

Company: Noble Energy Inc

Well: Larson A23-651

Field: Wattenberg

County: Weld State: Colorado

UltraSonic Summary Print

Location:		SWNW 19-6N-63W 2565 FNL & 0 FWL	Elev.: K.B. 4679.00 ft G.L. 4649.00 ft D.F.
Permanent Datum:	Ground Level		Elev.: 4649.00 f
Log Measured From:	Kelly Bushing		30.00 ft above Perm.Datum
Drilling Measured From:	Kelly Bushing		
API Serial No.	Section:	Township:	Range:
05-123-45512	19	6N	63W

Logging Date	17-Jun-2018
Run Number	UltraSonic
Depth Driller	18045.00 ft
Schlumberger Depth	18045.00 ft
Bottom Log Interval	6000.00 ft
Top Log Interval	100.00 ft
Casing Fluid Type	Water
Salinity	
Density	8.4 lbm/gal
Fluid Level	8.00 ft
BIT/CASING/TUBING STRING	
Bit Size	8.50 in
From	1969.00 ft
To	18045.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	N/A
From	0.00 ft
To	18031.00 ft
Max Recorded Temperatures	197 degF
Logger on Bottom	17-Jun-2018 10:46:00
Unit Number	Location: OSLCEA2377 Ft. Morgan
Recorded By	L. Awalt
Witnessed By	B. Mansfield

Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

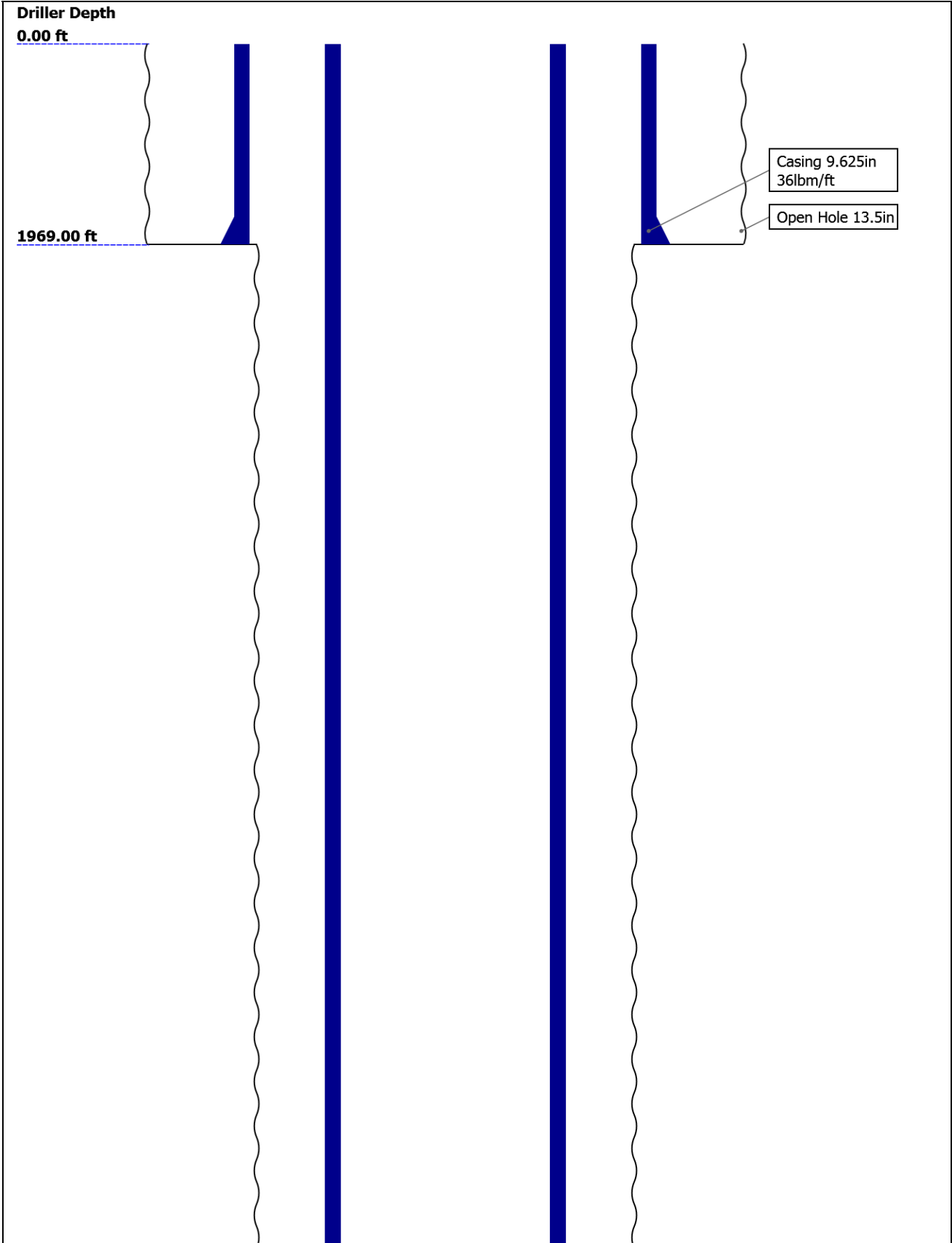
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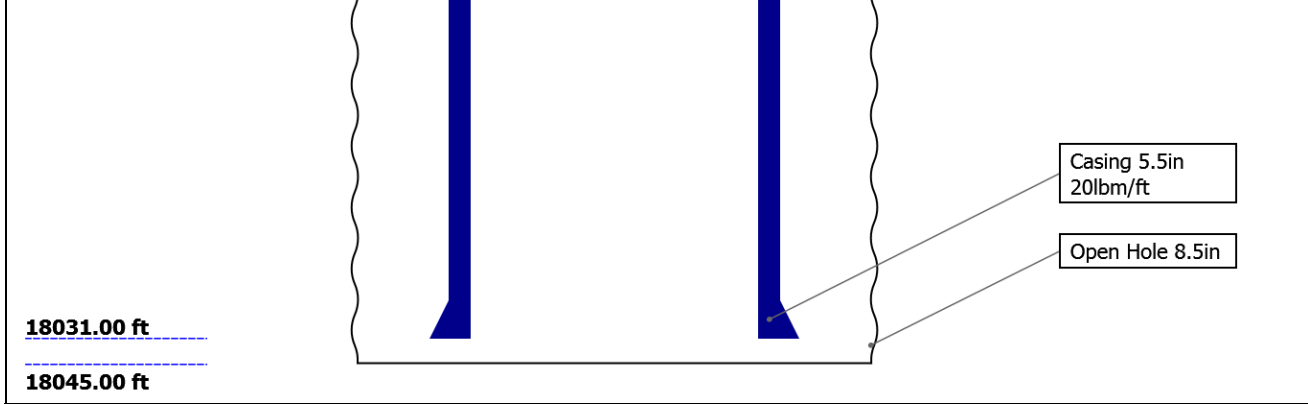
- 1. Header
- 2. Disclaimer
- 3. Contents
- 4. Well Sketch
- 5. Borehole Size/Casing/Tubing Record
- 6. Remarks and Equipment Summary
- 7. Depth Summary
- 8. USI Fluid Properties Measurement_1
- 9. UltraSonic 2500 PSI Main Pass
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 - 9.3 Composite Summary
 - 9.4 Log (DJ Basin Ultrasonic Cement Summary Report)
 - 9.5 Parameter Listing
- 10. UltraSonic 0 PSI Repeat Pass
 - 10.1 Integration Summary

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- 10.2 Software Version
- 10.3 Composite Summary
- 10.4 Log (DJ Basin Ultrasonic Cement Summary Report)
- 10.5 Parameter Listing
- 11. XYZ (USI Fluid Acoustic Slowness vs Depth 3.0 in)
- 12. XYZ (USI Acoustic Impedance of Mud vs Depth 3.0

Well Sketch



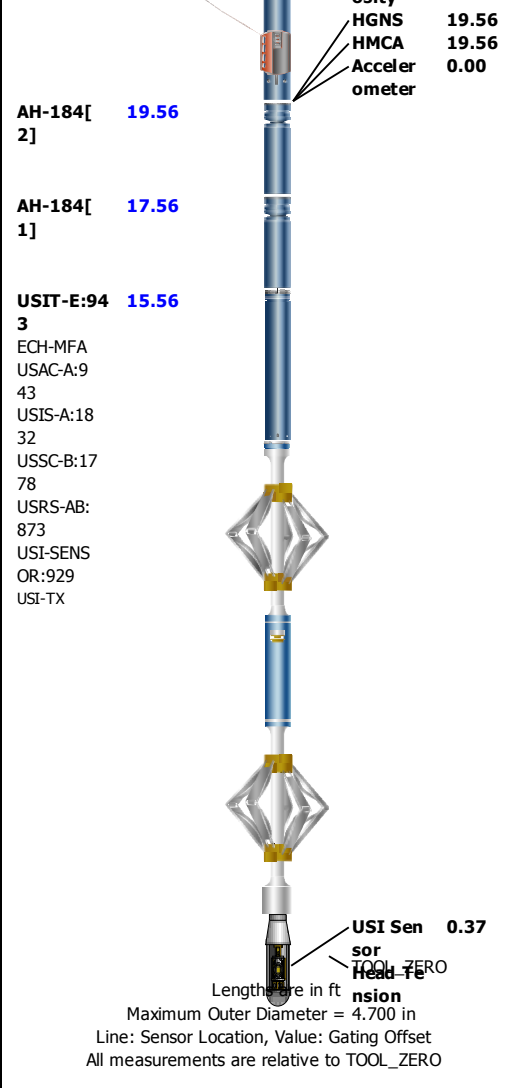


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	13.5	8.5				
Top Driller (ft)	0	1969				
Top Logger (ft)	0	1969				
Bottom Driller (ft)	1969	18045				
Bottom Logger (ft)	1969	18045				
Casing						
Size (in)	9.625	5.5				
Weight (lbm/ft)	36	20				
Inner Diameter (in)	8.921	4.778				
Grade	N/A	N/A				
Top Driller (ft)	0	0				
Top Logger (ft)	0	0				
Bottom Driller (ft)	1969	18031				
Bottom Logger (ft)	1969	18031				

Remarks and Equipment Summary

UltraSonic: Toolstring				UltraSonic: Remarks	
<div><div><div>Equip nameLength</div><div>LEH-QT38.38</div><div>LEH-QT</div></div><div><div>EDTC-B:8478</div><div>EDTH-B</div><div>EDTG-A</div><div>EDTC-B:8478</div></div><div><div>HGNS-H28.97</div><div>HGNH</div><div>NSR-F:5203</div><div>NPV-N</div><div>HACCZ-H:4168</div><div>HGNS-H</div><div>HMCA-H</div></div></div> <div><div>CTEM31.97</div><div>ACCZ0.00</div><div>HV0.00</div><div>Gamma30.1</div><div>Ray</div><div>TelStatu28.97</div><div>s</div><div>Temper28.94</div><div>ature</div><div>GR28.23</div></div> <div><div>CNL Por21.89</div><div>osity</div></div>	Thank you for choosing Schlumberger!				
	Log run for cement evaluation				
	Tool run centralized as per tool sketch				
	USRS-AB sub run with USI-TX transducer				
	Crew: Doug Robinson, Gary Lapp				



Depth Summary			
	UltraSonic		
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	7-46NT-XS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		

Rig Type

UltraSonic:Depth Control Parameters

Depth Control Remarks

Log SequenceFirst Log In the Well

Rig Up Length At Surface

Rig Up Length At Bottom

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[6]:Up

6023.53

109.18

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 : 53.11m(174.25ft) to 60.61m(198.84ft)

MUD_N_FRP = 1.17

DFD = 1.01g/cm3(8.40lbm/gal)

CZMD median computed in free pipe normalization interval = 1.69 MRayl

Start Depth(ft)

Stop Depth(ft)

Start Value(Mrayl)

End Value(Mrayl)

UltraSonic

2500 PSI Main Pass

Software Version

Acquisition System

Version

Maxwell 2018

8.0.95333.3100

Application Patch

Wireline_Hotfix-FormatEditor-2018CMZ_8.0.97560

Wireline_Hotfix-SML-2018CMZ_8.0.101107

Wireline_Hotfix-TVD-DLIS-2018CMZ_8.0.101344

Wireline_TestKit-CMR-NG-2018CMZ_8.0.97136

Pass Summary

Run Name

Pass Objective

Direction

Top

Bottom

Start

Stop

DSC Mode

Depth Shift

Include Parallel Data

UltraSonic

Log[6]:Up

Up

109.18 ft

6023.53 ft

17-Jun-2018 10:21:00 AM

17-Jun-2018 11:22:11 AM

ON

4.17 ft

Yes

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc

Well:Larson A23-651

UltraSonic: Log[6]:Up:S004

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: 17-Jun-2018 12:17:07

TIME_1900 - Time Marked every 60.00 (s)

Casing Collar Locator Ultrasonic (CCLU)
USIT-E

-20in1

Amplitude of Eccentering (ECCE) USIT-E

0in0.5

Gamma Ray (ECGR_EDTC) EDTC-B

0gAPI150

USIT - USIT Processing Flags (UFLG) USIT-E

80

Acoustic Impedance Average (AIAV) USIT-E

0Mrayl10

Gas

Liquid

Micro-Debonding

Bonded

Absent

1,500

2,500

6,500

Explicit Normalization

Absent

-500,000

2,200

3,254

4,309

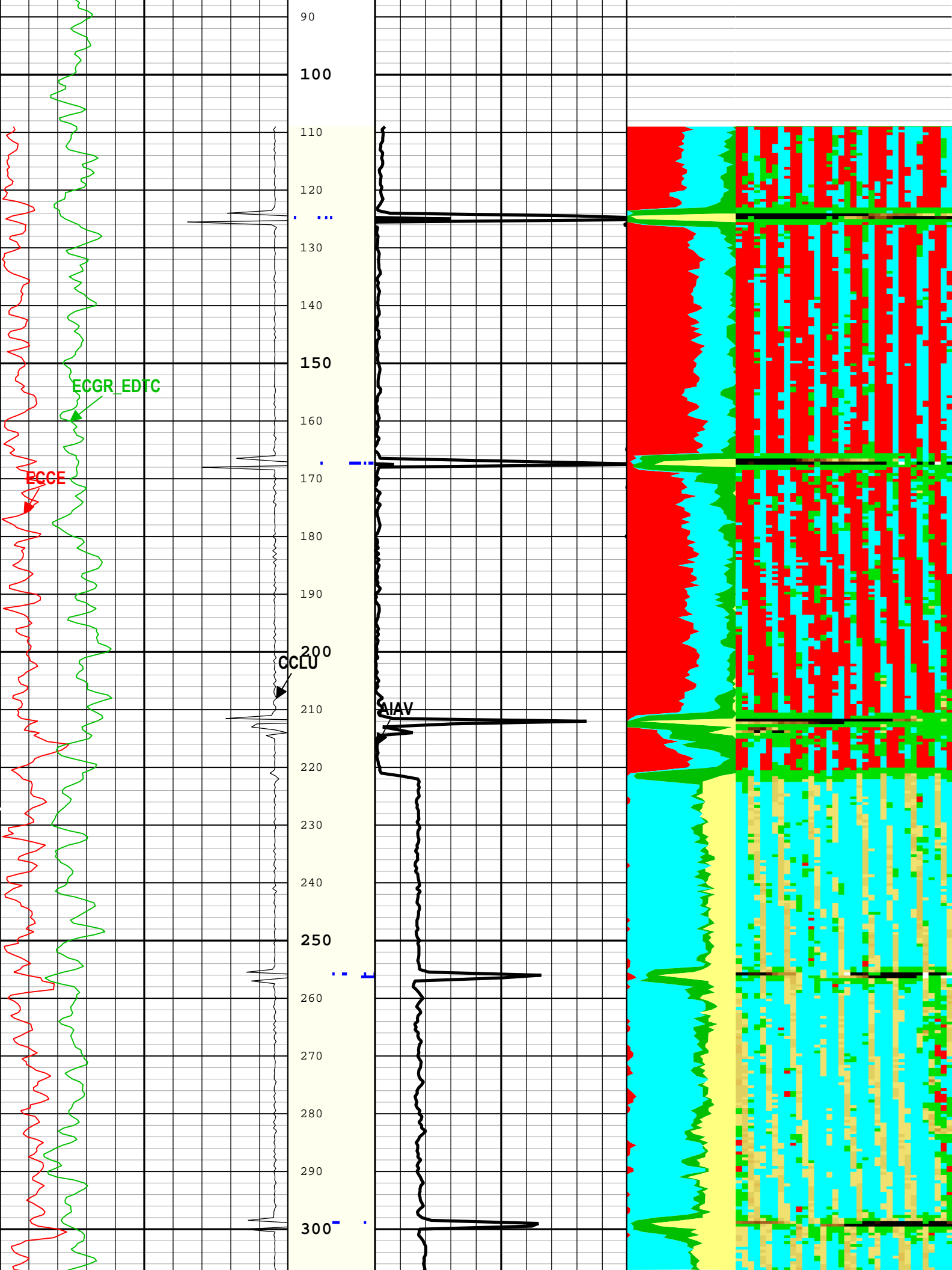
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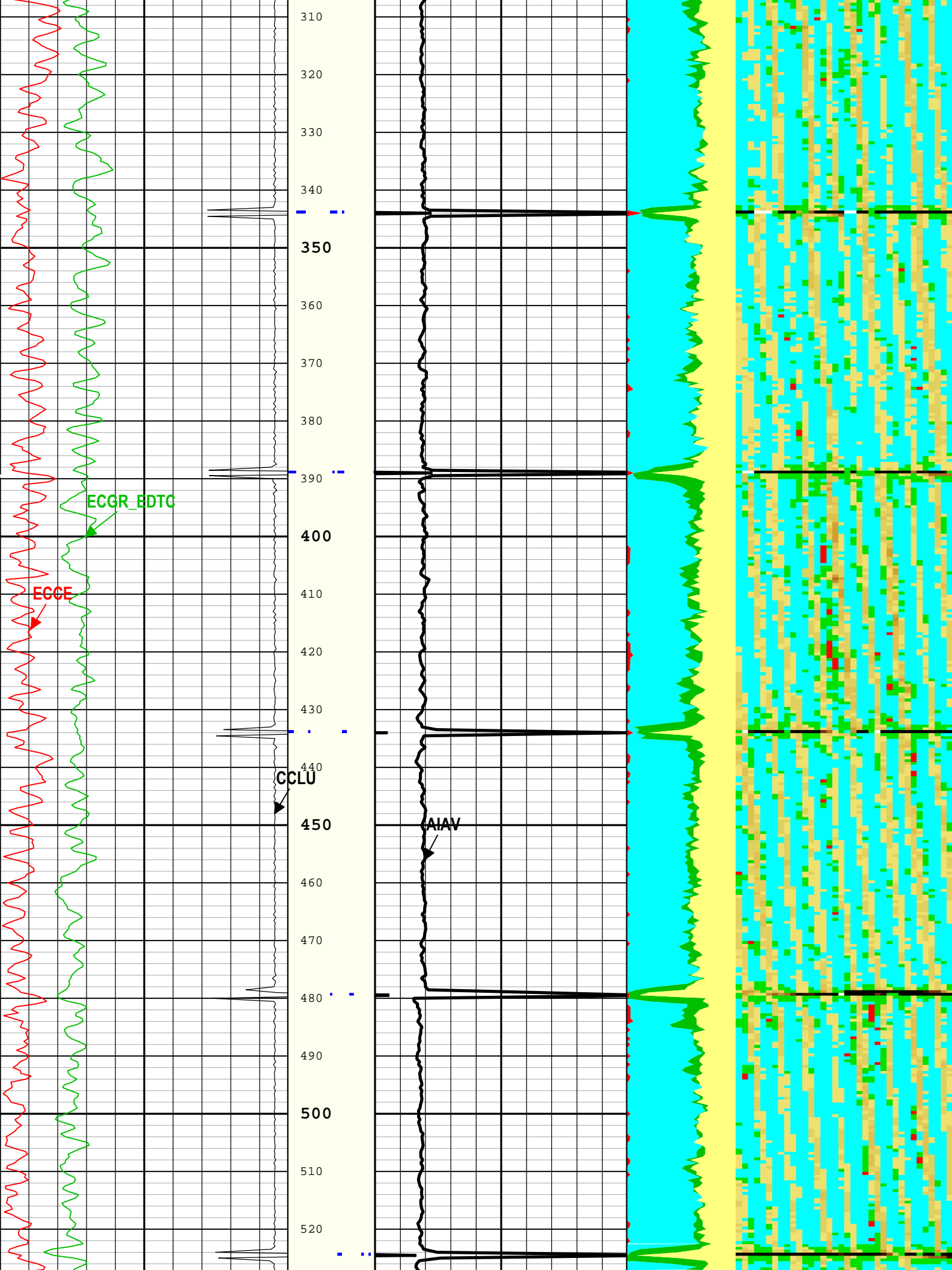
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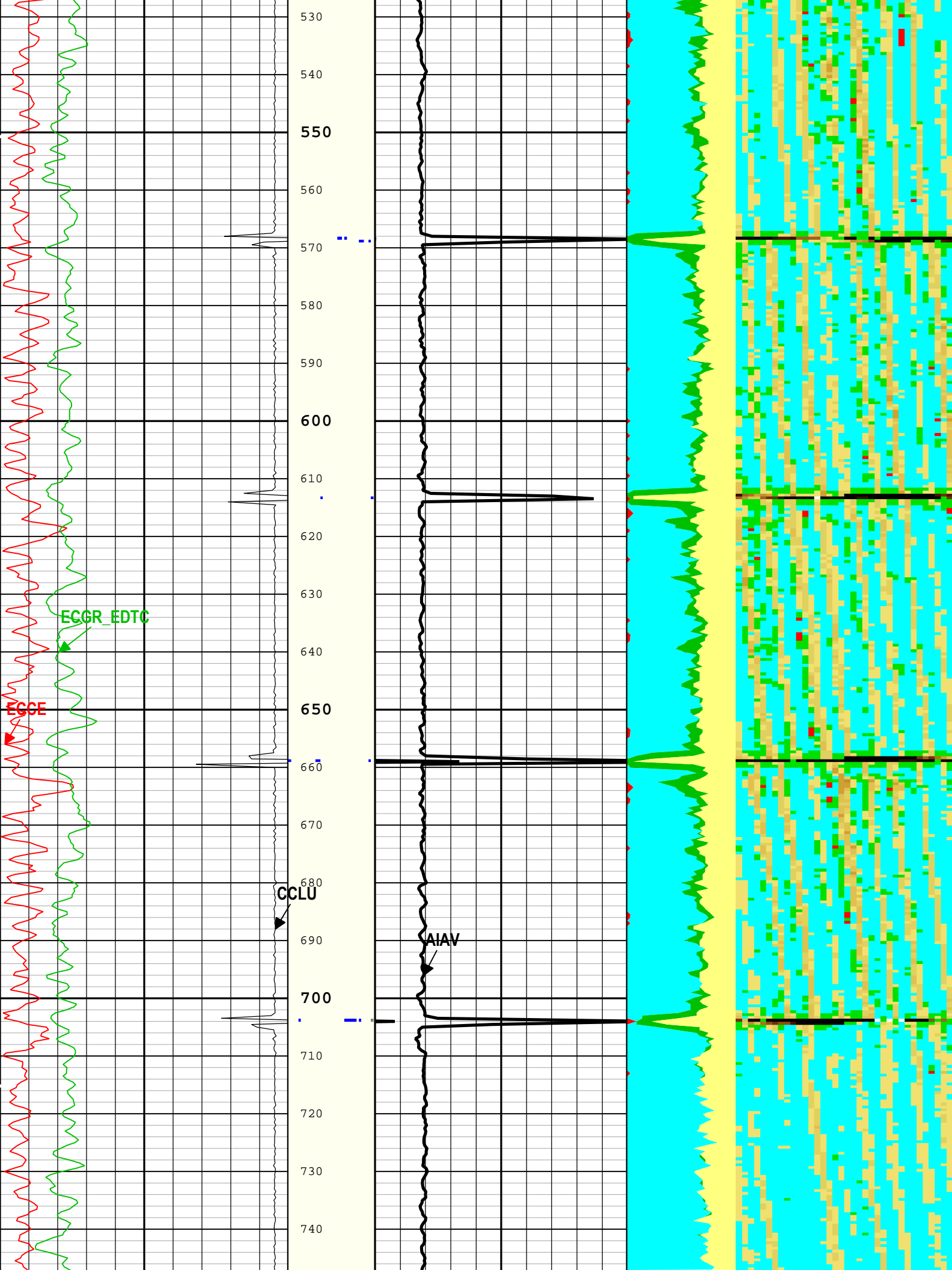
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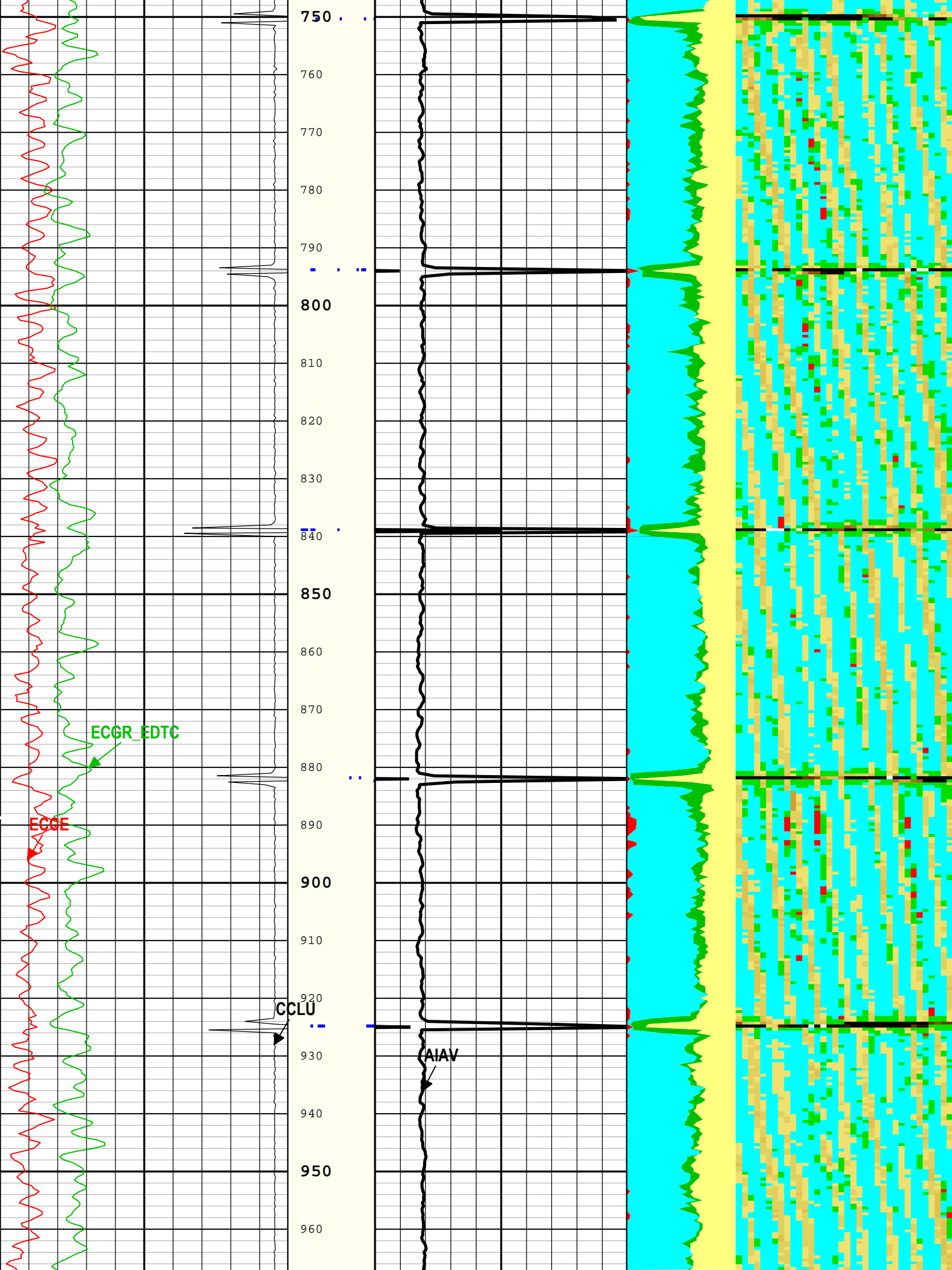
Custom Normalization

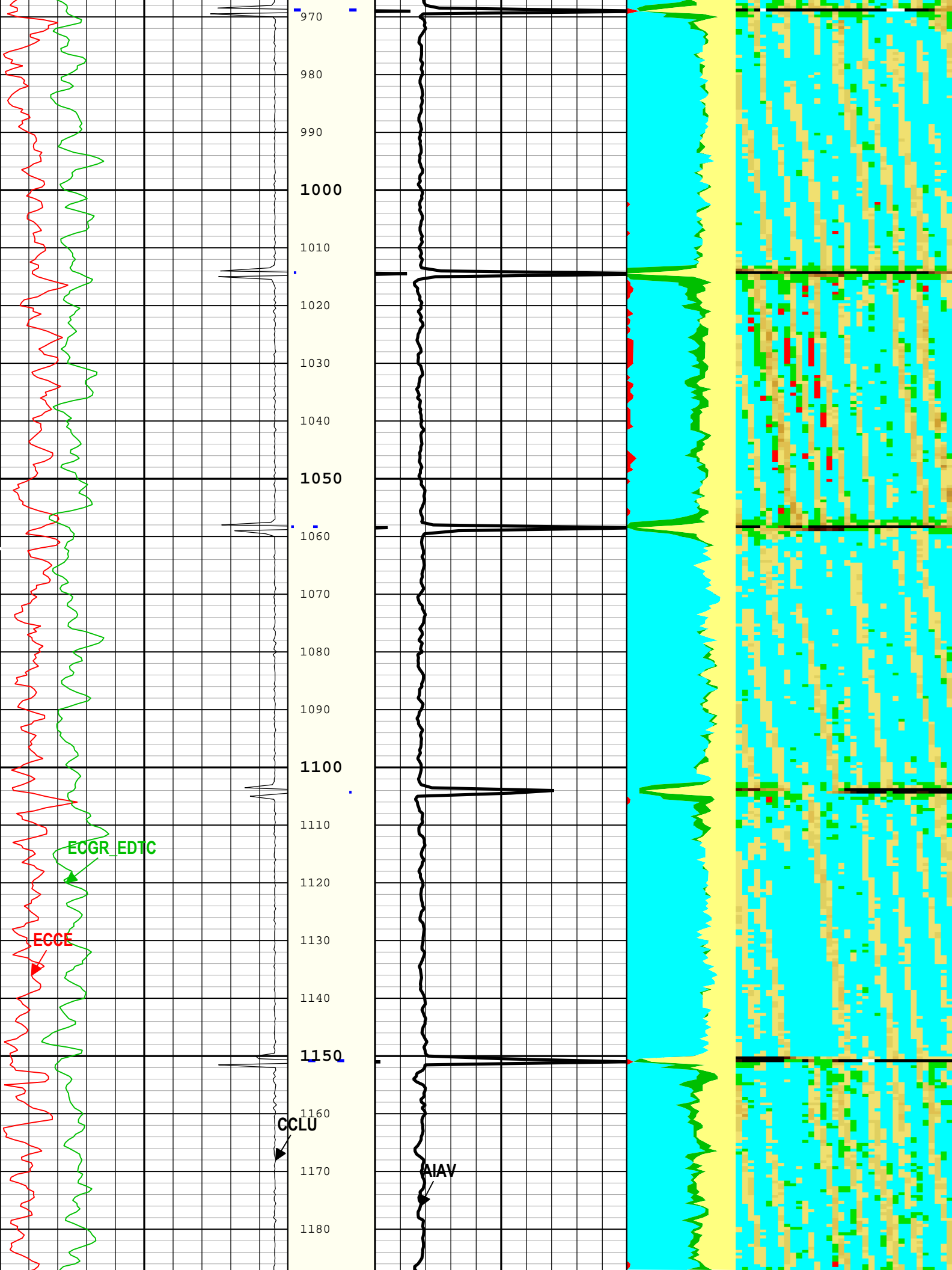
USIT - Acoustic Impedance With Micro-debonding Image (AI_MDEBOND_IMG) USIT-E (Mrayl)

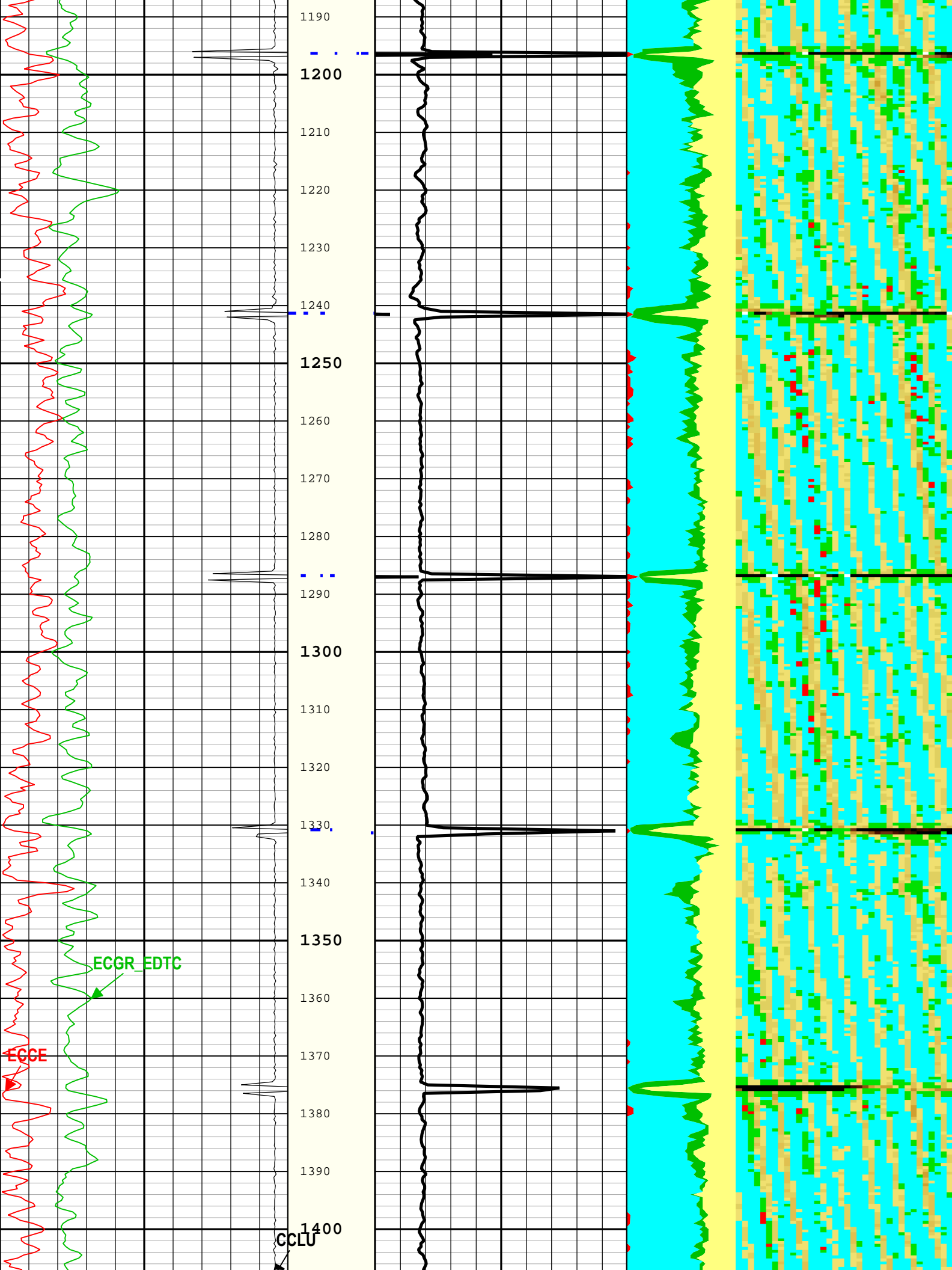


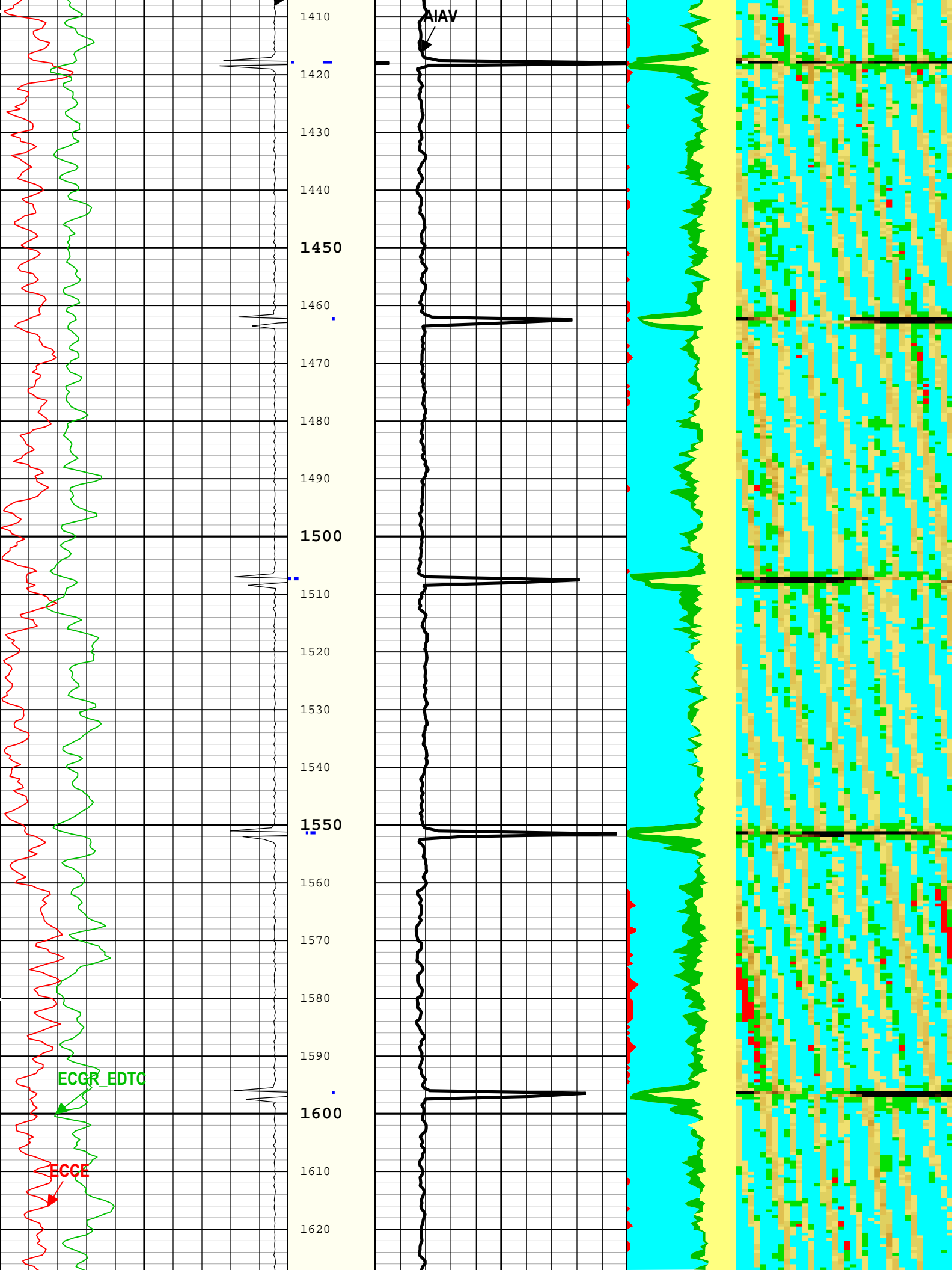


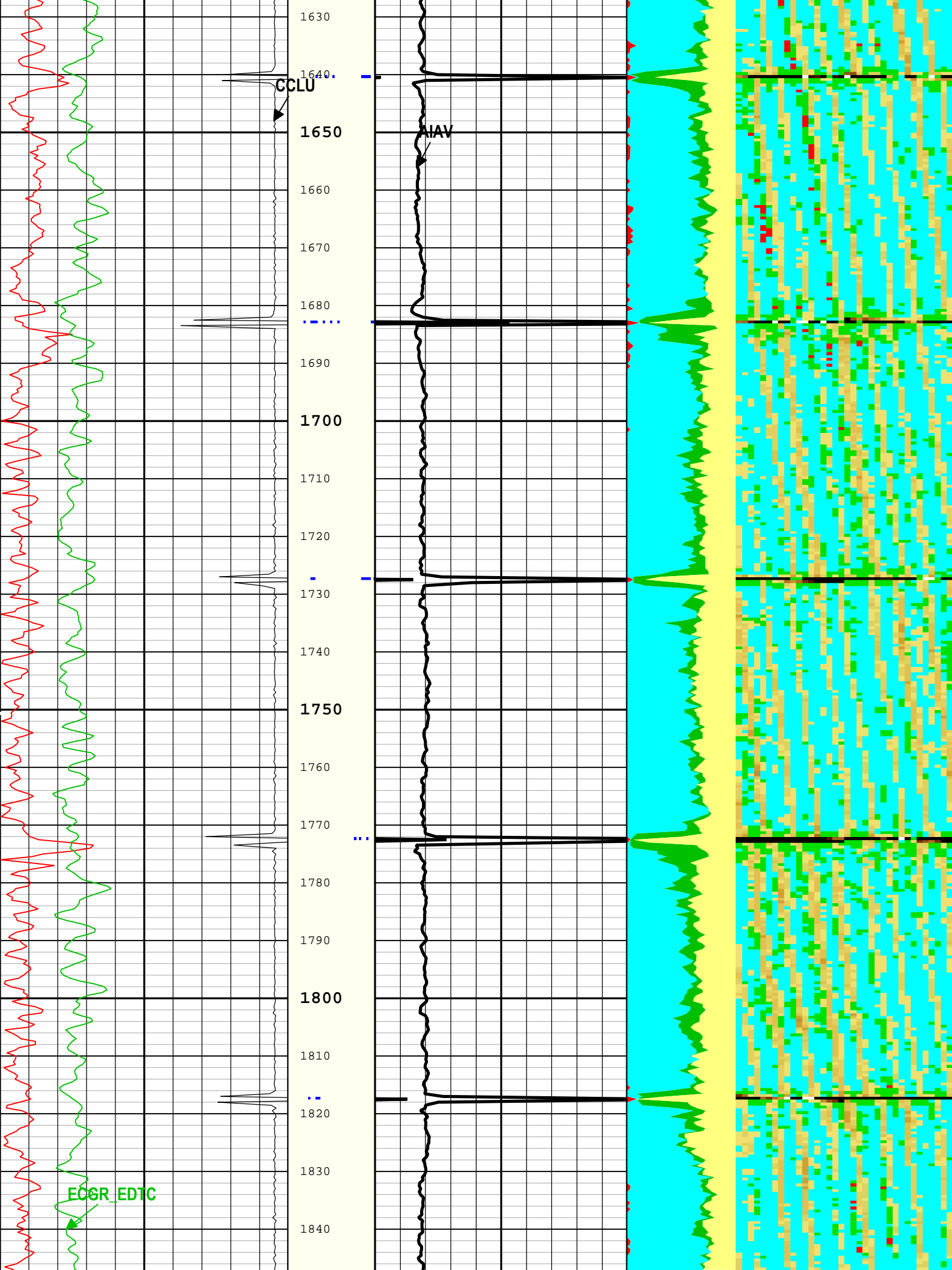


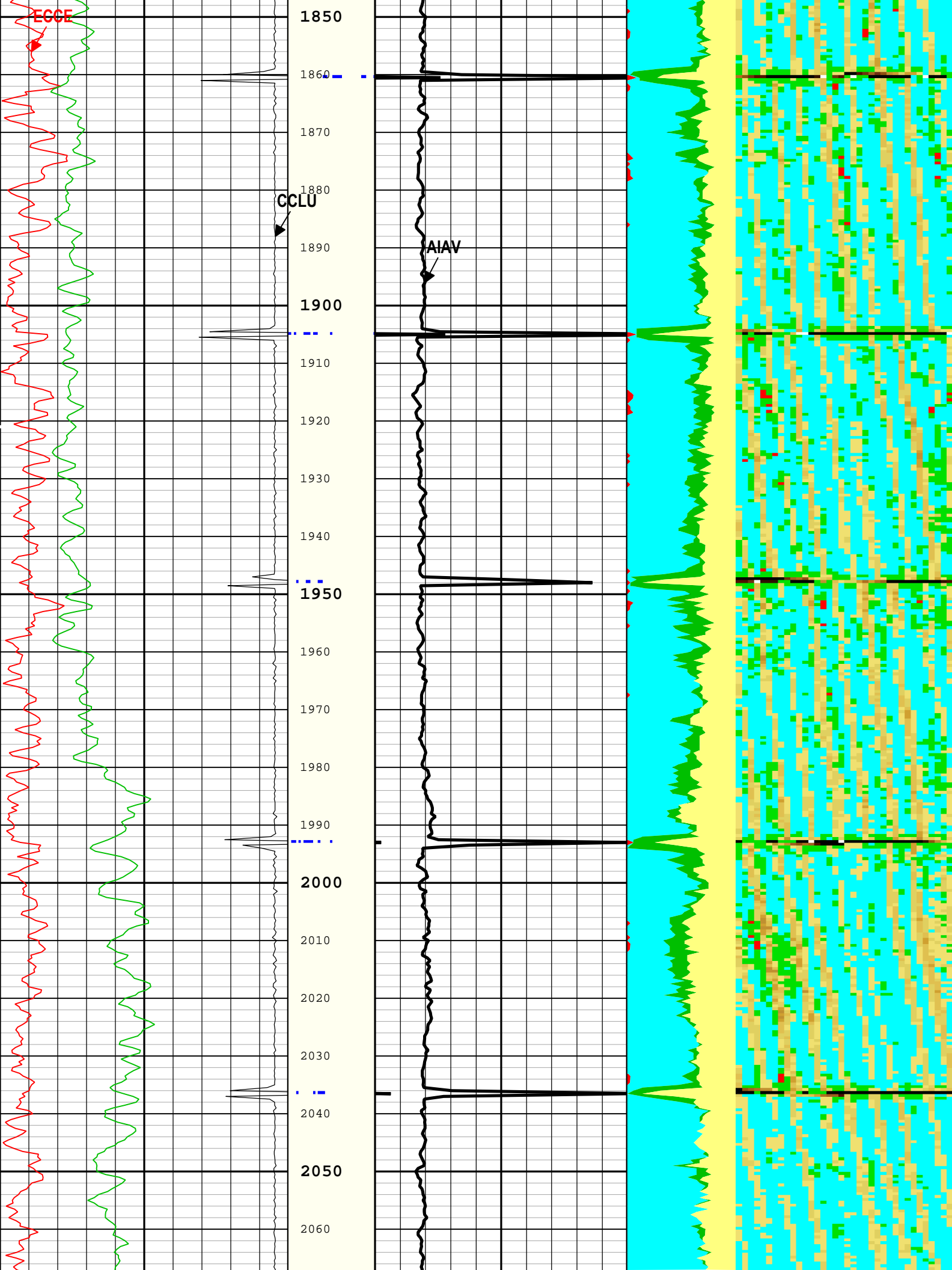


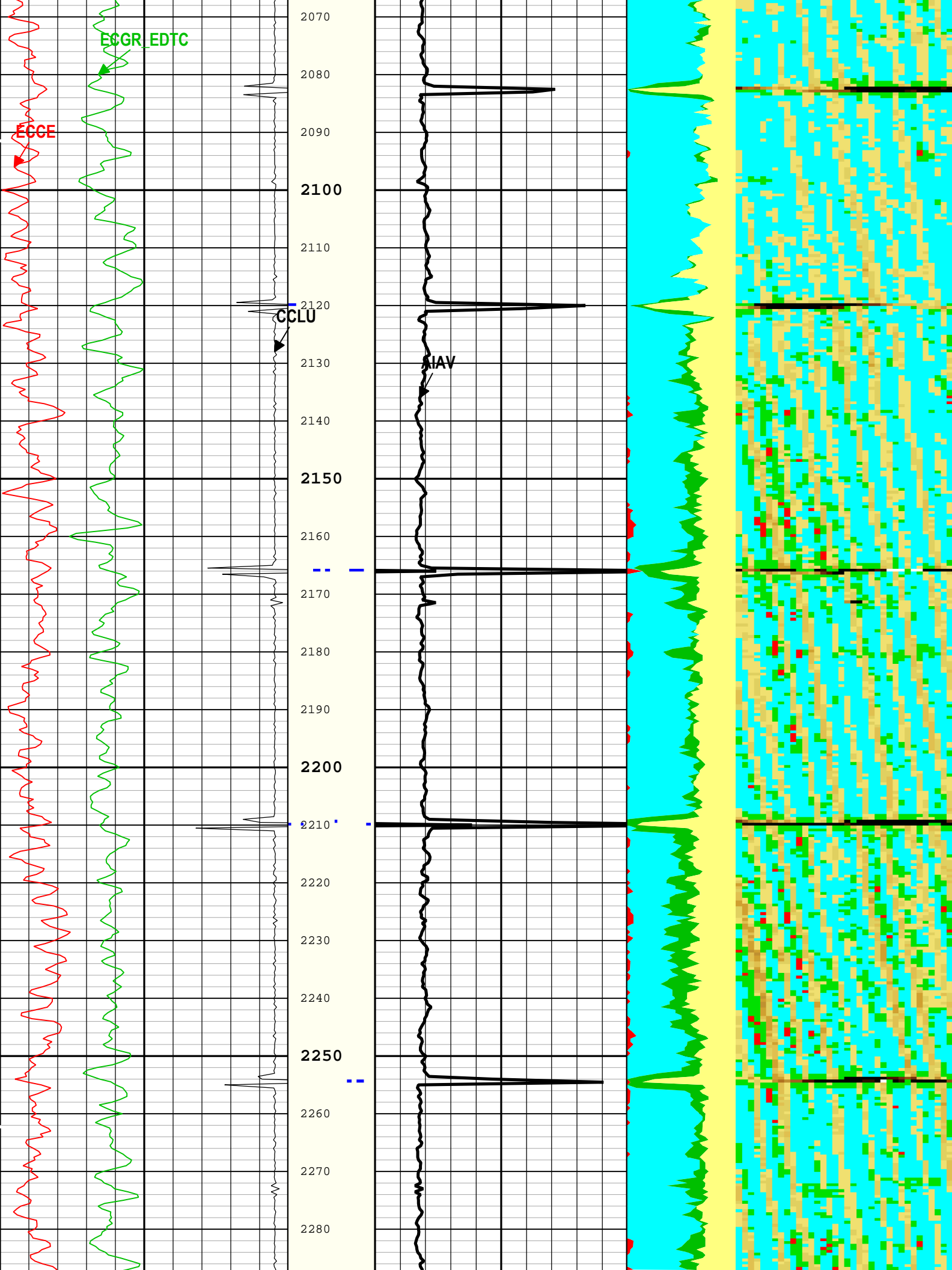


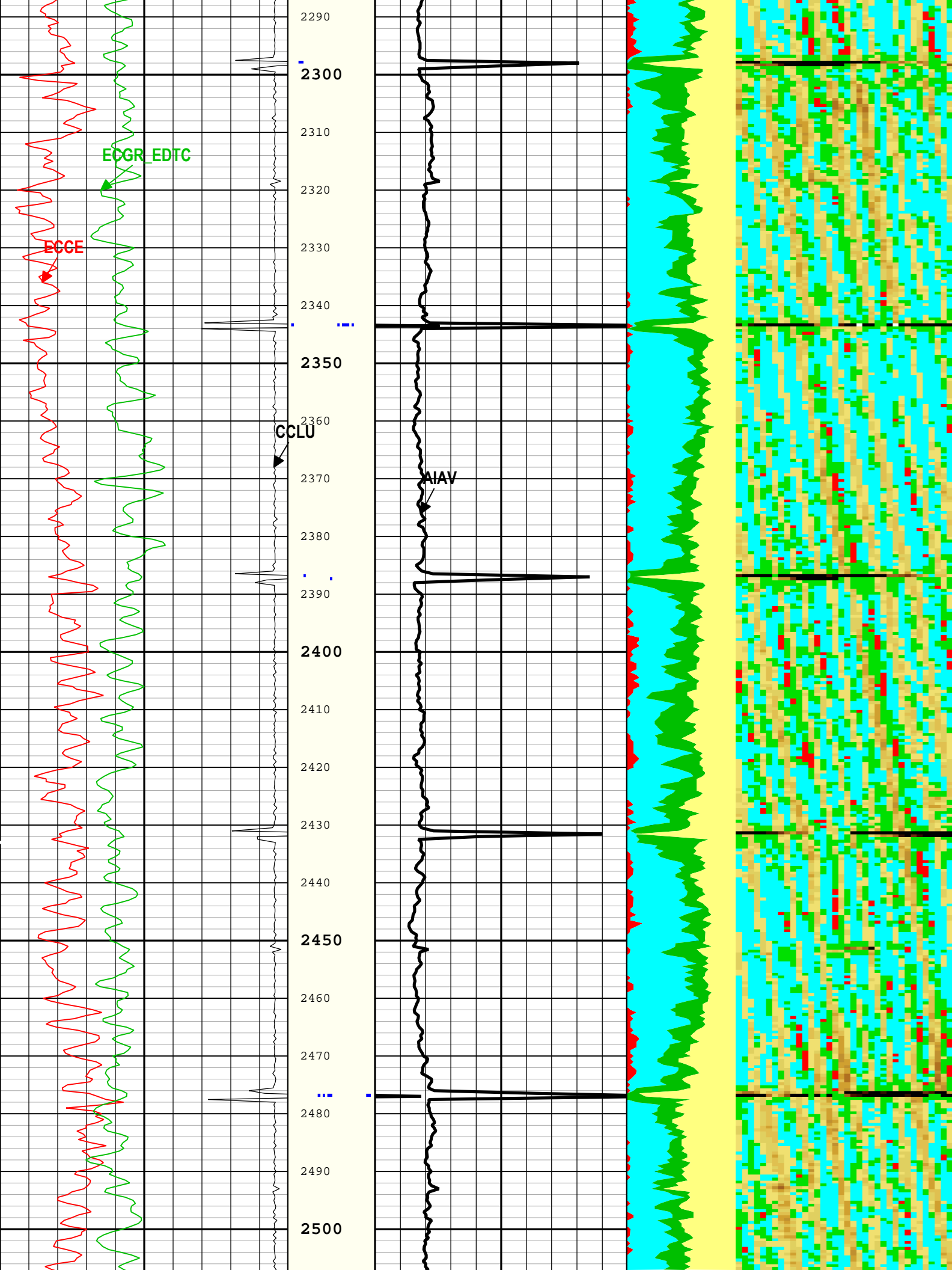


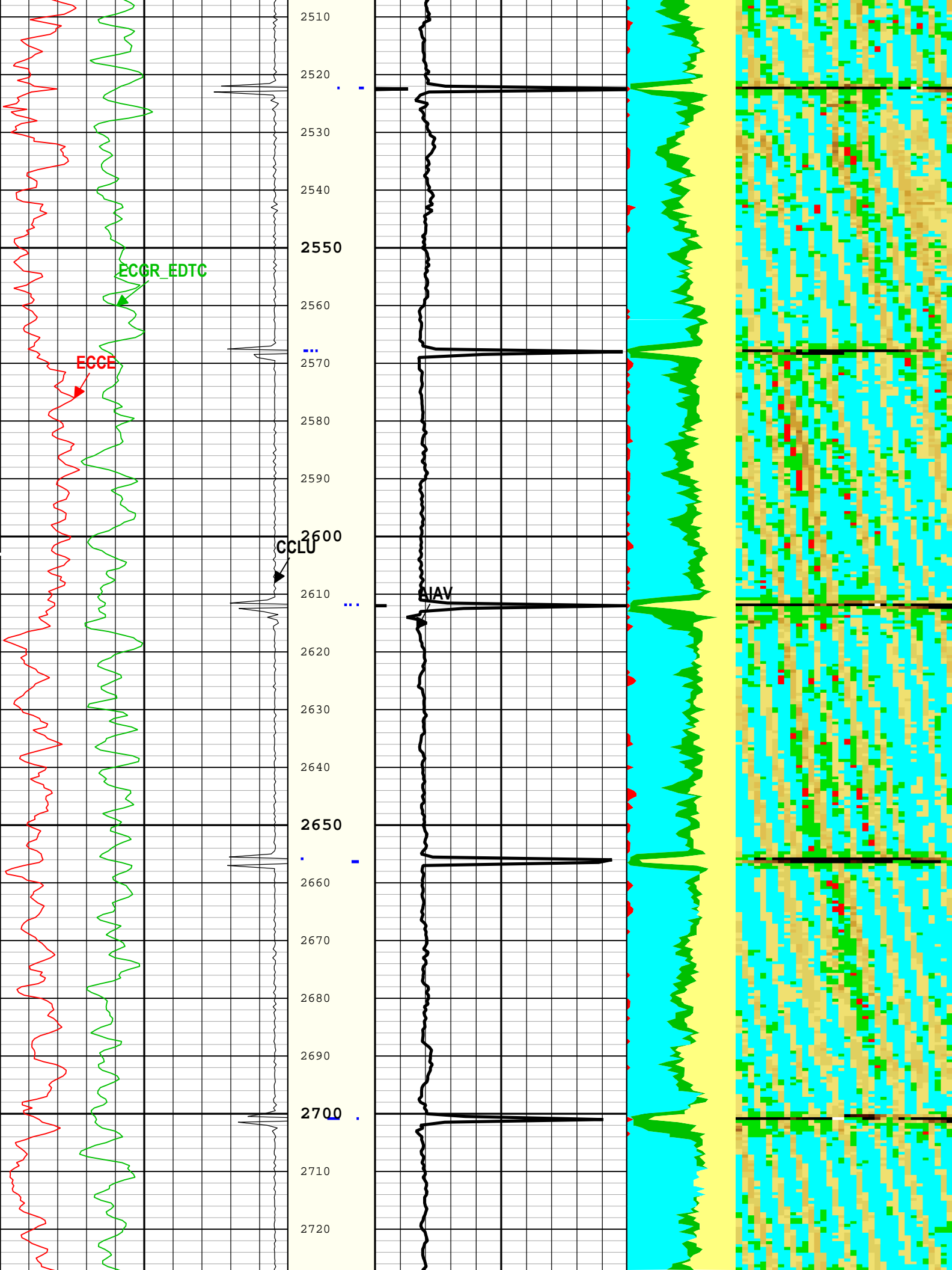


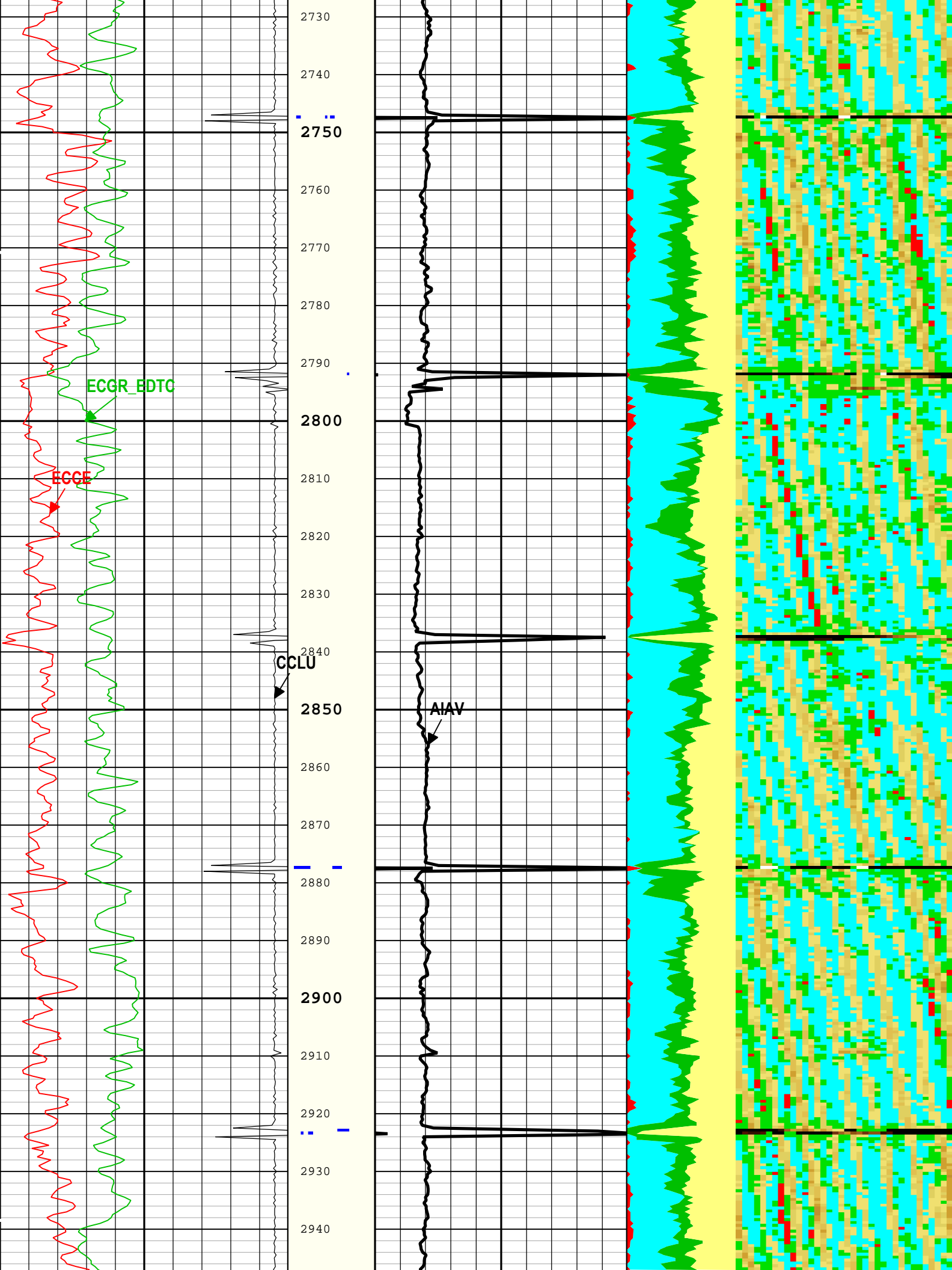


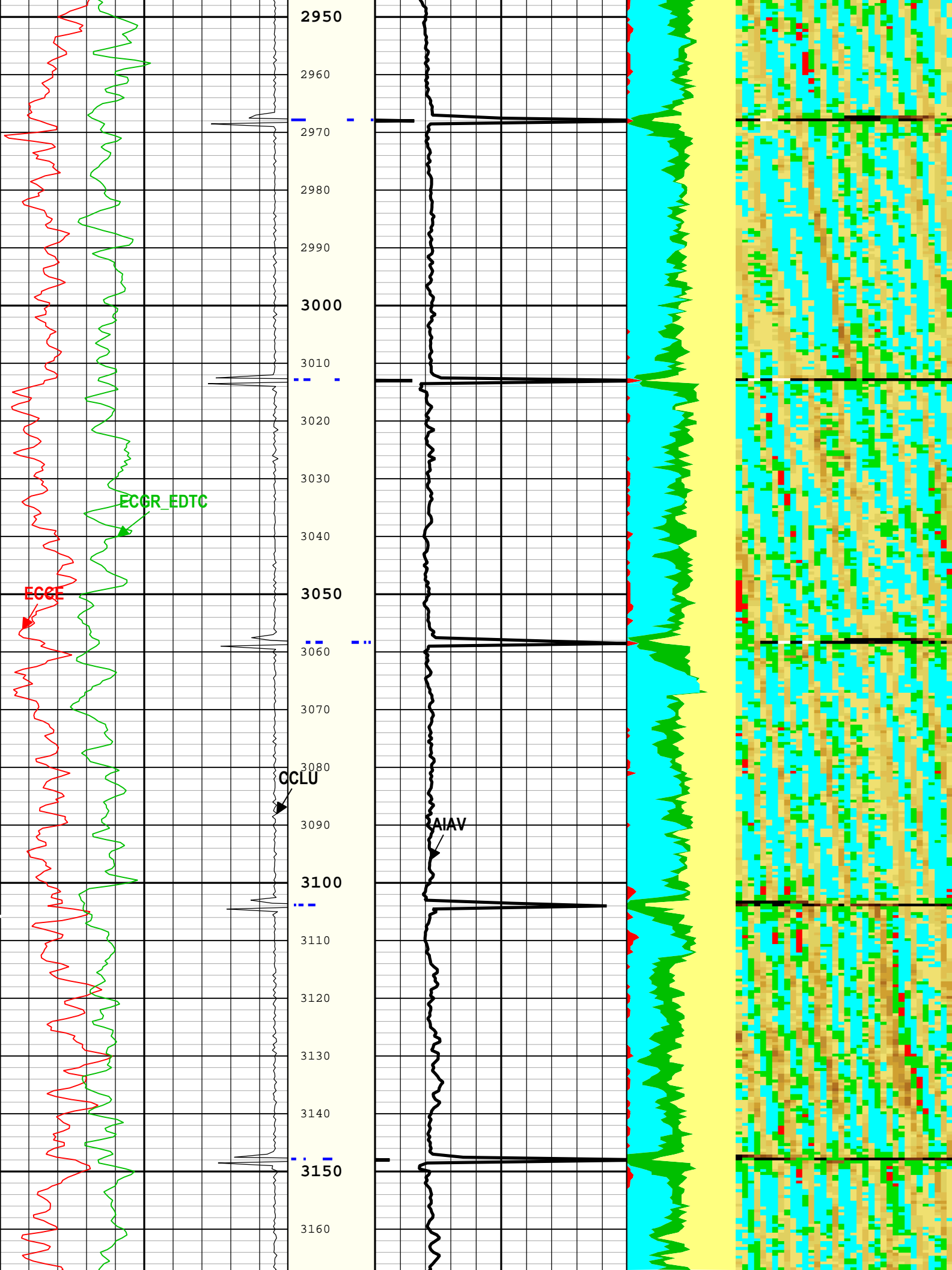


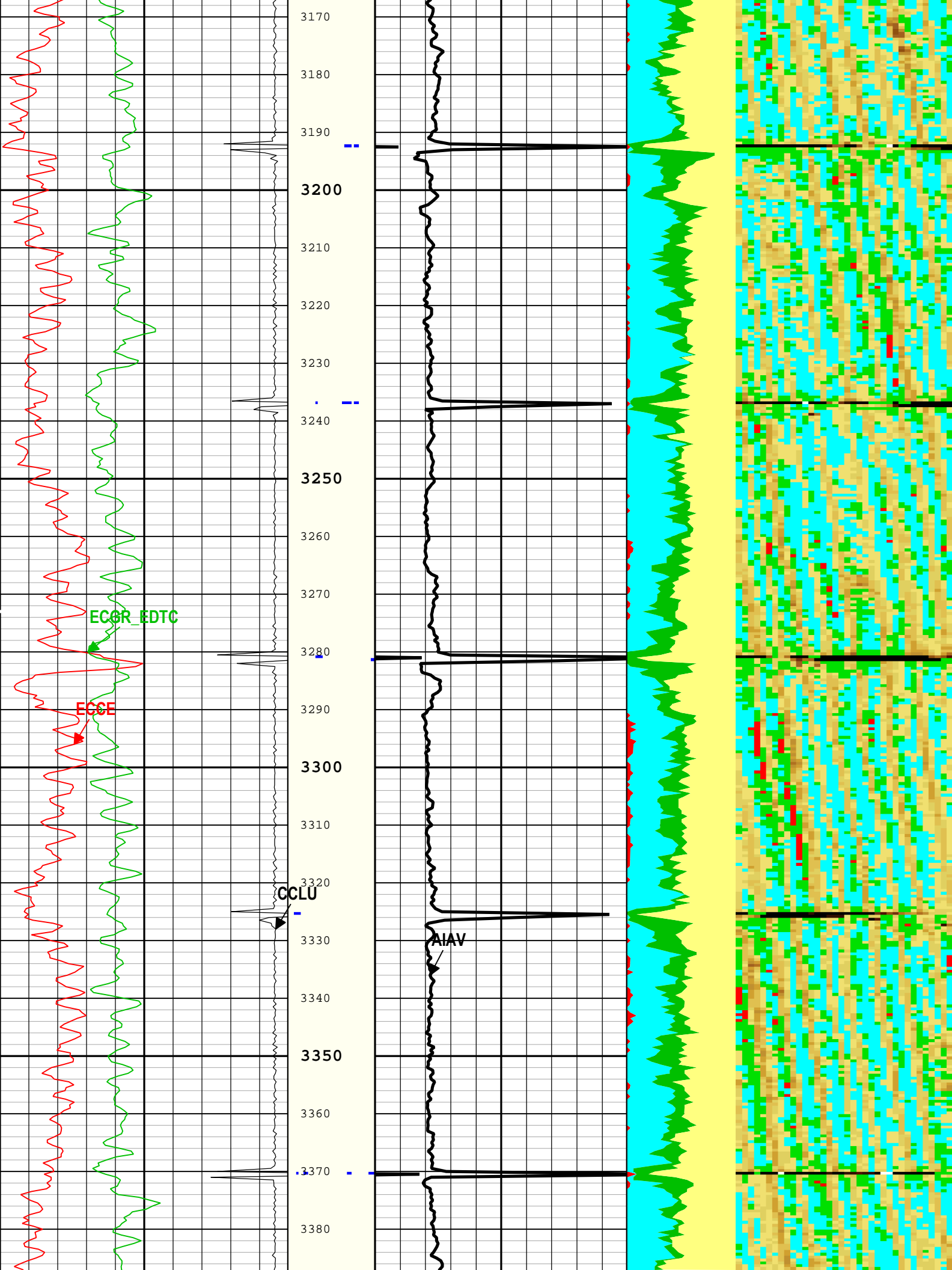


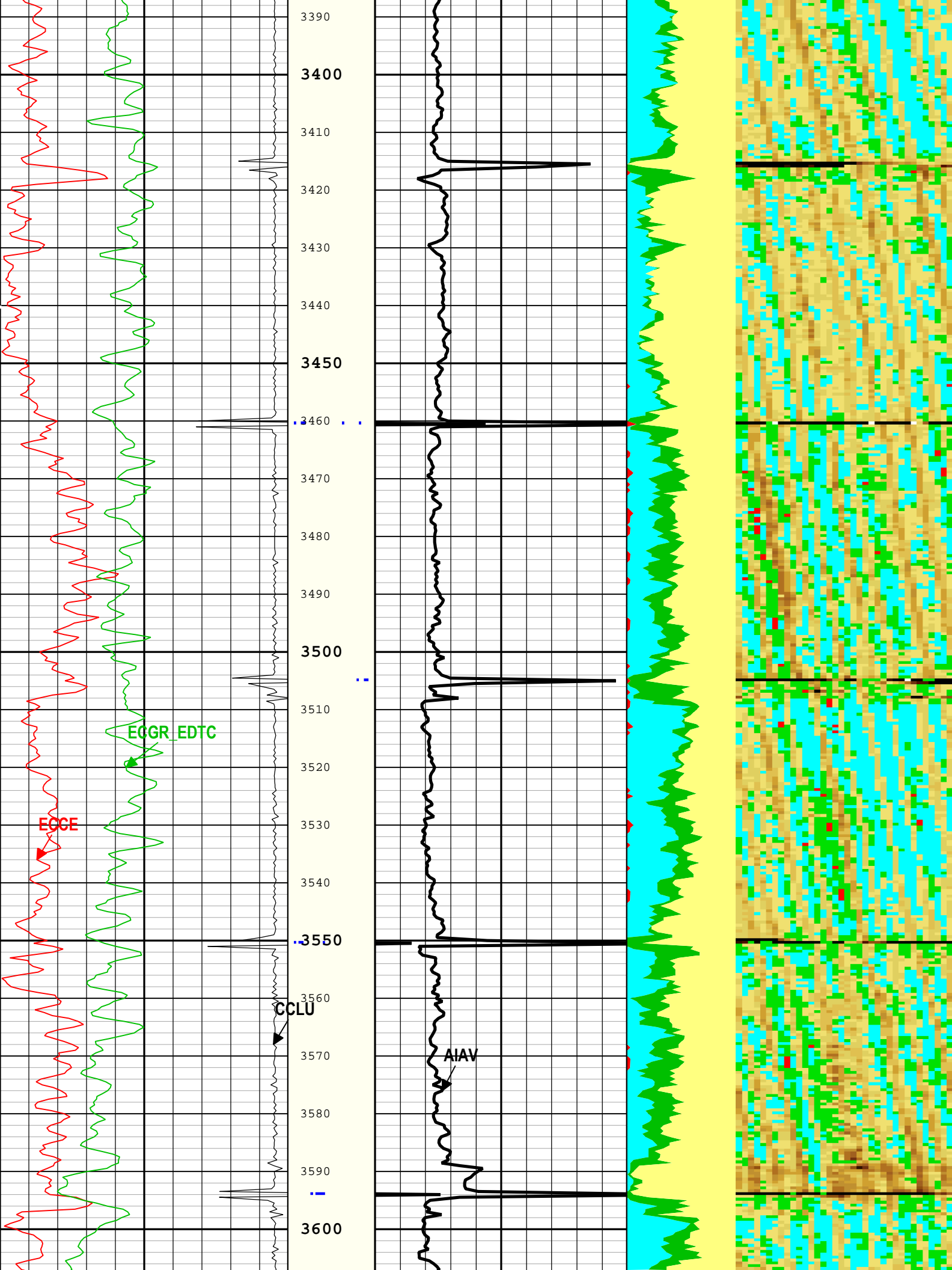


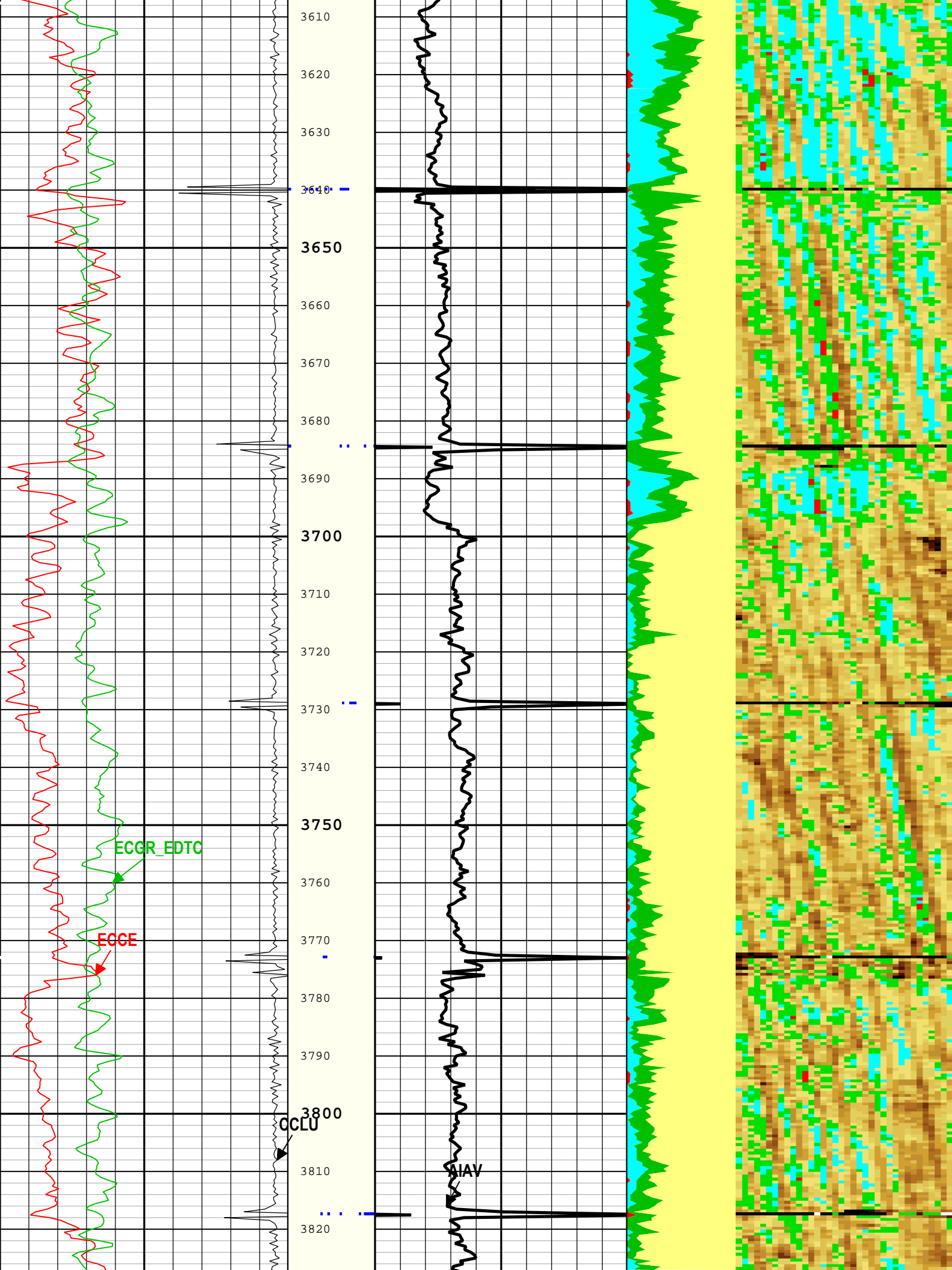


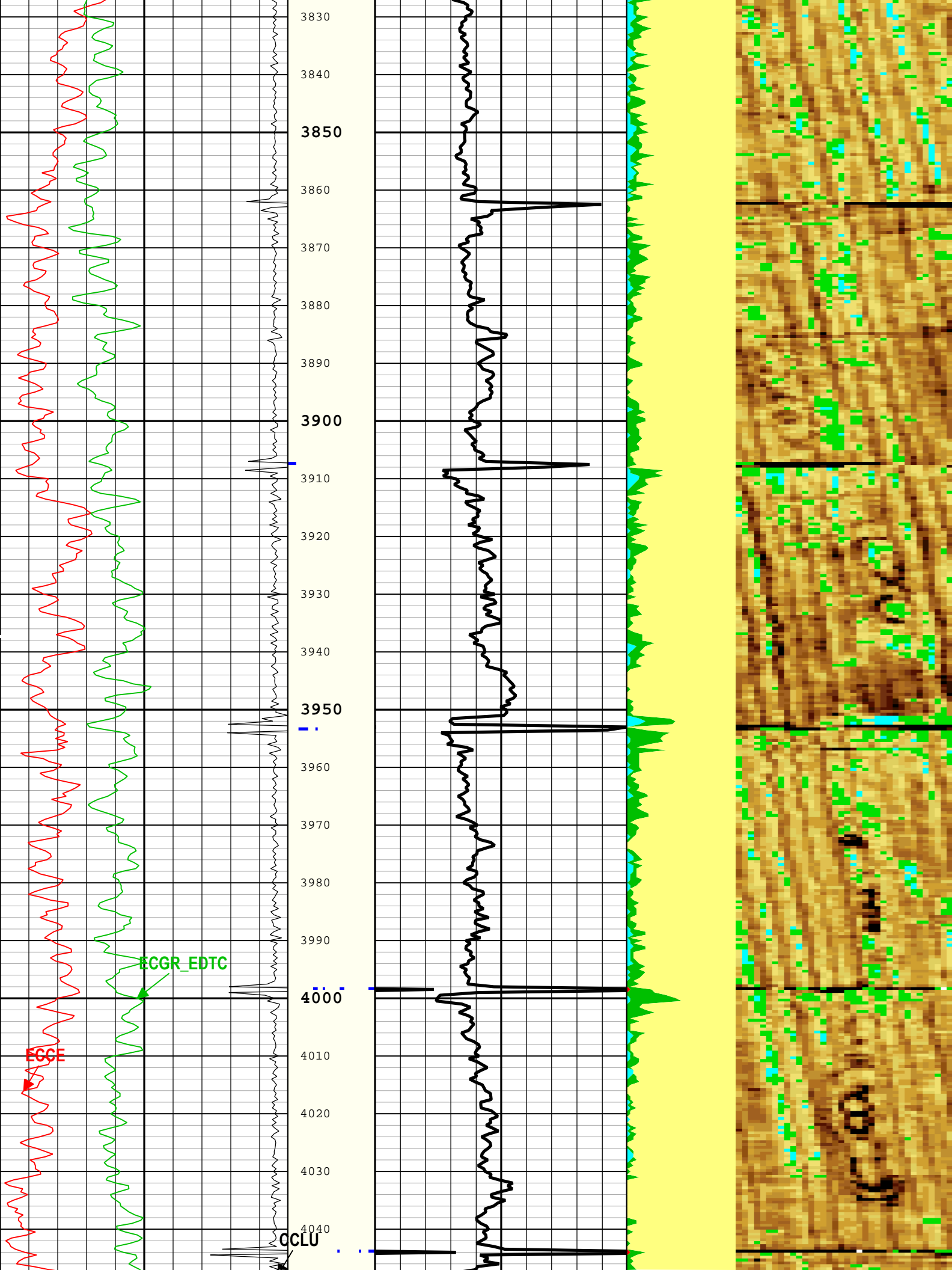


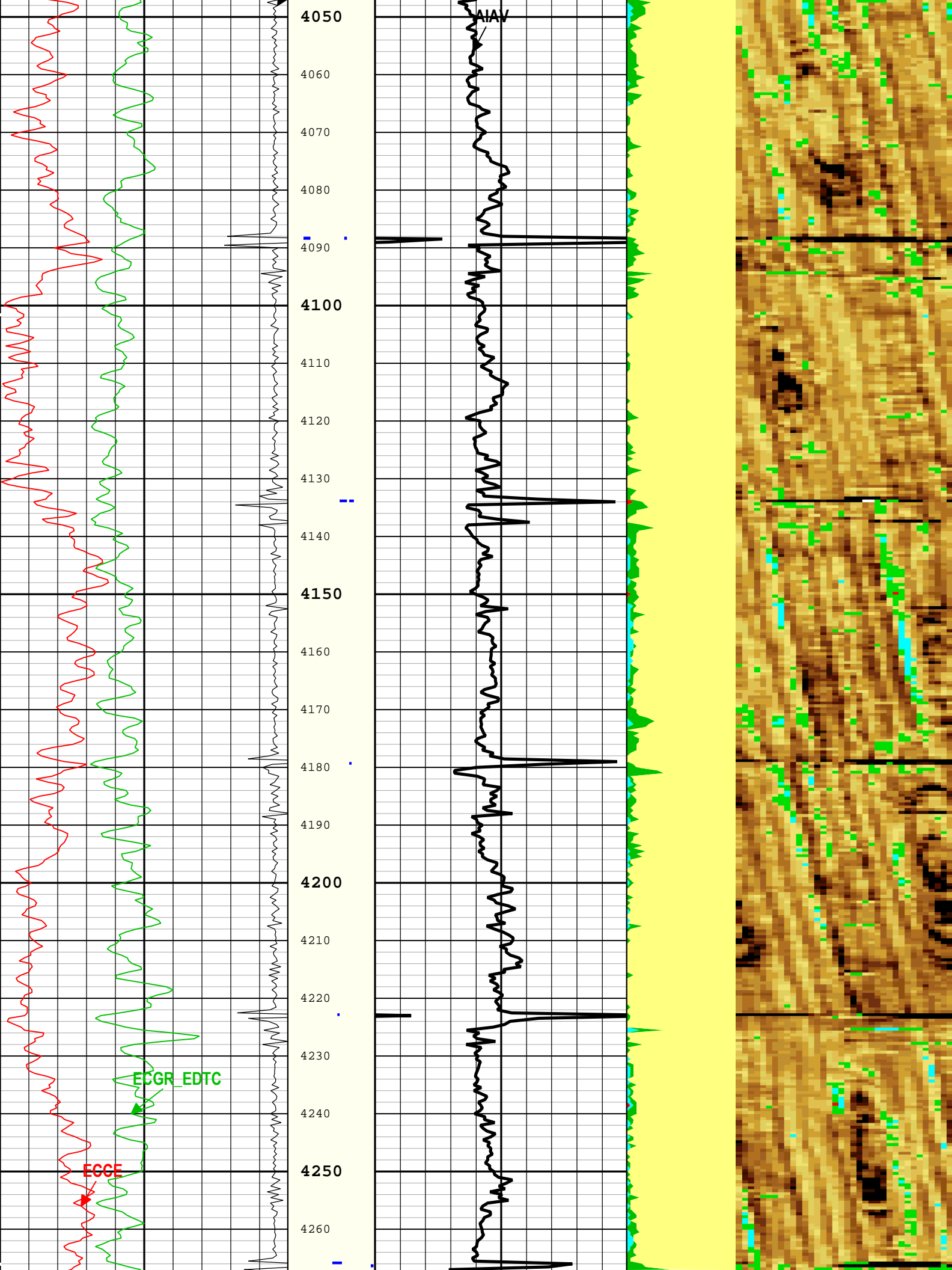


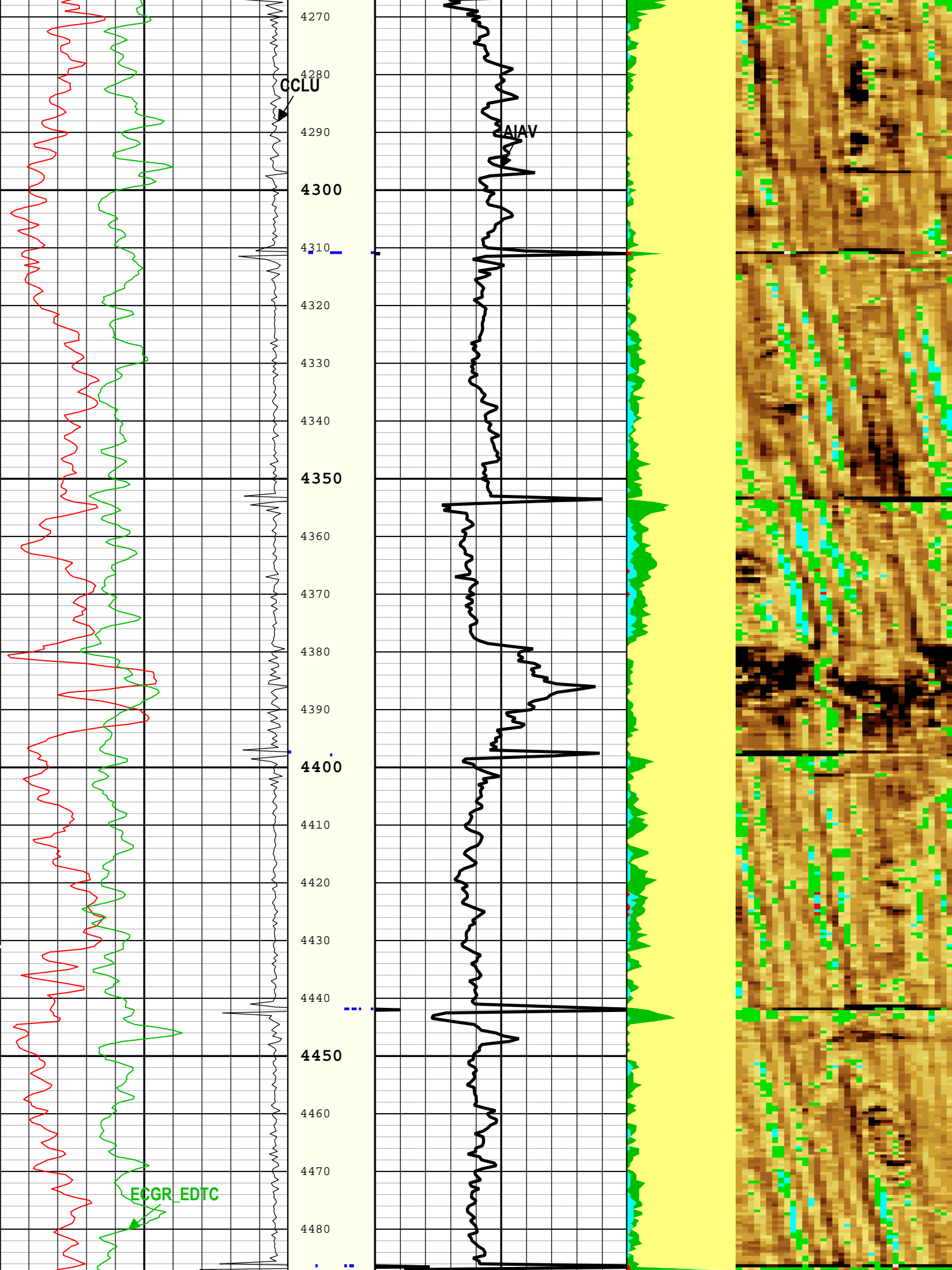


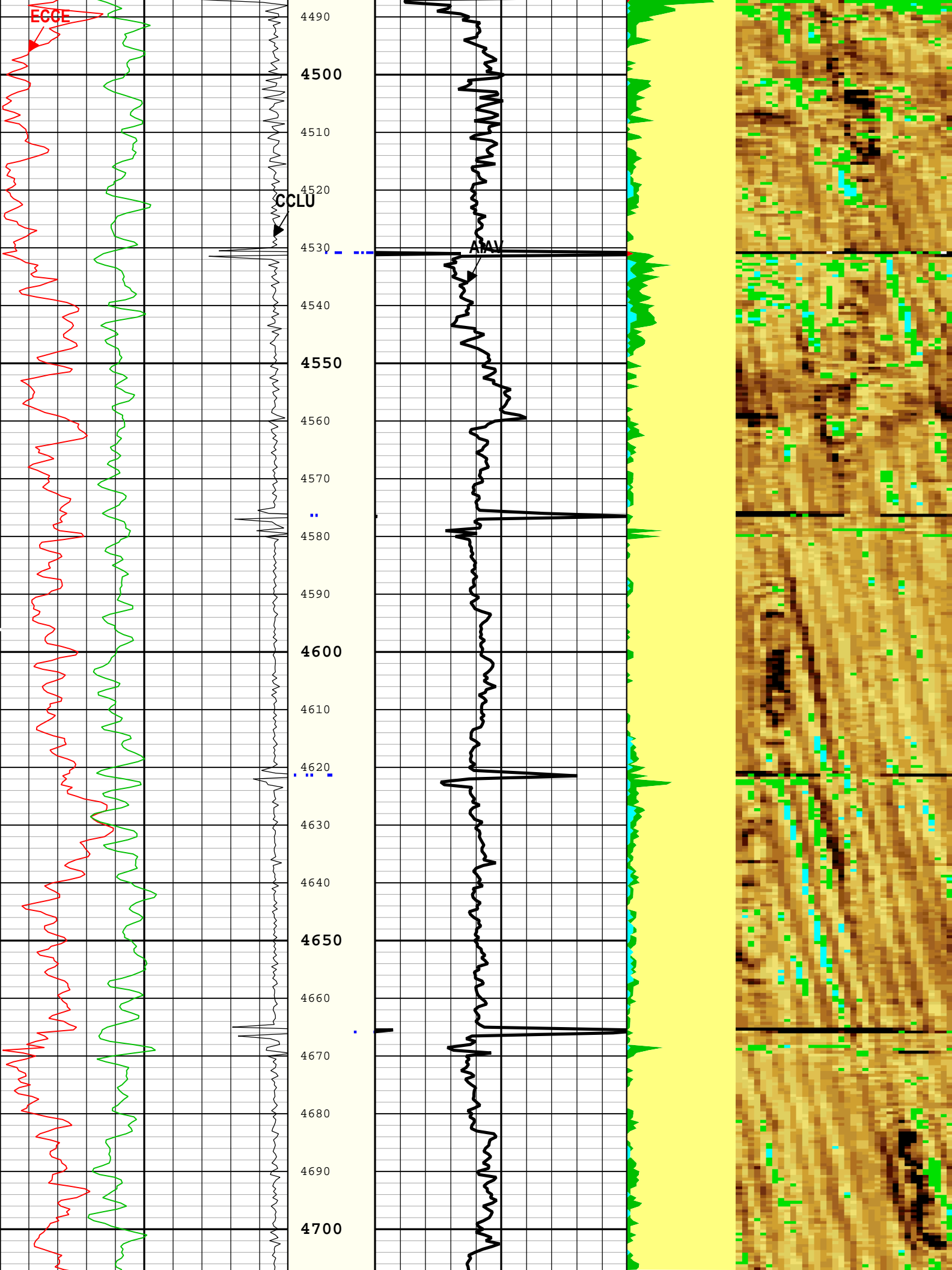


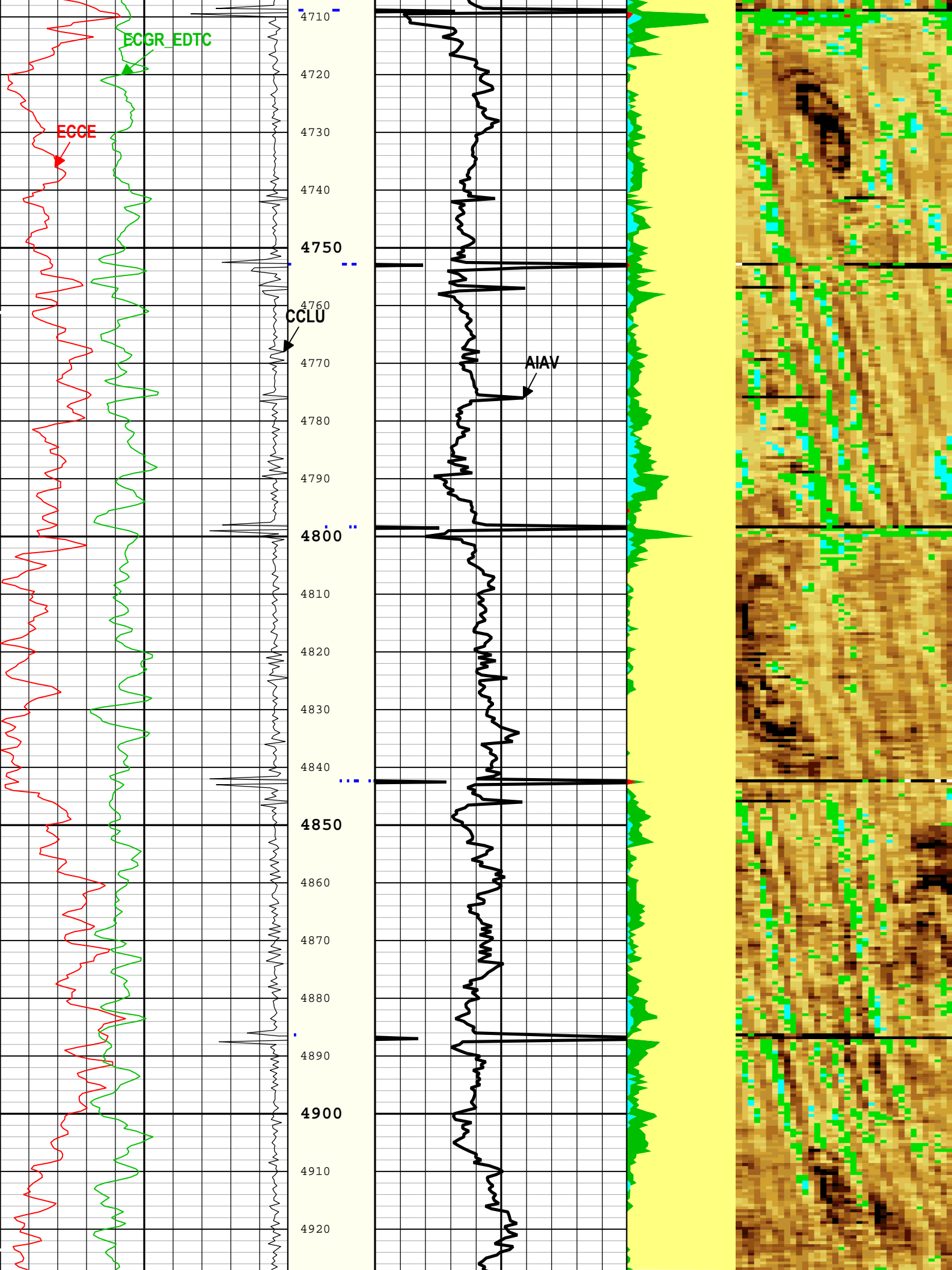


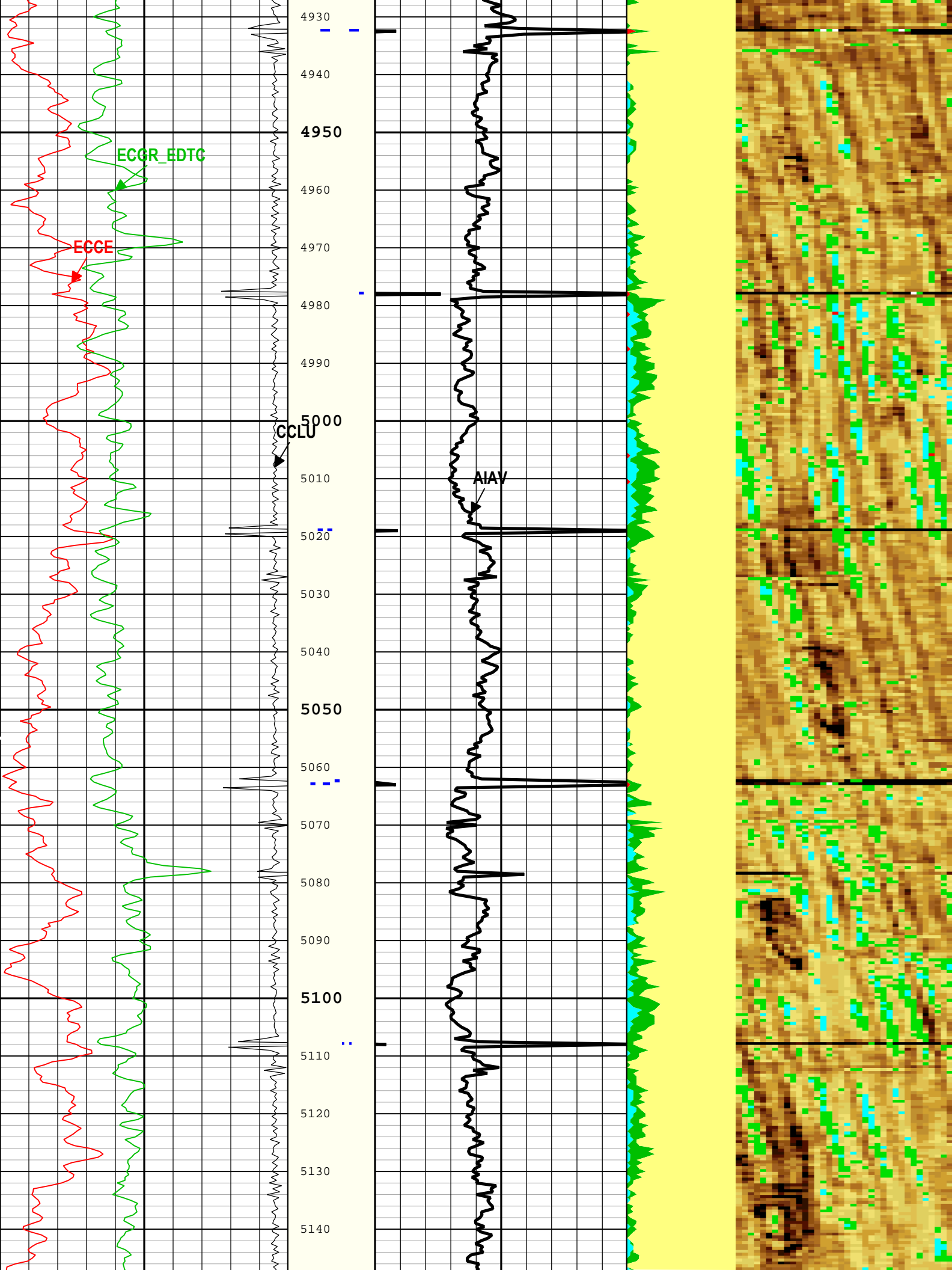


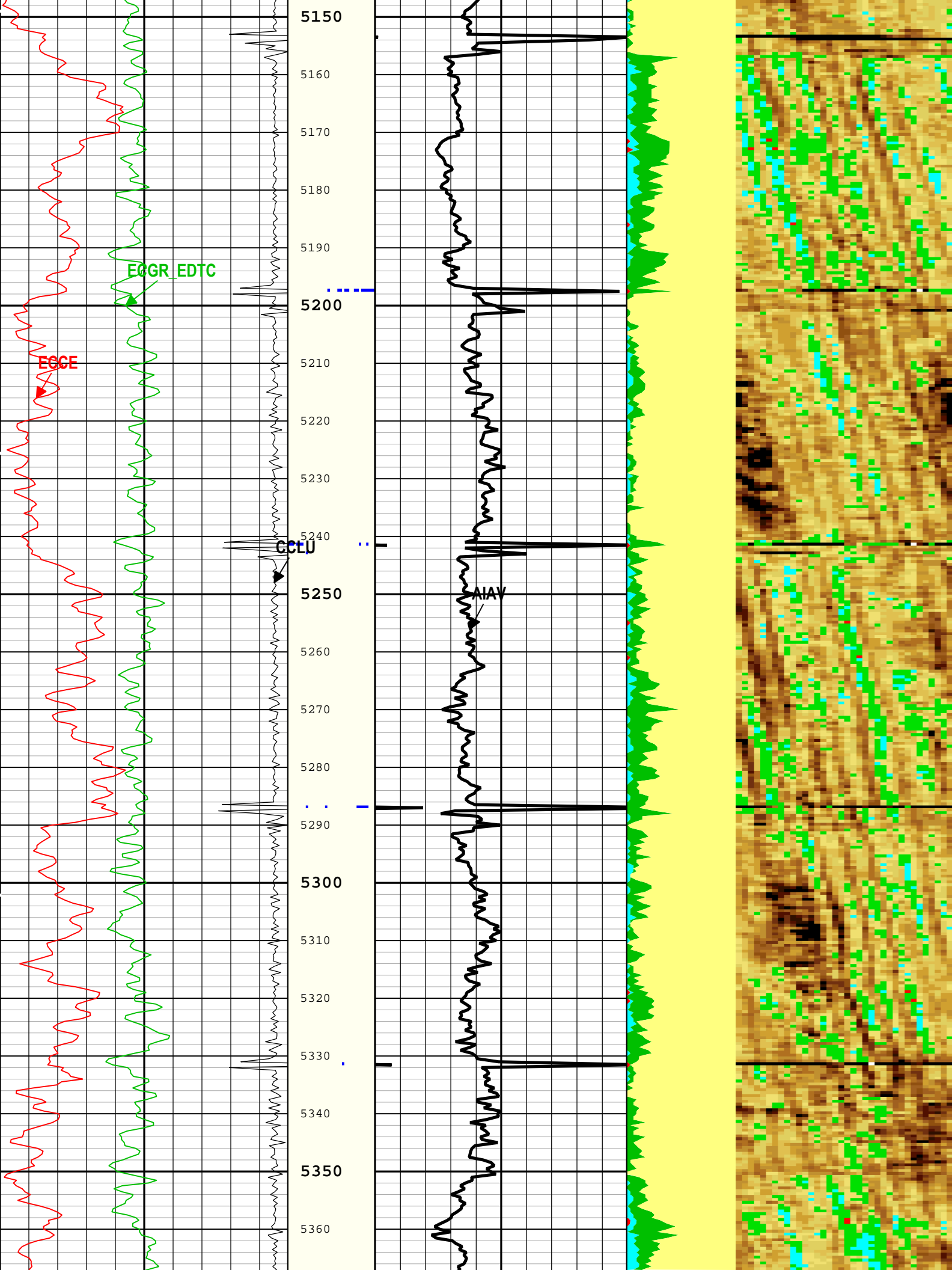


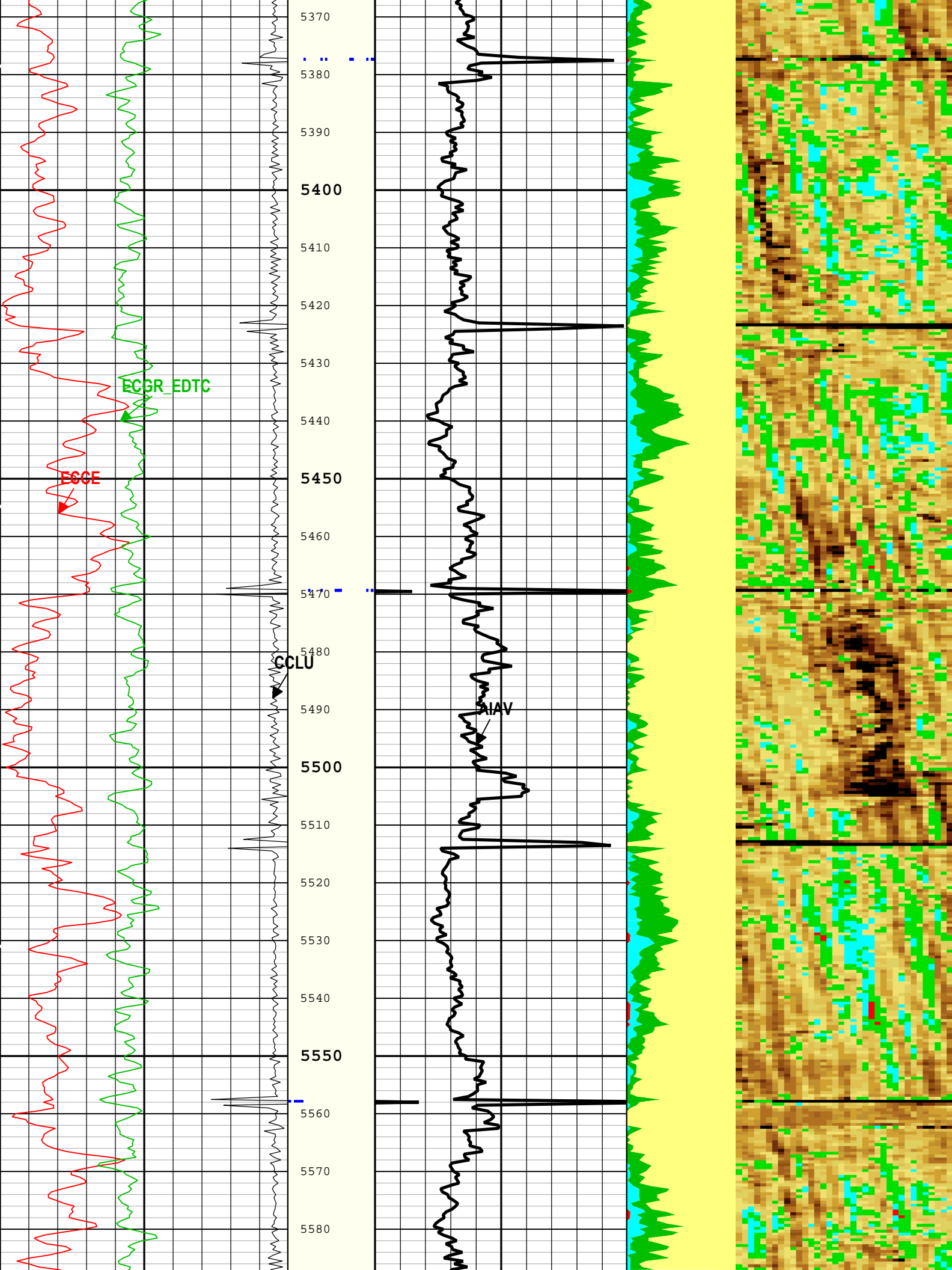


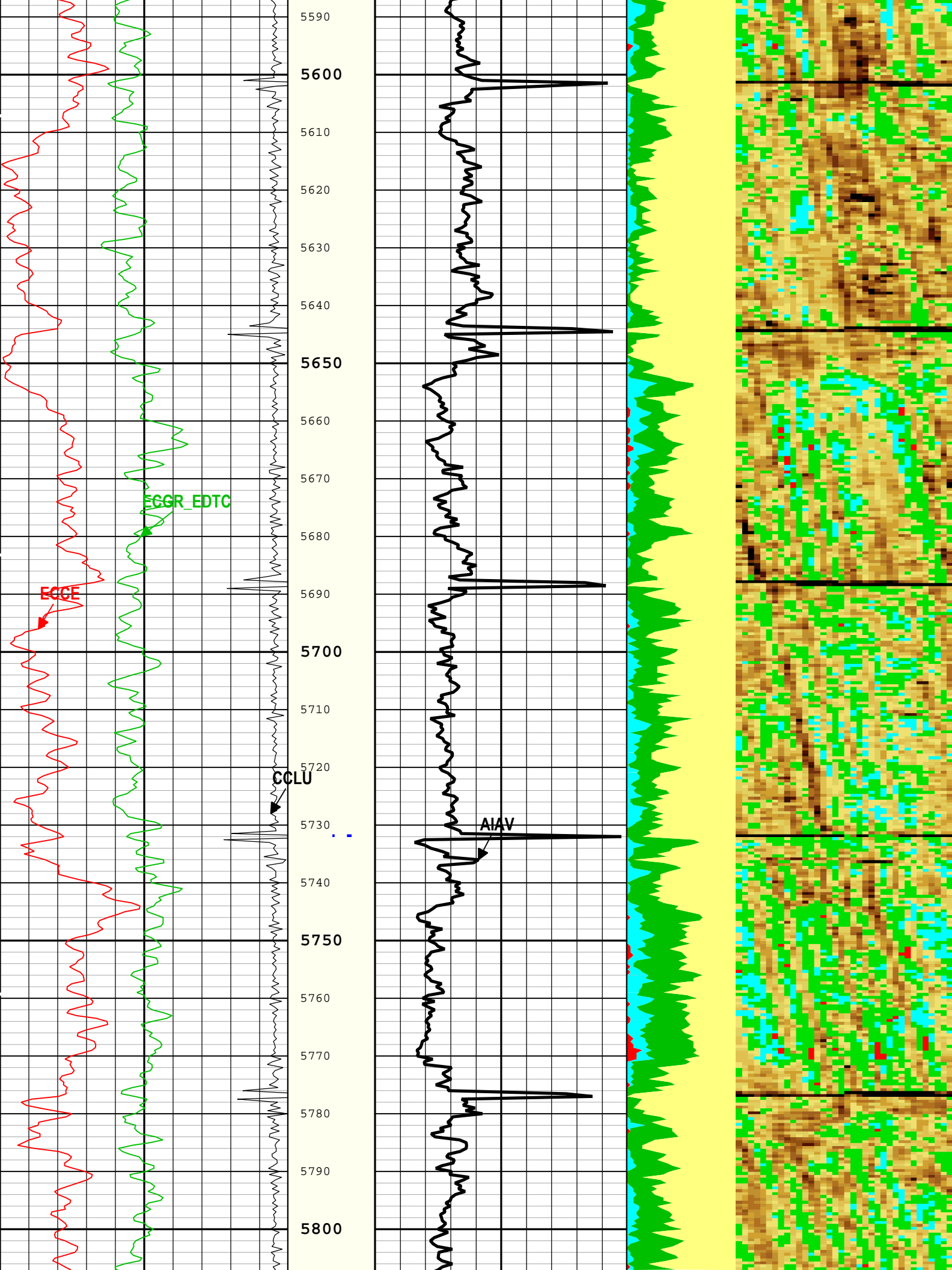


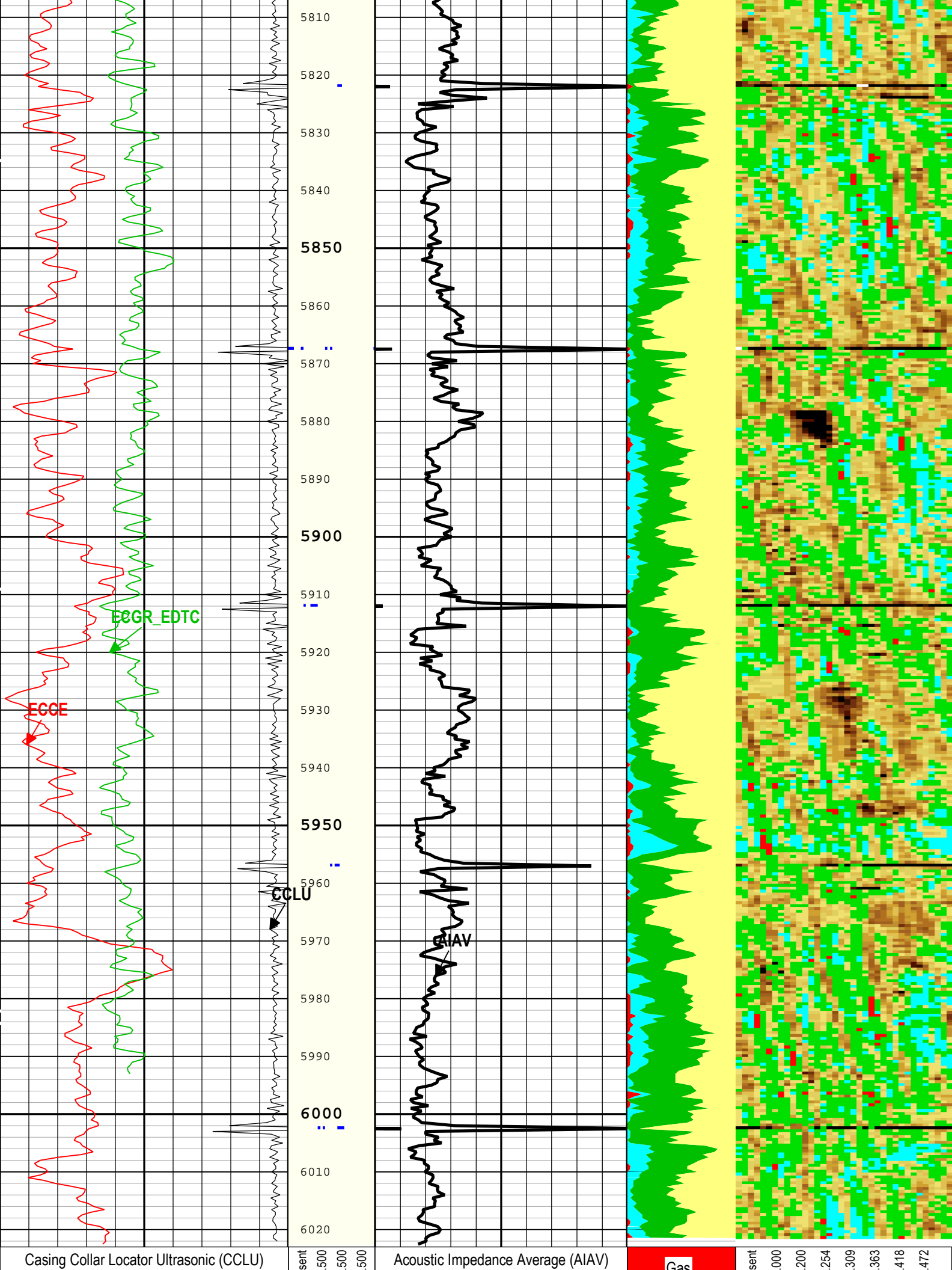












USIT-E

-20in1

Amplitude of Eccentering (ECCE) USIT-E

0in0.5

Gamma Ray (ECGR_EDTC) EDTC-B

0gAPI150

Ab

126

Explicit Normalization

USIT - USIT Processing Flags (UFLG) USIT-E

USIT-E

0Mrayl10

Liquid

Micro-Debonding

Bonded

Ab

-500234567

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 ftIndex Unit: ftIndex Type: Measured Depth

Creation Date: 17-Jun-2018 12:17:07

Channel Processing Parameters

UltraSonic: Parameters

Parameter	Description	Tool	Value	Unit
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	18031	ft
CDEN	Cement Density	EDTC-B	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	206	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	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	0.1	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

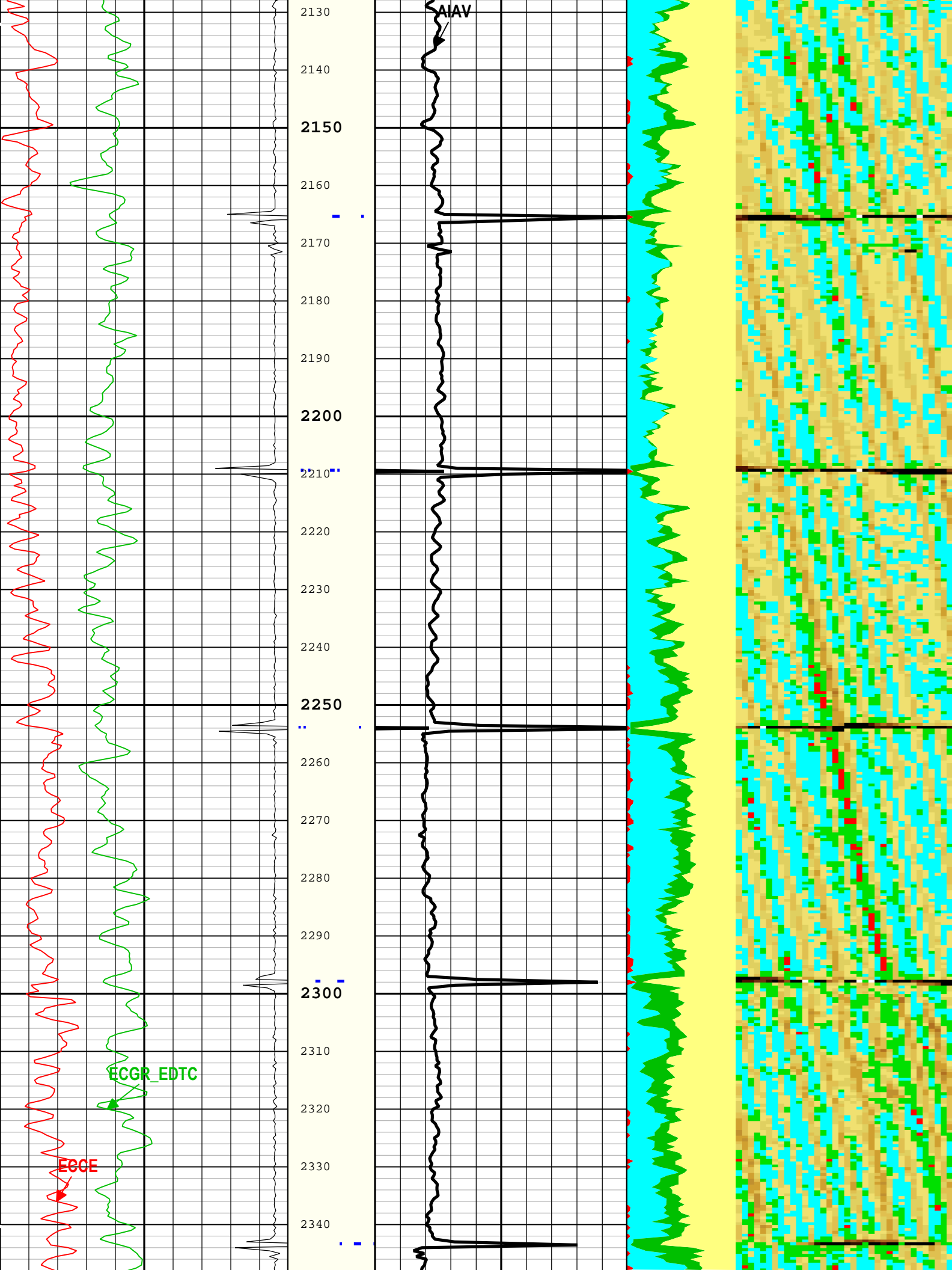
Parameter	Value	Start (ft)	Stop (ft)
BS	13.5	79.5	1969
BS	8.5	1969	6023

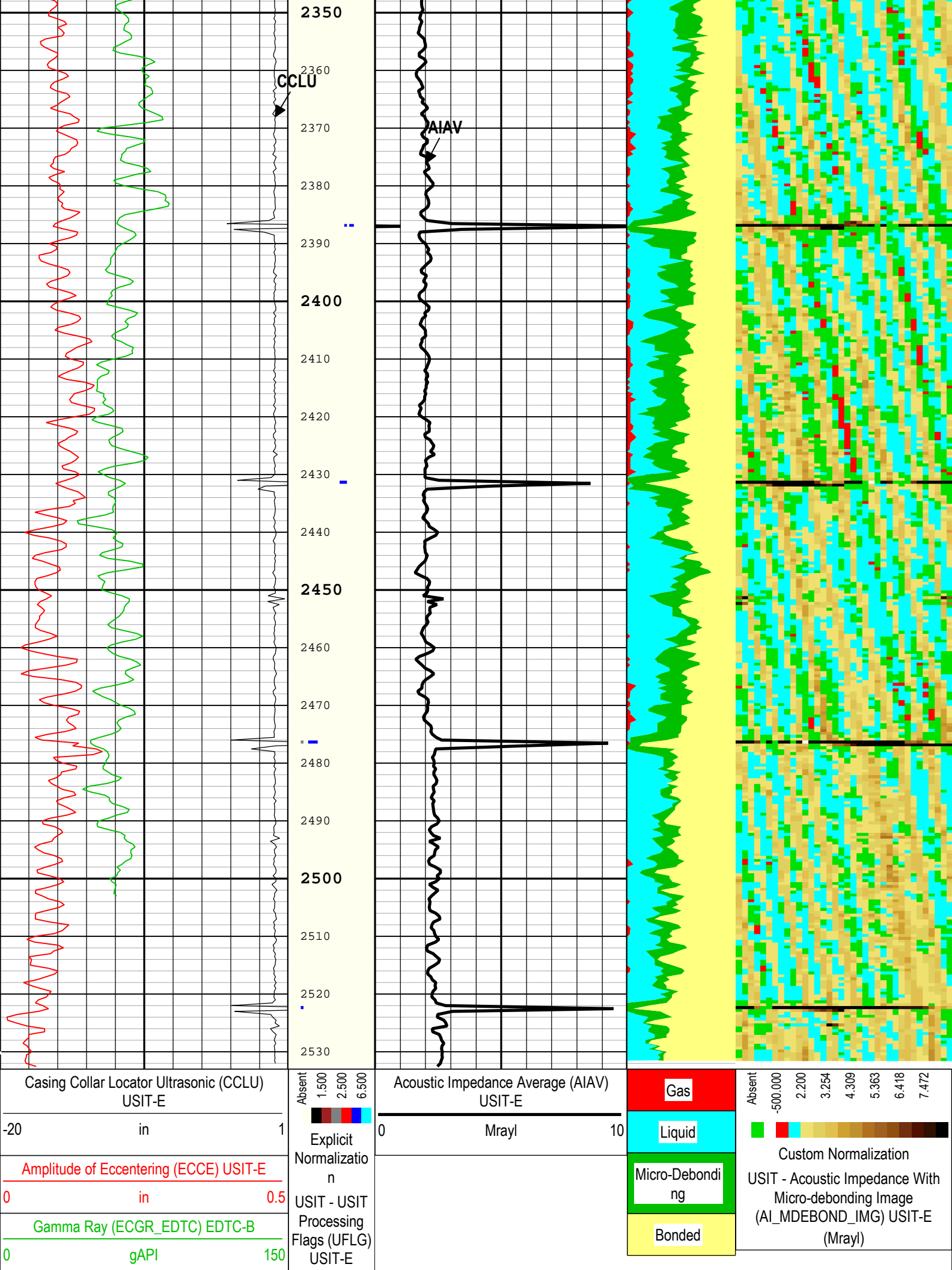
All depth are actual.

Tool Control Parameters

UltraSonic: Parameters

Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	48	dB
EMXV	EMEX Voltage	USIT-E	45	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	No	





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: 17-Jun-2018 12:17:27

Channel Processing Parameters

UltraSonic: Parameters

Parameter	Description	Tool	Value	Unit
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	18031	ft
CDEN	Cement Density	EDTC-B	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	
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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	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	0.1	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

Tool Control Parameters

UltraSonic: 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	45	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	31.88	us
WINE	Window End Time	USIT-E	71.88	us

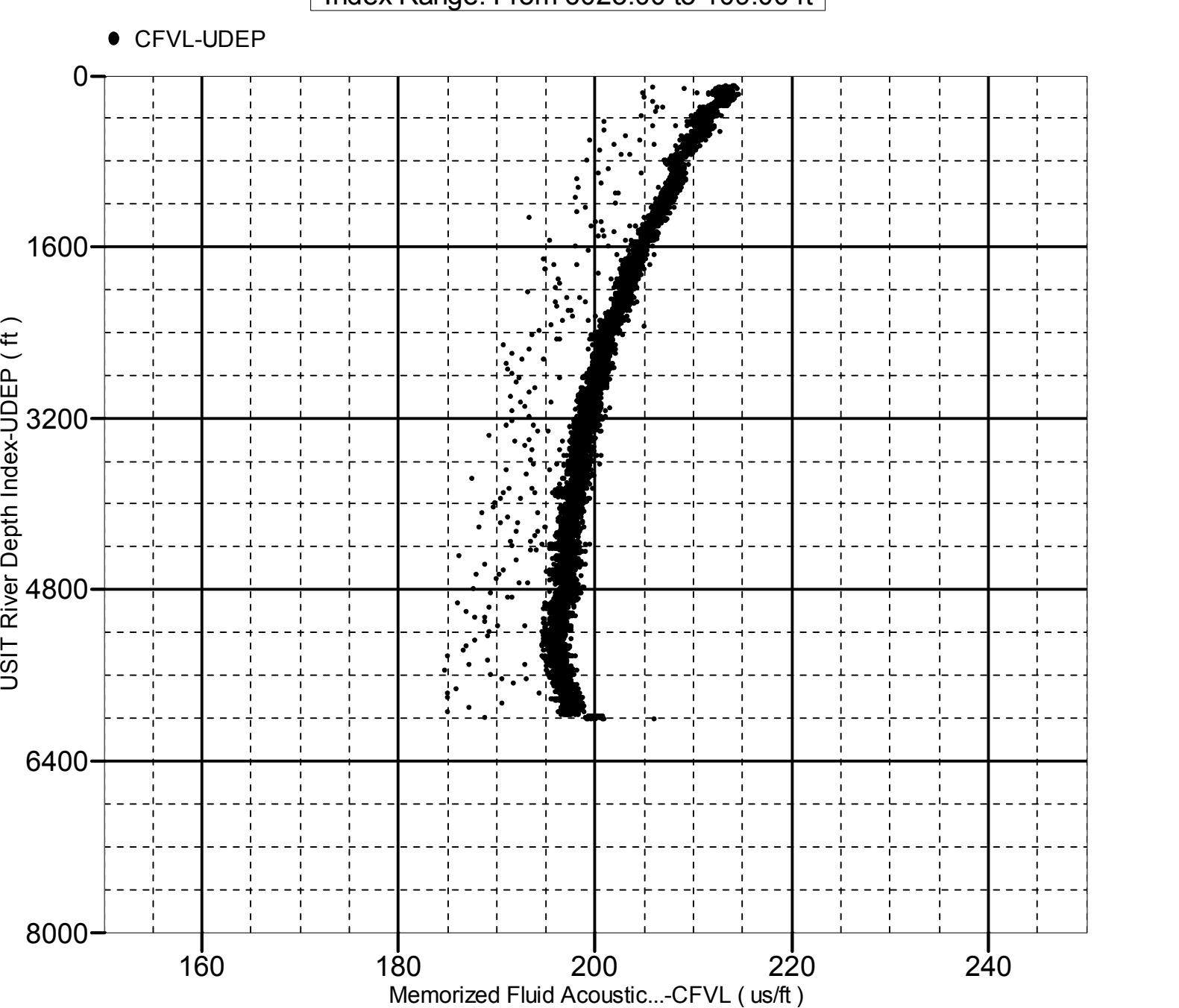
XYZ

Company:Noble Energy Inc Well:Larson A23-651
UltraSonic: Log[6]:Up:S004

Fluid Acoustic Slowness vs Depth

2D Cross Plot

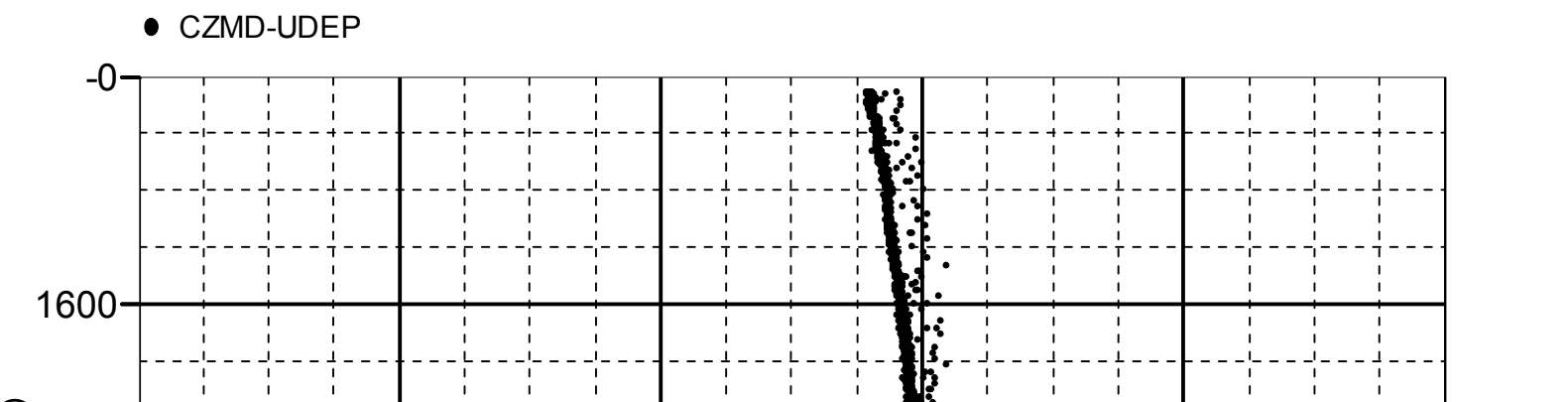
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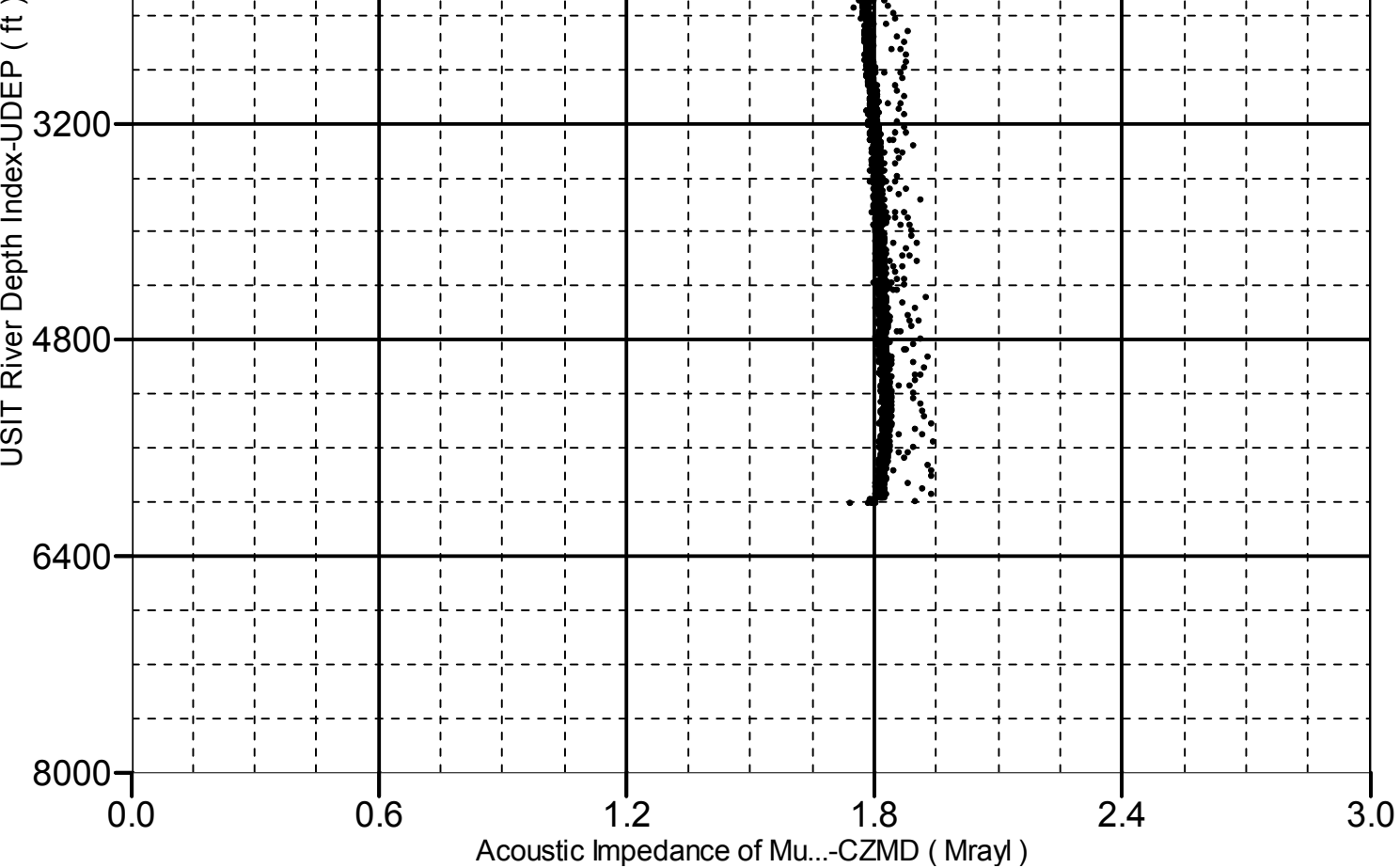


Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6023.00 to 109.00 ft





Company:	Noble Energy Inc	Schlumberger
Well:	Larson A23-651	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	

UltraSonic Summary Print