Schlumberger

Company: Noble Energy Inc

Well: Bison Ridge Y22-711

Field: Wattenberg

County: Weld Country: US

UltraSonic Summary Print

County: Weld
Field: Wattenberg
Location: SHL: NWSE Sec. 10, T2N, R64W
Well: Bison Ridge Y22-711
Company: Noble Energy Inc

Location:				
SHL: NWSE Sec. 10, T2N, R64W		Elev.:	K.B.	4953.00 ft
2640' FSL & 95' FEL			G.L.	4923.00 ft
Lat: 40.15182 / Long: -104.53506			D.F.	4953.00 ft
Permanent Datum:	Ground Level	Elev.:		4923.00 f
Log Measured From:	Kelly Bushing	30.00 ft		above Perm.Datum
Drilling Measured From:	Kelly Bushing			

API Serial No.	Max.Hole Deviation	Longitude:	Latitude:
05-123-45377	0 deg	-104.53506 degrees	40.151820 degrees

Logging Date	23-Jan-2018		
Run Number	One		
Depth Driller	17356.00 ft		
Schlumberger Depth	17356.00 ft		
Bottom Log Interval	6800.00 ft		
Top Log Interval	60.00 ft		
Casing Fluid Type	Calcium Chloride Brine		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	0.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.50 in		
From	2069.00 ft		
To	17356.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	N/A		
From	0.00 ft		
To	17345.90 ft		
Max Recorded Temperatures	205 degF		
Logger on Bottom Time	23-Jan-2018	11:18:00	
Unit Number Location:	9108	Fort Morgan, CO	
Recorded By	Benjamin Marmon		
Witnessed By	Bill Mansfield		

Disclaimer

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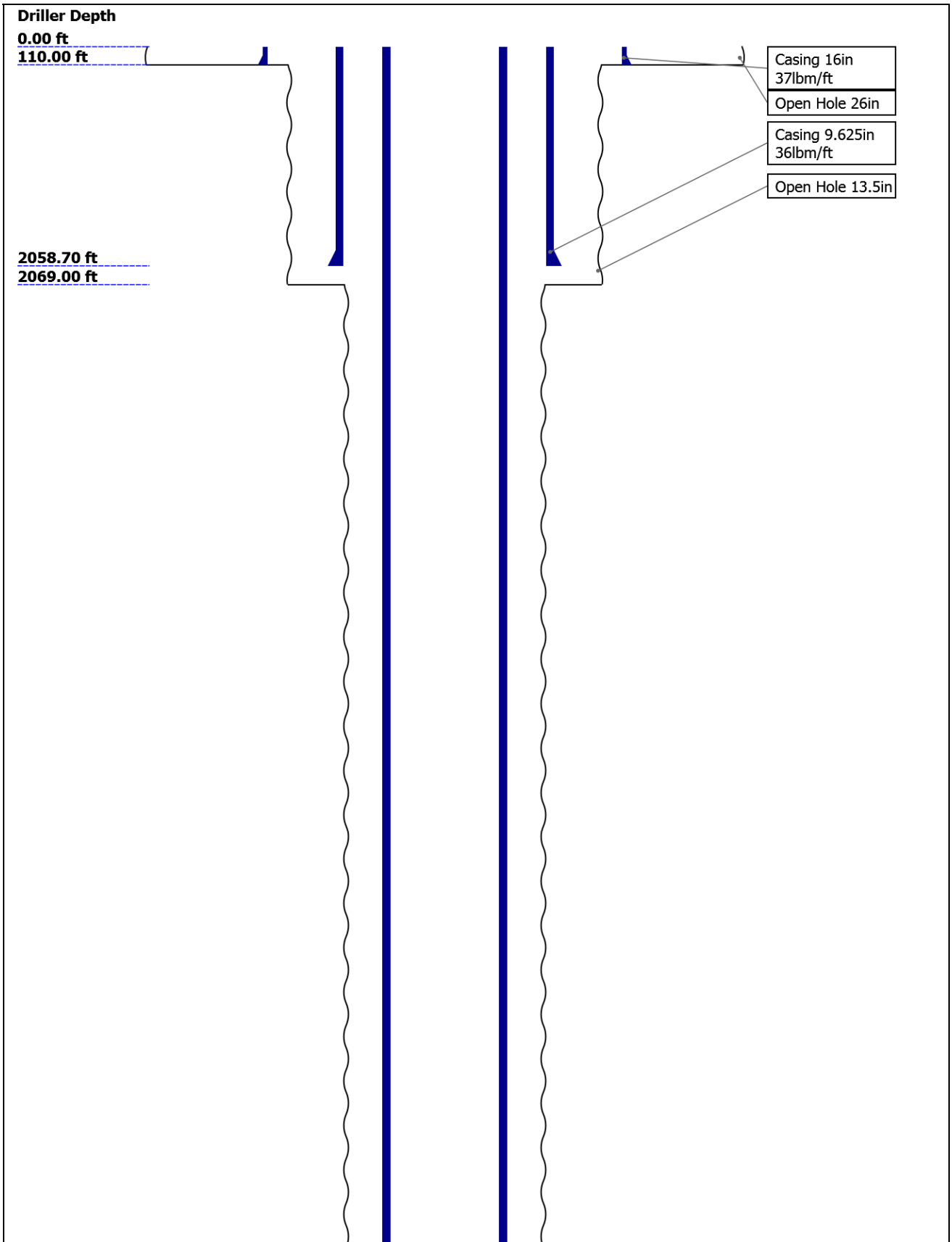
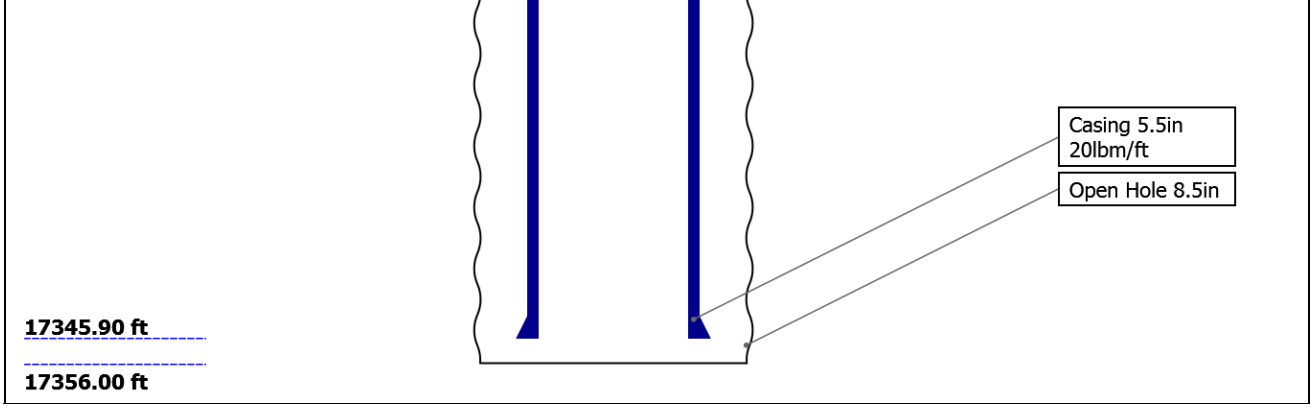
Contents

Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	2069			
Top Logger (ft)	0	110	2069			
Bottom Driller (ft)	110	2069	17356			
Bottom Logger (ft)	110	2069	17356			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	37	36	20			
Inner Diameter (in)	15.571	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	2058.7	17345.9			
Bottom Logger (ft)	110	2058.7	17345.9			

Operational Run Summary

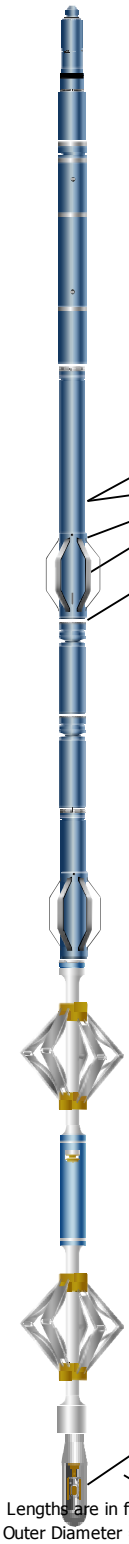
Parameter (unit)	One					
Date Log Started	23-Jan-2018					
Time Log Started	10:47:56					
Date Log Finished	23-Jan-2018					
Time Log Finished	12:16:01					
Top Log Interval (ft)						
Bottom Log Interval (ft)						
Total Depth (ft)						
Max Hole Deviation (deg)						
Azimuth of Max Deviation (deg)						
Bit Size (in)	8.500					
Logging Unit Number	9108					
Logging Unit Location	Fort Morgan, CO					
Recorded By	Benjamin Marmon					

Witnessed By	Bill Mansfield					
Service Order Number	DX2A-00001					

Remarks and Equipment Summary

One: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	**33.83**		
LEH-QT			
SAH-F	**30.91**		
EDTC-B	**26.06**		
EDTH-B			
EDTG-A			
EDTC-B			
		CTEM	**22.56**
		ACCZ	**0.00**
		HV	**0.00**
		Gamma Ray	**20.69**
		TelStatus	**19.56**
AH-184[2]	**19.56**		
AH-184[1]	**17.56**		
USIT-E	**15.56**		
ECH-MFA			
USAC-A			
USIS-A			
USSC-B			
USRS-A			
USI-SENS			
OR			
USI-TX			
		USI Sensor Head Tension	**0.37**
		TOOL_ZERO	



Lengths are in ft
Maximum Outer Diameter = 6.250 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

One: Remarks

This is the first log in the well.
Toolstring ran as per tool sketch.
Log up correlated to log down.
Repeat Pass logged at 0 PSI
Main pass logged at 2500 PSI
BHT = 205 degF

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-B		
Serial Number	993		

Calibration Date	28-Sep-2017		
Calibrator Serial Number	57		
Calibration Cable Type	7-39 AIXXS		
Wheel Correction 1	-4		
Wheel Correction 2	0		

Tension Device

Type	CMTD-B/A		
Serial Number	171		
Calibration Date	22-Jan-2018		
Calibrator Serial Number	78796A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	42		
Calibration Peak Error	78		

Logging Cable

Type	7-39AI-XXS		
Serial Number	F714037		
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane		

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth control followed during logging operations.
Rig Up Length At Surface		IDW used as primary depth control device.
Rig Up Length At Bottom		ZChart used as secondray depth control device.
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[4]:Up	7200.89	73.16

Fluid Velocity = "Automatic".
CFVL equals DFSL channel

Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)

Mud Impedance = "FreePipe Norm.".
Free Pipe normalization zone is : 44.91m(147.33ft) to 55.88m(183.33ft)
MUD_N_FRP = 1.17
DFD = 1.01g/cm3(8.40lbm/gal)
CZMD median computed in free pipe normalization interval = 1.72 MRayl

Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)

One

2500 PSI Main Pass

Software Version

Acquisition System	Version
Maxwell 2018	8.0.95333.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data

One	Log[4]:Up	Up	73.16 ft	7200.89 ft	23-Jan-2018 11:19:00 AM	23-Jan-2018 12:15:06 PM	ON	13.54 ft	No

All depths are referenced to toolstring zero

Log

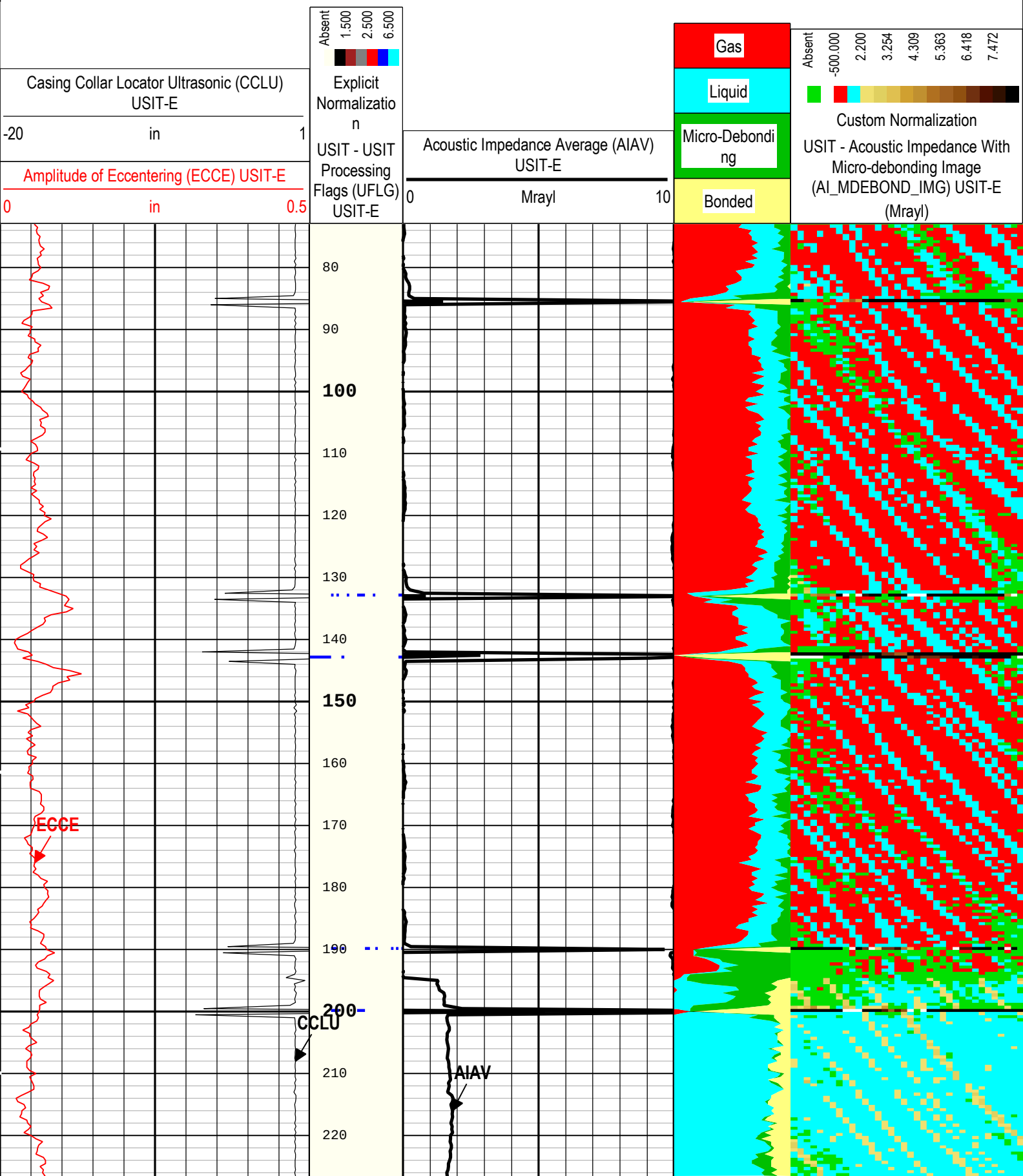
Company:Noble Energy Inc Well:Bison Ridge Y22-711

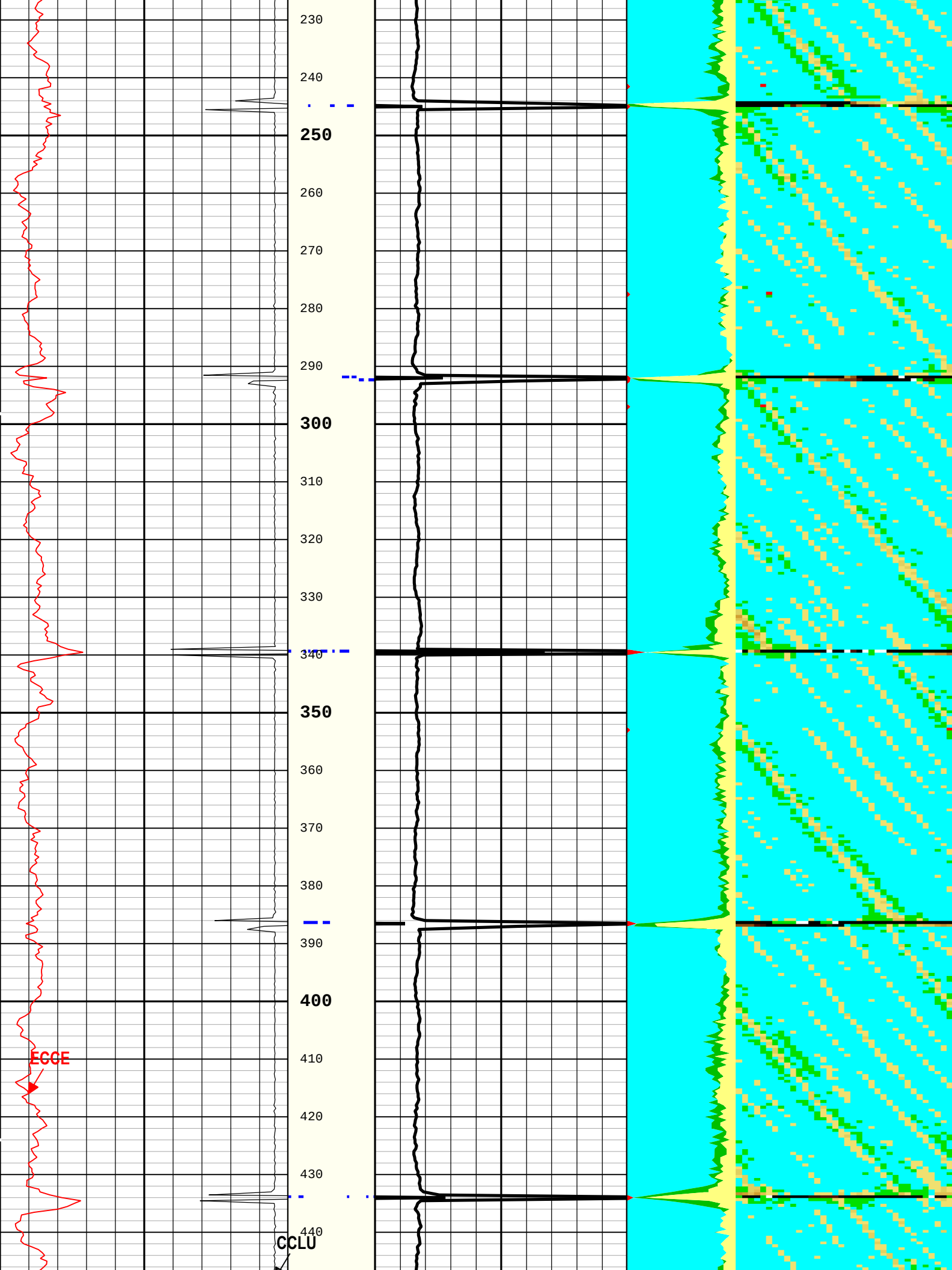
One: Log[4]:Up:S005

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 23-Jan-2018 13:48:26

TIME_1900 - Time Marked every 60.00 (s)

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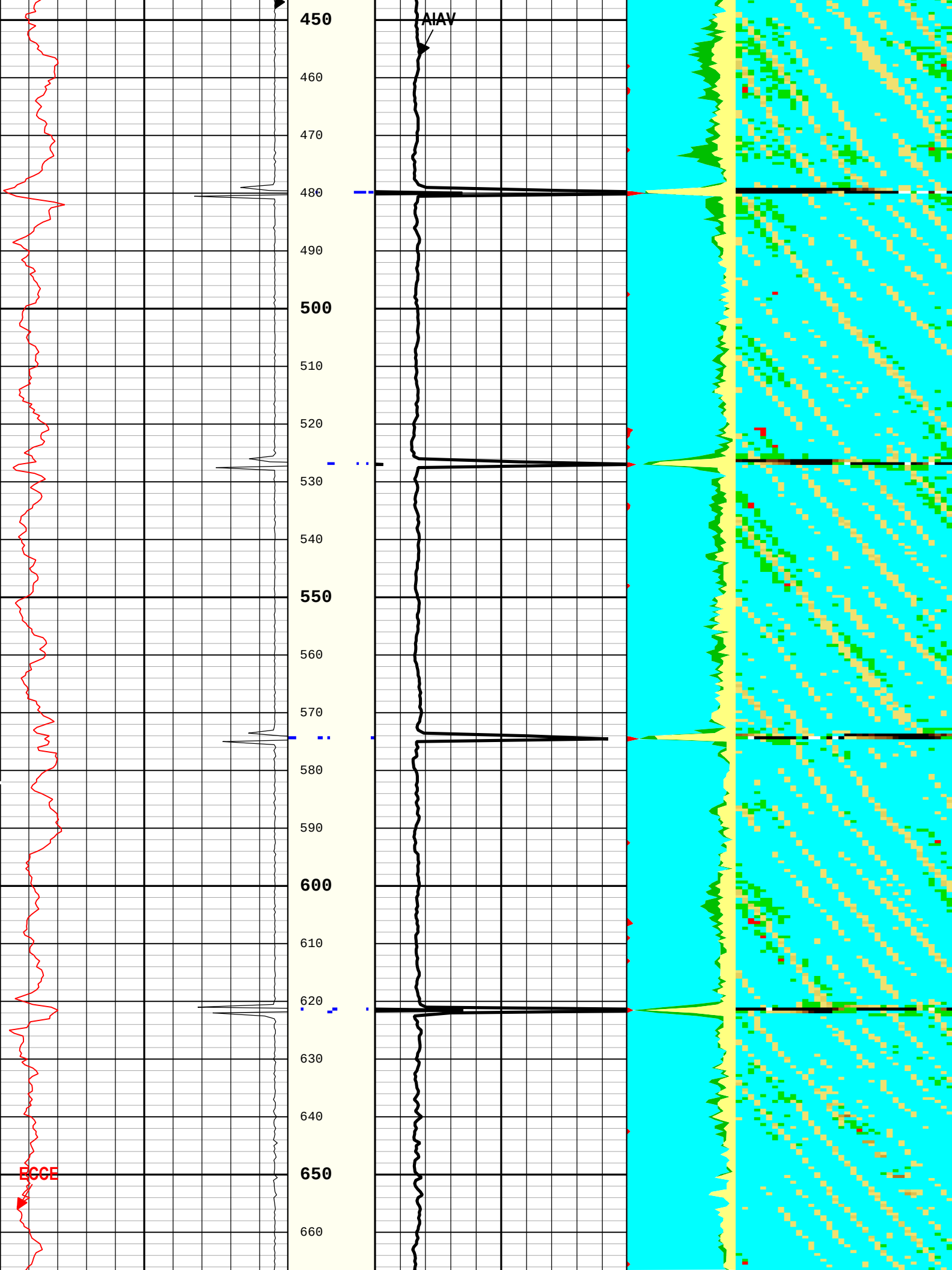
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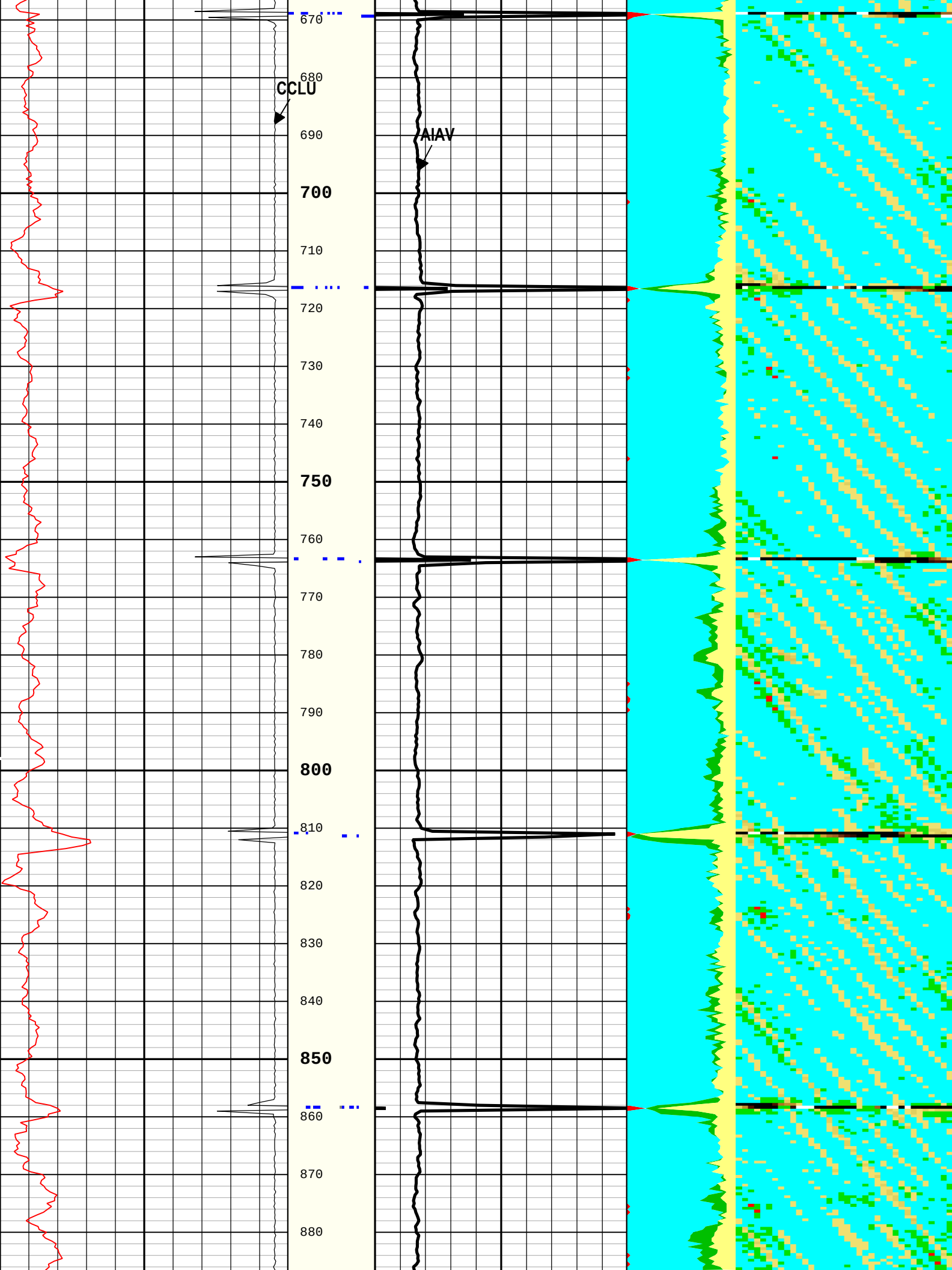
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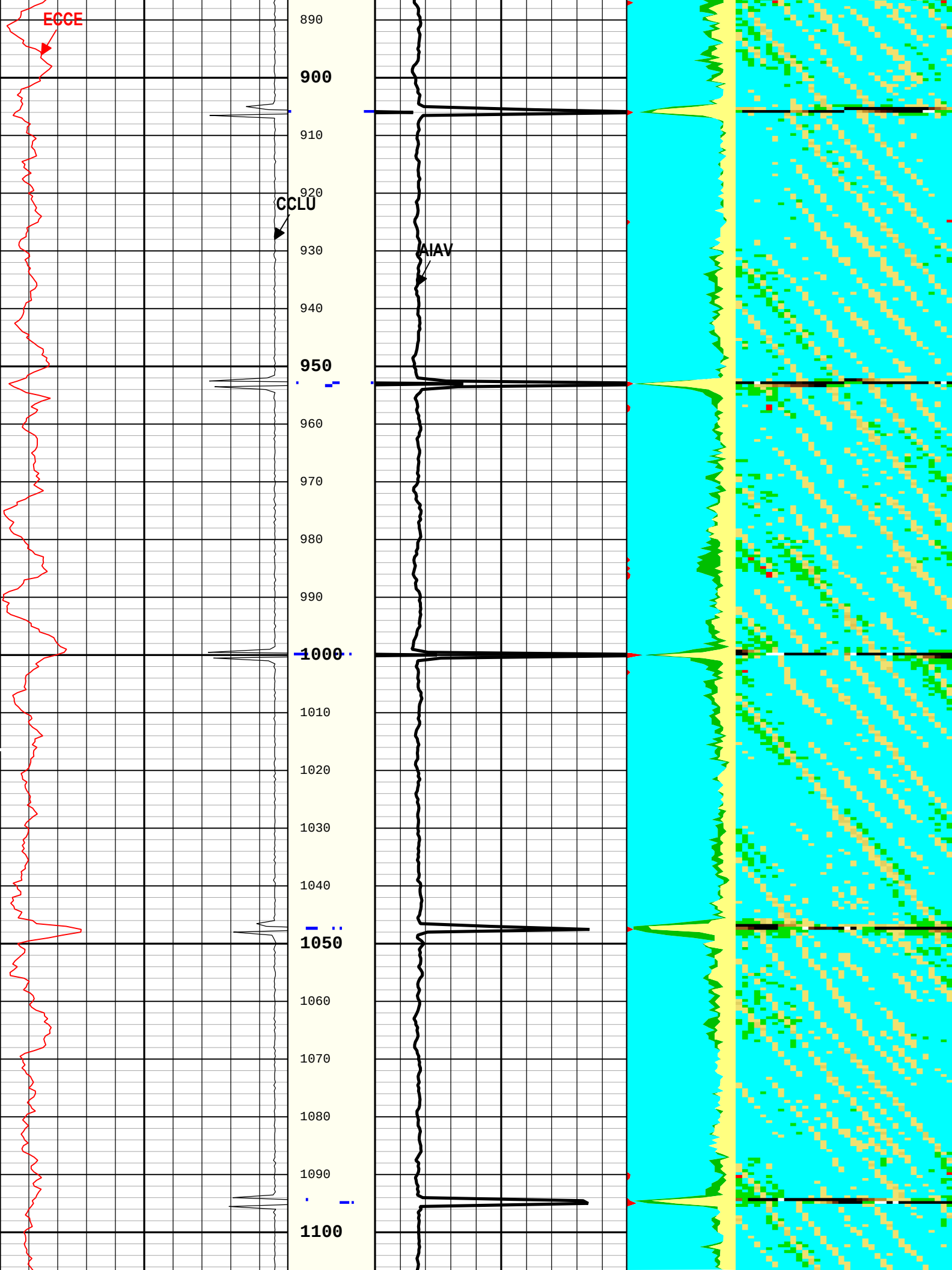
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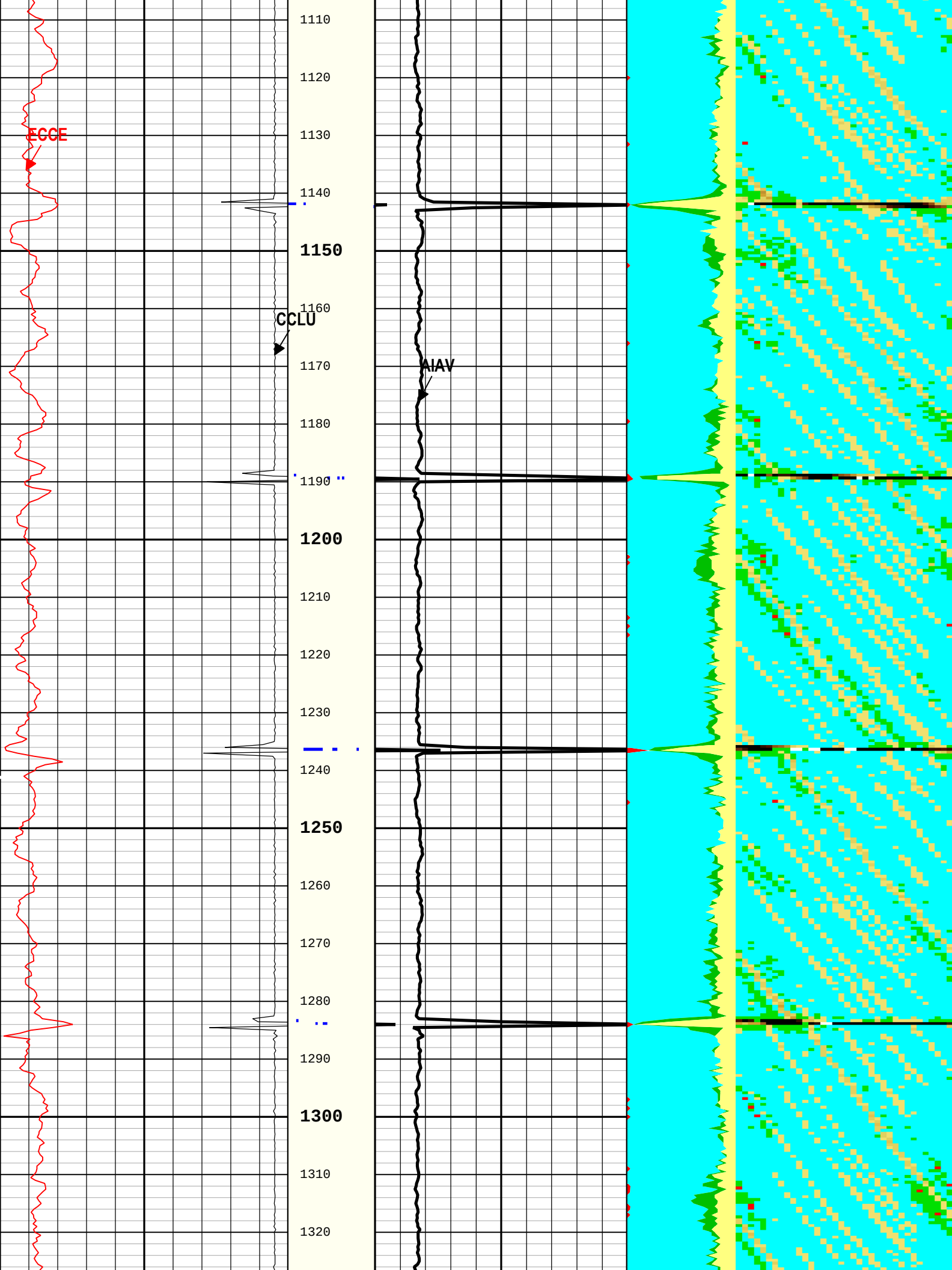
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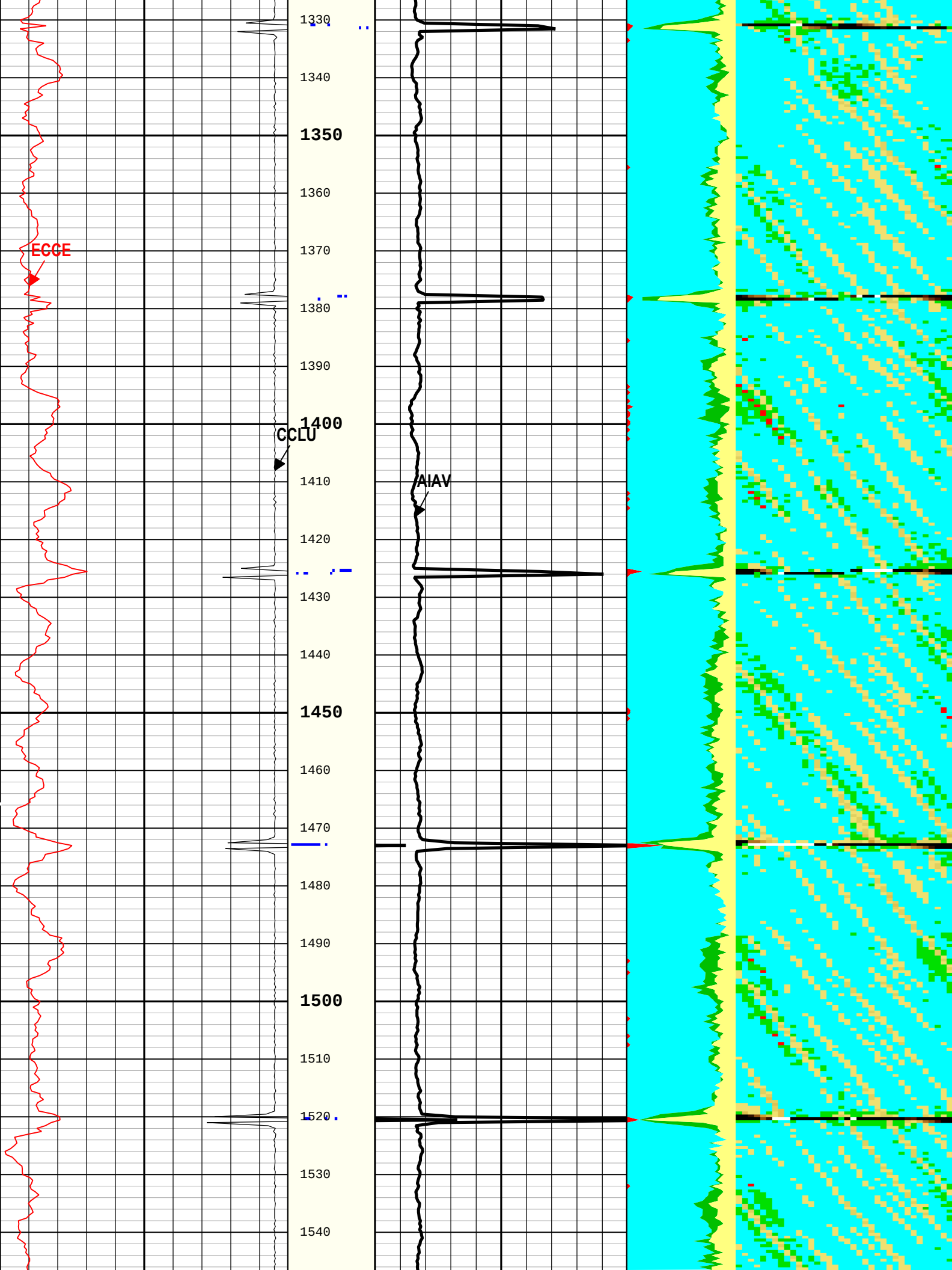
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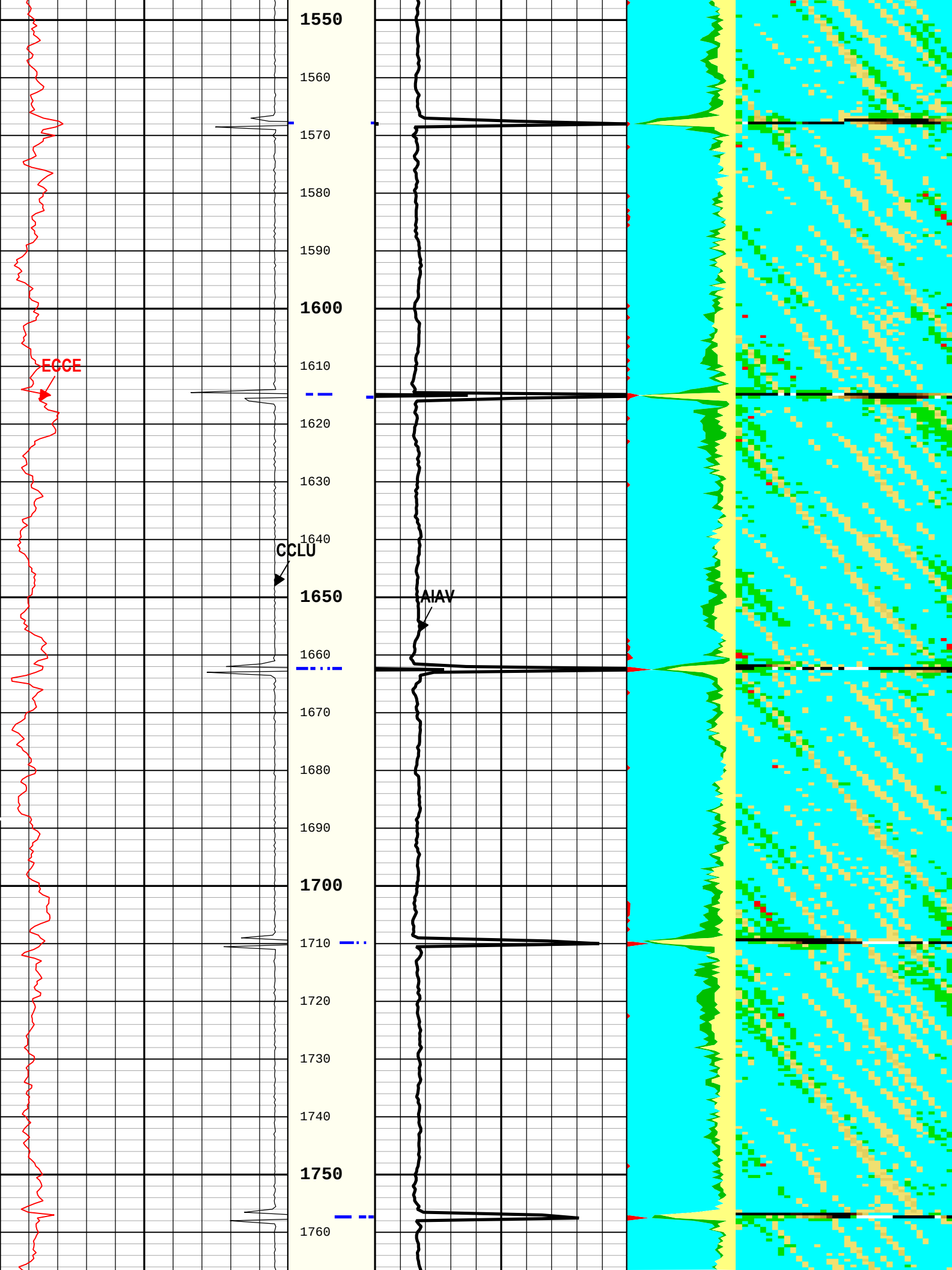
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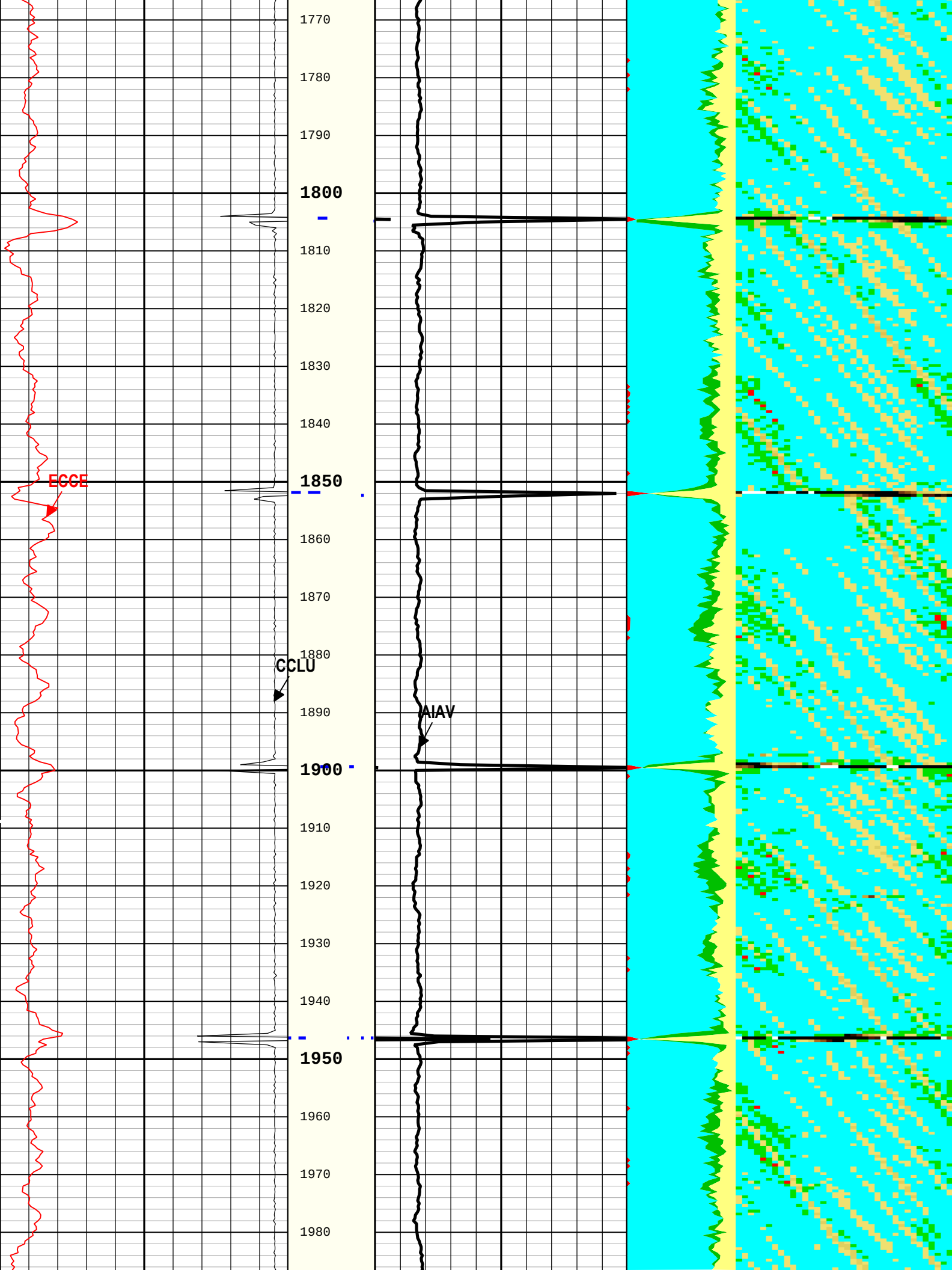
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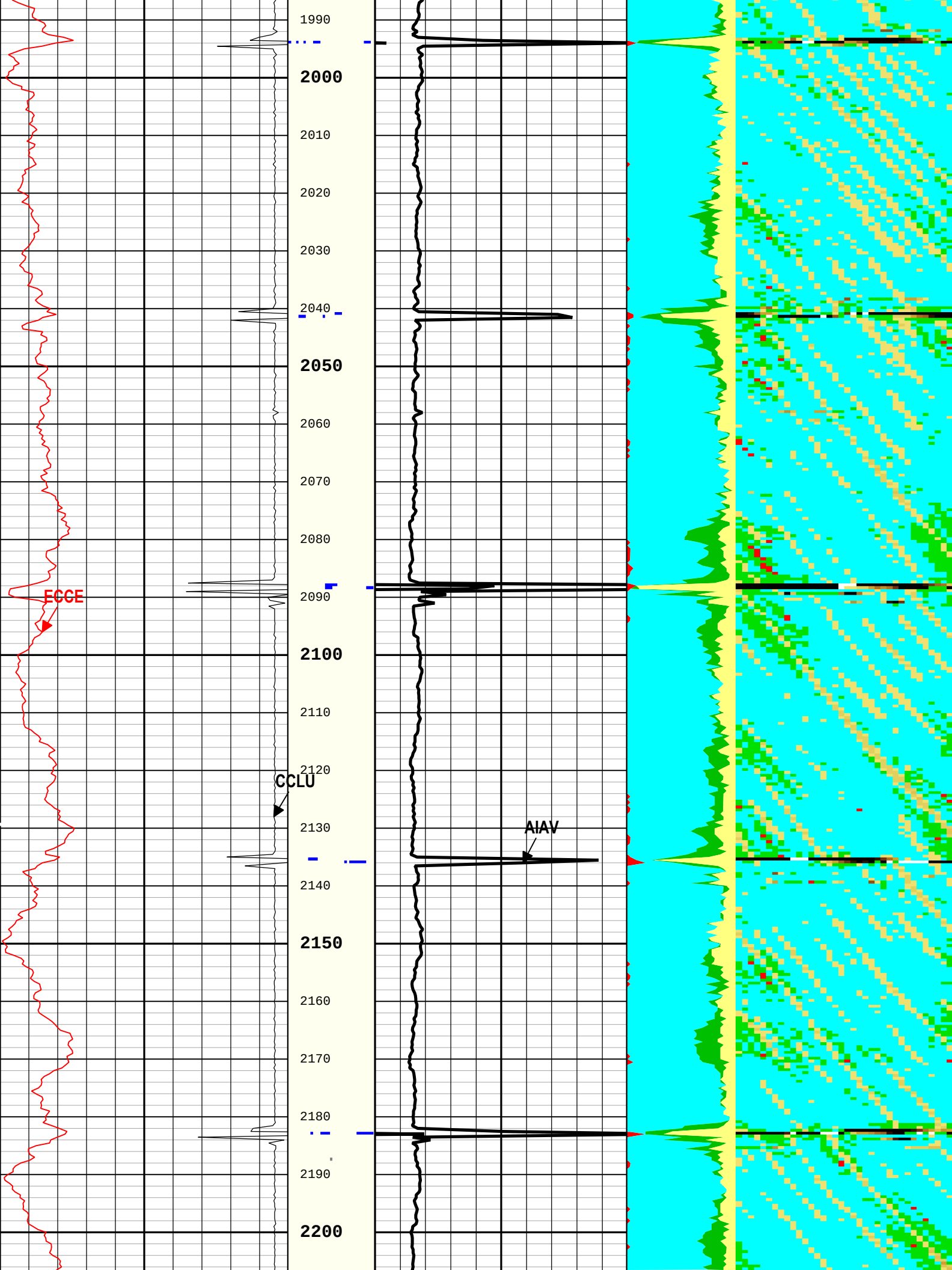
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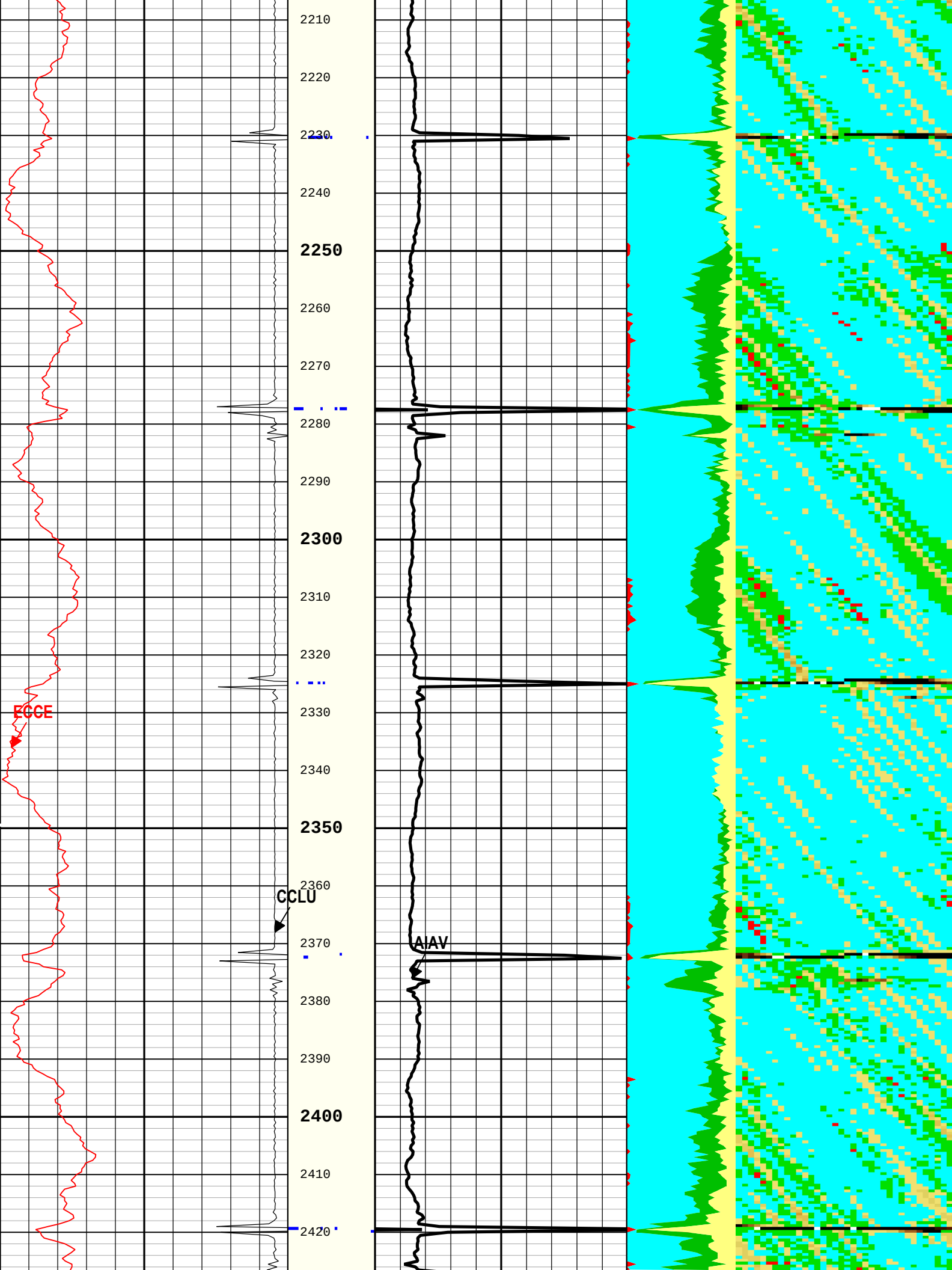
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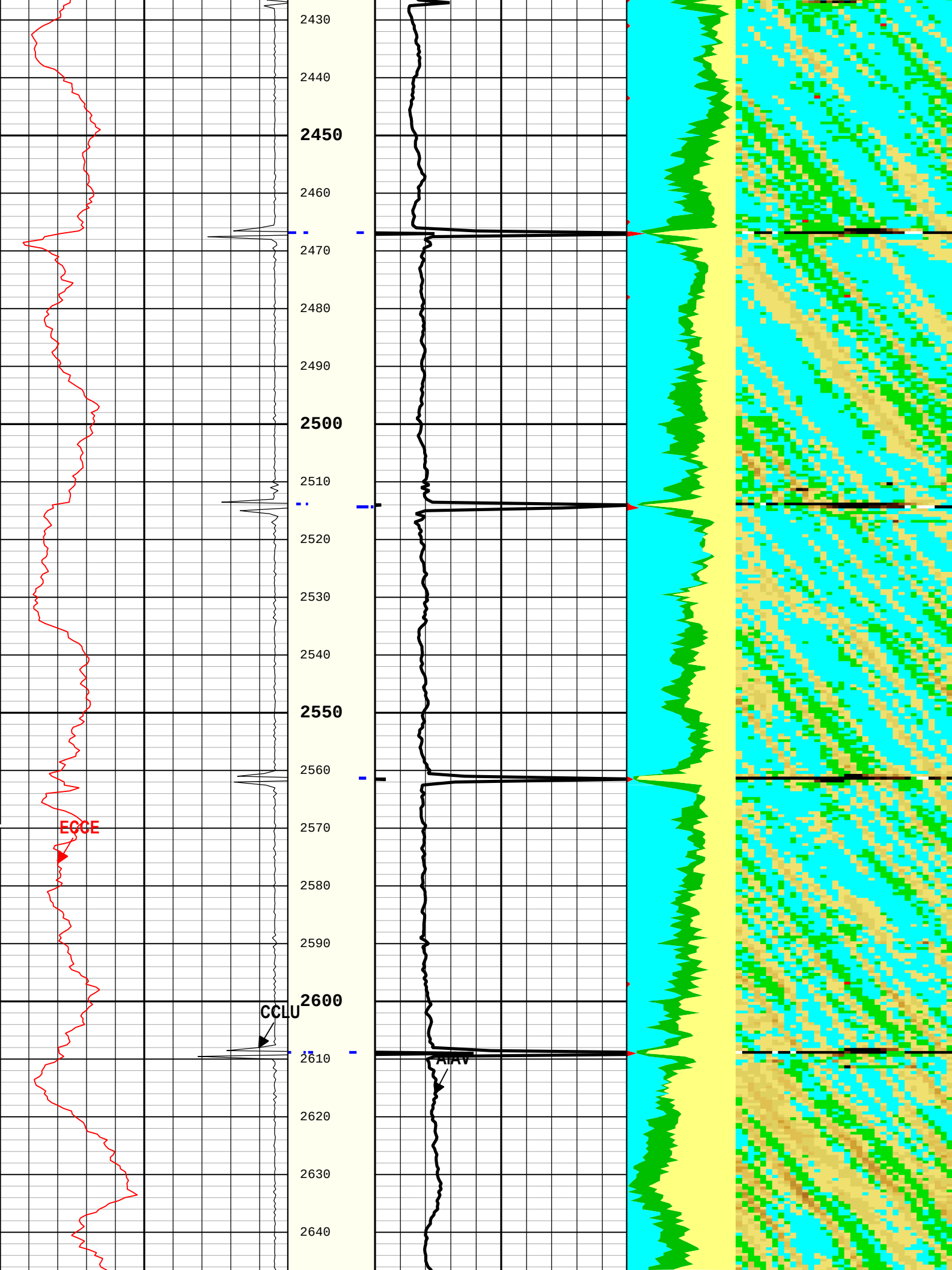
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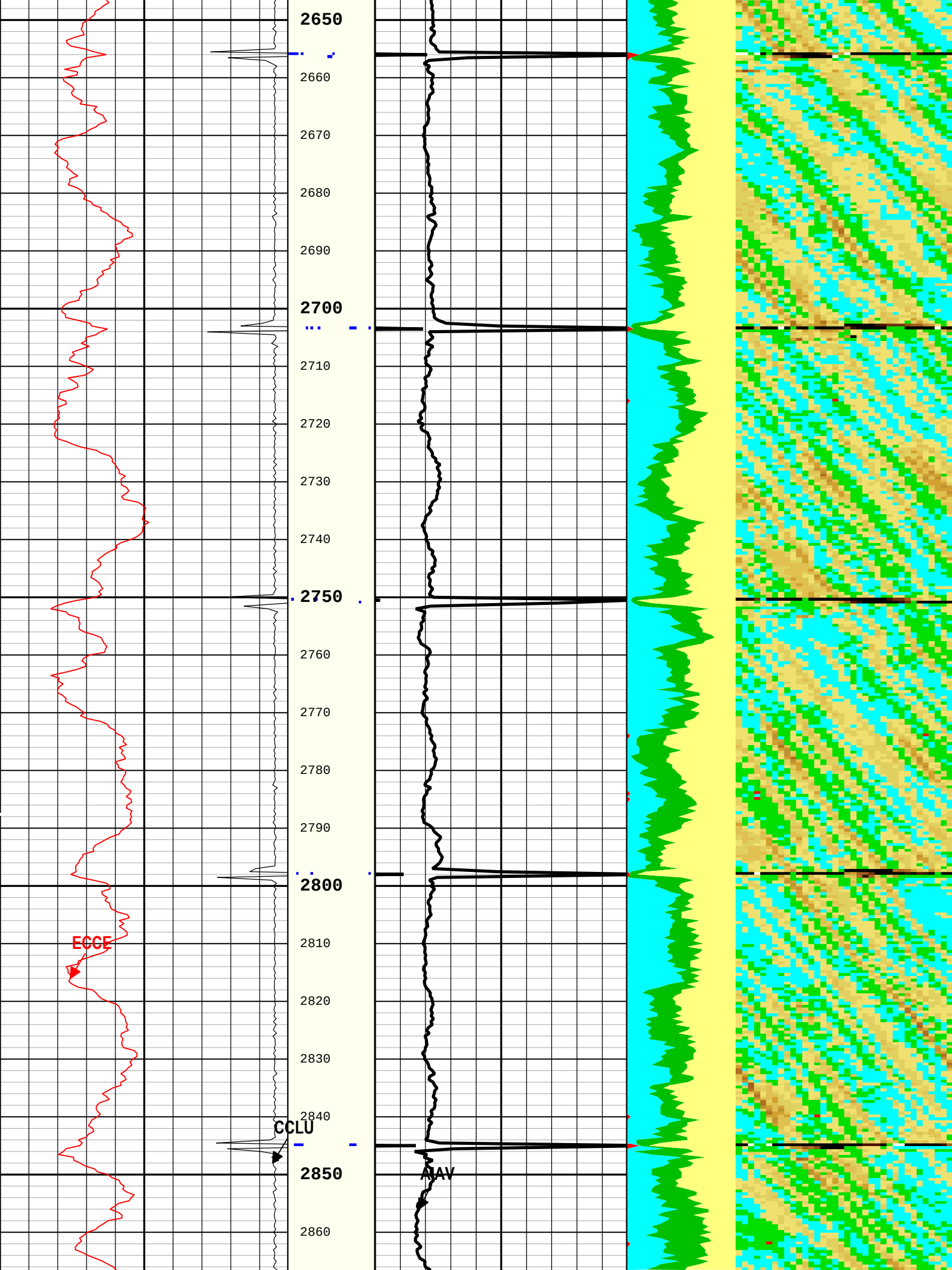
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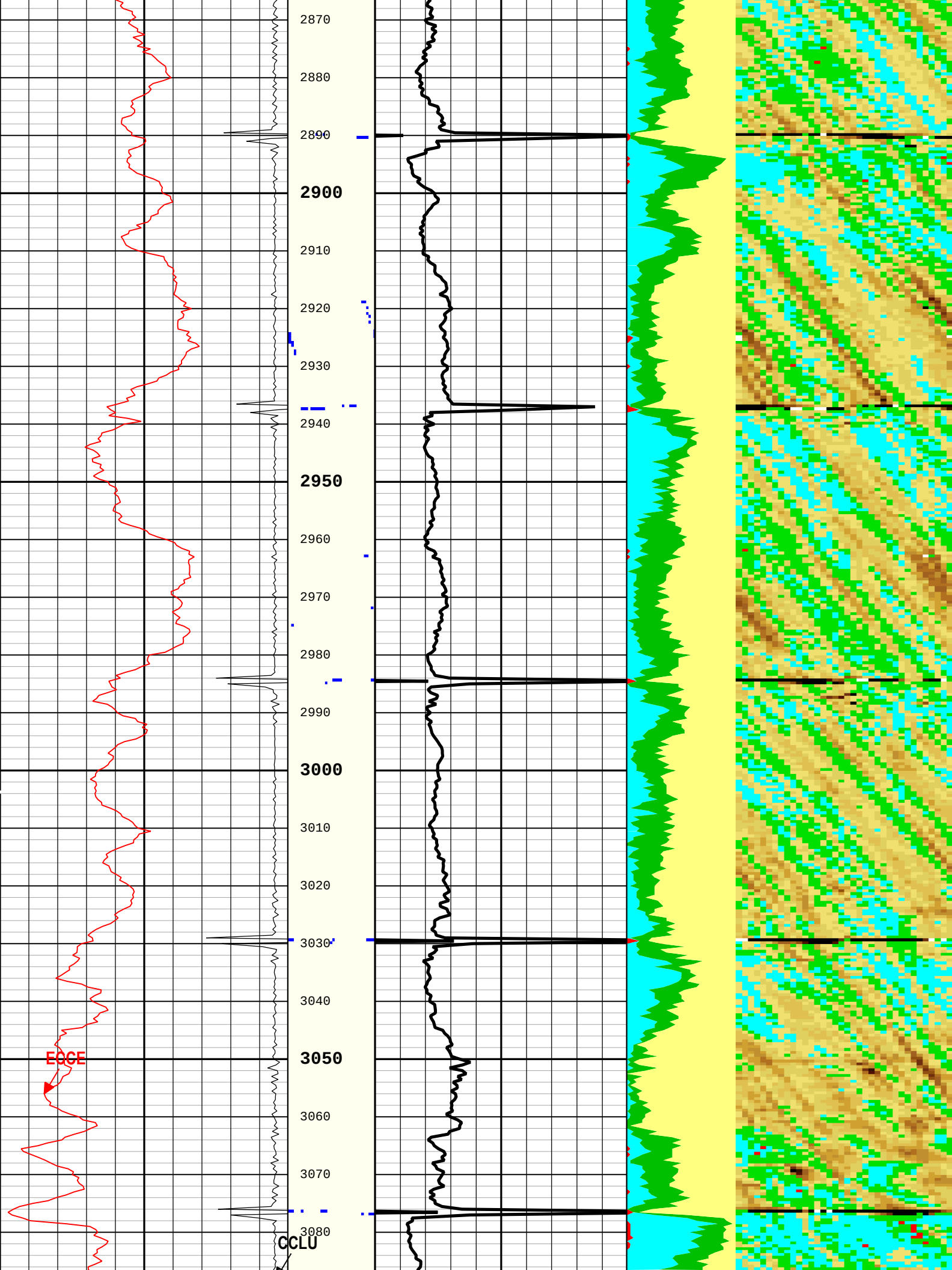
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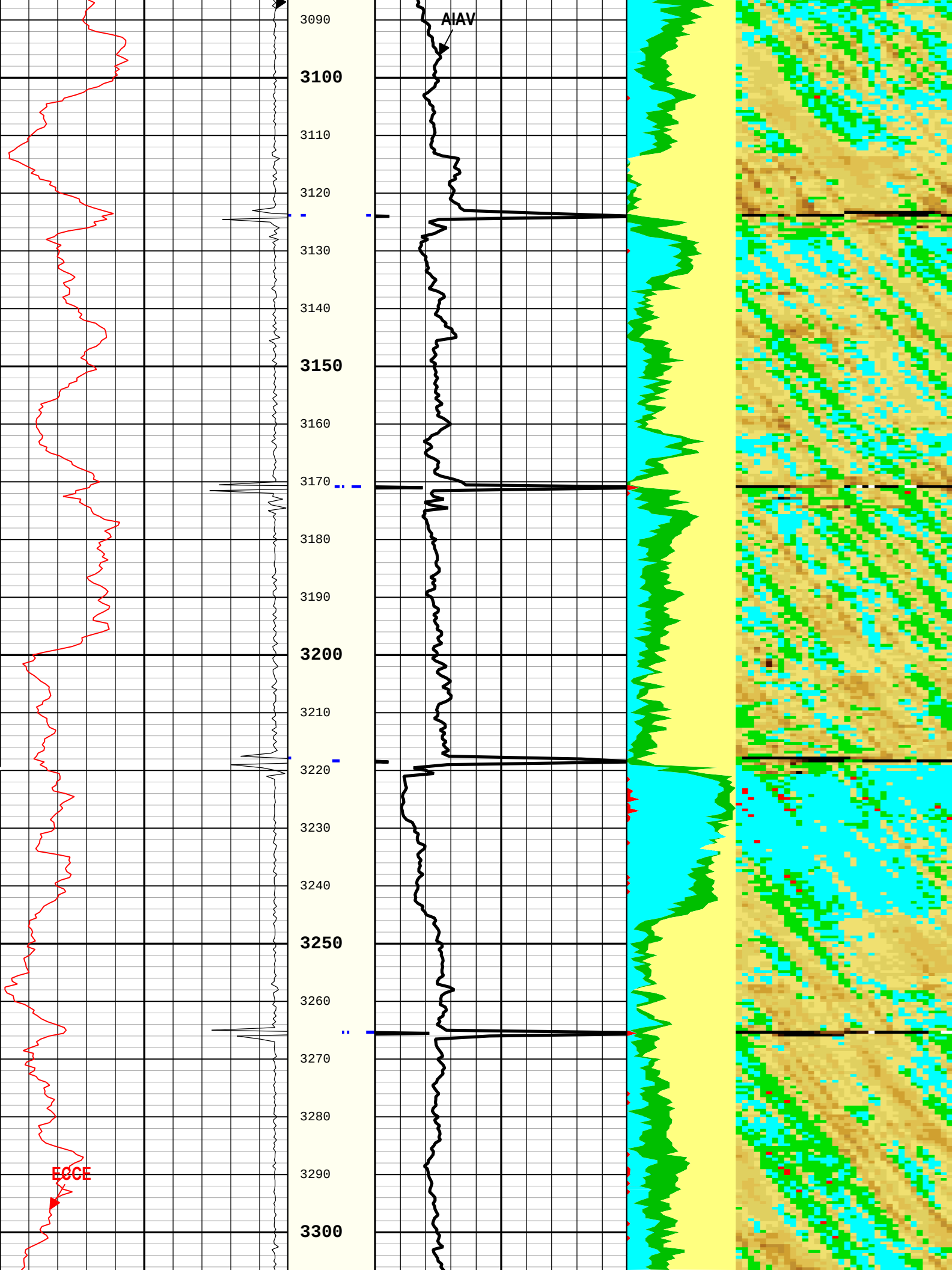
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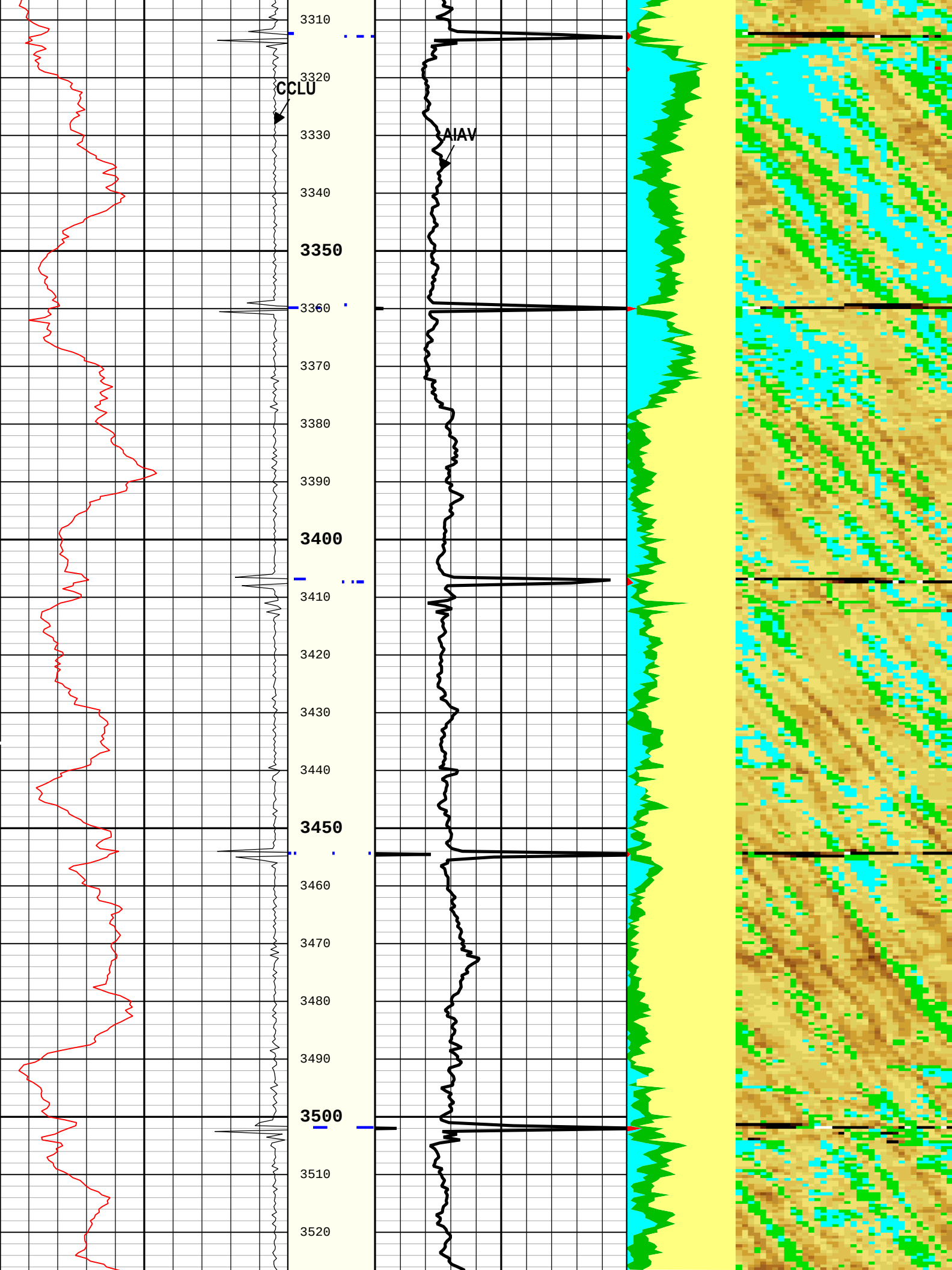
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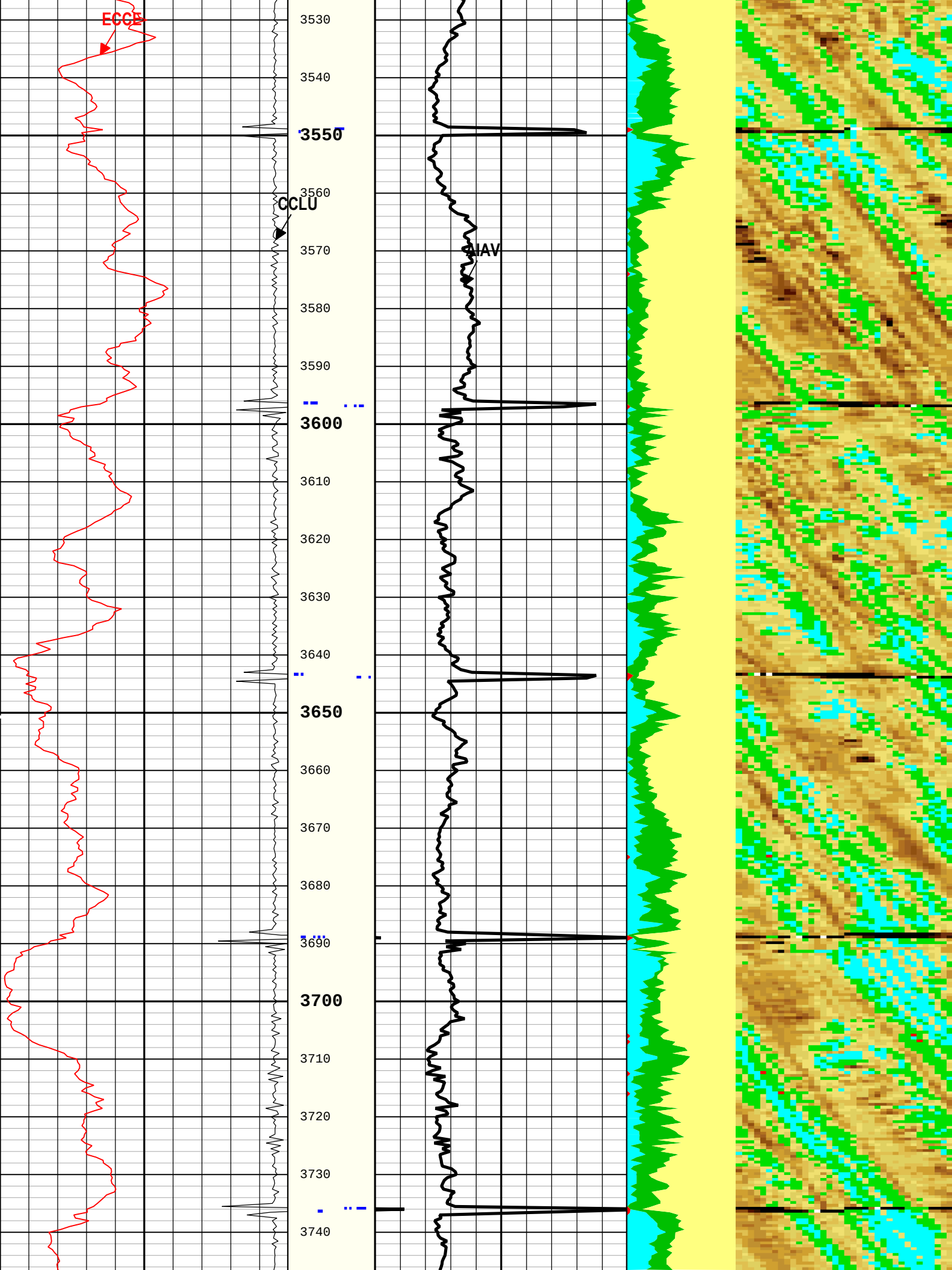
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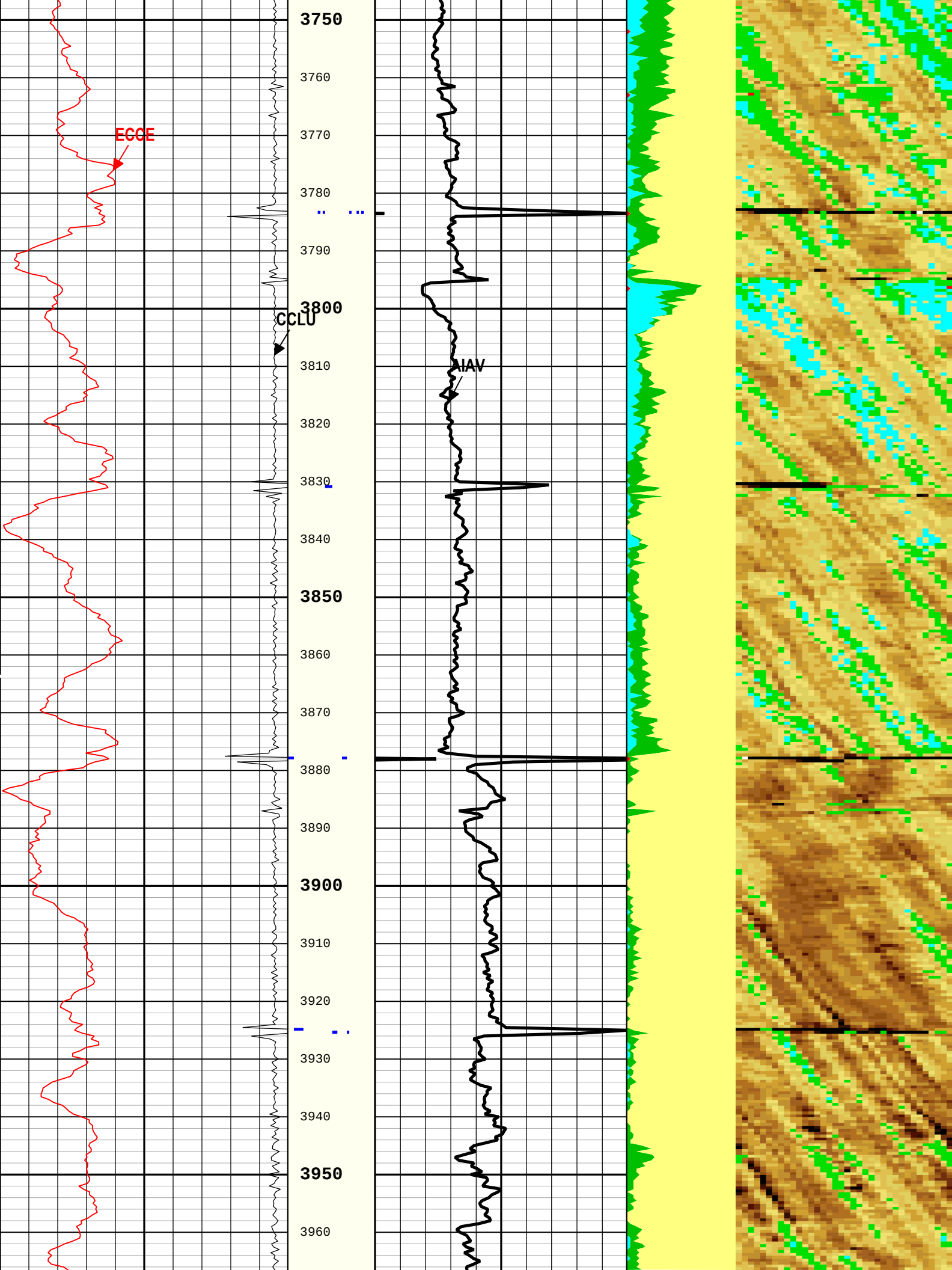
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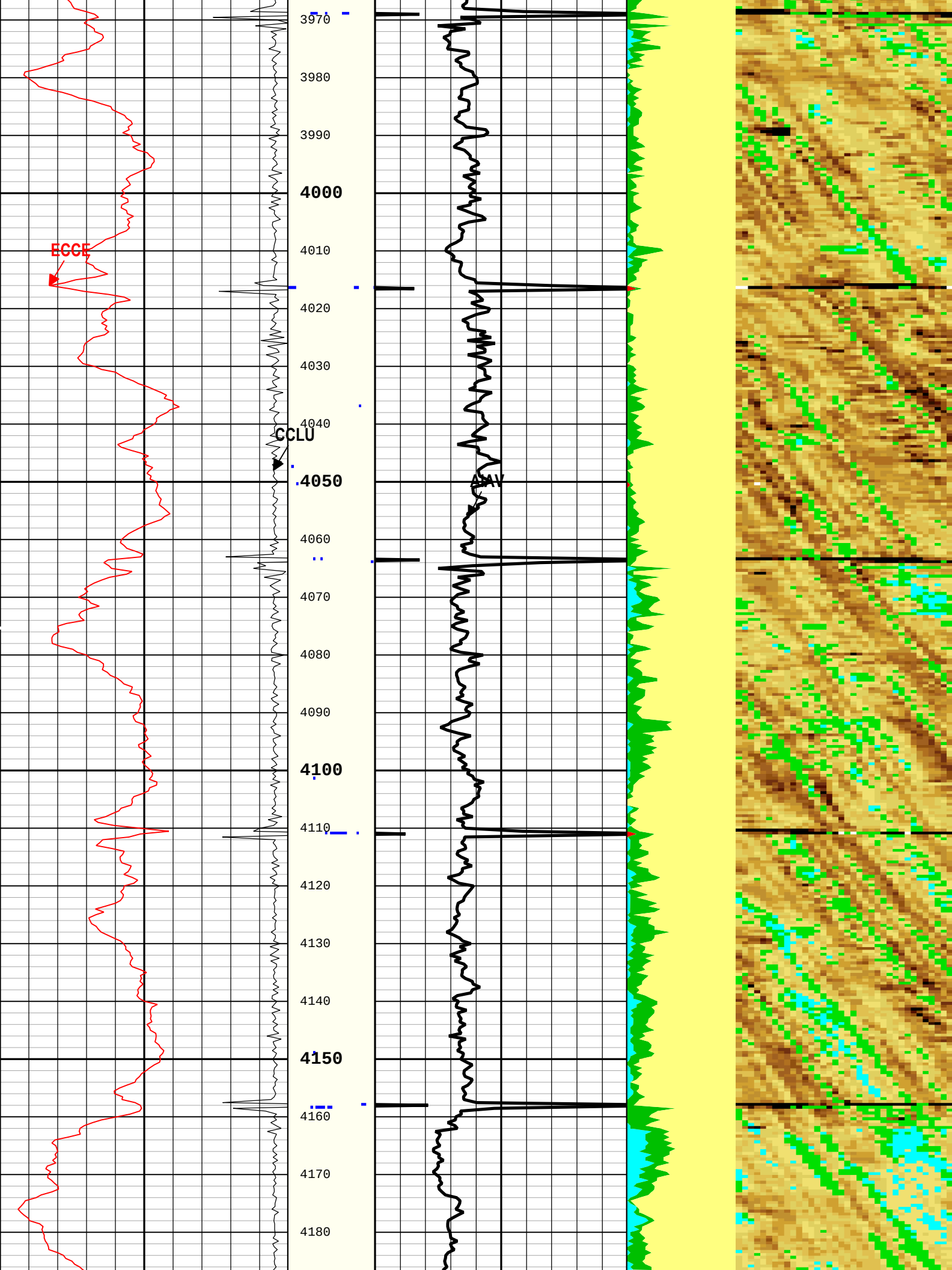
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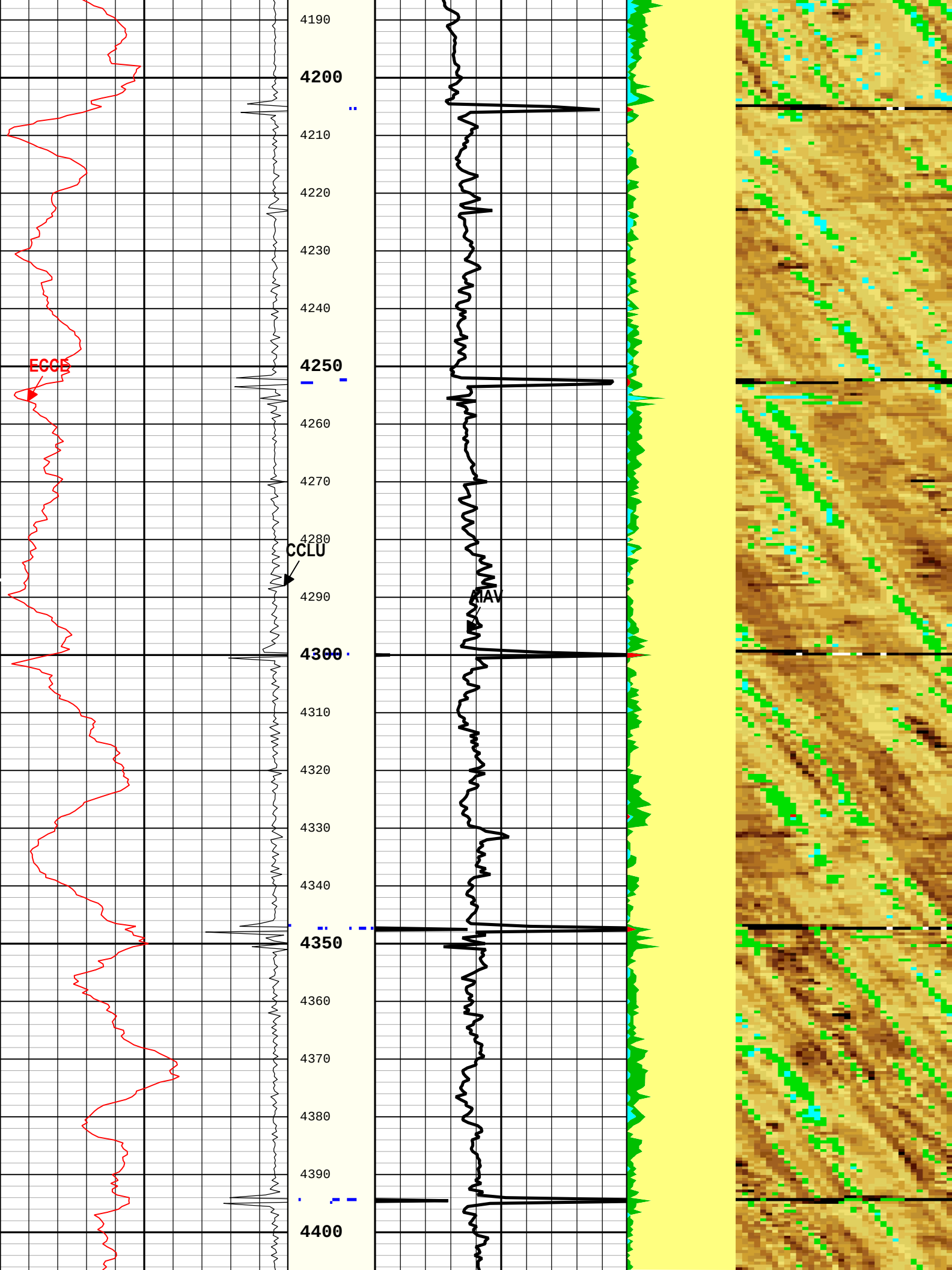
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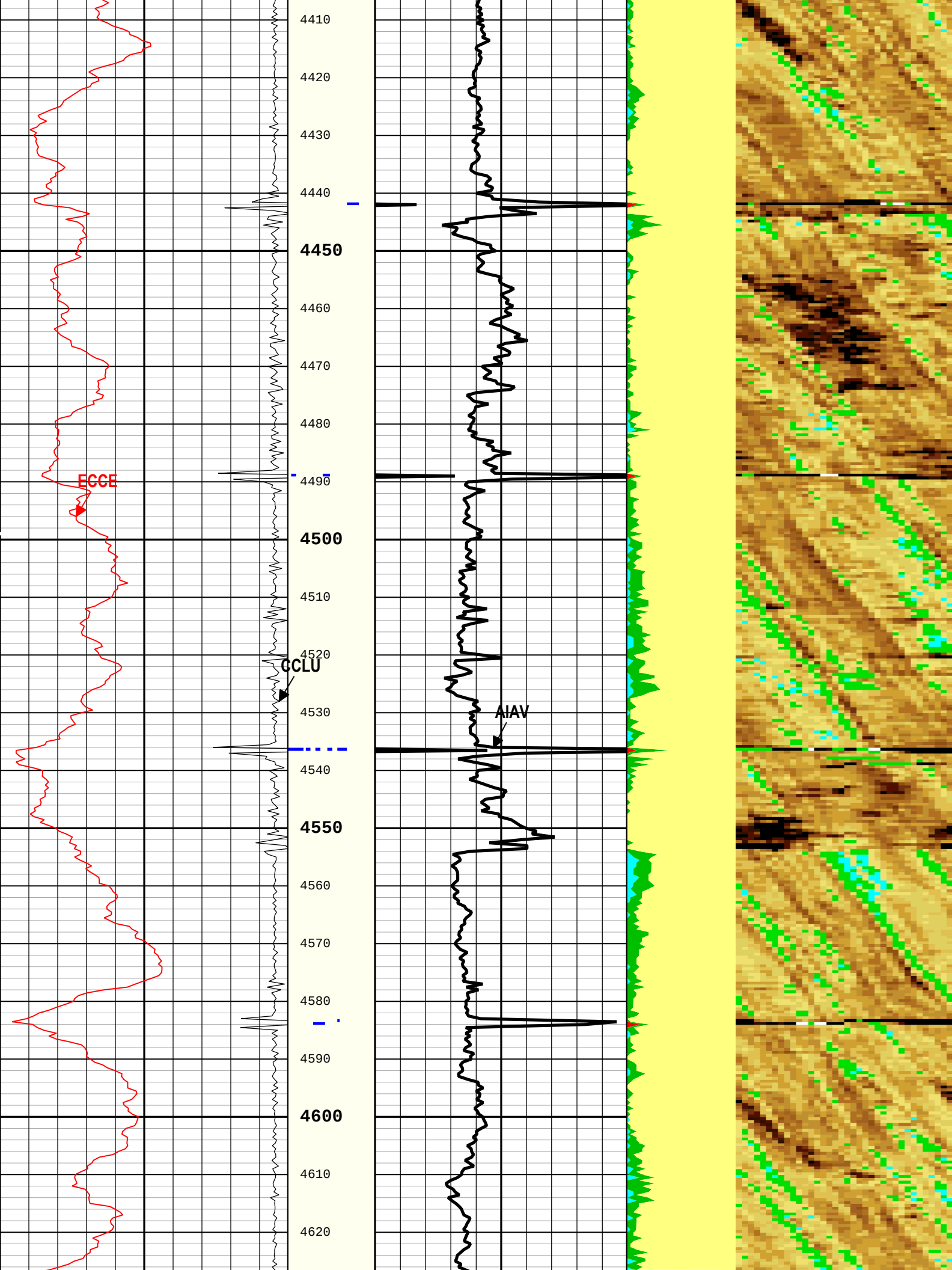
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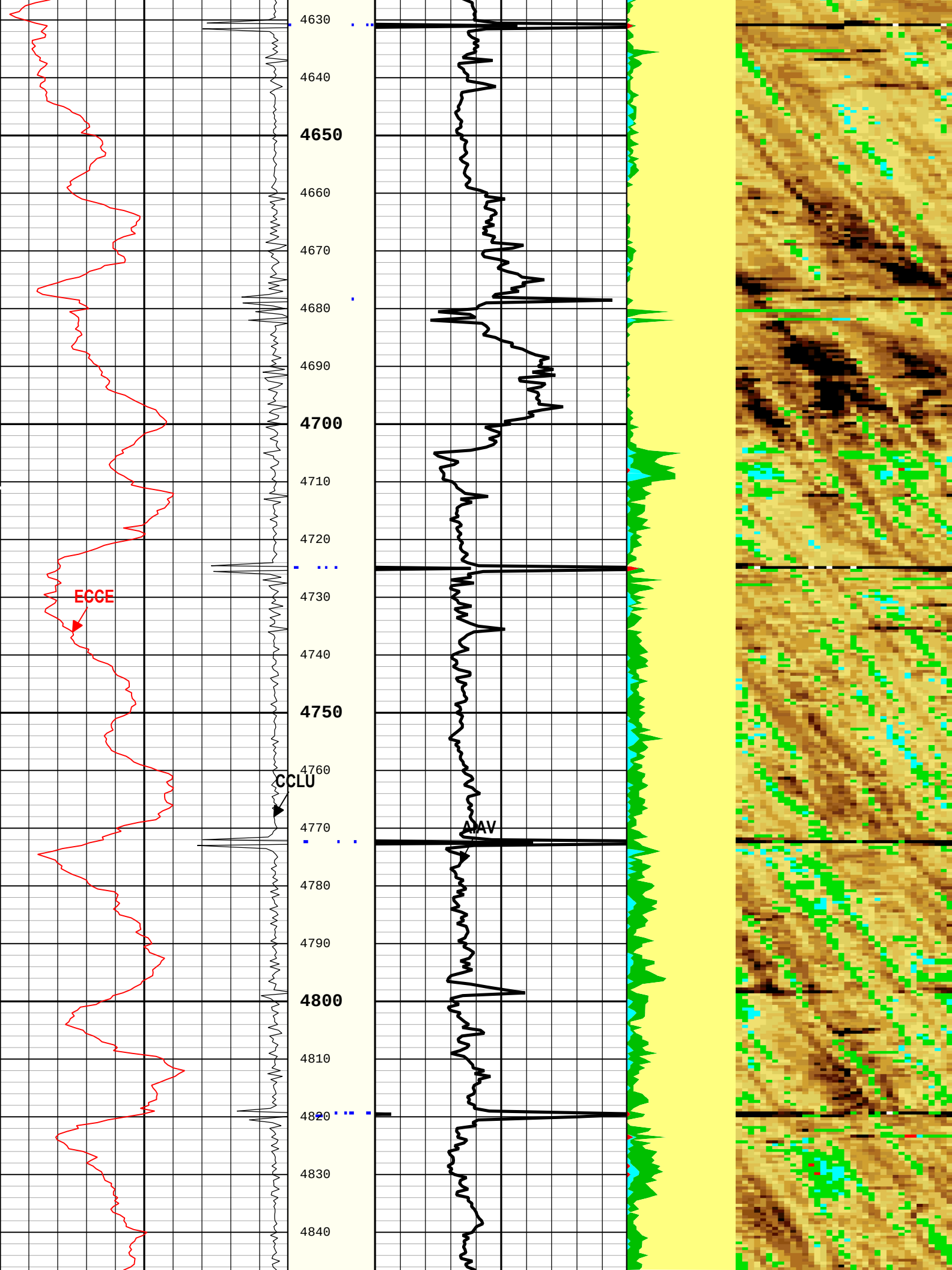
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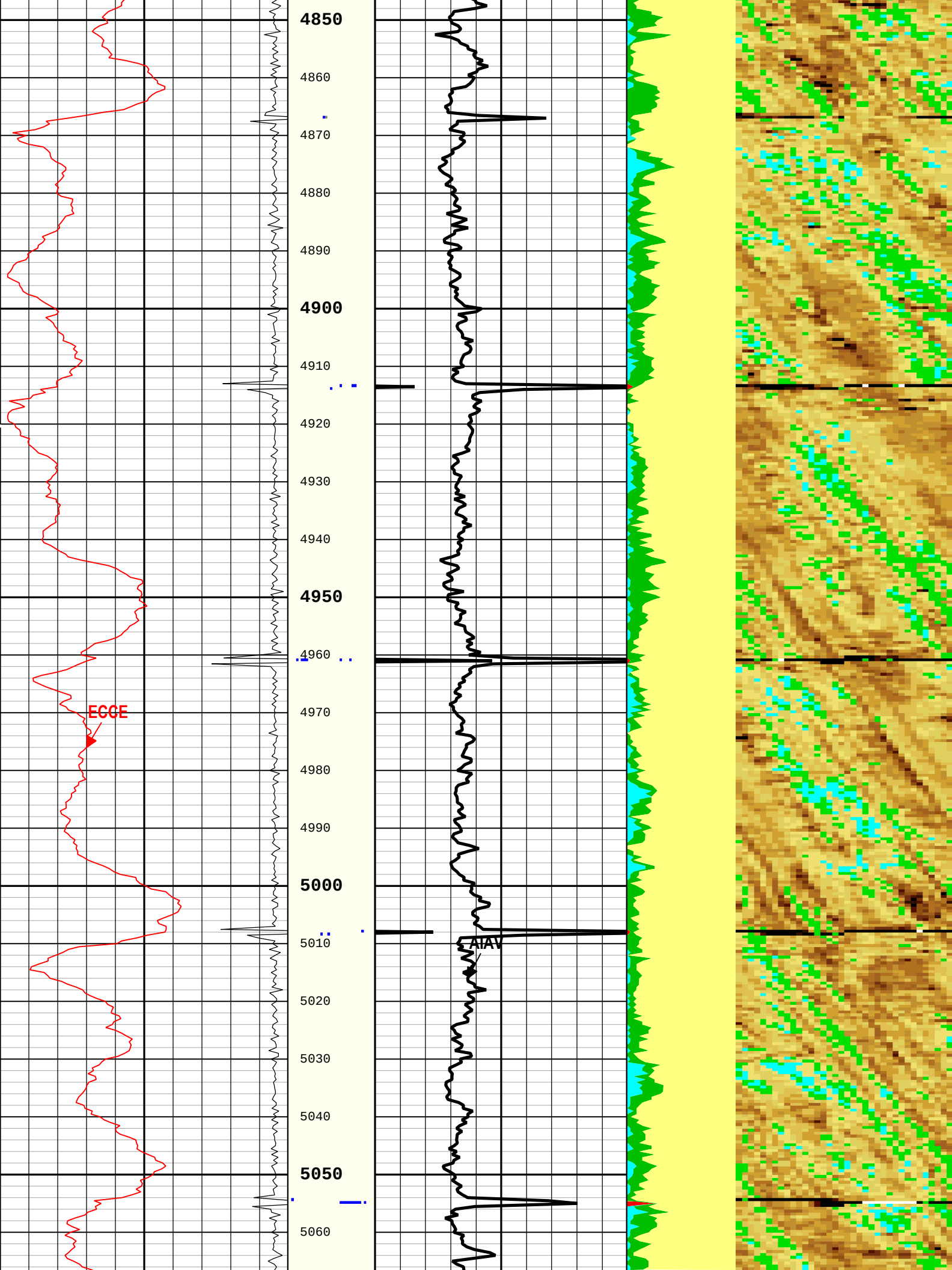
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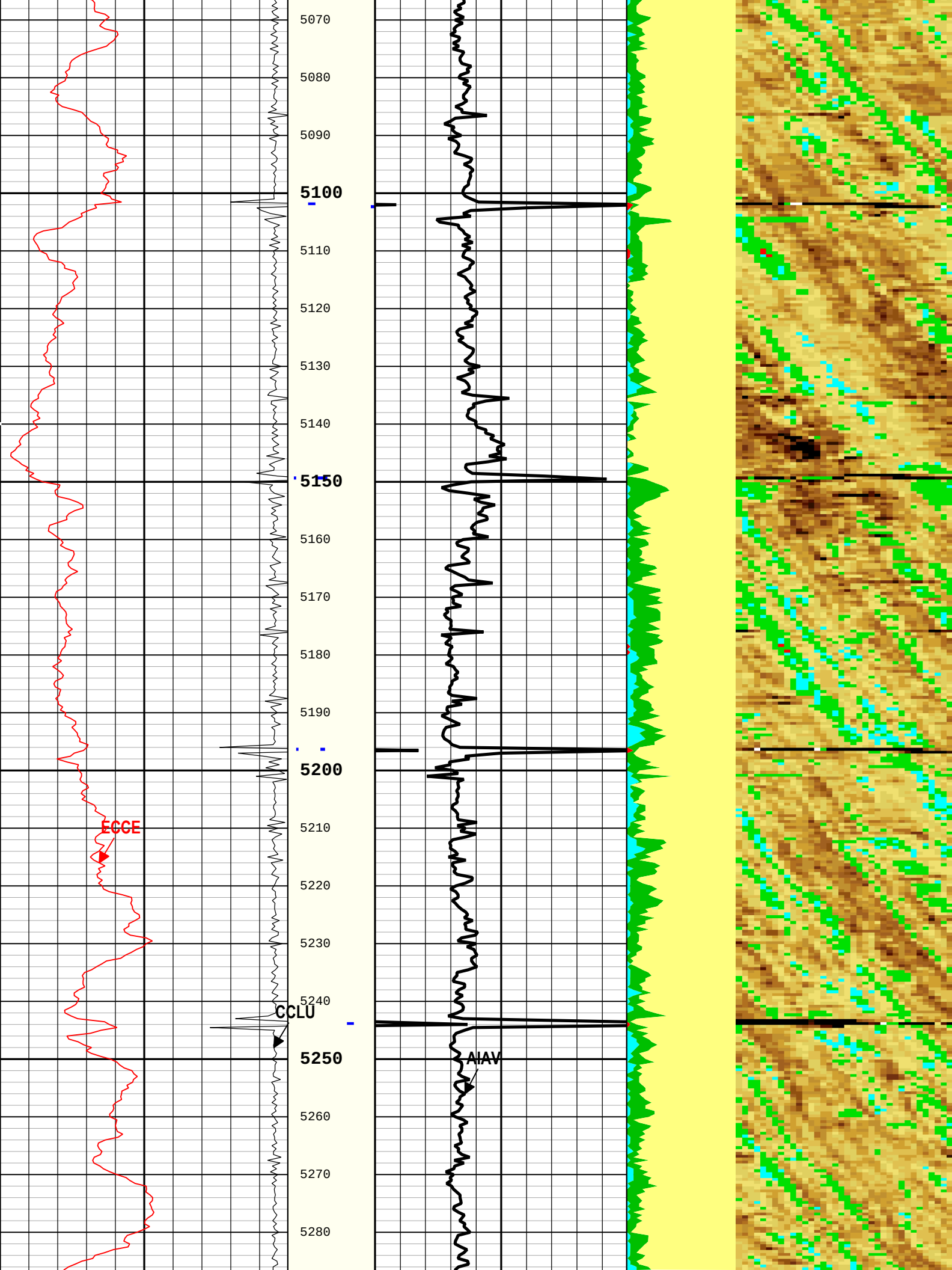
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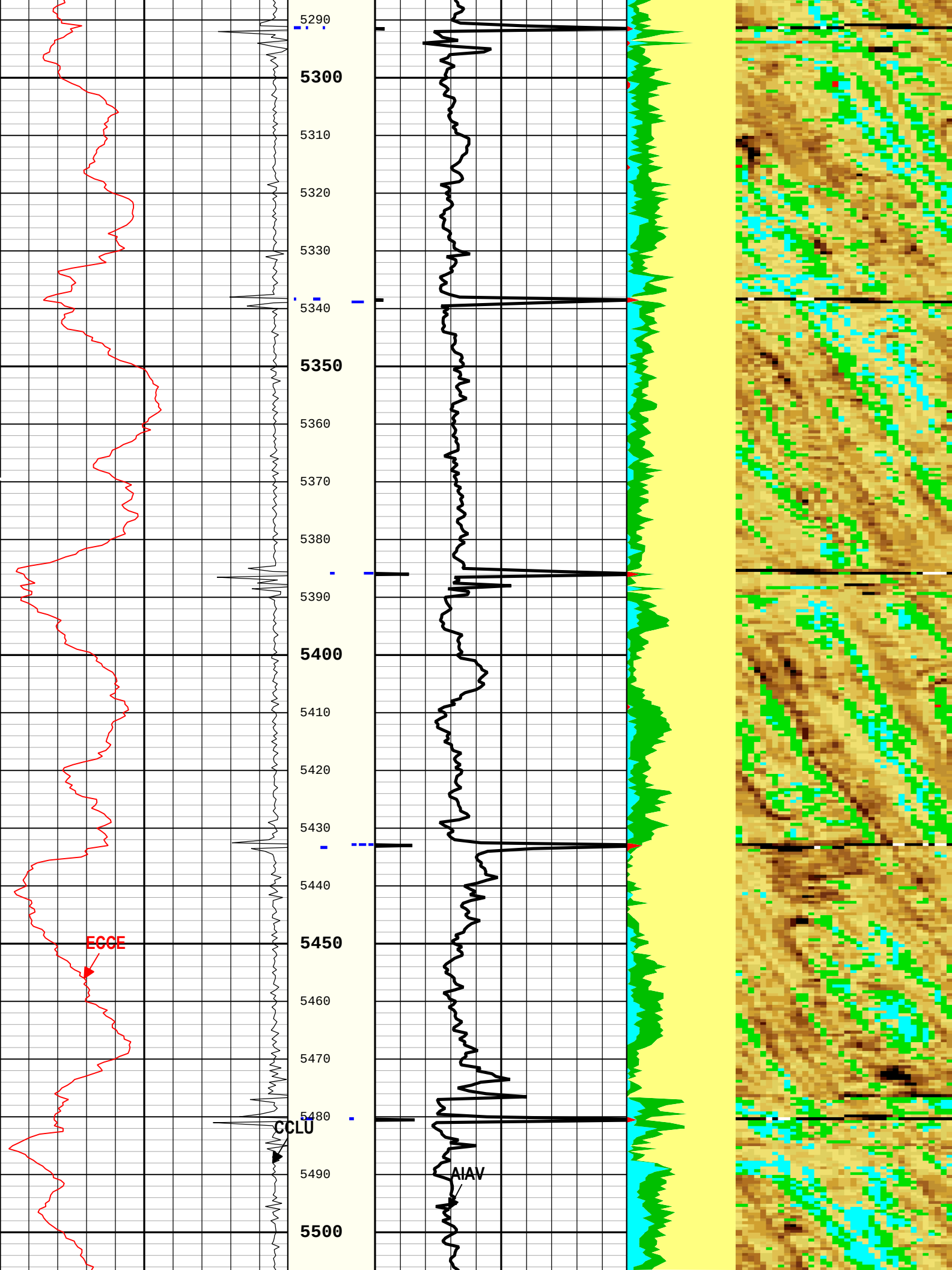
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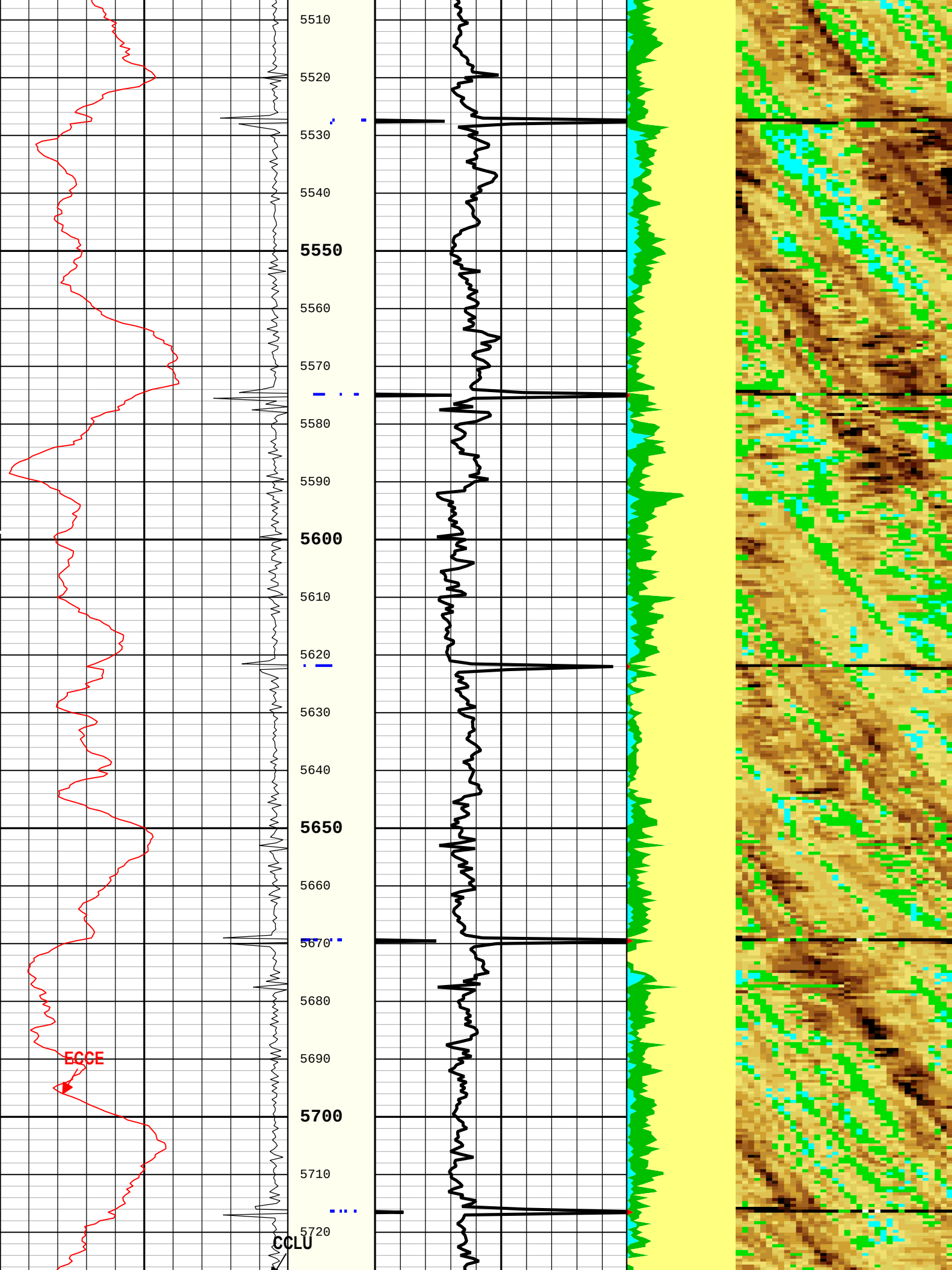
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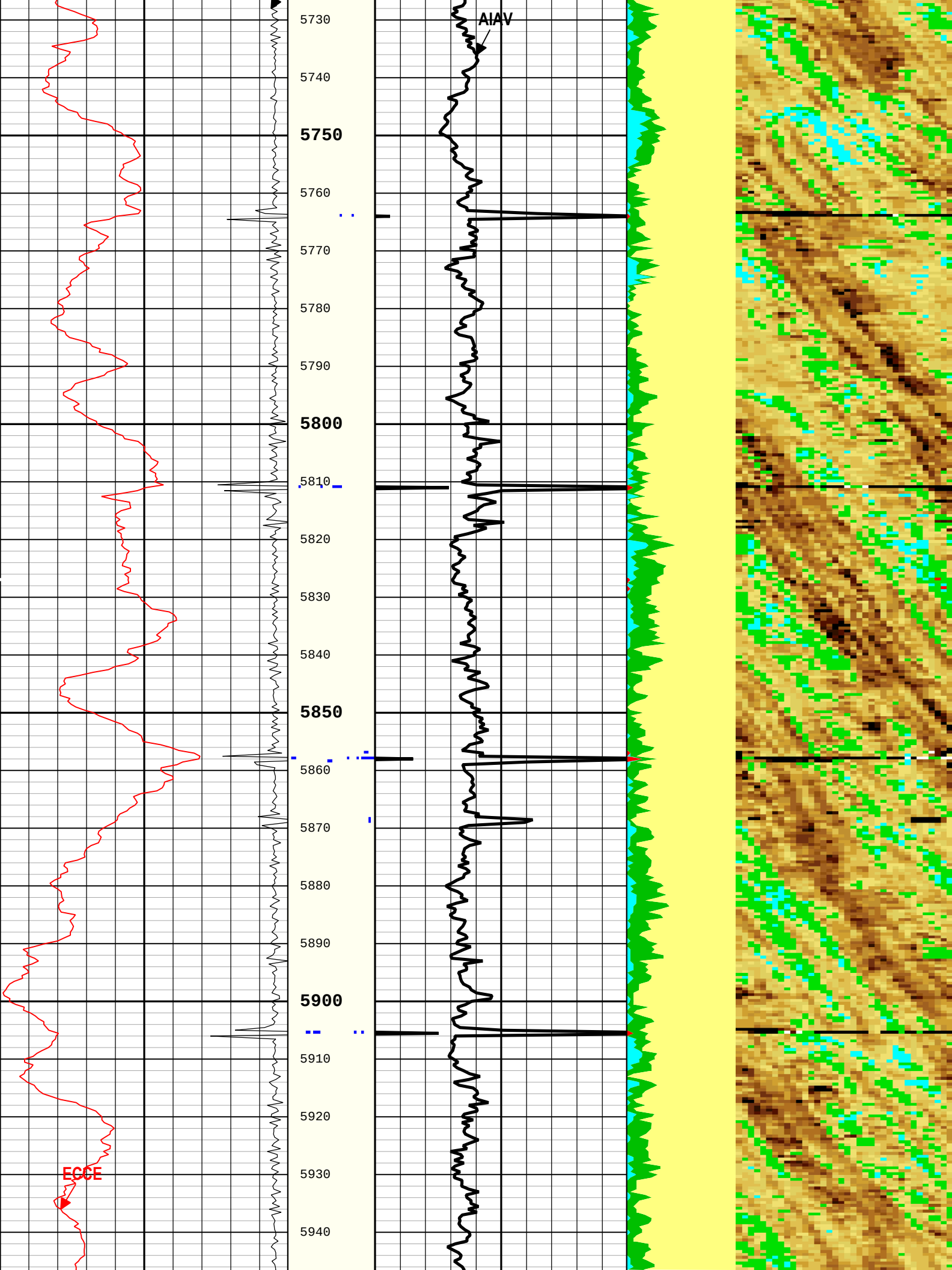
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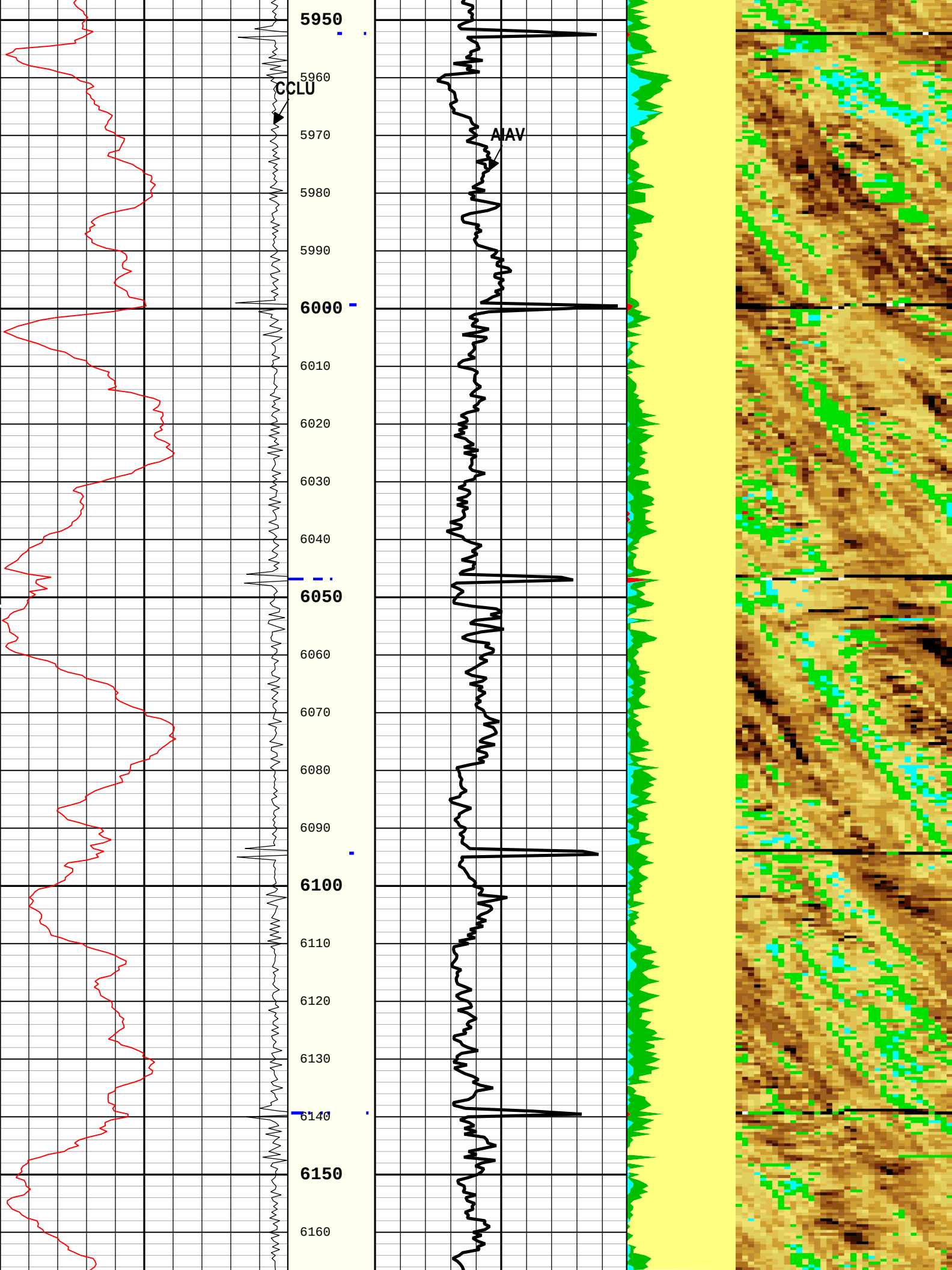
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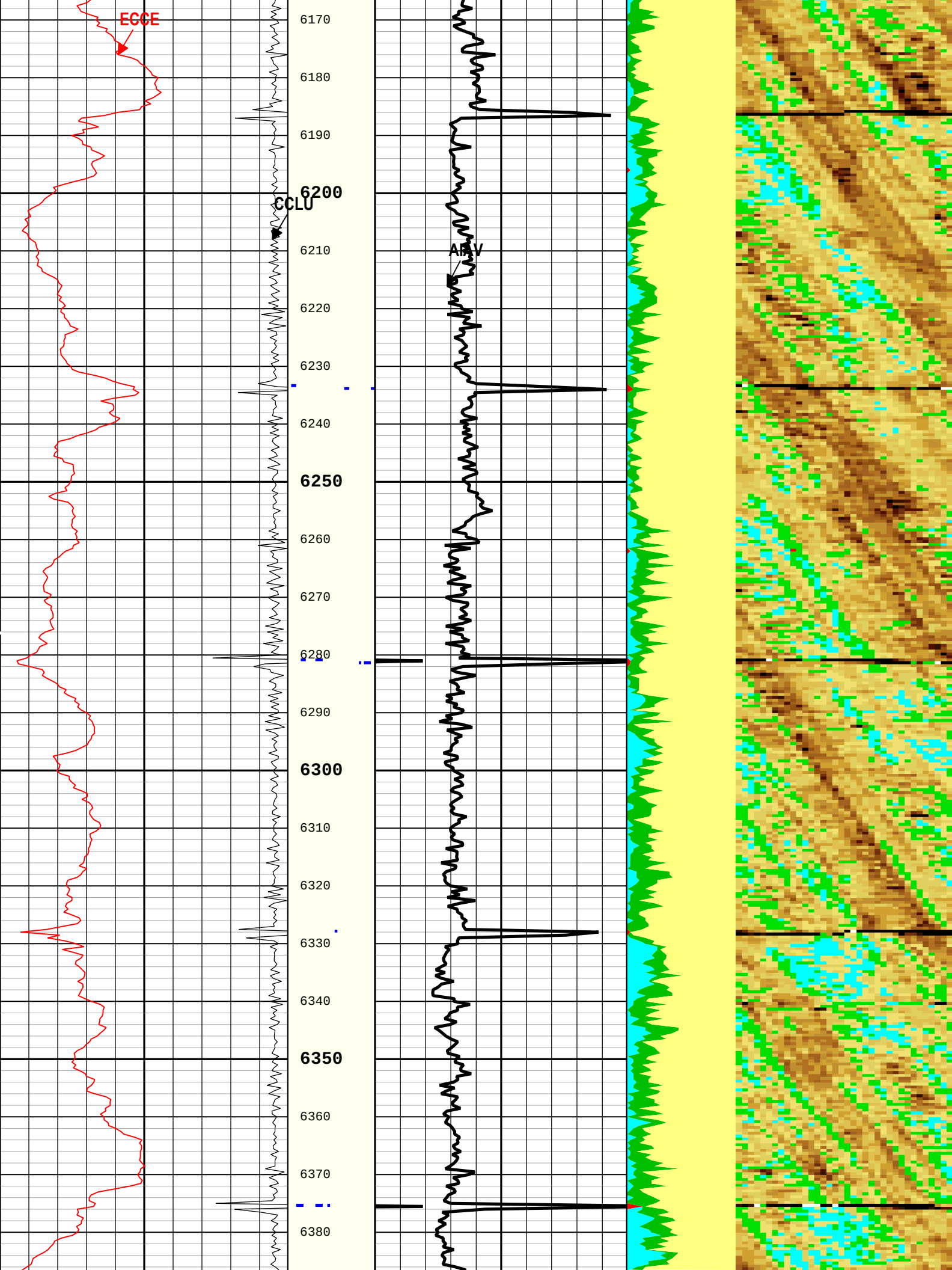
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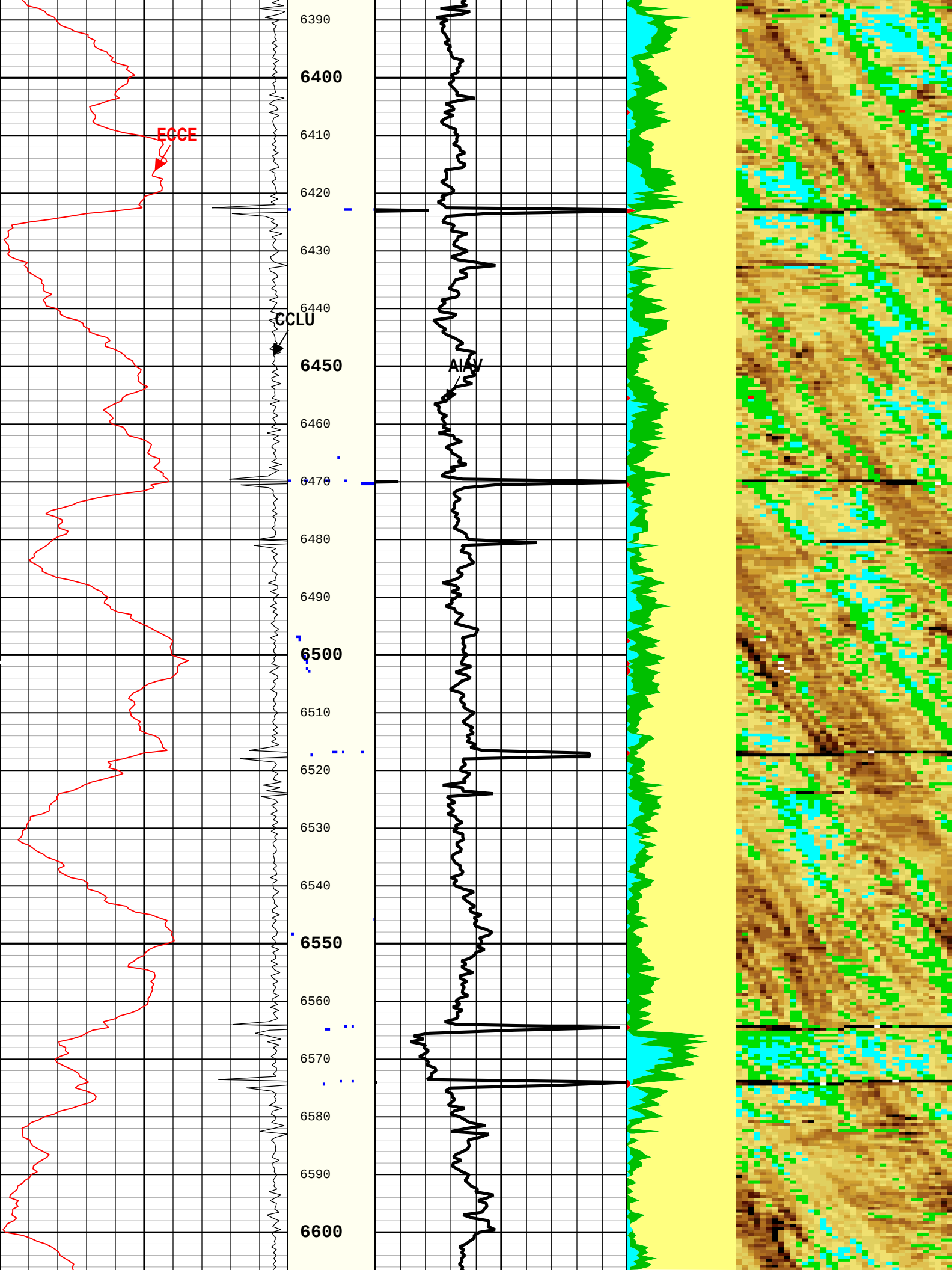
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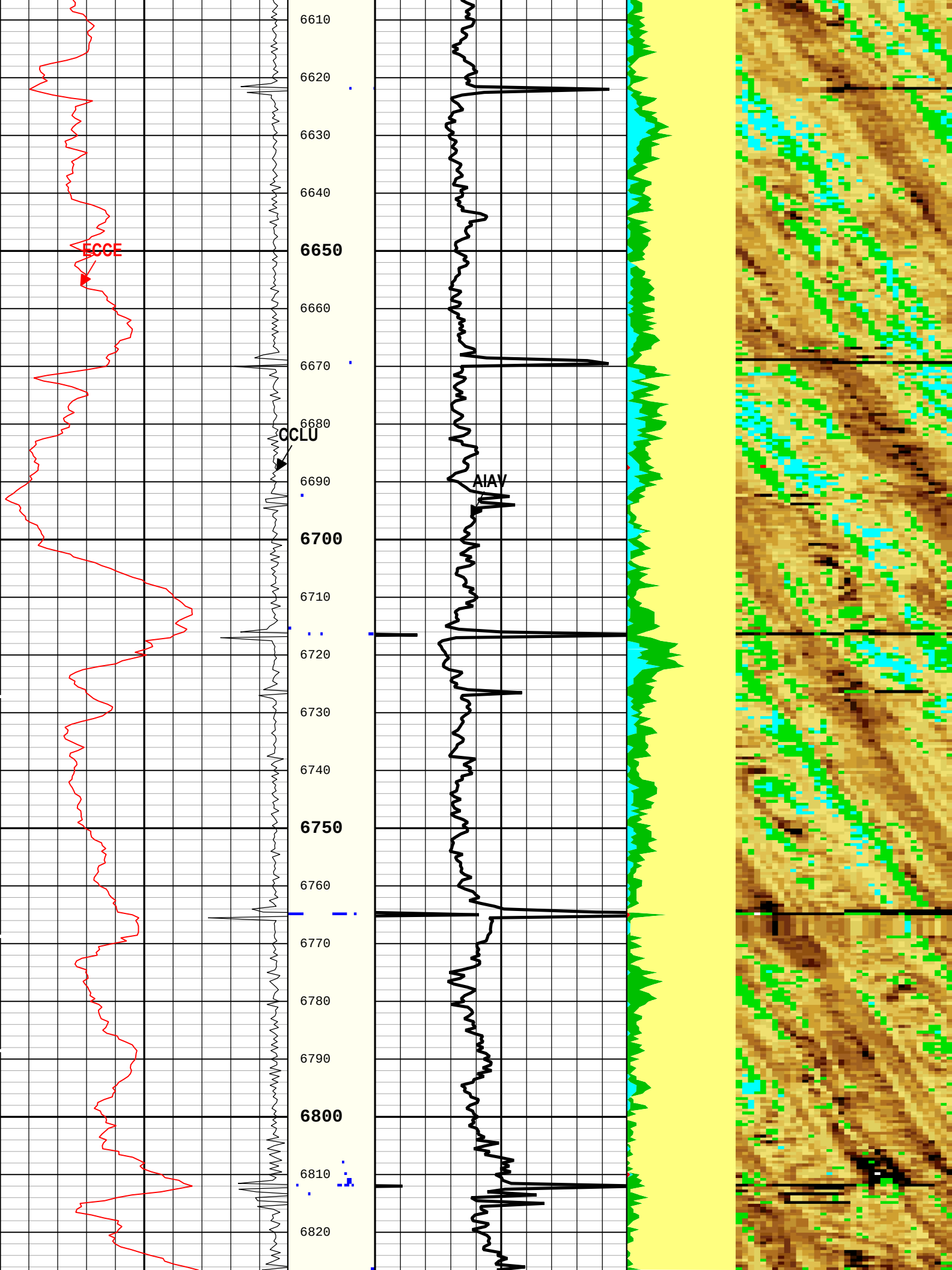
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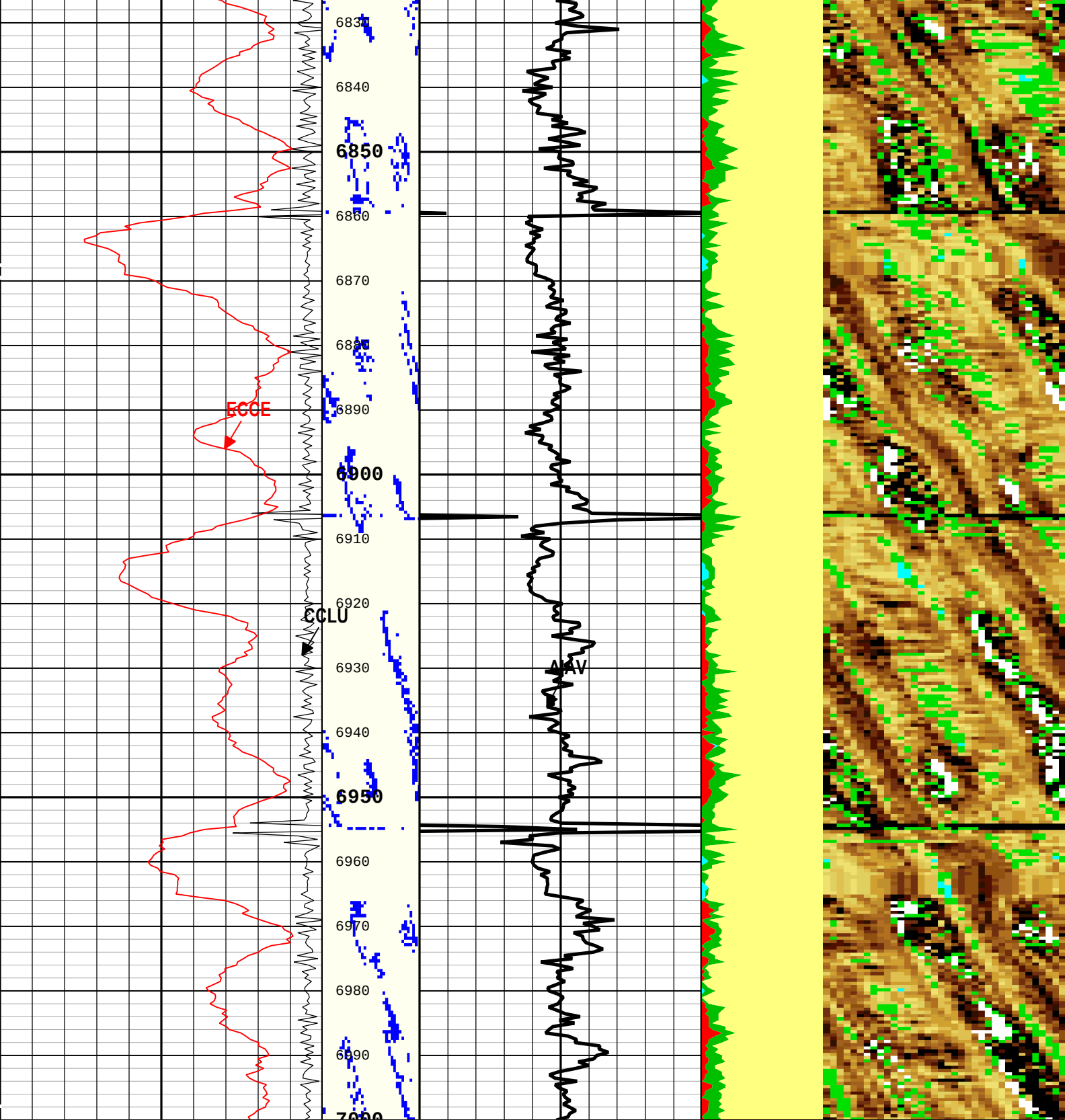


Casing Collar Locator Ultrasonic (CCLU) USIT-E

-20 in 1

Amplitude of Eccentering (ECCE) USIT-E

0 in 0.5

Absent 1.500 2.500 6.500

Explicit Normalization

USIT - USIT Processing Flags (UFLG) USIT-E

Acoustic Impedance Average (AIAV) USIT-E

0 Mrayl 10

Gas

Liquid

Micro-Debonding

Bonded

Absent -500.000 2.200 3.254 4.309 5.363 6.418 7.472

Custom Normalization

USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)

TIME_1900 - Time Marked every 60.00 (s)

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 23-Jan-2018 13:48:26

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	Depth Zoned	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.17	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.01	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	26	73	110
BS	13.5	110	2069
BS	8.5	2069	7000

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
EMXV	EMEX Voltage	USIT-E	Time Zoned	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	No	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-E	500000	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	Time Zoned	us

Time Zone Parameters

Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
EMXV	55	23-Jan-2018 11:19:00	23-Jan-2018 11:22:07	7200.89	7184.55
EMXV	75	23-Jan-2018 11:22:07	23-Jan-2018 11:58:55	7184.55	2802.44
EMXV	90	23-Jan-2018 11:58:55	23-Jan-2018 12:15:06	2802.44	73.16
WINB	31.88	23-Jan-2018 11:19:00	23-Jan-2018 11:33:05	7200.89	7132.43
WINB	18.16	23-Jan-2018 11:33:05	23-Jan-2018 12:15:06	7132.43	73.16

WINB	18.16	23-Jan-2018 11:55:05	23-Jan-2018 12:15:06	7132.43	73.16
WINE	71.88	23-Jan-2018 11:19:00	23-Jan-2018 11:33:12	7200.89	7113.78
WINE	75.71	23-Jan-2018 11:33:12	23-Jan-2018 12:15:06	7113.78	73.16

All depth are at tool zero.

One

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2018	8.0.95333.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[2]:Up	Up	1959.18 ft	2536.13 ft	23-Jan-2018 10:55:51 AM	23-Jan-2018 11:01:12 AM	ON	4.17 ft	No

All depths are referenced to toolstring zero

Log

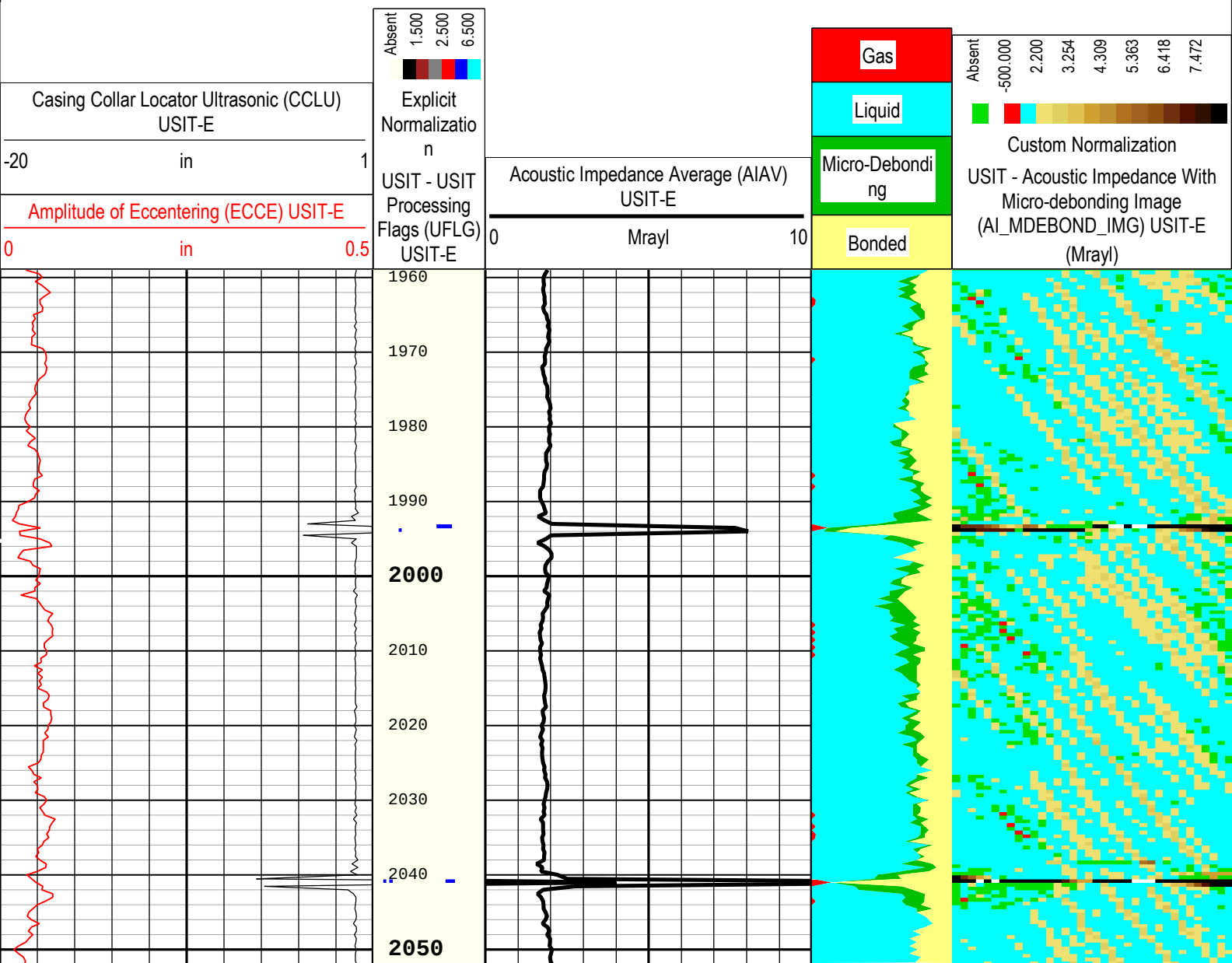
Company:Noble Energy Inc Well:Bison Ridge Y22-711

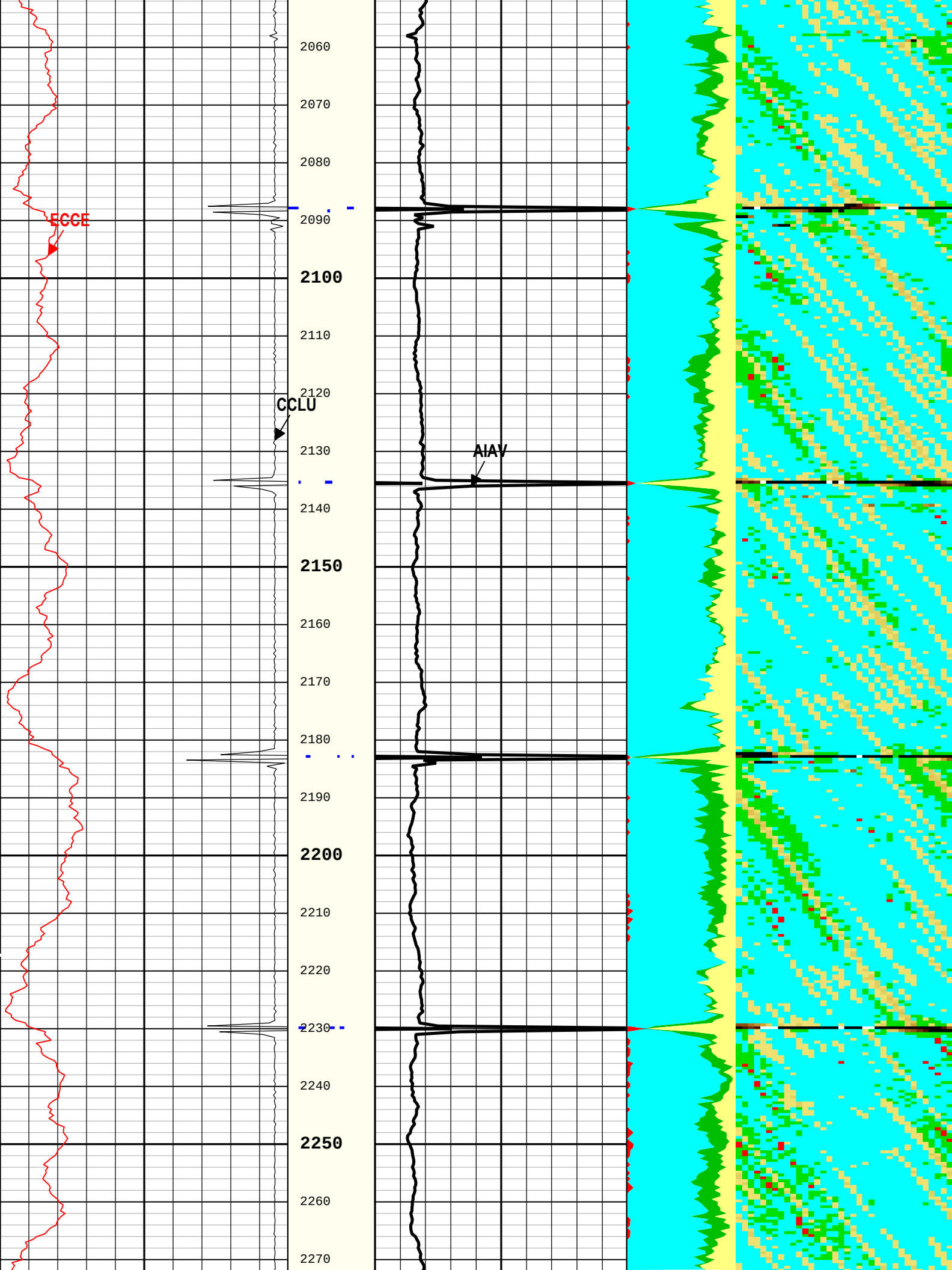
One: Log[2]:Up:S005

Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

Creation Date: 23-Jan-2018 13:48:33

TIME_1900 - Time Marked every 60.00 (s)

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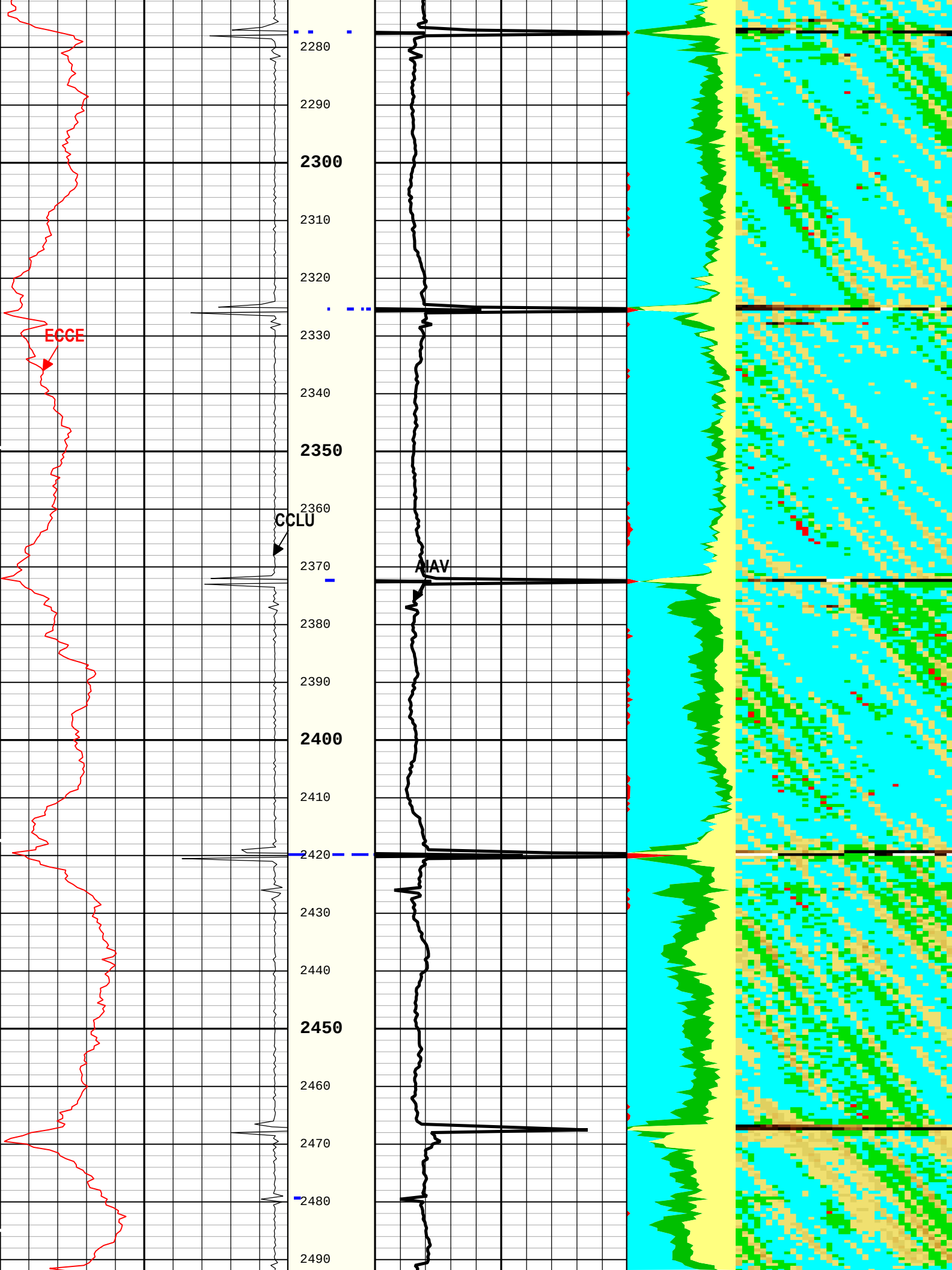
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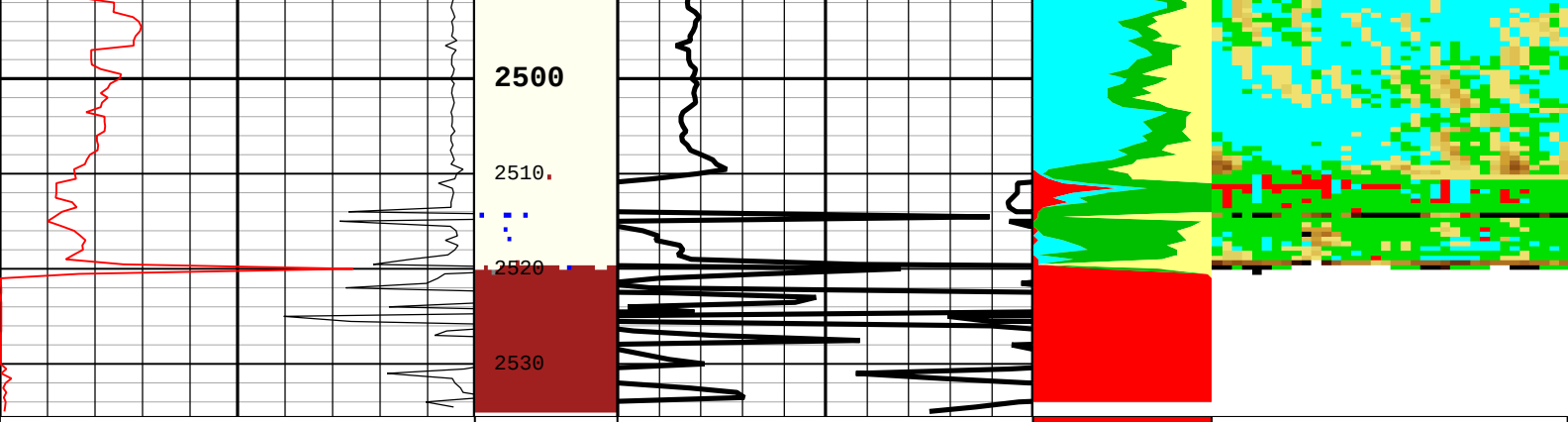


Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 23-Jan-2018 13:48:33

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	Depth Zoned	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.17	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.01	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	FreePipe Norm.	
ZMUD	Acoustic Impedance of Mud	Borehole	1.48	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	13.5	1959	2069
BS	8.5	2069	2535.5

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
EMXV	EMEX Voltage	USIT-E	Time Zoned	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	No	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-E	500000	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in LF	
WINB	Window Begin Time	USIT-E	Time Zoned	us
WINE	Window End Time	USIT-E	71.88	us

Time Zone Parameters

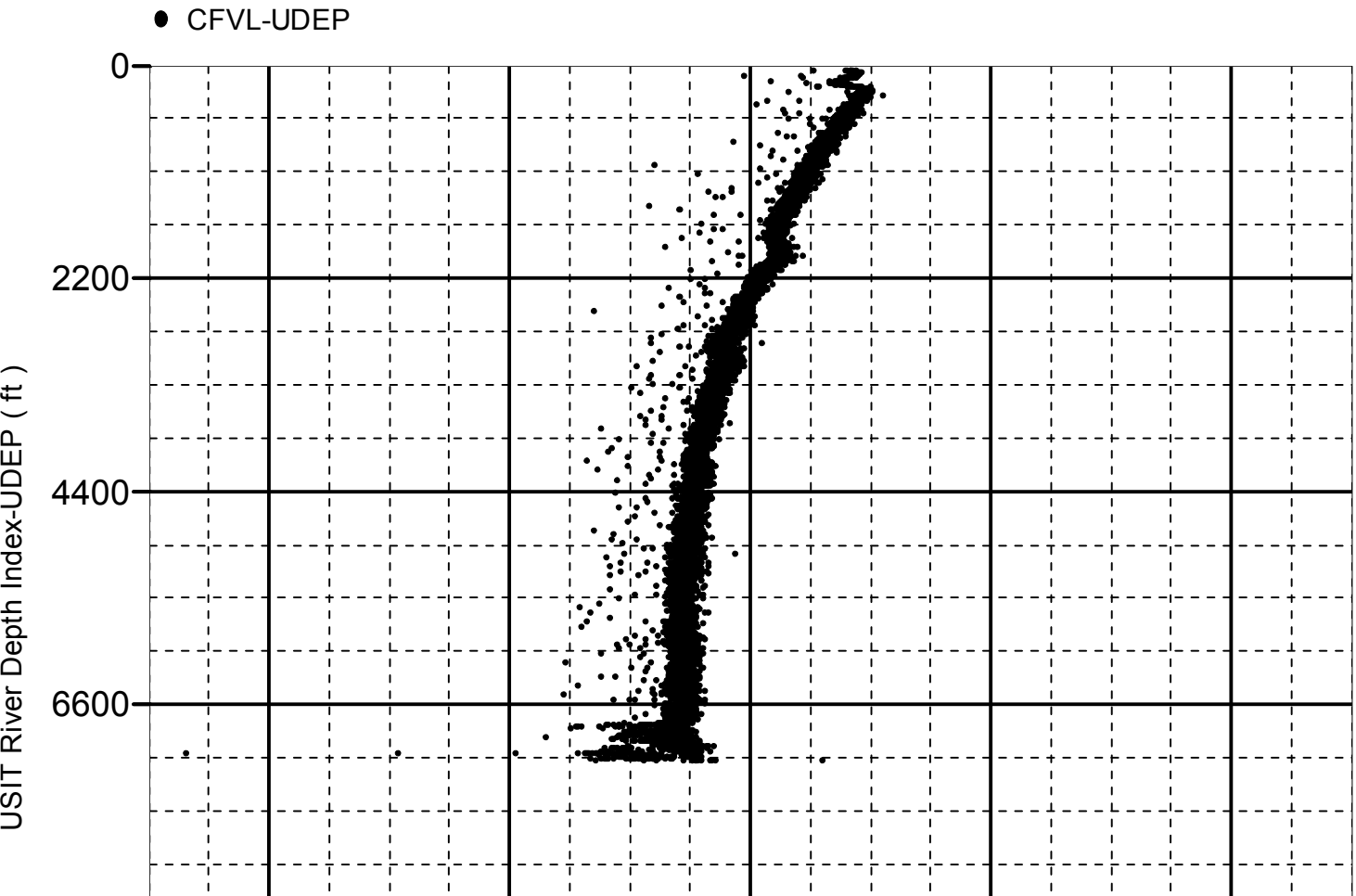
Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
EMXV	45	23-Jan-2018 10:55:51	23-Jan-2018 10:57:55	2536.12	2422.16
EMXV	55	23-Jan-2018 10:57:55	23-Jan-2018 11:01:12	2422.16	1959.18
WINB	31.88	23-Jan-2018 10:55:51	23-Jan-2018 10:57:03	2536.12	2480.5
WINB	16.62	23-Jan-2018 10:57:03	23-Jan-2018 11:01:12	2480.5	1959.18

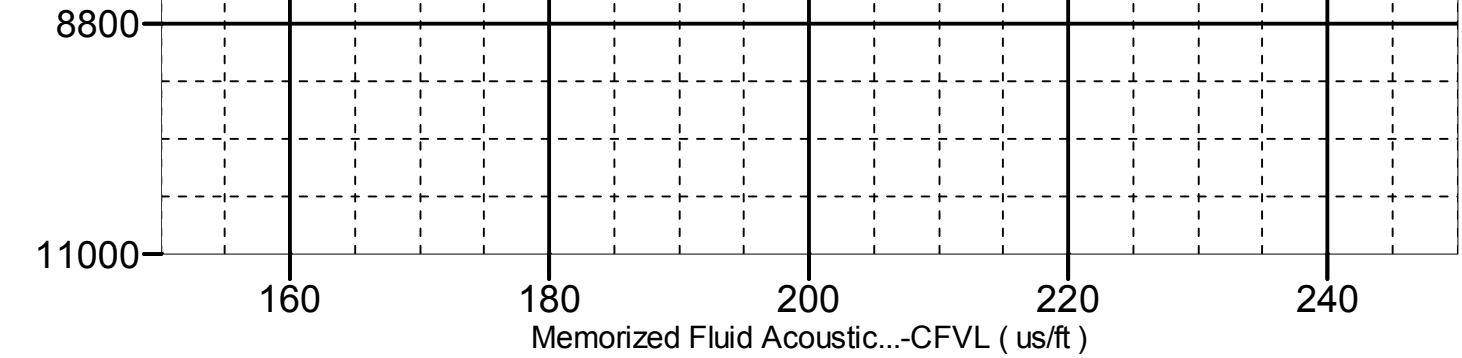
All depth are at tool zero.

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 7200.50 to 73.00 ft





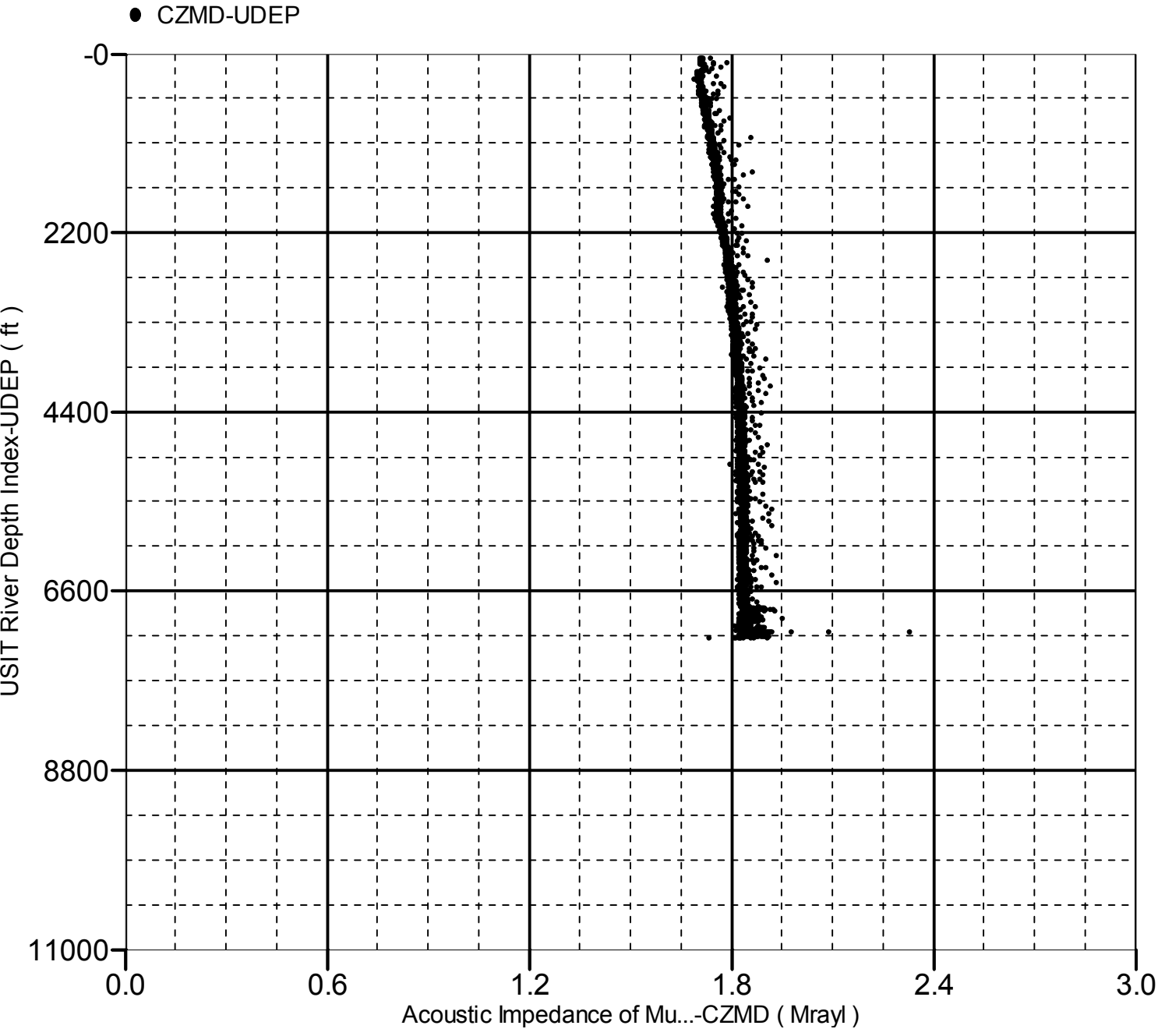
XYZ

Company:Noble Energy Inc Well:Bison Ridge Y22-711
One: Log[4]:Up:S005

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 7200.50 to 73.00 ft



Company:	Noble Energy Inc
Well:	Bison Ridge Y22-711
Field:	Wattenberg
County:	Weld
Country:	US

Schlumberger

UltraSonic Summary Print