Schlumberger

Company: NOBLE ENERGY INC.

Well: VOGLER STATE D21-790

Field: WATTENBERG

County: WELD State: COLORADO

County: WELD
Field: WATTENBERG
Location: SHL: NENE SECTION 21 TOWNSHIP 3N RANGE 6
Well: VOGLER STATE D21-790
Company: NOBLE ENERGY INC.

ULTRASONIC IMAGER

DJ BASIN ULTRASONIC CEMENT

GAMMA RAY - COLLAR LOCATOR LOG

Location:			
SHL: NENE SECTION 21 TOWNSHIP 3N RANGE 6 BHL: 200' FNL & 660' FEL		Elev.: K.B. 4850.00 ft G.L. 4820.00 ft D.F.	
Permanent Datum:	Ground Level	Elev.:	4820.00 f
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

API Serial No.	Section:	Township:	Range:
05-123-48561	21	3N	64W

Logging Date		07-May-2019	
Run Number		ONE	
Depth Driller		17665.00 ft	
Schlumberger Depth		17665.00 ft	
Bottom Log Interval		6833.00 ft	
Top Log Interval		64.00 ft	
Casing Fluid Type		BRINE	
Salinity			
Density		8.4 lbm/gal	
Fluid Level		8.00 ft	
BIT/CASING/TUBING STRING			
Bit Size		8.50 in	
From		1957.00 ft	
To		17665.00 ft	
Casing/Tubing Size		5.5 in	
Weight		20 lbm/ft	
Grade		P110	
From		0.00 ft	
To		17650.80 ft	
Max Recorded Temperatures		216.52 degF	
Logger on Bottom	Time	07-May-2019 11:15:00	
Unit Number	Location:	9108 FORT MORGAN	
Recorded By		CODY SPENCE	
Witnessed By		BILL MANSFIELD	

Disclaimer

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6IN [5:100]
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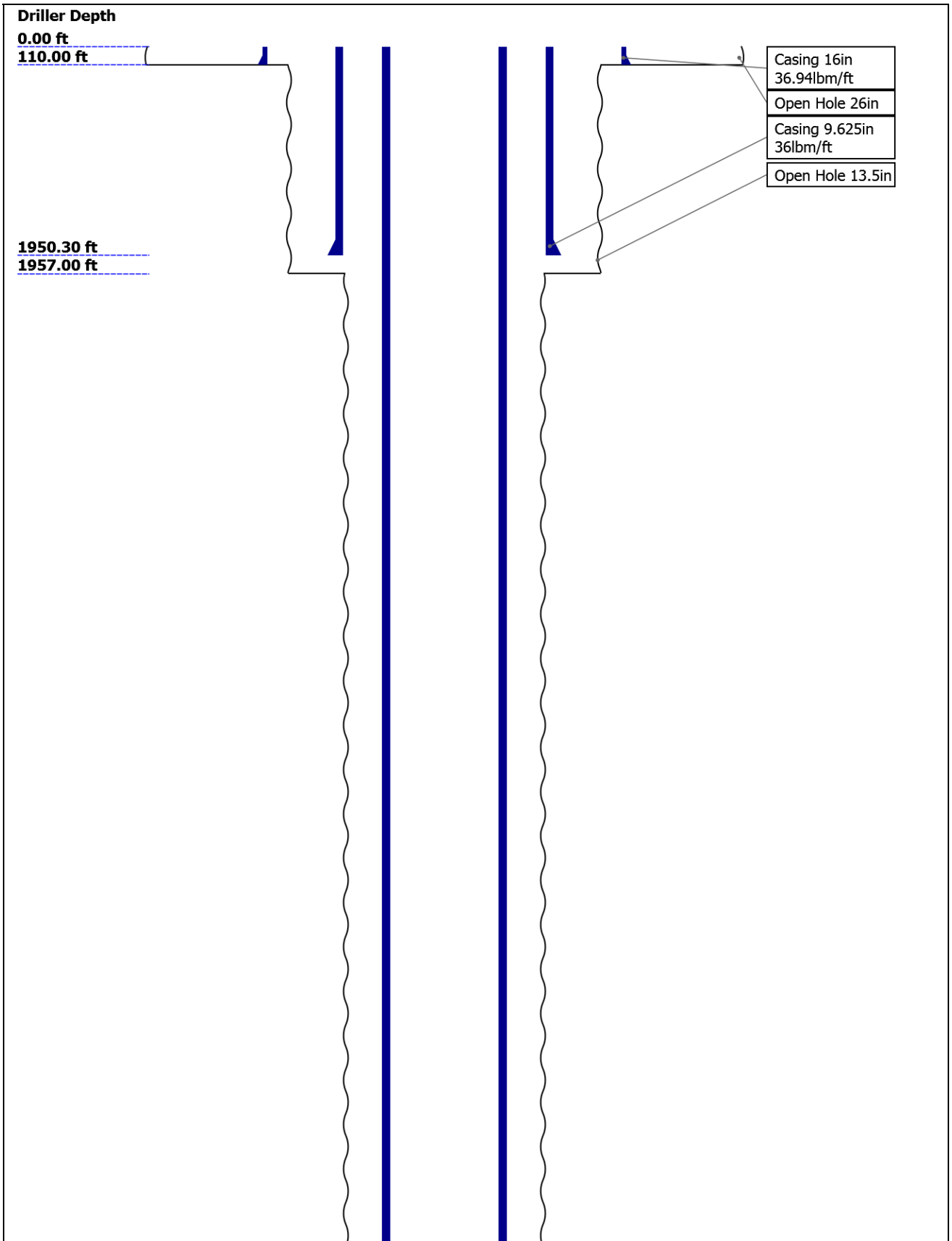
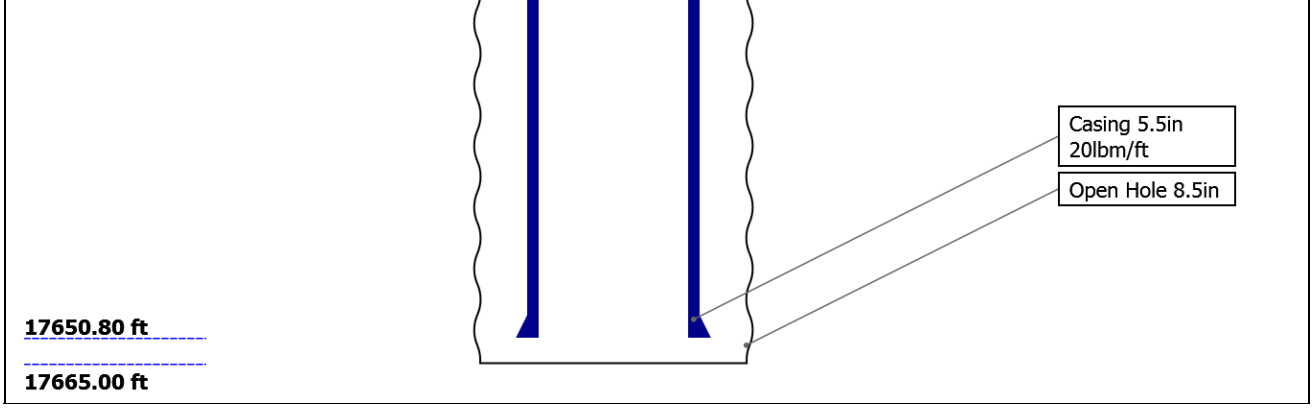
Well Sketch



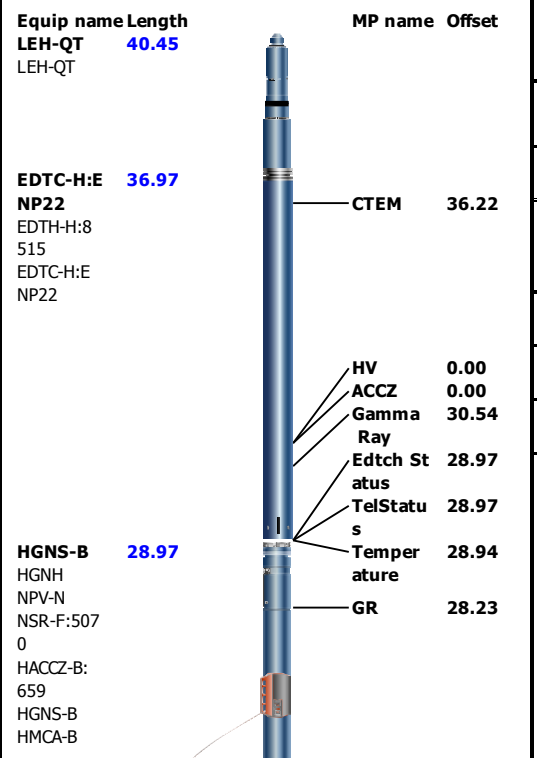


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	1957			
Top Logger (ft)	0	110	1957			
Bottom Driller (ft)	110	1957	17665			
Bottom Logger (ft)	110	1957	17665			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	36.94	36	20			
Inner Diameter (in)	15.572	8.921	4.778			
Grade	X52	J55	P110			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	1950.3	17650.8			
Bottom Logger (ft)	110	1950.3	17650.8			

Remarks and Equipment Summary

ONE: Toolstring



ONE: Remarks

THANK YOU FOR CHOOSING SCHLUMBERGER TECHNOLOGY CORPORATION!

LOGGING OBJECTIVE: CASING AND CEMENT EVALUATION

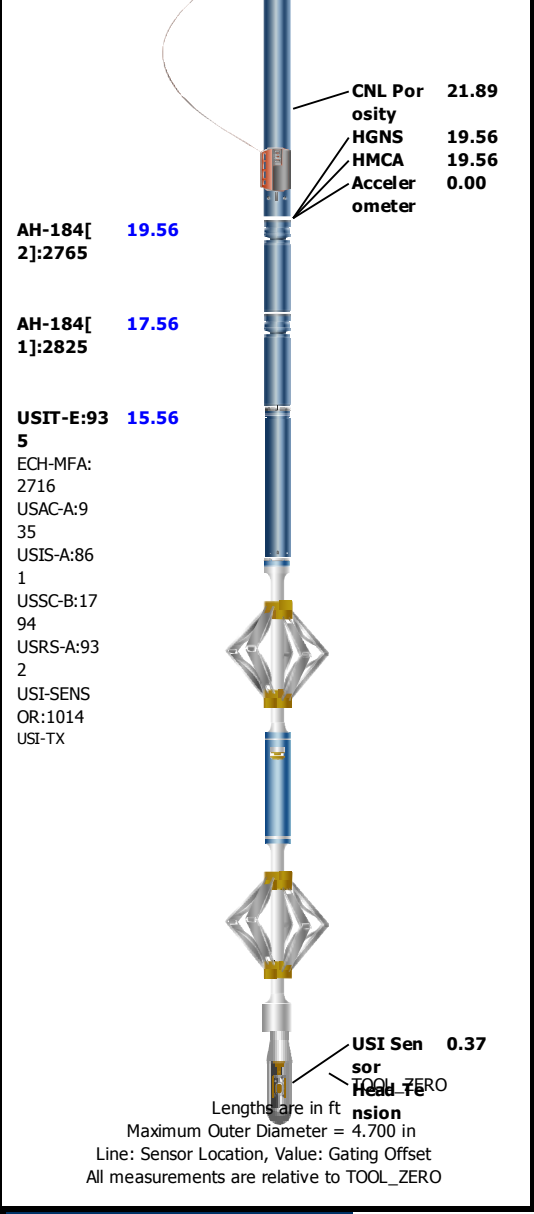
TOOLSTRING RAN AS PER TOOLSKETCH

TOOLSTRING CENTRALIZED WITH GEMCOS ON USAC AND USING BOOSTER KIT ON IN-LINE CENTRALIZERS

MAIN PASS LOGGED UNDER 2500PSI

REPEAT PASS LOGGED UNDER 0PSI

CREW: ROB STELTER, CODY SPENCE



Depth Summary

	ONE		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6527		
Calibration Date	28-Sep-2017		
Calibrator Serial Number	IDWC-C-57		
Calibration Cable Type	7-46 AXS		
Wheel Correction 1	-2		
Wheel Correction 2	-2		
Tension Device			
Type	CMTD-B/A		
Serial Number	147		
Calibration Date	28-NOV-2017		
Calibrator Serial Number	88310A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	16		
Calibration Peak Error	25		

Logging Cable

Type	7-32AS-XS		
Serial Number	F715040		
Length	23500.00 ft		
Conveyance Type	Wireline		
Rig Type	LAND		

ONE:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	ALL SCHLUMBERGER DEPTH CONTROL POLICIES AND GUIDELINES FOLLOWED
Rig Up Length At Surface		IDW USED AS PRMARY DEPTH CONTROL
Rig Up Length At Bottom		Z-CHART USED AS SECONDARY DEPTH CONTROL
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	6841.43	41.32

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 : 67.42m(221.21ft) to 76.23m(250.09ft)
MUD_N_FRP = 1.16
DFD = 1.01g/cm3(8.40lbm/gal)
CZMD median computed in free pipe normalization interval = 1.67 MRayl

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

ONE

DJ BASIN MAIN PASS @2500PSI @10DEG X 6IN [5:100]

Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.102758.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	41.32 ft	6841.43 ft	07-May-2019 11:20:31 AM	07-May-2019 1:29:24 PM	ON	6.77 ft	Yes

All depths are referenced to toolstring zero

Log

Company:NOBLE ENERGY INC. Well:VOGLER STATE D21-720

ONE: Log[4]:Up:S007

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: 07-May-2019 15:15:40

TIME_1900 - Time Marked every 60.00 (s)

Casing Collar Locator Ultrasonic (CCLU) USIT-E

-20 in 1

Amplitude of Eccentering (ECCE) USIT-E

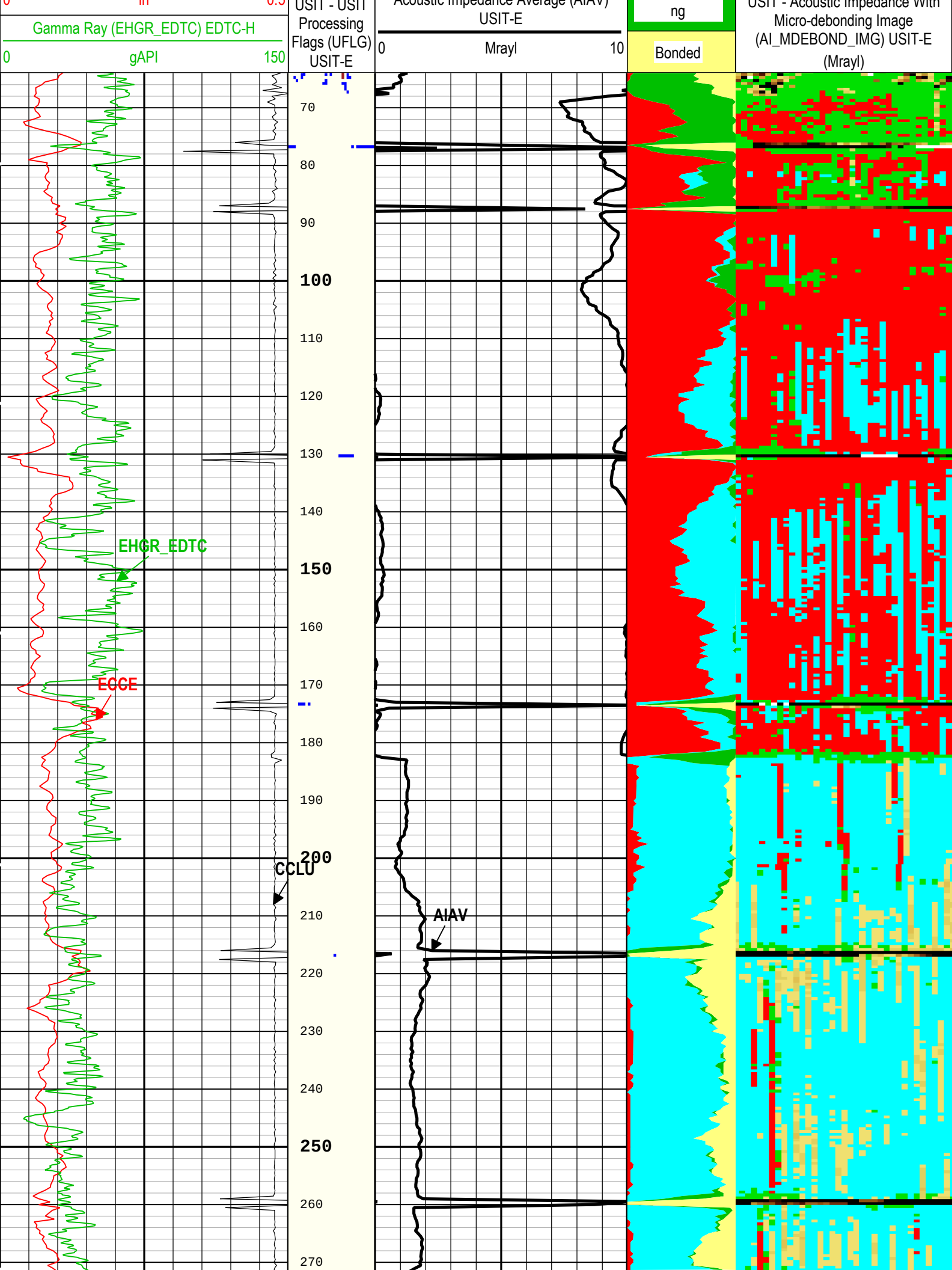
0 in 0.5

U L B R U
Orientation: Top of Hole
Absent 1.500 2.500 6.500
Explicit Normalization

Acoustic Impedance Average (AIAV)

Gas
Liquid
Micro-Debondi

U L B R U
Orientation: Top of Hole
Absent -500.000 2.200 3.254 4.309 5.363 6.418 7.472
Custom Normalization
USIT - Acoustic Impedance With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Gamma Ray (EHGR_EDTC) EDTC-H
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USIT - USIT Processing Flags (UFLG) USIT-E
Acoustic Impedance Average (AIAV) USIT-E
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USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)
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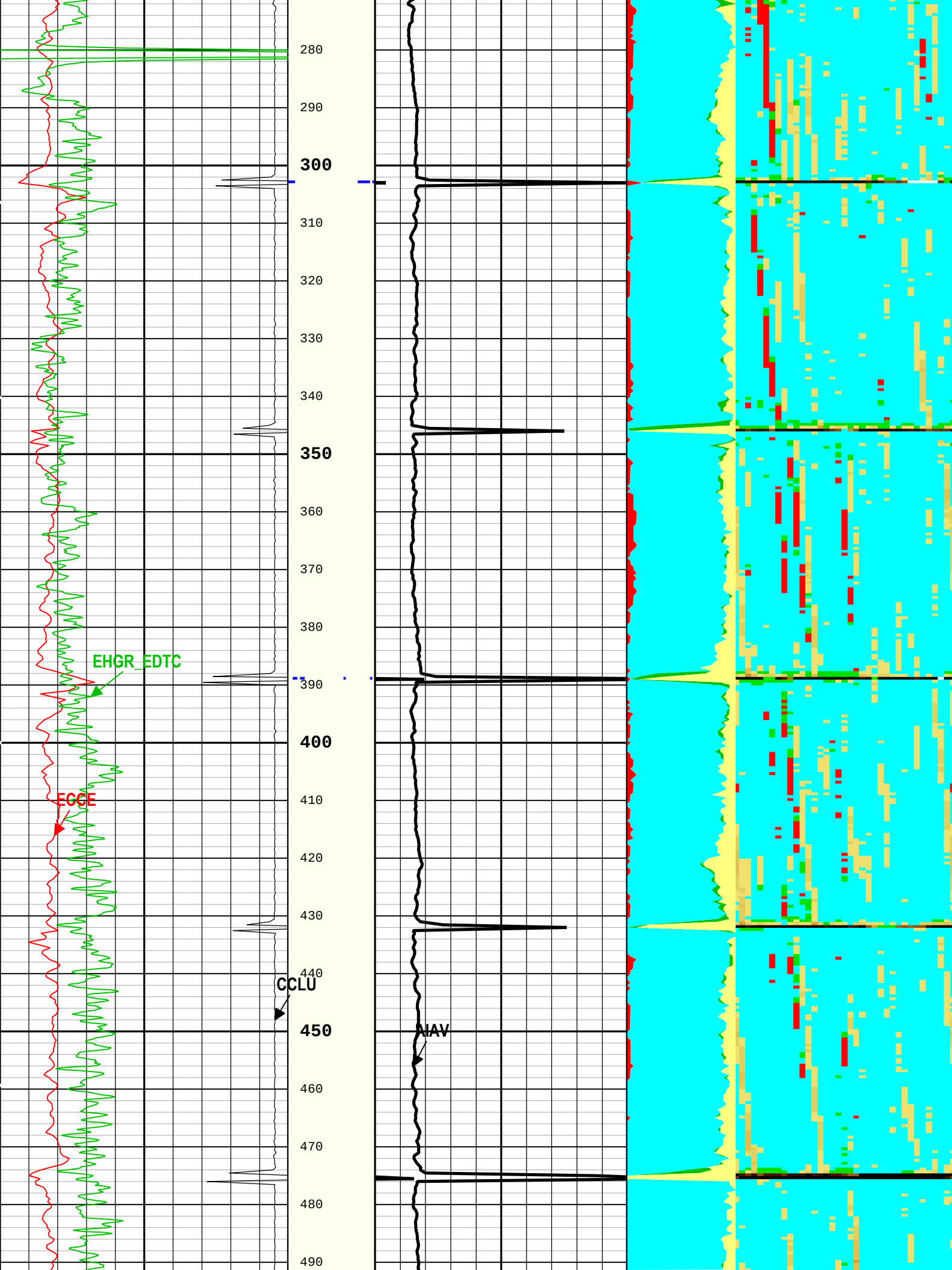
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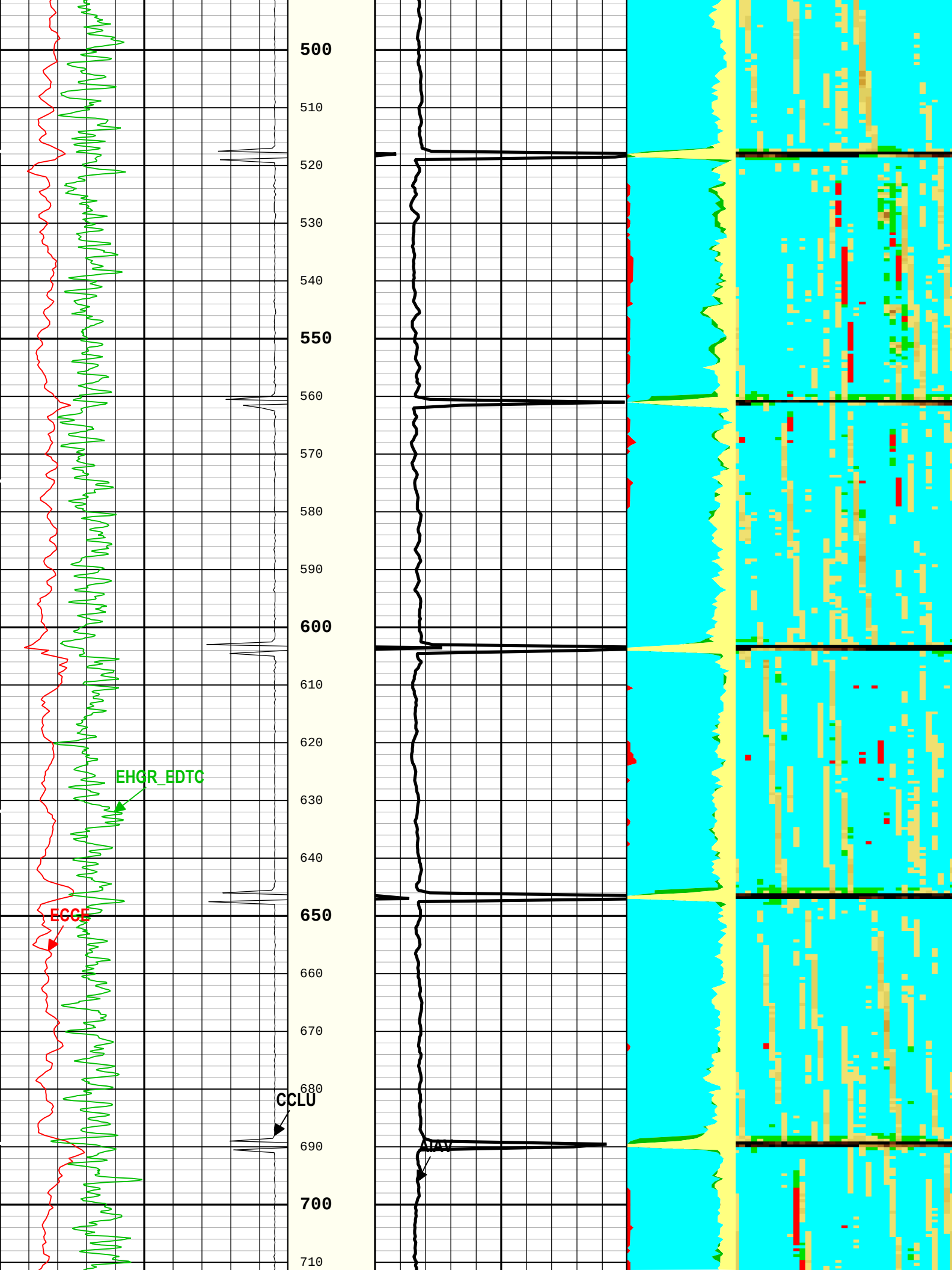
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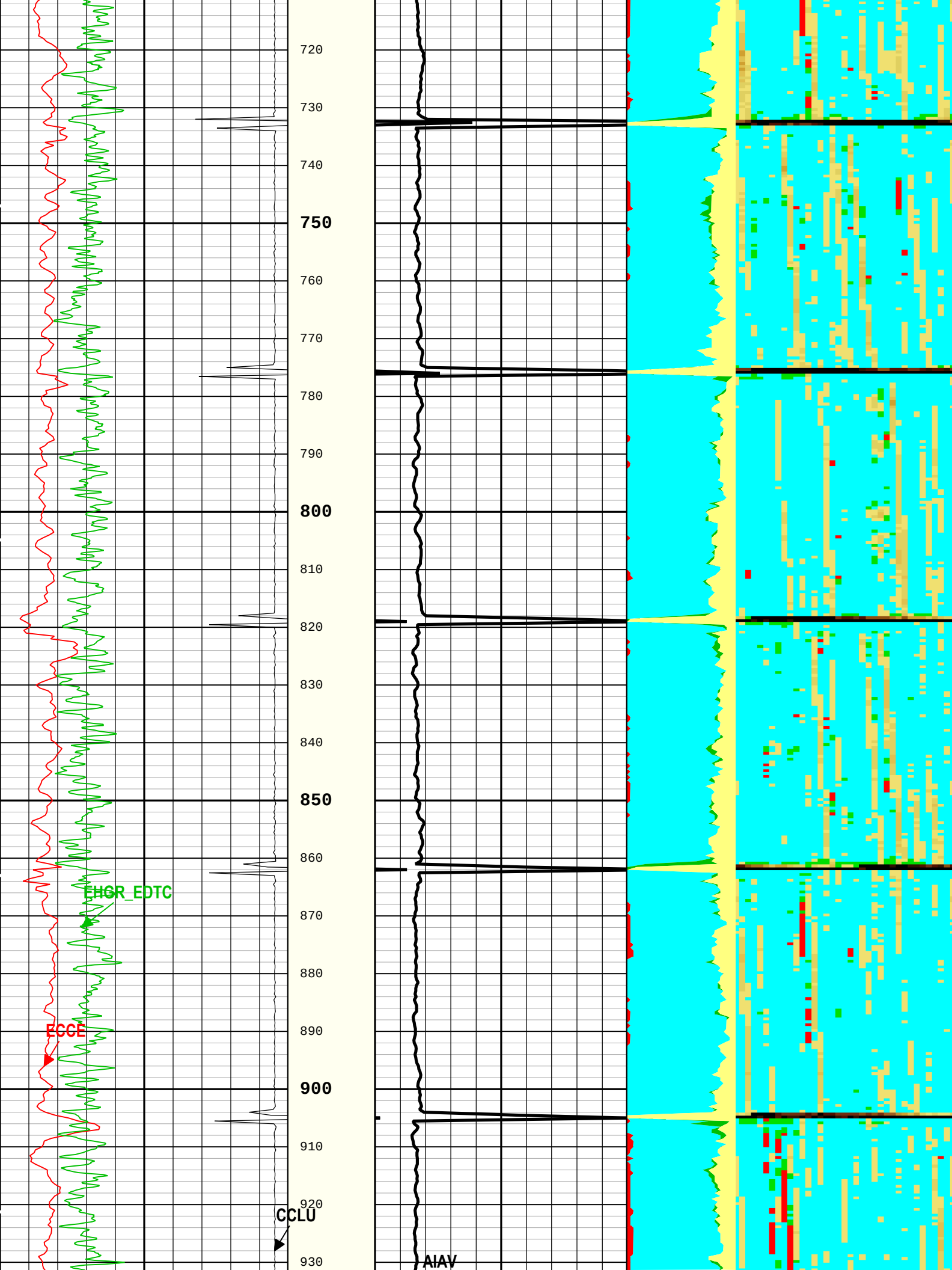
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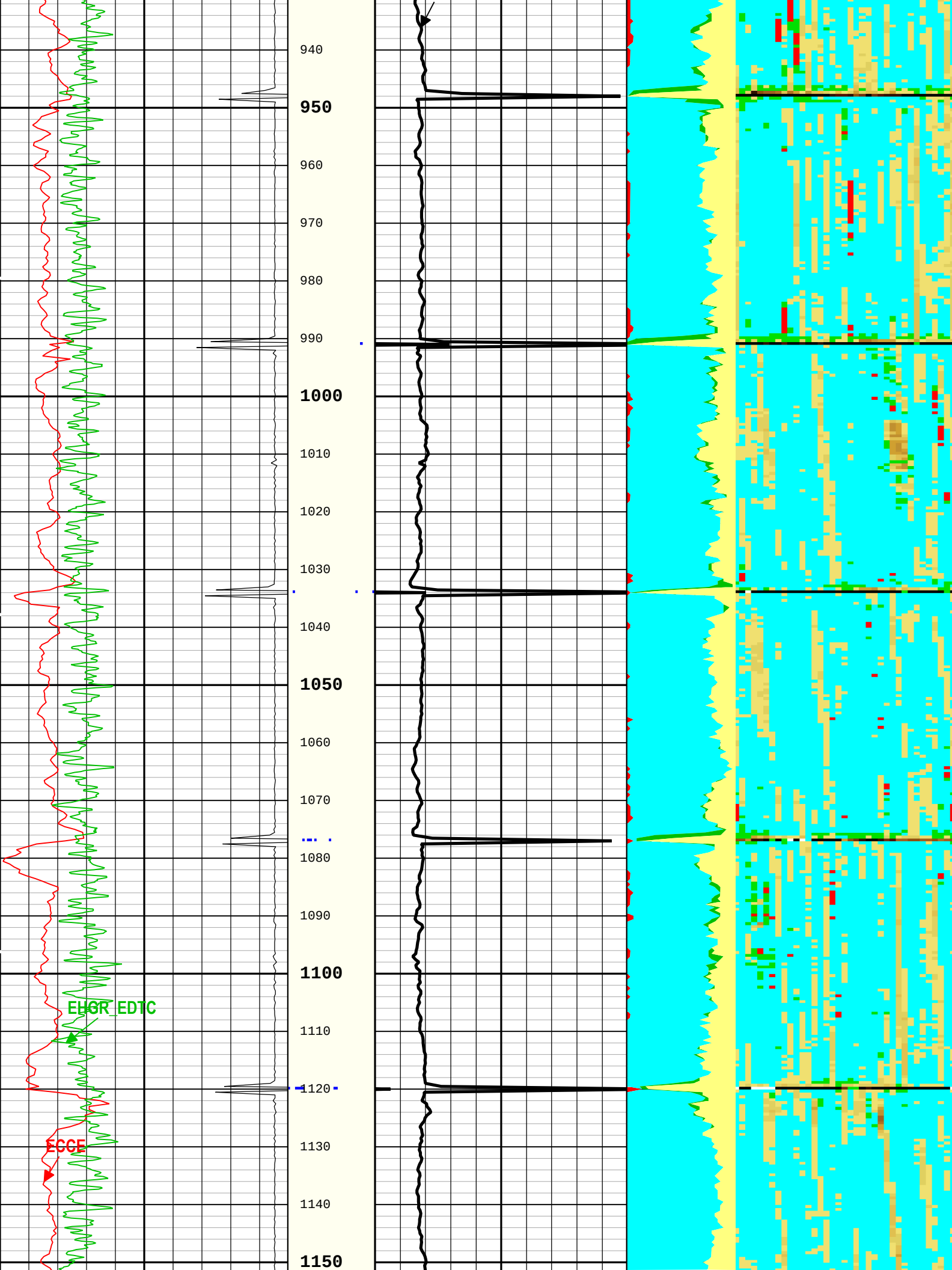
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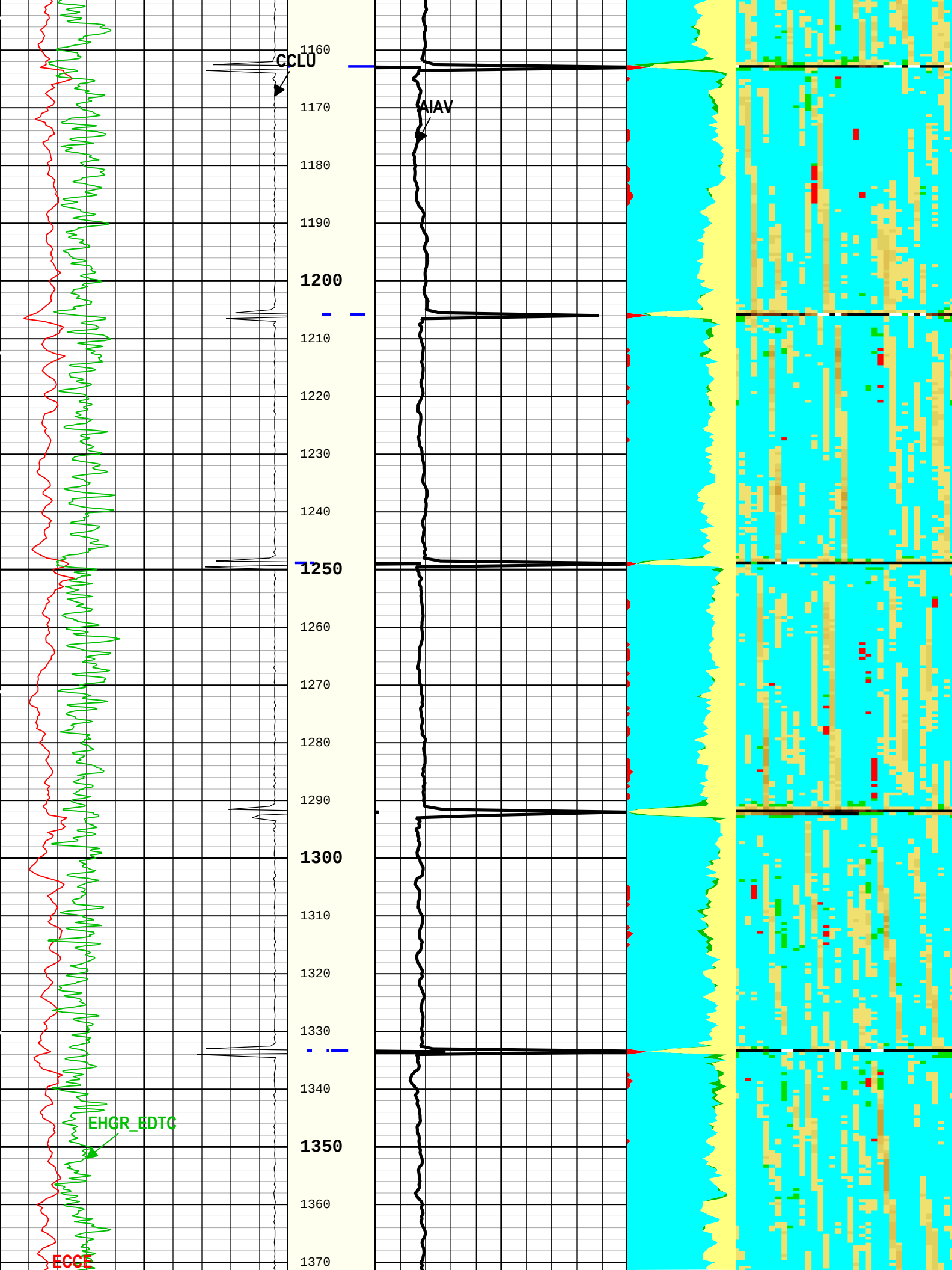
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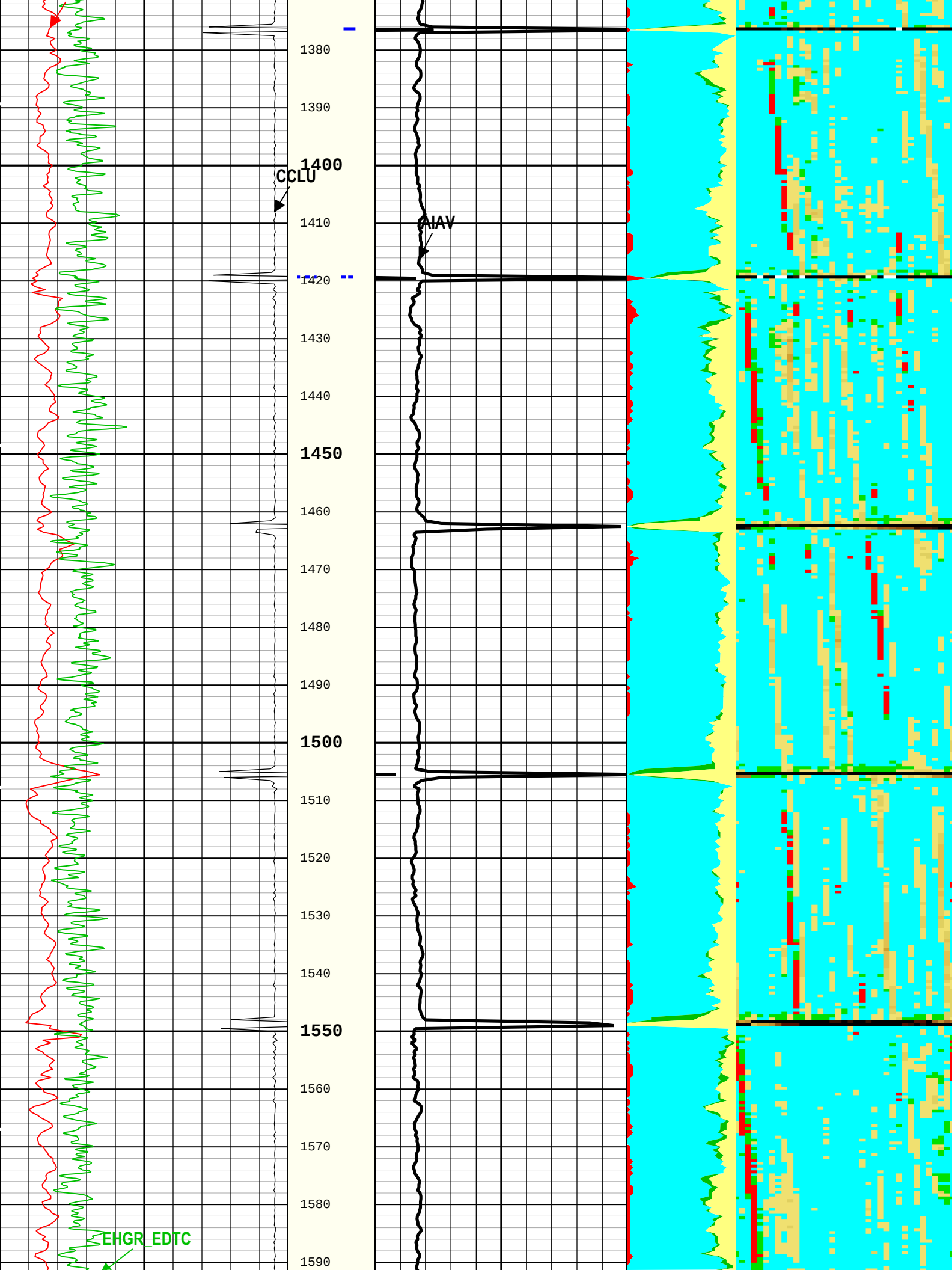
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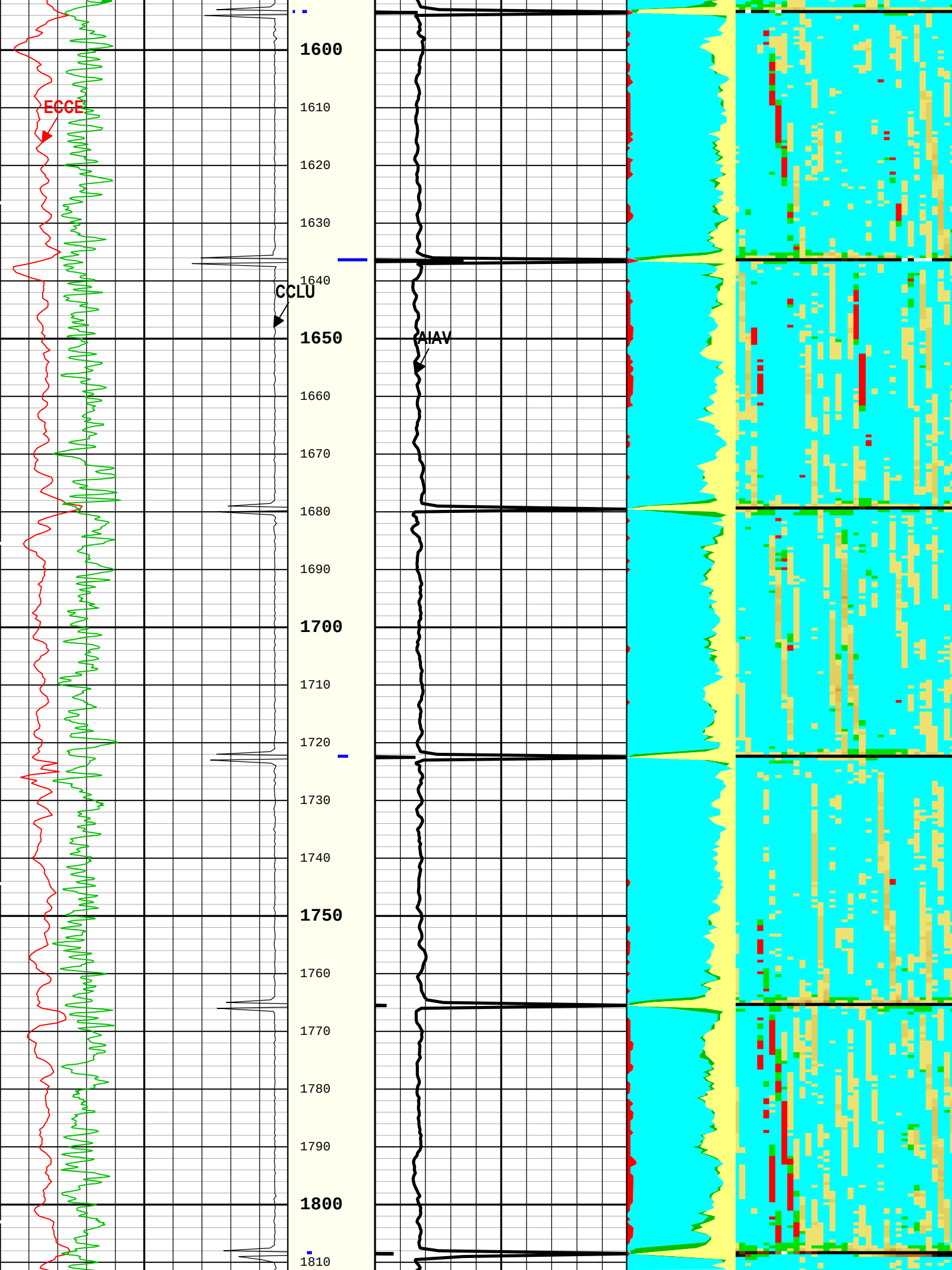
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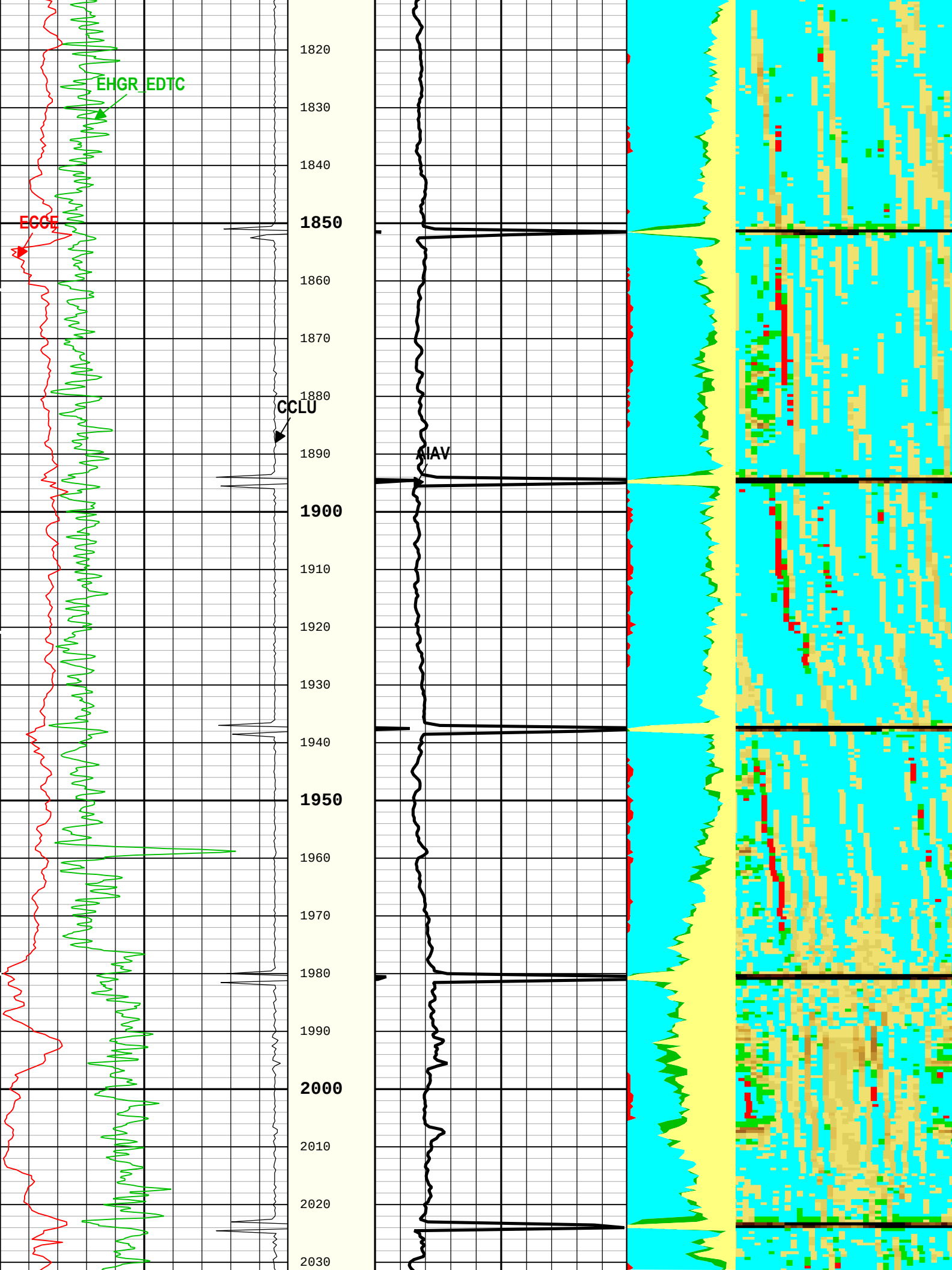
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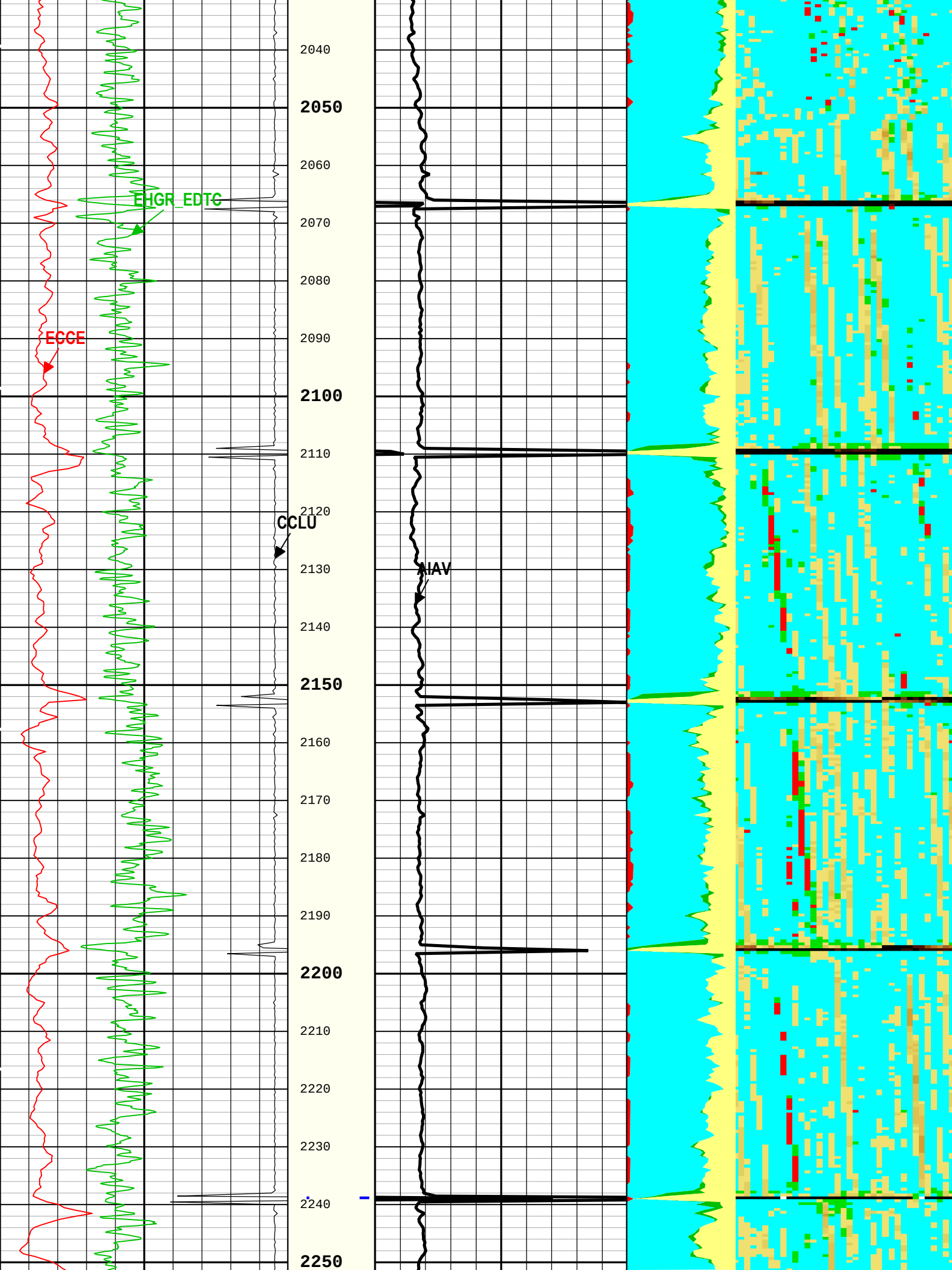
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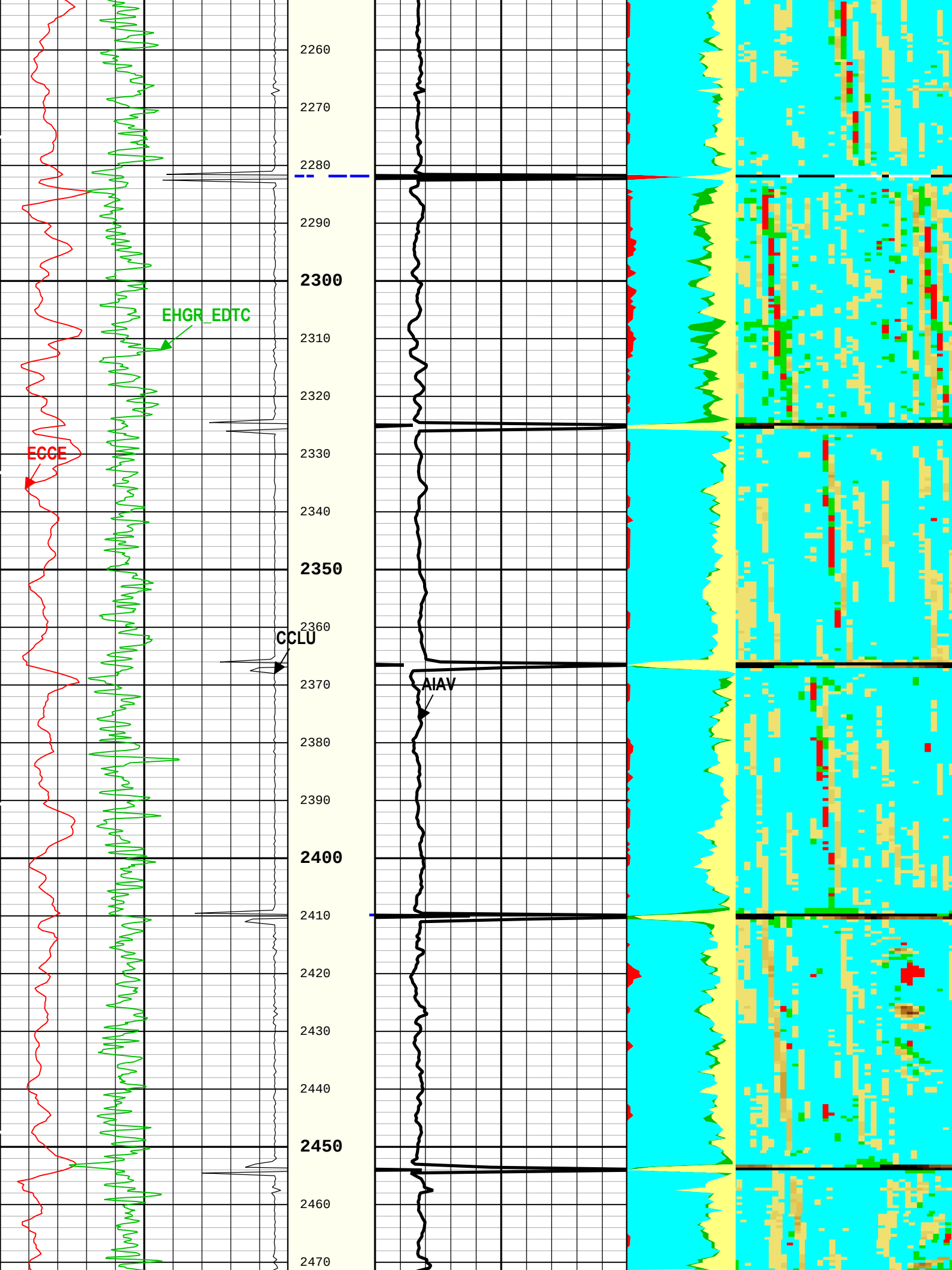
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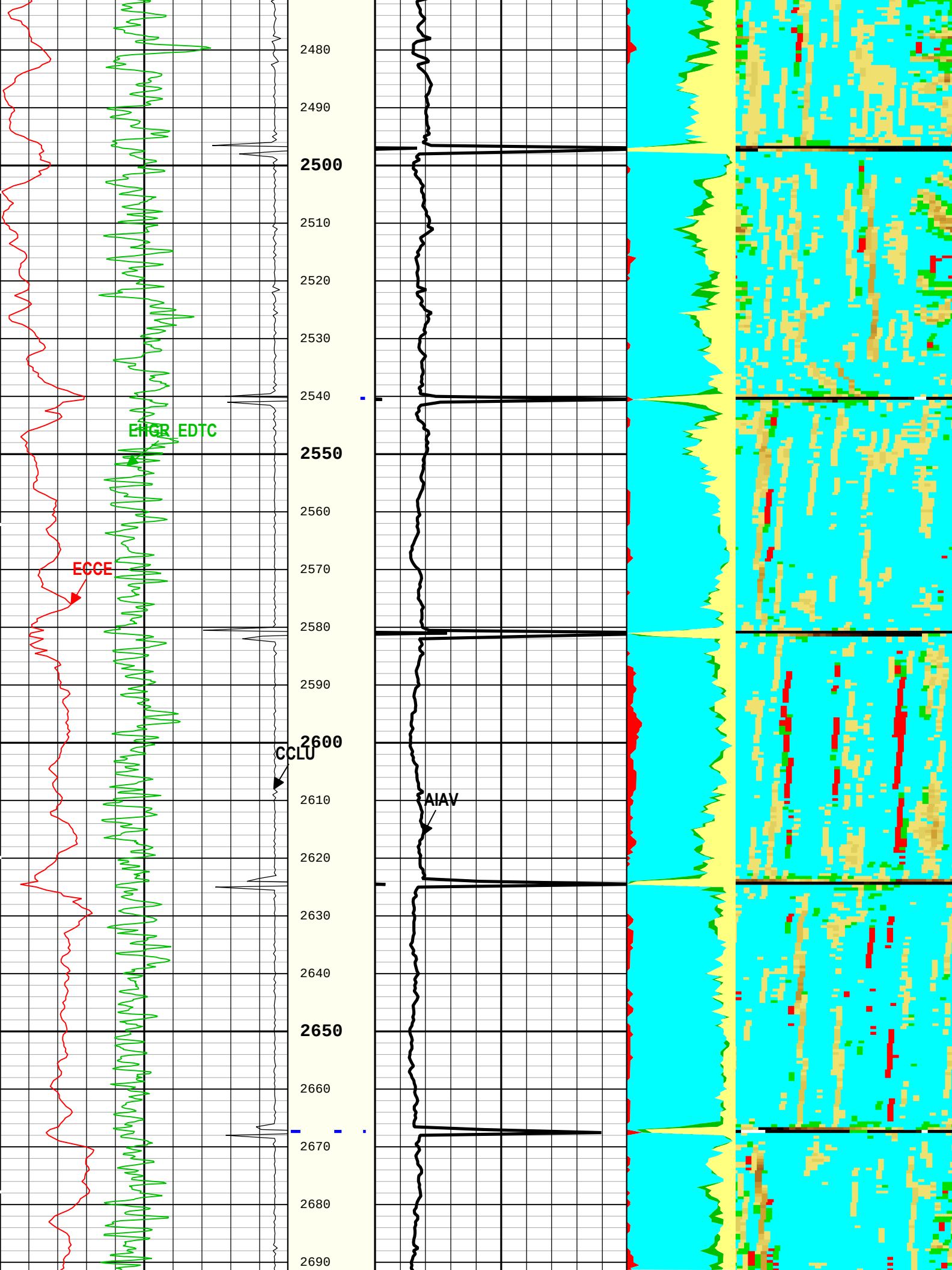
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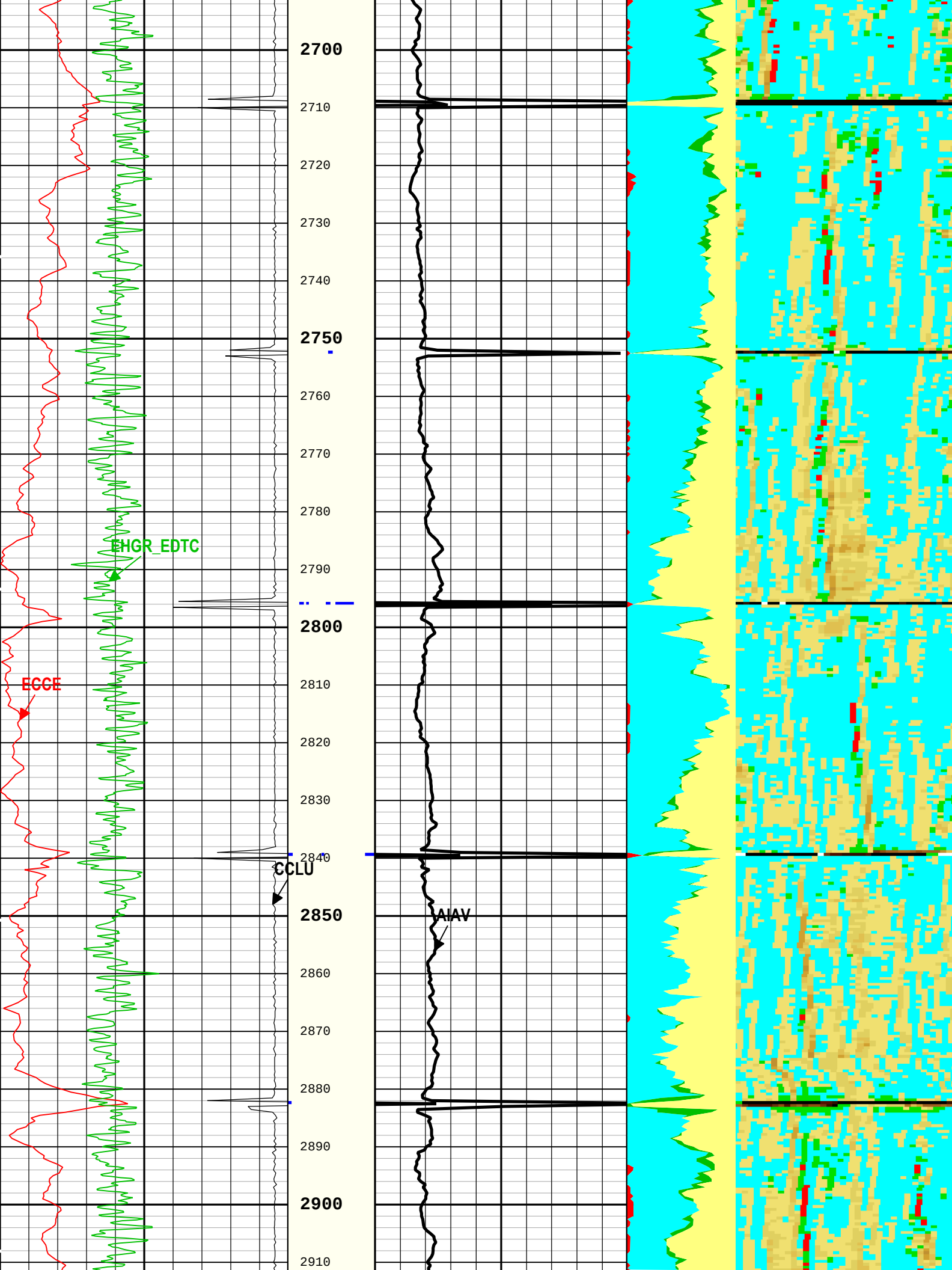
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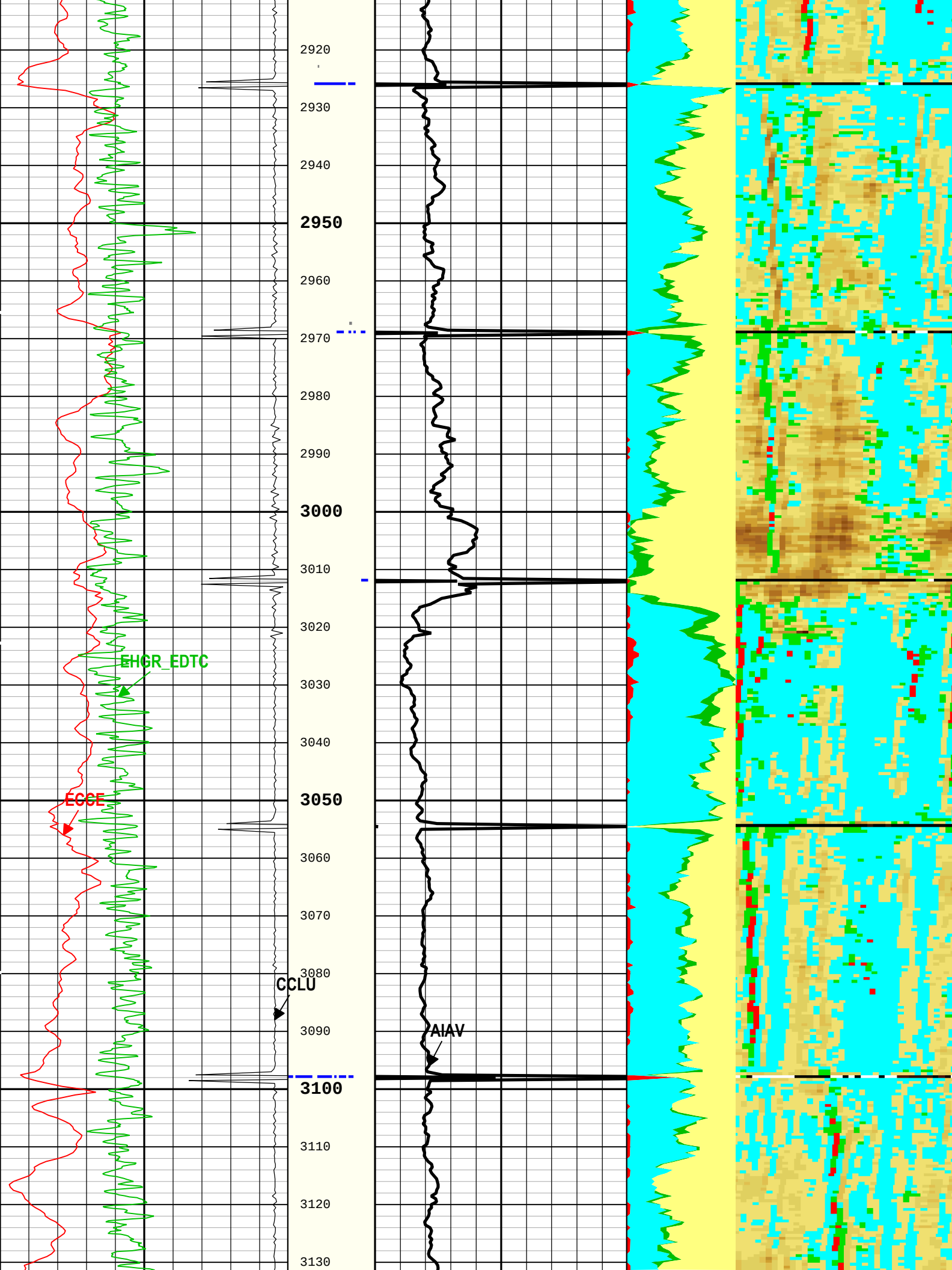
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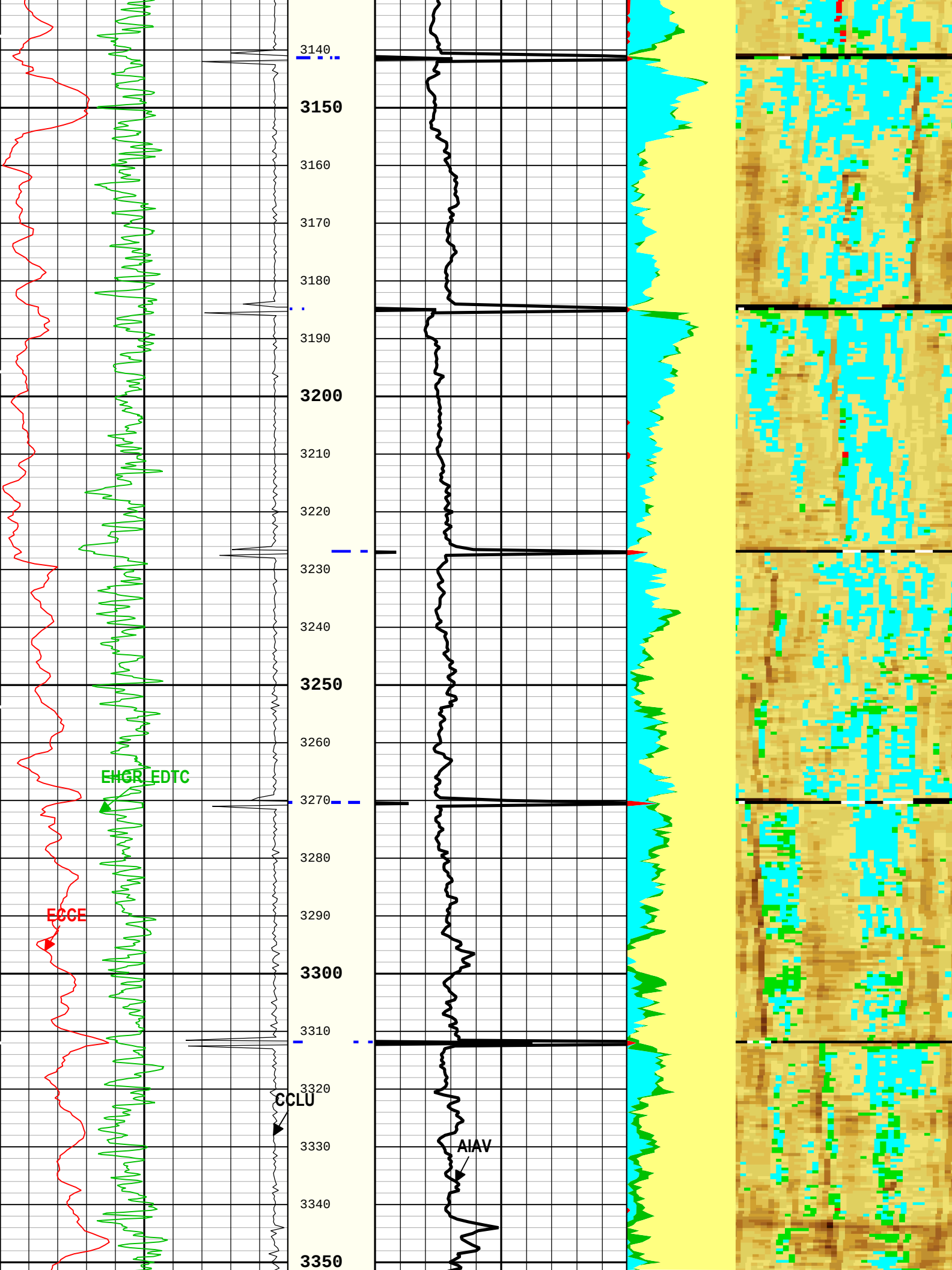
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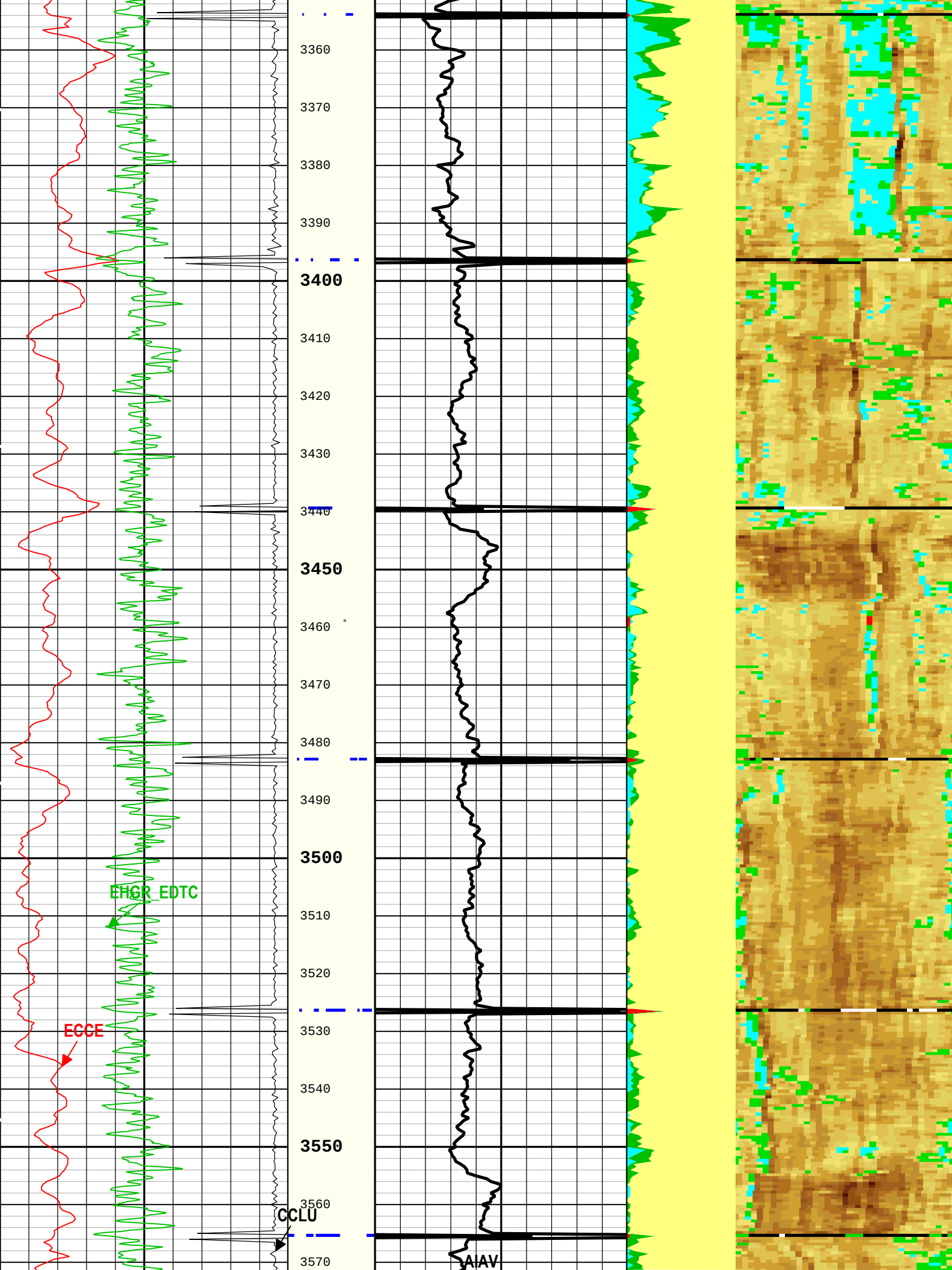
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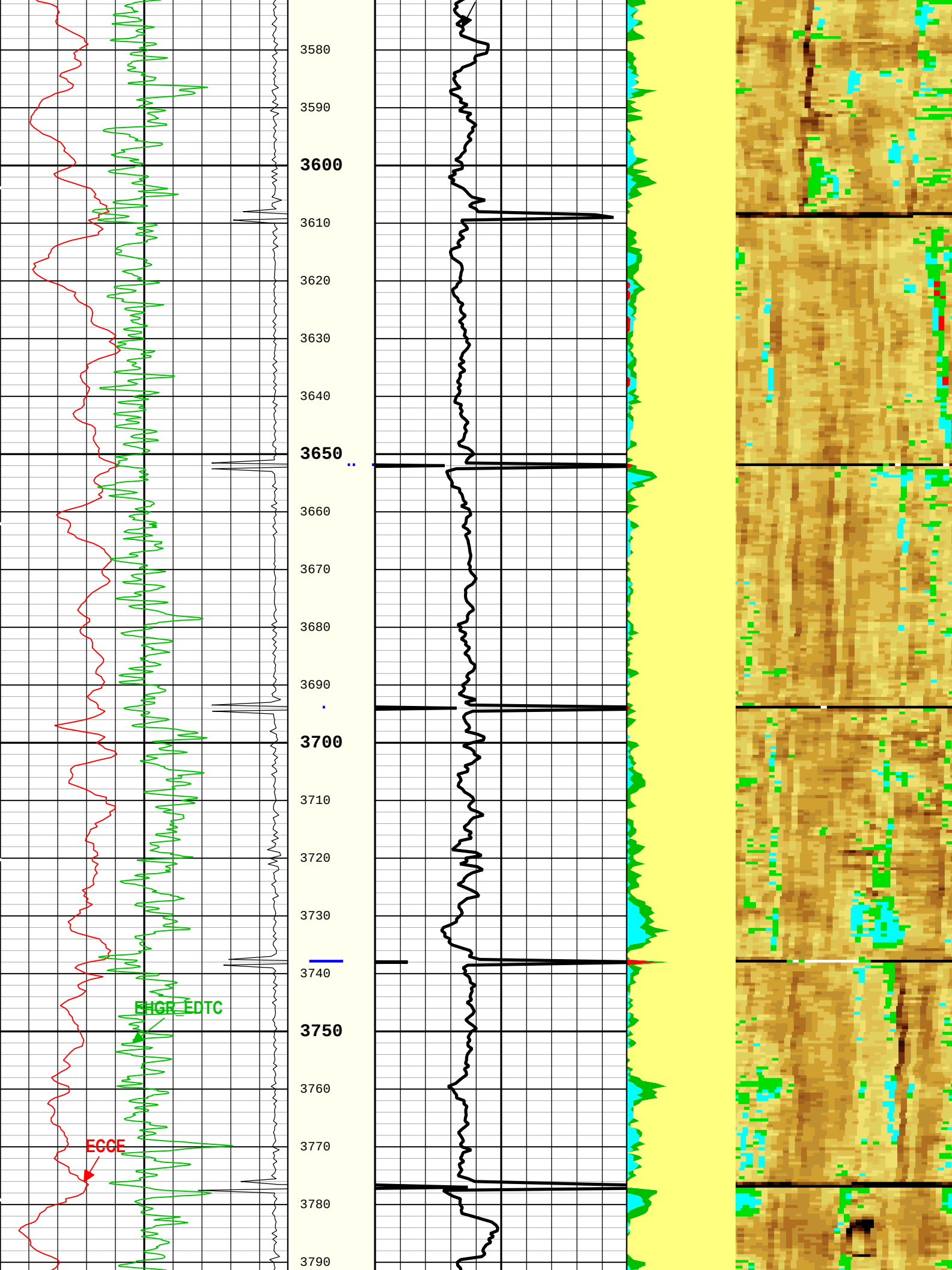
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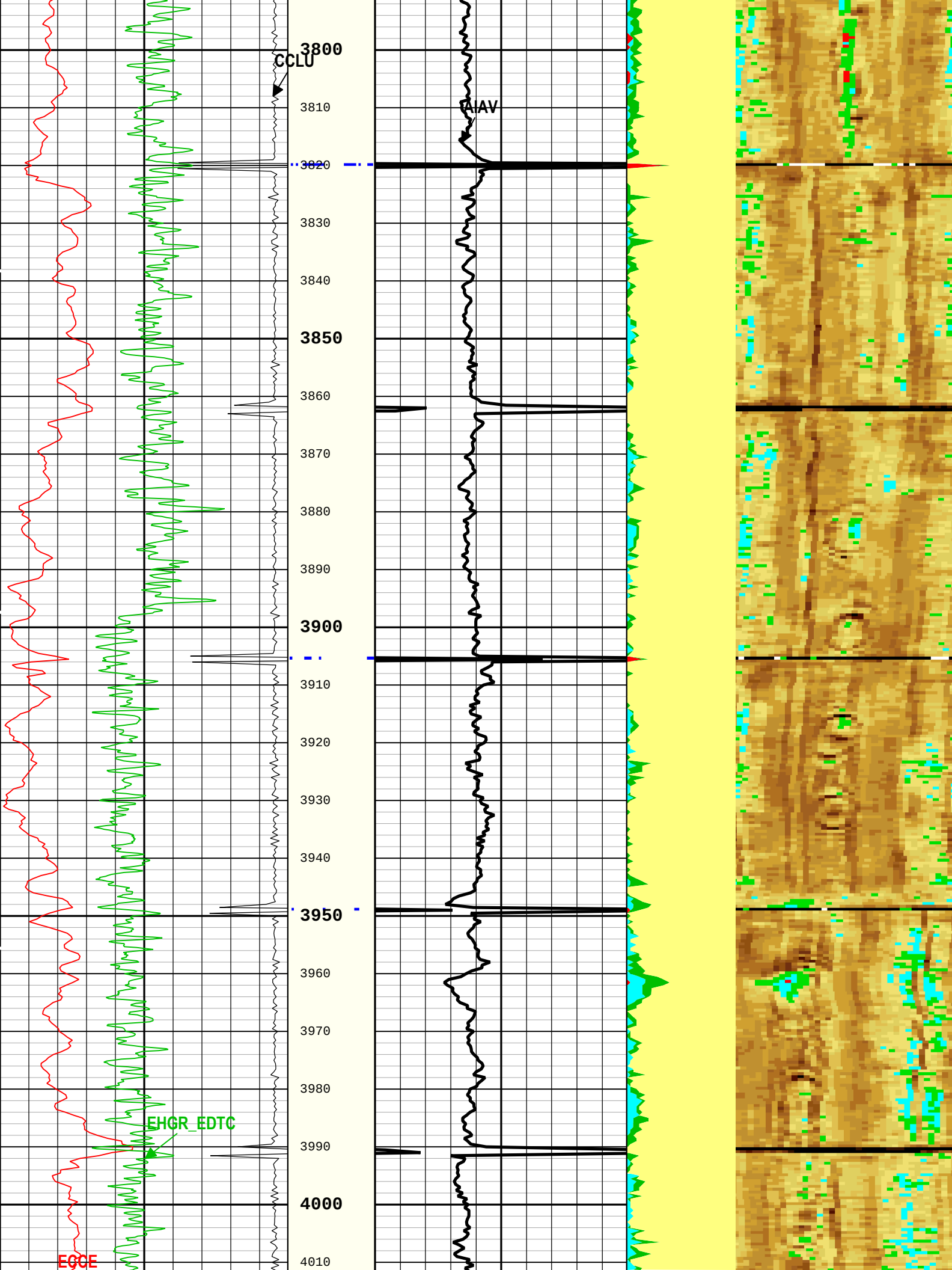
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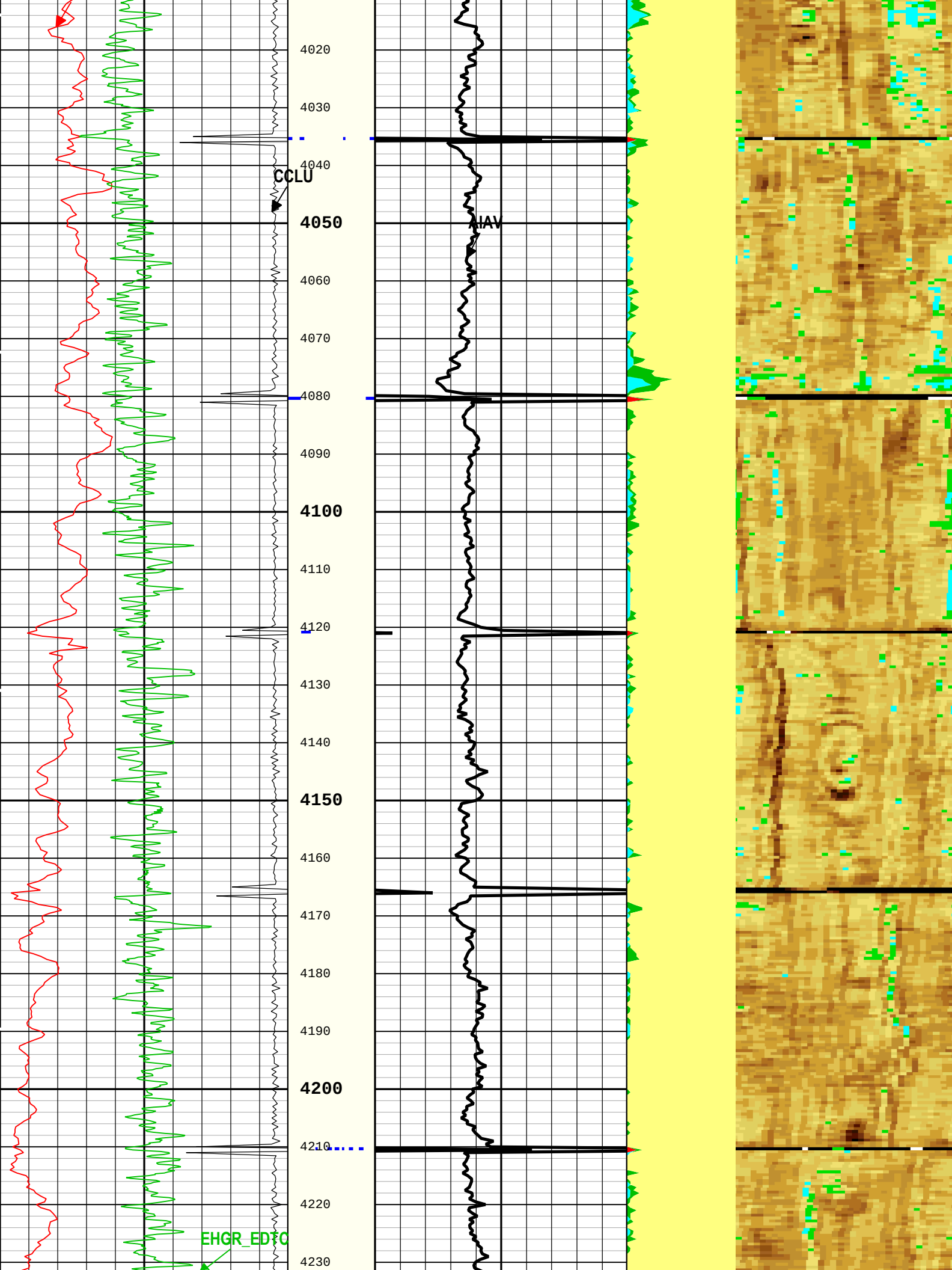
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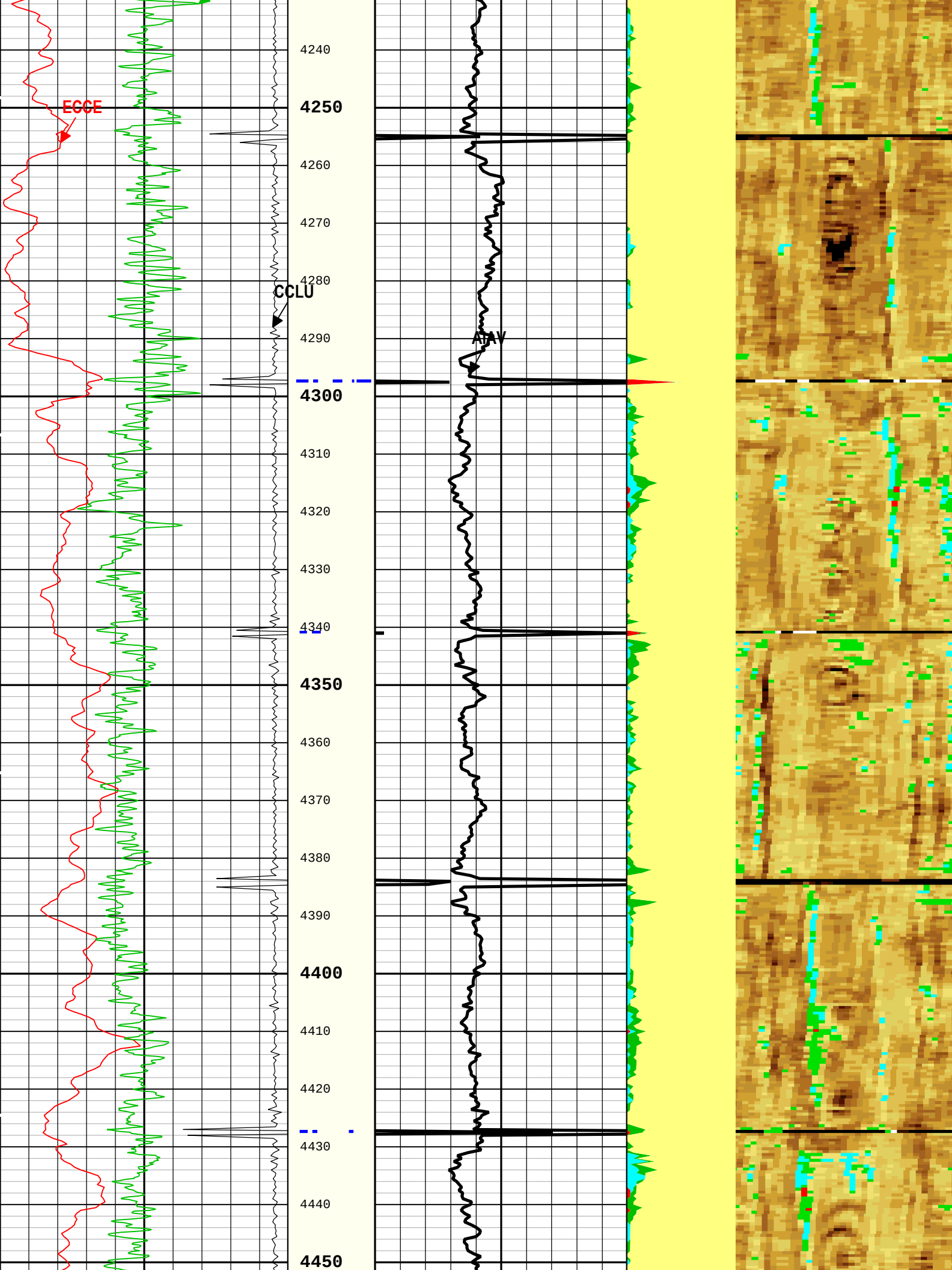
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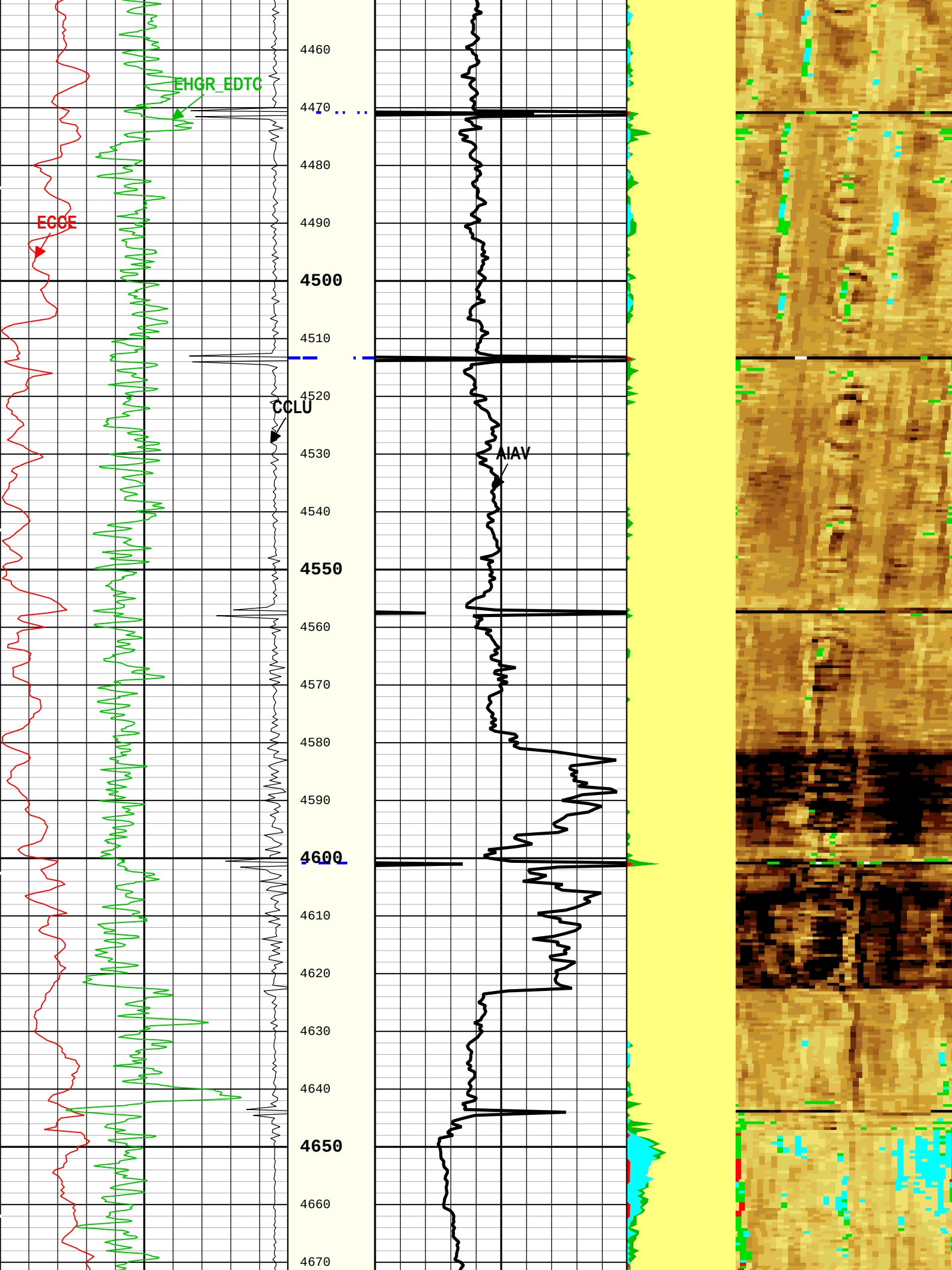
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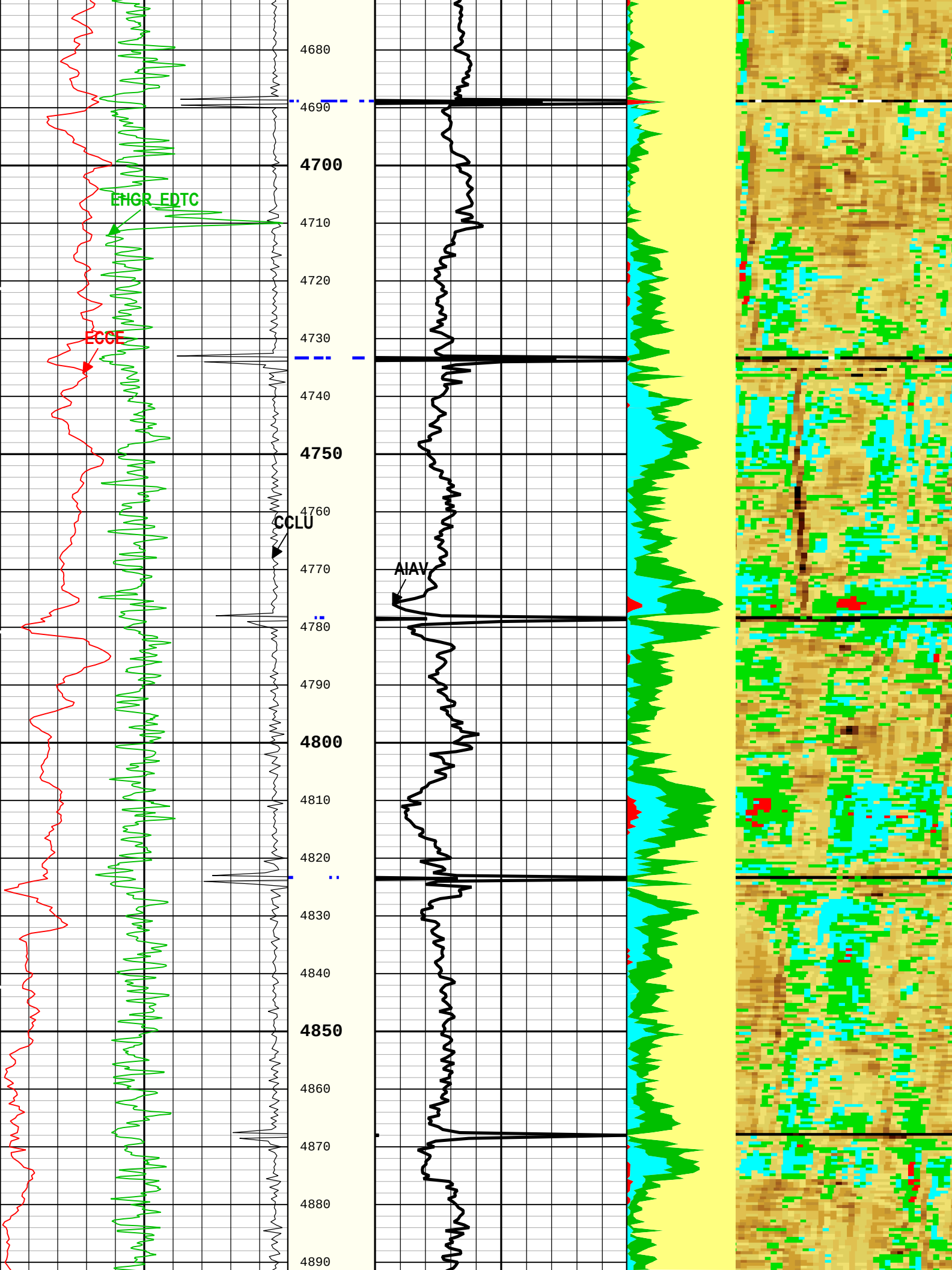
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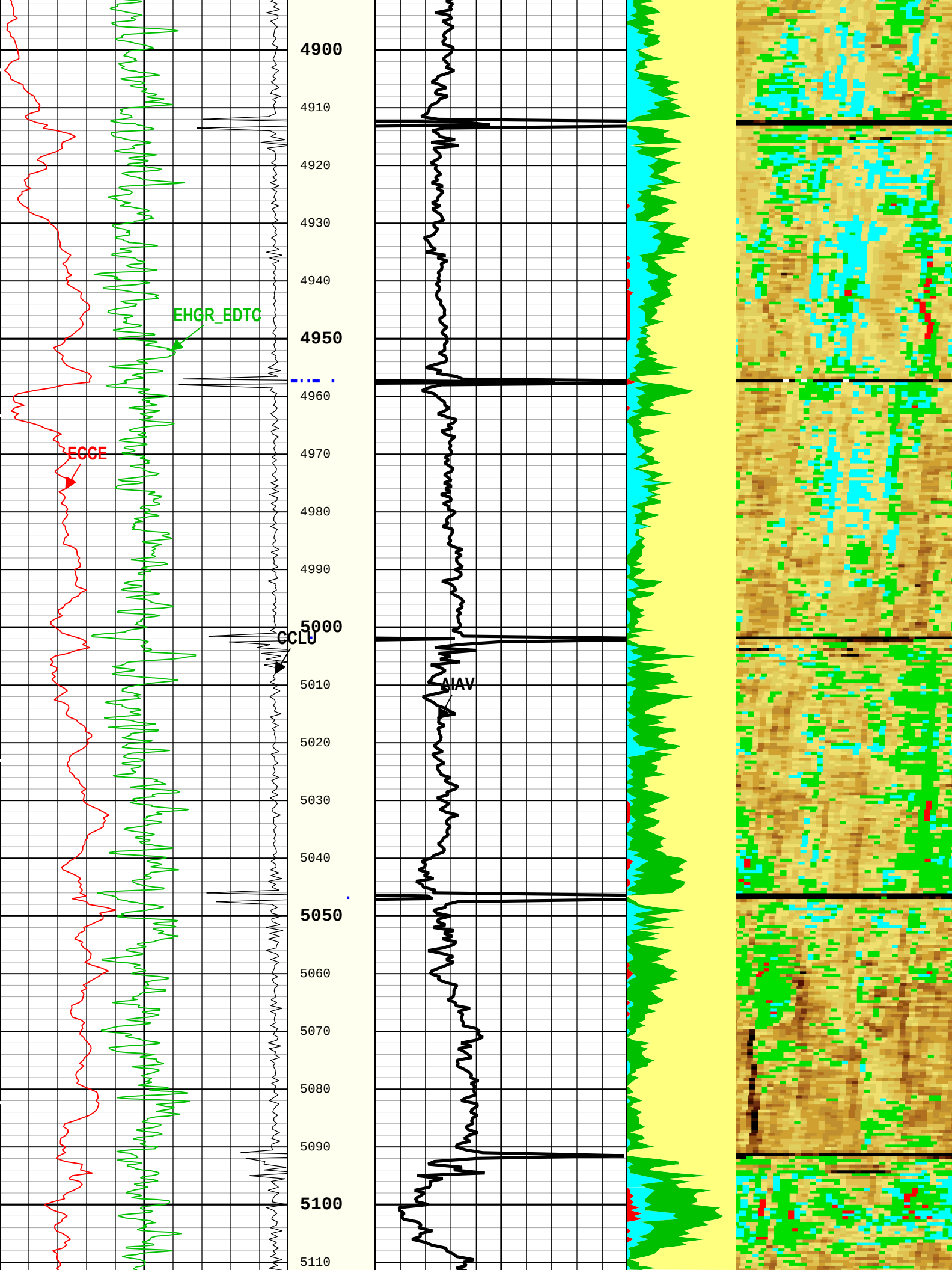
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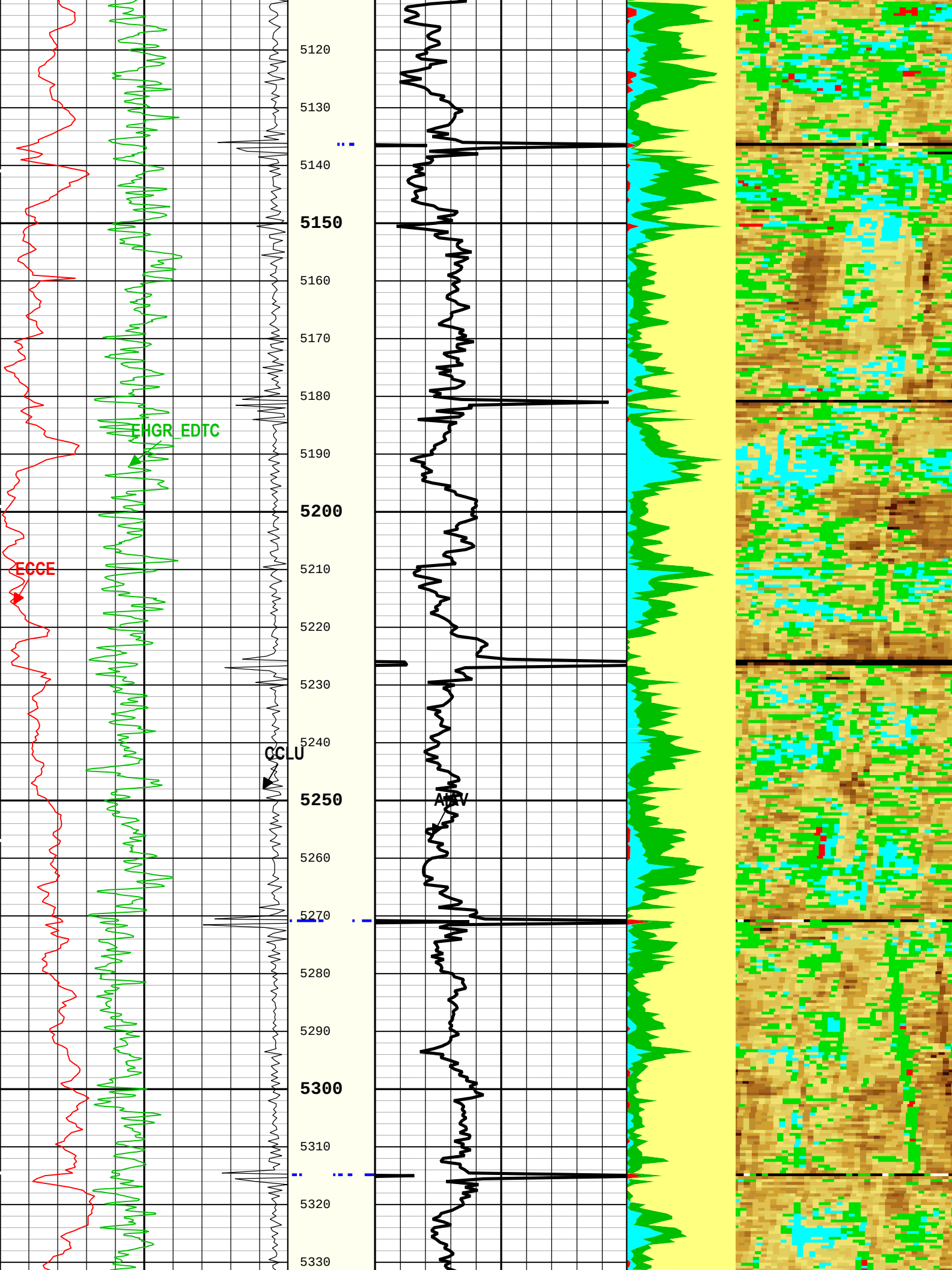
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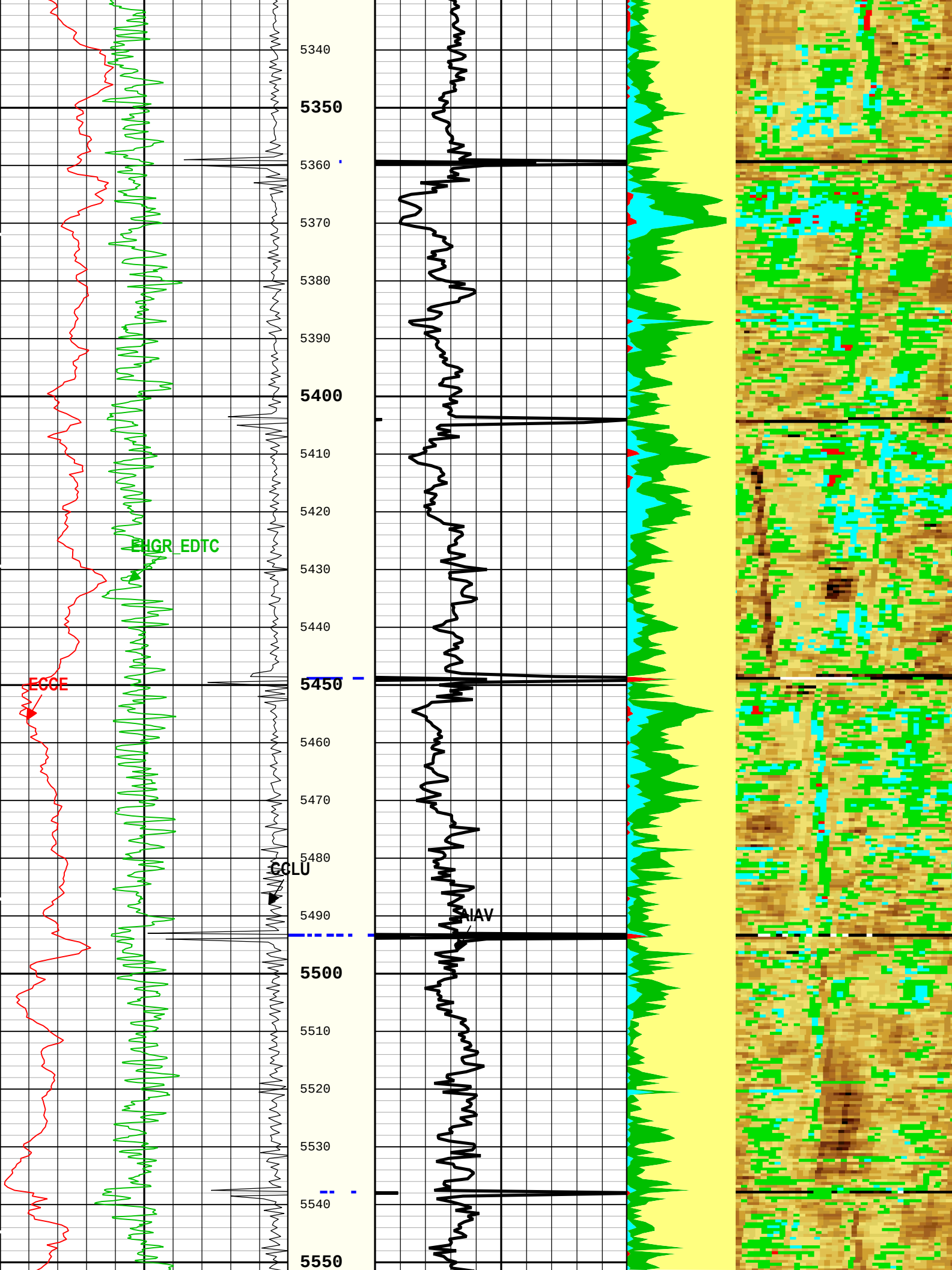
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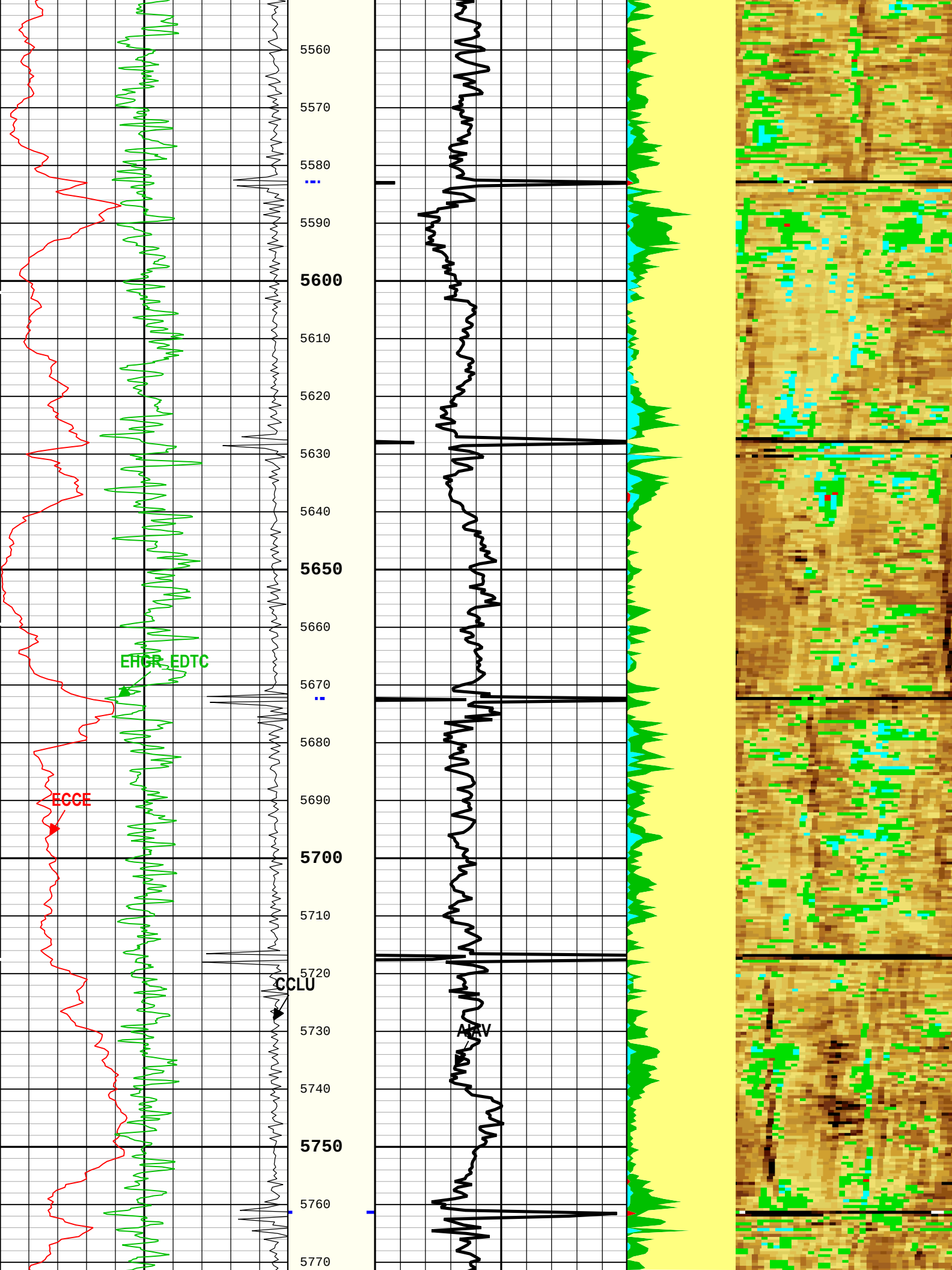
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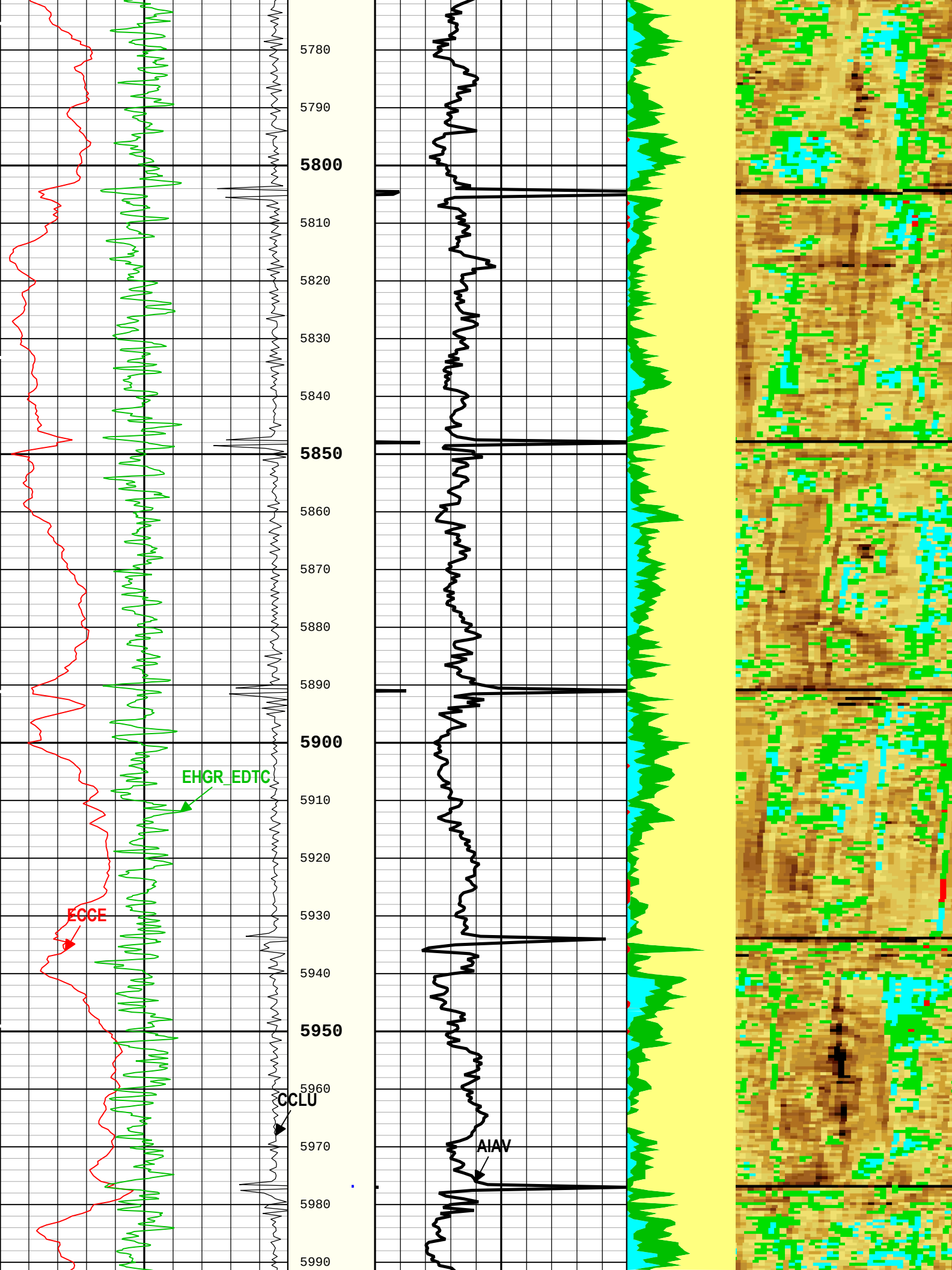
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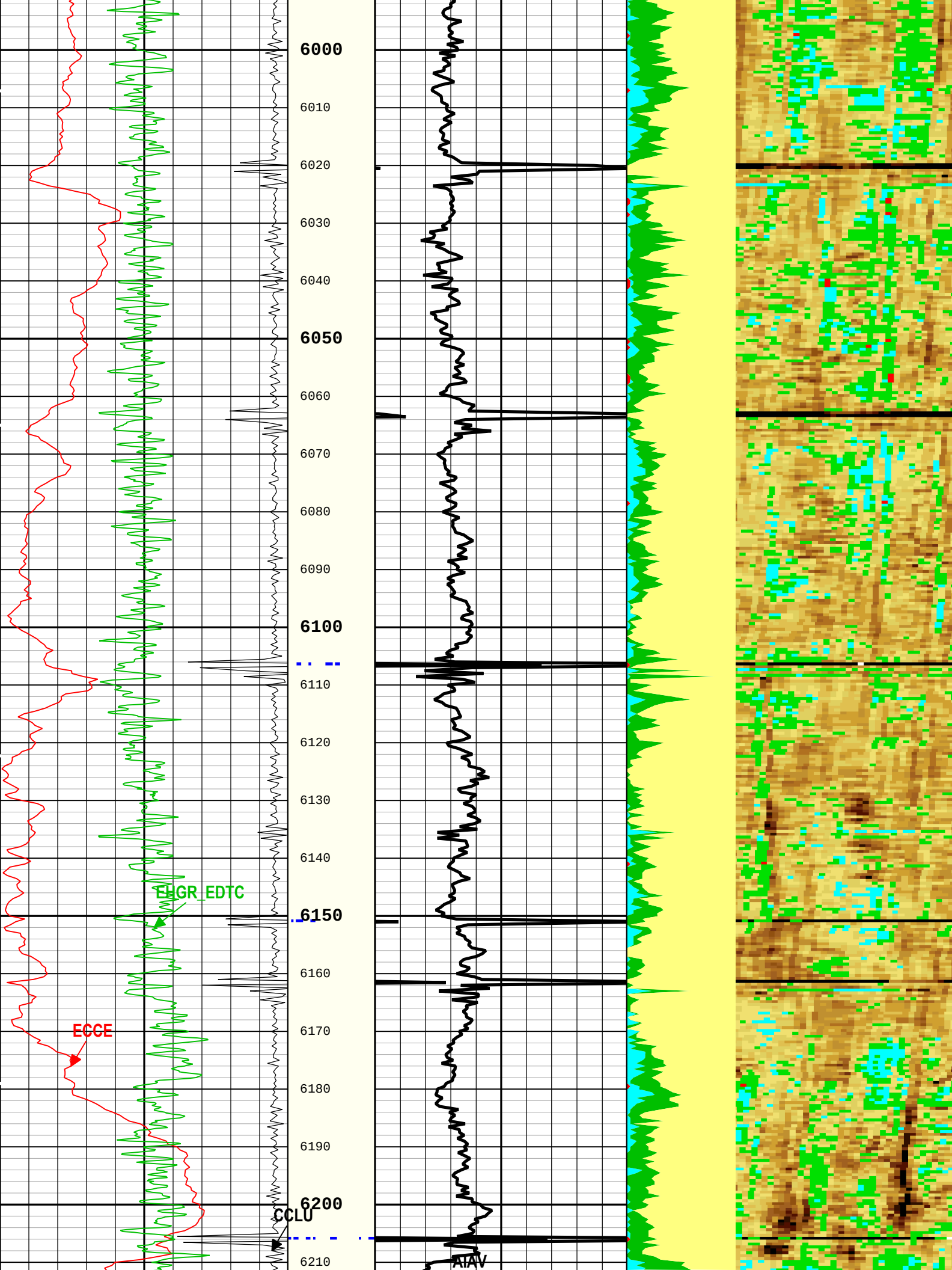
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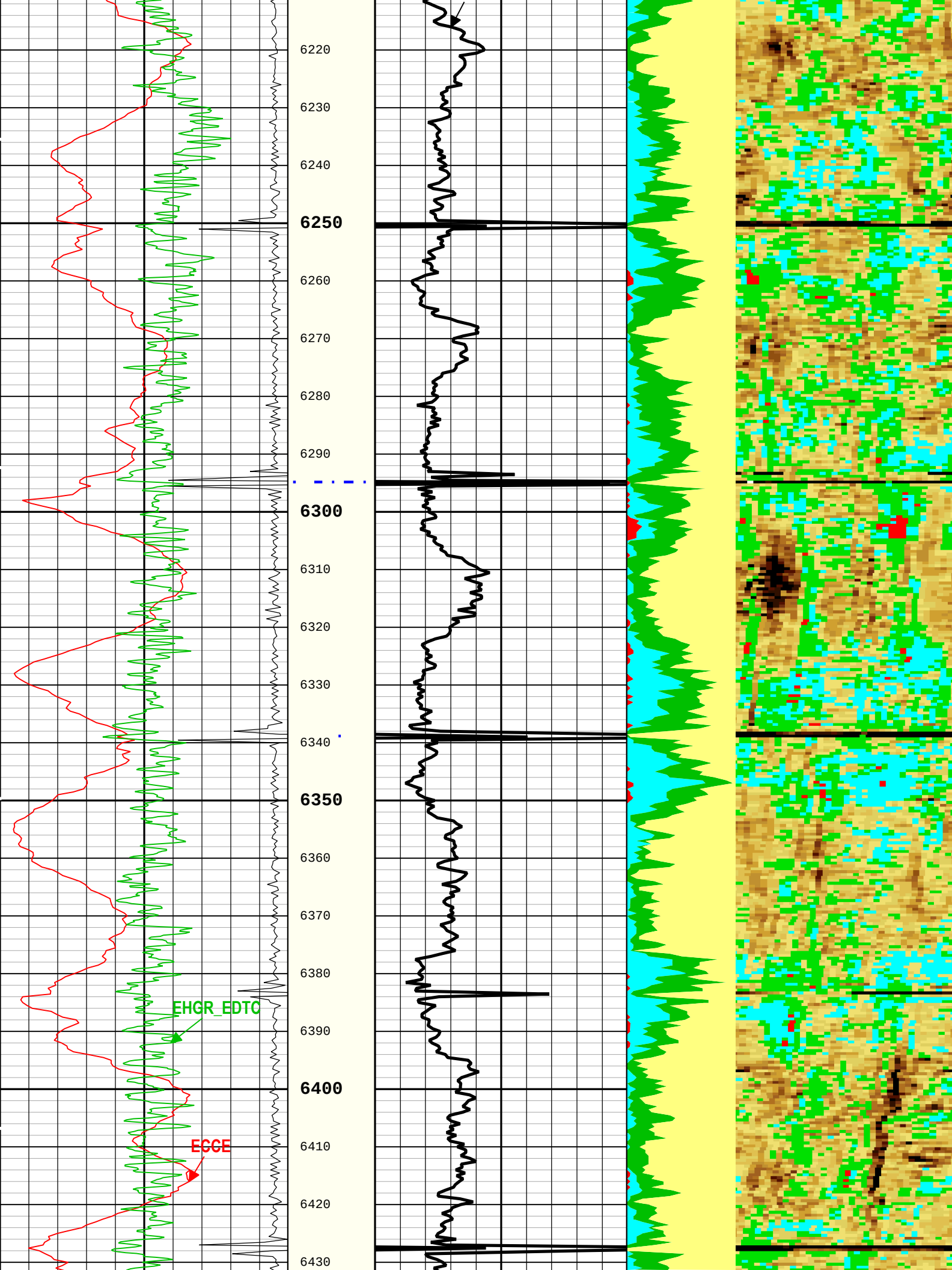
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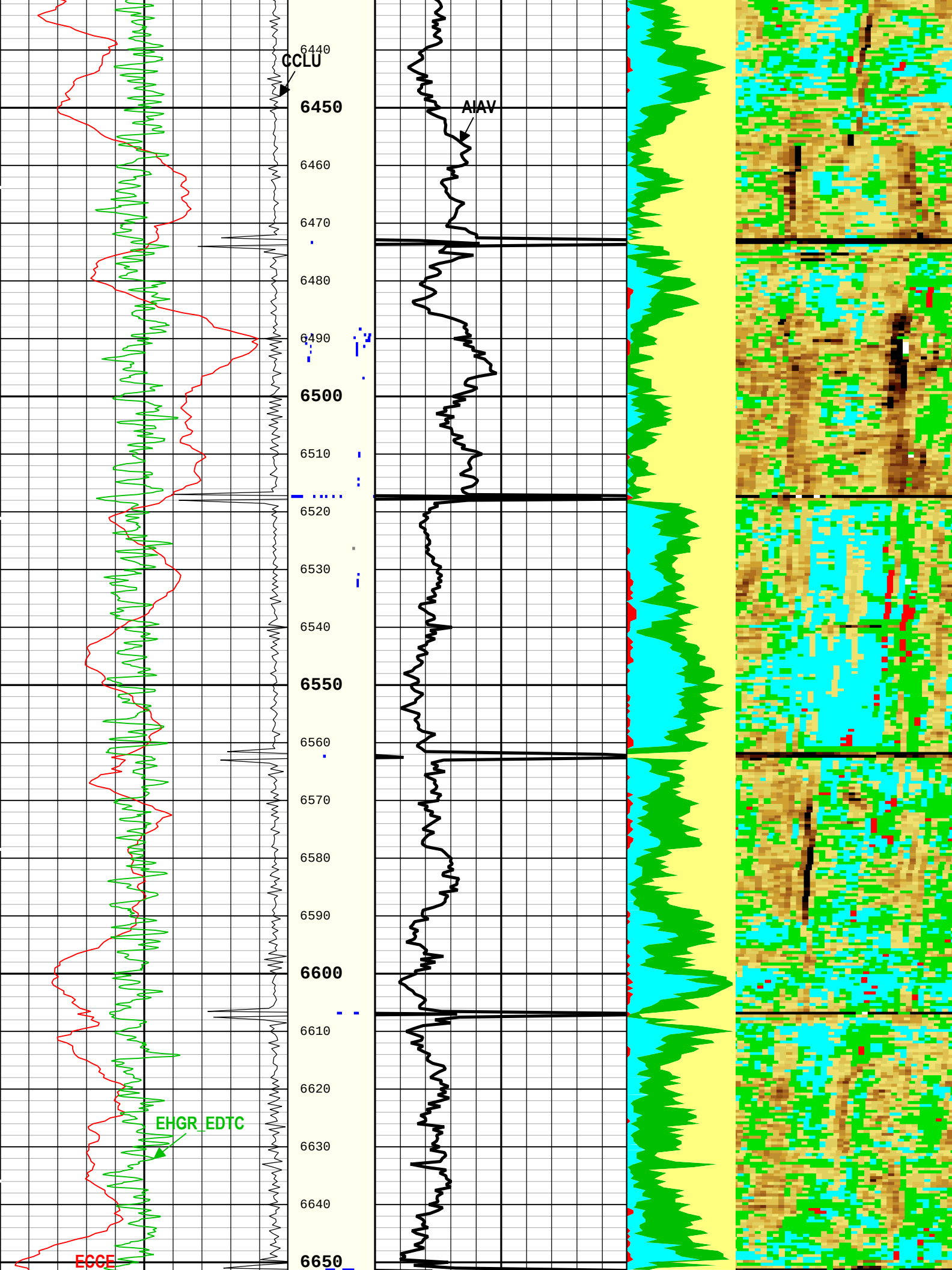
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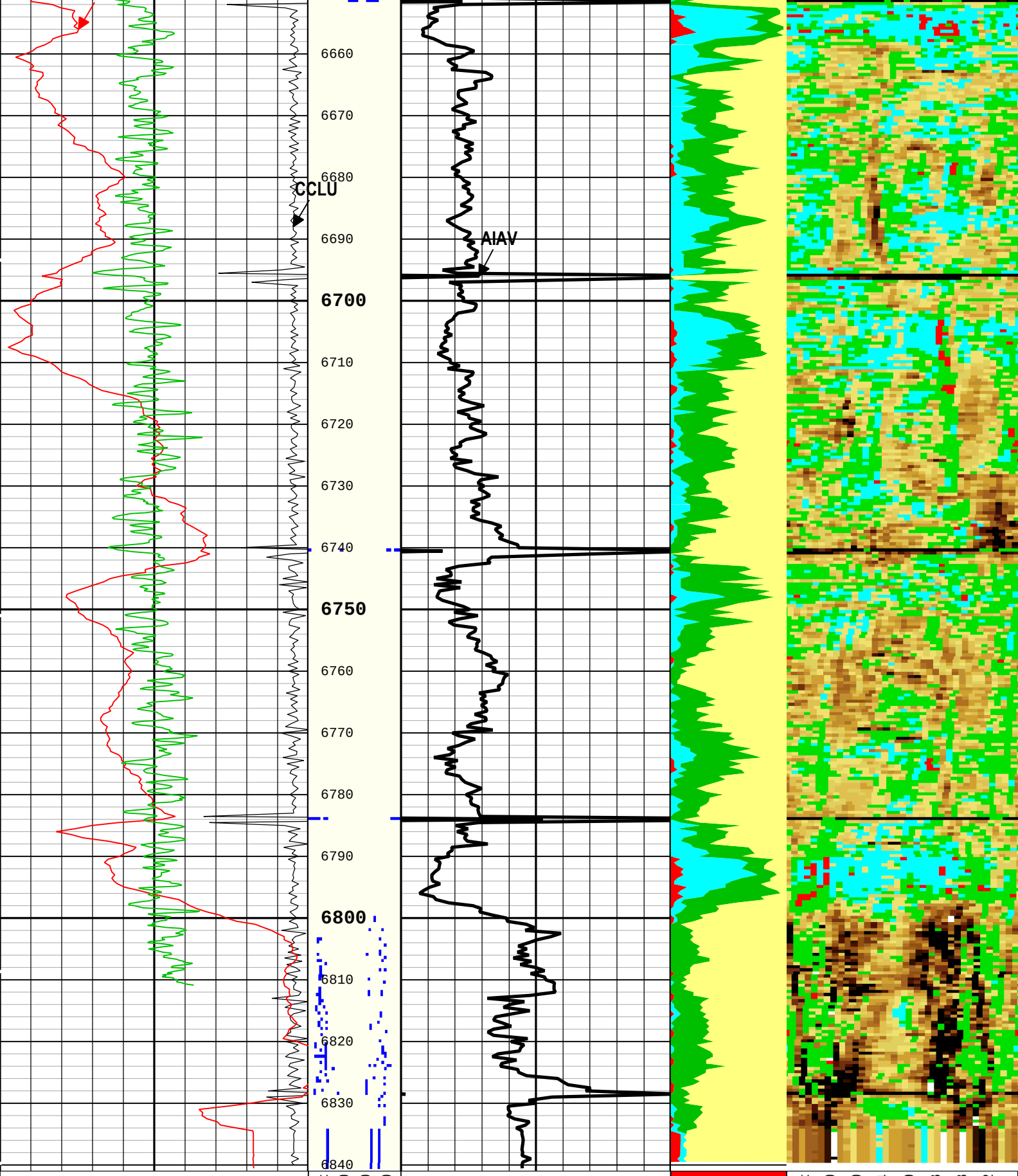


Casing Collar Locator Ultrasonic (CCLU) USIT-E

-20 in 1

Amplitude of Eccentering (ECCE) USIT-E

0 in 0.5

Gamma Ray (EHGR_EDTC) EDTC-H

Absent 1.500 2.500 6.500

Explicit Normalization

USIT - USIT Processing Flags (UFLG)

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)

0 gAPI 150

USIT-E
Orientation: Top of Hole
U L B R U

Orientation: Top of Hole
U L B R U

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: 07-May-2019 15:15:40

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	Depth Zoned	in
CBLO	Casing Bottom (Logger)	WLSESSION	17650.8	ft
CDEN	Cement Density	EDTC-H	16.69	lbm/gal
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	196	us/ft
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	RB	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.16	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.6	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	1.57	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	64	110
BS	13.5	110	1957
BS	8.5	1957	6841

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-4	dB
AGMX	Maximum Gain of Cartridge	USIT-E	20	dB
EMXV	EMEX Voltage	USIT-E	60	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	Yes	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-E	666667	Hz

UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	
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	29.36	07-May-2019 11:20:31	07-May-2019 11:28:12	6841.43	6796.63
WINB	23.6	07-May-2019 11:28:12	07-May-2019 11:55:24	6796.63	5232.94
WINB	28.49	07-May-2019 11:55:24	07-May-2019 11:56:40	5232.94	5159.92
WINB	31.63	07-May-2019 11:56:40	07-May-2019 13:29:24	5159.92	41.32
WINE	69.36	07-May-2019 11:20:31	07-May-2019 11:29:58	6841.43	6695.17
WINE	71.39	07-May-2019 11:29:58	07-May-2019 13:29:24	6695.17	41.32

All depth are at tool zero.

ONE

DJ BASIN REPEAT PASS @0PSI @10DEG X 6IN [5:100]

Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.102758.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[2]:Up	Up	1980.36 ft	2502.34 ft	07-May-2019 10:42:15 AM	07-May-2019 10:53:23 AM	ON	1.45 ft	Yes

All depths are referenced to toolstring zero

Log

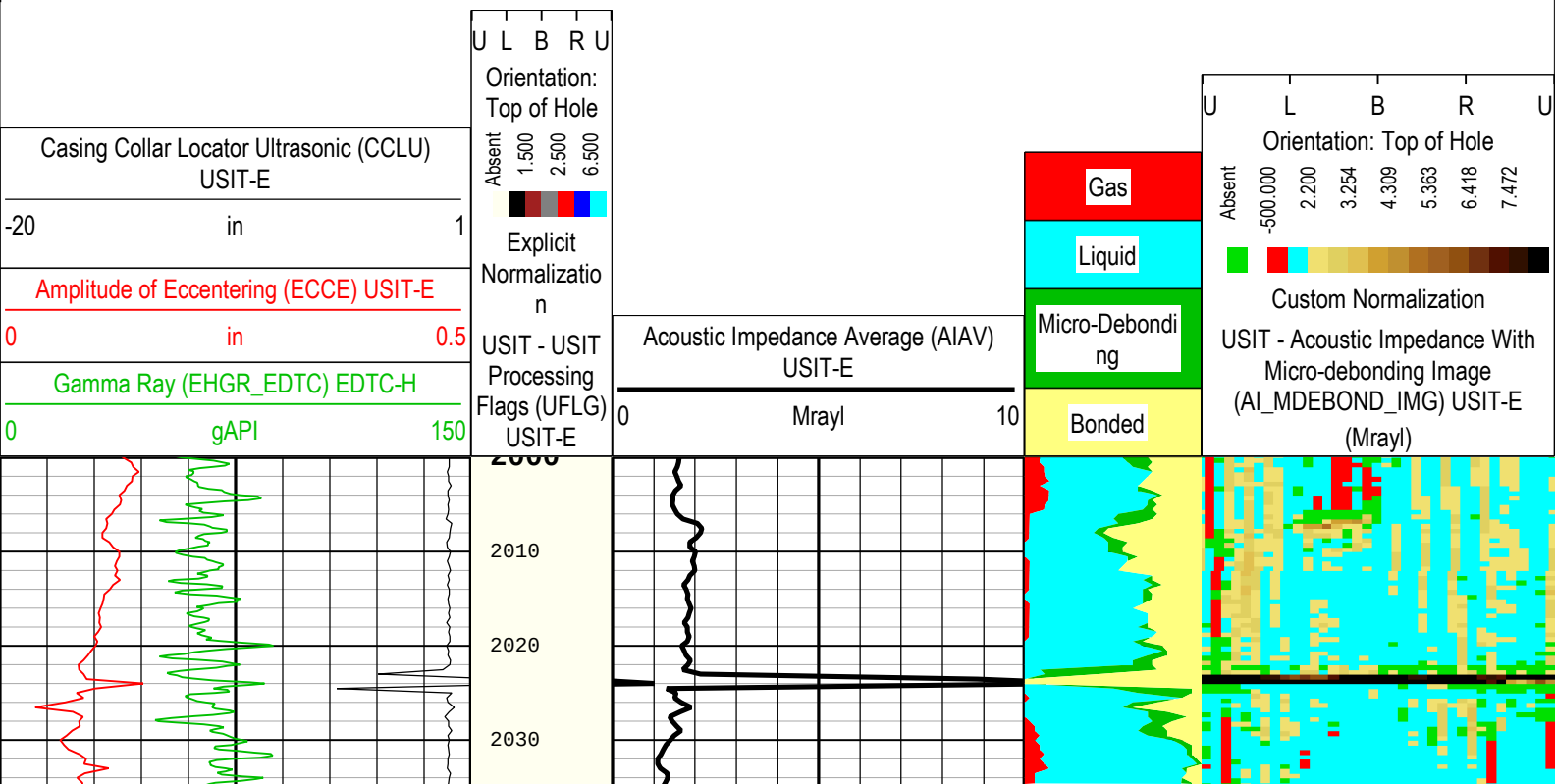
Company:NOBLE ENERGY INC. Well:VOGLER STATE D21-720

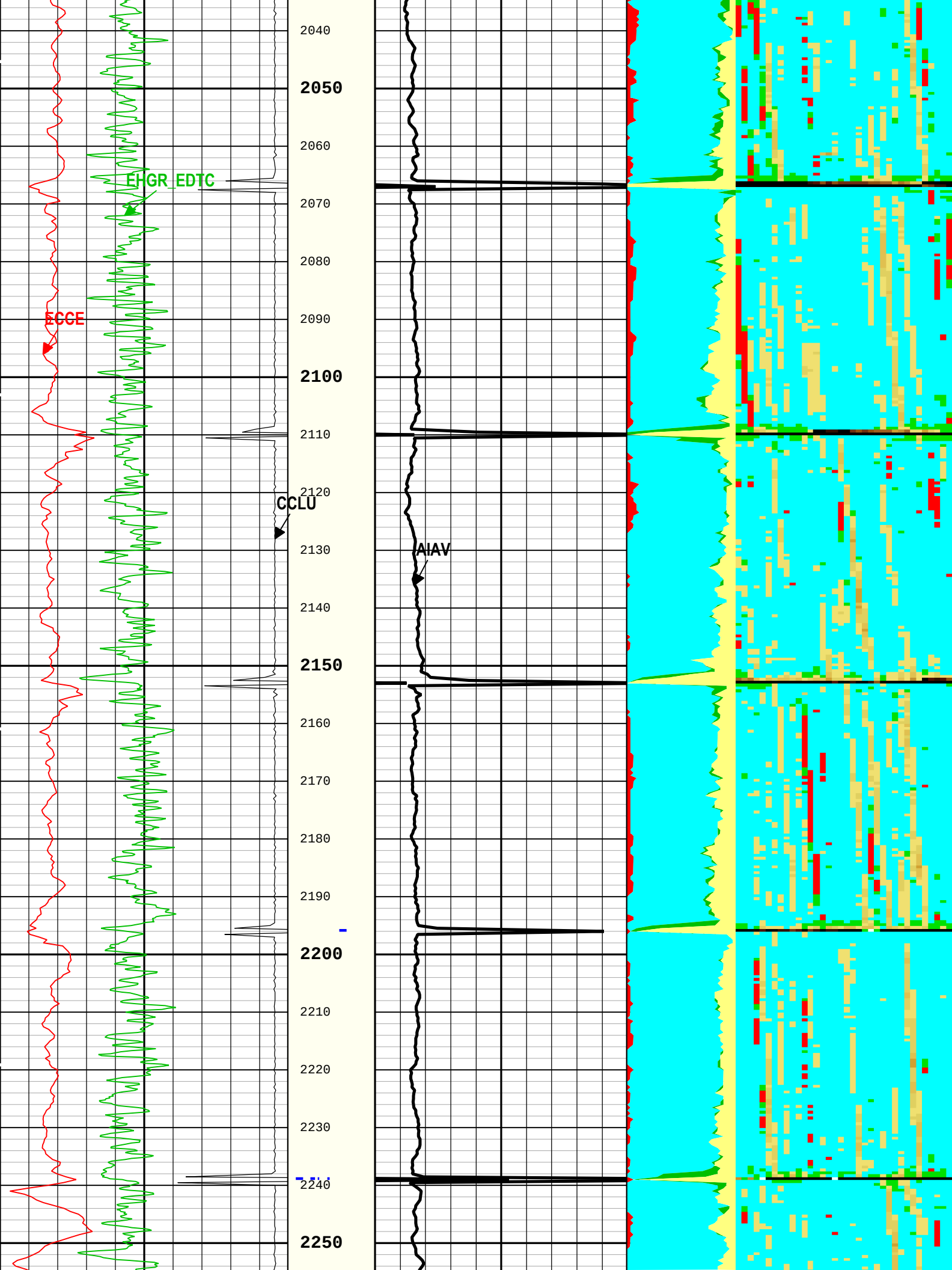
ONE: Log[2]:Up:S007

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: 07-May-2019 15:16:11

TIME_1900 - Time Marked every 60.00 (s)

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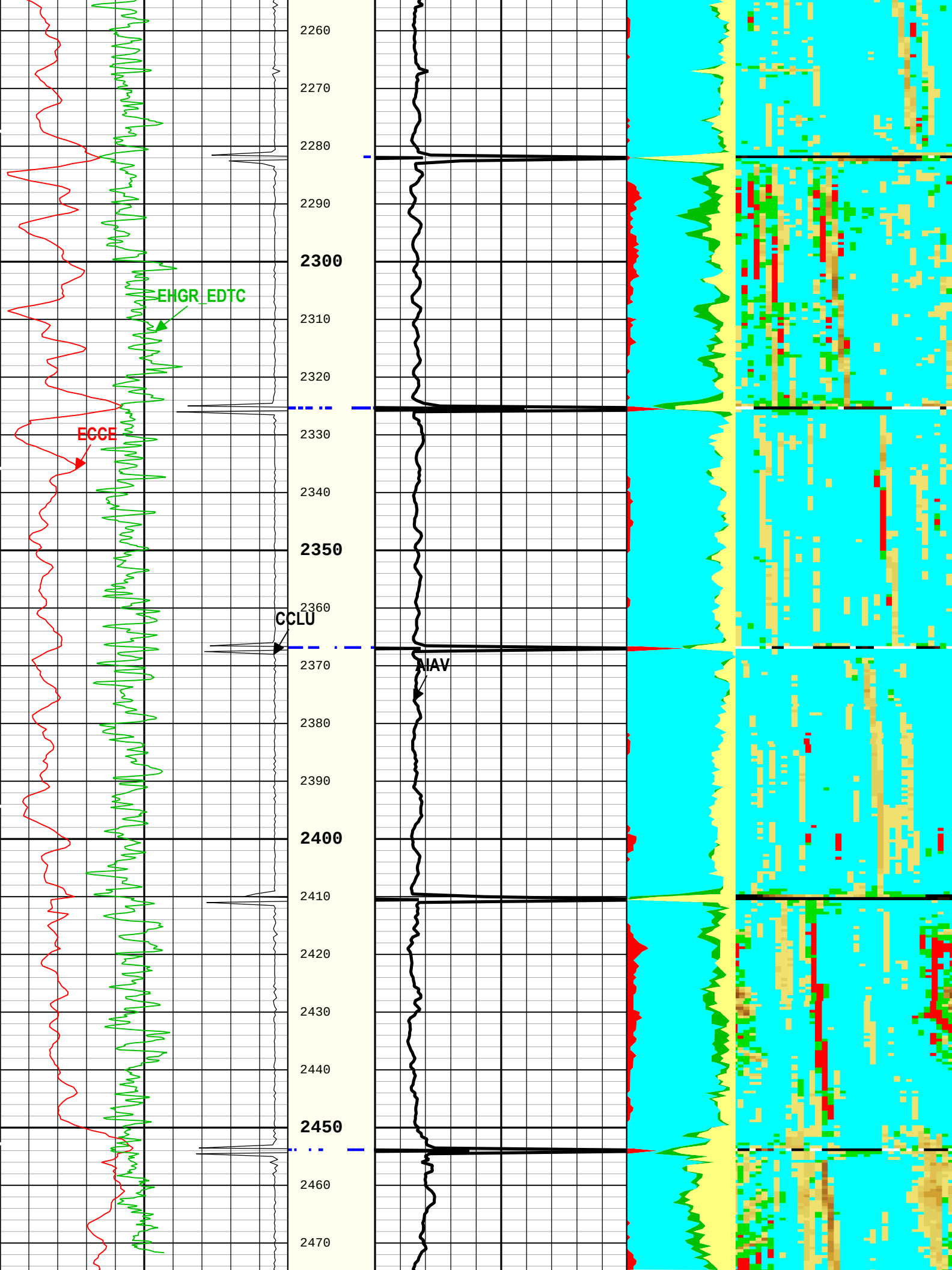
EHGR_EDTC
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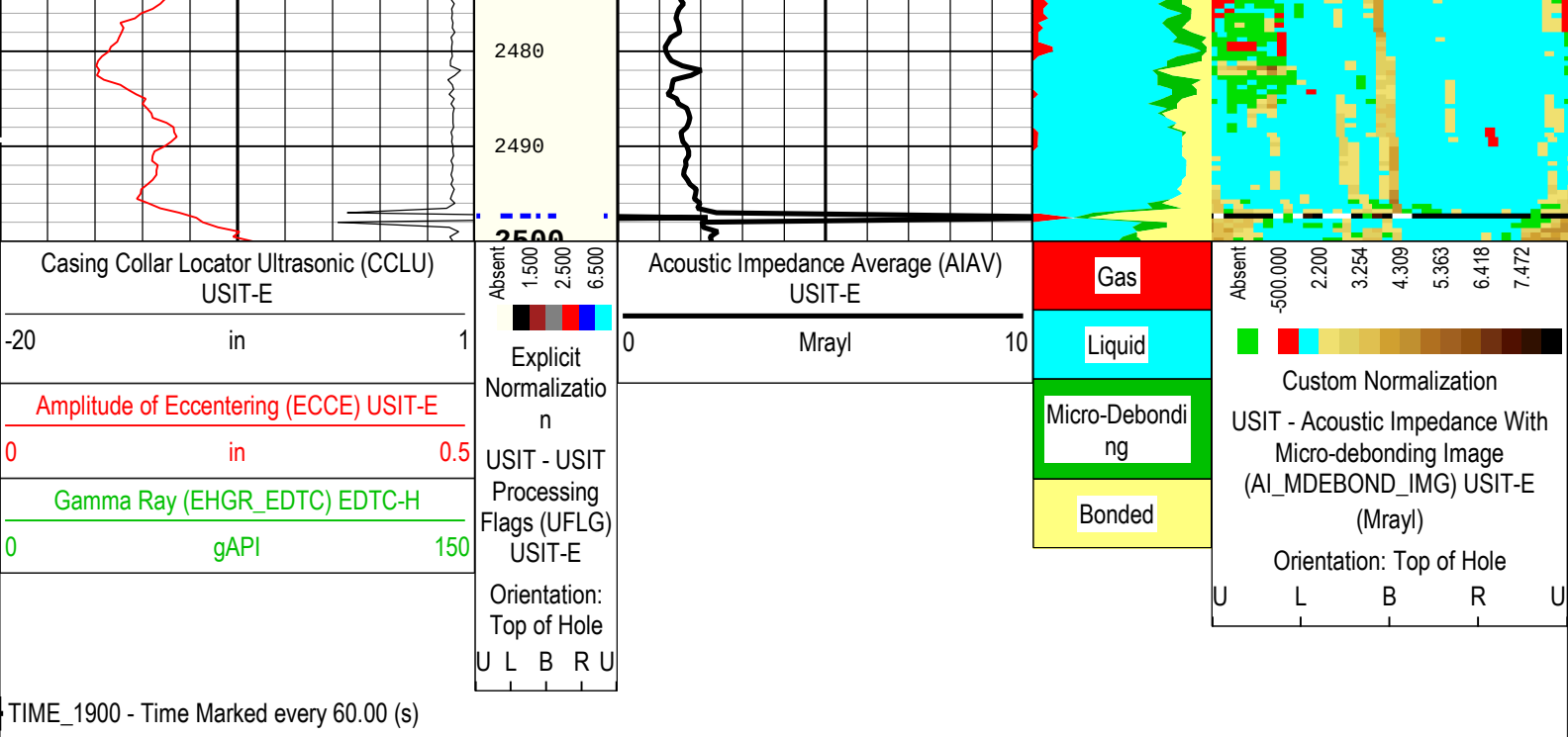


TIME_1900 - Time Marked every 60.00 (s)

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: 07-May-2019 15:16:11

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	8.5	in
CBLO	Casing Bottom (Logger)	WLSESSION	17650.8	ft
CDEN	Cement Density	EDTC-H	16.69	lbm/gal
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	196	us/ft
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
HEMA	Hematite Presence Flag	Borehole	No	
ICE_PROCESS	ICE Processing	USIT-E	Yes	
IMAR	Image Rotation	USIT-E	RB	
MEAS_WLEN	Tcube Processing Window Length in Measurement Mode	USIT-E	22.44	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.16	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.6	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	1.57	Mrayl
ZTCM	Acoustic Impedance Threshold for Cement	USIT-E	2.2	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-4	dB

AGMX	Maximum Gain of Cartridge	USIT-E	20	dB
EMXV	EMEX Voltage	USIT-E	60	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	Yes	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic Sampling Frequency	USIT-E	666667	Hz
UPAT	USIT Emission Pattern	USIT-E	Pattern 375 KHz	
UWKM	USIT Working Mode	USIT-E	Uncompressed 10 deg at 6.0 in	
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	29.36	07-May-2019 10:42:15	07-May-2019 10:42:48	2502.34	2493.36
WINB	33.02	07-May-2019 10:42:48	07-May-2019 10:53:23	2493.36	1980.36
WINE	69.36	07-May-2019 10:42:15	07-May-2019 10:42:42	2502.34	2495.16
WINE	74.88	07-May-2019 10:42:42	07-May-2019 10:53:23	2495.16	1980.36

All depth are at tool zero.

XYZ

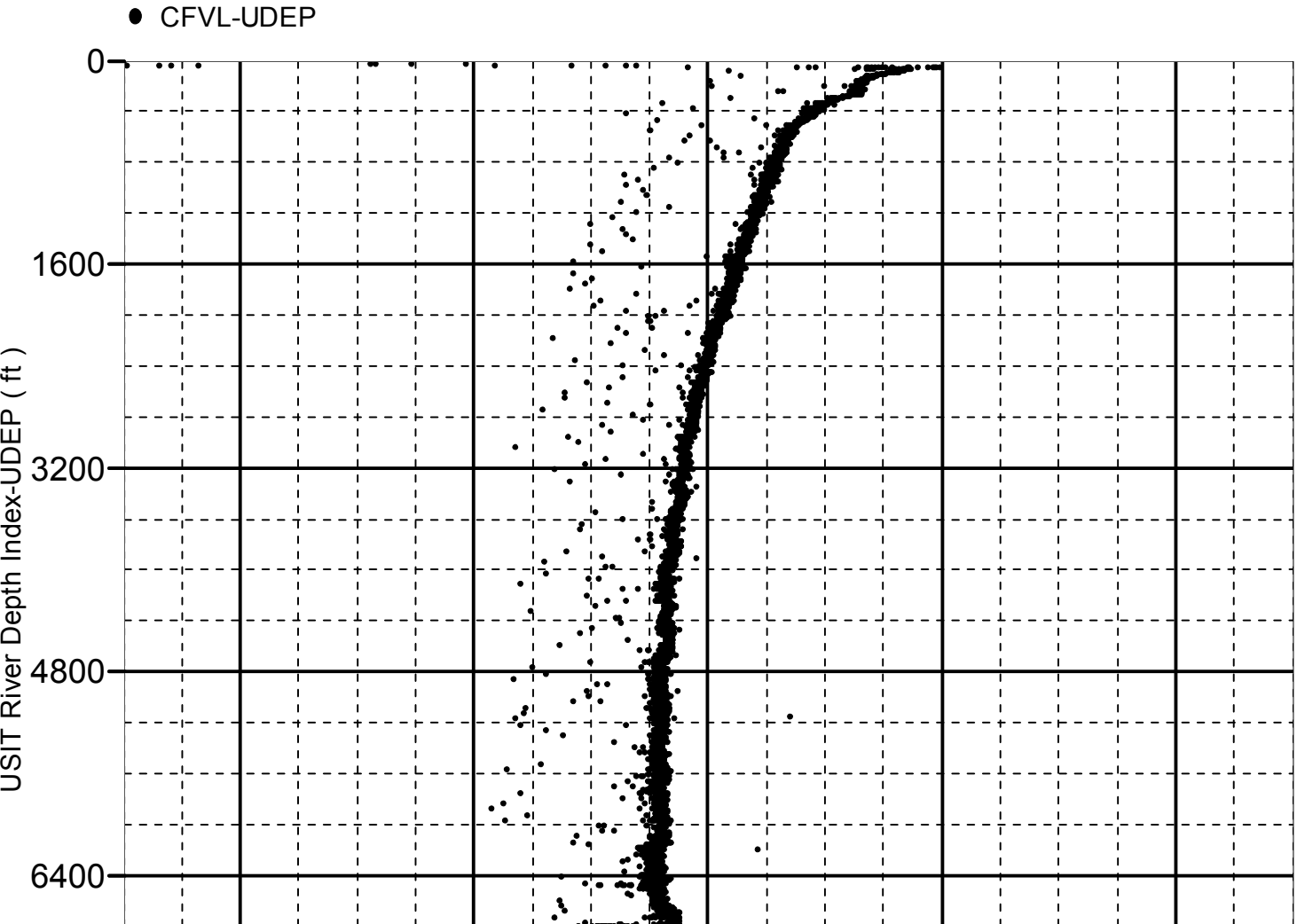
Company:NOBLE ENERGY INC. Well:VOGLER STATE D21-720

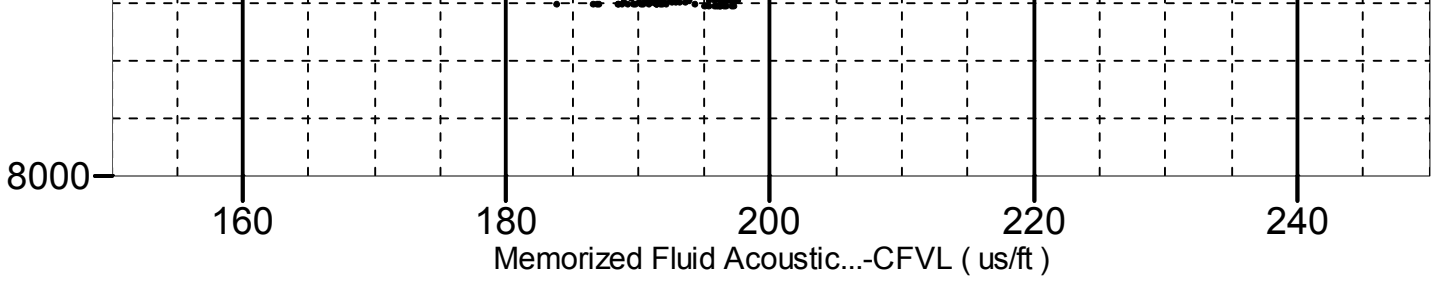
ONE: Log[4]:Up:S007

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6841.00 to 41.00 ft





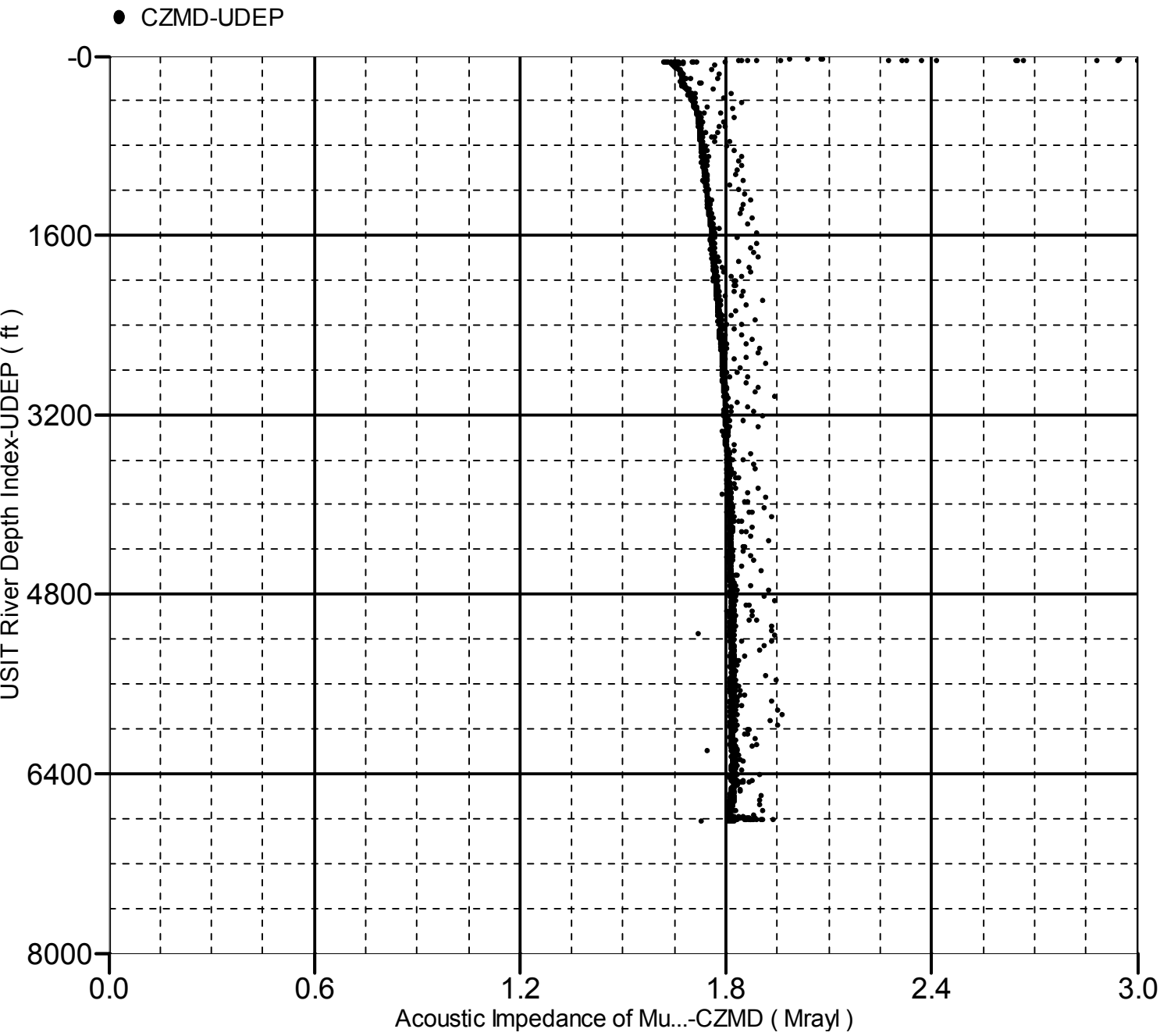
XYZ

Company:NOBLE ENERGY INC. Well:VOGLER STATE D21-720
ONE: Log[4]:Up:S007

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6841.00 to 41.00 ft



Company: NOBLE ENERGY INC.

Schlumberger

Well: VOGLER STATE D21-790

Field: WATTENBERG

County: WELD

State: COLORADO

ULTRASONIC IMAGER
DJ BASIN ULTRASONIC CEMENT
GAMMA RAY - COLLAR LOCATOR LOG