

Company: Noble Energy Inc

Well: Hurley H26-783

Field: Wattenberg

County: Weld State: Colorado

## UltraSonic Summary Print

Weld  
 Wattenberg  
 SWNW  
 Hurley H26-783  
 Noble Energy Inc

Location:	SWNW	Elev.:	K.B. 4851.00 ft
	2366 FNL & 1274 FWL		G.L. 4821.00 ft
	Lat/Long: 40.1971/-104.63565		D.F. 4851.00 ft
Permanent Datum:		Ground Level	4821.00 f
Log Measured From:		Kelly Bushing	30.00 ft
Drilling Measured From:		Kelly Bushing	above Perm.Datum
API Serial No.	05-123-46764	Section:	26
		Township:	3N
		Range:	65W

Logging Date	24-Aug-2018
Run Number	ONE
Depth Driller	16138.00 ft
Schlumberger Depth	6585.00 ft
Bottom Log Interval	6585.00 ft
Top Log Interval	0.00 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	1850.00 ft
To	6585.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	N/A
From	0.00 ft
To	6585.00 ft
Max Recorded Temperatures	23.1 degF
Logger on Bottom	24-Aug-2018
Unit Number	2377
Recorded By	Evan Grzecki
Recorded By	Bill Mansfield
Location:	Fort Morgan
Time	14:15:00

## 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.

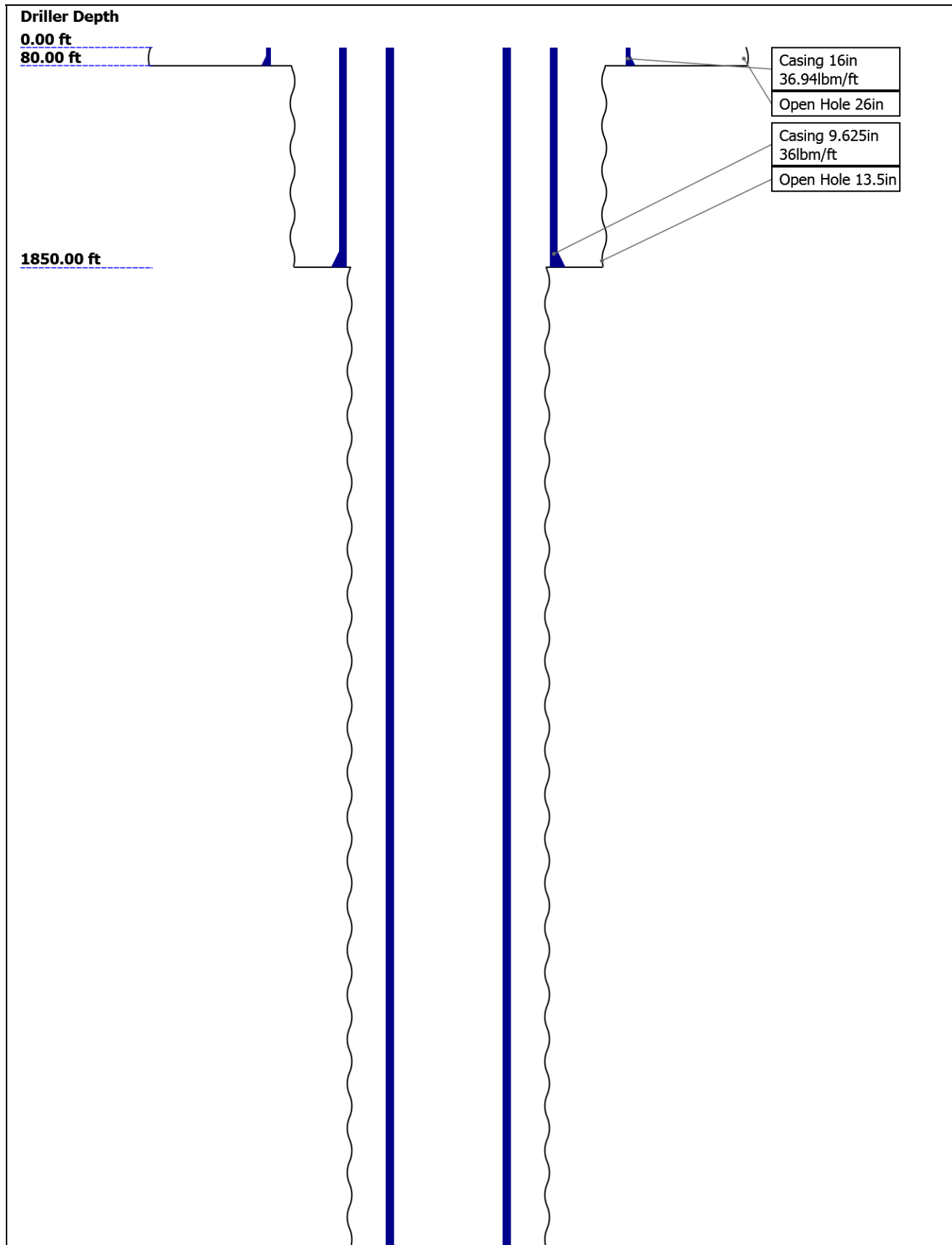
## Contents

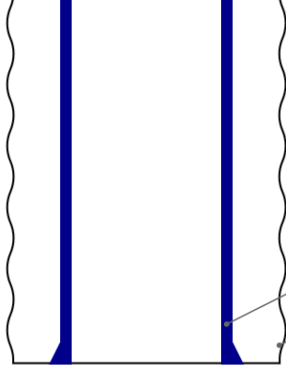
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## Well Sketch





Casing 5.5in  
20lbm/ft  
Open Hole 8.5in

16138.00 ft

## Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	26	13.5	8.5			
Top Driller ( ft )	0	80	1850			
Top Logger ( ft )	0	80	1850			
Bottom Driller ( ft )	80	1850	16138			
Bottom Logger ( ft )	80	1850	6585			
<b>Casing</b>						
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	N/A	N/A			
Top Driller ( ft )	0	0	0			
Top Logger ( ft )	0	0	0			
Bottom Driller ( ft )	80	1850	16138			
Bottom Logger ( ft )	80	1850	6585			

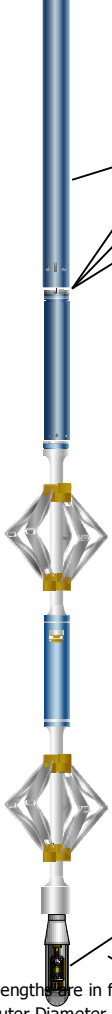
## Remarks and Equipment Summary

ONE: Toolstring		ONE: Remarks
<b>Equip name</b>	<b>Length</b>	<p>Thank you for choosing Schlumberger!</p> <p>Log run for cement and casing evaluation</p> <p>Toolstring run centralized using knuckles and houma kit as per toolsketch</p> <p>USRS-AB sub run with USI-TX transducer</p> <p>Log correlated to downlog</p> <p>Crew: Rob Selter, Kyle Howington</p> <p>BHT: 231 Deg F</p> <p>TOC: ~2500ft</p> <p>Cement: Halliburton 13.2ppg slurry with 11.5ppg spacer</p> <p>Main Pass logged @ 2500psi</p> <p>Repeat Pass logged @ 0psi</p>
LEH-QT	38.95	
LEH-QT		
<b>EDTC-B:9</b>	<b>35.47</b>	
EDTH-B:93		
EDTG-B:79		
445		
EDTC-B:92		
47		
<b>AH-184[2]</b>	<b>28.97</b>	
<b>AH-184[1]</b>	<b>26.97</b>	
<b>HGNS-H:4</b>	<b>24.97</b>	
HGNH:298		
7		
NPV-N		
NSR-F:507		



CTEM 31.97  
ACCZ 0.00  
HV 0.00  
Gamma Ray 30.1  
TelStatu s 28.97  
GP14  
4900  
Temperature 24.94  
GR 24.23

HMCA-H  
 HACZ-H:  
 5118  
 HGNS-H:4  
 736



**CNL Porosity** 17.89  
**HGNS** 15.56  
**HMCA** 15.56  
**Accelerometer** 0.00

**USIT-E:93** 15.56  
**0**

ECH-MFA:  
 1924  
 USAC-A:9  
 30  
 USIS-A:18  
 20  
 USSC-B:79  
 9  
 USRS-AB:  
 857  
 USI-SENS  
 OR:888  
 USI-TX

**USI Sen** 0.37  
**sensor**  
**TOOL\_ZERO**  
**Head Fe**  
**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

	ONE		
<b>Depth Measuring Device</b>			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			
Wheel Correction 1	0		
Wheel Correction 2	0		
<b>Tension Device</b>			
Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		
<b>Logging Cable</b>			
Type	7-46NT-XS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		

Rig Type	Crane USA	
<b>ONE:Depth Control Parameters</b>		<b>Depth Control Remarks</b>
Log Sequence	First 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[3]:Up	6587.31	67.42

**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 : 31.19m(102.34ft) to 39.32m(129.01ft)  
MUD\_N\_FRP = 1.11  
DFD = 1.01g/cm3(8.40lbm/gal)  
CZMD median computed in free pipe normalization interval = 1.63 MRayl**

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

## 2500 PSI Main Pass

### Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100

### Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[3]:Up	Up	67.43 ft	6587.31 ft	24-Aug-2018 3:09:41 PM	24-Aug-2018 3:59:14 PM	ON	5.47 ft	Yes

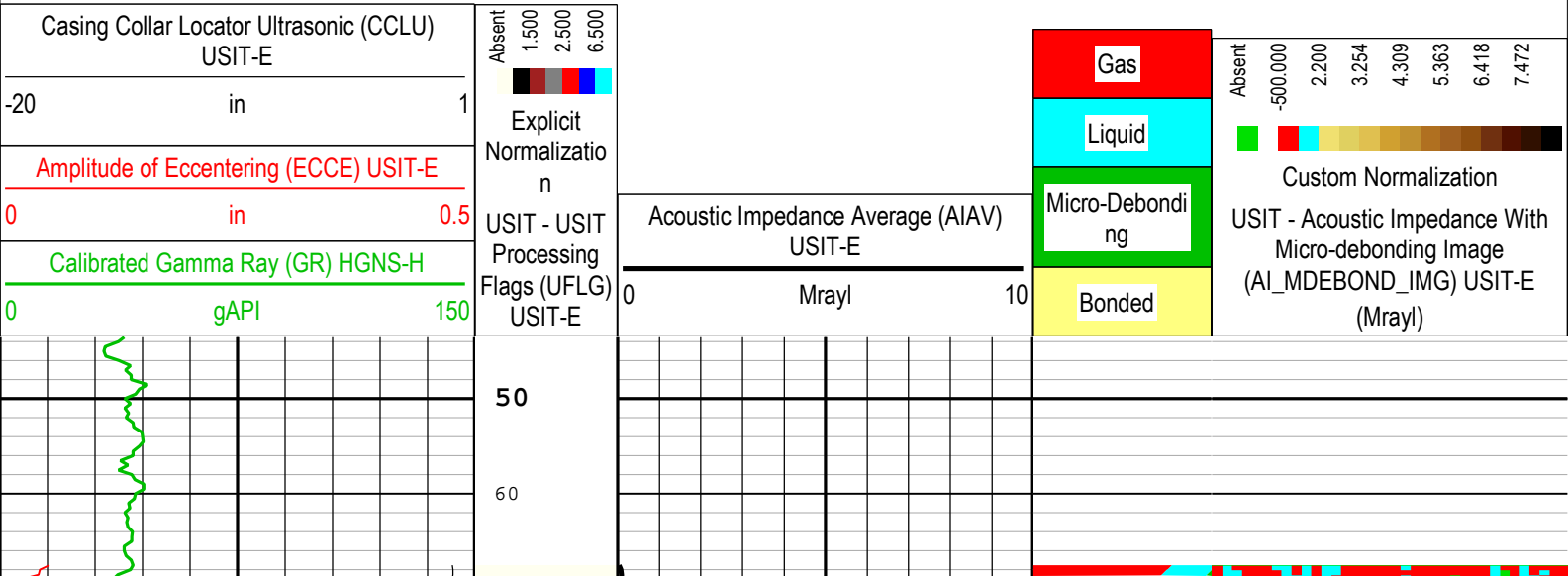
All depths are referenced to toolstring zero

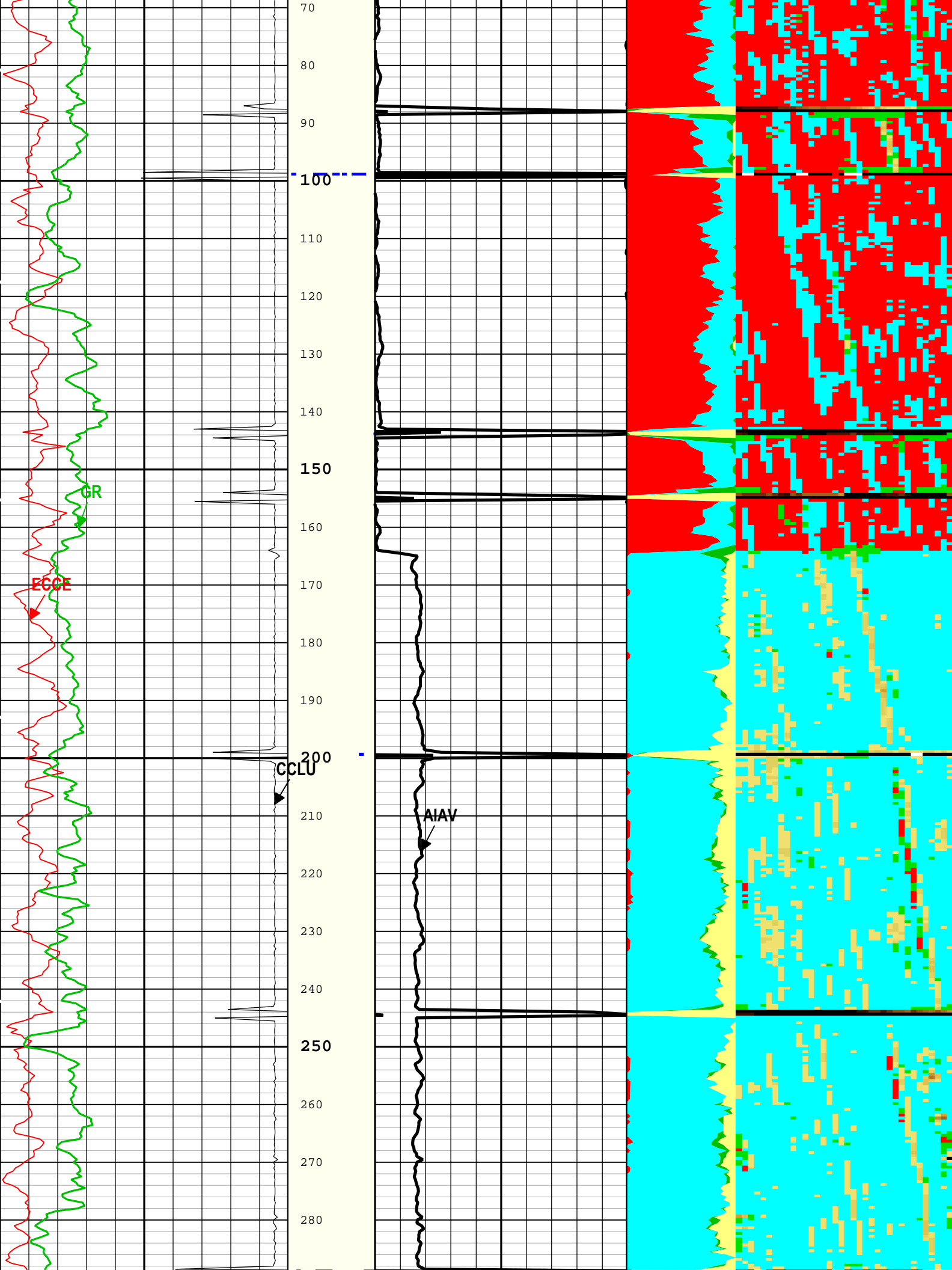
## Log

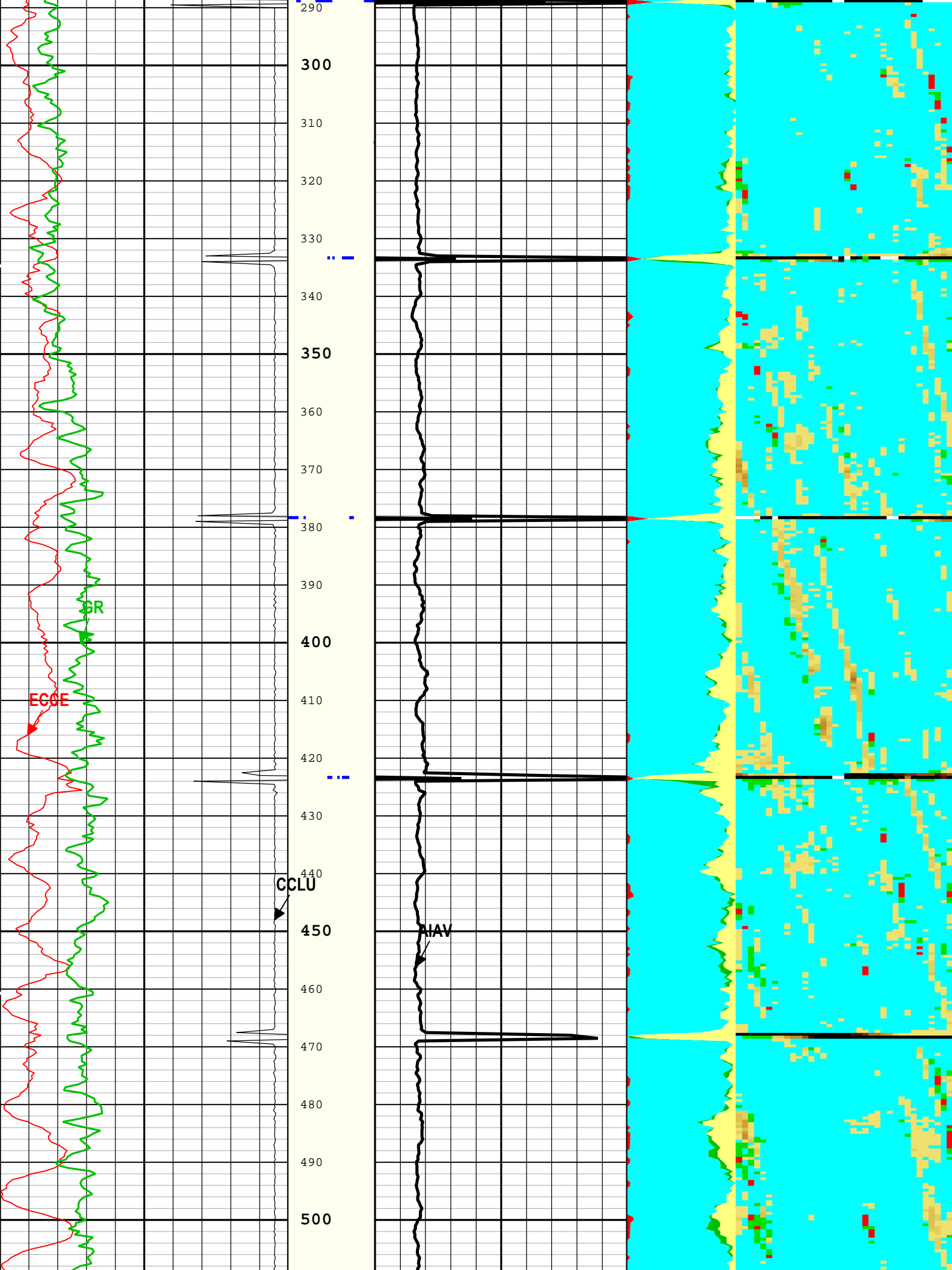
Company:Noble Energy Inc    Well:Hurley H26-783  
ONE: Log[3]:Up:S002

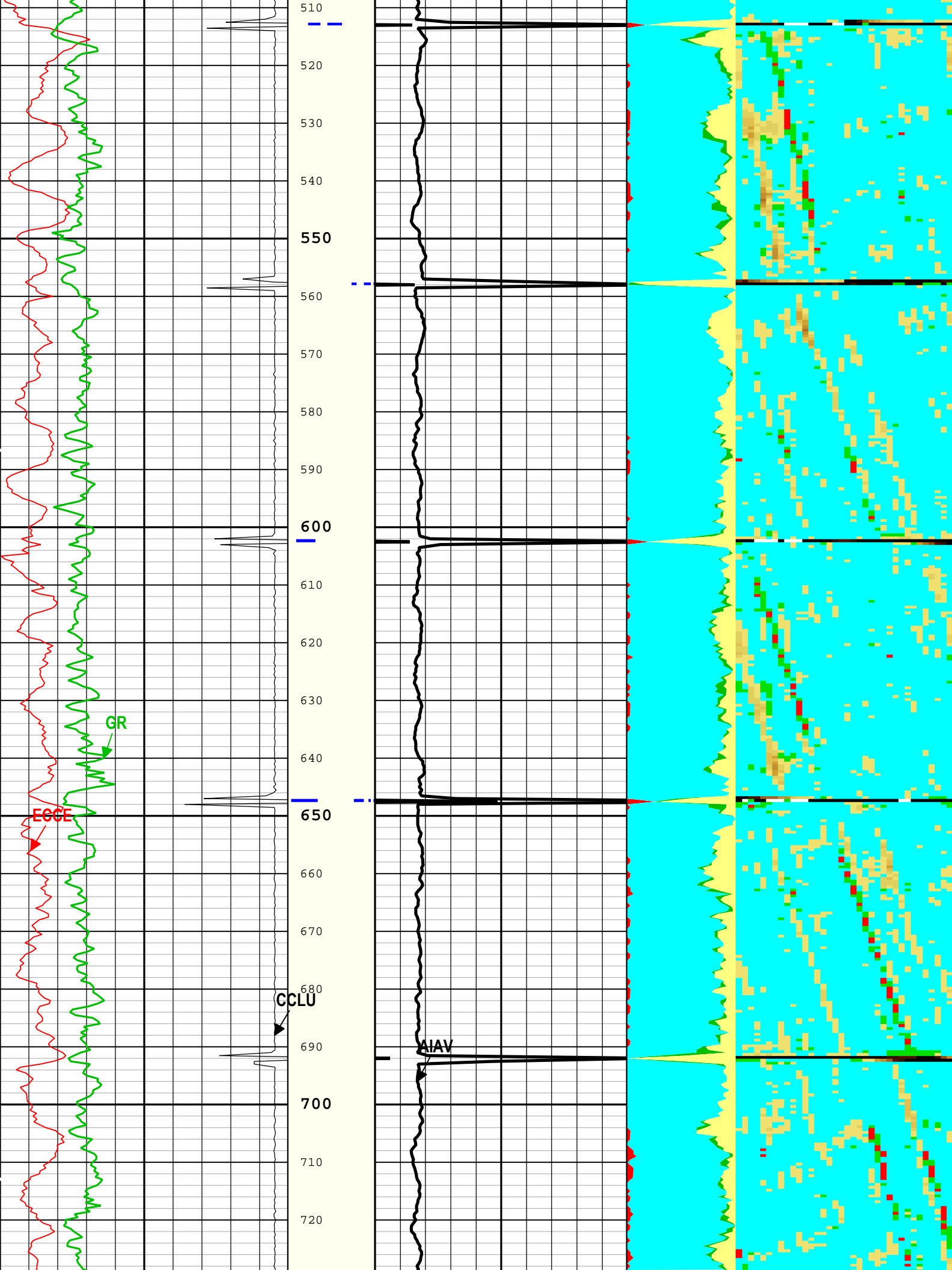
Description: Format: Log ( DJ Basin Ultrasonic Cement Summary Report )    Index Scale: 5 in per 100 ft    Index Unit: ft    Index Type: Measured Depth  
Creation Date: 24-Aug-2018 16:12:26

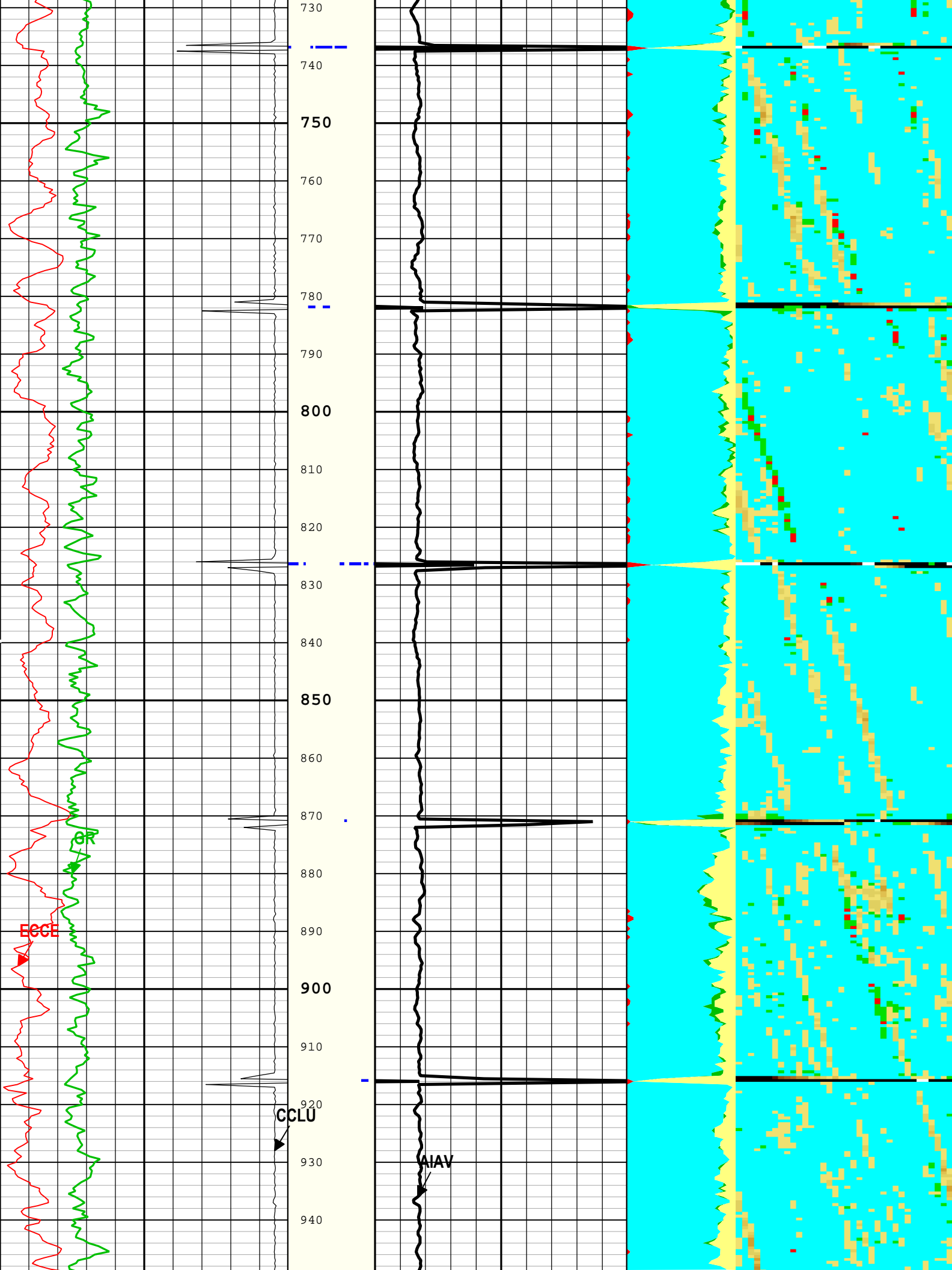
TIME\_1900 - Time Marked every 60.00 (s)

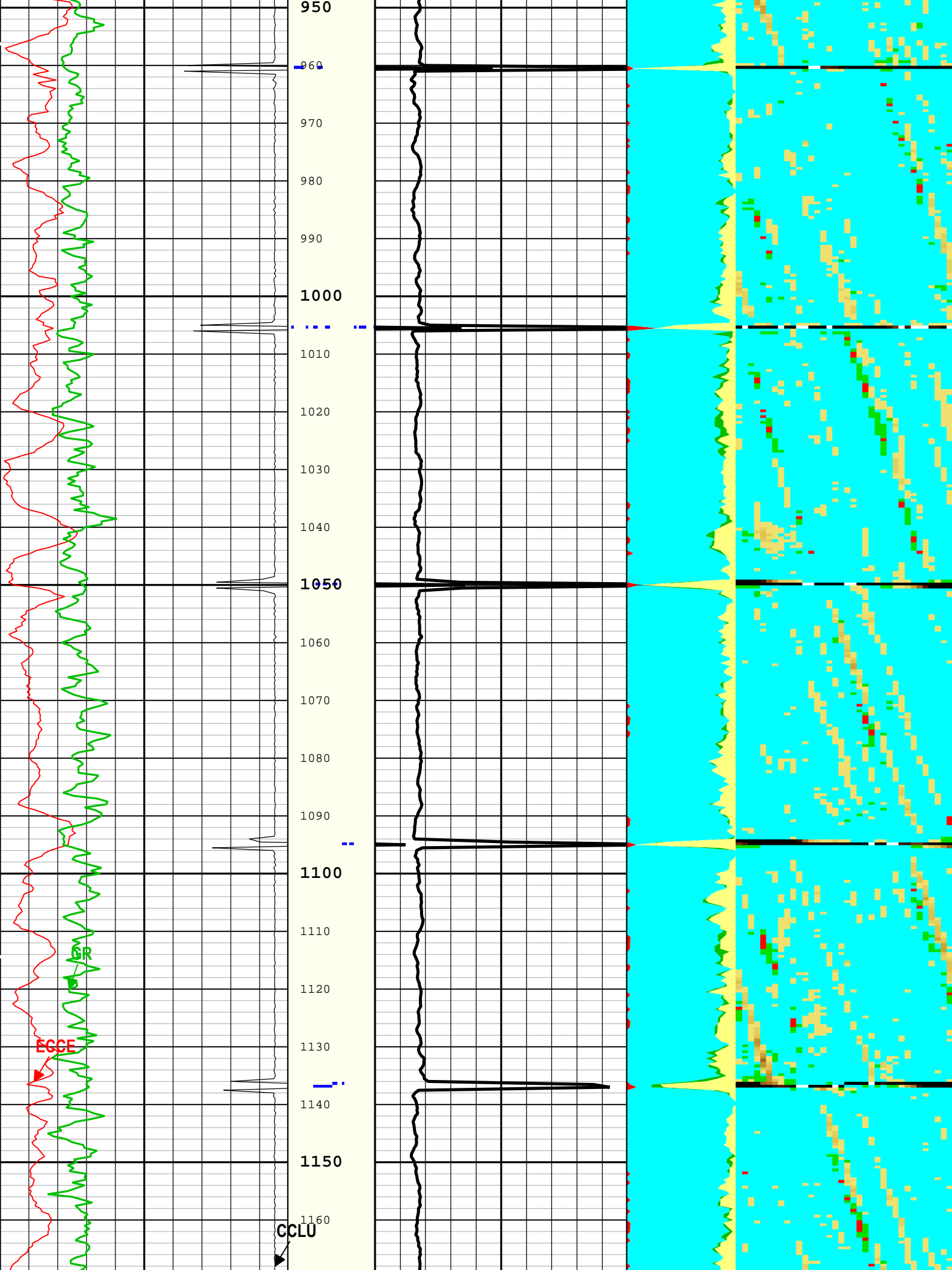


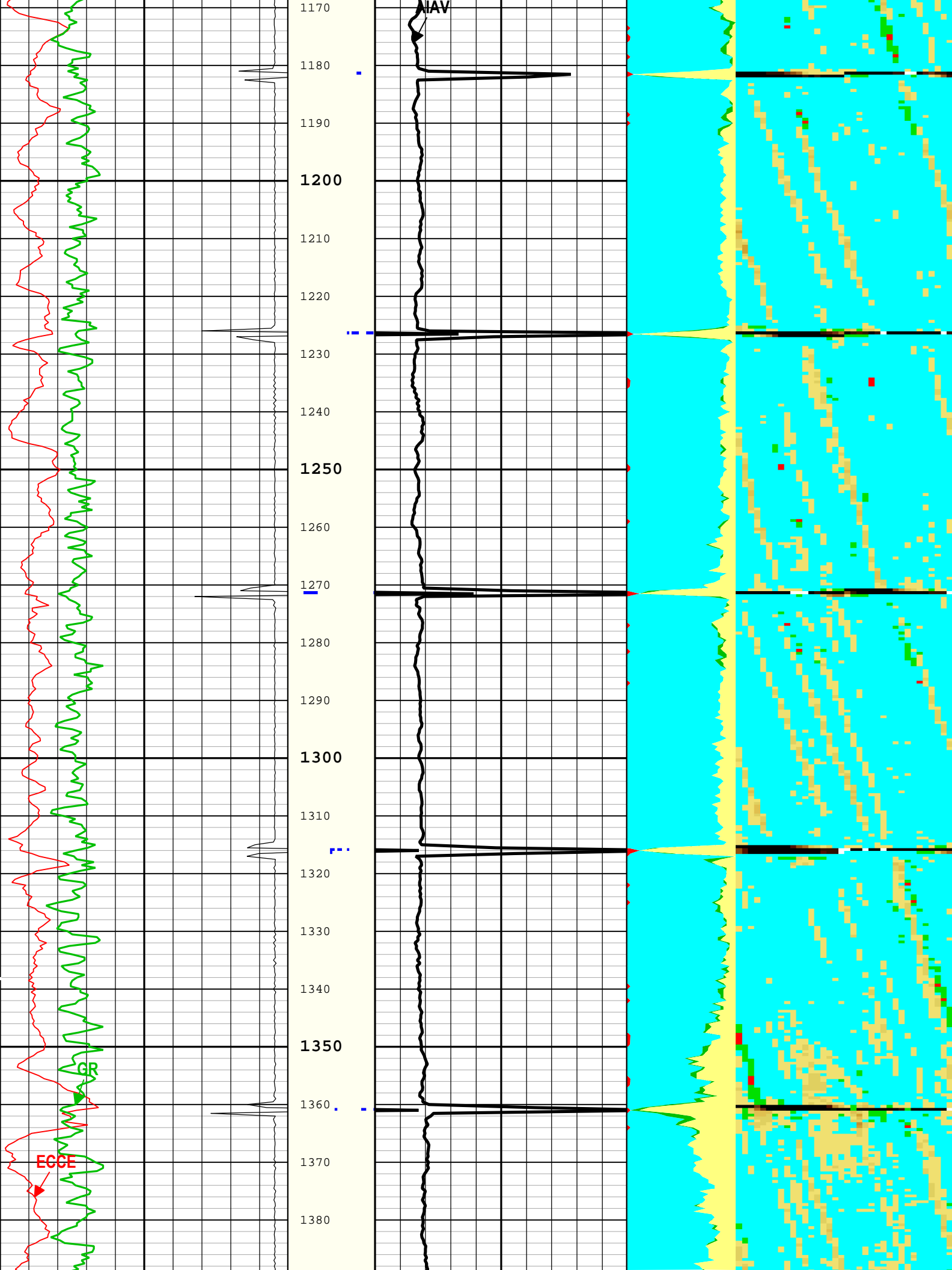


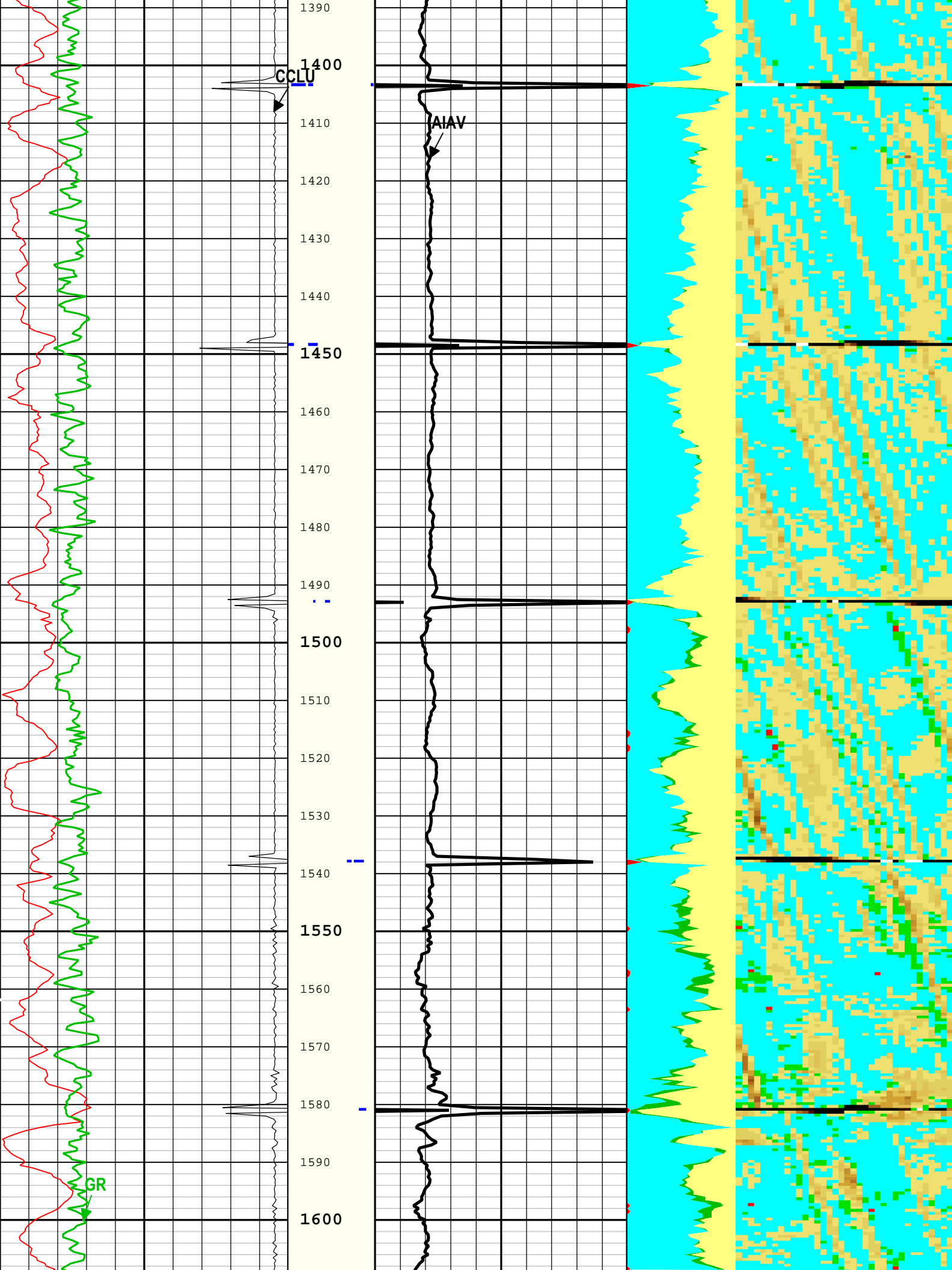


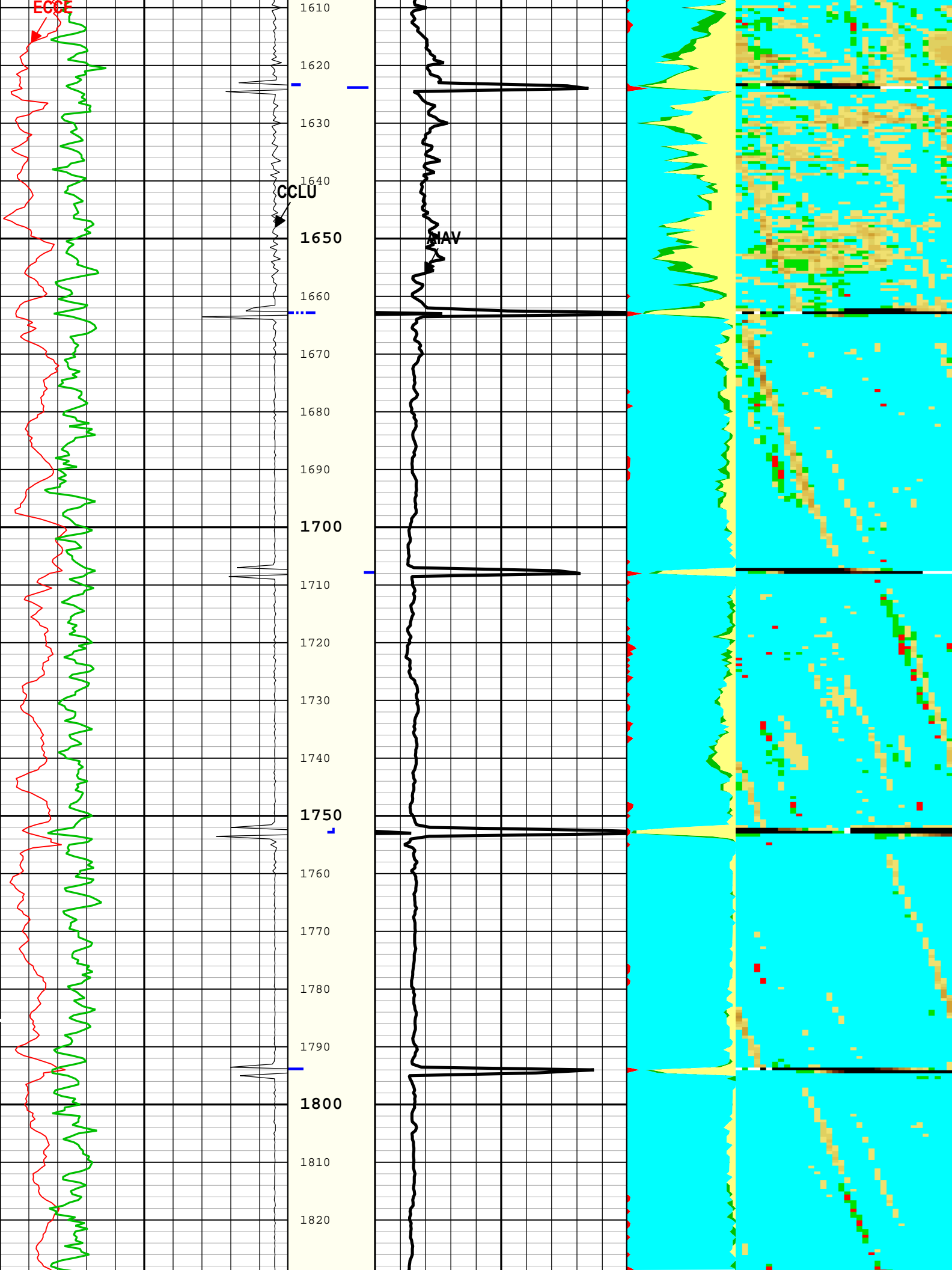


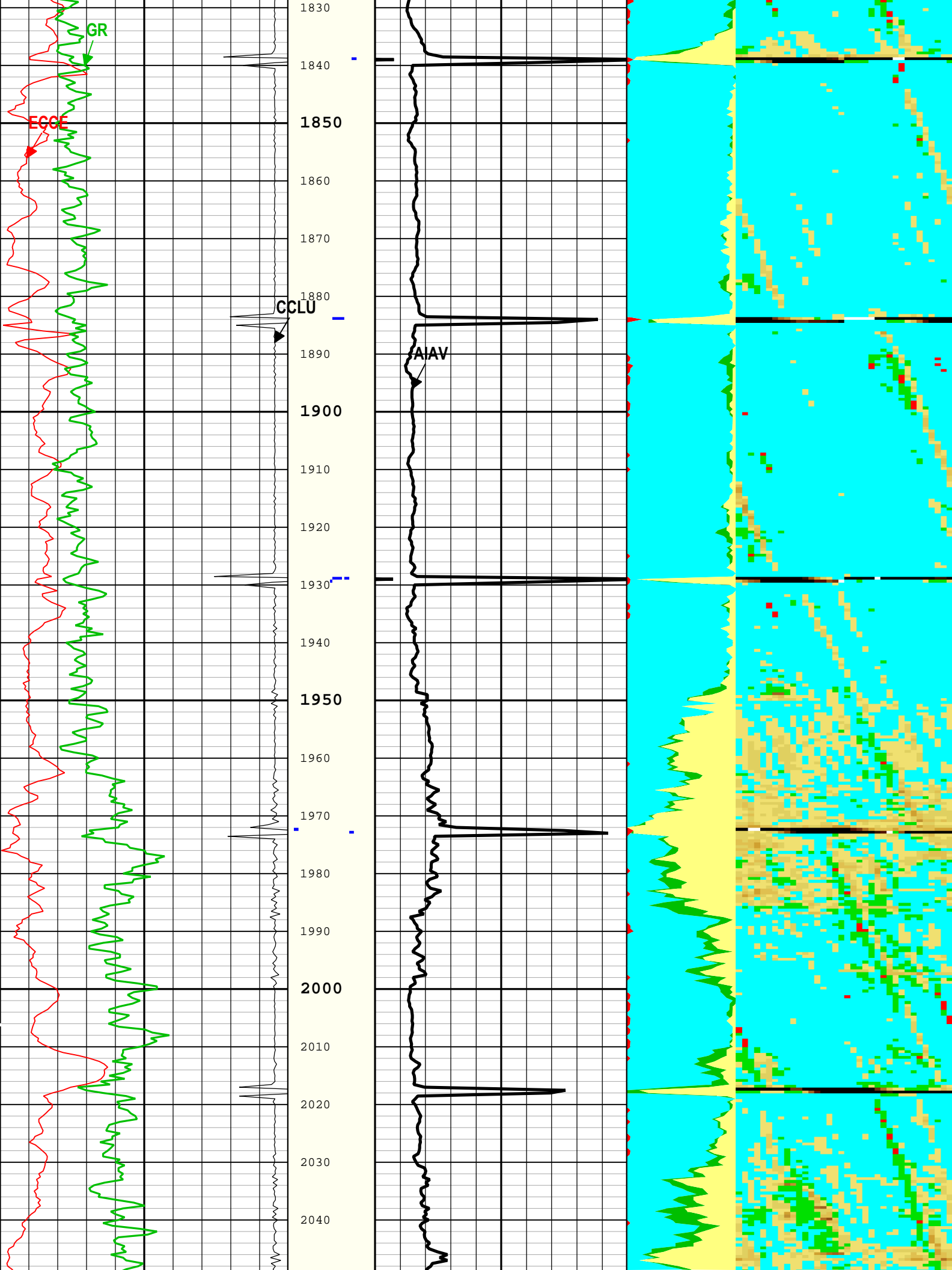


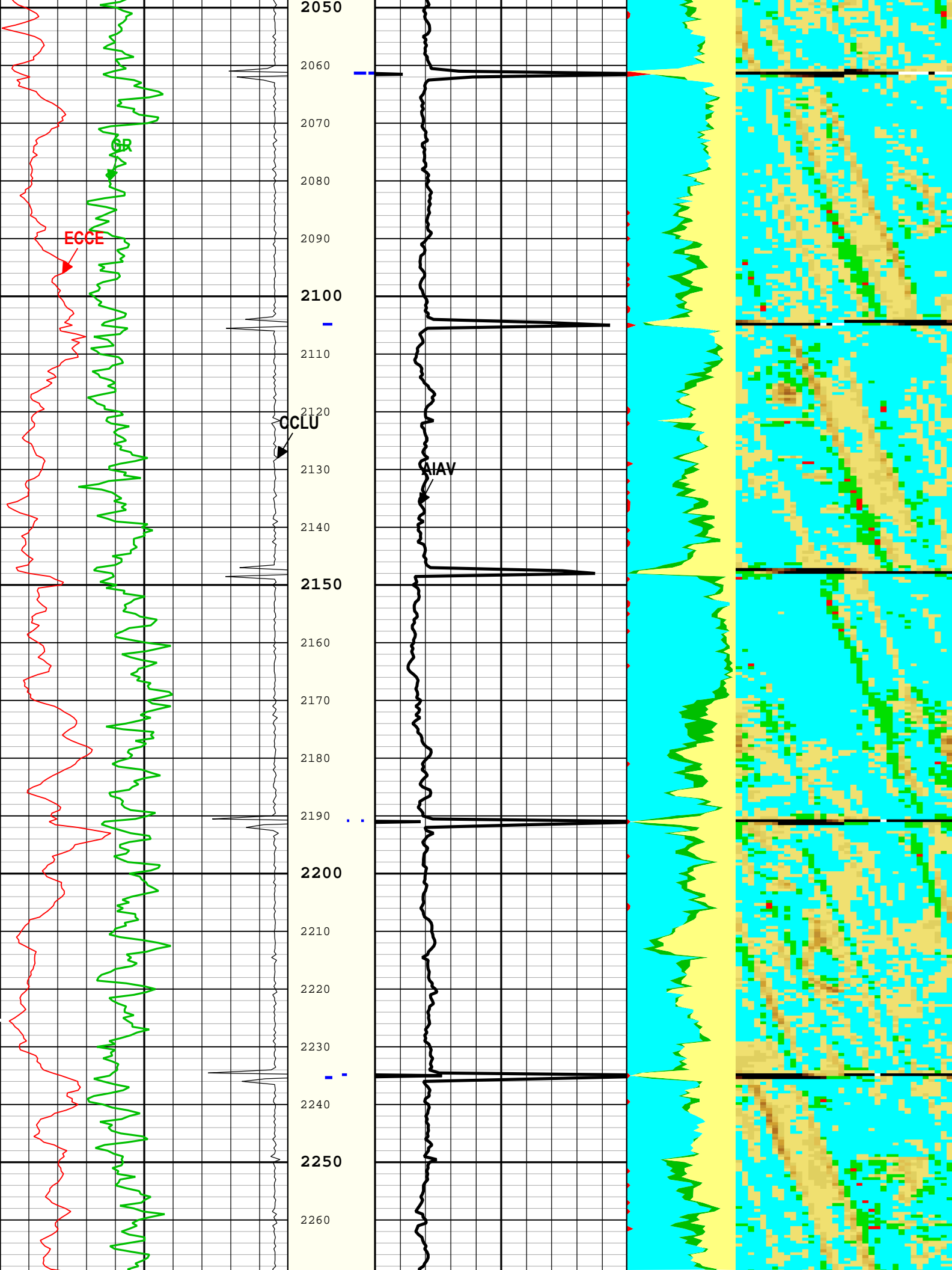


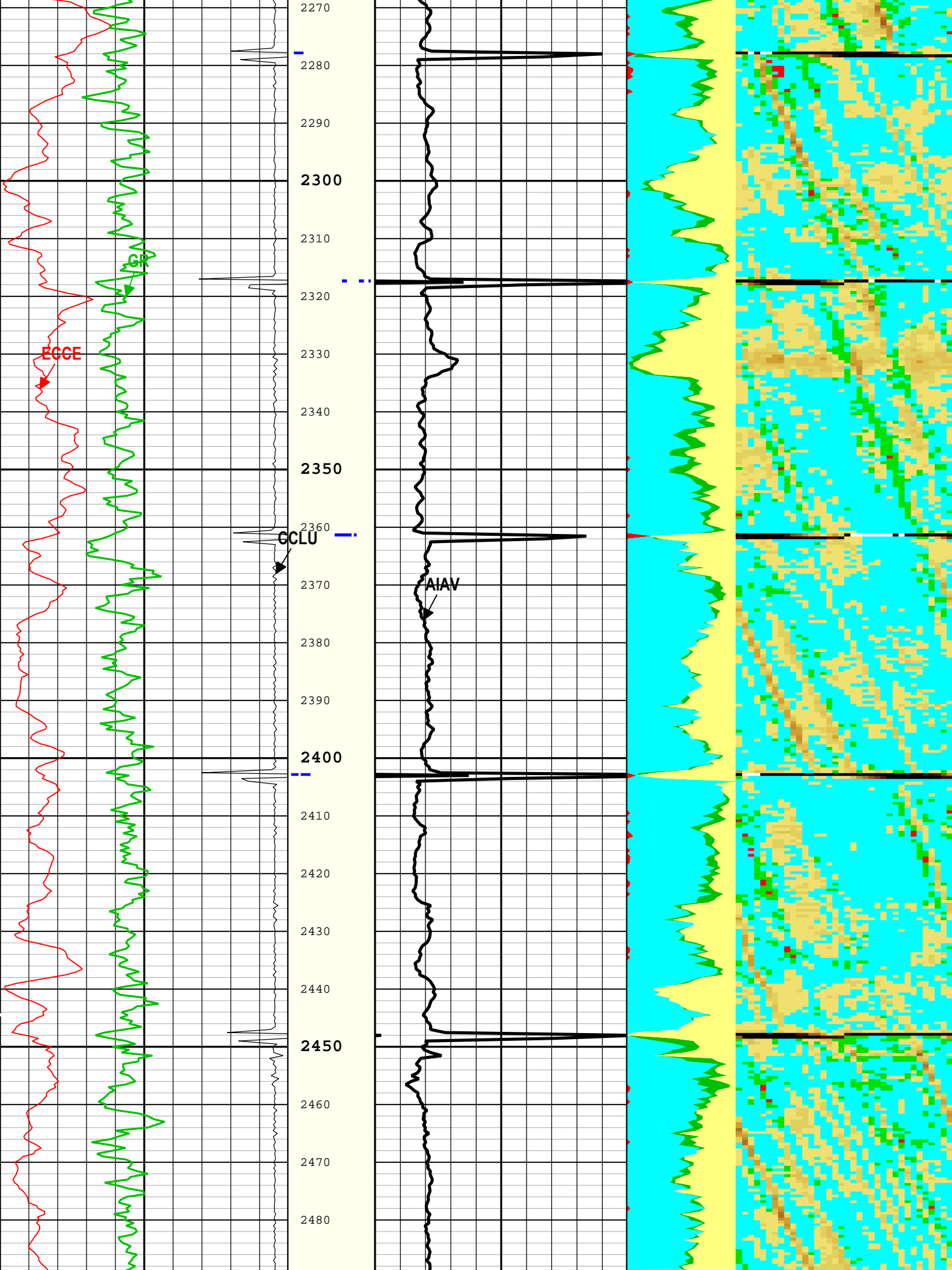


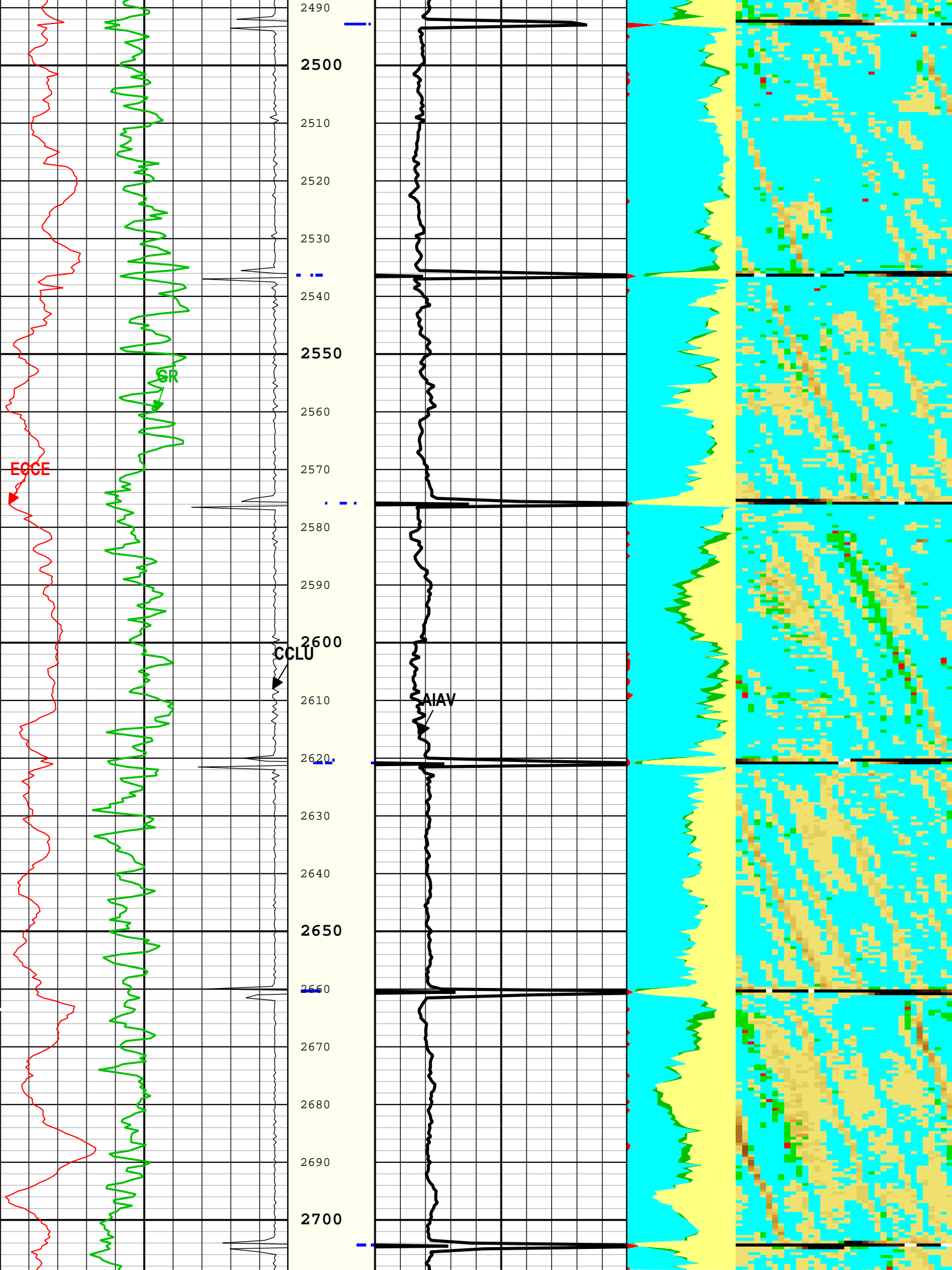


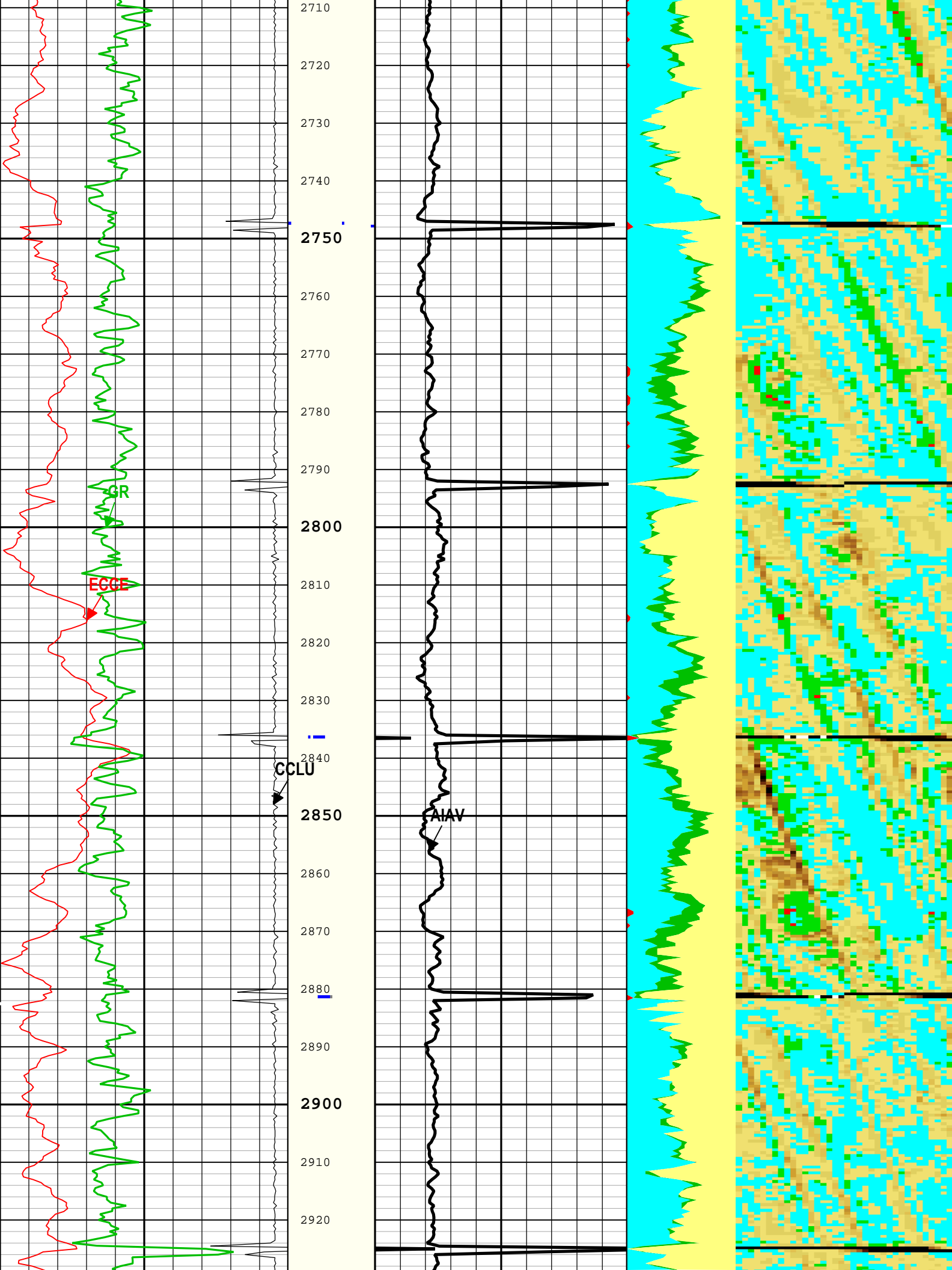


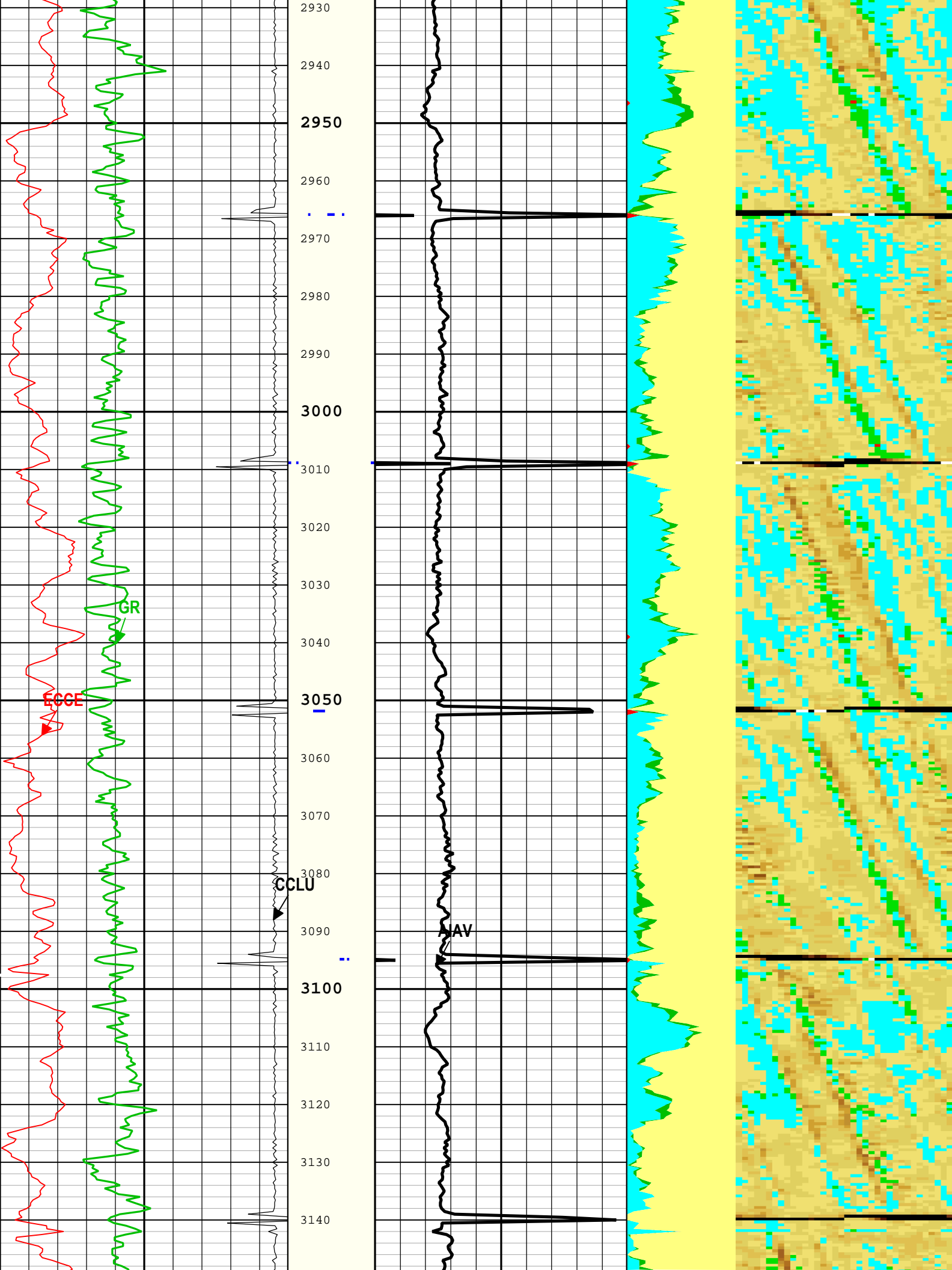


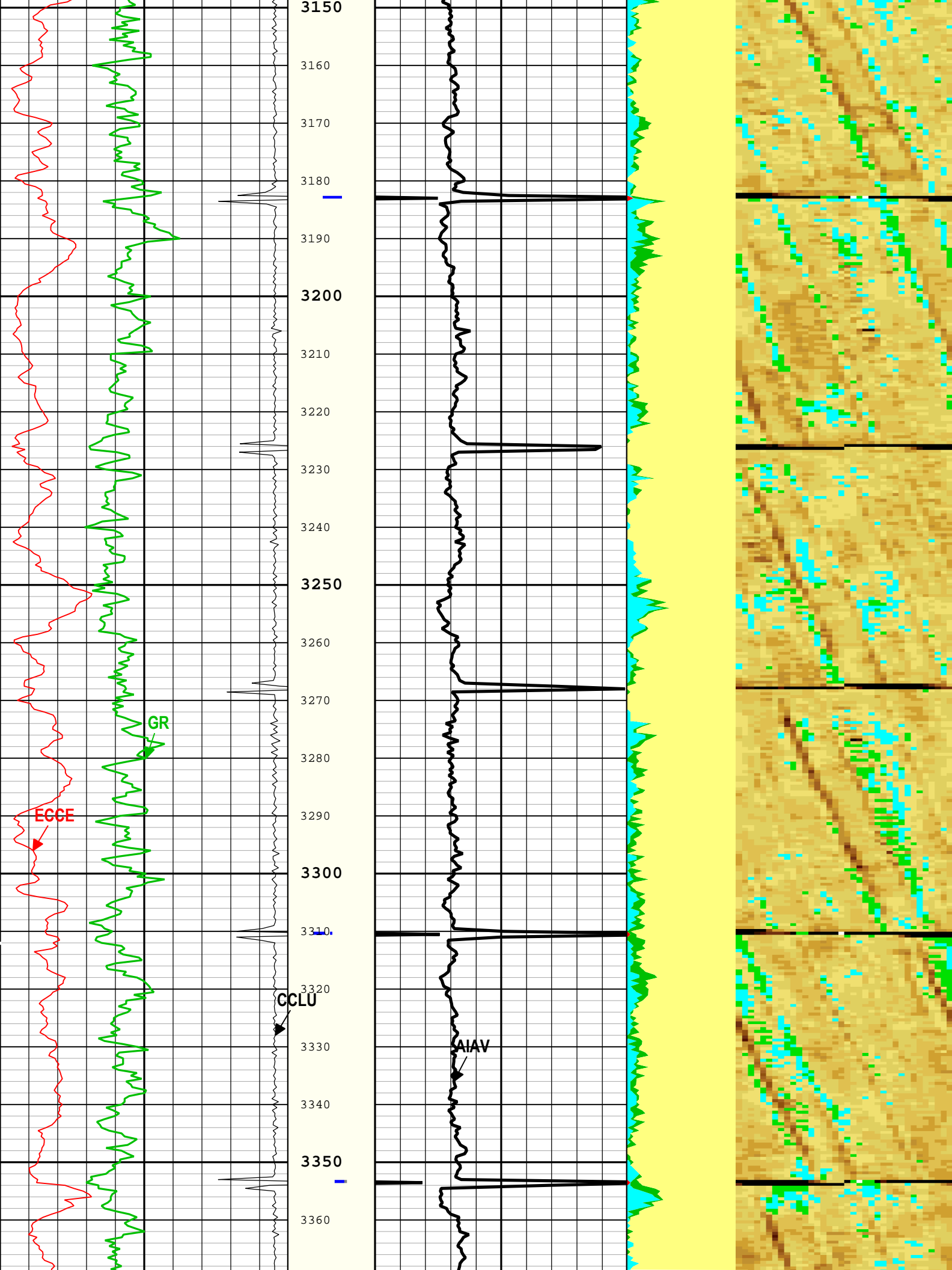


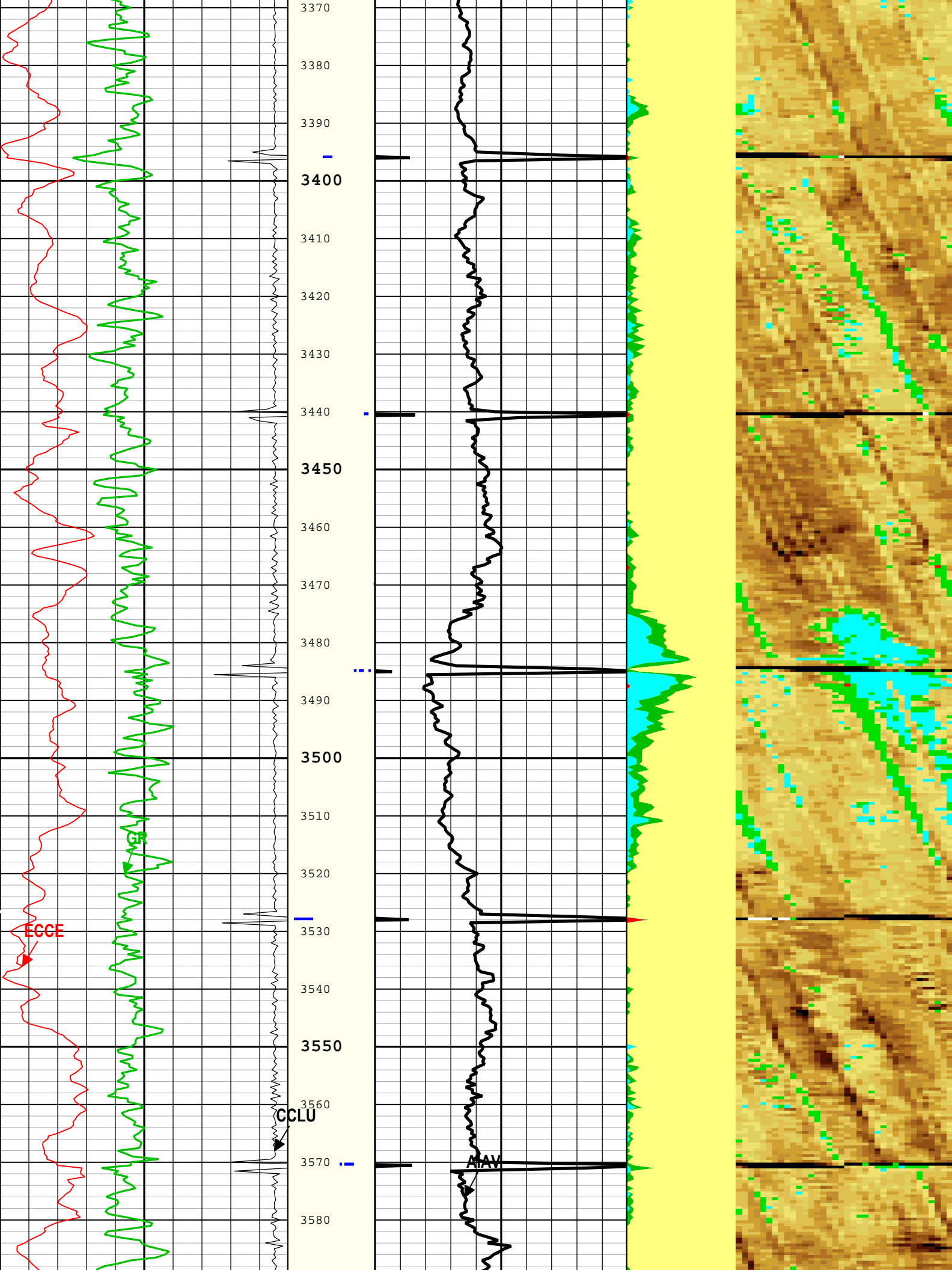


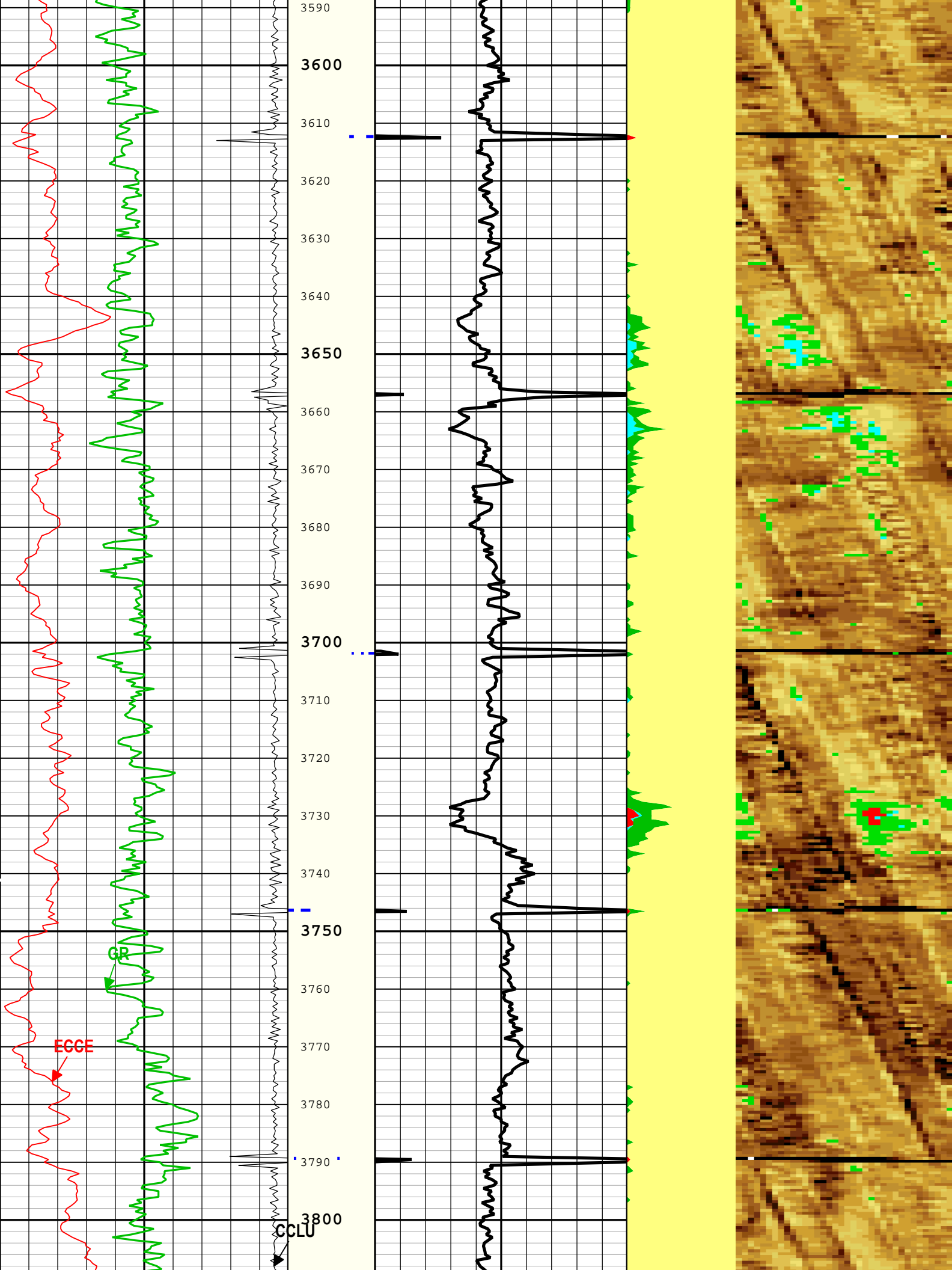


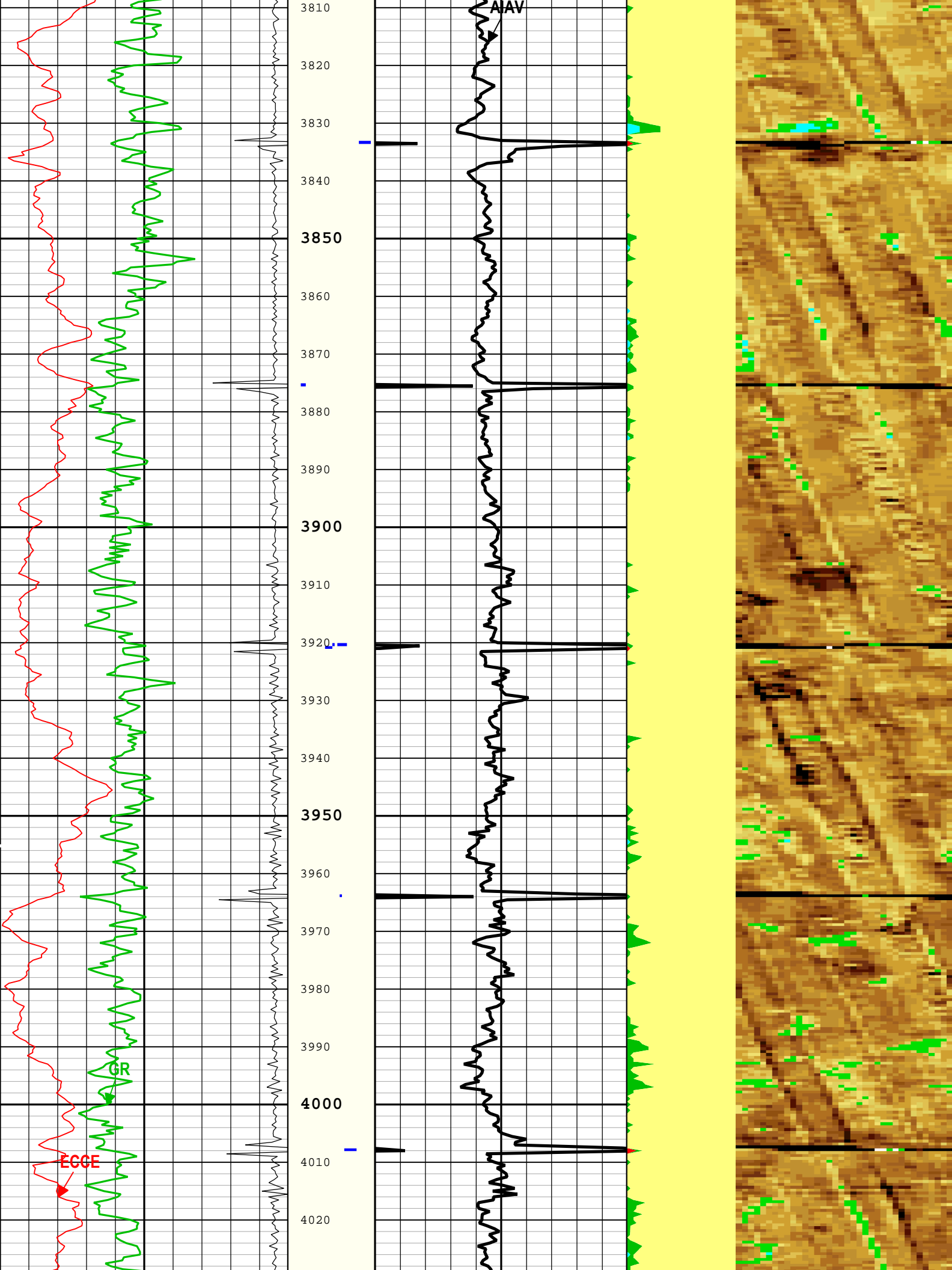


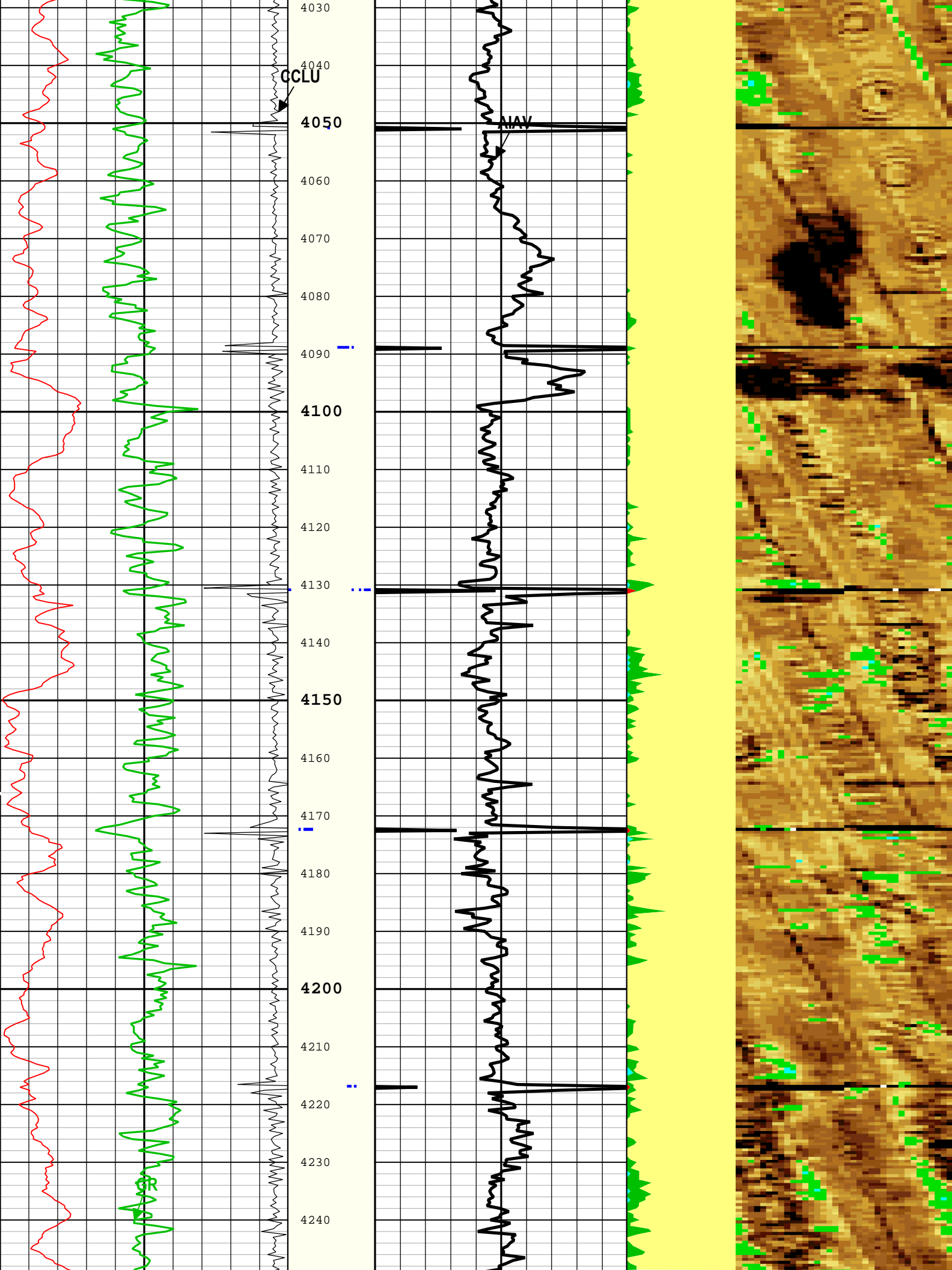


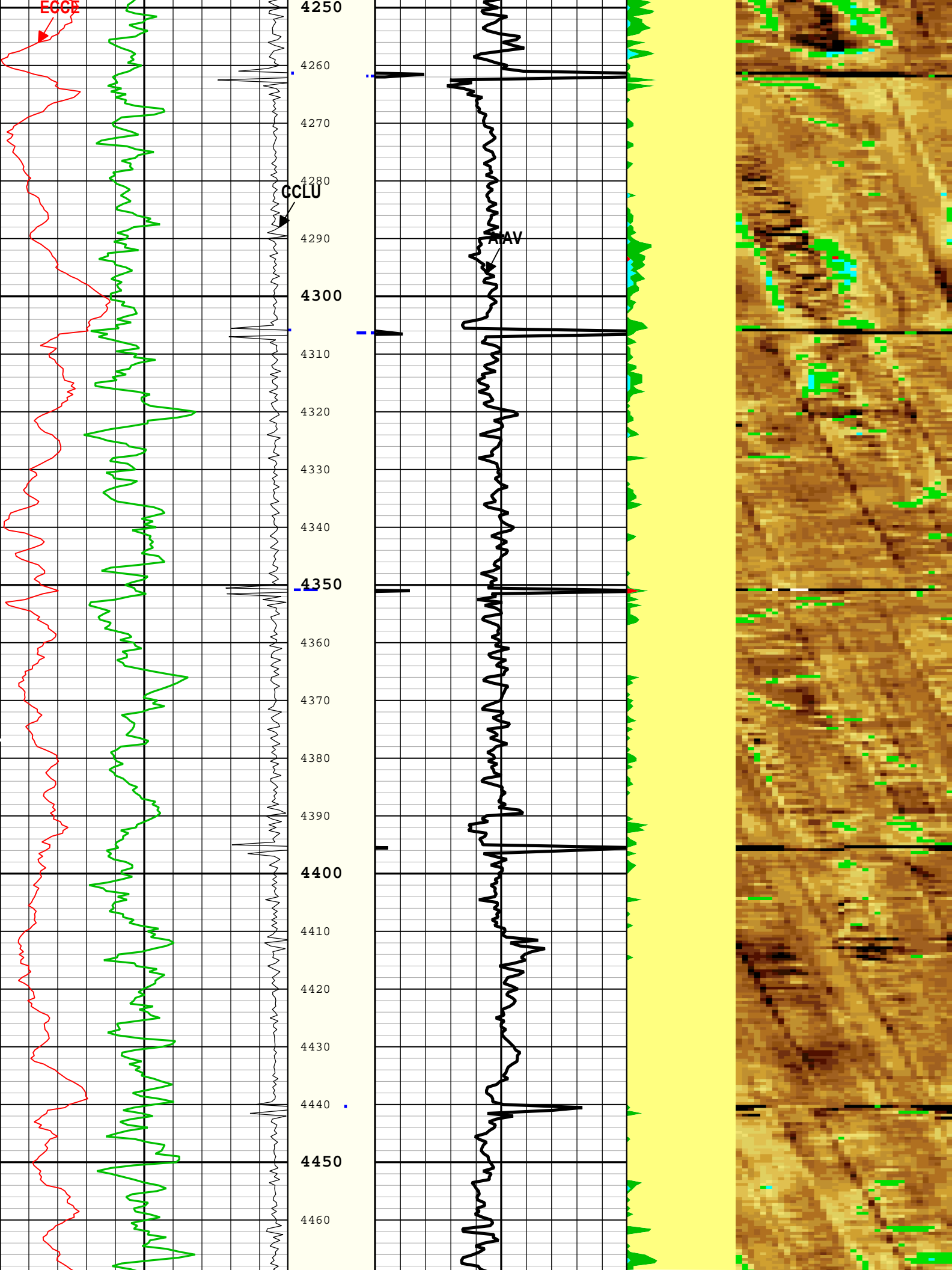


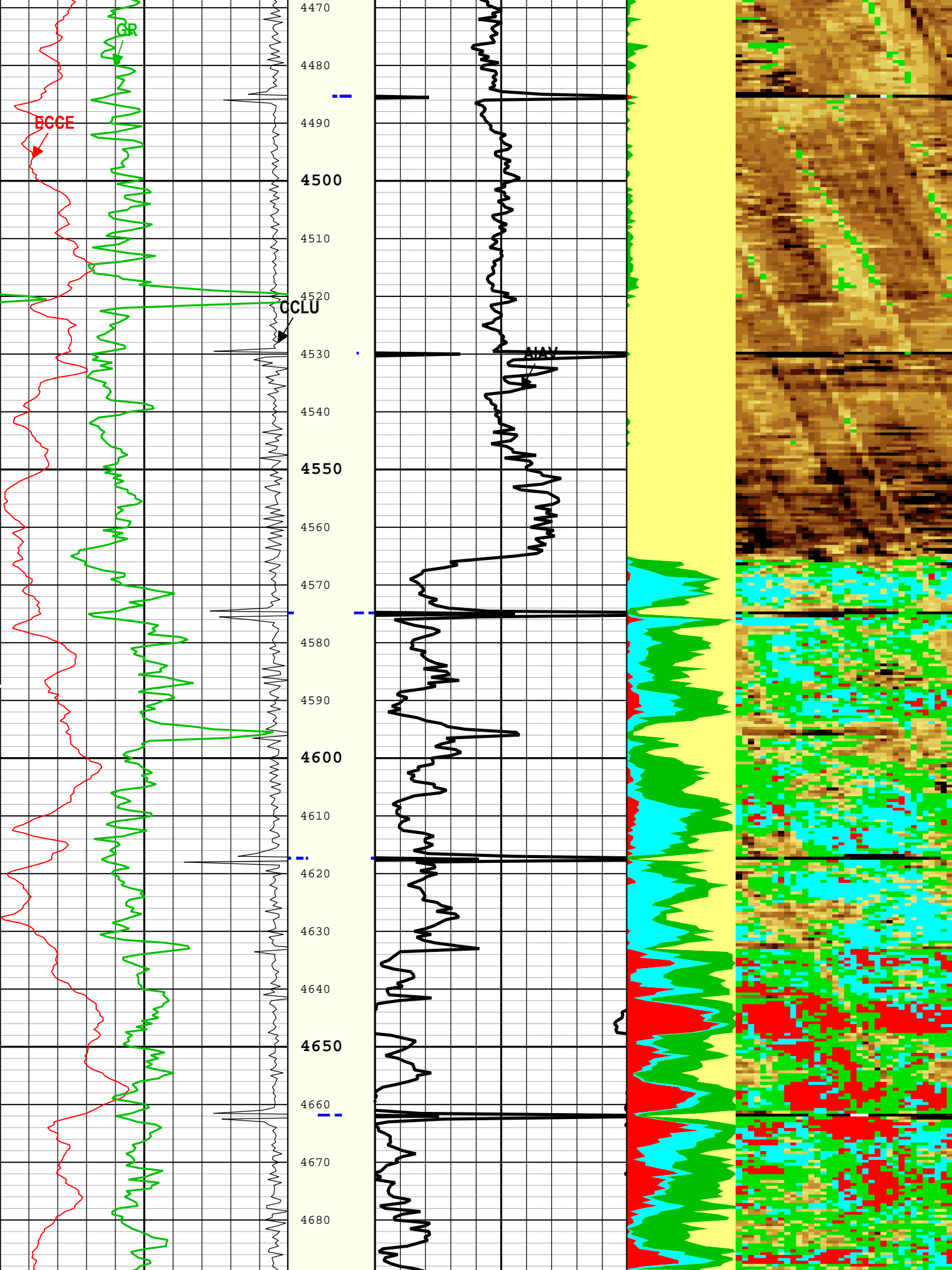


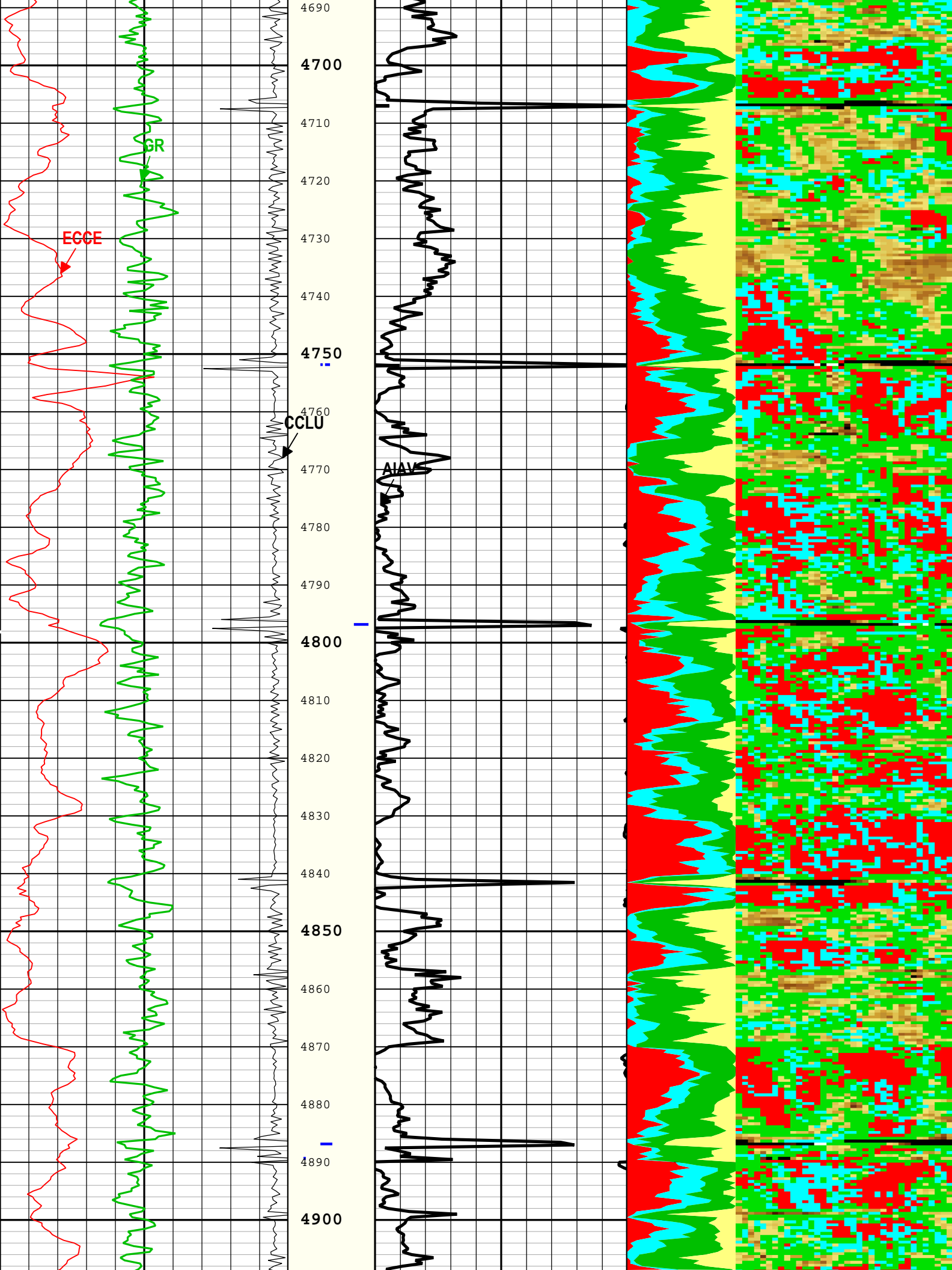


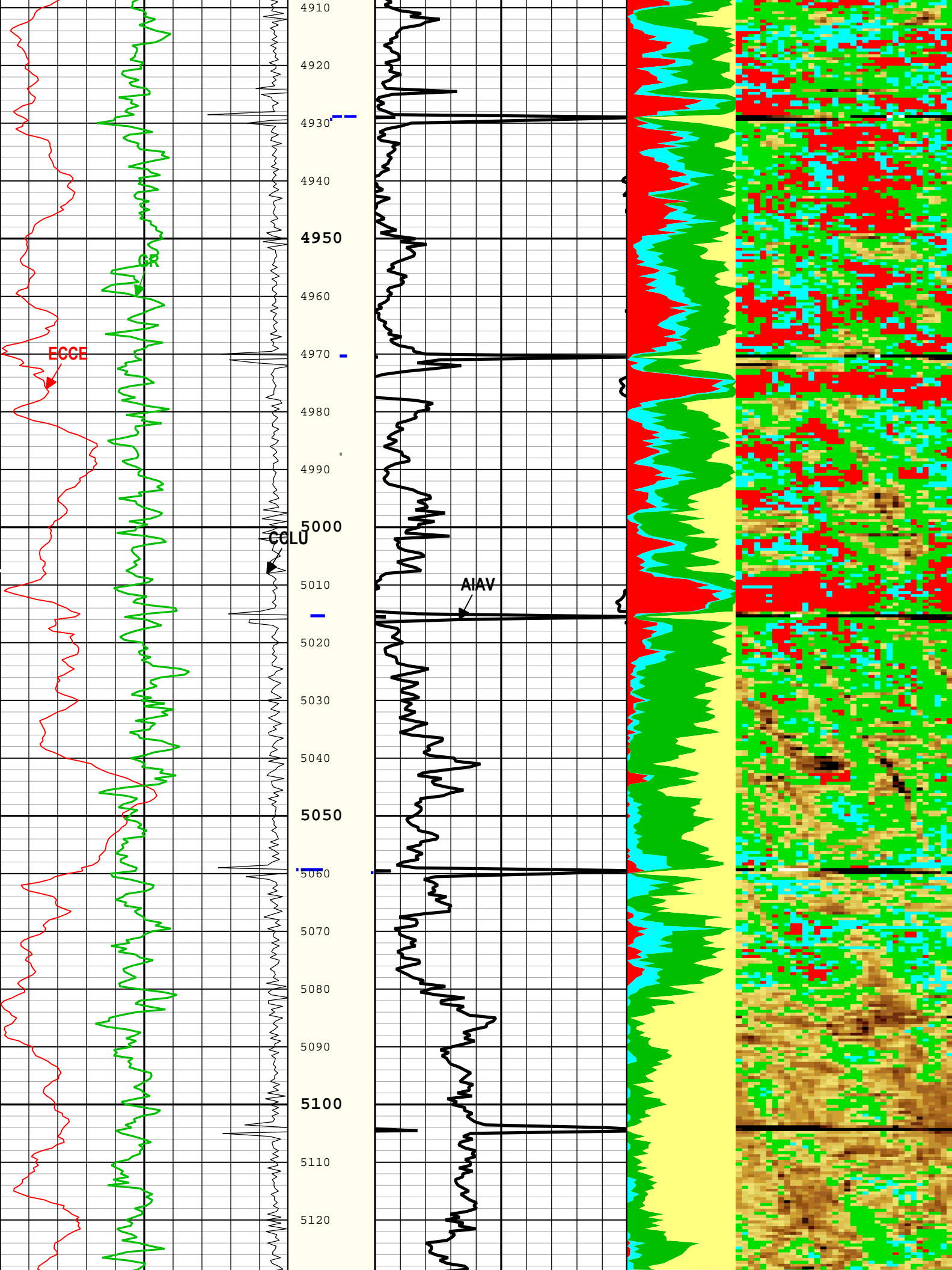


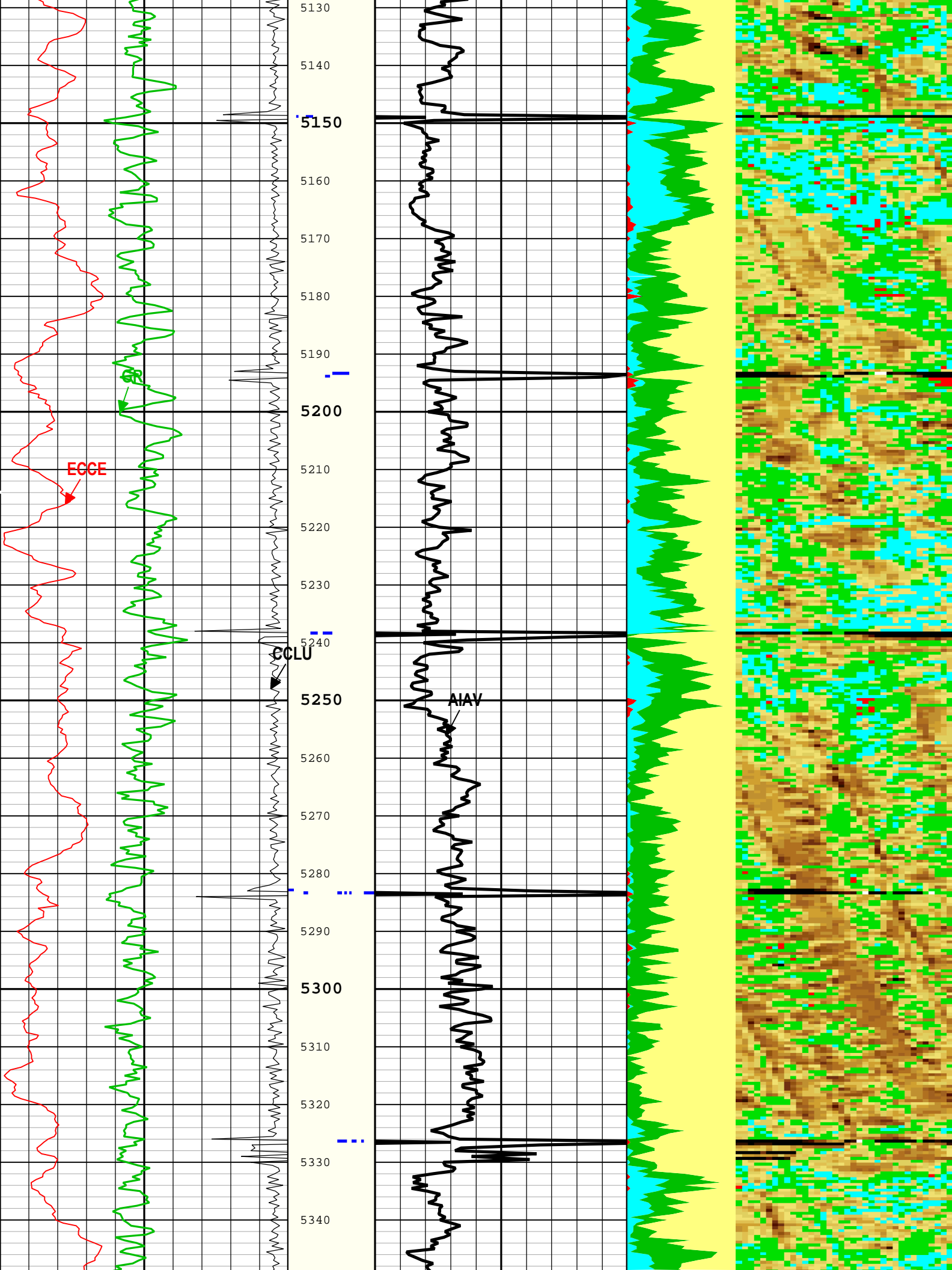


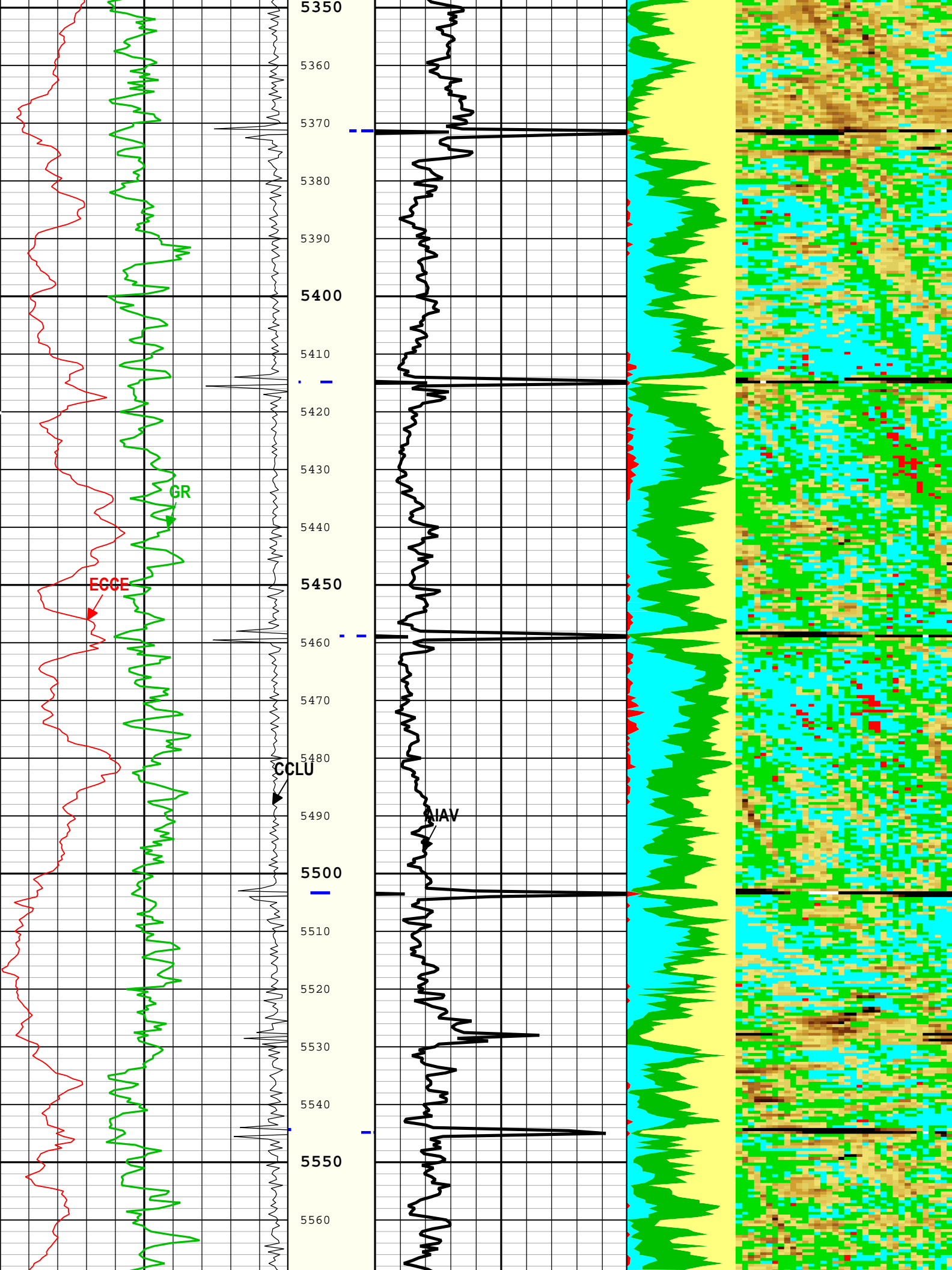


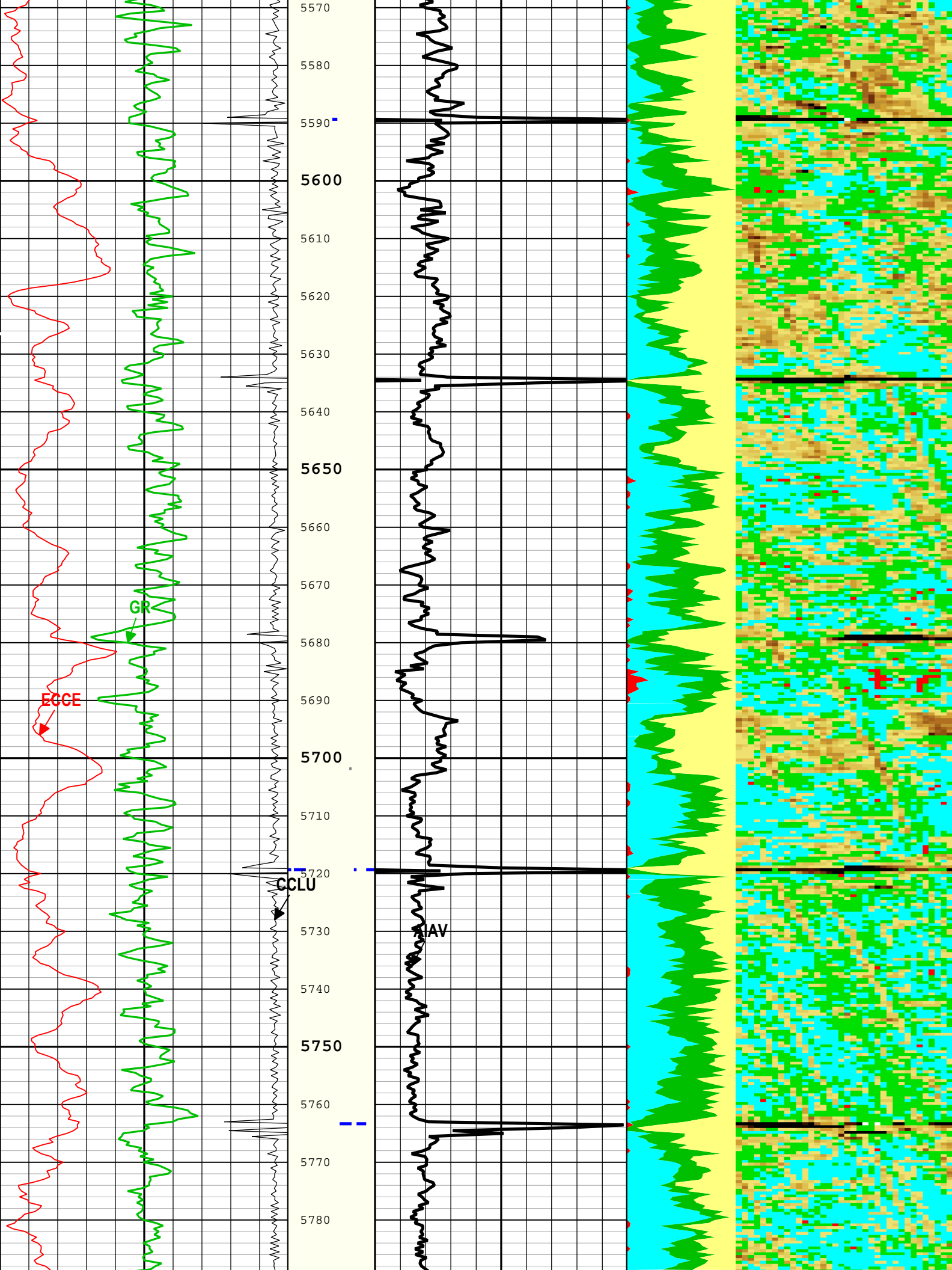


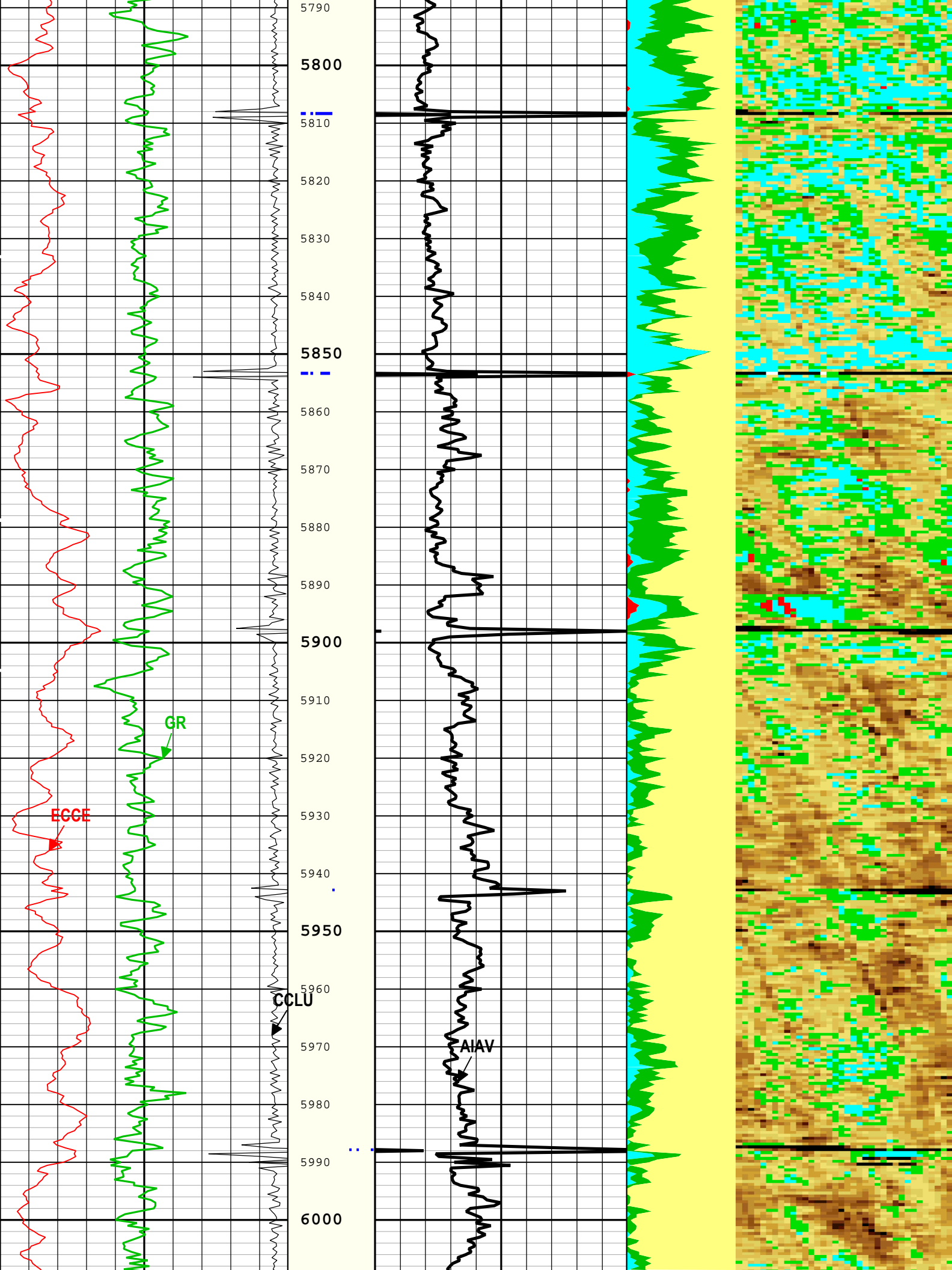


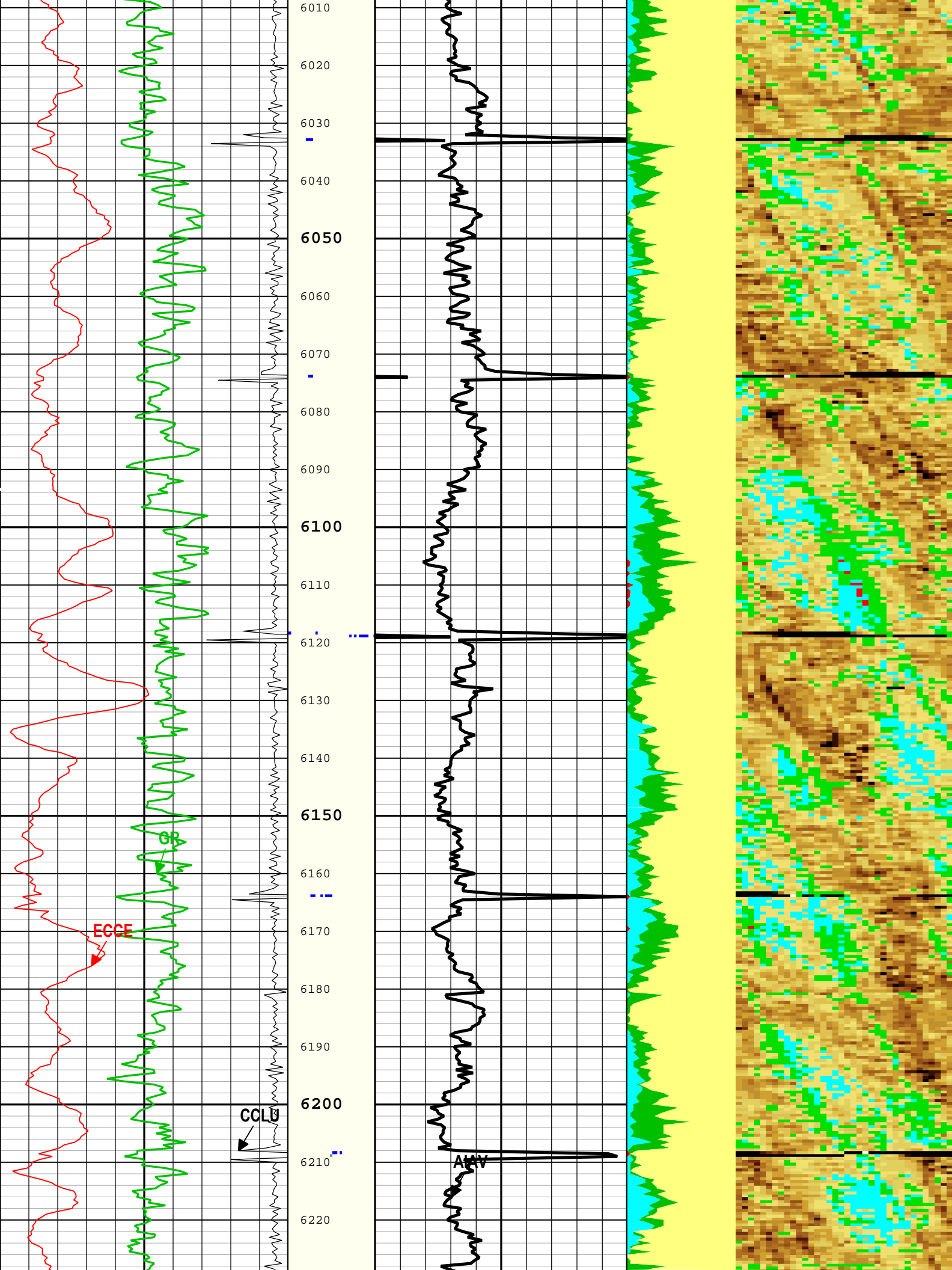


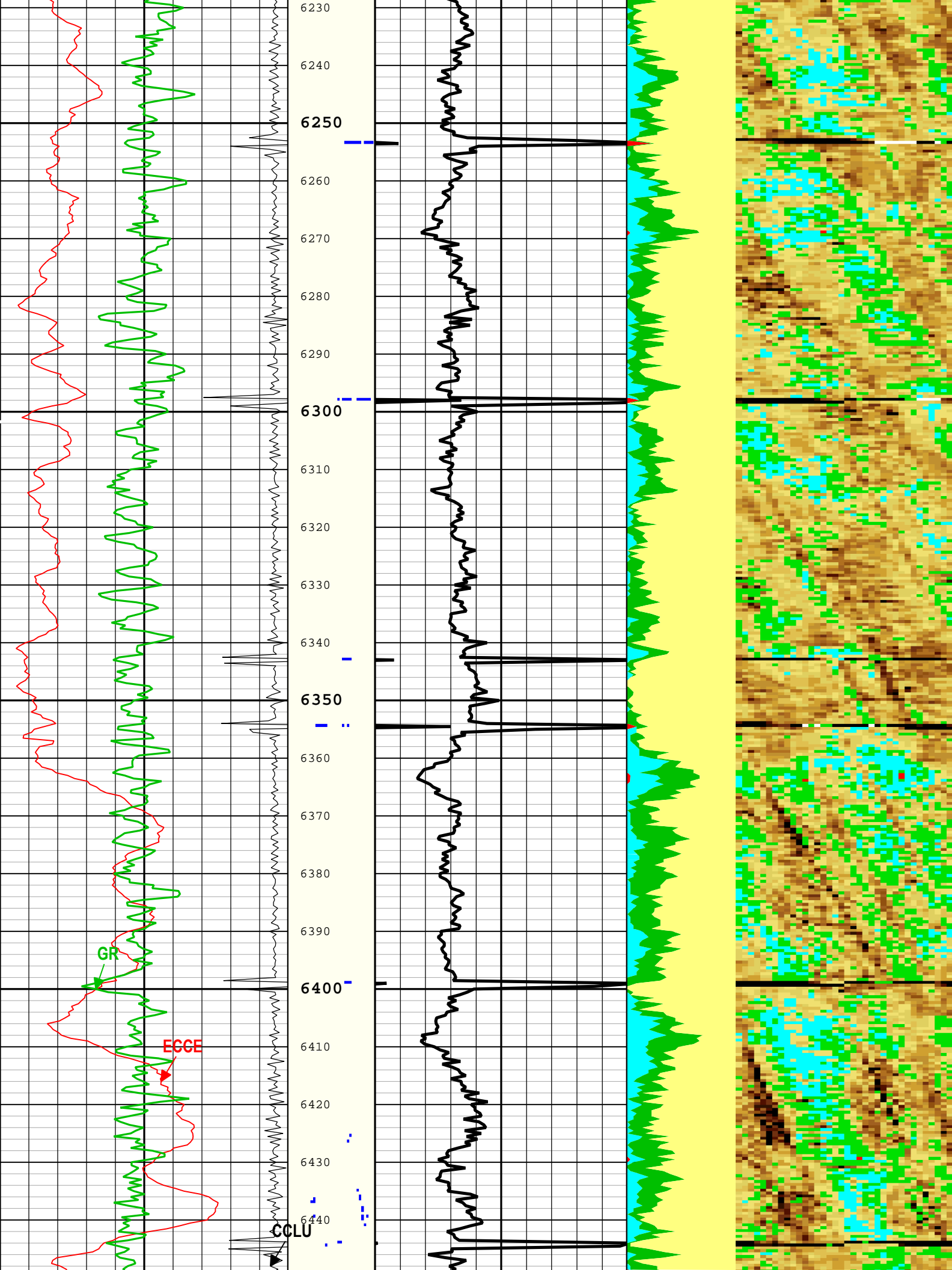


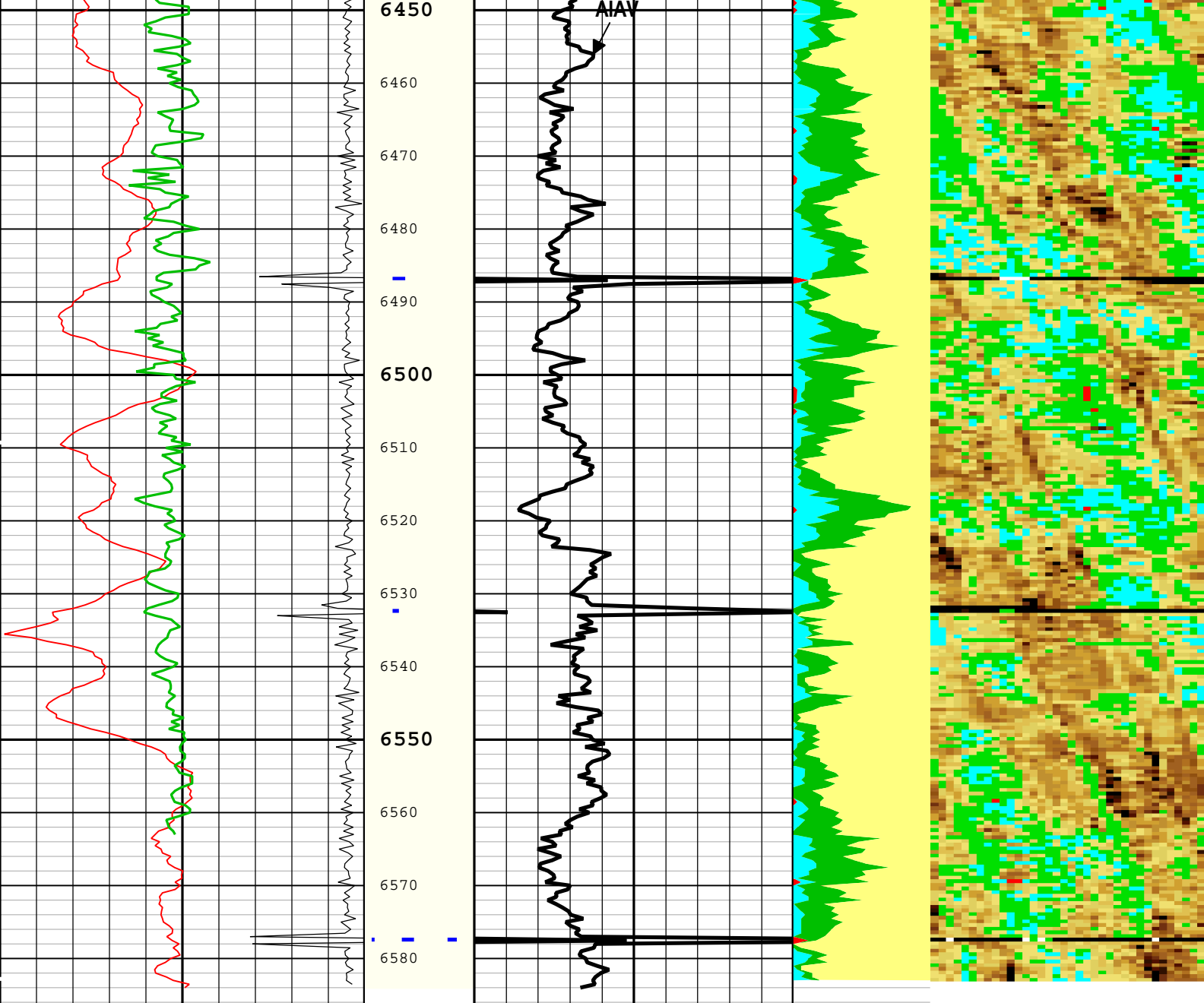












Casing Collar Locator Ultrasonic (CCLU) USIT-E	Absent 1.500 2.500 6.500	Acoustic Impedance Average (AIAV) USIT-E	Gas	Absent -500.000 2.200 3.254 4.309 5.363 6.418 7.472
-20 in 1	Explicit Normalization	0 Mrayl 10	Liquid	Custom Normalization
Amplitude of Eccentering (ECCE) USIT-E	USIT - USIT		Micro-Debonding	USIT - Acoustic Impedance With
0 in 0.5	Processing		Bonded	Micro-debonding Image
Calibrated Gamma Ray (GR) HGNS-H	Flags (UFLG)			(AI_MDEBOND_IMG) USIT-E
0 gAPI 150	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 ft Index Unit: ft Index Type: Measured Depth  
 Creation Date: 24-Aug-2018 16:12:26

## Channel Processing Parameters

### ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI(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	Depth Zoned	us
MUD_N_FRP	Free Pipe Mud Normalization Factor	USIT-E	1.11	
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

## Depth Zone Parameters

Parameter	Value	Start ( ft )	Stop ( ft )
BS	26	43.5	80
BS	13.5	80	1850
BS	8.5	1850	6585
MEAS_WLEN	22.44	43.5	6585
MEAS_WLEN	20	6585	6586.5

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	48	dB
EMXV	EMEX Voltage	USIT-E	40	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	31.88	us
WINE	Window End Time	USIT-E	71.88	us

## ONE

## 0 PSI Repeat Pass

## Software Version

Acquisition System	Version
Maxwell 2018 SP2	8.2.104493.3100

## Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[1]:Up	Up	1941.73 ft	2543.90 ft	24-Aug-2018 2:34:25 PM	24-Aug-2018 2:37:49 PM	ON	5.47 ft	Yes

All depths are referenced to toolstring zero

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: 24-Aug-2018 16:12:33

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

Calibrated Gamma Ray (GR) HGNS-H

0 gAPI 150

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

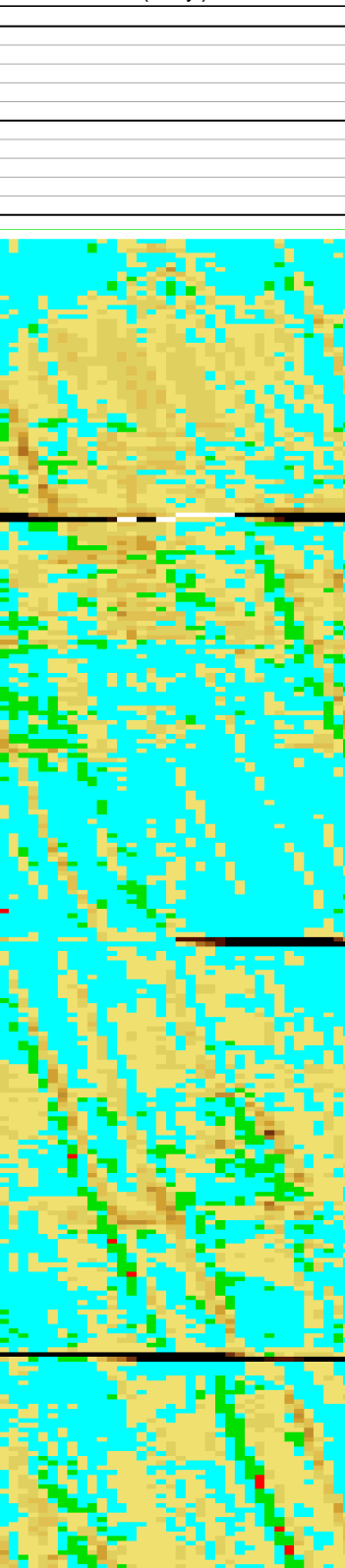
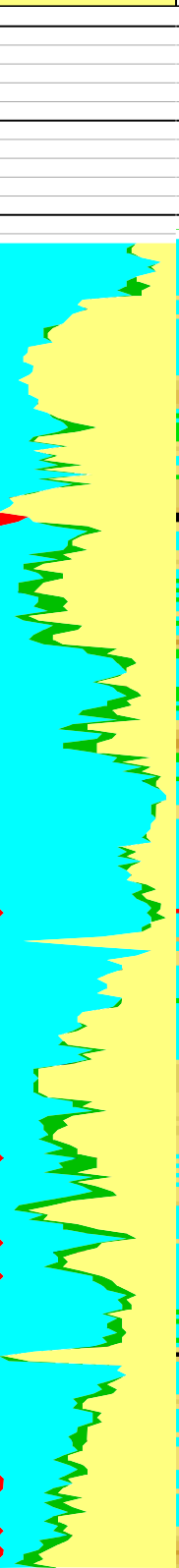
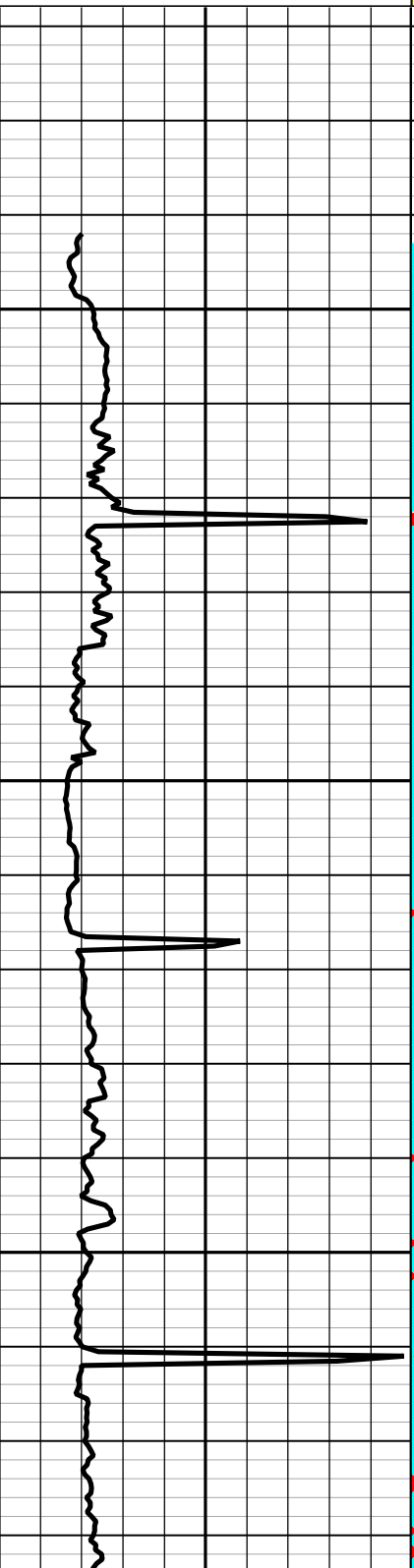
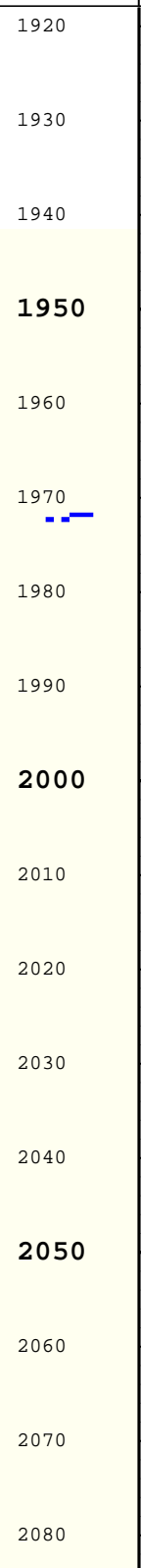
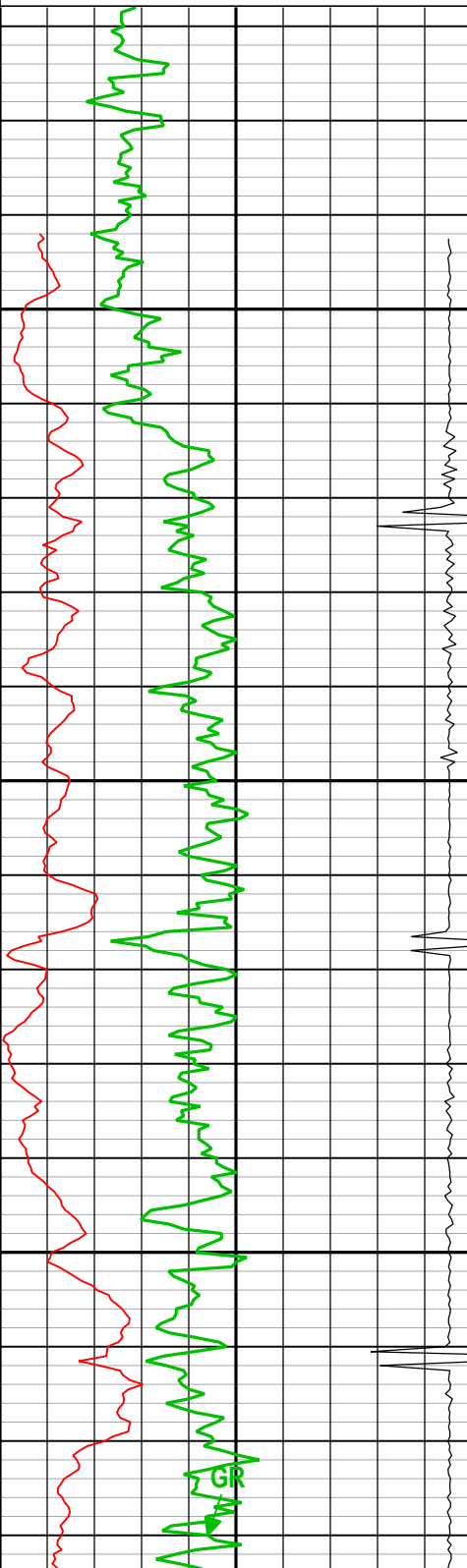
Micro-Debonding

Bonded

Absent -500.000 2.200 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)



1920

1930

1940

1950

1960

1970

1980

1990

2000

2010

2020

2030

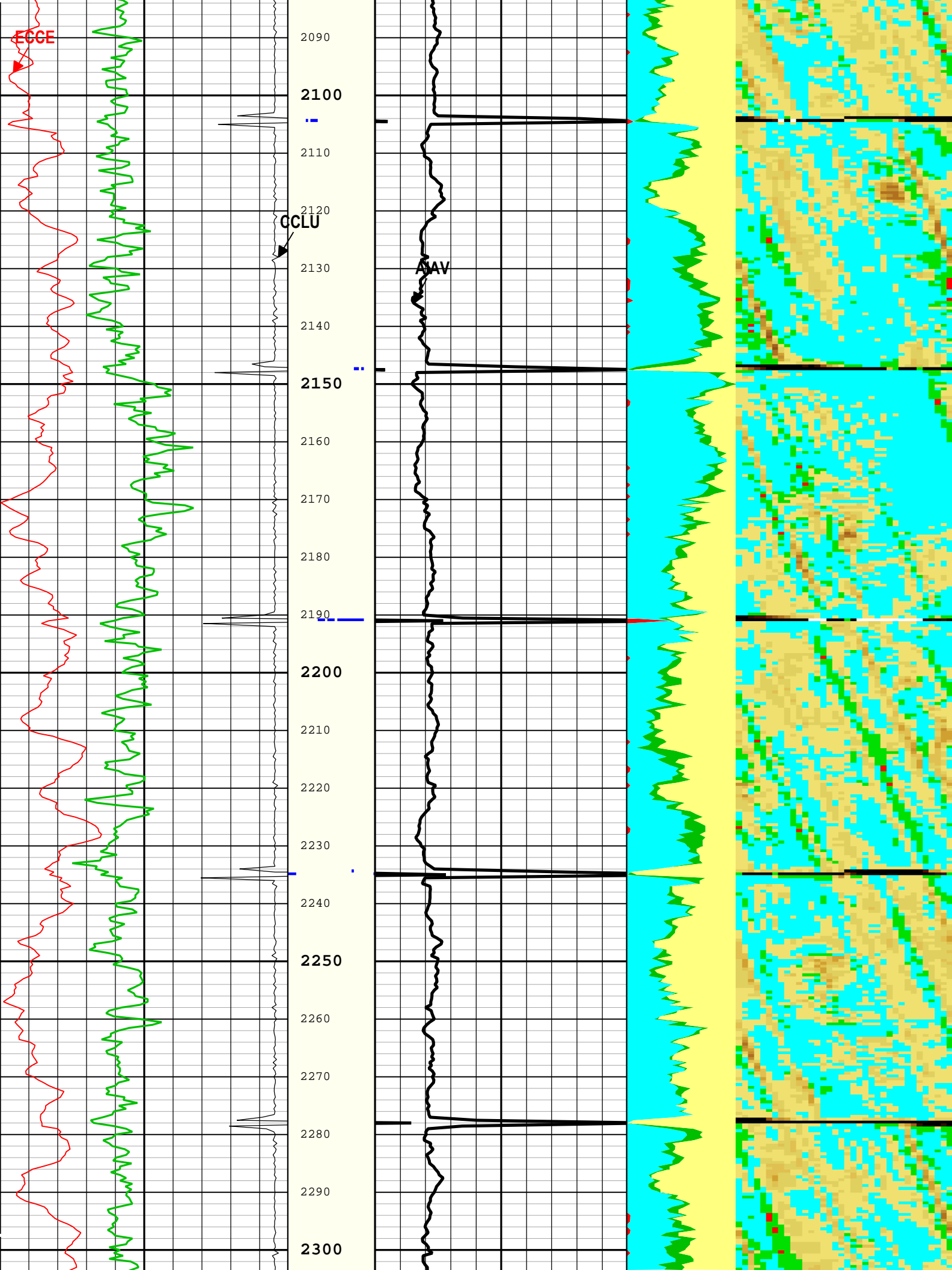
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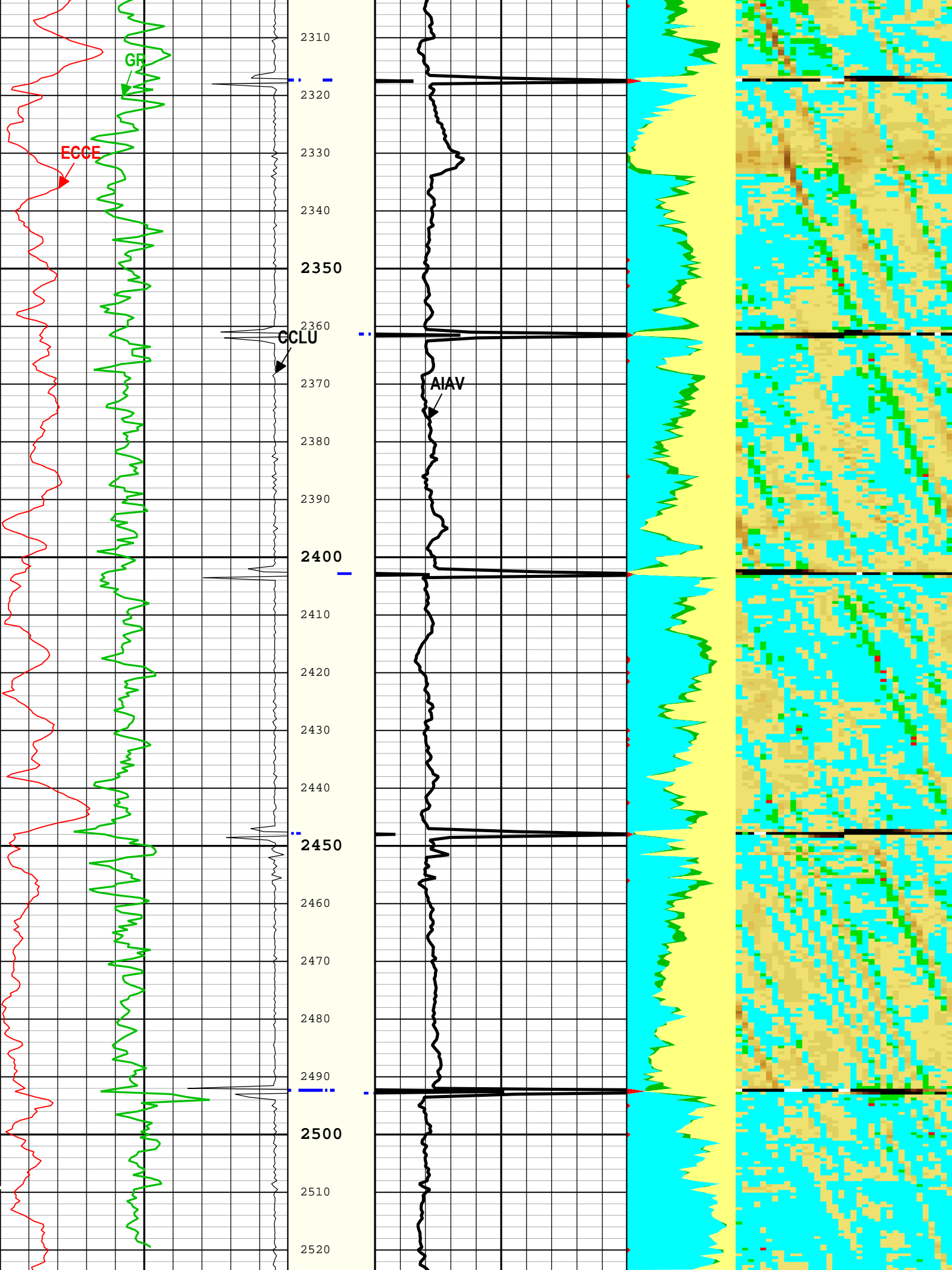
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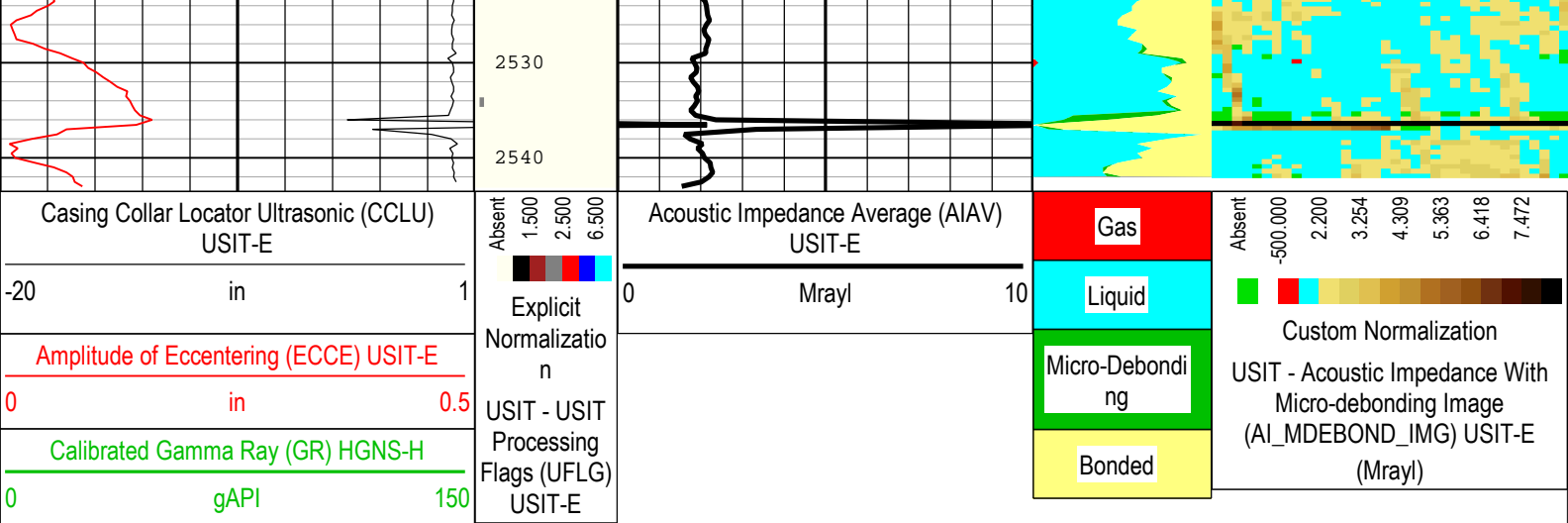
2060

2070

2080







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: 24-Aug-2018 16:12:33

## Channel Processing Parameters

### ONE: Parameters

Parameter	Description	Tool	Value	Unit
BARI(ISSBAR)	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	8.5	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	1.11	
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

## 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	48	dB
EMXV	EMEX Voltage	USIT-E	40	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	31.88	us
WINE	Window End Time	USIT-E	71.88	us

XYZ

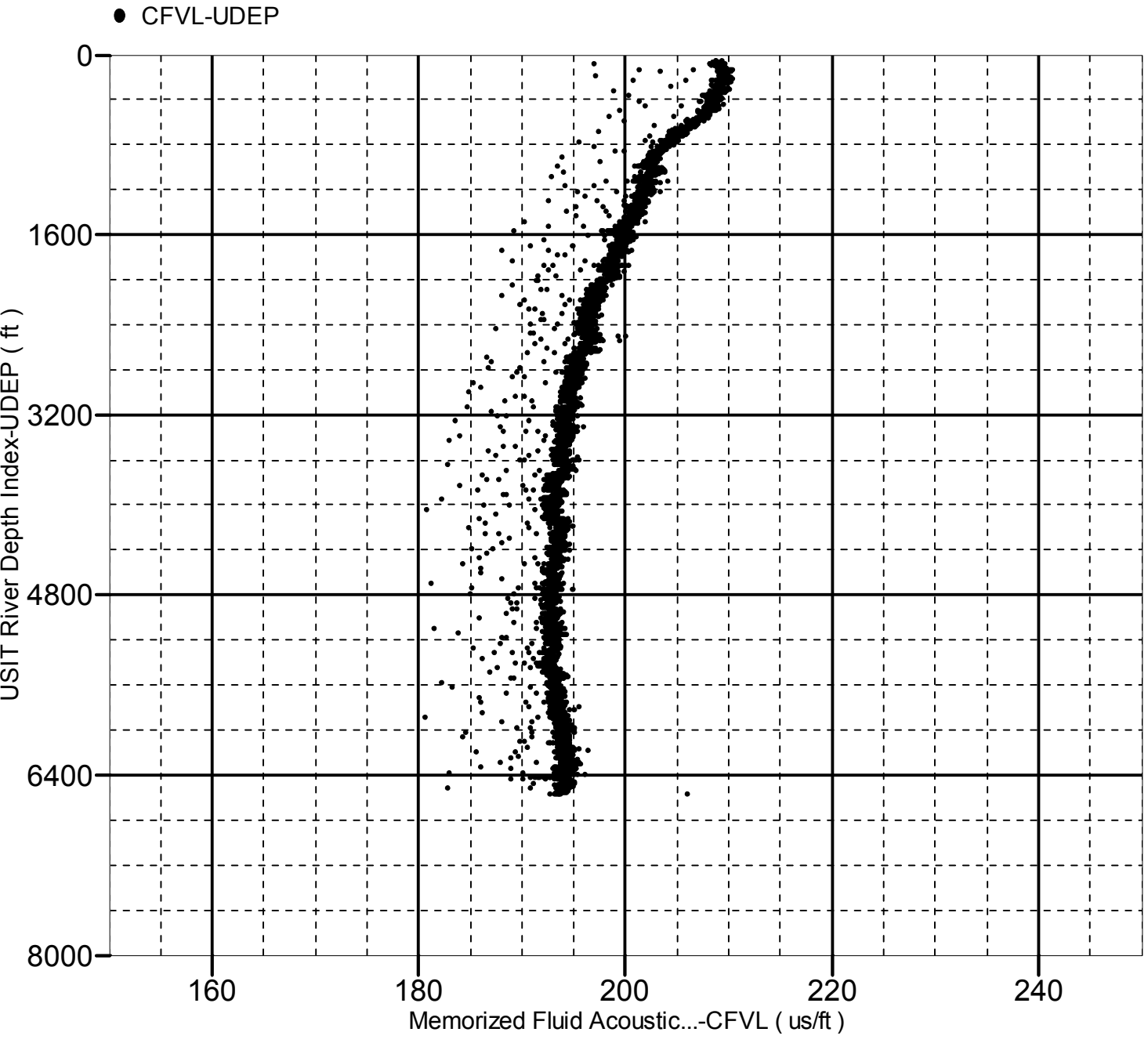
Company:Noble Energy Inc Well:Hurley H26-783

ONE: Log[3]:Up:S002

# Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6587.00 to 67.50 ft



XYZ

Company:Noble Energy Inc Well:Hurley H26-783

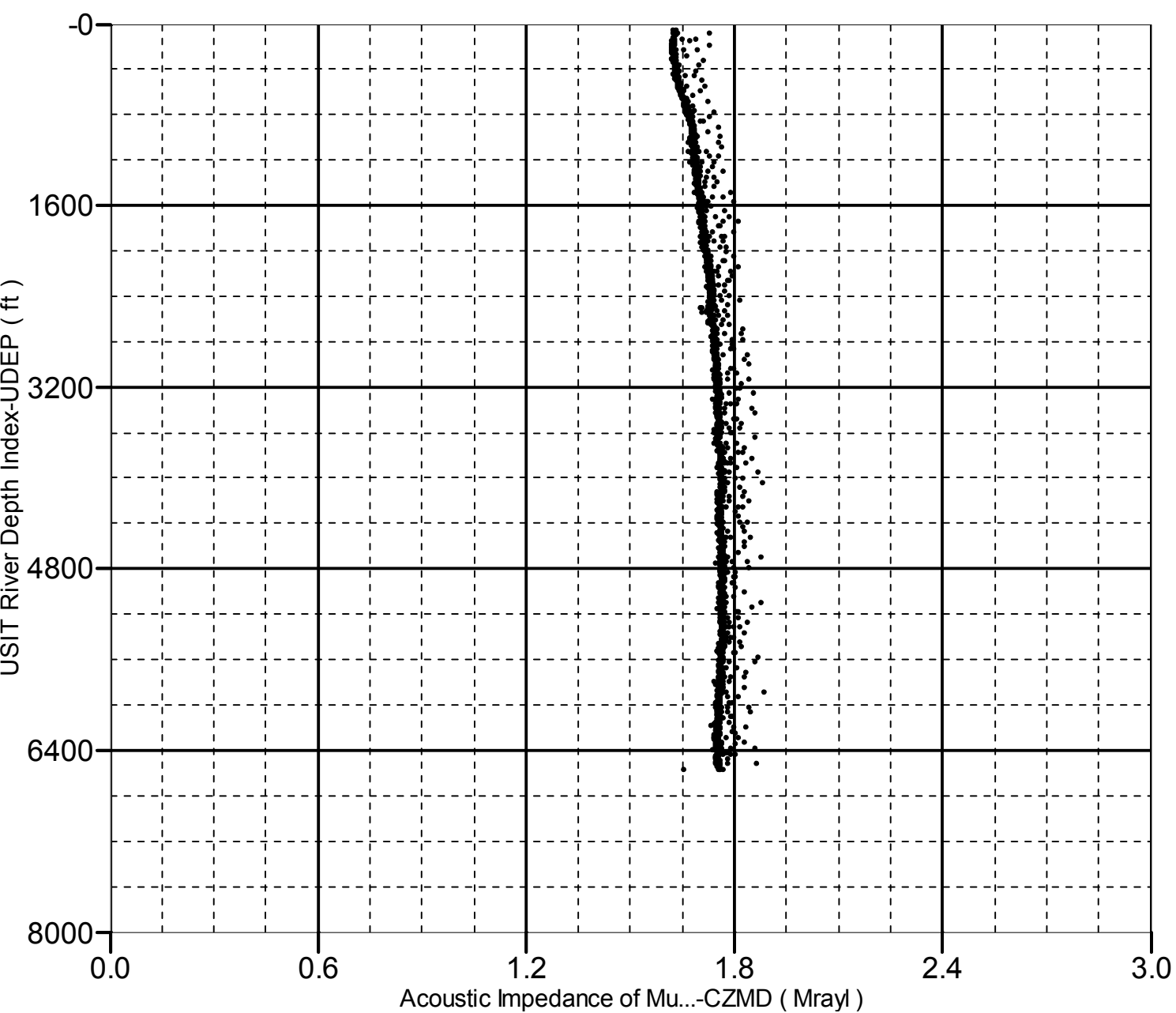
ONE: Log[3]:Up:S002

# Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6587.00 to 67.50 ft

● CZMD-UDEP



Company: Noble Energy Inc

**Schlumberger**

Well: Hurley H26-783

Field: Wattenberg

County: Weld

State: Colorado

UltraSonic Summary Print

