POLAR GEOPHYSICAL INSTITUTE
RUSSIAN ACADEMY OF SCIENCES

PGI
GEOPHYSICAL DATA

2016
OCTOBER
NOVEMBER
DECEMBER

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 2016. All-sky camera observations are published only for the quarters when observations were carried out. All data are available by request.

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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	407 833
November	410 686
December	412 536

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

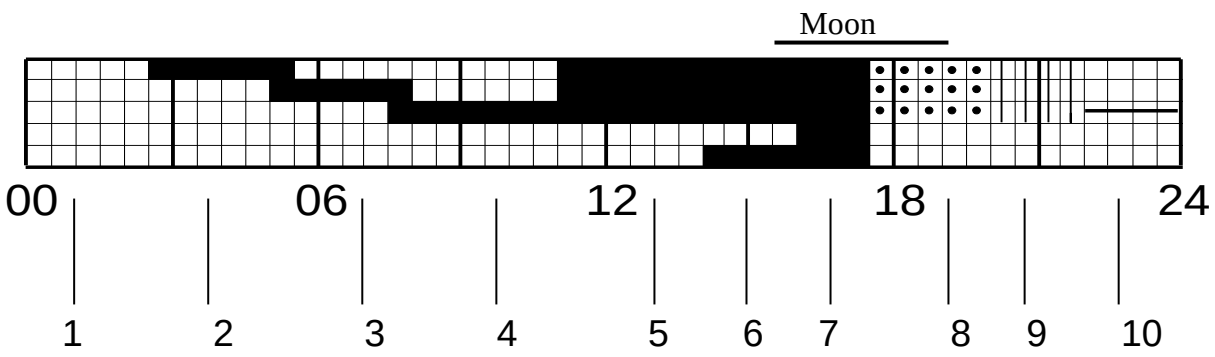
Calendar

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, 2016
Lower limit of K=9 is 1500 nT

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

GEOMAGNETIC K-INDICES, LOVOZERO
November, 2016
Lower limit of K=9 is 1500 nT

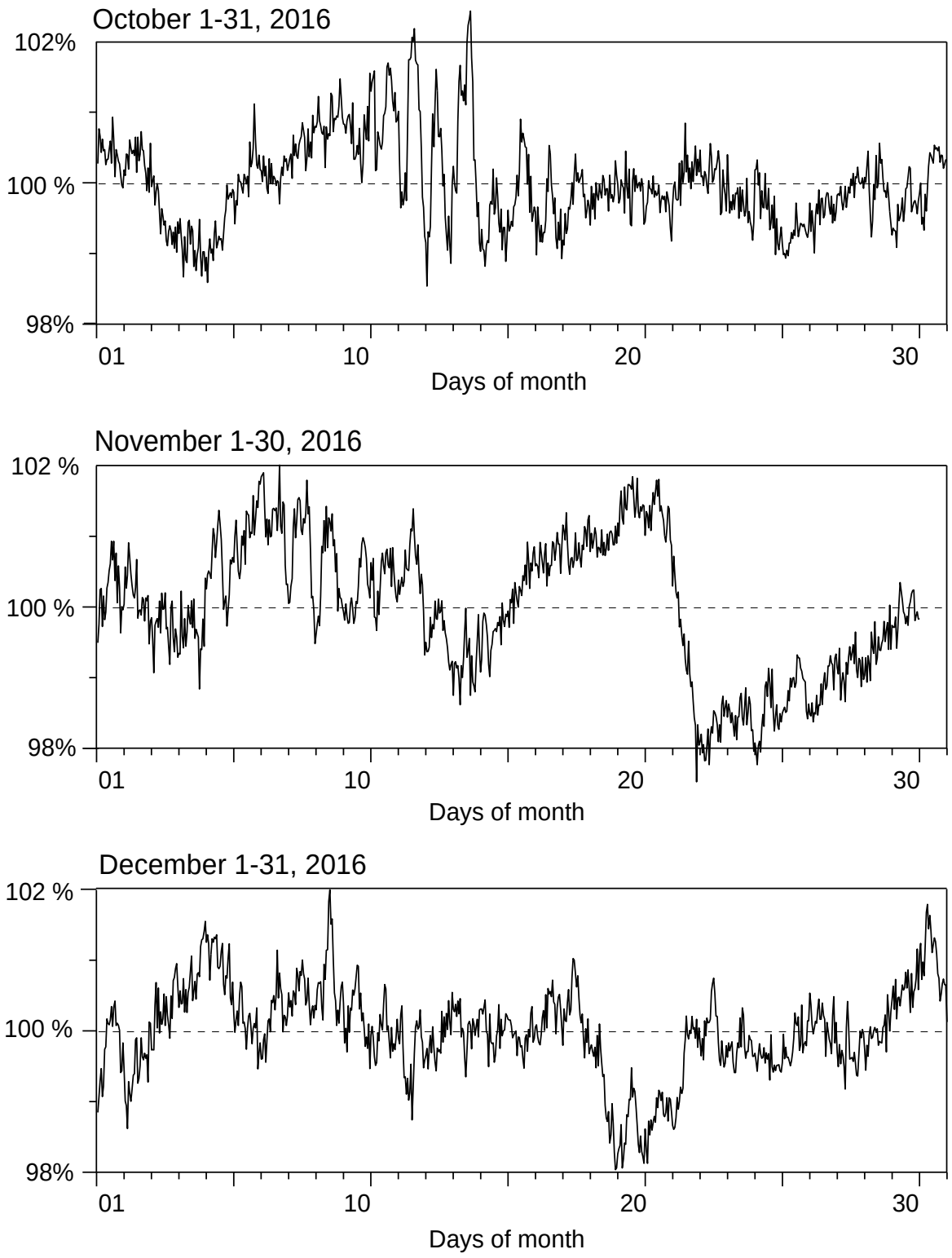
	Time, UT								
	03	06	09	12	15	18	21	24	
Day									
1	2 2 1	0 0 0	1 0 0	1 2 2	4 4 4	4 1 1	1 1 1	1 4 5	
2	6 6 3	0 0 0	0 0 1	2 1 2	4 4 5	4 4 4	3 1 2	3 5 6	
3	5 3 3	3 2 1	1 1 1	4 33	2 3 3	3 3 3	3 4 4	4 6 6	
4	4 3 2	1 0 0	1 1 1	1 1 1	1 0 0	0 0 0	0 0 1	0 0 1	
5	0 0 0	0 0 0	1 0 0	0 0 1	0 0 0	0 0 0	0 0 0	0 0 0	Q
6	0 0 0	0 0 0	0 0 0	0 0 1	1 0 0	0 0 0	1 2 2	2 2 2	
7	3 2 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	
8	0 0 0	0 0 0	0 0 0	0 1 1	1 1 1	0 0 0	0 0 0	1 1 0	
9	0 0 0	0 0 0	1 1 1	1 1 2	2 2 2	2 1 2	3 4 5	4 1 0	
10	0 0 0	0 0 0	0 0 1	0 1 1	3 5 5	5 5 4	3 5 5	4 5 5	
11	6 6 1	1 0 0	0 0 1	1 1 0	0 0 0	1 3 3	3 3 2	3 3 5	
12	5 3 1	1 1 1	1 2 1	2 2 4	4 2 2	3 3 4	4 4 3	5 6 5	
13	5 5 5	2 2 1	2 1 2	2 1 2	2 2 2	2 4 3	1 4 5	5 2 1	
14	0 1 0	0 0 0	0 0 1	1 1 1	1 1 3	2 4 2	4 2 1	3 4 3	
15	3 2 3	3 2 1	2 0 0	0 1 0	1 1 1	1 0 1	1 0 0	0 1 0	
16	0 0 0	0 0 0	1 0 0	0 0 0	0 0 0	0 0 0	0 3 4	2 2 3	
17	1 1 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 1	1 2 1	1 1 1	
18	1 1 1	0 0 0	0 0 0	0 0 0	0 0 0	0 2 2	0 0 0	1 1 1	
19	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1 1 1	1 0 0	Q
20	0 0 0	0 0 0	0 0 0	0 1 1	1 0 0	0 0 0	0 0 1	2 2 2	
21	1 0 0	0 0 0	1 0 0	0 0 0	0 1 0	0 0 2	3 3 5	5 2 0	
22	0 1 1	0 1 1	1 1 0	0 0 1	1 1 0	2 3 3	3 2 5	7 4 4	
23	4 4 4	3 2 2	2 1 1	1 1 1	1 1 2	2 2 3	3 5 3	2 1 3	
24	4 4 2	2 2 1	1 1 1	2 1 4	5 6 5	5 5 4	5 5 6	5 6 6	
25	6 5 3	1 1 4	3 3 2	2 1 2	3 2 2	3 5 3	3 6 5	3 3 2	
26	3 2 2	2 1 2	2 2 2	1 1 1	1 0 1	2 4 3	4 3 3	4 4 3	
27	1 1 1	2 2 1	1 1 1	1 1 1	1 1 1	0 1 1	3 2 2	2 3 4	
28	2 0 0	0 0 0	0 0 1	1 1 0	1 0 0	0 3 3	1 2 4	4 4 3	
29	3 0 0	0 0 0	0 0 0	0 1 1	1 1 1	0 0 0	1 2 2	4 3 1	
30	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 1	0 0 0	0 0 0	Q

GEOMAGNETIC K-INDICES, LOVOZERO

December, 2016
Lower limit of K=9 is 1500 nT

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

Apatity neutron monitor



ALL – SKY CAMERA OBSERVATIONS

October - December 2016

CALENDAR OF **TV** OBSERVATIONS

October 01 - 02

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

October 02 - 03

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

October 03 - 04

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

October 04 - 05

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

October 05- 06

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

October 06 - 07

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

October 07 - 08

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

October 08 - 09

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

CALENDAR OF **TV** OBSERVATIONS

October 09 - 10

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

October 10 - 11

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

October 11 - 12

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

October 12 - 13

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

October 13- 14

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

October 14 - 15

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

October 15 - 16

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

October 16 - 17

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

CALENDAR OF **TV** OBSERVATIONS

October 17 - 18

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

October 18 - 19

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

October 19 - 20

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

October 20 - 21

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

October 21- 22

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

October 22 - 23

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

October 23 - 24

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

October 24 - 25

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

CALENDAR OF **TV** OBSERVATIONS

October 25 - 26

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

October 26 - 27

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

October 27 - 28

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

October 28 - 29

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

October 29- 30

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

October 30 - 31

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

October 31 – November 01

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

November 01 - 02

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

CALENDAR OF **TV** OBSERVATIONS

November 02 - 03

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

November 03 - 04

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

November 04 - 05

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

November 05 - 06

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

November 06- 07

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

November 07 - 08

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

November 08 - 09

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

November 09 - 10

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

CALENDAR OF **TV** OBSERVATIONS

November 10 - 11

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

November 11 - 12

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

November 12 - 13

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

November 13 - 14

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

November 14- 15

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

November 15 - 16

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

November 16 - 17

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

November 17 - 18

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

CALENDAR OF **TV** OBSERVATIONS

November 18 - 19

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

November 19 - 20

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

November 20 - 21

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

November 21 - 22

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

November 22- 23

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

November 23 - 24

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

November 24 - 25

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

November 25 - 26

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

CALENDAR OF **TV** OBSERVATIONS

November 26 - 27

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

November 27 - 28

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

November 28 - 29

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

November 29 - 30

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

November 30- December 01

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

December 01 - 02

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

December 02 - 03

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

December 03 - 04

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

CALENDAR OF **TV** OBSERVATIONS

December 04 - 05

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

December 05 - 06

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

December 06 - 07

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

December 07 - 08

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

December 08- 09

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

December 09 - 10

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

December 10 - 11

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

December 11 - 12

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

CALENDAR OF **TV** OBSERVATIONS

December 12 - 13

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

December 13 - 14

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

December 14 - 15

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

December 15 - 16

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

December 16- 17

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

December 17 - 18

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

December 18 - 19

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

December 19 - 20

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

CALENDAR OF **TV** OBSERVATIONS

December 20 - 21

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

December 21 - 22

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

December 22 - 23

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

December 23 - 24

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

December 24- 25

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

December 25 - 26

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

December 26 - 27

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

December 27 - 28

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

CALENDAR OF **TV** OBSERVATIONS

December 28 - 29

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

December 29 - 30

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

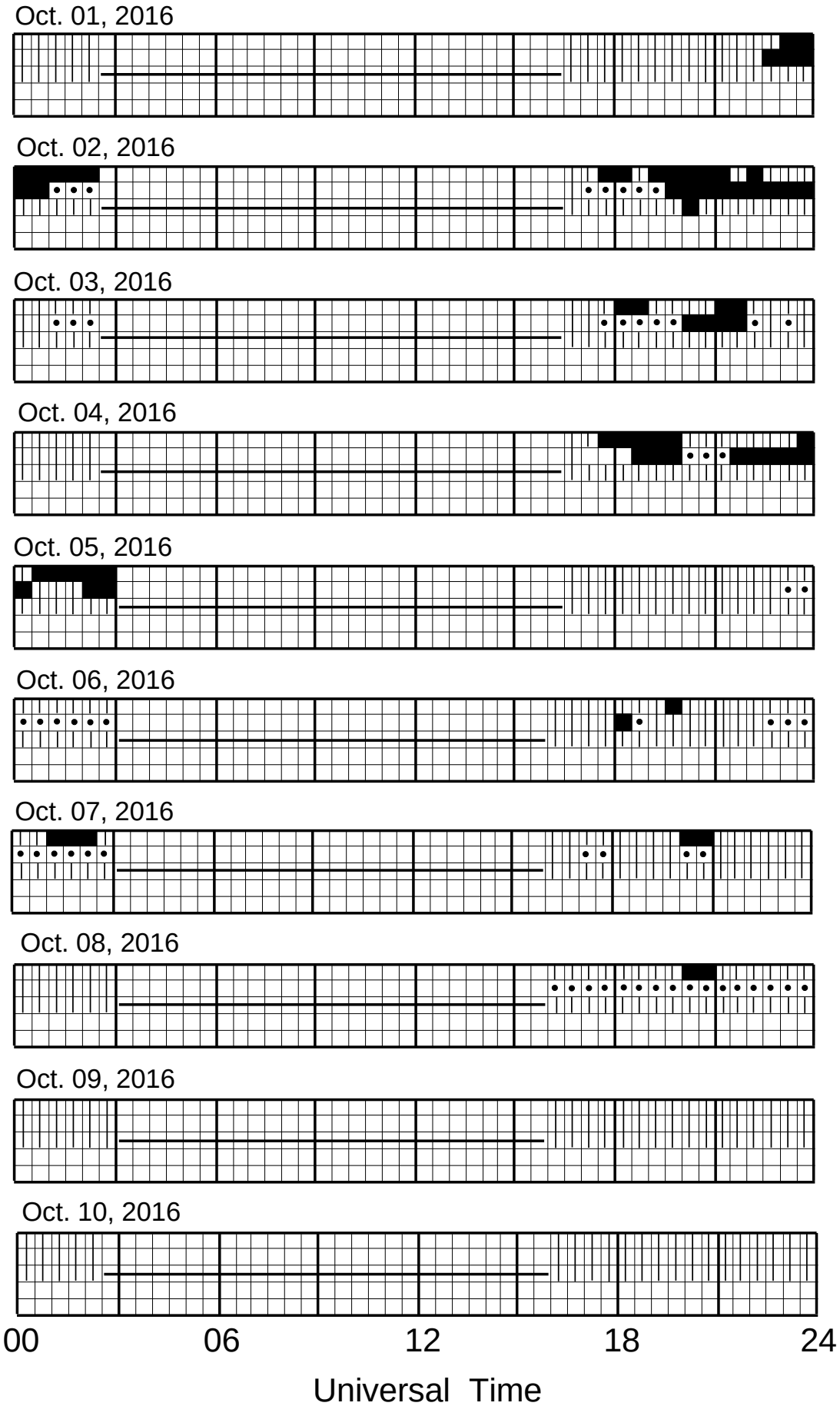
December 30 - 31

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

December 31 – January 01

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

Apatity ascaplots



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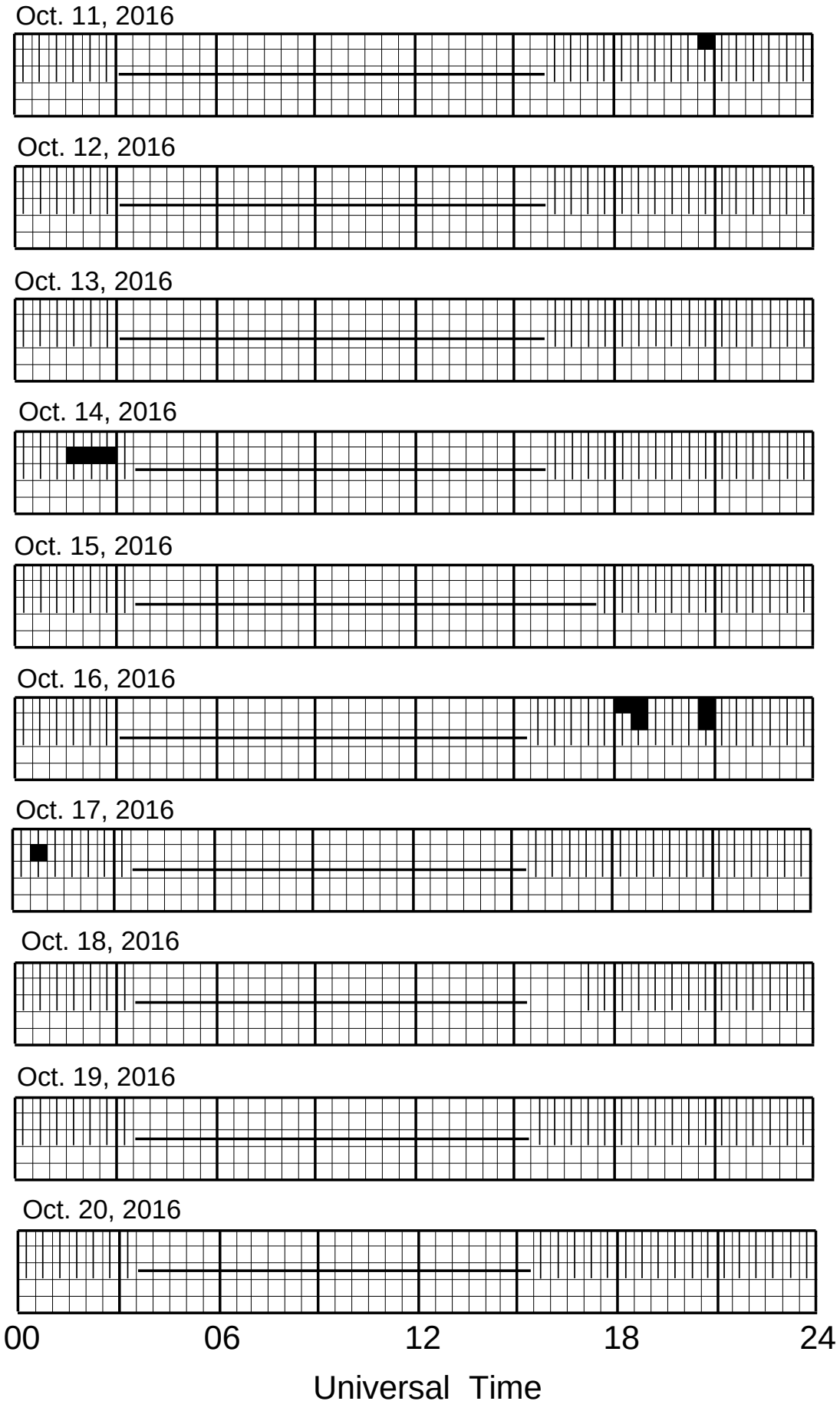

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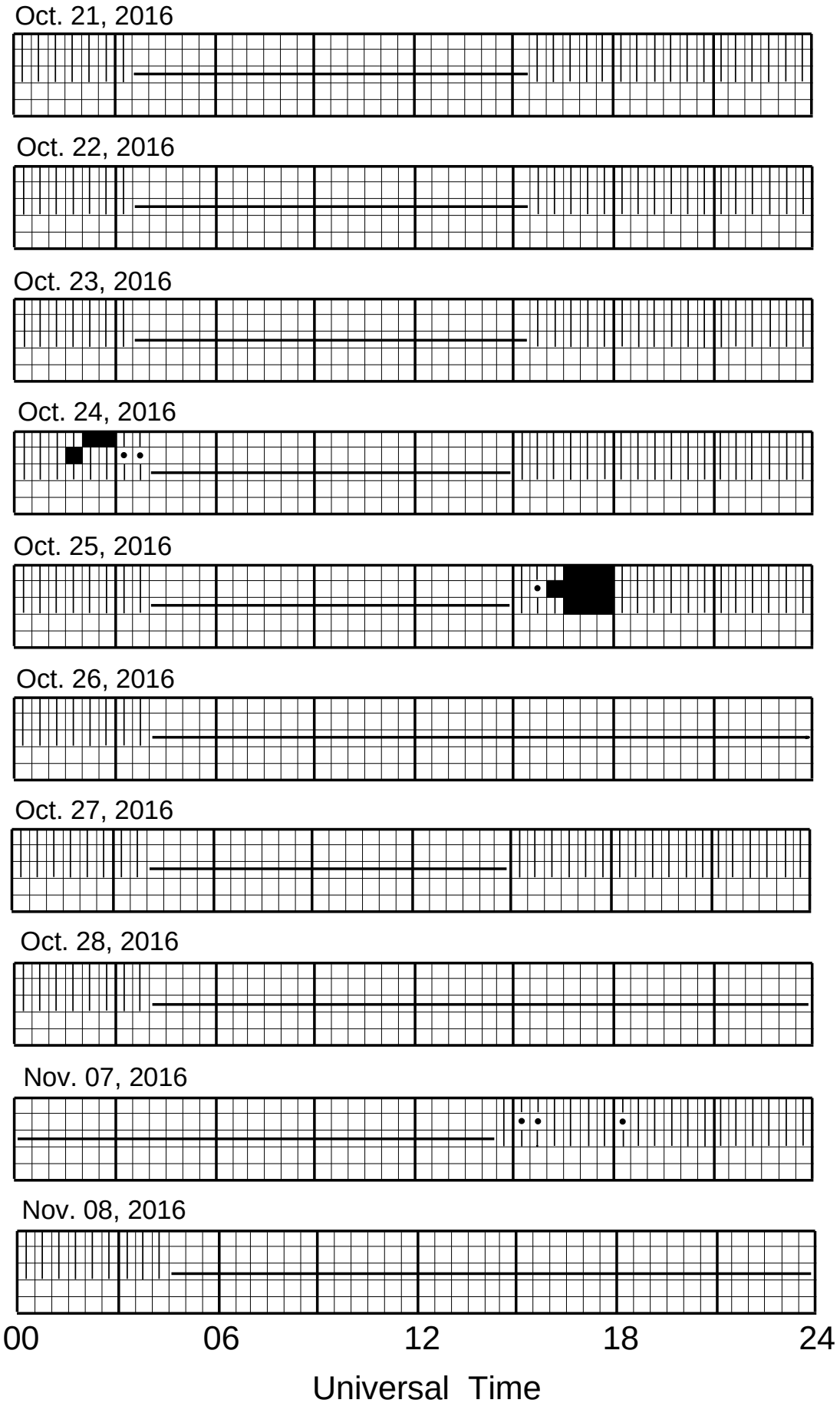

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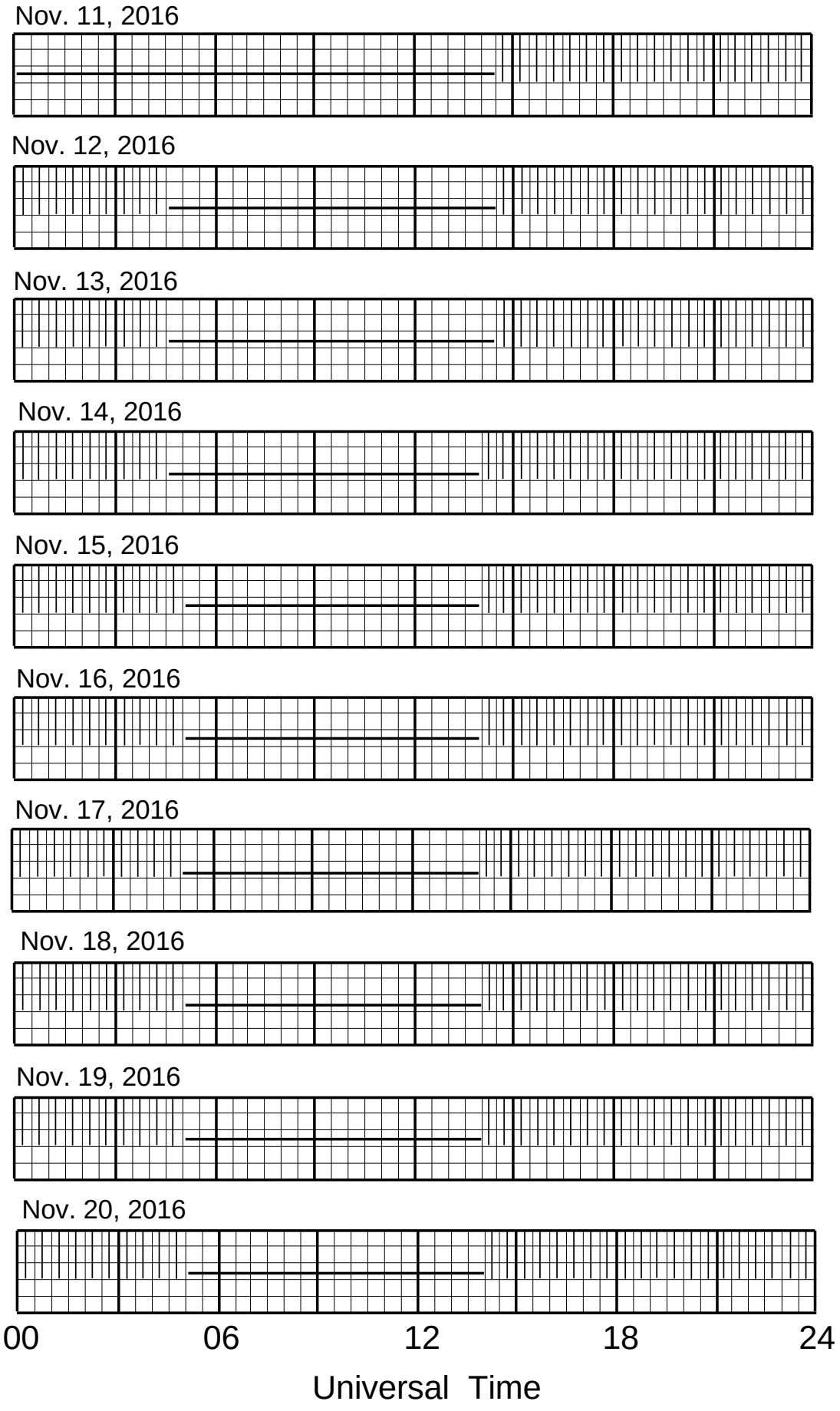

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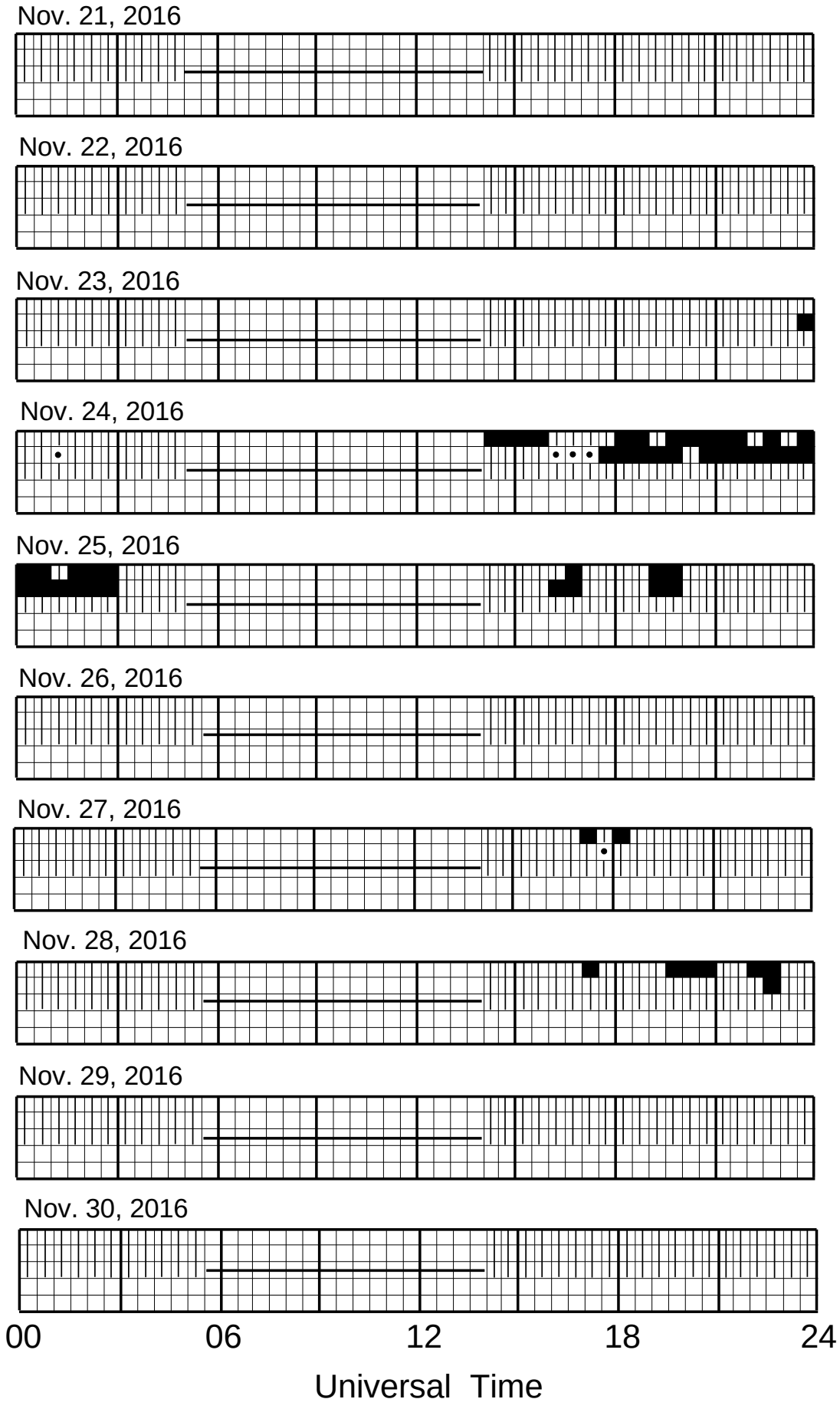

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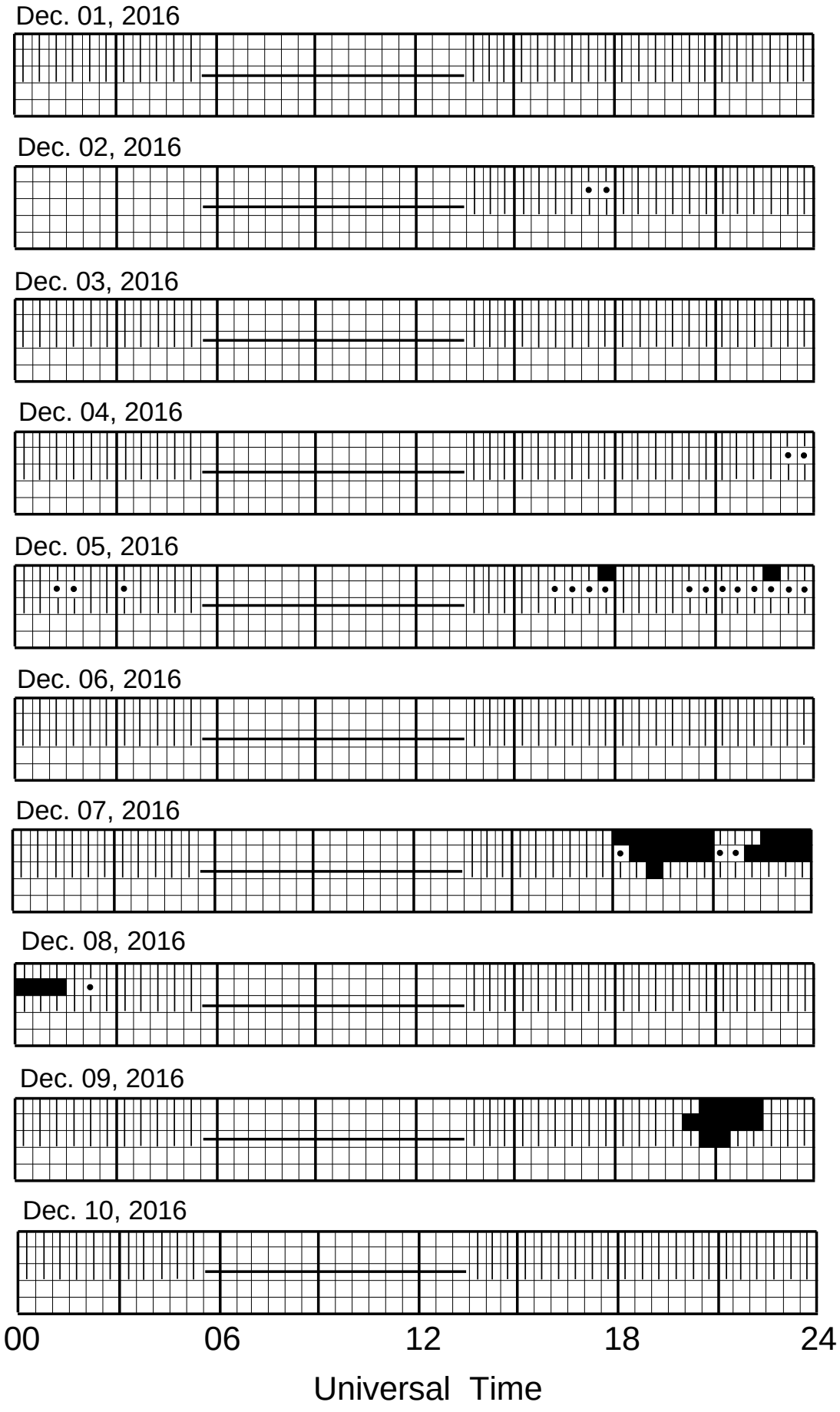

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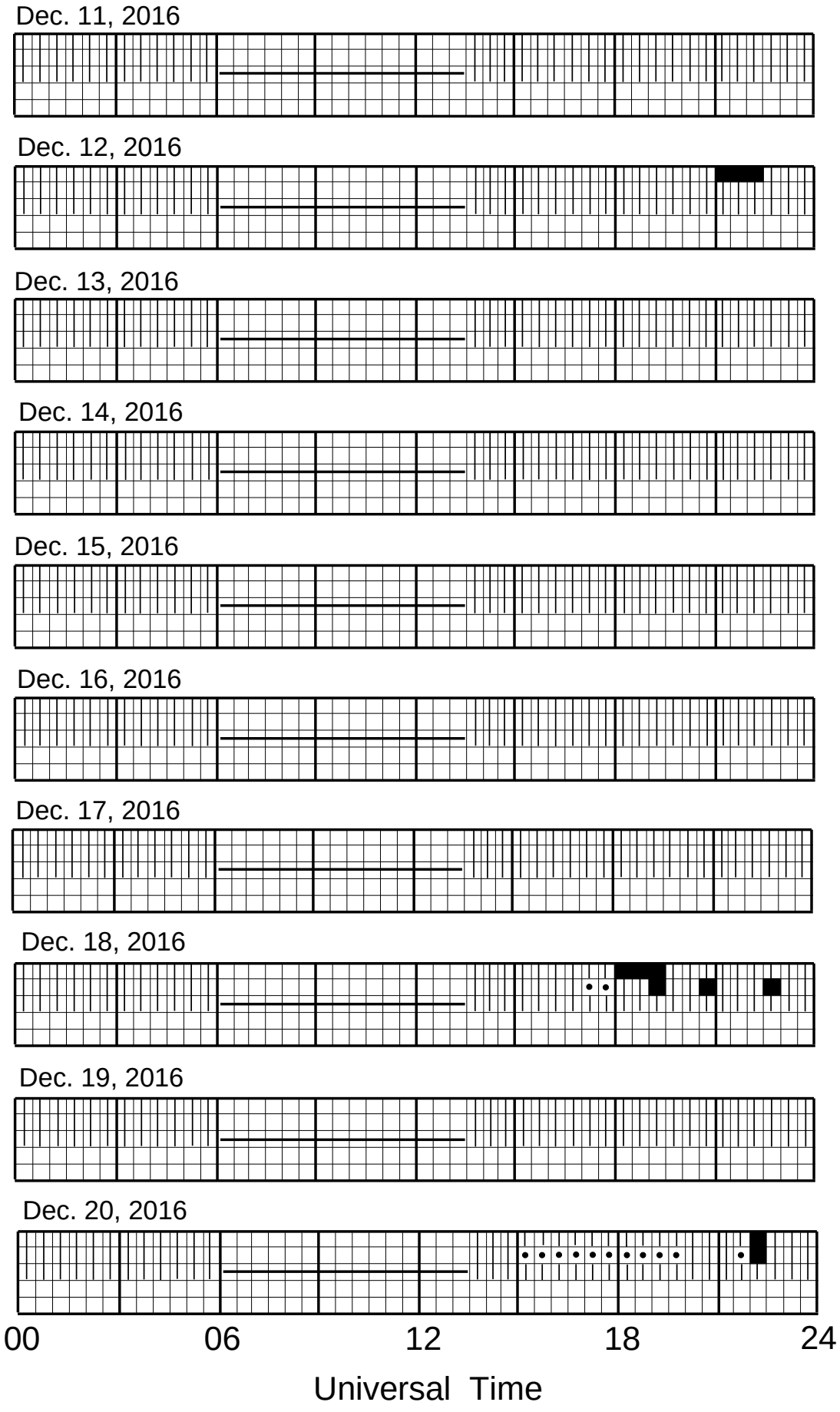

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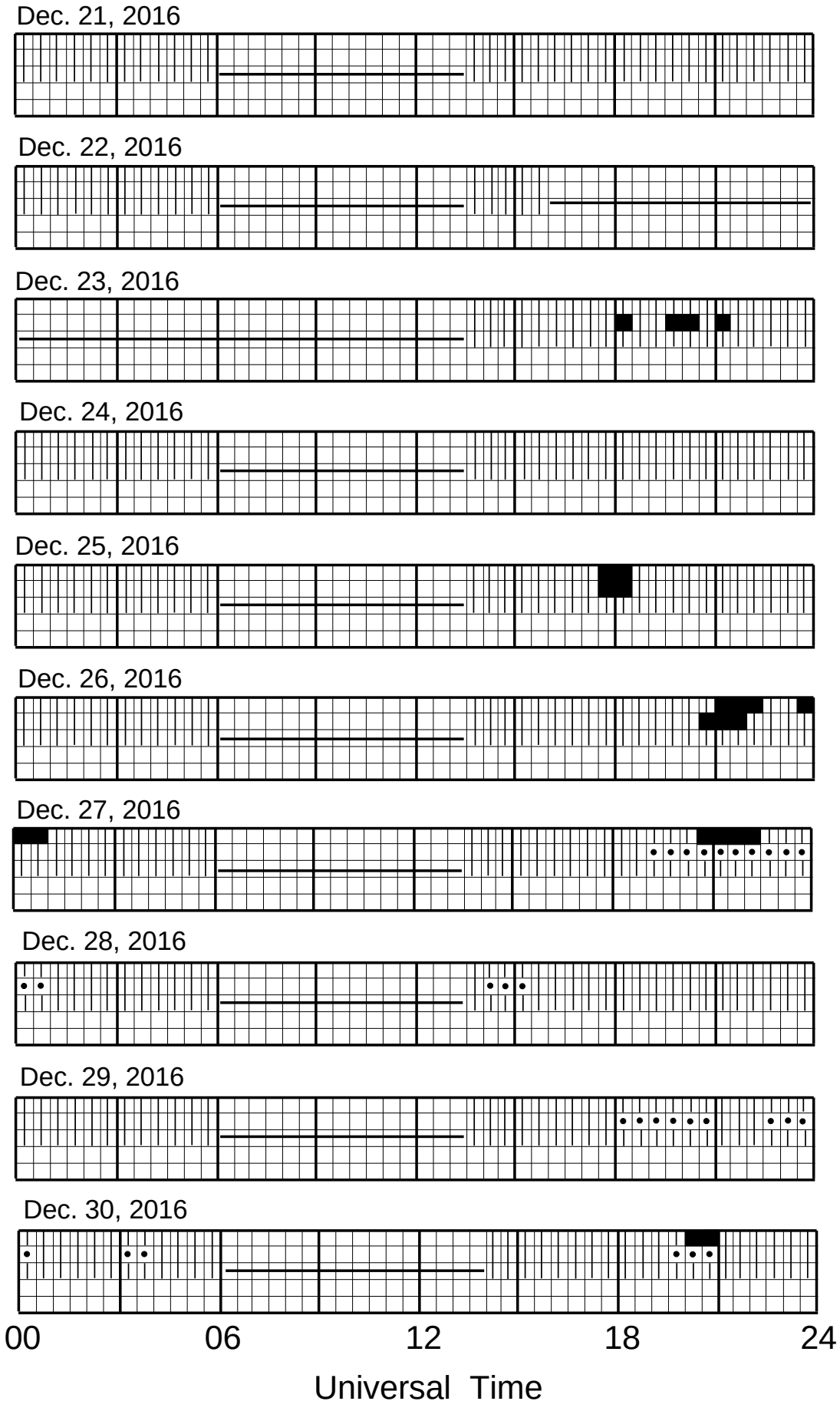

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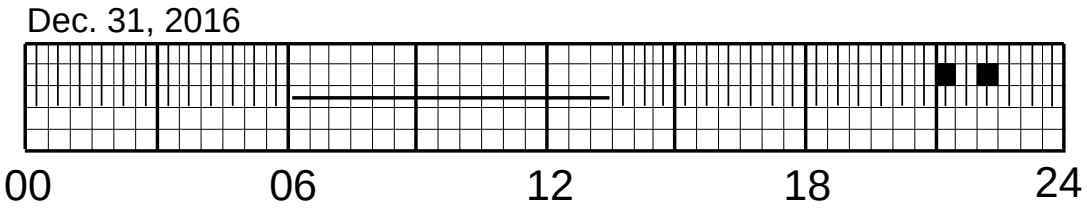

Universal Time

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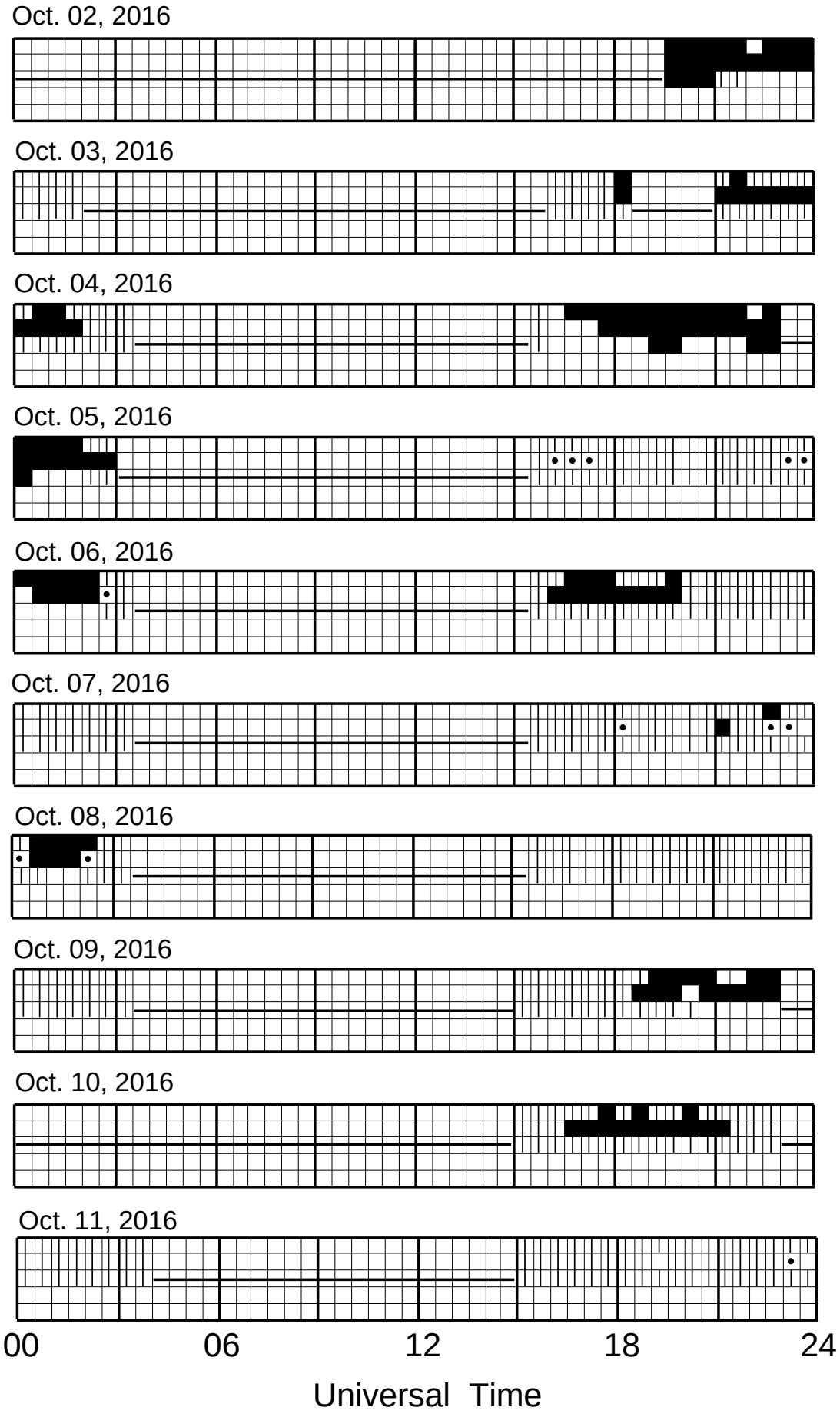

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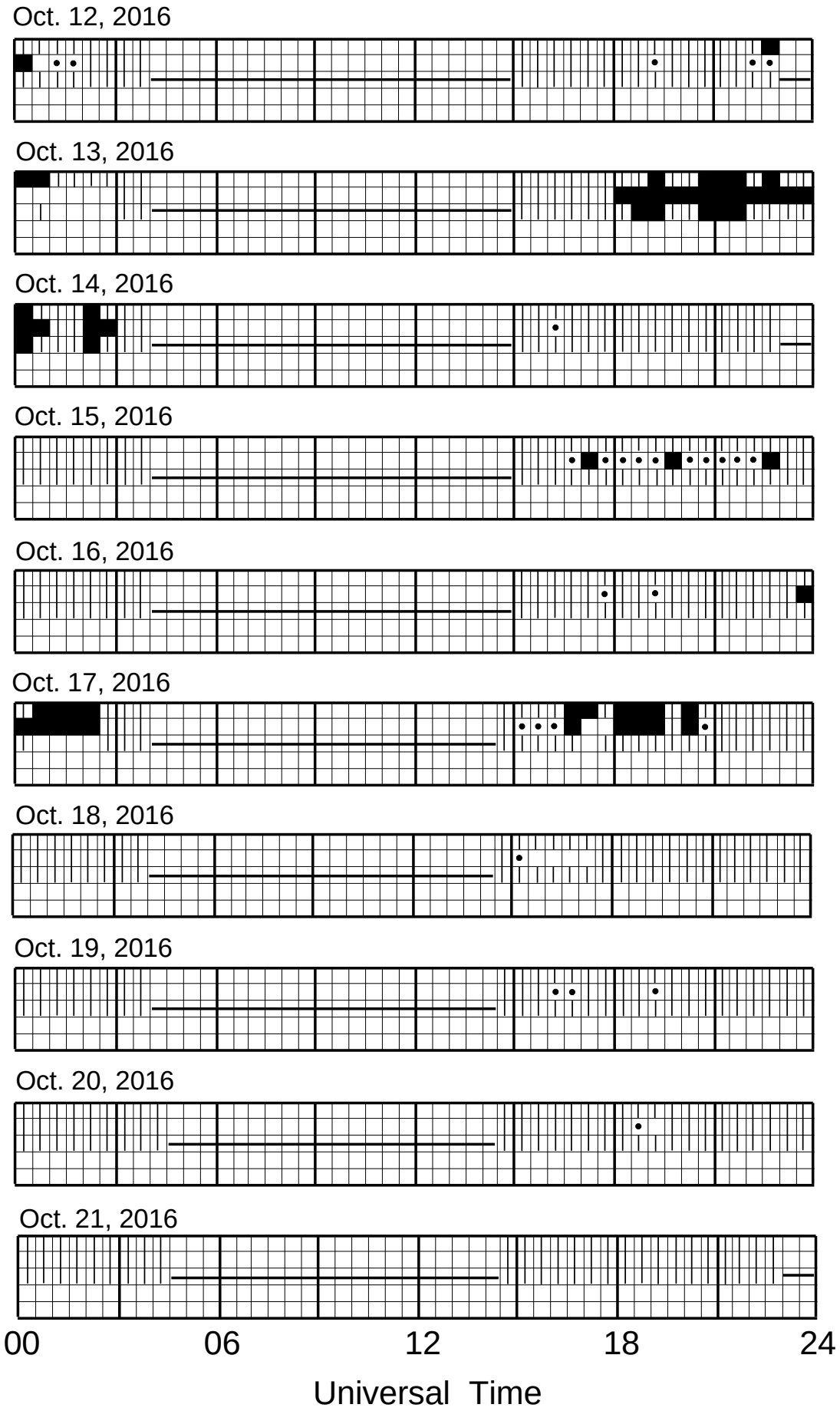

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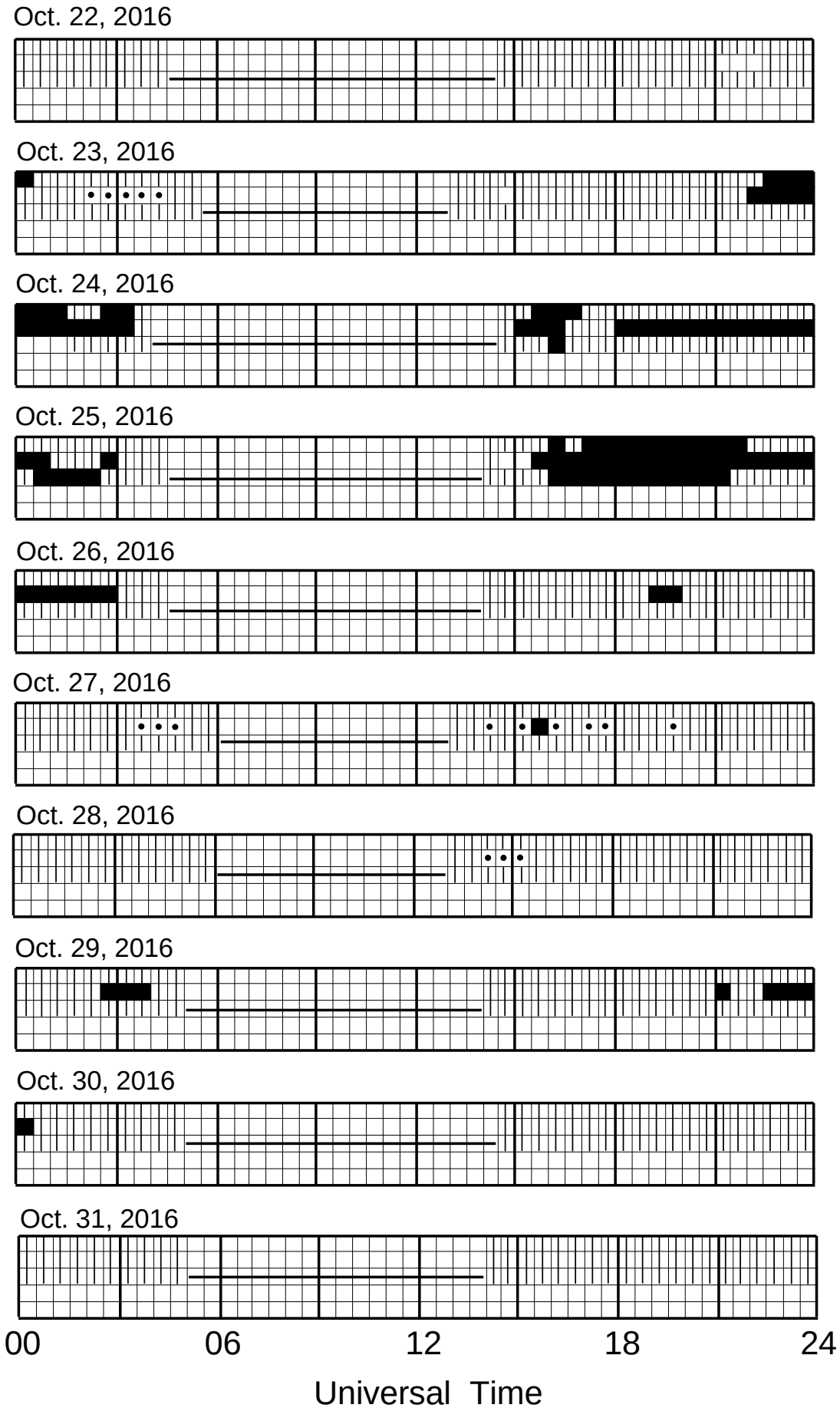

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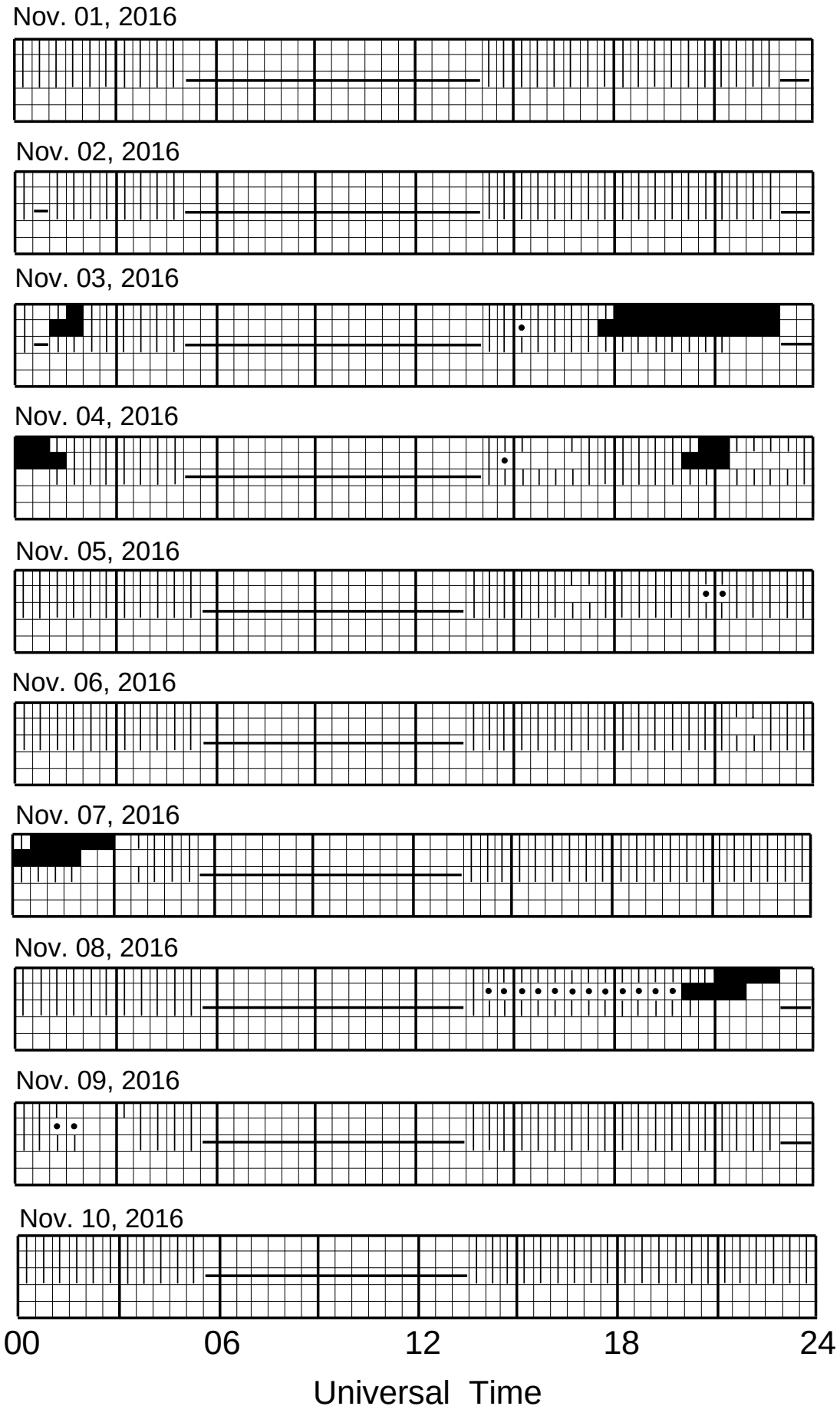

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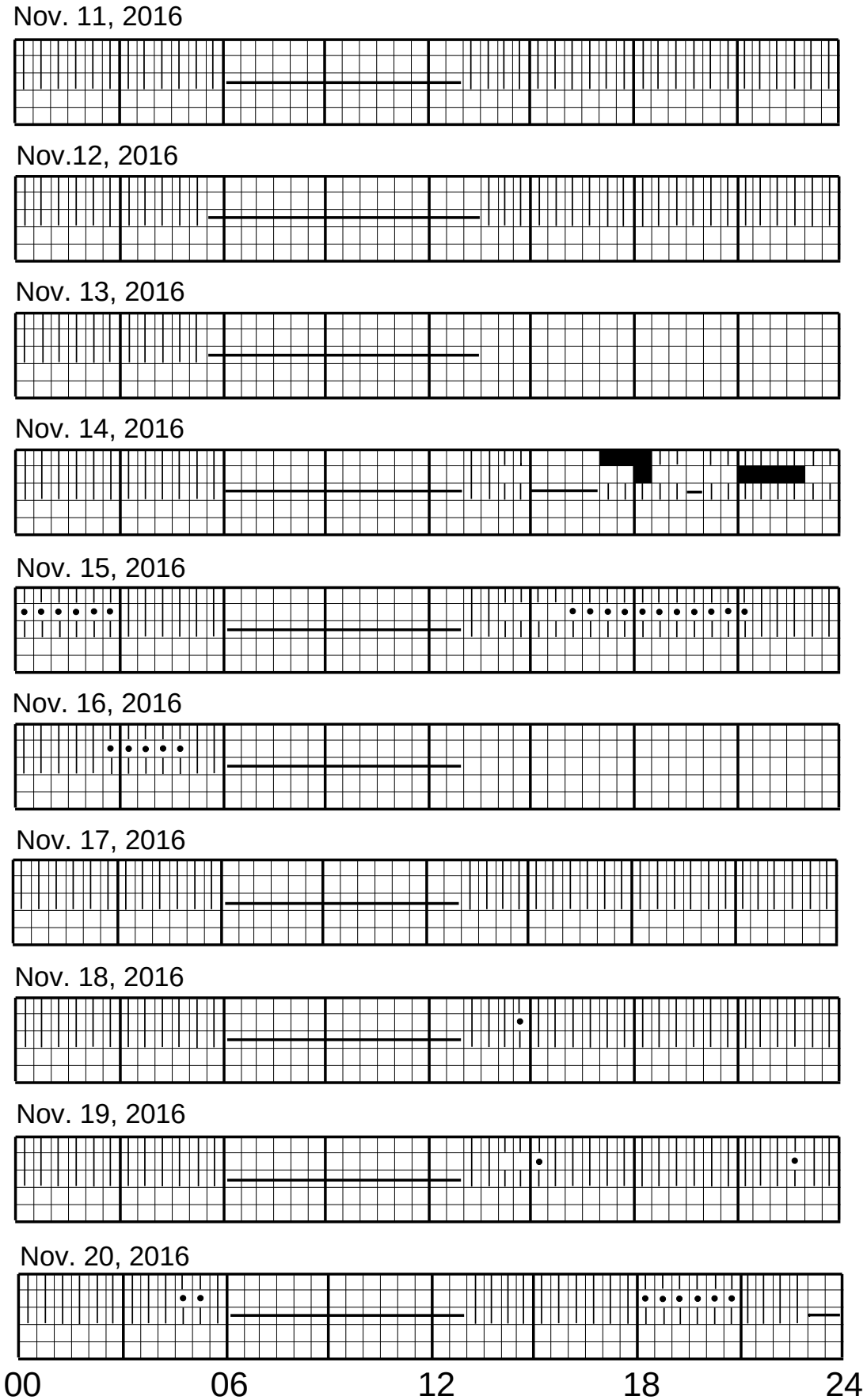

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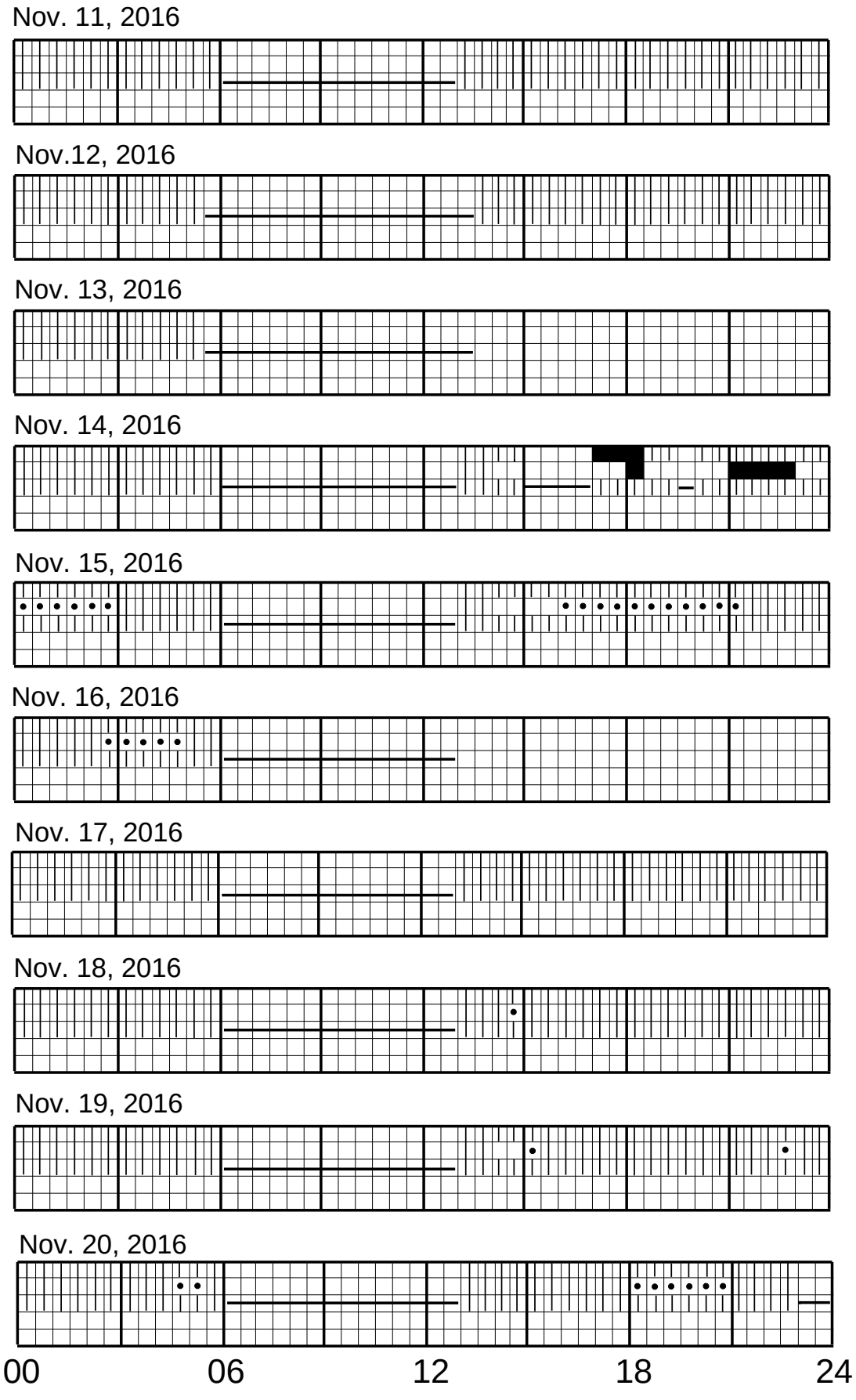

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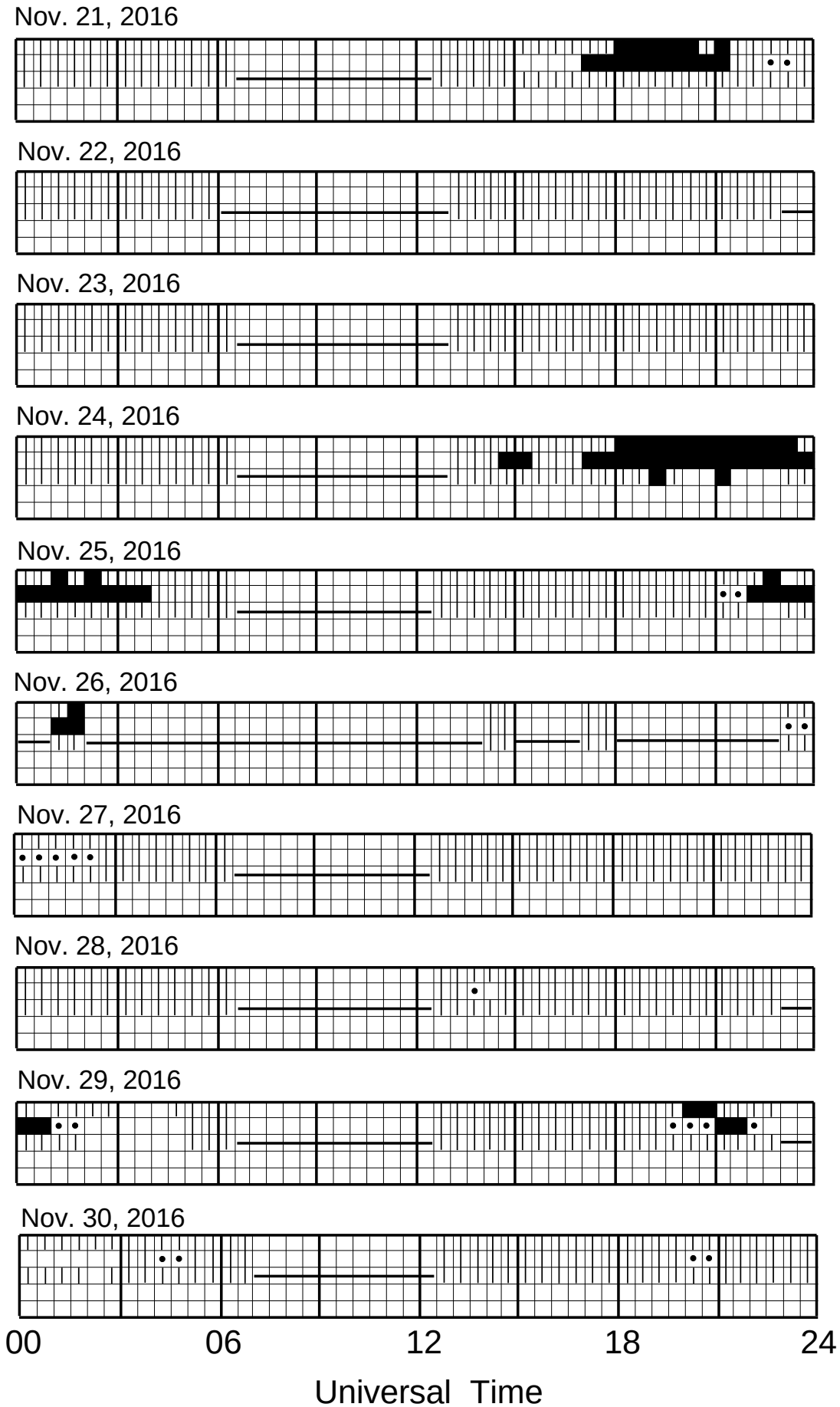

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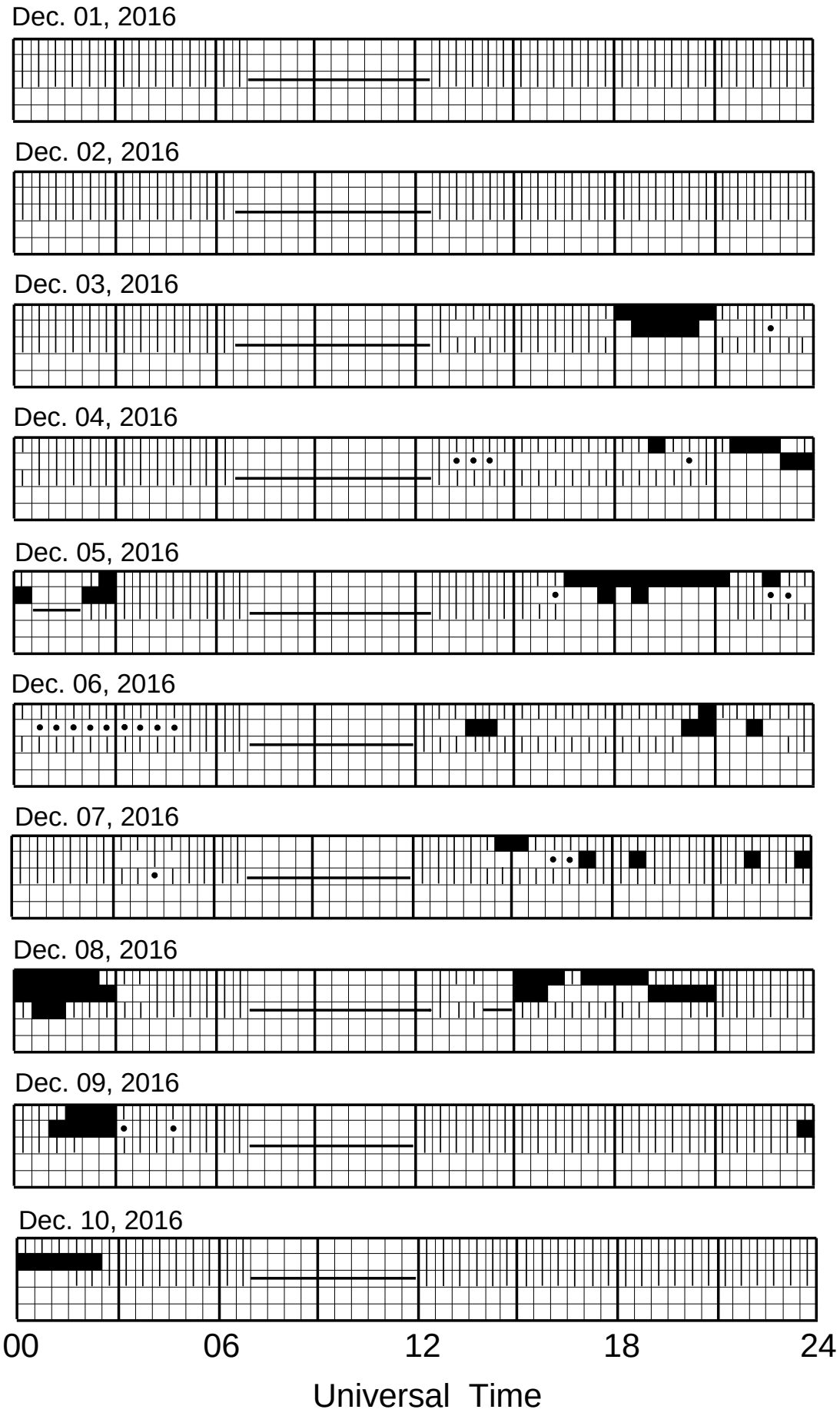

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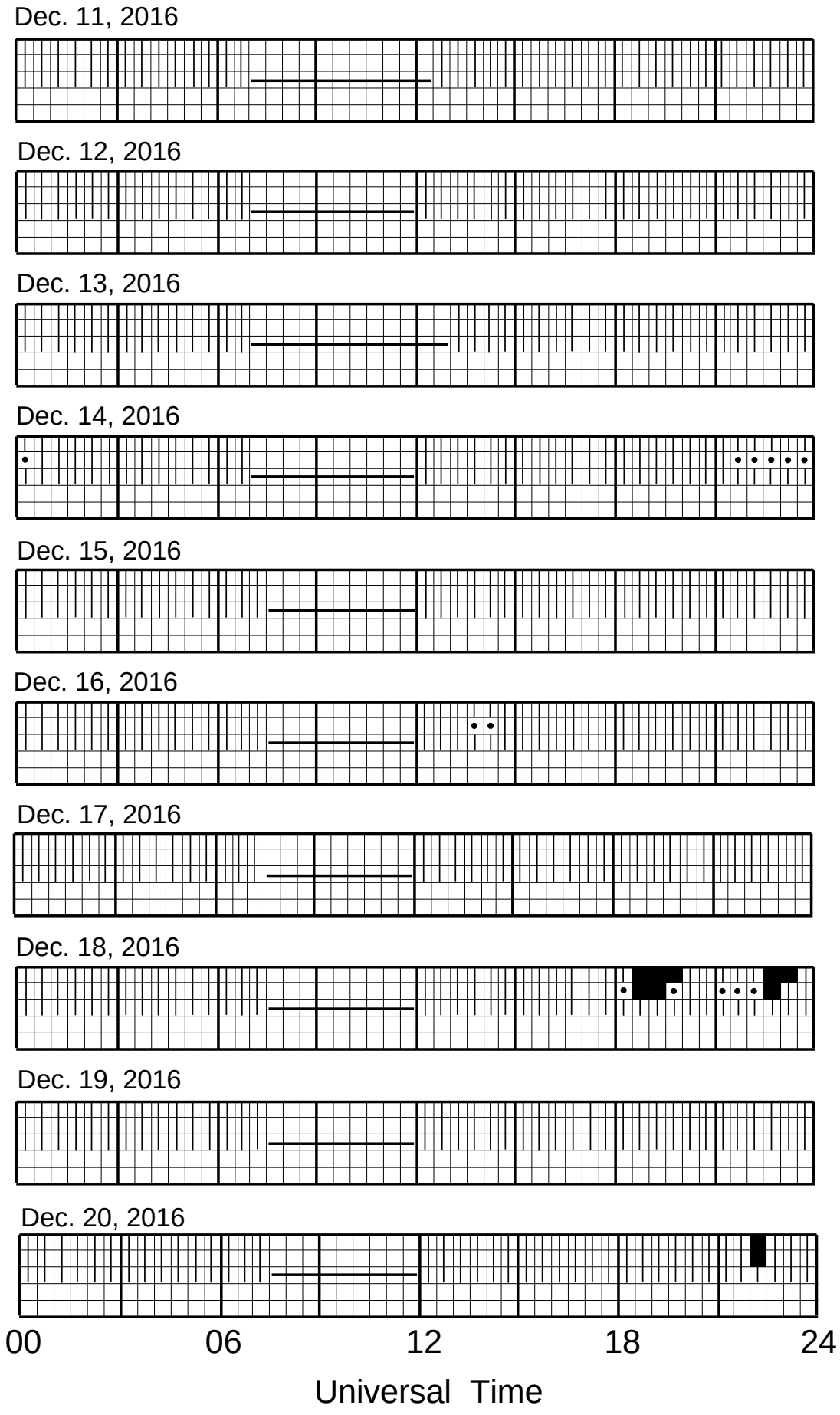

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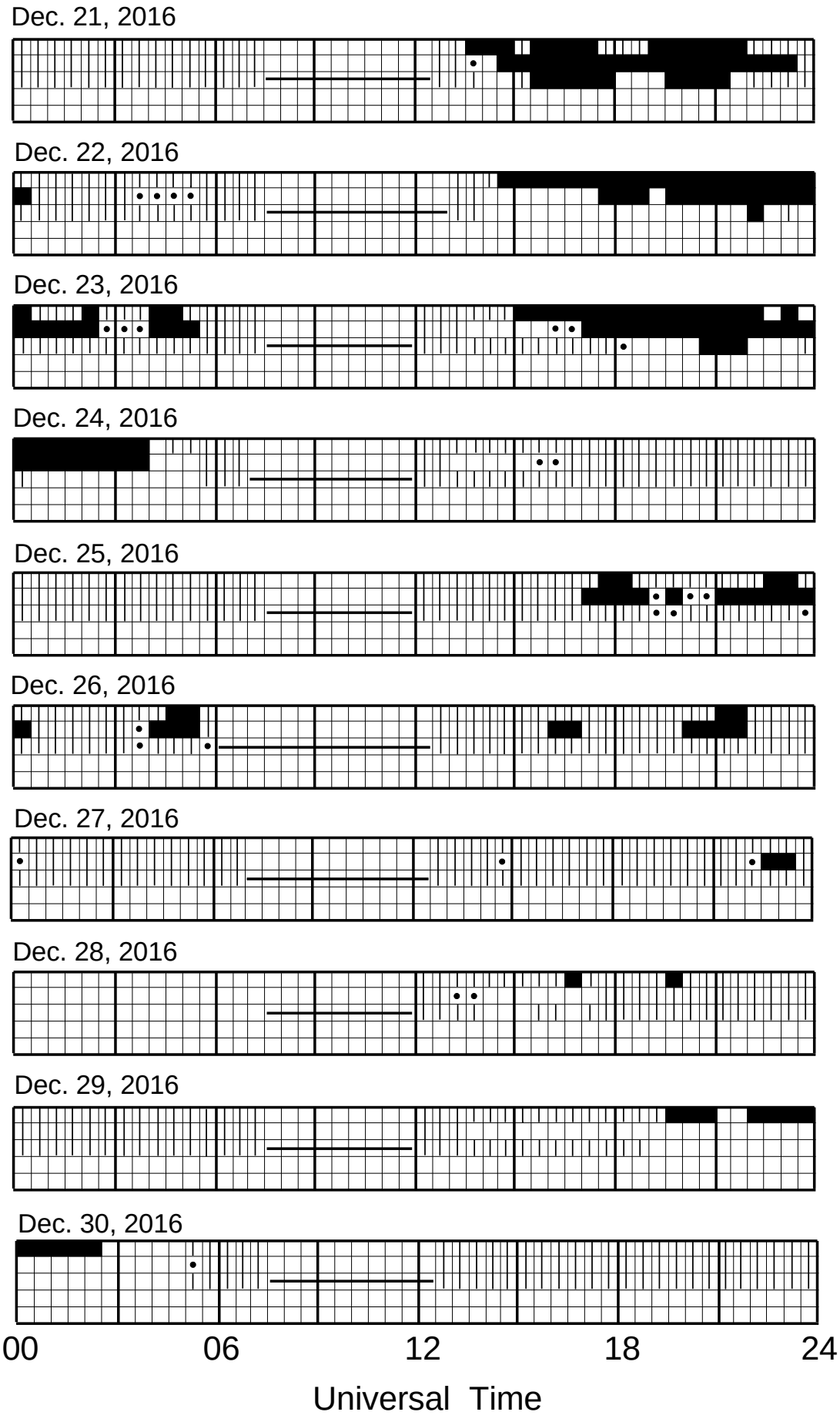

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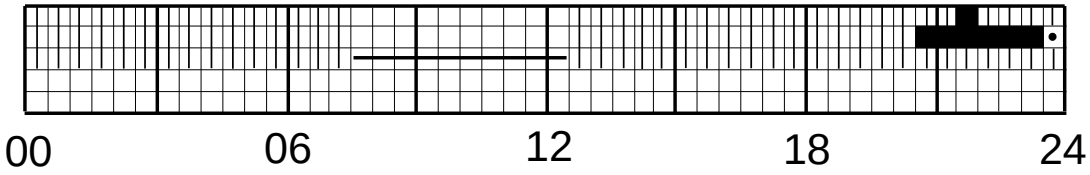
Dec. 31, 2016



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Universal Time

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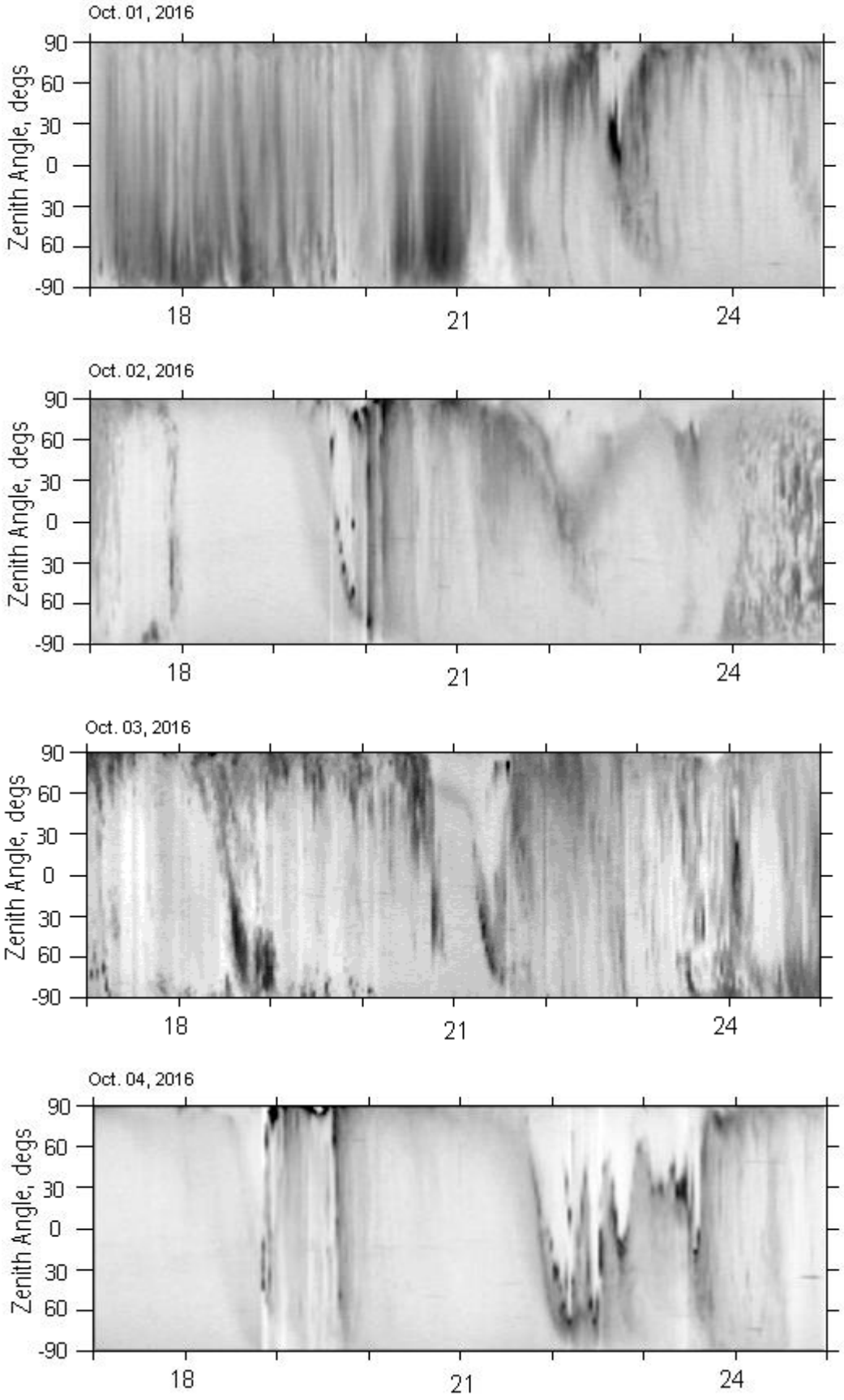

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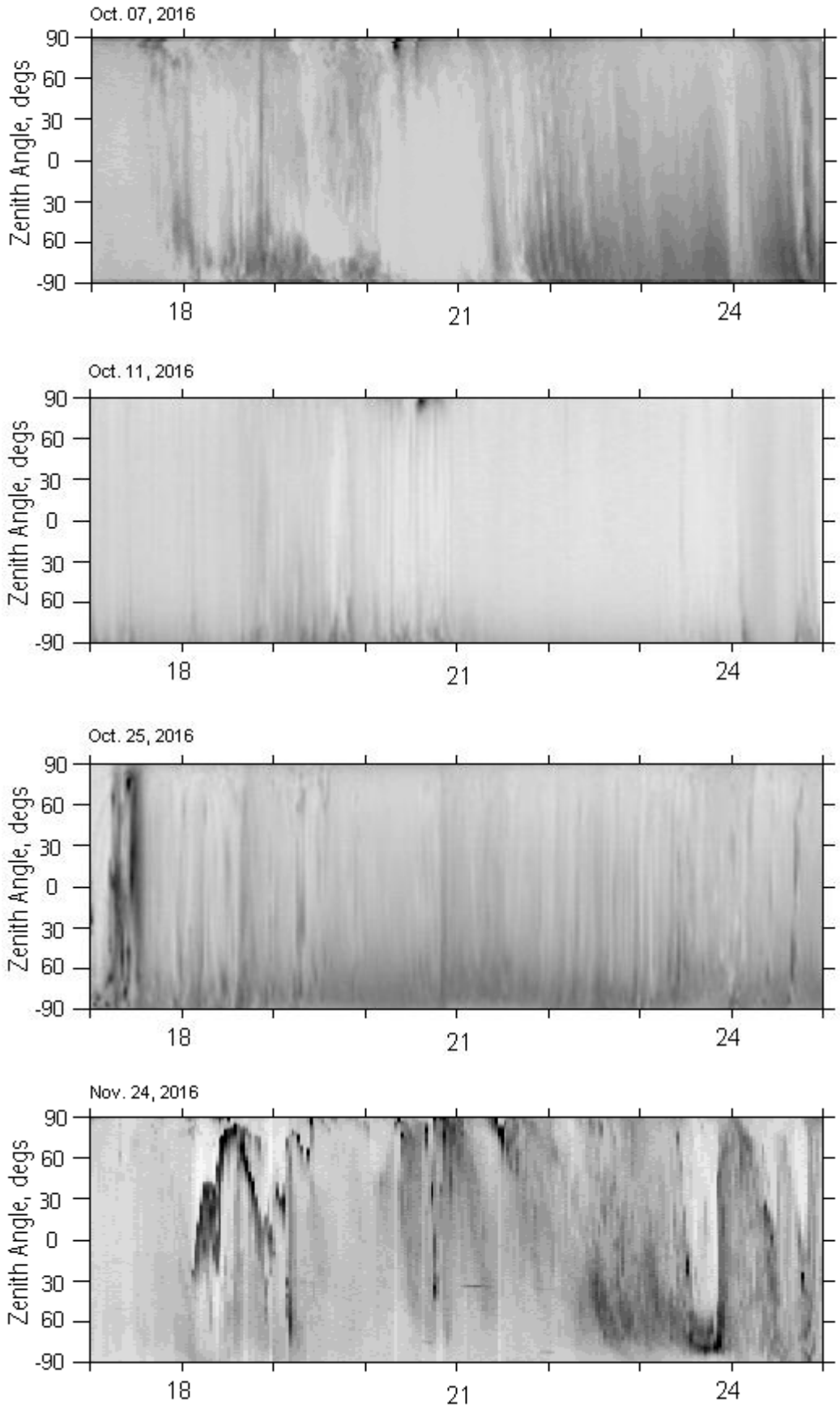
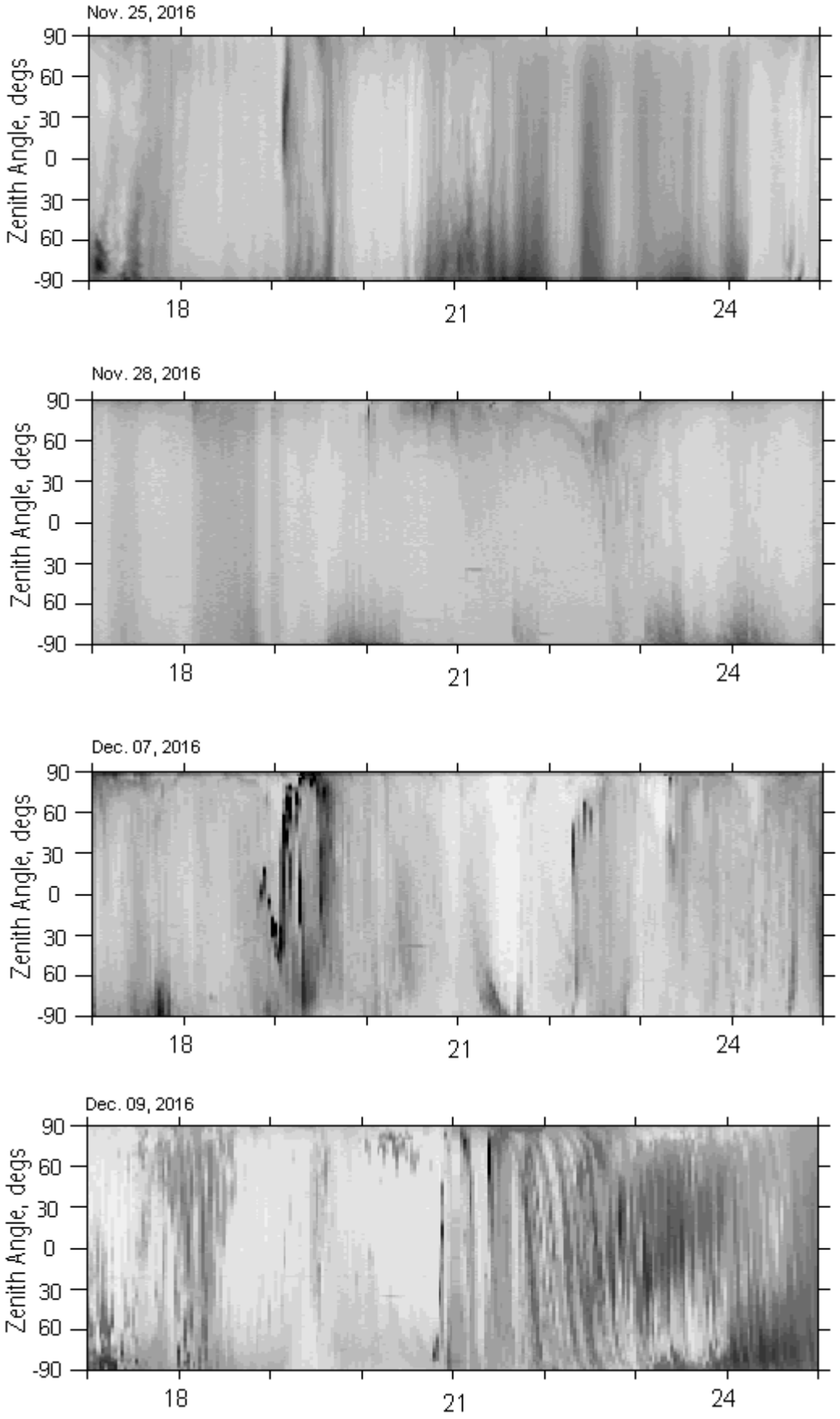


Apatity TV keograms



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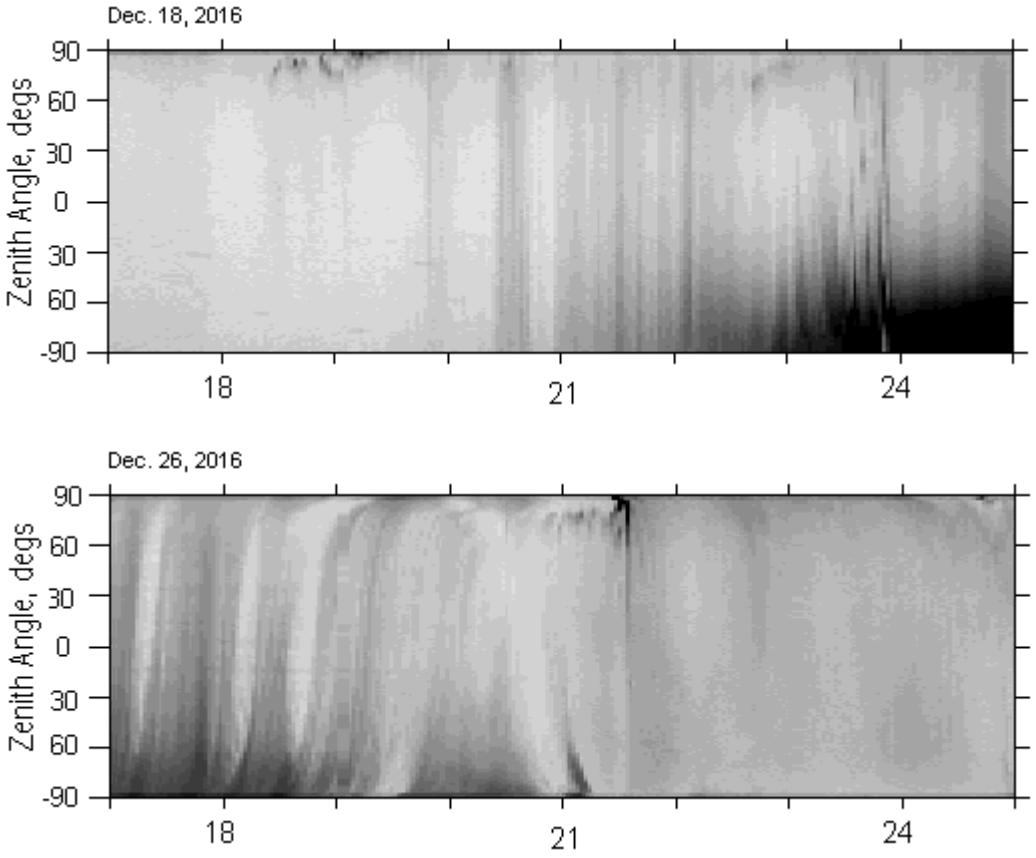
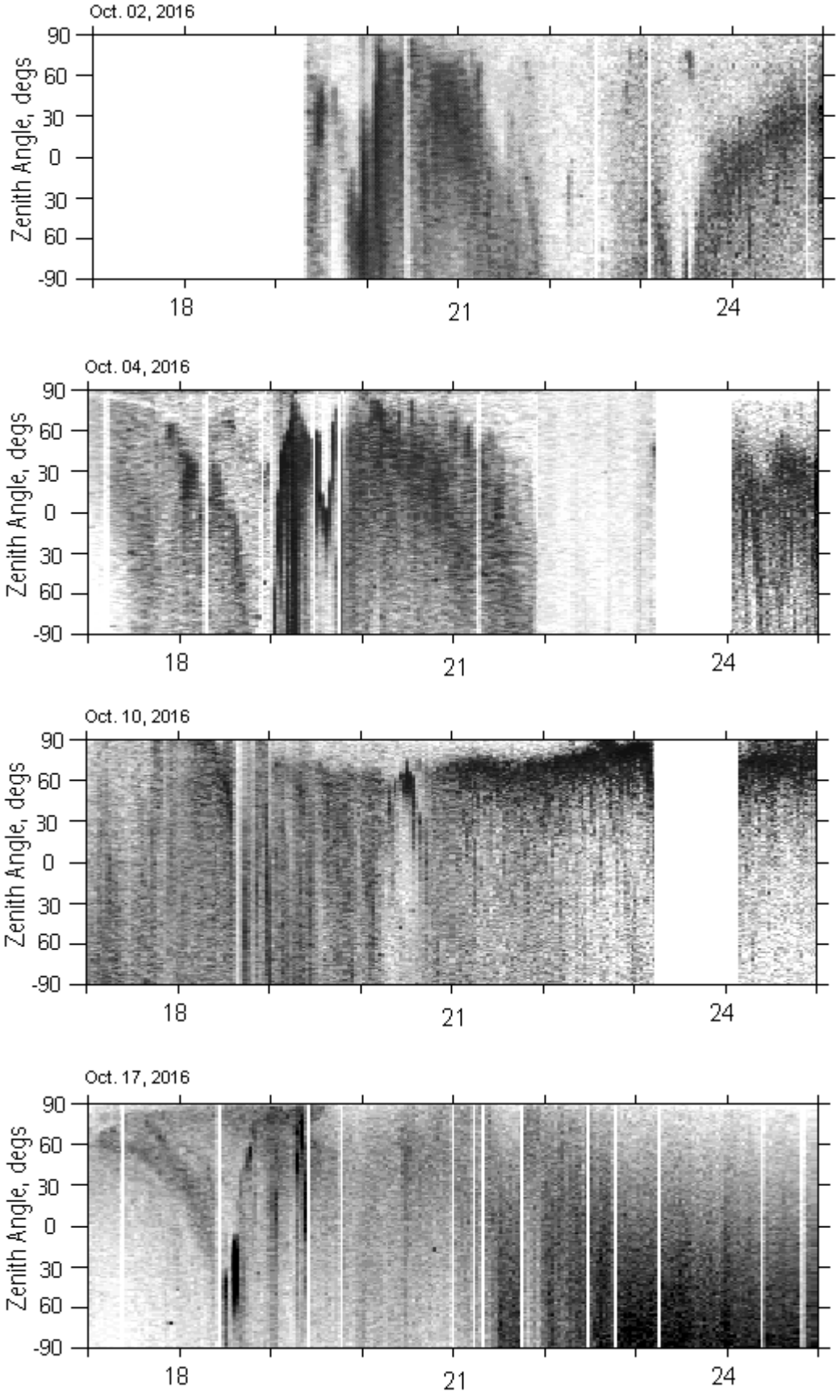


Universal Time

Lovozero TV keograms



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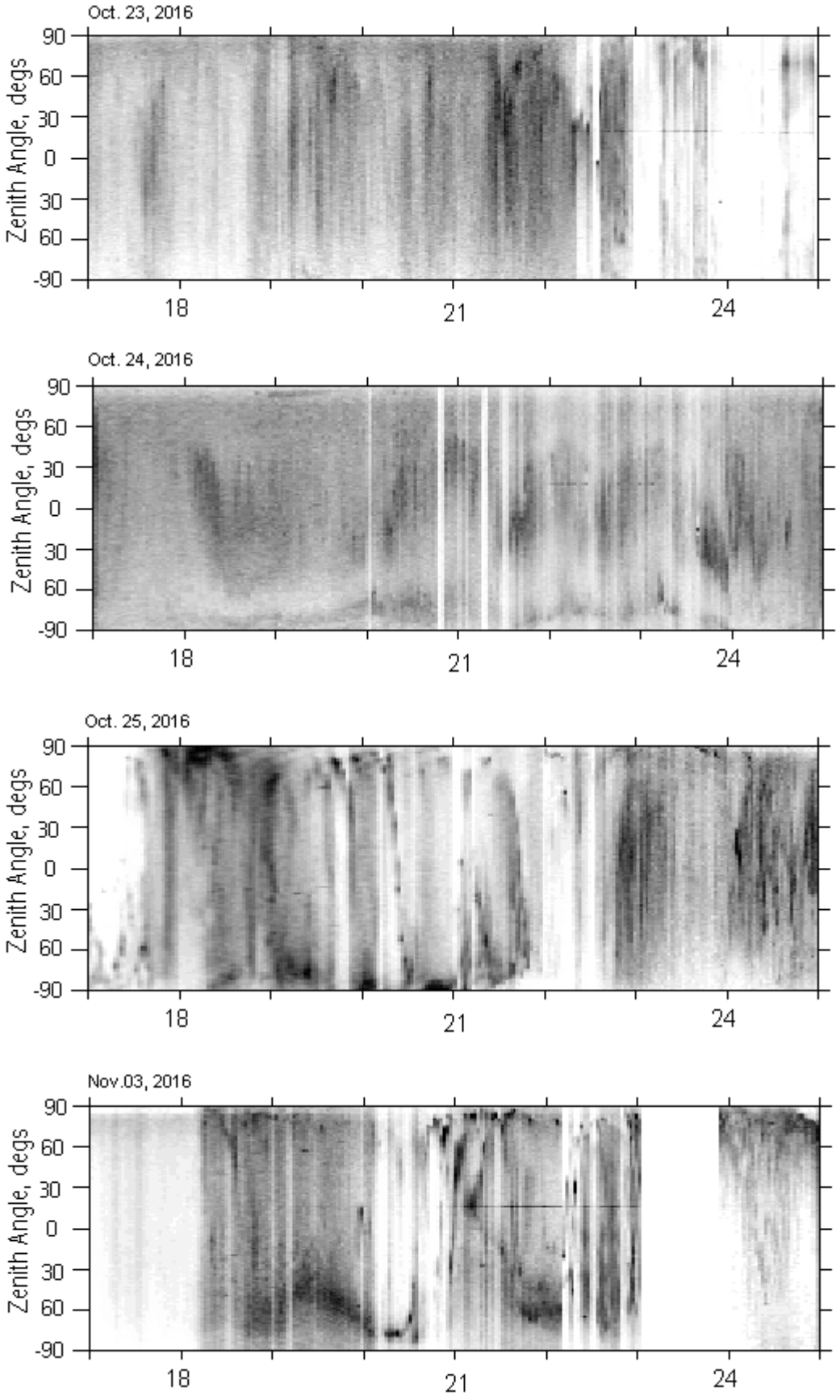

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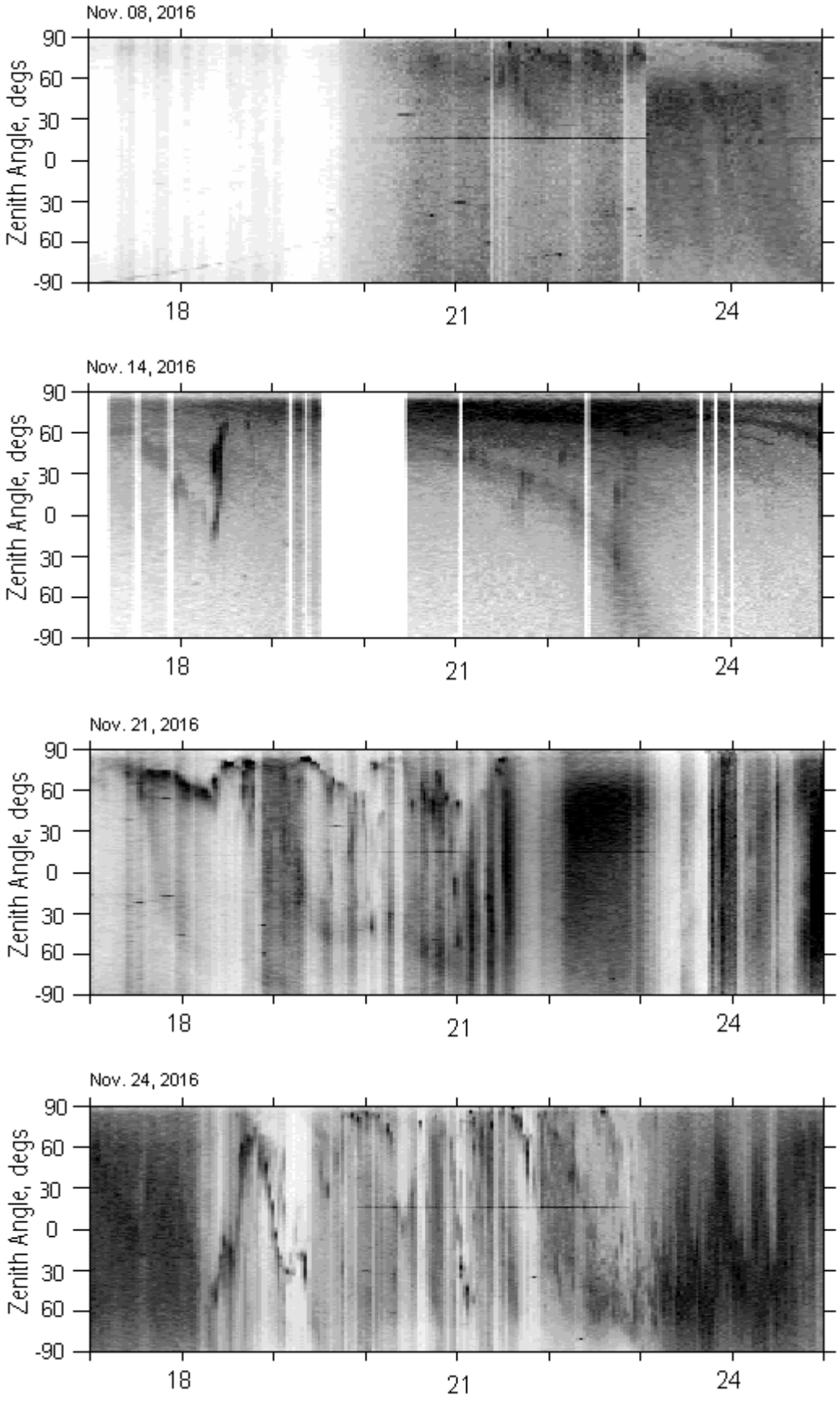

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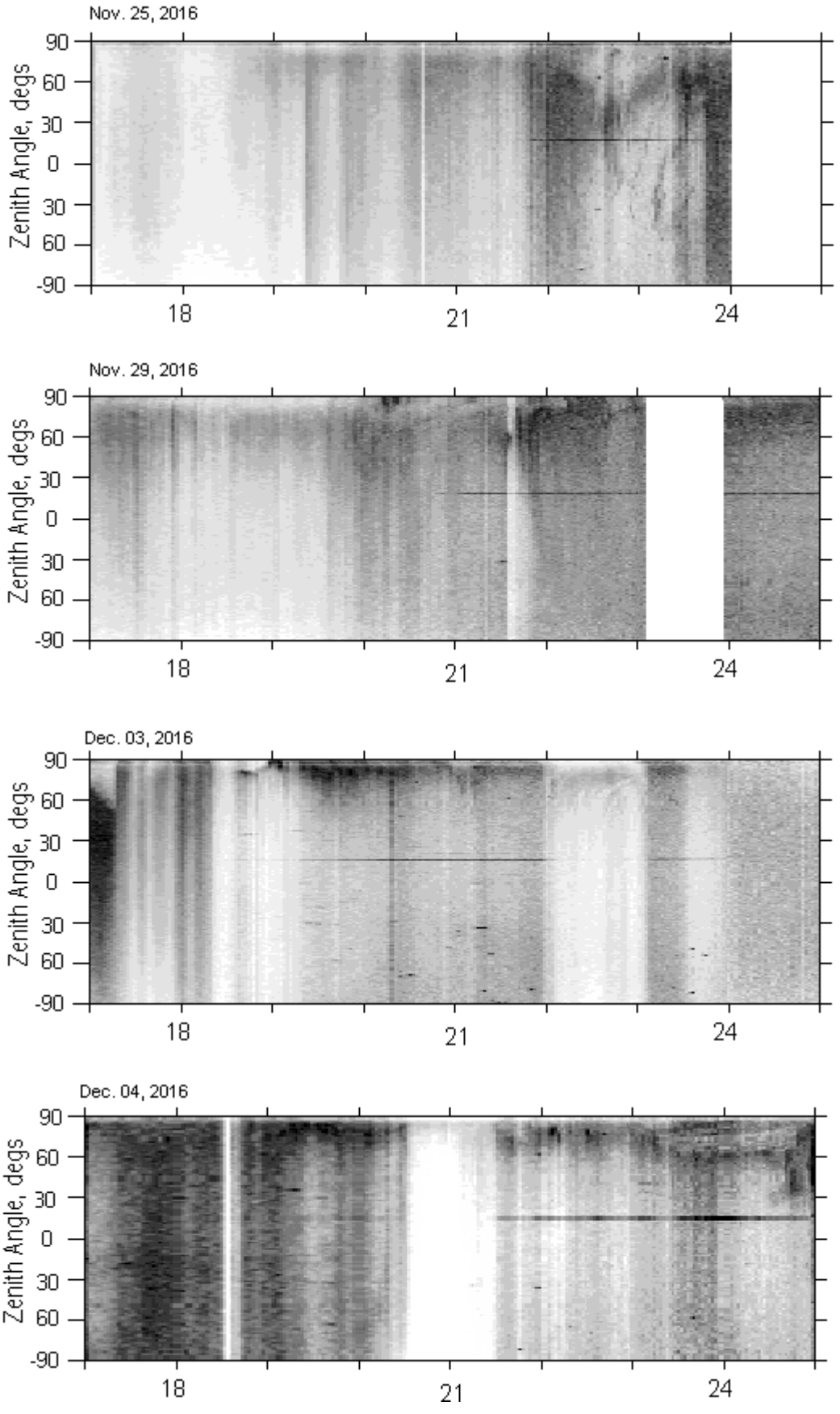

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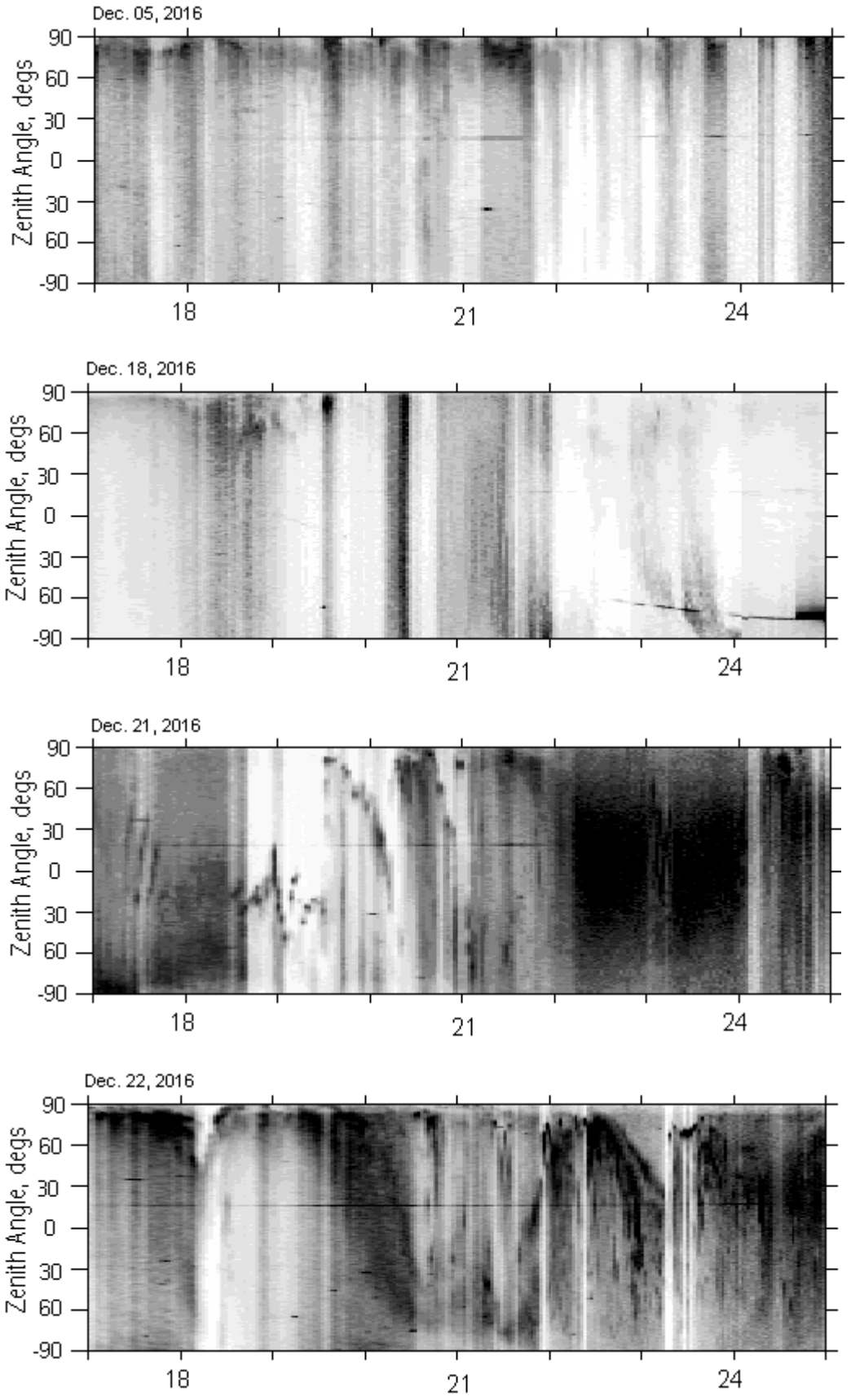

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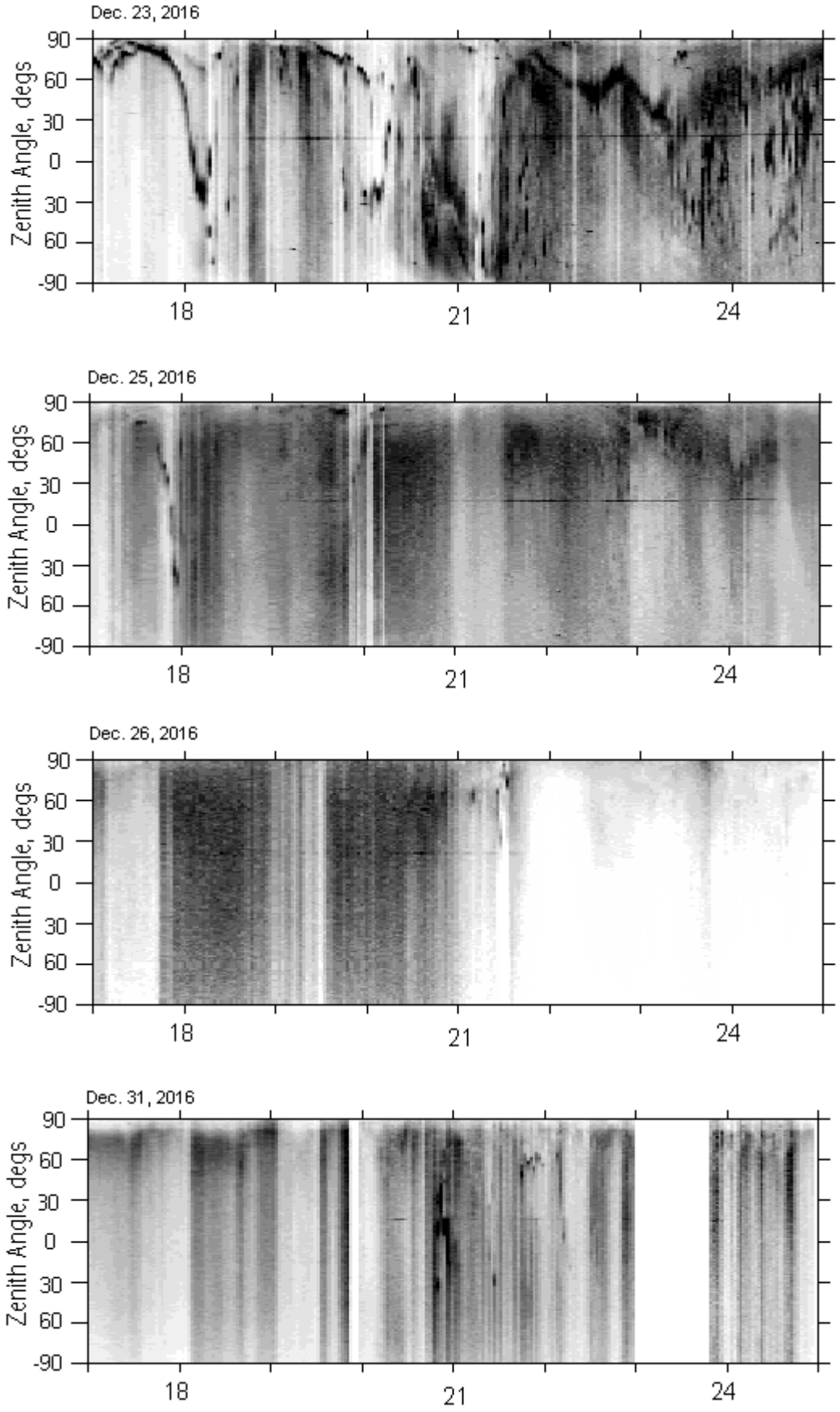
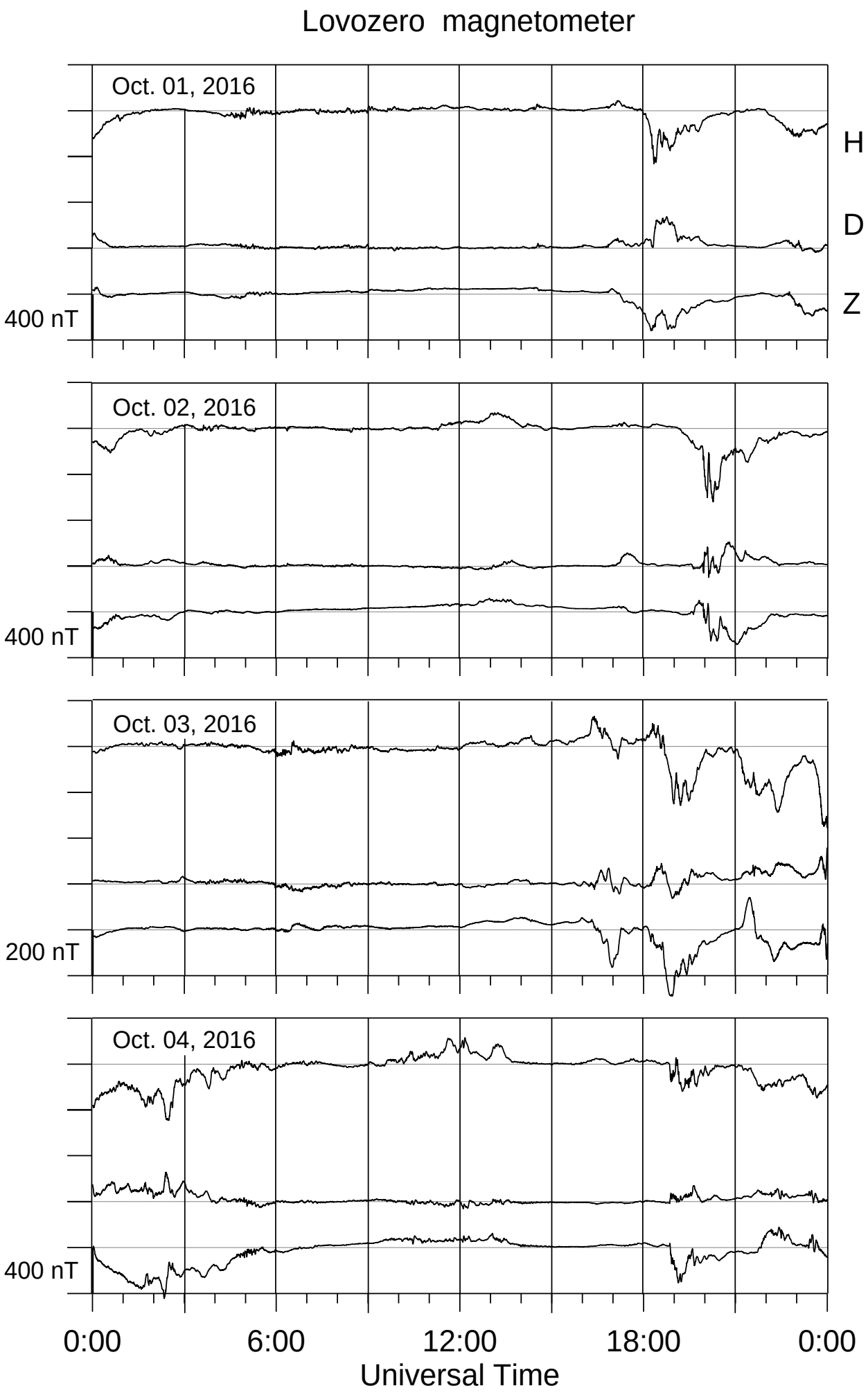


LOVOZERO MAGNETOGRAMS

October - December 2016


Lovozero magnetometer
Oct. 01, 2016
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D
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400 nT
Oct. 02, 2016
400 nT
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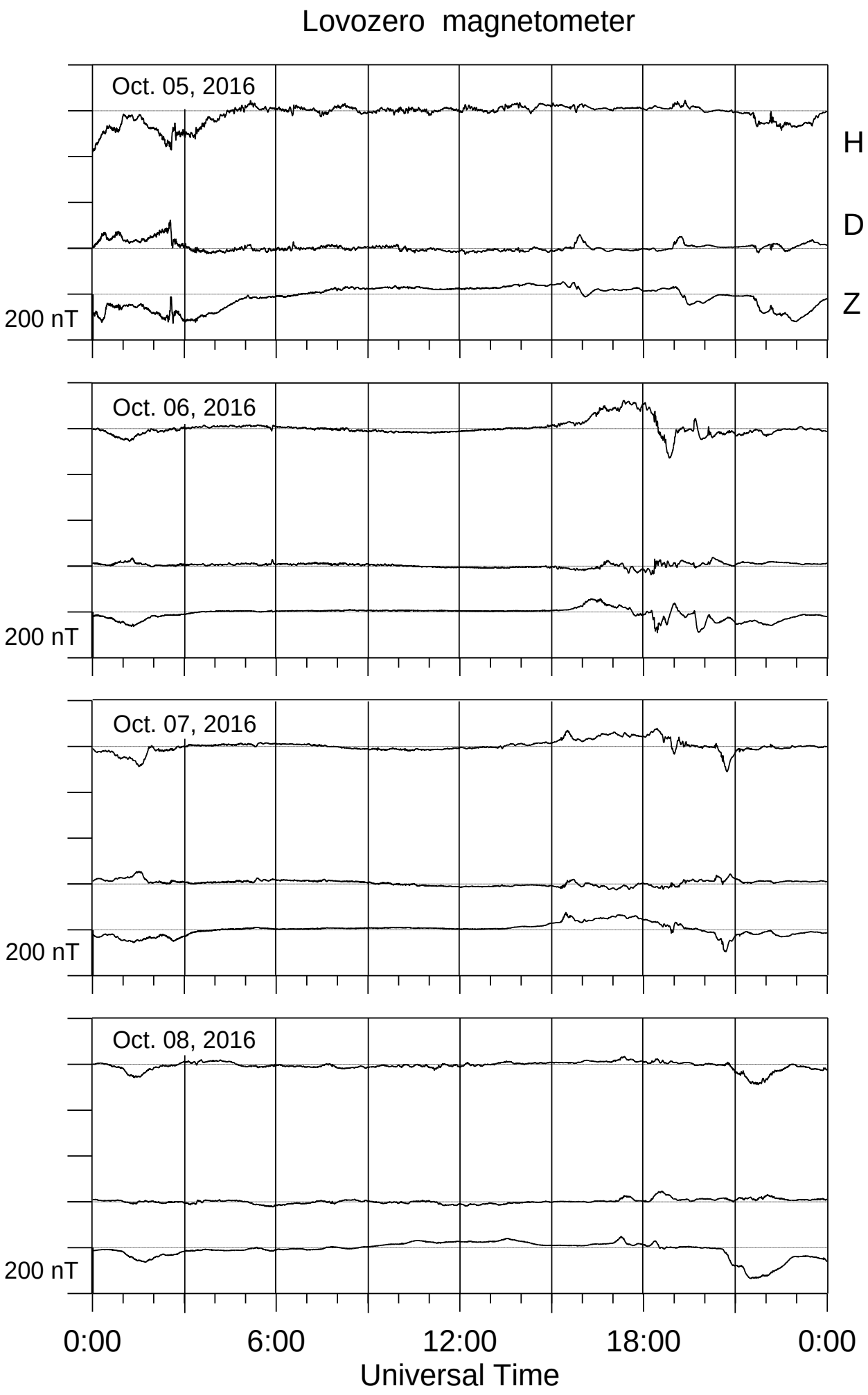
Universal Time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200 nT
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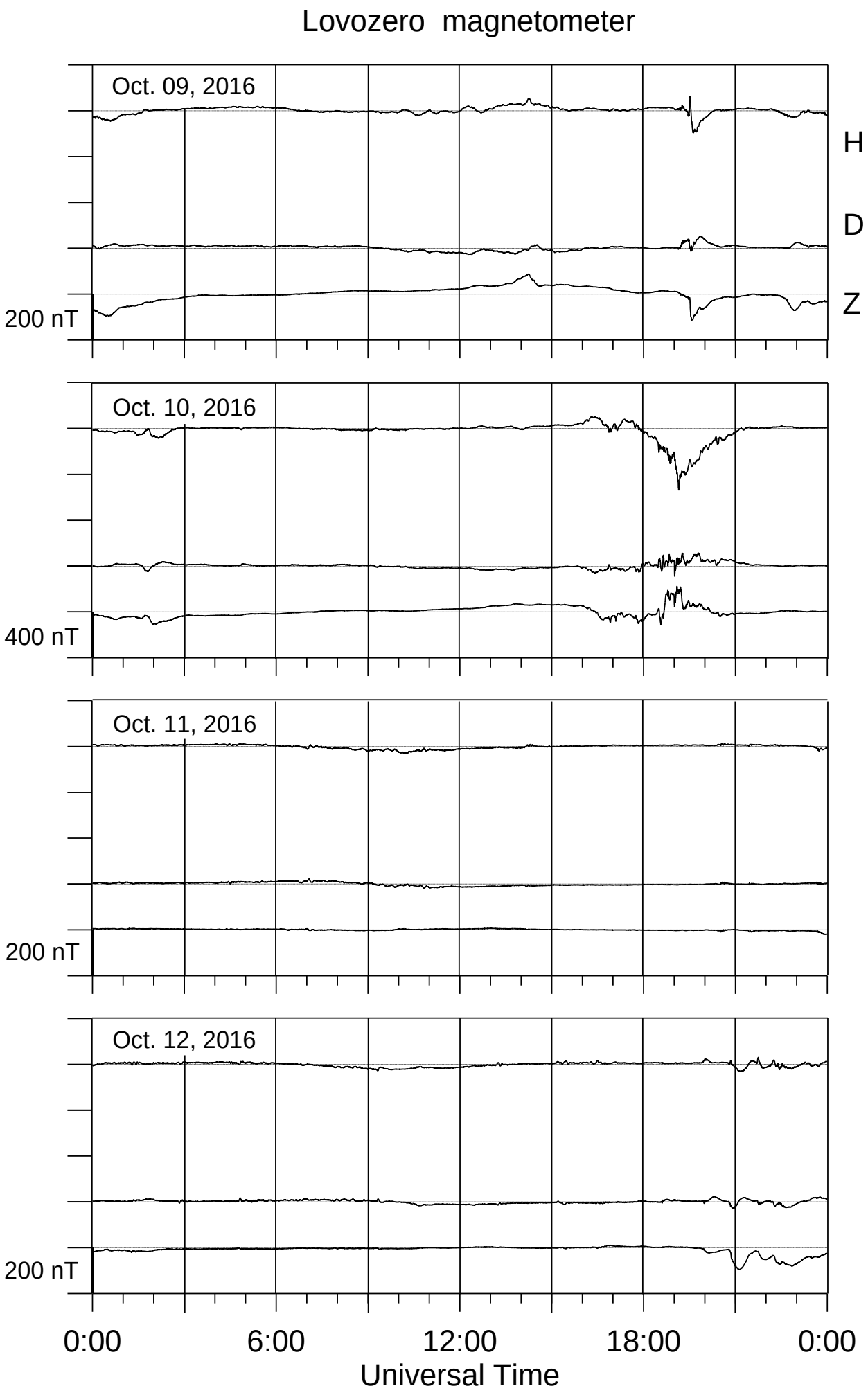
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D
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200 nT
Oct. 10, 2016
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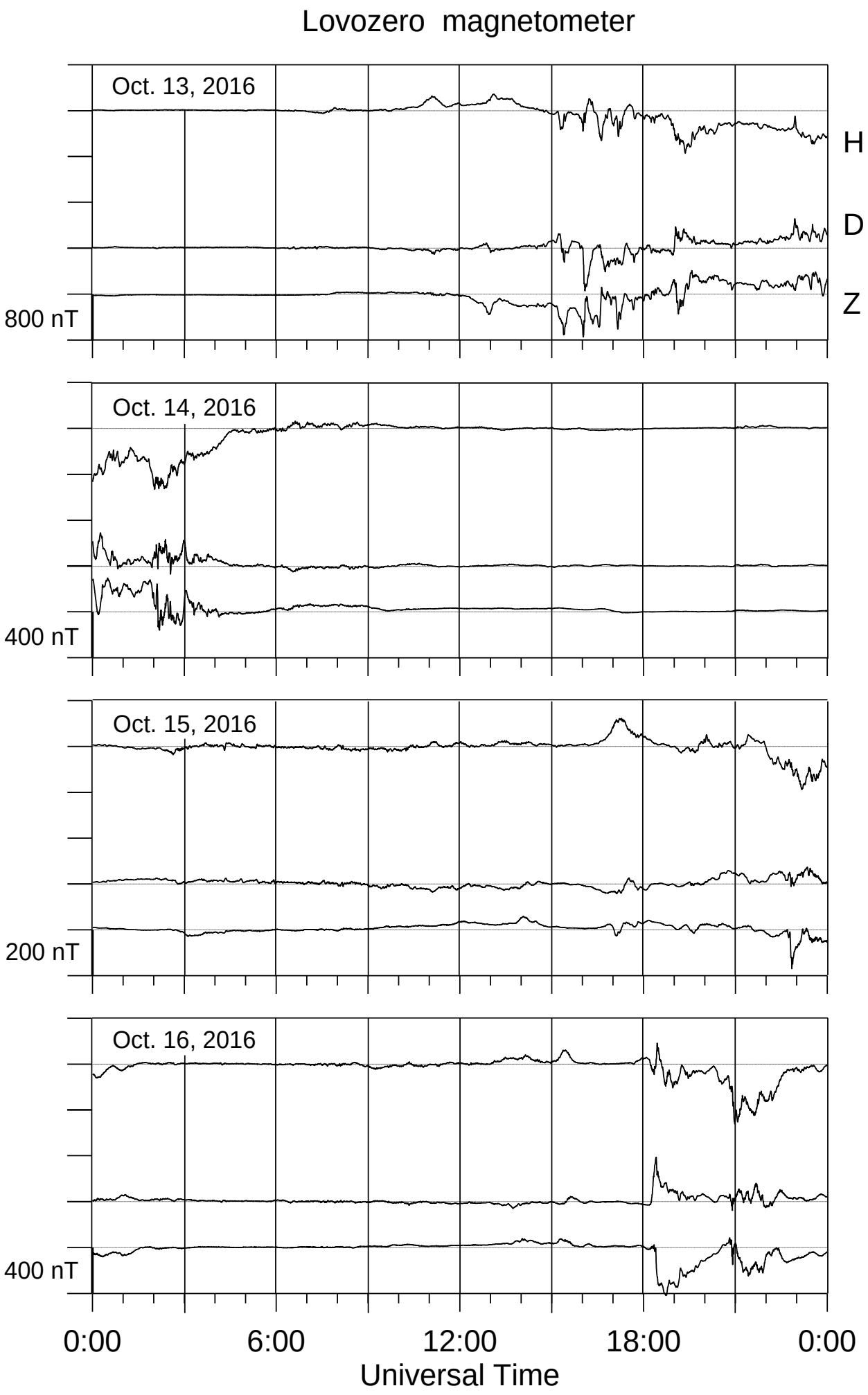
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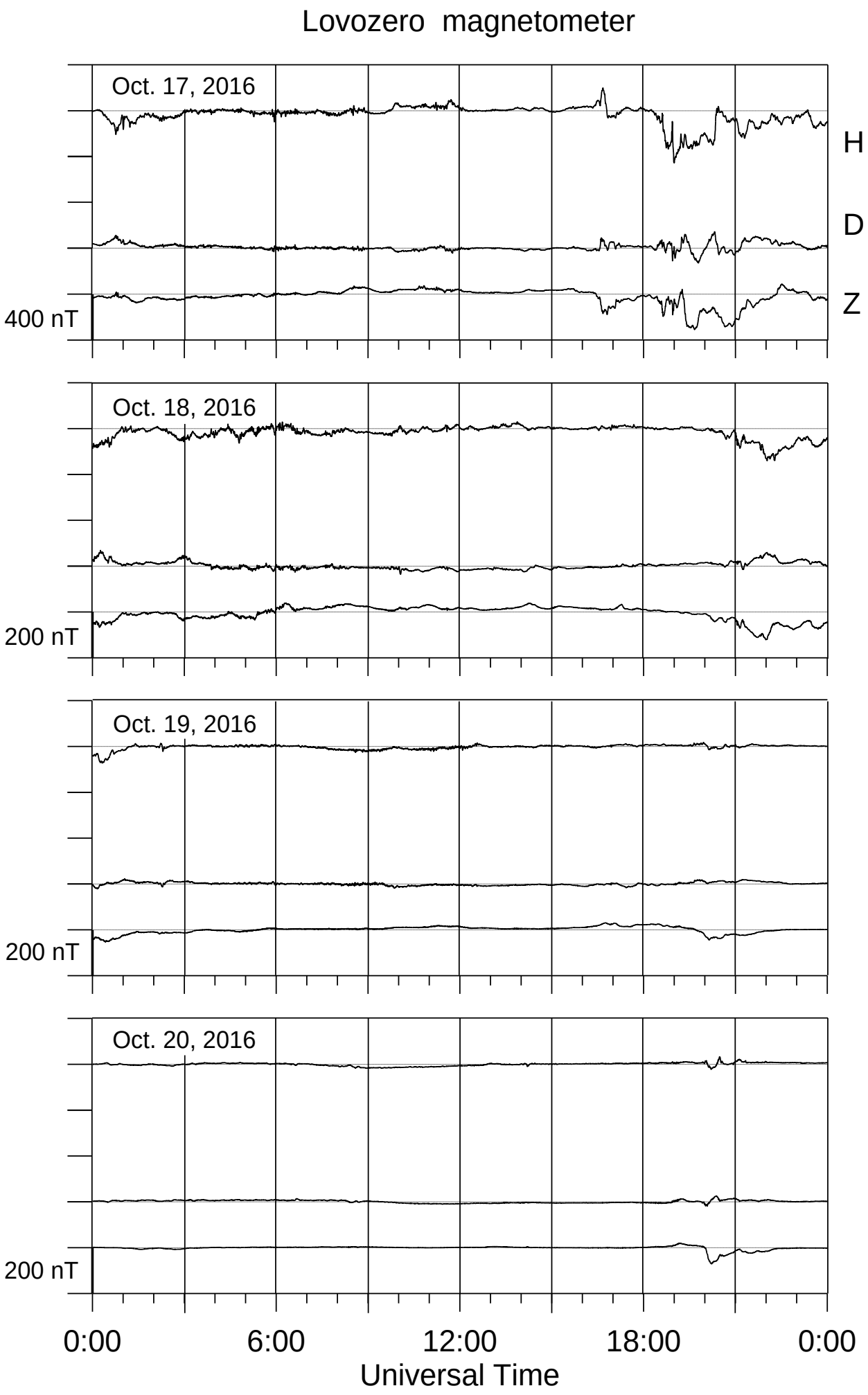
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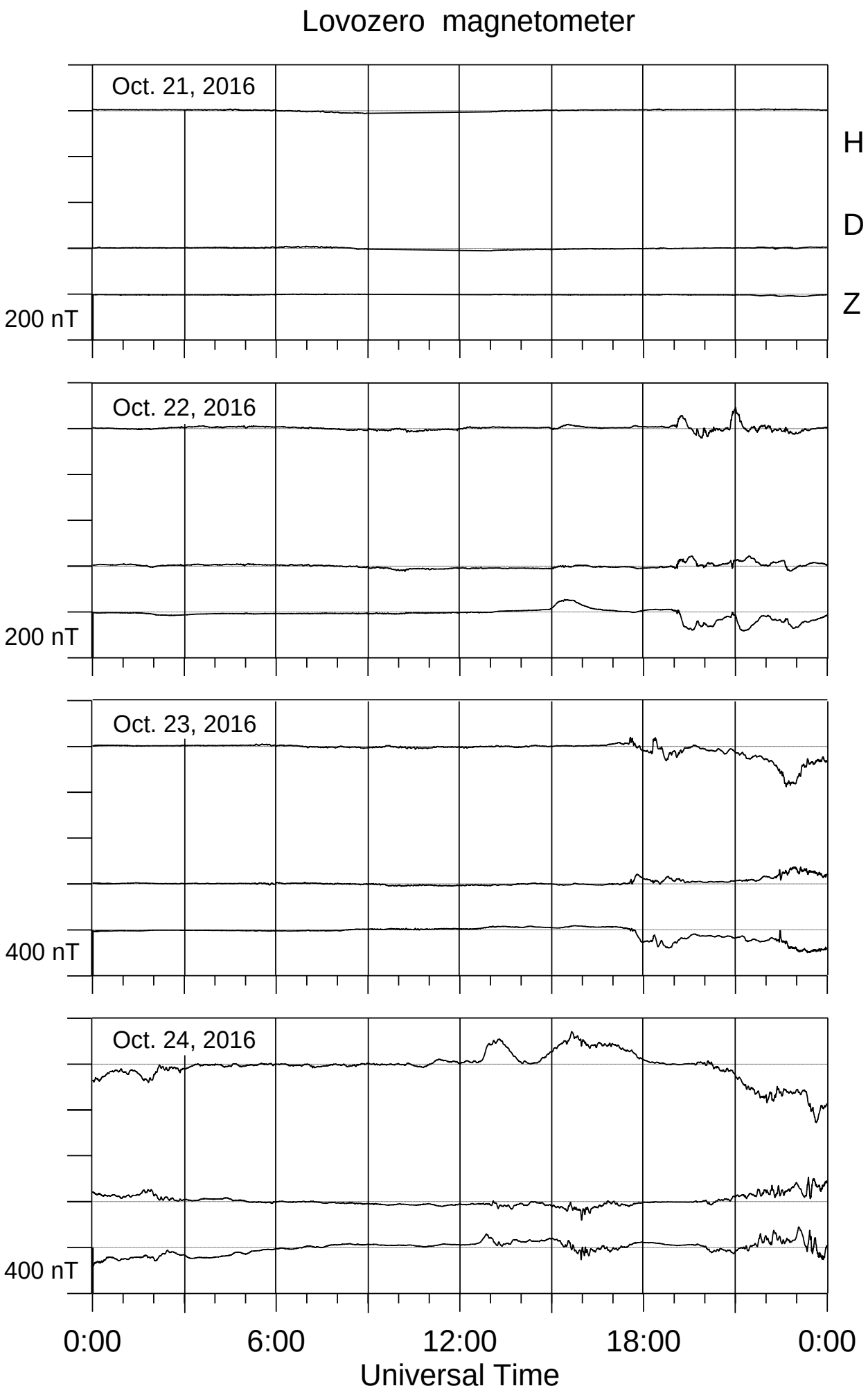
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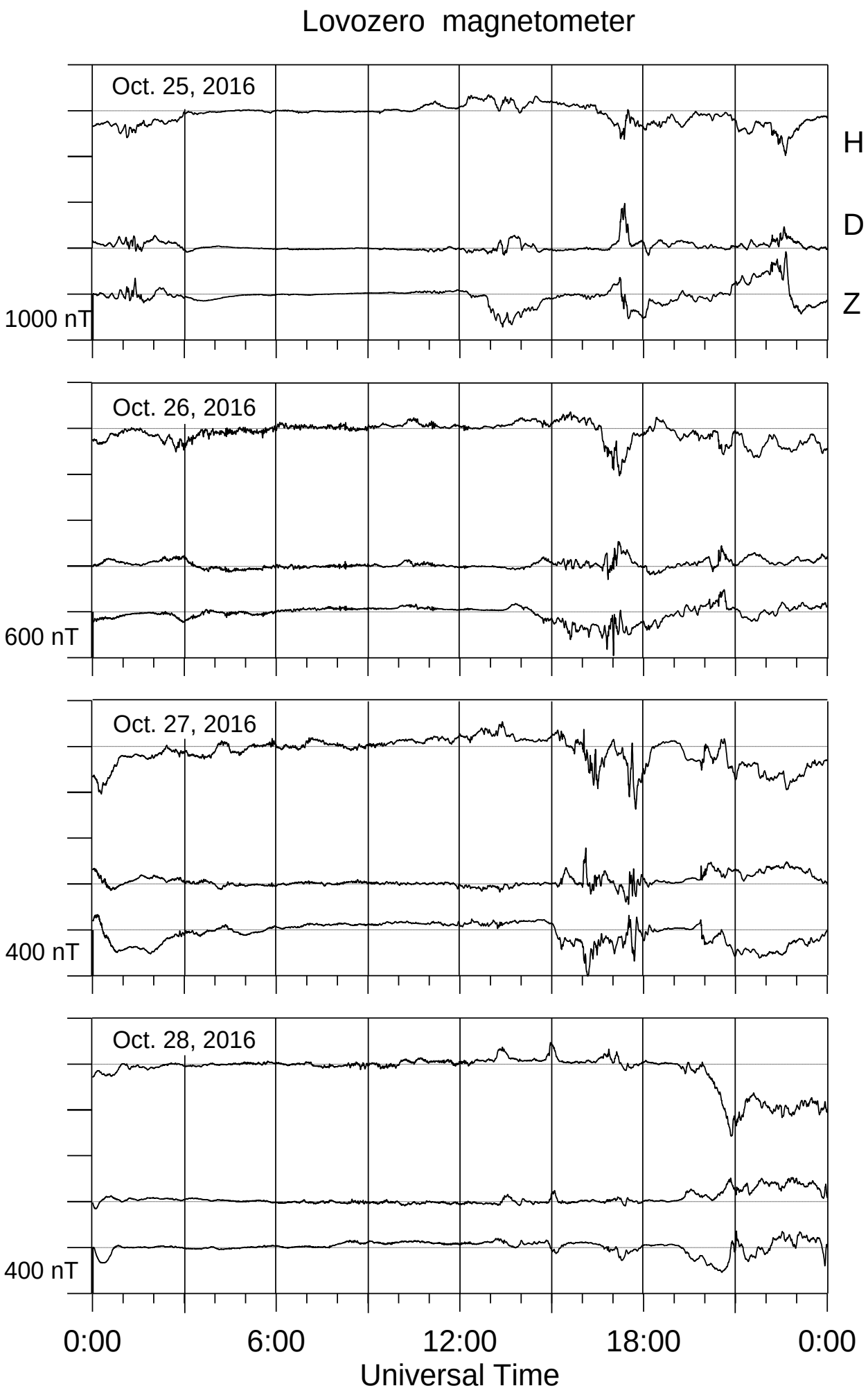
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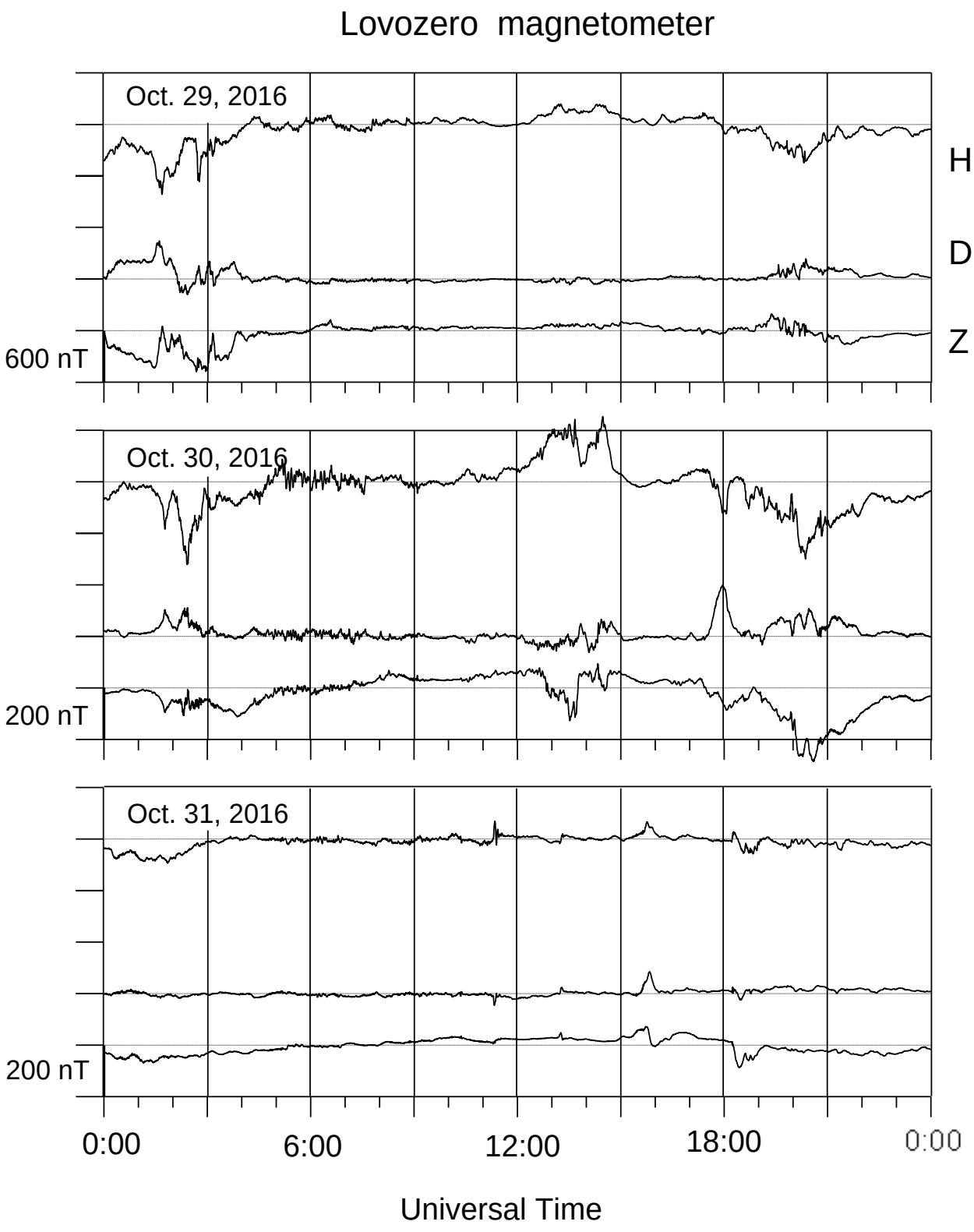
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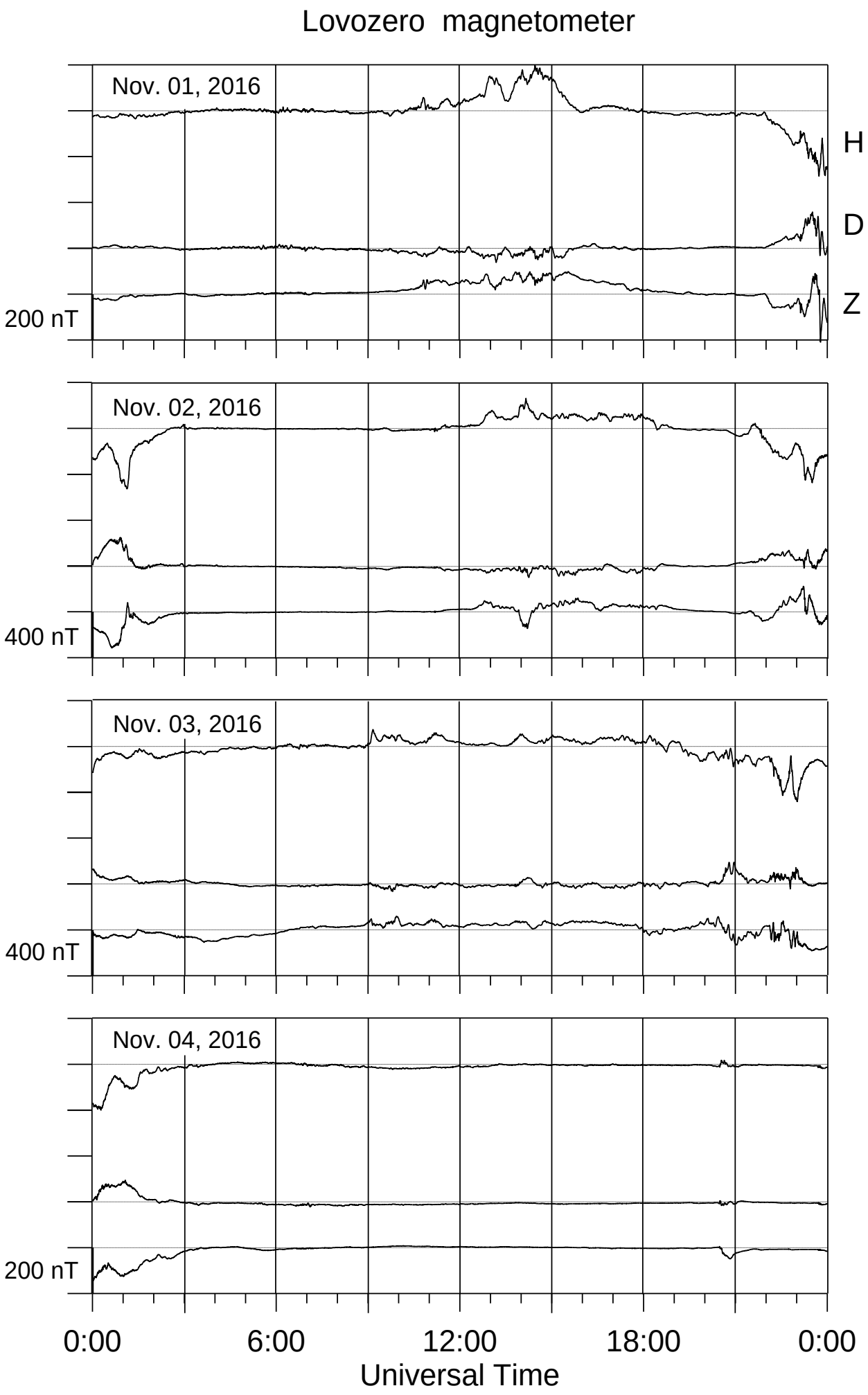
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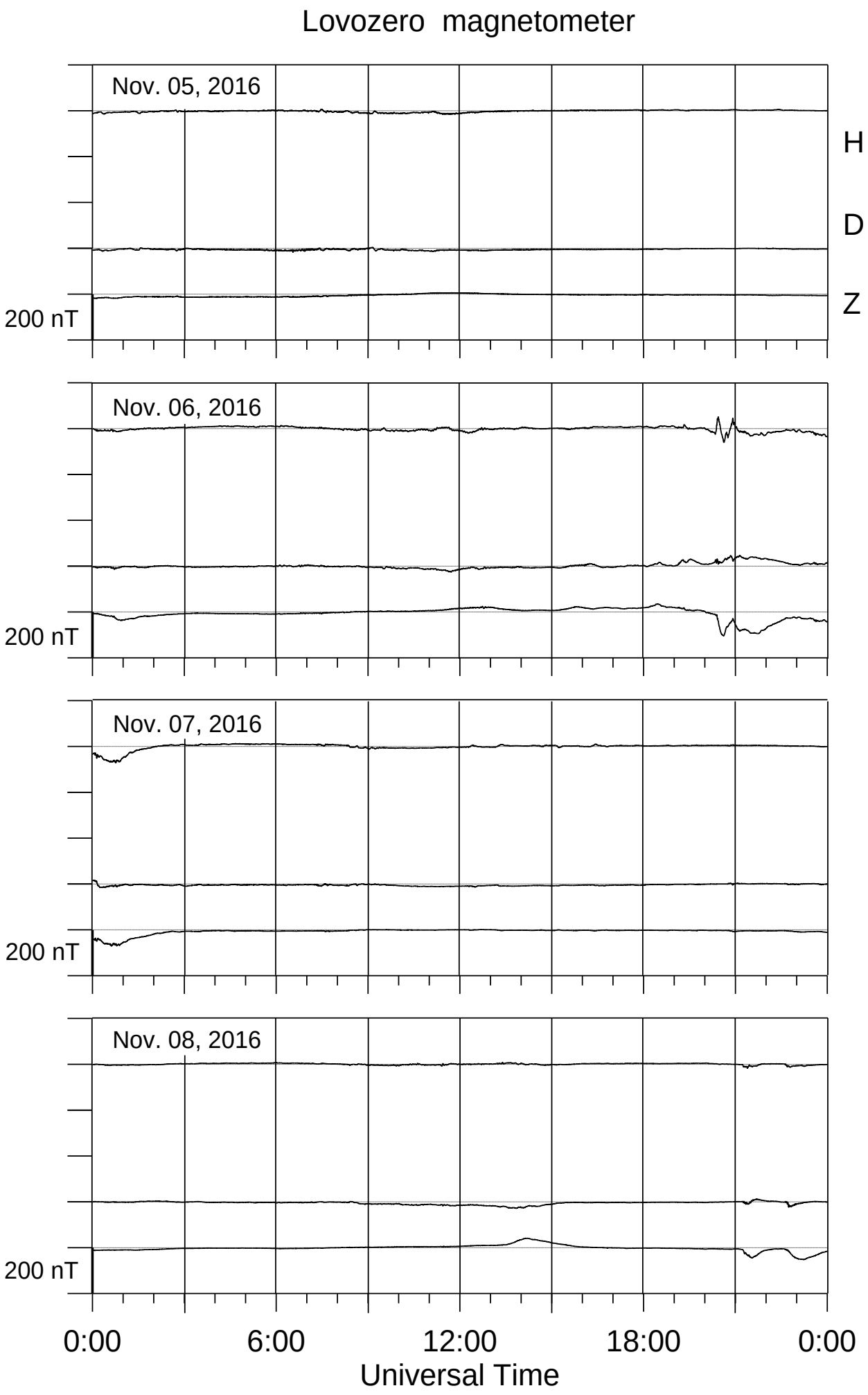
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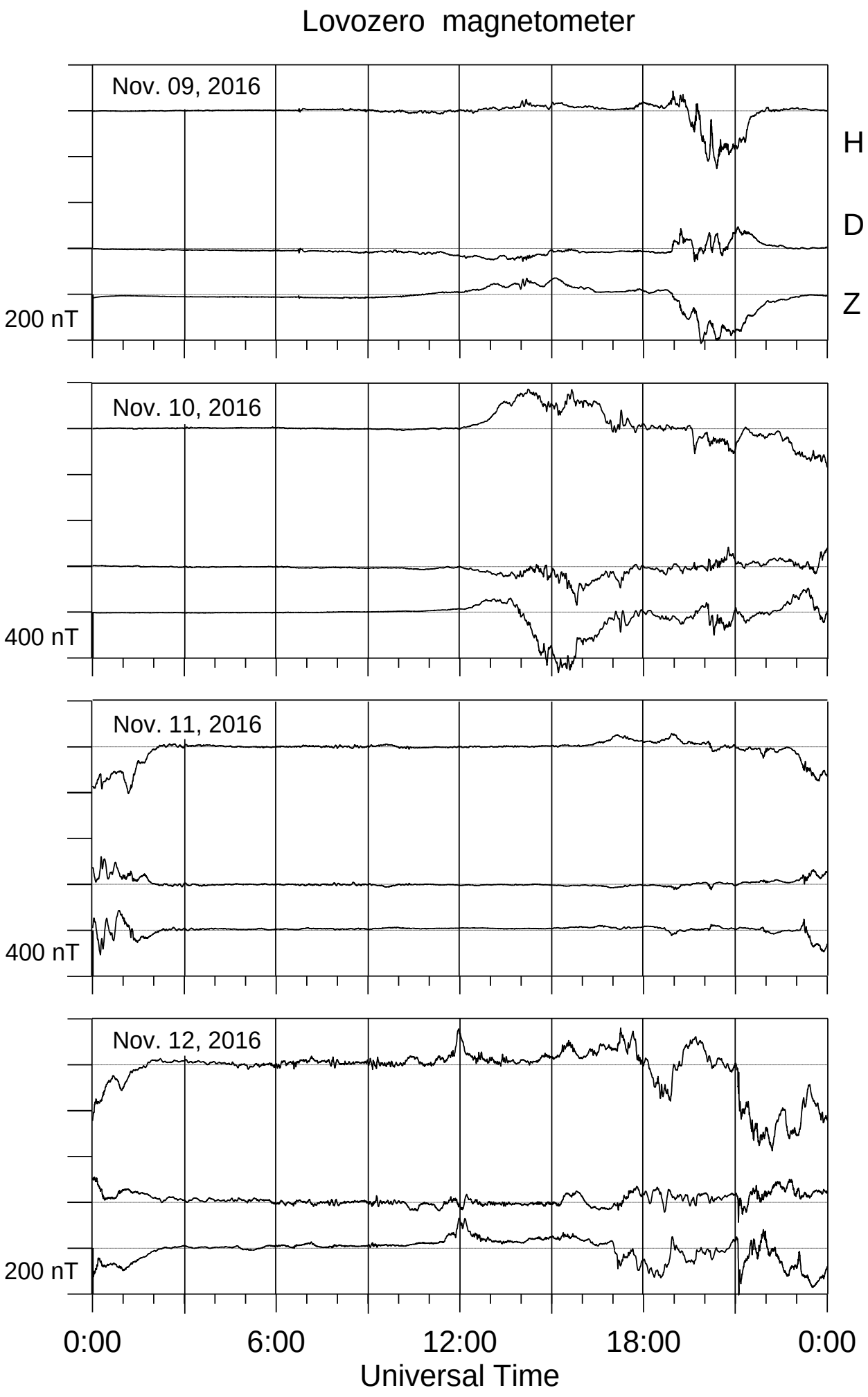
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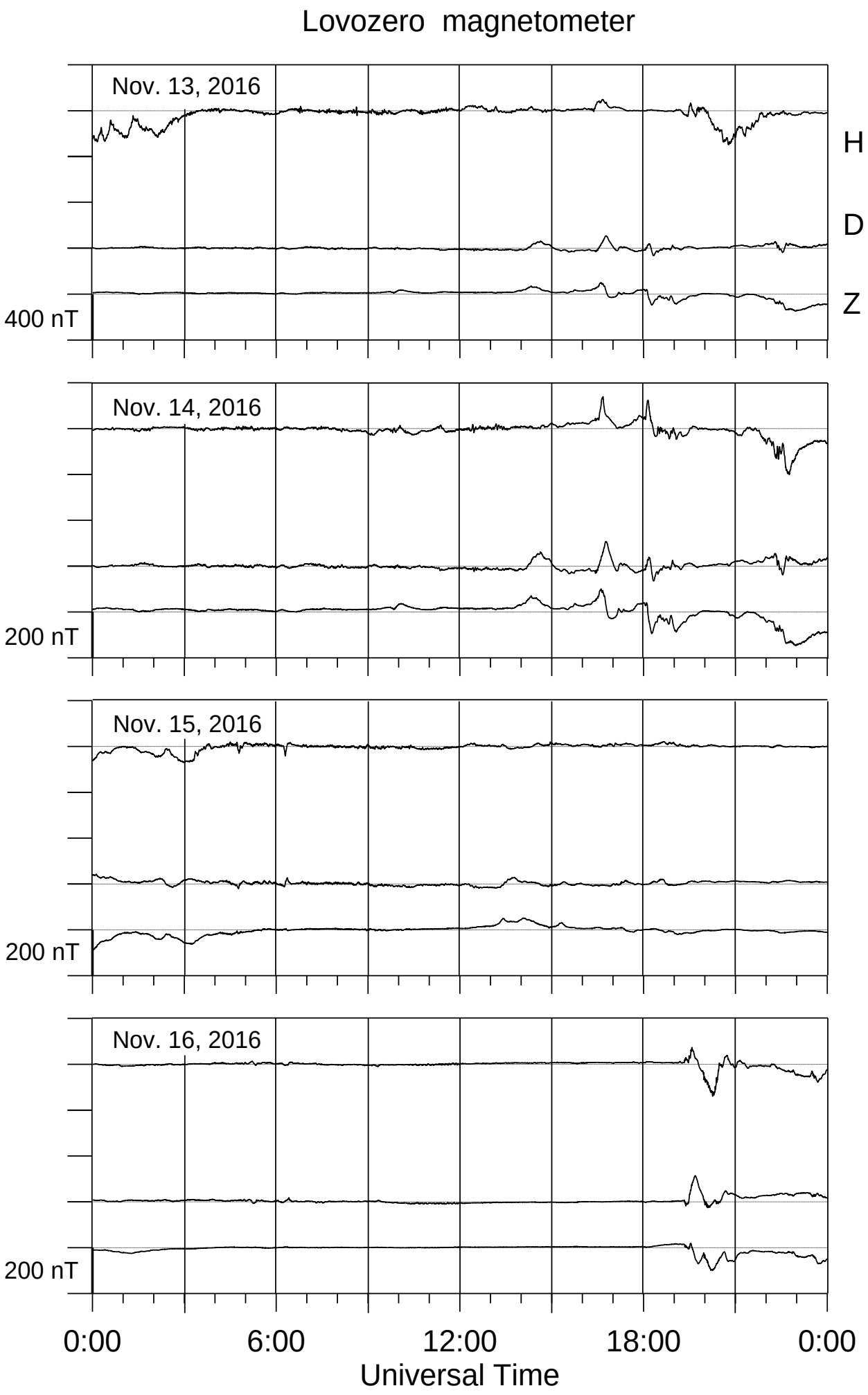
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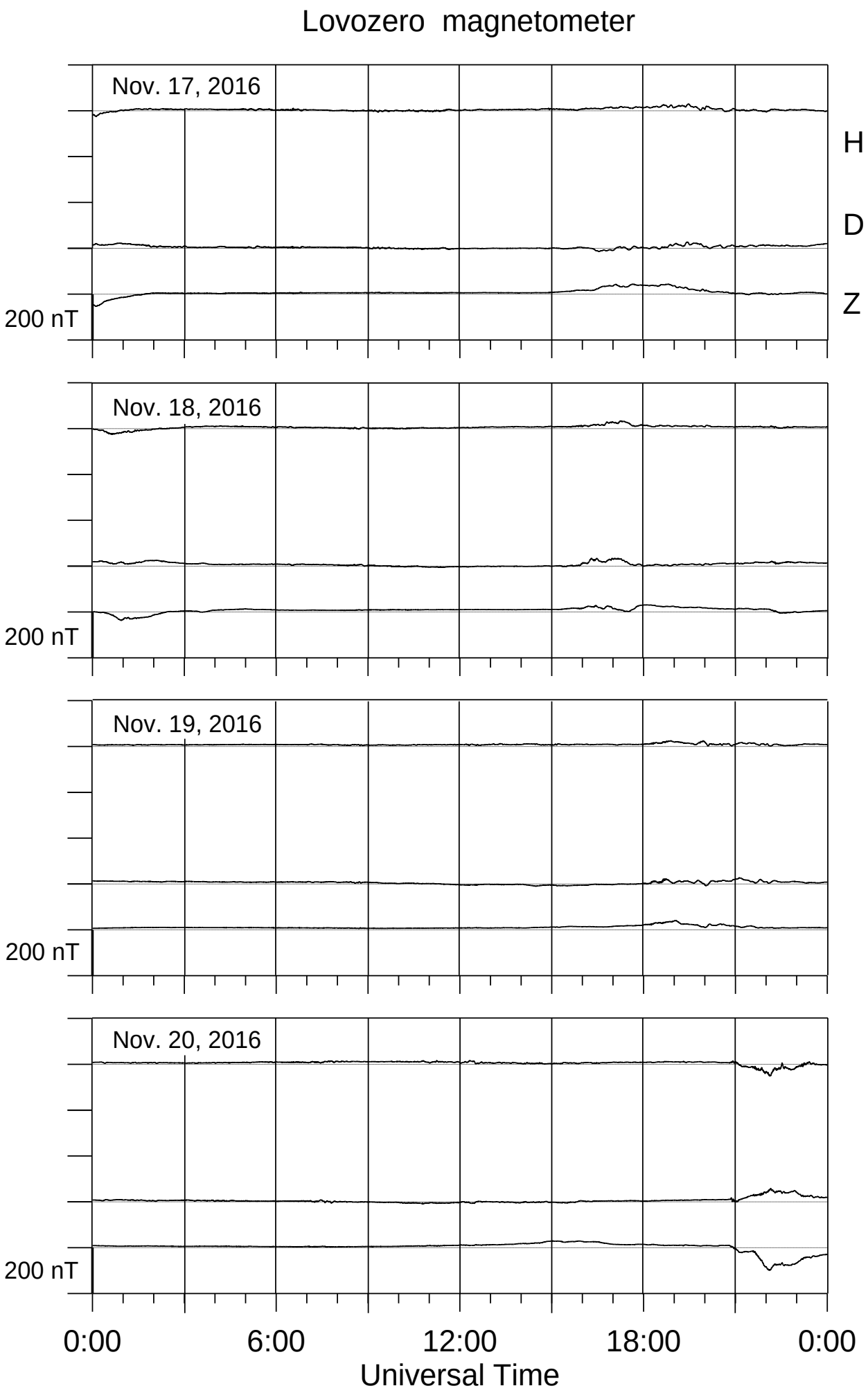
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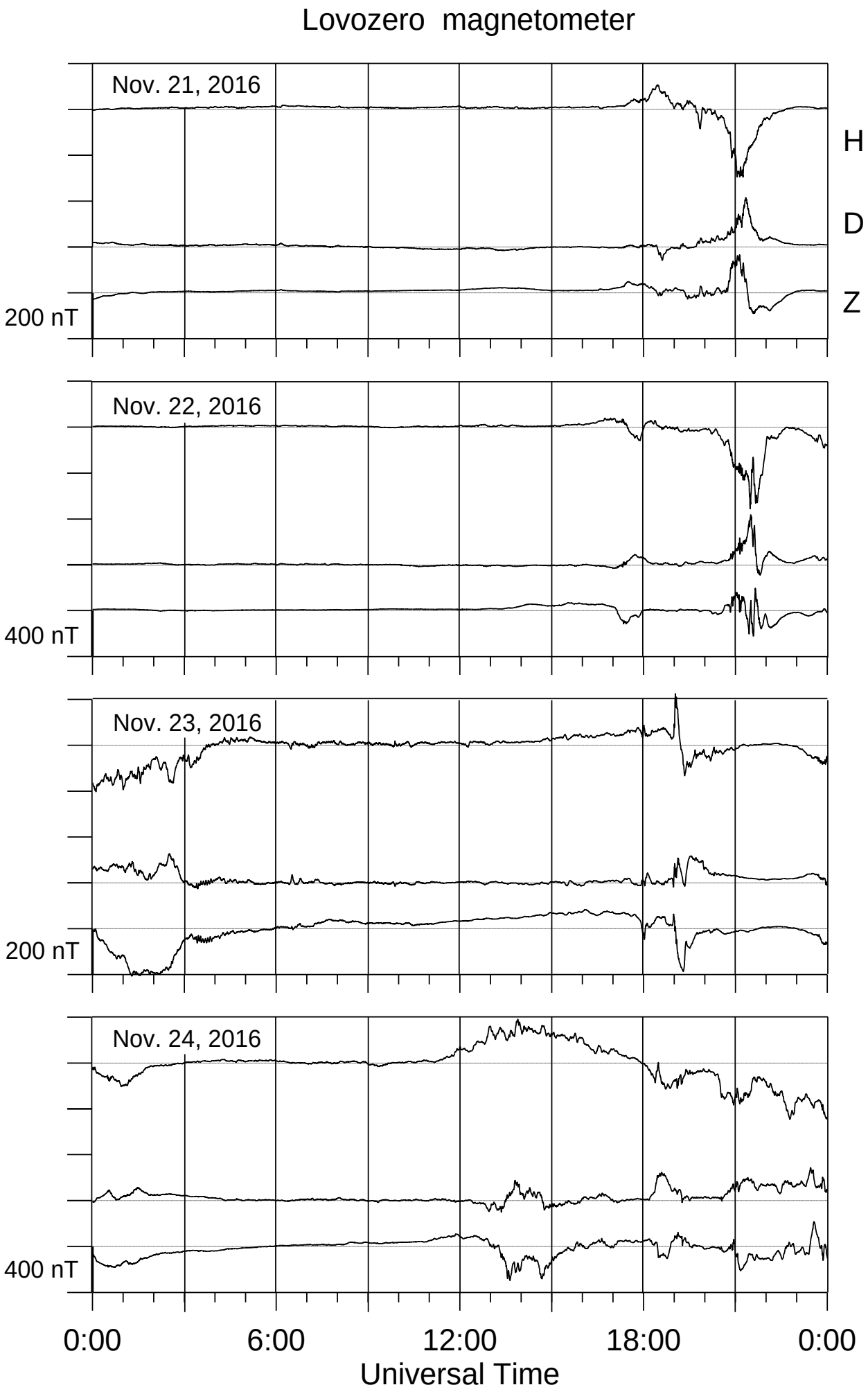
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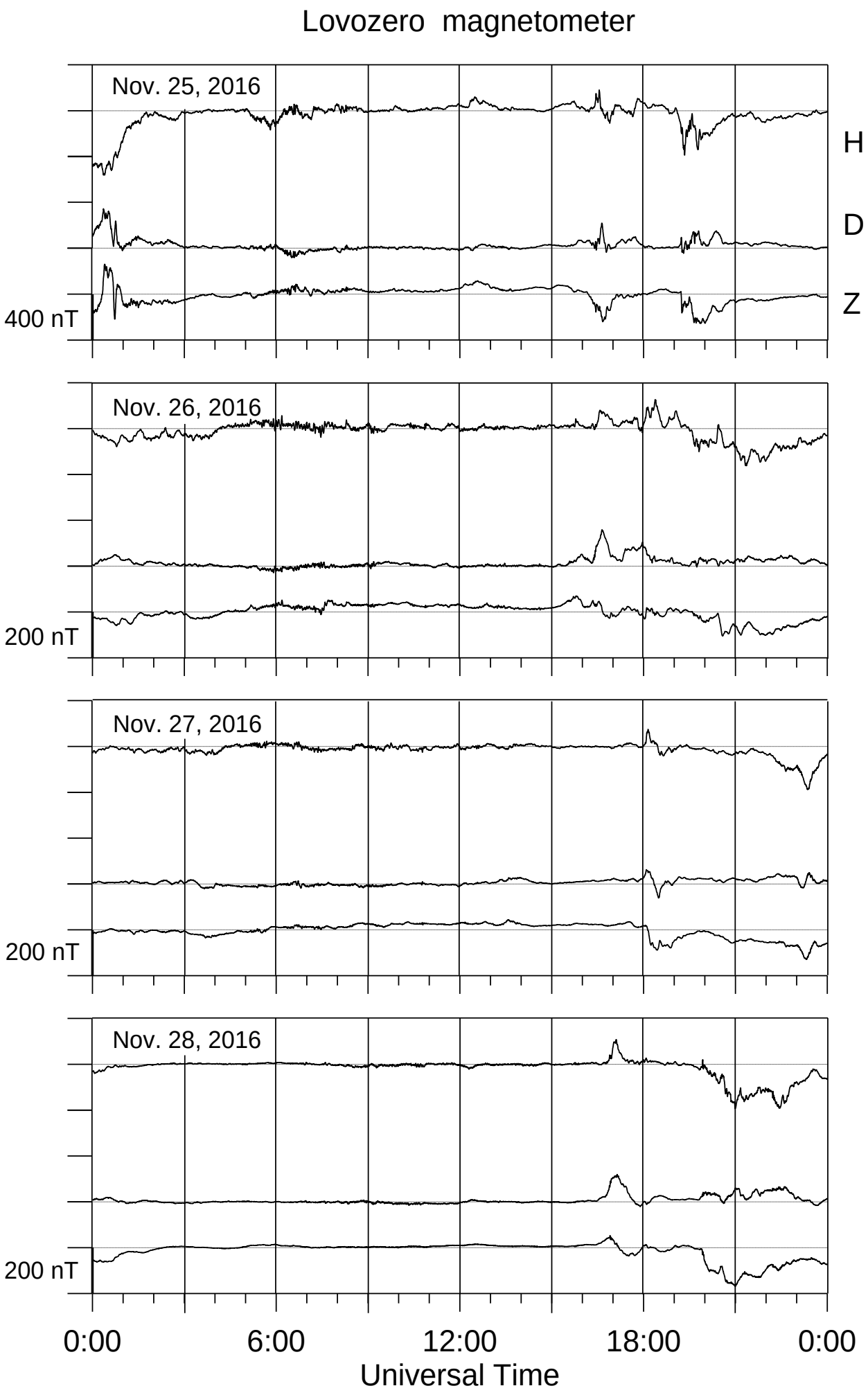
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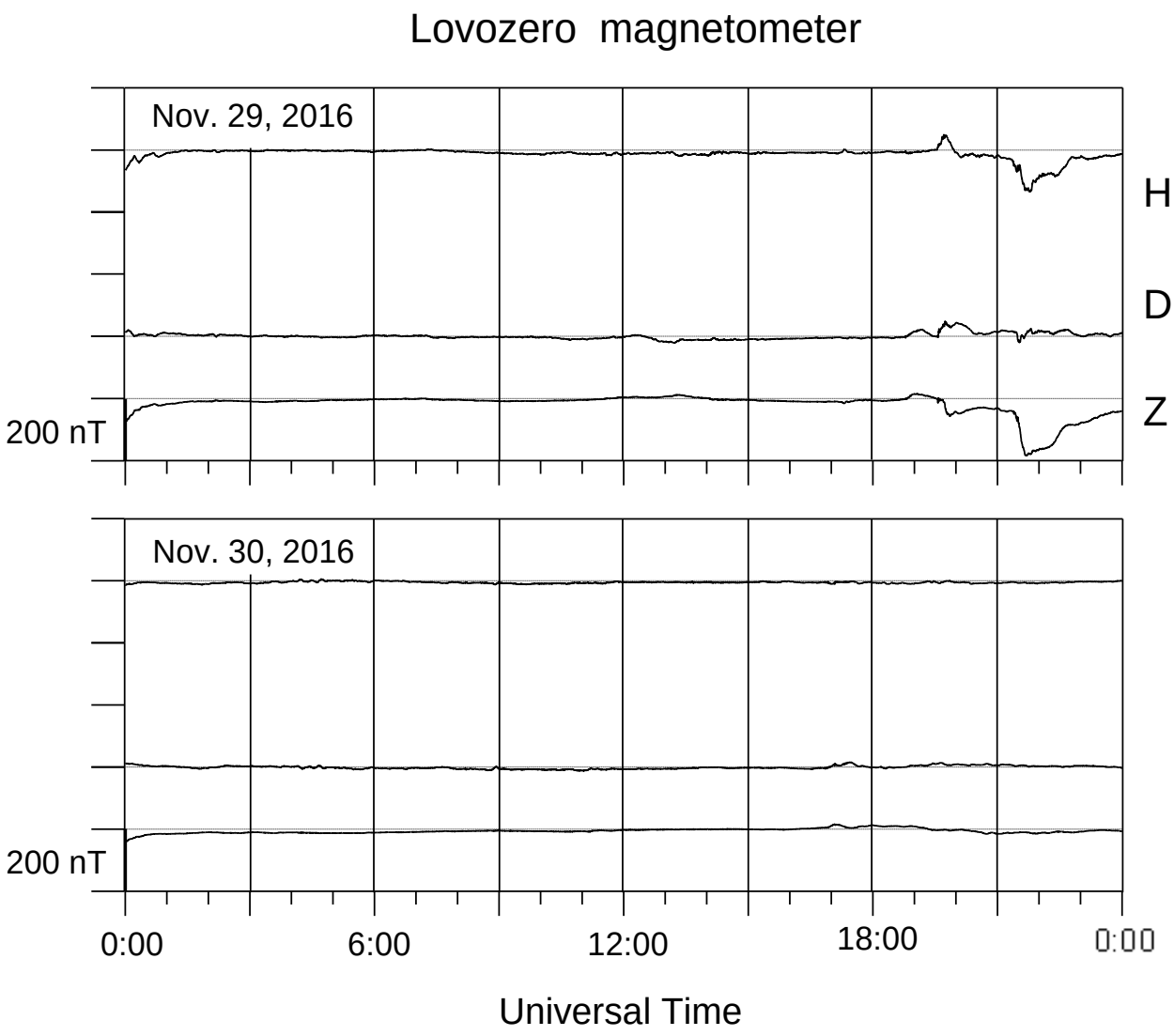
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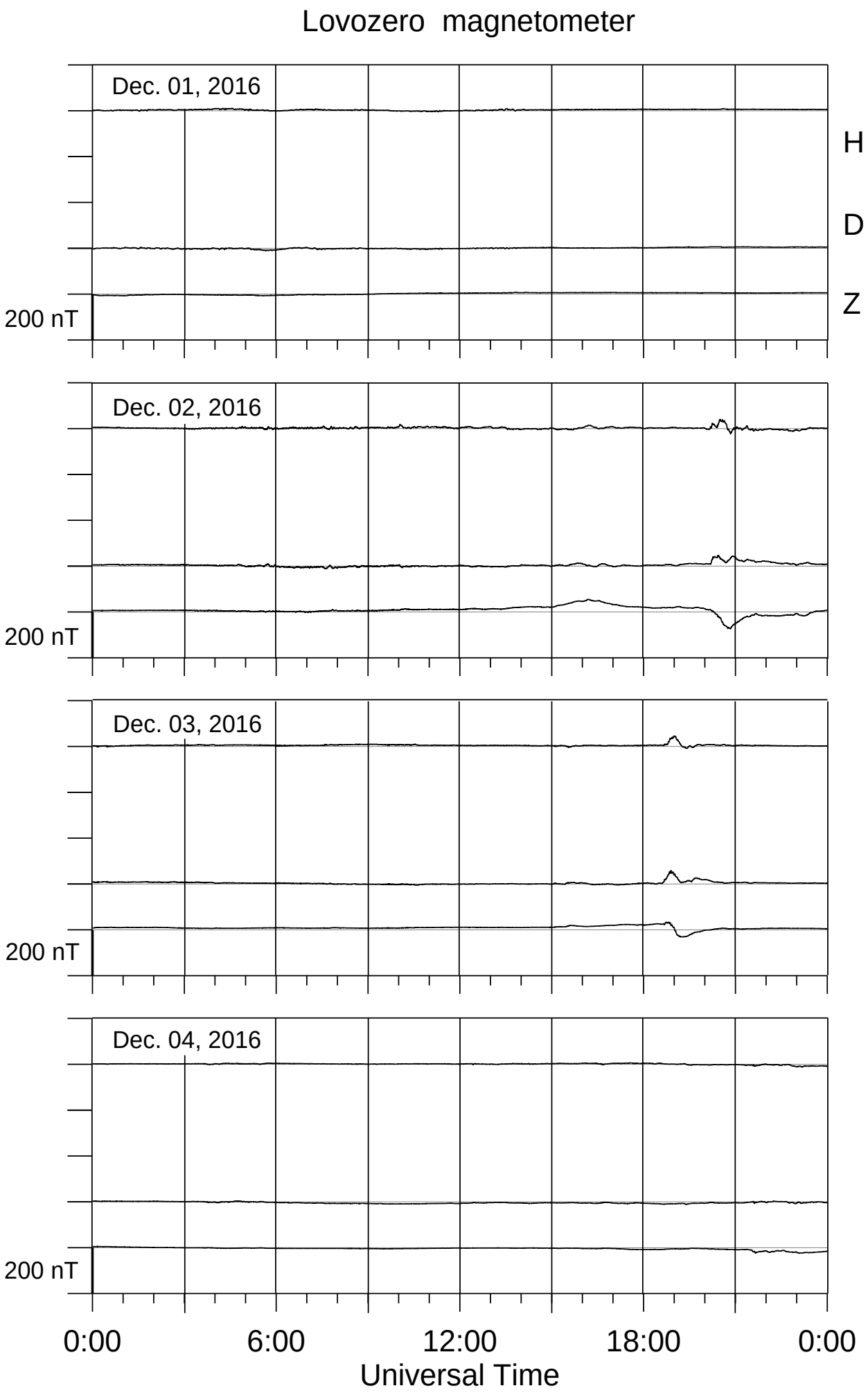
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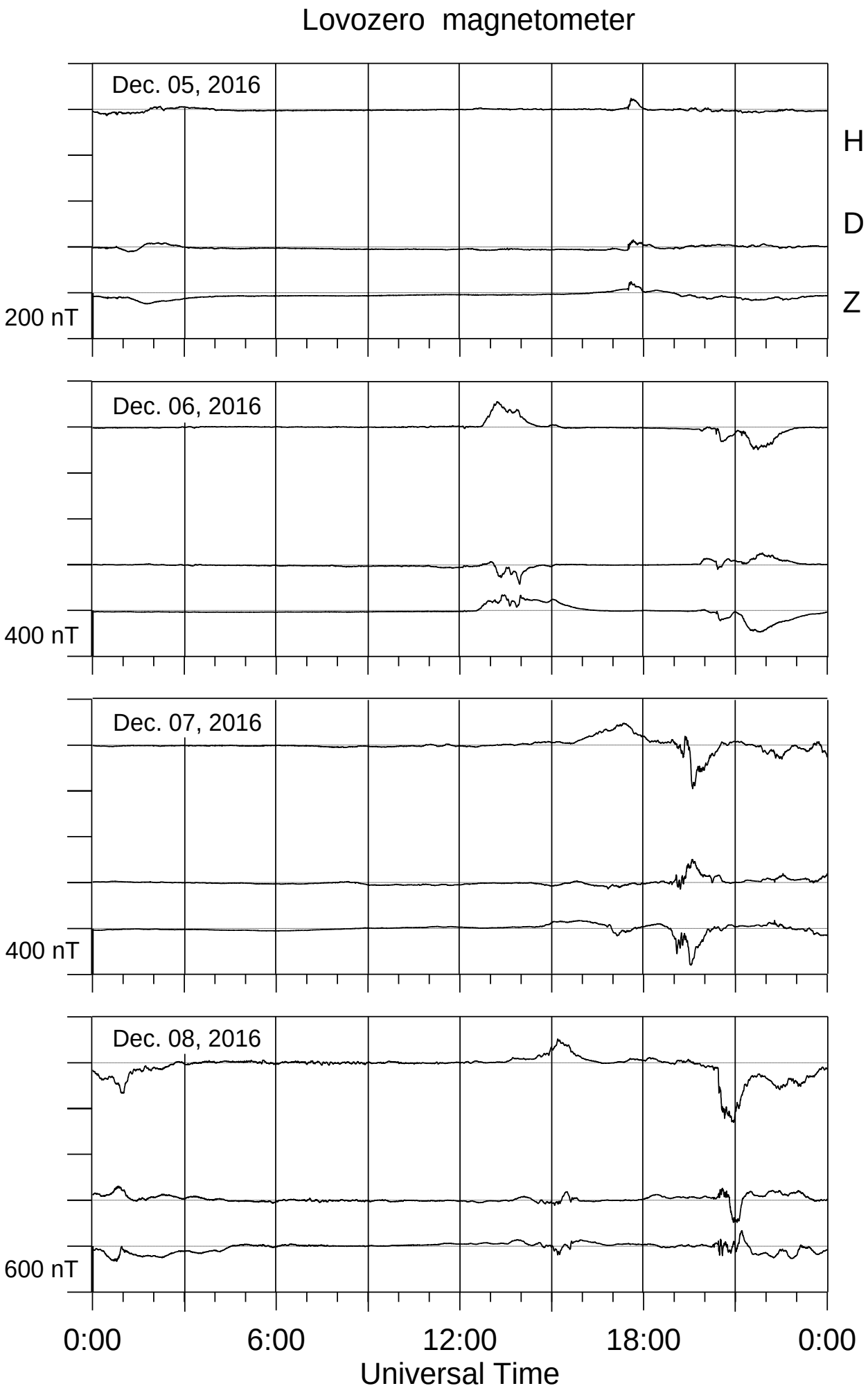
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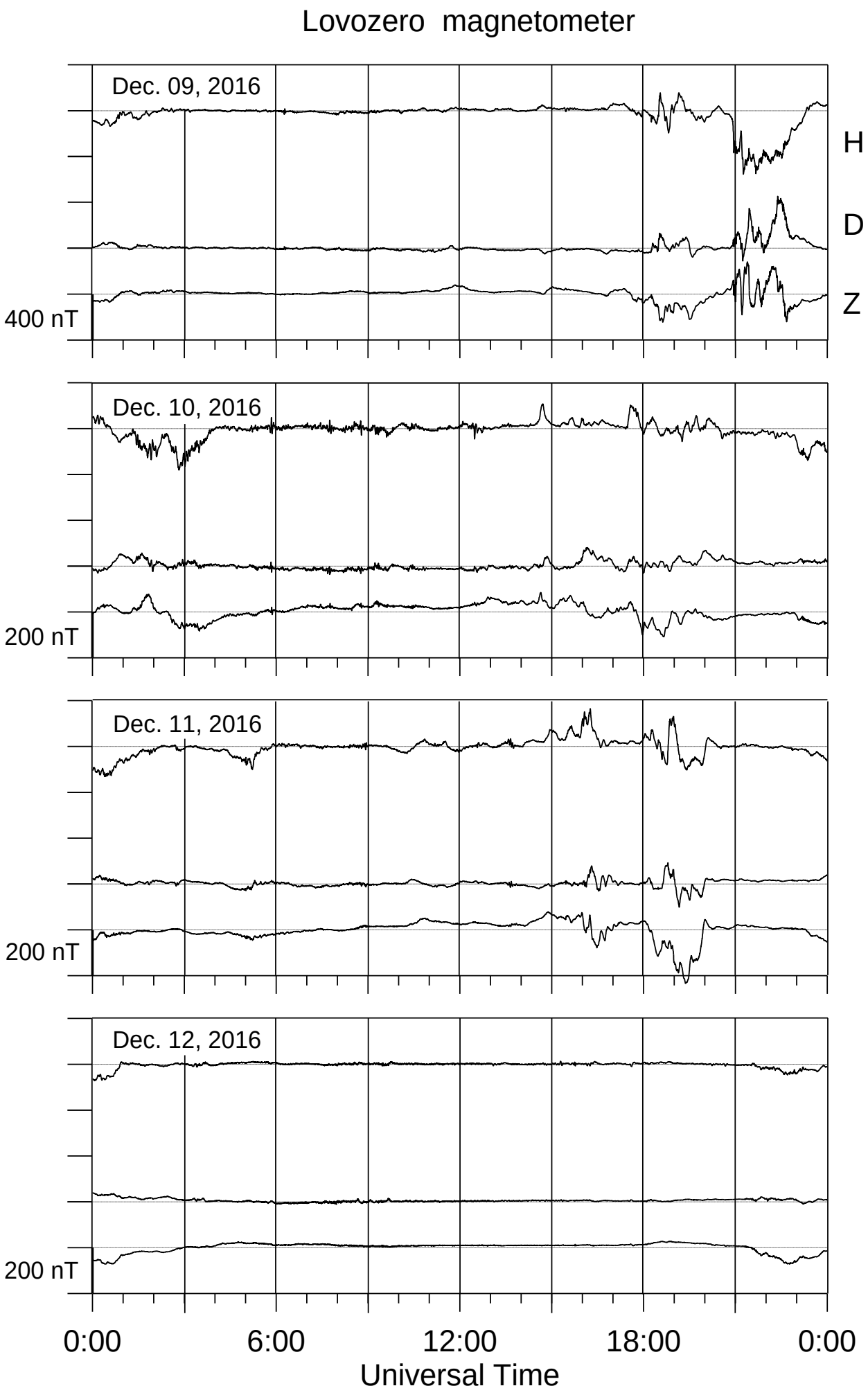
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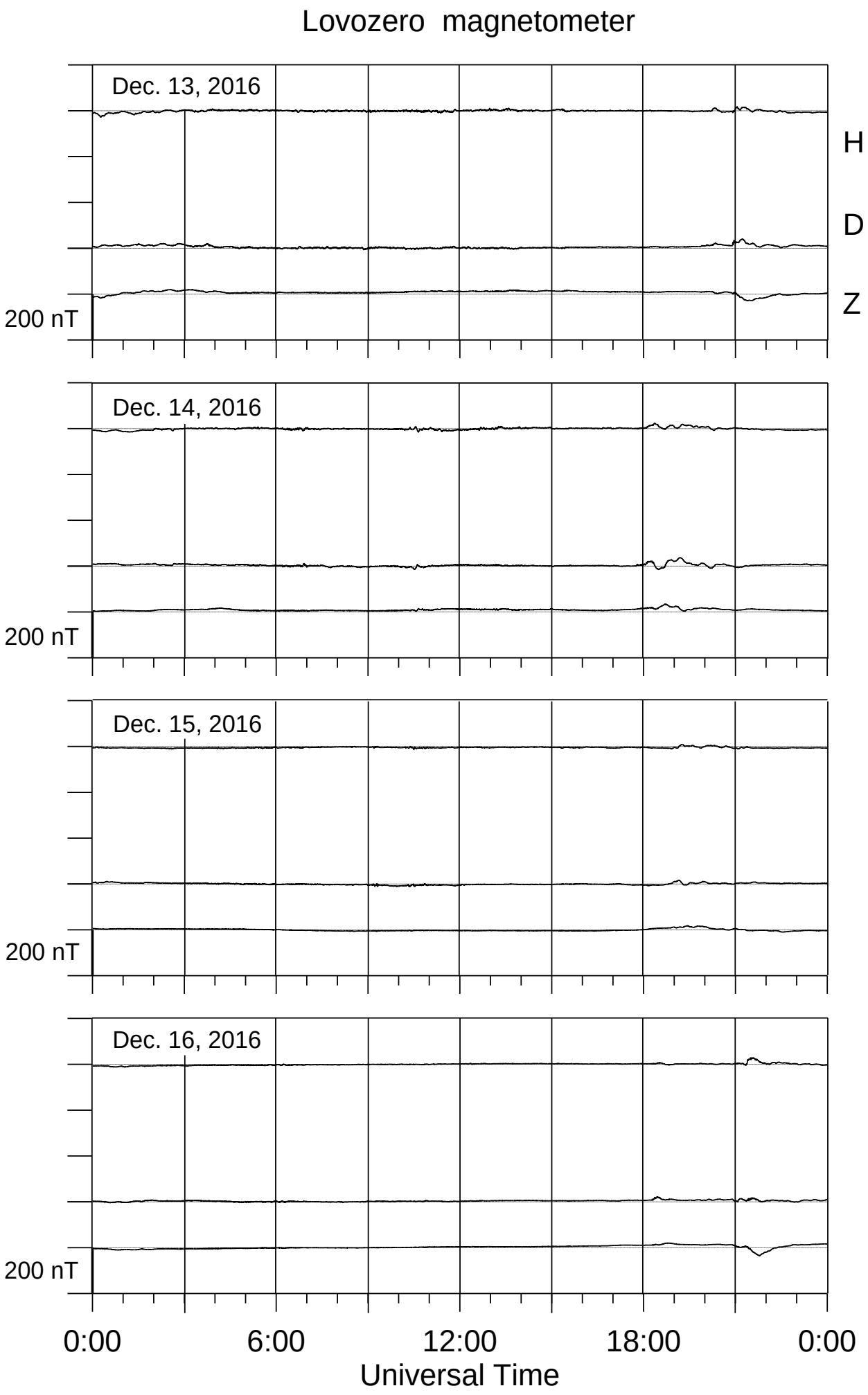
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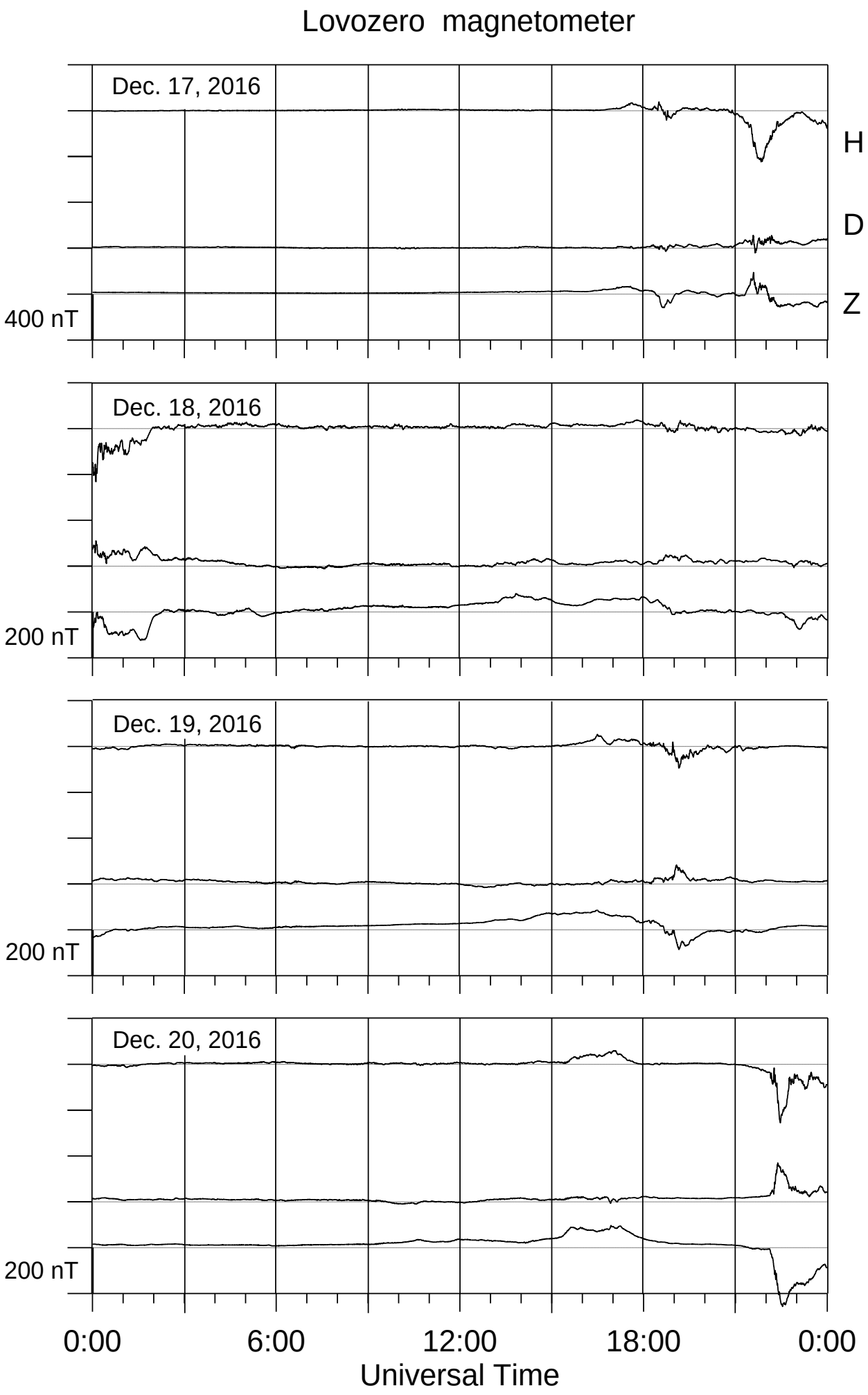
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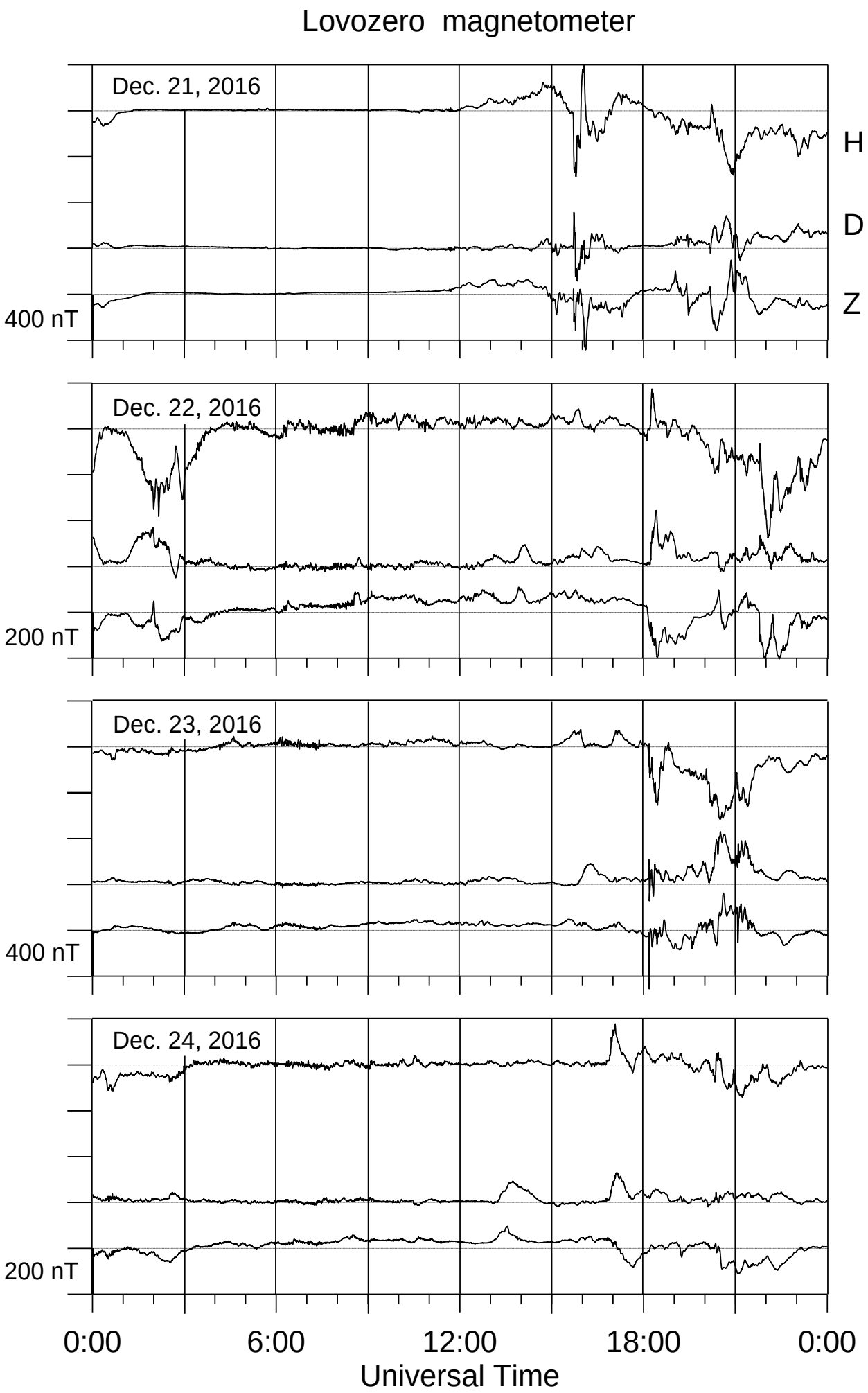
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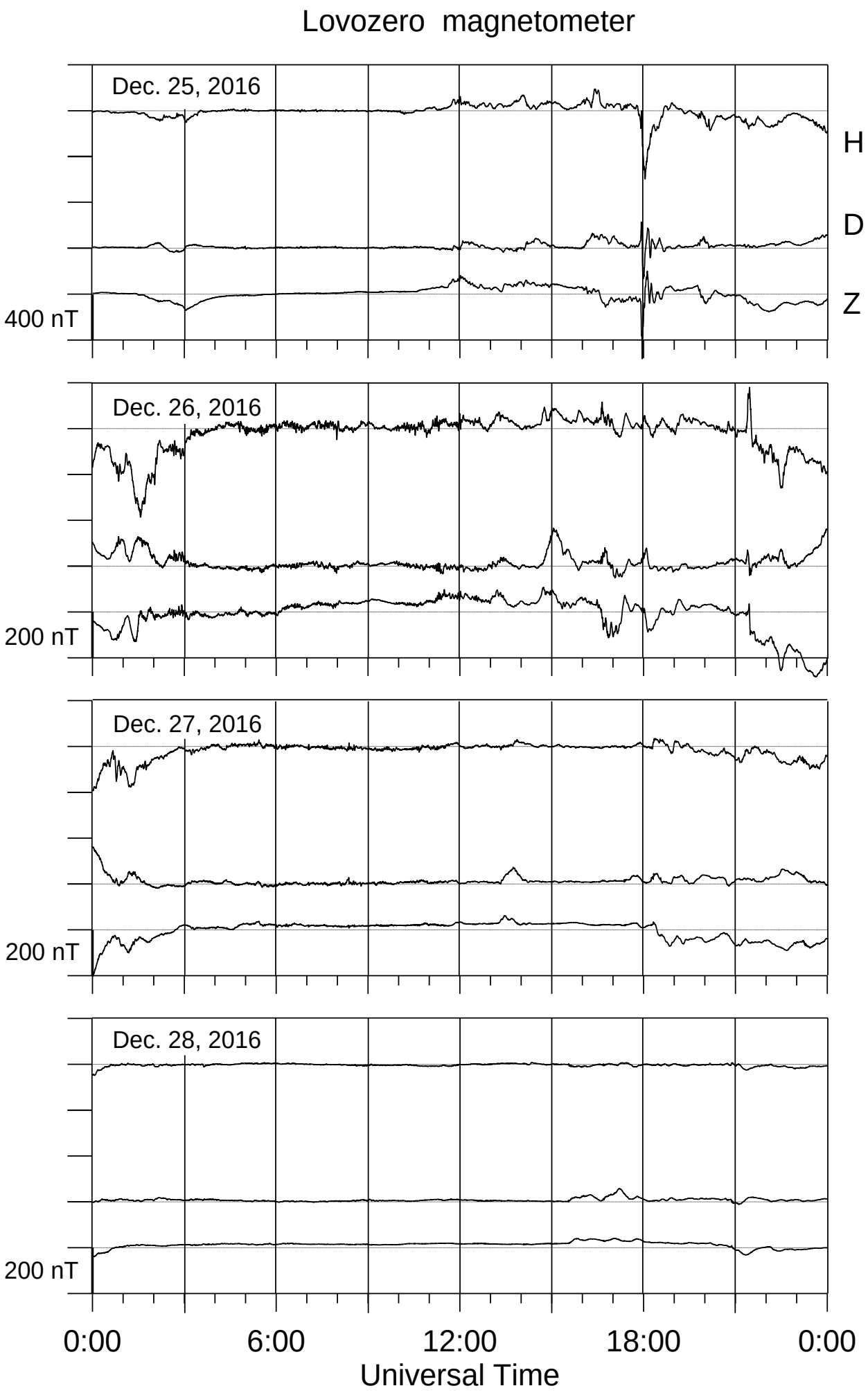
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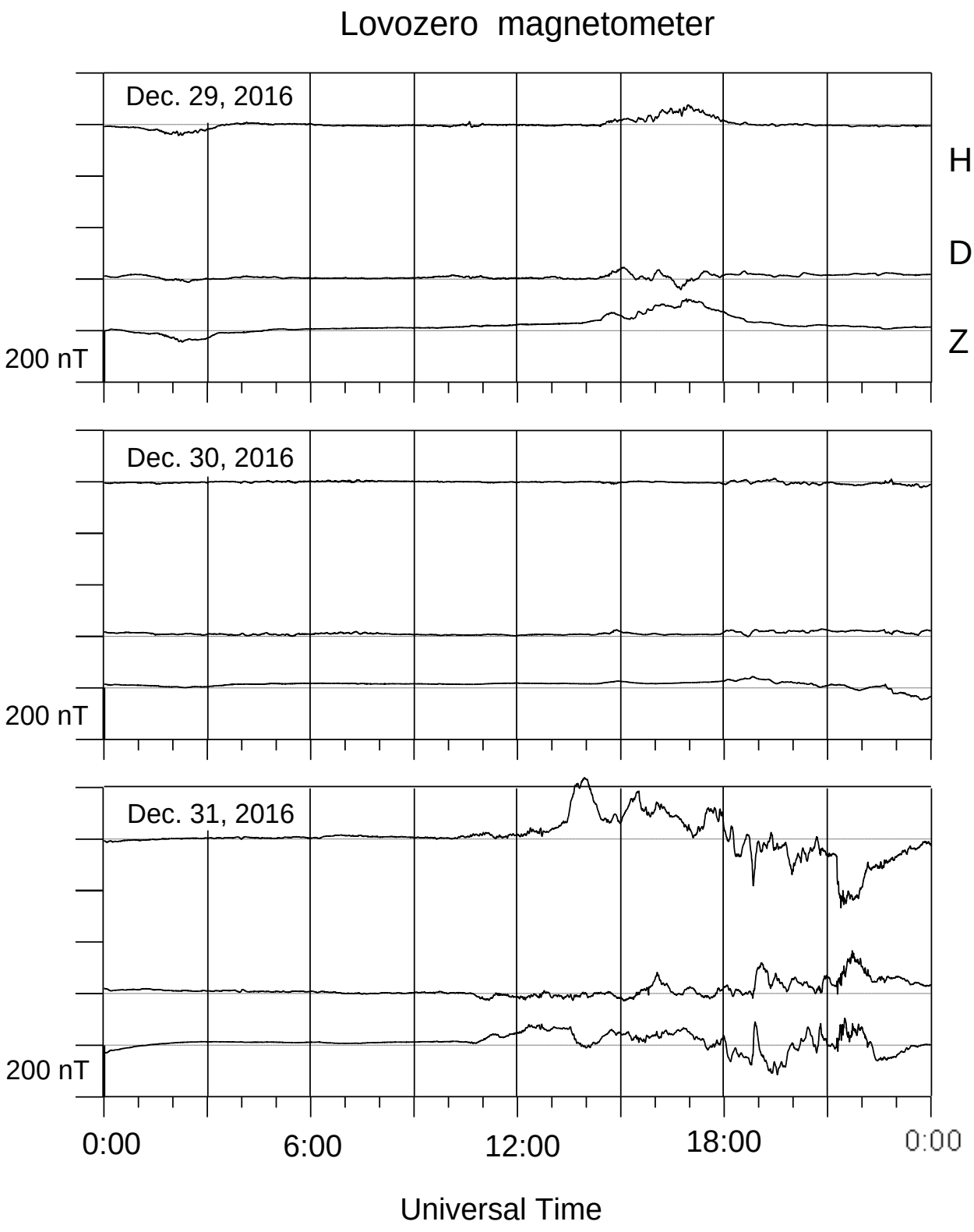
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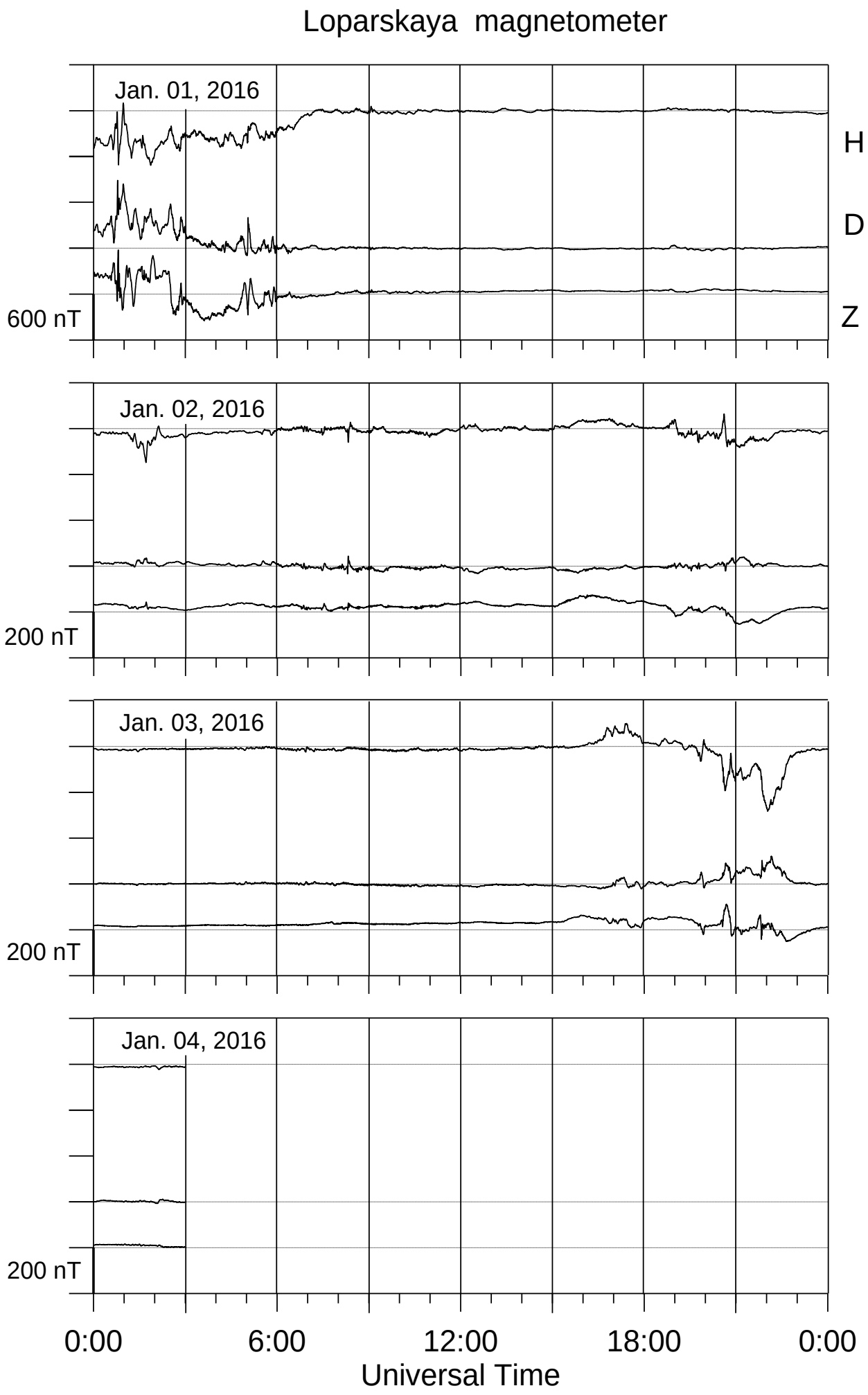
Universal Time

LOPARSKAYA MAGNETOGRAMS

October - December 2016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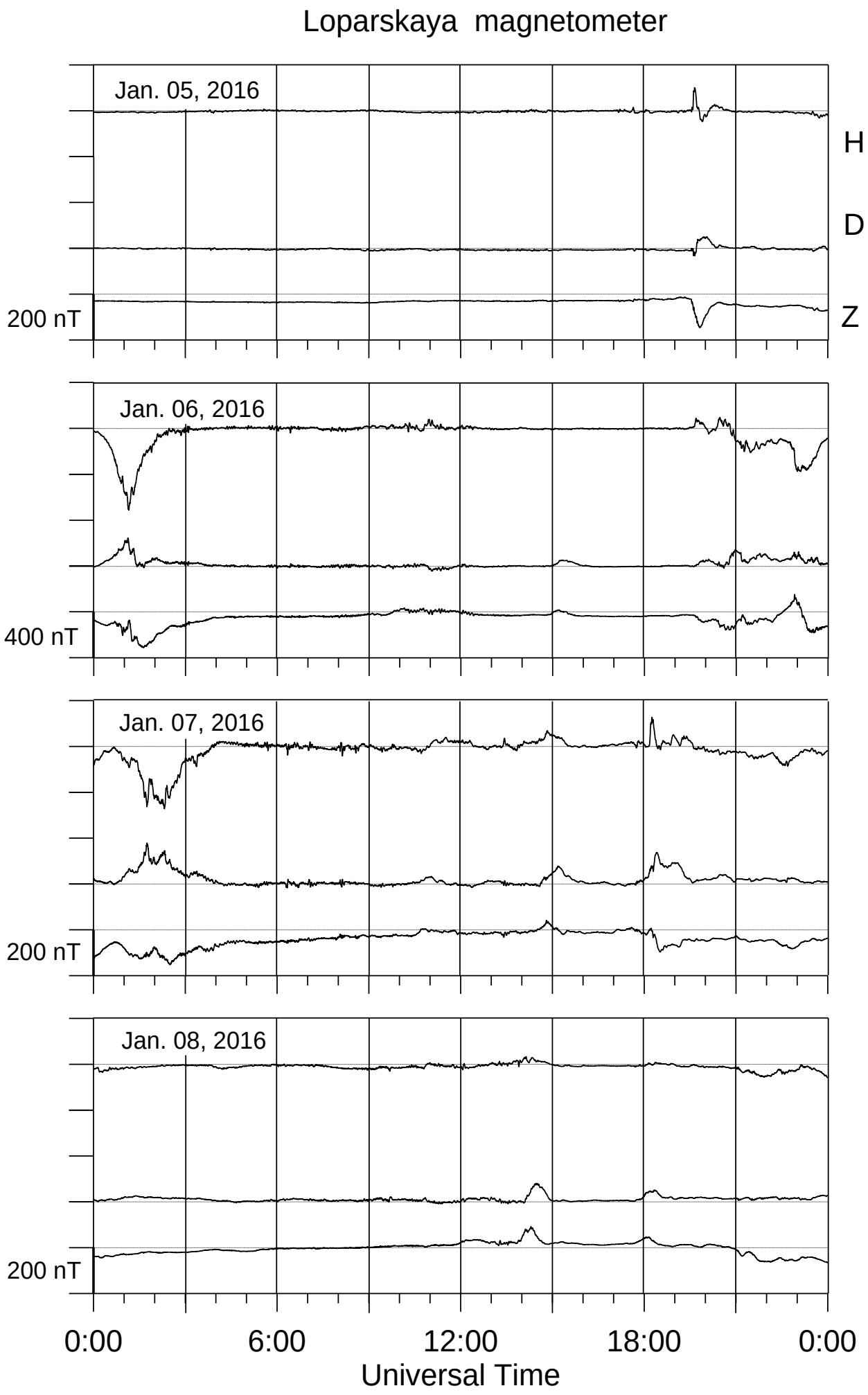
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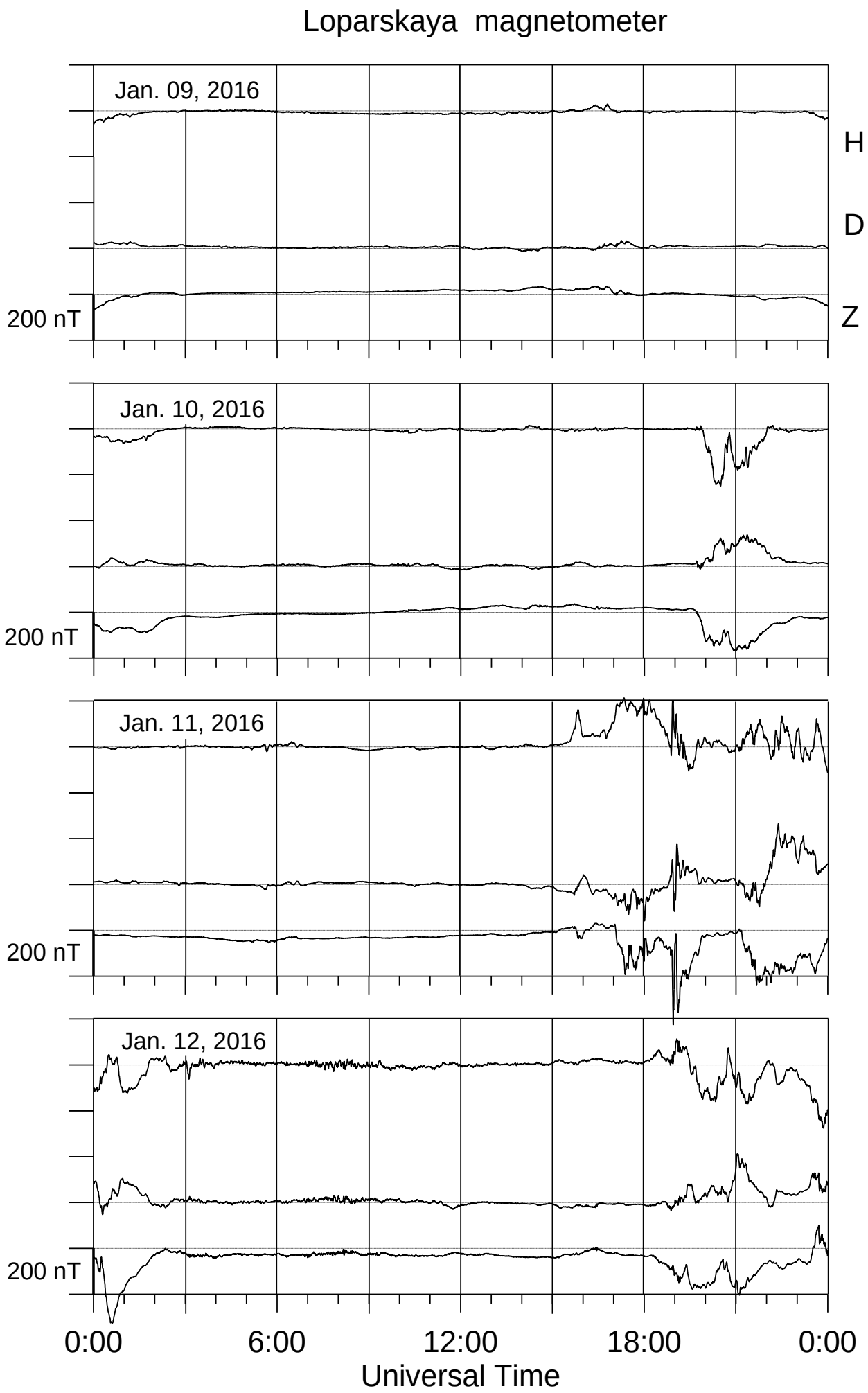
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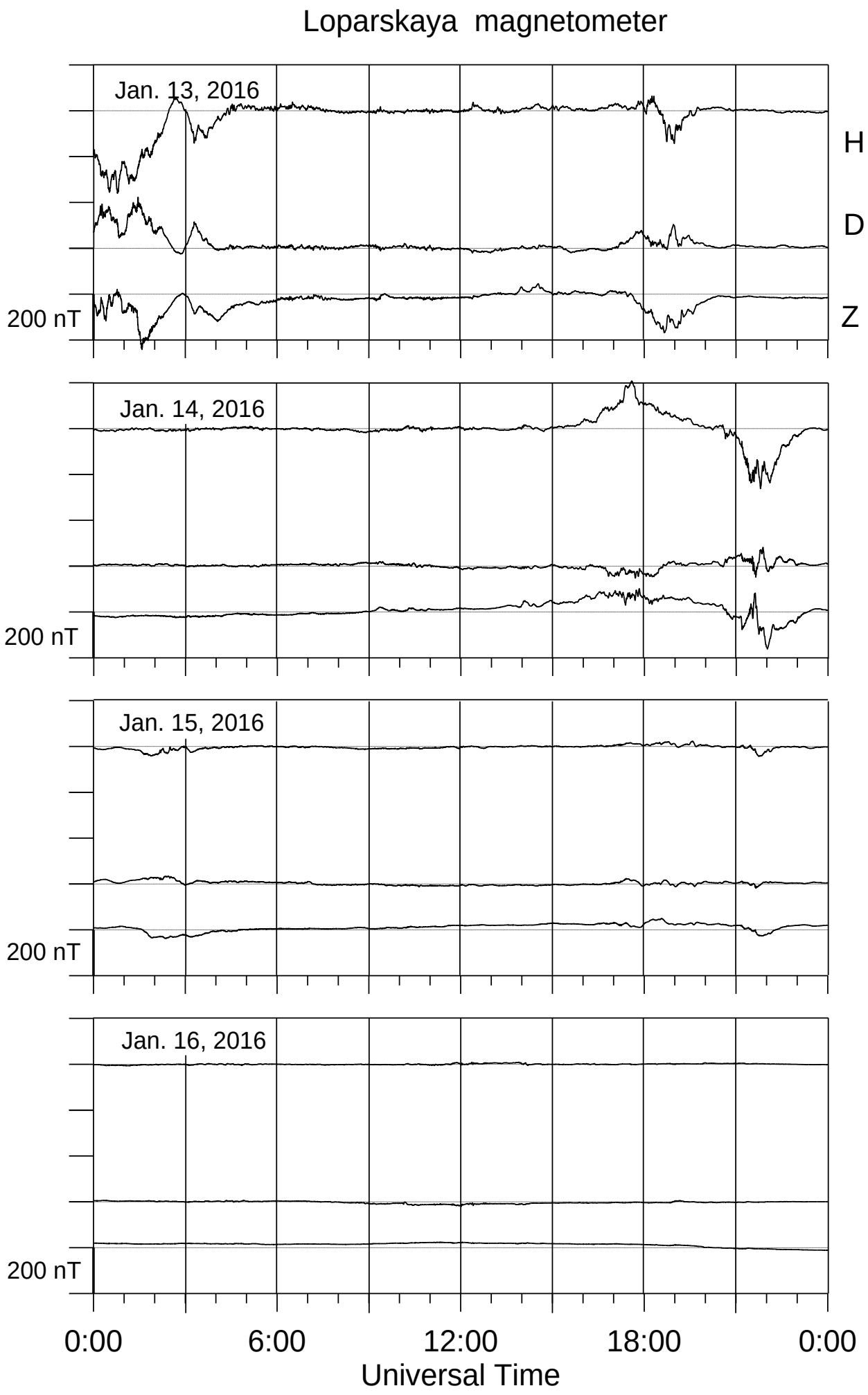
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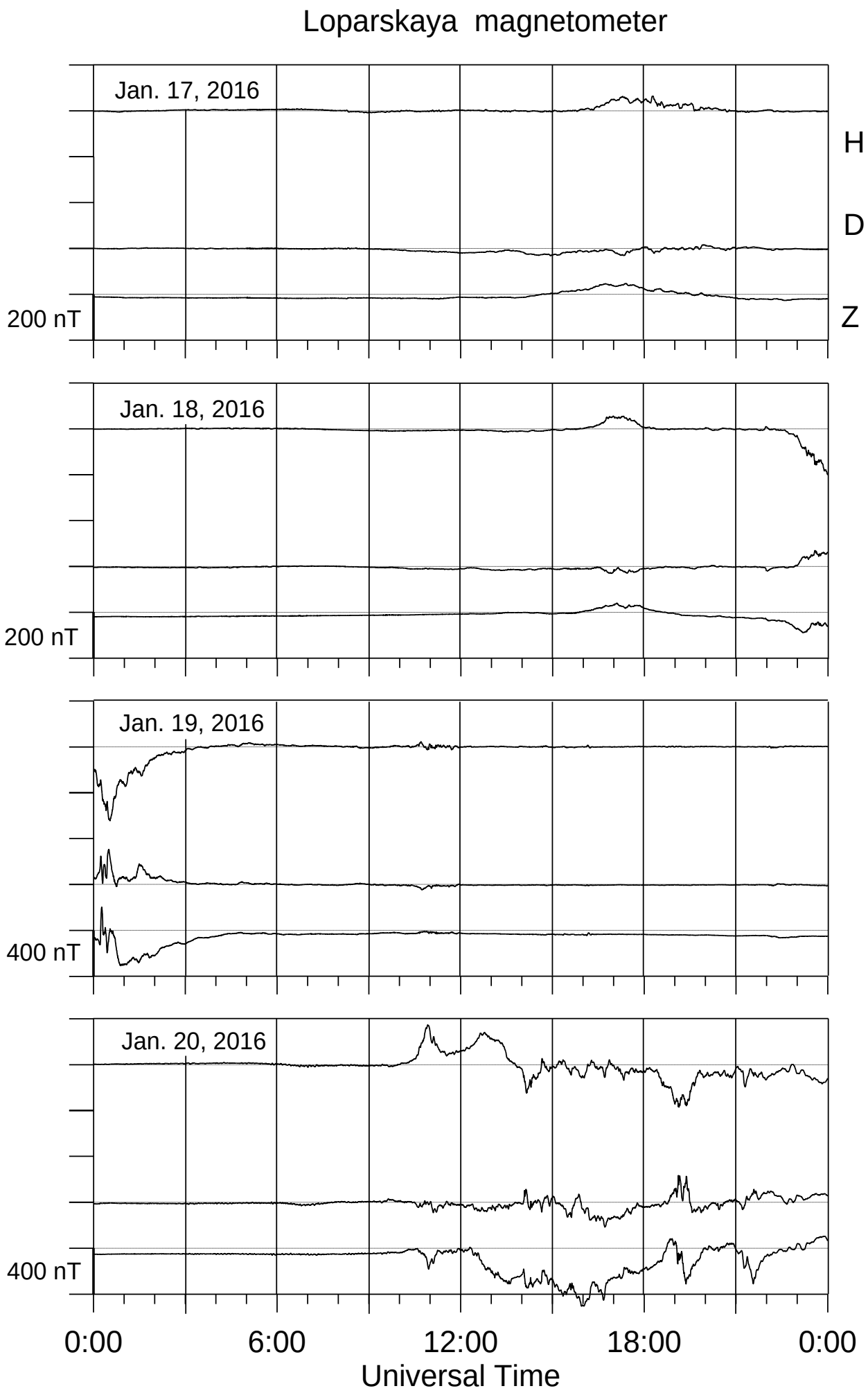
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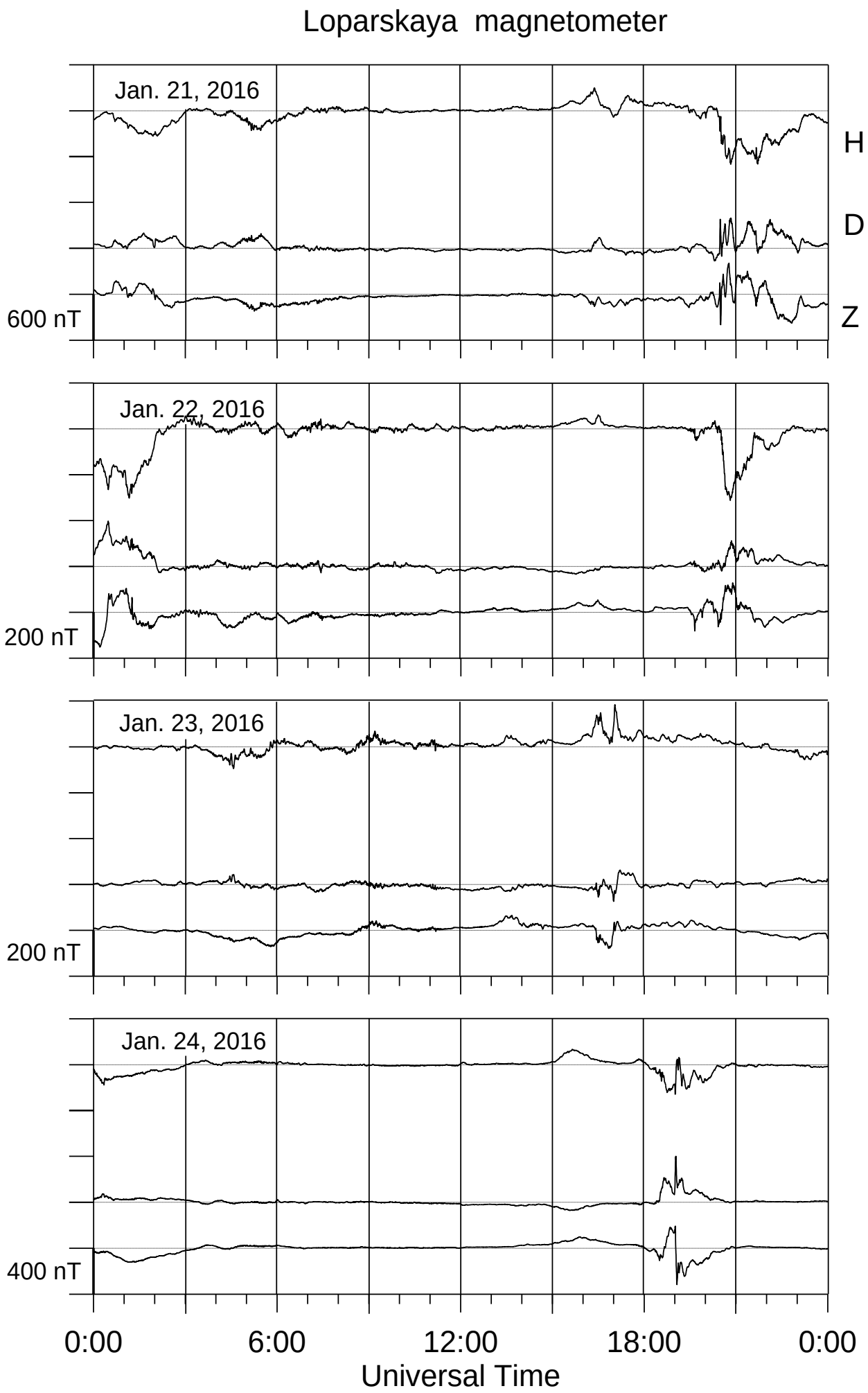
Loparskaya magnetometer
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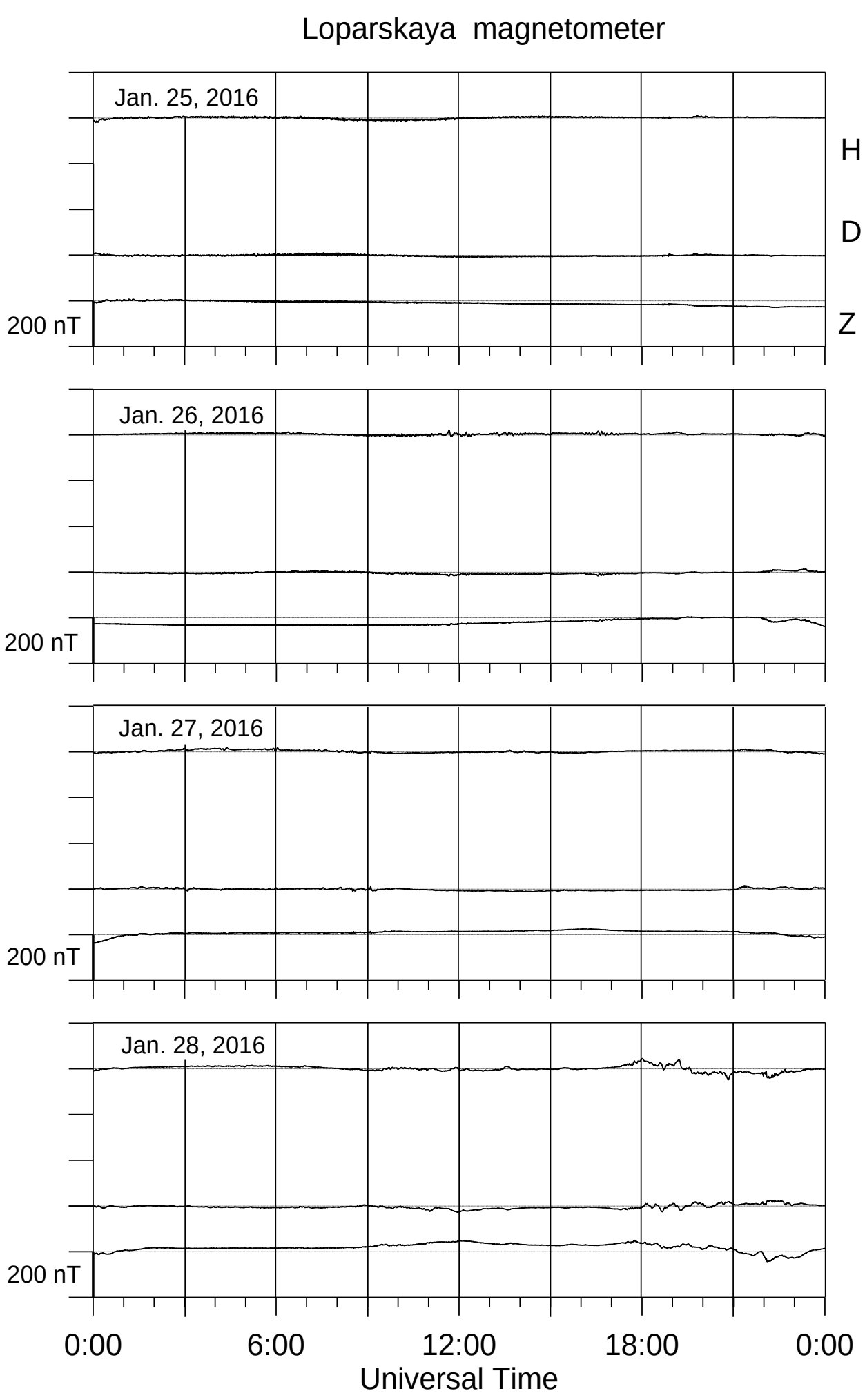
Loparskaya magnetometer
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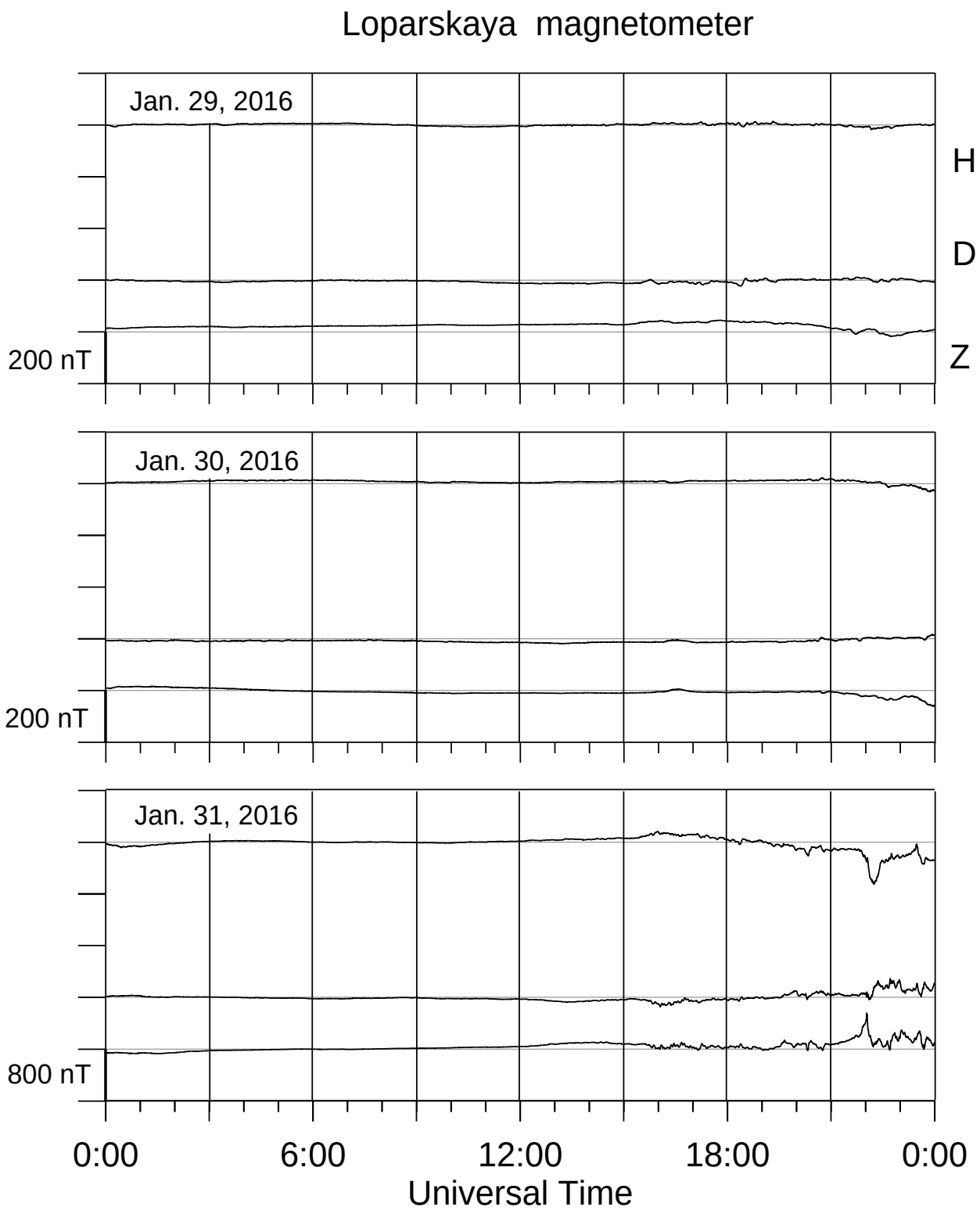
Universal Time


Loparskaya magnetometer
Jan. 29, 2016
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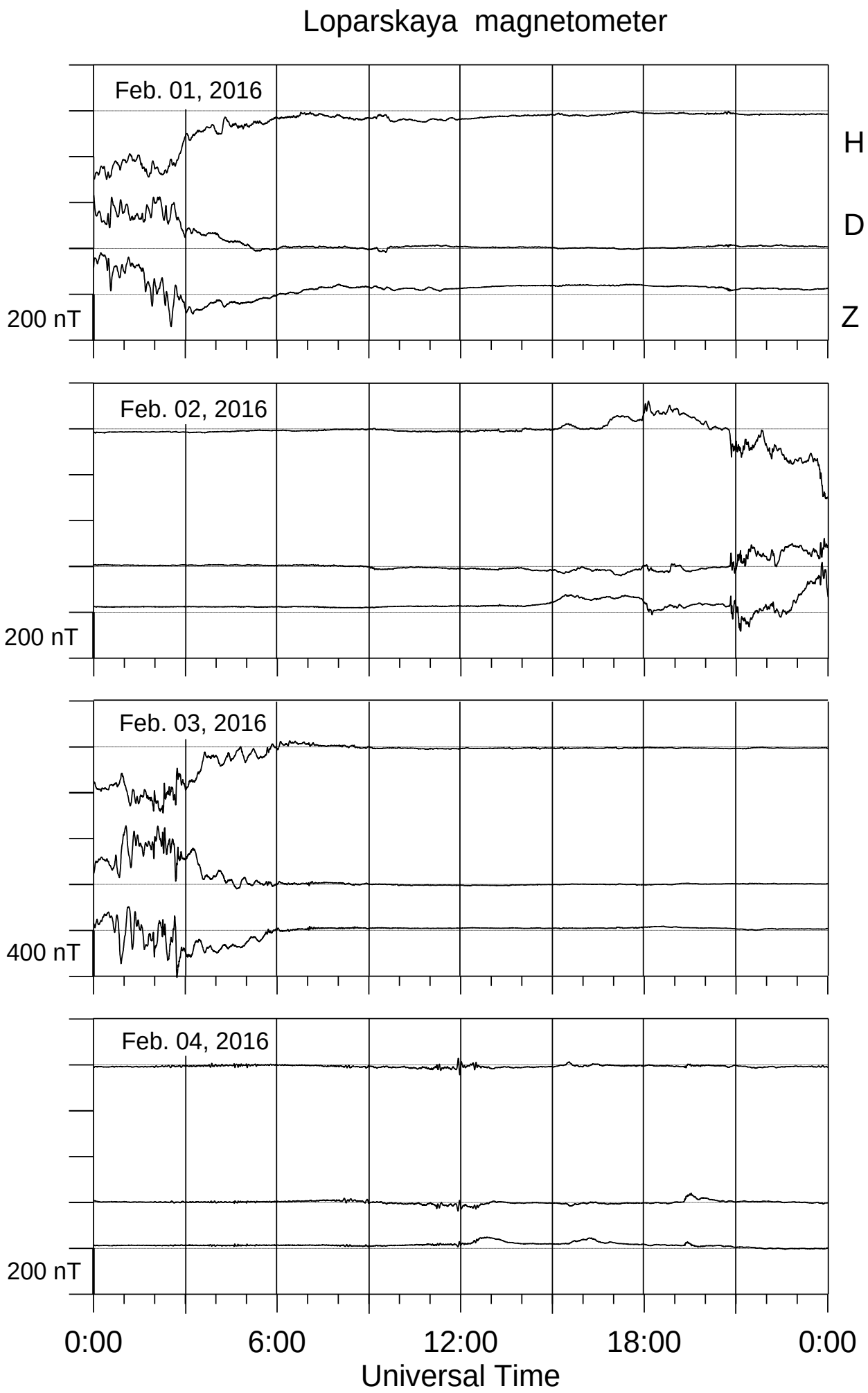
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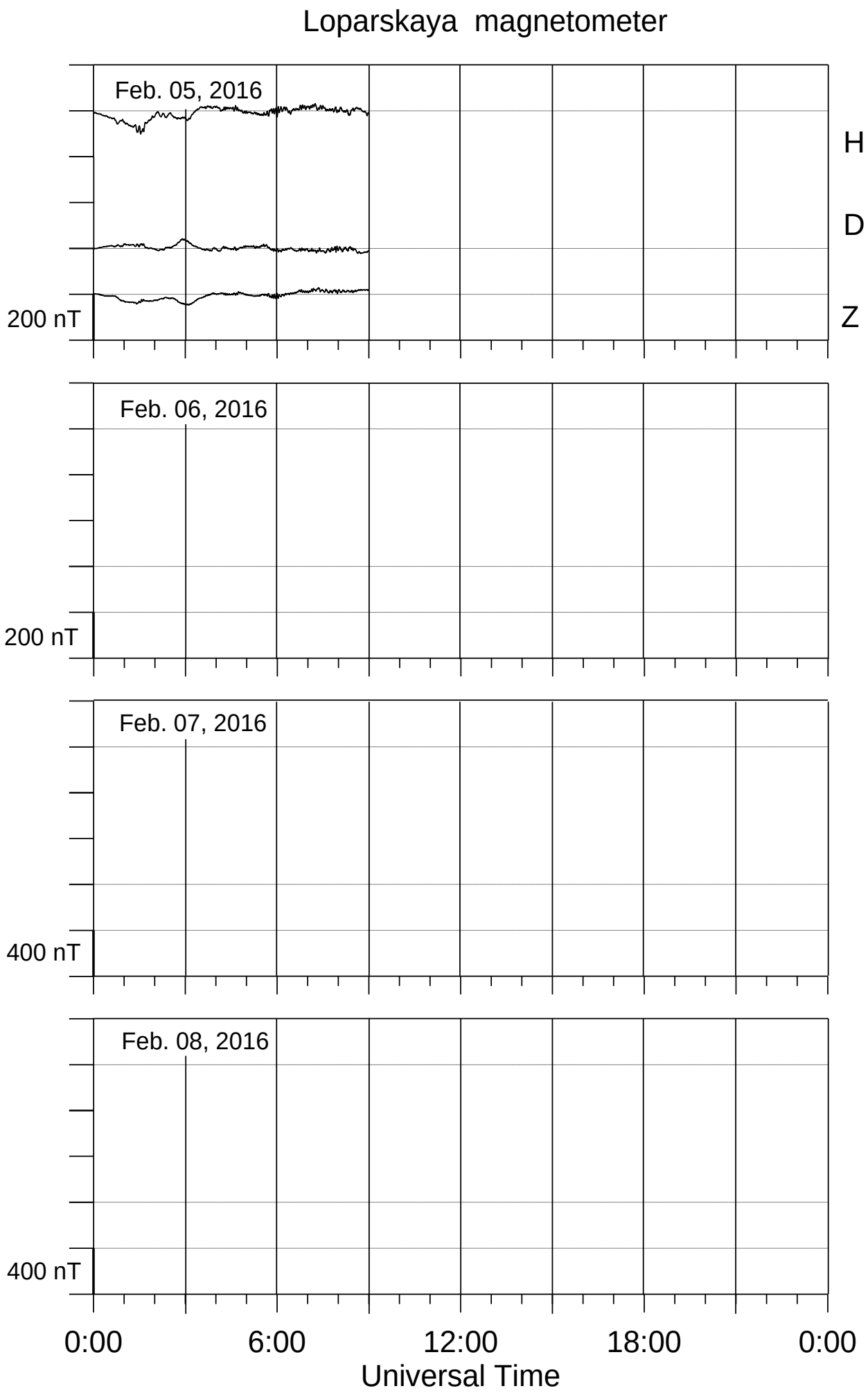
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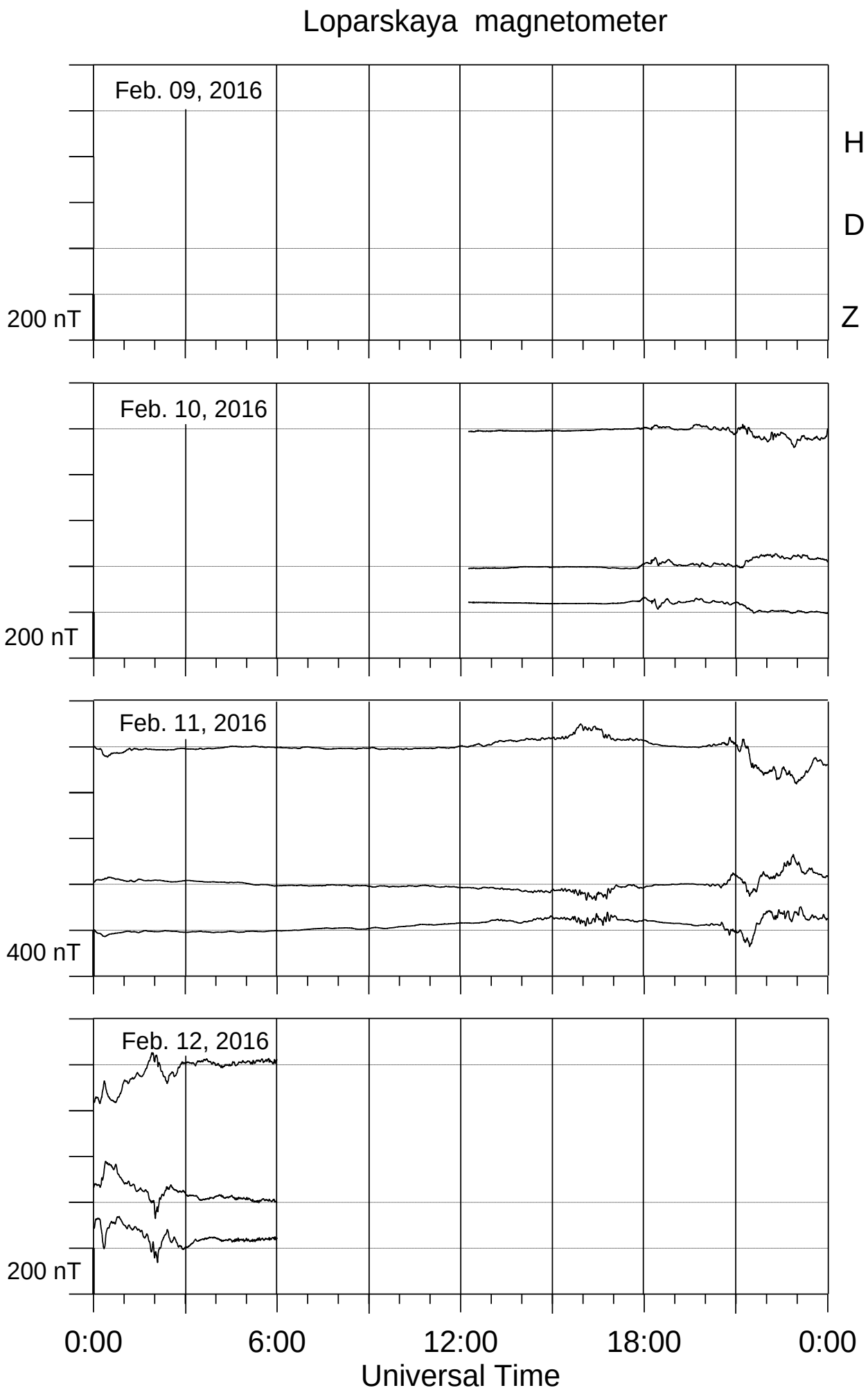
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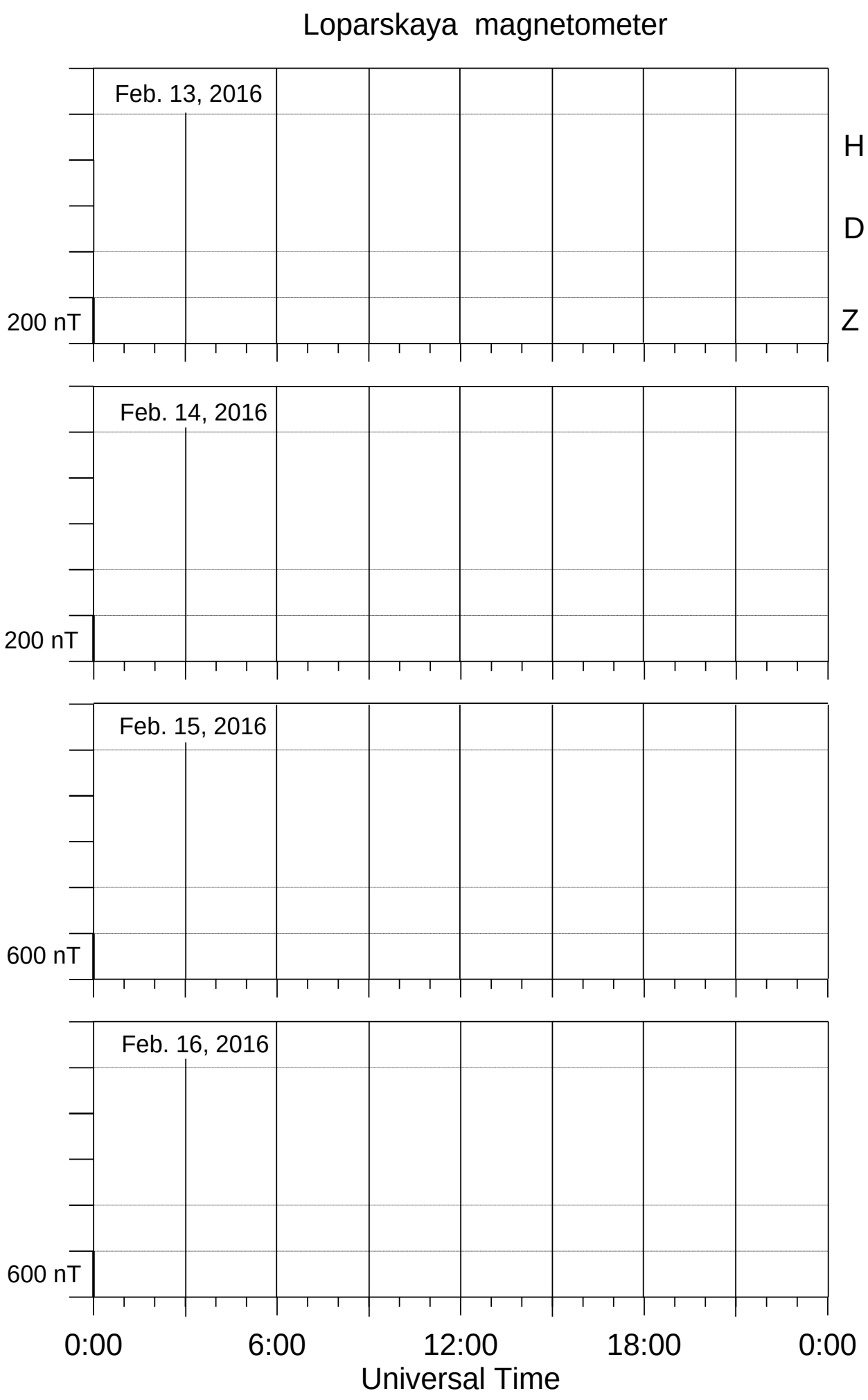
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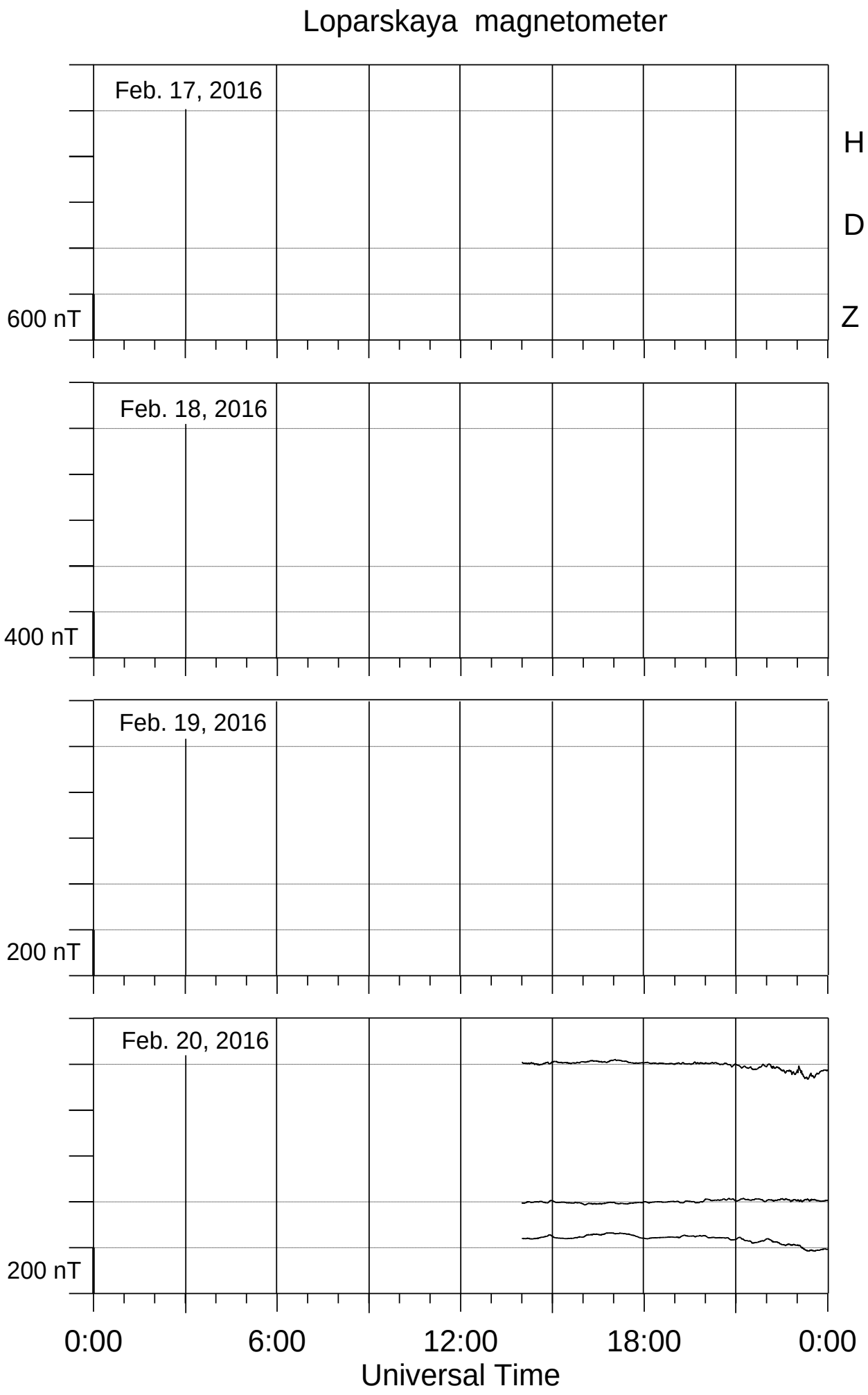
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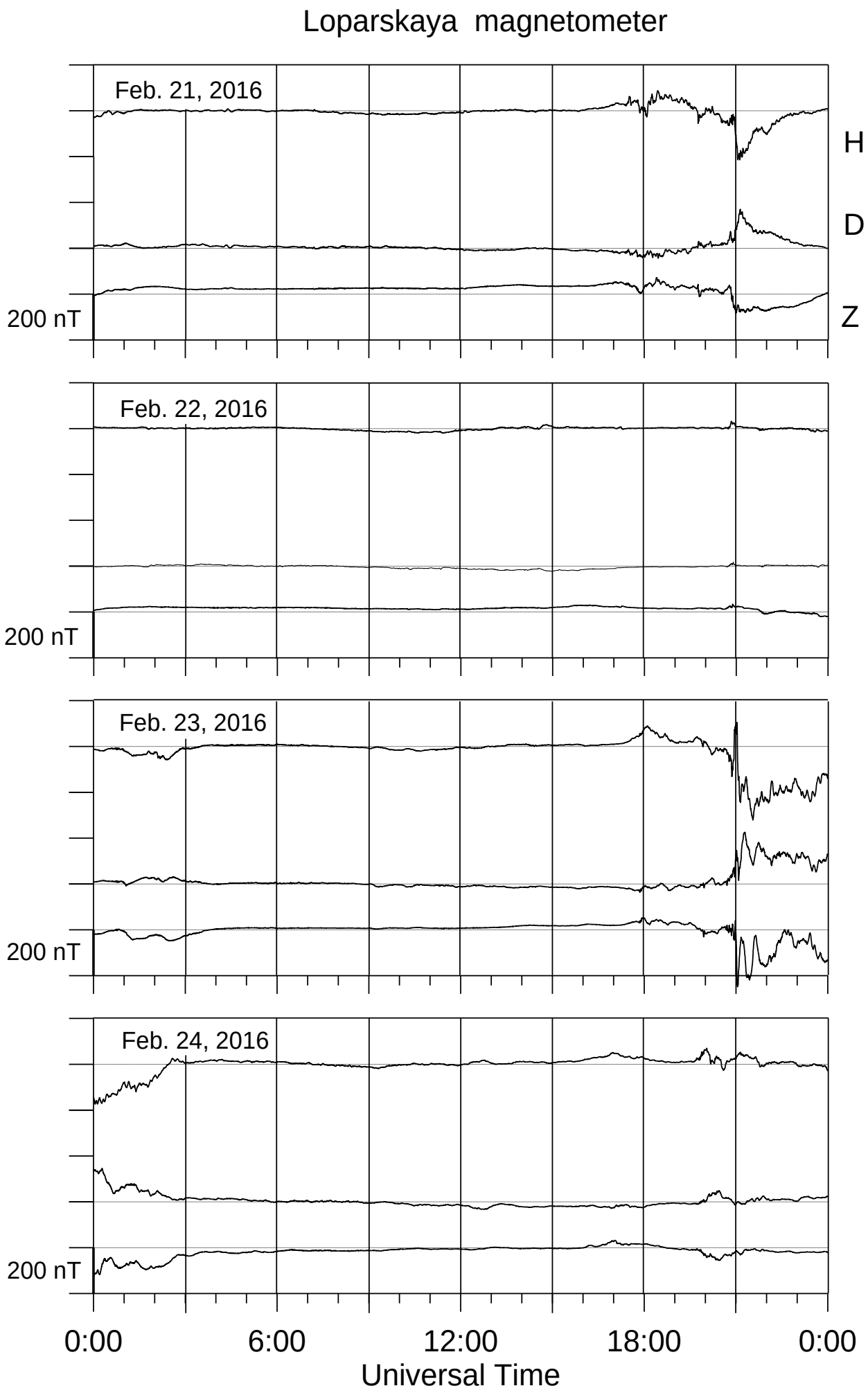
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Feb. 22, 2016
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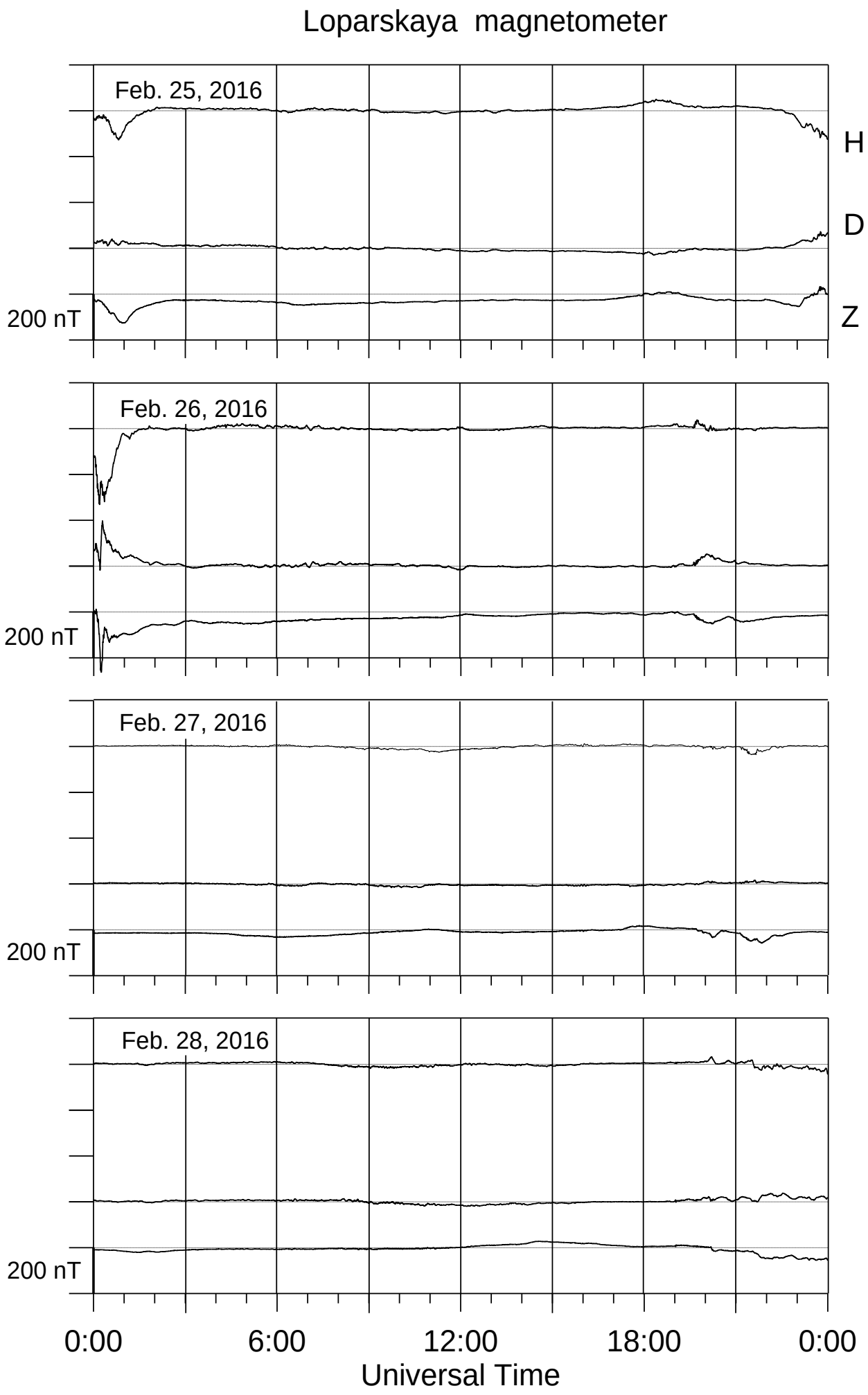
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Feb. 26, 2016
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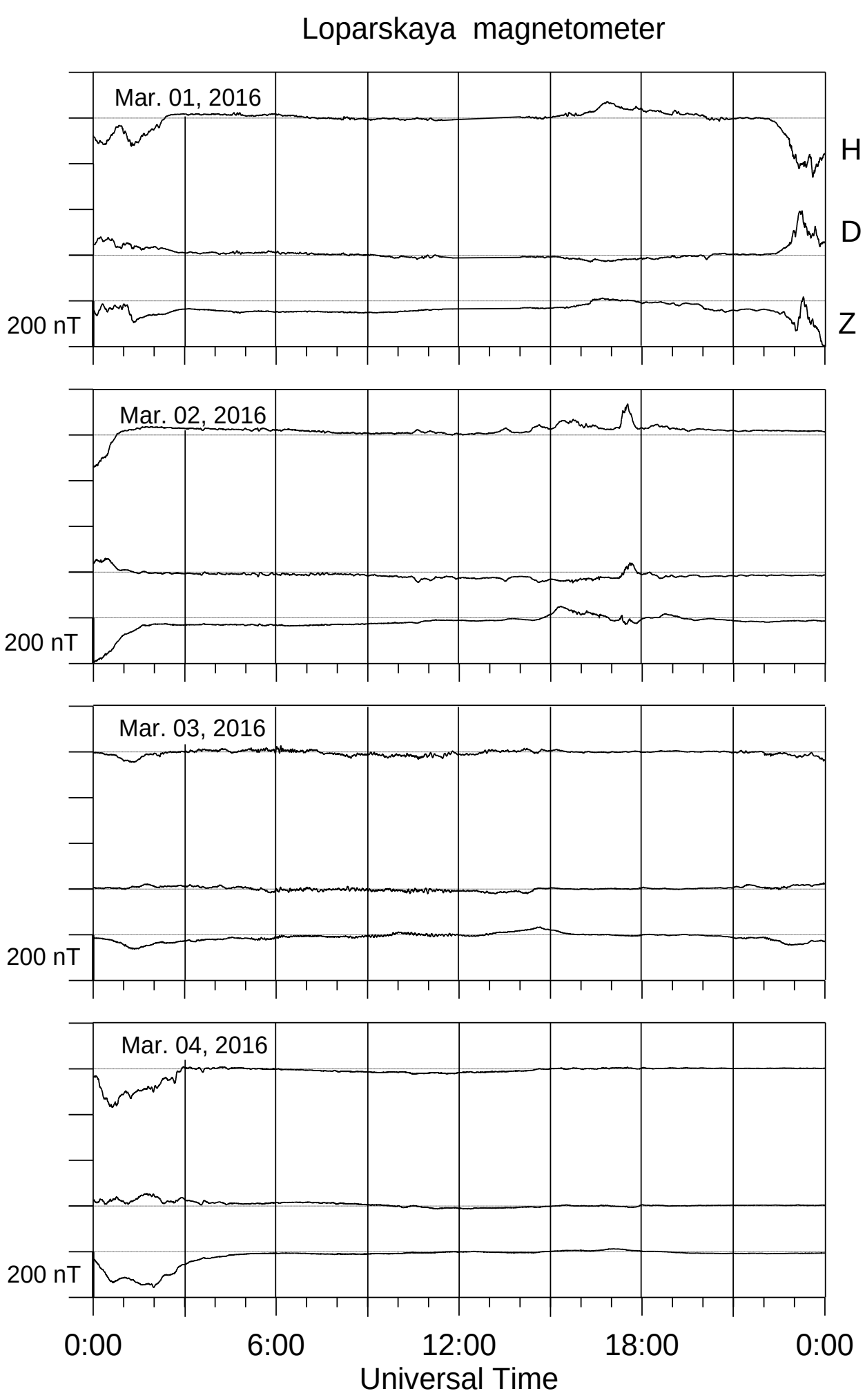
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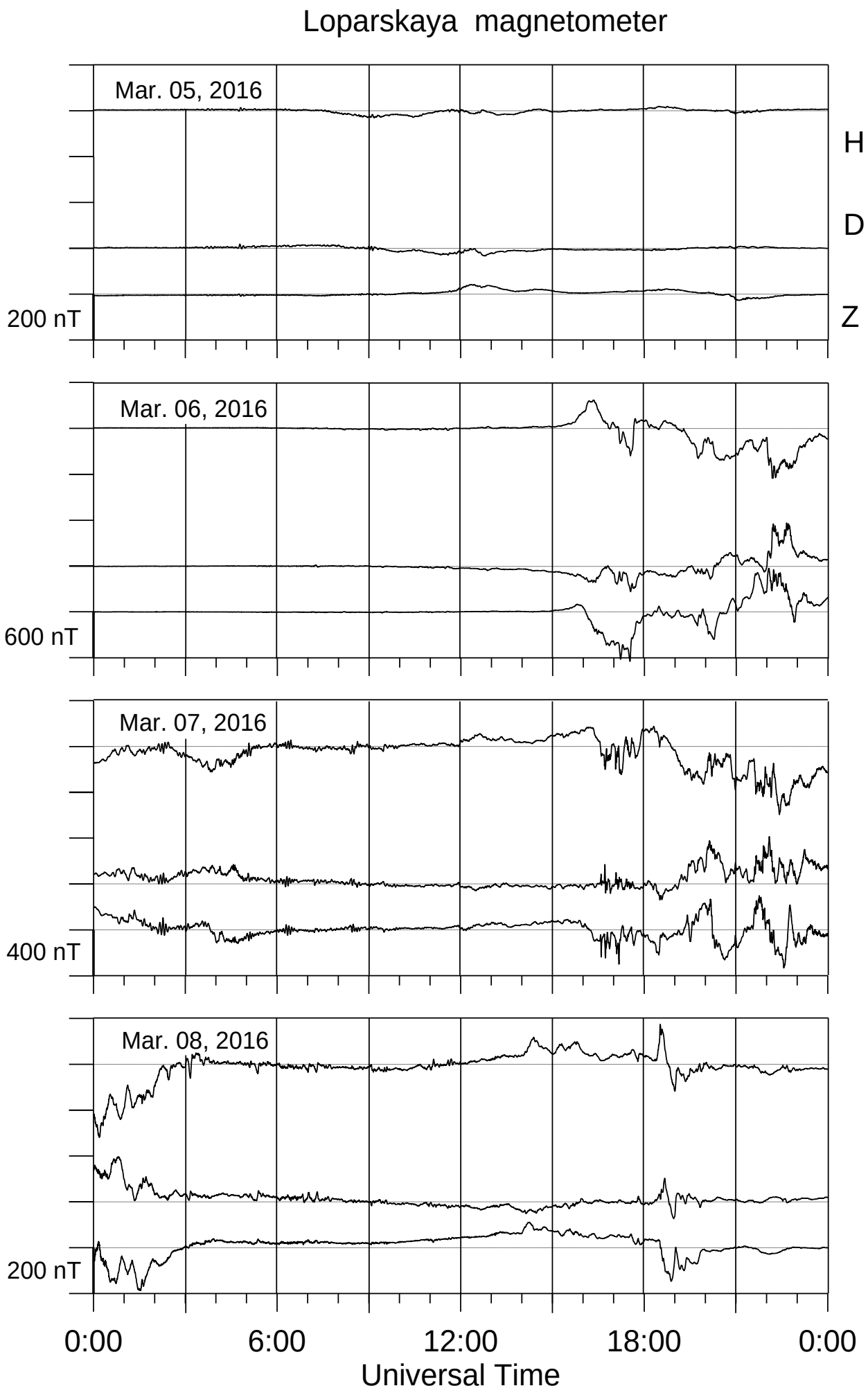
Loparskaya magnetometer
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Mar. 06, 2016
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Mar. 08, 2016
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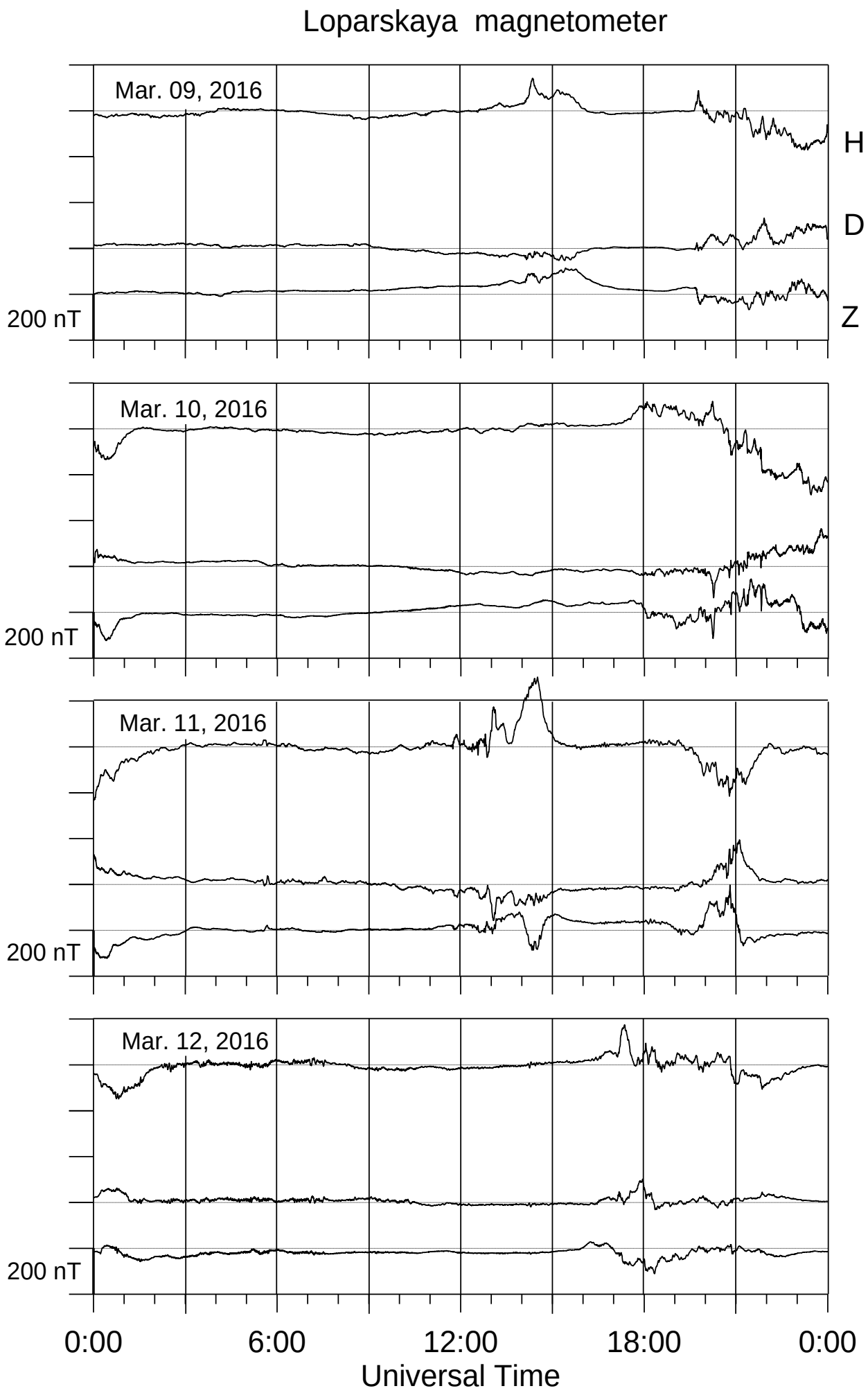
Loparskaya magnetometer
Mar. 09, 2016
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Mar. 10, 2016
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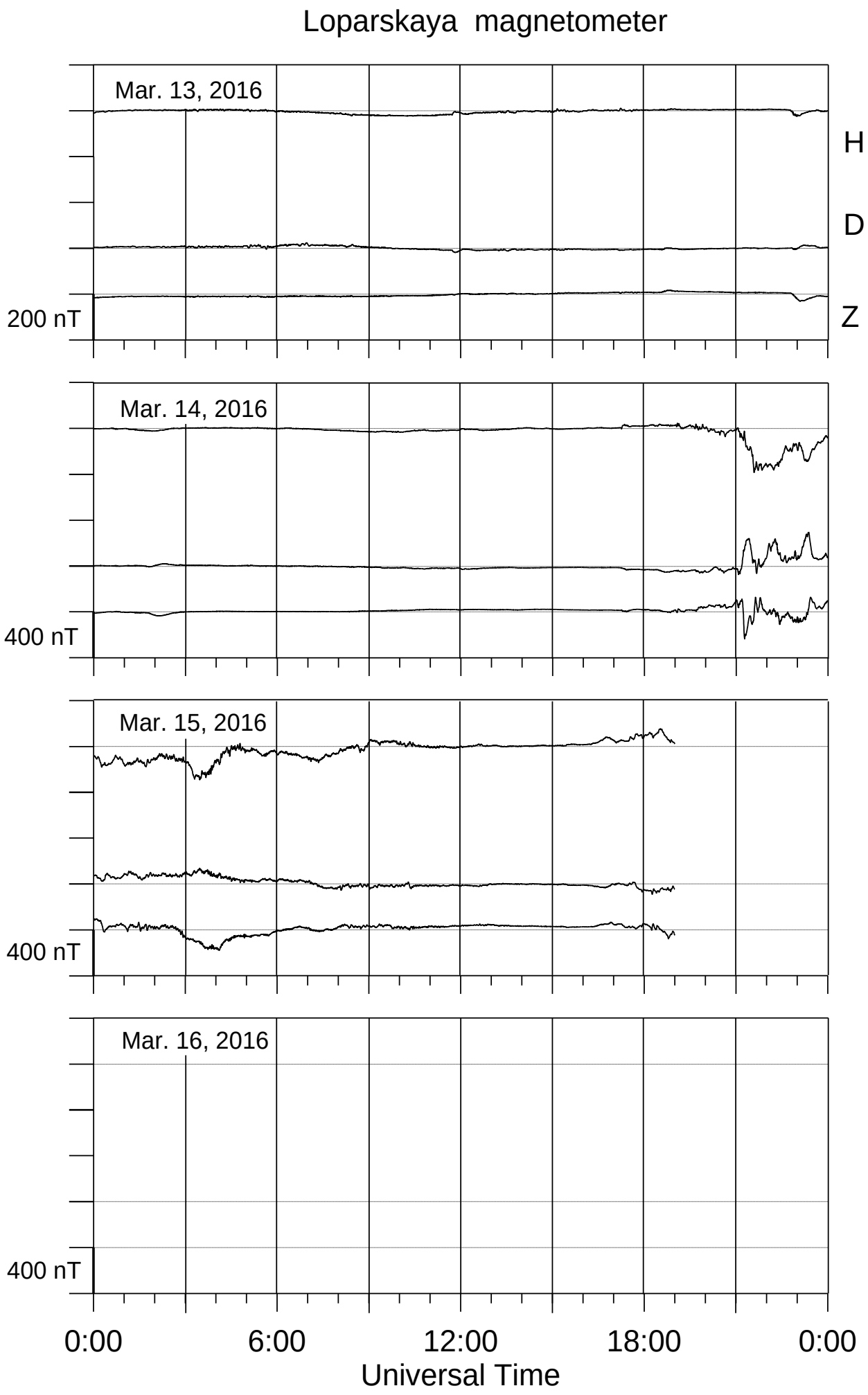
Loparskaya magnetometer
Mar. 13, 2016
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Mar. 14, 2016
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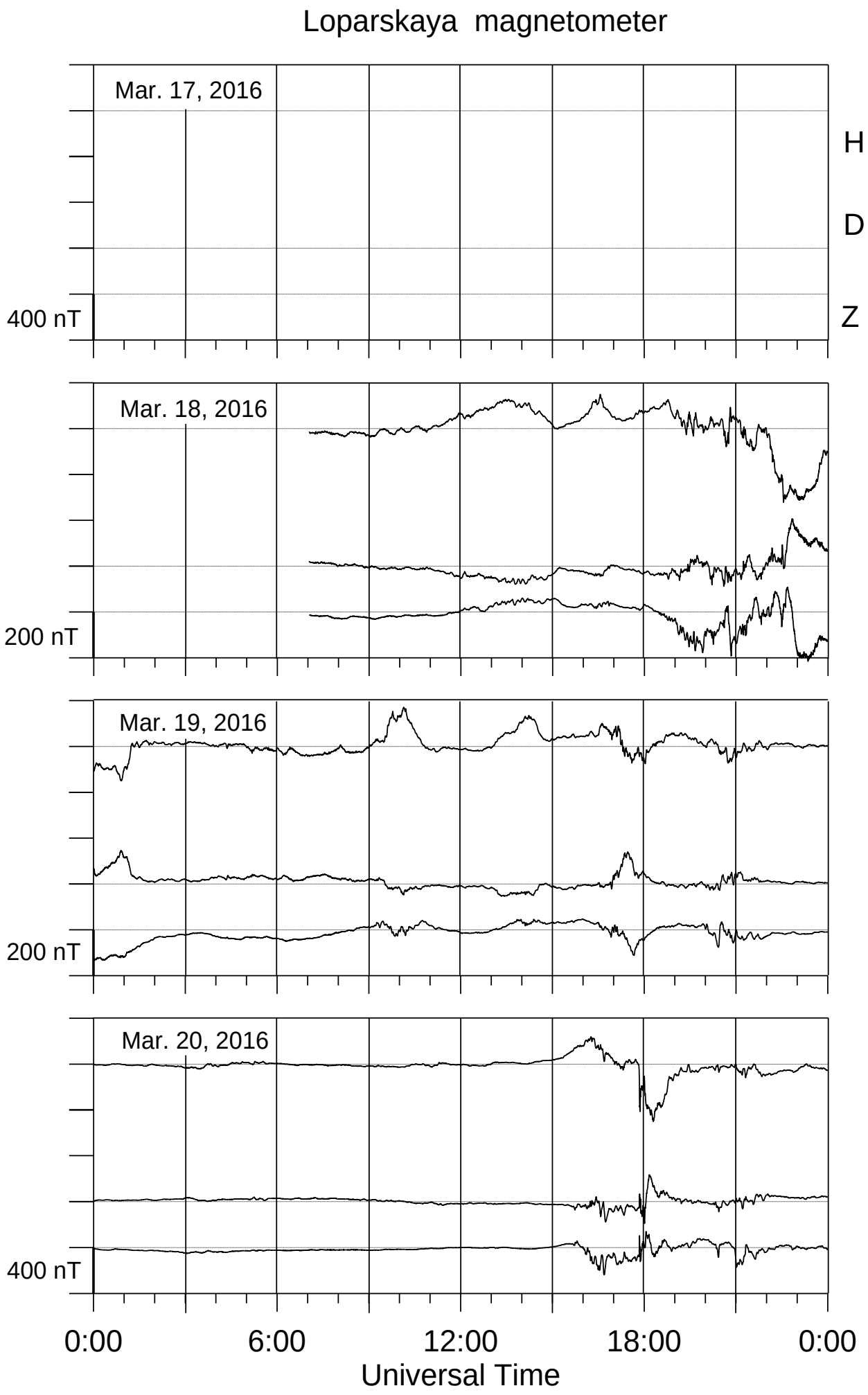
Universal Time


Loparskaya magnetometer
Mar. 17, 2016
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Mar. 18, 2016
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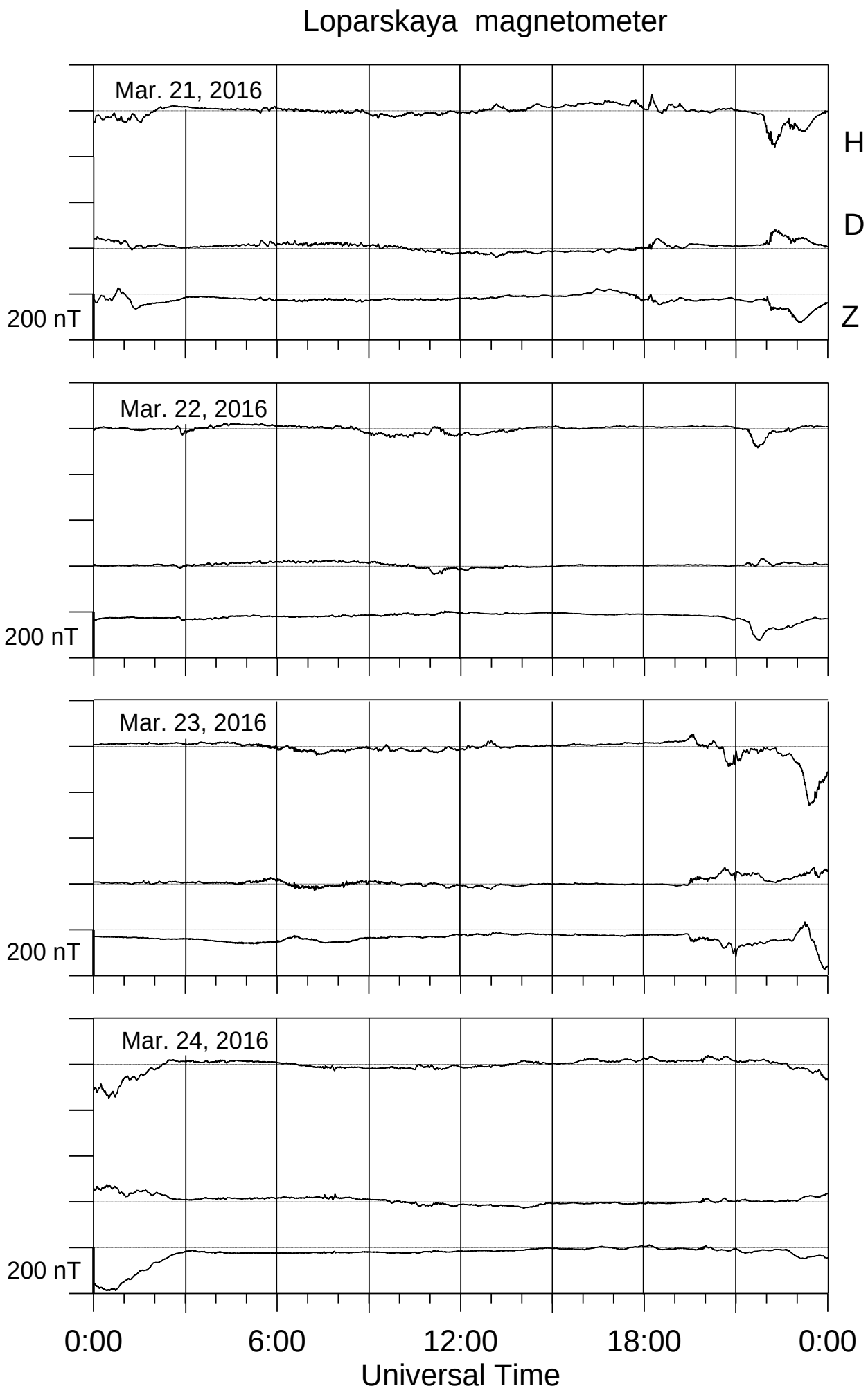
Universal Time


Loparskaya magnetometer
Mar. 21, 2016
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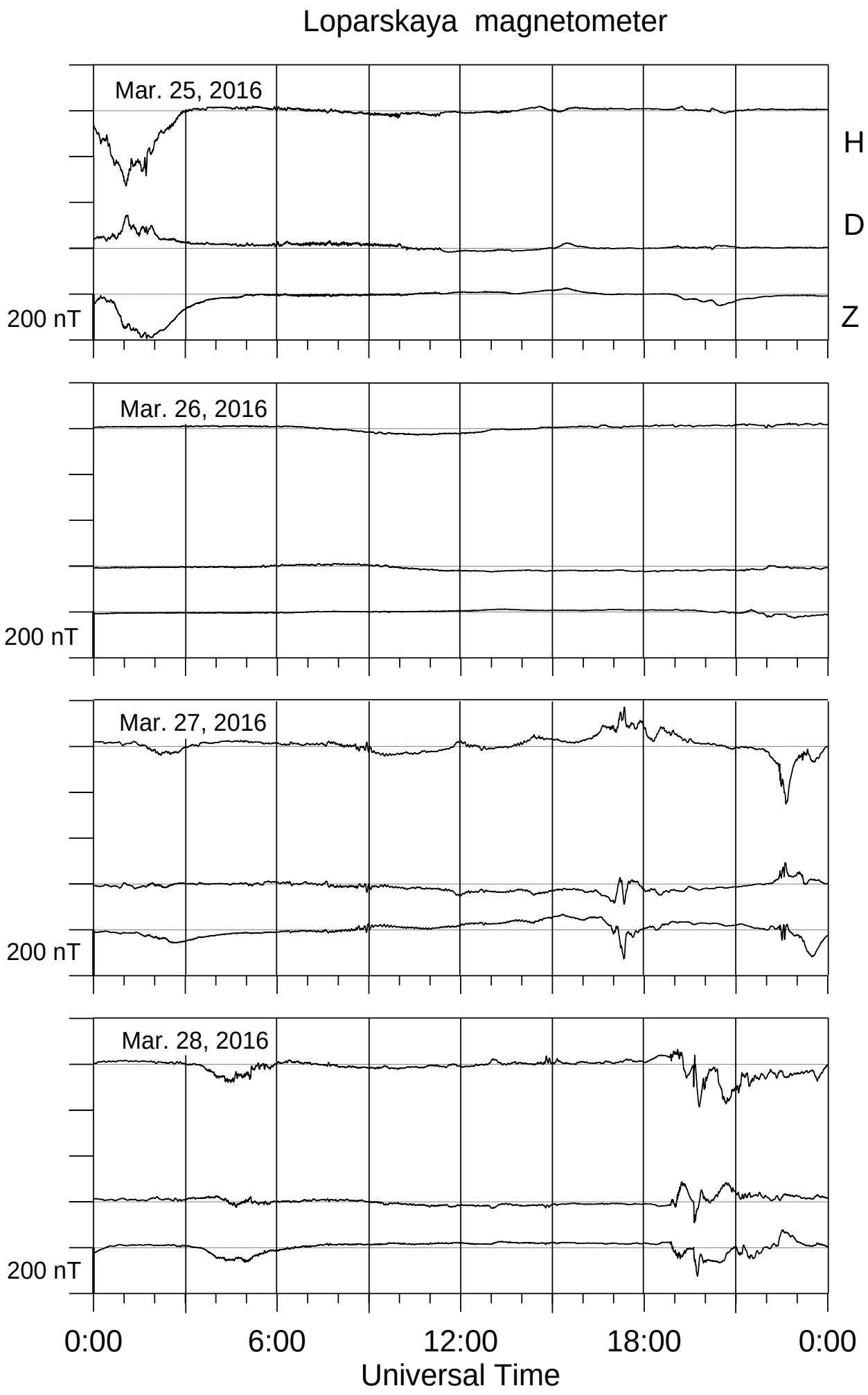
Universal Time


Loparskaya magnetometer
Mar. 25, 2016
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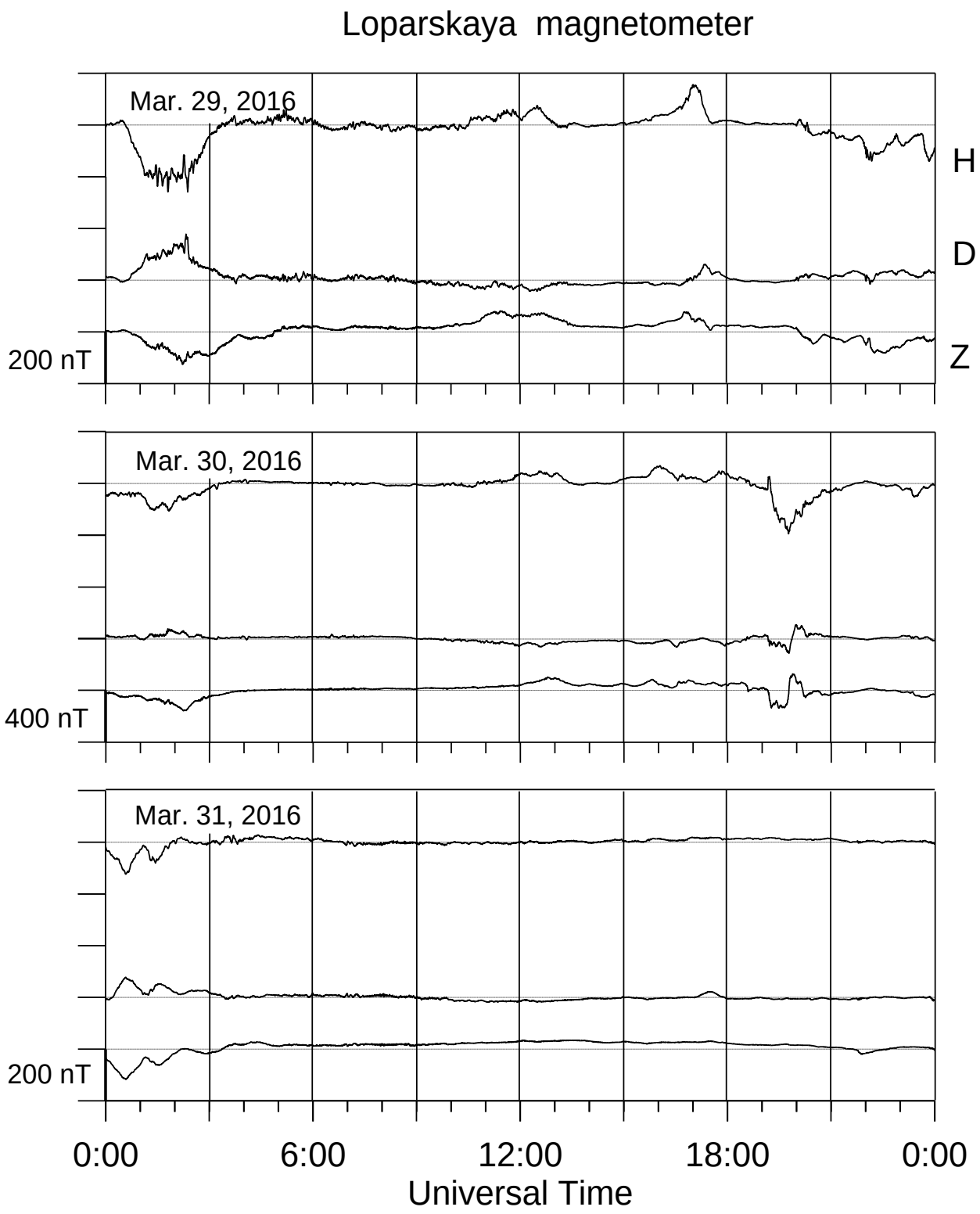
Loparskaya magnetometer
Mar. 29, 2016
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Universal Time