



# RADIAL CEMENT BOND LOG

FILE NO: CH142943  
API NO: 05077105210000  
COMPANY: LARAMIE ENERGY LLC  
WELL: BCU 0993-21-10W  
FIELD: BUZZARD CREEK  
COUNTY: MESA  
STATE: COLORADO

Ver. 4.11

**LOCATION:**

SHL: 2387.0' FNL & 1256.0' FWL  
BHL: 2387.0' FNL & 1256.0' FWL

OTHER SERVICES  
RPM

SEC 21 TWP 9S RGE 93W

PERMANENT DATUM GL ELEVATION 7257 FT  
LOG MEASURED FROM KB 30 FT ABOVE P.D.  
DRILL. MEAS. FROM KB  
ELEVATIONS:  
KB 7287 FT  
DF  
GL 7257 FT

DATE	10-NOV-2018
RUN	1
TRIP	1
SERVICE ORDER	US142943J
DEPTH DRILLER	7647 FT
DEPTH LOGGER	7588 FT
BOTTOM LOGGED INTERVAL	7588 FT
TOP LOGGED INTERVAL	30 FT
TIME STARTED	08:30
TIME FINISHED	11:30
OPERATOR RIG TIME	3.0 HRS
TYPE OF FLUID IN HOLE	WATER
FLUID DENSITY	NA
FLUID SALINITY	NA
FLUID LEVEL	56 FT
LOGGED CEMENT TOP	1478 FT
WELLHEAD PRESSURE	0 PSI
MAXIMUM HOLE DEVIATION	NA
NOMINAL LOGGING SPEED	100 F/MIN
MAX. RECORDED TEMP.	250 DEGF
REFERENCE LOG	NA
REFERENCE LOG DATE	NA
EQUIP. NO.	ML-4291
LOCATION	GRAND JCT.
RECORDED BY	M. BAUKA
WITNESSED BY	NA

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE THE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT. BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS, WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

## REMARKS

RUN 1 TRIP 1: \*2 OPERATIONS IN WELLBORE\*

\*\*OPERATION 1: RAL/GR/CCL RUN CENTRALIZED\*\*

\*\*OPERATION 2: RPM/GR/CCL RUN IN PNC-3D\*\*

LOGGED WITH 0 PSI ON WELLHEAD

SJ: 5680' - 5700'

SJ: 6742' - 6762'

## EQUIPMENT DATA

RUN	TRIP	TOOL	SERIES NO.	SERIAL NO.	POSITION
1	1	RAL	1426XA	11871500	CENTRALIZED
1	1	GR/CCL	1355XA	12670180	CENTRALIZED

# MAIN PASS 0 PSI

ECLIPS 7.0i ECLIPS General Release Rel 7.0i Thu Jun 08 20:36:10 CDT 2017  
Updates: 1,32

Plotted: Sat Nov 10 12:11:52 2018

## PARAMETER AND FILTER SUMMARY REPORT

FILE: /dat1a/LARAMIE\_BCU\_0993-21-10W/p012g02.prm  
LOGGING MODE: DEPTH DIRECTION: UP  
TOP DEPTH: 14.750 ft BOTTOM DEPTH: 7582.000 ft

### SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
AMPLITUDE	FILTER ()	medium (1)		"	"
TRAVEL TIME	FILTER ()	medium (1)		"	"

### RAL CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM

### ANALOG RAL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
AMPLITUDE WINDOW (NEAR)	AMP WINDOW START (fgp1*)	186	us	TOP	BOTTOM
	AMP WINDOW START (fgp2*)	186	us	"	"
	AMP WINDOW START (fgp3*)	186	us	"	"
	AMP WINDOW START (fgp4*)	186	us	"	"
	AMP WINDOW START (fgp5*)	186	us	"	"
	AMP WINDOW START (fgp6*)	186	us	"	"
	AMP WINDOW START (fgp7*)	186	us	"	"
	AMP WINDOW START (fgp8*)	186	us	"	"
	AMP WINDOW START (fgpn*)	186	us	"	"
TRAVEL TIME WINDOW (NEAR)	AMP WINDOW LENGTH	25	us	"	"
	TT WINDOW START (ttn*)	160	us	"	"
	TT WINDOW LENGTH	500	us	"	"
	FIRST BRK THRESHOLD (ttn*)	4	mV	"	"
RAL CASING PARAMETERS	PPT NEAR	200.391	us	"	"
RAL TOOL DELAY	TOOL DELAY (str1*)	-66	us	"	"
	TOOL DELAY (str2*)	-66	us	"	"
	TOOL DELAY (str3*)	-66	us	"	"
	TOOL DELAY (str4*)	-66	us	"	"
	TOOL DELAY (str5*)	-66	us	"	"
	TOOL DELAY (str6*)	-66	us	"	"
	TOOL DELAY (str7*)	-66	us	"	"
	TOOL DELAY (str8*)	-66	us	"	"
	TOOL DELAY (strn*)	-66	us	"	"
BASELINE NOISE (NEAR)	NOISE WINDOW START	125	us	"	"
	NOISE WINDOW LENGTH	25	us	"	"

### PERCENT BOND CEMENT MAP

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
RAL FREE PIPE AMPLITUDE	FREE AMP REC 1	80	mV	TOP	BOTTOM
	FREE AMP REC 2	80	mV	"	"
	FREE AMP REC 3	80	mV	"	"
	FREE AMP REC 4	80	mV	"	"
	FREE AMP REC 5	80	mV	"	"
	FREE AMP REC 6	80	mV	"	"
	FREE AMP REC 7	80	mV	"	"

	FREE AMP REC 8	80	mV	"	"
RAL FULL BOND AMPLITUDE	FULL BOND AMP REC 1	2	mV	"	"
	FULL BOND AMP REC 2	2	mV	"	"
	FULL BOND AMP REC 3	2	mV	"	"
	FULL BOND AMP REC 4	2	mV	"	"
	FULL BOND AMP REC 5	2	mV	"	"
	FULL BOND AMP REC 6	2	mV	"	"
	FULL BOND AMP REC 7	2	mV	"	"
	FULL BOND AMP REC 8	2	mV	"	"

## CURVE DESCRIPTION REPORT

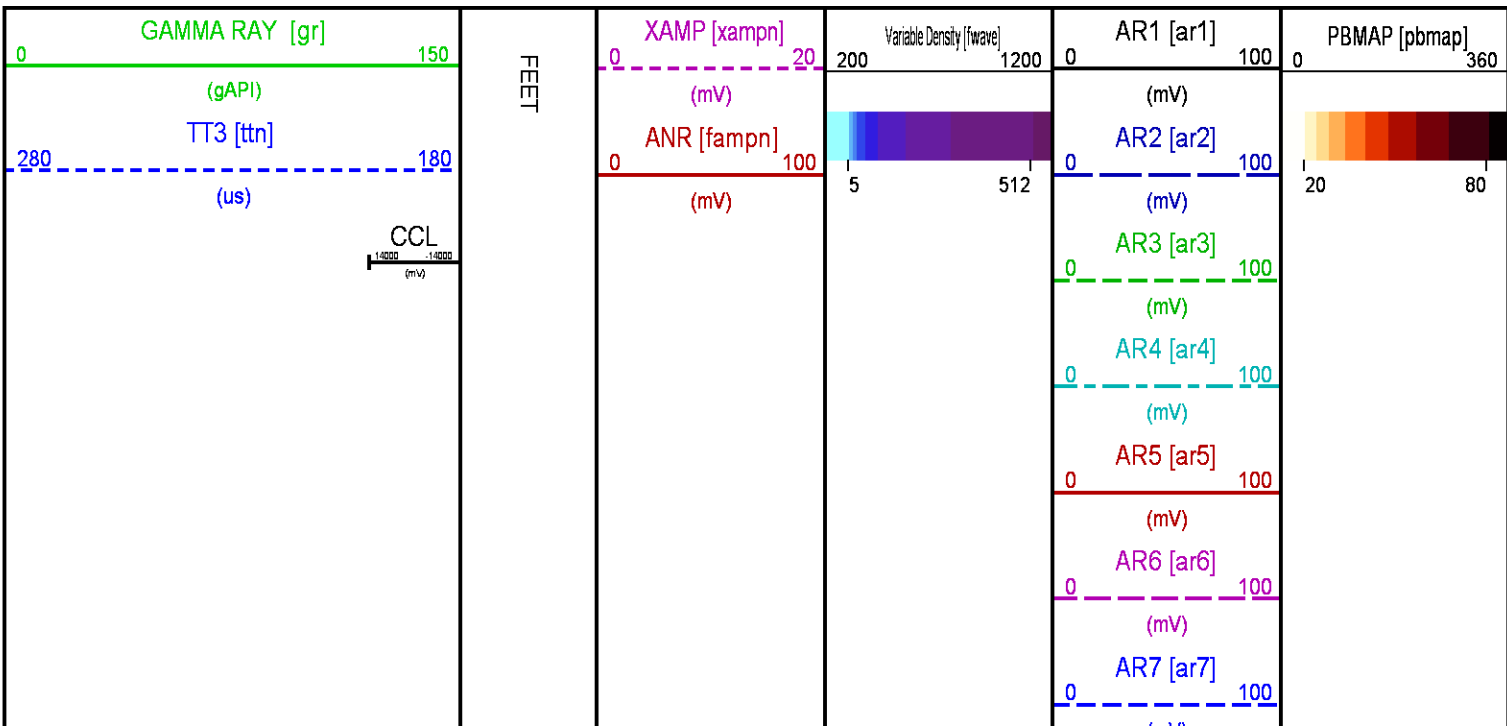
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:AR1	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R1
F1:AR2	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R2
F1:AR3	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R3
F1:AR4	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R4
F1:AR5	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R5
F1:AR6	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R6
F1:AR7	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R7
F1:AR8	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE T-R8
F1:CCL	Nov 10 09:53:43 2018	CASING COLLAR LOCATOR
F1:FAMPN	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE NEAR RECEIVER
F1:FWAVE	Nov 10 09:53:43 2018	FAR WAVE FORM
F1:GR	Nov 10 09:53:43 2018	GAMMA RAY
F1:PBMAP	Nov 10 09:53:43 2018	PERCENT BOND CEMENT MAP
F1:TTN	Nov 10 09:53:43 2018	TRAVELTIME FROM NEAR TRANSMITTER-RECEIVER
F1:XAMPN	Nov 10 09:53:43 2018	FIXED GATE AMPLITUDE NEAR RECEIVER TIMES FIVE

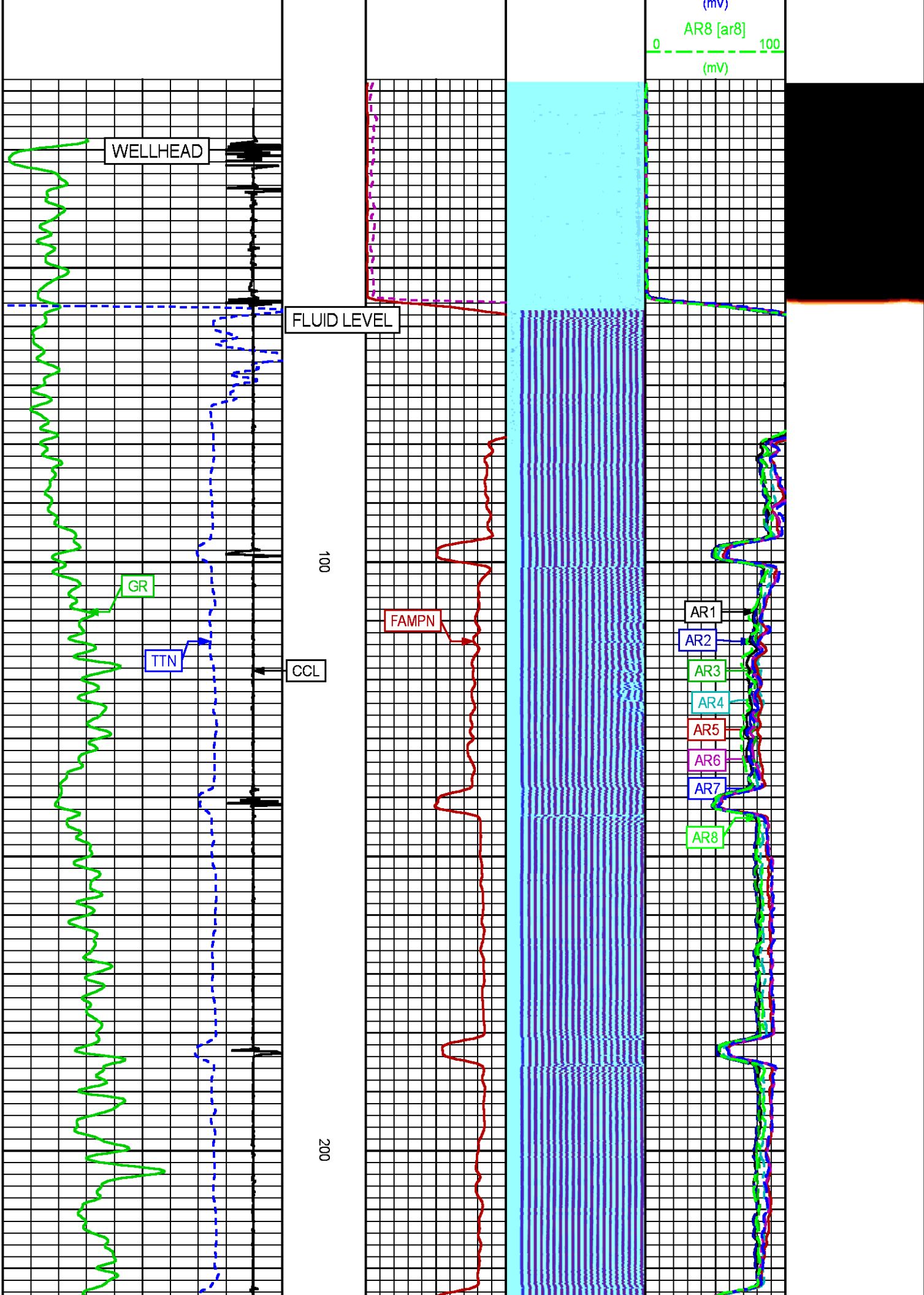
## CURVE MEASURE POINT OFFSET

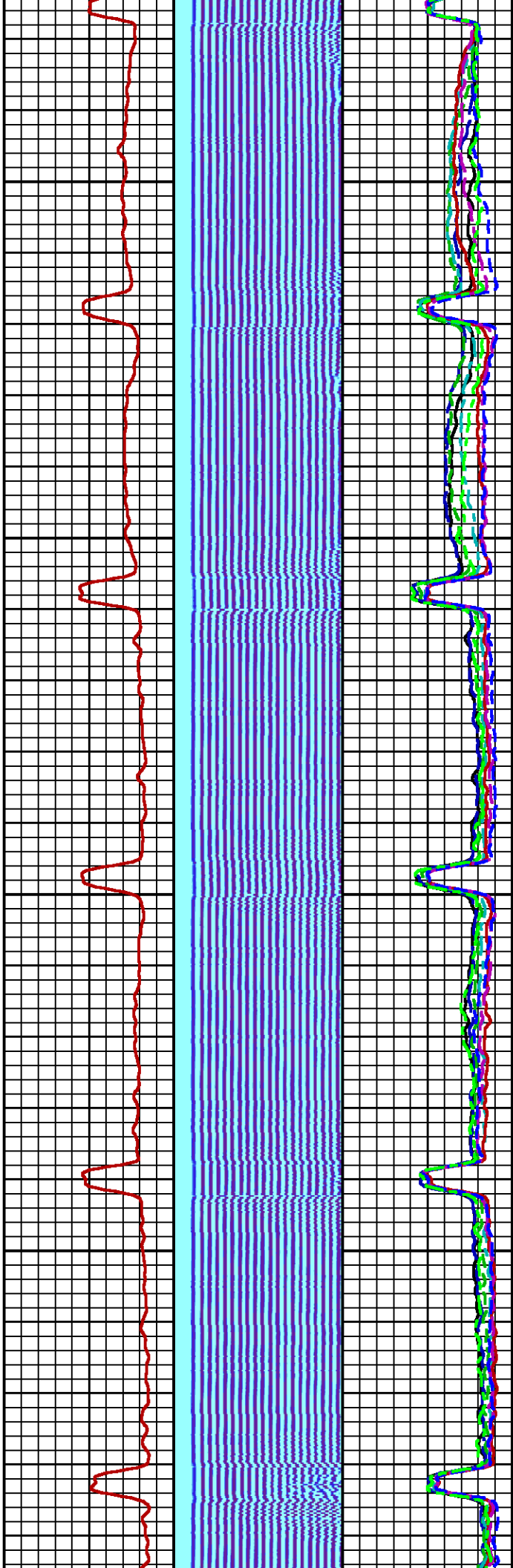
CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
AR1	-11.25	AR5	-11.25	CCL	-5.75	XAMPN	-11.25
AR2	-11.25	AR6	-11.25	FAMPN	-11.25		
AR3	-11.25	AR7	-11.25	GR	-1.75		
AR4	-11.25	AR8	-11.25	TTN	-11.25		

Presentation : SysA:/dat1a/LARAMIE\_BCU\_0993-21-10W/BCU\_0993-21-10W\_RAL\_MAIN.fvpdf [5"/100' Scale]  
Plot Interval : 18.5 - 7594.75 Feet

Data File 1 : F1 : SysA:/dat1a/LARAMIE\_BCU\_0993-21-10W/45\_LARAMIE\_BCU\_0993-21-10W\_RAL\_MAIN.xtf  
Created On : Nov 10 09:53:43 2018  
Company : LARAMIE ENERGY LLC  
Well : BCU 0993-21-10W  
Field : BUZZARD CREEK  
File Interval : 14.75 - 7596 Feet  
OCT : p012g

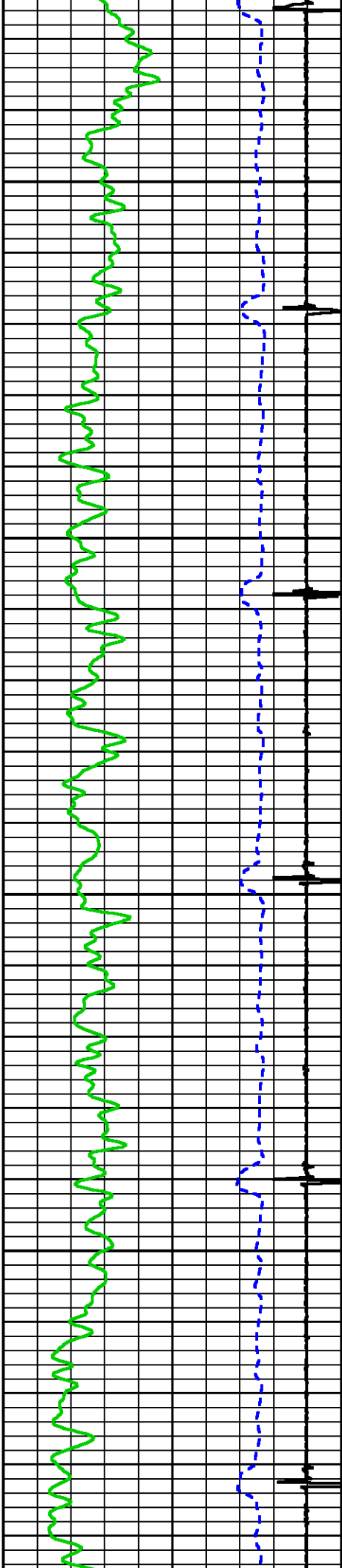


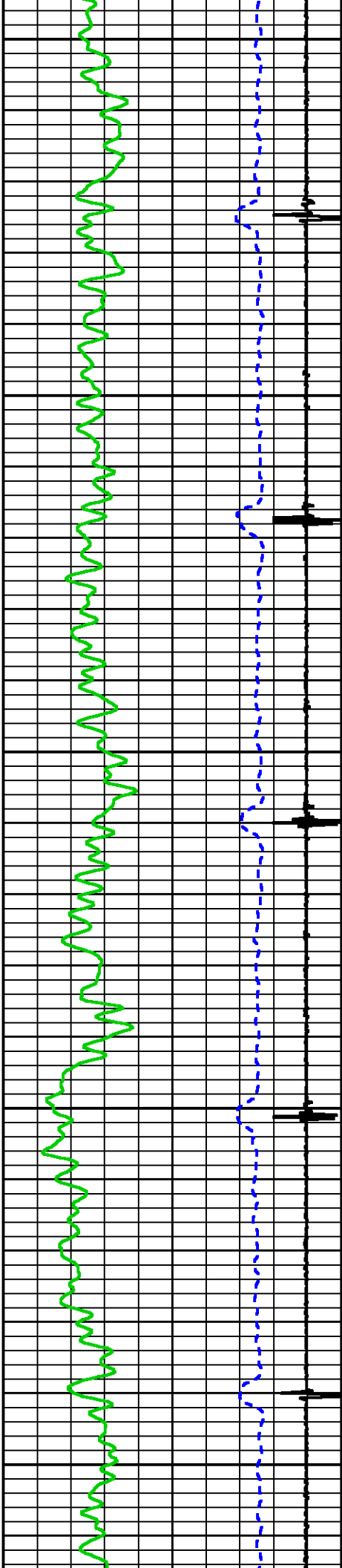




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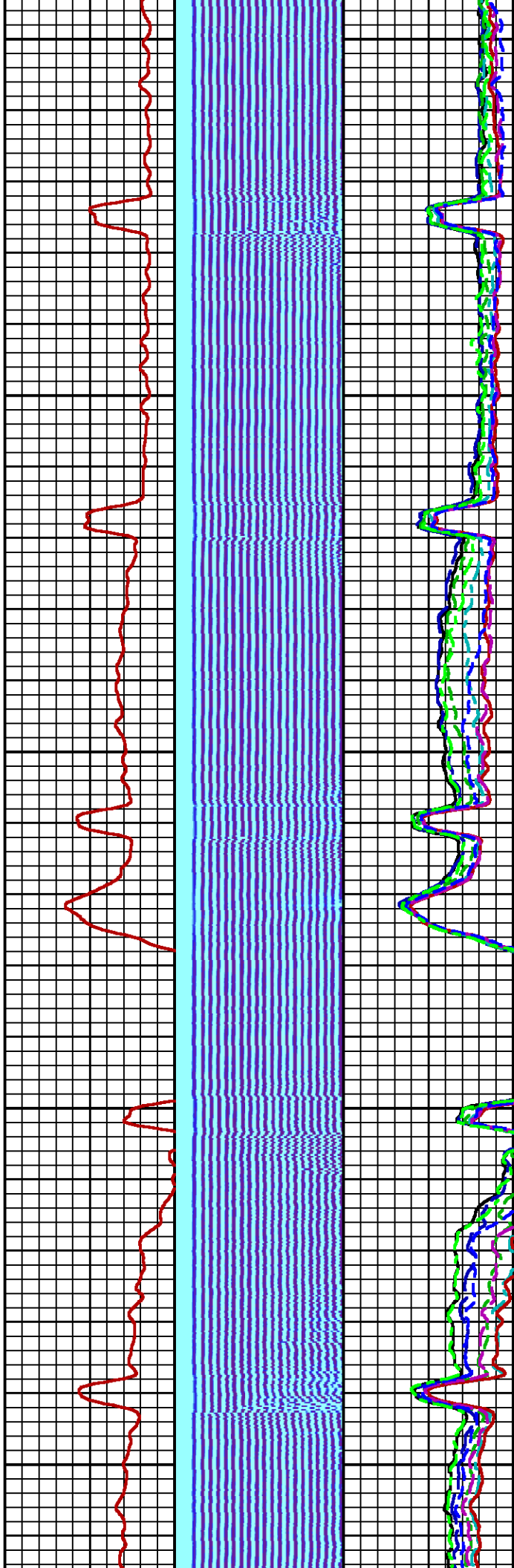
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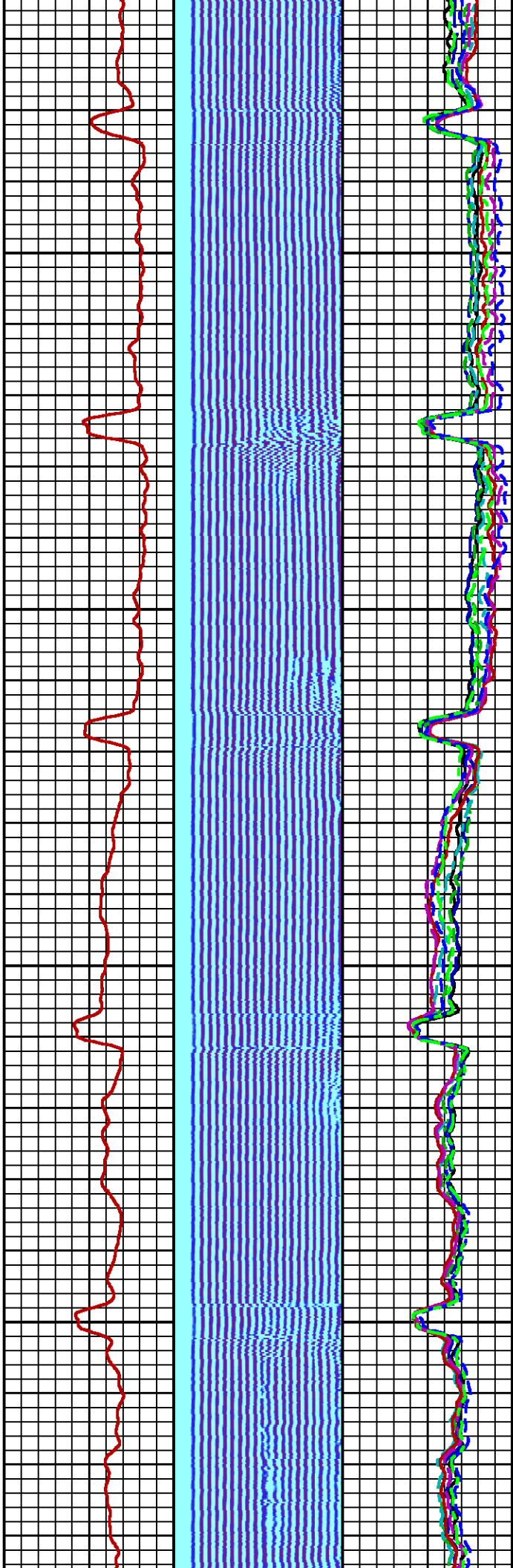




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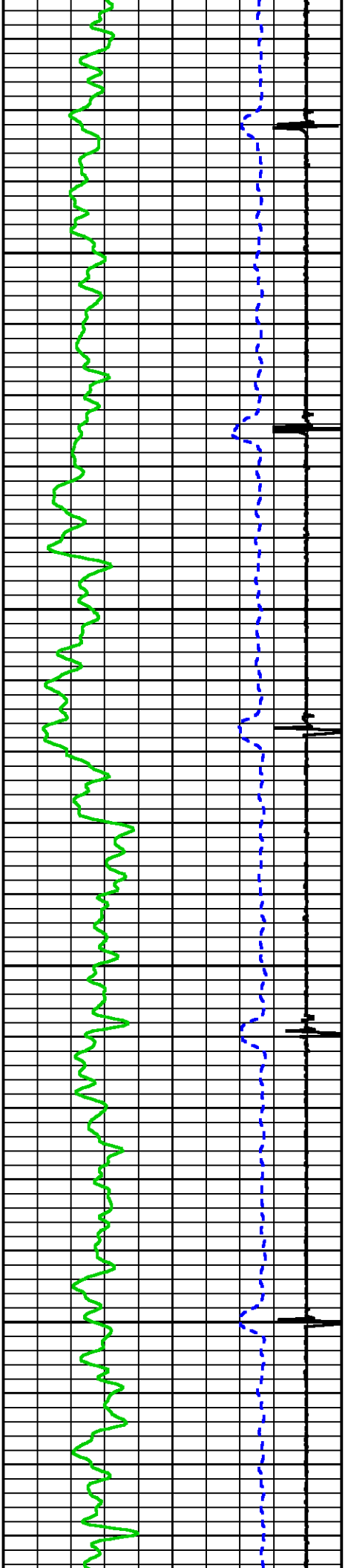
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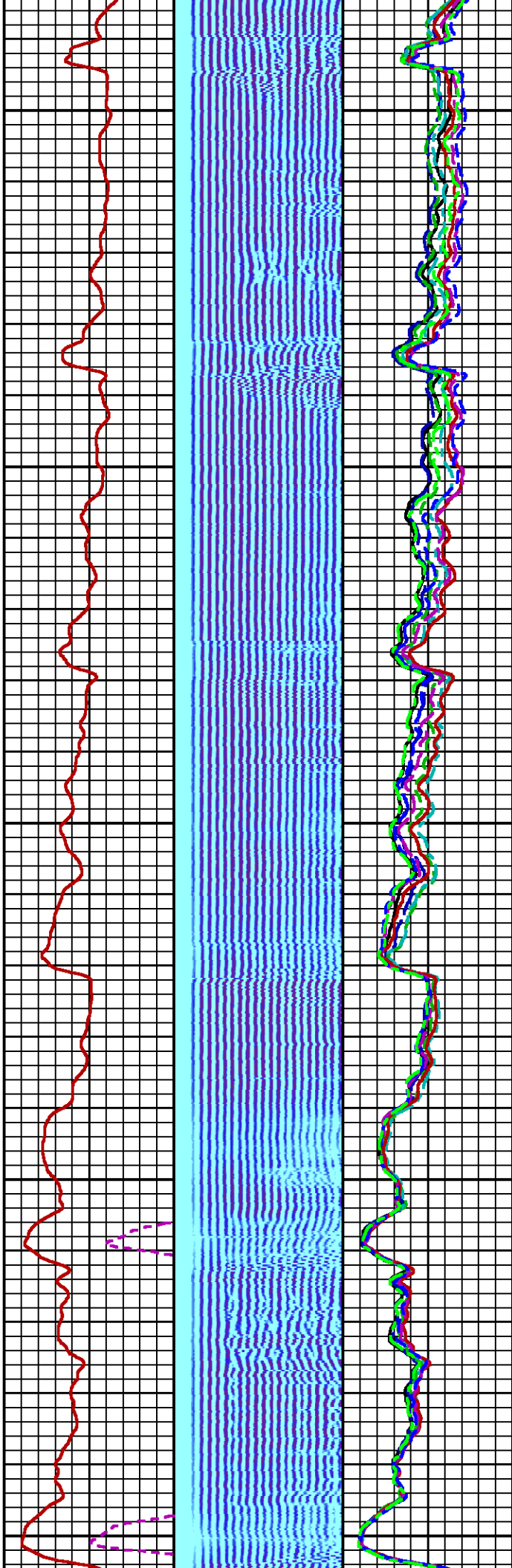
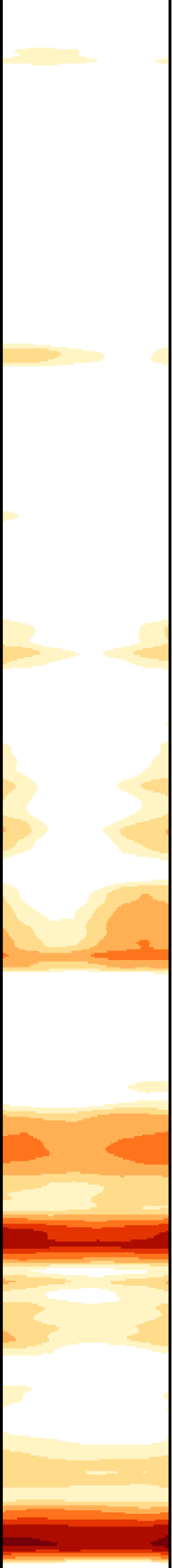


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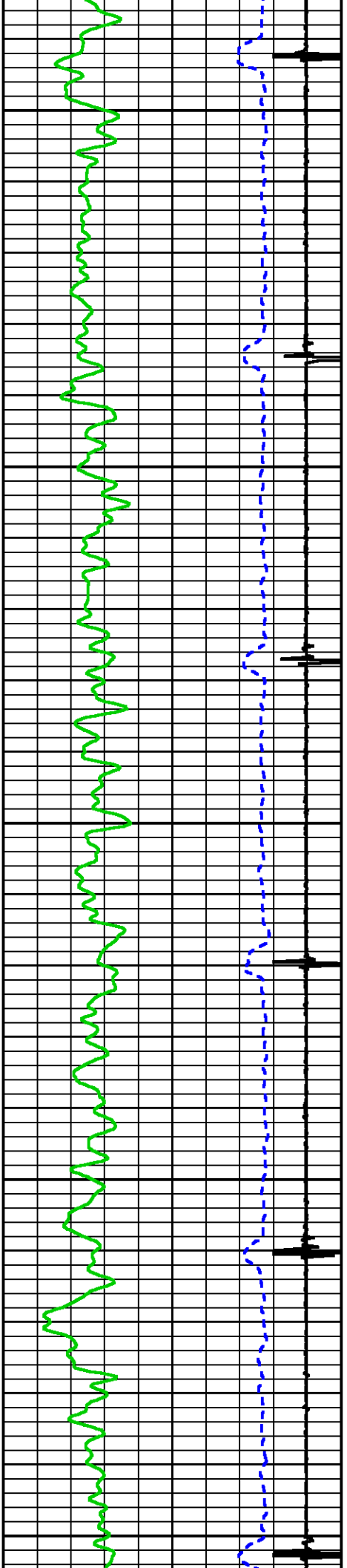




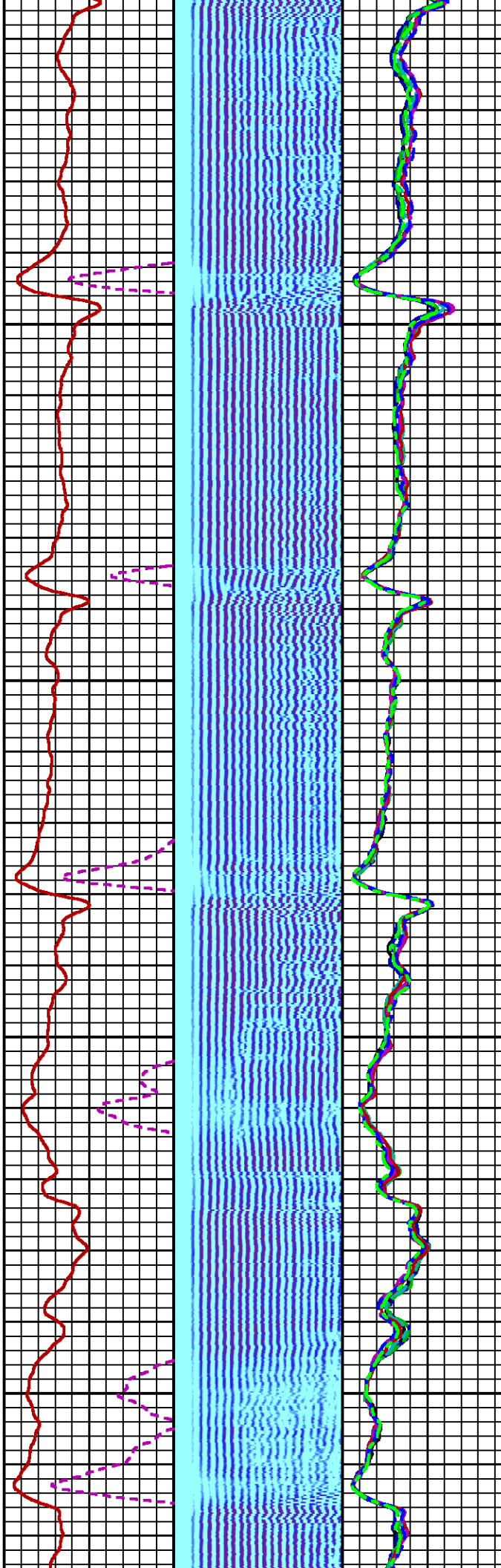
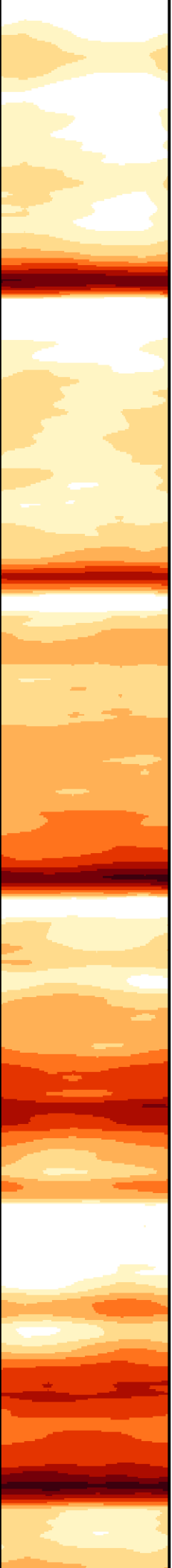
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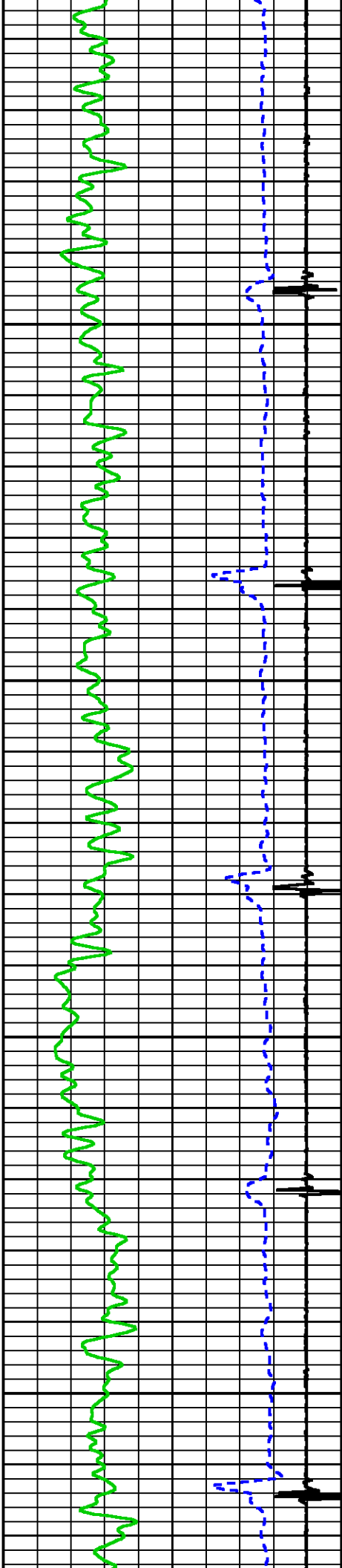


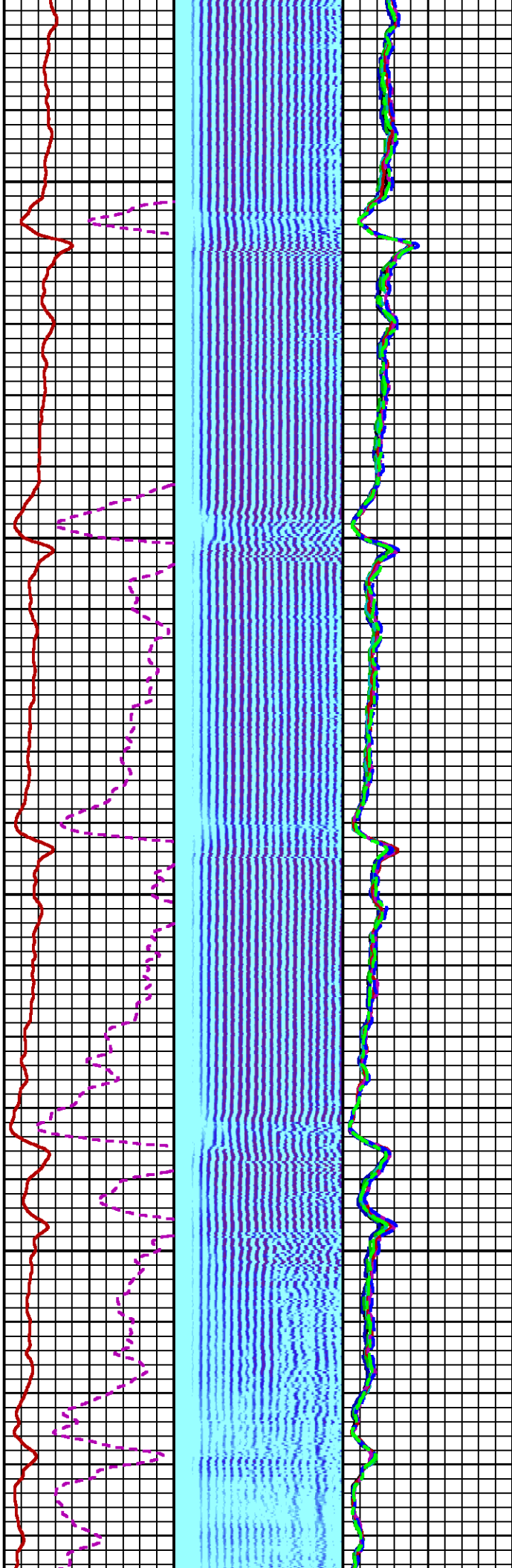




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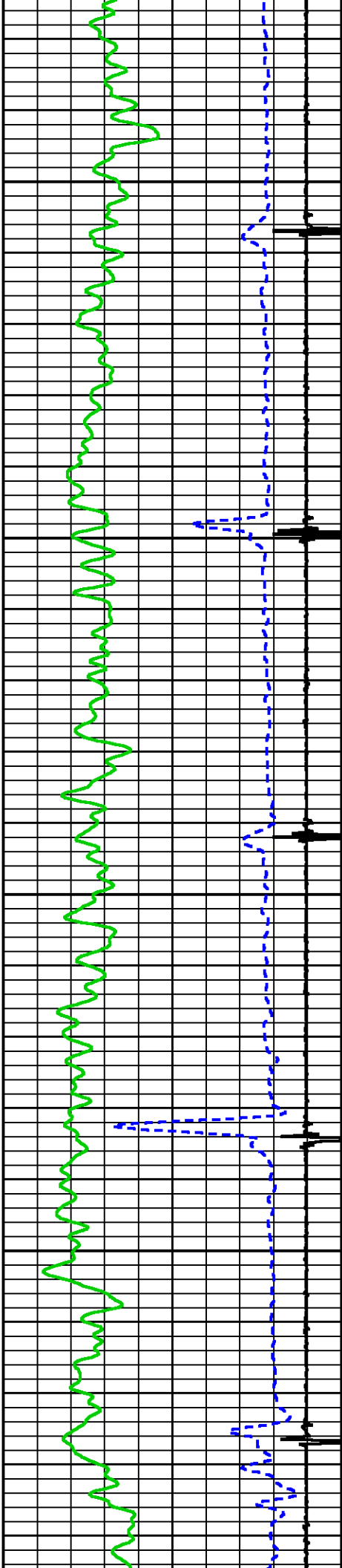


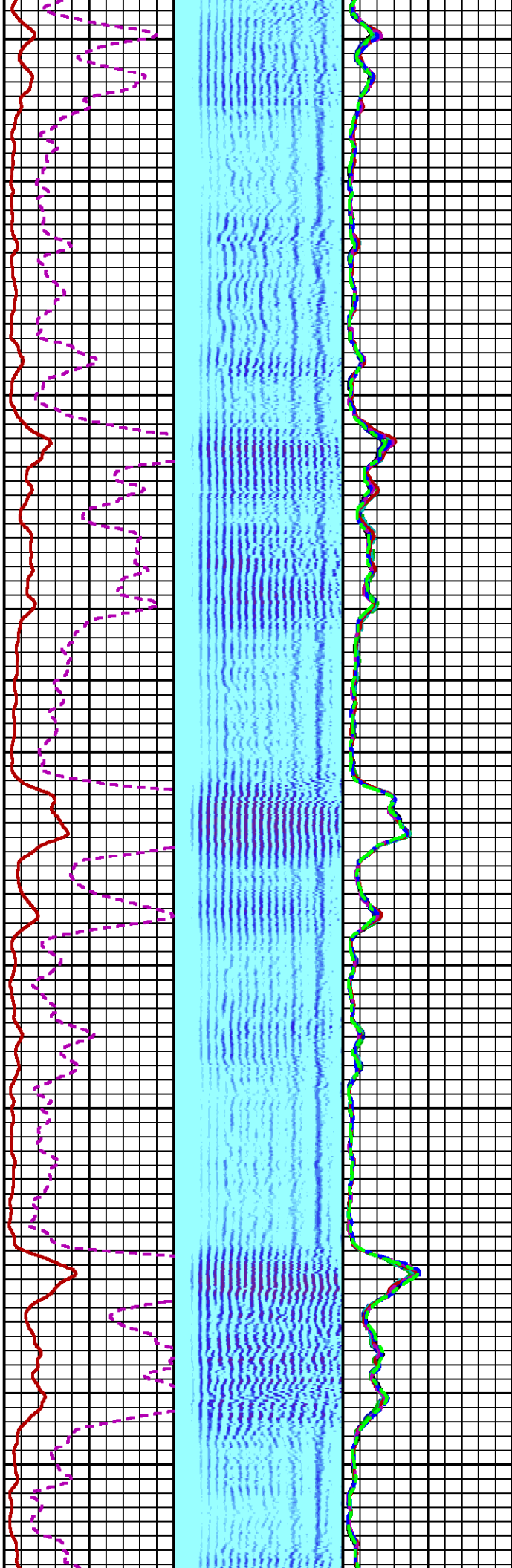


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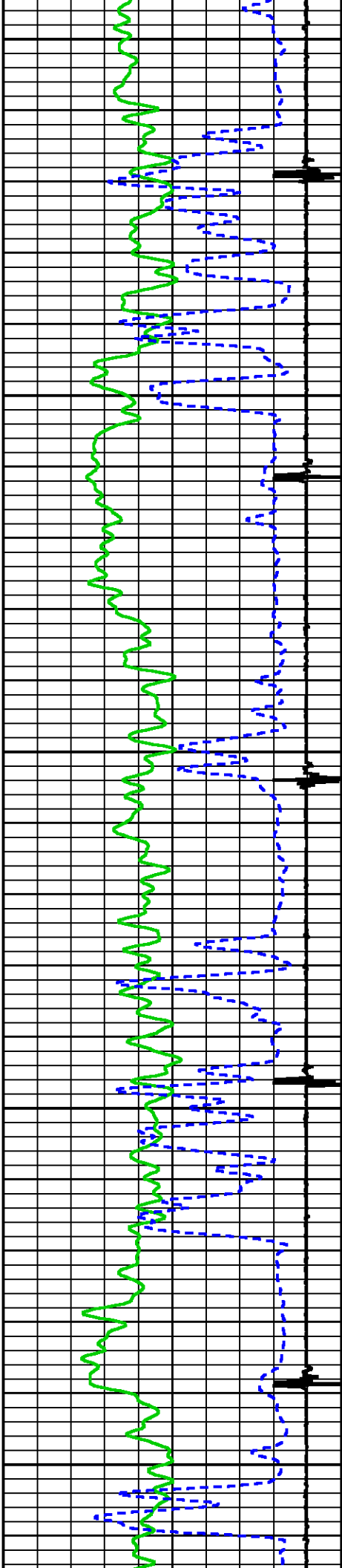
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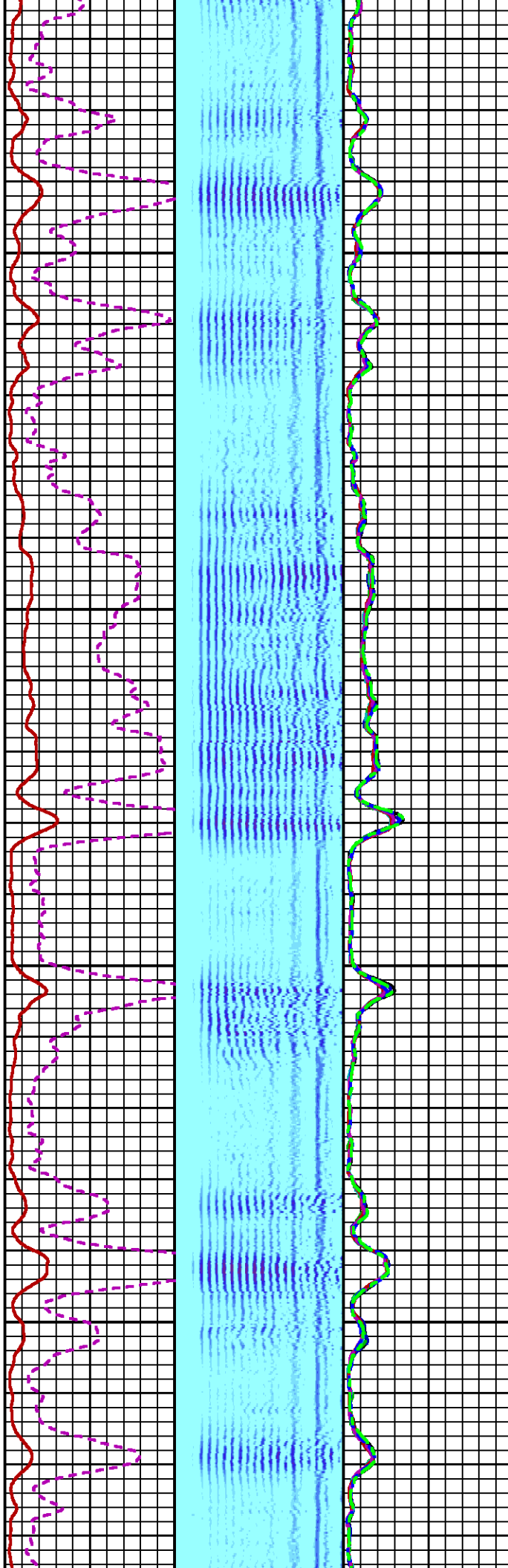
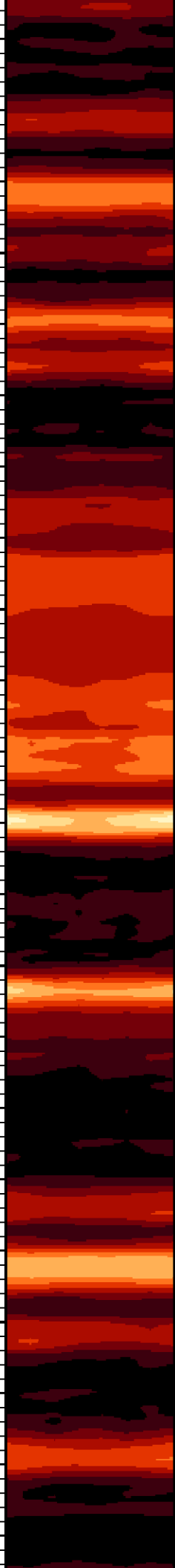




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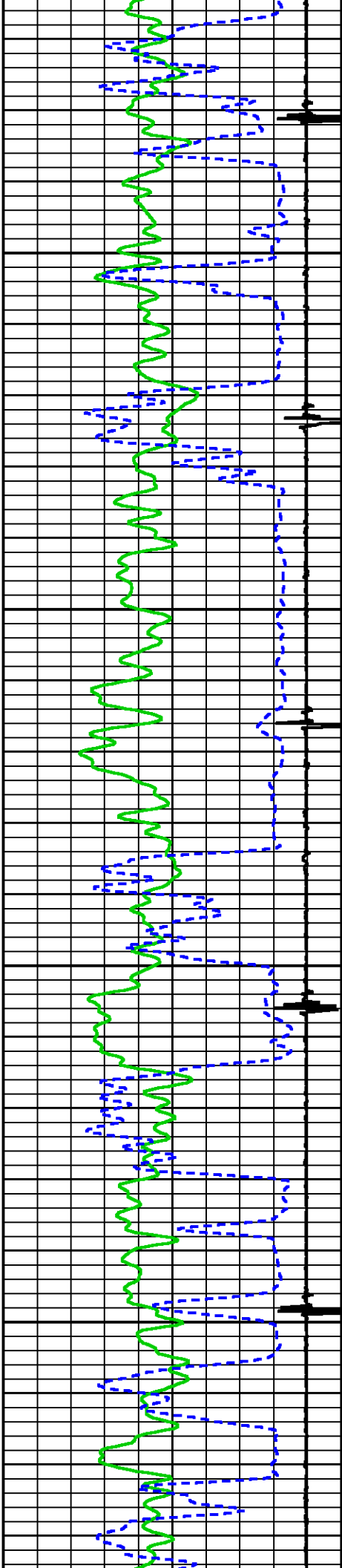
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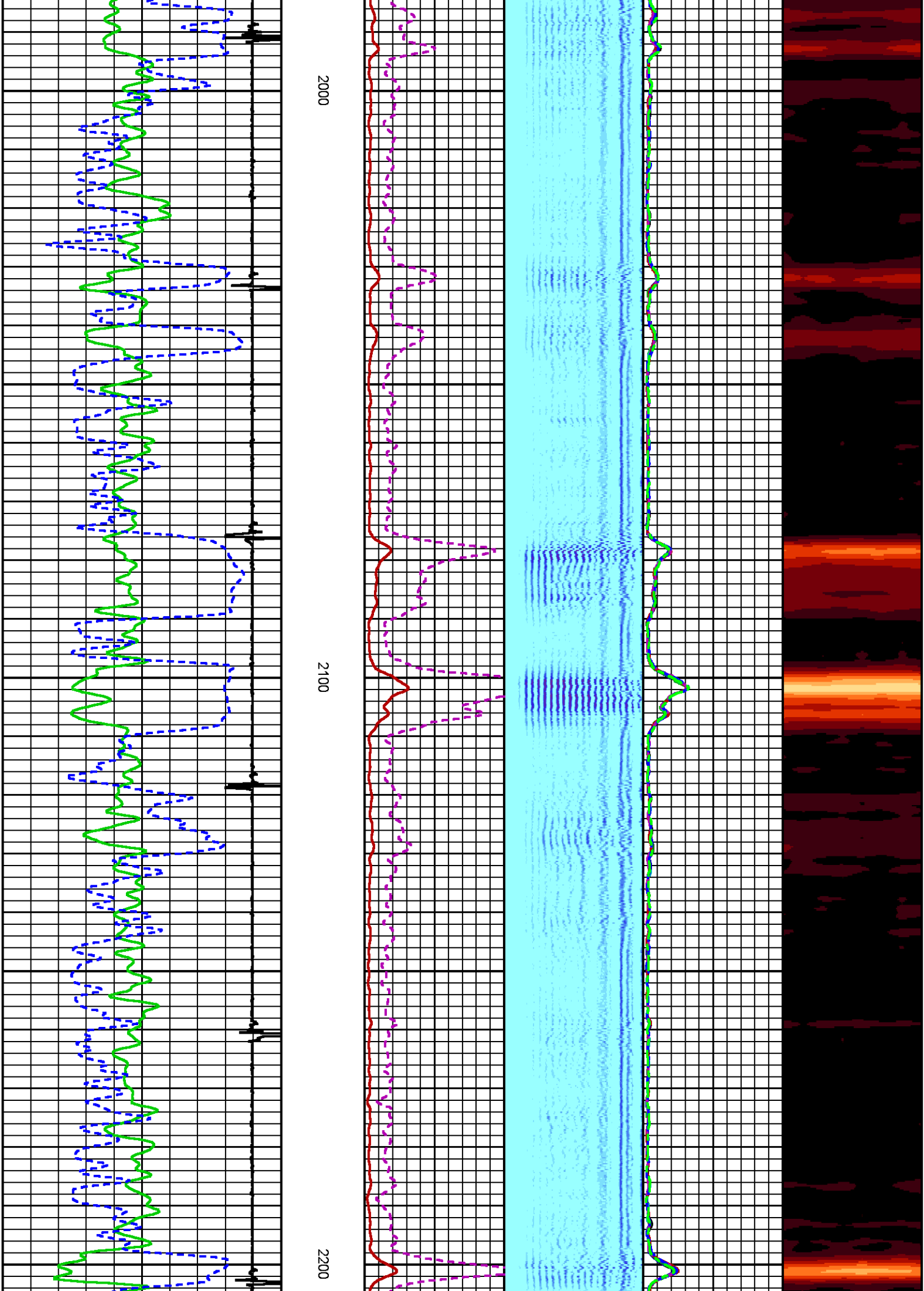




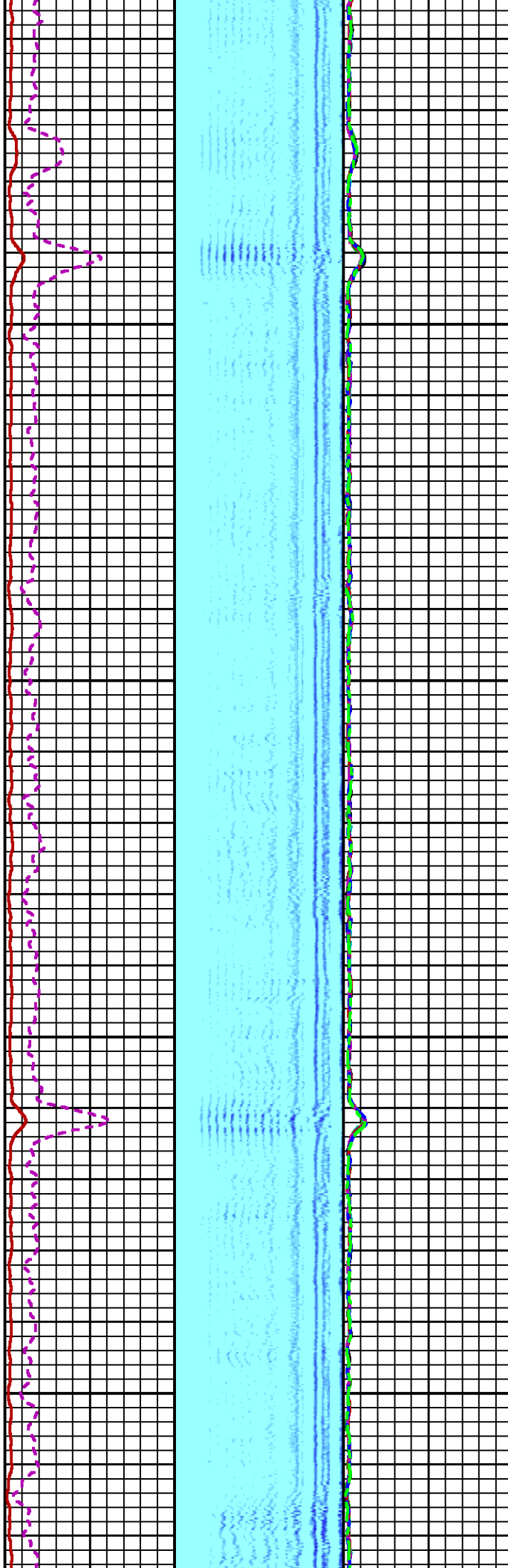
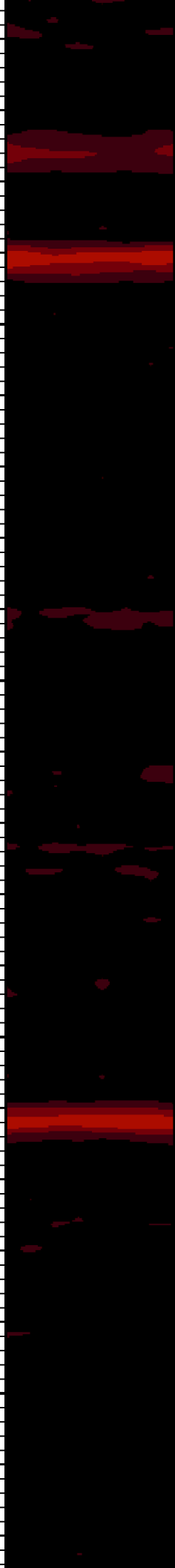
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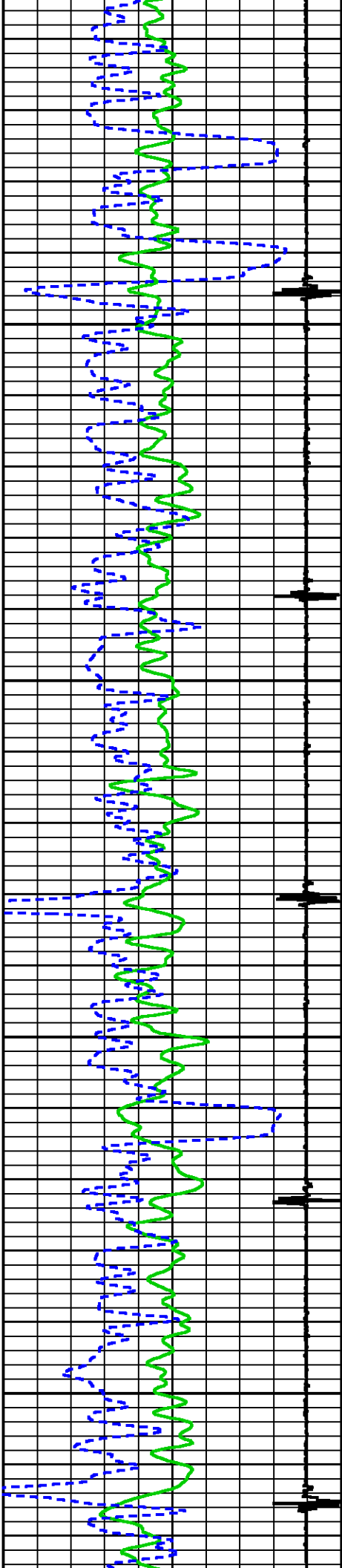




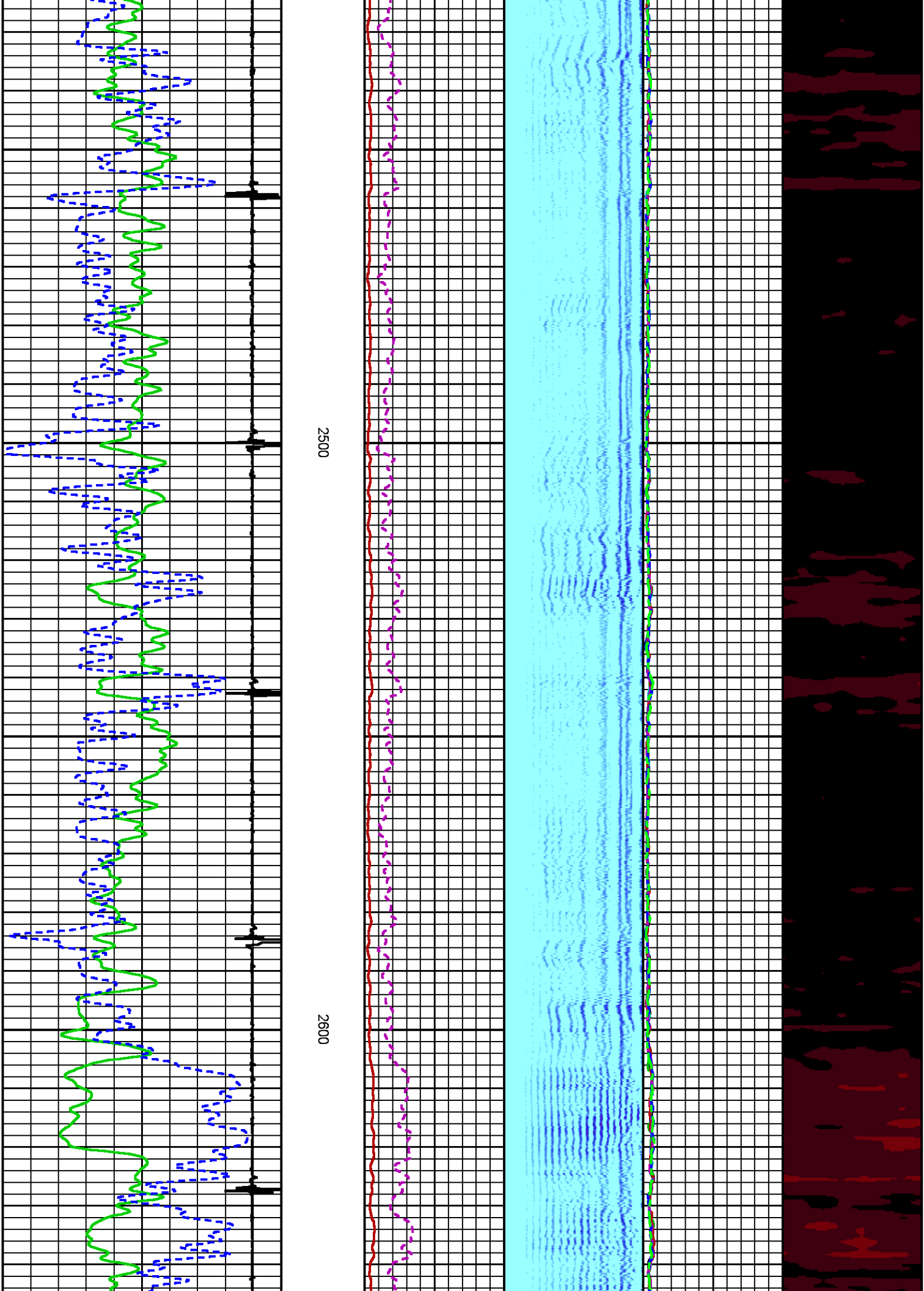


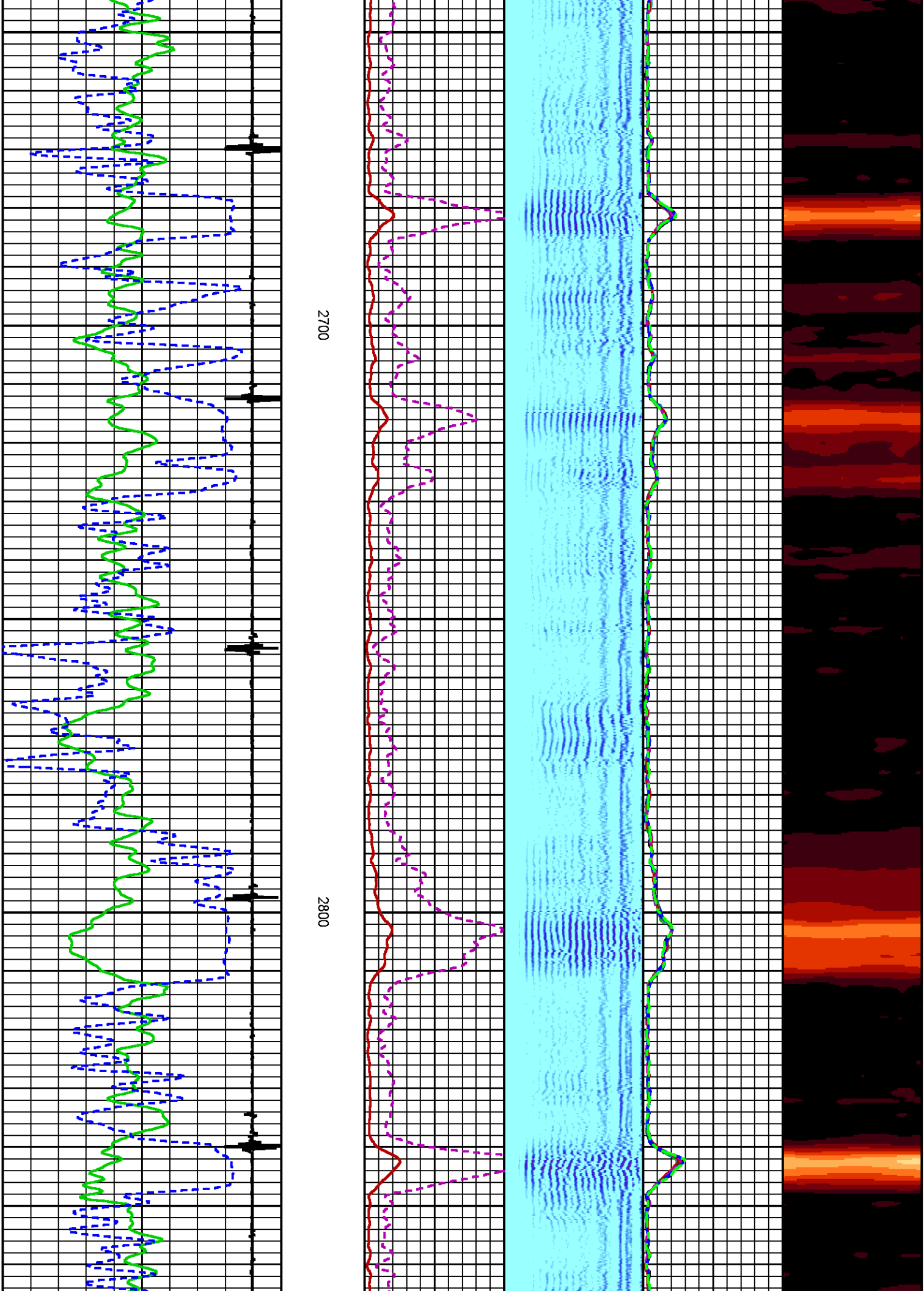
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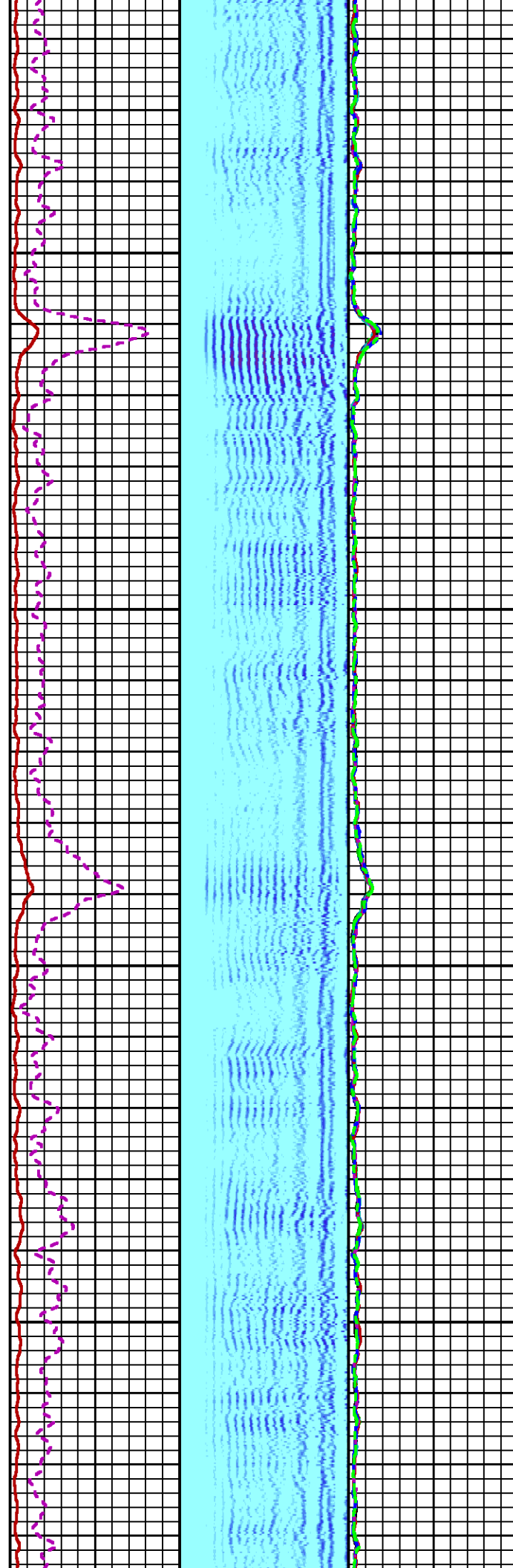
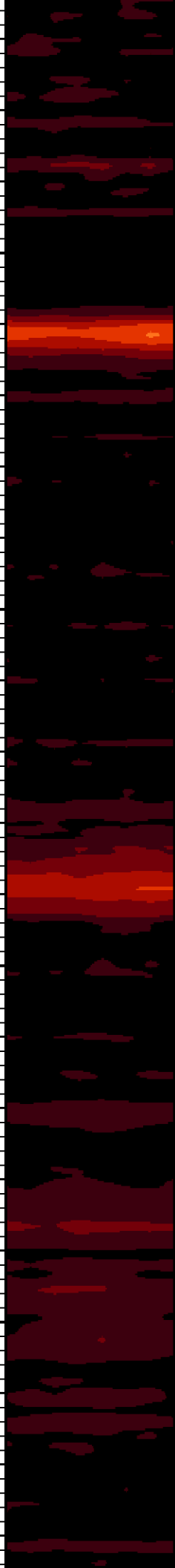
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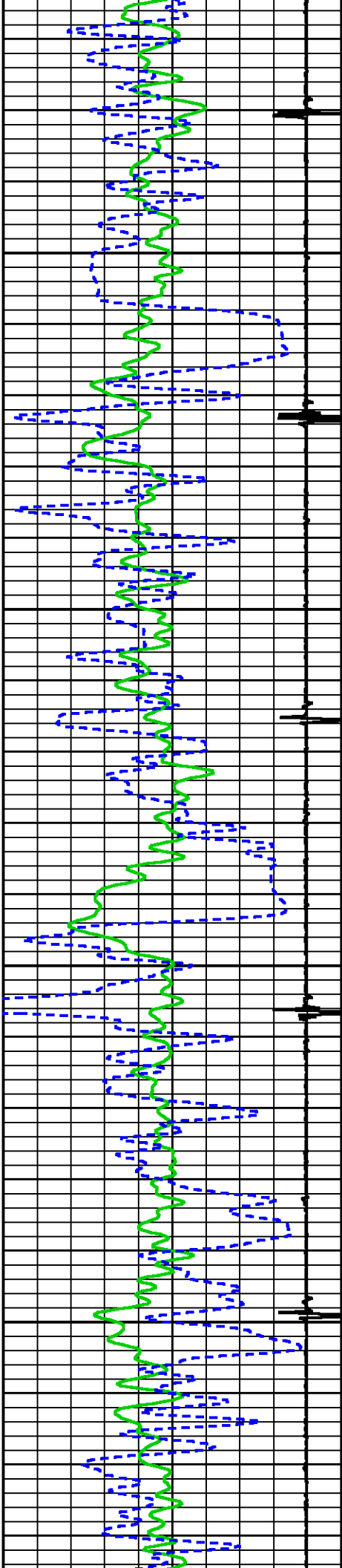


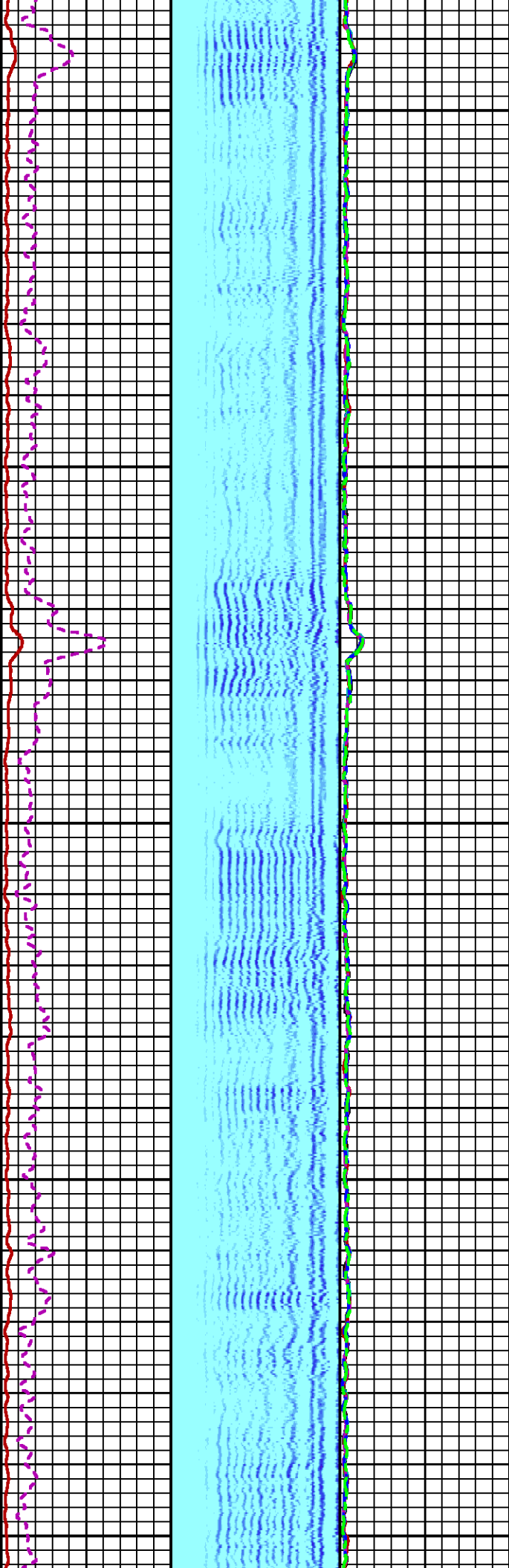




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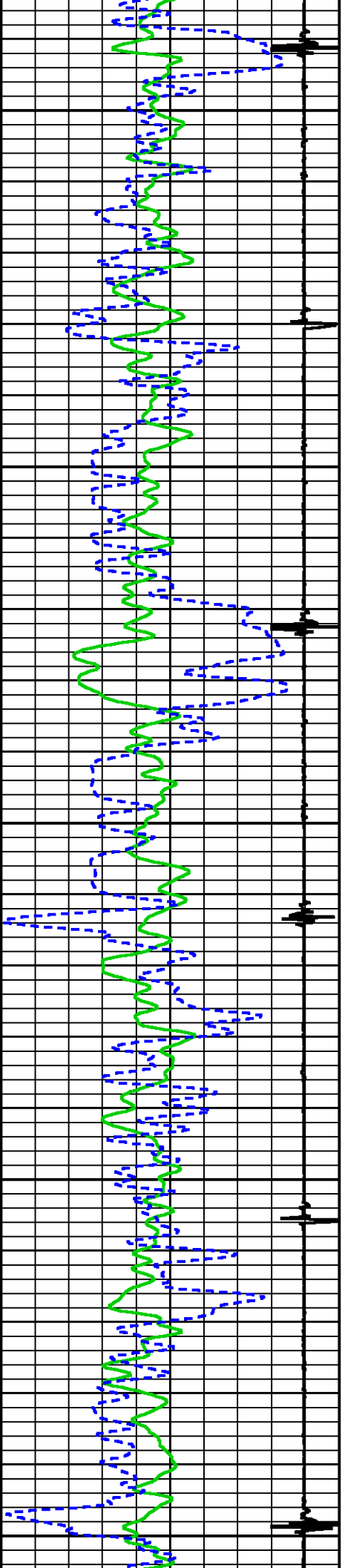


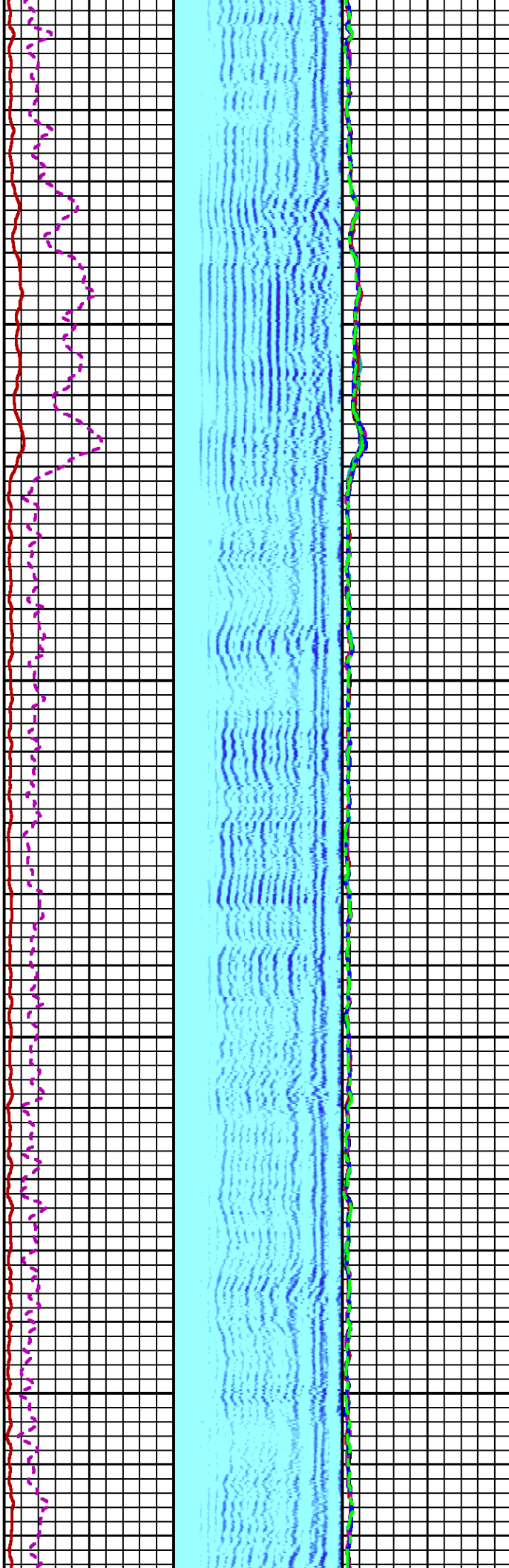
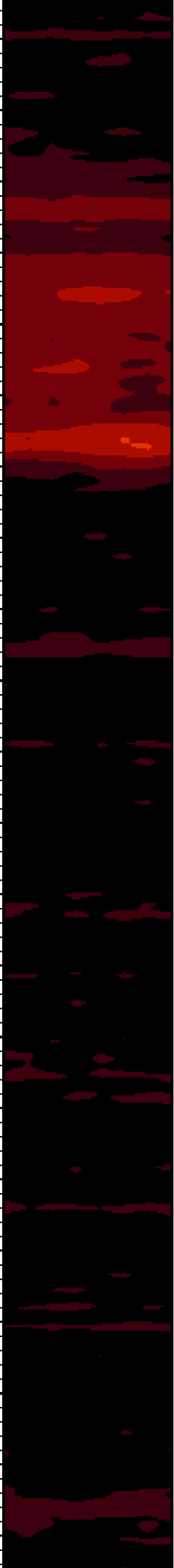


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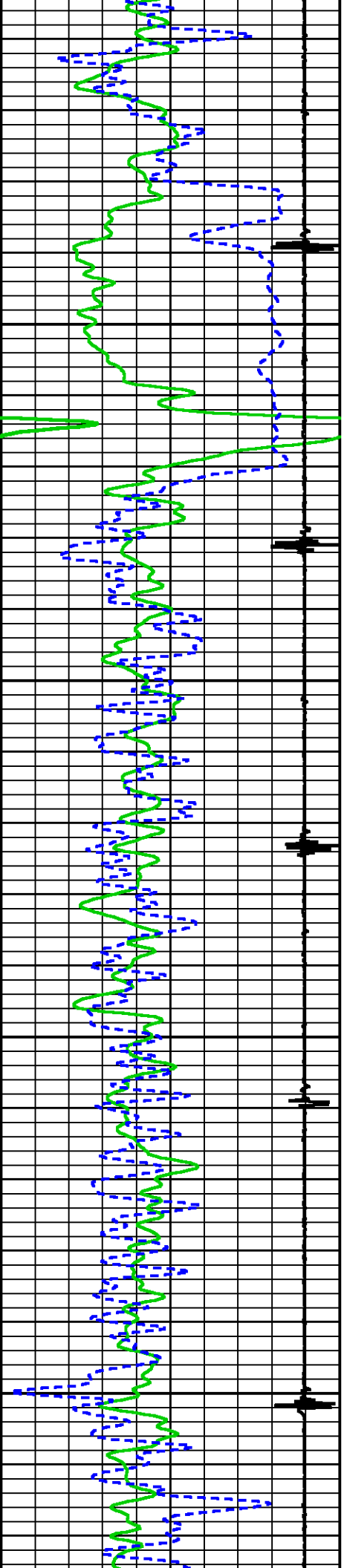
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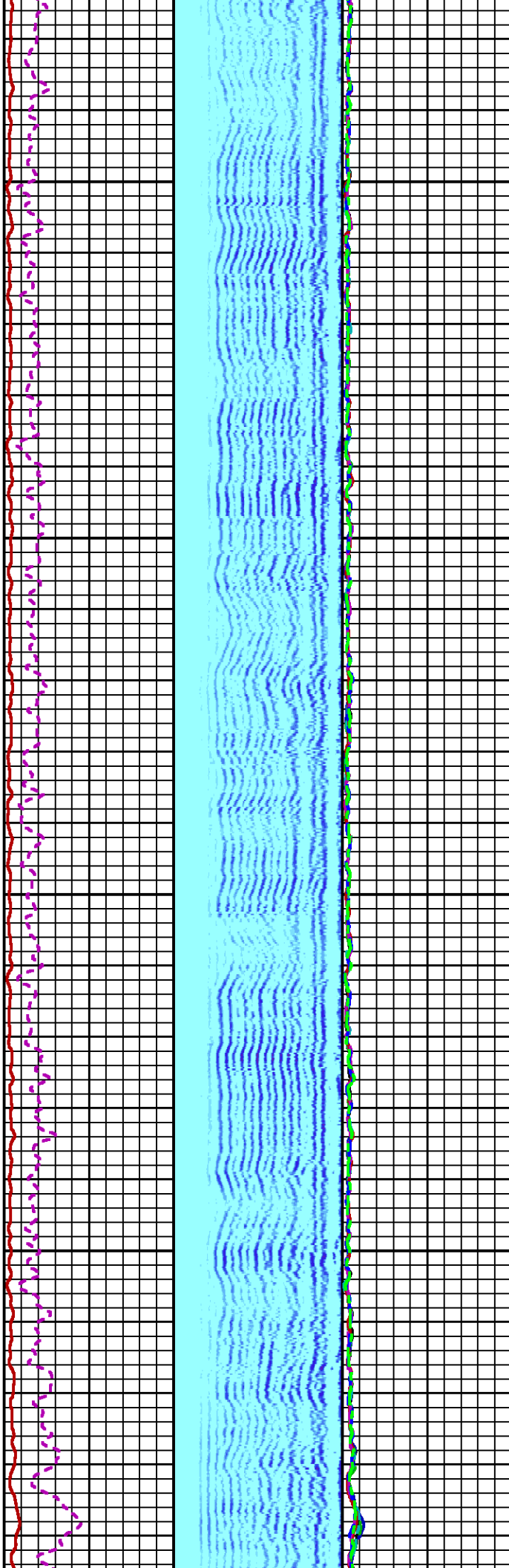
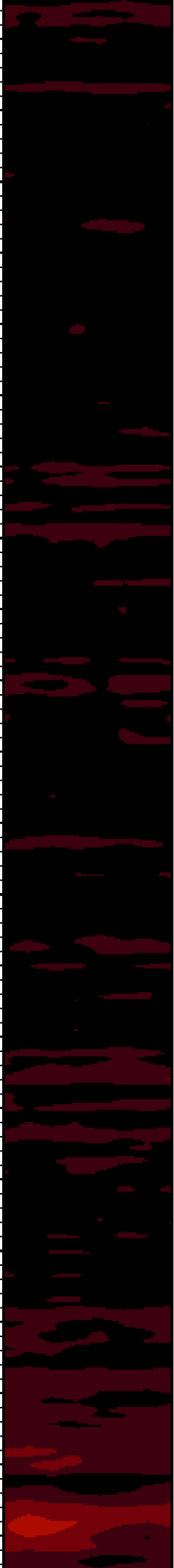


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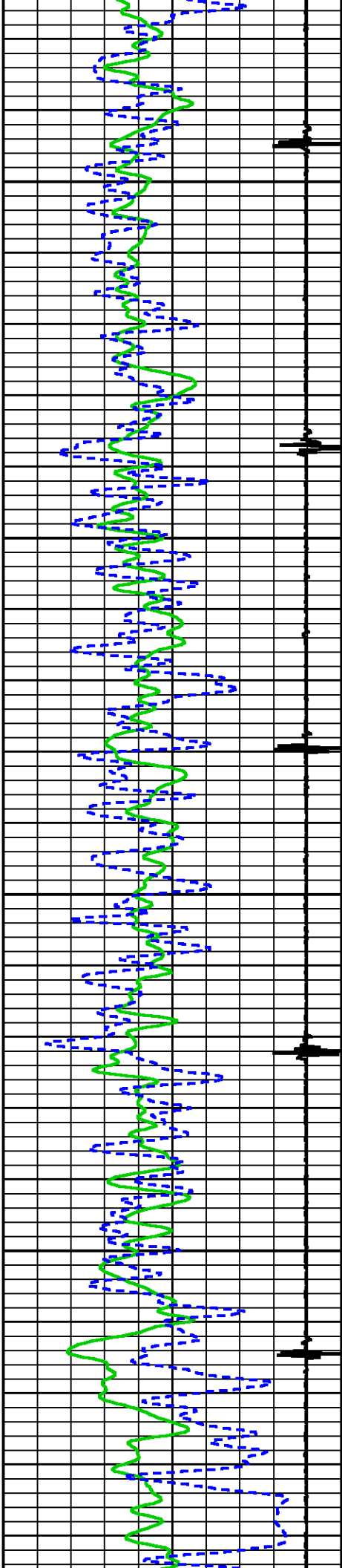




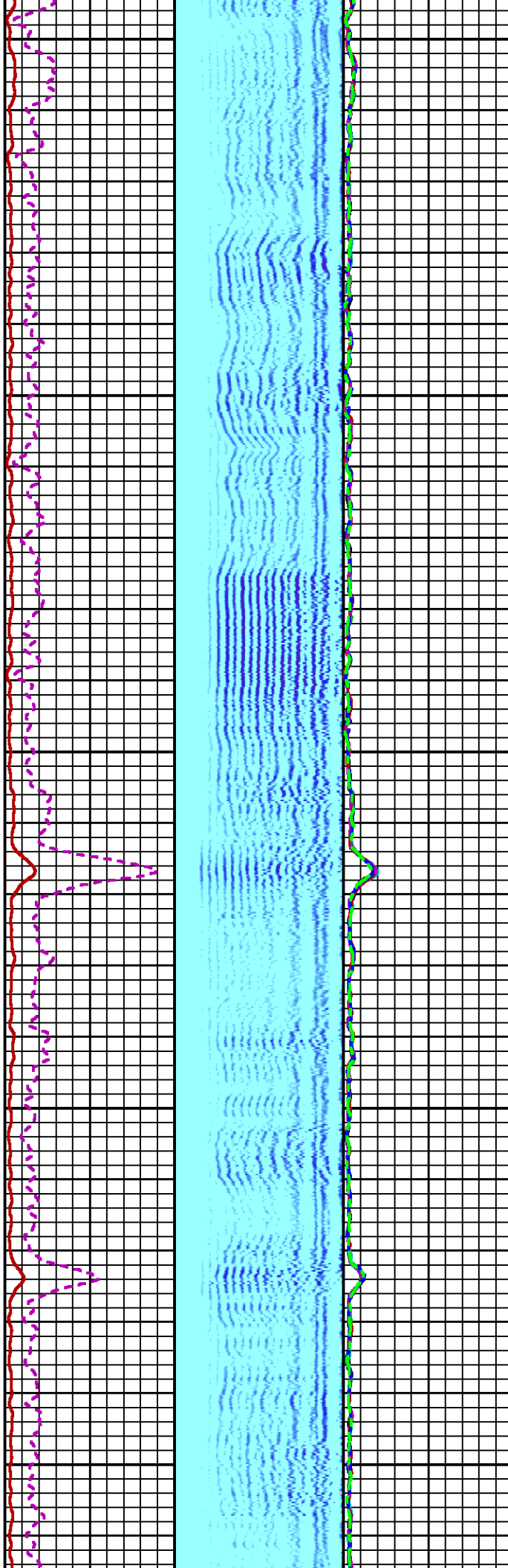
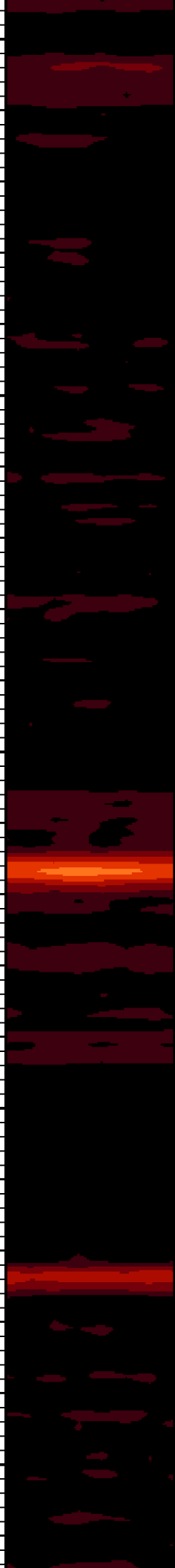


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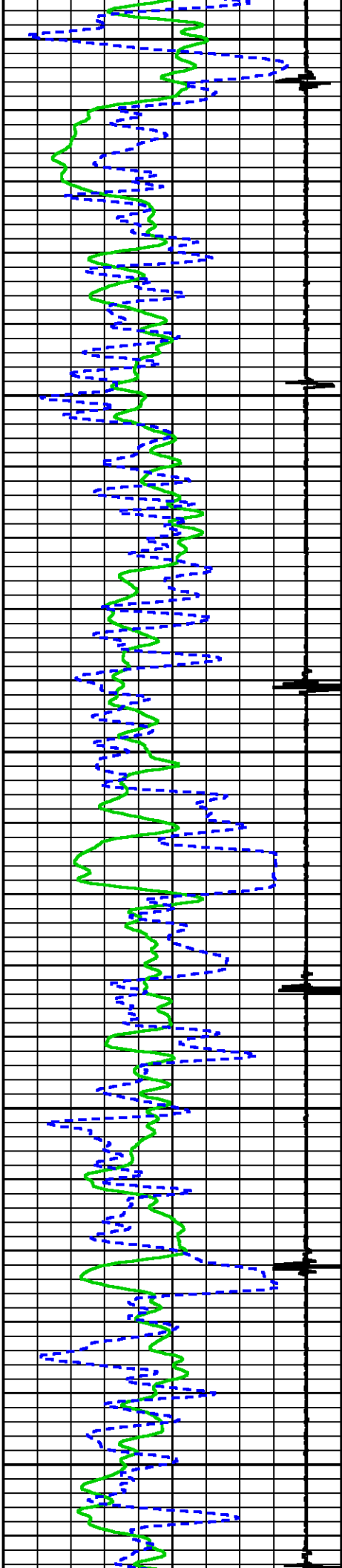


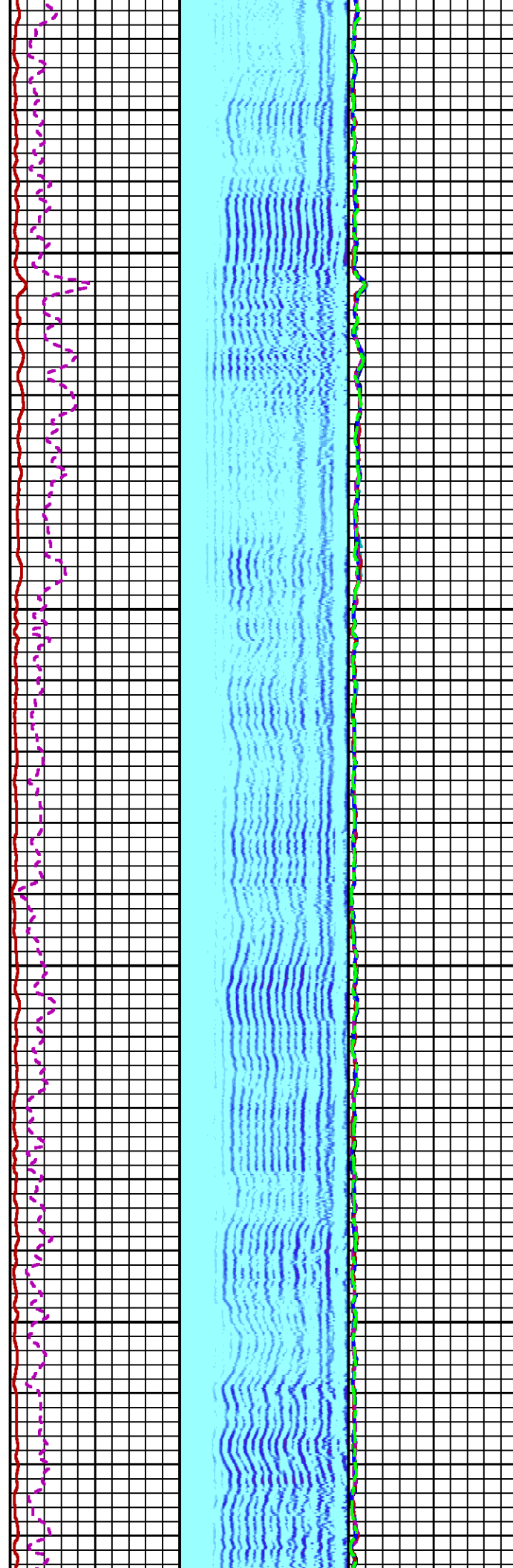
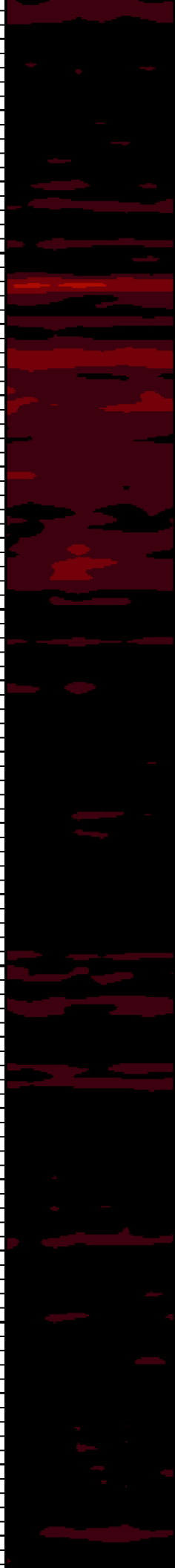




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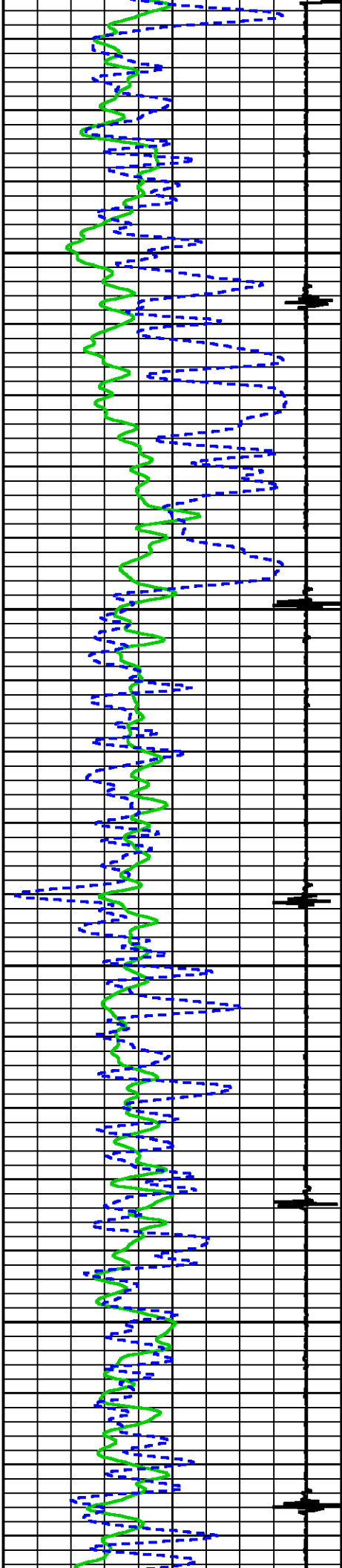
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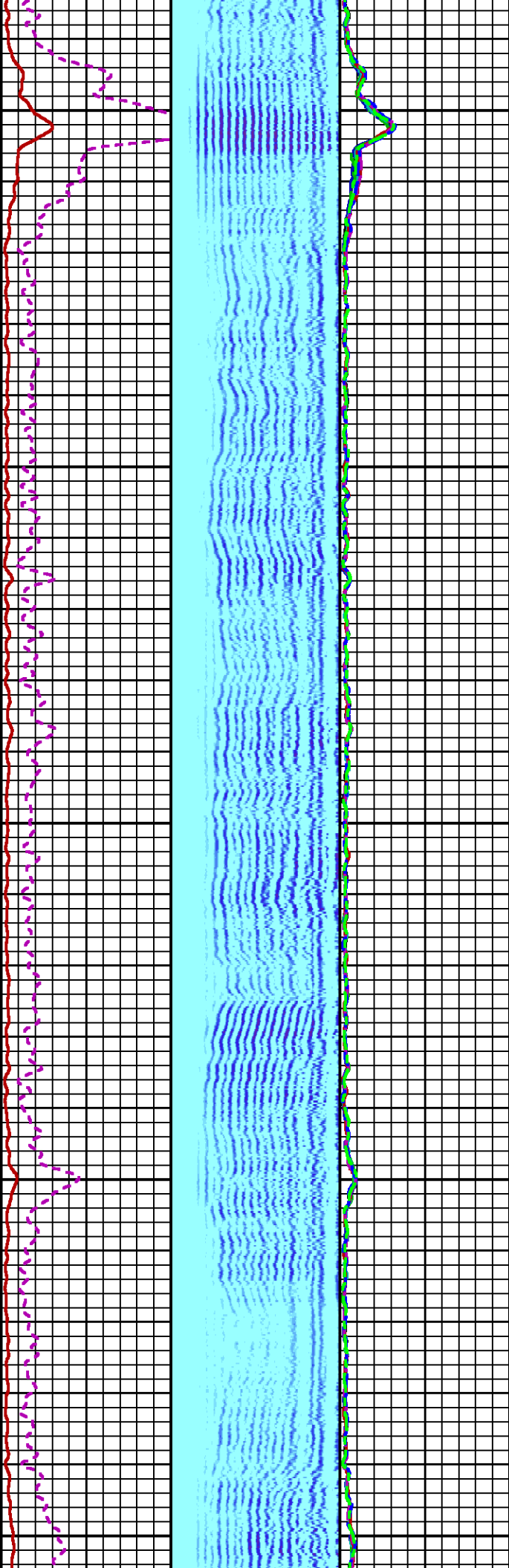




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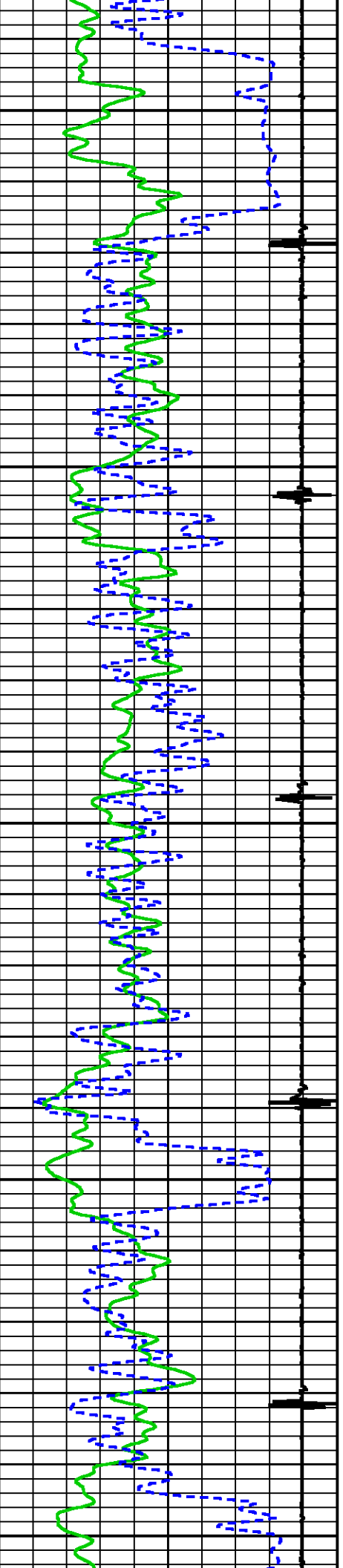


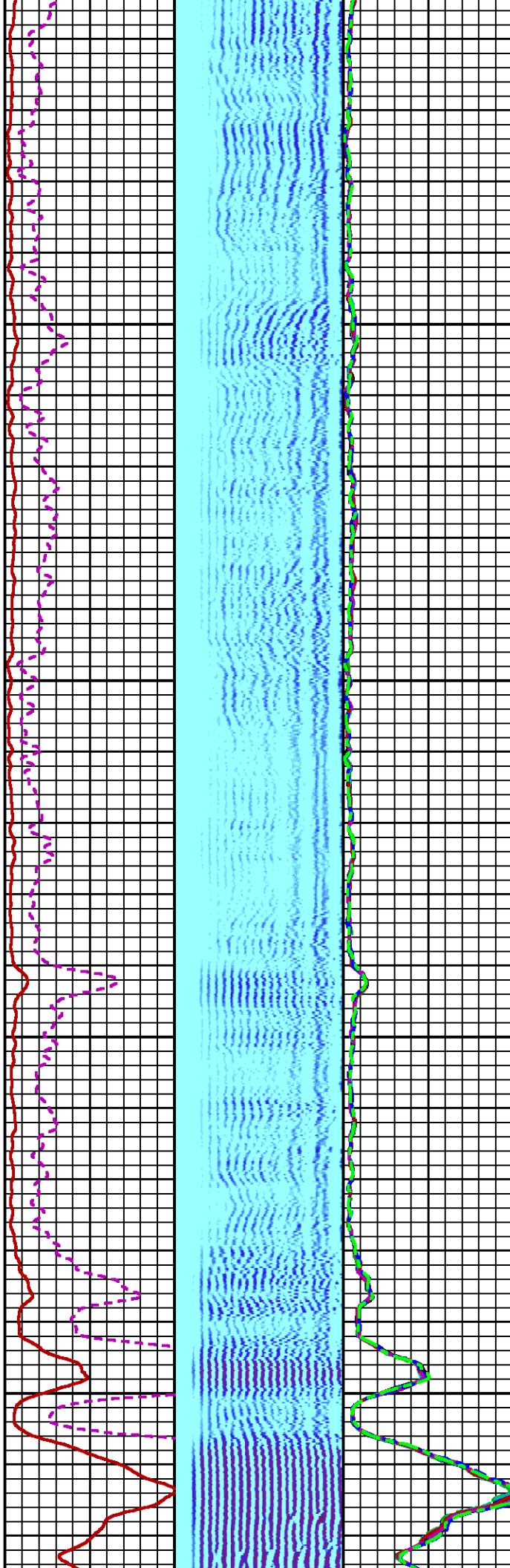
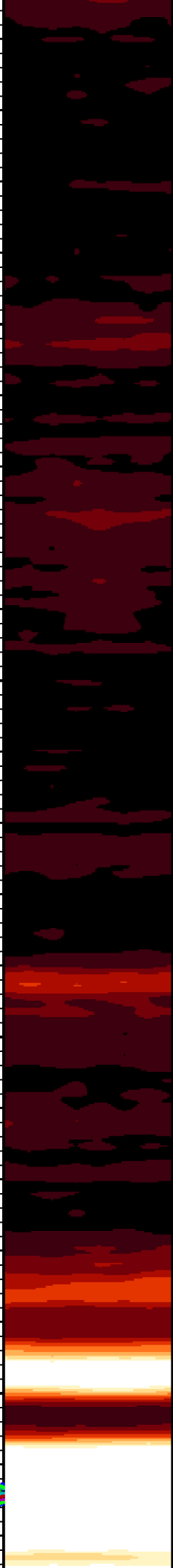


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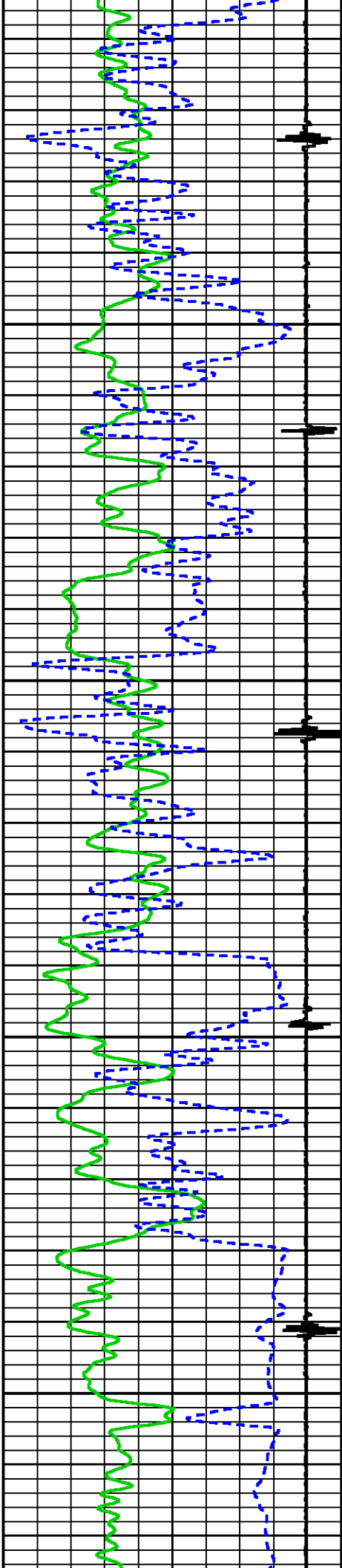
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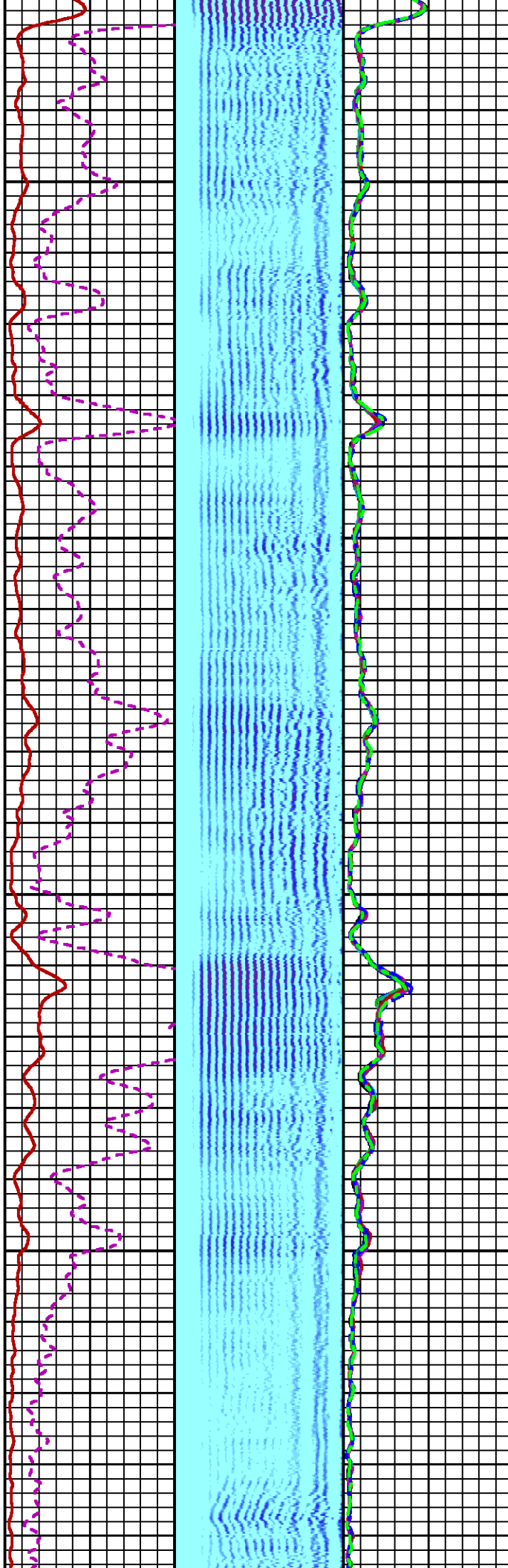
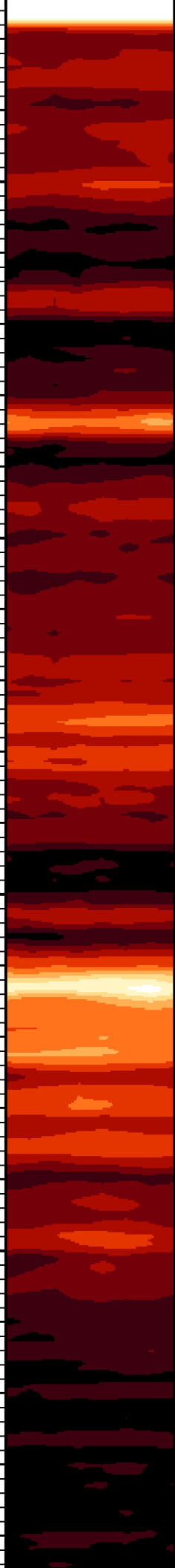




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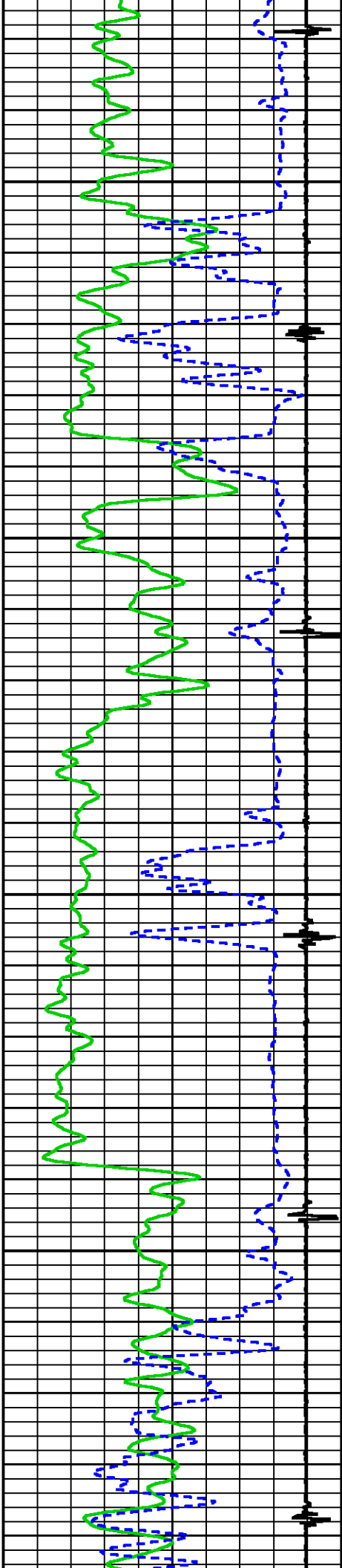
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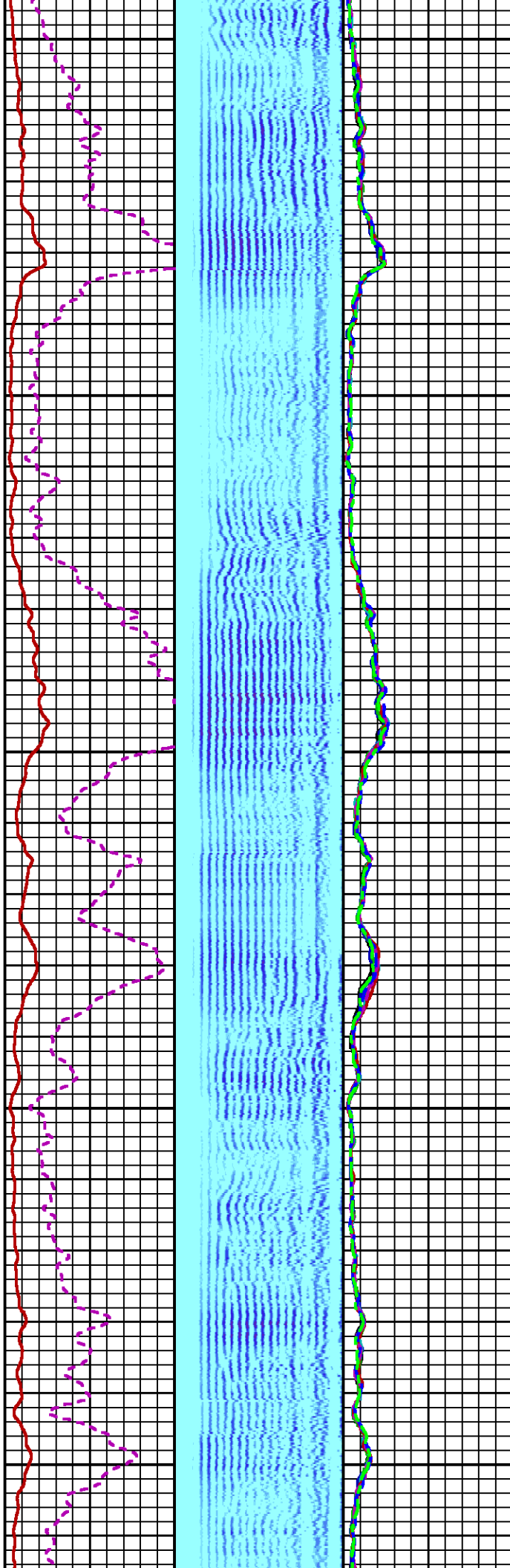
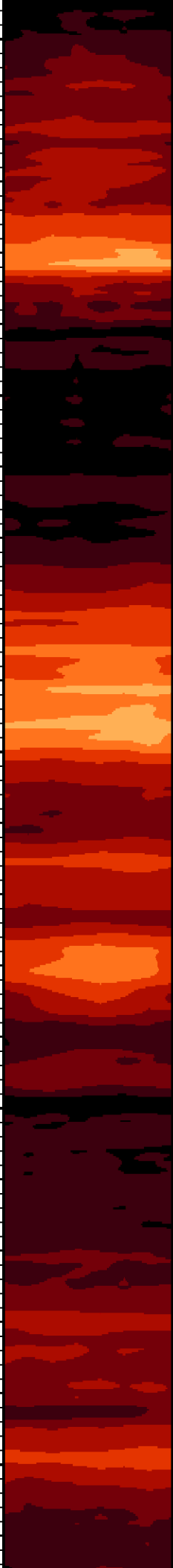


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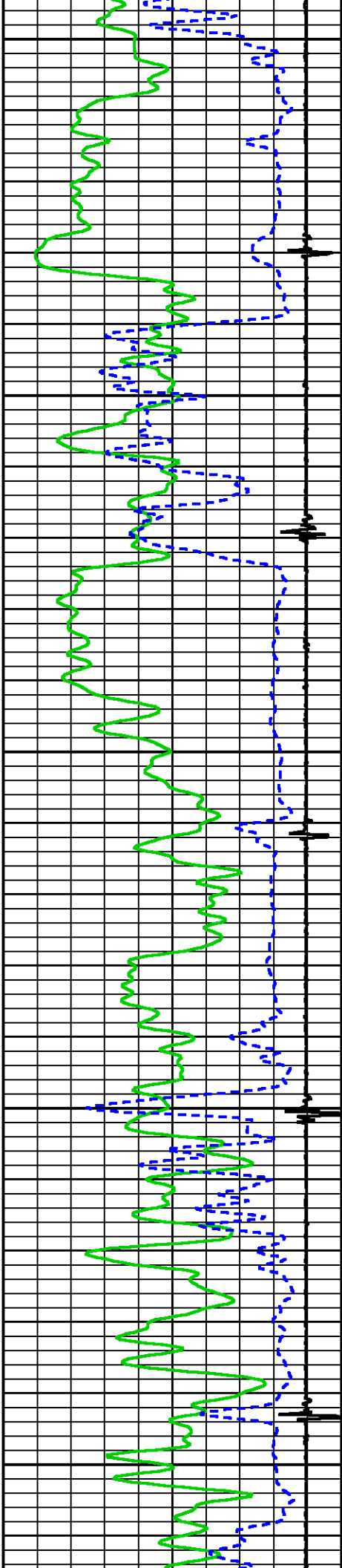




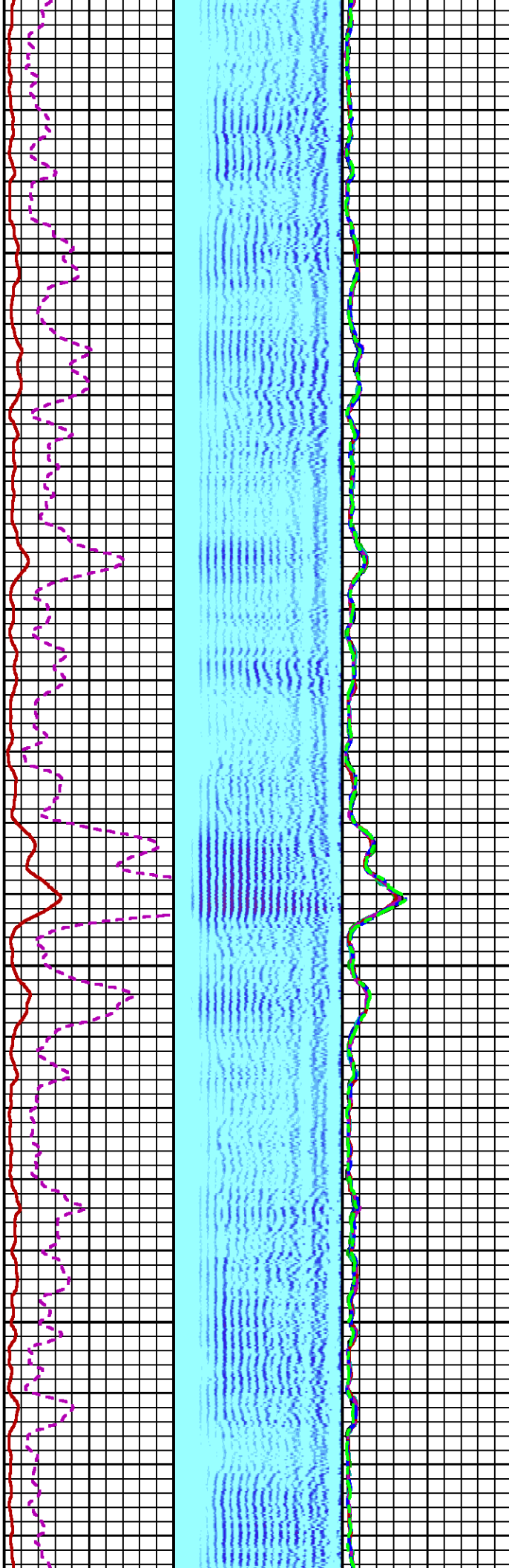
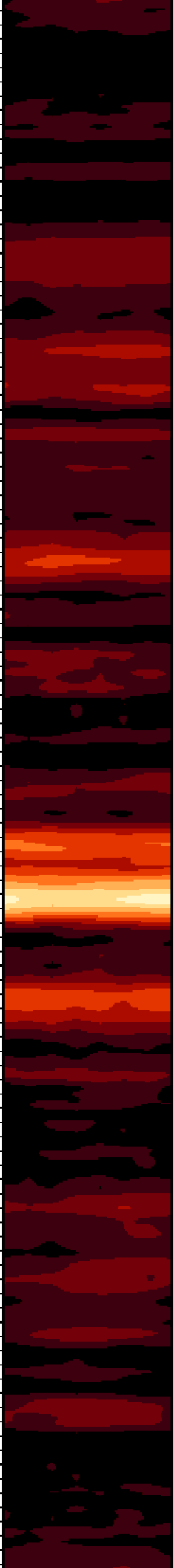


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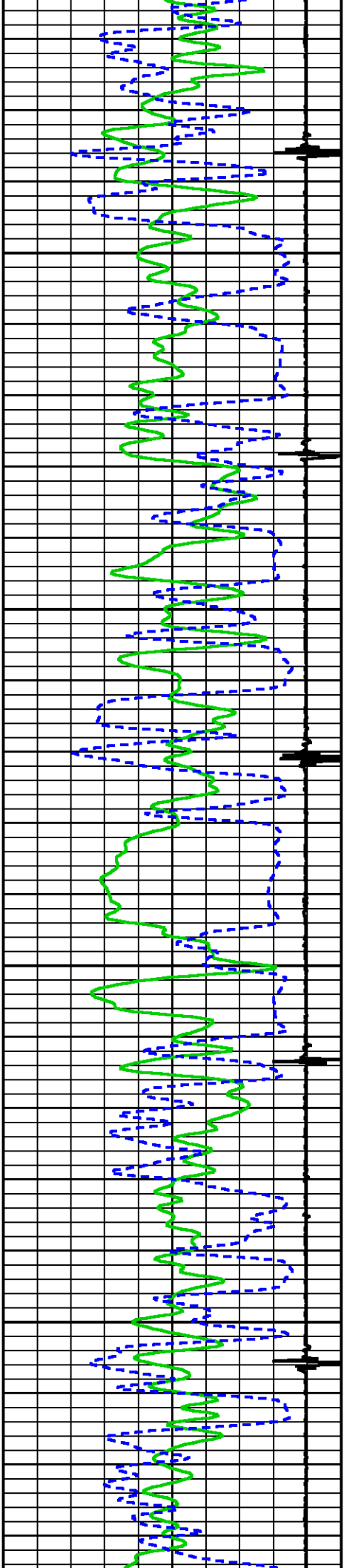


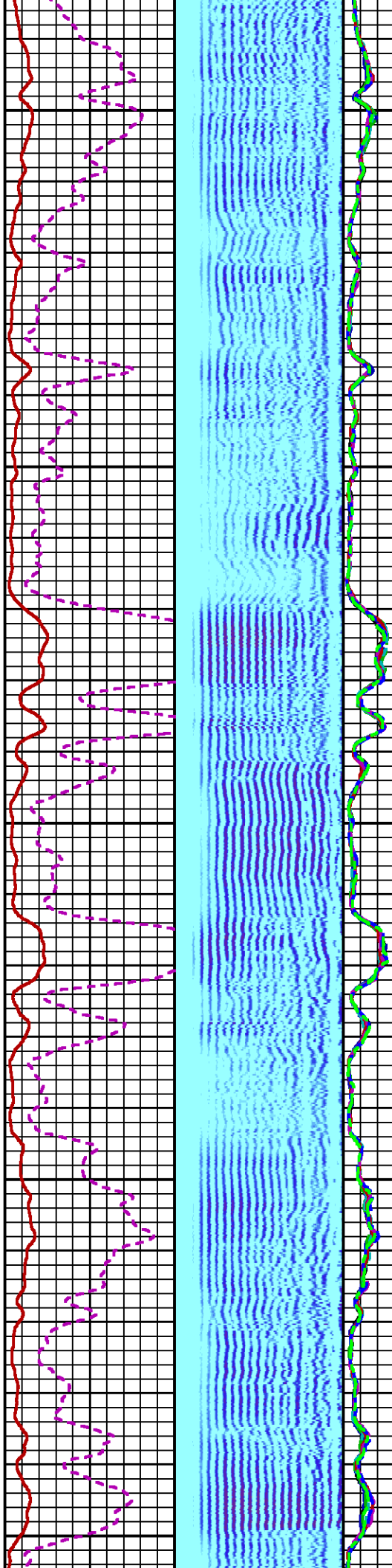
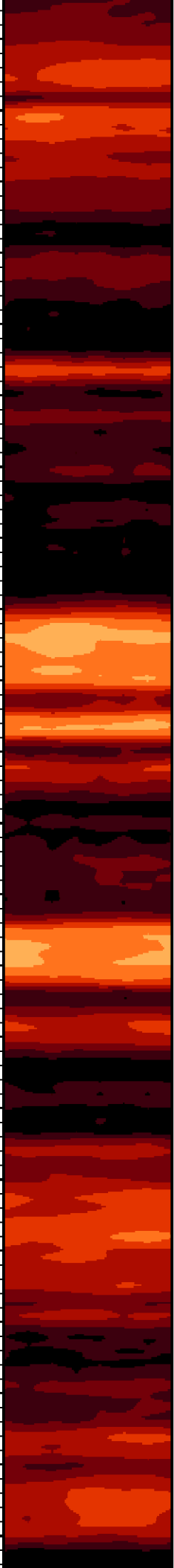




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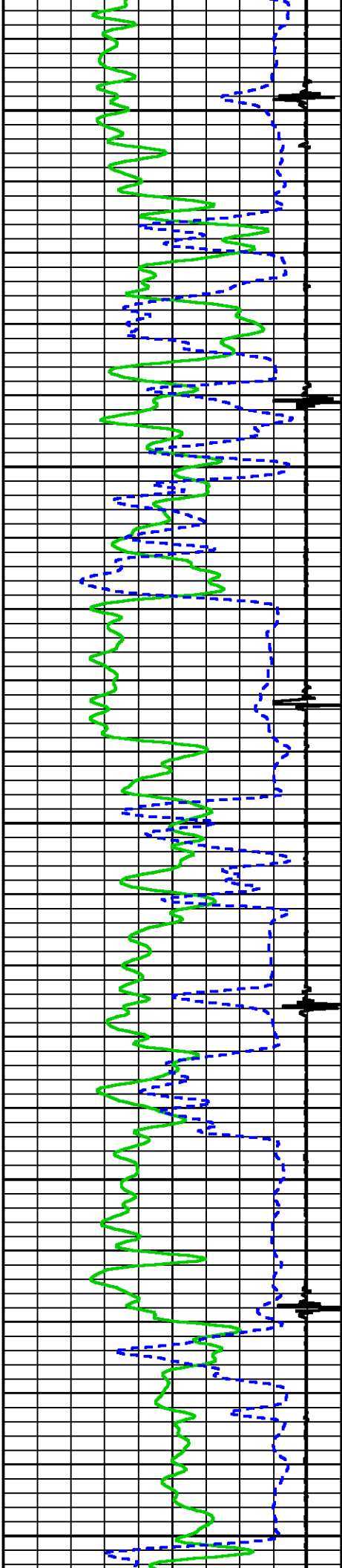


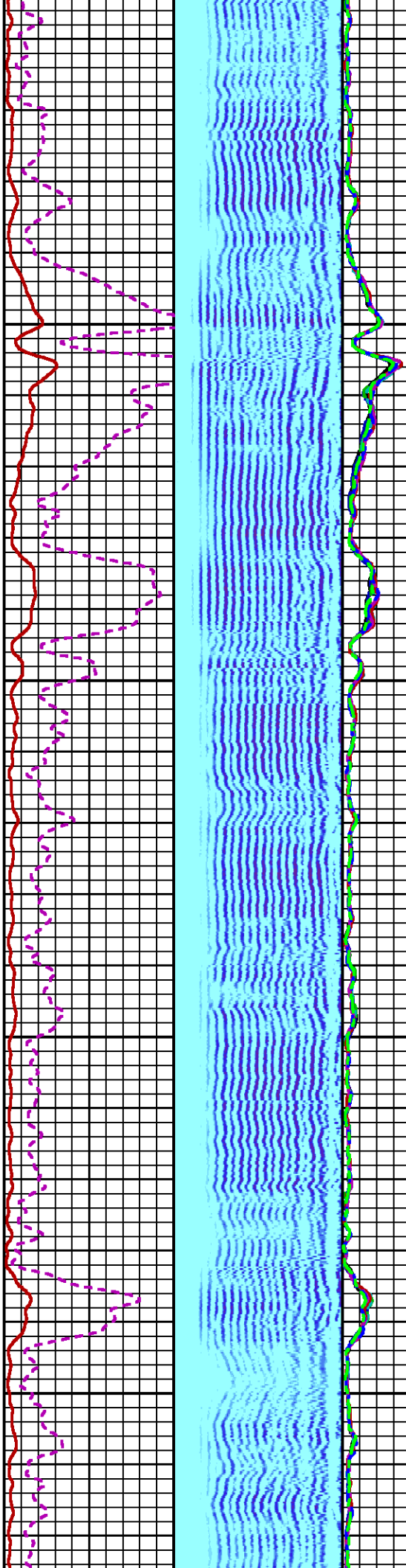
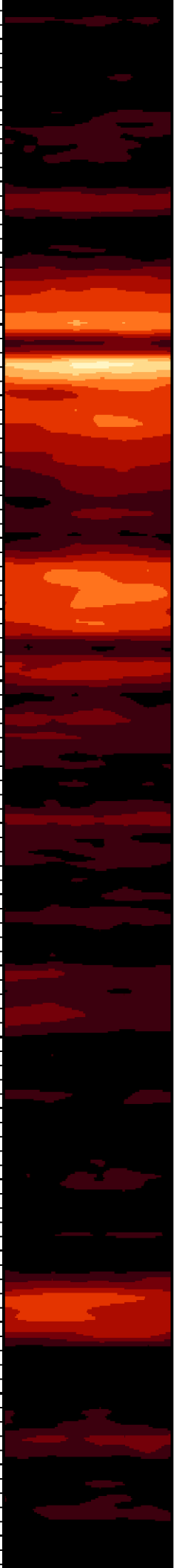


5300

5400

5500

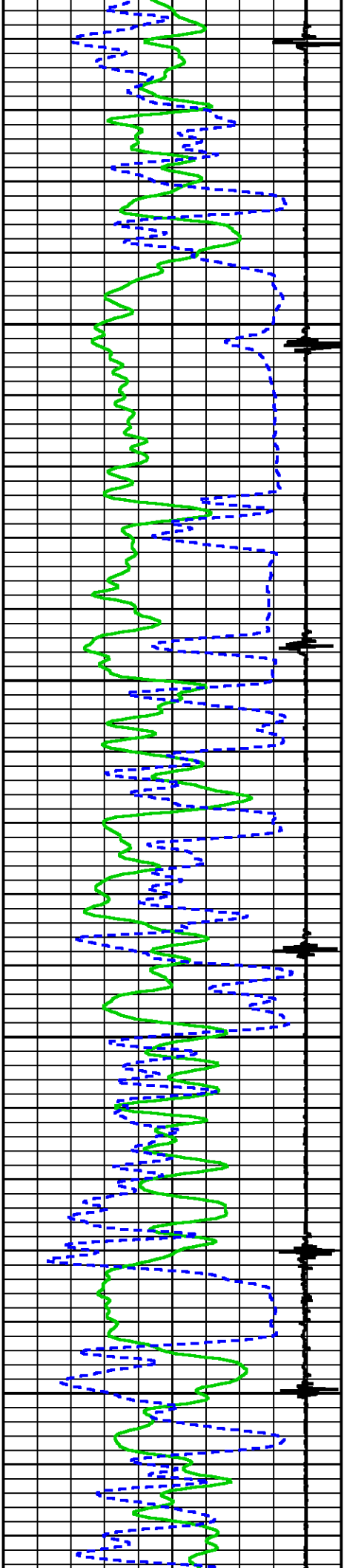


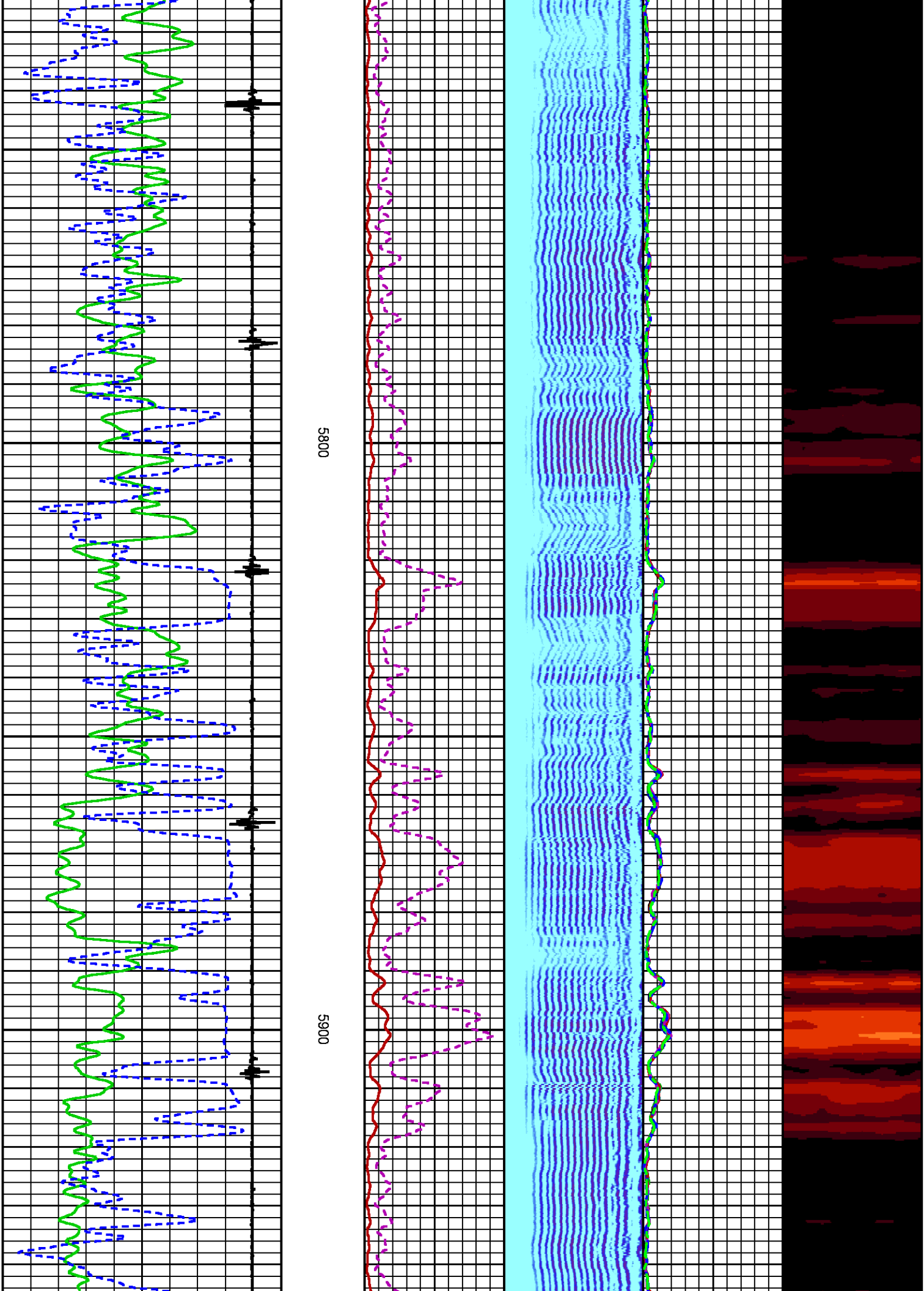


5600

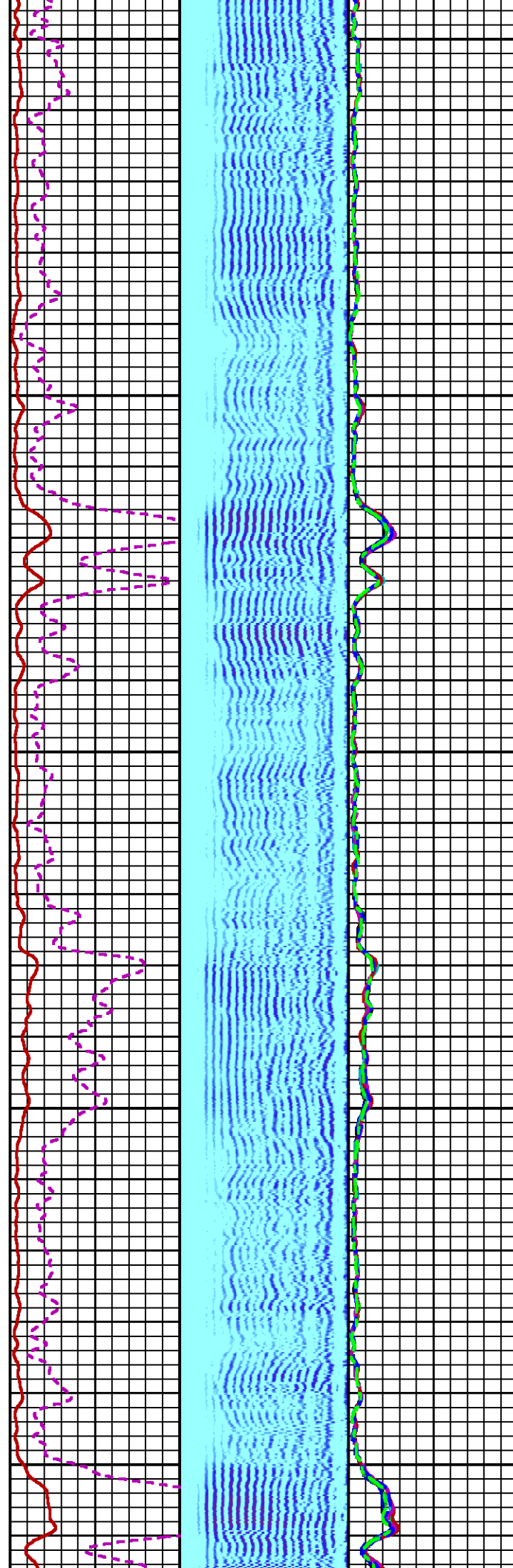
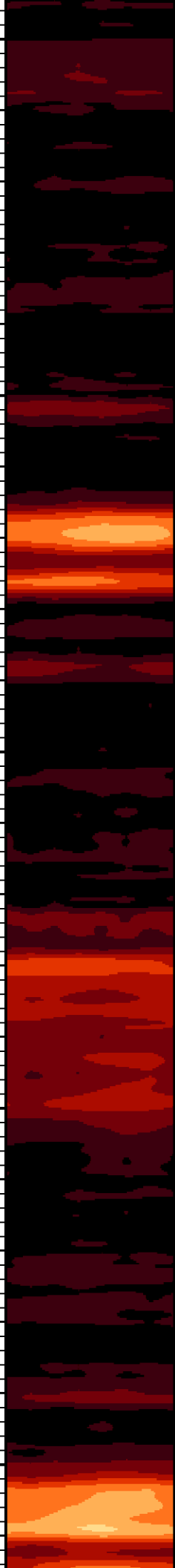
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3



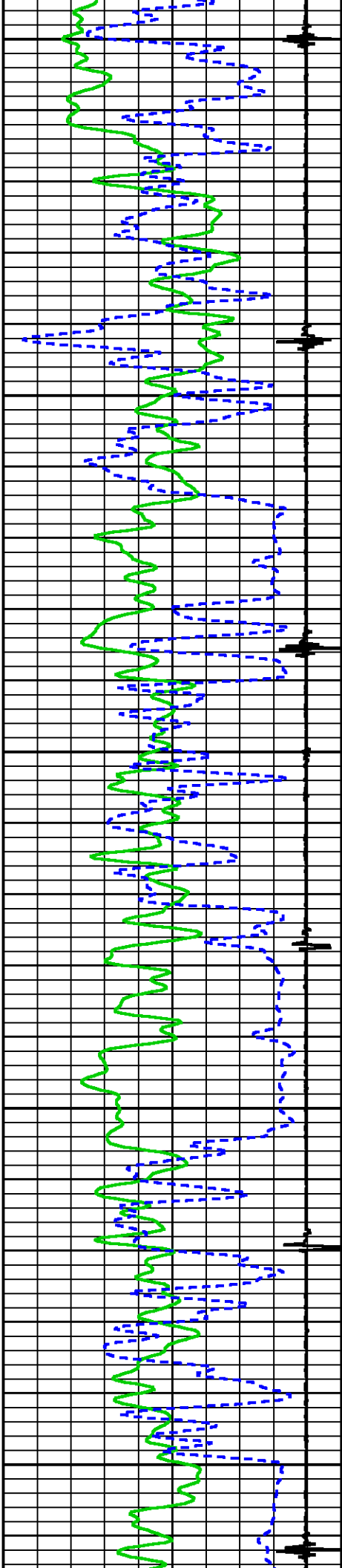


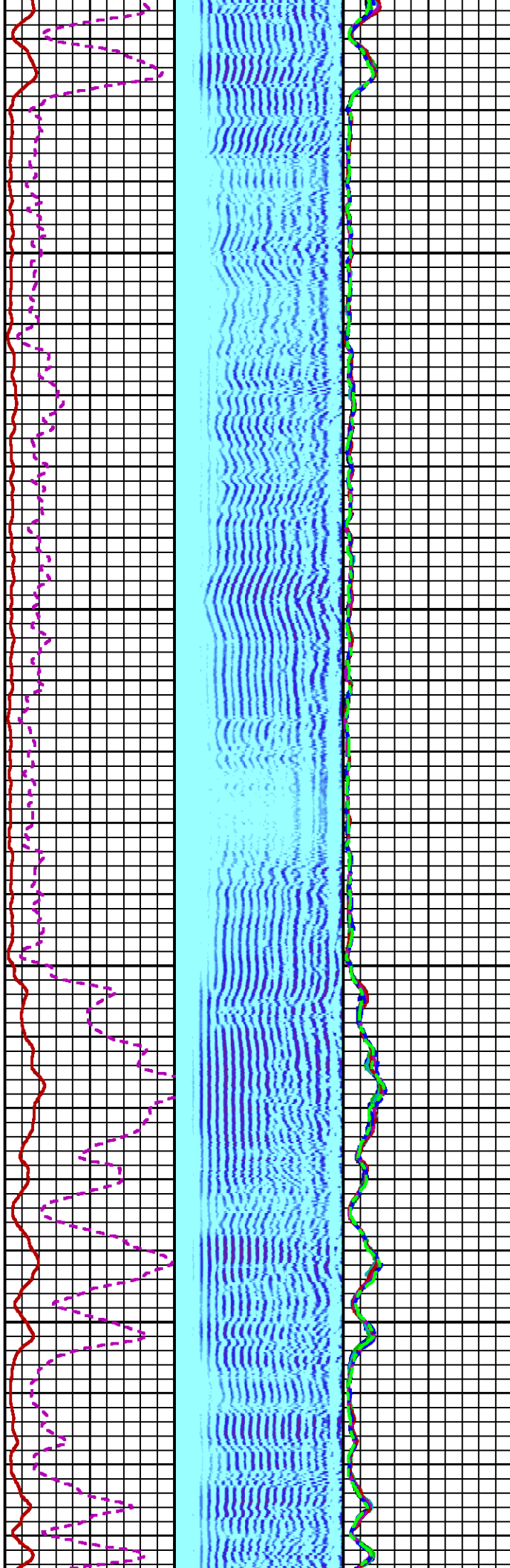
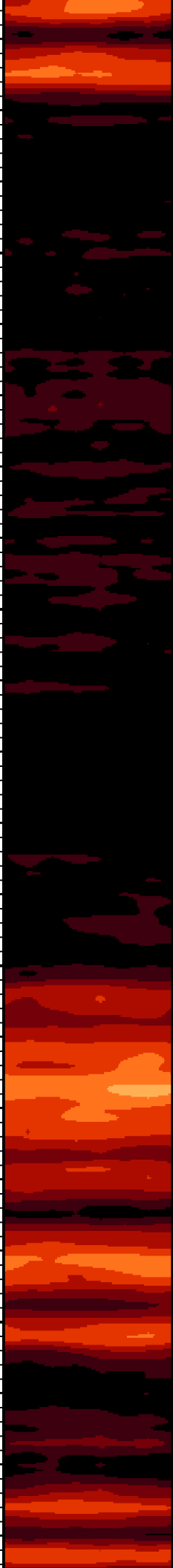




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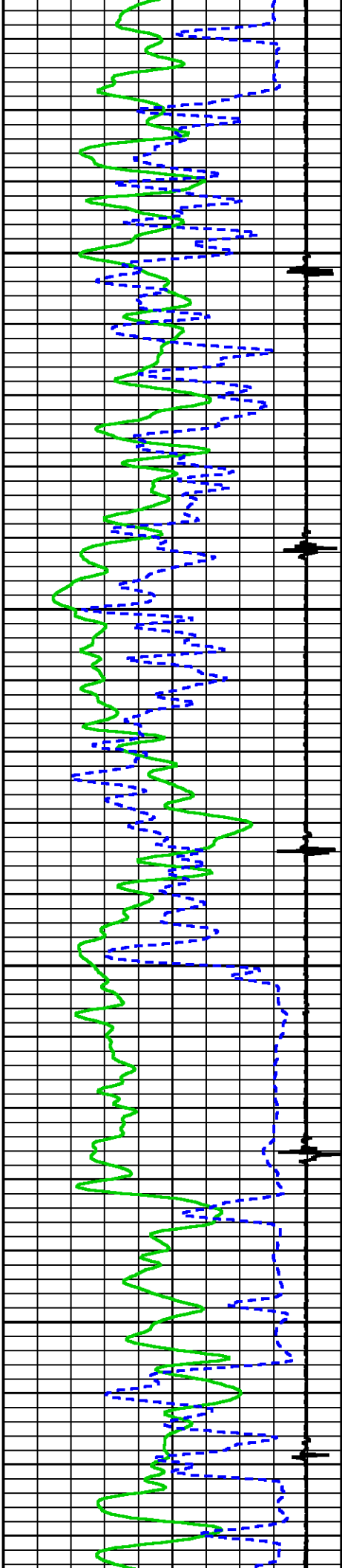
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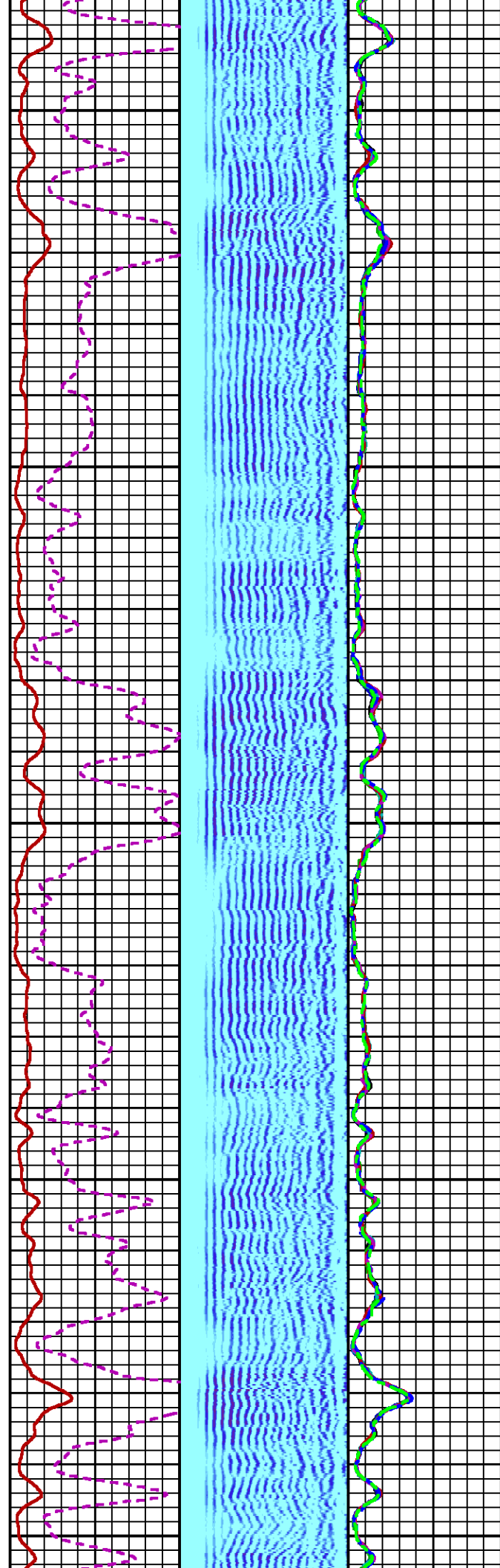
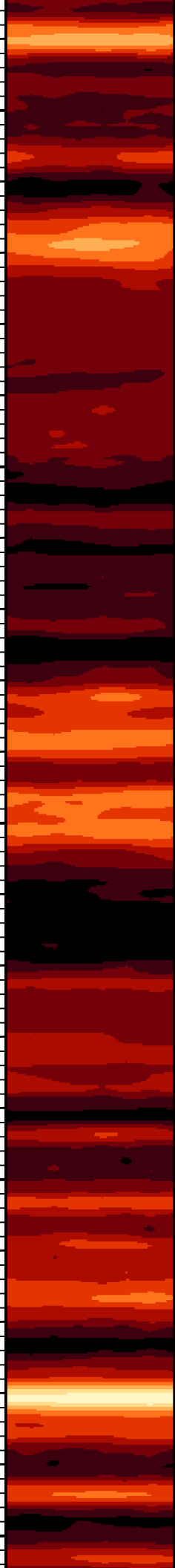


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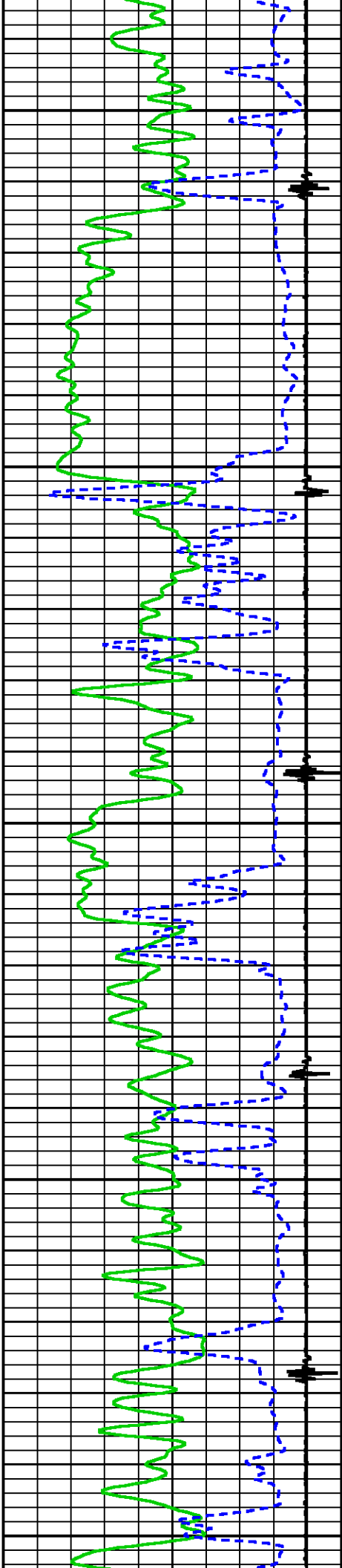


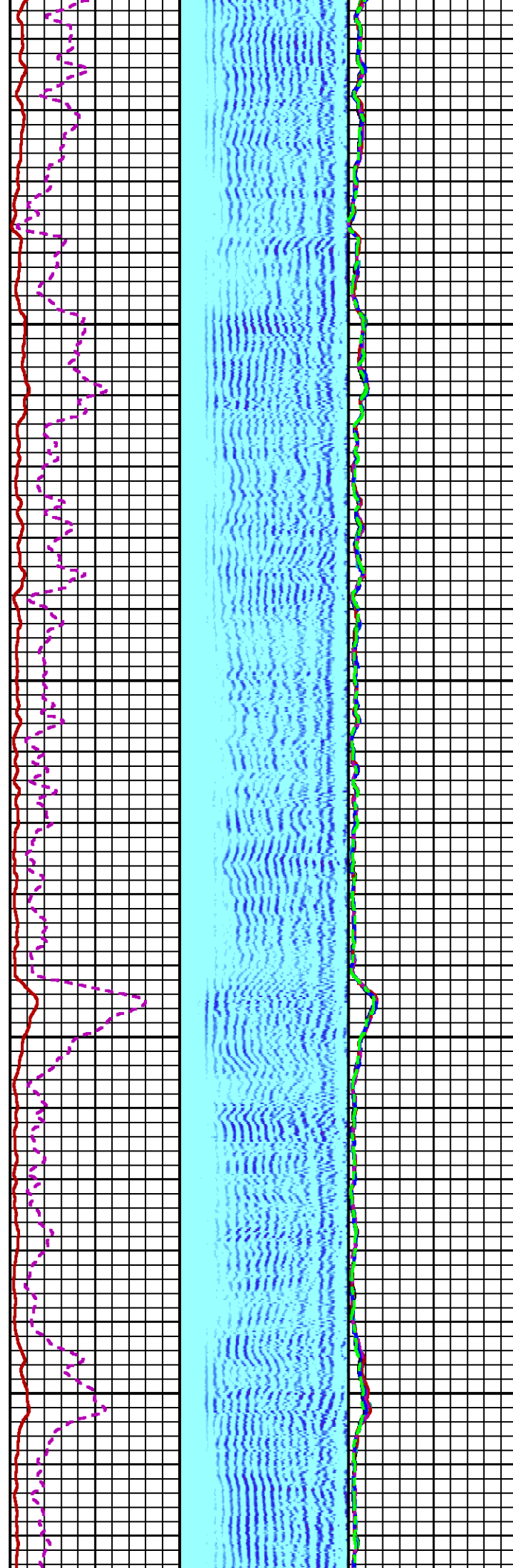
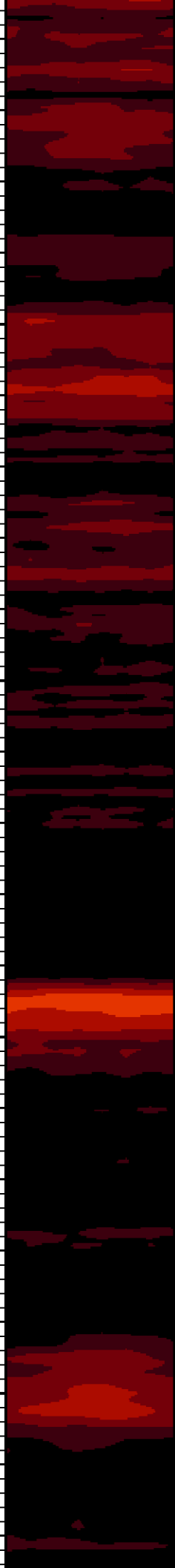


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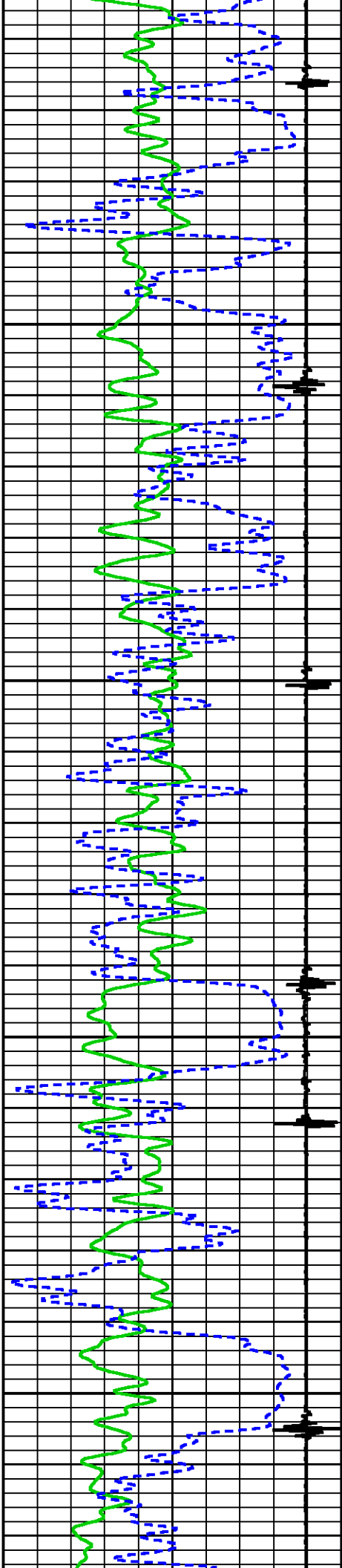


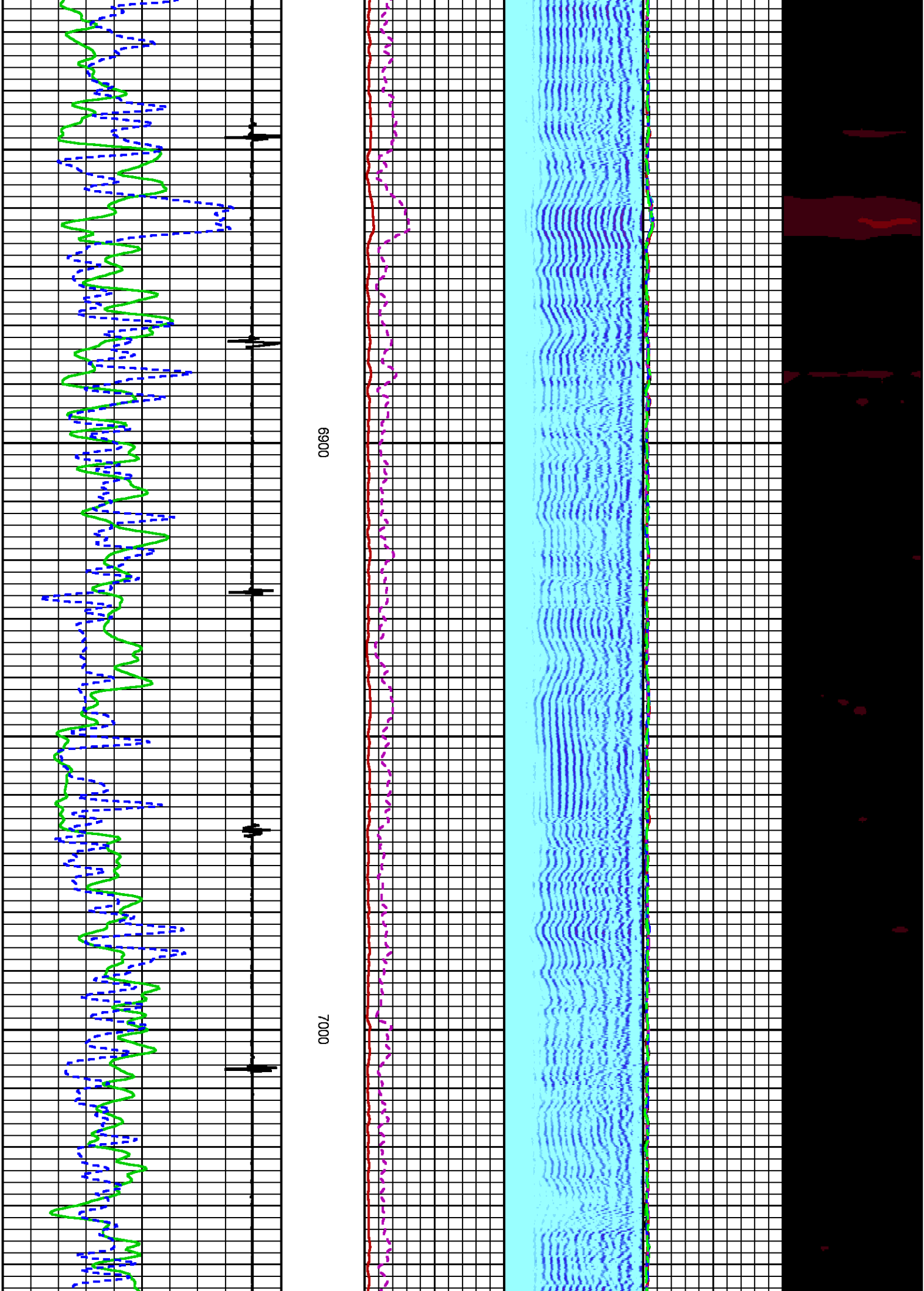


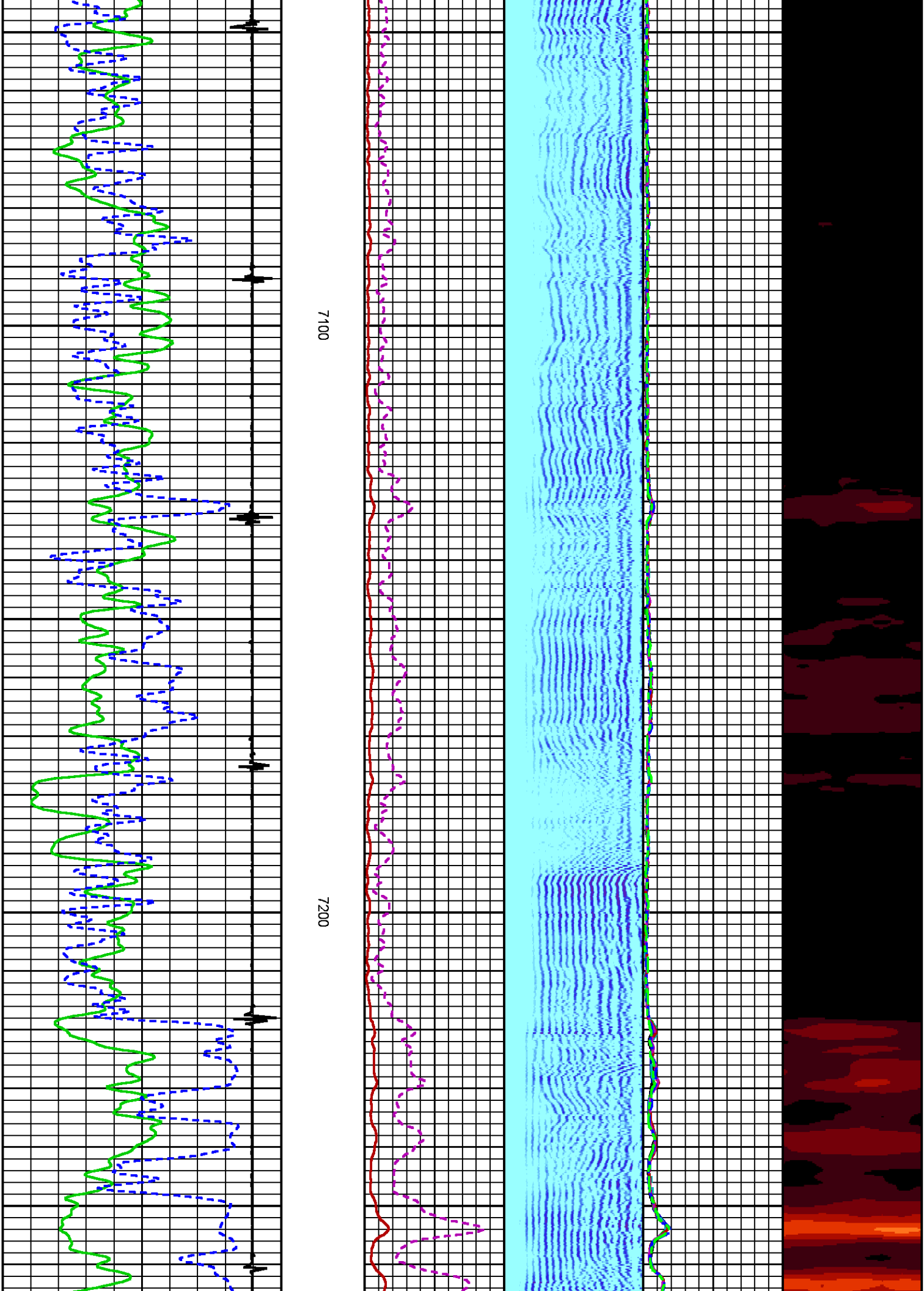
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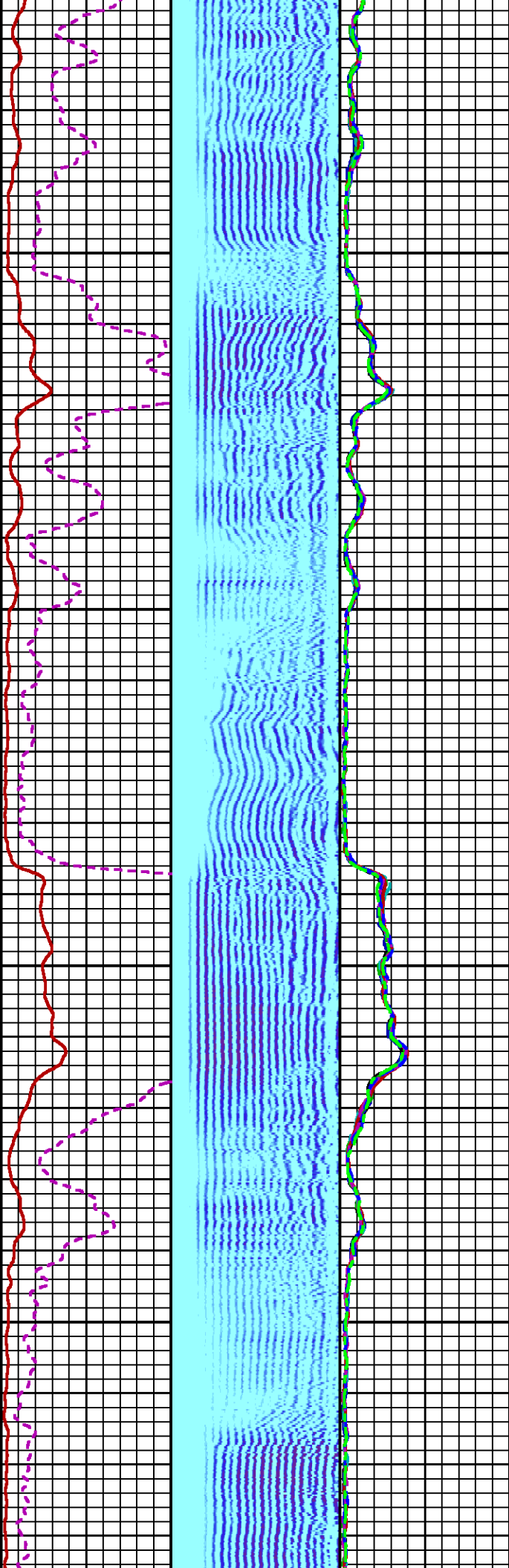
6800

SJ



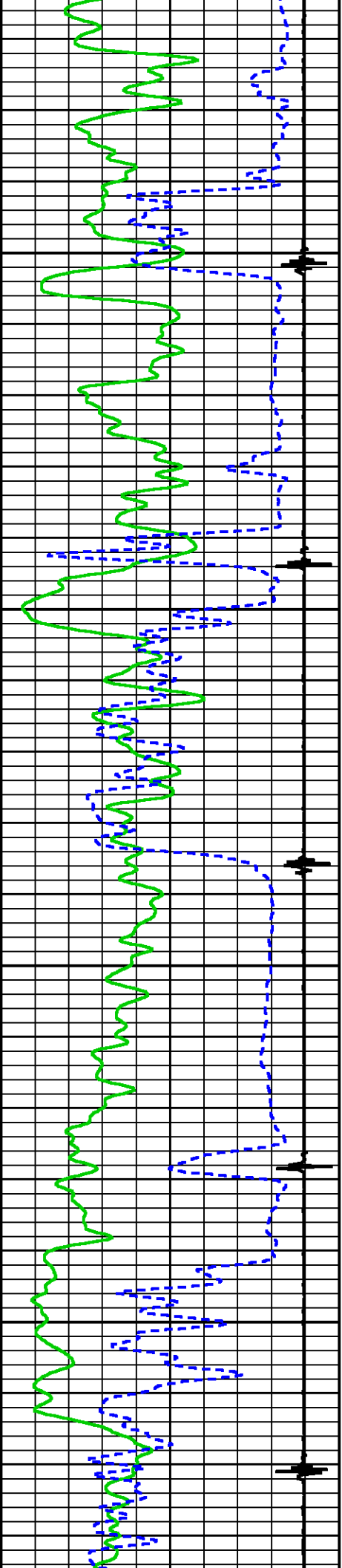




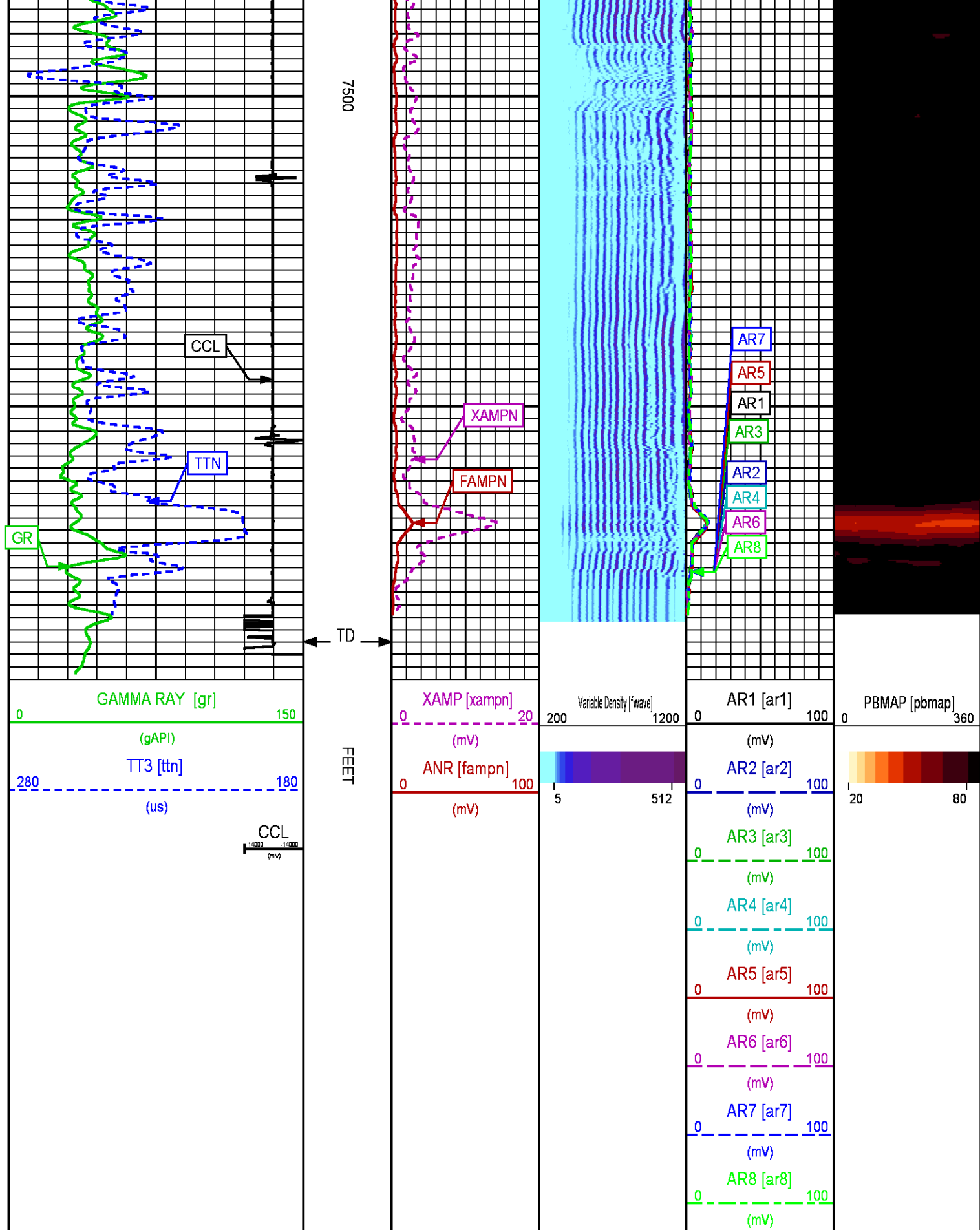


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ECLIPS 7.0i ECLIPS General Release Rel 7.0i Thu Jun 08 20:36:10 CDT 2017

Updates: 1,32

Plotted: Sat Nov 10 12:25:04 2018

## PARAMETER AND FILTER SUMMARY REPORT

FILE: /data/LARAMIE\_BCU\_0993-21-10W/p012g01.prm  
 LOGGING MODE: DEPTH DIRECTION: UP  
 TOP DEPTH: 7154.750 ft BOTTOM DEPTH: 7545.750 ft

## SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
AMPLITUDE	FILTER ()	medium (1)		"	"
TRAVEL TIME	FILTER ()	medium (1)		"	"

## RAL CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM

## ANALOG RAL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
AMPLITUDE WINDOW (NEAR)	AMP WINDOW START (fgp1*)	186	us	TOP	BOTTOM
	AMP WINDOW START (fgp2*)	186	us	"	"
	AMP WINDOW START (fgp3*)	186	us	"	"
	AMP WINDOW START (fgp4*)	186	us	"	"
	AMP WINDOW START (fgp5*)	186	us	"	"
	AMP WINDOW START (fgp6*)	186	us	"	"
	AMP WINDOW START (fgp7*)	186	us	"	"
	AMP WINDOW START (fgp8*)	186	us	"	"
	AMP WINDOW START (fgpn*)	186	us	"	"
	AMP WINDOW LENGTH	25	us	"	"
TRAVEL TIME WINDOW (NEAR)	TT WINDOW START (ttn*)	160	us	"	"
	TT WINDOW LENGTH	500	us	"	"
	FIRST BRK THRESHOLD (ttn*)	4	mV	"	"
RAL CASING PARAMETERS	PPT NEAR	200.391	us	"	"
RAL TOOL DELAY	TOOL DELAY (str1*)	-66	us	"	"
	TOOL DELAY (str2*)	-66	us	"	"
	TOOL DELAY (str3*)	-66	us	"	"
	TOOL DELAY (str4*)	-66	us	"	"
	TOOL DELAY (str5*)	-66	us	"	"
	TOOL DELAY (str6*)	-66	us	"	"
	TOOL DELAY (str7*)	-66	us	"	"
	TOOL DELAY (str8*)	-66	us	"	"
	TOOL DELAY (strn*)	-66	us	"	"
BASELINE NOISE (NEAR)	NOISE WINDOW START	125	us	"	"
	NOISE WINDOW LENGTH	25	us	"	"

## PERCENT BOND CEMENT MAP

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
RAL FREE PIPE AMPLITUDE	FREE AMP REC 1	80	mV	TOP	BOTTOM
	FREE AMP REC 2	80	mV	"	"
	FREE AMP REC 3	80	mV	"	"
	FREE AMP REC 4	80	mV	"	"
	FREE AMP REC 5	80	mV	"	"
	FREE AMP REC 6	80	mV	"	"
	FREE AMP REC 7	80	mV	"	"
	FREE AMP REC 8	80	mV	"	"
RAL FULL BOND AMPLITUDE	FULL BOND AMP REC 1	2	mV	"	"
	FULL BOND AMP REC 2	2	mV	"	"
	FULL BOND AMP REC 3	2	mV	"	"
	FULL BOND AMP REC 4	2	mV	"	"
	FULL BOND AMP REC 5	2	mV	"	"
	FULL BOND AMP REC 6	2	mV	"	"

## CURVE DESCRIPTION REPORT

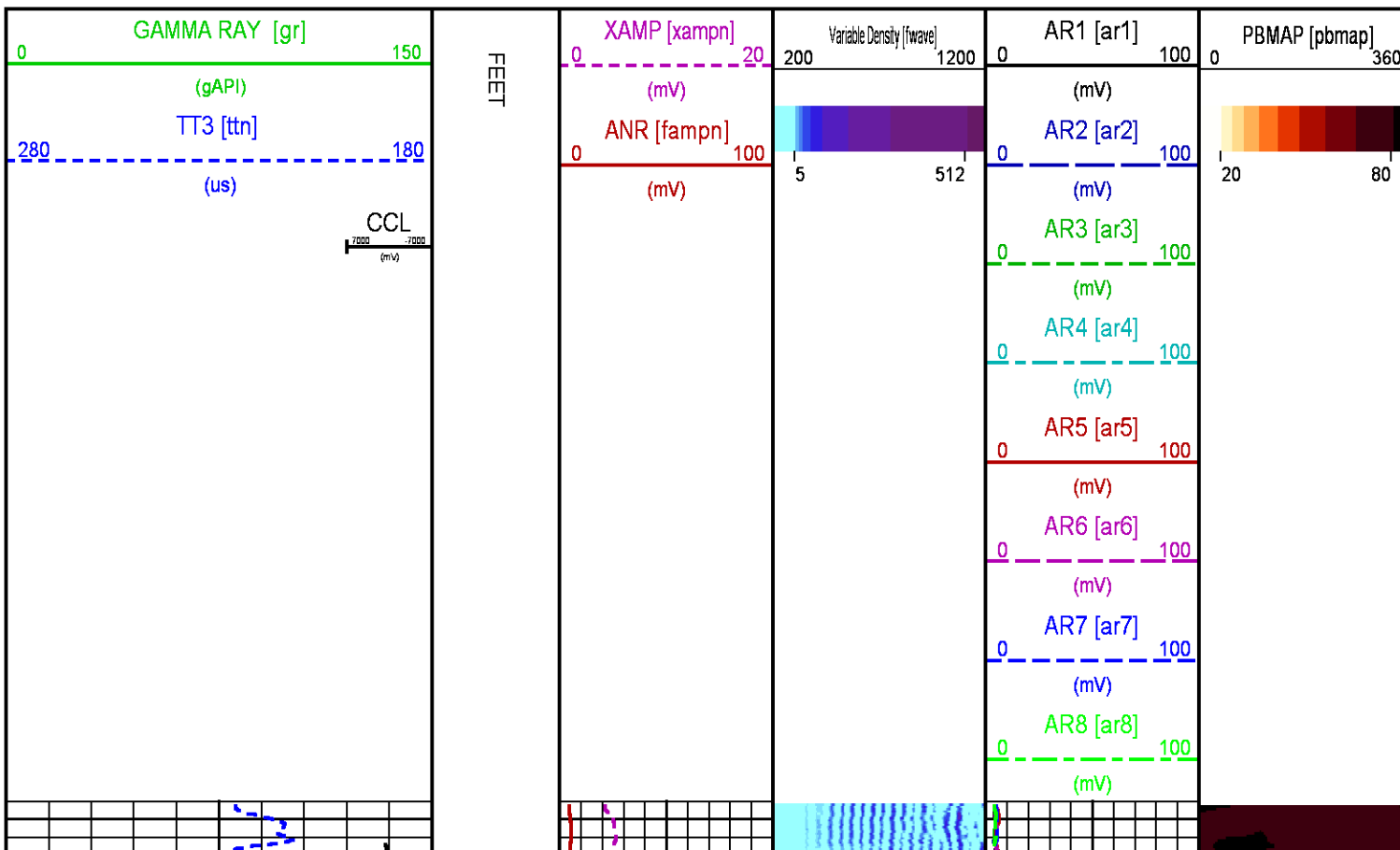
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:AR1	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R1
F1:AR2	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R2
F1:AR3	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R3
F1:AR4	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R4
F1:AR5	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R5
F1:AR6	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R6
F1:AR7	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R7
F1:AR8	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE T-R8
F1:CCL	Nov 10 09:44:32 2018	CASING COLLAR LOCATOR
F1:FAMPN	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE NEAR RECEIVER
F1:FWAVE	Nov 10 09:44:32 2018	FAR WAVE FORM
F1:GR	Nov 10 09:44:32 2018	GAMMA RAY
F1:PBMAP	Nov 10 09:44:32 2018	PERCENT BOND CEMENT MAP
F1:TTN	Nov 10 09:44:32 2018	TRAVELTIME FROM NEAR TRANSMITTER-RECEIVER
F1:XAMPN	Nov 10 09:44:32 2018	FIXED GATE AMPLITUDE NEAR RECEIVER TIMES FIVE

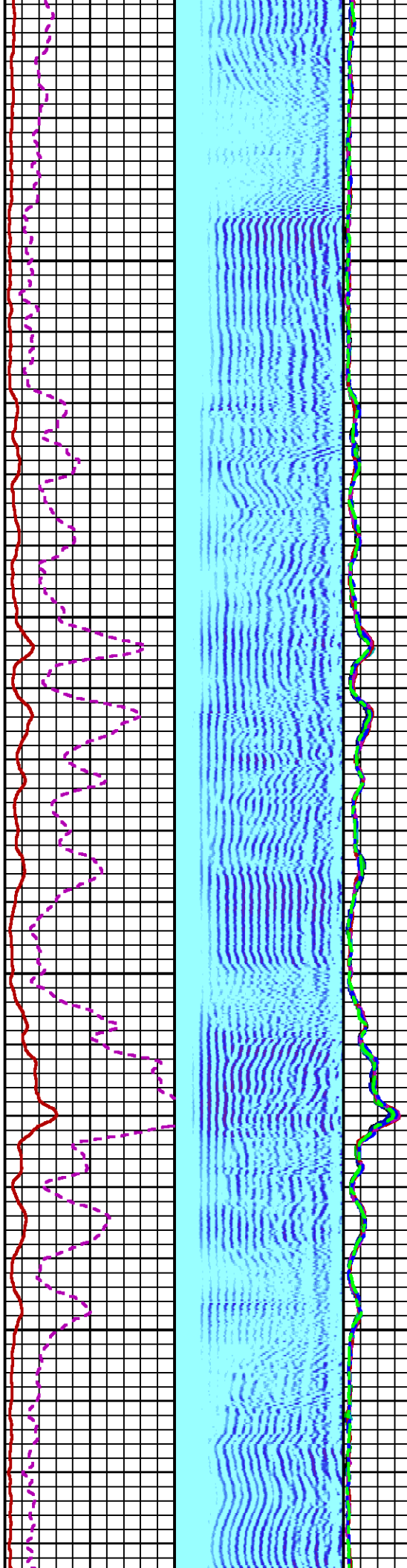
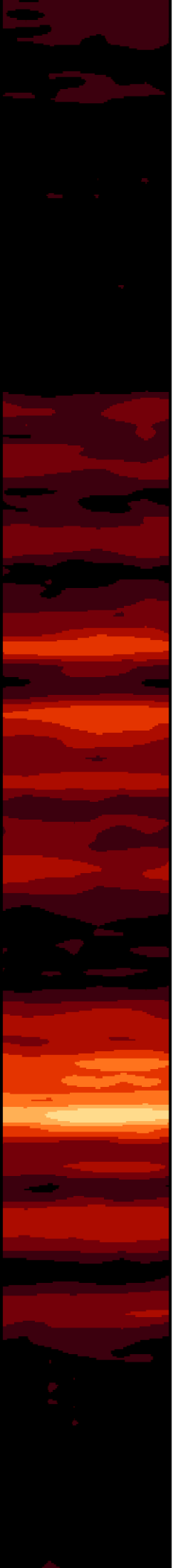
## CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
AR1	-11.25	AR5	-11.25	CCL	-5.75	XAMPN	-11.25
AR2	-11.25	AR6	-11.25	FAMPN	-11.25		
AR3	-11.25	AR7	-11.25	GR	-1.75		
AR4	-11.25	AR8	-11.25	TTN	-11.25		

Presentation : SysA:/dat1a/LARAMIE\_BCU\_0993-21-10W/BCU\_0993-21-10W\_RAL\_REPEAT.fvpdf [5"/100' Scale]  
Plot Interval : 7158.25 - 7504 Feet

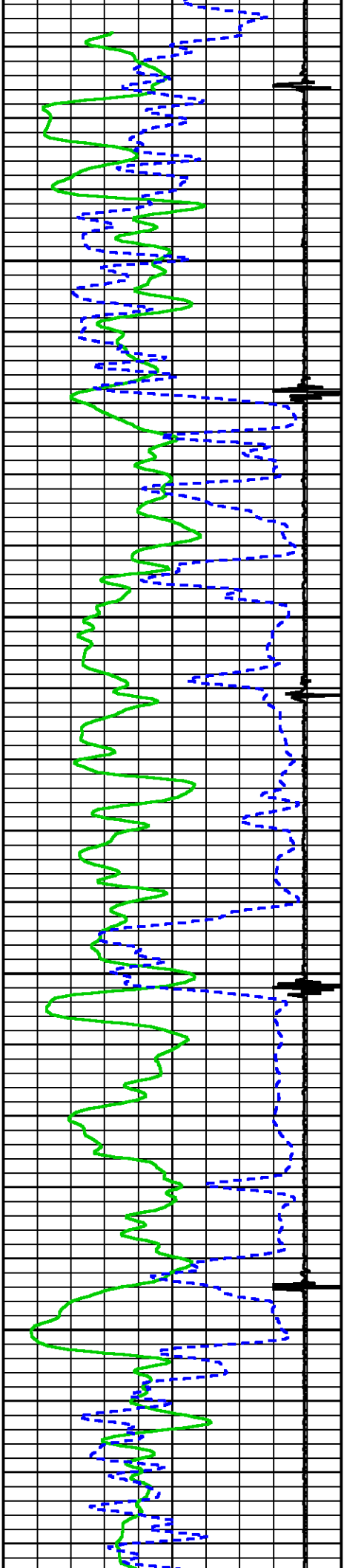
Data File 1 : F1 : SysA:/dat1a/LARAMIE\_BCU\_0993-21-10W/45\_LARAMIE\_BCU\_0993-21-10W\_RAL\_REPEAT.xtf  
Created On : Nov 10 09:44:32 2018  
Company : LARAMIE ENERGY LLC  
Well : BCU 0993-21-10W  
Field : BUZZARD CREEK  
File Interval : 7154.5 - 7504 Feet  
OCT : p012g

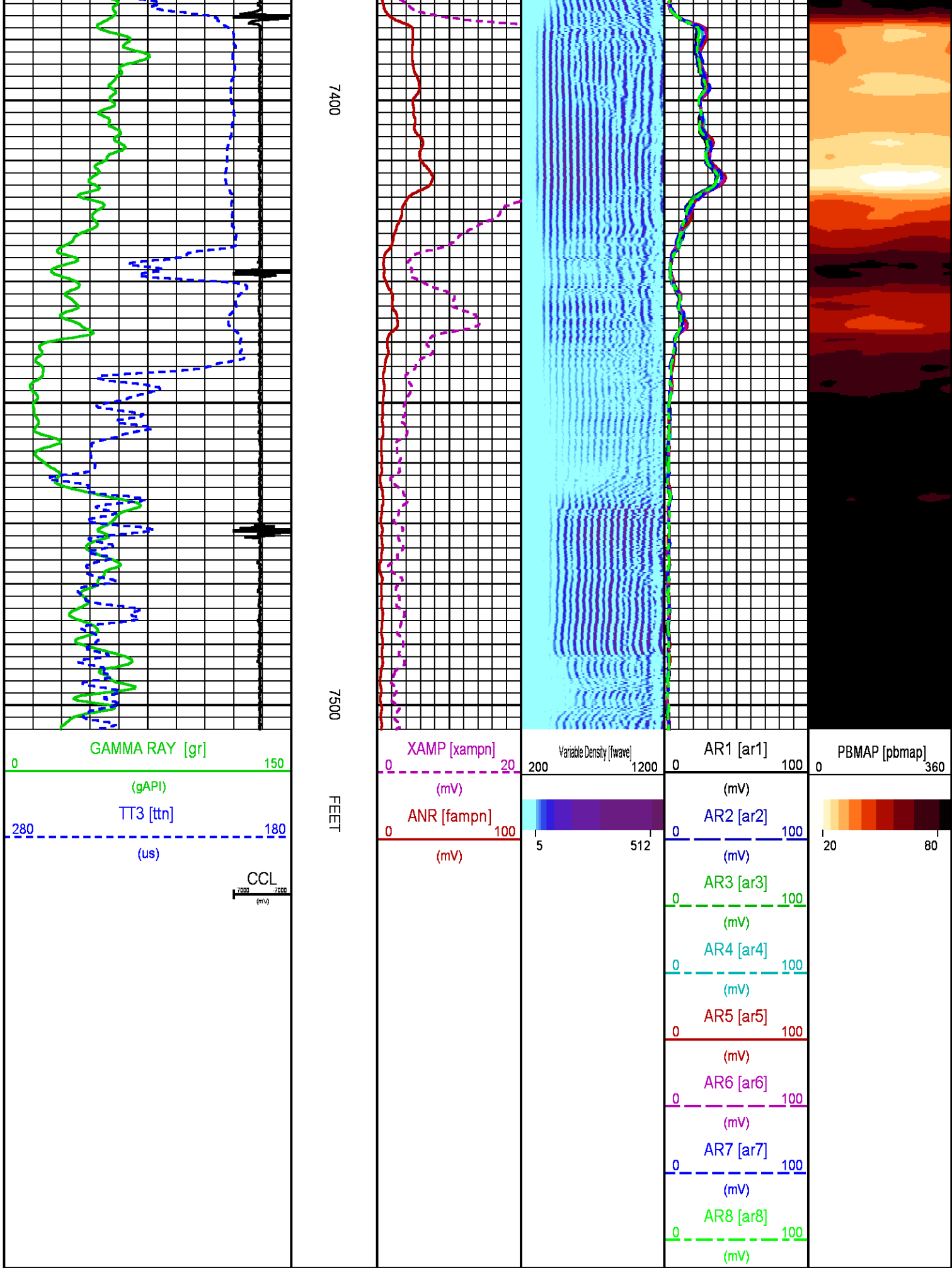




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# CALIBRATION / VERIFICATION SUMMARY

Source File: /dat1a/LARAMIE\_BCU\_0993-21-10W/p012g.tp1

## RAL PRIMARY CALIBRATION SUMMARY

TOOL #: 1426XA 11871500

DATE/TIME PERFORMED: Sat Nov 10 08:47:28 2018

UNIT #: 5753XD 111111

	NEAR (mV)	RADIAL (mV)	FAR (mV)
TARGETS	100.00	100.00	150.00

	NEAR	R1	R2	R3	R4	R5	R6	R7	R8	FAR	CAL
ZERO (mV)	-0.37	-0.25	-0.10	-0.35	-0.20	-0.15	-0.11	0.39	-0.07	-0.79	-0.03
AMP FLUID (mV)	43	42	42	42	43	43	43	42	42	57	41
TT (us)	216	216	216	216	215	215	215	215	216	323	216
M FACTOR	2.30	2.37	2.37	2.34	2.32	2.33	2.32	2.42	2.37	2.58	2.43

## RAL BEFORE LOG VERIFICATION SUMMARY

TOOL #: 1426XA 11871500

DATE/TIME PERFORMED: Sat Nov 10 08:49:10 2018

DAYS SINCE CAL: 0

UNIT #: 5753XD 111111

CABLE #: ML4291 SMALL1

	NEAR (mV)	R1 (mV)	R2 (mV)	R3 (mV)	R4 (mV)	R5 (mV)	R6 (mV)	R7 (mV)	R8 (mV)	FAR (mV)	CAL (mV)
ZERO	-1.51	-1.25	-0.98	-1.57	-1.48	-1.00	-1.19	-0.38	-0.78	-3.85	-0.06
AMP AIR	1.69	1.70	1.60	1.86	1.68	1.34	1.63	1.12	1.15	4.16	100.62

## GR PRIMARY CALIBRATION SUMMARY

TOOL #: 1355XA 12670180

DATE/TIME PERFORMED: Thu Mar 29 16:39:27 2018

UNIT #: 4352 ML4352

CALB JIG #: 4702NK DA\_228

	BACKGROUND (cts)	CALBRTR ON (cts)	CR DIFF (cts/s)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	CALBRTR (gAPI)
GR	41.51	221.16	179.6	0.557	23.11	123.11	100

## GR PRIMARY VERIFICATION SUMMARY

TOOL #: 1355XA 12670180

DATE/TIME PERFORMED: Thu Mar 29 16:50:56 2018

UNIT #: 4352 ML4352

VERI JIG #: 4702NK DA\_228

	BACKGROUND (cts)	CALBRTR ON (cts)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	DIFF. (gAPI)
GR	40.09	214.13	0.557	22.32	119.20	96.88
						90.00 110.00

# INSTRUMENT CONFIGURATION

Source File: /dat1a/LARAMIE\_BCU\_0993-21-10W/p012g~RAL-tdg

## A3 CABLEHEAD

Diameter : 1.37"

## RADIAL BOND TOOL

Diameter : 2.75"  
Length : 11.17'  
Weight : 126 lbs  
Series : 1426XA  
Mnemonic : RAL  
Measure Point: 5.75': XMTR  
Measure Point: 4.21': NEAR MP  
Measure Point: 3.25': FAR MP  
Measure Point: 2.67': NEAR RCVR  
Measure Point: 0.75': FAR RCVR

## RAL GR/TEMP/CCL/CHV DETECTOR

Diameter : 2.75"  
Length : 6.96'  
Weight : 85 lbs  
Series : 1355XA  
Mnemonic : RAL  
Measure Point: 5.79': CCL  
Measure Point: 1.67': GR  
Measure Point: 0.17': TEMP

TOTAL LENGTH: 18.85'  
TOTAL WEIGHT: 227 lbs  
MAX DIAMETER: 0'4.00"

18.85'

XMTR 12.71'

NEAR MP 11.17'

FAR MP 10.21'


NEAR RCVR 9.62'

FAR RCVR 7.71'

CCL 5.79'

GR 1.67'

TEMP 0.17'

	LOCATION:	ELEVATIONS:	
	SHL: 2387.0' FNL & 1256.0' FWL BHL: 2387.0' FNL & 1256.0' FWL	KB 7287 FT DF GL 7257 FT	
	SEC 21 TWP 9S RGE 93W	DATE 10-NOV-2018	