

Company: Noble Energy Inc.

Well: Hurley H26-730

Field: Wattenberg

County: Weld State: Colorado

UltraSonic Summary Print

County:	Weld
Field:	Wattenberg
Location:	SENE Sec. 26, T3N, R65W
Well:	Hurley H26-730
Company:	Noble Energy Inc.
Location:	
SENE Sec. 26, T3N, R65W	Elev.: K.B. 4913.00 ft
SHL: 2234' FNL & 1019' FEL	G.L. 4883.00 ft
Lat/Long: 40.1974 / -104.62484	D.F. 4913.00 ft
Permanent Datum:	Ground Level
Log Measured From:	Kelly Bushing
Drilling Measured From:	Kelly Bushing
API Serial No.	Section: 26
05-123-46763	Township: 3N
	Range: 65W

Logging Date	06-Sep-2018
Run Number	1
Depth Driller	16167.00 ft
Schlumberger Depth	16167.00 ft
Bottom Log Interval	6600.00 ft
Top Log Interval	110.00 ft
Casing Fluid Type	Brine
Salinity	
Density	8.4 lbm/gal
Fluid Level	0.00 ft
BIT/CASING/TUBING STRING	
Bit Size	8.50 in
From	1947.00 ft
To	16167.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	P110
From	0.00 ft
To	16157.00 ft
Max Recorded Temperatures	205 degF
Logger on Bottom	06-Sep-2018
Unit Number	9108
Recorded By	Ali AlRamadhan
Witnessed By	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.

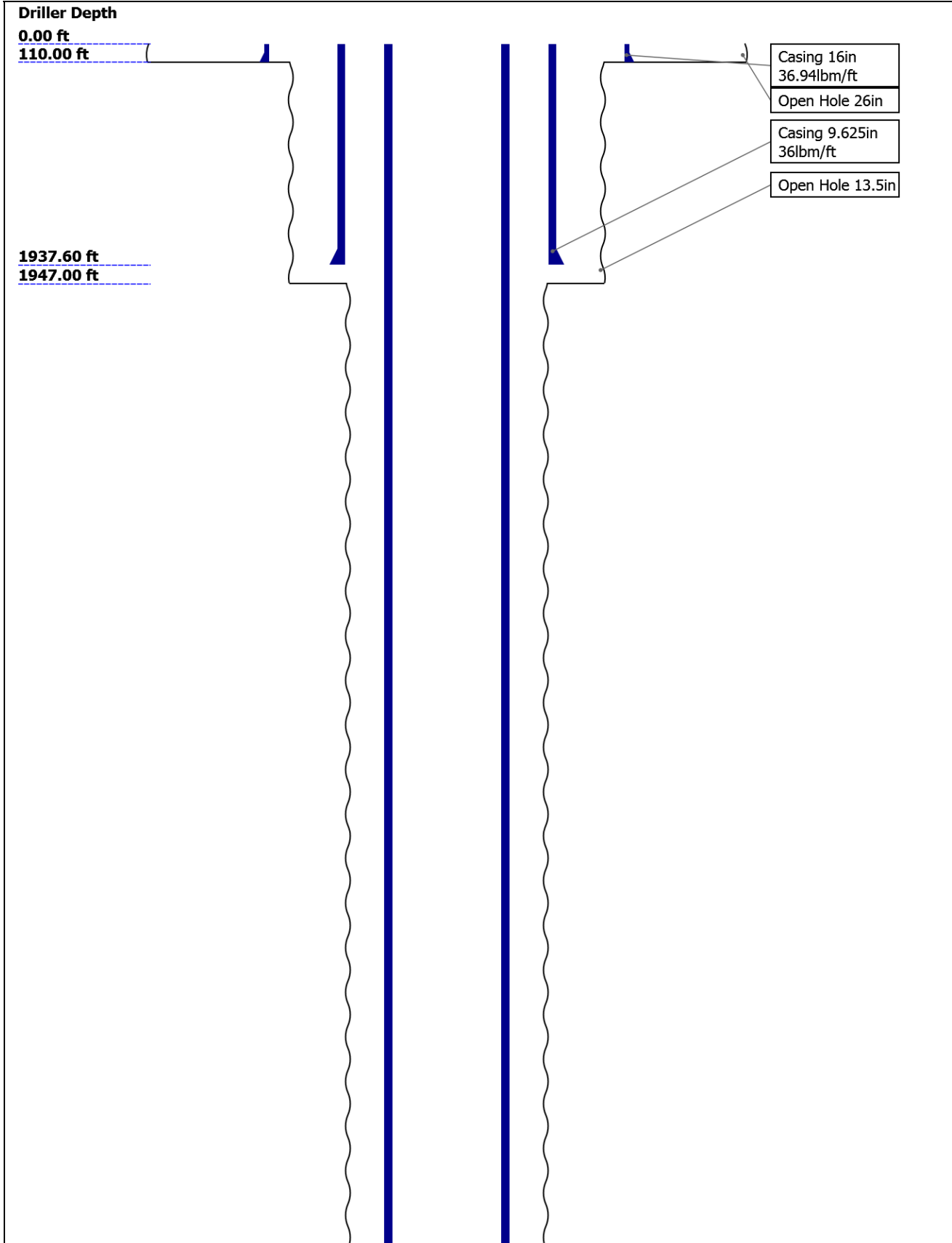
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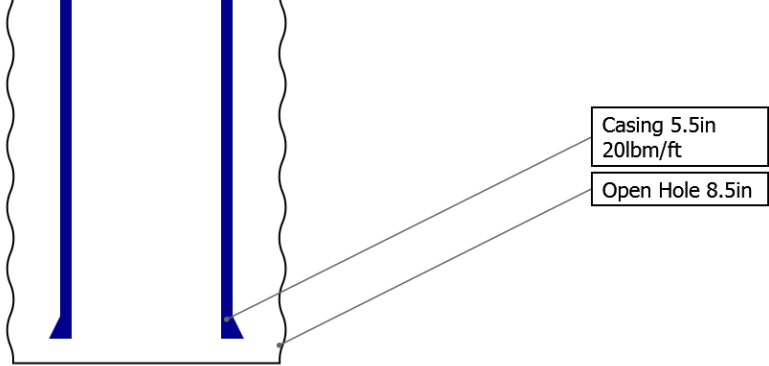
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Well Sketch



16157.00 ft

16167.00 ft



Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	26	13.5	8.5			
Top Driller ( ft )	0	110	1947			
Top Logger ( ft )	0	110	1947			
Bottom Driller ( ft )	110	1947	16167			
Bottom Logger ( ft )	110	1947	16167			
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	N/A	J55	P110			
Top Driller ( ft )	0	0	0			
Top Logger ( ft )	0	0	0			
Bottom Driller ( ft )	110	1937.6	16157			
Bottom Logger ( ft )	110	1937.6	16157			

Remarks and Equipment Summary

1: Toolstring			1: Remarks	
<div><div><div>Equip nameLength</div><div>LEH-QT29.54</div><div>LEH-QT</div></div><div><div>EDTC-B:826.06</div><div>473M</div><div>EDTH-B:8624</div><div>EDTG-B:77434</div><div>EDTC-B:8473M</div></div><div><div>AH-184[2]:5941</div><div>AH-184[1]:5965</div><div>USIT-E:9015.56</div><div>0</div><div>ECH-MFA:1818</div><div>USAC-A:900</div><div>USAC-A:10</div></div></div> <div><p>The diagram shows a vertical toolstring with various components. The components are labeled with their names and lengths in feet. The components are: LEH-QT (29.54 ft), EDTC-B:8 (26.06 ft), 473M, EDTH-B:86 (24 ft), EDTG-B:77 (434 ft), EDTC-B:84 (73M), AH-184[2] (5941 ft), AH-184[1] (5965 ft), USIT-E:90 (15.56 ft), 0, ECH-MFA (1818 ft), USAC-A (900 ft), and USAC-A (10 ft).</p></div> <div><div>MP nameOffset</div><div>CTEM22.56</div><div>ACCZ0.00</div><div>HV0.00</div><div>Gamma20.69</div><div>Ray</div><div>TelStatu19.56</div><div>s</div></div>	Thank you for choosing Schlumberger!			
	Toolstring run as per tool sketch and client logging program.			
	5" gemcos run on EDTC and USAC for centralization.			
	This is the first log in well.			
	Main pass logged at 2500 PSI. Repeat pass logged at 0 PSI.			
	BHT: 205 degF			

Thank you for choosing Schlumberger!

Toolstring run as per tool sketch and client logging program.

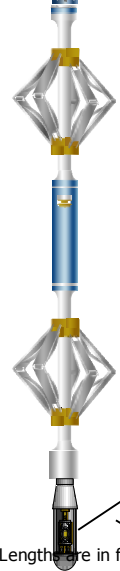
5" gemcos run on EDTC and USAC for centralization.

This is the first log in well.

Main pass logged at 2500 PSI. Repeat pass logged at 0 PSI.

BHT: 205 degF

USIS-A:19  
94  
USSC-B:92  
5  
USRS-AB:  
857  
USI-SENS  
OR:888  
USI-TX



USI Sen 0.37  
sor  
Head - ZERO  
nsion

Length in ft

Maximum Outer Diameter = 3.625 in

Line: Sensor Location, Value: Gating Offset

All measurements are relative to TOOL\_ZERO

## Depth Summary

1

### 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	Land		

1:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth control policies followed.
Rig Up Length At Surface		IDW used as primary depth reference.
Rig Up Length At Bottom		Z-Chart used as secondary depth reference.
Rig Up Length Correction		Log depth shifted to marker joint at 6356.3 ft
Stretch Correction		
Tool Zero Check At Surface		

## USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[3]:Up	6680.15	100.9

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 : 34.05m(111.71ft) to 40.02m(131.29ft)  
MUD\_N\_FRP = 1.08  
DFD = 1.01g/cm3(8.40lbm/gal)  
CZMD median computed in free pipe normalization interval = 1.58 MRayl

Start Depth(ft)	Stop Depth(ft)	Start Value(Mrayl)	End Value(Mrayl)
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1

## 2500 PSI Main Pass

### Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100
Application Patch	Wireline_Hotfix-Mandatory-2018SP1_8.1.102865

### Pass Summary

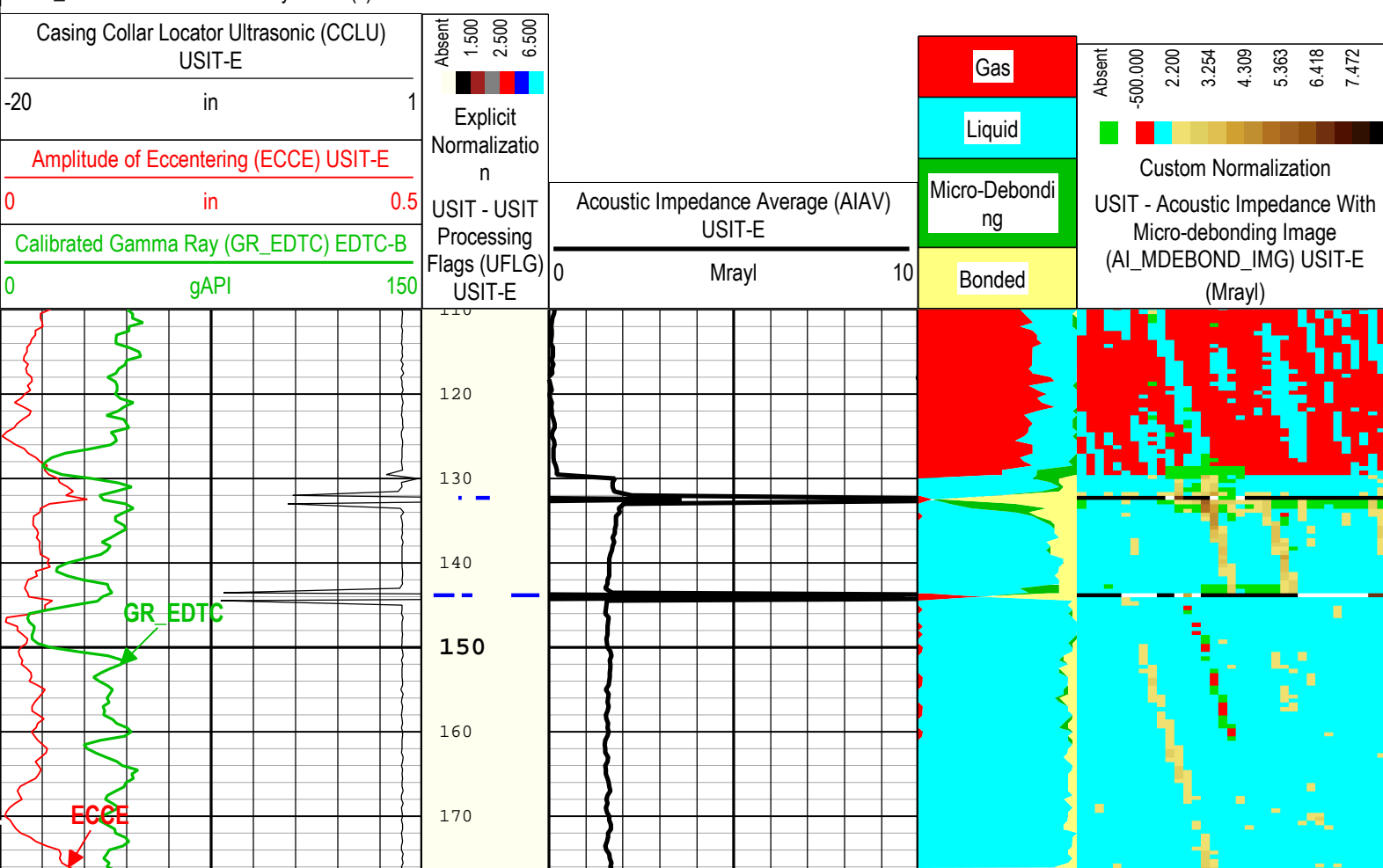
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Log[3]:Up	Up	100.90 ft	6680.15 ft	06-Sep-2018 11:17:18 AM	06-Sep-2018 11:58:02 AM	ON	-6.39 ft	No

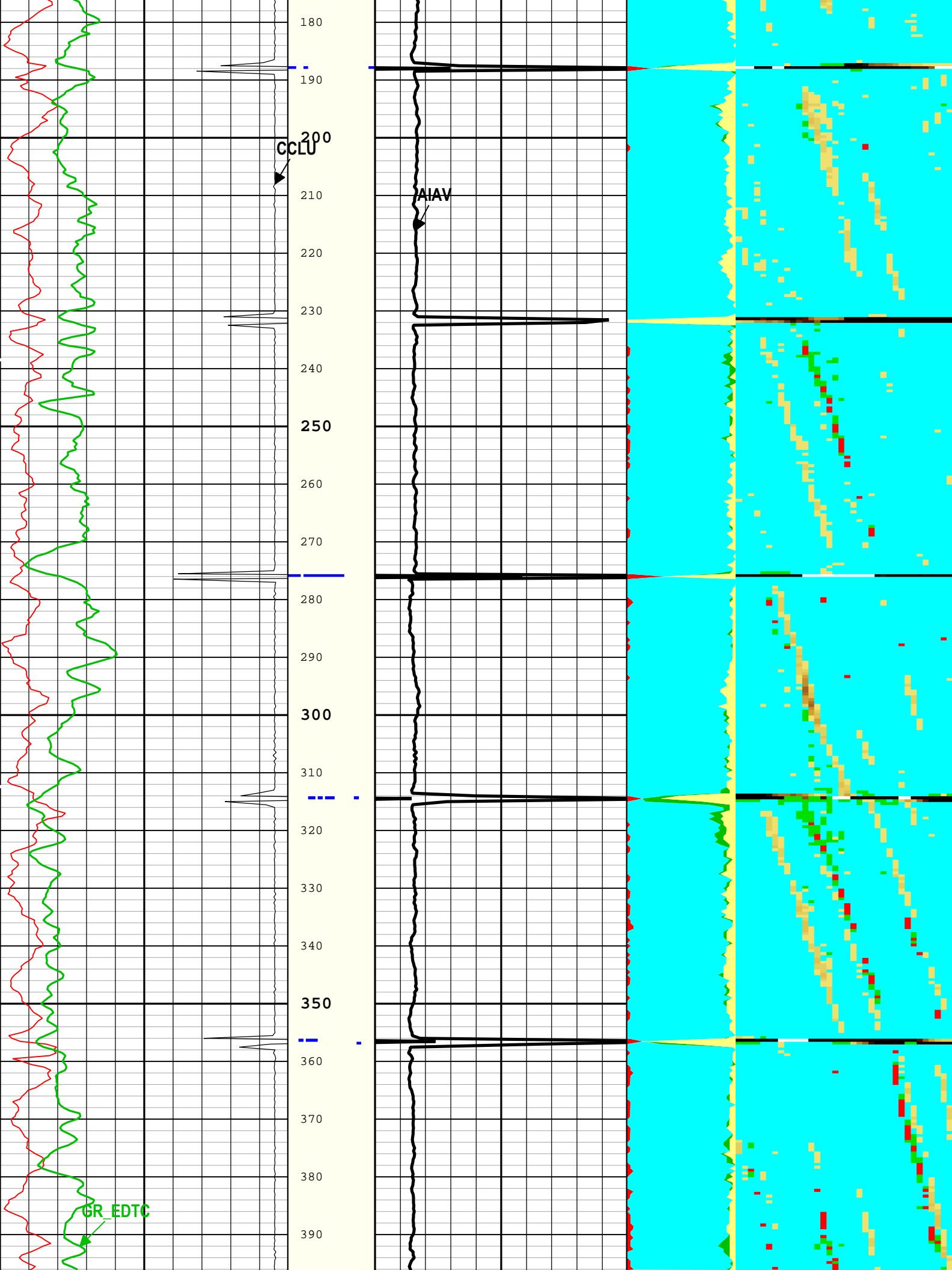
All depths are referenced to toolstring zero

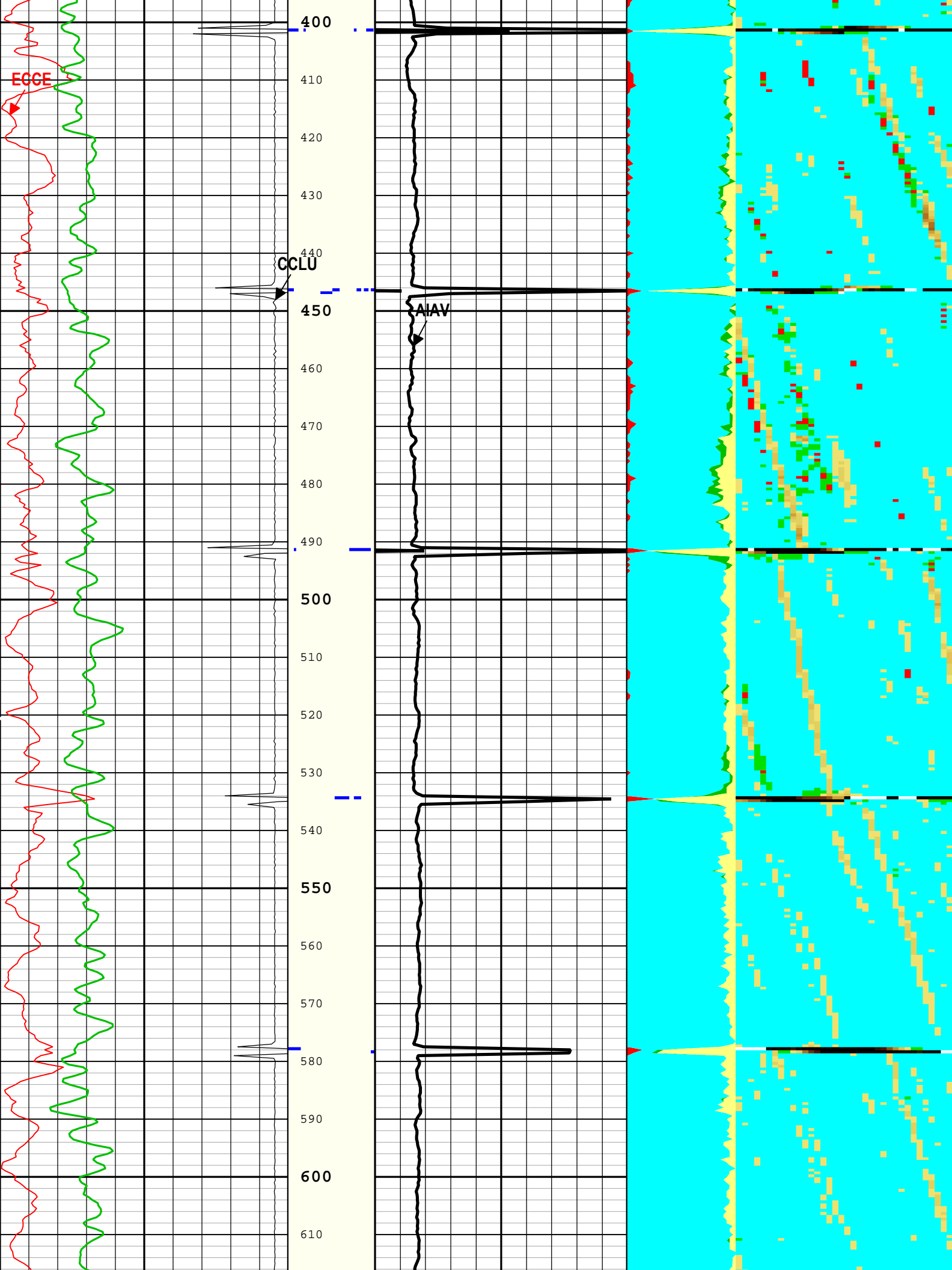
Log	Company:Noble Energy Inc.	Well:Hurley H26-730
		1: Log[3]:Up:S005

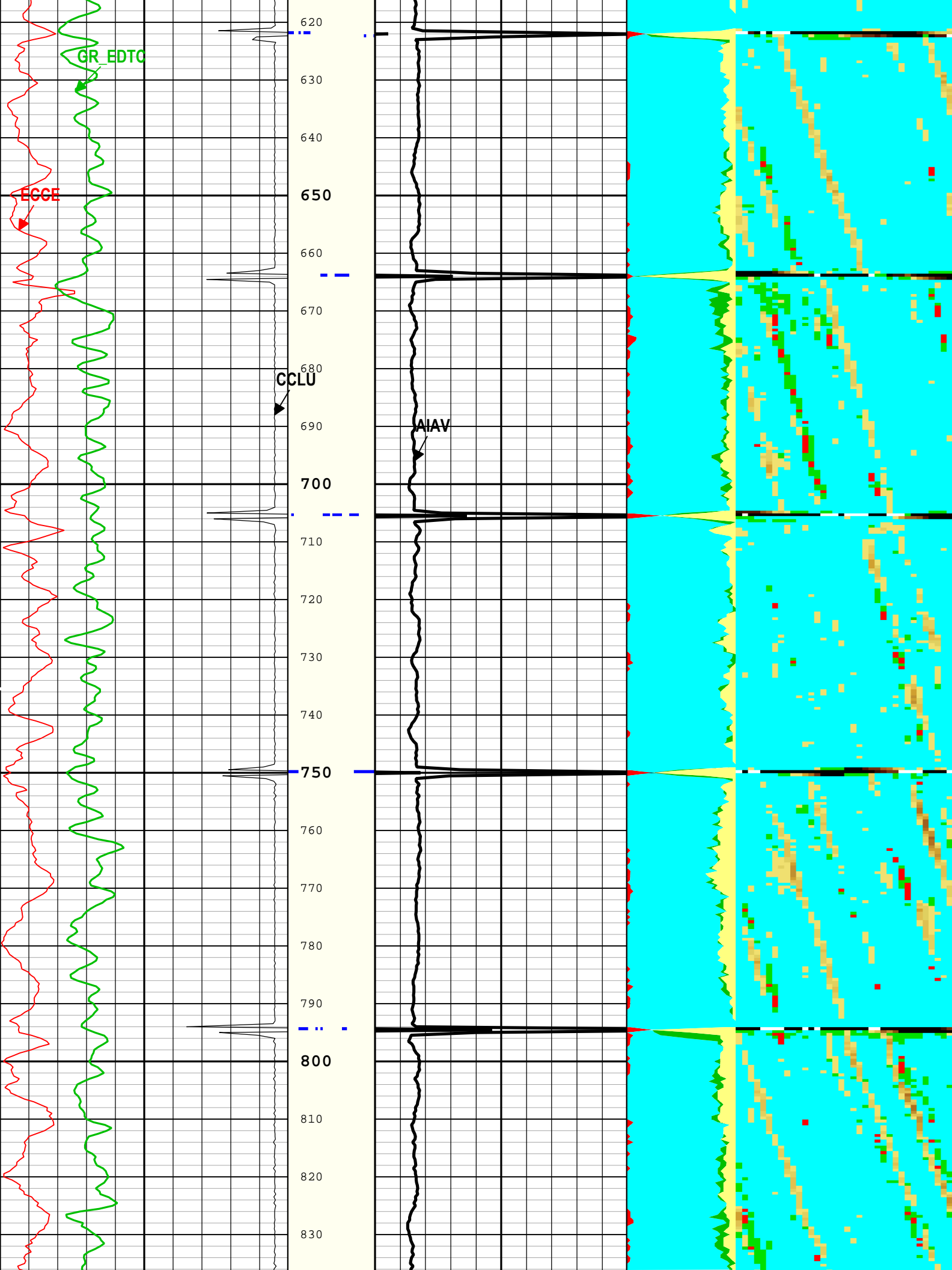
Description: Format: Log ( DJ Basin Ultrasonic Cement Summary Report ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 06-Sep-2018 14:42:32

TIME\_1900 - Time Marked every 60.00 (s)

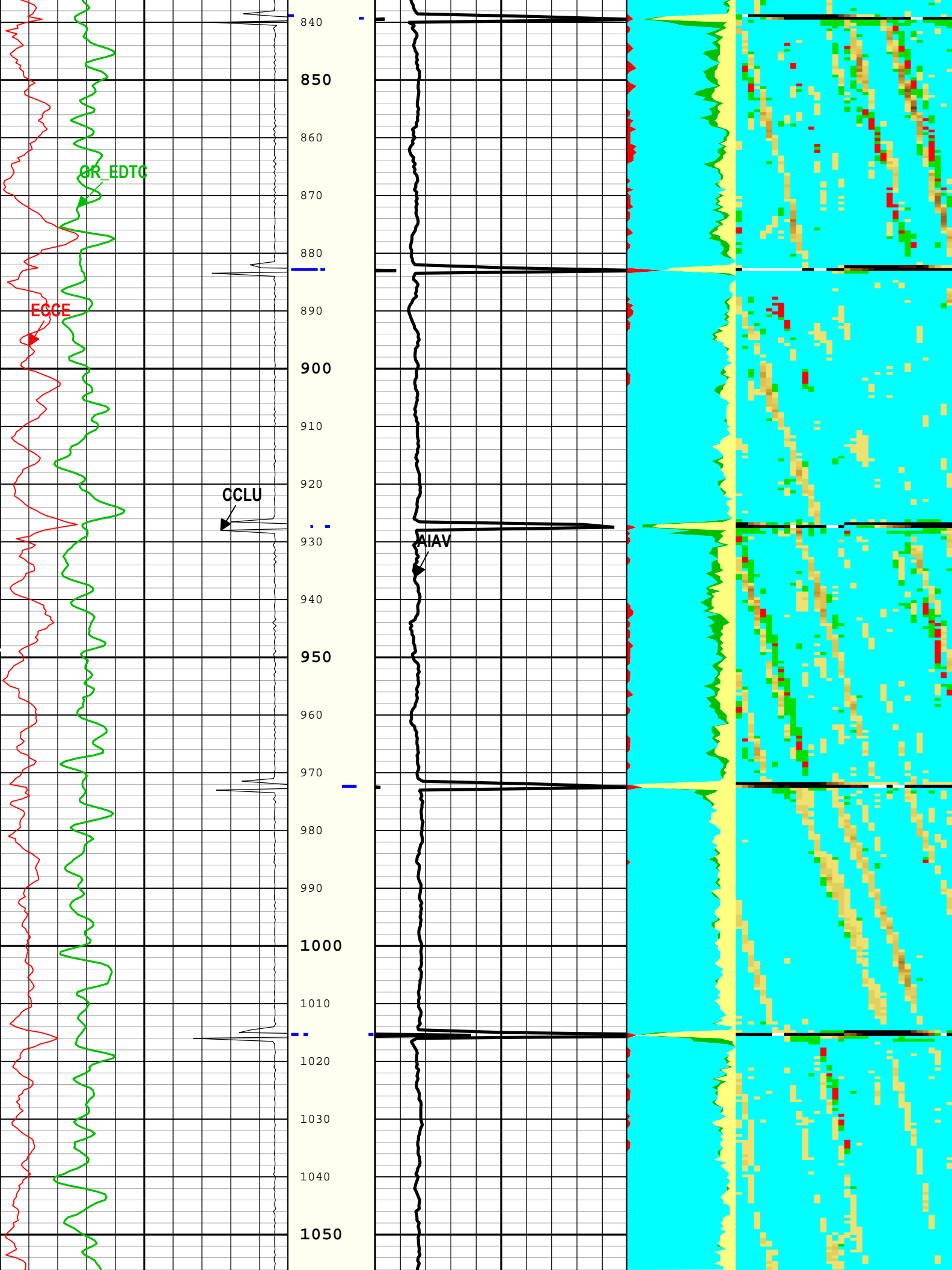


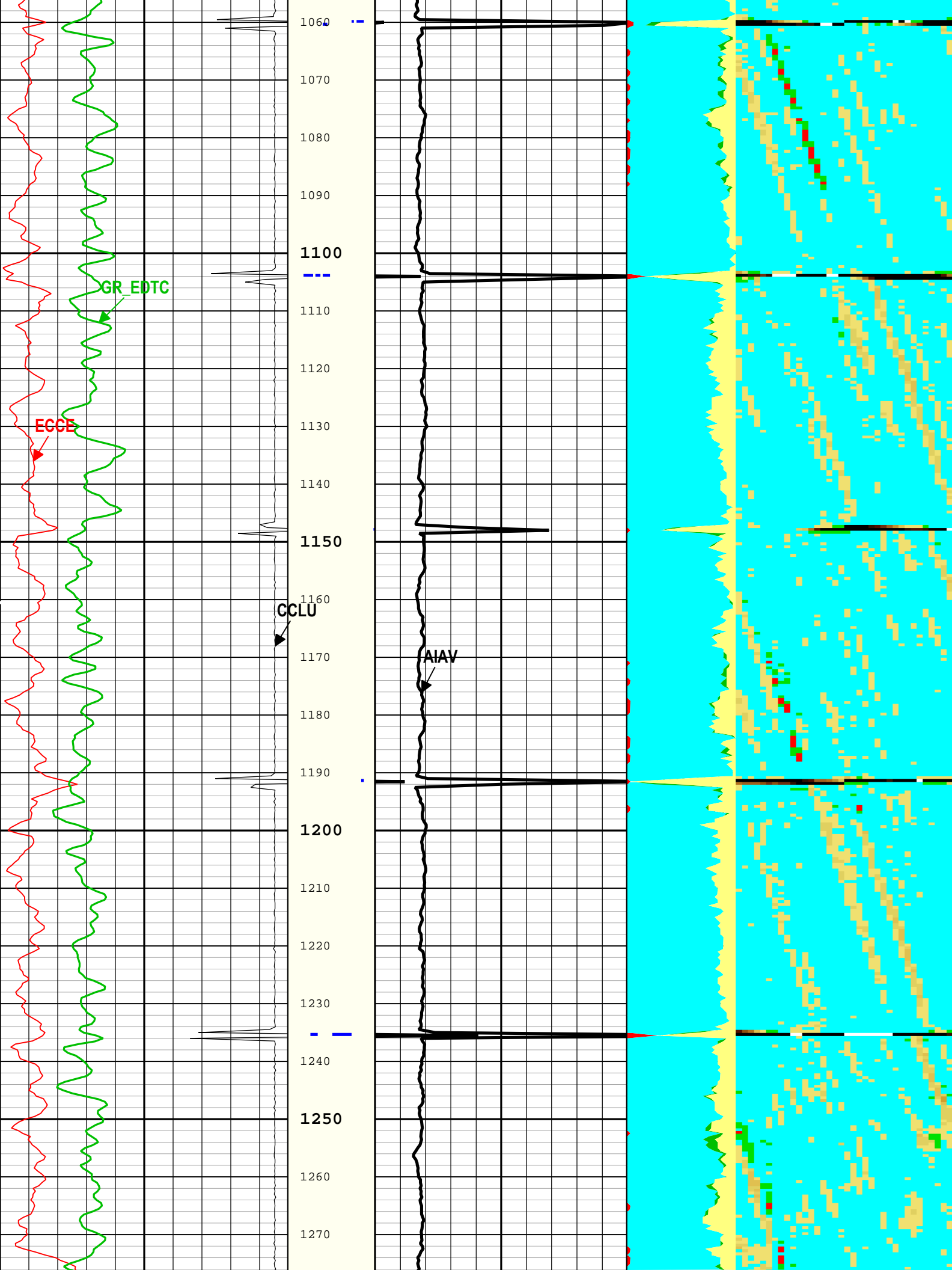


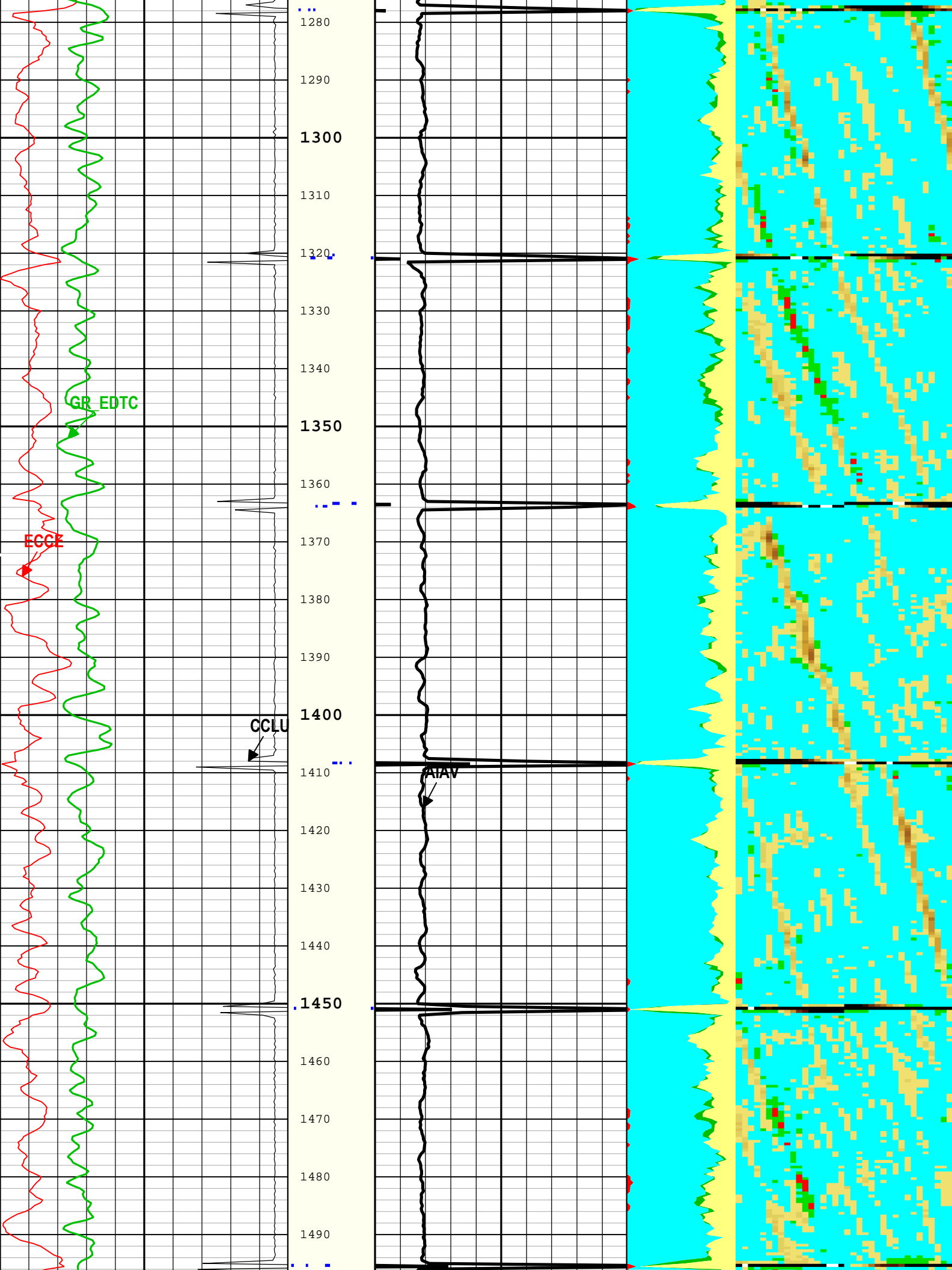


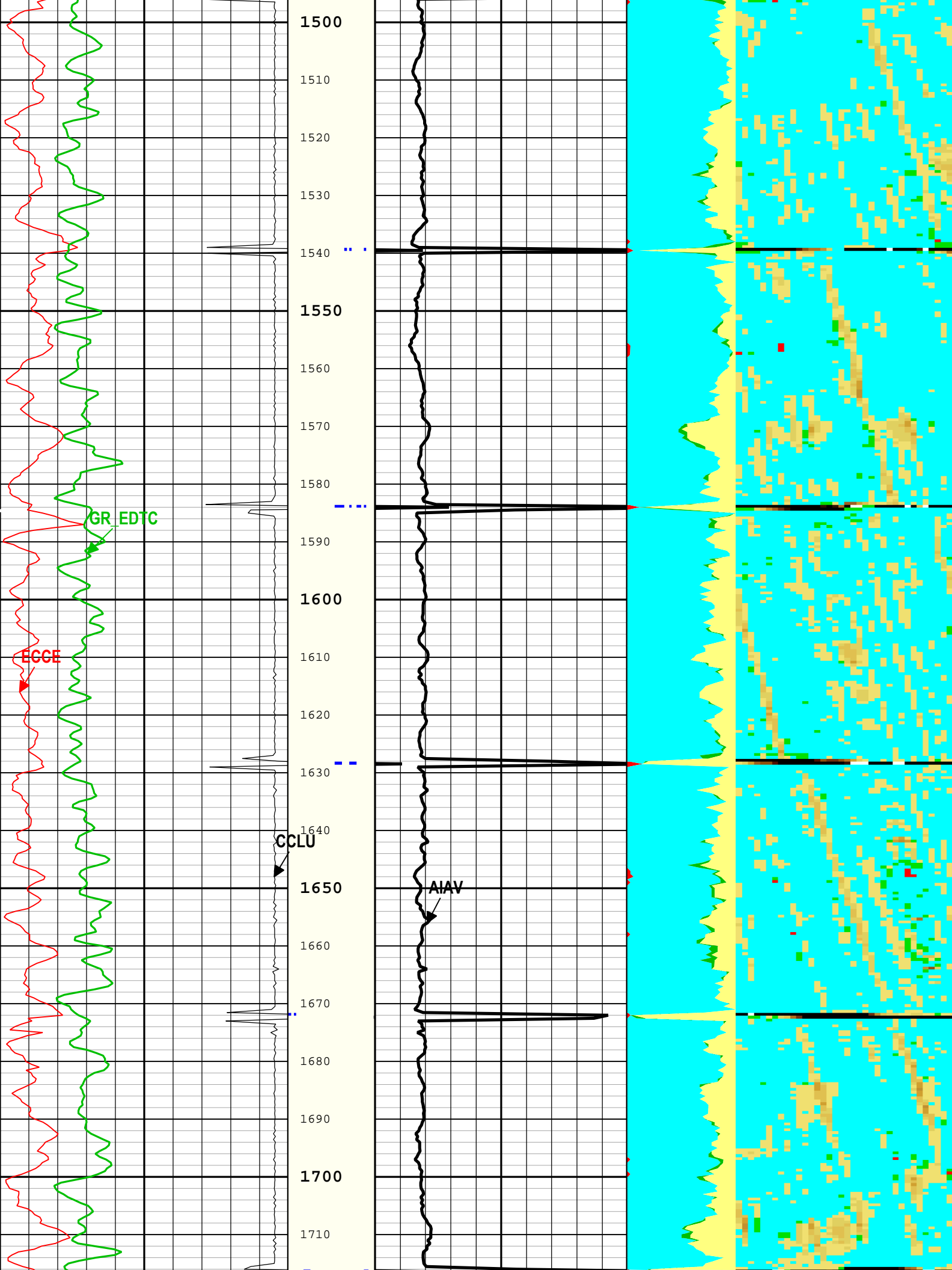


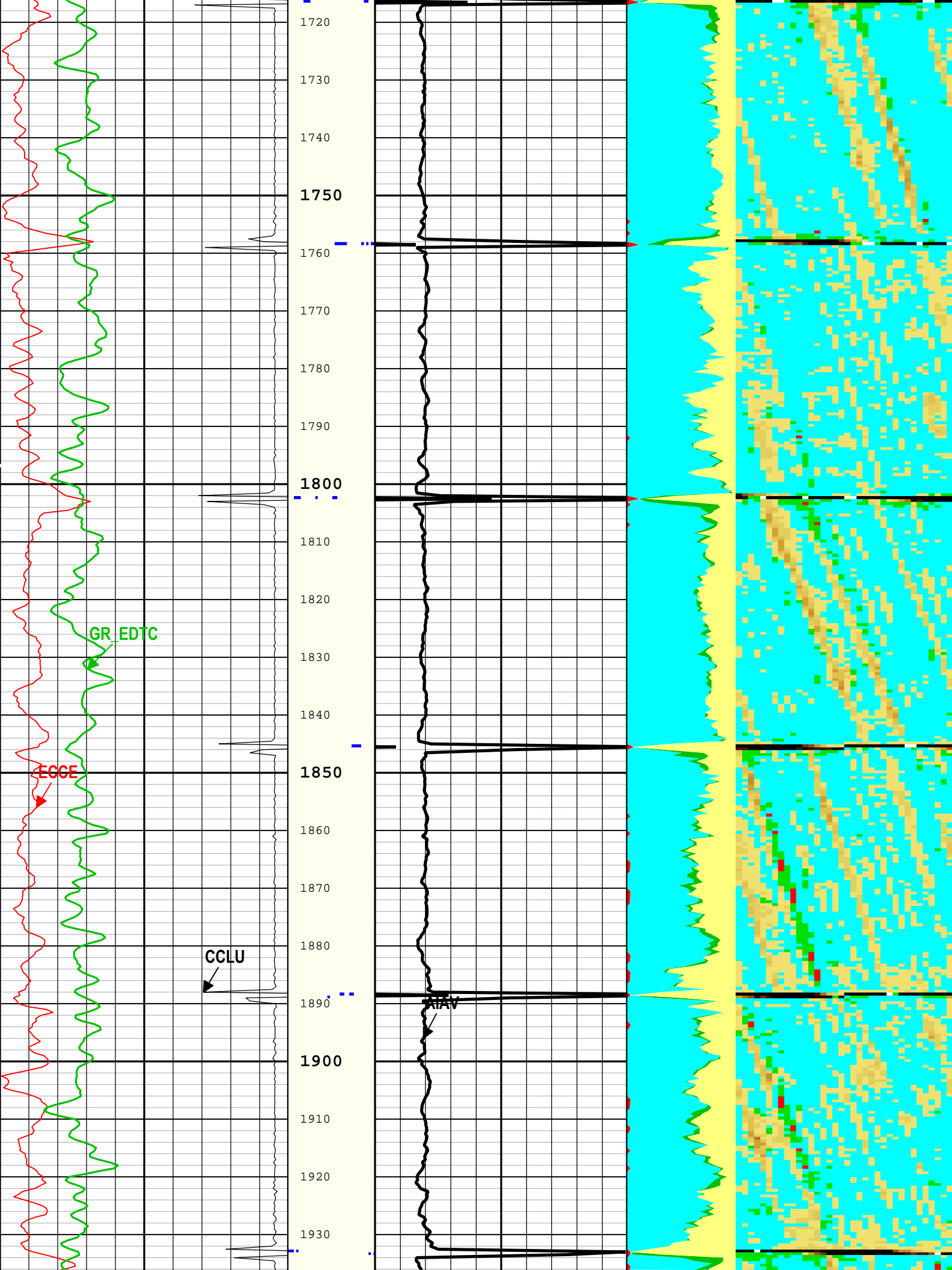


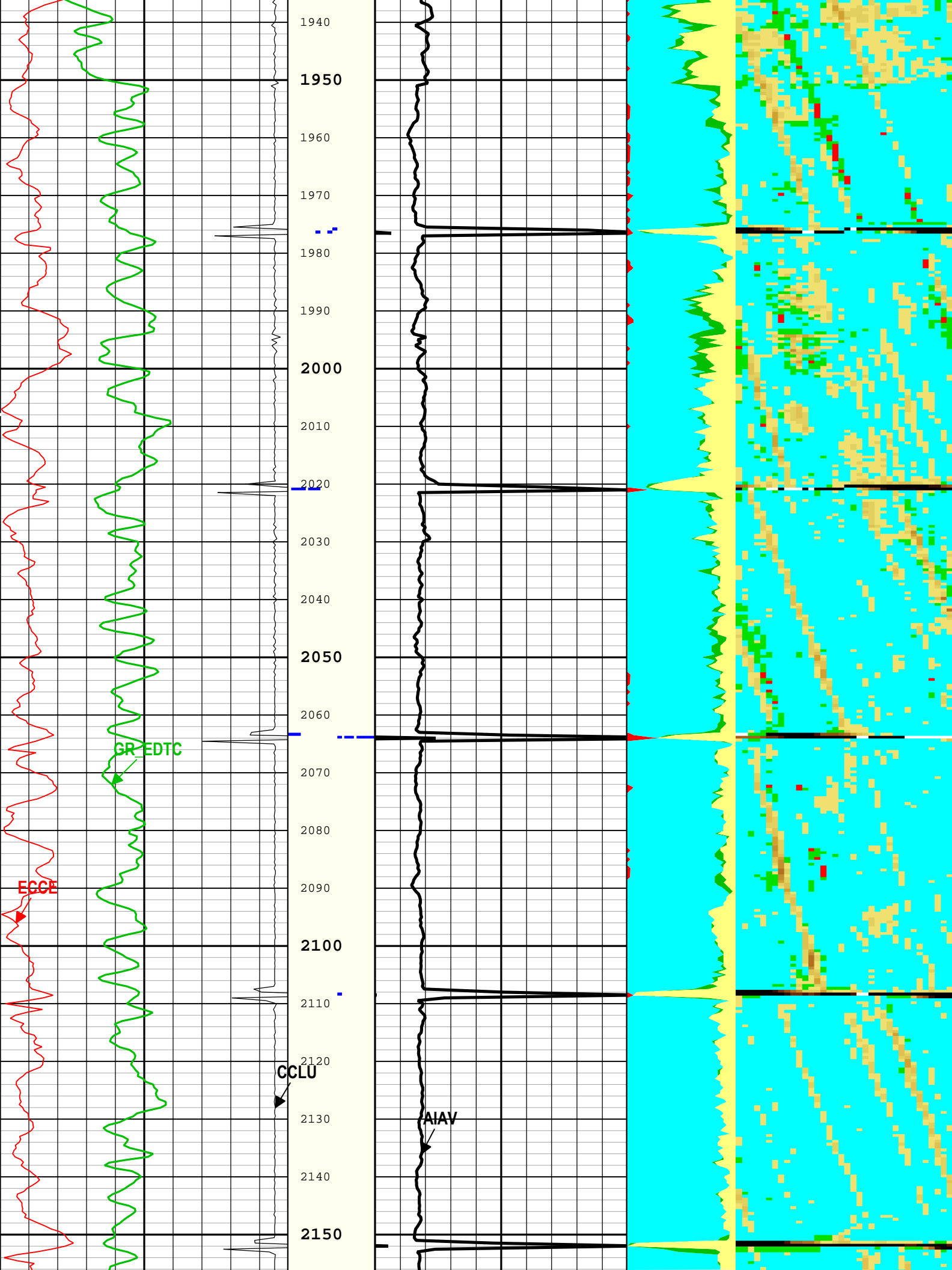


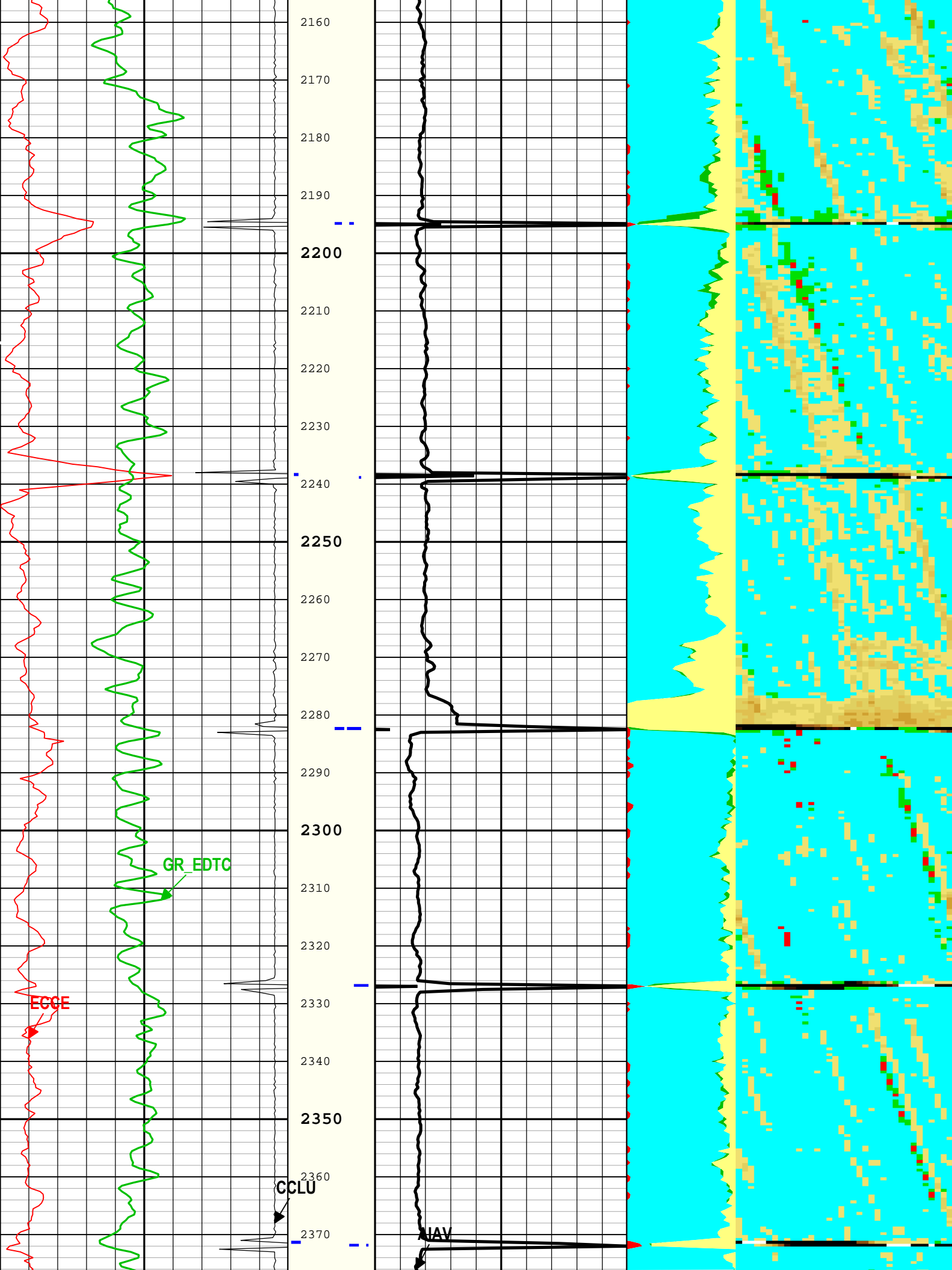


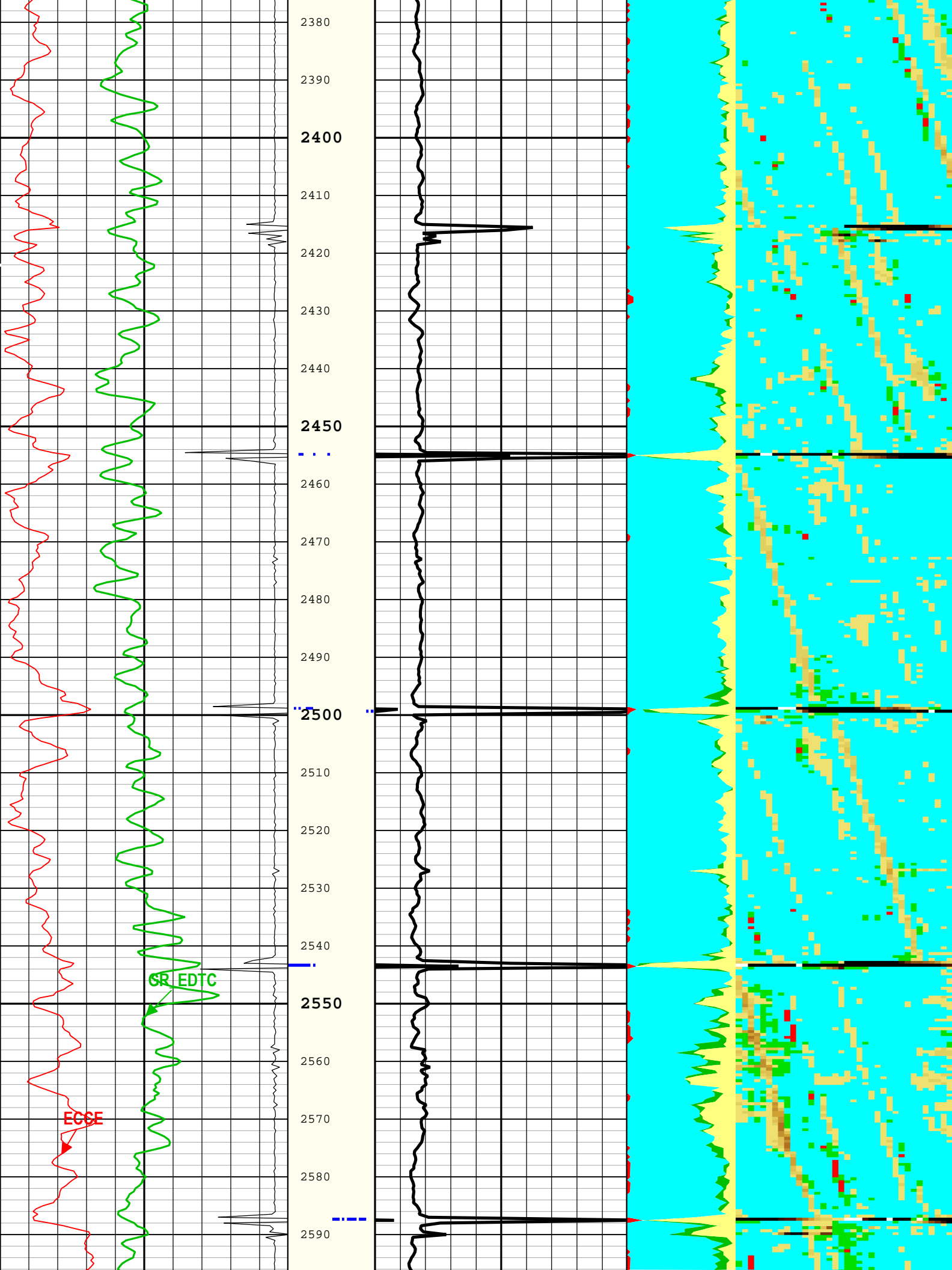




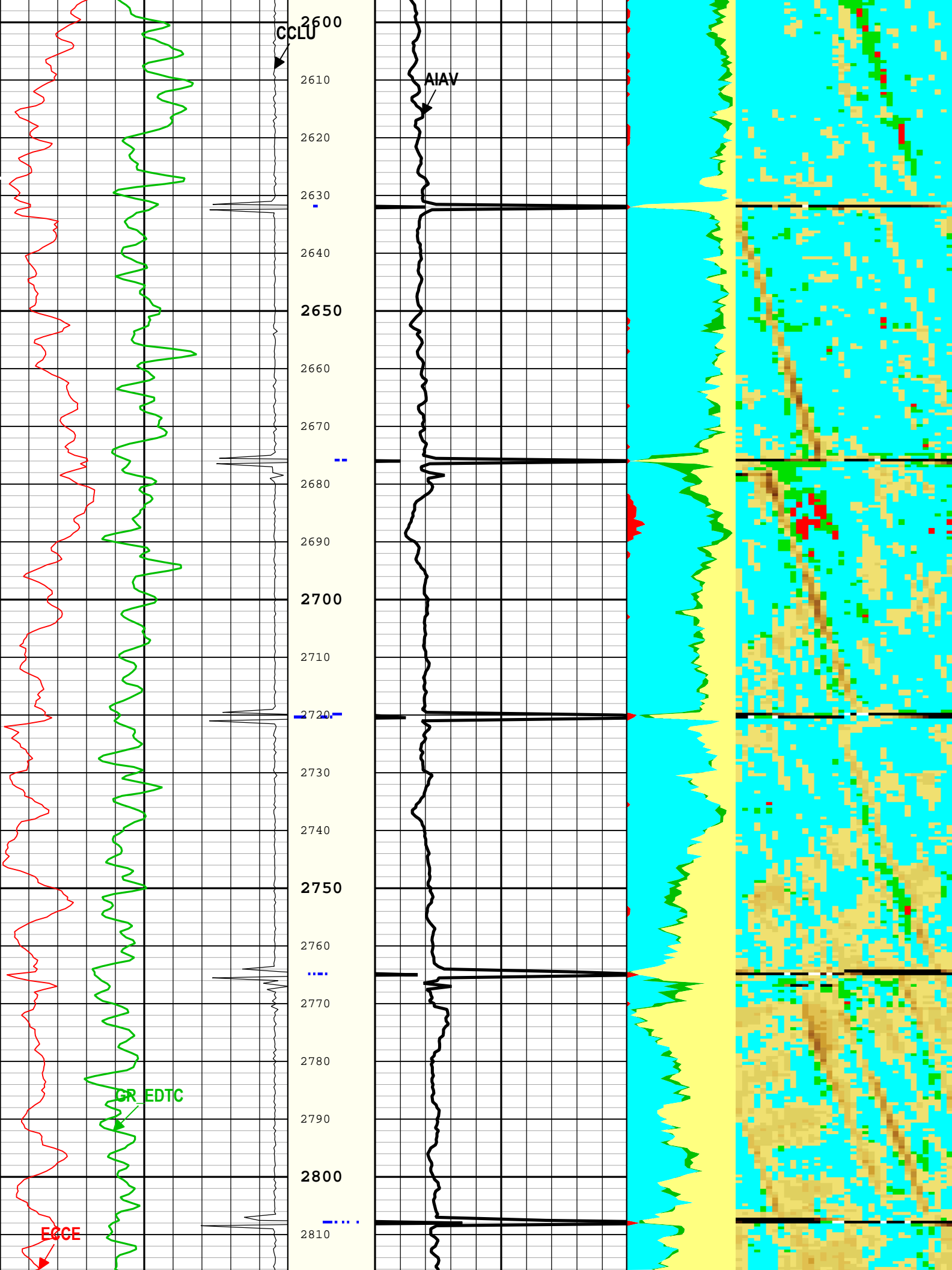


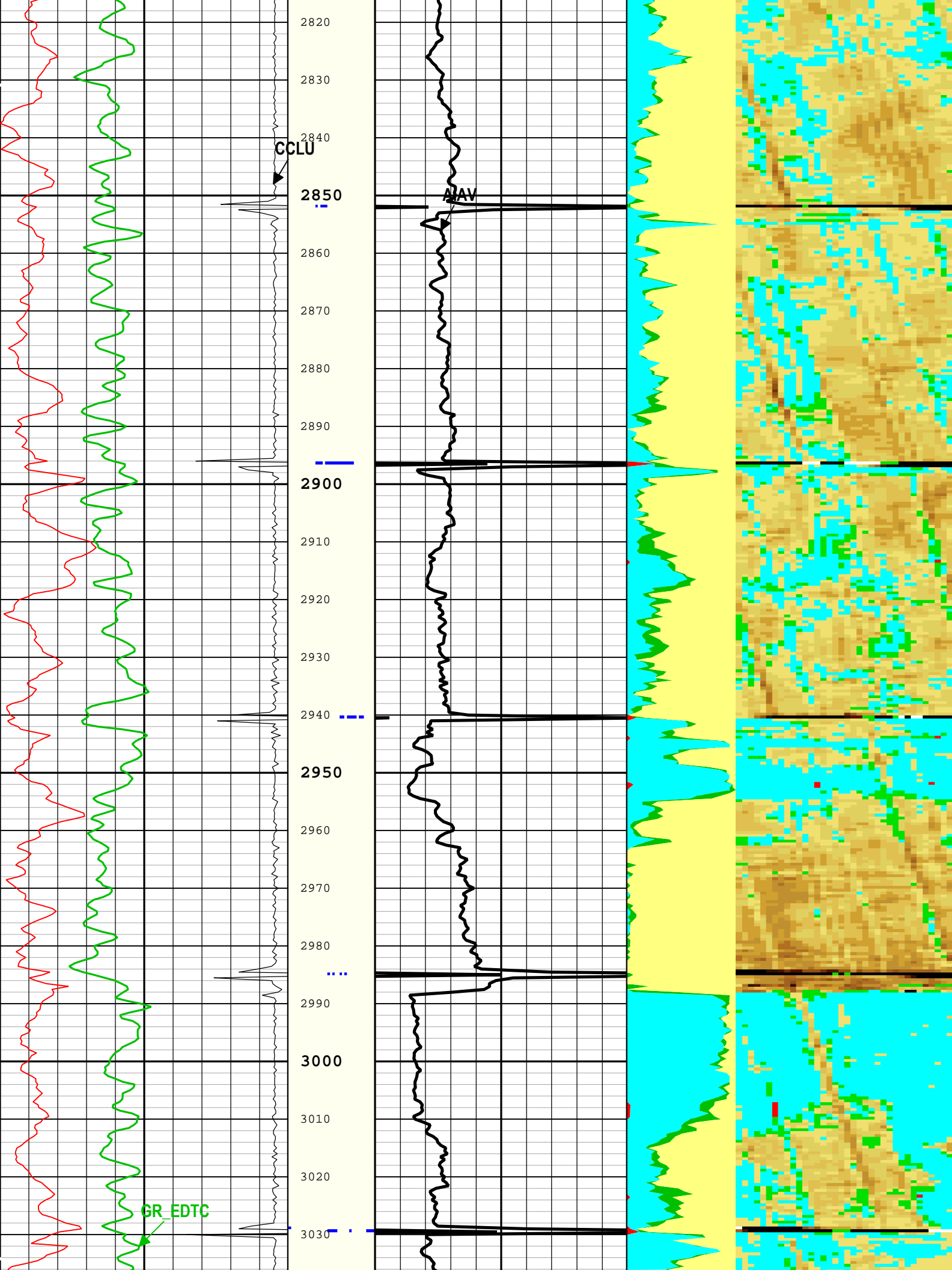


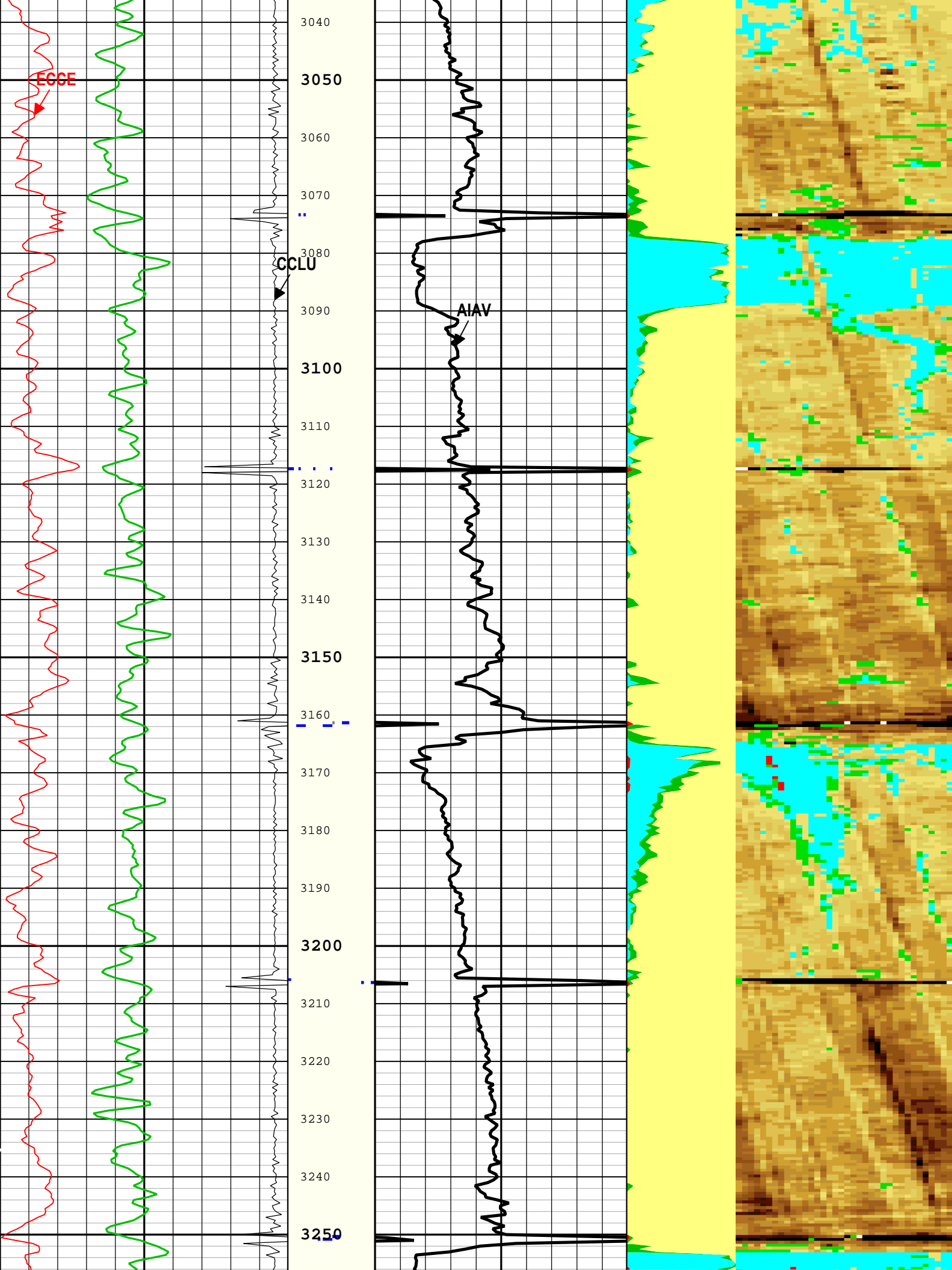


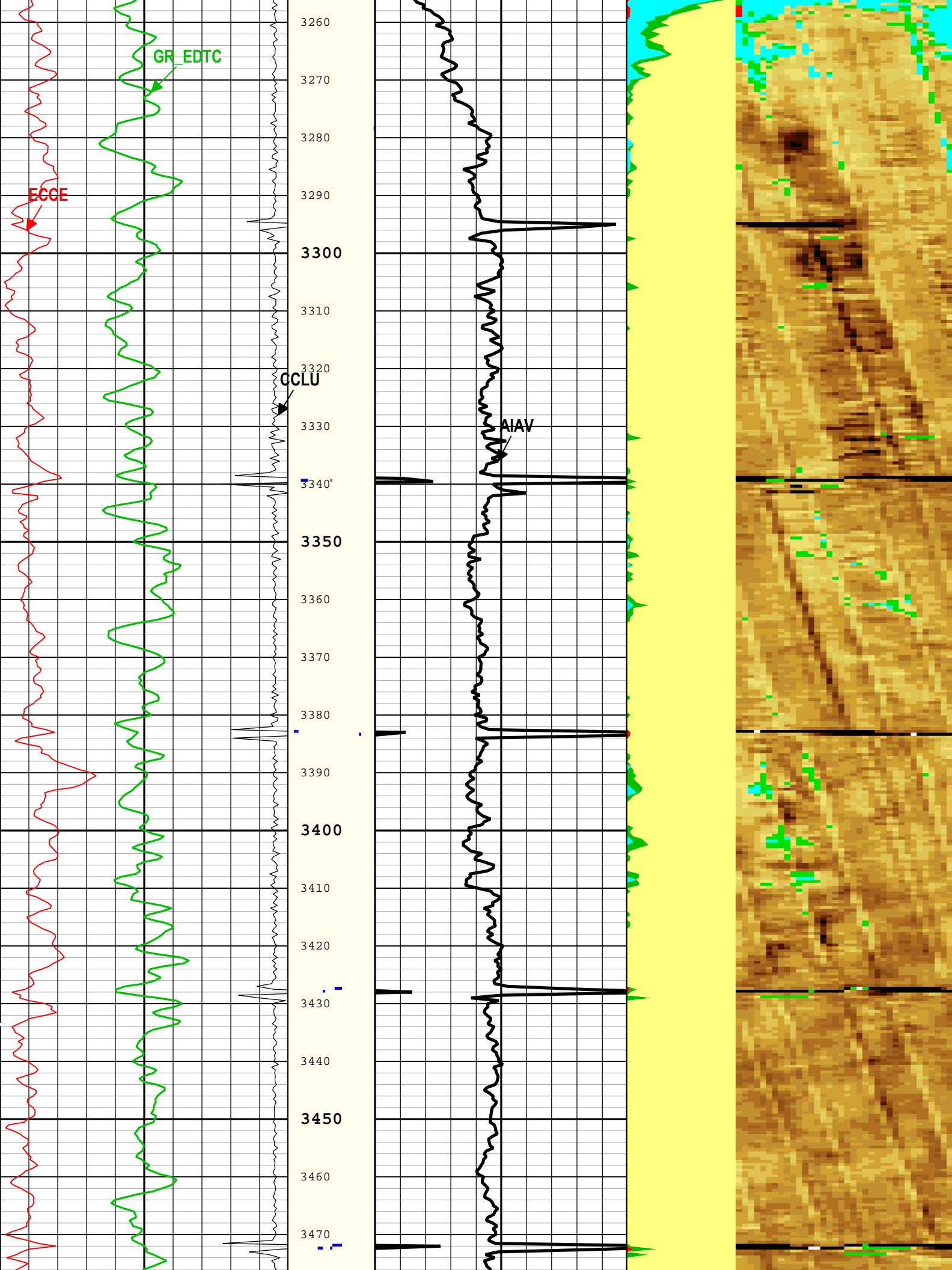


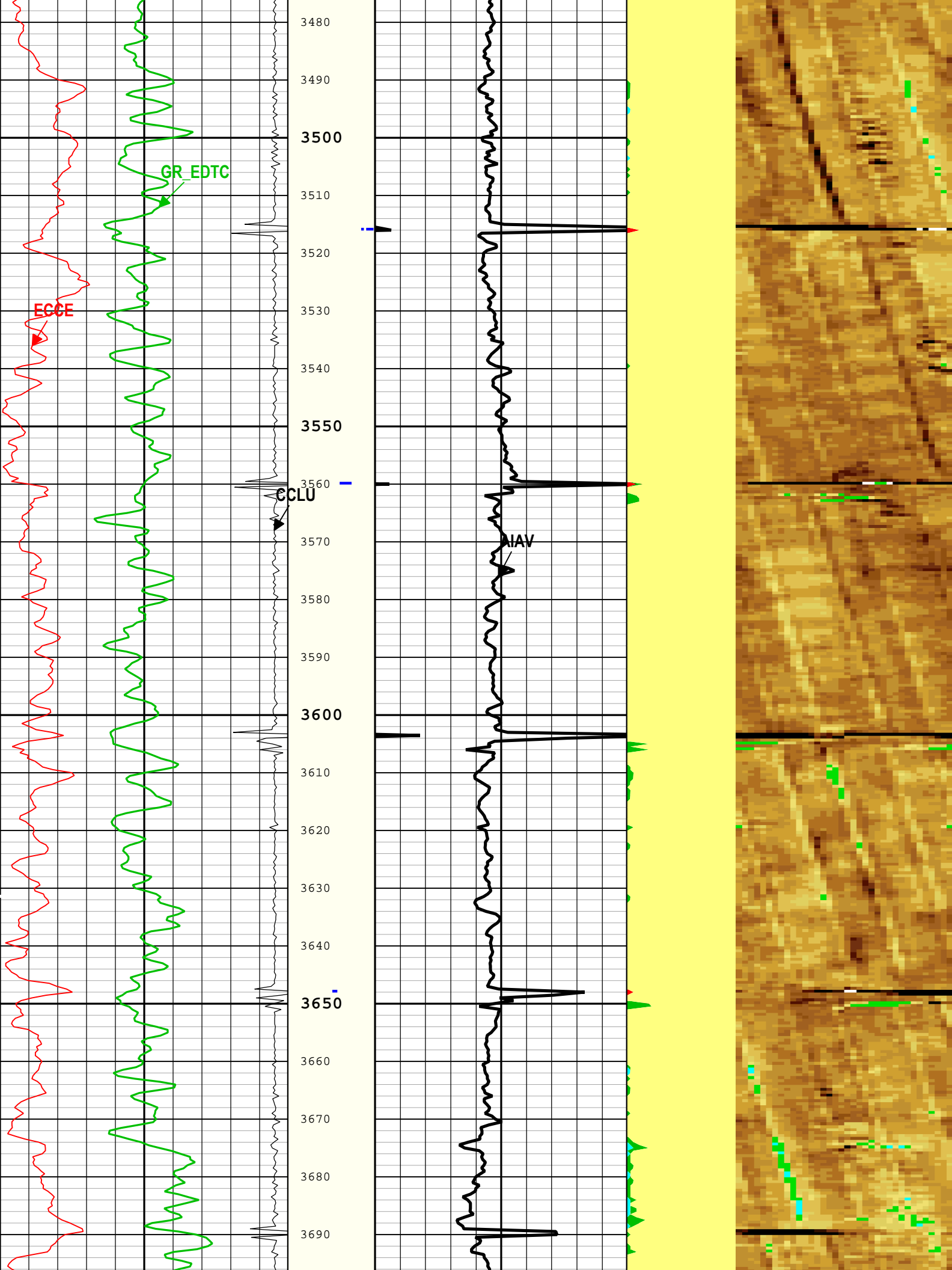


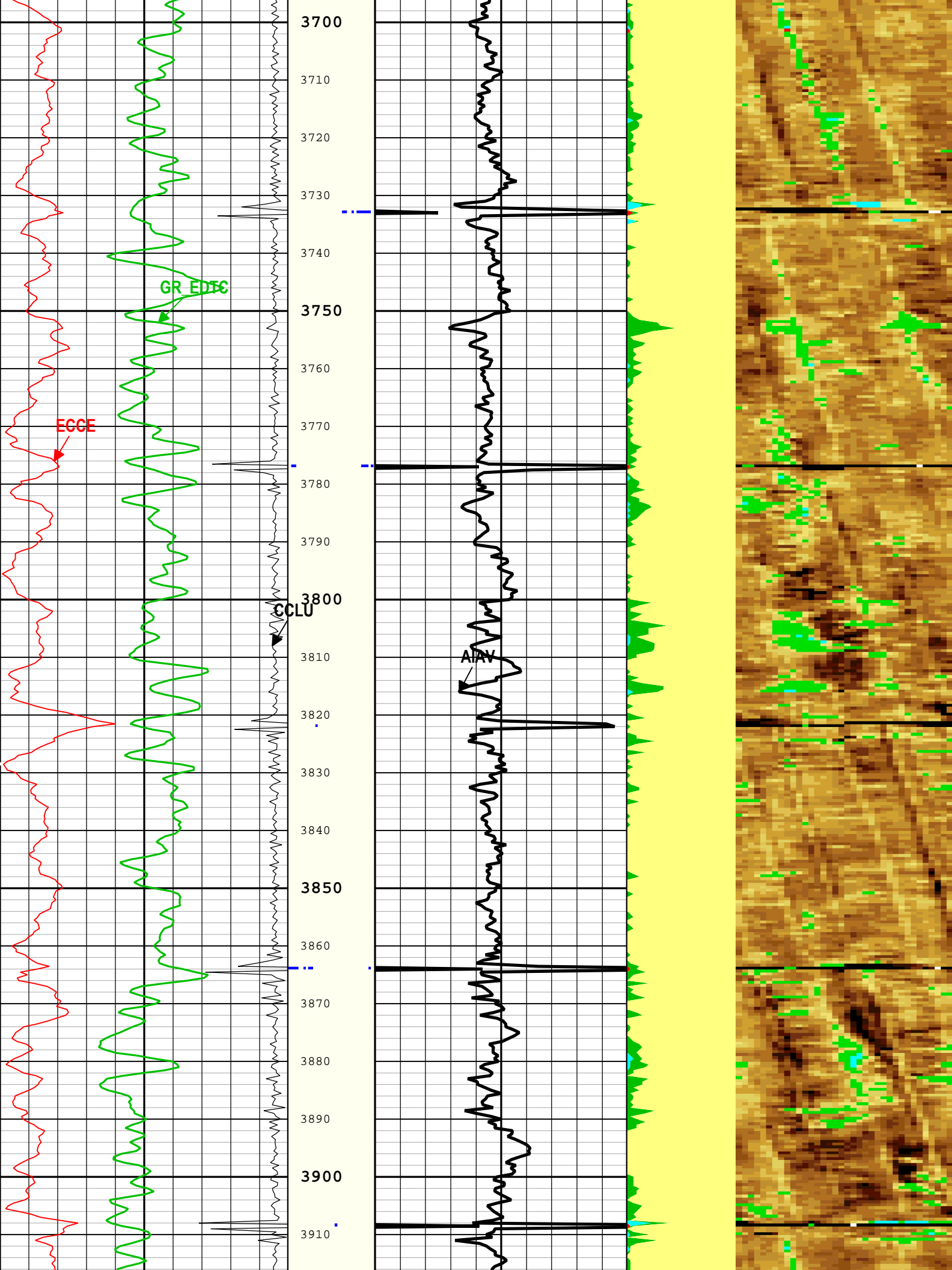


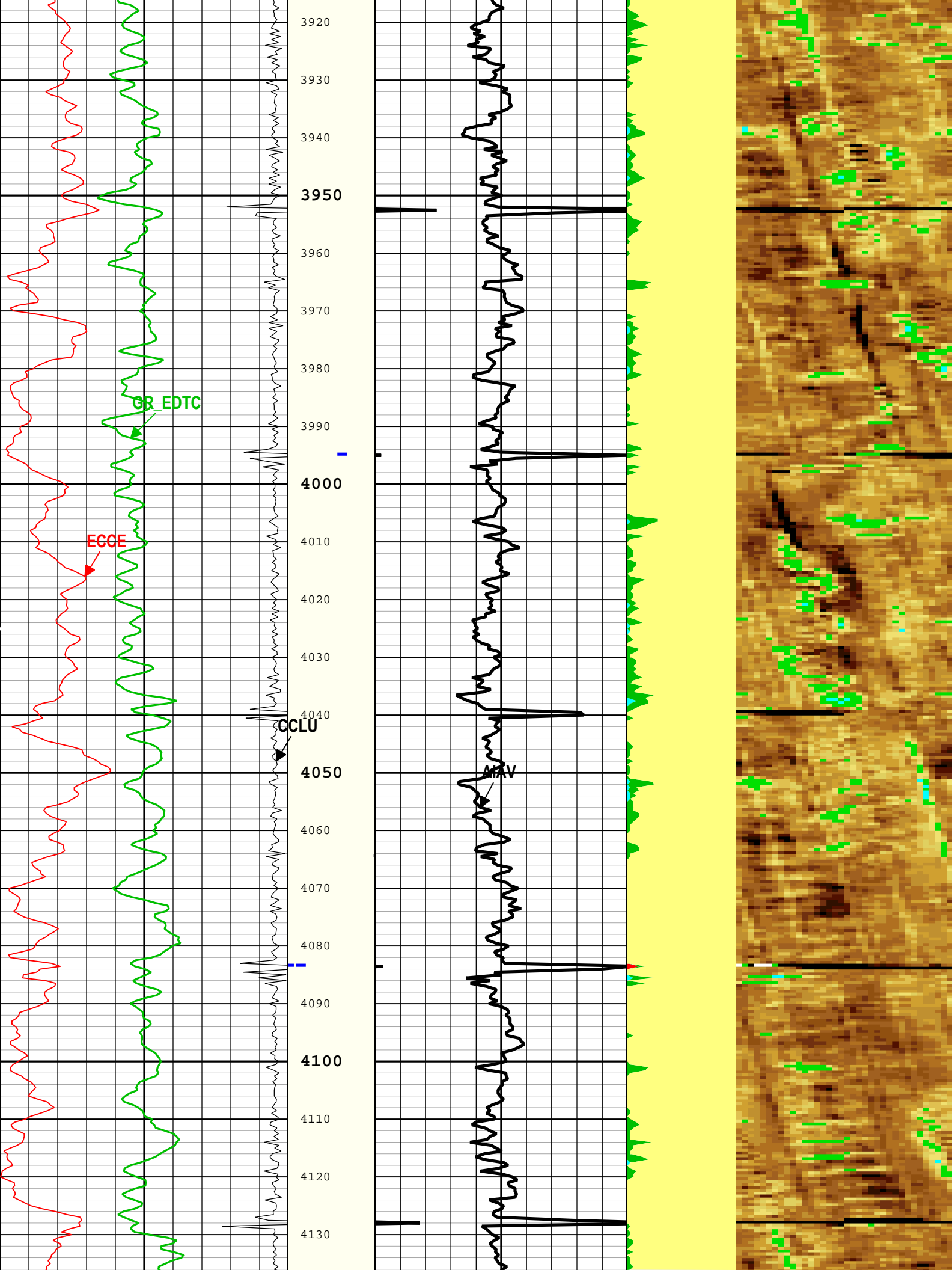


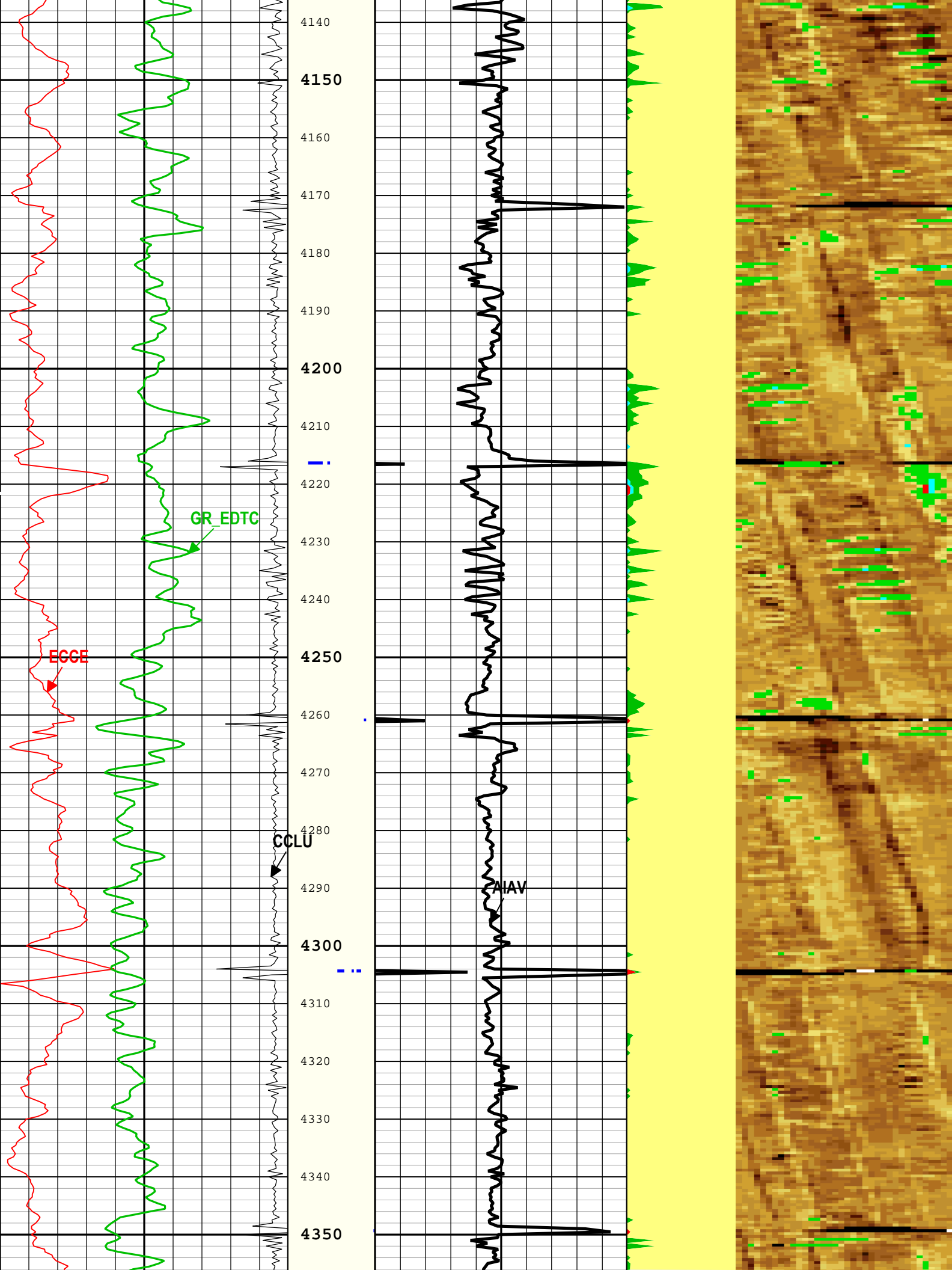




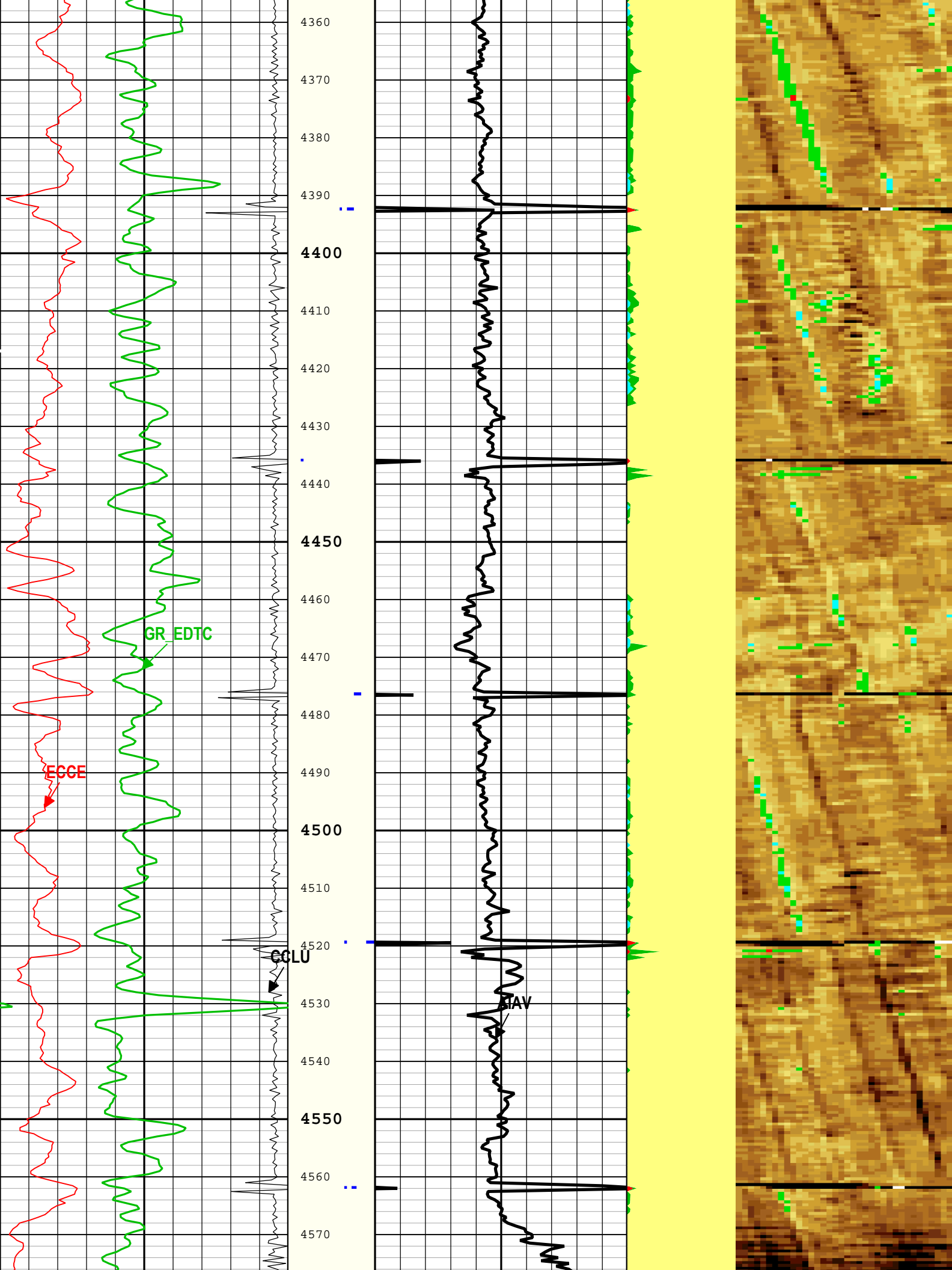


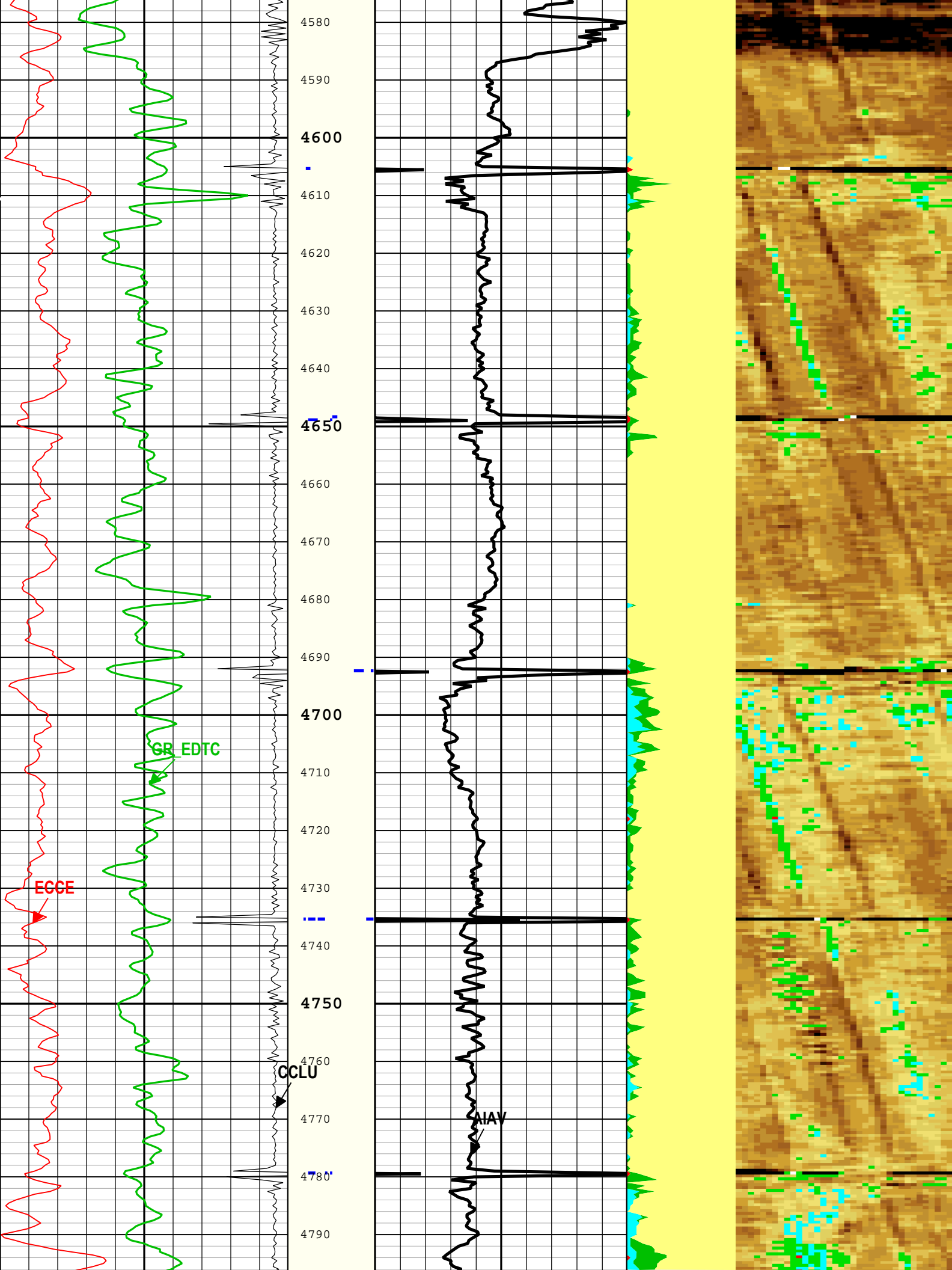


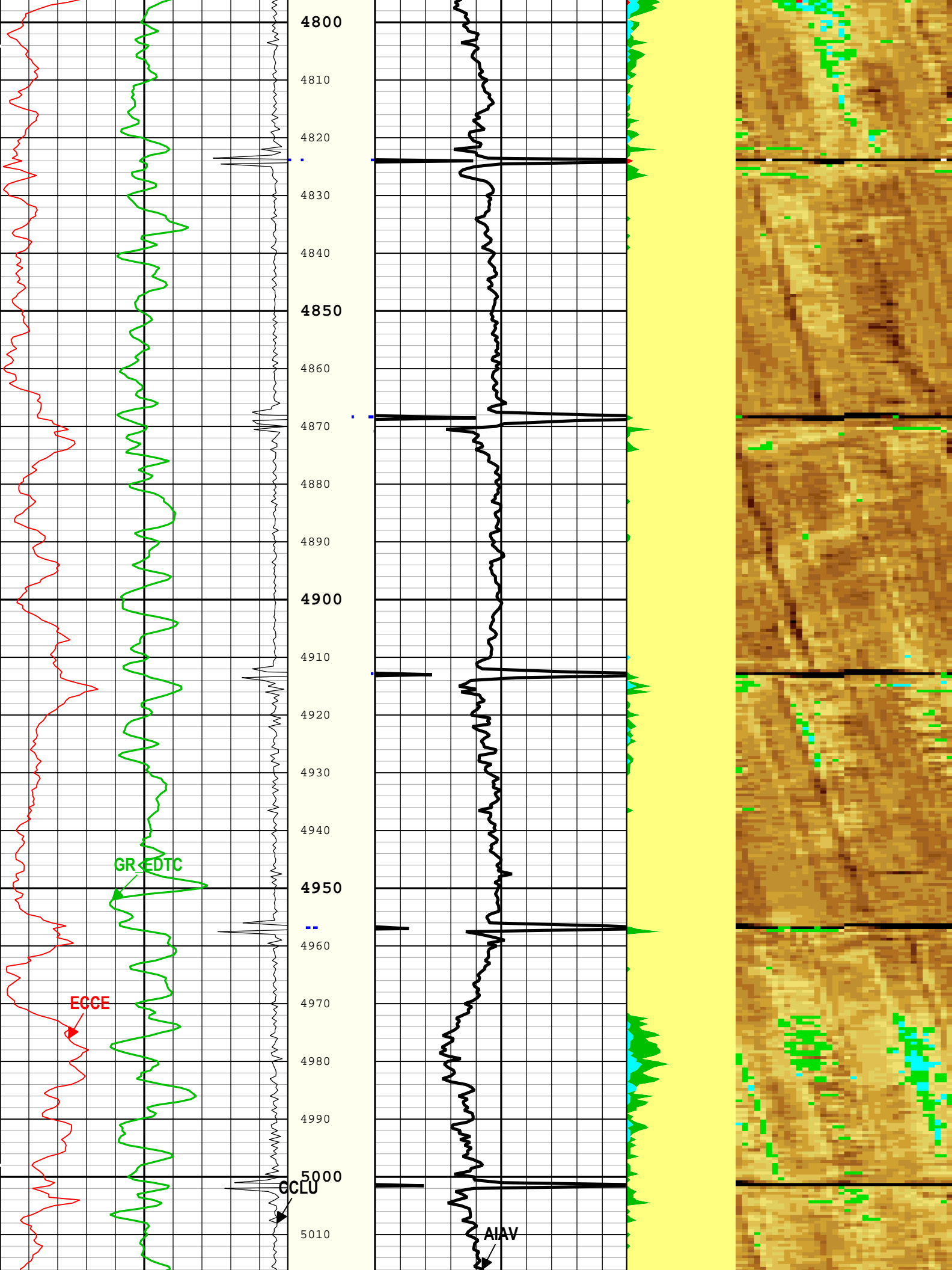


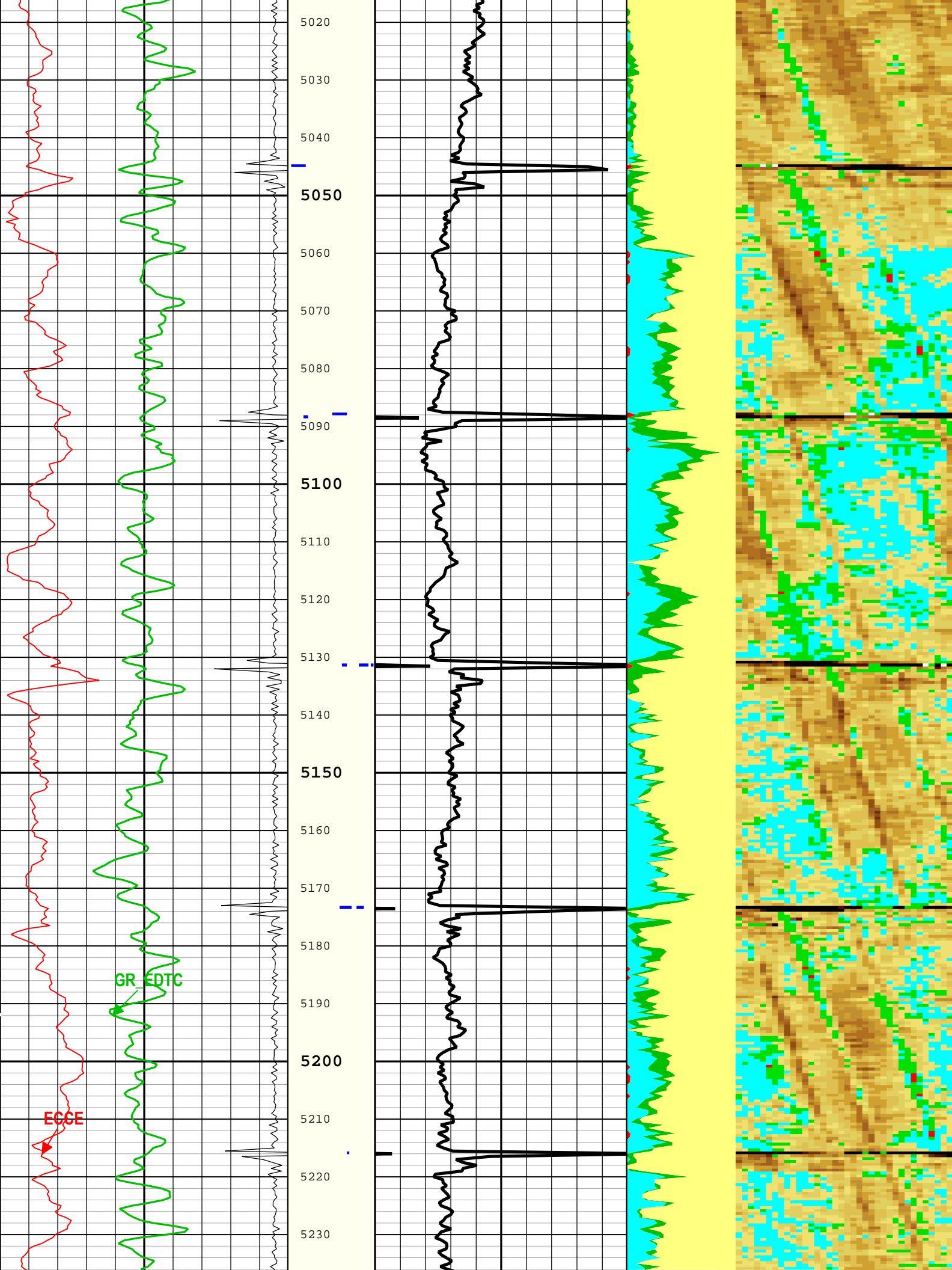


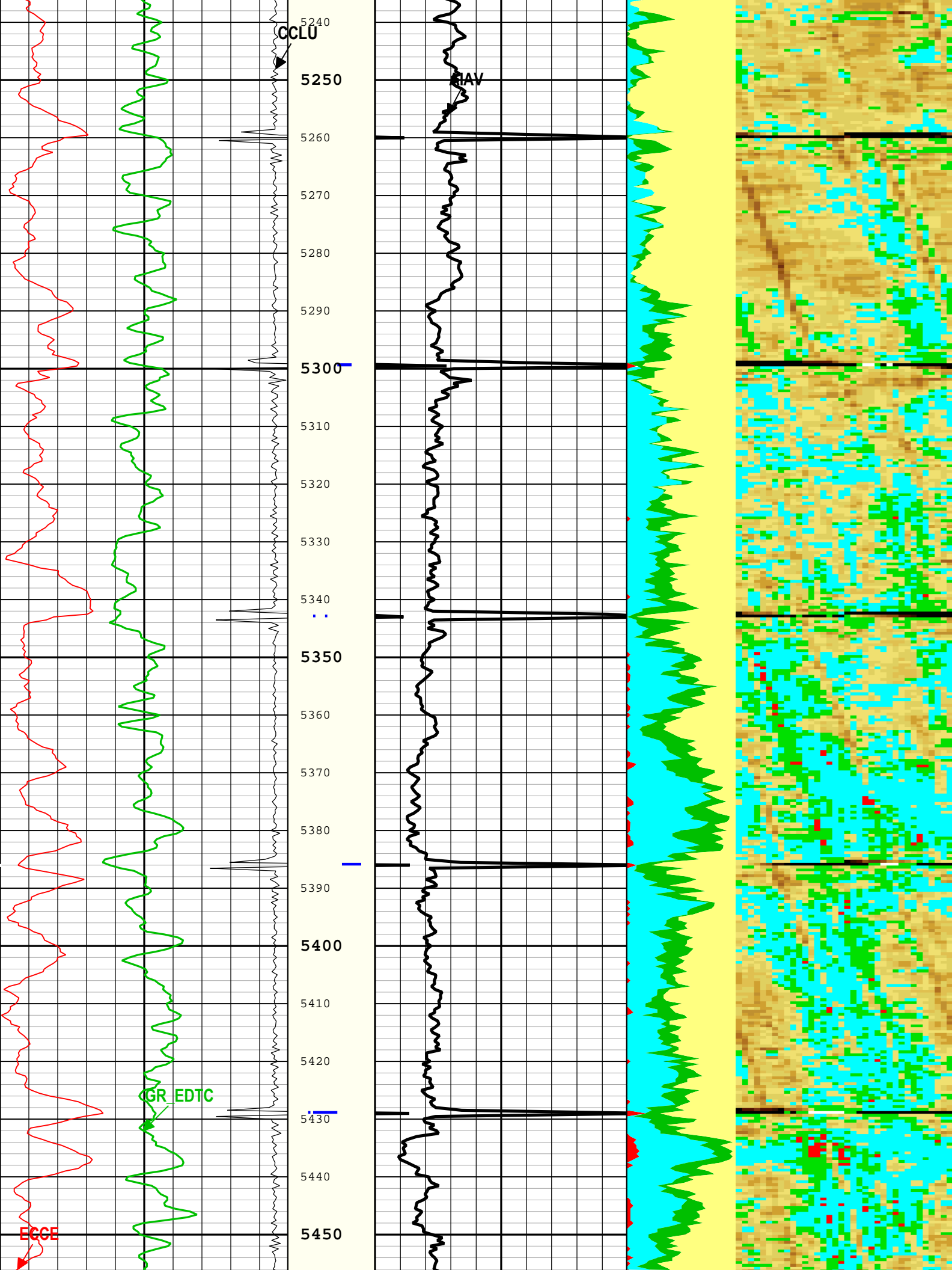


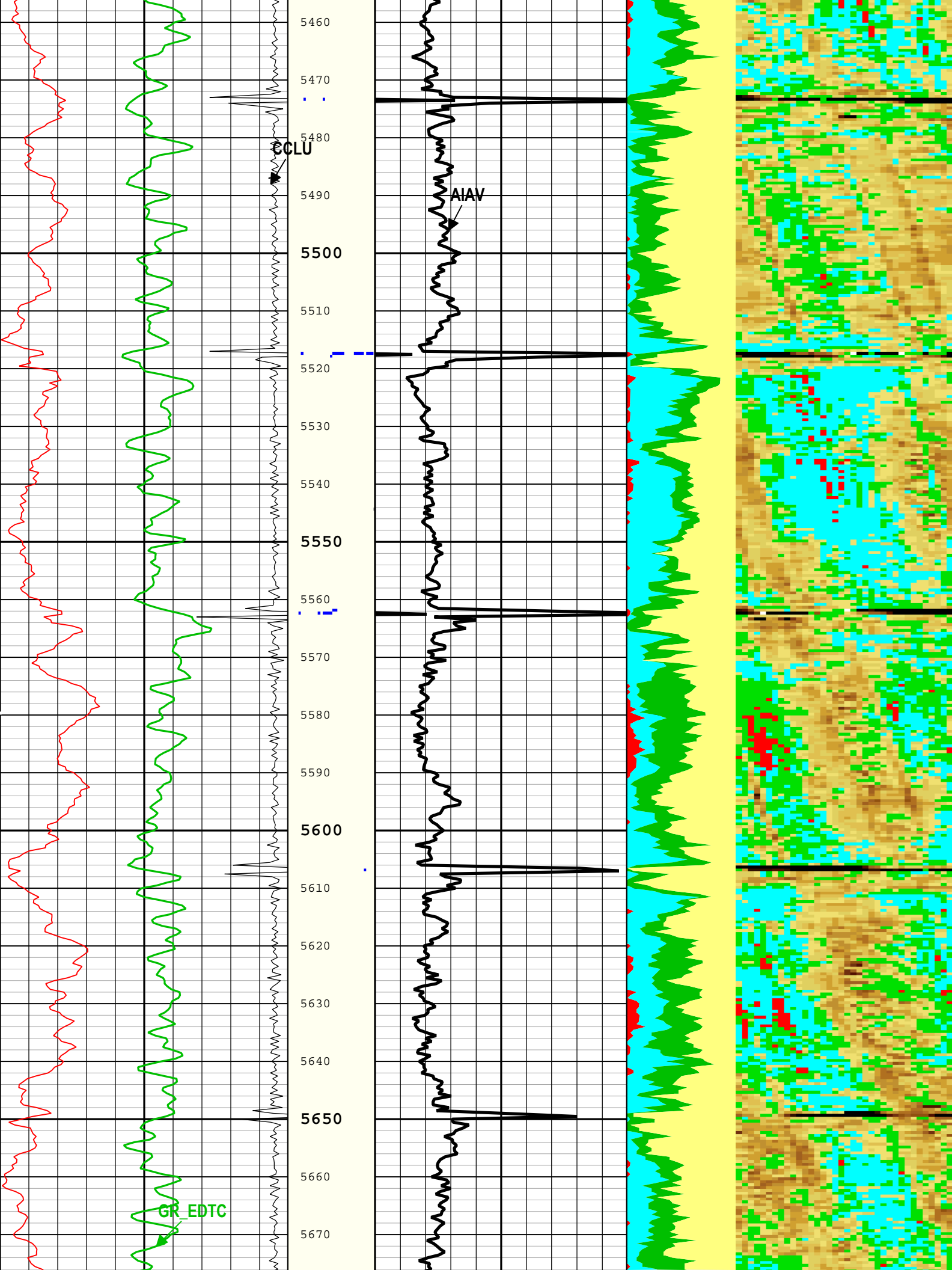


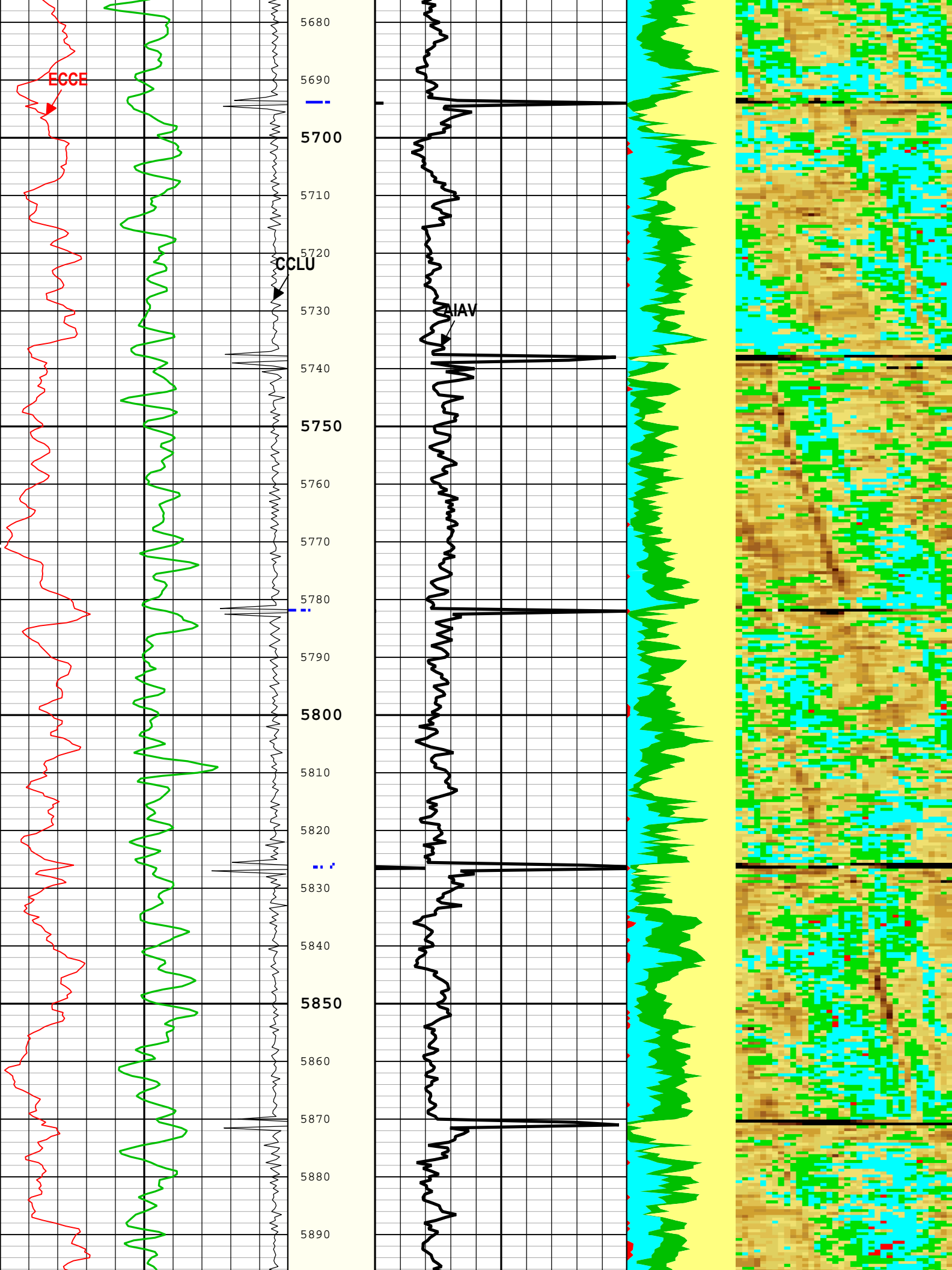


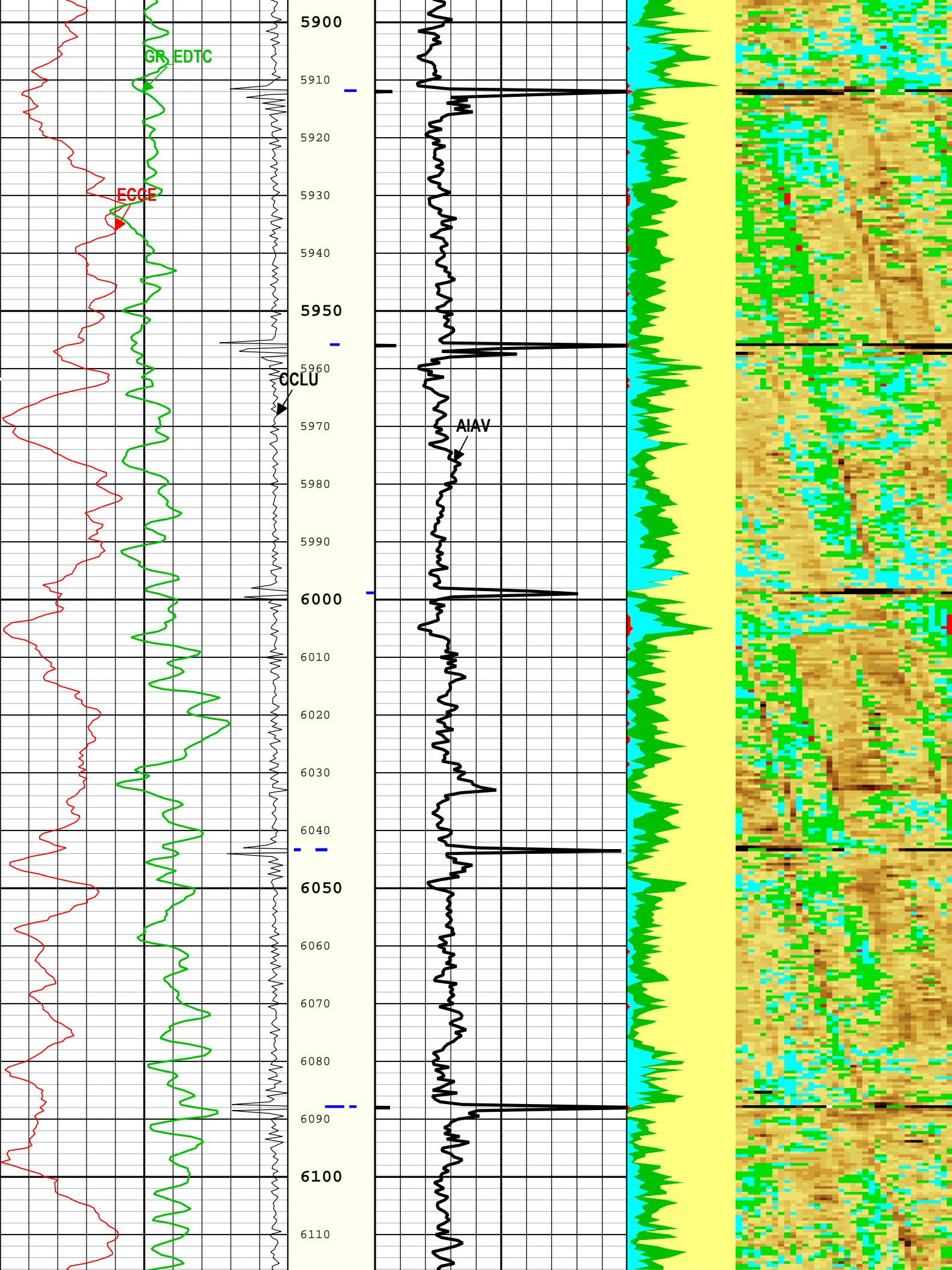




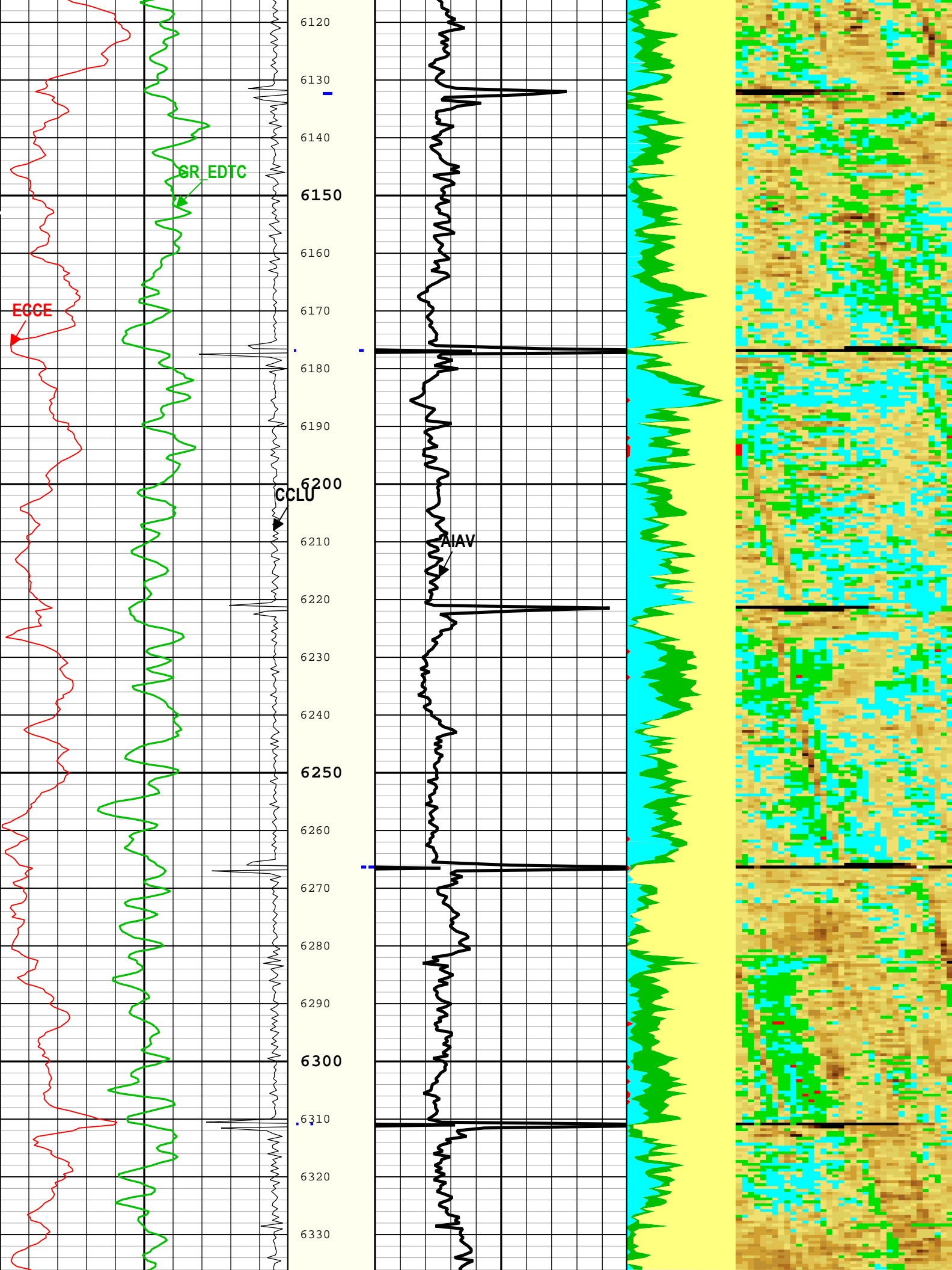


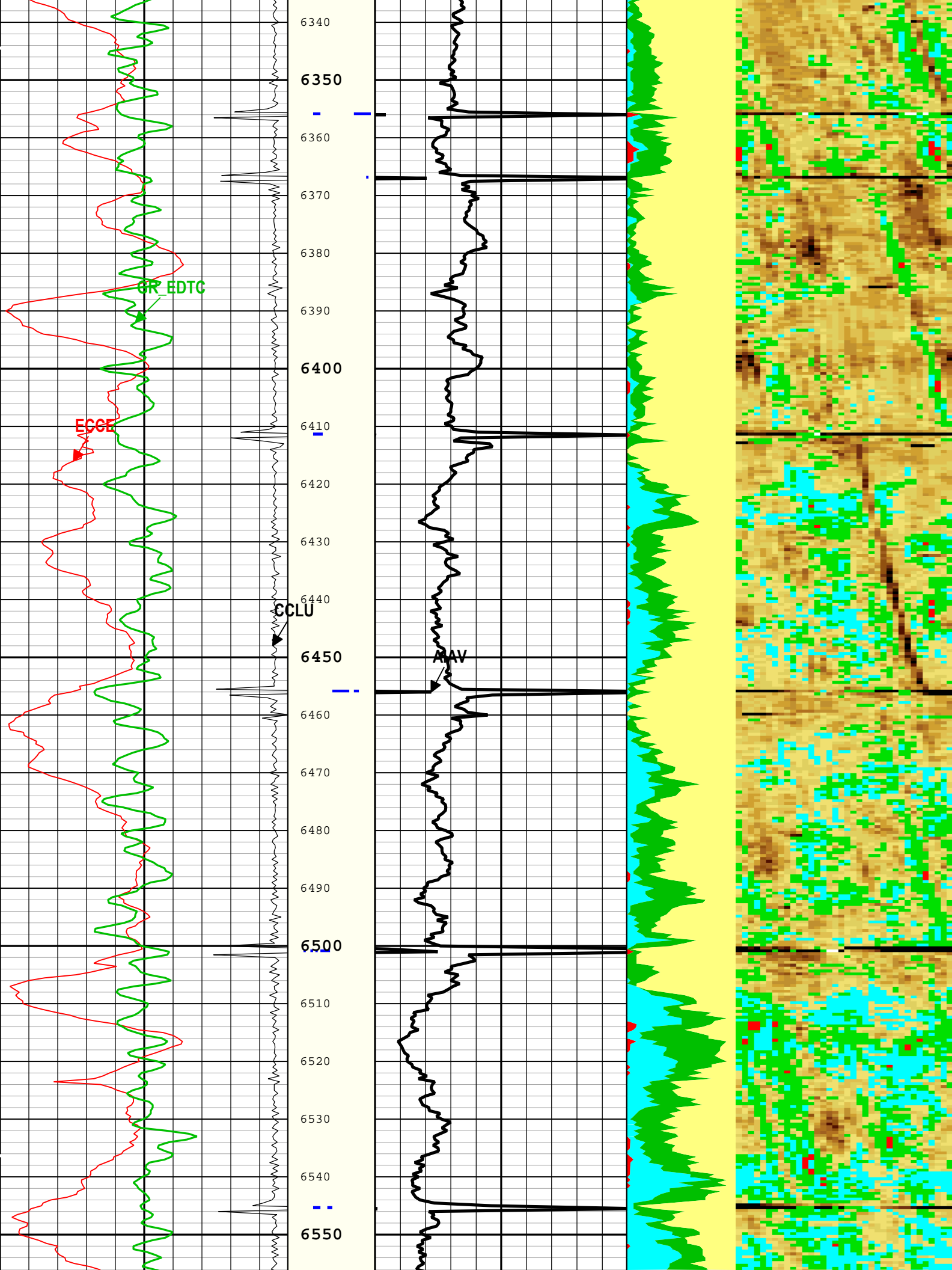


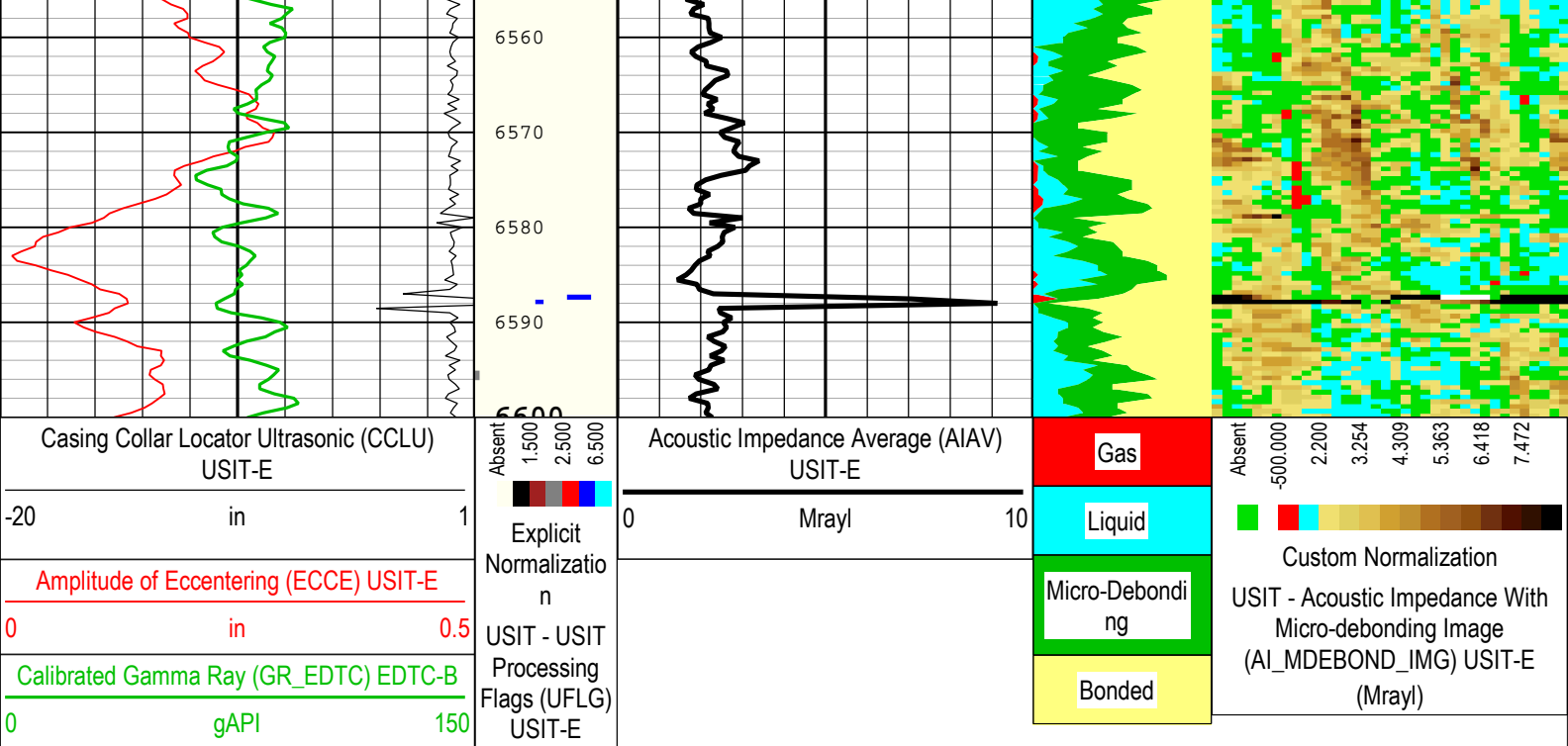












TIME\_1900 - Time Marked every 60.00 (s)

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: 06-Sep-2018 14:42:32

## Channel Processing Parameters

### 1: 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	1.08	
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	1.72	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	110	110
BS	13.5	110	1947
BS	8.5	1947	6600

All depth are actual.

## Tool Control Parameters

### 1: Parameters

# 1: 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	50	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 )
WINB	31.88	06-Sep-2018 11:17:18	06-Sep-2018 11:23:46	6680.15	6580.49
WINB	28.9	06-Sep-2018 11:23:46	06-Sep-2018 11:24:03	6580.49	6524.84
WINB	31.28	06-Sep-2018 11:24:03	06-Sep-2018 11:24:16	6524.84	6483.15
WINB	34.07	06-Sep-2018 11:24:16	06-Sep-2018 11:24:31	6483.15	6436.82
WINB	29.88	06-Sep-2018 11:24:31	06-Sep-2018 11:58:02	6436.82	100.9
WINE	71.88	06-Sep-2018 11:17:18	06-Sep-2018 11:23:41	6680.15	6596.41
WINE	72.64	06-Sep-2018 11:23:41	06-Sep-2018 11:23:58	6596.41	6542.2
WINE	76.62	06-Sep-2018 11:23:58	06-Sep-2018 11:24:06	6542.2	6515.28
WINE	81.51	06-Sep-2018 11:24:06	06-Sep-2018 11:24:28	6515.28	6444.03
WINE	75.23	06-Sep-2018 11:24:28	06-Sep-2018 11:25:07	6444.03	6320.19
WINE	75.58	06-Sep-2018 11:25:07	06-Sep-2018 11:58:02	6320.19	100.9

All depth are at tool zero.

## 1

## 0 PSI Repeat Pass

## Software Version

Acquisition System	Version
Maxwell 2018 SP1	8.1.99839.3100
Application Patch	Wireline_Hotfix-Mandatory-2018SP1_8.1.102865

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1	Log[1]:Up	Up	1979.02 ft	2525.20 ft	06-Sep-2018 10:49:58 AM	06-Sep-2018 10:54:20 AM	ON	-9.05 ft	No

All depths are referenced to toolstring zero

## Log

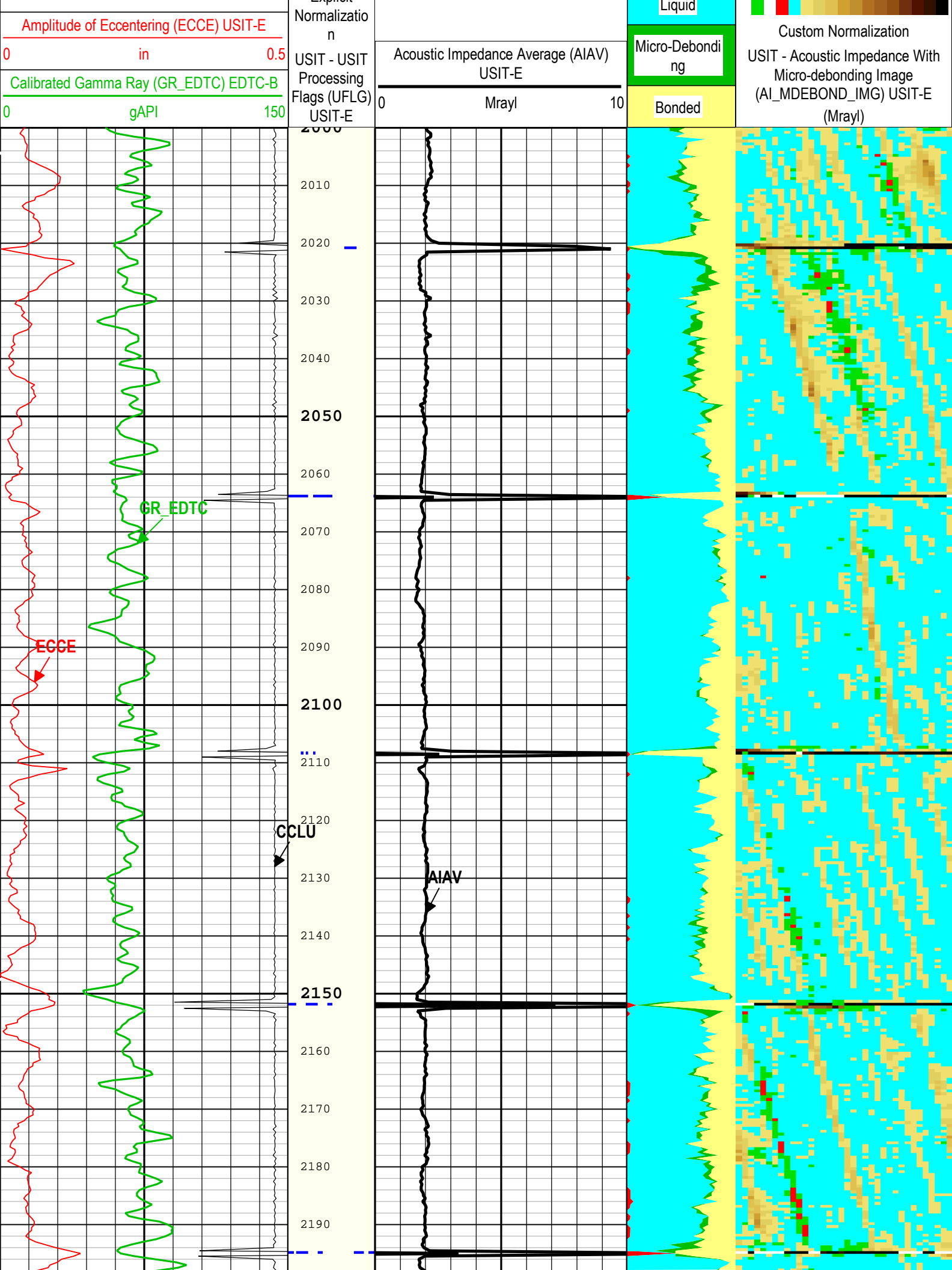
Company:Noble Energy Inc. Well:Hurley H26-730

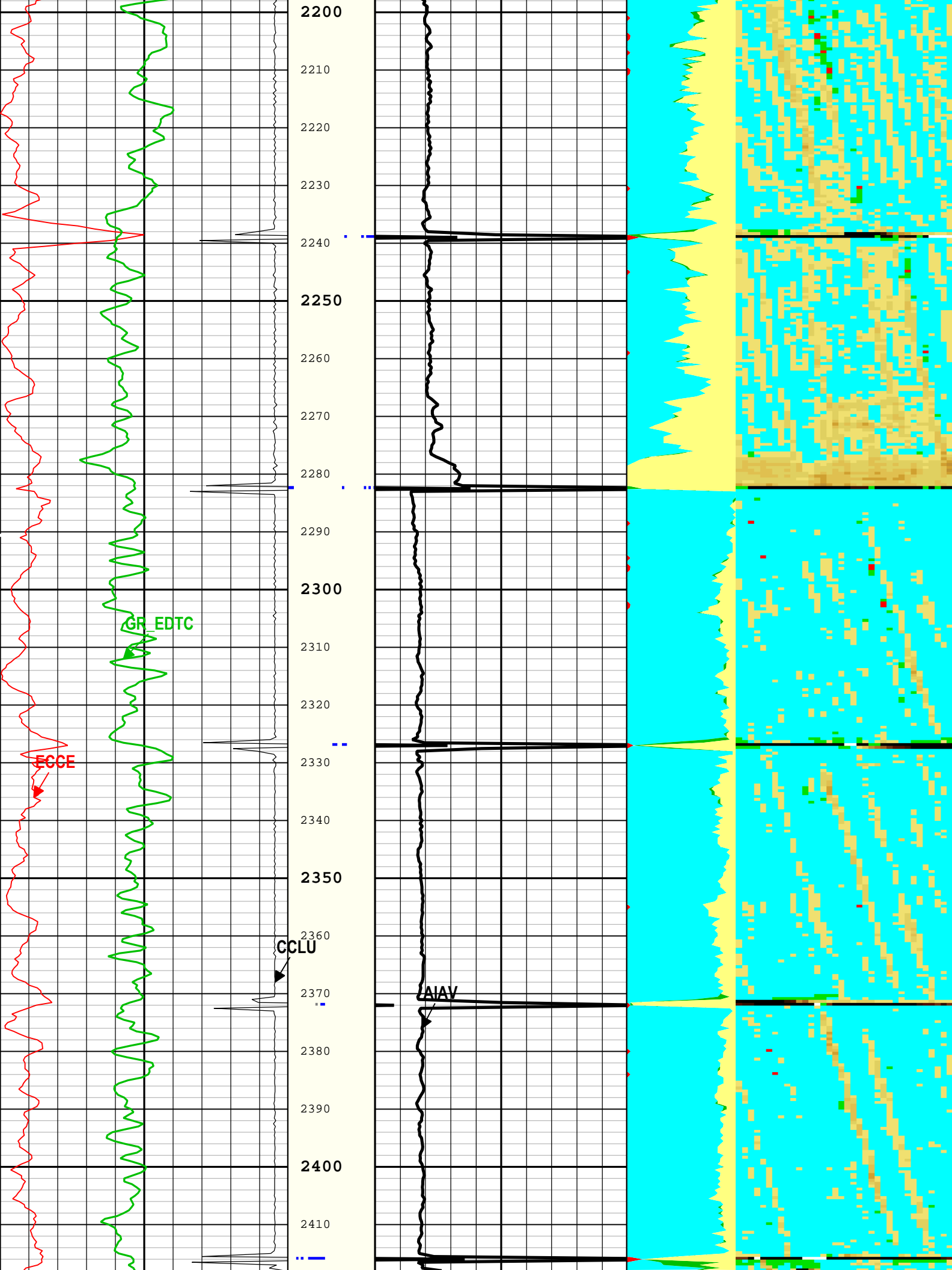
1: Log[1]:Up:S005

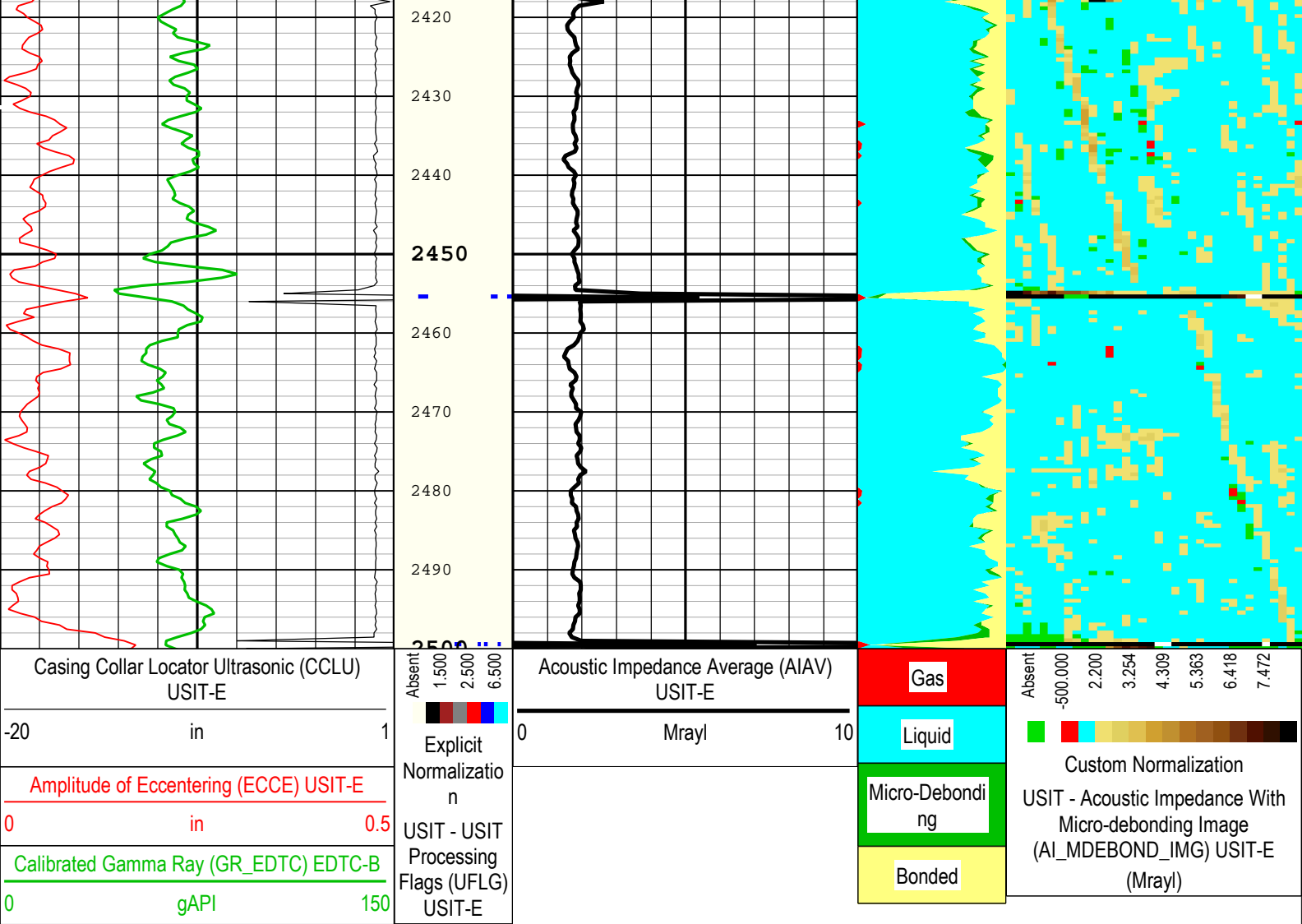
Description: Format: Log ( DJ Basin Ultrasonic Cement Summary Report ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth  
Creation Date: 06-Sep-2018 14:42:48

TIME\_1900 - Time Marked every 60.00 (s)

Casing Collar Locator Ultrasonic (CCLU) USIT-E			<div><div>Absent</div><div>1.500</div><div>2.500</div><div>6.500</div><div>Explicit</div></div>			<div><div>Gas</div><div>Absent</div><div>-500.000</div><div>2.200</div><div>3.254</div><div>4.309</div><div>5.363</div><div>6.418</div><div>7.472</div></div>		
-20	in	1						





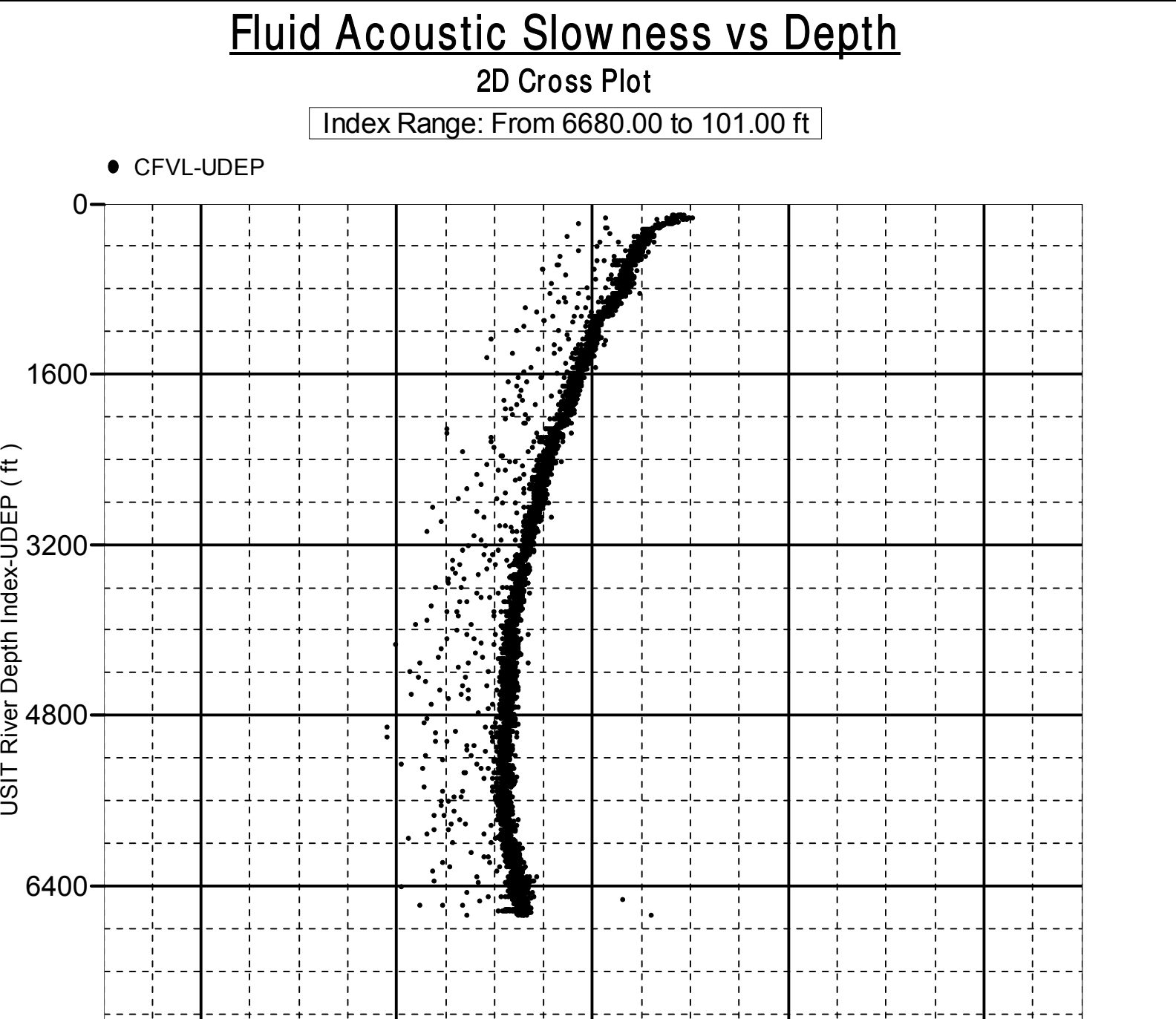


TIME\_1900 - Time Marked every 60.00 (s)

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: 06-Sep-2018 14:42:48

Channel Processing Parameters				
1: Parameters				
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	8.5	in
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
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	1.08	
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	1.72	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				
1: 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:Hurley H26-730 1: Log[3]:Up:S005			

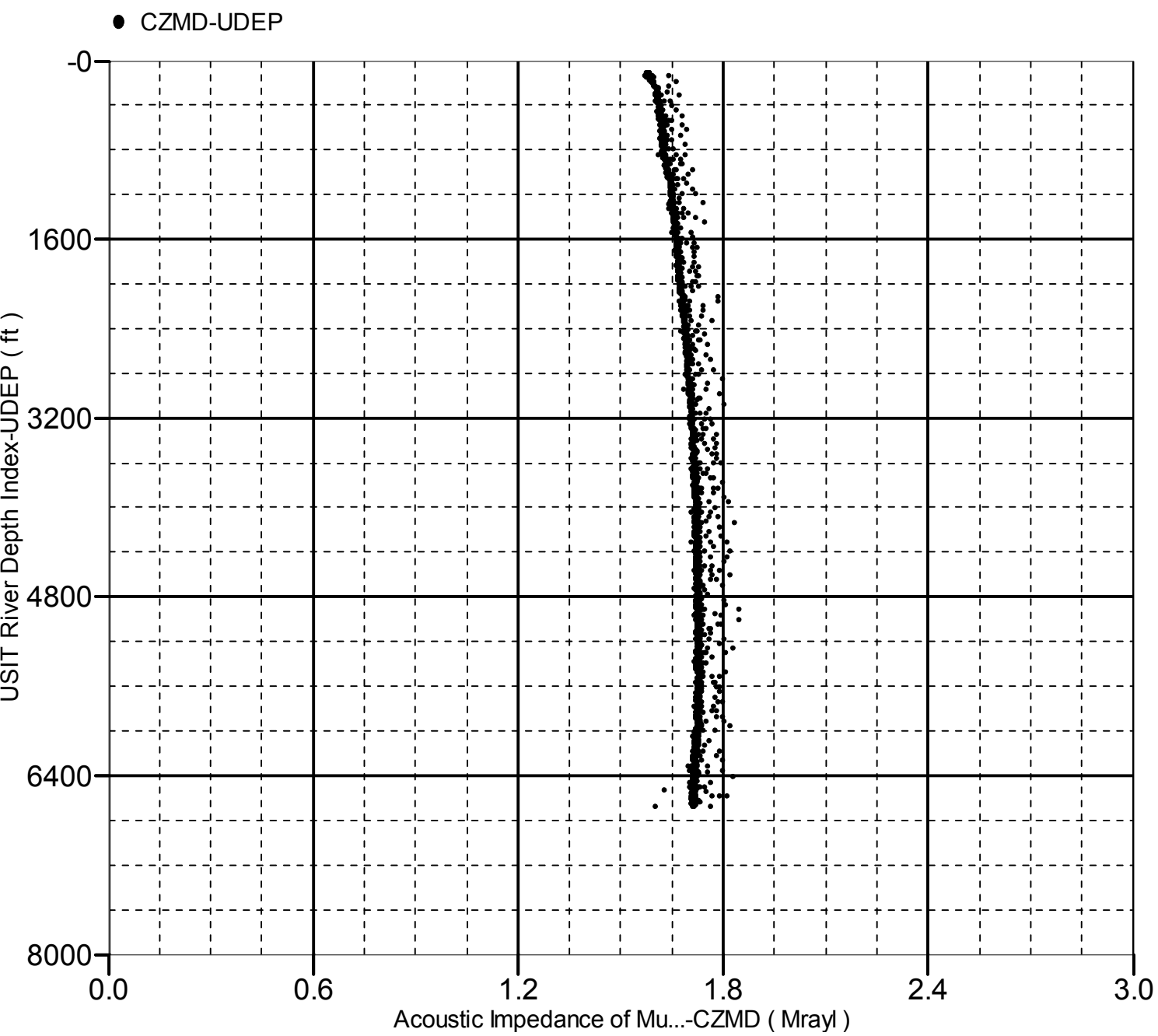




# Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6680.00 to 101.00 ft



Company:	Noble Energy Inc.	<b>Schlumberger</b>
Well:	Hurley H26-730	
Field:	Wattenberg	
County:	Weld	
State:	Colorado	

UltraSonic Summary Print

