

Company: Noble Energy Inc.

Well: Dorothy State LG16-748

Field: DJ Horizontal Niobrara

County: Weld State: Colorado

UltraSonic Summary Print

County:		Weld	
Field:		DJ Horizontal Niobrara	
Location:		SWSE	
Well:		Dorothy State LG16-748	
Company:		Noble Energy Inc.	
Location:			
SWSE		Elev.:	
350 FSL 1535 FEL		K.B. 4878.00 ft	
		G.L. 4848.00 ft	
		D.F. 4878.00 ft	
Permanent Datum:		Ground Level	
Log Measured From:		Kelly Bushing	
Drilling Measured From:		Kelly Bushing	
		30.00 ft	
API Serial No.		Section:	
05-123-47705		4	
		Township:	
		8	
		Range:	
		59	

Logging Date	10-Jan-2019
Run Number	One
Depth Driller	16940.00 ft
Schlumberger Depth	16940.00 ft
Bottom Log Interval	6318.00 ft
Top Log Interval	60.00 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	1955.00 ft
To	16940.00 ft
Casing/Tubing Size	5.5 in
Weight	20 lbm/ft
Grade	N/A
From	0.00 ft
To	16926.20 ft
Max Recorded Temperatures	215 degF
Logger on Bottom	10-Jan-2019
Unit Number	MSLC-AR1 2215
Recorded By	Z. Hamidaddin / A. Voyage
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.

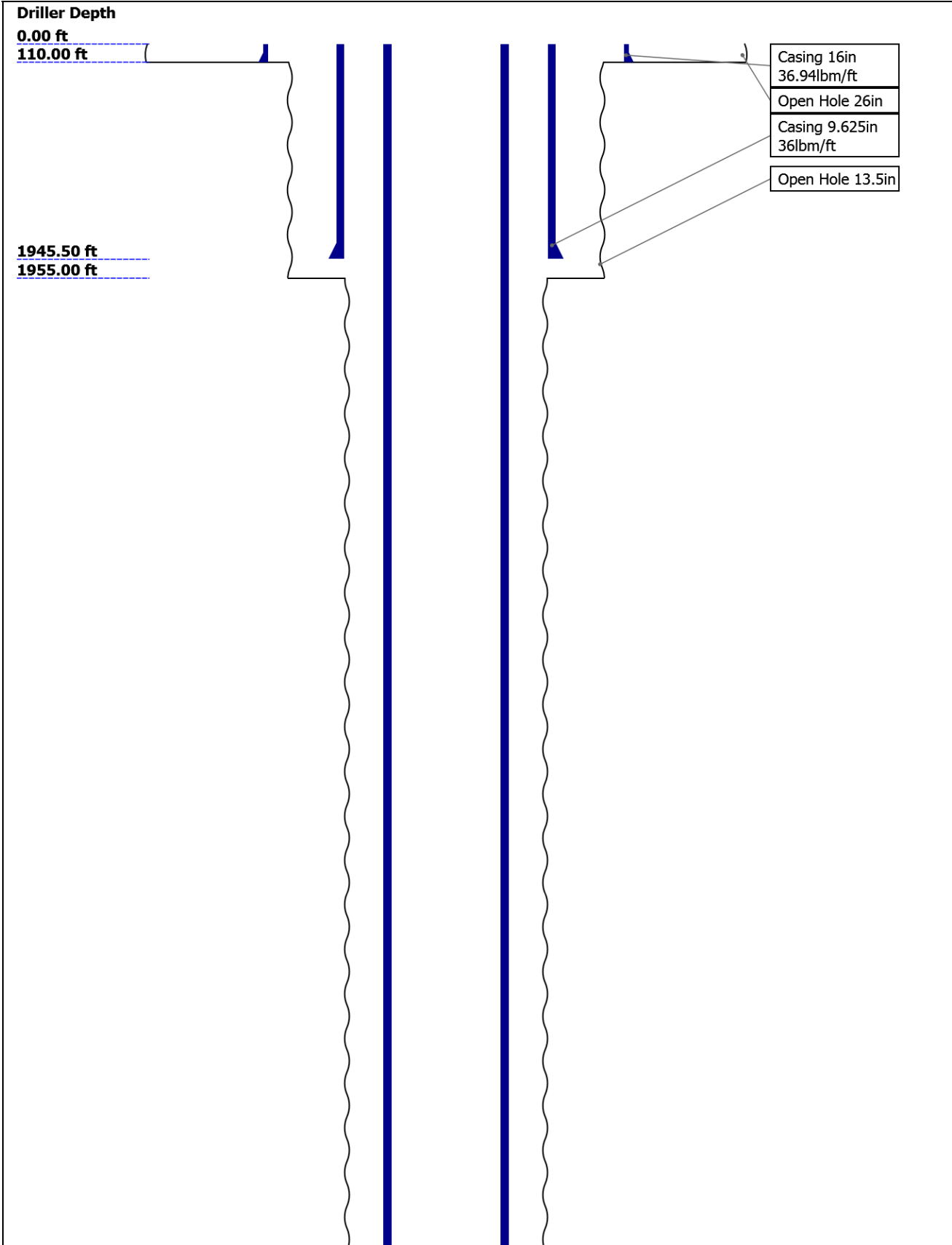
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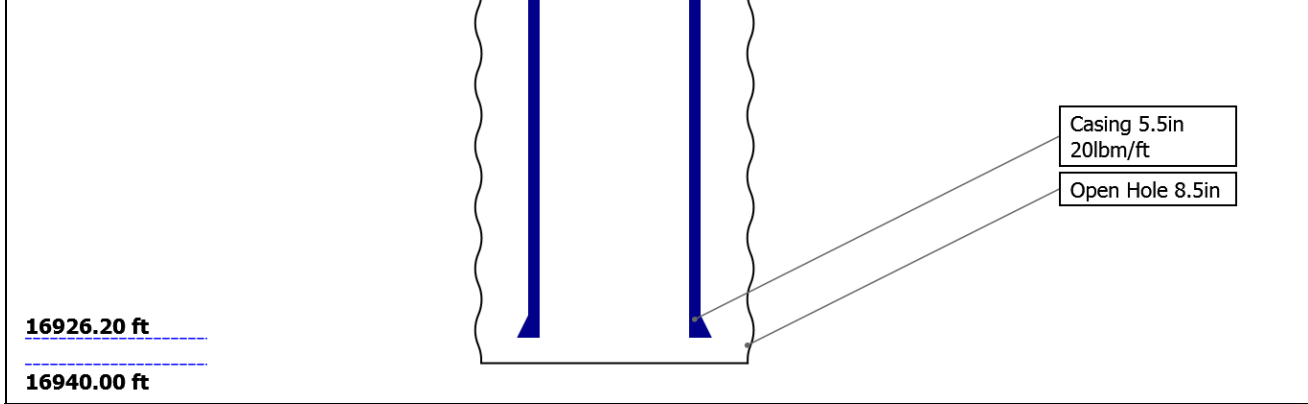
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Well Sketch



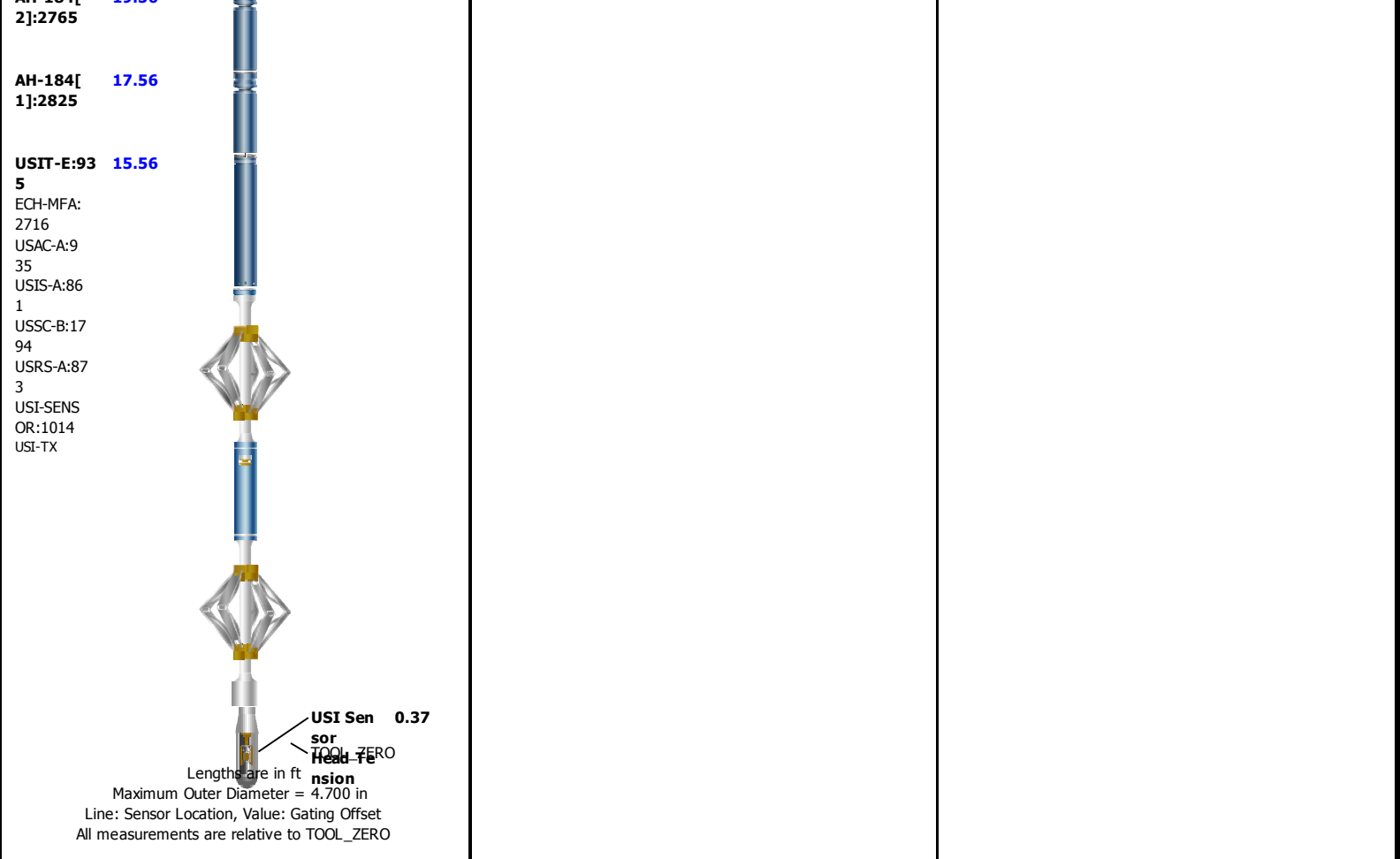


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	1955			
Top Logger (ft)	0	110	1955			
Bottom Driller (ft)	110	1955	16940			
Bottom Logger (ft)	110	1955	16940			
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	N/A	N/A			
Top Driller (ft)	0	0	0			
Top Logger (ft)	0	0	0			
Bottom Driller (ft)	110	1945.5	16926.2			
Bottom Logger (ft)	110	1945.5	16926.2			

Remarks and Equipment Summary

One: Toolstring				One: Remarks	
Equip name	Length	MP name	Offset	Thank you for choosing Schlumberger Wireline!	
LEH-QT	35.45			Log run for cement evaluation	
LEH-QT				Toolstring ran centralized as per tool sketch with booster kit and small hole springs	
DTC-H	31.97	CTEM	31.07	USRS-A sub with USI-TX transducer used	
ECH-KC		HV	0.00	Main pass logged with 2500 psi	
DTC-H		TelStatus	28.97	Repeat pass logged with no pressure	
		ToolStatus	28.97	Log correlated to marker joint @ 5535.9 ft	
HGNS-H	28.97	Temperature	28.94	Crew: Alex Schaab, Levi Arnold	
HGNH		GR	28.23		
NSR-F					
NPV-N					
HGNS-H					
HACCZ-H					
HMCA-H					
		CNL Porosity	21.89		
		HMCA	19.56		
		HGNS	19.56		
		Accelerometer	0.00		
AH-184T	19.56				



Depth Summary			
	One		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6690		
Calibration Date	04-Jan-2019		
Calibrator Serial Number	IDWC-C-57		
Calibration Cable Type	7-46 PXS		
Wheel Correction 1	-5		
Wheel Correction 2	-4		
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	7-46PI-XS		
Serial Number	F715040		
Length	23500.00 ft		
Conveyance Type	Wireline		

Rig Type	Crane USA	
One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All schlumberger Standards followed
Rig Up Length At Surface		IDW used as primary depth measurement
Rig Up Length At Bottom		Z-Chart used as secondary depth measurement
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	6322.52	57.6

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 = "Theoretical".
CZMD uses theoretical results.
MUD_N_THE=1.04
DFD=1.01g/cm3(8.40lbm/gal)

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 SP1	8.1.99839.3100
Application Patch	Wireline_Hotfix-Mandatory-2018SP1_8.1.106254

Pass Summary

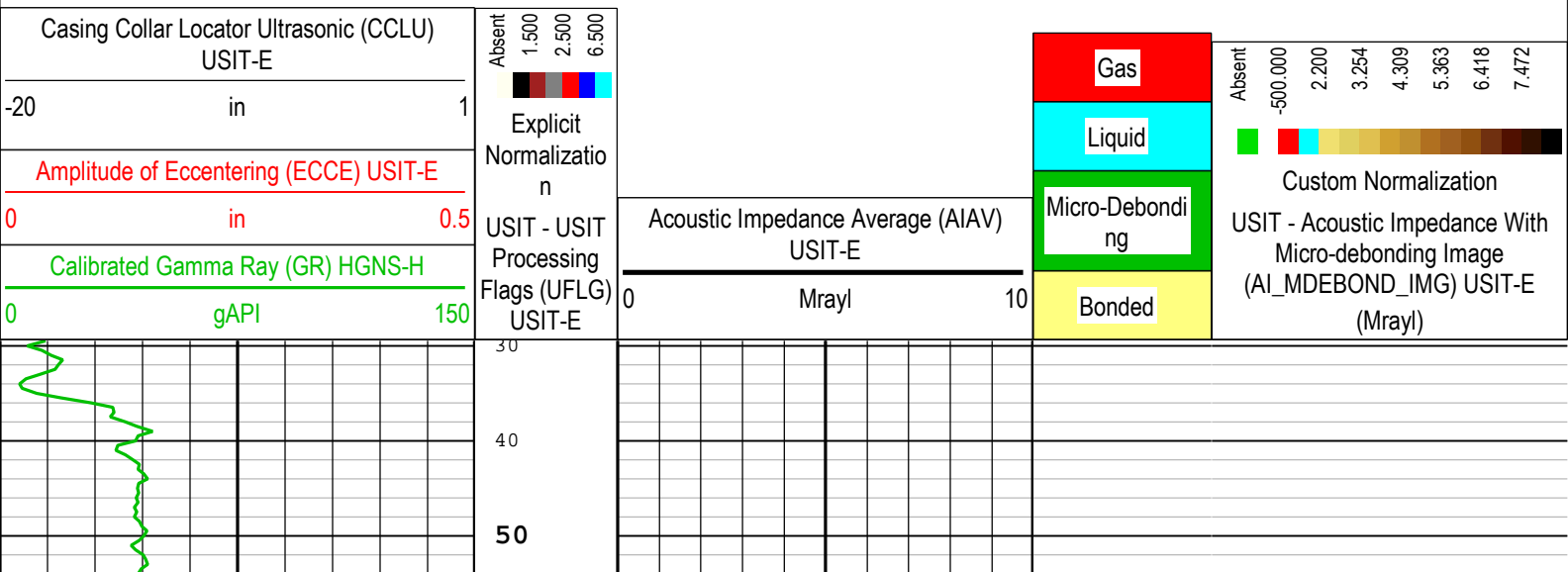
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up	57.60 ft	6322.53 ft	10-Jan-2019 1:22:08 PM	10-Jan-2019 2:08:49 PM	ON	3.95 ft	Yes

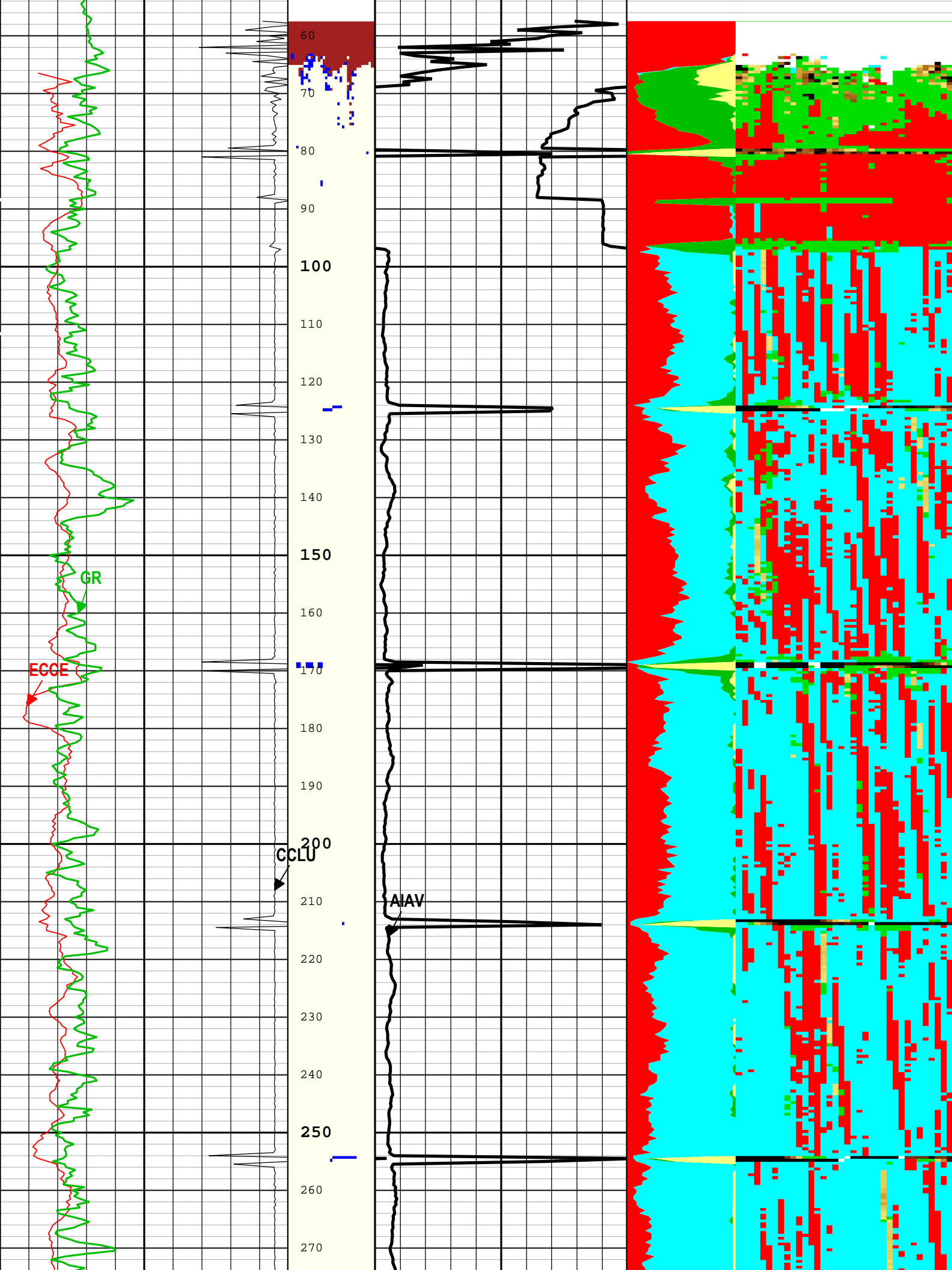
All depths are referenced to toolstring zero

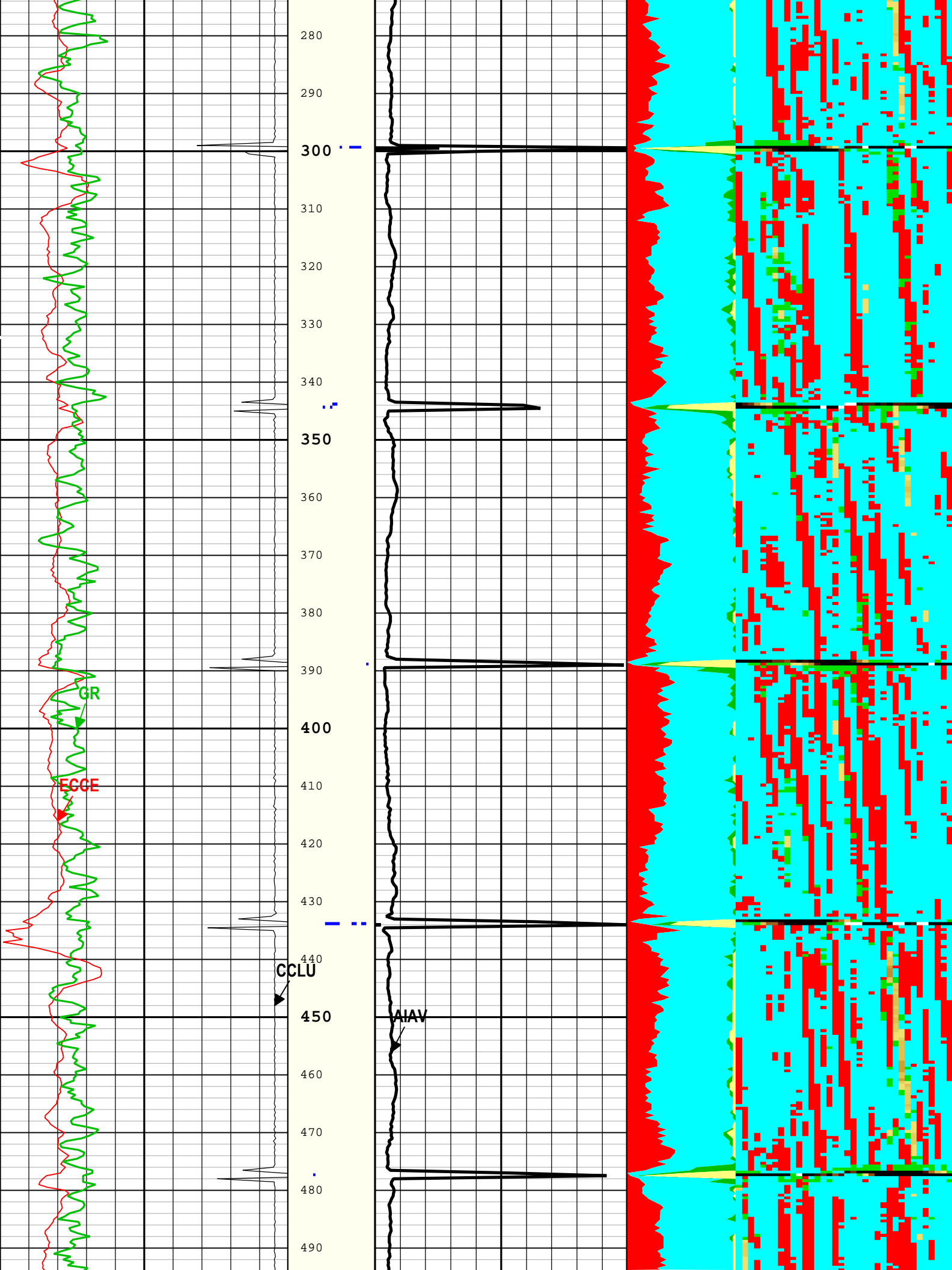
Log	Company:Noble Energy Inc. Well:Dorothy State LG16-748 One: Log[4]:Up:S005
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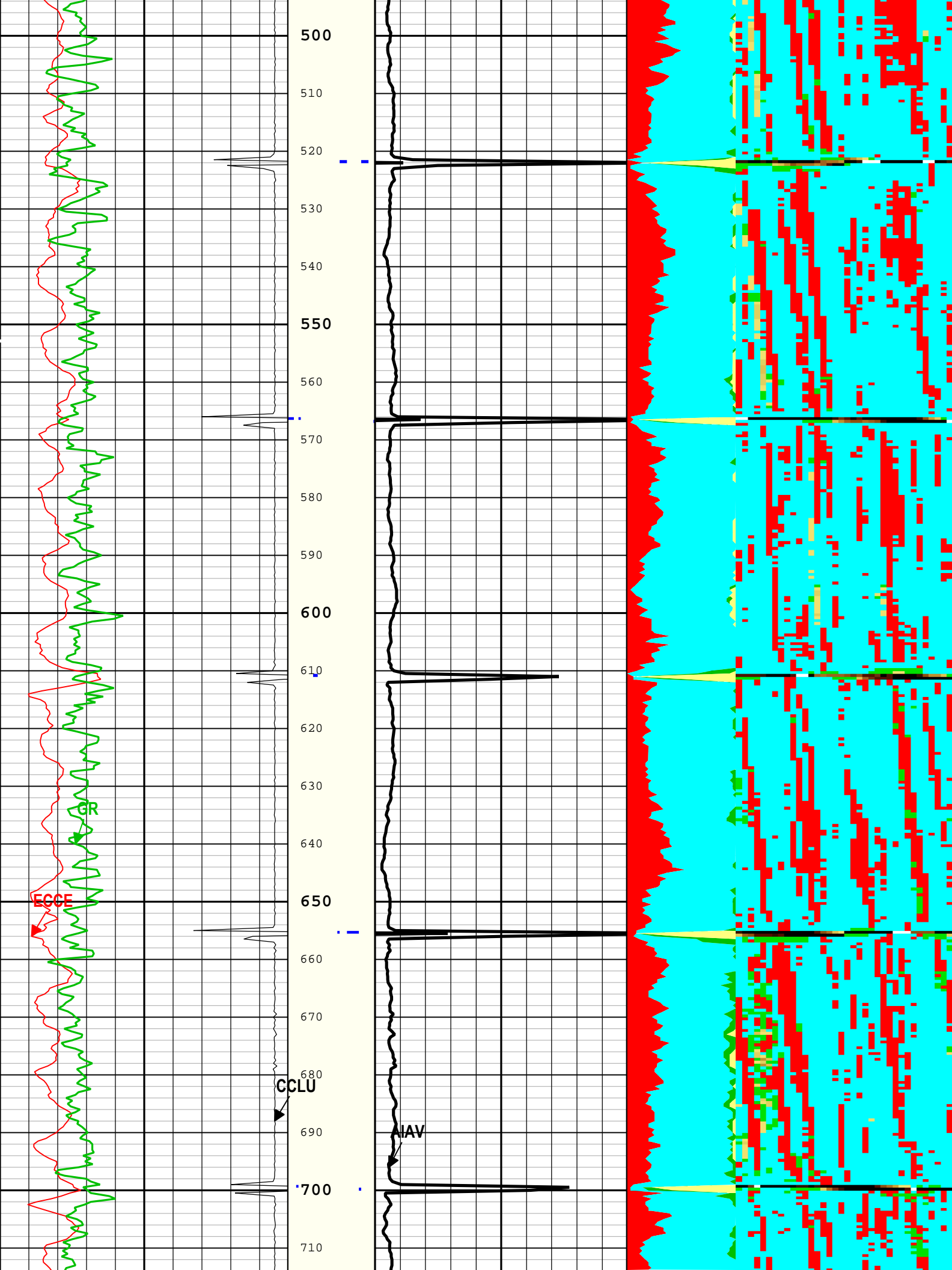
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Creation Date: 10-Jan-2019 17:05:00

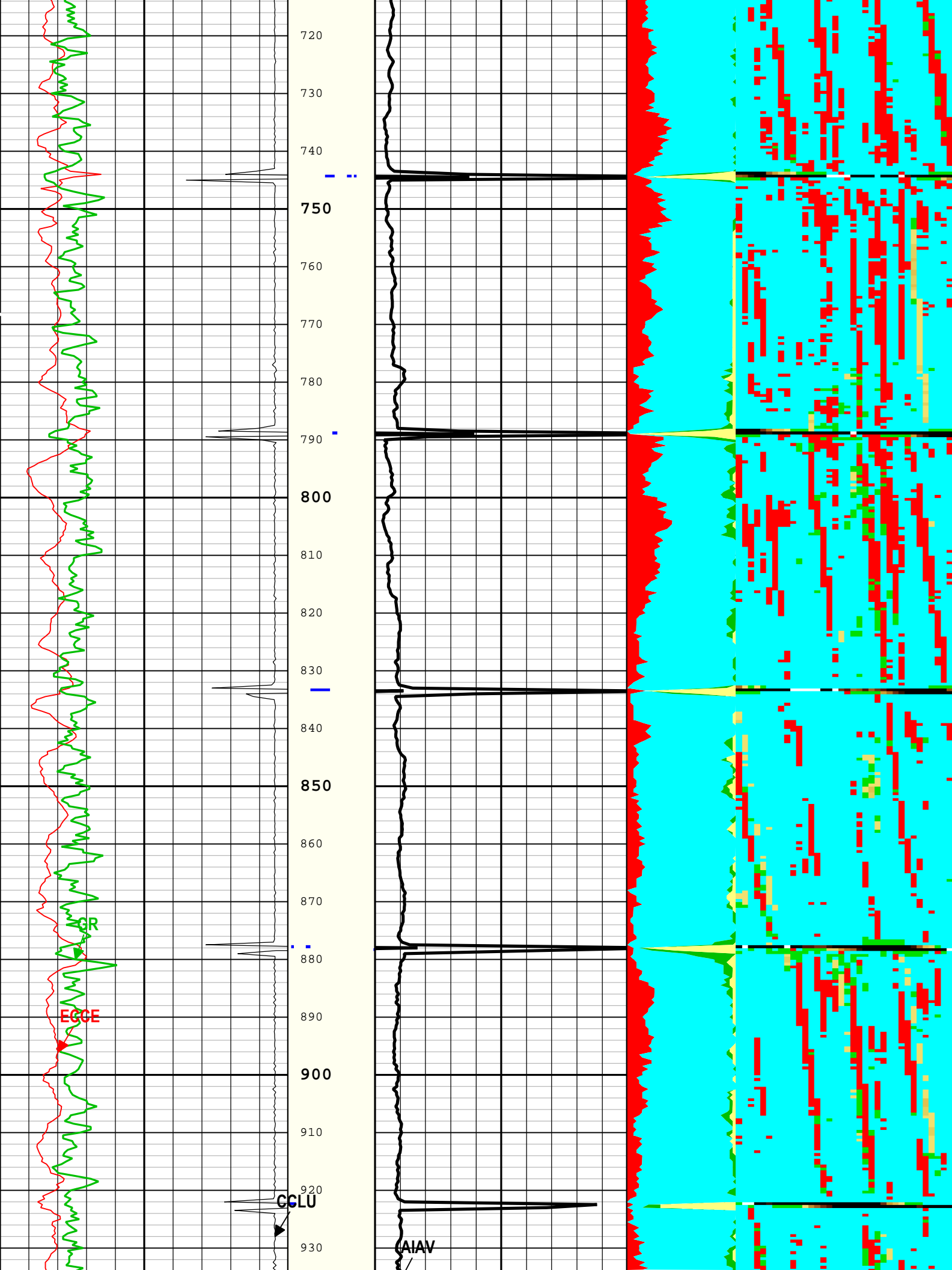
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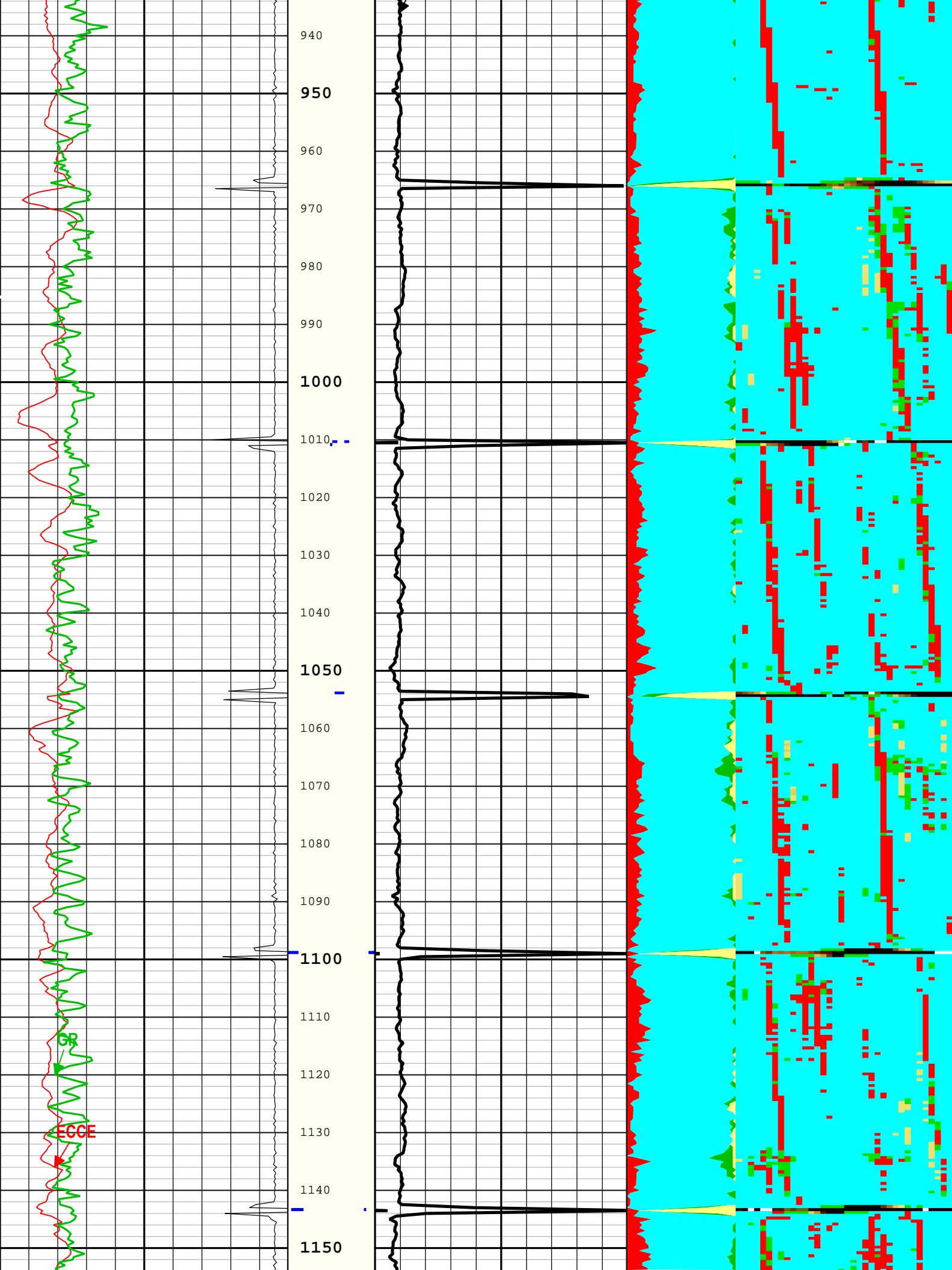


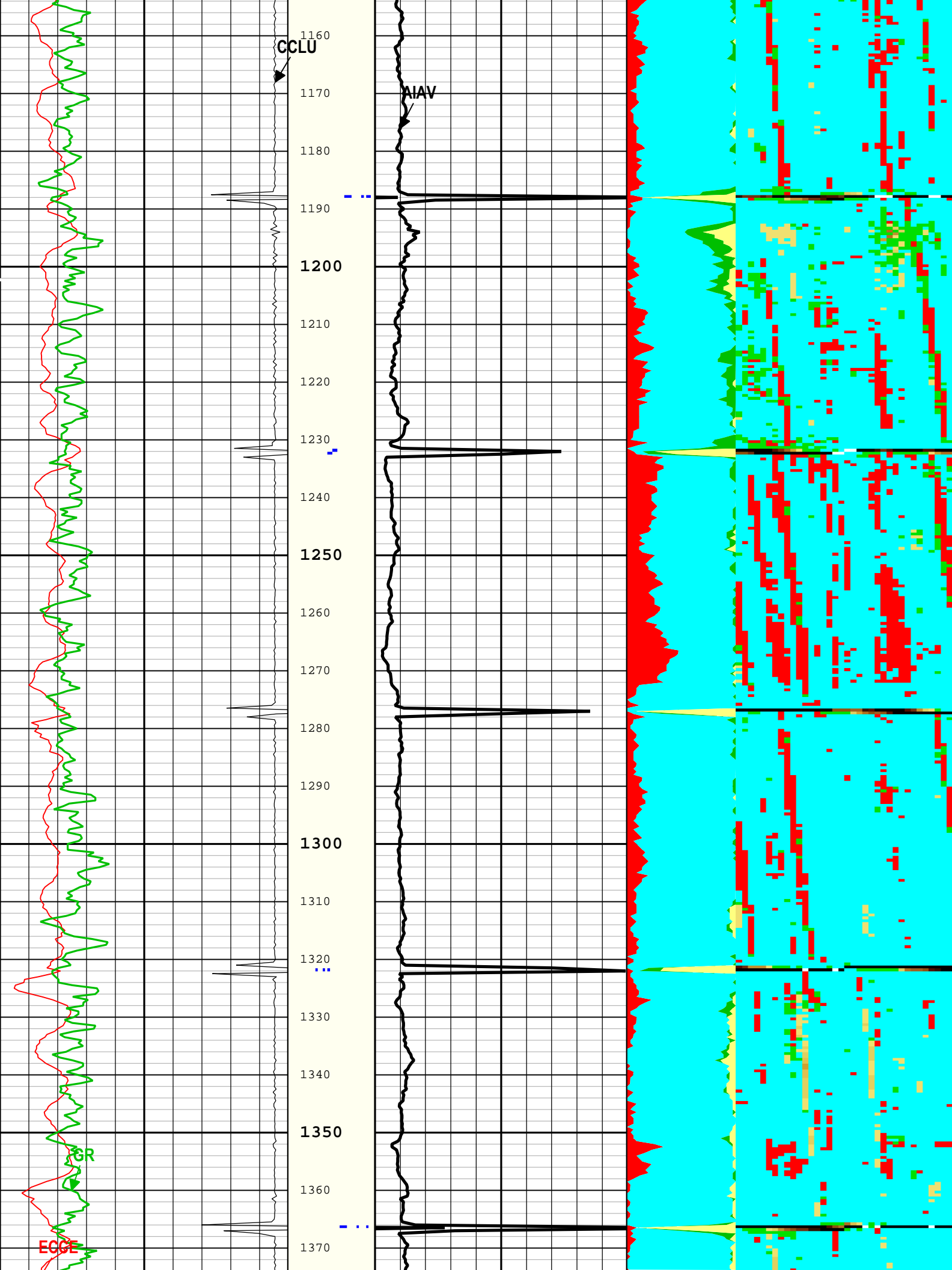


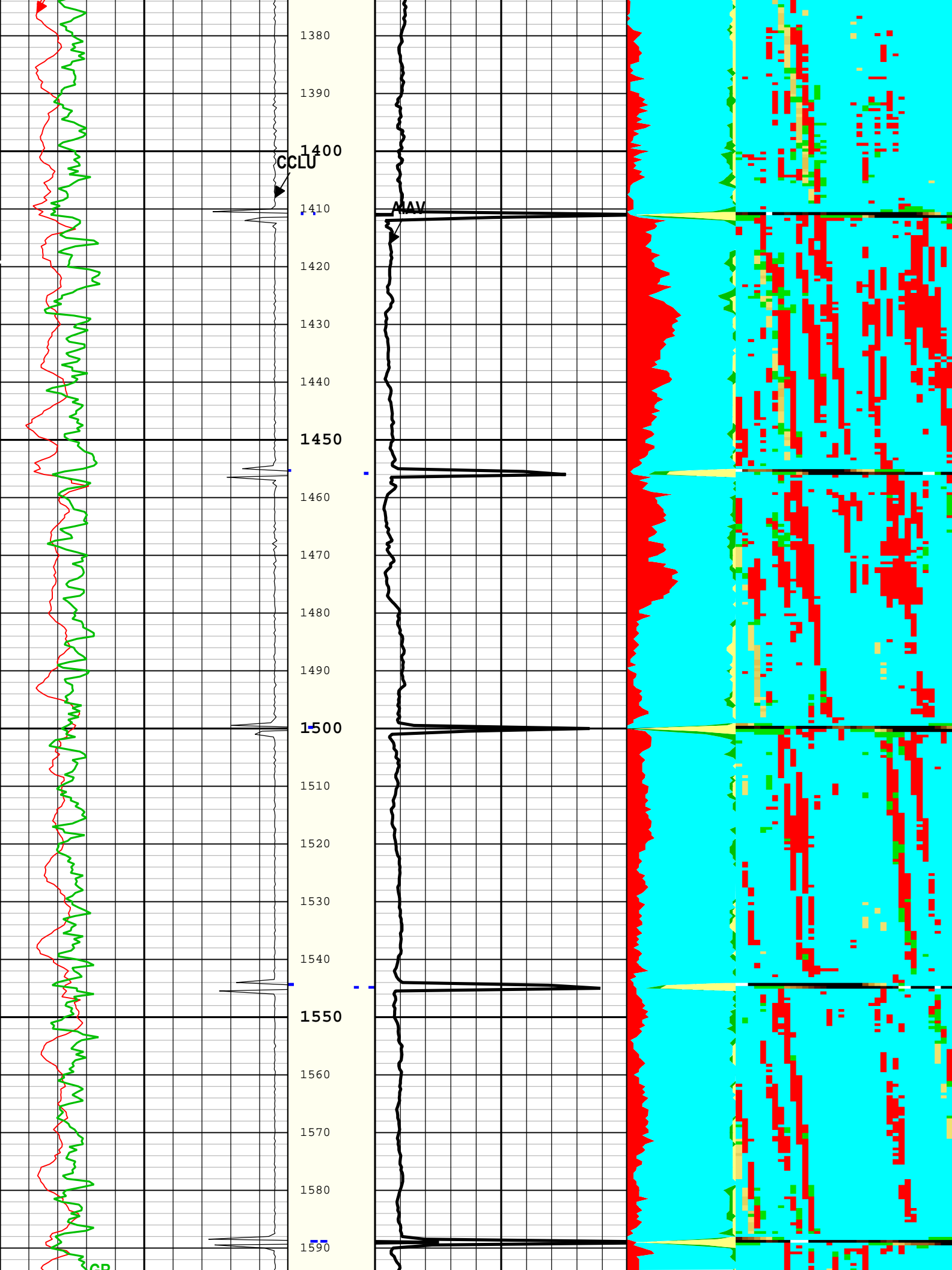


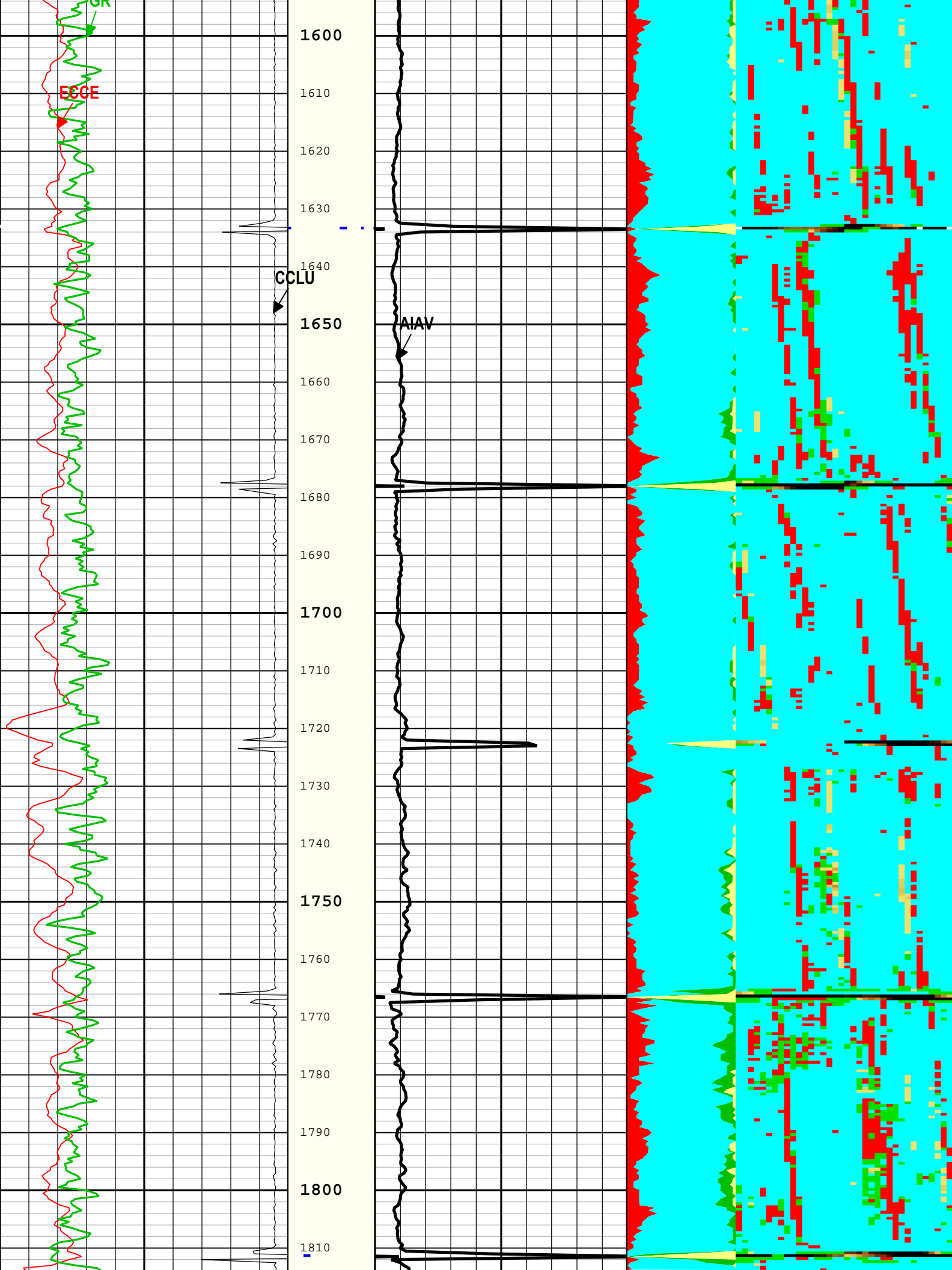


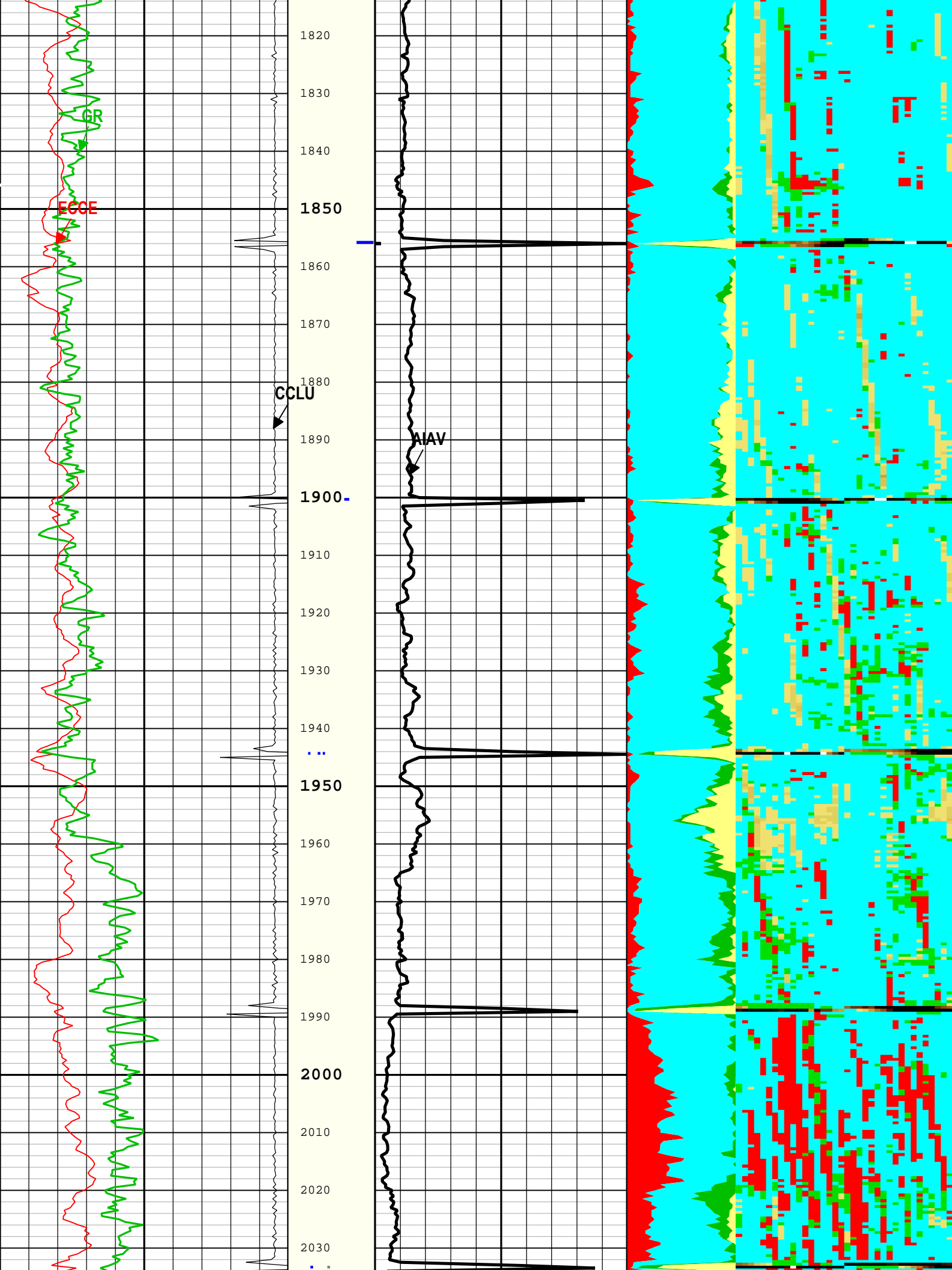


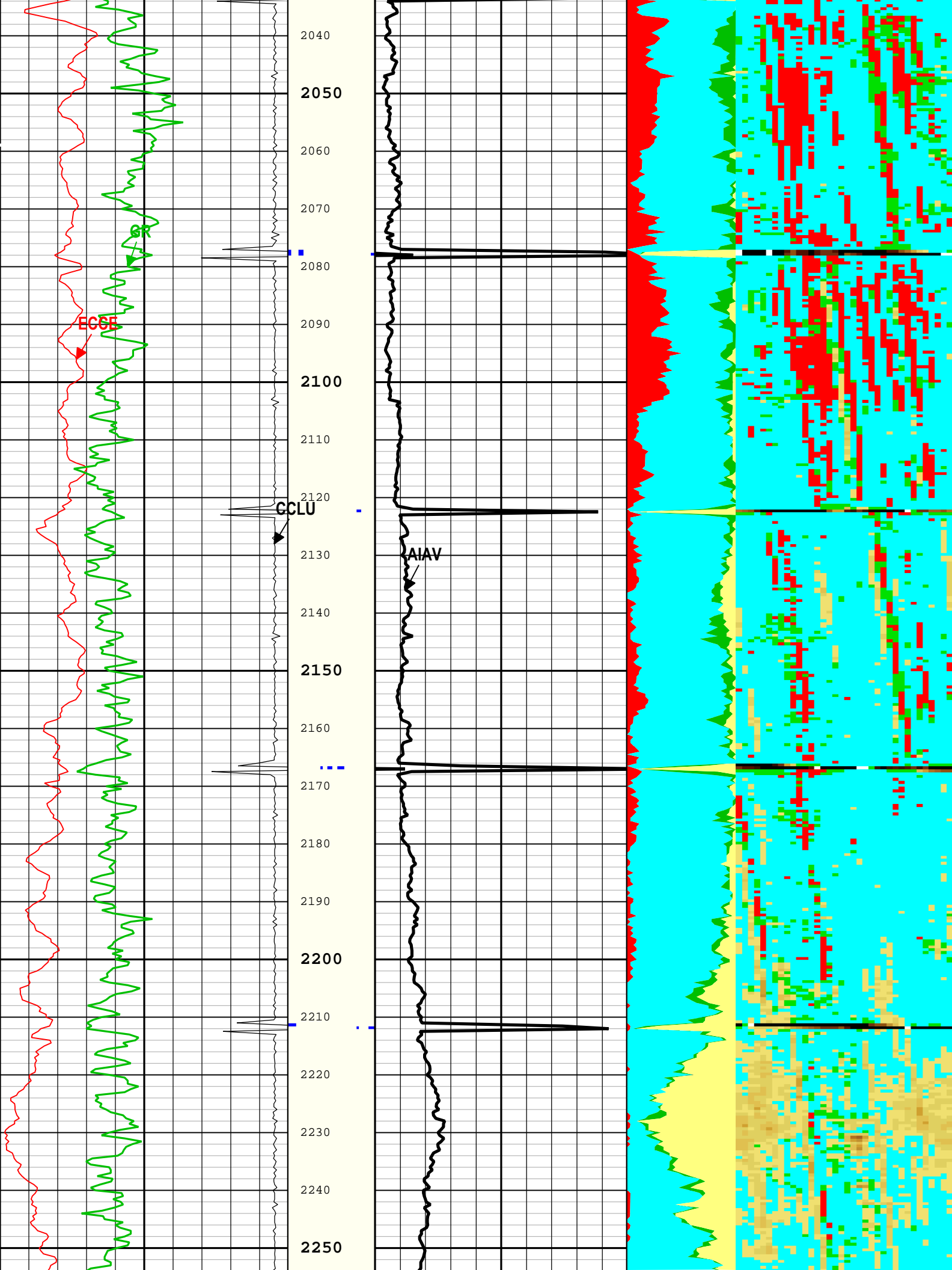


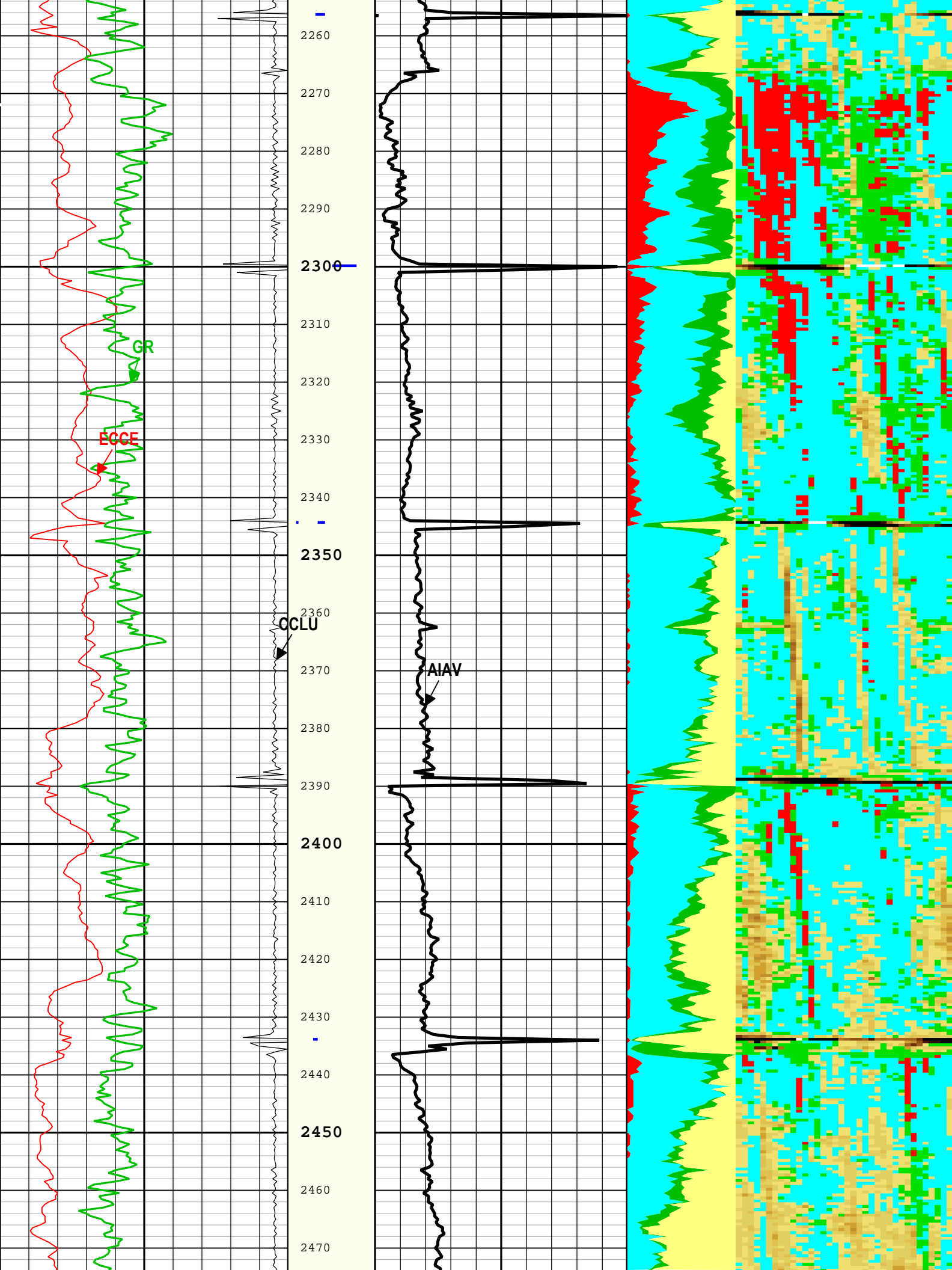


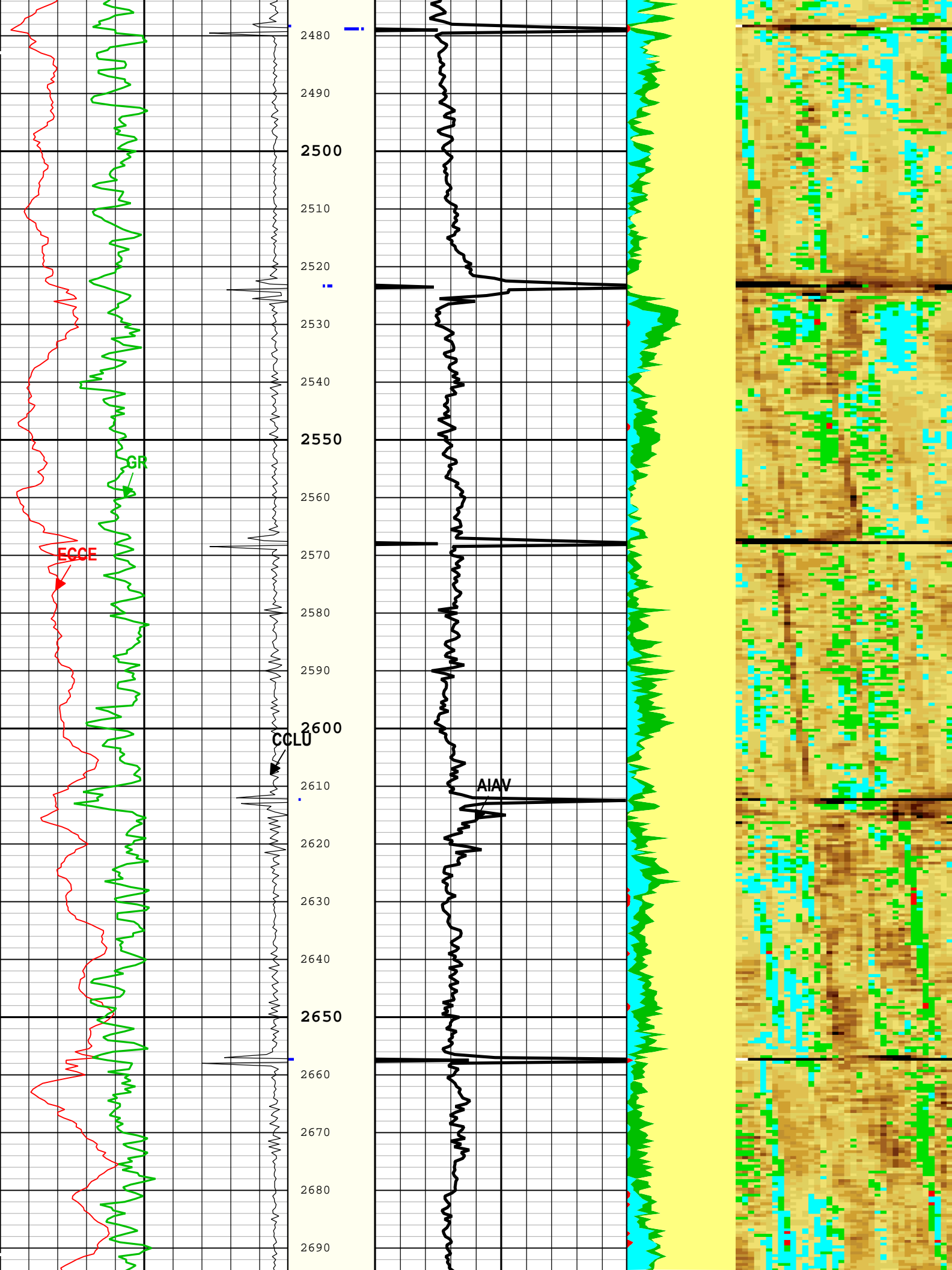


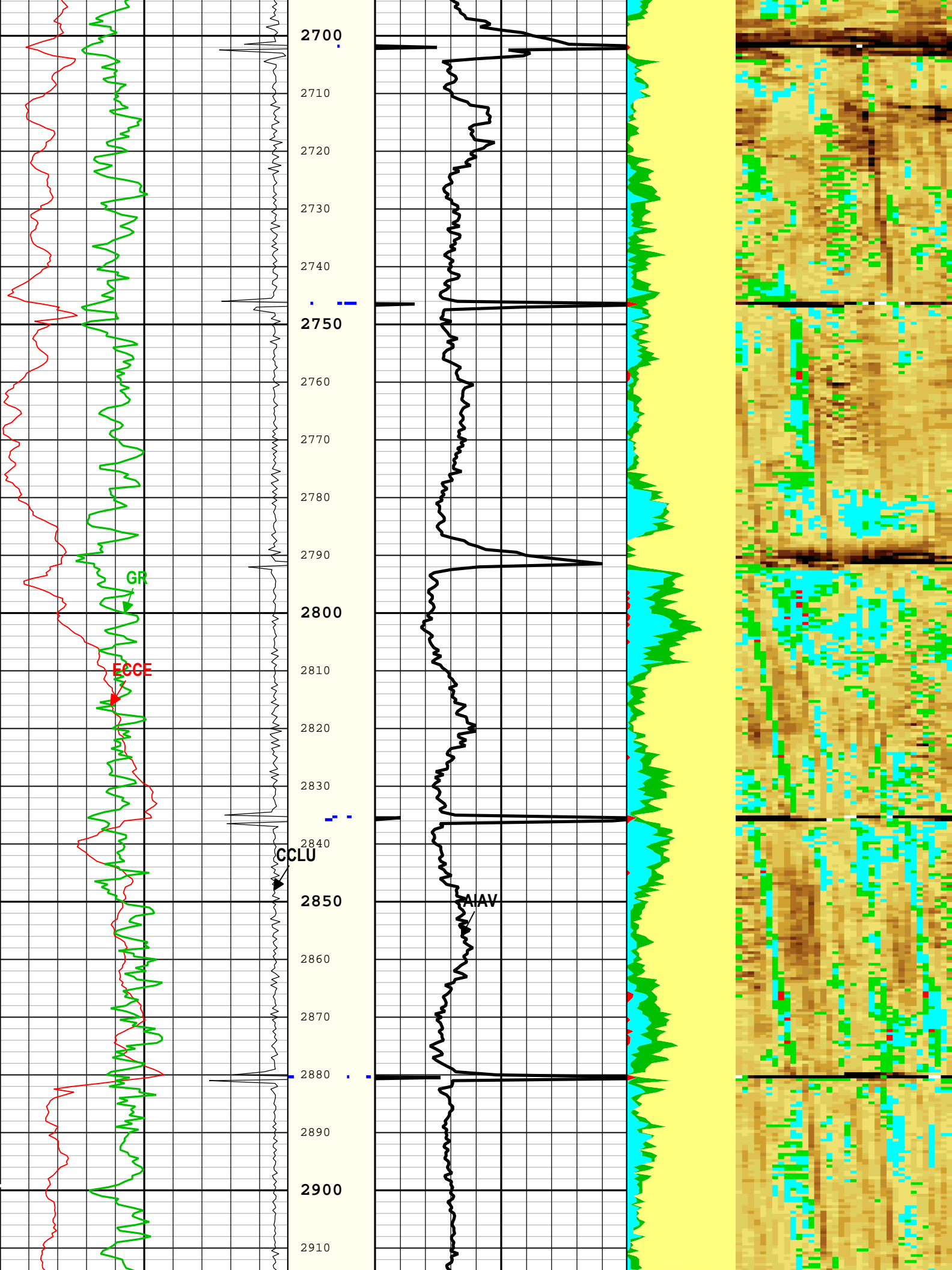


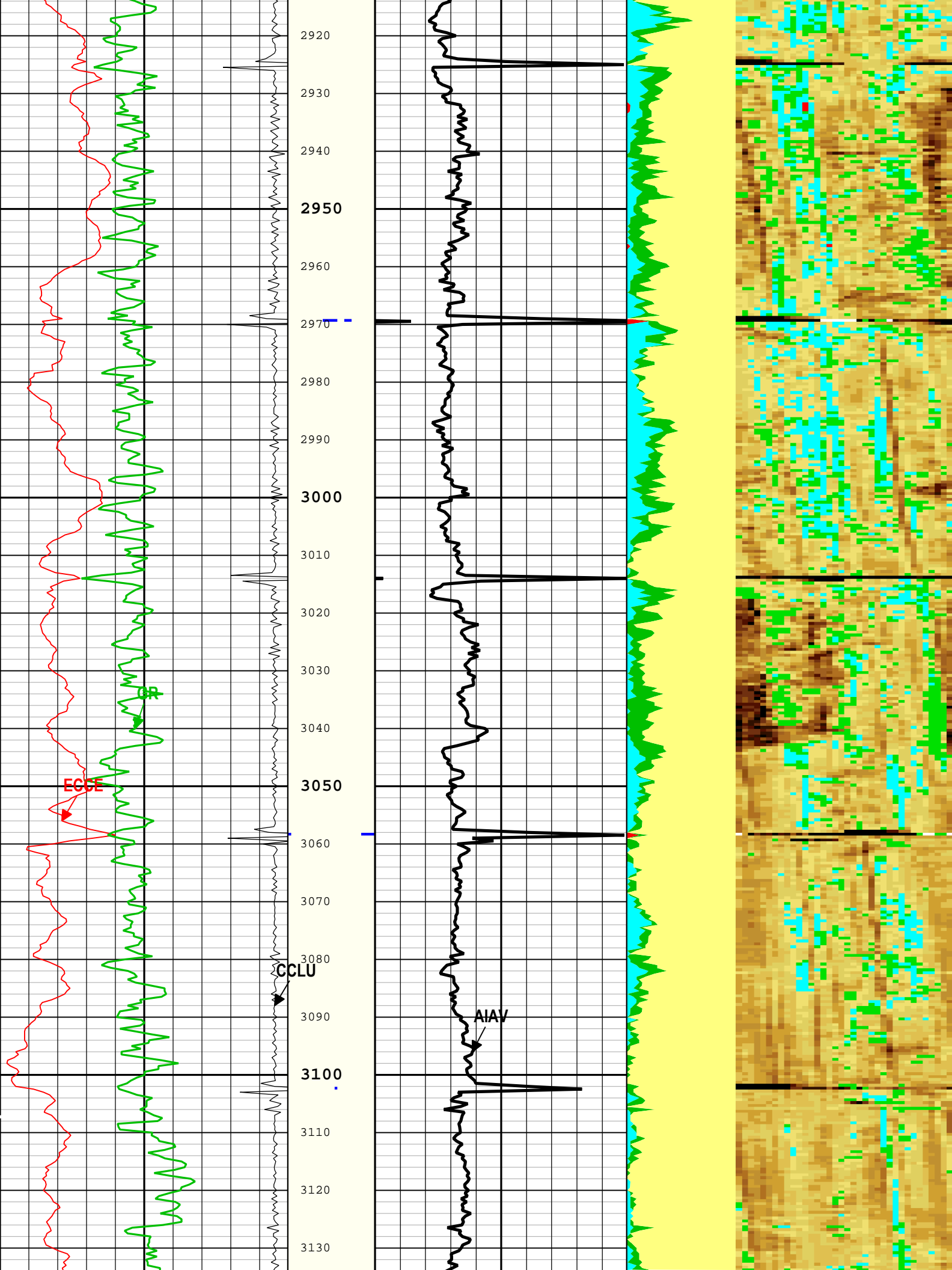


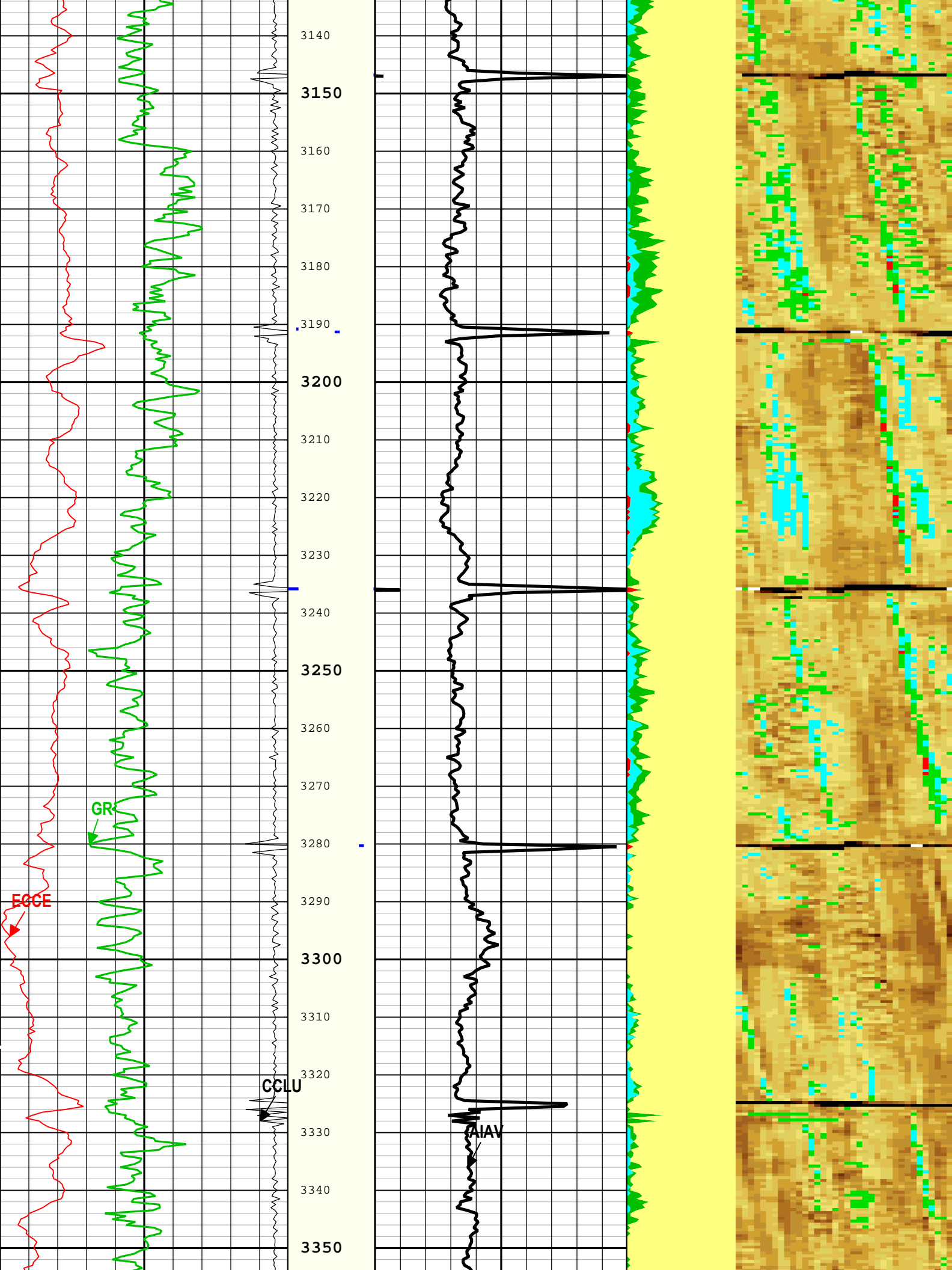


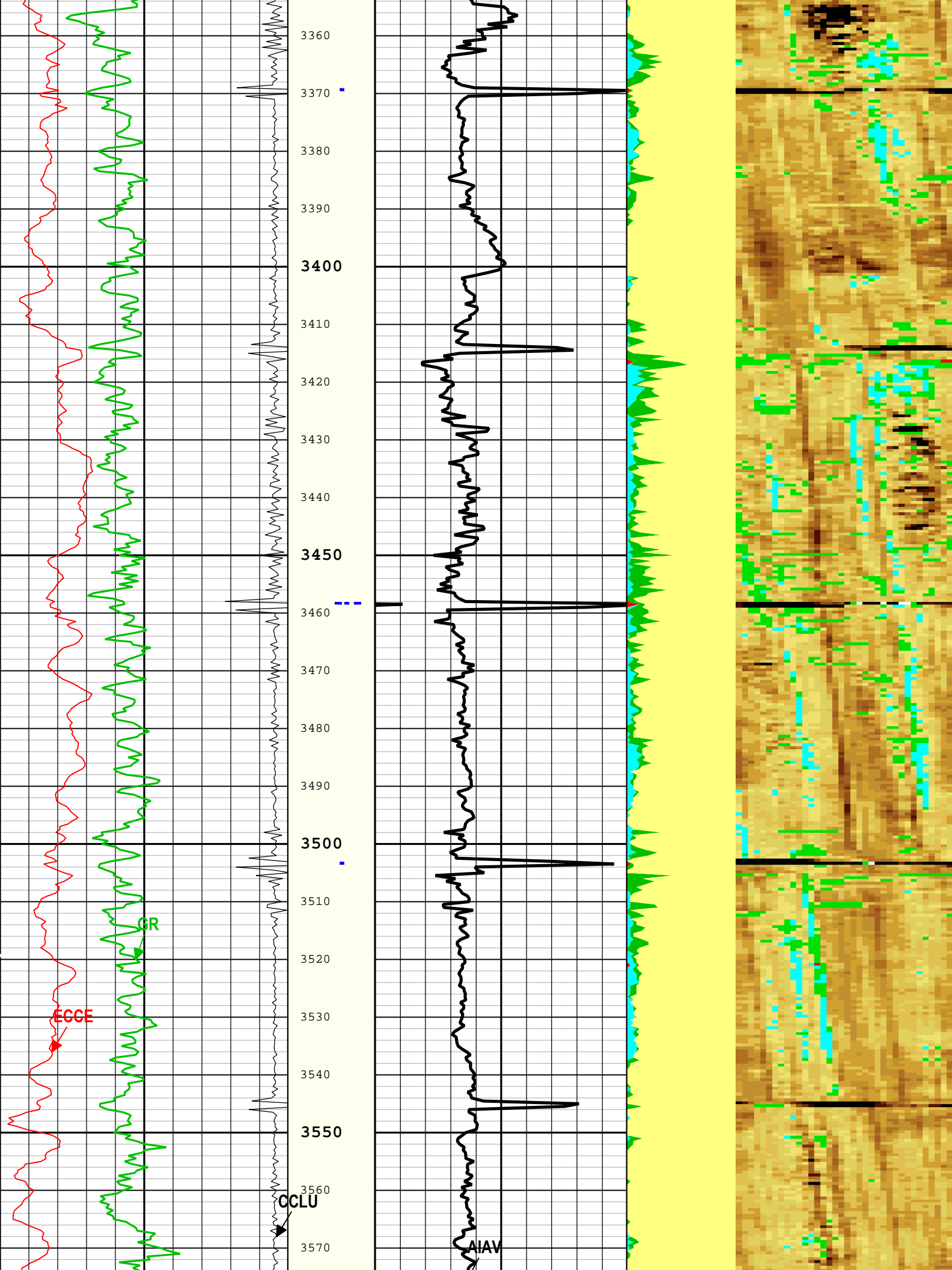


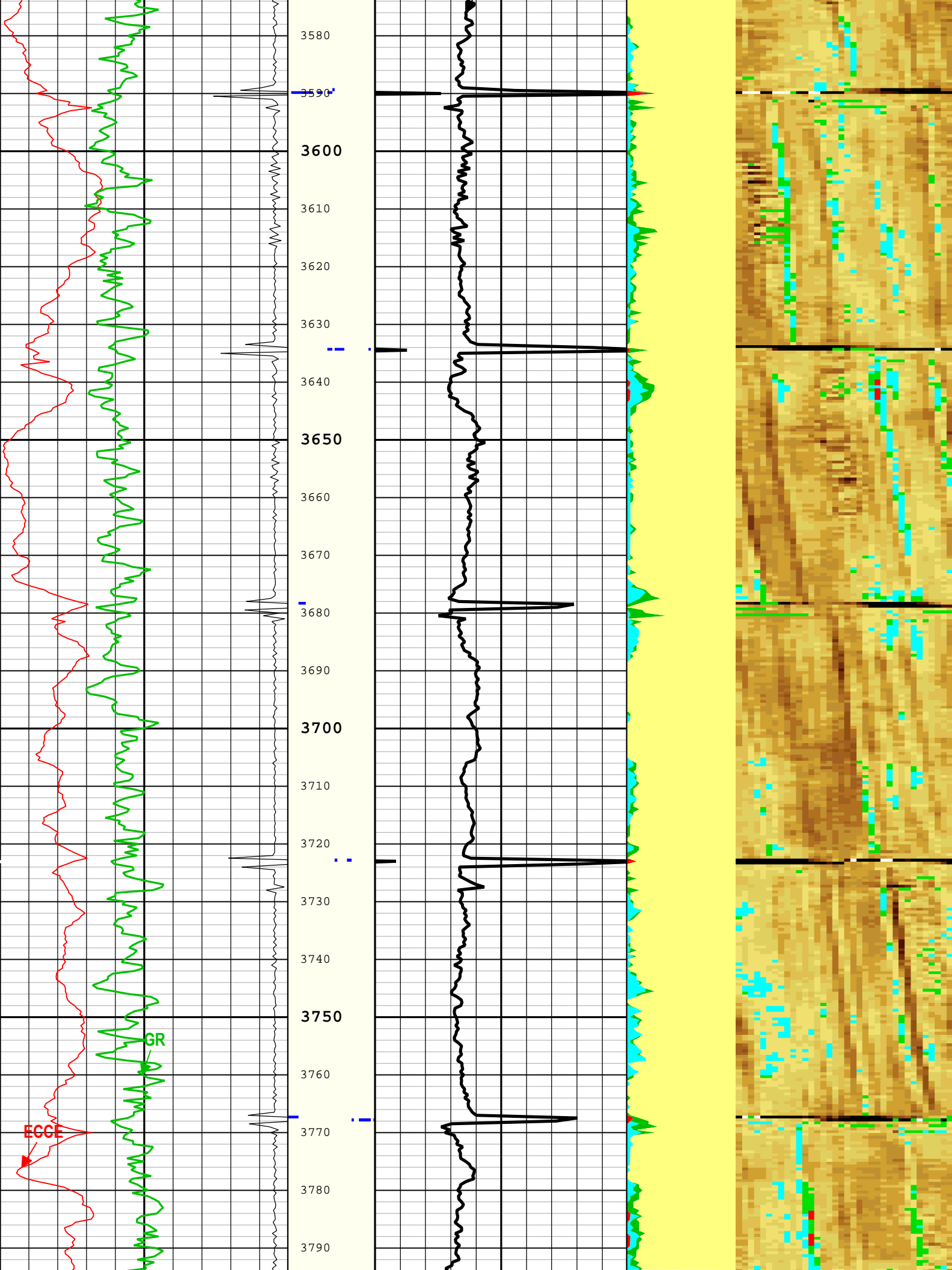


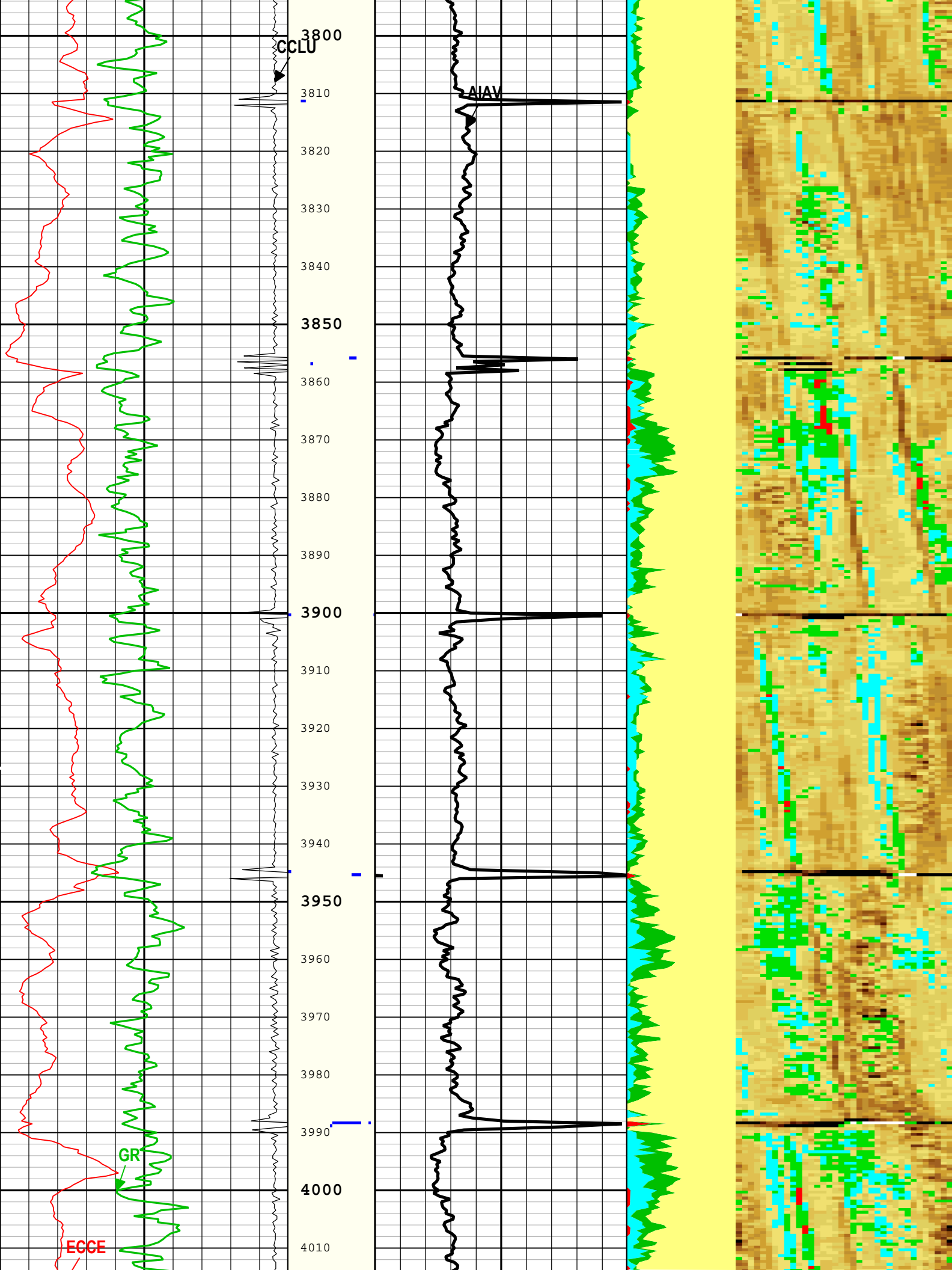


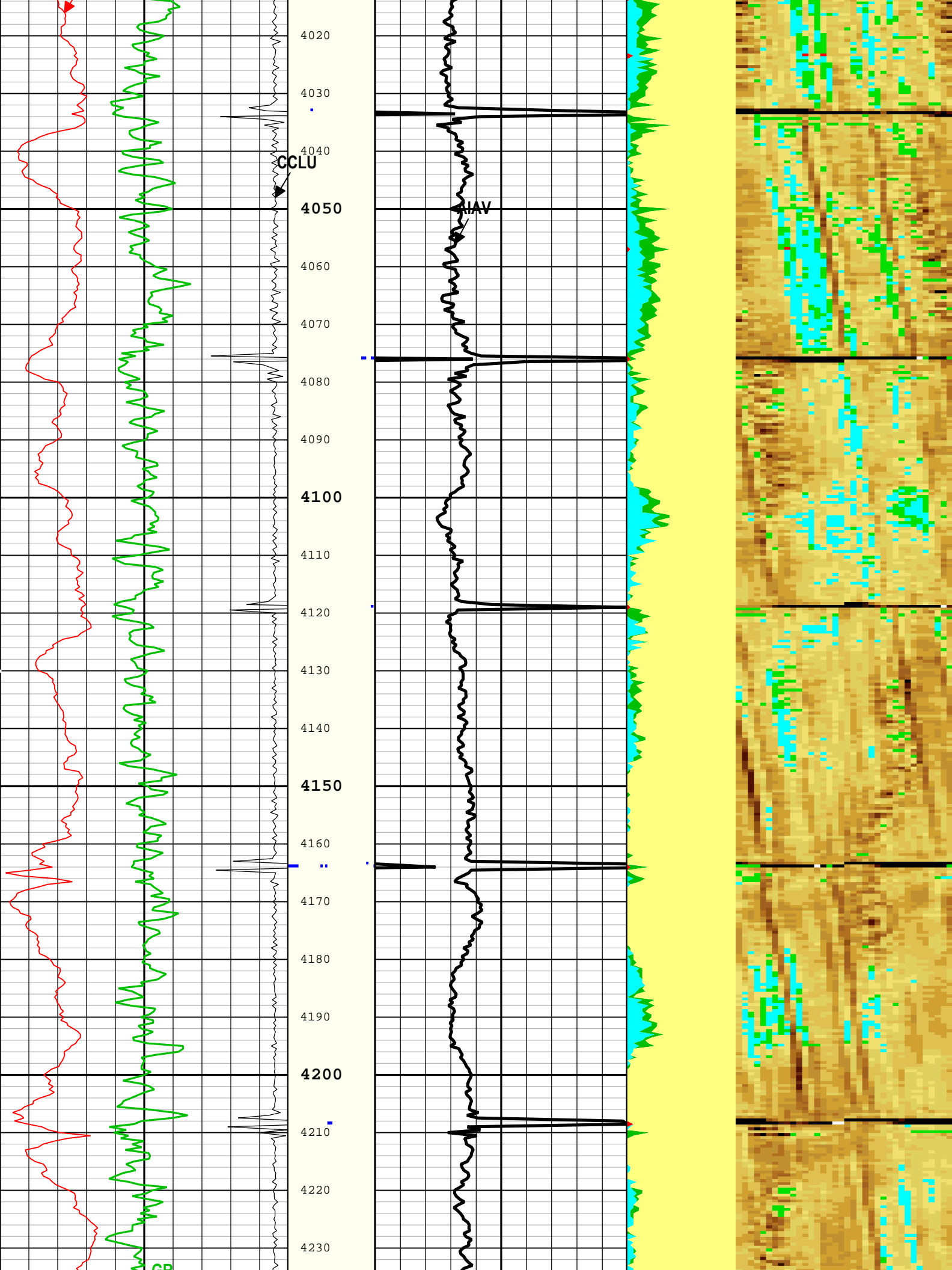


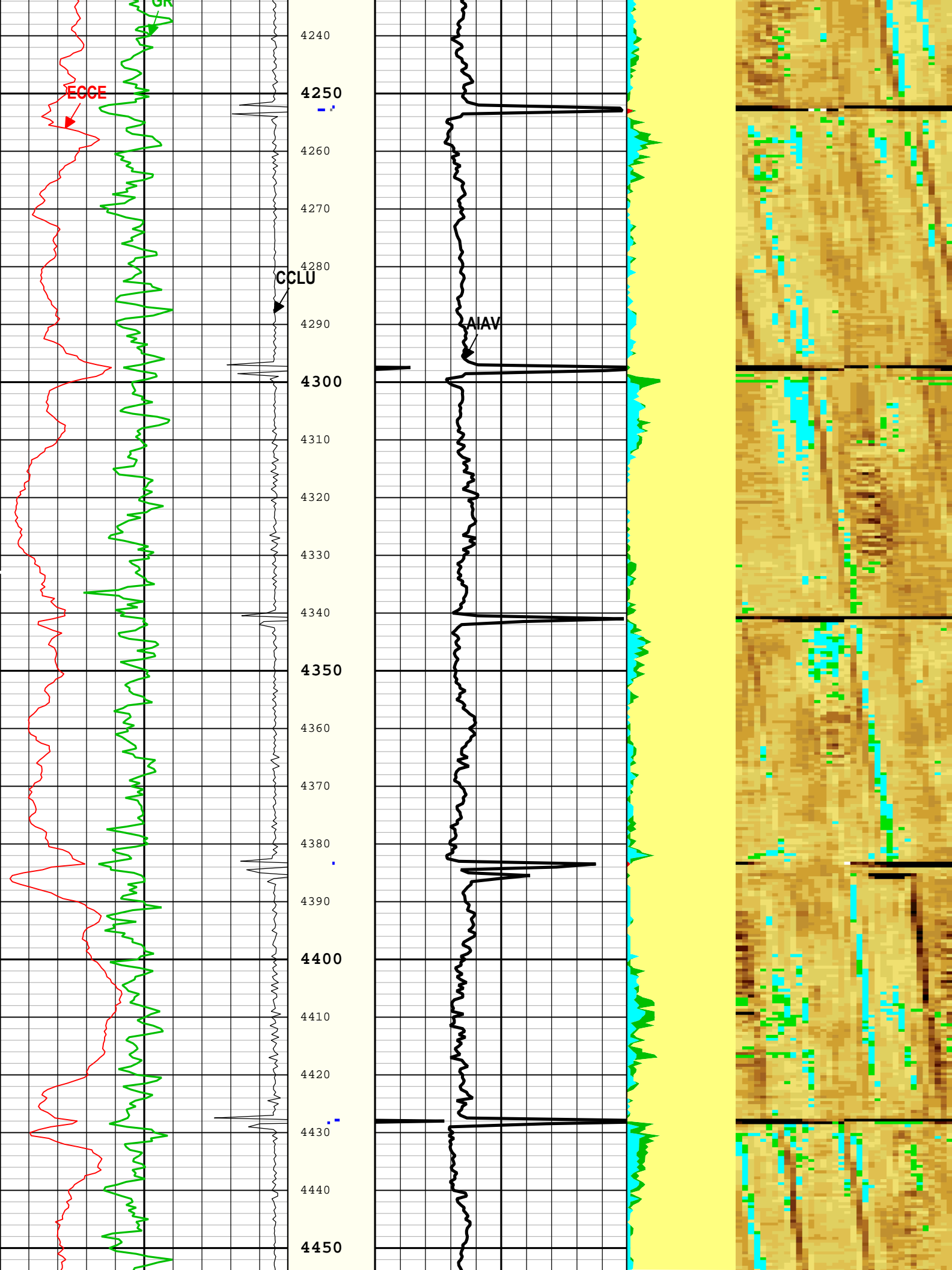


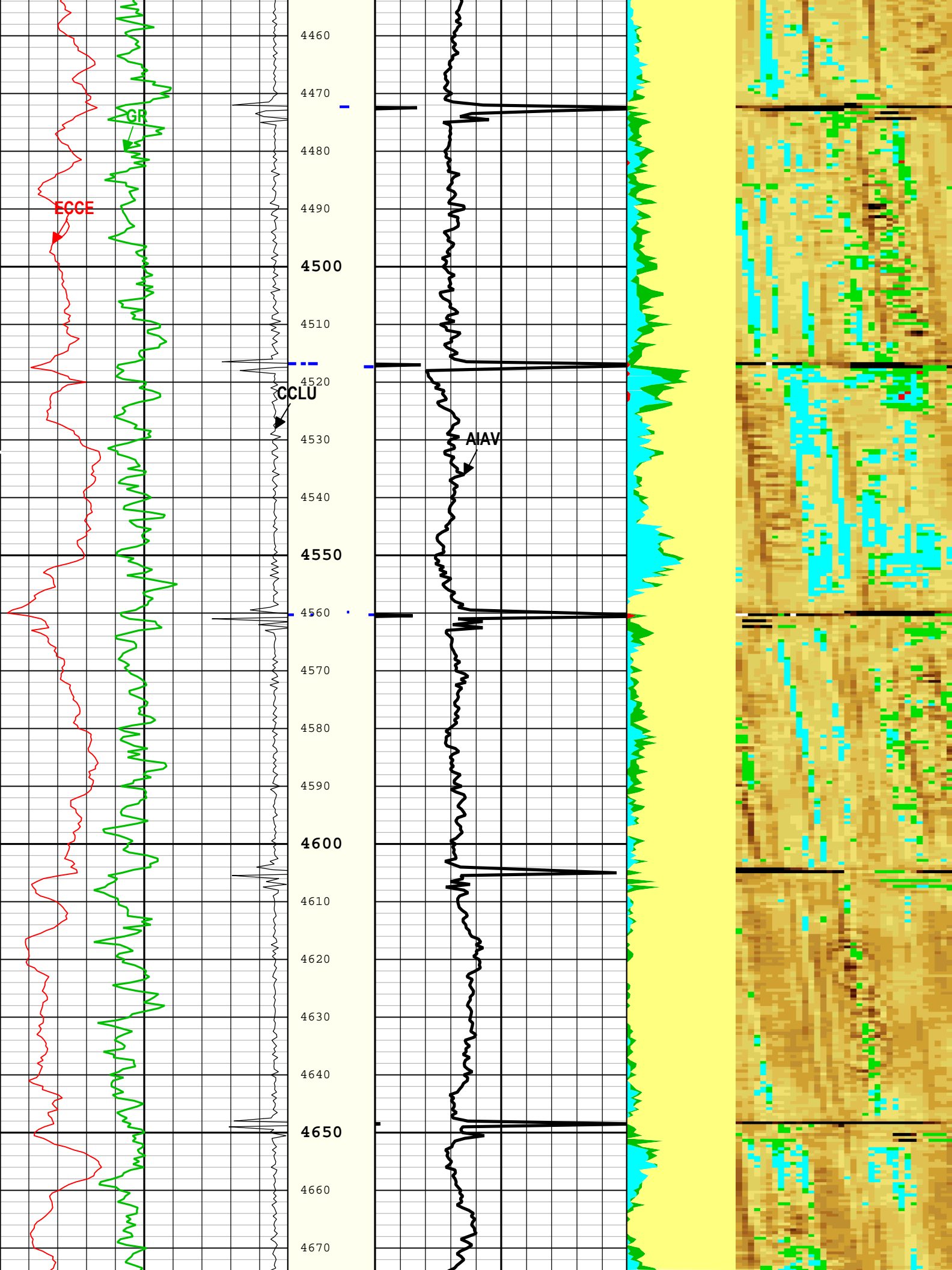


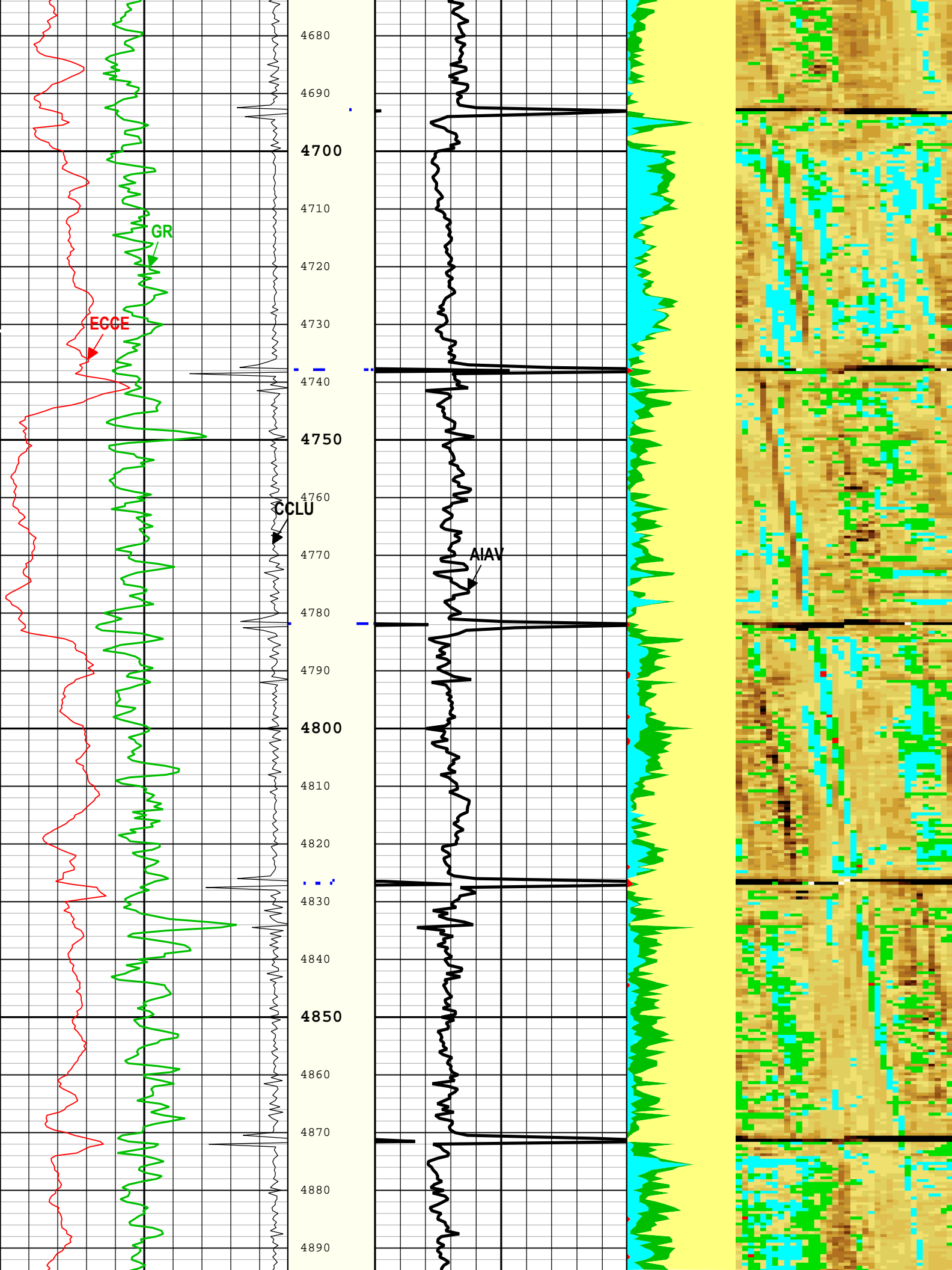


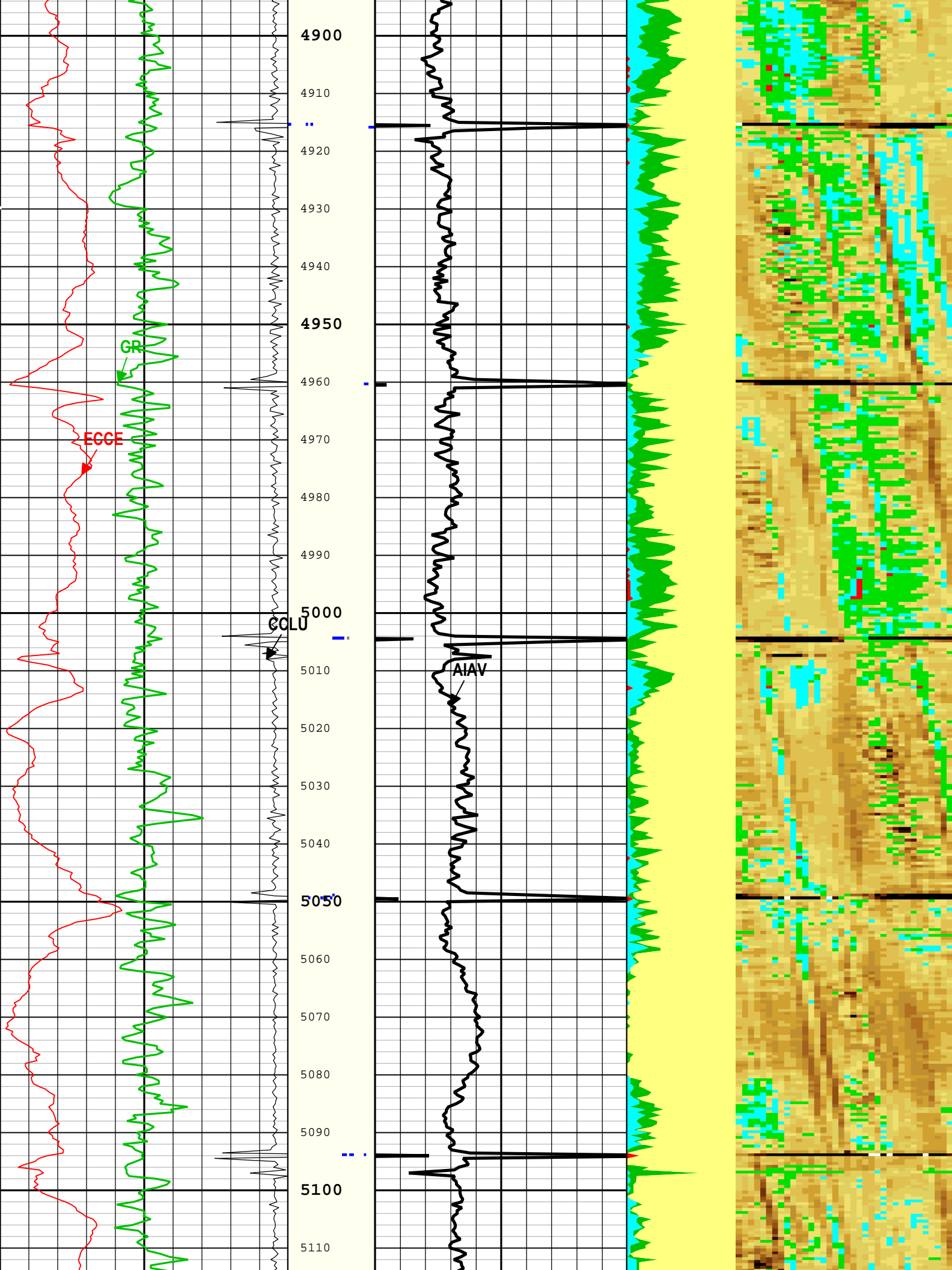


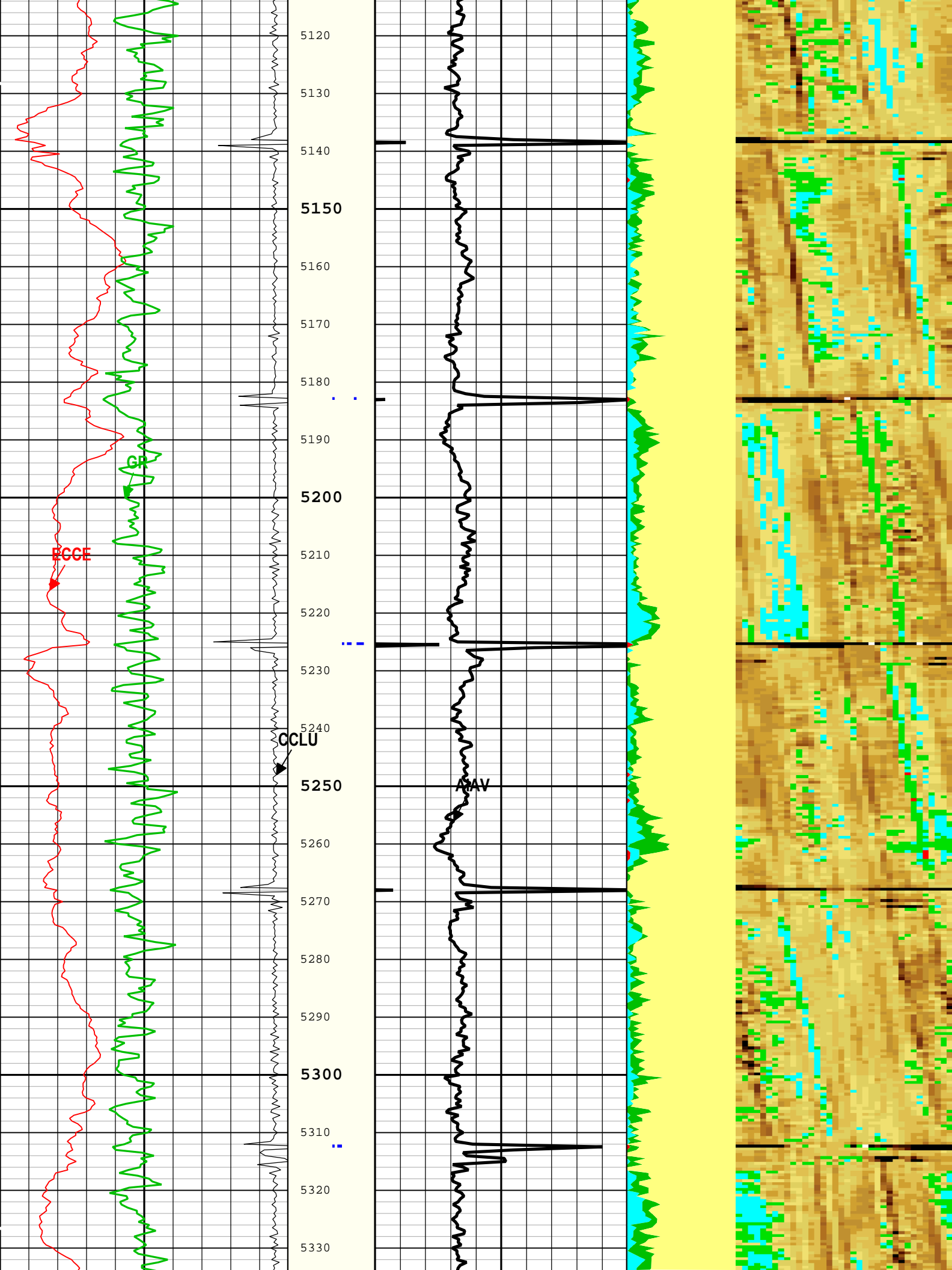


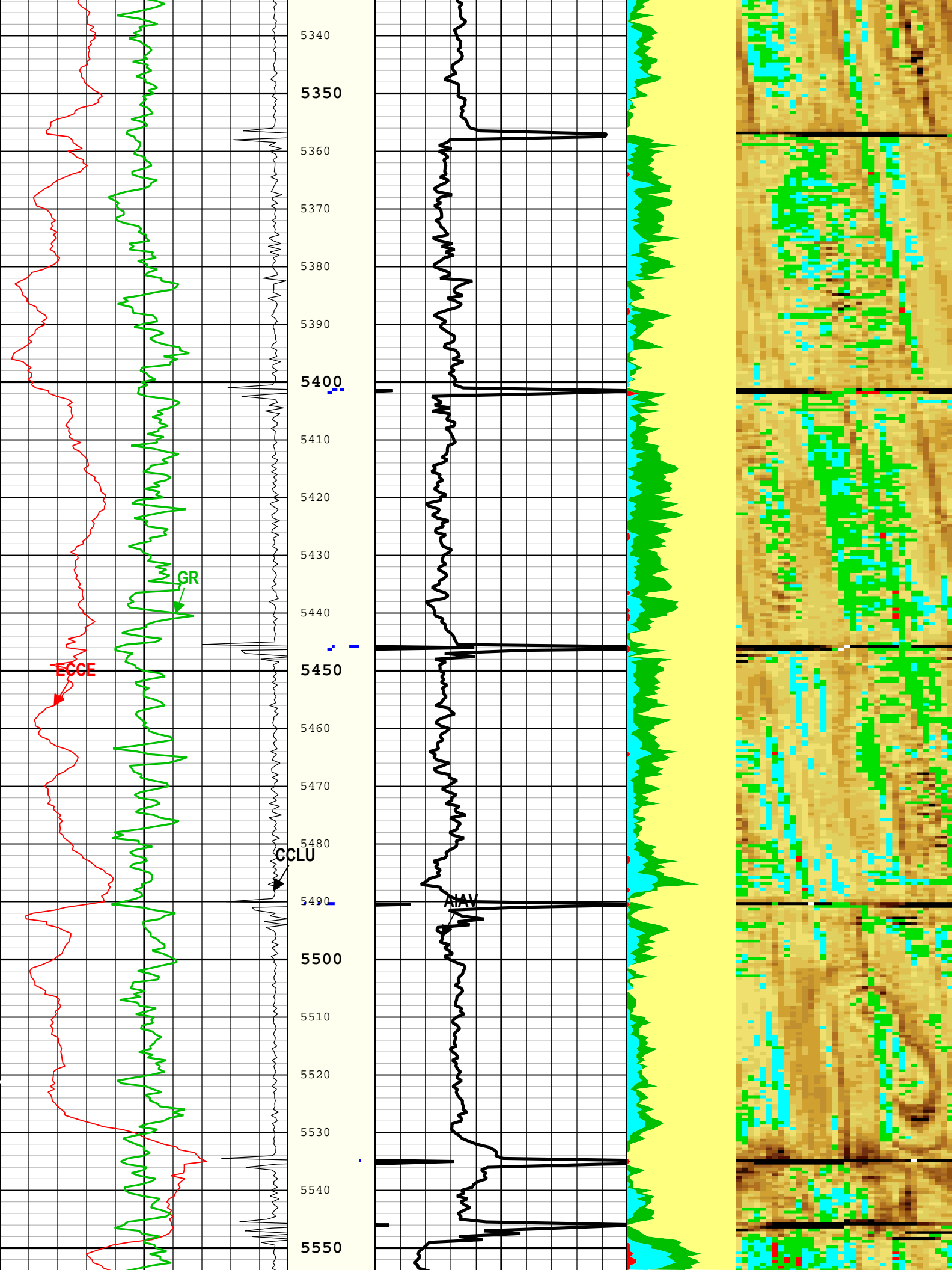


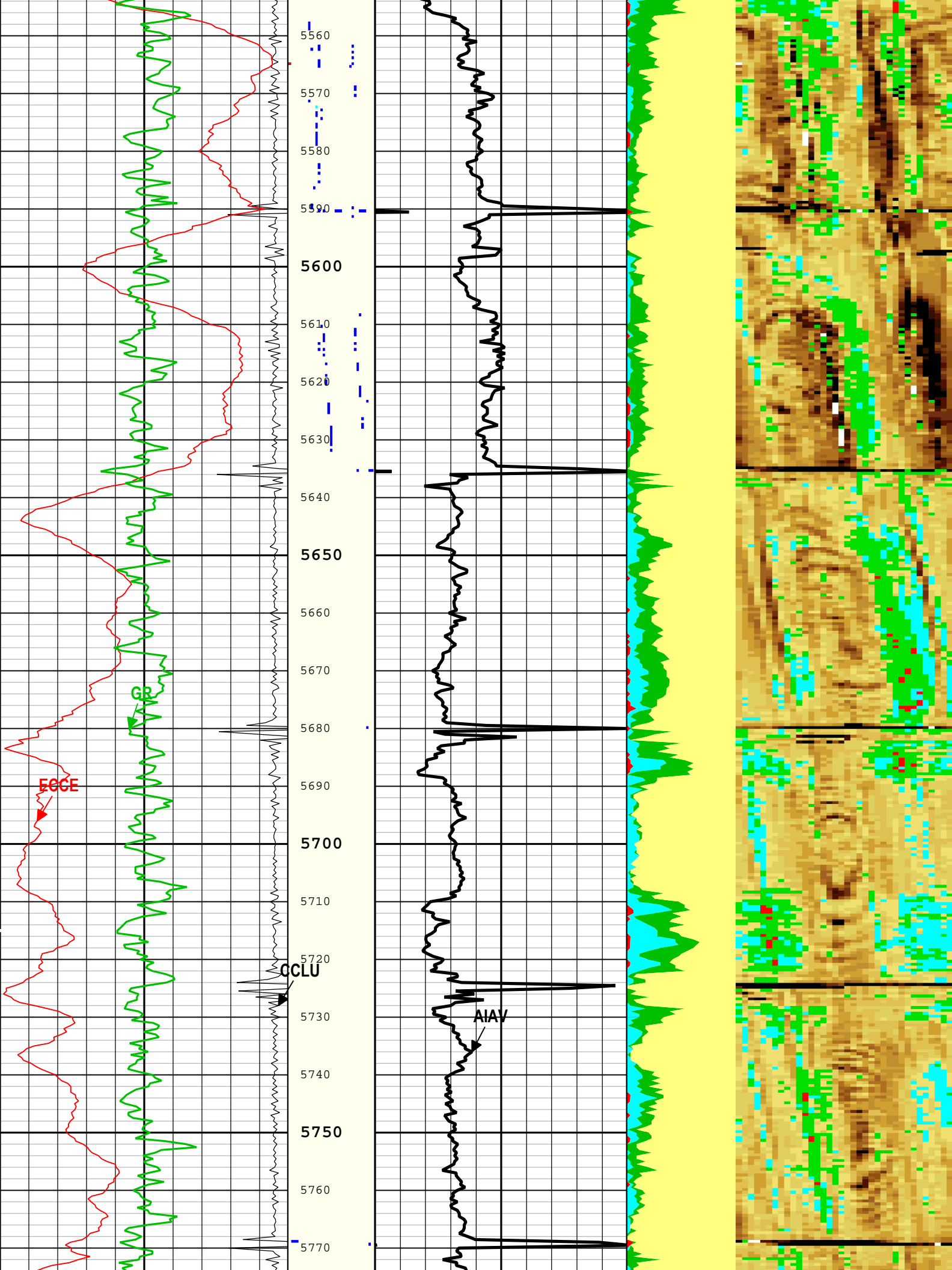


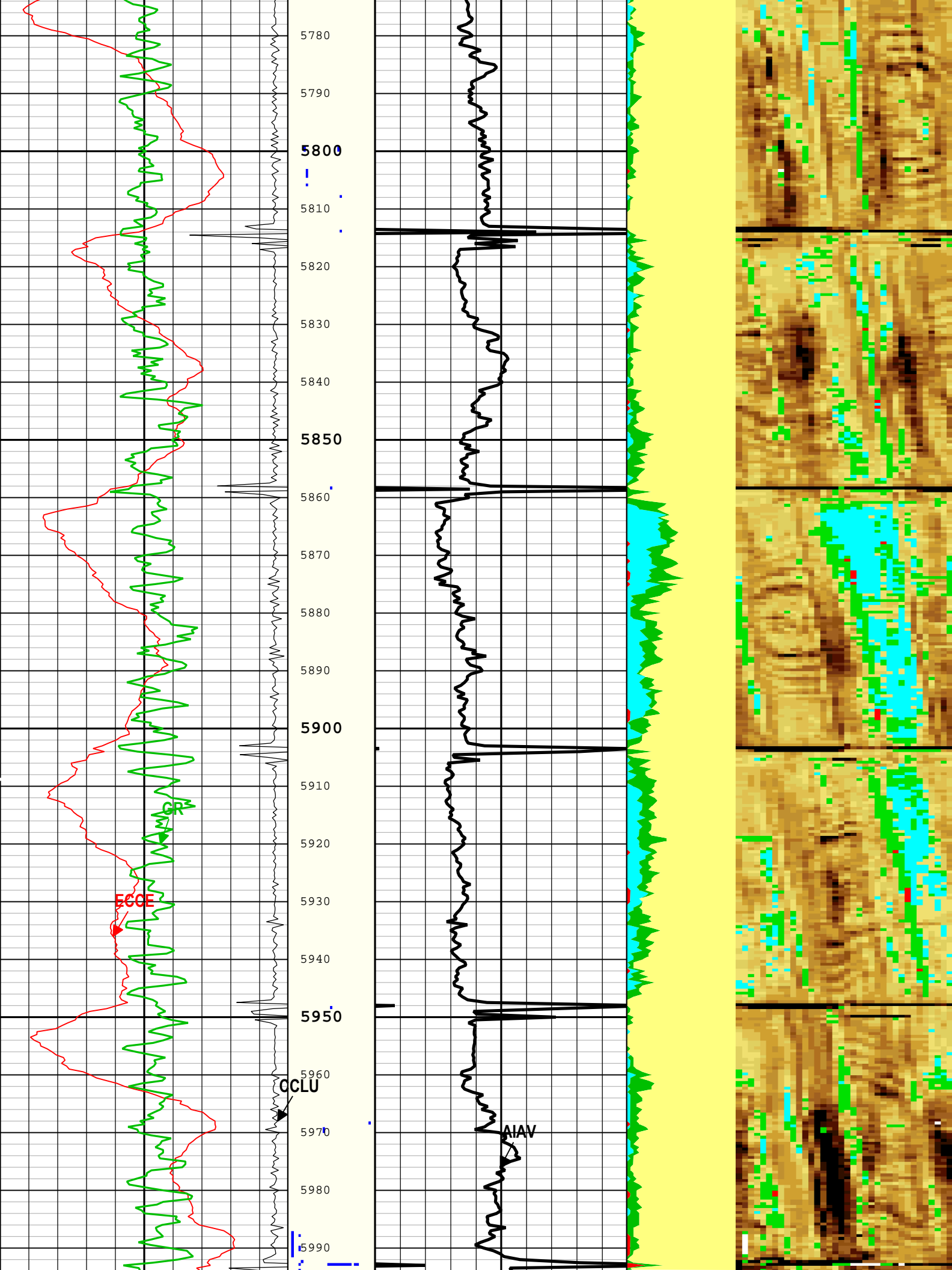


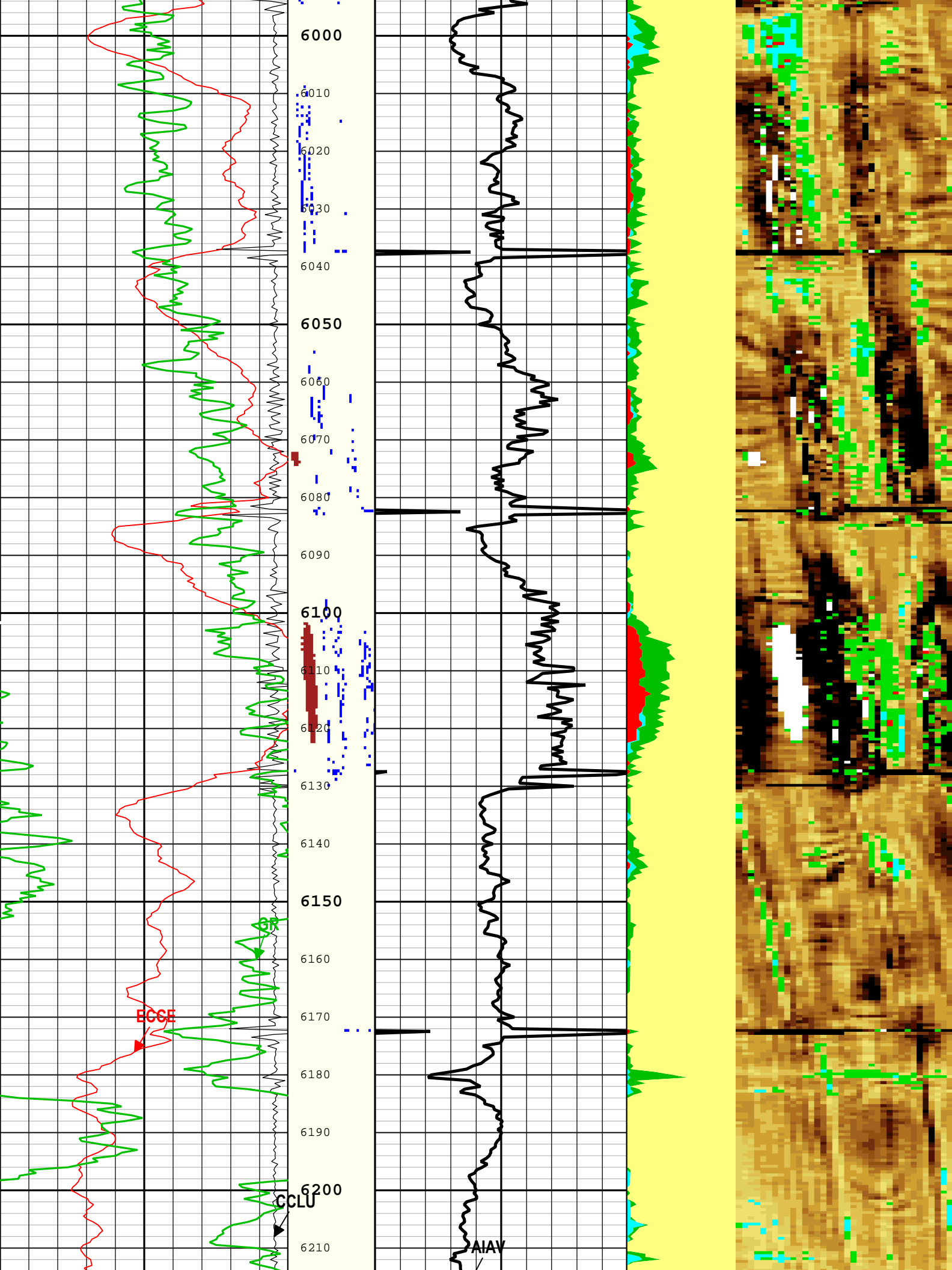


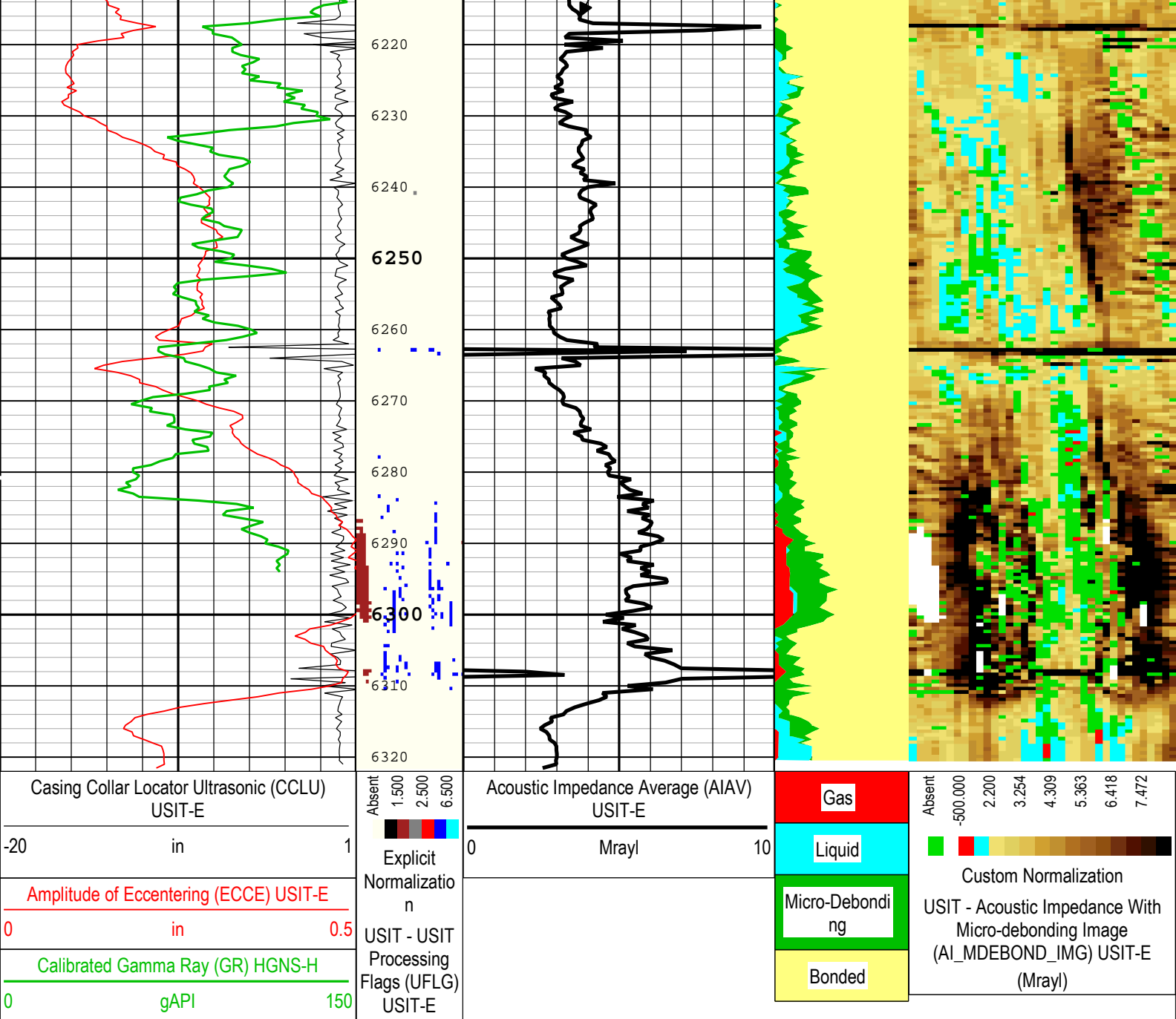












TIME_1900 - Time Marked every 60.00 (s)

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: 10-Jan-2019 17:05:00

Channel Processing Parameters

One: 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_THE	Theoretical Mud Normalization Factor	USIT-E	1.04	

U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.75	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	Theoretical	
ZMUD	Acoustic Impedance of Mud	Borehole	1.5	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	29.5	110
BS	13.5	110	1955
BS	8.5	1955	6322
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	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	31.88	us
WINE	Window End Time	USIT-E	71.88	us

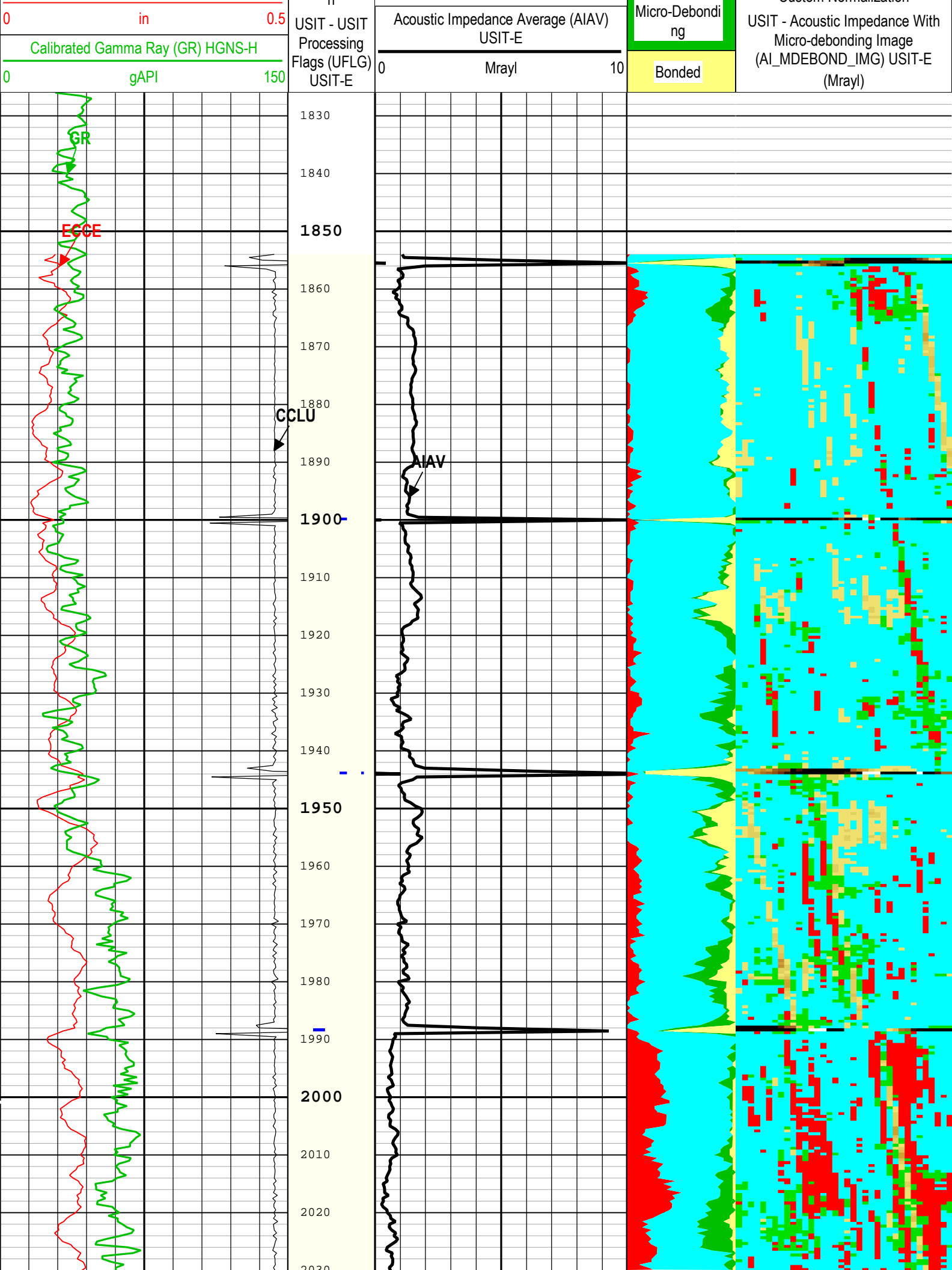
One									
0 PSI Repeat Pass									

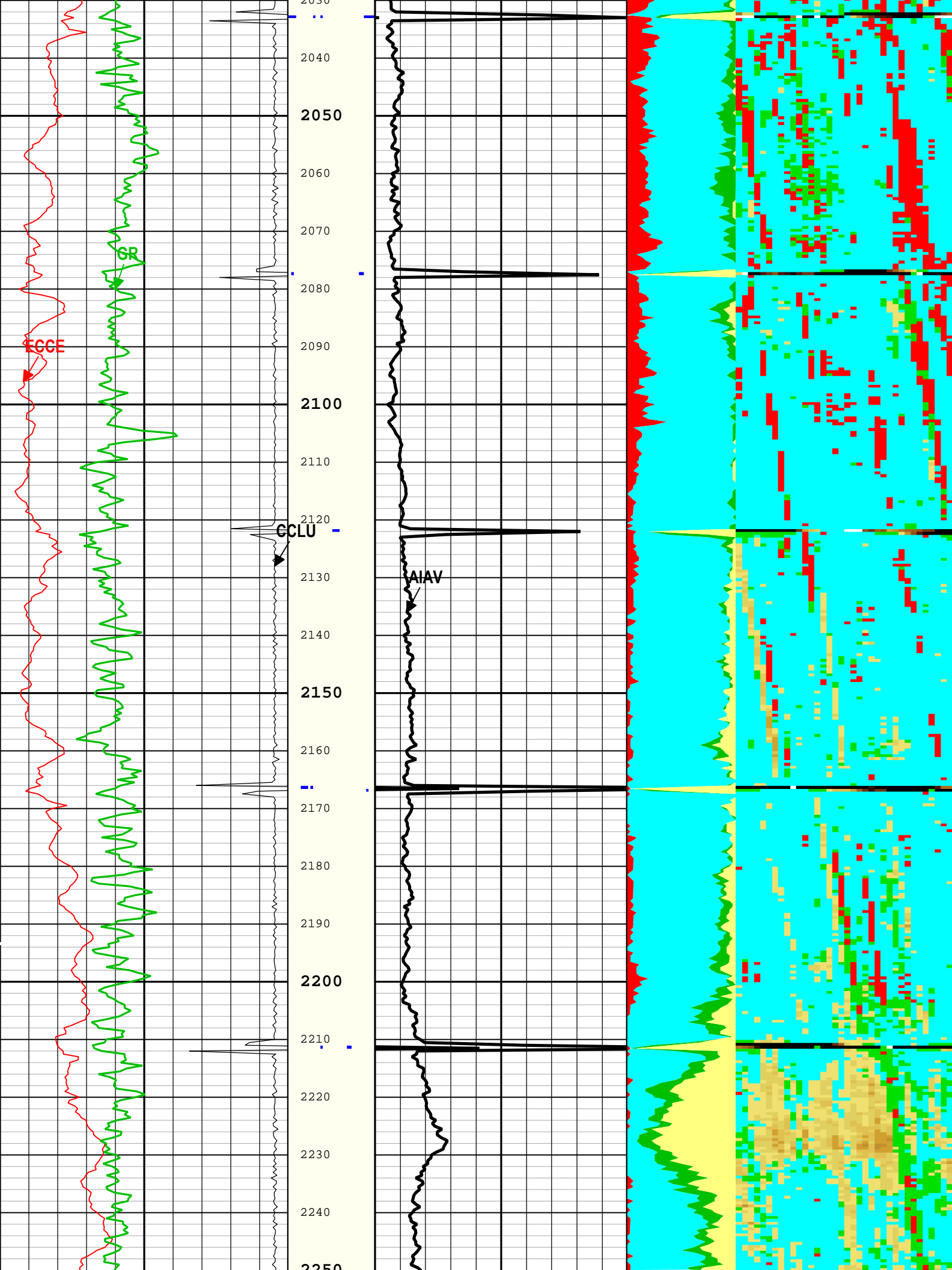
Software Version									
Acquisition System						Version			
Maxwell 2018 SP1						8.1.99839.3100			
Application Patch						Wireline_Hotfix-Mandatory-2018SP1_8.1.106254			

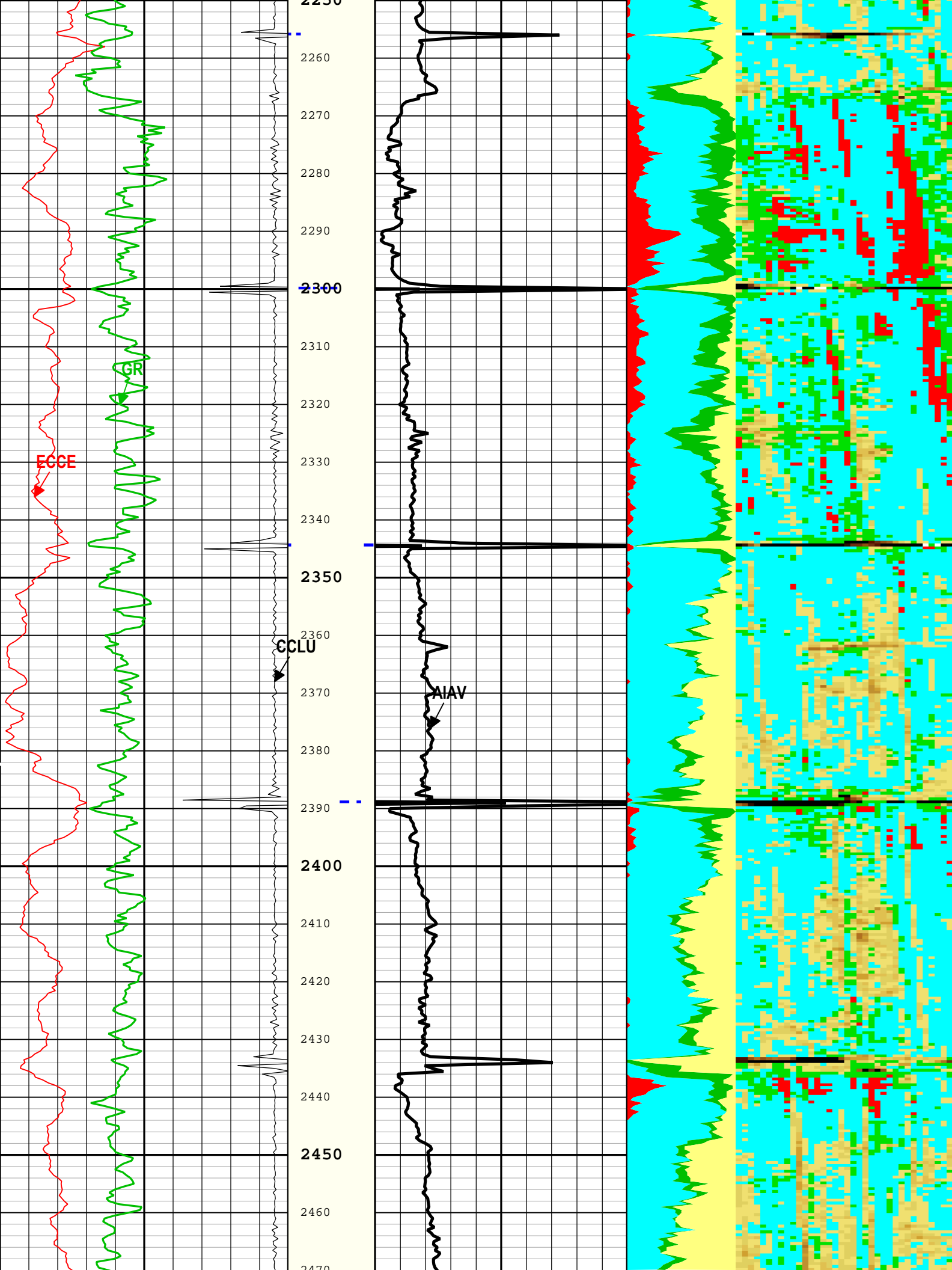
Pass Summary									
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[1]:Up	Up	1854.03 ft	2513.22 ft	10-Jan-2019 12:49:42 PM	10-Jan-2019 12:53:45 PM	ON	3.12 ft	Yes
All depths are referenced to toolstring zero									

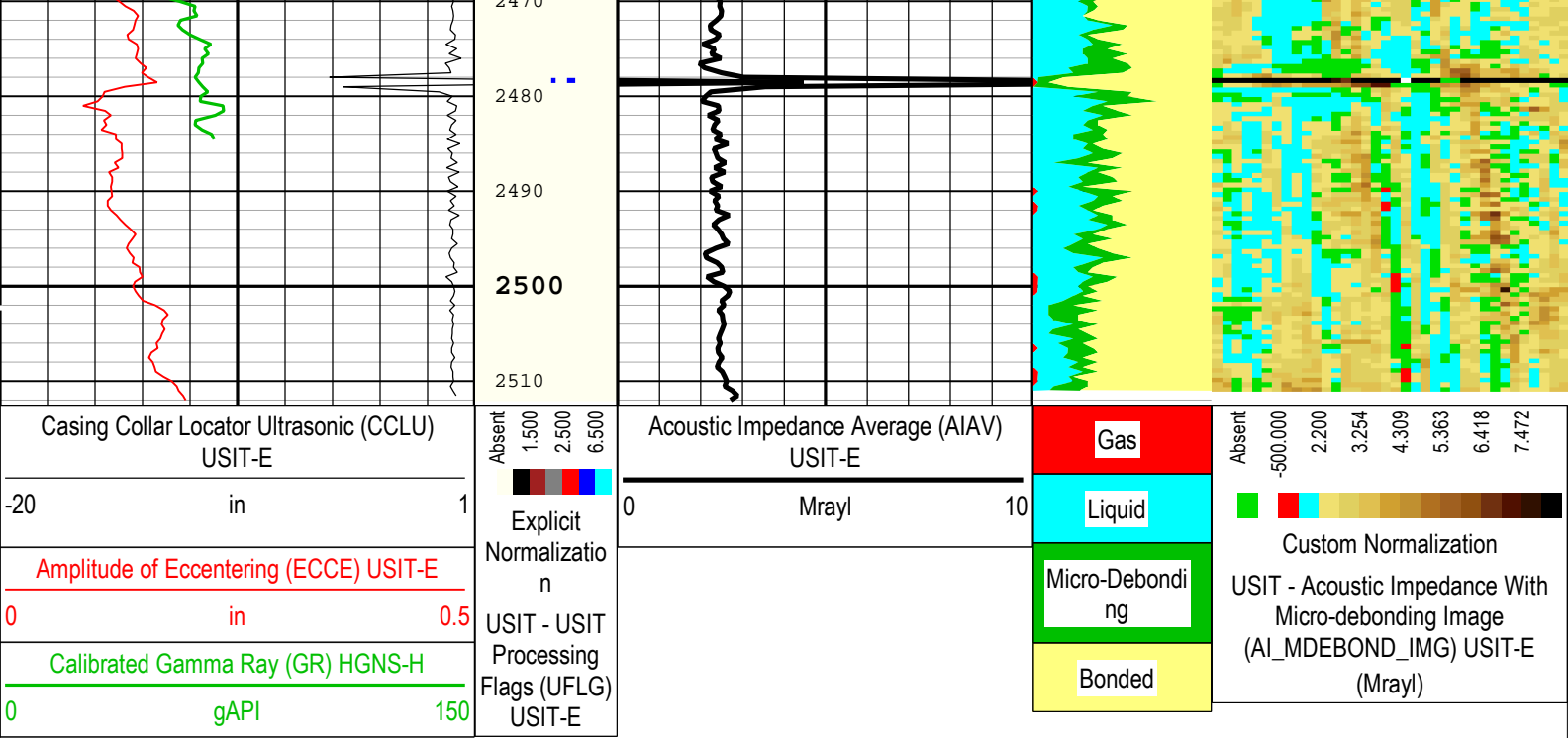
Log	Company:Noble Energy Inc.				Well:Dorothy State LG16-748	
	One: Log[1]:Up:S005					
Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth						
Creation Date: 10-Jan-2019 17:05:07						

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>			<div><div>Gas</div><div>Liquid</div></div>		<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	<div><div>Explicit</div><div>Normalization</div><div>n</div></div>							
Amplitude of Eccentering (ECCE) USIT-E						Custom Normalization				









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: 10-Jan-2019 17:05:07

Channel Processing Parameters

One: 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_THE	Theoretical Mud Normalization Factor	USIT-E	1.04	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	1.75	Mrayl
USI_FVEL_SEL	USI Fluid Velocity Selection	USIT-E	Automatic	
USI_ZMUD_SEL	USI Mud Impedance Selection	USIT-E	Theoretical	
ZMUD	Acoustic Impedance of Mud	Borehole	1.5	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	1826	1955
BS	8.5	1955	2512.5

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
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Parameter	Description	Unit	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	50	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

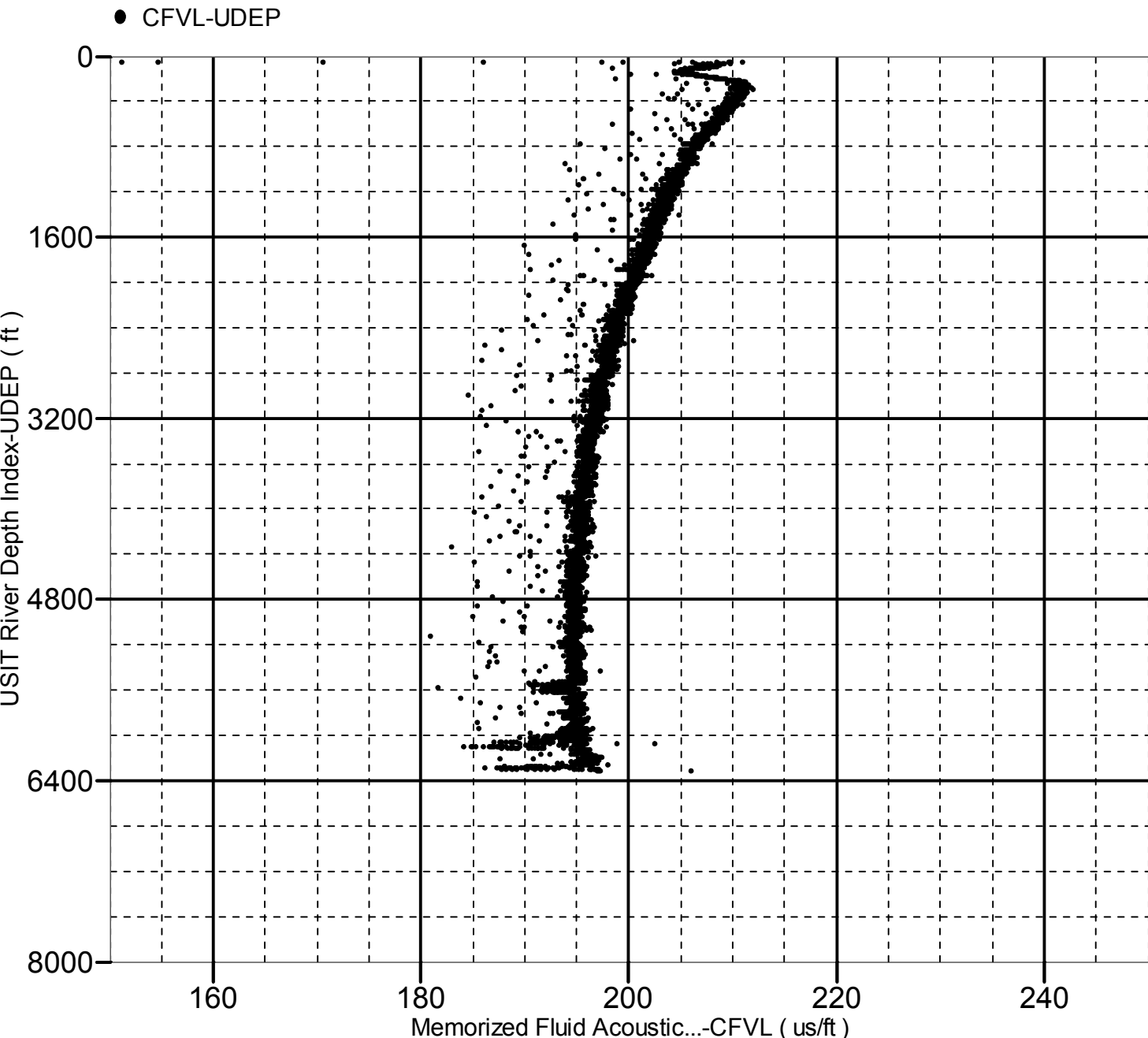
Company:Noble Energy Inc. Well:Dorothy State LG16-748

One: Log[4]:Up:S005

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6322.00 to 57.50 ft

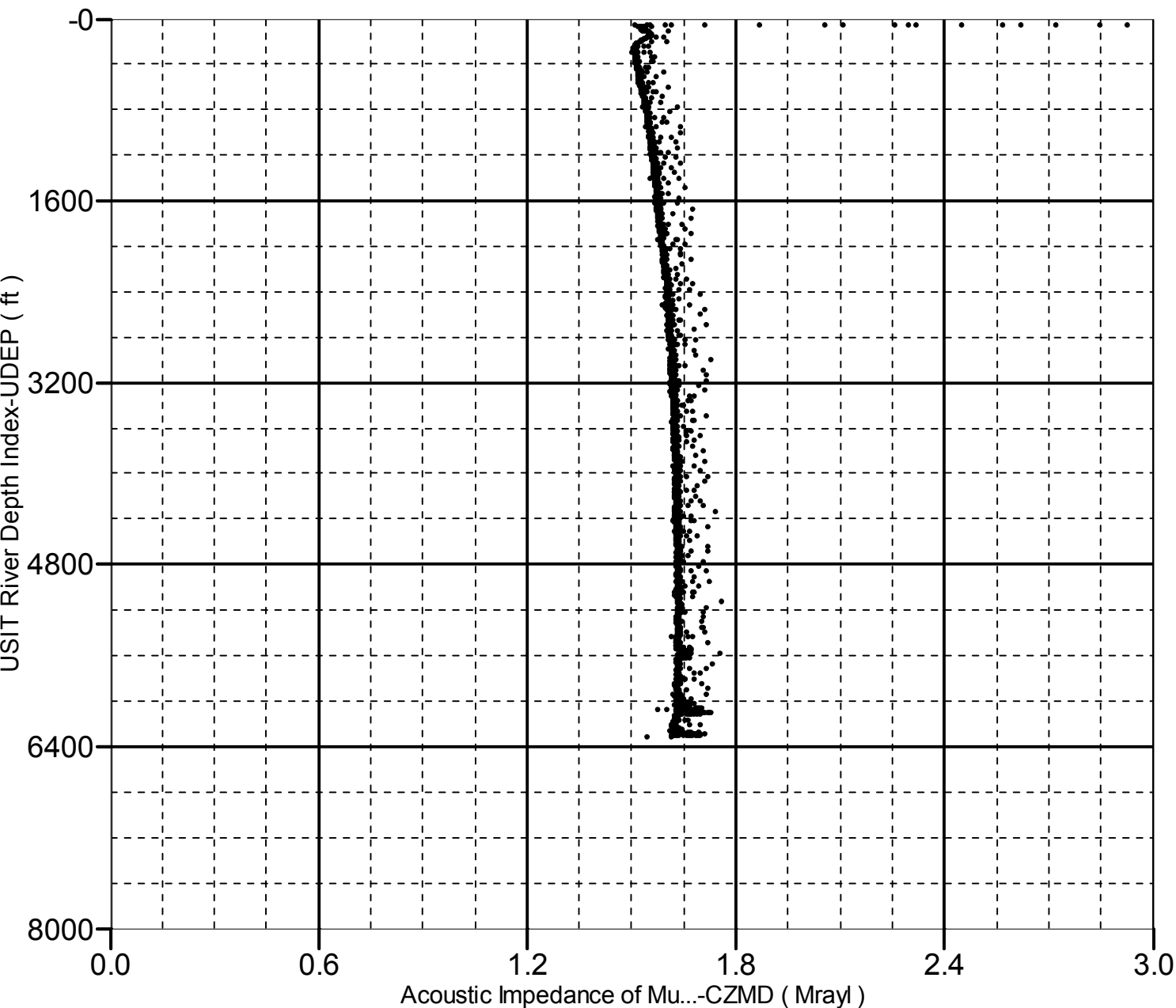


Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 6322.00 to 57.50 ft

● CZMD-UDEP



Company:	Noble Energy Inc.	Schlumberger
Well:	Dorothy State LG16-748	
Field:	DJ Horizontal Niobrara	
County:	Weld	
State:	Colorado	

