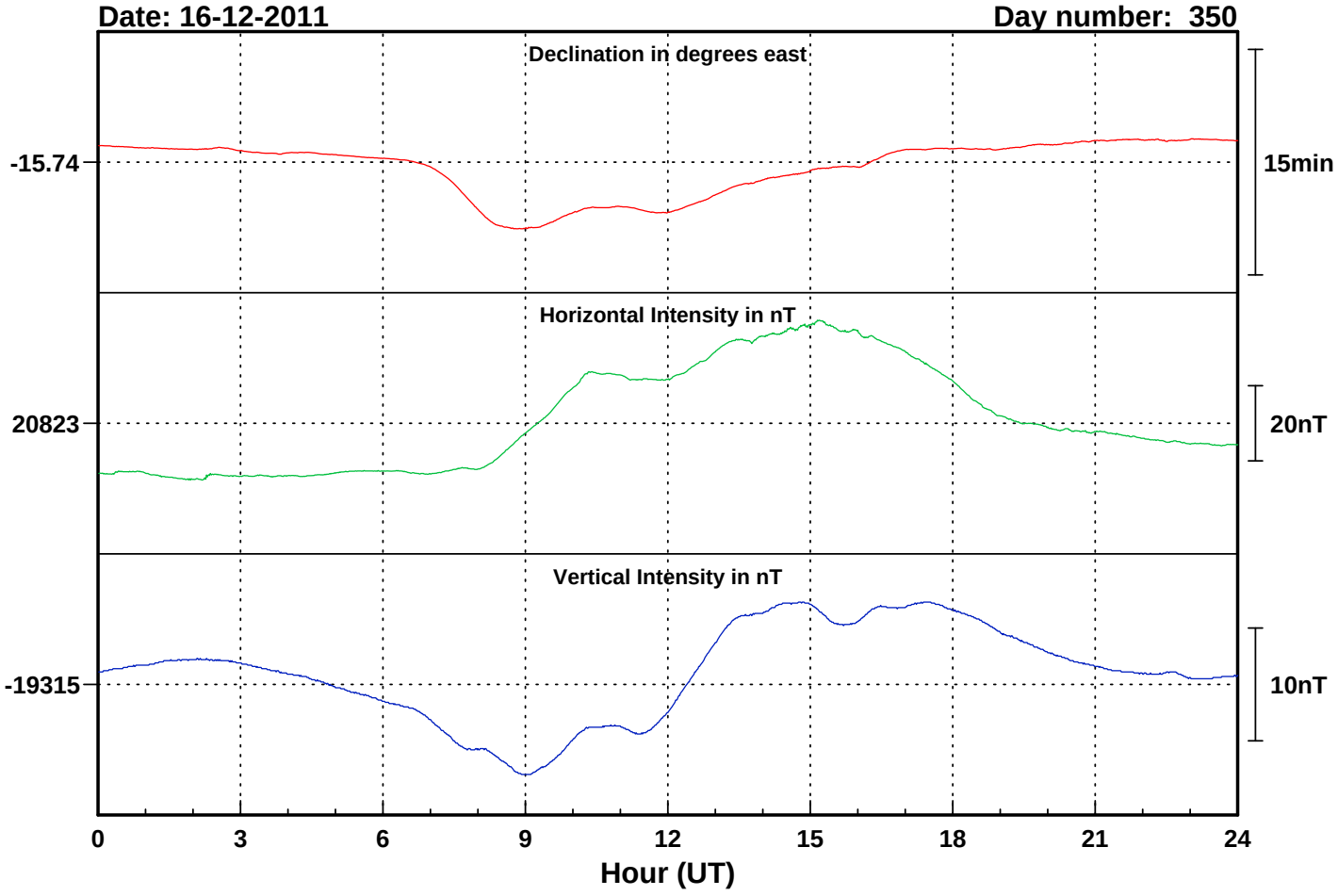
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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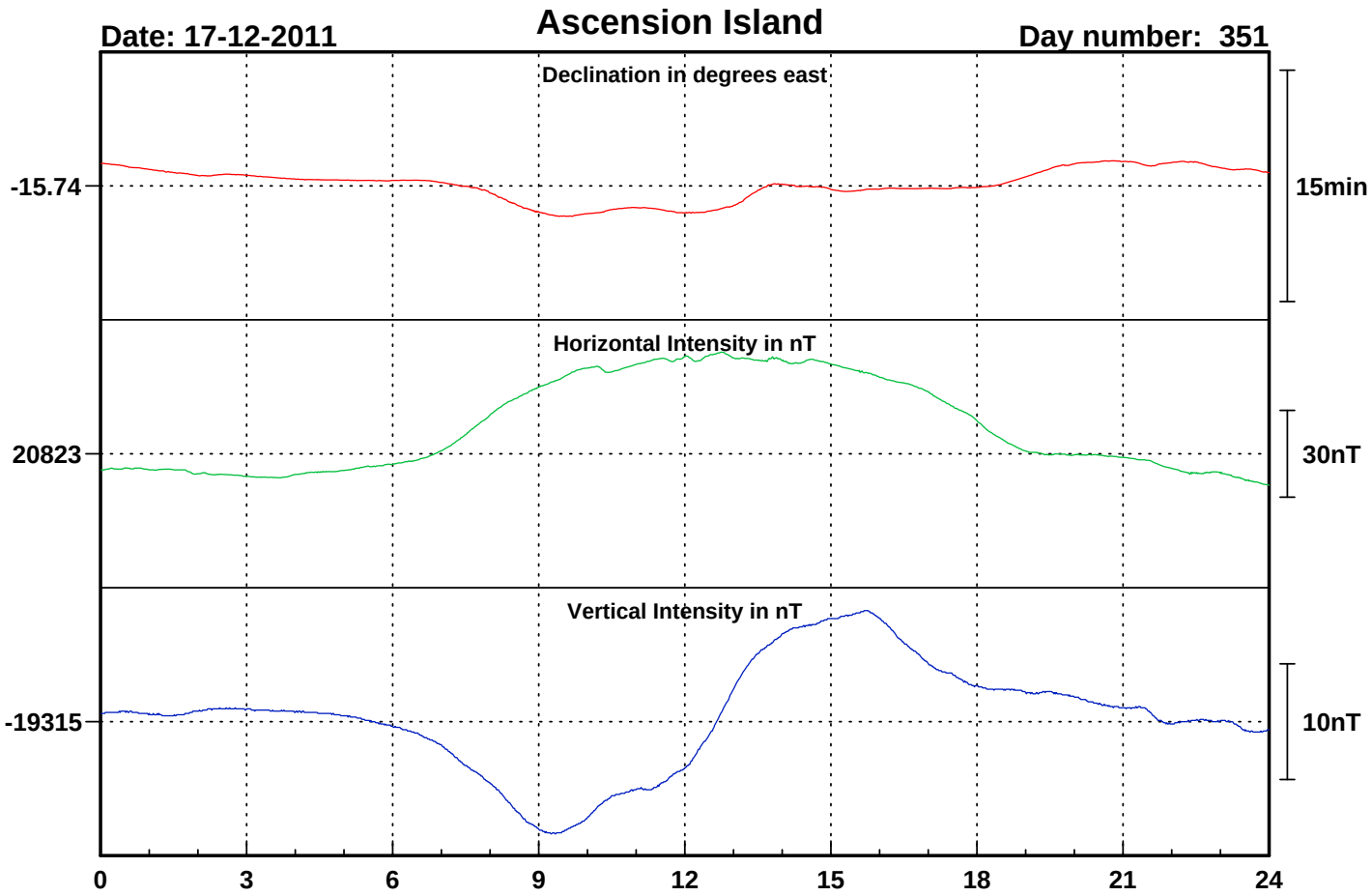
24
Hour (UT)


Ascension Island
Date: 17-12-2011
Day number: 351
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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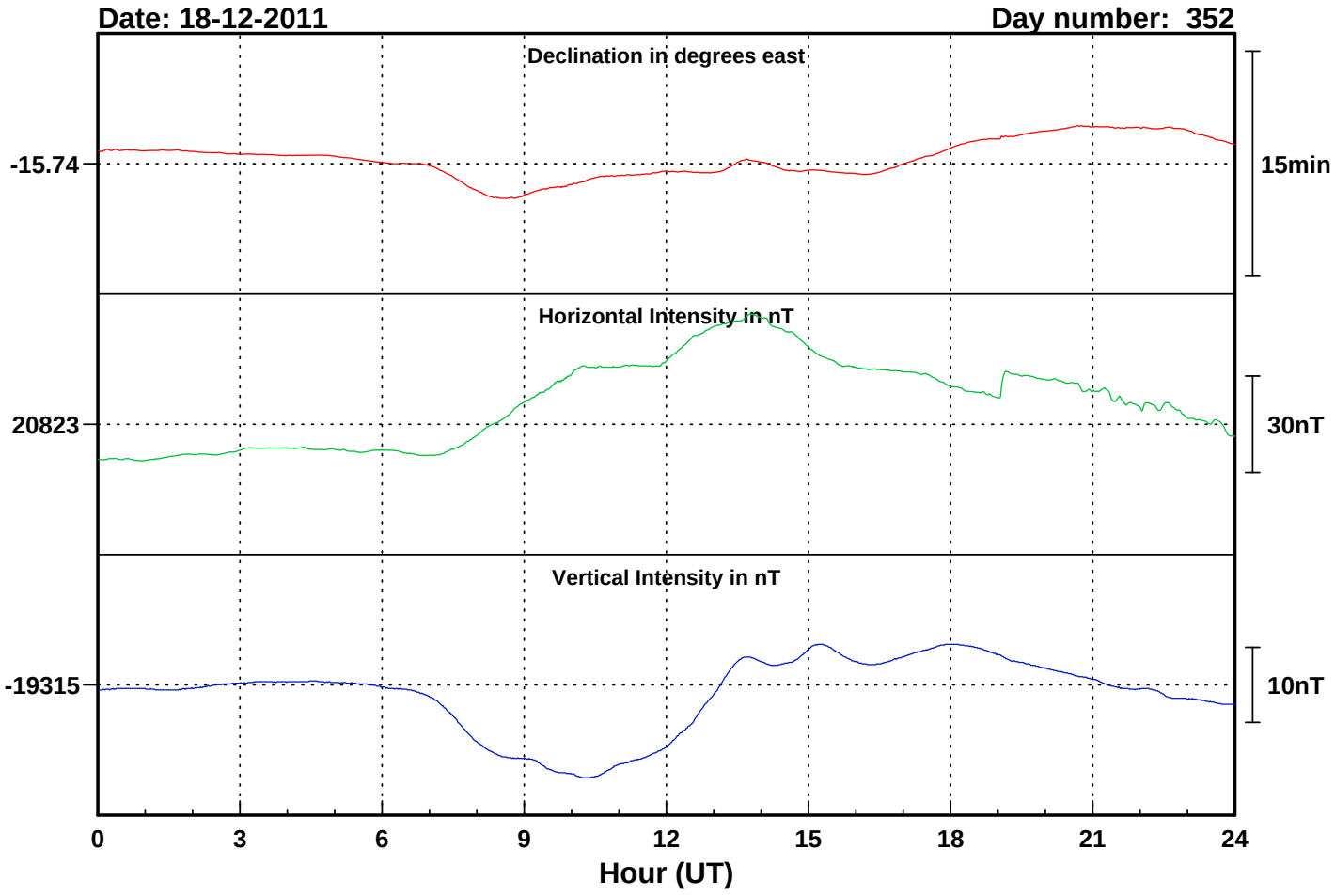
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Day number: 352
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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3
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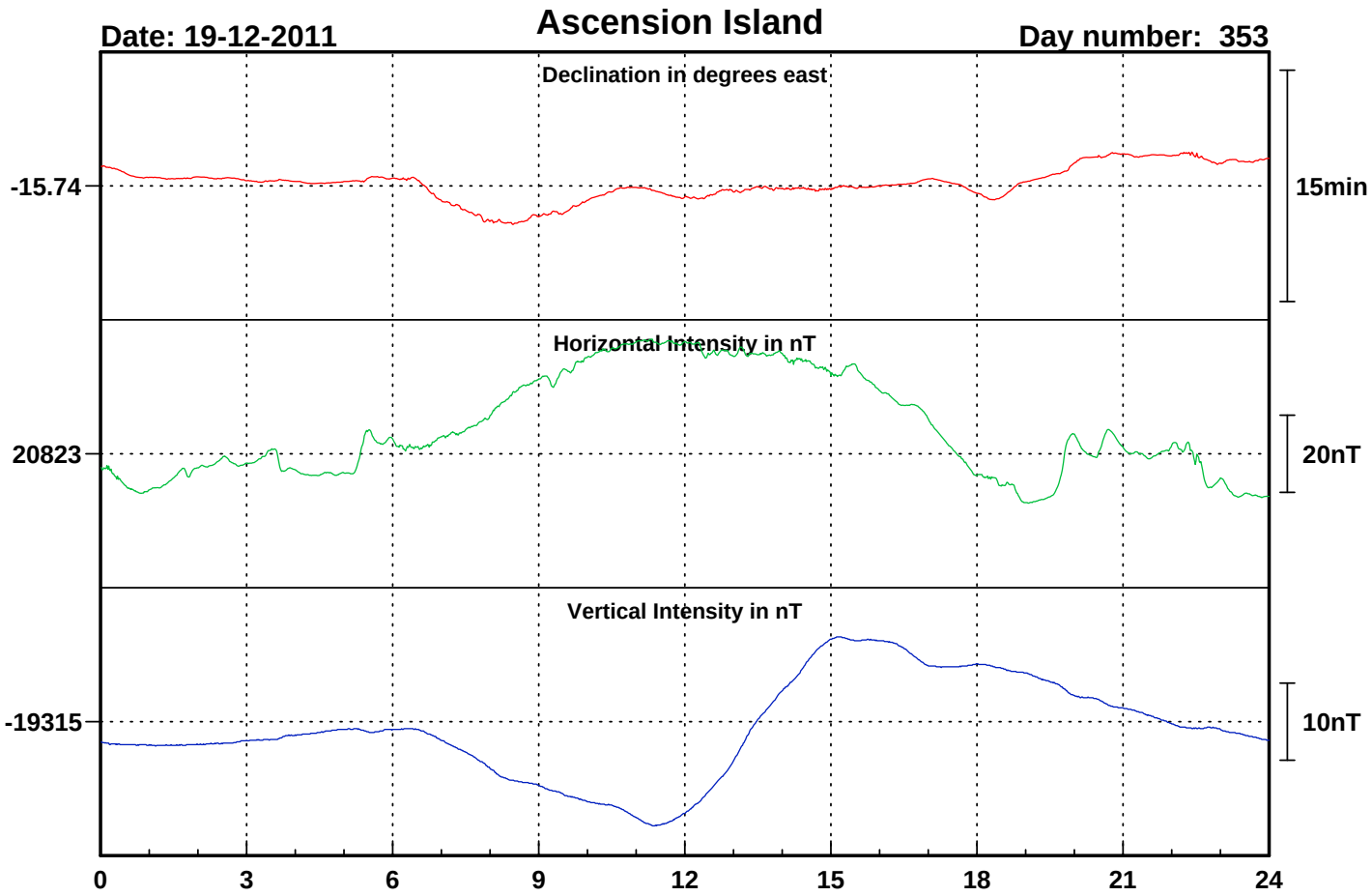
24
Hour (UT)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Day number: 353
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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10nT
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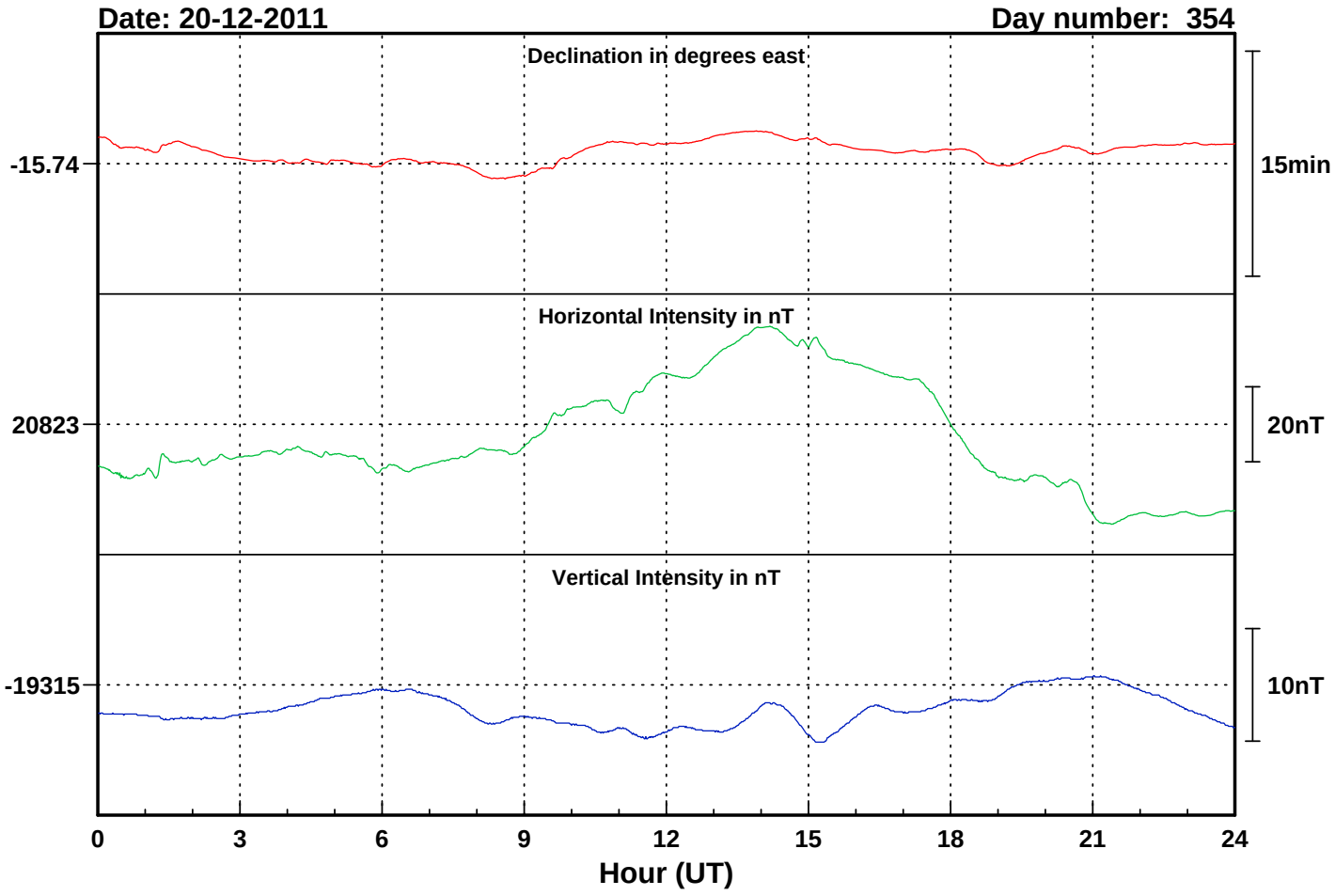
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15min
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20823
20nT
Vertical Intensity in nT
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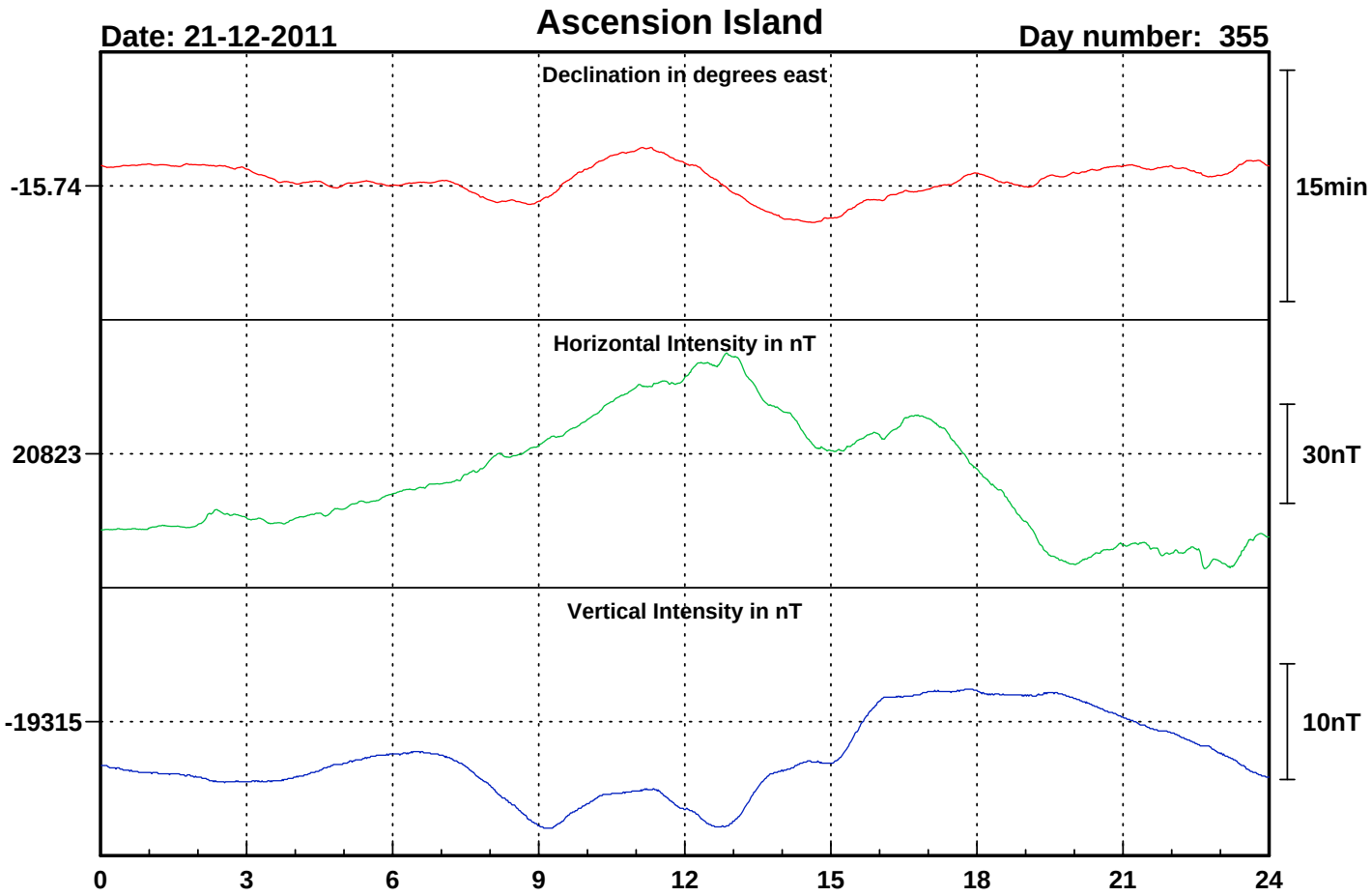
24
Hour (UT)


Ascension Island
Date: 21-12-2011
Day number: 355
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
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10nT
0
3
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12
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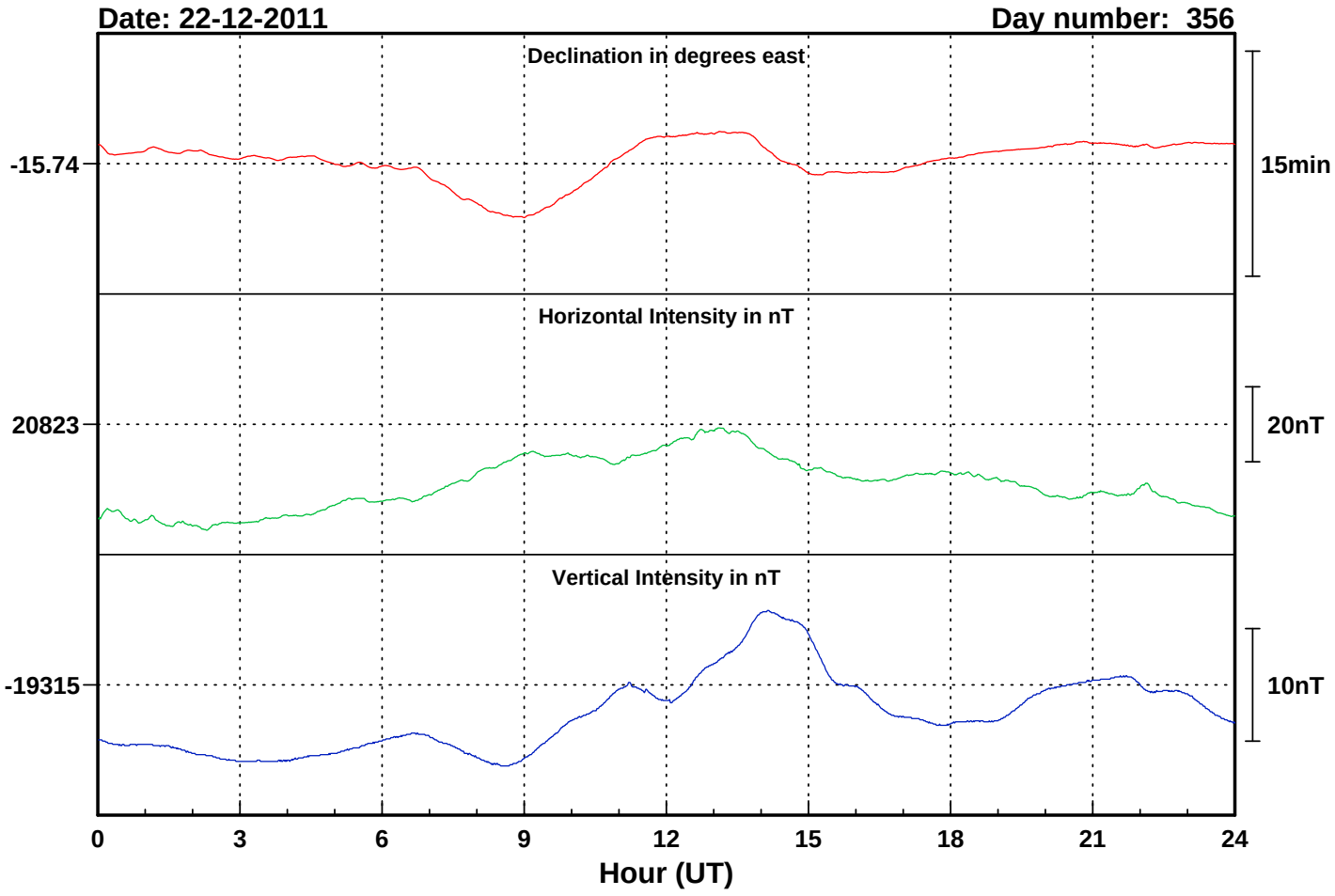
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Day number: 356
Declination in degrees east
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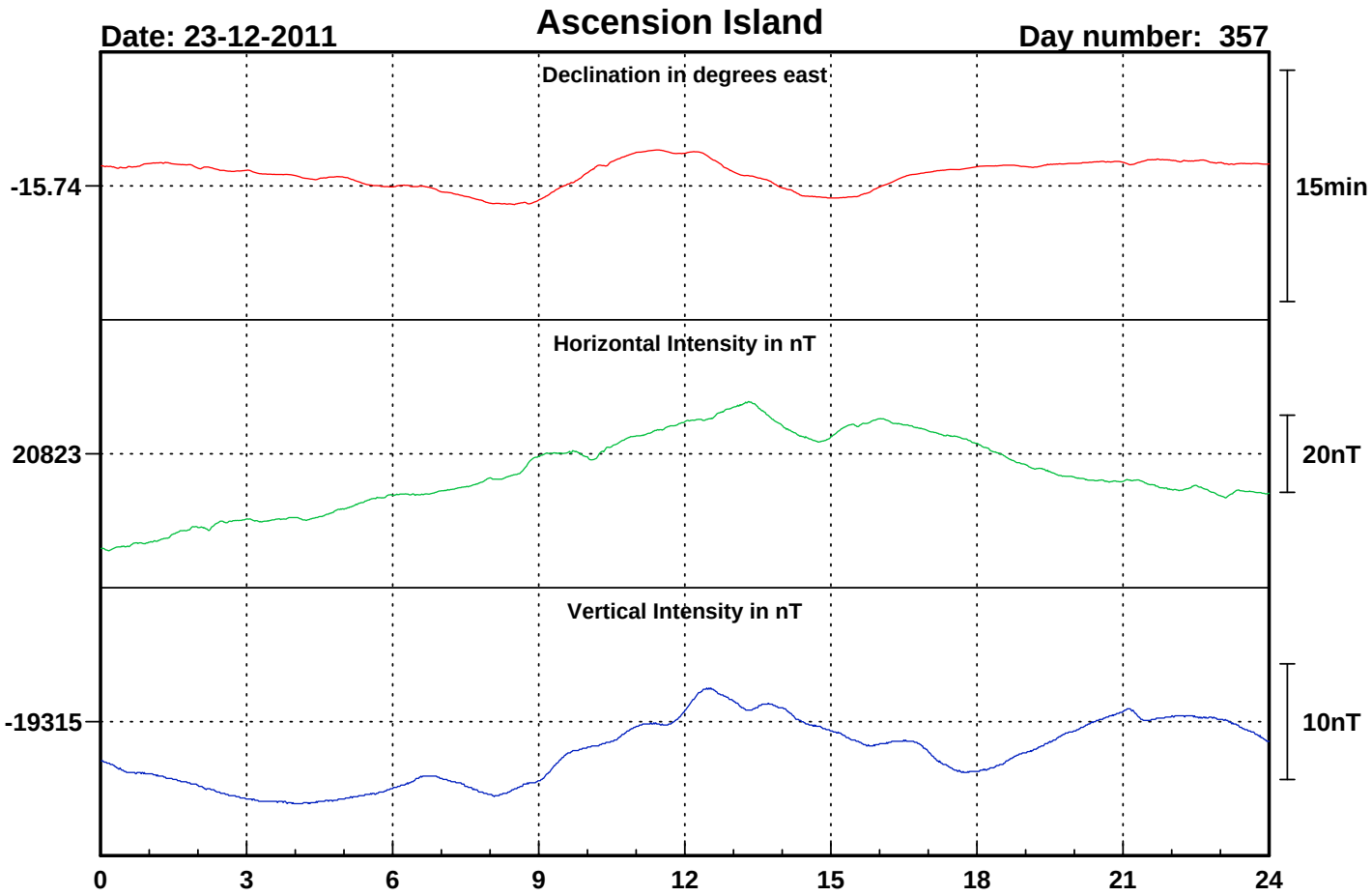
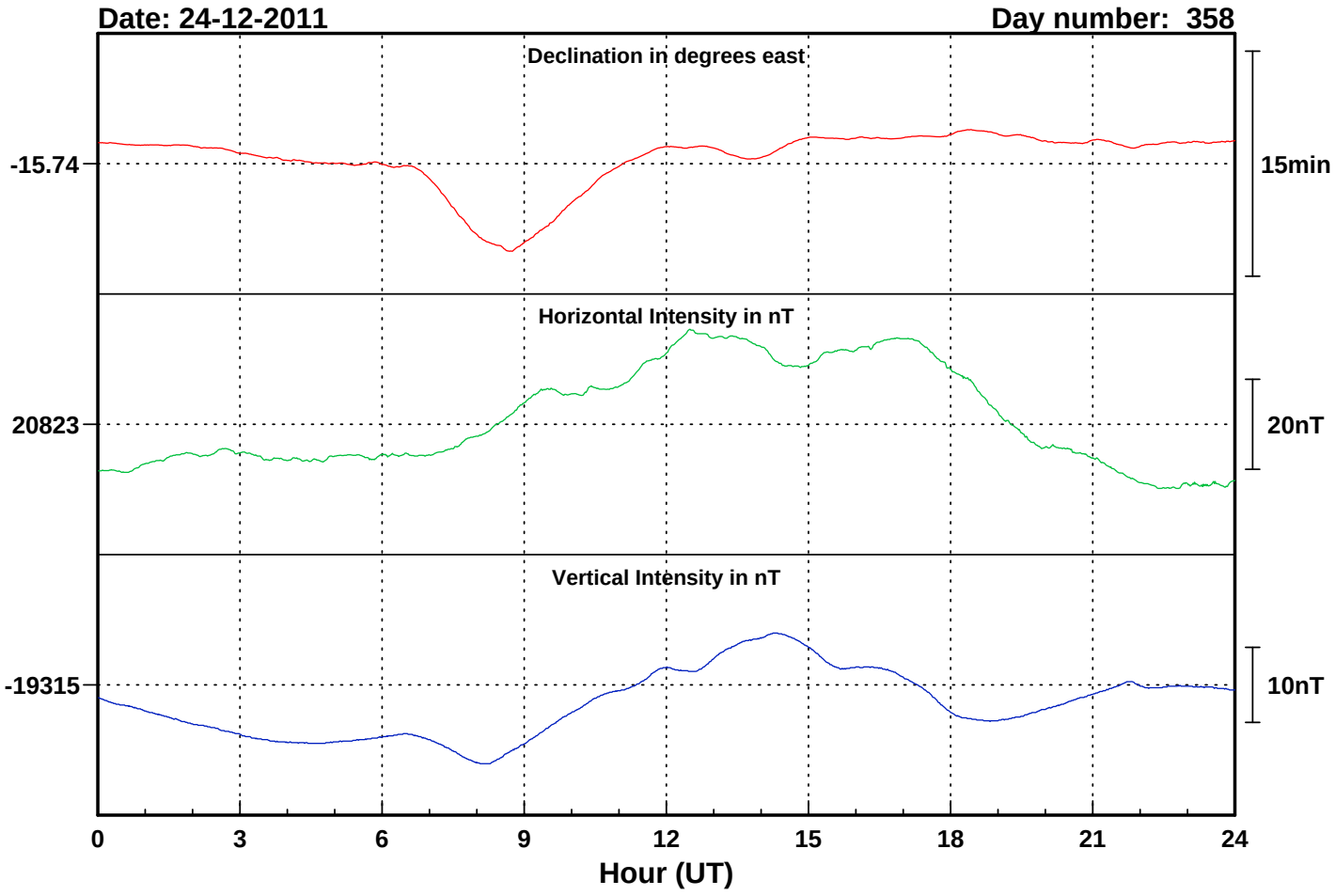
15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Ascension Island
Date: 23-12-2011
Day number: 357
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24


Date: 24-12-2011
Day number: 358
Declination in degrees east
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15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
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6
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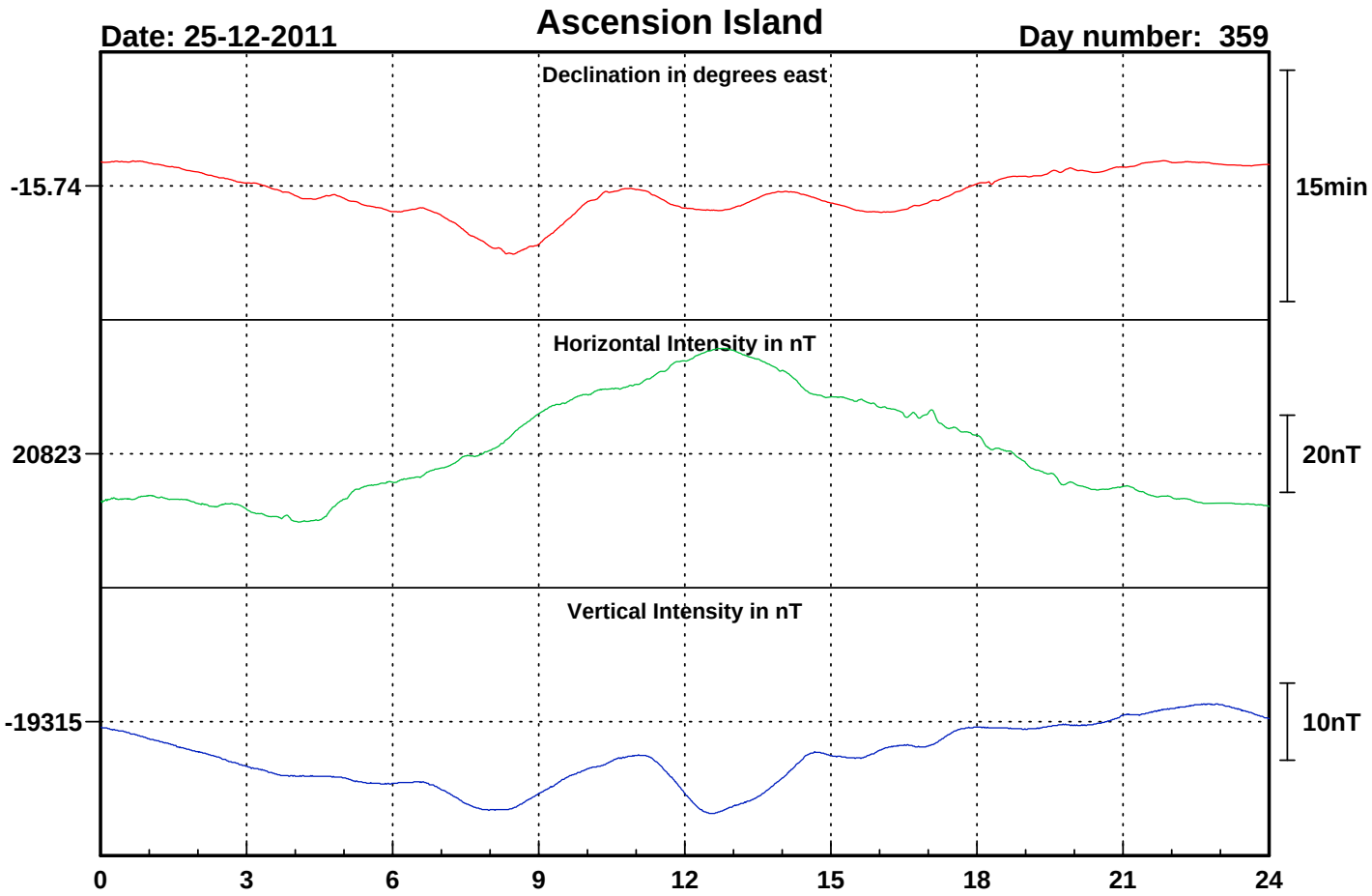
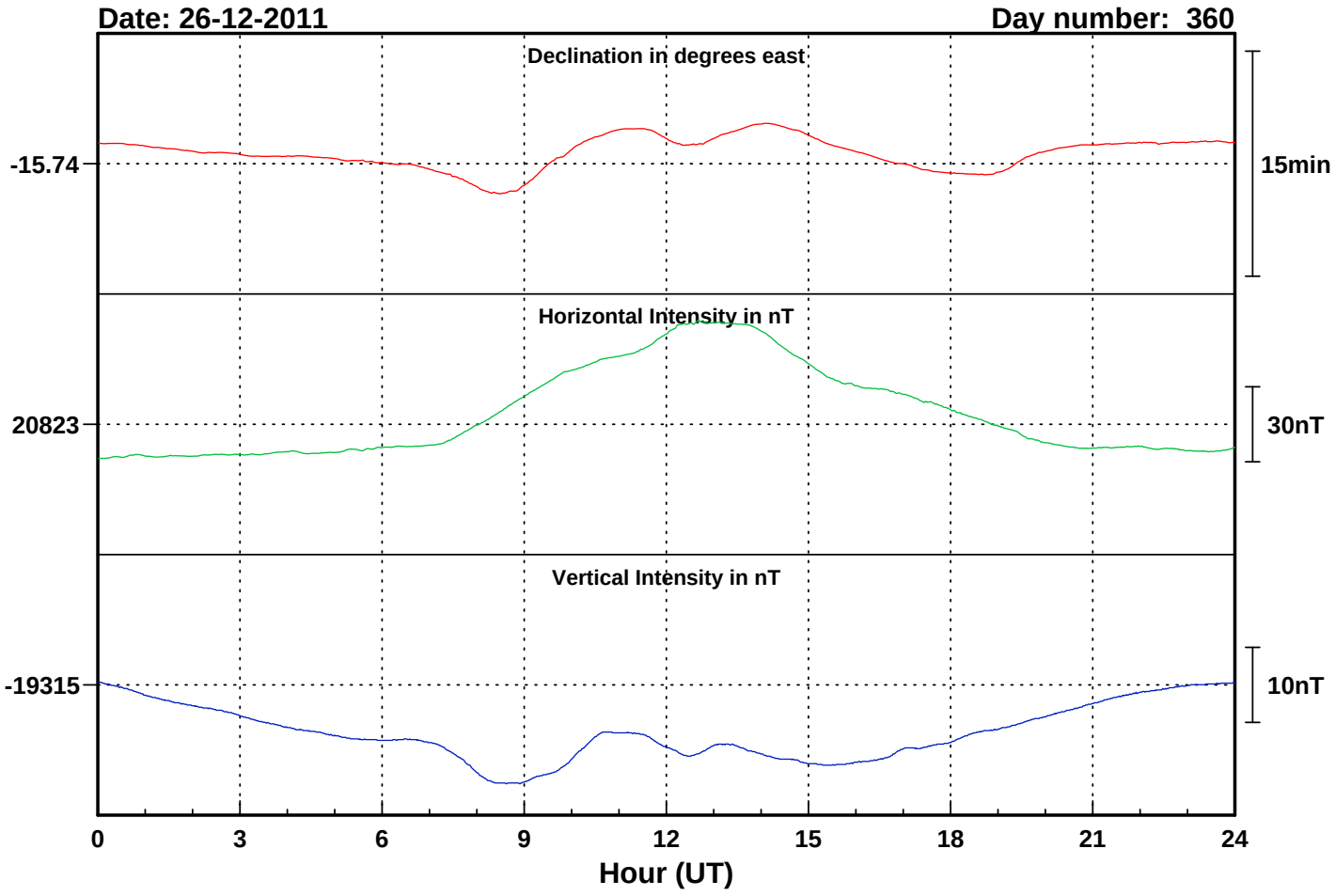
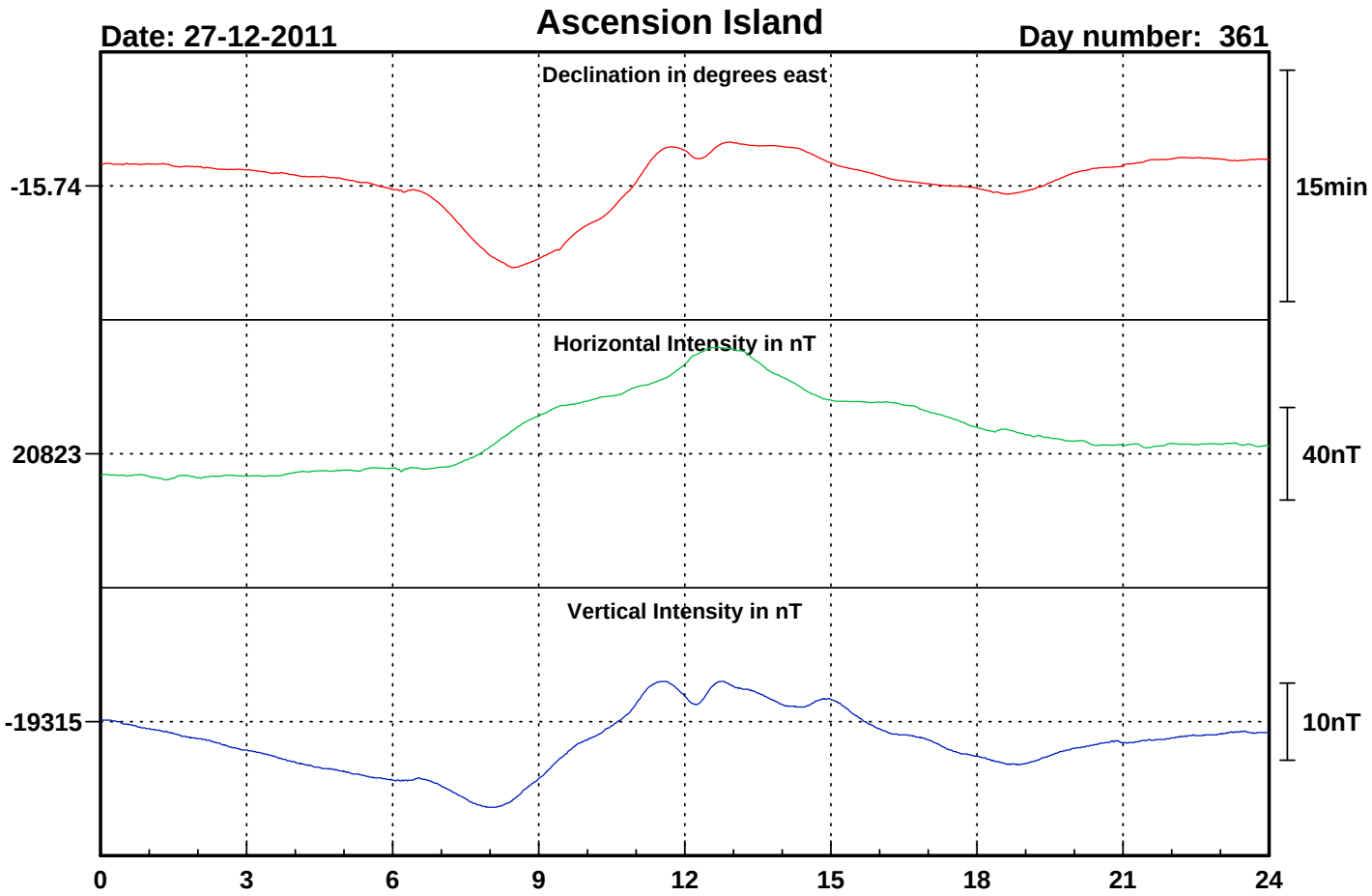
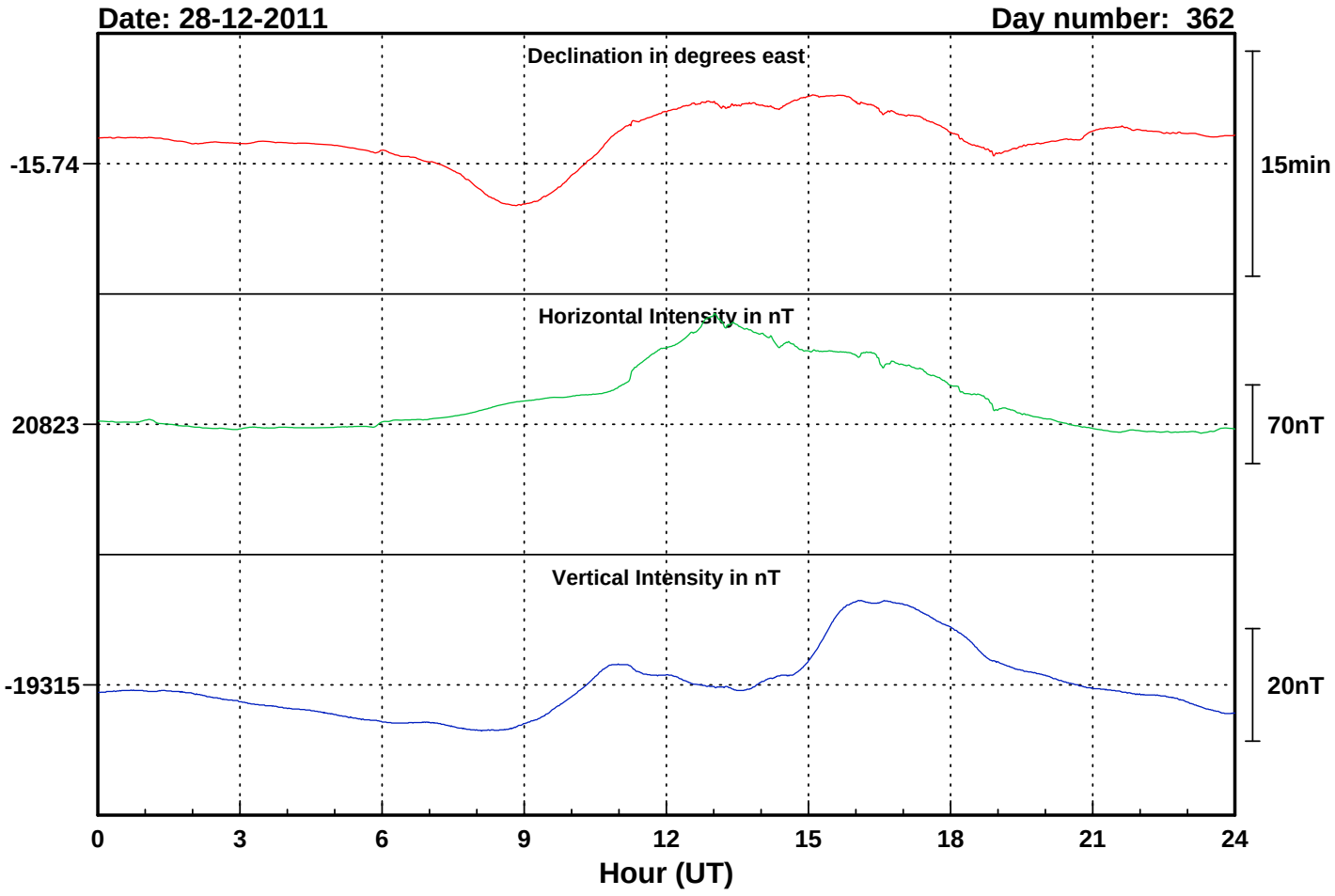
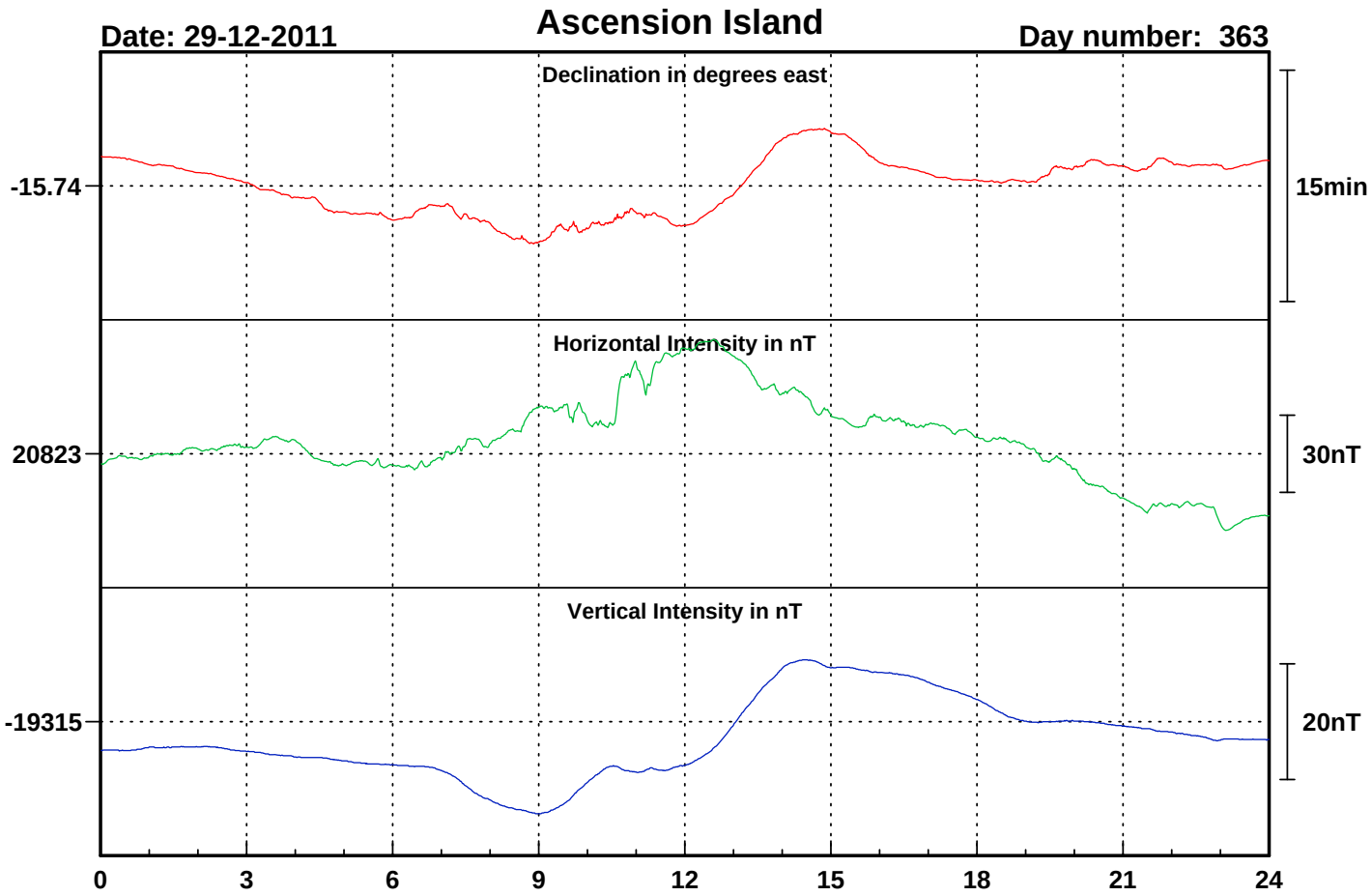
24
Hour (UT)

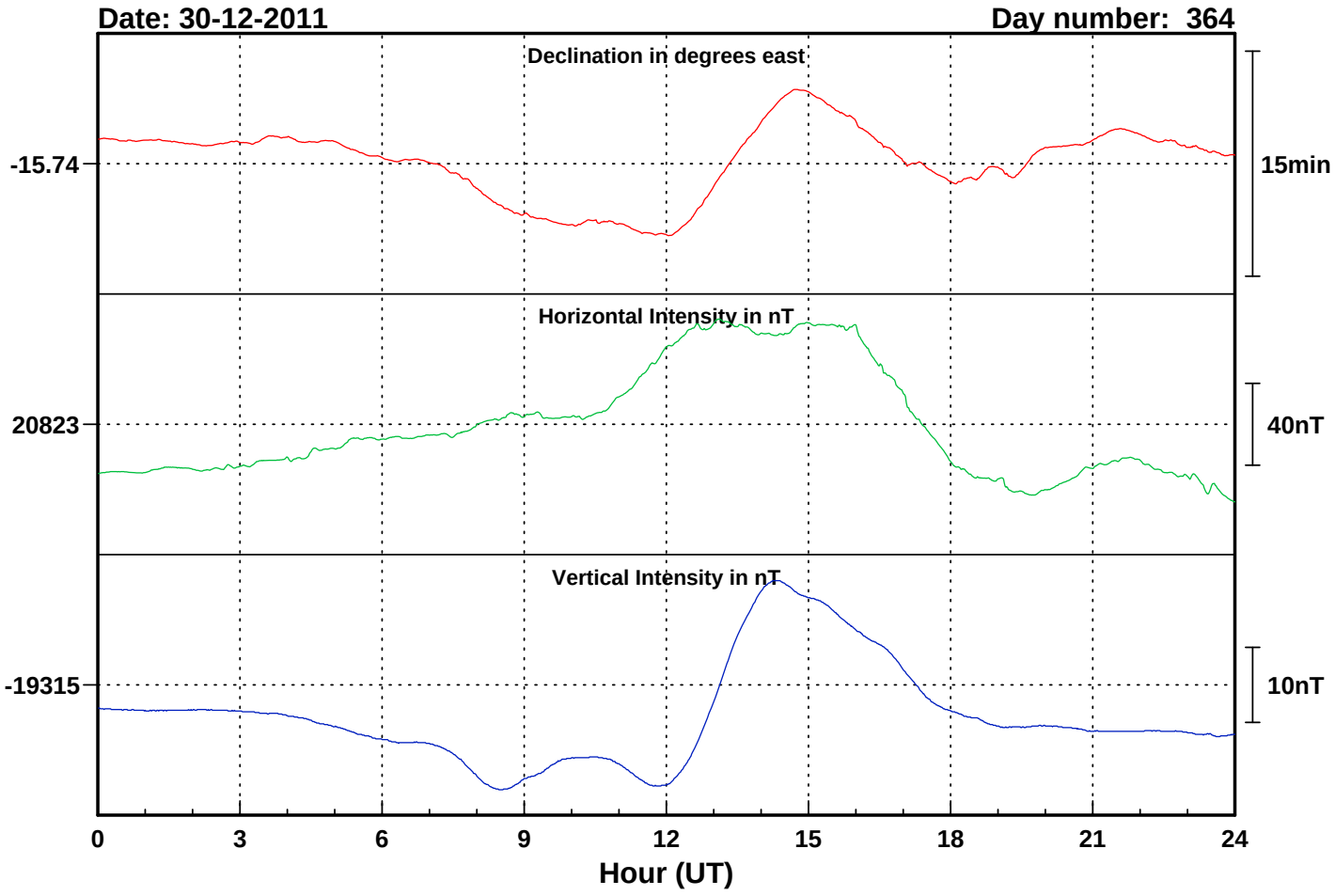

Ascension Island
Date: 25-12-2011
Day number: 359
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
20nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24

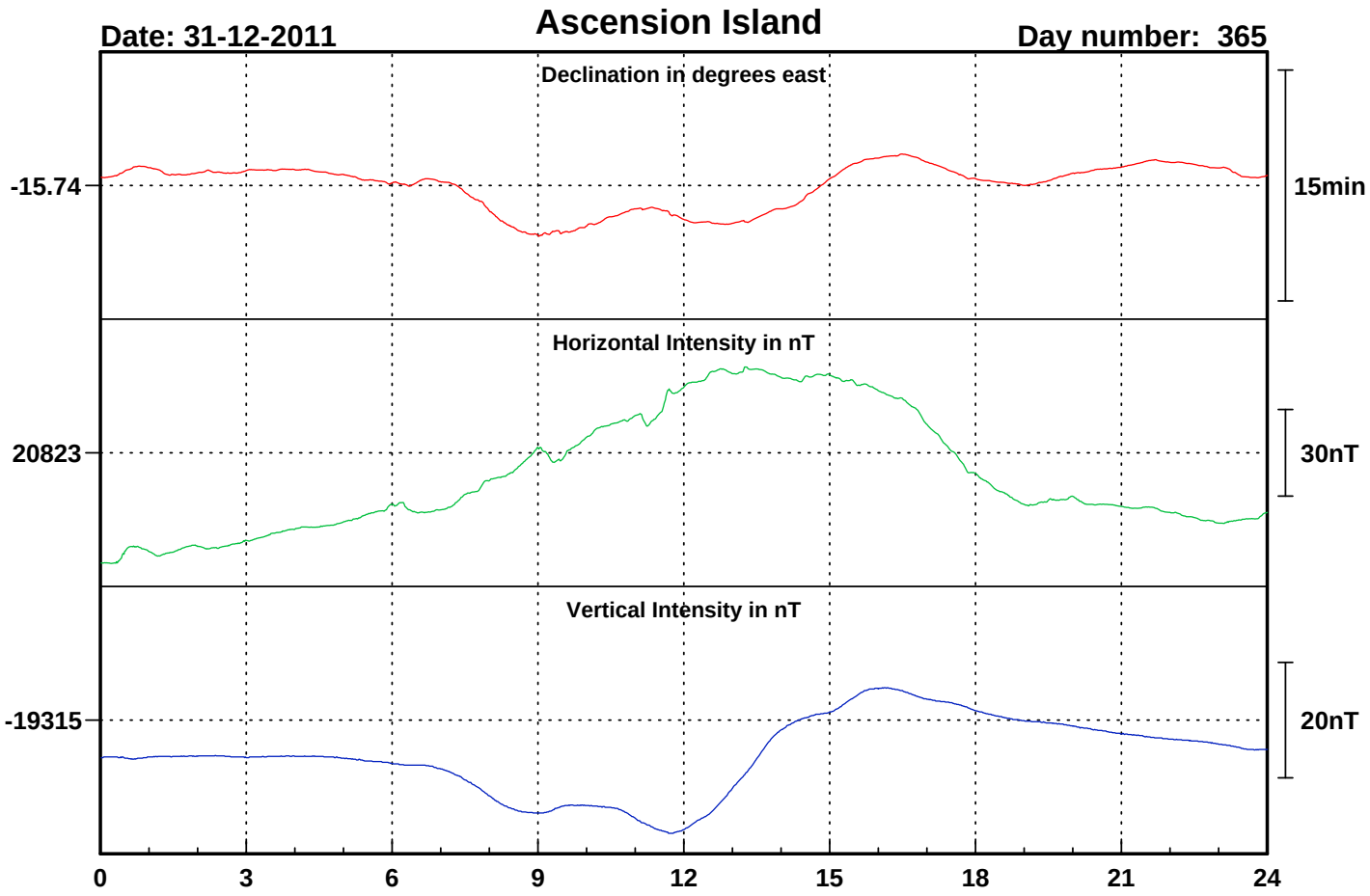

Date: 26-12-2011
Day number: 360
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Ascension Island
Date: 27-12-2011
Day number: 361
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
40nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24

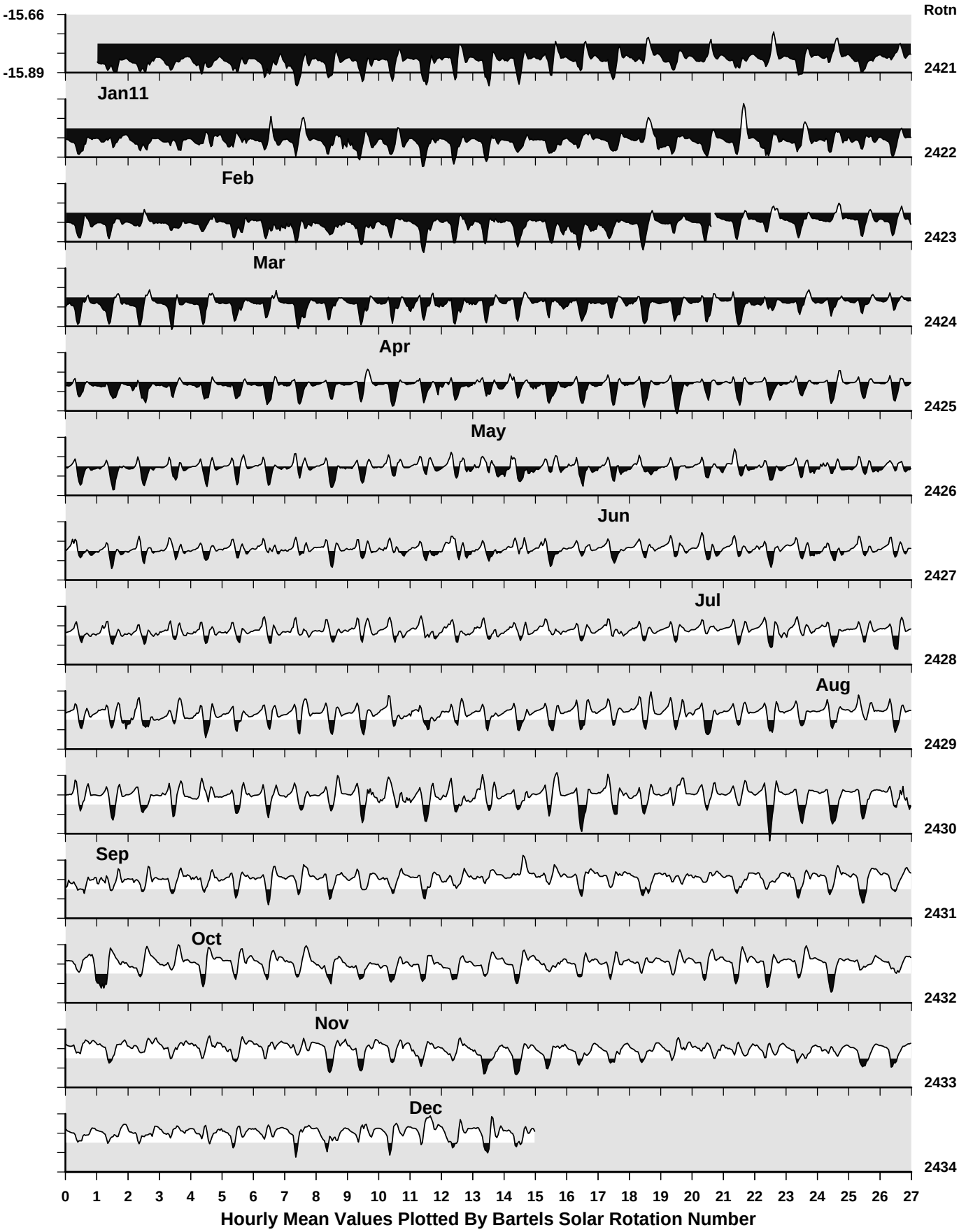

Date: 28-12-2011
Day number: 362
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
70nT
Vertical Intensity in nT
-19315
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Ascension Island
Date: 29-12-2011
Day number: 363
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
20nT
0
3
6
9
12
15
18
21
24


Date: 30-12-2011
Day number: 364
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
40nT
Vertical Intensity in nT
-19315
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)

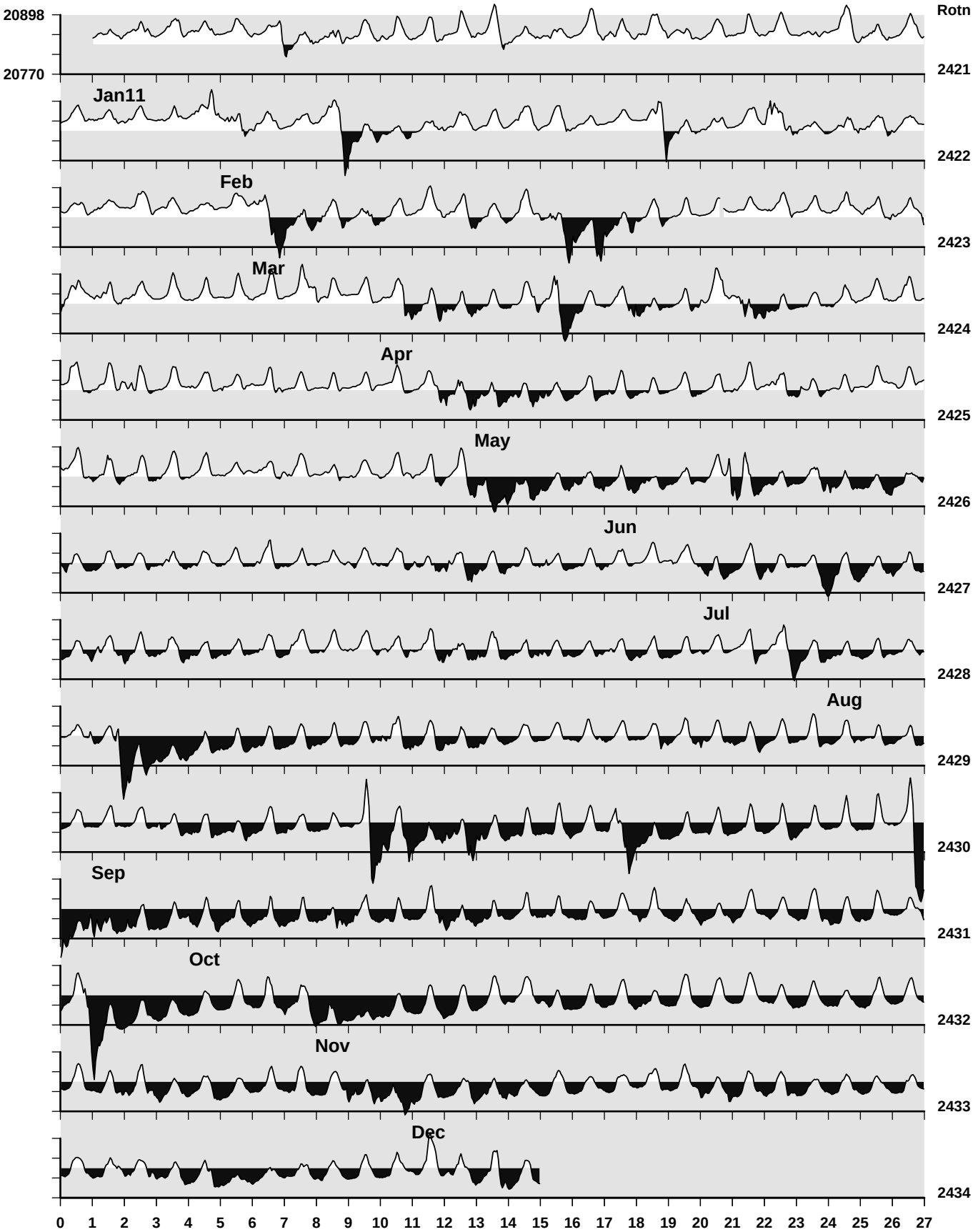

Ascension Island
Date: 31-12-2011
Day number: 365
Declination in degrees east
-15.74
15min
Horizontal Intensity in nT
20823
30nT
Vertical Intensity in nT
-19315
20nT
0
3
6
9
12
15
18
21
24

Ascension Island Observatory: Declination (degrees)



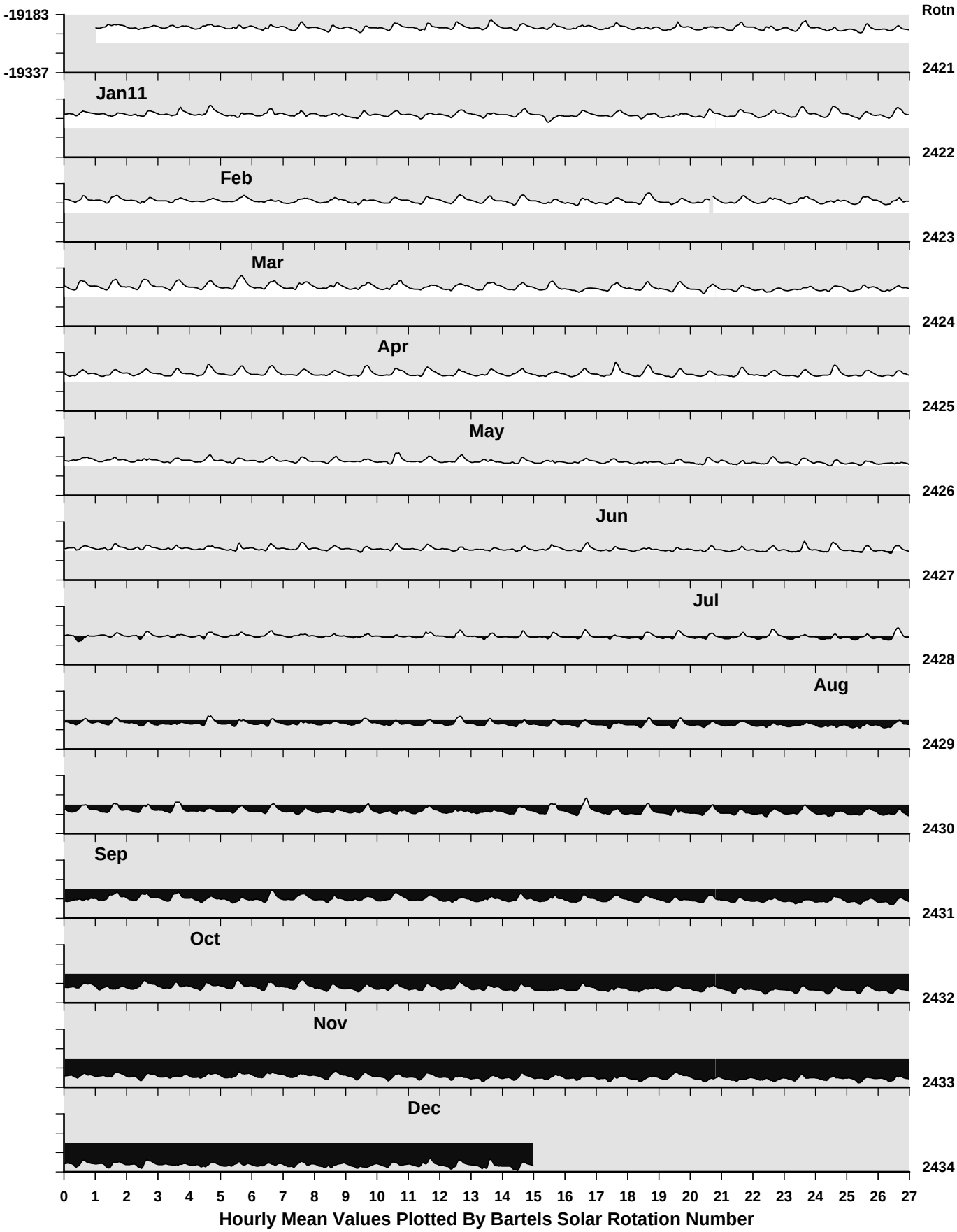
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Horizontal Intensity (nT



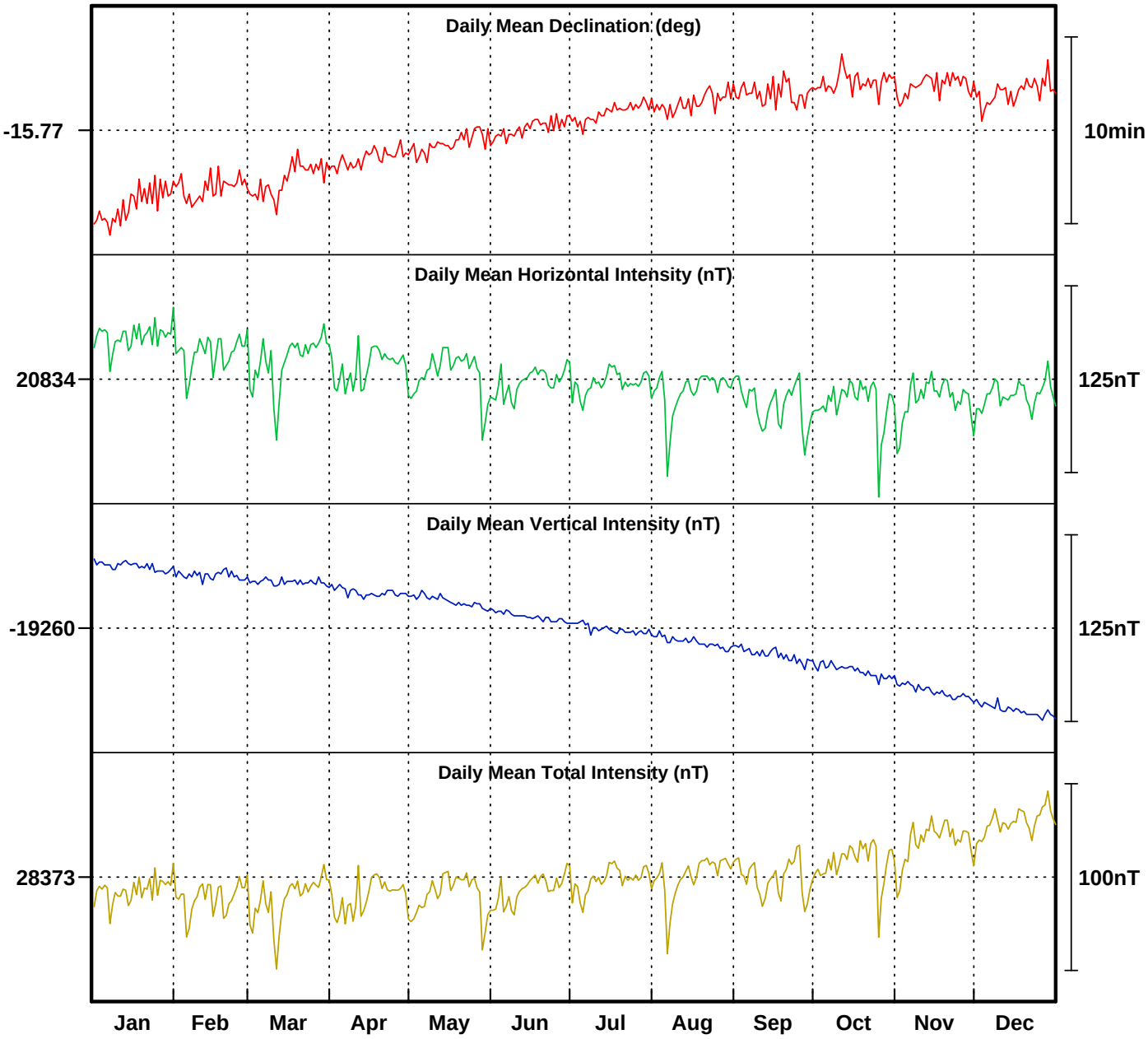
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Is Observatory 2011



Monthly Mean Values for Ascension Island Observatory 2011

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	-15° 50.3′	20863 nT	-42° 39.1′	20071 nT	-5694 nT	-19219 nT	28366 nT
February	-15° 49.5′	20851 nT	-42° 40.6′	20061 nT	-5686 nT	-19225 nT	28362 nT
March	-15° 49.0′	20846 nT	-42° 41.4′	20057 nT	-5682 nT	-19230 nT	28361 nT
April	-15° 47.9′	20842 nT	-42° 42.4′	20054 nT	-5674 nT	-19237 nT	28362 nT
May	-15° 47.1′	20838 nT	-42° 43.2′	20052 nT	-5668 nT	-19242 nT	28363 nT
June	-15° 46.2′	20832 nT	-42° 44.6′	20048 nT	-5662 nT	-19253 nT	28367 nT
July	-15° 45.4′	20831 nT	-42° 45.4′	20048 nT	-5657 nT	-19261 nT	28371 nT
August	-15° 44.9′	20826 nT	-42° 46.6′	20044 nT	-5652 nT	-19270 nT	28373 nT
September	-15° 44.4′	20817 nT	-42° 48.2′	20036 nT	-5647 nT	-19278 nT	28372 nT
October	-15° 43.8′	20818 nT	-42° 49.0′	20039 nT	-5644 nT	-19289 nT	28381 nT
November	-15° 44.0′	20820 nT	-42° 50.1′	20040 nT	-5646 nT	-19303 nT	28391 nT
December	-15° 44.3′	20823 nT	-42° 50.9′	20043 nT	-5648 nT	-19315 nT	28402 nT

Note

i. The values shown here are provisional.