

Company: Noble Energy Inc.

Well: Freedom Federal LC21-635

Field: Wildcat

County: Weld State: Colorado

DJ BASIN UltraSonic Summary Print

County: Weld
Field: Wildcat
Location: NWSW Sec. 22, T9N, R59W
Well: Freedom Federal LC21-635
Company: Noble Energy Inc.

Location:		NWSW Sec. 22, T9N, R59W SHL: 1625' FSL & 400' FWL Lat: 40.73333 Long:-103.97207	Elev.: K.B. 4913.00 ft G.L. 4883.00 ft D.F. 4913.00 ft
Permanent Datum:	Ground Level	Kelly Bushing	30.00 ft
Log Measured From:	Kelly Bushing		
Drilling Measured From:	Kelly Bushing		
API Serial No.	Section:	Township:	Range:
05-123-42805	22	9N	59W

Logging Date 03-Aug-2017

Run Number Two

Depth Driller 11149.00 ft

Schlumberger Depth 11149.00 ft

Bottom Log Interval 5940.00 ft

Top Log Interval 116.00 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 1940.00 ft

To 11149.00 ft

Casing/Tubing Size 5.5 in

Weight 20 lbm/ft

Grade N/A

From 30.00 ft

To 11139.90 ft

Max Recorded Temperatures 191 degF

Logger on Bottom 04-Aug-2017 00:10:00

Unit Number 2377 Location: Fort Morgan

Recorded By Camila Lang

Witnessed By Bill Mansfield

Disclaimer

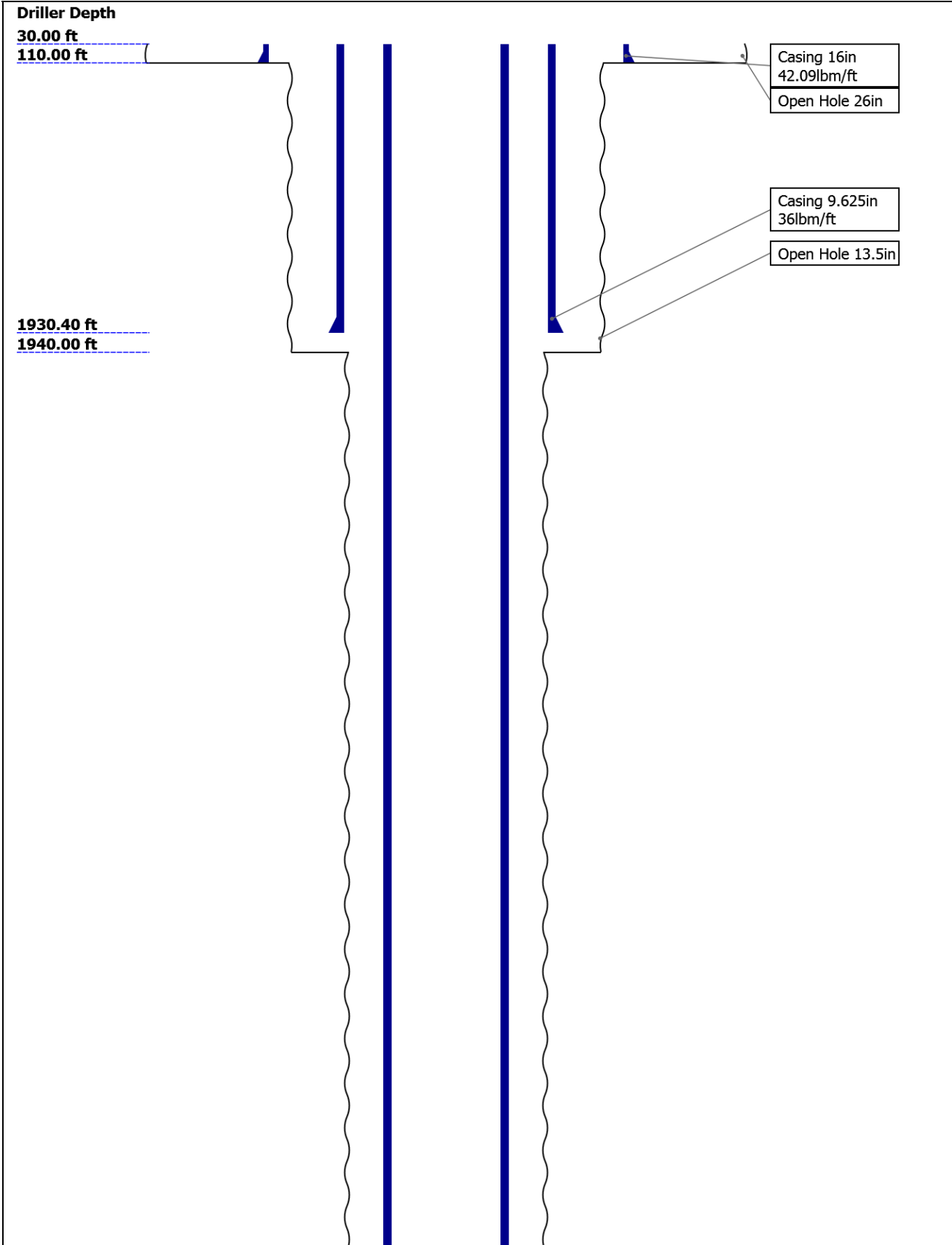
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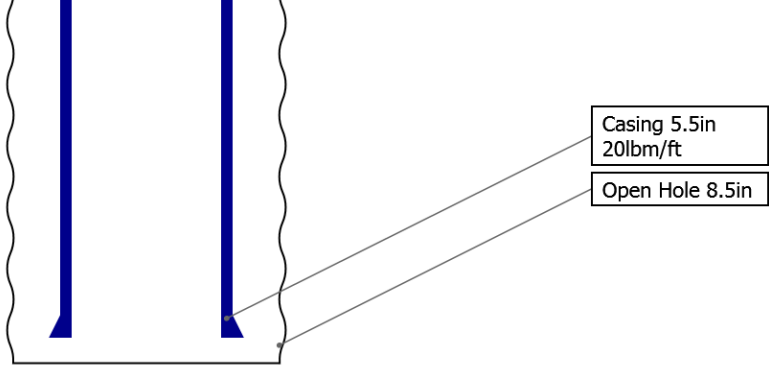
- 12. Two 0 PSI Repeat Pass
 - 12.1 Integration Summary
 - 12.2 Software Version
 - 12.3 Composite Summary
 - 12.4 Log (DJ Basin Ultrasonic Cement Summary Report)
 - 12.5 Parameter Listing

Well Sketch



11139.90 ft

11149.00 ft



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	30	110	1940			
Top Logger (ft)	30	110	1940			
Bottom Driller (ft)	110	1940	11149			
Bottom Logger (ft)	110	1940	11149			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	42.09	36	20			
Inner Diameter (in)	15.511	8.921	4.778			
Grade	N/A	N/A	N/A			
Top Driller (ft)	30	30	30			
Top Logger (ft)	30	30	30			
Bottom Driller (ft)	110	1930.4	11139.9			
Bottom Logger (ft)	110	1930.4	11139.9			

Operational Run Summary

Parameter (unit)	Two					
Date Log Started	03-Aug-2017					
Time Log Started	23:41:37					
Date Log Finished	04-Aug-2017					
Time Log Finished	00:57:02					
Top Log Interval (ft)	116.00					
Bottom Log Interval (ft)	5940.00					
Total Depth (ft)	5940.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	8.500					
Logging Unit Number	2377					
Logging Unit Location	Fort Morgan					
Recorded By	Camila Lang					

Borehole Fluids

Remarks and Equipment Summary

Two: Toolstring			Two: Remarks	
Equip name	Length	MP name	Offset	<p>This is the first log in the well.</p> <p>Tool ran as per tool sketch.</p> <p>CSG 9.625" 36lb/ft @1930.4'</p> <p>5.5" 20lb/ft @ 11139.9'</p> <p>Main pass recorded at 2500 psi, and repeat pass recorded at 0 psi.</p>
LEH-QT	38.38			
LEH-QT				
EDTC-B:8	35.47			
EDTH-B:92				
EDTG-A:7				
7004				
EDTC-B:81				
02				
HGNS-H:4	28.97			
826				
HGNH:392				
1				
NSR-F:506				
9				
NPV-N				
HMCA-H				
HACCZ-H:				
6305				
HGNS-H:4				
826				
AH-184[19.56			
2]				
AH-184[17.56			
1]				
USIT-E:93	15.56			
0				
ECH-MFA:				
1924				
USAC-A:9				
30				
USIS-A:18				
26				
USSC-B				
USRS-A:84				
0				
USI-SENS				
OR				



Depth Summary

	Two		
--	-----	--	--

Depth Measuring Device

Type	IDW-JA		
Serial Number	5845		
Calibration Date	07-Jul-2017		
Calibrator Serial Number	57		
Calibration Cable Type	7-46 PXS		
Wheel Correction 1	-4		
Wheel Correction 2	-5		

Tension Device

Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		

Logging Cable

Type	7-46A-XS		
Serial Number	710146		
Length	23000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane USA		

Two:Depth Control Parameters

Log Sequence	First Log In the Well	Depth Control Remarks	
Rig Up Length At Surface		All Schlumberger depth control policies were followed.	
Rig Up Length At Bottom		IDW used as a primary depth reference.	
Rig Up Length Correction		Z-chart used as a secondary depth reference.	
Stretch Correction			
Tool Zero Check At Surface			

USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 2	Log[2]:Up	5942.59	74.38

Fluid Velocity = "Automatic". CFVL equals DFSL channel

Start Depth(ft)	Stop Depth(ft)	Start Value(us/ft)	End Value(us/ft)
-----------------	----------------	--------------------	------------------

Mud Impedance = "FreePine Norm "

Free Pipe normalization zone is : 33.03m(108.36ft) to 34.55m(113.36ft)
MUD_N_FRP = 1.17
DFD = 1.01g/cm3(8.40lbm/gal)
CZMD median computed in free pipe normalization interval = 1.67 MRayl

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

2500 PSI Main Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP1	7.1.82245.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Two	Log[2]:Up	Up	74.38 ft	5942.59 ft	04-Aug-2017 12:14:44 AM	04-Aug-2017 12:57:02 AM	ON	3.36 ft	Yes

All depths are referenced to toolstring zero

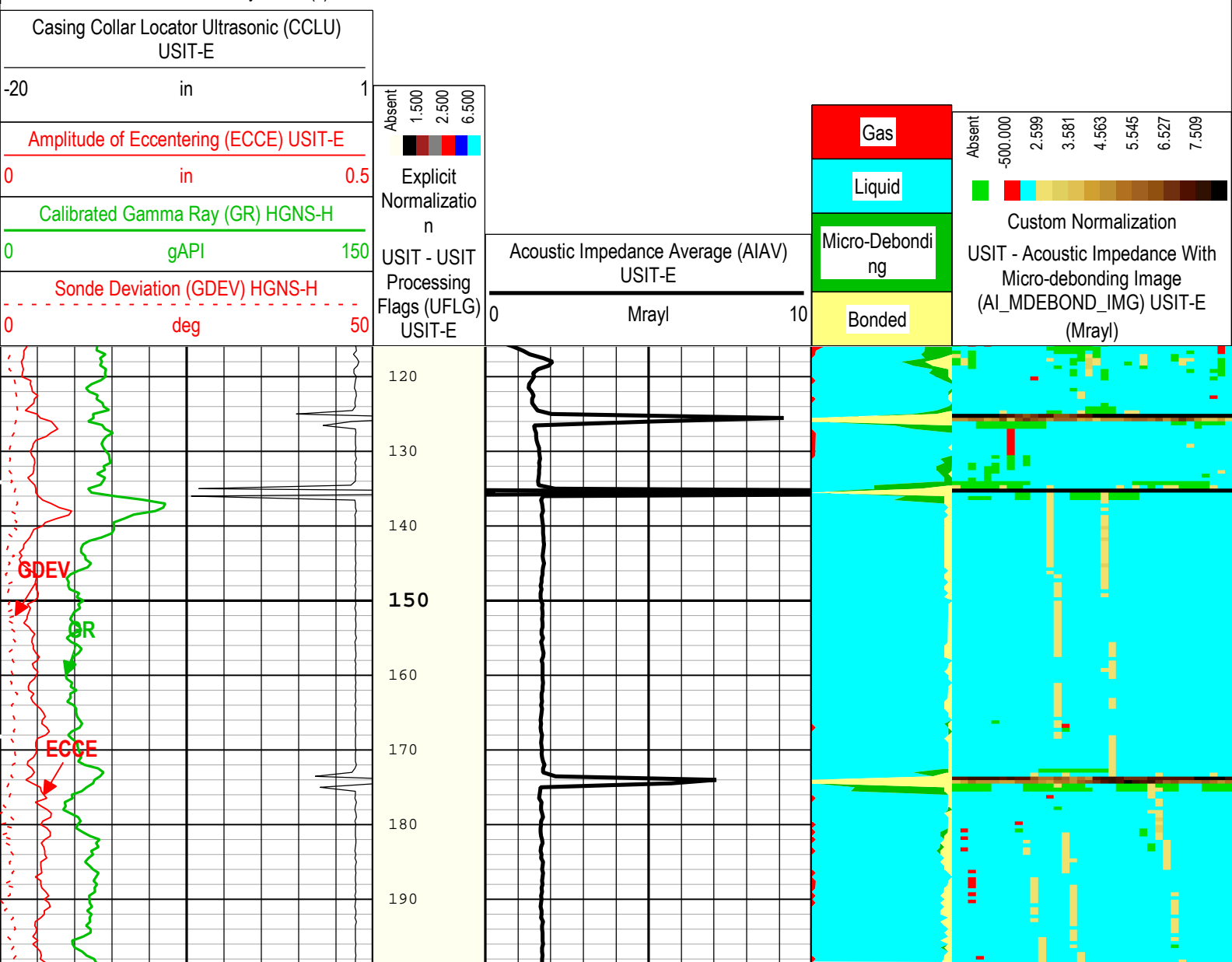
Log

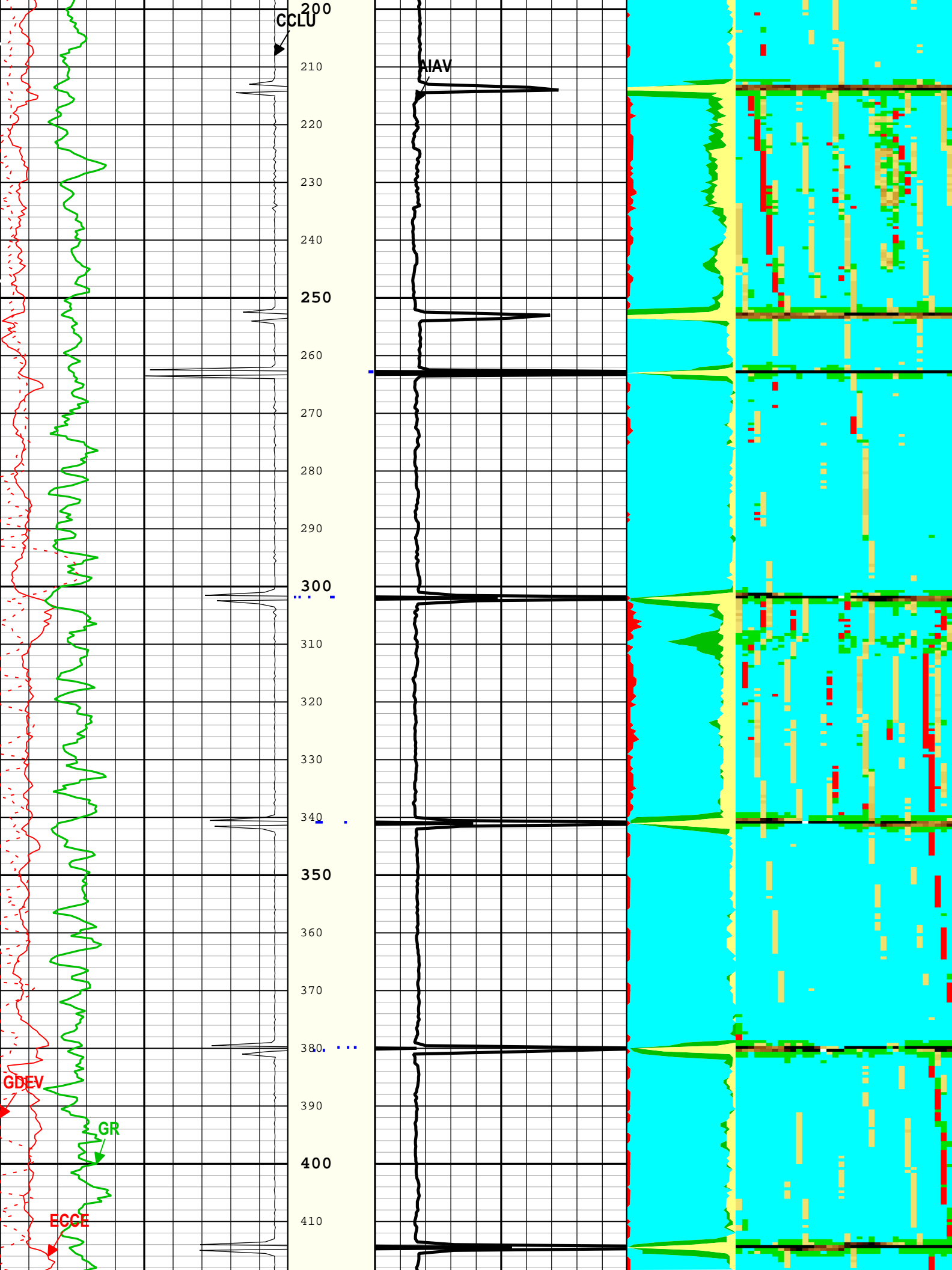
Company:Noble Energy Inc. Well:Freedom Federal LC21-635

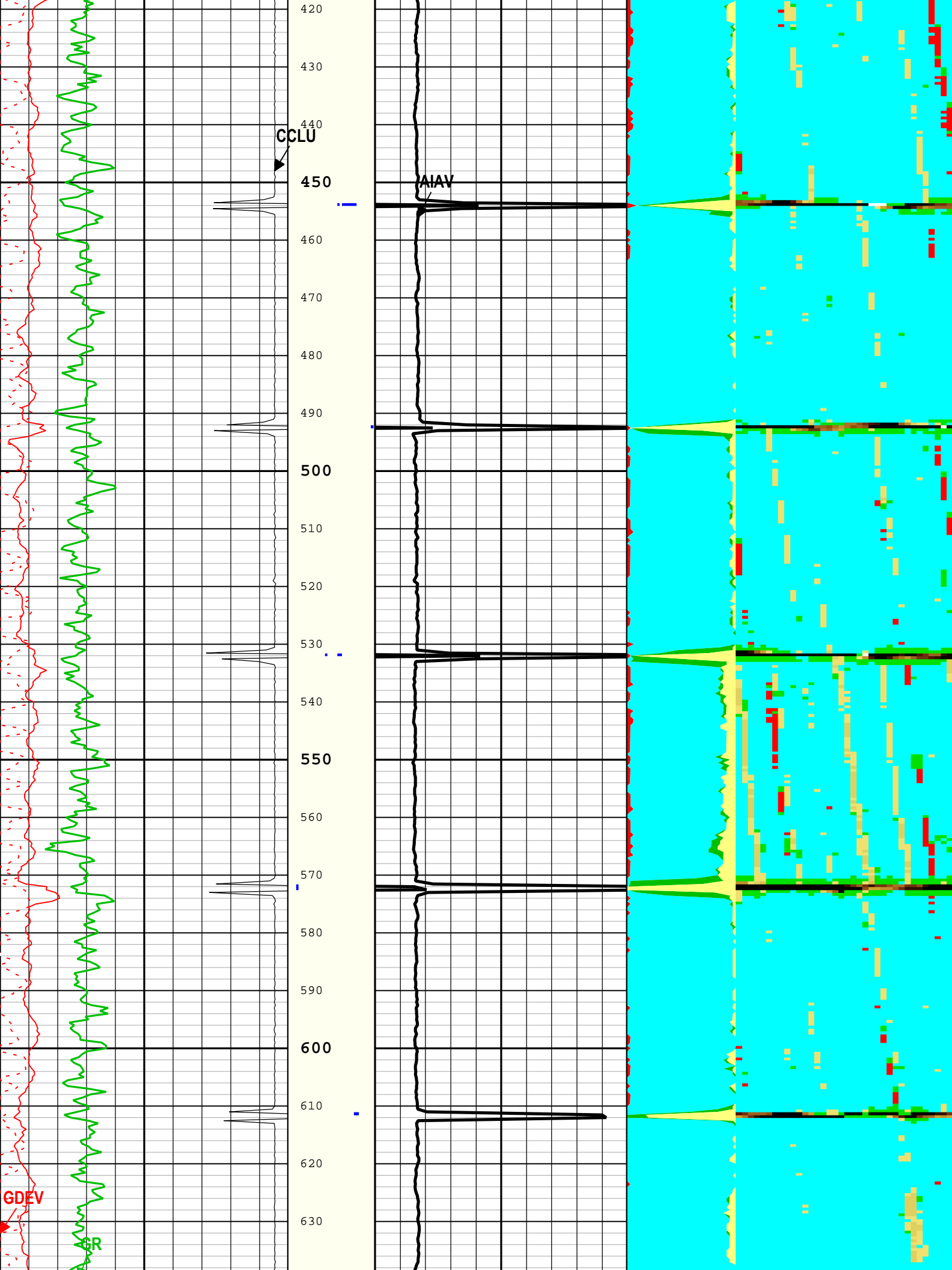
Two: Log[2]:Up:S015

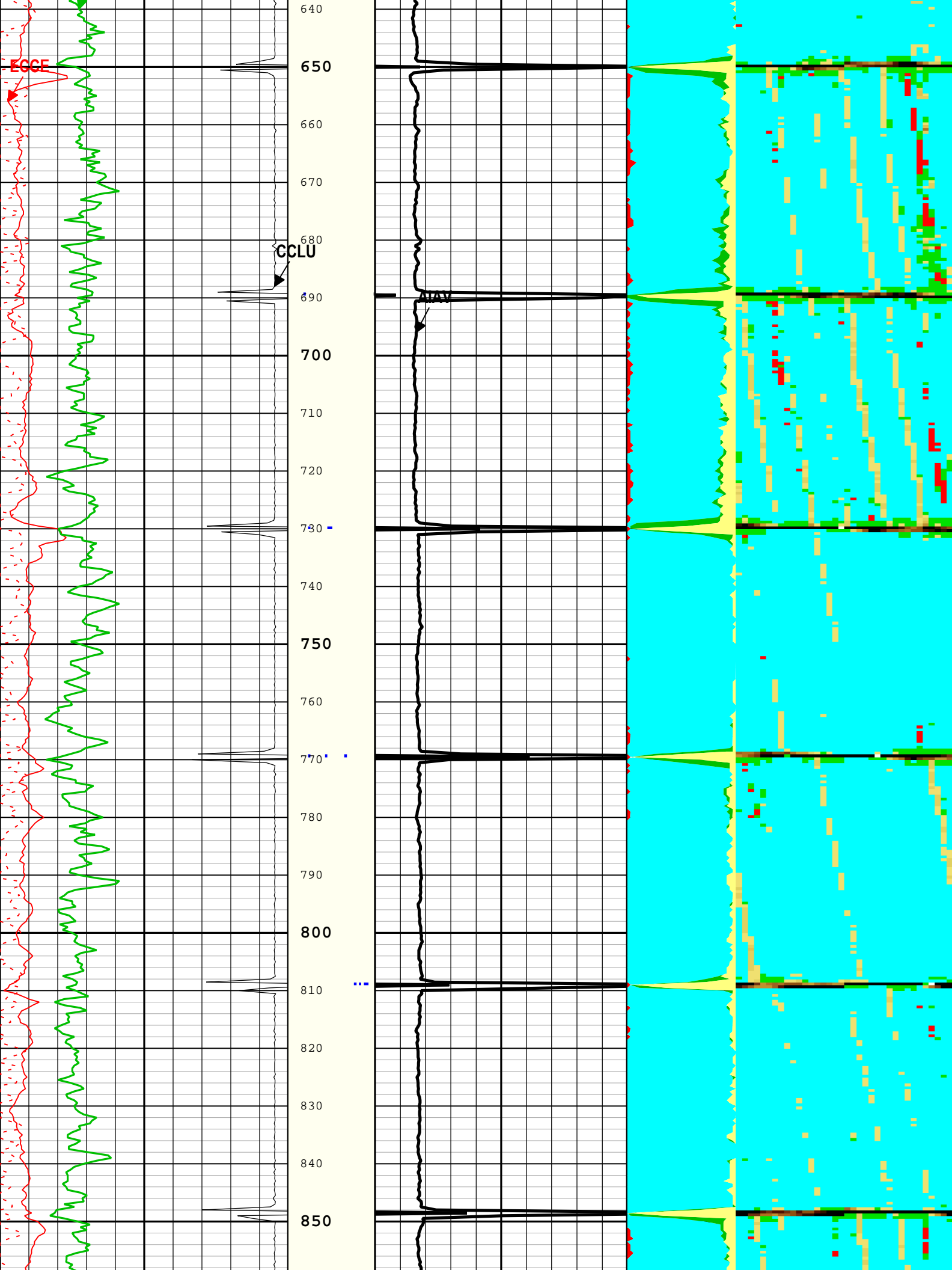
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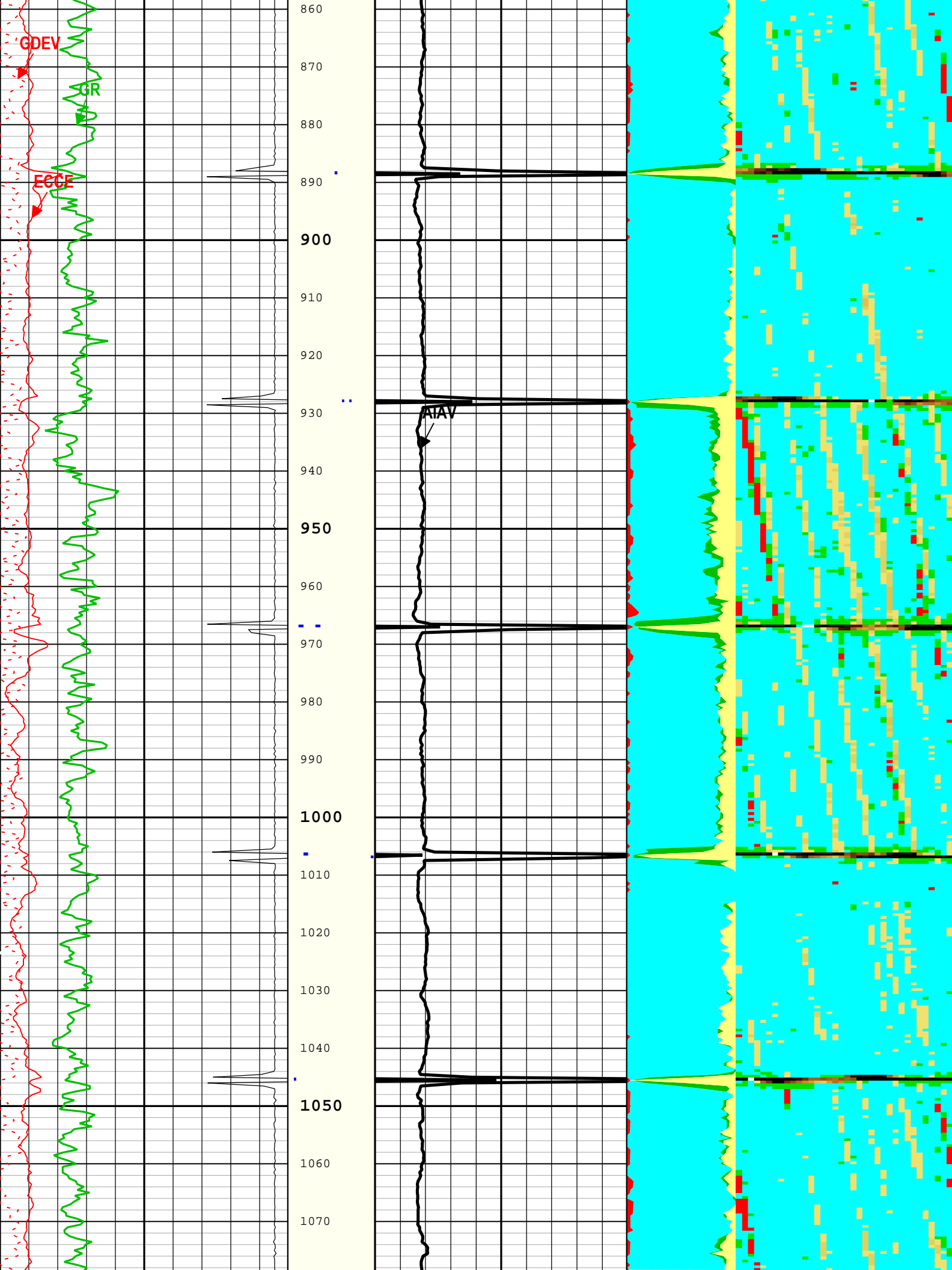
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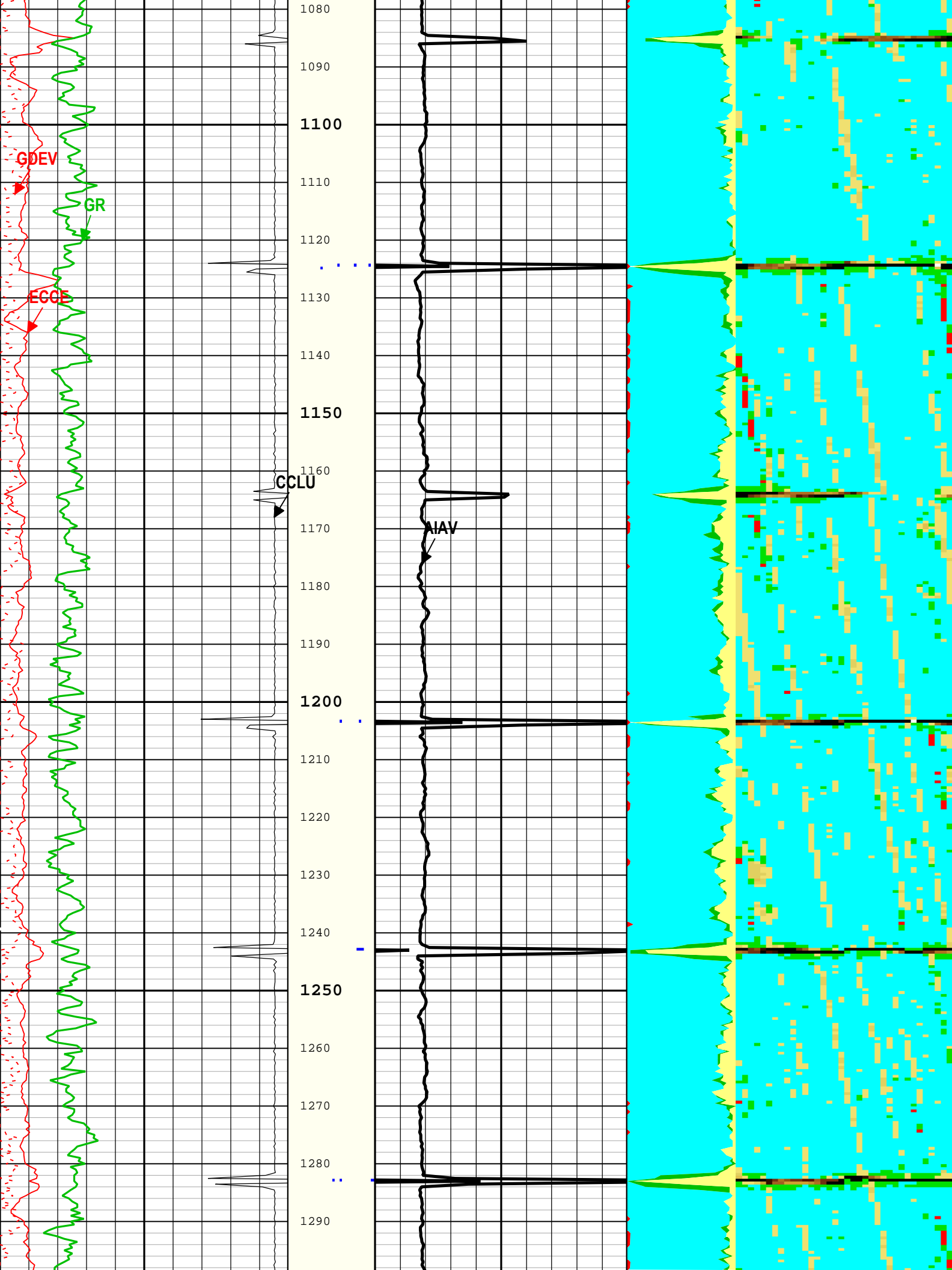


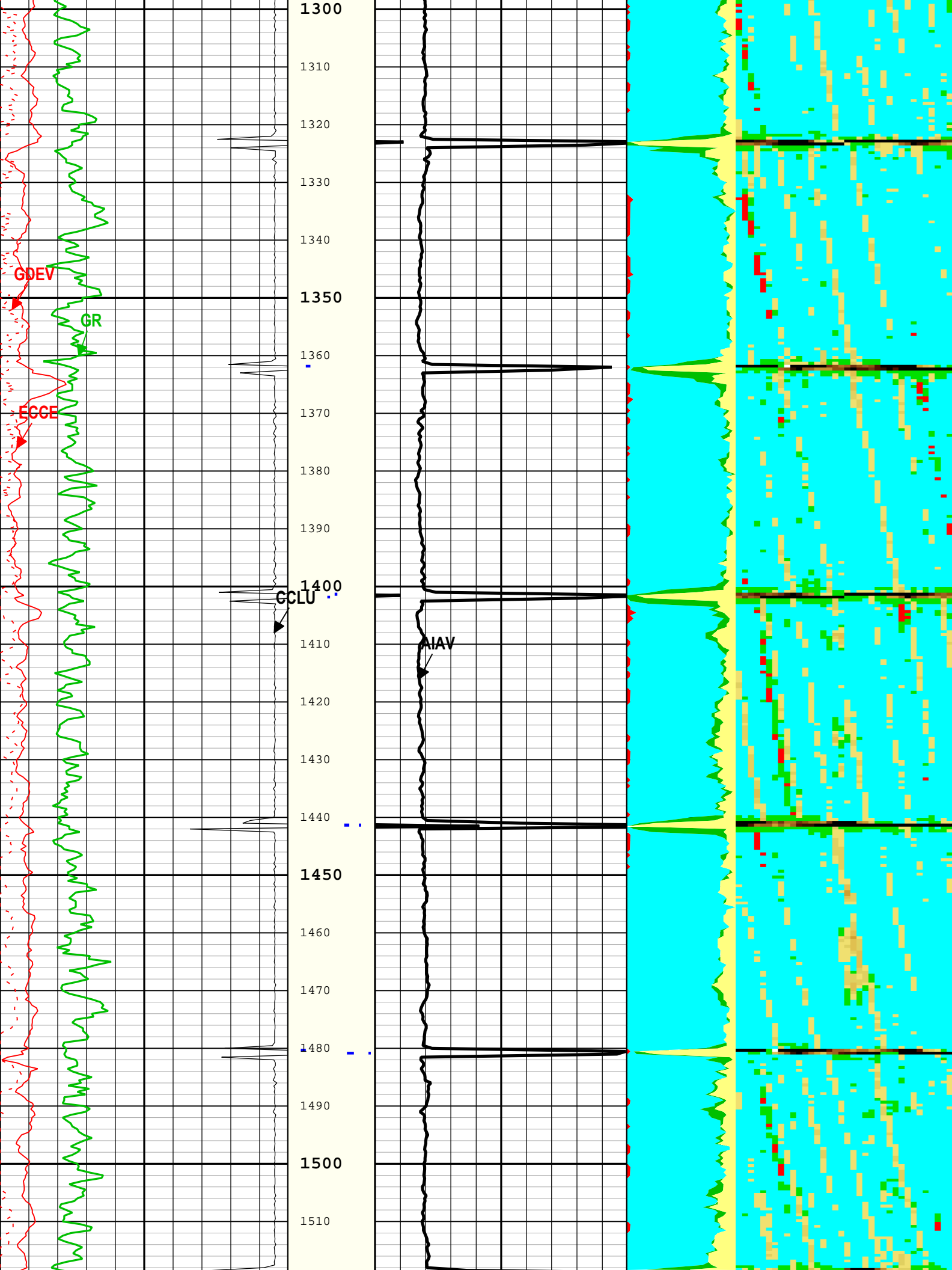


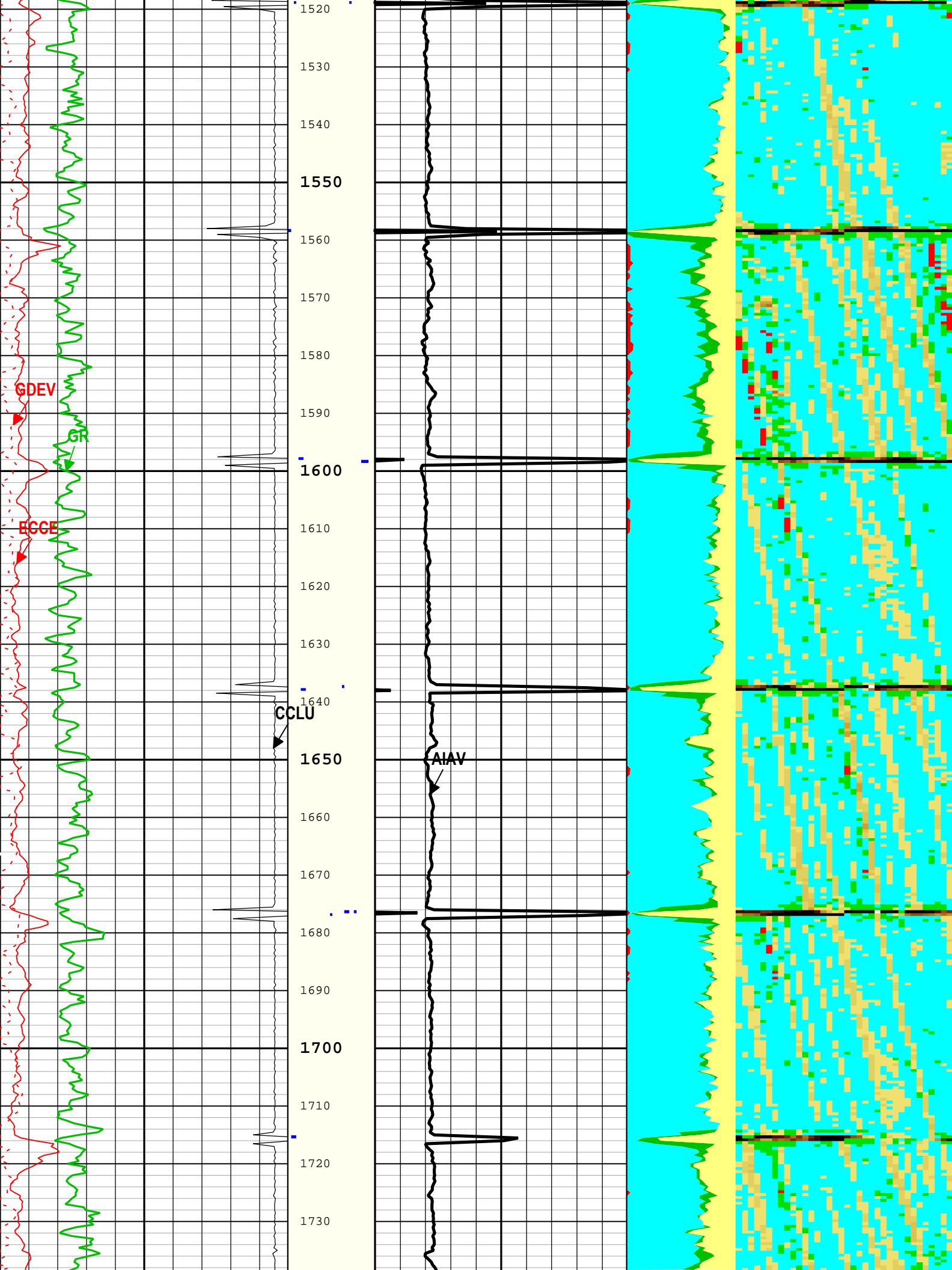


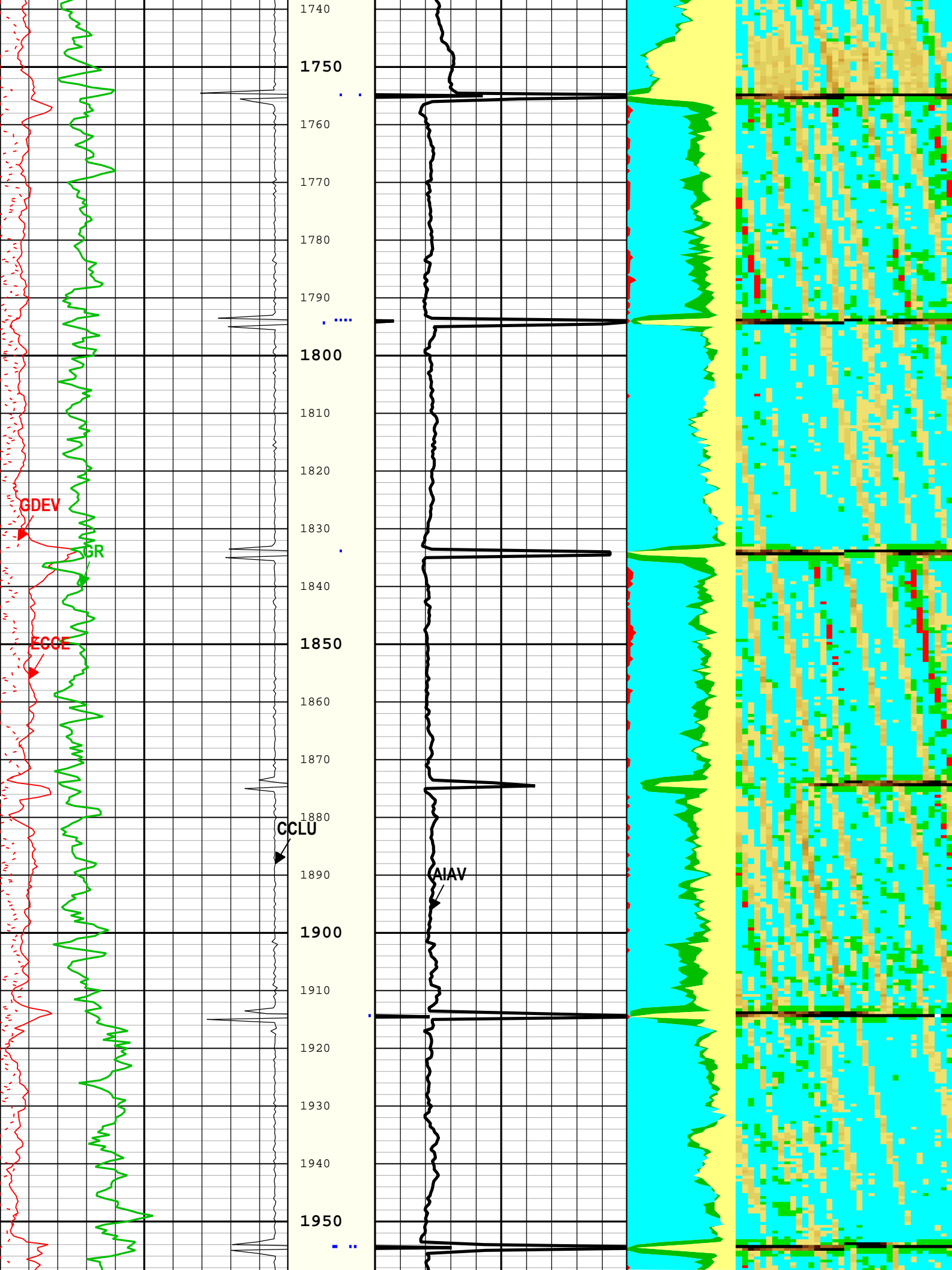


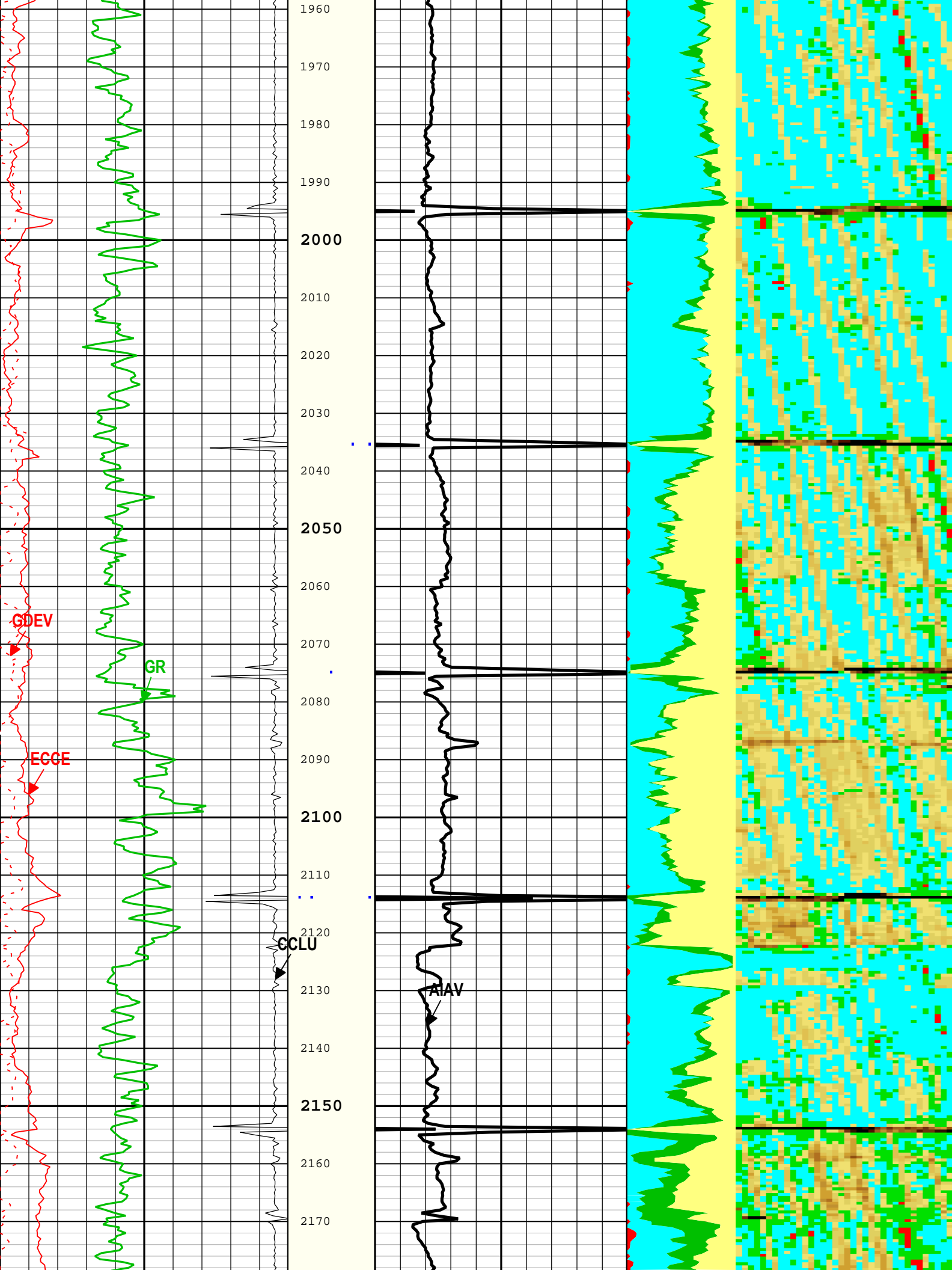


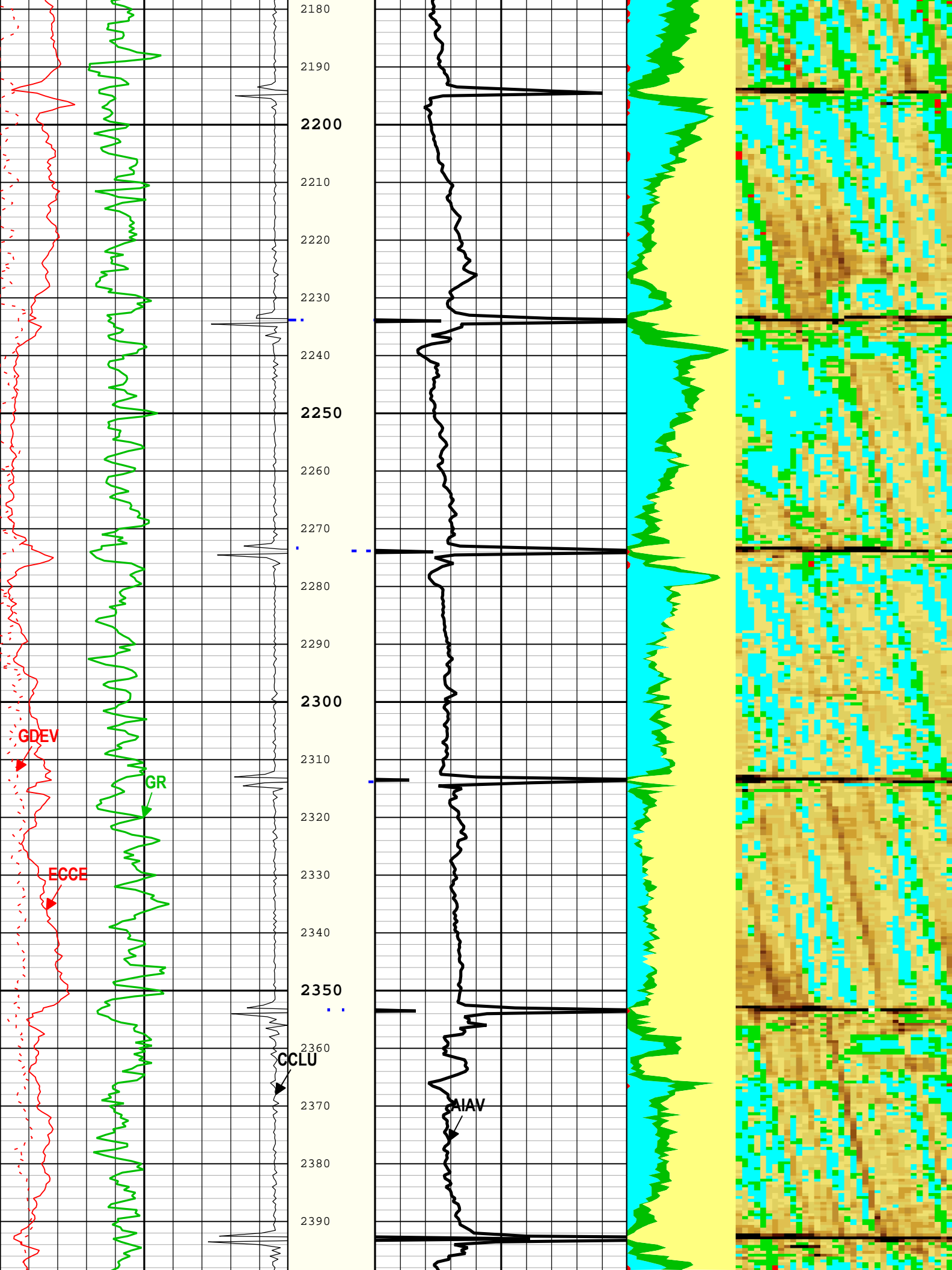


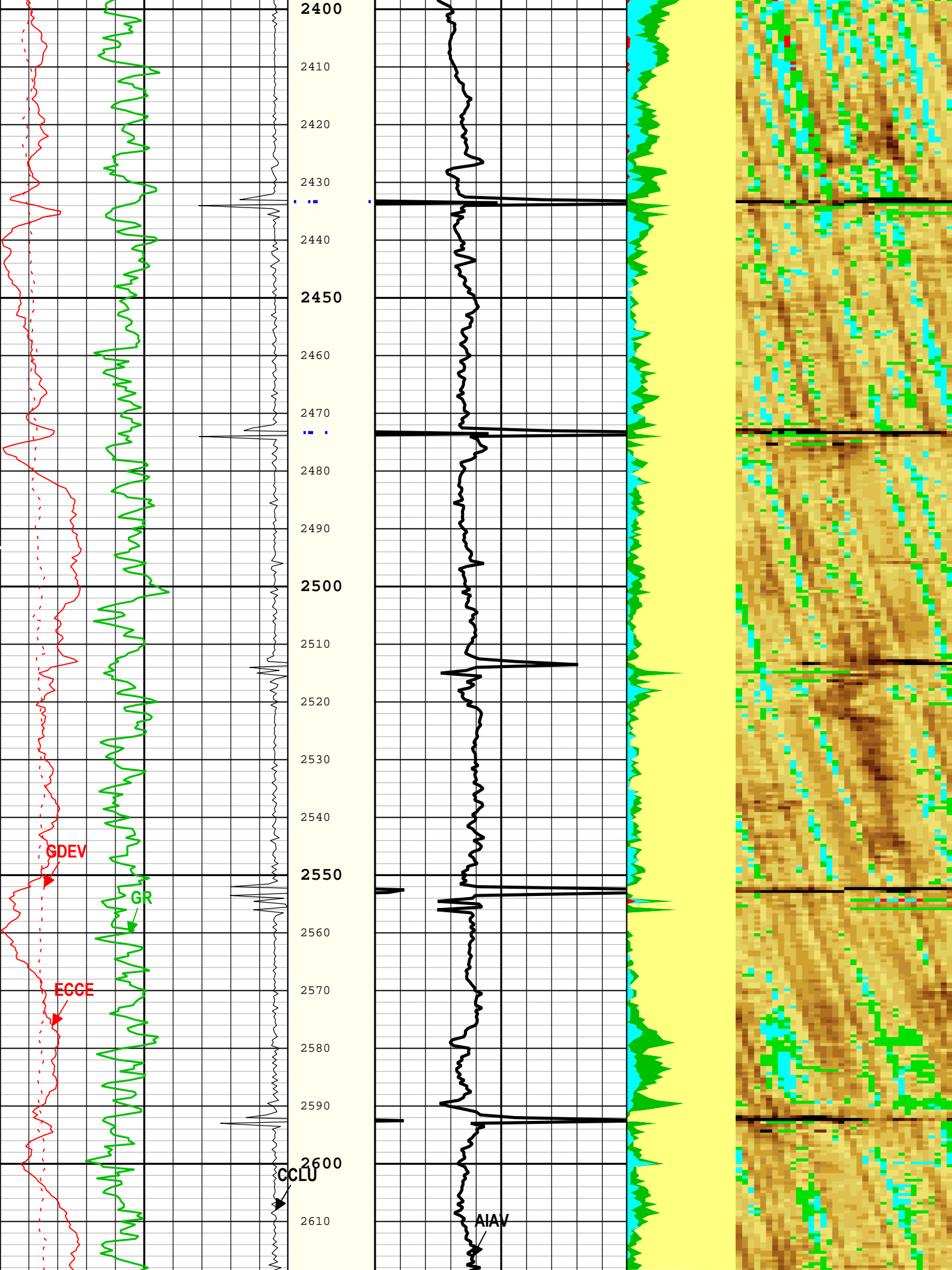


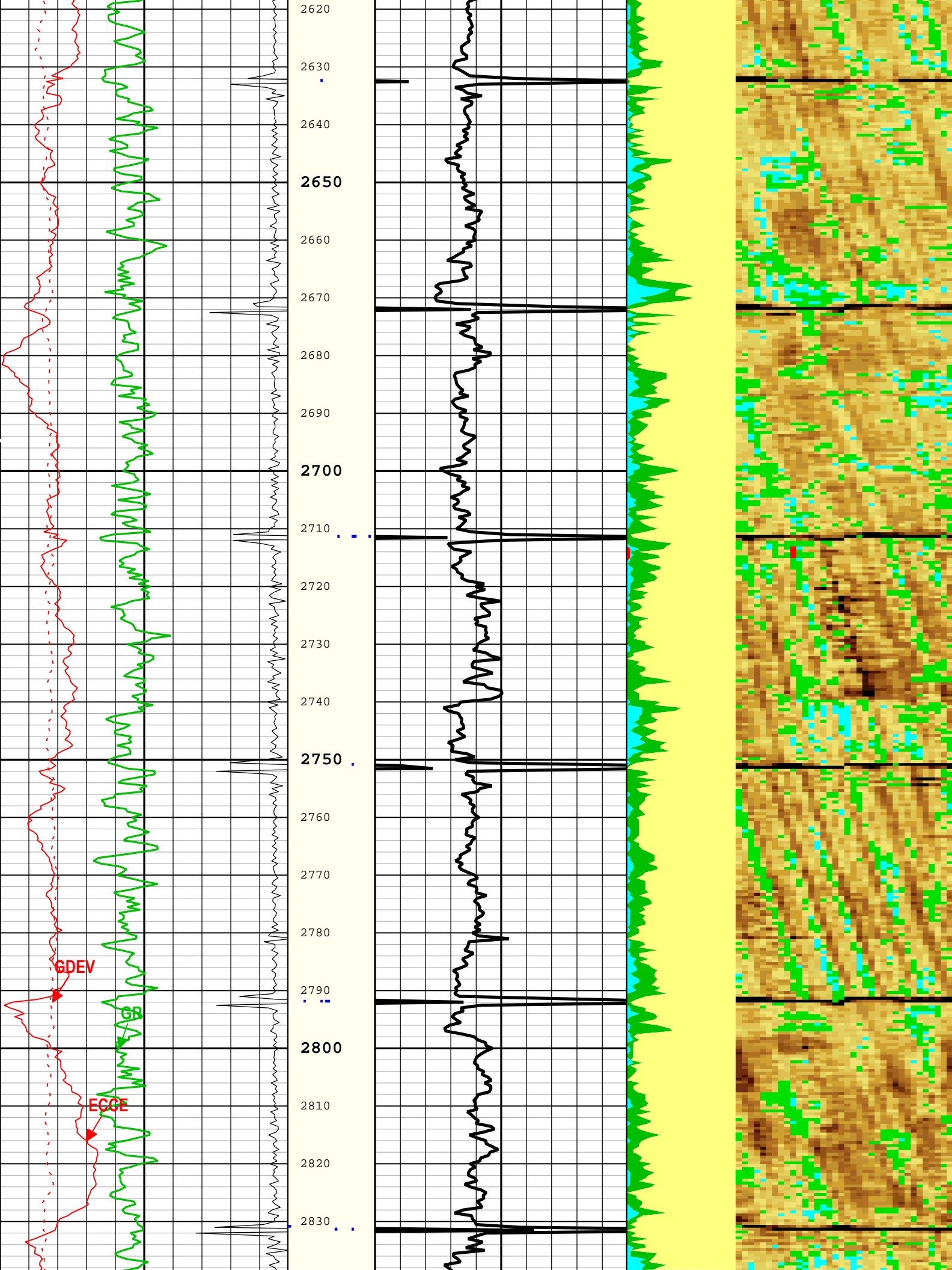


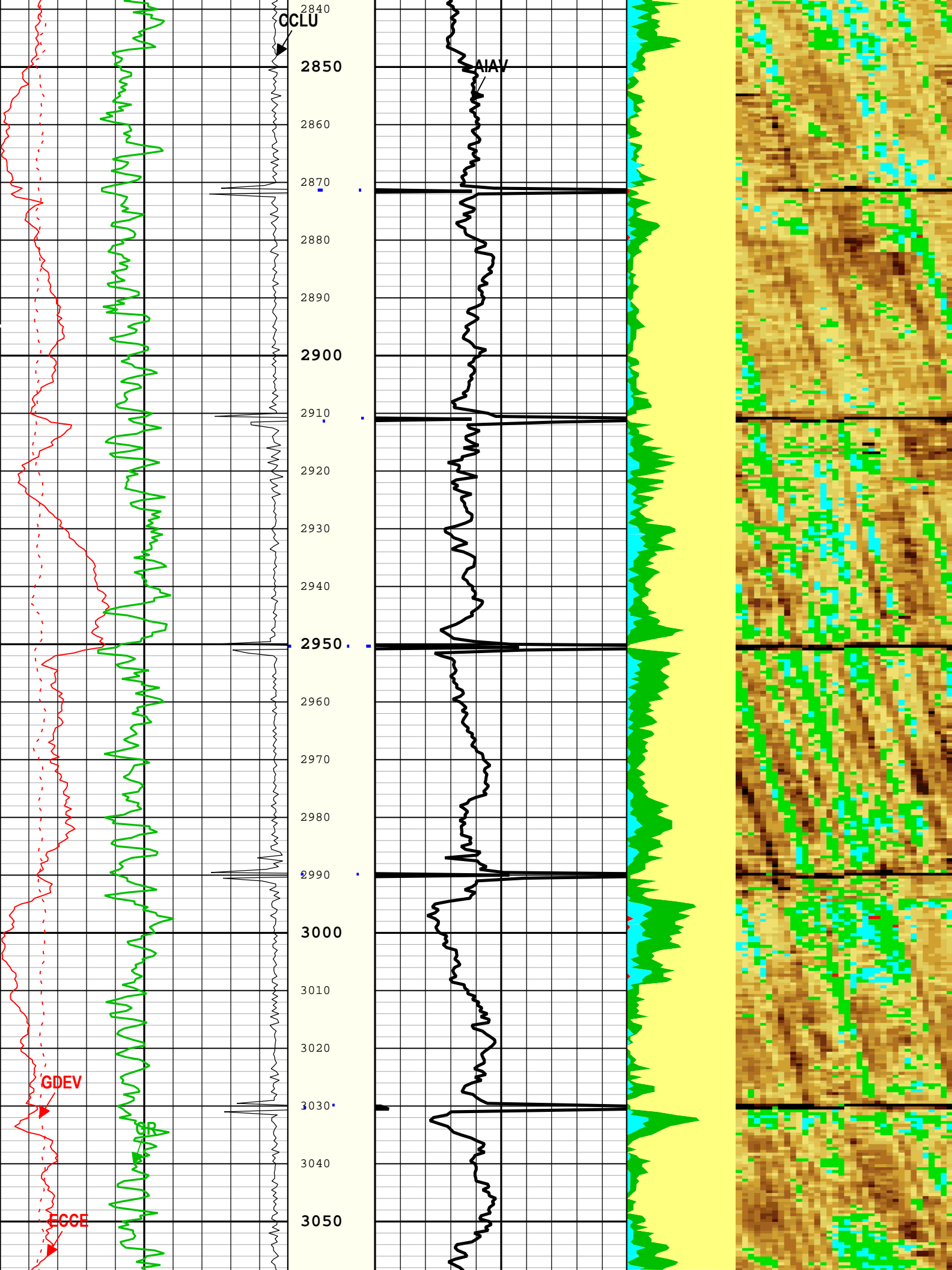


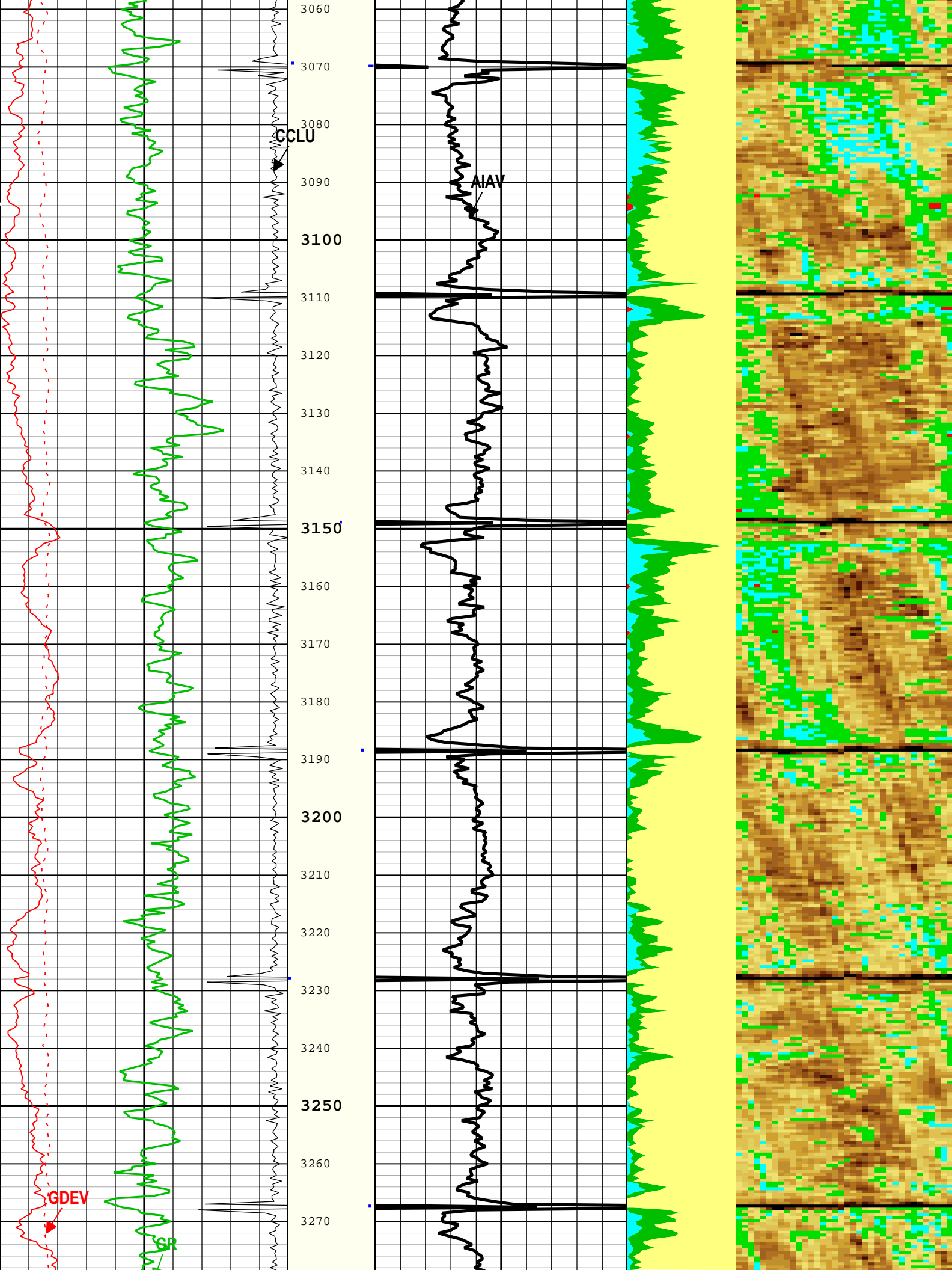


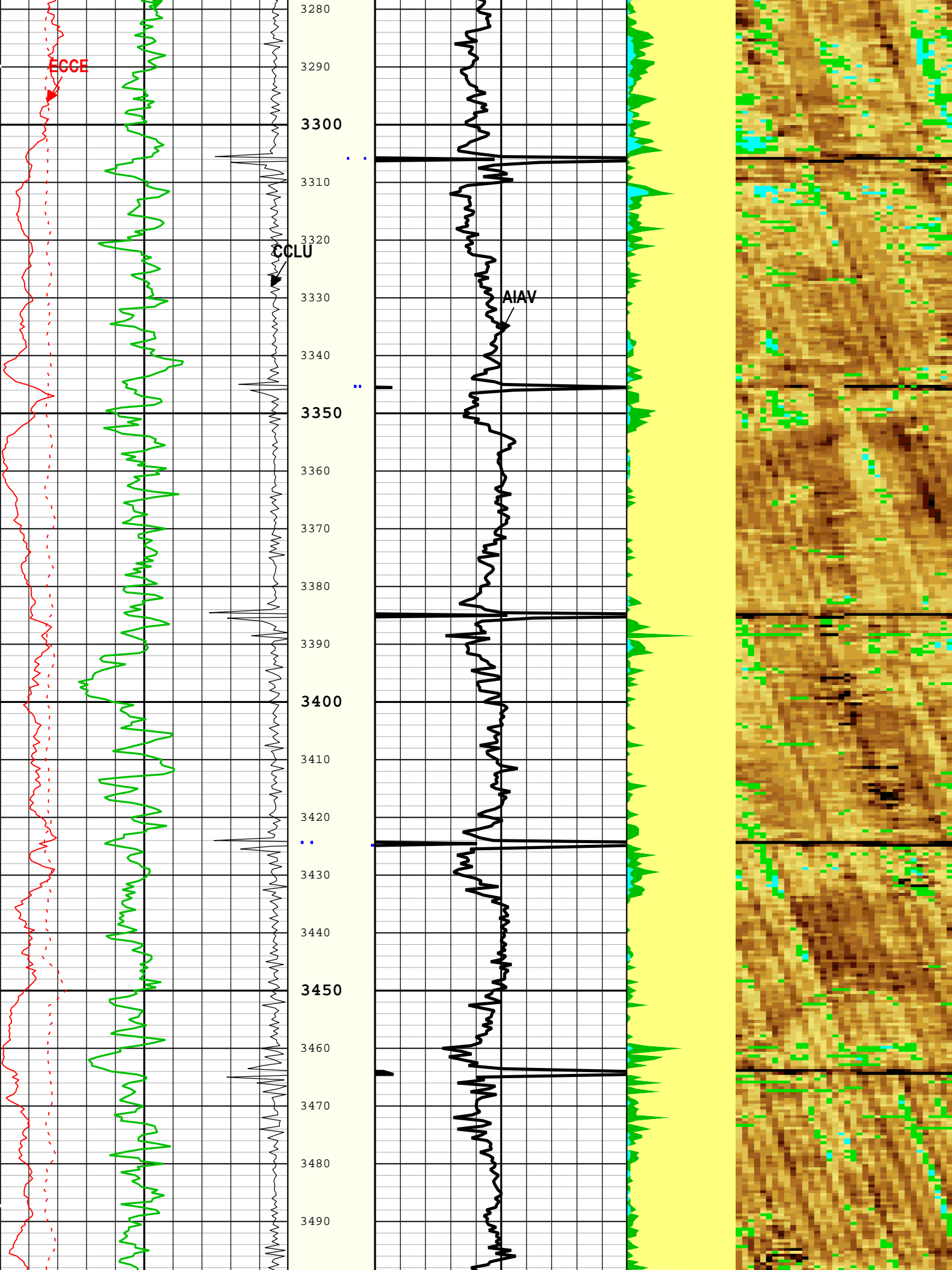


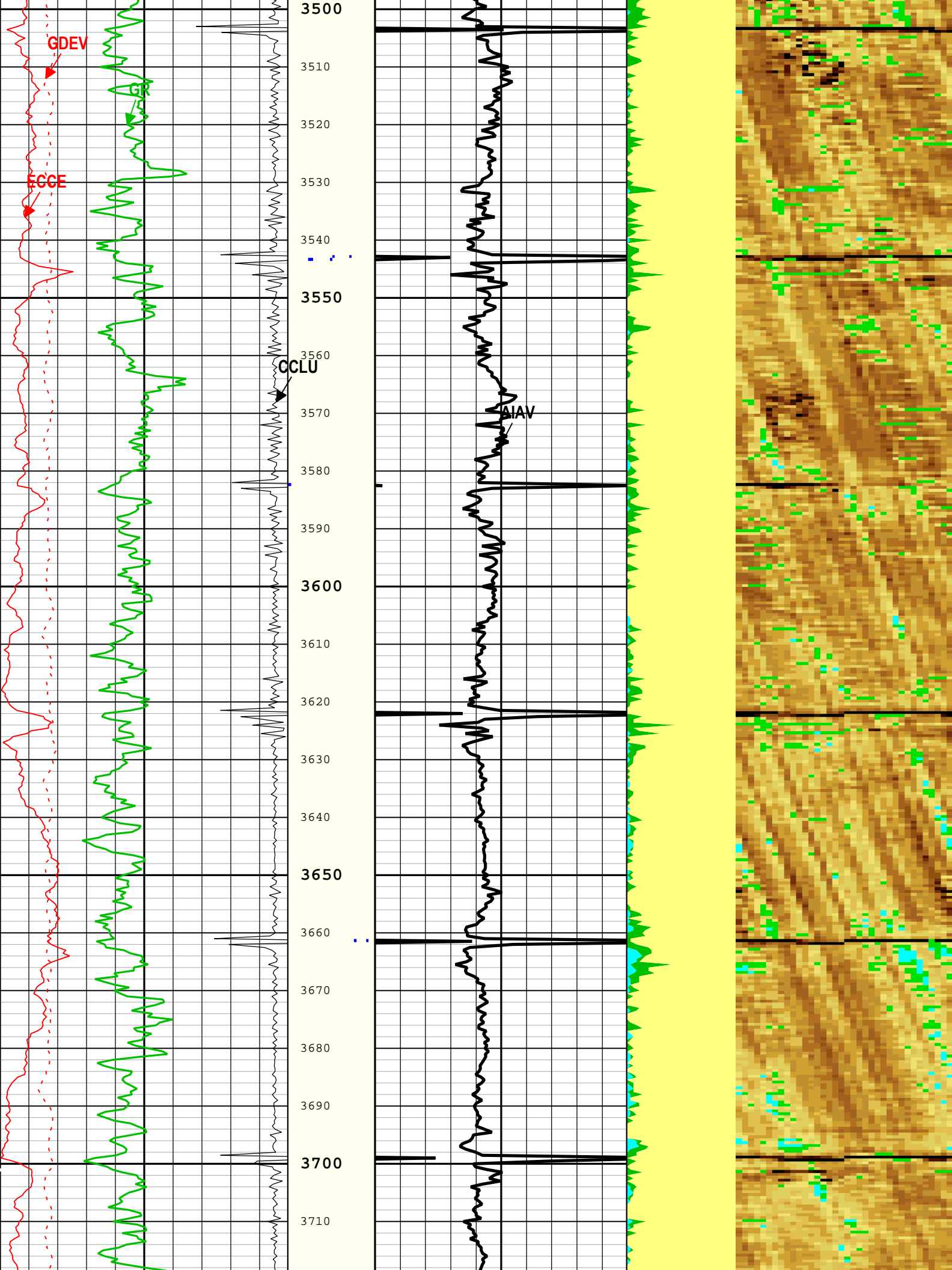


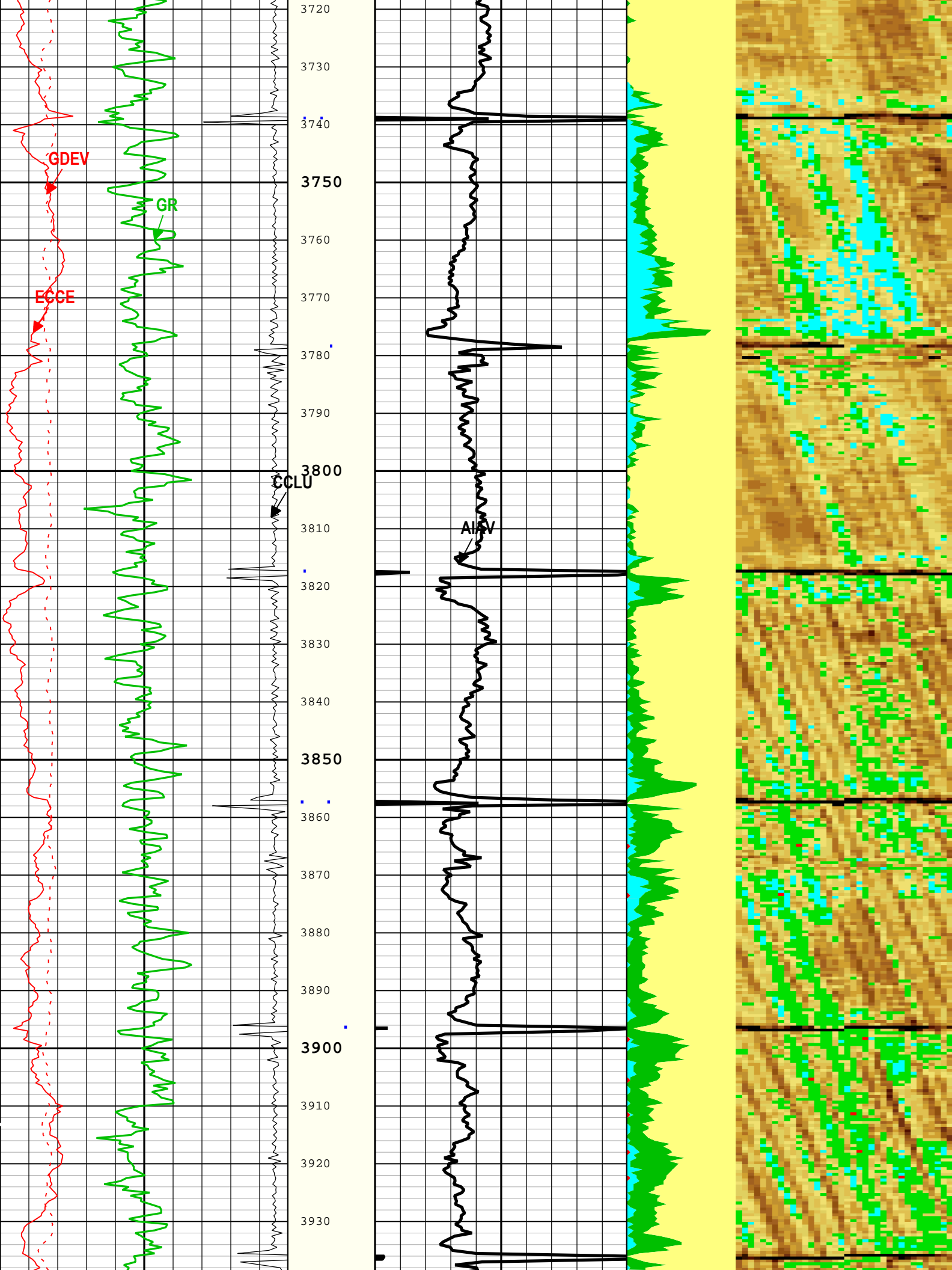


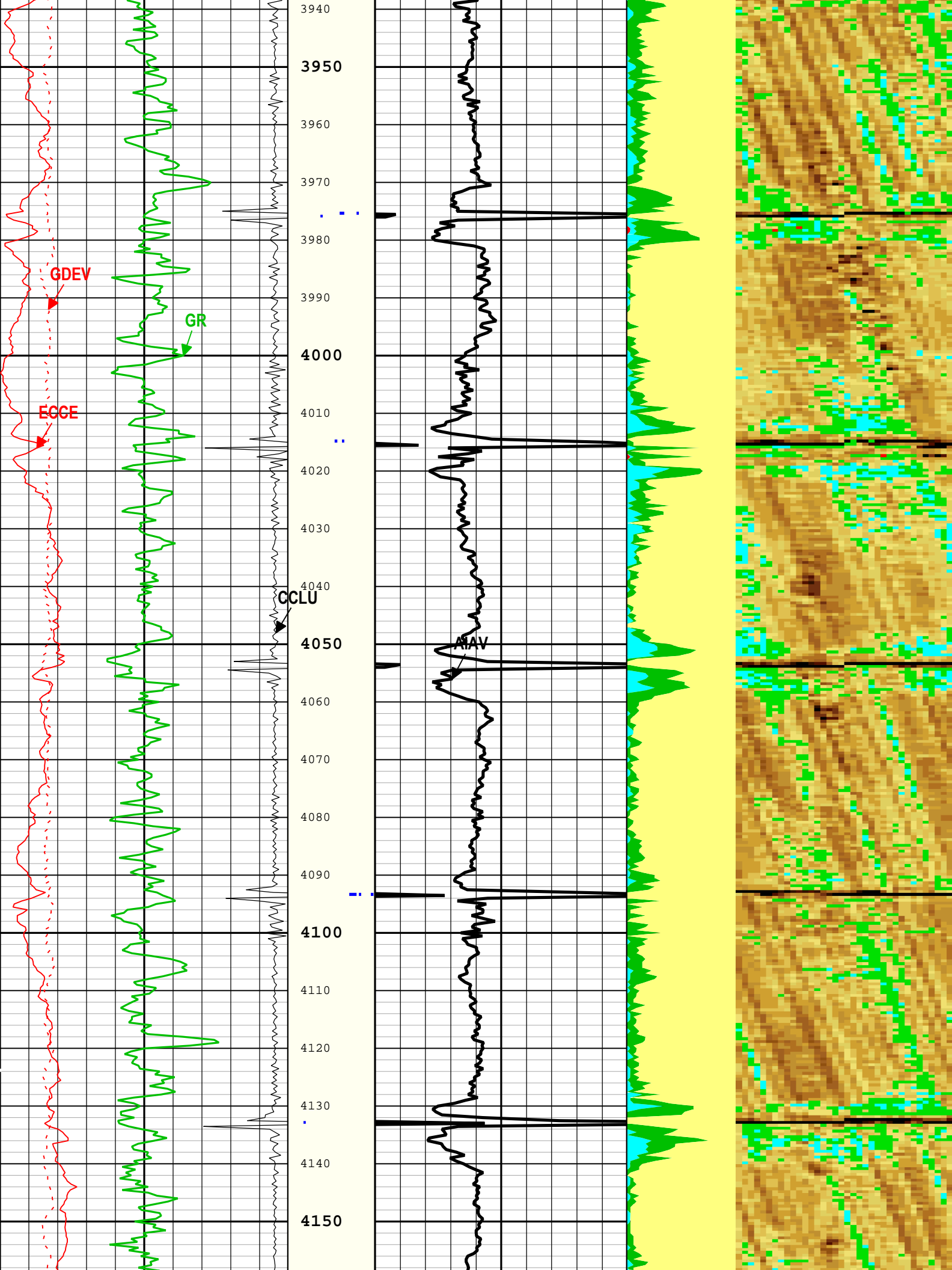


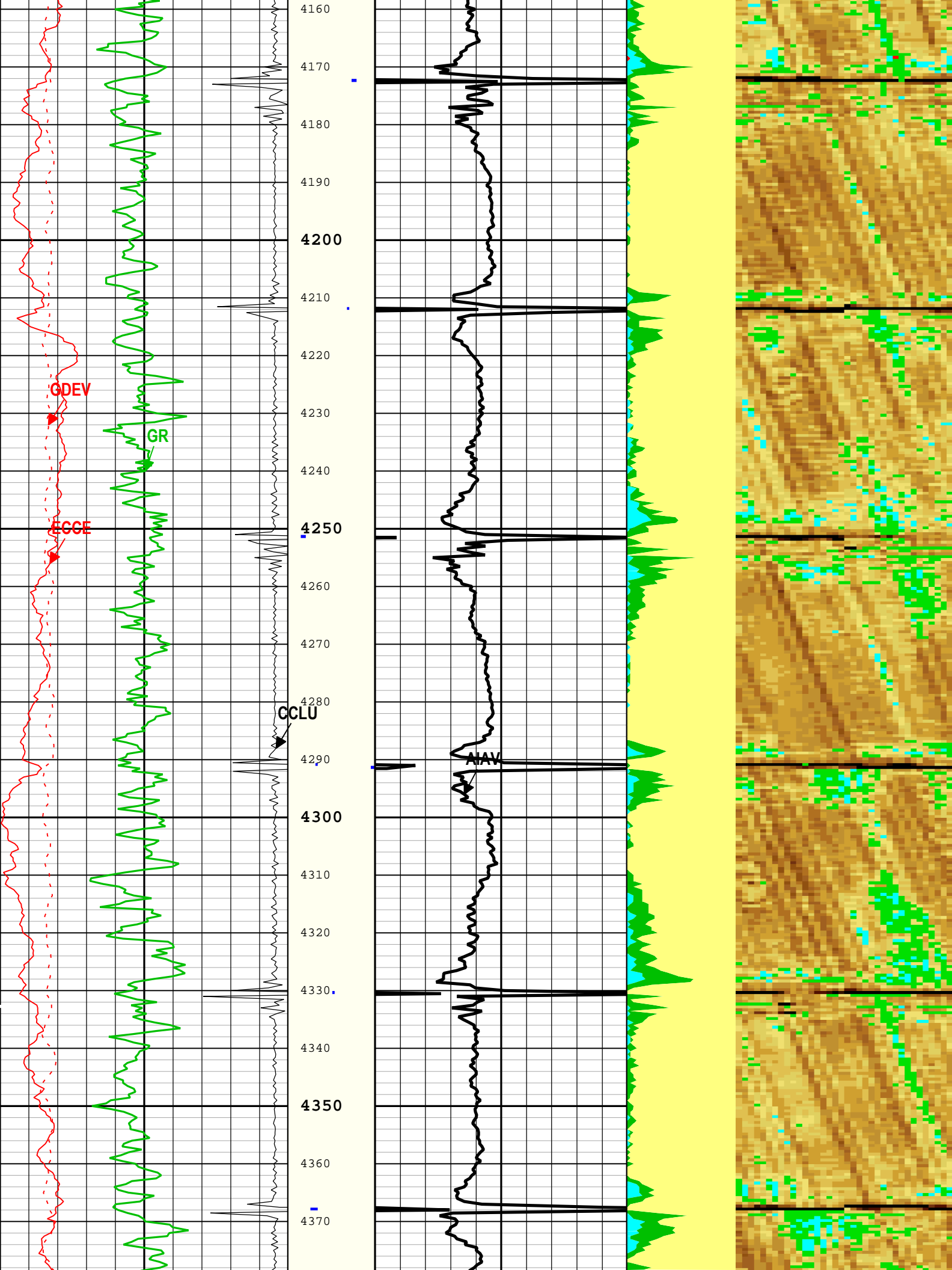


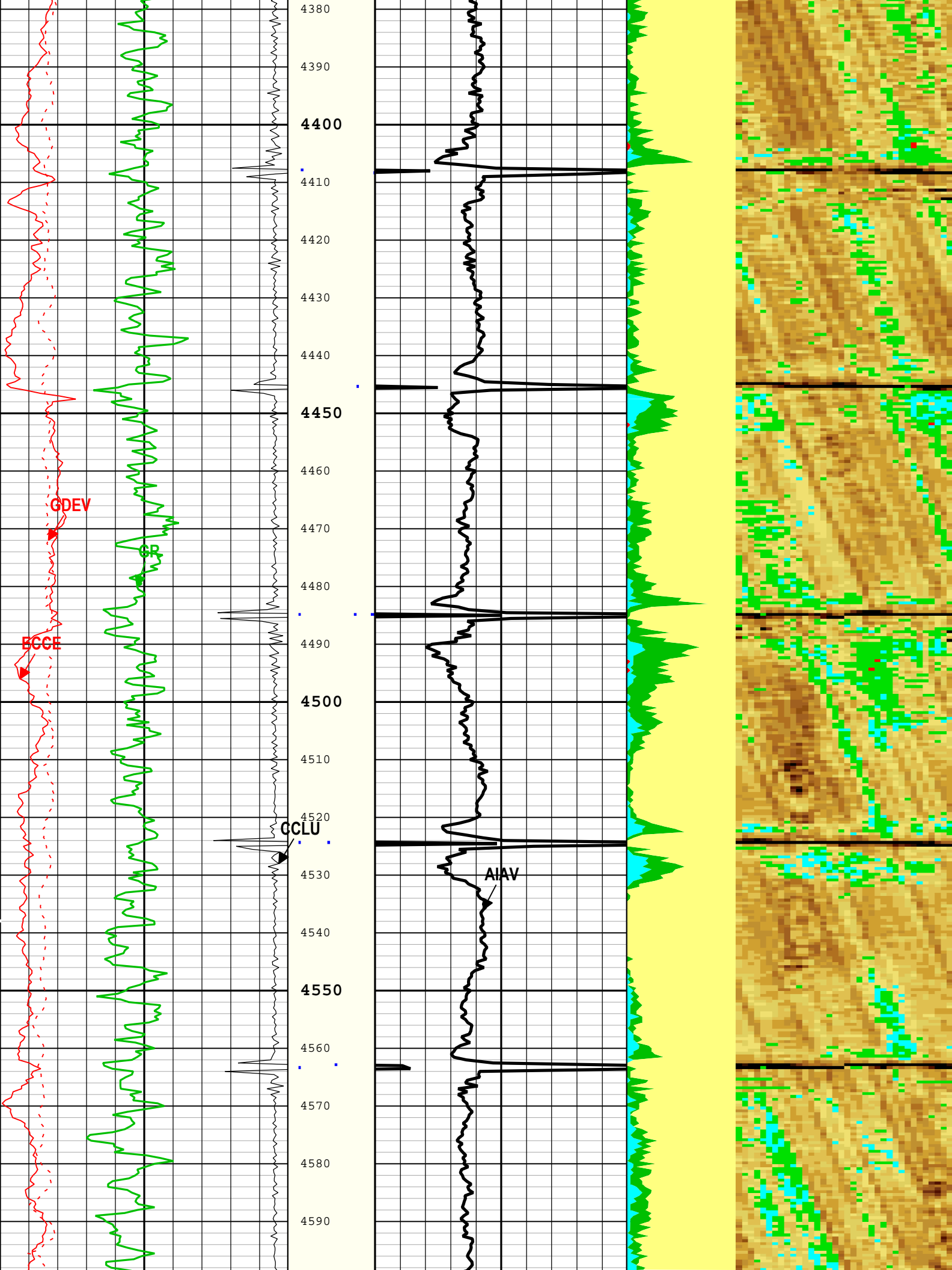


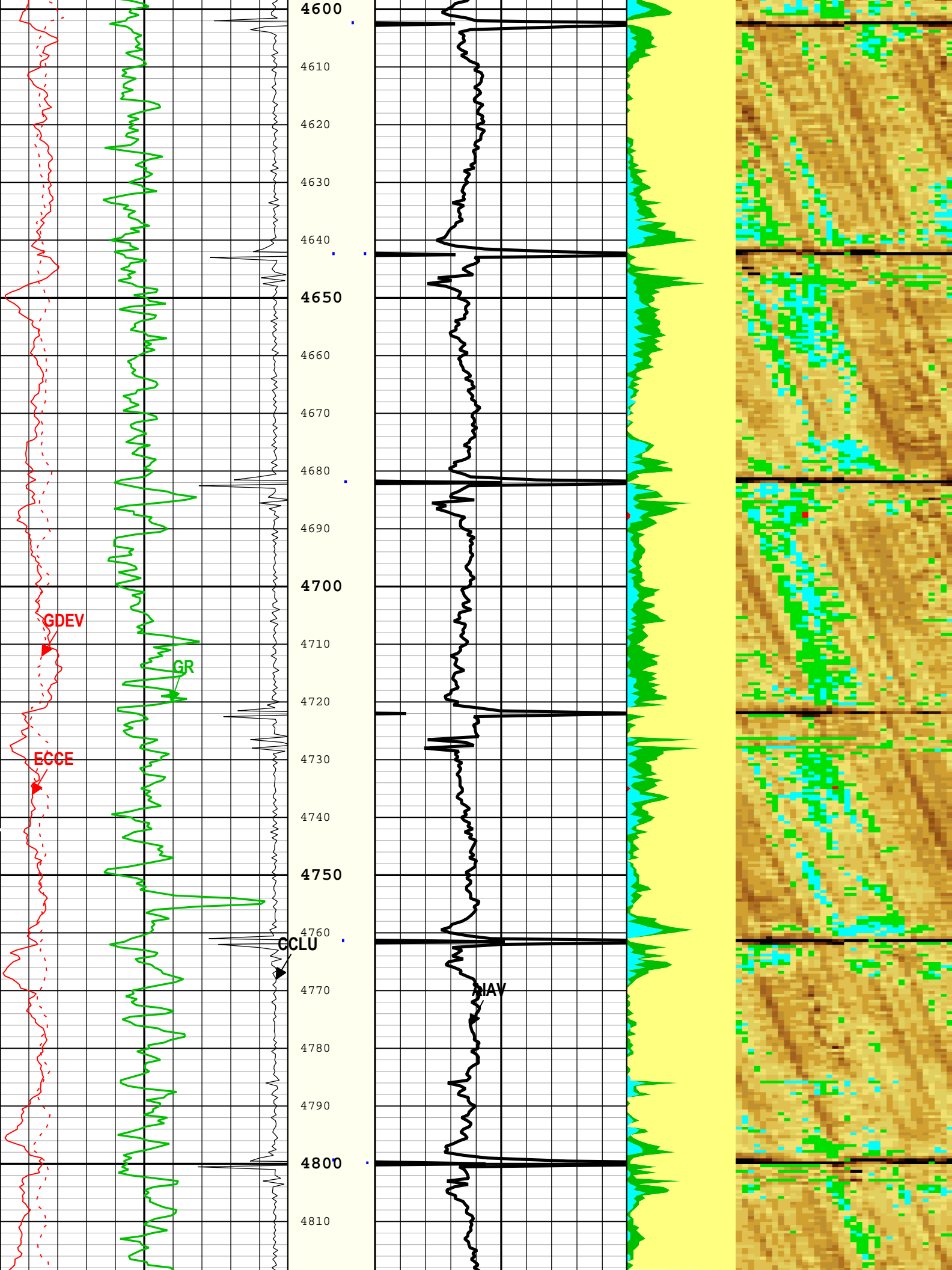


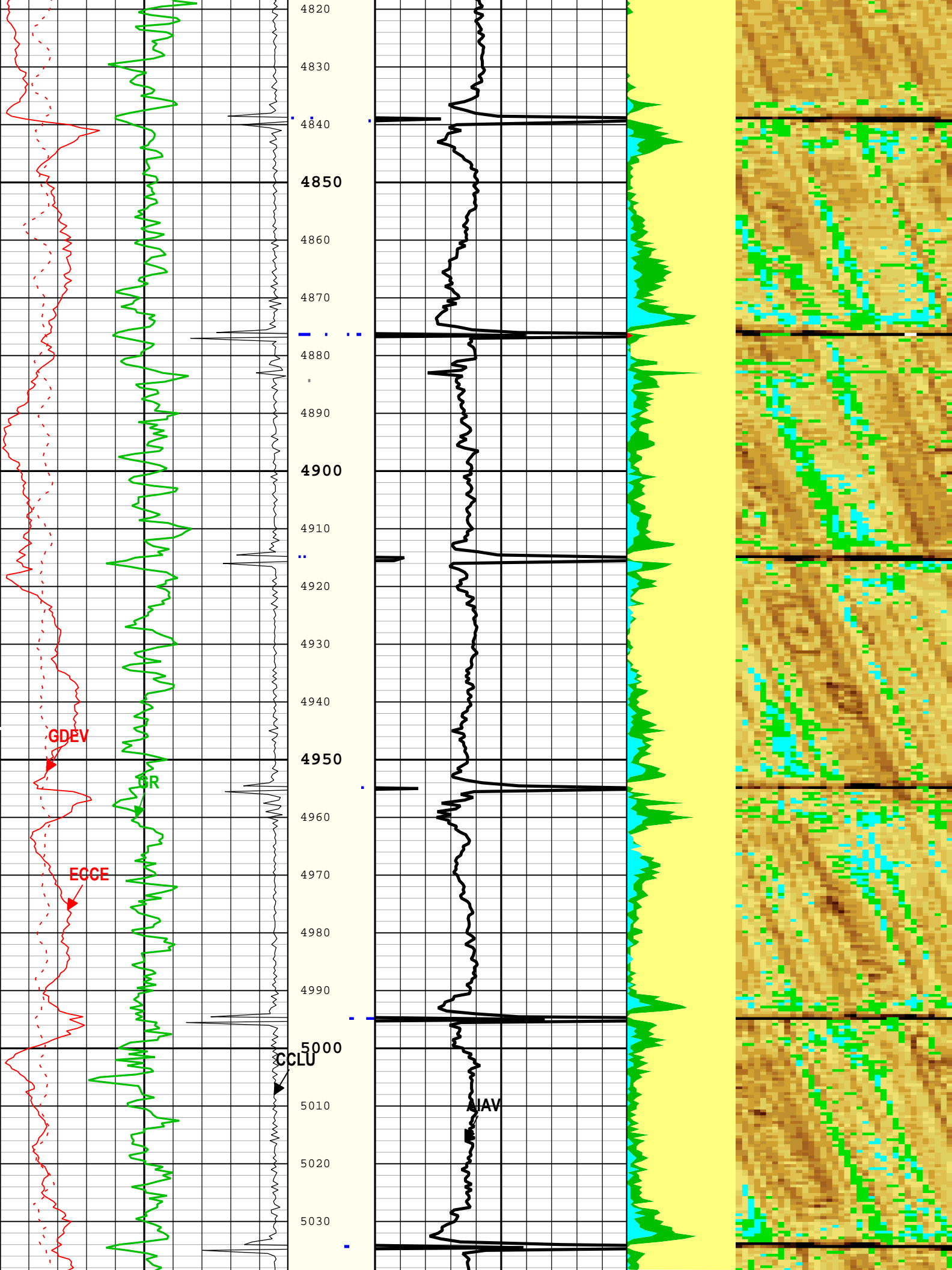


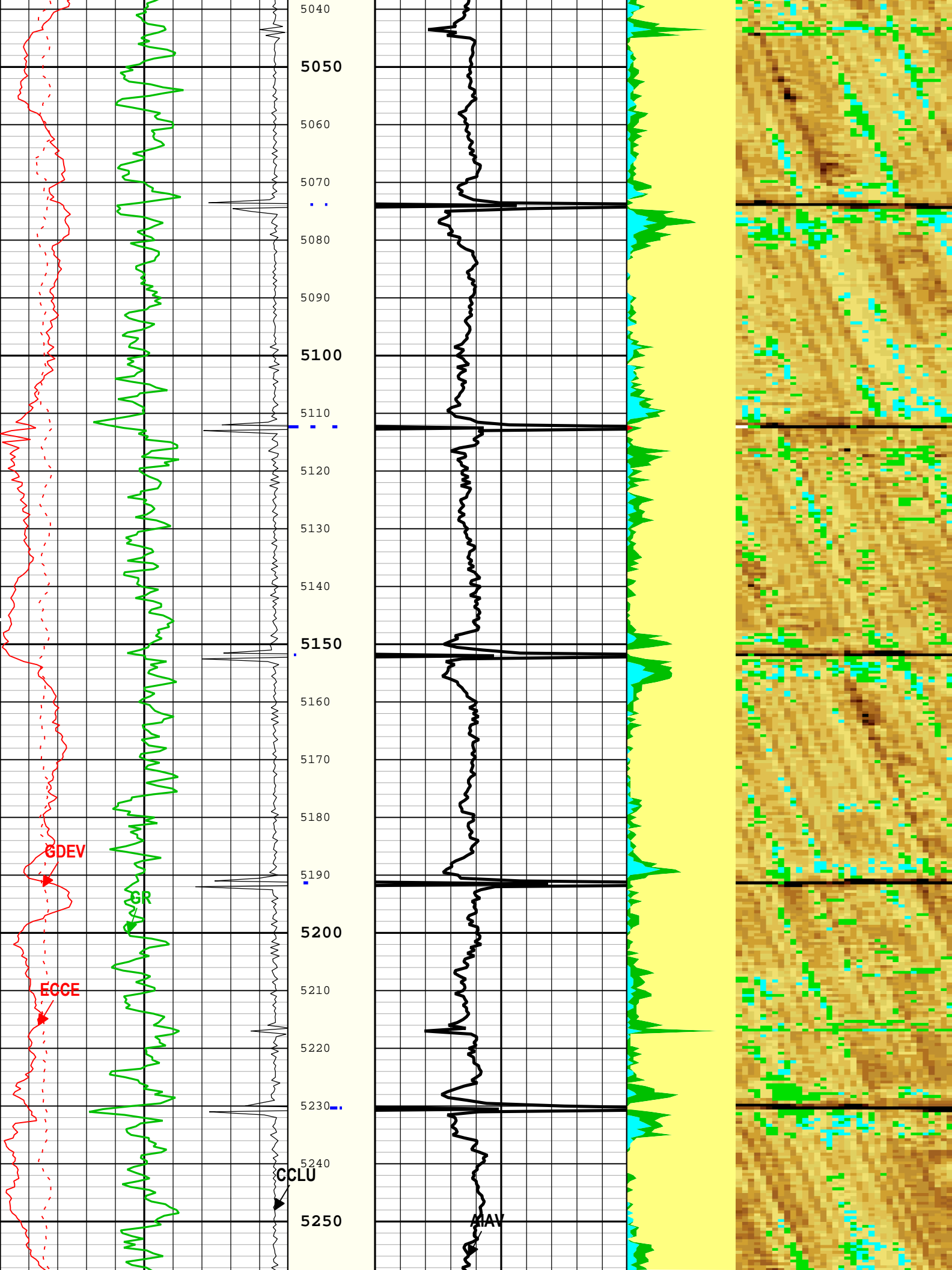


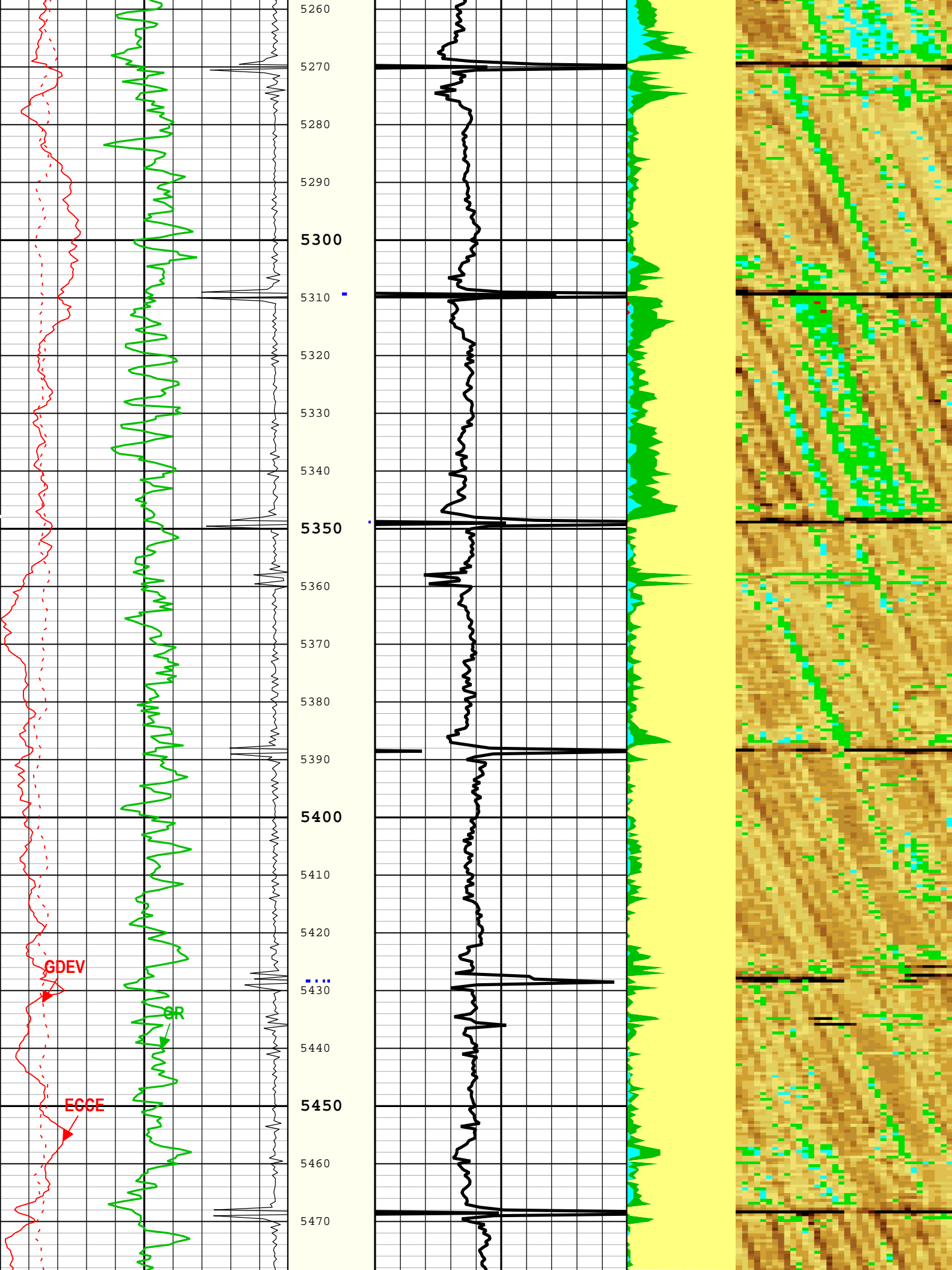


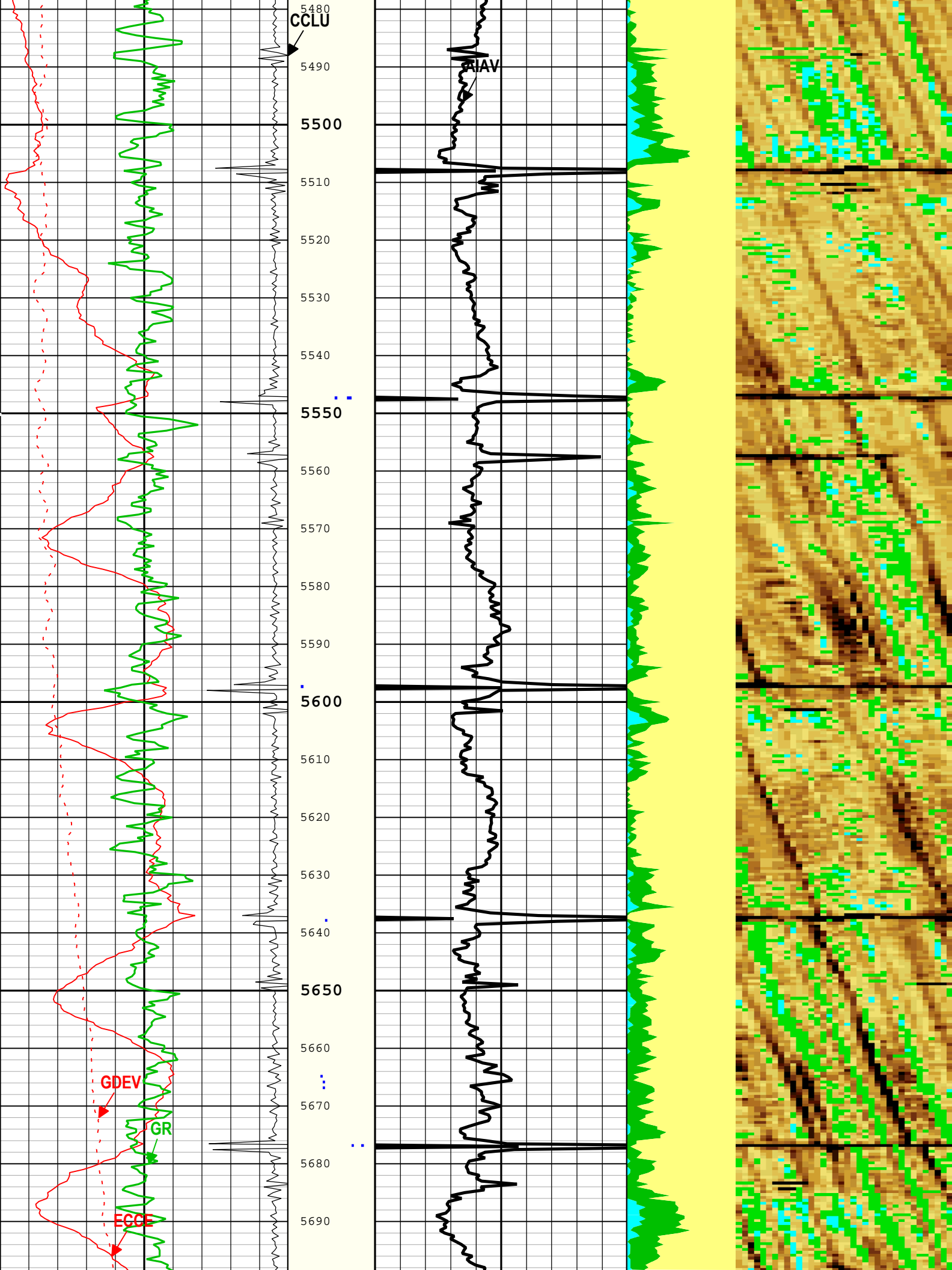


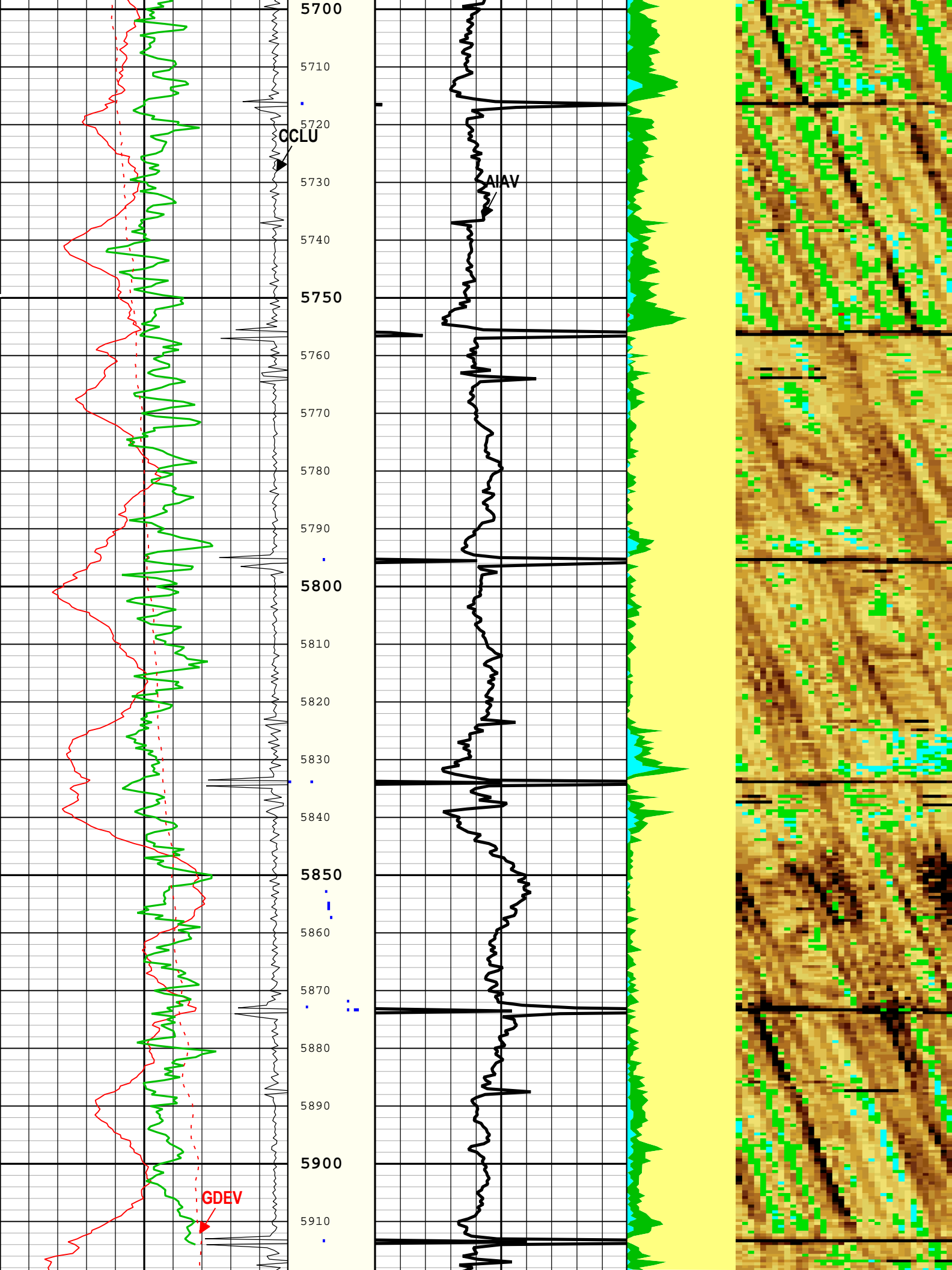


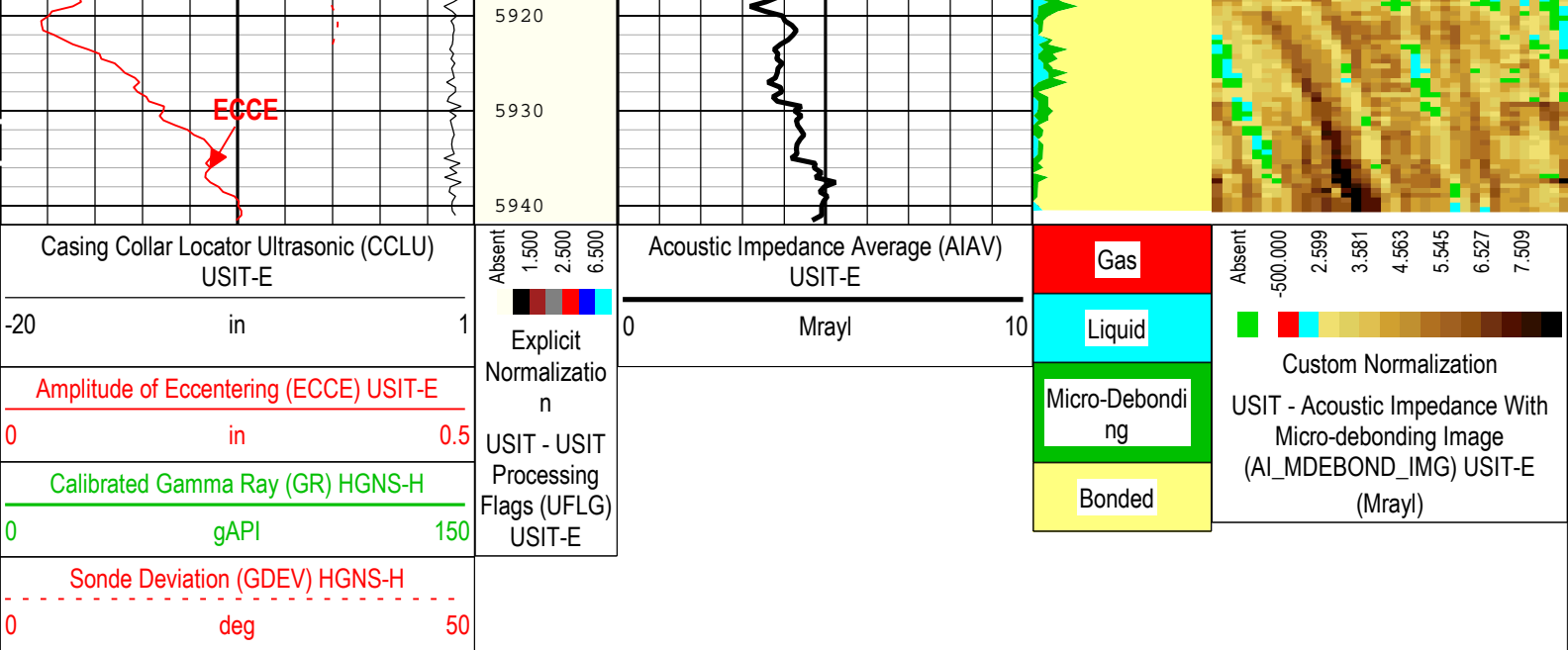












TIME_1900 - Time Marked every 60.00 (s)

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: 04-Aug-2017 07:05:59

Channel Processing Parameters

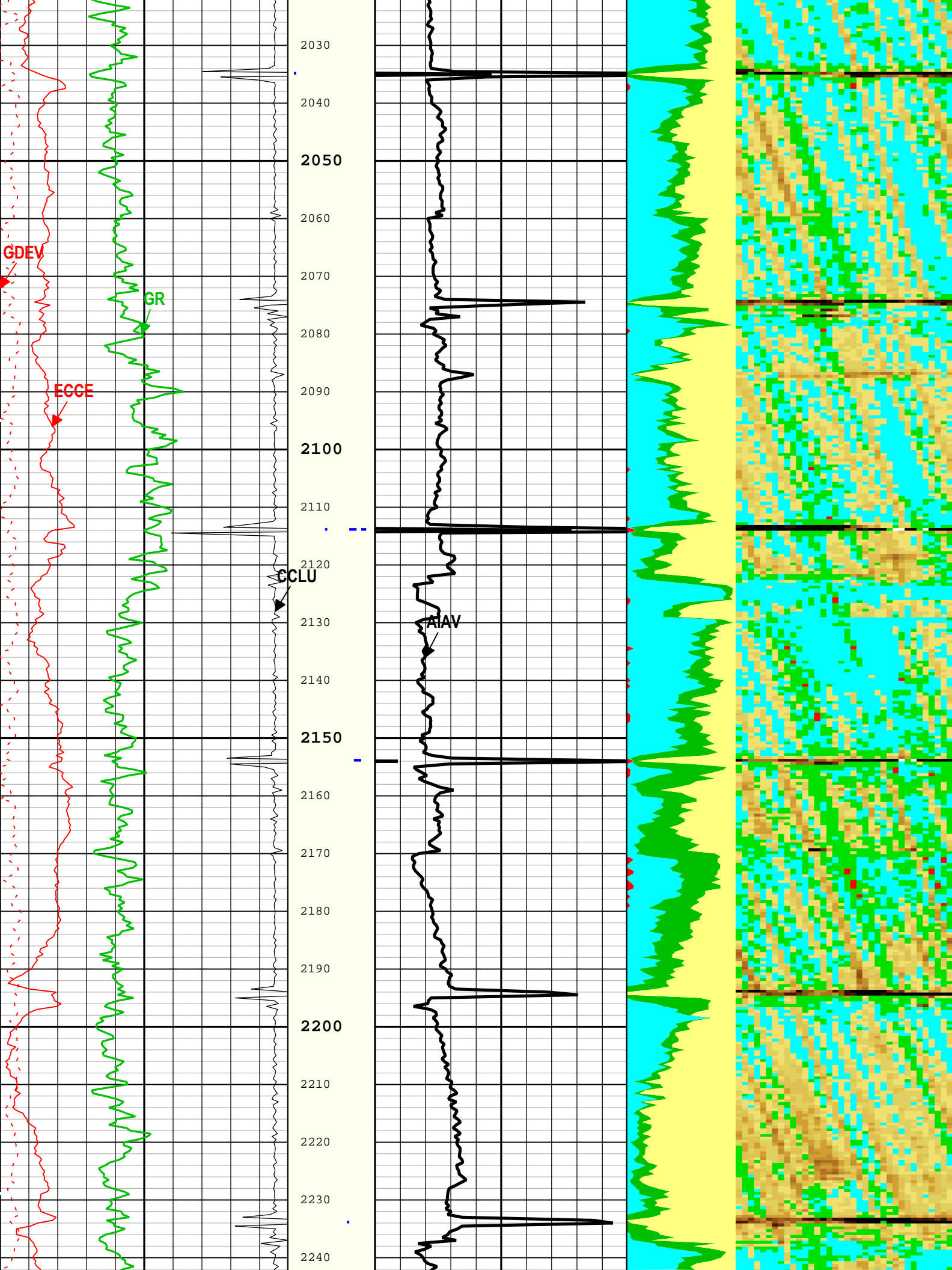
Two: Parameters

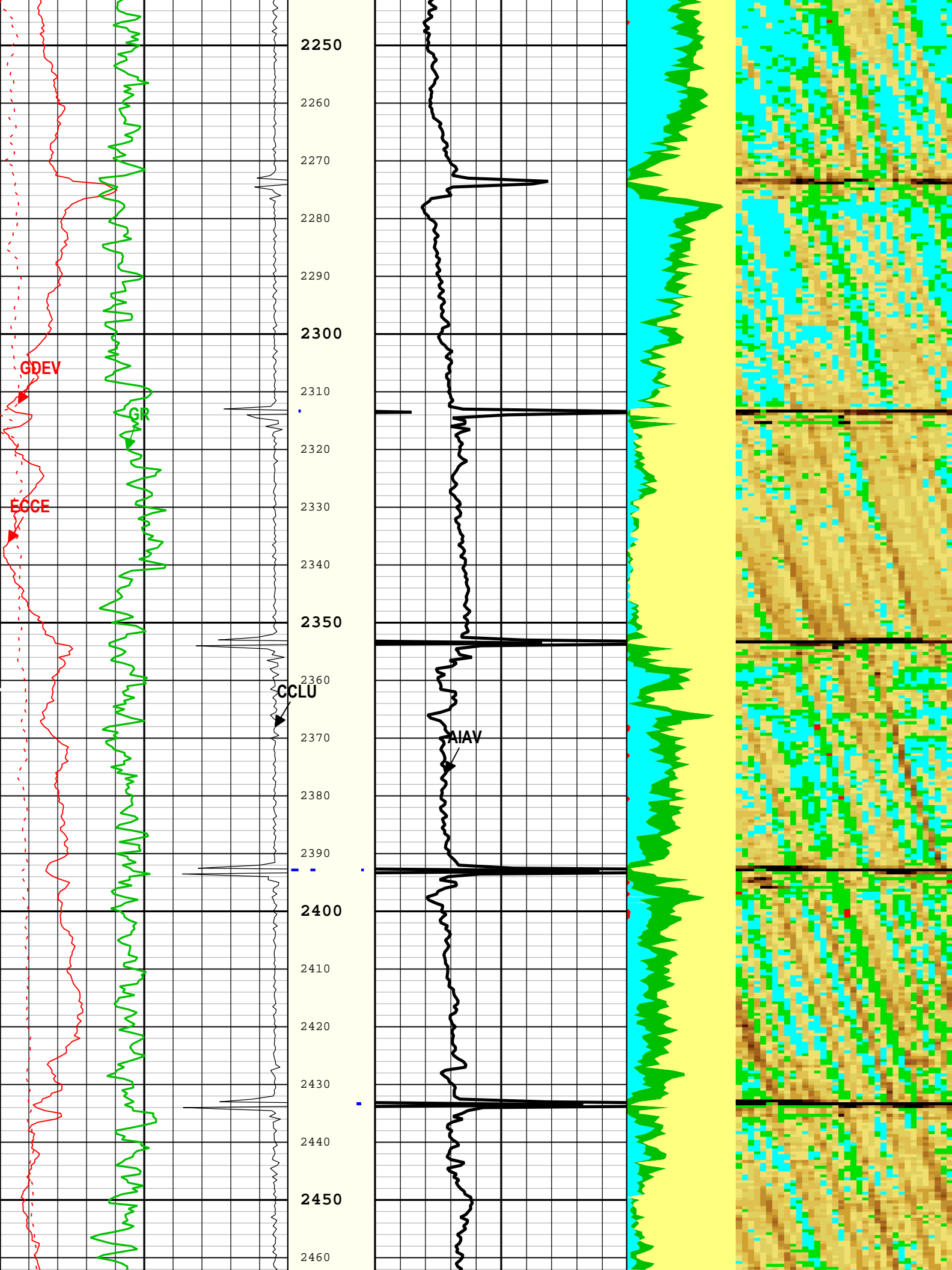
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BS	Bit Size	WLSESSION	Depth Zoned	in
CMTY(U-USIT_CEMT)	Cement Type	USIT-E	Regular Cement	
DFD	Drilling Fluid Density	Borehole	8.4	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DTMD	Borehole Fluid Slowness	Borehole	206	us/ft
FDII	FPM Data Interpolation Interval	USIT-E	0	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	1.17	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
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	2.6	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

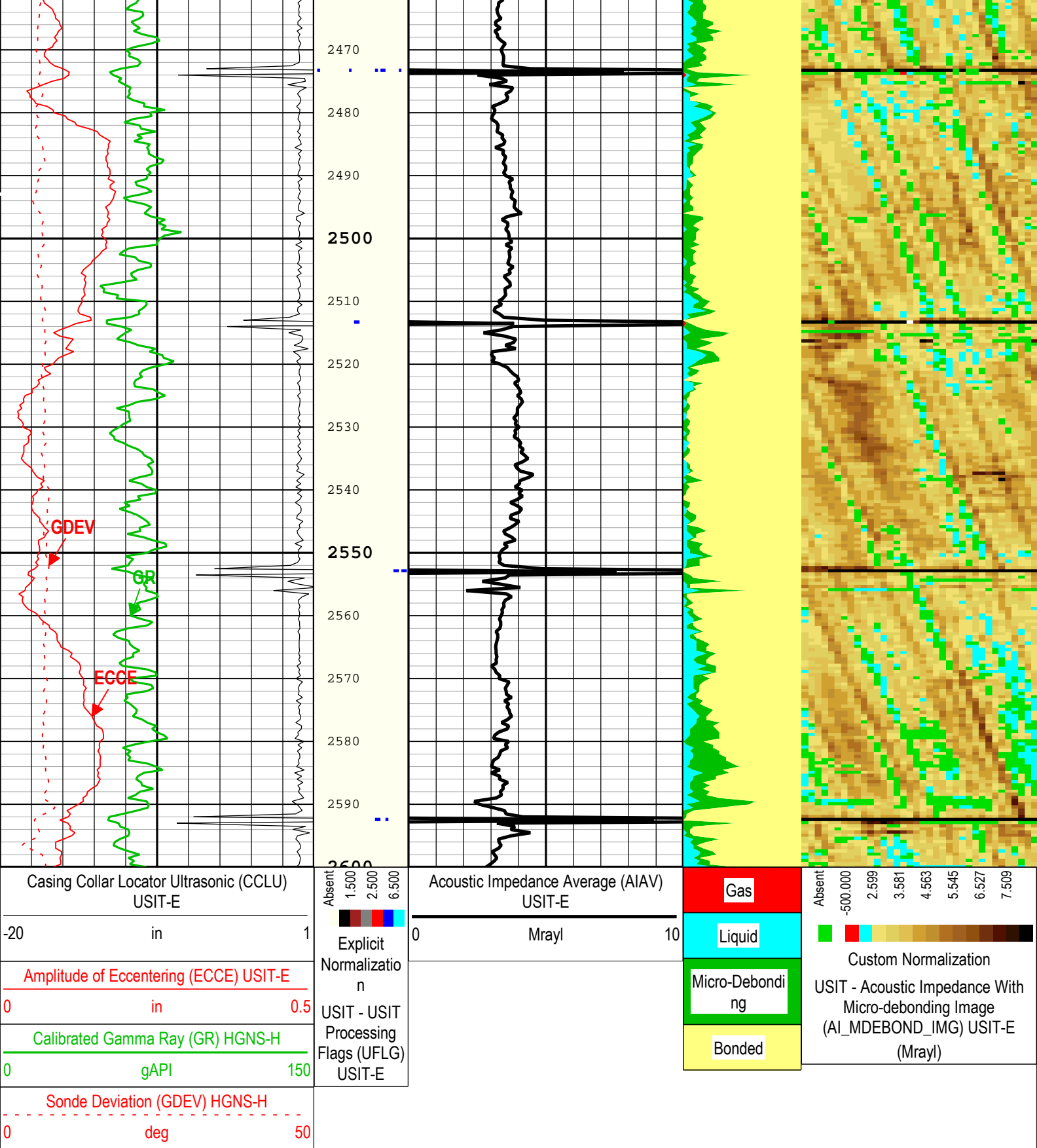
Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	13.5	116	1940
BS	8.5	1940	5942

All depth are actual.







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: 04-Aug-2017 07:06:05

Channel Processing Parameters

Two: Parameters

Parameter	Description	Tool	Value	Unit
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
FDII	FPM Data Interpolation Interval	USIT-E	0	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	1.17	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.1	Mrayl
UFGDE	Fiberglass Density	USIT-E	16.27	lbm/gal
UFGPS	Fiberglass Processing Selection	USIT-E	No	
UFGVL	Fiberglass Velocity	USIT-E	9678.48	ft/s
USI_FSOD	USIT USI Fluid Slowness Fits Casing Outer Diameter	USIT-E	0_OFF	
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	2.6	Mrayl
ZTGS	Acoustic Impedance Threshold for Gas	USIT-E	0.3	Mrayl

Tool Control Parameters

Two: Parameters				
Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
U-USIT_DDT5	USIC Downhole Decimation for T5 only	USIT-E	0_NONE	
EMXV	EMEX Voltage	USIT-E	50	V
HRES	Horizontal Resolution	USIT-E	10 deg	
TMUC	Type of Mud	USIT-E	BRI	
ULOG	Logging Objective	USIT-E	MEASUREMENT	
UMFR	Modulation Frequency	USIT-E	333333	Hz
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	
USIT_DEPTHLOG	Starting Depth Log for Ultrasonics	USIT-E	7000	ft
WINB	Window Begin Time	USIT-E	31.88	us
WINE	Window End Time	USIT-E	71.88	us

XYZ

Company:Noble Energy Inc. Well:Freedom Federal LC21-635

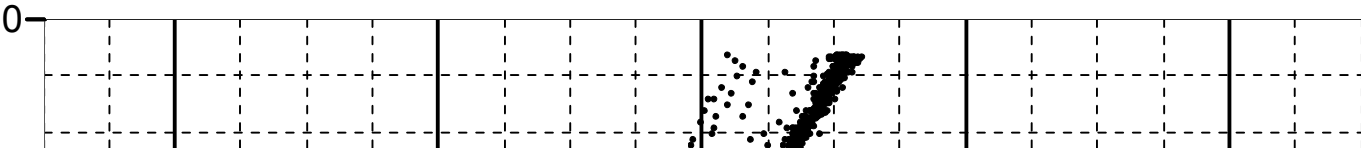
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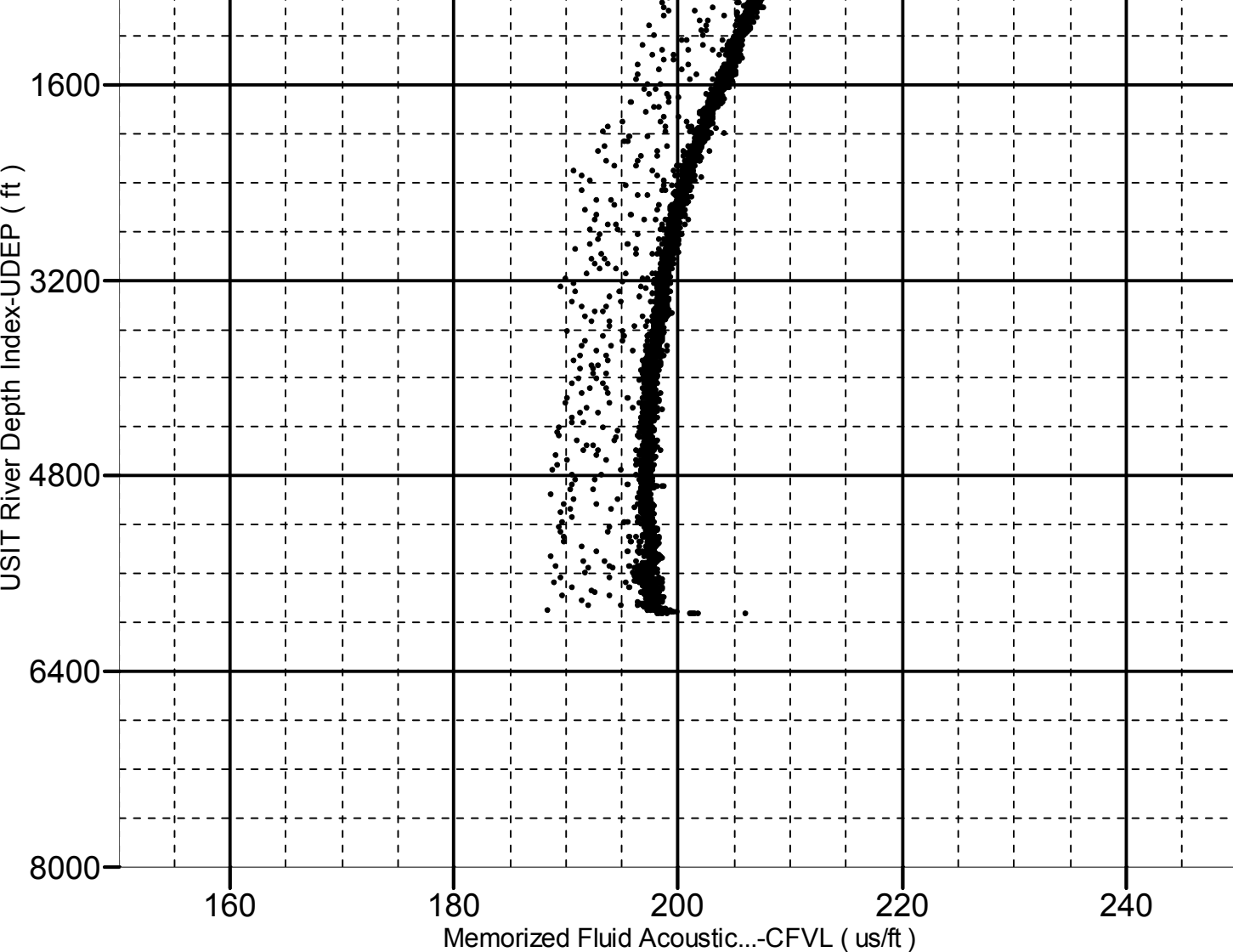
Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 5942.00 to 80.00 ft

● CFVL-UDEP





XYZ

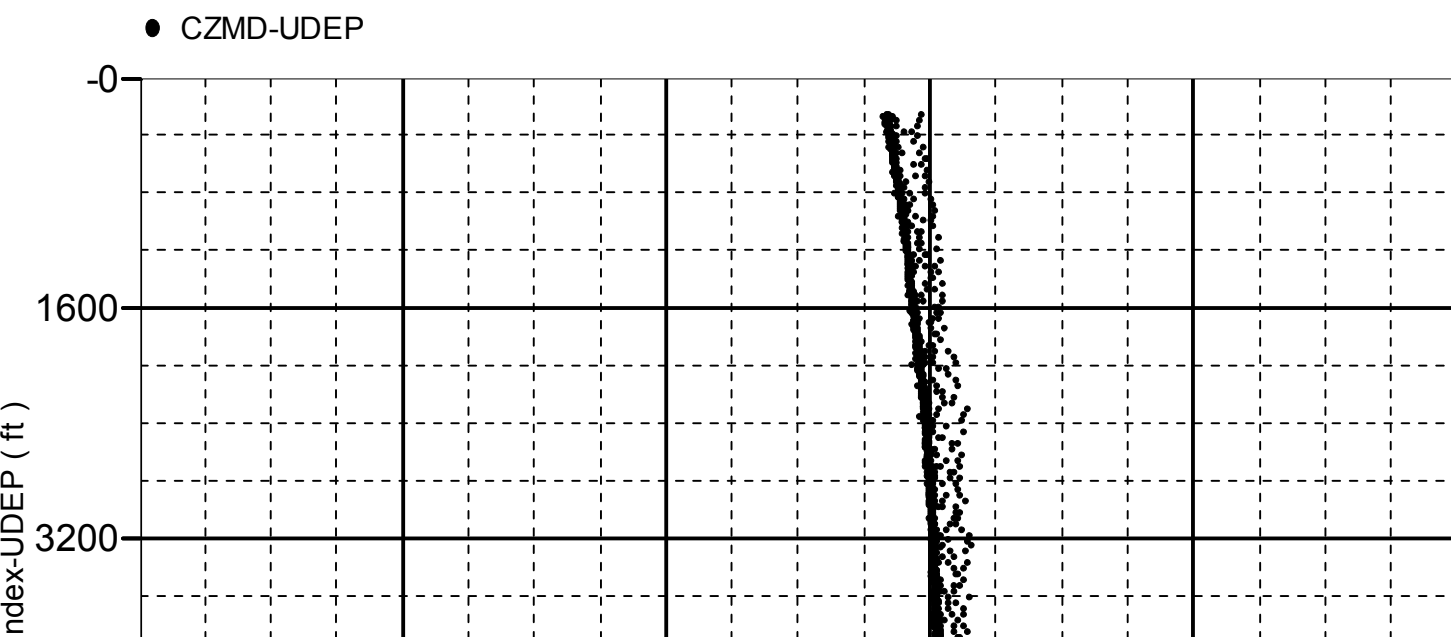
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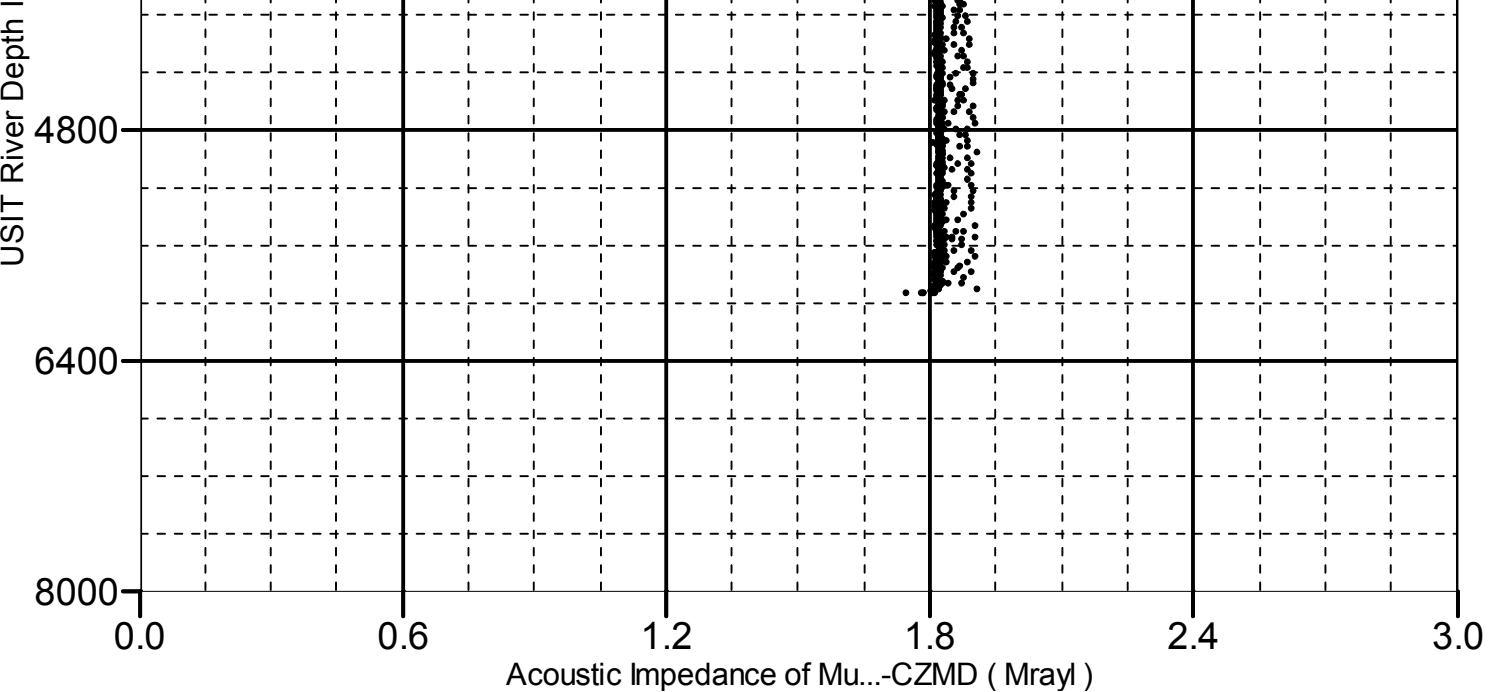
Two: Log[2]:Up:S015

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 5942.00 to 80.00 ft





Calibration Report							
HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run Two							
Primary Equipment :							
HILT Gamma-Ray and Neutron Sonde, 150 degC		HGNS-H		4826			
Calibration Parameter :							
Water Temperature (Calibration Tank Water Temperature)		43.1					
Housing Size (Thermal Housing Size)		3.37					
JIG-BKG (Jig minus background reference)		165					
HGNS Accelerometer Calibration - Accelerometer Accumulations							
Before (Measured):		14:08:02 03-Aug-2017					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.1	32.8	<div><div></div><div></div><div></div><div></div></div>
HGNS Neutron Calibration - HGNS Neutron Accumulations							
Before:							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
Near Zero Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
Far Zero Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
Near Plus Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
Far Plus Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
Near Corrected Plus Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
Far Corrected Plus Measurement - 0	1/s	Before	----	----	----	----	<div><div></div><div></div></div>
HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations							
Before (Measured):		10:12:33 03-Aug-2017					
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	<div><div></div><div></div></div>
RGR Zero Measurement	gAPI	Before	30.0	0	76.3	120.0	<div><div></div><div></div><div></div><div></div></div>
RGR Plus Measurement	gAPI	Before	185.4	157.1	176.9	206.3	<div><div></div><div></div><div></div><div></div></div>
GR Calibration Gain		Before	0.89	0.80	0.93	1.05	<div><div></div><div></div><div></div><div></div></div>

Company:	Noble Energy Inc.	Schlumberger
Well:	Freedom Federal LC21-635	
Field:	Wildcat	
County:	Weld	
State:	Colorado	
DJ BASIN UltraSonic Summary Print		