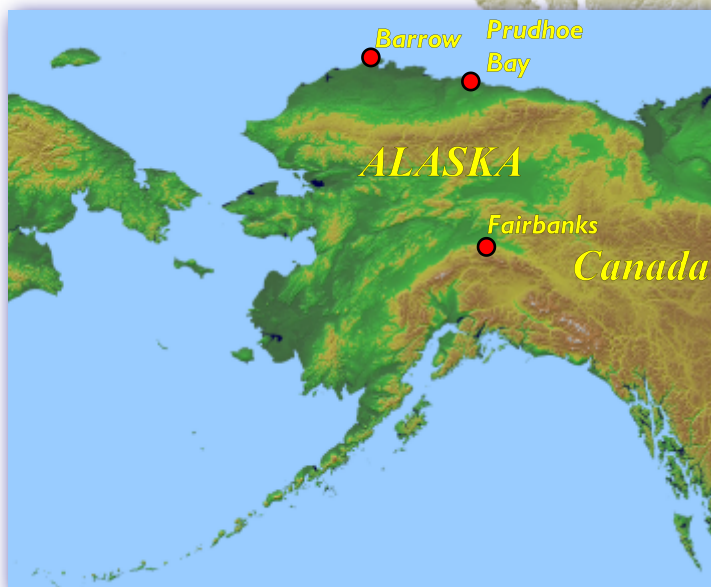


BRITISH GEOLOGICAL SURVEY

**Jim Carrigan
Observatory
Prudhoe Bay
Monthly
Magnetic
Bulletin
October 2009
09/10/JC**



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

1. JIM CARRIGAN OBSERVATORY MAGNETIC DATA

1. Introduction

Jim Carrigan Observatory is the fourth overseas geomagnetic observatory established by the British Geological Survey (BGS). The installation is a joint project between BGS and Sperry Drilling Services (SDS) in support of directional drilling programmes. SDS has operated a prototype station since 1997 which was upgraded by the BGS to a standard high-quality observatory in October 2003.

This bulletin is published to meet the needs of users of geomagnetic data. 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:

National Geomagnetic Service
British Geological Survey
Murchison House, West Mains Road
Edinburgh EH9 3LA
Scotland, UK

Tel: +44 (0) 131 667 1000
Fax: +44 (0) 131 668 0265
E-mail: orba@bgs.ac.uk
Internet: www.geomag.bgs.ac.uk

2. Position

Jim Carrigan Observatory is situated at T-Pad, a man-made gravel bed close to the drilling sites at Prudhoe Bay, Alaska, USA.

The observatory co-ordinates are:-

Geographic: 70° 21.36'N 211° 12.06'E
Geomagnetic: 70° 04.2'N 254° 00.36'E
Height above mean sea level: 10m (approx)

The geomagnetic co-ordinates are calculated using the 10th generation International Geomagnetic Reference Field (IGRF) at epoch 2009.5.

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 and became fully operational from 27th October 2003. The system operates under the control of data acquisition software running on QNX computers, which controls 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. Regular manual absolute measurements of the field are made throughout the year. 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.

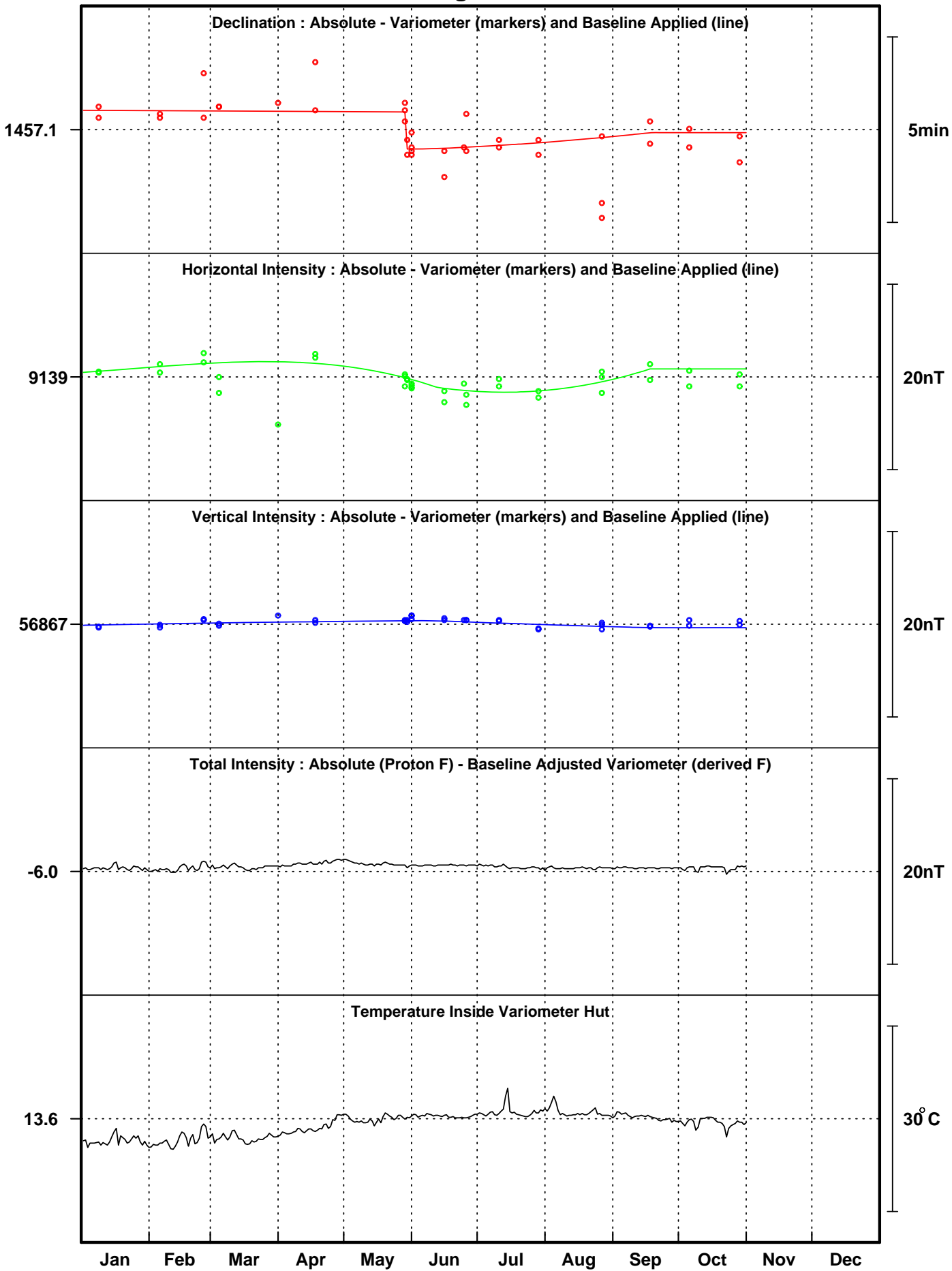
4.4 Hourly Mean Value Plots

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.

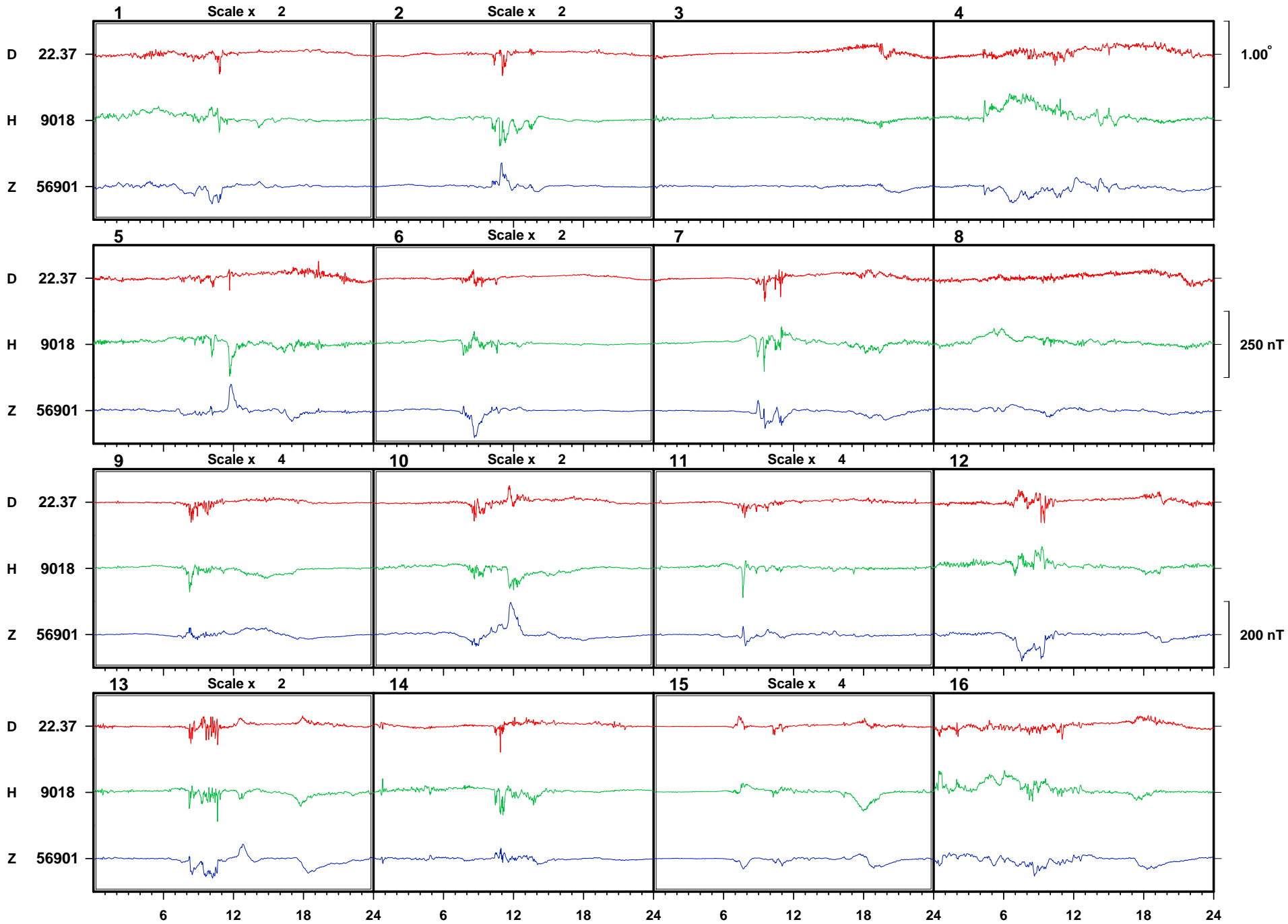
Jim Carrigan Obs 2009

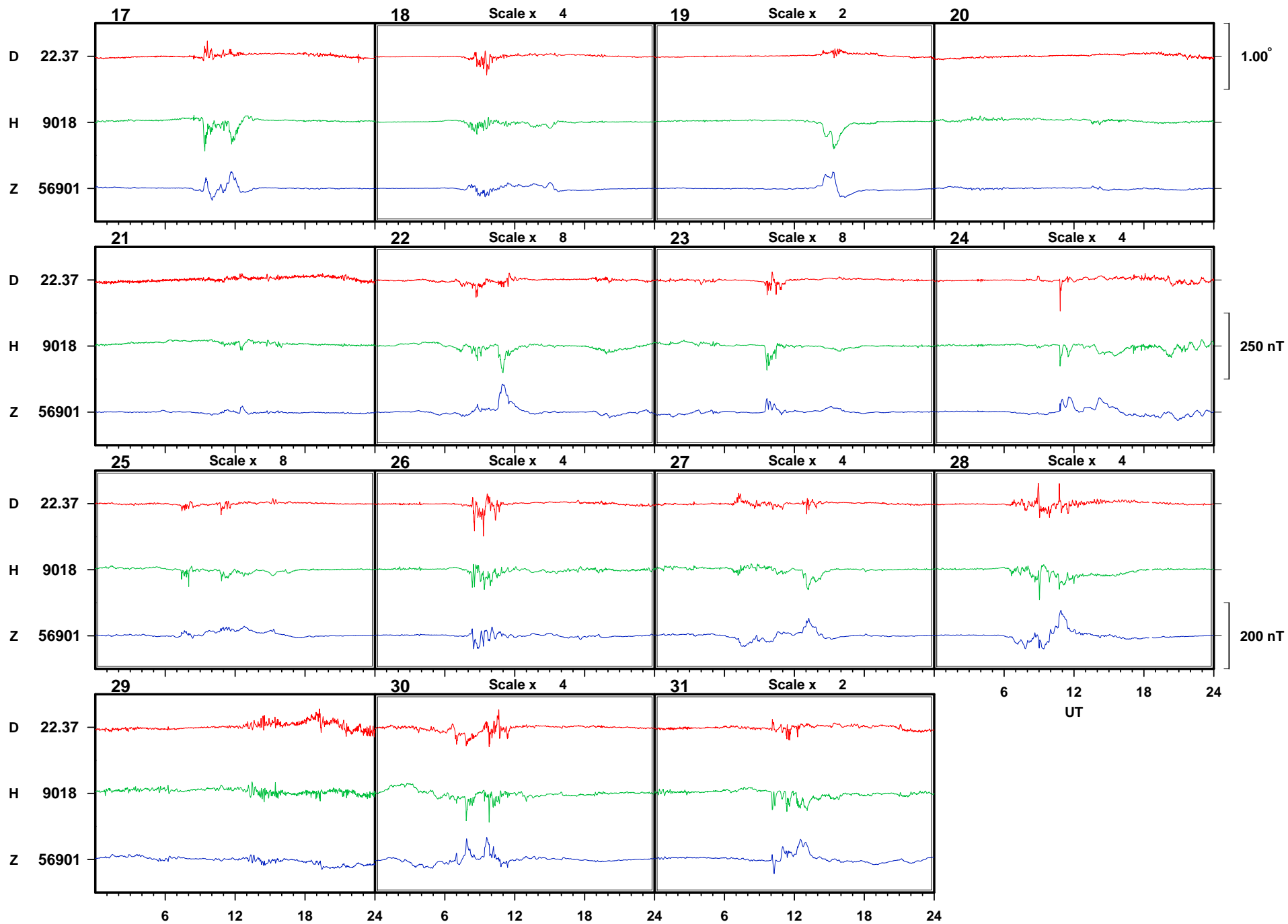


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2009



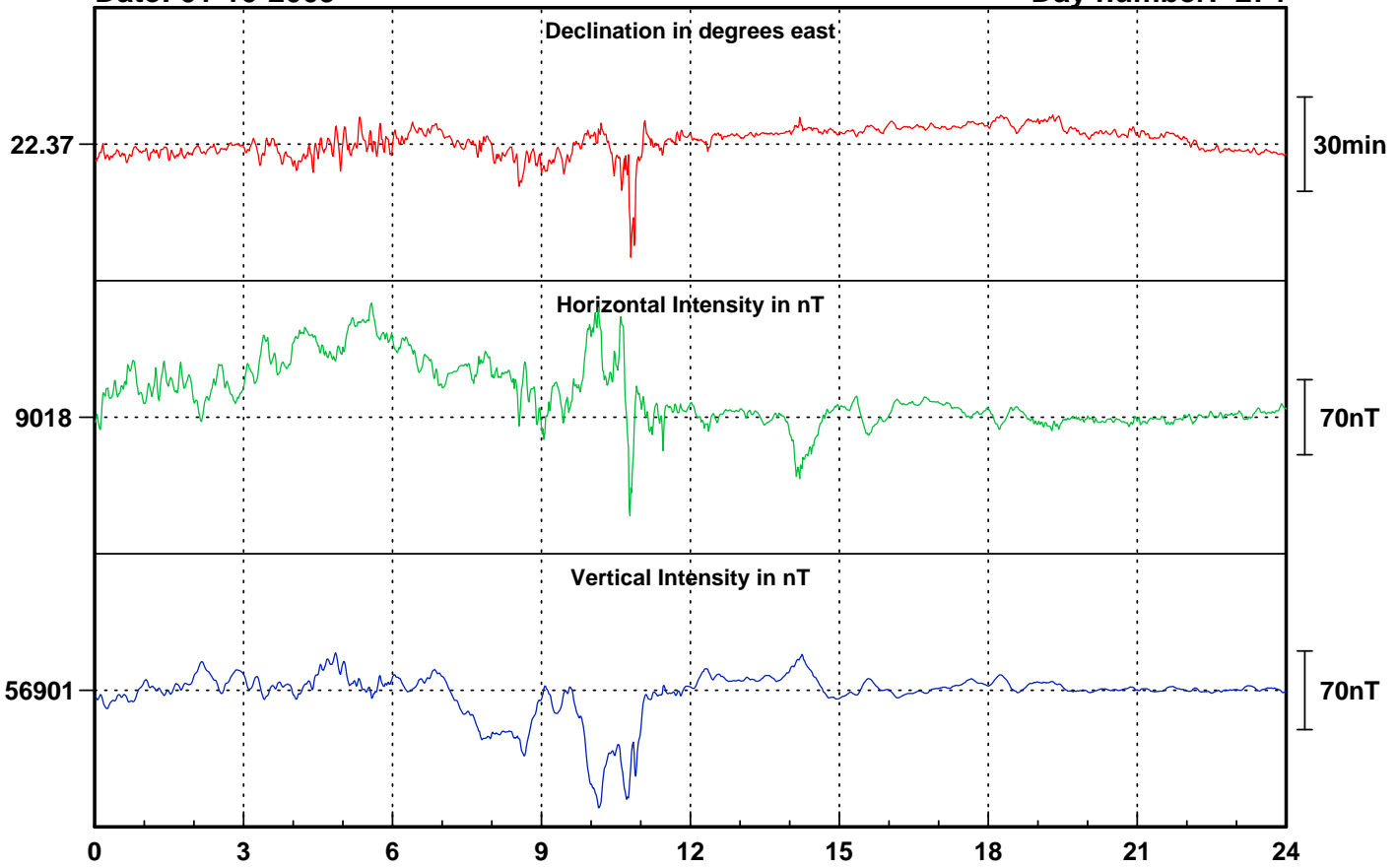


Jim Carrigan October 2009

Jim Carrigan

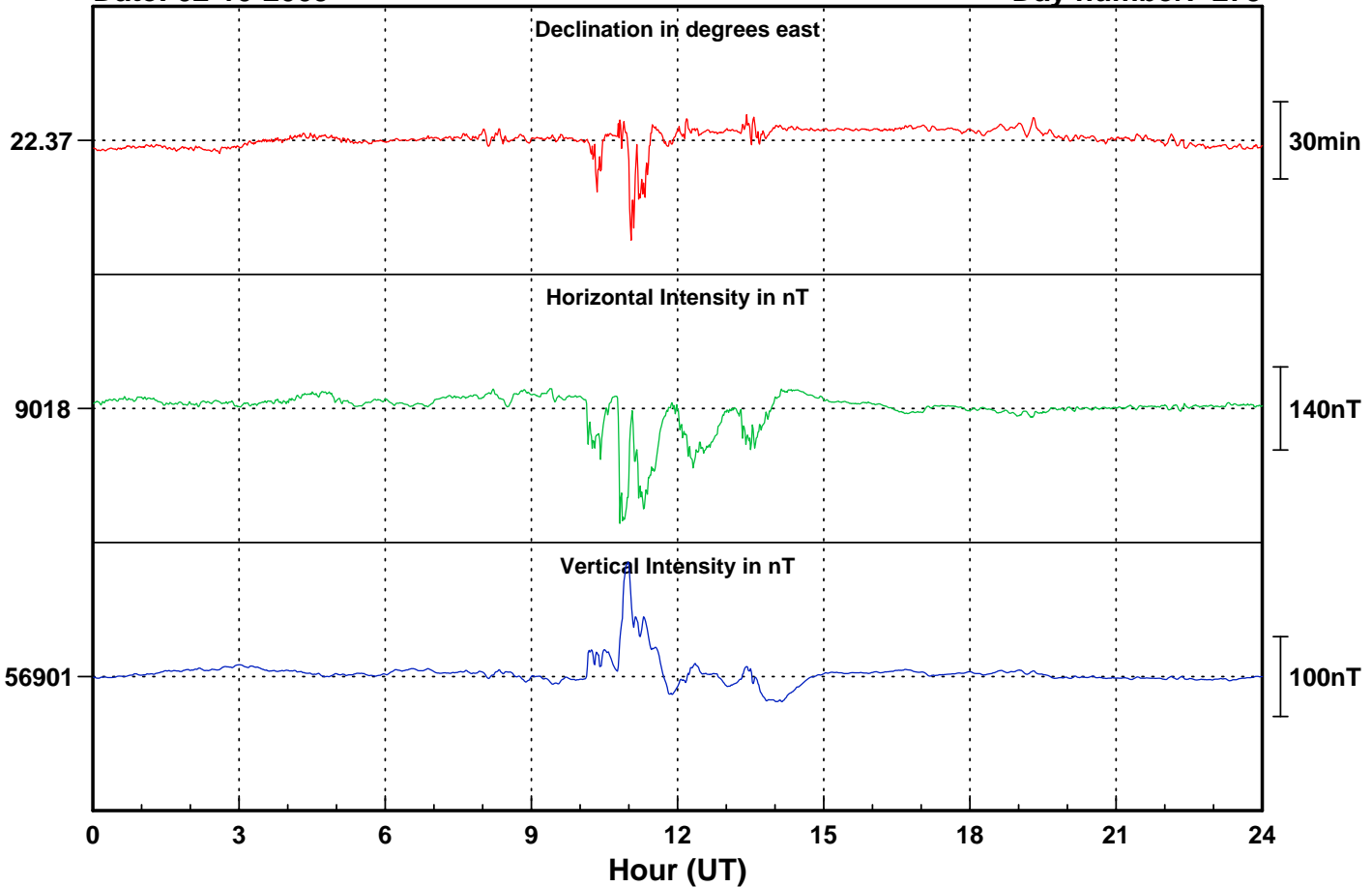
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Day number: 274



Date: 02-10-2009

Day number: 275

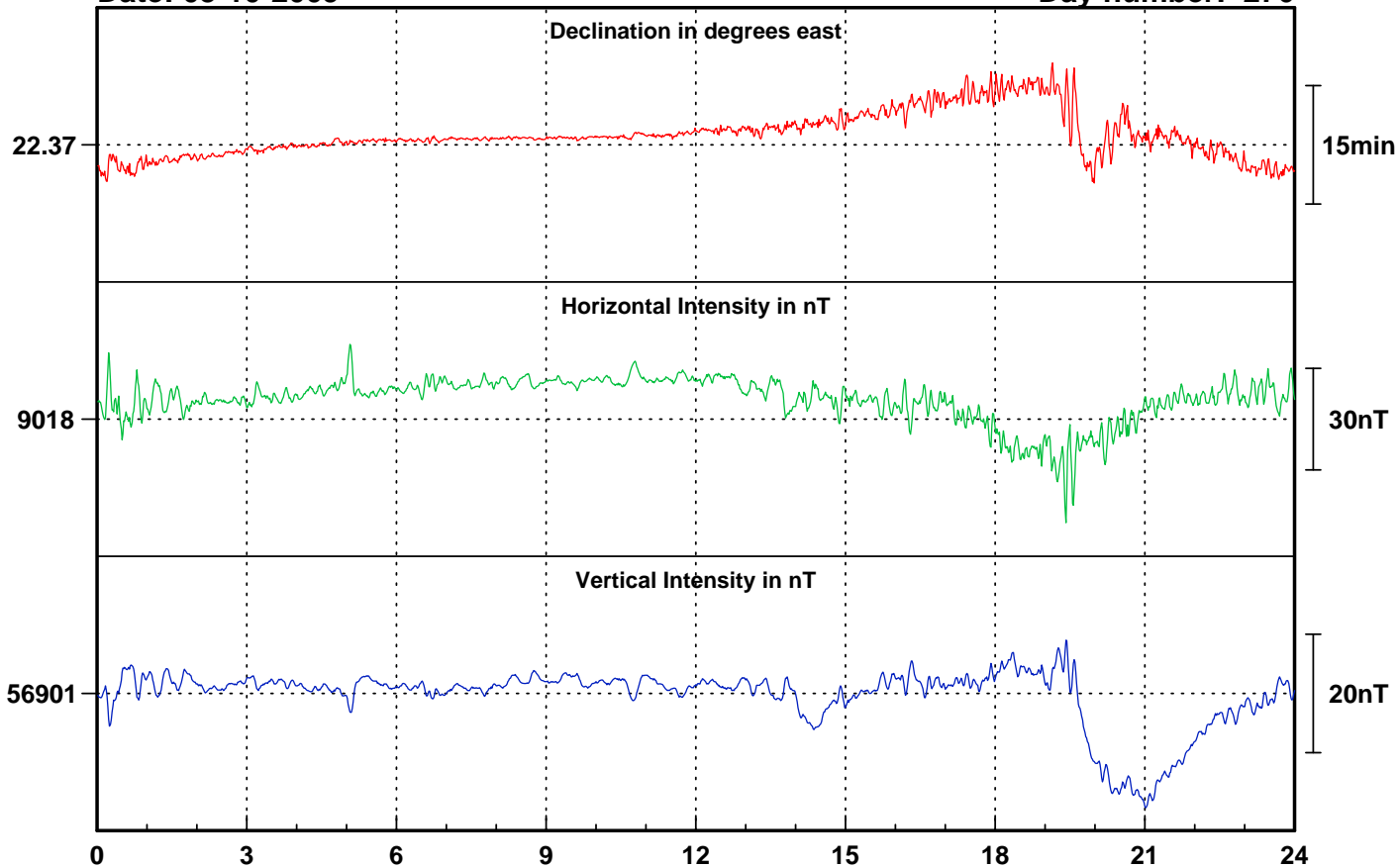


Hour (UT)

Date: 03-10-2009

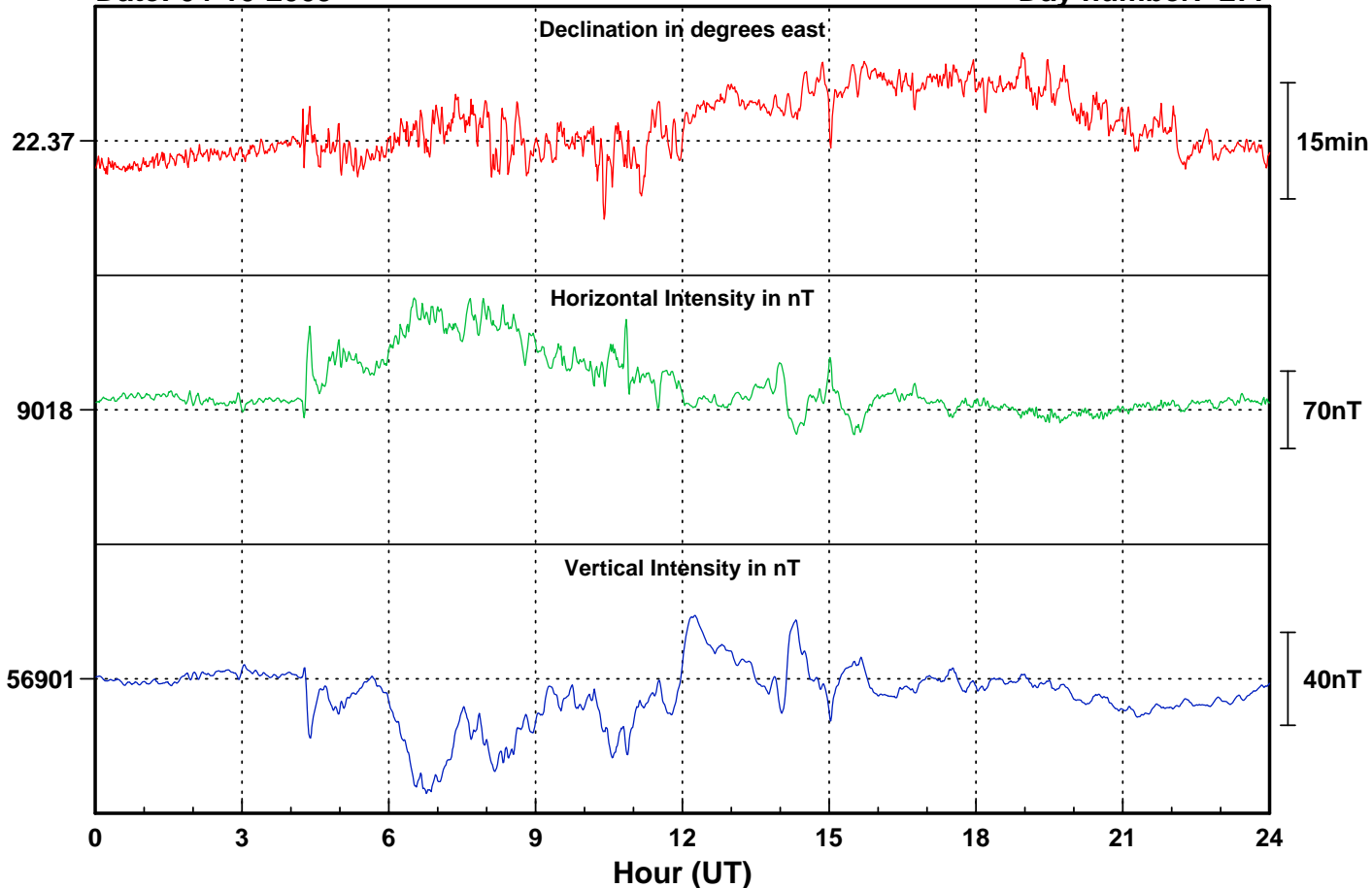
Jim Carrigan

Day number: 276



Date: 04-10-2009

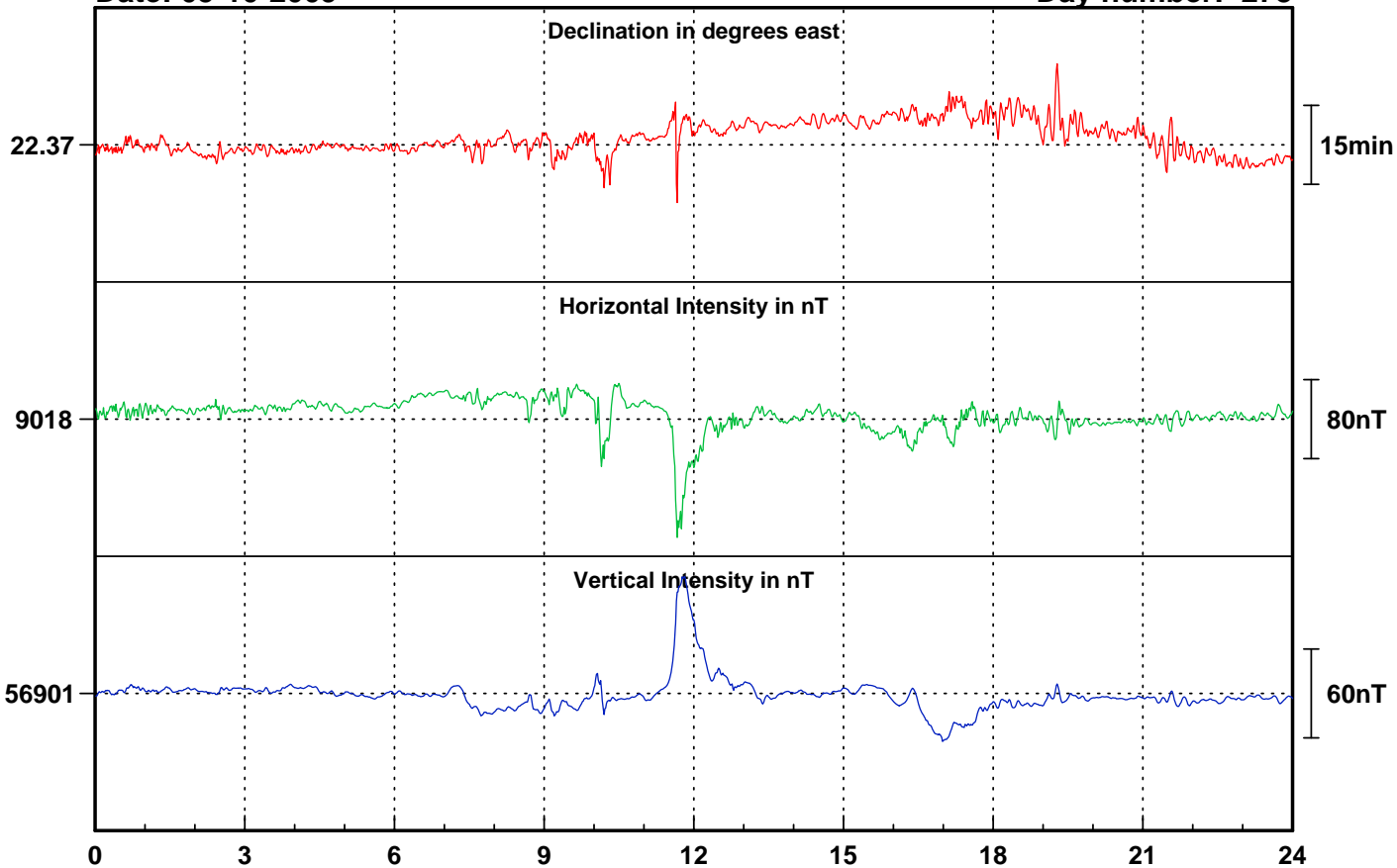
Day number: 277



Date: 05-10-2009

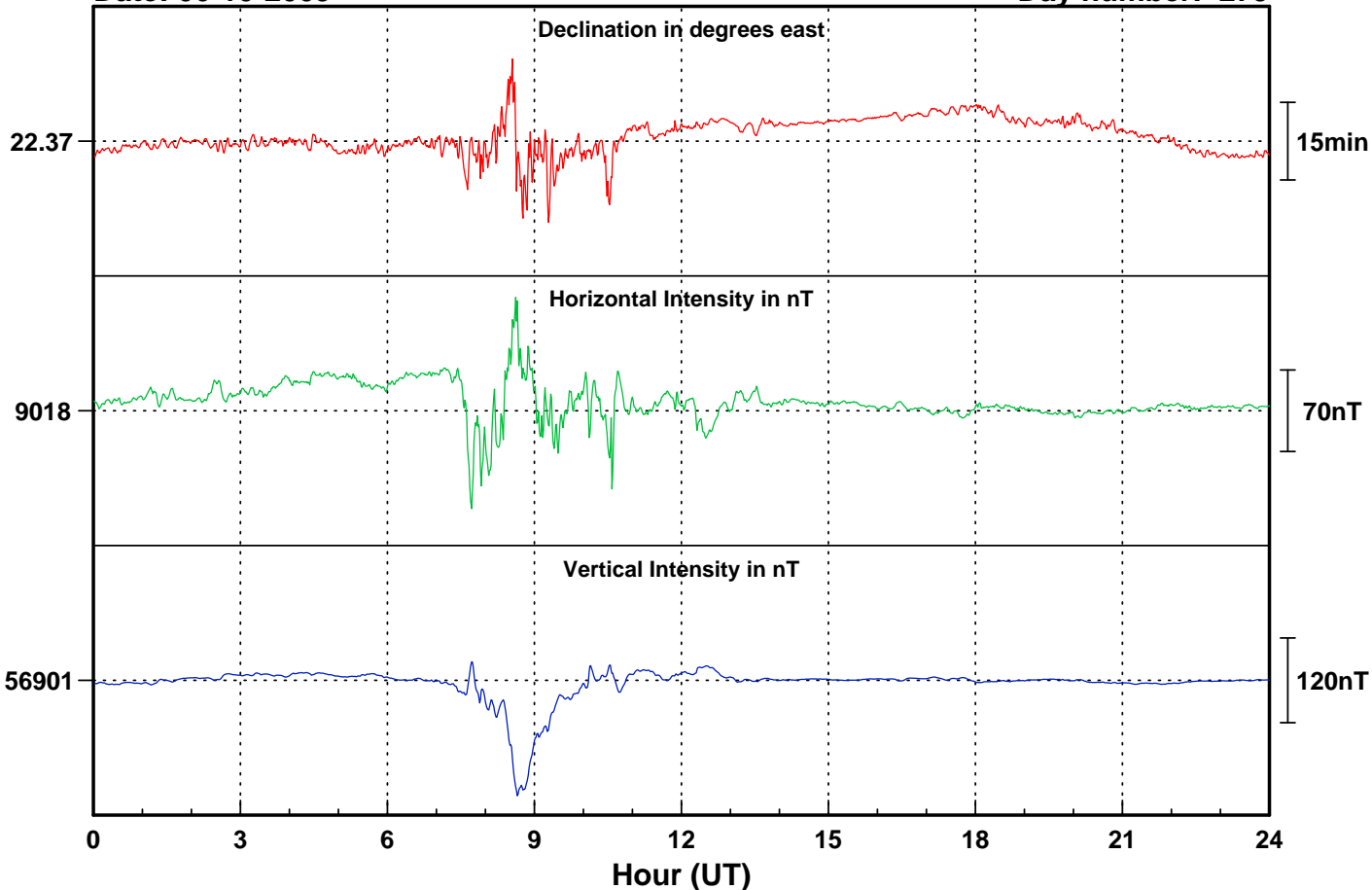
Jim Carrigan

Day number: 278



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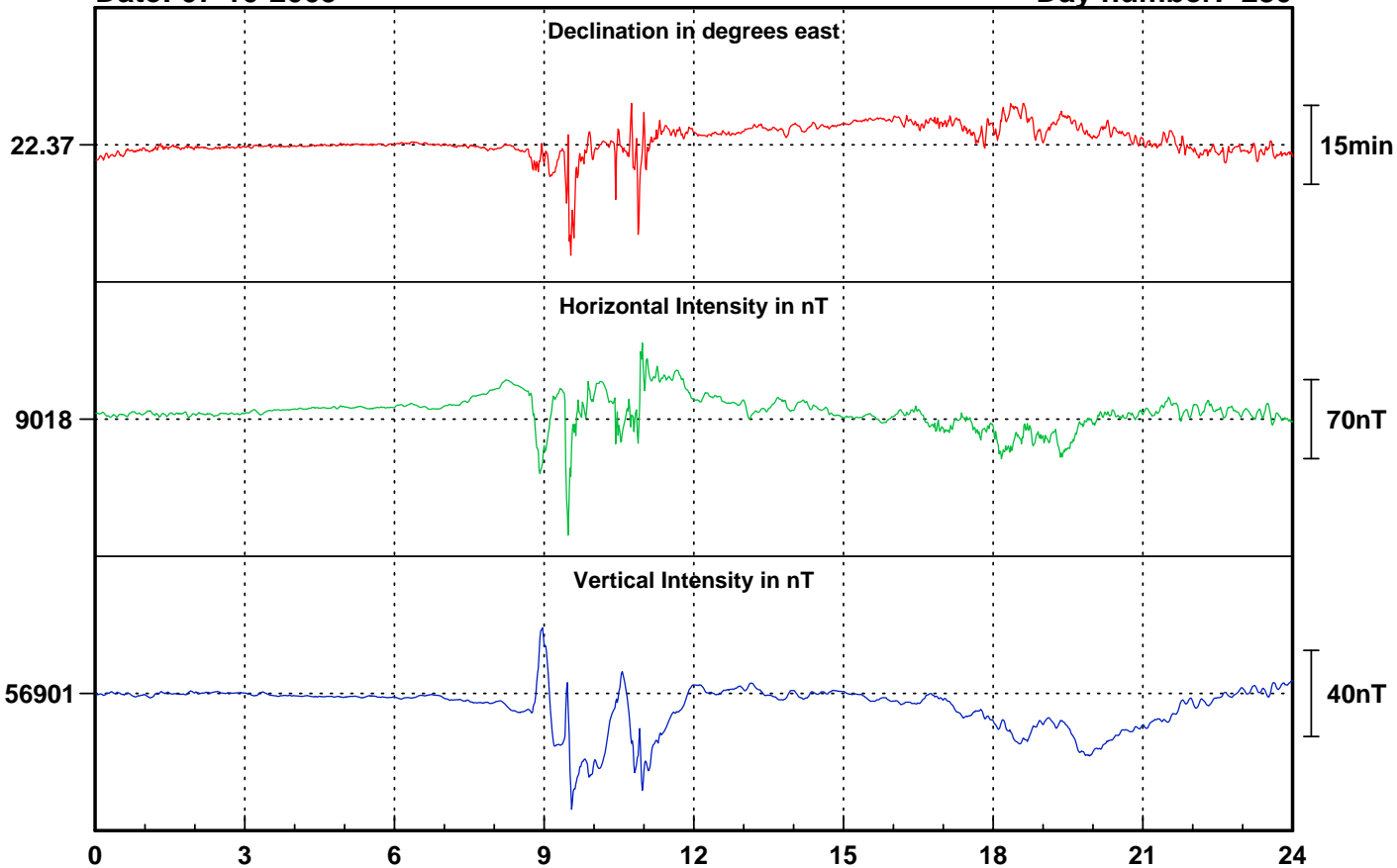
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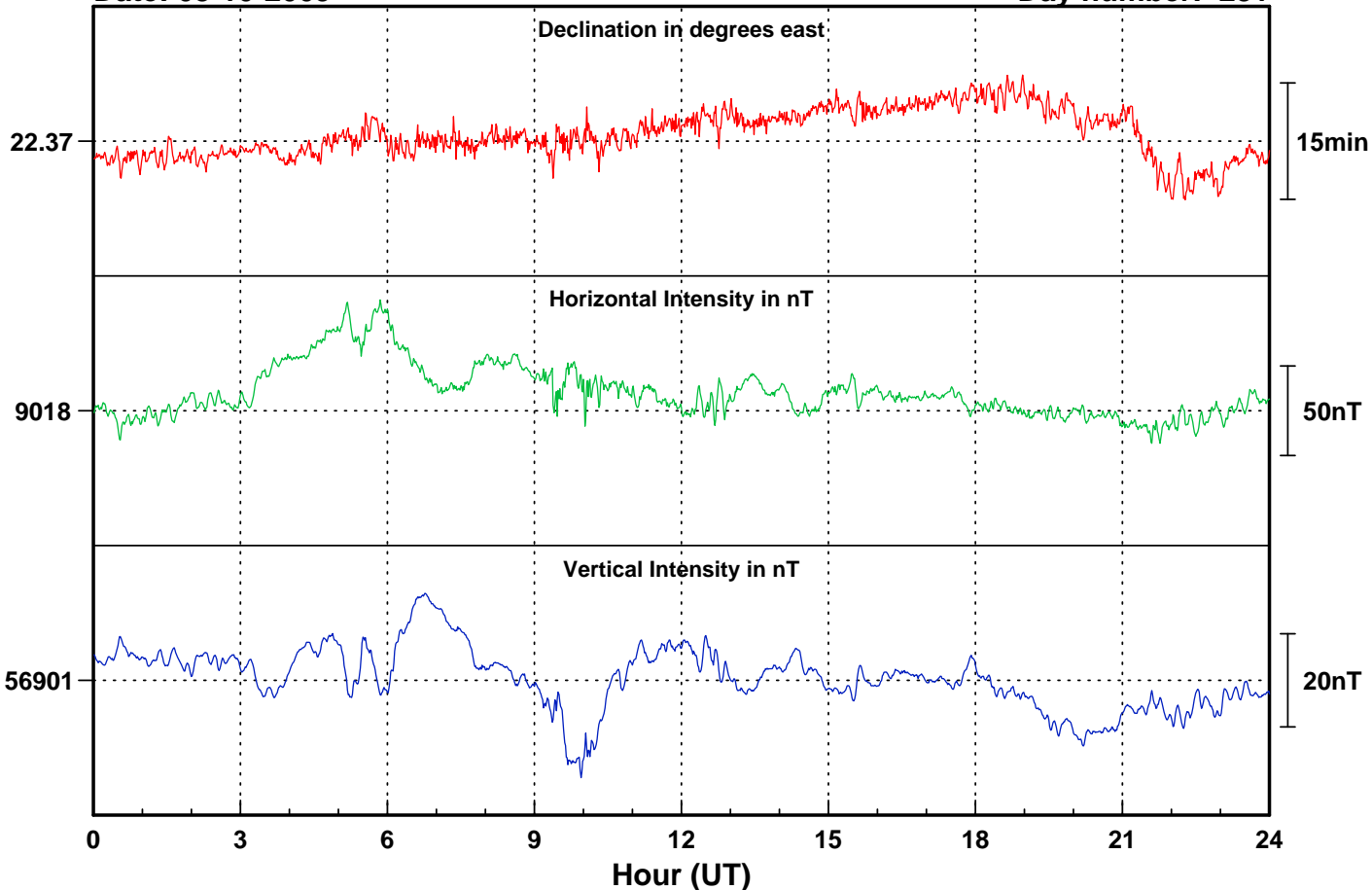
Jim Carrigan

Day number: 280



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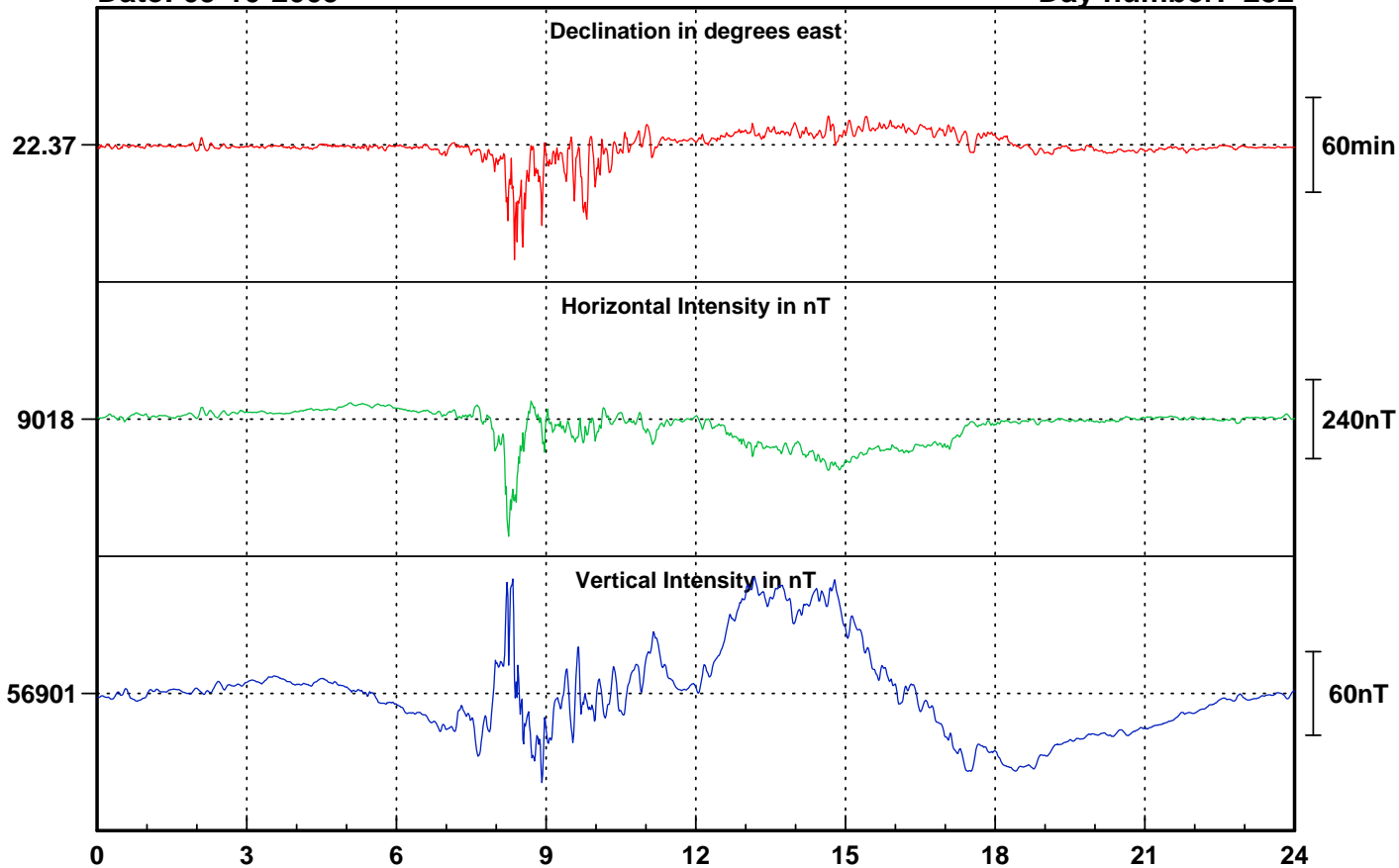
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Date: 09-10-2009

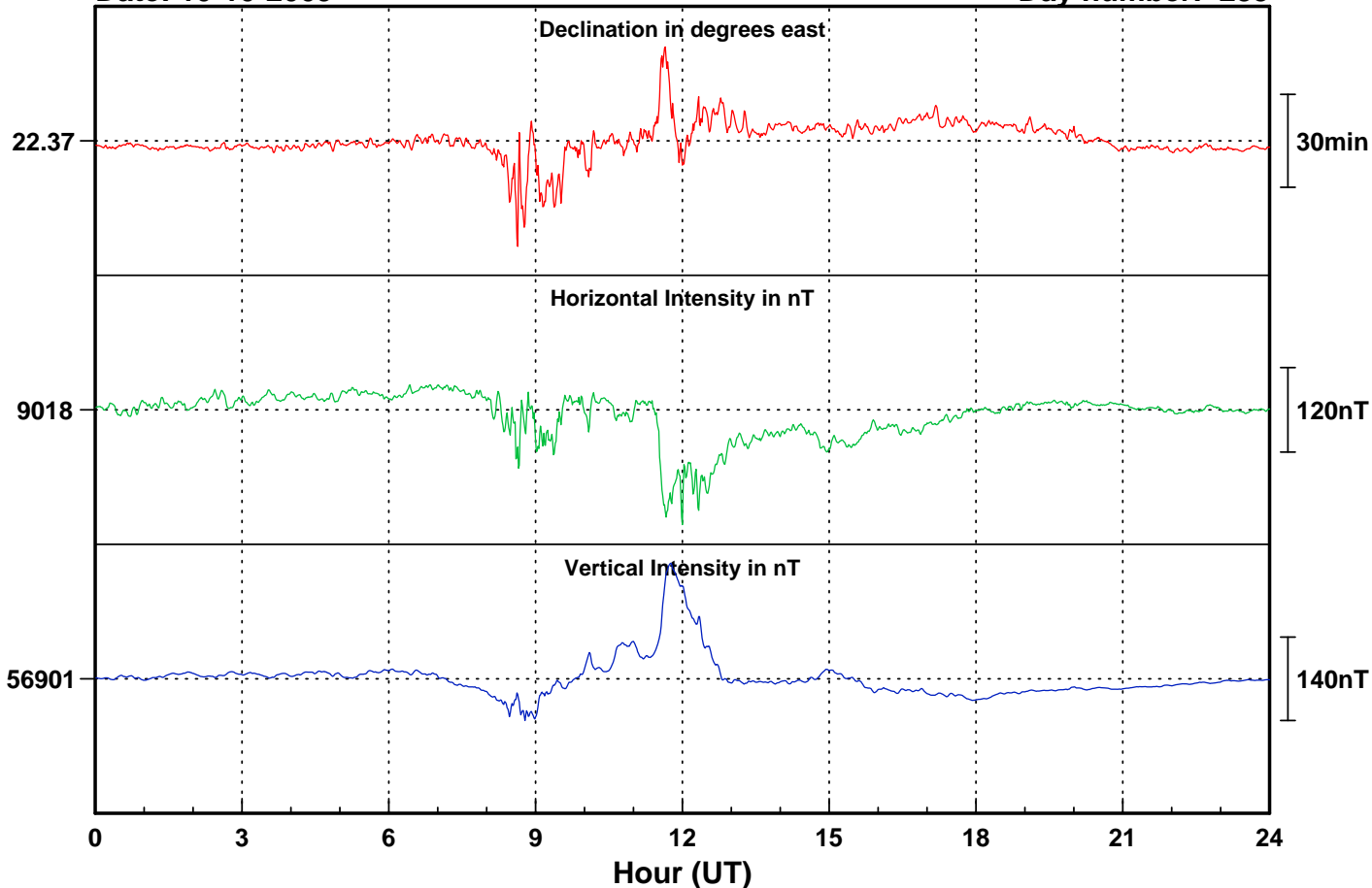
Jim Carrigan

Day number: 282



Date: 10-10-2009

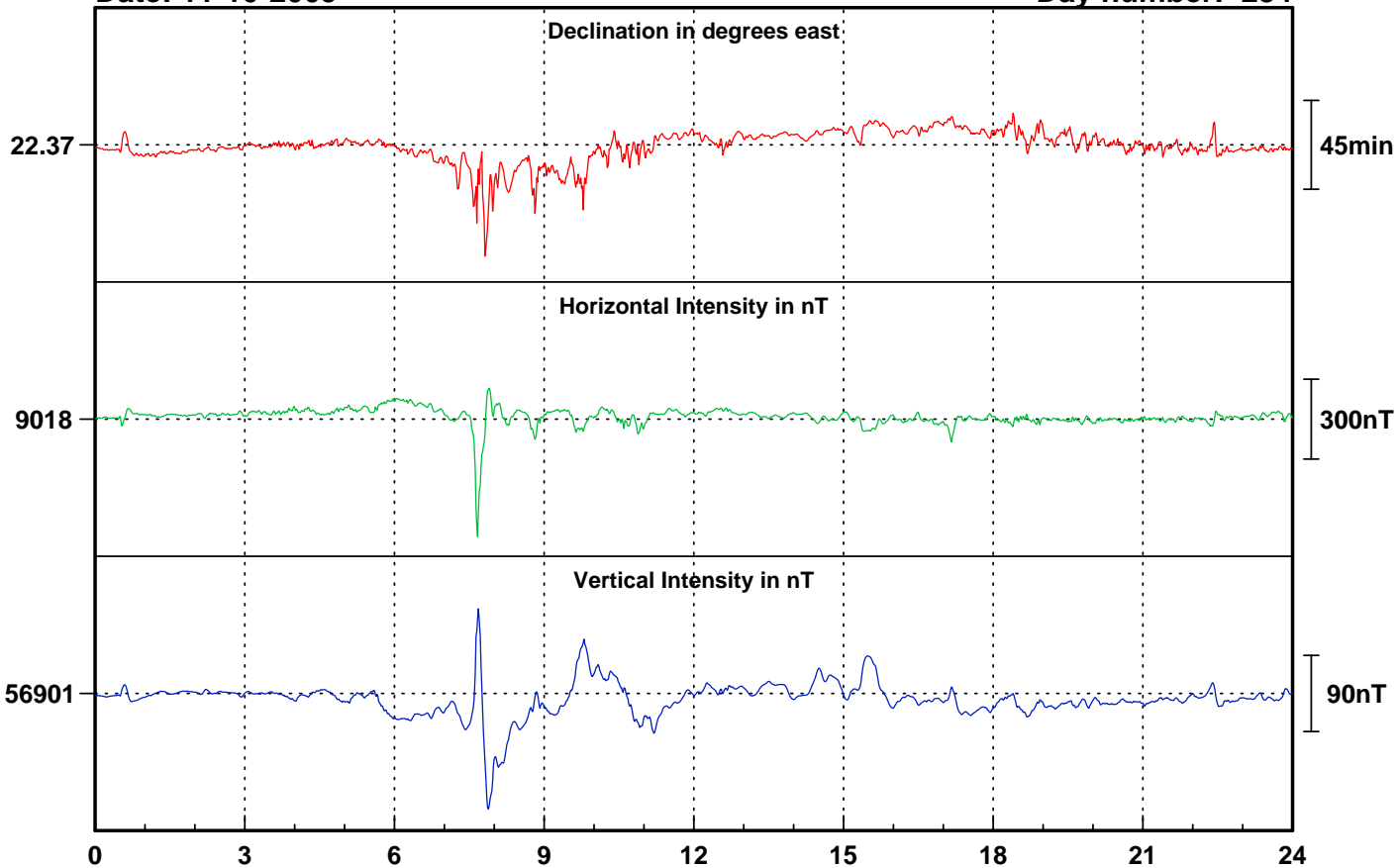
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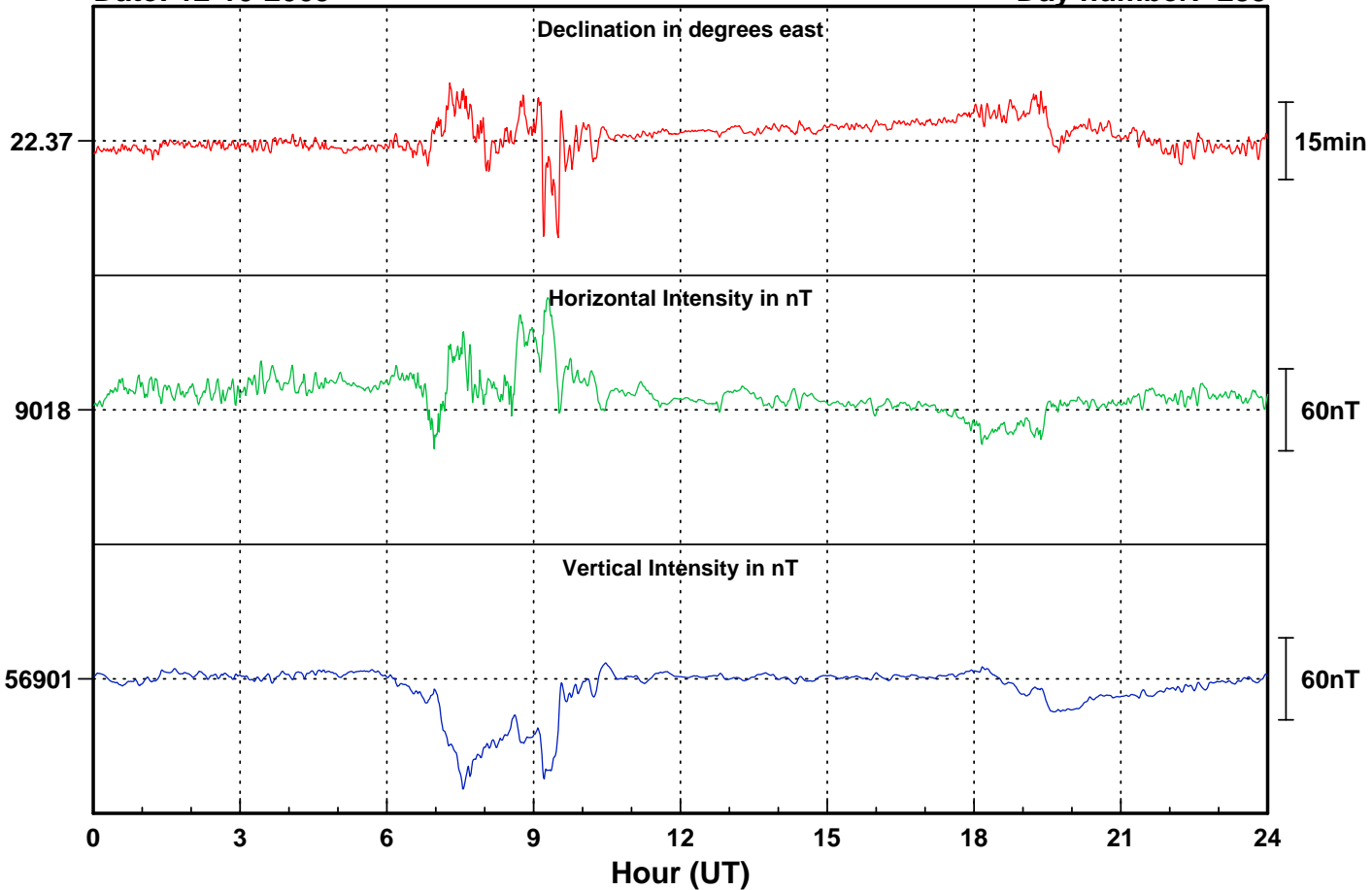
Jim Carrigan

Day number: 284



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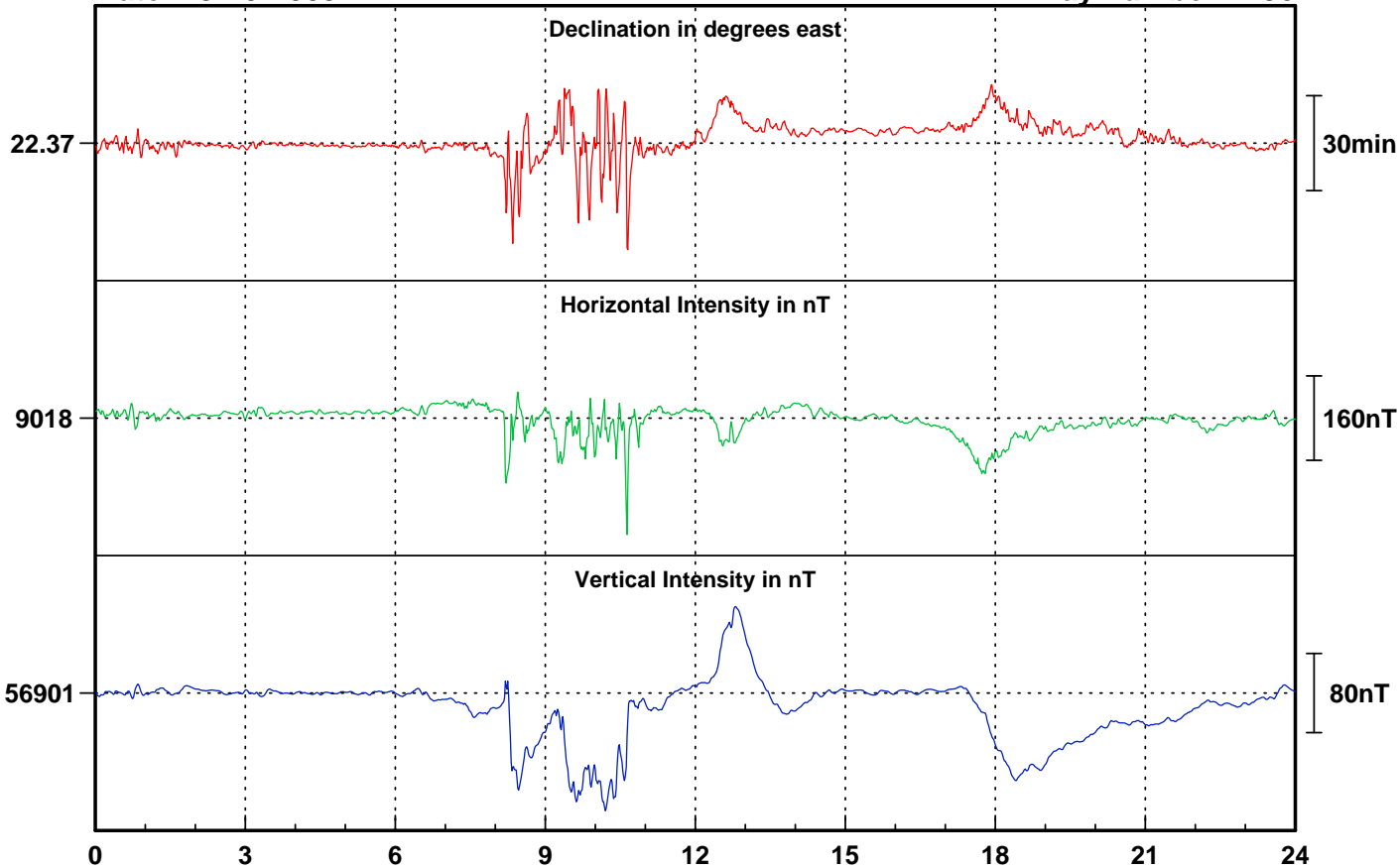
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Date: 13-10-2009

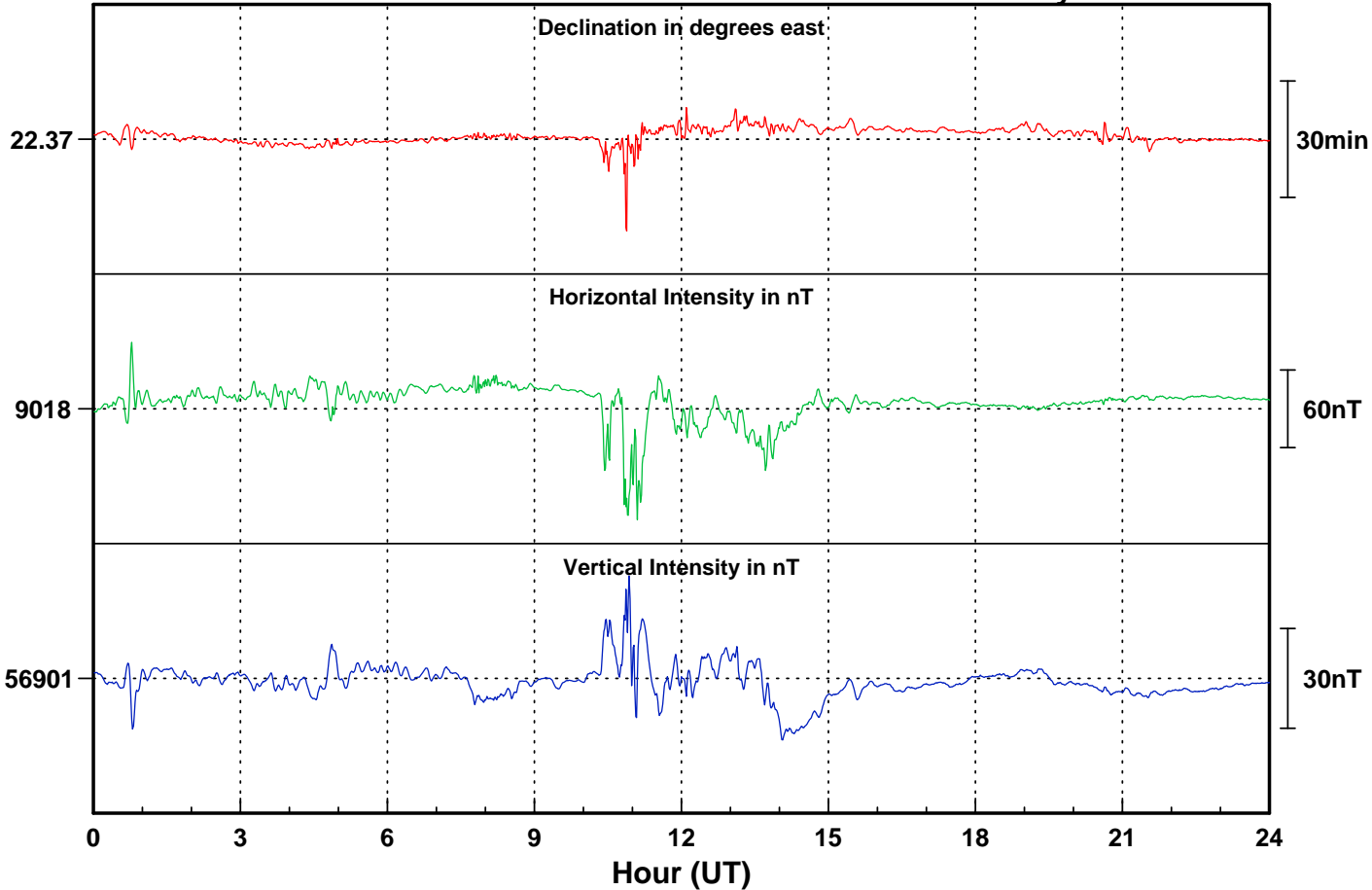
Jim Carrigan

Day number: 286



Date: 14-10-2009

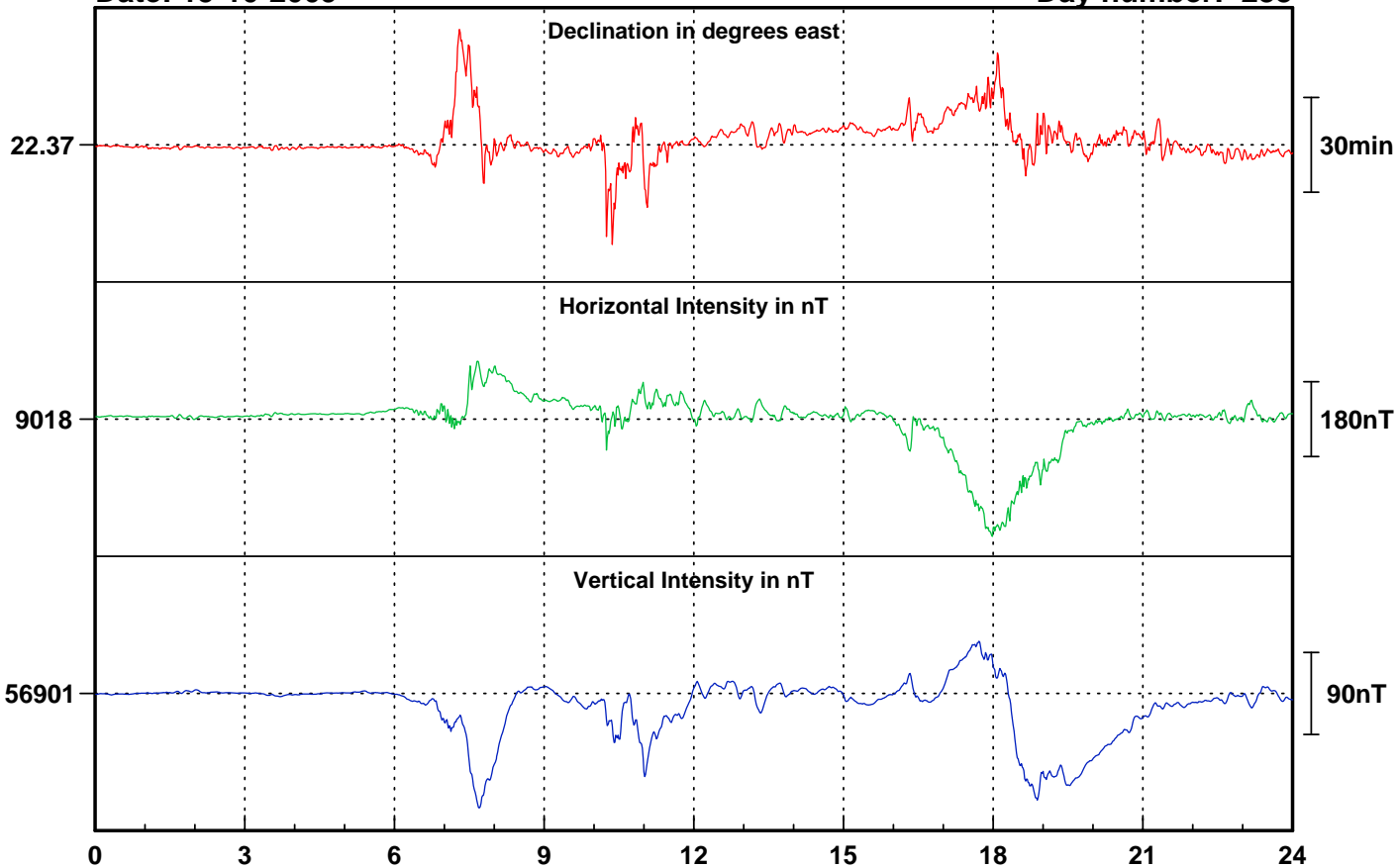
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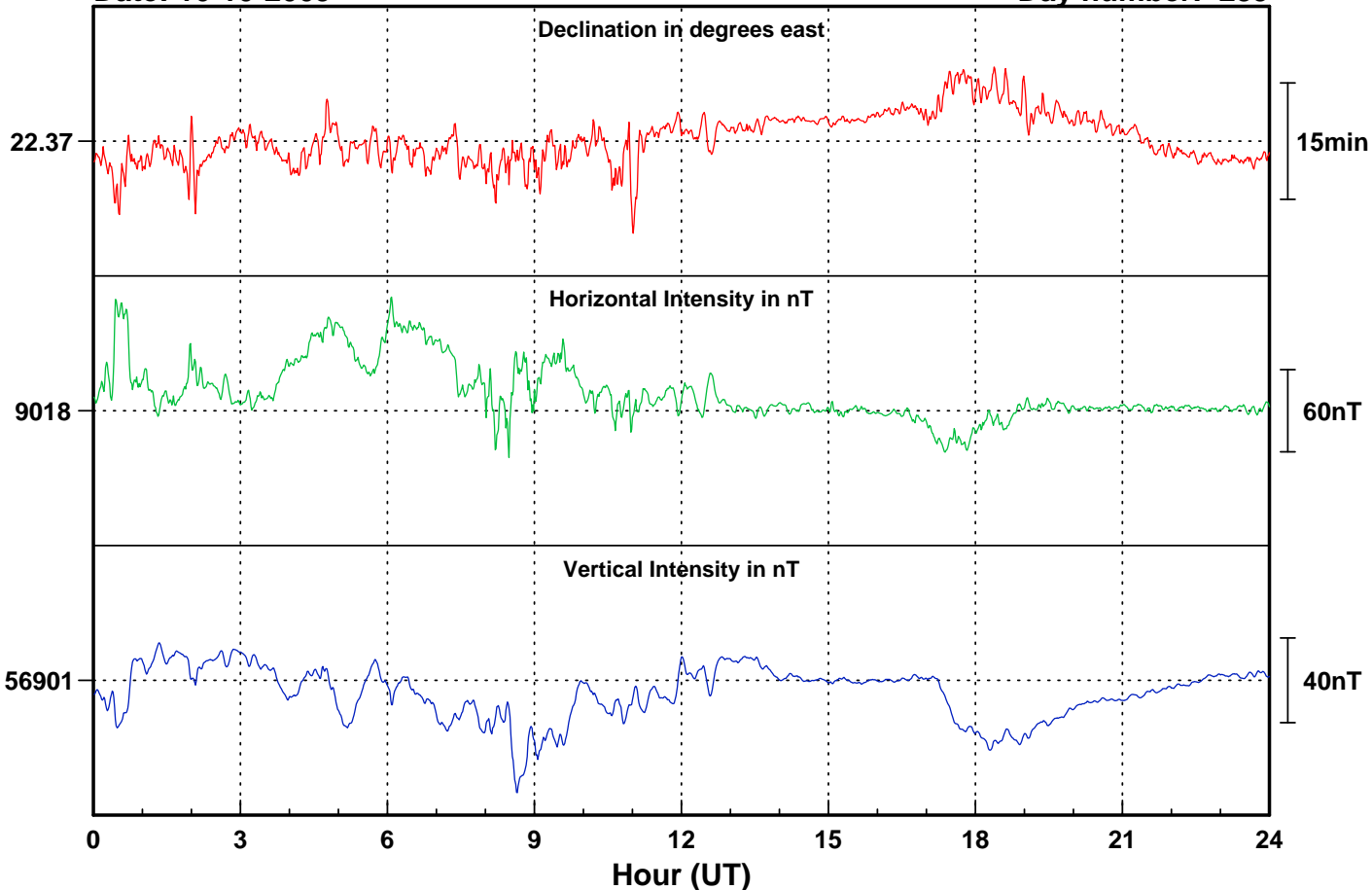
Jim Carrigan

Day number: 288



Date: 16-10-2009

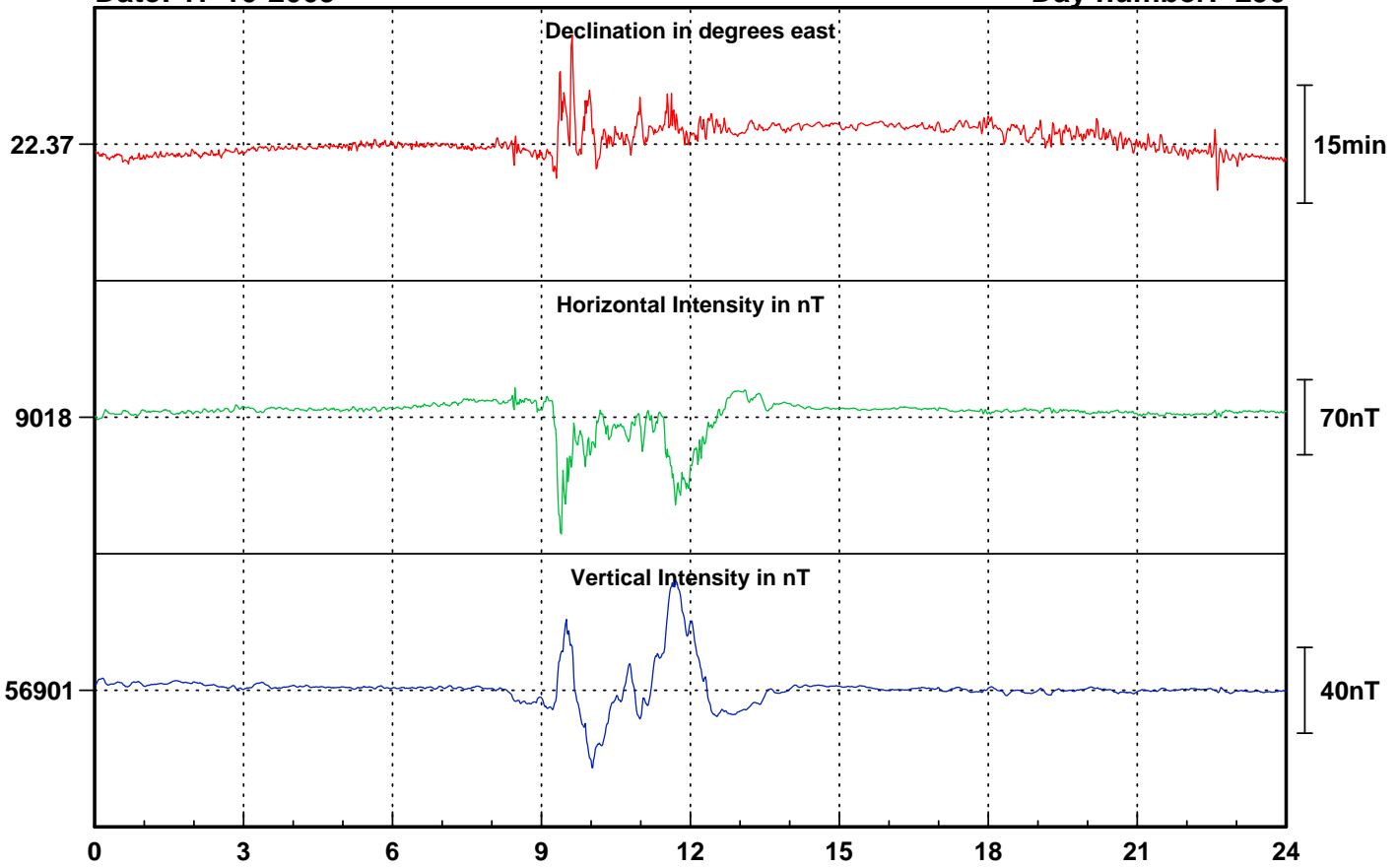
Day number: 289



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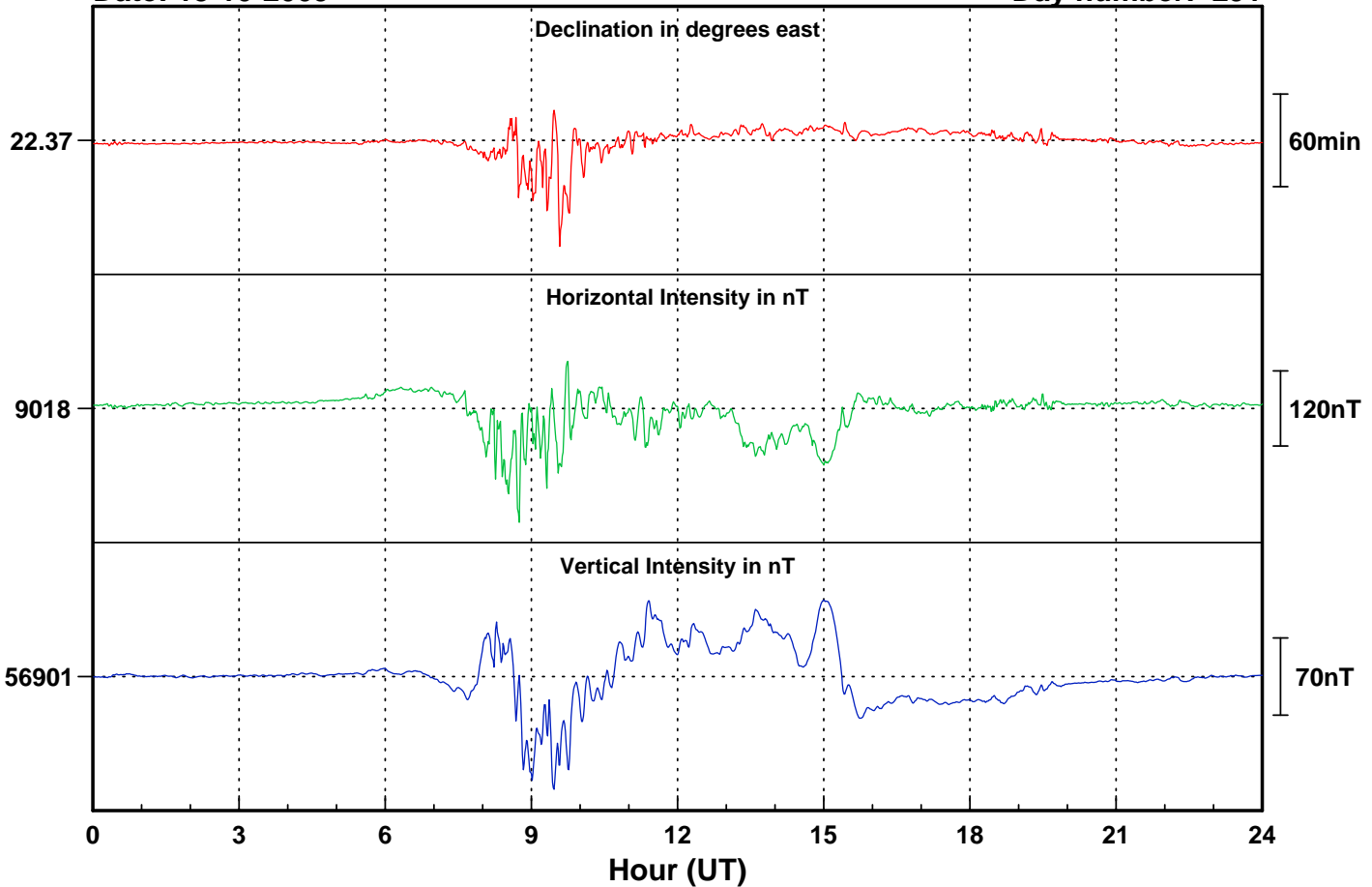
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Day number: 290



Date: 18-10-2009

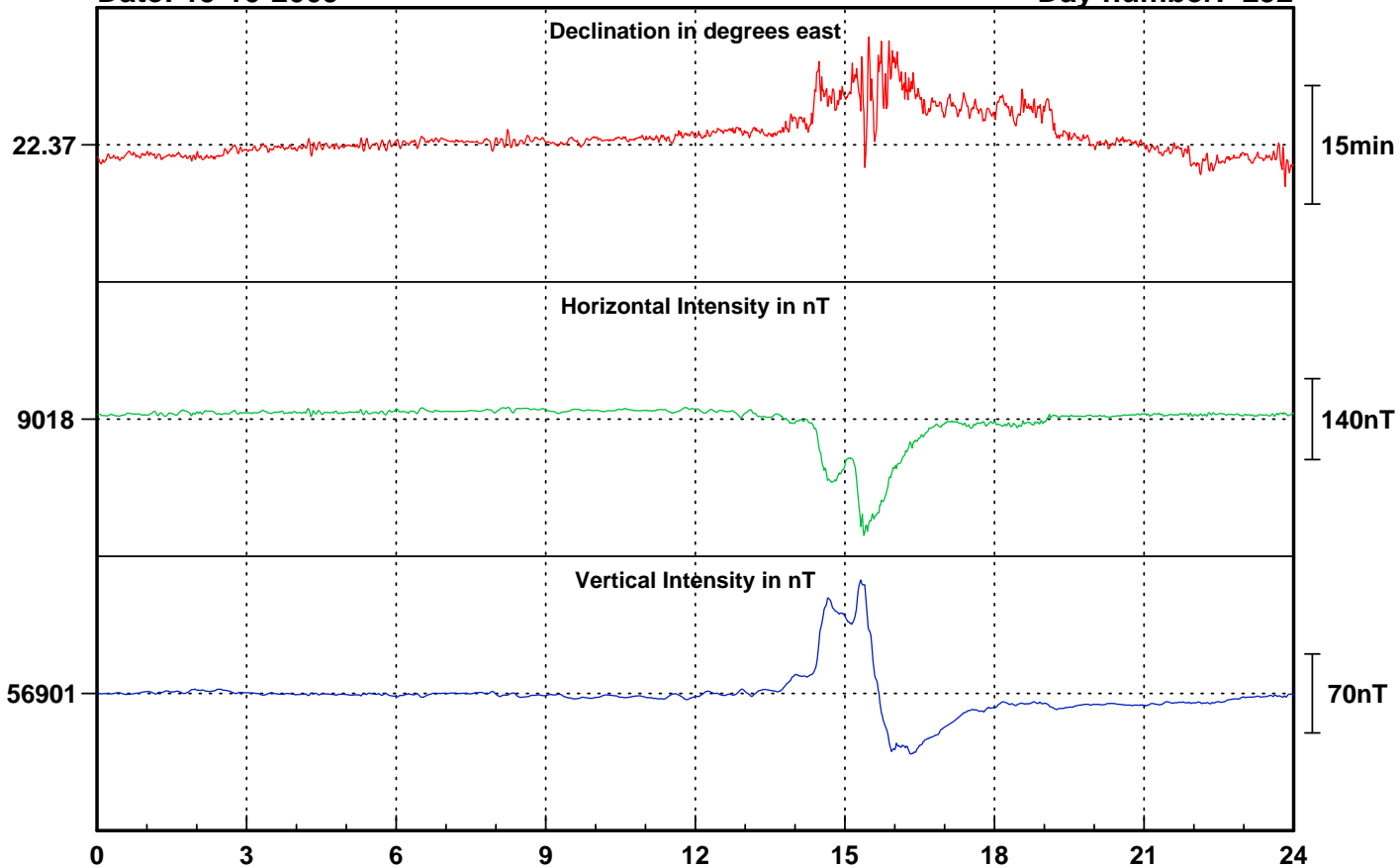
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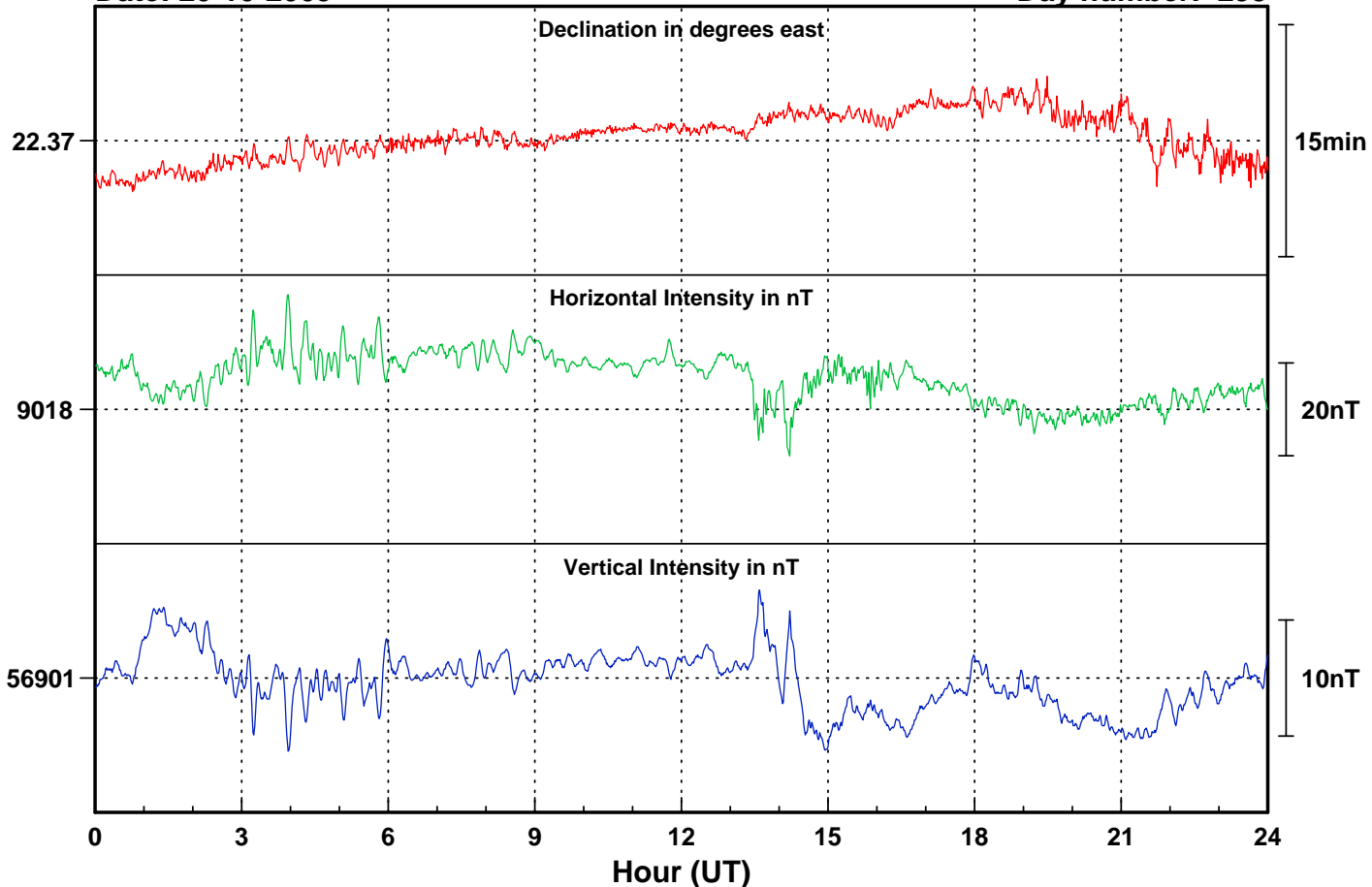
Jim Carrigan

Day number: 292



Date: 20-10-2009

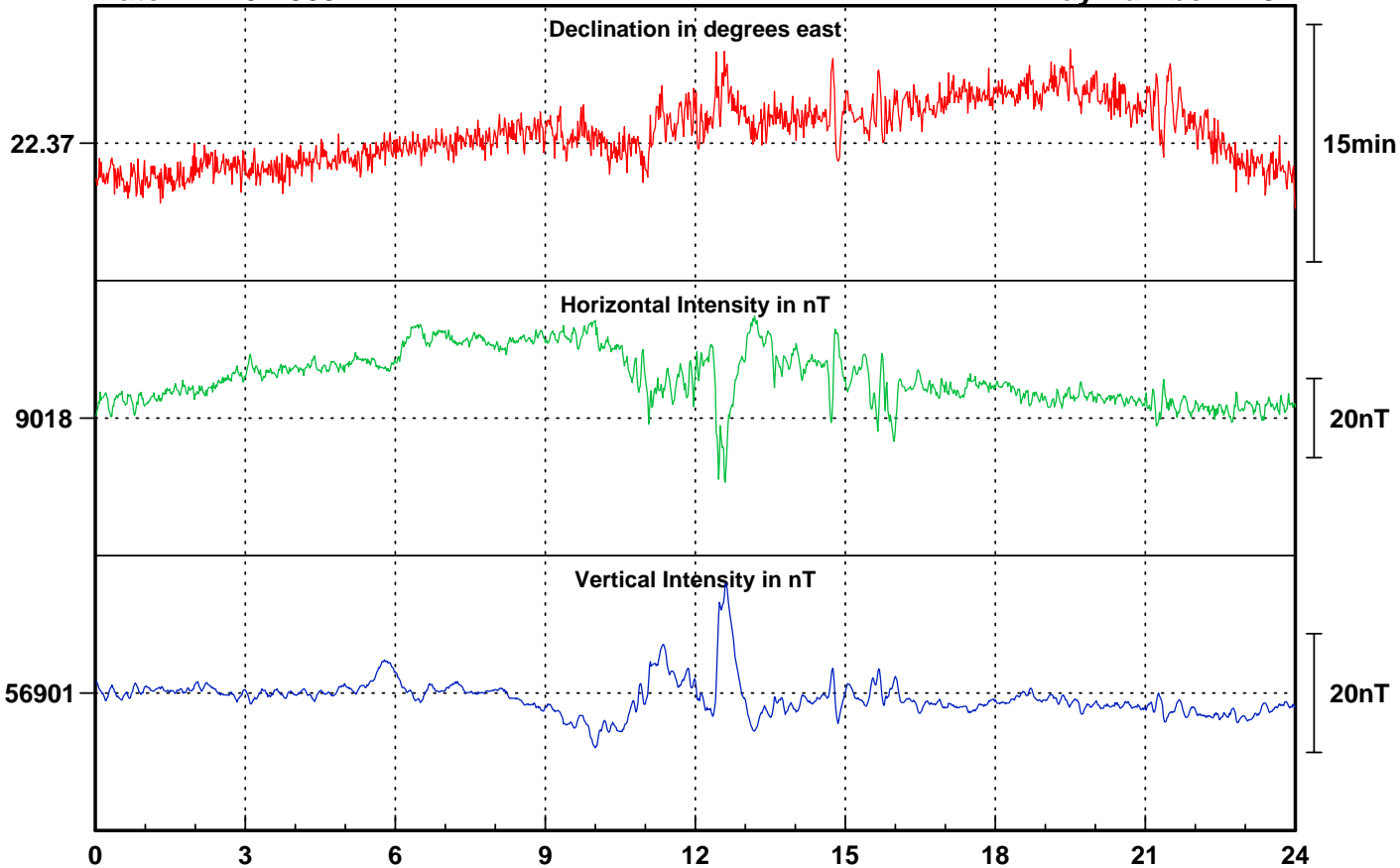
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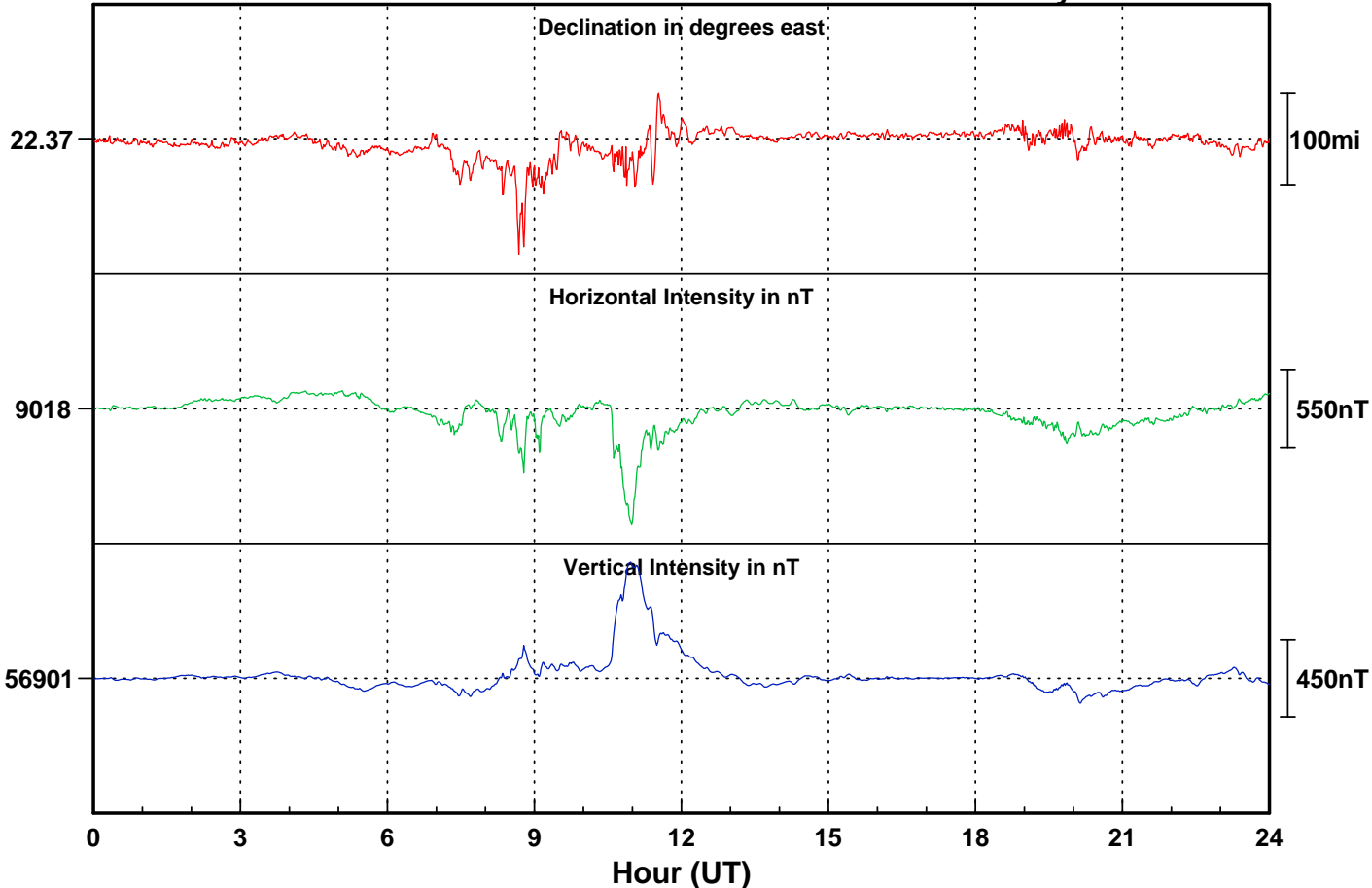
Jim Carrigan

Day number: 294



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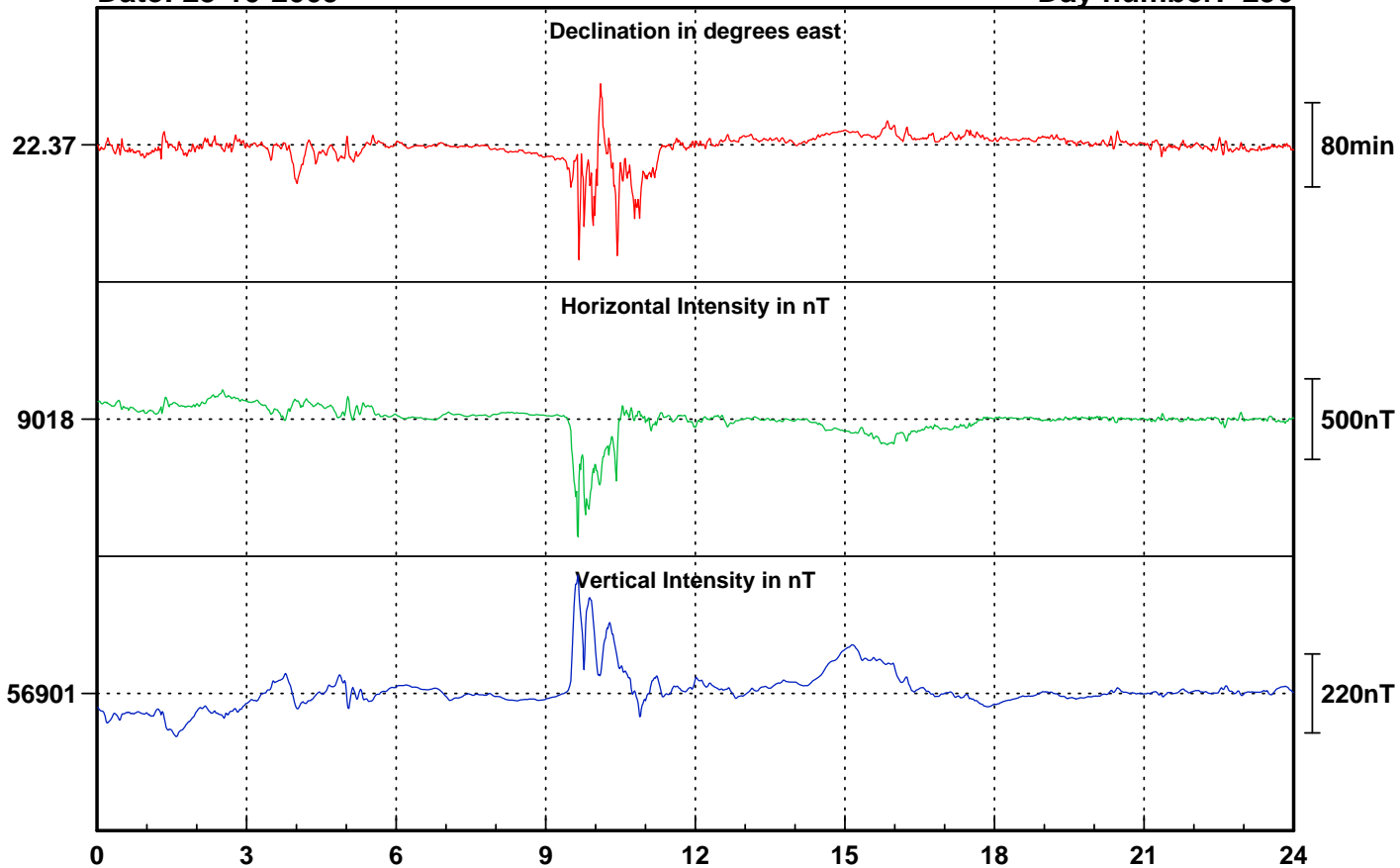
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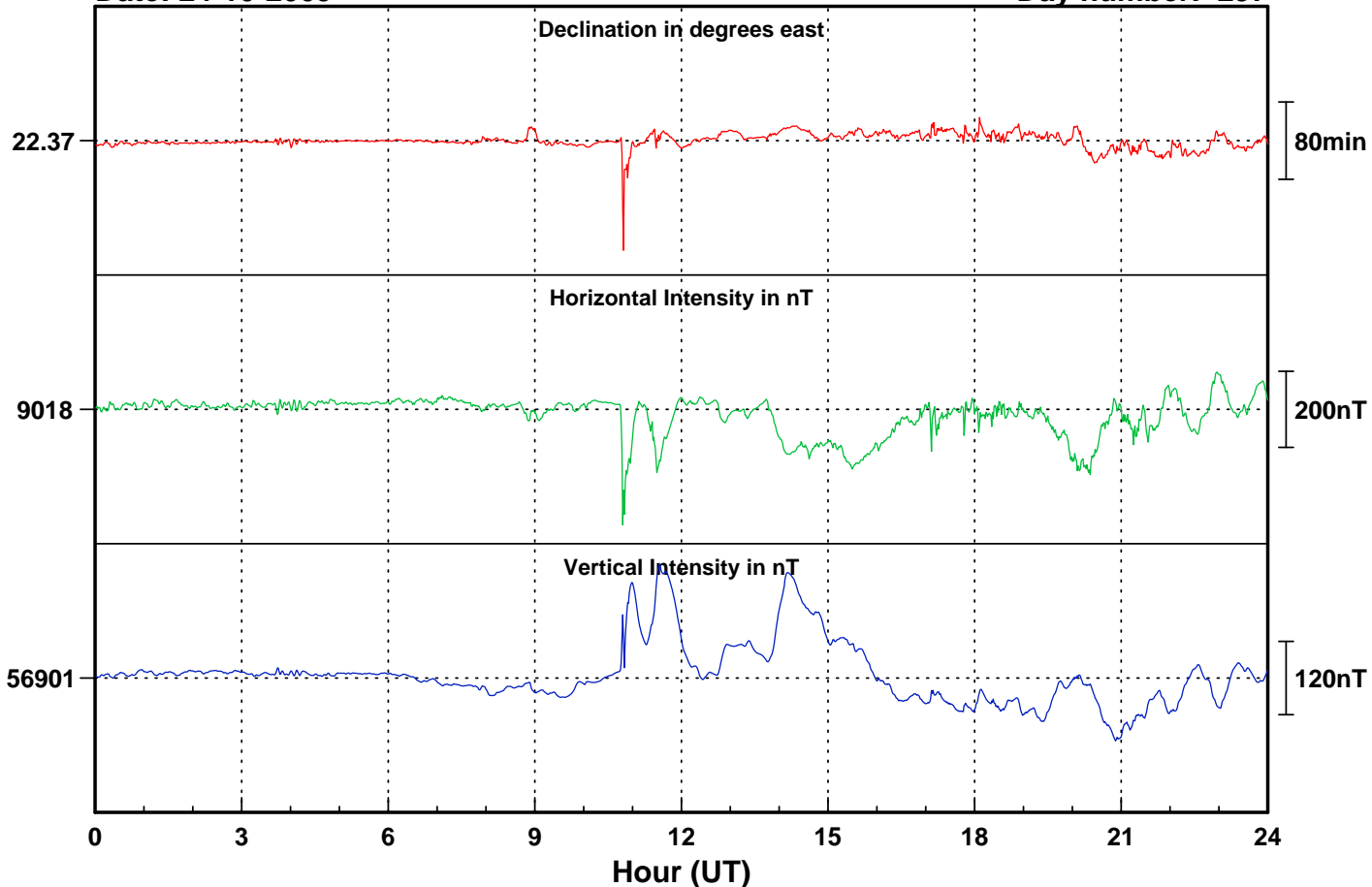
Jim Carrigan

Day number: 296



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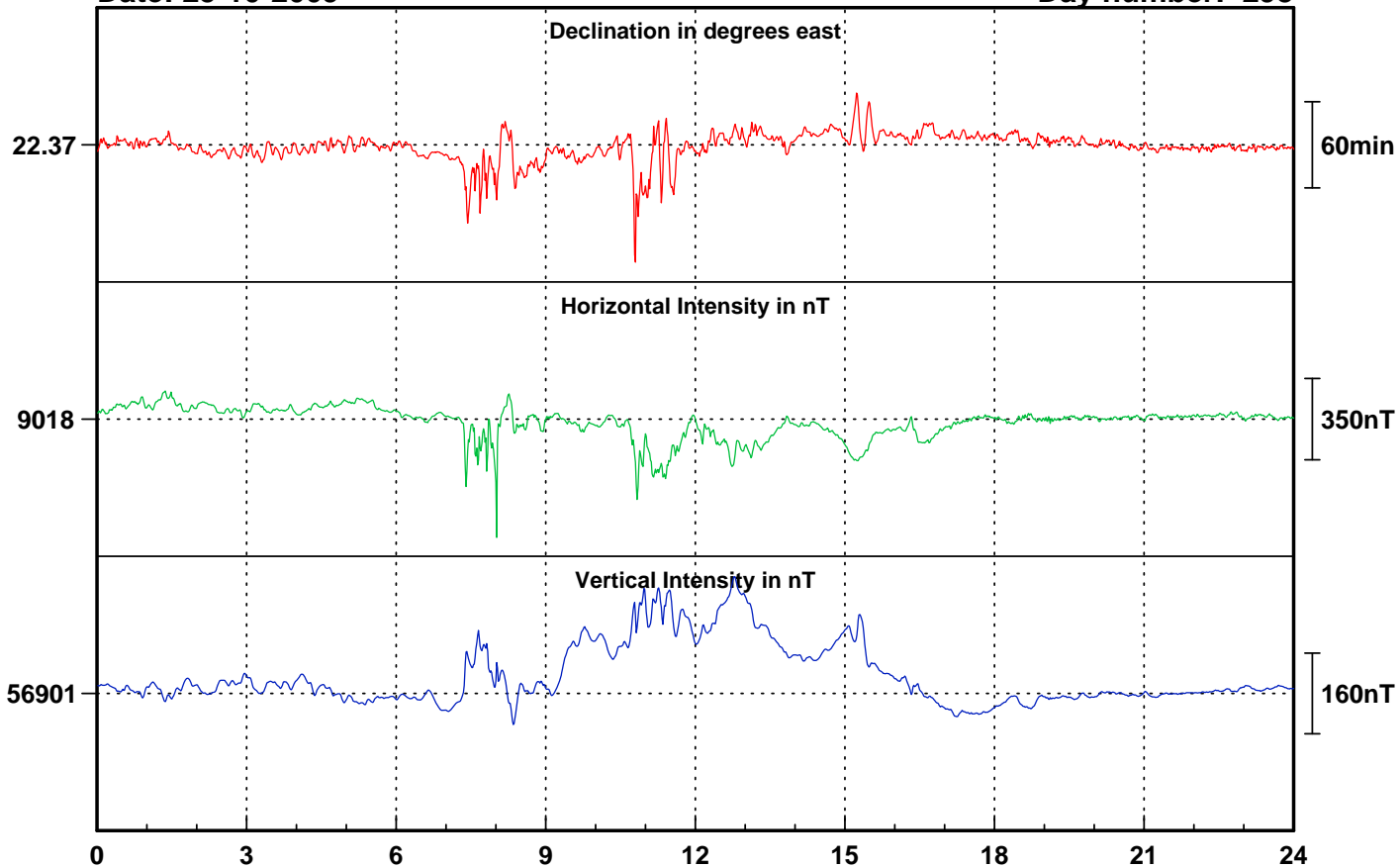
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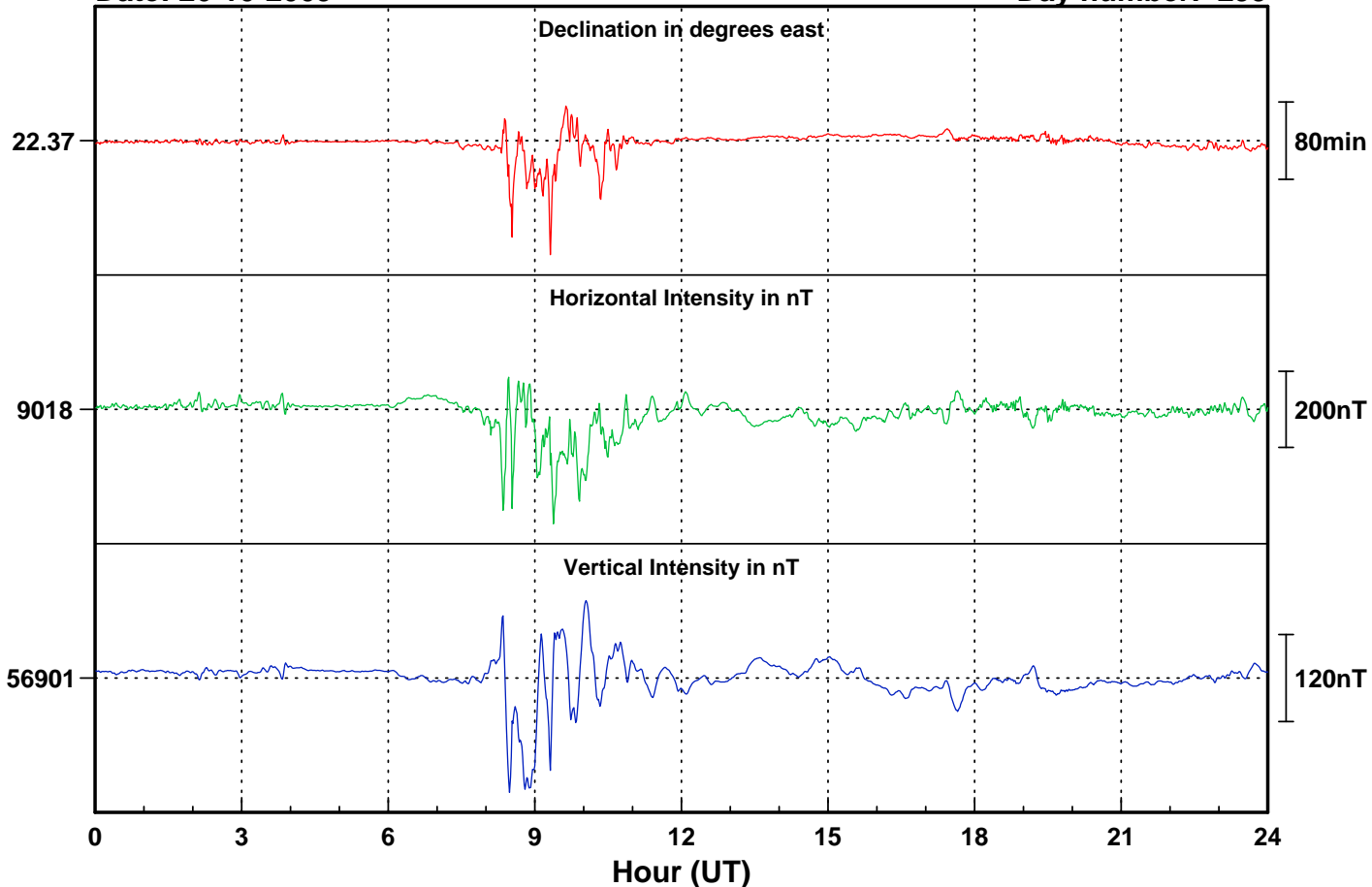
Jim Carrigan

Day number: 298



Date: 26-10-2009

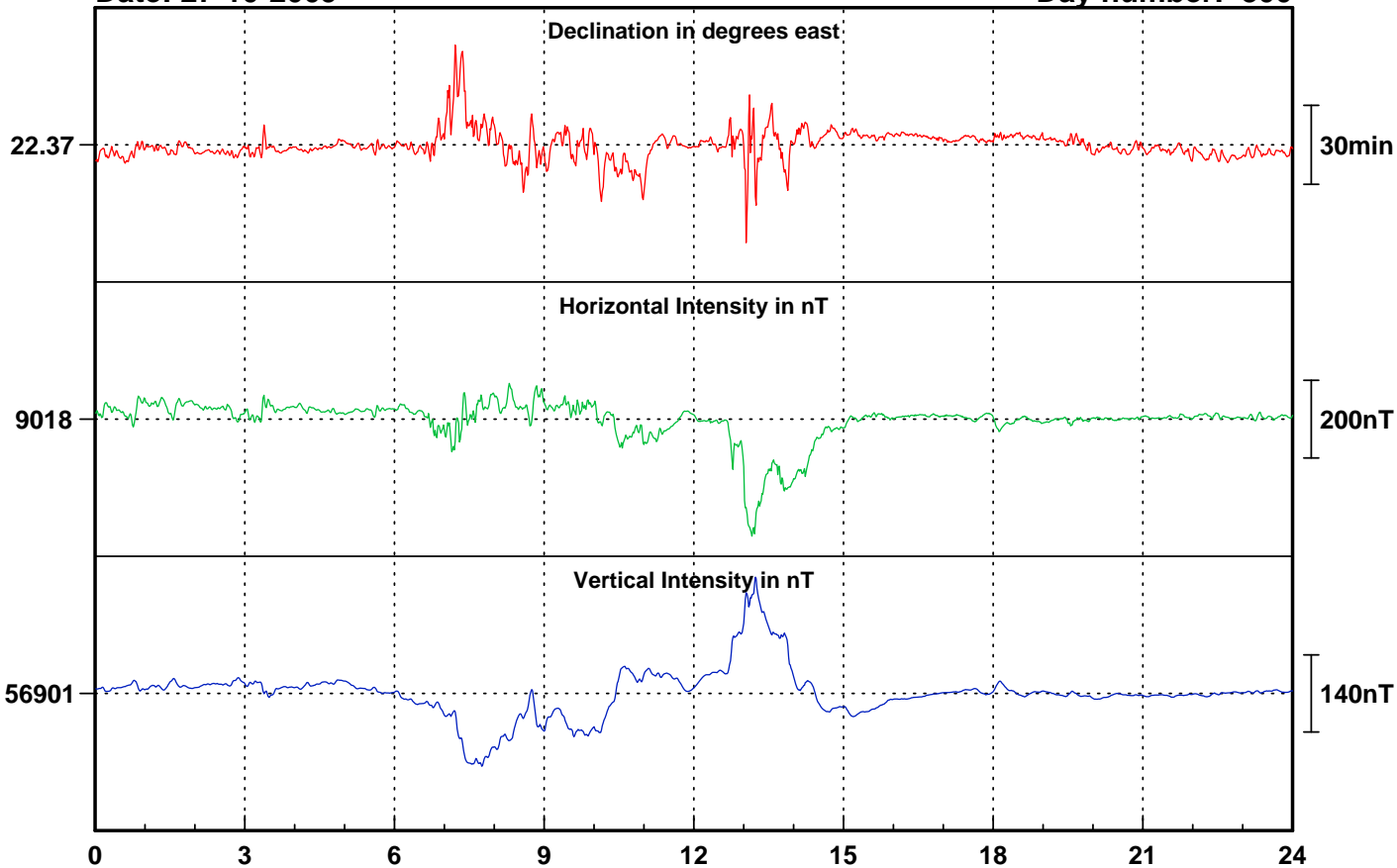
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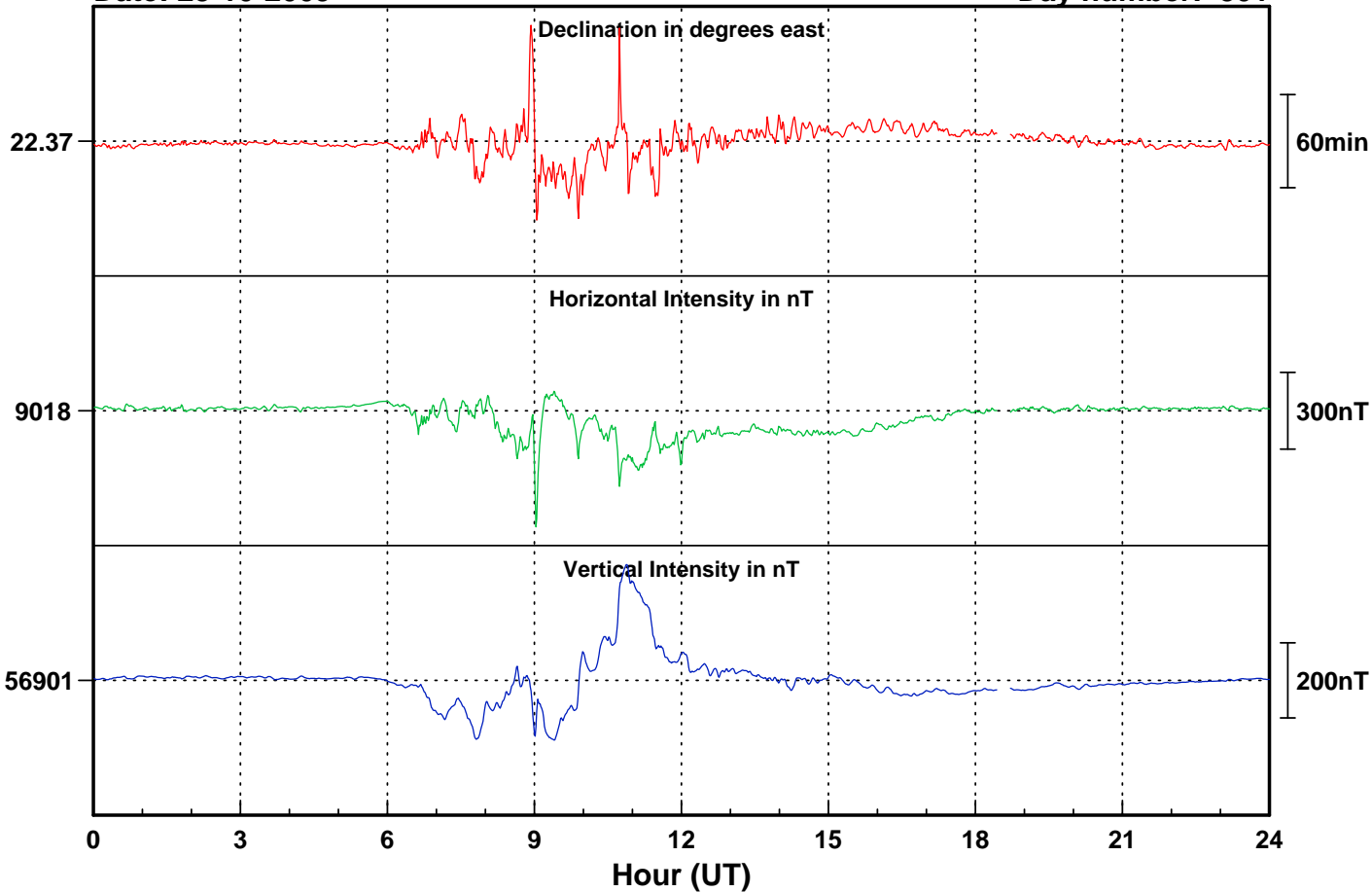
Jim Carrigan

Day number: 300



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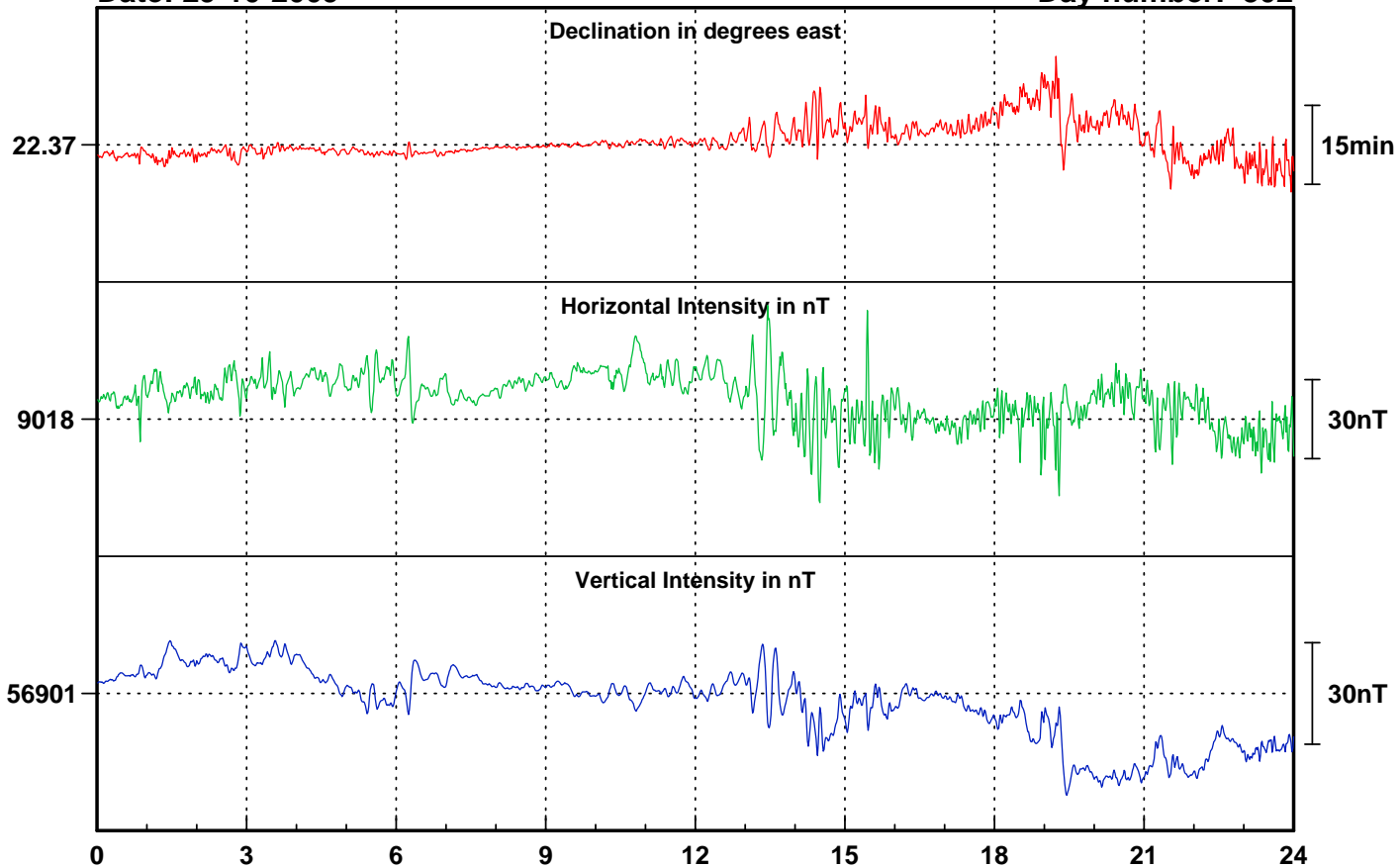
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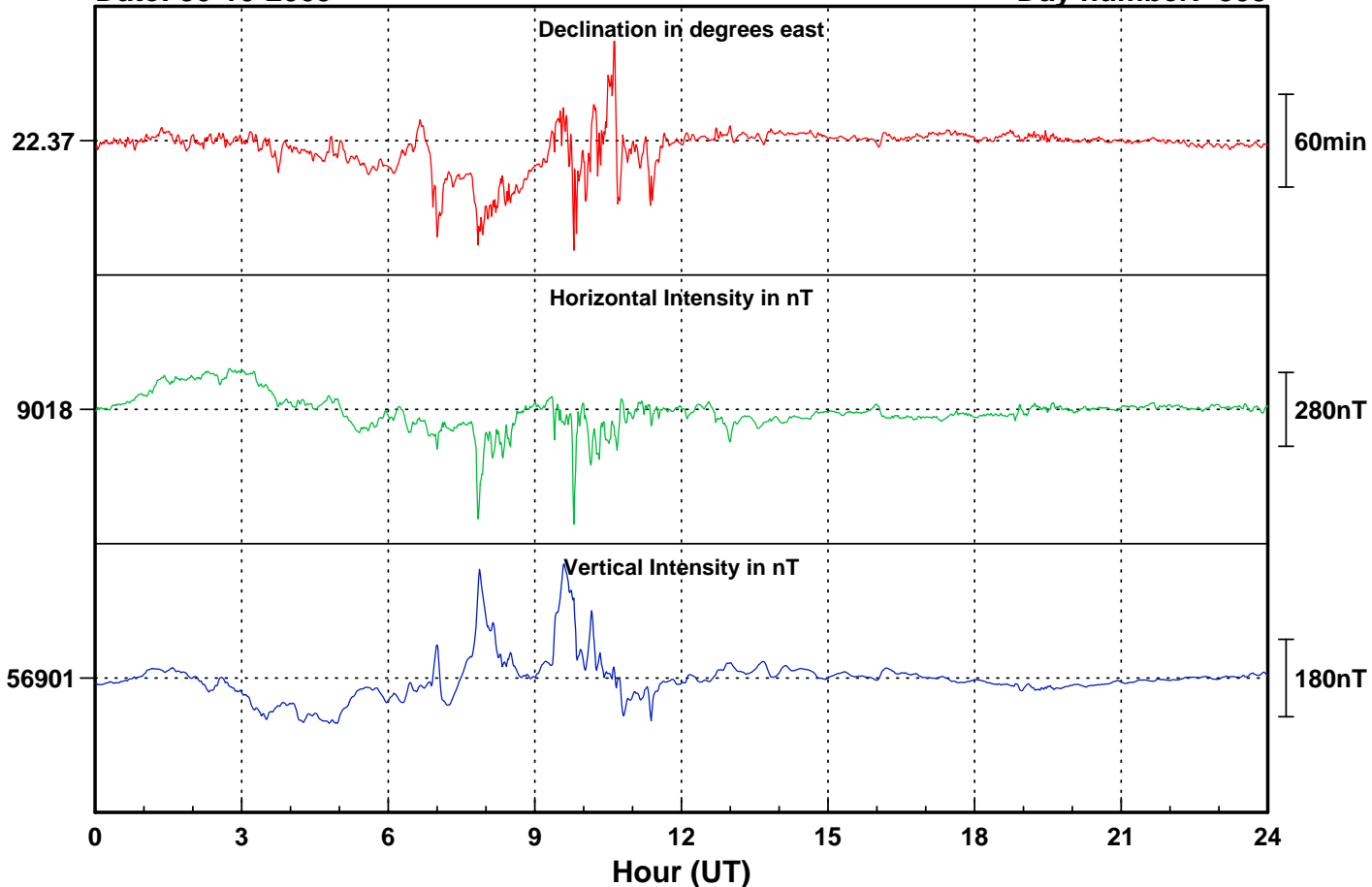
Jim Carrigan

Day number: 302



Date: 30-10-2009

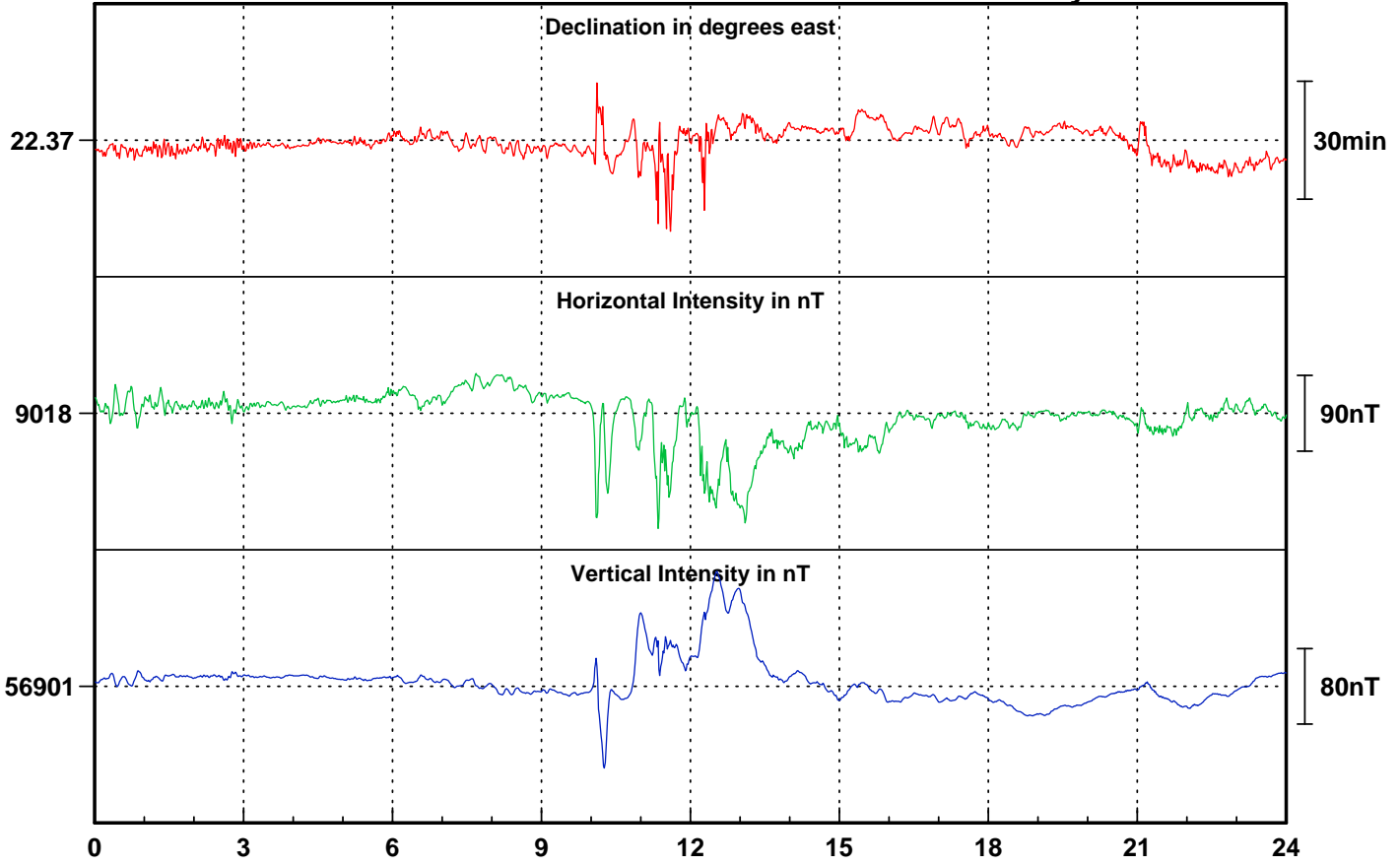
Day number: 303



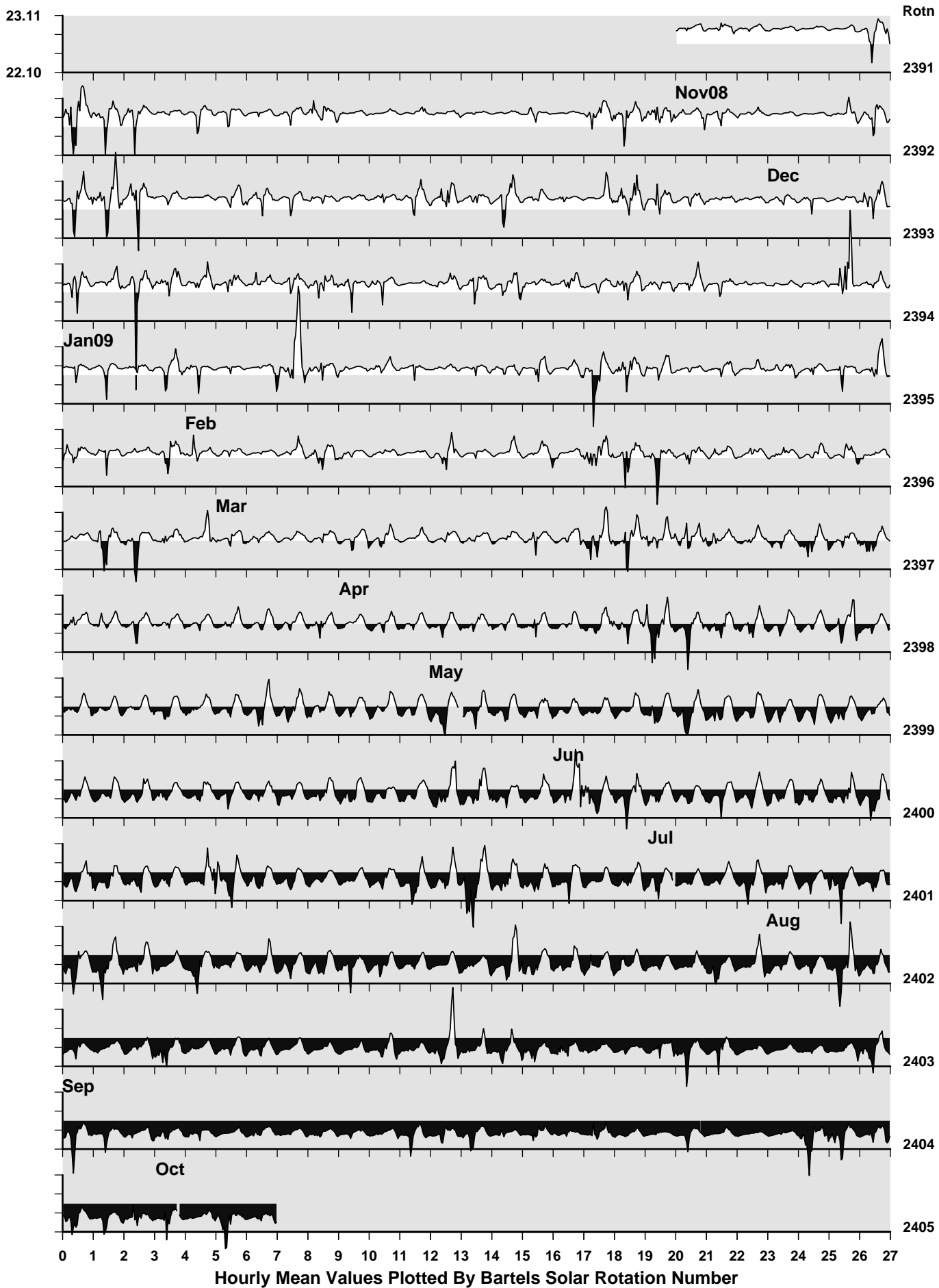
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Jim Carrigan

Day number: 304

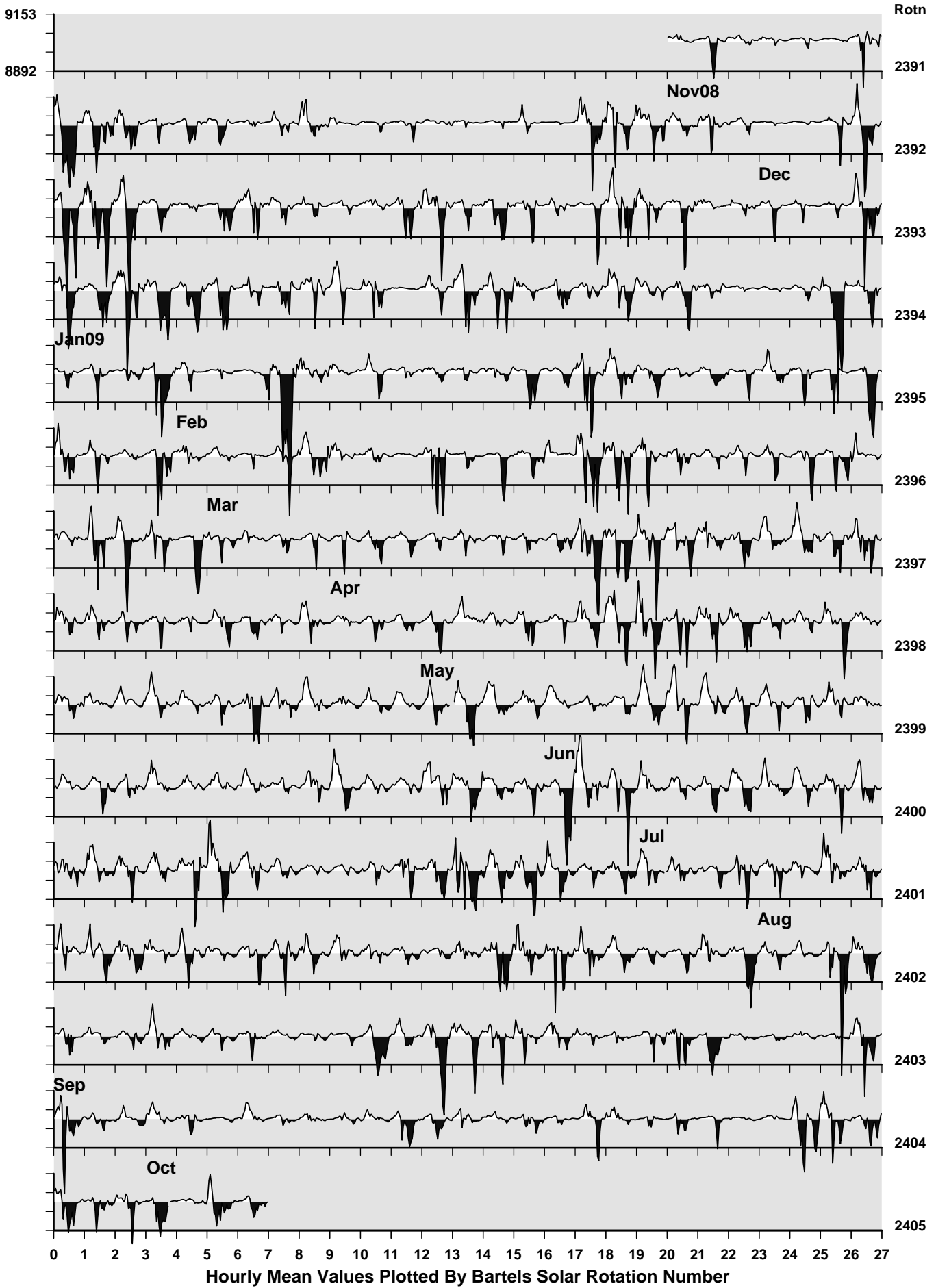


Jim Carrigan Observatory: Declination (degrees)



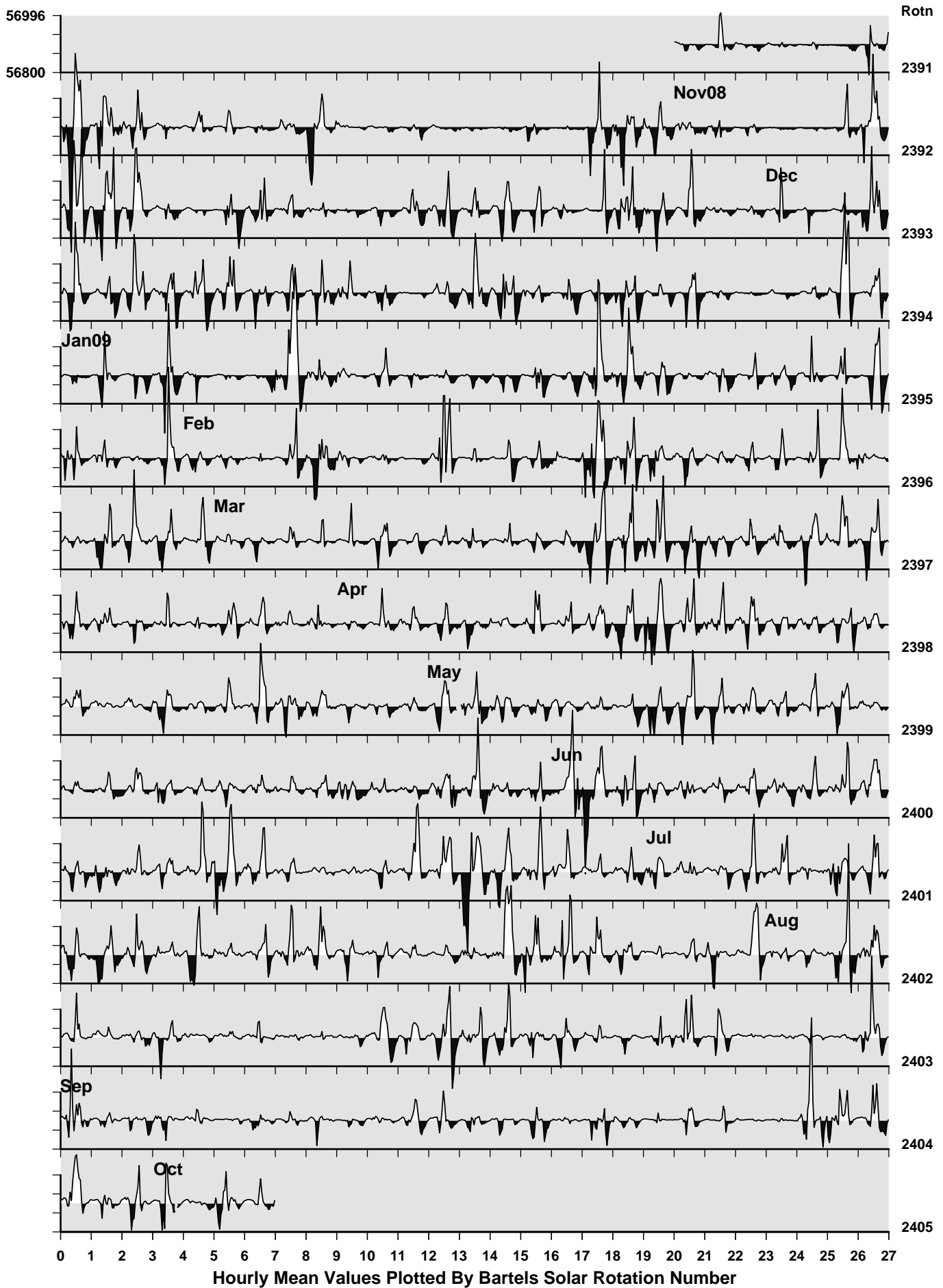
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Jim Carrigan Observatory: Horizontal Intensity (nT)



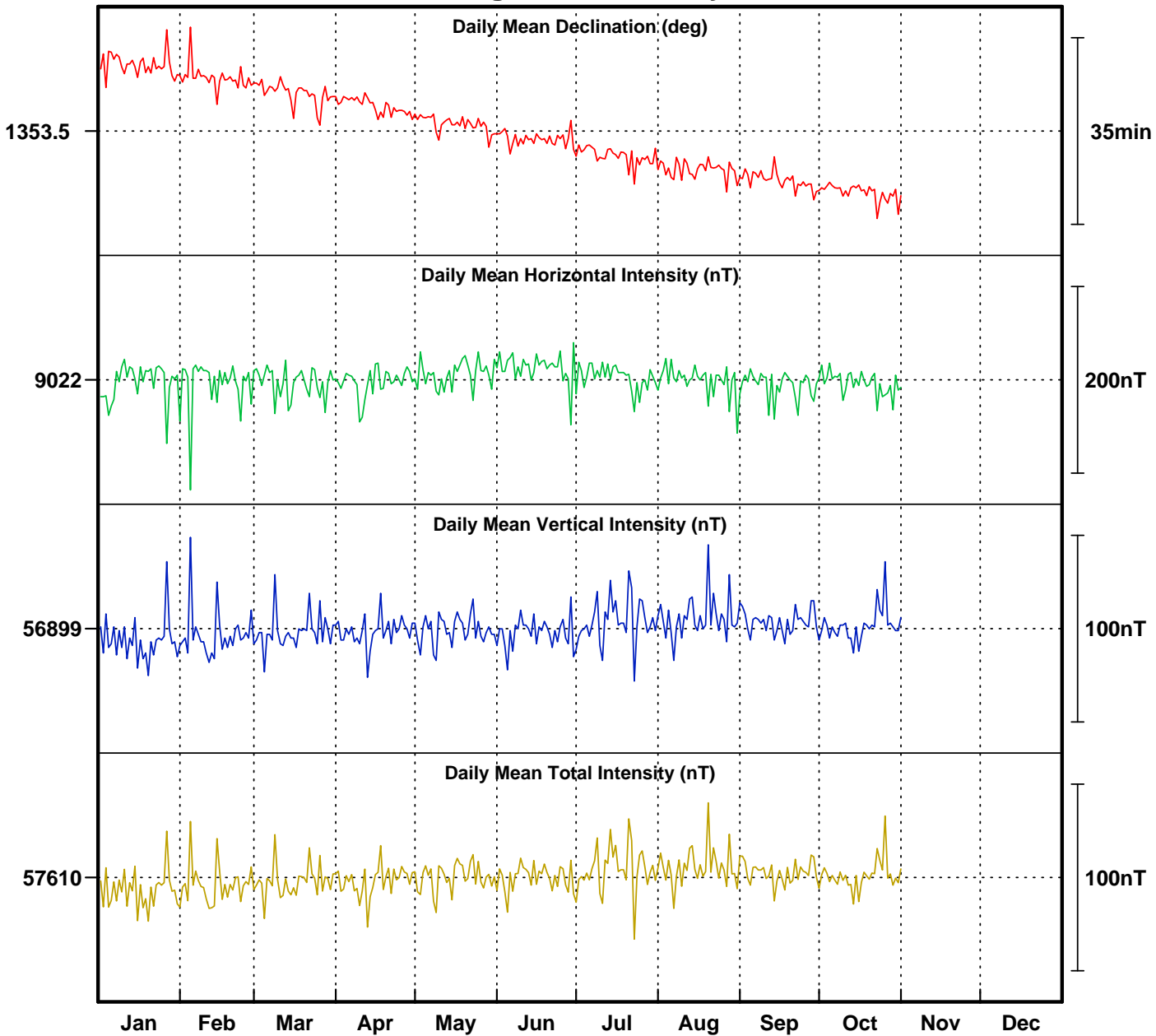
Hourly Mean Values Plotted By Bartels Solar Rotation Number

Jim Carrigan Observatory: Vertical Intensity (nT)



Hourly Mean Values Plotted By Bartels Solar Rotation Number

Jim Carrigan Observatory 2009



Monthly Mean Values for Jim Carrigan Observatory 2009

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	22° 45.9′	9018 nT	80° 59.6′	8316 nT	3490 nT	56893 nT	57603 nT
February	22° 43.5′	9019 nT	80° 59.6′	8319 nT	3484 nT	56896 nT	57606 nT
March	22° 40.6′	9019 nT	80° 59.6′	8322 nT	3477 nT	56898 nT	57608 nT
April	22° 38.1′	9020 nT	80° 59.5′	8325 nT	3471 nT	56898 nT	57608 nT
May	22° 34.7′	9028 nT	80° 59.0′	8336 nT	3467 nT	56898 nT	57610 nT
June	22° 31.9′	9035 nT	80° 58.6′	8345 nT	3462 nT	56897 nT	57610 nT
July	22° 28.8′	9025 nT	80° 59.3′	8339 nT	3451 nT	56904 nT	57615 nT
August	22° 26.3′	9021 nT	80° 59.5′	8338 nT	3443 nT	56905 nT	57616 nT
September	22° 24.2′	9017 nT	80° 59.7′	8336 nT	3437 nT	56902 nT	57612 nT
October	22° 22.0′	9018 nT	80° 59.6′	8340 nT	3432 nT	56901 nT	57611 nT

Note

i. The values shown here are provisional.