KIRUNA GEOPHYSICAL DATA

DATA SUMMARY 13/01-03
JANUARY-MARCH 2013

Collected at
SWEDISH INSTITUTE OF SPACE PHYSICS
KIRUNA, SWEDEN

Kiruna Geophysical Data

Data Summary 13/01-03
January – March 2013

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Kiruna 2013

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INTRODUCTION

"Kiruna Geophysical Data" is a collection of results of ground-based more or less continuous measurements of upper atmosphere variables carried out at the Swedish Institute of Space Physics. Our objective with this data summary is to present current geophysical data, related to polar upper atmospheric conditions, to those who require it for their research work.

Coordinates of the Swedish Institute of Space Physics are:

Geogr.		Geomagn. Dipole		Corr. Geomagn.	
Lat.	Long.	Lat.	Long.	Lat.	Long.
67.8°N	20.4°E	65.2°N	116.0°E	64.8°N	104.2°E

The following ground-based measurements of upper atmospheric parameters have been conducted at the Swedish Institute of Space Physics in the period for which data is presented in this report.

	Geomagnetism		Optical aurora		Ionospheric ionization
1.	Geomagnetic digital recording	1.	All-sky camera	1.	Riometer 30.0 MHz
				2.	Riometer 38.2 MHz

The Ionospheric Observatory at Lycksele (64.7°N, 18.8°E) is also operated by the Swedish Institute of Space Physics. Magnetometer, riometer, and ionosonde measurements are conducted there.

Universal time is used in all tables.

Ionosonde data obtained at the Swedish Institute of Space Physics in Kiruna have been published together with ionosonde data from Lycksele and Uppsala in a monthly report "Ionospheric Data Sweden" between January 1990 and March 2000. Copies are available from the Swedish Institute of Space Physics.

Scaled ionosonde parameters from 1965 – 1998 are also available from
`http://www.wdc.rl.ac.uk/wdcc1/ionosondes/data_archive.html`

The most recent data from all instruments are accessible via internet at
`http://www.irf.se/Data`

For more information contact urban.brandstrom@irf.se

GEOMAGNETIC DATA

Magnetograms

The magnetograms reproduced here are plots of data recorded by a three component digital fluxgate magnetometer with a sampling frequency of 1 sample/second.

The scaling is indicated by the tick mark values on the plots. Note that for large disturbances the normal scaling has been reduced. The positive direction of the components are: X north, Y east and Z down, in geographic coordinates.

K-indices

The K-indices give a measure of the amount of disturbance of the geomagnetic field.

A reading of maximum deflection has been made during each 3-hour interval (starting from 00 to 03 UT) of two components X and Y. The Sq + L variation has been compensated for. A detailed description of the determination of K-indices has been given by J. Bartels: The technique of scaling indices K and Q geomagnetic activity. IGY Annals 4, London 1957.

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	

ALL-SKY CAMERA DATA

Digital all-sky camera images are typically recorded in jpeg format at a rate of one frame per minute. The filename of each image contains information about UTC and exposure time. Longer exposure times are used at regular intervals (typically eight minutes). Data might be recorded at higher frame rates during selected periods. More information and image data are available from: `http://www.irf.se/allsky`

Information about available records of all-sky camera data is presented as colour keograms. Keograms are time sequences of poleward to equatorward slices through the centre of all-sky images. The top of the image points poleward, the bottom equatorward. Time is on the horizontal axis (0:00-24:00 UTC). Each page contains keograms for seven days. White areas indicate missing data (e.g. daylight conditions).

IONOSPHERIC ABSORPTION DATA

Ionospheric absorption at 30.0 MHz and 38.2 MHz is recorded by two La Jolla riometers. The riometer records of cosmic noise power are reproduced in this report. The zero power level is at bottom of each panel.

The absorption (in decibels) can be computed from the formula

$$A(dB) = 10\log_{10}\frac{P_o}{P}$$

where P is the received cosmic noise power, P_o the cosmic noise power expected under ionospherically quiet conditions at the same sidereal time.

GEOMAGNETIC K-INDICES, KIRUNA

January 2013

Lower limit of K=9 is 1500 nT

Time in UT

Day	00 - 03	03 - 06	06 - 09	09 - 12	12 - 15	15 - 18	18 - 21	21 - 24	Sum
1	0	0	0	0	0	0	0	0	0
2	0	0	0	1	1	1	0	2	5
3	1	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	1	1	2
5	0	0	0	0	0	0	1	0	1
6	0	0	0	1	0	0	2	2	5
7	1	0	0	1	0	0	0	1	3
8	0	0	1	1	0	0	2	4	8
9	2	0	0	0	0	0	2	2	6
10	0	0	0	0	0	0	1	1	2
11	0	0	0	0	0	0	0	3	3
12	3	1	0	0	0	0	1	0	5
13	4	1	1	1	2	3	6	6	24
14	4	3	1	2	3	2	3	2	20
15	1	1	1	1	1	0	3	0	8
16	0	0	0	0	0	1	2	4	7
17	4	2	1	2	2	6	4	5	26
18	3	3	2	1	3	3	3	5	23
19	4	1	0	0	1	2	3	6	17
20	6	3	3	3	2	1	0	2	20
21	3	1	1	1	1	1	1	2	11
22	0	0	0	0	0	0	0	0	0
23	0	1	0	0	0	0	0	1	2
24	1	1	0	0	0	0	0	0	2
25	0	0	1	1	0	1	1	6	10
26	6	2	2	3	5	5	7	6	36
27	5	3	1	1	1	3	2	1	17
28	0	1	1	0	1	1	3	3	10
29	2	0	0	0	1	0	1	0	4
30	0	0	0	0	0	0	1	1	2
31	0	0	1	0	0	0	0	3	4
Sum	50	24	17	20	24	30	50	69	

GEOMAGNETIC K-INDICES, KIRUNA

February 2013

Lower limit of K=9 is 1500 nT

Time in UT

Day	00 - 03	03 - 06	06 - 09	09 - 12	12 - 15	15 - 18	18 - 21	21 - 24	Sum
1	3	0	0	1	1	2	0	5	12
2	4	2	3	2	2	1	4	3	21
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4	1	0	1	0	1	3	3	0	9
5	0	0	1	0	0	0	0	0	1
6	0	0	0	0	0	0	1	2	3
7	2	1	2	3	2	1	3	2	16
8	2	2	3	1	3	4	2	3	20
9	3	1	1	1	0	0	2	2	10
10	2	1	1	1	0	1	4	2	12
11	2	2	1	0	0	1	3	3	12
12	1	0	0	1	1	1	2	5	11
13	3	4	1	1	1	1	5	6	22
14	6	3	3	3	2	3	3	4	27
15	0	1	0	1	1	2	3	2	10
16	0	0	0	1	2	5	5	3	16
17	2	1	1	2	4	5	5	2	22
18	1	0	0	0	1	0	2	6	10
19	1	0	1	1	1	3	3	3	13
20	1	1	1	2	3	3	3	2	16
21	5	2	1	1	1	3	4	5	22
22	4	3	2	2	3	4	6	5	29
23	5	1	0	1	2	3	5	5	22
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25	0	0	0	1	1	1	0	2	5
26	2	1	1	2	1	3	3	2	15
27	2	1	2	1	1	0	1	2	10
28	2	2	1	1	2	1	3	7	19
Sum	59	30	29	31	38	53	78	88	

GEOMAGNETIC K-INDICES, KIRUNA

March 2013

Lower limit of K=9 is 1500 nT

Time in UT

Day	00 - 03	03 - 06	06 - 09	09 - 12	12 - 15	15 - 18	18 - 21	21 - 24	Sum
1	6	5	3	5	5	5	6	7	42
2	6	4	3	2	2	3	5	5	30
3	4	4	3	1	2	2	3	5	24
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5	4	1	1	2	2	0	3	3	16
6	3	3	1	1	1	0	0	2	11
7	0	0	1	2	2	1	0	1	7
8	0	0	1	2	1	1	2	2	9
9	3	2	2	2	2	1	1	2	15
10	0	1	2	2	1	2	1	5	14
11	5	1	2	1	1	1	0	0	11
12	1	1	2	2	3	2	2	2	15
13	2	0	2	2	1	0	2	1	10
14	0	1	1	2	3	2	1	0	10
15	0	2	2	2	2	1	0	1	10
16	3	3	2	2	3	2	2	2	19
17	4	3	6	5	5	7	7	7	44
18	4	2	2	2	2	1	2	2	17
19	1	2	1	1	2	1	3	5	16
20	4	2	2	1	3	4	5	5	26
21	7	7	3	1	2	1	1	0	22
22	1	1	1	2	2	2	5	5	19
23	2	0	1	2	2	3	4	6	20
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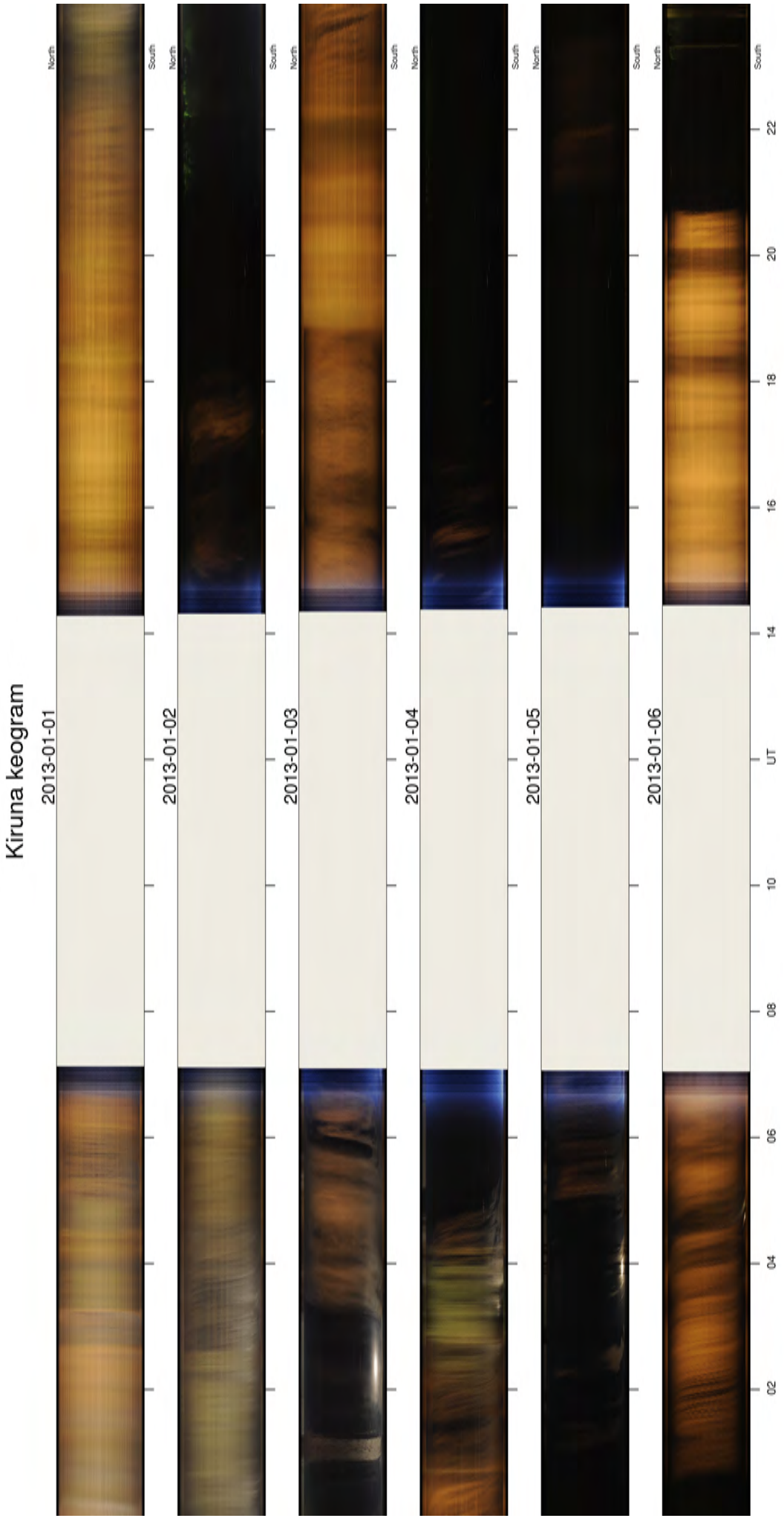
26	1	1	2	2	2	0	0	0	8
27	1	2	2	3	4	7	5	7	31
28	6	2	2	2	2	4	3	5	26
29	6	3	4	4	5	6	6	6	40
30	6	7	3	2	3	2	5	5	33
31	2	1	1	2	1	2	4	5	18
Sum	90	63	62	63	72	67	82	98	

ALL-SKY CAMERA KEOGRAMS

January - March 2013

http://www.irf.se/allsky/kgd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2013-01-02
2013-01-03
2013-01-04
2013-01-05
2013-01-06
North
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02
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08
10
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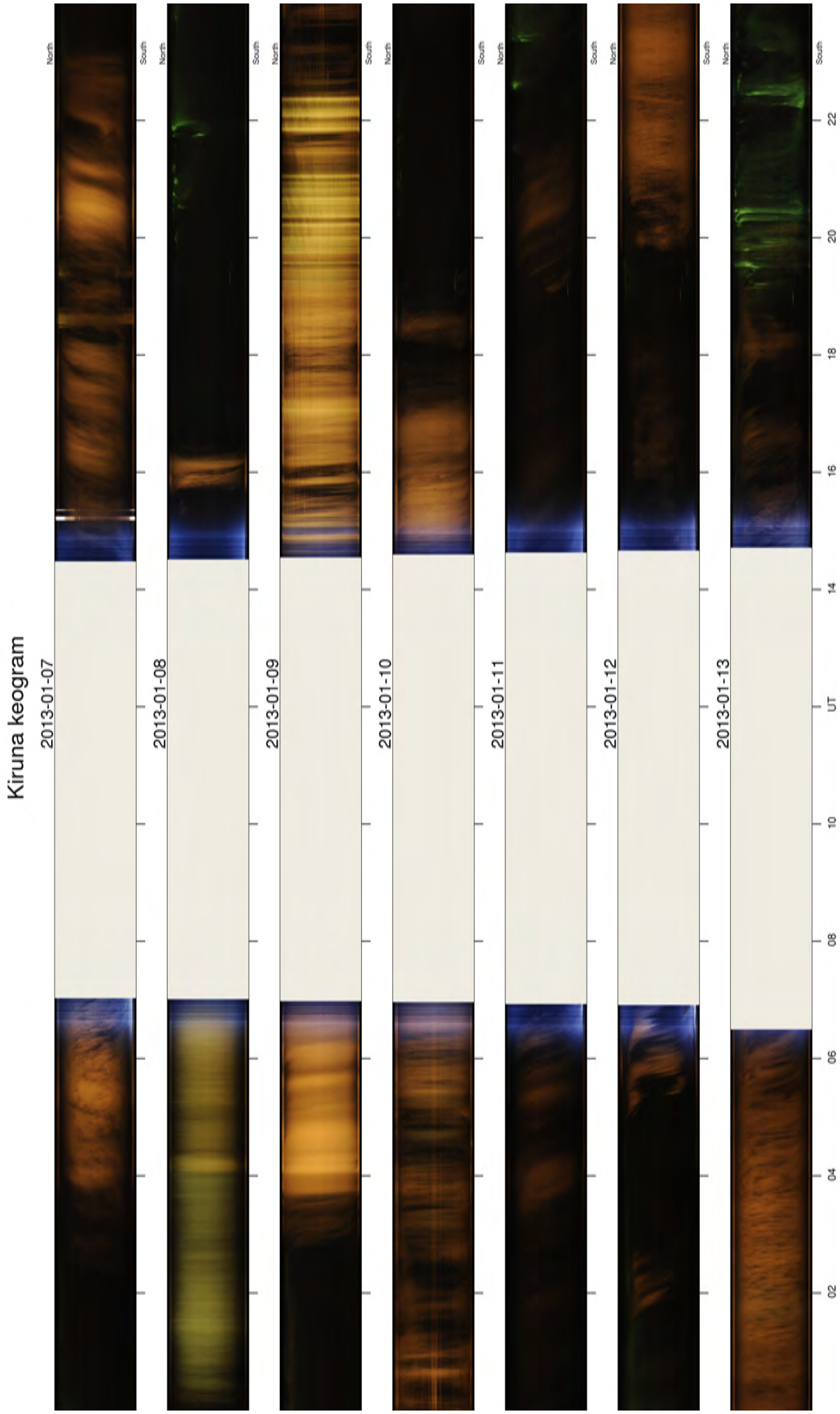
16
18
20
22
UT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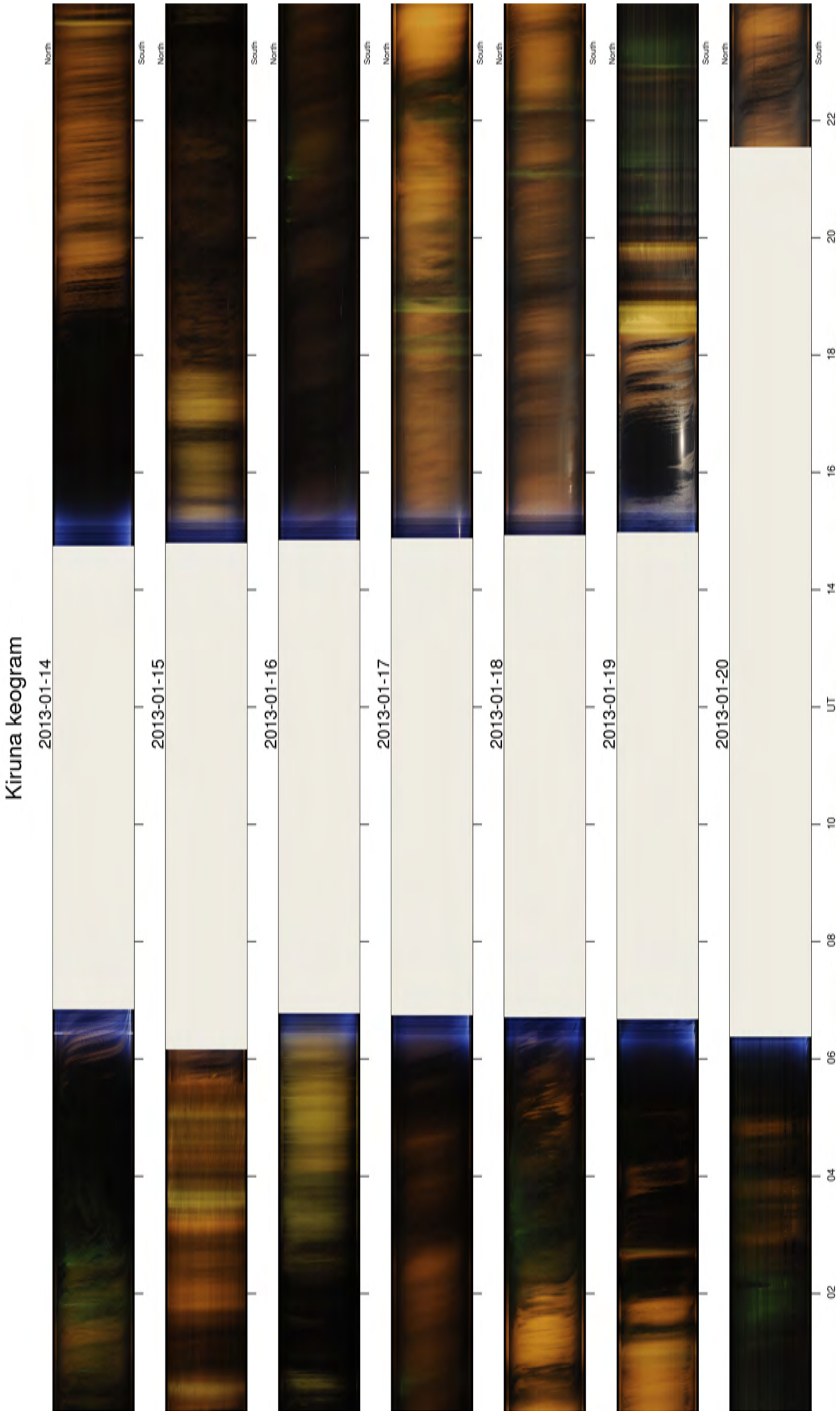
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2013-01-17
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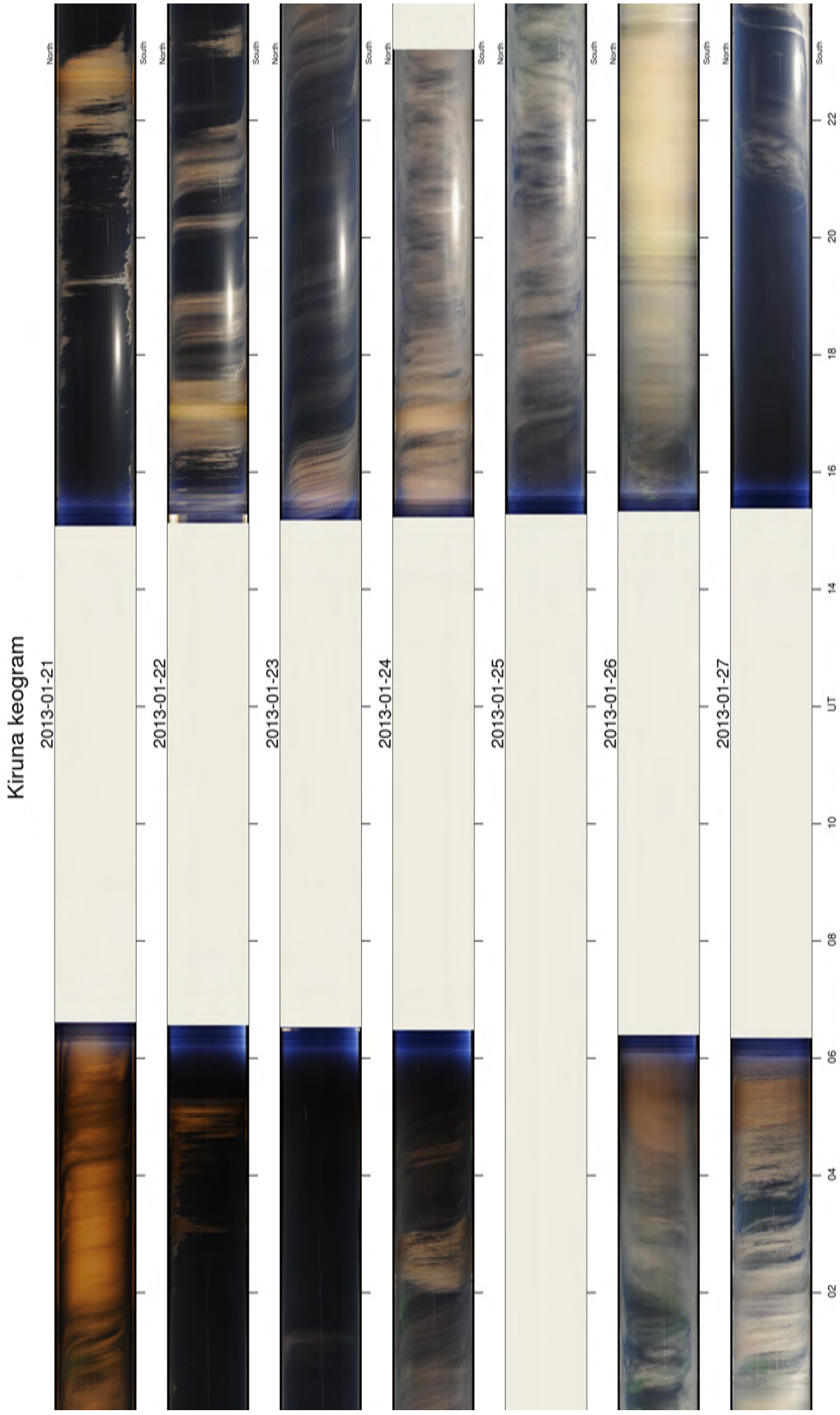
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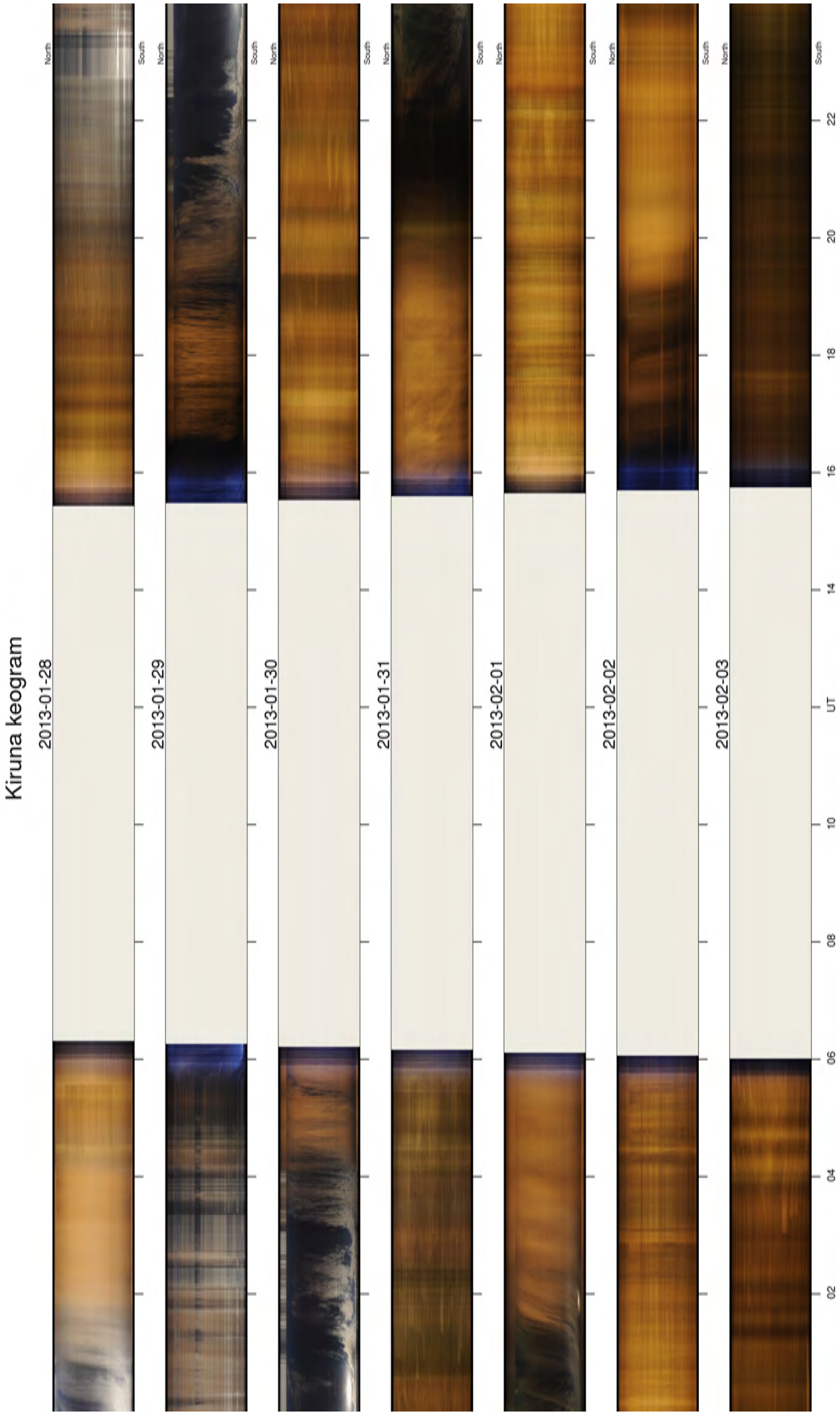
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2013-01-31
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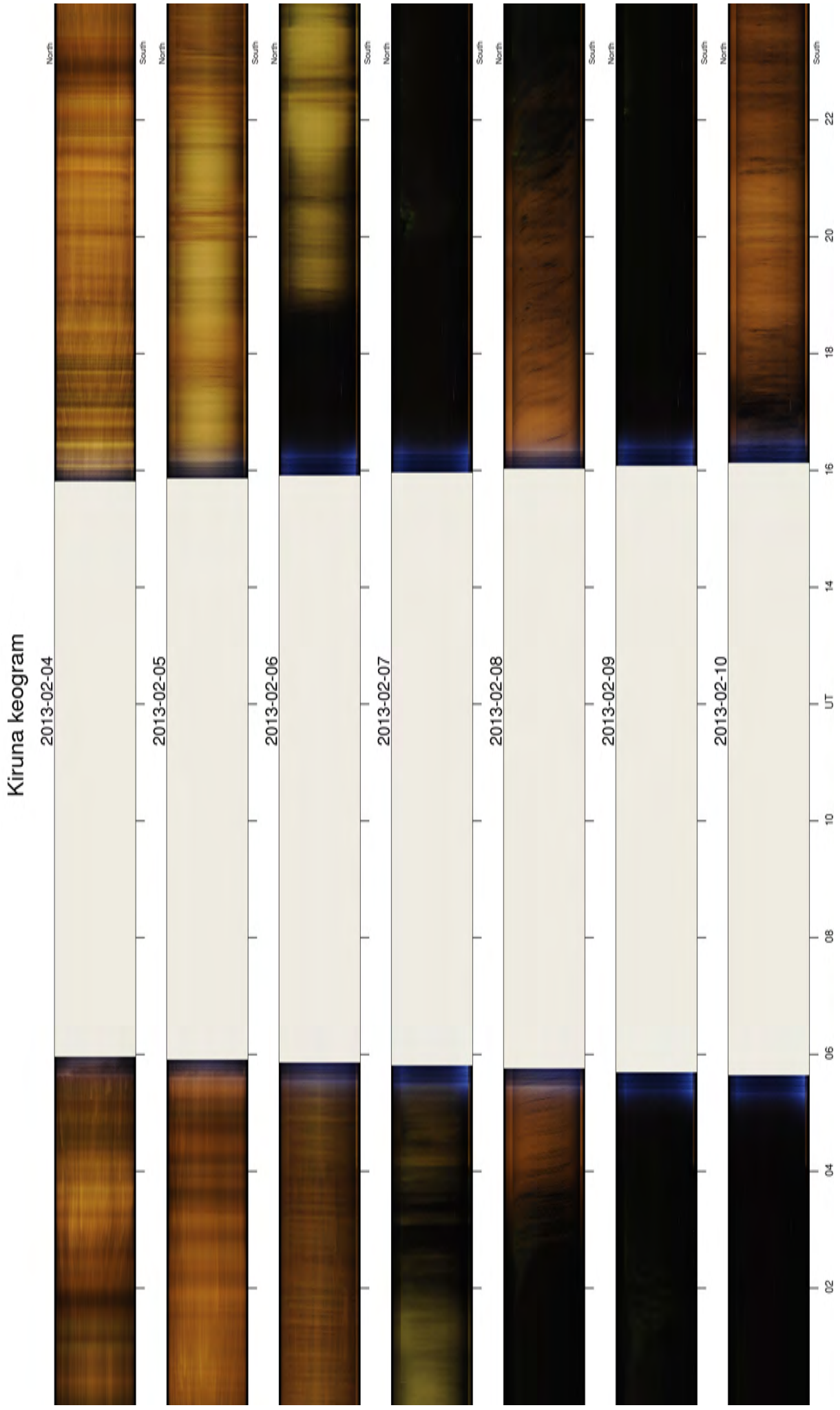
UT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2013-02-05
2013-02-06
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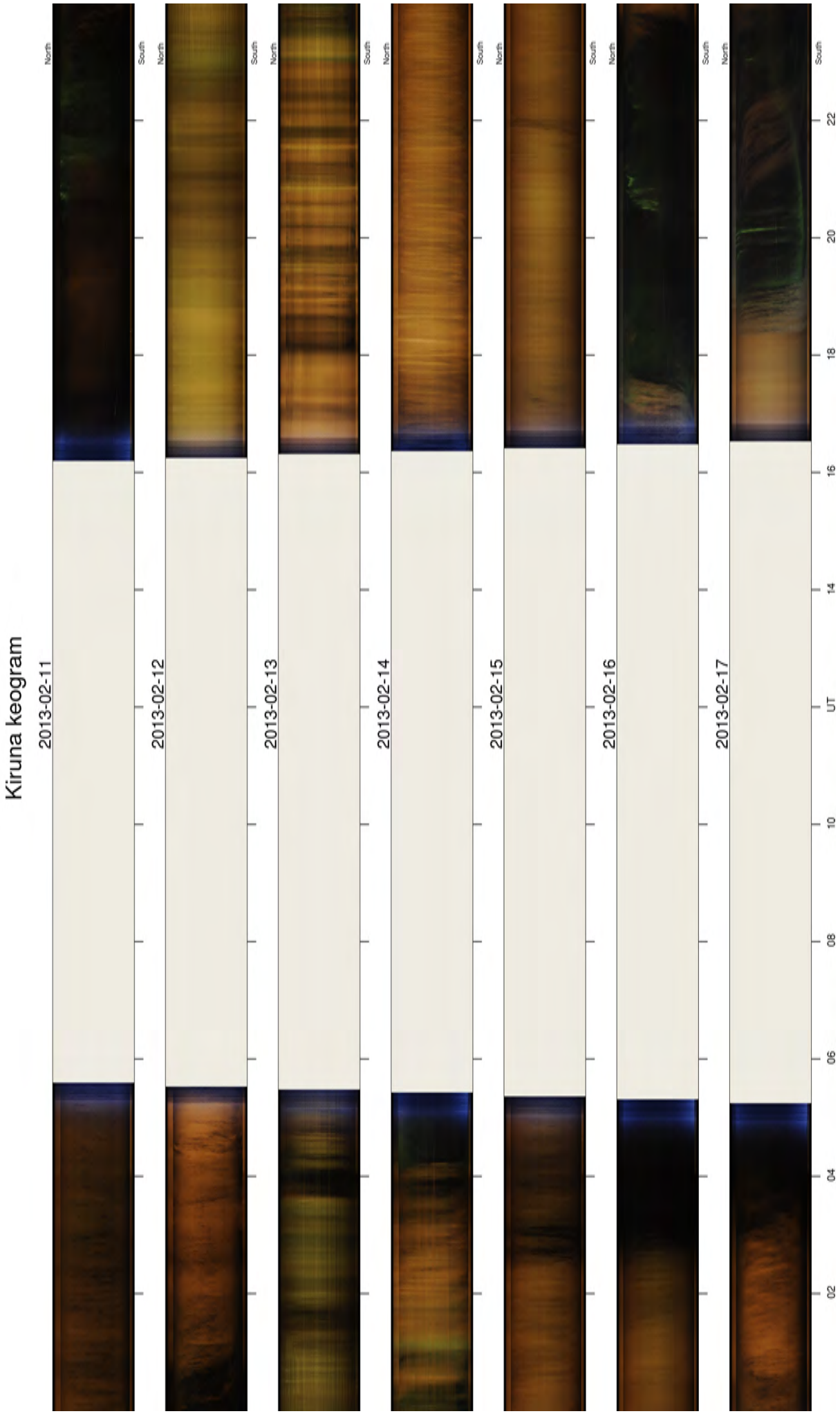
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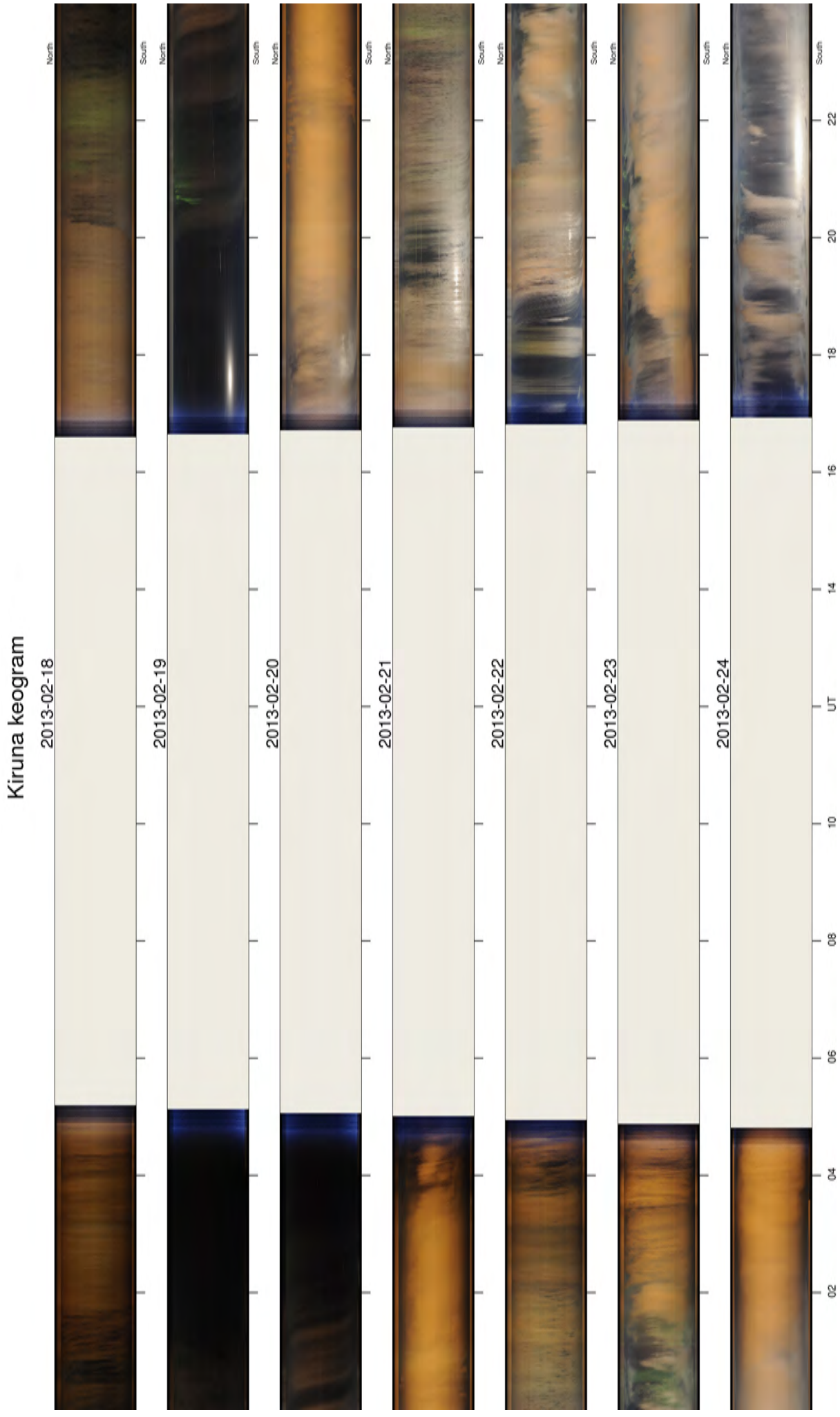
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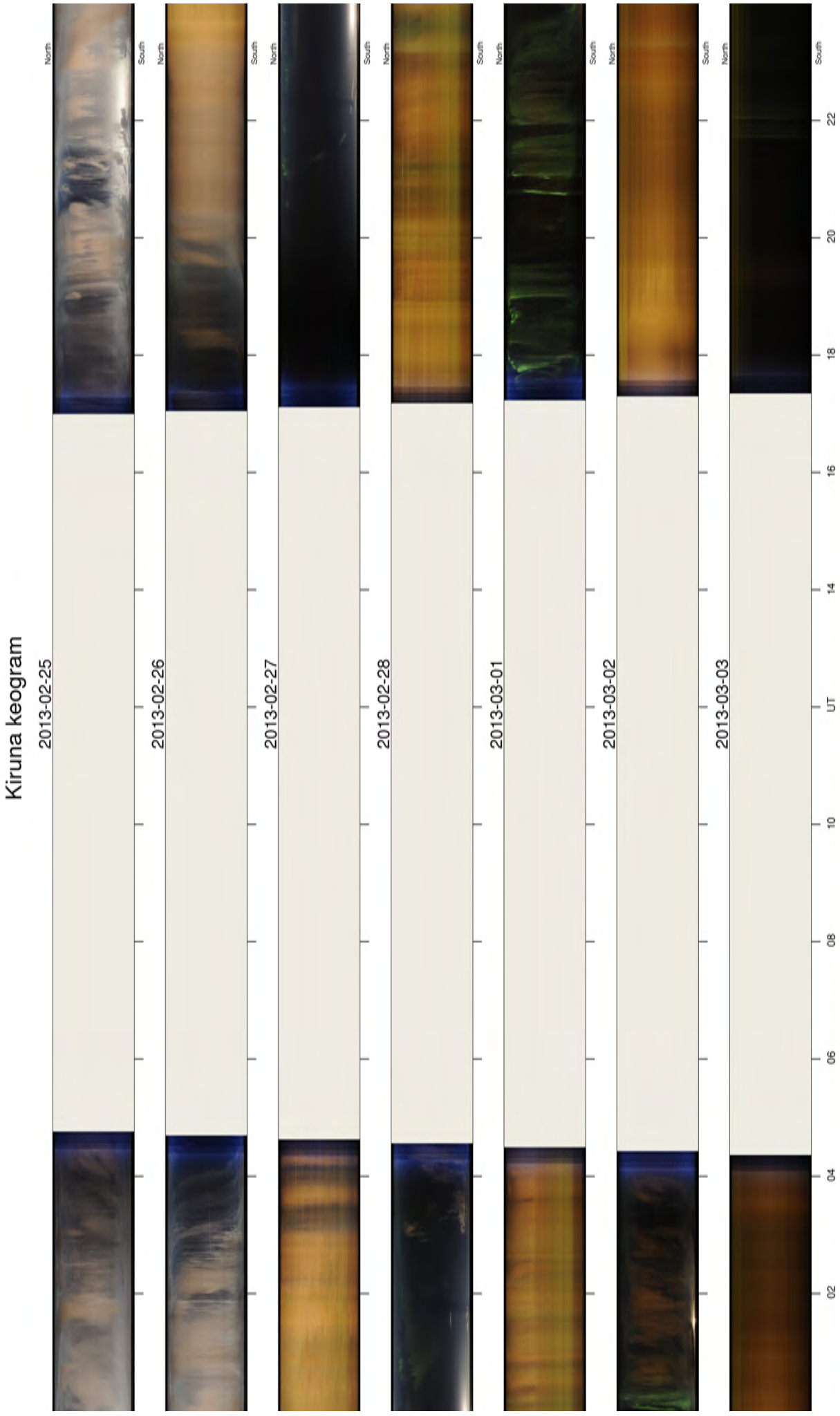
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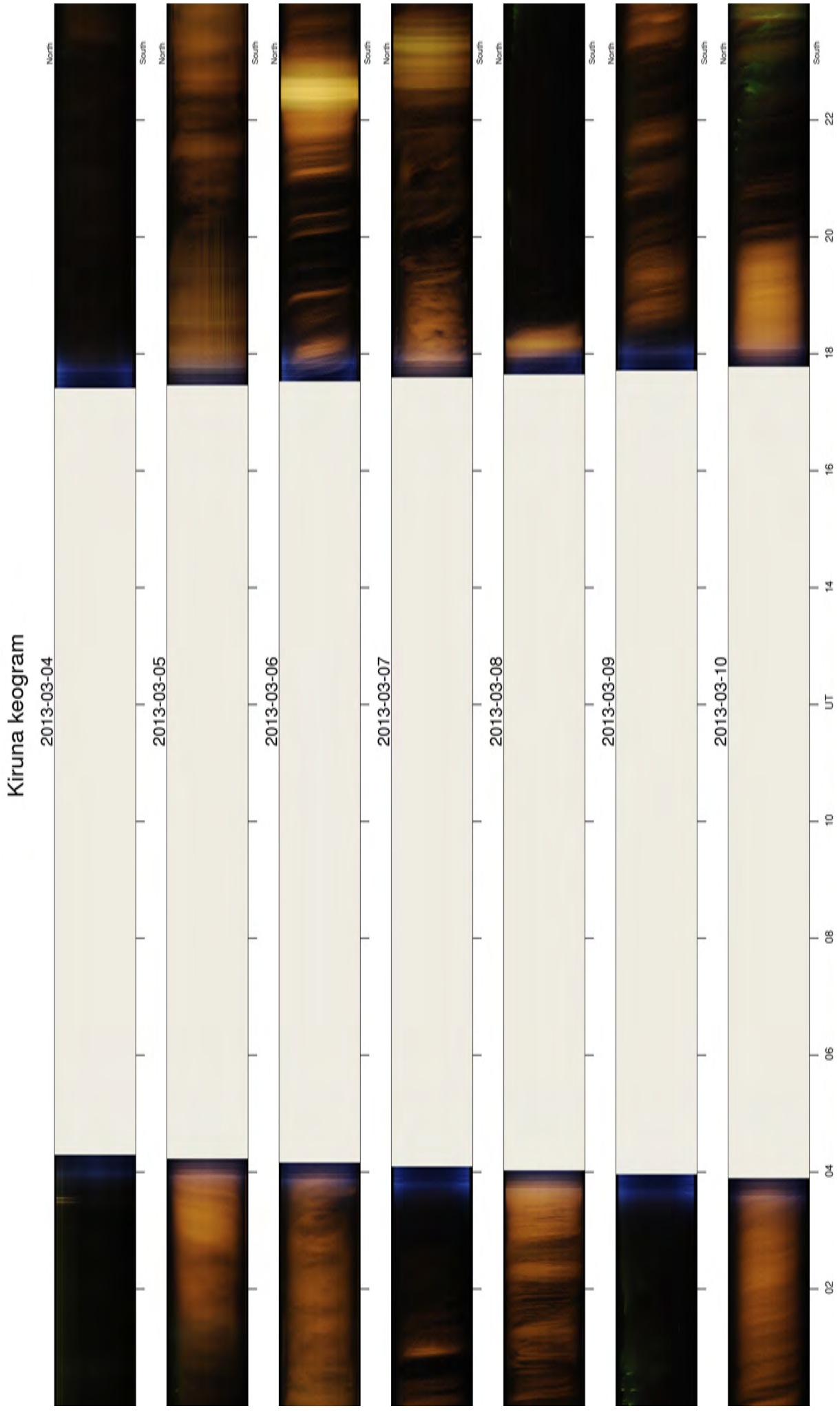
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2013-03-06
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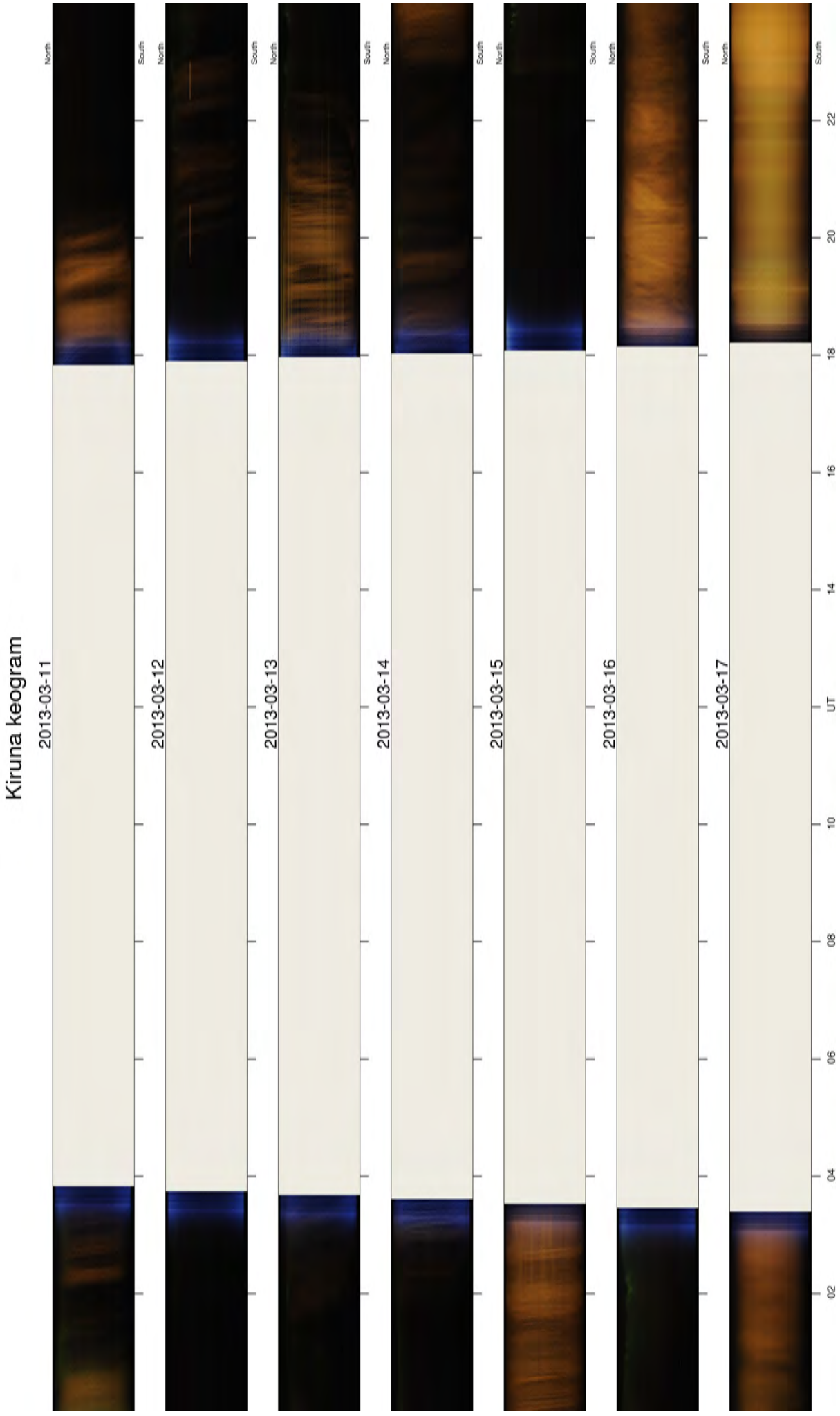
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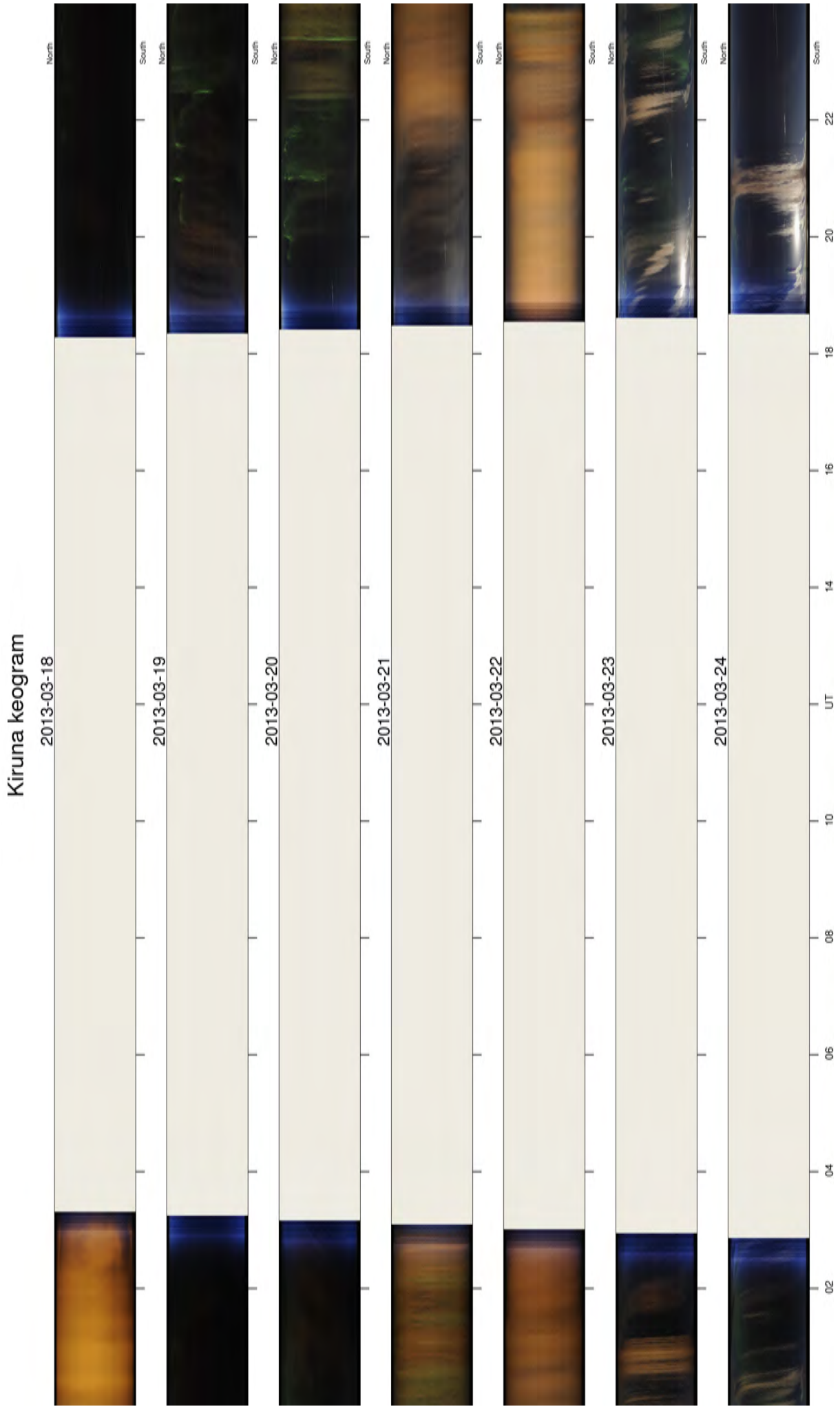
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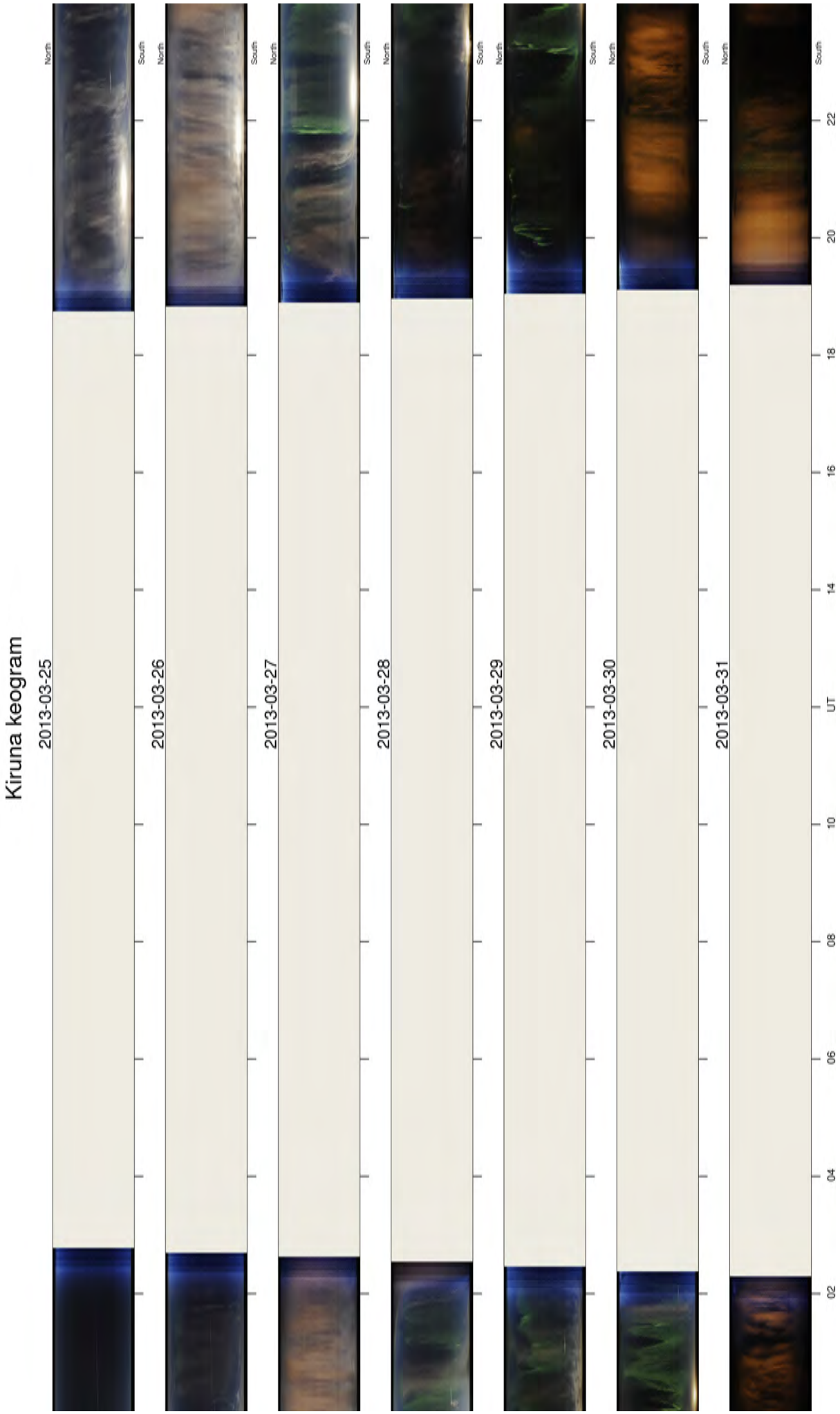
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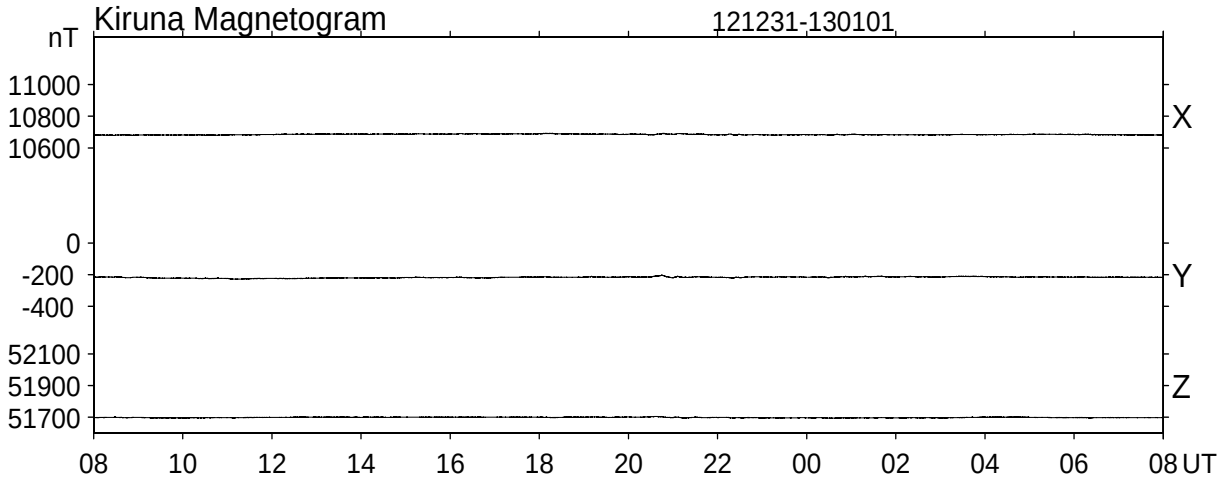
KIRUNA MAGNETOGRAM PLOTS

January - March 2013

http://www.irf.se/mag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121231-130101
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51900
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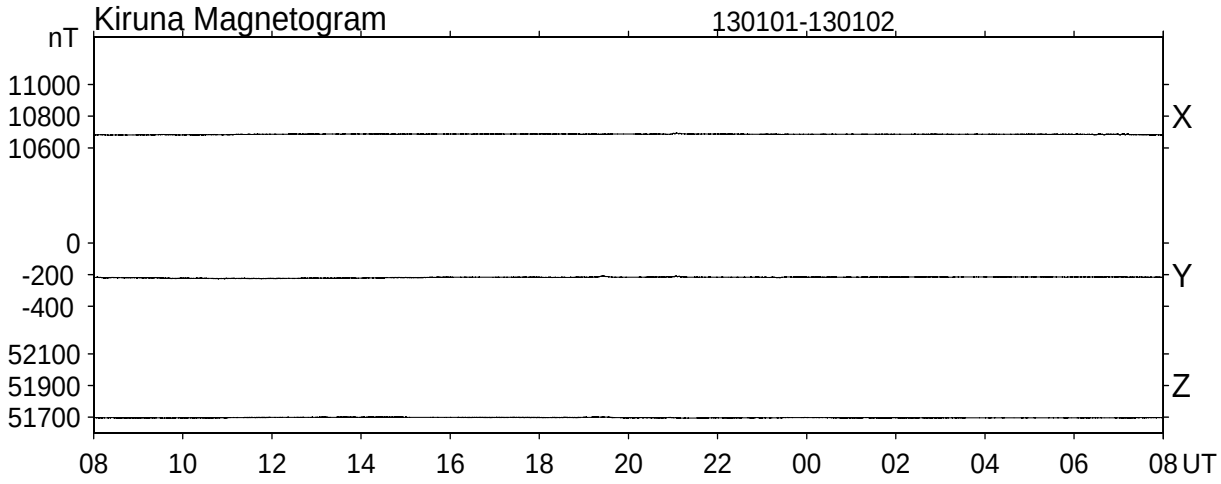
X
Y
Z
08 10 12 14 16 18 20 22 00 02 04 06 08 UT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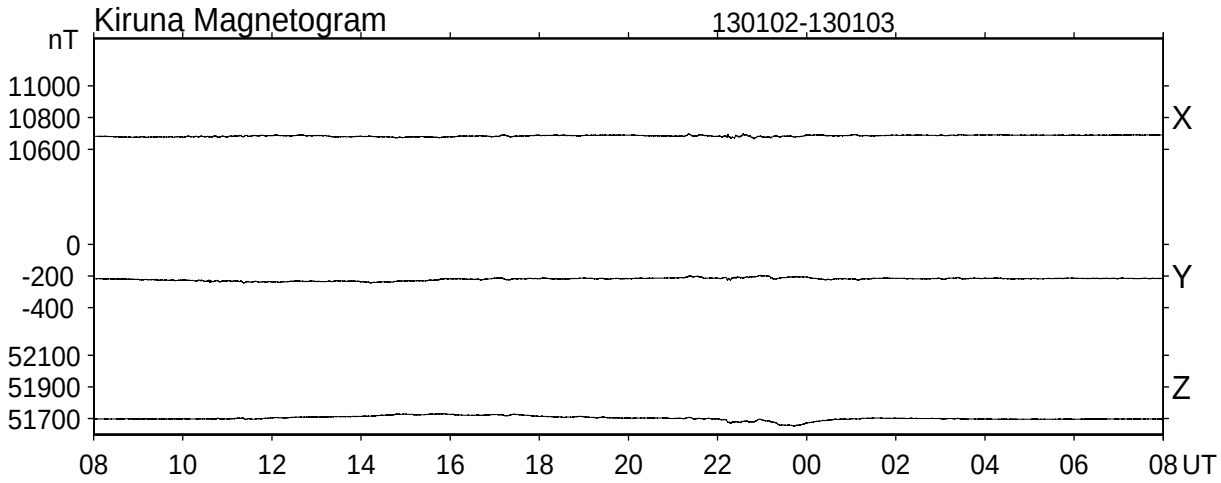
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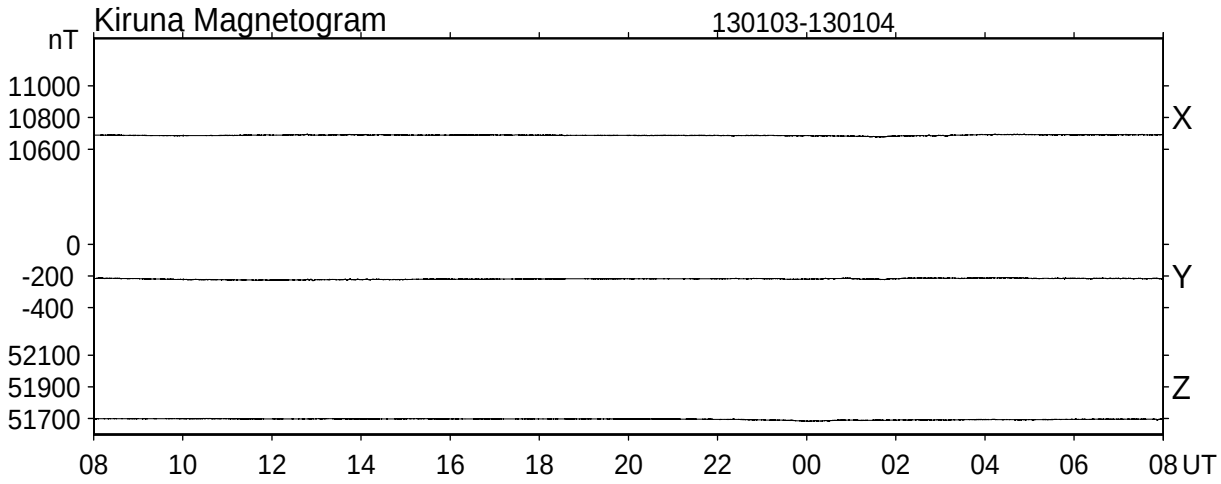
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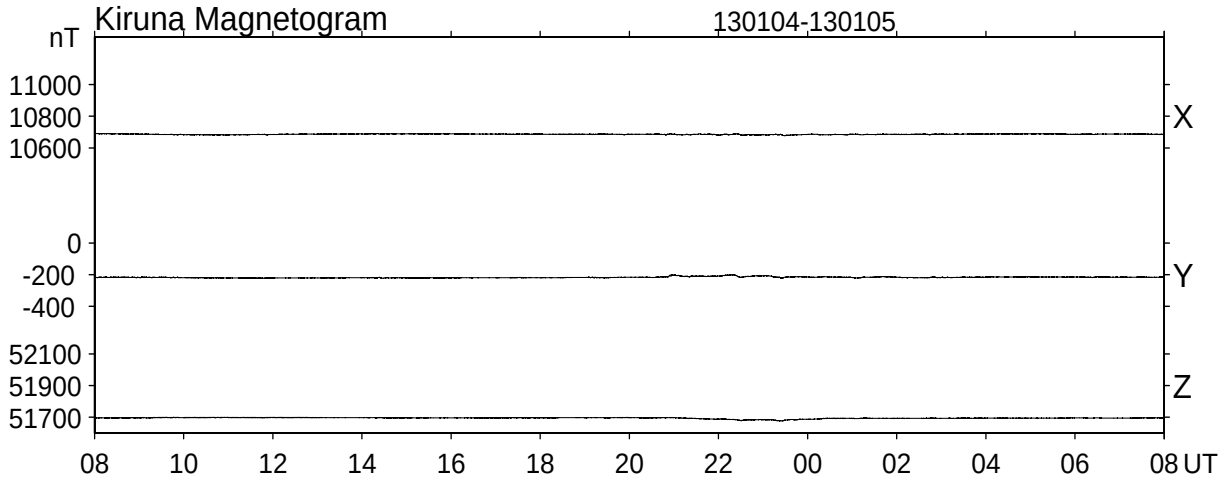
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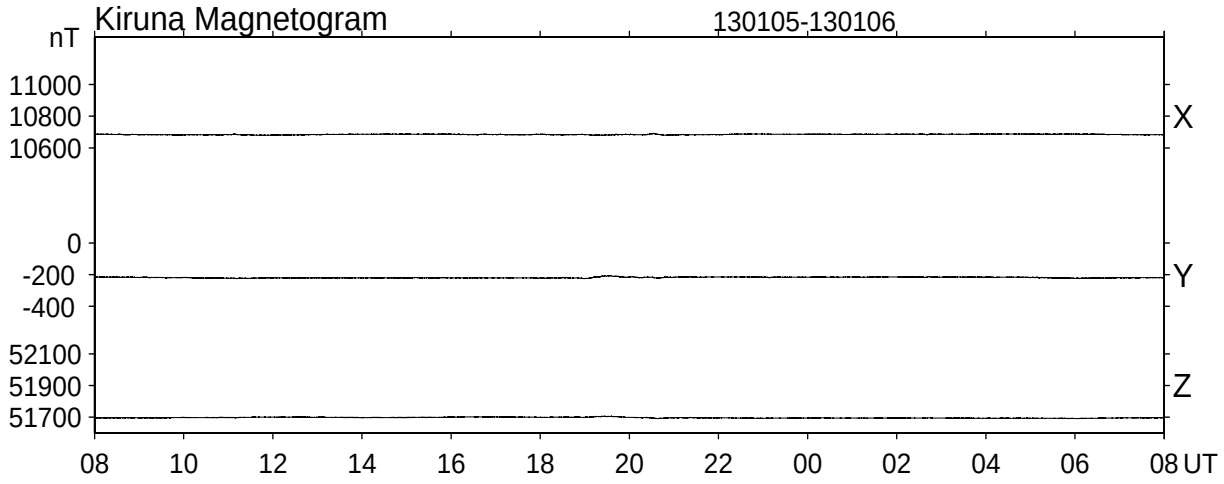
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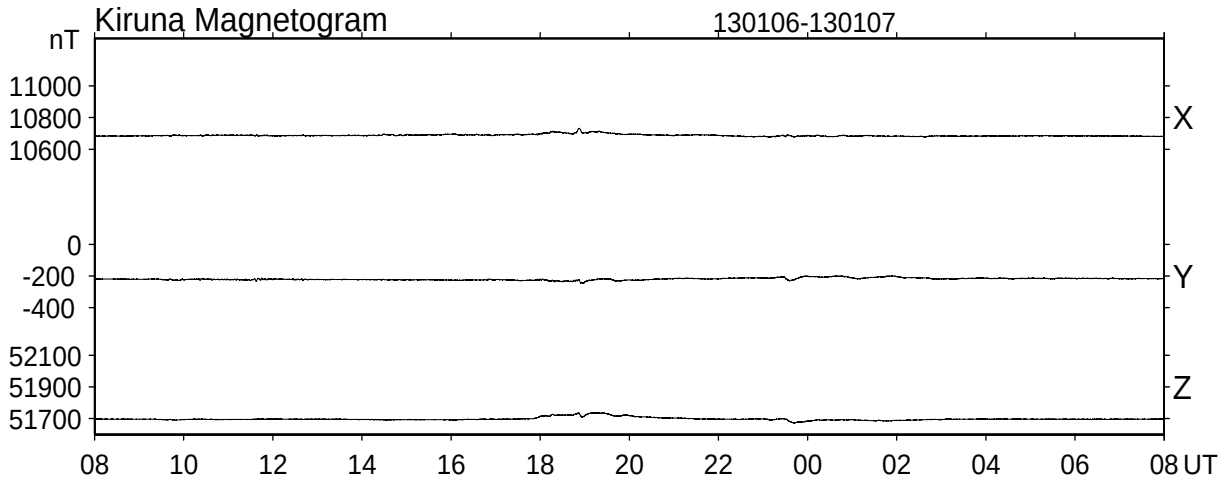
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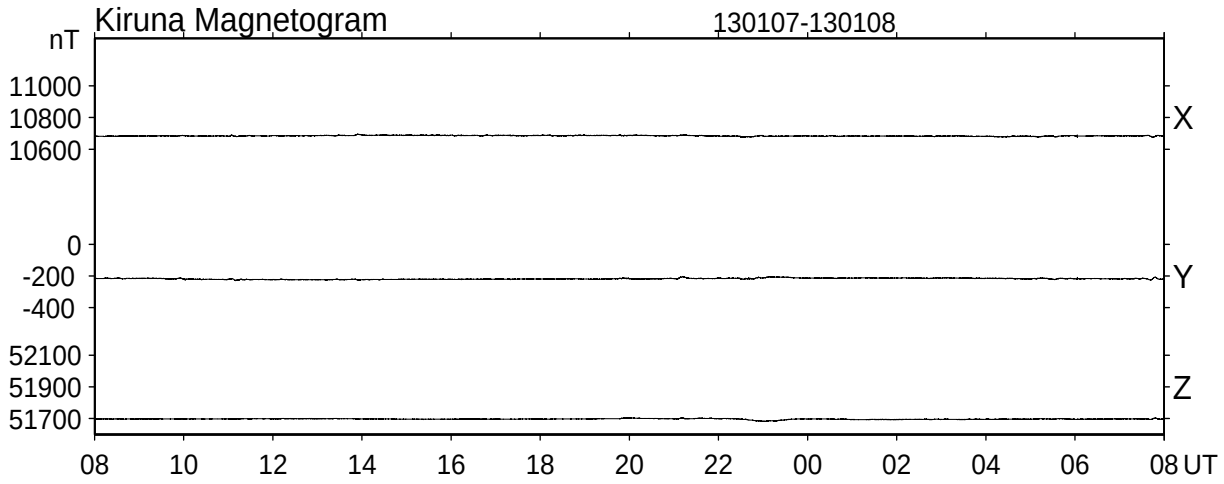
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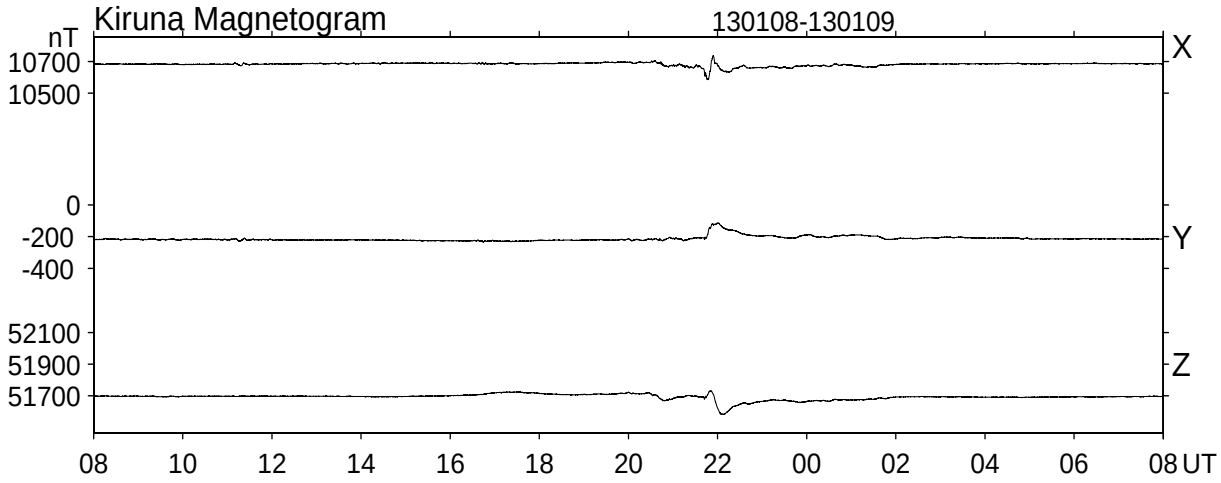
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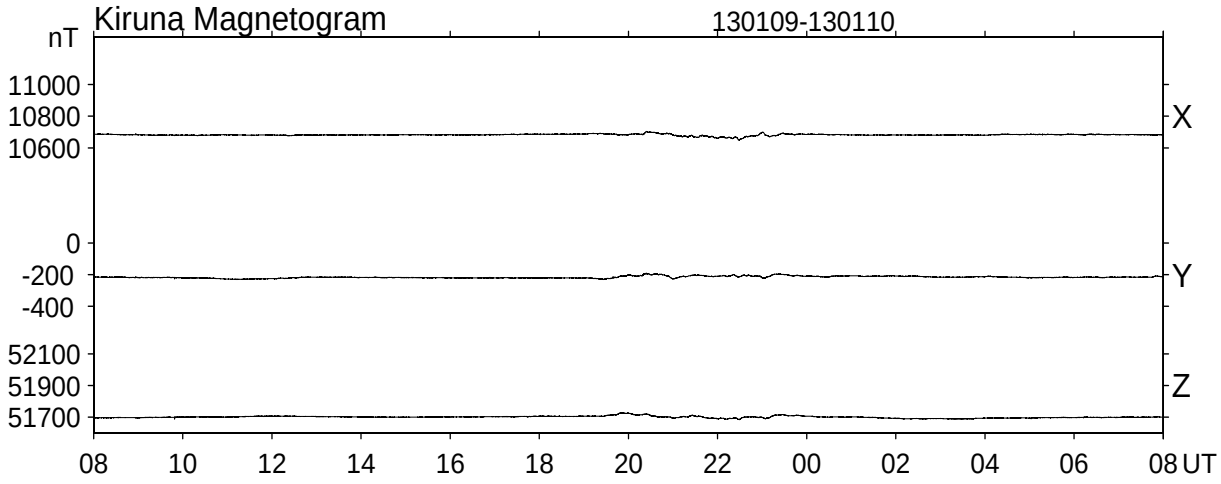
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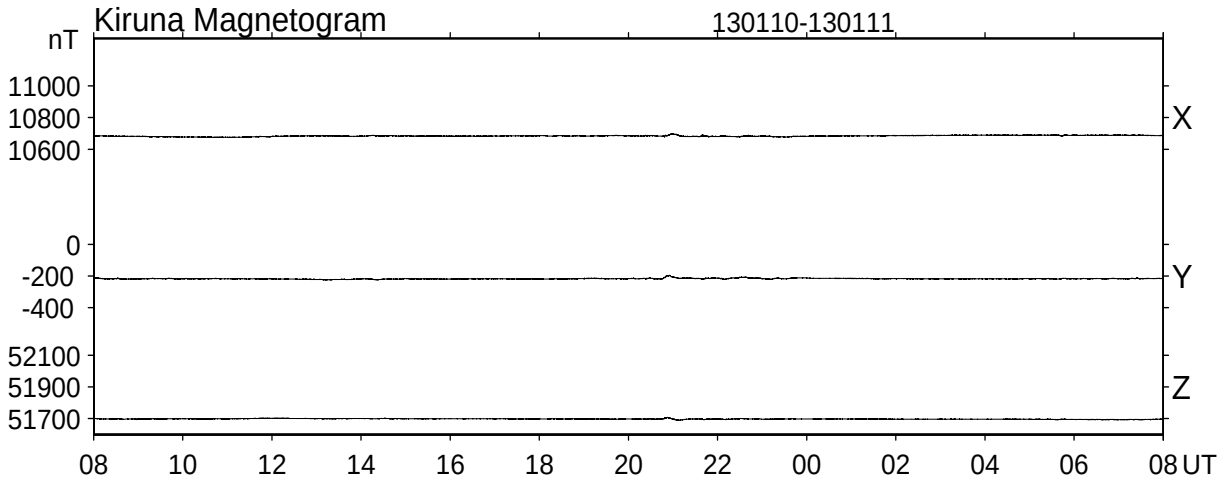
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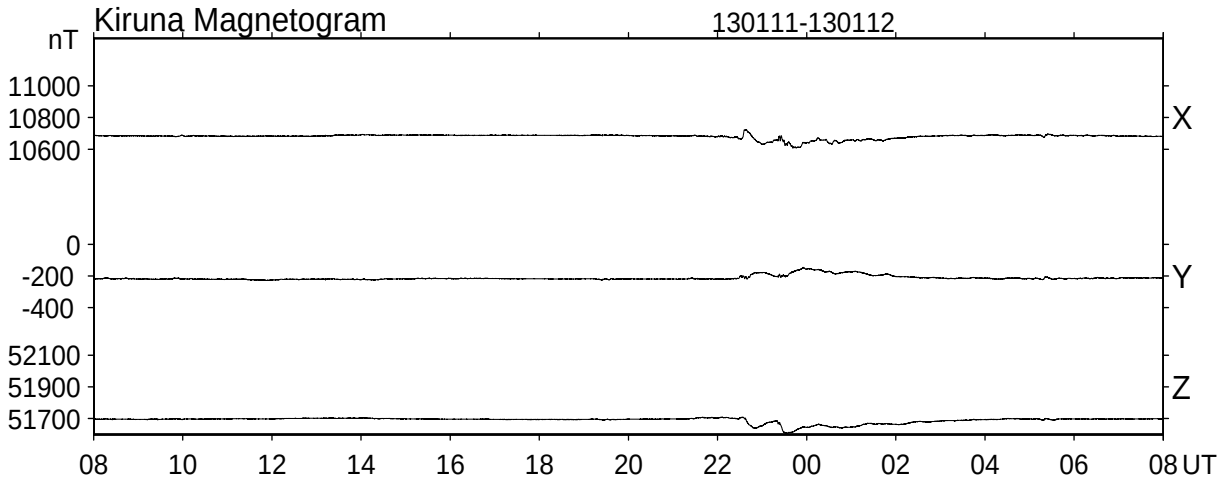
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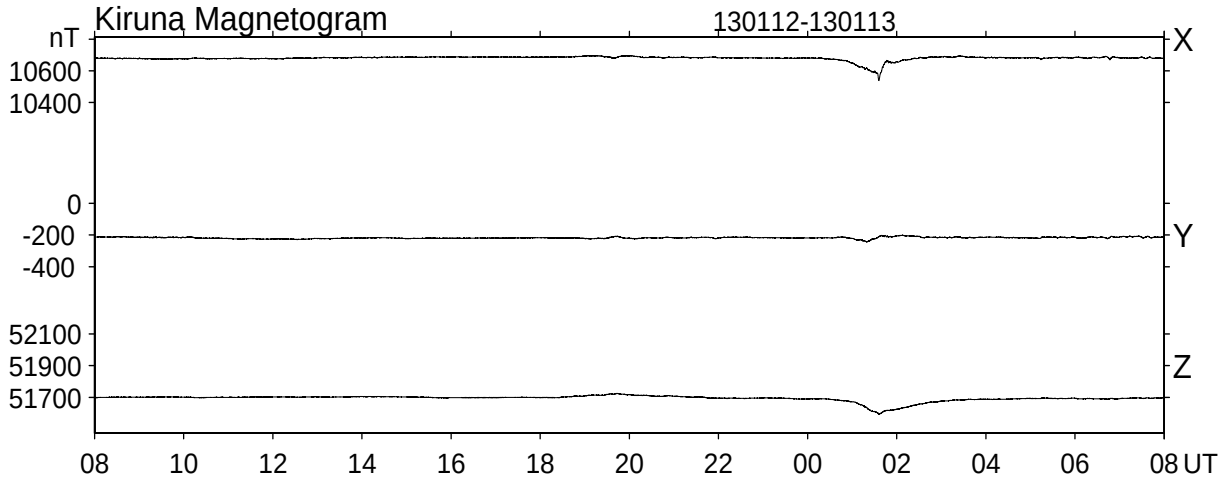
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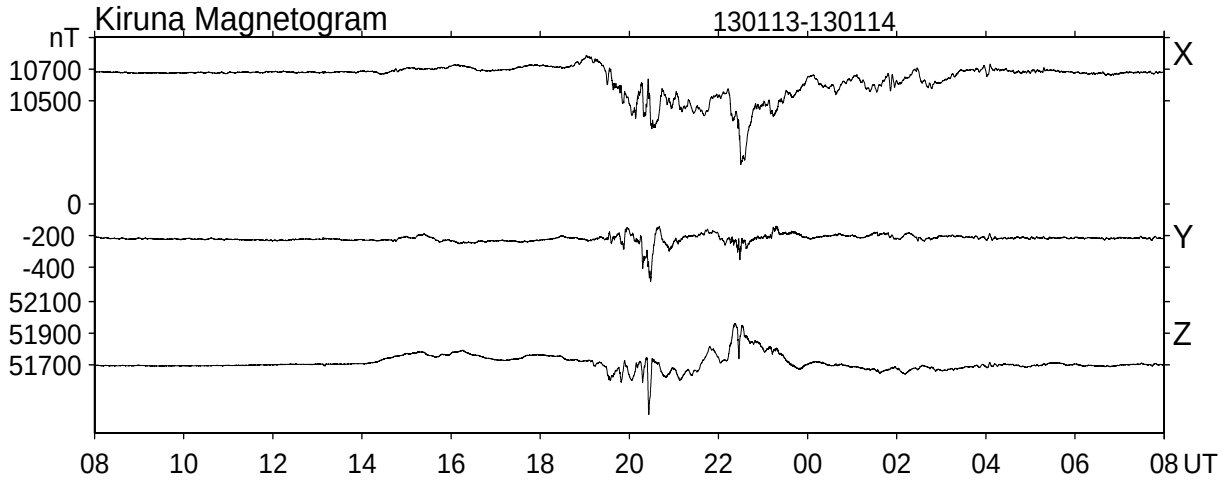
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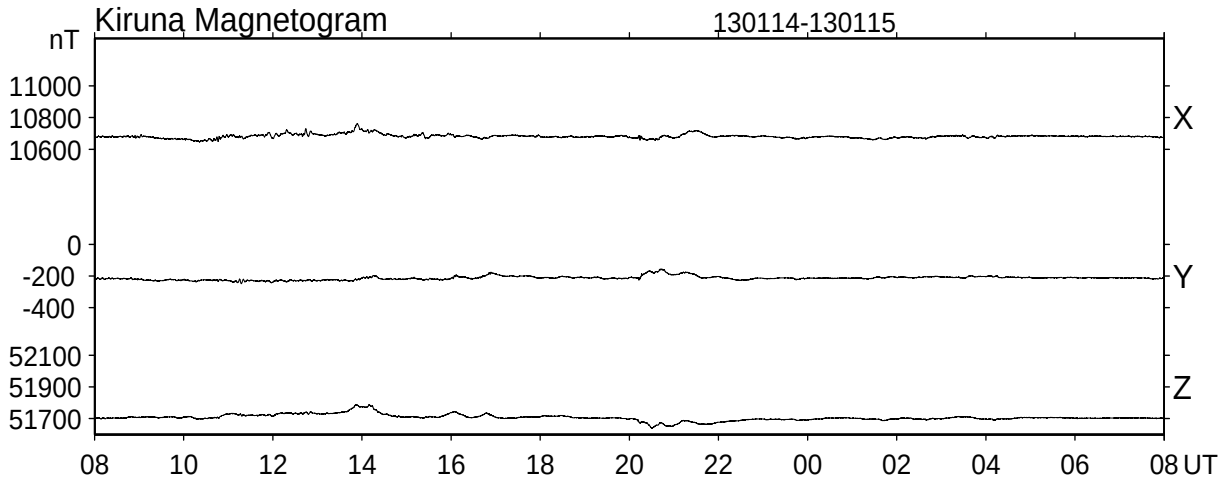
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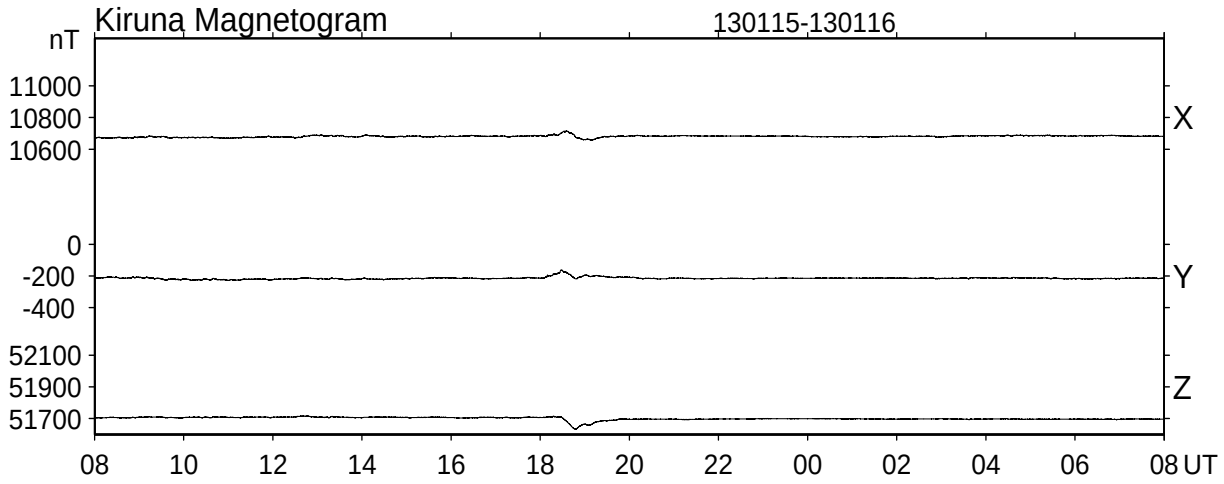
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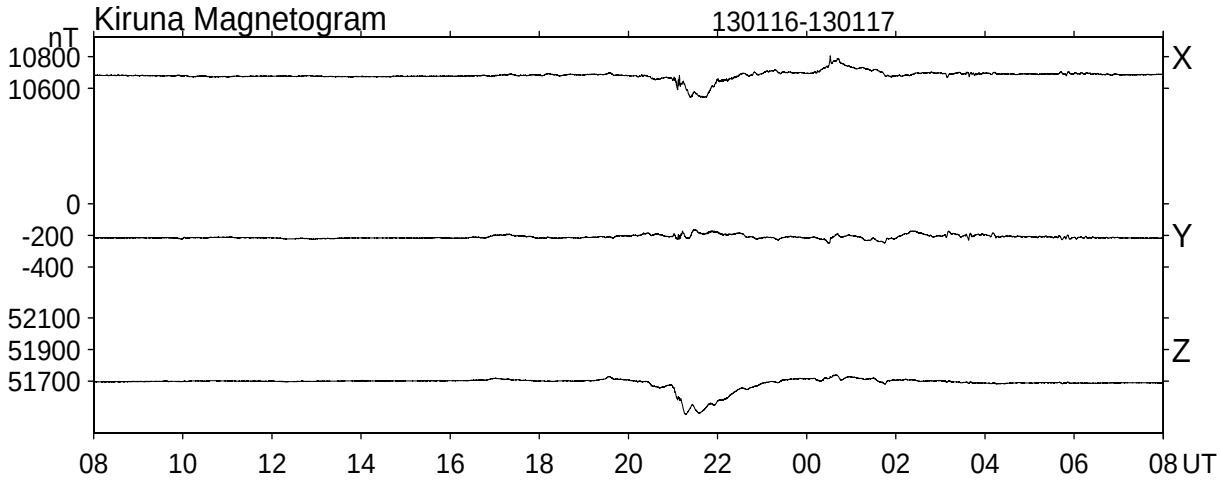
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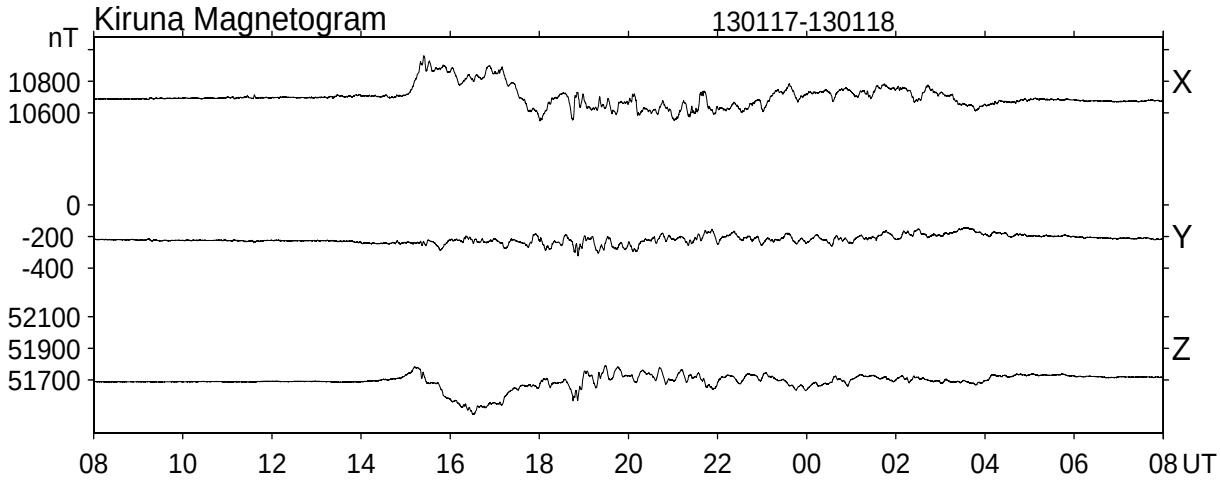
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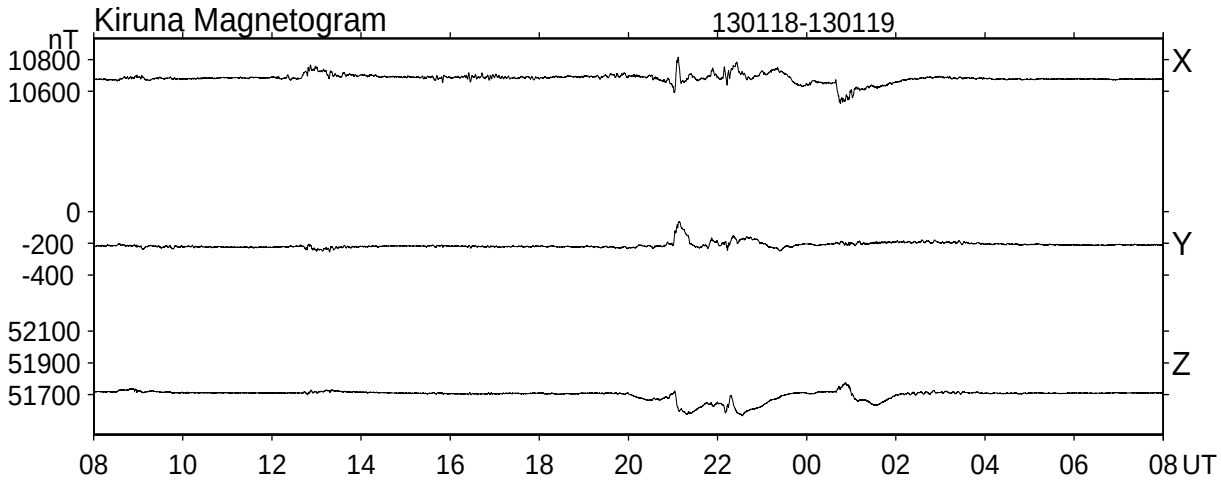
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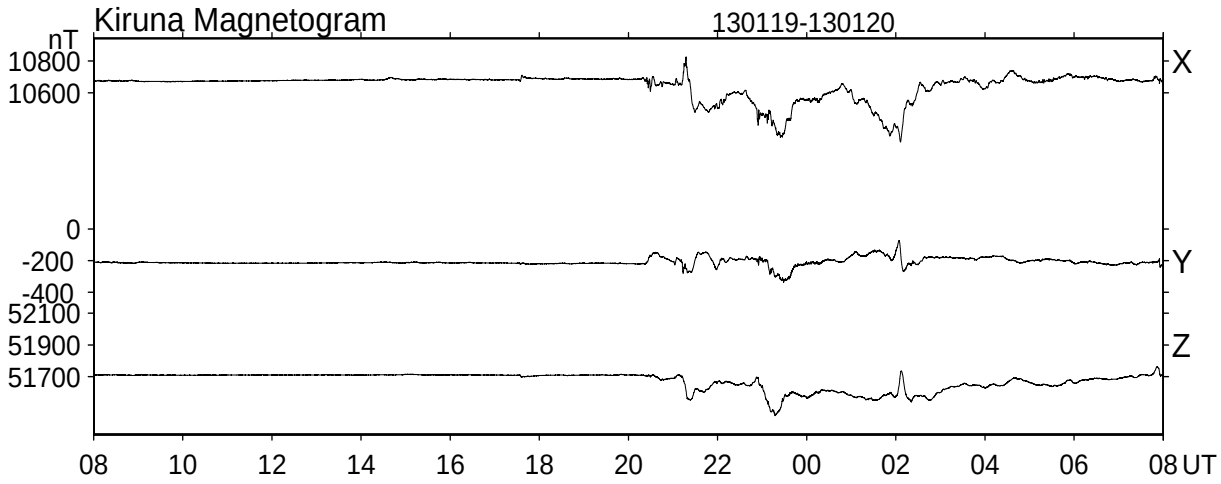
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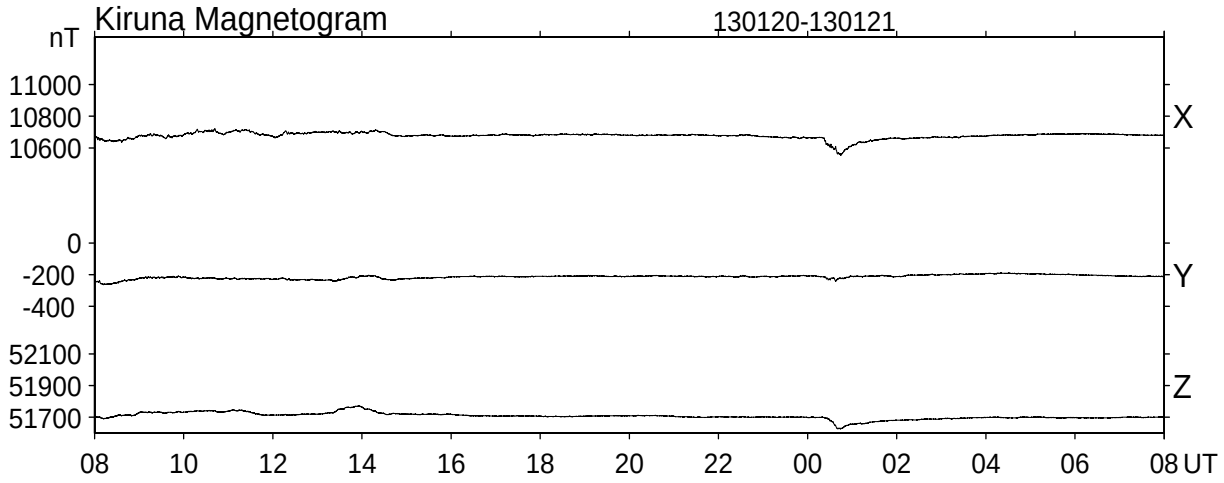
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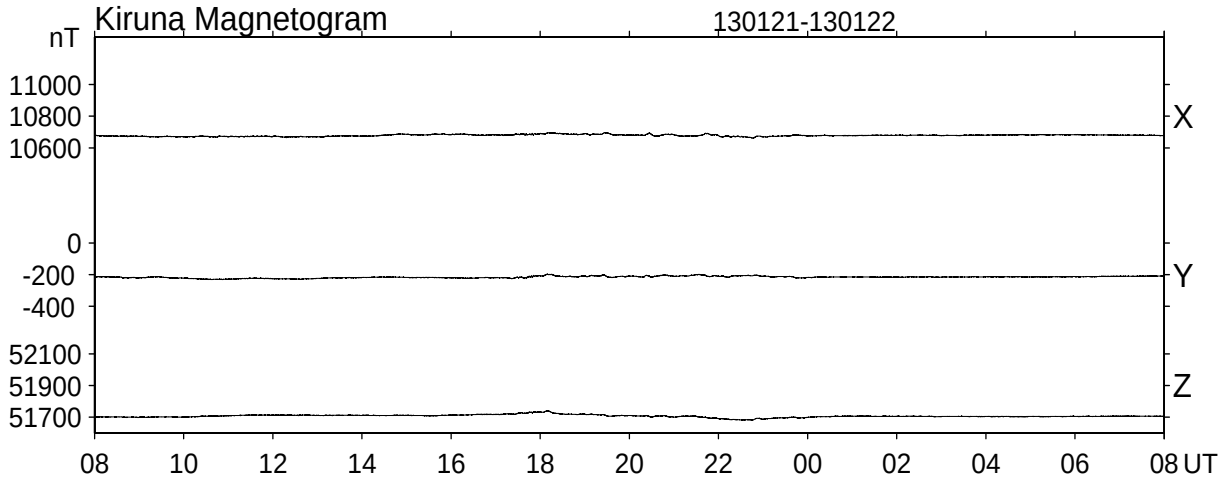
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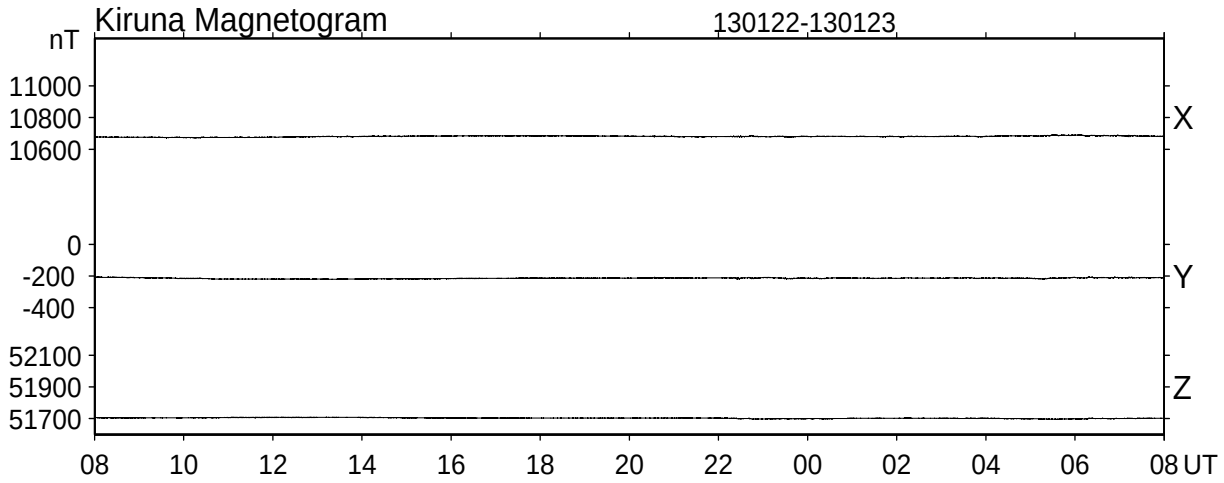
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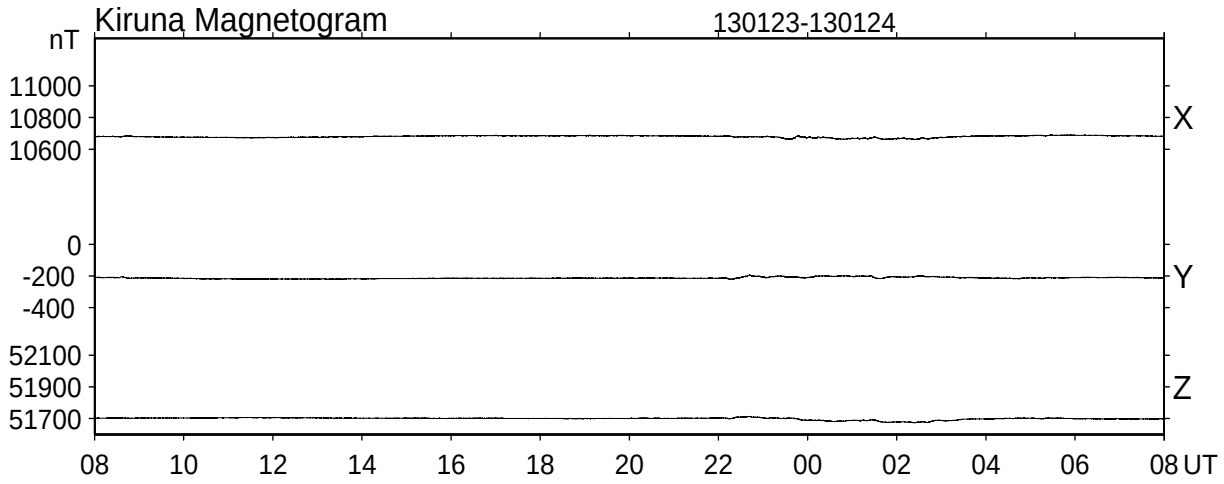
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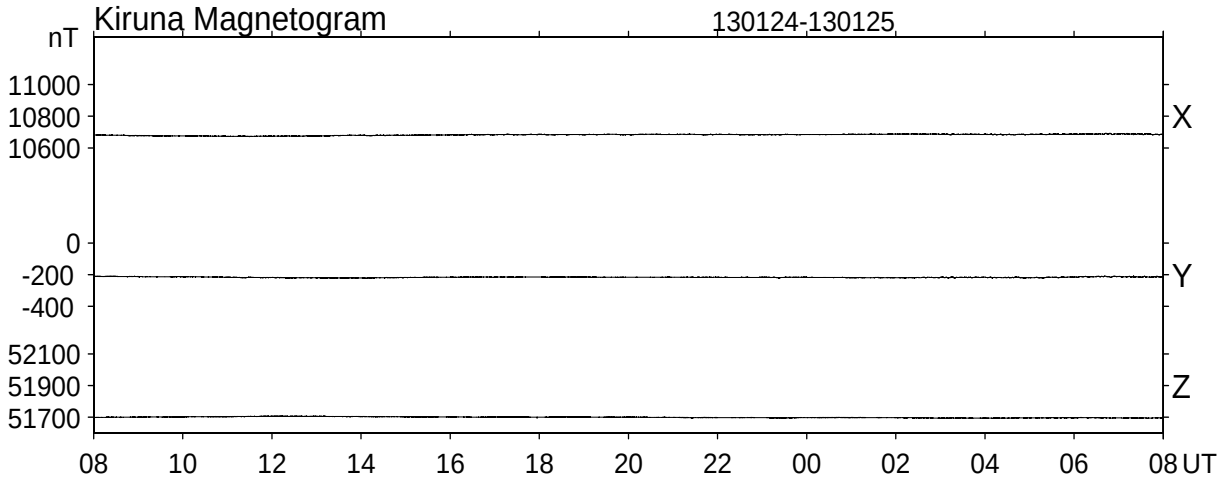
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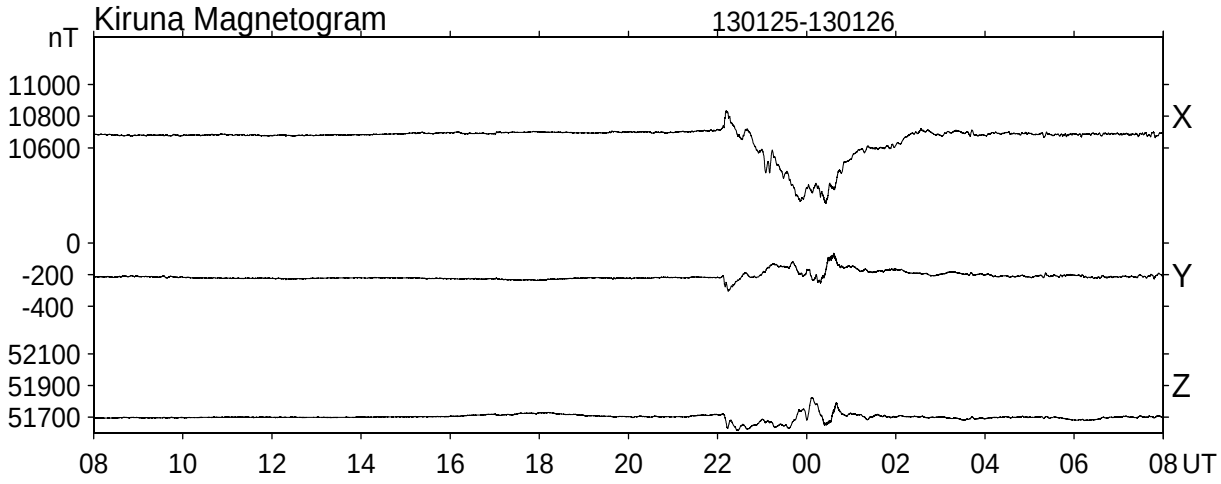
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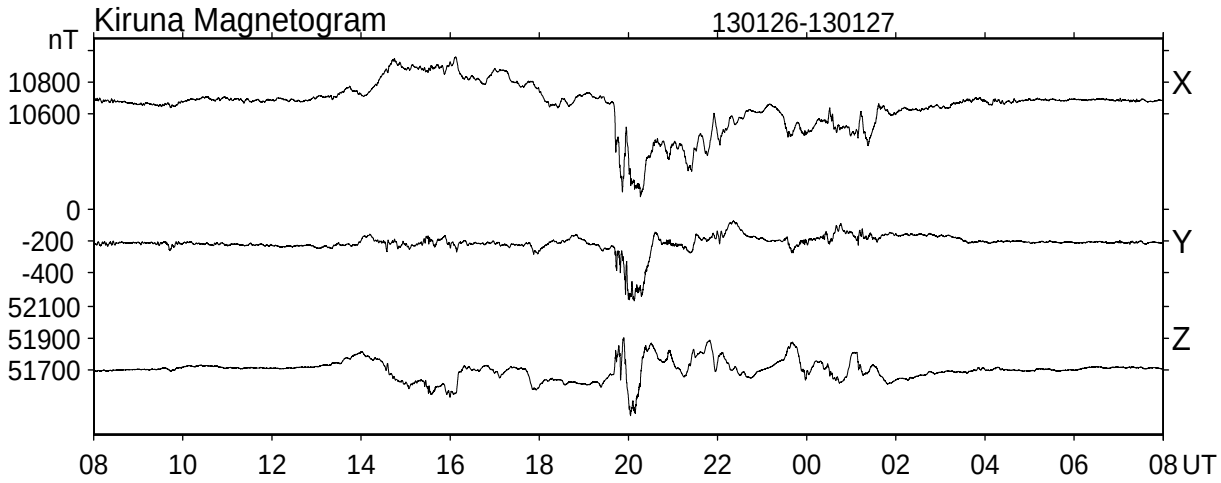
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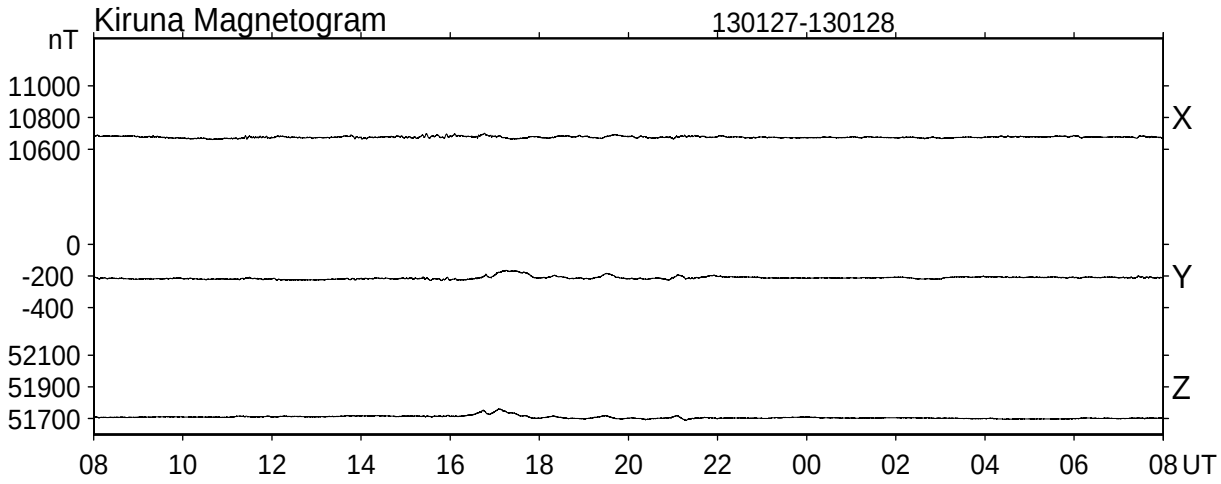
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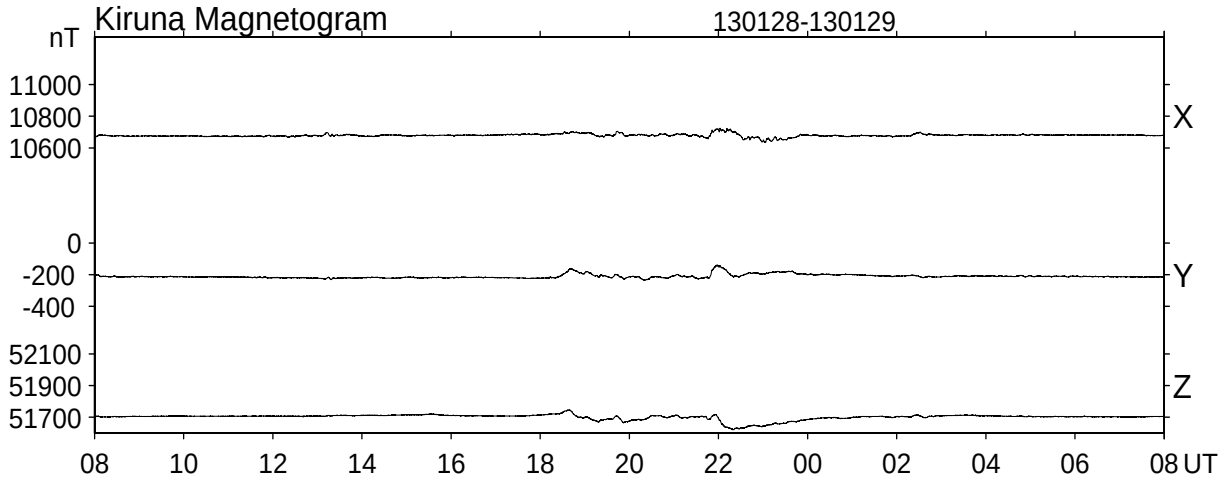
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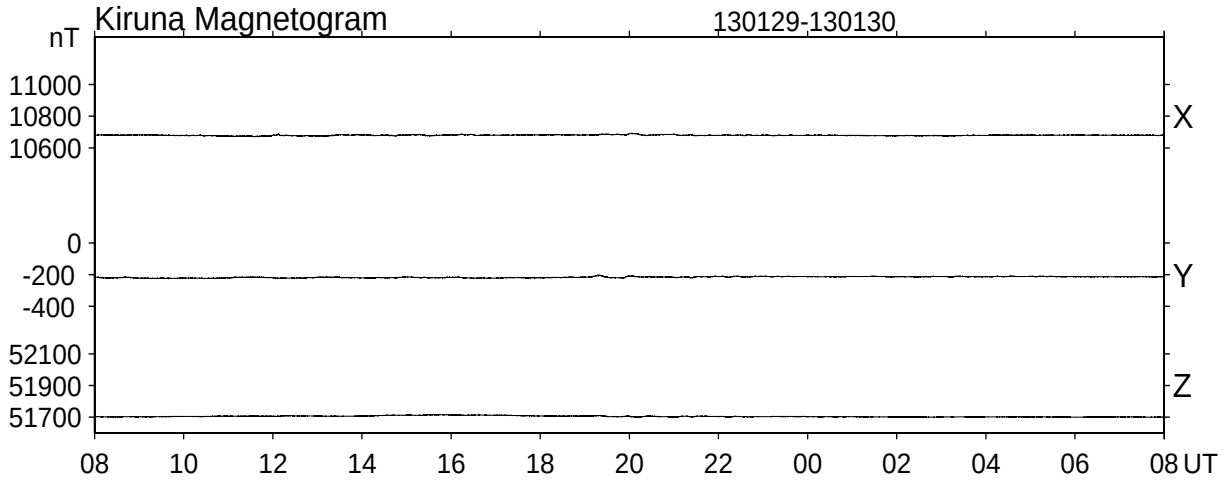
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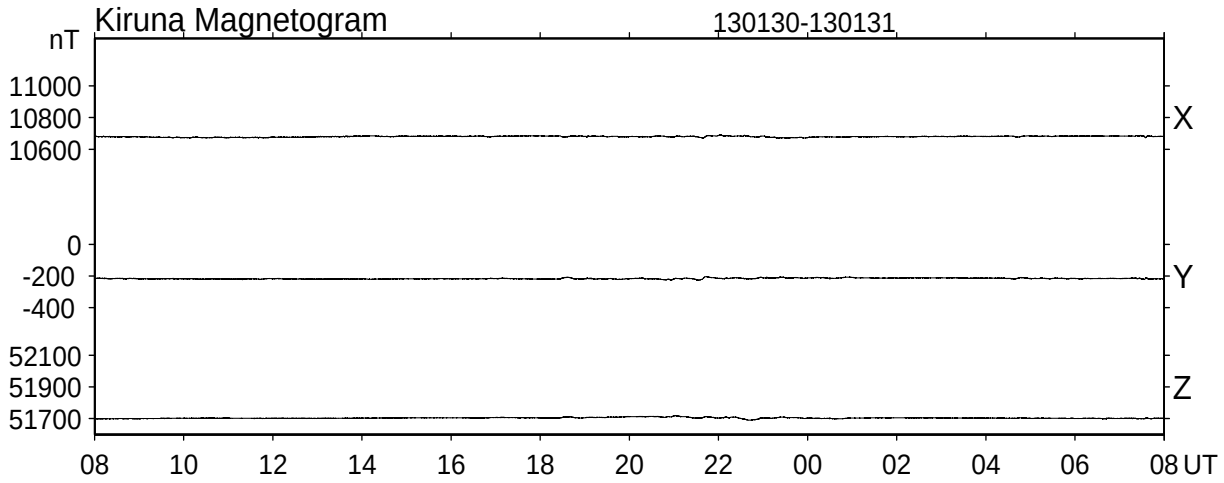
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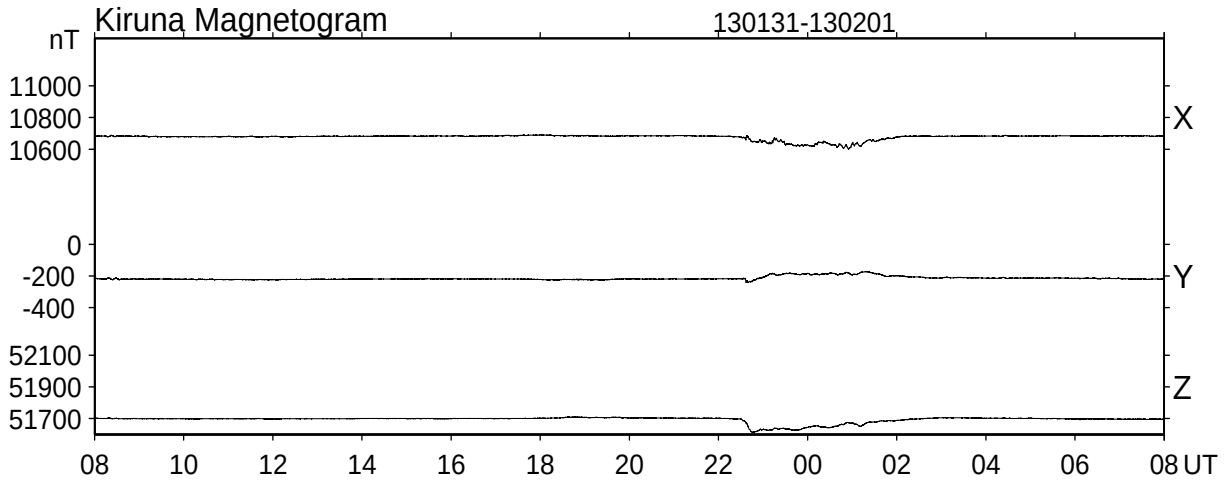
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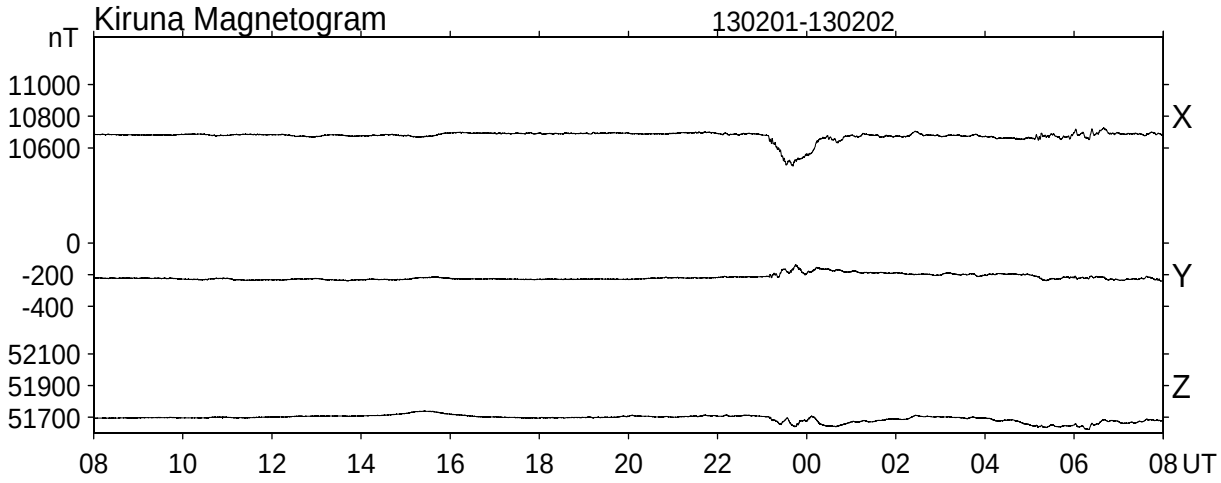
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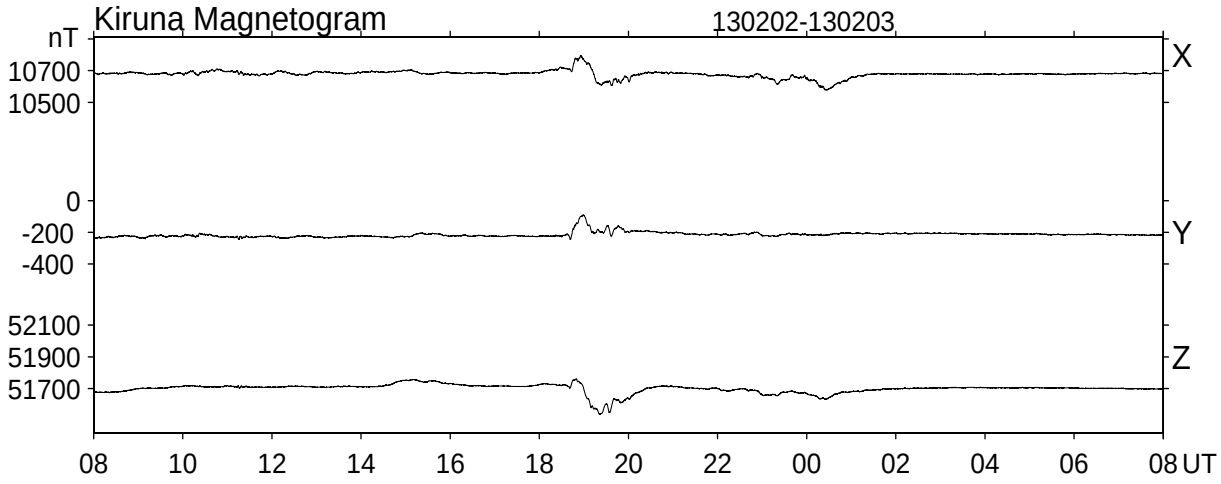
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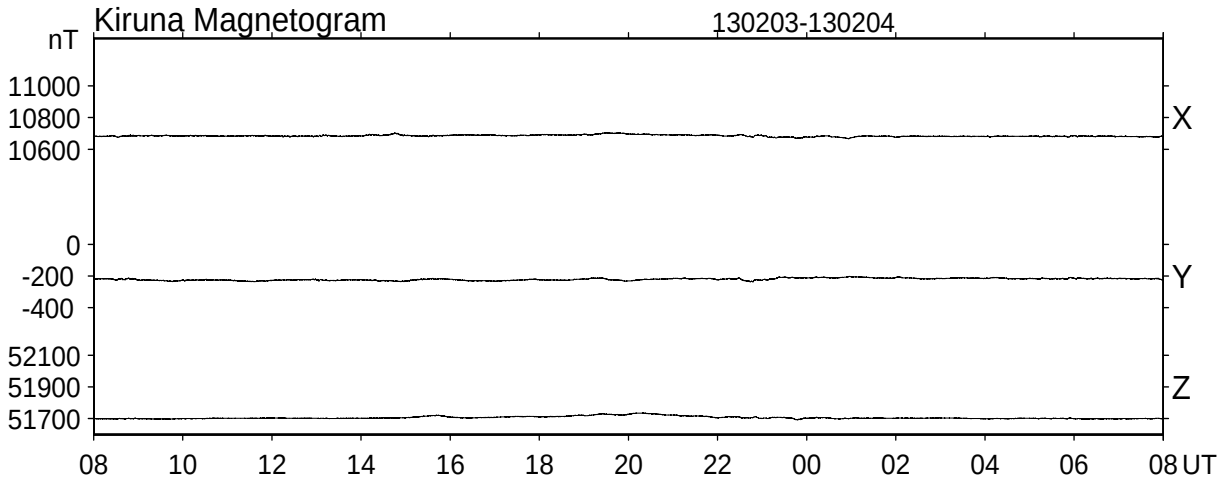
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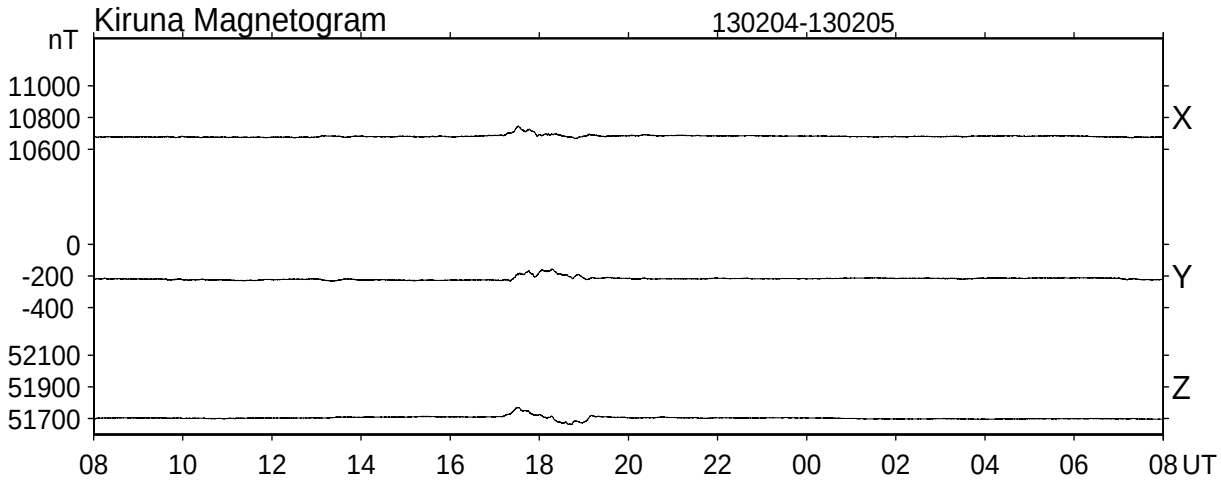
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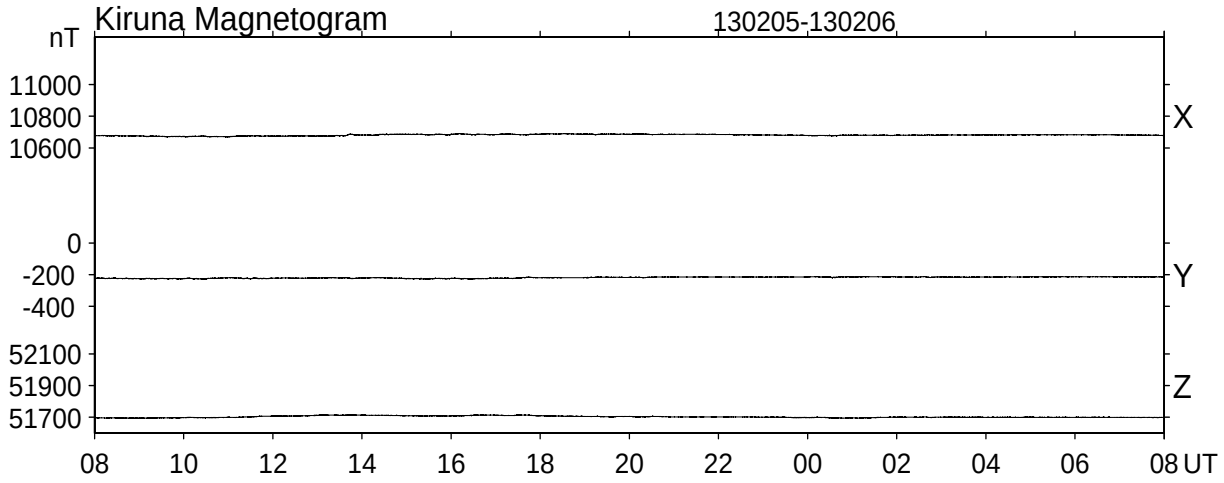
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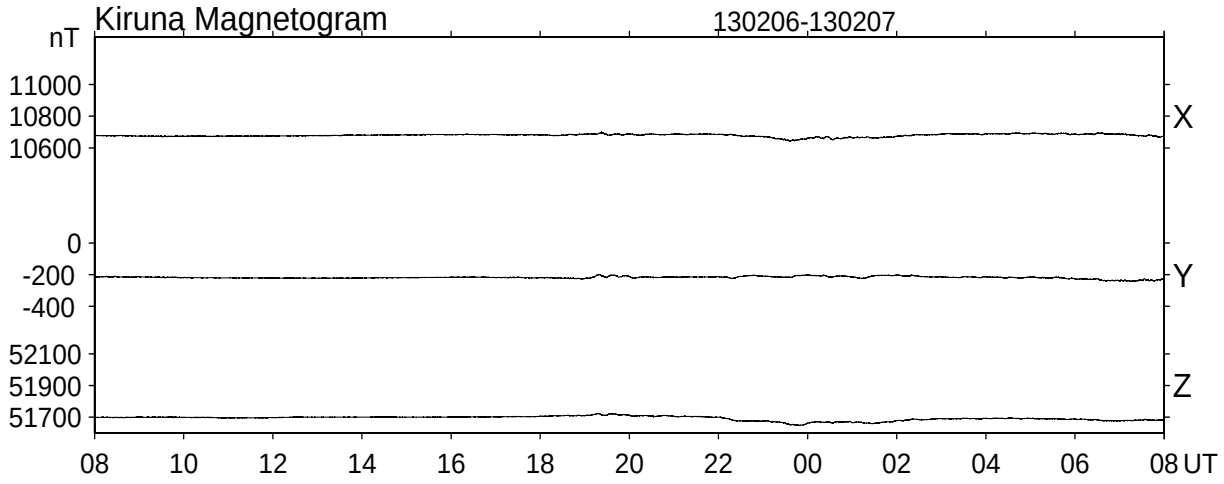
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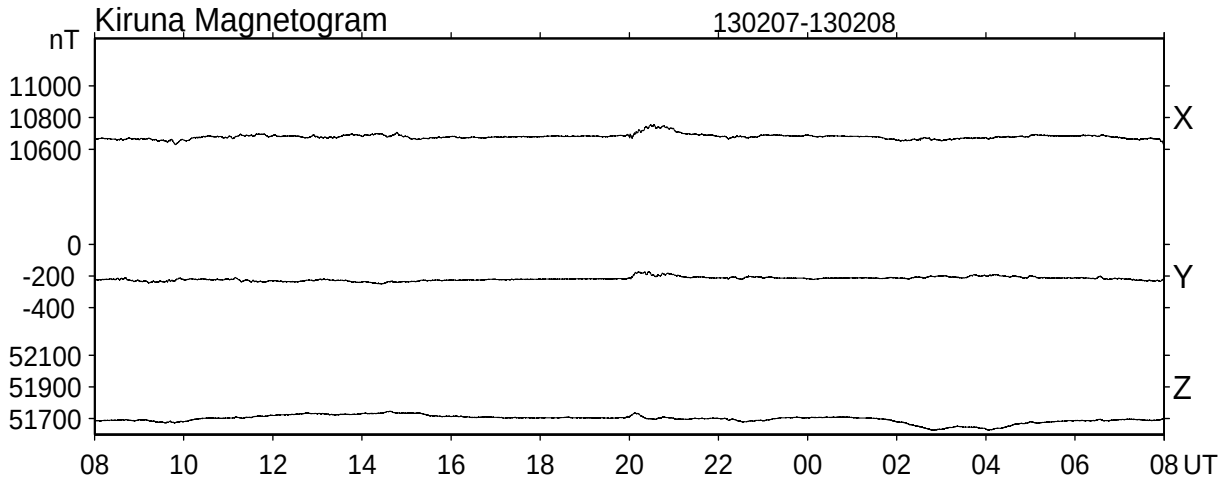
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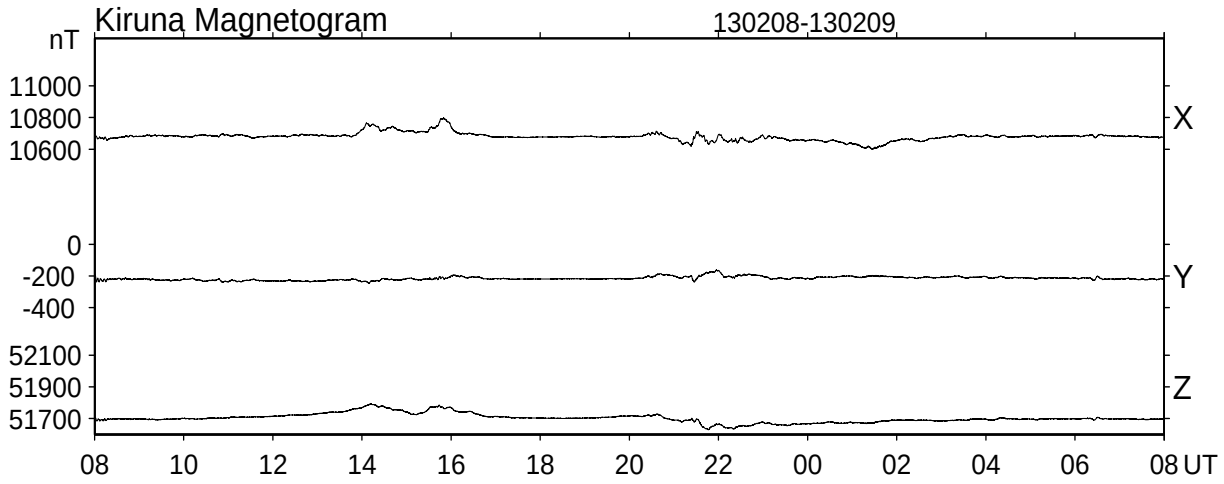
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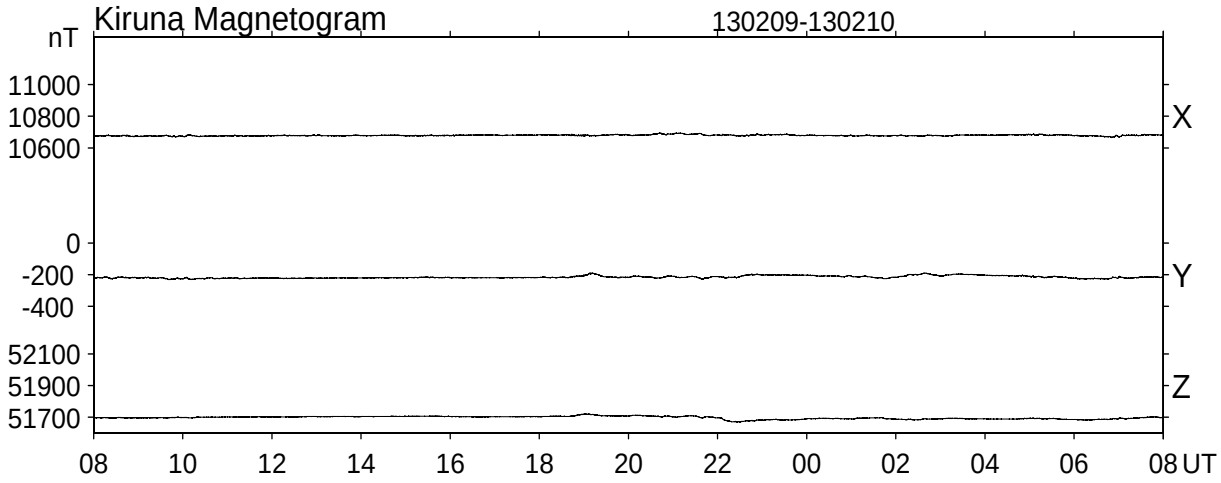
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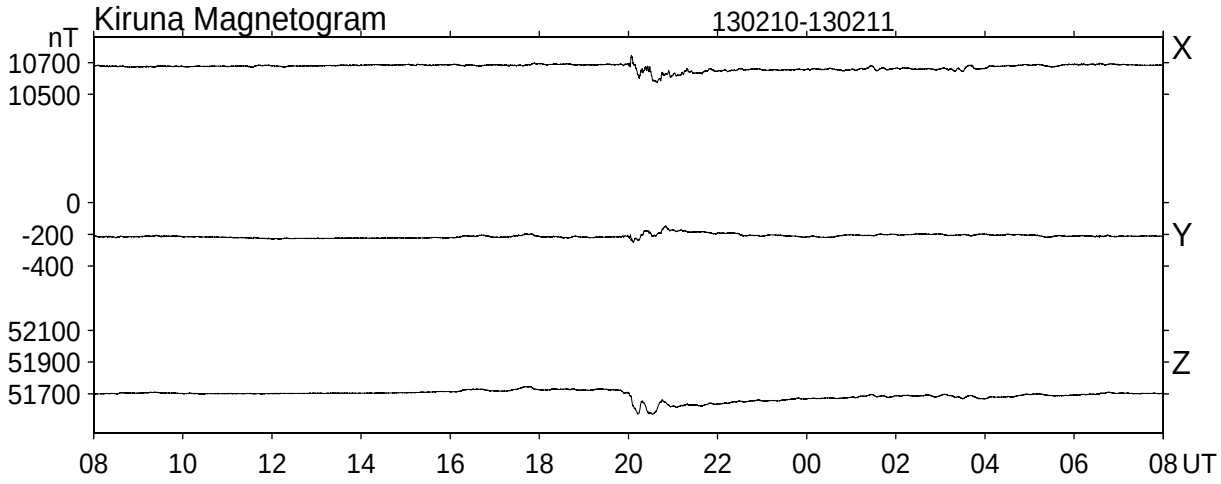
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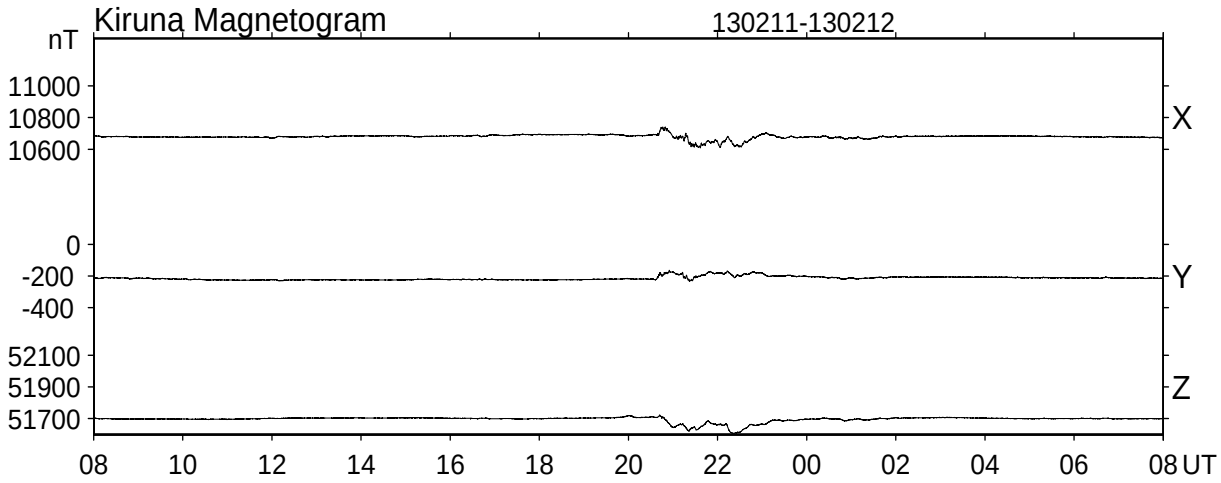
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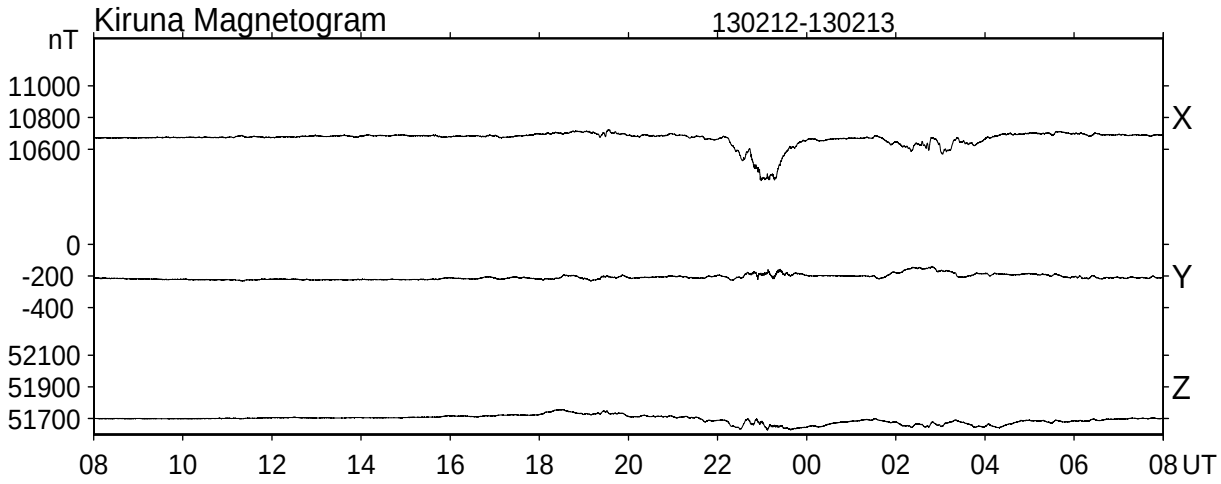
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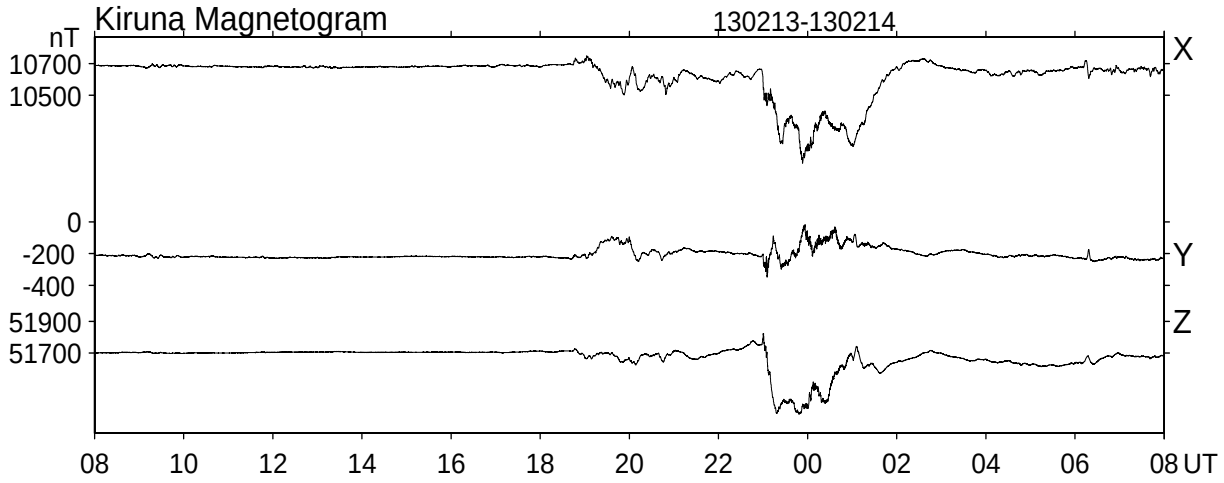
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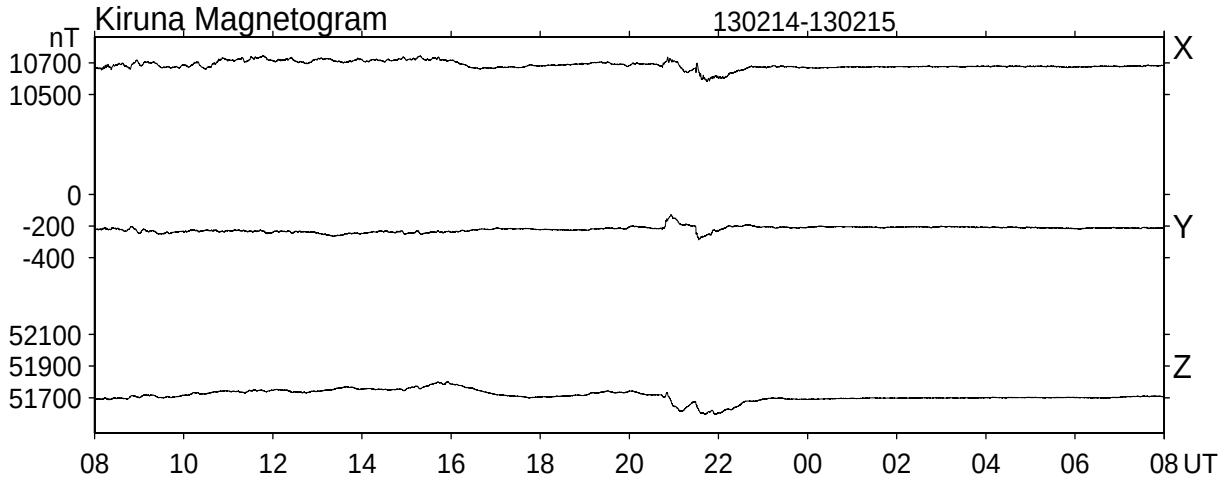
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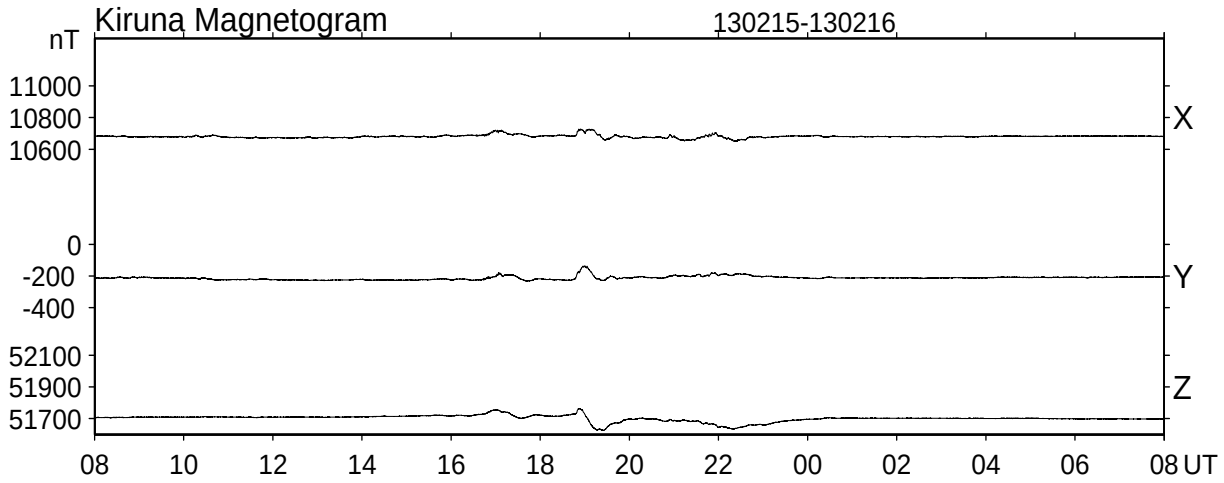
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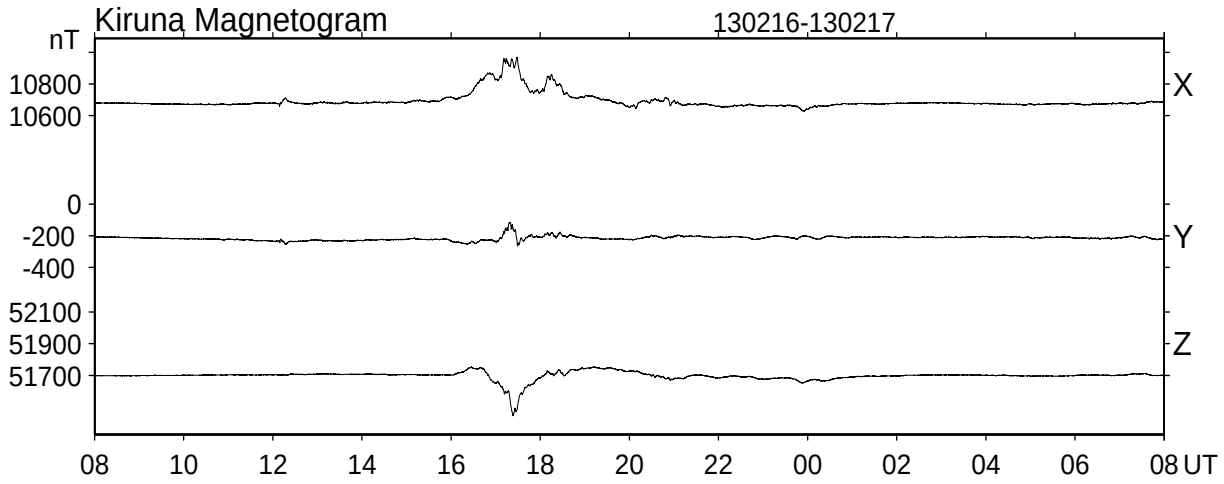
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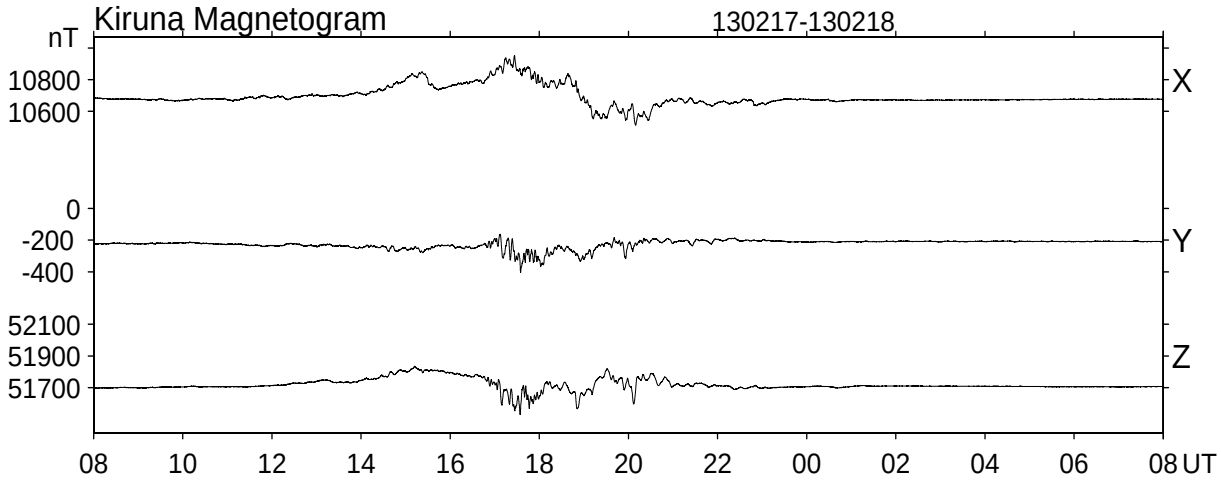
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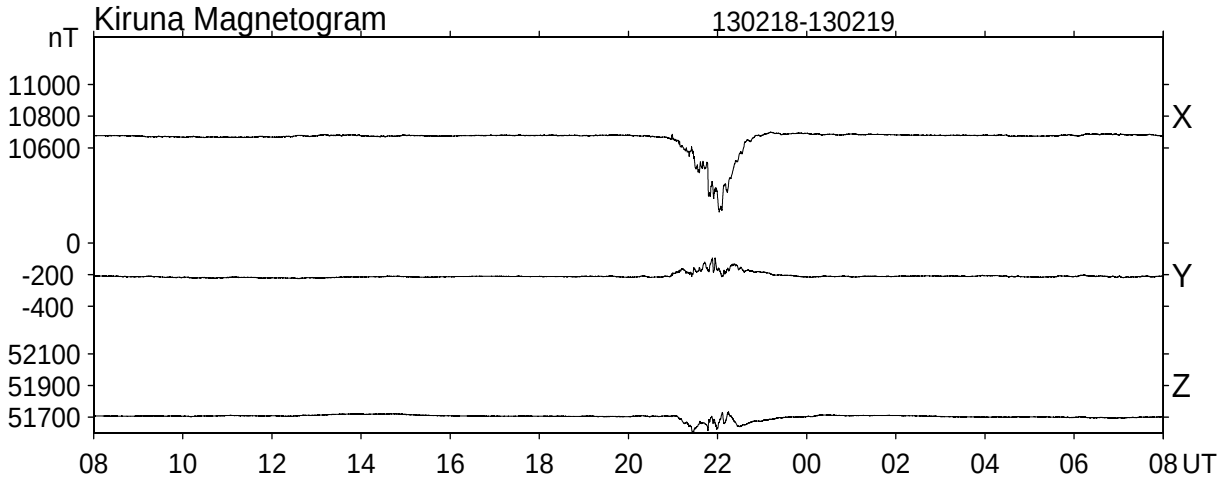
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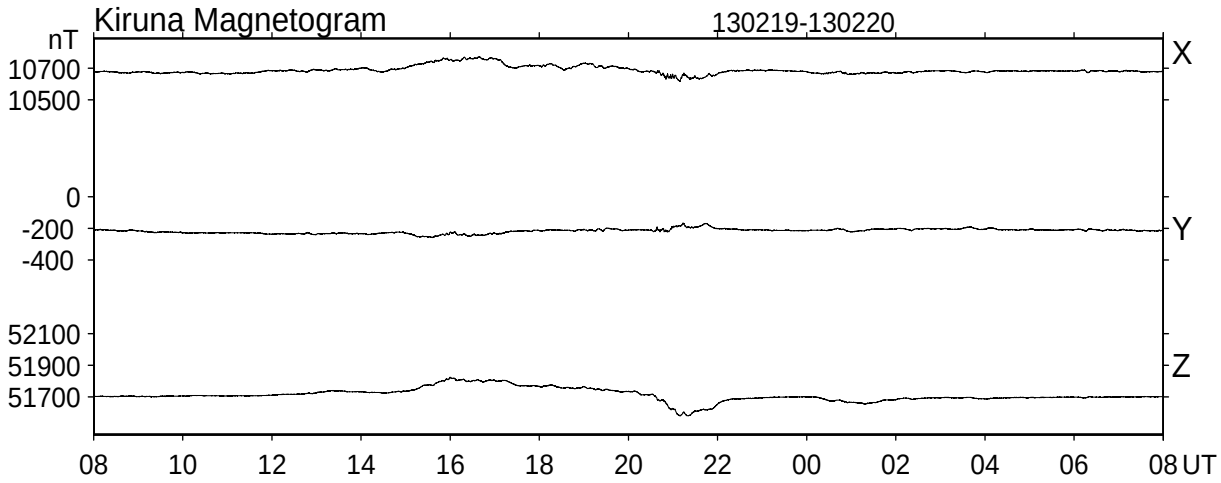
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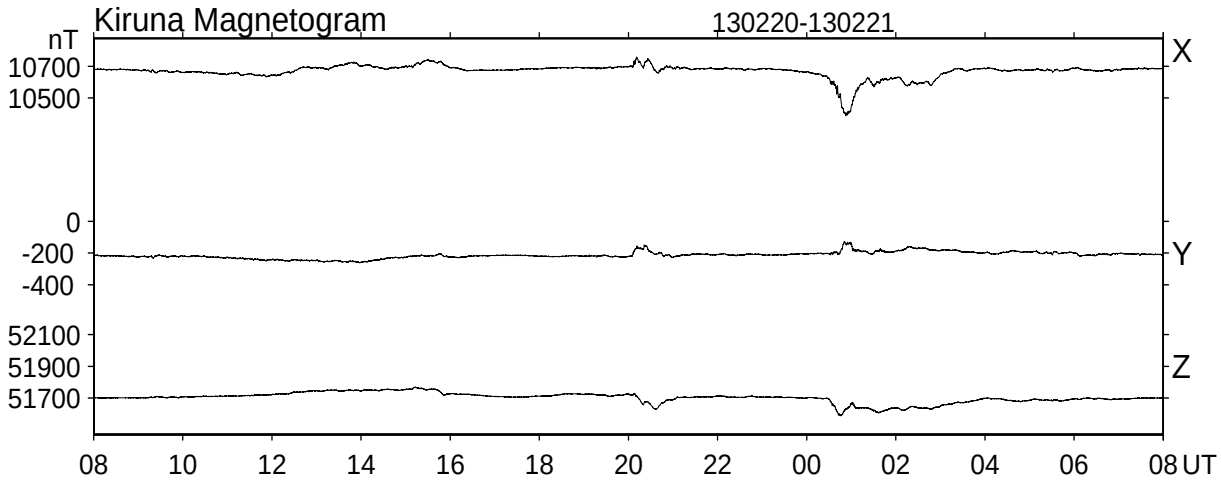
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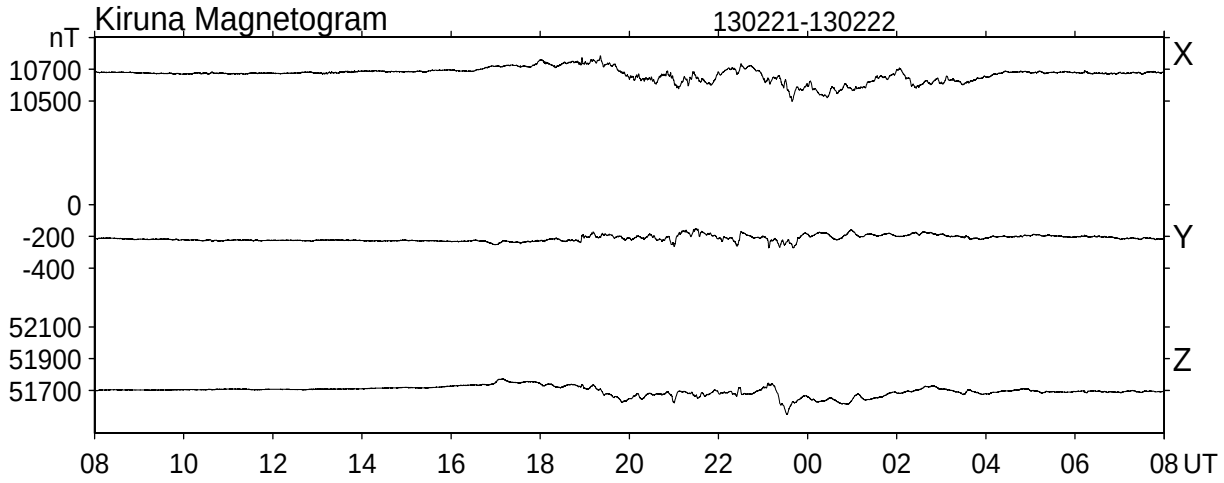
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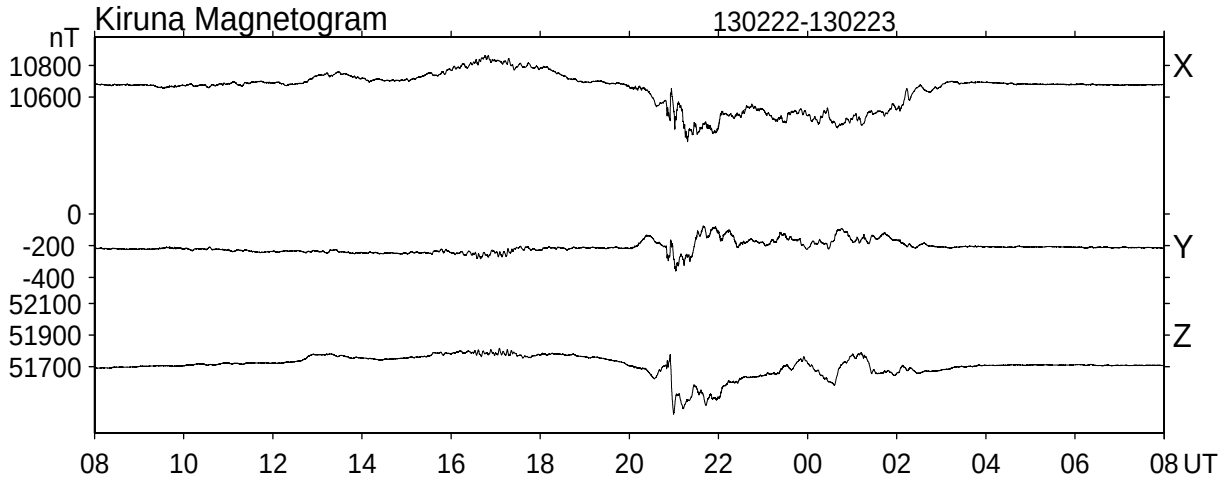
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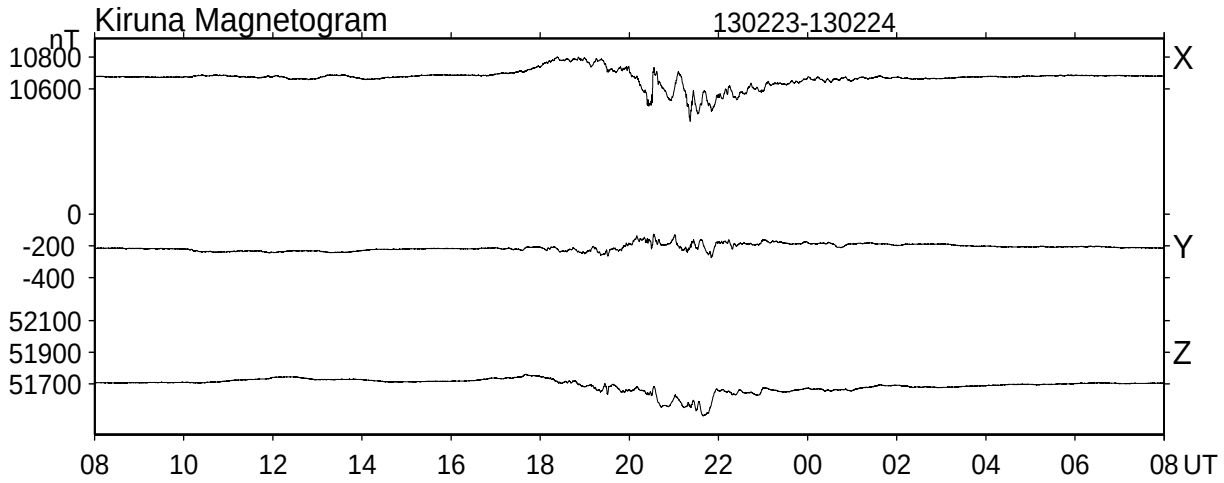
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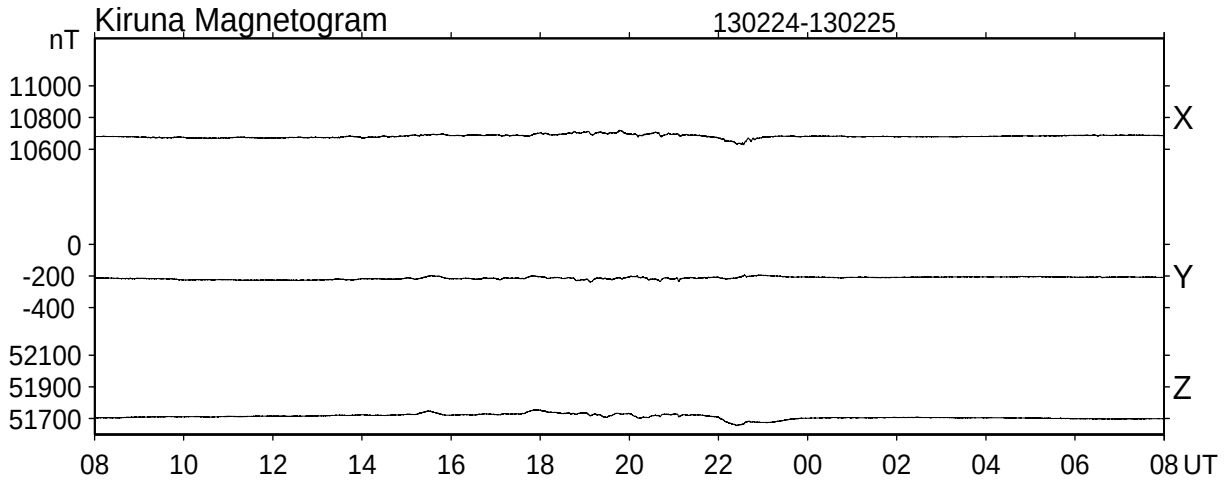
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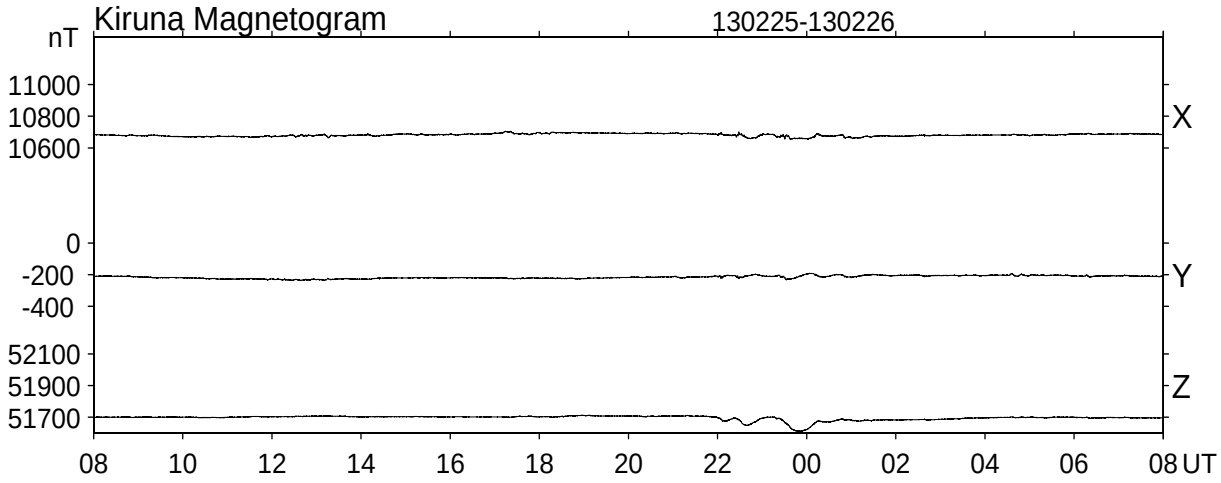
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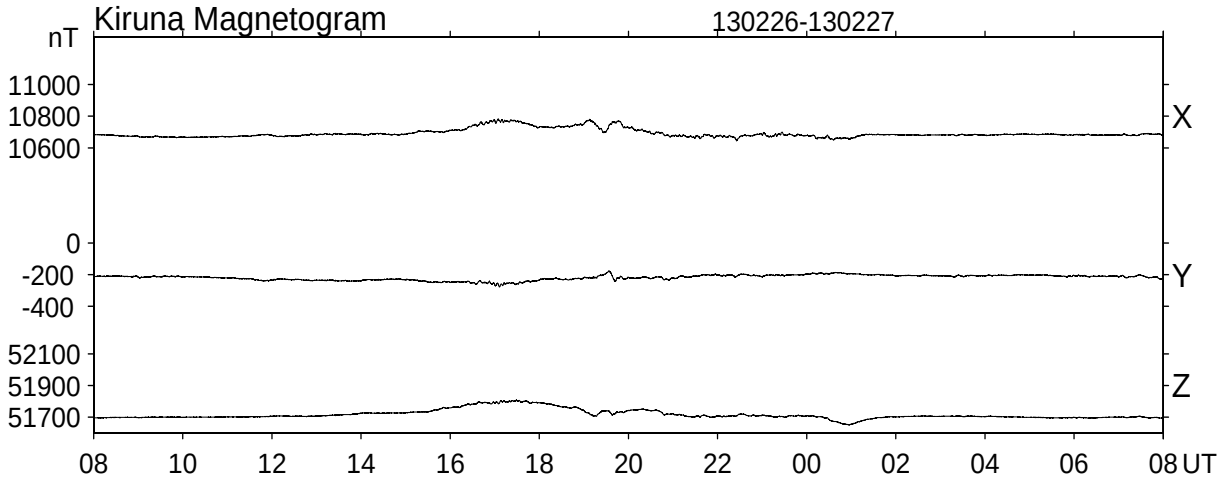
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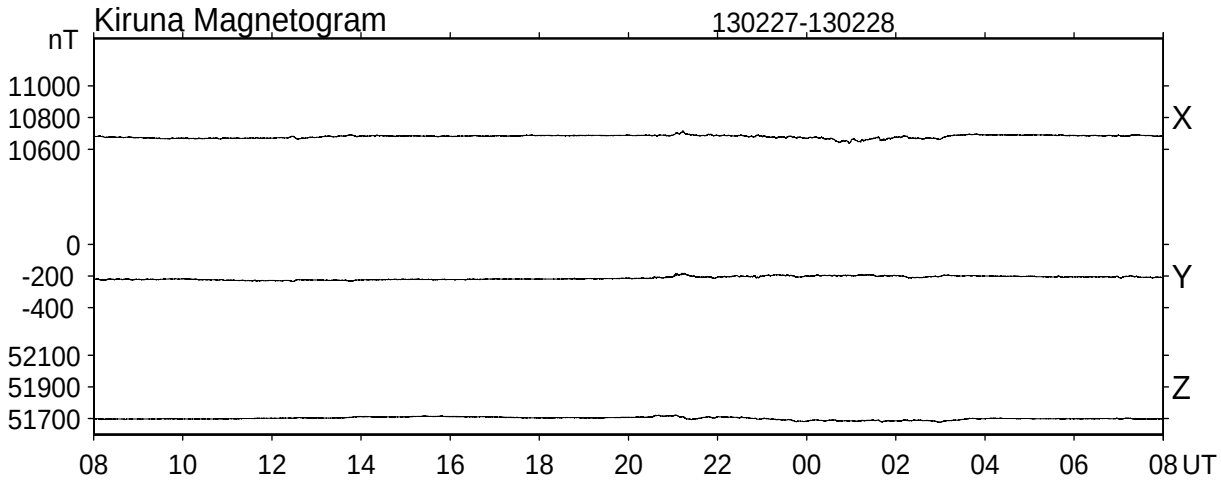
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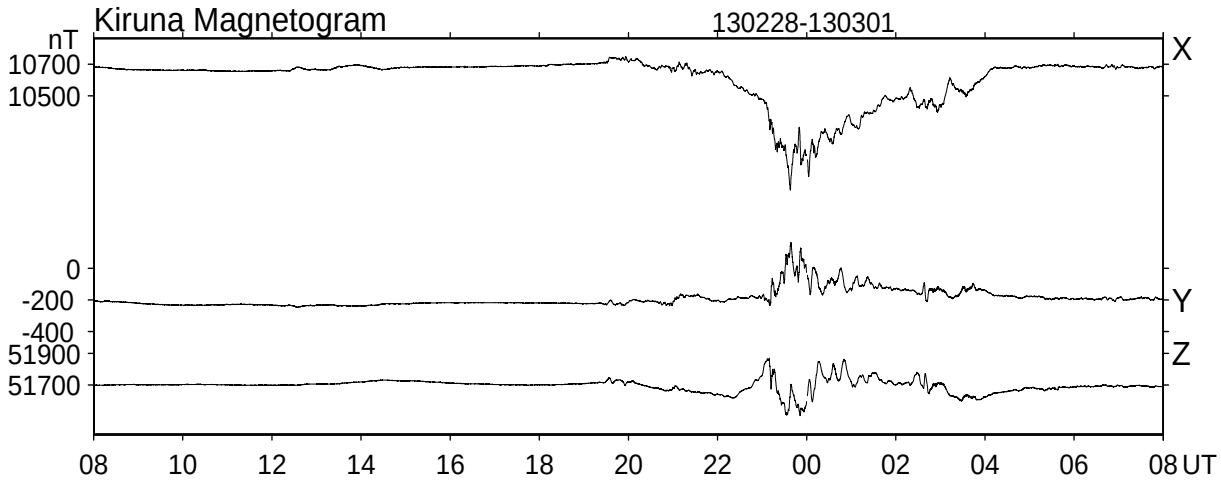
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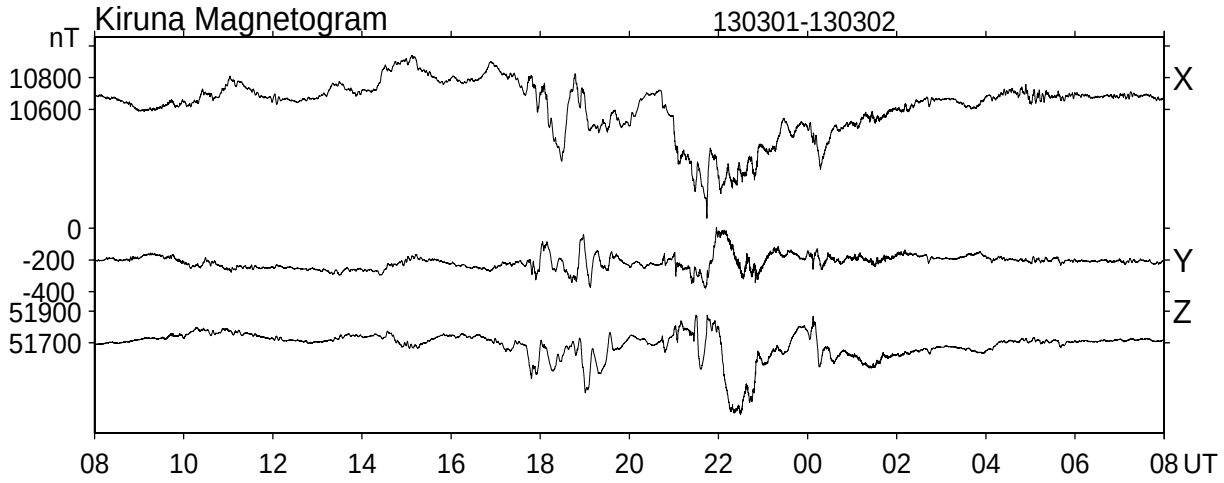
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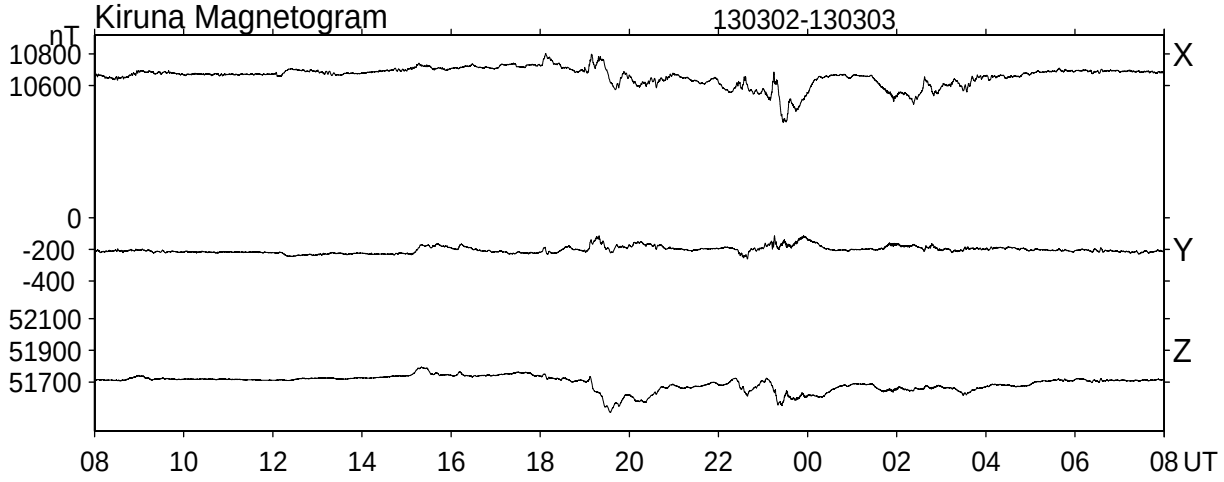
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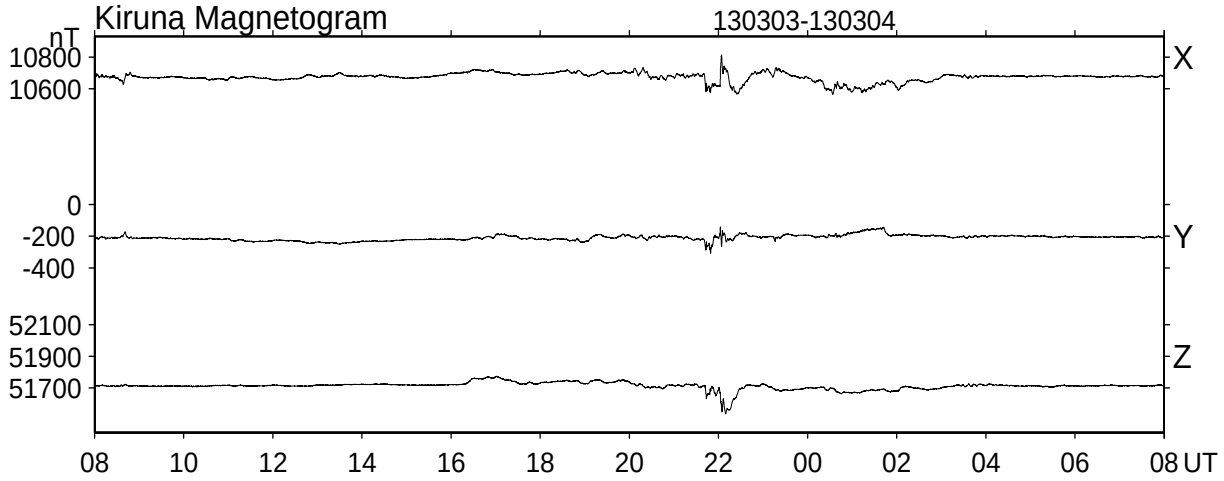
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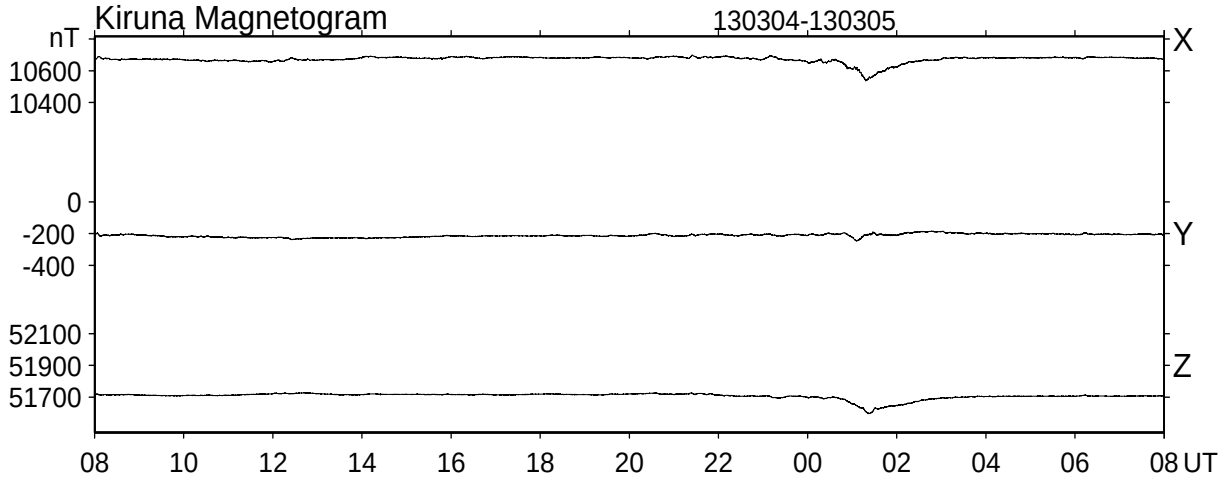
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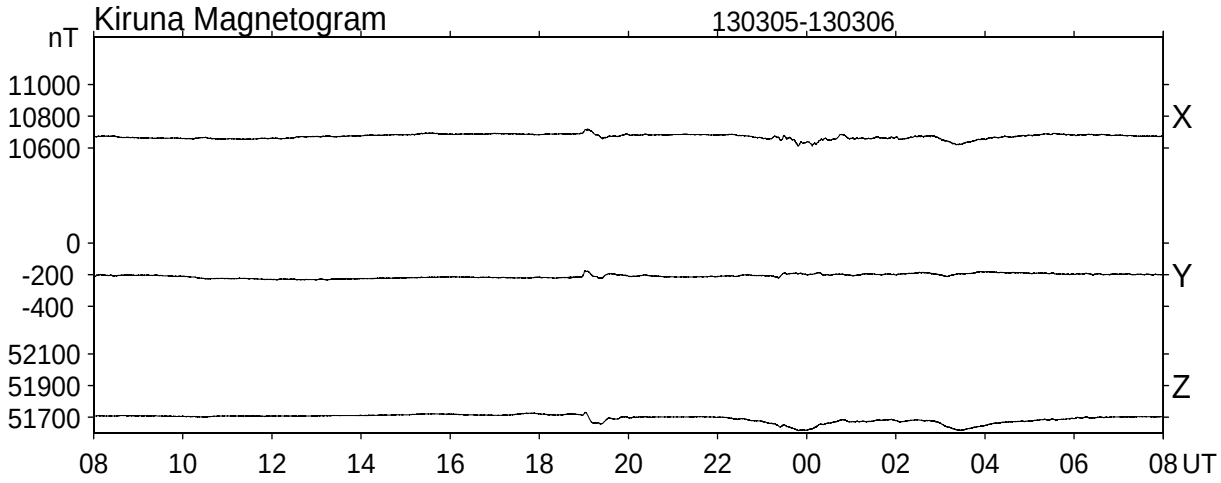
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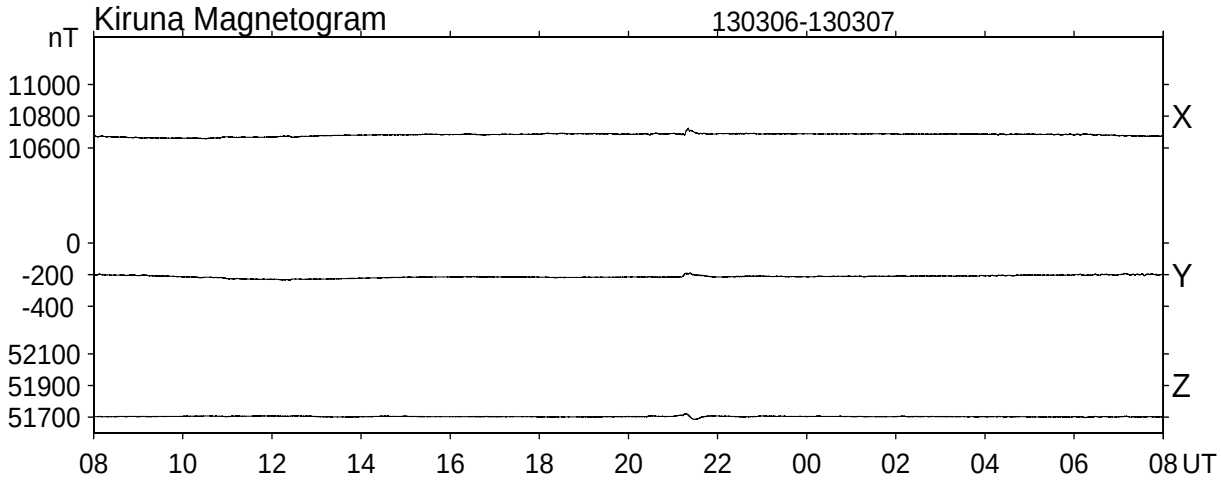
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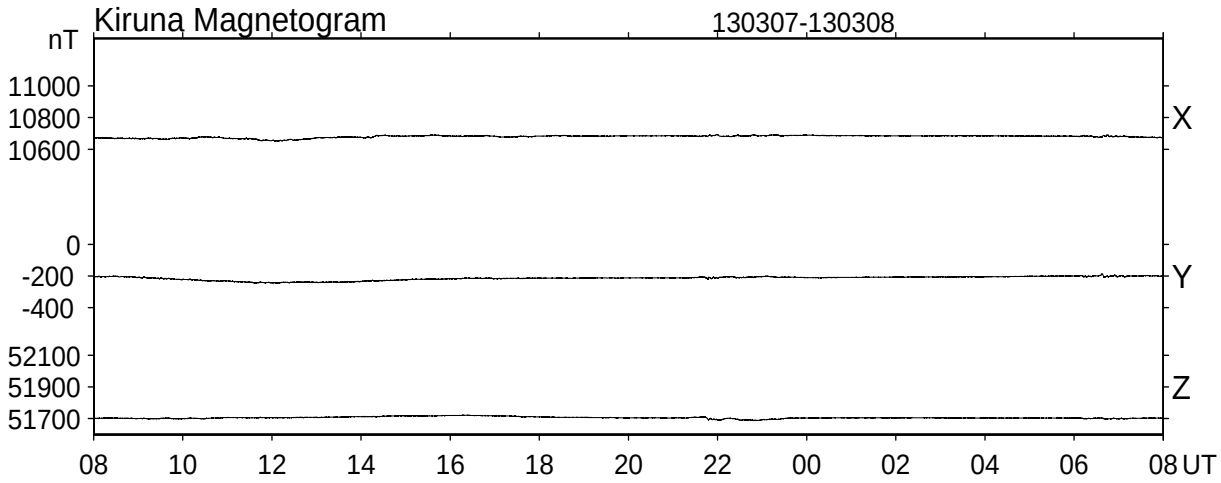
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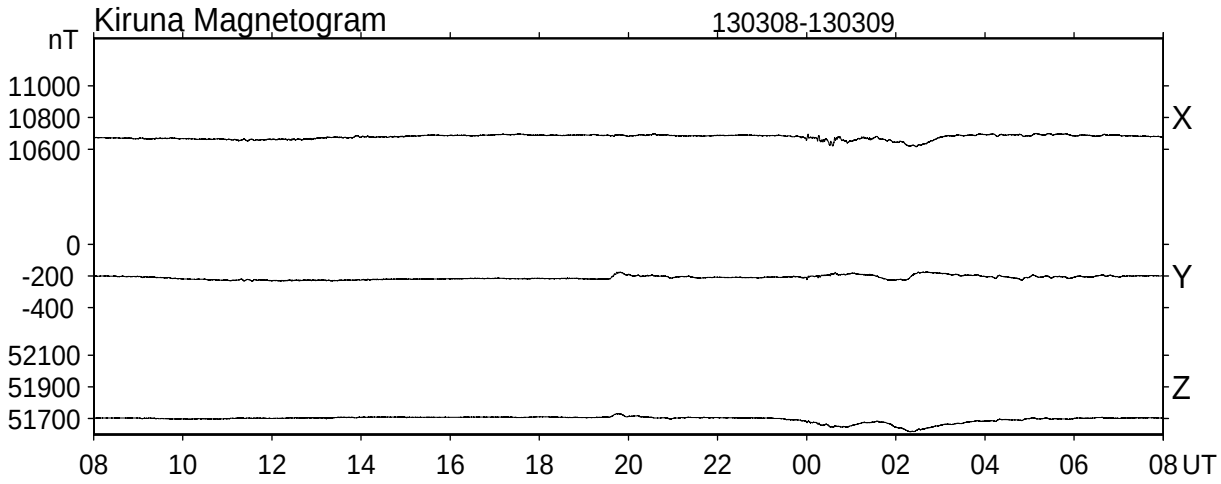
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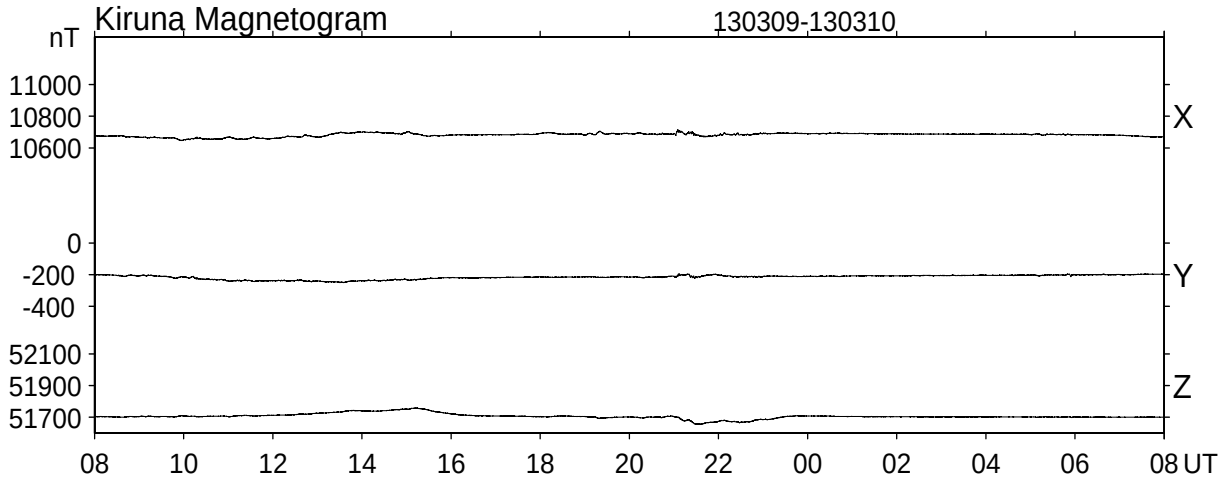
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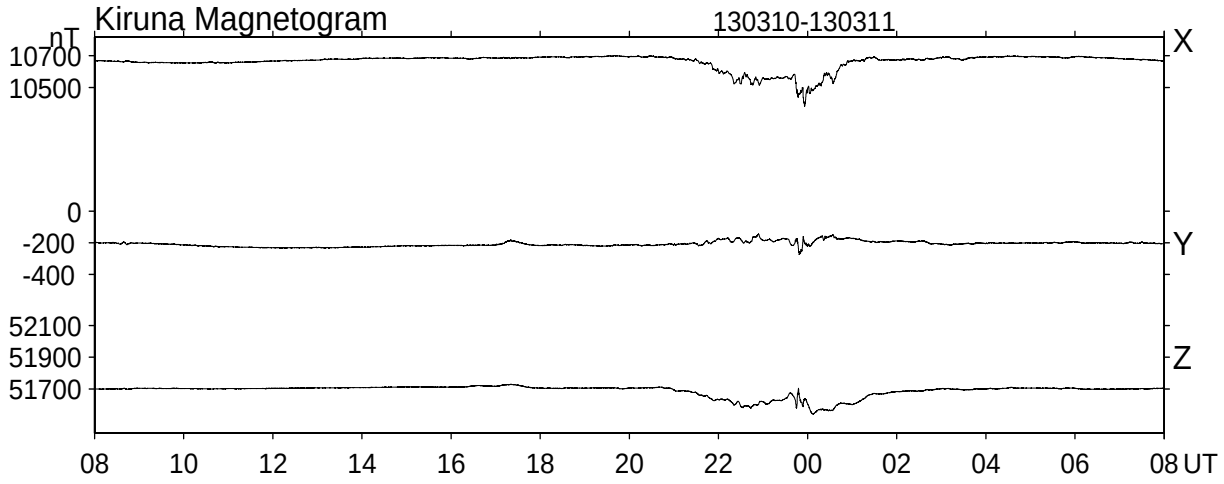
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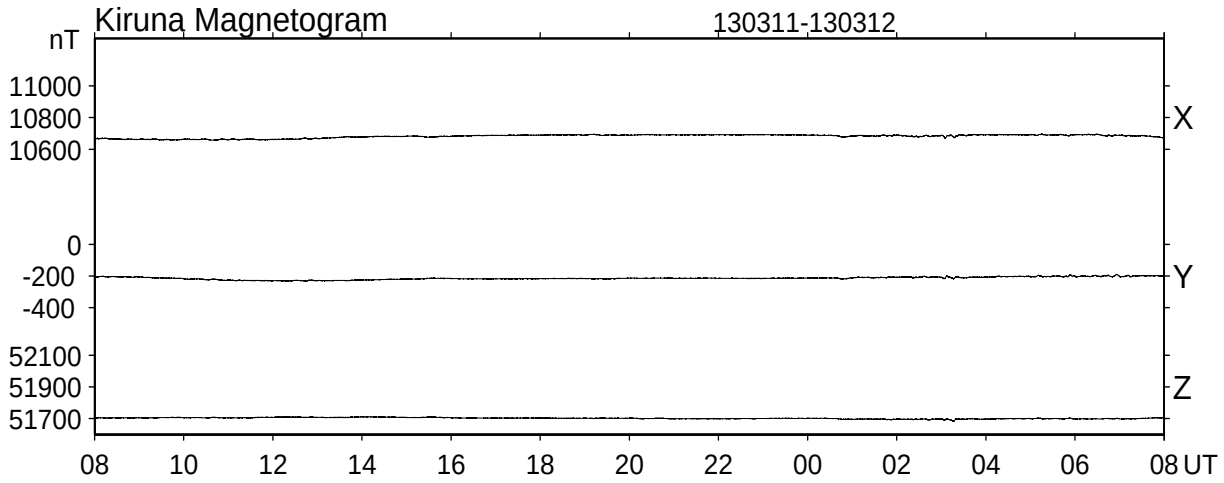
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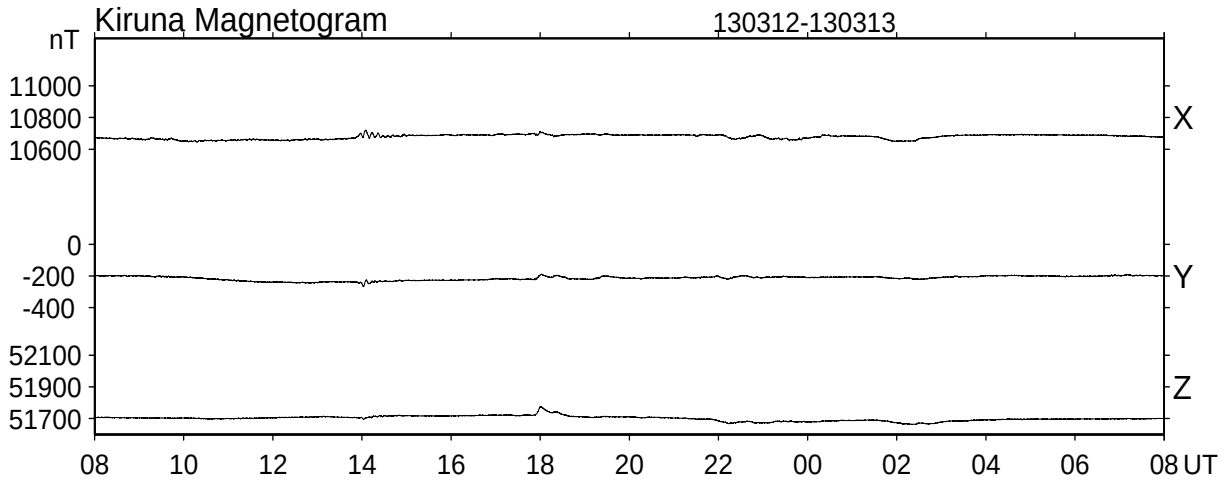
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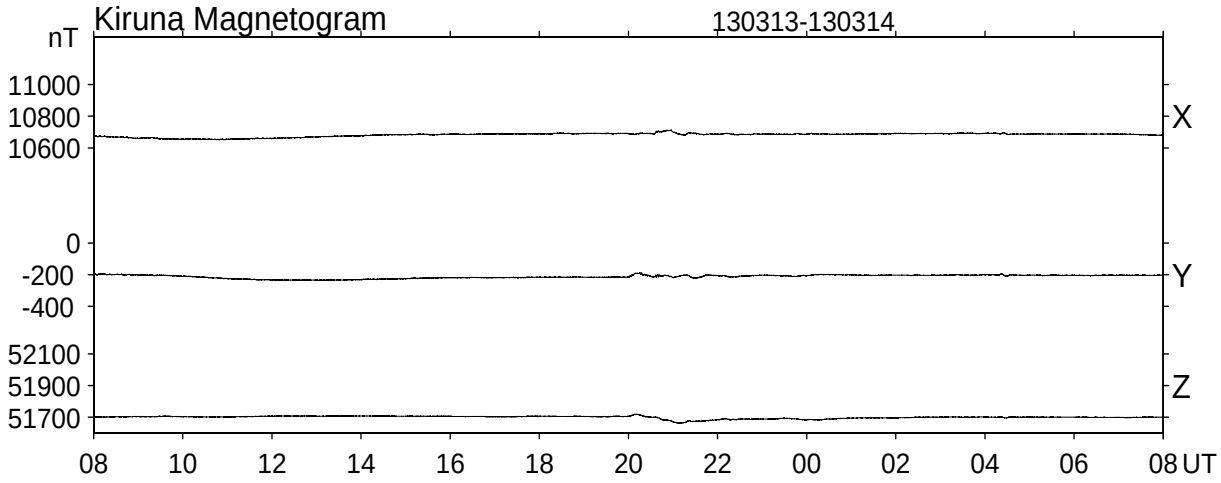
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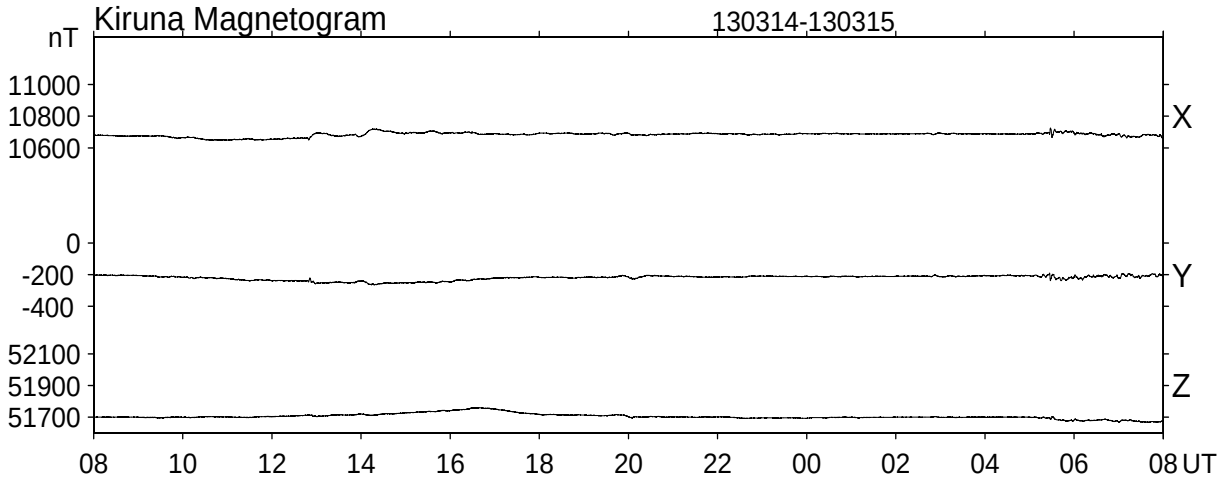
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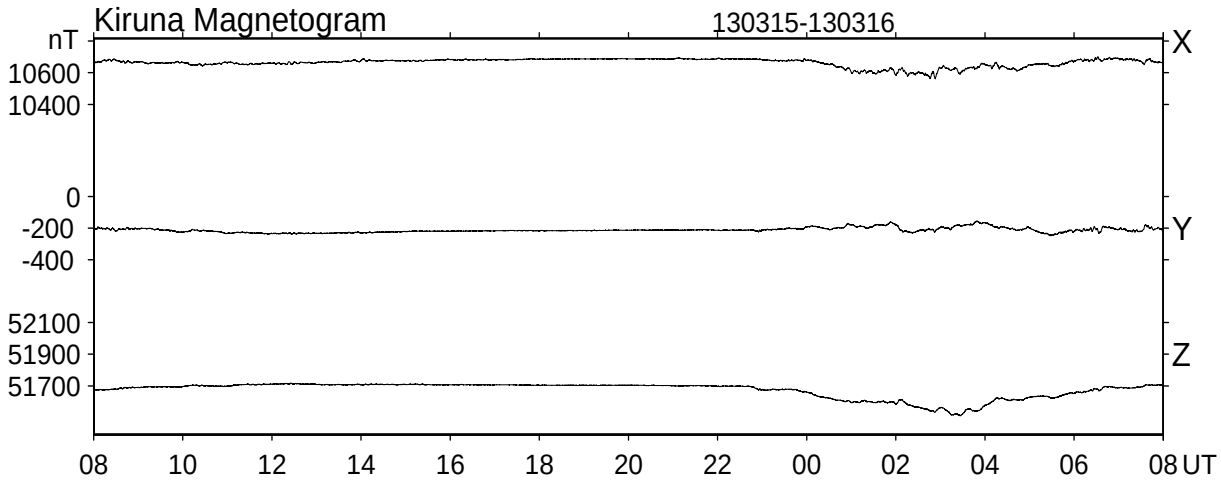
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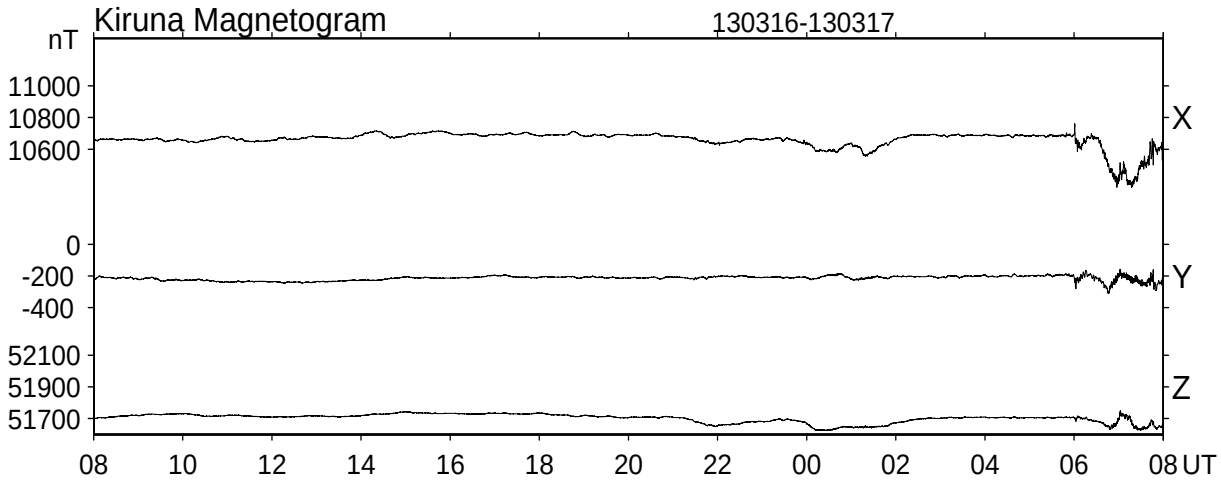
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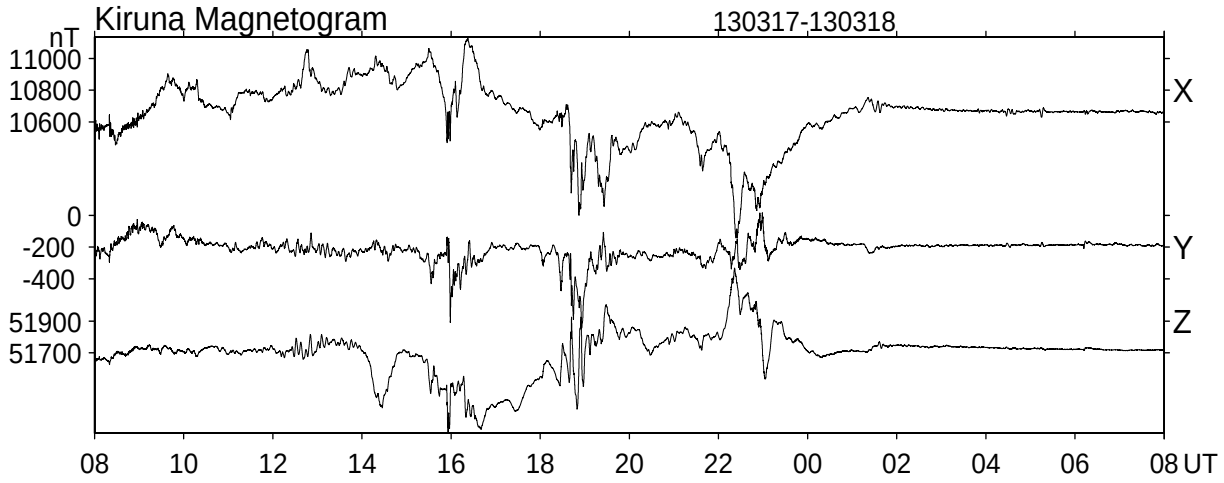
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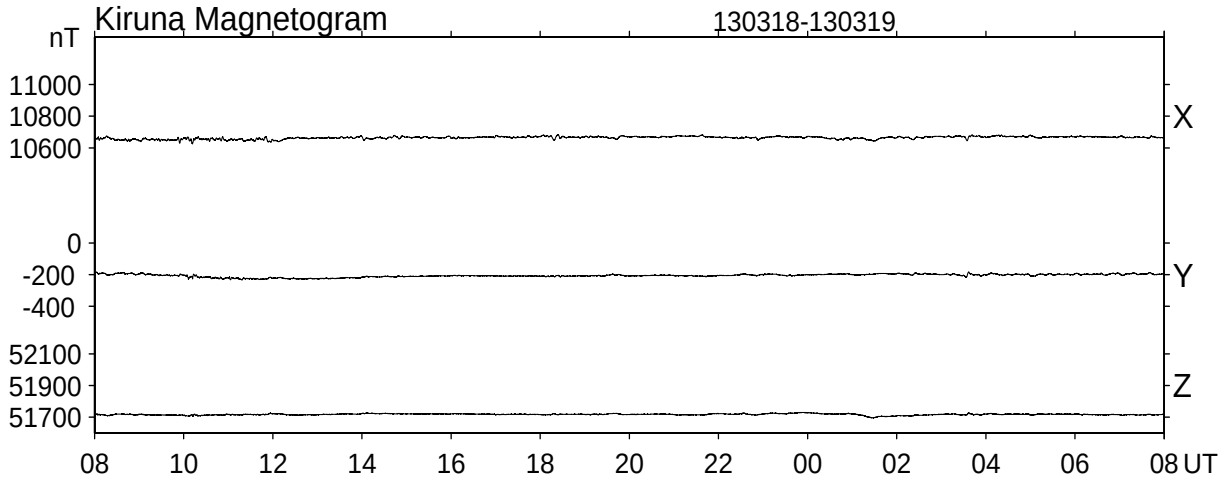
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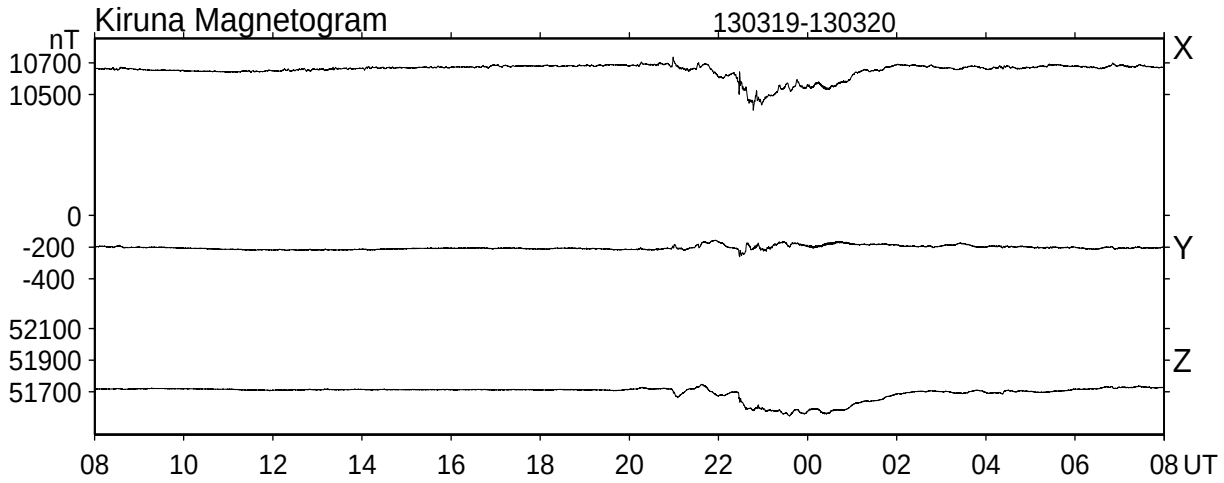
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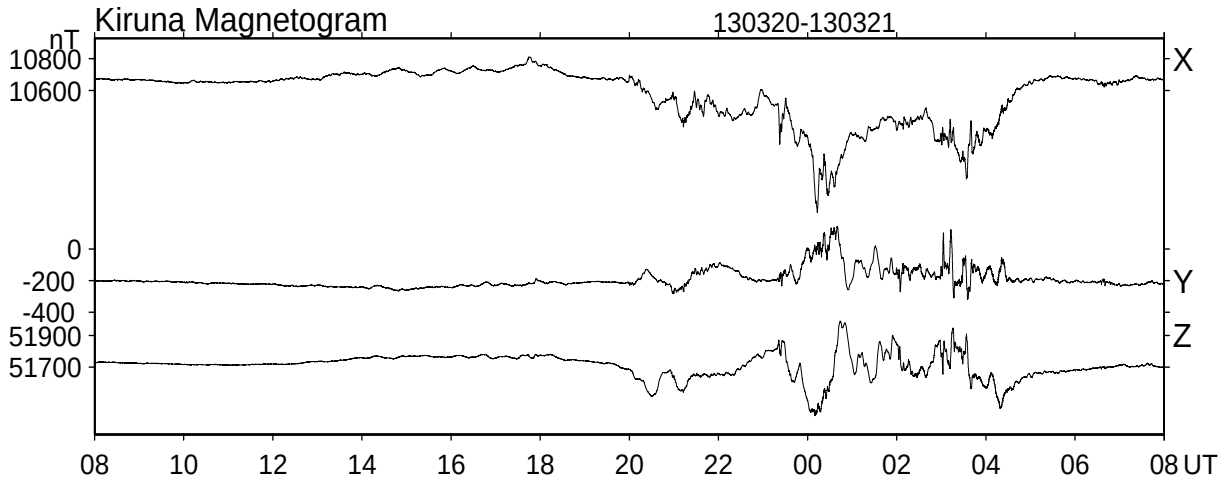
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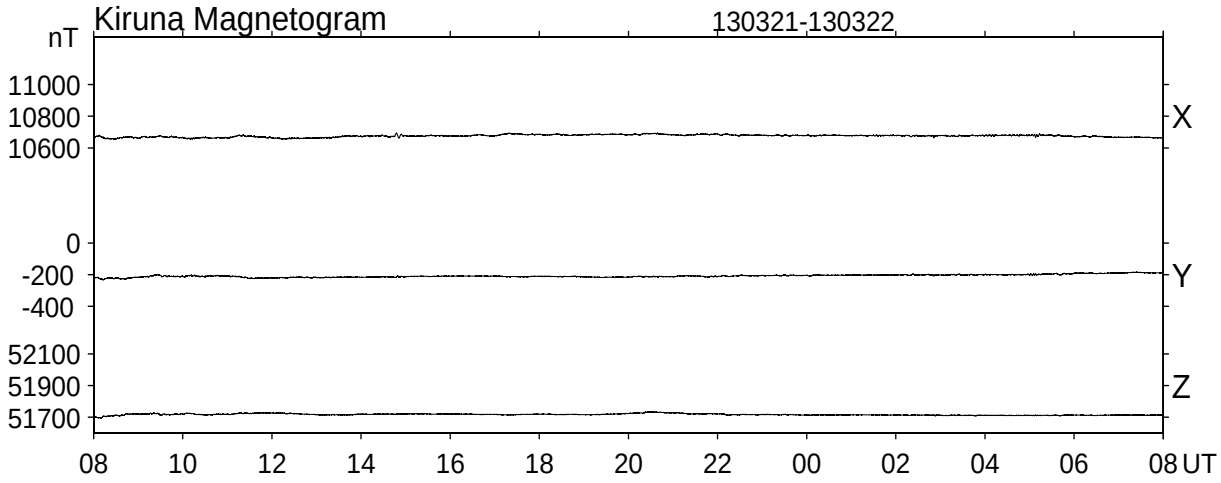
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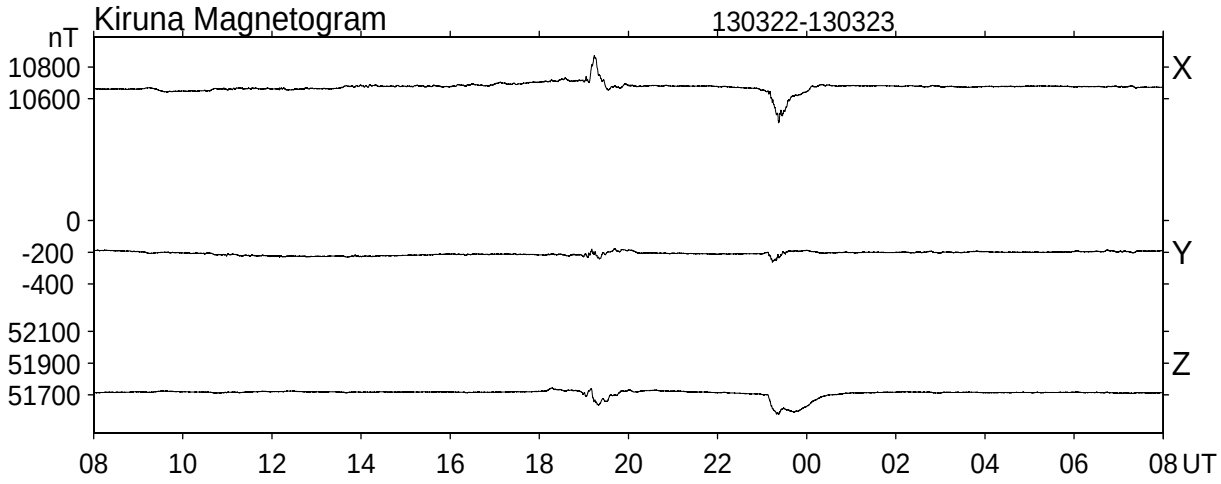
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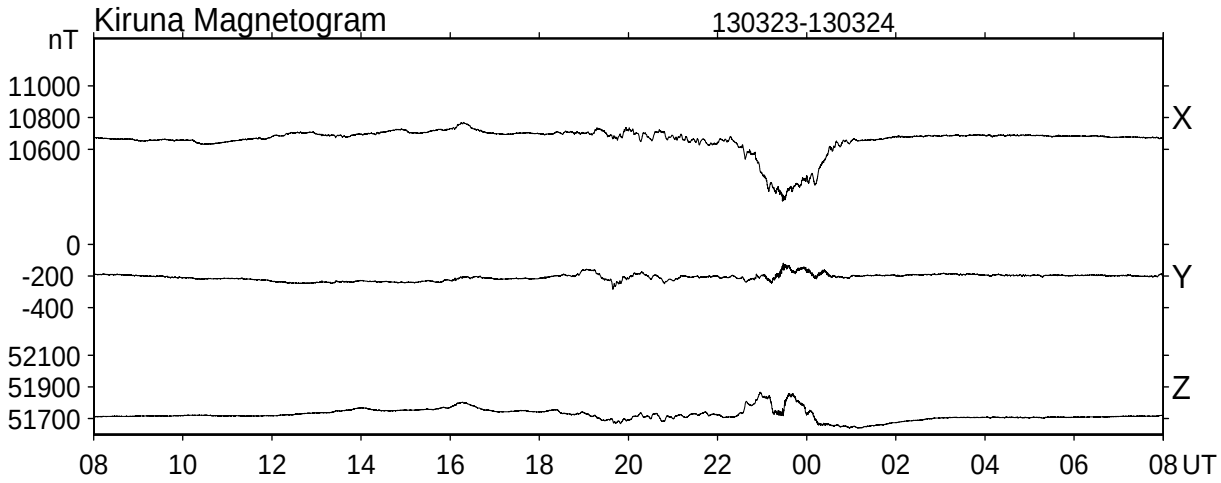
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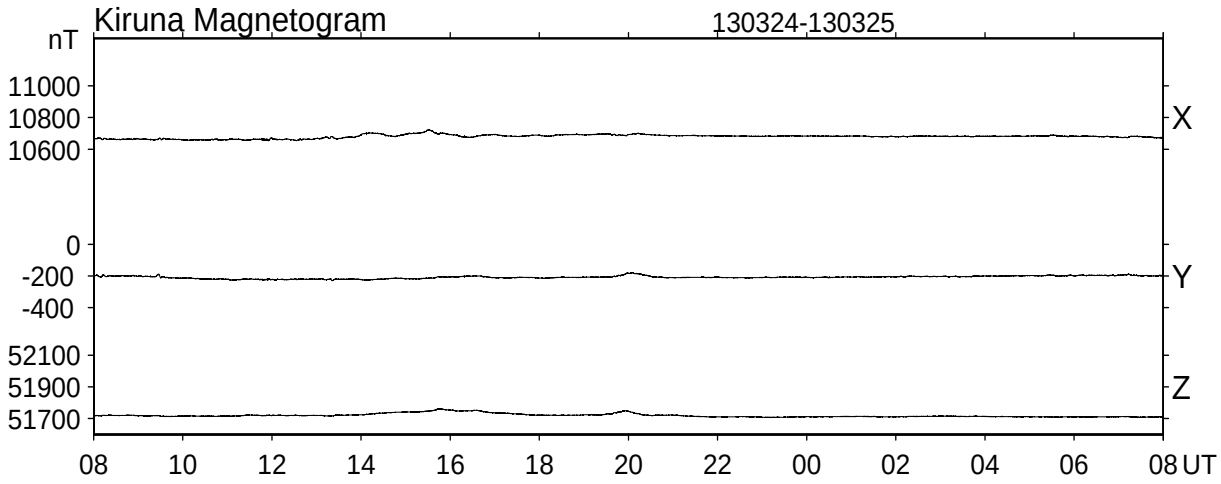
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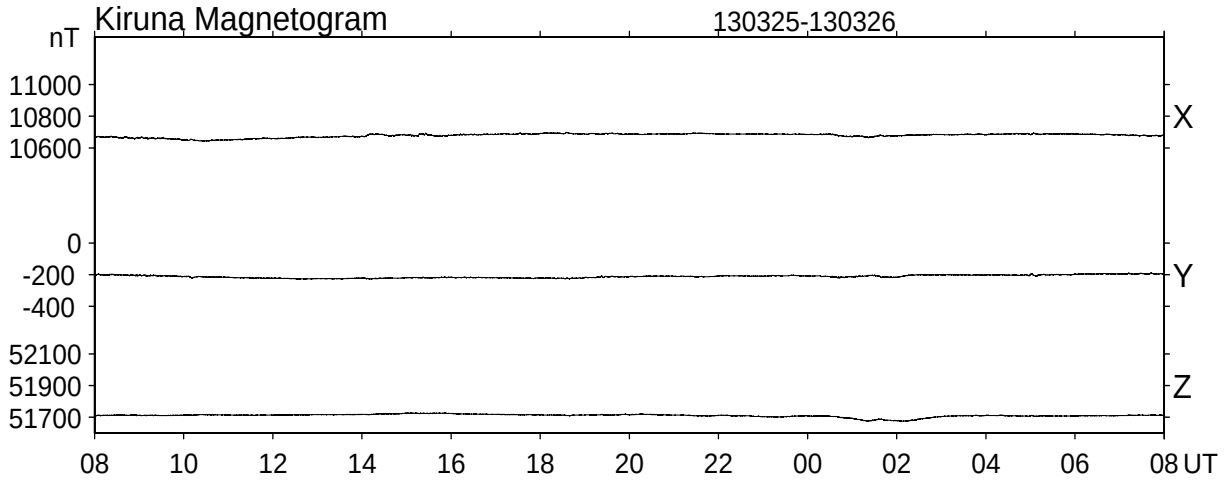
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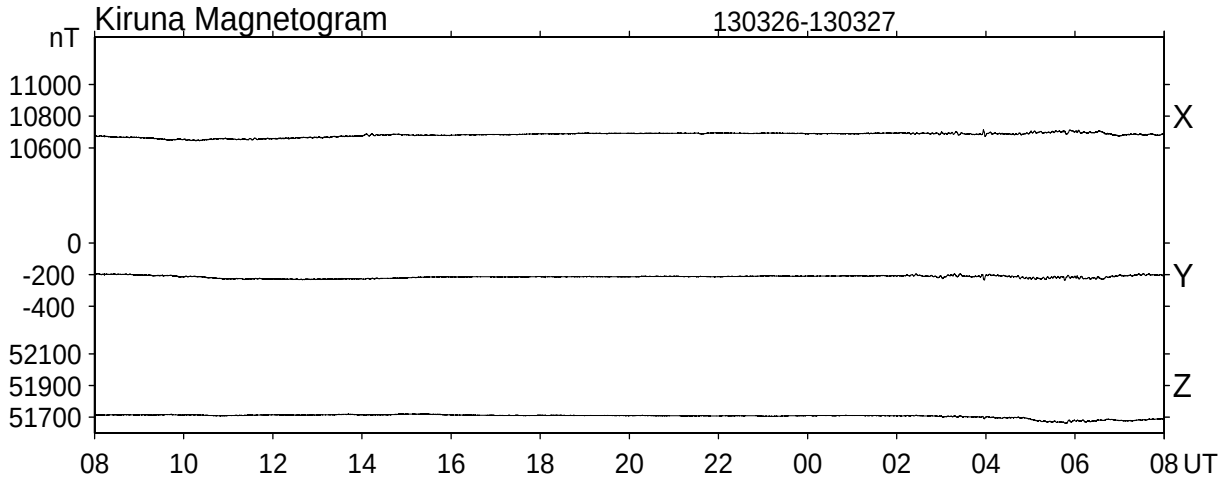
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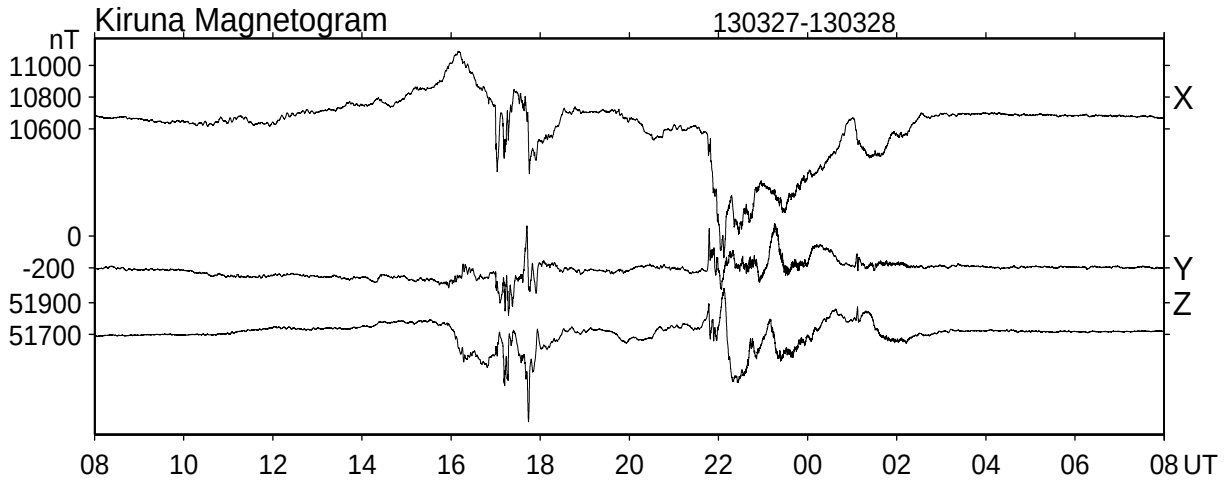
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130327-130328
nT
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-200
51900
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X
Y
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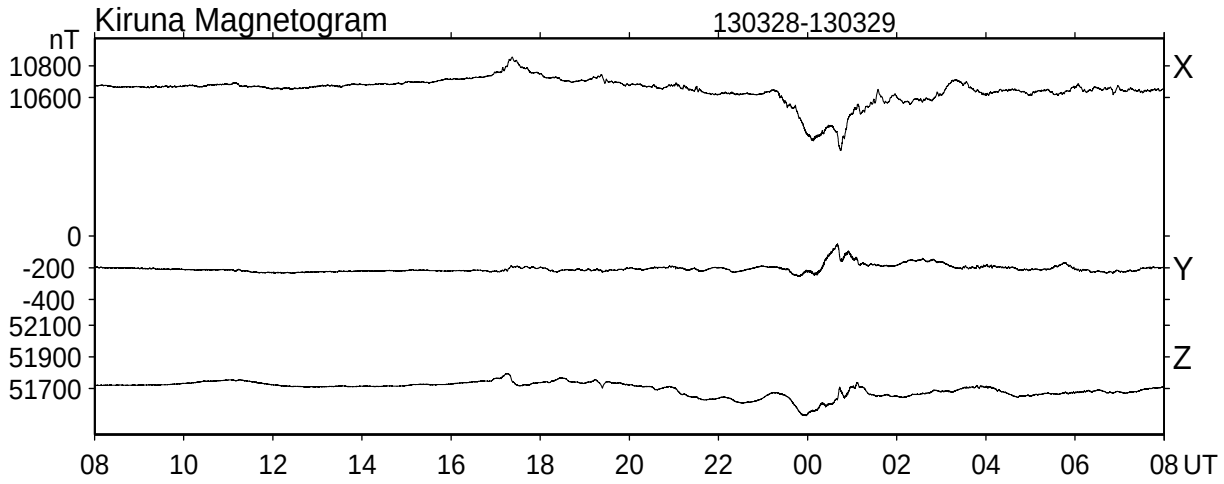
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X
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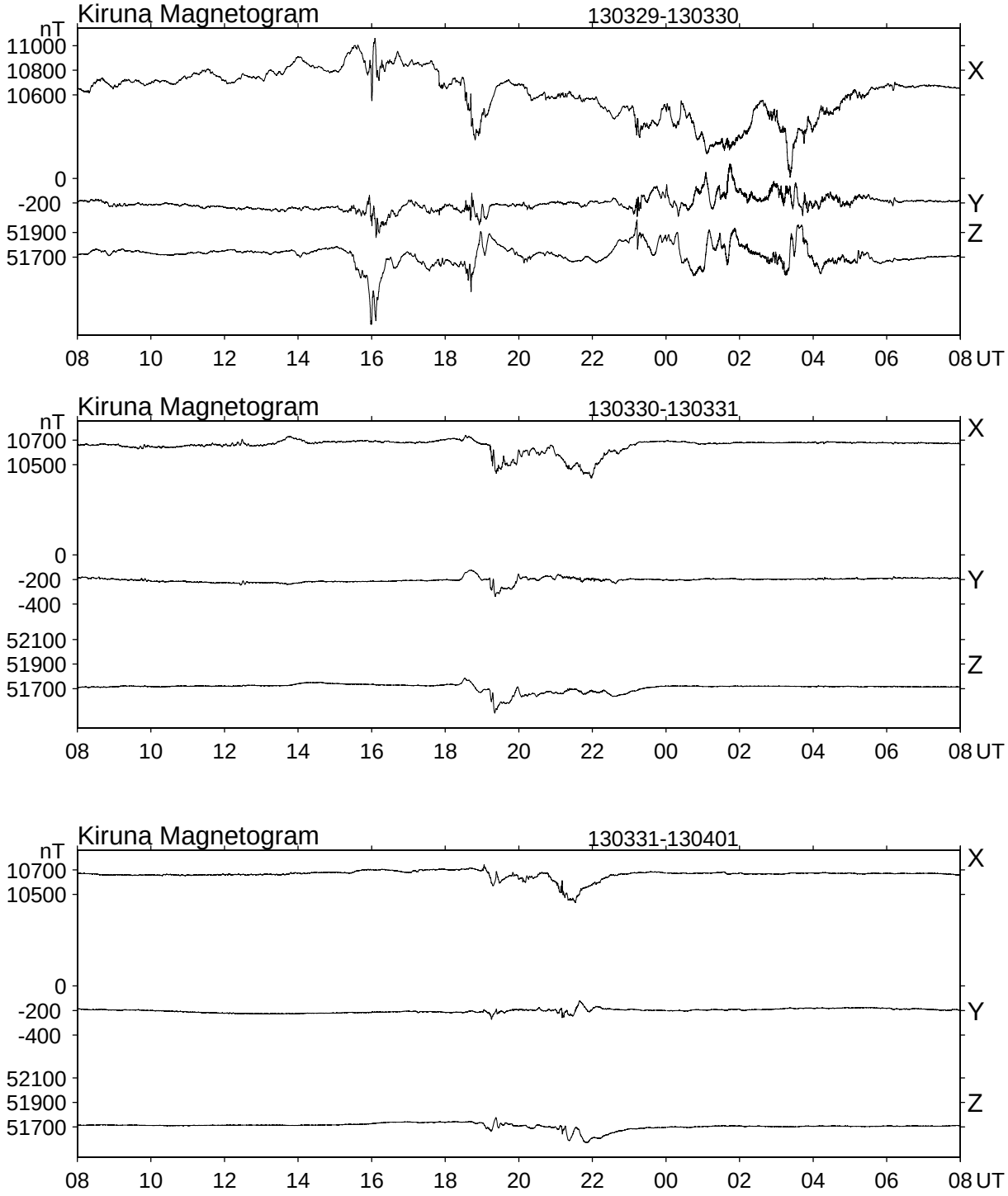
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X
Y
Z
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Kiruna Magnetogram
130330-130331
nT
10700
10500
0
-200
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52100
51900
51700
X
Y
Z
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Kiruna Magnetogram
130331-130401
nT
10700
10500
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-200
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52100
51900
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X
Y
Z
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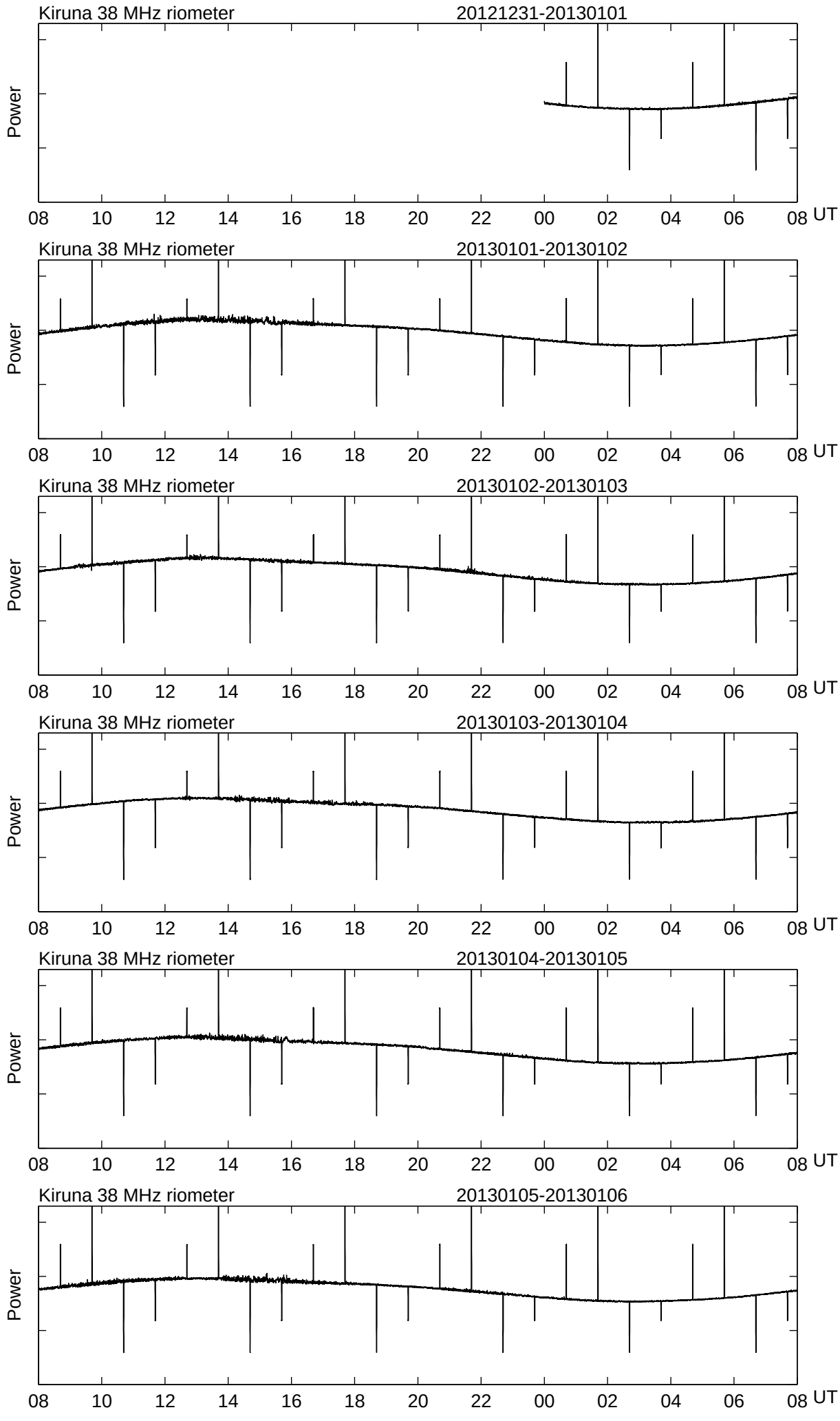
KIRUNA VERTICAL RIOMETER

January - March 2013

http://www.irf.se/~rio


Kiruna 38 MHz riometer
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Kiruna 38 MHz riometer
20130101-20130102
Power
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Kiruna 38 MHz riometer
20130102-20130103
Power
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Kiruna 38 MHz riometer
20130103-20130104
Power
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Kiruna 38 MHz riometer
20130104-20130105
Power
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Kiruna 38 MHz riometer
20130105-20130106
Power
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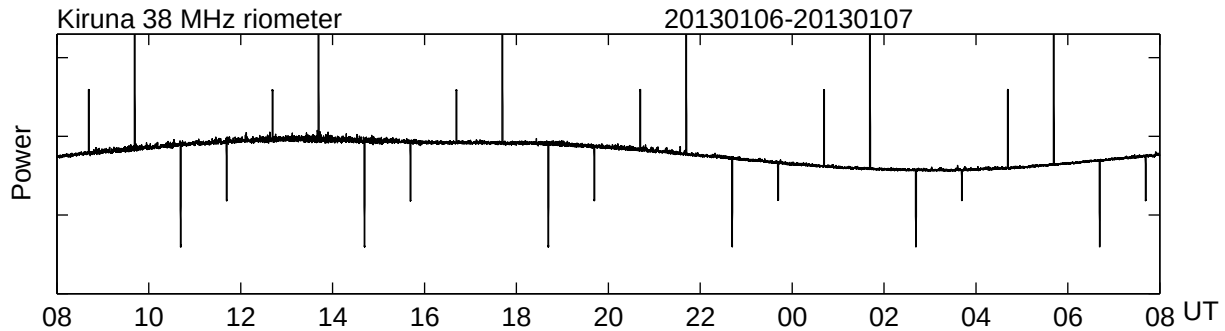
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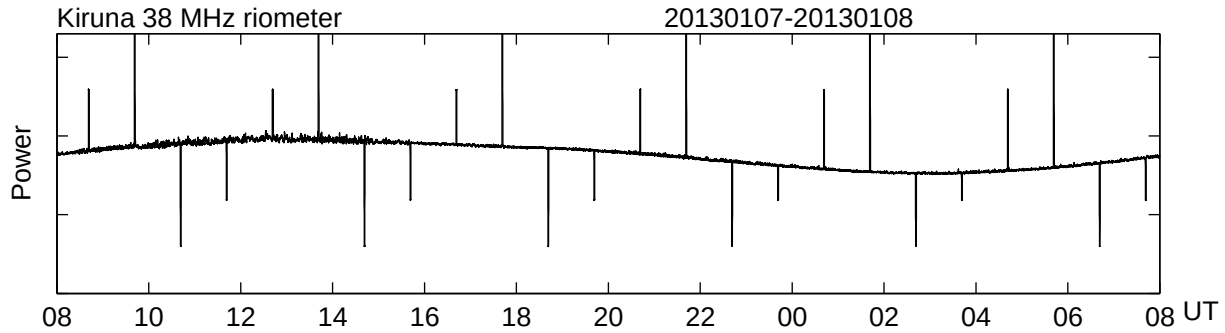
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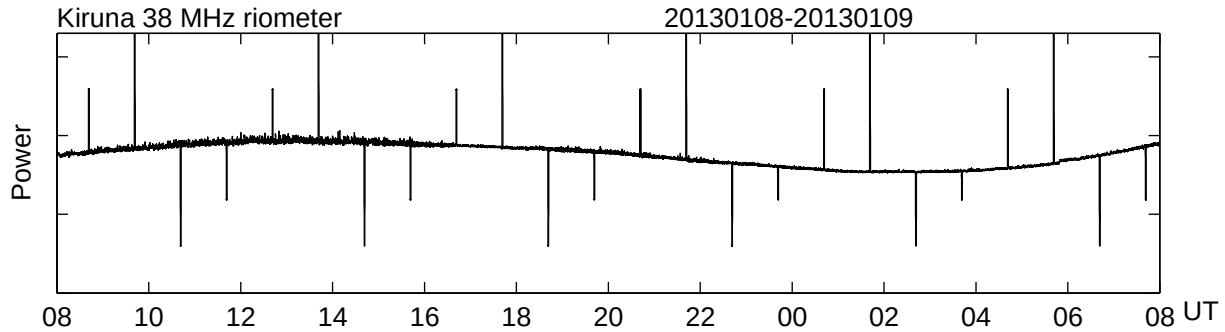
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20130108-20130109
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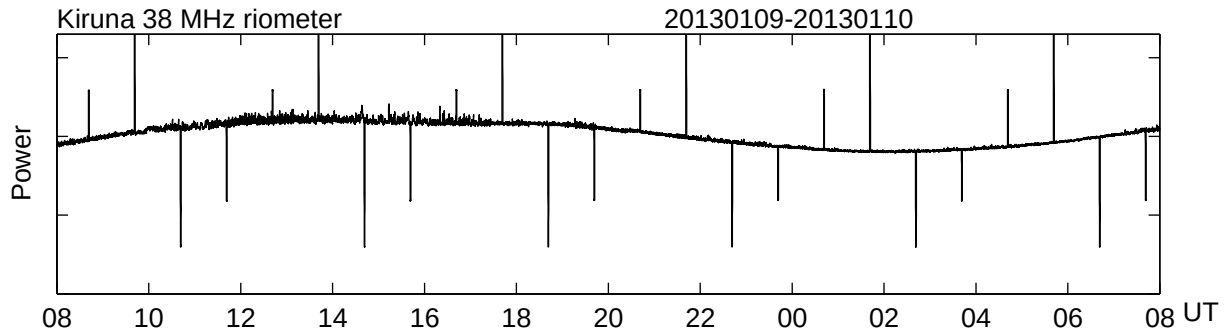
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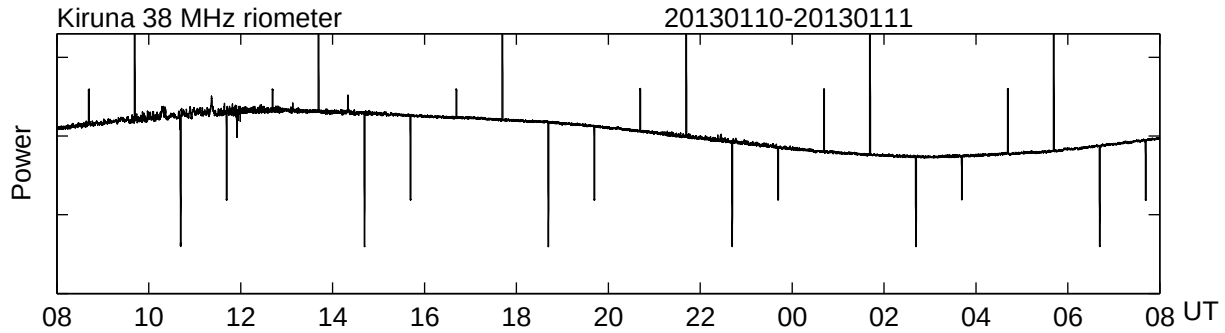
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20130110-20130111
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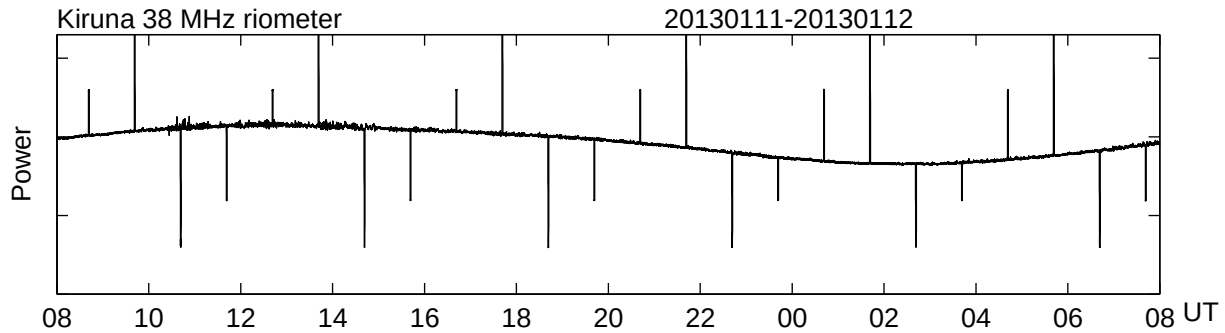
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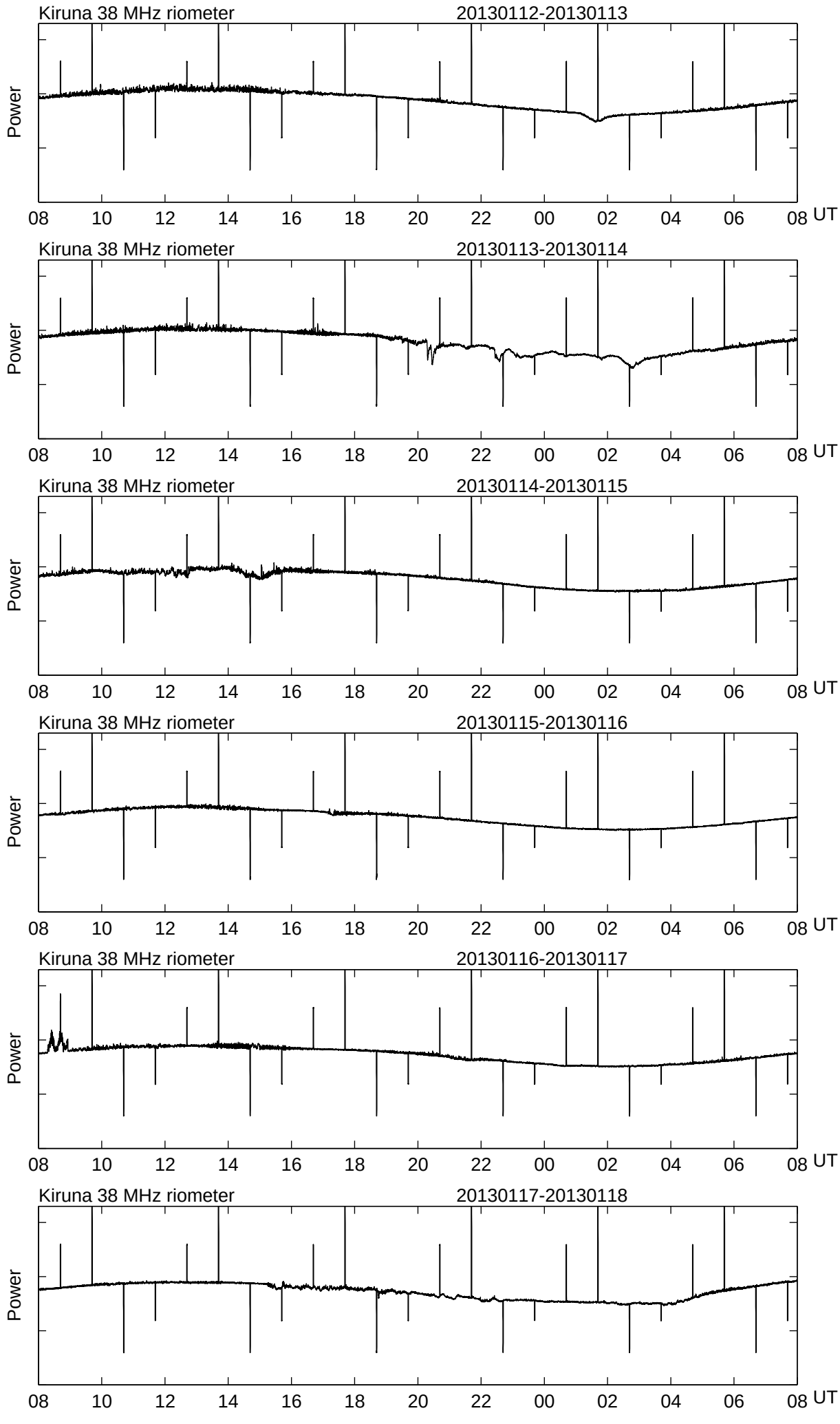
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Kiruna 38 MHz riometer
20130113-20130114
Power
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Kiruna 38 MHz riometer
20130114-20130115
Power
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Kiruna 38 MHz riometer
20130115-20130116
Power
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Kiruna 38 MHz riometer
20130116-20130117
Power
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Power
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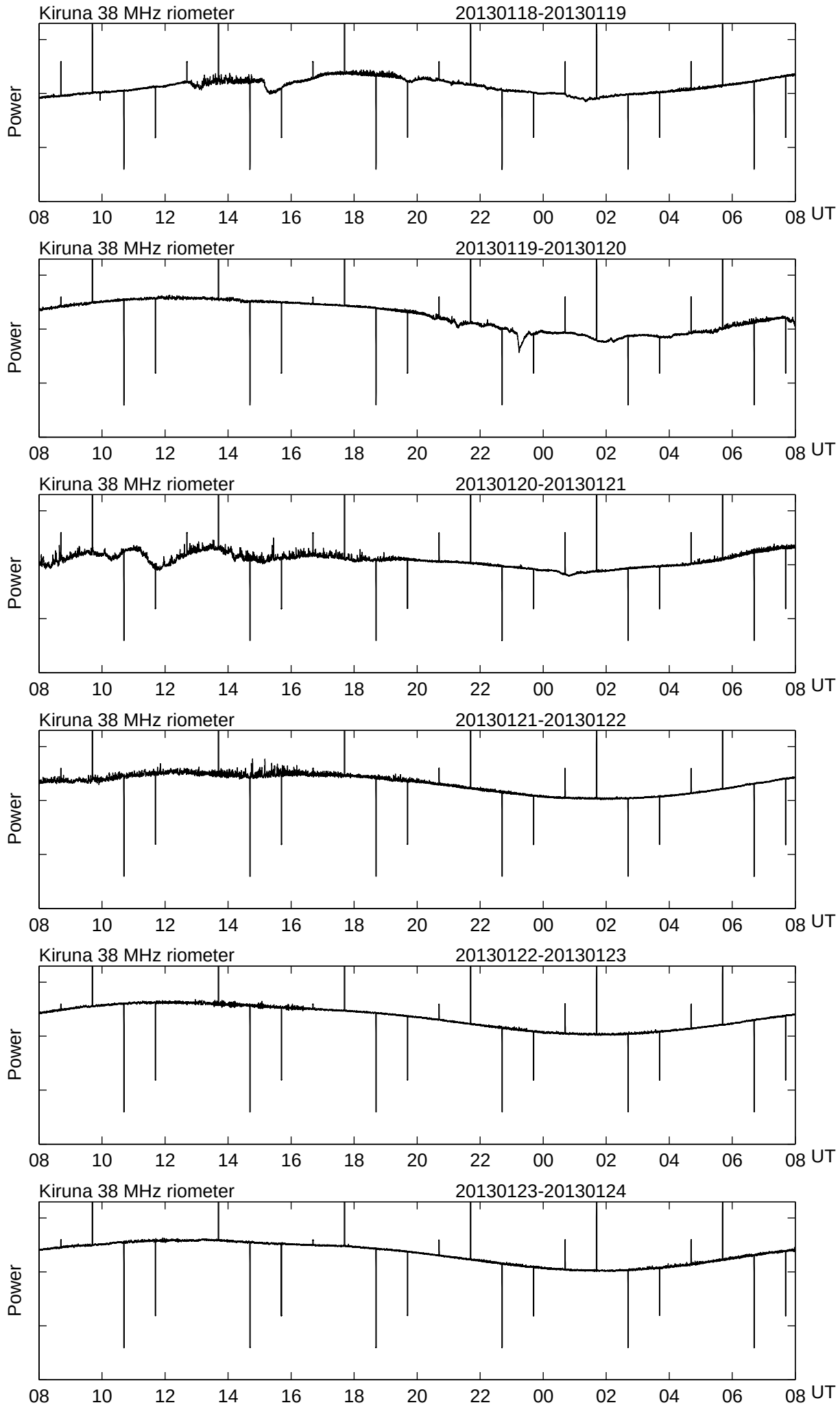
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Kiruna 38 MHz riometer
20130119-20130120
Power
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Kiruna 38 MHz riometer
20130120-20130121
Power
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Kiruna 38 MHz riometer
20130121-20130122
Power
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Kiruna 38 MHz riometer
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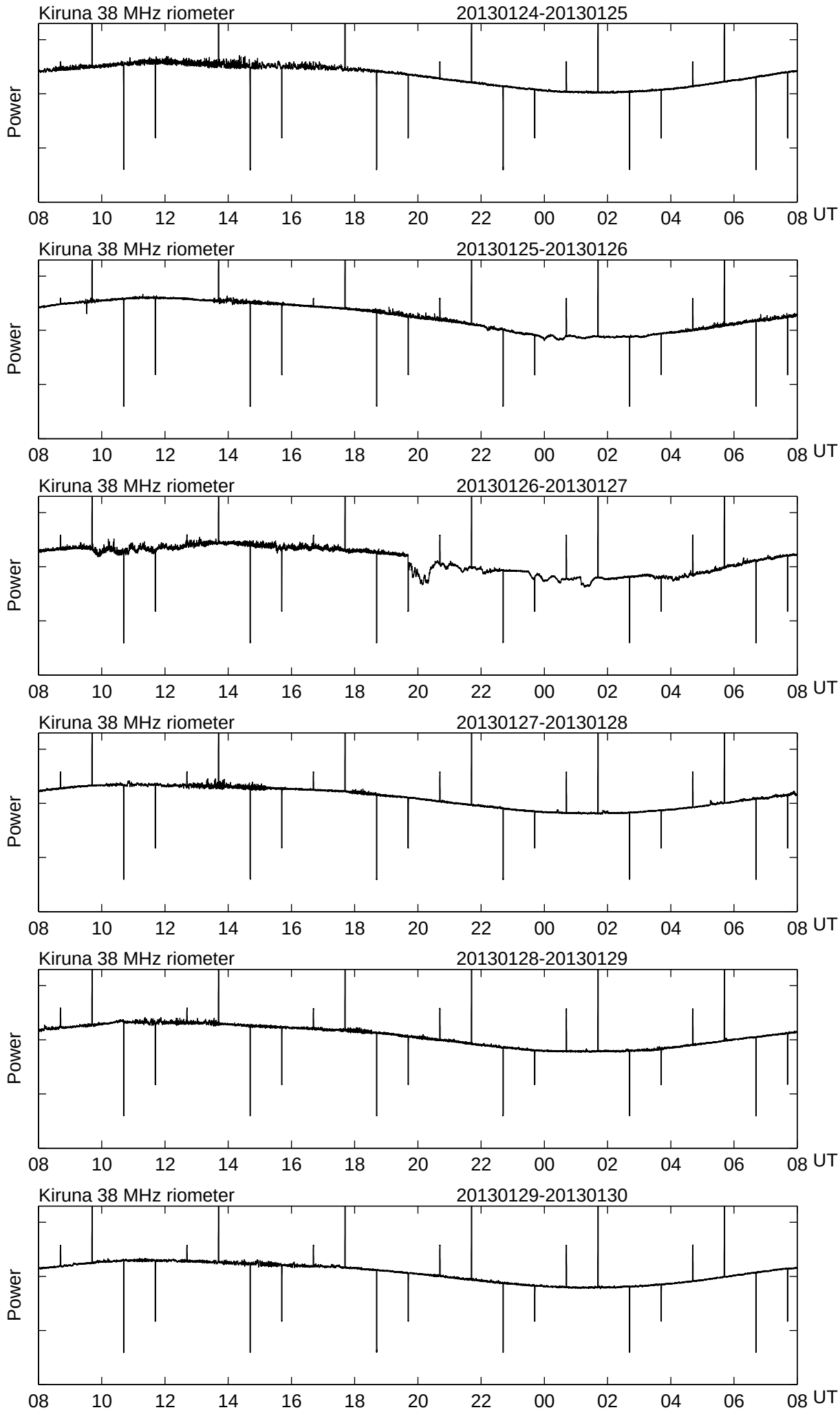
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Kiruna 38 MHz riometer
20130125-20130126
Power
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Kiruna 38 MHz riometer
20130126-20130127
Power
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Kiruna 38 MHz riometer
20130127-20130128
Power
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Kiruna 38 MHz riometer
20130128-20130129
Power
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20130129-20130130
Power
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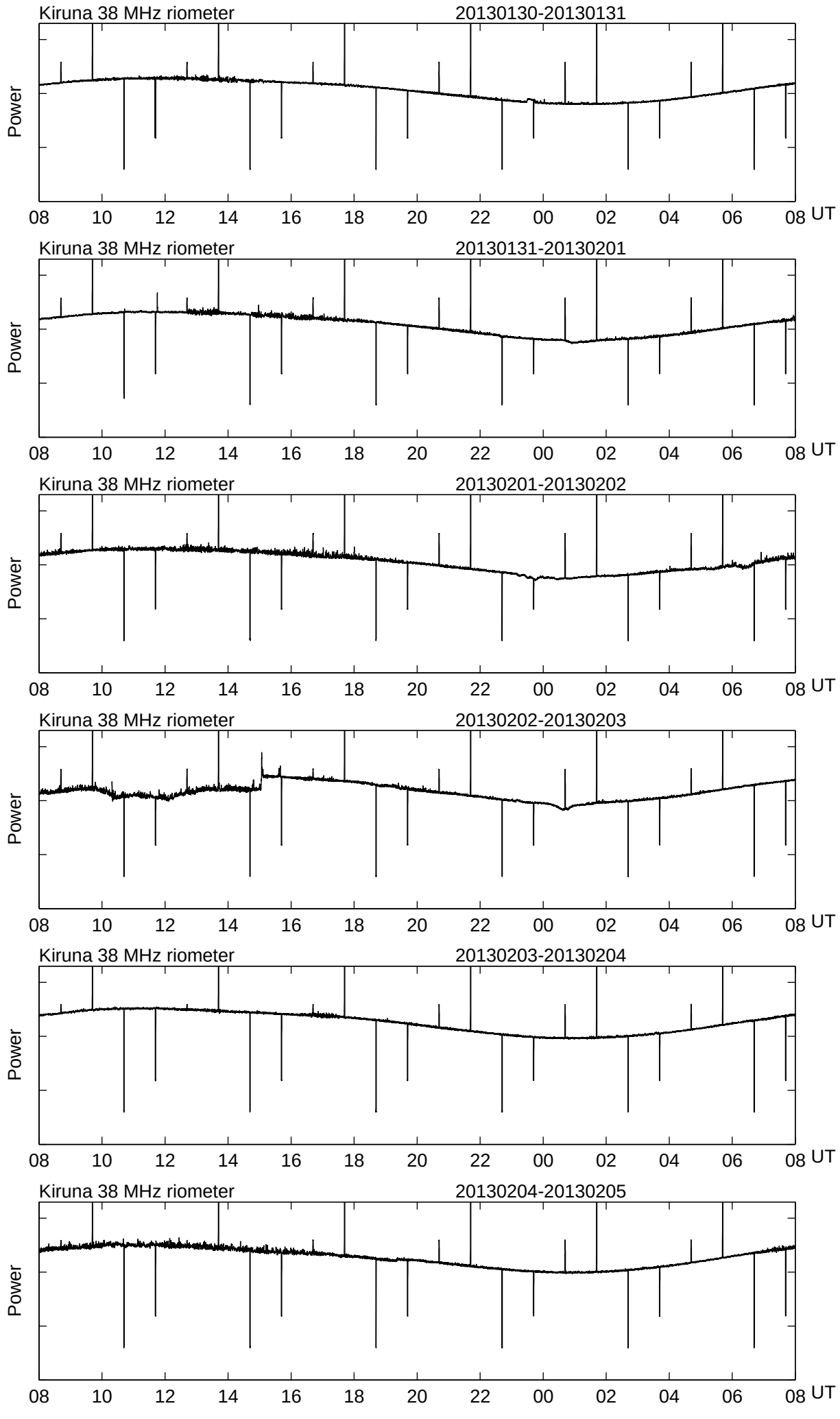
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Kiruna 38 MHz riometer
20130131-20130201
Power
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Kiruna 38 MHz riometer
20130201-20130202
Power
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Kiruna 38 MHz riometer
20130202-20130203
Power
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Kiruna 38 MHz riometer
20130203-20130204
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20130204-20130205
Power
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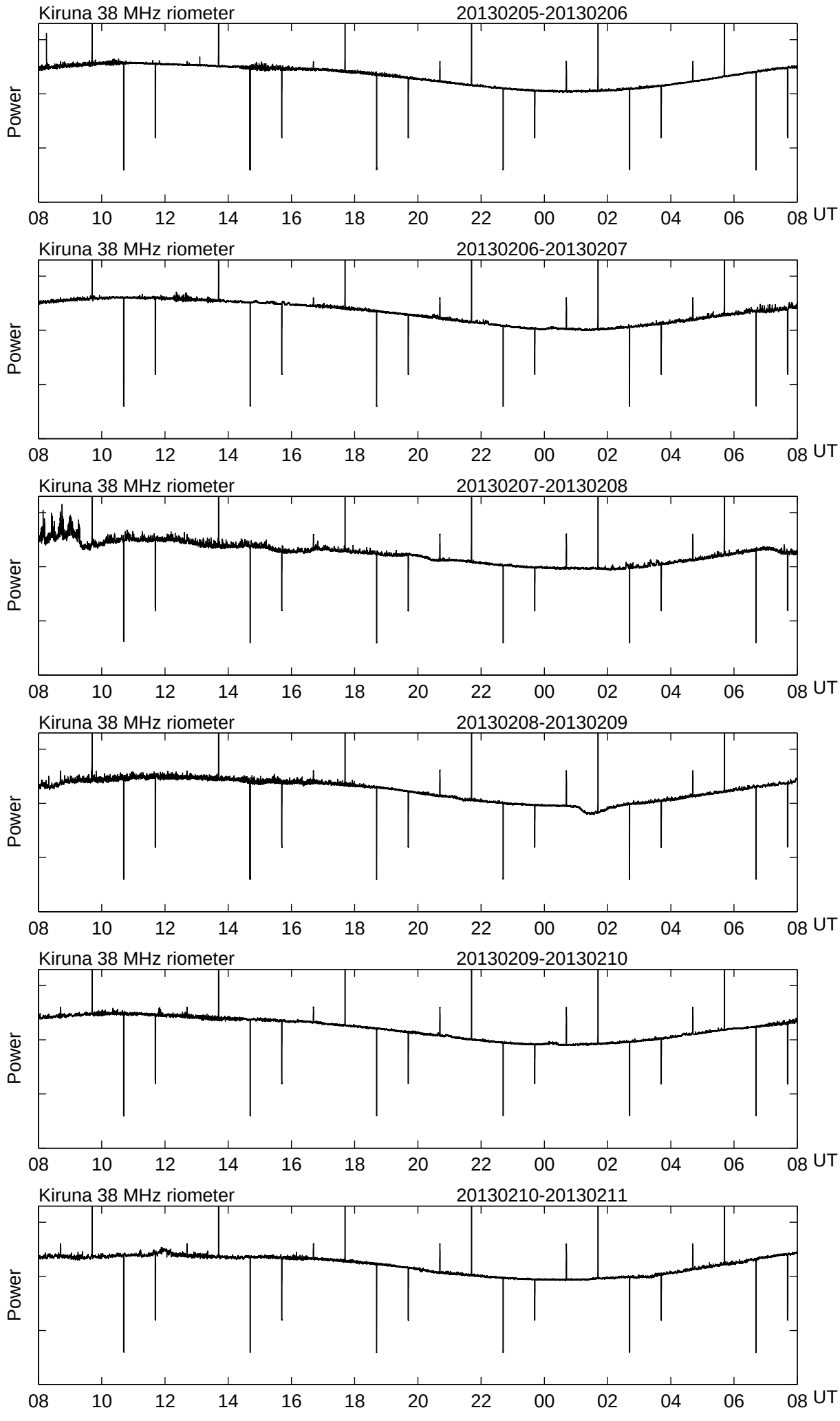
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Kiruna 38 MHz riometer
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Power
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Kiruna 38 MHz riometer
20130207-20130208
Power
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Kiruna 38 MHz riometer
20130208-20130209
Power
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Kiruna 38 MHz riometer
20130209-20130210
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20130210-20130211
Power
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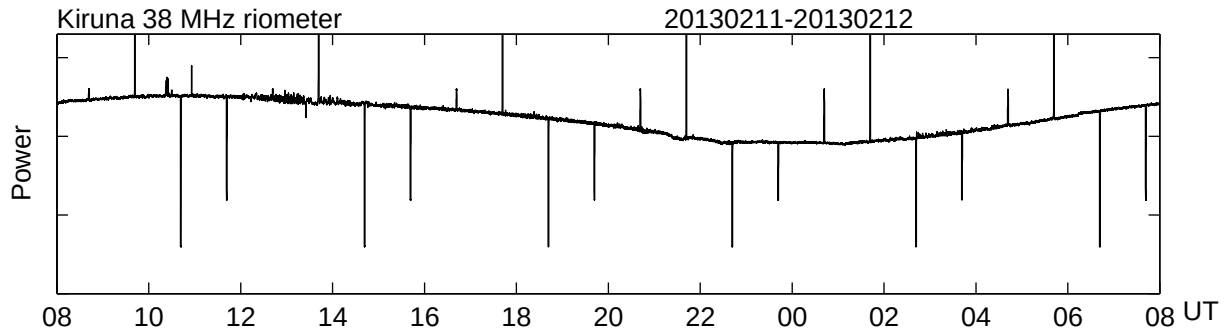
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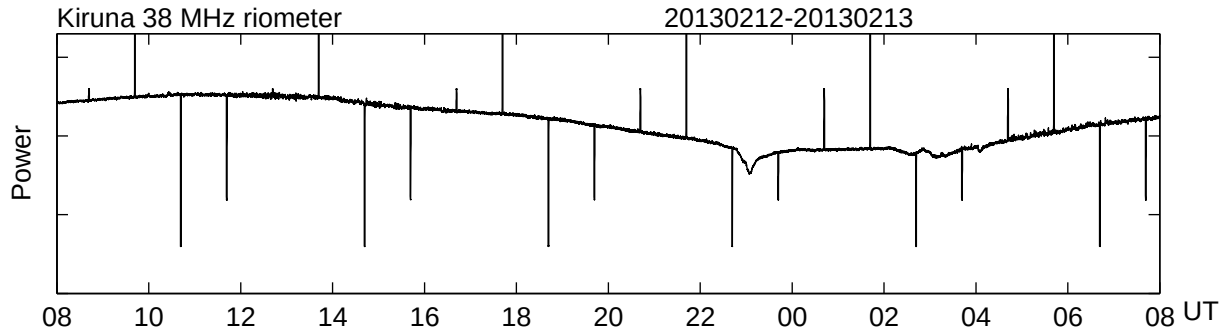
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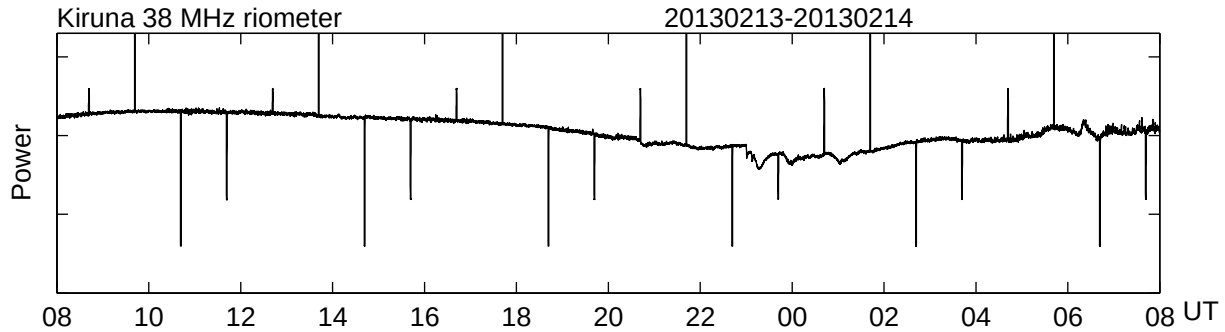
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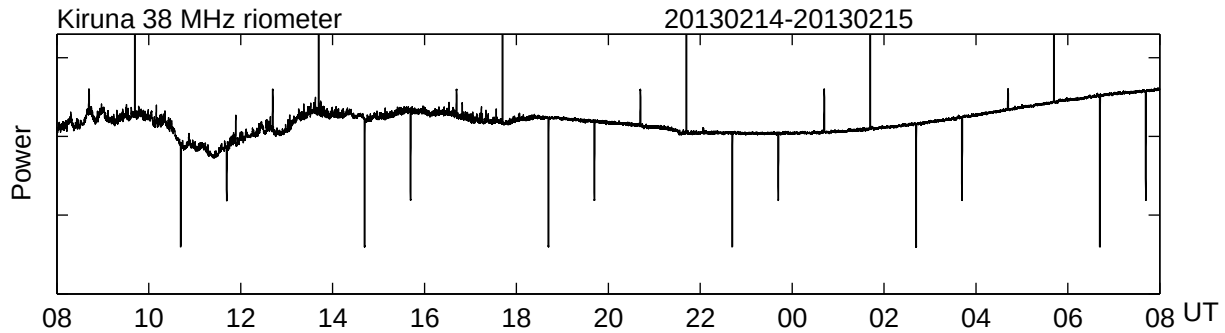
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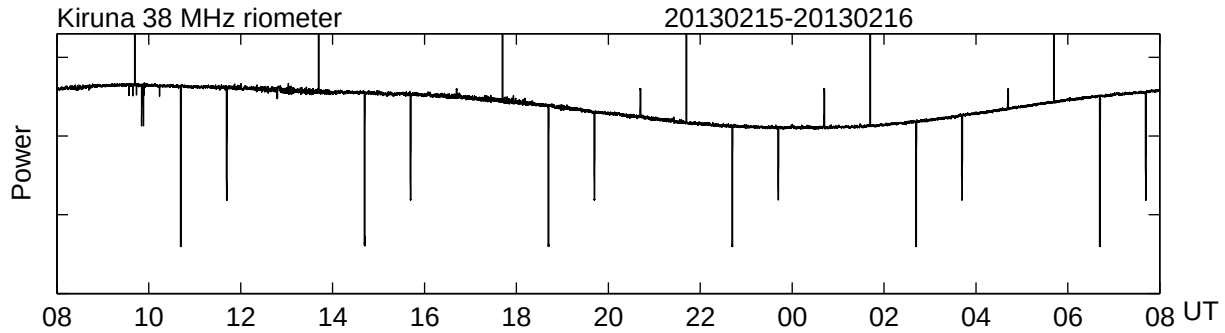
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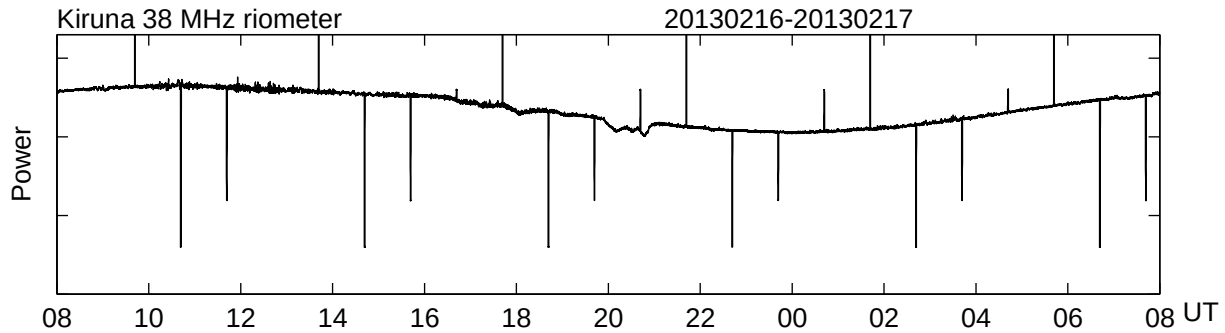
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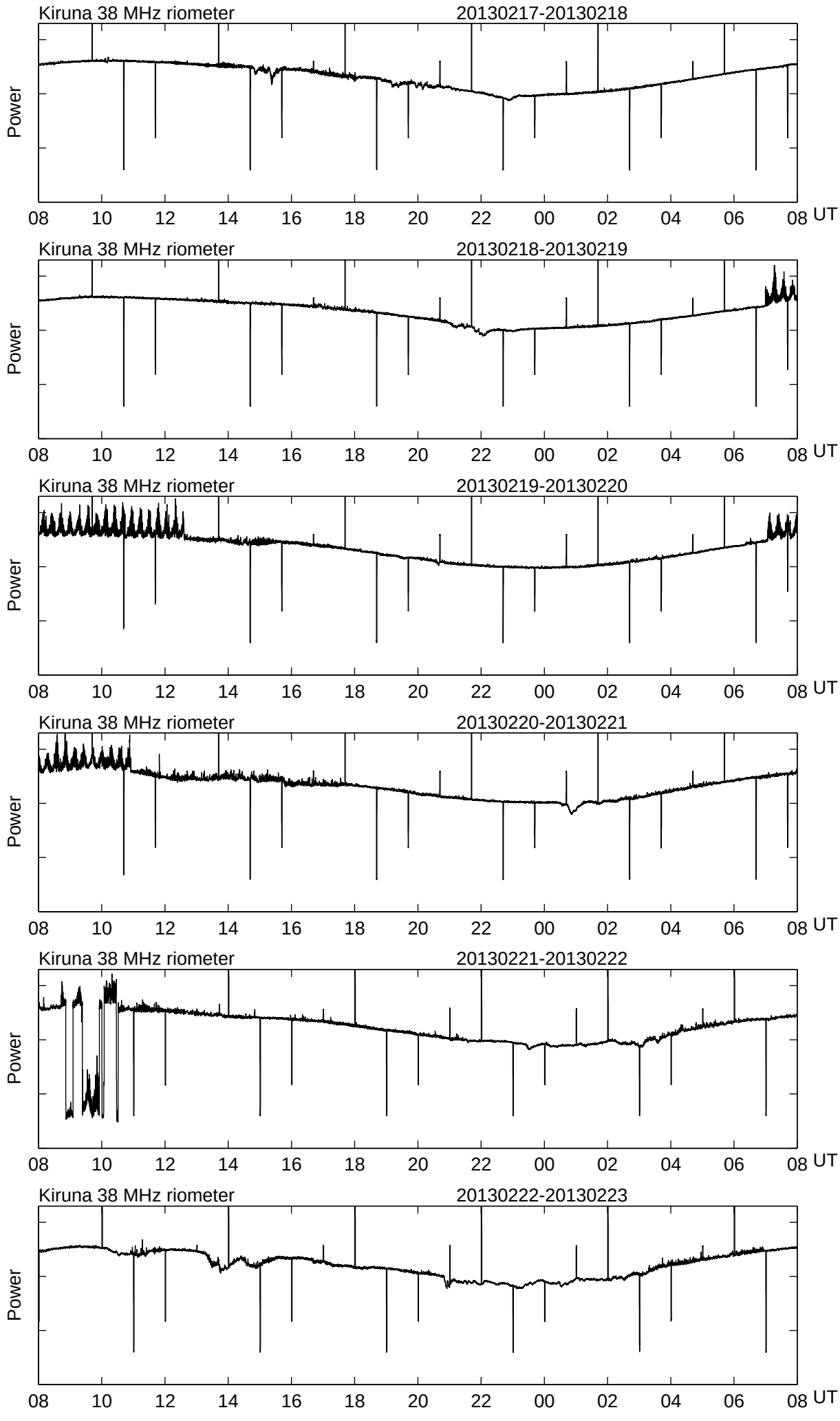
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Kiruna 38 MHz riometer
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Power
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Kiruna 38 MHz riometer
20130219-20130220
Power
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Kiruna 38 MHz riometer
20130220-20130221
Power
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Kiruna 38 MHz riometer
20130221-20130222
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Power
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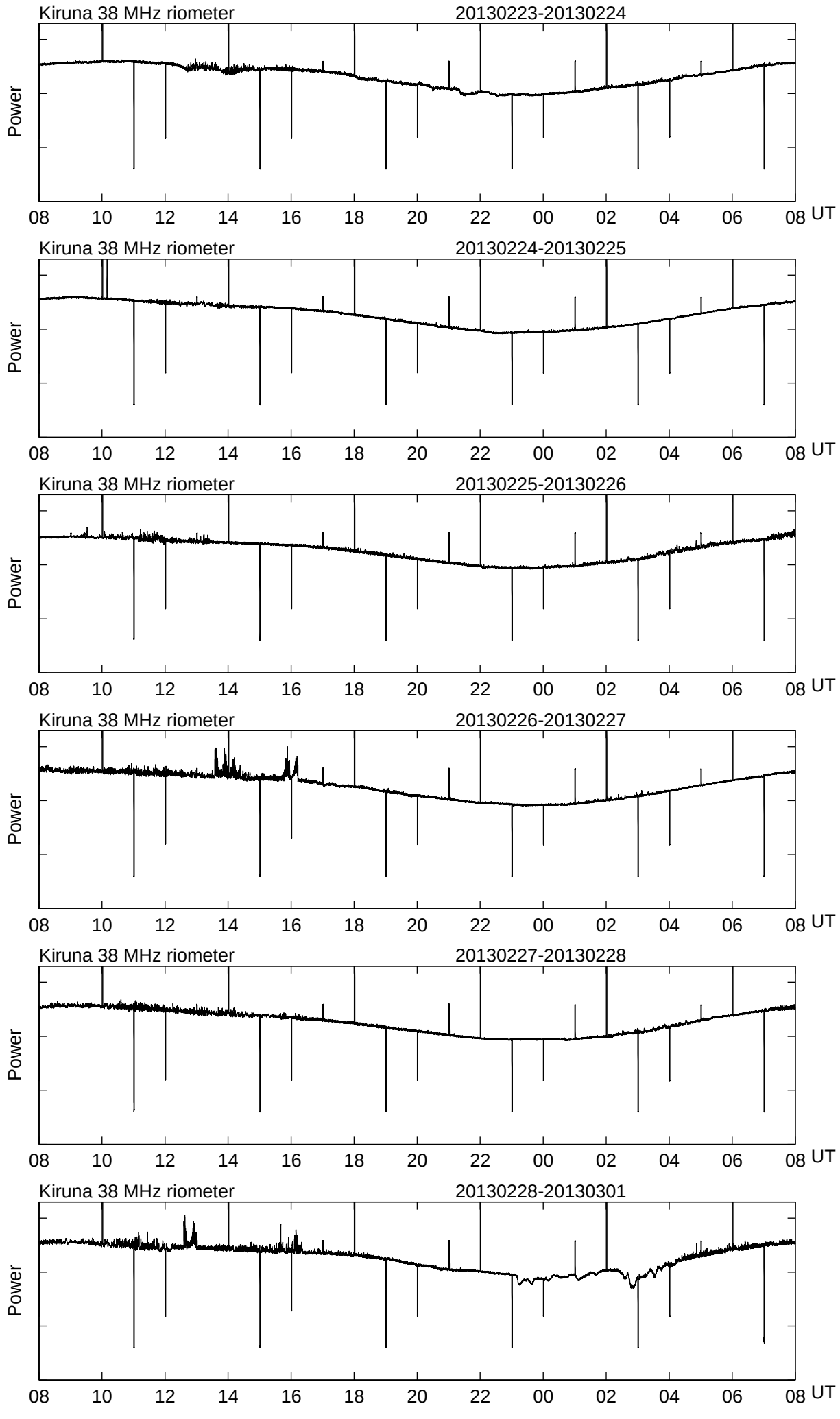
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Kiruna 38 MHz riometer
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Kiruna 38 MHz riometer
20130225-20130226
Power
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Kiruna 38 MHz riometer
20130226-20130227
Power
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Kiruna 38 MHz riometer
20130227-20130228
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20130228-20130301
Power
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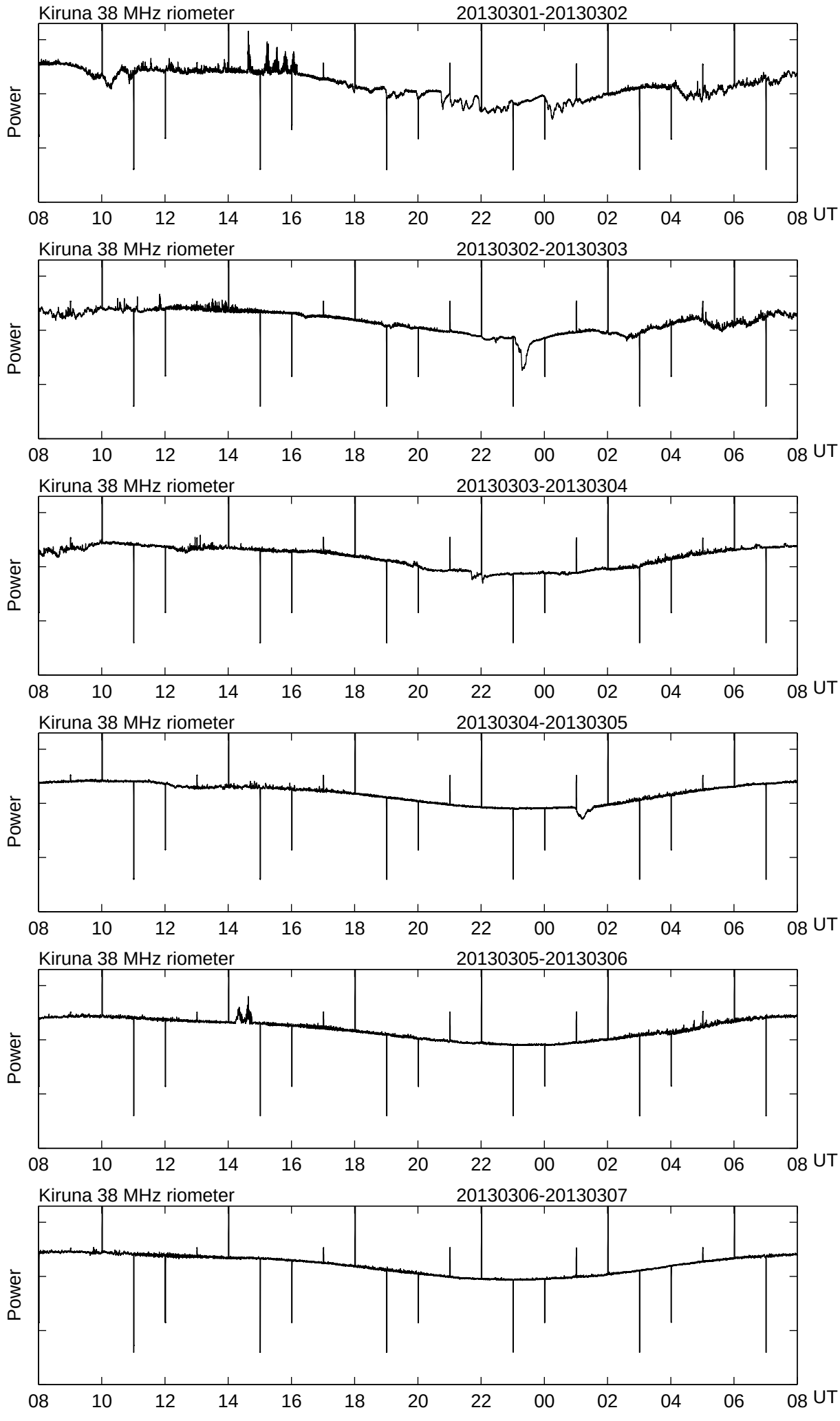
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Kiruna 38 MHz riometer
20130303-20130304
Power
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20130304-20130305
Power
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20130305-20130306
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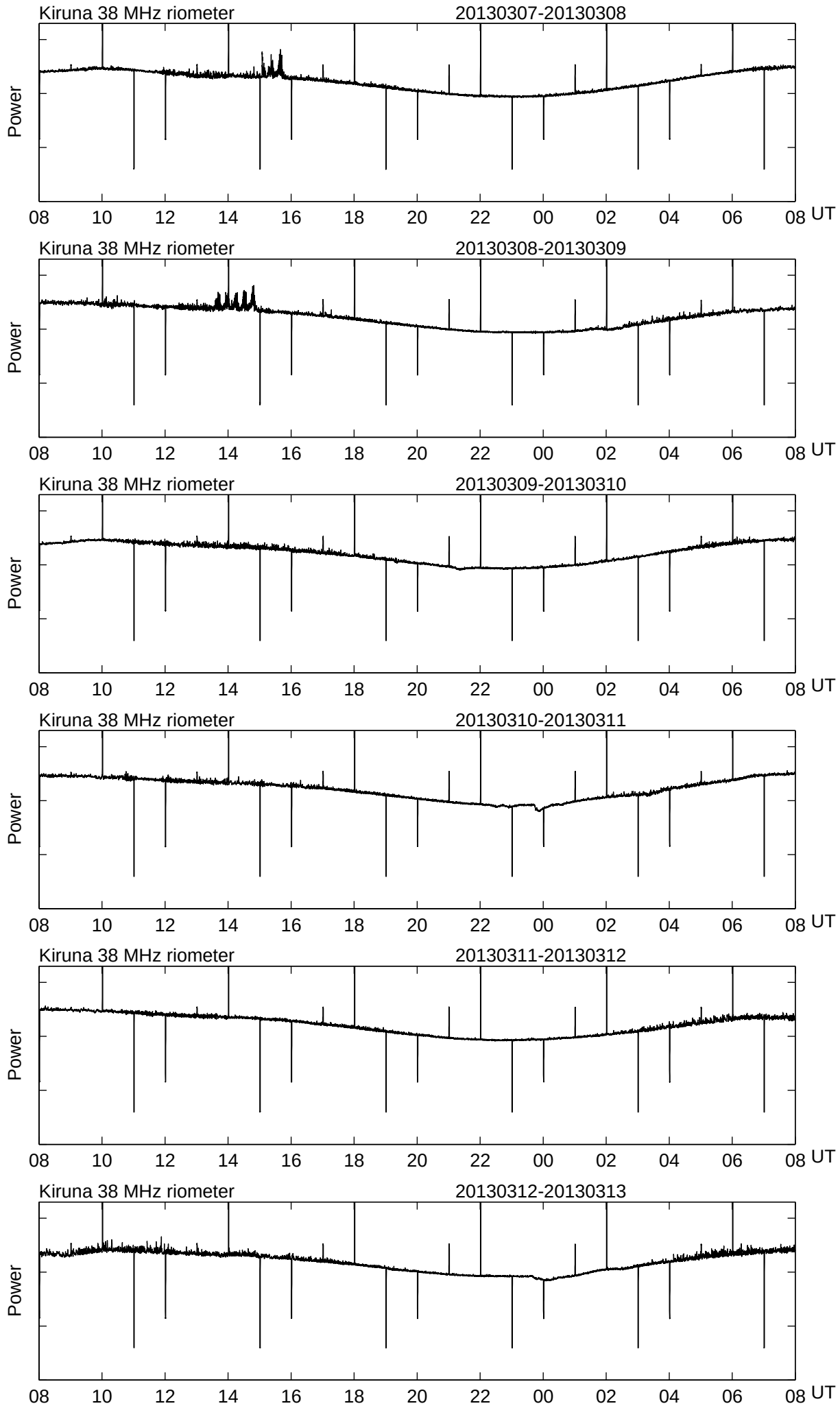
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20130309-20130310
Power
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20130310-20130311
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Kiruna 38 MHz riometer
20130311-20130312
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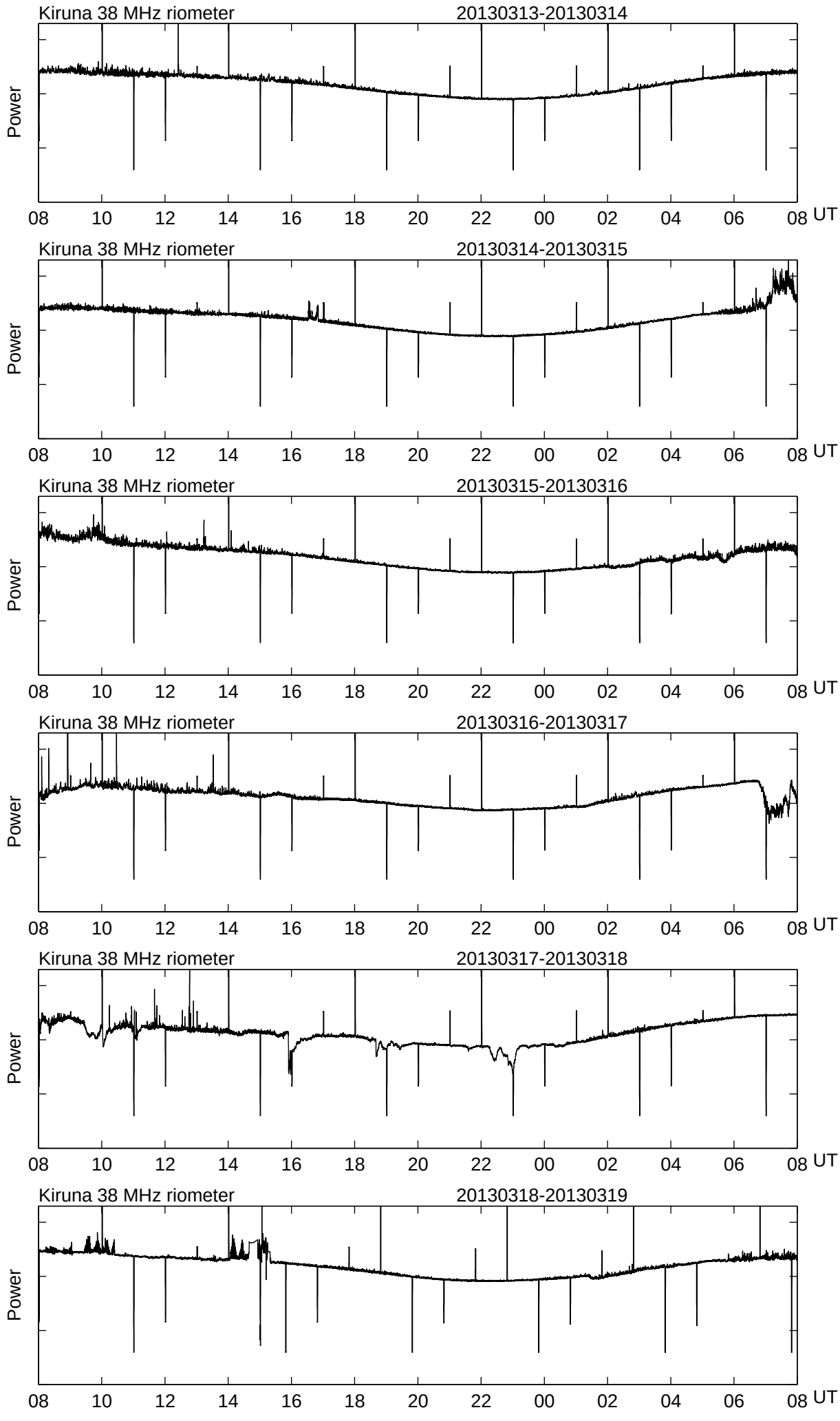
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Kiruna 38 MHz riometer
20130315-20130316
Power
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Kiruna 38 MHz riometer
20130316-20130317
Power
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Kiruna 38 MHz riometer
20130317-20130318
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Power
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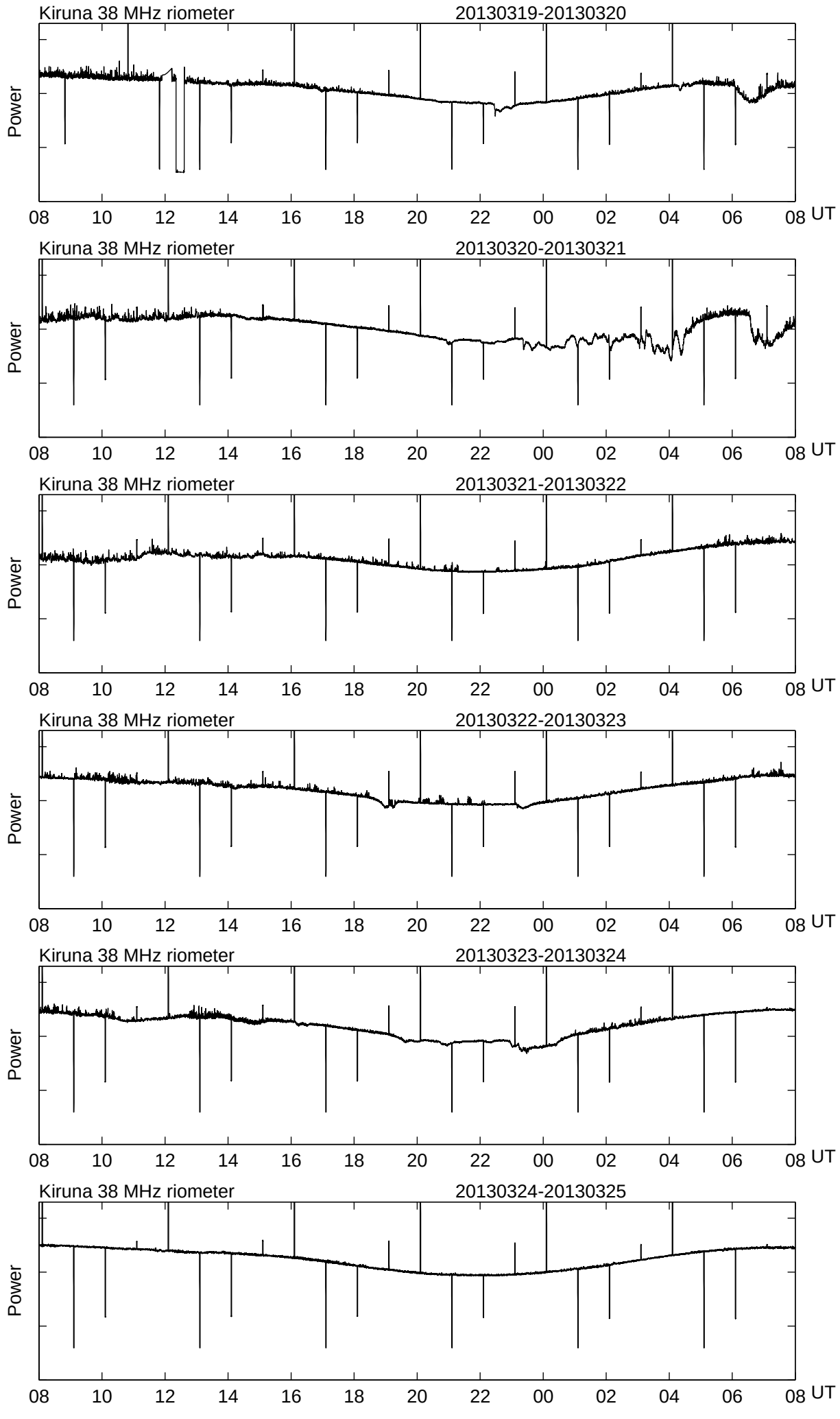
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20130321-20130322
Power
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Kiruna 38 MHz riometer
20130322-20130323
Power
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Kiruna 38 MHz riometer
20130323-20130324
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Power
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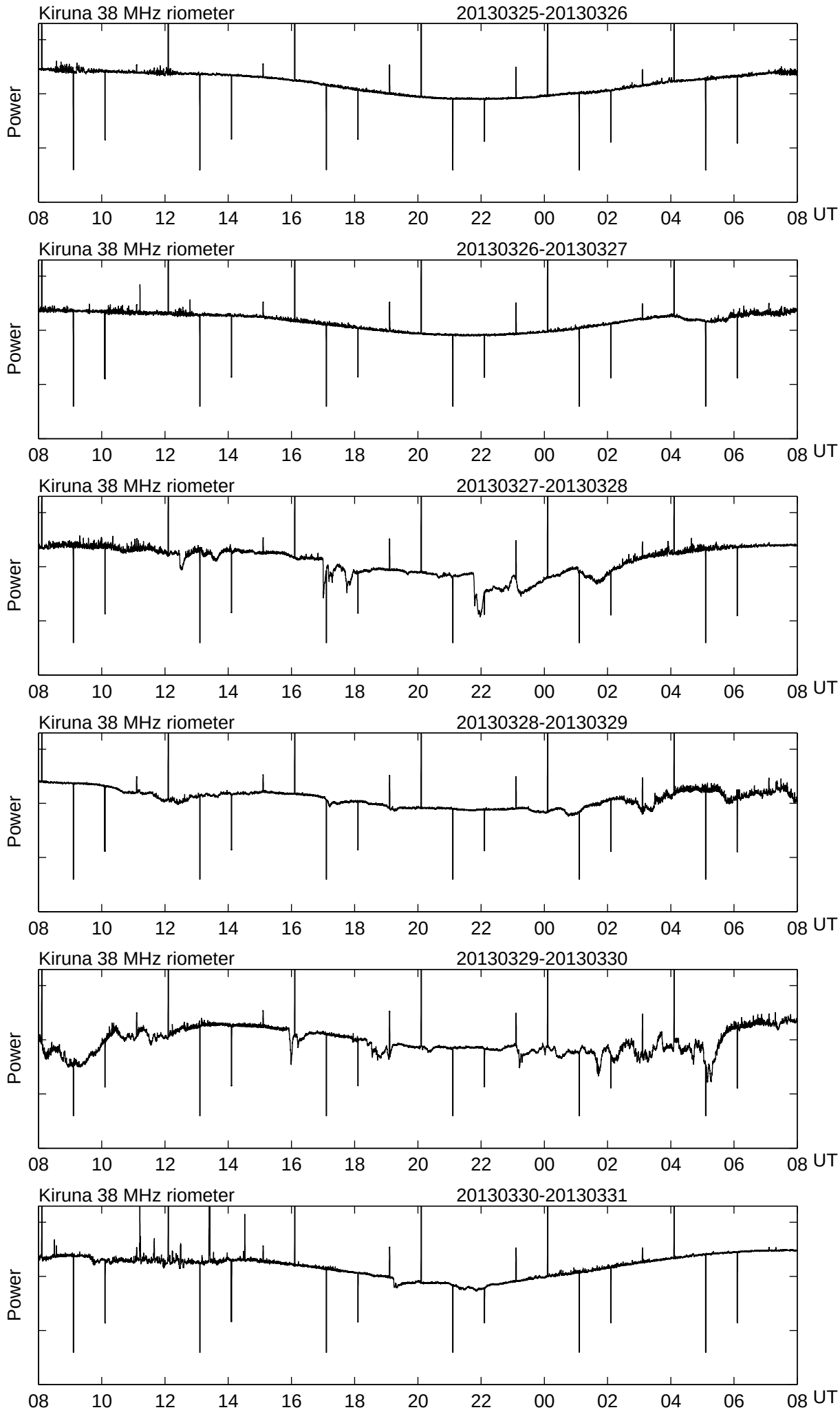
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Power
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Kiruna 38 MHz riometer
20130327-20130328
Power
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Kiruna 38 MHz riometer
20130328-20130329
Power
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Kiruna 38 MHz riometer
20130329-20130330
Power
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Kiruna 38 MHz riometer
20130330-20130331
Power
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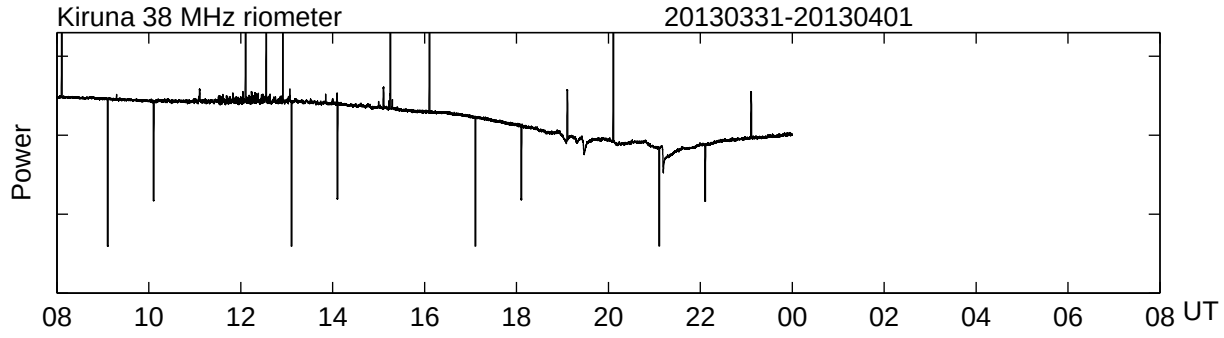
Kiruna 38 MHz riometer
20130331-20130401
Power
08
10
12
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UT

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