

Company: Noble Energy Inc

Well: Larson A23-668

Field: Wattenberg

County: Weld State: Colorado

UltraSonic Summary Print

County:	Weld				
Field:	Wattenberg				
Location:	NENE				
Well:	Larson A23-668				
Company:	Noble Energy Inc				
		Location:			
		NENE	Elev.:	K.B.	4682.00 ft
		630 FNL 275 FEL		G.L.	4652.00 ft
		Permanent Datum:	Ground Level	Elev.:	4652.00 f
		Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
		Drilling Measured From:	Kelly Bushing		
		API Serial No.	Section:	Township:	Range:
		05-123-45095	24	6N	64W
Logging Date	16-Jul-2018				

Run Number	1A	
Depth Driller	17400.00 ft	
Schlumberger Depth	6780.00 ft	
Bottom Log Interval	6780.00 ft	
Top Log Interval	100.00 ft	
Casing Fluid Type	Salt Brine	
Salinity		
Density	8.4 lbm/gal	
Fluid Level	0.00 ft	
BIT/CASING/TUBING STRING		
Bit Size	8.50 in	
From	1959.00 ft	
To	6780.00 ft	
Casing/Tubing Size	5.5 in	
Weight	20 lbm/ft	
Grade	N/A	
From	0.00 ft	
To	6780.00 ft	
Max Recorded Temperatures	232 degF	
Logger on Bottom	16-Jul-2018	13:48:00
Unit Number	Location: Time	
Recorded By	9108	Fort Morgan
Witnessed By	Evan Grzecki	
	Bill 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.

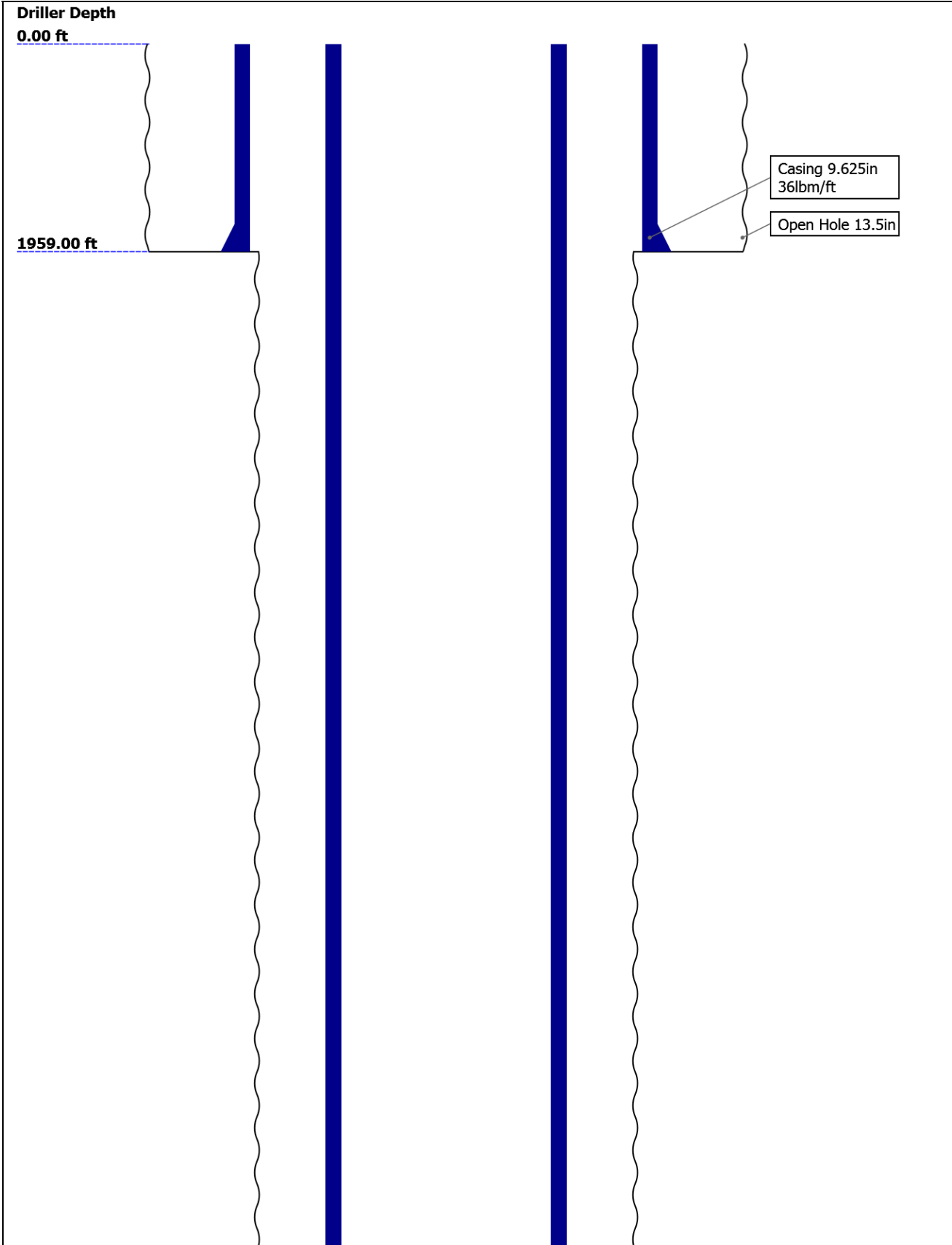
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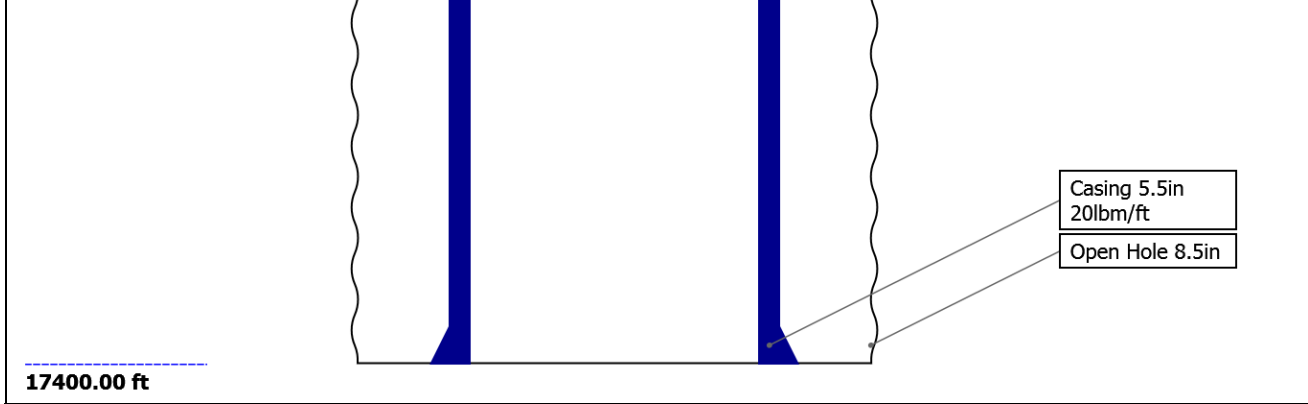
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- Disclaimer
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- in )
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- 12. XYZ ( USI Acoustic Impedance of Mud vs Depth 3.0

Well Sketch






Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	13.5	8.5				
Top Driller ( ft )	0	1959				
Top Logger ( ft )	0	1959				
Bottom Driller ( ft )	1959	17400				
Bottom Logger ( ft )	1959	6780				
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 )	1959	17400				
Bottom Logger ( ft )	1959	6780				

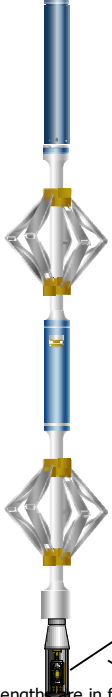
Remarks and Equipment Summary

1A: Toolstring				1A: Remarks	
<div><div><div>Equip nameLength</div><div>LEH-QT31.54</div><div>LEH-QT</div></div><div><div>DTC-H28.06</div><div>ECH-KC</div><div>DTC-H</div></div><div><div>SGT-N25.06</div><div>SGH-K</div><div>SGD-TAA</div><div>SGC-TB</div></div><div><div>AH-184[2]19.56</div><div>AH-184[1]17.56</div><div>USF-5.0015.56</div></div></div> <div></div> <div><div>MP nameOffset</div><div>CTEM27.16</div><div>HV0.00</div><div>TelStatus25.06</div><div>ToolStatus25.06</div><div>GR24.14</div></div>	Thank you for choosing Schlumberger!				
	Log run for cement evaluation				
	Toolstring run centralized using knuckles and houma kit as per toolsketch				
	USRS-AB sub run with USI-TX transducer				
	Log correlated to downlog				
	Crew: Gary Lapp, Claude Walls				
	BHT: 232 Deg F				
	TOC: ~3300'				
	Main Pass Logged @ 2500psi				
	Repeat Pass Logged @ 0psi				

USIT-E:93 15.56

0

ECH-MFA:  
1924  
USAC-A:9  
30  
USIS-A  
USSC-B  
USRS-AB  
USI-SENS  
OR:888  
USI-TX



USI Sen 0.37

son

TOOL\_ZERO

Head Fe

nsion

Lengths are in ft  
Maximum Outer Diameter = 3.410 in  
Line: Sensor Location, Value: Gating Offset  
All measurements are relative to TOOL\_ZERO

Depth Summary

	1A		
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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	Crane USA		

1A:Depth Control Parameters

Depth Control Remarks

Log Sequence	First Log In the Well	
Rig Up Length At Surface		
Rig Up Length At Bottom		
Rig Up Length Correction		

# USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[3]:Up	6777.7	1792.32

Fluid Velocity = "Automatic".  
CFVL equals DFSL channel

Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)
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Mud Impedance = "FreePipe Norm."  
Free Pipe normalization zone is : 57.50m(188.65ft) to 65.12m(213.65ft)  
MUD\_N\_FRP = 1.14  
DFD = 1.01g/cm3(8.40lbm/gal)  
CZMD median computed in free pipe normalization interval = 1.66 MRayl

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

## 2500 PSI Main Pass

## Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100
Application Patch	Wireline_Hotfix-Mandatory-2018SP1_8.1.101341

## Composite Summary

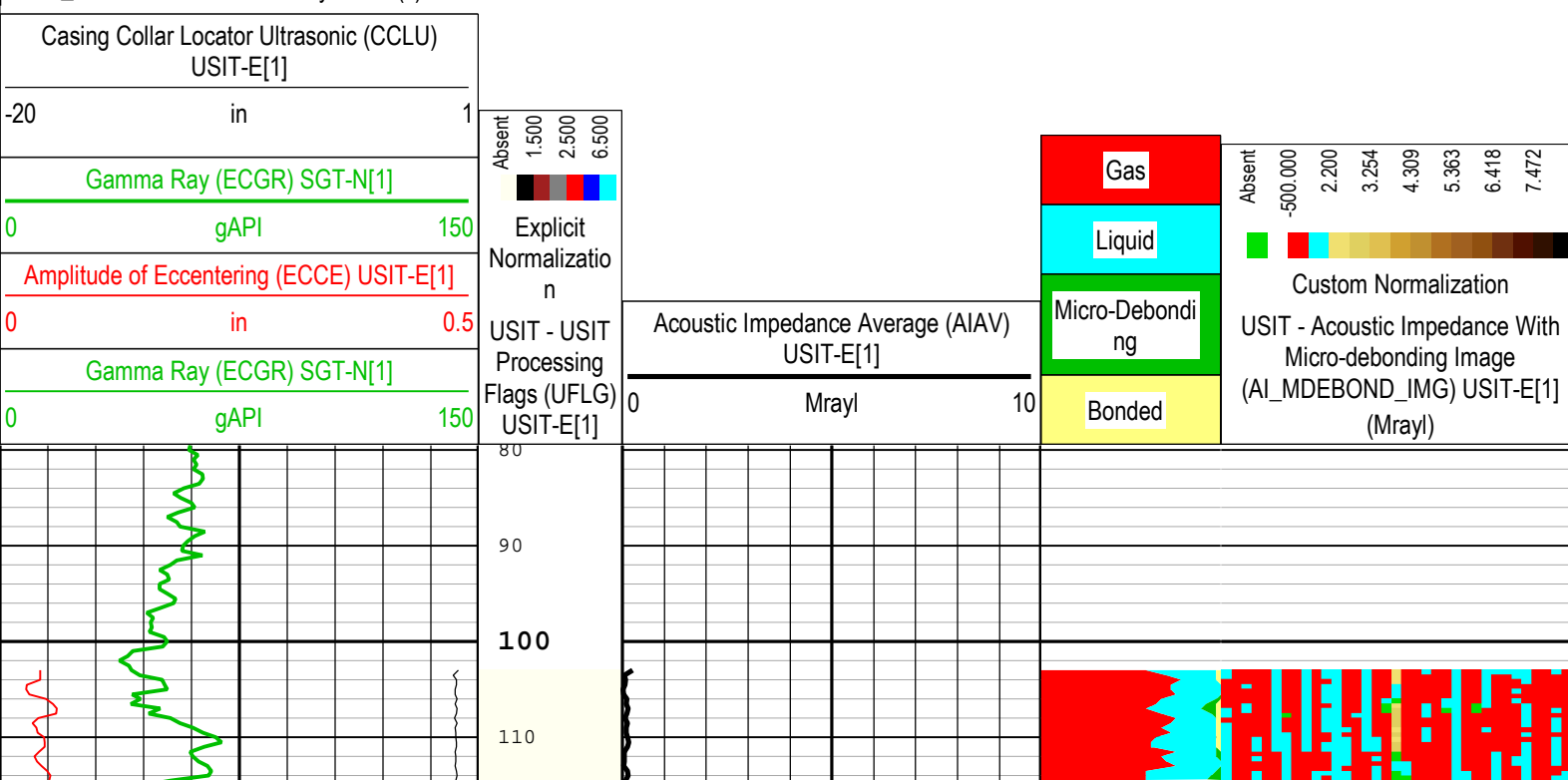
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[3]:Up	Up	1792.32 ft	6777.70 ft	16-Jul-2018 1:48:00 PM	16-Jul-2018 2:23:57 PM	ON	2.86 ft	Yes
1A	Log[5]:Up	Up	103.35 ft	1959.05 ft	16-Jul-2018 2:43:58 PM	16-Jul-2018 3:03:07 PM	ON	2.86 ft	Yes

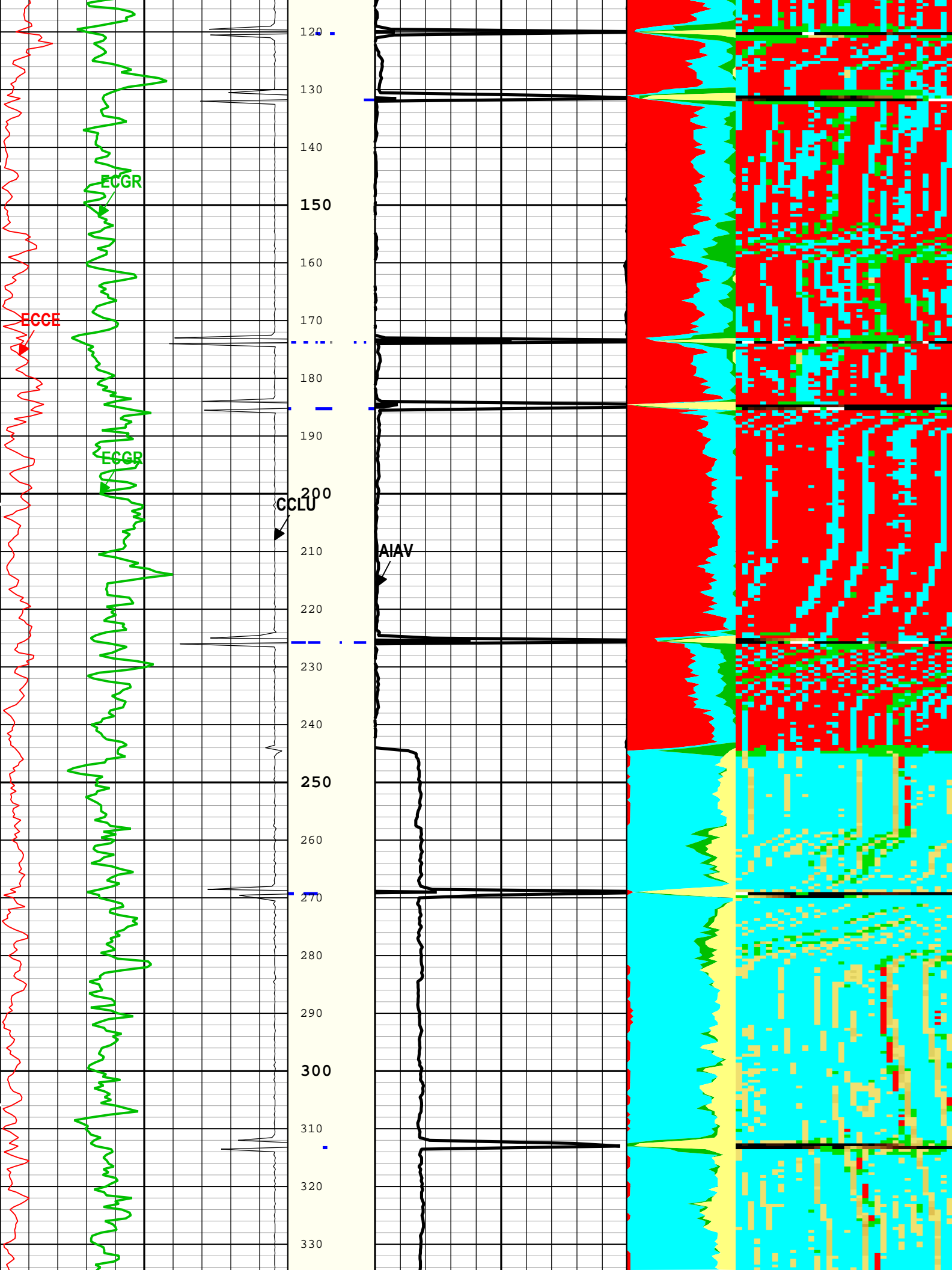
All depths are referenced to toolstring zero

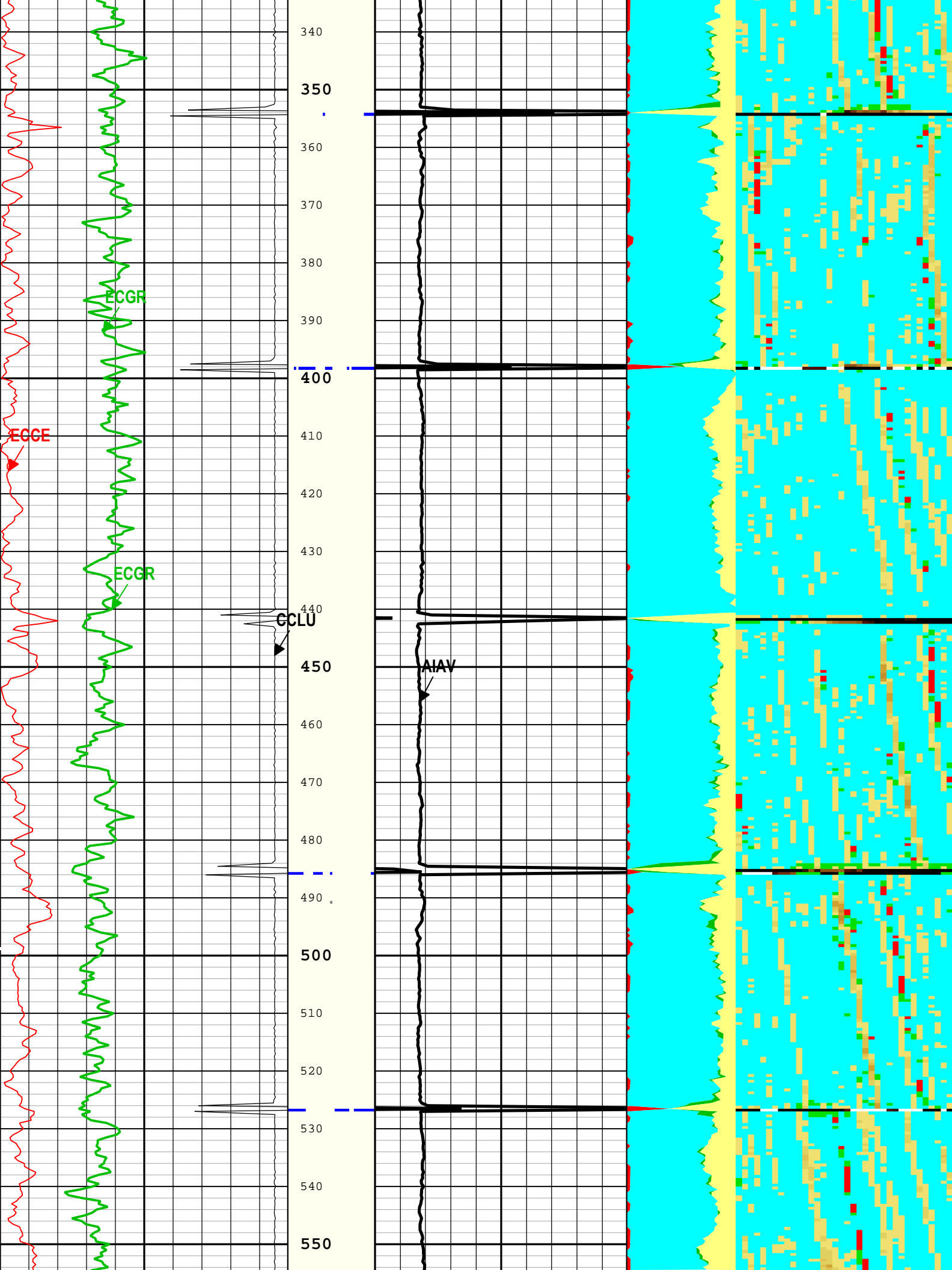
Log	Company:Noble Energy Inc	Well:Larson A23-668	MAIN:S003
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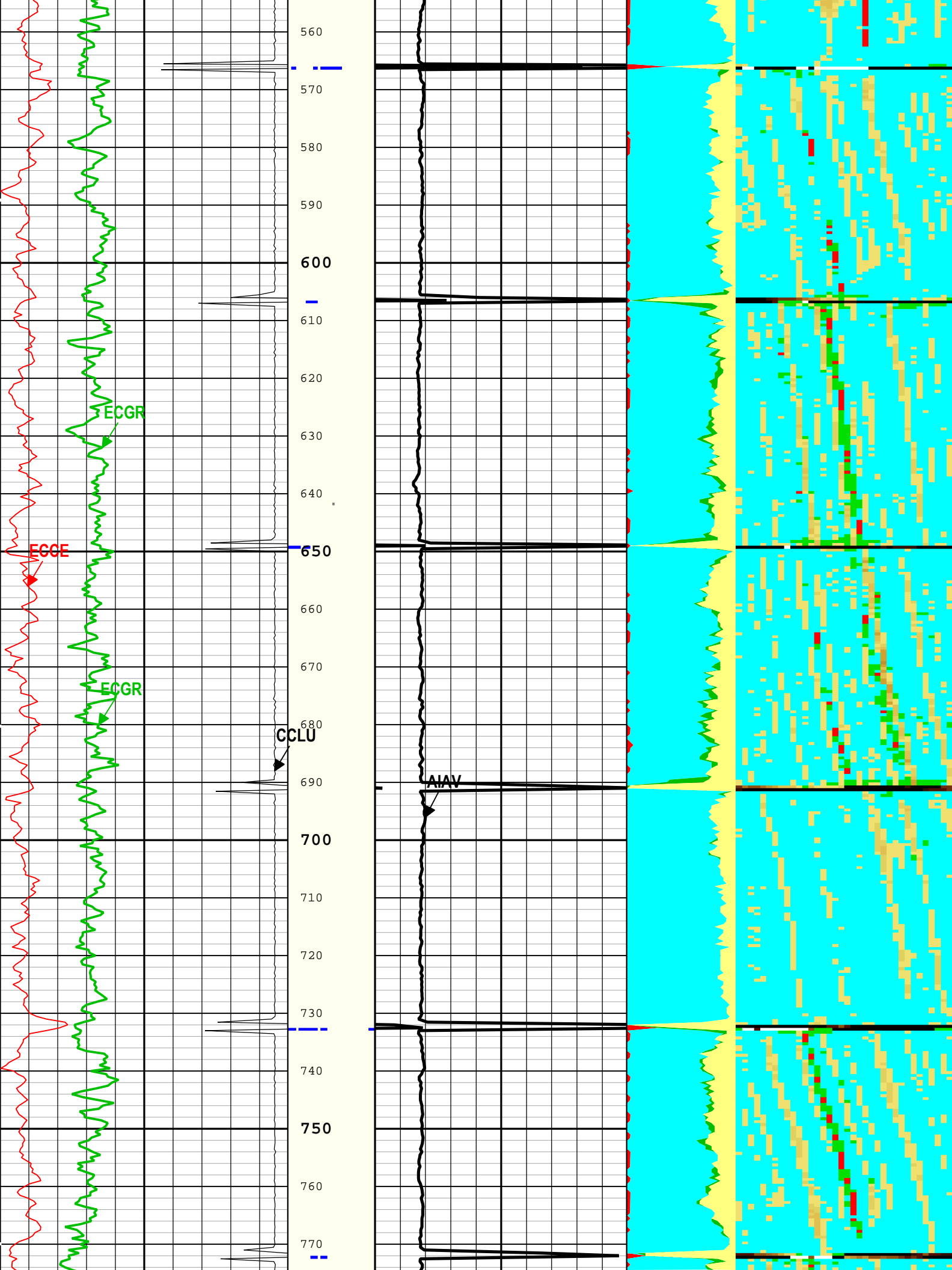
Description: Format: Log ( DJ Basin Ultrasonic Cement Summary Report ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 16-Jul-2018 20:10:38

TIME\_1900 - Time Marked every 60.00 (s)

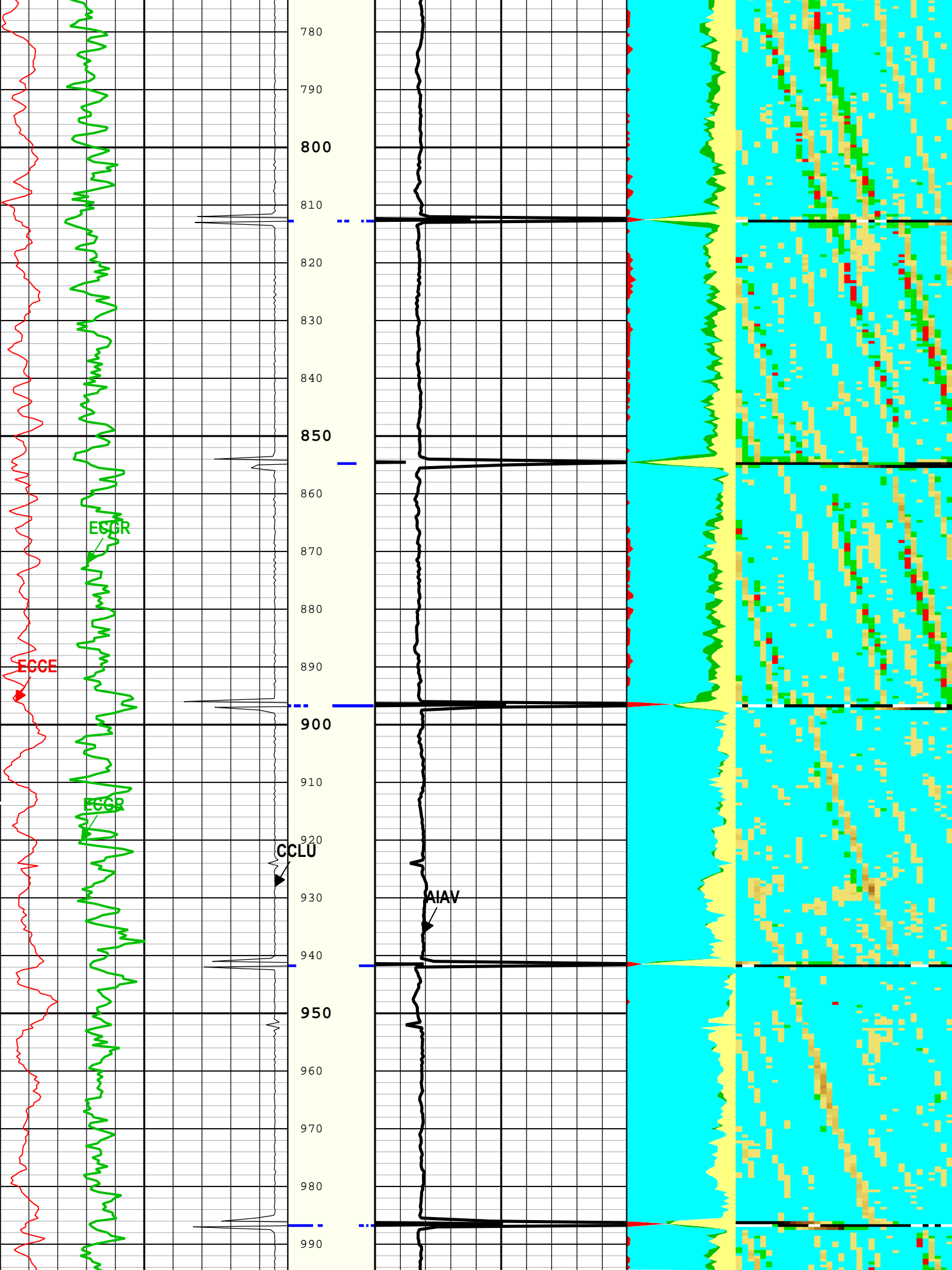


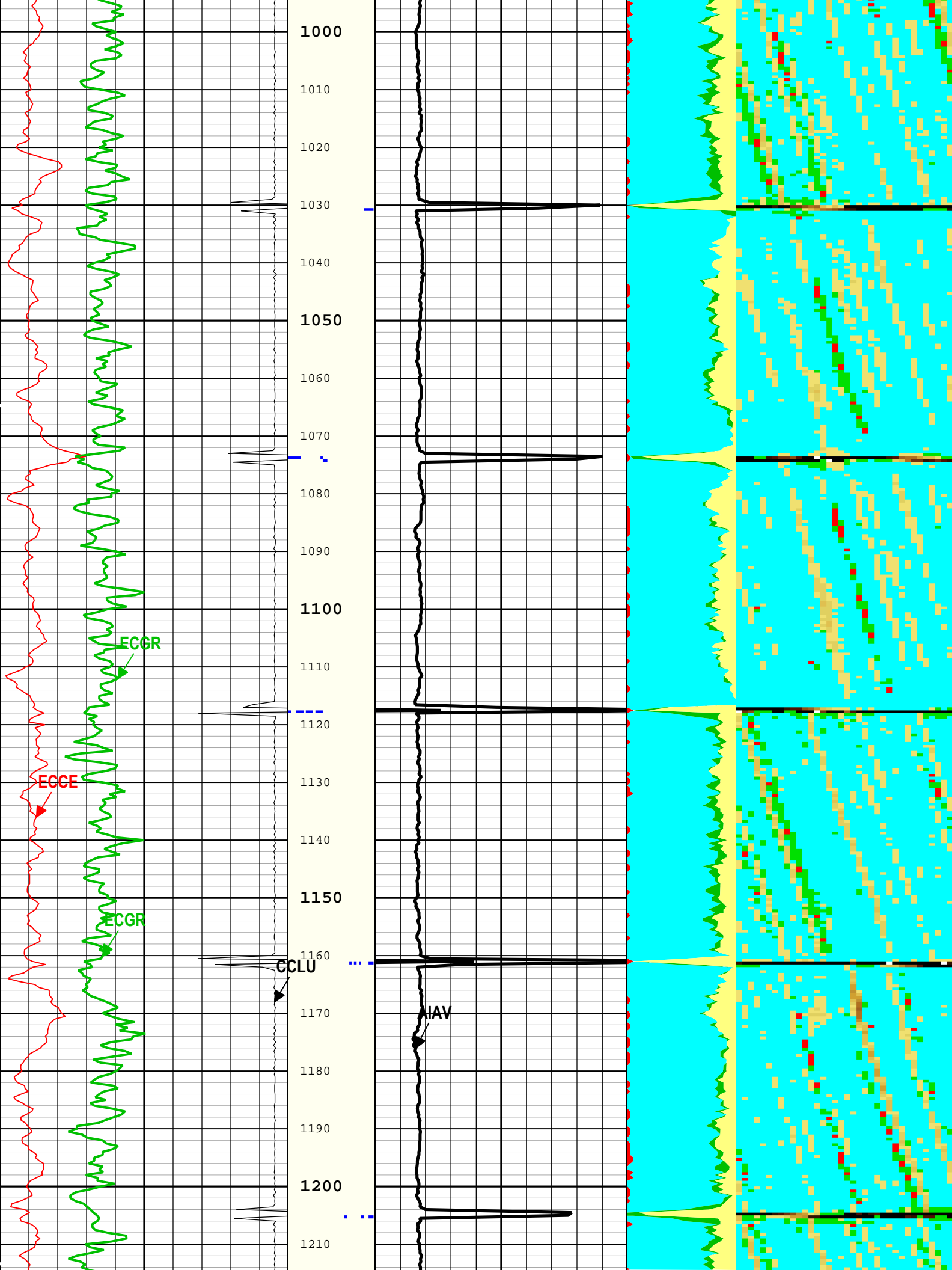


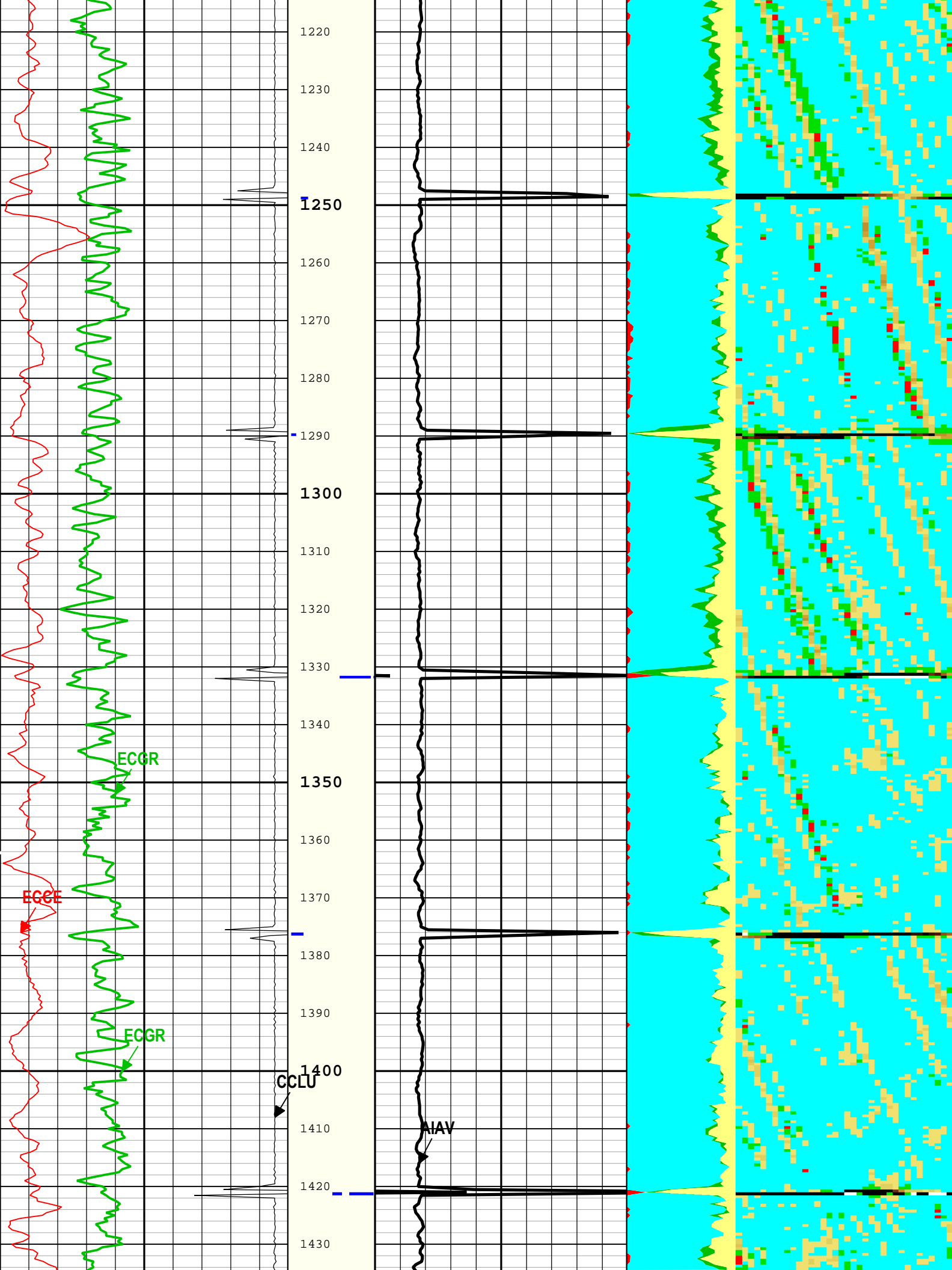


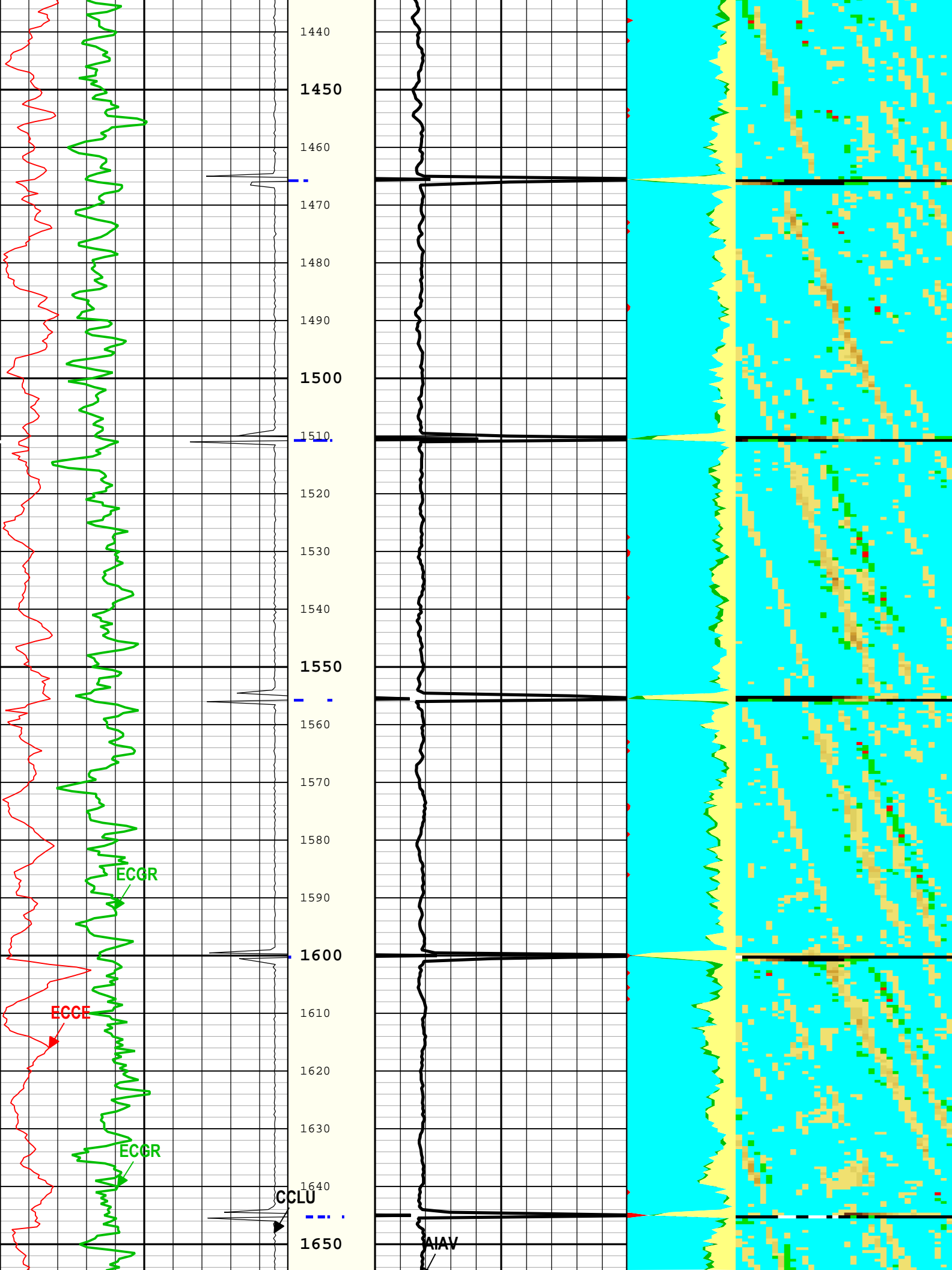


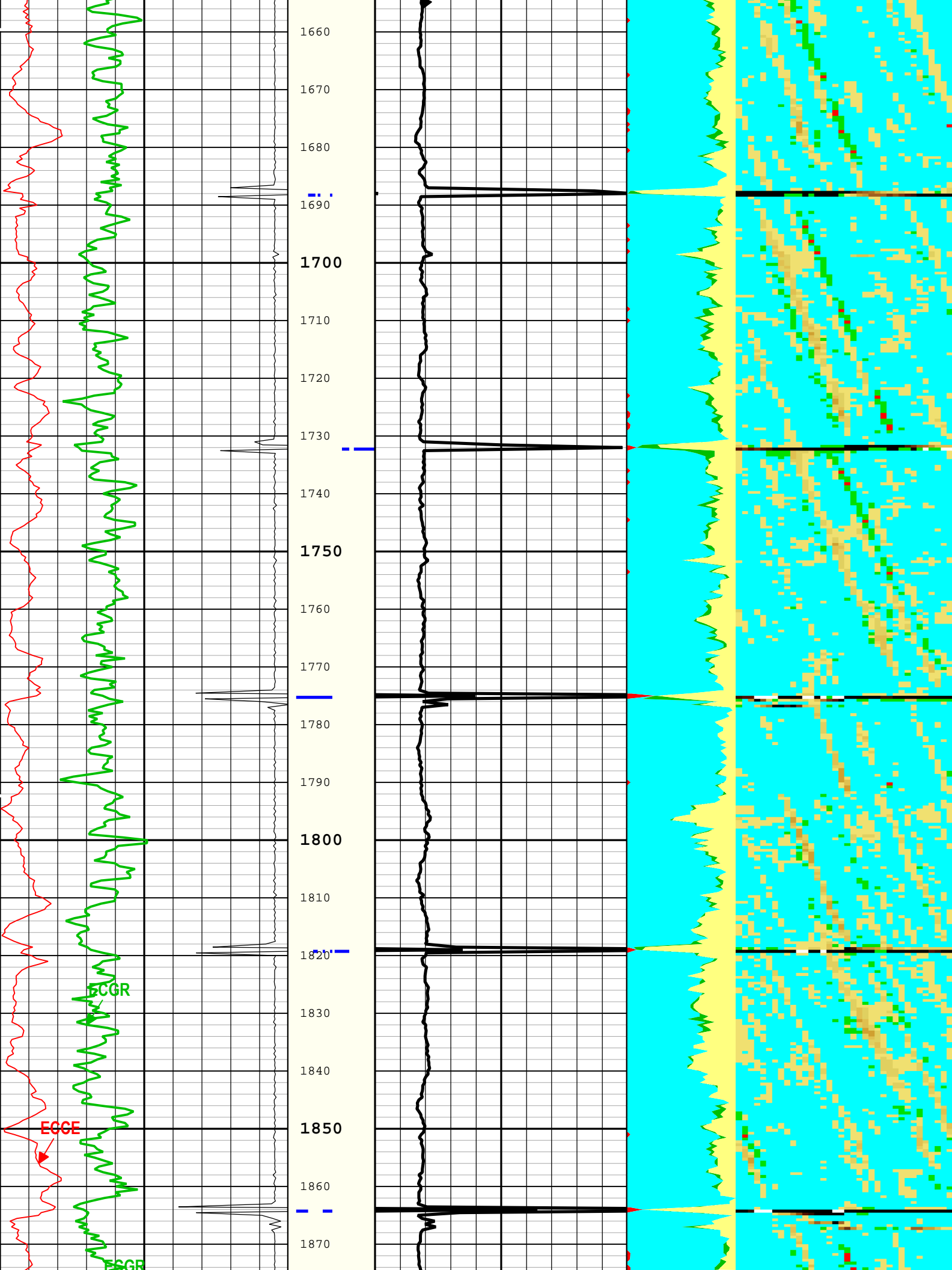


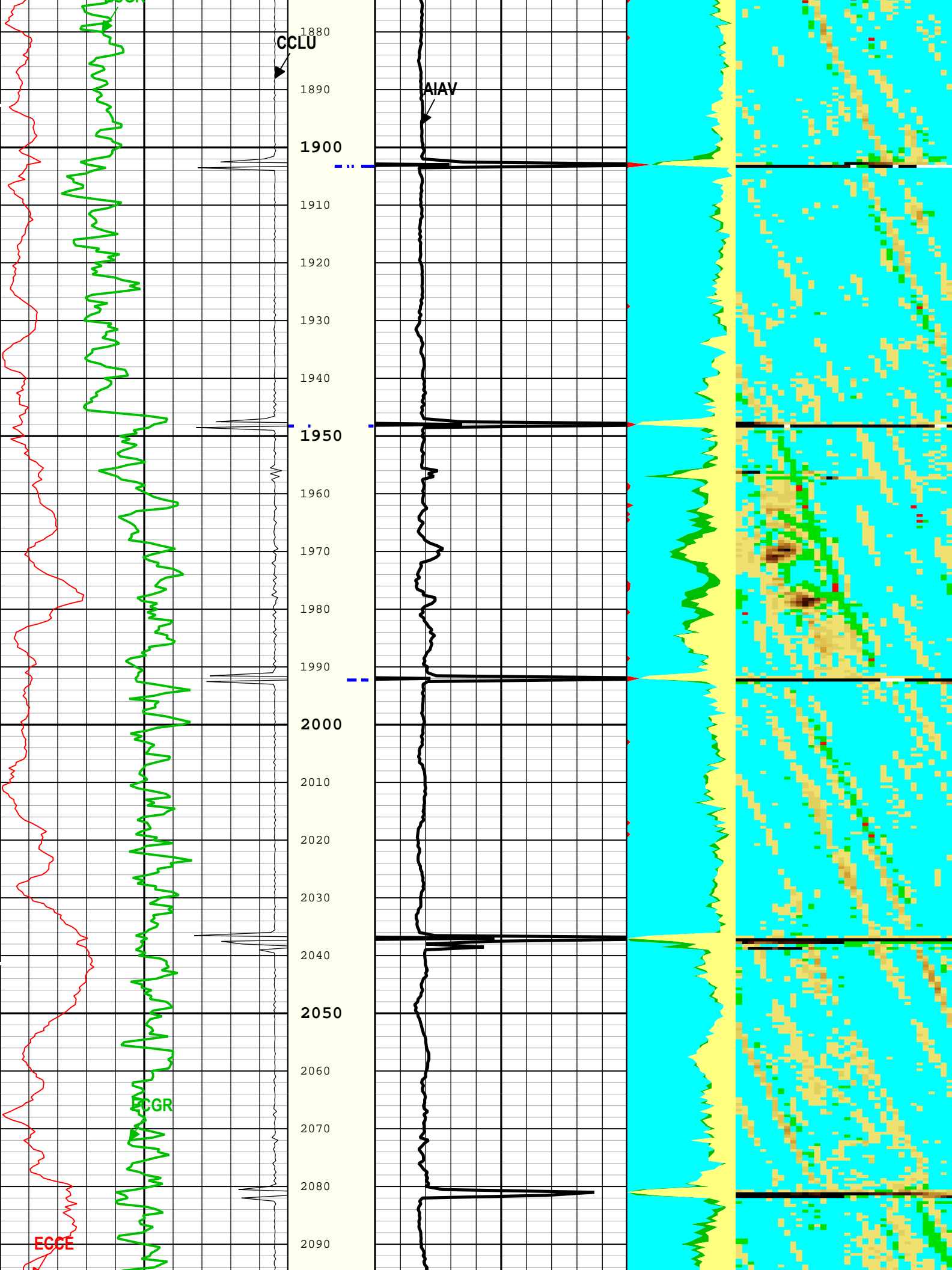


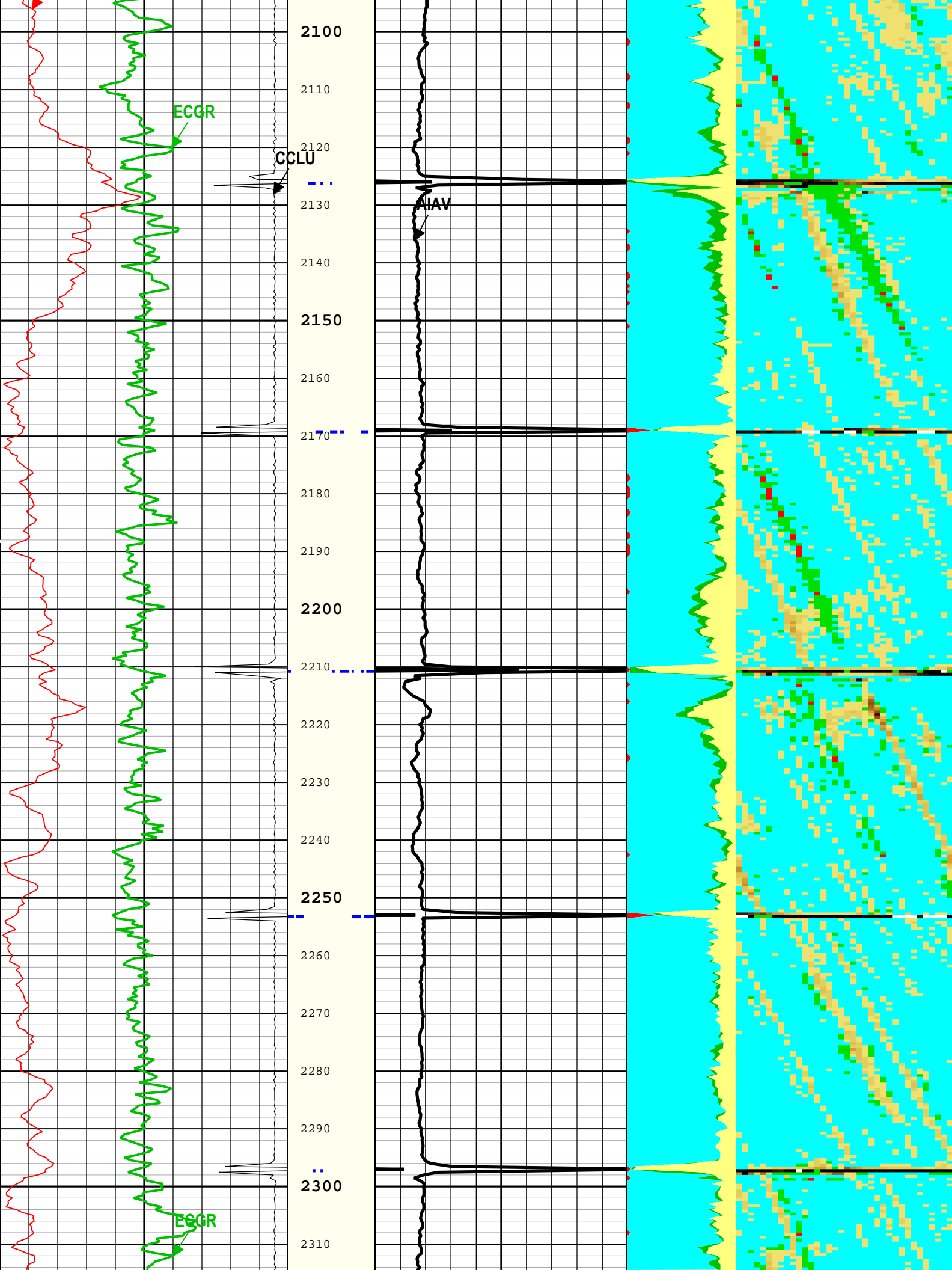


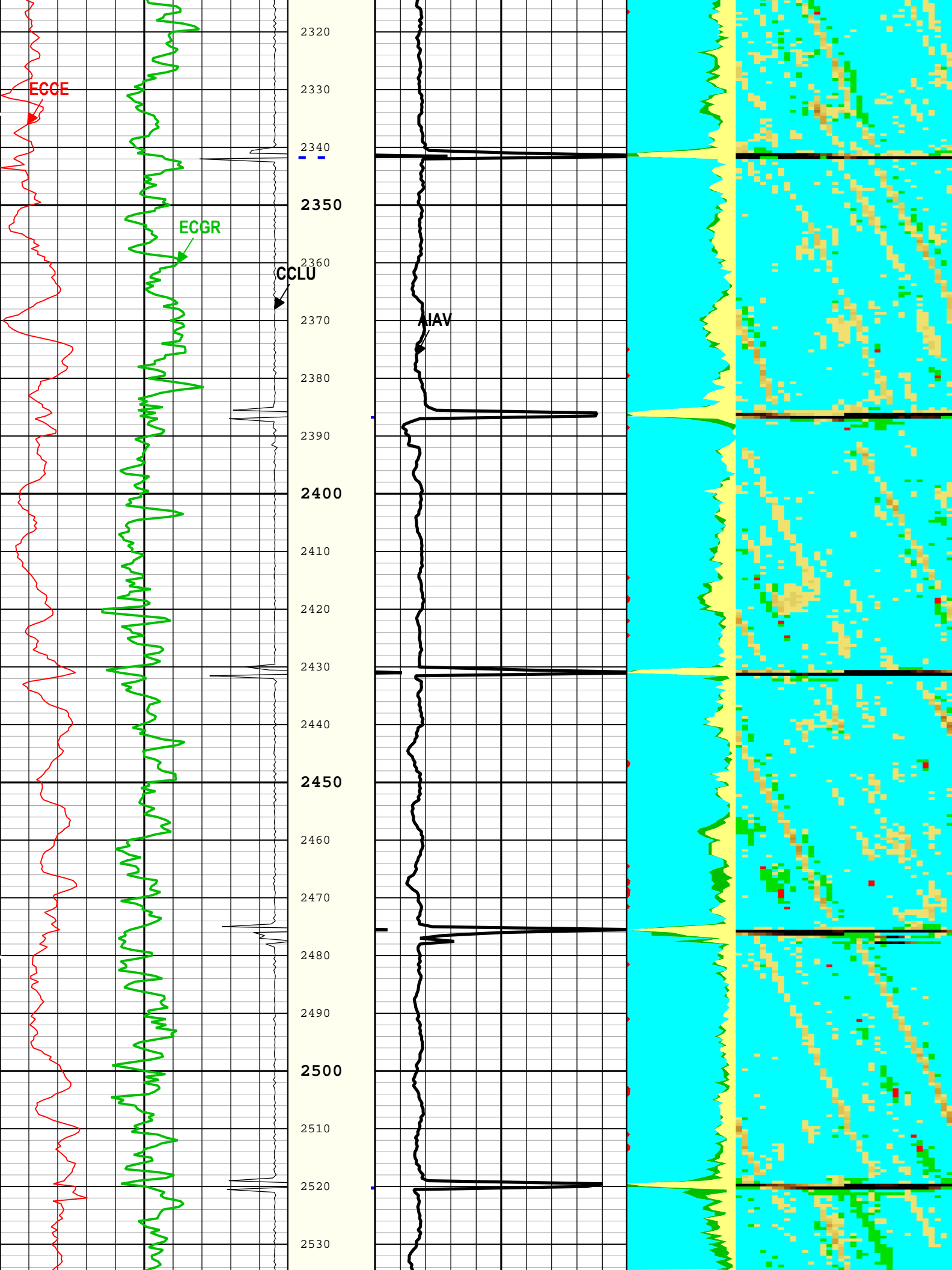




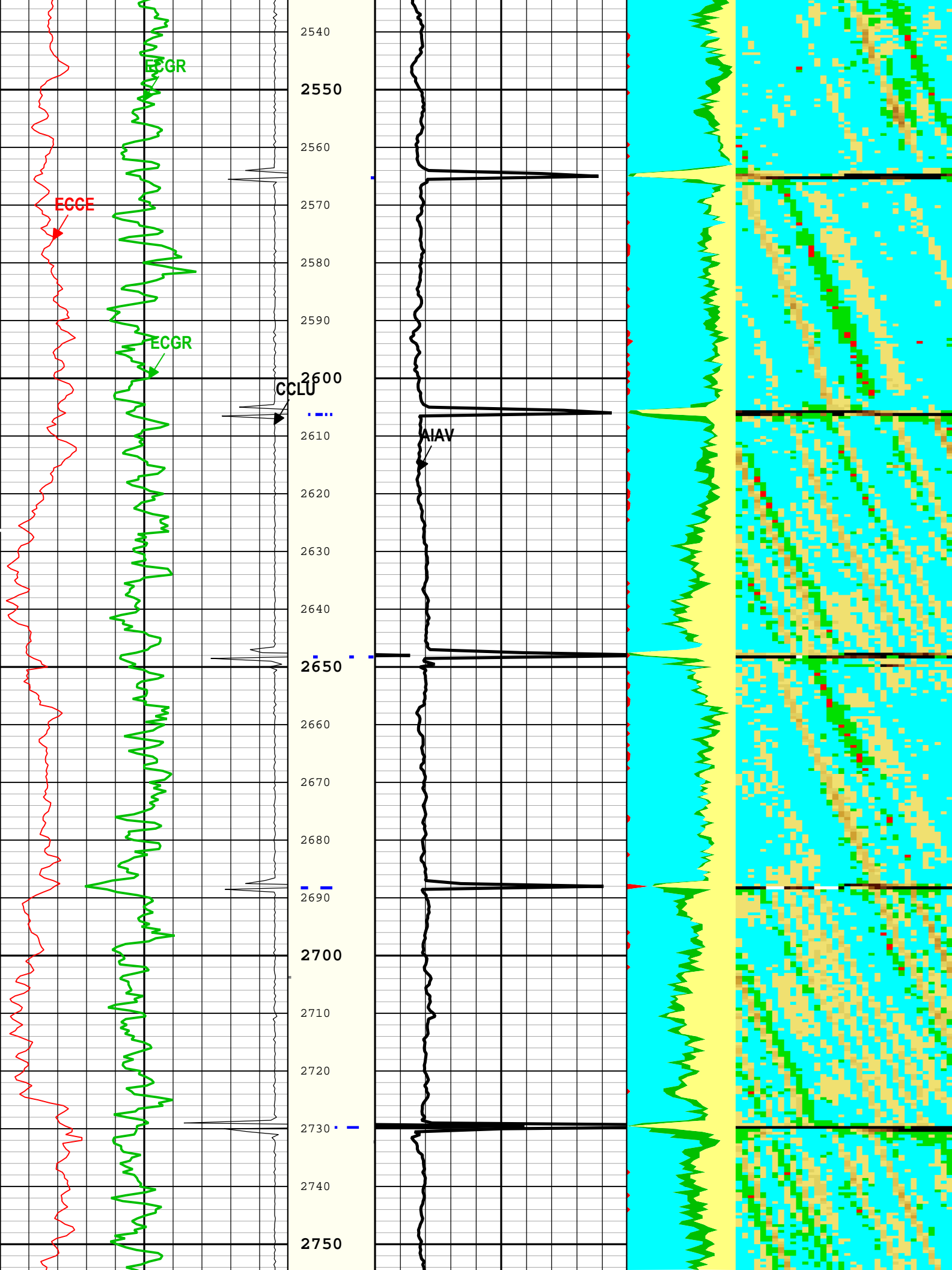


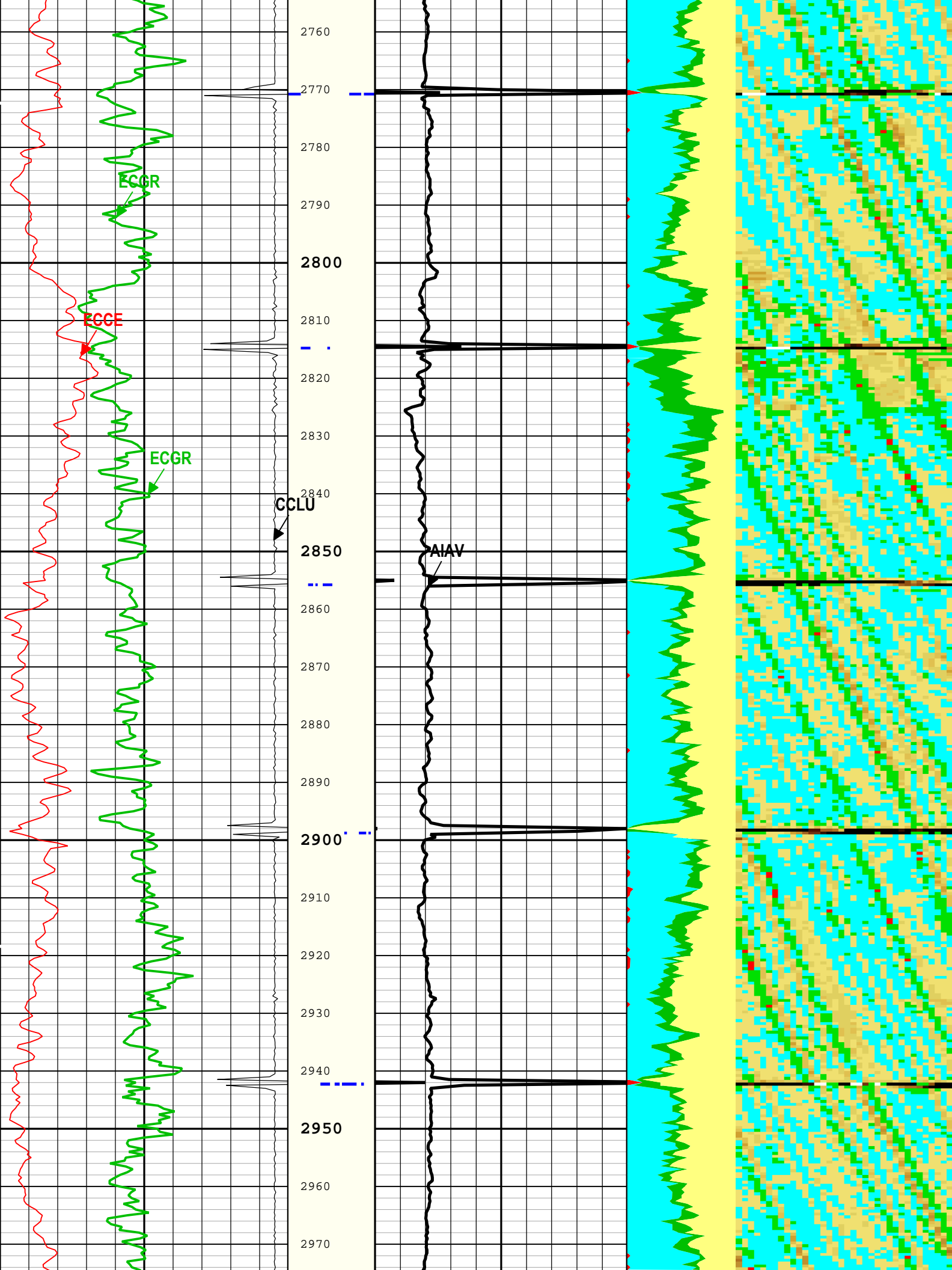


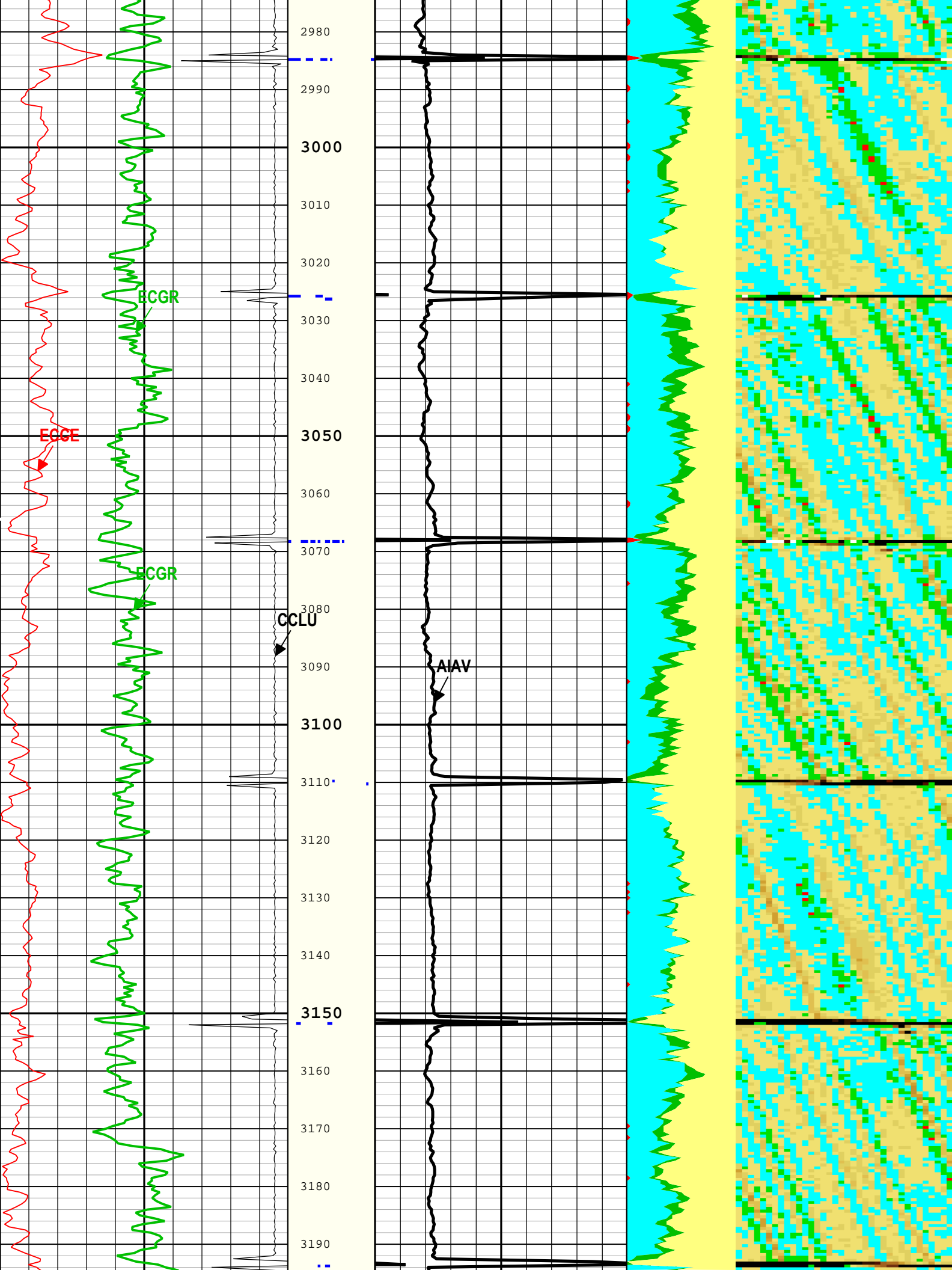


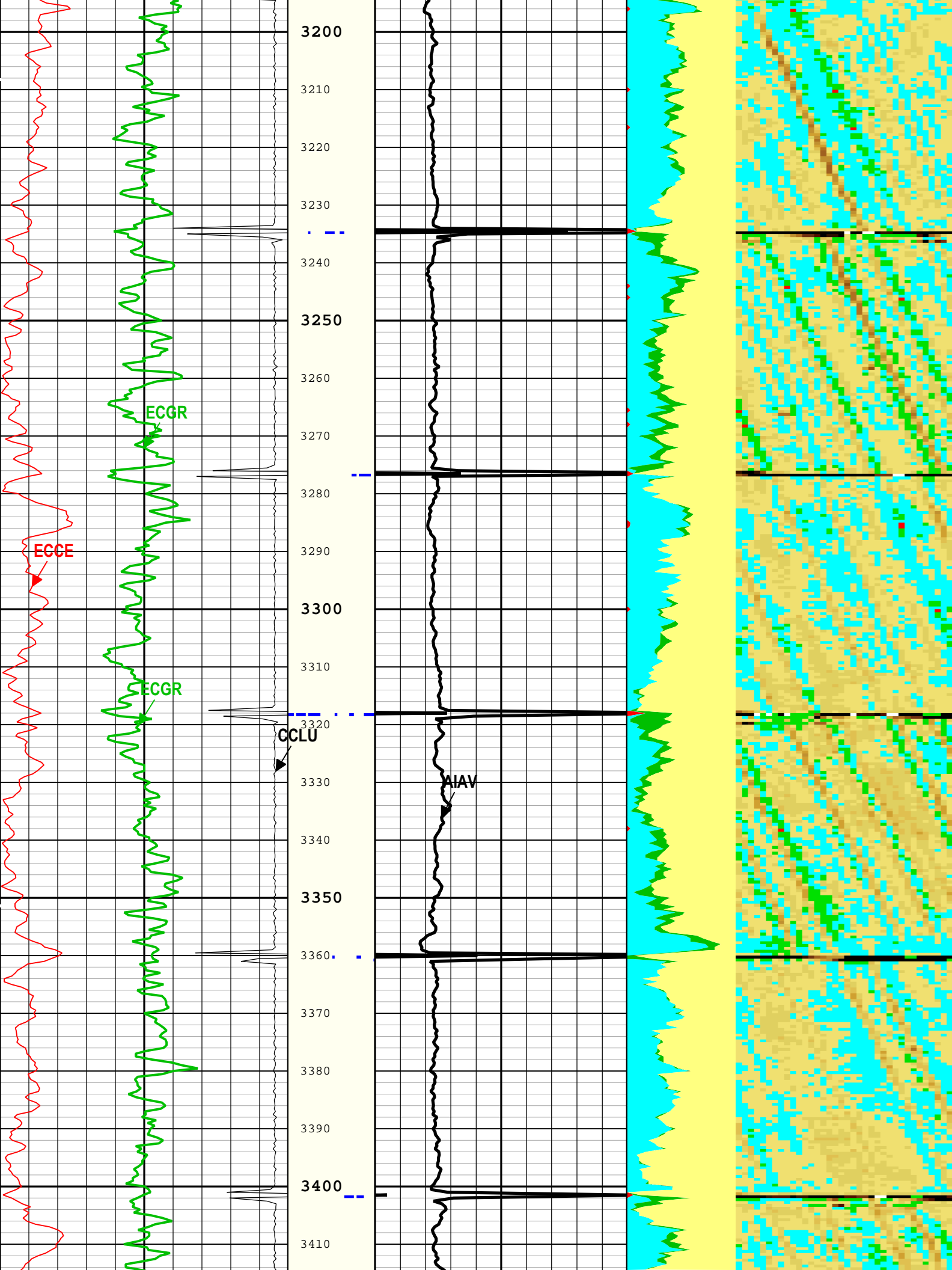


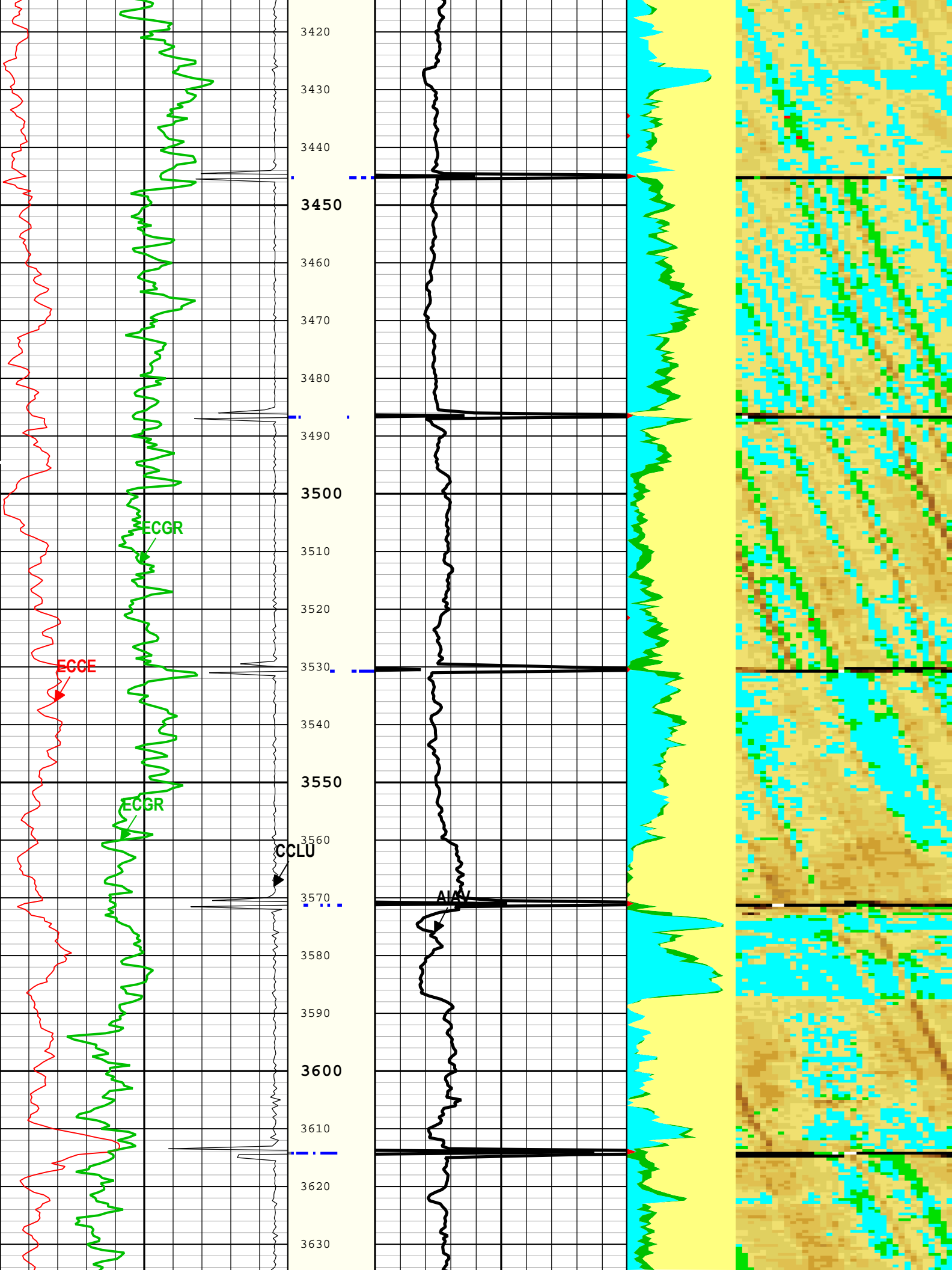


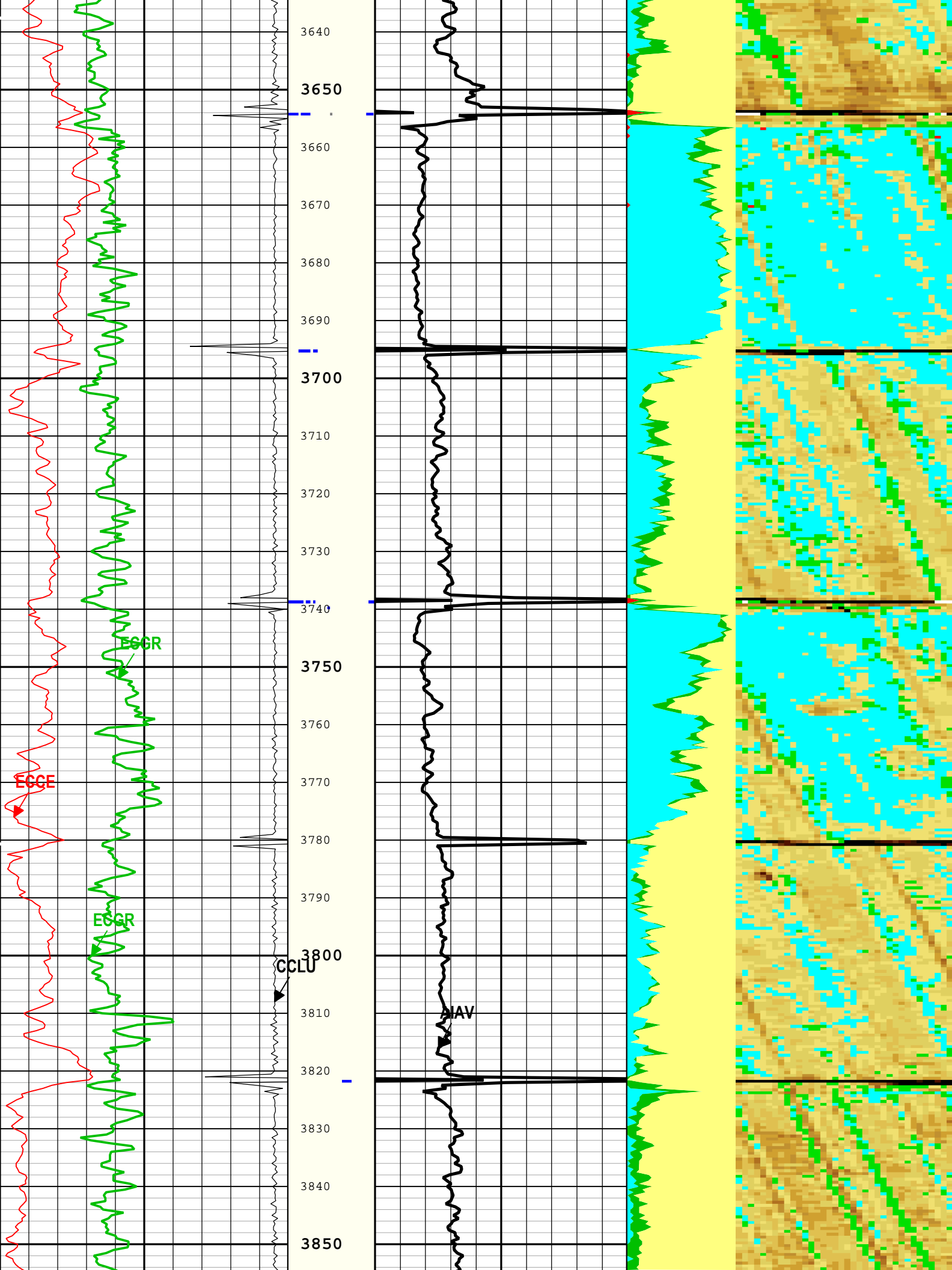


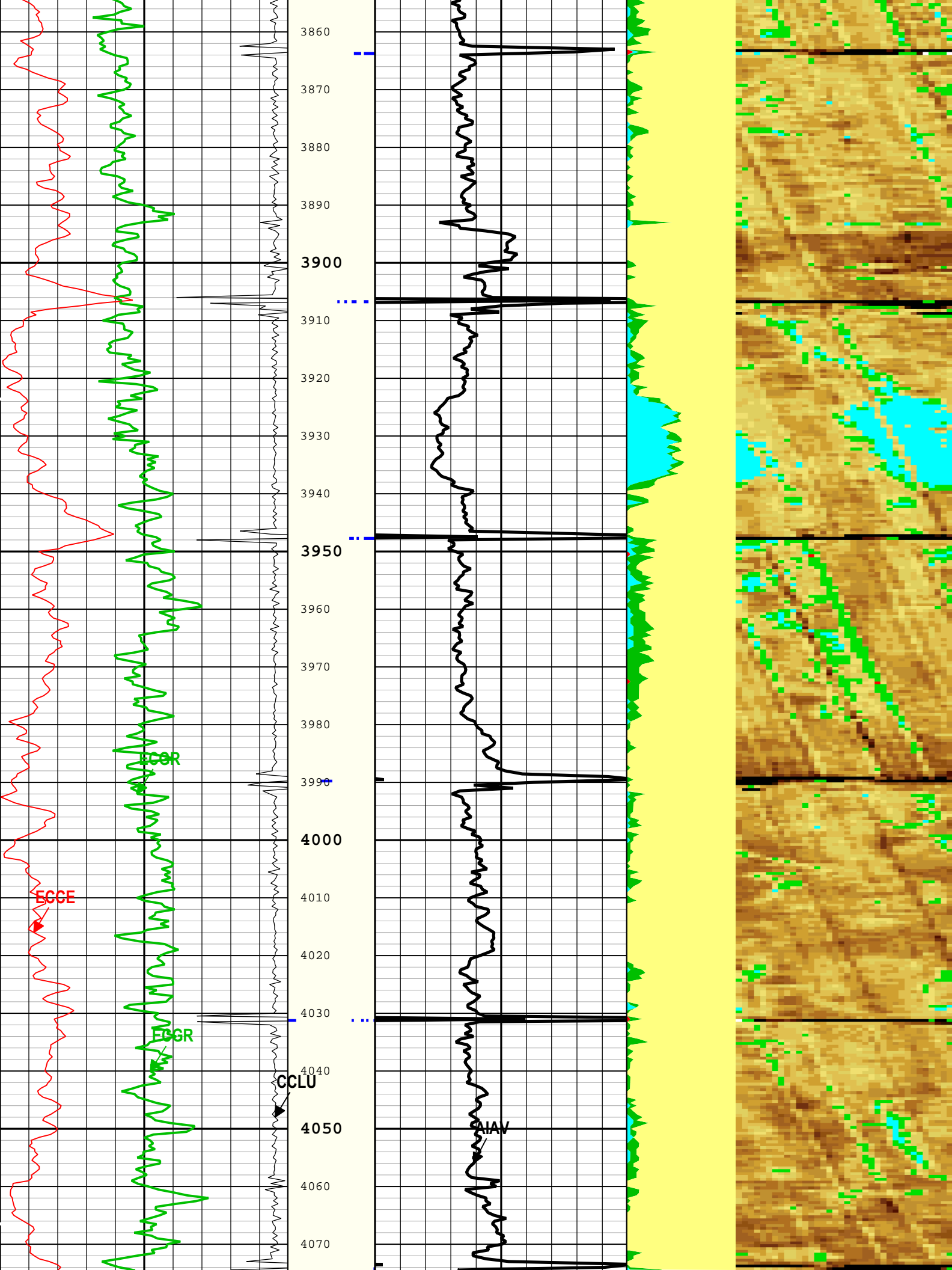


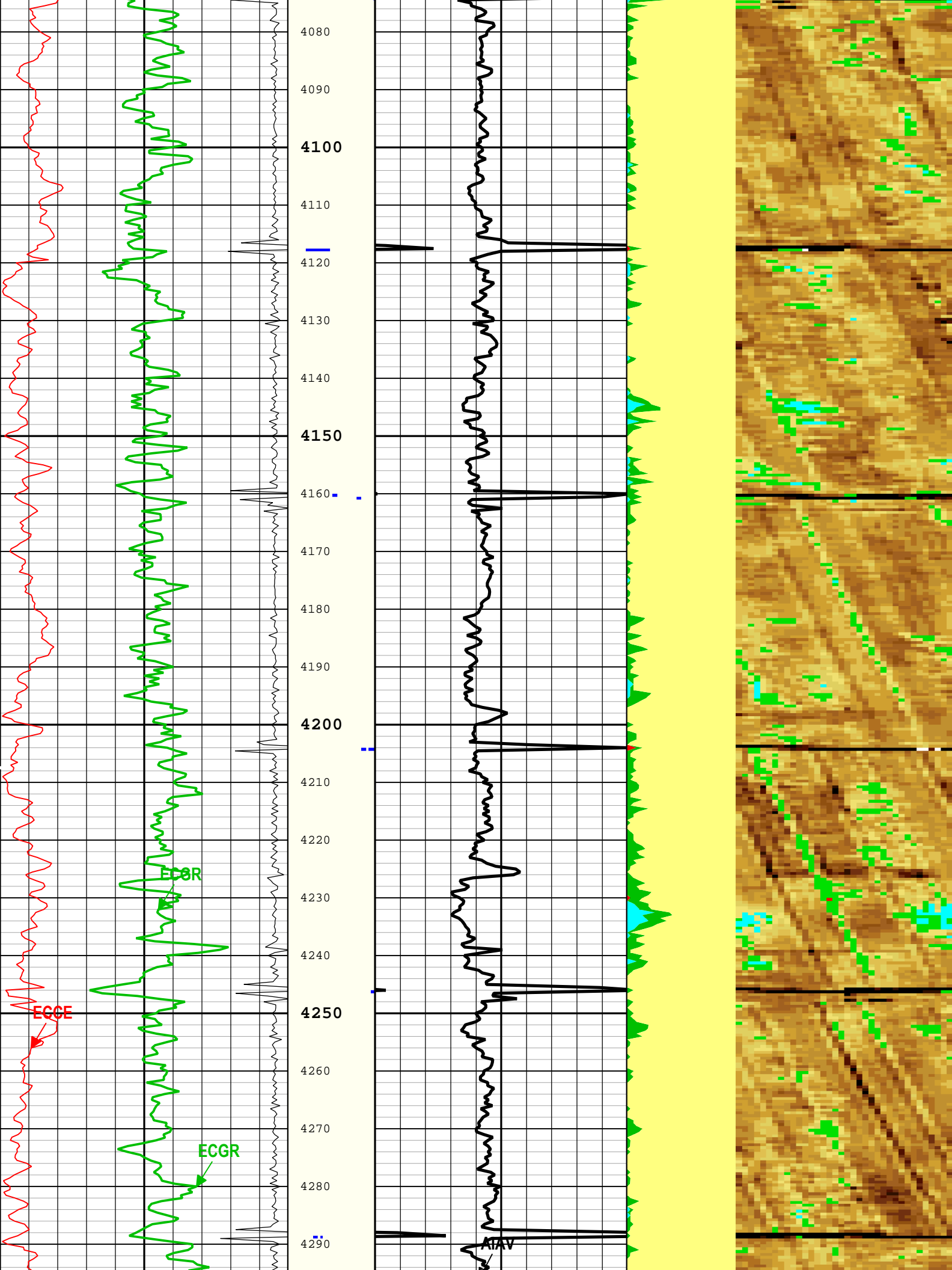




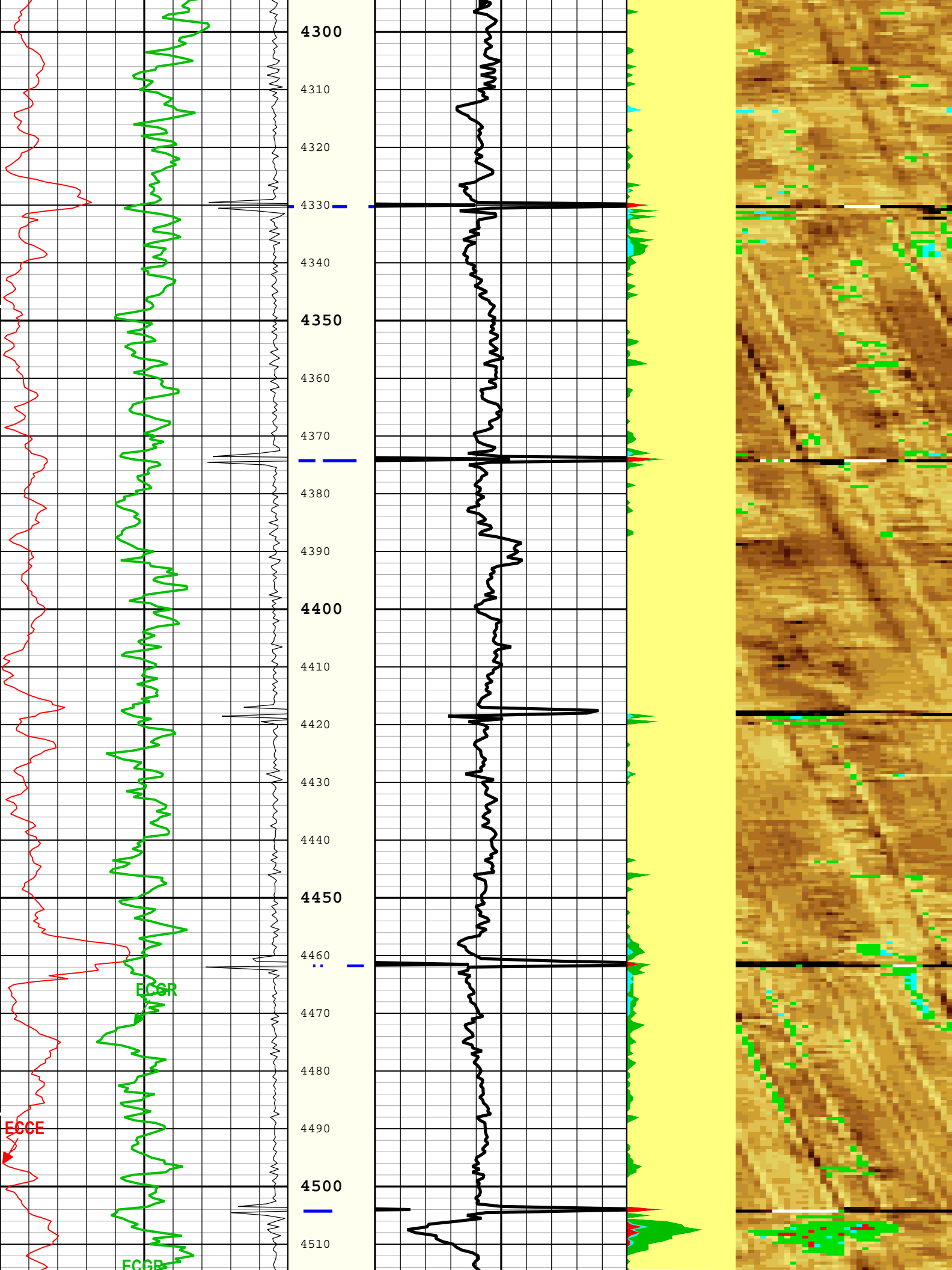


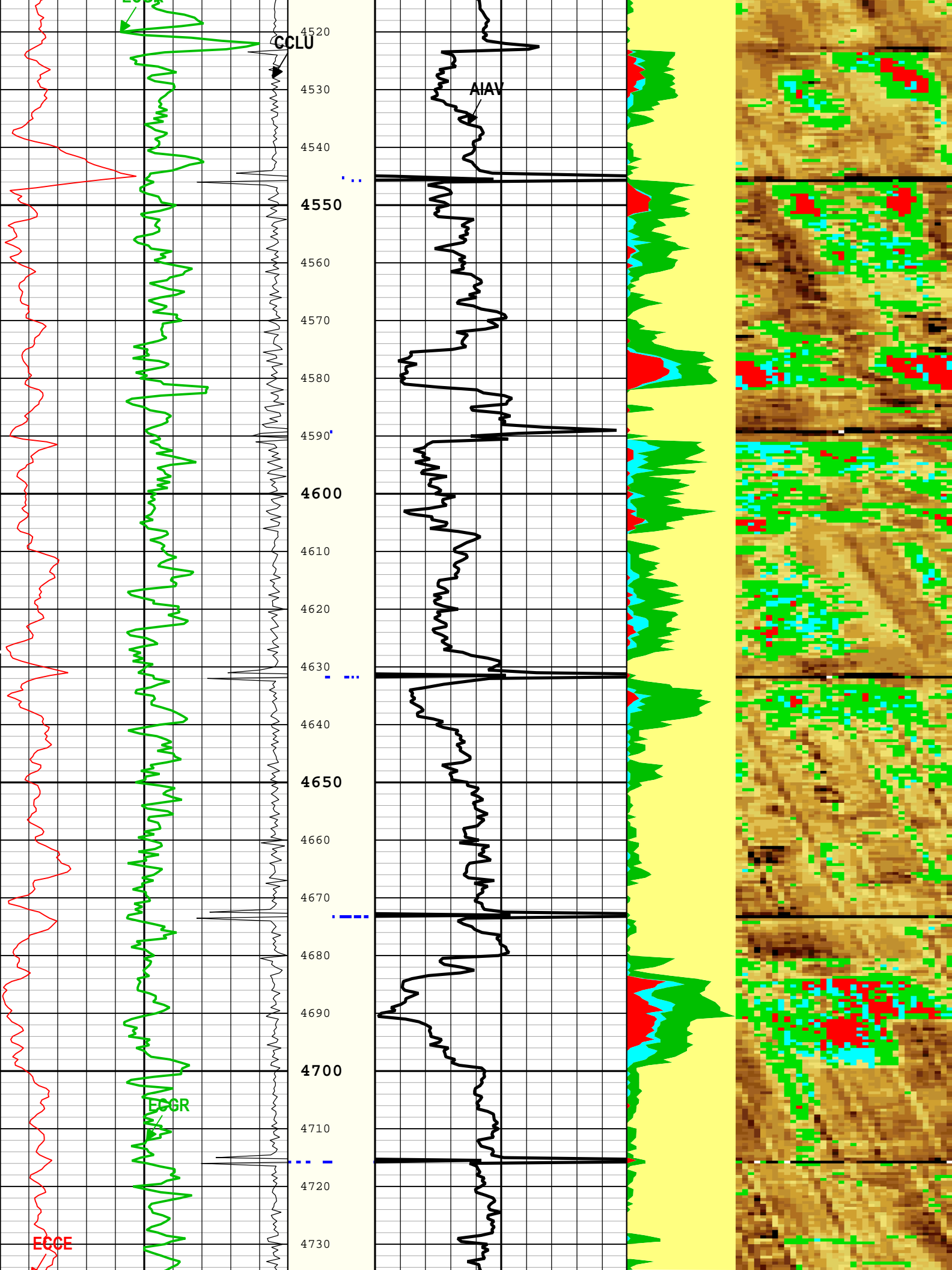


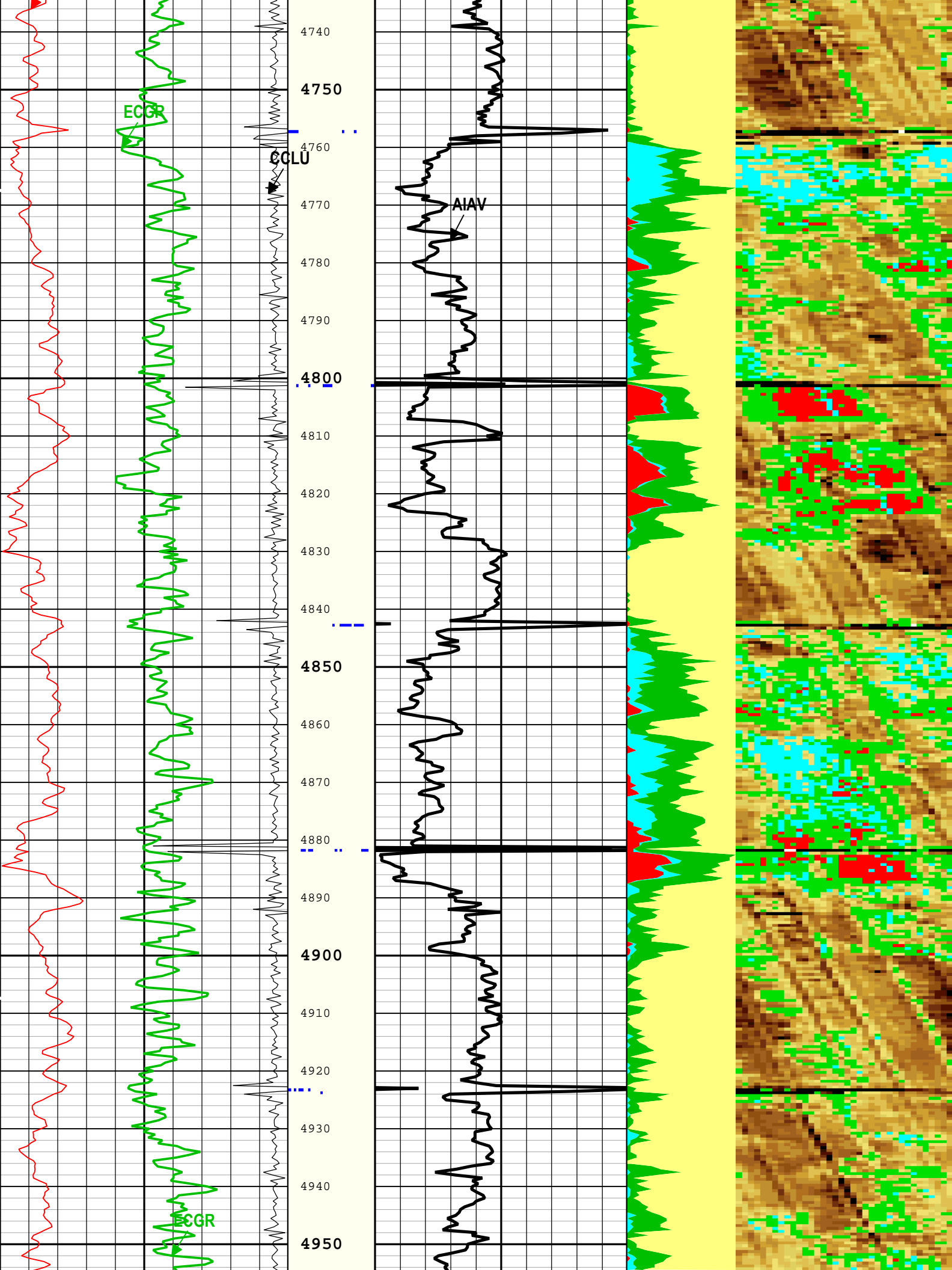


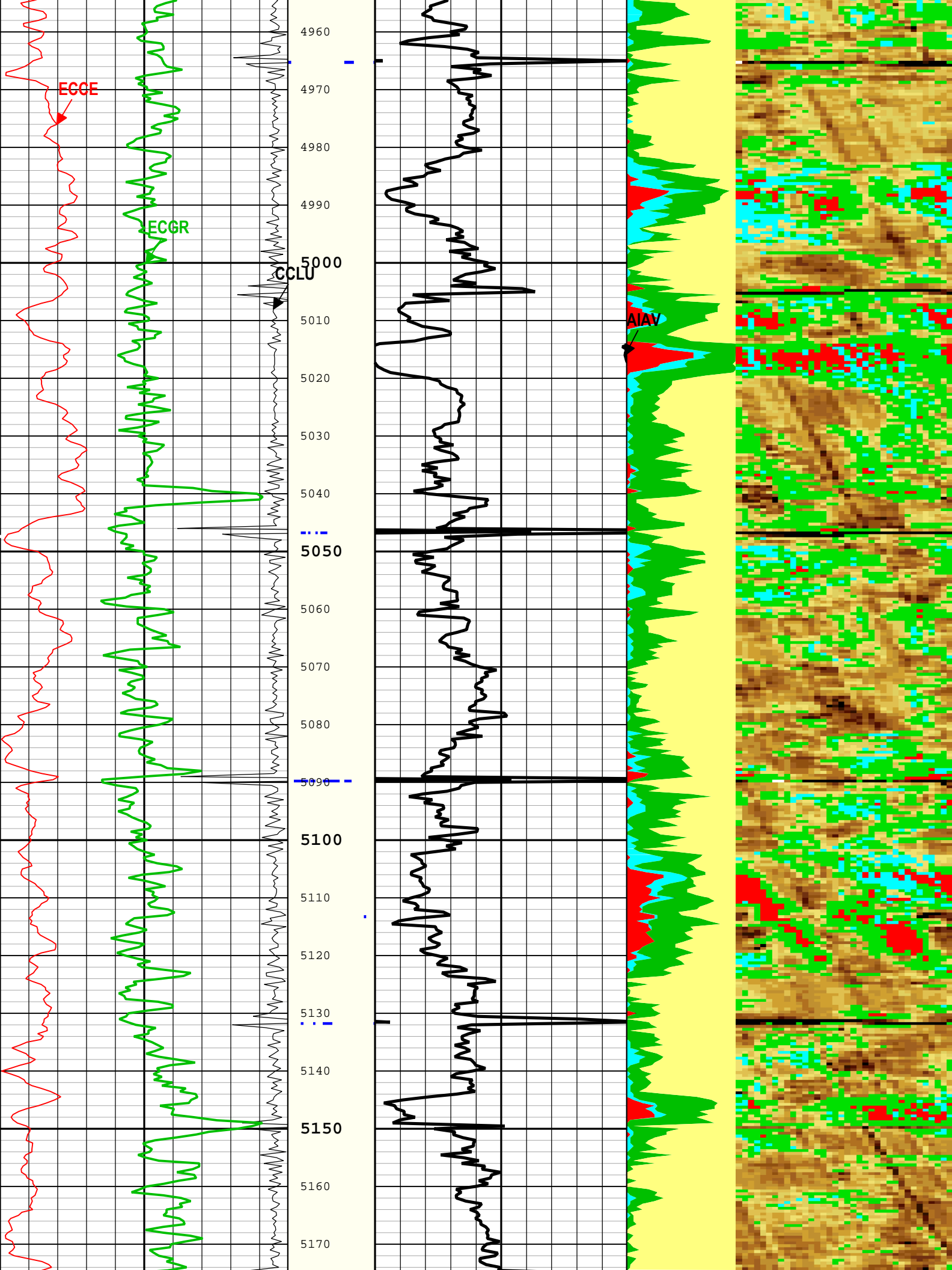


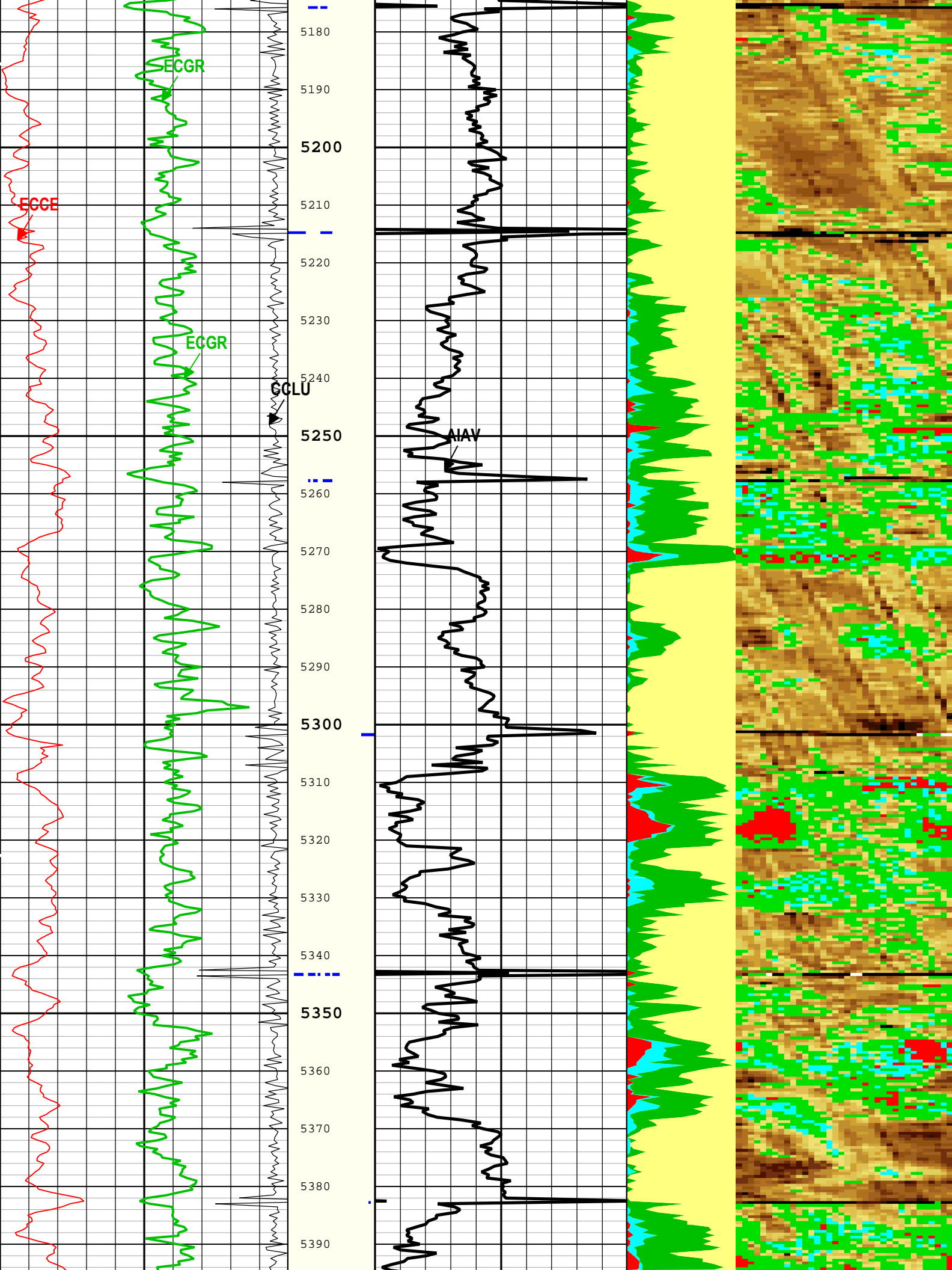


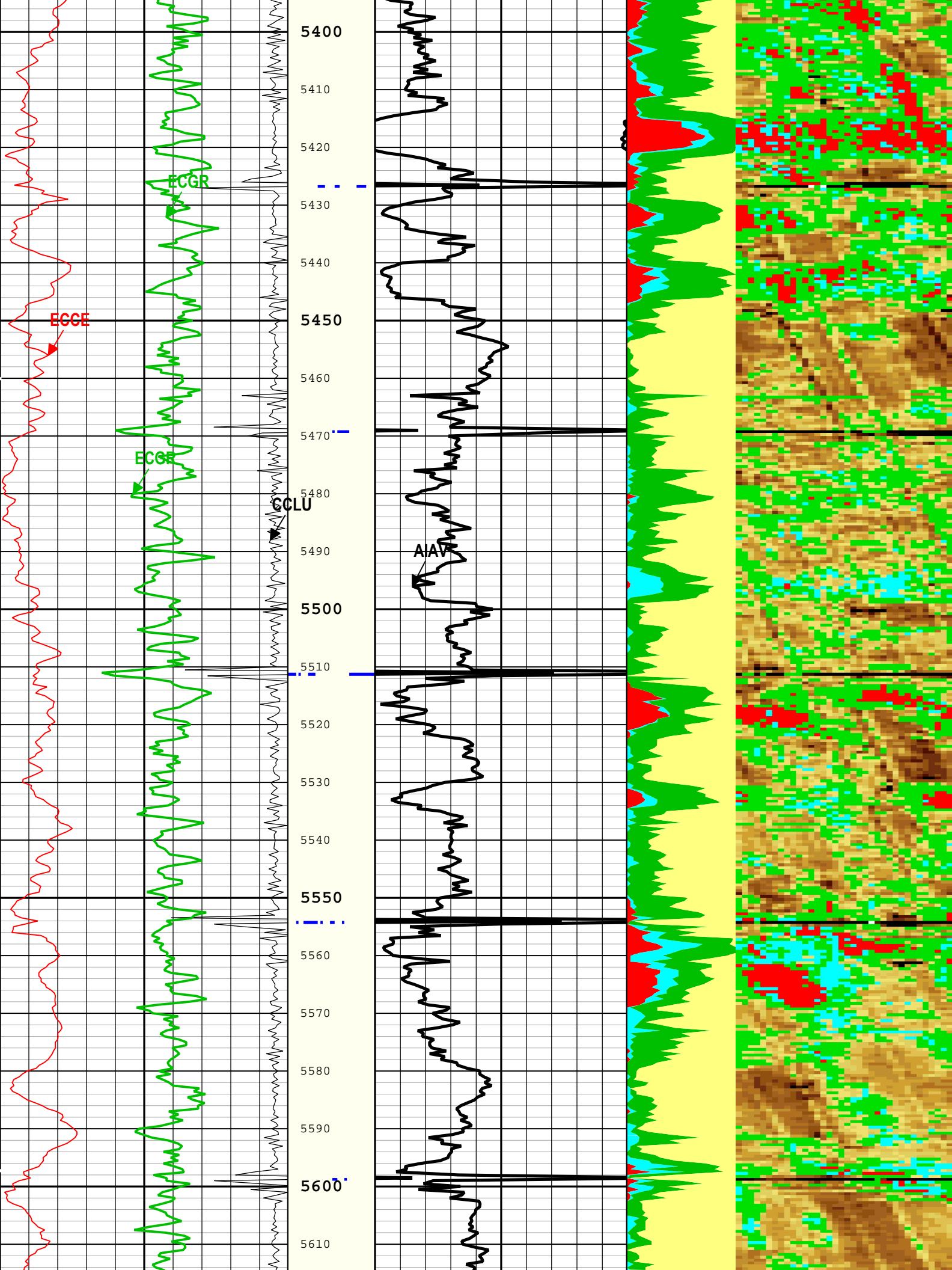


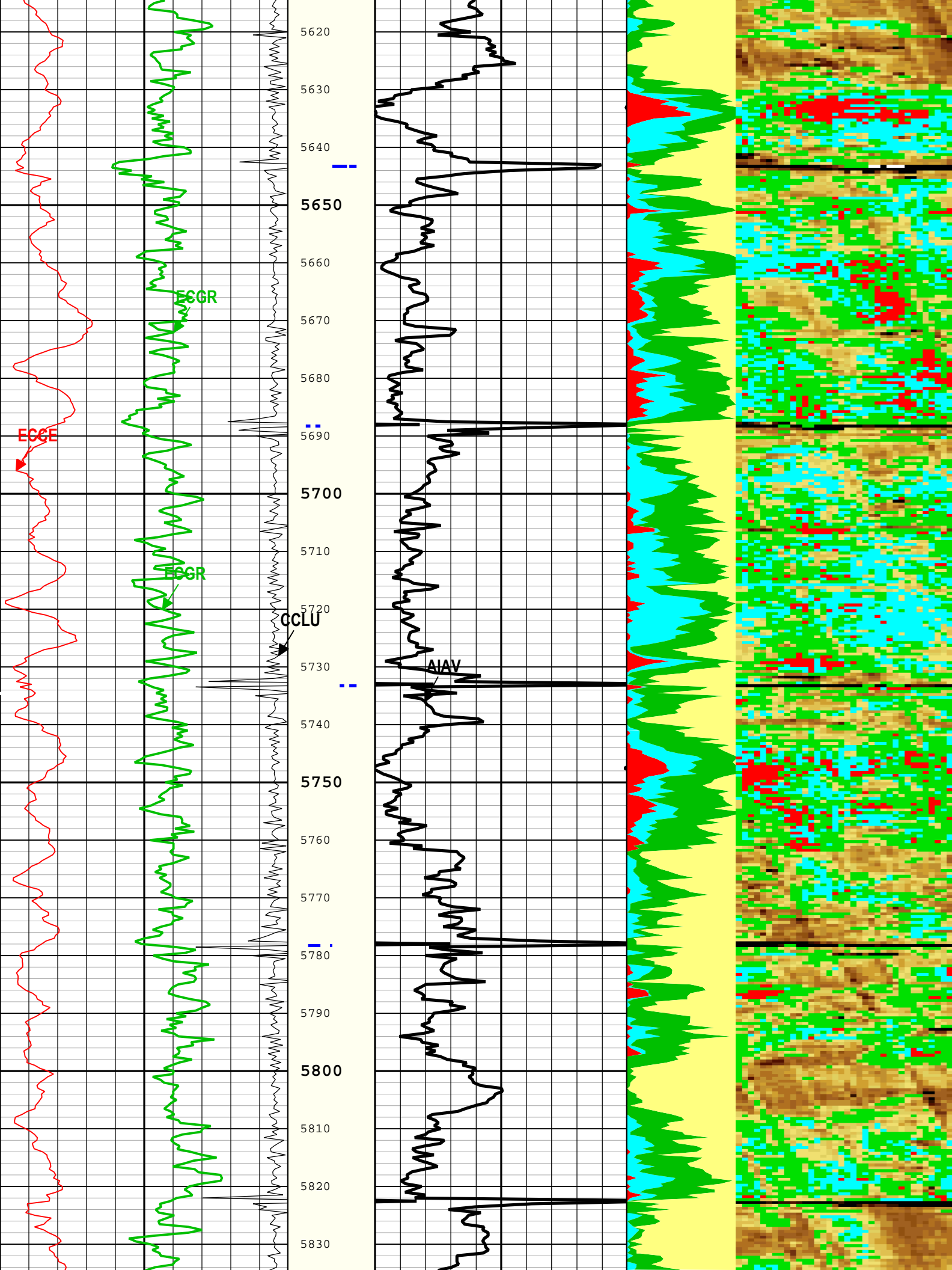




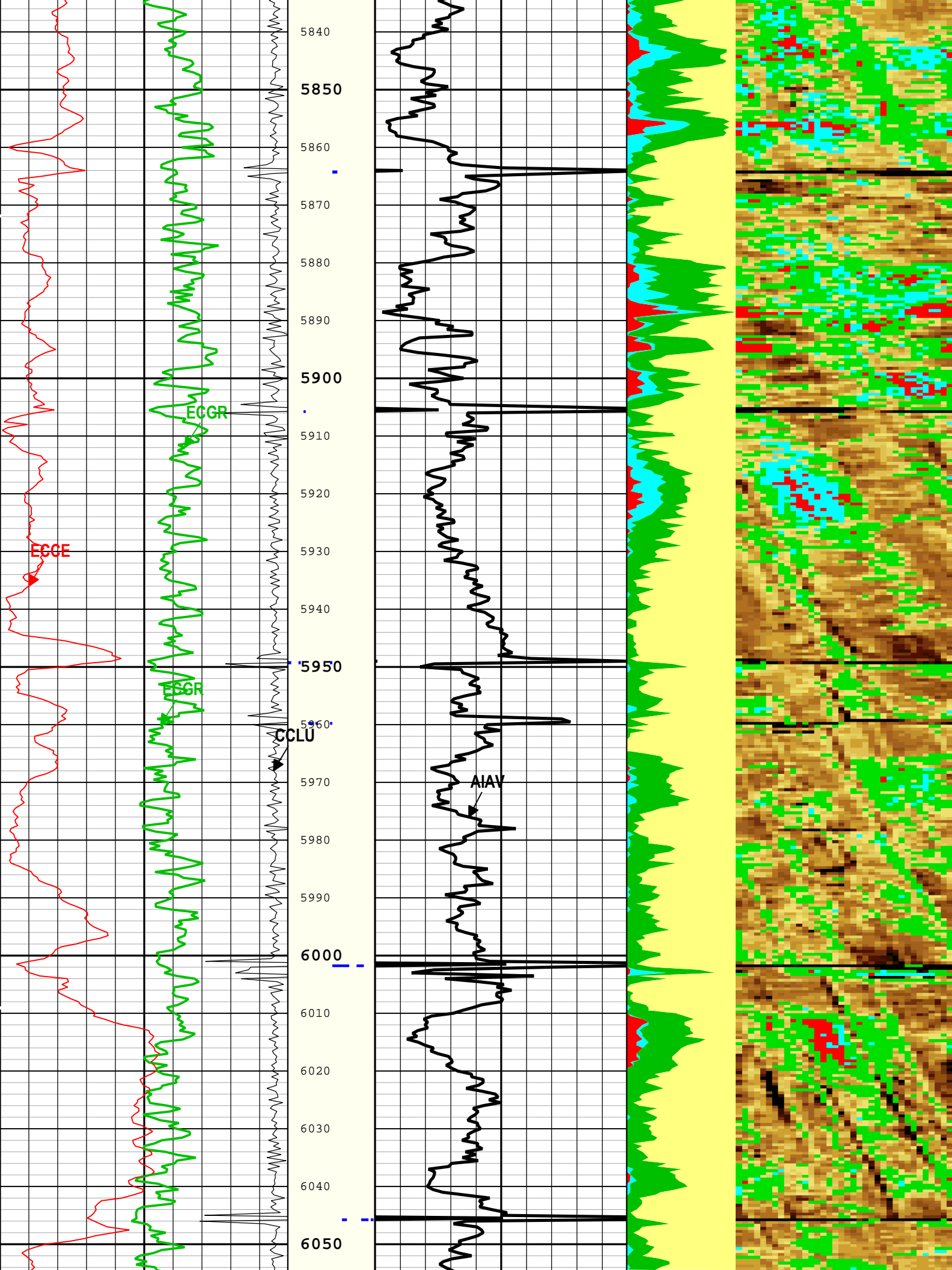




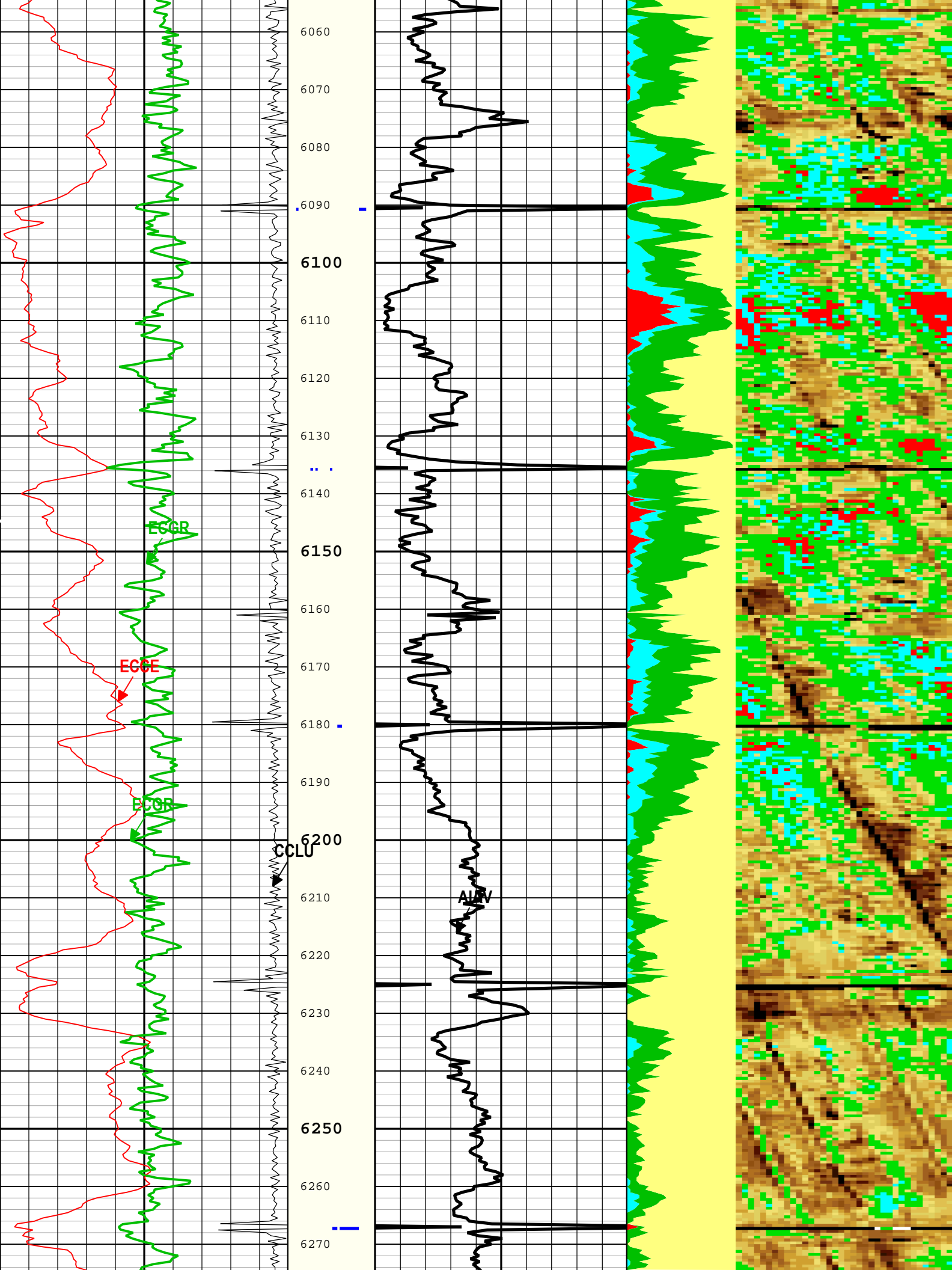


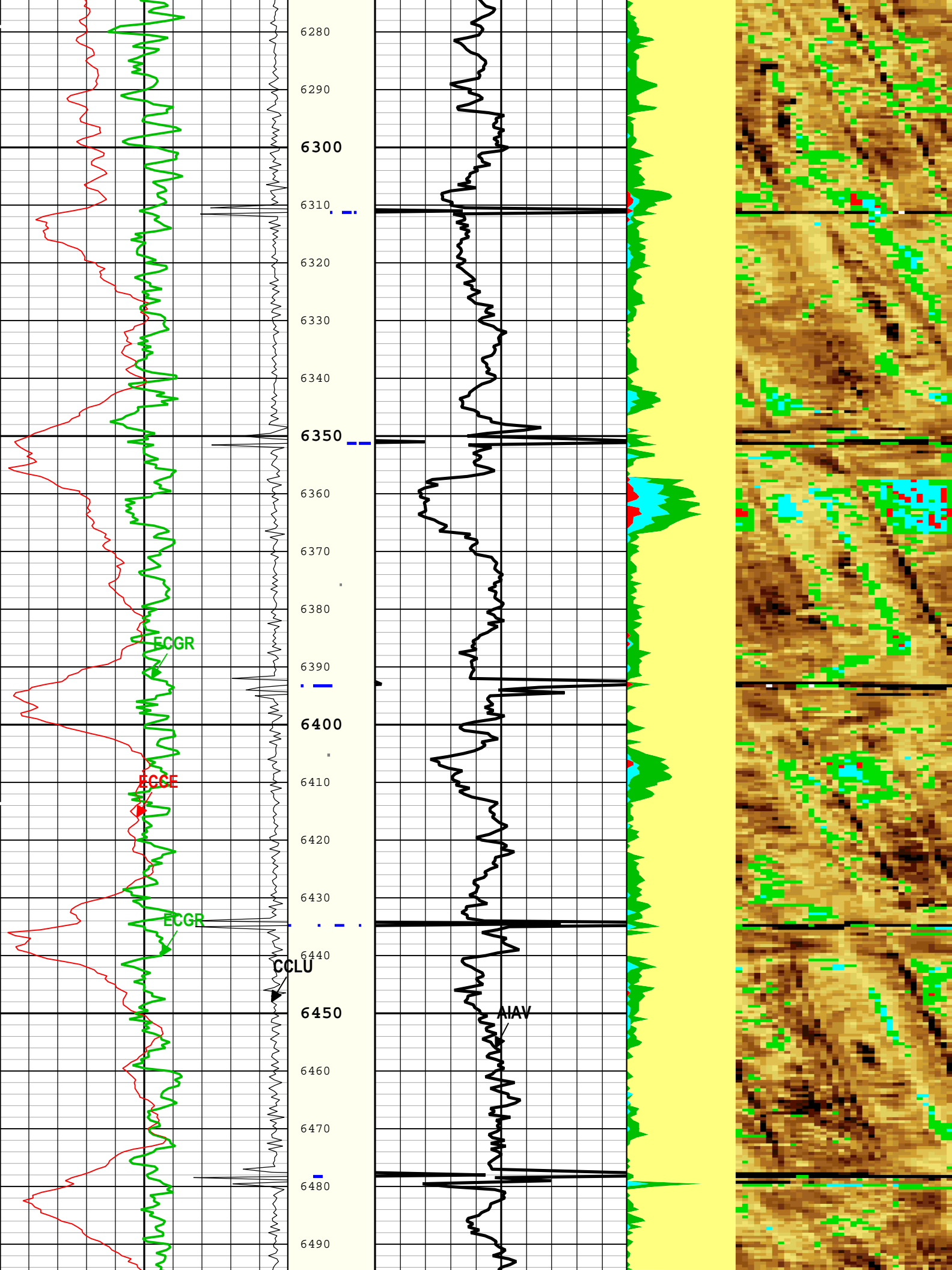


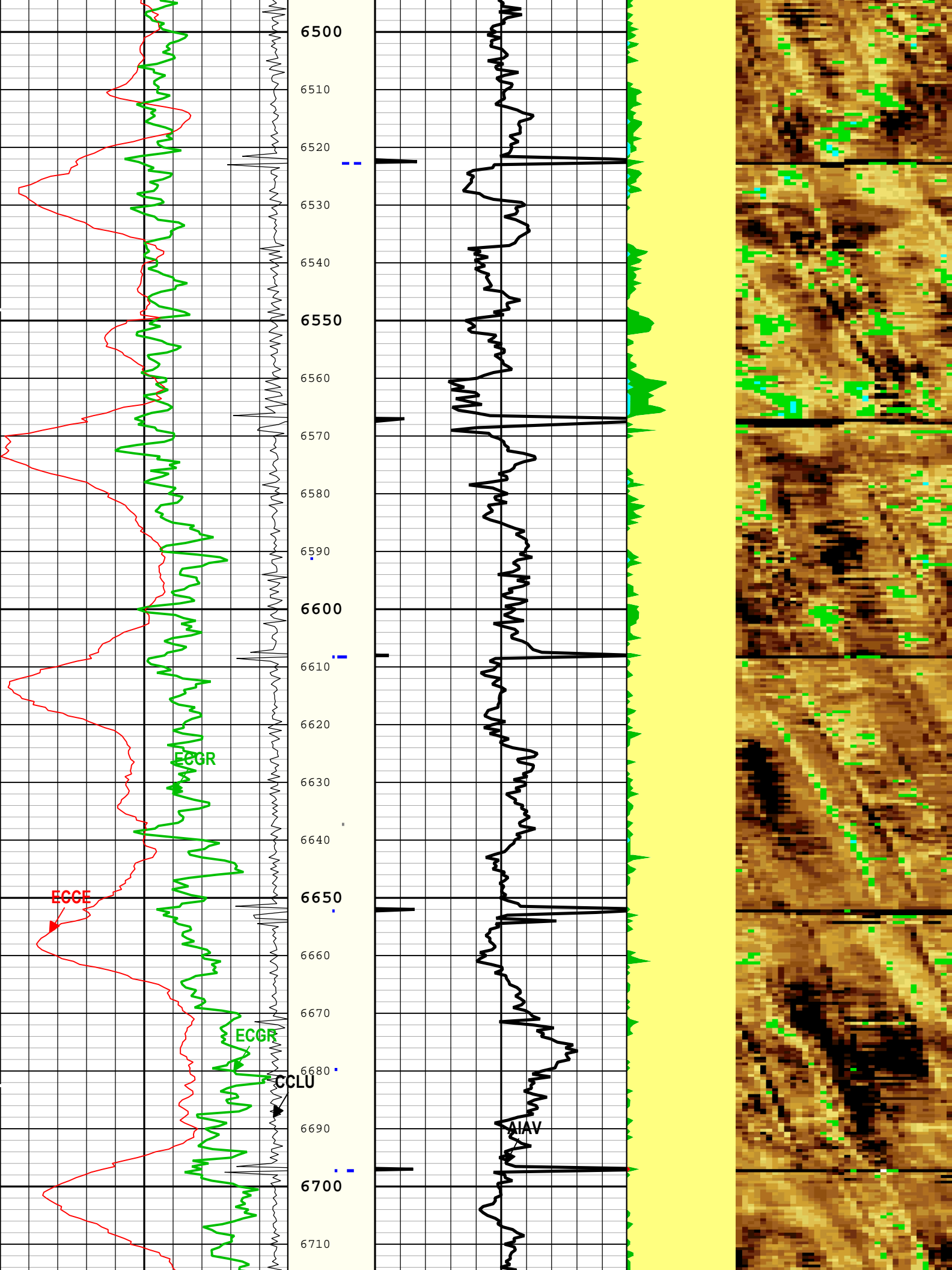


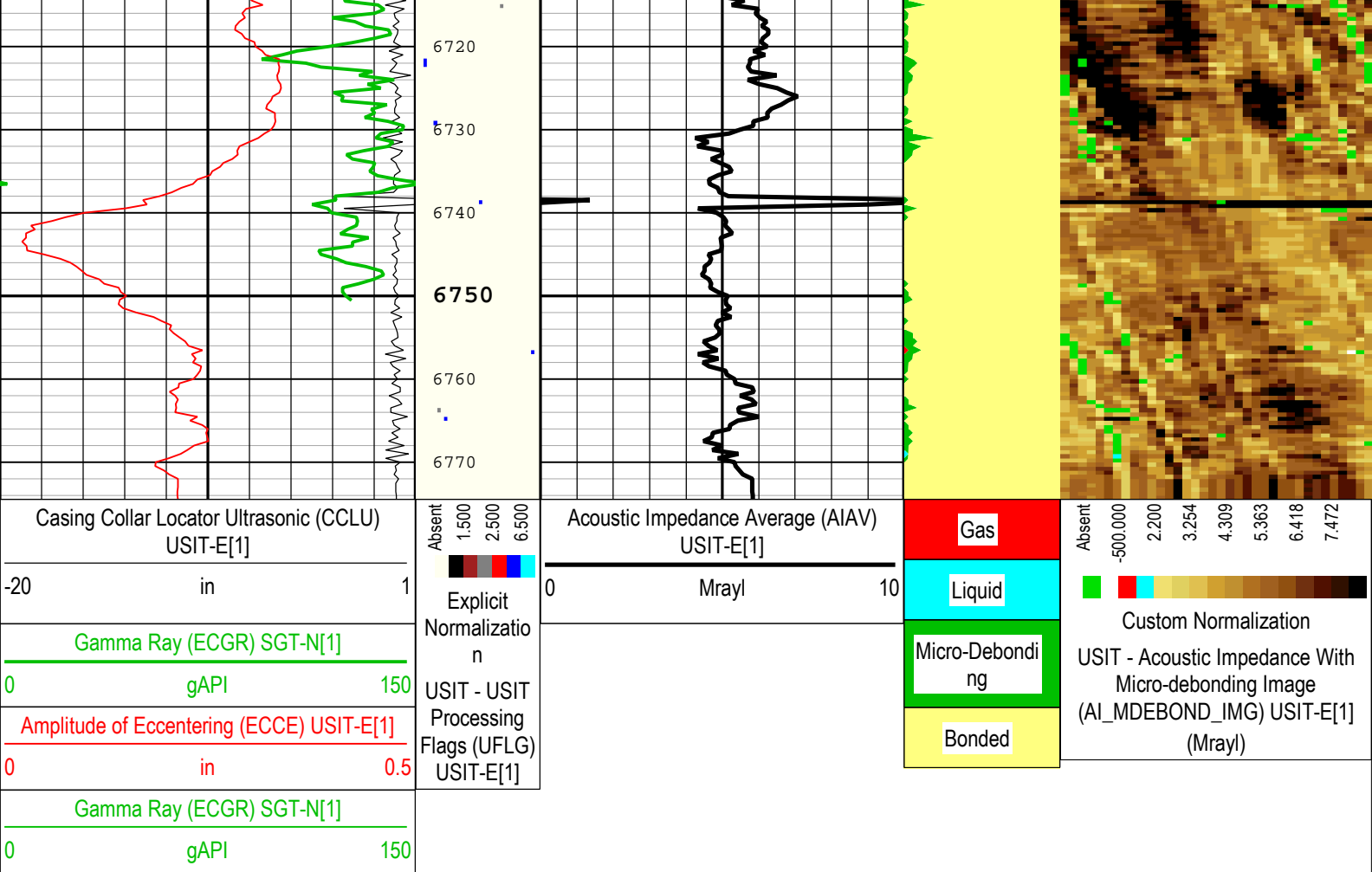












TIME\_1900 - Time Marked every 60.00 (s)

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: 16-Jul-2018 20:10:38

## Channel Processing Parameters

### 1A: 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	6780	ft
CDEN	Cement Density	SGT-N	16.69	lbm/gal
CMTY(U-USIT_CENT)	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	1.14	
MUD_N_THE	Theoretical Mud Normalization Factor	USIT-E	1.15	
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

1A

Depth Zoned Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	13.5	79.5	1959
BS	8.5	1959	6774.5
All depth are actual.			

Tool Control Parameters

1A: 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	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

1A

Time Zoned Parameters

Pass Log[3]:Up

Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
EMXV	40	16-Jul-2018 13:48:00	16-Jul-2018 13:52:24	6774.81	6224.24
EMXV	50	16-Jul-2018 13:52:24	16-Jul-2018 14:18:43	6224.24	2519.22
EMXV	60	16-Jul-2018 14:18:43	16-Jul-2018 14:23:57	2519.22	1790.79
WINB	31.88	16-Jul-2018 13:48:00	16-Jul-2018 13:49:58	6774.81	6550.67
WINB	27.37	16-Jul-2018 13:49:58	16-Jul-2018 13:50:25	6550.67	6491.26
WINB	24.3	16-Jul-2018 13:50:25	16-Jul-2018 13:54:44	6491.26	5907.38
WINB	29.67	16-Jul-2018 13:54:44	16-Jul-2018 14:23:57	5907.38	1790.79
WINE	71.88	16-Jul-2018 13:48:00	16-Jul-2018 13:50:01	6774.81	6544.99
WINE	71.11	16-Jul-2018 13:50:01	16-Jul-2018 13:54:45	6544.99	5904.18
WINE	68.04	16-Jul-2018 13:54:45	16-Jul-2018 14:23:57	5904.18	1790.79

Pass Log[5]:Up

EMXV	60	16-Jul-2018 14:45:46	16-Jul-2018 15:03:07	1950.16	100.64
WINB	29.67	16-Jul-2018 14:43:58	16-Jul-2018 14:52:44	1950.16	953.52
WINB	31.63	16-Jul-2018 14:52:44	16-Jul-2018 14:52:55	953.52	925.25
WINB	35.81	16-Jul-2018 14:52:55	16-Jul-2018 15:03:07	925.25	100.64
WINE	68.04	16-Jul-2018 14:43:58	16-Jul-2018 14:52:41	1950.16	959.42
WINE	71.04	16-Jul-2018 14:52:41	16-Jul-2018 15:03:07	959.42	100.64
All depth are at tool zero.					

# 0 PSI Repeat Pass

## Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100
Application Patch	Wireline_Hotfix-Mandatory-2018SP1_8.1.101341

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[4]:Up	Up	1958.23 ft	2504.44 ft	16-Jul-2018 2:34:44 PM	16-Jul-2018 2:37:43 PM	ON	2.08 ft	Yes

All depths are referenced to toolstring zero

## Log

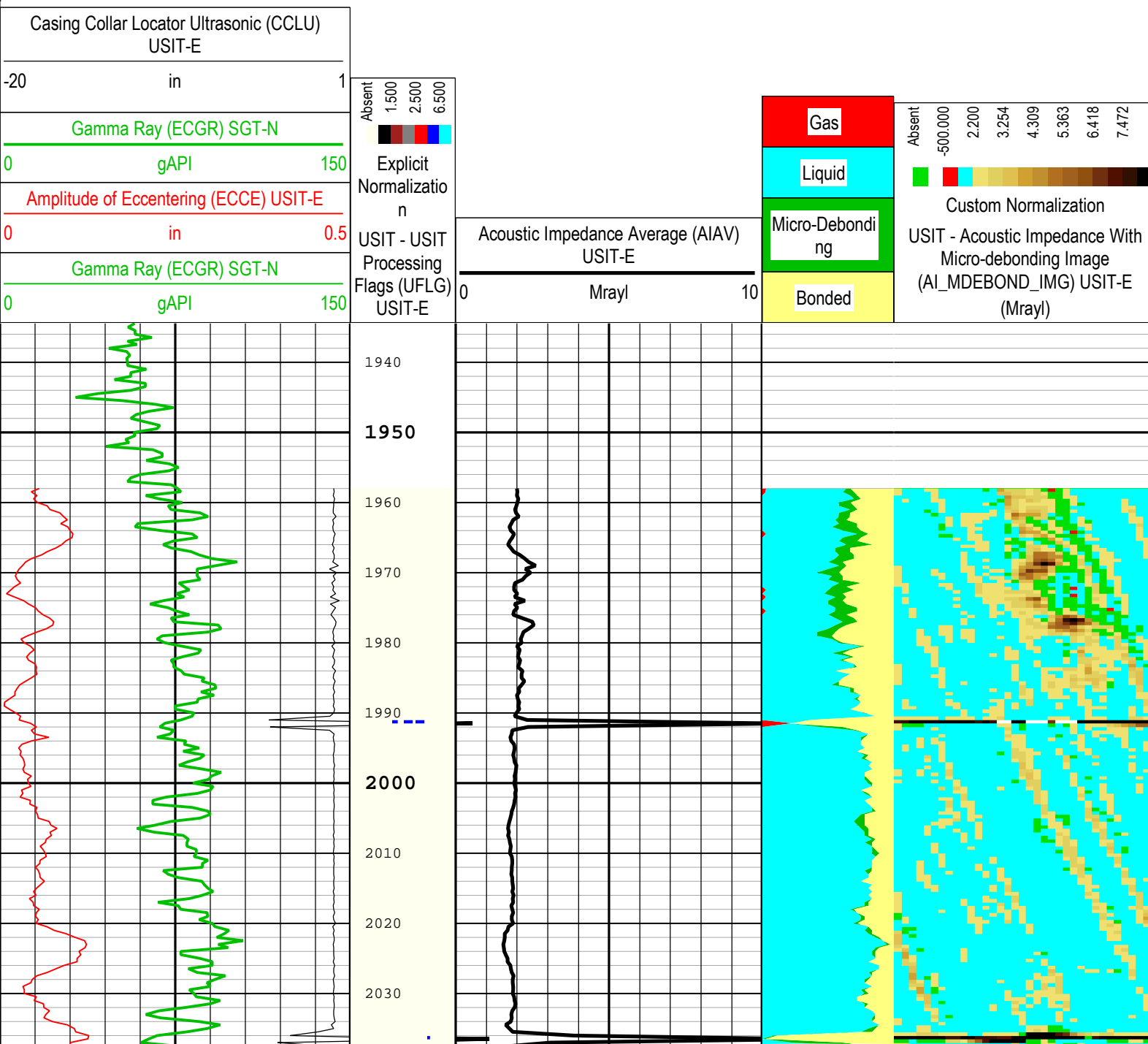
Company:Noble Energy Inc Well:Larson A23-668

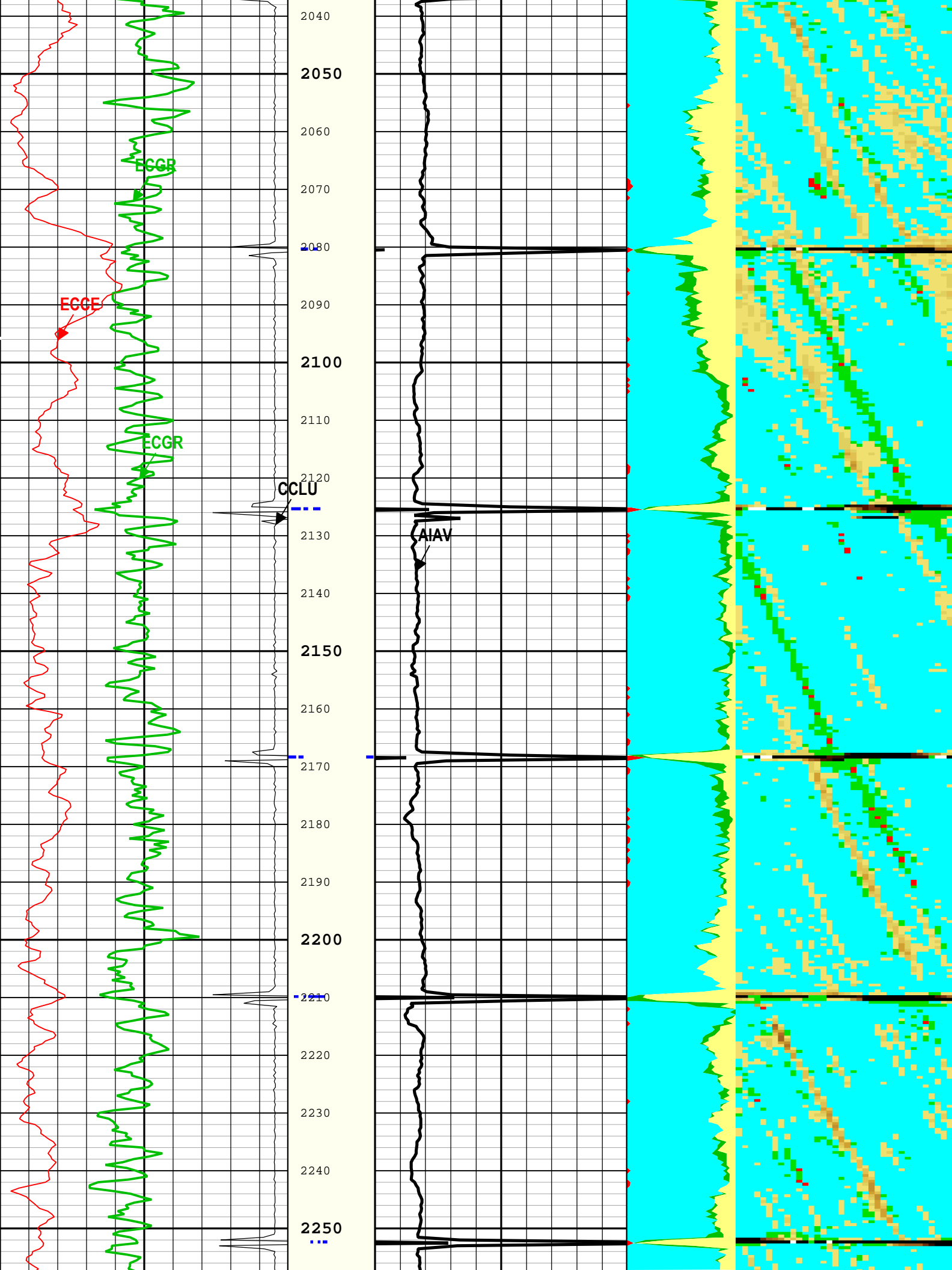
1A: Log[4]:Up:S003

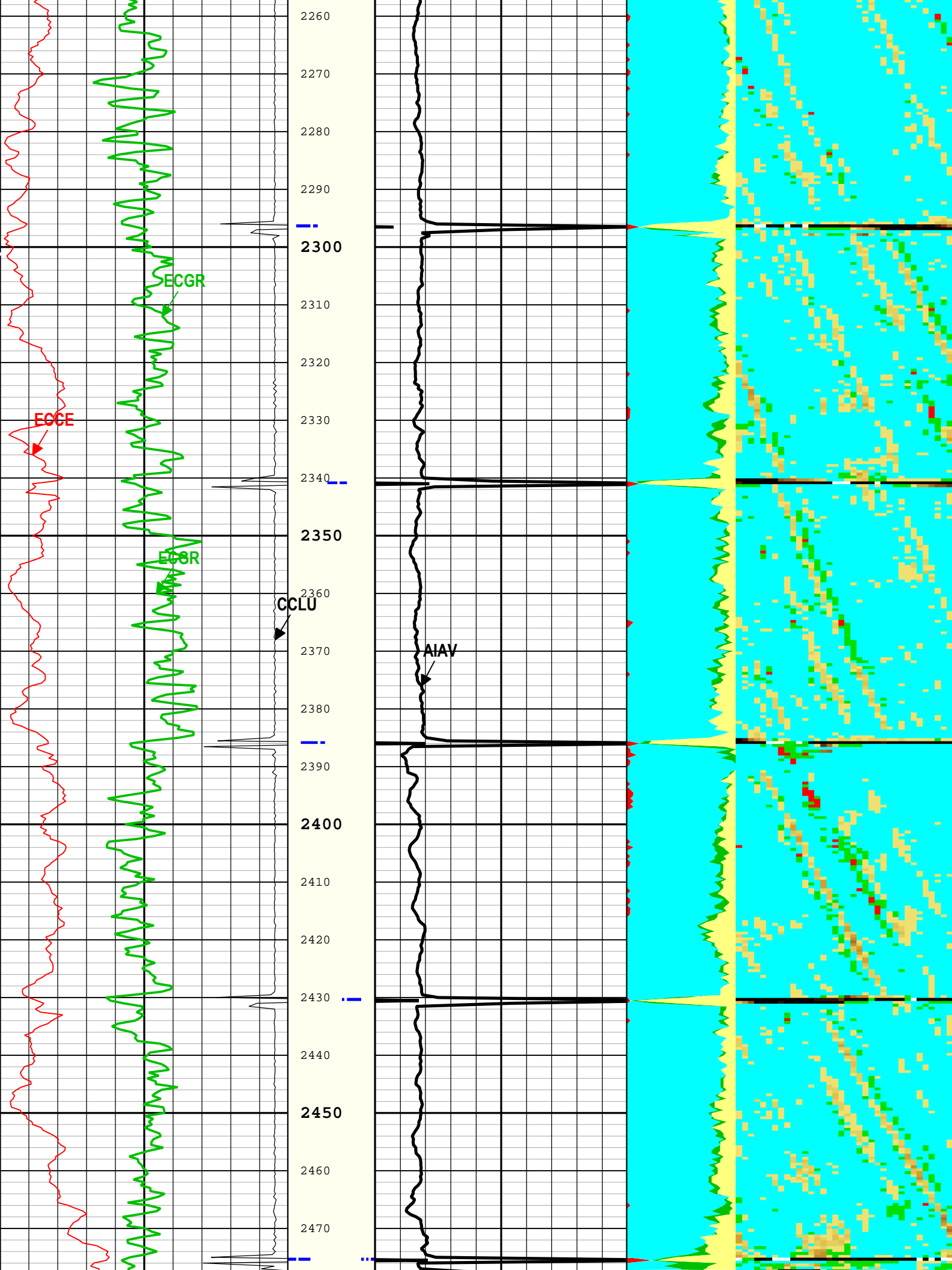
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Creation Date: 16-Jul-2018 20:10:57

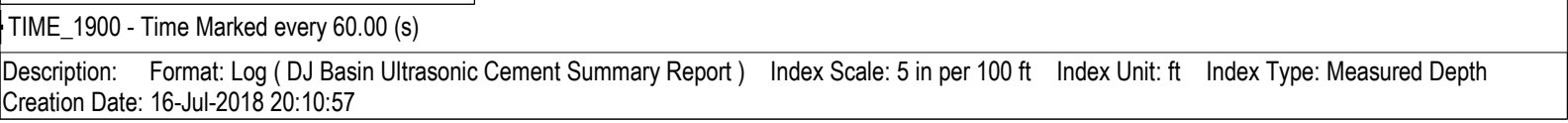
TIME\_1900 - Time Marked every 60.00 (s)











1A: 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	6780	ft
CDEN	Cement Density	SGT-N	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	1.14	
MUD_N_THE	Theoretical Mud Normalization Factor	USIT-E	1.15	
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

Parameter	Value	Start ( ft )	Stop ( ft )
BS	13.5	1934.5	1959
BS	8.5	1959	2504

All depth are actual.

Tool Control Parameters

1A: Parameters

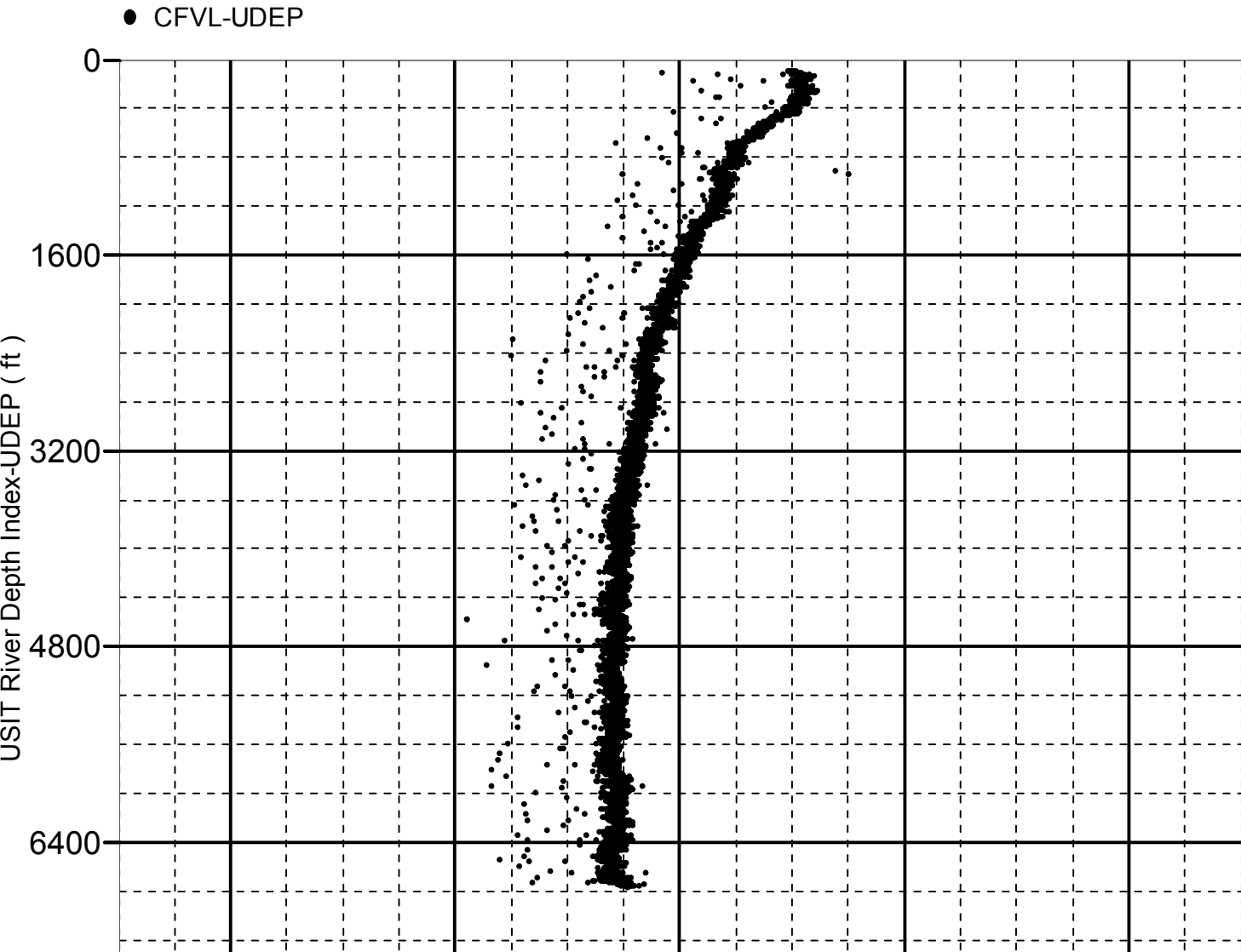
Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	48	dB
EMXV	EMEX Voltage	USIT-E	60	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	No	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
USFR	Ultrasonic 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	29.67	us
WINE	Window End Time	USIT-E	68.04	us

XYZ

Company:Noble Energy Inc Well:Larson A23-668  
MAIN:S003

Fluid Acoustic Slow ness vs Depth  
2D Cross Plot

Index Range: From 103.00 to 6774.50 ft

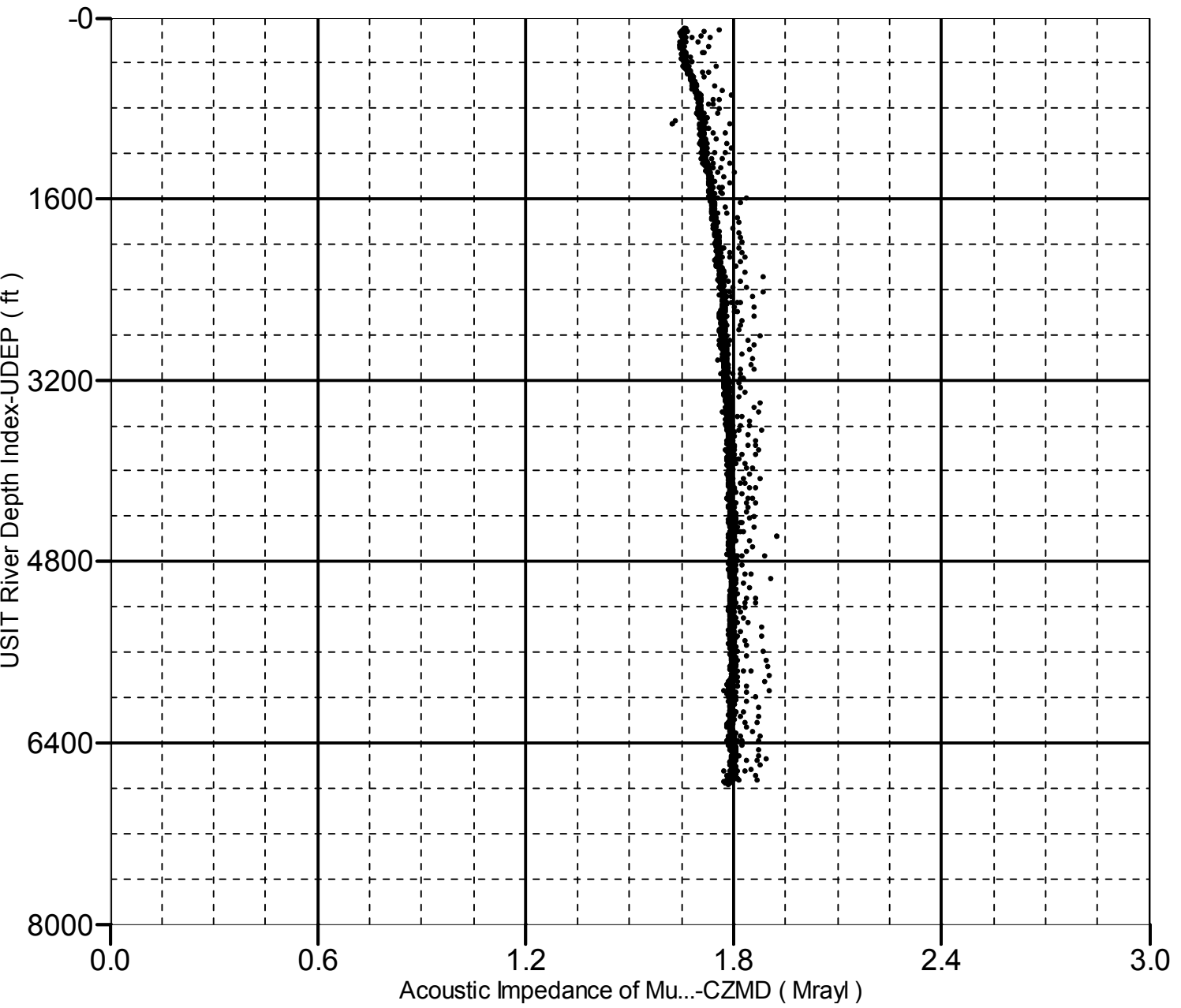


# Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 103.00 to 6774.50 ft

● CZMD-UDEP





Company:	Noble Energy Inc	Schlumberger
Well:	Larson A23-668	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	

# UltraSonic Summary Print