Schlumberger

Company: Noble Energy Inc

Well: Lapp A22-689

Field: Wattenberg

County: Weld Country: US

UltraSonic Summary Print

County: Weld
Field: Wattenberg
Location: SHL: SWSW S13, T6N, R64W
Well: Lapp A22-689
Company: Noble Energy Inc

Location:				
SHL: SWSW S13, T6N, R64W		Elev.:	K.B.	4727.00 ft
70' FNL & 535' FWL			G.L.	4697.00 ft
LAT: 40.48094 / LONG: -104.50639			D.F.	4727.00 ft
Permanent Datum:	Ground Level	Elev.:	4697.00 f	
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

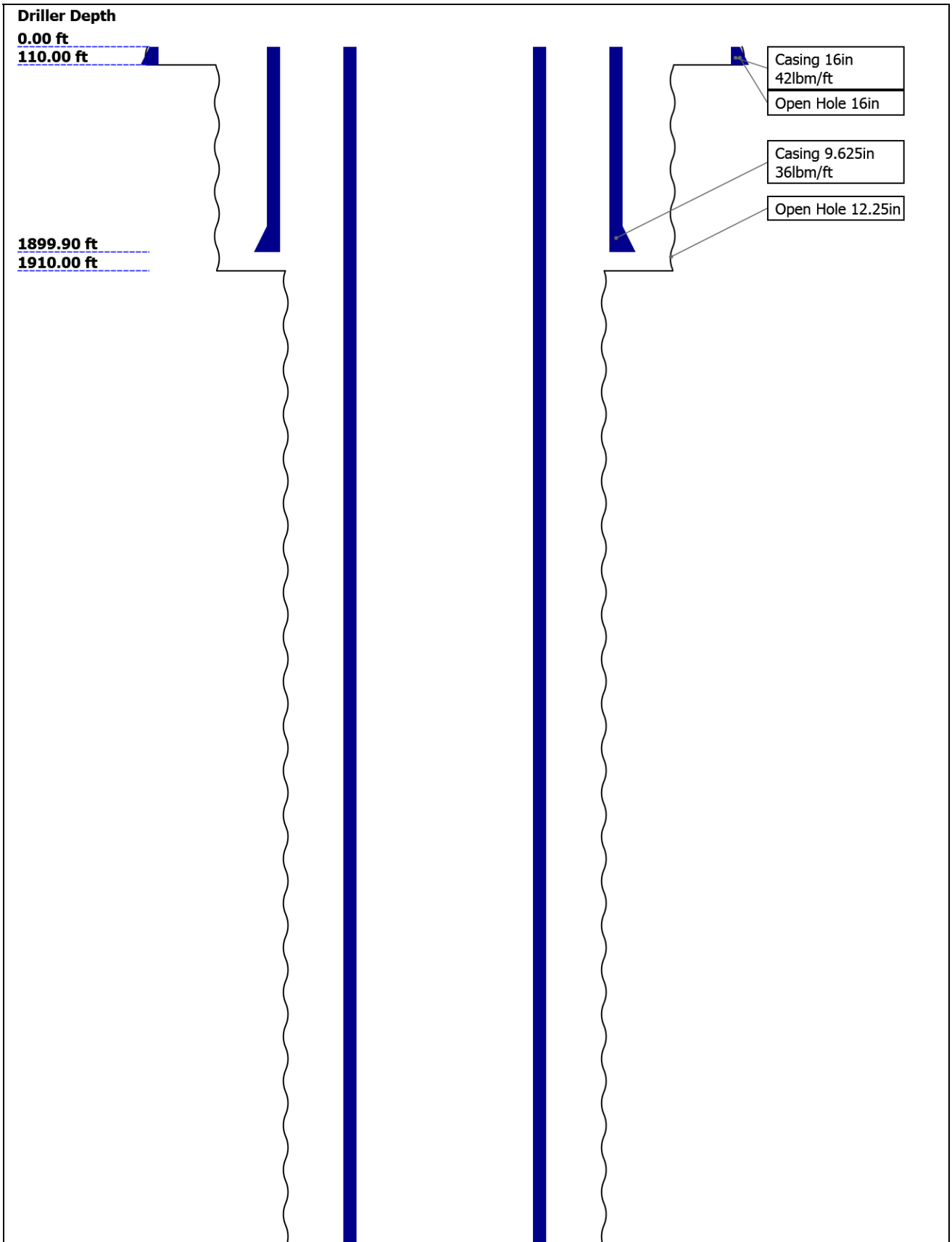
API Serial No.	Max.Hole Deviation	Longitude:	Latitude:
05-123-42821		-104.50640 degrees	40.480940 degrees

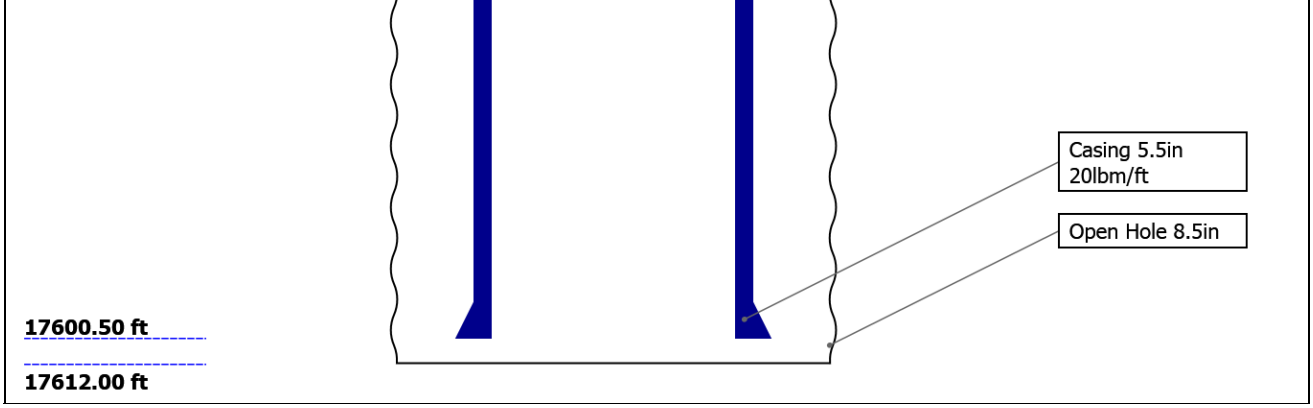
Logging Date			12-Sep-2016			
Run Number			One			
Depth Driller			17612.00 ft			
Schlumberger Depth			6200.00 ft			
Bottom Log Interval			6200.00 ft			
Top Log Interval			70.00 ft			
Casing Driller Size @ Depth			5.5 in @ 17600.50 ft			
Casing Schlumberger			17600.5 ft			
Bit Size			8.5 in			
Type Fluid In Hole			Water			
MUD	Density	Viscosity	8.8 lbm/gal	26 s		
	Fluid Loss	PH				
	Source of Sample		Active Tank			
RM @ Meas Temp			0.2 ohm.m @ 68 degF			
RMF @ Meas Temp			0.15 ohm.m @ 68 degF			
RMC @ Meas Temp						
Source RMF	RMC			Pressed		
RM @ BHT	RMF @ BHT		0.07 @ 217	0.05 @ 217		
Max Recorded Temperatures			217 degF			
Circulation Stopped	Time					
Logger on Bottom	Time		12-Sep-2016	08:30:00		
Unit Number	Location:		2161	Fort Morgan, CO		
Recorded By			Benjamin Marmon			
Witnessed By			Bill Mansfield			

Disclaimer

Contents

Well Sketch





Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	16	12.25	8.5			
Top Driller (ft)	0	110	1910			
Top Logger (ft)	0	110	1910			
Bottom Driller (ft)	110	1910	17612			
Bottom Logger (ft)	110	1910	6200			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	42	36	20			
Inner Diameter (in)	15.512	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	1899.9	17600.5			
Bottom Logger (ft)	110	1899.9	17600.5			

Operational Run Summary

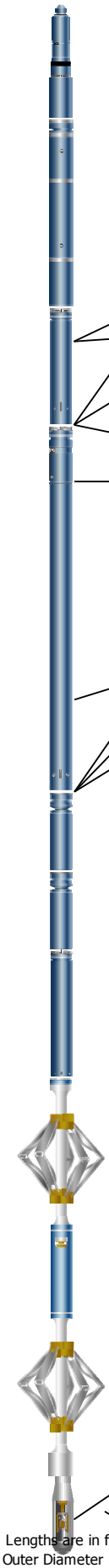
Parameter (unit)	One					
Date Log Started	12-Sep-2016					
Time Log Started	13:50:55					
Date Log Finished	12-Sep-2016					
Time Log Finished	15:22:08					
Top Log Interval (ft)						
Bottom Log Interval (ft)						
Total Depth (ft)						
Max Hole Deviation (deg)						
Azimuth of Max Deviation (deg)						
Bit Size (in)	8.500					
Logging Unit Number	2161					
Logging Unit Location	Fort Morgan, CO					
Recorded By	Benjamin Marmon					

Witnessed By	Bill Mansfield					
Service Order Number	D5ND-00125					

Remarks and Equipment Summary

One: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	**39.74**		
LEH-QT			
SAH-F:1817	**36.82**		
DTC-H	**31.97**	**CTEM**	**31.07**
ECH-KC		**HV**	**0.00**
DTC-H		**TelStatus**	**28.97**
		ToolStatus	**28.97**
HGNS-H:4865	**28.97**	**Temperature**	**28.94**
HGNH:4817		**GR**	**28.23**
NPV-N			
NSR-F:5068			
HGNS-H:4865			
HMCA-H			
HACCZ-H:6991			
		CNL Porosity	**21.89**
		HMCA	**19.56**
		HGNS	**19.56**
		Accelerometer	**0.00**
AH-184[2]:2829	**19.56**		
AH-184[1]:2745	**17.56**		
USIT-E:984	**15.56**		
ECH-MFA:1959			
USAC-A:984			
USIS-A:758			
USSC-B:777			
USRS-A:982			
USI-SENSOR			
		USI Sensor Head Tension	**0.37**



Lengths are in ft
Maximum Outer Diameter = 3.875 in

One: Remarks

This is the frist log in the well.

Toolstring ran as per toolsketch.

BHT: 217 degF

Expected TOC: 1606'

Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type	7-39 PLXS		
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	7-39P-LXS		
Serial Number			
Length	14000.00 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 procedures followed during logging operations.
Rig Up Length At Surface		IDW used as primart depth control device.
Rig Up Length At Bottom		Z-Chart used as secondary 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	6613.07	68.7

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 : 26.26m(86.17ft) to 37.44m(122.84ft)
MUD_N_FRP = 1.14
DFD = 1.05g/cm3(8.80lbm/gal)
CZMD median computed in free pipe normalization interval = 1.80 MRayl

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

One

2500 PSI Main Pass

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.64464.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	68.70 ft	6613.07 ft	12-Sep-2016 2:38:24 PM	12-Sep-2016 3:20:53 PM	ON	7.81 ft	No

All depths are referenced to toolstring zero

Log

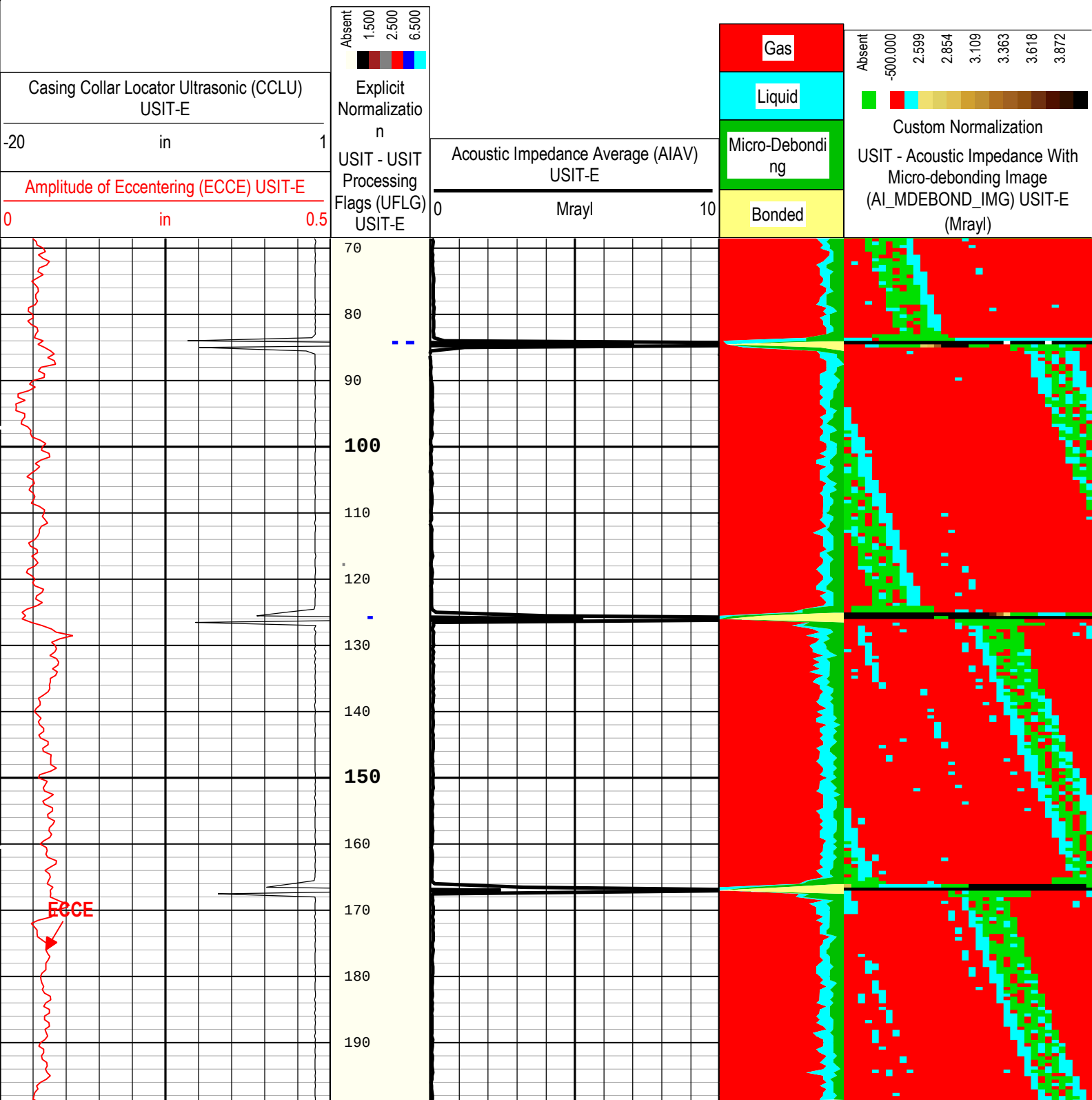
Company:Noble Energy Inc Well:Lapp A22-689

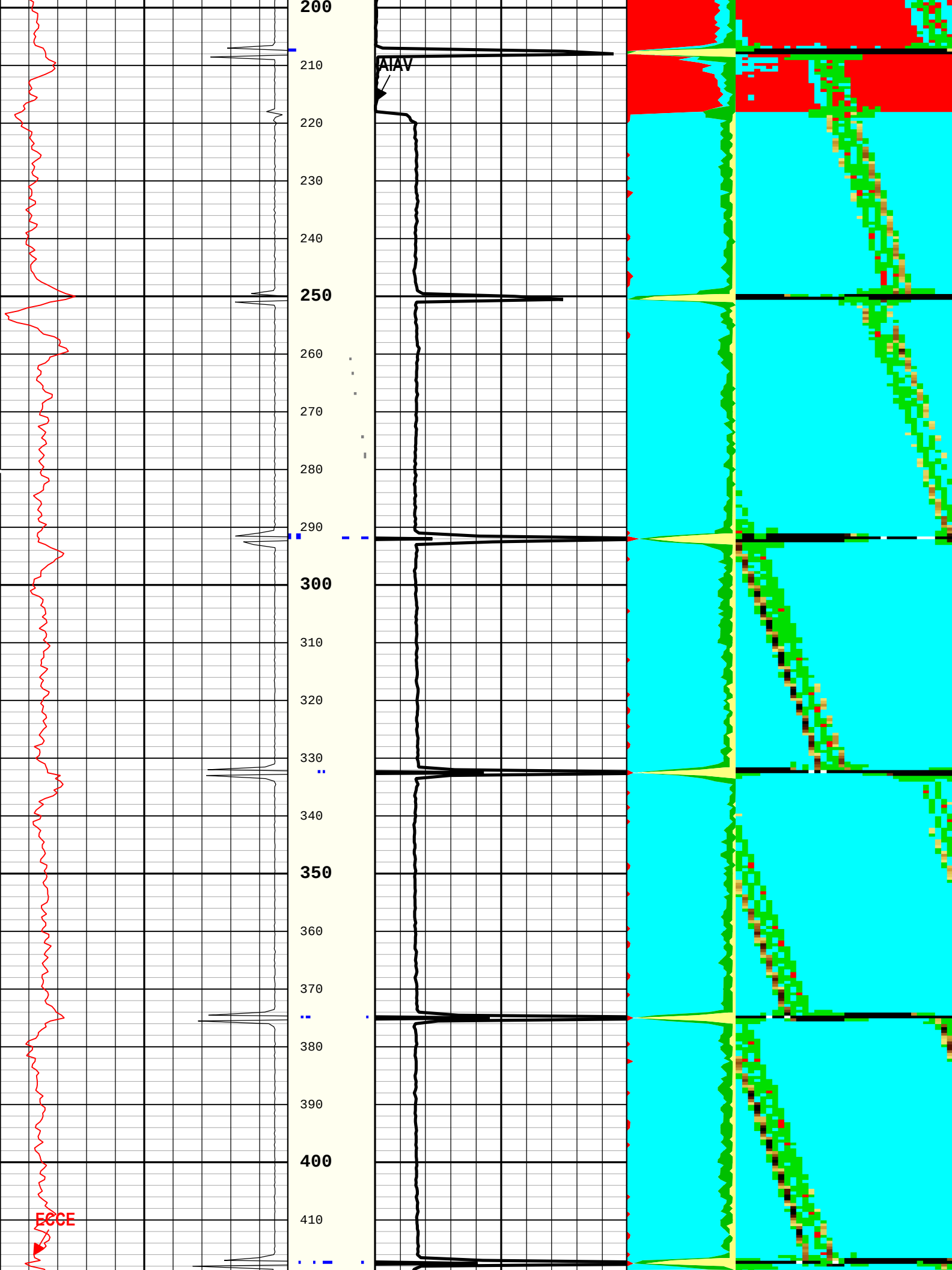
One: Log[4]:Up:S006

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: 12-Sep-2016 15:52:56

TIME_1900 - Time Marked every 60.00 (s)

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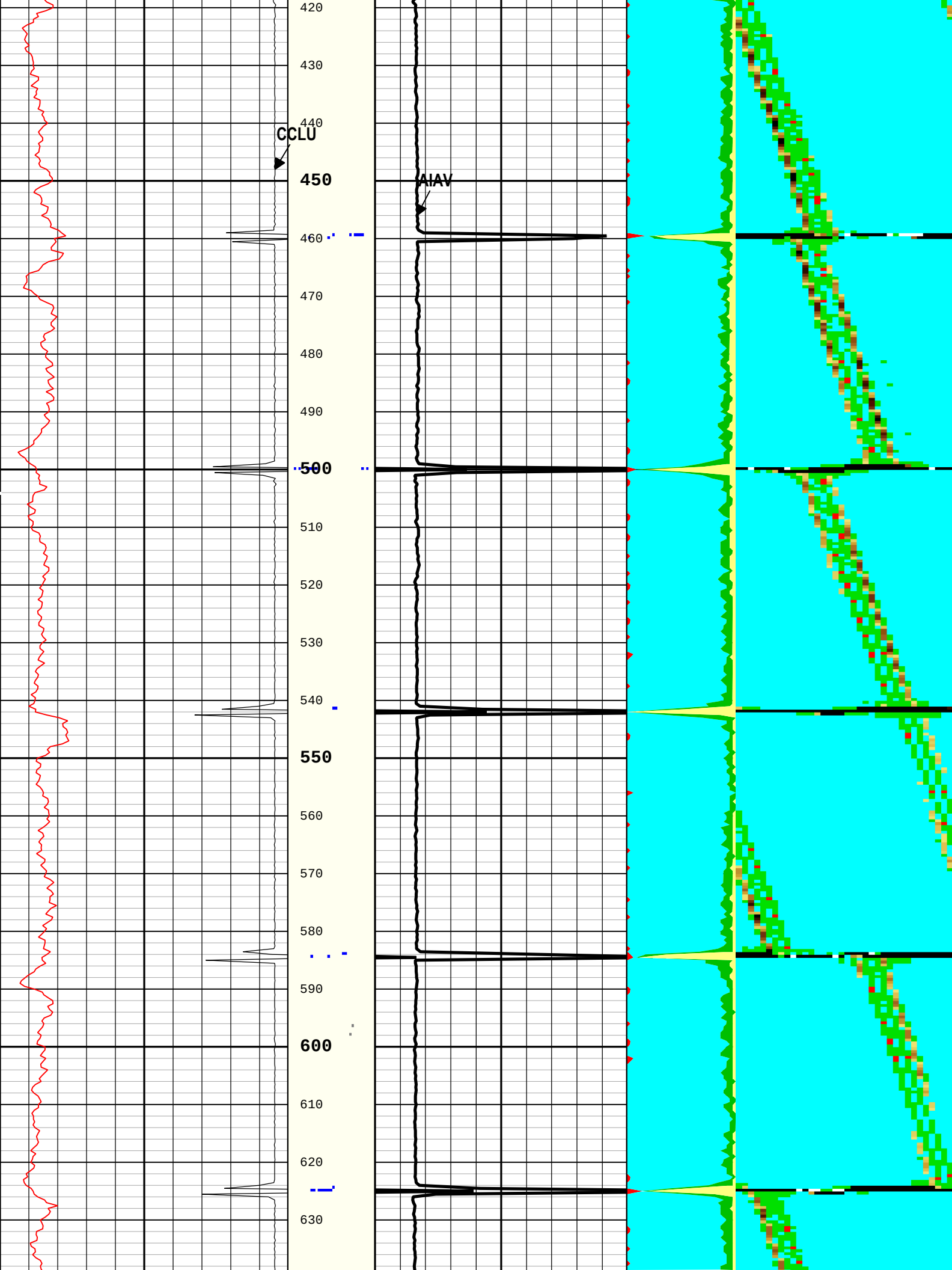
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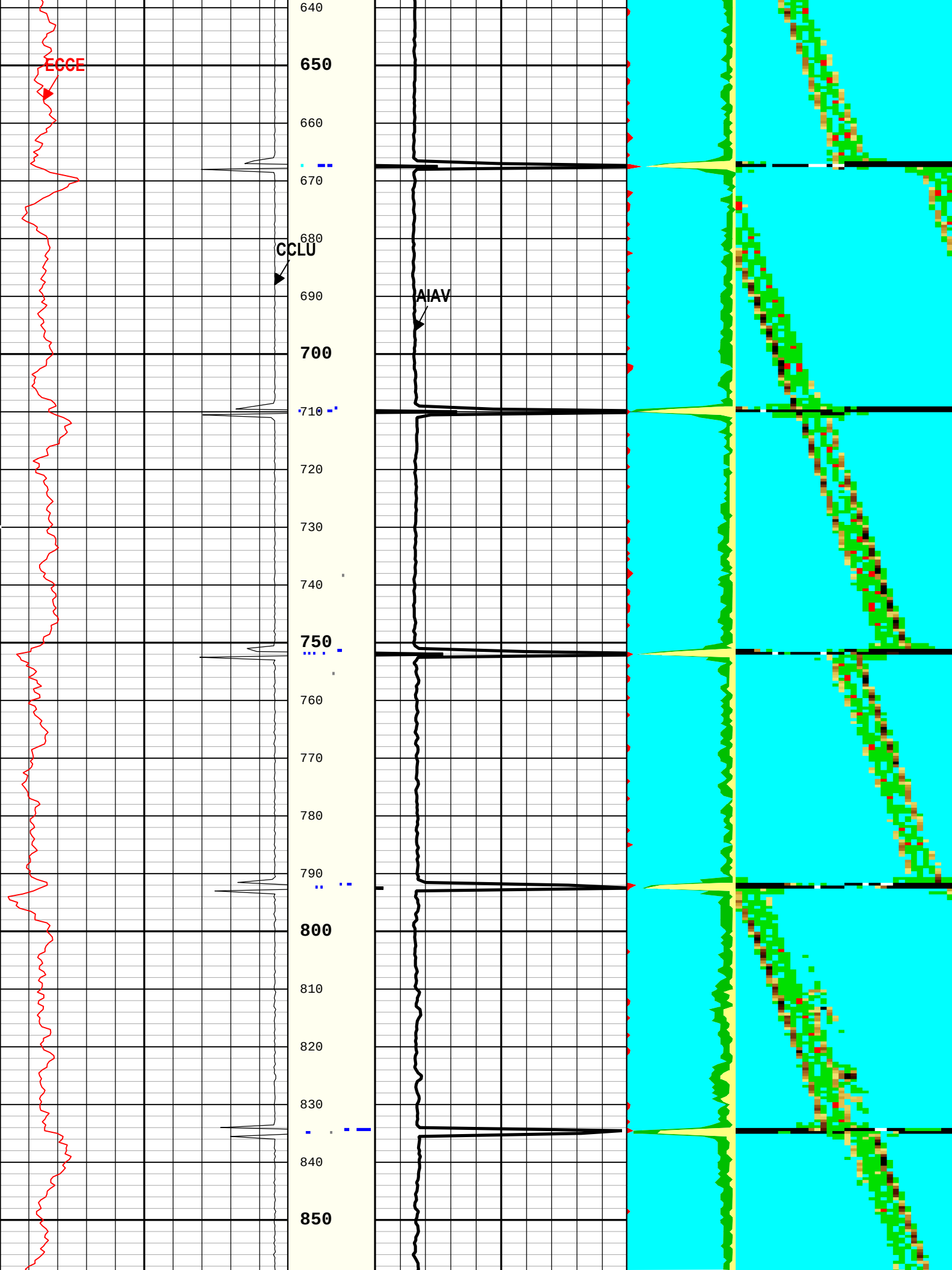
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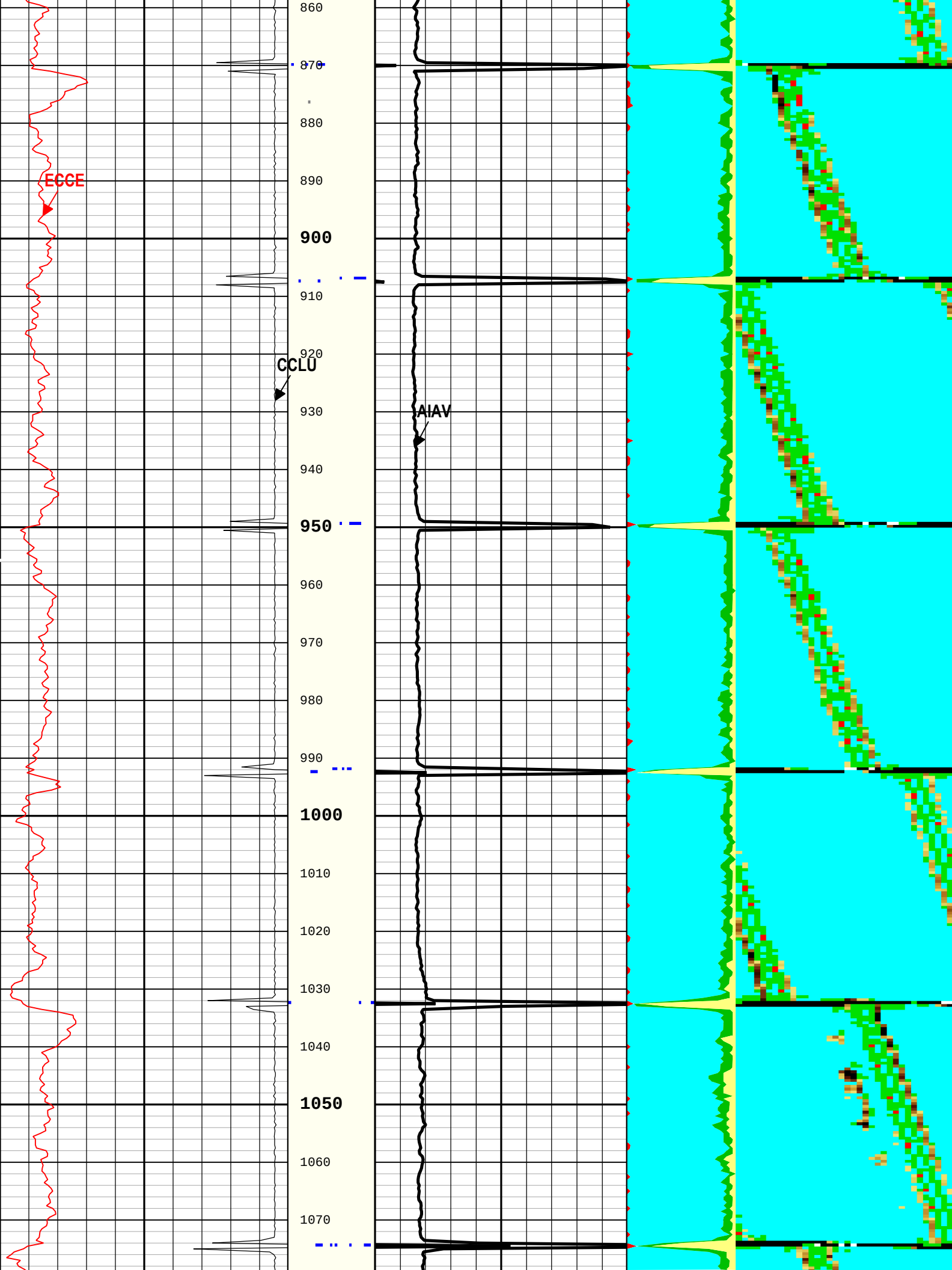
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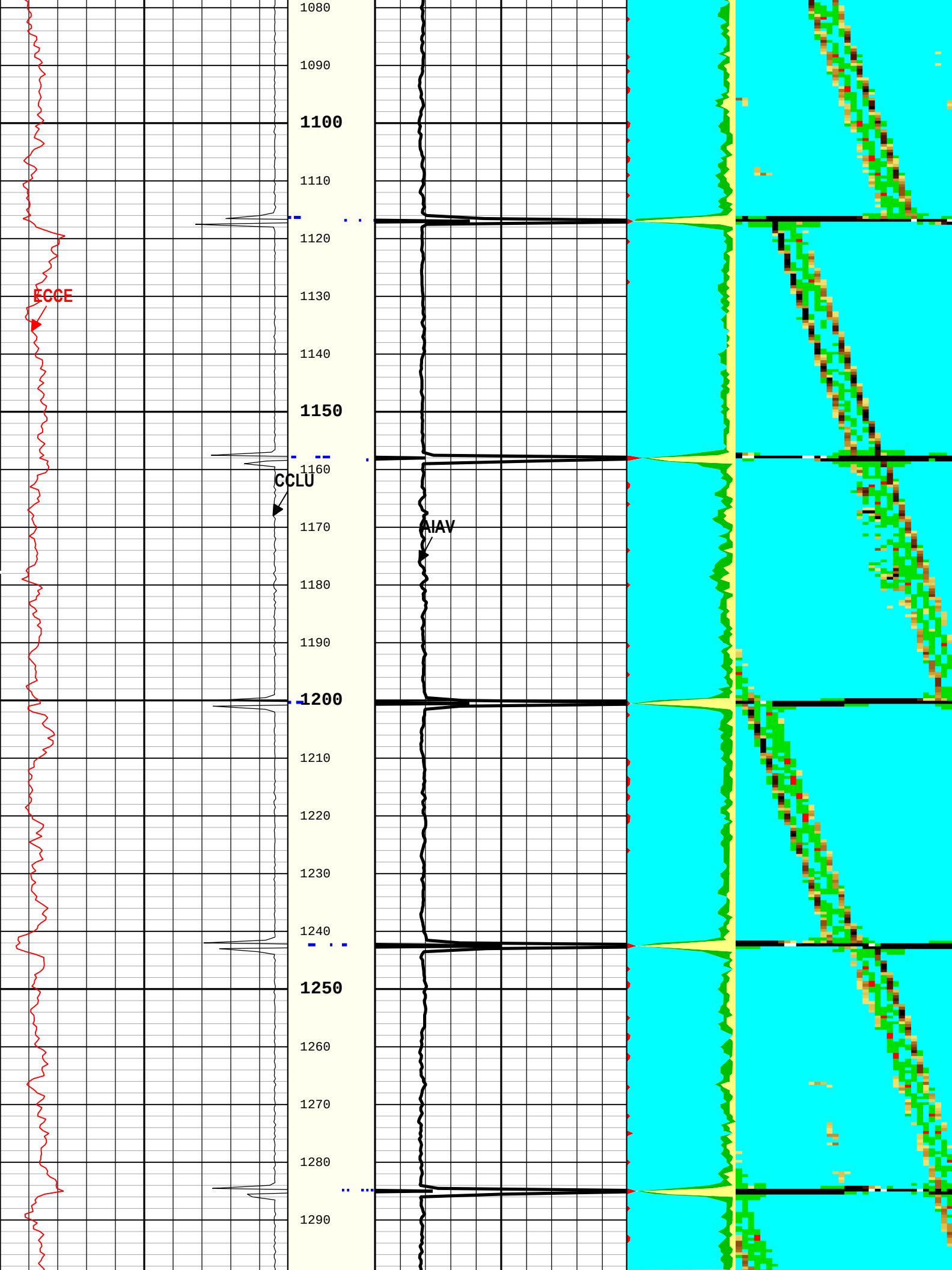
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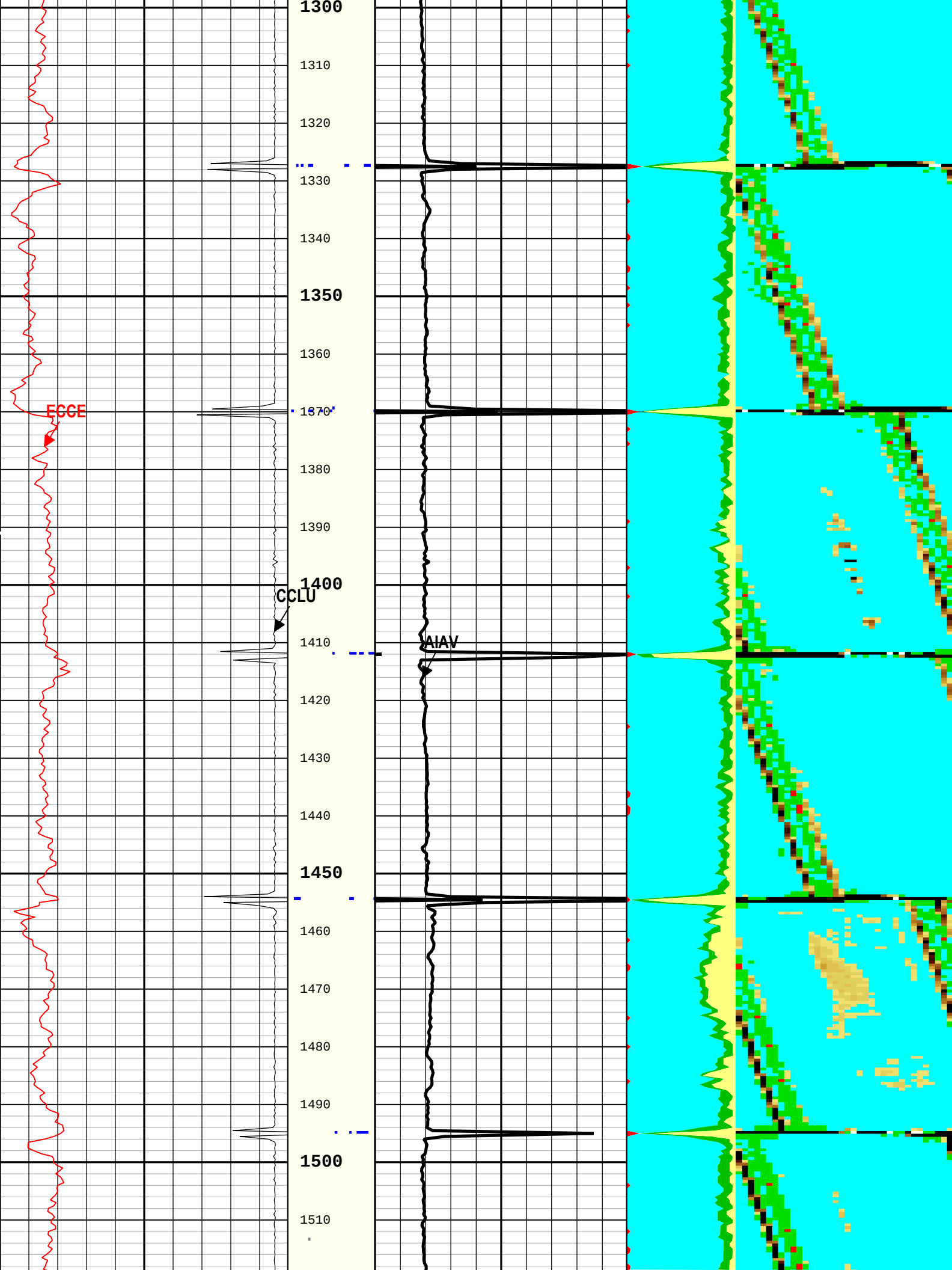
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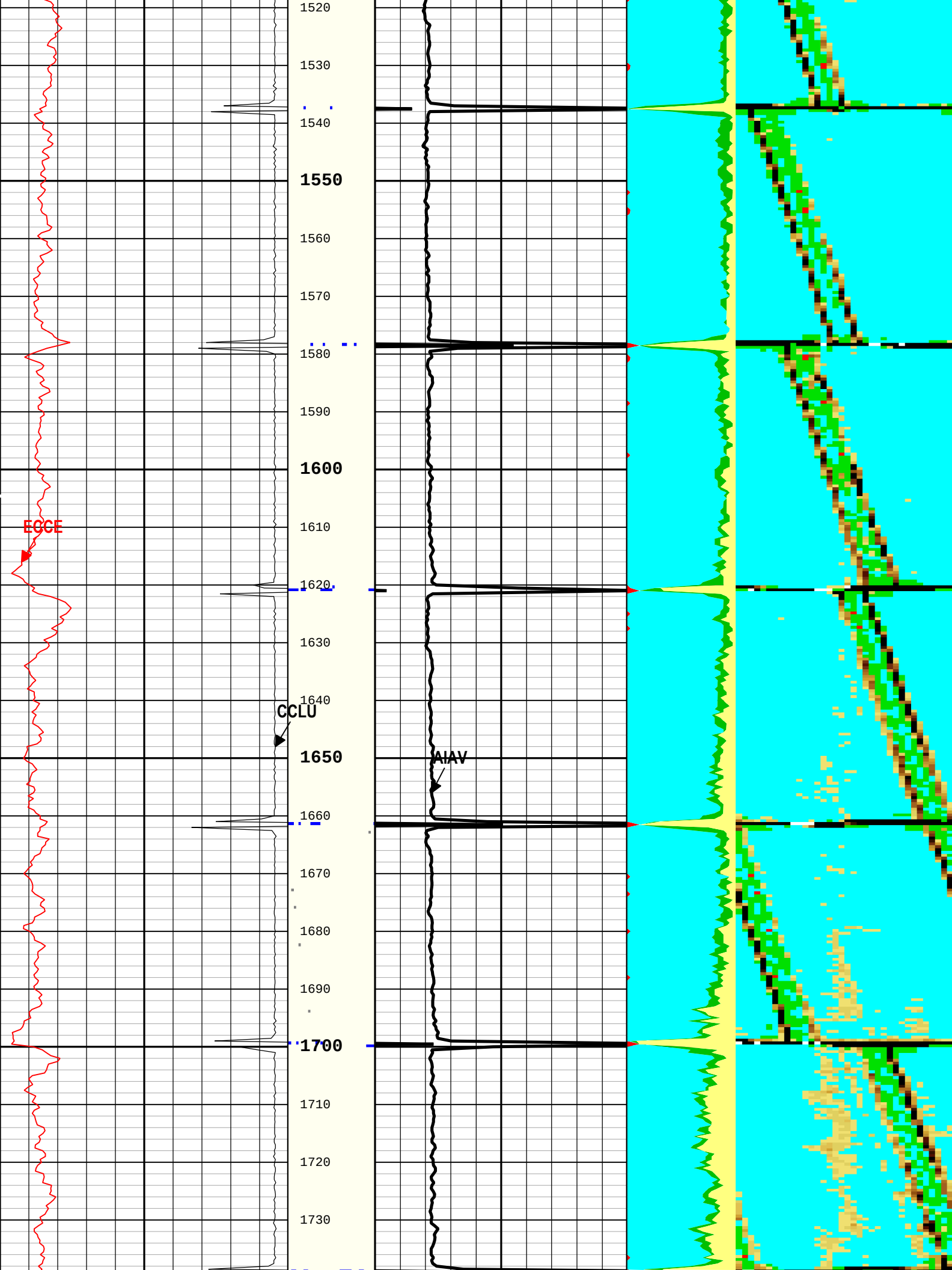
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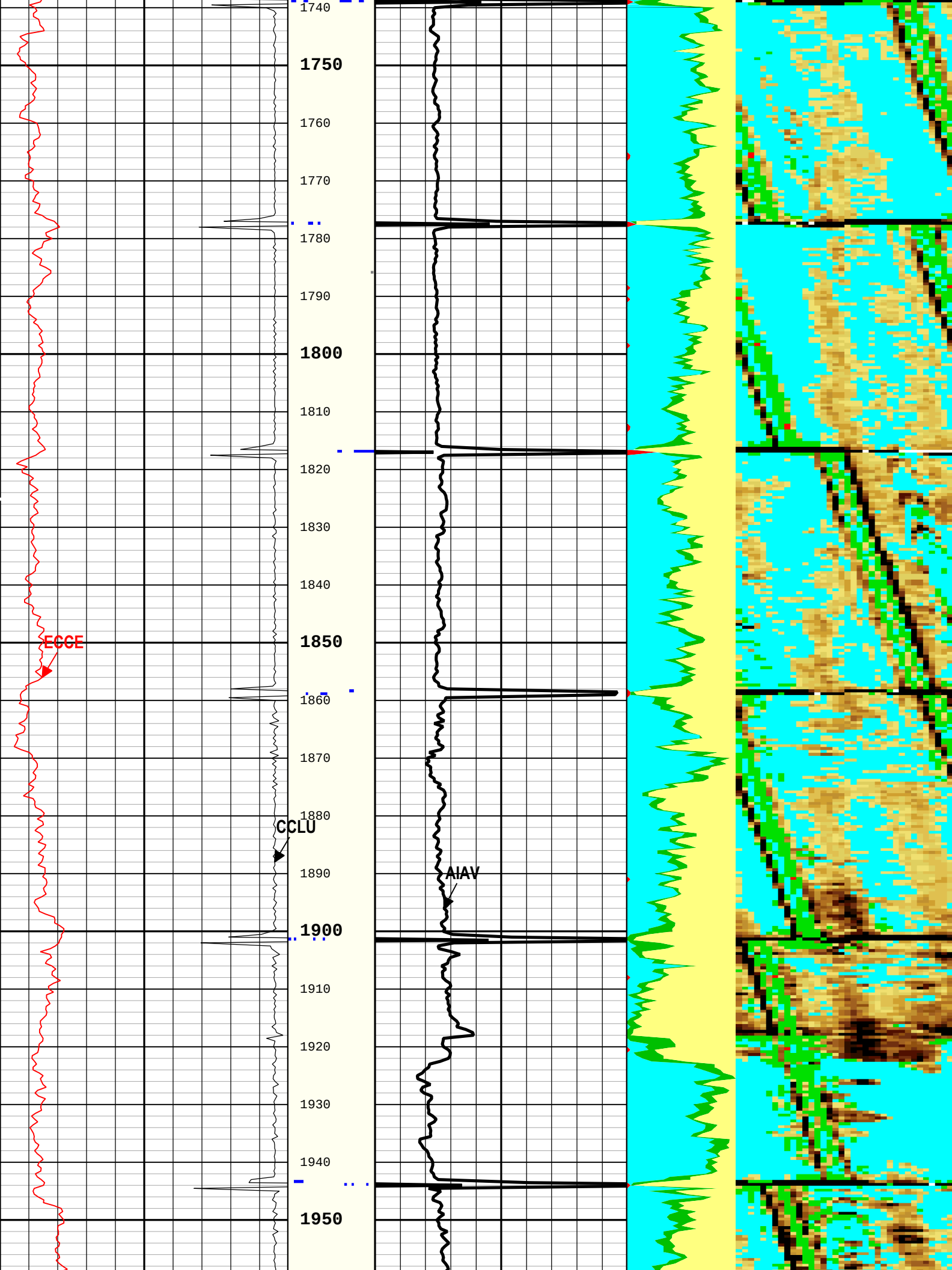
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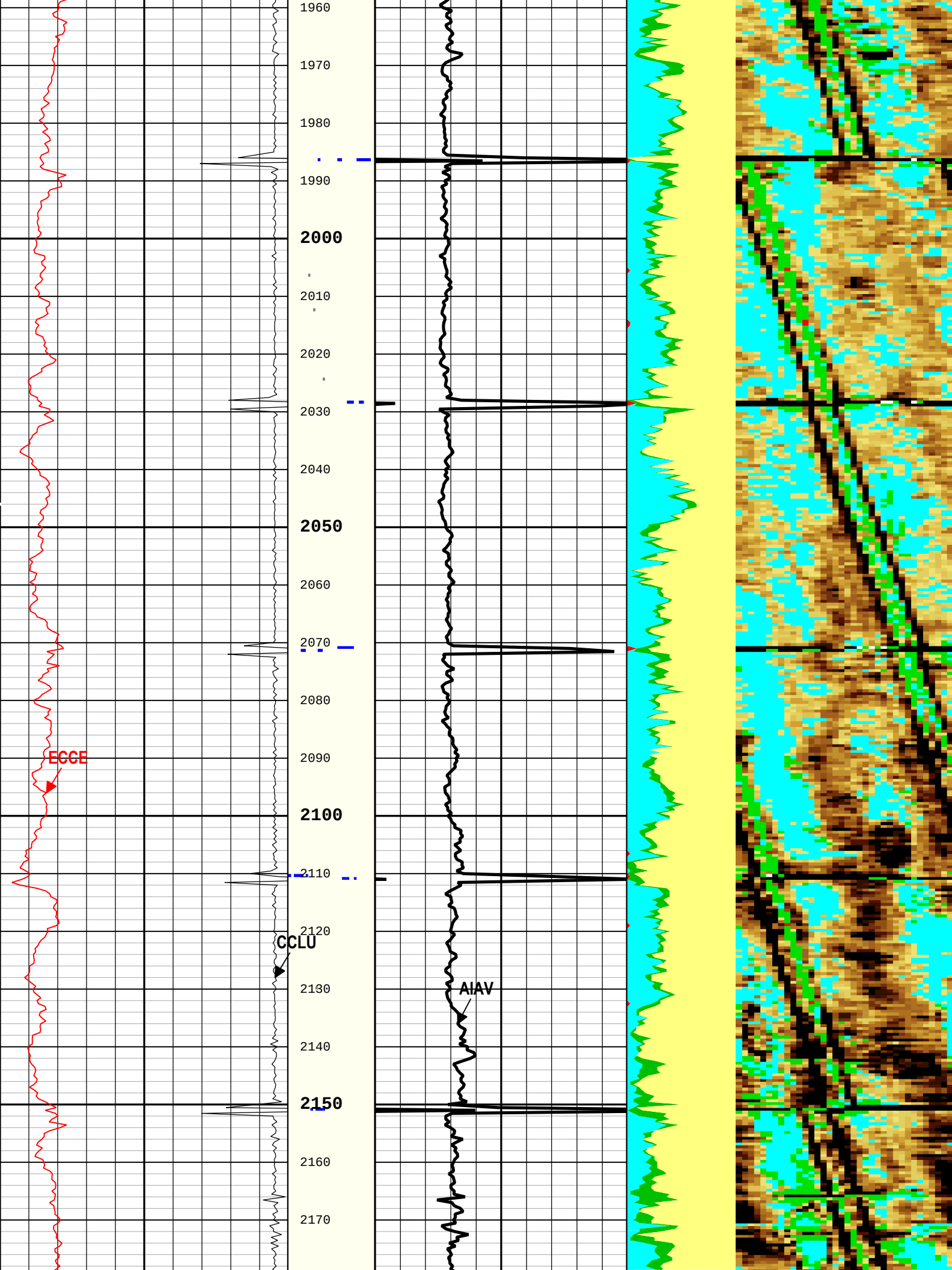
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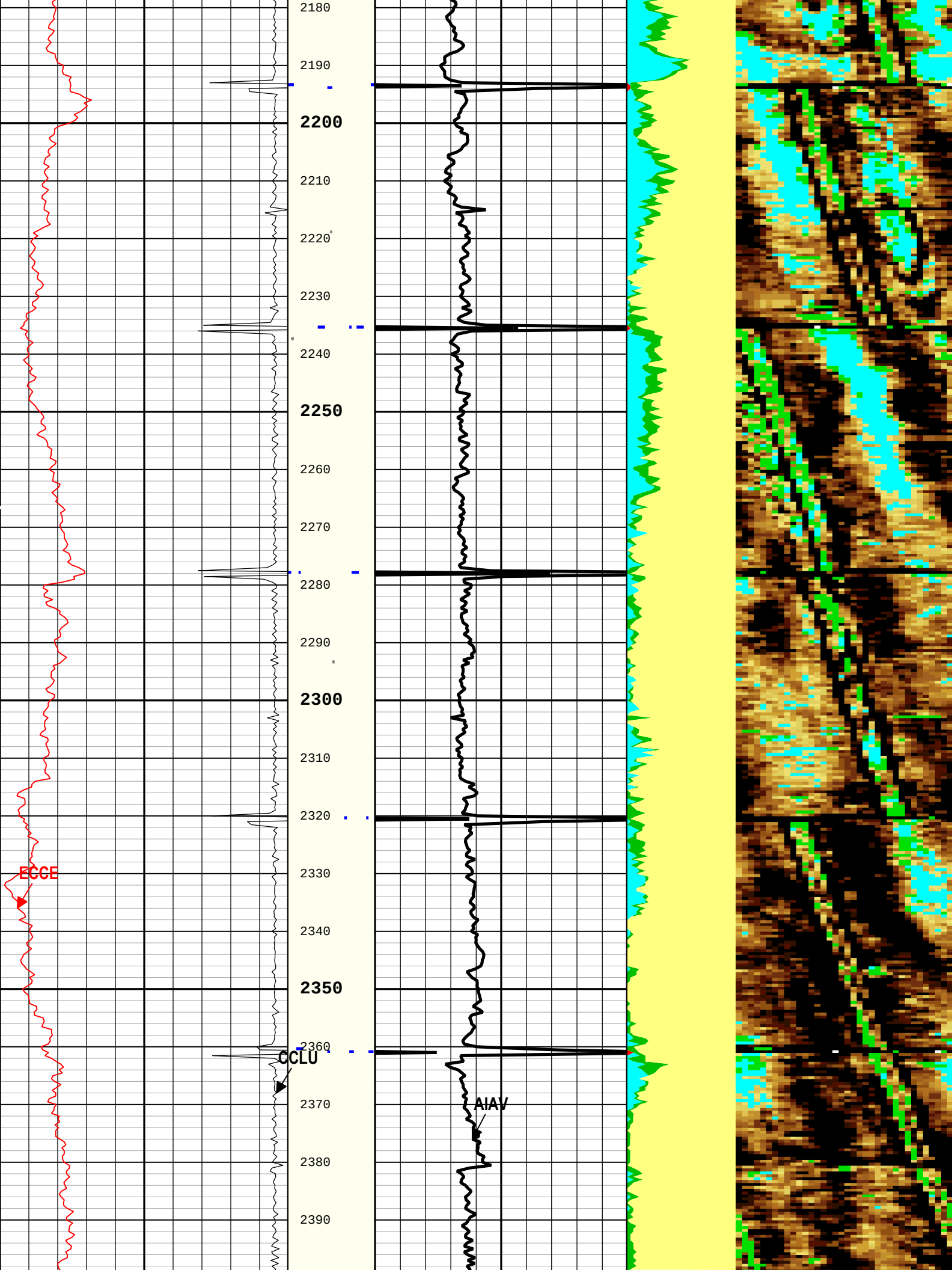
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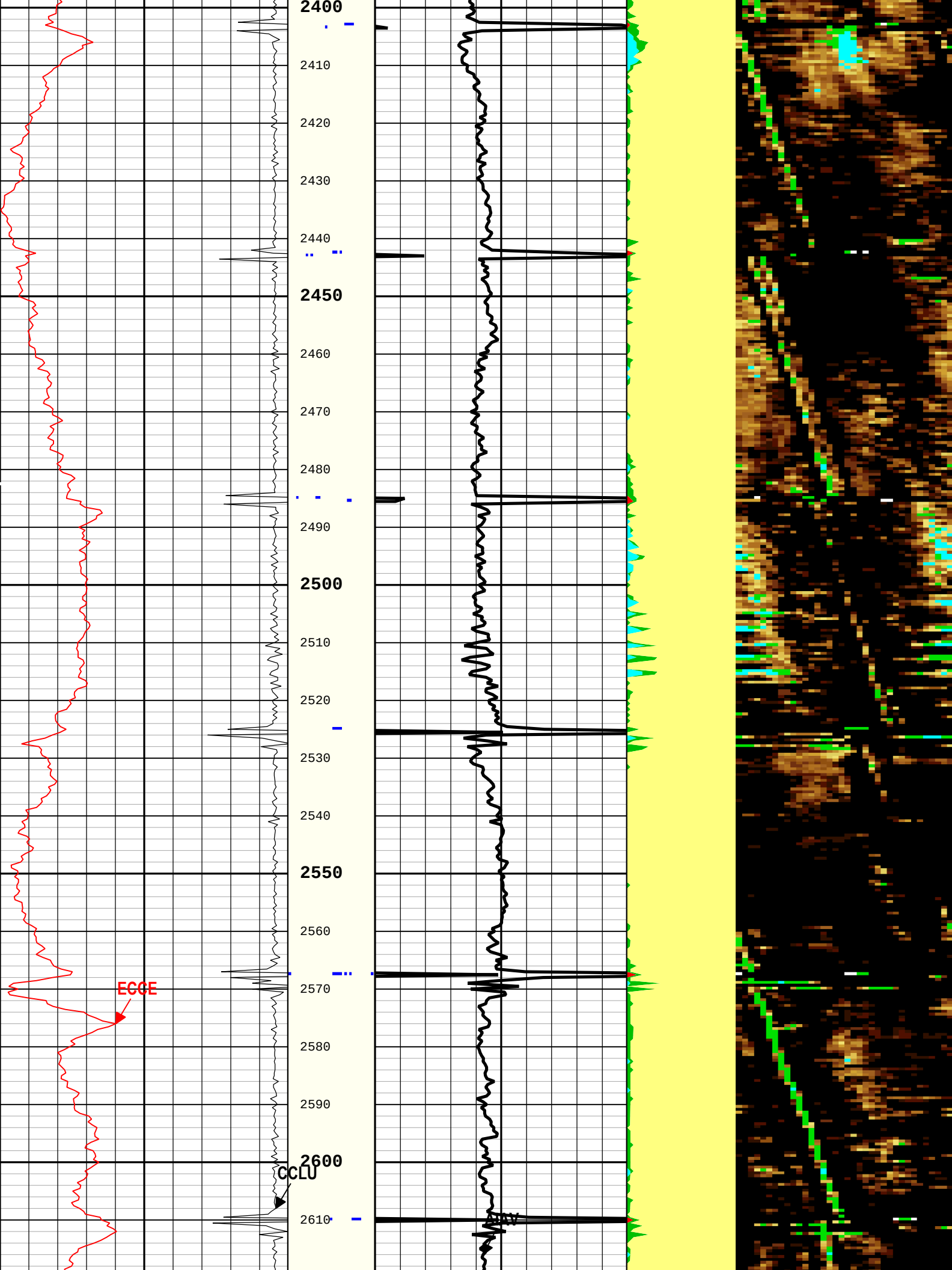
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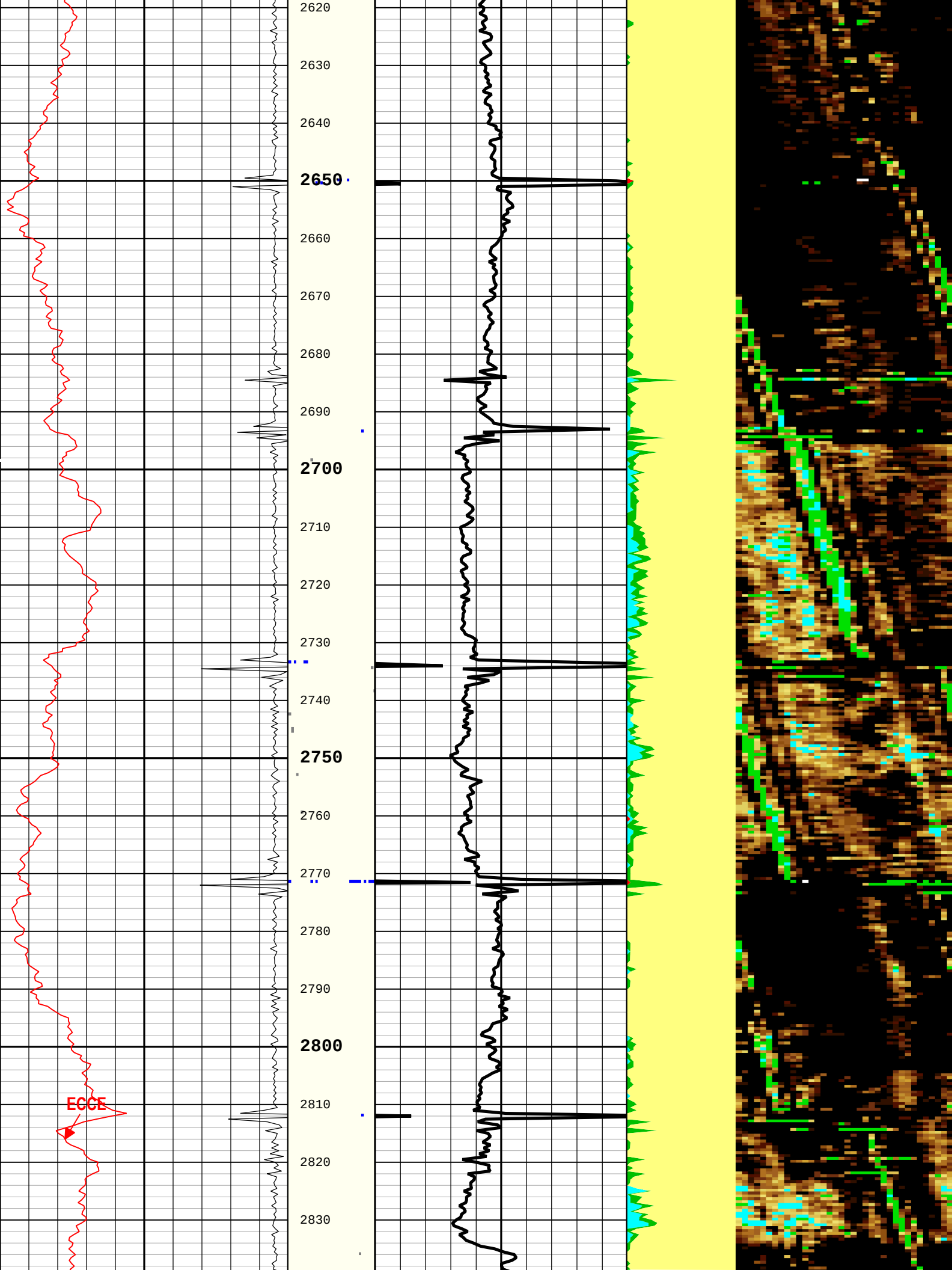
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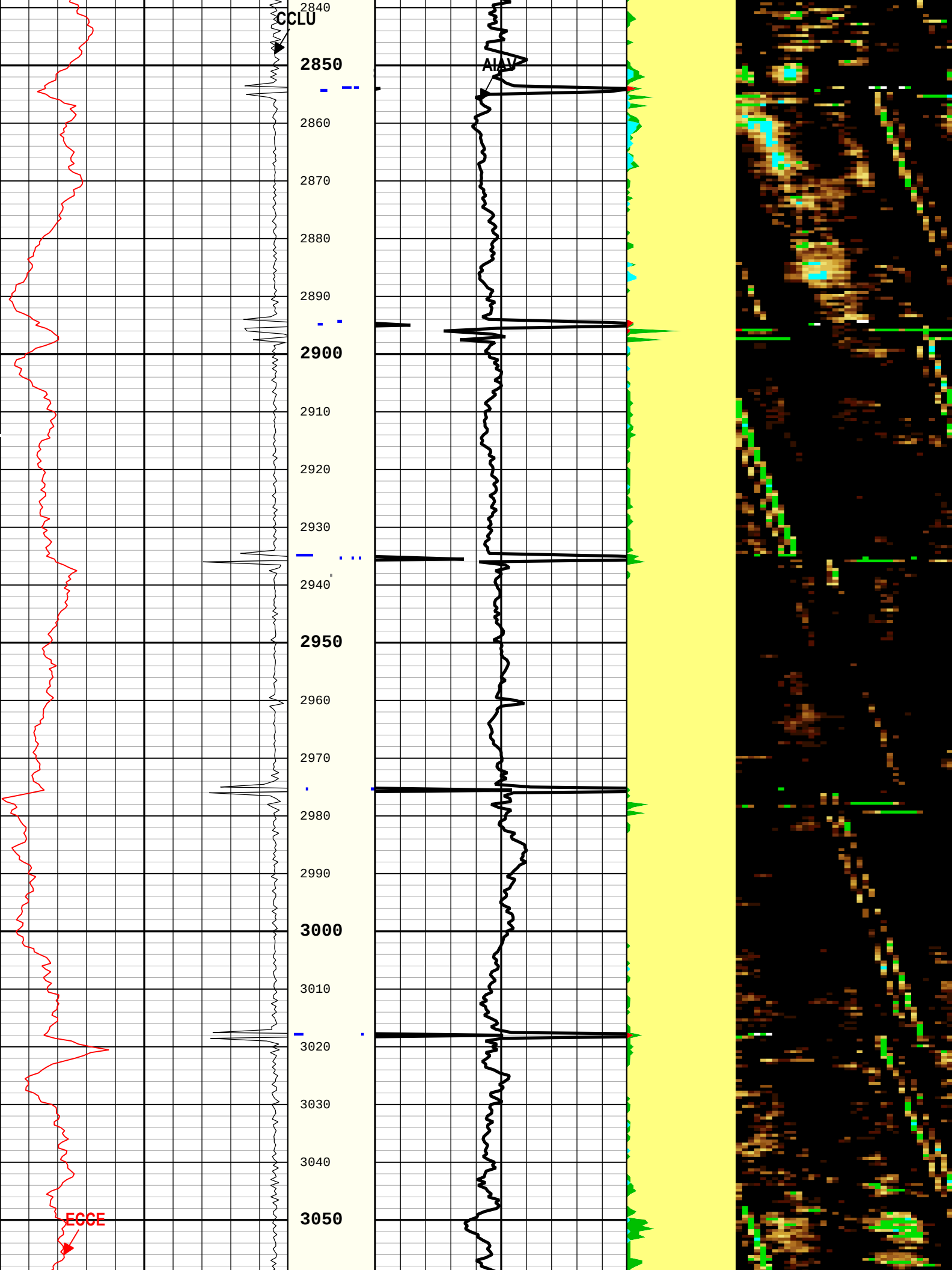
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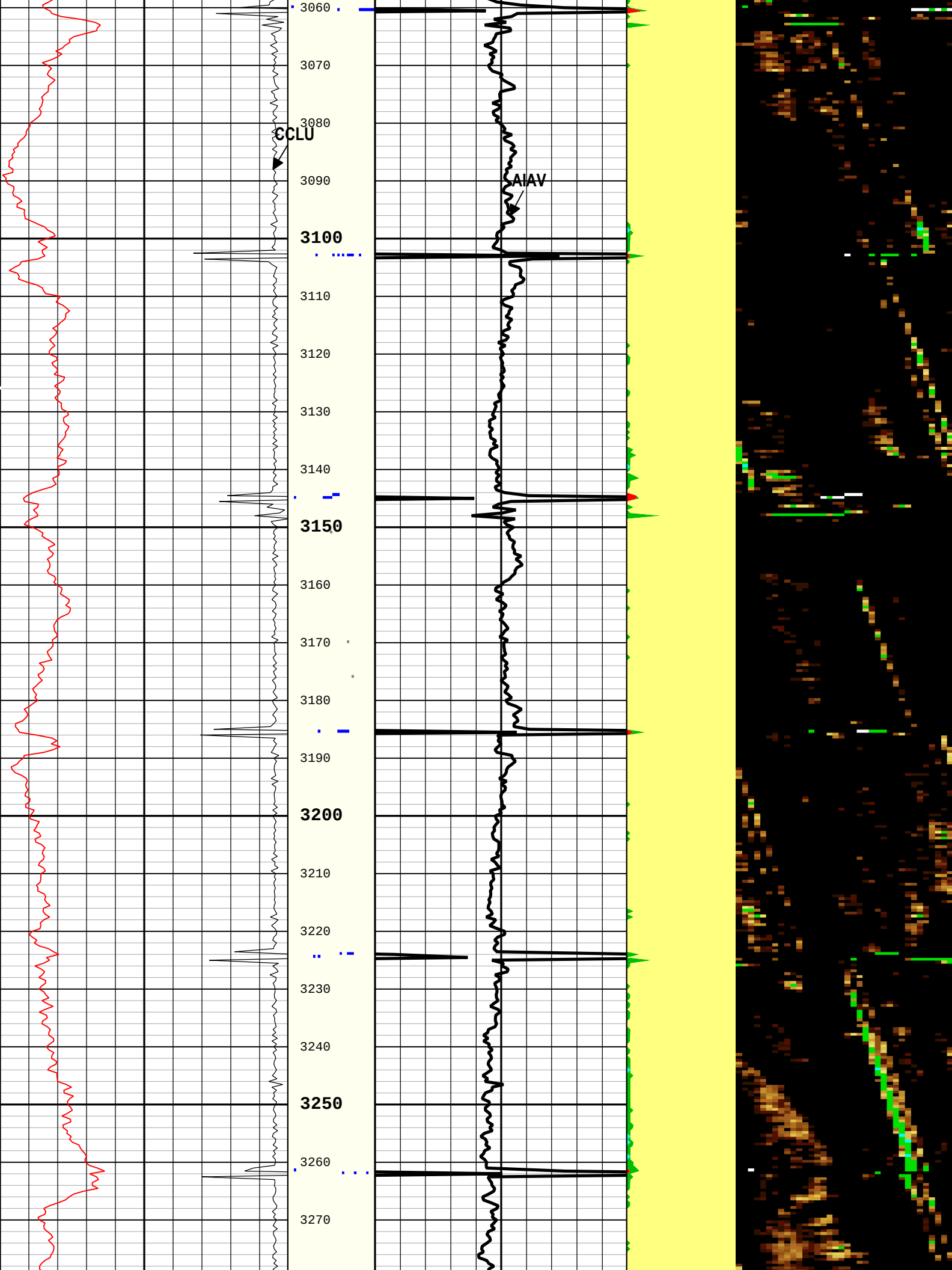
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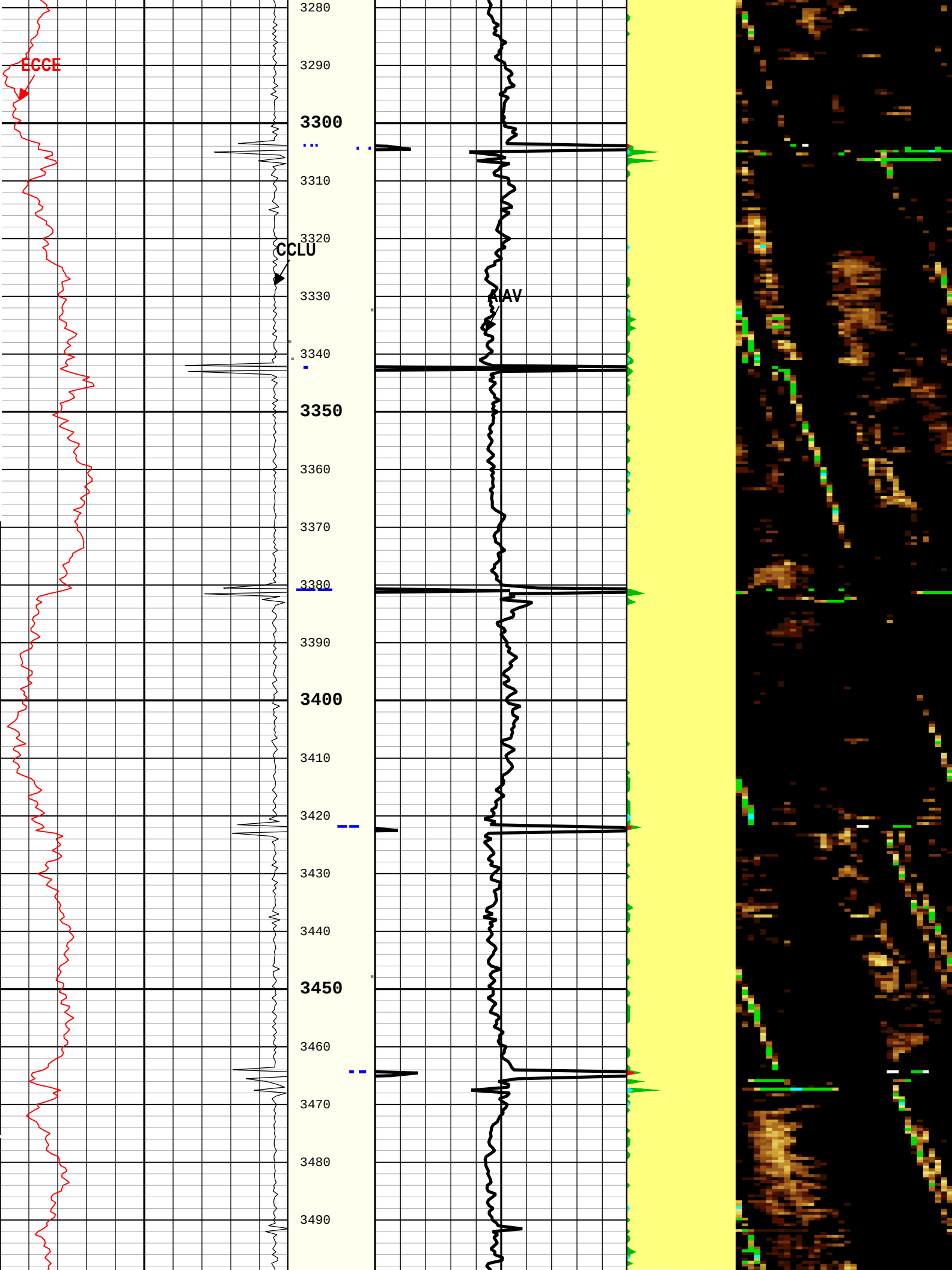
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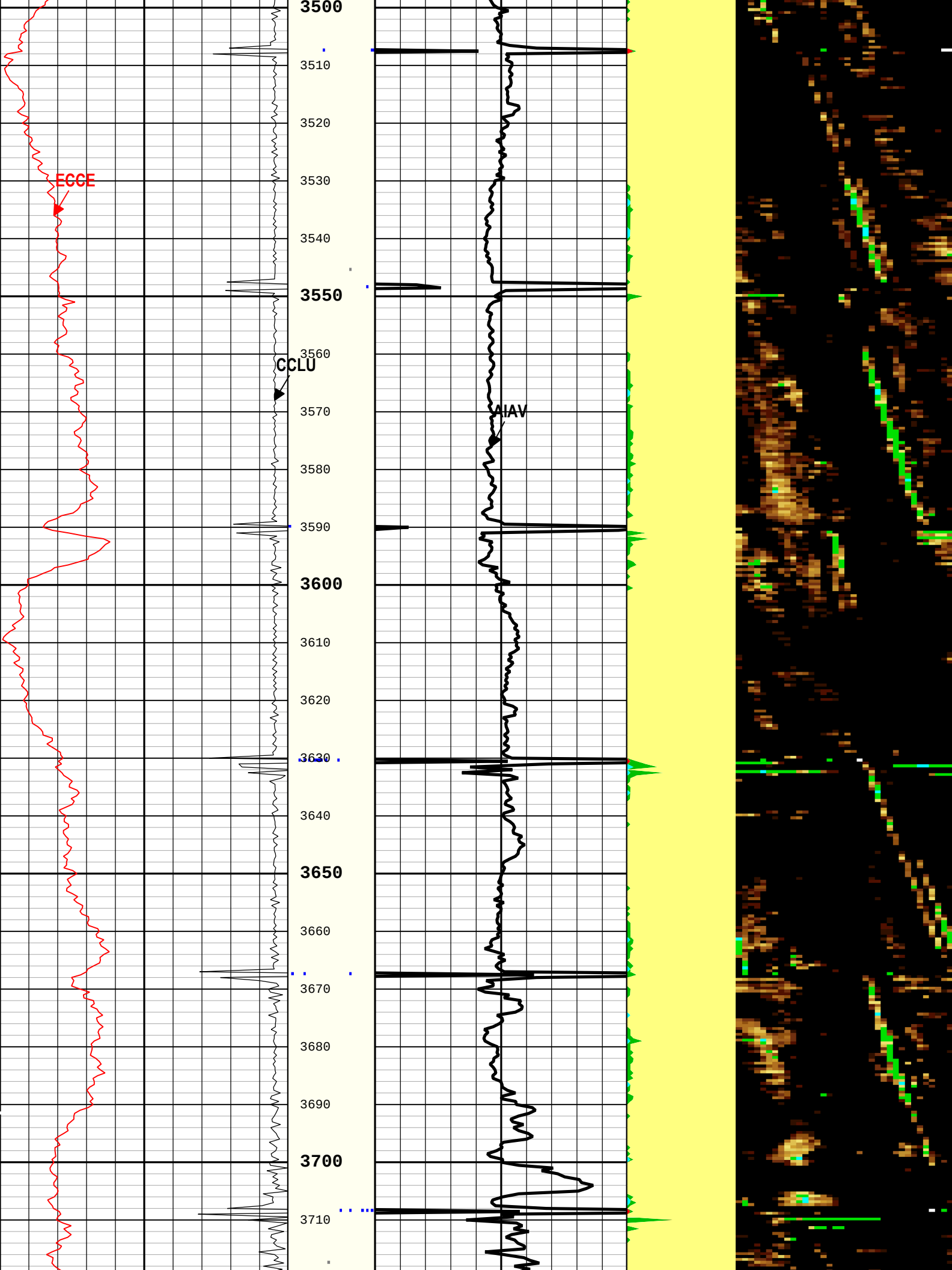
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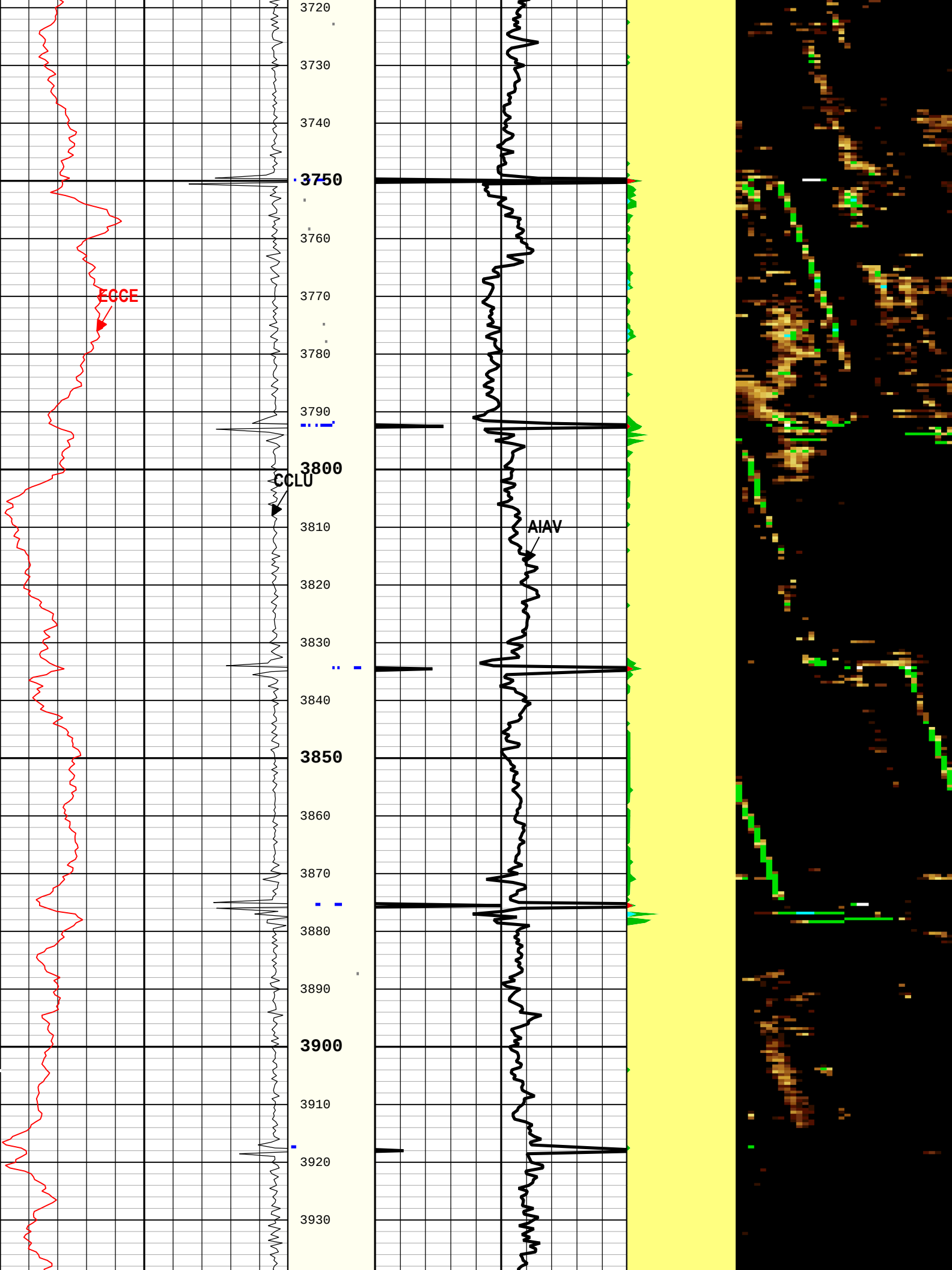
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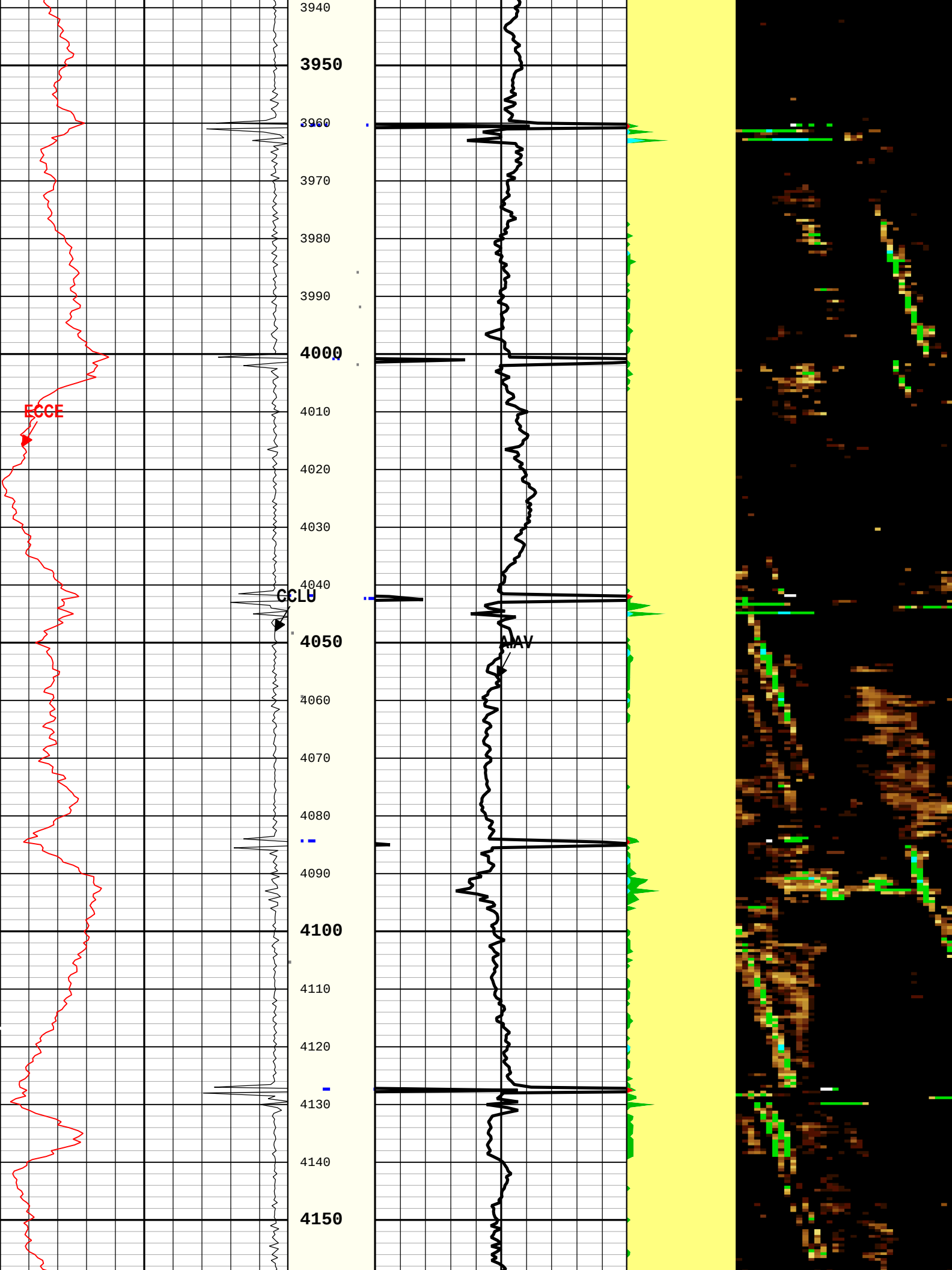
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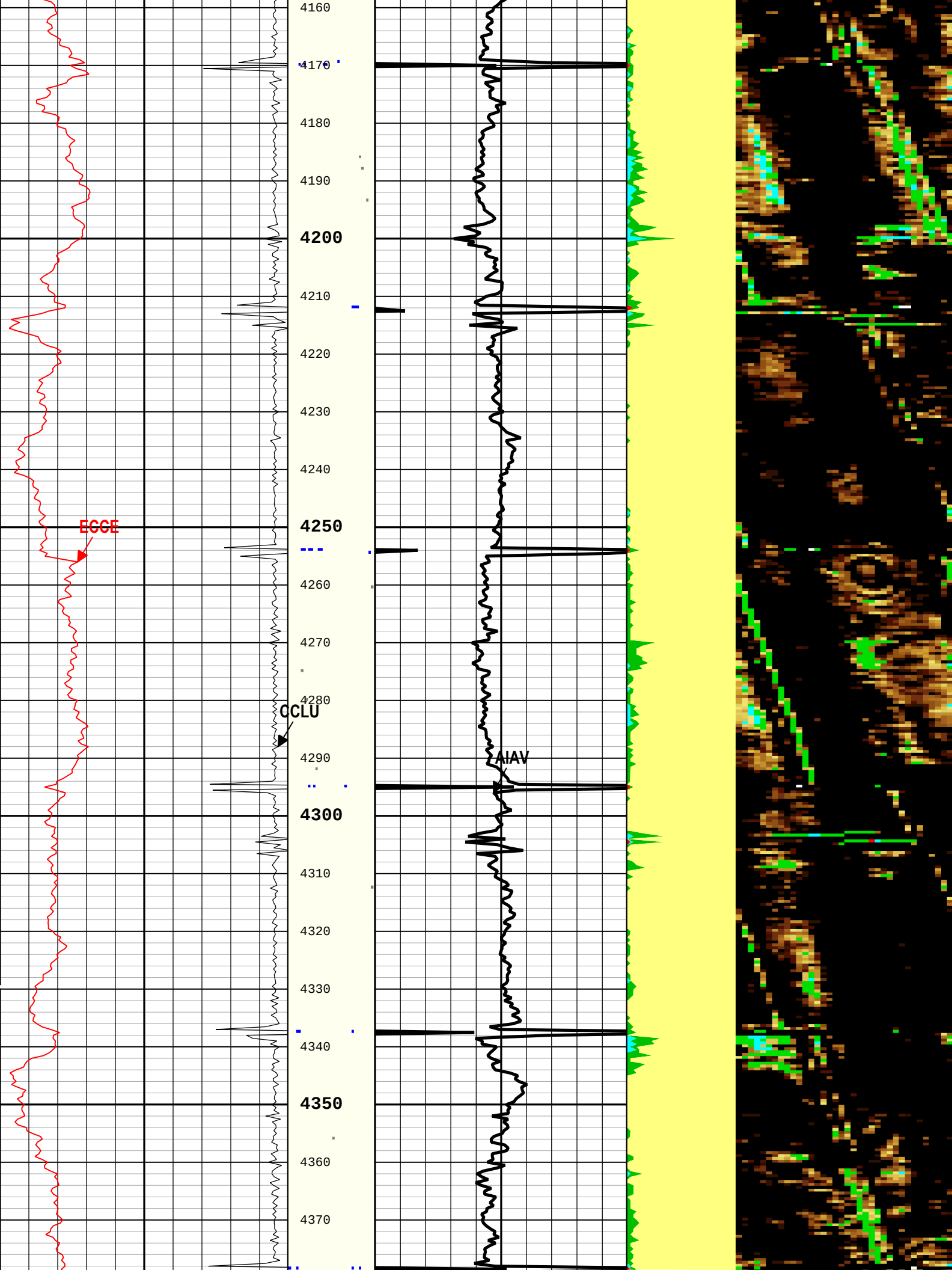
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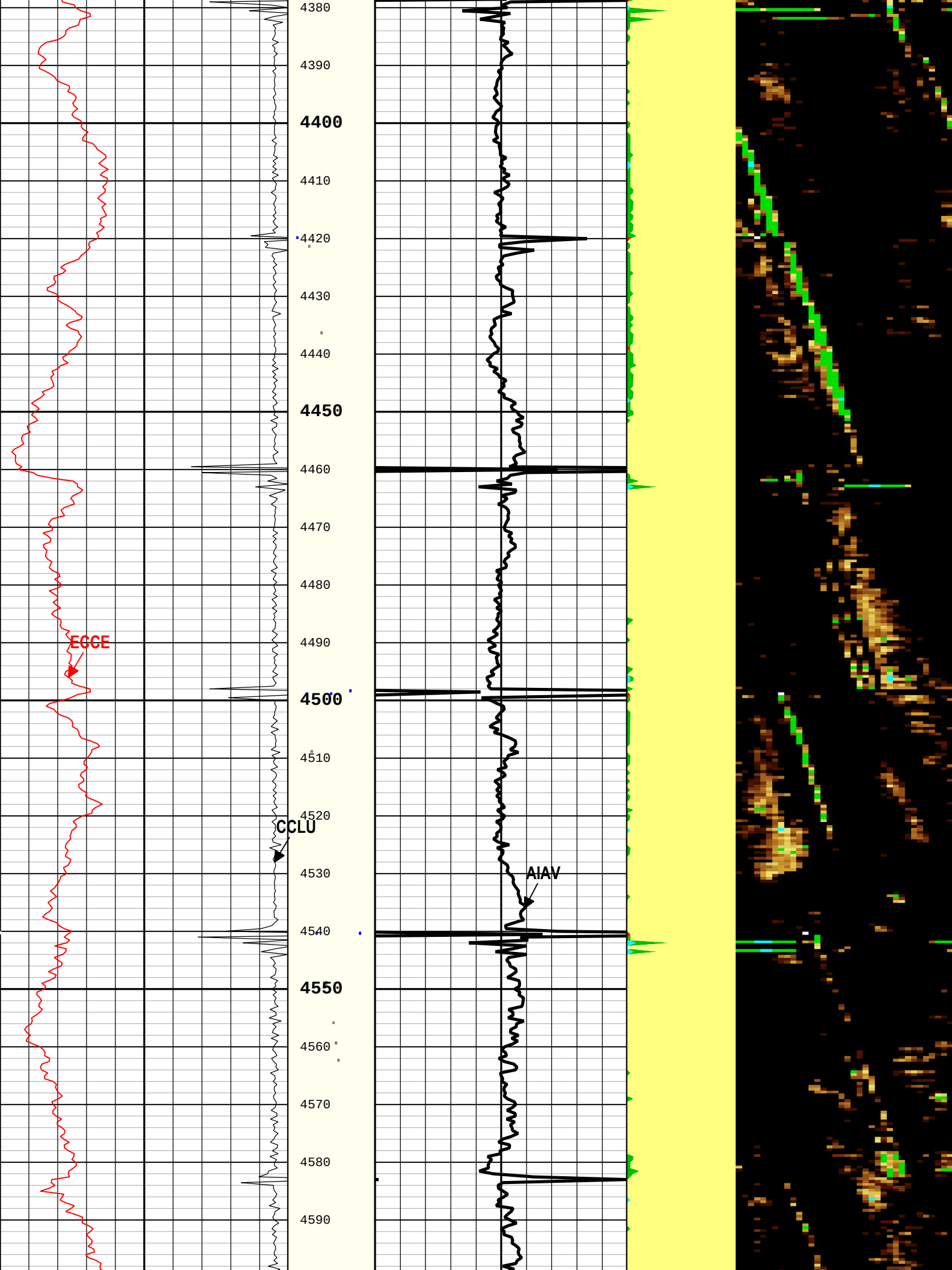
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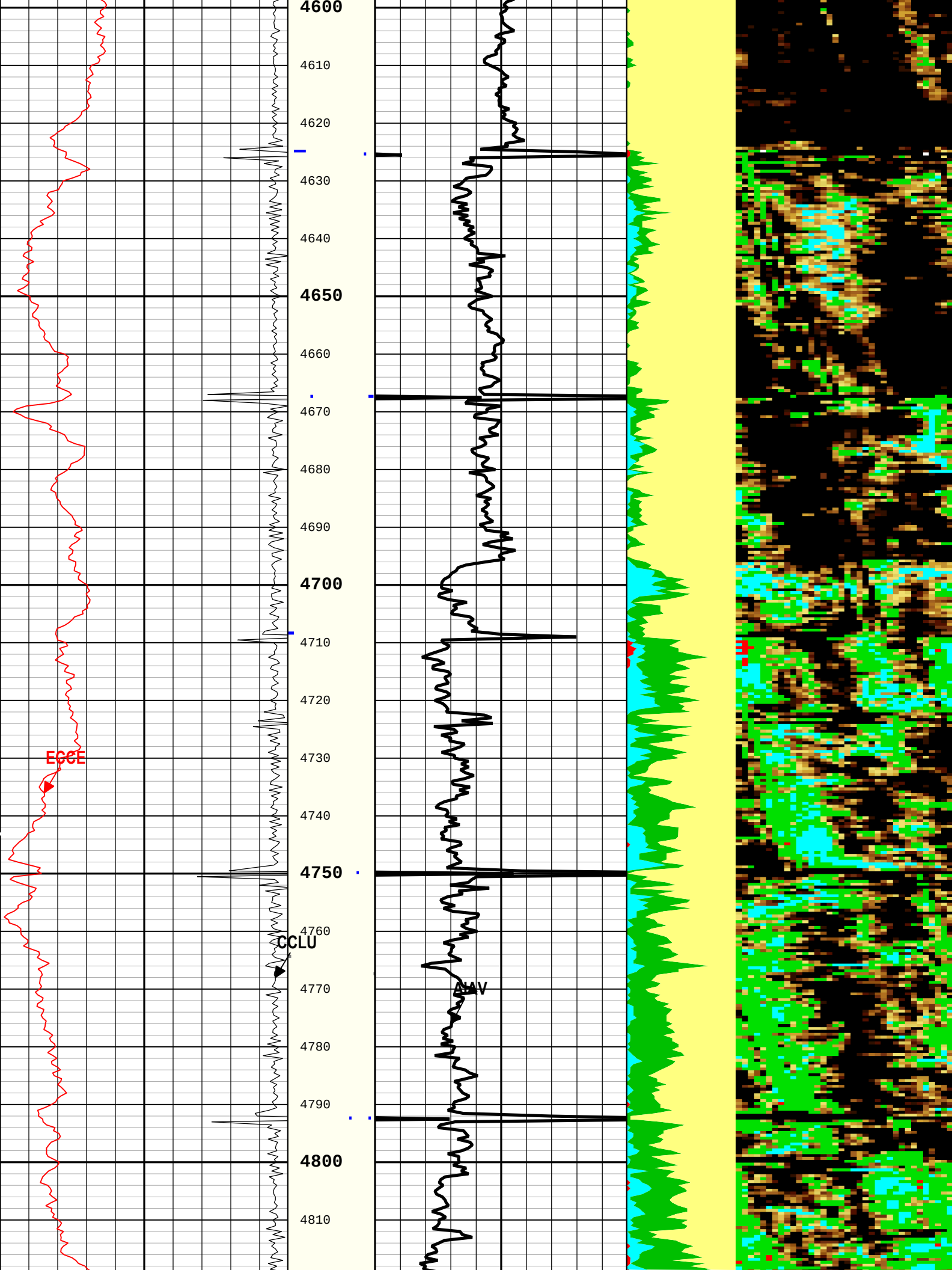
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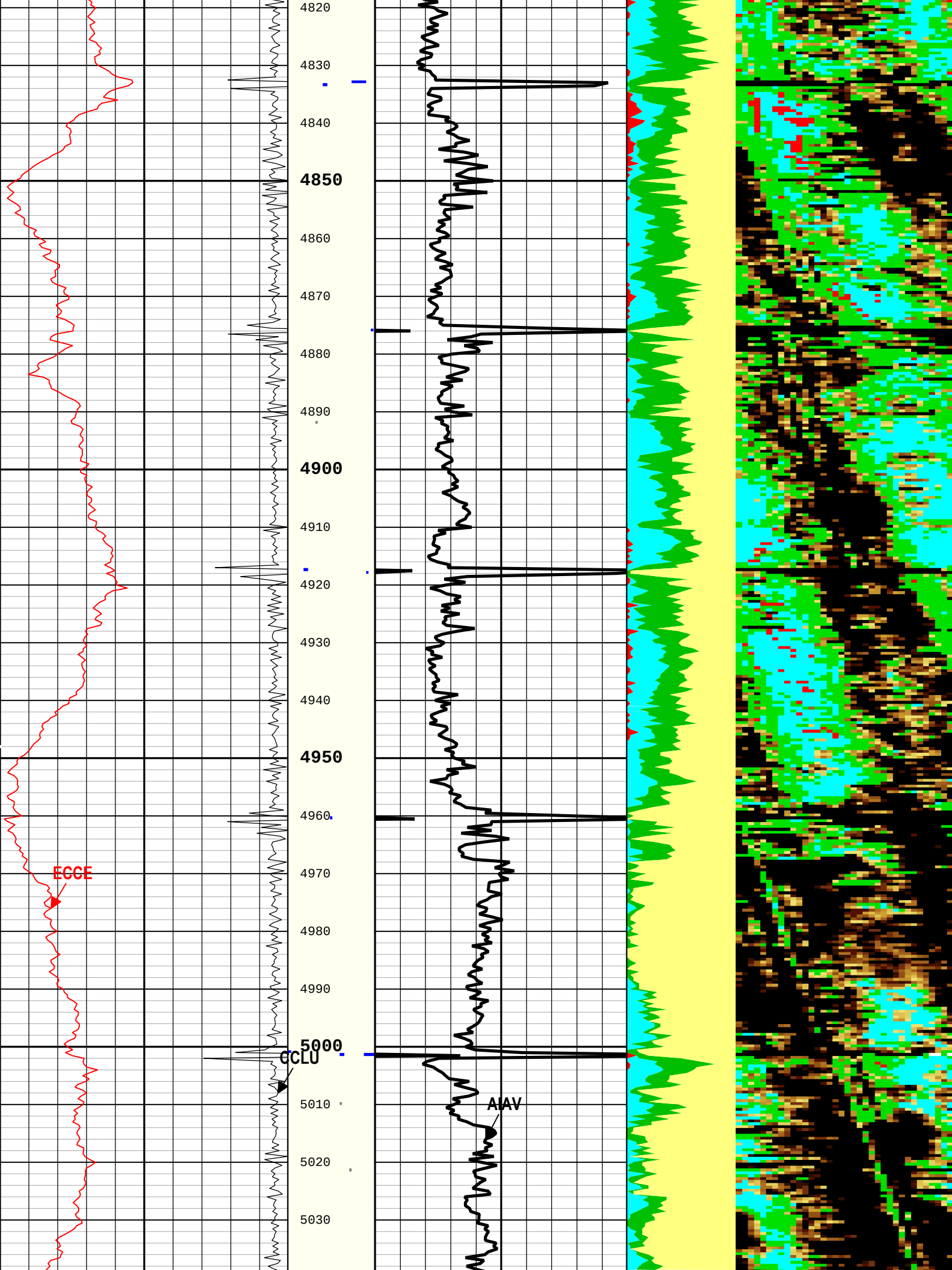
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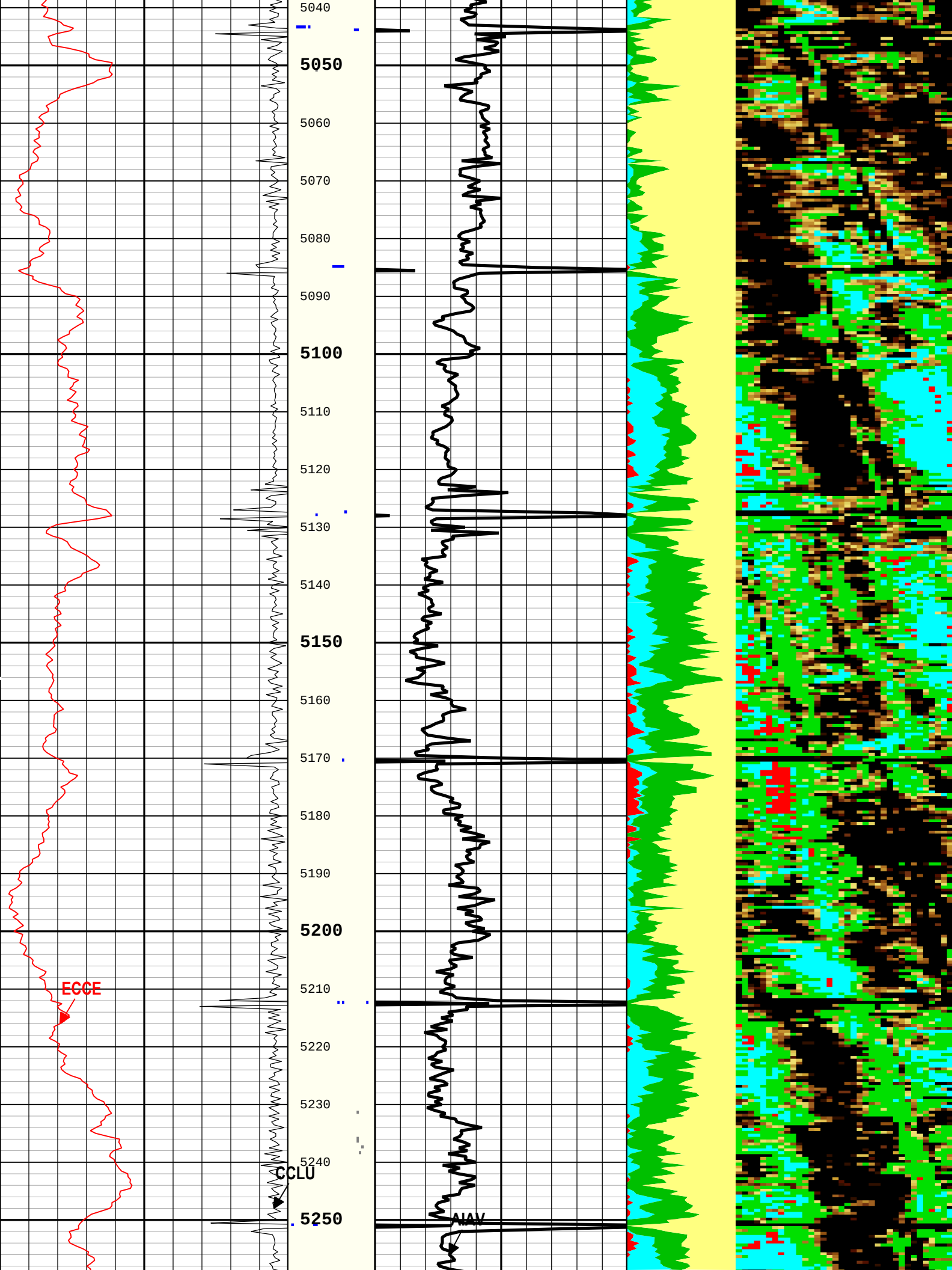
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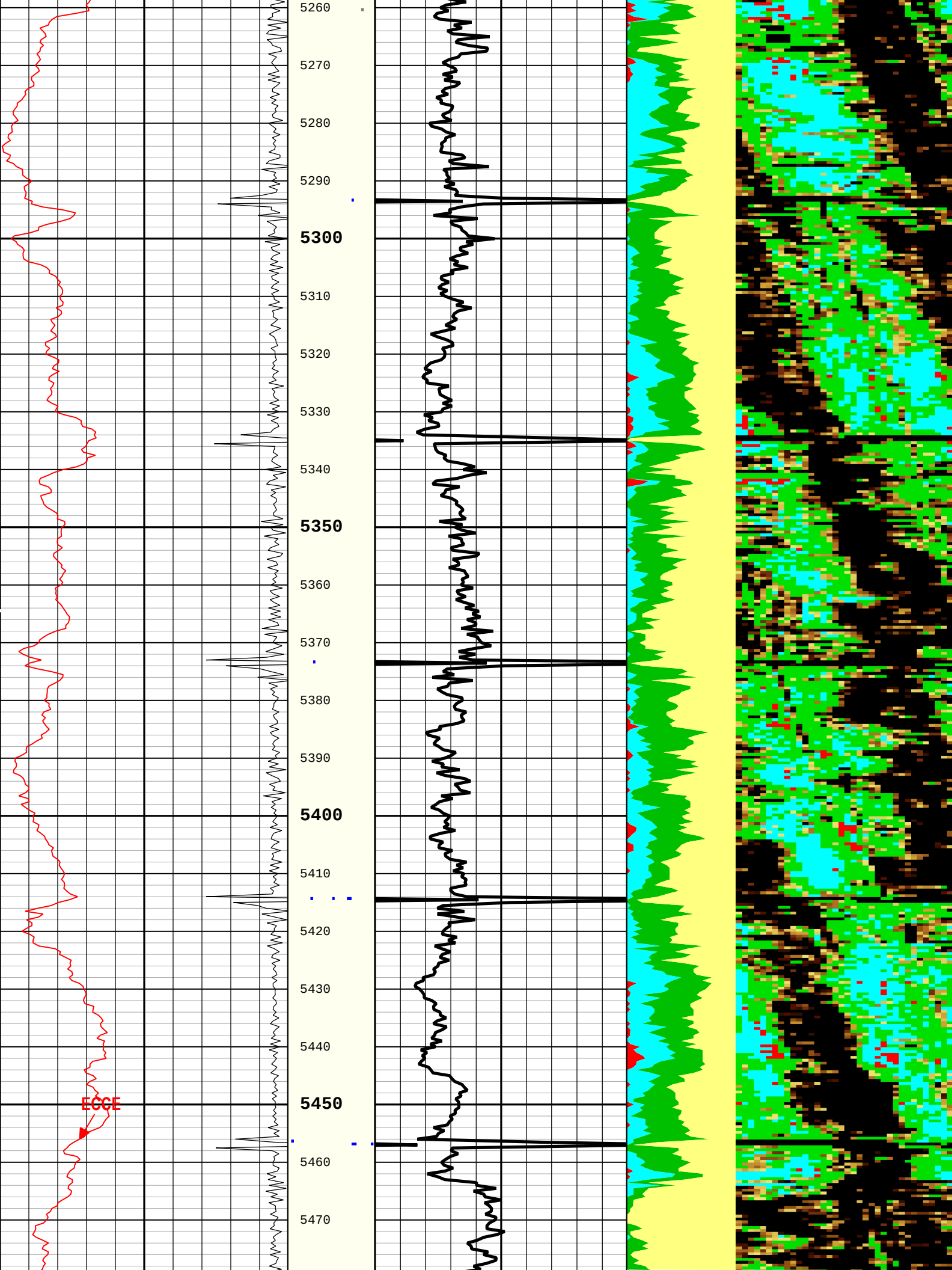
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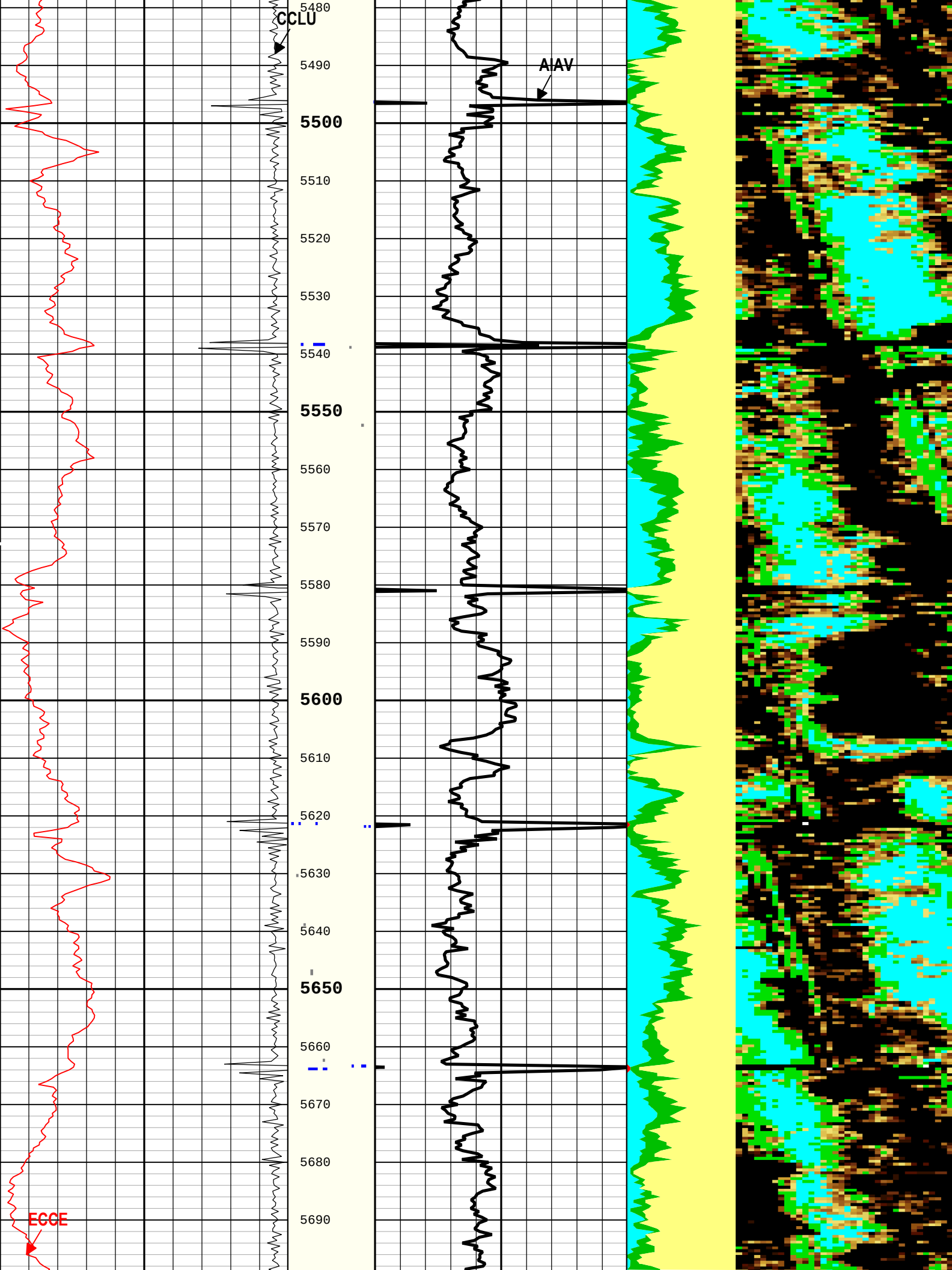
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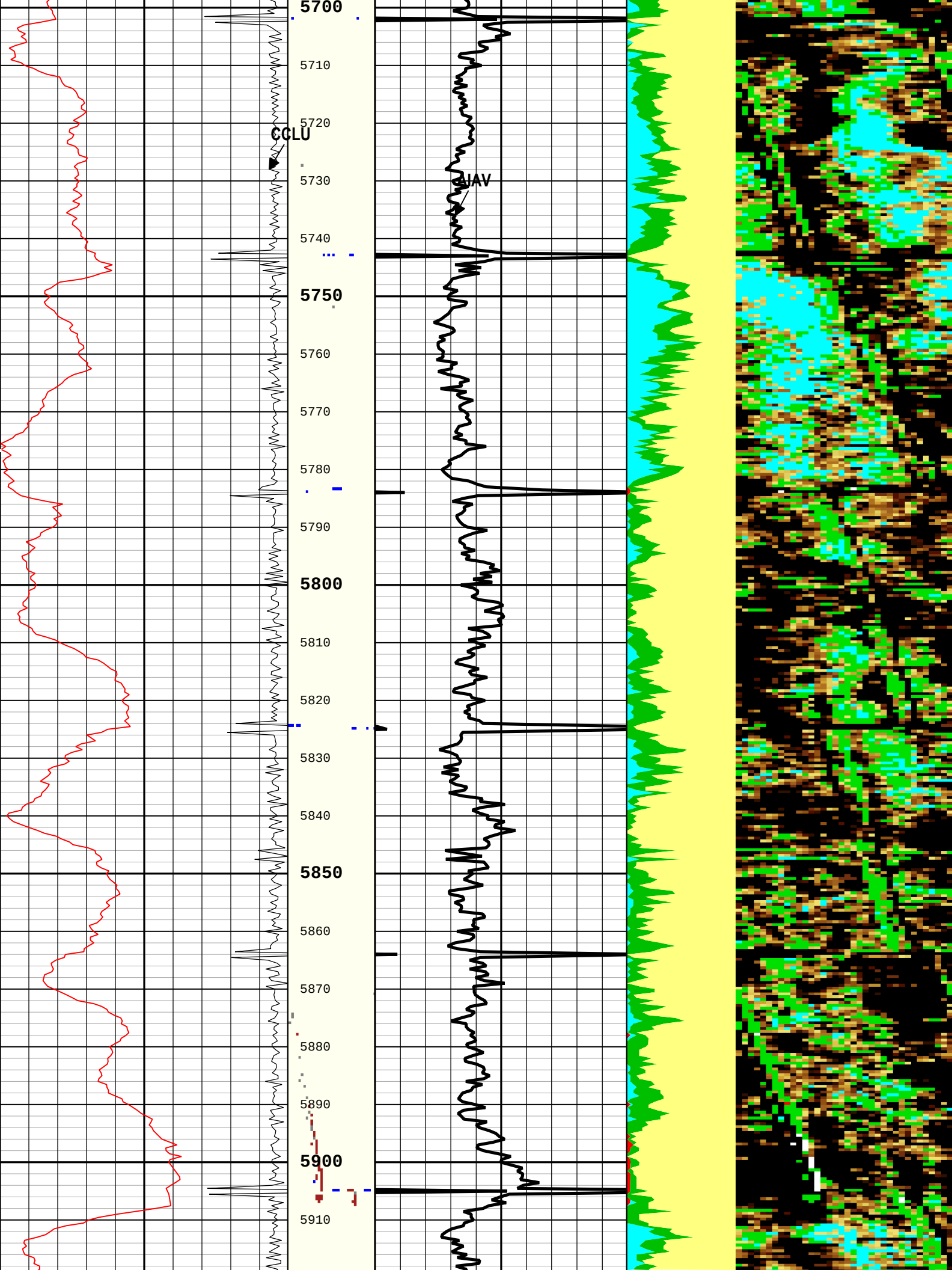
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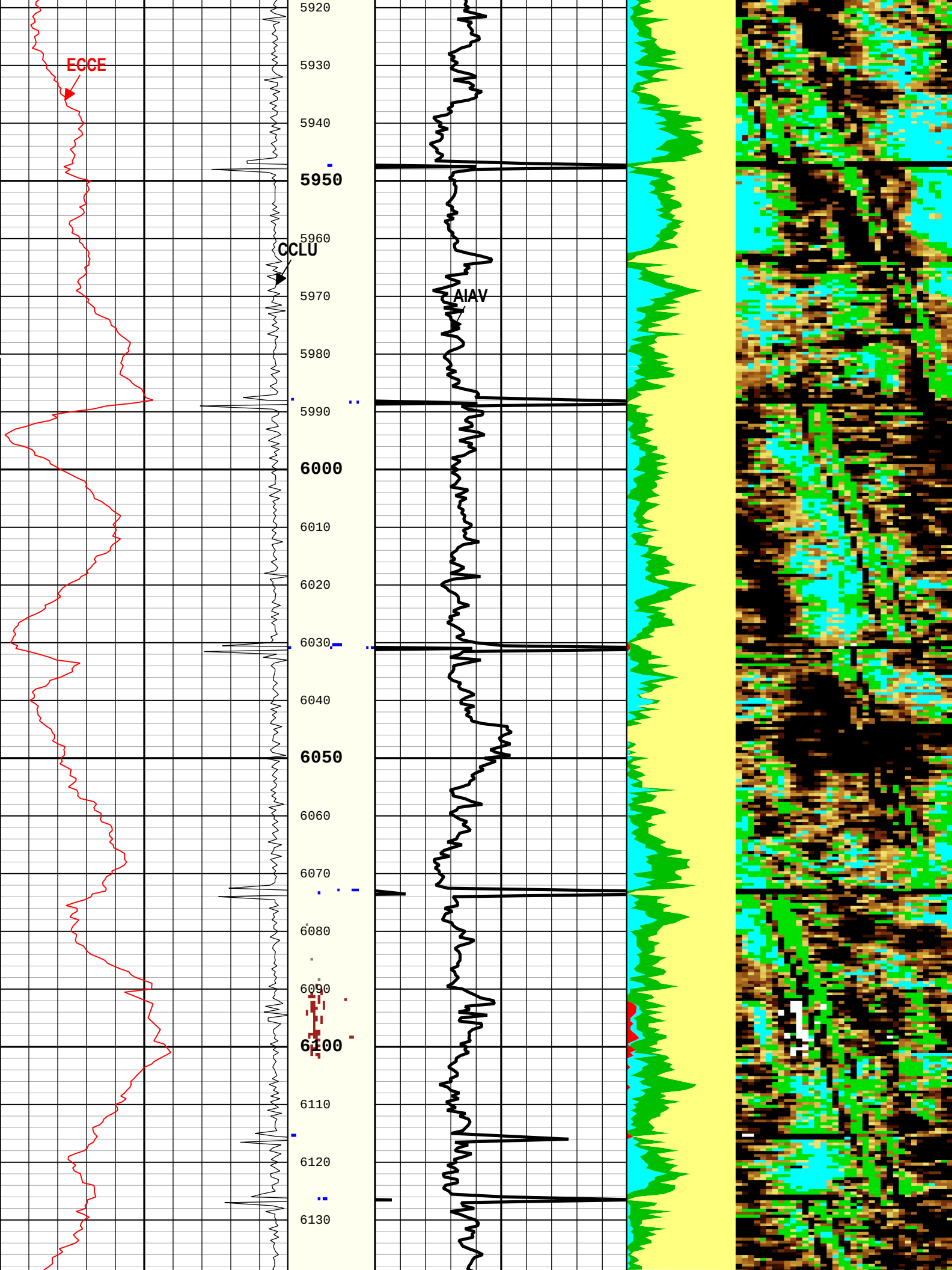
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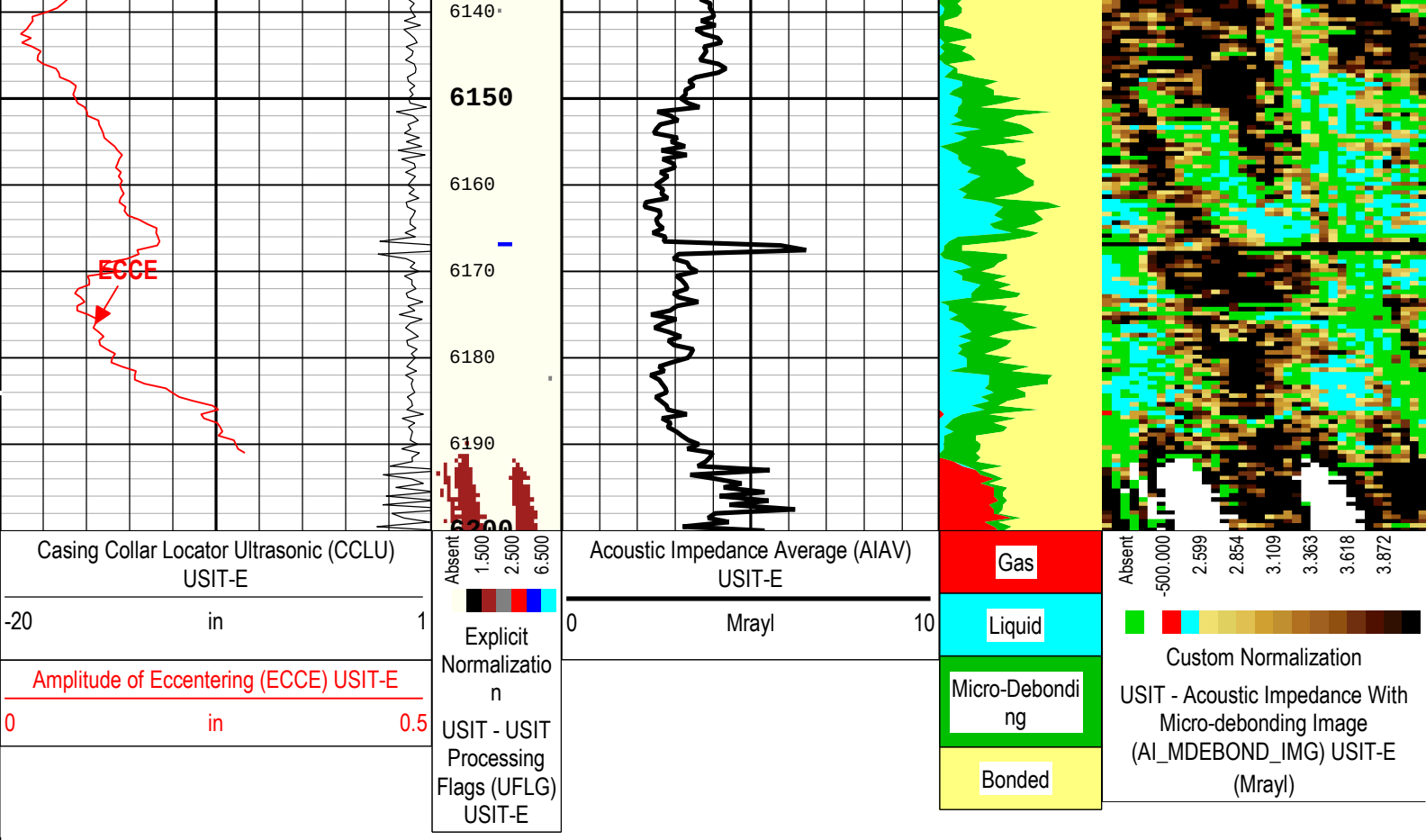
6120
6130



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: 12-Sep-2016 15:52:56

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	Light Cement	
DFD	Drilling Fluid Density	Borehole	8.8	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	190	us/ft
FDII	FPM Data Interpolation Interval	USIT-E	0	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	1.14	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.05	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
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	1.78	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.6	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	16	68.5	110
BS	12.25	110	1910
BS	8.5	1910	6200

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	40	dB
U-USIT_DDT5	USIC Downhole Decimation for T5 only	USIT-E	0_NONE	
EMXV	EMEX Voltage	USIT-E	60	V
HRES	Horizontal Resolution	USIT-E	10 deg	
TMUC	Type of Mud	USIT-E	BRI	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
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	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	6604	ft
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)
WINB	15	12-Sep-2016 14:38:24	12-Sep-2016 14:52:14	6613.07	5523.77
WINB	27	12-Sep-2016 14:52:14	12-Sep-2016 15:20:53	5523.77	68.7
WINE	80	12-Sep-2016 14:38:24	12-Sep-2016 14:52:17	6613.07	5512.19
WINE	70	12-Sep-2016 14:52:17	12-Sep-2016 15:20:53	5512.19	68.7

All depth are at tool zero.

One

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.64464.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[2]:Up	Up	1986.04 ft	2512.11 ft	12-Sep-2016 2:10:01 PM	12-Sep-2016 2:13:17 PM	ON	6.51 ft	No

All depths are referenced to toolstring zero

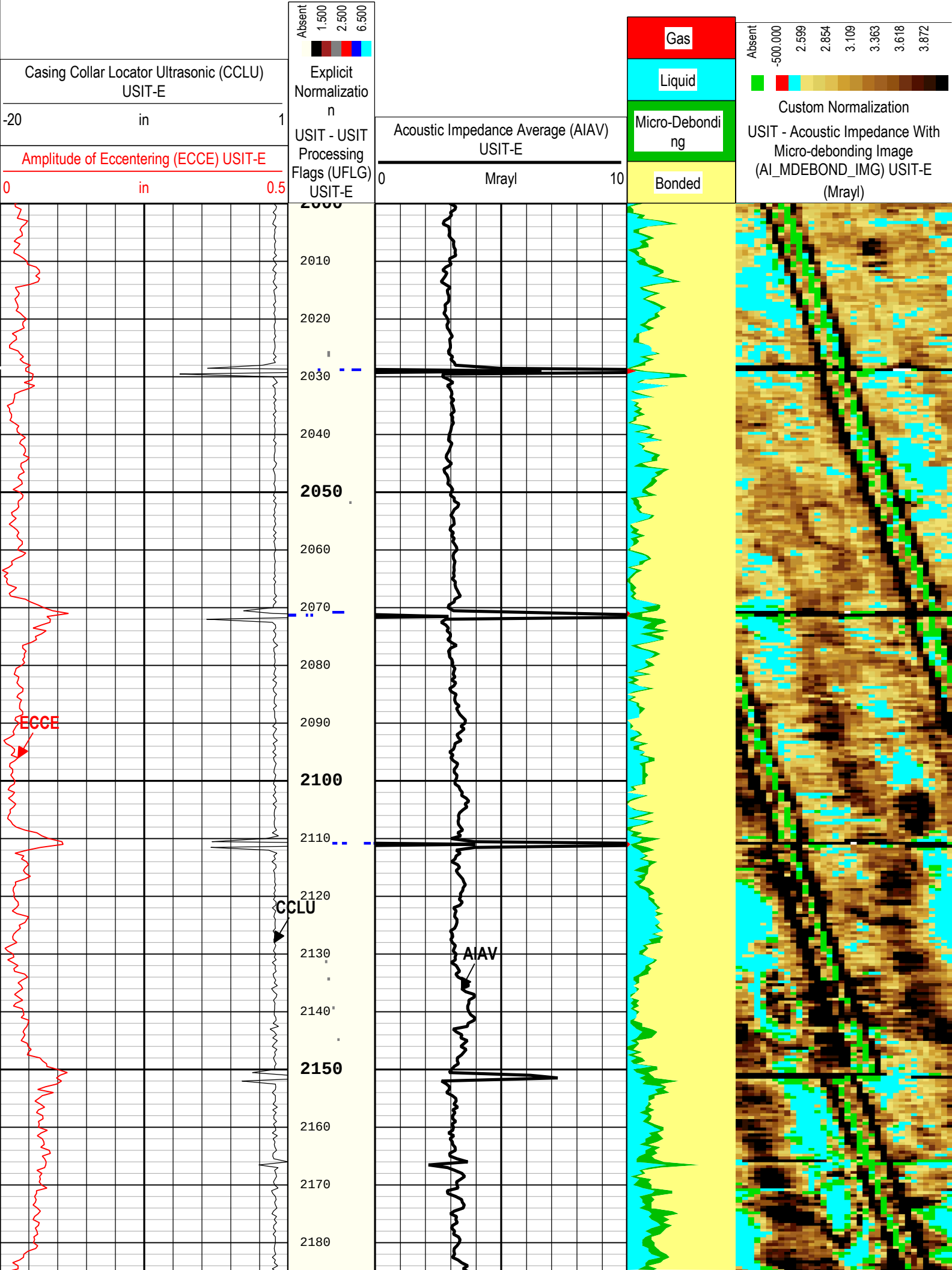
Log

Company:Noble Energy Inc Well:Lapp A22-689

One: Log[2]:Up:S006

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: 12-Sep-2016 15:53:01

TIME_1900 - Time Marked every 60.00 (s)


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
2.599
2.854
3.109
3.363
3.618
3.872
Custom Normalization
USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)
2010
2020
2030
2040
2050
2060
2070
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2100
2110
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2140
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2170
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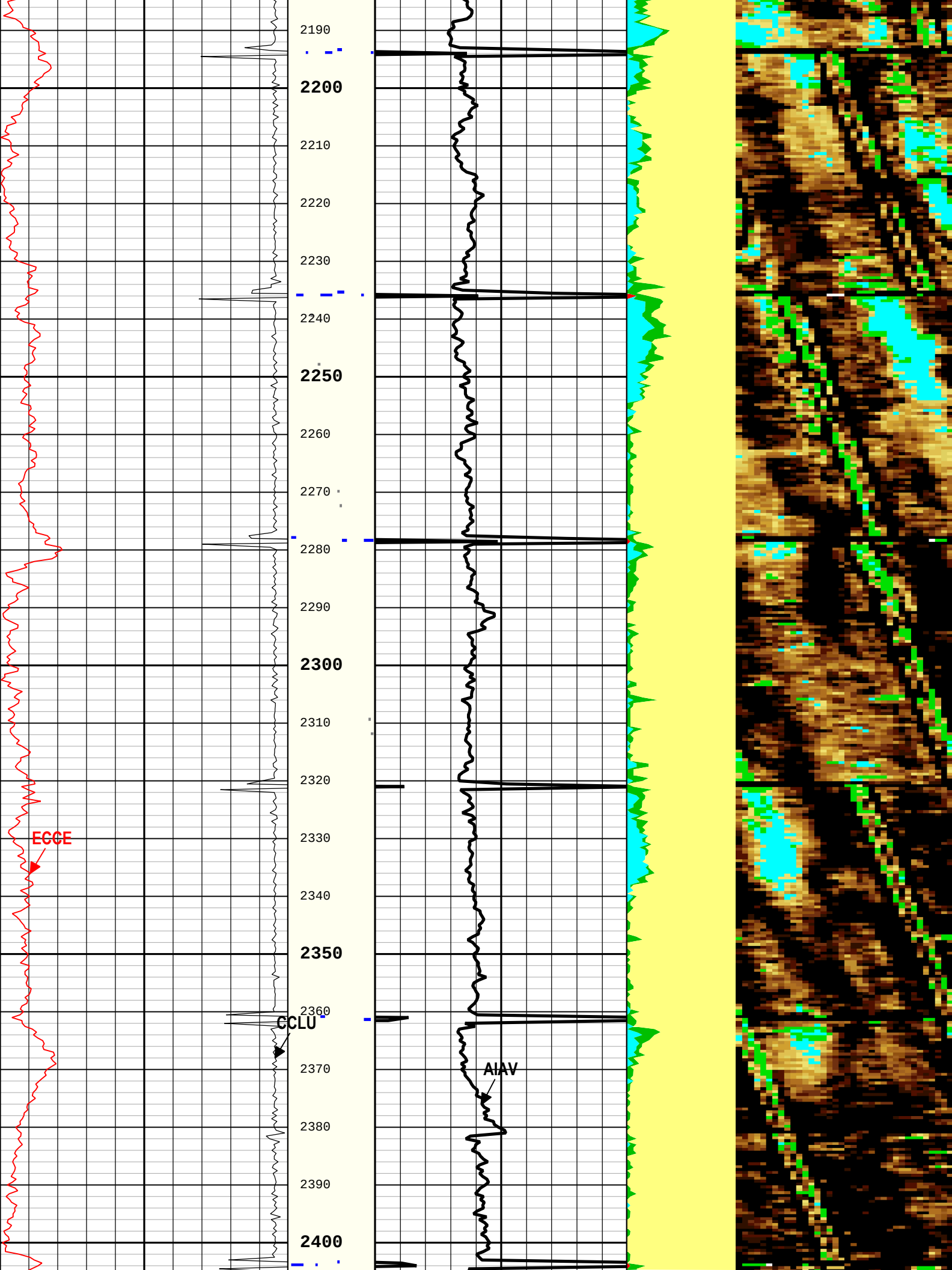
ECCE
CCLU
AIAV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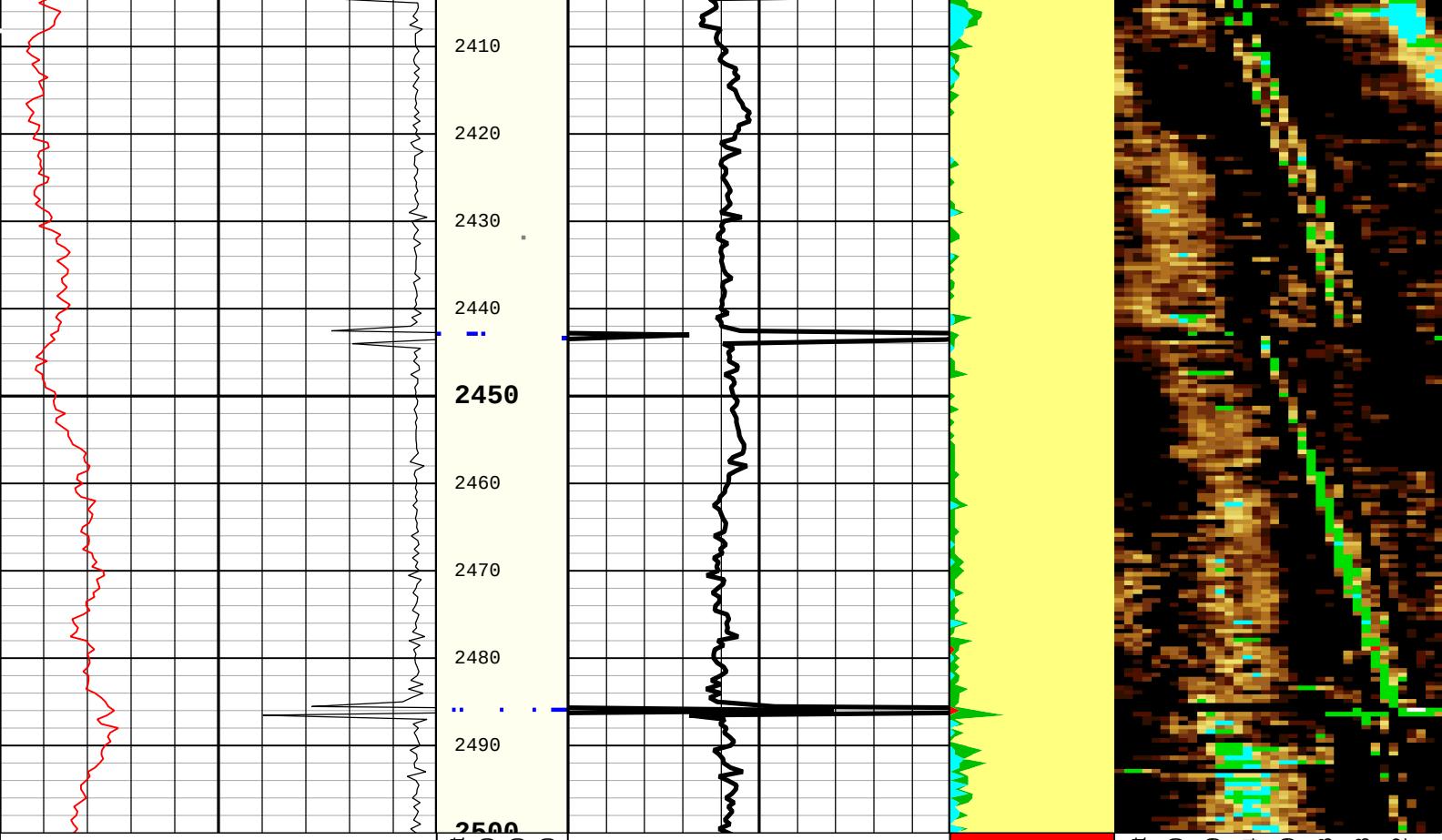

TIME_1900 - Time Marked every 60.00 (s)

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HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	Off	
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MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.14	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.05	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal

UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
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	1.78	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.6	Mrayl
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One: Parameters

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HRES	Horizontal Resolution	USIT-E	10 deg	
TMUC	Type of Mud	USIT-E	BRI	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
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	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	2500	ft
WINB	Window Begin Time	USIT-E	27.85	us
WINE	Window End Time	USIT-E	67.85	us

XYZ

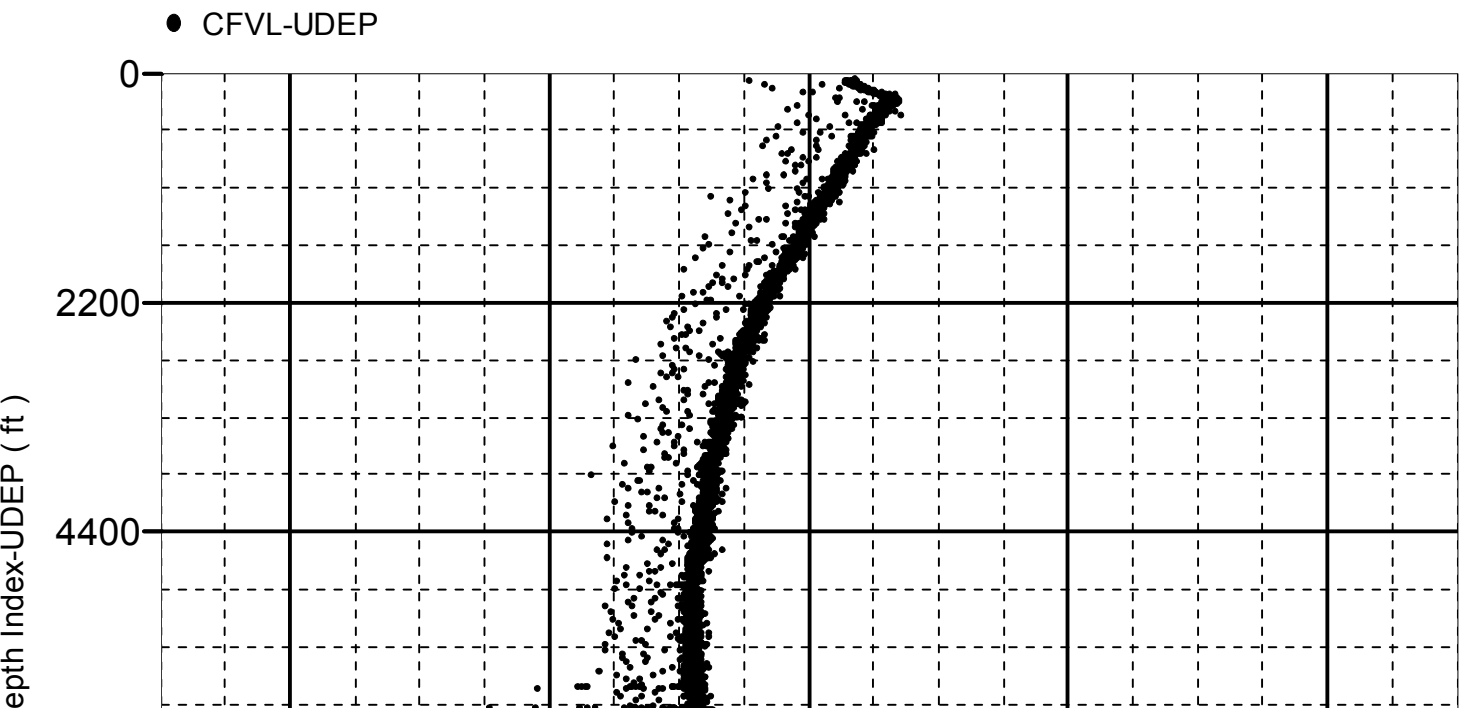
Company:Noble Energy Inc Well:Lapp A22-689

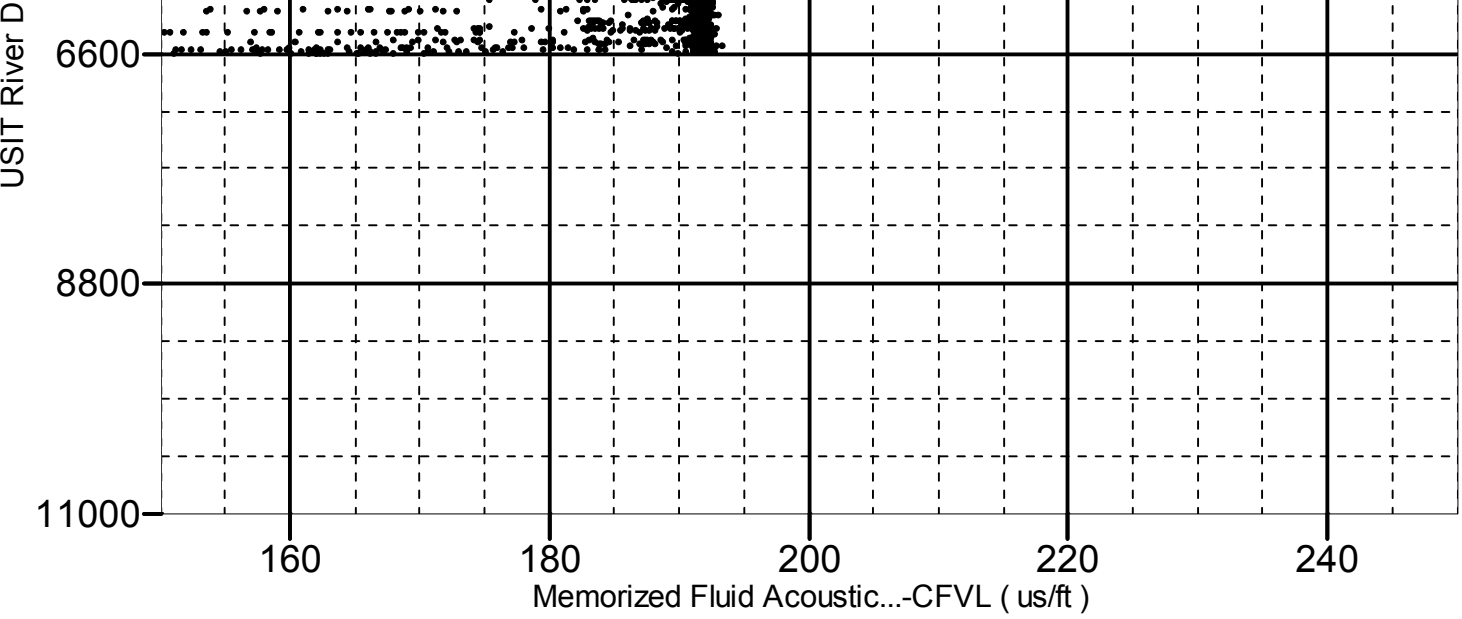
One: Log[4]:Up:S006

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6612.50 to 68.50 ft





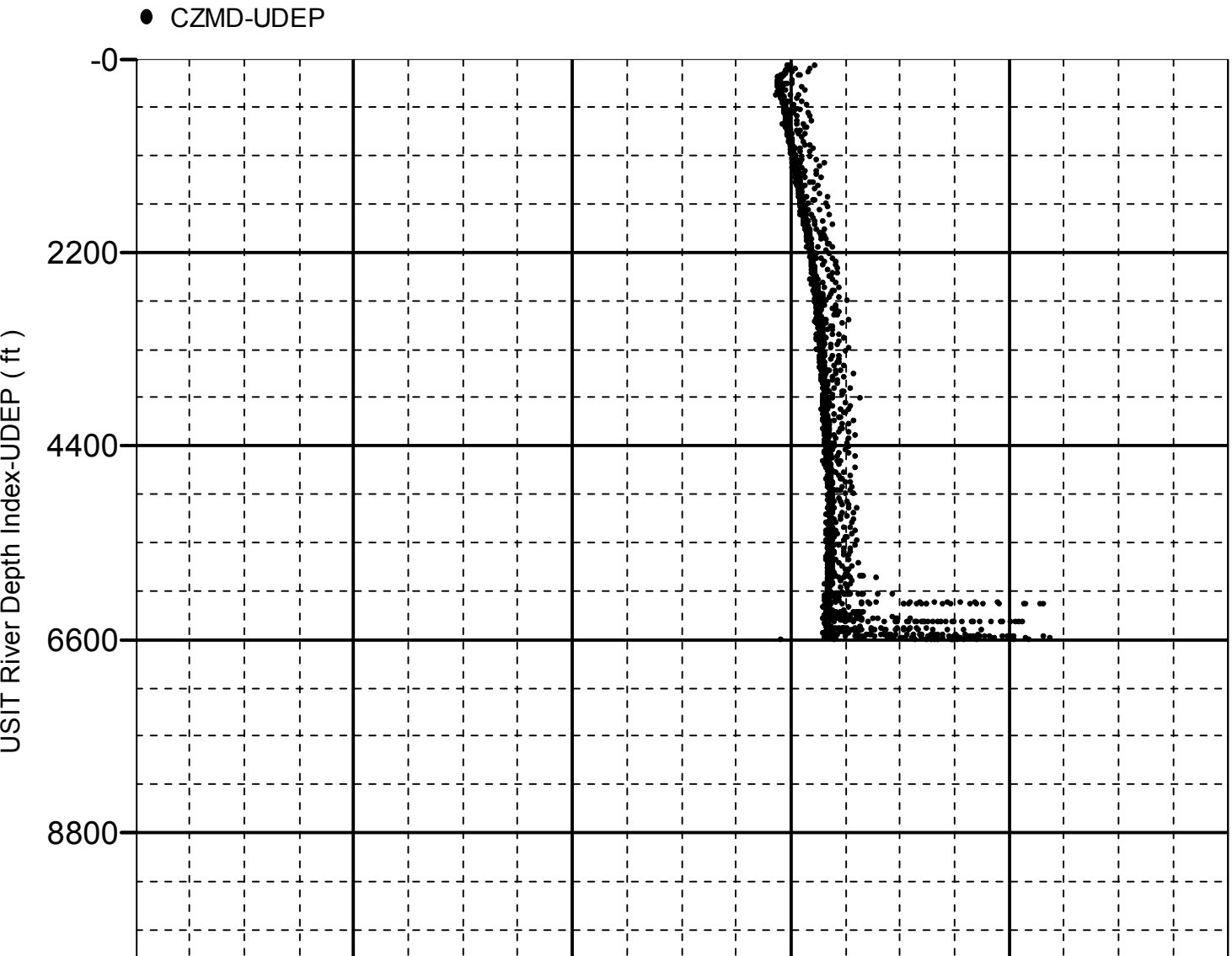
XYZ

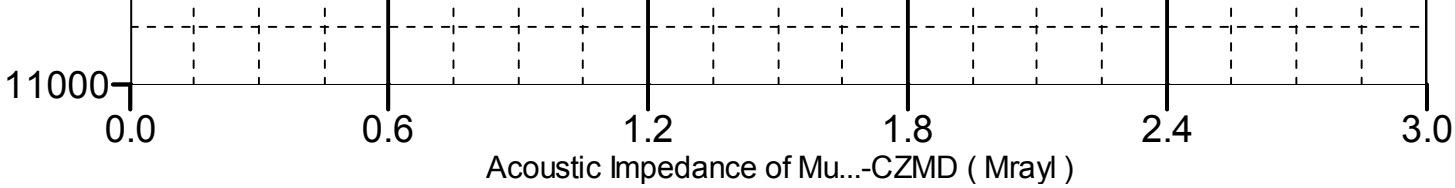
Company:Noble Energy Inc Well:Lapp A22-689
One: Log[4]:Up:S006

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6612.50 to 68.50 ft





Company:	Noble Energy Inc
Well:	Lapp A22-689
Field:	Wattenberg
County:	Weld
Country:	US

Schlumberger

UltraSonic Summary Print