

BRITISH GEOLOGICAL SURVEY

King Edward Point

Observatory

Monthly Magnetic Bulletin

December 2014

14/12/KE



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

KING EDWARD POINT OBSERVATORY MAGNETIC DATA

1. Introduction

King Edward Point observatory was installed by the British Geological Survey (BGS), with the permission of the Government of South Georgia and the South Sandwich Islands (GSGSSI), in collaboration with British Antarctic Survey (BAS), and became operational in February 2011.

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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Fax: +44 (0) 131 668 2683
E-mail: enquiries@bgs.ac.uk
Internet: www.geomag.bgs.ac.uk

2. Position

King Edward Point Observatory, one of the geomagnetic observatories maintained and operated by the British Geological Survey (BGS), is situated on a site adjacent to the Government of South Georgia and the South Sandwich Islands (GSGSSI) research station at King Edward Point, Cumberland East Bay, South Georgia. The observatory co-ordinates are:

Geographic: 54° 16' 55.7" S 323° 30' 25.6" E
Geomagnetic: 46° 05' 53" S 029° 43' 48" E
Height above mean sea level: 7 m

The geographical coordinates are measured by a handheld GPS device, which uses WGS84 as the reference coordinate system. The height above MSL is determined from the best available contour maps. The geomagnetic co-ordinates are approximations, calculated using the 11th generation International Geomagnetic Reference

Field (IGRF) at epoch 2014.5. 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 February 2011. 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 0.1 Hz.

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. One set 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 King Edward Point magnetic observatory, South Georgia operated by the British Geological Survey in co-operation with the British Antarctic Survey and the Government of South Georgia and the South Sandwich Islands (GSGSSI).'

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

KING EDWARD POINT OBSERVATORY

ABSOLUTE OBSERVATIONS

Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
01-Dec-14	335	11:59	-7.2680	-7.0417	12:10	-55.6031	12.3	27942.4	15785.3	15997.8	-23056.5	-23198.9	AS
01-Dec-14	335	12:20	-7.2525	-7.0450	12:31	-55.5958	12.3	27943.8	15789.0	15998.1	-23055.7	-23198.6	AS
01-Dec-14	335	17:09	-7.1047	-7.0417	17:53	-55.6352	12.3	27942.4	15772.3	15998.3	-23065.3	-23198.5	SW
01-Dec-14	335	18:15	-7.1284	-7.0483	18:27	-55.6633	12.3	27937.1	15758.1	15998.0	-23068.7	-23198.7	AS
01-Dec-14	335	18:39	-7.1117	-7.0367	18:49	-55.6723	12.3	27935.9	15753.7	15998.3	-23070.1	-23198.5	AS
02-Dec-14	336	11:18	-7.2814	-7.0433	11:29	-55.6418	12.3	27943.4	15770.3	15998.3	-23068.0	-23198.7	AS
02-Dec-14	336	11:40	-7.2778	-7.0467	11:51	-55.6456	12.3	27940.6	15767.1	15999.6	-23066.7	-23197.7	AS
02-Dec-14	336	16:08	-7.0302	-7.0450	16:20	-55.6648	12.3	27928.9	15752.8	15998.0	-23062.3	-23198.9	AS
02-Dec-14	336	16:33	-7.0686	-7.0450	16:44	-55.6643	12.3	27929.2	15753.2	15997.8	-23062.4	-23199.0	AS
03-Dec-14	337	11:46	-7.3254	-7.0483	11:57	-55.6469	12.3	27938.1	15765.2	15997.9	-23065.0	-23198.8	AS
03-Dec-14	337	12:08	-7.2978	-7.0450	12:16	-55.6577	12.3	27934.7	15759.0	15998.0	-23065.2	-23198.8	AS
04-Dec-14	338	12:15	-7.2286	-7.0383	12:26	-55.6410	12.3	27939.7	15768.5	15998.1	-23064.7	-23198.8	AS
04-Dec-14	338	12:33	-7.2322	-7.0433	12:47	-55.6474	12.3	27937.4	15764.6	15997.9	-23064.6	-23198.8	AS
05-Dec-14	339	11:46	-7.2952	-7.0467	11:57	-55.6725	12.3	27929.9	15750.3	15997.8	-23065.2	-23199.1	AS

KING EDWARD POINT OBSERVATORY

ABSOLUTE OBSERVATIONS (cont)

Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
05-Dec-14	339	12:08	-7.2492	-7.0450	12:20	-55.6464	12.3	27935.5	15764.0	15998.1	-23062.7	-23198.8	AS
05-Dec-14	339	16:08	-7.0834	-7.0467	16:20	-55.6467	12.3	27935.0	15763.6	15998.3	-23062.4	-23198.6	AS
05-Dec-14	339	16:31	-7.0868	-7.0483	16:42	-55.6479	14.5	27937.3	15764.4	15998.3	-23064.7	-23200.0	AS
06-Dec-14	340	16:48	-7.1376	-7.0467	16:58	-55.6408	12.3	27933.4	15765.0	15997.9	-23059.4	-23198.9	AS
06-Dec-14	340	17:07	-7.0858	-7.0467	17:17	-55.6059	12.3	27944.2	15785.2	15998.4	-23058.8	-23198.4	AS
07-Dec-14	341	17:02	-6.9504	-7.0500	17:12	-55.6609	12.3	27936.3	15758.6	15997.7	-23067.4	-23199.0	AS
08-Dec-14	342	11:41	-7.2684	-7.0467	11:49	-55.6698	12.3	27934.5	15754.0	15997.9	-23068.3	-23198.7	AS
08-Dec-14	342	11:58	-7.2675	-7.0467	12:08	-55.6440	12.3	27937.1	15765.9	15997.8	-23063.4	-23198.8	AS
08-Dec-14	342	18:04	-7.0211	-7.0467	18:17	-55.6506	12.3	27936.5	15762.9	15997.8	-23064.7	-23198.8	AS
09-Dec-14	343	12:13	-7.2055	-7.0450	12:25	-55.6597	12.3	27933.5	15757.5	15999.2	-23064.7	-23197.9	AS
09-Dec-14	343	12:36	-7.1979	-7.0417	12:47	-55.6524	12.3	27933.5	15760.4	15997.8	-23062.7	-23198.9	AS
15-Dec-14	349	14:08	99999.9	-7.0433	14:50	-55.7252	12.3	27916.7	15721.6	15997.7	-23068.9	-23199.1	SW
15-Dec-14	349	14:59	-7.1752	-7.0417	15:21	-55.6908	12.3	27922.6	15738.8	15997.9	-23064.3	-23198.9	SW
30-Dec-14	364	13:41	-7.0852	-7.0217	13:58	-55.6761	12.3	27928.1	15747.8	16005.8	-23064.8	-23193.5	JK
30-Dec-14	364	14:11	-7.0565	-7.0433	14:24	-55.6985	12.3	27921.2	15735.0	16005.6	-23065.3	-23193.6	JK

King Edward Point 2014

Declination : Absolute - Variometer (markers) and Baseline Applied (line)

-422.7

5min

Horizontal Intensity : Absolute - Variometer (markers) and Baseline Applied (line)

15998

20nT

Vertical Intensity : Absolute - Variometer (markers) and Baseline Applied (line)

-23199

20nT

Total Intensity : Absolute (Proton F) - Baseline Adjusted Variometer (derived F)

-12.3

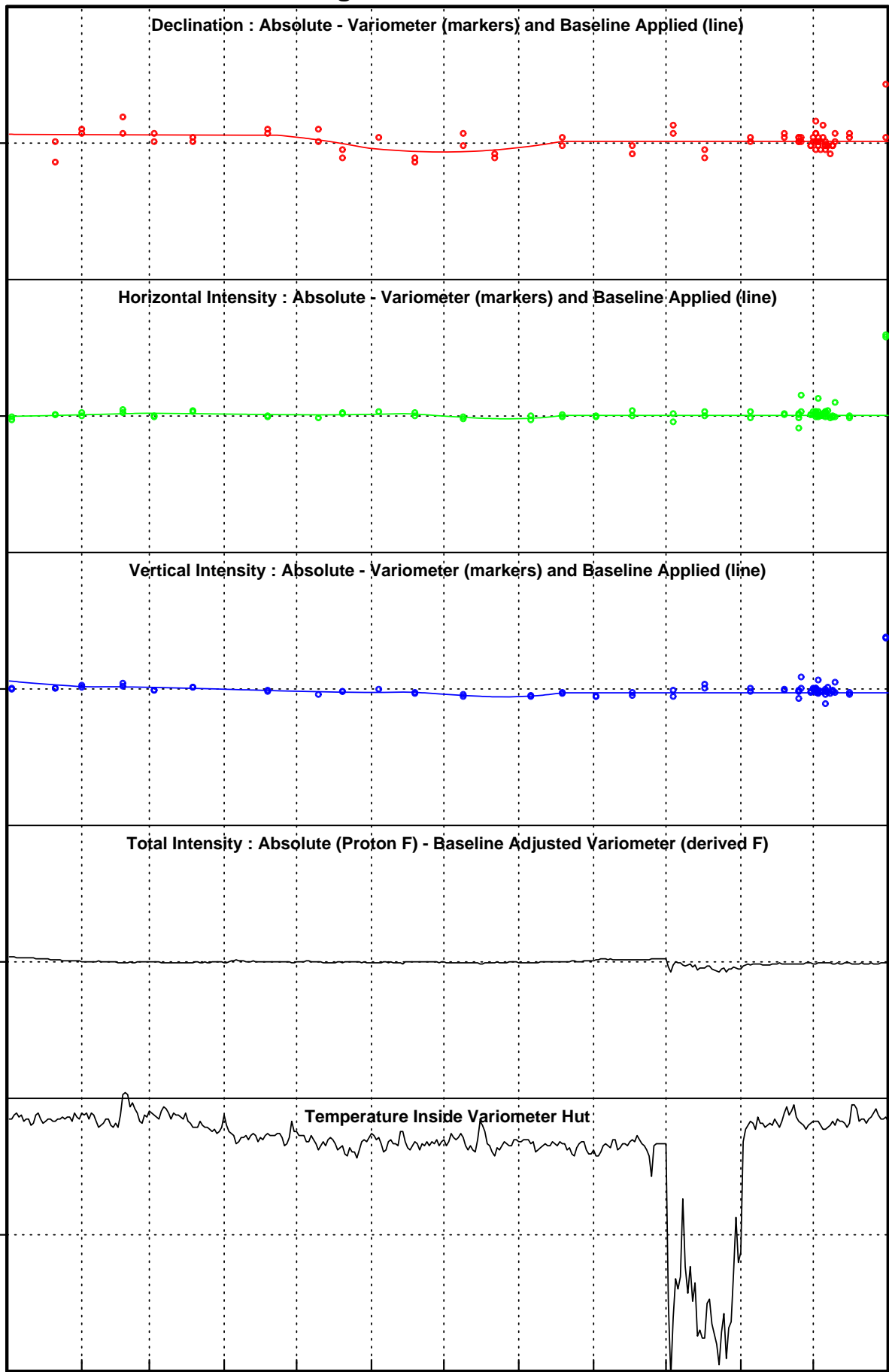
20nT

Temperature Inside Variometer Hut

3.0

10°C

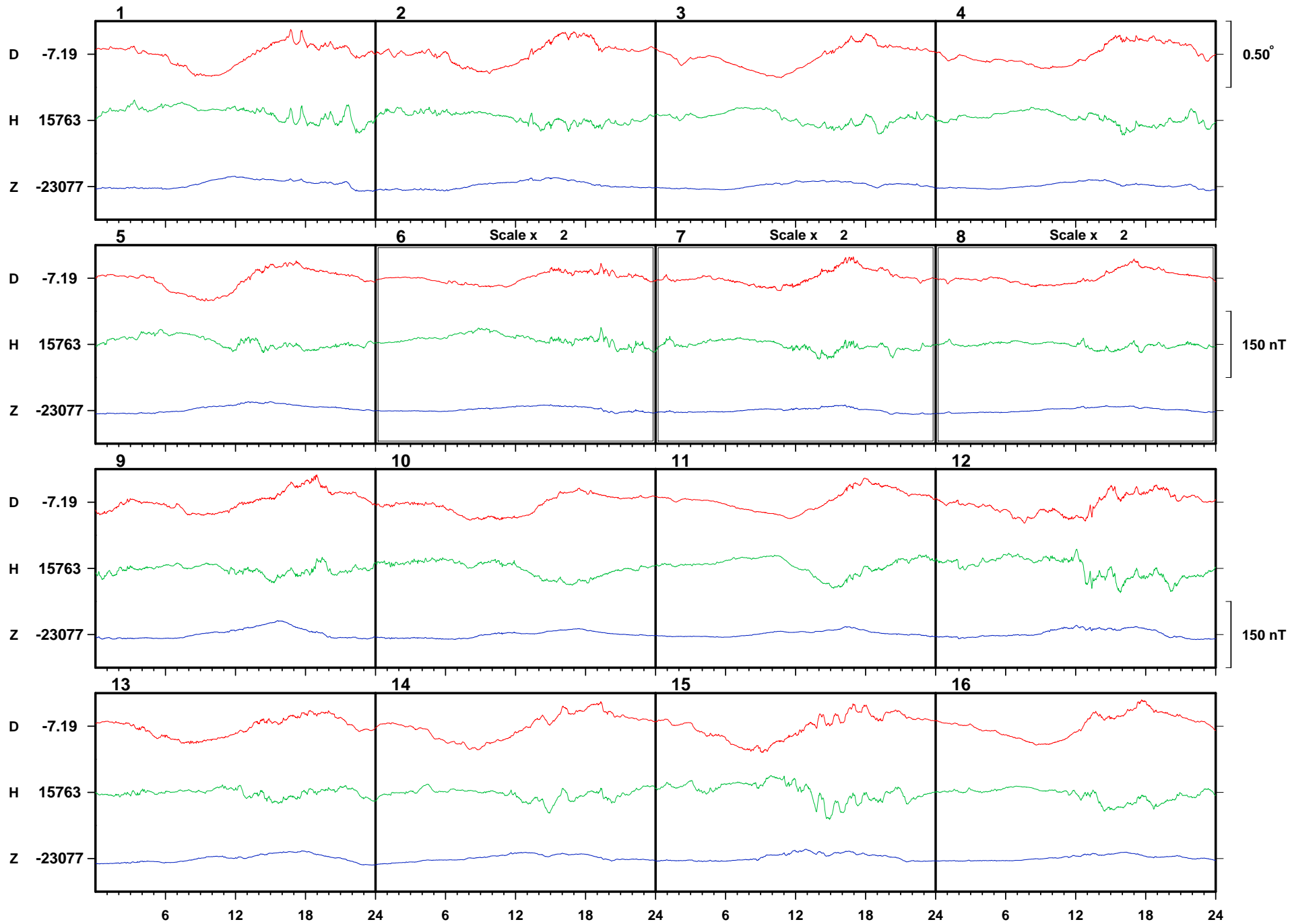
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

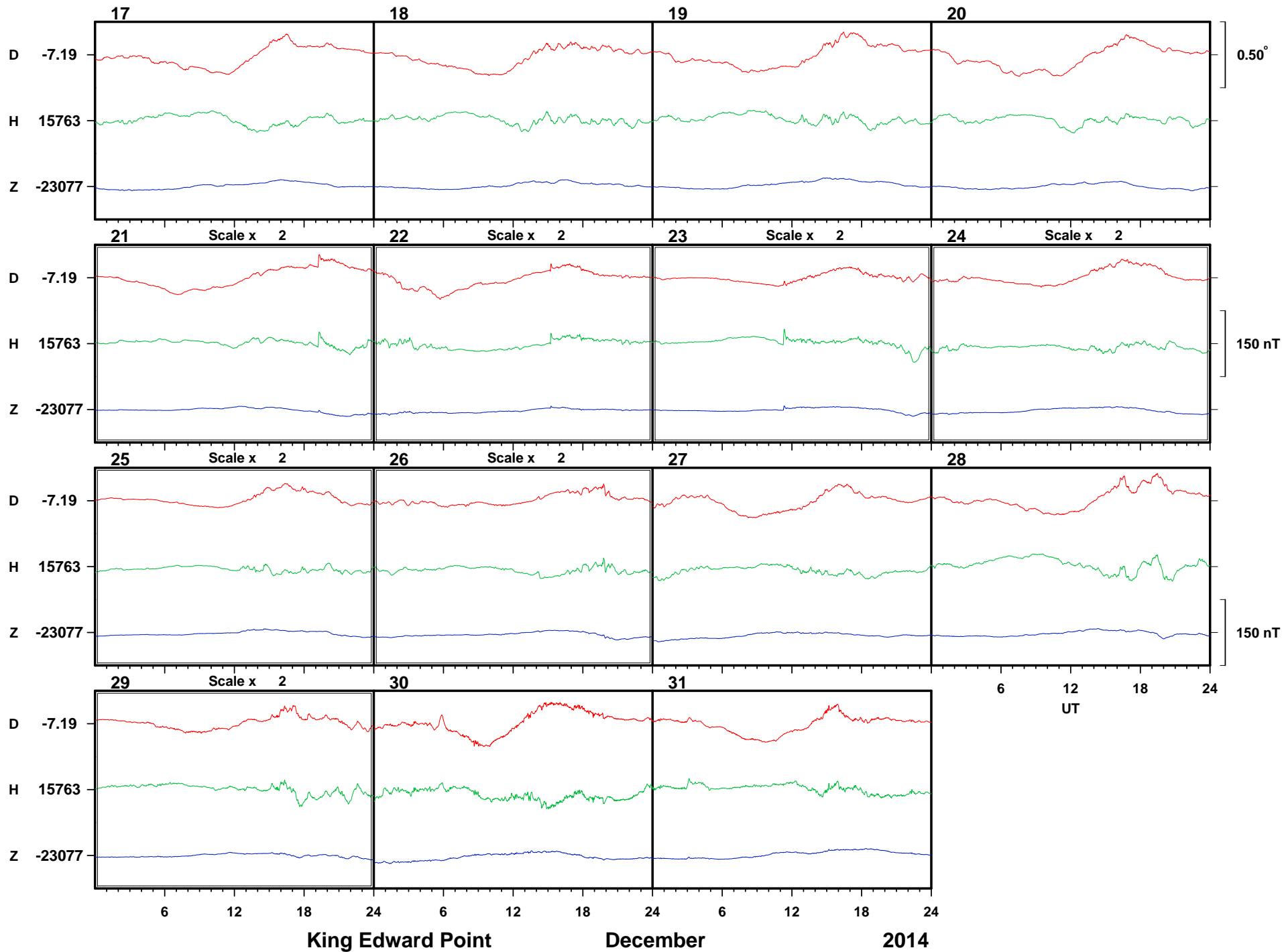


King Edward Point

December

2014

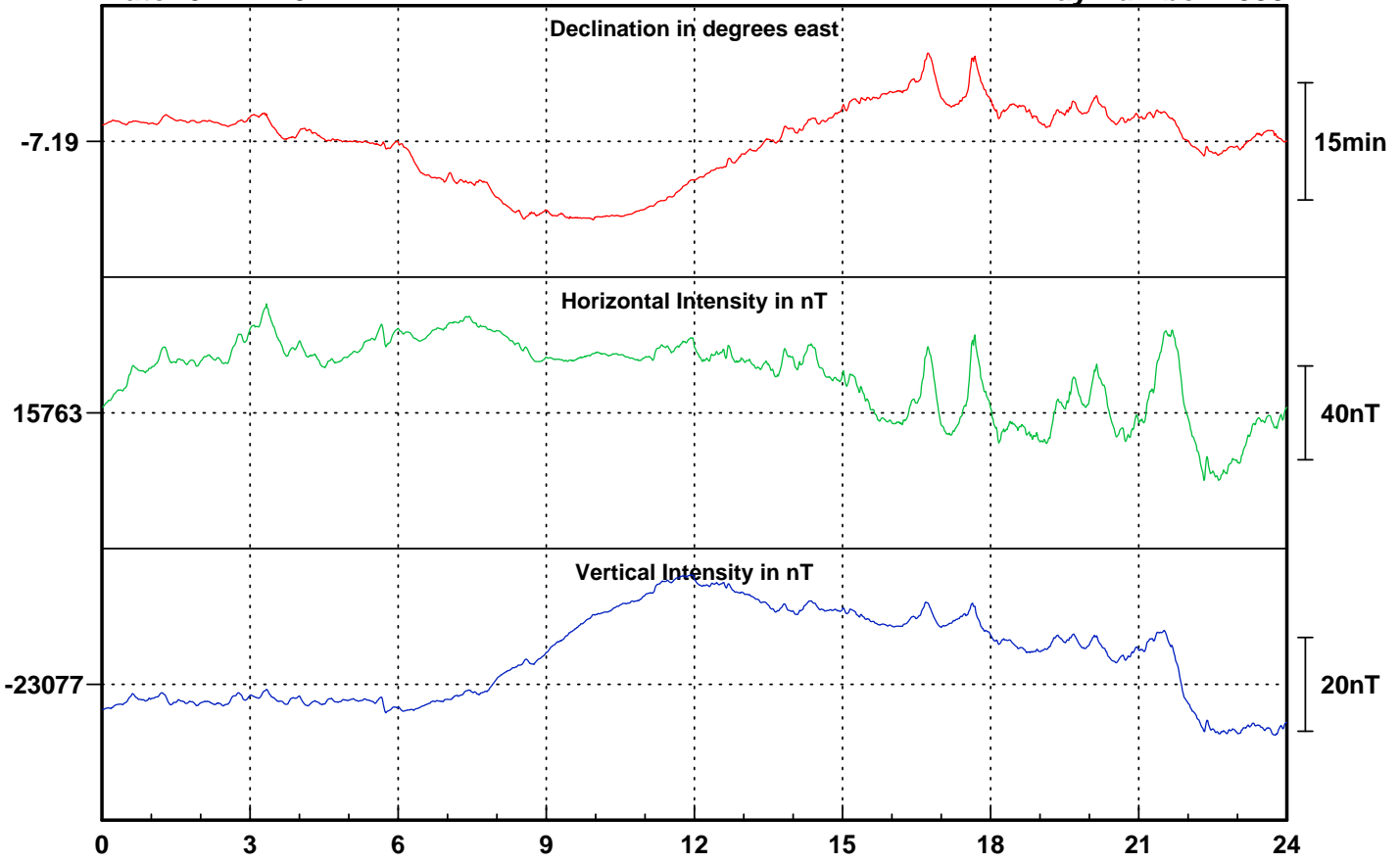




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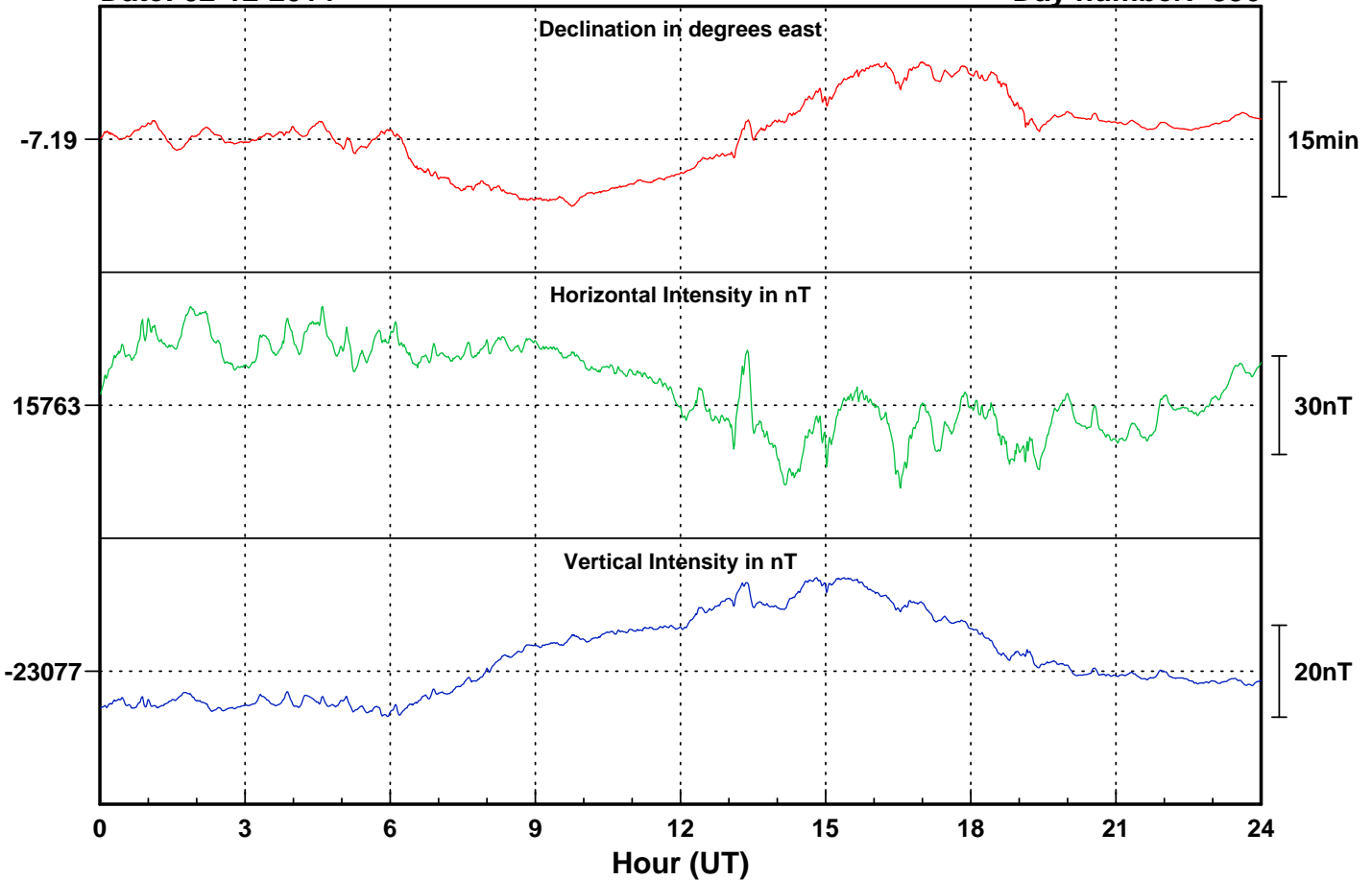
King Edward Point

Day number: 335



Date: 02-12-2014

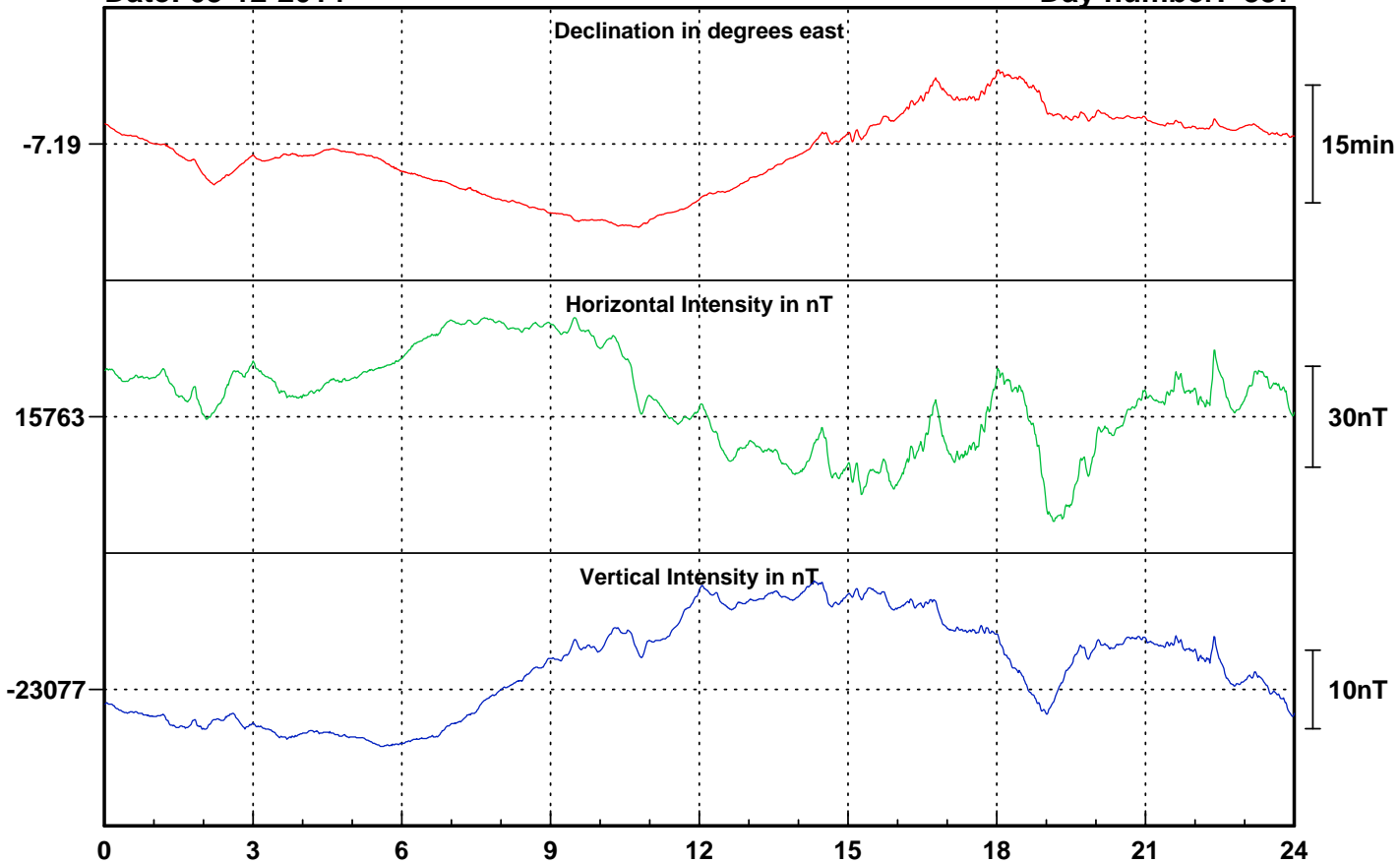
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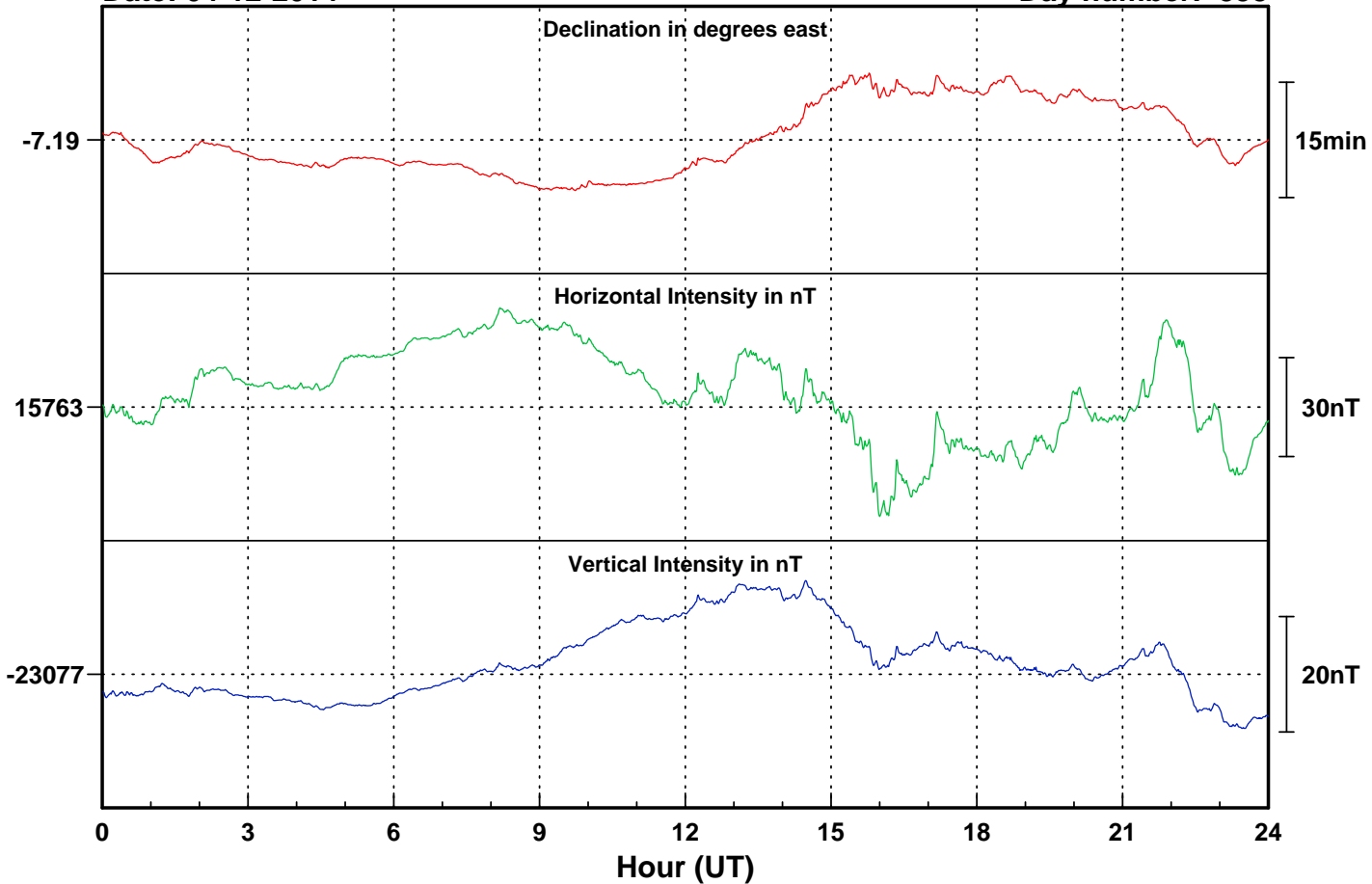
King Edward Point

Day number: 337



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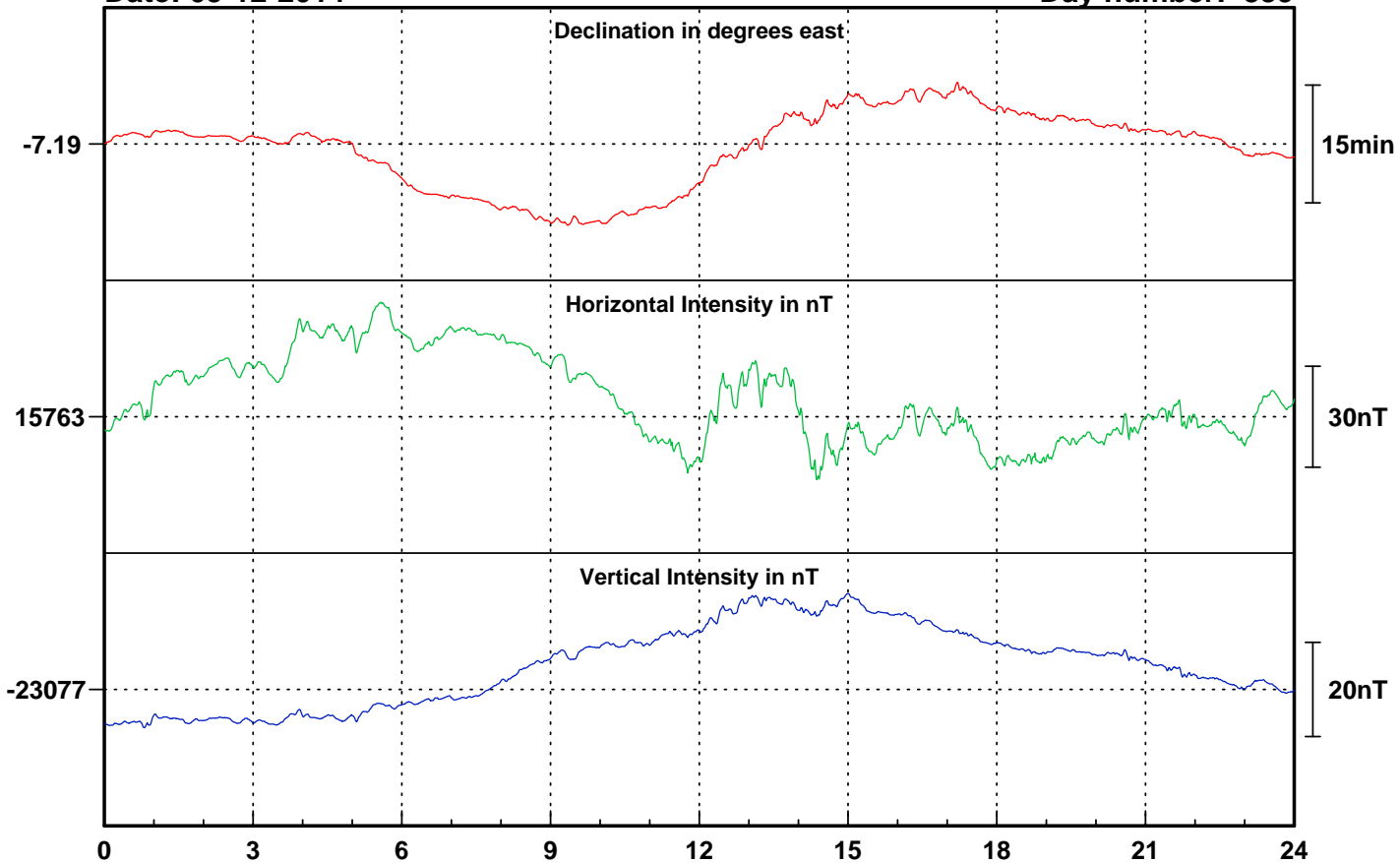
Day number: 338



Date: 05-12-2014

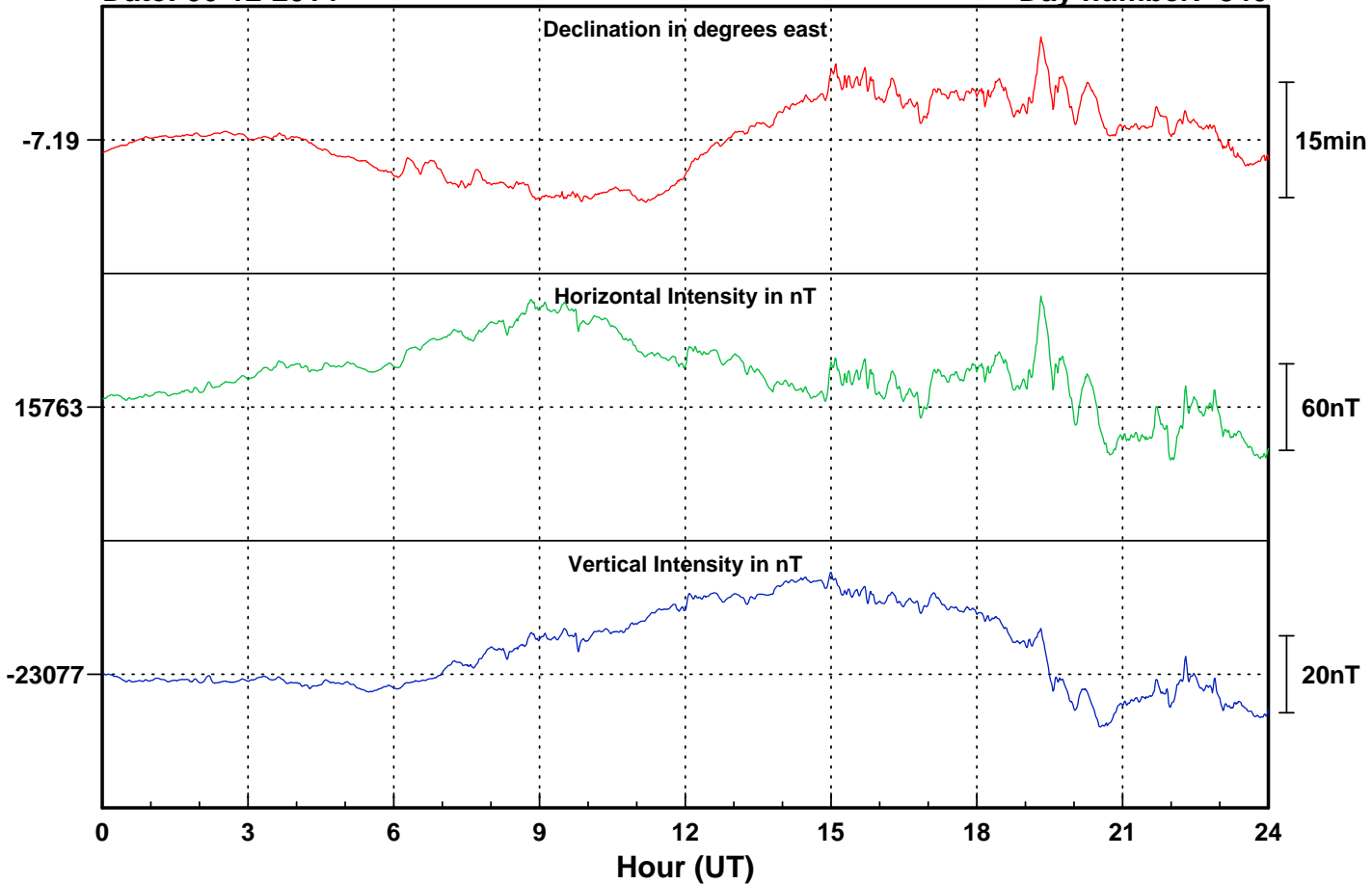
King Edward Point

Day number: 339



Date: 06-12-2014

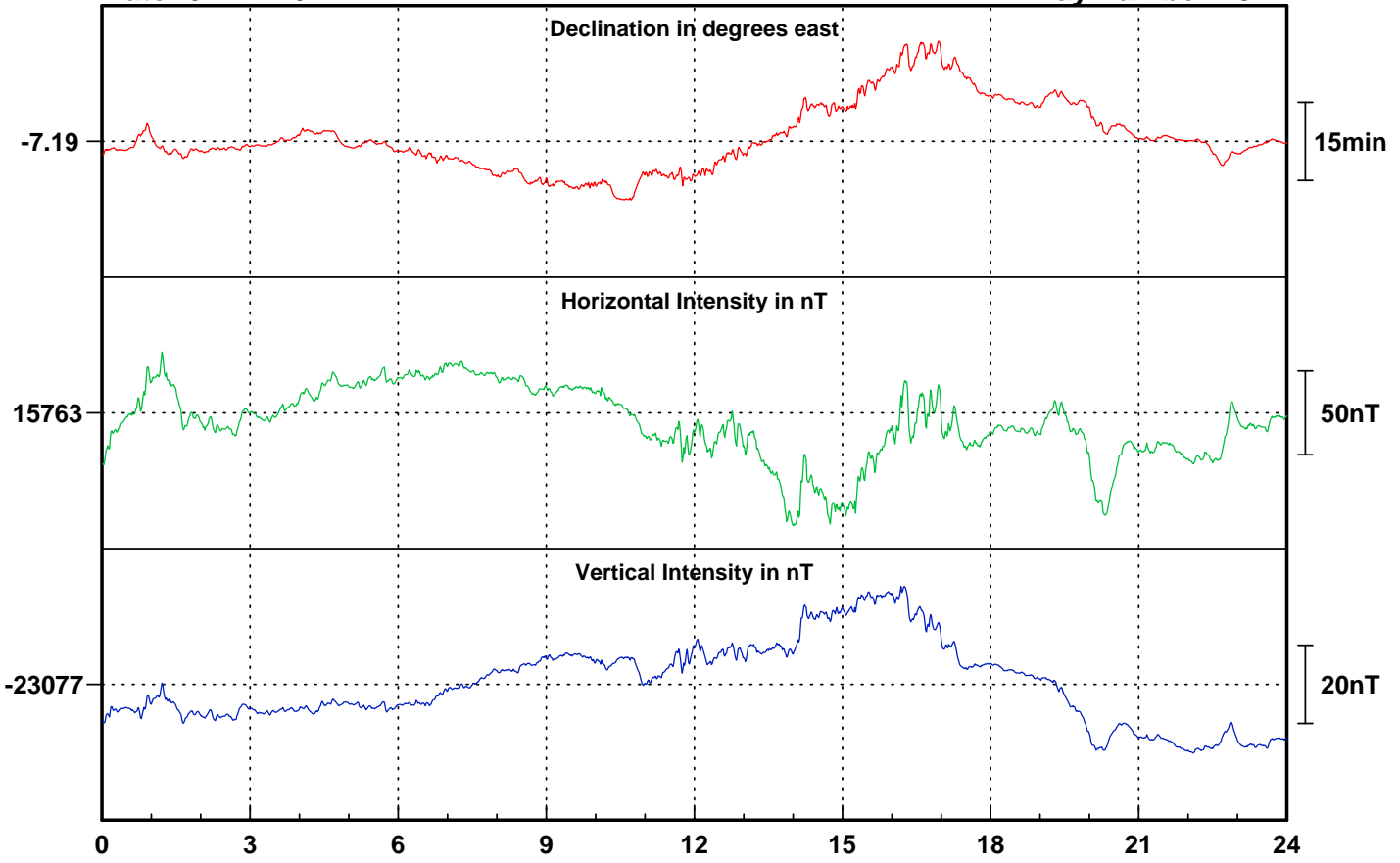
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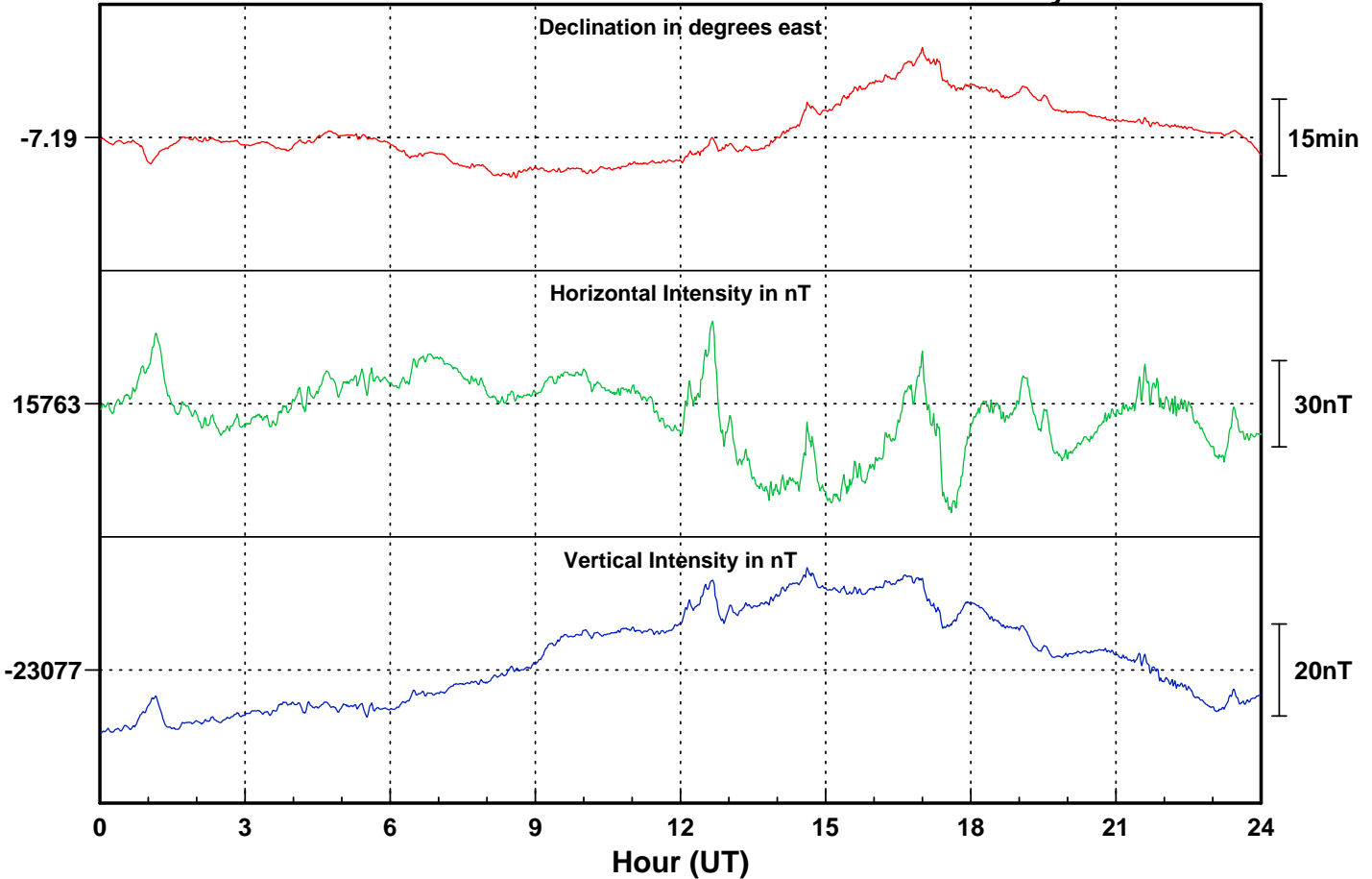
King Edward Point

Day number: 341



Date: 08-12-2014

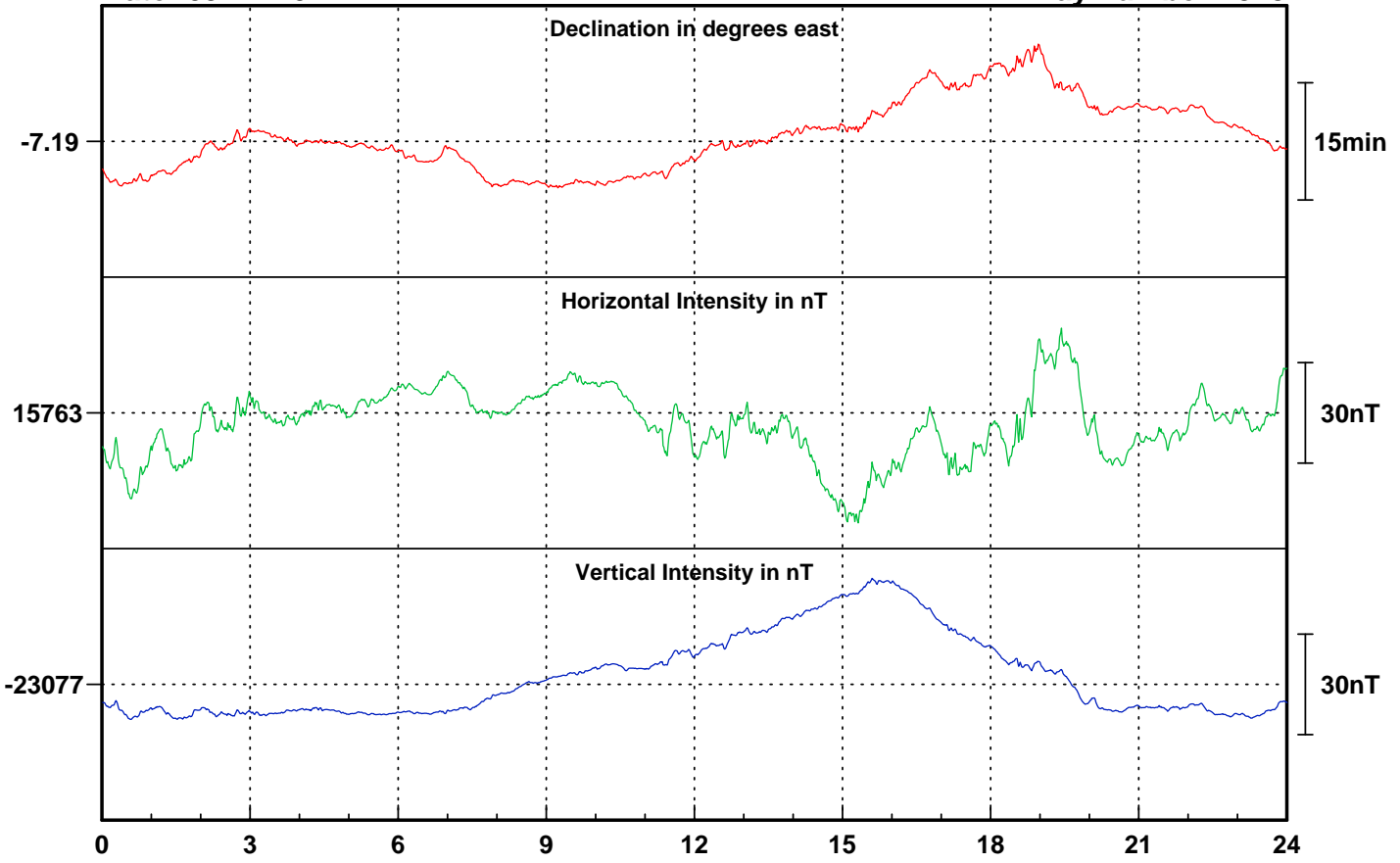
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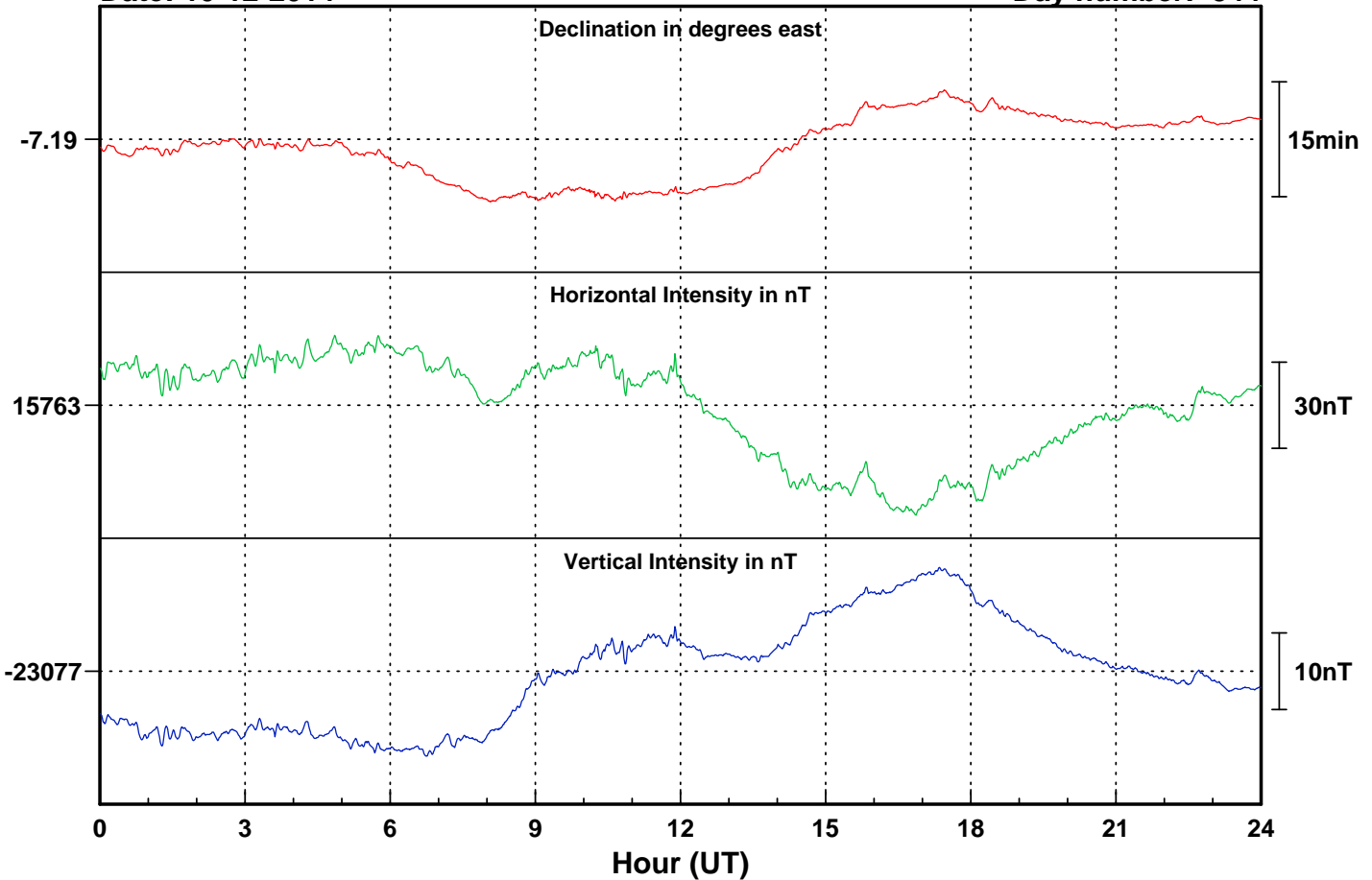
King Edward Point

Day number: 343



Date: 10-12-2014

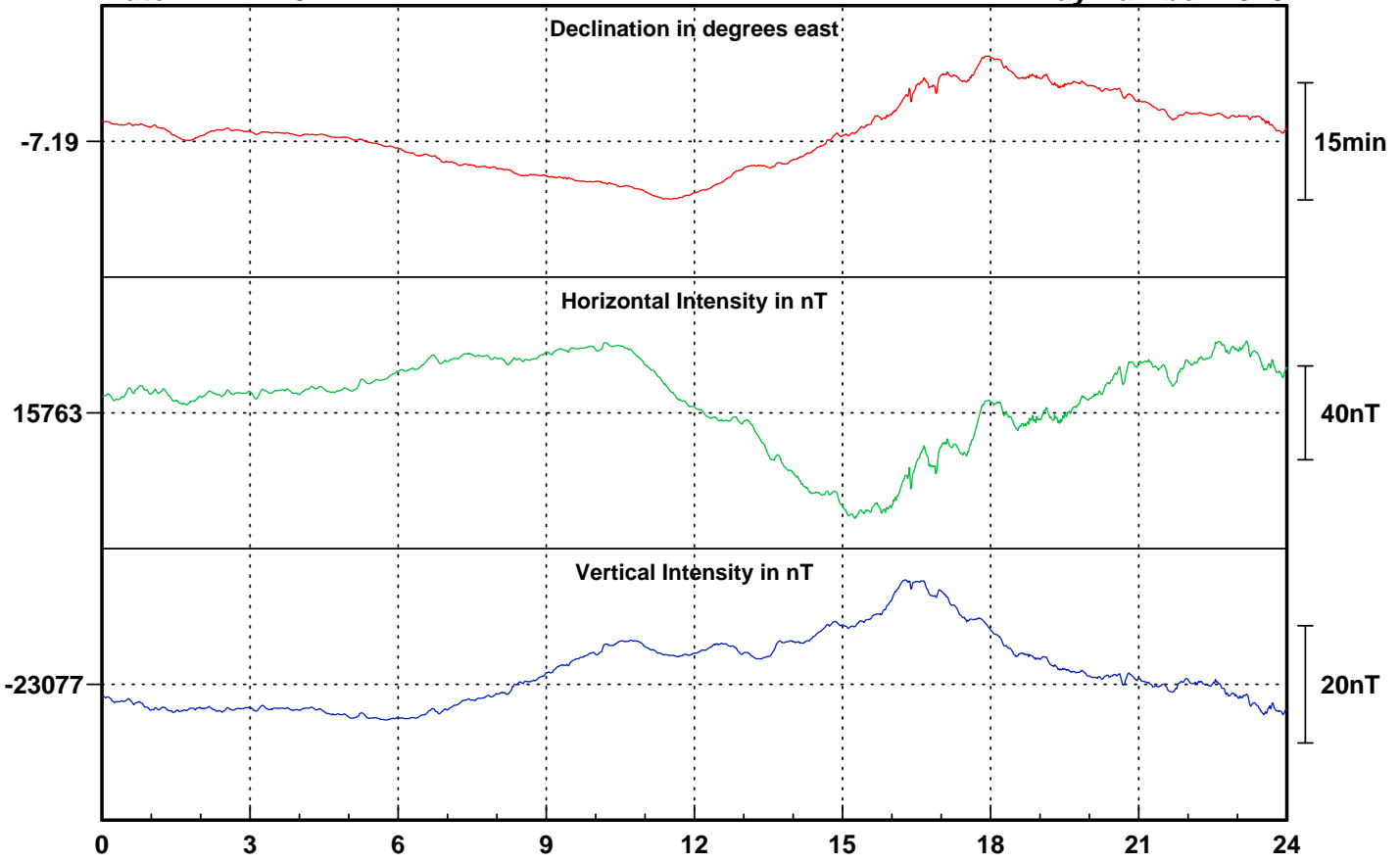
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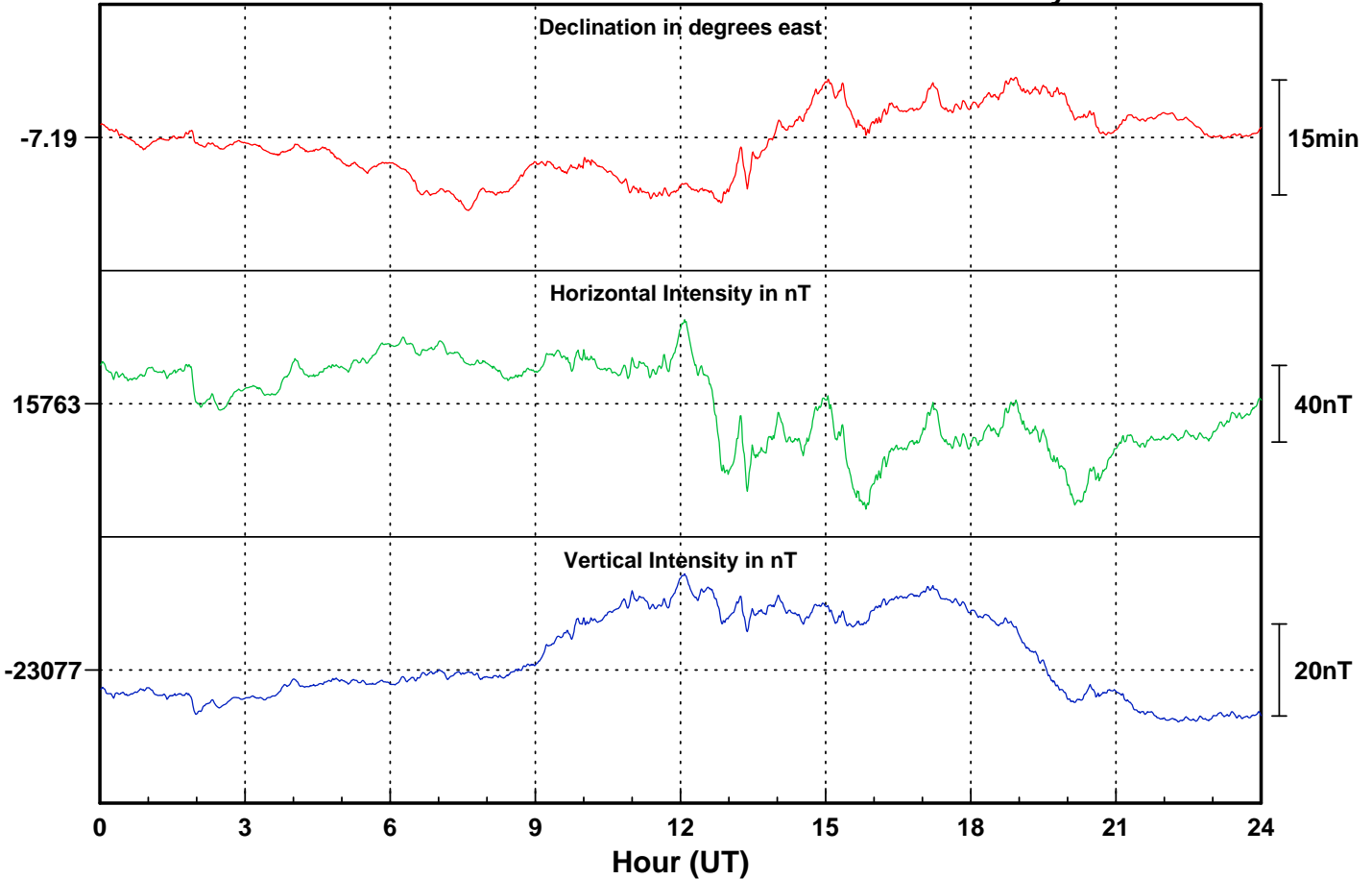
King Edward Point

Day number: 345



Date: 12-12-2014

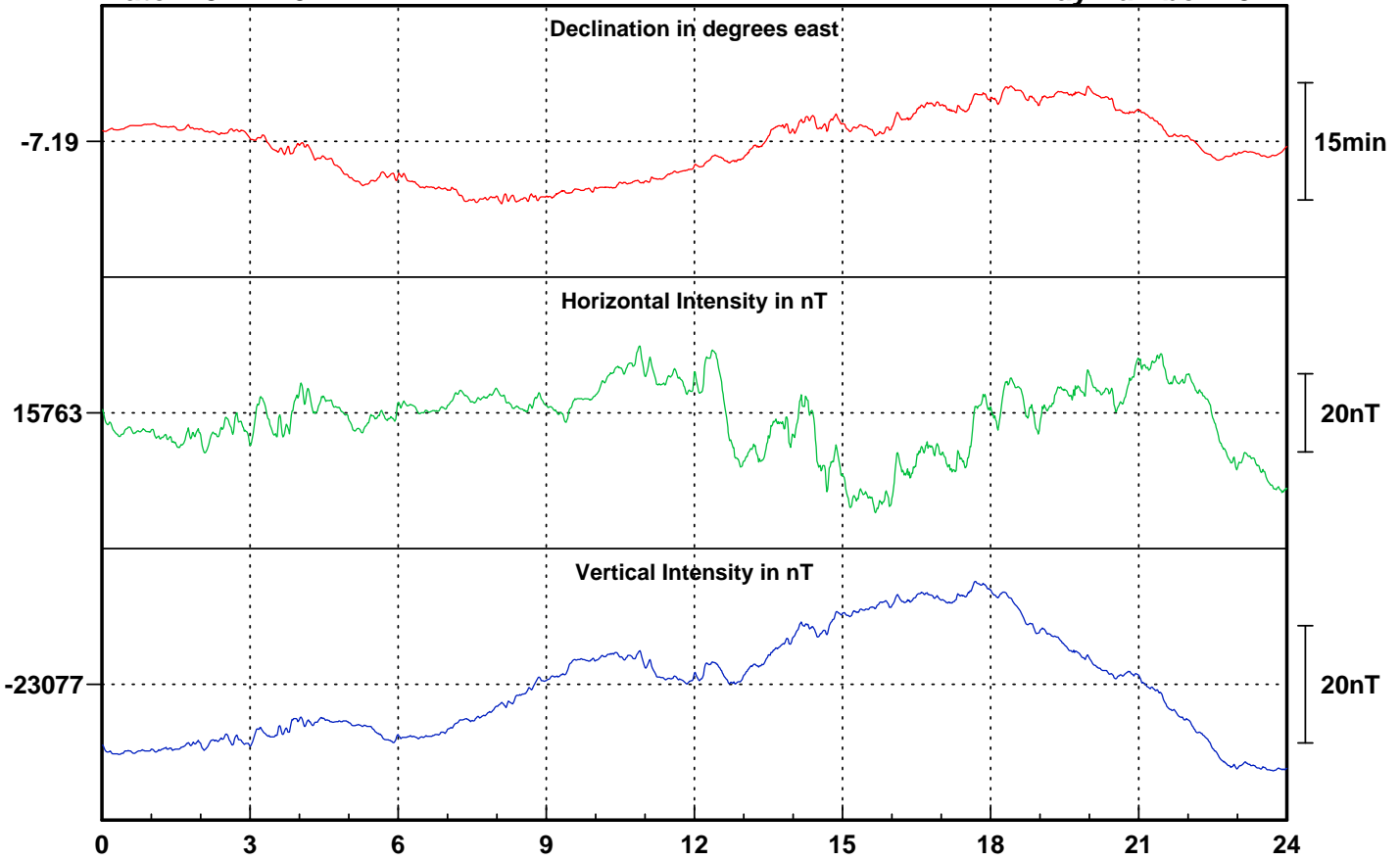
Day number: 346



Date: 13-12-2014

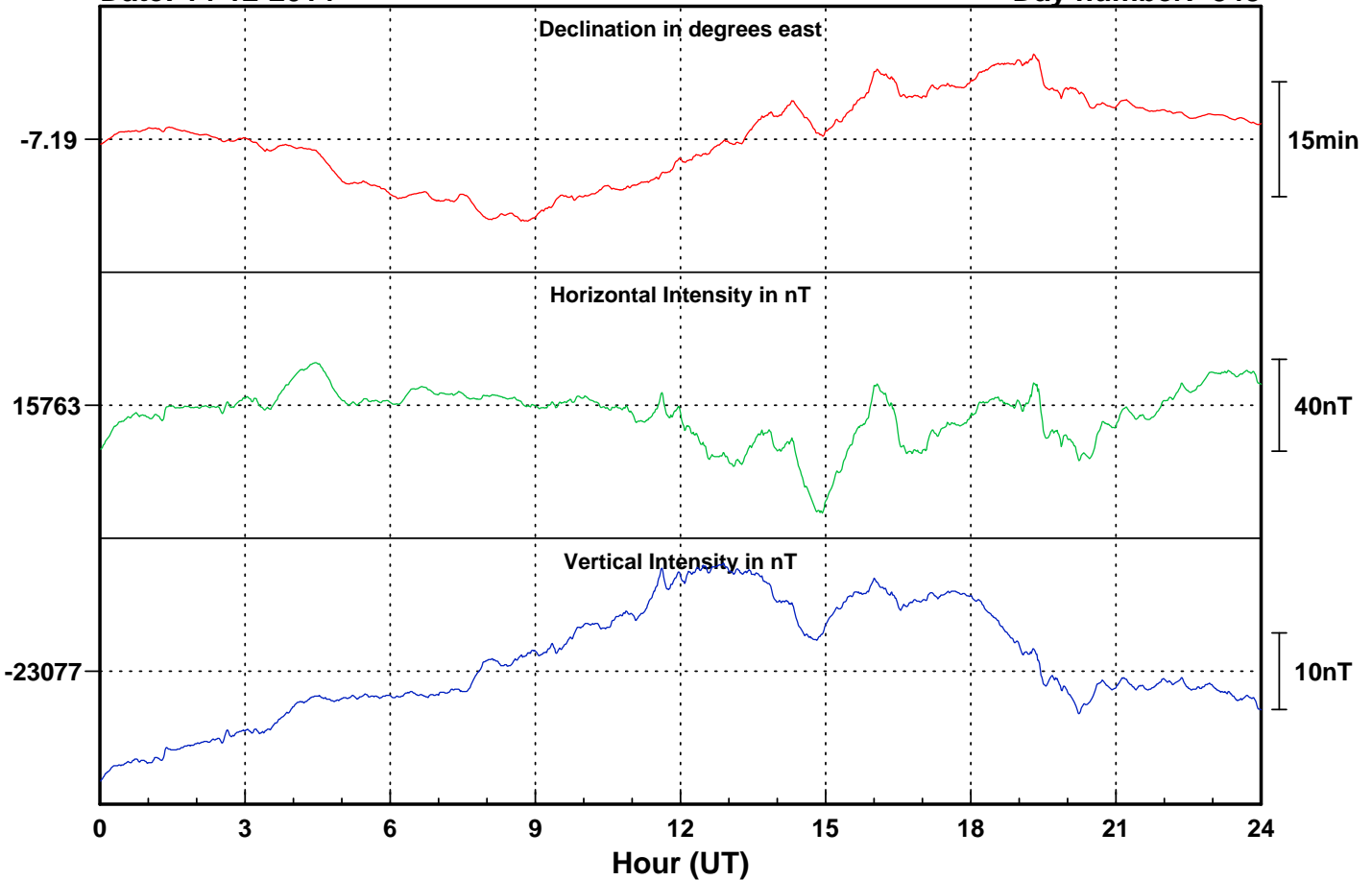
King Edward Point

Day number: 347



Date: 14-12-2014

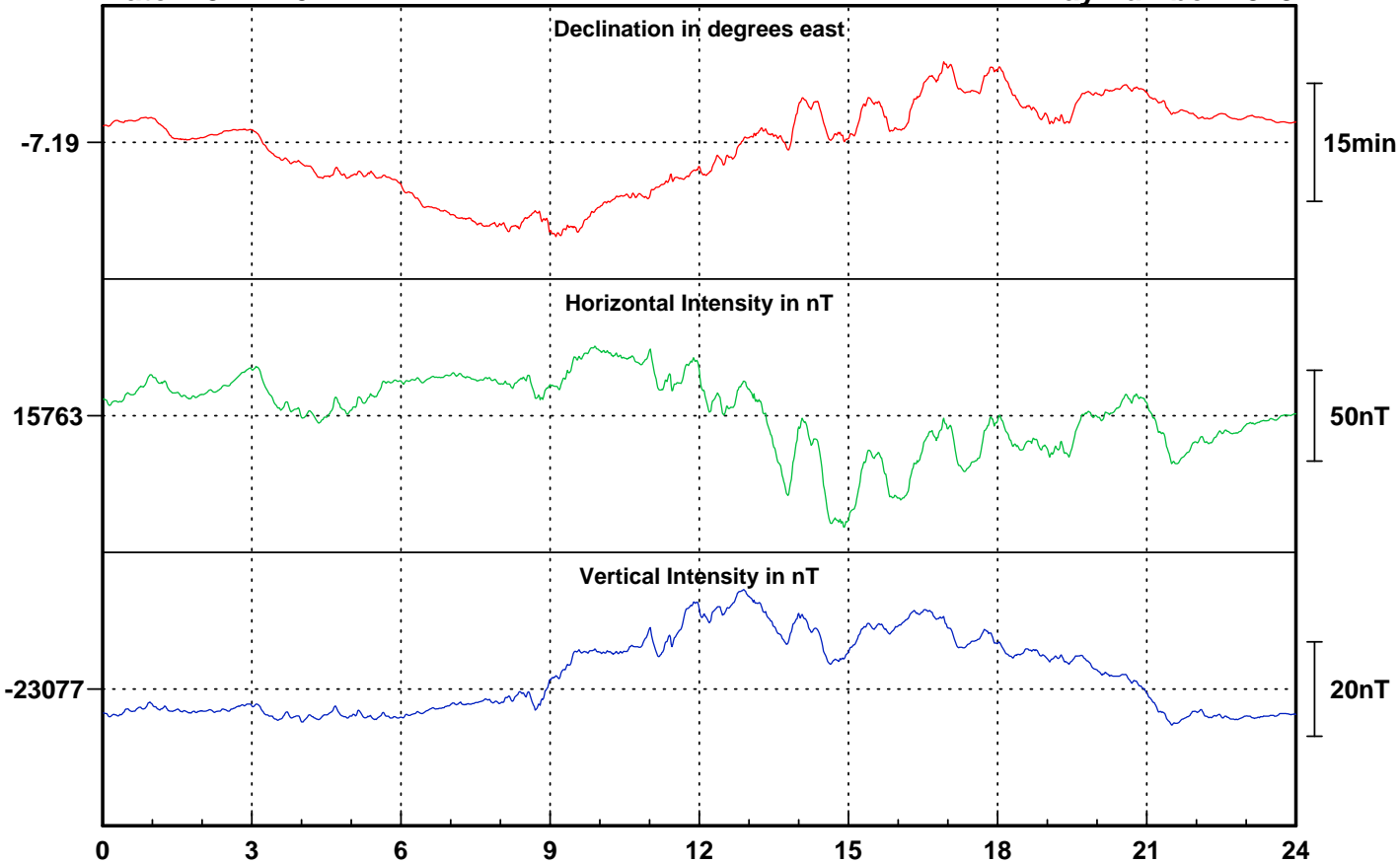
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Date: 15-12-2014

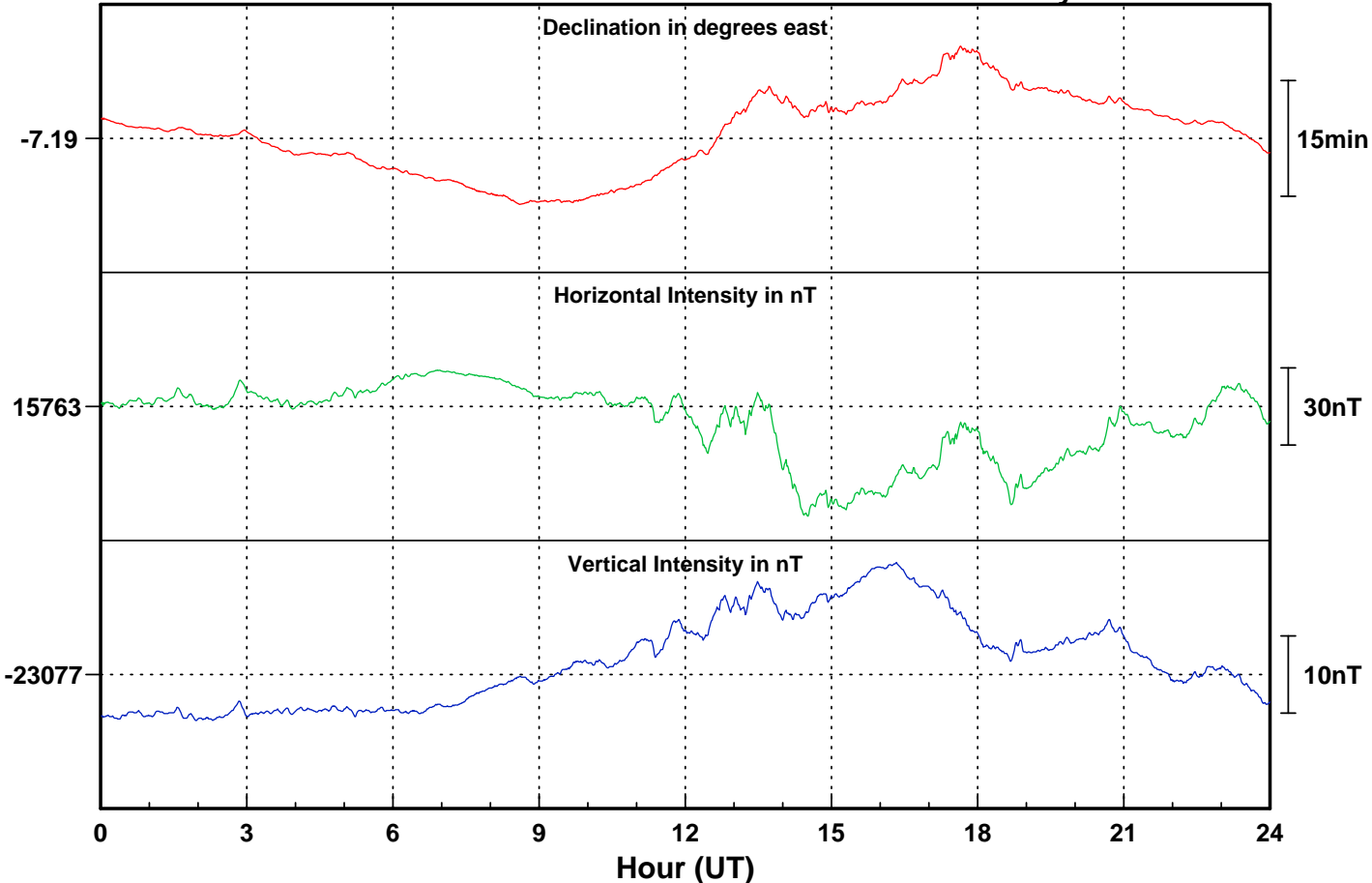
King Edward Point

Day number: 349



Date: 16-12-2014

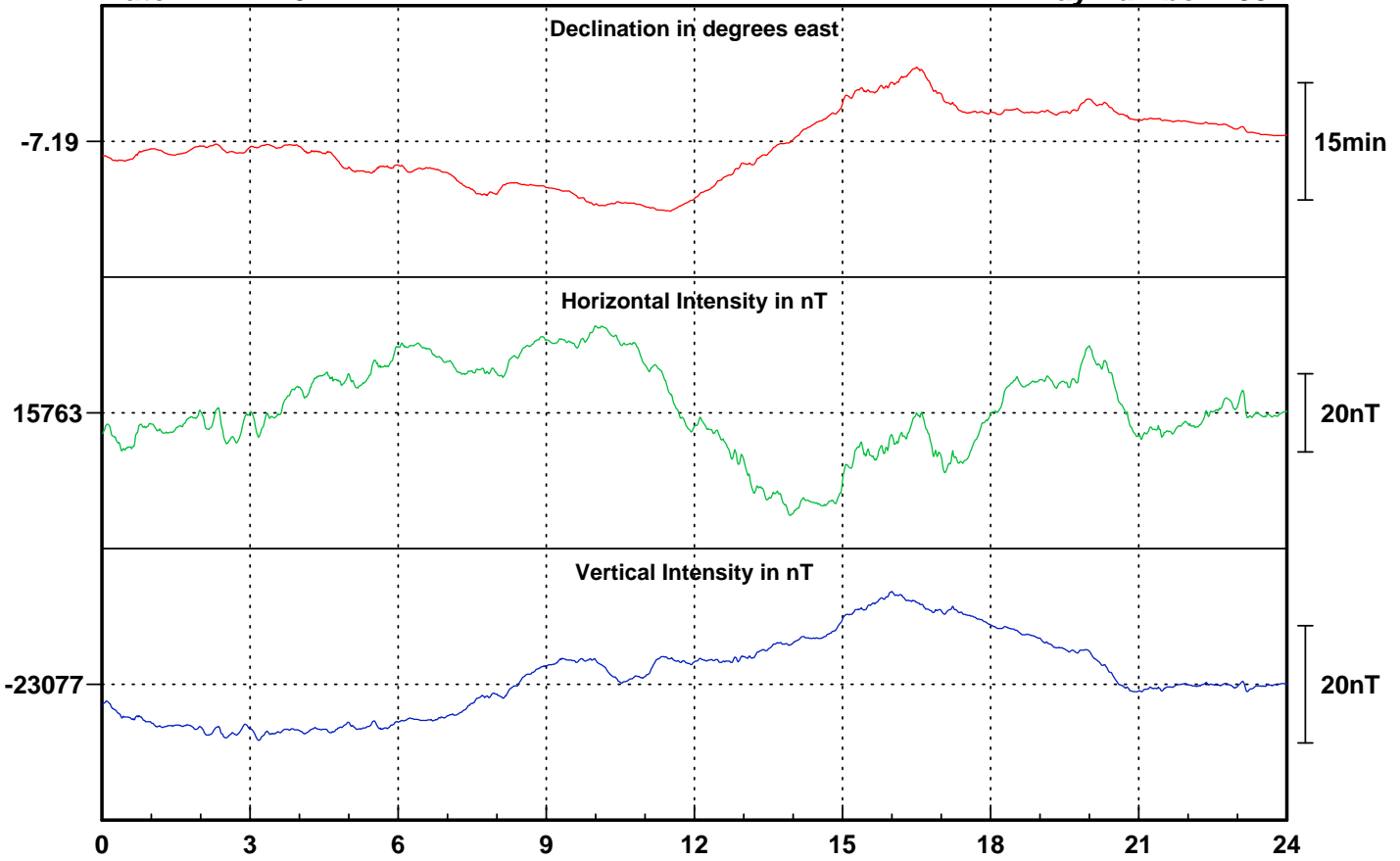
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Date: 17-12-2014

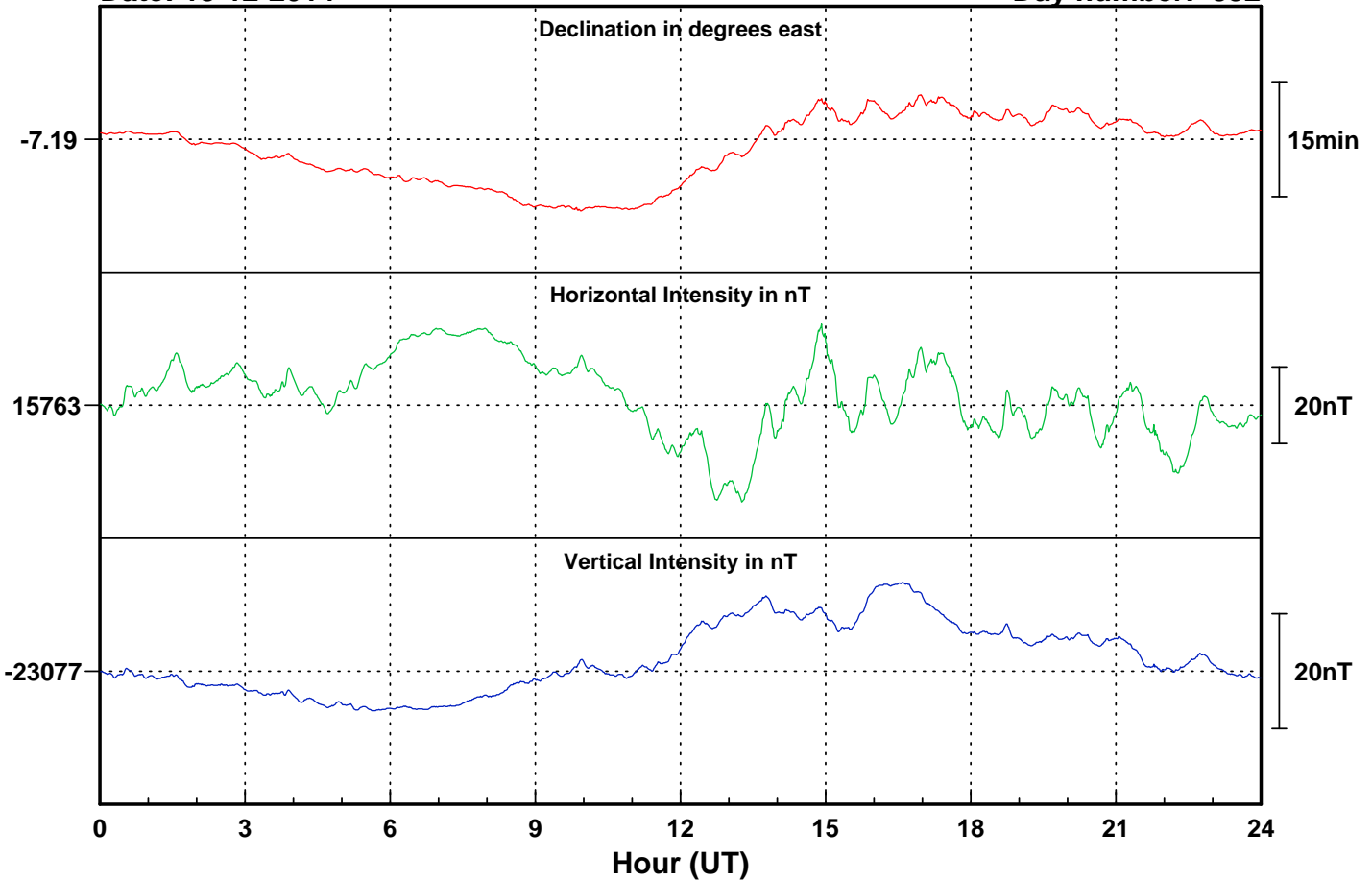
King Edward Point

Day number: 351



Date: 18-12-2014

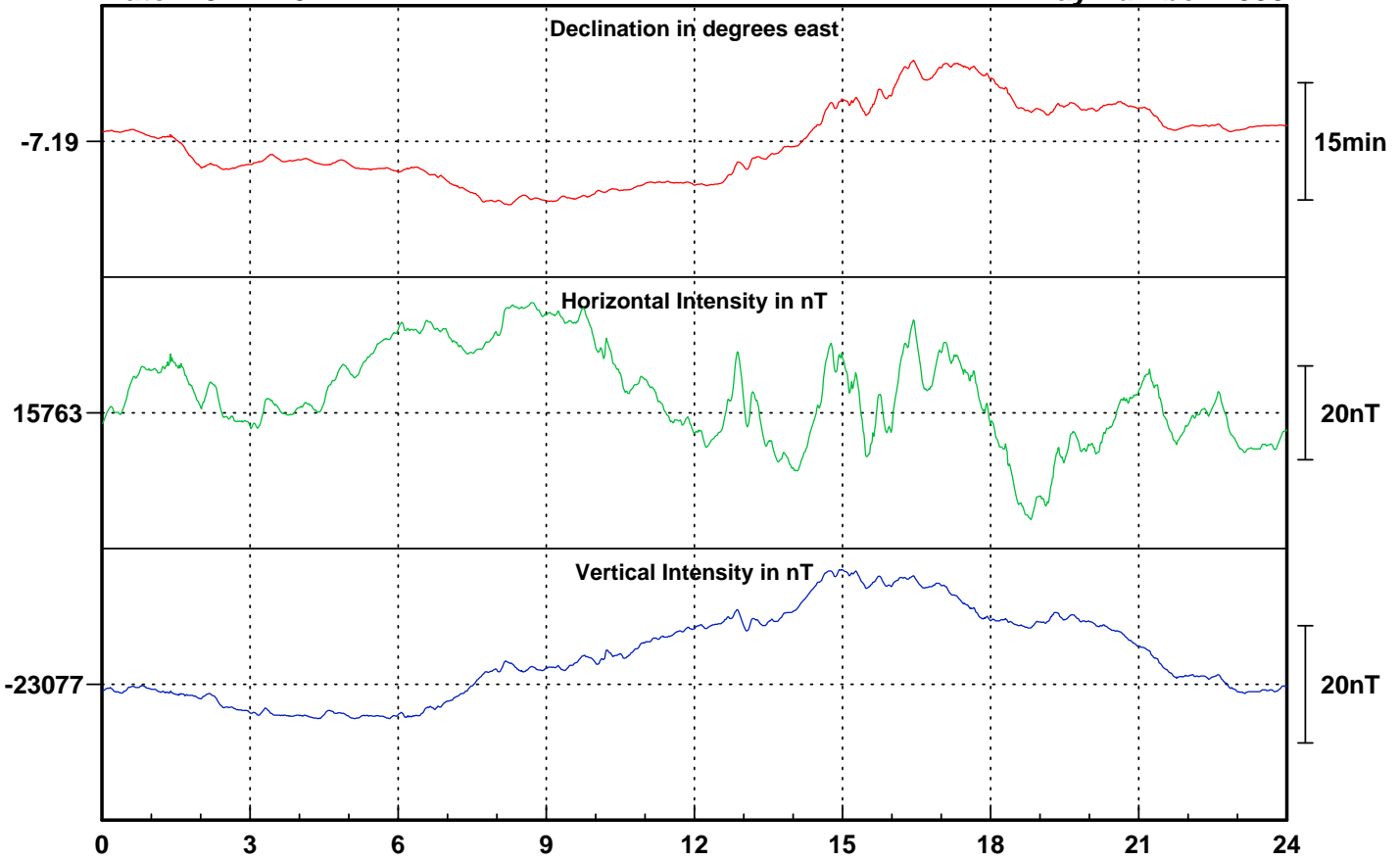
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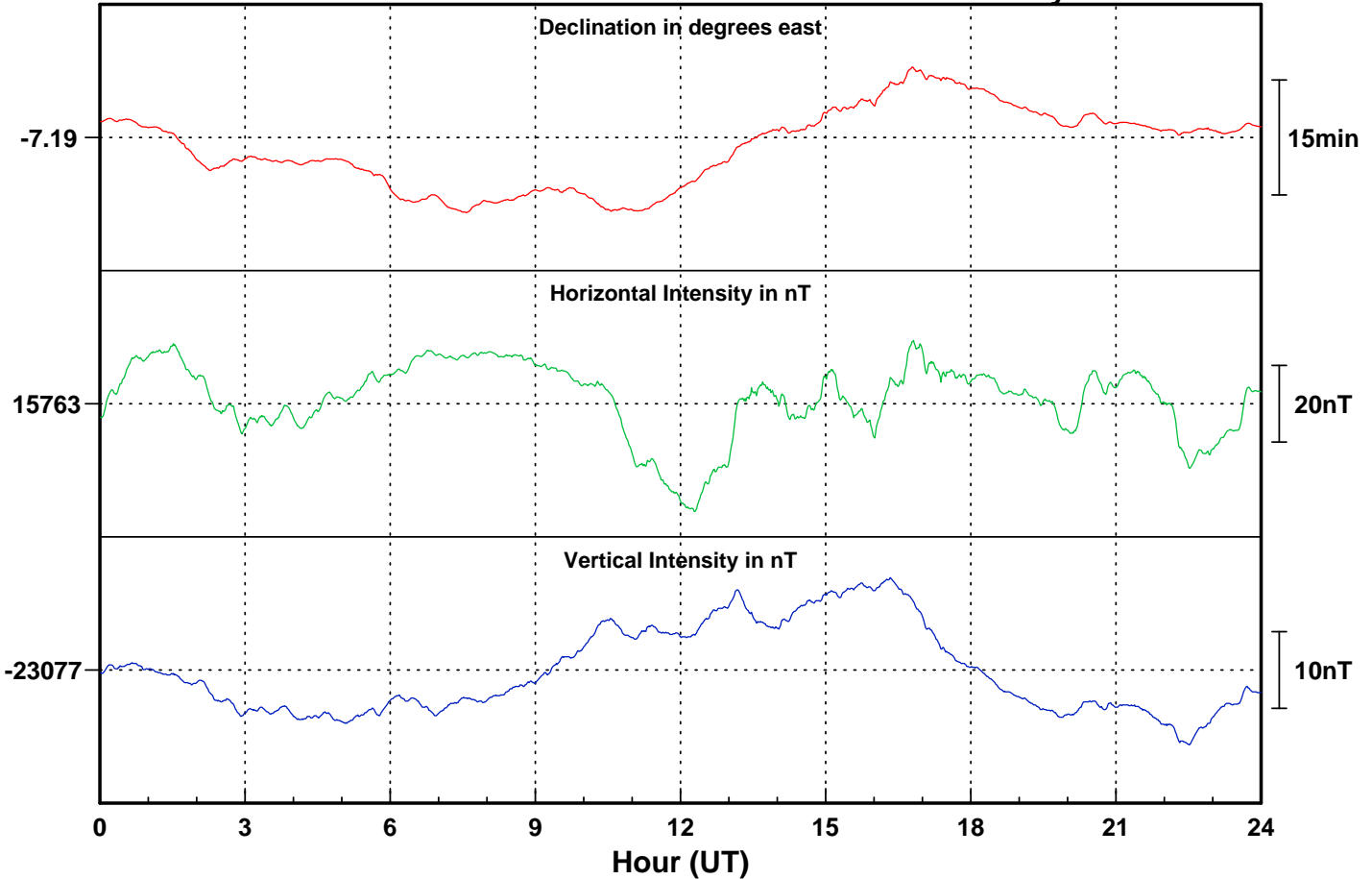
King Edward Point

Day number: 353



Date: 20-12-2014

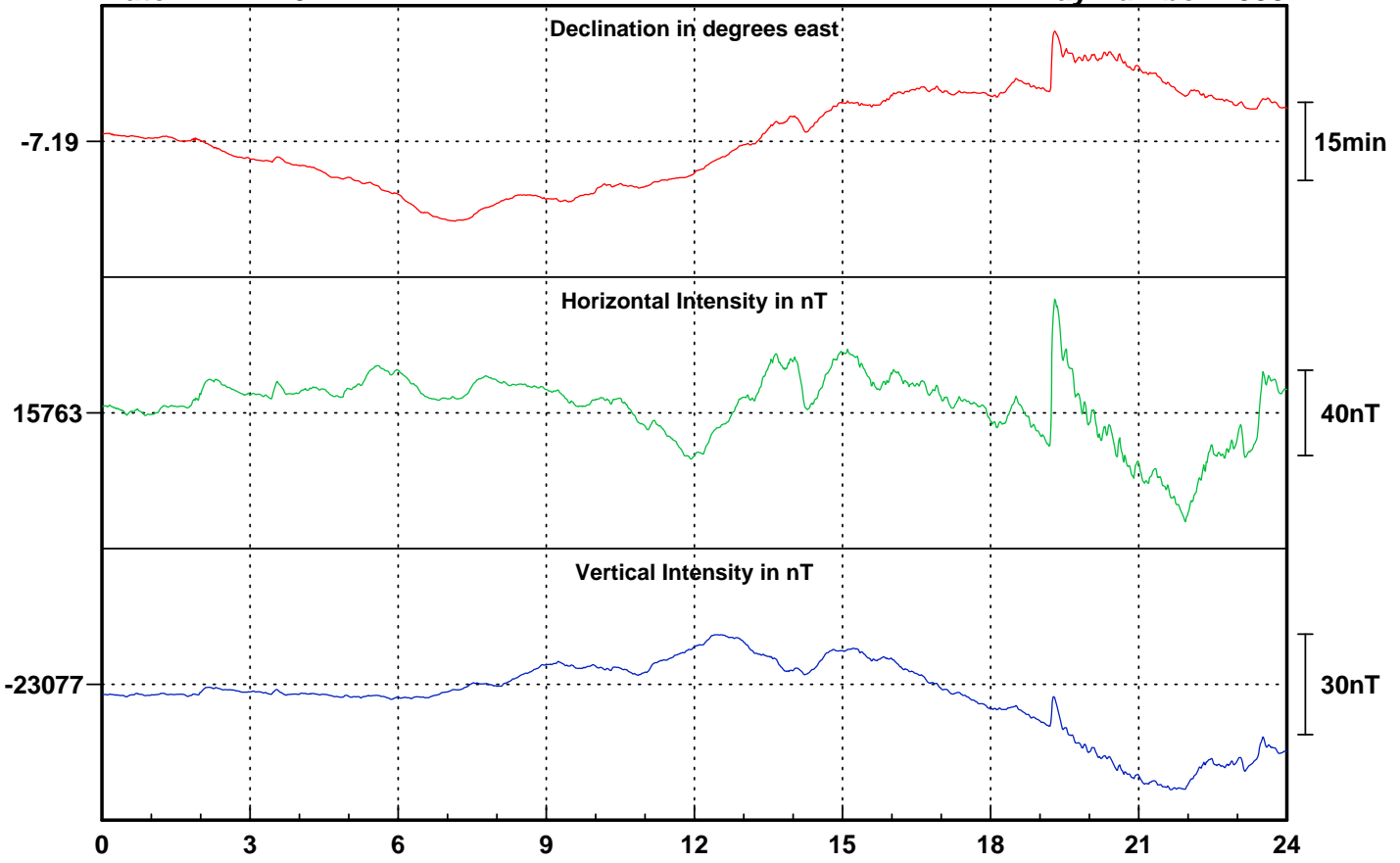
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Date: 21-12-2014

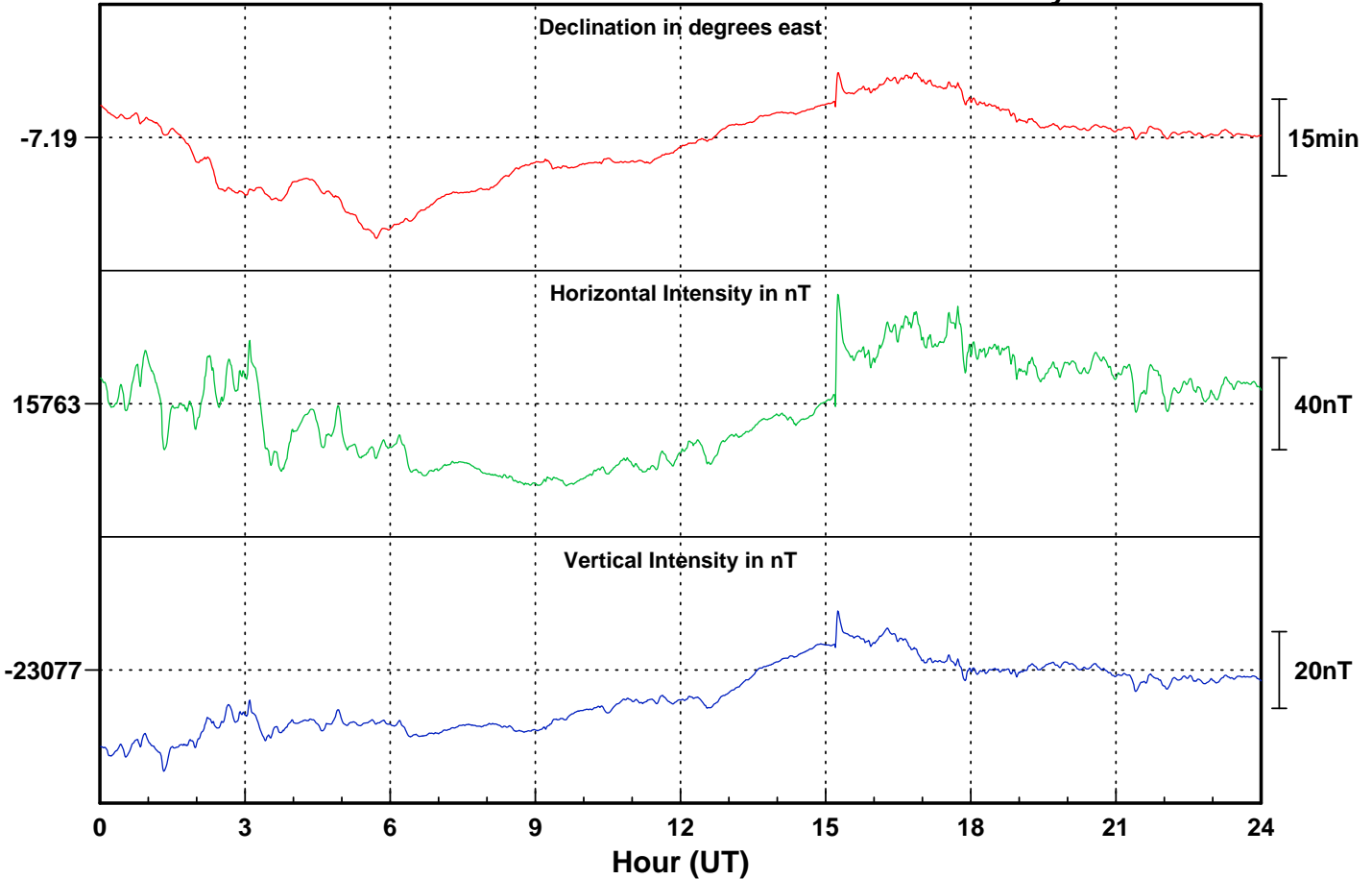
King Edward Point

Day number: 355



Date: 22-12-2014

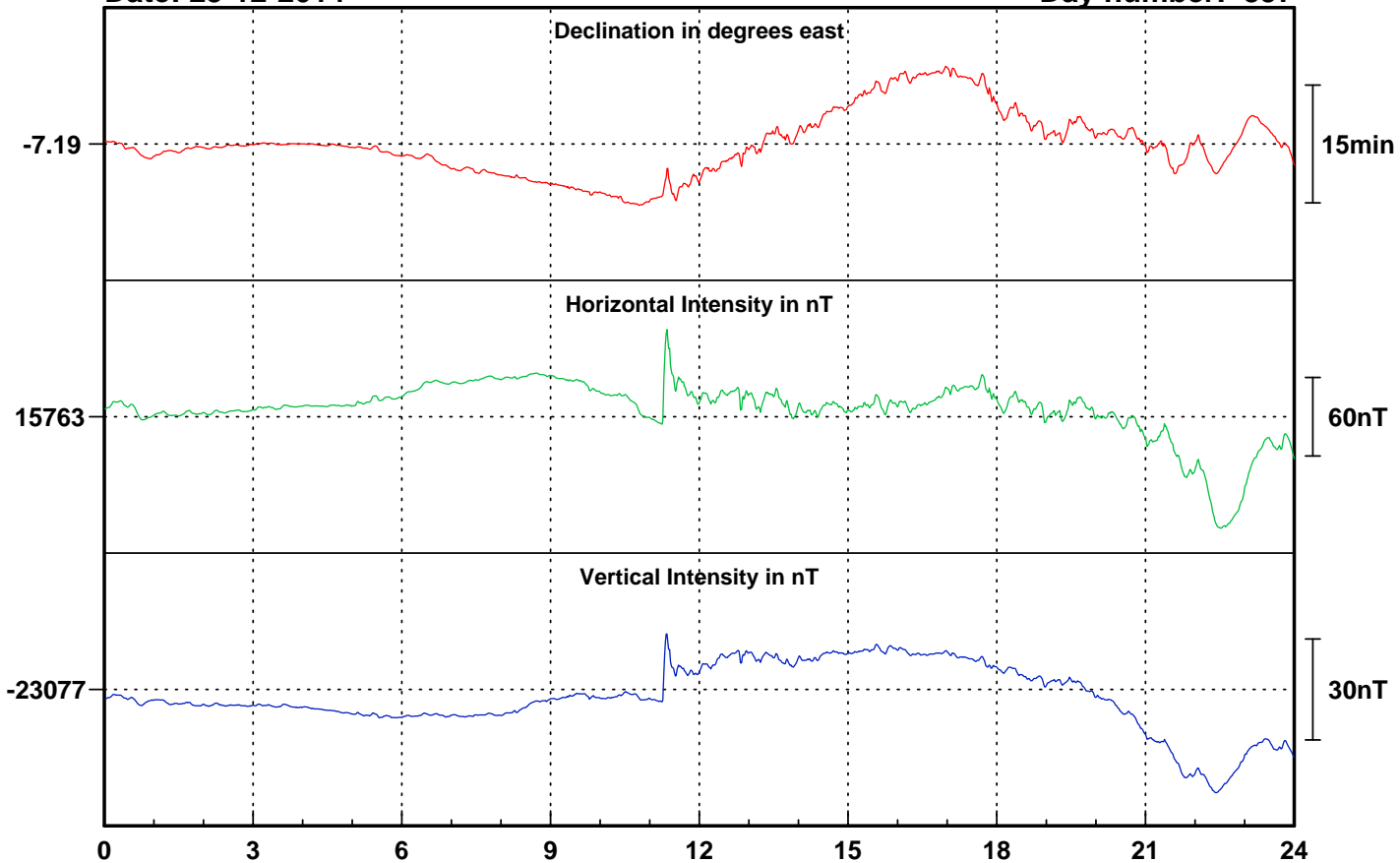
Day number: 356



Date: 23-12-2014

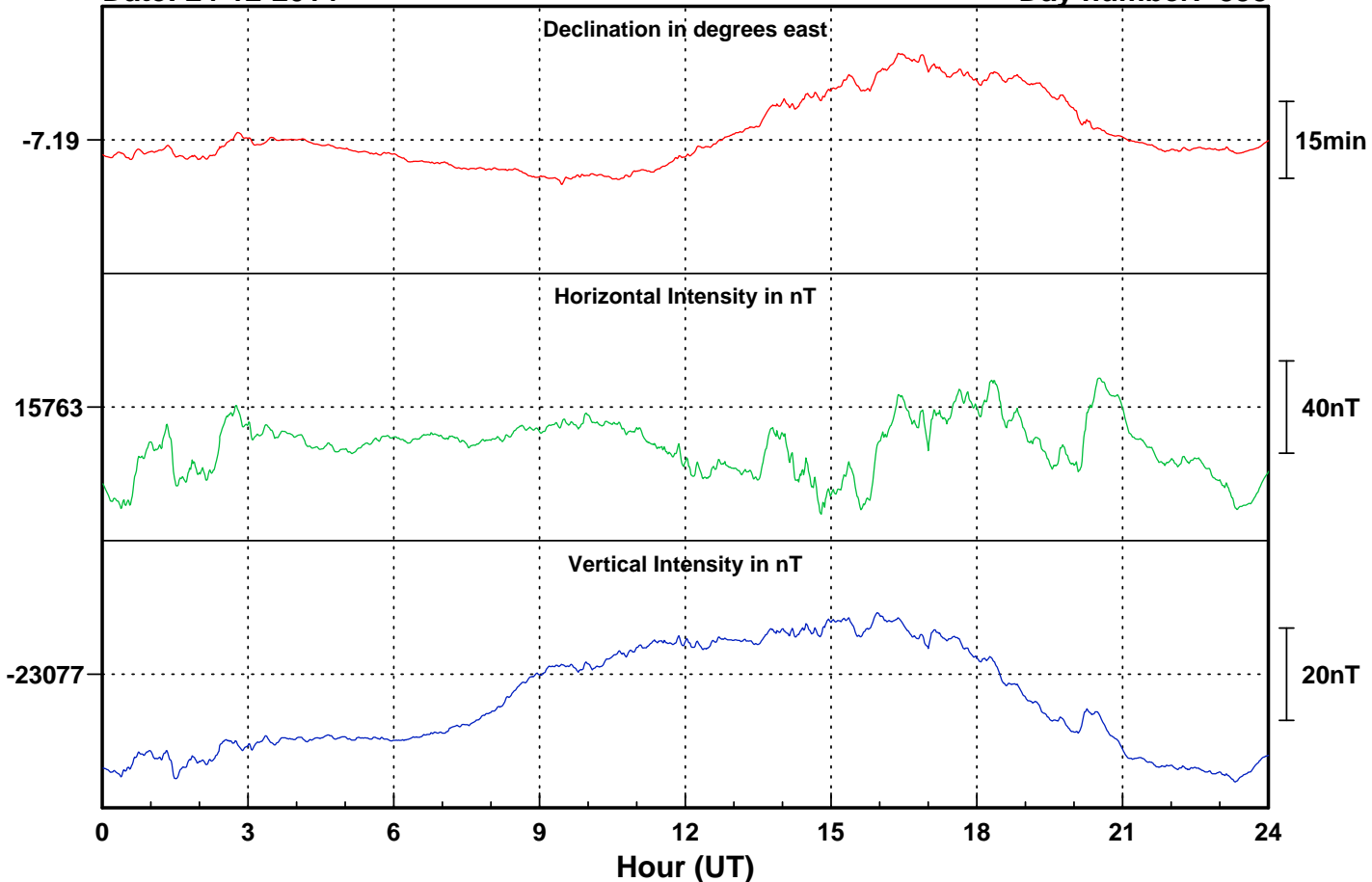
King Edward Point

Day number: 357



Date: 24-12-2014

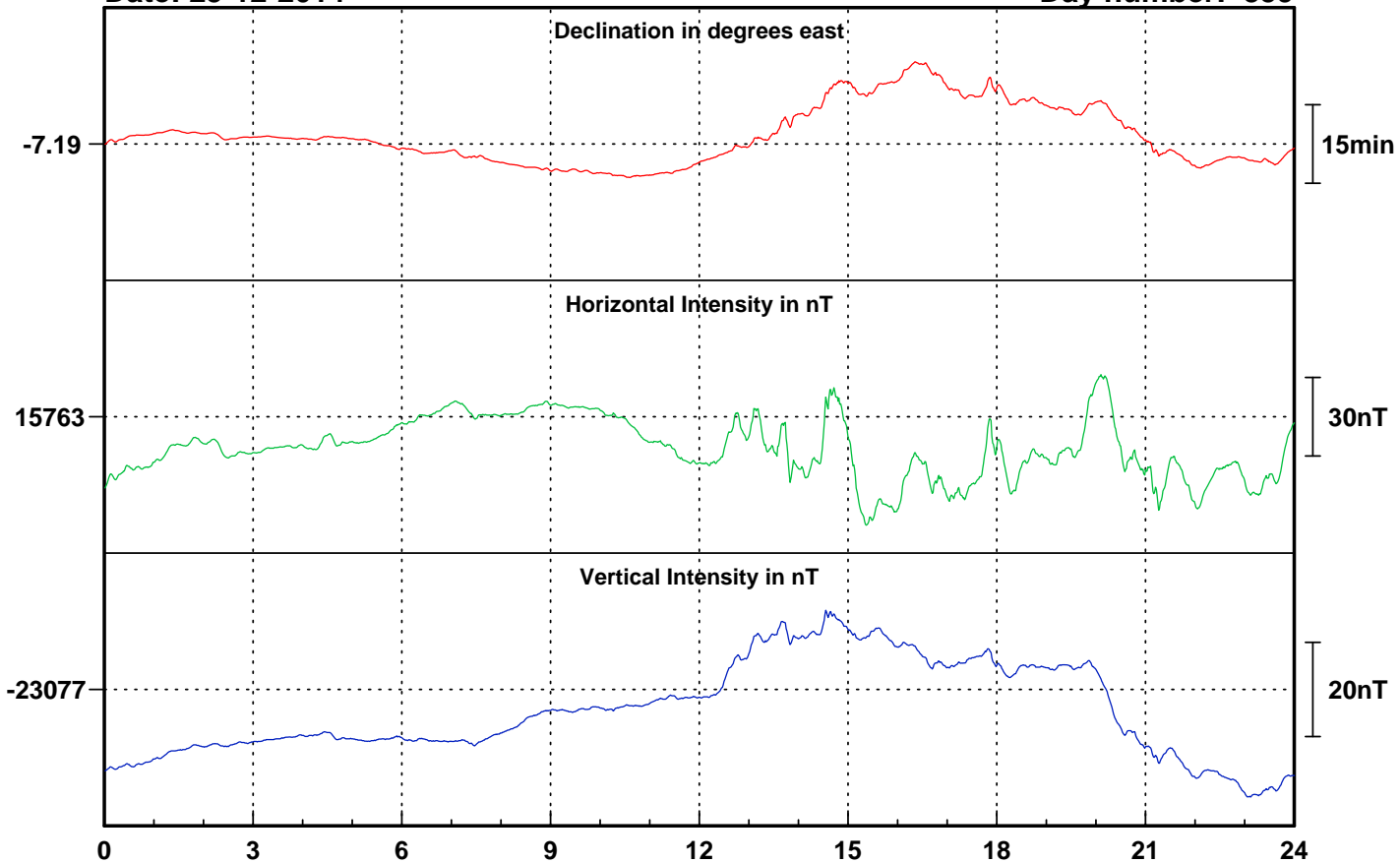
Day number: 358



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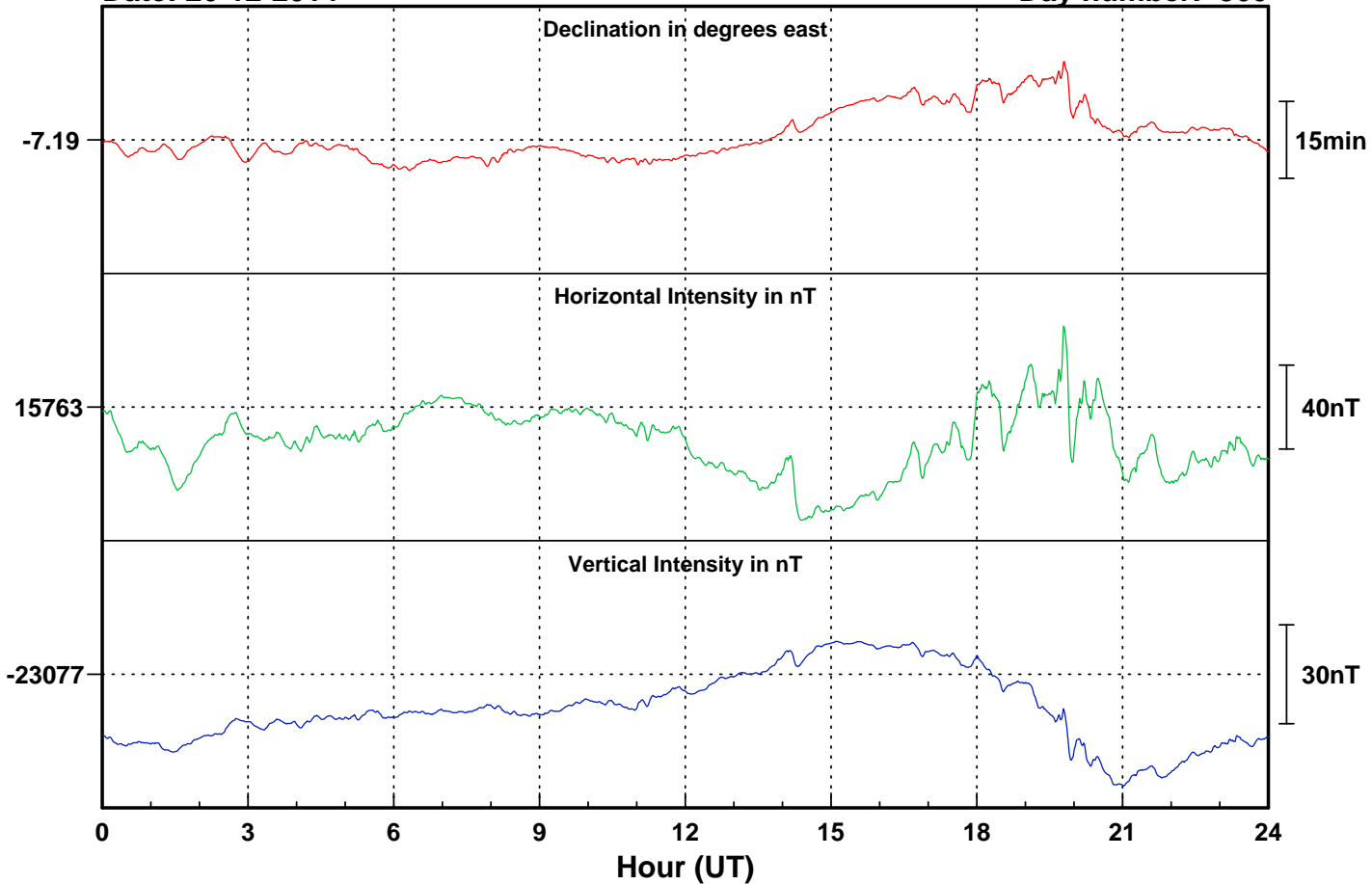
King Edward Point

Day number: 359



Date: 26-12-2014

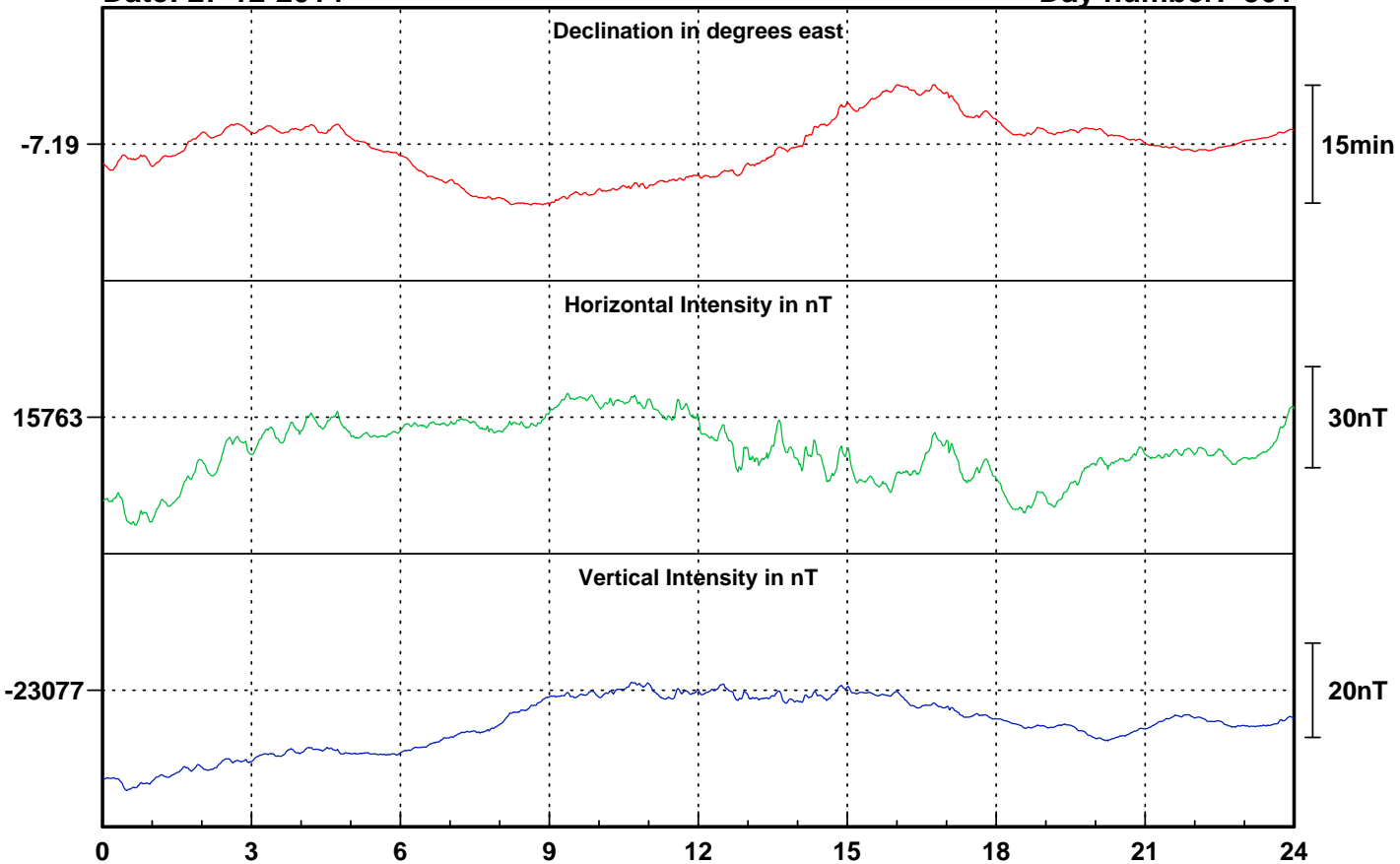
Day number: 360



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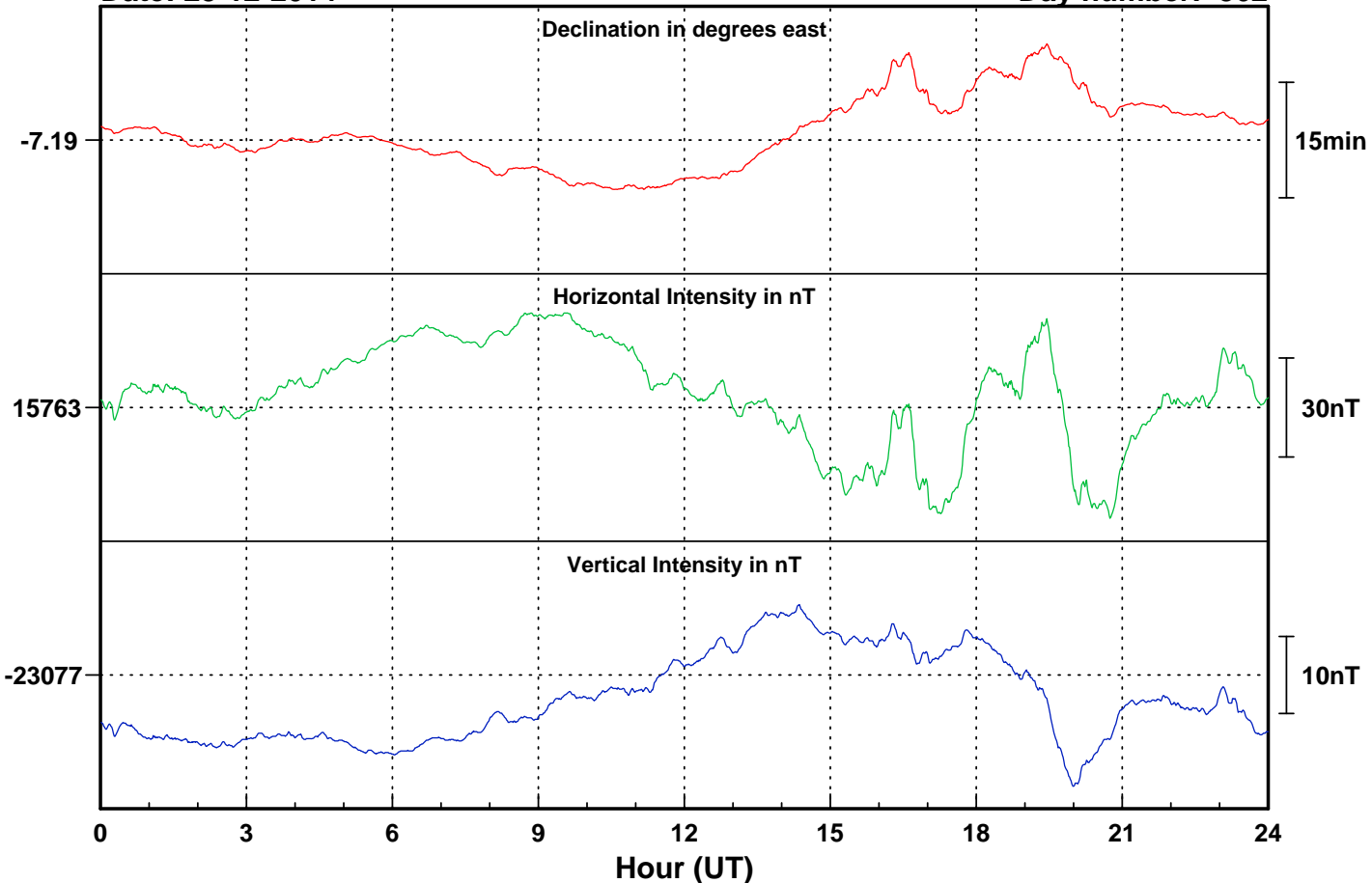
King Edward Point

Day number: 361



Date: 28-12-2014

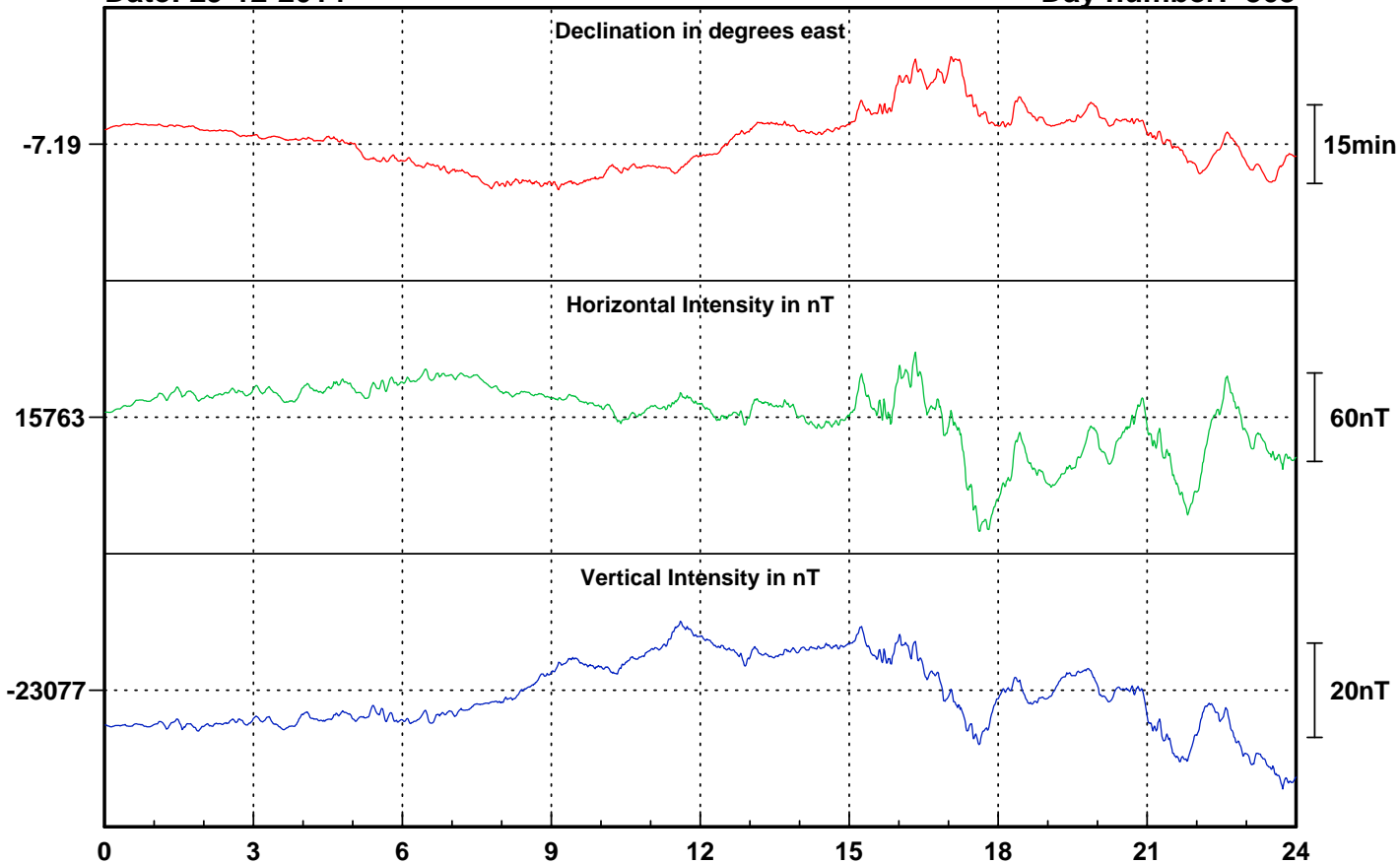
Day number: 362



Date: 29-12-2014

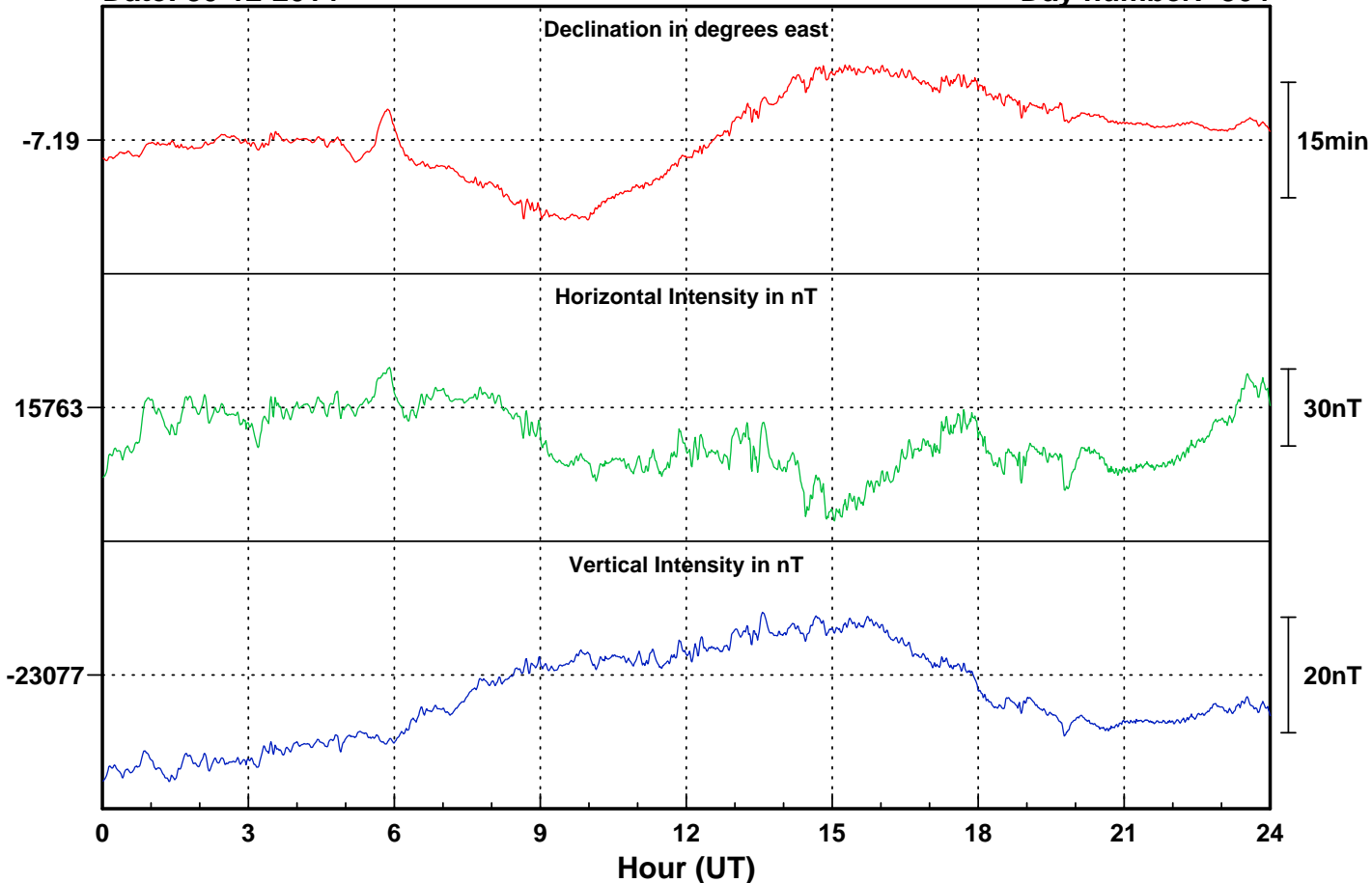
King Edward Point

Day number: 363



Date: 30-12-2014

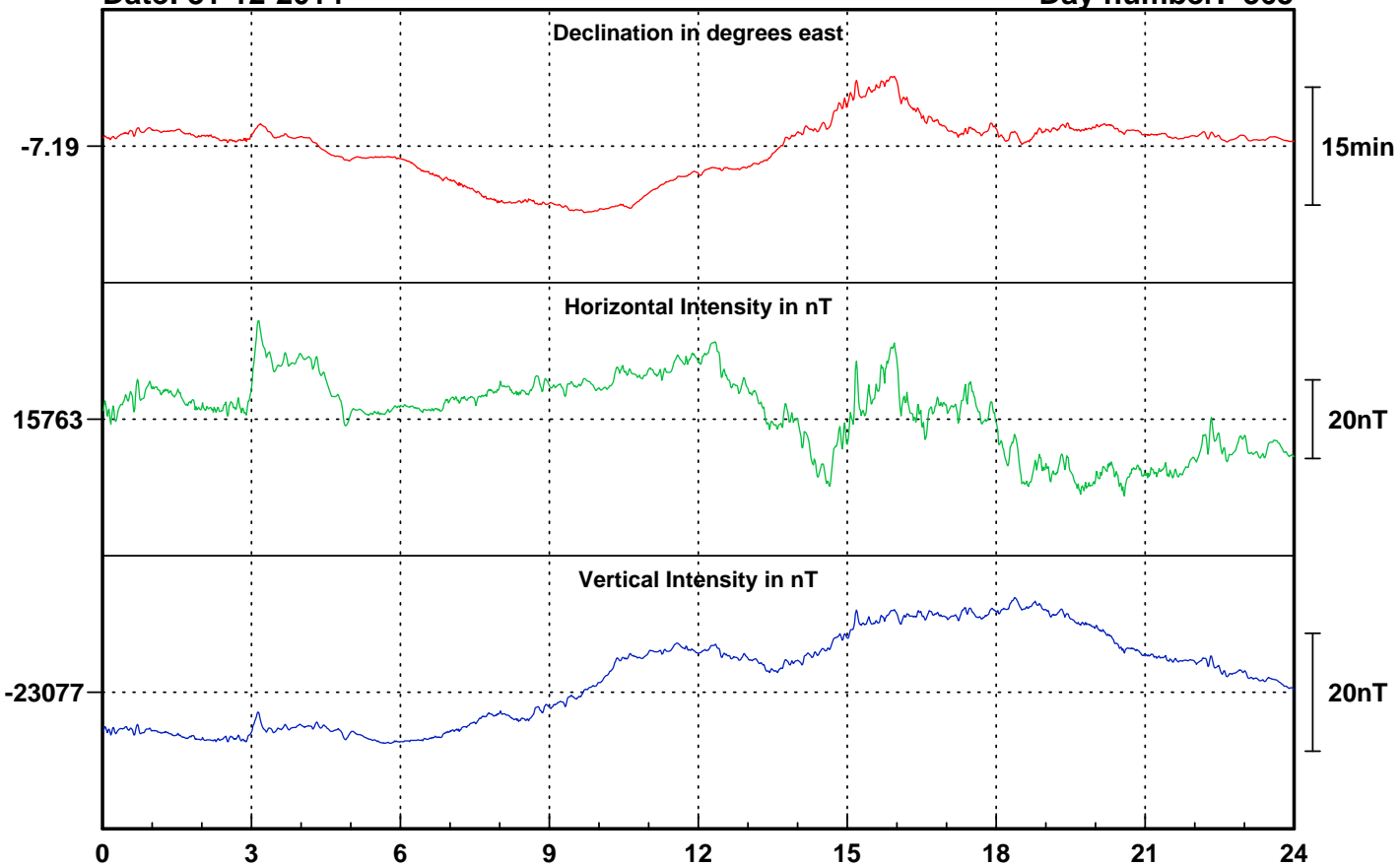
Day number: 364



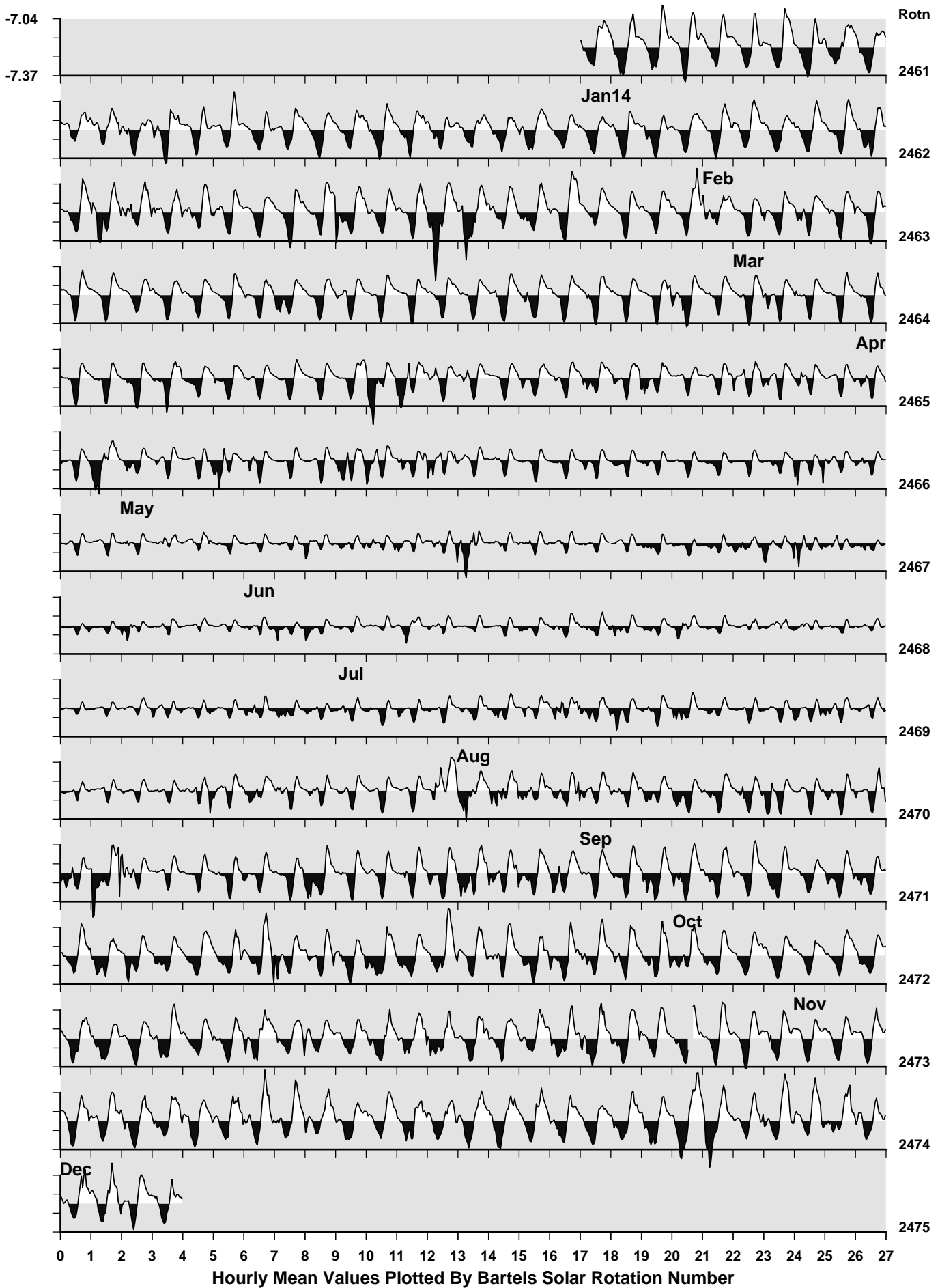
Date: 31-12-2014

King Edward Point

Day number: 365

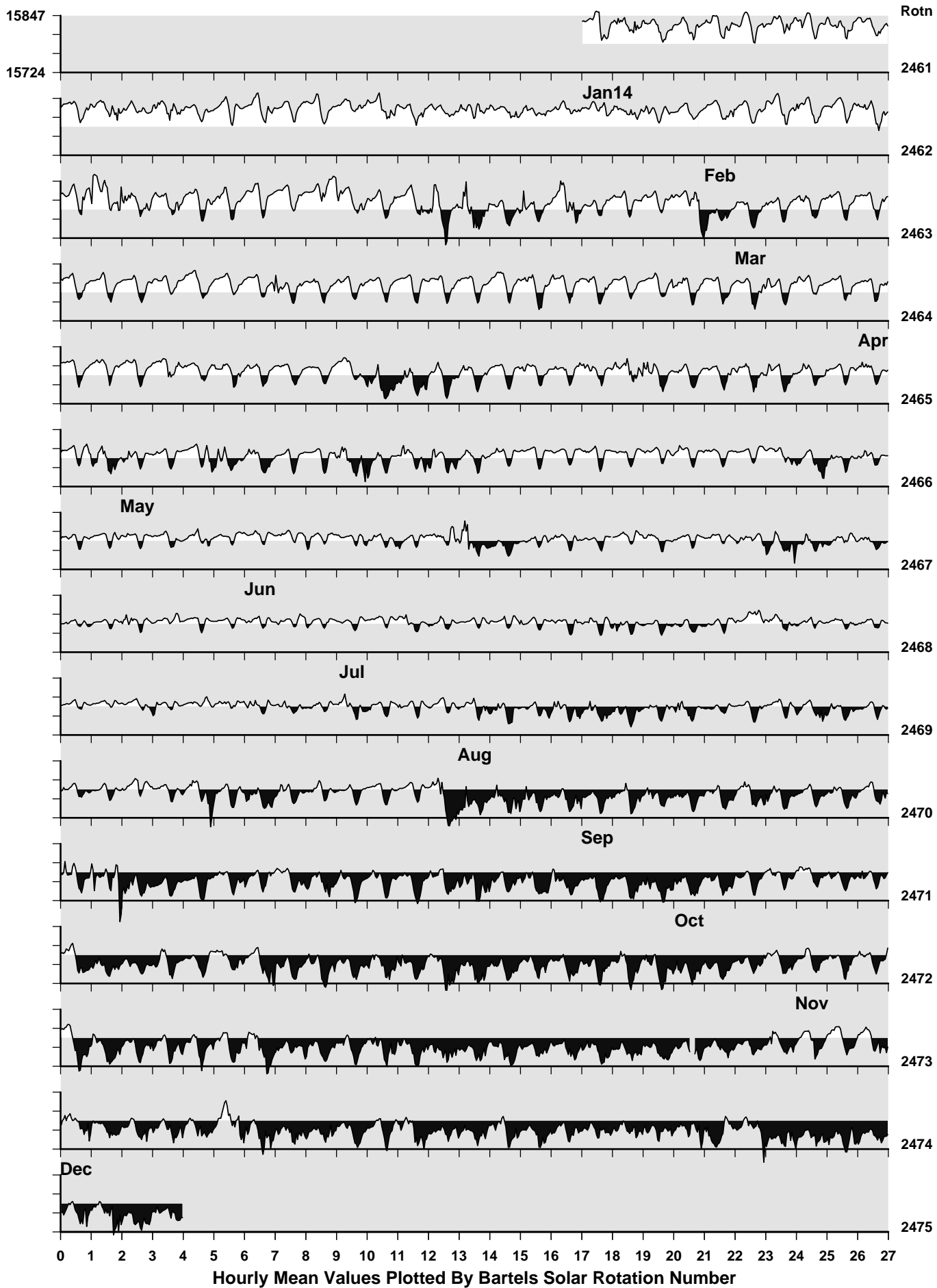


King Edward Point Observatory: Declination (degrees)

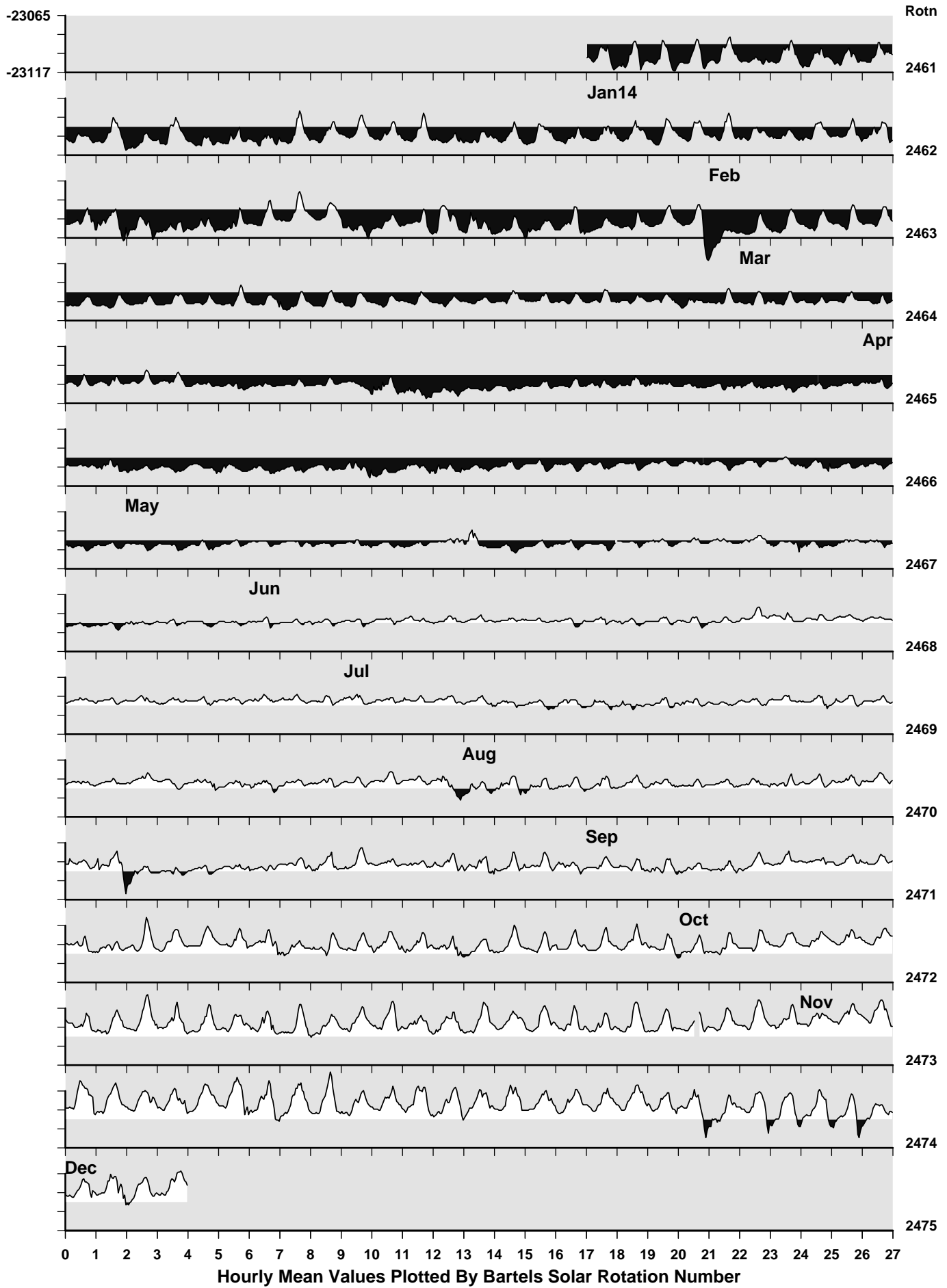


Hourly Mean Values Plotted By Bartels Solar Rotation Number

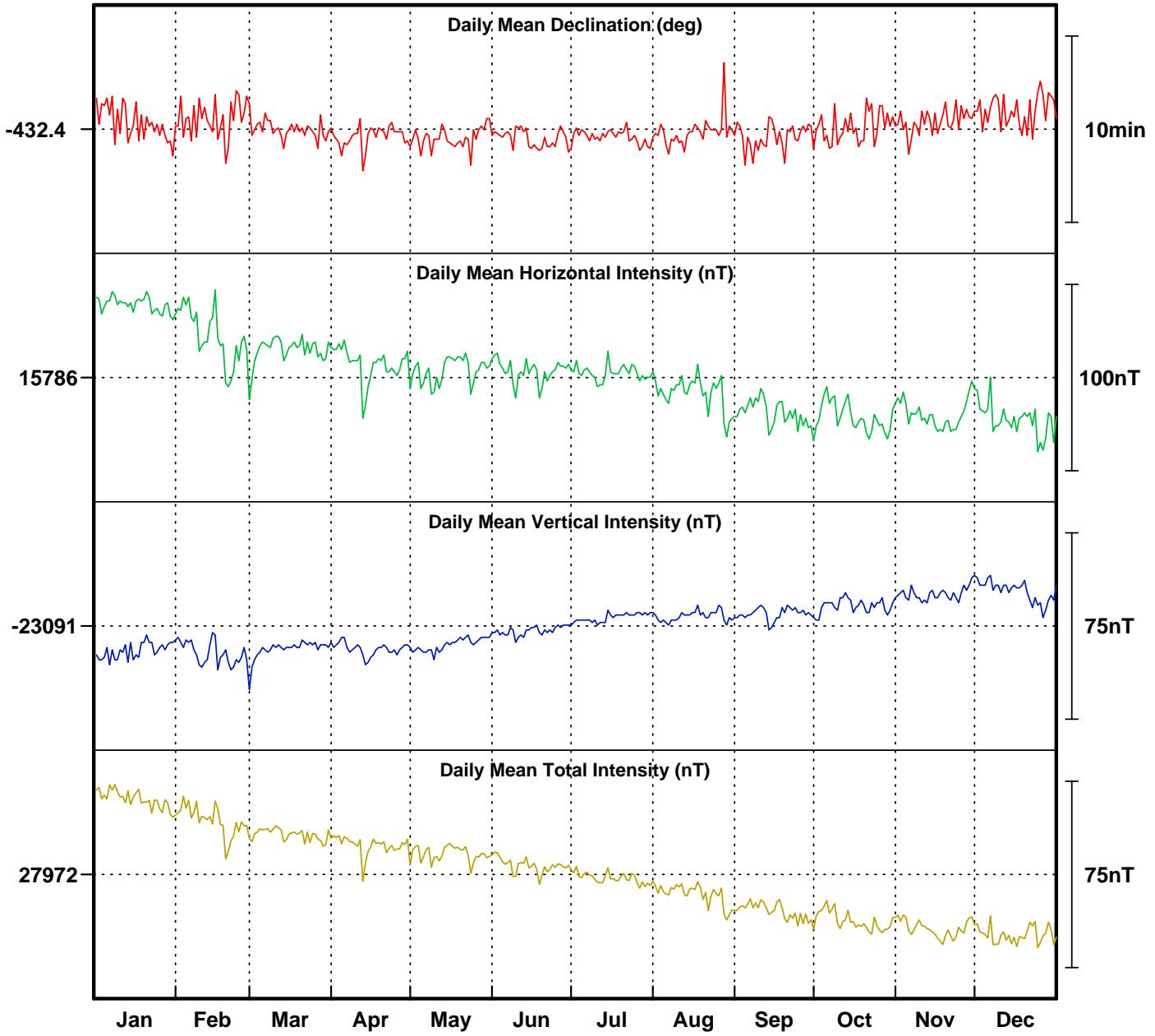
King Edward Point Observatory: Horizontal Intensity fhT ζ



King Edward Point Observatory: Vertical Intensity (nT)



King Edward Point Observatory 2014



Monthly Mean Values for King Edward Point Observatory 2014

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-7° 12.0′	15825 nT	-55° 35.3′	15700 nT	-1984 nT	-23101 nT	28002 nT
February	-7° 11.8′	15807 nT	-55° 37.2′	15683 nT	-1980 nT	-23103 nT	27993 nT
March	-7° 12.4′	15802 nT	-55° 37.6′	15677 nT	-1982 nT	-23100 nT	27988 nT
April	-7° 12.8′	15793 nT	-55° 38.5′	15668 nT	-1983 nT	-23101 nT	27983 nT
May	-7° 12.8′	15790 nT	-55° 38.6′	15665 nT	-1983 nT	-23099 nT	27980 nT
June	-7° 12.9′	15789 nT	-55° 38.3′	15664 nT	-1983 nT	-23093 nT	27975 nT
July	-7° 12.8′	15788 nT	-55° 38.0′	15663 nT	-1982 nT	-23088 nT	27970 nT
August	-7° 12.5′	15777 nT	-55° 39.2′	15652 nT	-1980 nT	-23088 nT	27963 nT
September	-7° 12.8′	15767 nT	-55° 40.2′	15642 nT	-1980 nT	-23087 nT	27957 nT
October	-7° 12.2′	15765 nT	-55° 40.1′	15641 nT	-1977 nT	-23083 nT	27953 nT
November	-7° 11.9′	15766 nT	-55° 39.6′	15642 nT	-1976 nT	-23078 nT	27950 nT
December	-7° 11.4′	15763 nT	-55° 39.9′	15639 nT	-1973 nT	-23077 nT	27947 nT

Note

i. The values shown here are provisional.