

BRITISH GEOLOGICAL SURVEY

**Sable Island
Observatory
Monthly
Magnetic
Bulletin**

May 2013

I 3/05/SB



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

SABLE ISLAND OBSERVATORY MAGNETIC DATA

1. Introduction

Sable Island geomagnetic observatory was established by the British Geological Survey (BGS). The installation was a joint venture between BGS, Halliburton (Sperry Drilling Services at the time), and Sable Offshore Energy in support of directional drilling programmes. The observatory became operational from 8th May 1999. Halliburton discontinued their involvement from 2011 and BGS continued the observatory operations with support from Environment Canada.

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) 131 650 0265
E-mail: enquiries@bgs.ac.uk
Internet: www.geomag.bgs.ac.uk

2. Position

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

Geographic: 43°55'55"N 299°59'28"E
Geomagnetic: 53°26'10"N 015°09'22"E
Height above mean sea level: 5m (approx)

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 in April 2004 and became fully operational from May 2004. 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.

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 Sable Island magnetic observatory, operated by the British Geological Survey in cooperation with Environment Canada (EC).'

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

SABLE ISLAND OBSERVATORY

ABSOLUTE OBSERVATIONS

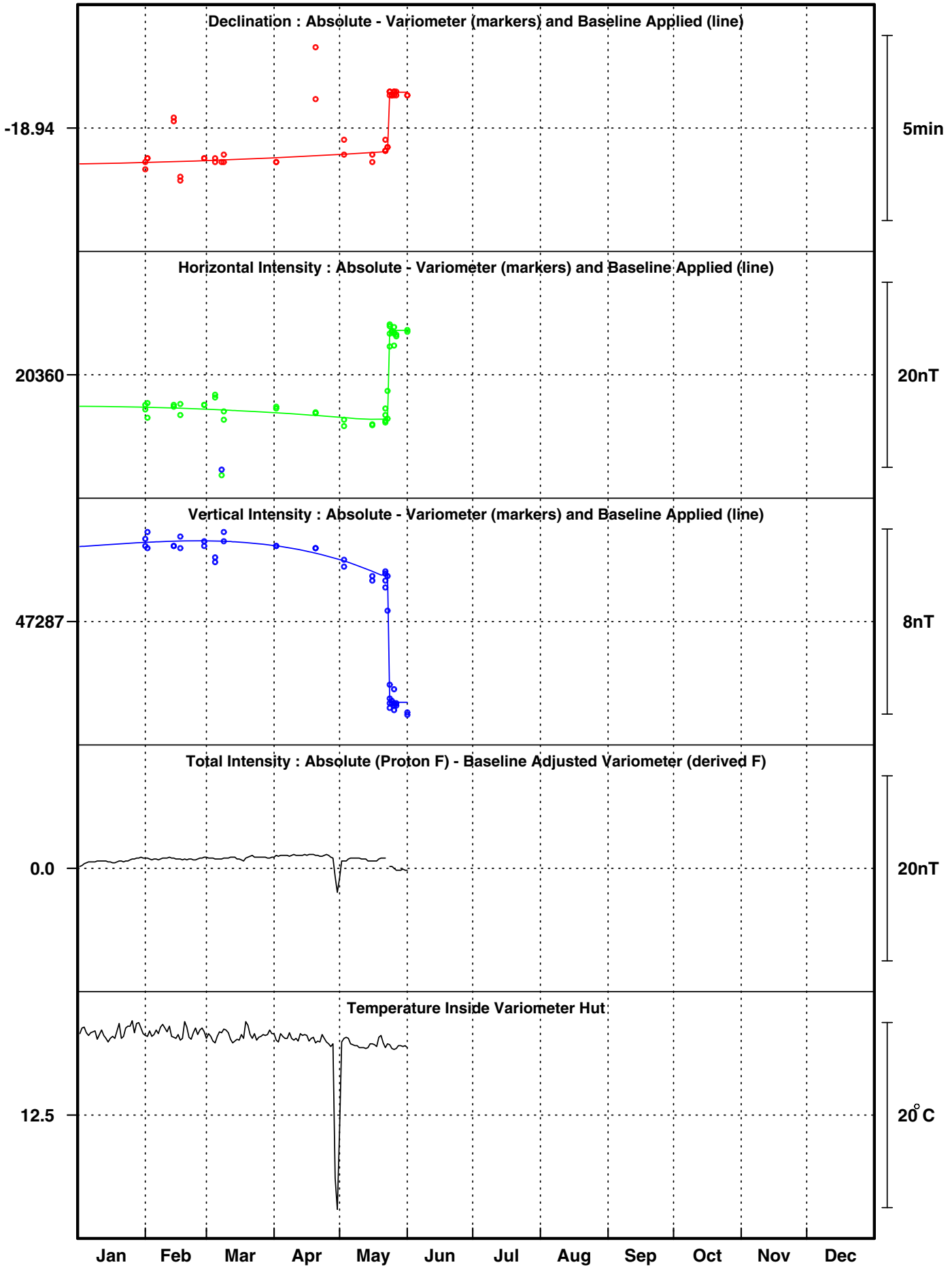
Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
02-May-13	122	16:32	-18.1409	-18.9433	16:47	66.0592	-0.1	50911.2	20659.4	20354.7	46531.1	47290.1	GL
02-May-13	122	17:02	-18.1496	-18.9500	17:17	66.0414	-0.1	50919.2	20677.1	20355.4	46532.0	47289.8	GL
15-May-13	135	16:53	-18.1980	-18.9500	17:12	66.0181	-0.1	50923.1	20697.6	20354.9	46527.1	47289.4	GL
15-May-13	135	17:28	-18.2071	-18.9533	17:48	66.0162	-0.1	50927.9	20701.1	20354.8	46530.8	47289.2	GL
21-May-13	141	20:42	-18.0344	-18.9483	20:54	66.0322	-0.1	50932.4	20689.9	20355.1	46540.7	47289.6	AS
21-May-13	141	21:04	-18.0271	-18.9483	21:15	66.0376	-0.1	50930.9	20684.9	20355.3	46541.2	47289.5	AS
21-May-13	141	21:25	-18.0241	-18.9433	21:35	66.0422	-0.1	50926.9	20679.5	20355.9	46539.3	47289.2	AS
21-May-13	141	21:44	-18.0366	-18.9483	21:50	66.0401	-0.1	50924.0	20680.1	20356.6	46535.9	47288.9	AS
22-May-13	142	12:54	-17.9587	-18.9467	13:05	66.0551	-0.1	50890.8	20654.4	20358.5	46510.9	47287.9	AS
22-May-13	142	13:13	-18.0018	-18.9467	13:23	66.0742	-0.1	50887.1	20637.4	20355.5	46514.4	47289.4	AS
22-May-13	142	15:33	-18.0898	-18.0033	15:44	66.0565	-0.1	50903.9	20658.6	20618.4	46523.4	46521.9	AS
22-May-13	142	15:54	-18.1044	-18.0033	16:03	66.0576	-0.1	50905.6	20658.4	20618.3	46525.4	46521.8	AS
22-May-13	142	17:37	-18.1571	-18.0033	17:46	66.0349	-0.1	50935.8	20689.1	20618.9	46544.8	46521.6	AS
22-May-13	142	17:53	-18.1498	-18.0033	18:02	66.0300	-0.1	50942.9	20696.0	20618.0	46549.5	46521.9	AS
22-May-13	142	19:15	-18.1211	-18.0033	19:26	66.0295	-0.1	50947.6	20698.3	20620.0	46553.6	46521.1	AS

SABLE ISLAND OBSERVATORY

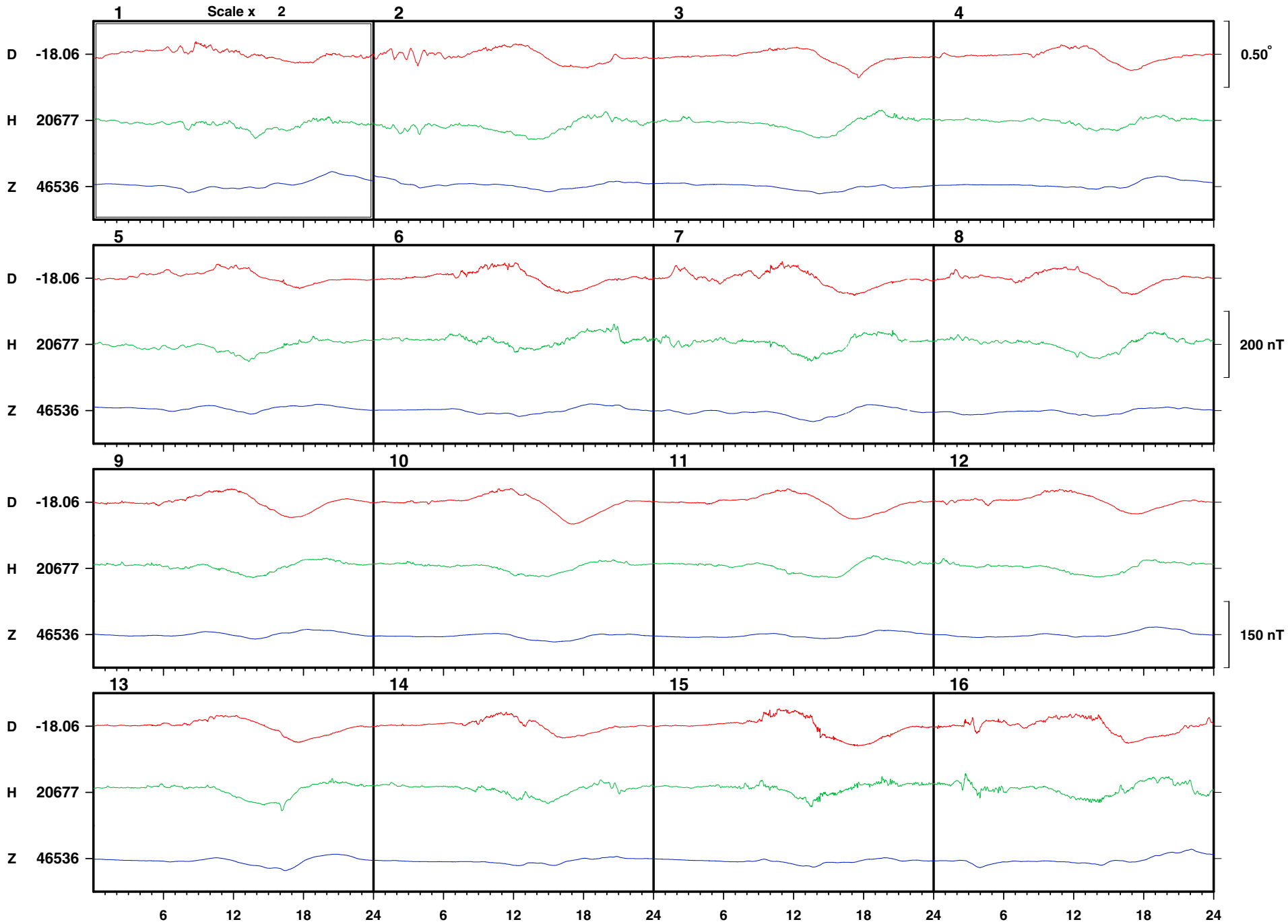
ABSOLUTE OBSERVATIONS

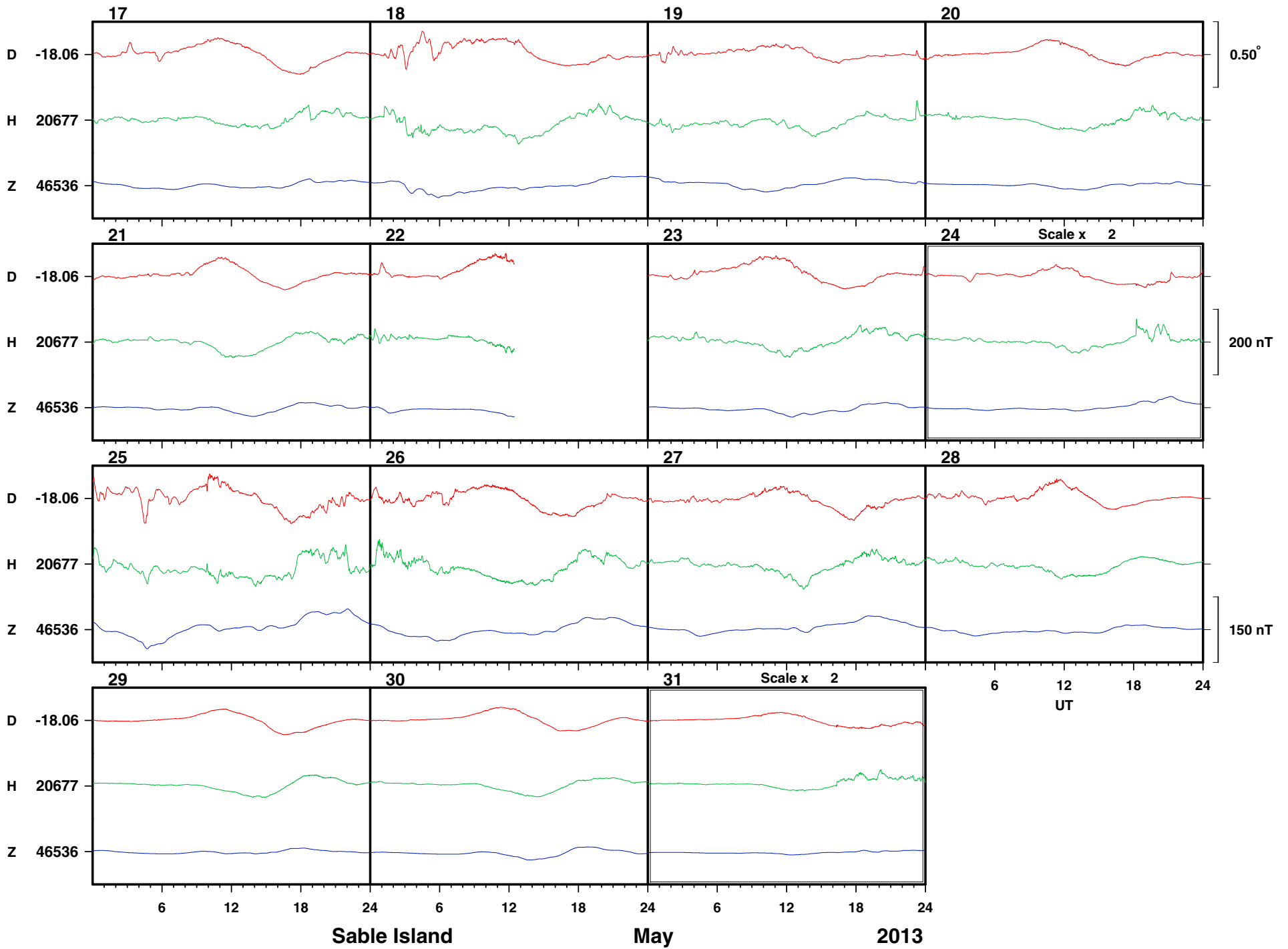
Date	Day Number	Declination			Inclination		Total Field		Horizontal Intensity		Vertical Intensity		Observer
		Time (UT)	Absolute (°)	Baseline (°)	Time (UT)	Absolute (°)	Site difference (nT)	Absolute corrected (nT)	Absolute (nT)	Baseline (nT)	Absolute (nT)	Baseline (nT)	
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23-May-13	143	12:23	-17.9495	-18.0050	12:34	66.0650	-0.1	50890.7	20646.4	20618.5	46514.4	46521.9	AS
23-May-13	143	12:43	-17.9869	-18.0050	12:52	66.0627	-0.1	50895.7	20650.2	20617.7	46518.2	46522.1	AS
23-May-13	143	18:39	-18.1296	-18.0050	18:50	66.0045	-0.1	50945.8	20717.8	20618.7	46542.9	46521.7	AS
23-May-13	143	18:59	-18.1172	-18.0067	19:06	66.0204	-0.1	50942.0	20703.4	20616.3	46545.2	46522.7	AS
24-May-13	144	14:24	-18.0821	-18.0067	14:34	66.0658	-0.1	50907.5	20652.6	20618.0	46530.1	46521.9	AS
24-May-13	144	14:44	-18.1060	-18.0067	14:54	66.0725	-0.1	50907.8	20647.2	20617.9	46532.8	46522.0	AS
25-May-13	145	14:26	-18.0601	-18.0050	14:38	66.0978	-0.1	50901.0	20623.9	20616.4	46535.7	46522.5	AS
25-May-13	145	14:49	-18.0950	-18.0050	14:59	66.0821	-0.1	50912.7	20641.4	20618.4	46540.7	46521.6	AS
25-May-13	145	18:19	-18.1952	-18.0067	18:28	66.0174	-0.1	50971.1	20717.6	20617.7	46570.7	46521.9	AS
25-May-13	145	18:36	-18.1989	-18.0050	18:45	66.0222	-0.1	50972.8	20714.4	20617.8	46574.0	46521.8	AS
26-May-13	146	16:13	-18.1820	-18.0050	16:23	66.0640	-0.1	50916.8	20657.8	20617.4	46537.9	46521.9	AS
26-May-13	146	16:30	-18.1896	-18.0067	16:38	66.0652	-0.1	50920.4	20658.3	20617.6	46541.7	46521.8	AS
31-May-13	151	16:38	-18.1464	-18.0067	16:57	66.0004	-0.1	50936.0	20717.2	20618.1	46532.5	46521.4	GL
31-May-13	151	17:10	-18.1651	-18.0067	17:30	65.9995	-0.1	50937.5	20718.5	20617.9	46533.5	46521.5	GL

Sable Island 2013



Sable Island May 2013

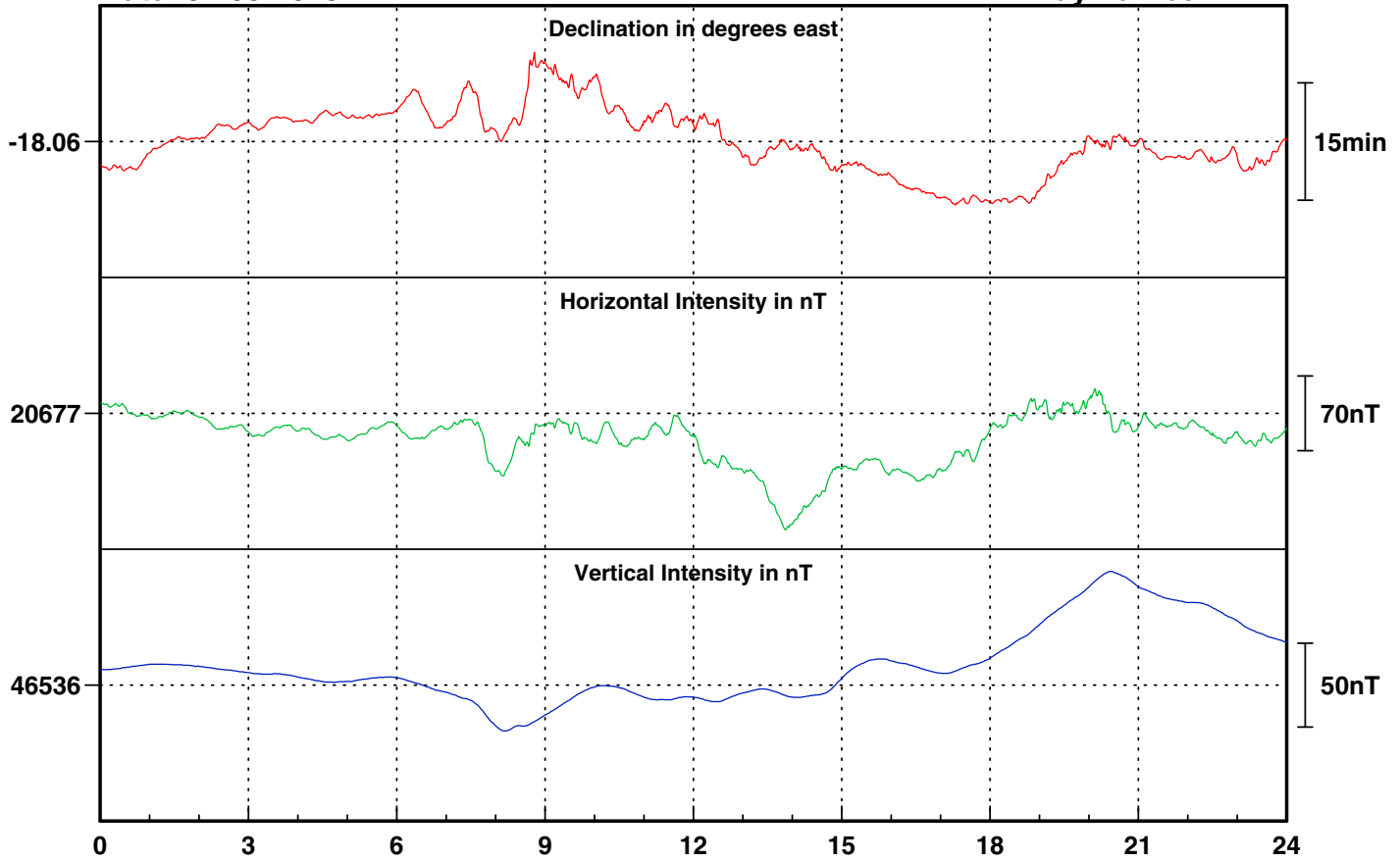




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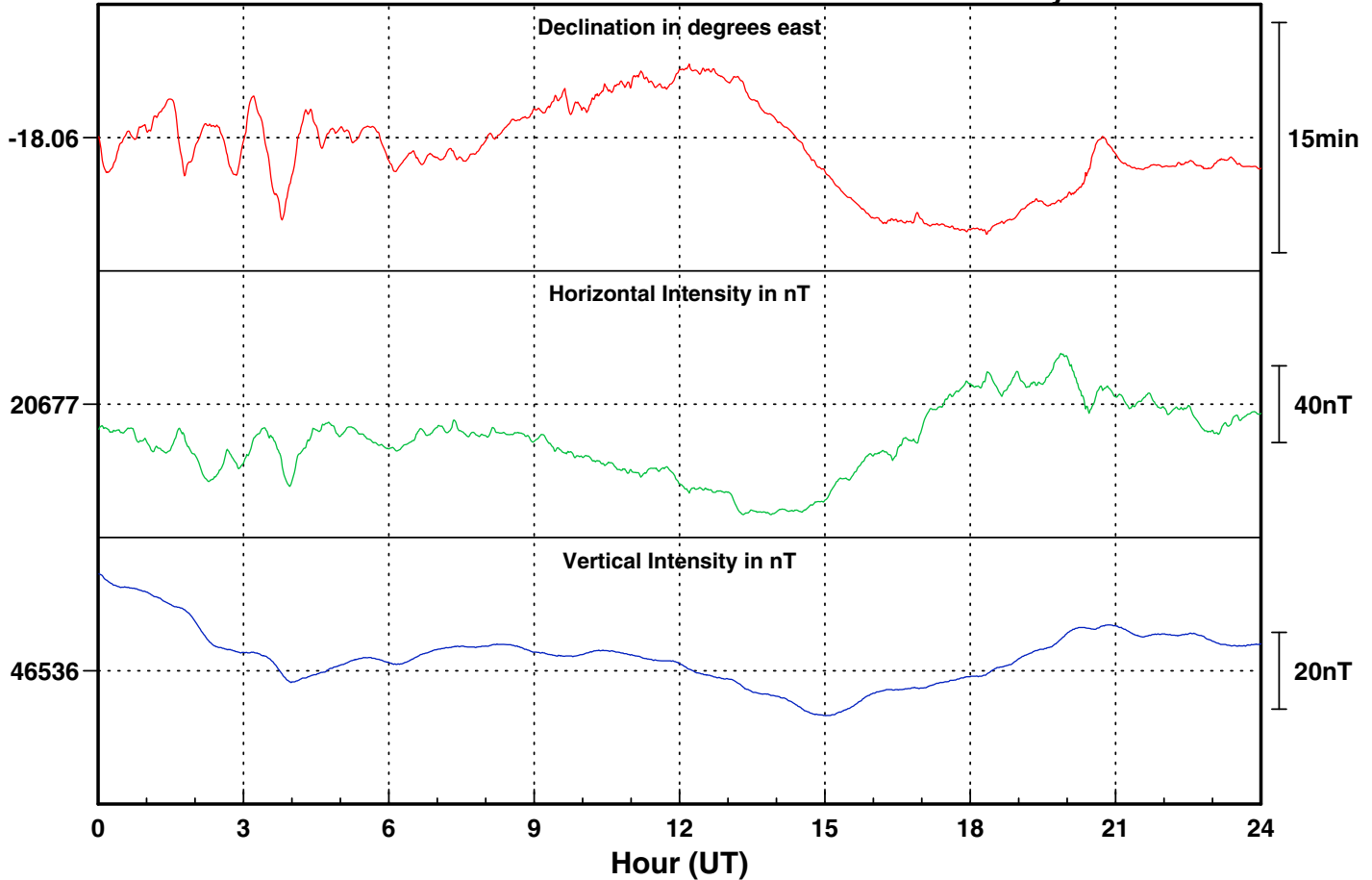
Sable Island

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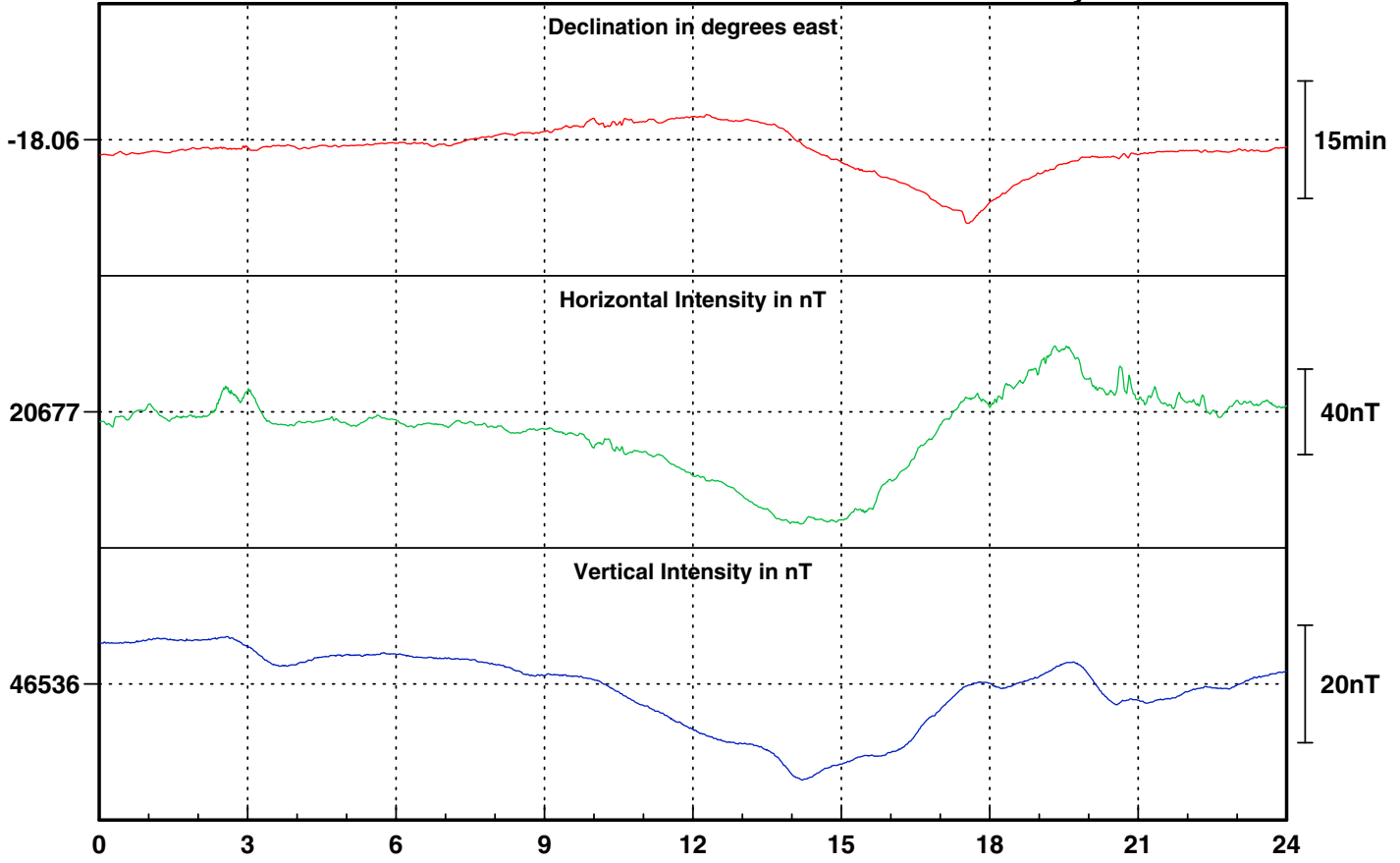
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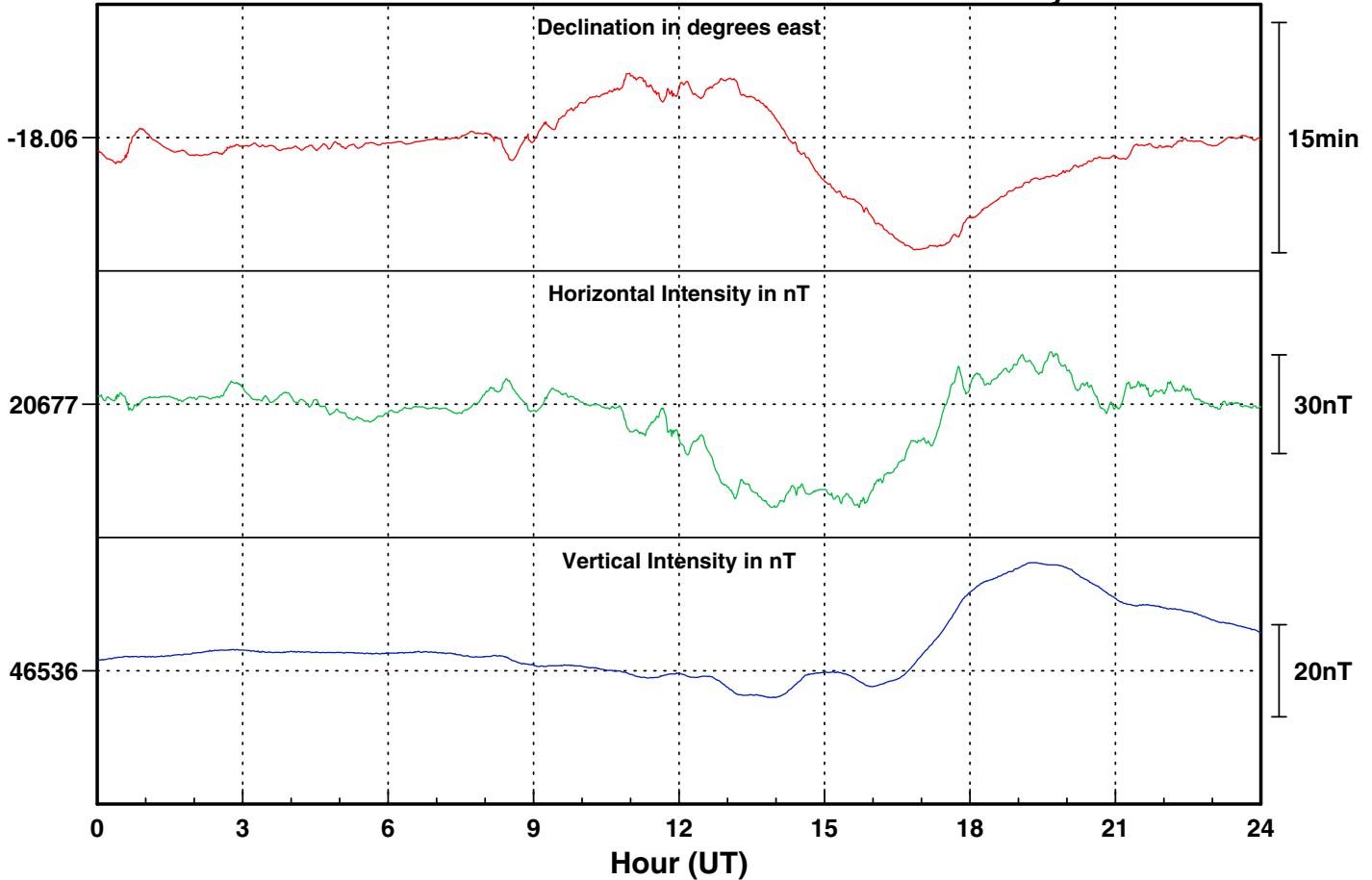
Sable Island

Day number: 123



Date: 04-05-2013

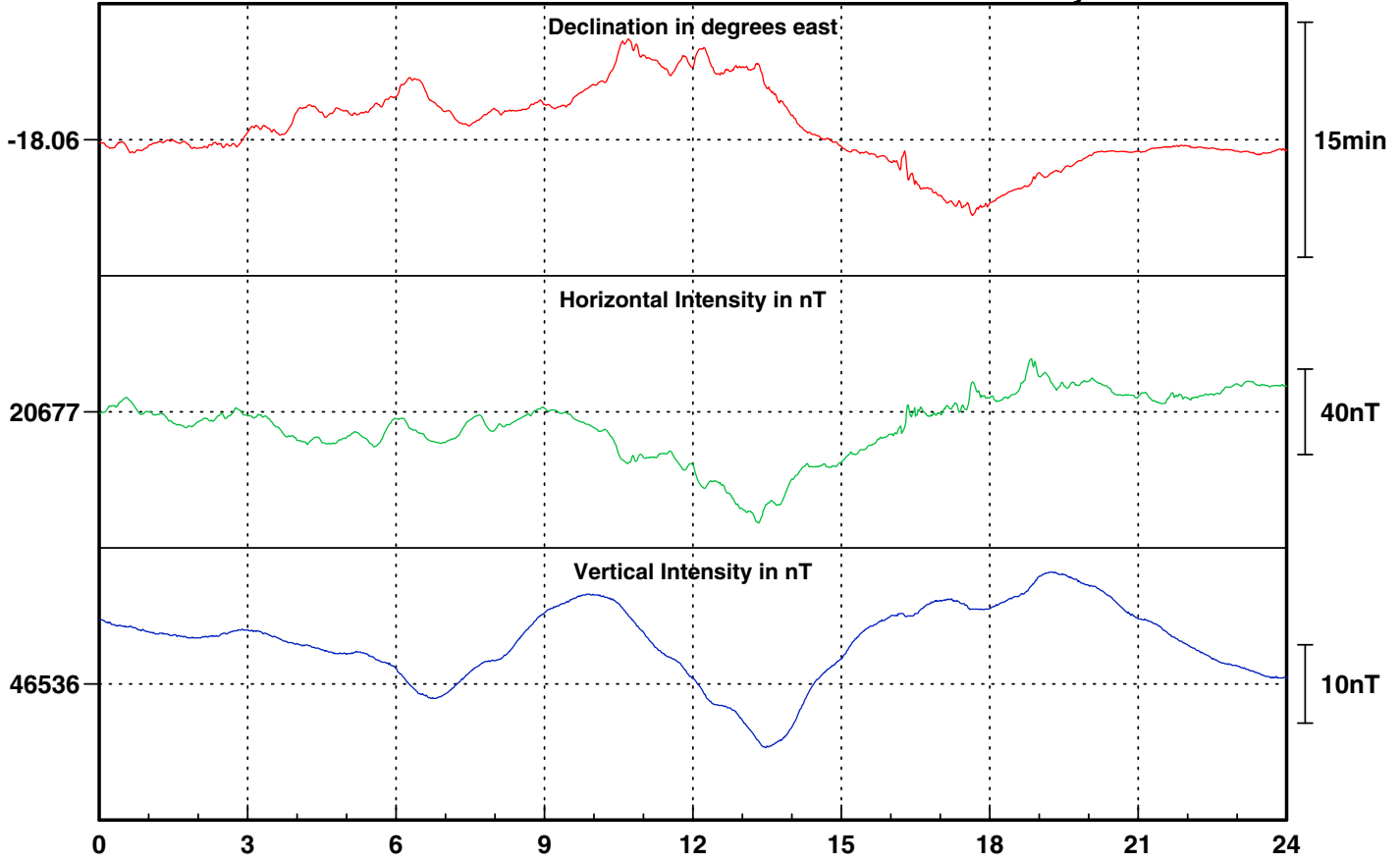
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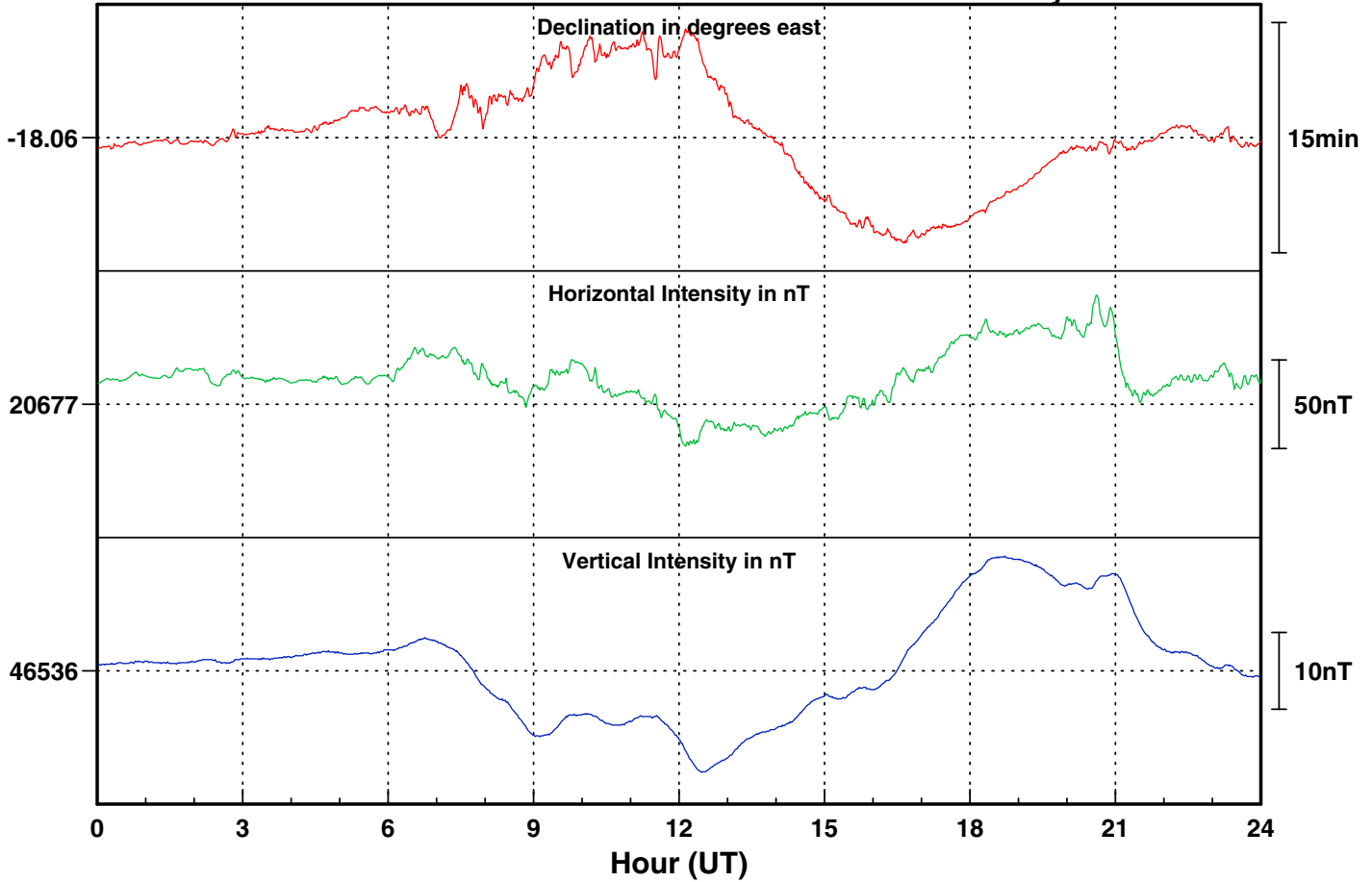
Sable Island

Day number: 125



Date: 06-05-2013

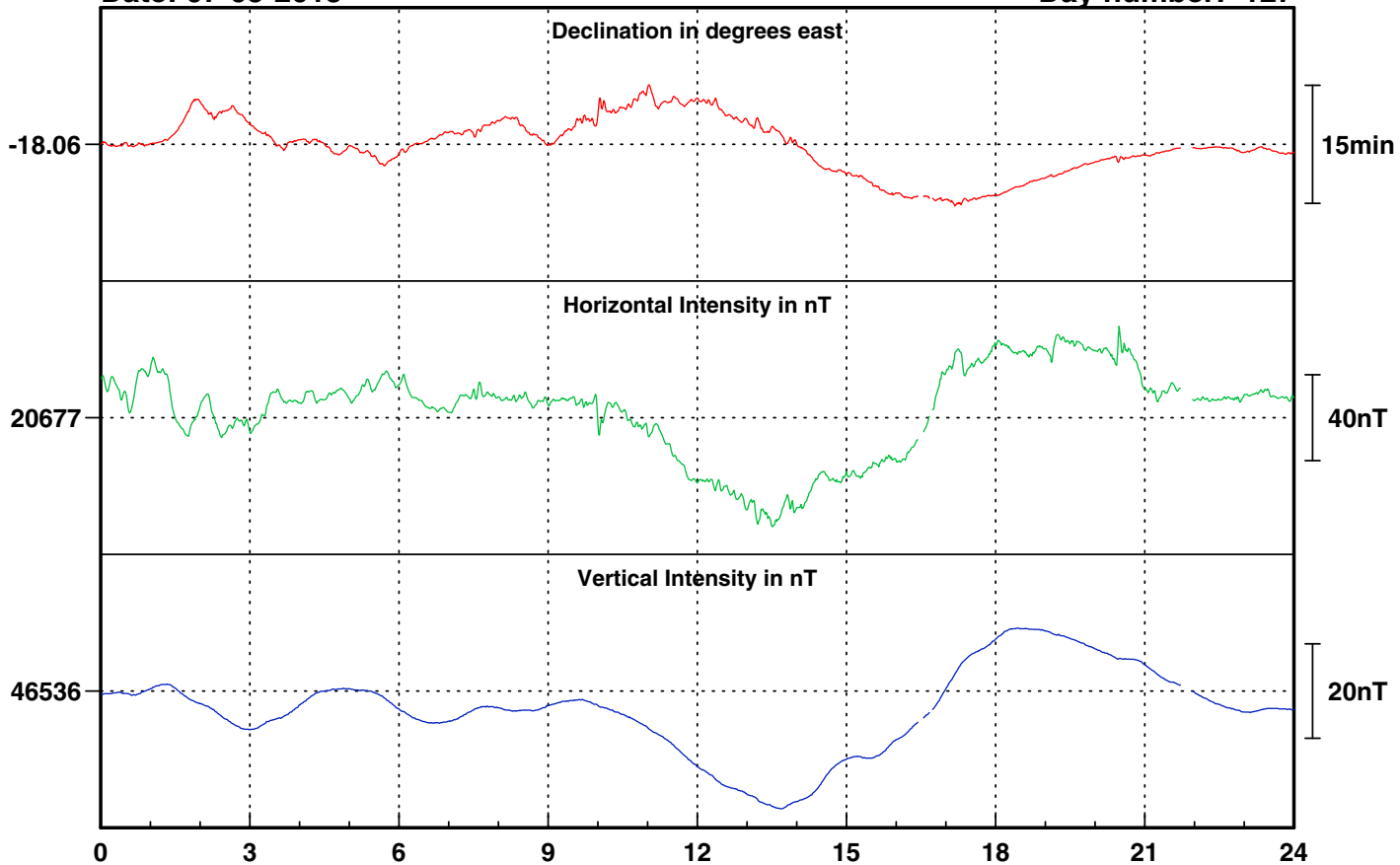
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Date: 07-05-2013

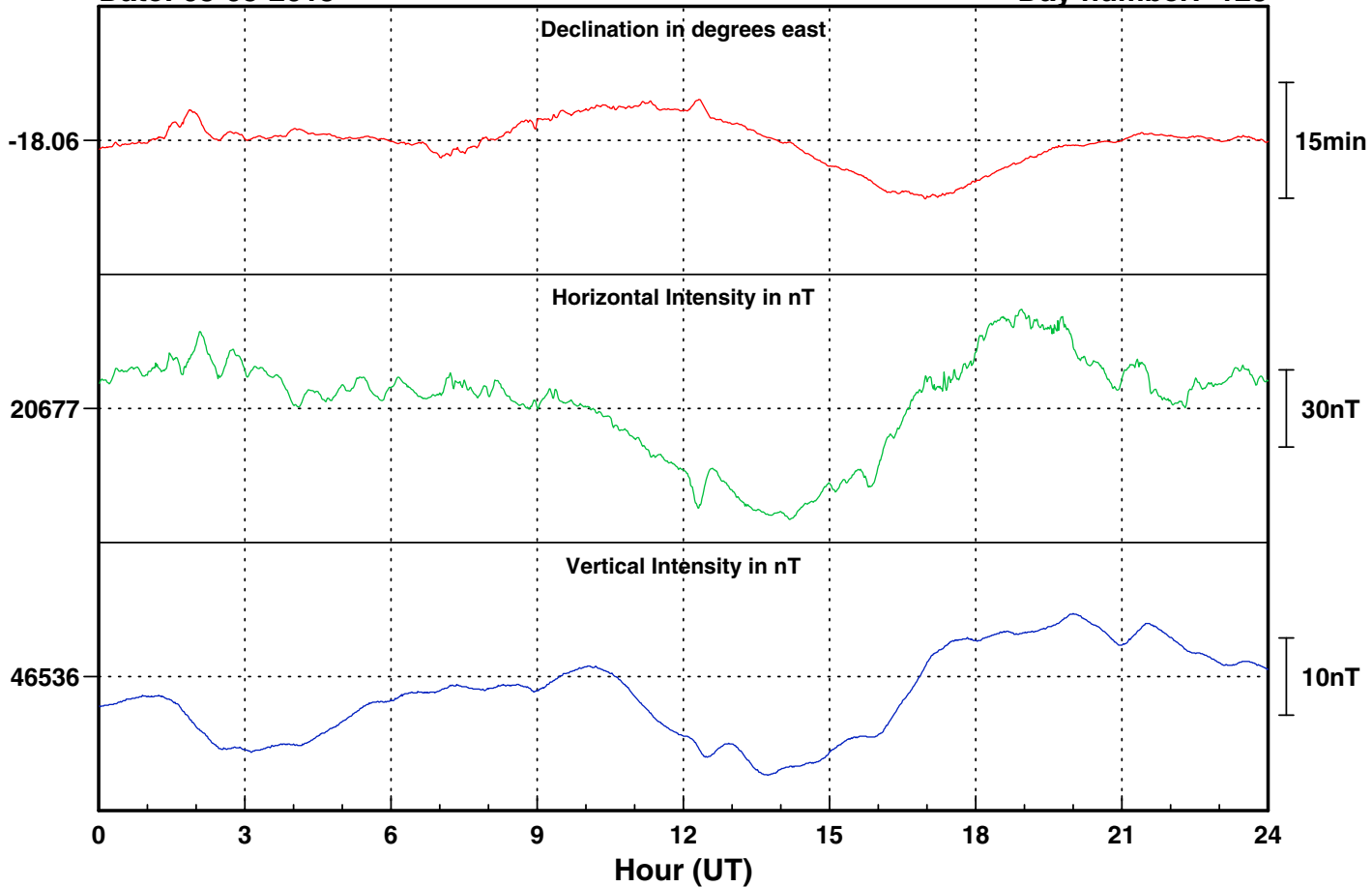
Sable Island

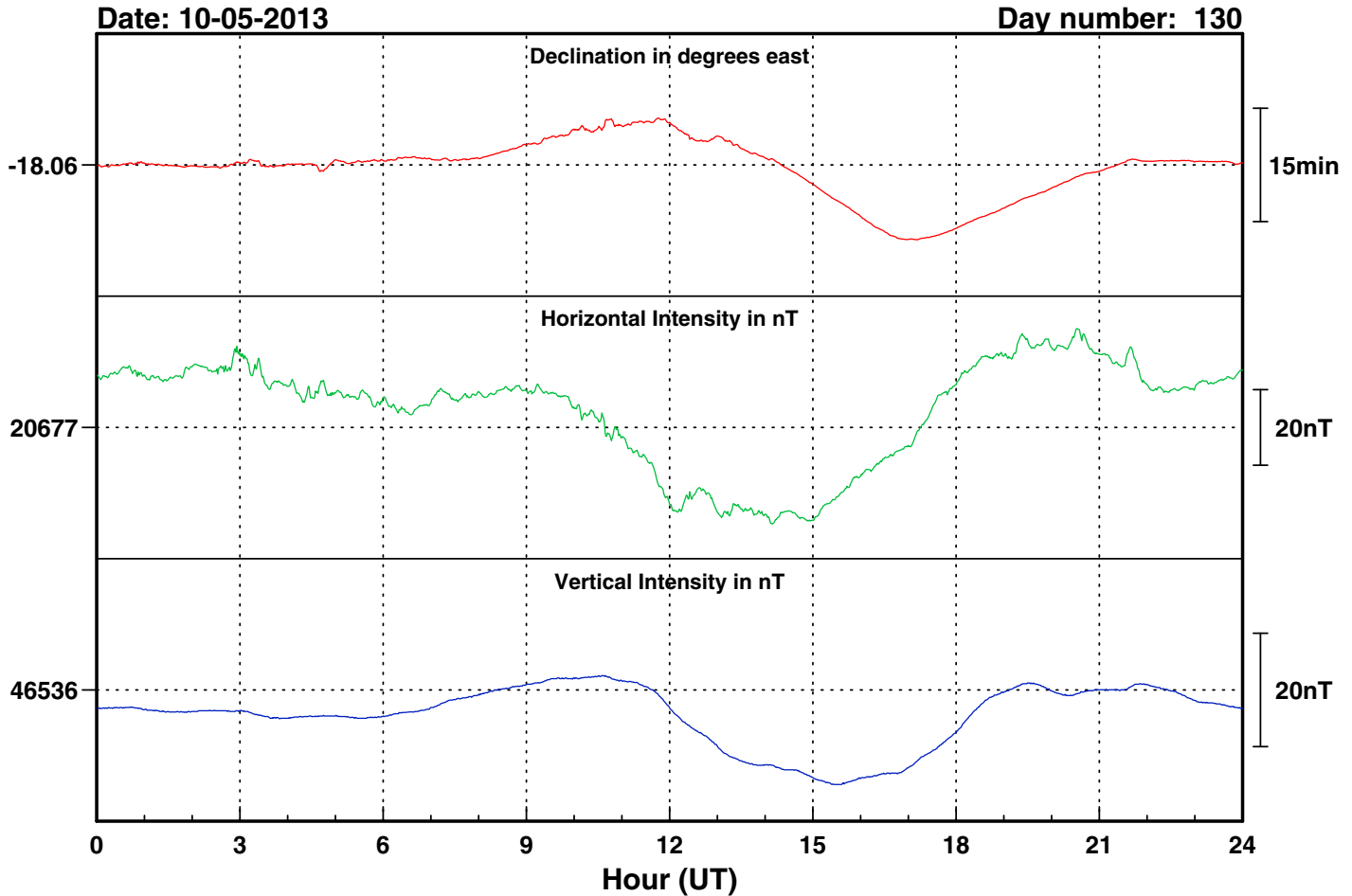
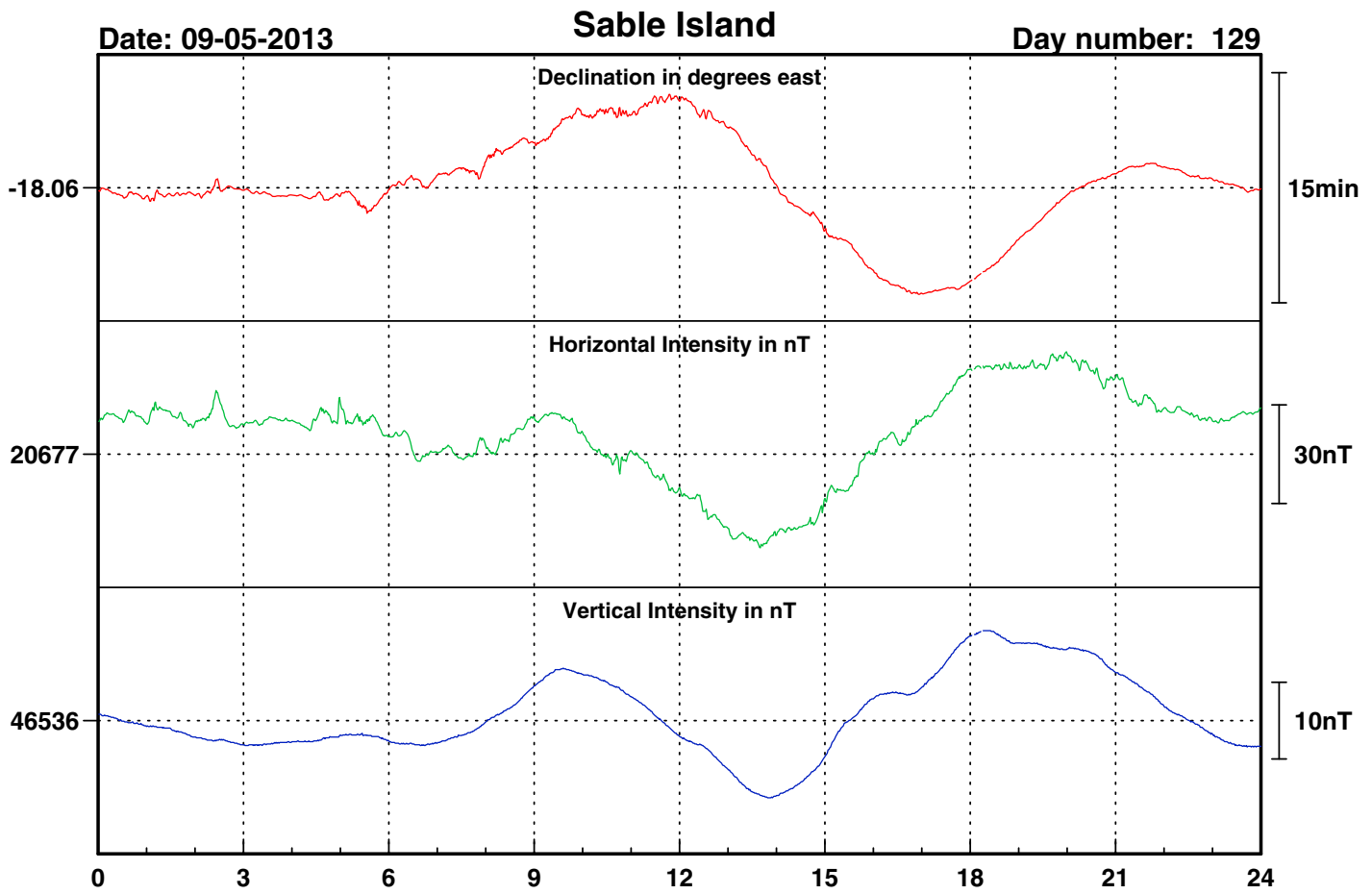
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Date: 08-05-2013

Day number: 128

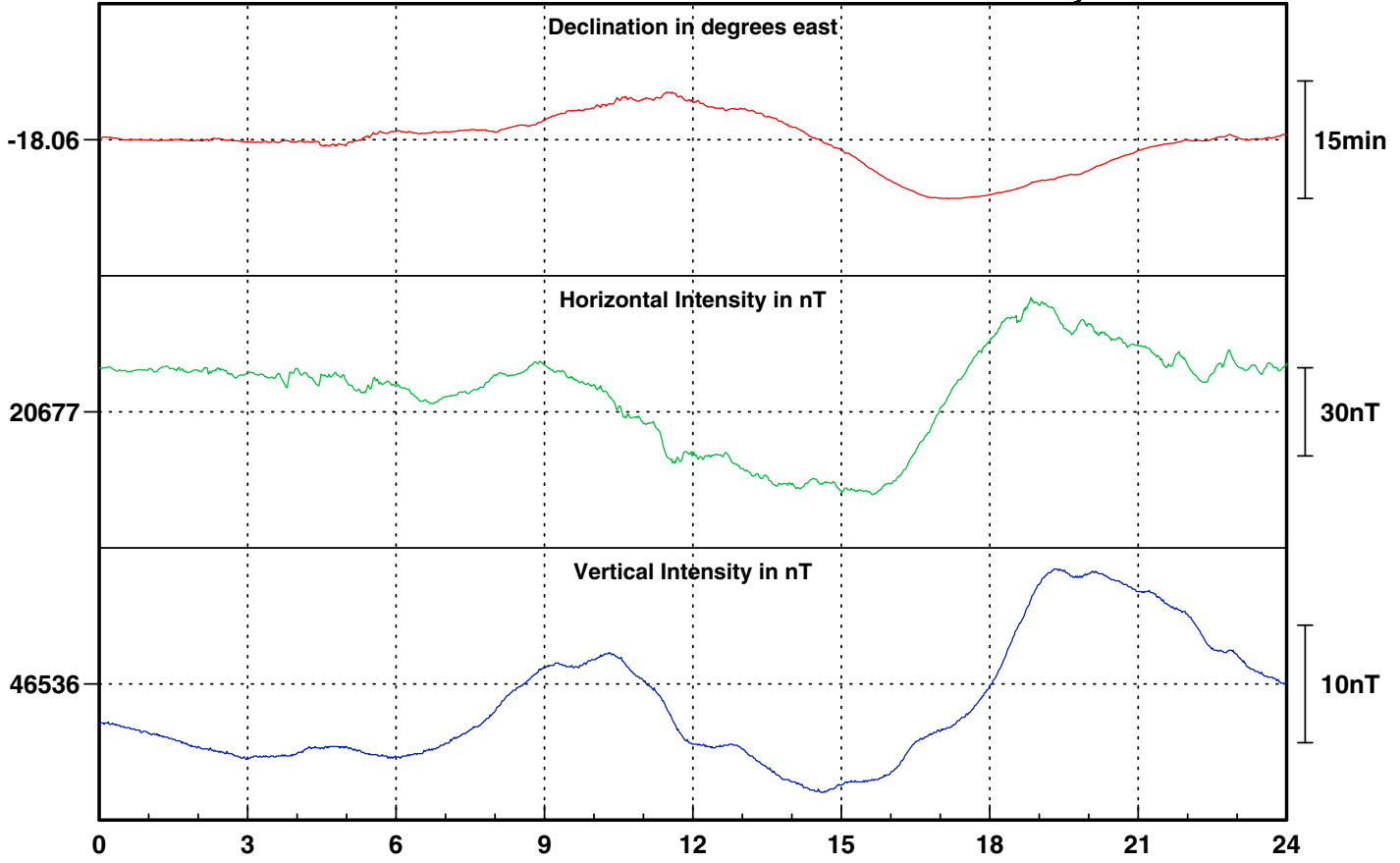




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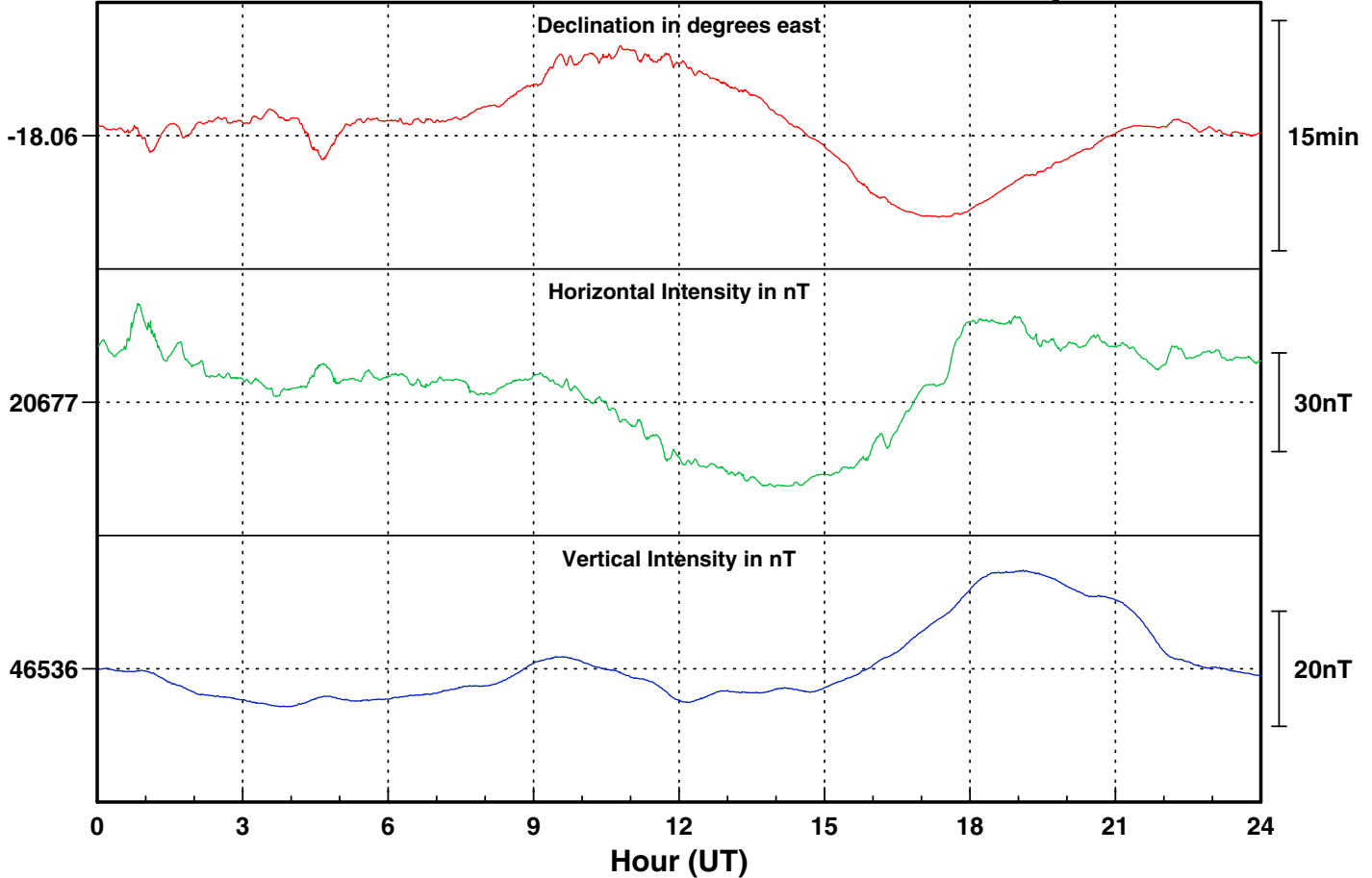
Sable Island

Day number: 131



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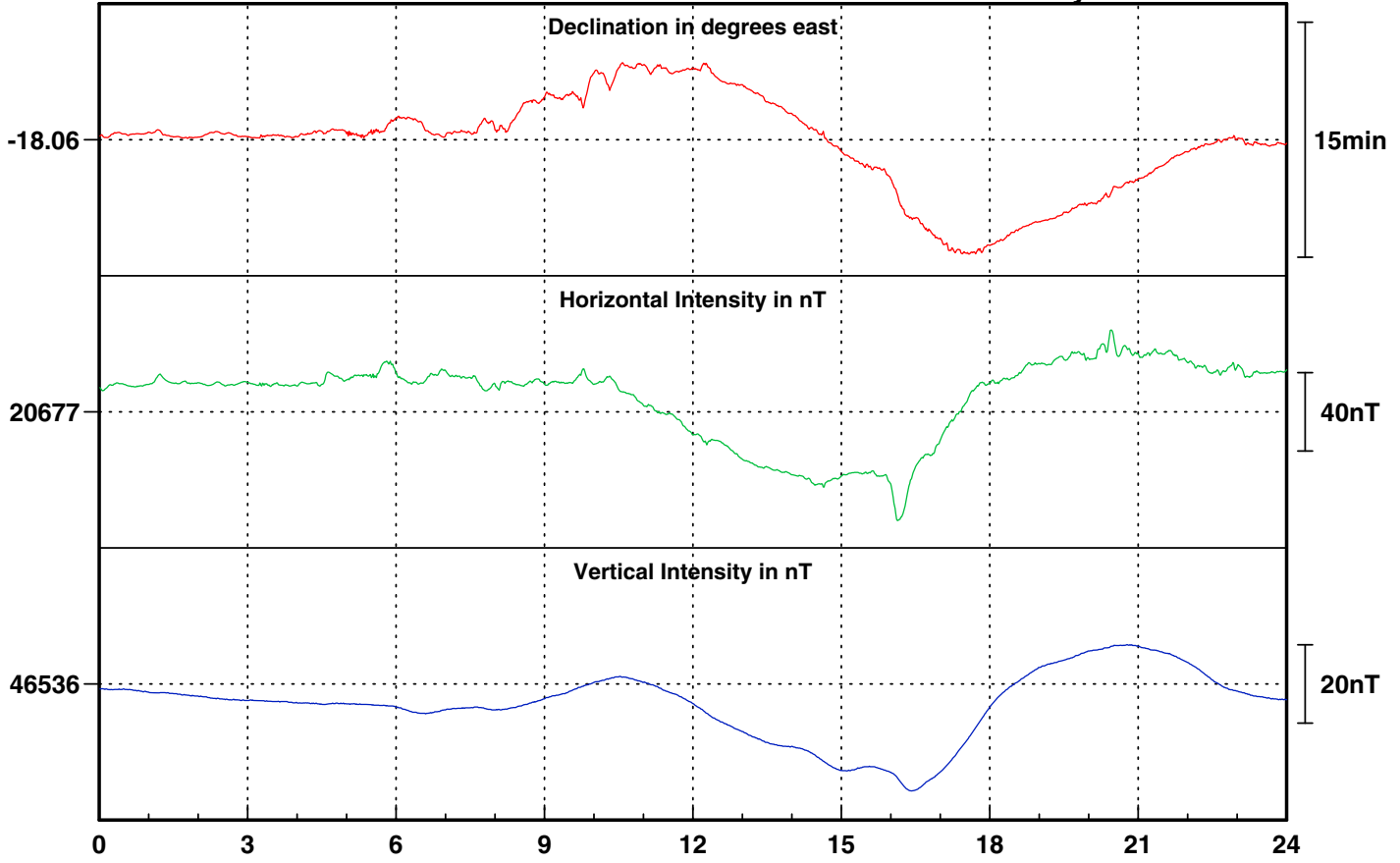
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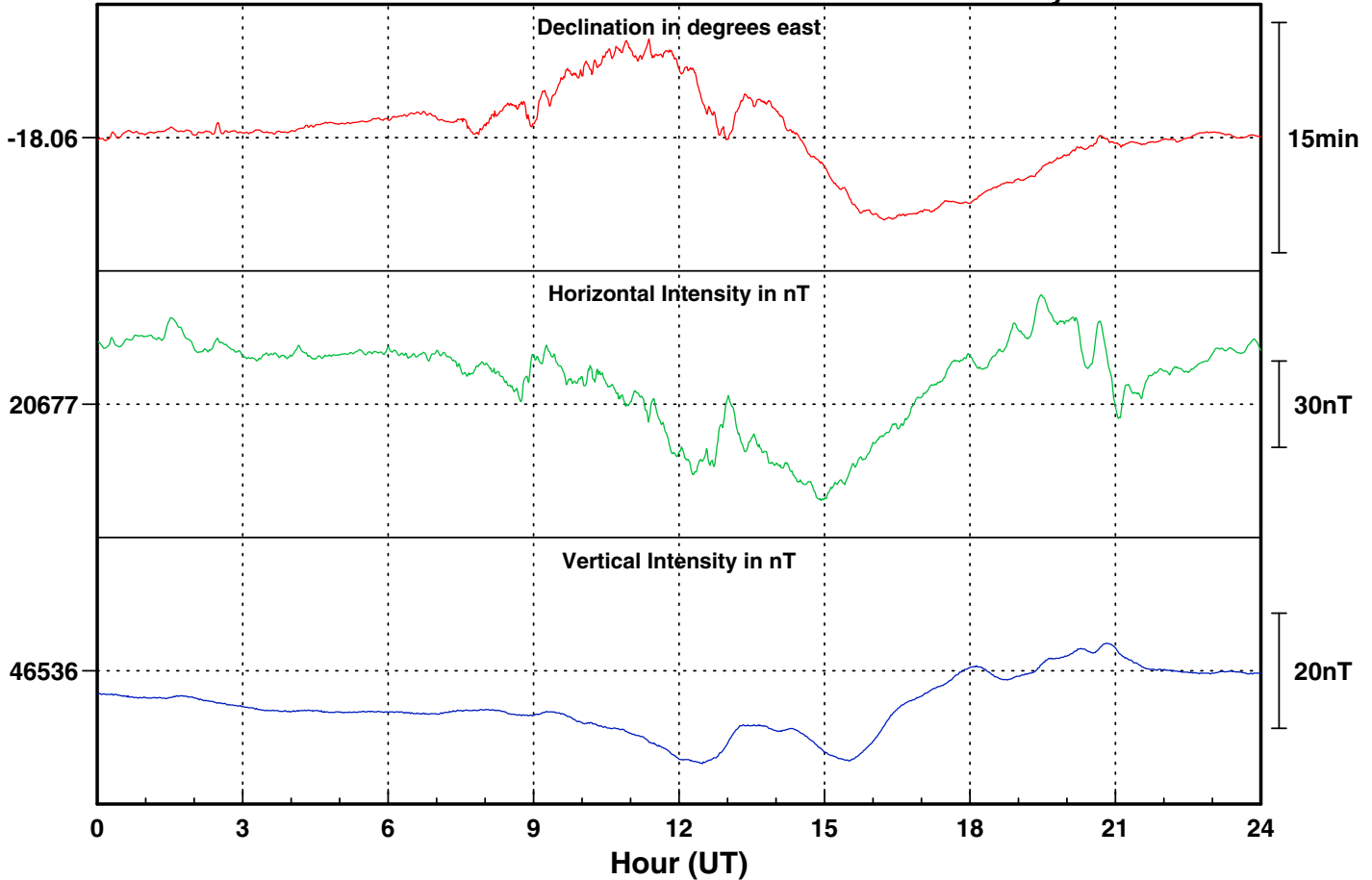
Sable Island

Day number: 133



Date: 14-05-2013

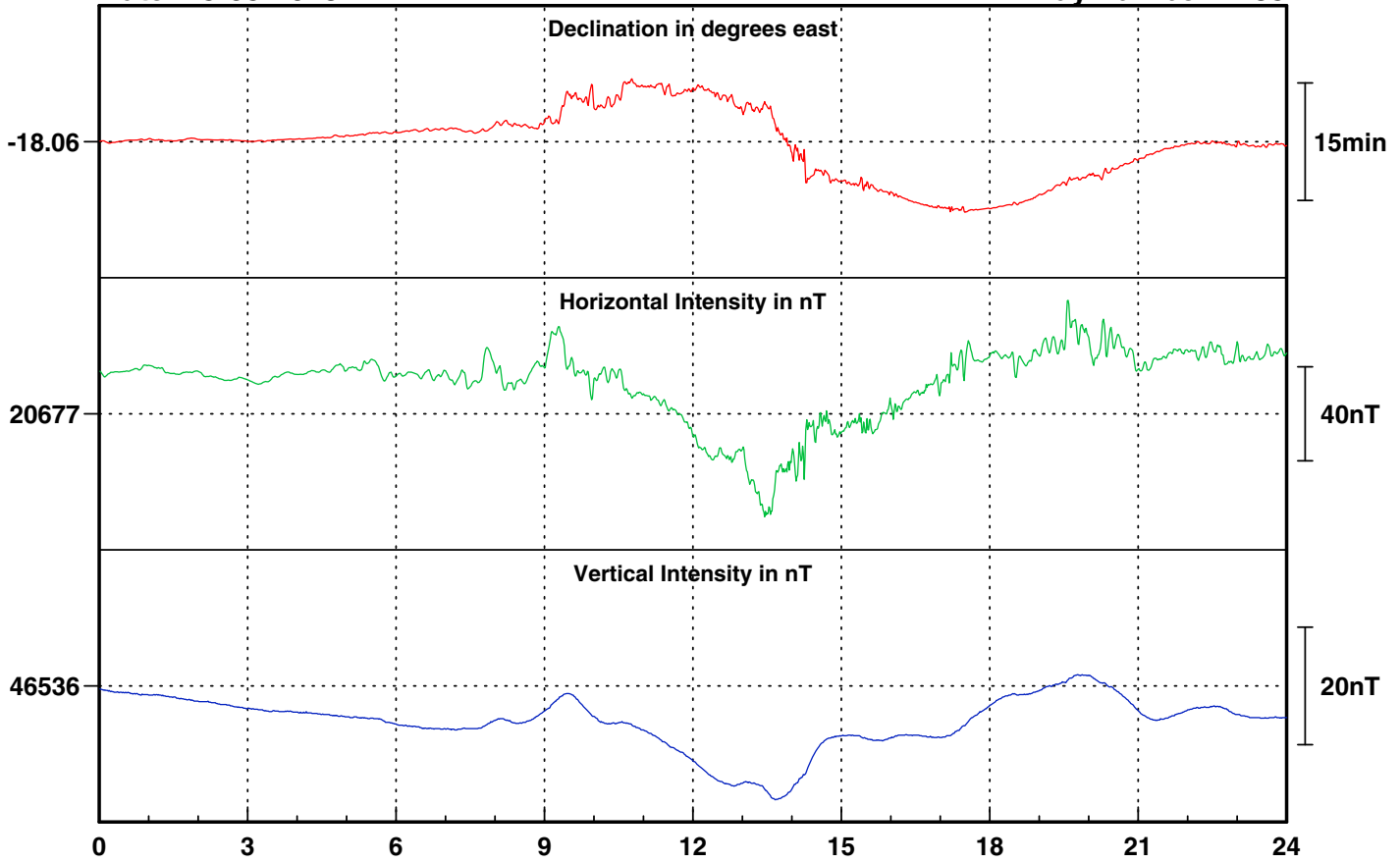
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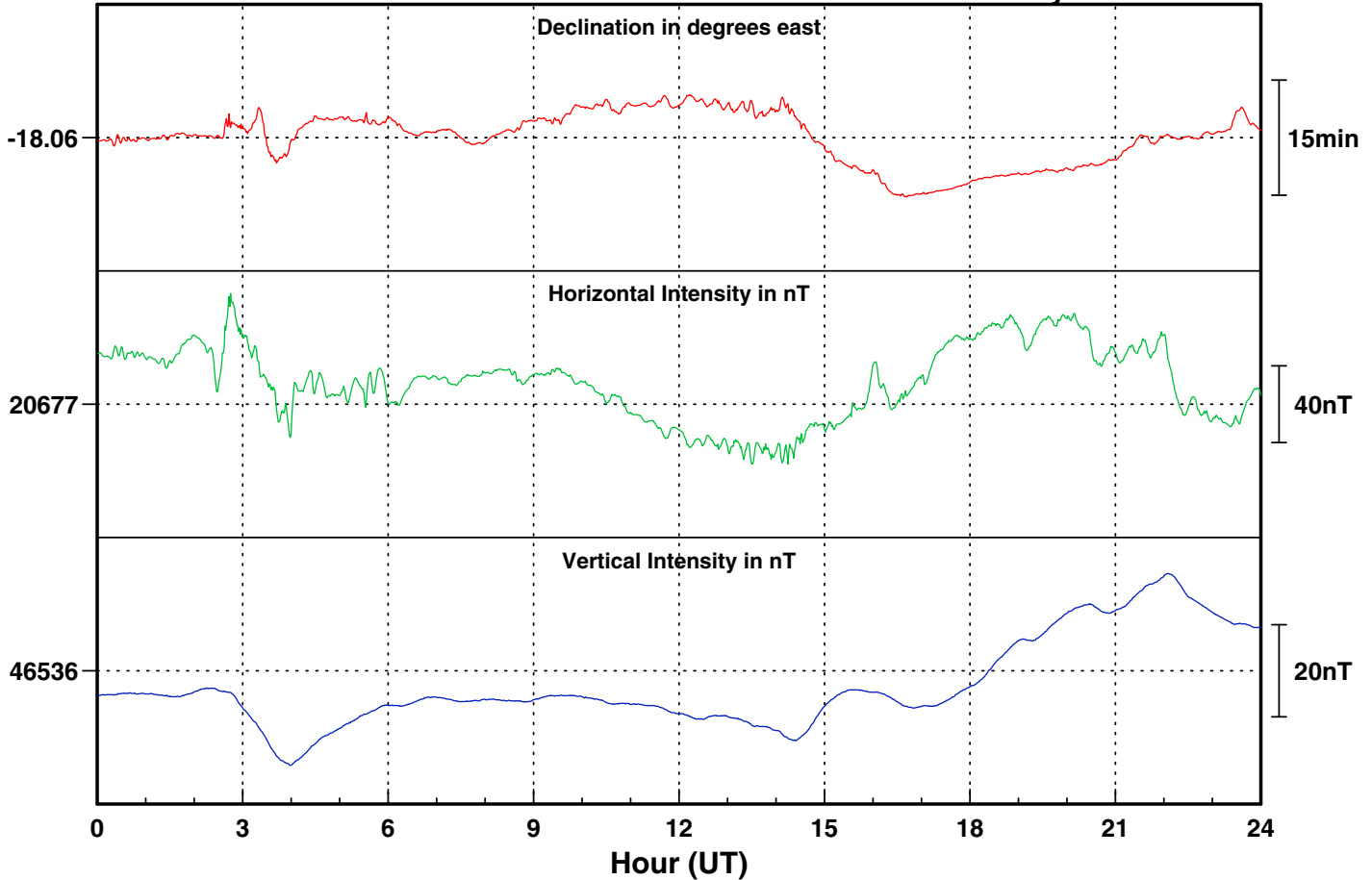
Sable Island

Day number: 135



Date: 16-05-2013

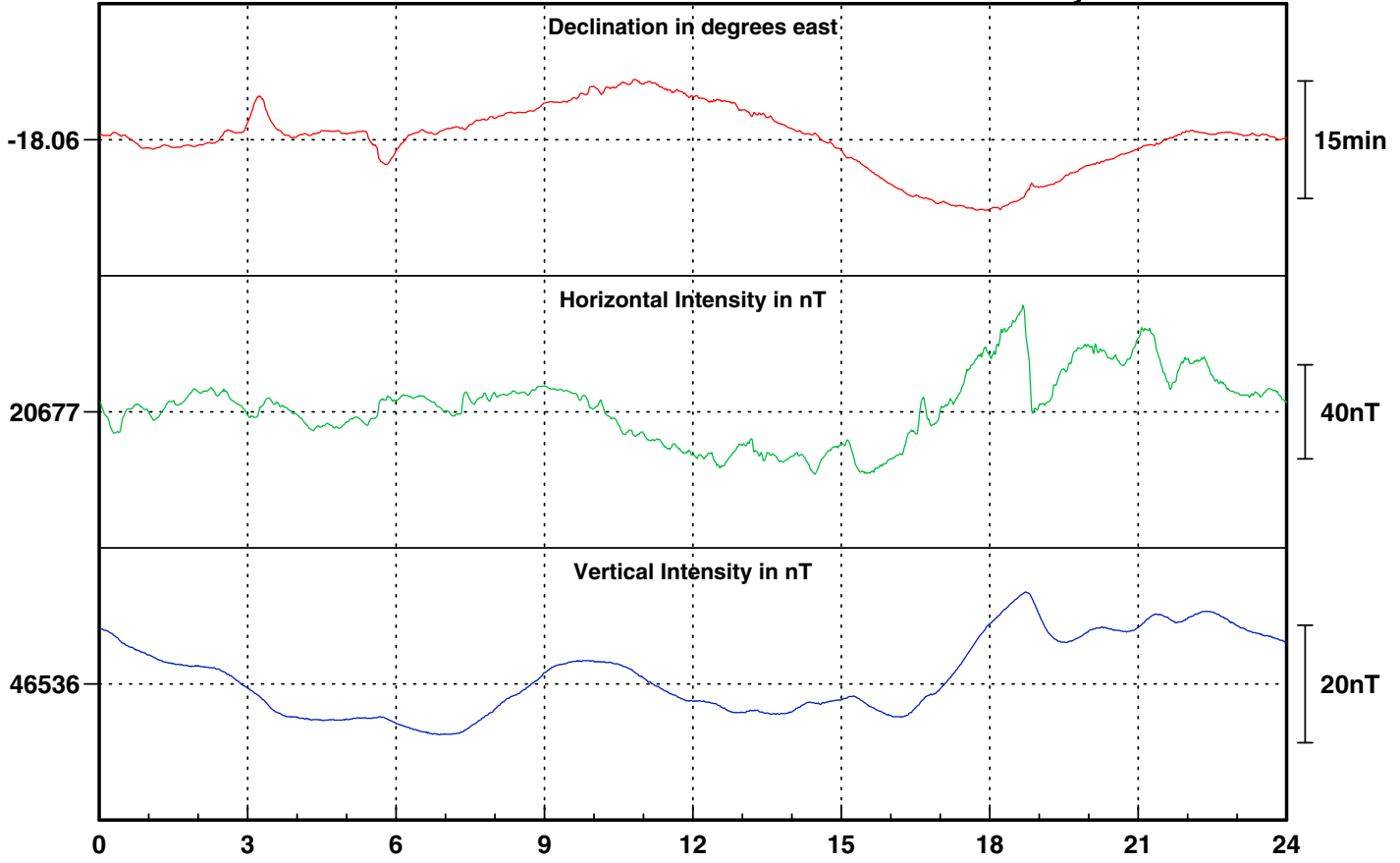
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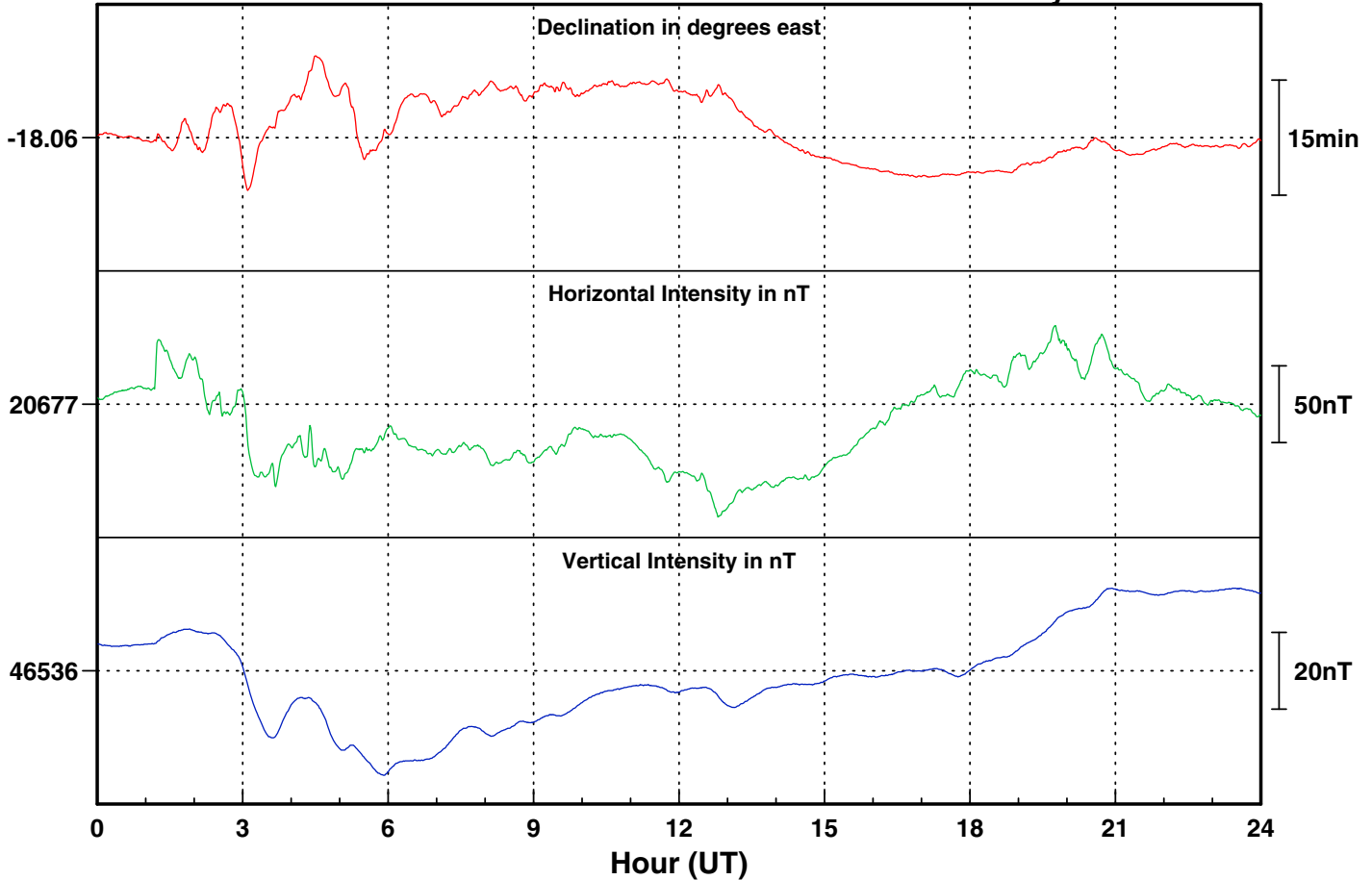
Sable Island

Day number: 137



Date: 18-05-2013

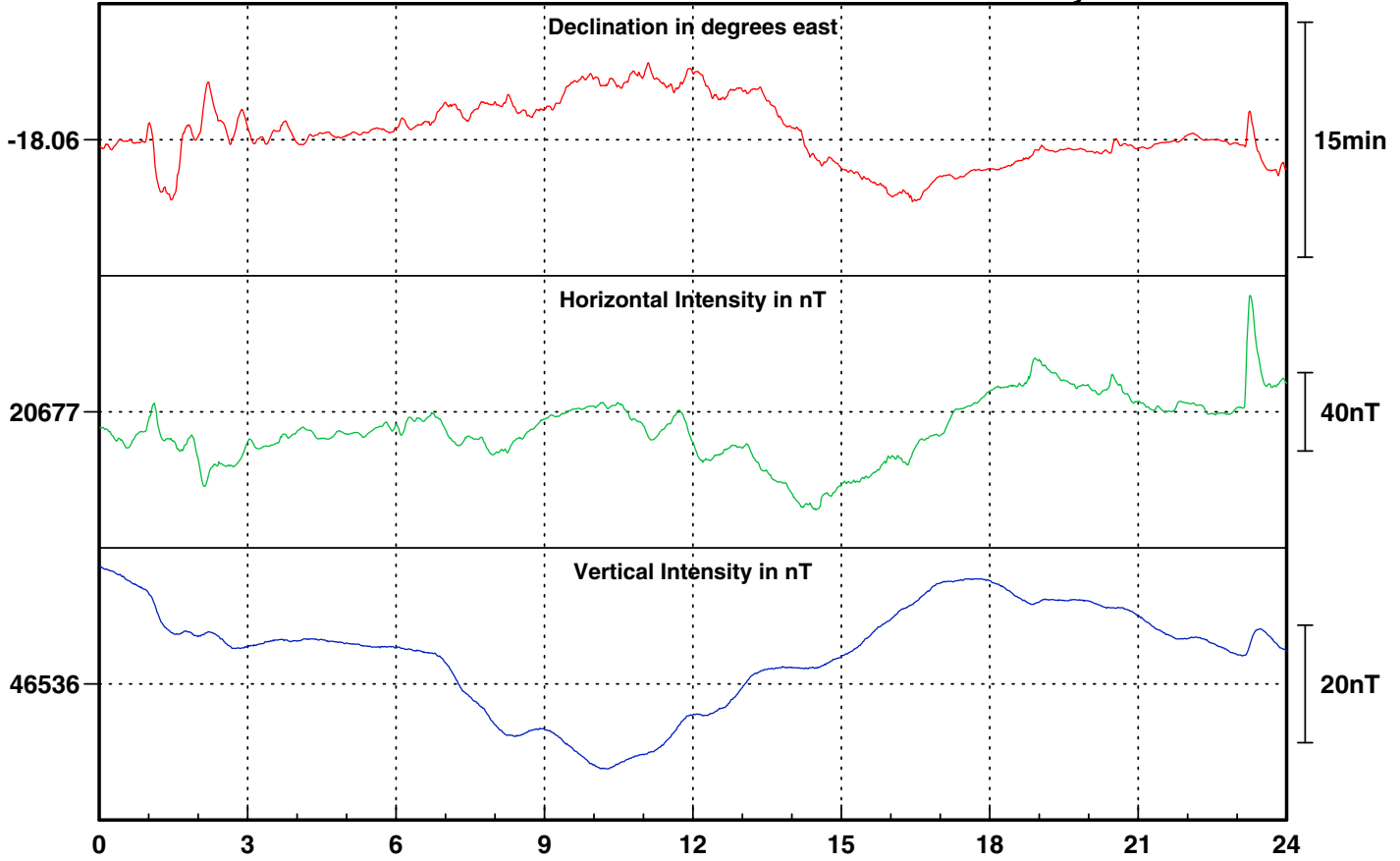
Day number: 138



Date: 19-05-2013

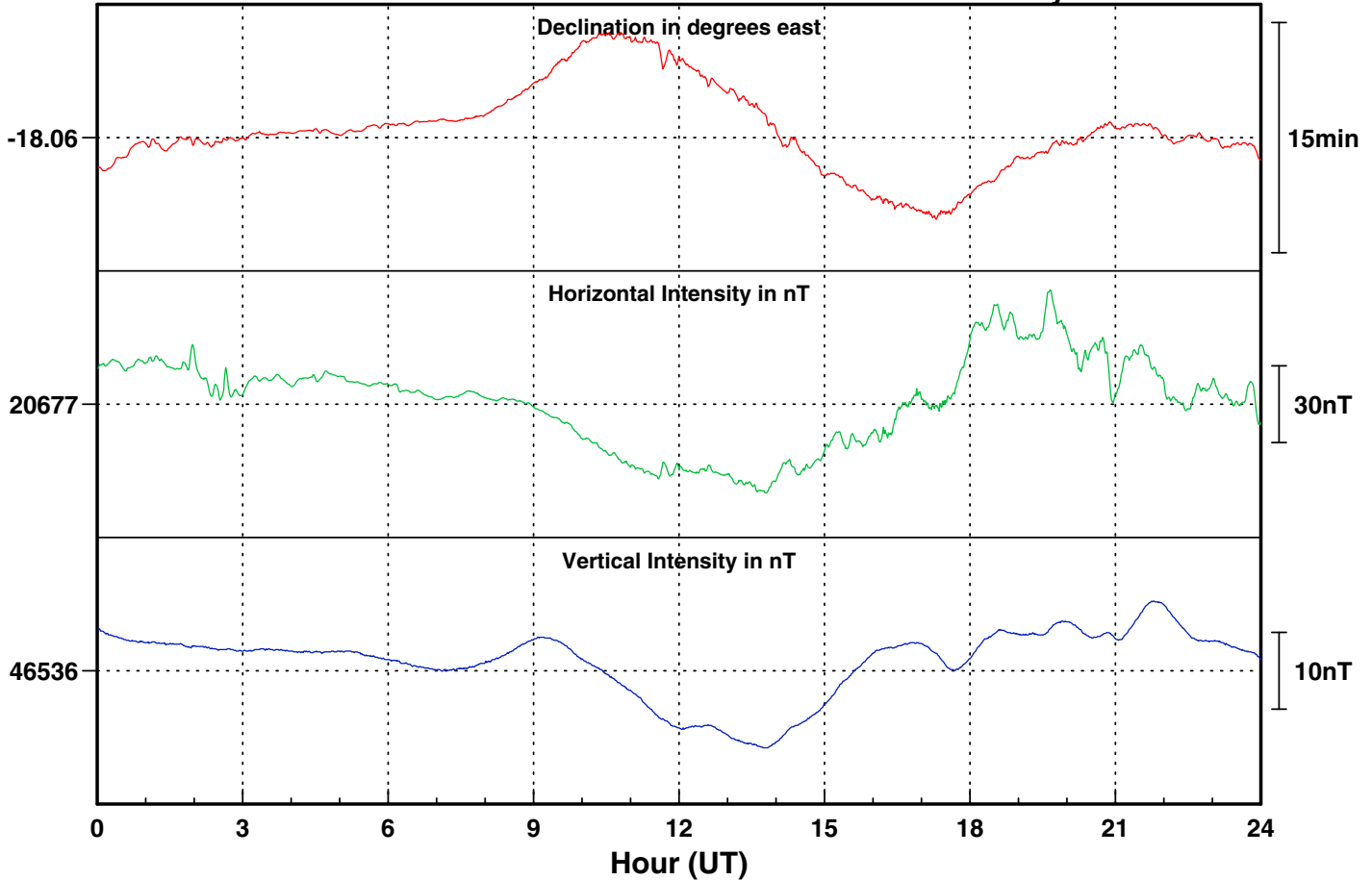
Sable Island

Day number: 139



Date: 20-05-2013

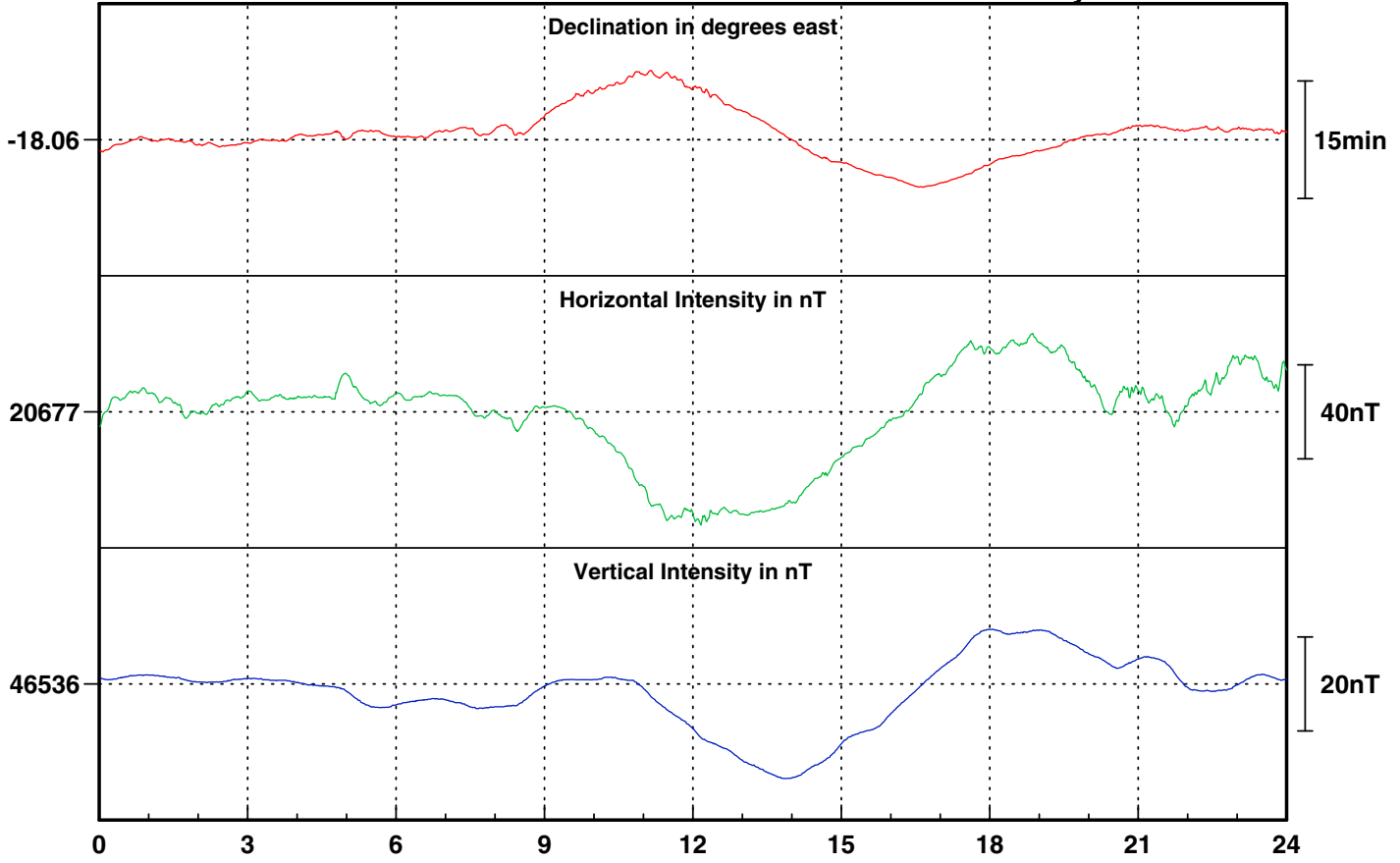
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Date: 21-05-2013

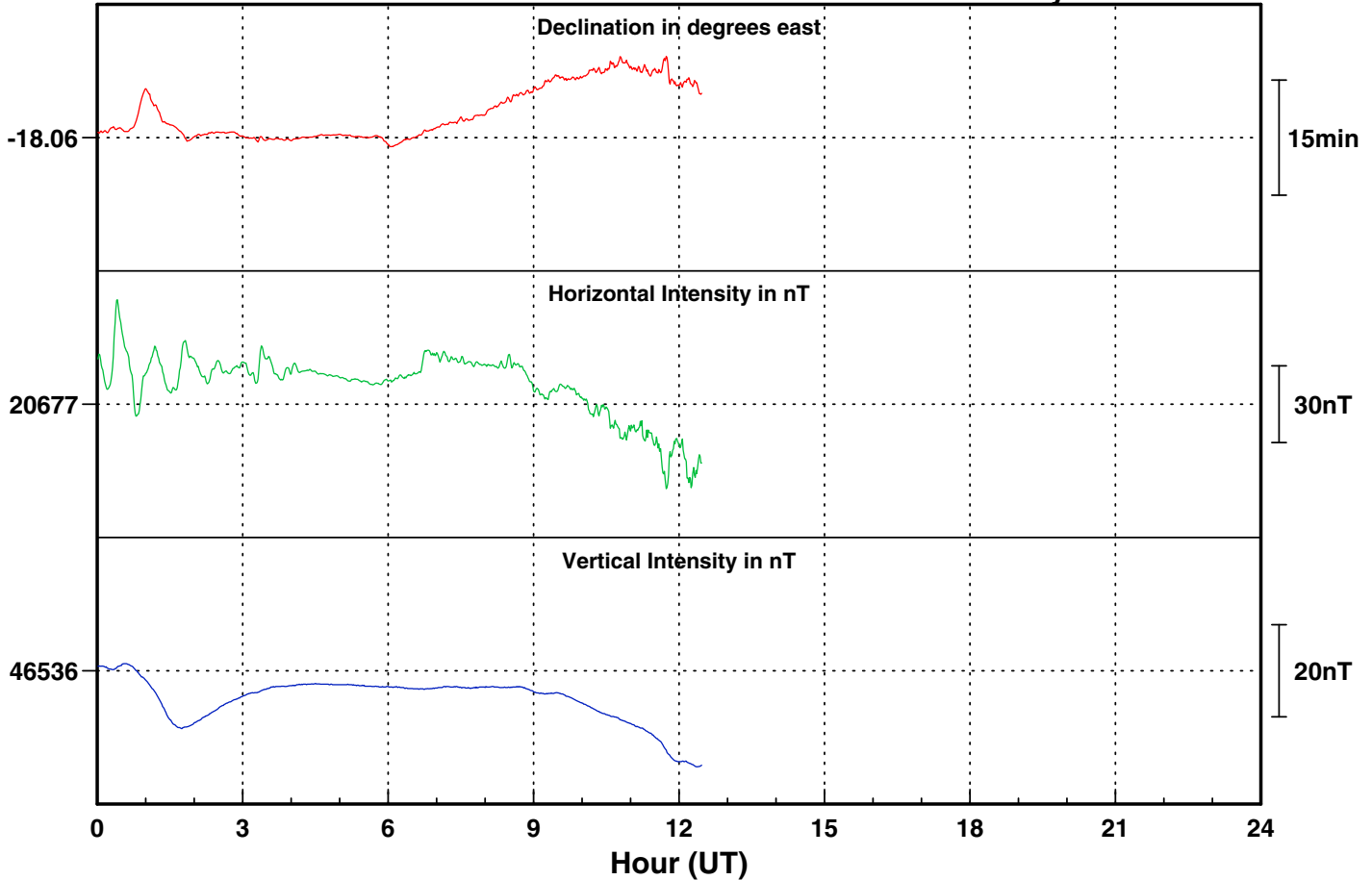
Sable Island

Day number: 141



Date: 22-05-2013

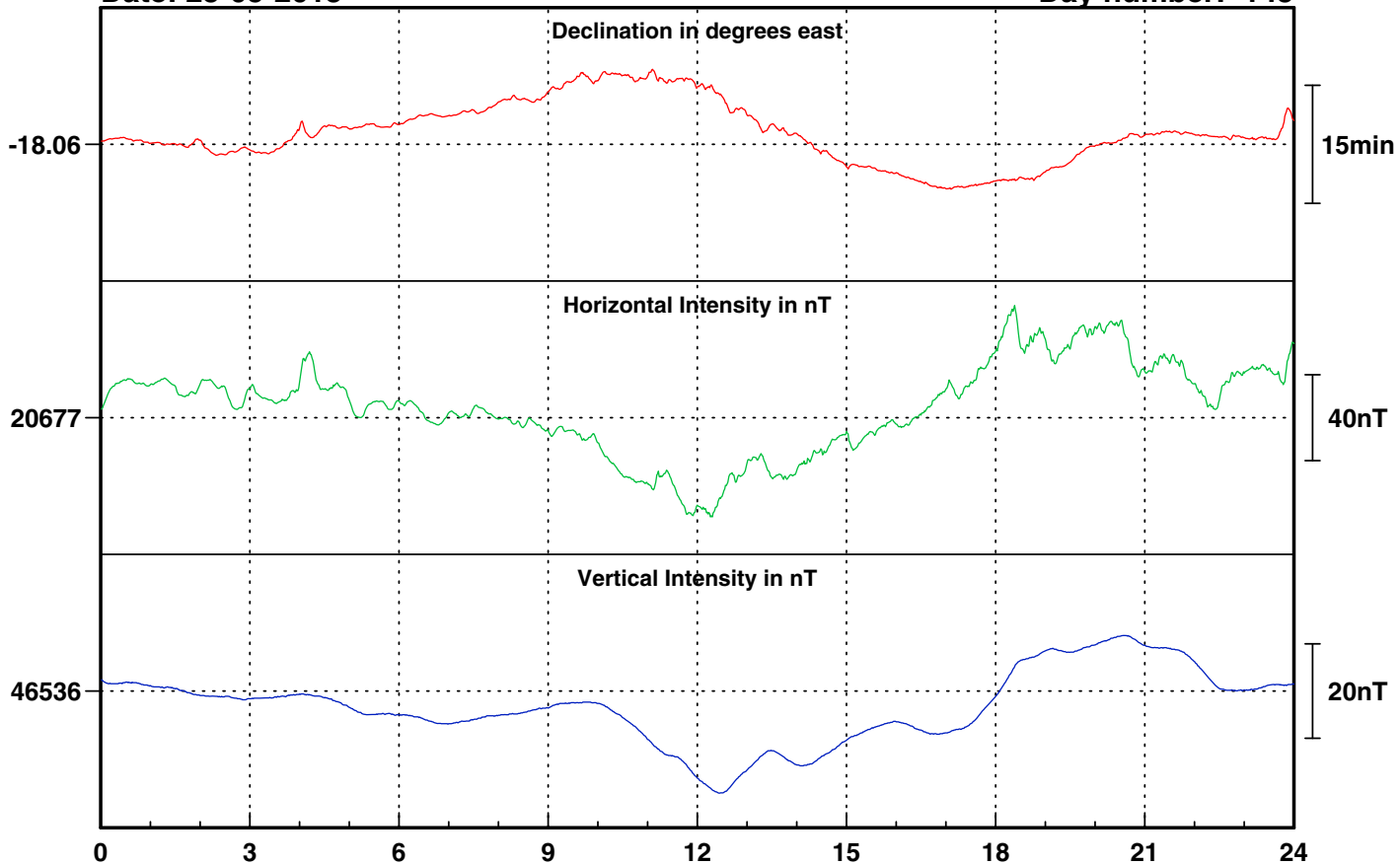
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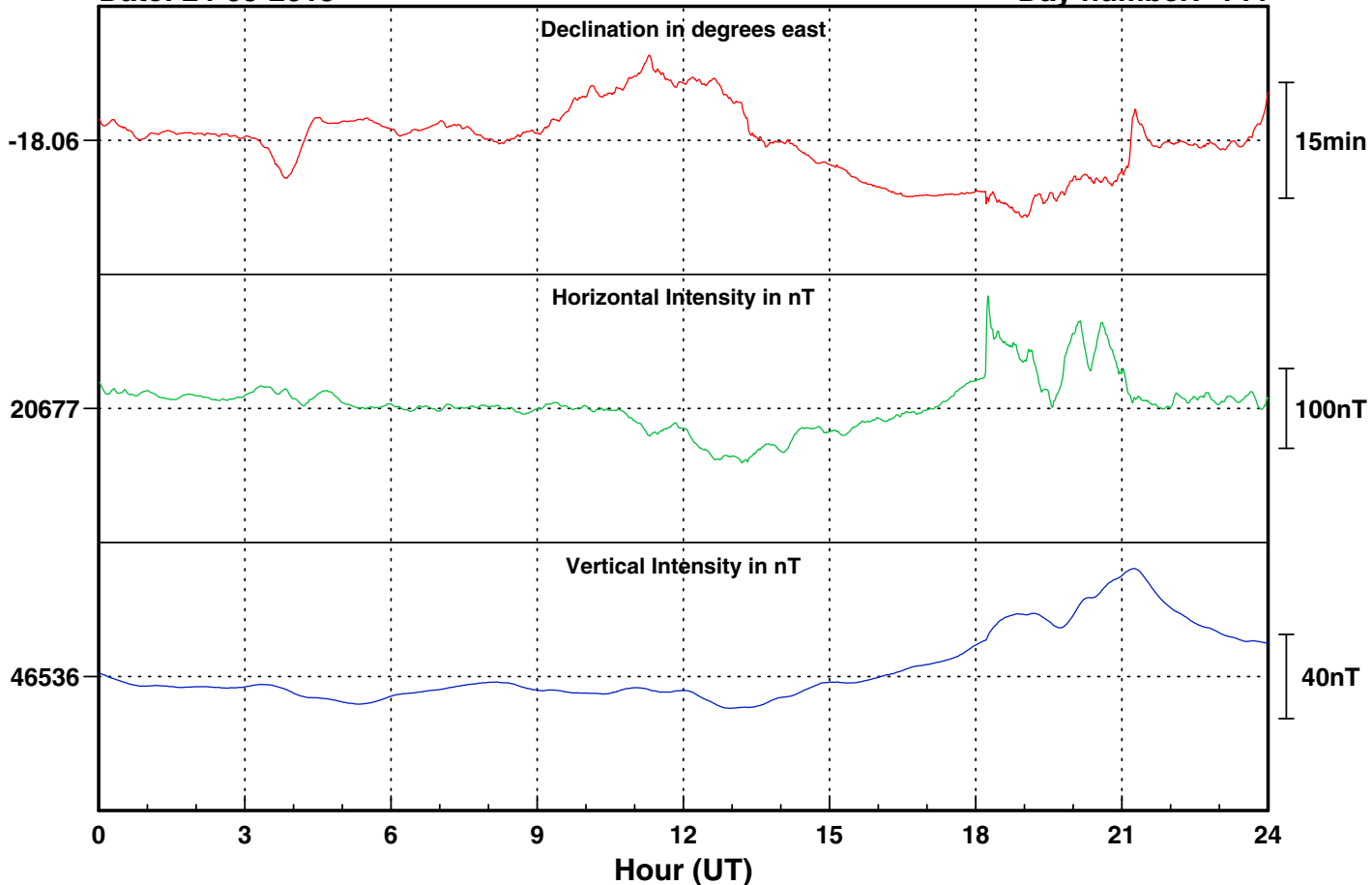
Sable Island

Day number: 143



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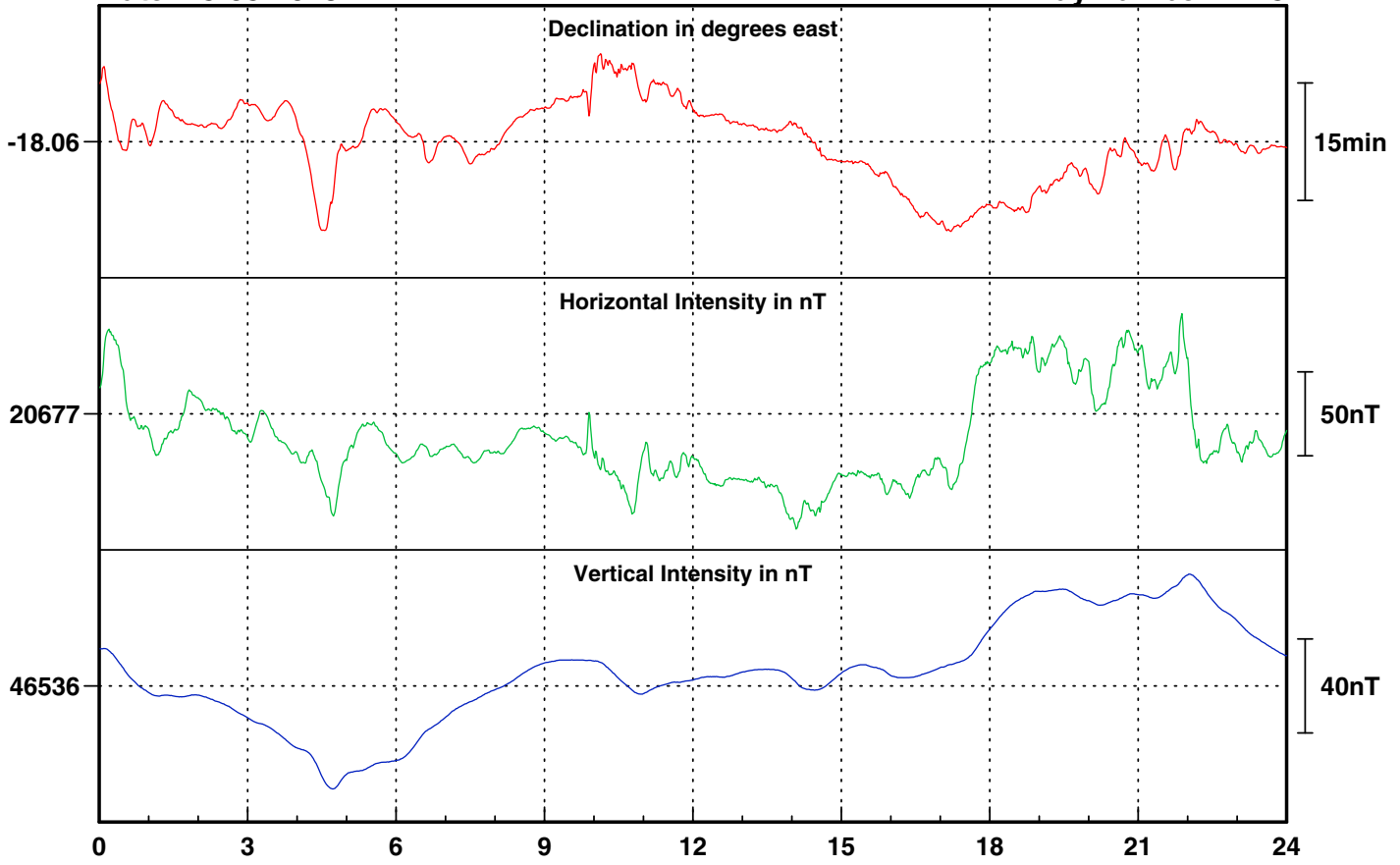
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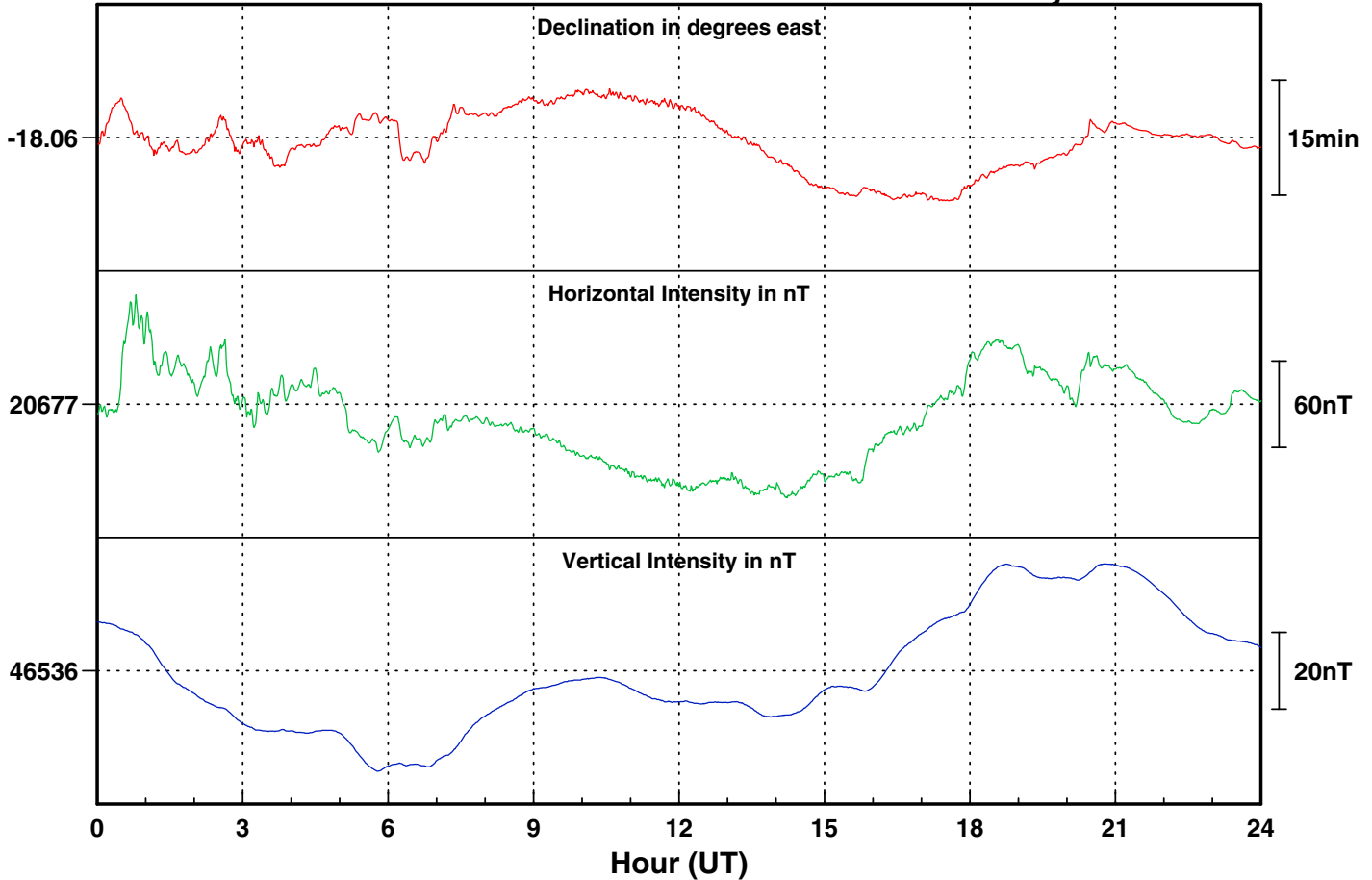
Sable Island

Day number: 145



Date: 26-05-2013

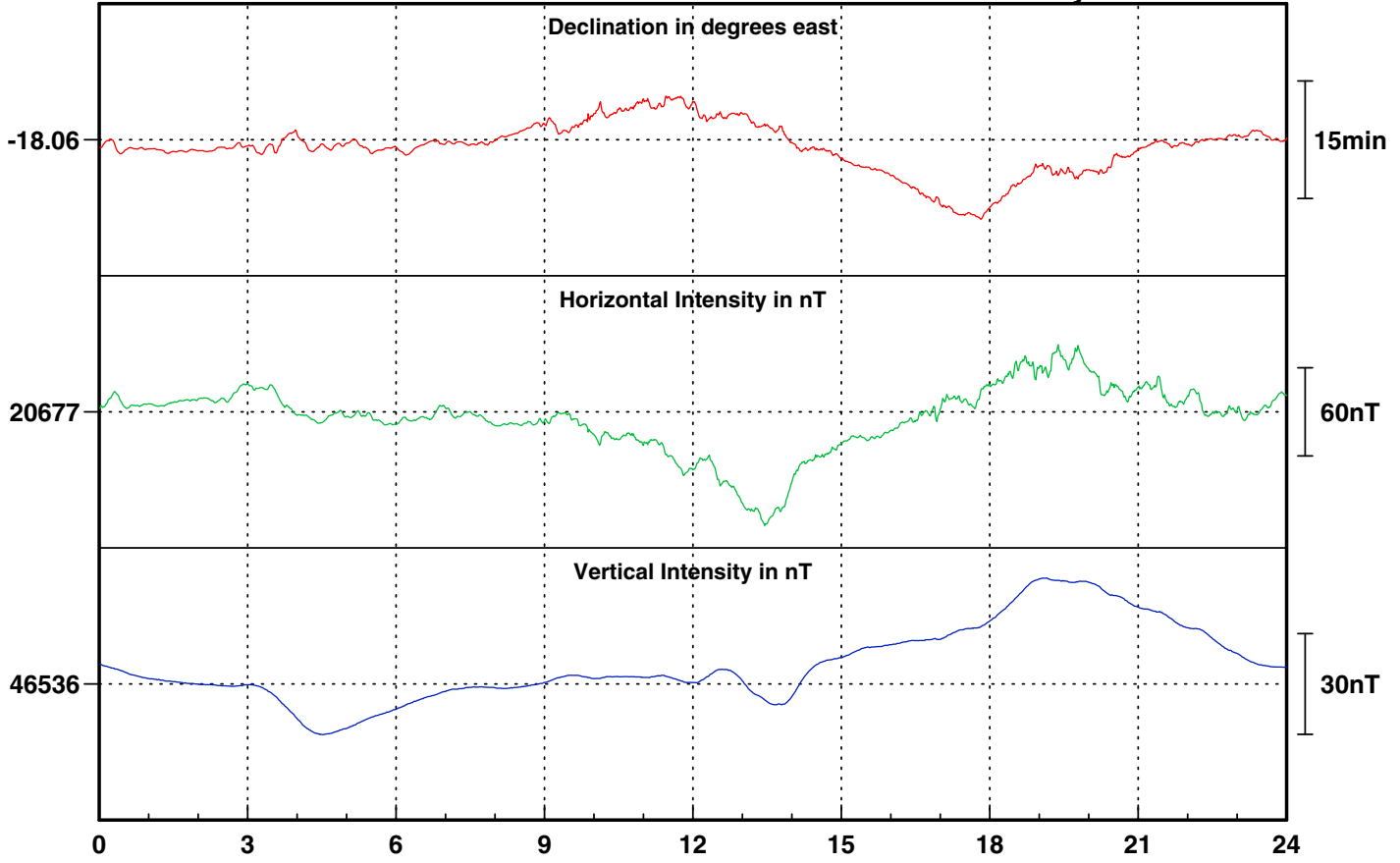
Day number: 146



Date: 27-05-2013

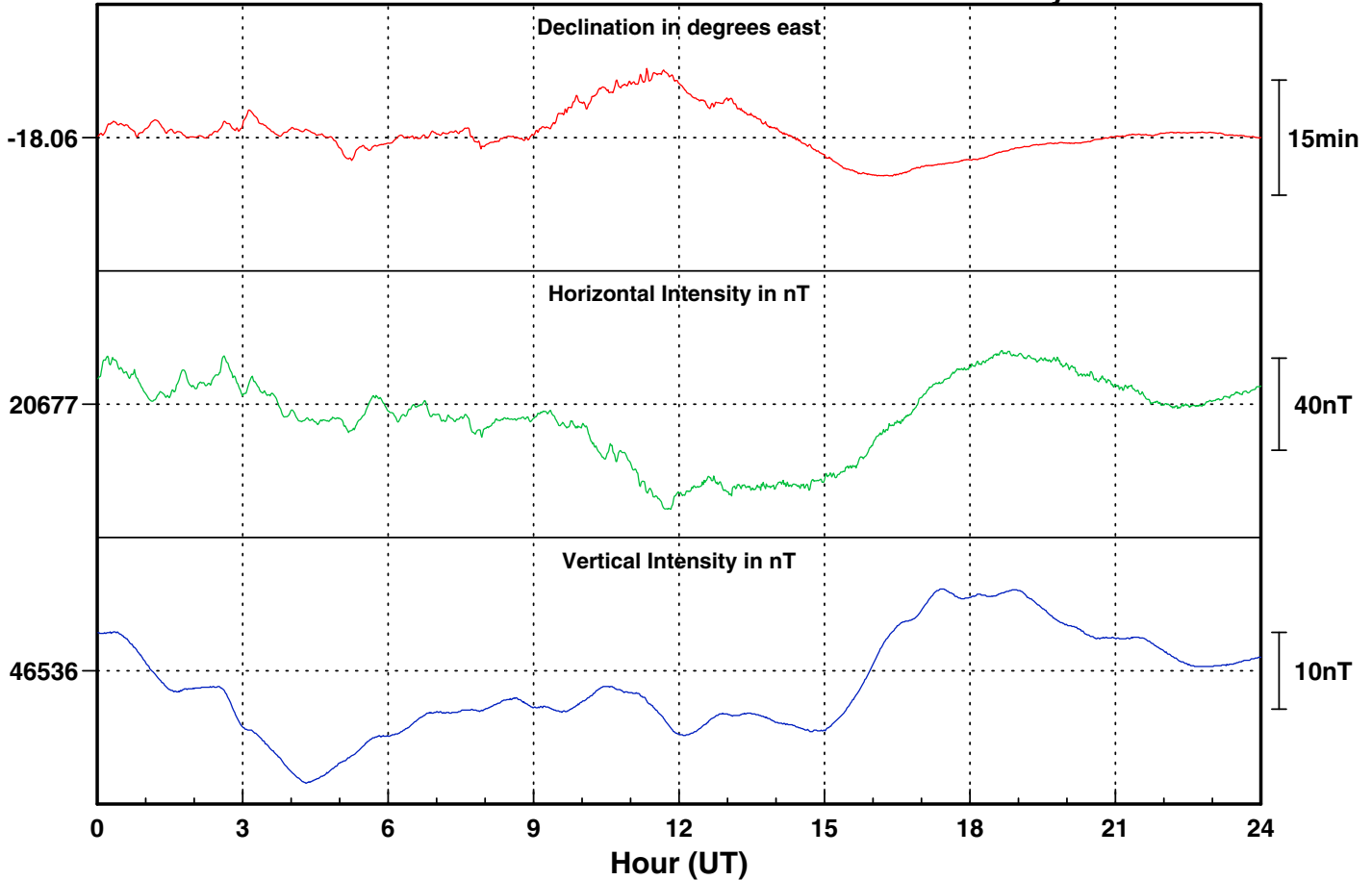
Sable Island

Day number: 147



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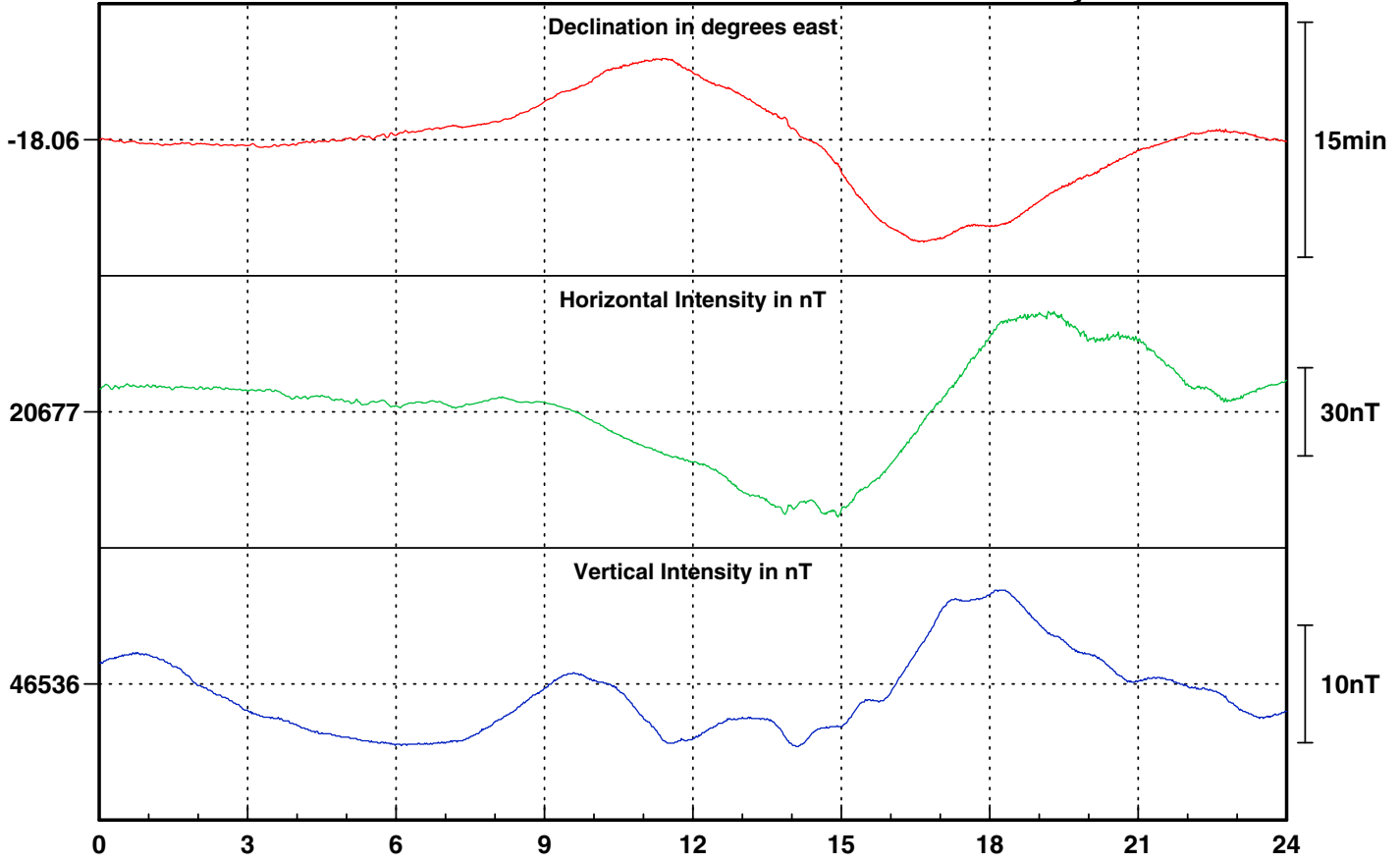
Day number: 148



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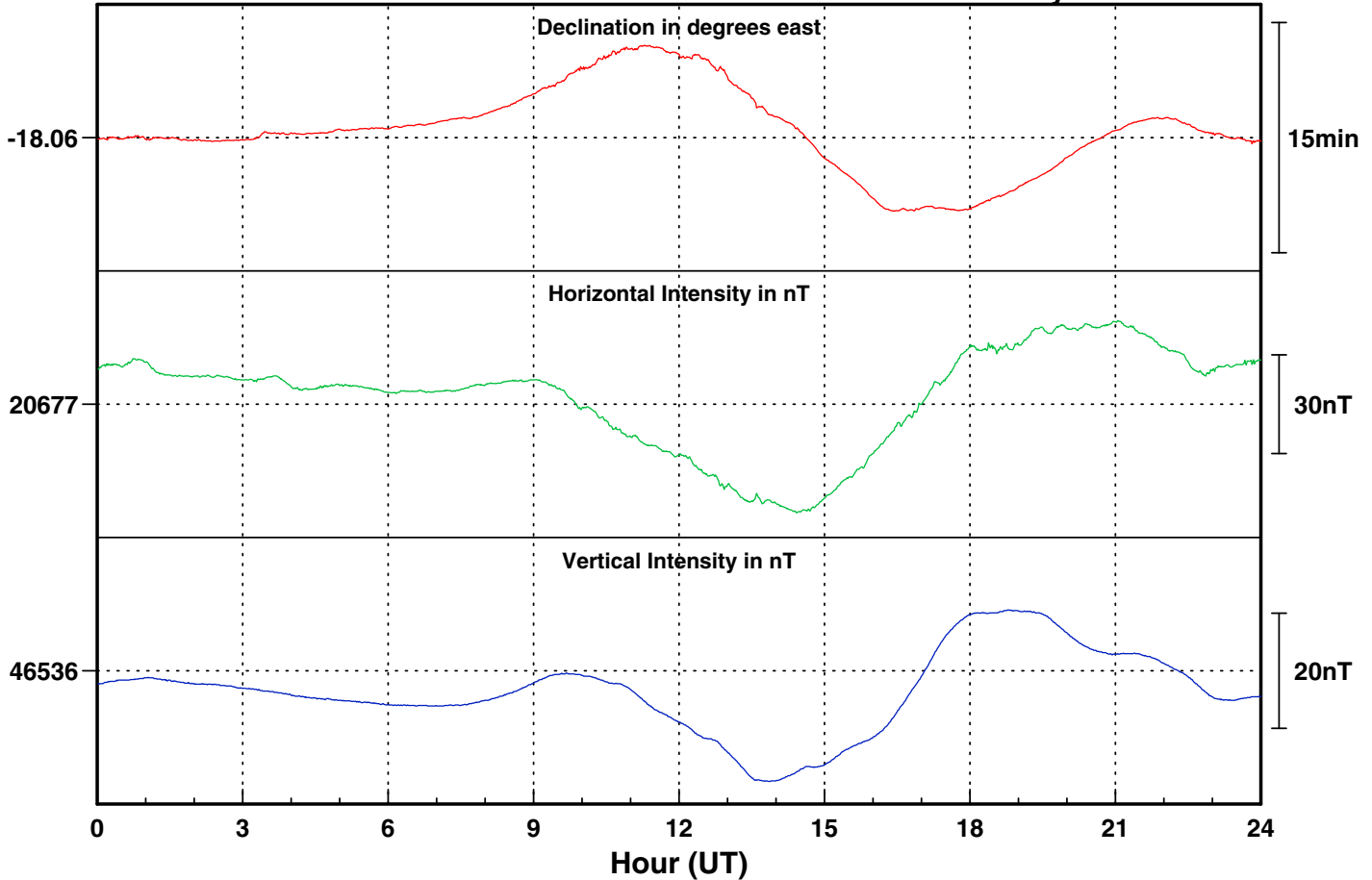
Sable Island

Day number: 149



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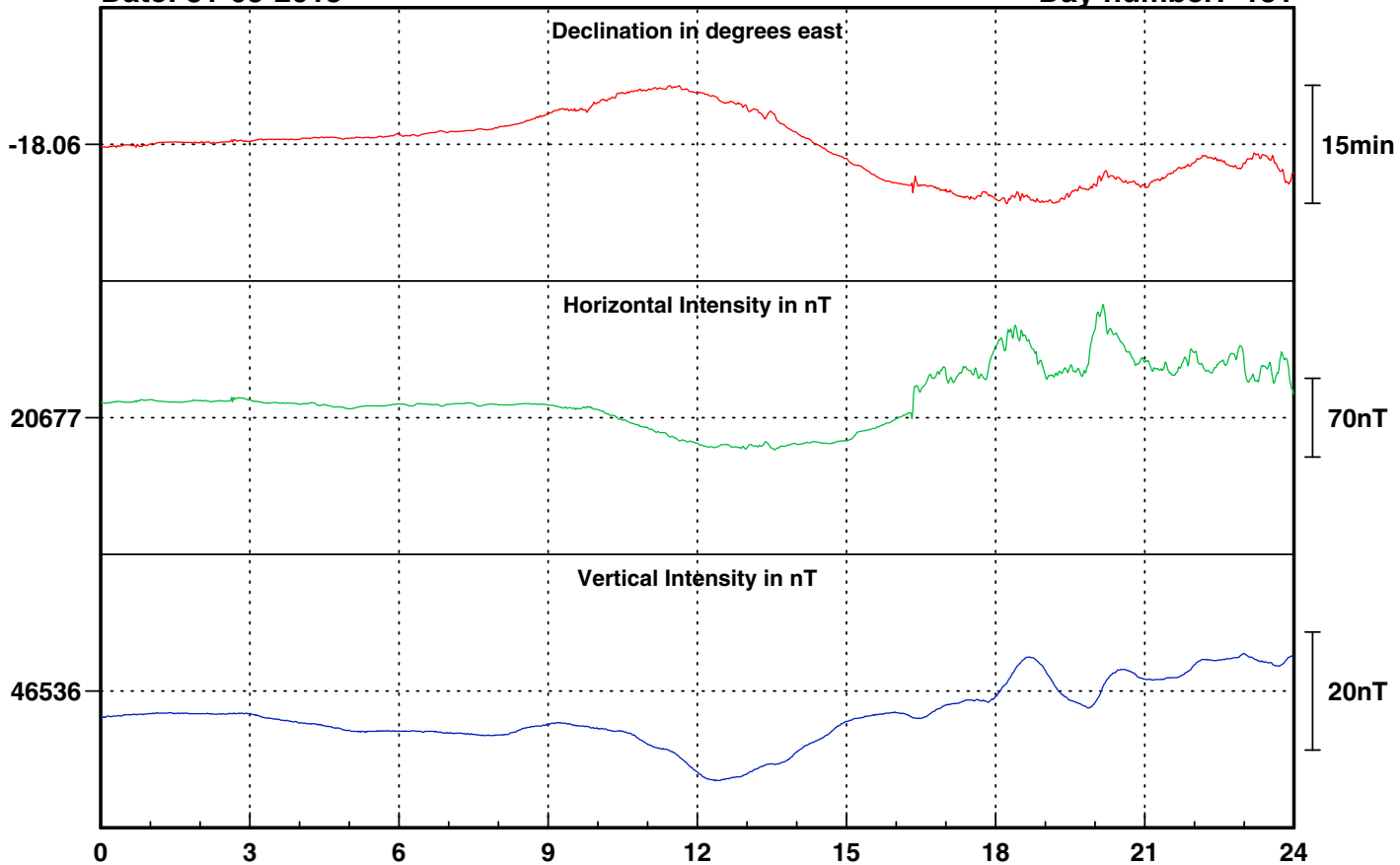
Day number: 150



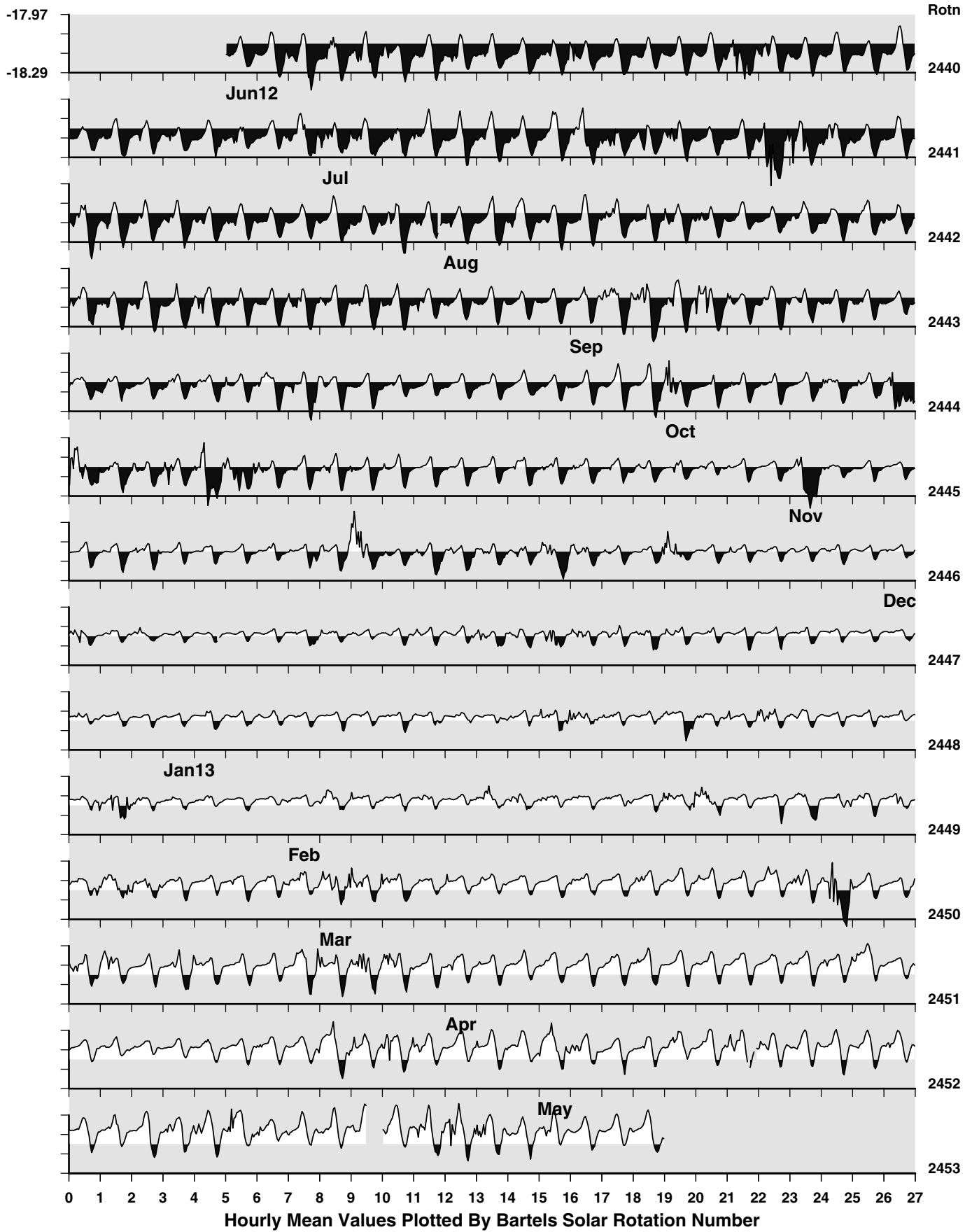
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Sable Island

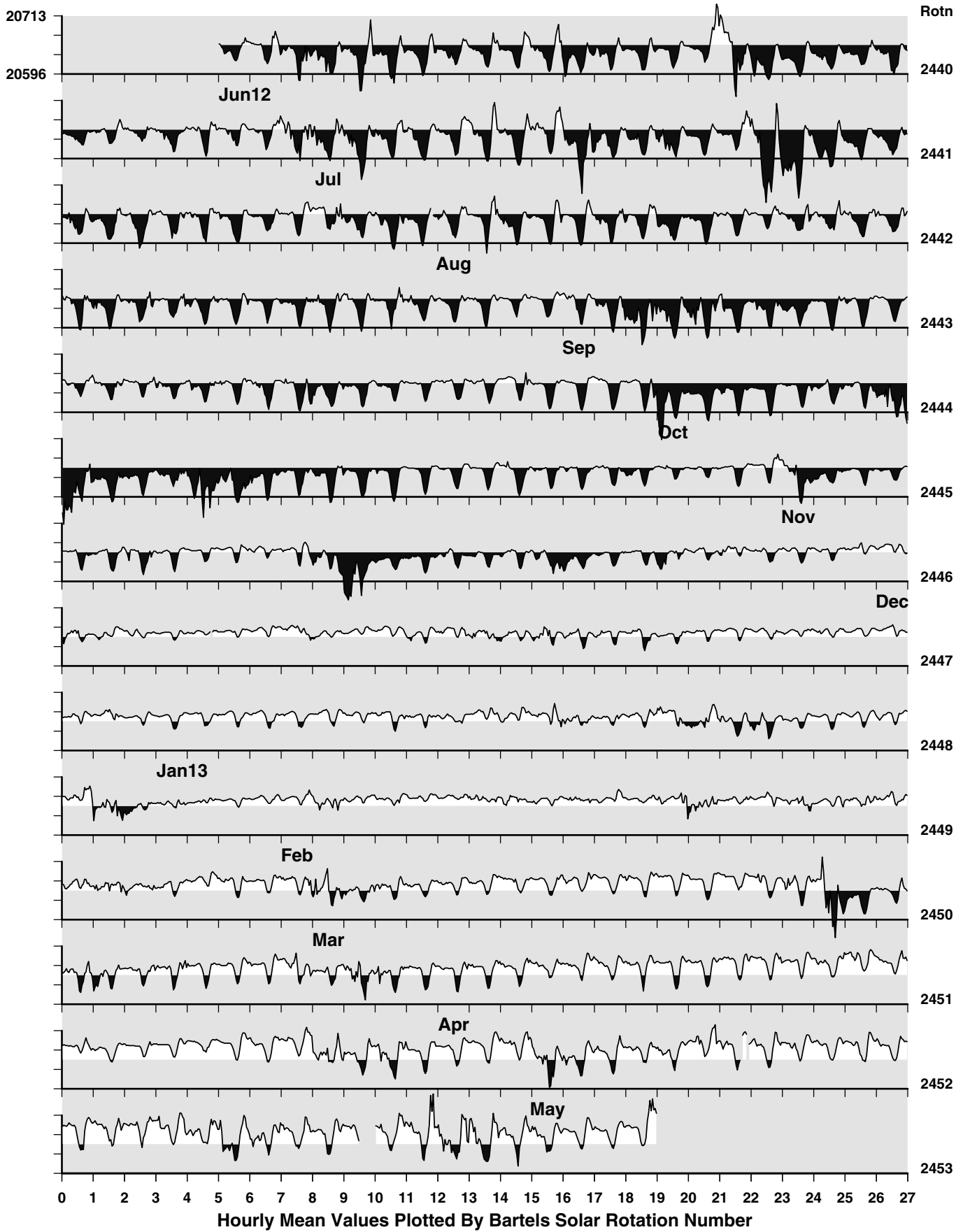
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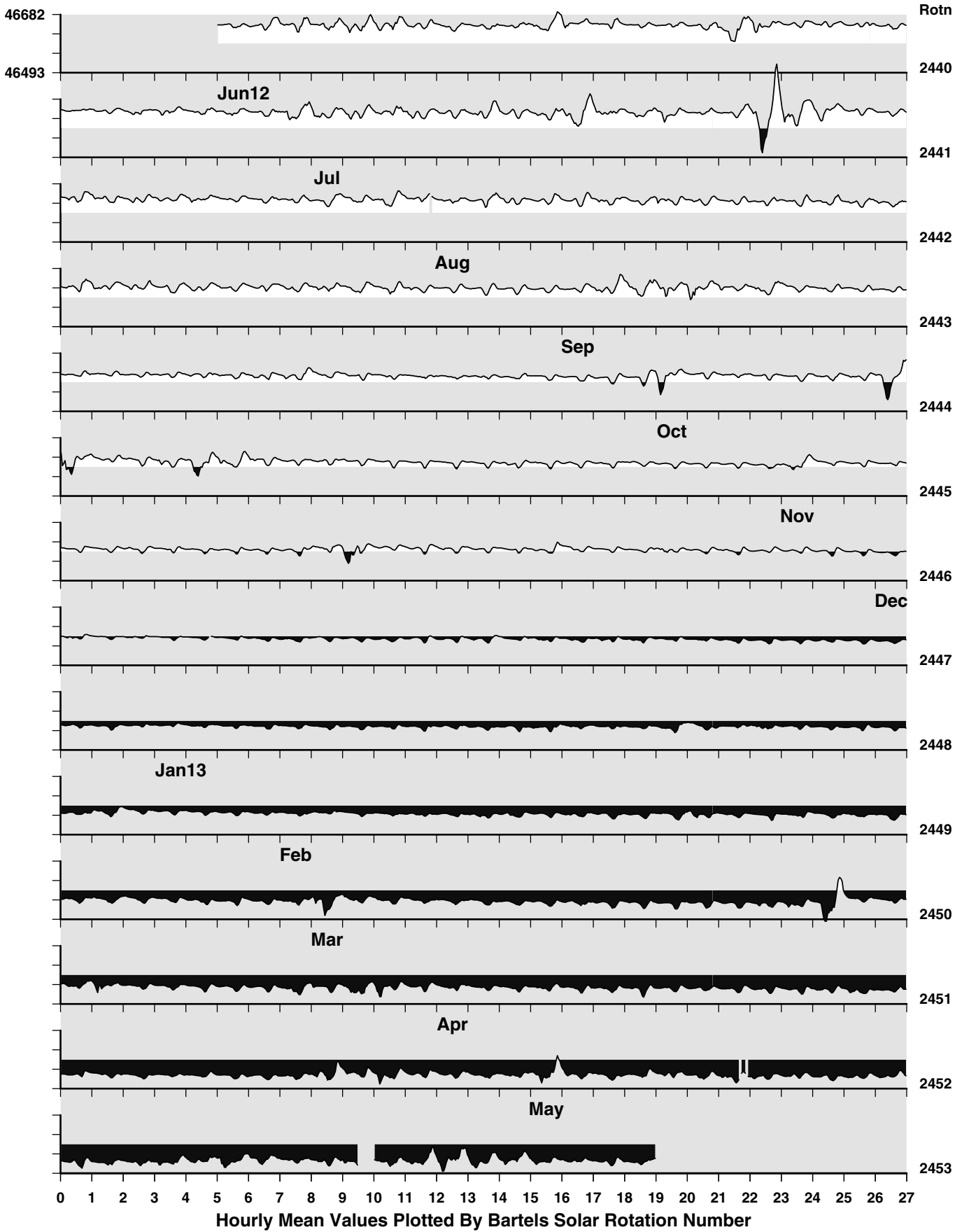
Sable Island Observatory: Declination (degrees)



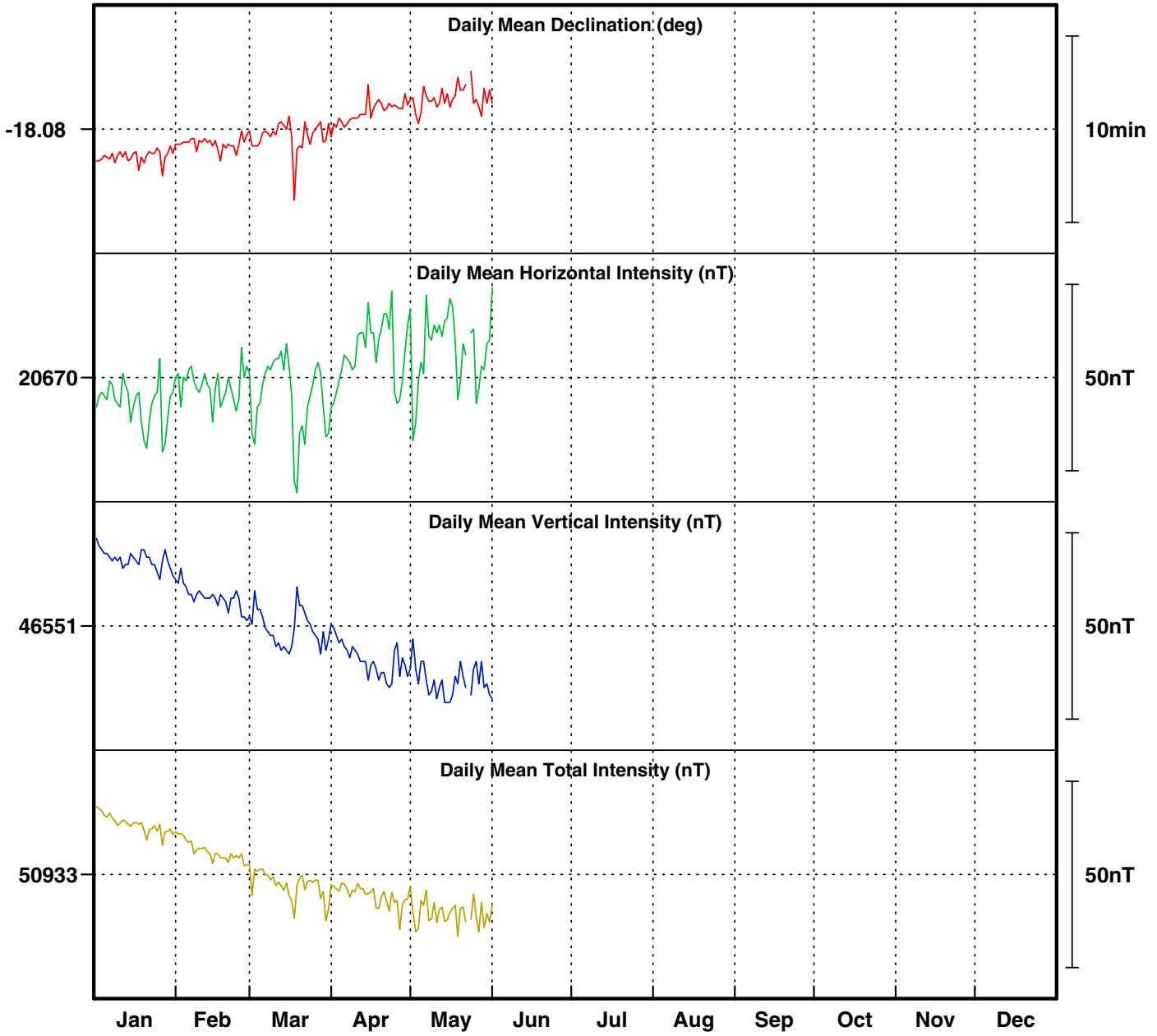
Sable Island Observatory: Horizontal Intensity inT/



Sable Island Observatory: Vertical Intensity (nT)



Sable Island Observatory 2013



Monthly Mean Values for Sable Island Observatory 2013

Month	<i>D</i>	<i>H</i>	<i>I</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>F</i>
January	-18° 6.6′	20663 nT	66° 4.3′	19640 nT	-6423 nT	46568 nT	50947 nT
February	-18° 5.9′	20668 nT	66° 3.8′	19645 nT	-6420 nT	46558 nT	50939 nT
March	-18° 5.5′	20664 nT	66° 3.8′	19643 nT	-6417 nT	46550 nT	50930 nT
April	-18° 4.1′	20677 nT	66° 2.7′	19657 nT	-6413 nT	46541 nT	50928 nT
May	-18° 3.4′	20677 nT	66° 2.6′	19659 nT	-6409 nT	46536 nT	50923 nT

Note

i. The values shown here are provisional.