

Company: Noble Energy Inc

Well: Wells Ranch AE32-615

Field: Wattenberg

County: Weld State: Colorado

Slim Cement Mapping Tool  
Cement Evaluation

County:	Weld			
Field:	Wattenberg			
Location:	SWSW Sec. 32, T6N, R62W	Elev.:	K.B.	4742.00 ft
Well:	Wells Ranch AE32-615	SHL: 652' FSL x 650' FWL	G.L.	4718.00 ft
Company:	Noble Energy Inc	Lat: 40.437740/Long: -104.354490	D.F.	4741.00 ft
	Location:	Permanent Datum:	Ground Level	Elev.: 4718.00 f
		Log Measured From:	Kelly Bushing	24.00 ft
		Drilling Measured From:	Kelly Bushing	above Perm.Datum
	API Serial No.	Section:	Township:	Range:
	05-123-41788	32	6N	62W
Logging Date	30-Oct-2015			

Run Number	Run 1		
Depth Driller	6840.00 ft		
Schlumberger Depth	6840.00 ft		
Bottom Log Interval	6670.00 ft		
Top Log Interval	24.00 ft		
Casing Fluid Type	Brine		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	0.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.75 in		
From	637.00 ft		
To	6840.00 ft		
Casing/Tubing Size	7 in		
Weight	26 lbm/ft		
Grade	P110		
From	0.00 ft		
To	6833.70 ft		
Max Recorded Temperatures	235.9 degF		
Logger on Bottom	30-Oct-2015	18-15:00	
Unit Number	Location:	Time	
Recorded By	9115		
	Aleksei Bekhterev	Ft. Morgan, CO	
Witnessed By	Bill Mansfield		

Disclaimer

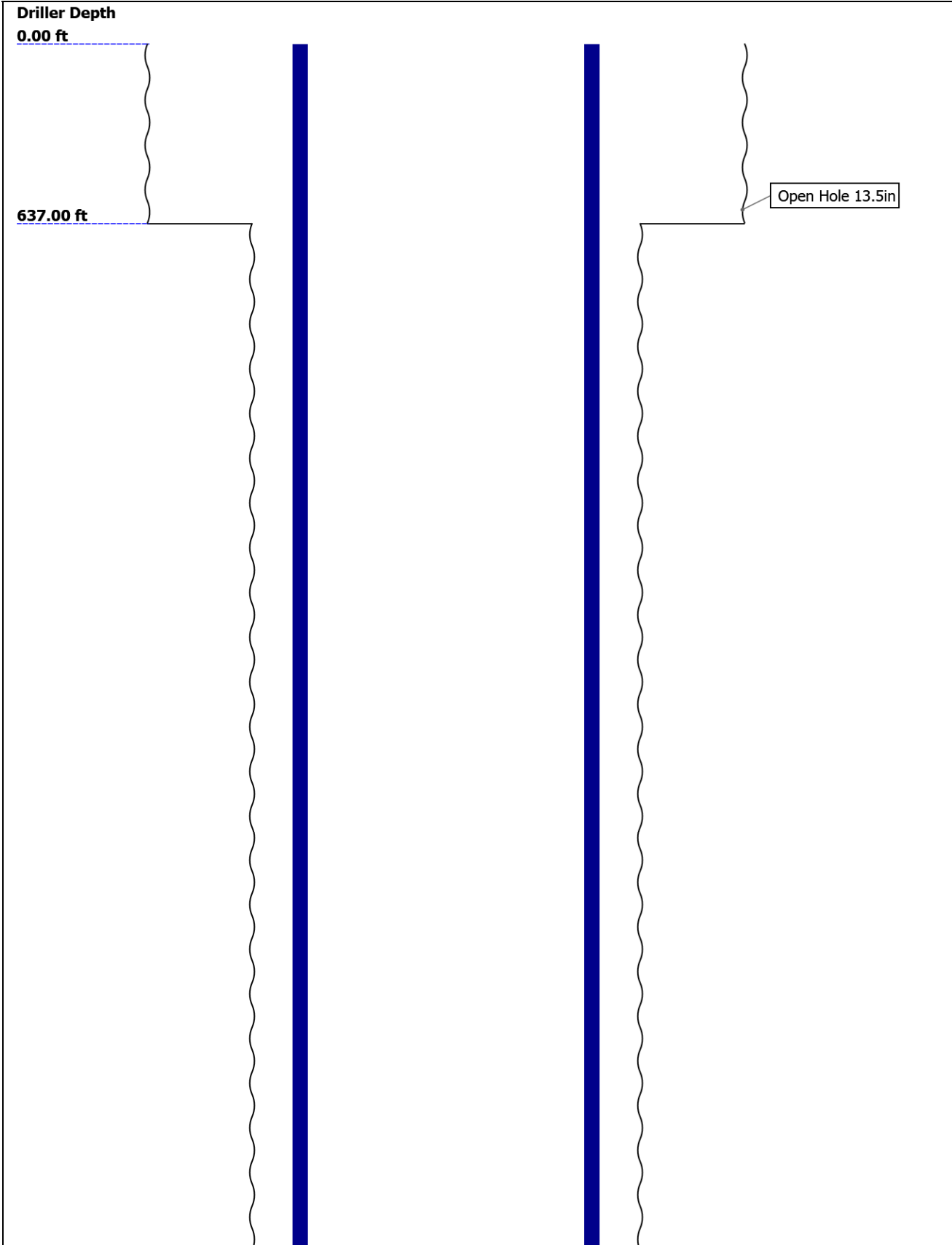
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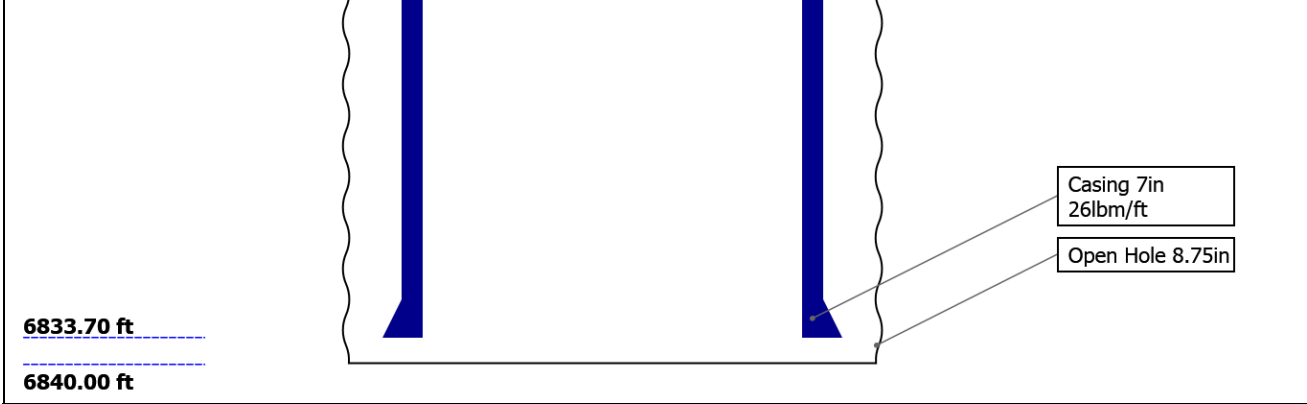
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Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	13.5	8.75				
Top Driller ( ft )	0	637				
Top Logger ( ft )	0	637				
Bottom Driller ( ft )	637	6840				
Bottom Logger ( ft )	637	6840				
Casing						
Size ( in )	7					
Weight ( lbm/ft )	26					
Inner Diameter ( in )	6.276					
Grade	P110					
Top Driller ( ft )	0					
Top Logger ( ft )	0					
Bottom Driller ( ft )	6833.7					
Bottom Logger ( ft )	6833.7					

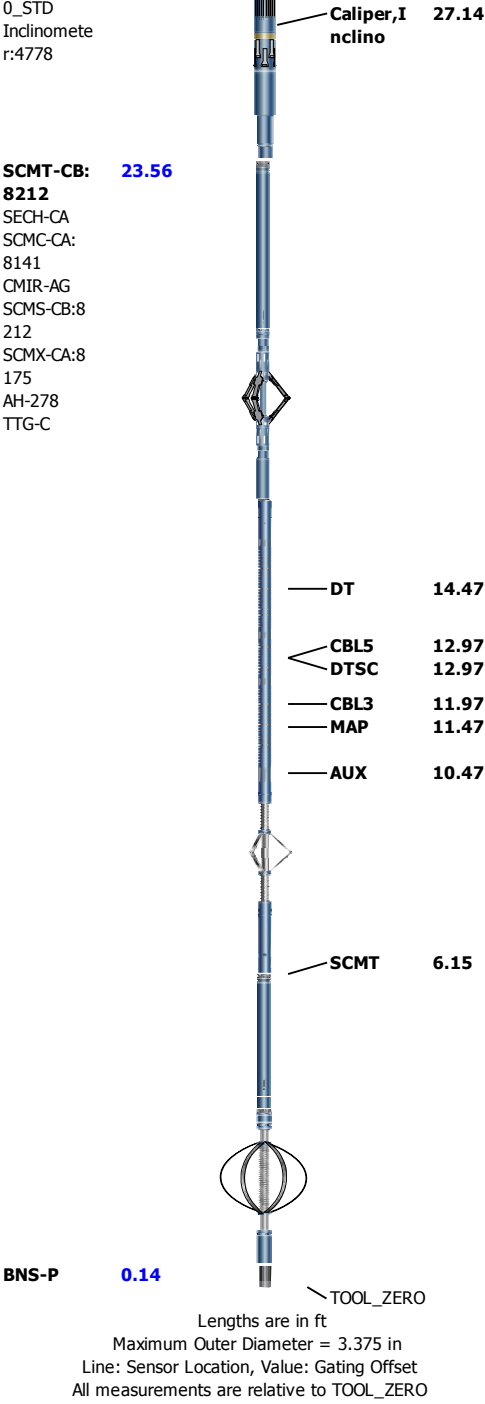
Operational Run Summary

Parameter ( unit )	Run 1					
Date Log Started	30-Oct-2015					
Time Log Started	17:16:50					
Date Log Finished	31-Oct-2015					
Time Log Finished	00:38:47					
Top Log Interval ( ft )	24.00					
Bottom Log Interval ( ft )	6670.00					
Total Depth ( ft )	6833.70					
Max Hole Deviation ( deg )	0.00					
Azimuth of Max Deviation ( deg )	0.00					
Bit Size ( in )	8.750					
Logging Unit Number	9115					
Logging Unit Location	Ft. Morgan, CO					
Recorded By	Aleksei Bekhterev					

## Borehole Fluids

## Remarks and Equipment Summary

Run 1: Toolstring				Run 1: Remarks
<b>Equip name</b>	<b>Length</b>	<b>MP name</b>	<b>Offset</b>	This is first run in hole
LEH-QT	44.74			Toolstring ran as per tool sketch
LEH-QT				Repeat pass is done with 0 psi
AH-63	41.83			Main pass is done with 2500 psi
AH-79	41.51			Log started 30 ft above top of the liner (6670 ft)
PSTP-B:28	40.68	GR	36.97	Fake black channel from TD to 5637' on MAP image due to SCMT receiver (MAP receiver 2) problem at bottom
12		PSTC	36.68	Temperature on bottom: 235.9 degF
PSC-A		PSTC To ol String	0.00	PMIT resolution: 0.2"
PSTC-A		Bottom		Pressure was released at 900 ft due to hydrostatic forces pushing cable out of the well
PBMS-B:28		Tempera ture	33.92	Crew: Gary Lapp, Jake Jump
12		CQG Pre ssure	33.58	Thank you for choosing Schlumberger Wireline!
		CCL	33.16	
		PBMS	32.41	
PMIT-B:47	32.41			
78				
MITH:800				
MITC-A:75				
9				
MITS-B:477				
8				
FINGERS-4				



## Depth Summary

	Run 1		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		
Serial Number			
Calibration Date			

Calibrator Serial Number			
Number of Calibration Points	0		
Logging Cable			
Type	7-46A-XS		
Serial Number			
Length	12000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane		
Run 1:Depth Control Parameters		Depth Control Remarks	
Log Sequence	First Log In the Well	All Schlumberger depth policies followed	
Rig Up Length At Surface		IDW used as primary depth device	
Rig Up Length At Bottom		Z-chart used as secondary depth reference	
Rig Up Length Correction			
Stretch Correction			
Tool Zero Check At Surface			

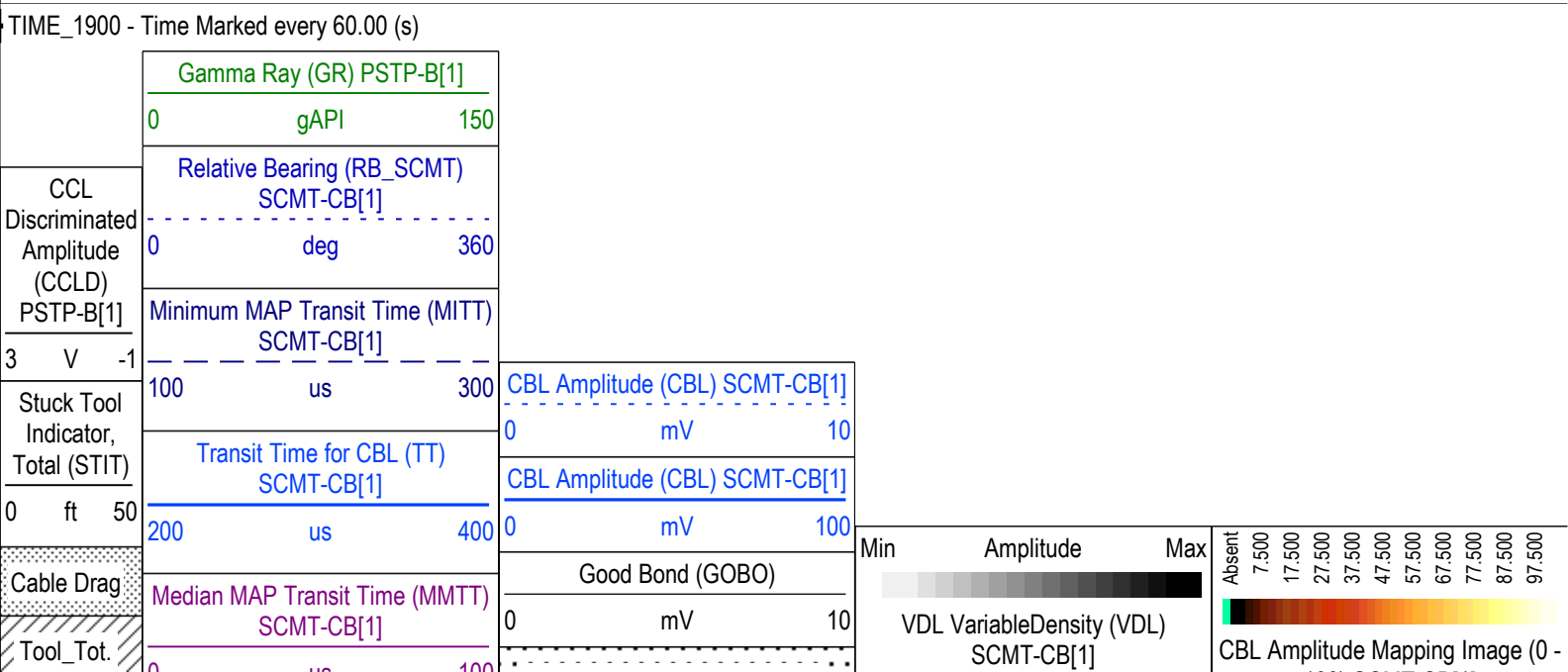
Composite 2

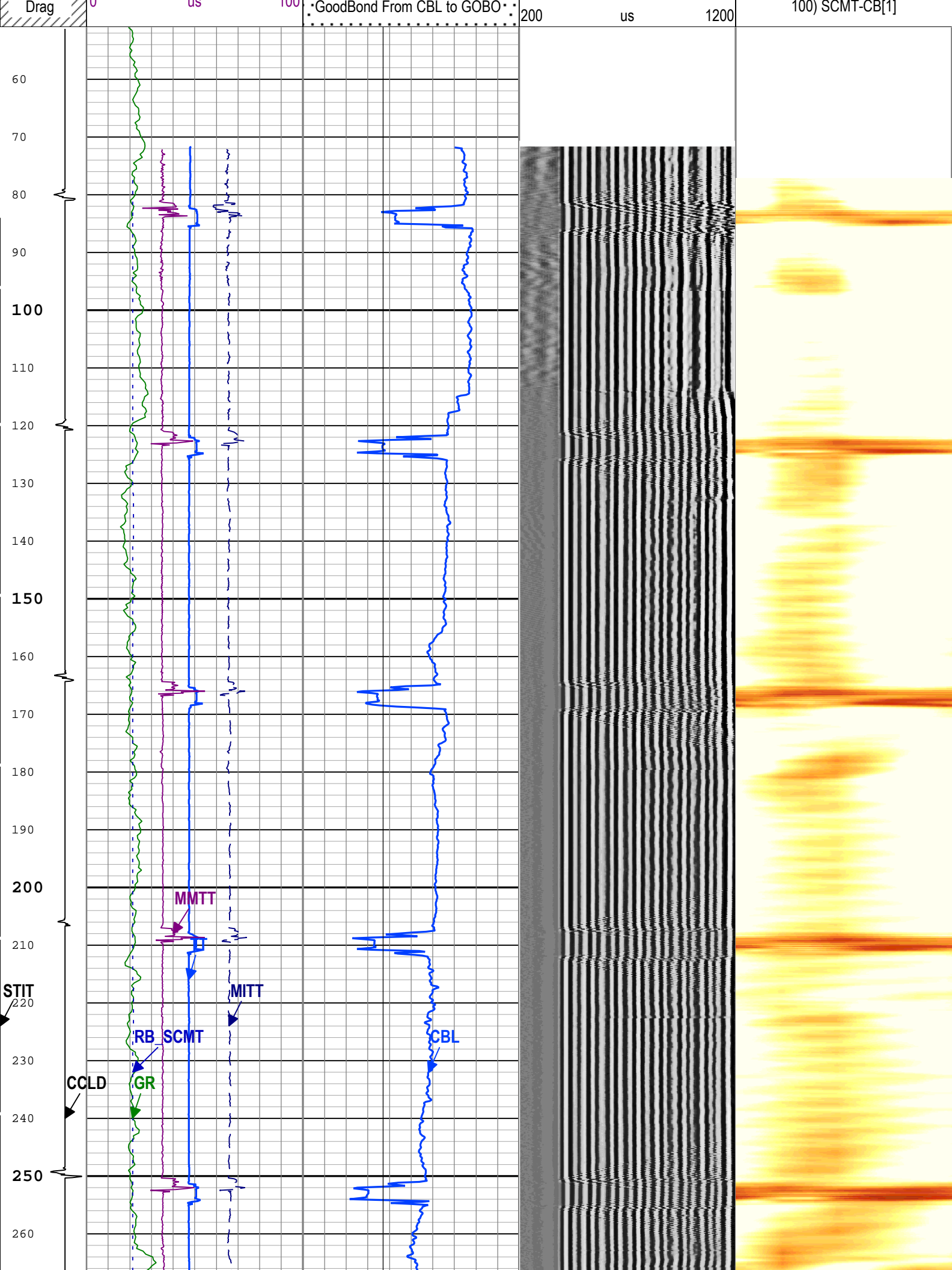
Software Version	
Acquisition System	Version
Maxwell 2016	6.0.52439.3100

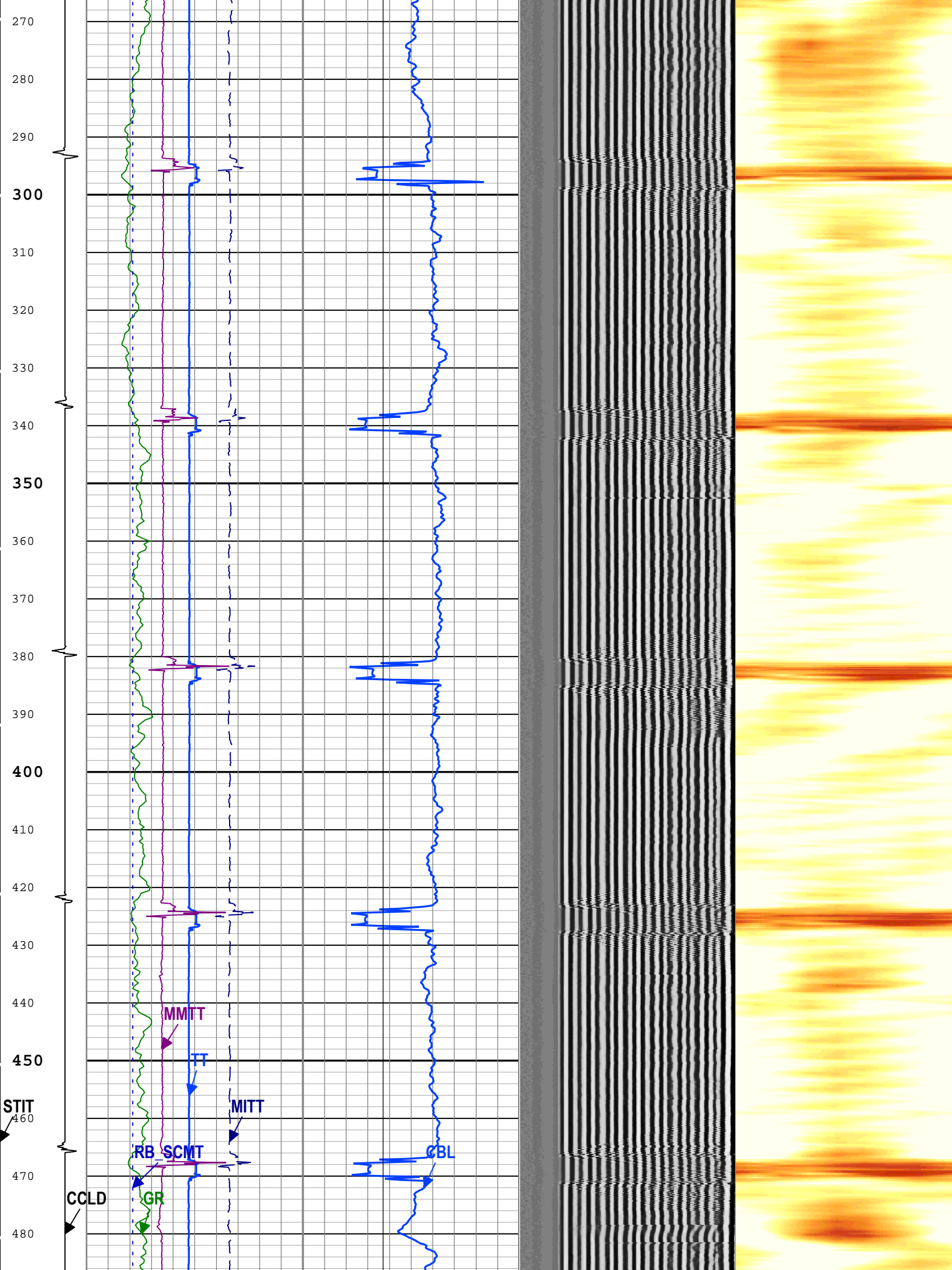
Composite Summary									
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run 1	Main[2]:Up	Up	346.83 ft	6676.24 ft	30-Oct-2015 6:26:59 PM	30-Oct-2015 10:16:35 PM	ON	5.03 ft	Yes
Run 1	Main[4]:Up	Up	83.56 ft	1247.98 ft	30-Oct-2015 10:47:24 PM	30-Oct-2015 11:45:49 PM	ON	7.88 ft	Yes
All depths are referenced to toolstring zero									

Log	Company:Noble Energy Inc      Well:Wells Ranch AE32-615 Composite 2:S059
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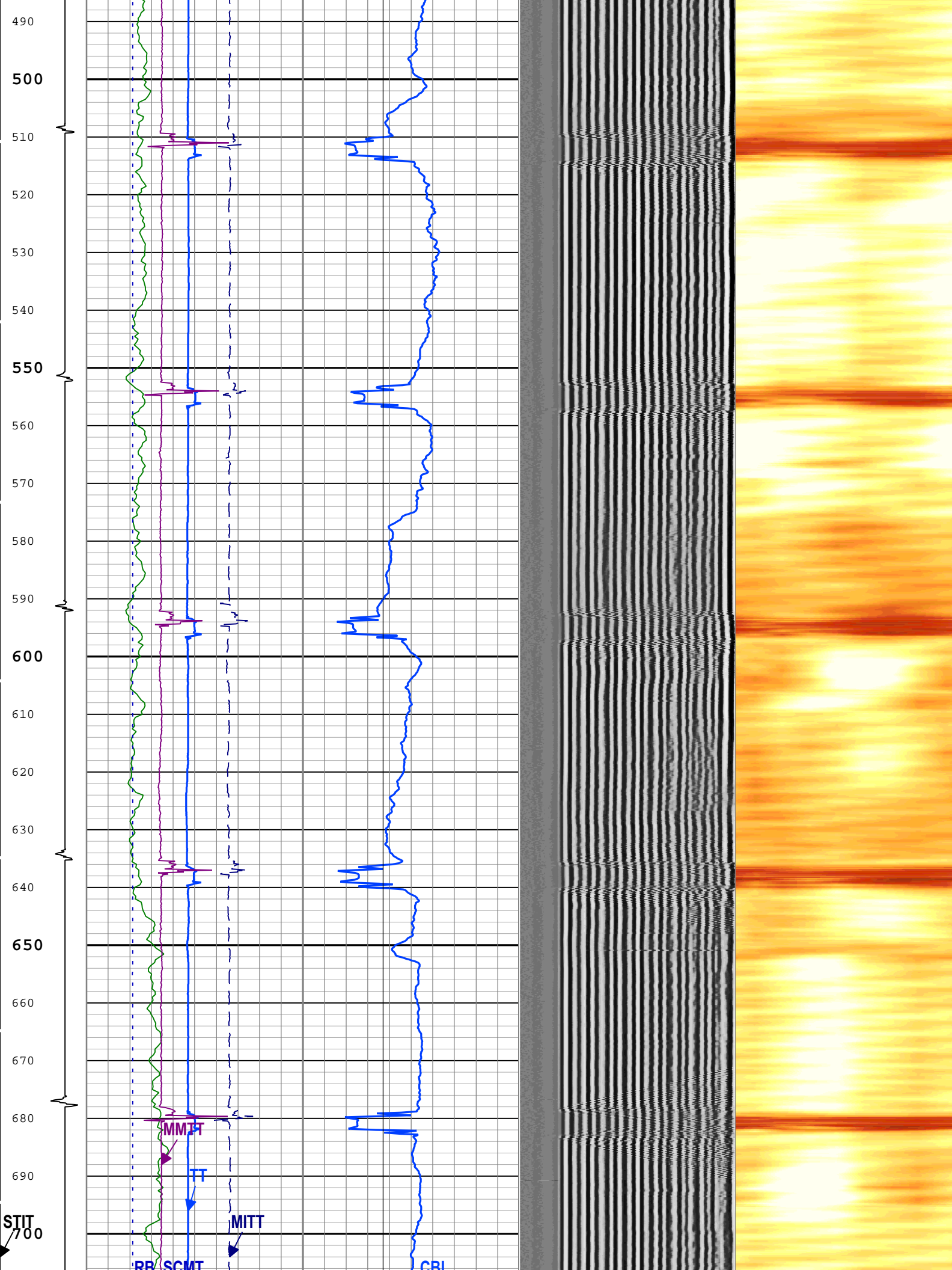
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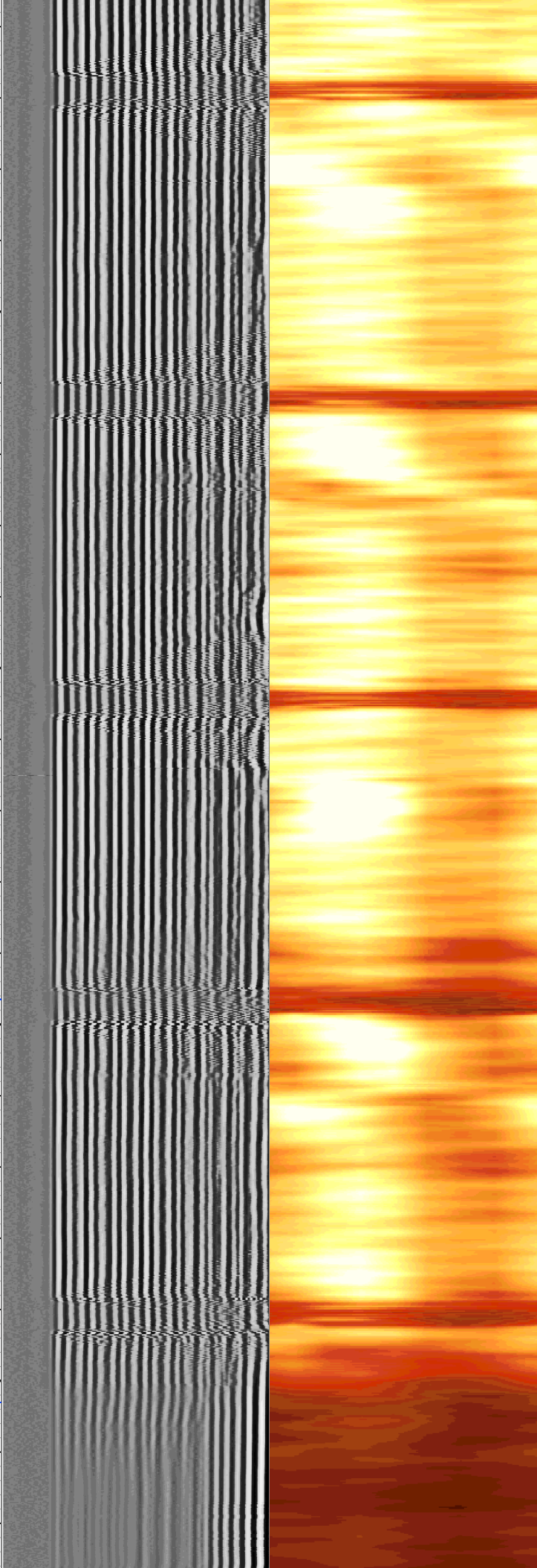
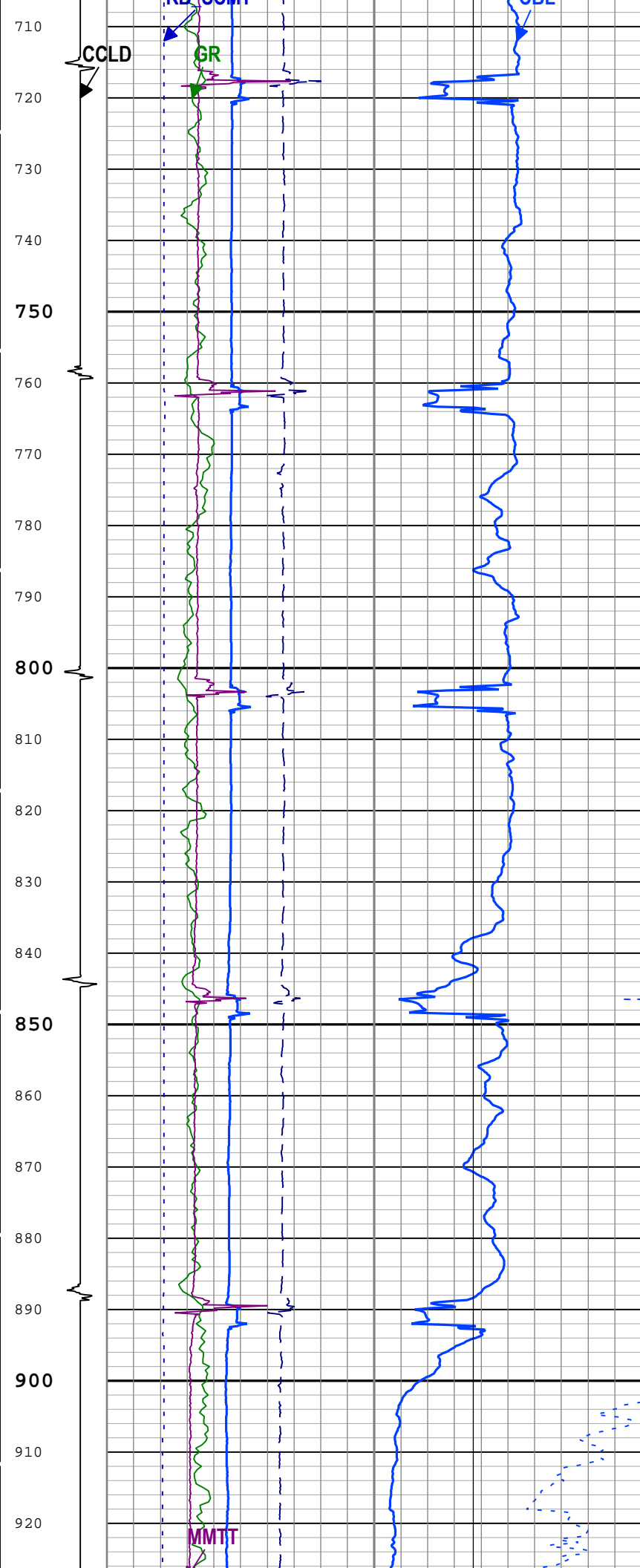


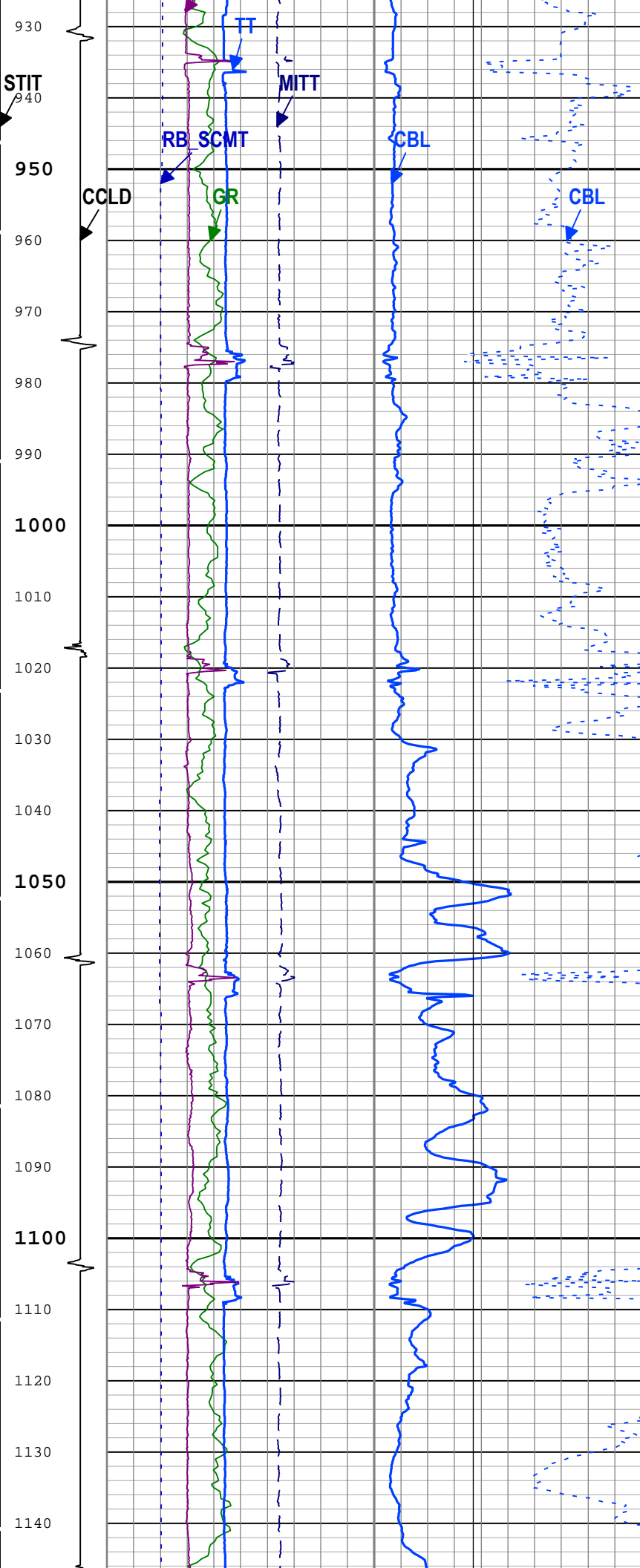




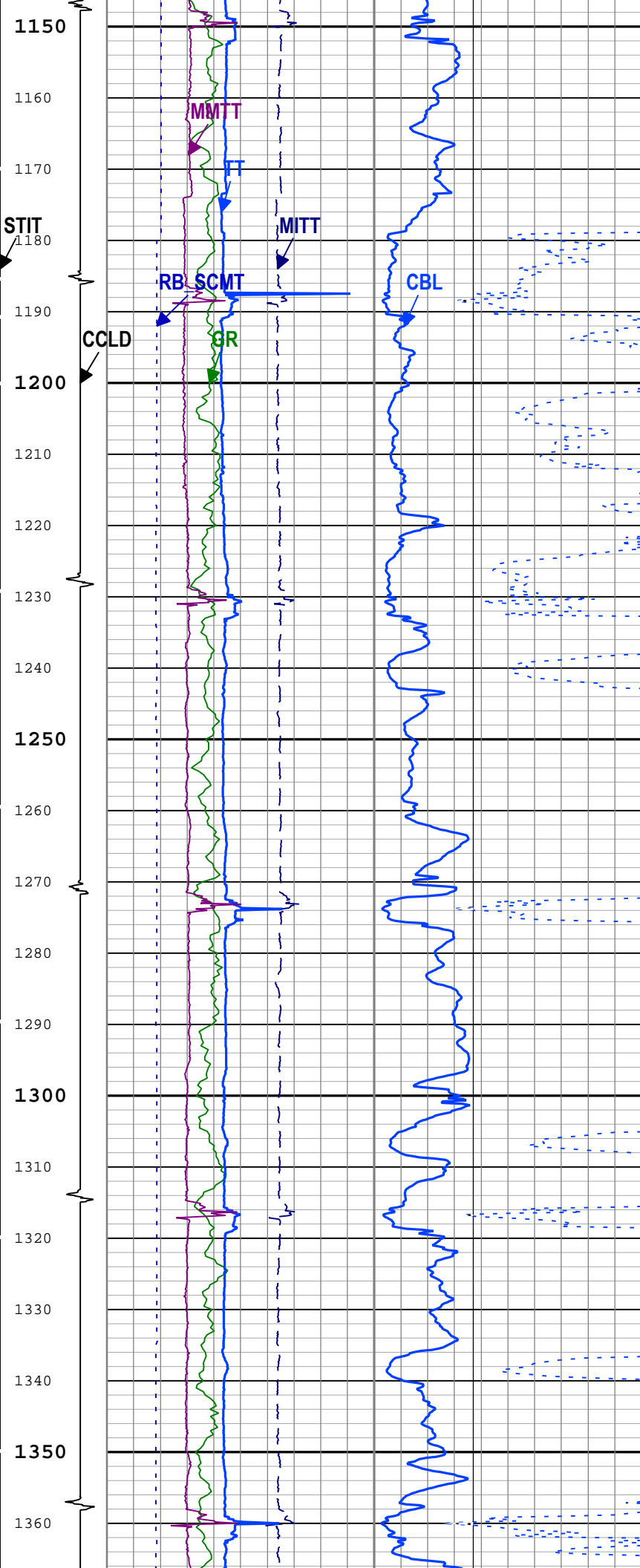


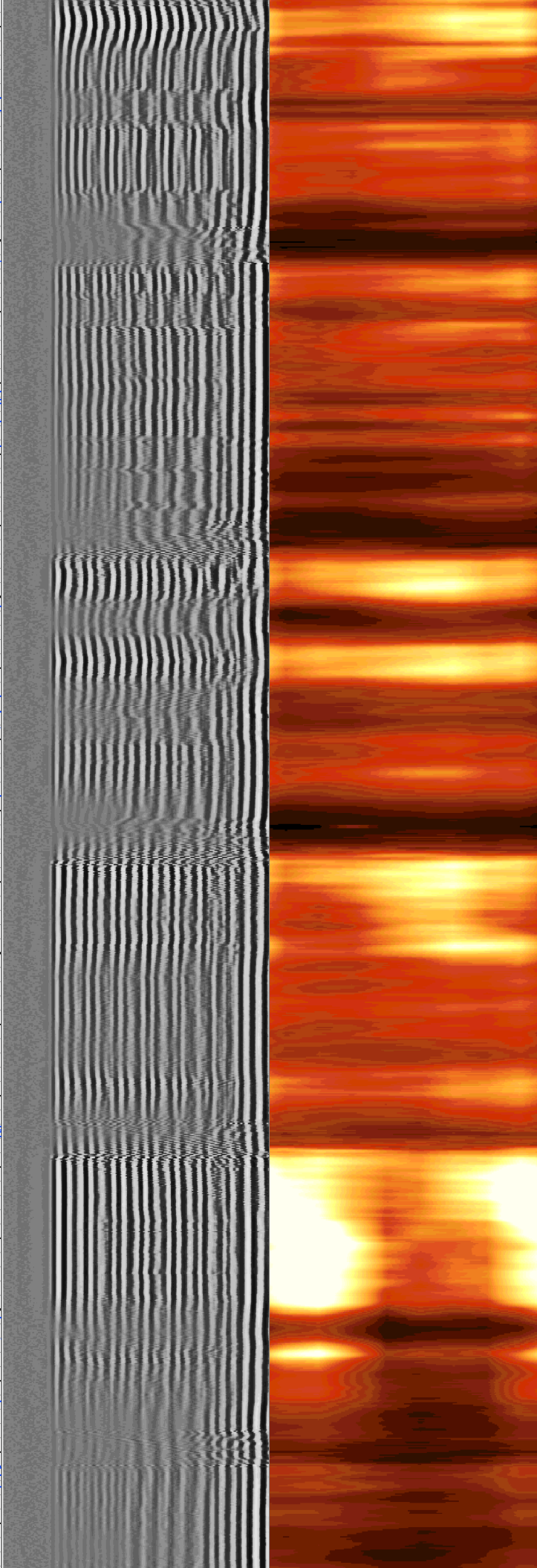
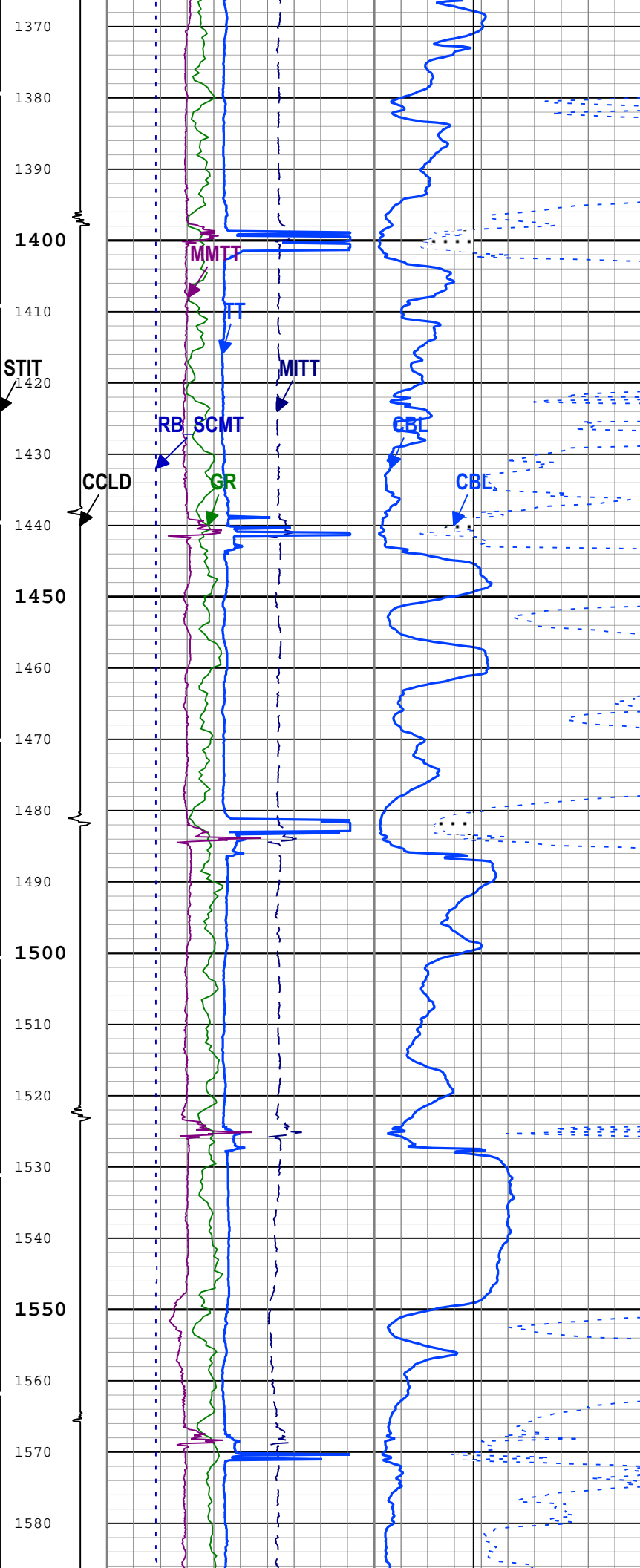


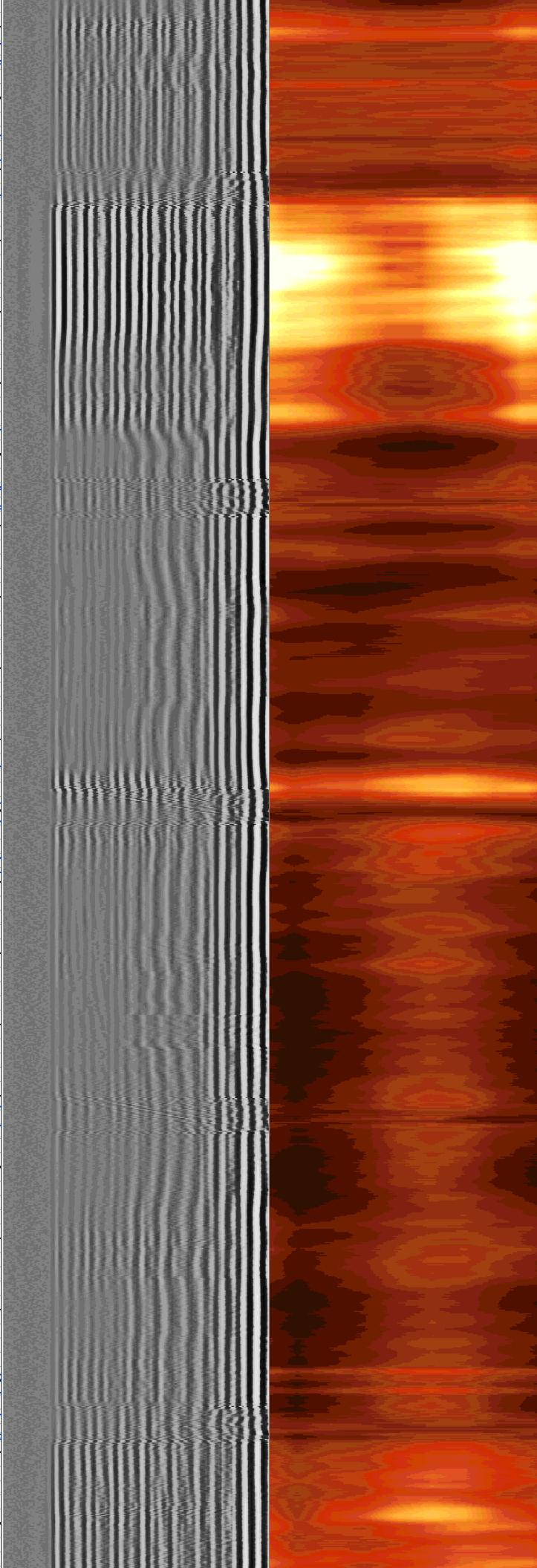
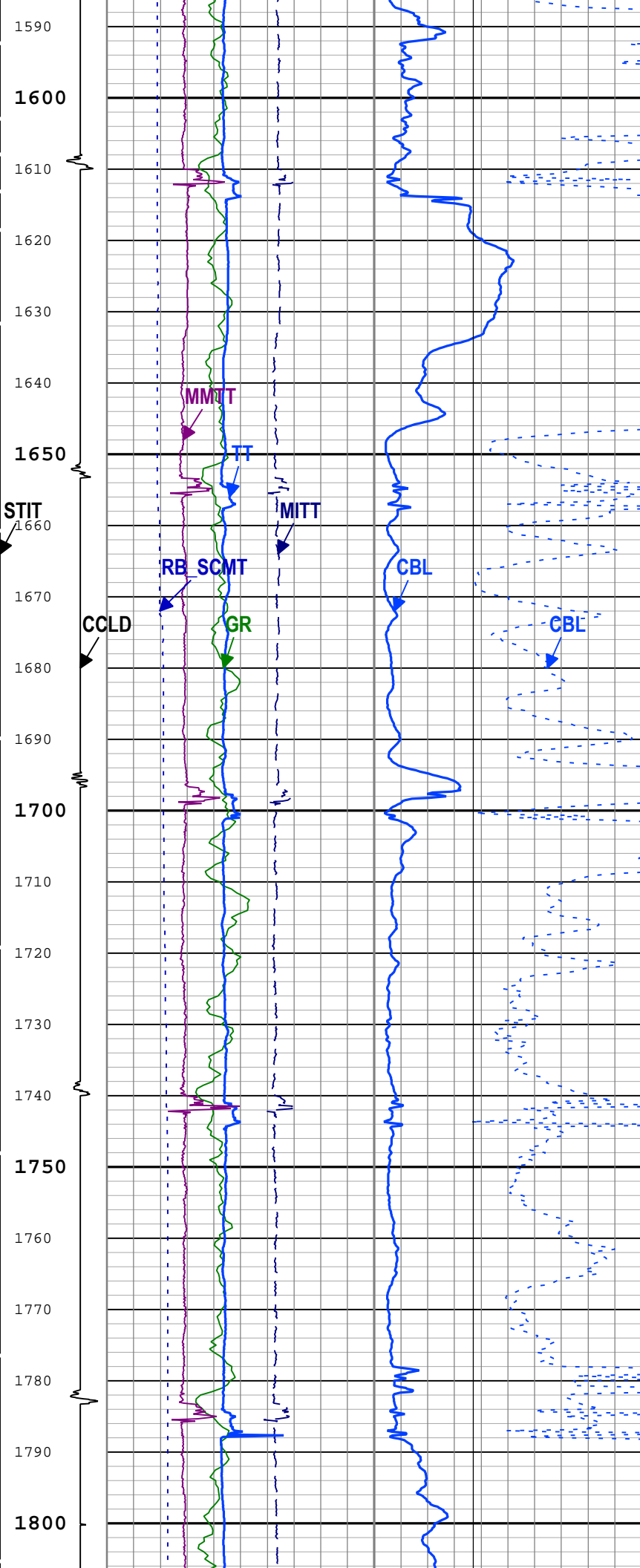




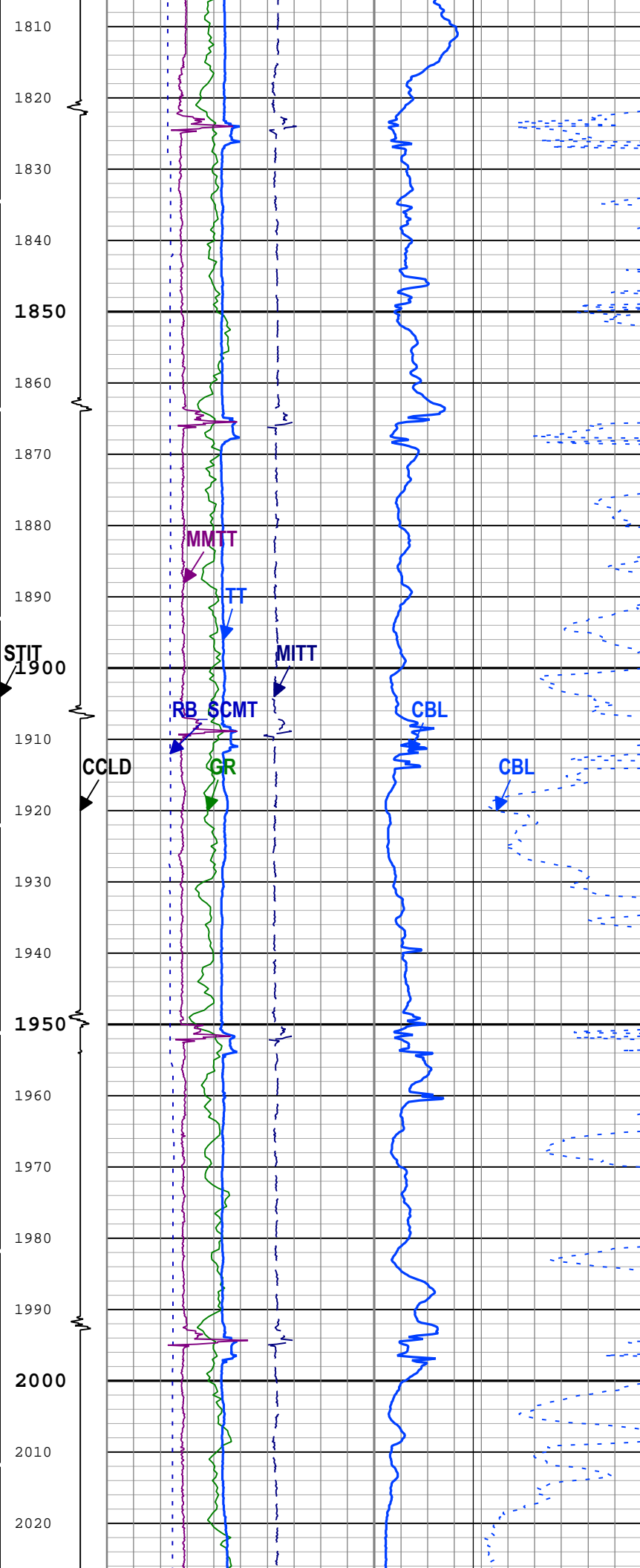


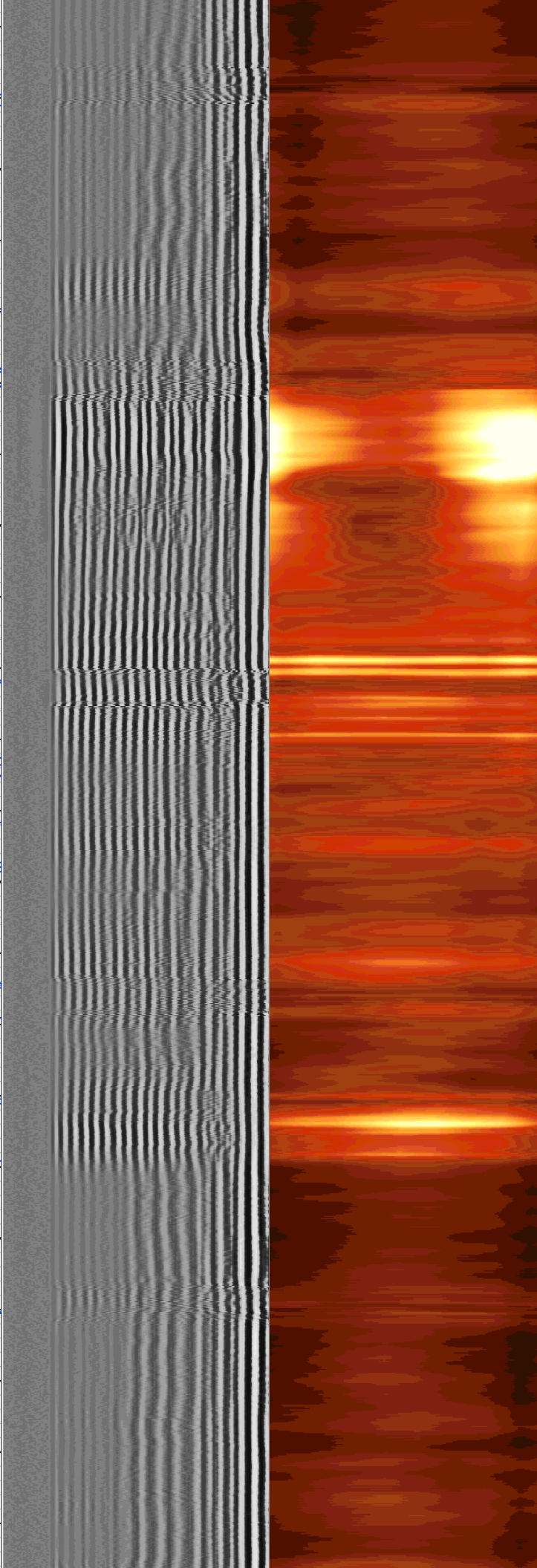
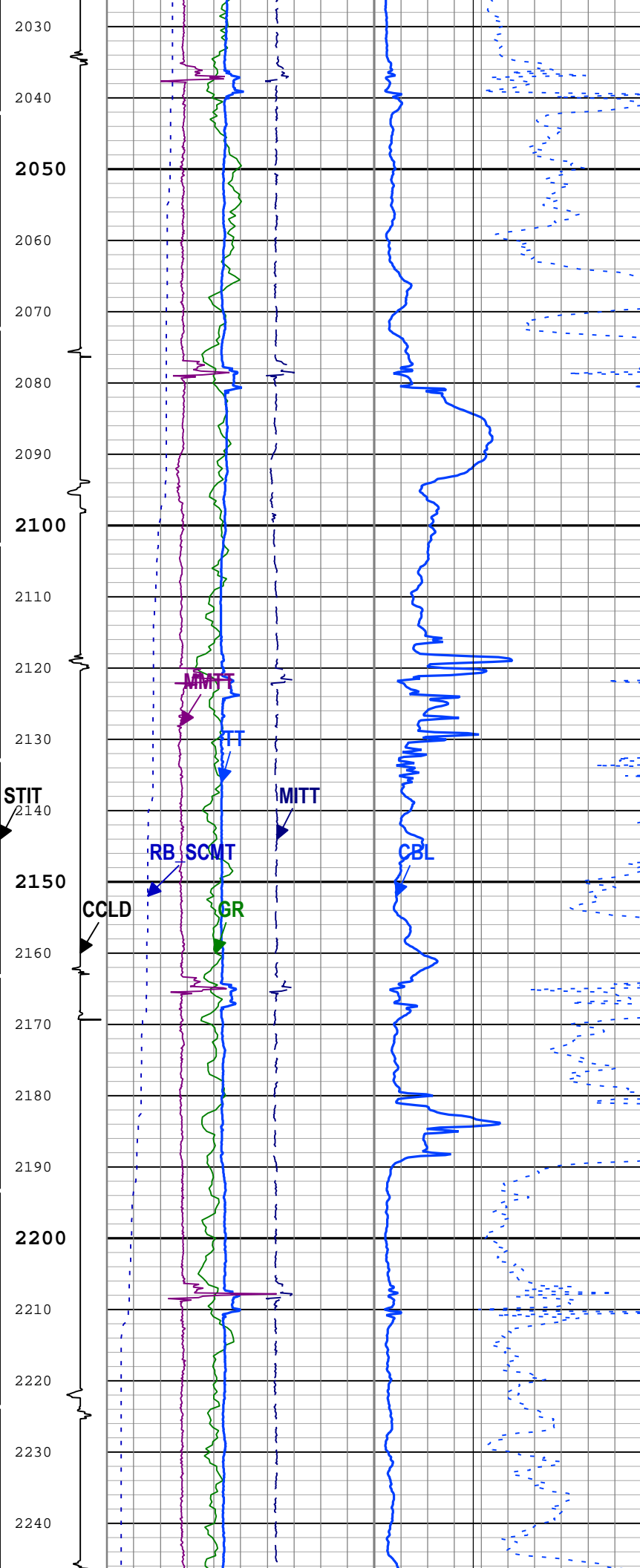




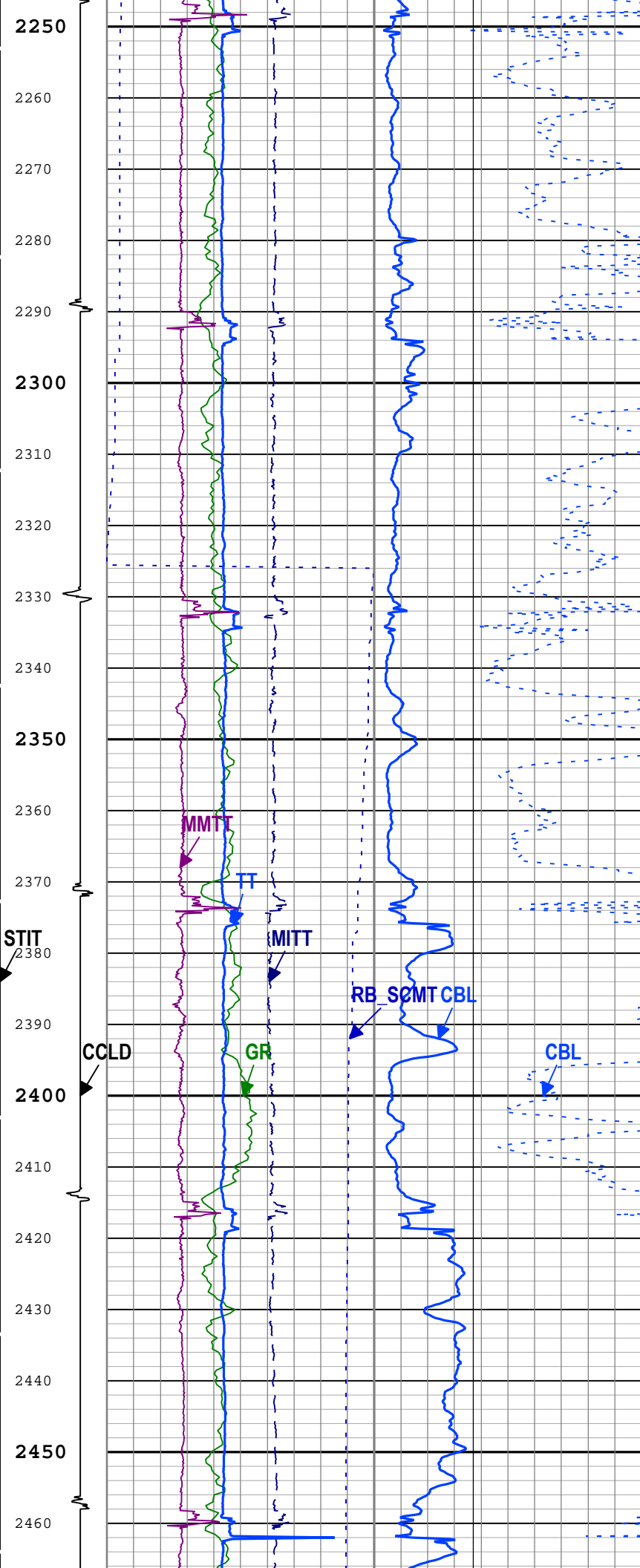


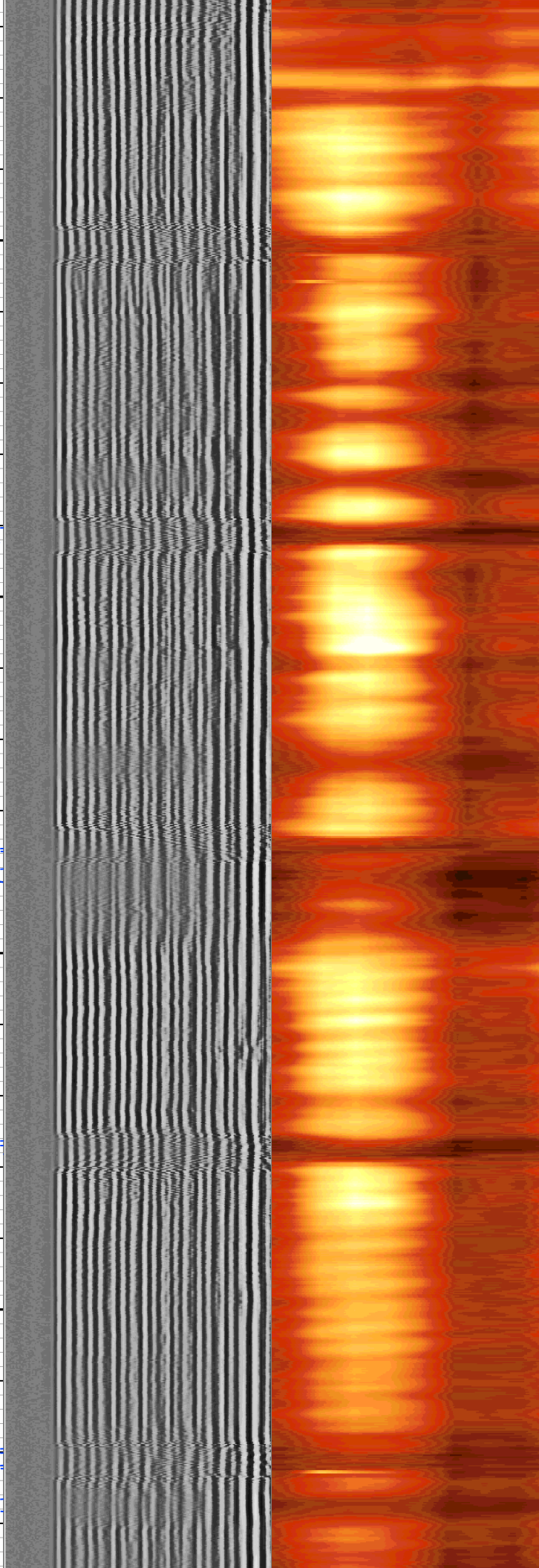
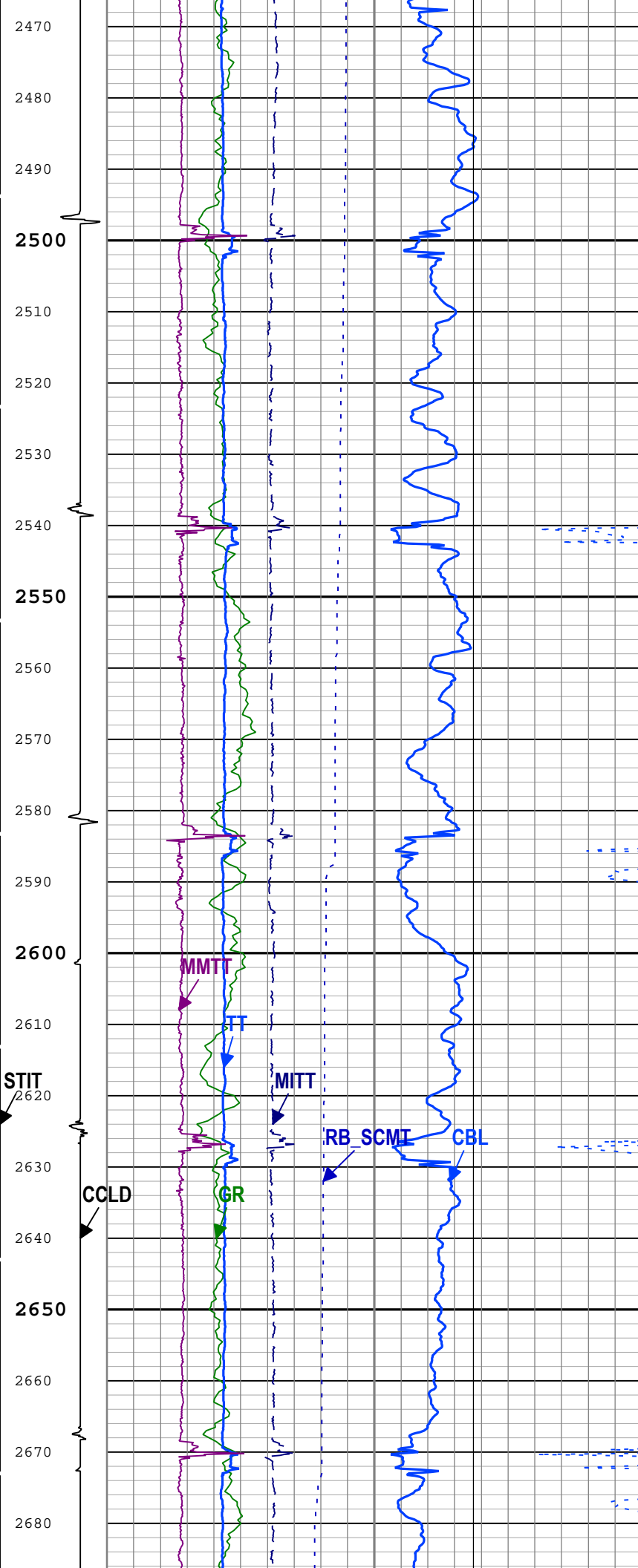


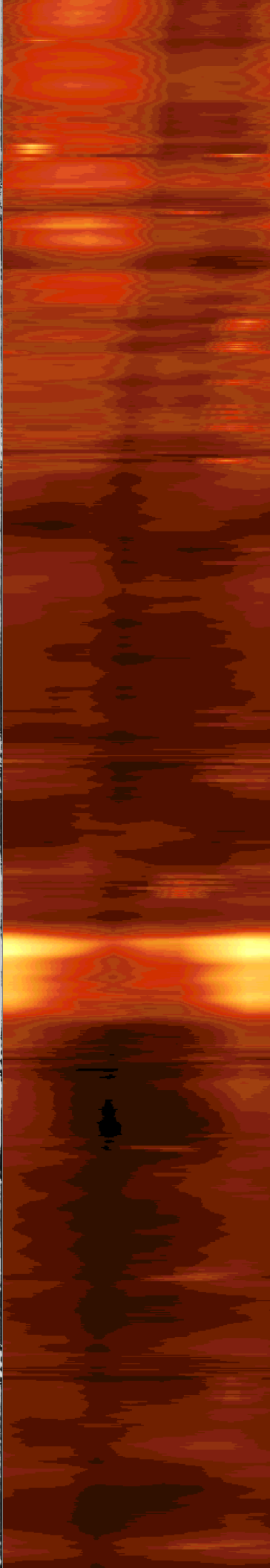
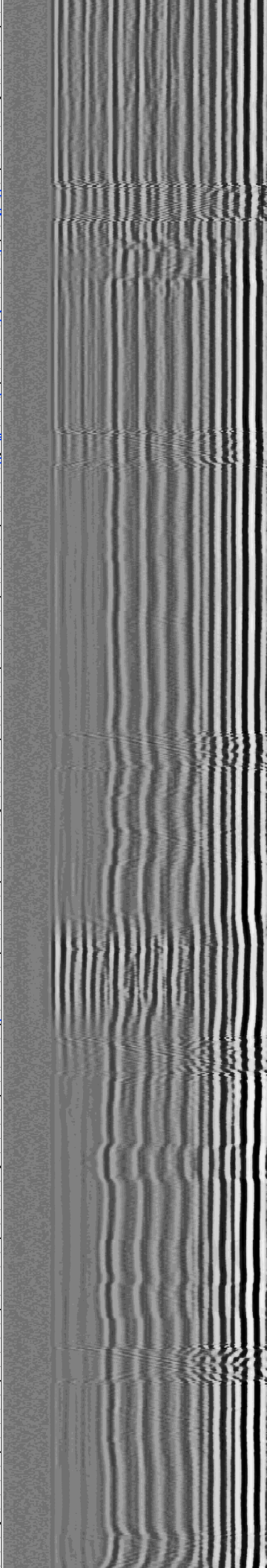
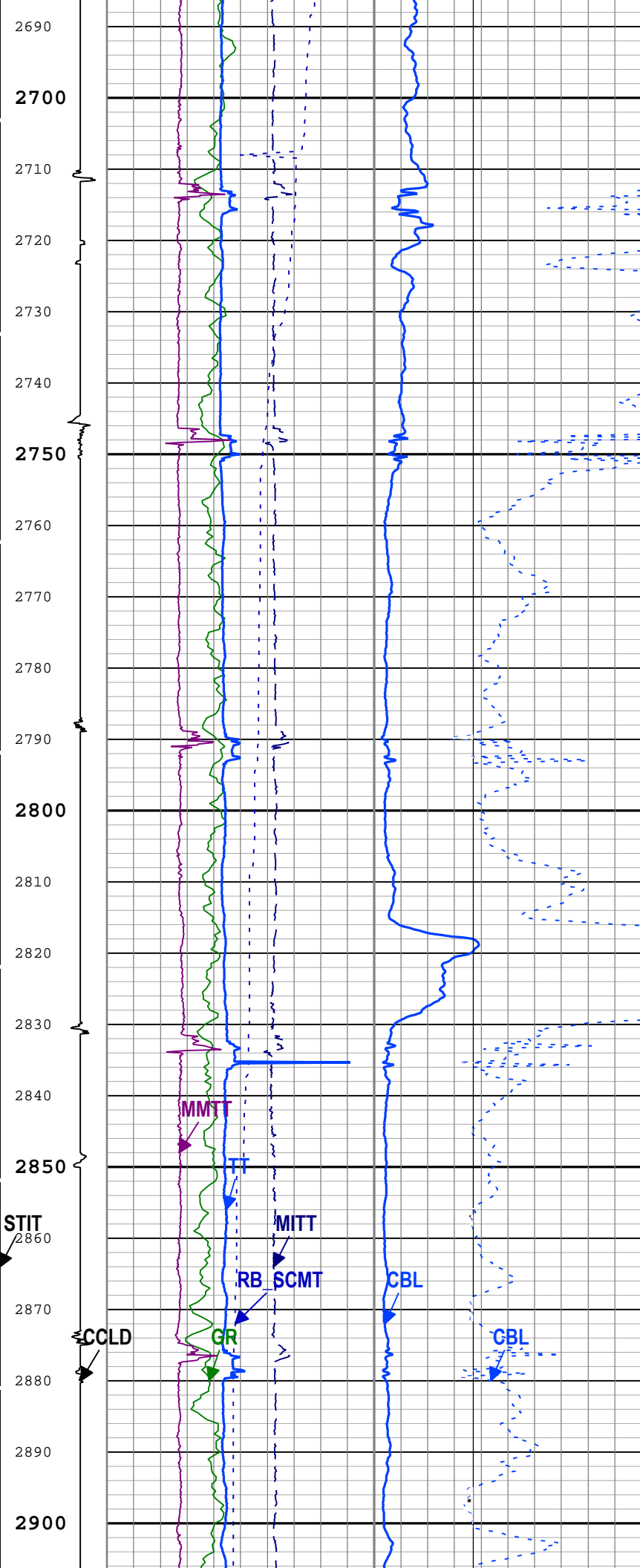




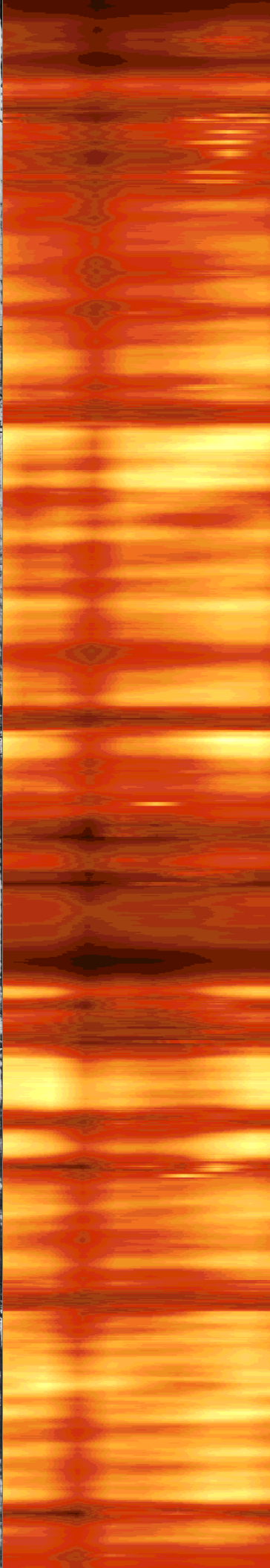
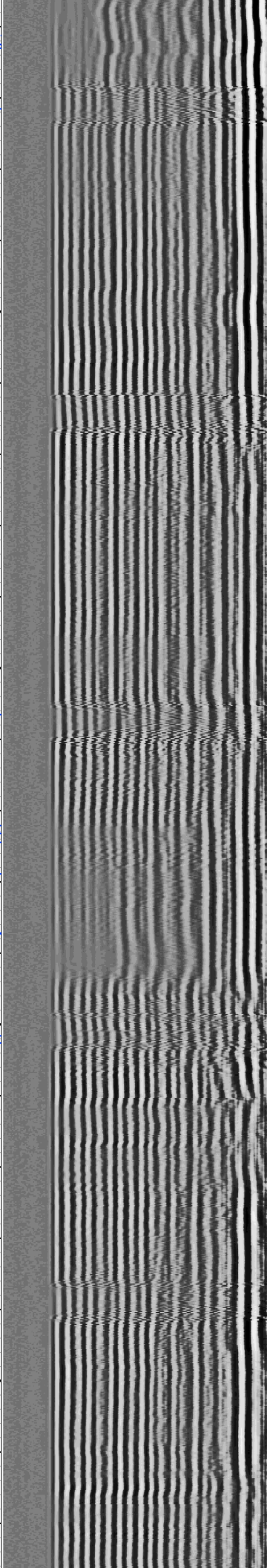
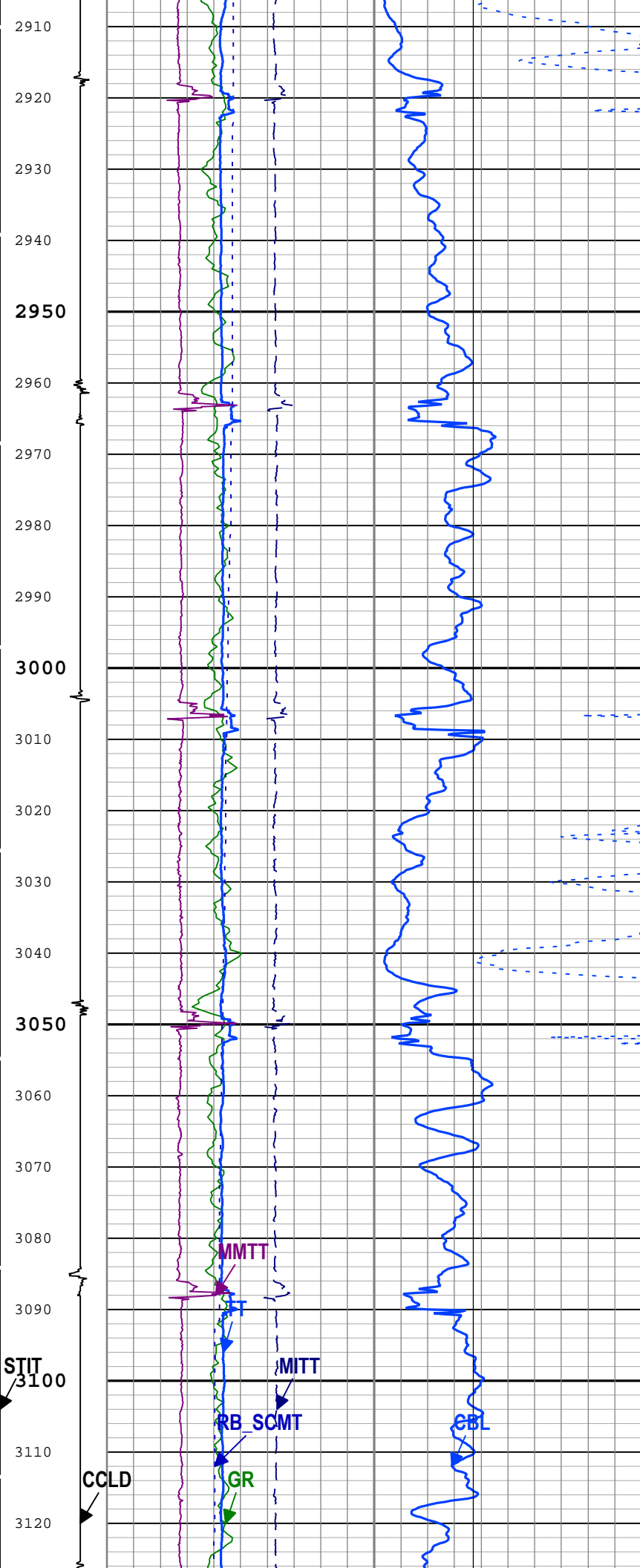


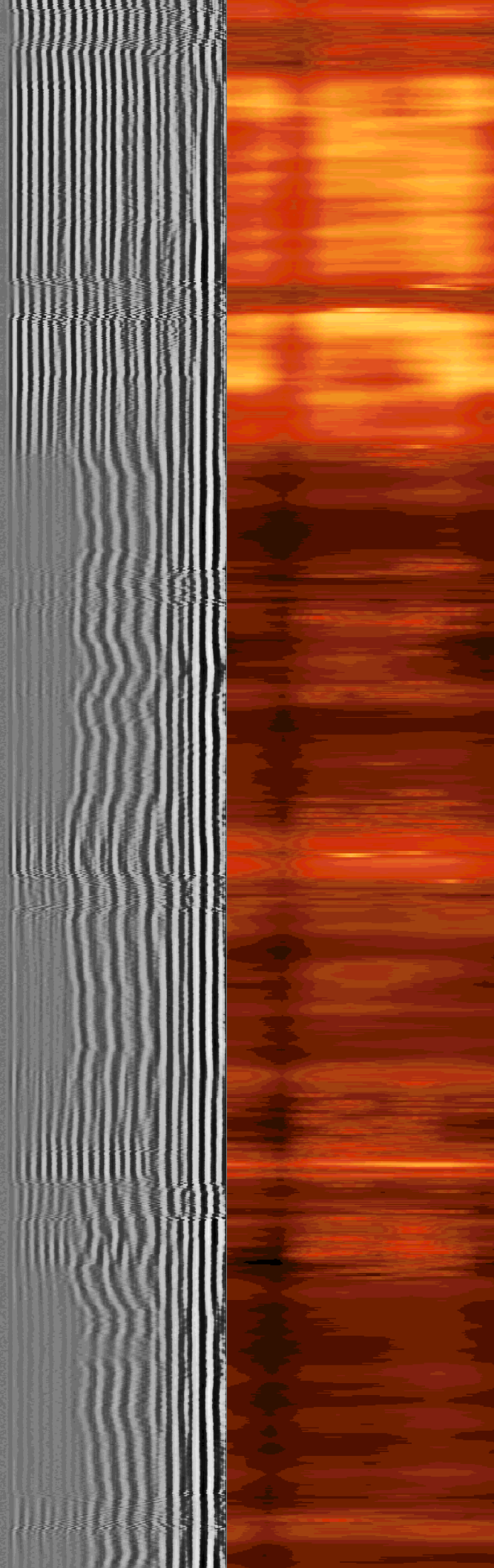
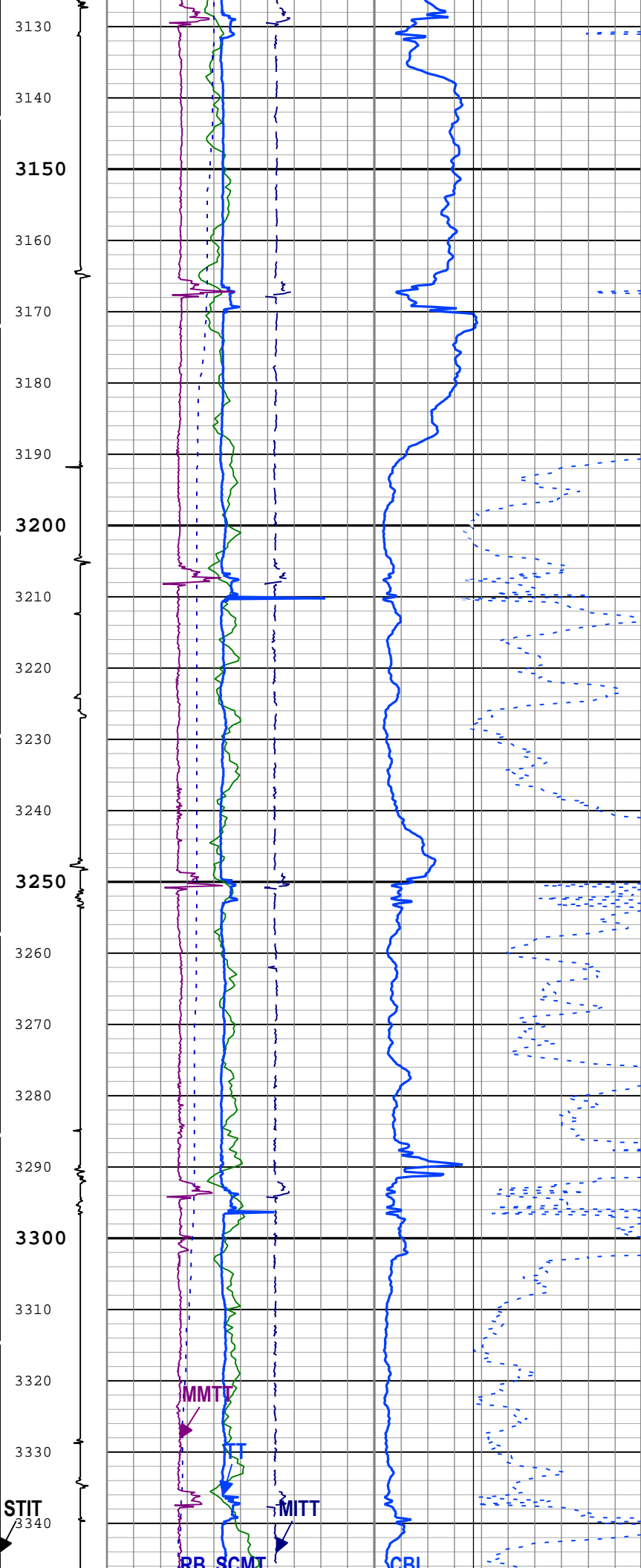


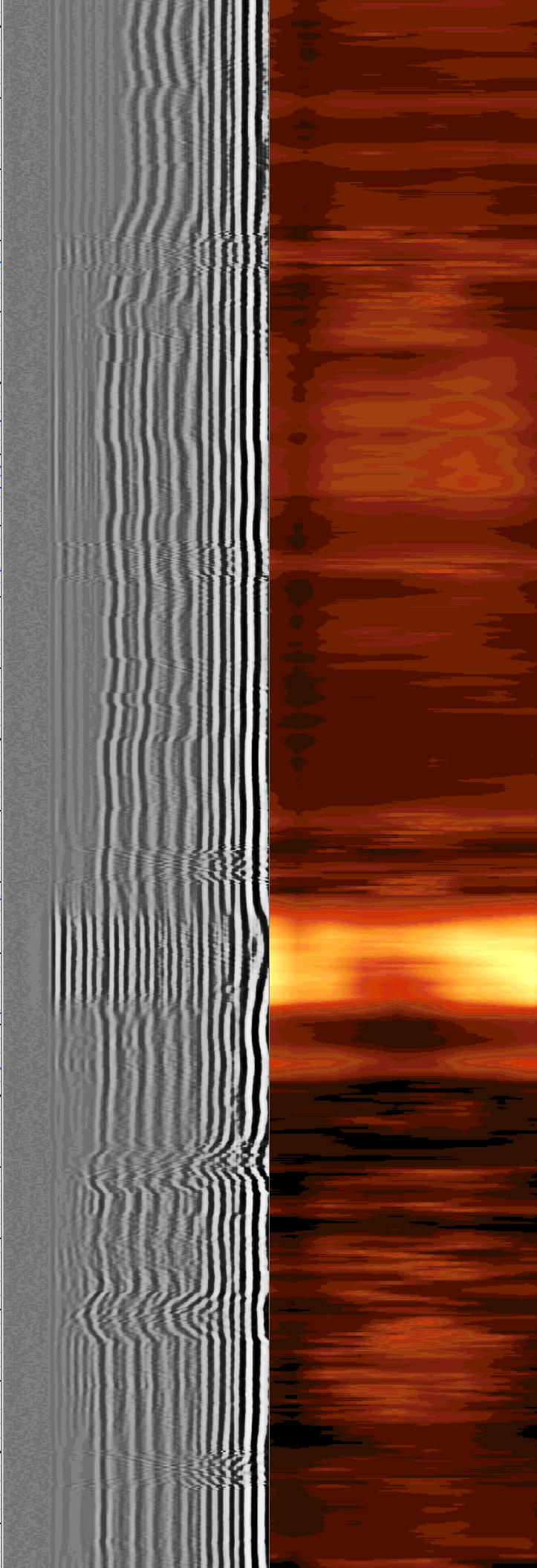
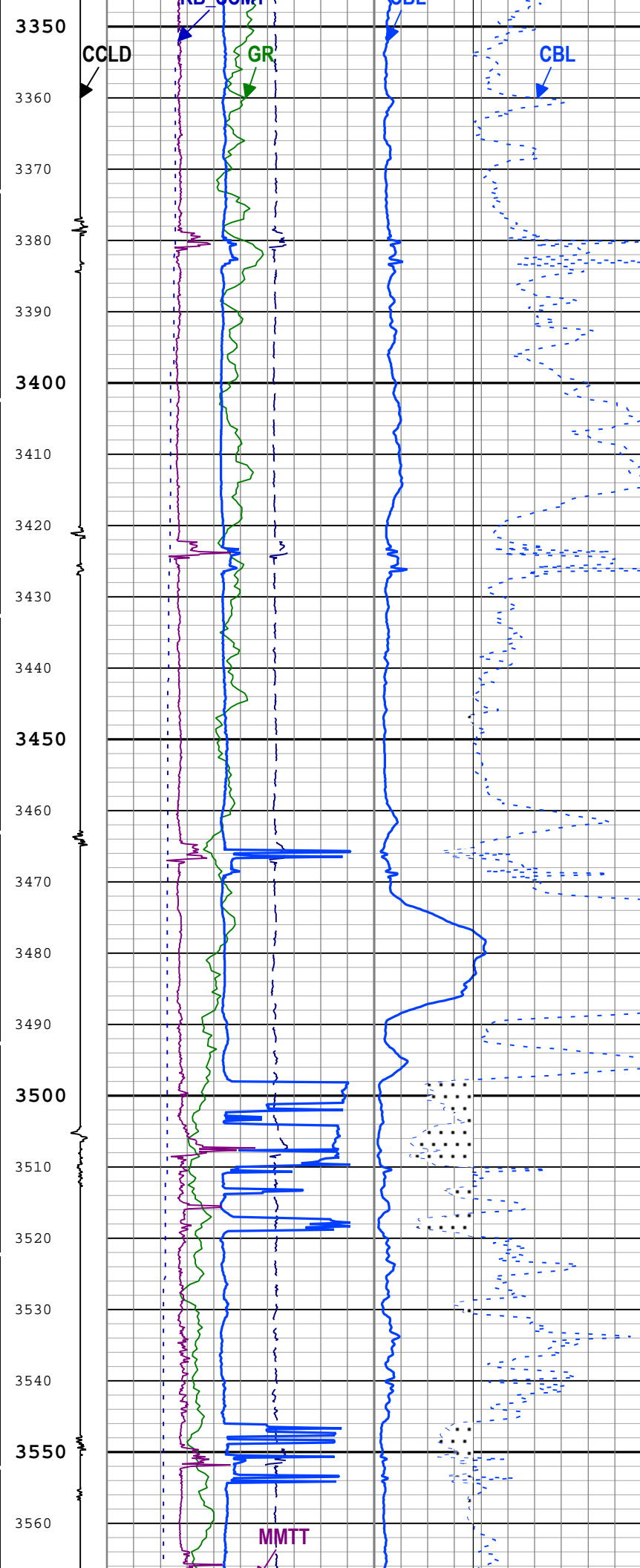




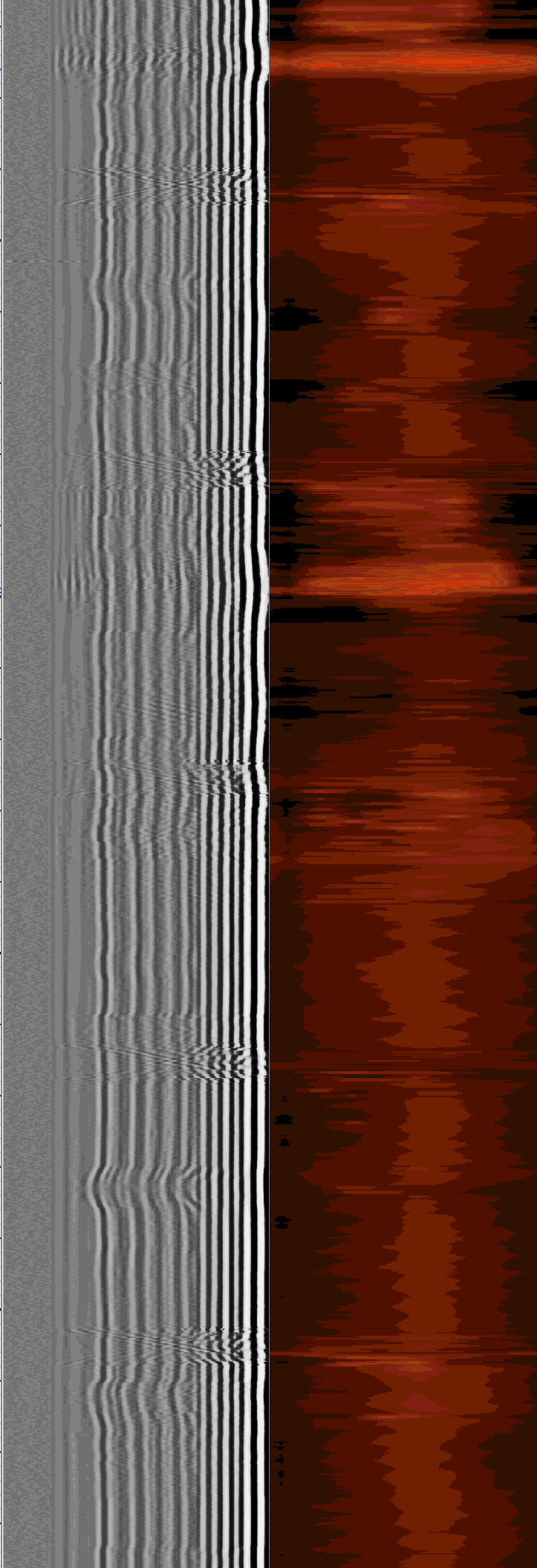
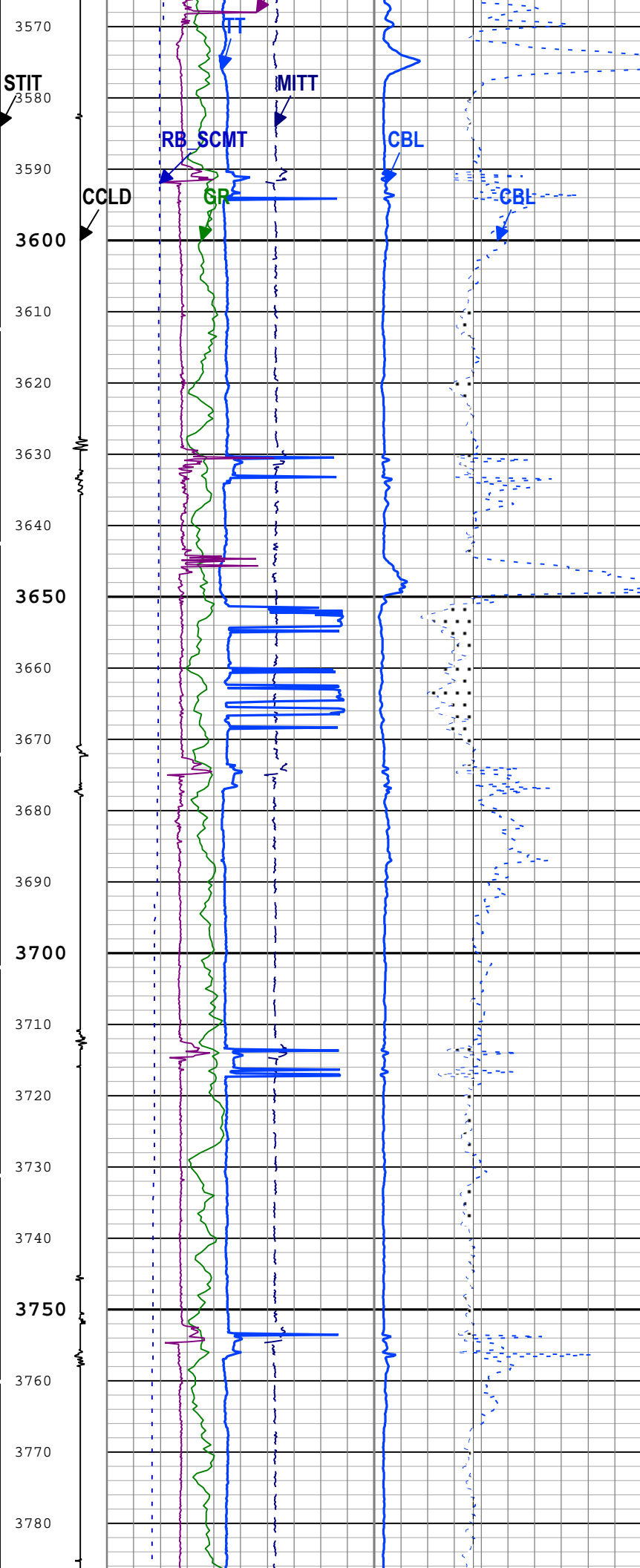


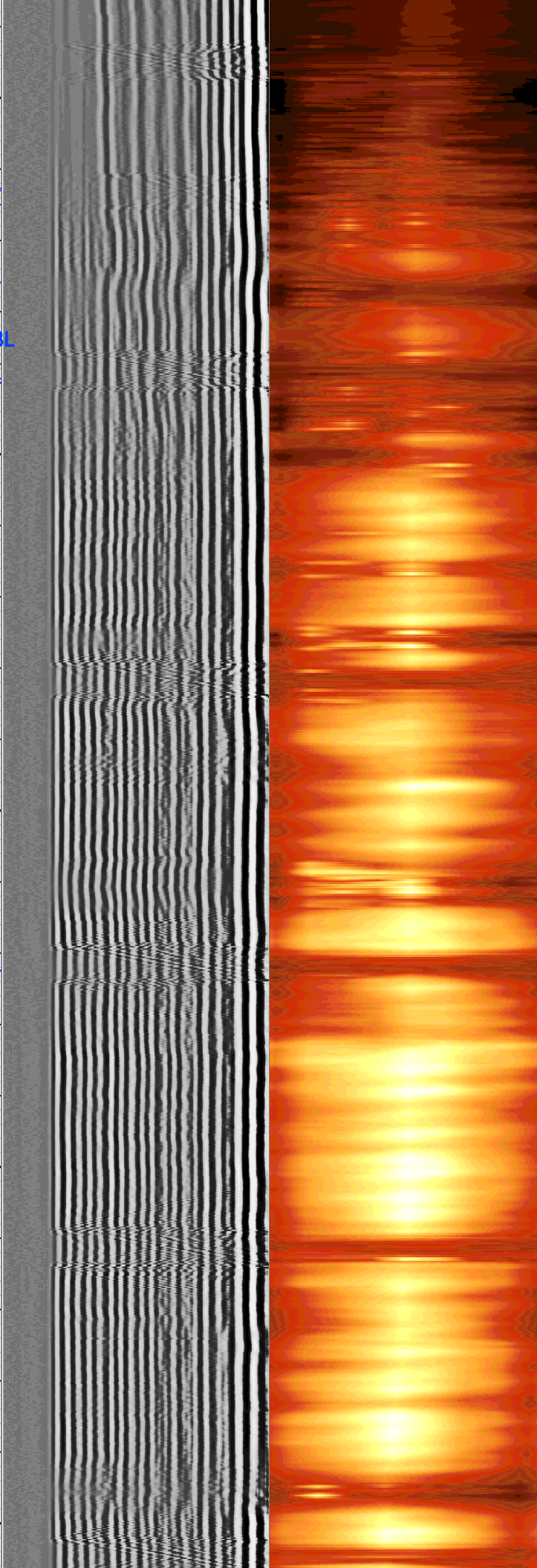
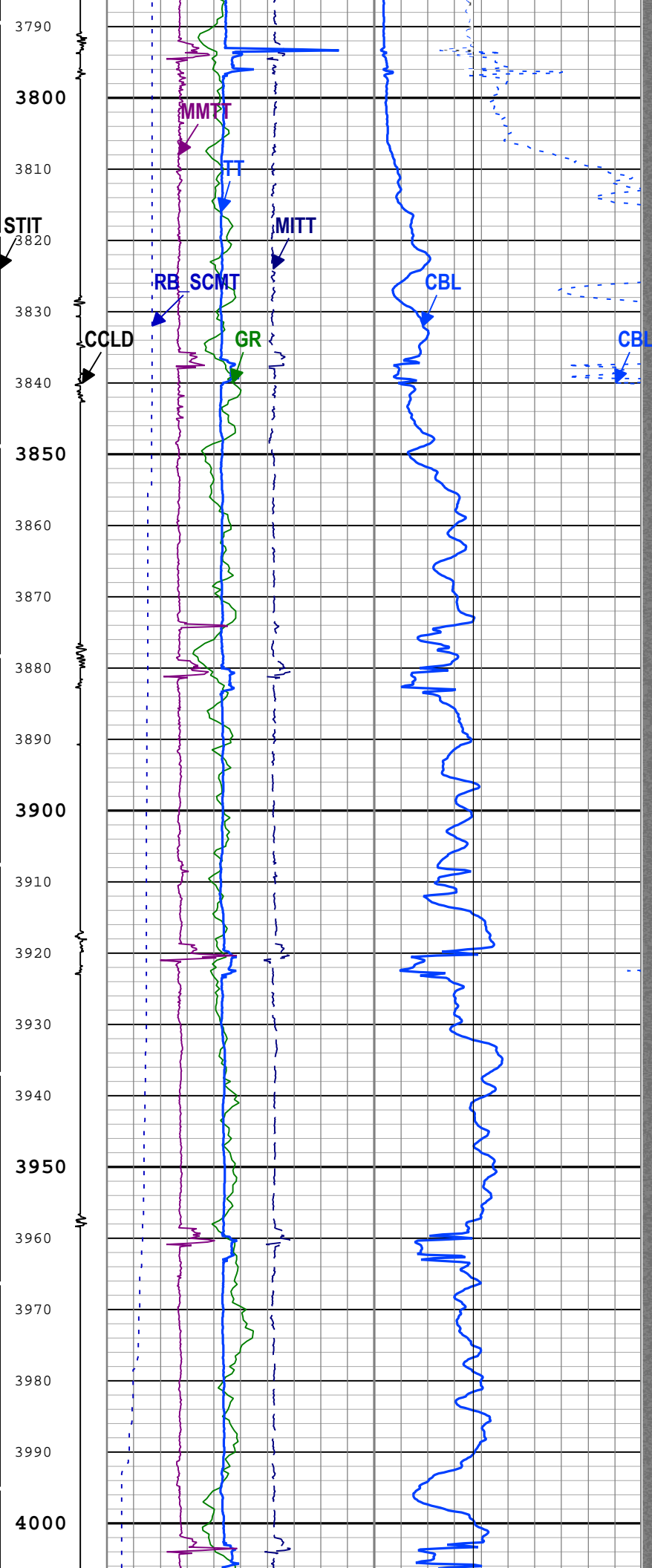




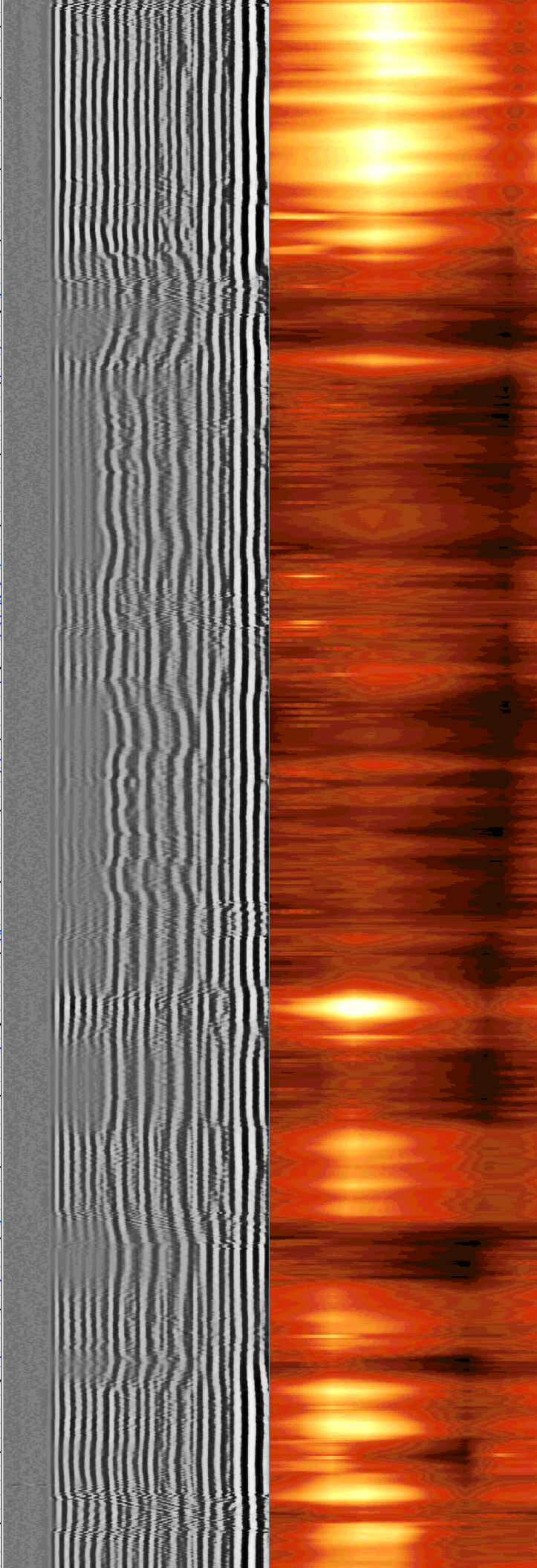
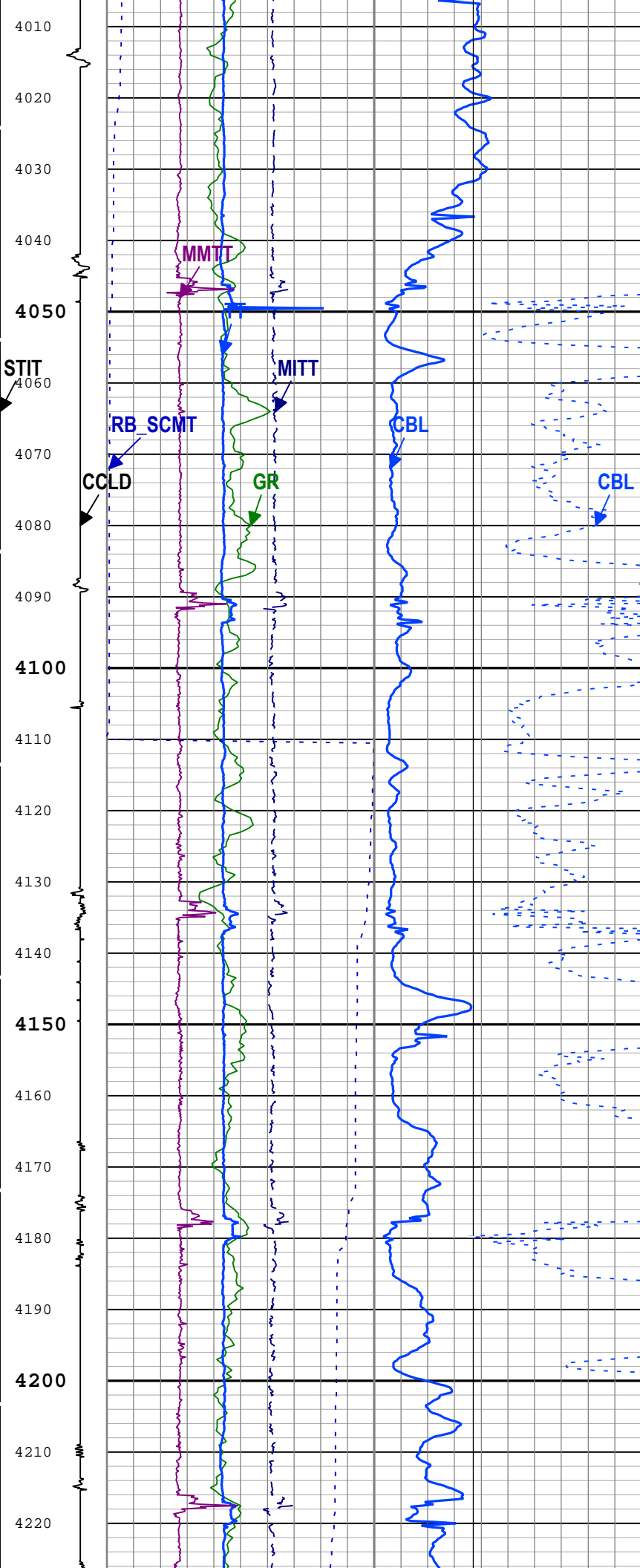


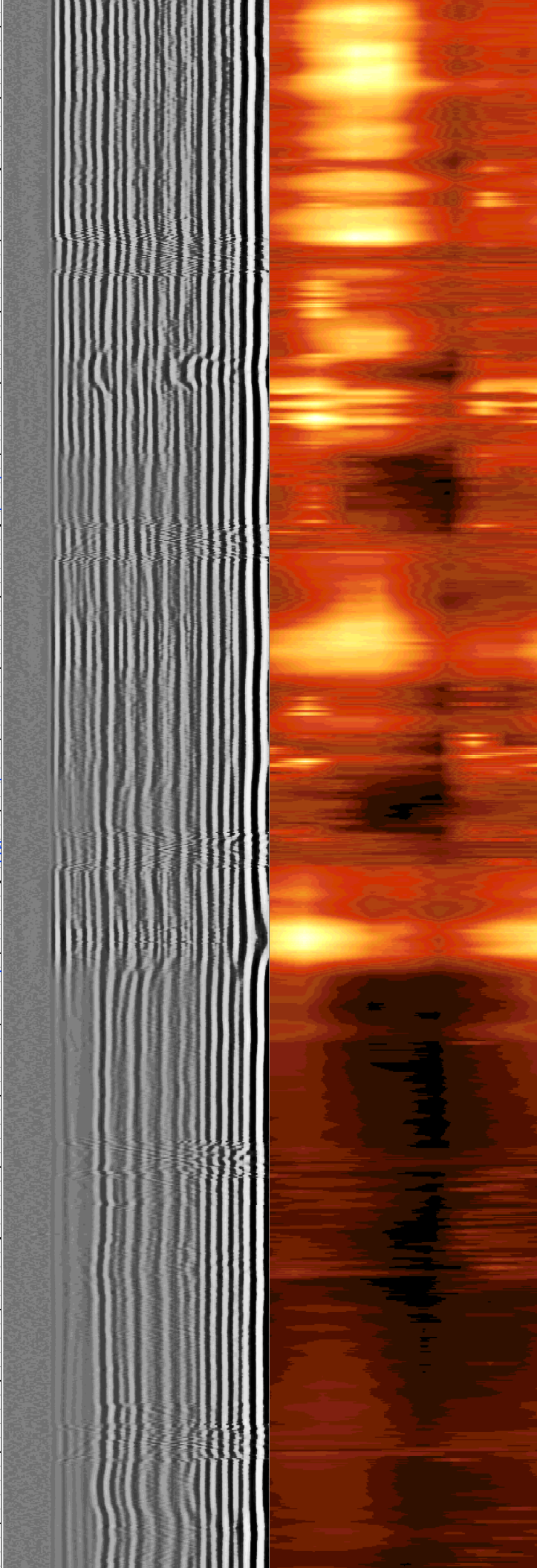
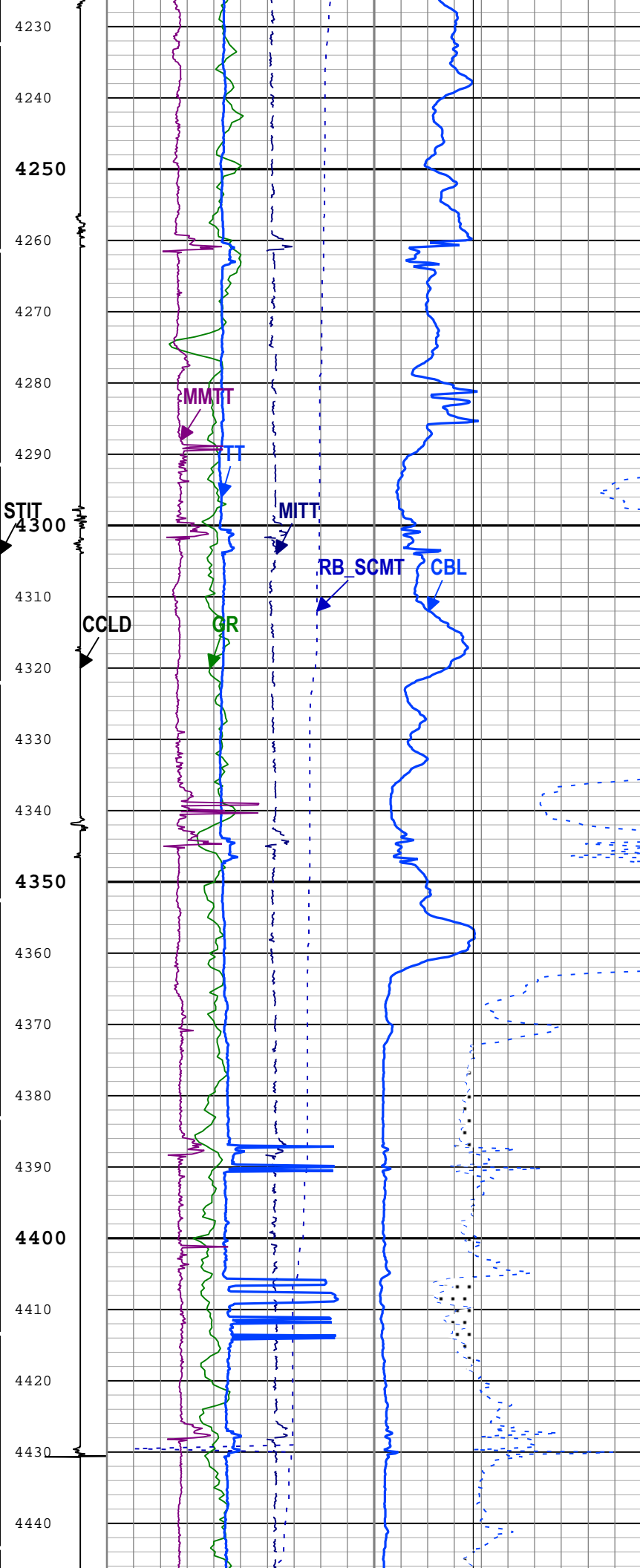


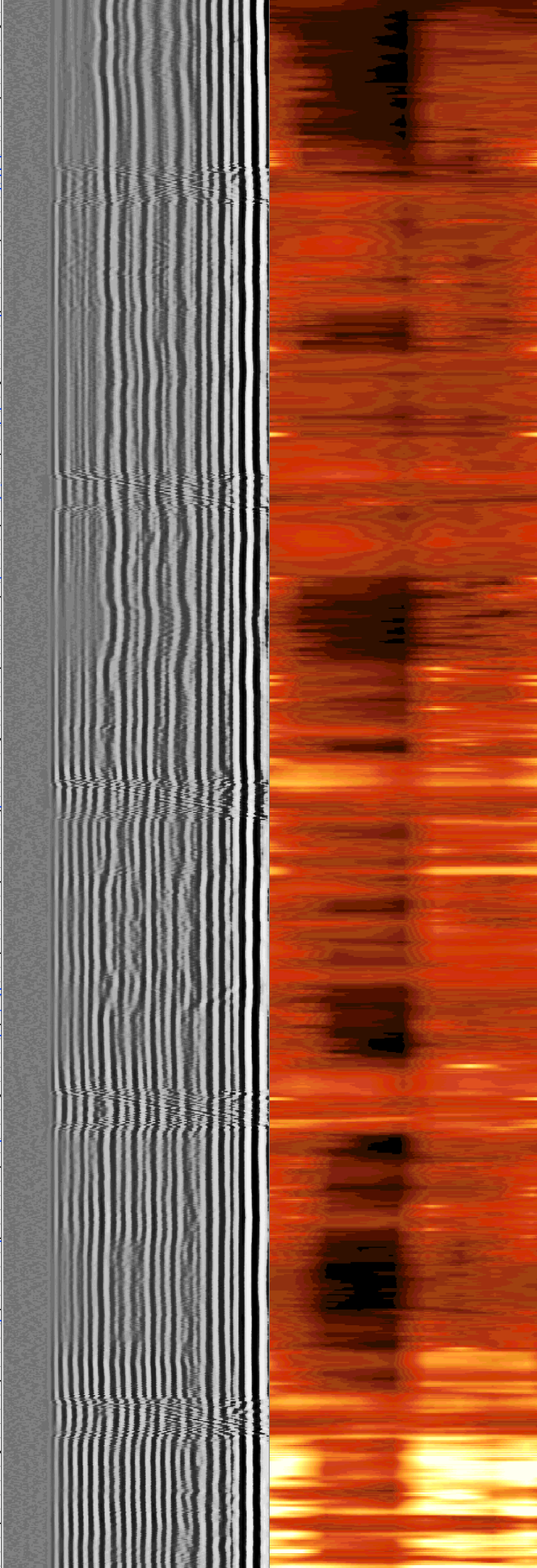
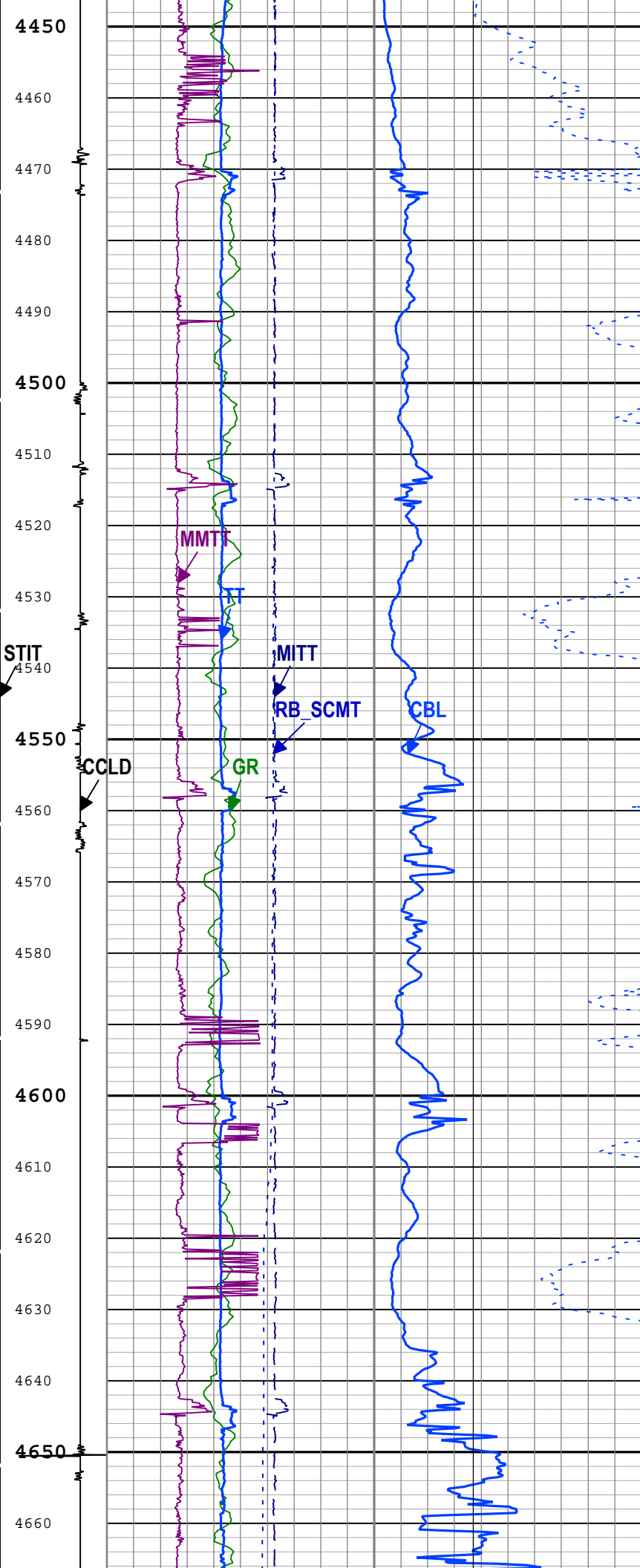




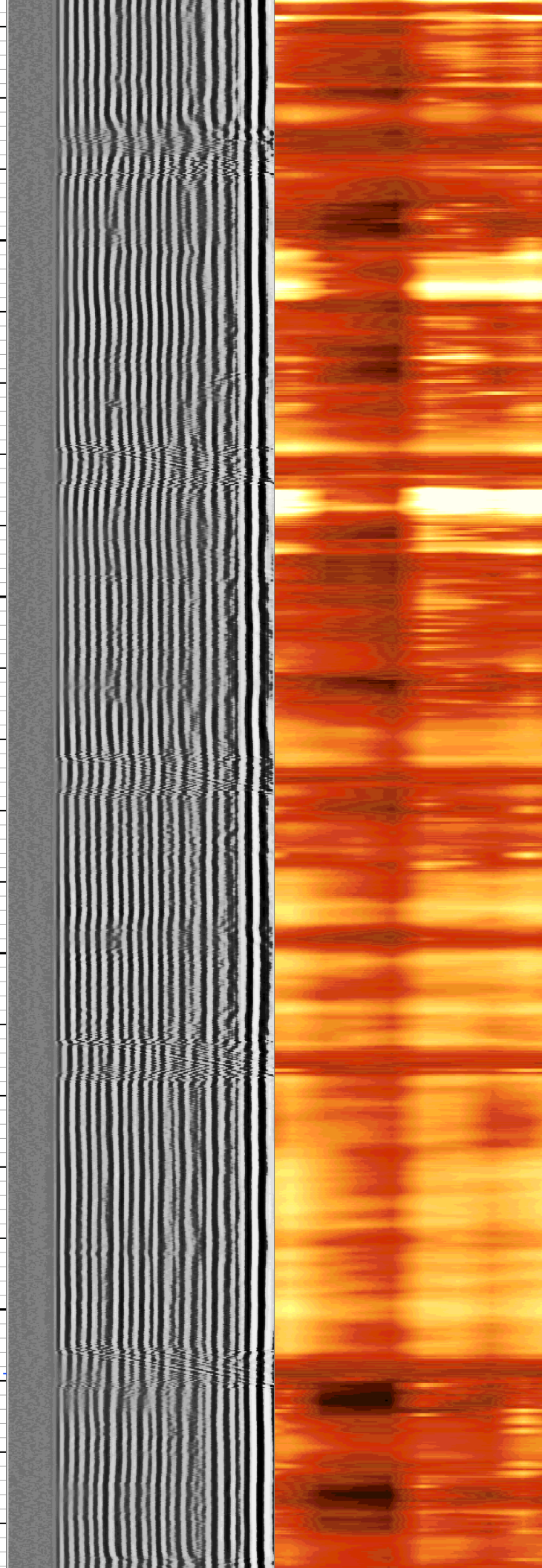
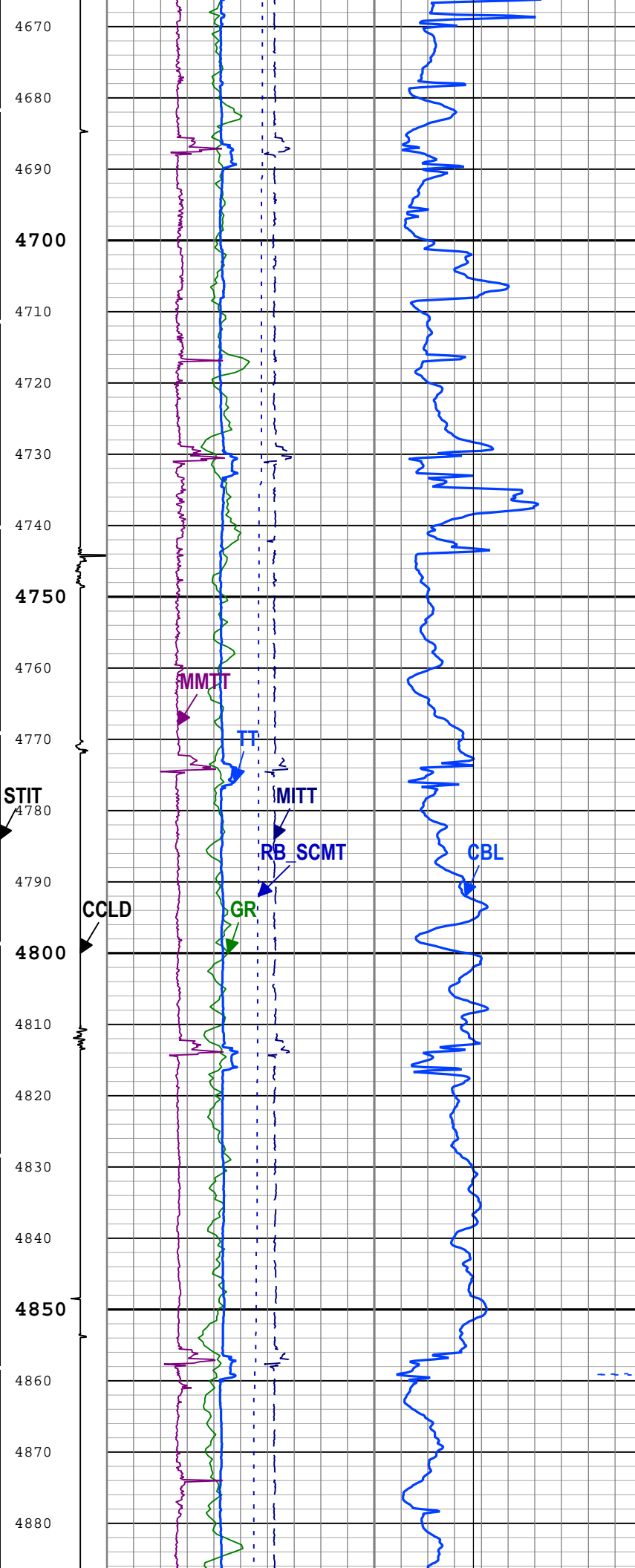


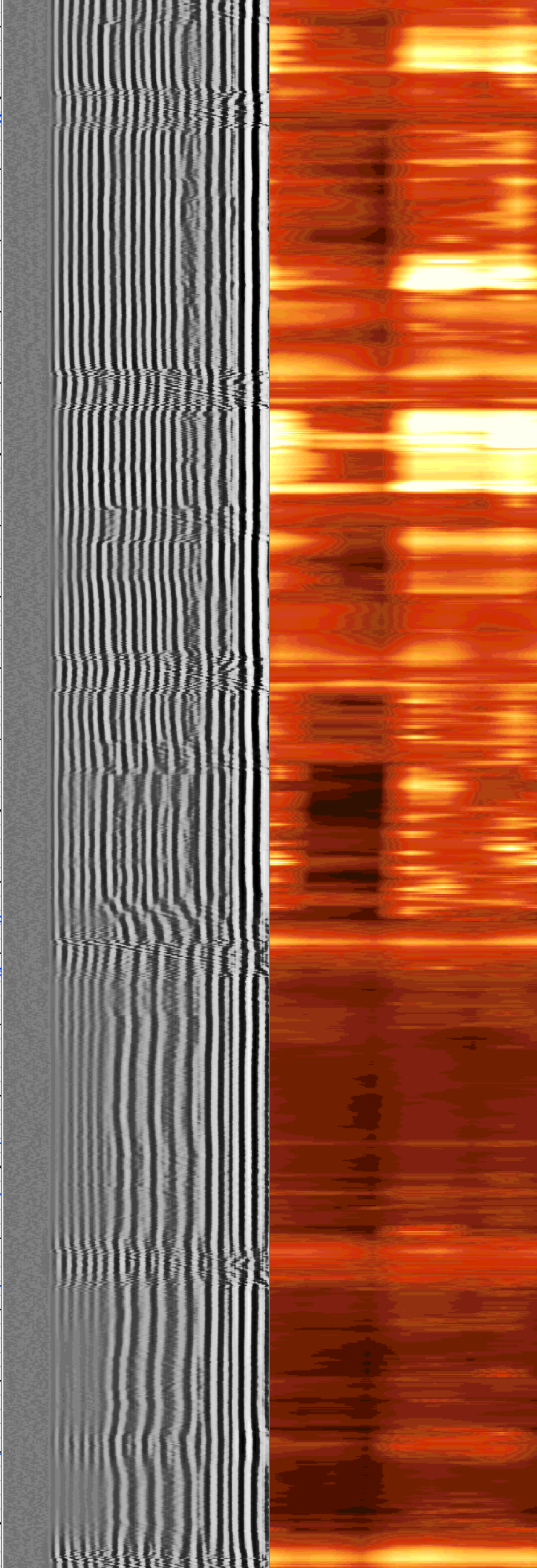
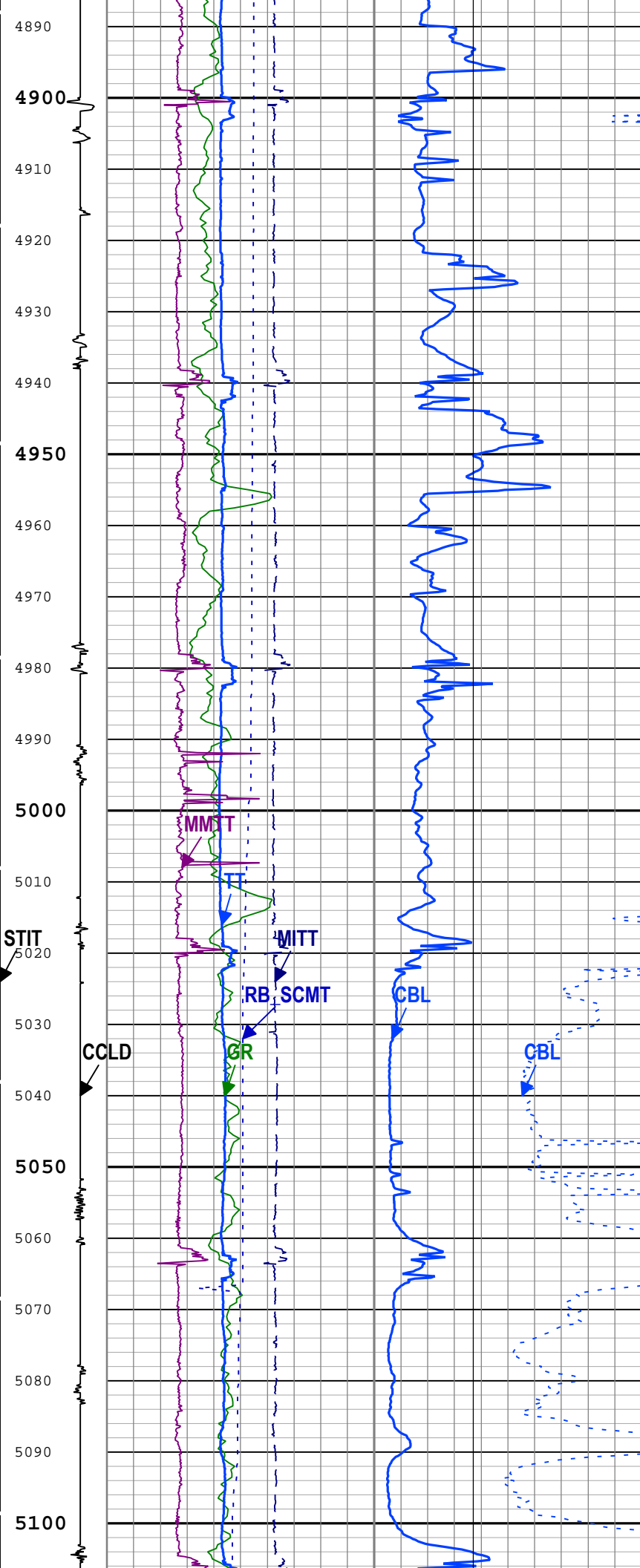


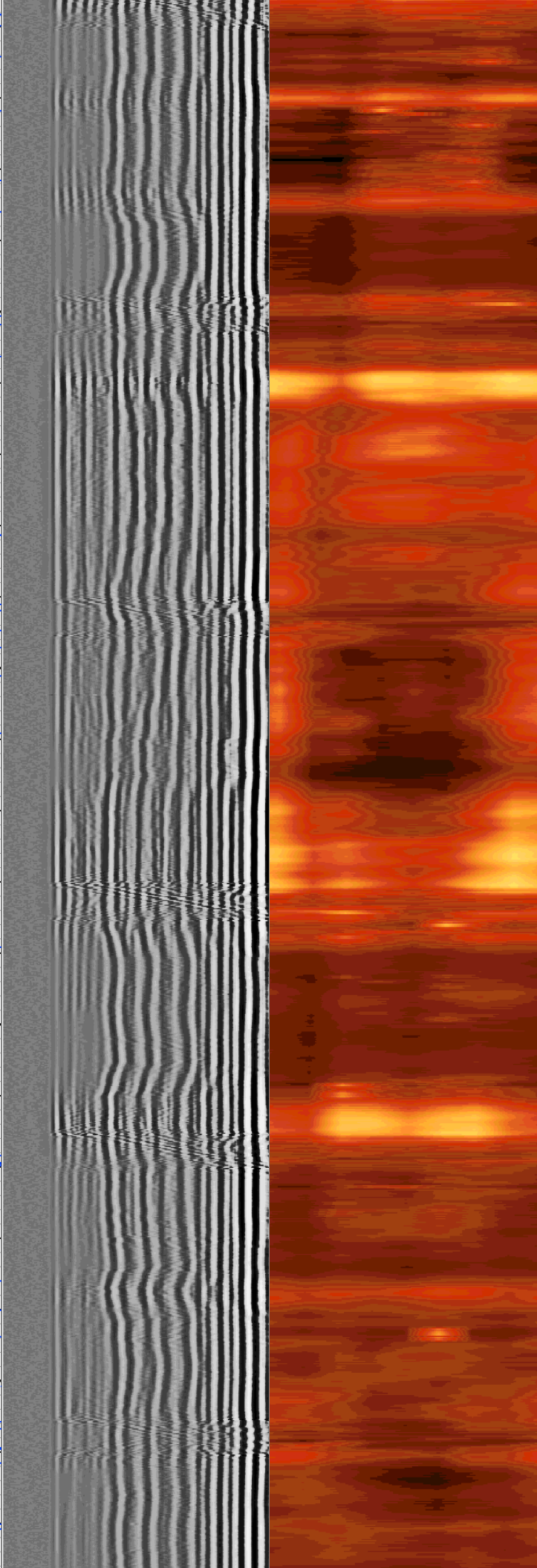
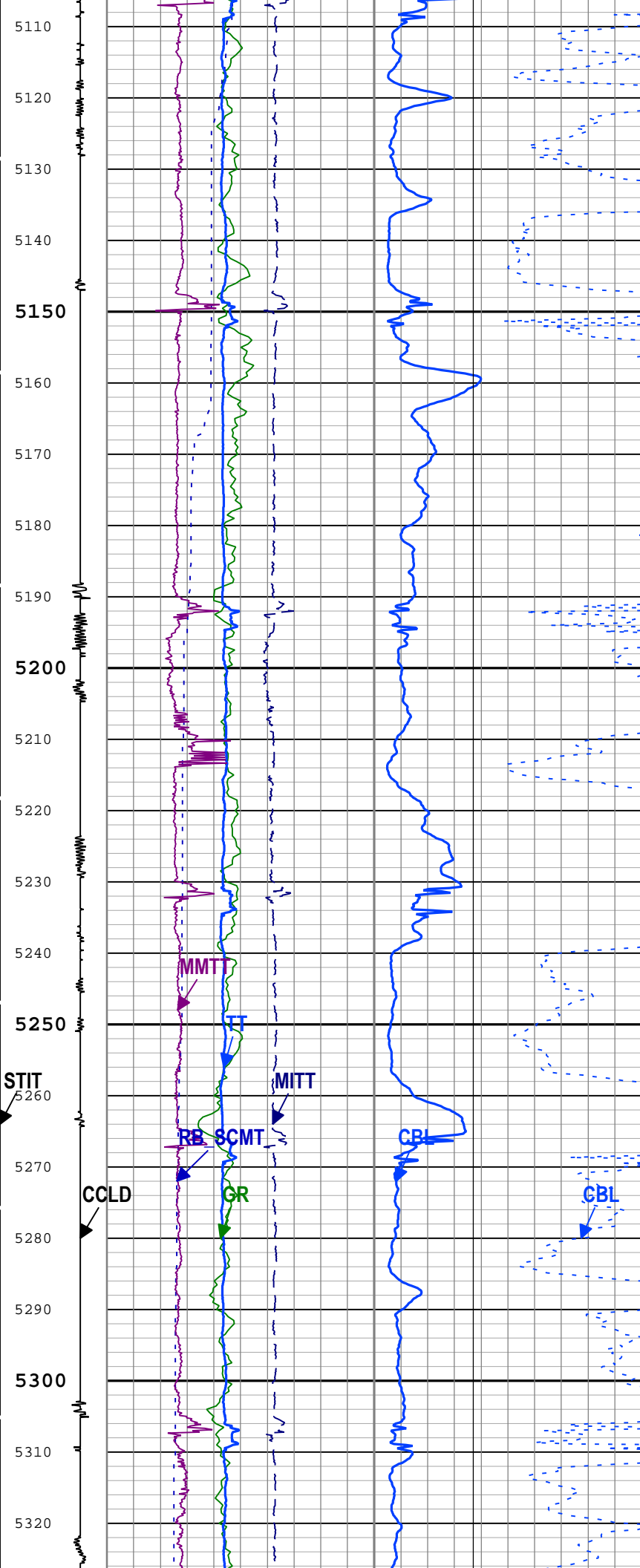




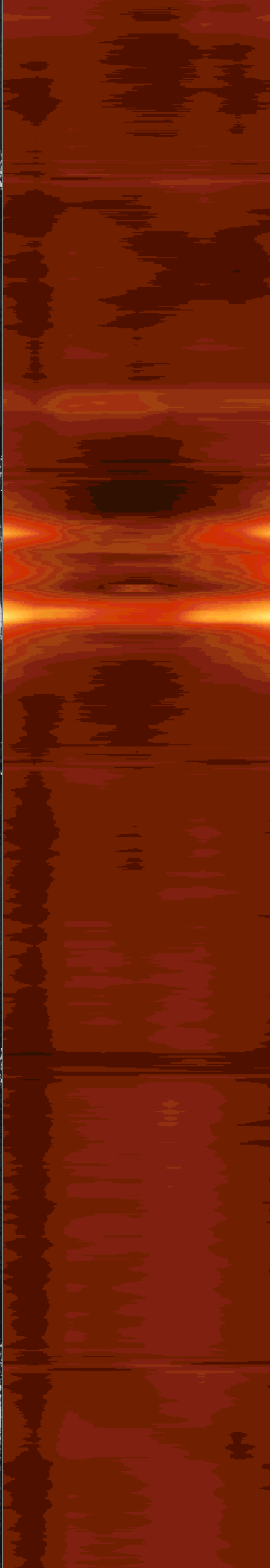
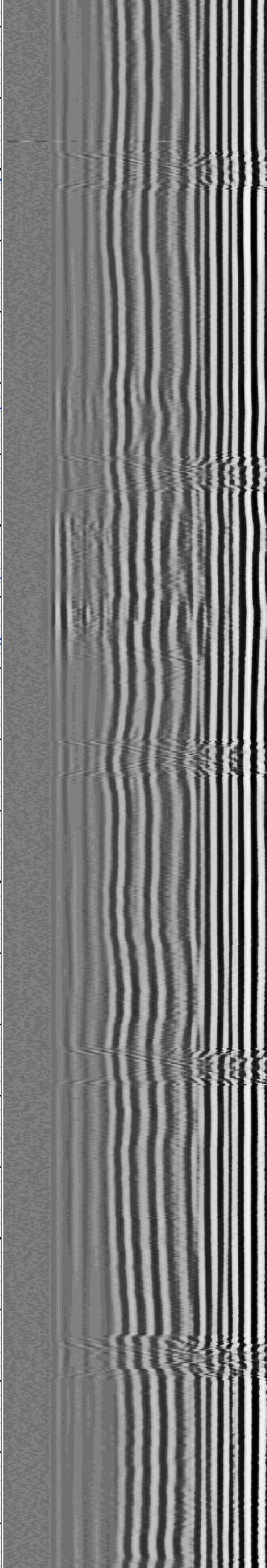
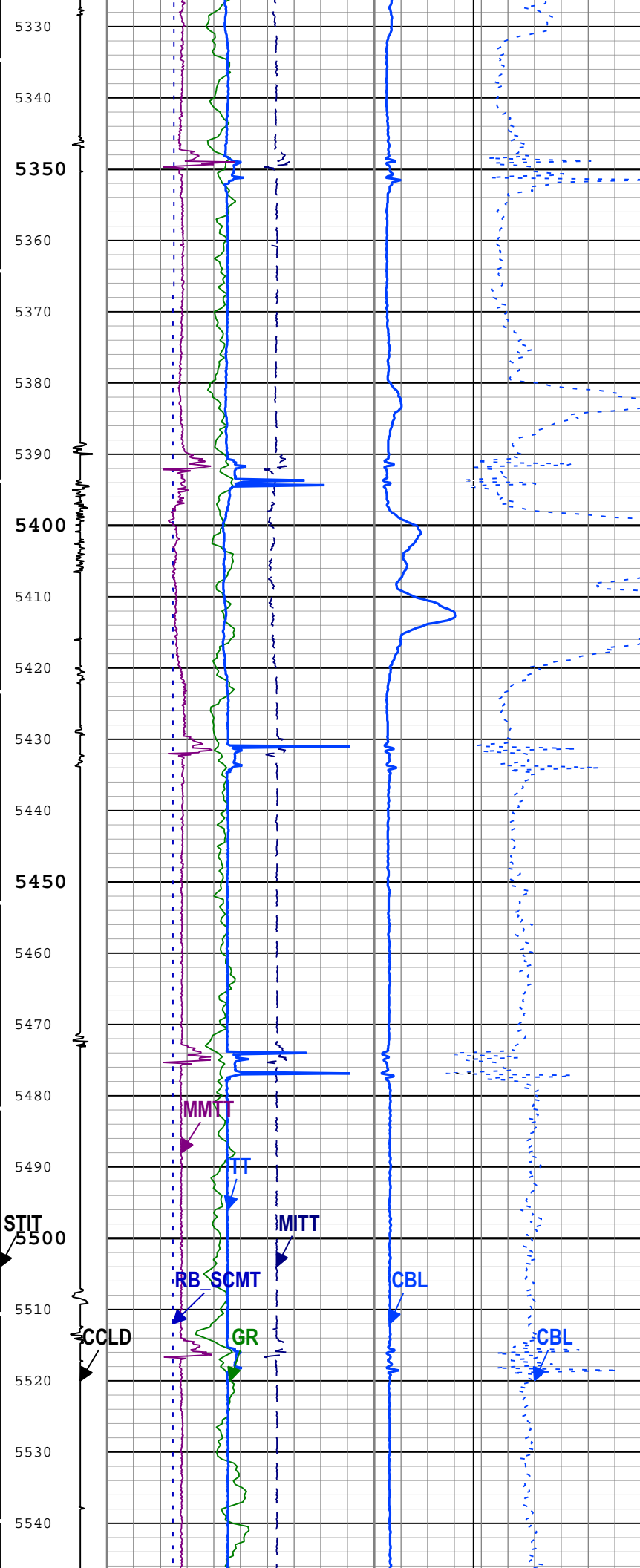


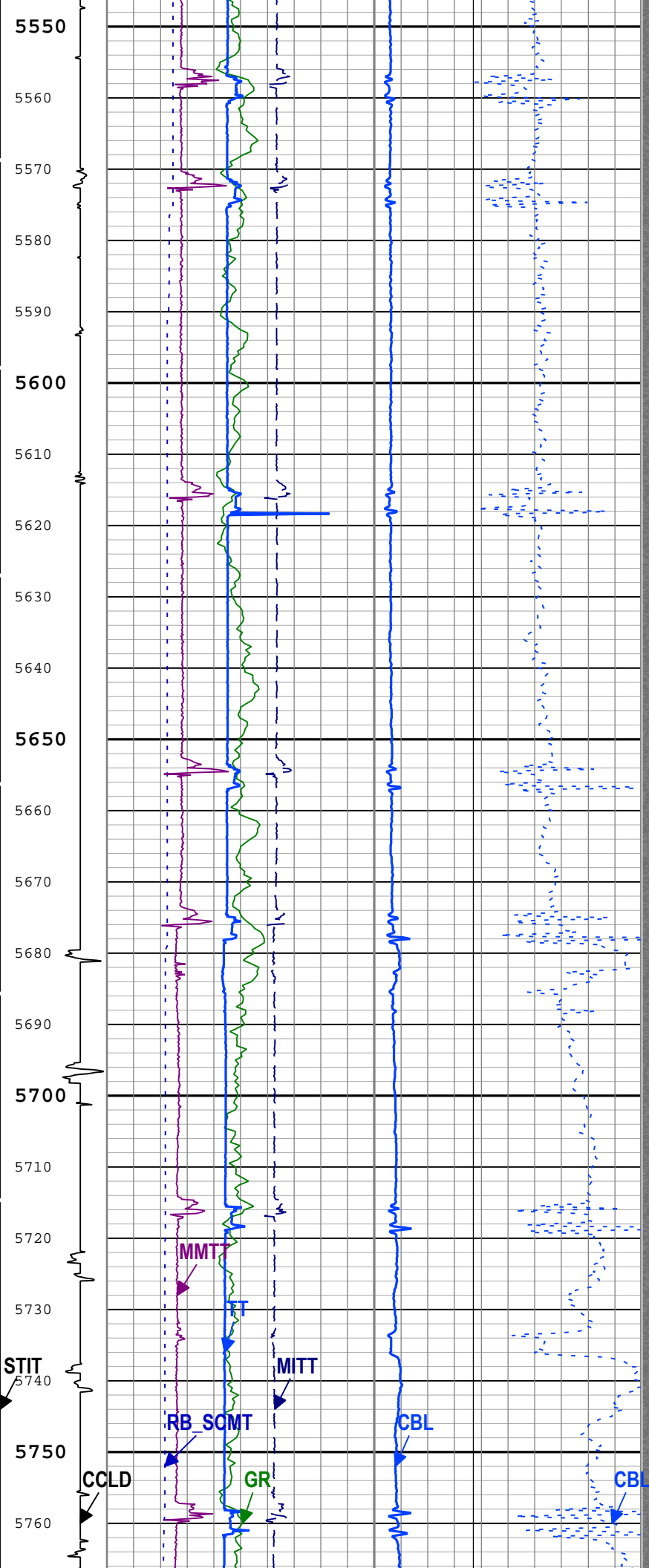




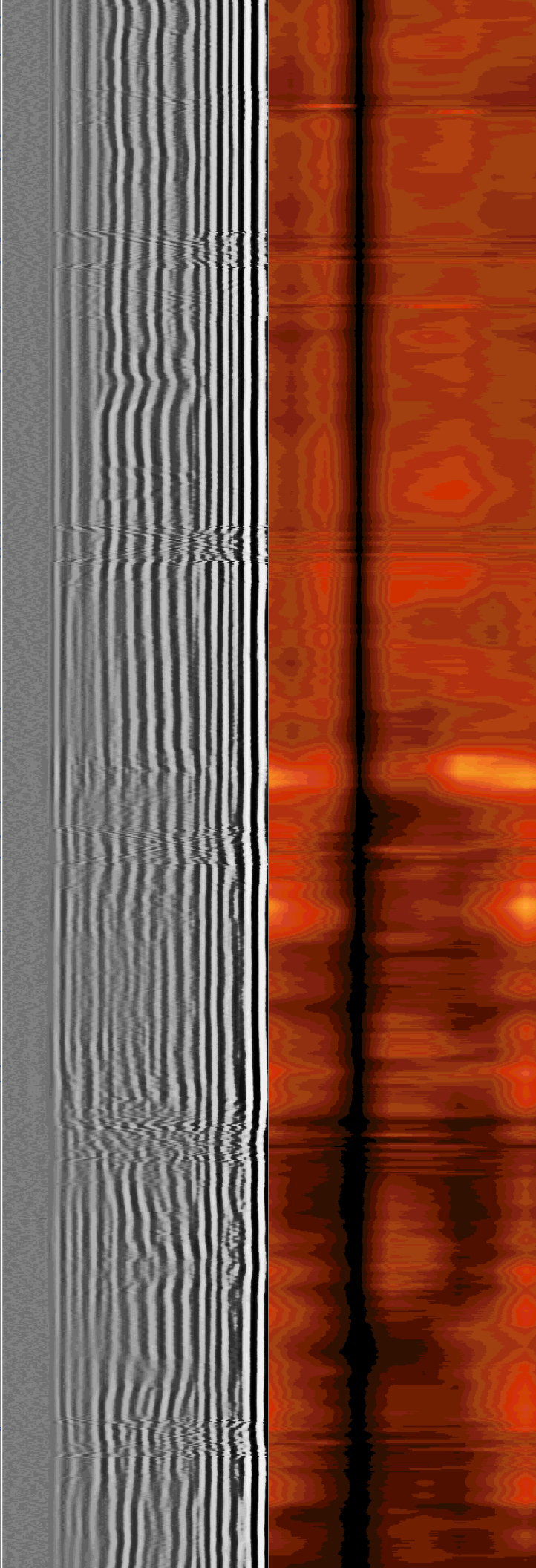
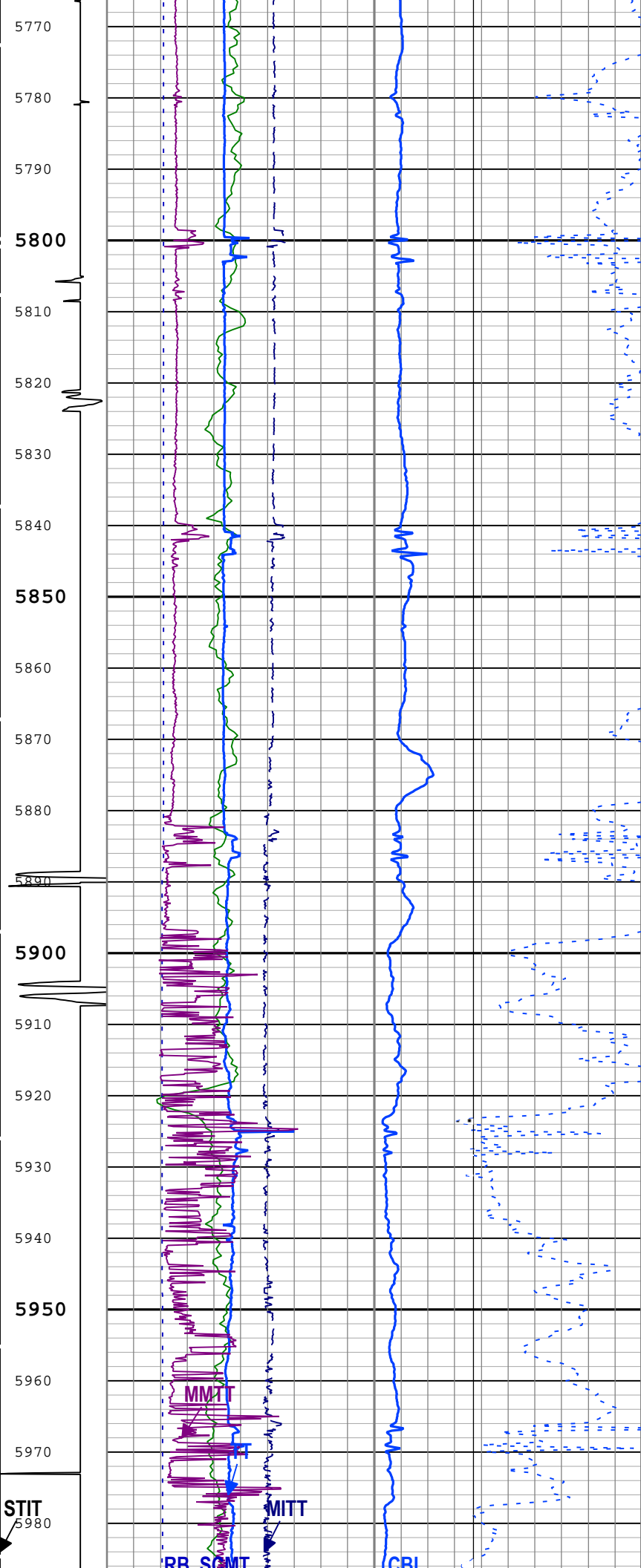


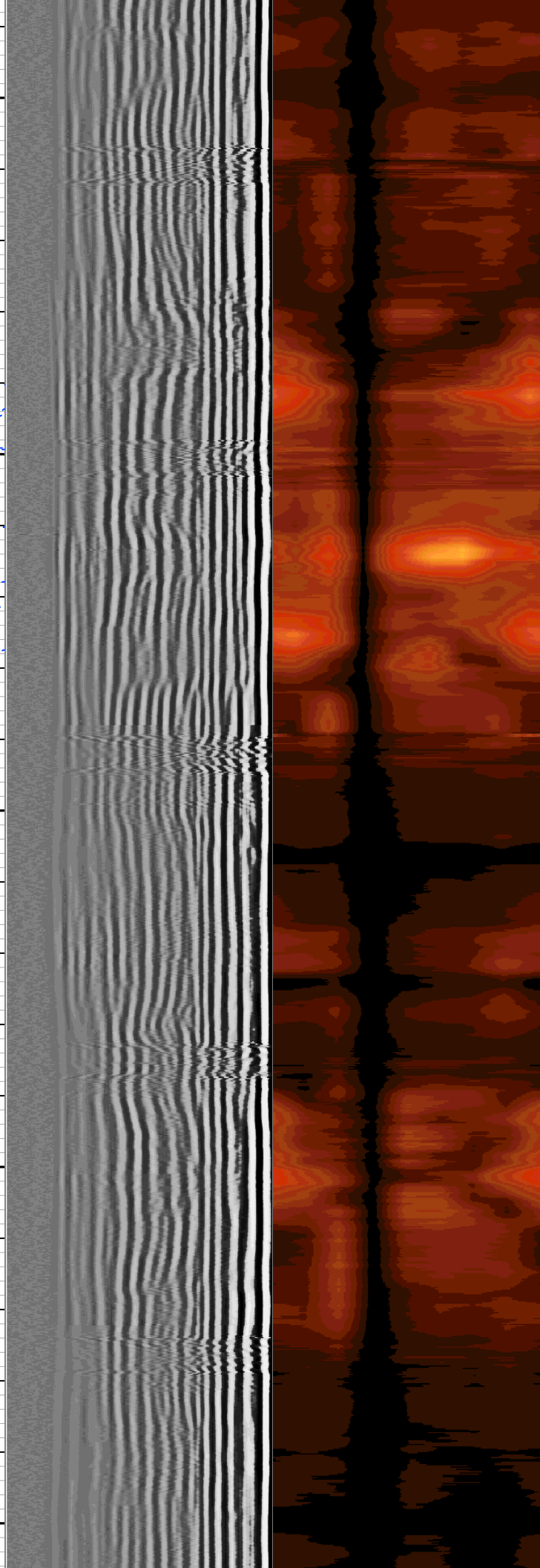
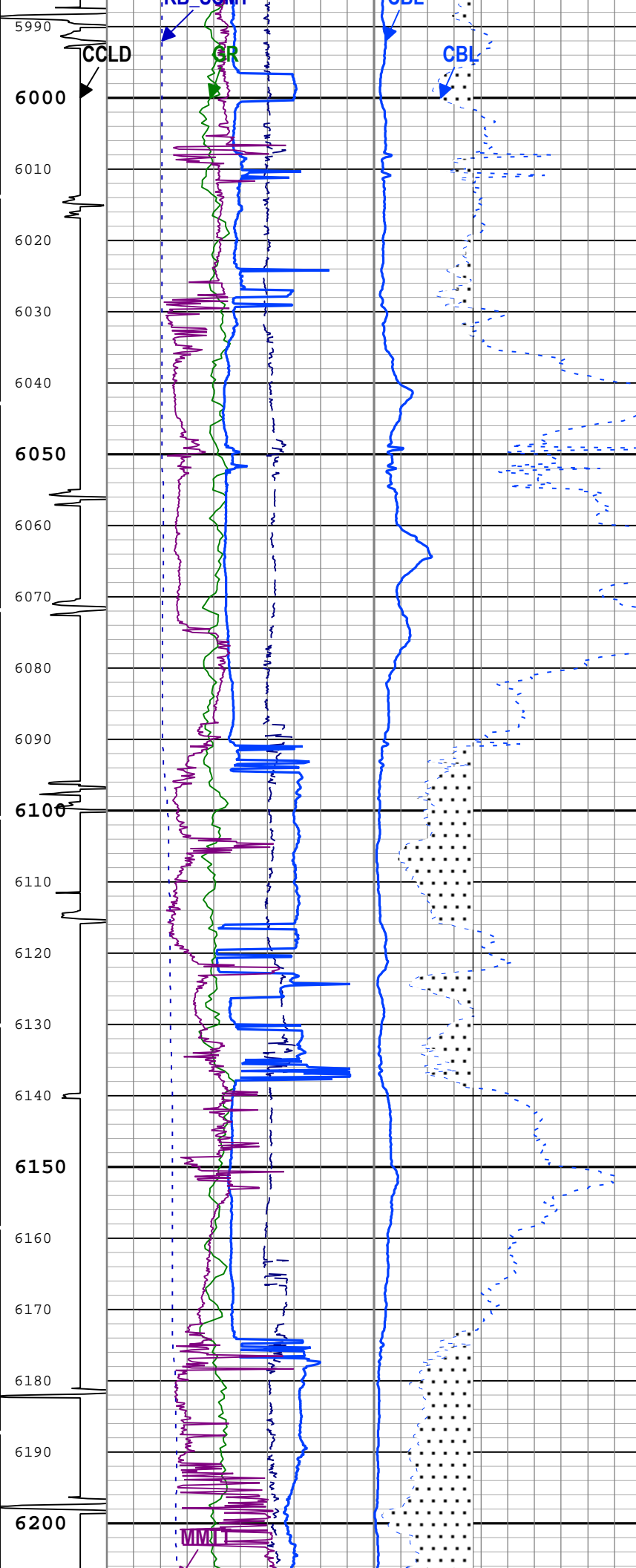


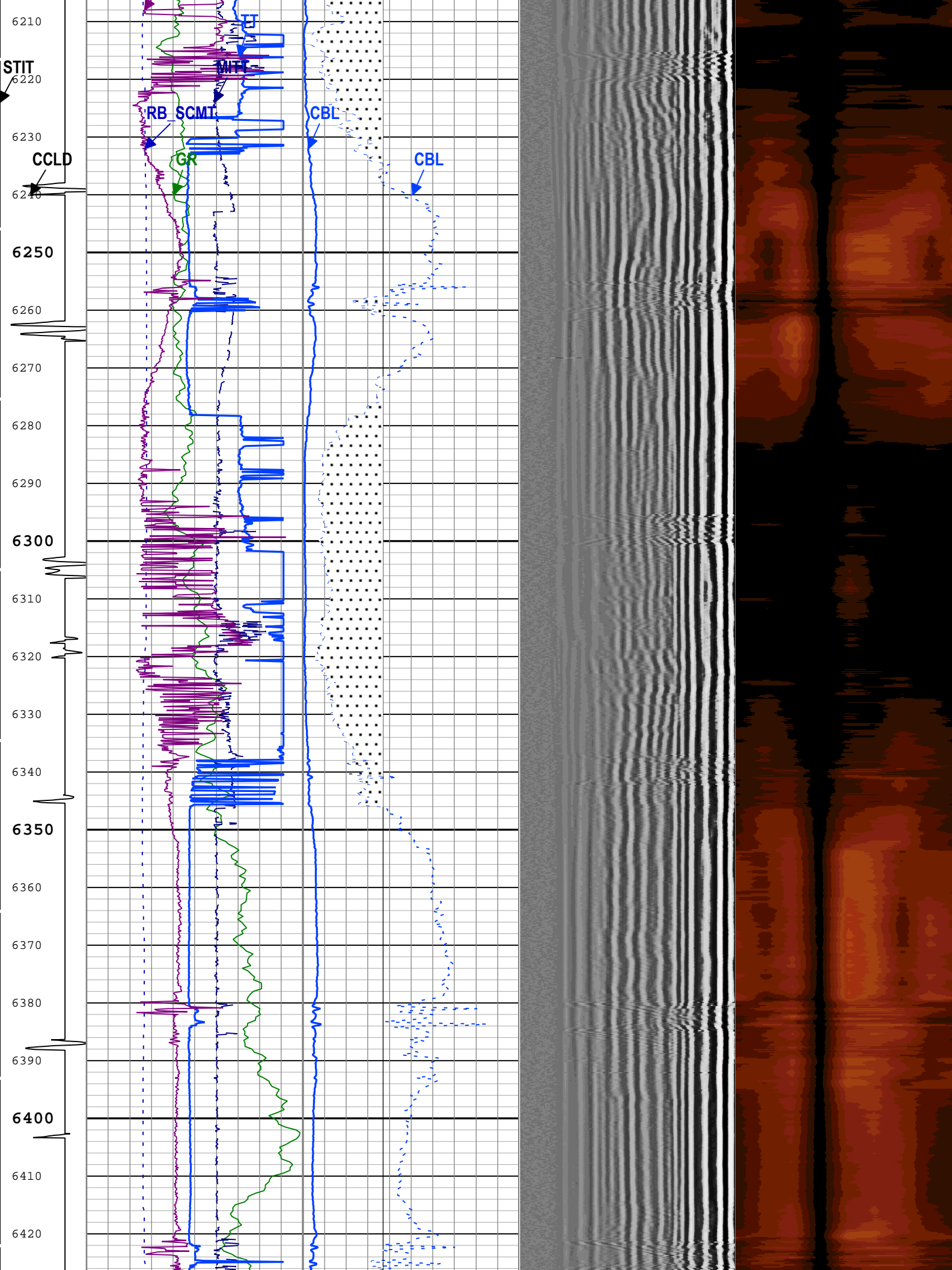




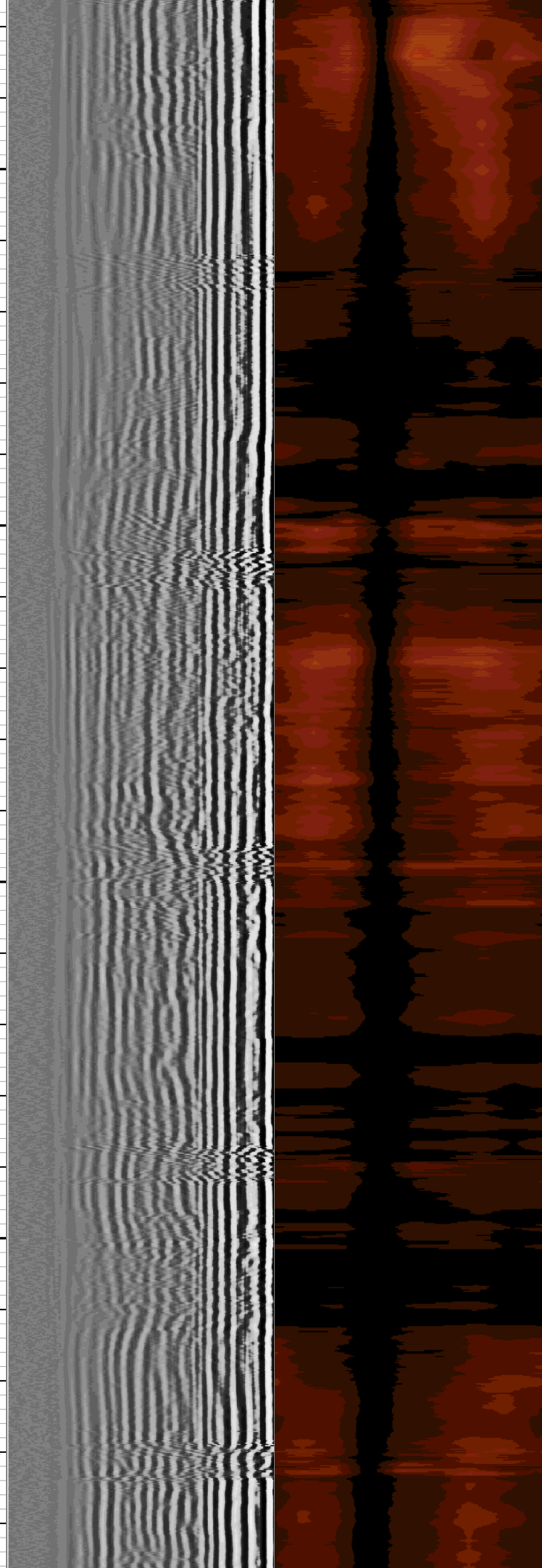
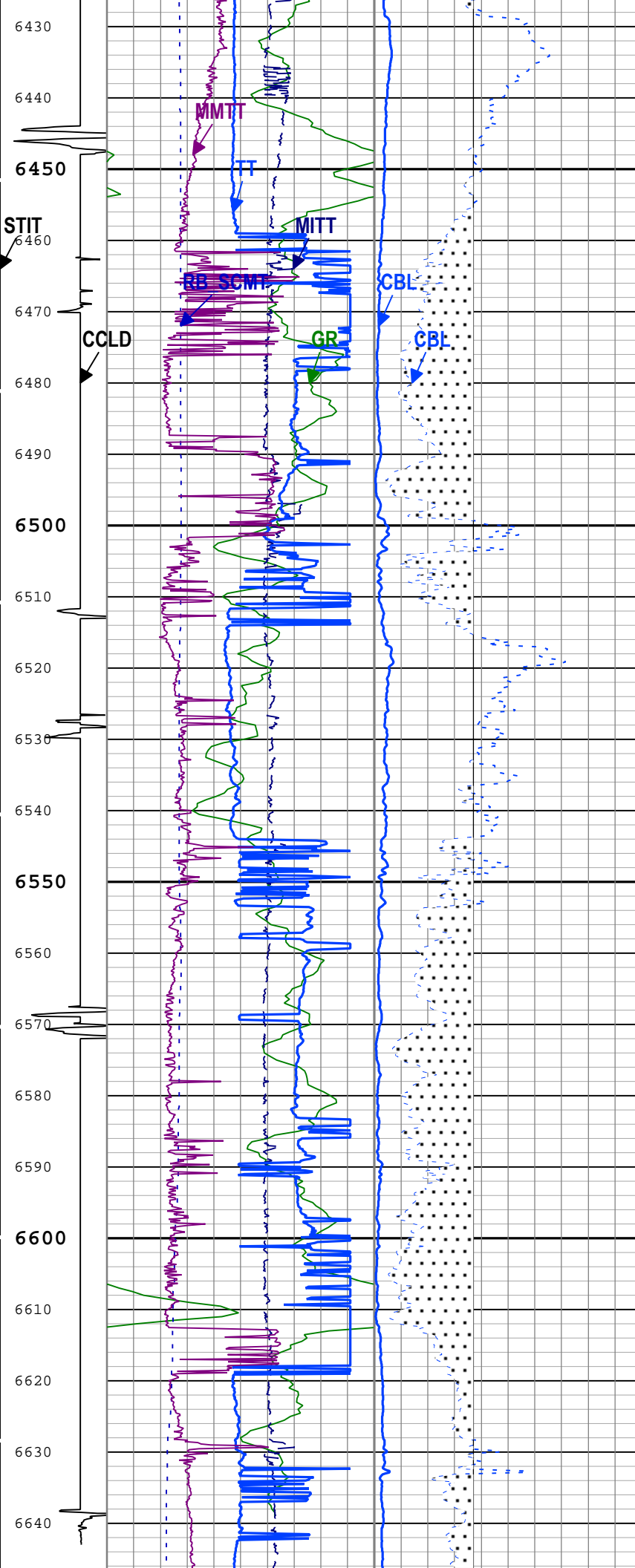


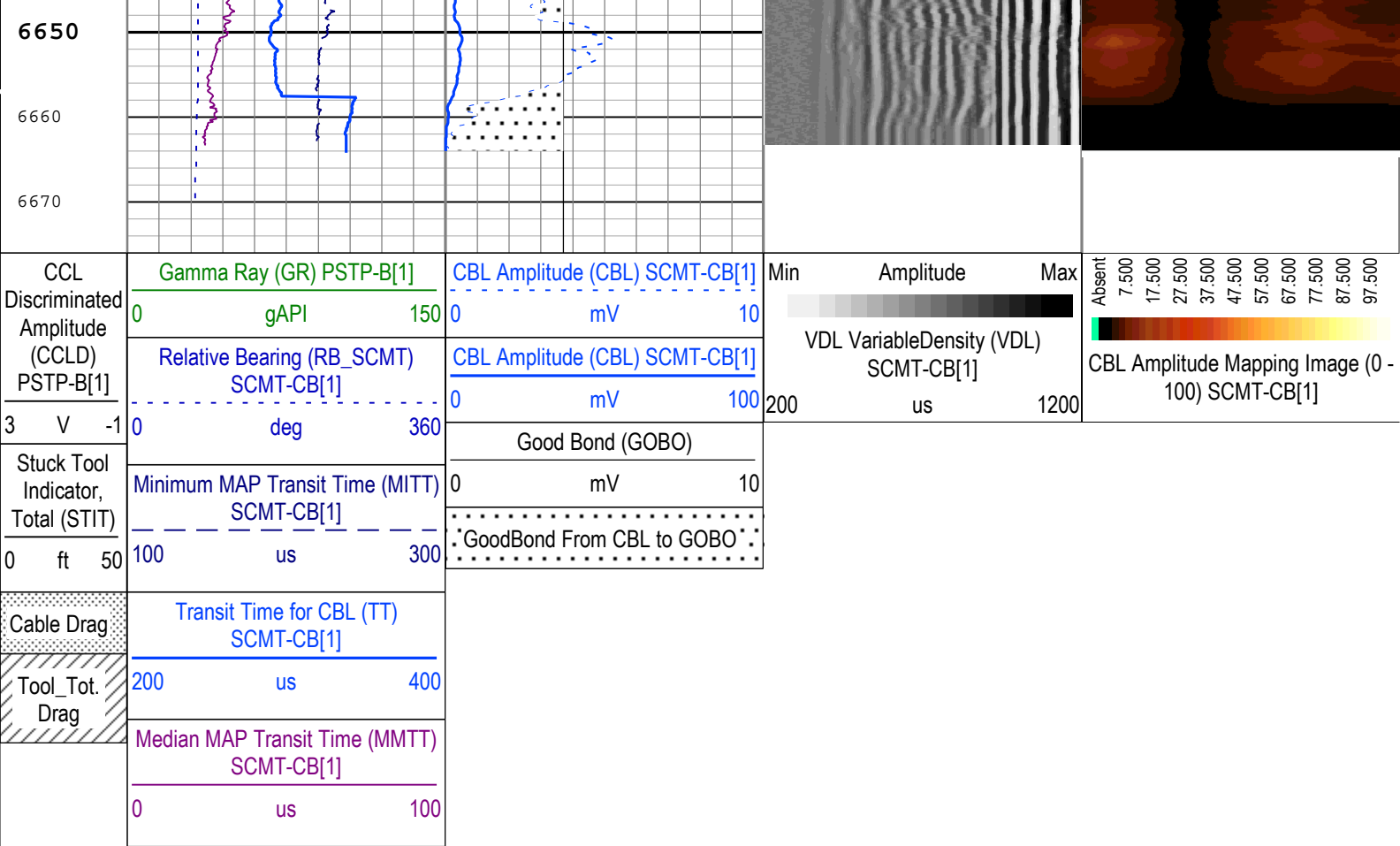








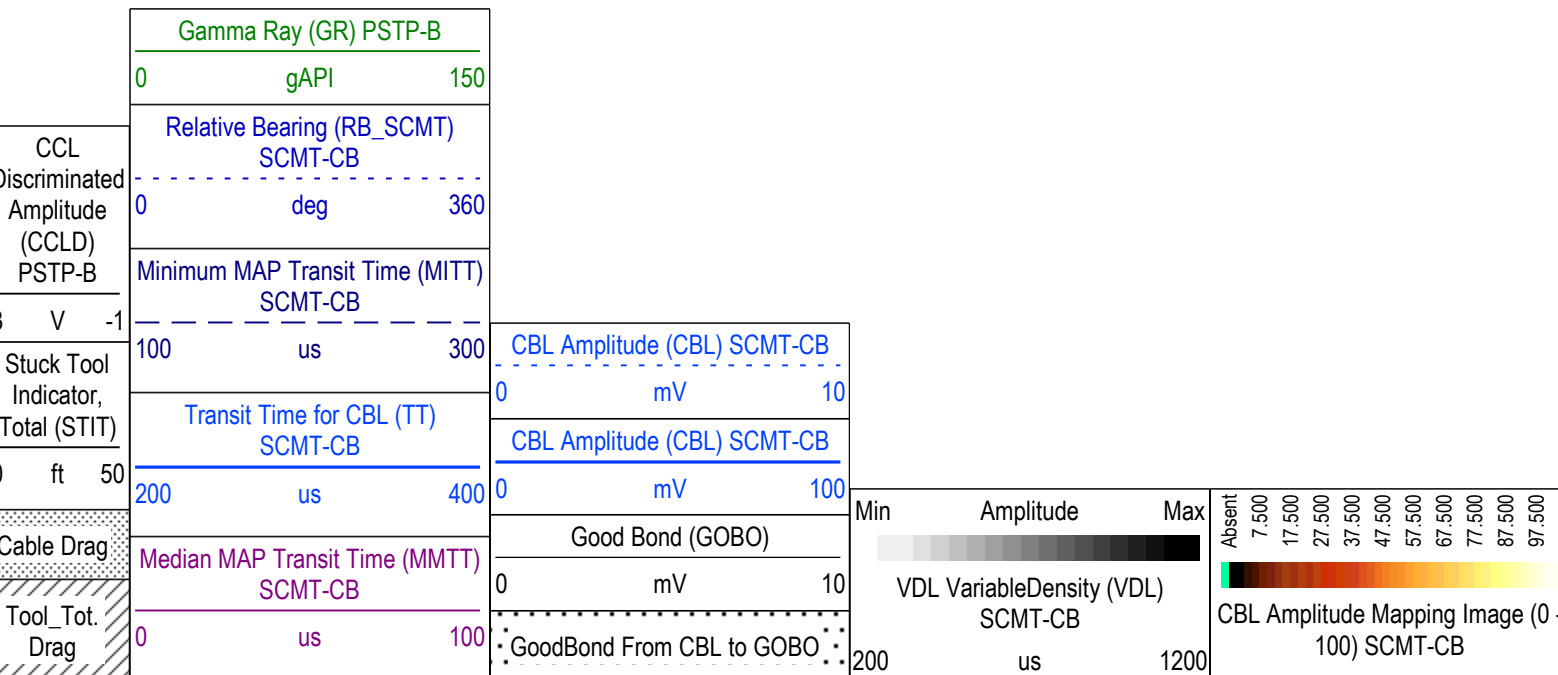


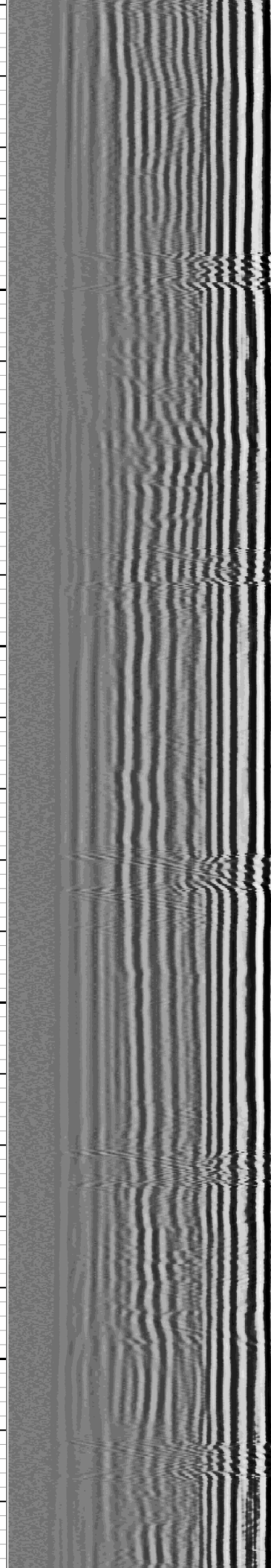
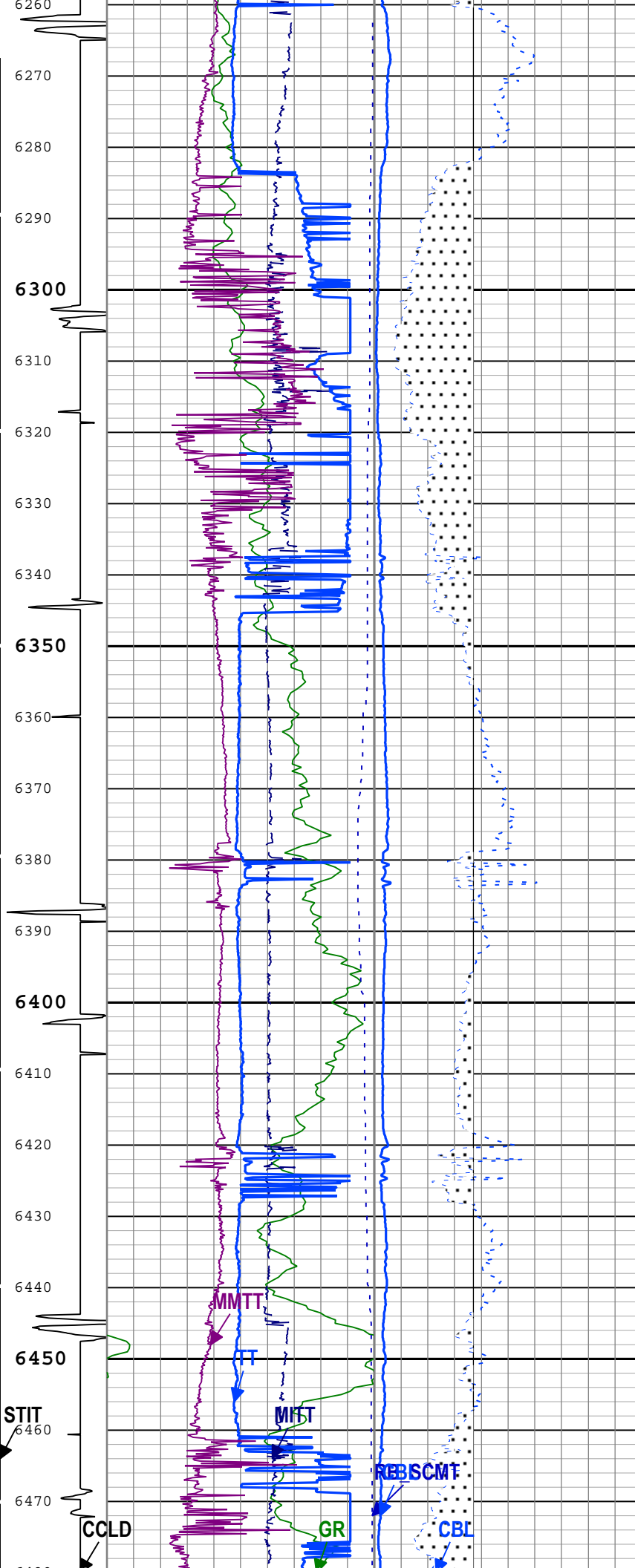


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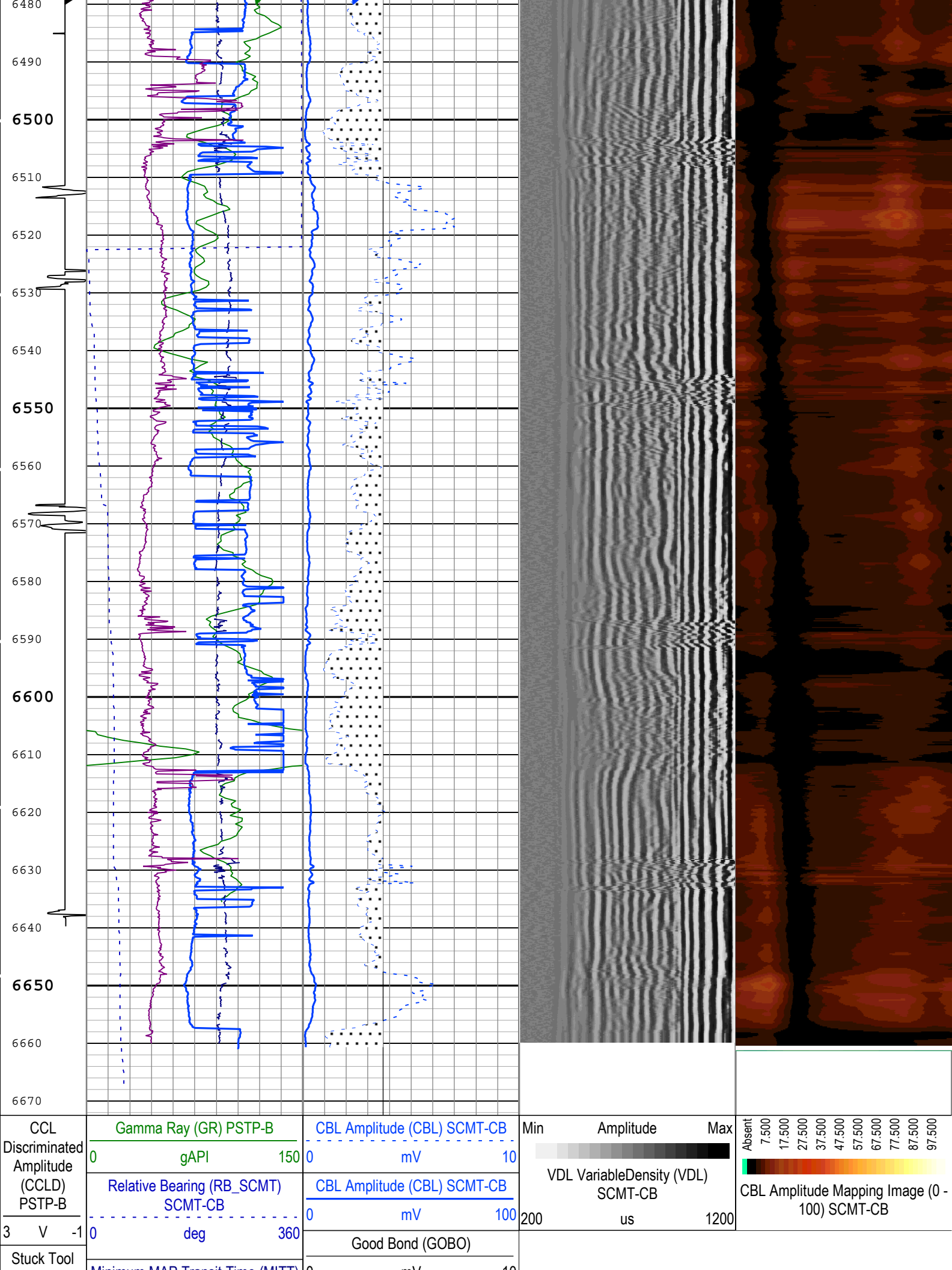
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Channel Processing Parameters				
Run 1: Parameters				
Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	235.9	degF
CB3G	SCMT CBL 3 ft Peak Detection T0_Delay and Noise Gate	SCMT-CB	282	us
CBLG	CBL Gate Width	SCMT-CB	40	us
CBRA	CBL LQC Reference Amplitude in Free Pipe	SCMT-CB	62	mV
THNO	Nominal Casing Thickness - Zoned along logger depths	WLSESSION	0.362	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	23	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4718	ft
FCF	CBL Fluid Compensation Factor	SCMT-CB	1	
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GOBO_CURR	Good Bond in Arbitrary Cement	SCMT-CB	3.71	mV
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_GRDBOTTOM	
MAPG	SCMT MAP Peak Detection T0_Delay and Noise Gate	SCMT-CB	217	us
MATT_CURR	Maximum Attenuation in Arbitrary Cement	SCMT-CB	38.78	dB/m
MCI	Minimum Cemented Interval for Isolation	SCMT-CB	10	ft
MMSA	MAP Minimum Sonic Amplitude	SCMT-CB	10.86	mV
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	SCMT-CB	1.84	mV











Indicator, Total (STIT)	Minimum MAP Transit Time (MTT)	0	ft	50	100	us	300	GoodBond From CBL to GOBO
Cable Drag	Transit Time for CBL (TT) SCMT-CB							
Tool_Tot. Drag		200	us	400				
	Median MAP Transit Time (MMTT) SCMT-CB							
		0	us	100				

TIME\_1900 - Time Marked every 60.00 (s)

Description: SCMT VDL Image    Format: Log ( SCMT\_VDL\_Image )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth    Creation Date: 31-Oct-2015 00:54:13

## Channel Processing Parameters

### Run 1: Parameters

Parameter	Description	Tool	Value	Unit
BHT	Bottom Hole Temperature	Borehole	235.9	degF
CB3G	SCMT CBL 3 ft Peak Detection T0_Delay and Noise Gate	SCMT-CB	282	us
CBLG	CBL Gate Width	SCMT-CB	40	us
CBRA	CBL LQC Reference Amplitude in Free Pipe	SCMT-CB	62	mV
THNO	Nominal Casing Thickness - Zoned along logger depths	WLSESSION	0.362	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
EDF	Elevation of Derrick Floor Above Permanent Datum	WLSESSION	23	ft
EPD	Elevation of Permanent Datum (PDAT) above Mean Sea Level	WLSESSION	4718	ft
FCF	CBL Fluid Compensation Factor	SCMT-CB	1	
GGRD	Geothermal Gradient	Borehole	1	0.01 degF/ft
GOBO_CURR	Good Bond in Arbitrary Cement	SCMT-CB	3.71	mV
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	GTEM_GRDBOTTOM	
MAPG	SCMT MAP Peak Detection T0_Delay and Noise Gate	SCMT-CB	217	us
MATT_CURR	Maximum Attenuation in Arbitrary Cement	SCMT-CB	38.78	dB/m
MCI	Minimum Cemented Interval for Isolation	SCMT-CB	10	ft
MMSA	MAP Minimum Sonic Amplitude	SCMT-CB	10.86	mV
MSA	Minimum Sonic Amplitude	SCMT-CB	1.84	mV
MSA_CURR	Minimum Sonic Amplitude in Arbitrary Cement	SCMT-CB	1.84	mV
PDAT	Permanent Datum	WLSESSION	GL	
RUN_SNUM	Run Sequence Number	WSDRUN	5	
SHT	Surface Hole Temperature	Borehole	68	degF
TD	Total Measured Depth	Borehole	6833.7	ft

## Tool Control Parameters

### Run 1: Parameters

Parameter	Description	Tool	Value	Unit
CMTM	SCMT Operating Mode	SCMT-CB	Log	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	1800	ft/h

## Calibration Report

SCMT-CB (Slim Cement Mapping Tool, 1-11/16 OD) Calibration - Run 1

CBL and MAP Amplitude Normalization - Measurements

Master (File): 04:15:22 30-Oct-2015

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CBL 3 ft Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 1 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 2 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 3 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 4 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 5 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 6 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 7 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
MAP 8 Temperature/Pressure Compensated Raw Amplitude (at 0 degree) - 0	mV	Master	----	----	----	----	
CBL 3 ft Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 1 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 2 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 3 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 4 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 5 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 6 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 7 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
MAP 8 Temperature/Pressure Compensated Raw Amplitude (at 90 degree) - 0	mV	Master	----	----	----	----	
CBL 3 ft Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 1 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 2 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 3 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 4 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 5 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 6 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 7 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
MAP 8 Temperature/Pressure Compensated Raw Amplitude (at 180 degree) - 0	mV	Master	----	----	----	----	
CBL 3 ft Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
MAP 1 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
MAP 2 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
MAP 3 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
MAP 4 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	
MAP 5 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	

MAP 6 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	<input type="text"/>
MAP 7 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	<input type="text"/>
MAP 8 Temperature/Pressure Compensated Raw Amplitude (at 270 degree) - 0	mV	Master	----	----	----	----	<input type="text"/>

### CBL and MAP Amplitude Normalization - Coefficients

Master (File):		04:15:22 30-Oct-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<input type="text"/>
Normalization Temperature in SFT Tube	degF	Master			90.00		<input type="text"/>
CBL Correction Factor		Master			0.074		<input type="text"/>
MAP 1 Correction Factor		Master			0.108		<input type="text"/>
MAP 2 Correction Factor		Master			0.111		<input type="text"/>
MAP 3 Correction Factor		Master			0.111		<input type="text"/>
MAP 4 Correction Factor		Master			0.113		<input type="text"/>
MAP 5 Correction Factor		Master			0.091		<input type="text"/>
MAP 6 Correction Factor		Master			0.098		<input type="text"/>
MAP 7 Correction Factor		Master			0.109		<input type="text"/>
MAP 8 Correction Factor		Master			0.095		<input type="text"/>

### CBL and MAP Amplitude Adjustment - Measurements

Before (Measured):		00:02:51 31-Oct-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<input type="text"/>
CBL Amplitude	mV	Before			68.77		<input type="text"/>
Average MAP Amplitude (Fluid Compensated)	mV	Before			104.12		<input type="text"/>
Measurement Depth	ft	Before			375.97		<input type="text"/>

### CBL and MAP Amplitude Adjustment - Coefficients

Before (Measured):		00:02:51 31-Oct-2015					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<input type="text"/>
CBL Adjustment Factor		Before			0.902		<input type="text"/>
CBL LQC Reference Amplitude in Free Pipe	mV	Before			62.00		<input type="text"/>
MAP Adjustment Factor		Before			0.960		<input type="text"/>
Depth of Before Calibration	ft	Before			375.97		<input type="text"/>



County:	Weld
State:	Colorado
Slim Cement Mapping Tool Cement Evaluation	