

RUSSIAN ACADEMY OF SCIENCES
KOLA SCIENCE CENTRE



PGI
GEOPHYSICAL DATA

2015

OCTOBER

NOVEMBER

DECEMBER

POLAR GEOPHYSICAL INSTITUTE
MURMANSK, APATITY, RUSSIA

PGI
GEOPHYSICAL DATA

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This bulletin presents the preliminary ground-based optical, geomagnetic and cosmic ray data obtained by Polar Geophysical Institute in the fourth quarter of 2015. All-sky camera observations are published only for the quarters when observations were carried out. All data are available by request.

CONTENTS:

Data description	2
Geomagnetic K-indices	6
Cosmic ray data	9
All-sky camera observations	
Magnetogram plots	

DATA DESCRIPTION

Magnetic data

The magnetograms (H, D, and Z) are plotted as magnetic variations recorded in Loparskaya and Lovozero stations by the three component Bobrov type magnetometer with a sampling frequency of 10 samples per seconds. The instrument has a range ± 2620 nT and a resolution of 5 pT. Magnetic observations are gathered every second and registered in the digital form as the 10-sec averaged data. Digits in the plots at the left hand side denote the scale of the records in nT/div. Timing is provided by the GPS.

Magnetic quiet values for H, D and Z components are shown by dotted line as a daily averaged magnetic activity level for three magnetically quiet days of each month. Quiet days are brand by the symbol Q in tables of geomagnetic K-indices.

Geomagnetic K-indices

The hourly K-indices indicate the level of geomagnetic field disturbance. The maximum deflection of two components H and D from the magnetic quiet value during one hour interval have been recalculated to the value of the local hourly K-index. The following scale has been used:

K-indices	Deflection in nT
0	0-15
1	15-30
2	30-60
3	60-120
4	120-210
5	210-360
6	360-600
7	600-990
8	990-1500
9	1500 and more

Cosmic ray data

The 18-NM-64-neutron monitor has been operating in Apatity since 1969. A plot of pressure corrected hourly data (count accumulated during one hour interval) is presented in units of percent with respect to the monthly mean intensity. Mean values are:

October	390 459
November	392 319
December	391 856

The hourly data are sent to WDC-B2 (Moscow) and WDC-C (Japan).

Please visit <http://pgia.ru/lang/en/data/>

All-sky camera observations

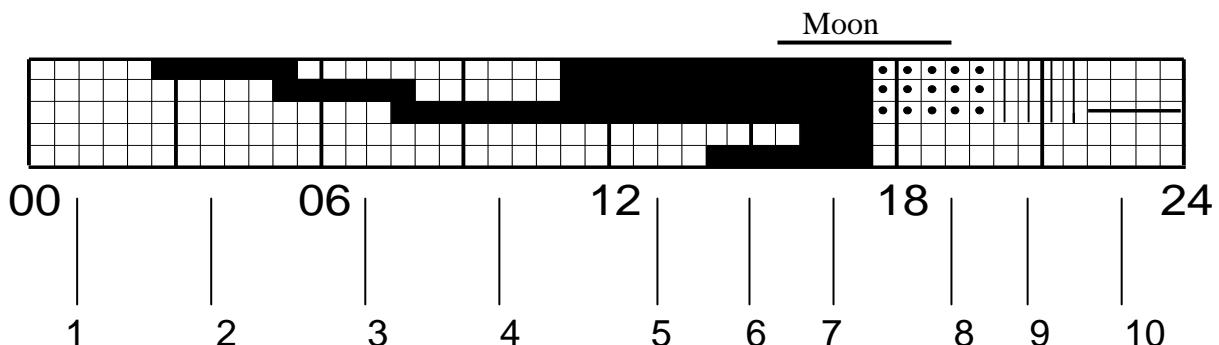
Calendar

Calendar shows the intervals of digital all-sky camera observations in Apatity and Lovozero, which are available during dark periods from 14:00 UT through midnight to 05:00 UT.

Ascaplots

All-sky camera observations are presented in this bulletin in the form of the standard five lines ascaplot. A detailed description of askaplots interpretation was published in: Annals of International Geophysical Year. V. XX. Part 1. P. 1-5. 1962.

Example of an ascaplot and the legend are given below. Top three lines give information on the existence of aurorae in north, zenith and south ranges of the sky, respectively. The fourth and fifth lines in the standard five lines ascaplot give the zenith range auroral intensity. We do not use all-sky camera observations to form a correct estimate of the auroral intensity.



- 1- no aurora
- 2- aurora present in north range
- 3- weak aurora present in zenith range
- 4- aurora present in south range
- 5- aurorae present in north, zenith and south ranges
- 6- medium aurora in zenith, aurorae present in north and south ranges
- 7- strong aurora in zenith, aurorae present in north and south ranges
- 8- partial cloudiness
- 9- total cloudiness
- 10- no operation

Keograms

Black white keograms show the auroral display along the geomagnetic meridian of station. Here we present a few selected auroral events observed at Apatity and Lovozero in night-time interval from 17:00 UT to 01:00 UT. Zenith angles are given along the vertical axis. Magnetic north is at the top of the figure.

Coordinates of stations

Stations	Code	Geographic		Corr. Geomagnetic	
		Lat	Long	Lat	Long
Loparskaya	LOP	68.63° N	33.25° E	64.94° N	113.6° E
Lovozero	LOZ	67.97° N	35.02° E	64.17° N	115.3° E
Apatity	APT	67.58° N	33.31° E	63.86° N	113.6° E

Please visit <http://pgia.ru/lang/en/data/>

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GEOMAGNETIC K-INDICES, LOVOZERO
 October, 2015
 Lower limit of K=9 is 1500 nT

Day	Time, UT								
	03	06	09	12	15	18	21	24	
1	101	111	101	122	224	544	445	465	
2	221	121	112	332	334	433	255	453	
3	432	111	101	122	224	534	332	310	
4	565	544	443	223	244	323	215	677	
5	642	112	323	343	344	112	543	444	
6	442	111	111	122	343	444	447	755	
7	455	345	433	443	455	456	767	775	
8	433	434	434	334	555	455	645	765	
9	443	333	231	225	544	445	566	775	
10	443	121	121	112	102	333	123	366	
11	544	311	100	011	222	331	455	355	
12	000	100	012	234	332	245	425	664	
13	431	133	233	211	002	454	426	677	
14	654	433	222	244	431	323	553	112	
15	321	111	111	123	101	222	344	554	
16	432	210	010	011	111	111	000	000	
17	132	111	111	011	224	433	441	101	
18	254	111	112	353	334	434	323	541	
19	000	000	001	111	110	000	020	122	Q
20	110	001	011	111	212	333	422	542	
21	100	011	101	131	321	223	223	432	
22	200	010	112	110	011	222	332	224	
23	311	000	001	111	112	223	212	335	
24	532	112	111	111	000	100	142	354	
25	221	11-	---	--1	111	100	000	000	
26	000	000	101	110	000	000	001	000	Q
27	000	000	010	0--1	010	000	001	320	
28	000	000	001	111	000	000	000	000	Q
29	000	000	000	011	111	101	111	125	
30	420	010	000	012	223	454	310	343	
31	000	000	000	011	111	233	104	553	

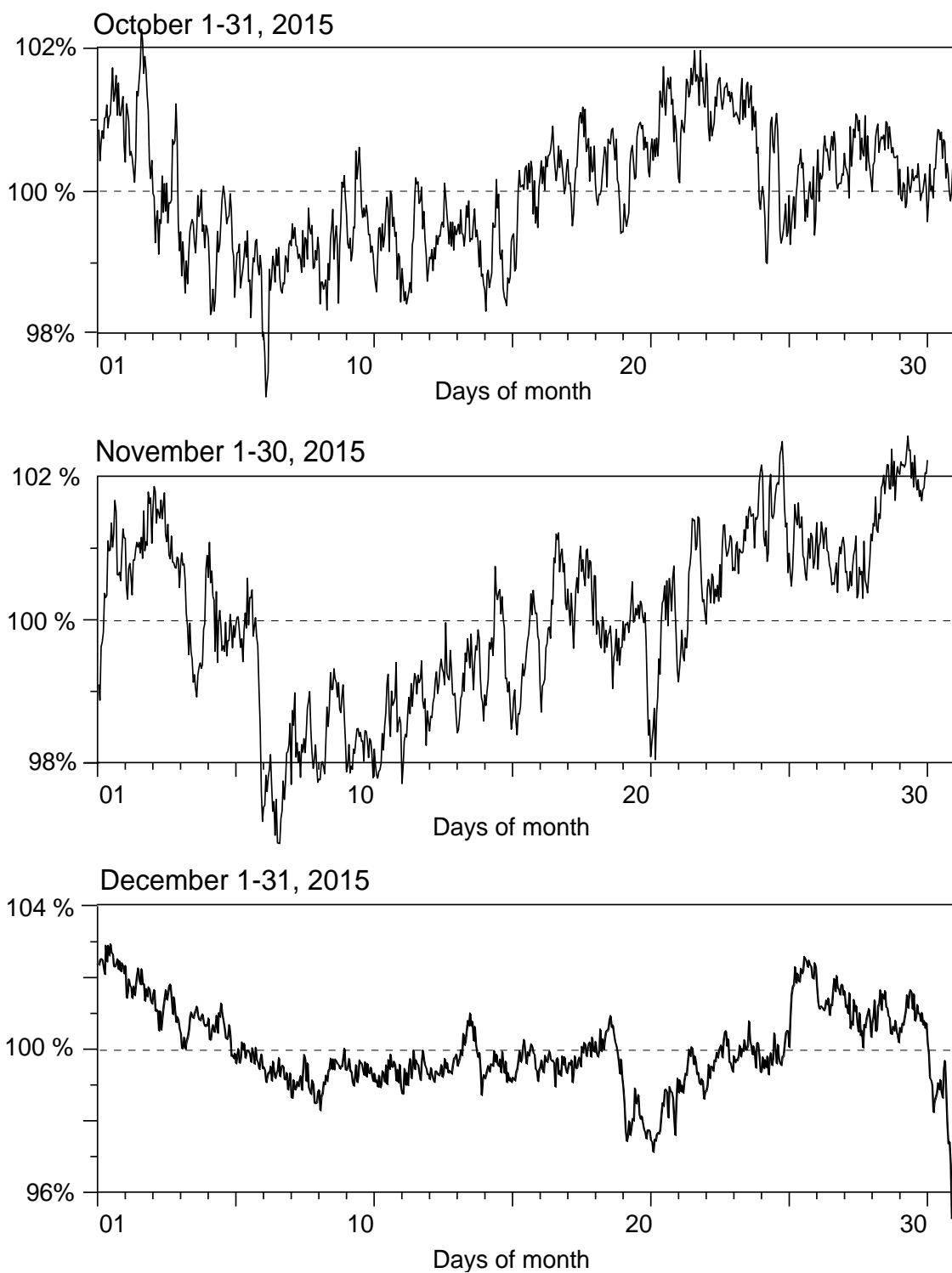
GEOMAGNETIC K-INDICES, LOVOZERO
 November, 2015
 Lower limit of K=9 is 1500 nT

Day	Time, UT								
	03	06	09	12	15	18	21	24	
1	300	111	111	111	444	444	333	000	
2	000	000	001	111	224	410	000	000	
3	011	112	223	234	555	434	667	524	
4	665	443	343	443	464	312	123	232	
5	223	211	112	222	222	344	335	445	
6	521	000	011	101	110	002	235	566	
7	555	666	544	344	445	444	452	201	
8	100	000	011	111	234	342	777	756	
9	643	322	223	344	455	554	555	675	
10	654	432	233	355	543	443	326	644	
11	562	113	233	212	2-3	354	656	301	
12	200	000	001	110	100	100	001	112	
13	310	000	001	111	235	544	541	555	
14	441	101	111	111	122	000	222	343	
15	220	100	100	000	000	100	023	466	
16	533	211	110	112	245	553	422	355	
17	111	111	000	000	000	123	311	111	
18	101	111	000	111	102	432	235	667	
19	632	211	121	112	100	000	221	000	
20	000	000	100	010	000	000	000	000	Q
21	001	110	000	000	000	000	011	000	
22	000	000	000	000	000	000	002	000	
23	000	000	000	000	000	000	000	000	Q
24	000	000	000	000	000	000	000	000	
25	000	000	000	000	000	000	000	000	Q
26	000	000	000	000	000	001	222	233	
27	321	211	110	010	000	112	002	222	
28	111	010	000	001	112	111	024	433	
29	101	100	101	100	122	102	344	456	
30	433	211	222	232	221	122	124	443	

GEOMAGNETIC K-INDICES, LOVOZERO
December, 2015
Lower limit of K=9 is 1500 nT

Day	Time, UT								
	03	06	09	12	15	18	21	24	
1	1 1 1	0 1 1	0 0 0	1 0 1	3 2 4	4 5 4	3 6 6	5 5 5	
2	3 2 1	1 1 1	0 0 0	0 0 1	1 1 3	2 2 2	1 2 4	3 1 0	
3	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 1	1 2 2	Q
4	0 0 0	0 1 1	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 2	
5	2 1 0	0 0 0	0 0 1	2 2 1	1 1 1	3 4 4	3 5 5	4 6 6	
6	3 3 1	1 3 3	2 2 1	1 2 4	5 5 3	4 4 4	5 5 5	5 5 5	
7	5 2 0	1 1 3	3 2 1	2 2 3	4 4 4	3 2 5	3 5 6	3 1 4	
8	6 5 1	1 1 2	1 0 1	1 1 1	1 2 2	0 1 2	2 1 0	1 3 3	
9	1 2 1	1 1 1	1 0 0	0 0 0	0 0 3	3 2 1	0 4 4	3 0 1	
10	3 4 3	2 4 2	2 1 2	2 1 2	3 2 3	4 5 4	5 6 4	3 5 6	
11	5 1 2	1 2 2	2 1 2	3 3 3	2 2 4	4 2 4	4 6 6	4 5 5	
12	3 1 2	2 2 2	1 2 2	1 1 0	1 1 0	4 2 3	1 1 3	3 2 1	
13	2 2 2	0 0 1	1 1 1	1 1 0	0 0 0	0 0 0	0 1 1	1 1 0	Q
14	0 0 1	1 0 0	0 0 0	0 1 1	1 2 2	3 4 4	4 4 4	7 7 4	
15	5 6 5	4 2 2	2 2 1	1 1 1	1 2 4	3 2 1	1 0 1	5 4 4	
16	6 4 2	3 2 1	1 1 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	
17	0 0 0	0 0 0	0 0 0	0 0 1	1 1 2	2 4 3	3 4 4	2 2 2	
18	2 2 0	0 0 0	0 0 1	1 0 1	1 1 0	0 0 0	0 0 0	3 3 0	
19	0 0 0	0 0 0	0 0 0	0 0 0	0 0 1	1 5 5	3 3 4	7 6 5	
20	3 3 2	4 4 4	4 4 2	2 3 5	5 5 4	6 7 5	5 6 7	6 6 5	
21	6 7 6	7 6 4	4 3 3	3 2 3	2 3 3	3 3 4	3 3 3	4 3 3	
22	3 3 3	2 1 0	1 2 1	1 3 2	2 0 0	0 0 0	2 3 3	2 3 3	
23	2 2 2	0 1 0	0 0 0	1 1 0	1 1 2	3 3 4	4 4 3	3 5 3	
24	3 3 2	1 0 0	2 1 1	1 1 2	1 1 1	1 0 0	3 3 2	2 2 2	
25	1 0 0	1 0 0	0 0 1	1 0 1	1 1 1	1 1 2	0 0 2	3 3 1	
26	1 1 1	1 1 2	1 0 1	0 0 1	1 1 3	3 2 1	3 3 3	6 4 3	
27	3 2 2	0 1 1	1 1 1	1 1 1	1 2 3	2 1 2	2 3 2	2 1 1	
28	1 0 0	0 0 0	0 0 0	0 1 1	0 1 1	0 0 0	0 0 0	0 1 1	Q
29	2 2 0	0 0 0	0 0 0	0 0 0	0 0 2	1 0 1	1 3 4	4 3 1	
30	0 0 0	0 0 0	0 0 0	1 1 0	1 1 1	1 0 0	0 0 0	1 3 2	
31	2 1 1	1 1 2	2 2 1	2 2 2	6 5 6	5 4 4	2 5 7	7 6 6	

Apatity neutron monitor



ALL – SKY CAMERA OBSERVATIONS**October - December 2015**

CALENDAR OF APATITY TV OBSERVATIONS

October 01 - 02

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 02 - 03

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 03 - 04

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—												

October 04 - 05

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 05 - 06

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 06 - 07

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 07 - 08

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 08 - 09

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 09 - 10

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 10 - 11

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

October 11 - 12

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT				—									—			

CALENDAR OF APATITY TV OBSERVATIONS

October 12 - 13

October 13 - 14

October 14 - 15

October 15 - 16

October 16 - 17

October 17 - 18

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT		—										—				

October 18 - 19

October 19 - 20

October 20 - 21

October 21 - 22

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT			—											—		

October 22 - 23

CALENDAR OF APATITY TV OBSERVATIONS

October 23 - 24

October 24 - 25

October 25 - 26

October 26 - 27

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT		—												—		

October 27 - 28

October 28 - 29

October 29 - 30

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
APT		—										—				

October 30 - 31

October 31 – November 01

November 01 - 02

November 02 - 03

CALENDAR OF APATITY TV OBSERVATIONS

November 03 - 04

November 04 - 05

November 05 - 06

November 06 - 07

November 07 - 08

November 08 - 09

November 09 - 10

November 10 - 11

November 11 -12

November 12 - 13

November 13 - 14

CALENDAR OF APATITY TV OBSERVATIONS

November 14 - 15

November 15 - 16

November 16 - 17

November 17 - 18

November 18 - 19

November 19 - 20

November 20 - 21

November 21 - 22

November 22 -23

November 23 - 24

November 24 - 25

CALENDAR OF APATITY TV OBSERVATIONS

December 05 - 06

December 06 - 07

December 08 - 09

December 09 - 10

December 10 - 11

December 11 - 12

December 12 - 13

December 13 - 14

December 14 - 15

December 15 - 16

December 16 - 17

CALENDAR OF APATITY TV OBSERVATIONS

December 17 - 18

December 18 - 19

December 19 - 20

December 20 - 21

December 21 - 22

December 22 - 23

December 23 - 24

December 24 - 25

December 25 - 26

December 26 - 27

December 27 - 28

CALENDAR OF APATITY TV OBSERVATIONS

December 28 - 29

December 29 - 30

December 30 - 31

December 31

CALENDAR OF LOVOZERO TV OBSERVATIONS

December 04 - 05

December 05 - 06

December 06 - 07

December 07 - 08

December 08 - 09

December 09 - 10

December 10 - 11

December 11 - 12

December 12 - 13

December 13 - 14

December 14 - 15

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—										—					

CALENDAR OF LOVOZERO TV OBSERVATIONS

December 15 - 16

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—									—				—	—	

December 16 - 17

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—										—					—

December 17 - 18

December 18 - 19

December 19 - 20

December 20 - 21

December 21 - 22

December 22 - 23

December 23 - 24

December 24 - 25

December 25 - 26

CALENDAR OF LOVOZERO TV OBSERVATIONS

December 26 - 27

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—															

December 27 - 28

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—															

December 28 - 29

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

December 29 - 30

UT	14	15	16	17	18	19	20	21	22	23	24	01	02	03	04	05
LOZ	—															

December 30 - 31

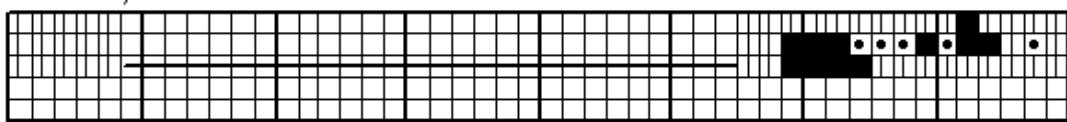
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LOZ	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

December 31

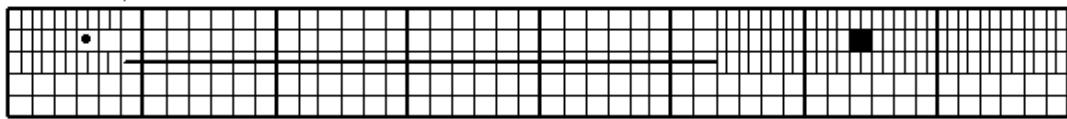
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LOZ		—	—	—	—	—	—	—	—	—	—					

Apatity ascaplots

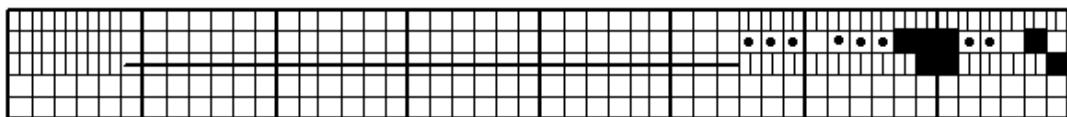
Oct. 01, 2015



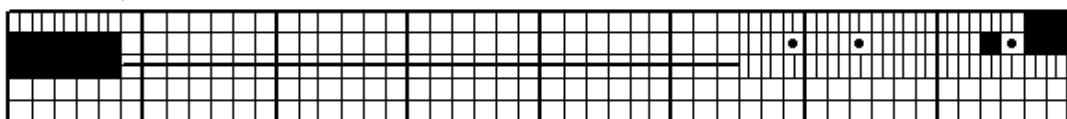
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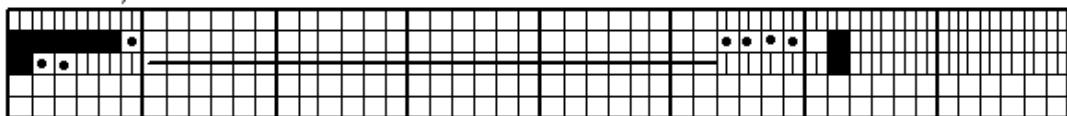
Oct. 03, 2015



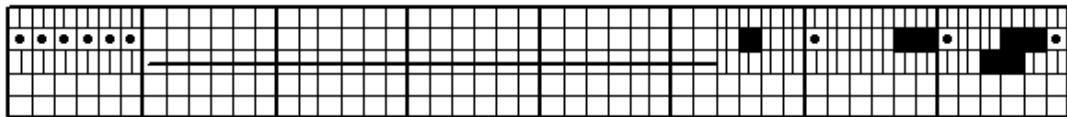
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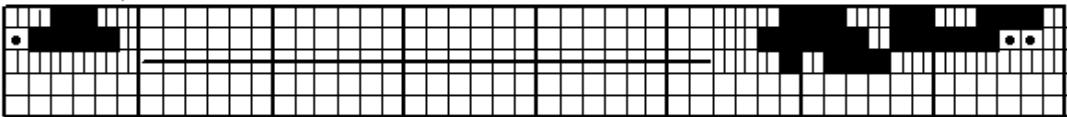
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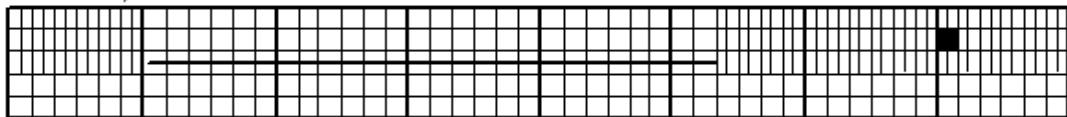
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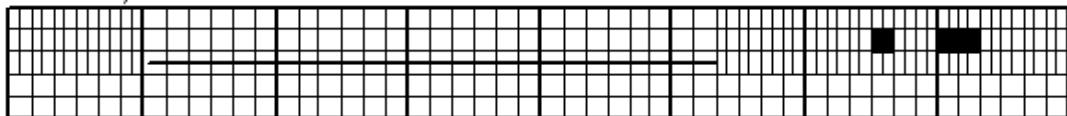
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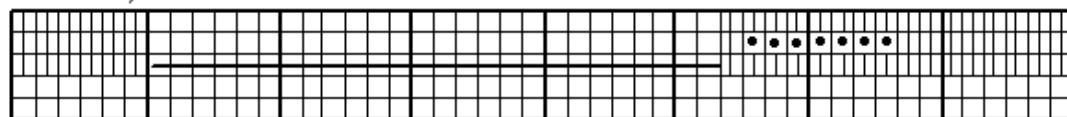
Oct. 08, 2015



Oct. 09, 2015



Oct. 10, 2015



00

06

12

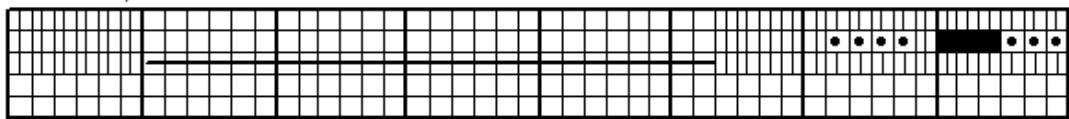
18

24

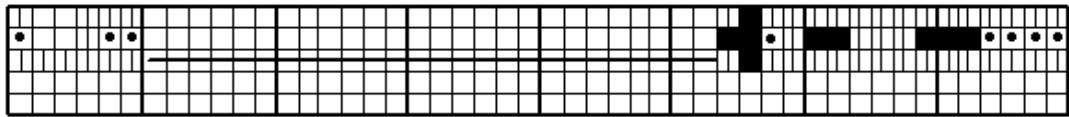
Universal Time

Apatity ascaplots

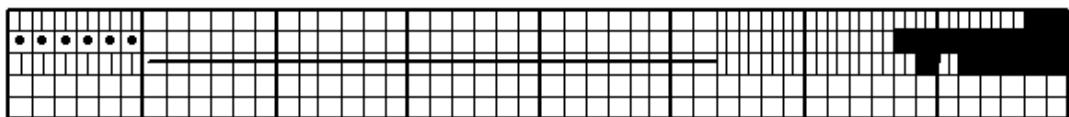
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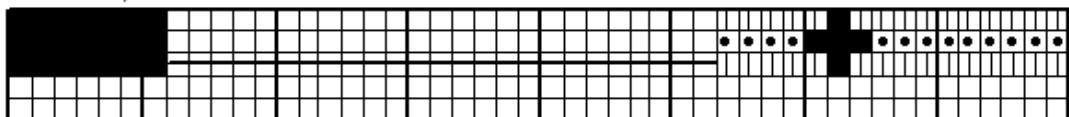
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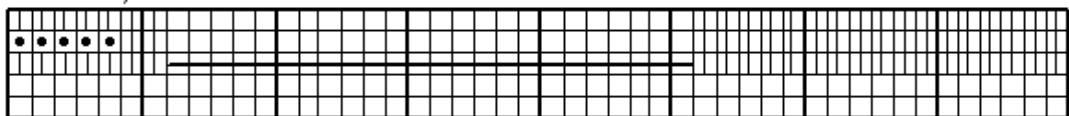
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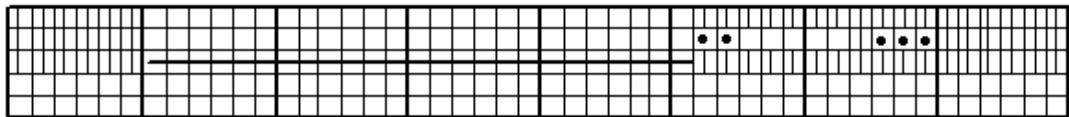
Oct. 14, 2015



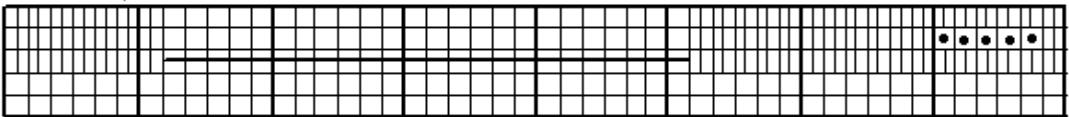
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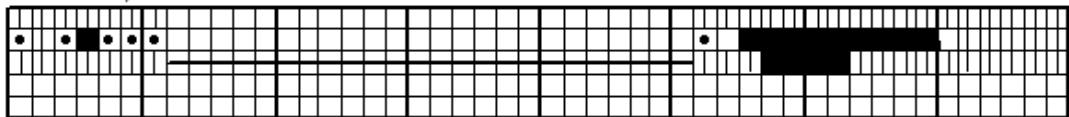
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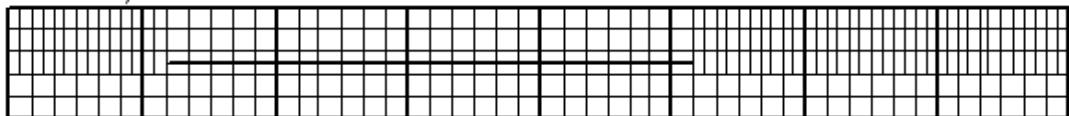
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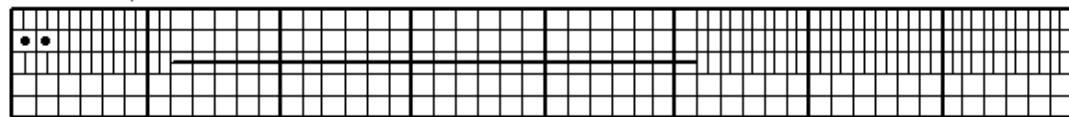
Oct. 18, 2015



Oct. 19, 2015



Oct. 20, 2015



00

06

12

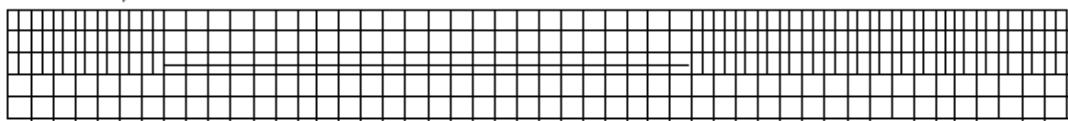
18

24

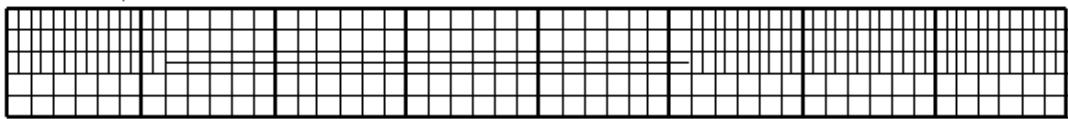
Universal Time

Apatity ascaplots

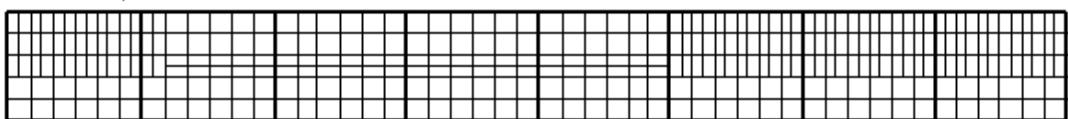
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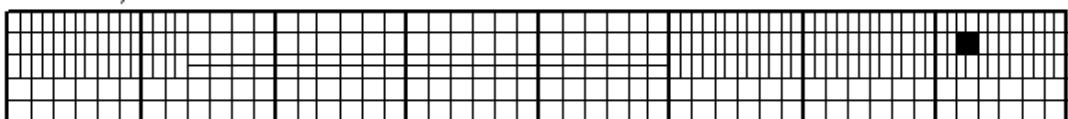
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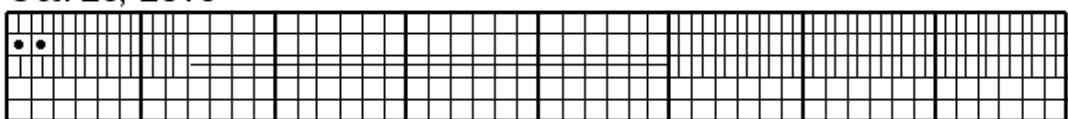
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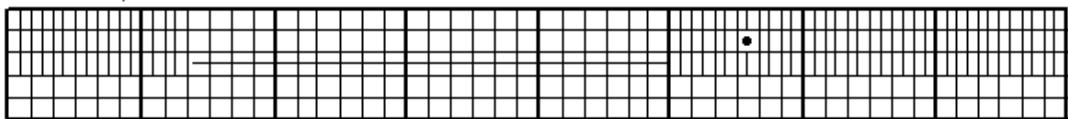
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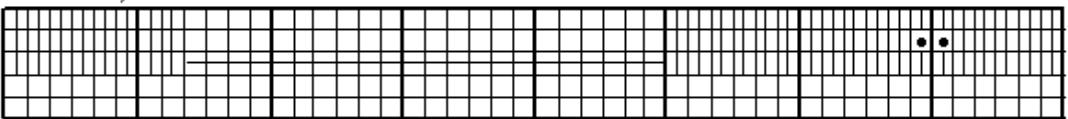
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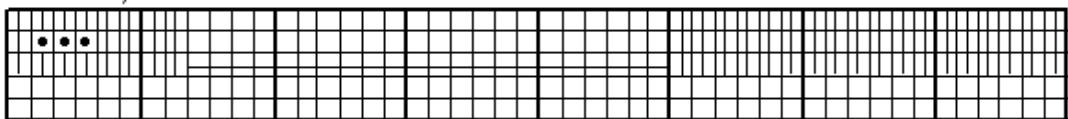
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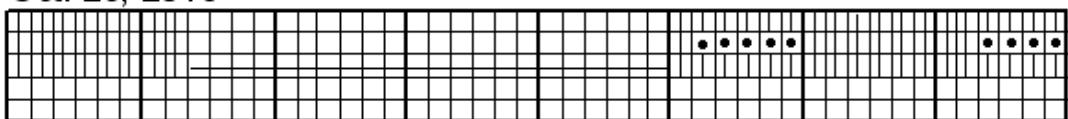
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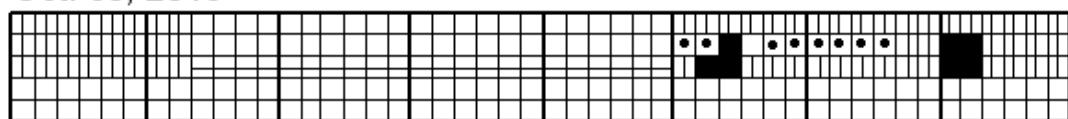
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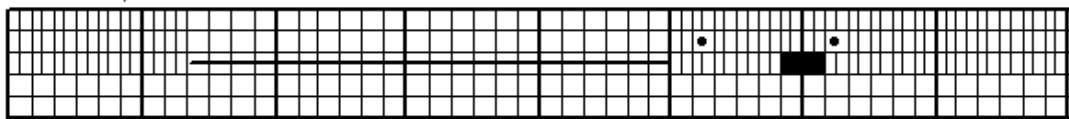
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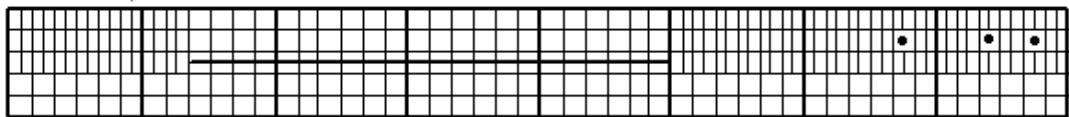
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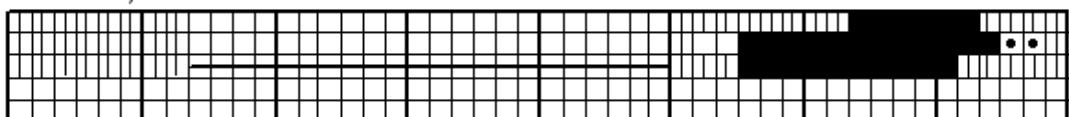
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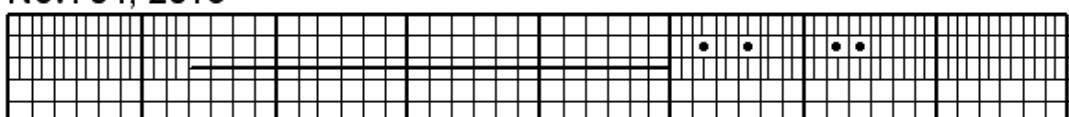
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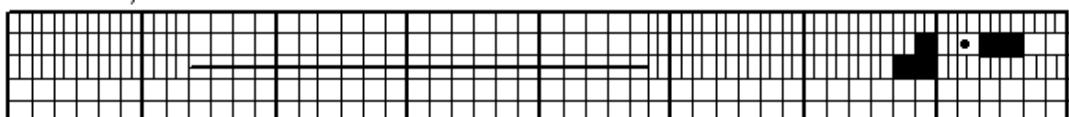
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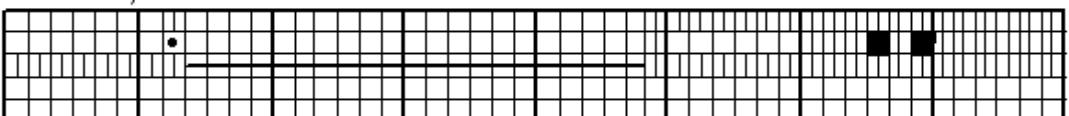
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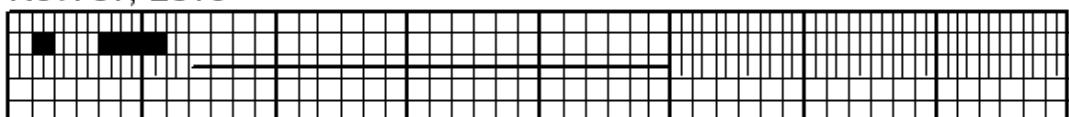
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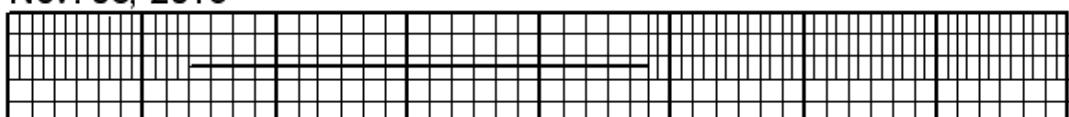
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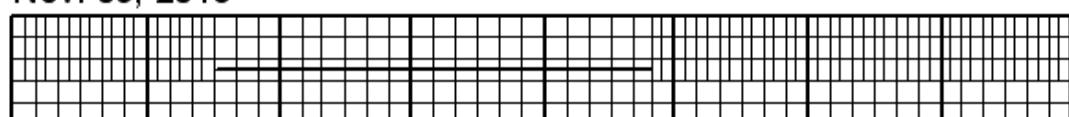
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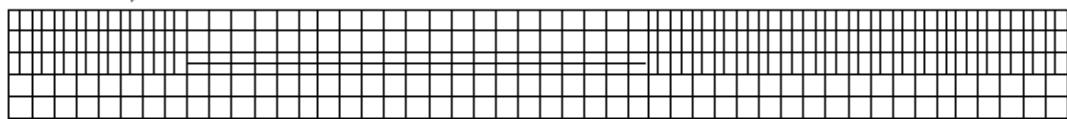
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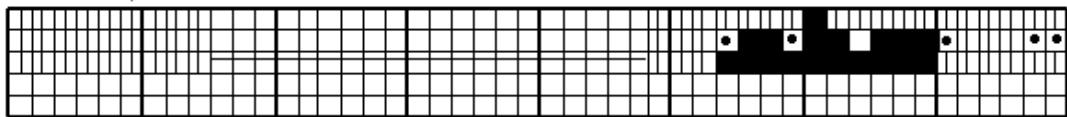
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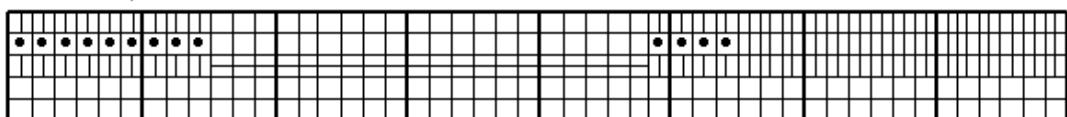
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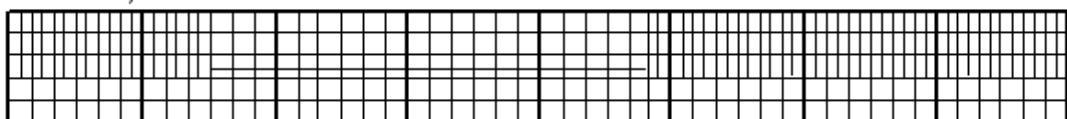
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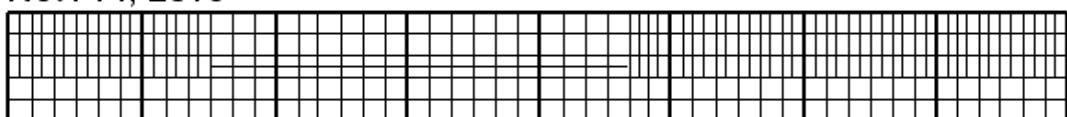
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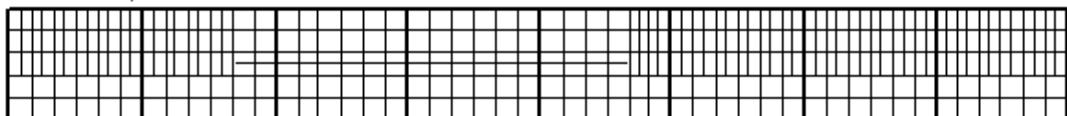
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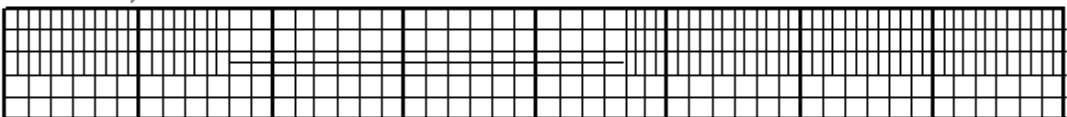
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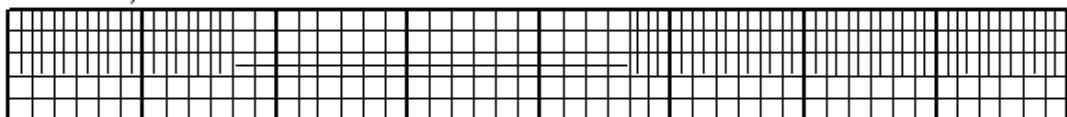
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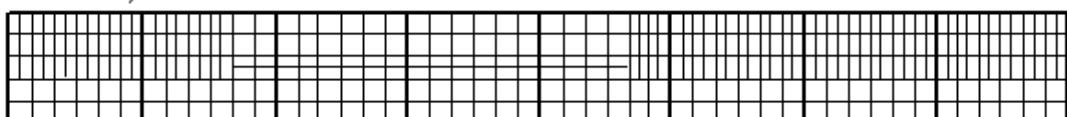
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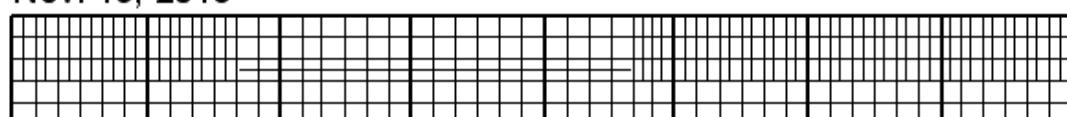
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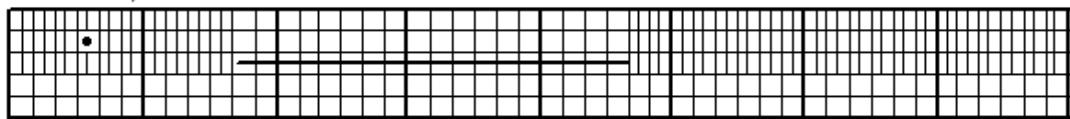
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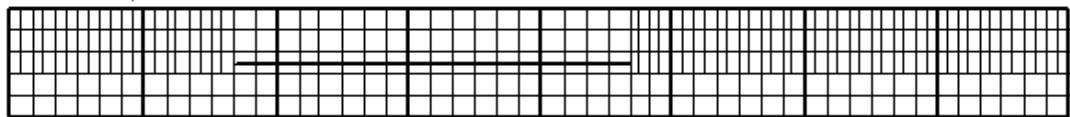
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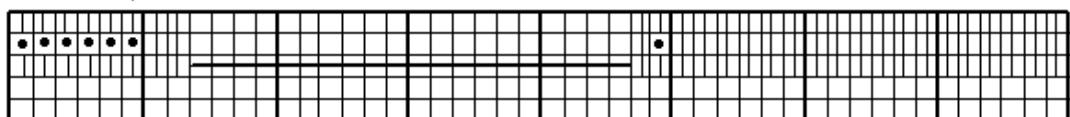
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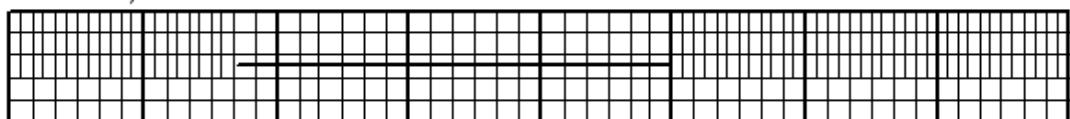
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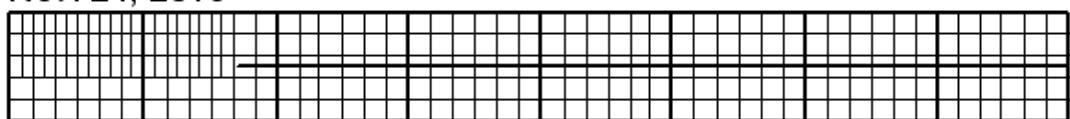
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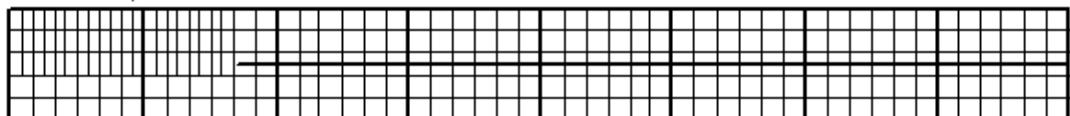
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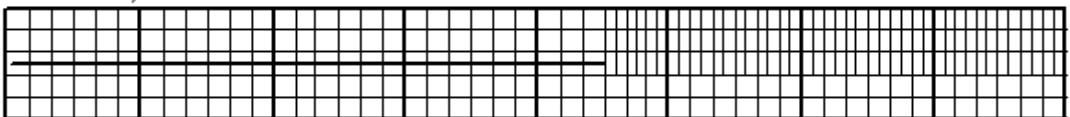
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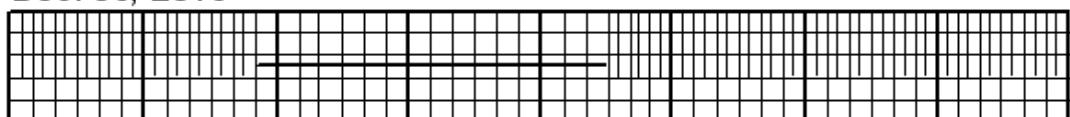
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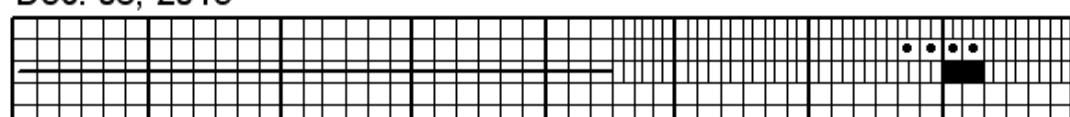
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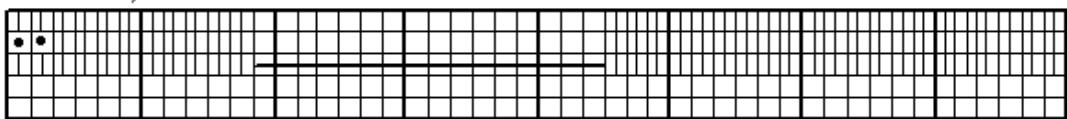
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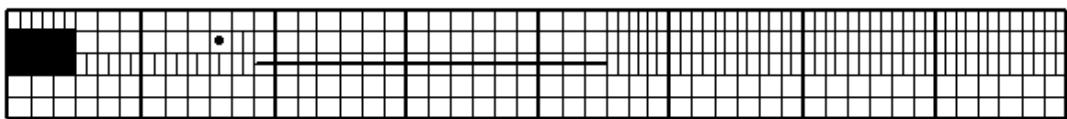
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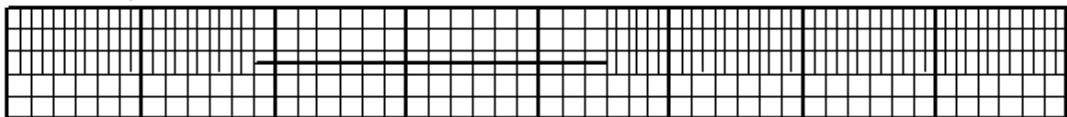
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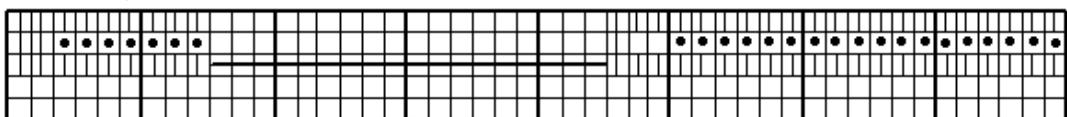
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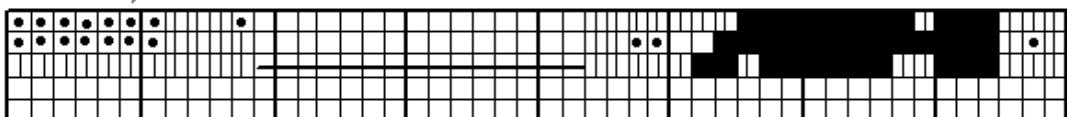
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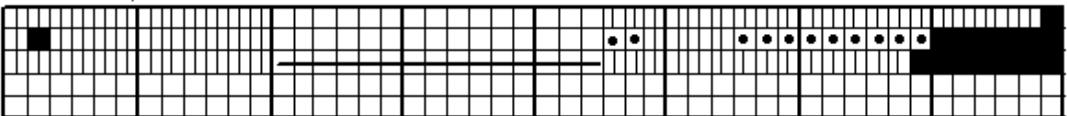
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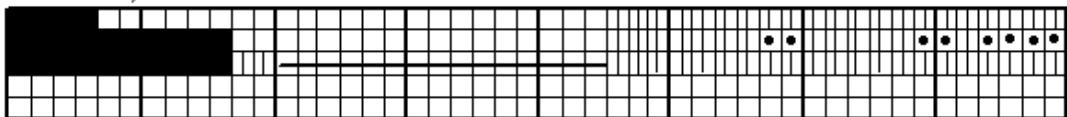
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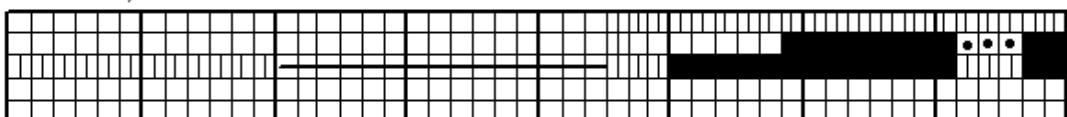
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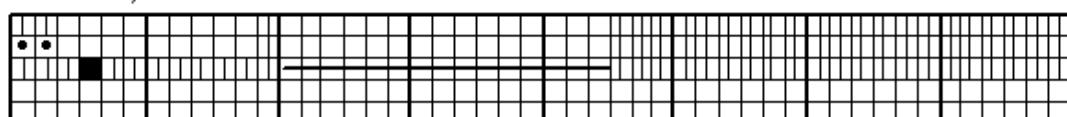
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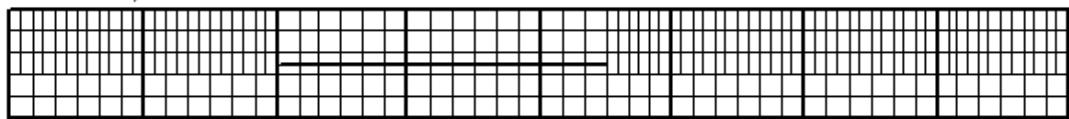
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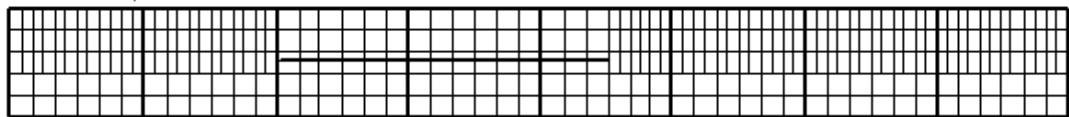
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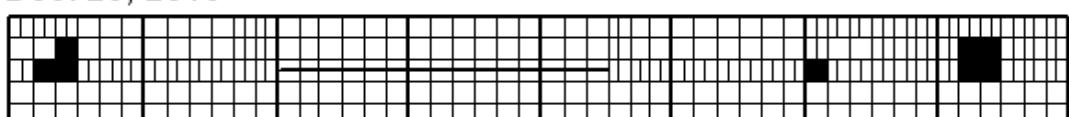
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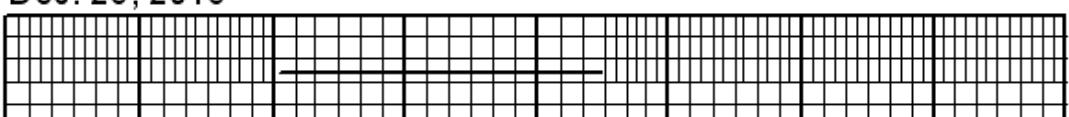
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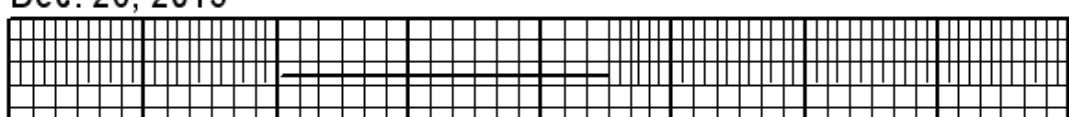
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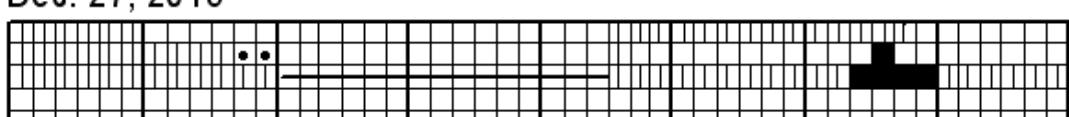
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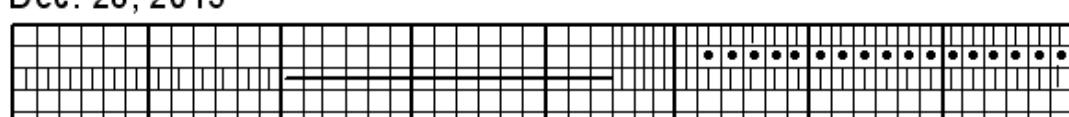
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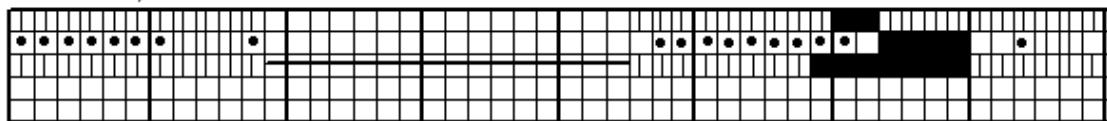
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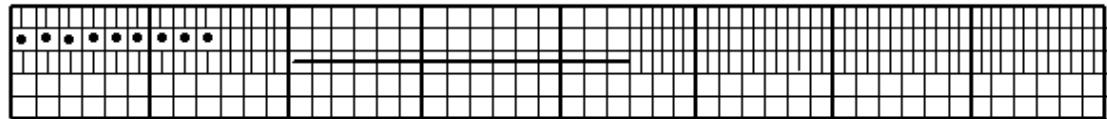
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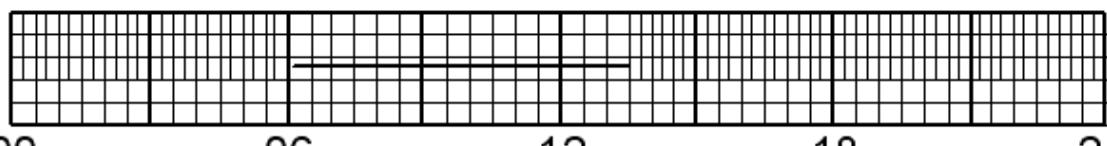
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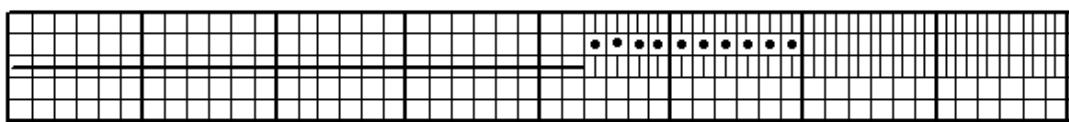


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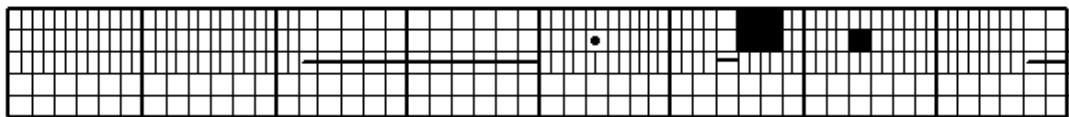
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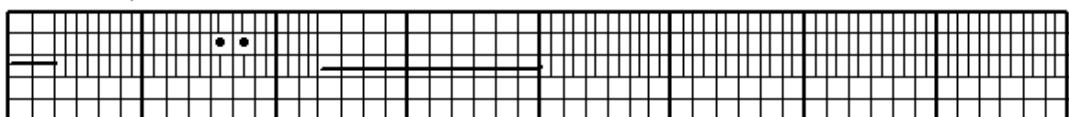
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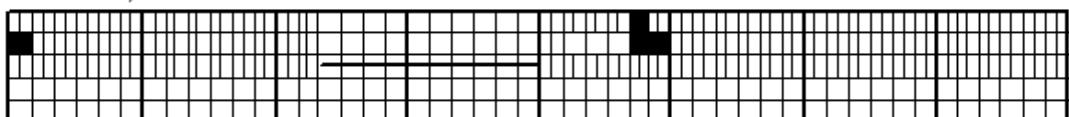
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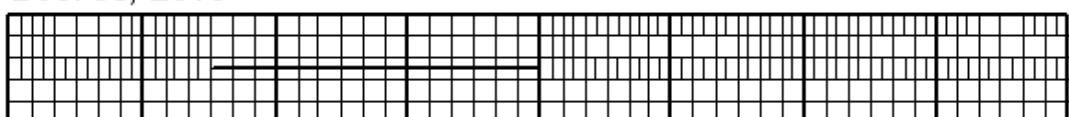
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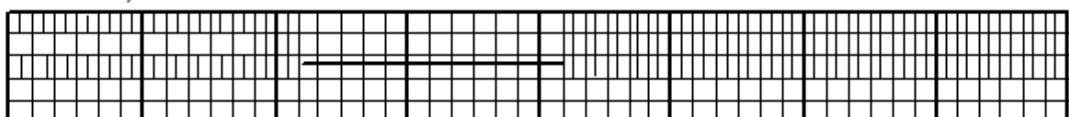
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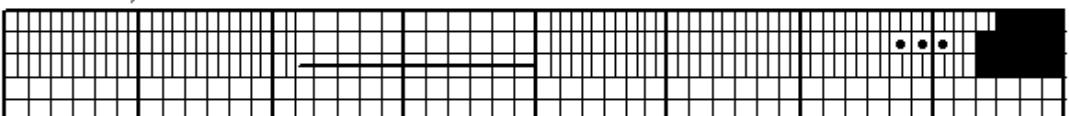
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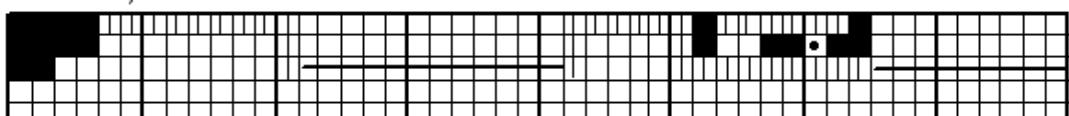
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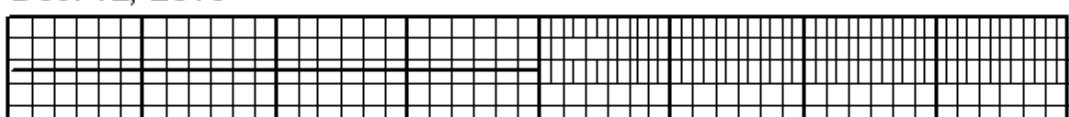
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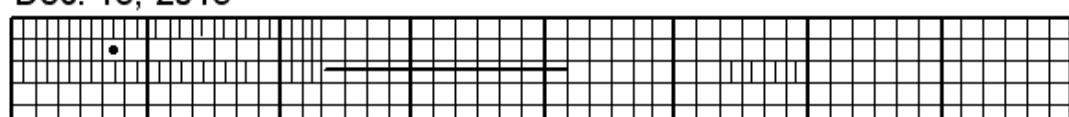
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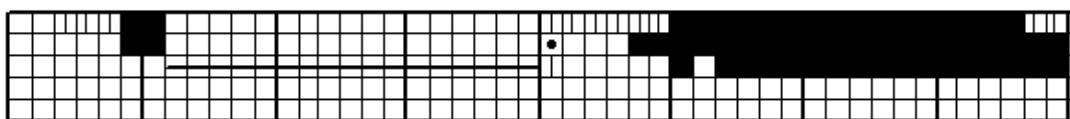
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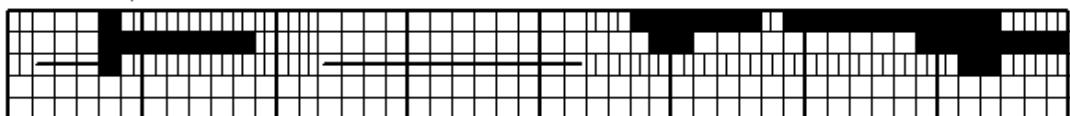
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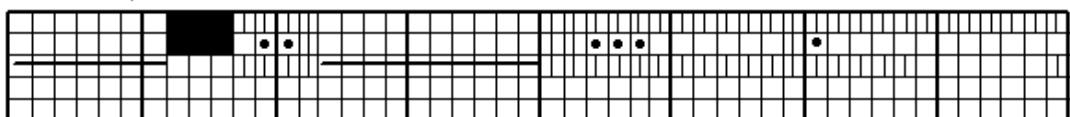
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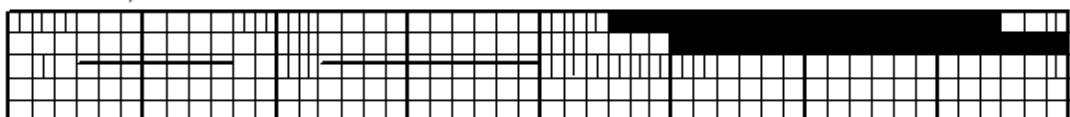
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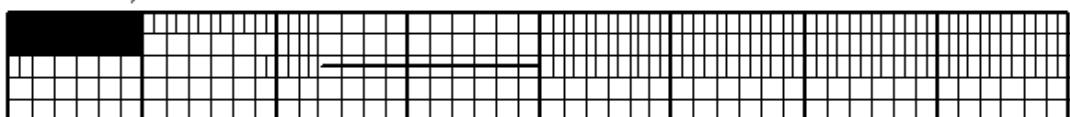
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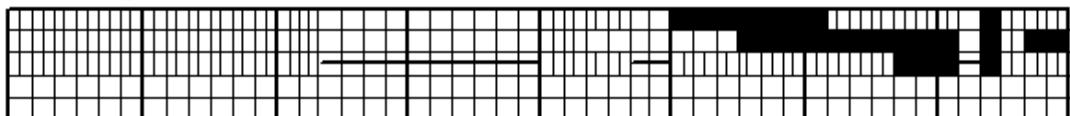
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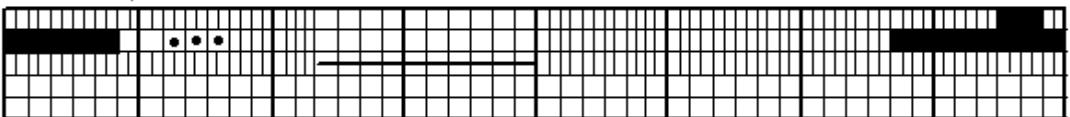
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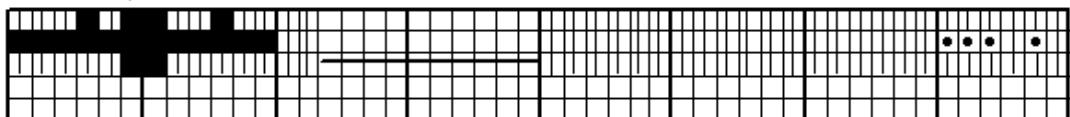
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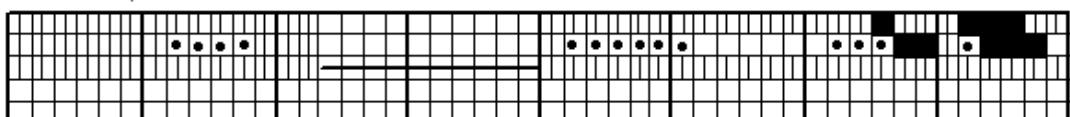
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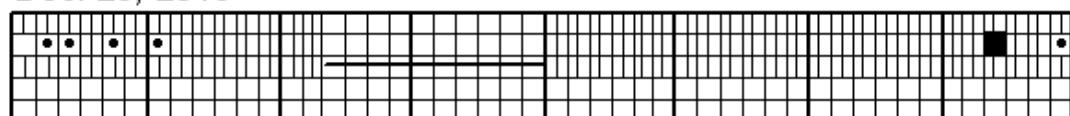
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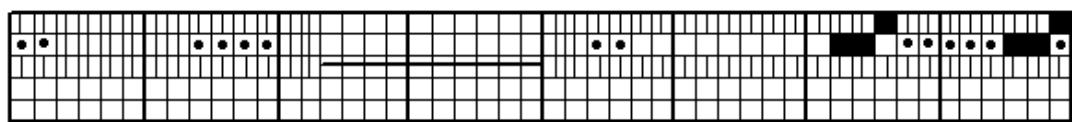


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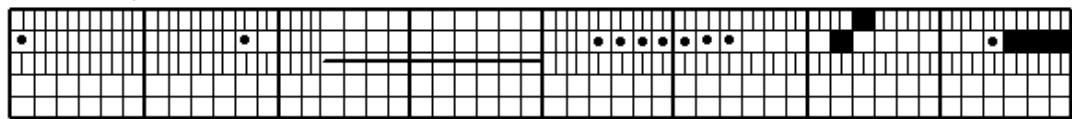


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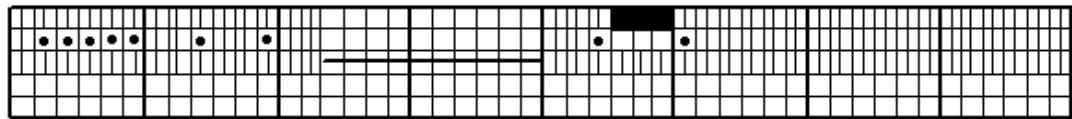
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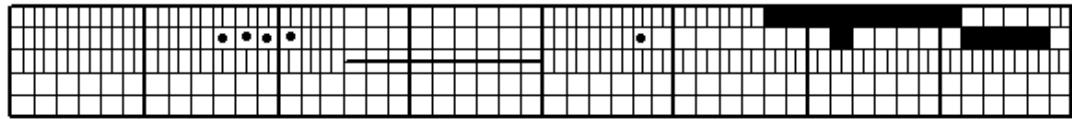
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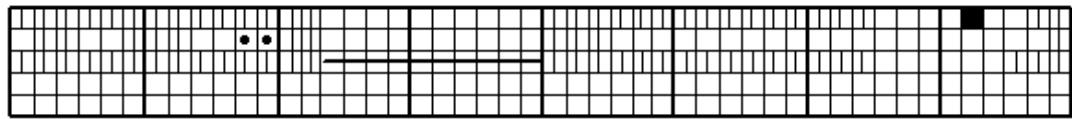
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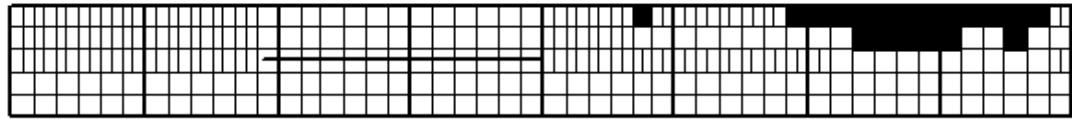
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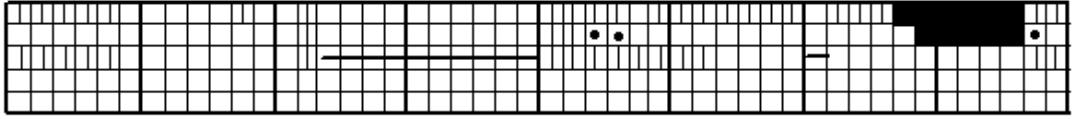
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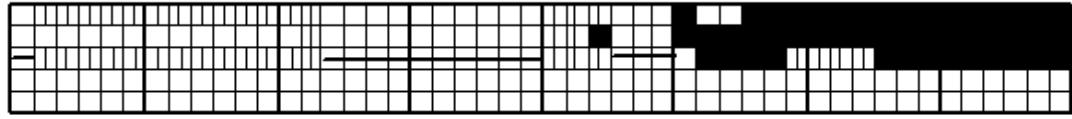
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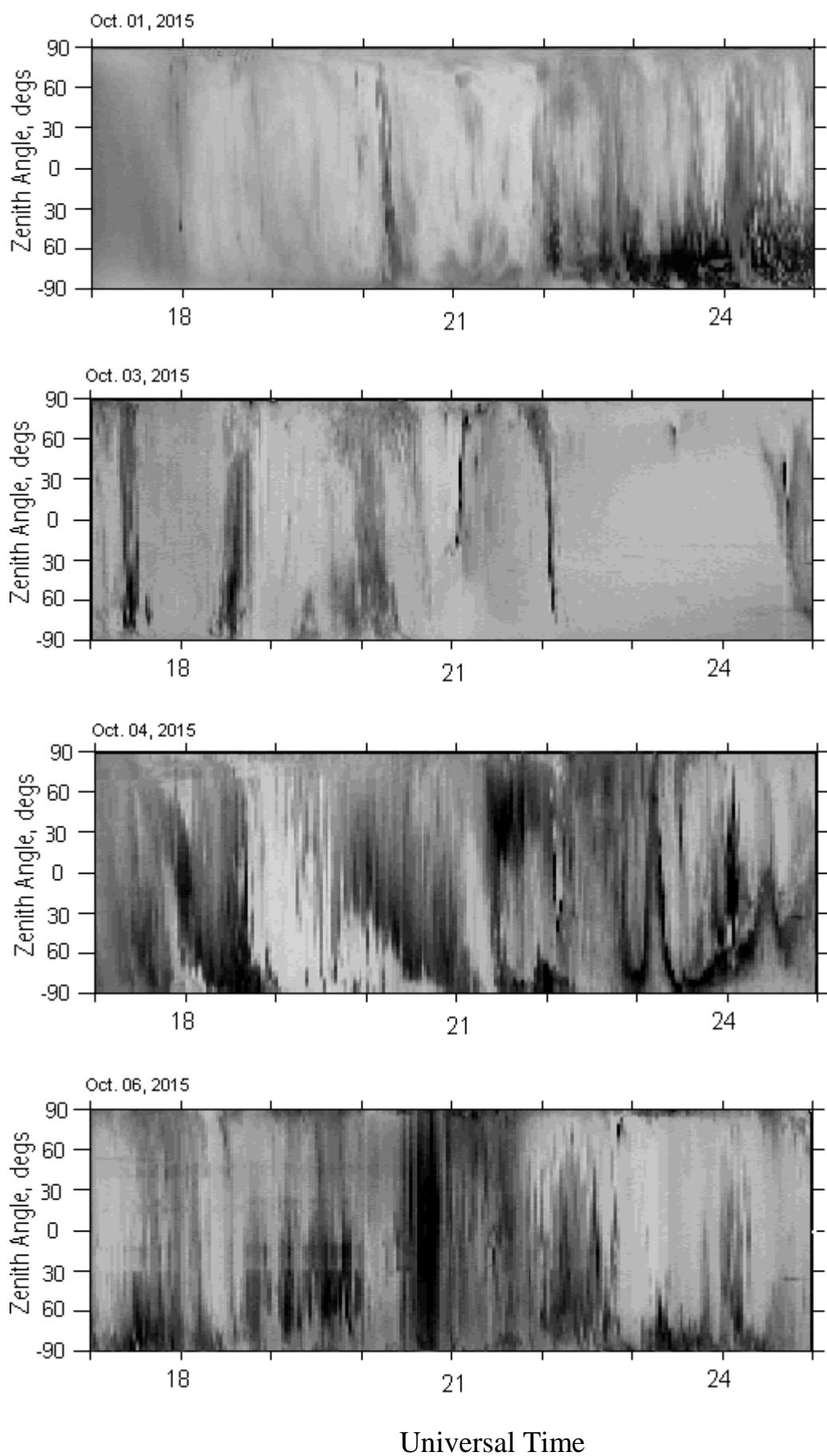
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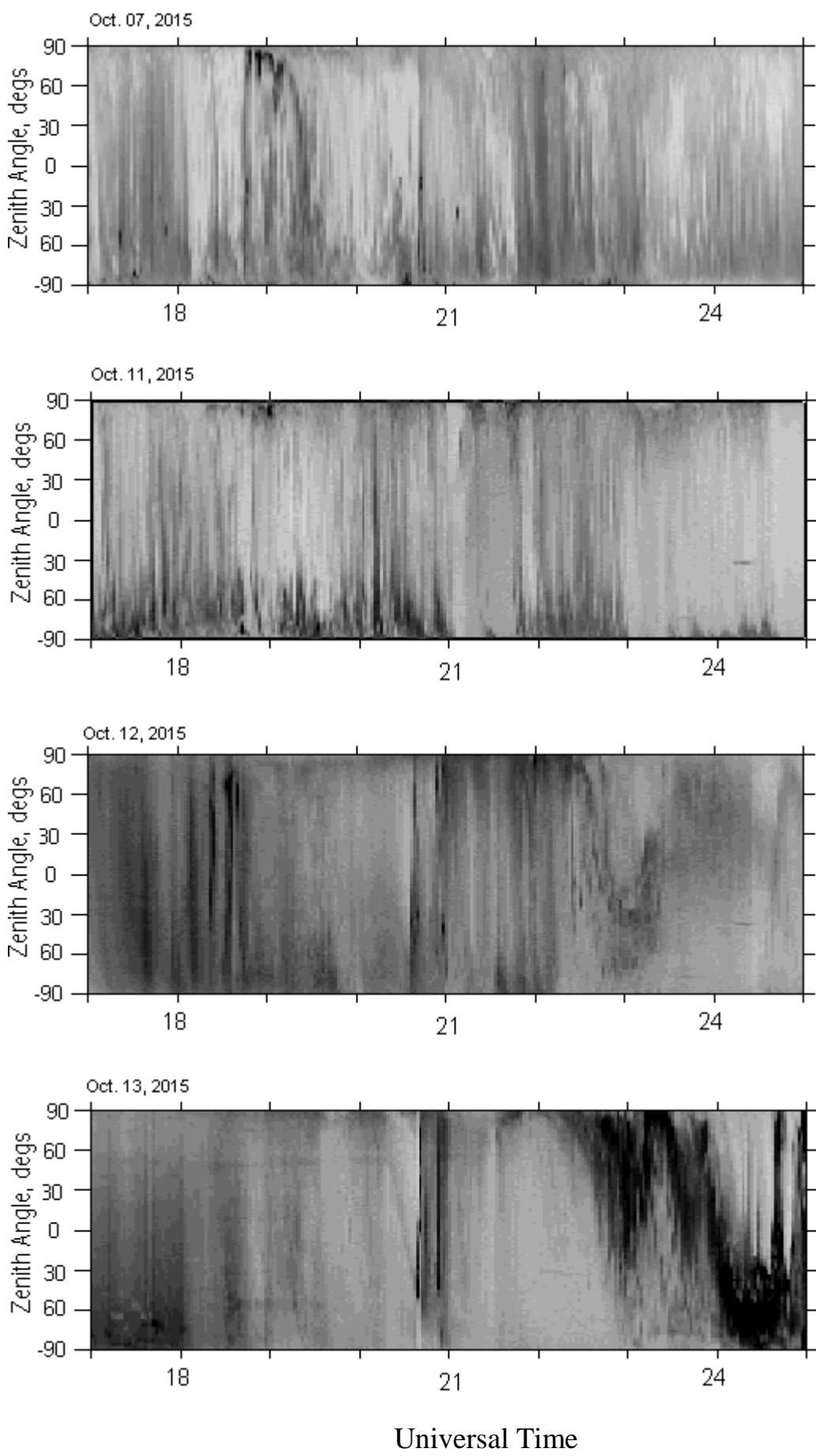
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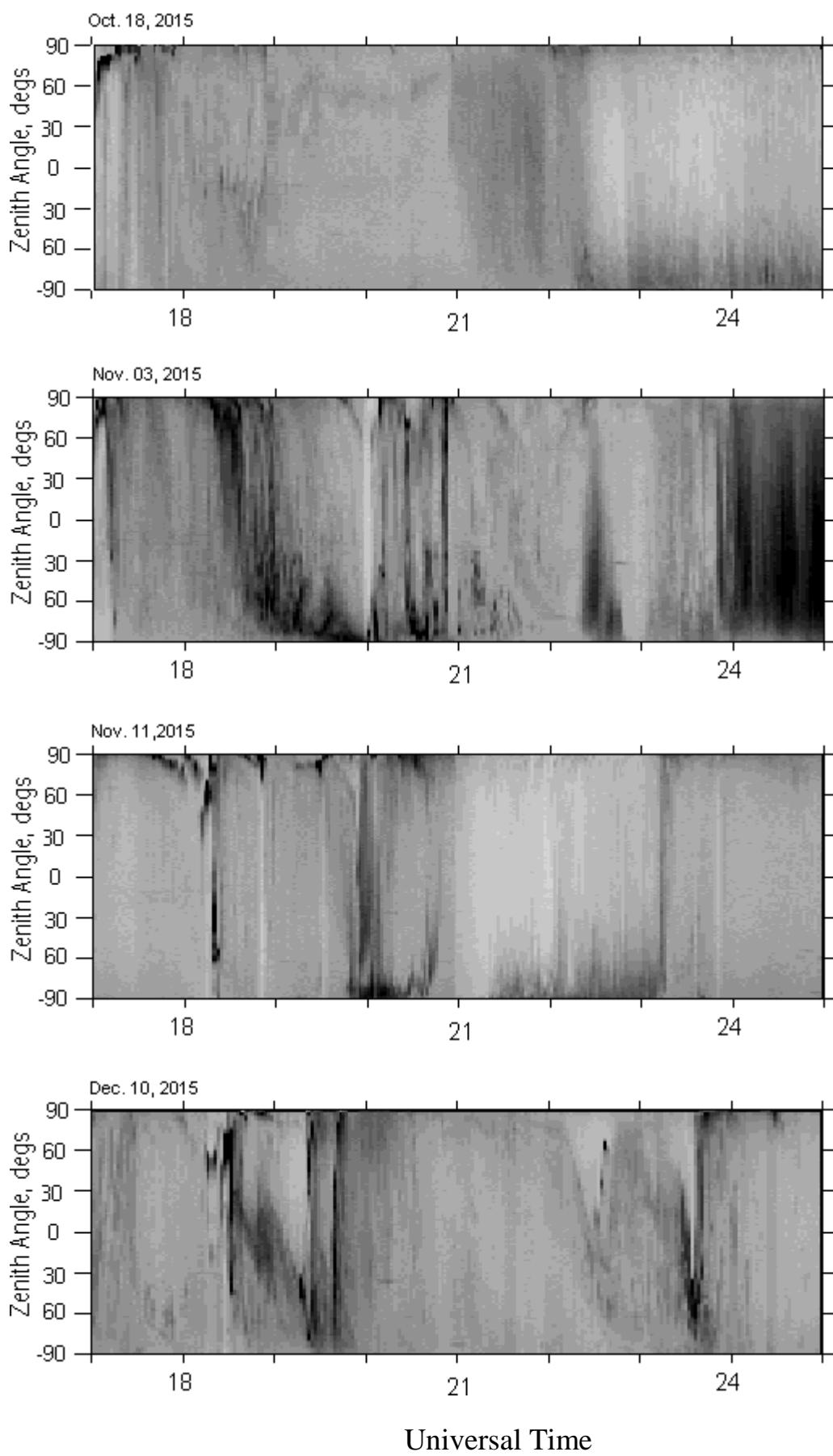
Apatity TV keograms



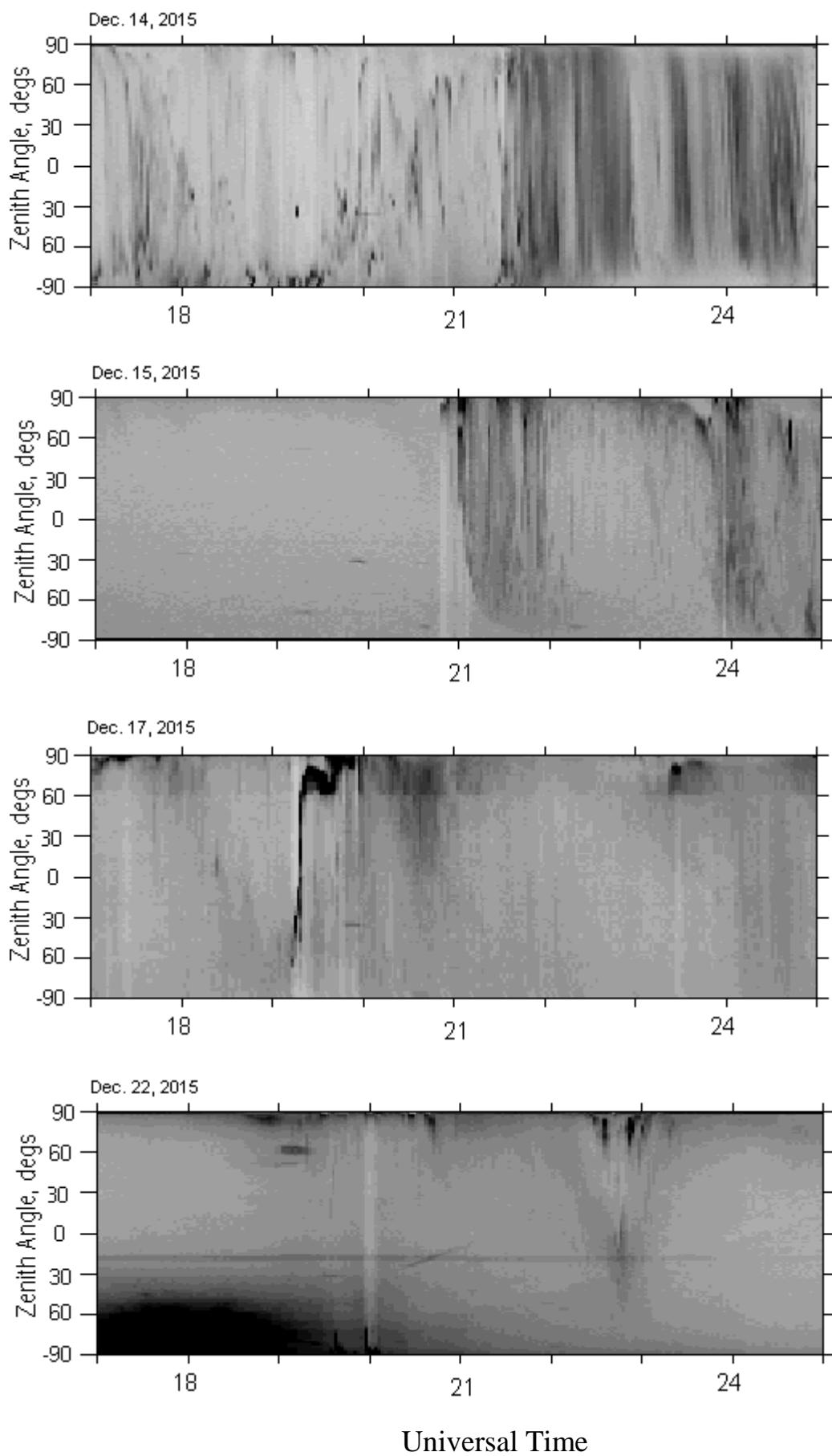
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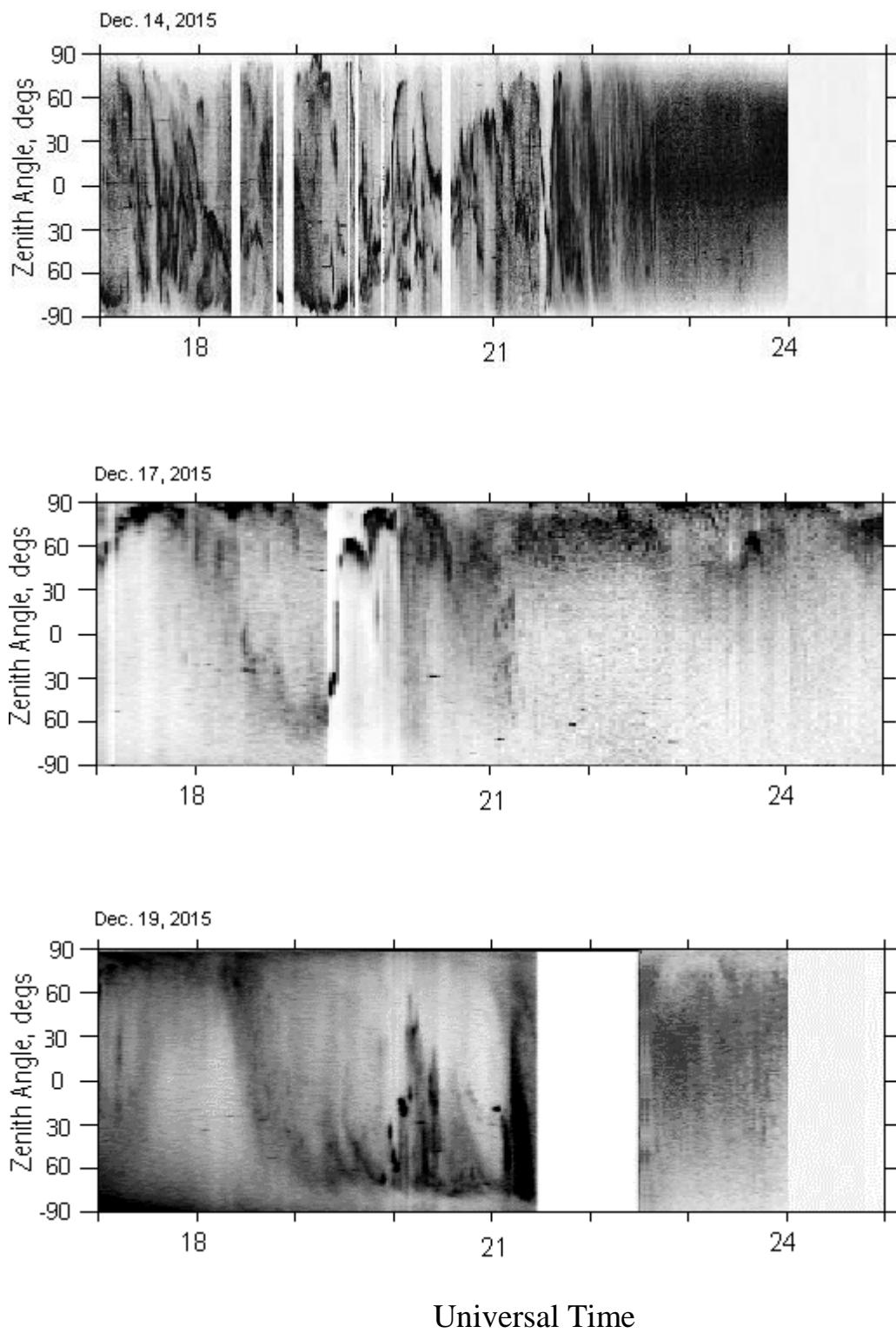
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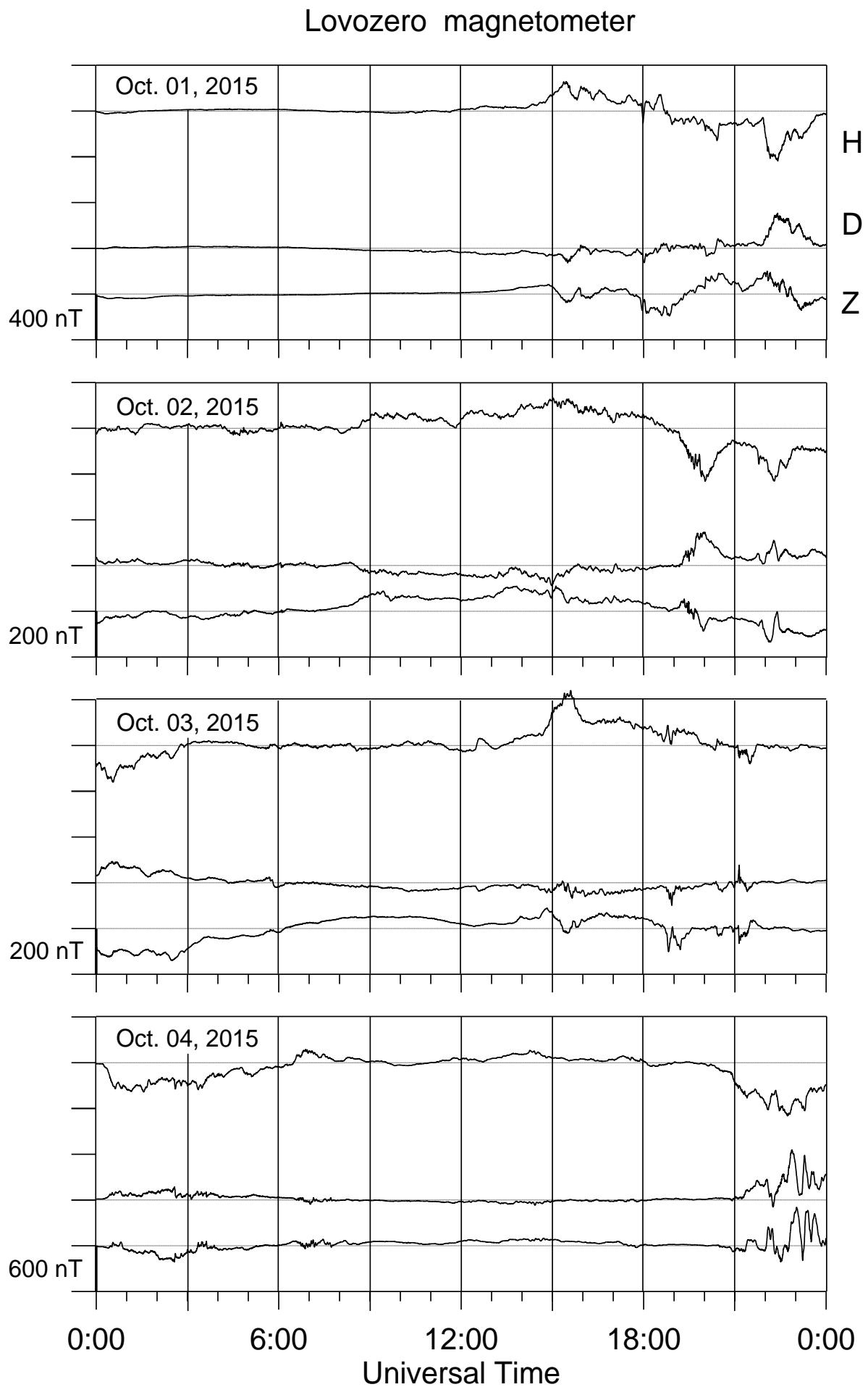
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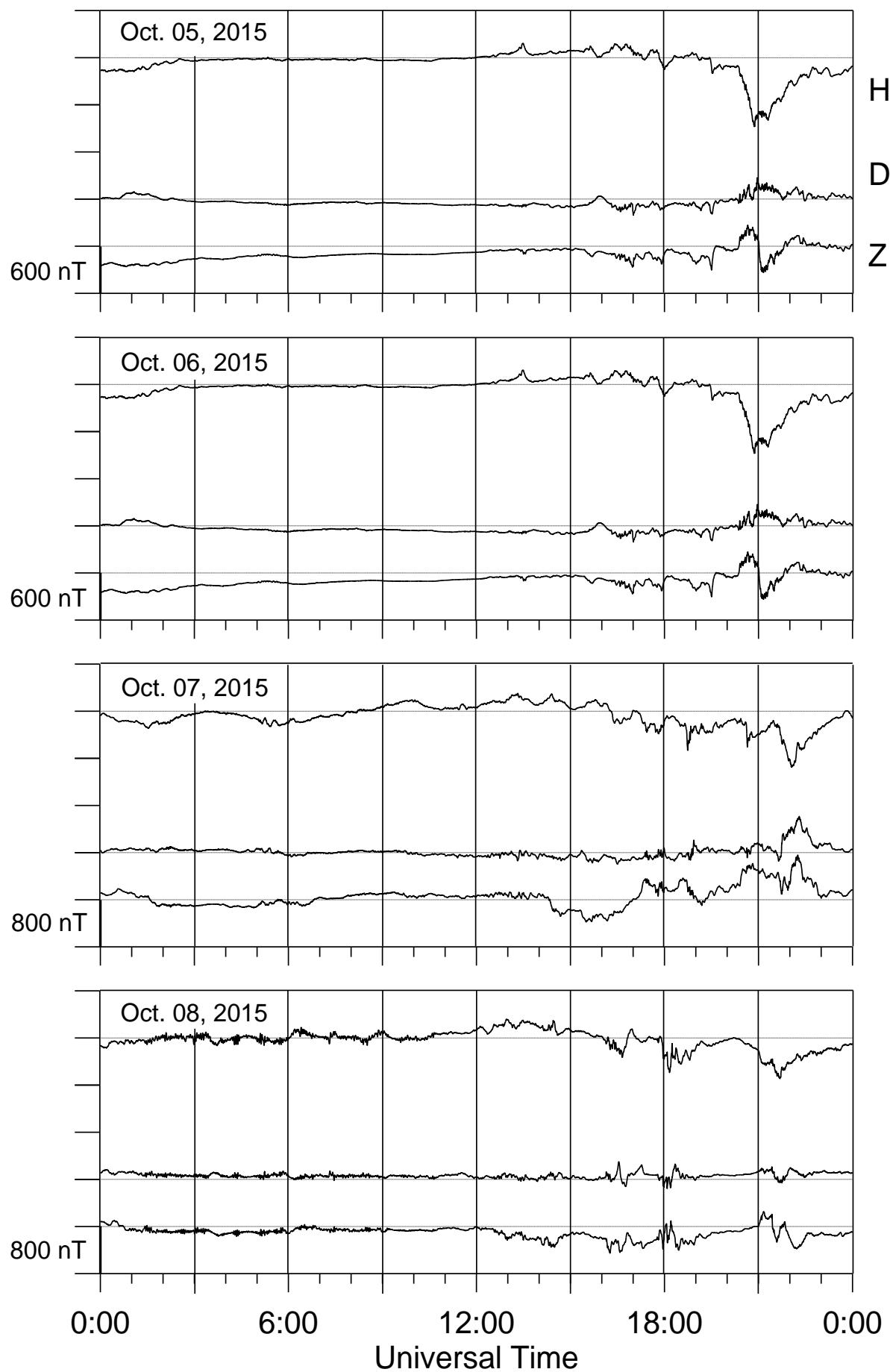
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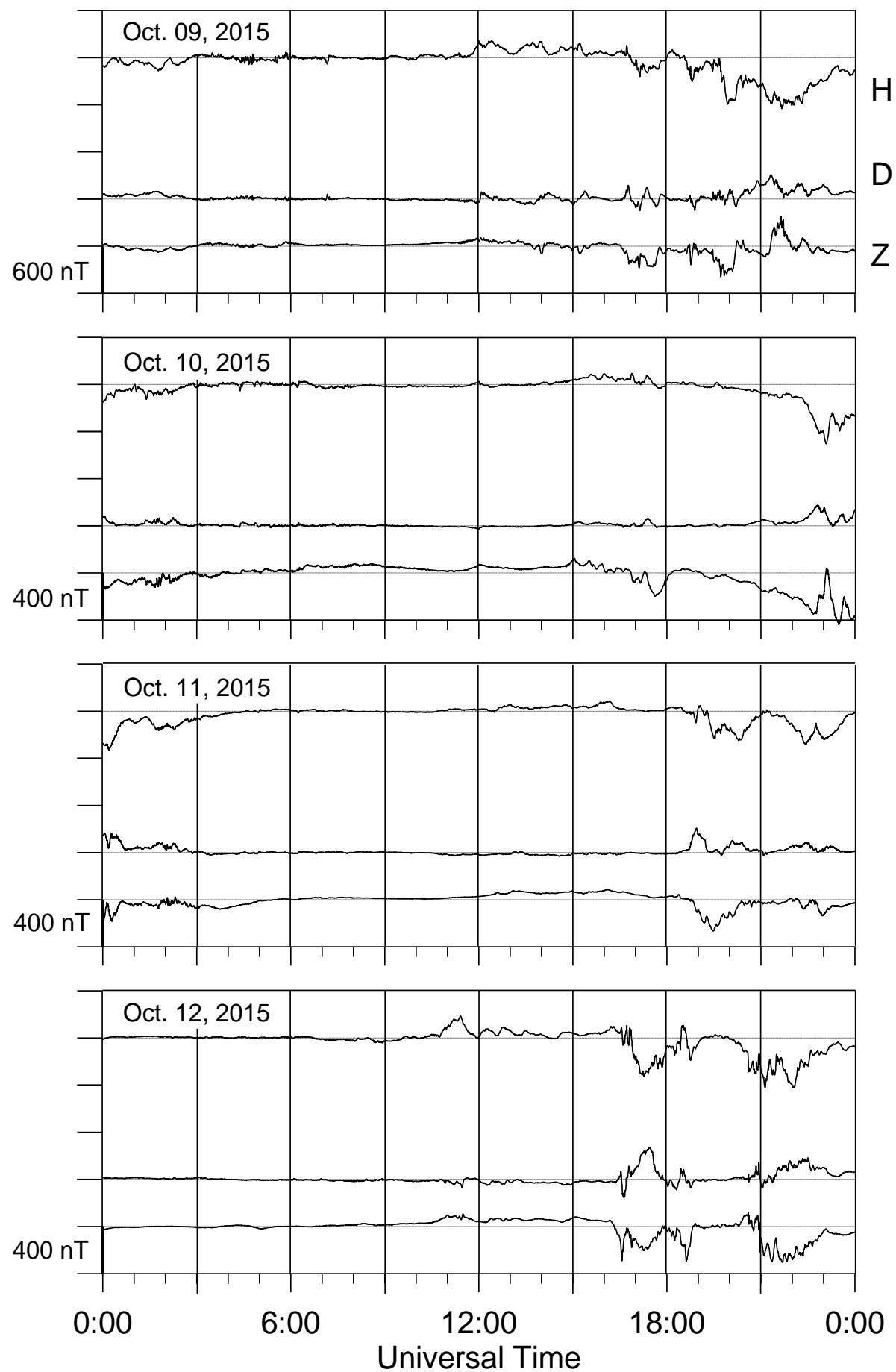
LOVOZERO MAGNETOGRAMS**October - December 2015**



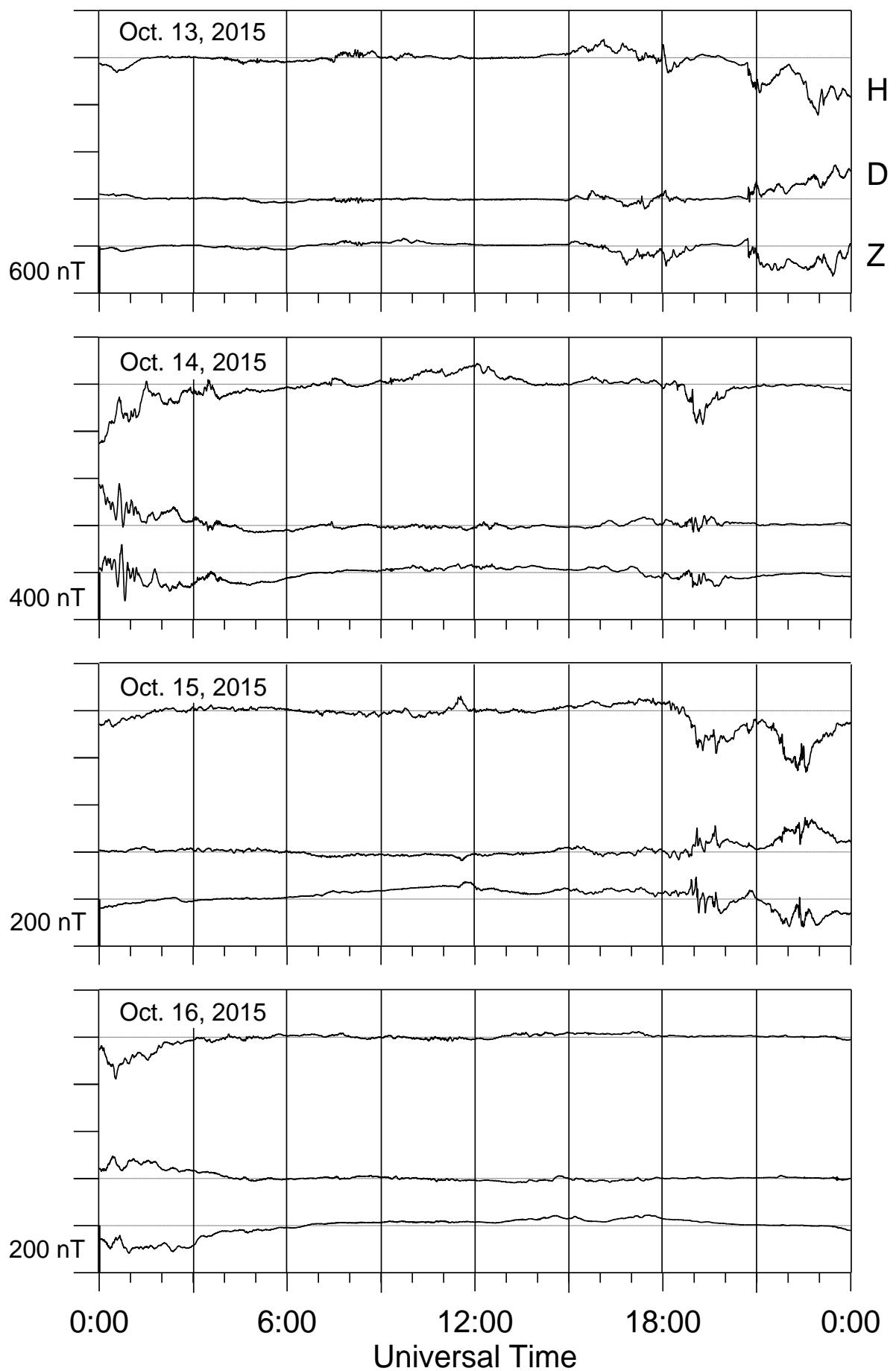
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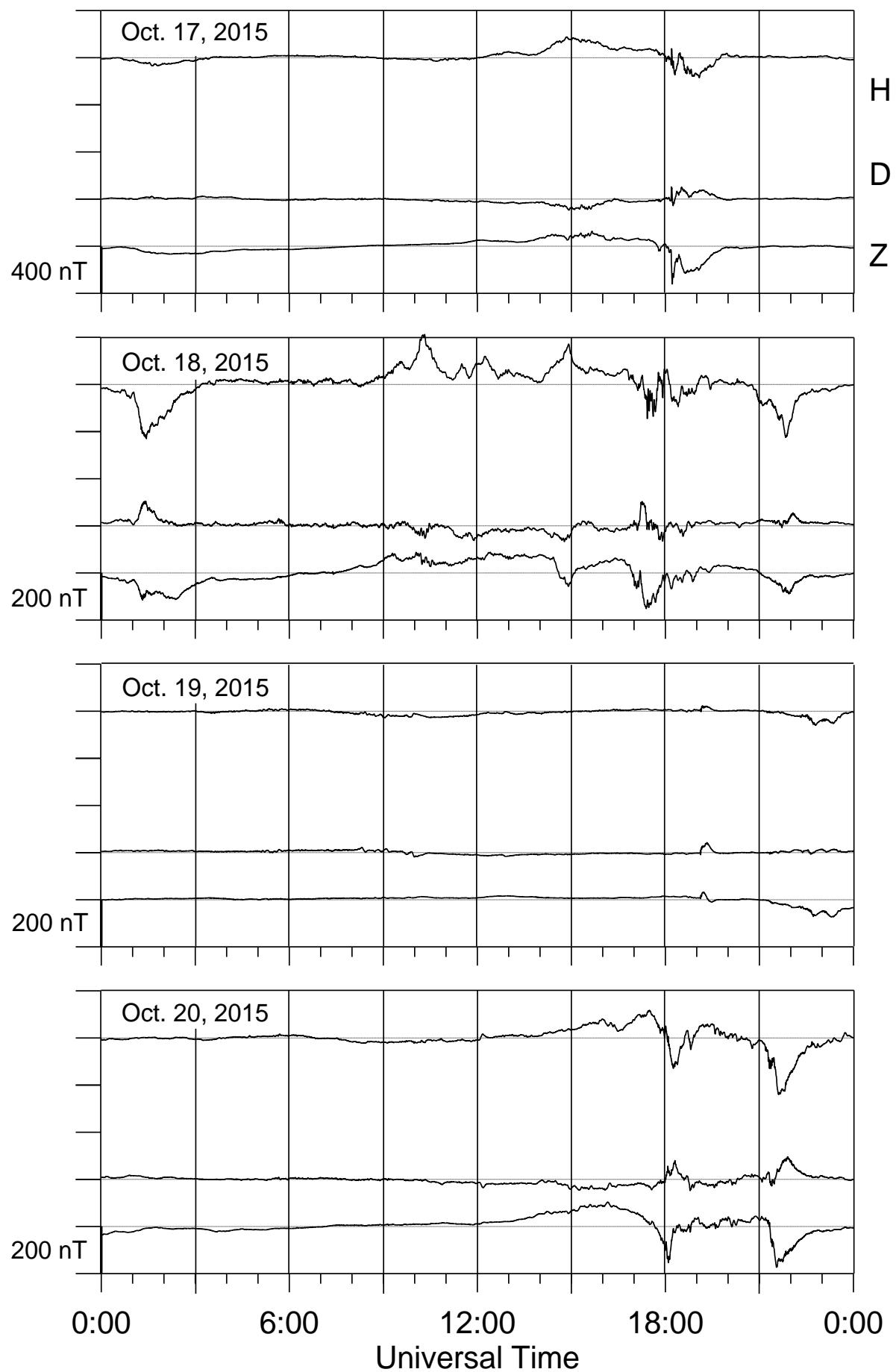
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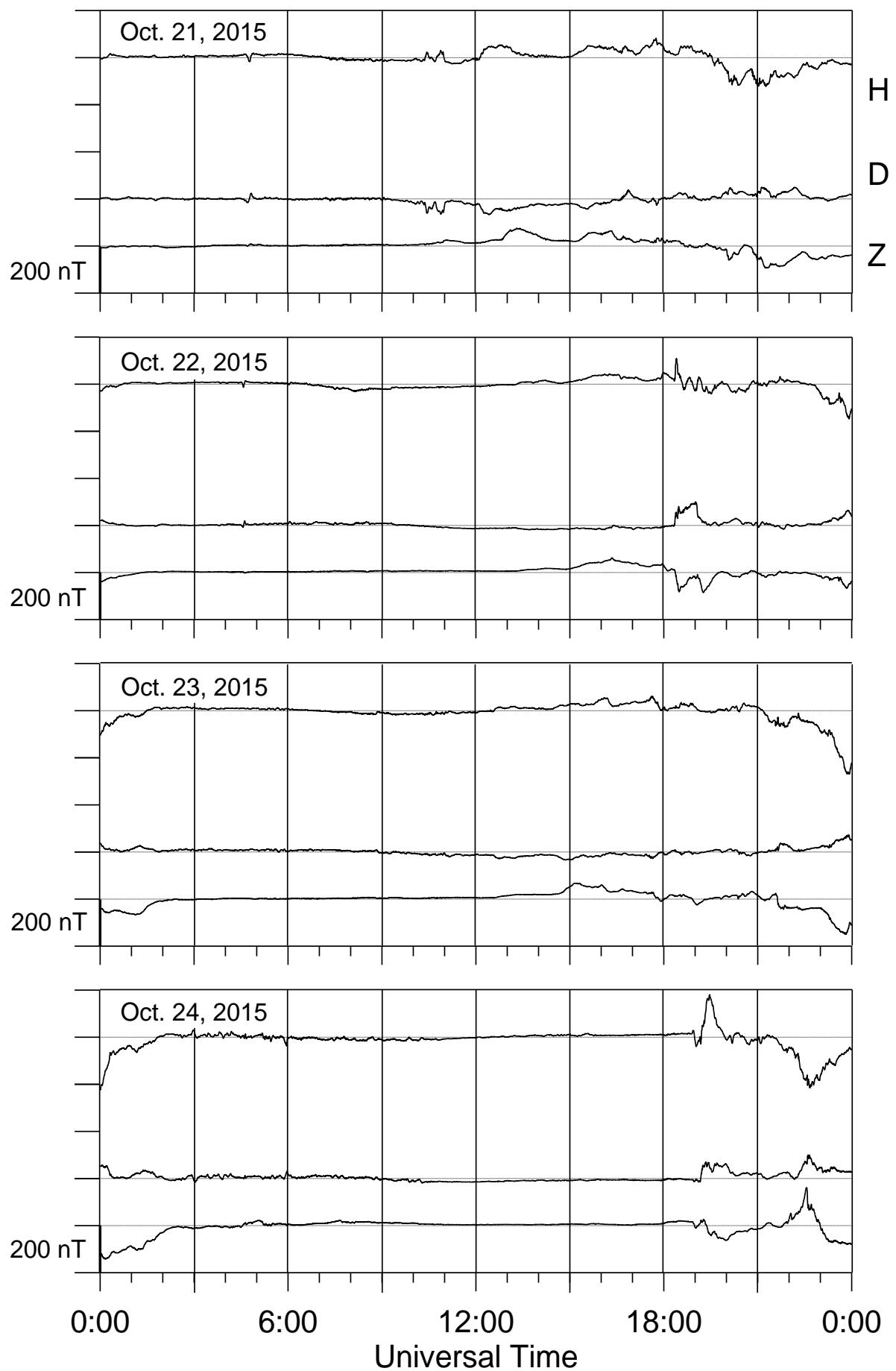
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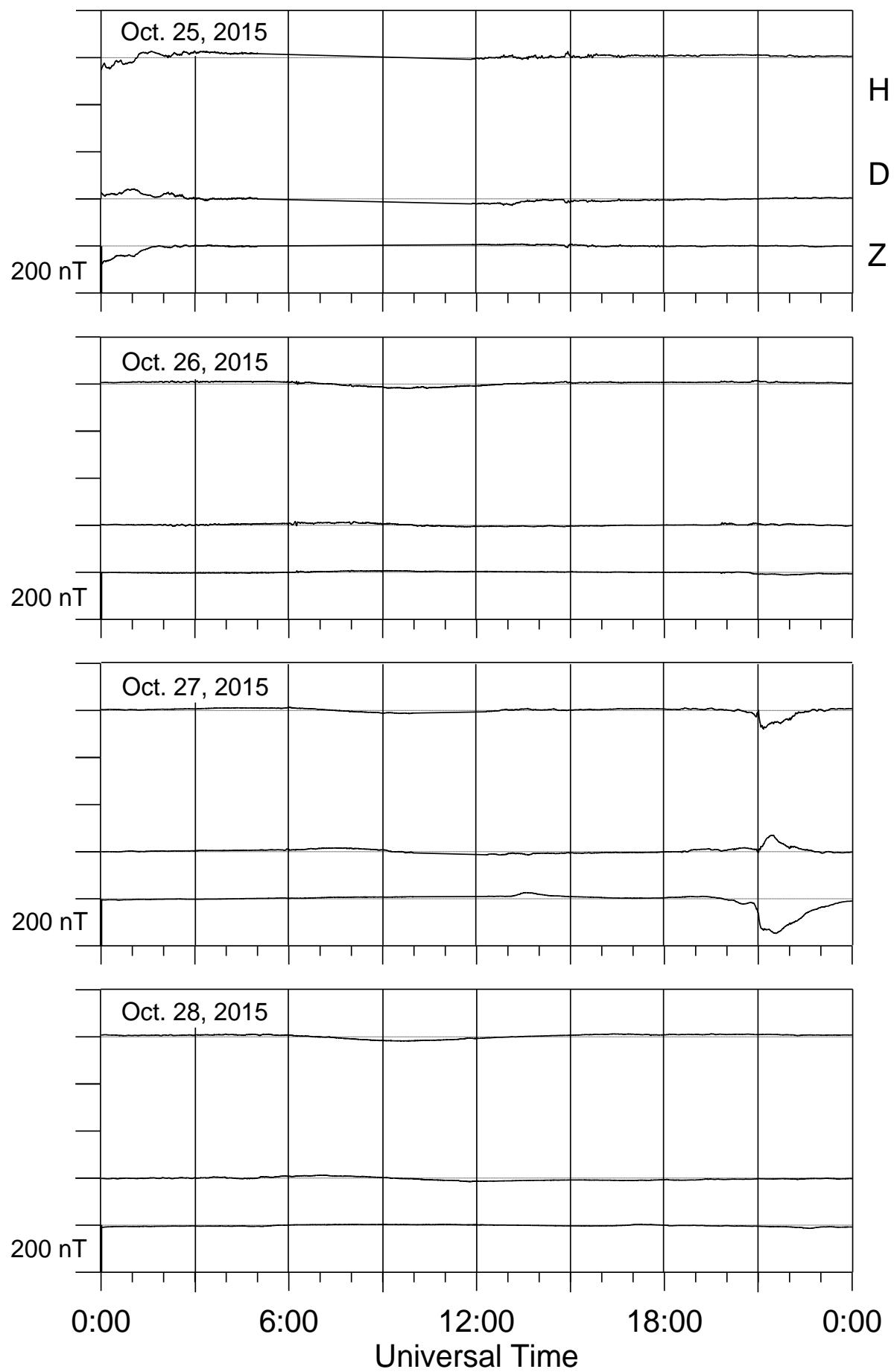
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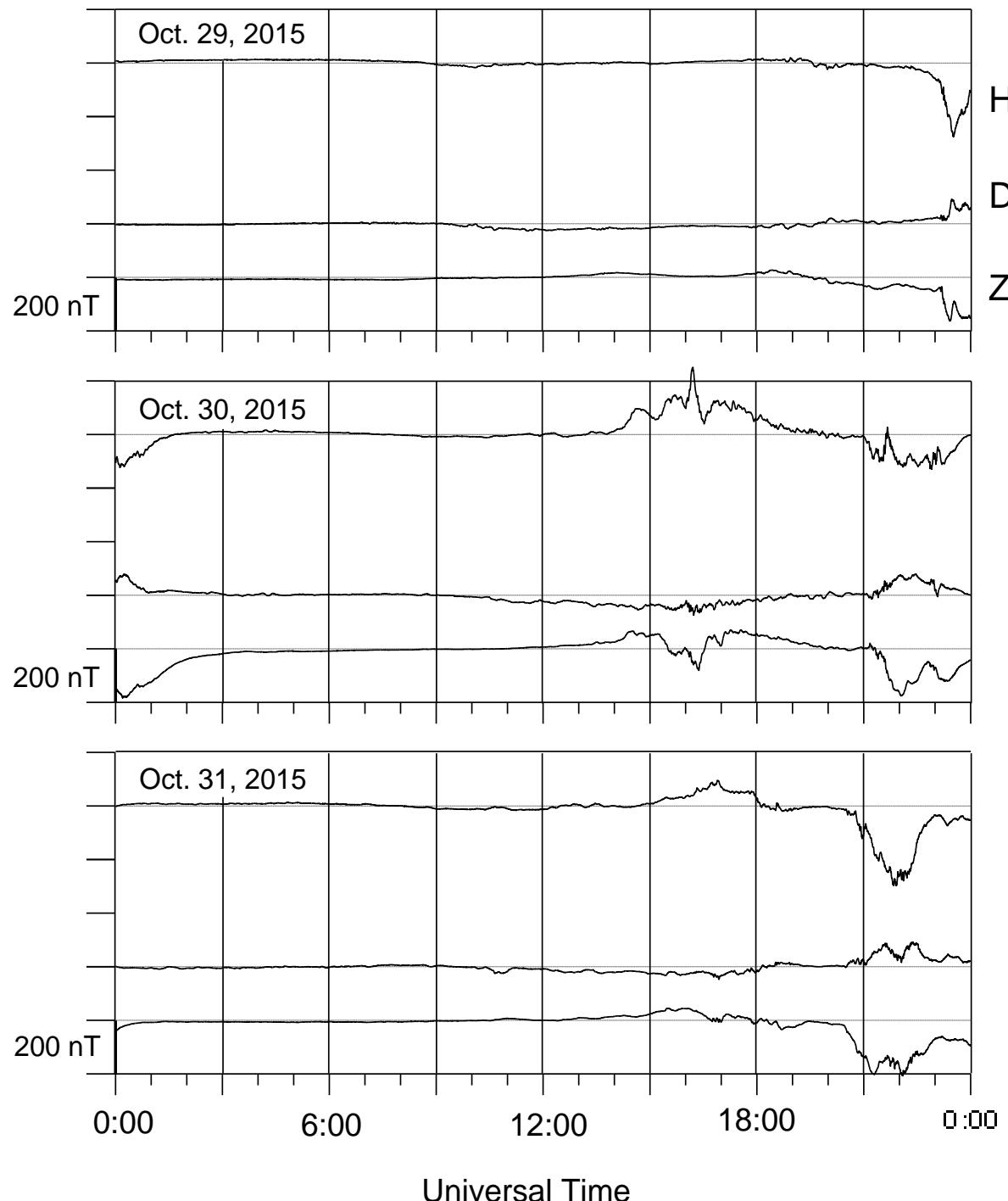
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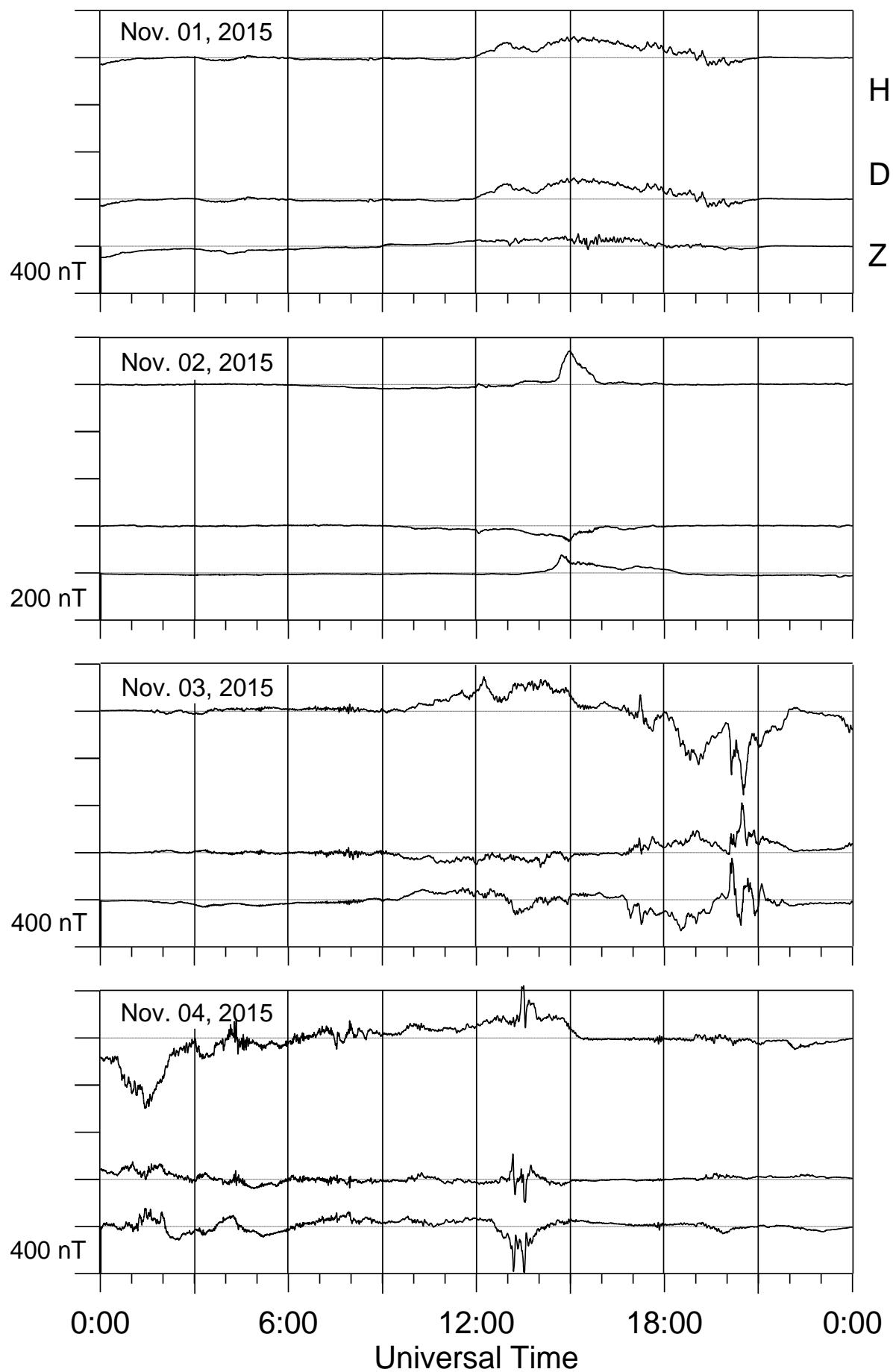
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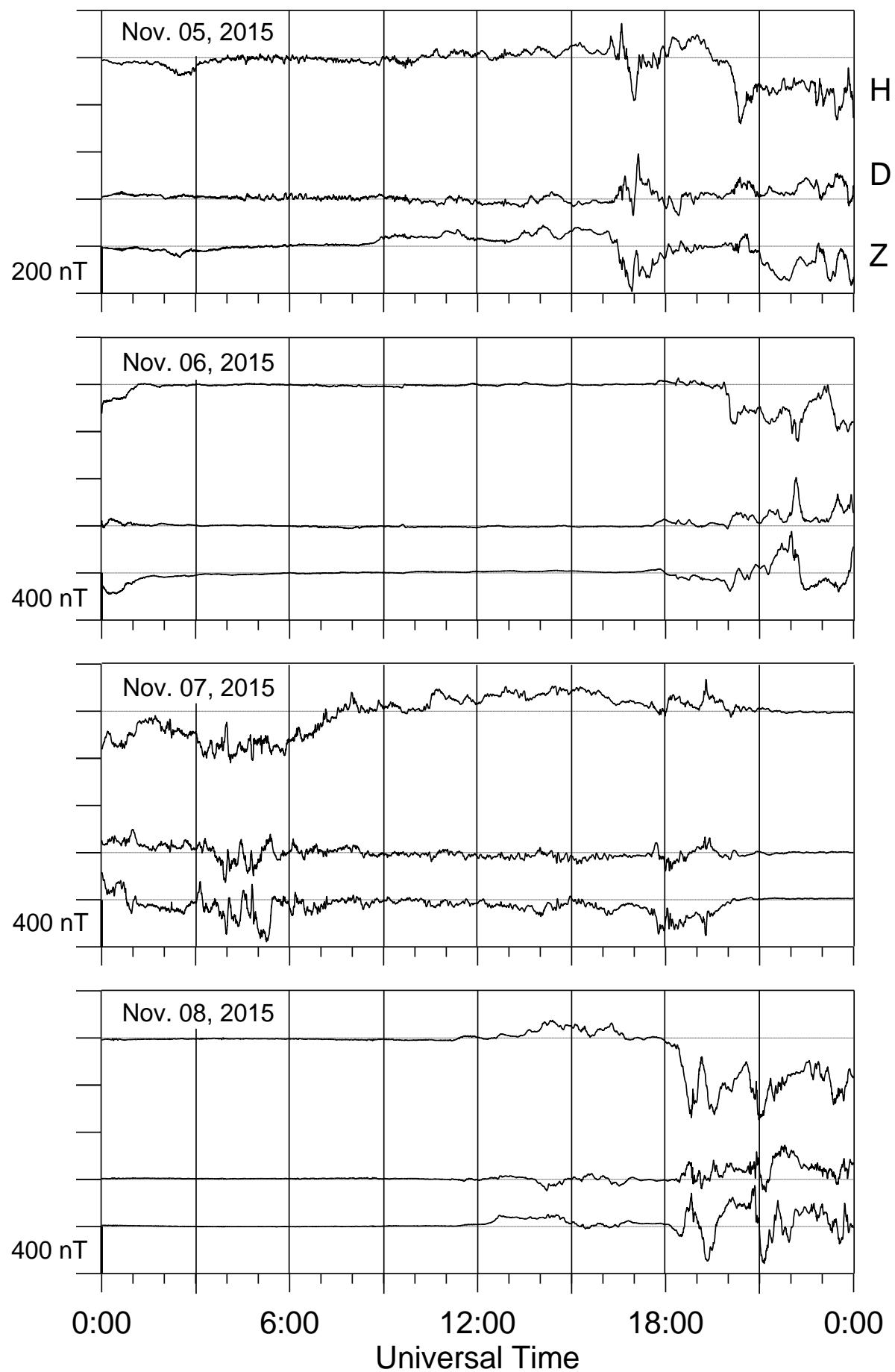
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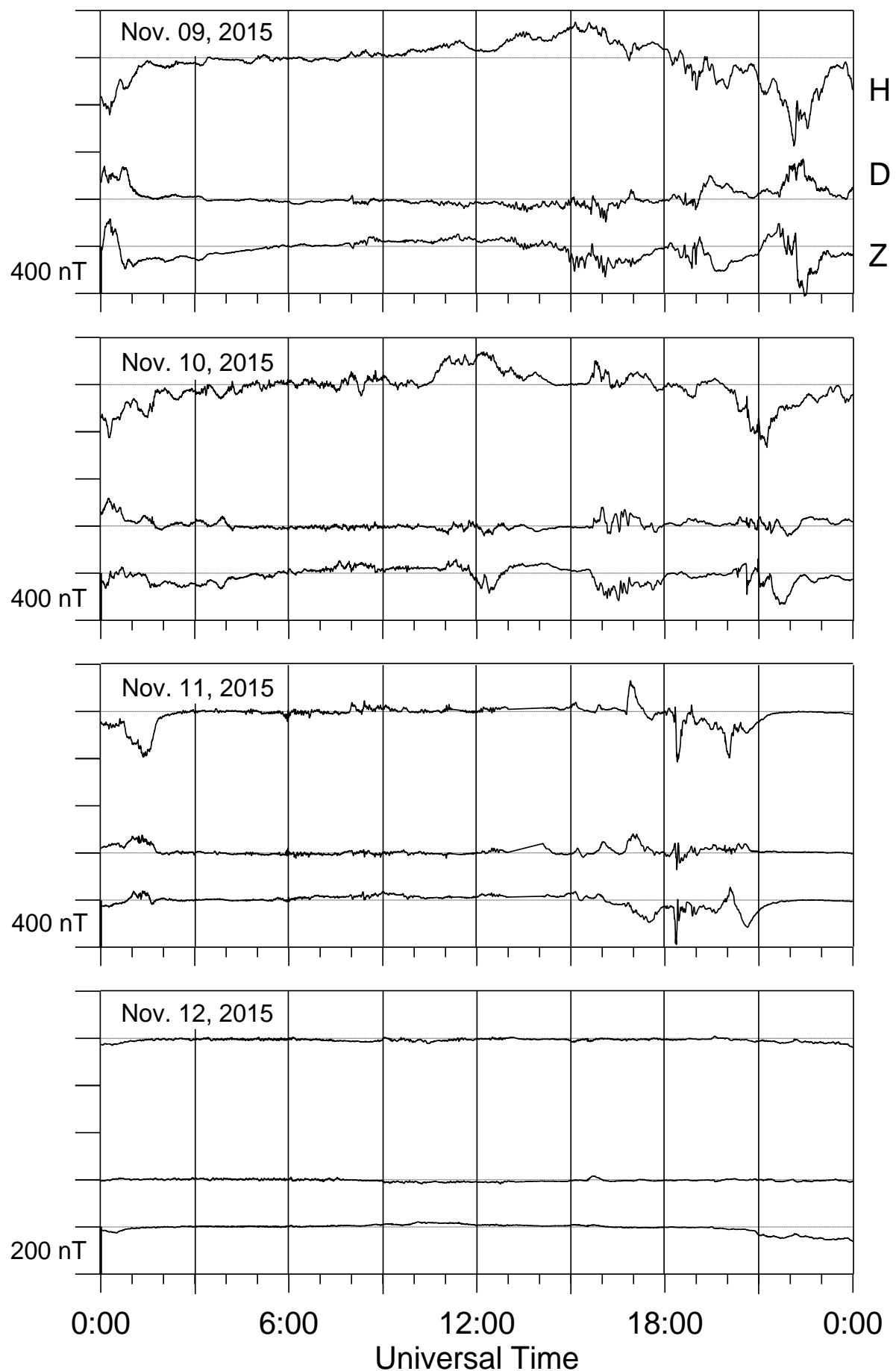
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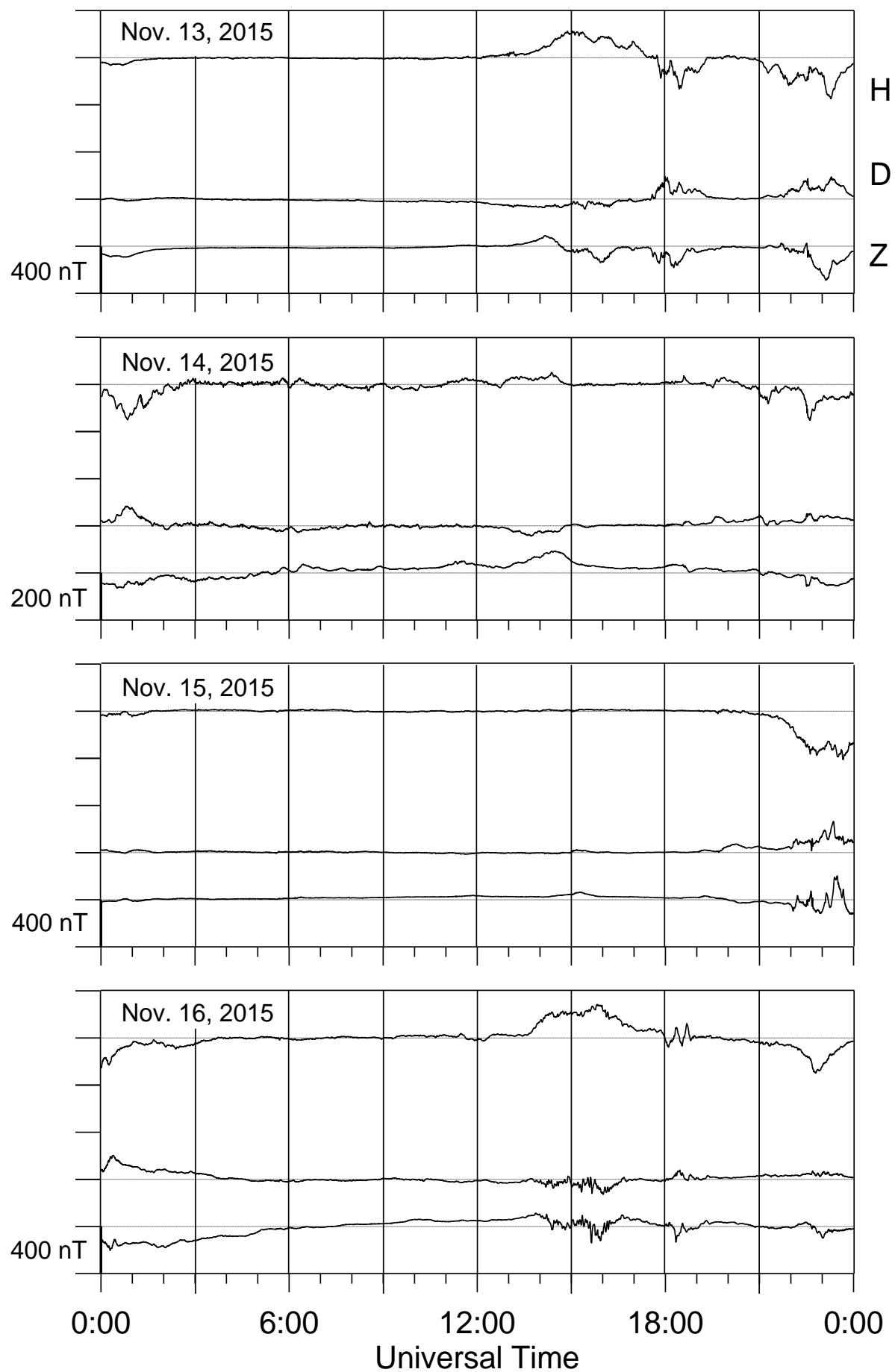
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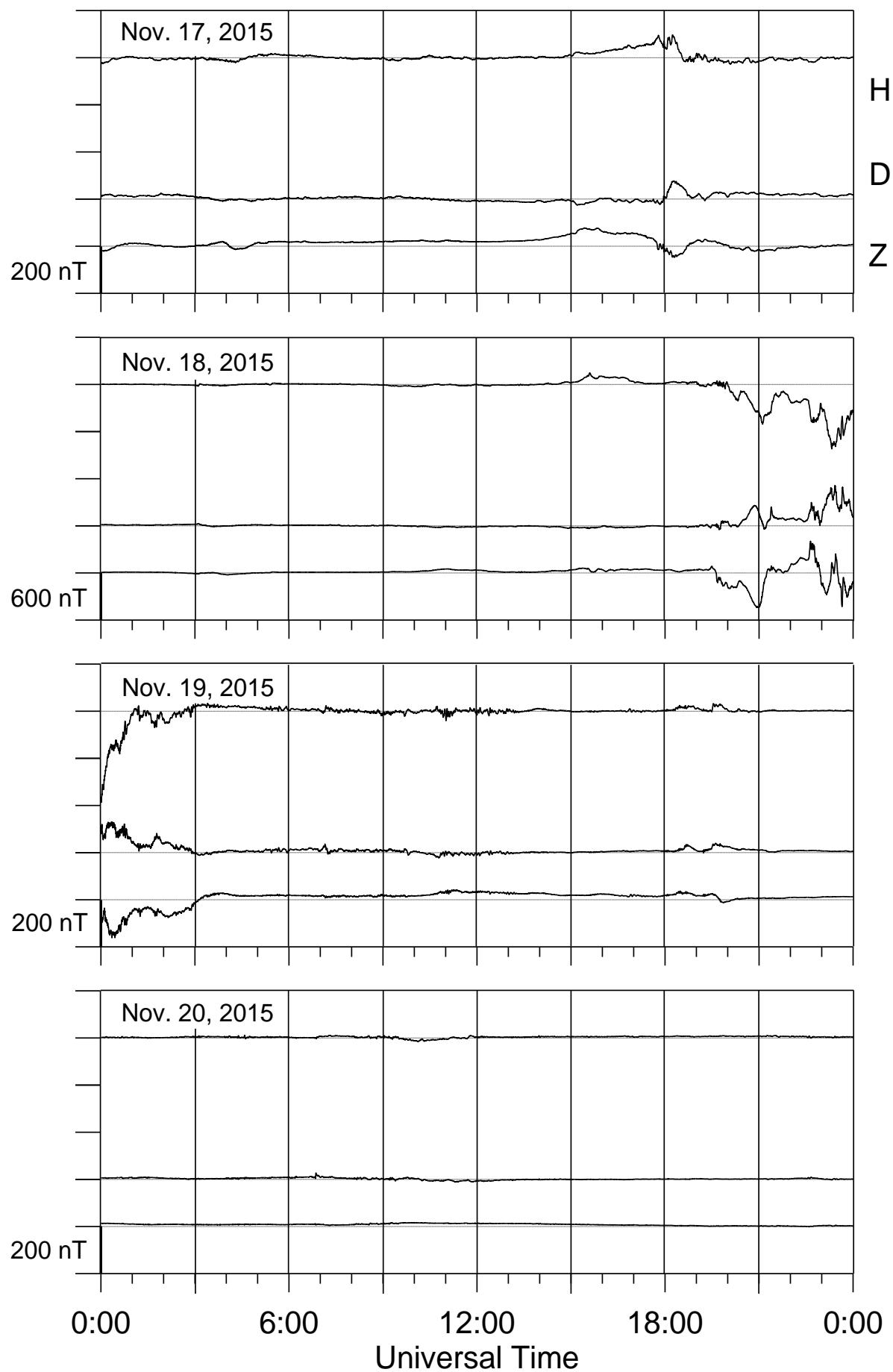
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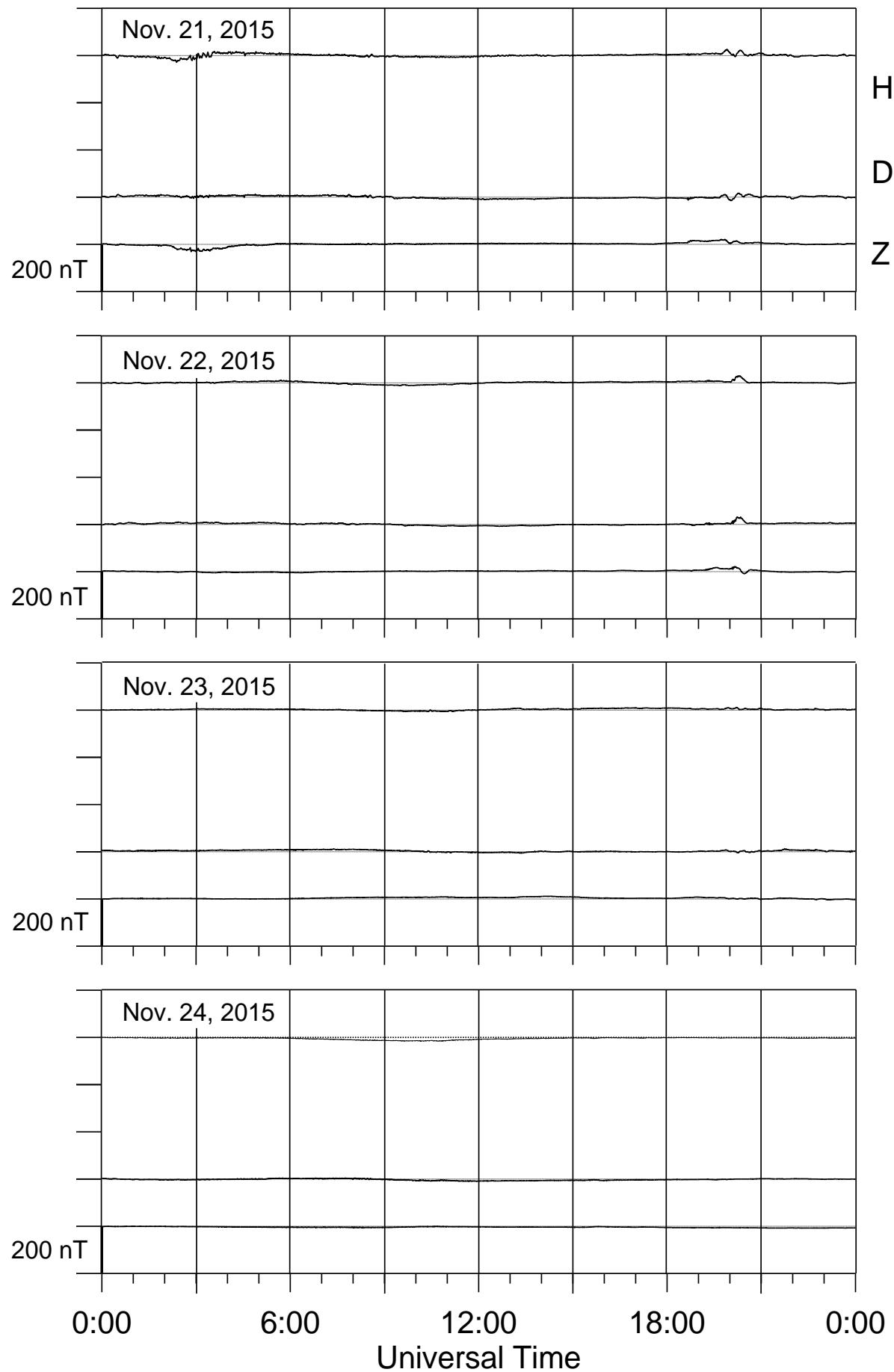
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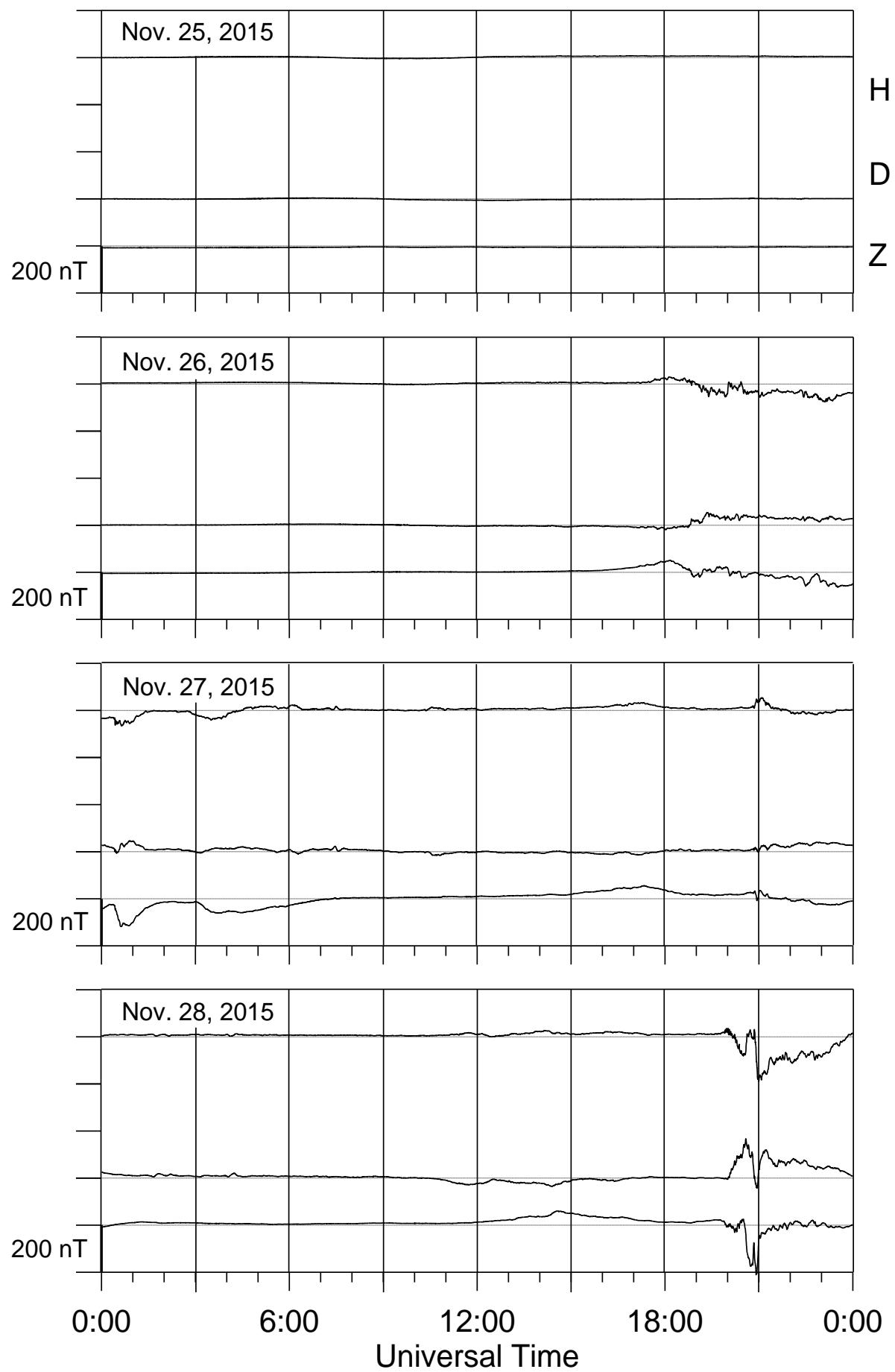
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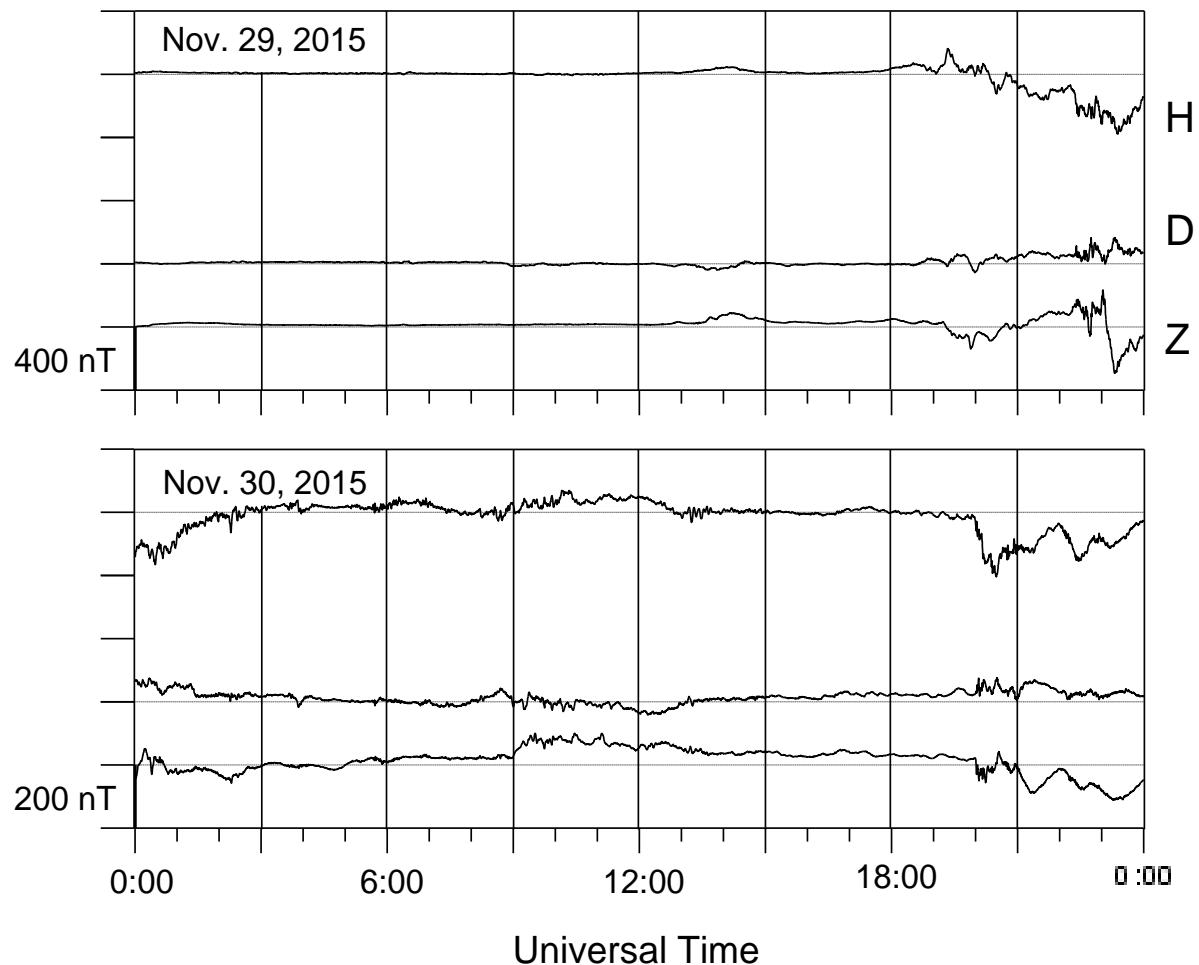
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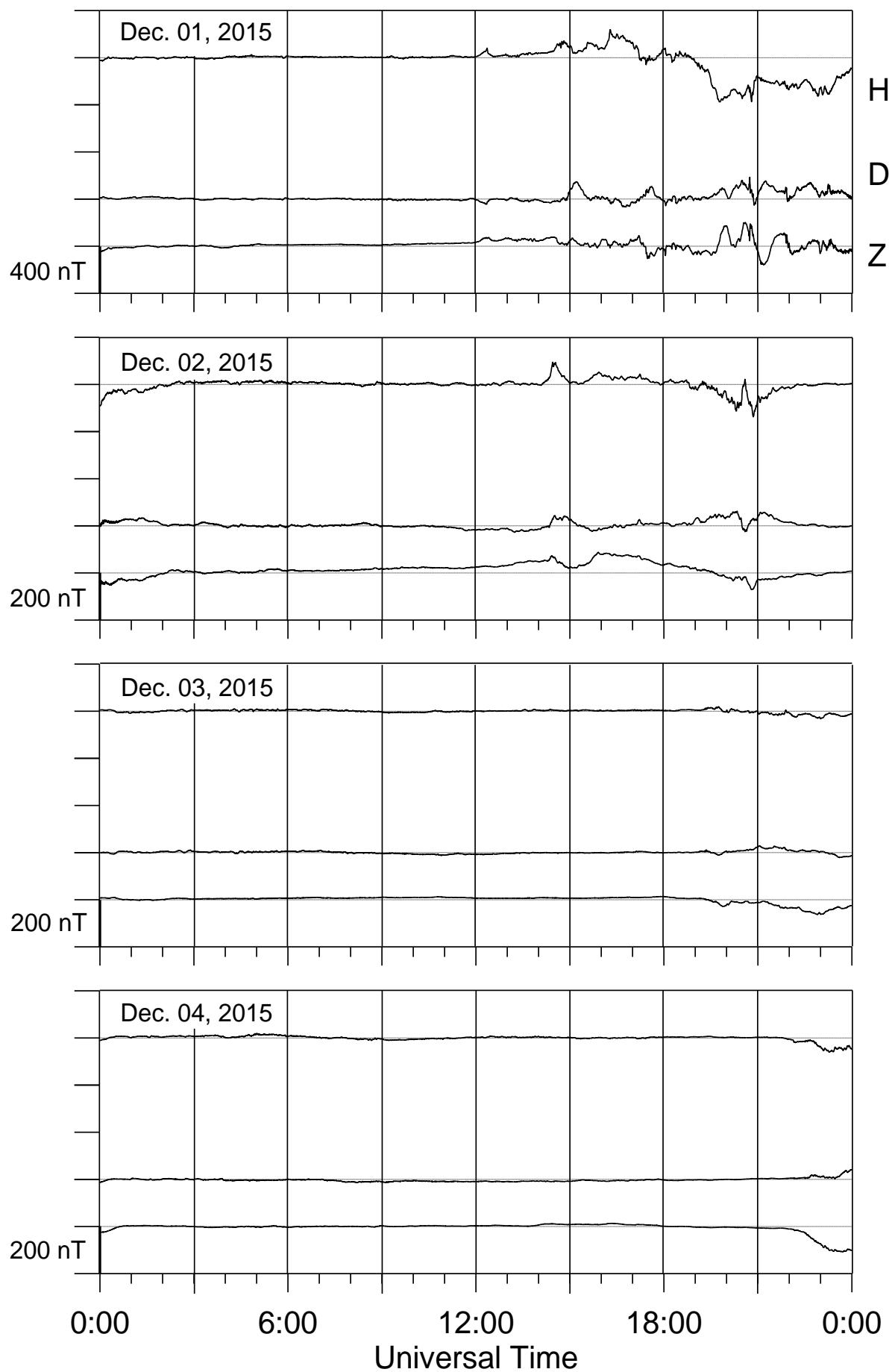
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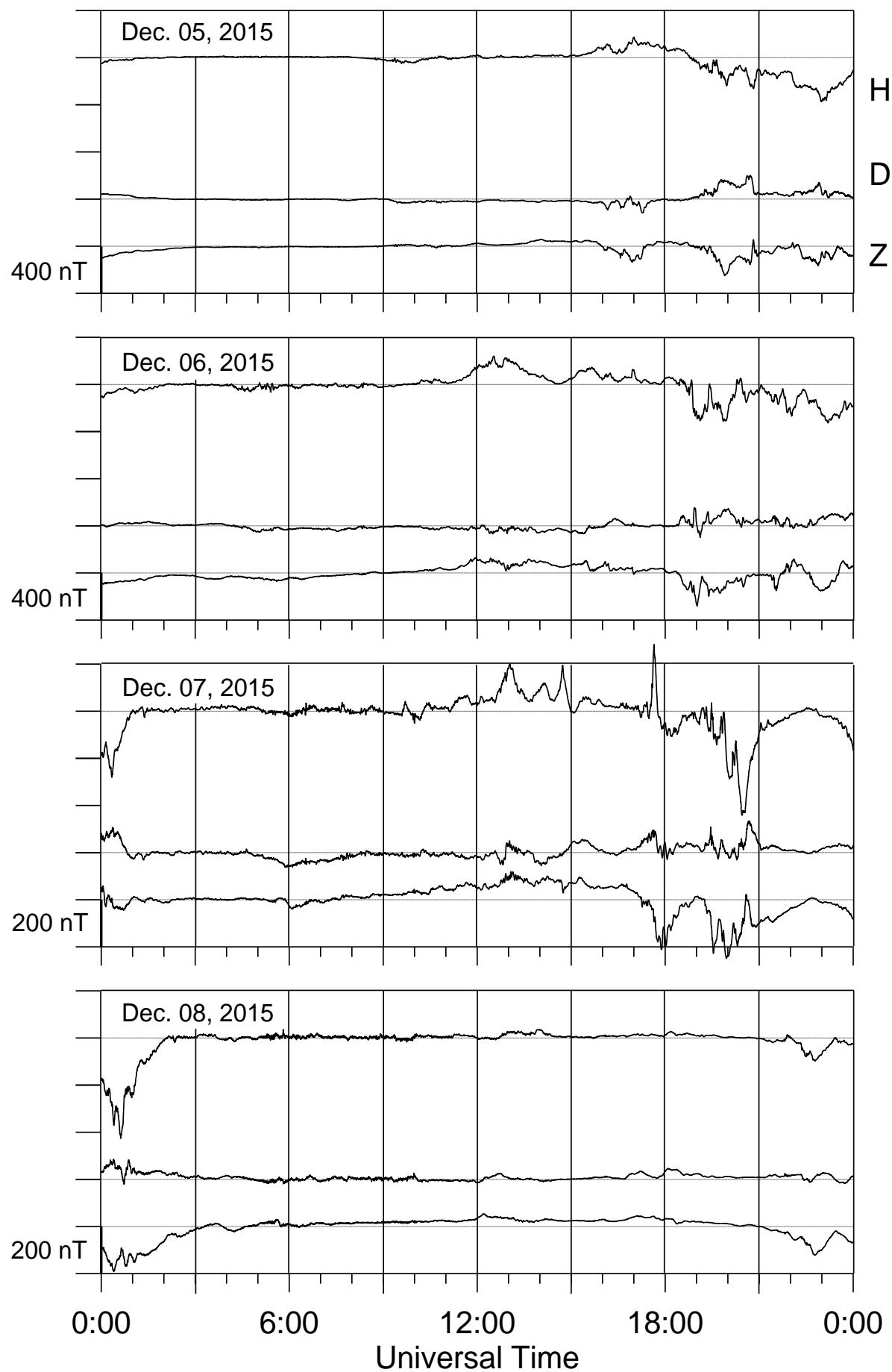
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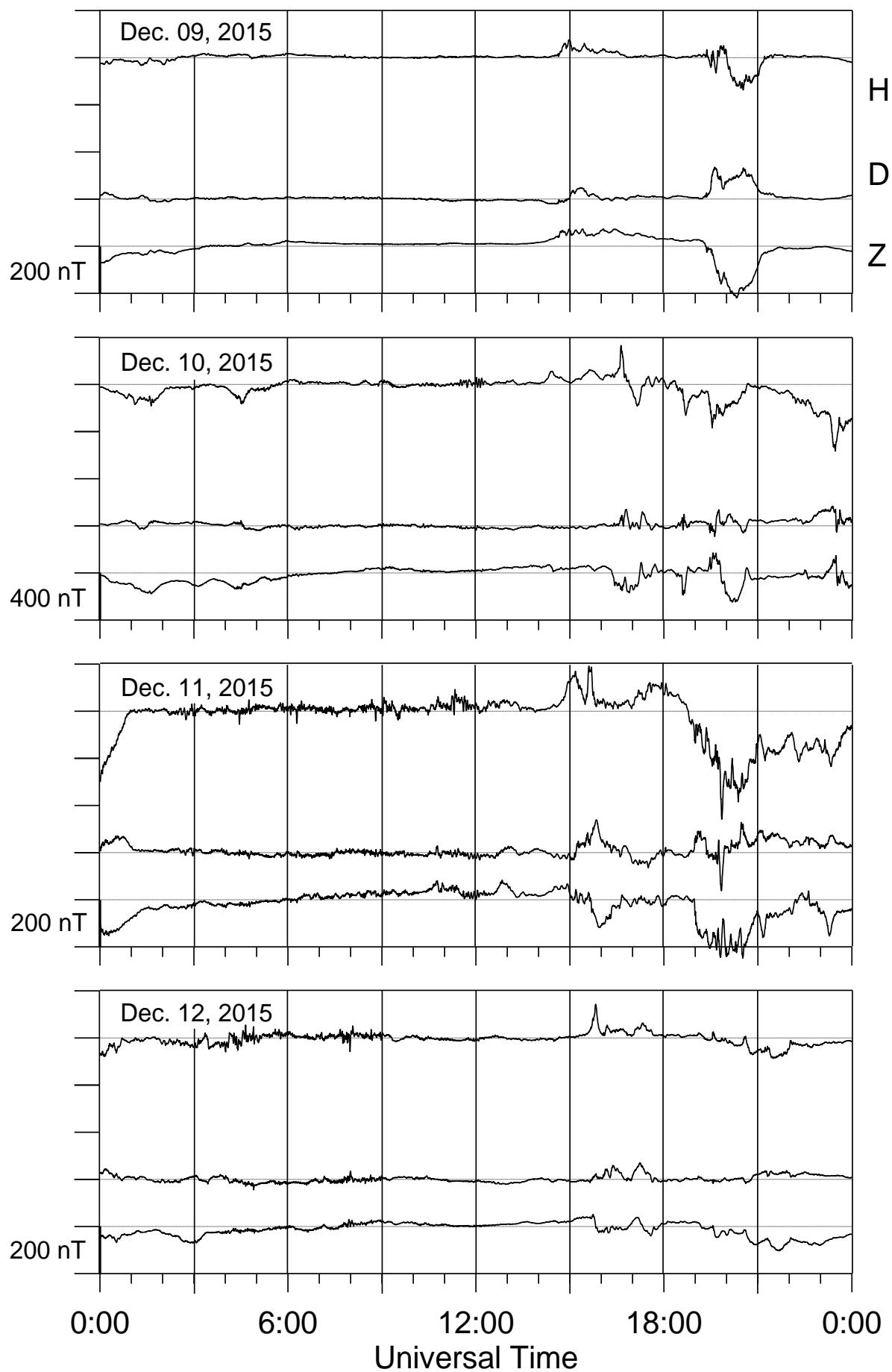
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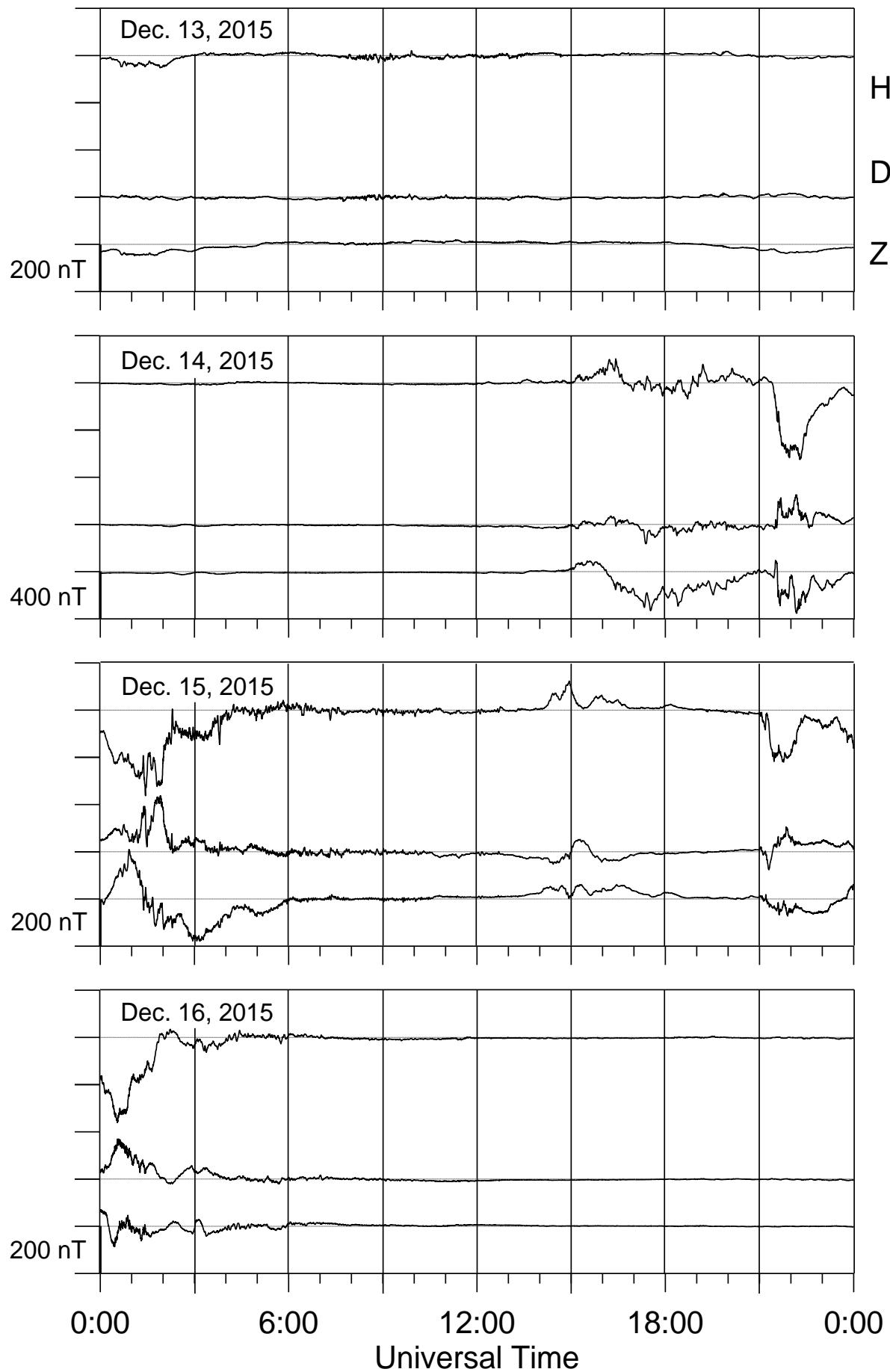
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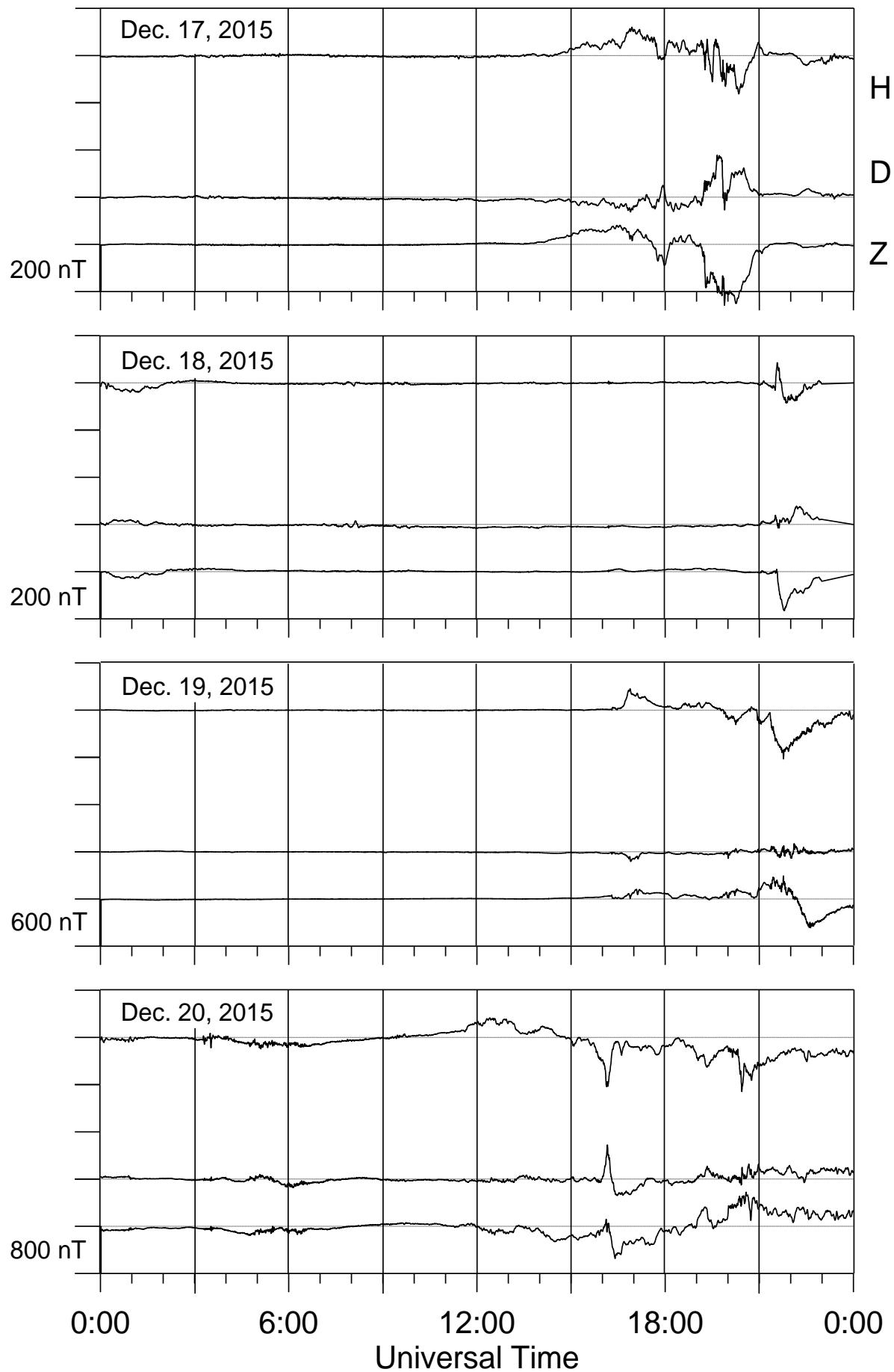
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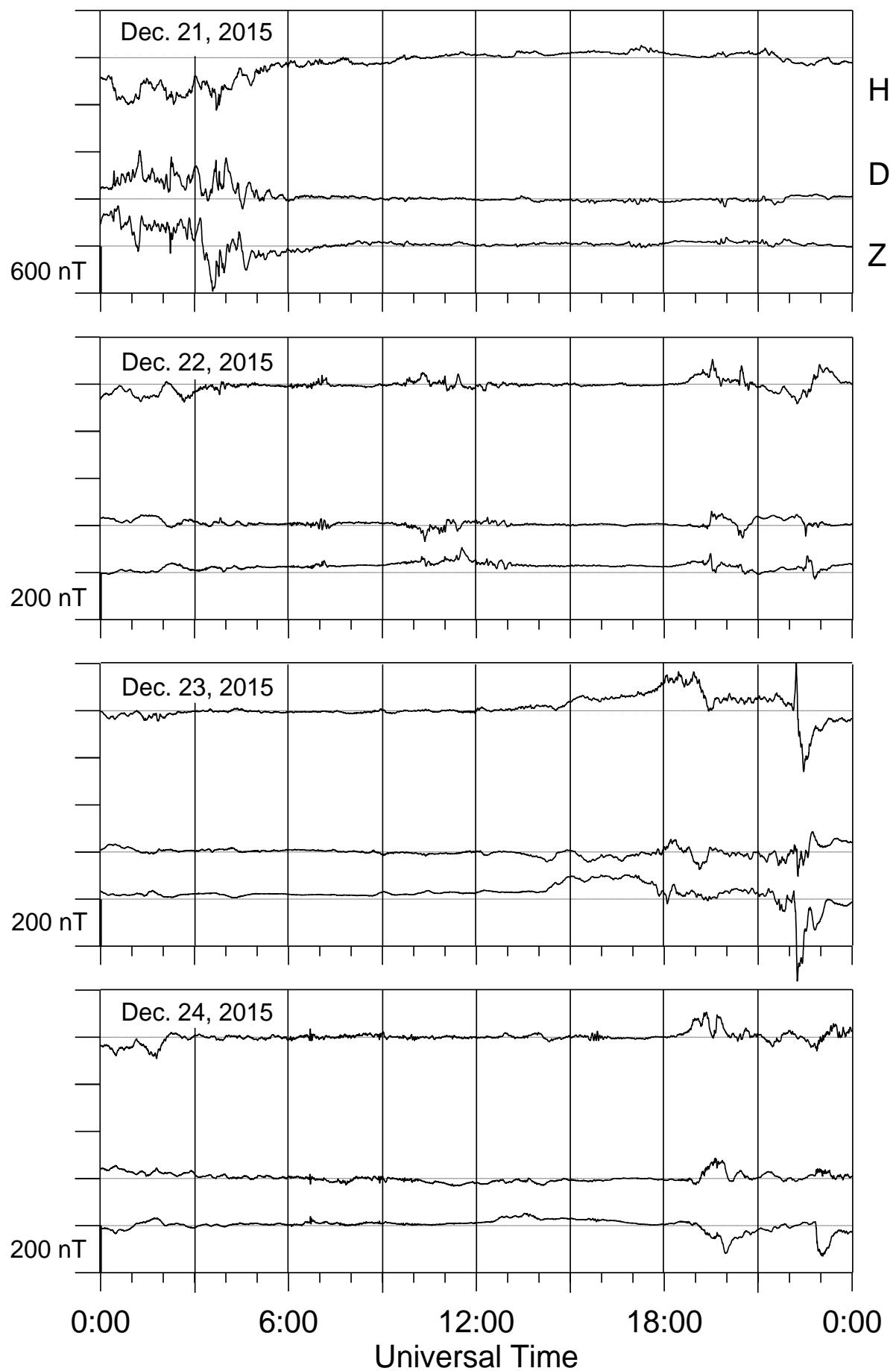
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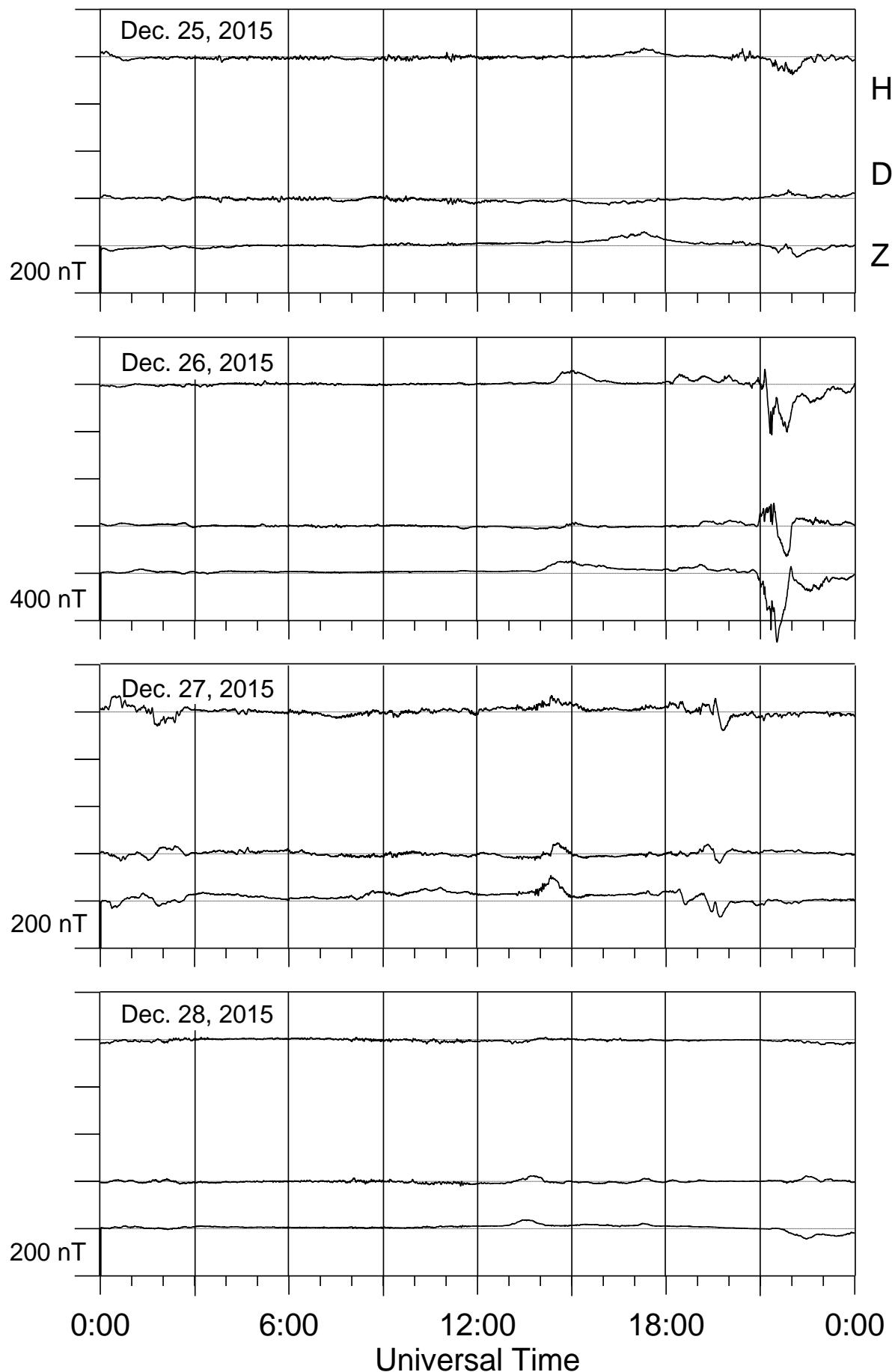
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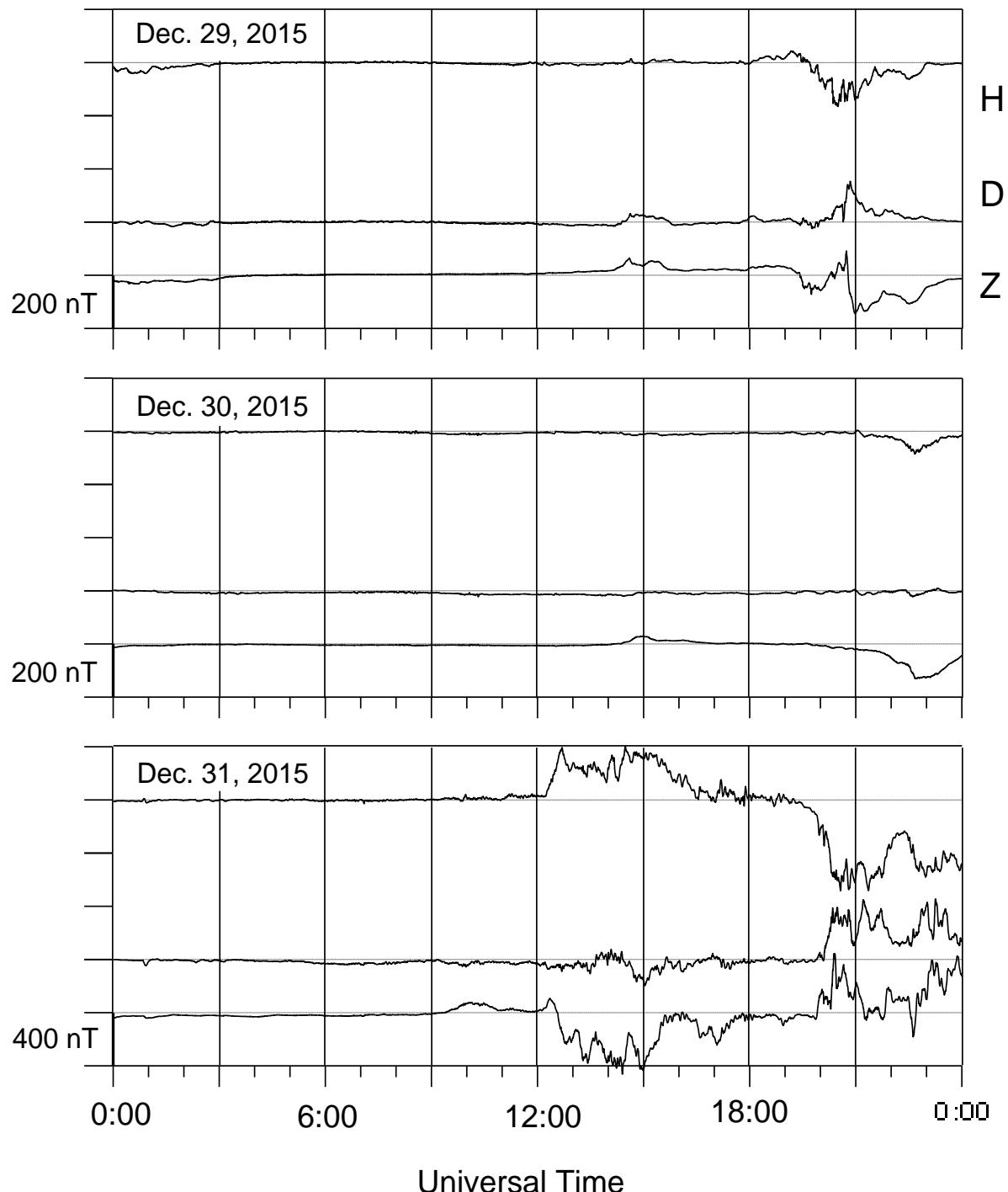
Lovozero magnetometer



Lovozero magnetometer

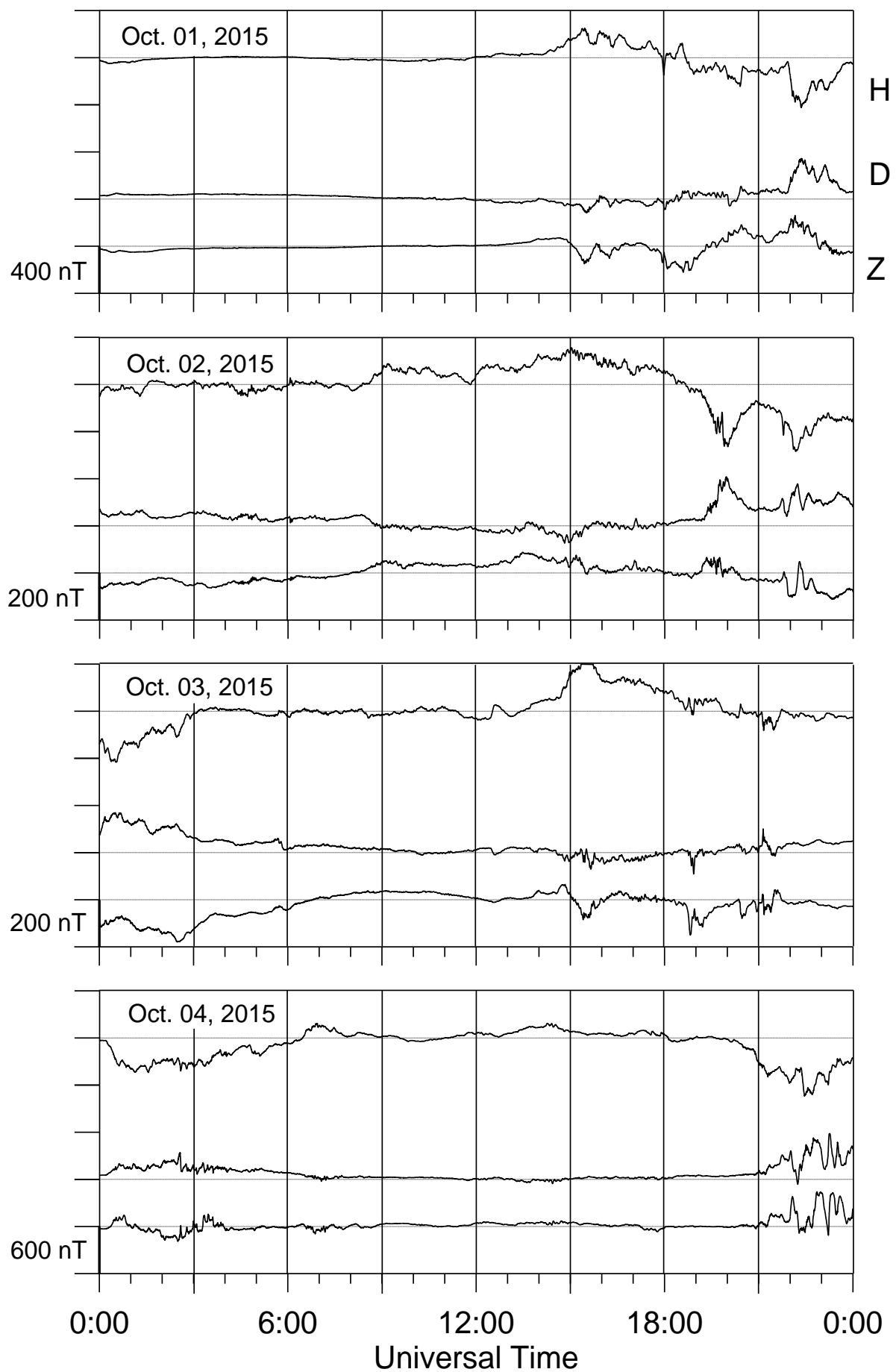


Lovozero magnetometer

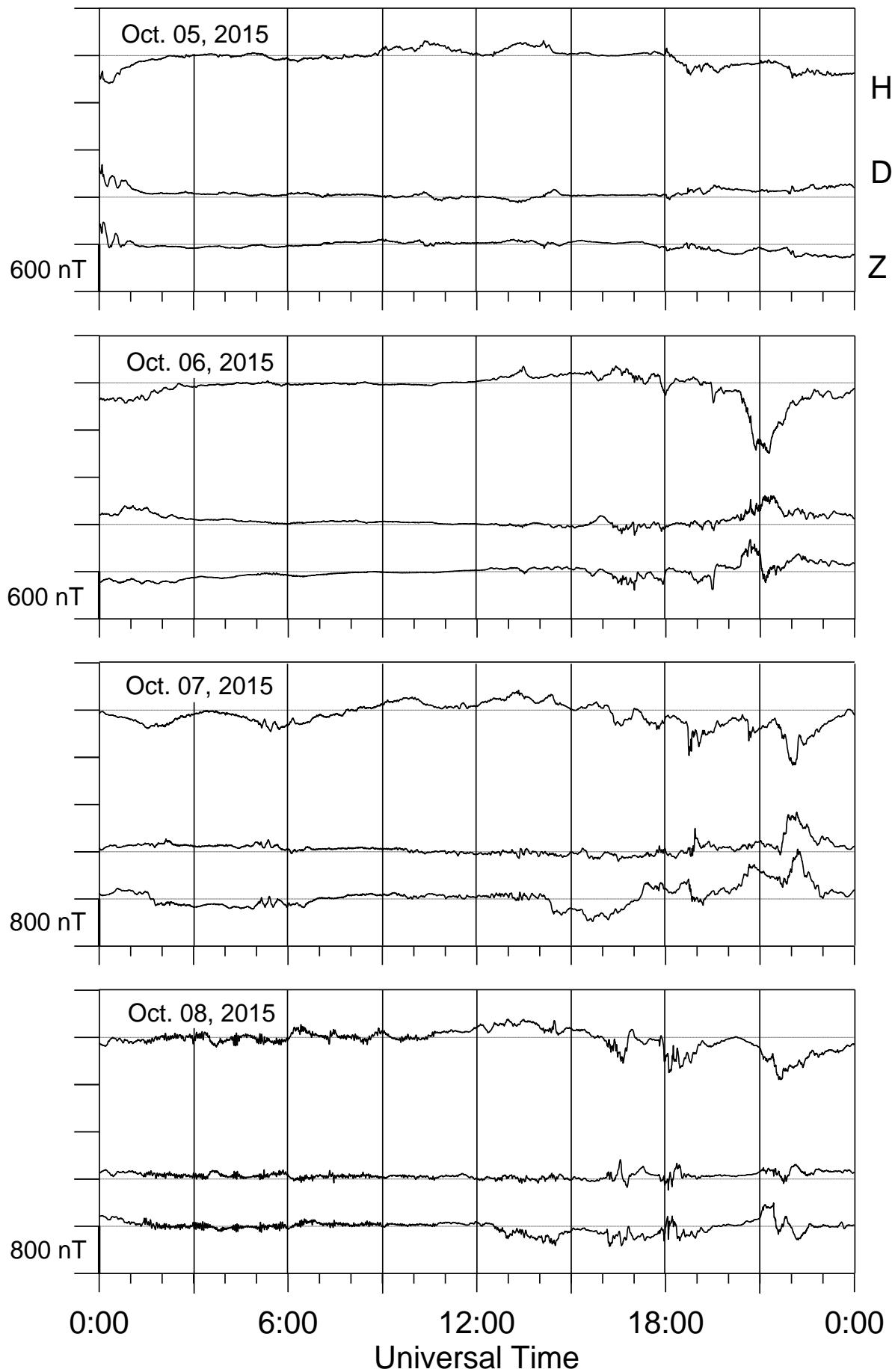


LOPARKAYA MAGNETOGRAMS**October - December 2015**

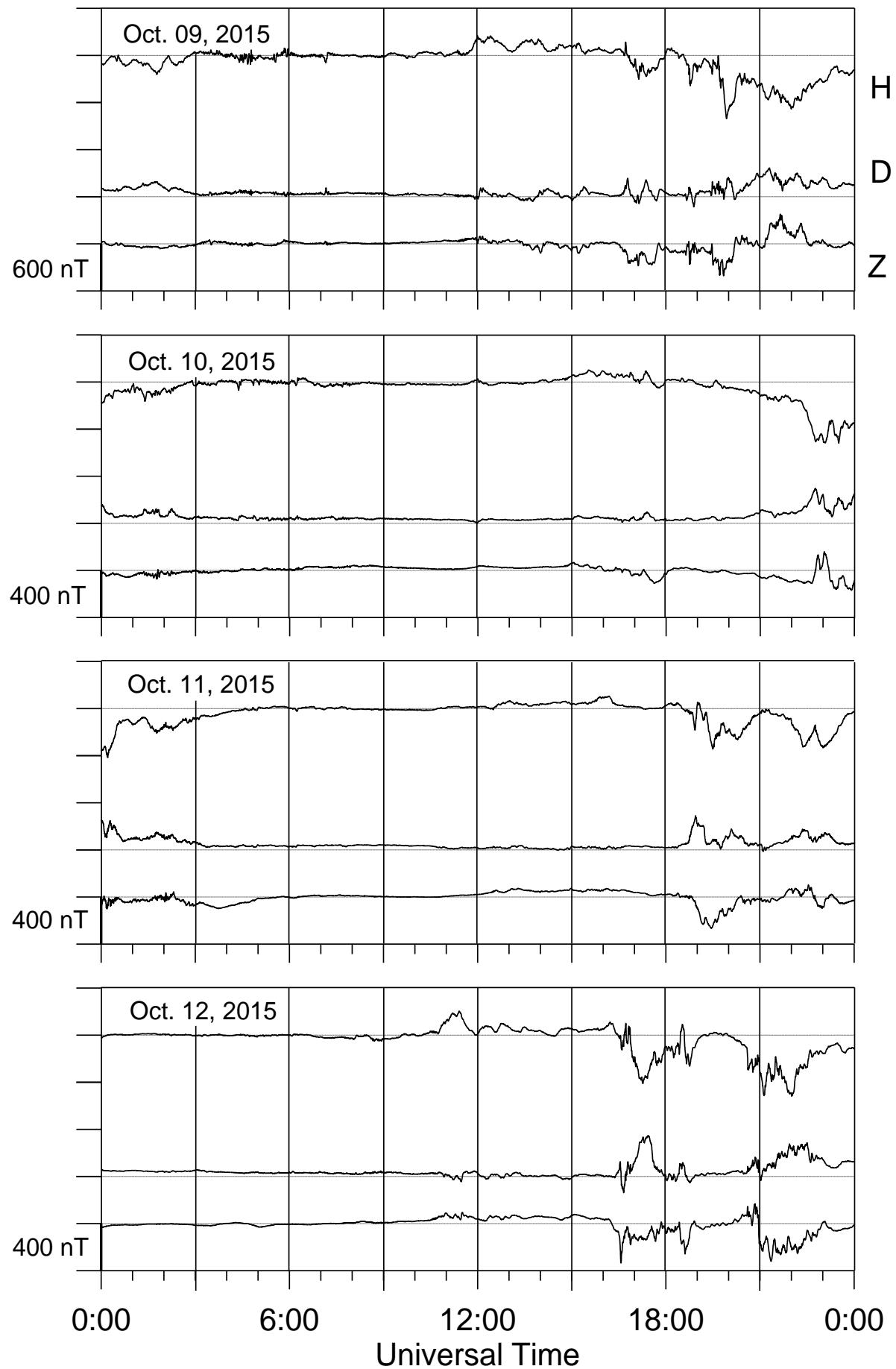
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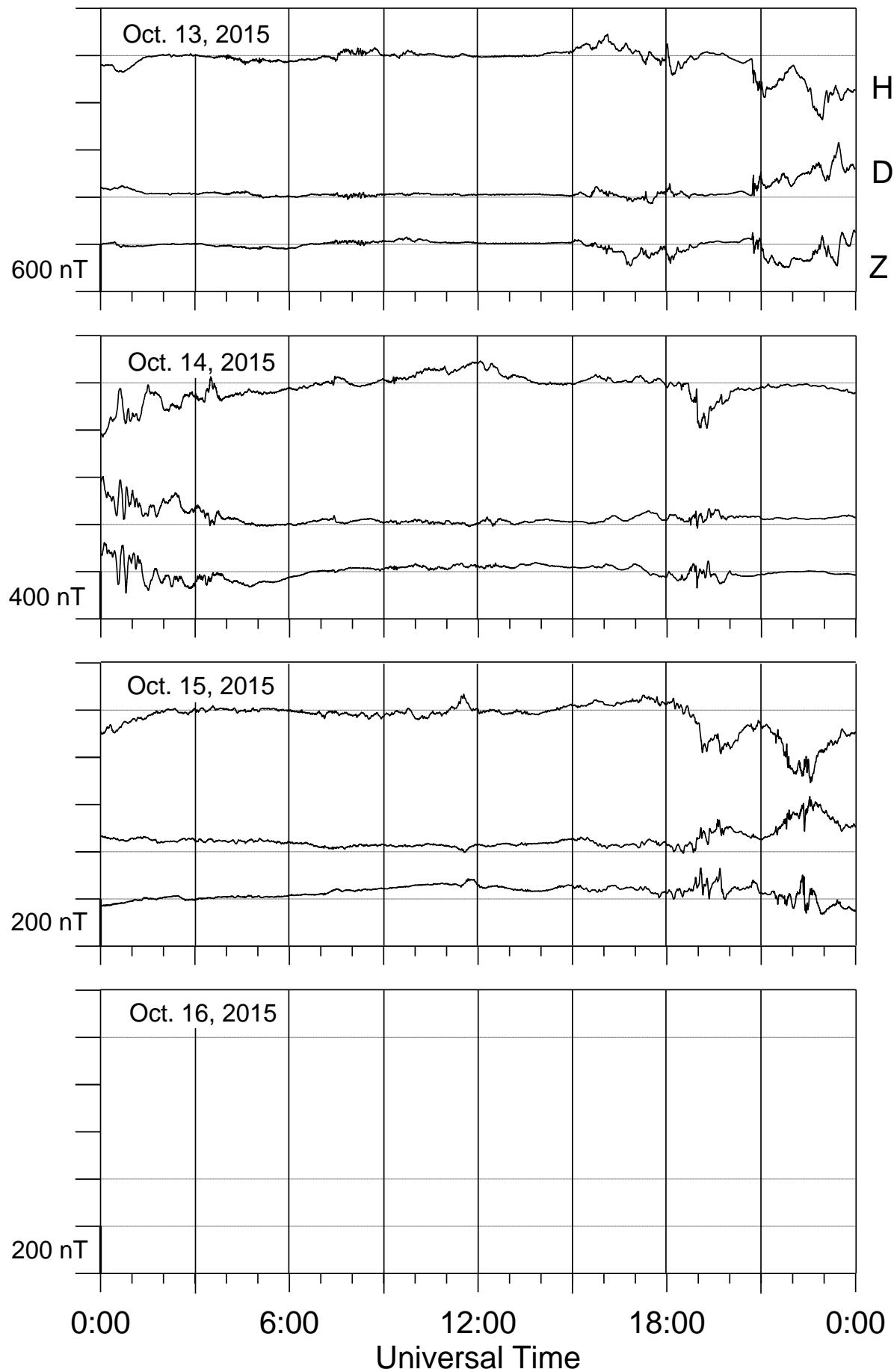
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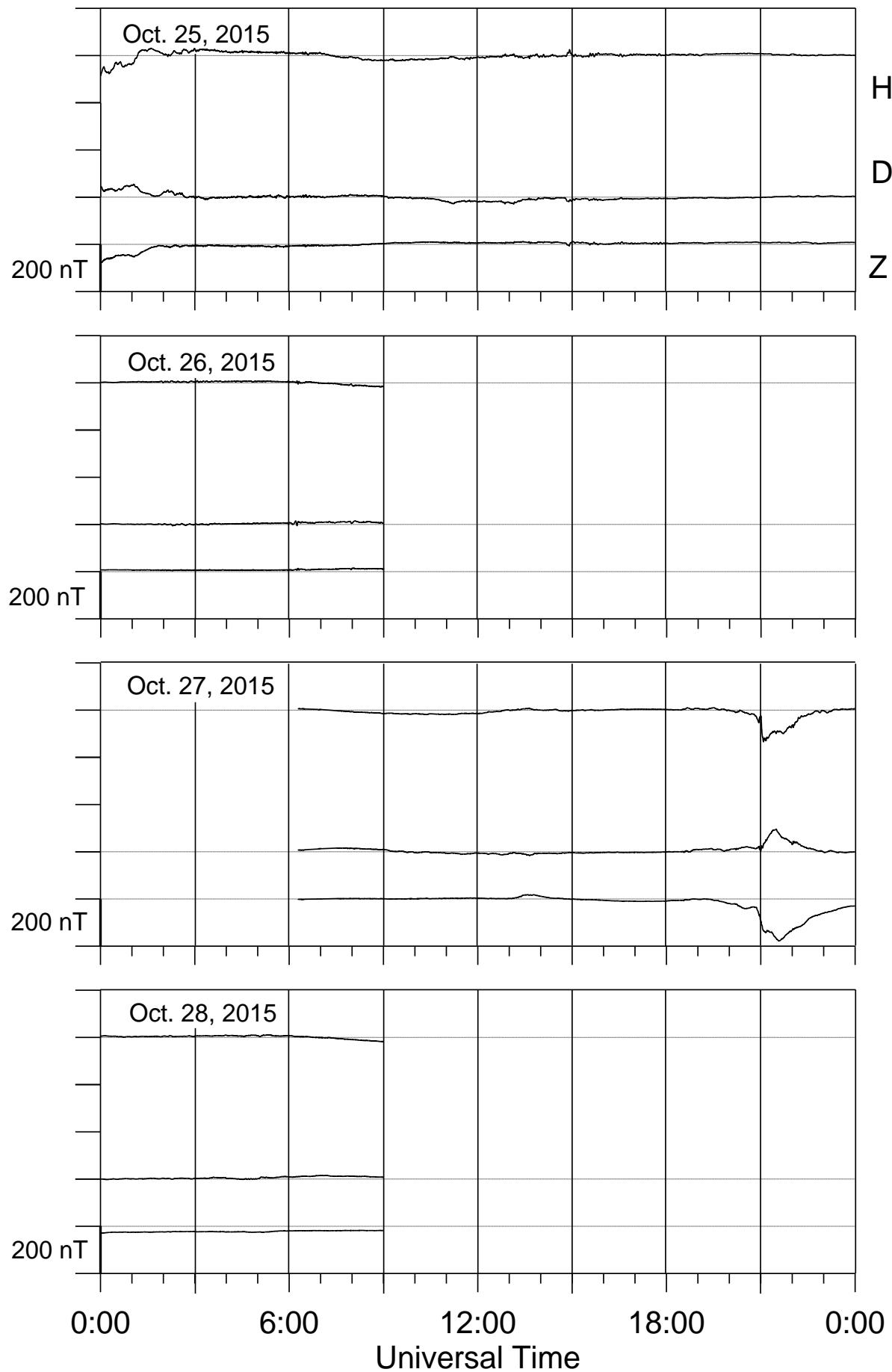
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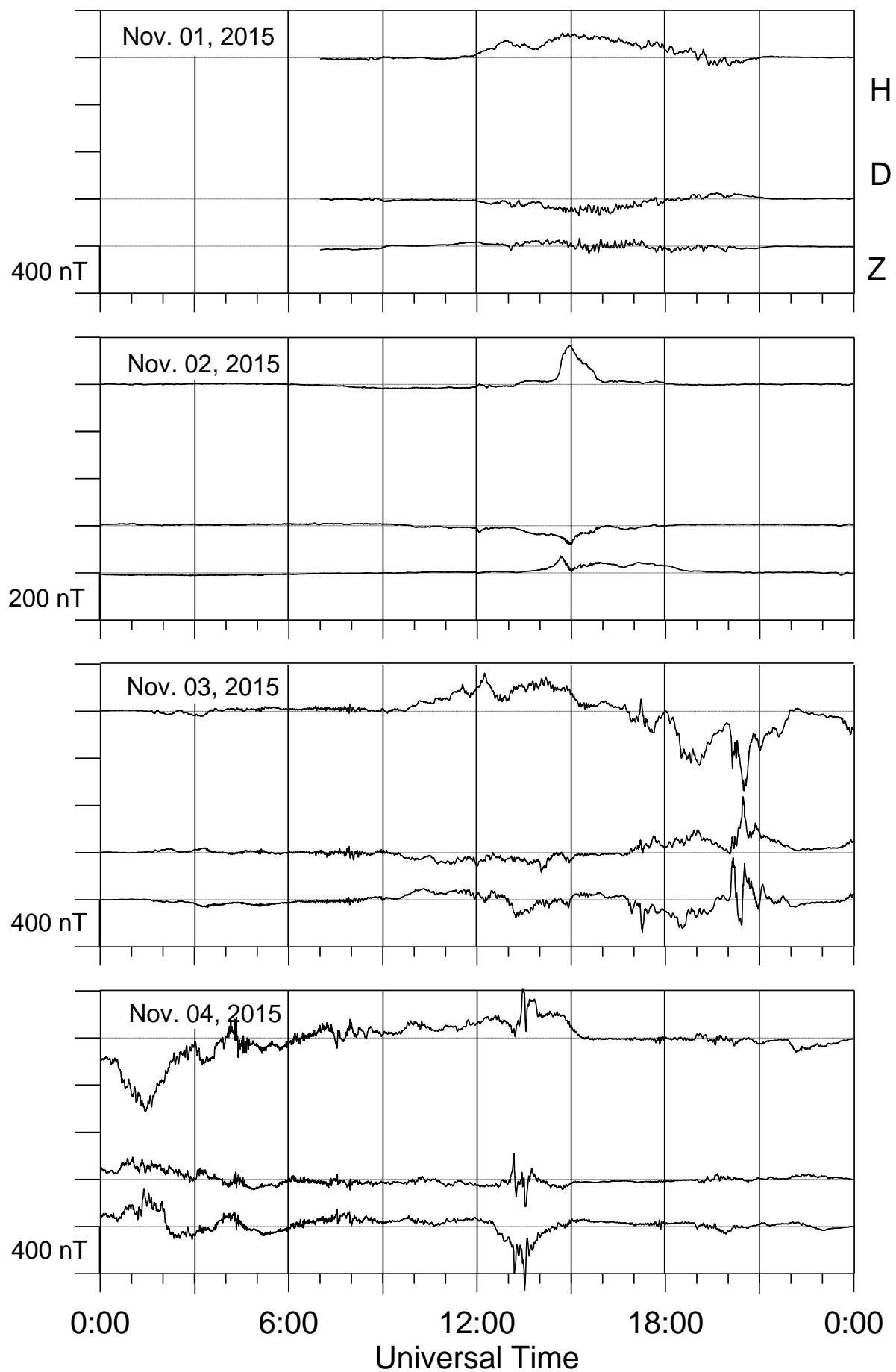
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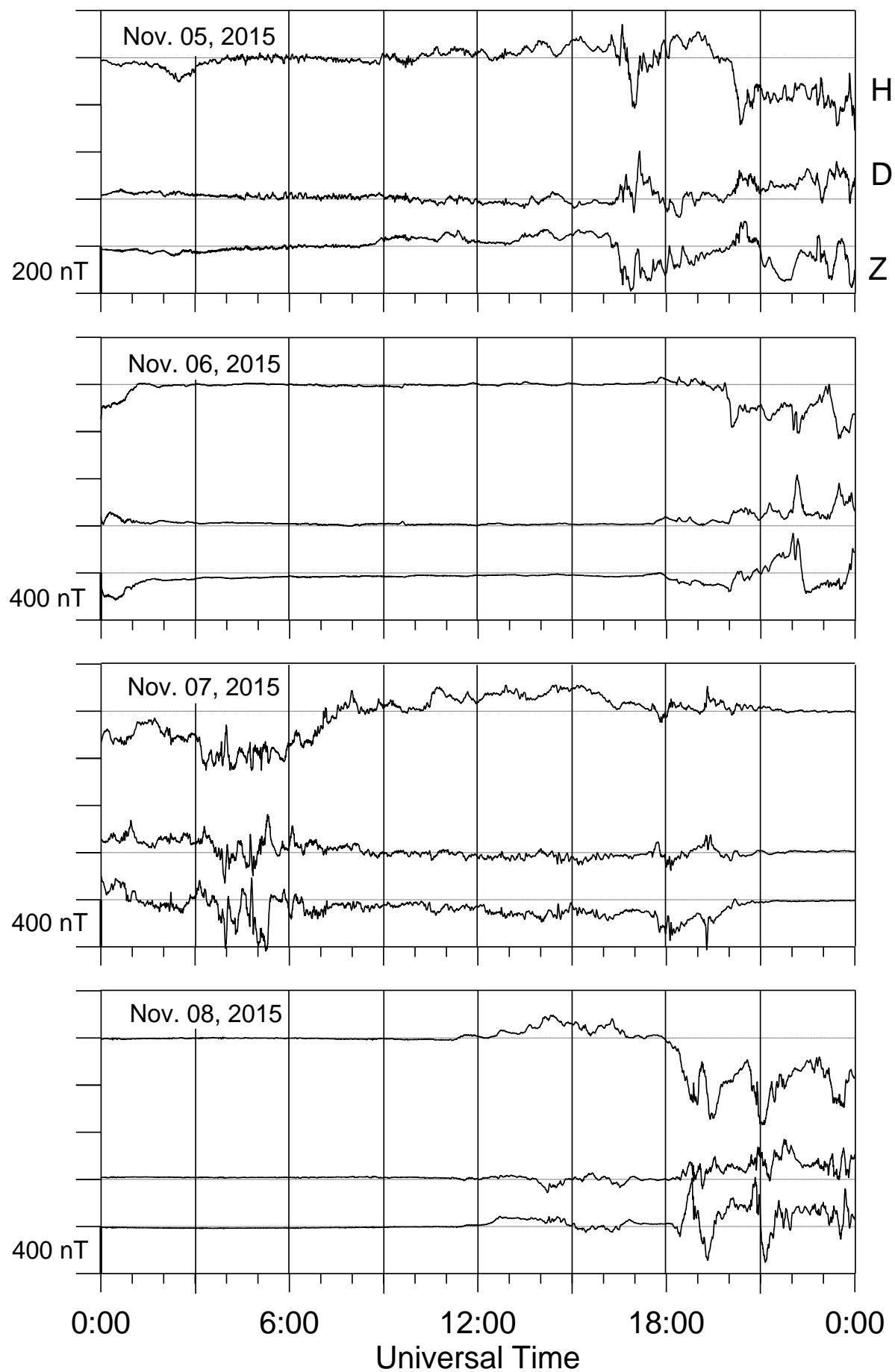
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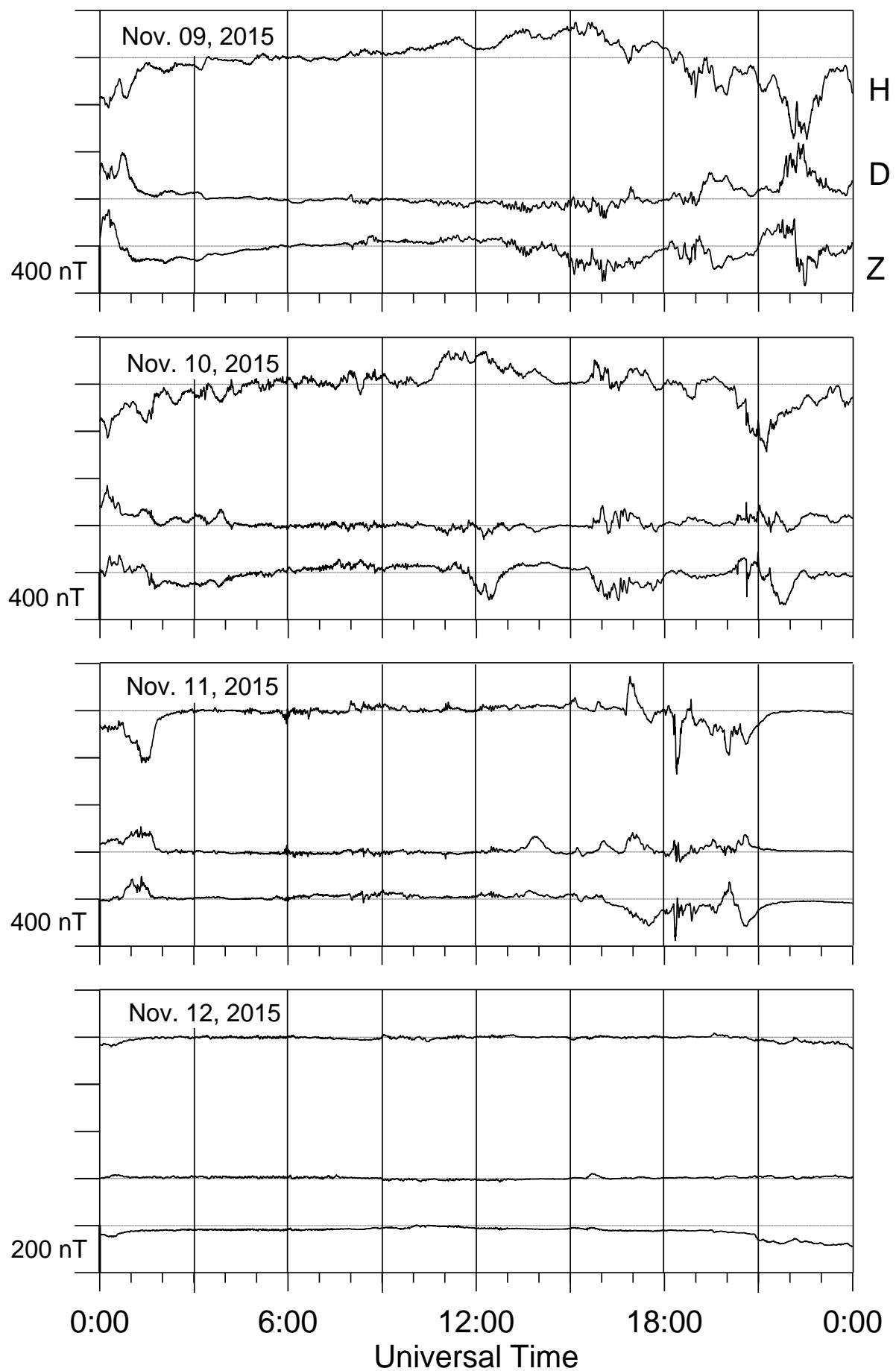
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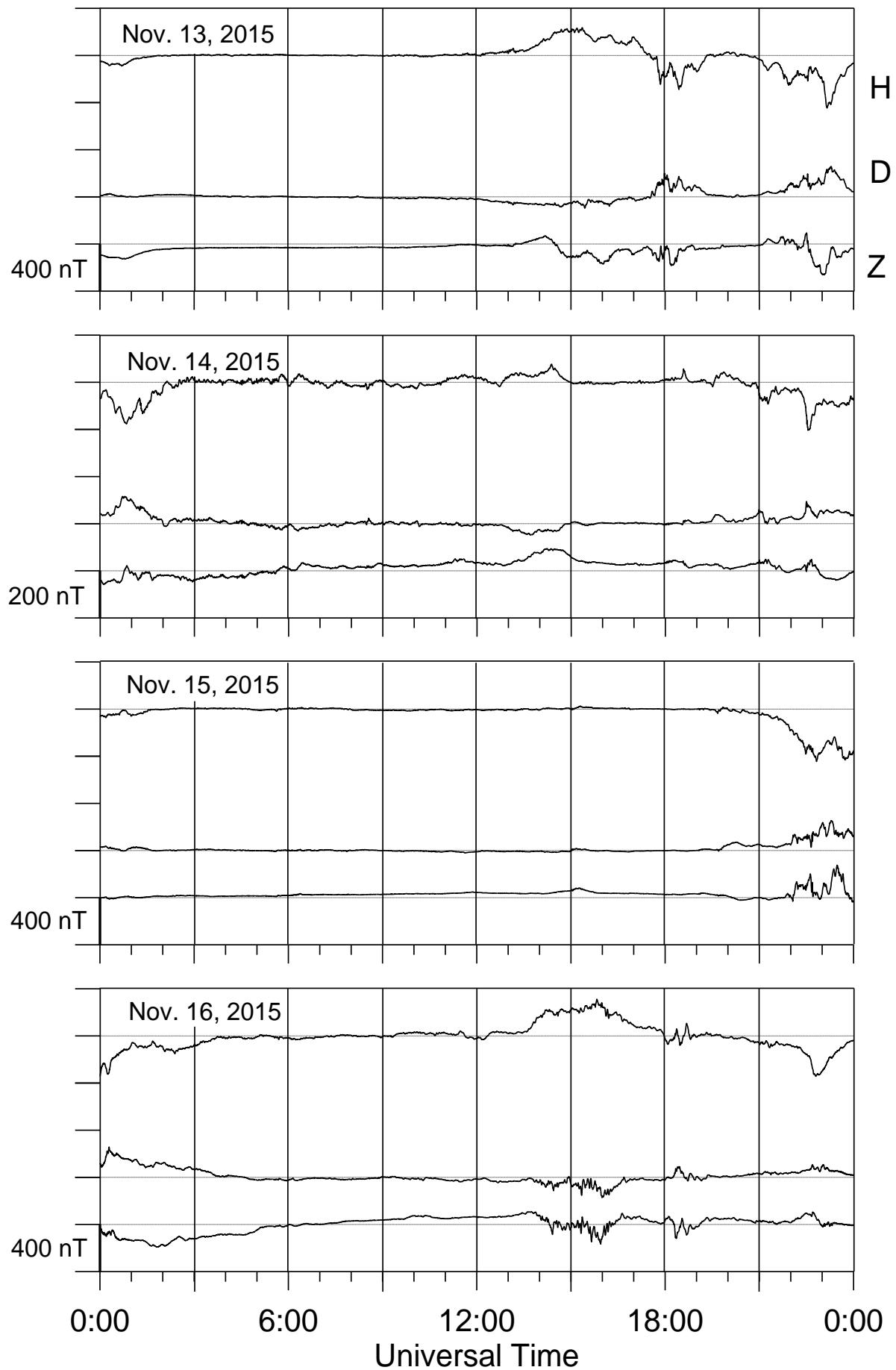
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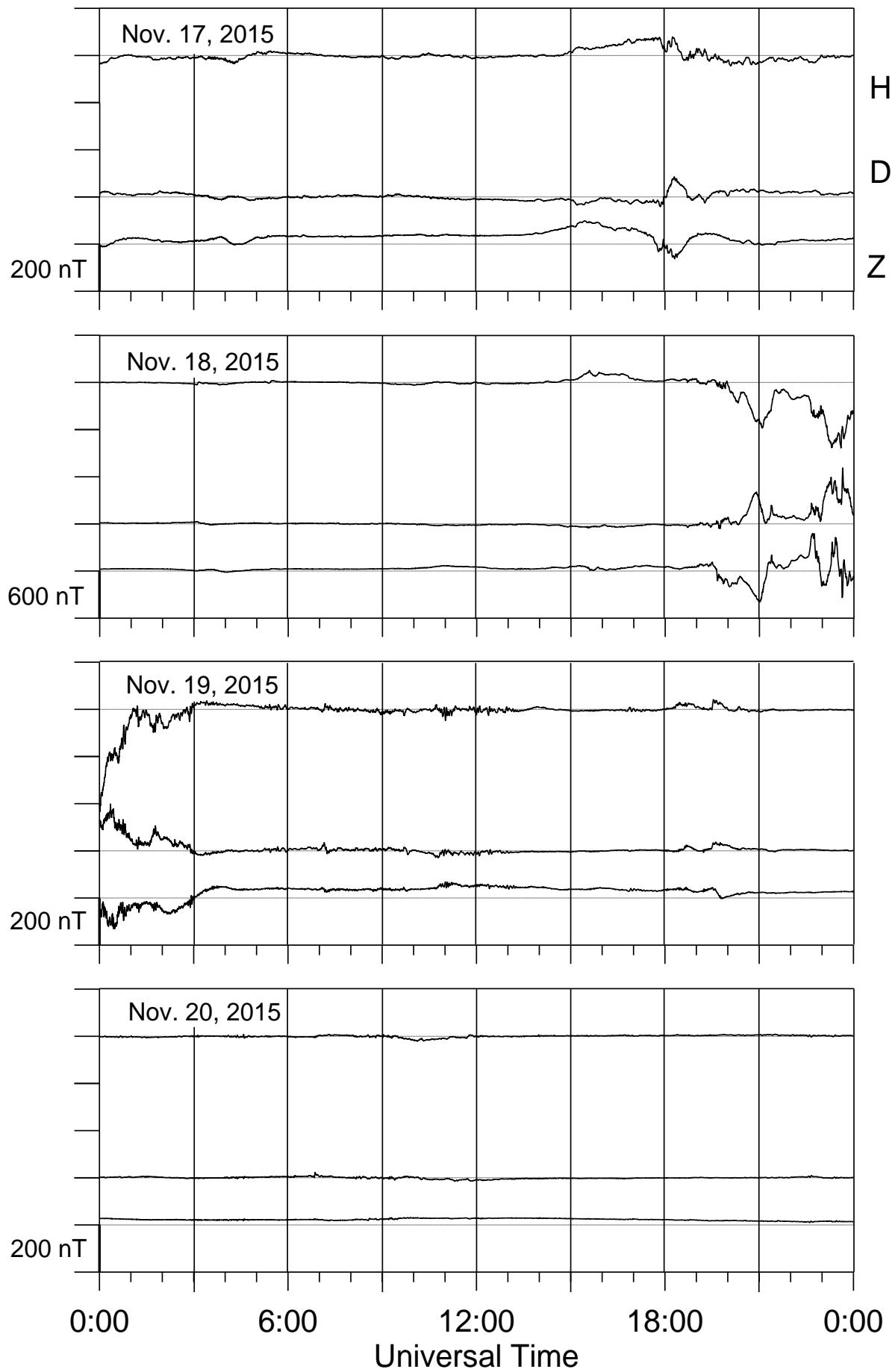
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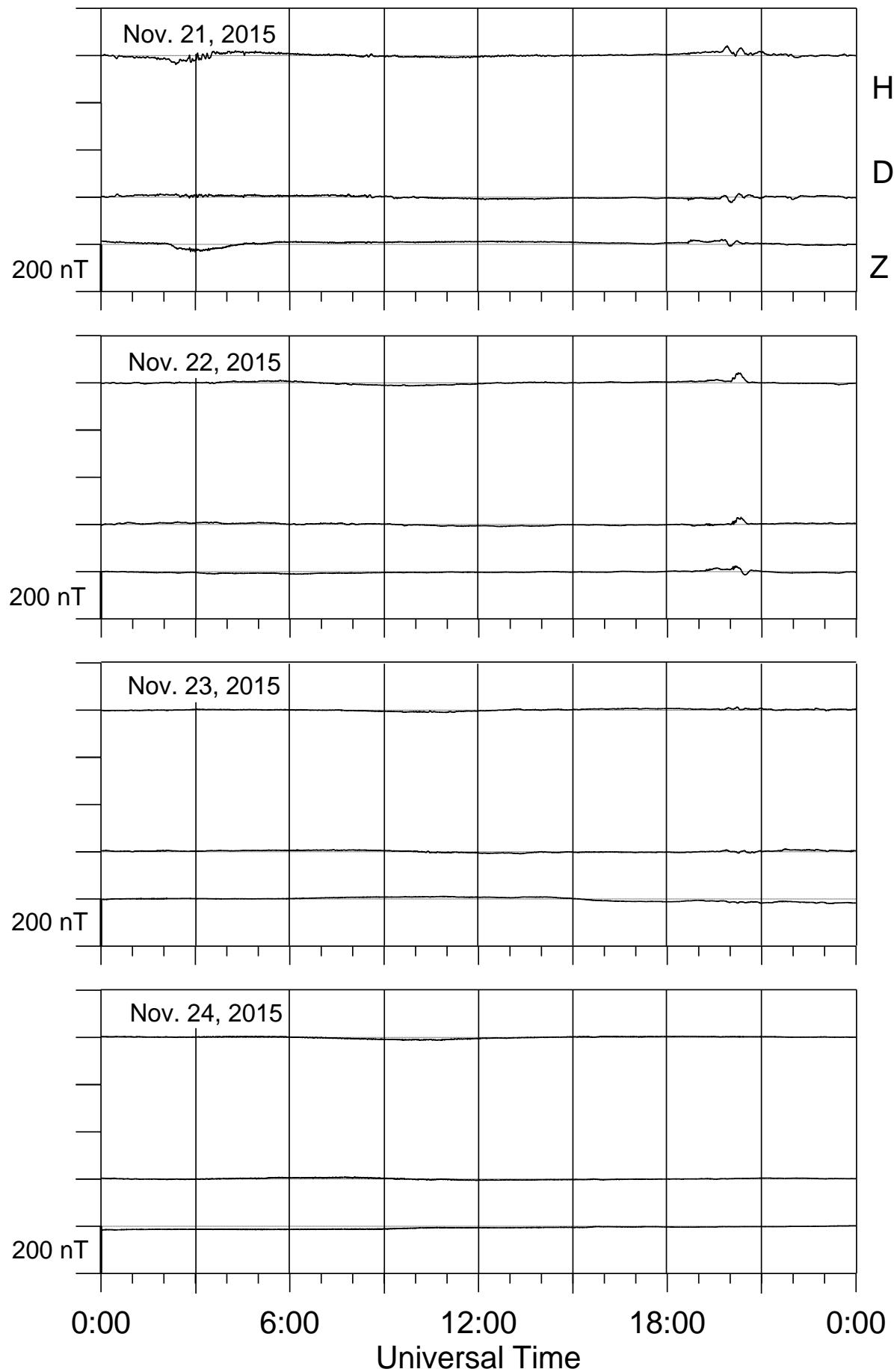
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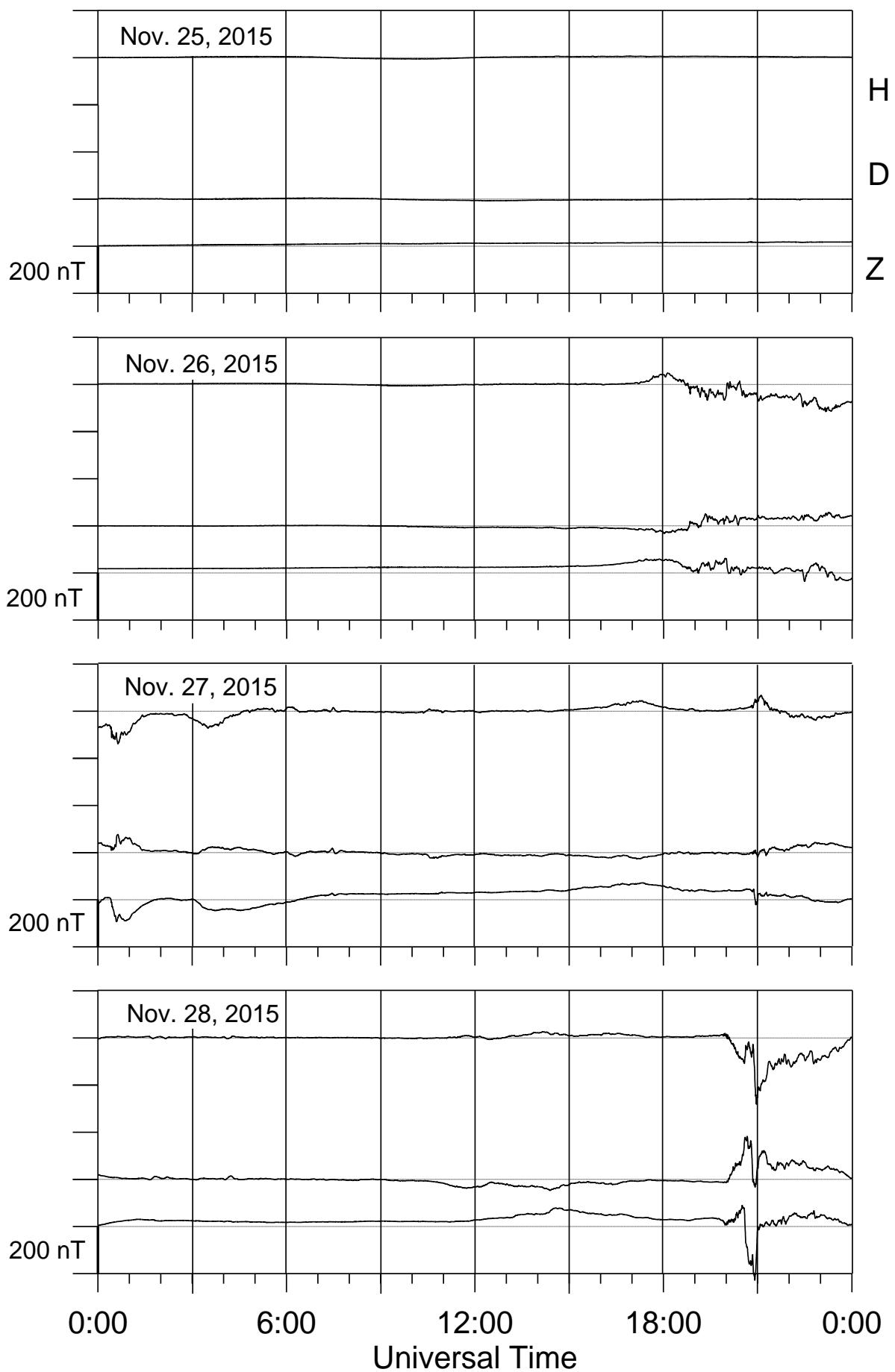
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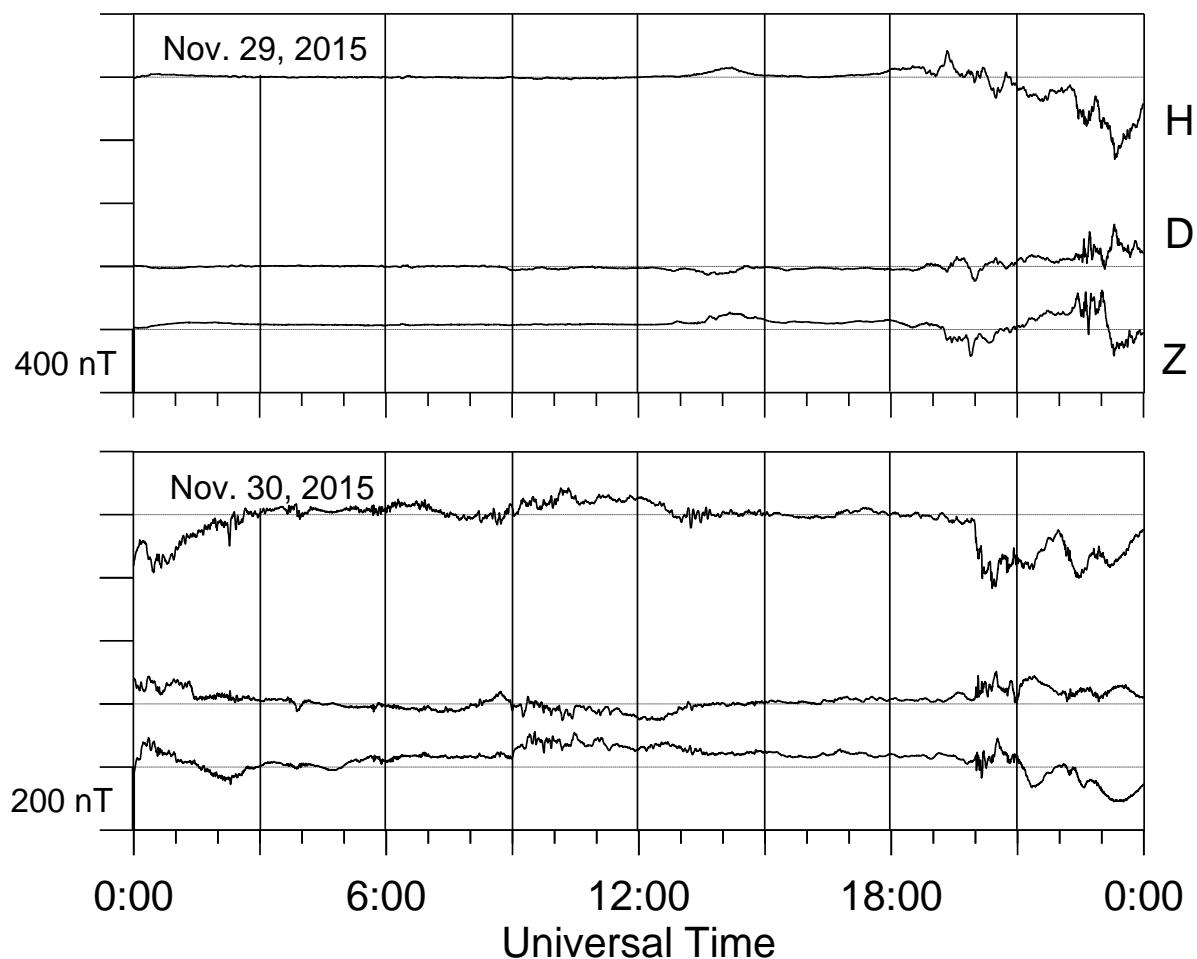
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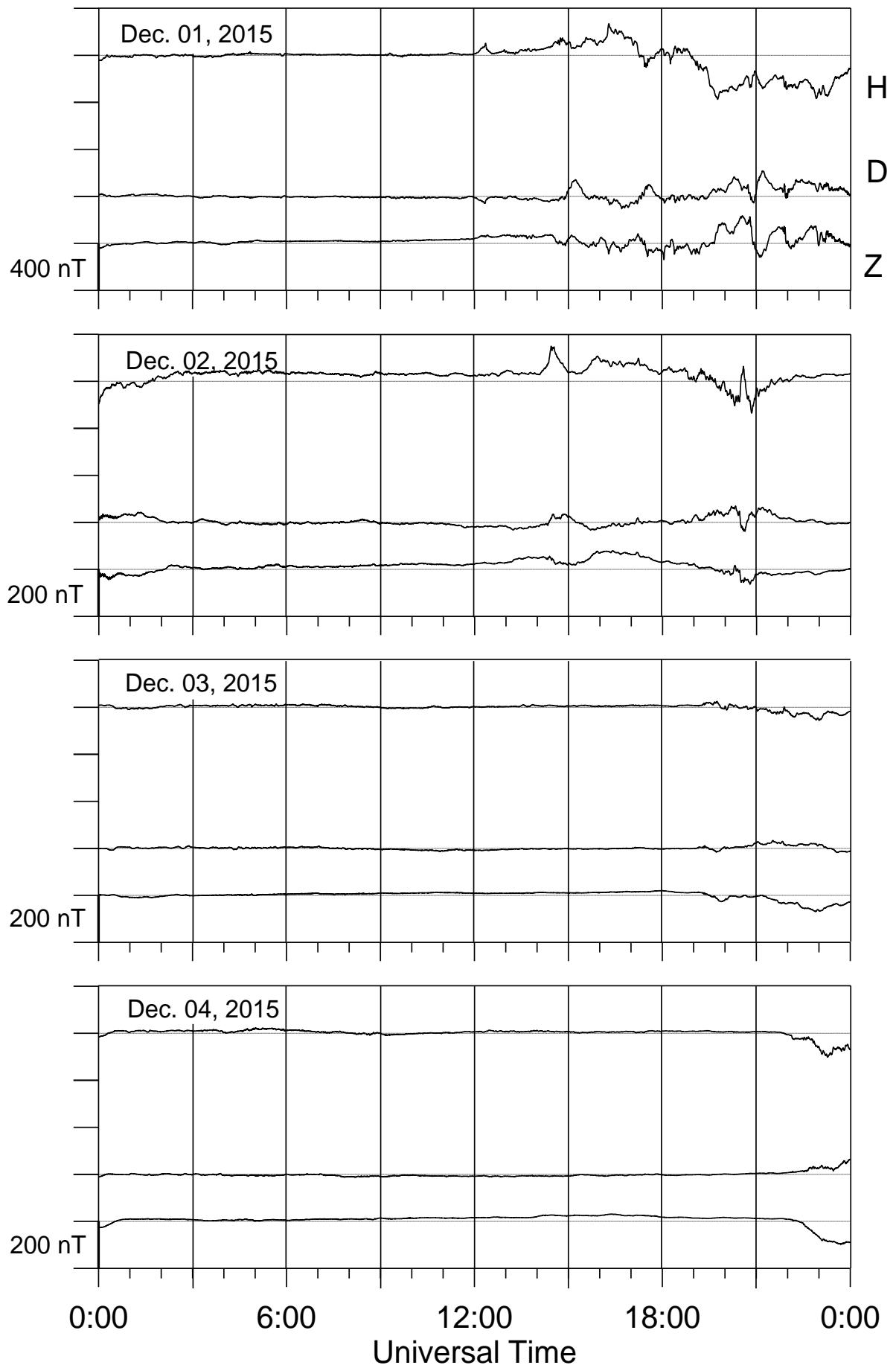
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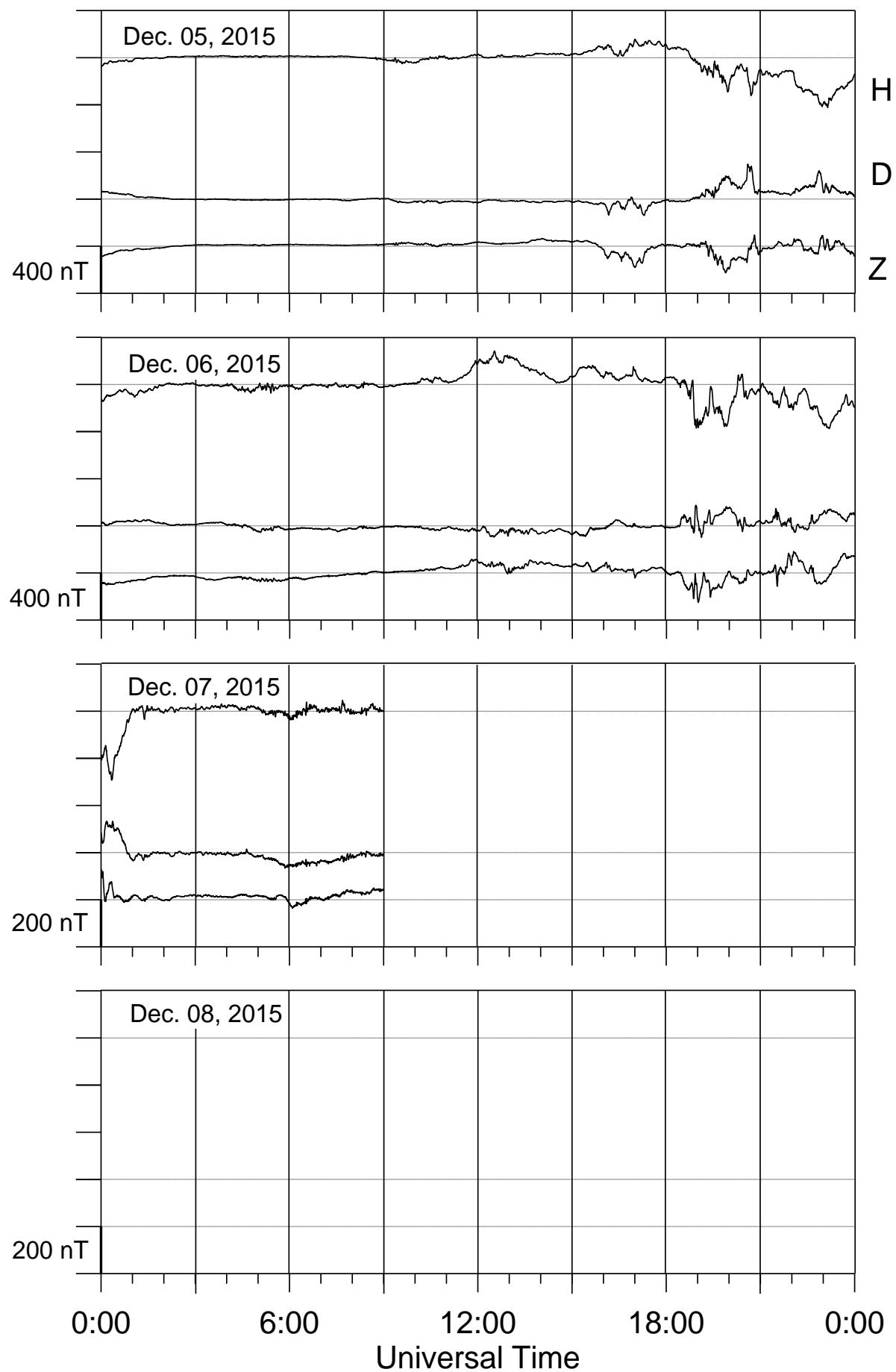
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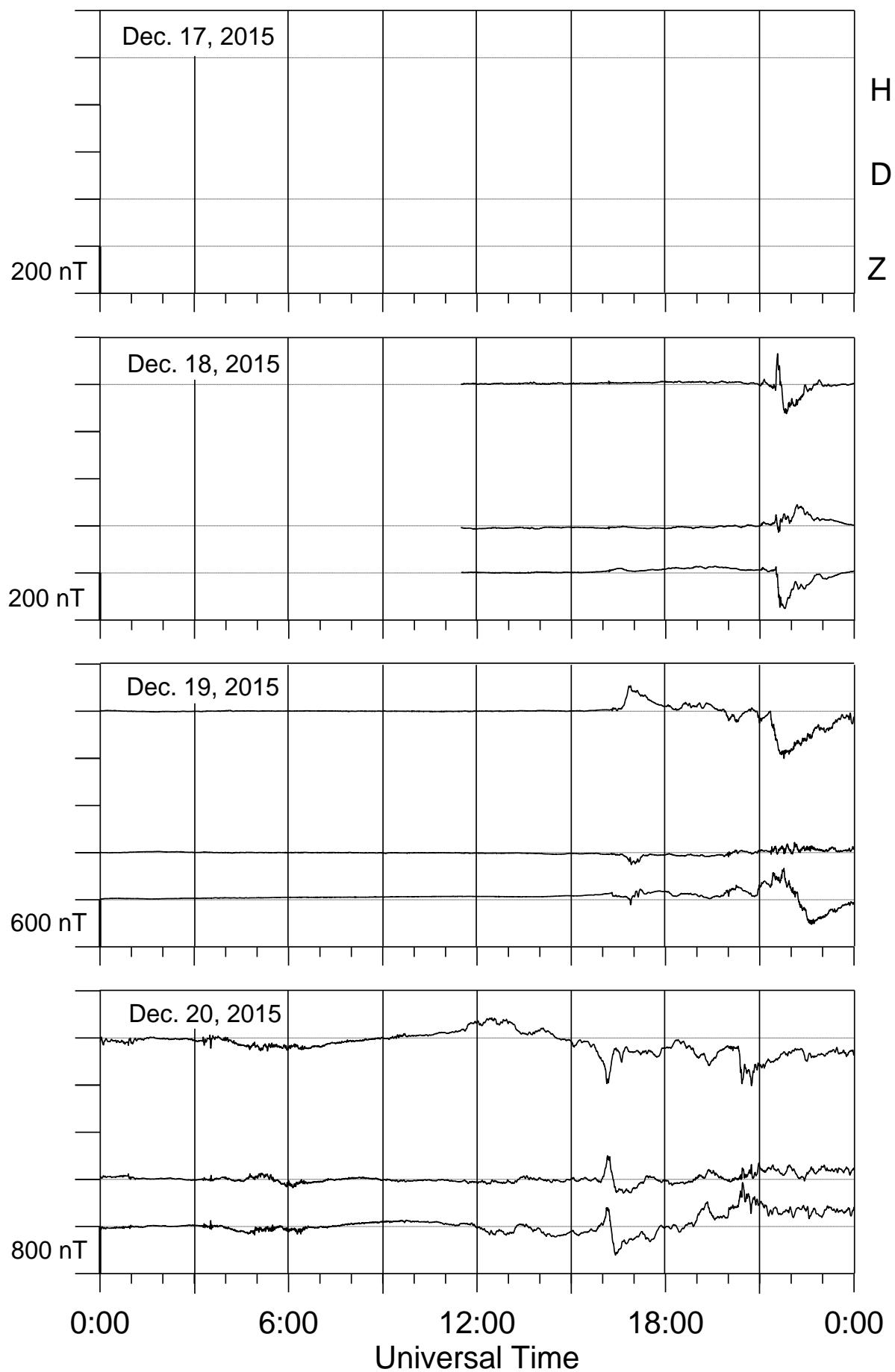
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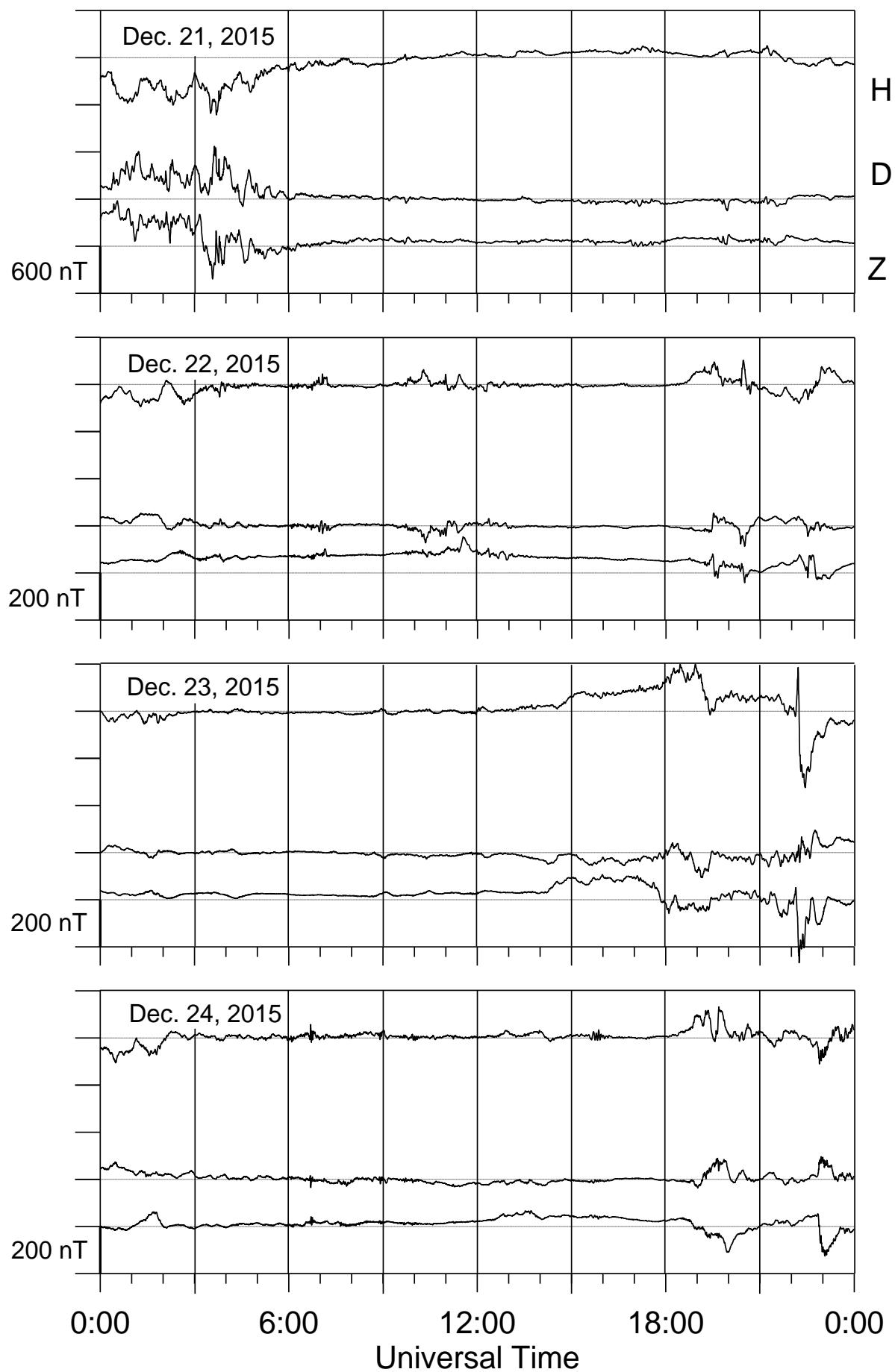
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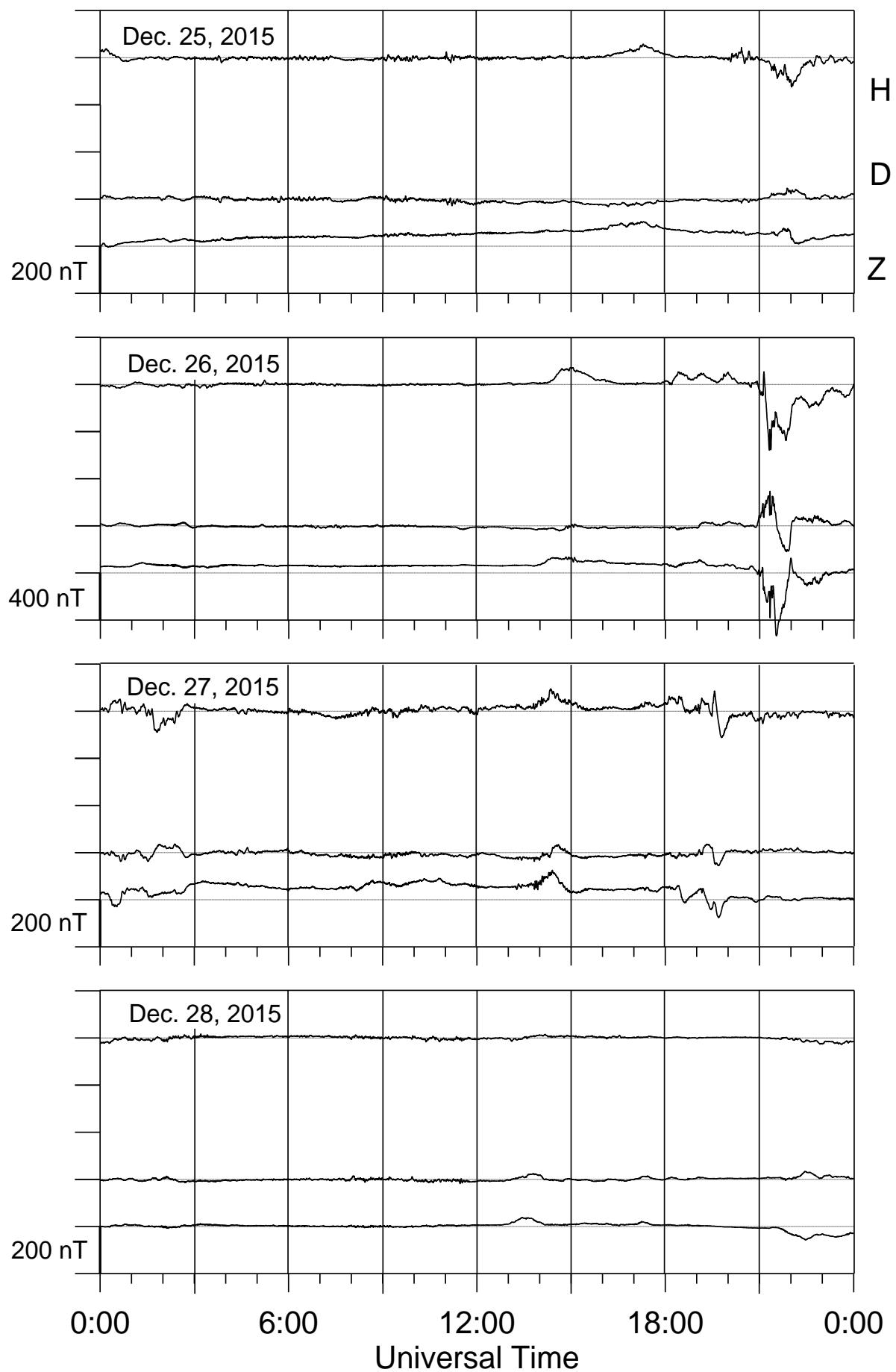
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