BRITISH GEOLOGICAL SURVEY

Ascension Island Observatory *Monthly Magnetic Bulletin*

December 2013

13/12/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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Internet: www.geomag.bgs.ac.uk

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° 56' 56"S*	*345° 37' 26"E*
Geomagnetic:	*2° 43' 05"S*	*057° 20' 56"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 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 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.’

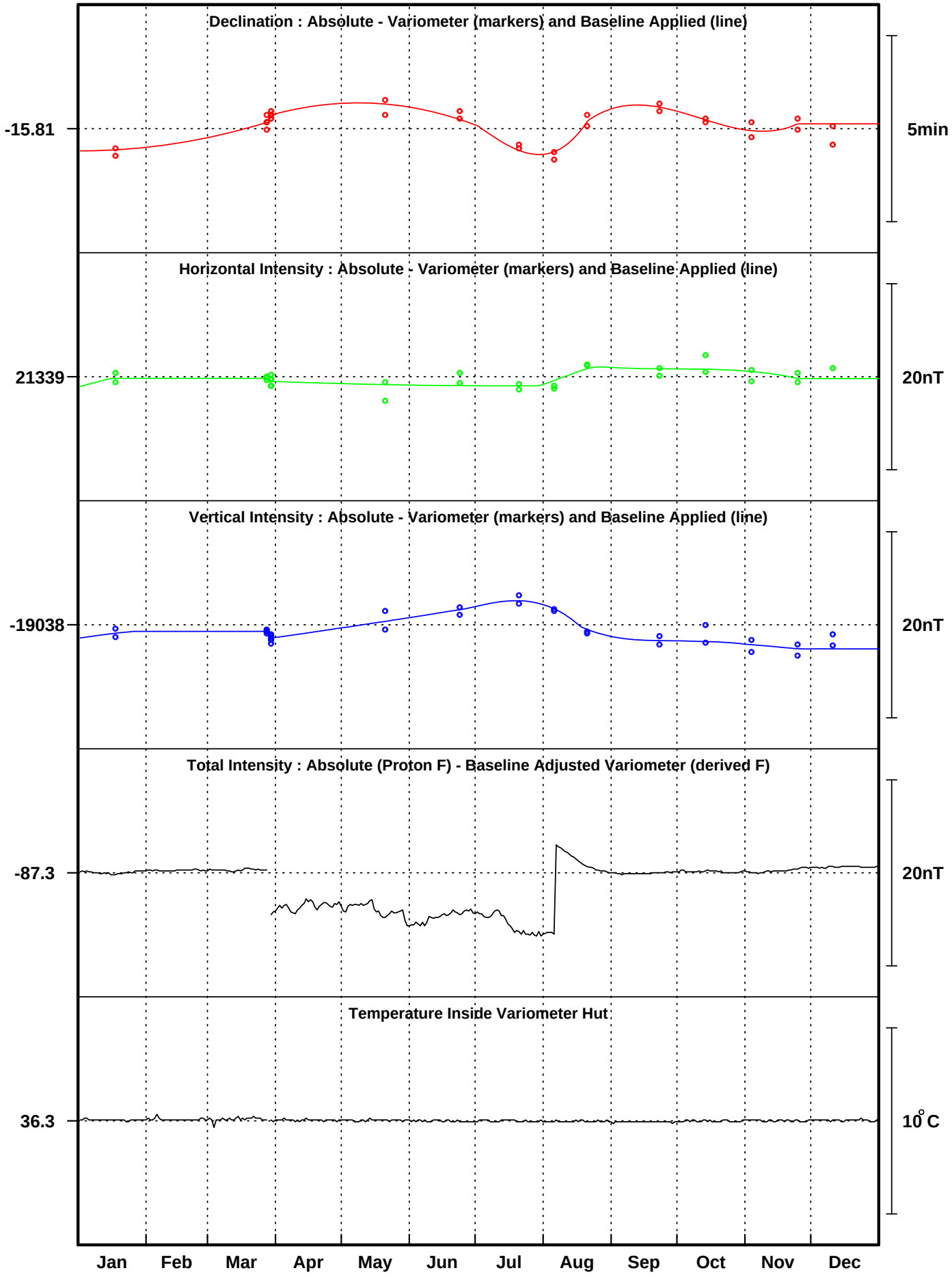
Commercial users can contact the geomagnetism team for information on the range of applications and services offered. Full contact details are available at www.geomag.bgs.ac.uk/contactus/staff

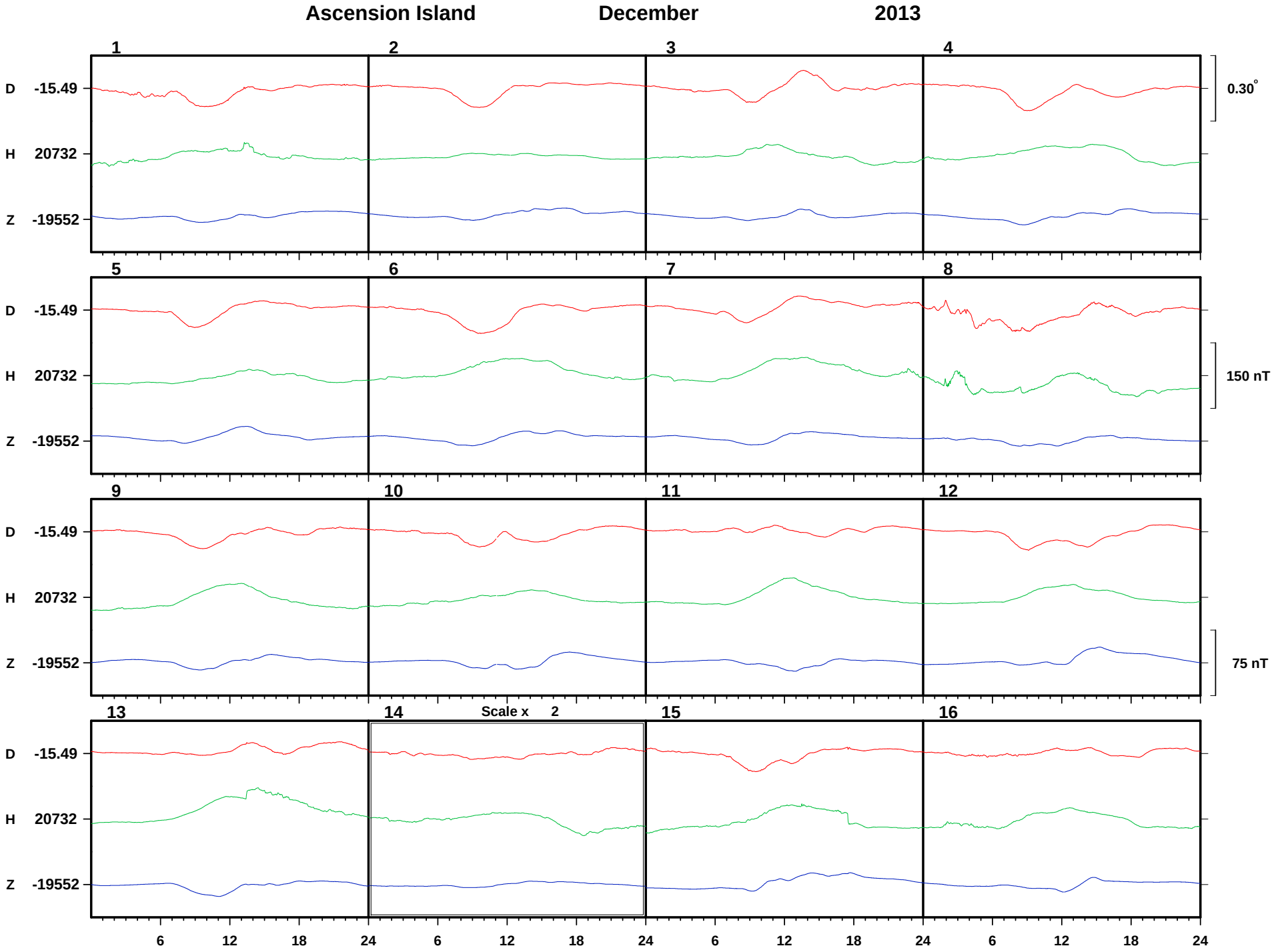
ASCENSION ISLAND OBSERVATORY

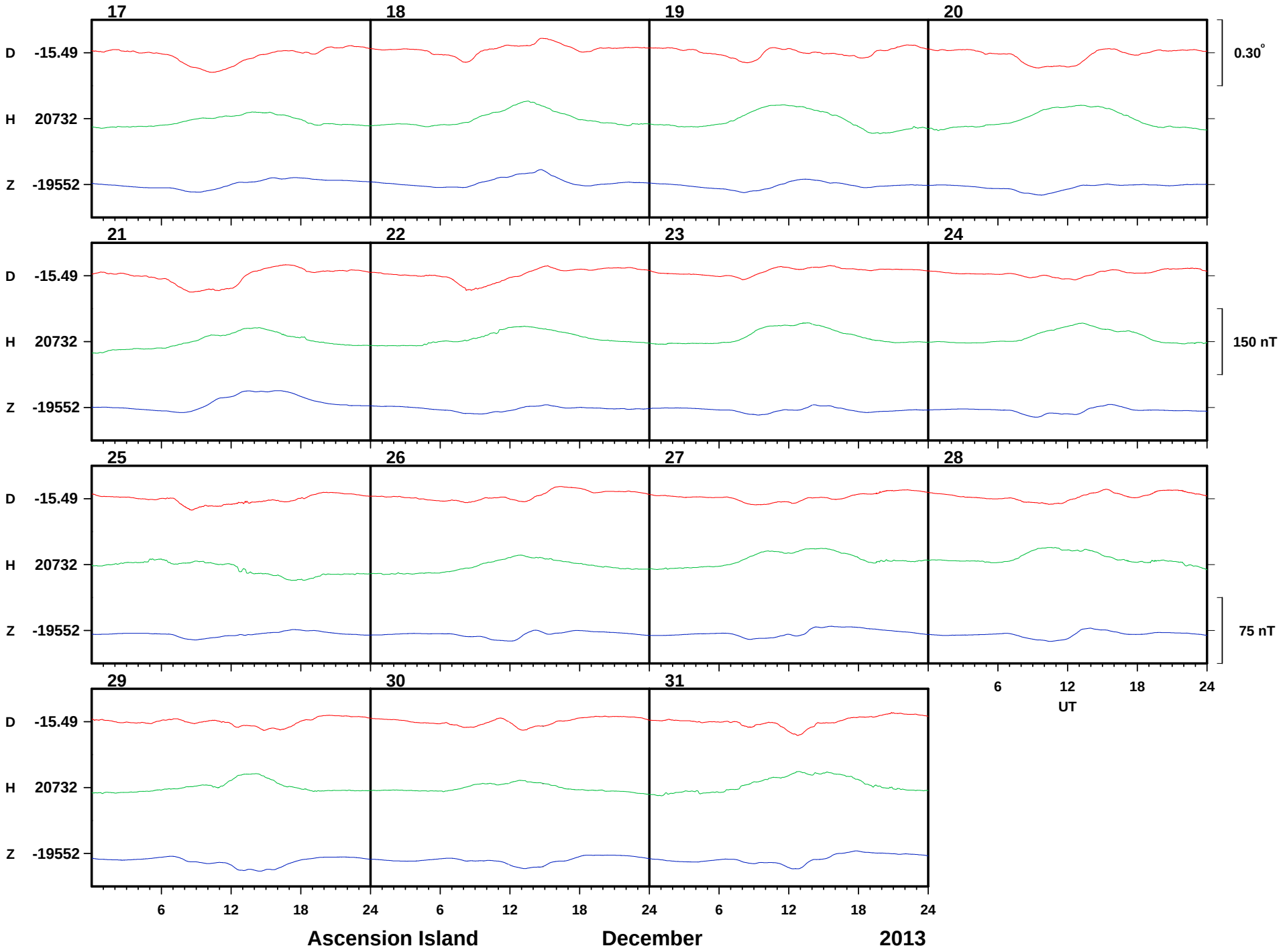
ABSOLUTE OBSERVATIONS

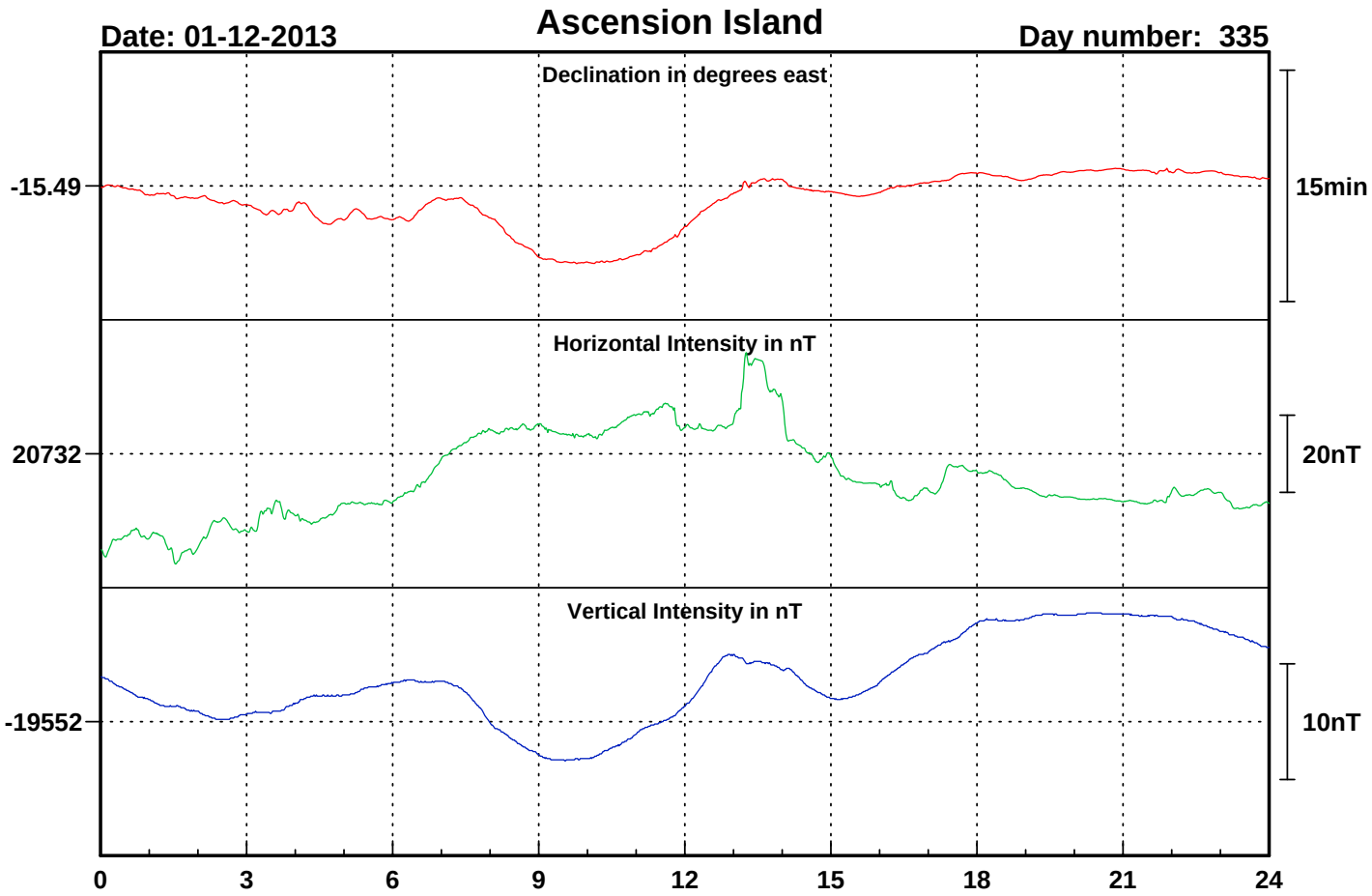
		Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		
Date	**Day Number**	**Time (UT)**	**Absolute (º)**	**Baseline (º)**	**Time (UT)**	**Absolute (º)**	**Site difference (nT)**	**Absolute corrected (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Absolute (nT)**	**Baseline (nT)**	**Observer**
10-Dec-13	344	18:09	-15.4871	-15.8167	18:21	-43.3122	87.3	28485.9	20727.1	21339.5	-19540.6	-19040.4	GA
10-Dec-13	344	18:31	-15.4786	-15.8083	18:42	-43.3126	87.3	28485.6	20726.8	99999.9	-19540.5	-19039.2	GA

Ascension Island 2013




Ascension Island
December
2013
1
2
3
4
D -15.49
H 20732
Z -19552
0.30°
5
6
7
8
150 nT
9
10
11
12
75 nT
13
14
15
16
Scale x 2
6
12
18
24


17
18
19
20
D -15.49
H 20732
Z -19552
0.30°
21
22
23
24
150 nT
25
26
27
28
75 nT
29
30
31
6
12
18
24
UT
Ascension Island
December
2013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Day number: 335
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
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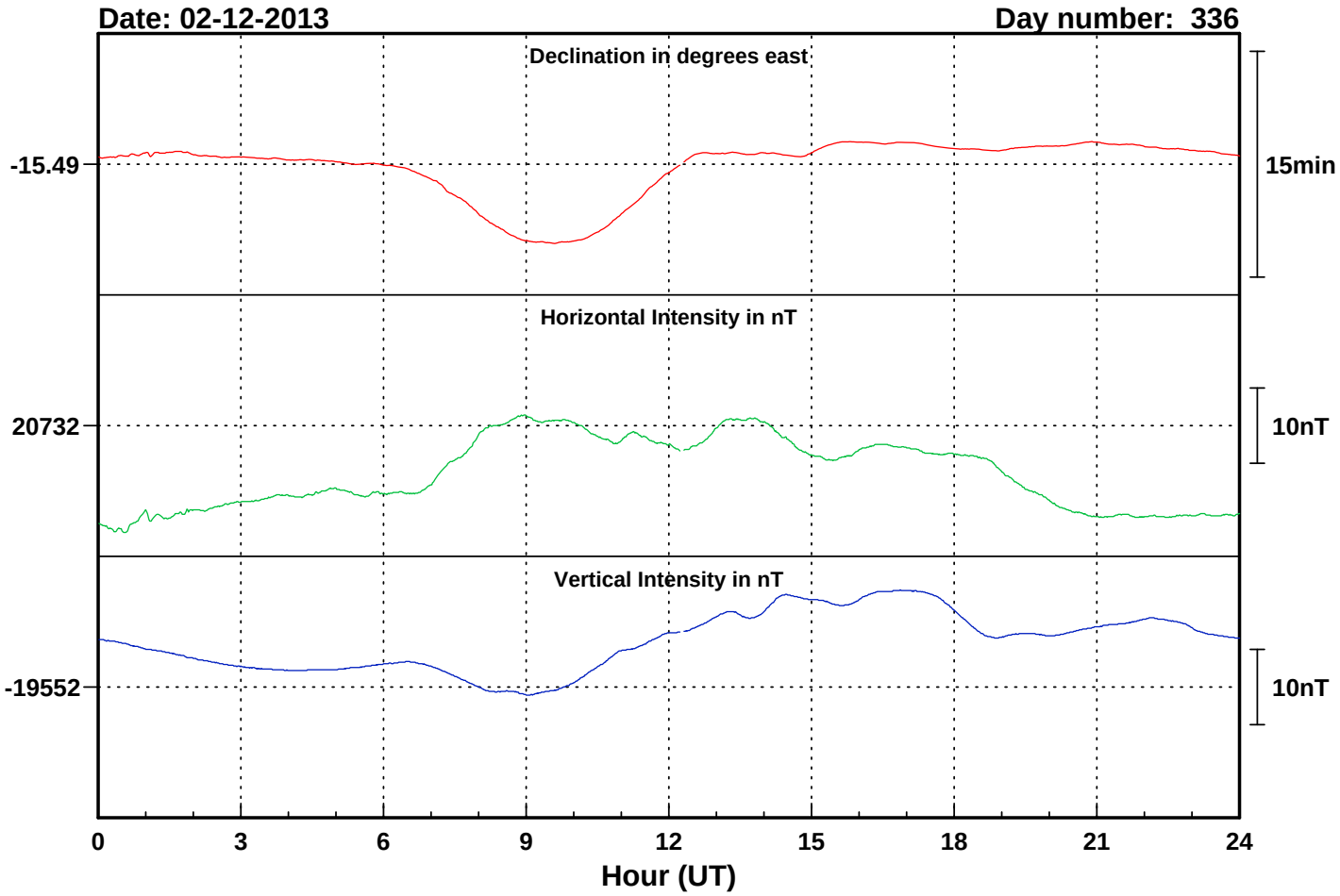
10nT
0
3
6
9
12
15
18
21
24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Declination in degrees east
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15min
Horizontal Intensity in nT
20732
10nT
Vertical Intensity in nT
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9
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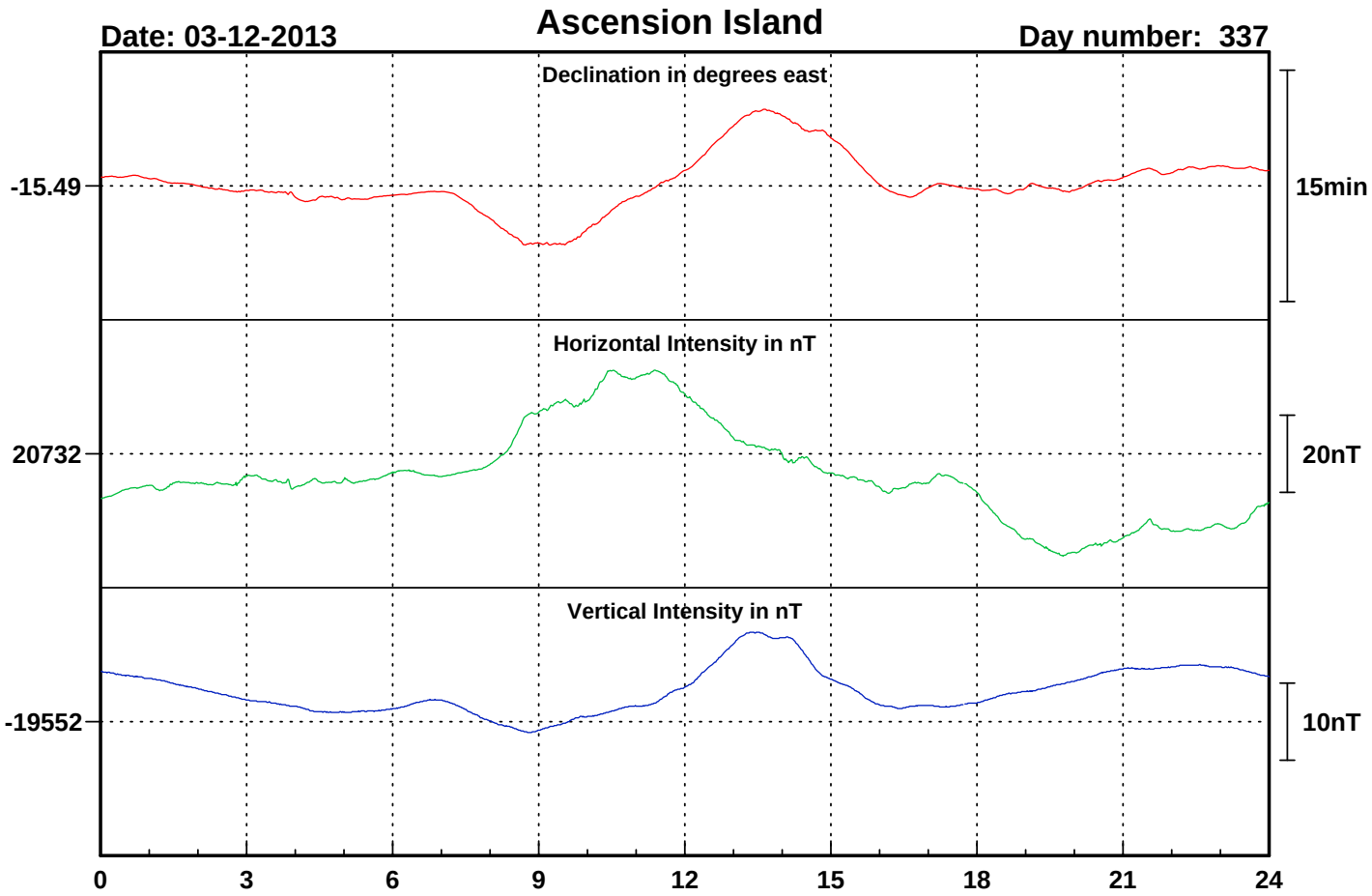
24
Hour (UT)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Day number: 337
Declination in degrees east
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15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
-19552
10nT
0
3
6
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18
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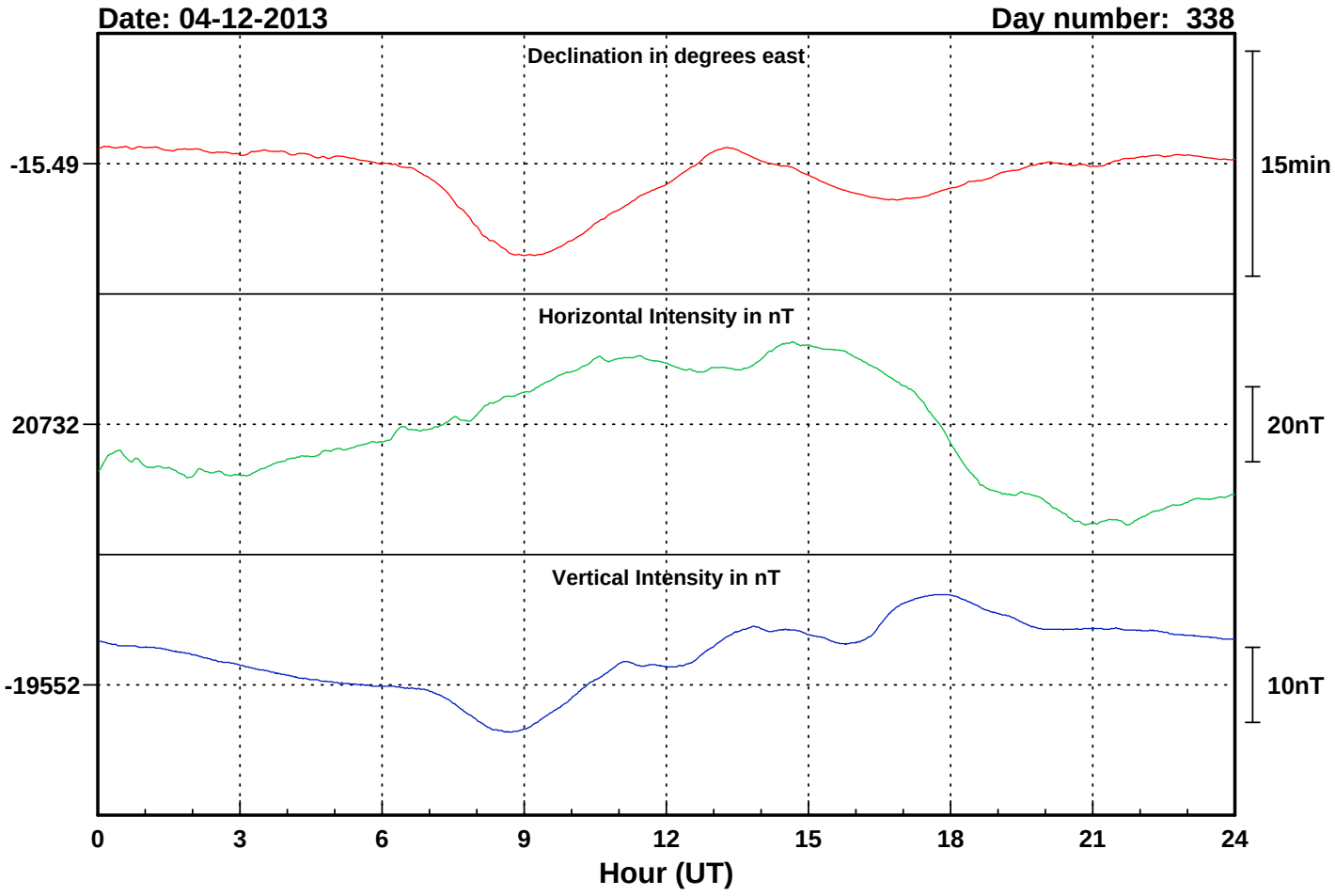
24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15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
-19552
10nT
0
3
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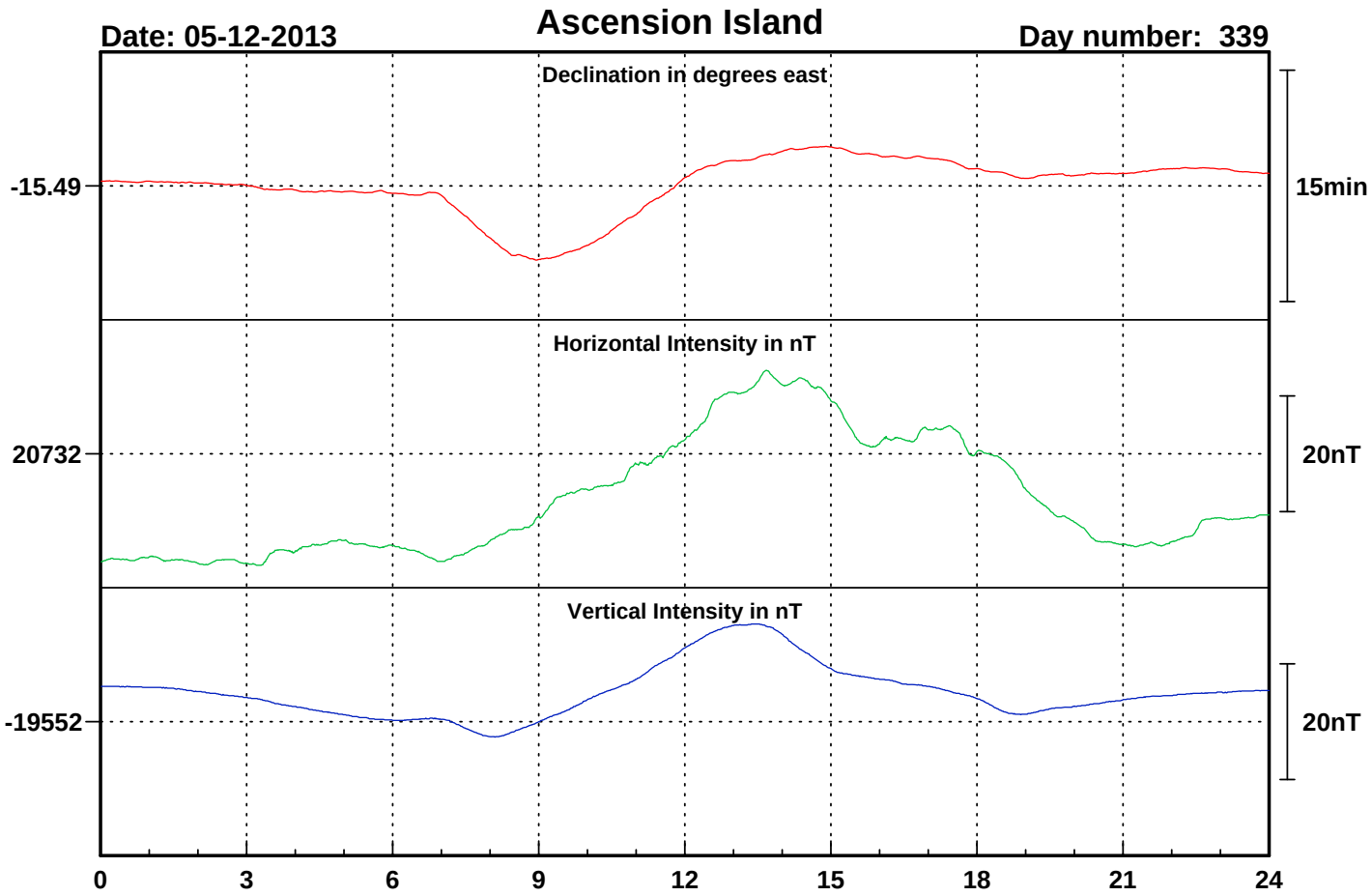
24
Hour (UT)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15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
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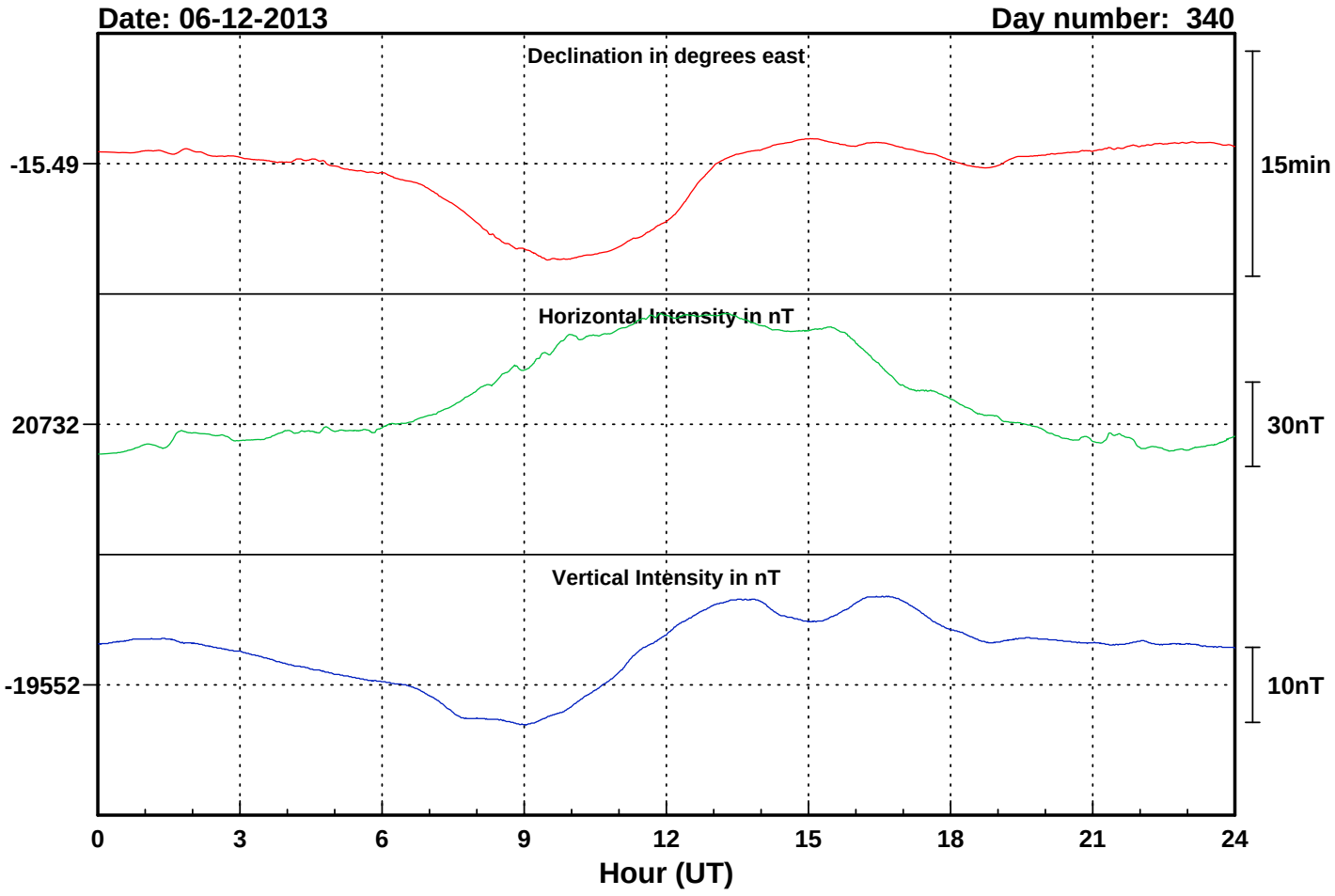
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30nT
Vertical Intensity in nT
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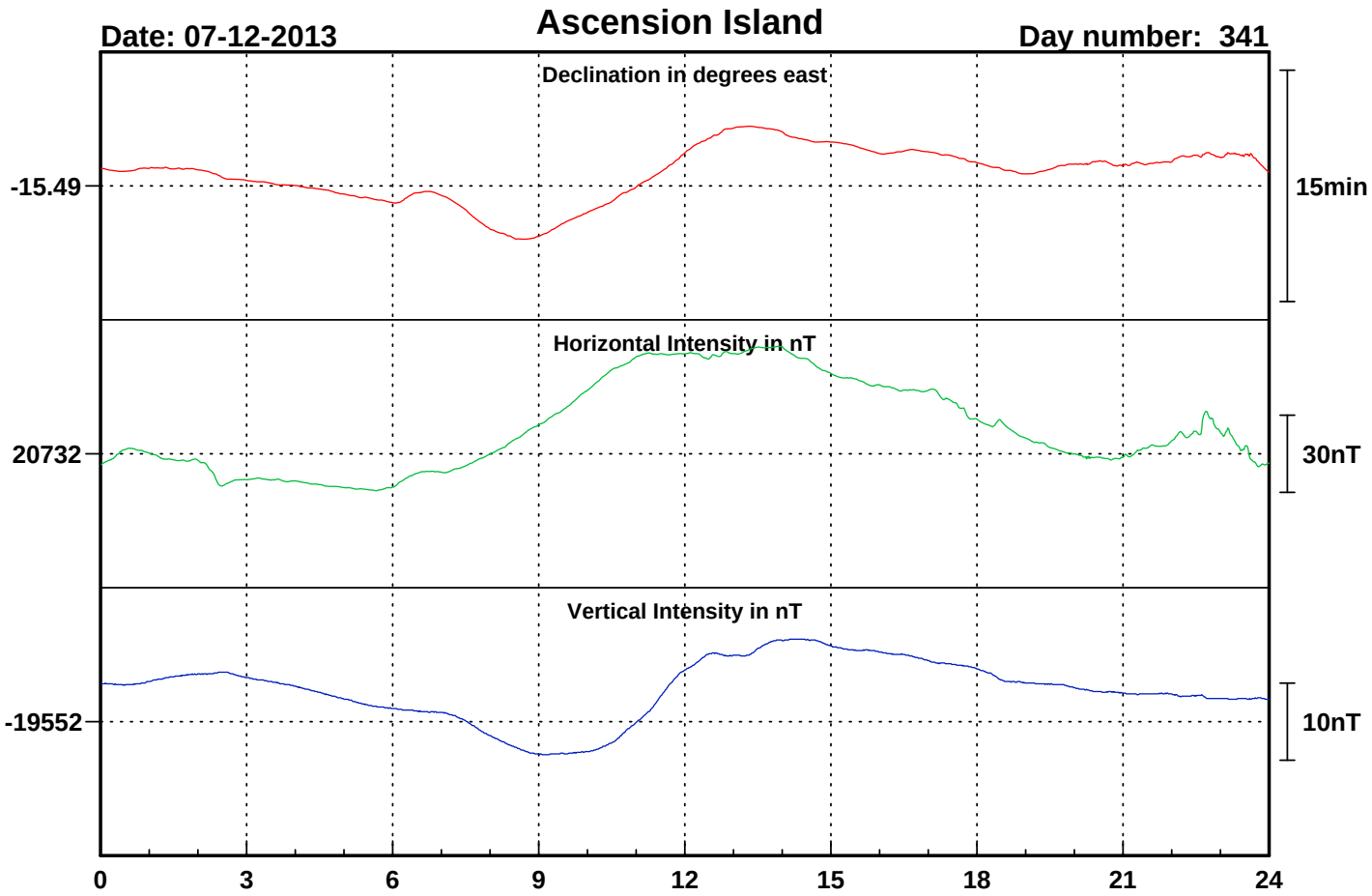
Hour (UT)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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
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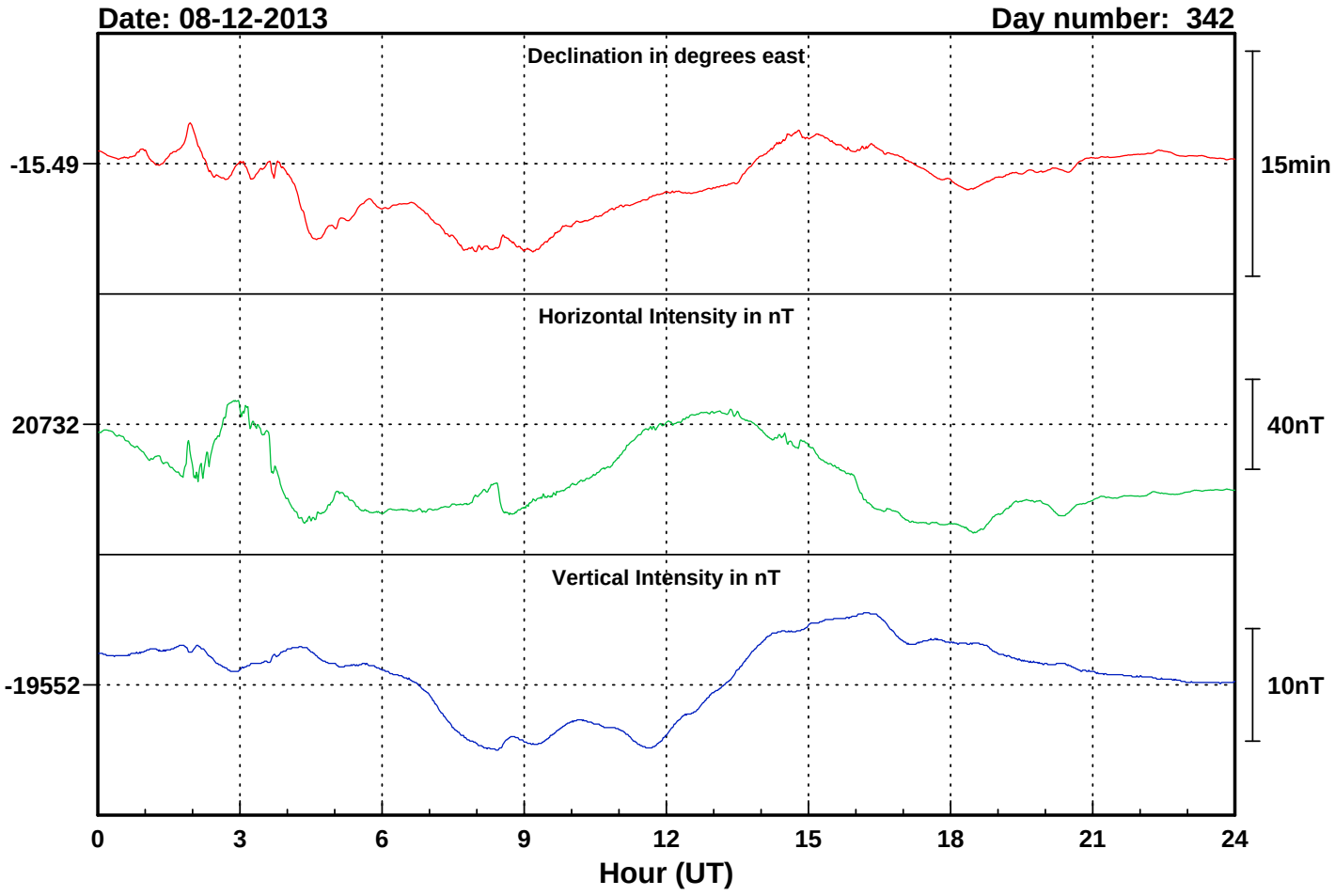
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15min
Horizontal Intensity in nT
20732
40nT
Vertical Intensity in nT
-19552
10nT
0
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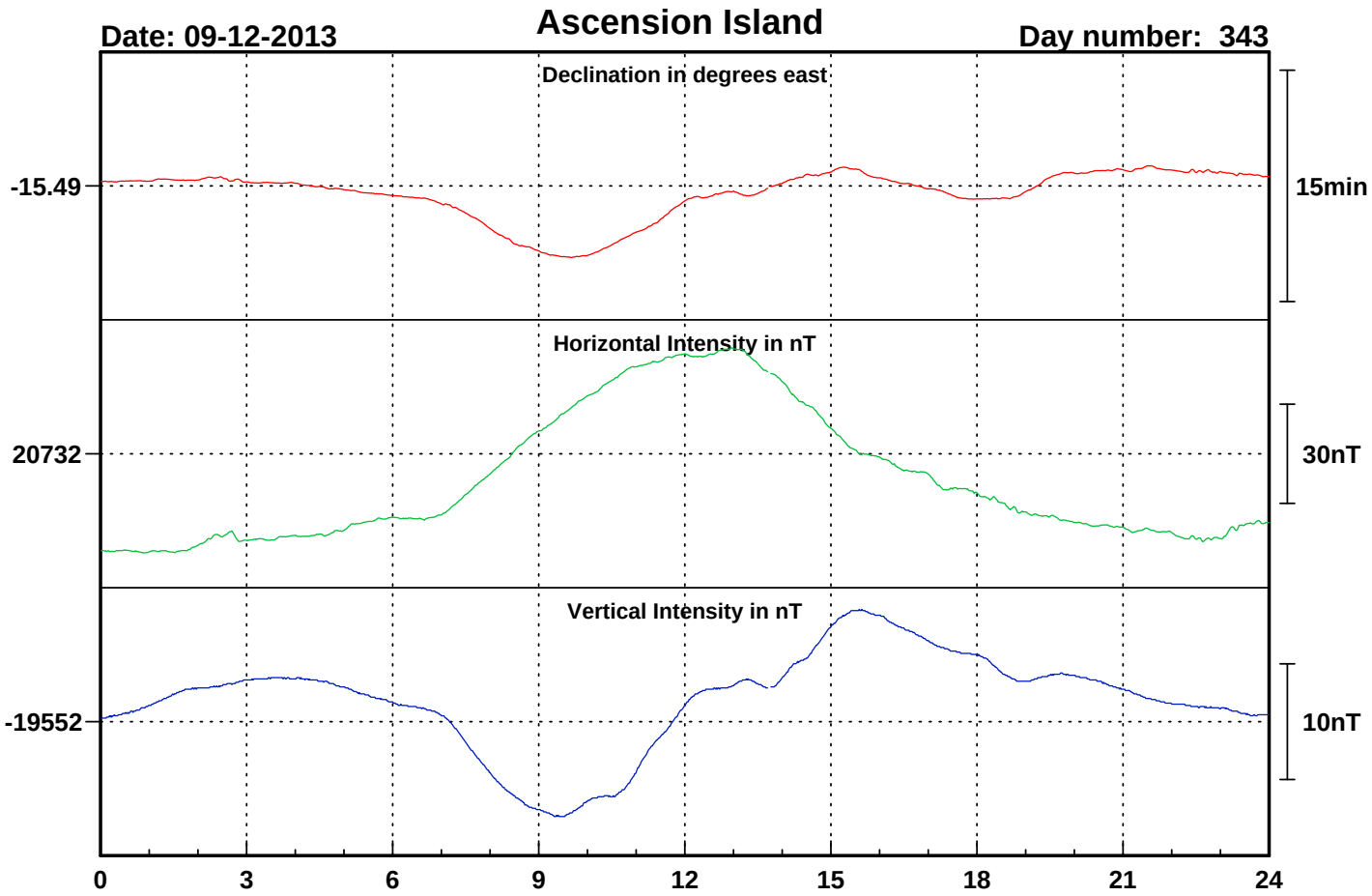
Hour (UT)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Day number: 343
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
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10nT
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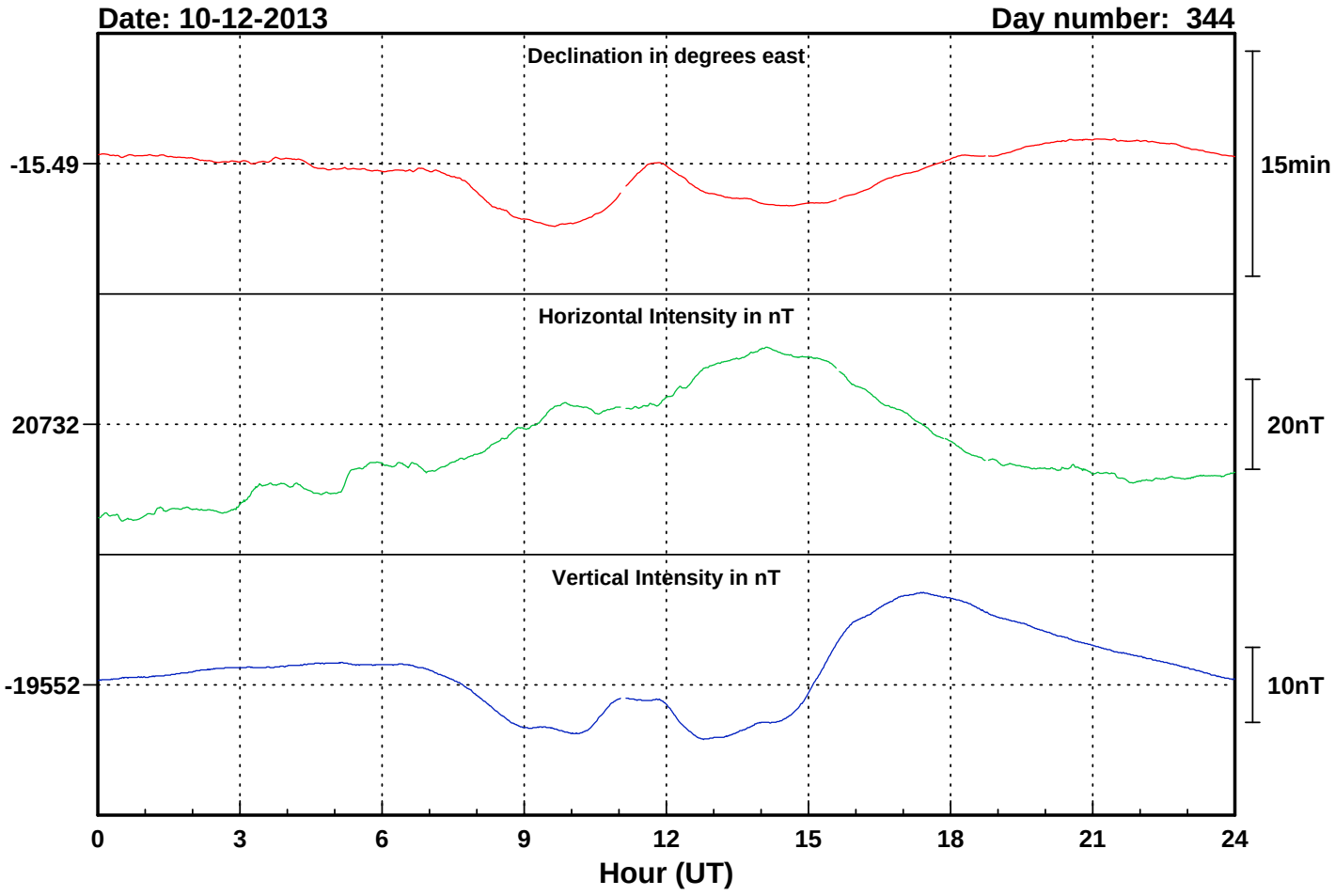
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15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
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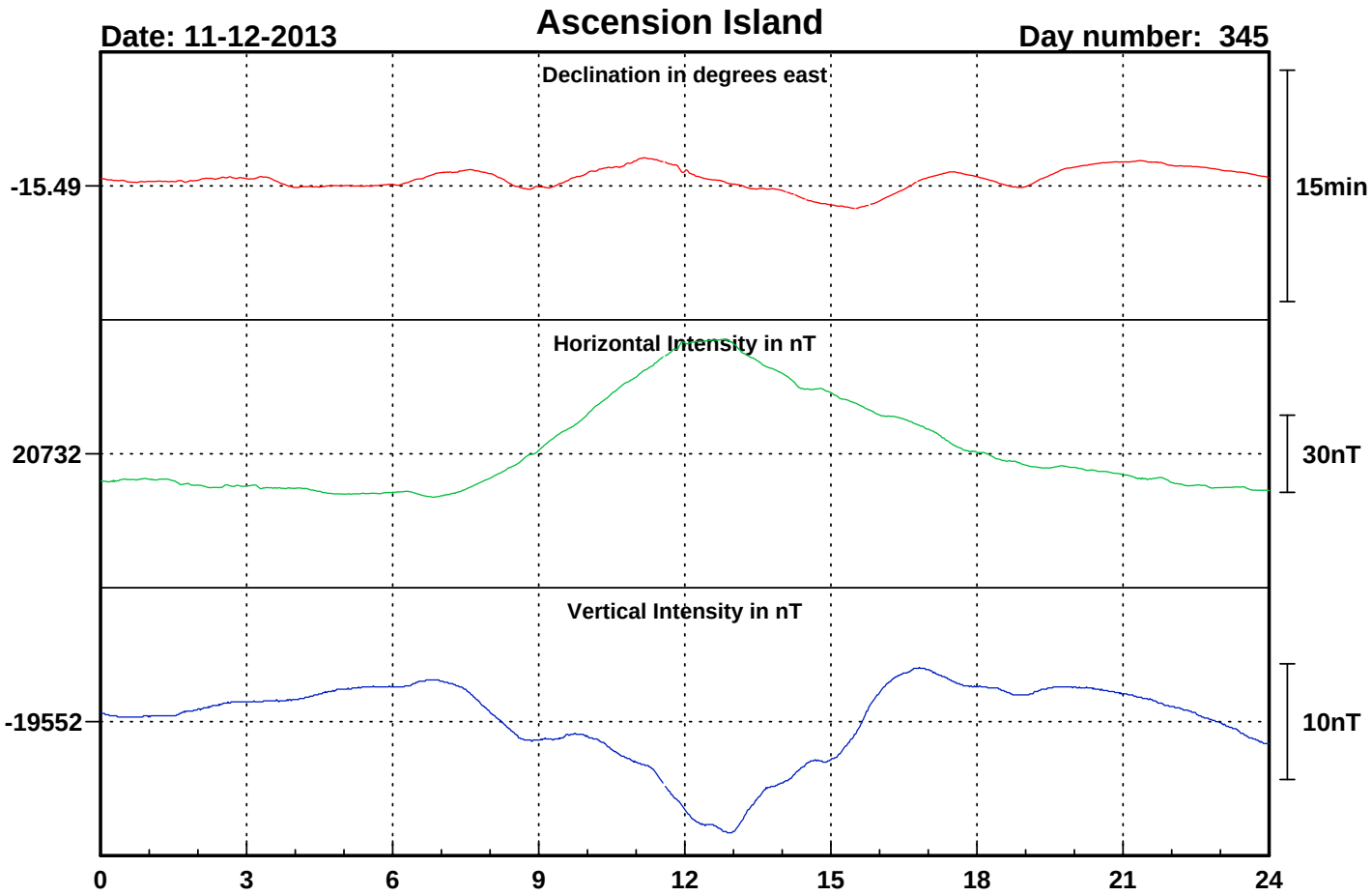
Hour (UT)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15min
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20732
30nT
Vertical Intensity in nT
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10nT
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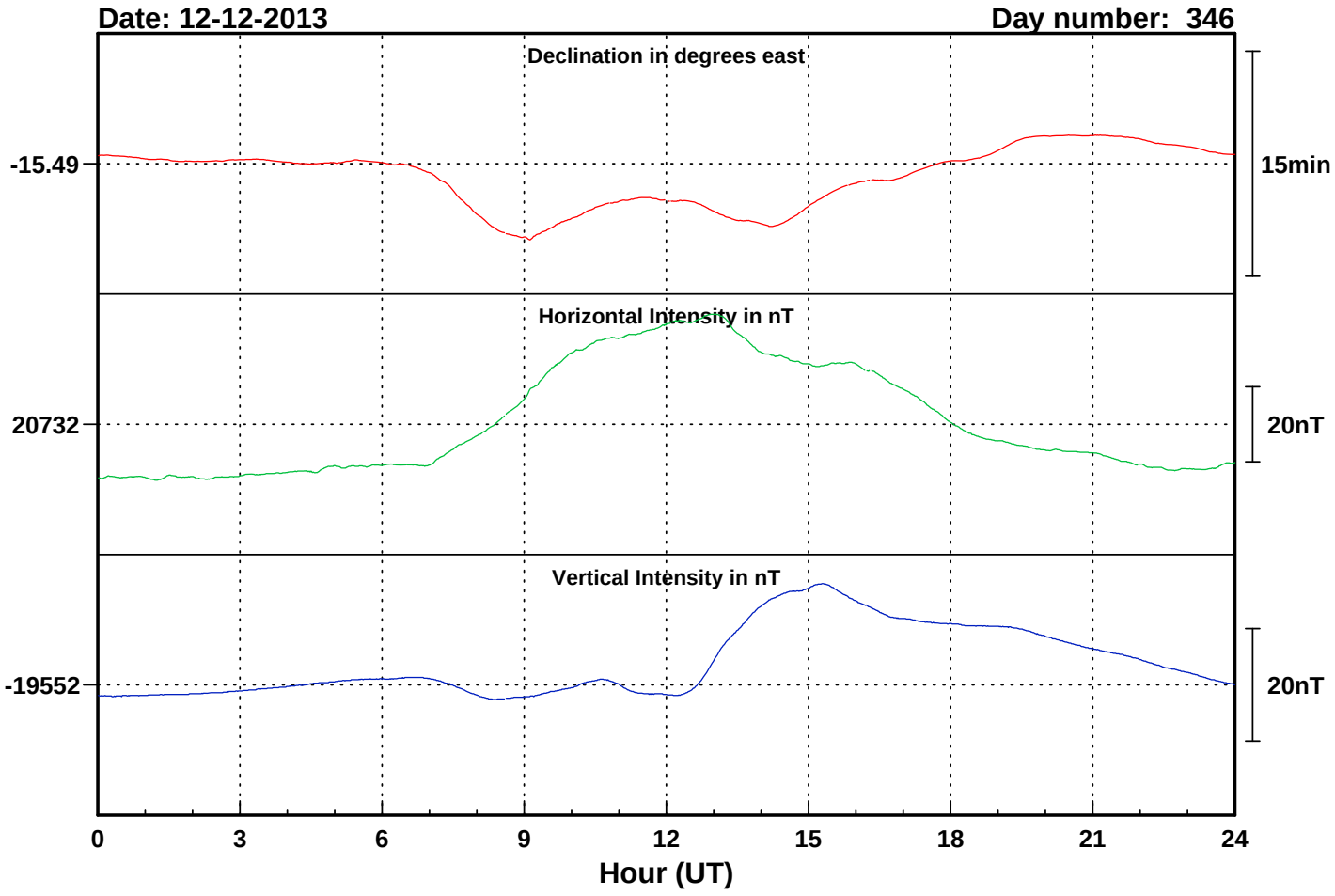
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15min
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Vertical Intensity in nT
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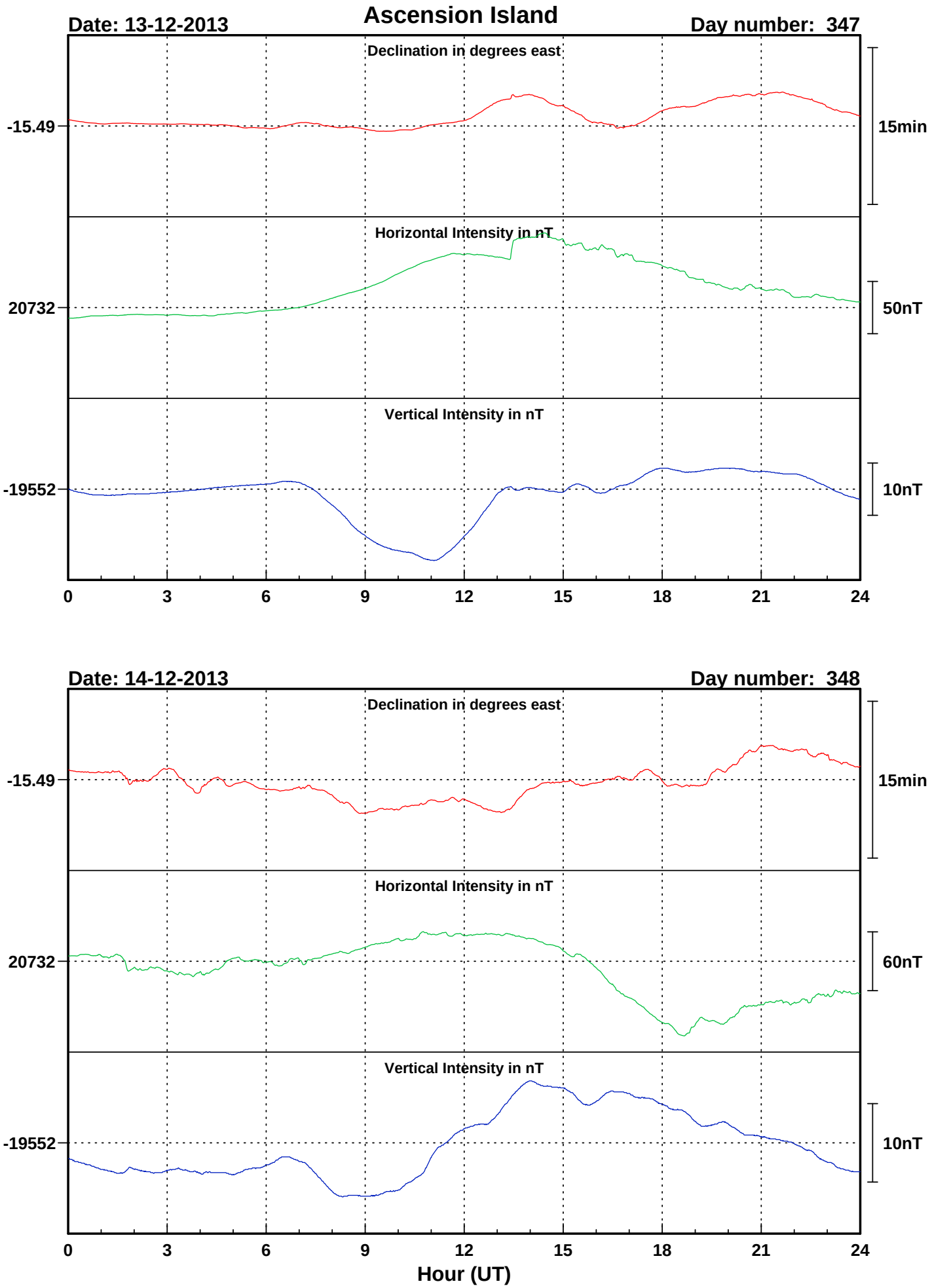
Hour (UT)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15min
Horizontal Intensity in nT
20732
50nT
Vertical Intensity in nT
-19552
10nT
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3
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24
Date: 14-12-2013
Day number: 348
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
60nT
Vertical Intensity in nT
-19552
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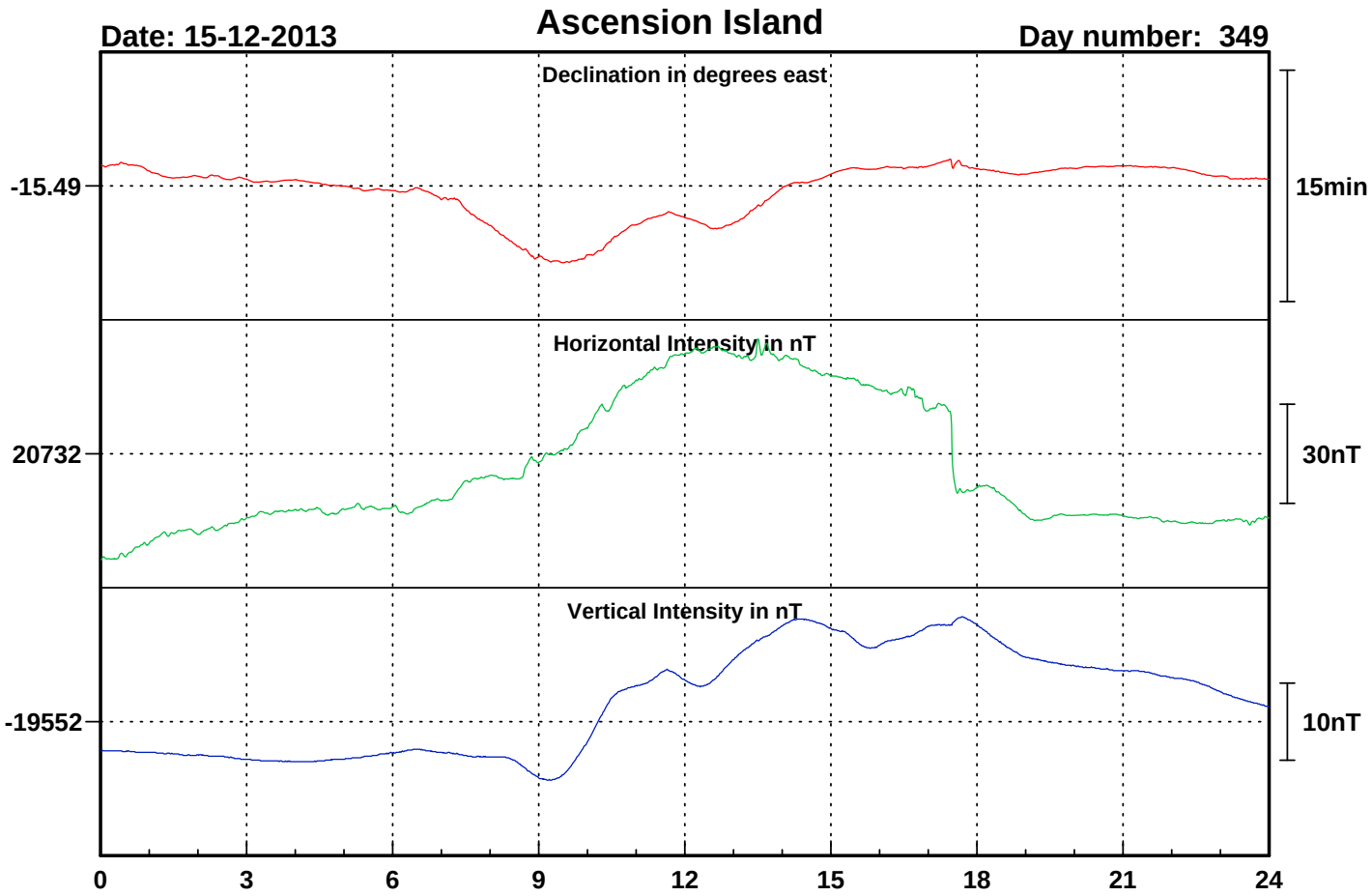
Hour (UT)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15min
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20732
30nT
Vertical Intensity in nT
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10nT
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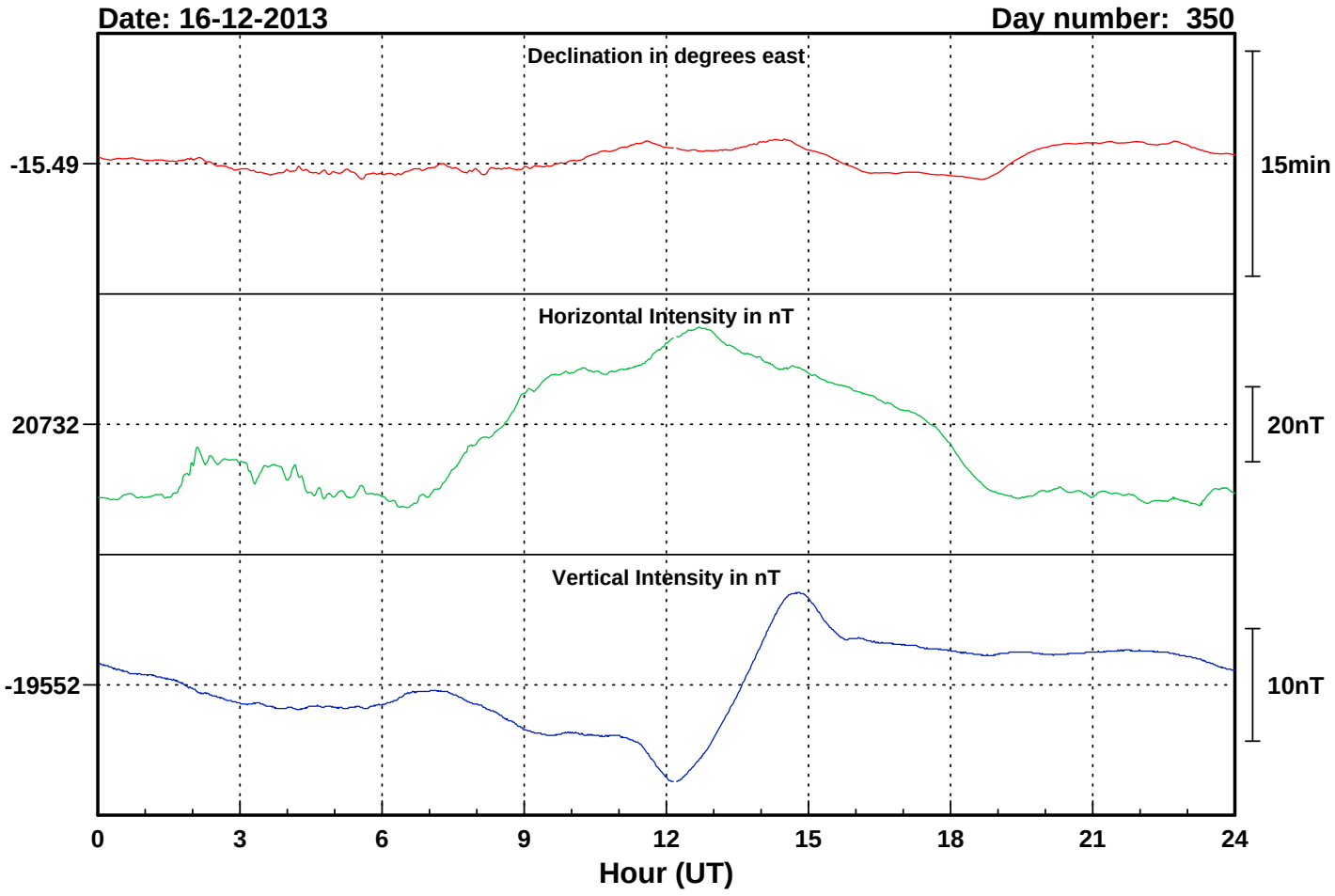
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20nT
Vertical Intensity in nT
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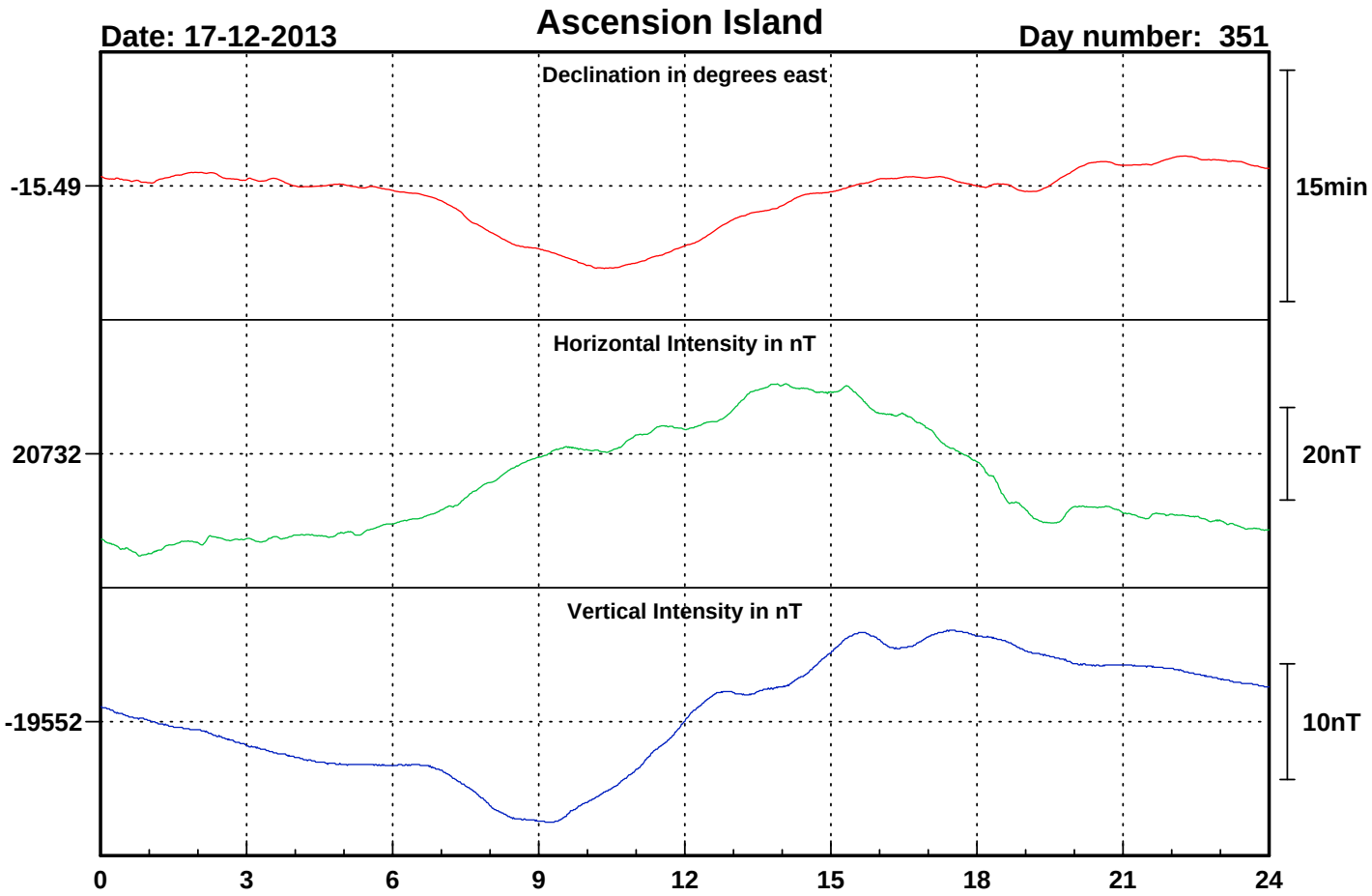
Hour (UT)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Day number: 351
Declination in degrees east
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15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
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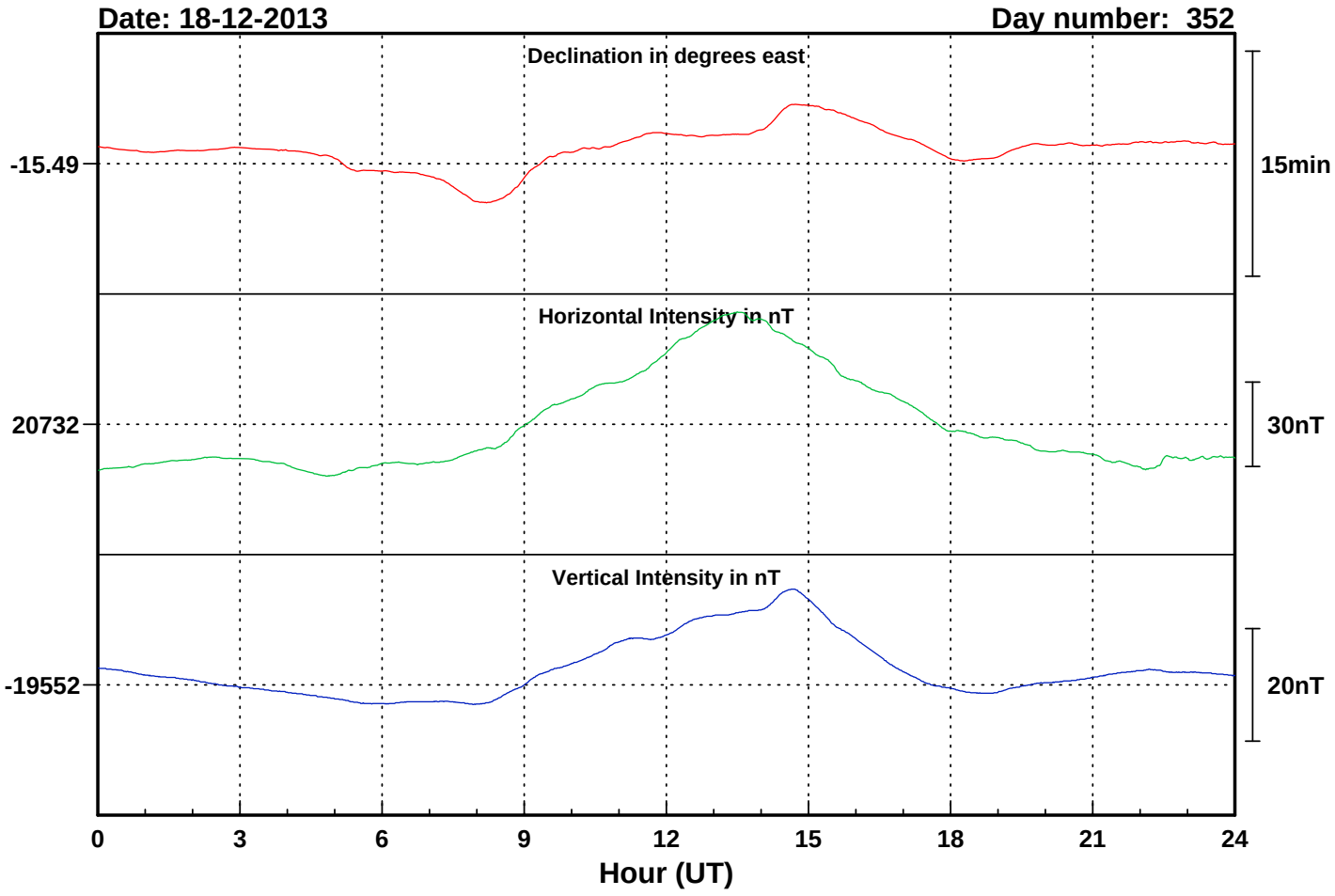
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
20nT
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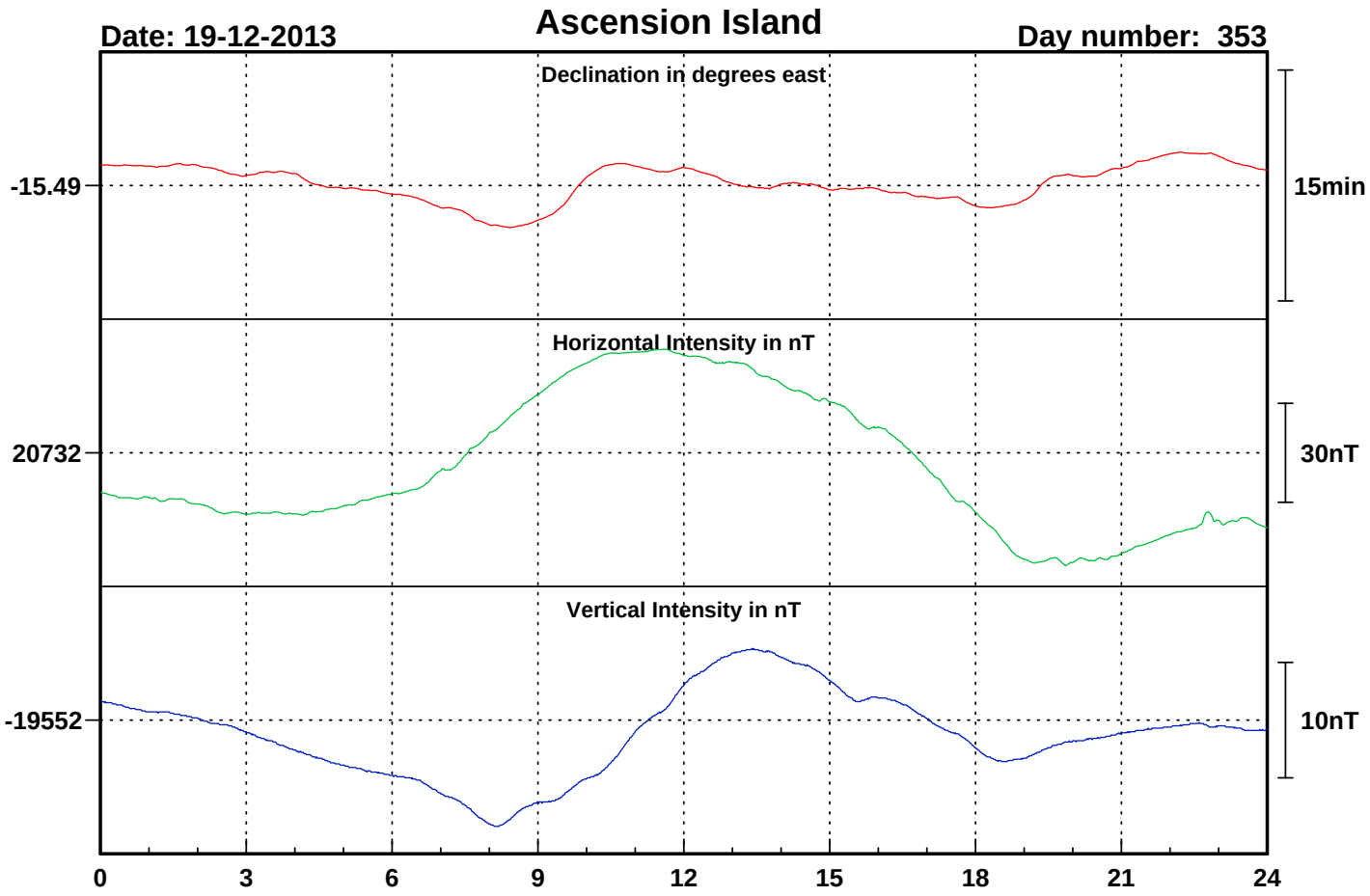
Hour (UT)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Day number: 353
Declination in degrees east
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
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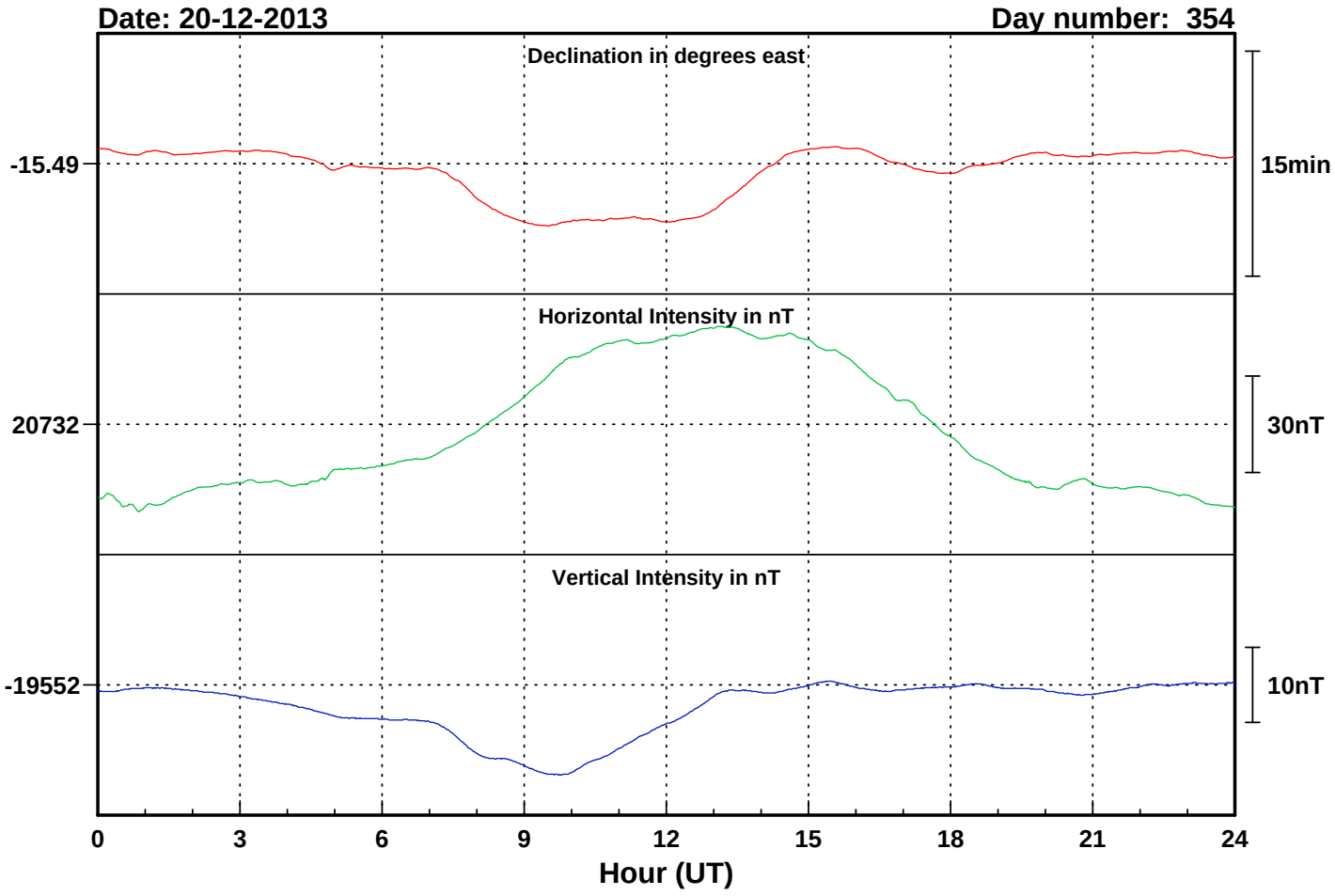
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
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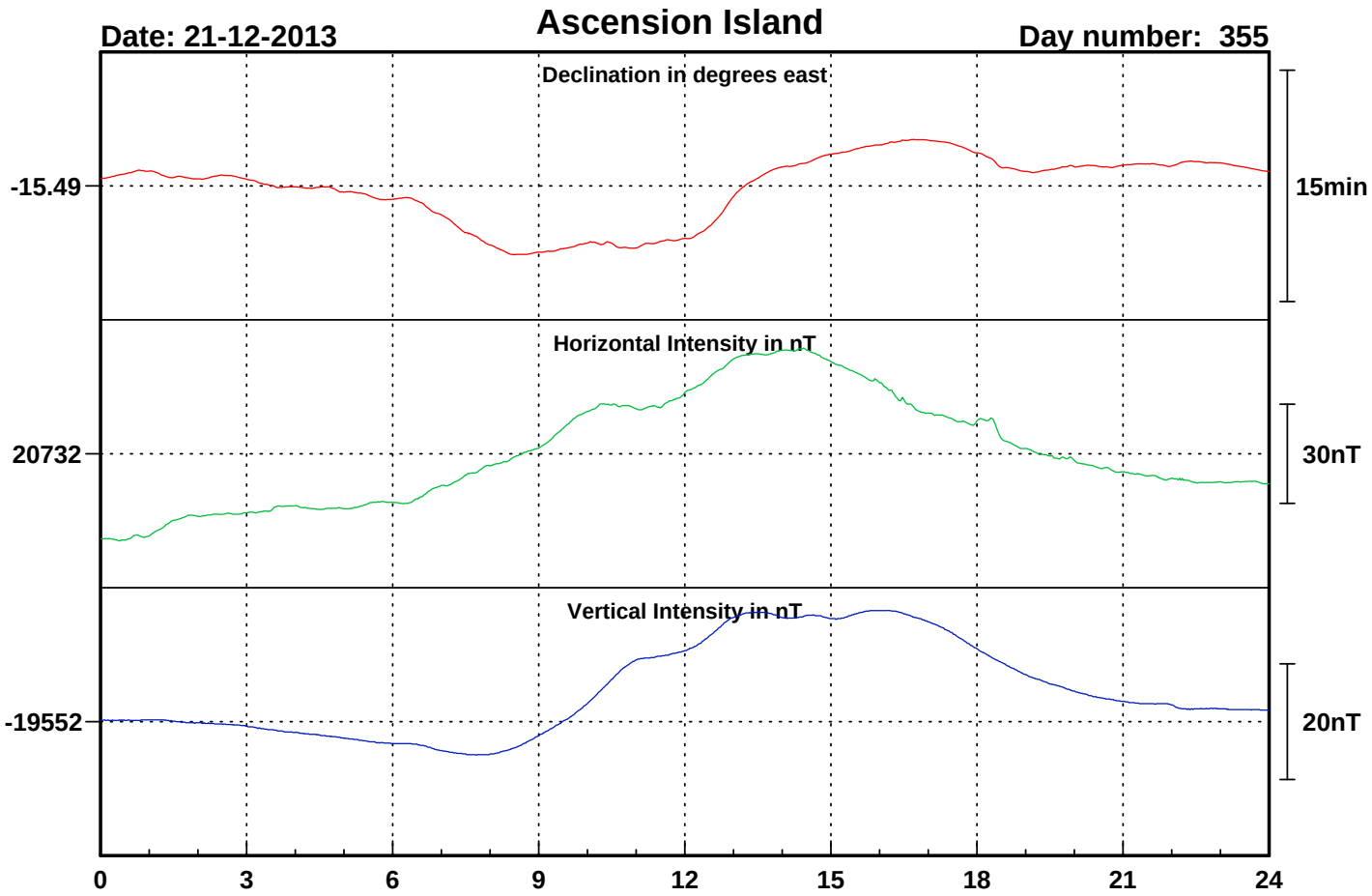
Hour (UT)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Day number: 355
Declination in degrees east
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
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0
3
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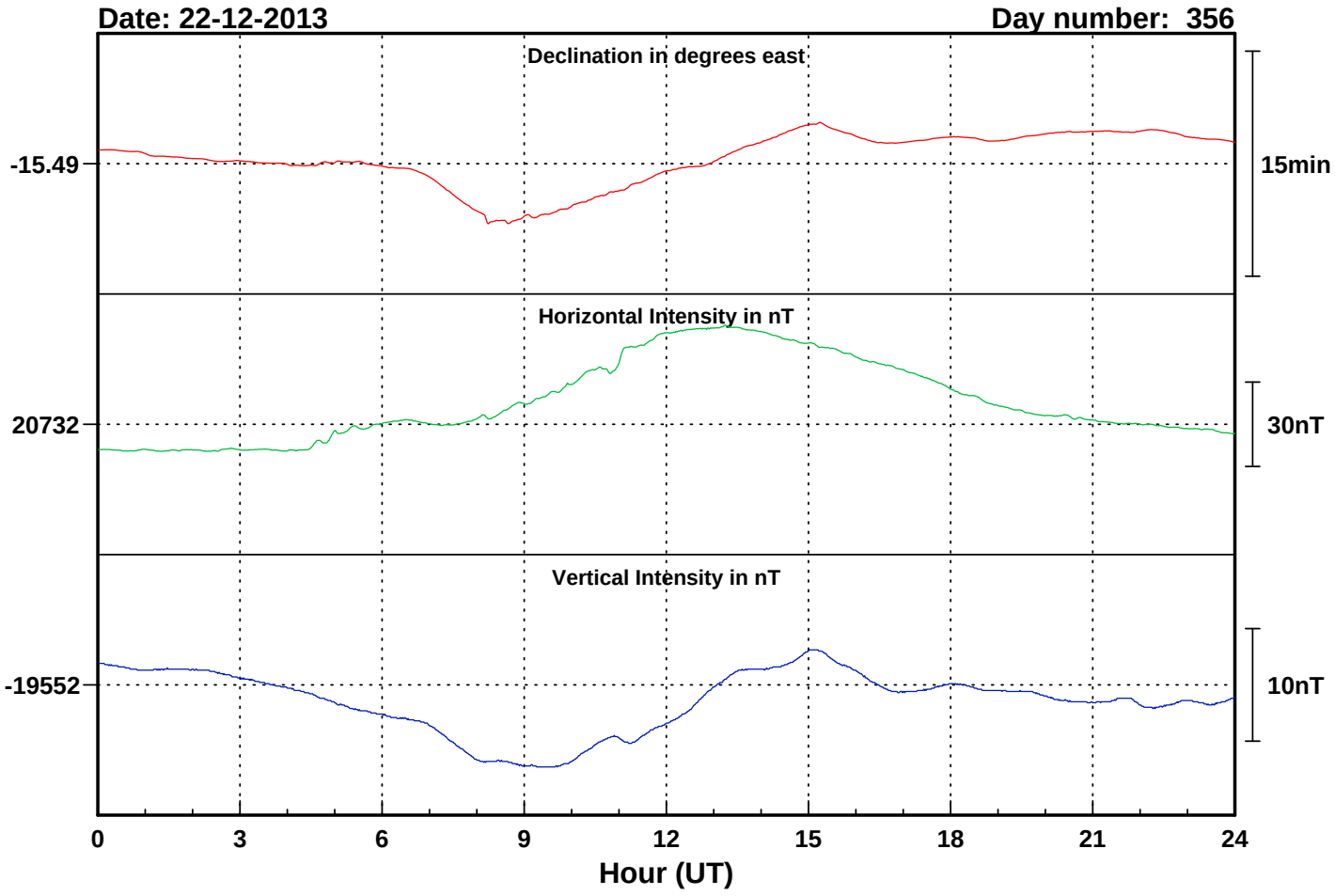
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
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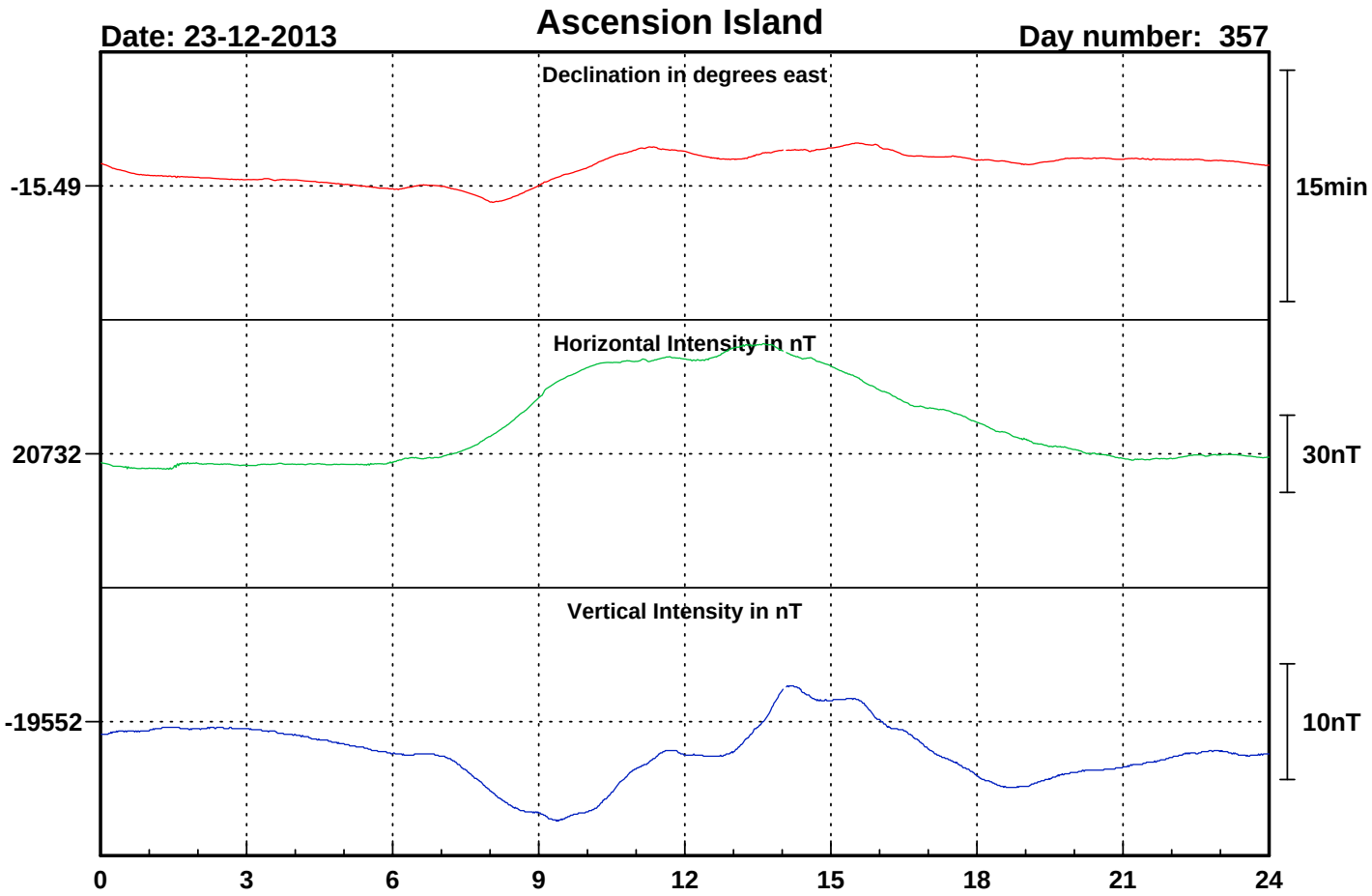
24
Hour (UT)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Day number: 357
Declination in degrees east
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15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
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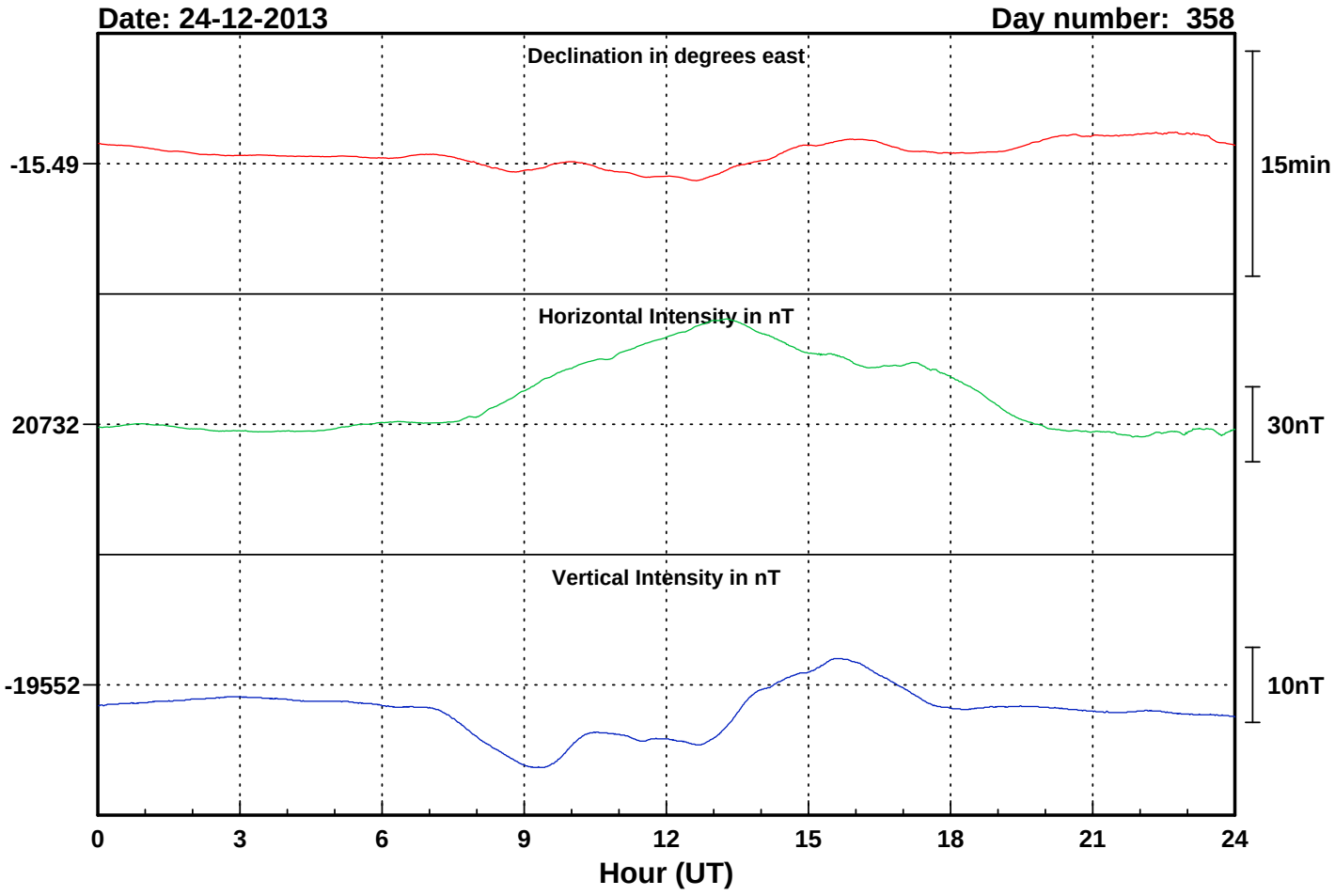
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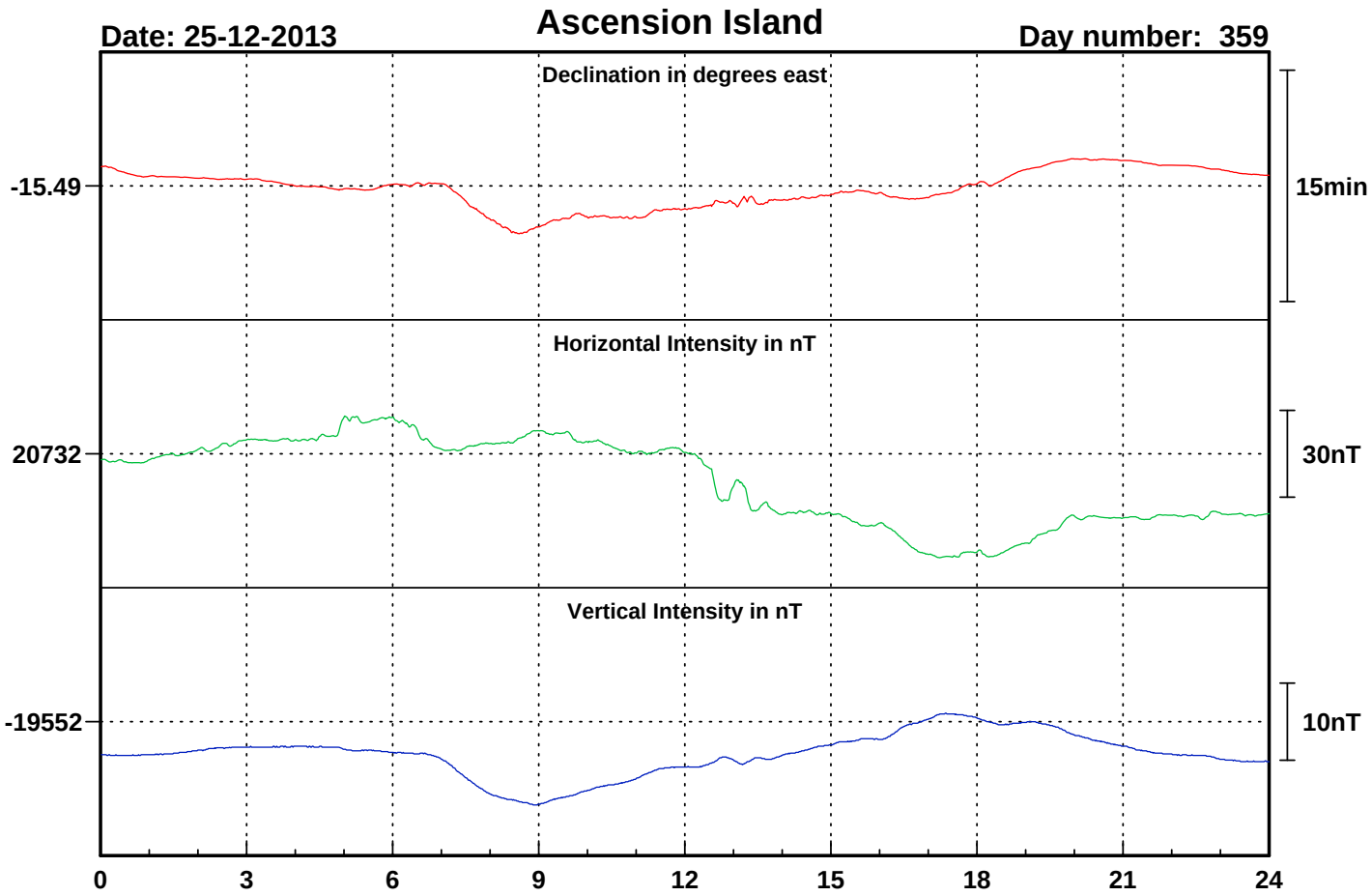
Day number: 358
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)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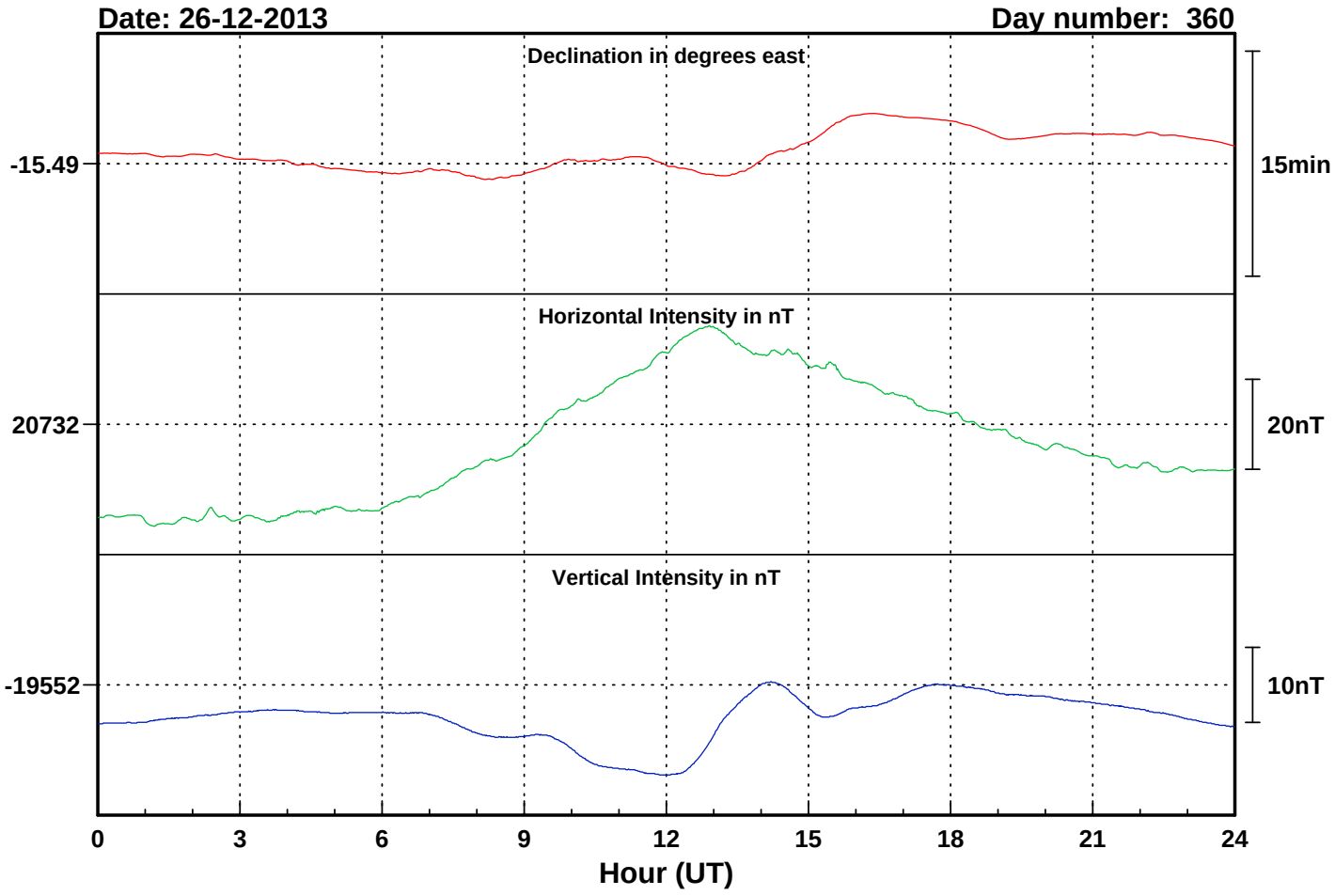
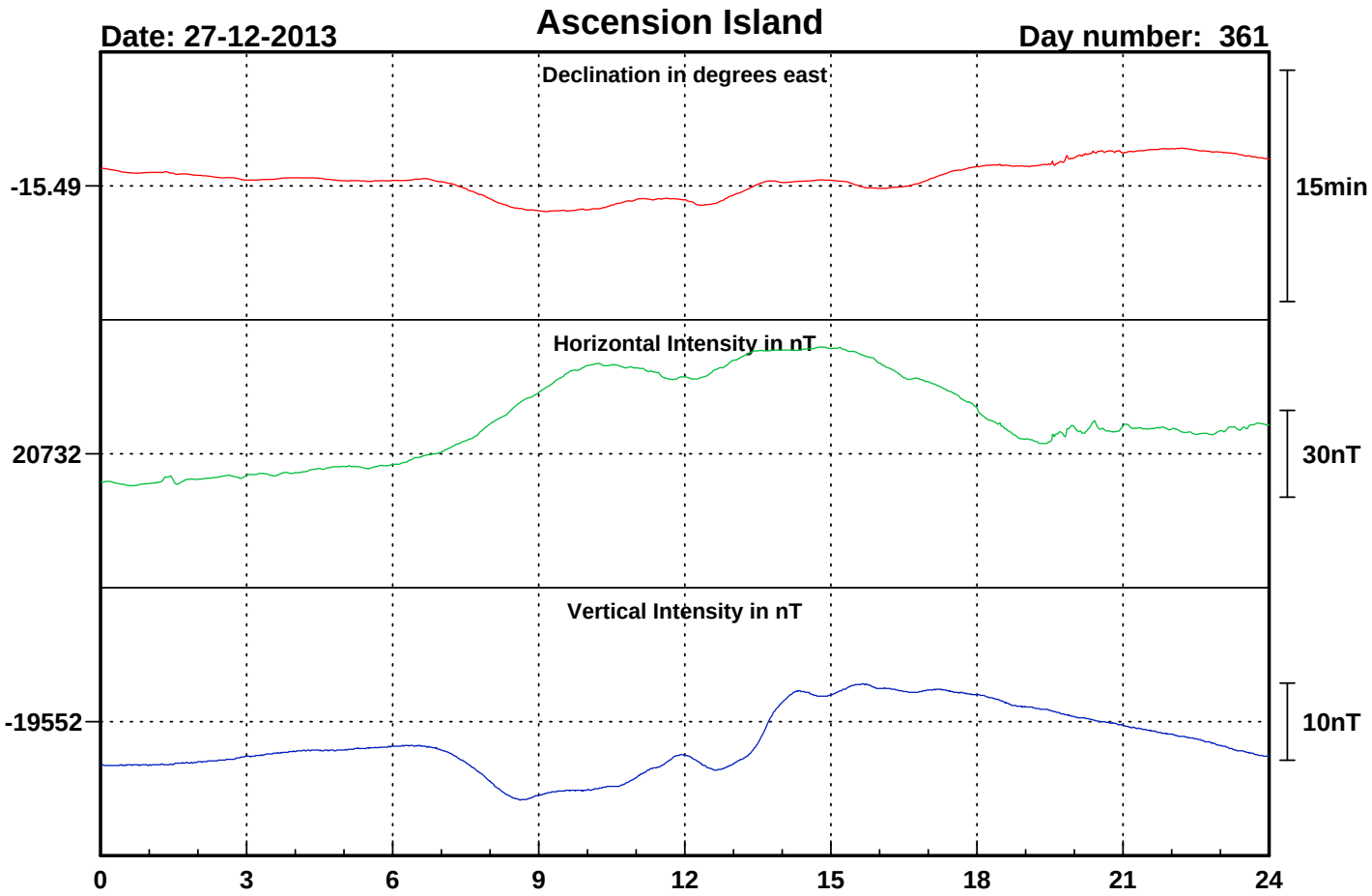
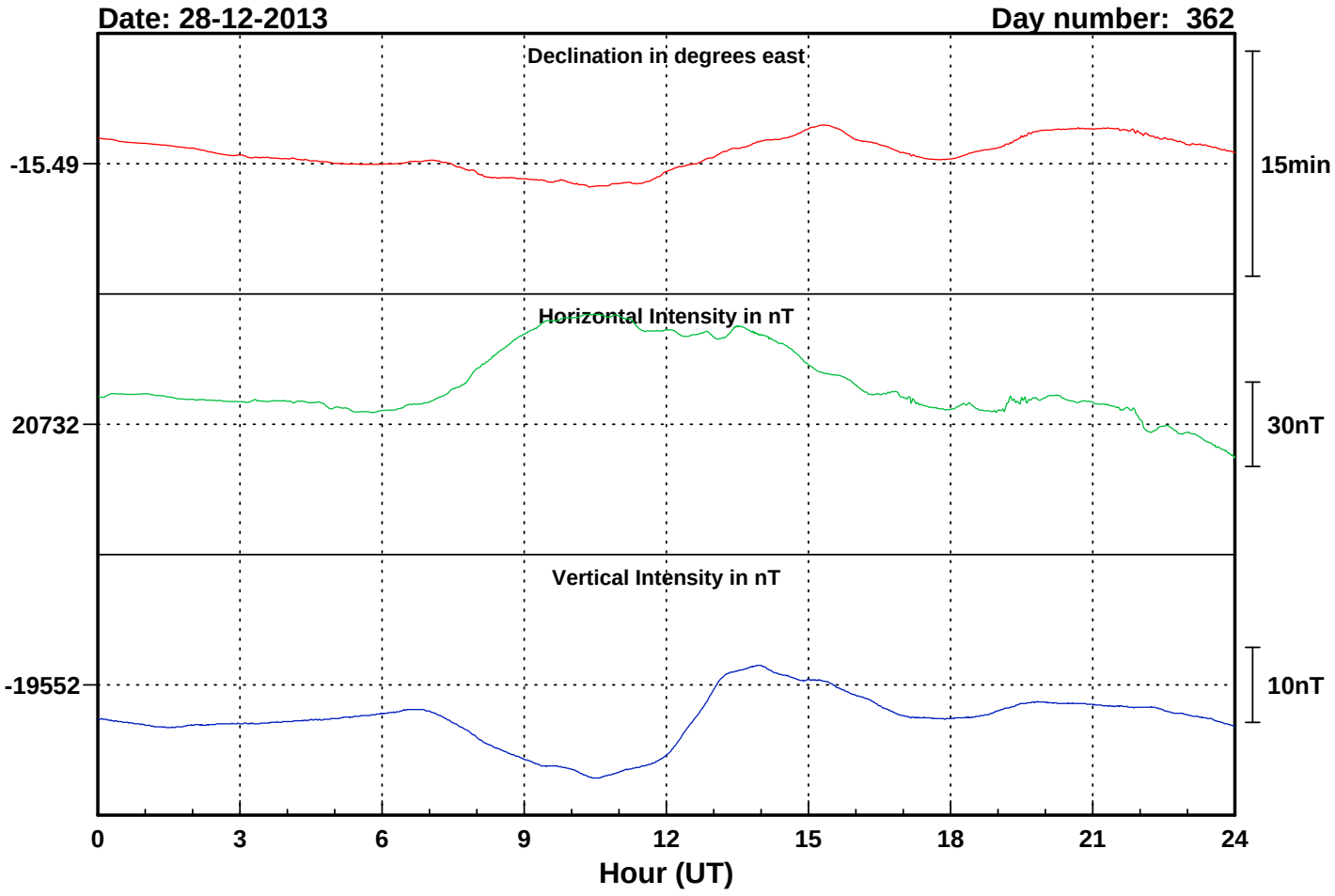
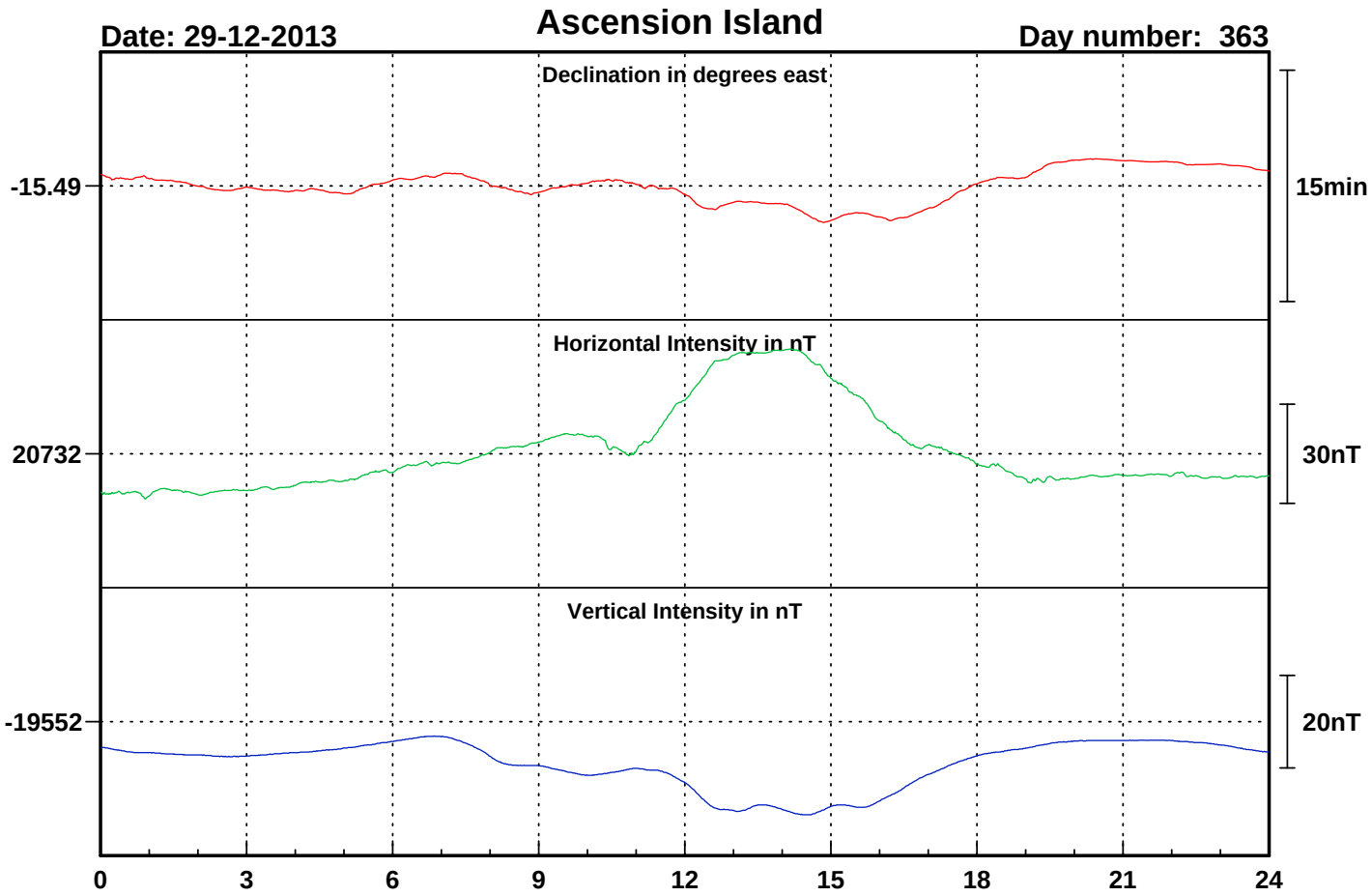
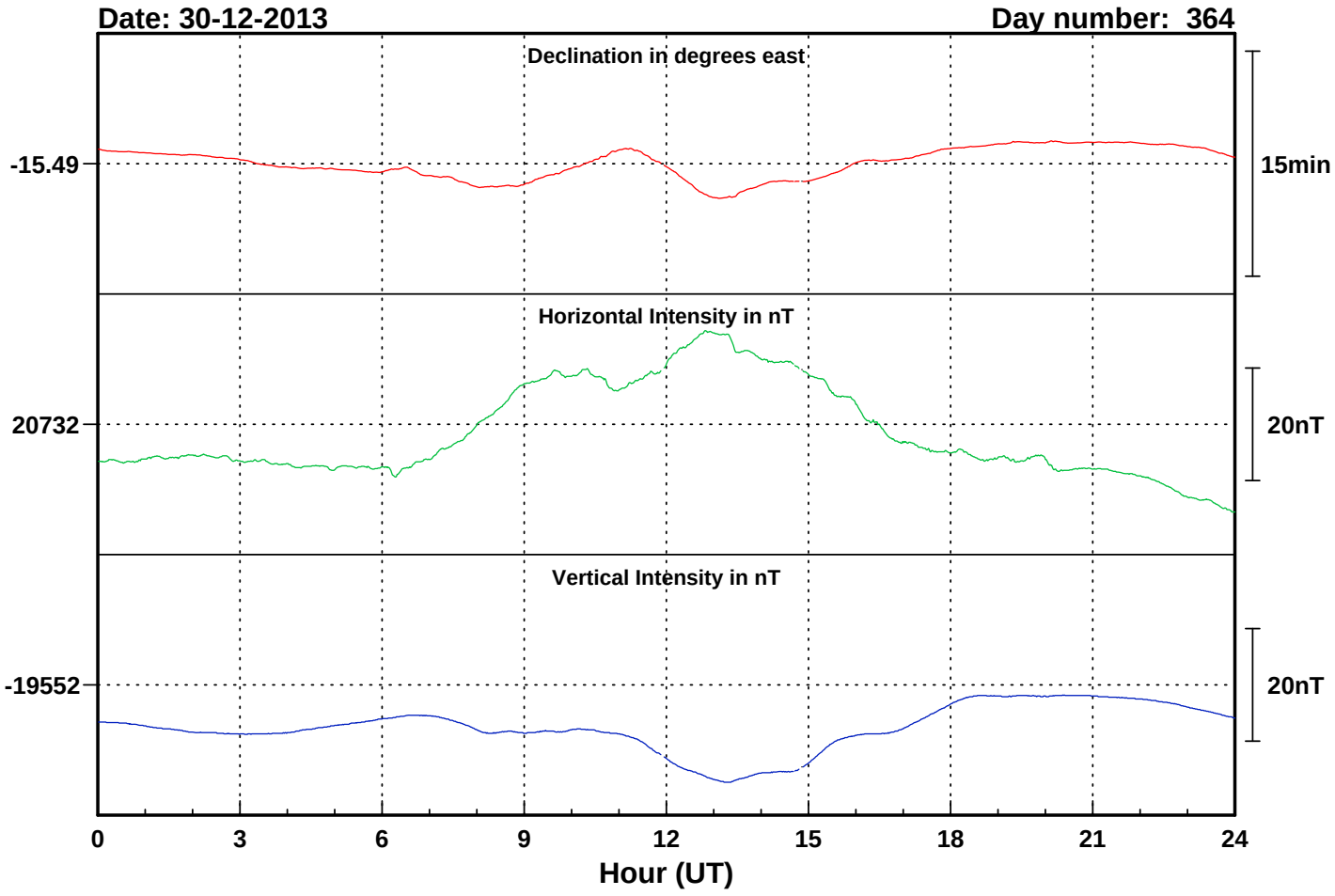
Date: 25-12-2013
Day number: 359
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
12
15
18
21
24

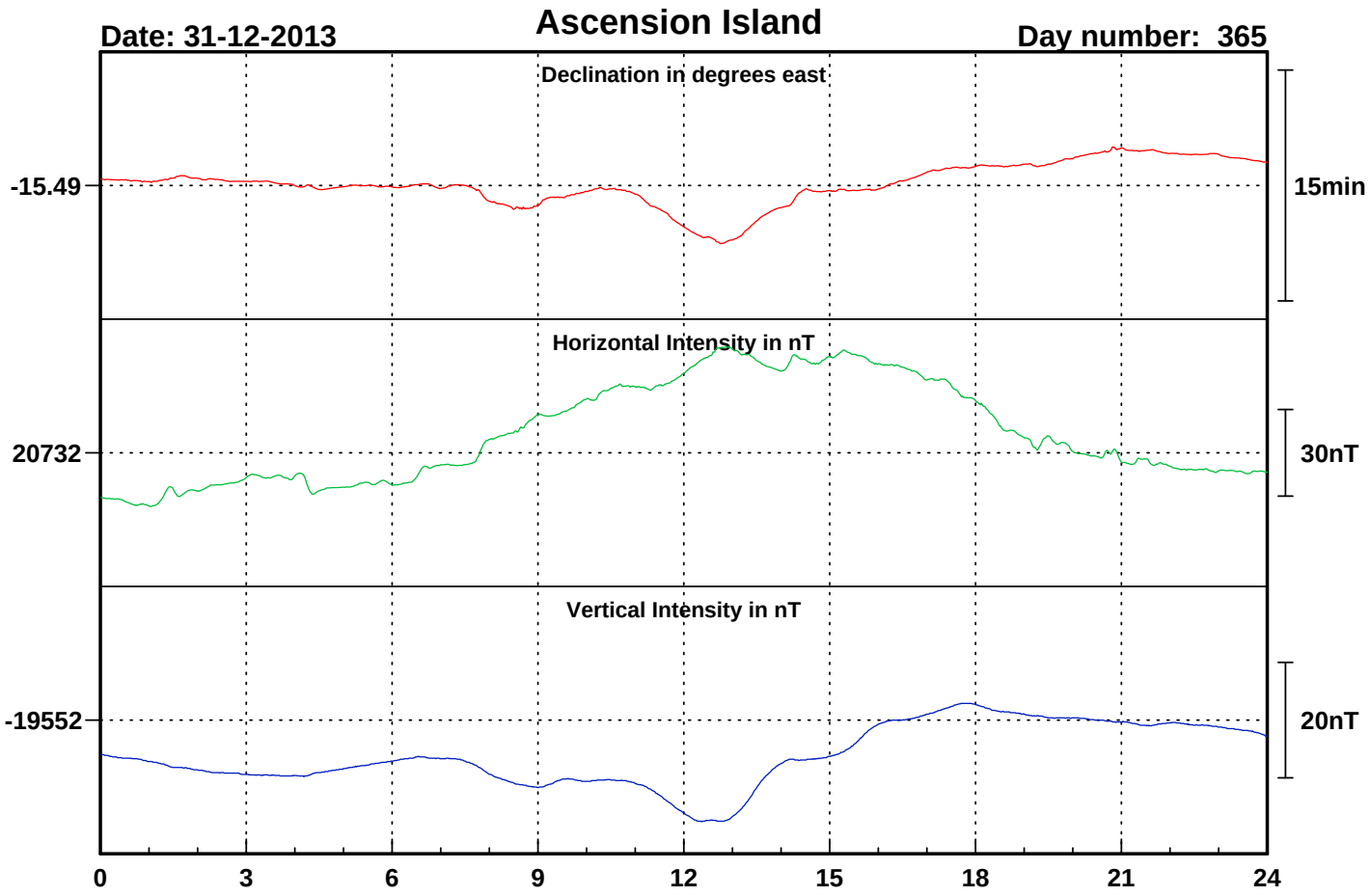

Date: 26-12-2013
Day number: 360
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Ascension Island
Date: 27-12-2013
Day number: 361
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
12
15
18
21
24

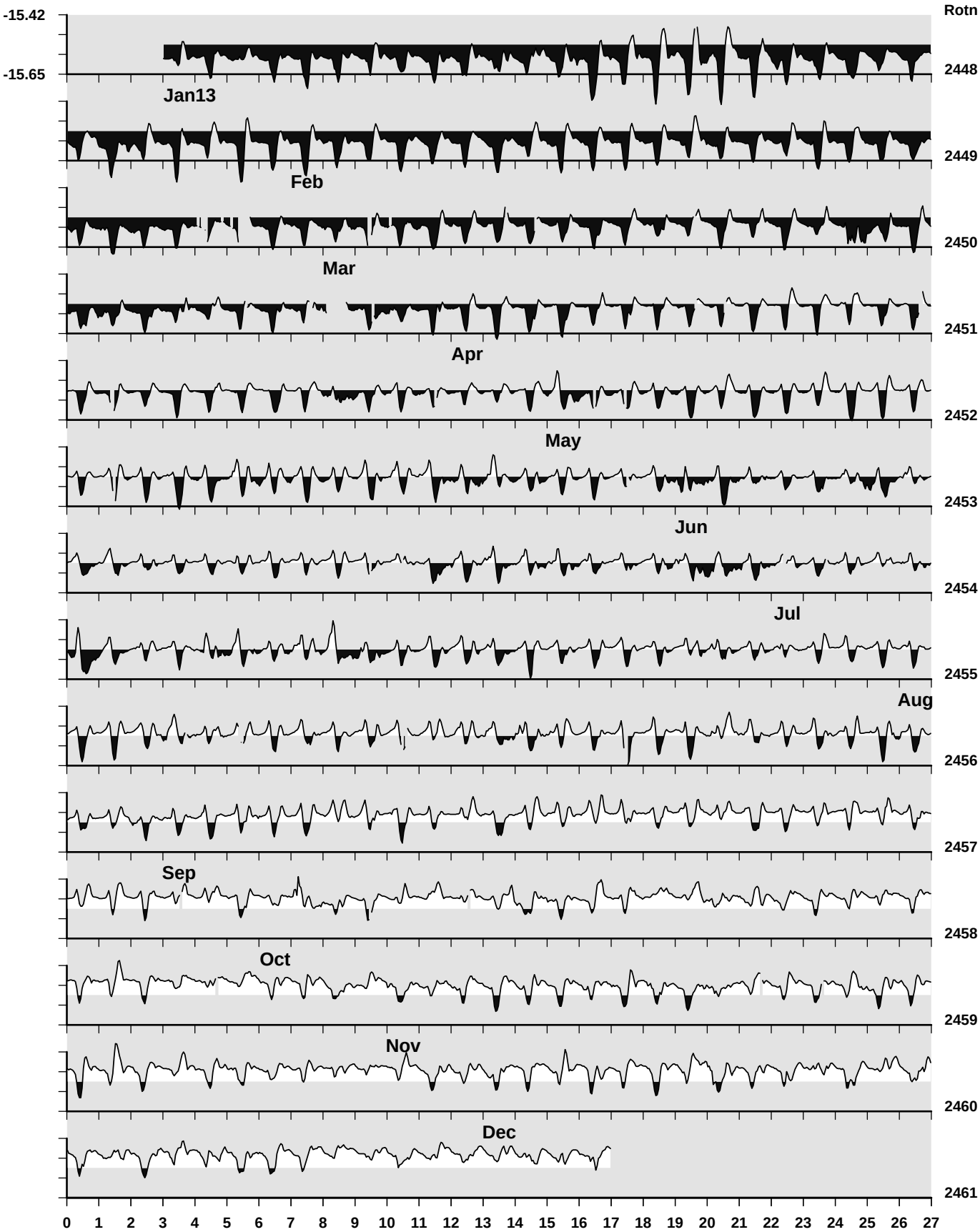

Date: 28-12-2013
Day number: 362
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
10nT
0
3
6
9
12
15
18
21
24
Hour (UT)


Ascension Island
Date: 29-12-2013
Day number: 363
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
20nT
0
3
6
9
12
15
18
21
24


Date: 30-12-2013
Day number: 364
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
20nT
Vertical Intensity in nT
-19552
20nT
0
3
6
9
12
15
18
21
24
Hour (UT)

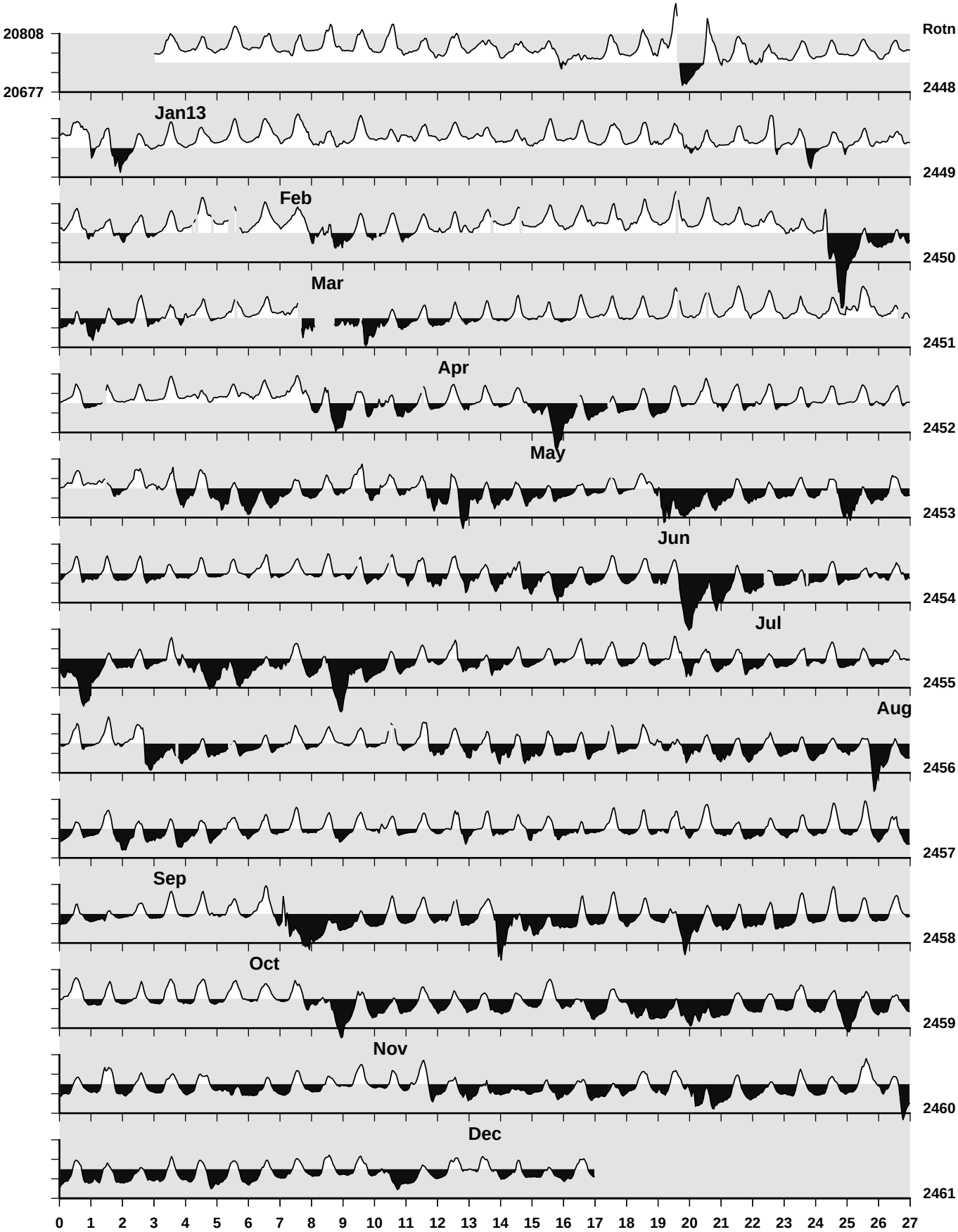

Ascension Island
Date: 31-12-2013
Day number: 365
Declination in degrees east
-15.49
15min
Horizontal Intensity in nT
20732
30nT
Vertical Intensity in nT
-19552
20nT
0
3
6
9
12
15
18
21
24

Ascension Island Observatory: Declination (degrees)



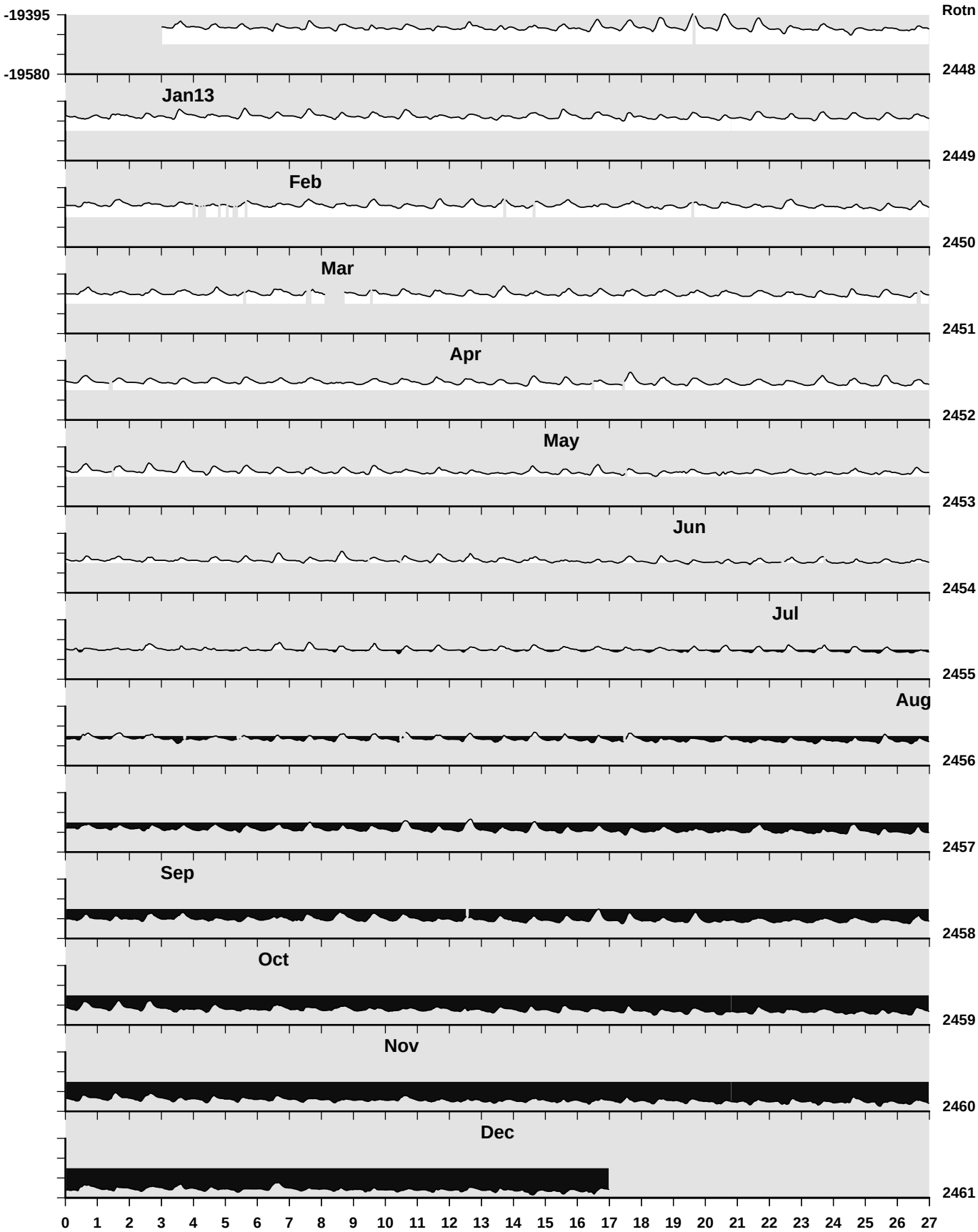
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Horizontal Intensity (nT)



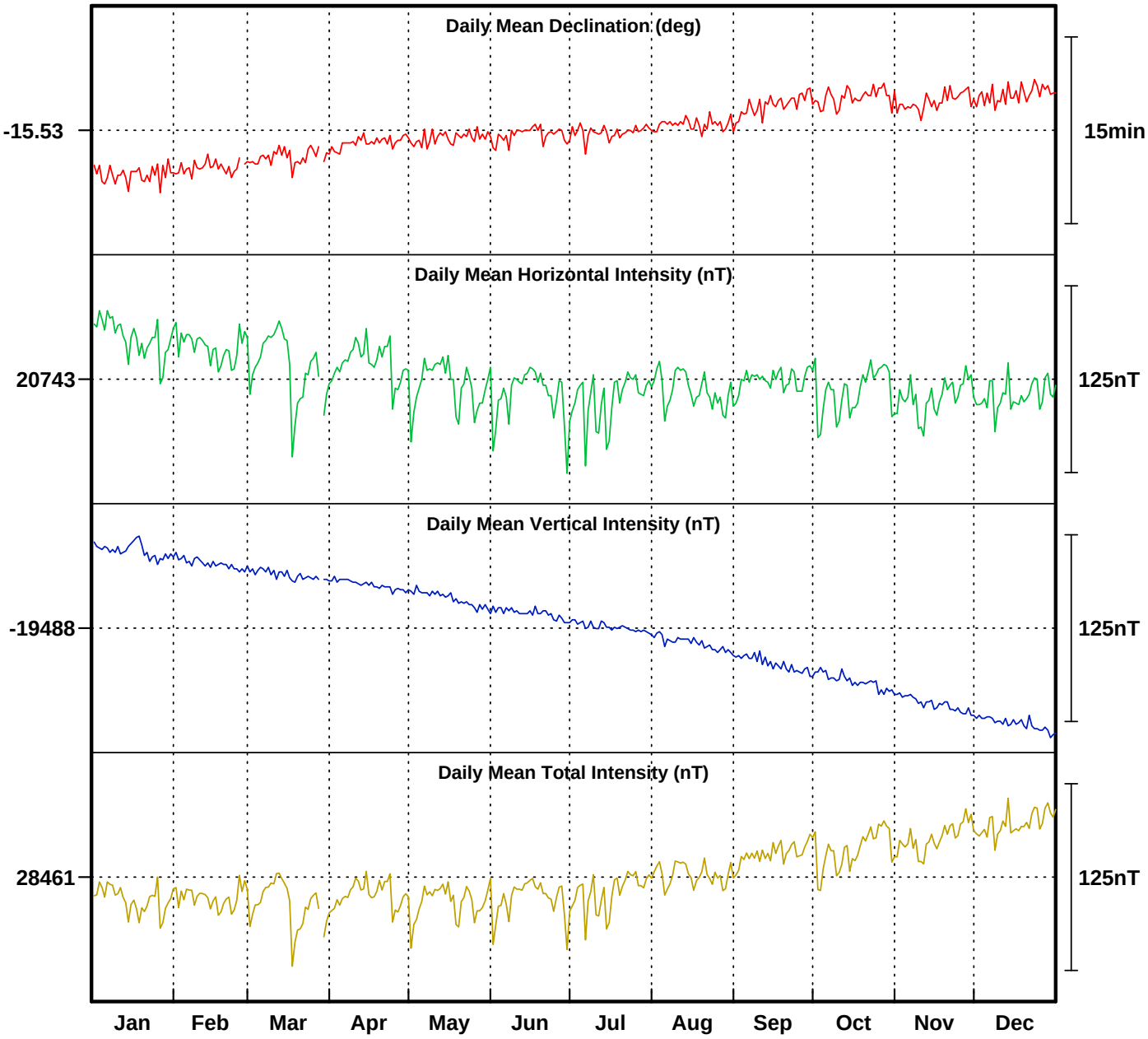
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Island Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Ascension Is Observatory 2013



Monthly Mean Values for Ascension Island Observatory 2013

Month	*D*	*H*	*I*	*X*	*Y*	*Z*	*F*
January	-15° 35.6′	20771 nT	-43° 5.9′	20007 nT	-5584 nT	-19436 nT	28446 nT
February	-15° 35.1′	20765 nT	-43° 7.2′	20001 nT	-5579 nT	-19444 nT	28448 nT
March	-15° 34.2′	20751 nT	-43° 9.0′	19989 nT	-5570 nT	-19452 nT	28442 nT
April	-15° 33.0′	20755 nT	-43° 9.3′	19995 nT	-5564 nT	-19459 nT	28450 nT
May	-15° 32.7′	20739 nT	-43° 11.4′	19980 nT	-5558 nT	-19468 nT	28445 nT
June	-15° 32.5′	20732 nT	-43° 12.8′	19974 nT	-5555 nT	-19478 nT	28446 nT
July	-15° 32.2′	20730 nT	-43° 13.8′	19973 nT	-5553 nT	-19487 nT	28452 nT
August	-15° 31.6′	20736 nT	-43° 14.3′	19979 nT	-5551 nT	-19498 nT	28463 nT
September	-15° 30.0′	20743 nT	-43° 14.9′	19988 nT	-5543 nT	-19512 nT	28478 nT
October	-15° 29.4′	20735 nT	-43° 16.6′	19981 nT	-5538 nT	-19523 nT	28480 nT
November	-15° 29.8′	20731 nT	-43° 18.2′	19978 nT	-5539 nT	-19539 nT	28488 nT
December	-15° 29.2′	20732 nT	-43° 19.3′	19979 nT	-5536 nT	-19552 nT	28497 nT

Note

i. The values shown here are provisional.