

Company: Noble Energy Inc

Well: Bison Ridge Y22-734

Field: Wattenberg

County: Weld Country: US

UltraSonic Summary Print

County:	Weld			
Field:	Wattenberg			
Location:	SHL: NWSE Sec. 10, T2N, R64W			
Well:	Bison Ridge Y22-734			
Company:	Noble Energy Inc			
	Location:			
	SHL: NWSE Sec. 10, T2N, R64W		Elev.:	K.B. 4954.00 ft
	2640' FSL & 1577' FEL			G.L. 4924.00 ft
	Lat: 40.15182 / Long: -104.53546			D.F. 4954.00 ft
	Permanent Datum:	Ground Level	Elev.:	4924.00 f
	Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
	Drilling Measured From:	Kelly Bushing		
	API Serial No.	Max.Hole Deviation	Longitude:	Latitude:
	05-123-45371	0 deg	-104.53546 degrees	40.151820 degrees

Logging Date	24-Jan-2018		
Run Number	One		
Depth Driller	17023.00 ft		
Schlumberger Depth	17023.00 ft		
Bottom Log Interval	6300.00 ft		
Top Log Interval	60.00 ft		
Casing Fluid Type	Calcium Chloride Brine		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	8.00 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.50 in		
From	2040.00 ft		
To	17023.00 ft		
Casing/Tubing Size	5.5 in		
Weight	20 lbm/ft		
Grade	N/A		
From	0.00 ft		
To	17023.00 ft		
Max Recorded Temperatures	189 degF		
Logger on Bottom	24-Feb-2018	09:52:00	
Unit Number	9108	Fort Morgan, CO	
Recorded By	Benjamin Mammon		
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.

Contents

1. Header

2. Disclaimer

3. Contents

4. Well Sketch

5. Borehole Size/Casing/Tubing Record

6. Operational Run Summary

7. Borehole Fluids

8. Remarks and Equipment Summary

9. Depth Summary

10. USI Fluid Properties Measurement_1

11. One 2500 PSI Main Pass

11.1 Integration Summary

11.2 Software Version

11.3 Composite Summary

11.4 Log (DJ Basin Ultrasonic Cement Summary Report)

11.5 Parameter Listing
13. XYZ (USI Fluid Acoustic Slowness vs Depth 3.0 in)

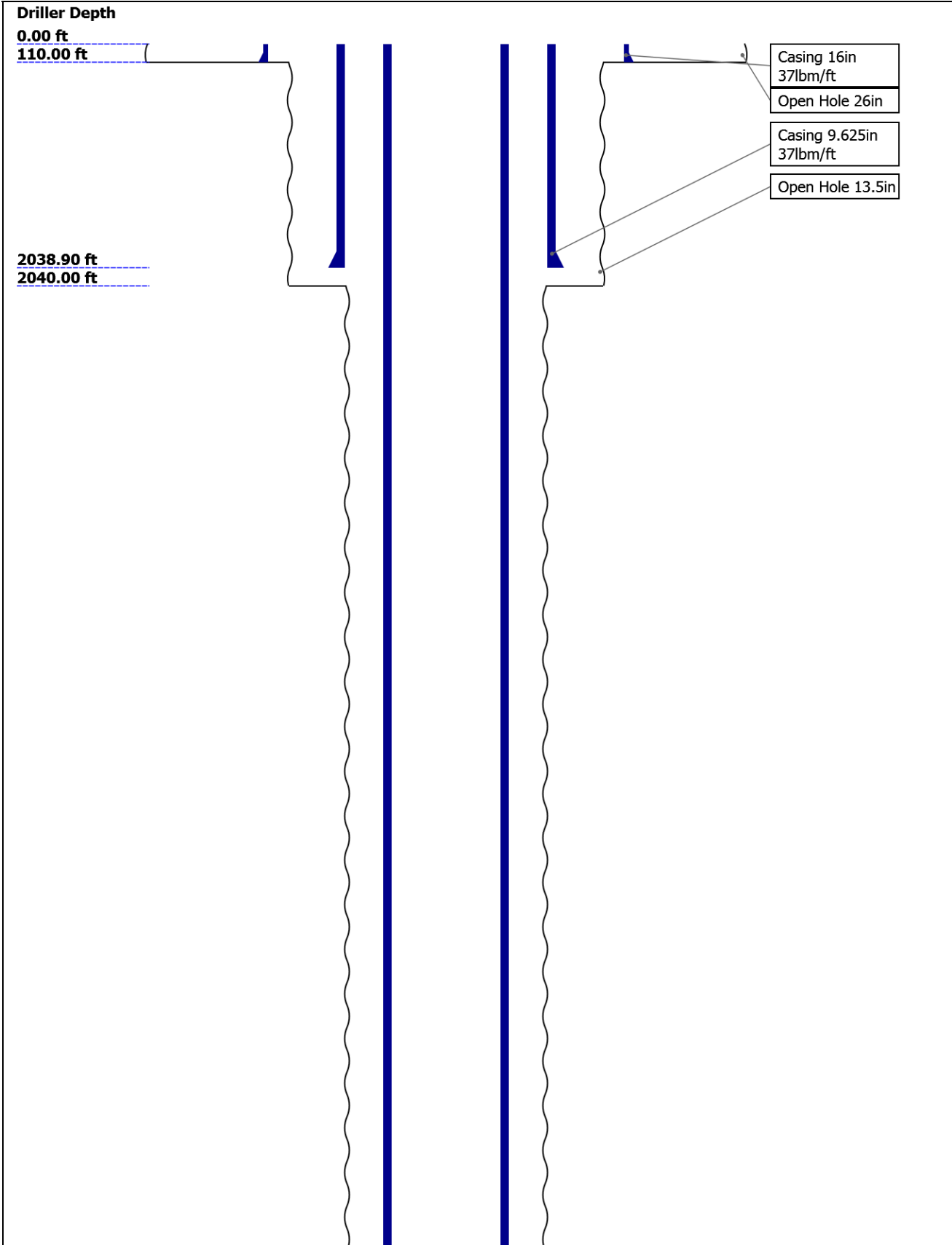
14. XYZ (USI Acoustic Impedance of Mud vs Depth 3.0 in)

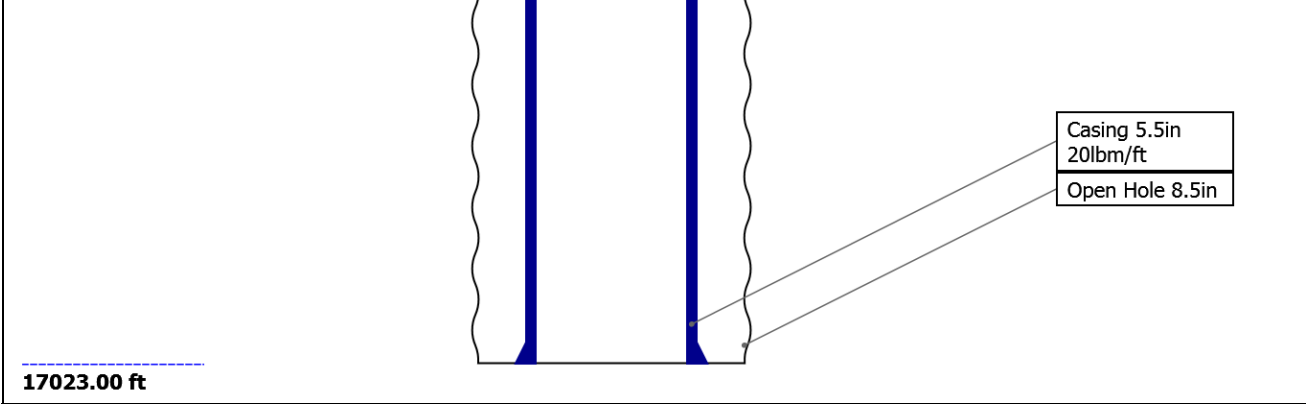
15. Calibration Report

16. Tail

- 12. One 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





Borehole Size/Casing/Tubing Record


Bit						
Bit Size (in)	26	13.5	8.5			
Top Driller (ft)	0	110	2040			
Top Logger (ft)	0	110	2040			
Bottom Driller (ft) (ft)	110	2040	17023			
Bottom Logger (ft)	110	2040	17023			
Casing						
Size (in)	16	9.625	5.5			
Weight (lbm/ft)	37	37	20			
Inner Diameter (in)	15.571	8.893	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	2038.9	17023			
Bottom Logger (ft)	110	2038.9	17023			

Operational Run Summary

Parameter (unit)	One					
Date Log Started	24-Jan-2018					
Time Log Started	09:20:28					
Date Log Finished	24-Jan-2018					
Time Log Finished	10:56:11					
Top Log Interval (ft)	60.00					
Bottom Log Interval (ft)	6300.00					
Total Depth (ft)						
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	8.500					
Logging Unit Number	9108					
Logging Unit Location	Fort Morgan, CO					
Recorded By	Benjamin Marmon					

Borehole Fluids						
Parameter(unit)	One					
Fluid Type	Water					
Fluid Name	Calcium Chloride Brine					
Max Recorded Temperatures (degF)	189					
Source of Sample	Active Tank					
Salinity (ppm)	0					
Density (lbm/gal)	8.4					
Funnel Viscosity (s)	26					
Fluid Loss (cm3)						
PH						
Date/Time Circulation Stopped	NaN					
Date Logger on Bottom	24-Feb-2018					
Time Logger on Bottom	09:52:00					
Source RMF						
RMC	Pressed					
RM @ Meas Temp (ohm.m@degF)	0.2 @ 68					
RMF @ Meas Temp (ohm.m@degF)	0.15 @ 68					
RMC @ Meas Temp (ohm.m@degF)						
RM @ BHT (ohm.m@degF)	0.07 @ 212					
RMF @ BHT (ohm.m@degF)	0.05 @ 212					
RMC @ BHT (ohm.m@degF)	NaN @ 212					
Total Solid (%)						
High Gravity Solids (%)						

One: Toolstring	On
-----------------	----

Equip name	Length		MP name	Offset	
LEH-QT:2 353 LEH-QT:23 53	33.83				This is the first log in the well.
					Toolstring ran as per toolsketch.
					Log up correlated to log down.
SAH-F:18 17	30.91				Main pass recorded at 2500 PSI.
					Repeat pass recorded at 0 PSI.
EDTC-B:8 424 EDTH-B:84 32 EDTG-A:7 7303 EDTC-B:84 24	26.06				
			CTEM	22.56	
			ACCZ	0.00	
			HV	0.00	
			Gamma Ray	20.69	
			TelStatu s	19.56	
AH-184[2]	19.56				
AH-184[17.56				

	One		
Depth Measuring Device			
Type	IDW-B		
Serial Number	993		
Calibration Date	28-Sep-2017		
Calibrator Serial Number	57		
Calibration Cable Type	7-39 AIXXS		
Wheel Correction 1	-4		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		
Serial Number	171		
Calibration Date	22-Jan-2018		
Calibrator Serial Number	78796A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	42		
Calibration Peak Error	78		
Logging Cable			
Type	7-39AI-XXS		
Serial Number	F714037		
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Crane		
One:Depth Control Parameters		Depth Control Remarks	

All Schlumberget depth control procedures followed during logging operation.

IDW used as primary depth control device.

ZChart used as secondary depth control device.

Start Depth(ft)	Stop Depth(ft)
371.19	64.28

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 103–110

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

09.04ft)

1.72 MRayl

Start Value(Mrayl)	End Value(Mrayl)
--------------------	------------------

ne

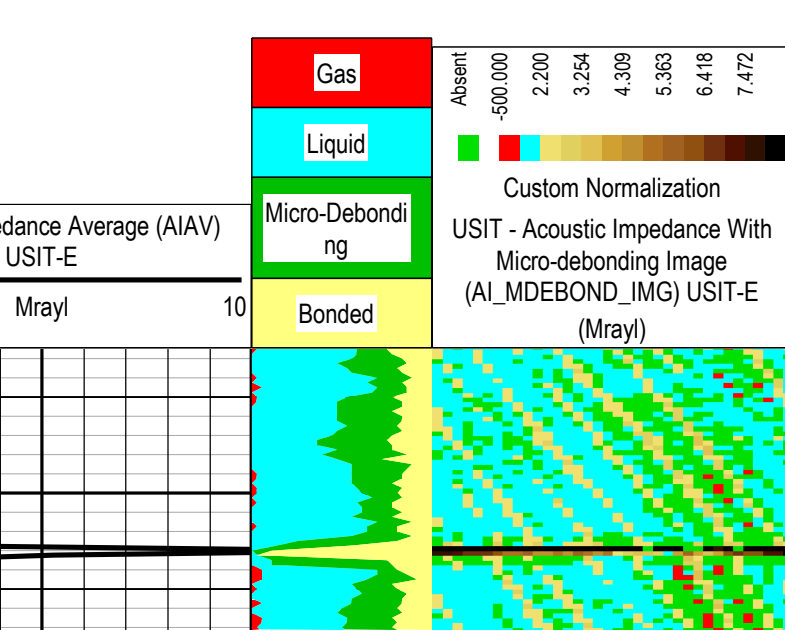
Main Pass

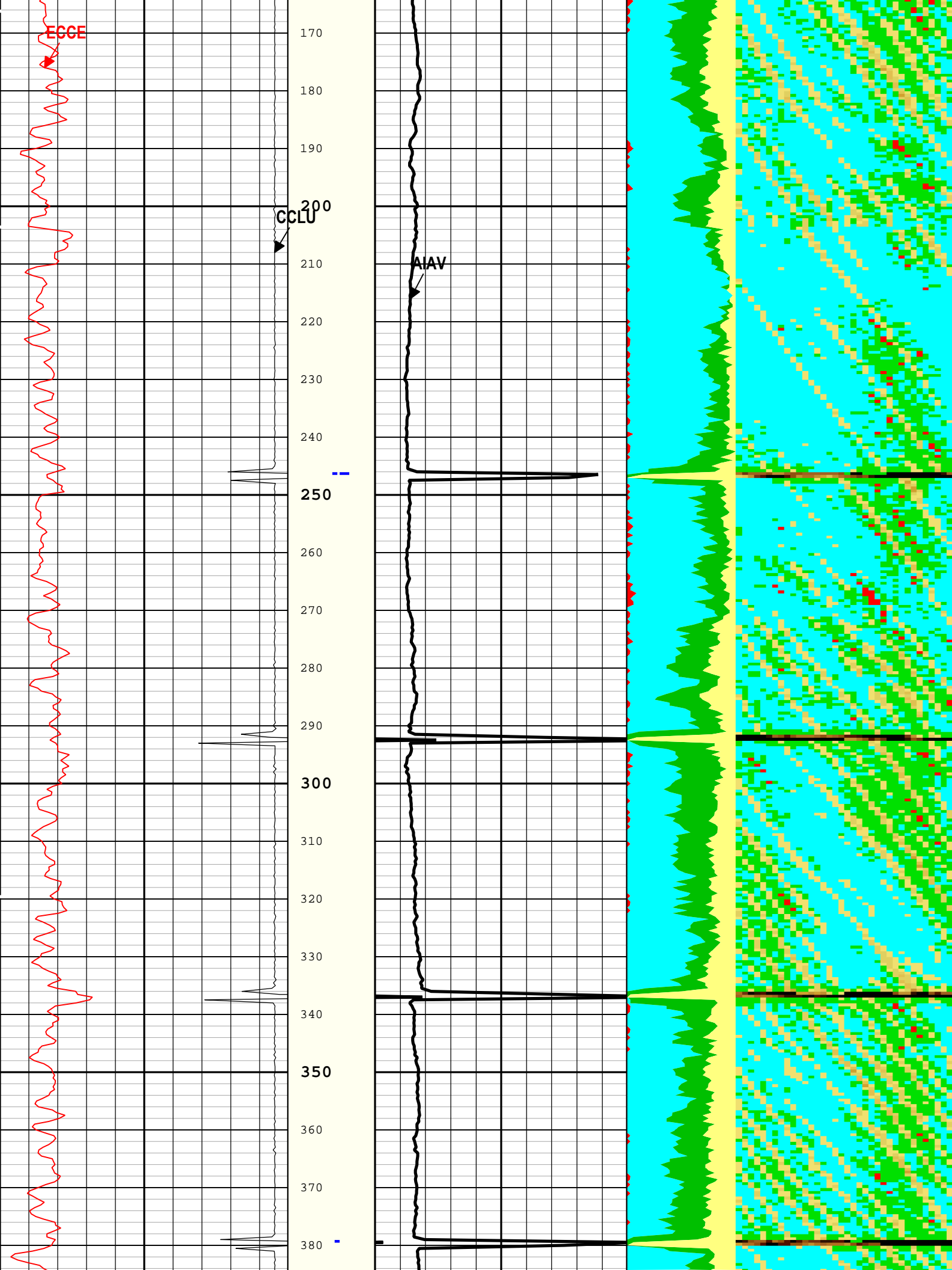
	Version
	7.3.92069.3100
	Wireline_NPD-ICE2-2017SP3_7.3.93033

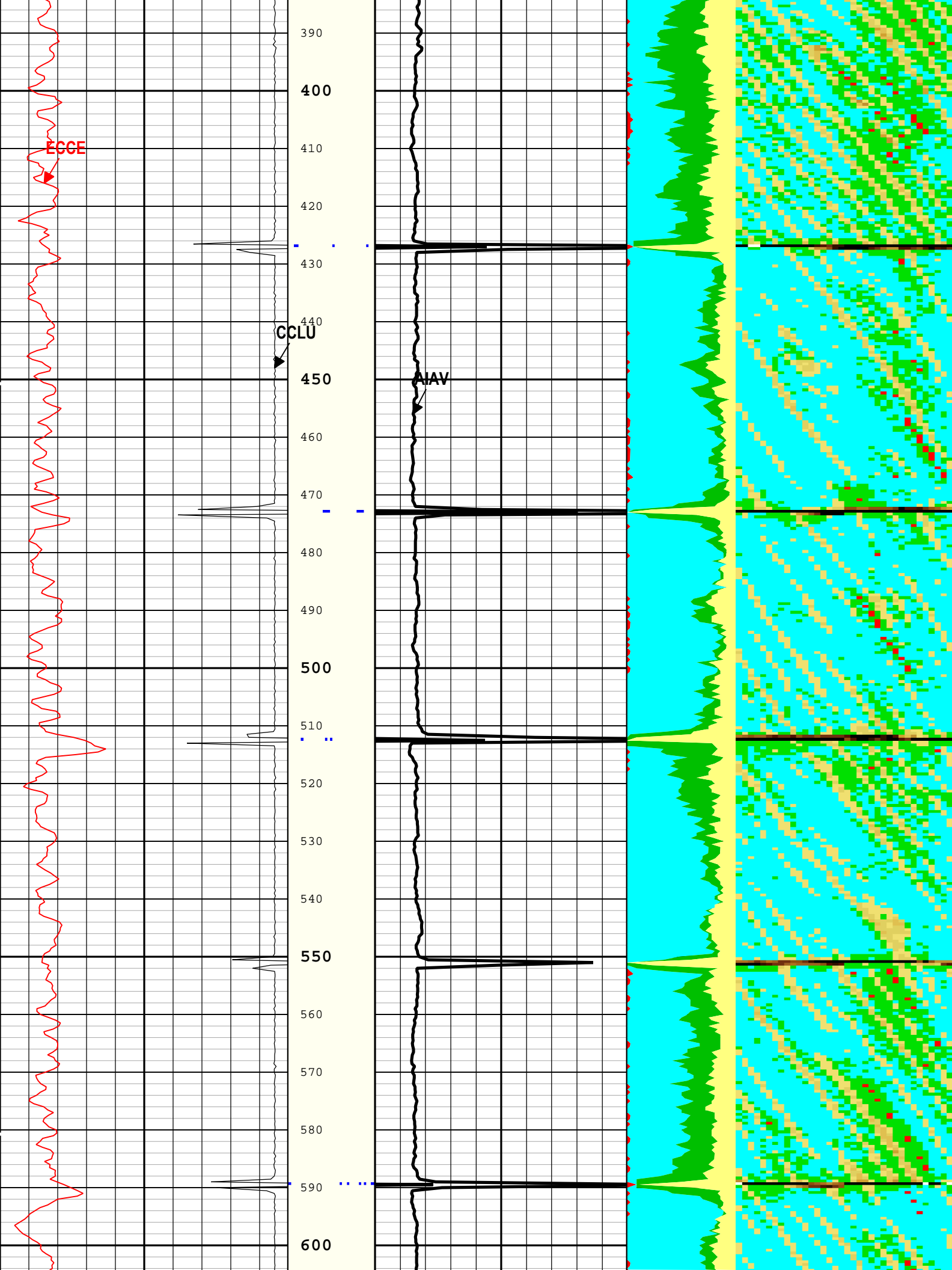
Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
4-Jan-2018 9:52:35 AM	24-Jan-2018 10:55:49 AM	ON	4.55 ft	No

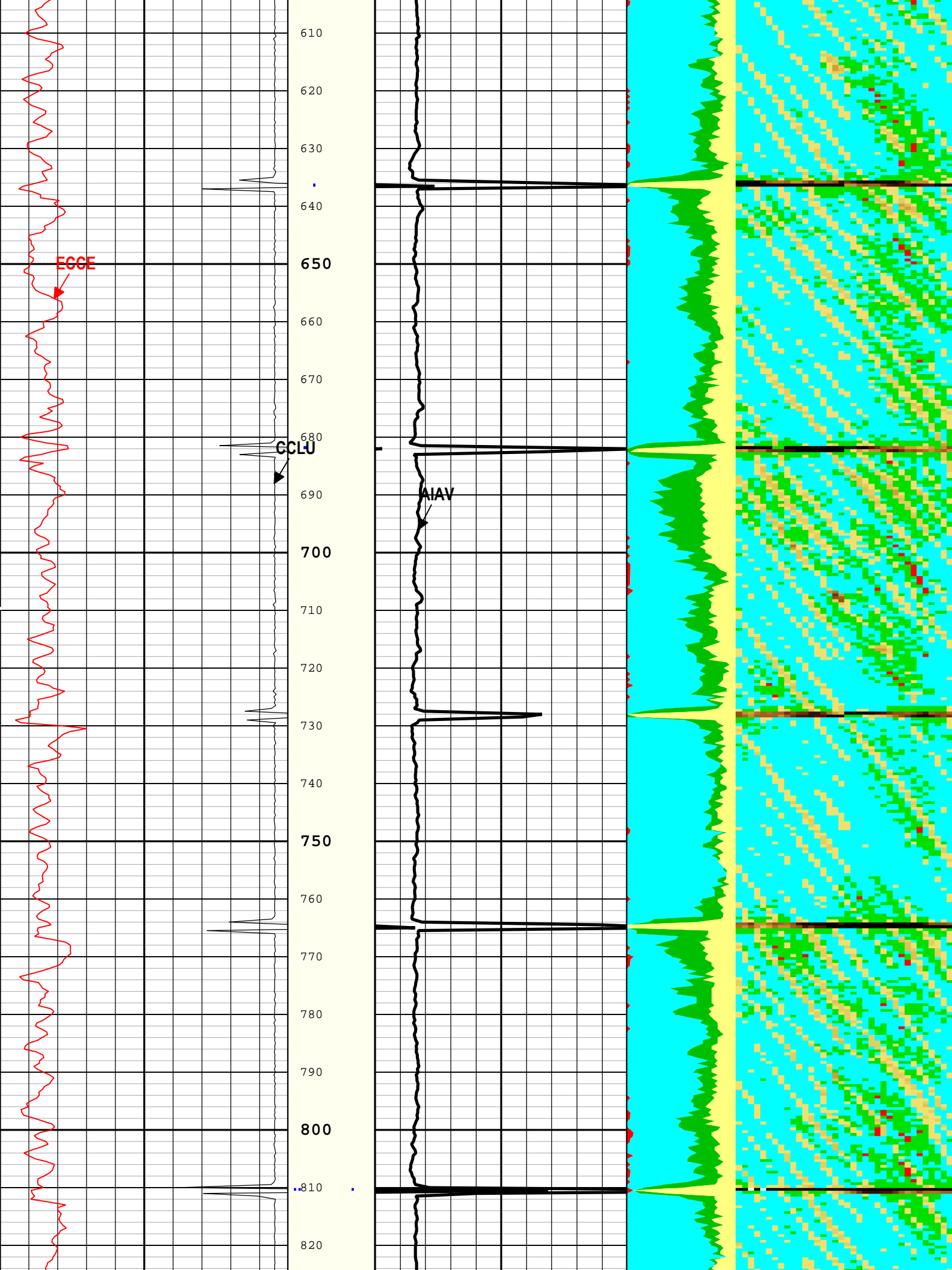
Company:Noble Energy Inc Well:Bison Ridge Y22-734
One: Log[5]:Up:S004

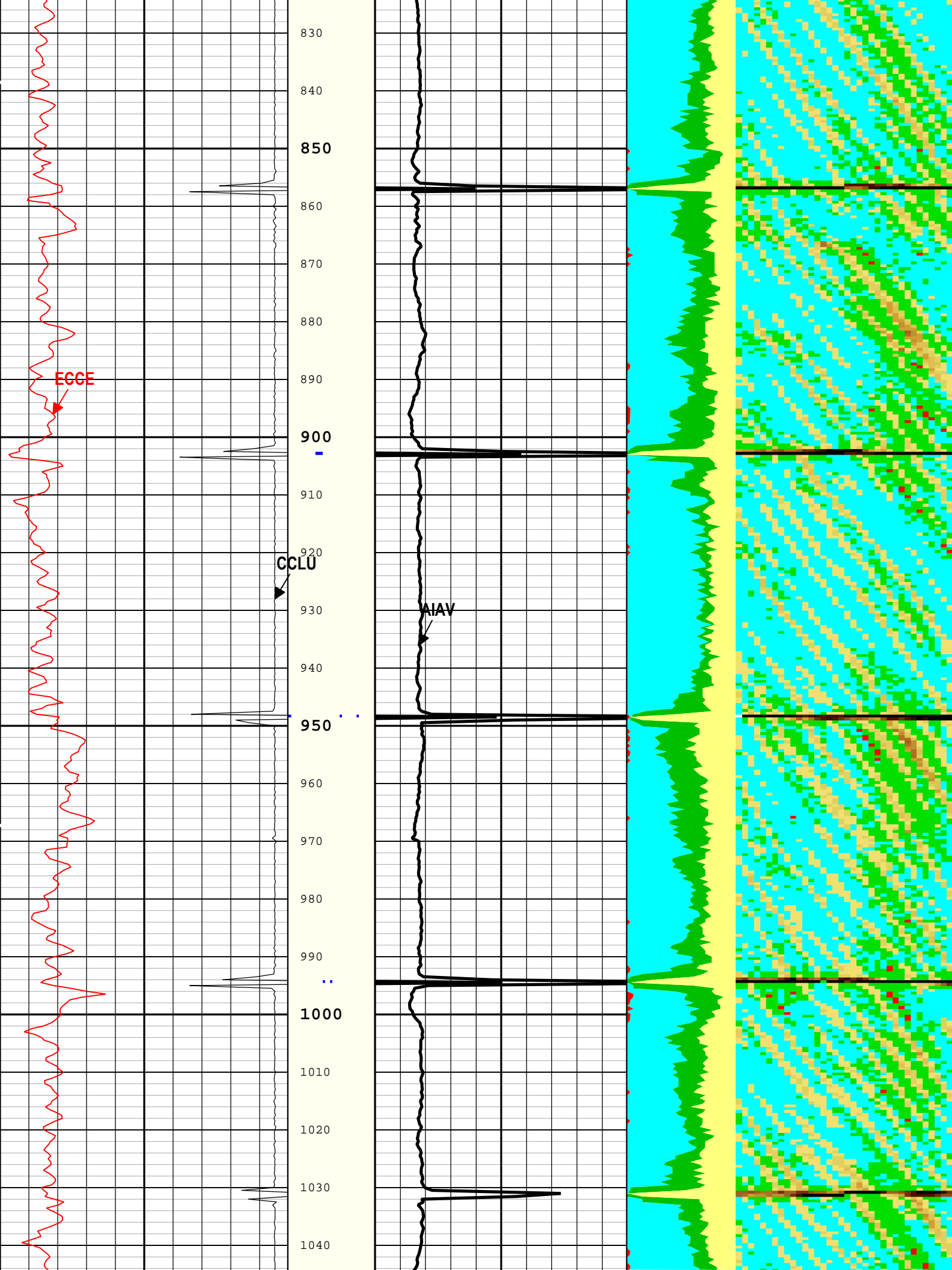
Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth

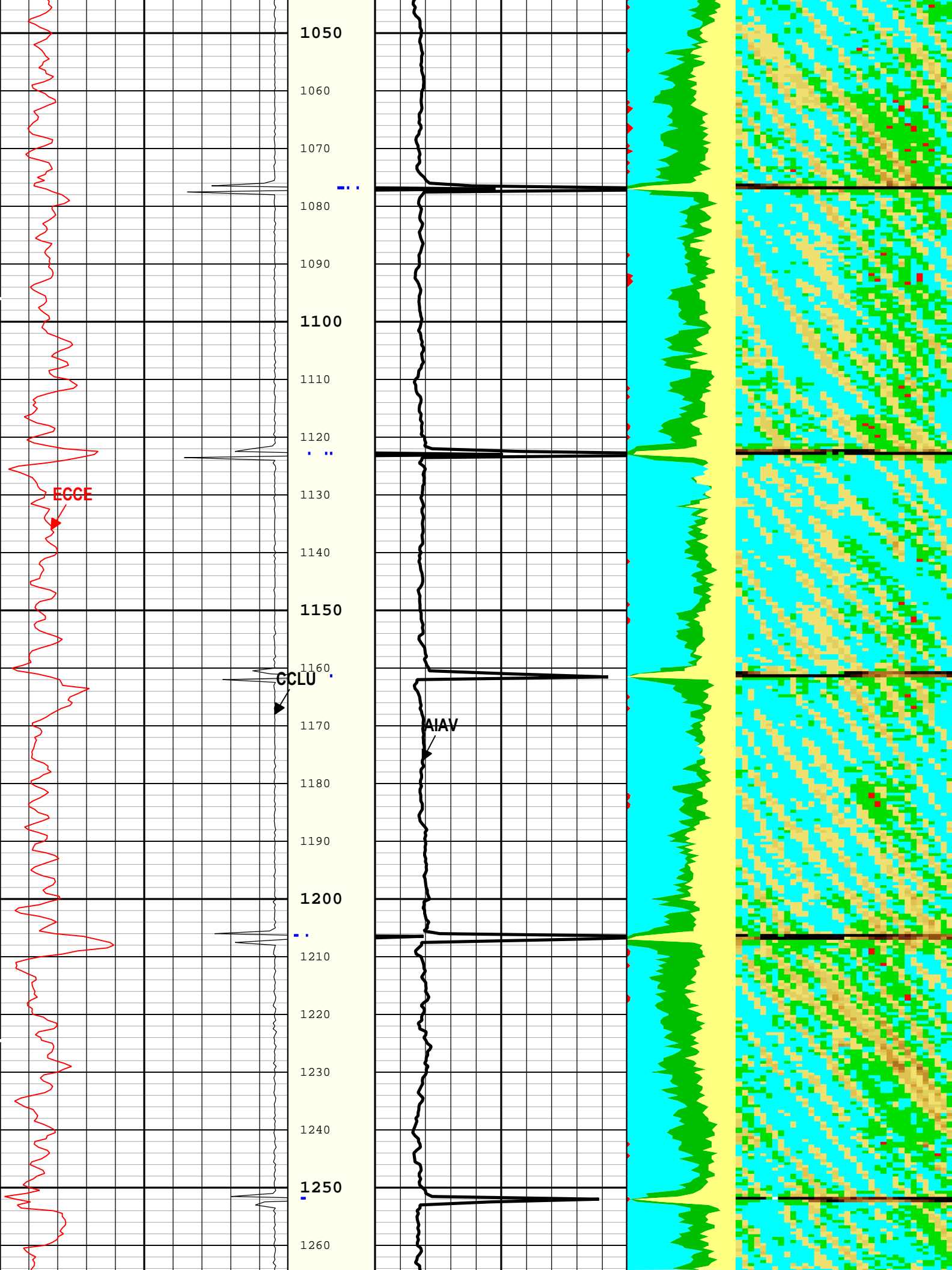


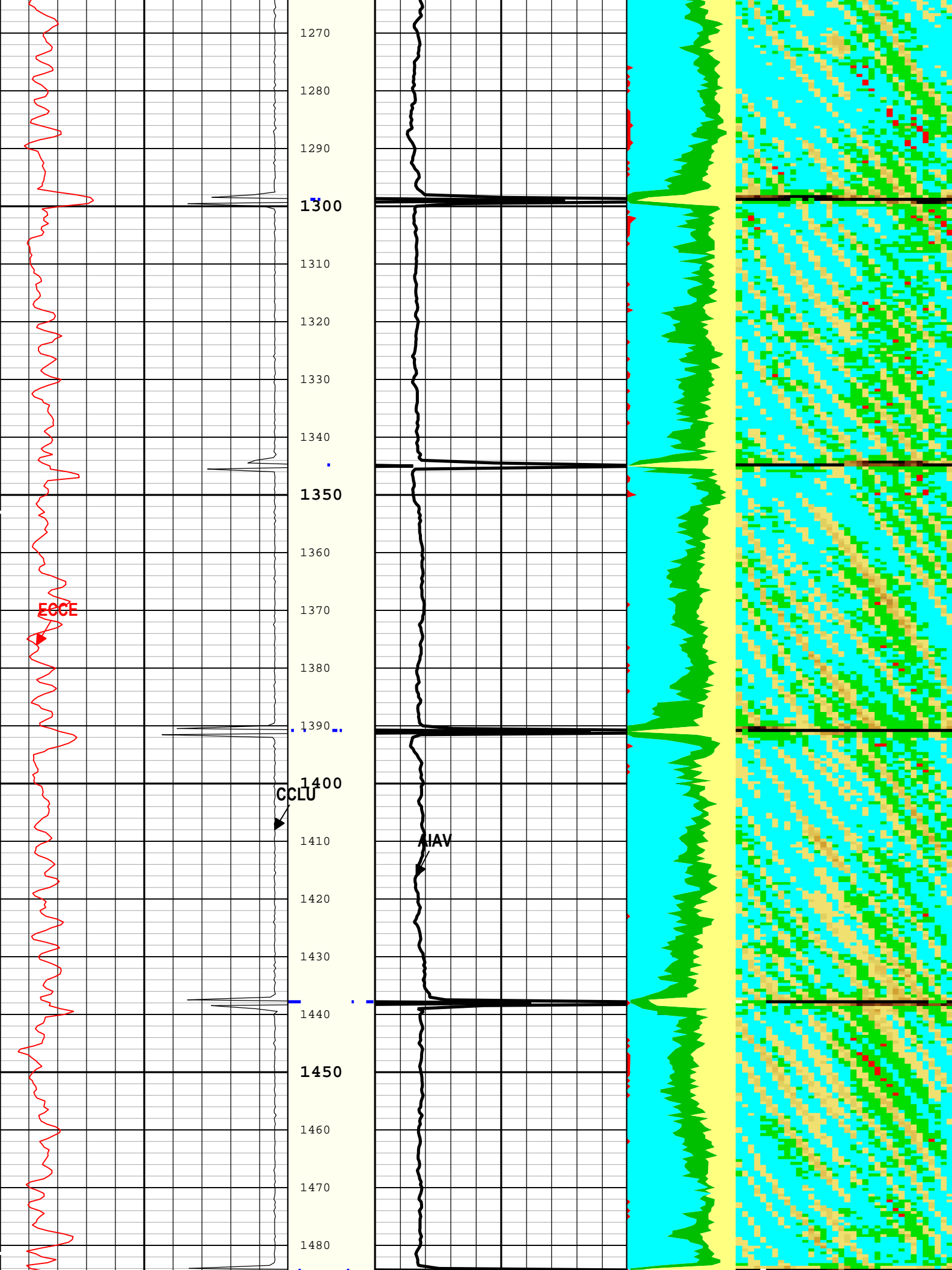


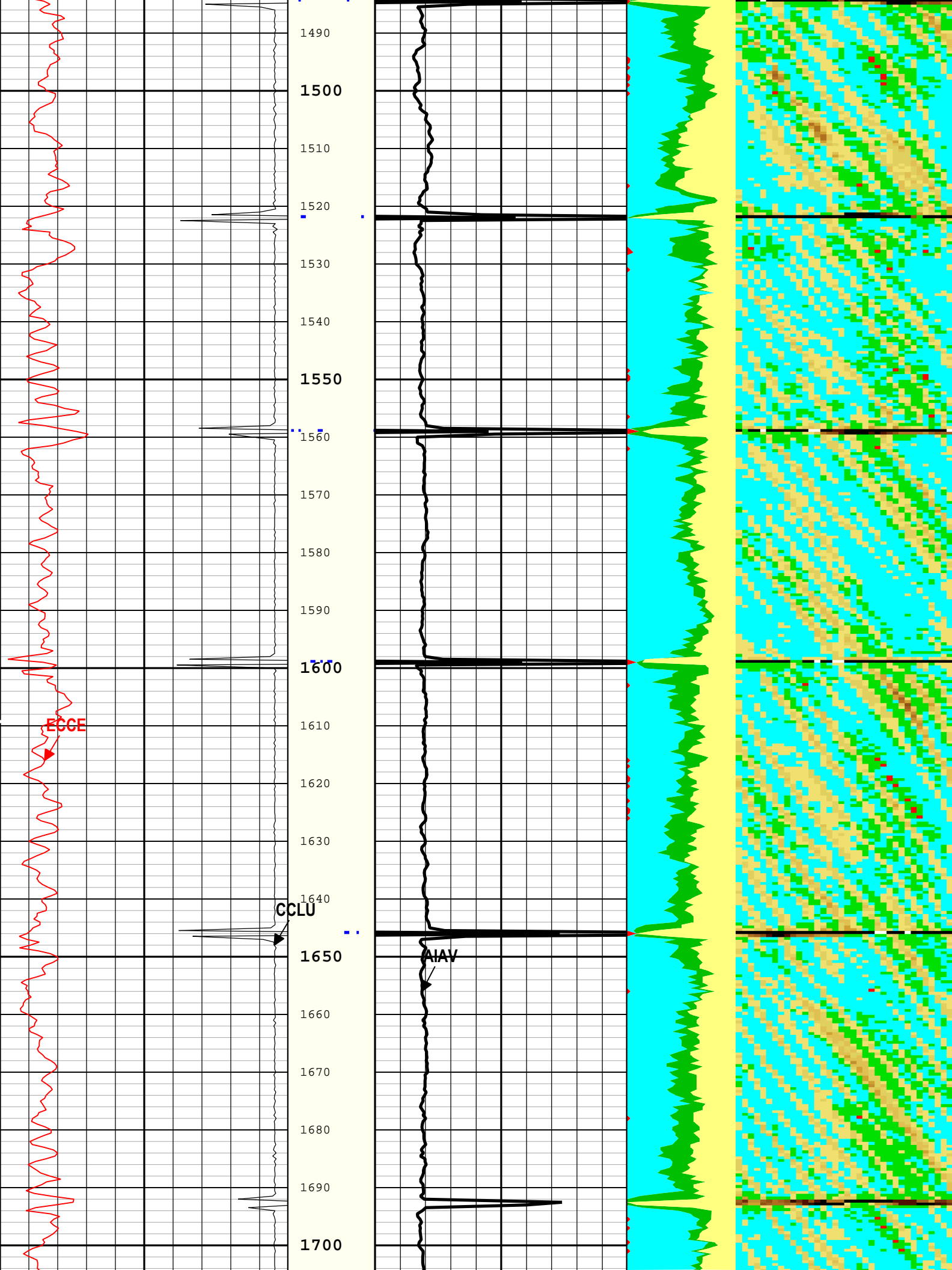


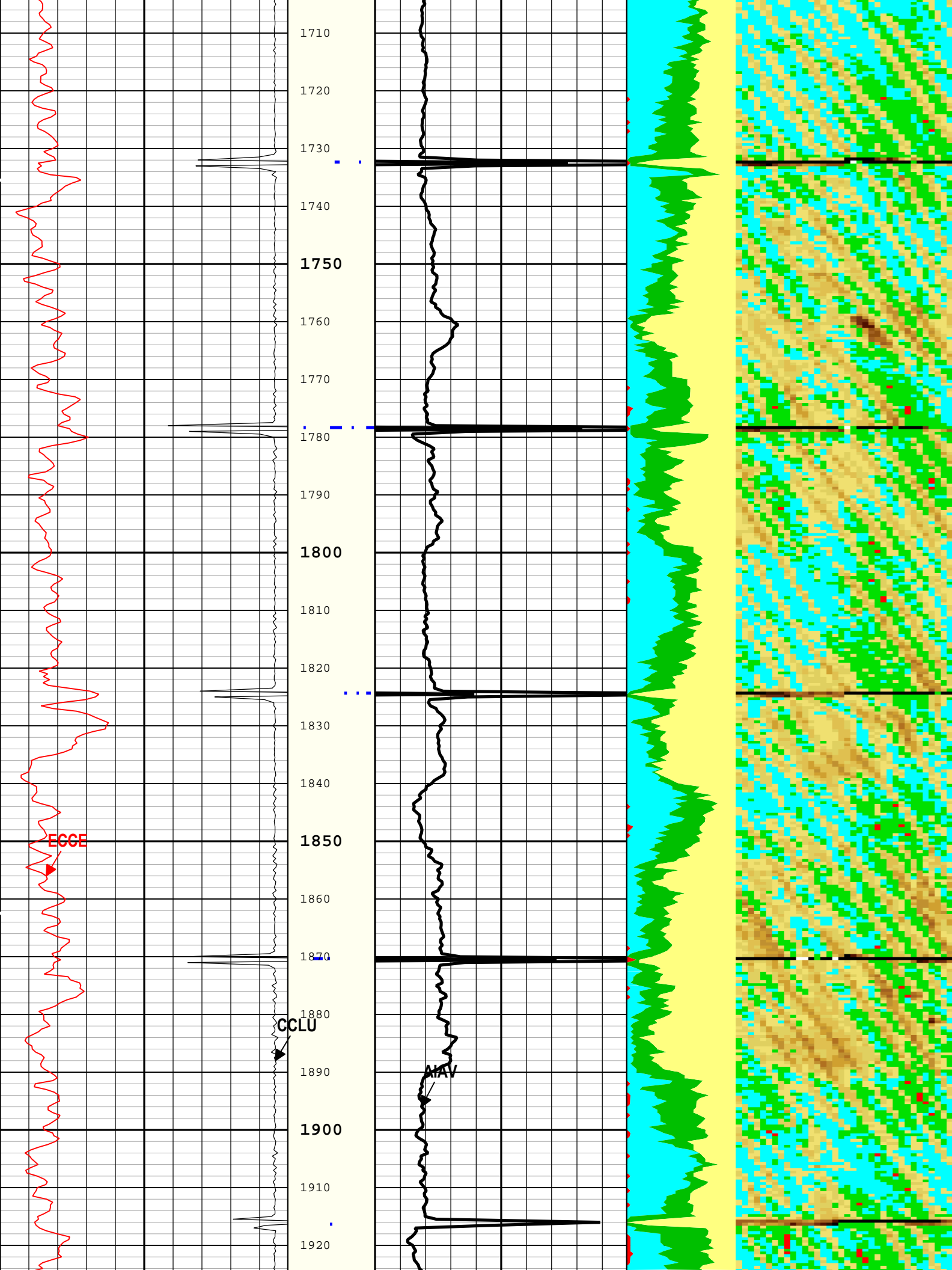


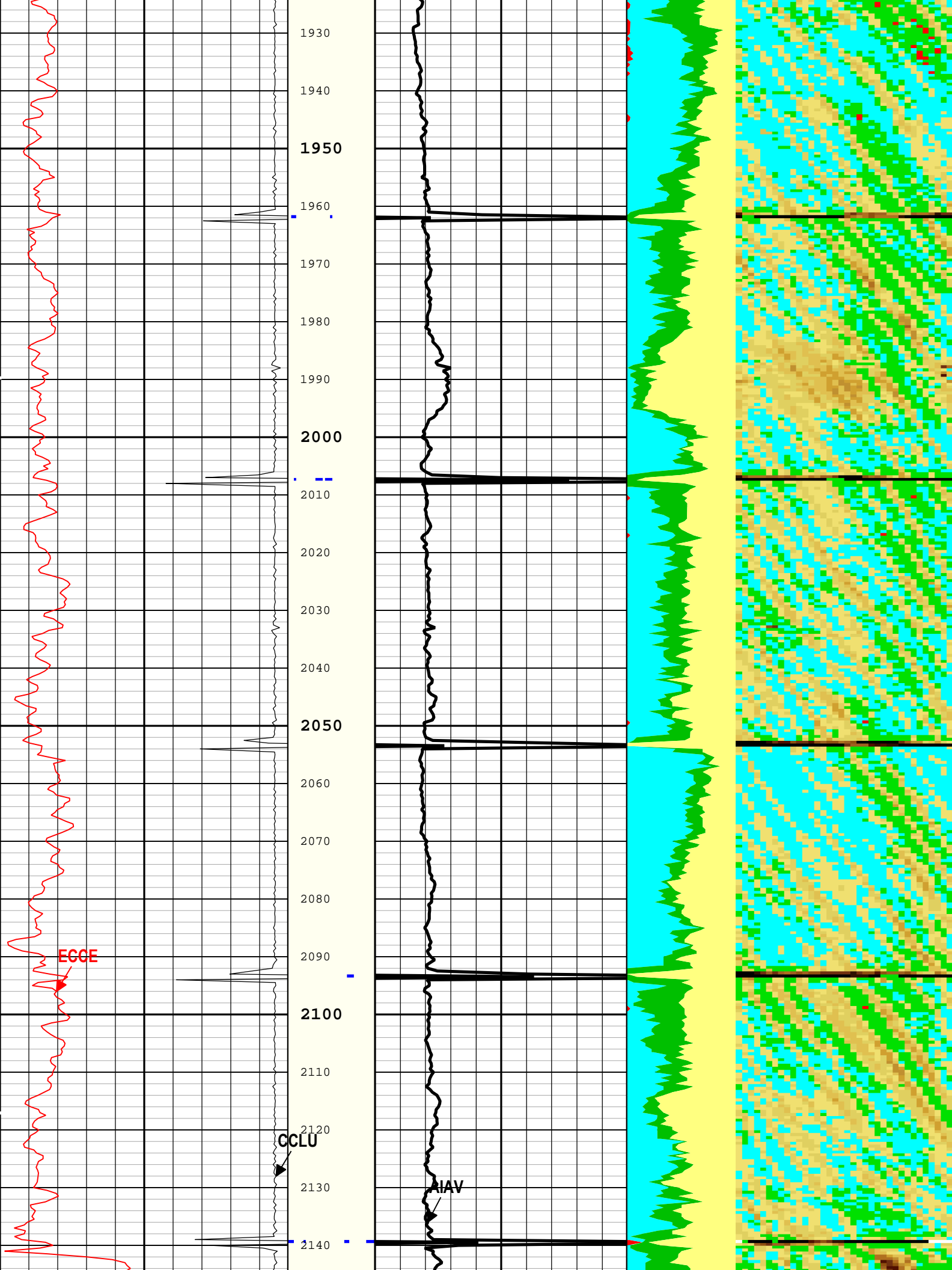


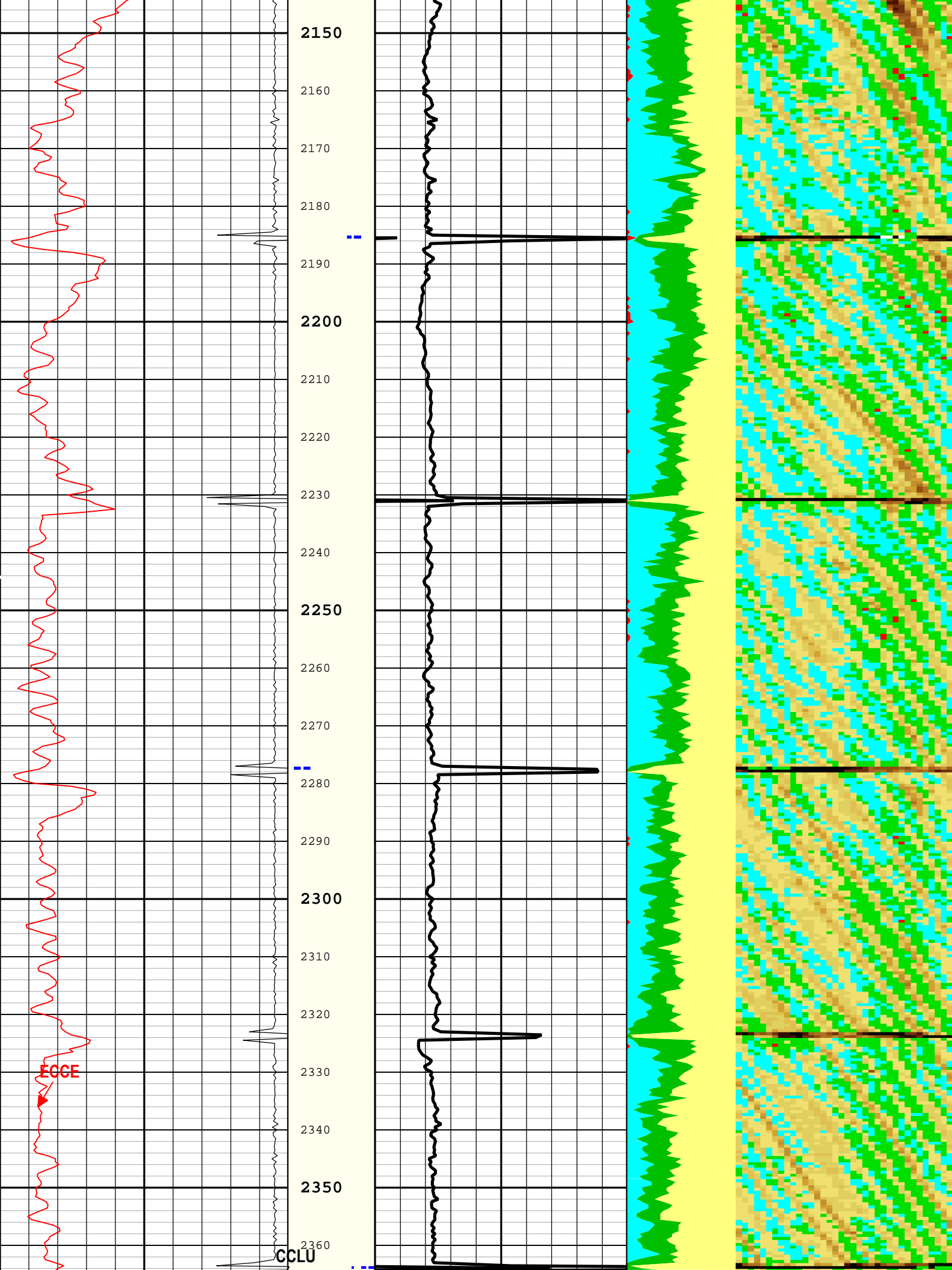


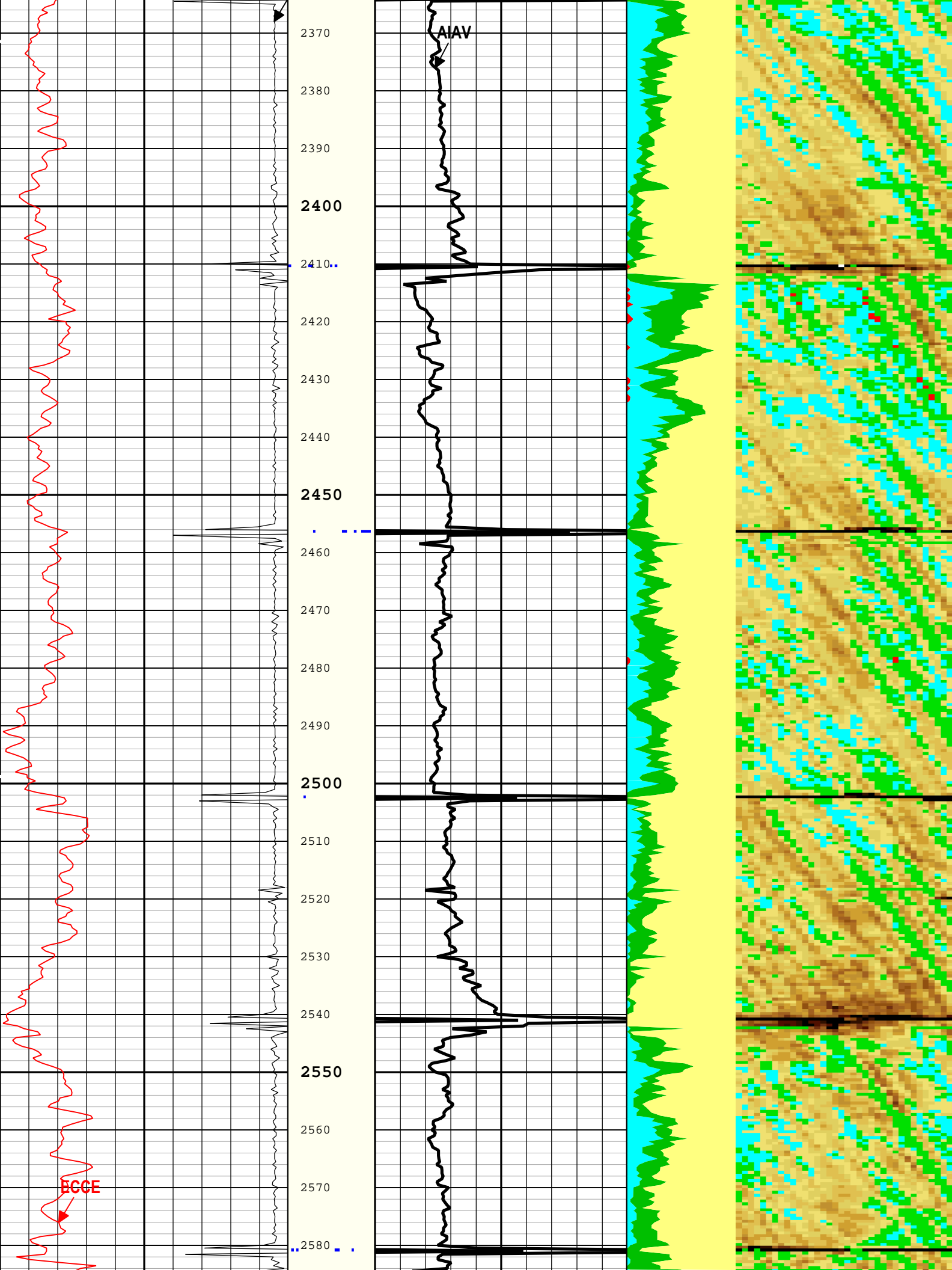


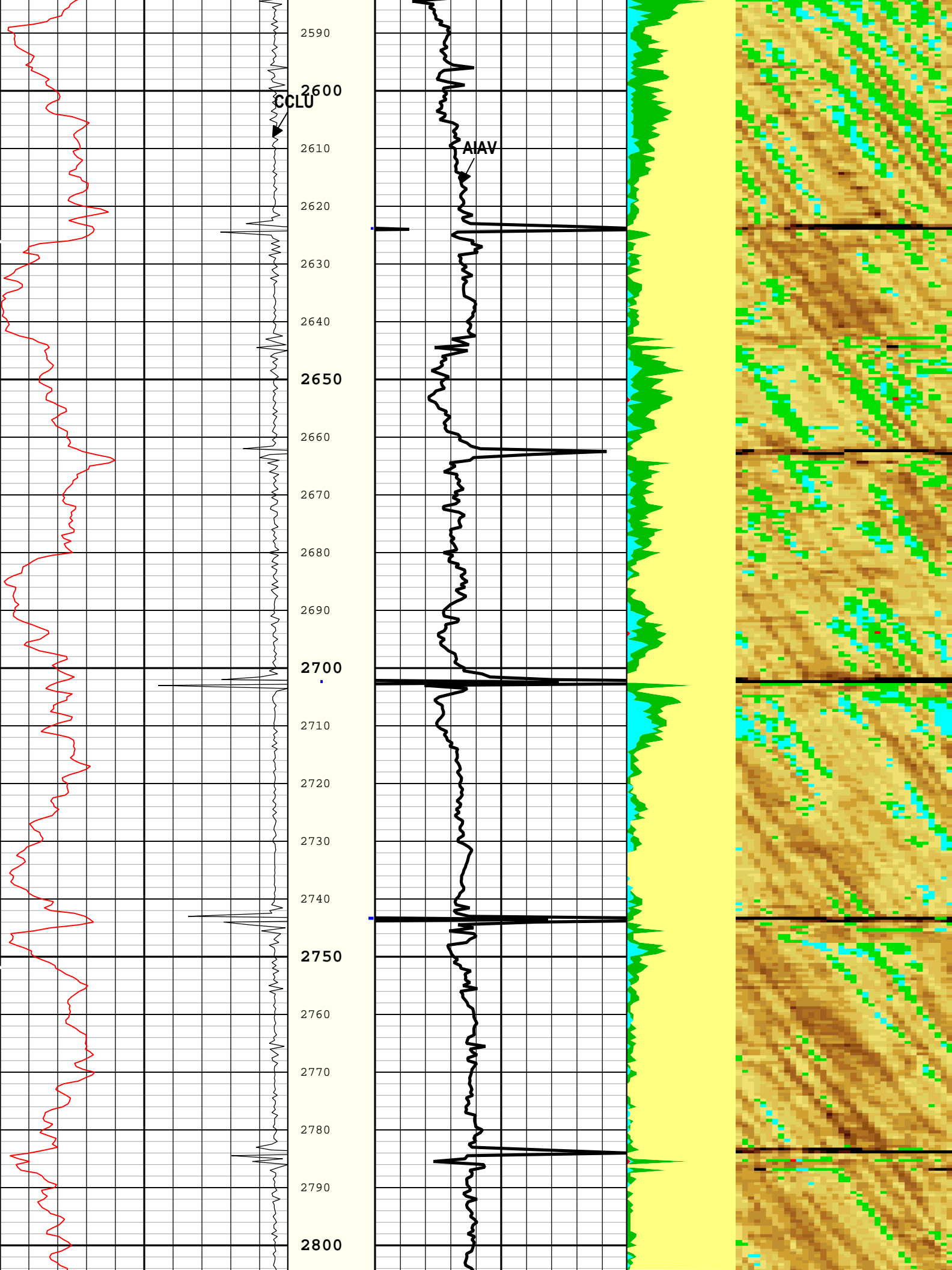


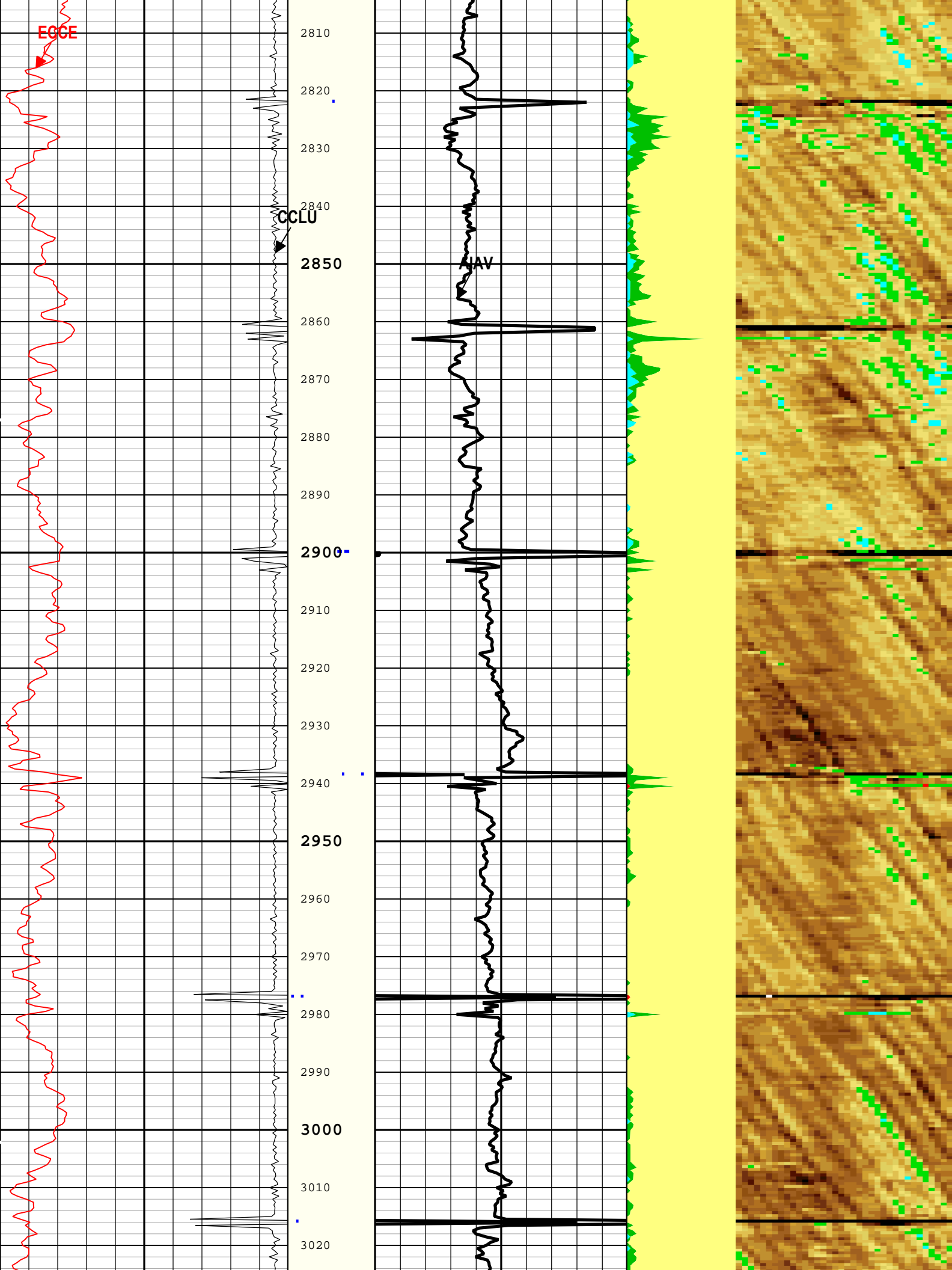


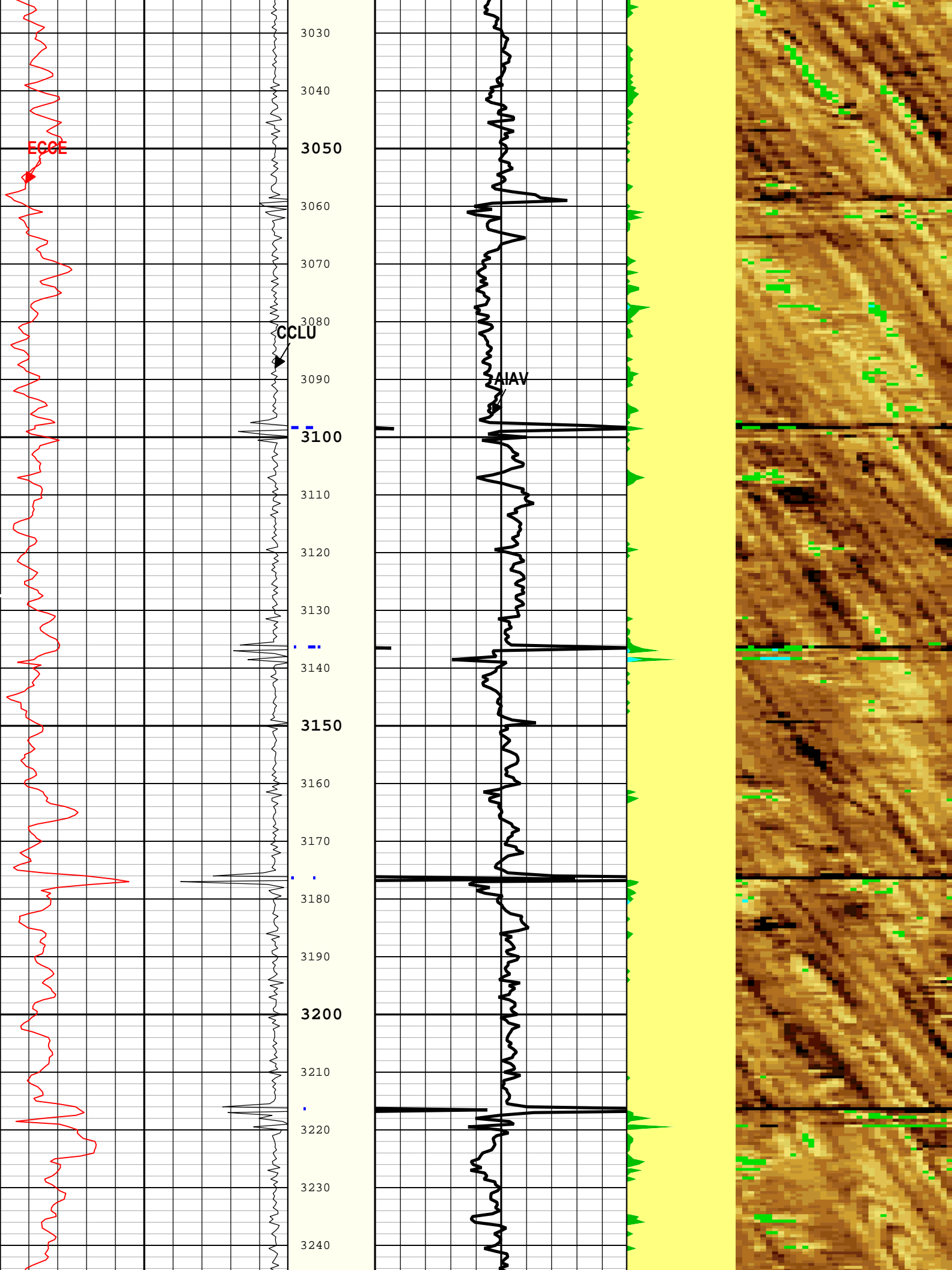


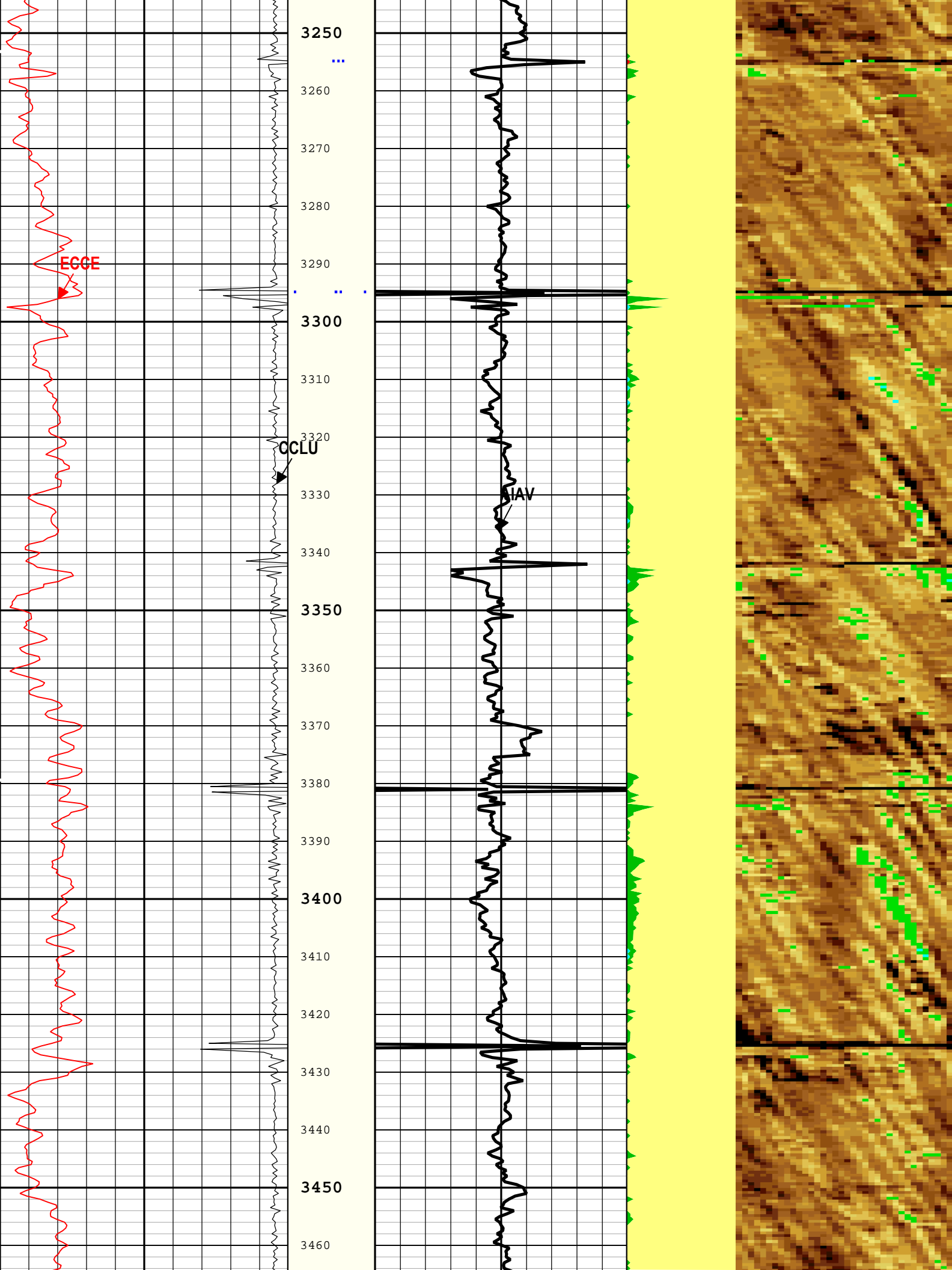


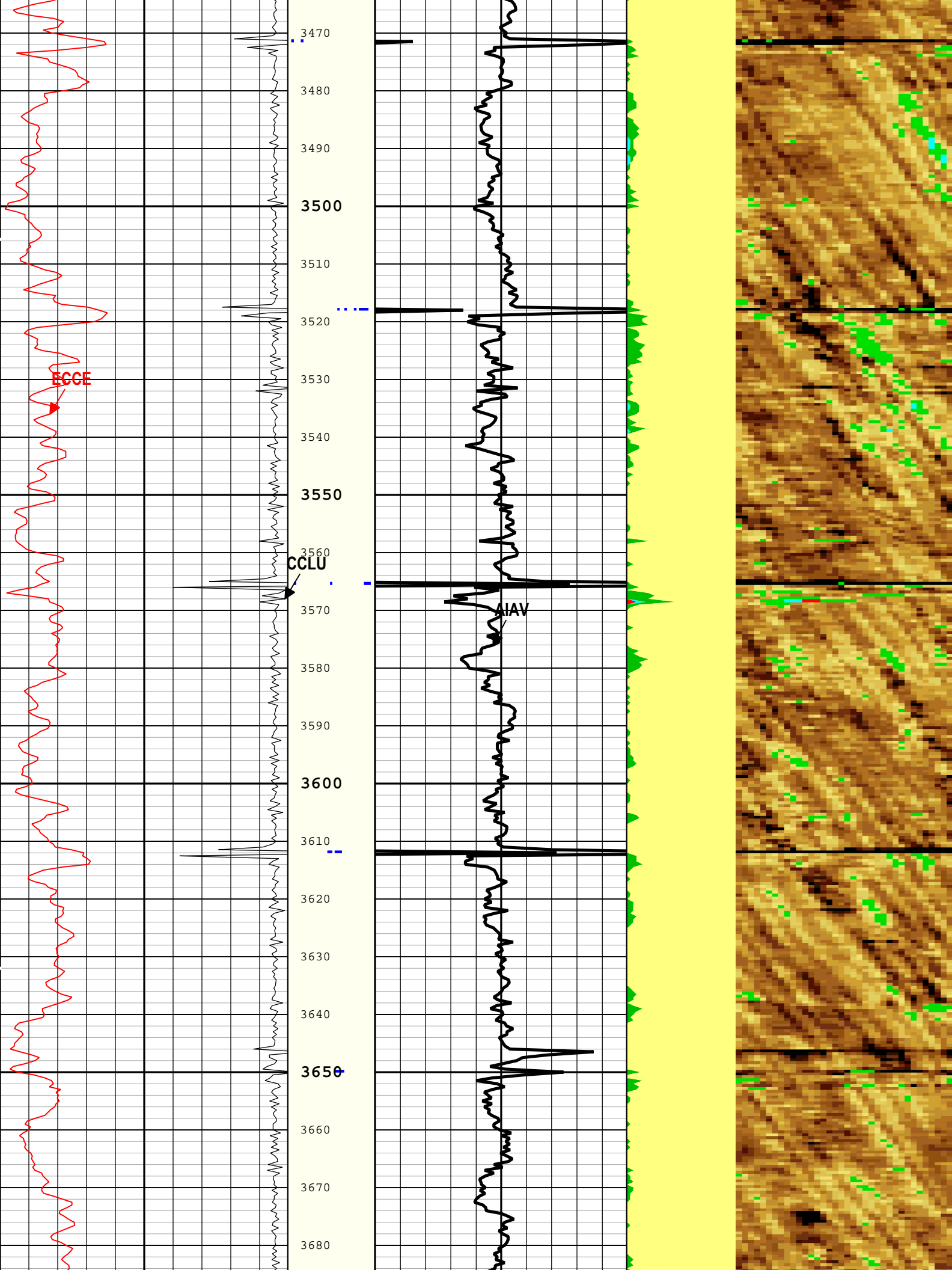


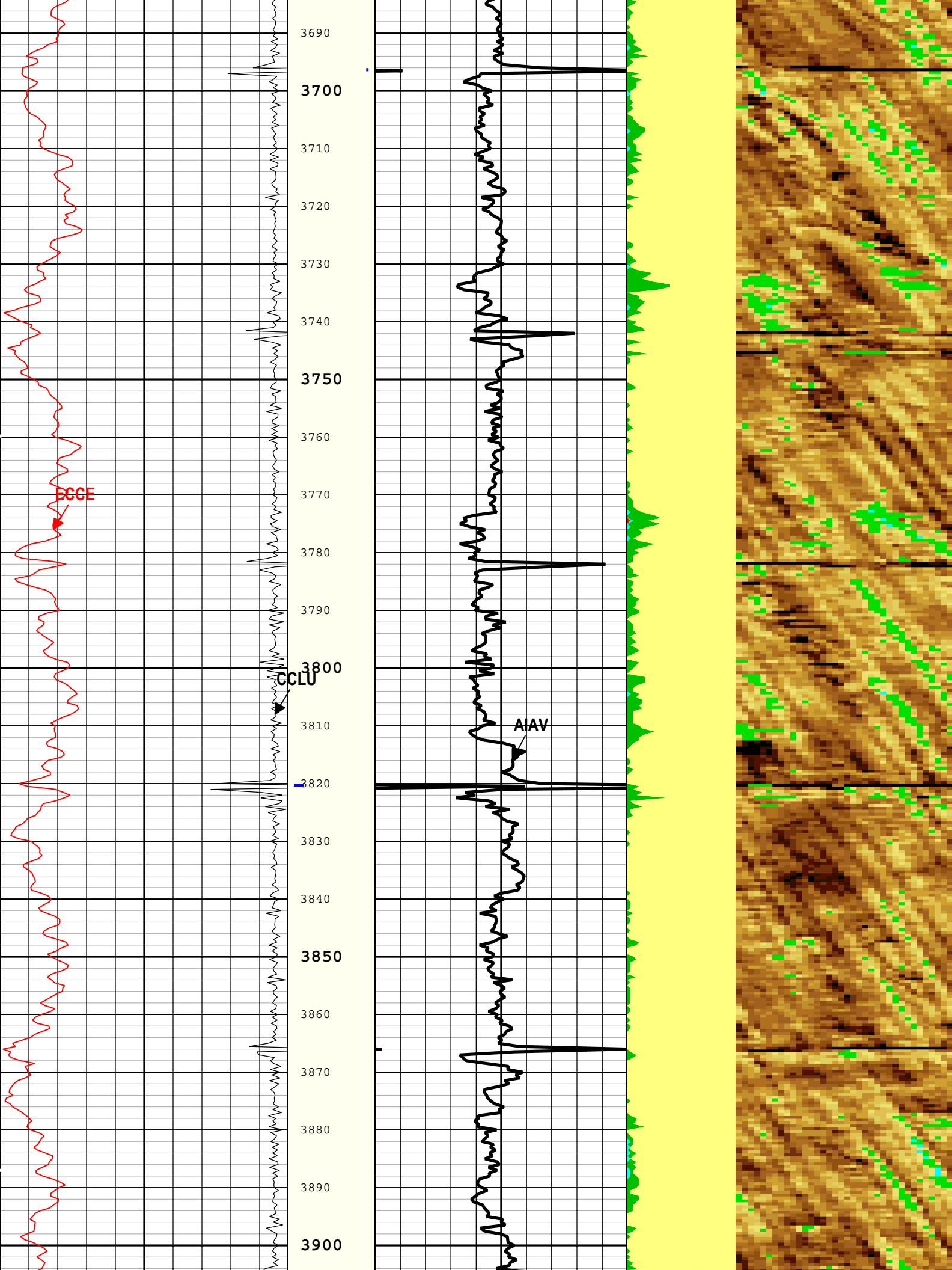


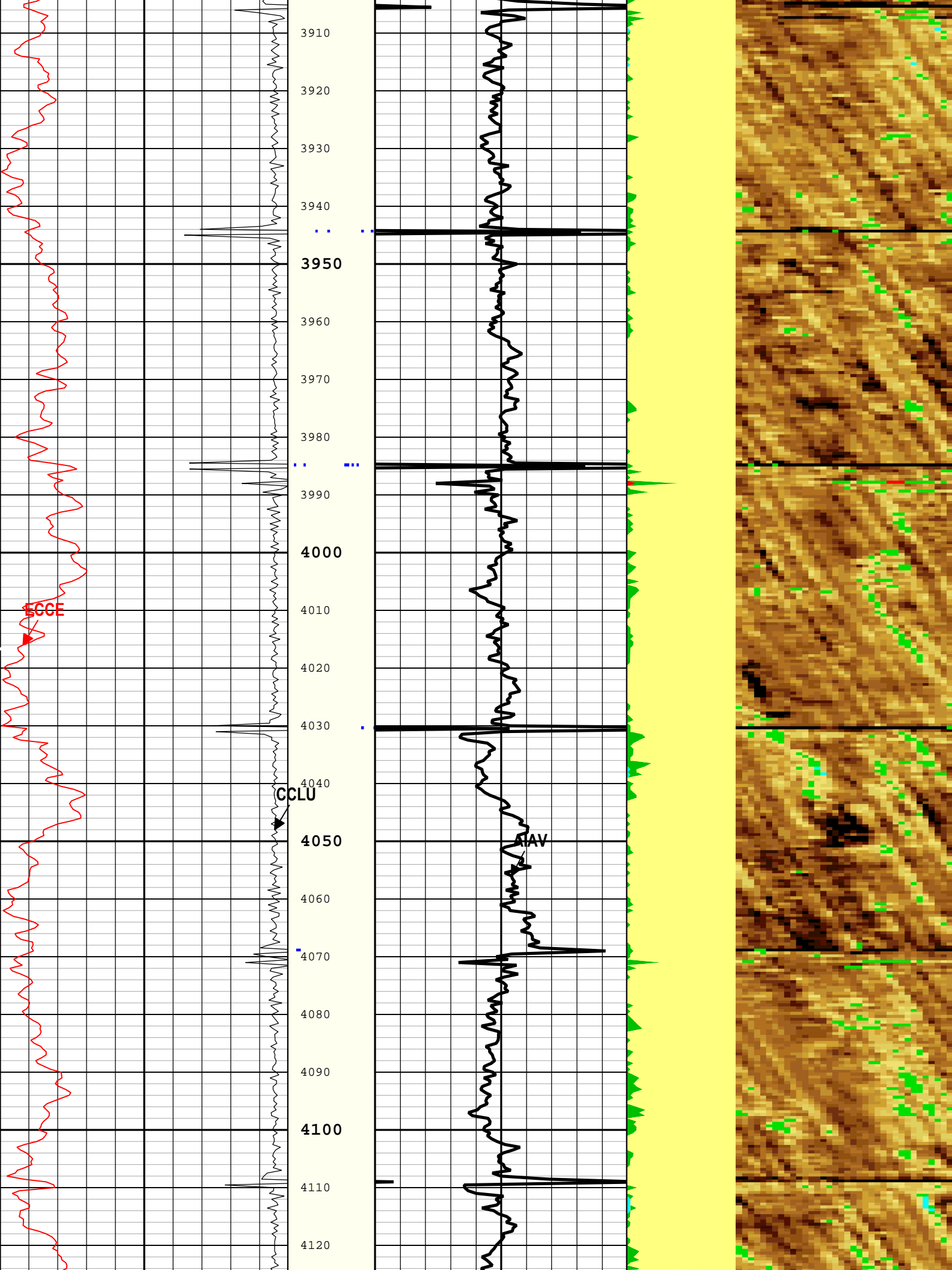


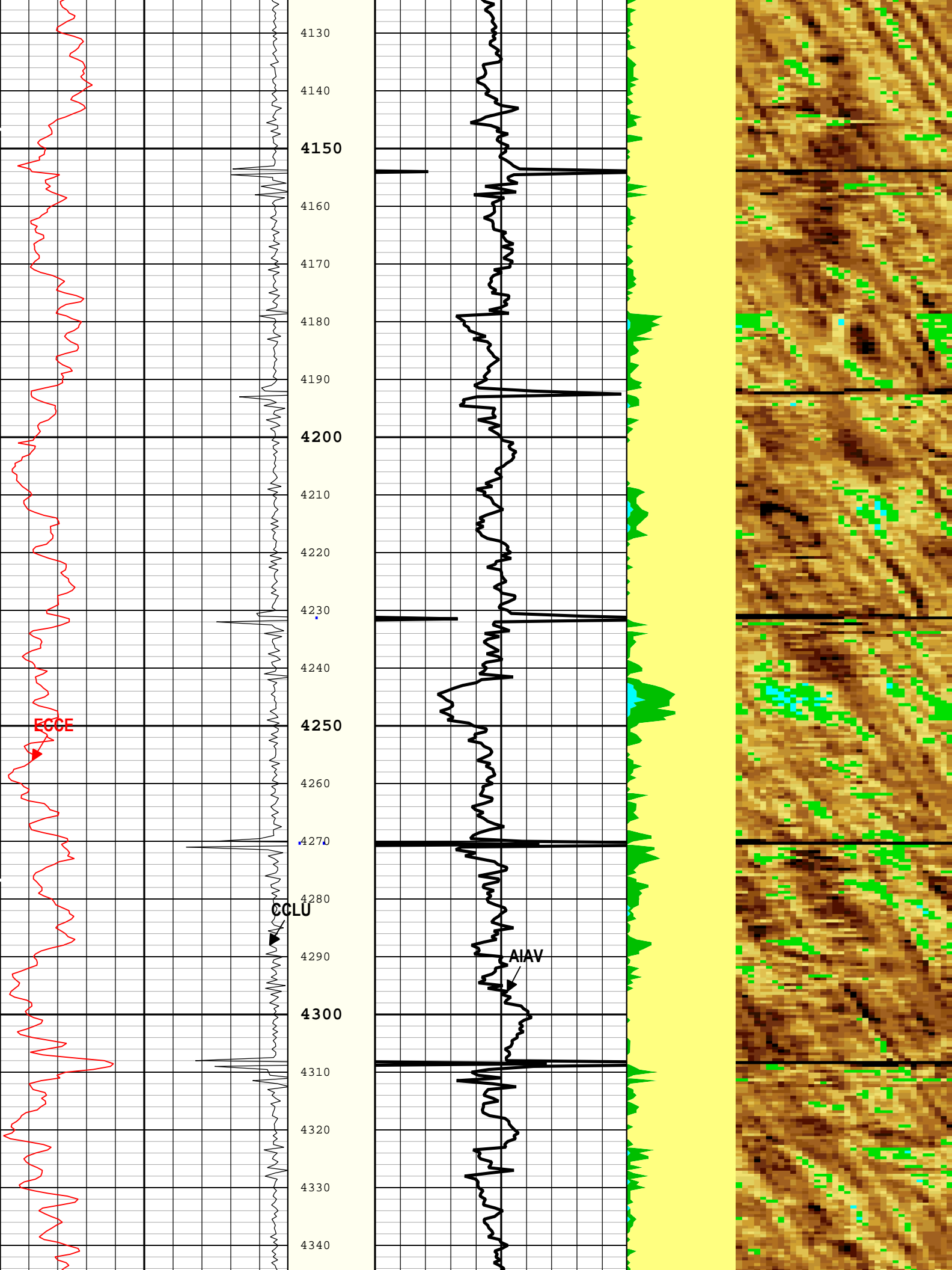


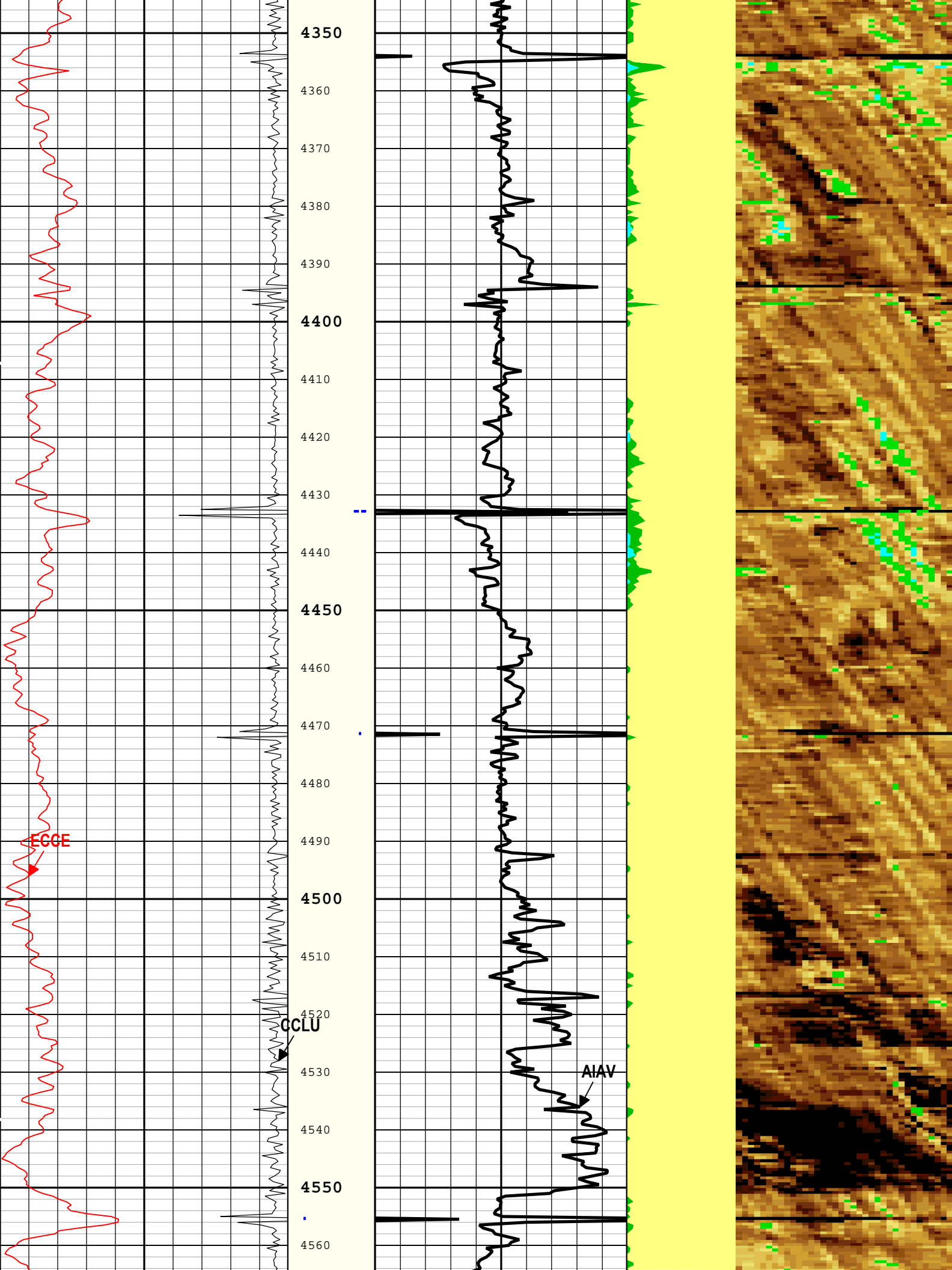


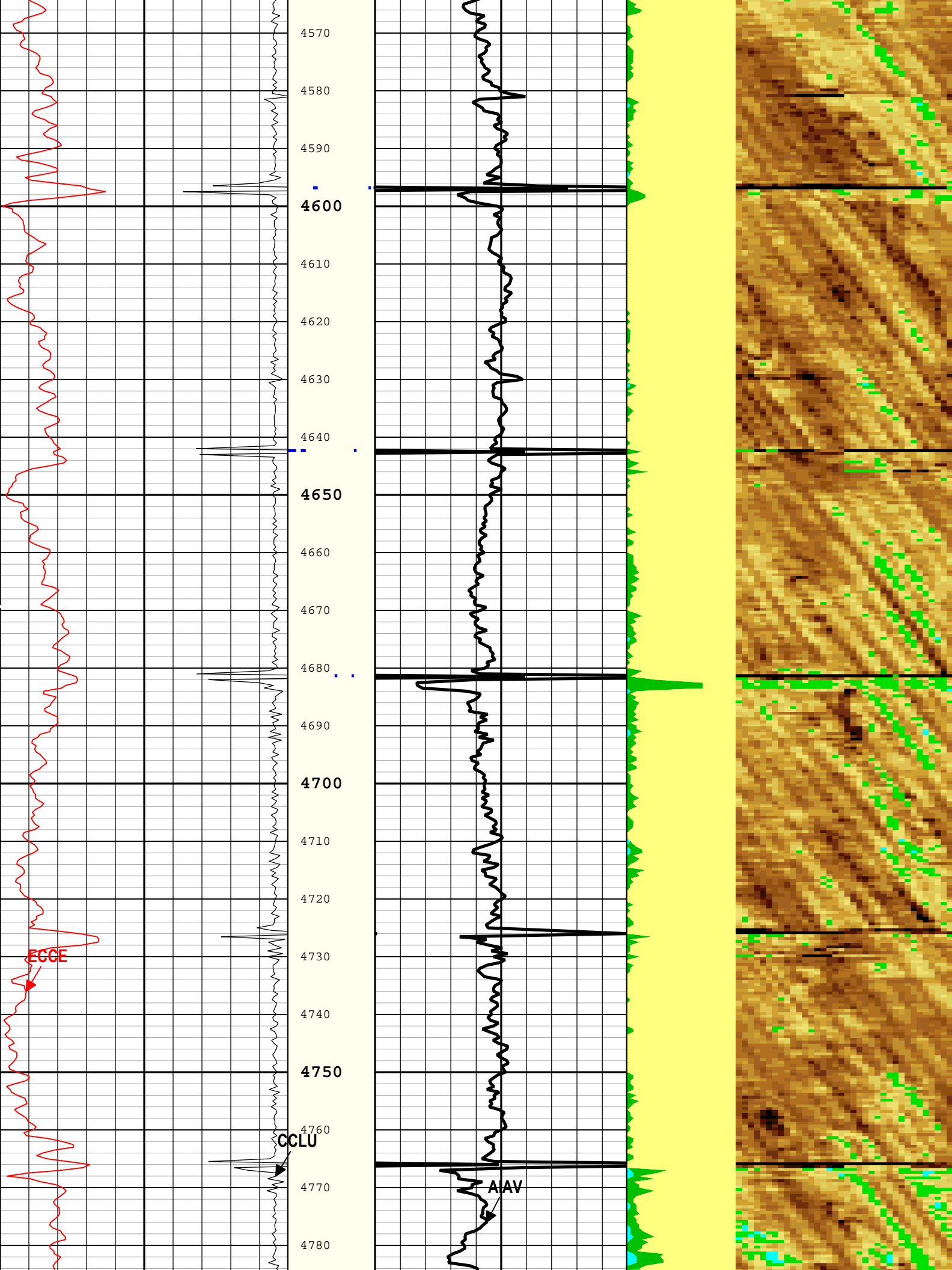


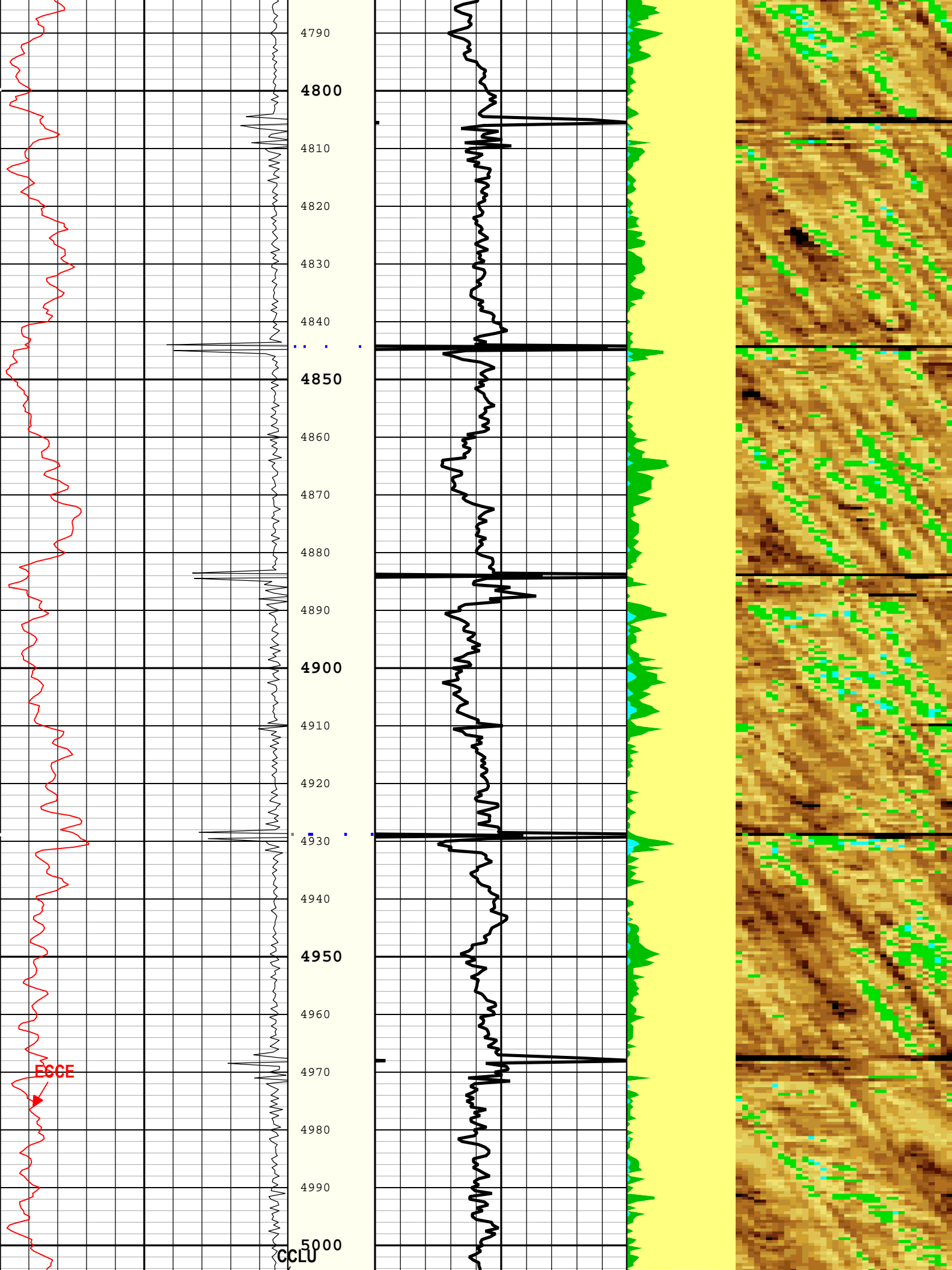


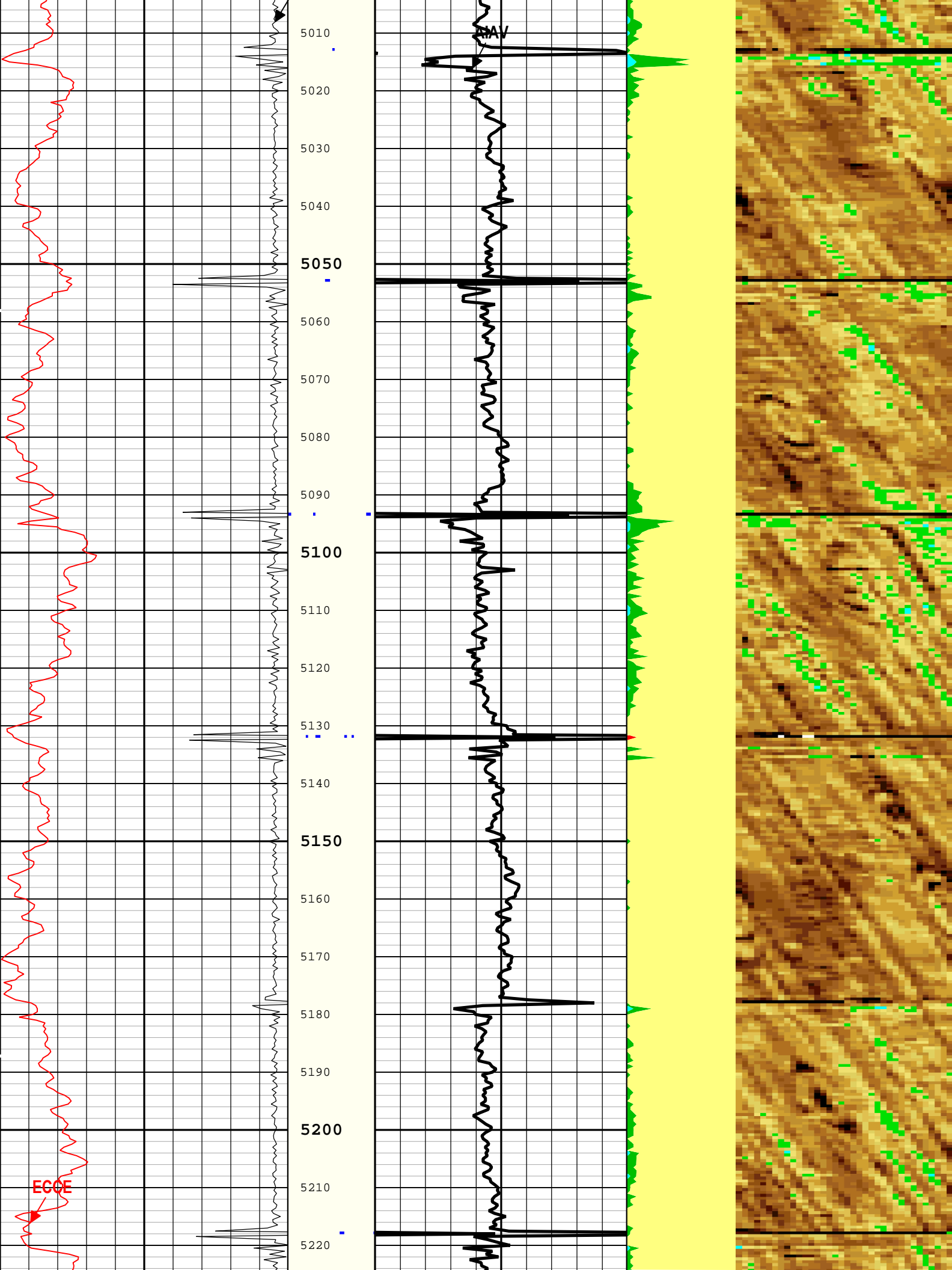


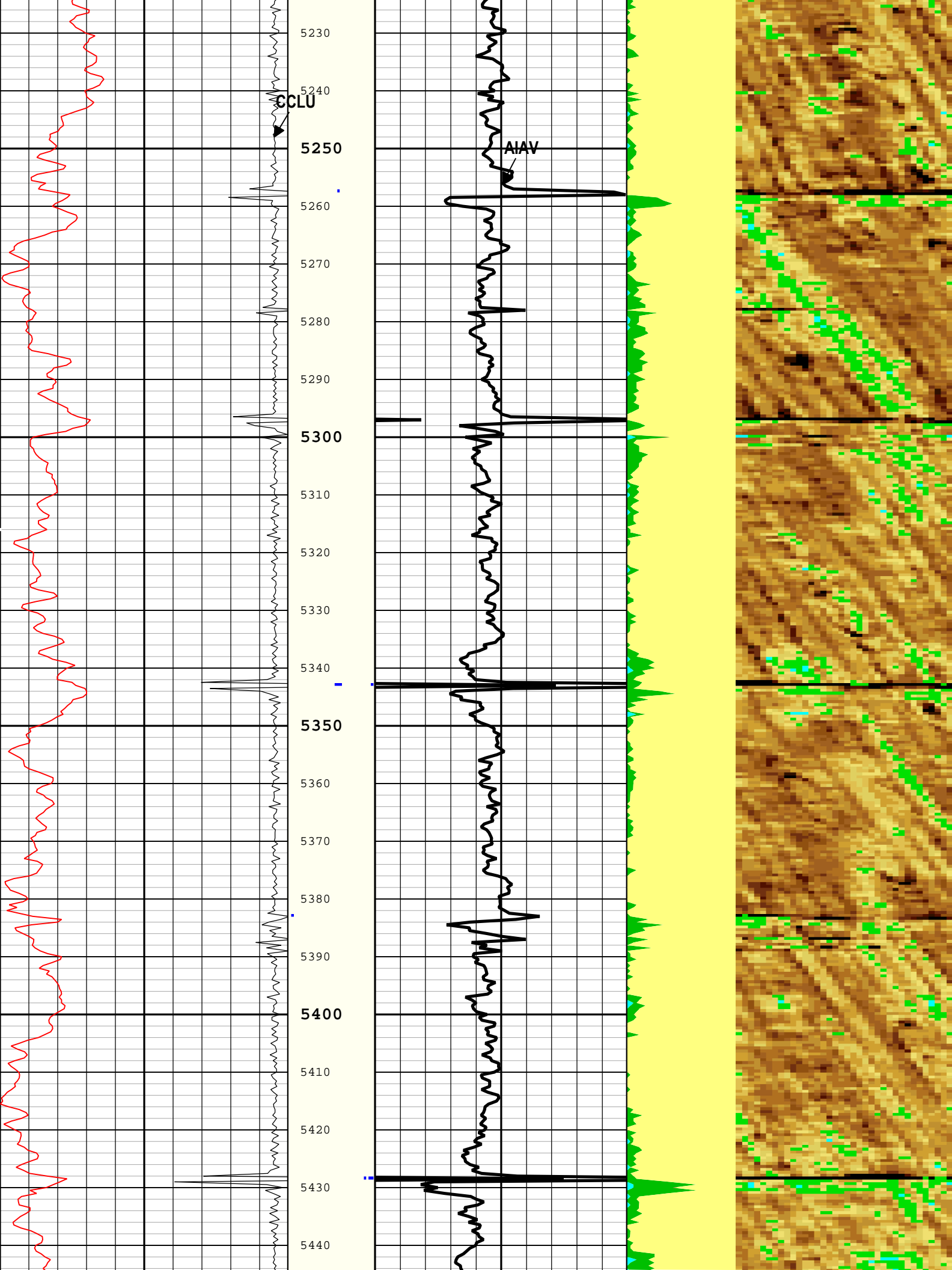


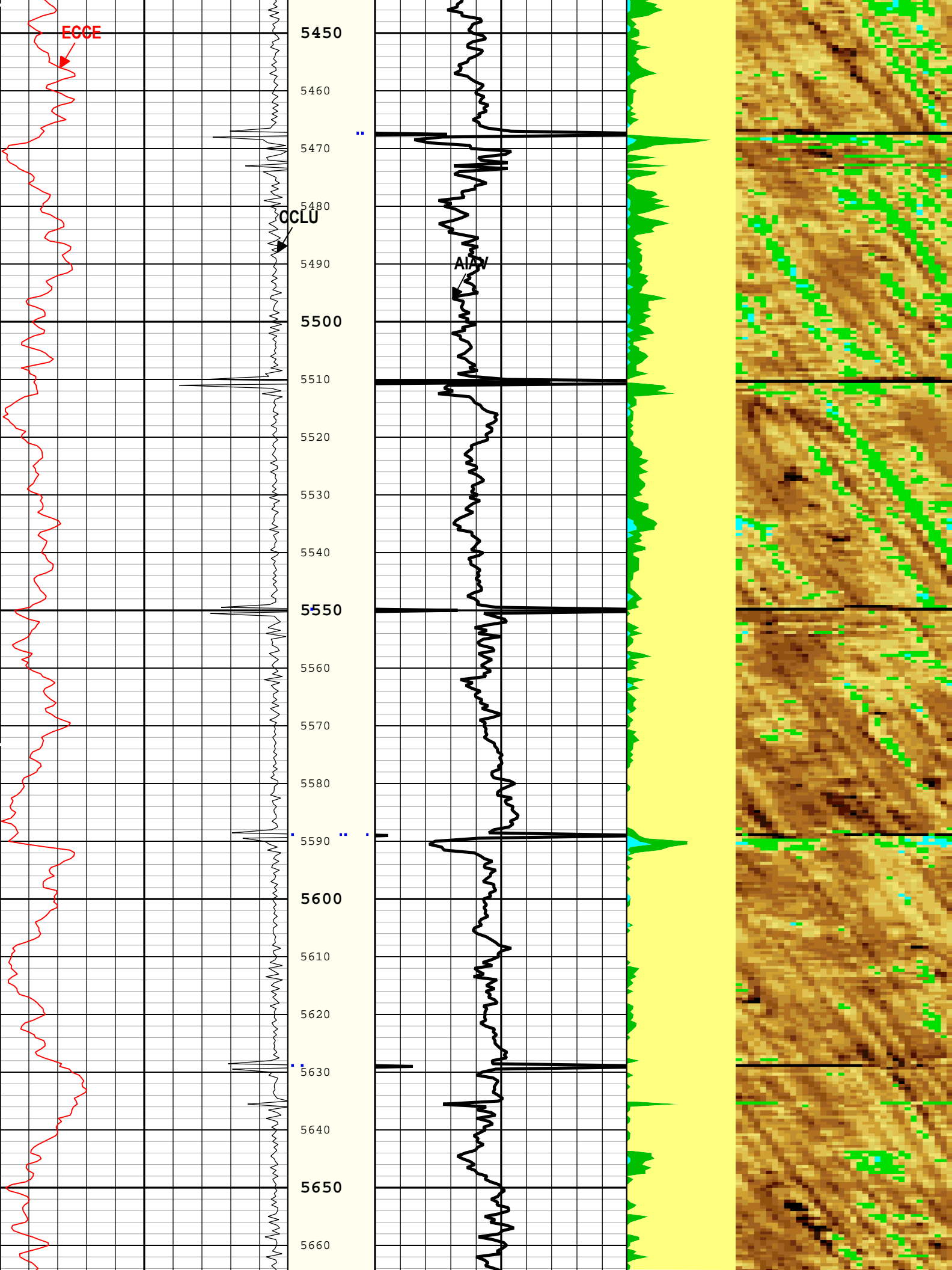


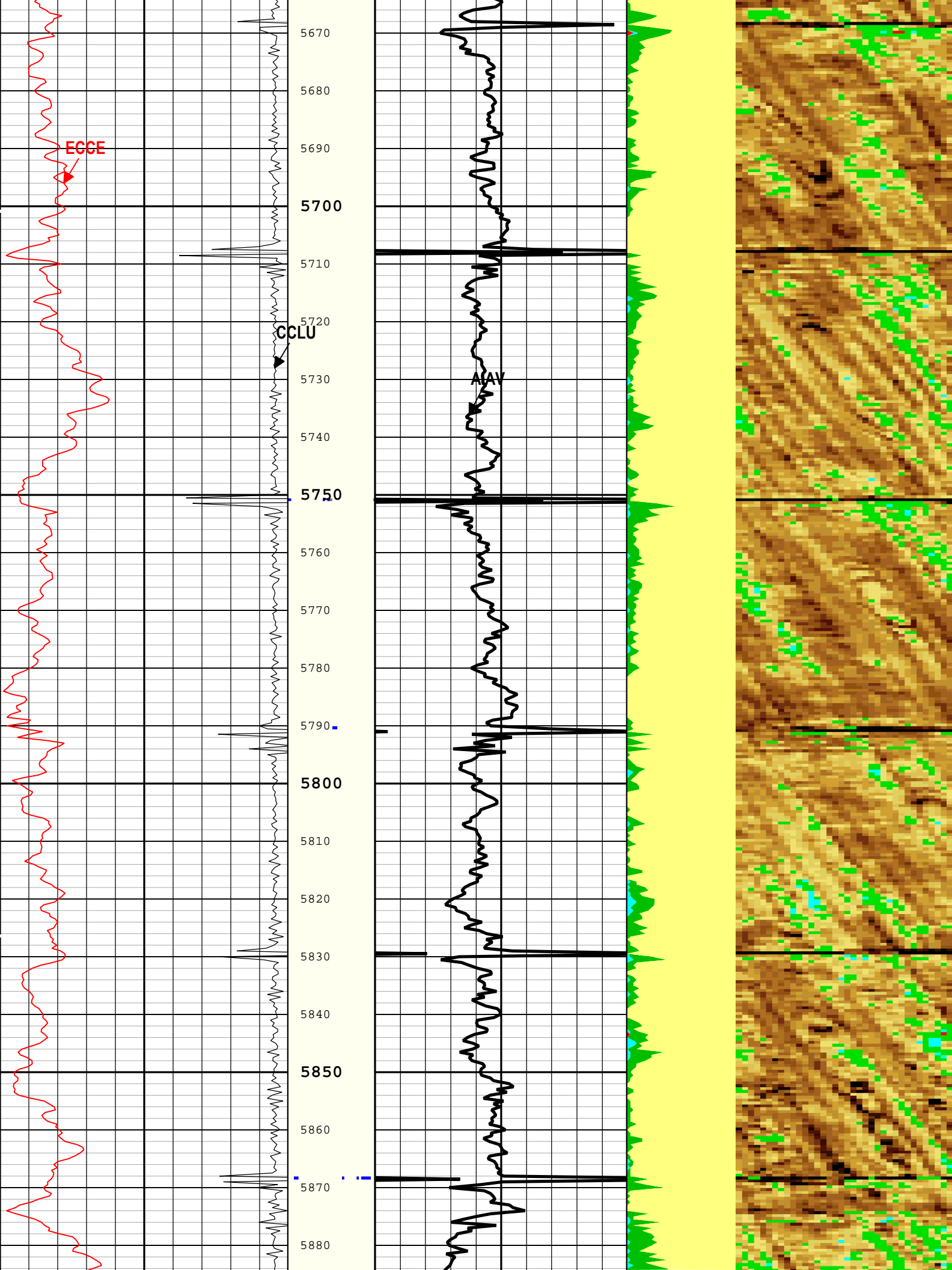


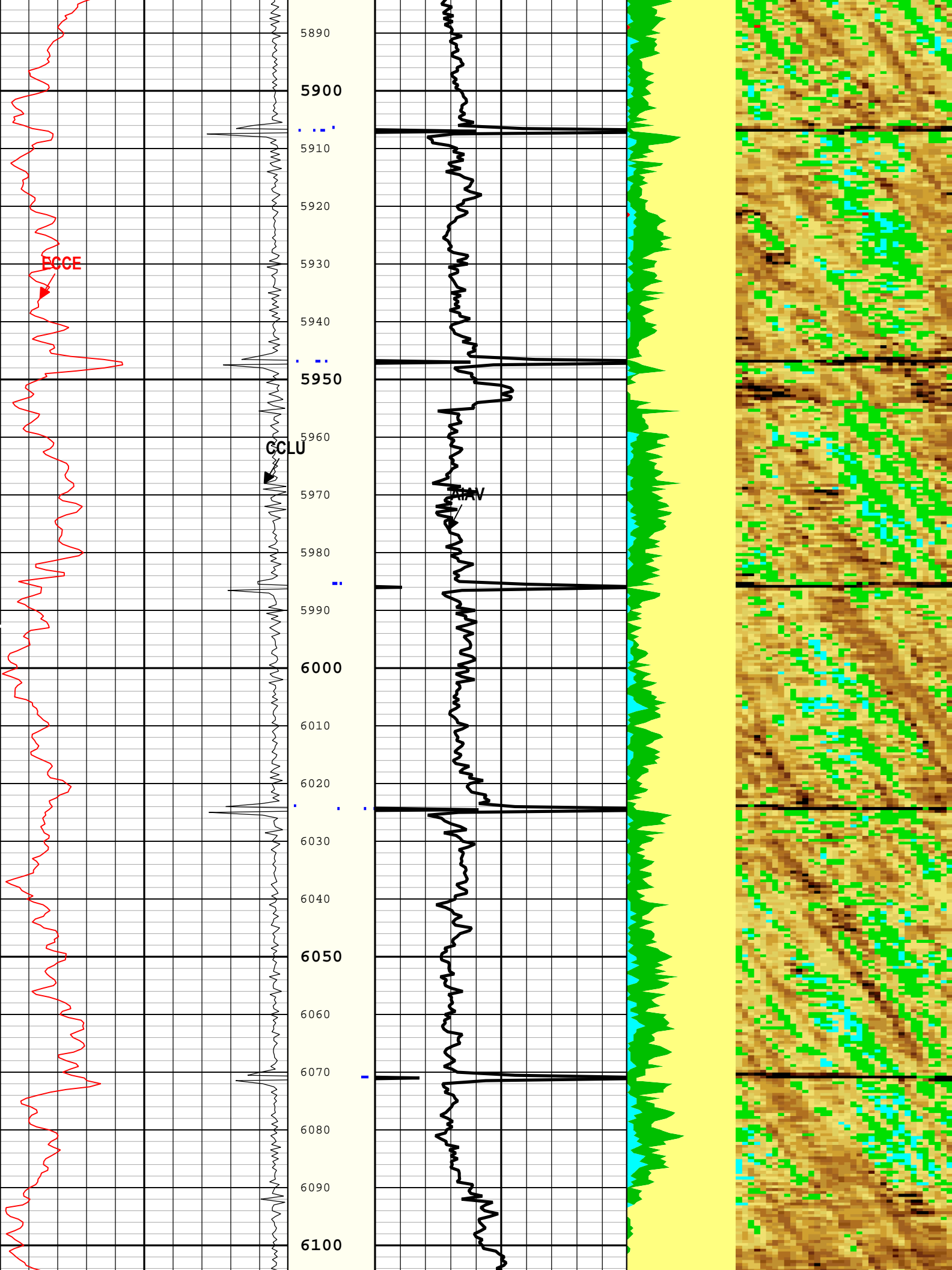


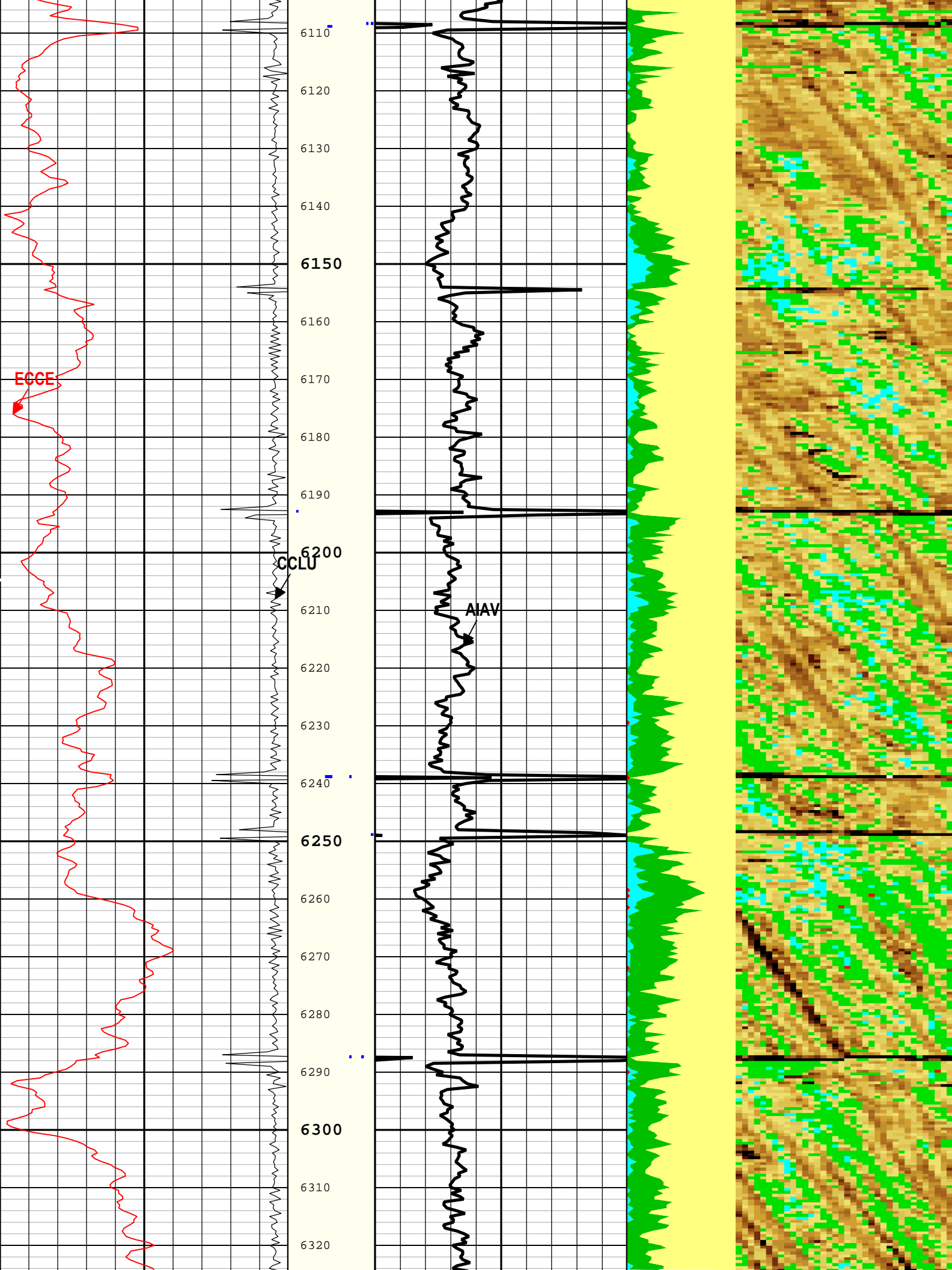


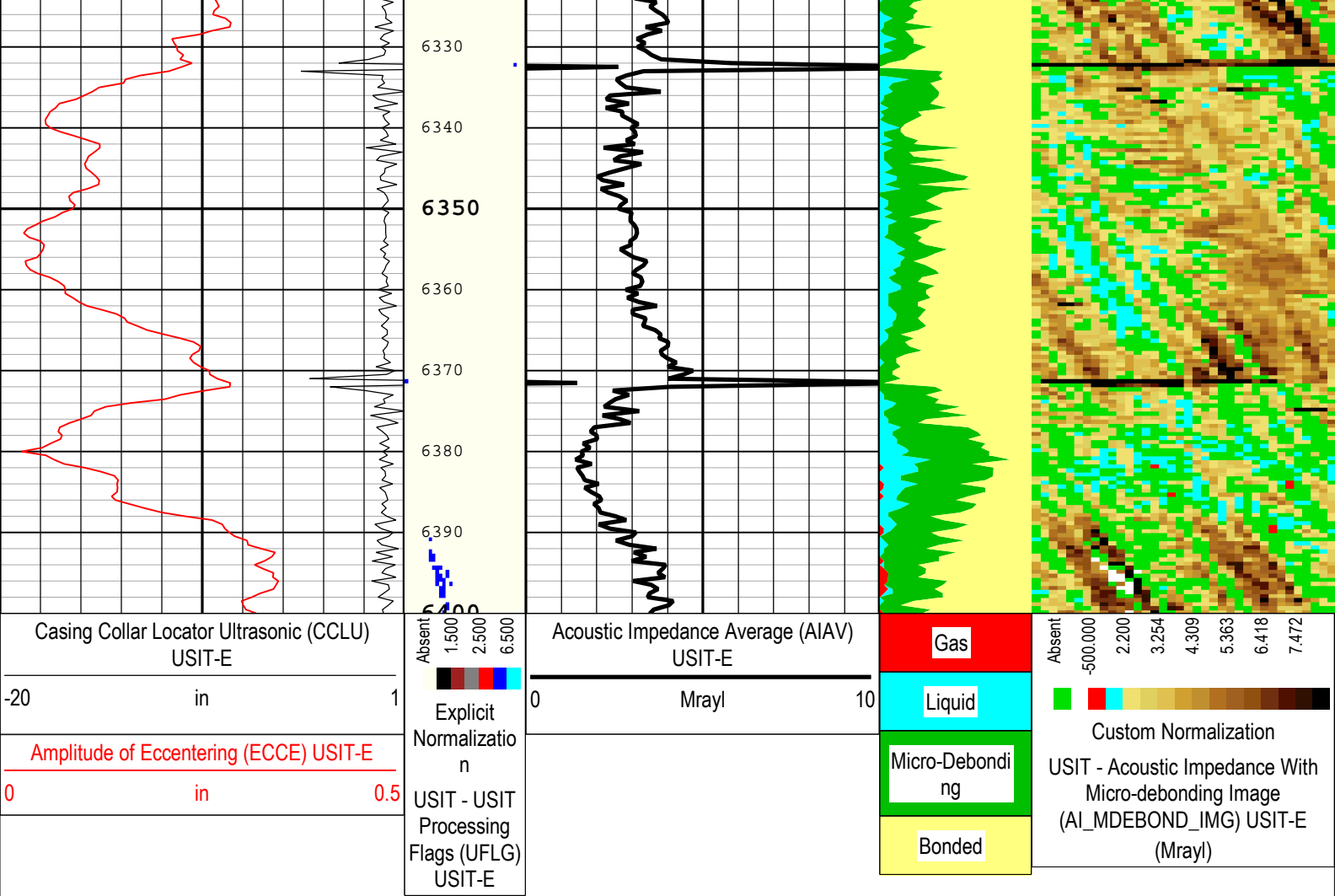












TIME_1900 - Time Marked every 60.00 (s)

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: 26-Jan-2018 18:23:39

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
FDII	FPM Data Interpolation Interval	USIT-E	0	ft
HEMA	Hematite Presence Flag	Borehole	No	
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	1.16	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.01	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	13.5	135	2040
BS	8.5	2040	6400

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	18	dB
EMXV	EMEX Voltage	USIT-E	85	V
HRES	Horizontal Resolution	USIT-E	10 deg	
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	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	24-Jan-2018 09:52:35	24-Jan-2018 10:02:51	6871.19	6829.69
WINB	15.86	24-Jan-2018 10:02:51	24-Jan-2018 10:55:49	6829.69	64.28
WINE	71.88	24-Jan-2018 09:52:35	24-Jan-2018 09:52:54	6871.19	6862.96
WINE	75.71	24-Jan-2018 09:52:54	24-Jan-2018 09:52:58	6862.96	6861.22
WINE	81.09	24-Jan-2018 09:52:58	24-Jan-2018 09:53:00	6861.22	6859.71
WINE	91.06	24-Jan-2018 09:53:00	24-Jan-2018 10:03:32	6859.71	6718
WINE	85.69	24-Jan-2018 10:03:32	24-Jan-2018 10:55:49	6718	64.28

All depth are at tool zero.

One

0 PSI Repeat Pass

Software Version

Acquisition System	Version
Maxwell 2017 SP3	7.3.92069.3100
Application Patch	Wireline_NPD-ICE2-2017SP3_7.3.93033

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	1986.18 ft	2520.48 ft	24-Jan-2018 9:34:05 AM	24-Jan-2018 9:37:24 AM	ON	2.73 ft	No

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc

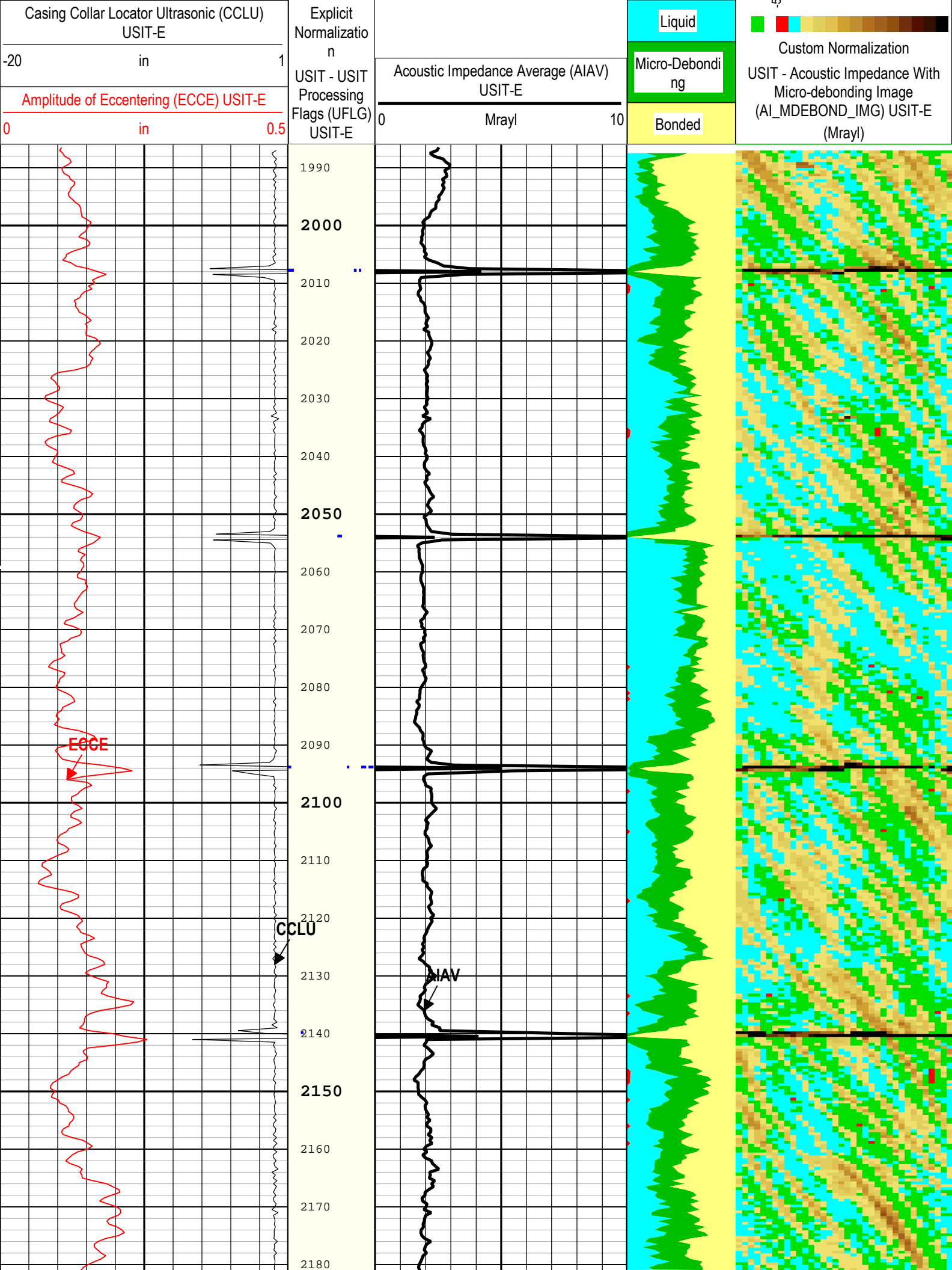
Well:Bison Ridge Y22-734

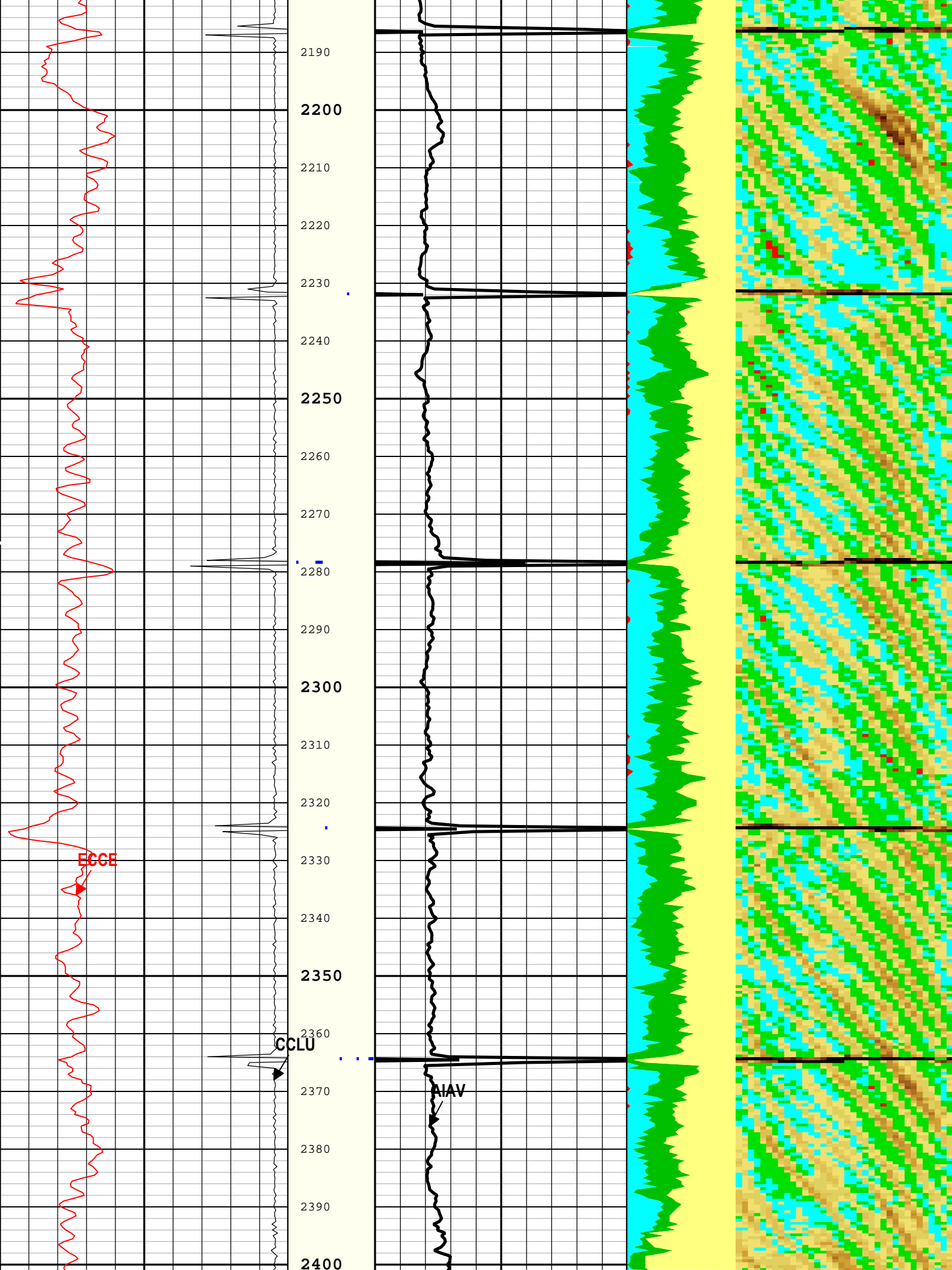
One: Log[3]:Up:S004

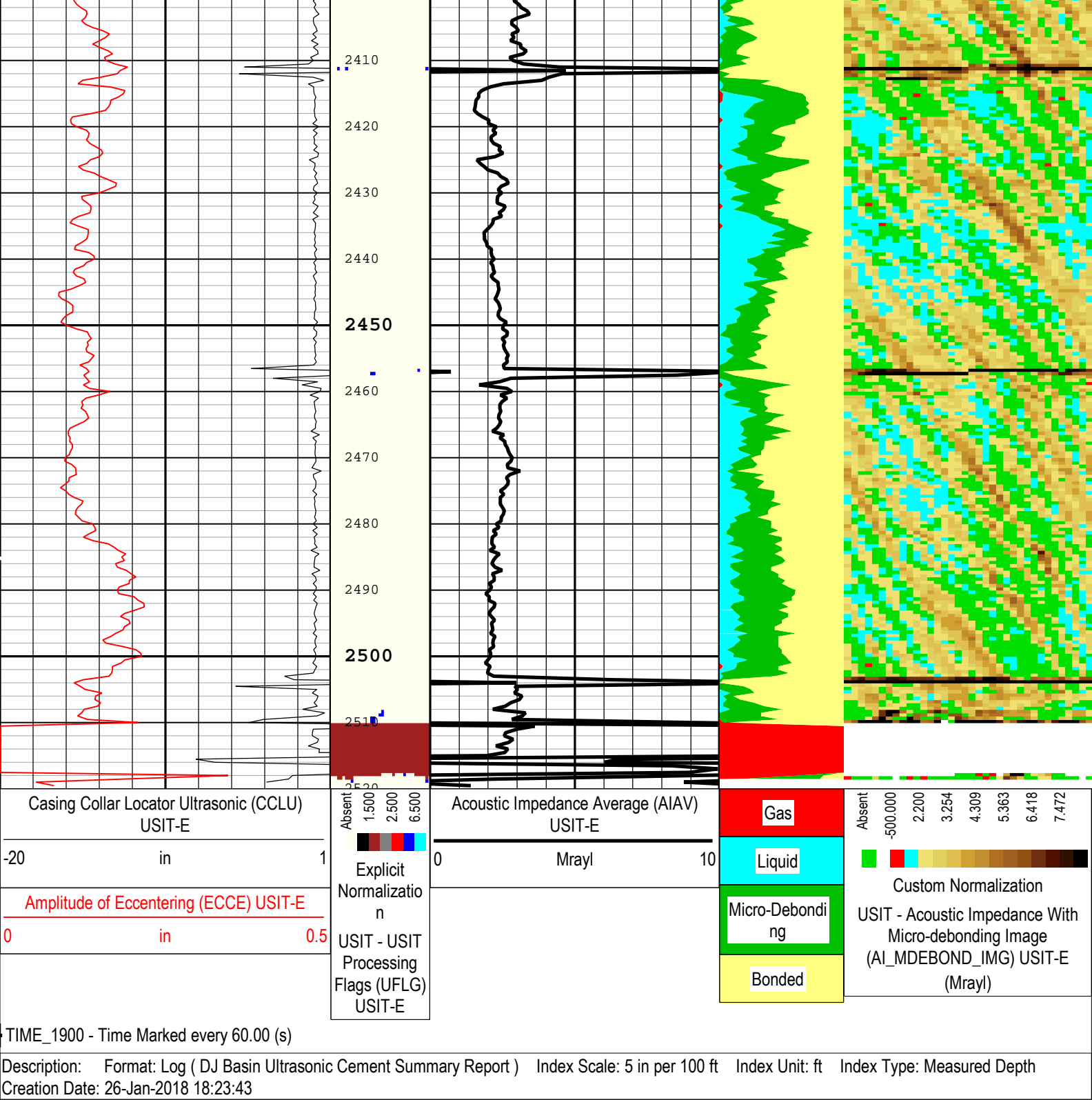
Description: Format: Log (DJ Basin Ultrasonic Cement Summary Report) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 26-Jan-2018 18:23:43

TIME_1900 - Time Marked every 60.00 (s)









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_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
FDII	FPM Data Interpolation Interval	USIT-E	0	ft
HEMA	Hematite Presence Flag	Borehole	No	
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	1.16	
U-USIT_DFSZ	Drilling Fluid Specific Acoustic Impedance	USIT-E	0.01	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	13.5	1986	2040
BS	8.5	2040	2520
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	18	dB
EMXV	EMEX Voltage	USIT-E	Time Zoned	V
HRES	Horizontal Resolution	USIT-E	10 deg	
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

Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth (ft)	Stop Depth (ft)
EMXV	65	24-Jan-2018 09:34:05	24-Jan-2018 09:34:51	2520.48	2491.86
EMXV	85	24-Jan-2018 09:34:51	24-Jan-2018 09:37:24	2491.86	1986.18
All depth are at tool zero.					

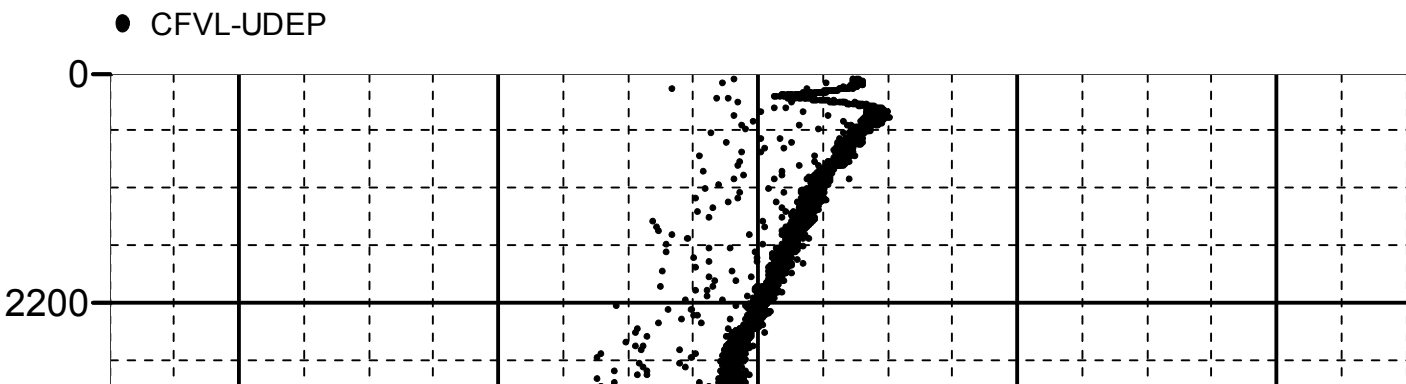
XYZ

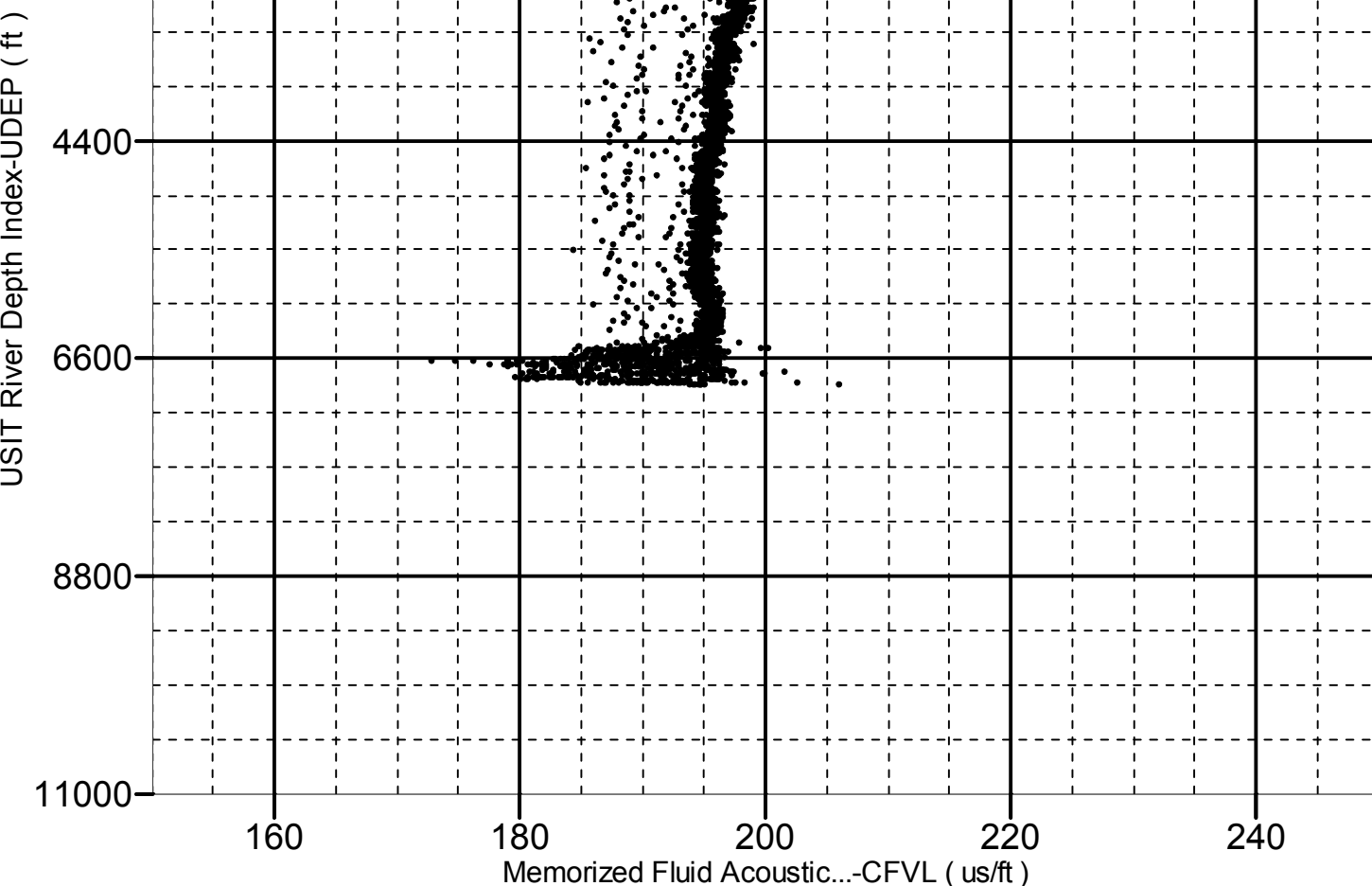
Company:Noble Energy Inc Well:Bison Ridge Y22-734
One: Log[5]:Up:S004

Fluid Acoustic Slowness vs Depth

2D Cross Plot

Index Range: From 6871.00 to 64.00 ft





XYZ

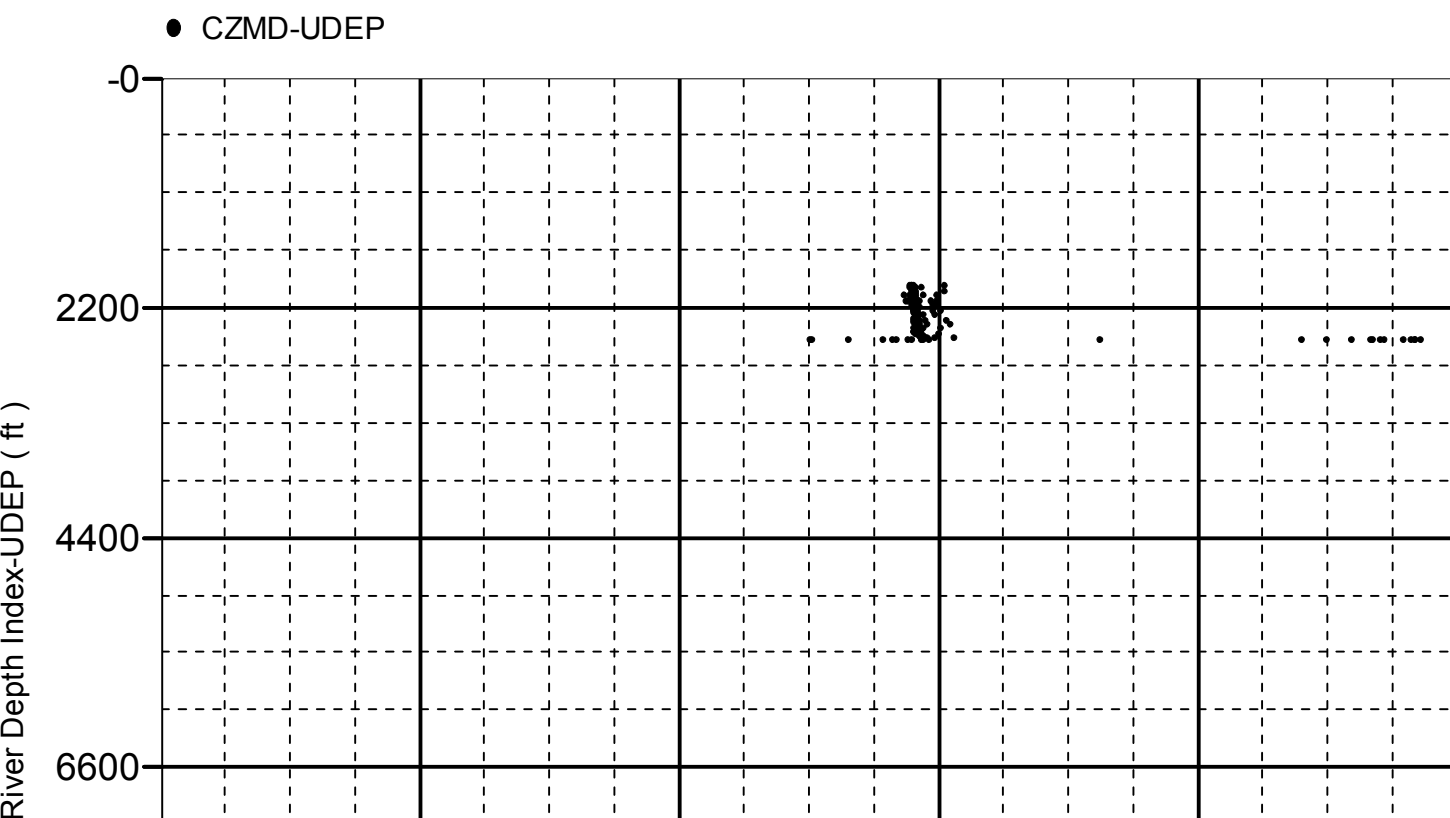
Company:Noble Energy Inc Well:Bison Ridge Y22-734

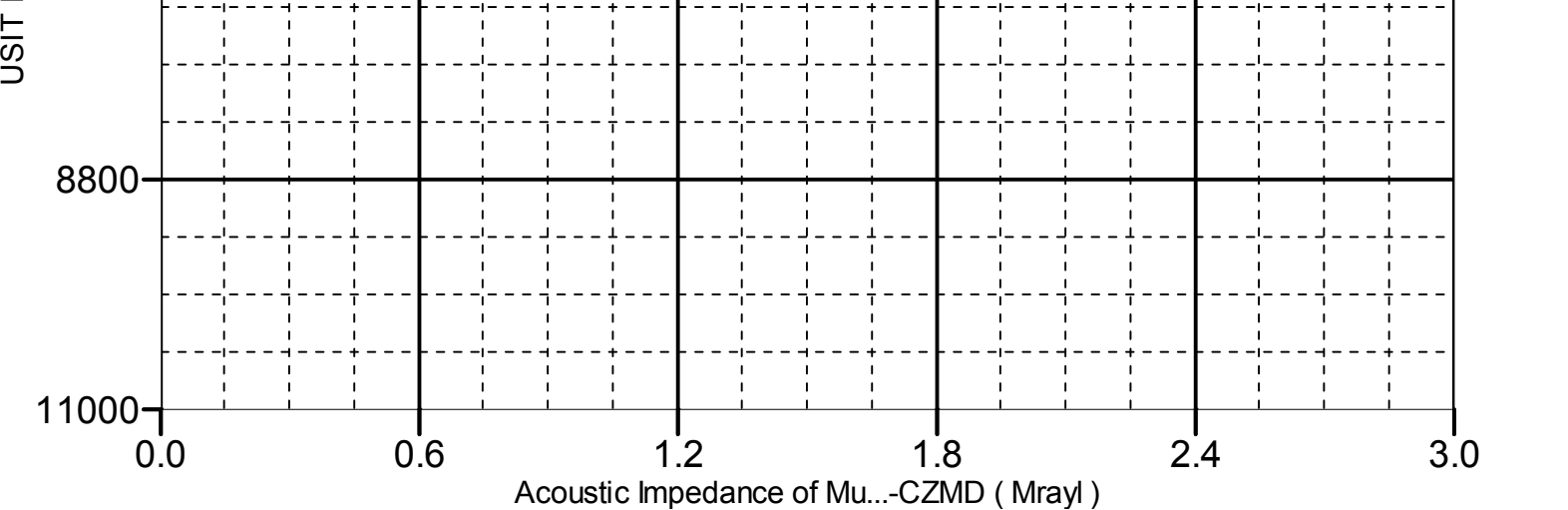
One: Log[3]:Up:S004

Acoustic Impedance of Mud vs Depth

2D Cross Plot

Index Range: From 2520.00 to 1986.00 ft





Calibration Report

EDTC-B (Enhanced Digital Telemetry Cartridge - Version B) Calibration - Run One

Primary Equipment :	EDTC-B	EDTC-B	8424
Calibration Parameter :	Plus Reference		

EDTC-B Accelerometer Calibration - EDTC-B Accelerometer Calibration

Before (Measured):	09:21:19 24-Jan-2018						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
AZ Vertical Measurement	ft/s2	Before	32.19	31.53	32.14	32.84	

EDTC-B Memory Data - EDTC-B Memory Data

Master (EEPROM):	09:21:01 24-Jan-2018						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Initial PMT HV	V	Master			1575.000		
Accelerometer Serial Number		Master			487		
Accelerometer Coefficients - 0		Master	----	----	2.942E+000	----	
Accelerometer Coefficients - 1		Master	----	----	2.637E-004	----	
Accelerometer Coefficients - 2		Master	----	----	2.594E-007	----	
Accelerometer Coefficients - 3		Master	----	----	-6.039E-008	----	
Accelerometer Coefficients - 4		Master	----	----	1.465E-009	----	
Accelerometer Coefficients - 5		Master	----	----	-1.108E-011	----	
Accelerometer Coefficients - 6		Master	----	----	2.837E-014	----	
Accelerometer Coefficients - 7		Master	----	----	-3.739E-003	----	
Accelerometer Coefficients - 8		Master	----	----	-8.552E-007	----	
Accelerometer Coefficients - 9		Master	----	----	-4.140E-008	----	
Accelerometer Coefficients - 10		Master	----	----	7.624E-010	----	
Accelerometer Coefficients - 11		Master	----	----	-4.810E-012	----	
Gamma-Ray Detector Serial Number		Master			7303		

EDTC-B Gamma-Ray Calibration - Gamma Ray Coefficients

Before:	After:						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Gamma Ray Gain		Before	1.000	0.900	NOT DONE	1.100	
		After	----	----	----	----	
		After-Before	----	----	----	----	

EDTC-B Gamma-Ray Calibration - Gamma Ray Accumulations

Before:	After:						
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement - 0	gAPI	Before	----	----	----	----	
		After	----	----	----	----	
		After-Before	----	----	----	----	
RGR Plus Measurement	gAPI	Before			NOT DONE		

		After After-Before	----	----	NOT DONE ----	----	

LEH-QT (Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor) Calibration - Run One

Primary Equipment :	Logging Equipment Head - QT, 3-3/8 inch 31 pin HPHT with Tension Sensor	LEH-QT	2353
---------------------	---	--------	------

HTEN Master Calibration - HTEN Master Calibration

Master:							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
HTEN Shop Gain		Master	1.000	0.800	NOT DONE	4.500	
HTEN Shop Offset	lbf	Master	0	-1000.000	NOT DONE	1000.000	

HTEN Before Calibration - HTEN Before Calibration

Before:							
Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RHTE Zero Measurement - 0	lbf	Before	----	----	----	----	
RHTE Plus Measurement - 0	lbf	Before	----	----	----	----	
HTEN Gain - 0		Before	----	----	----	----	
HTEN Offset - 0	lbf	Before	----	----	----	----	

County:	Weld
Country:	US
UltraSonic Summary Print	