

Company: Noble Energy Inc.

Well: EMMY H25-731

Field: DJ BASIN

County: Weld State: Colorado

UltraSonic Summary Print

Weld  
DJ BASIN  
SW SE SEC:25 TWN:3N RNG: 65W  
EMMY H25-731  
Noble Energy Inc.

Location:		SW SE SEC:25 TWN:3N RNG: 65W	Elev.:	K.B.	4835.00 ft
Permanent Datum:				G.L.	4805.00 ft
Log Measured From:				D.F.	4835.00 ft
Drilling Measured From:					
API Serial No.	Section:	Township:	Range:		
05-123-46971	25	3N	65W		

Logging Date 02-Nov-2018

Run Number ONE

Depth Driller 17293.00 ft

Schlumberger Depth 6650.00 ft

Bottom Log Interval 6650.00 ft

Top Log Interval 57.00 ft

Casing Fluid Type BRINE

Salinity

Density 8.4 lbm/gal

Fluid Level 8.00 ft

BIT/CASING/TUBING STRING

Bit Size 8.50 in

From 1947.00 ft

To 17293.00 ft

Casing/Tubing Size 5.5 in

Weight 20 lbm/ft

Grade P110

From 0.00 ft

To 17279.80 ft

Max Recorded Temperatures 223 degF

Logger on Bottom 02-Nov-2018 16:00:00

Unit Number 2377 Location: Fort Morgan, CO

Recorded By Justin Ray

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.

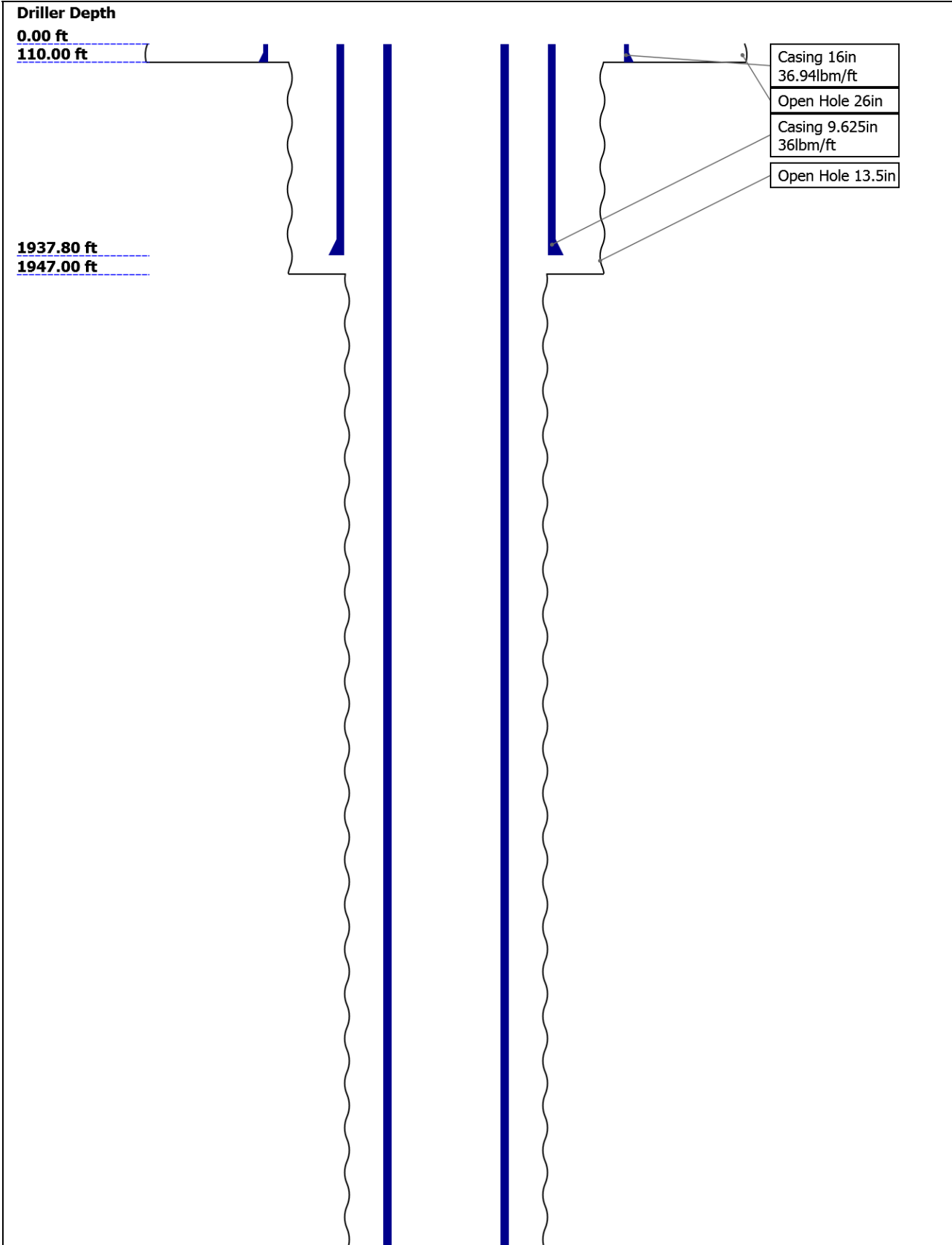
Contents

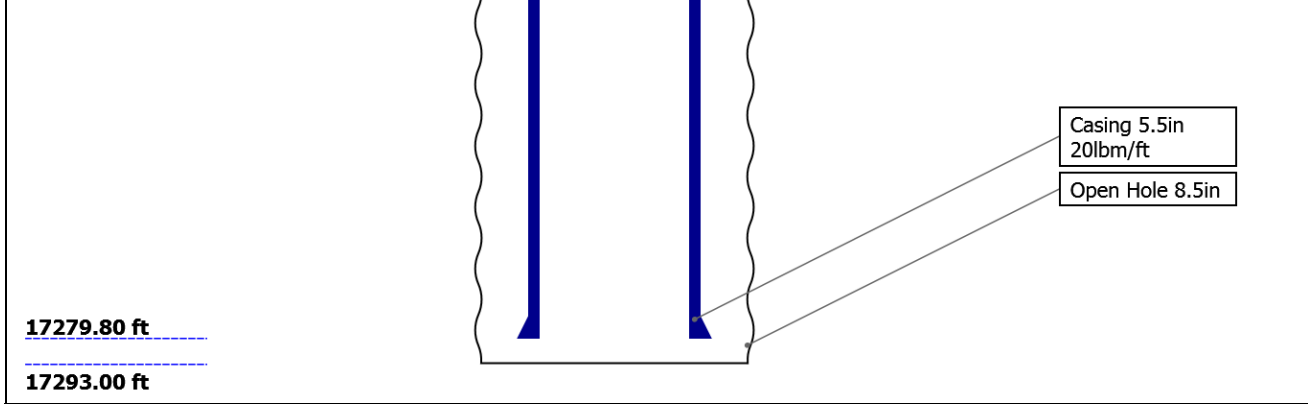
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Well Sketch






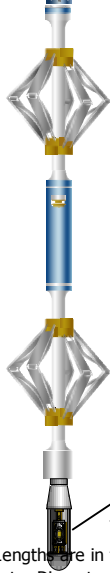
Borehole Size/Casing/Tubing Record

Bit						
Bit Size ( in )	26	13.5	8.5			
Top Driller ( ft )	0	110	1947			
Top Logger ( ft )	0	110	1947			
Bottom Driller ( ft )	110	1947	17293			
Bottom Logger ( ft )	110	1947	17293			
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	1937.8	17279.8			
Bottom Logger ( ft )	110	1937.8	17279.8			

Remarks and Equipment Summary

ONE: Toolstring				ONE: Remarks	
<div><div><div>Equip nameLengthMP nameOffset</div><div>LEH-QT28.97LEH-QT</div><div>EDTC-B:926.06316EDTH-B:9373EDTG-A:79527EDTC-B:9316</div><div>AH-184[19.562]</div><div>AH-184[17.561]</div><div>USIT-E:1715.5625ECH-MFA:1991USAC-A:1725USIT-A:10</div></div><div></div></div>	Tool string ran as per tool sketch				
	Gemcos, boosters and two knuckles ran for tool centralization				
	Main pass ran with 2500 PSI. Repeat pass ran with 0 PSI				
	Thank you for choosing Schlumberger				

USIS-A:18  
26  
USSC-B:99  
2  
USRS-AB:  
373  
USI-SENS  
OR:1064  
USI-TX



USI Sen 0.37  
sor  
Head  
nsion

Length in ft  
Maximum Outer Diameter = 5.000 in  
Line: Sensor Location, Value: Gating Offset  
All measurements are relative to TOOL\_ZERO

## Depth Summary

ONE

### 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

CRANE

### ONE:Depth Control Parameters

Log Sequence

First Log In the Well

Rig Up Length At Surface

Rig Up Length At Bottom

Rig Up Length Correction

Stretch Correction

1.00 ft

Tool Zero Check At Surface

### Depth Control Remarks

All Schlumberger depth control procedures followed

IDW used as primary depth control device

Z-Chart used as secondary depth control device

Log correlated to short joint at 6239.8-6250.8 FT

## USIT - Fluid Properties Measurement

Run Name	Pass Name	Start Depth(ft)	Stop Depth(ft)
Run 1	Log[4]:Up	6652.88	56.32

Fluid Velocity = "Automatic".  
CFVL equals DFSL channel

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

Mud Impedance = "FreePipe Norm".  
Free Pipe normalization zone is : 37.09m(121.68ft) to 44.19m(144.97ft)  
MUD\_N\_FRP = 1.18  
DFD = 1.01g/cm3(8.40lbm/gal)  
CZMD median computed in free pipe normalization interval = 1.68 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	8.0.95333.3100

Pass Summary

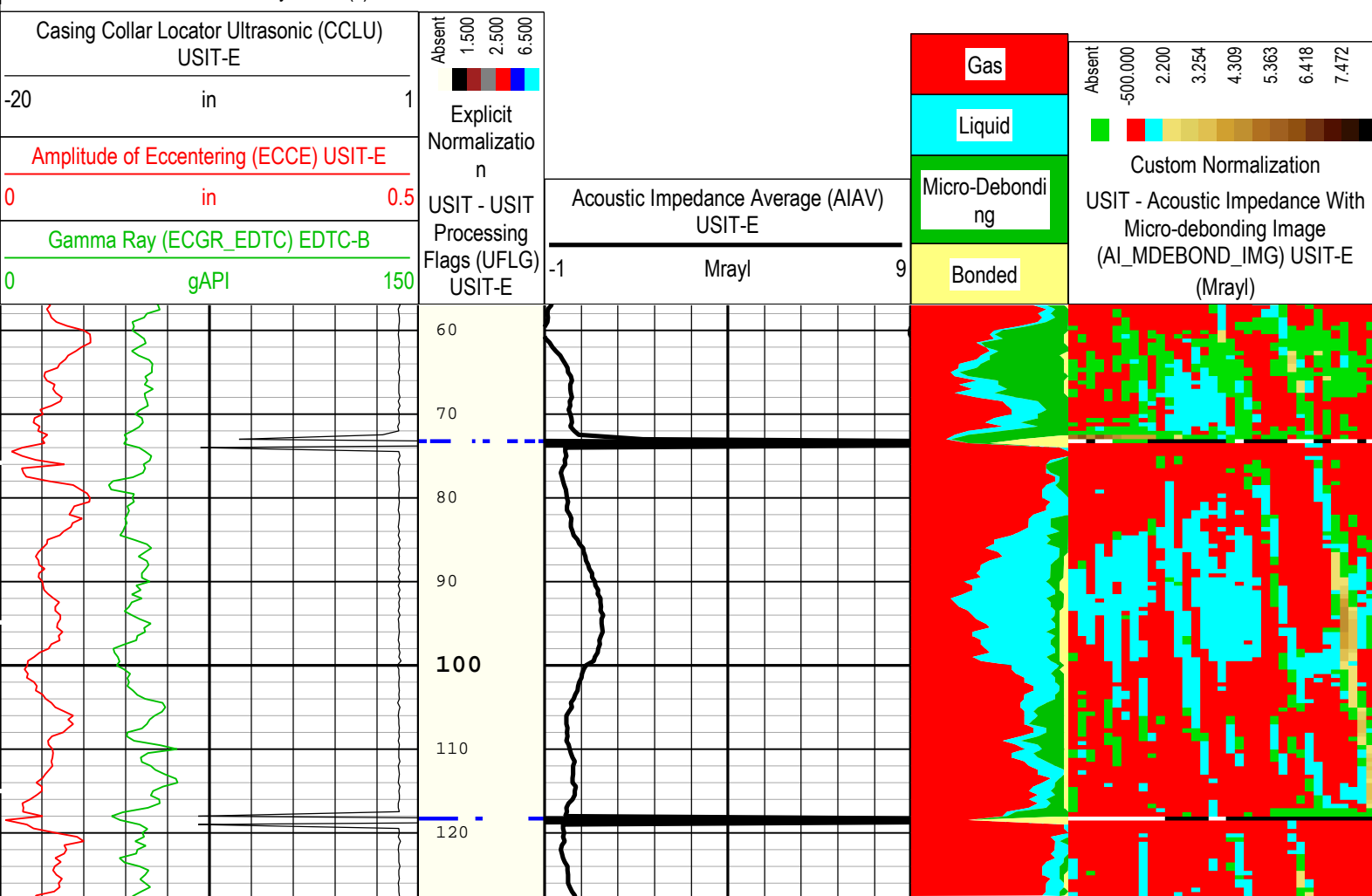
Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[4]:Up	Up	56.33 ft	6652.88 ft	02-Nov-2018 16:14:56	02-Nov-2018 16:58:48	ON	-2.24 ft	Yes

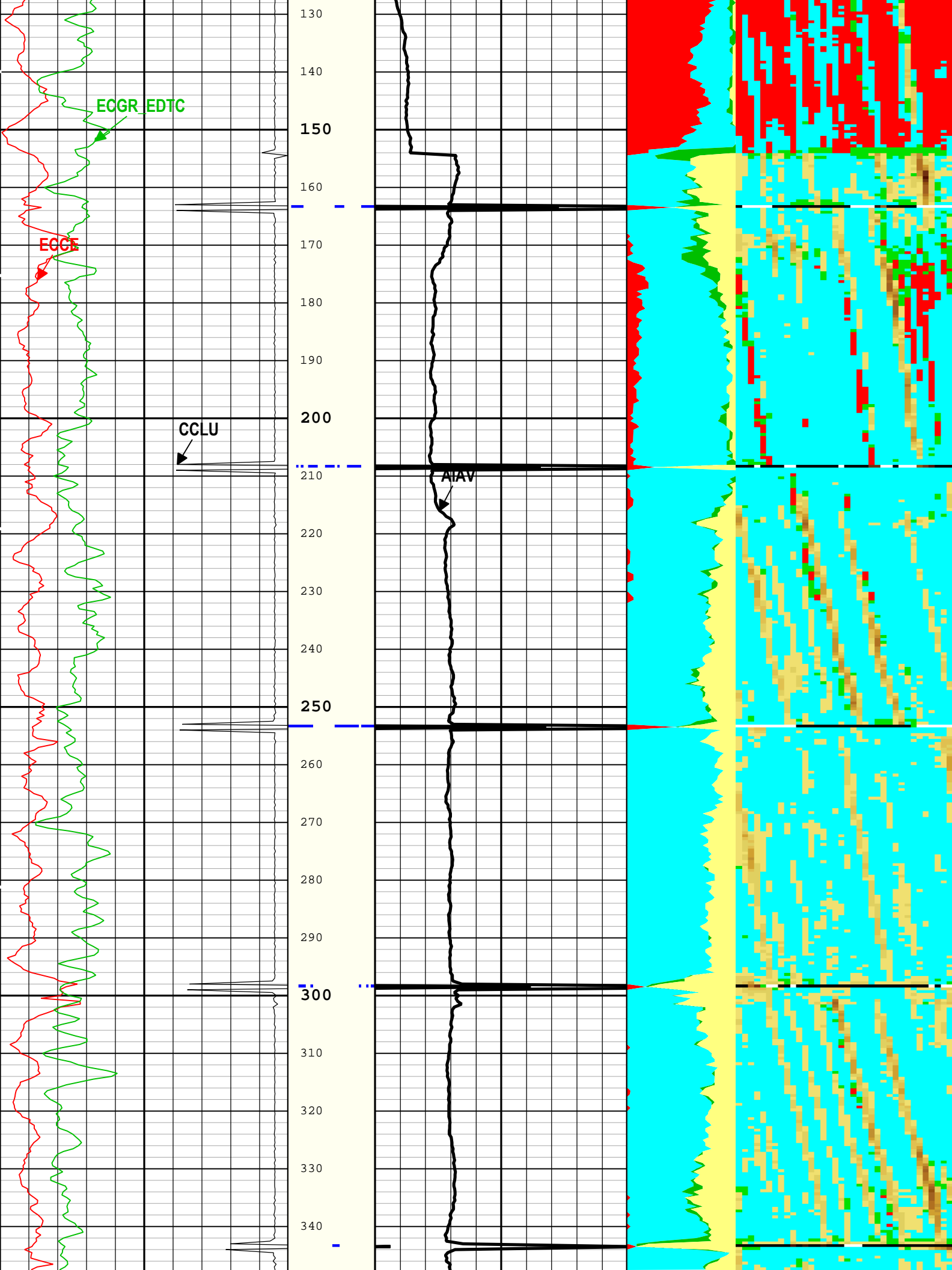
All depths are referenced to toolstring zero

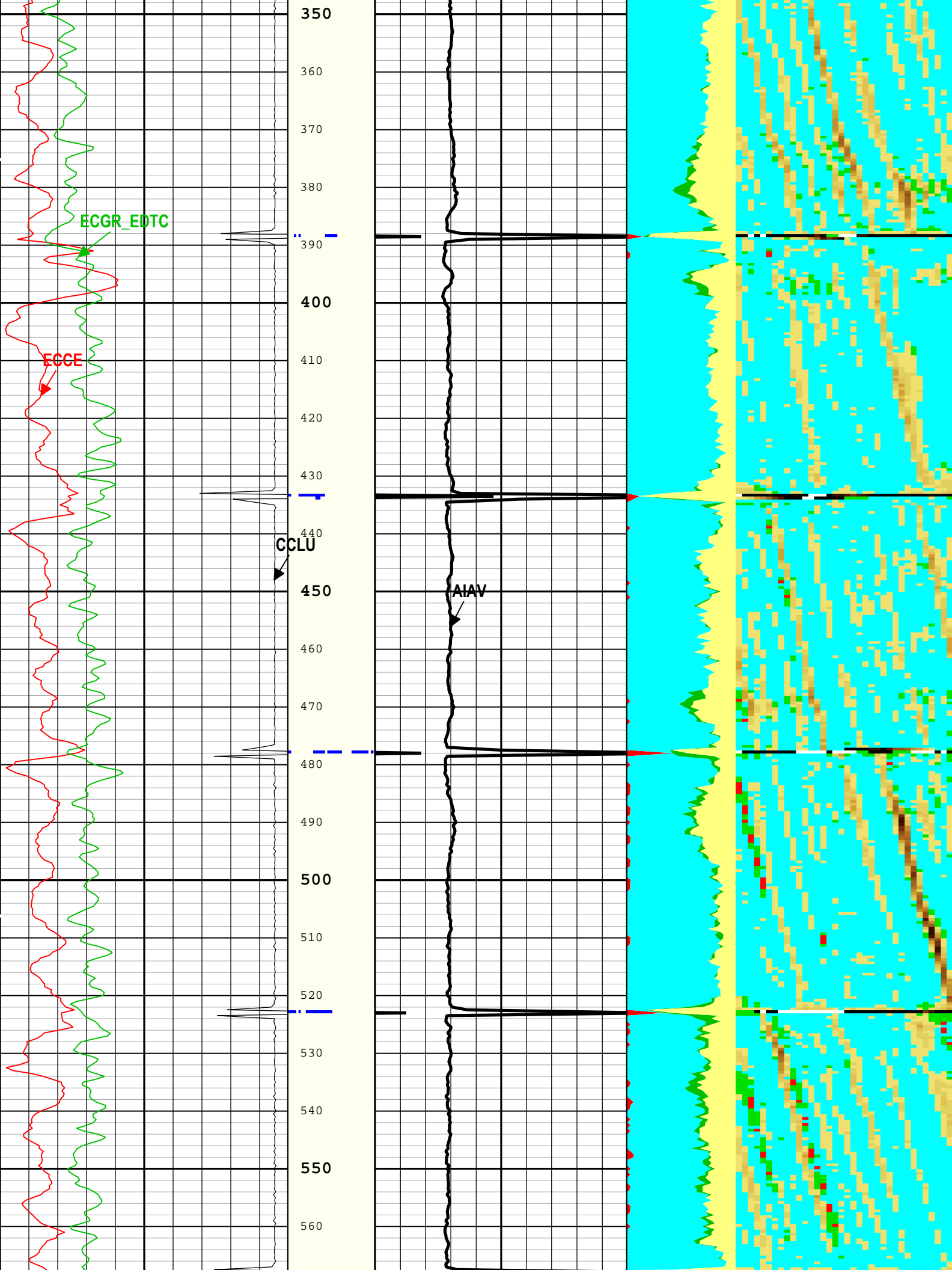
Log	Company:Noble Energy Inc.	Well:EMMY H25-731
		ONE: Log[4]:Up:S010

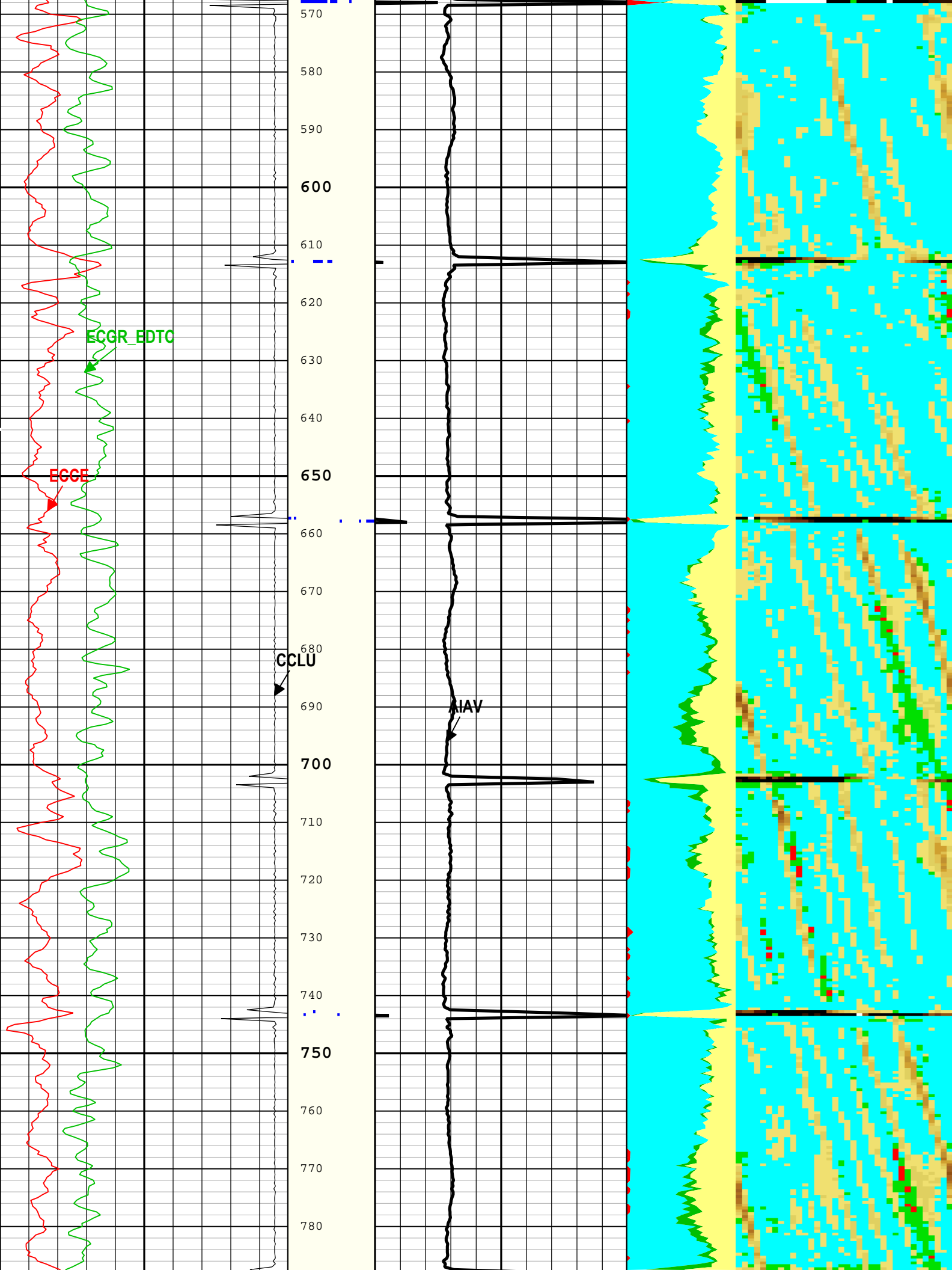
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Creation Date: 03-Nov-2018 15:53:46

TIME\_1900 - Time Marked every 60.00 (s)

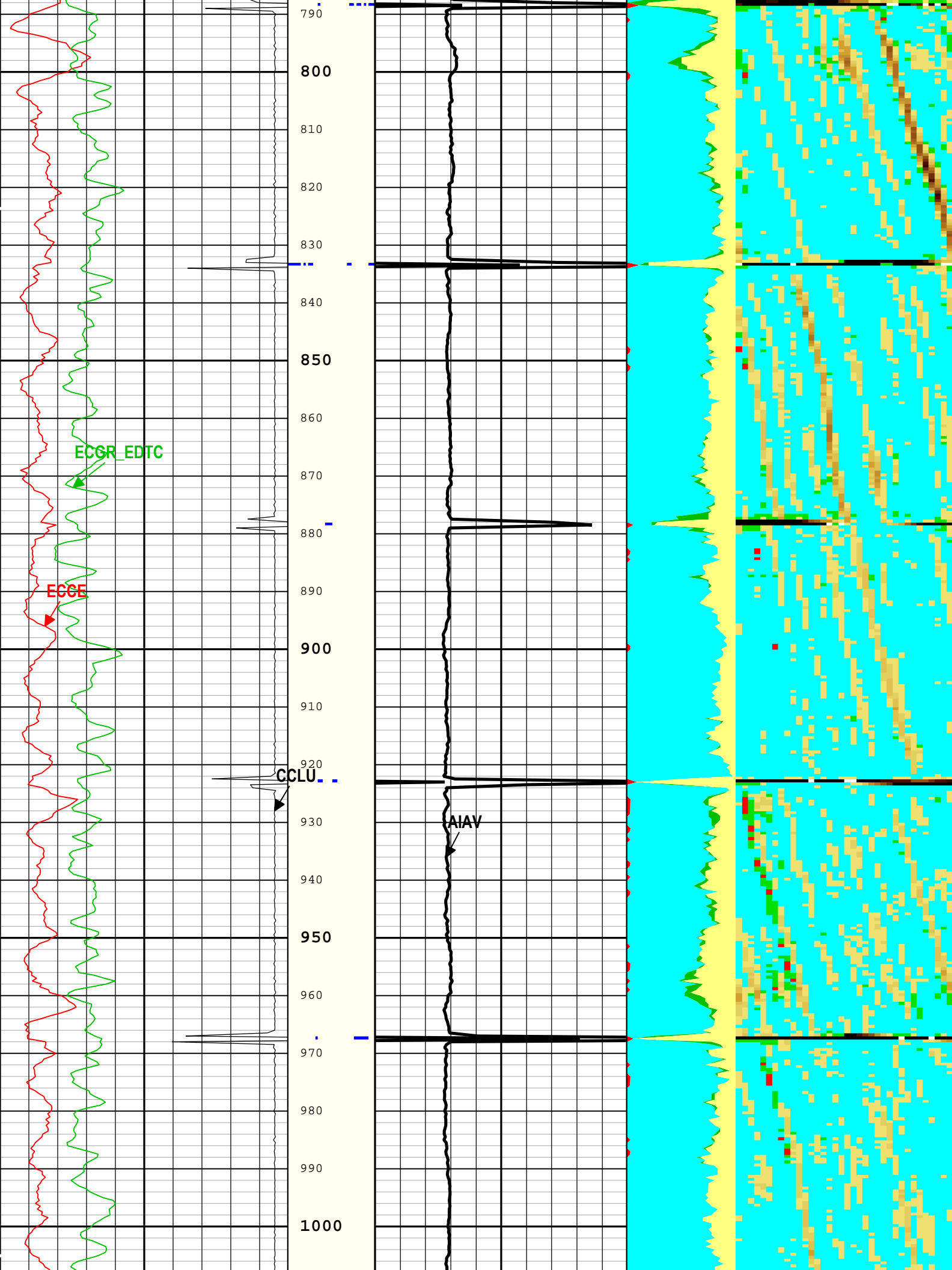


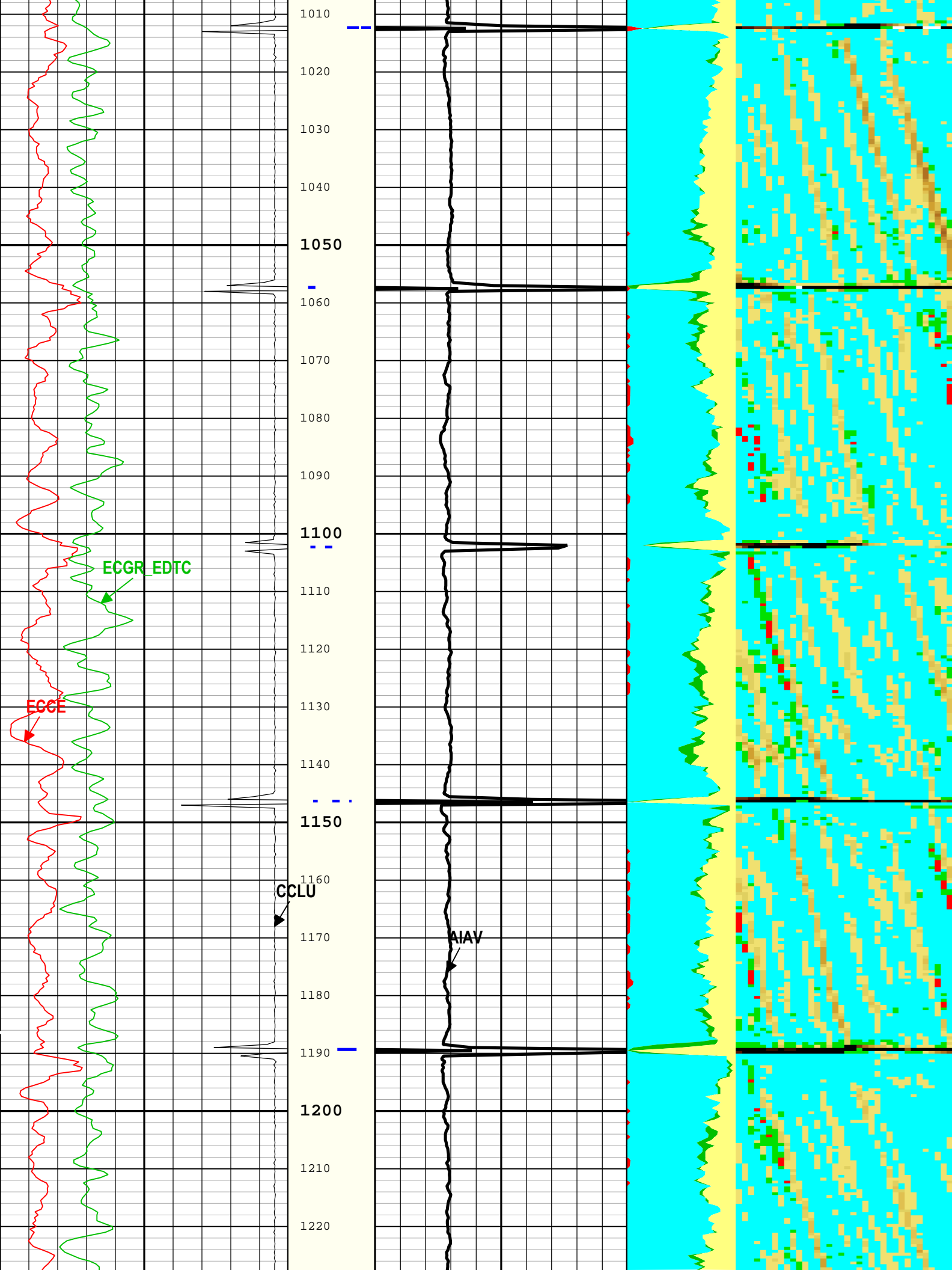


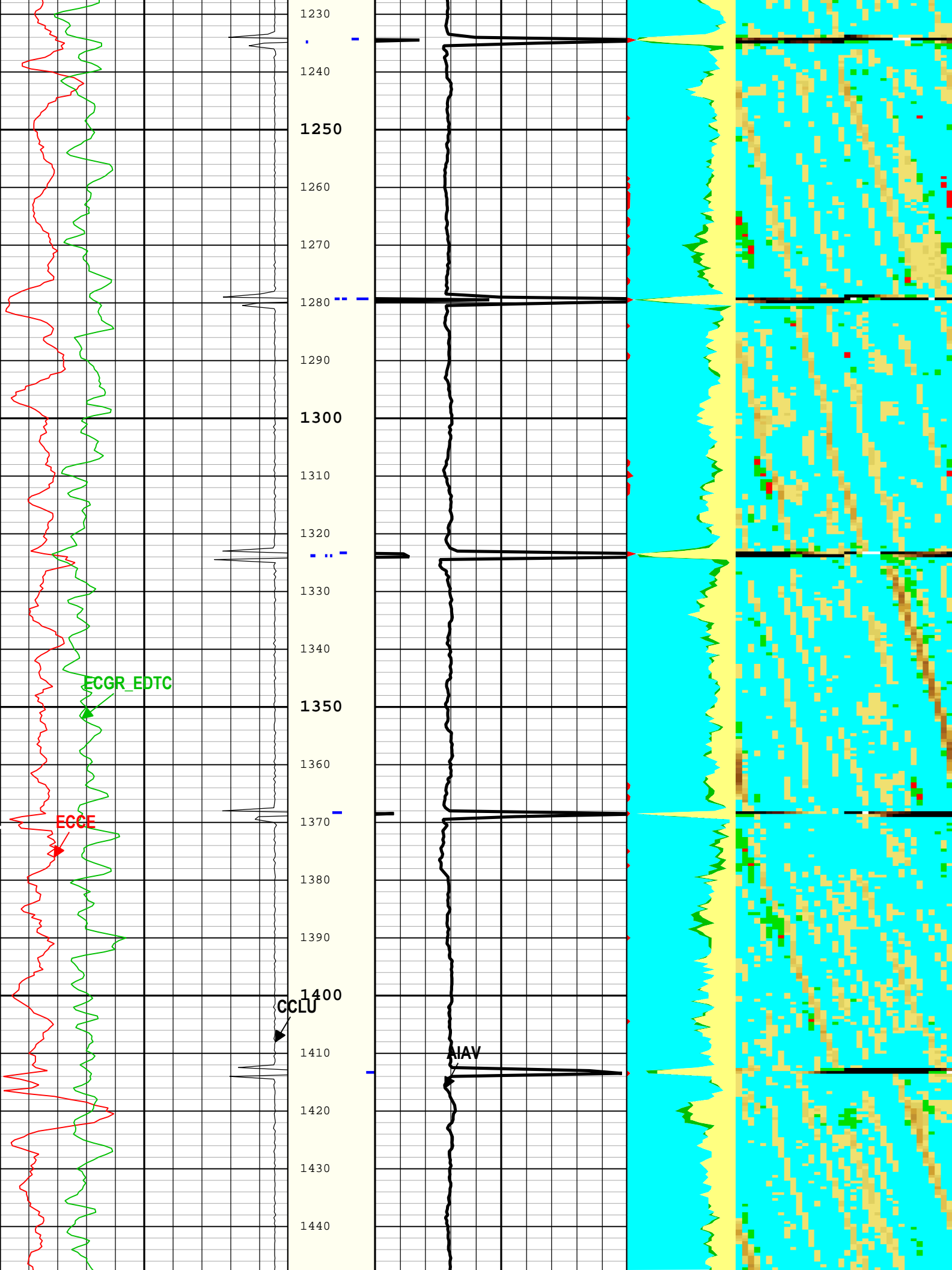


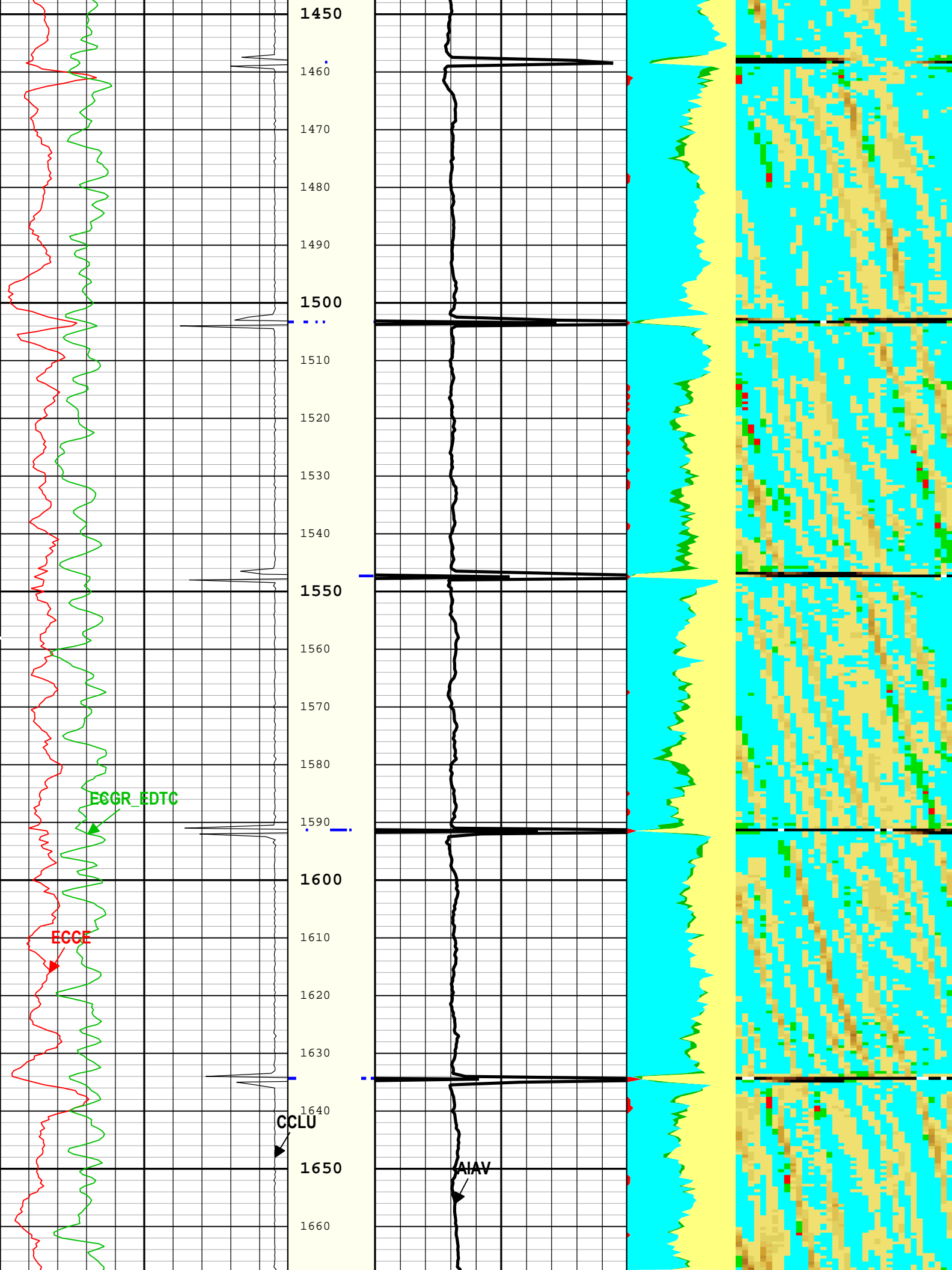


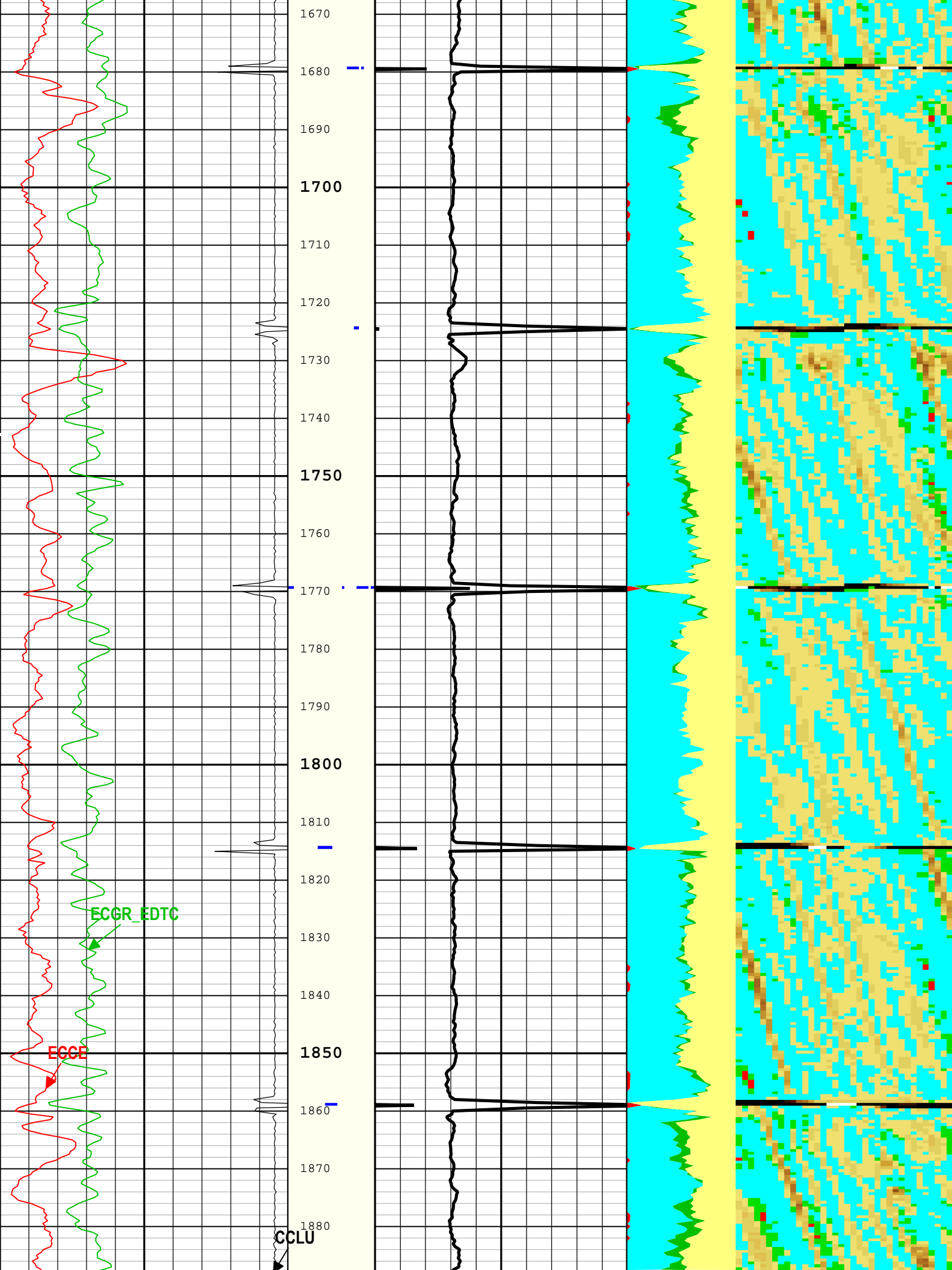


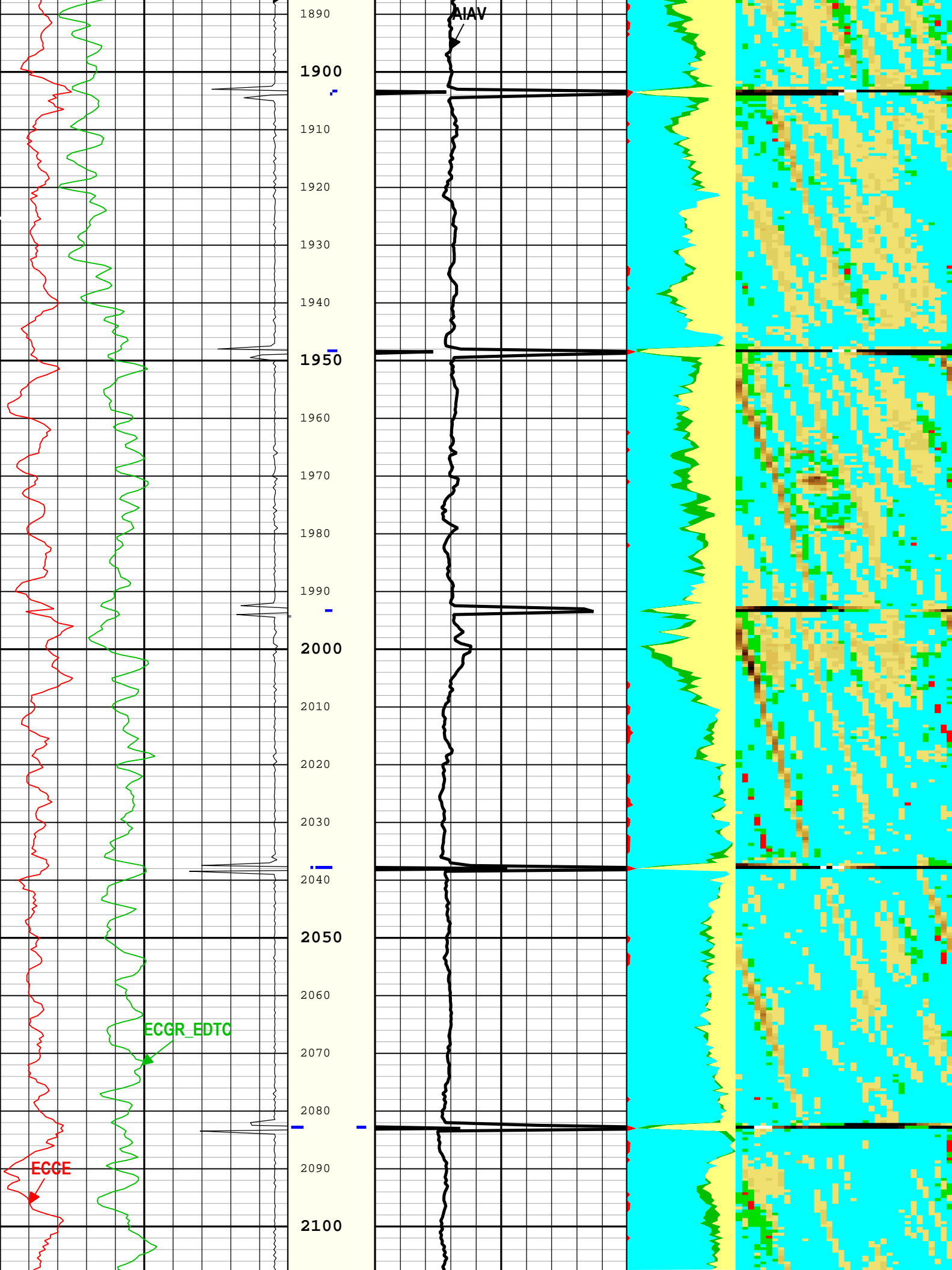


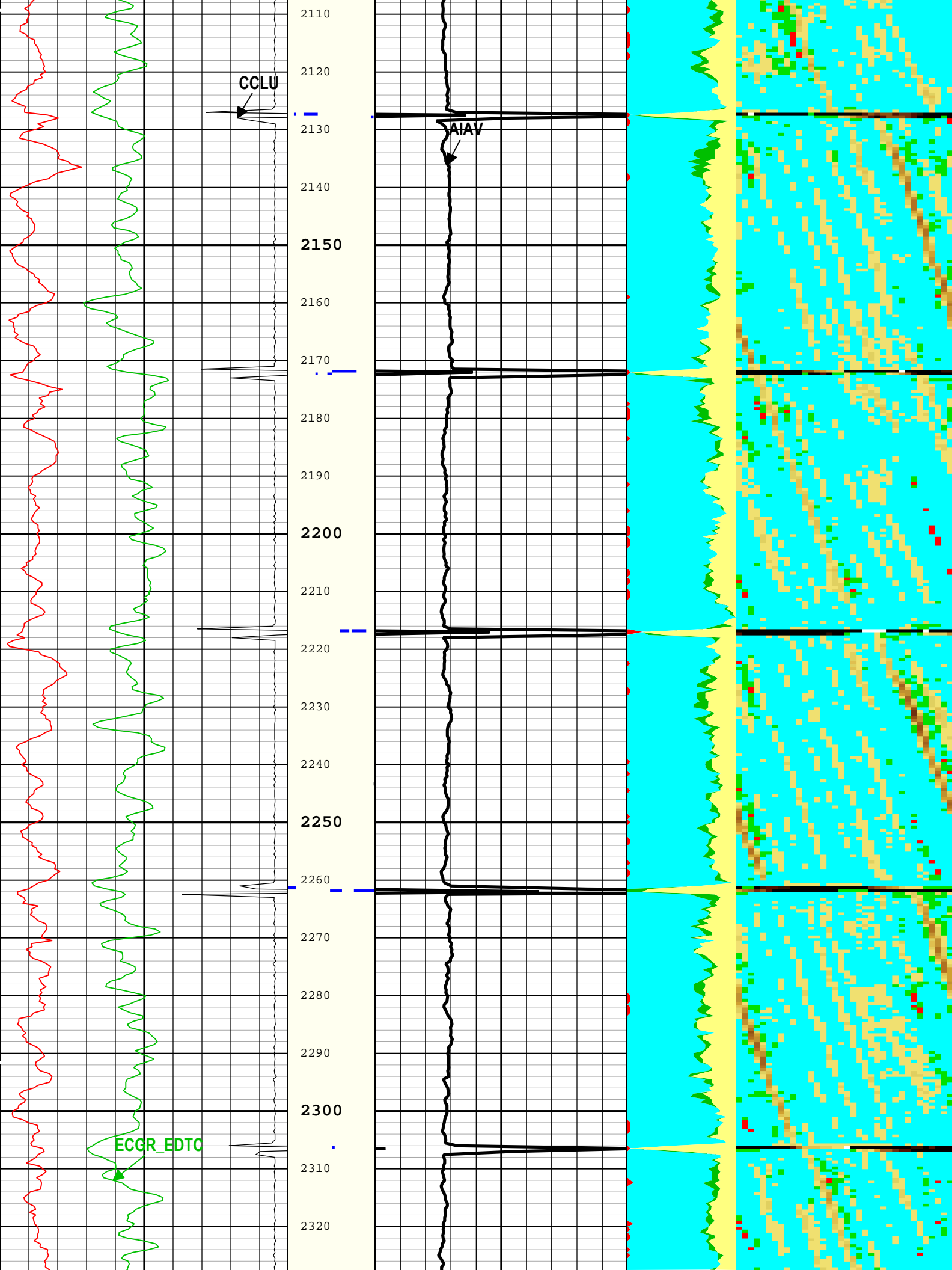


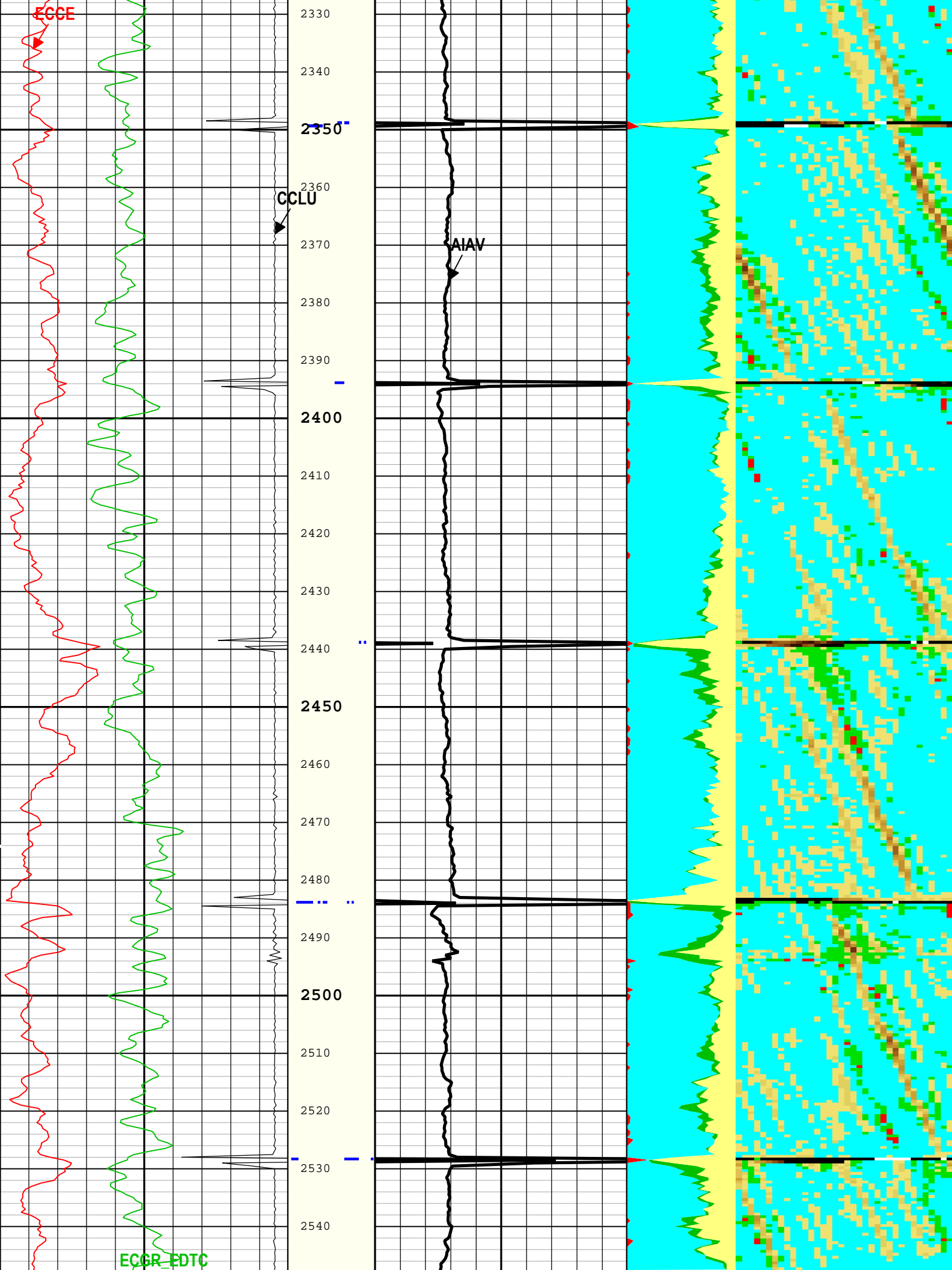




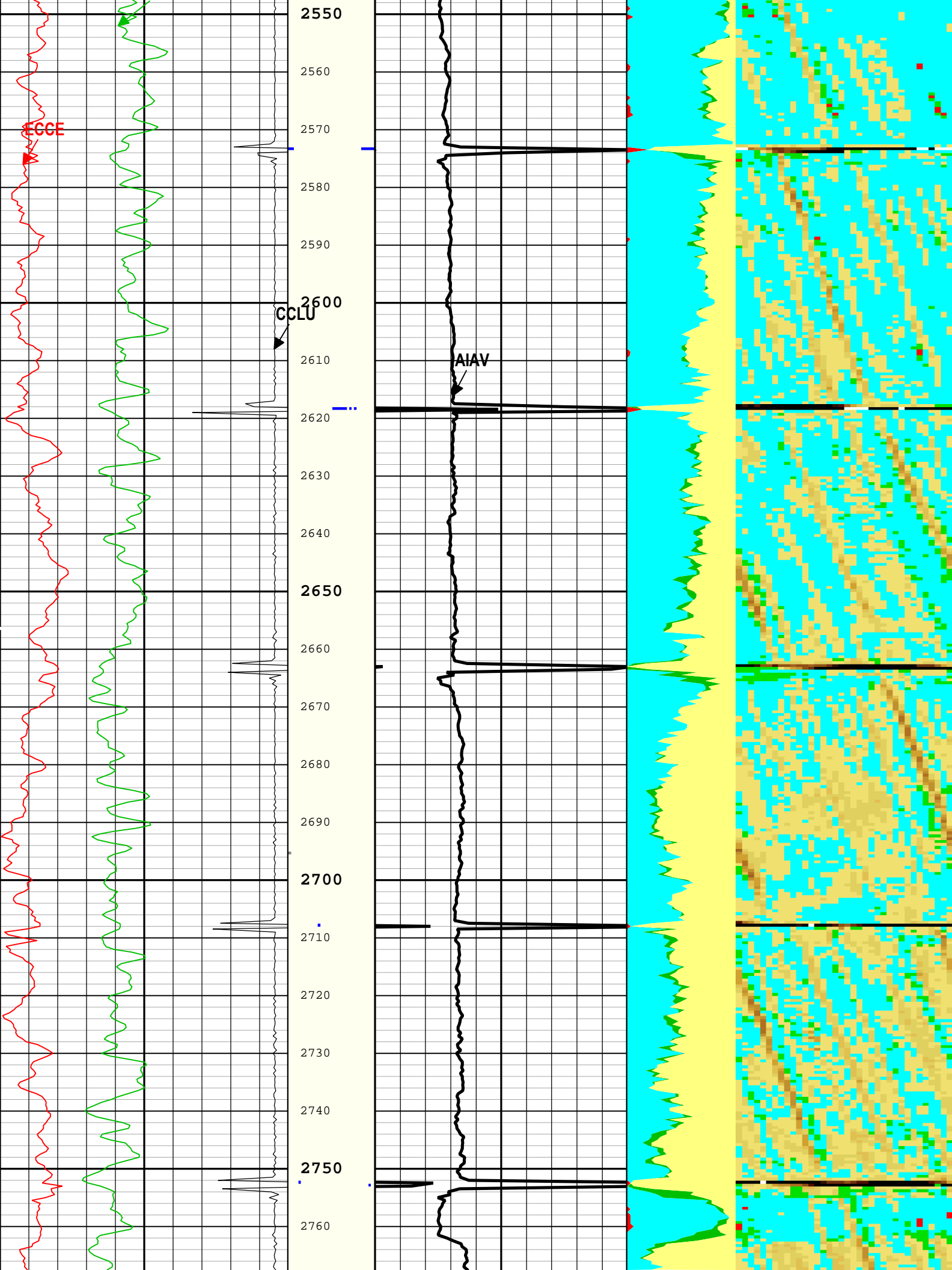


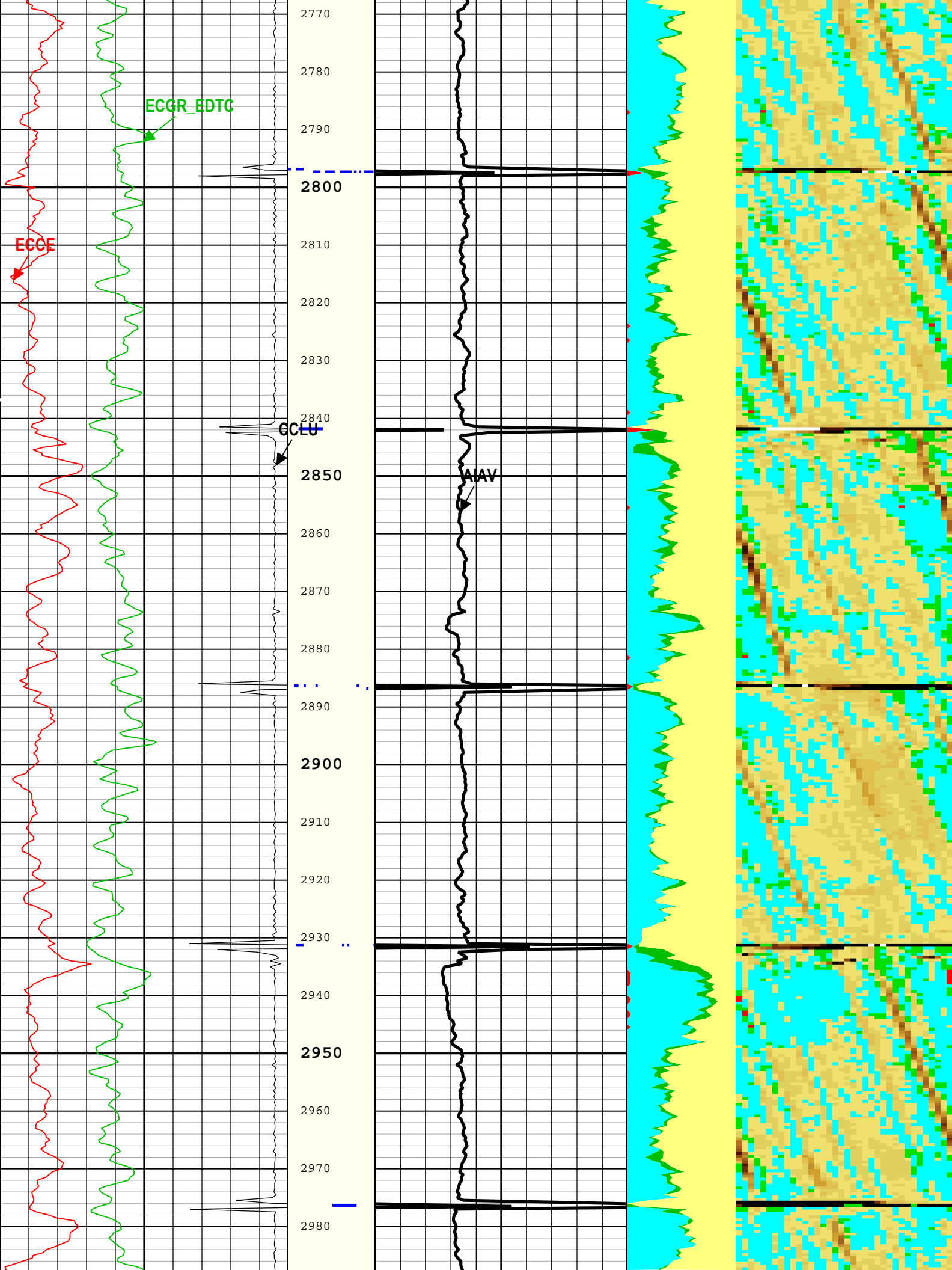


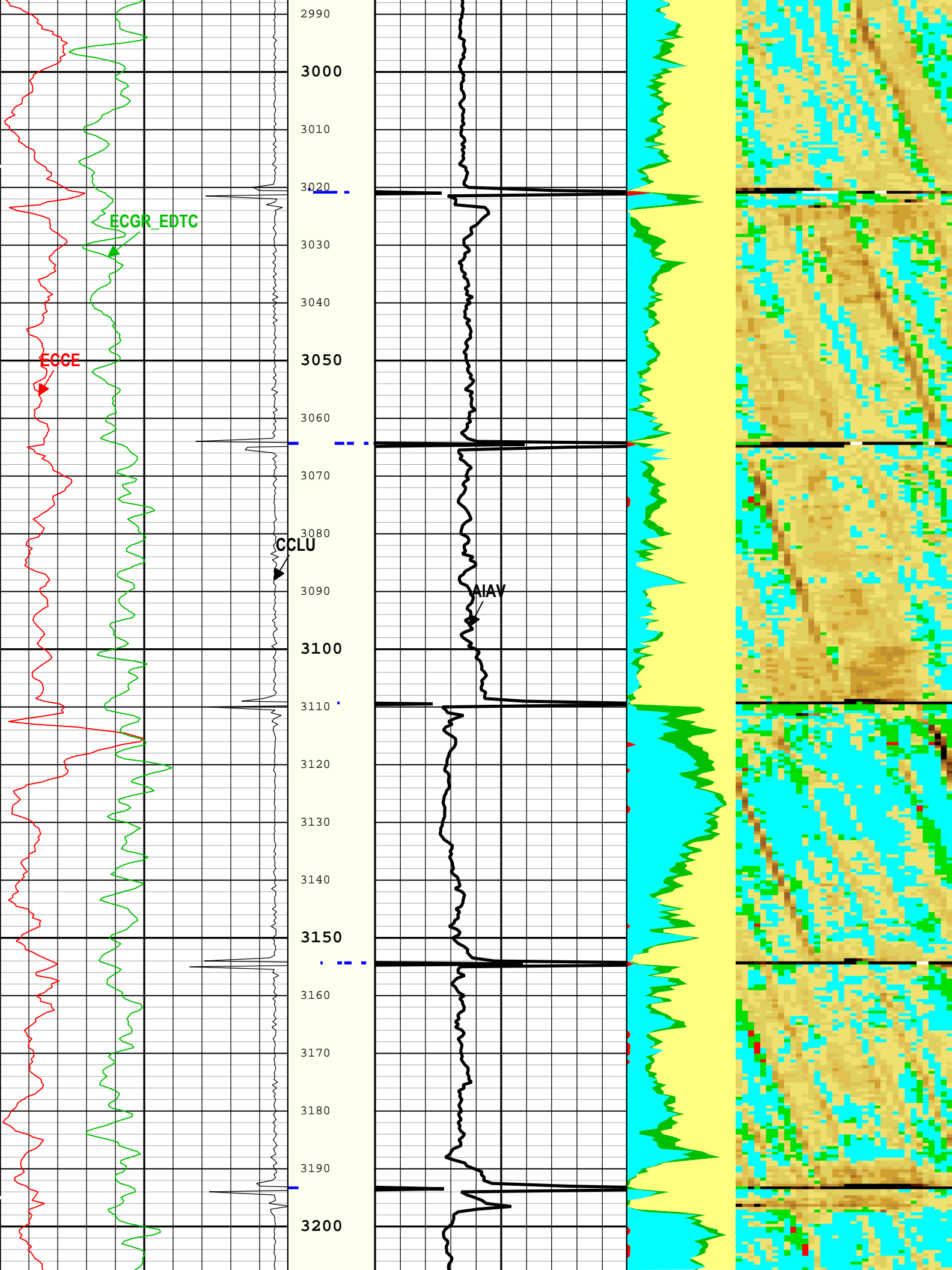


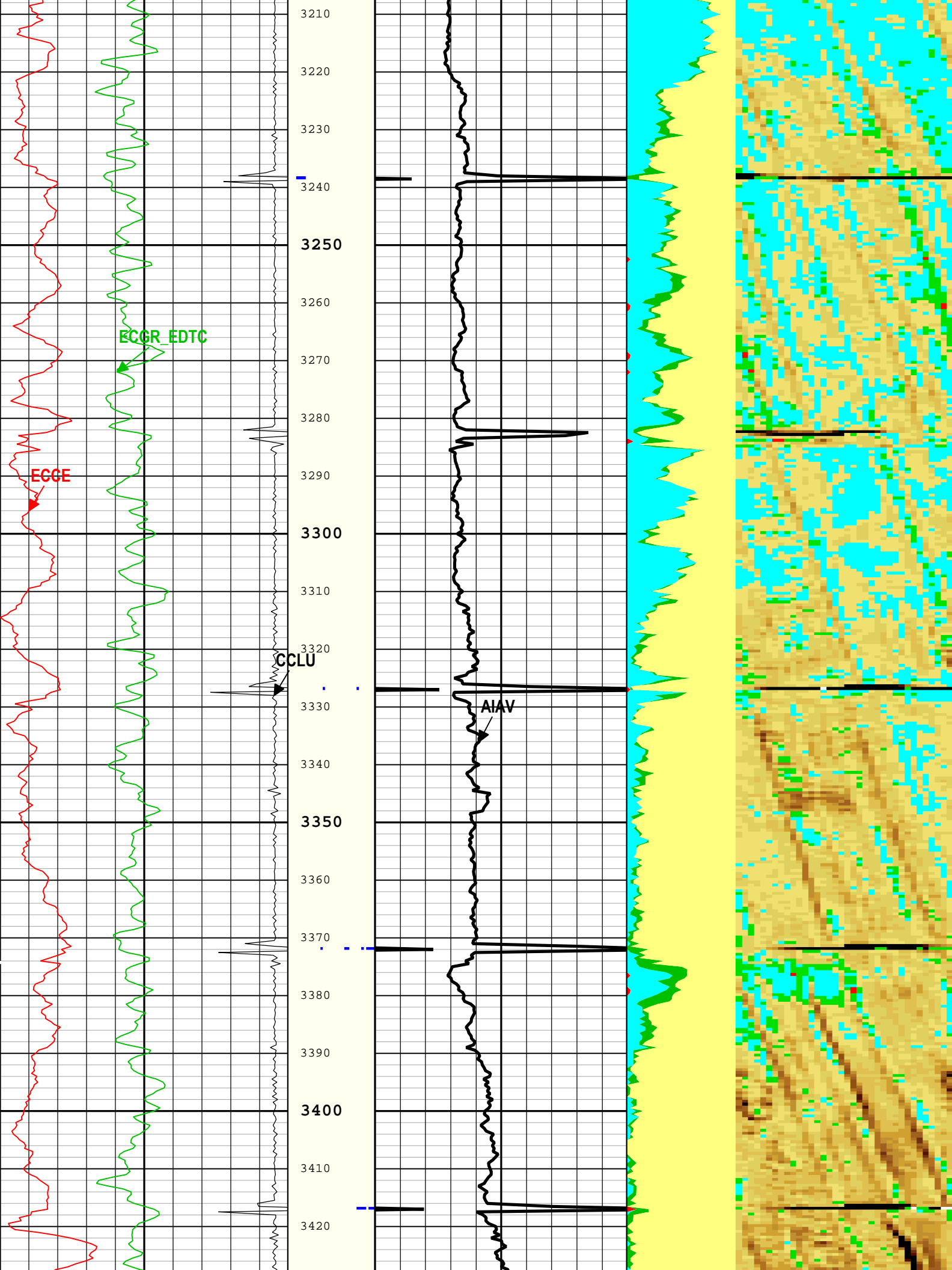


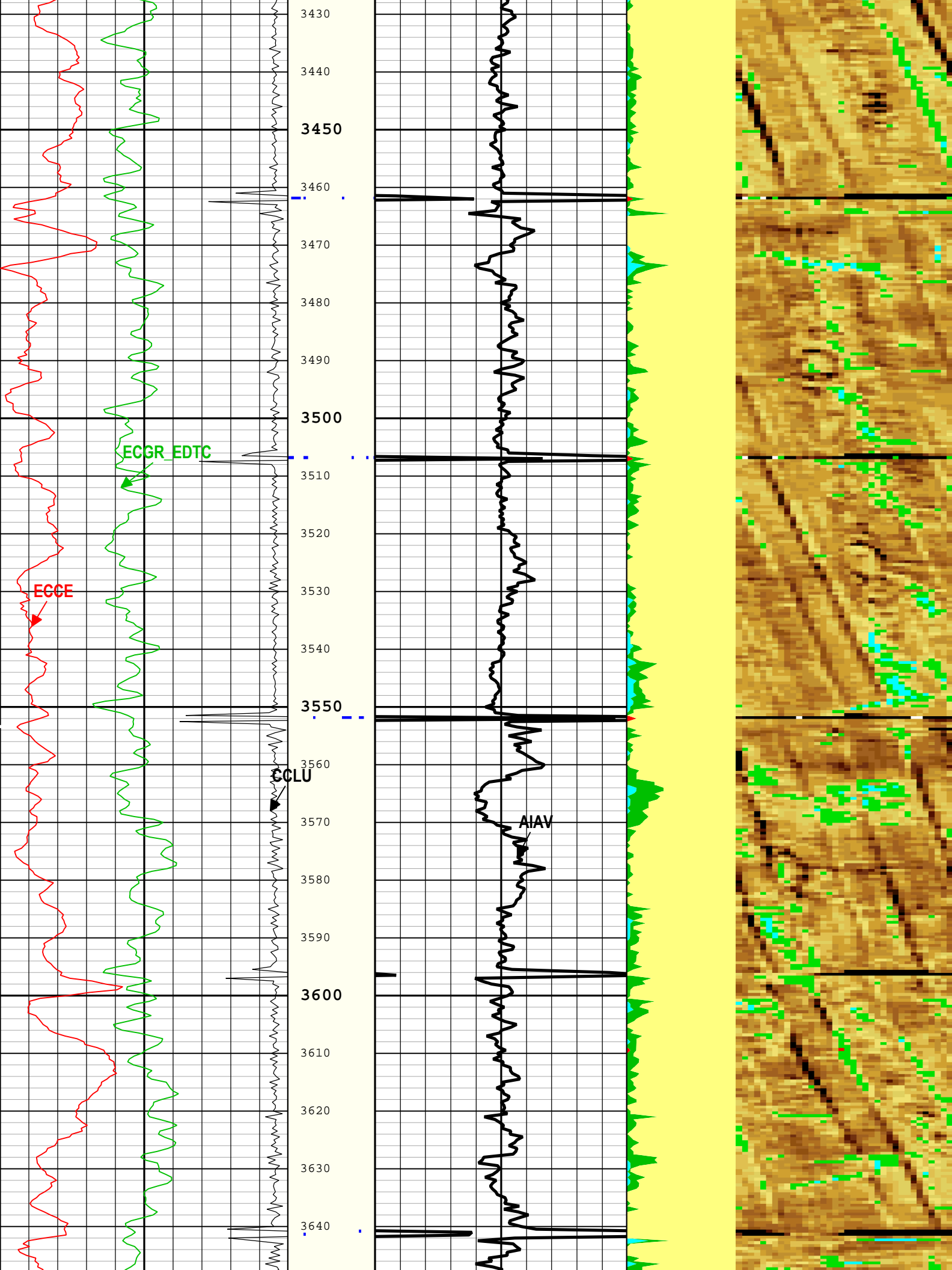


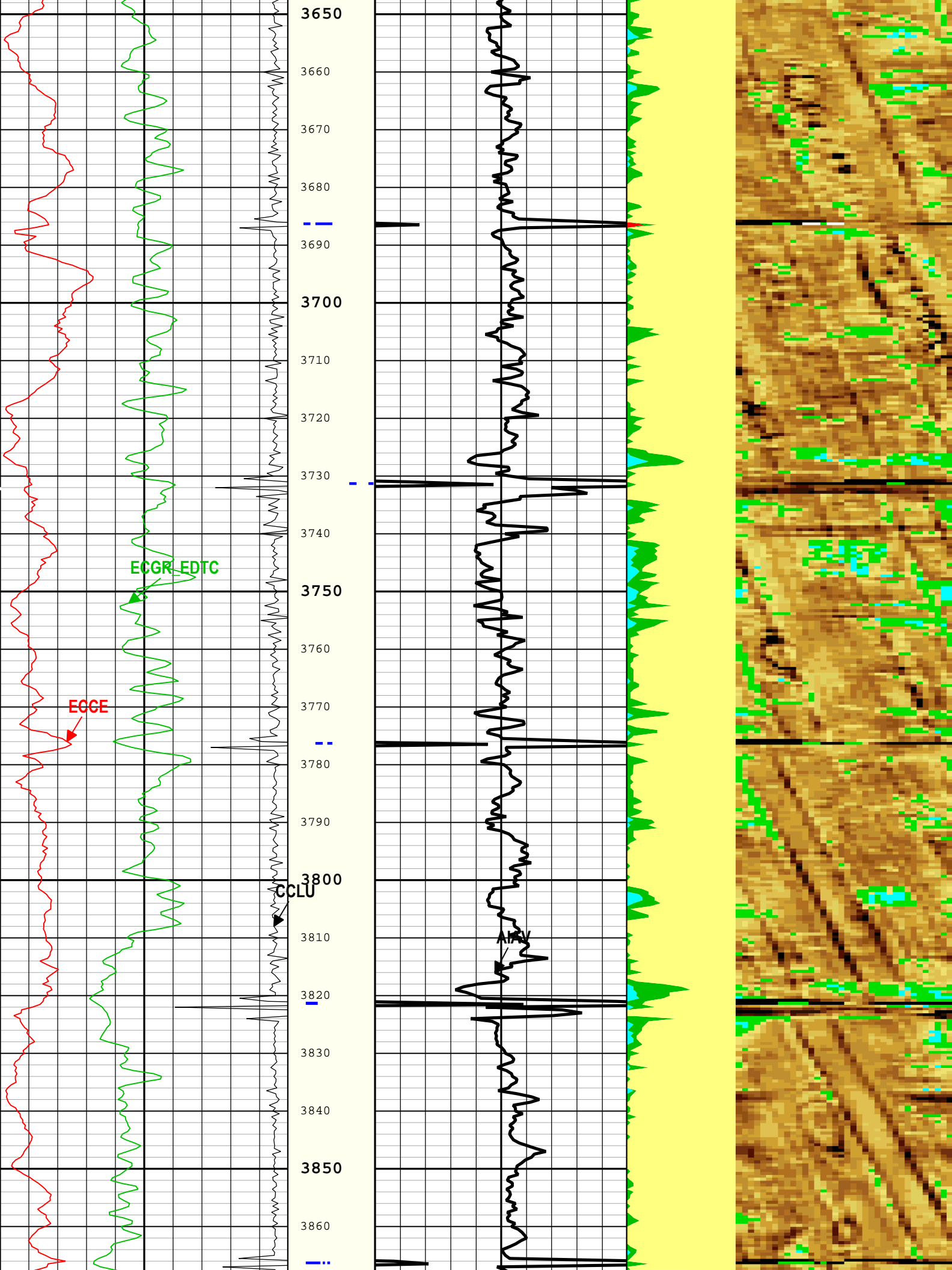


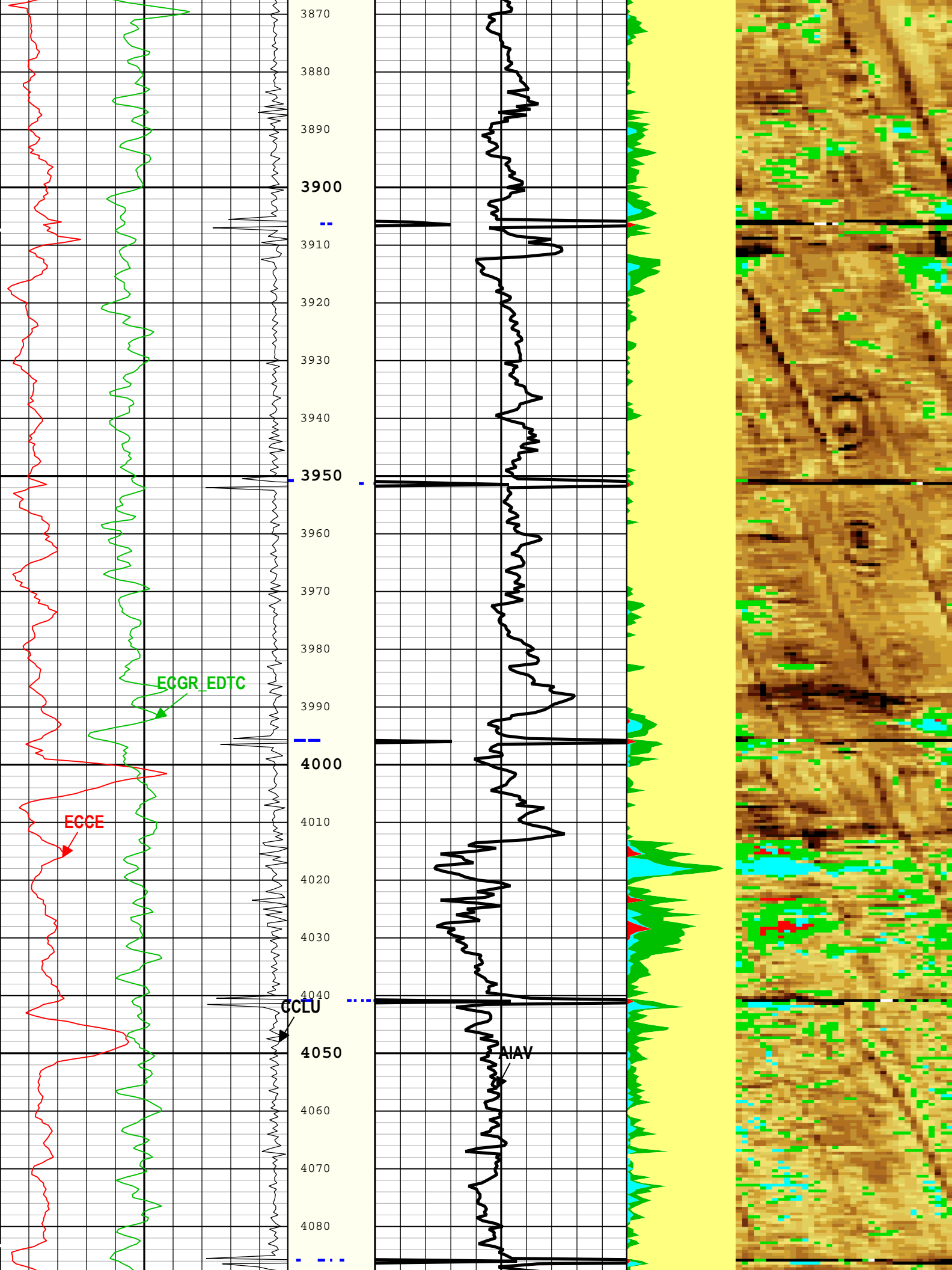


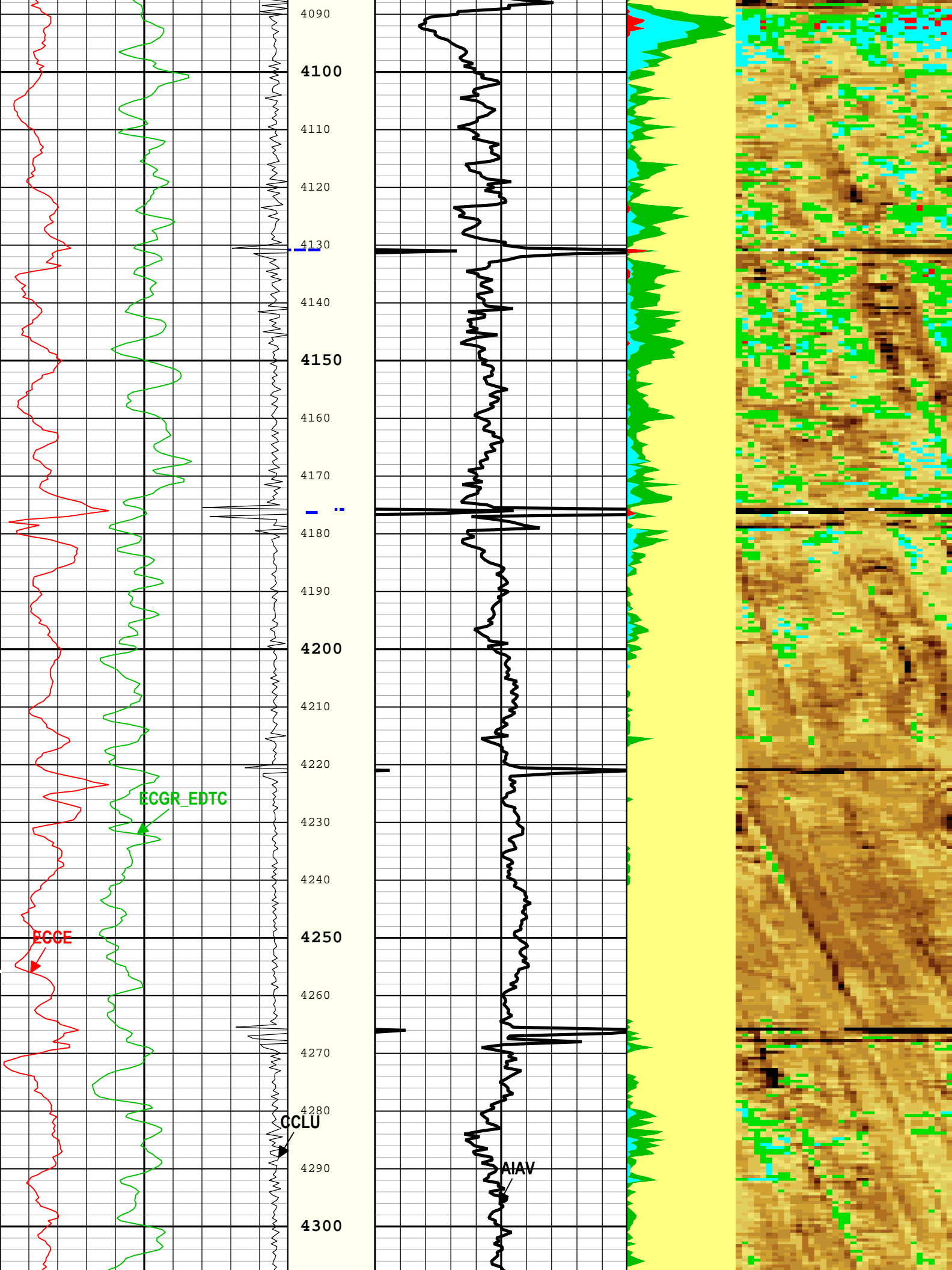




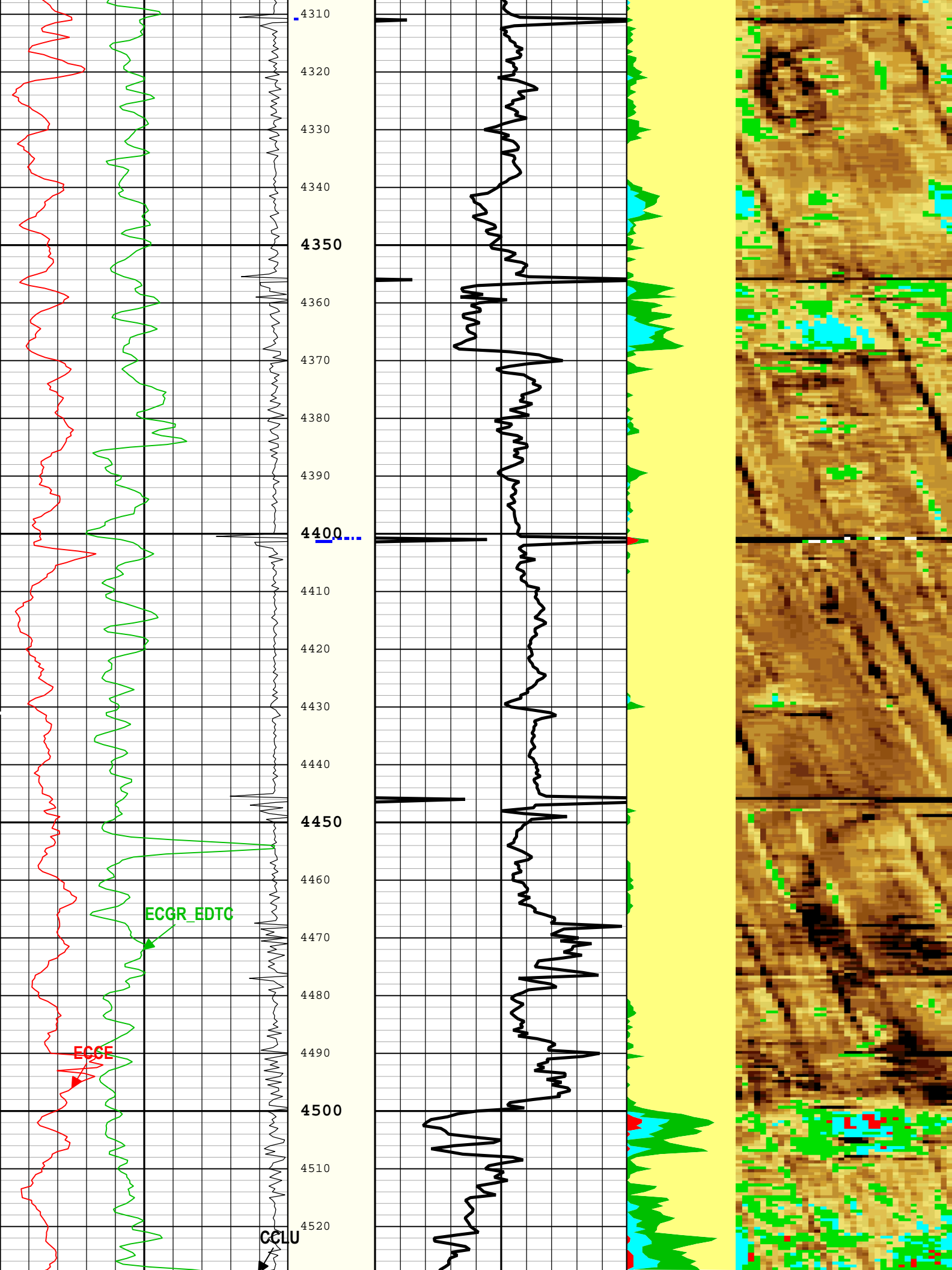


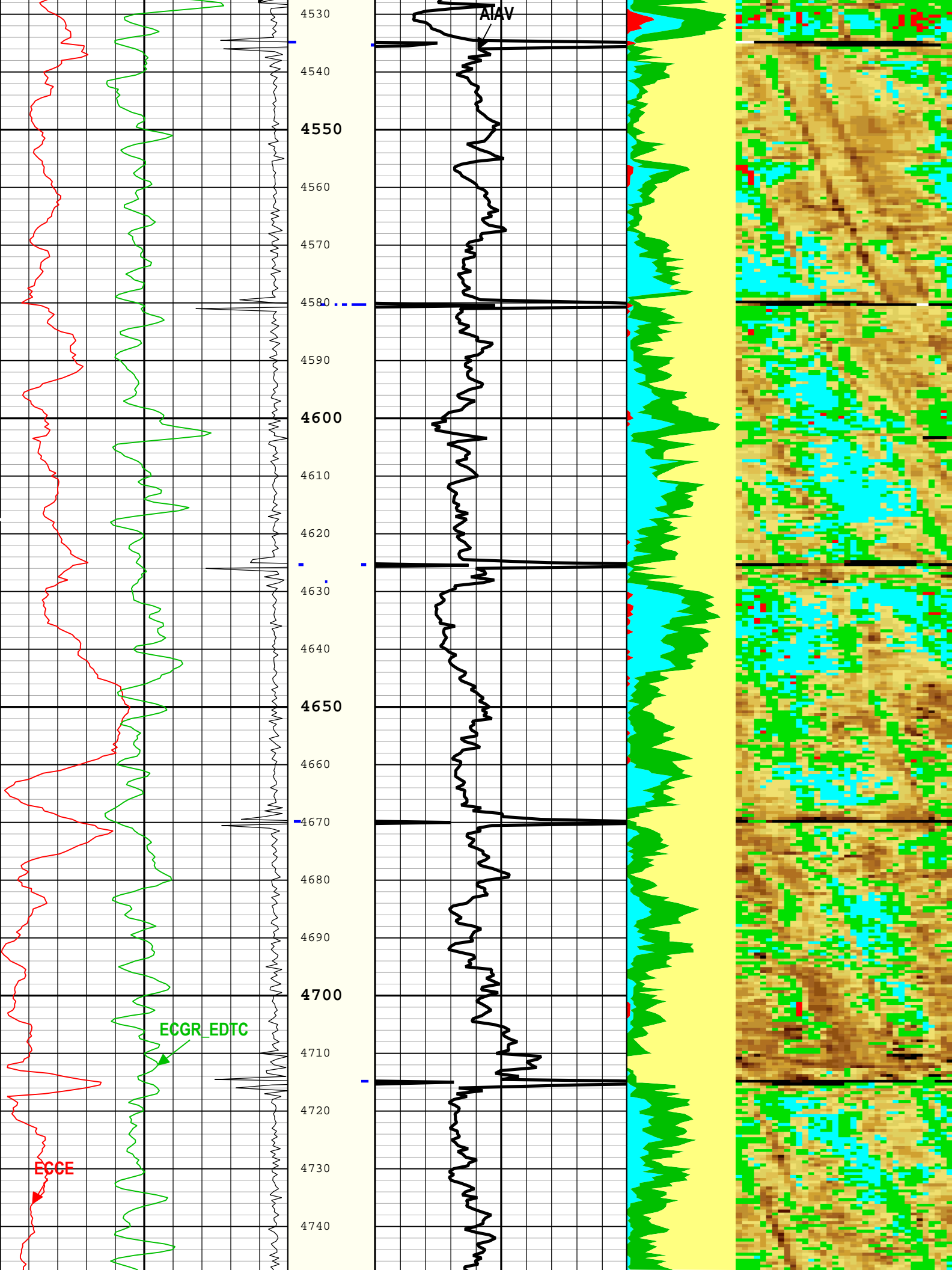


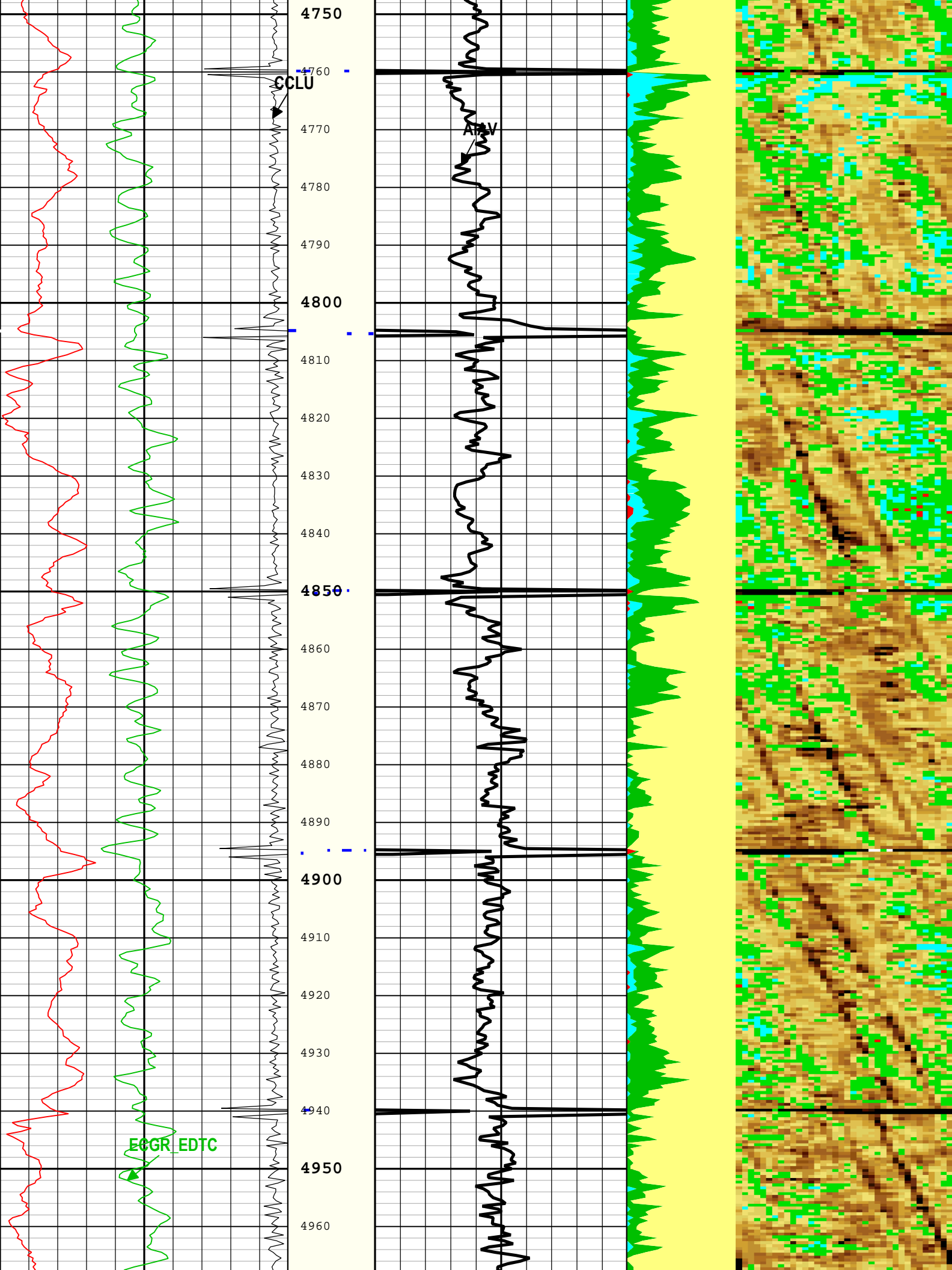


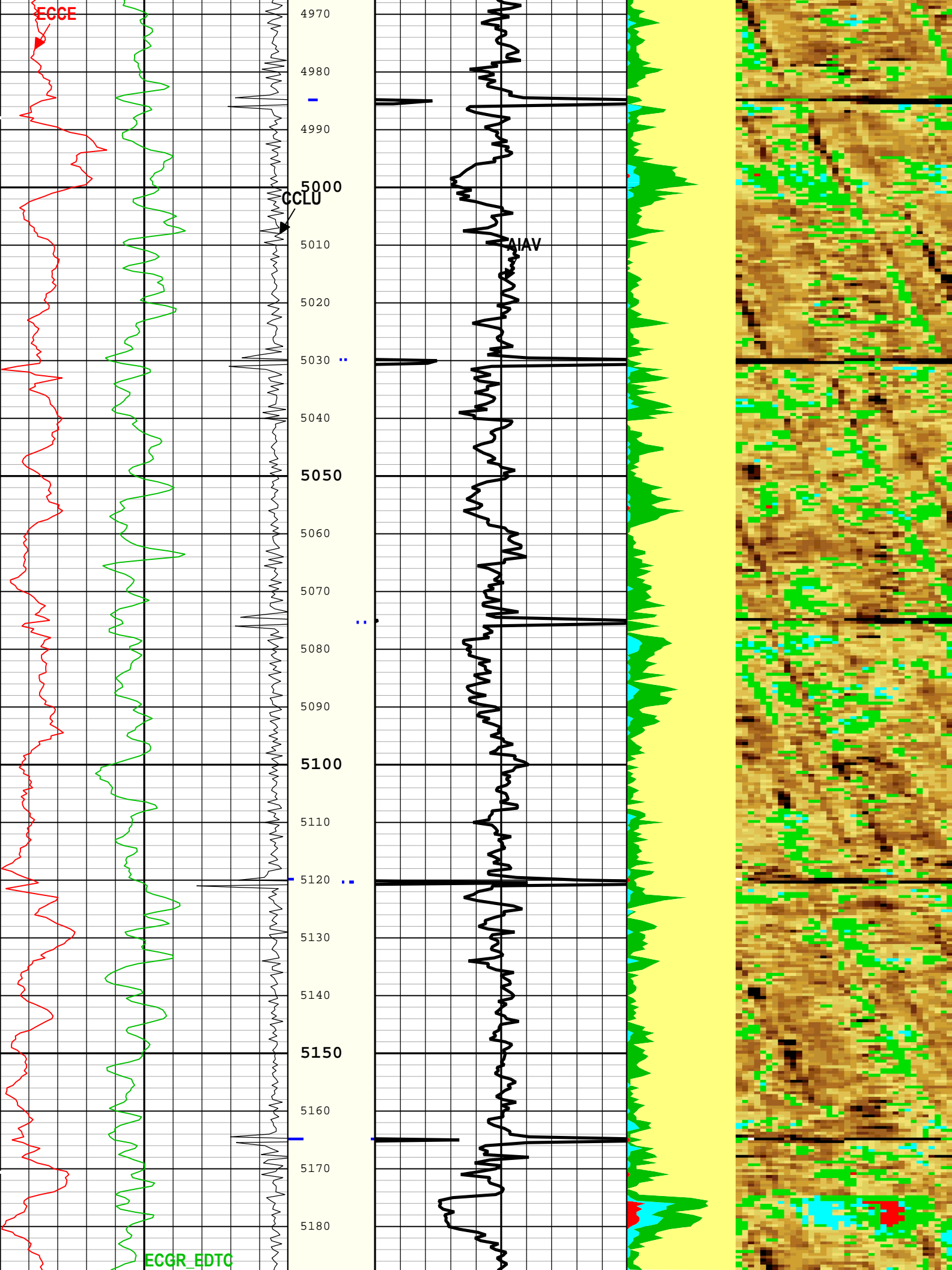


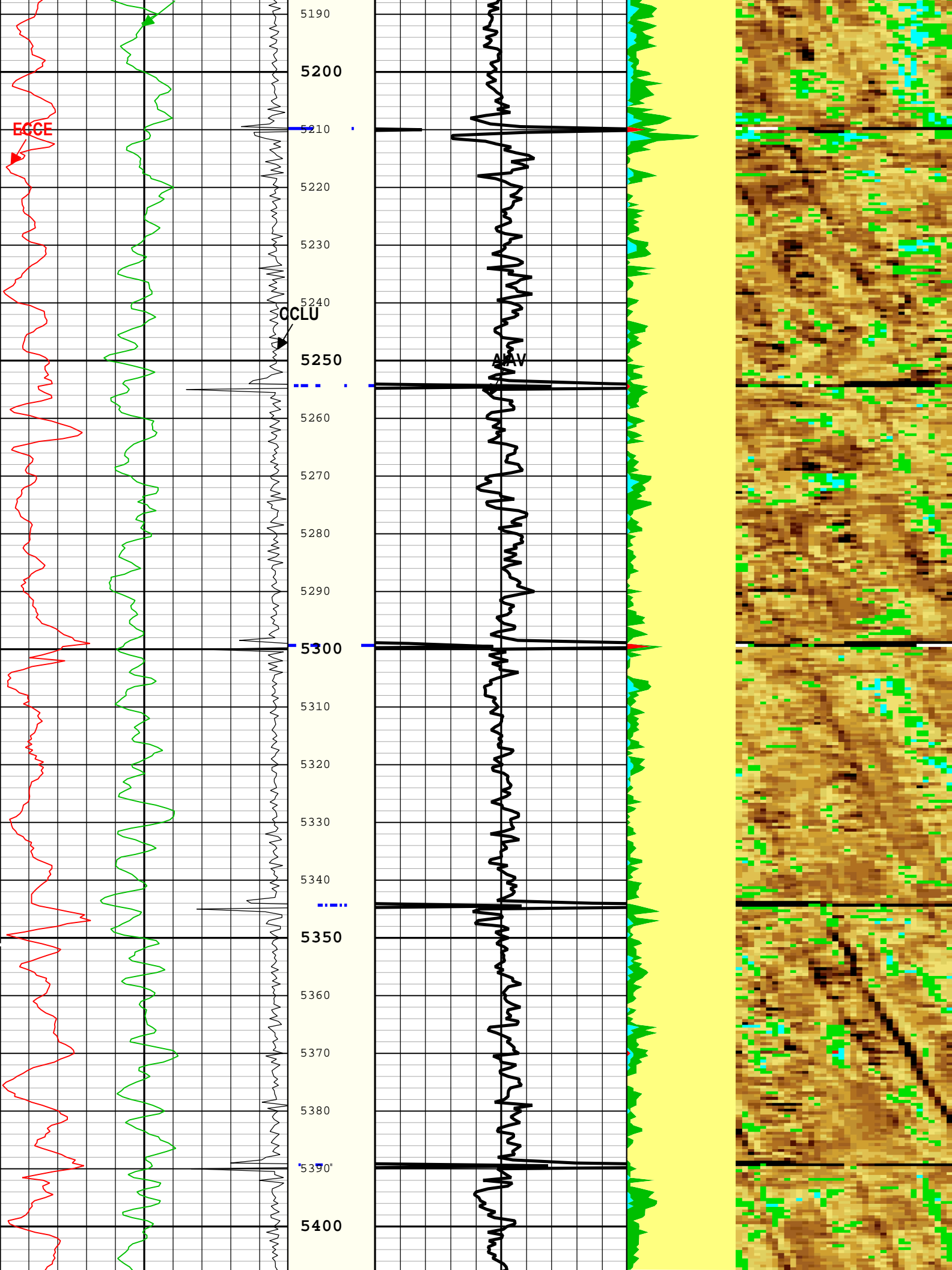


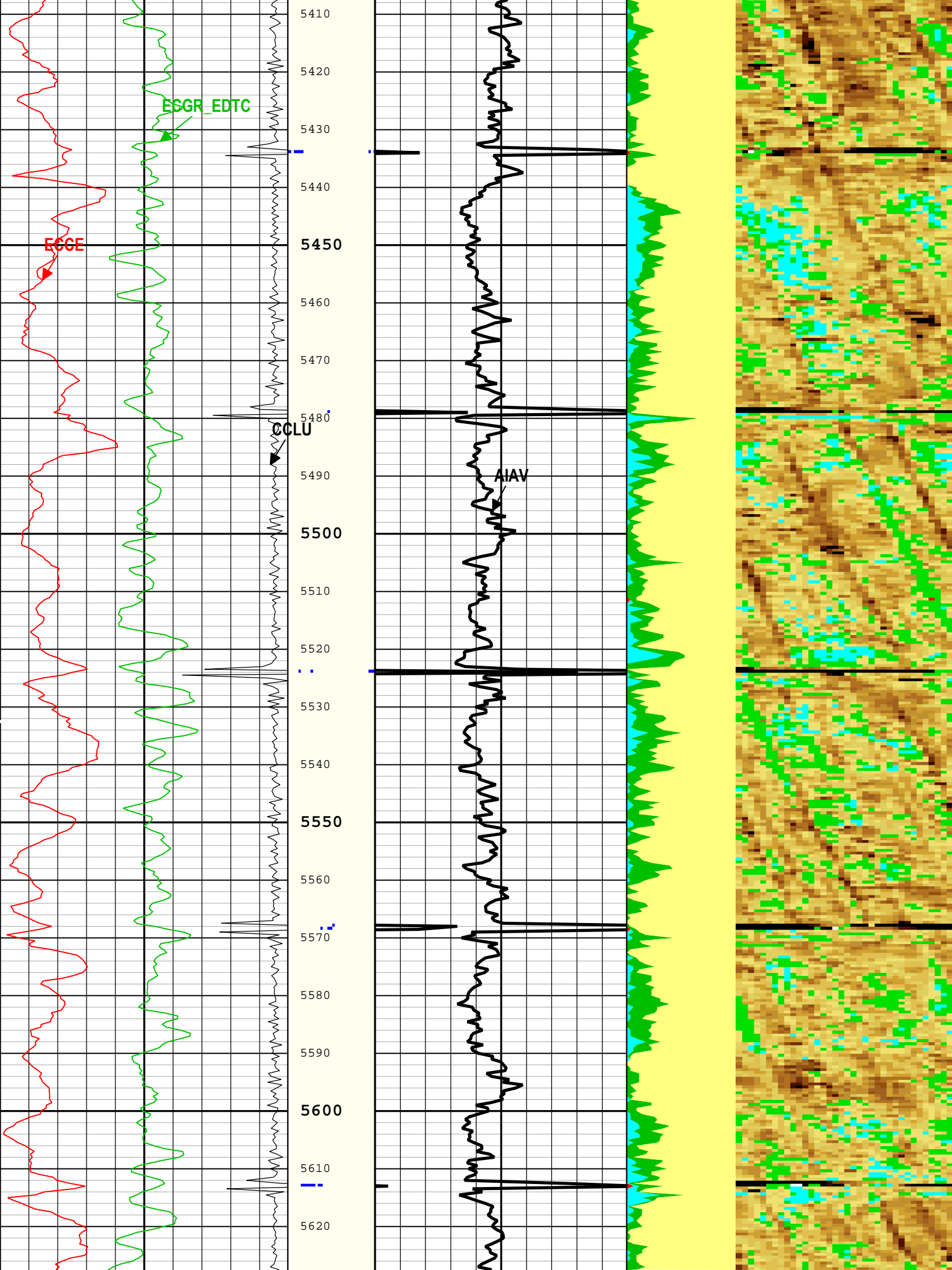


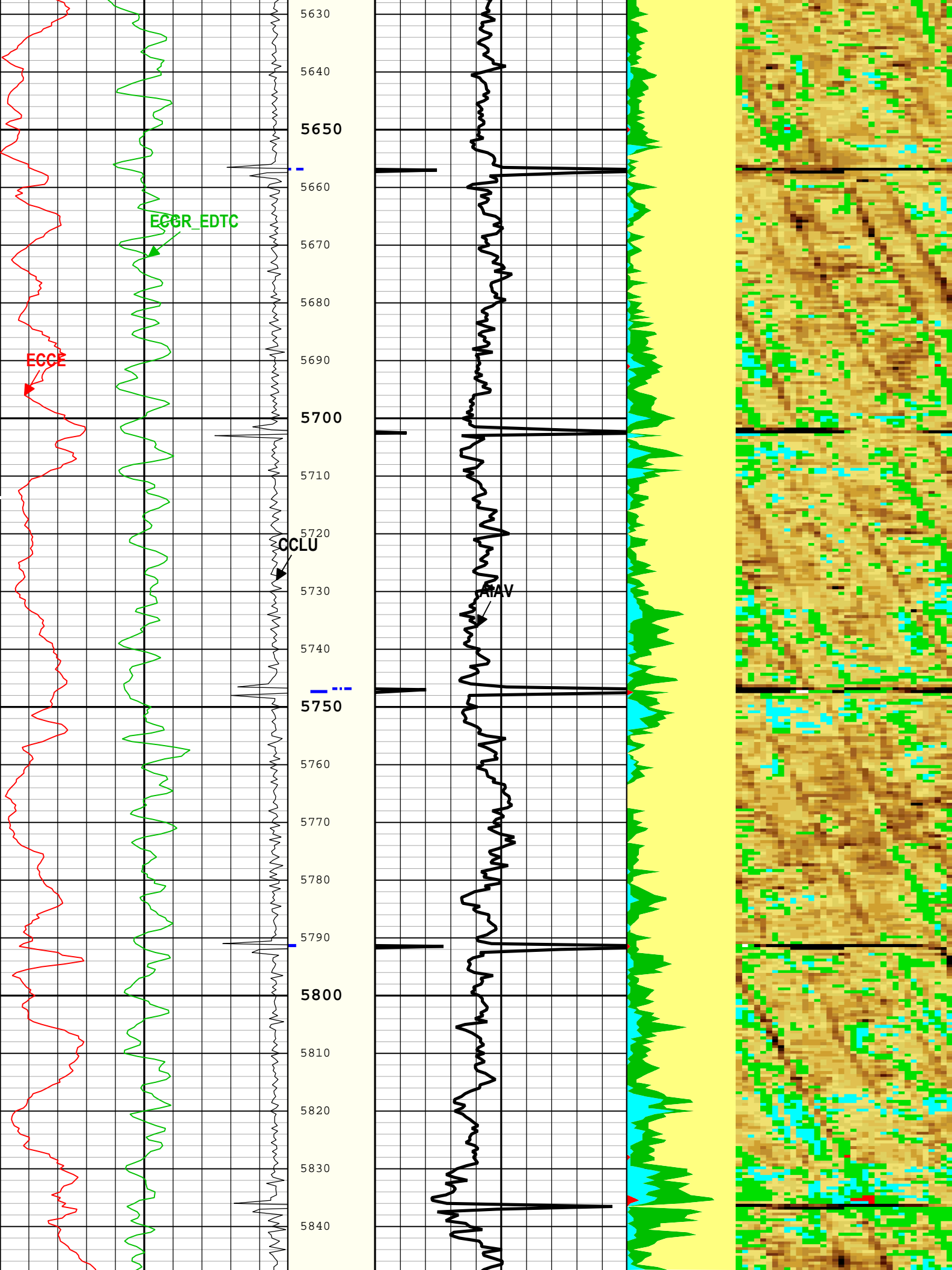




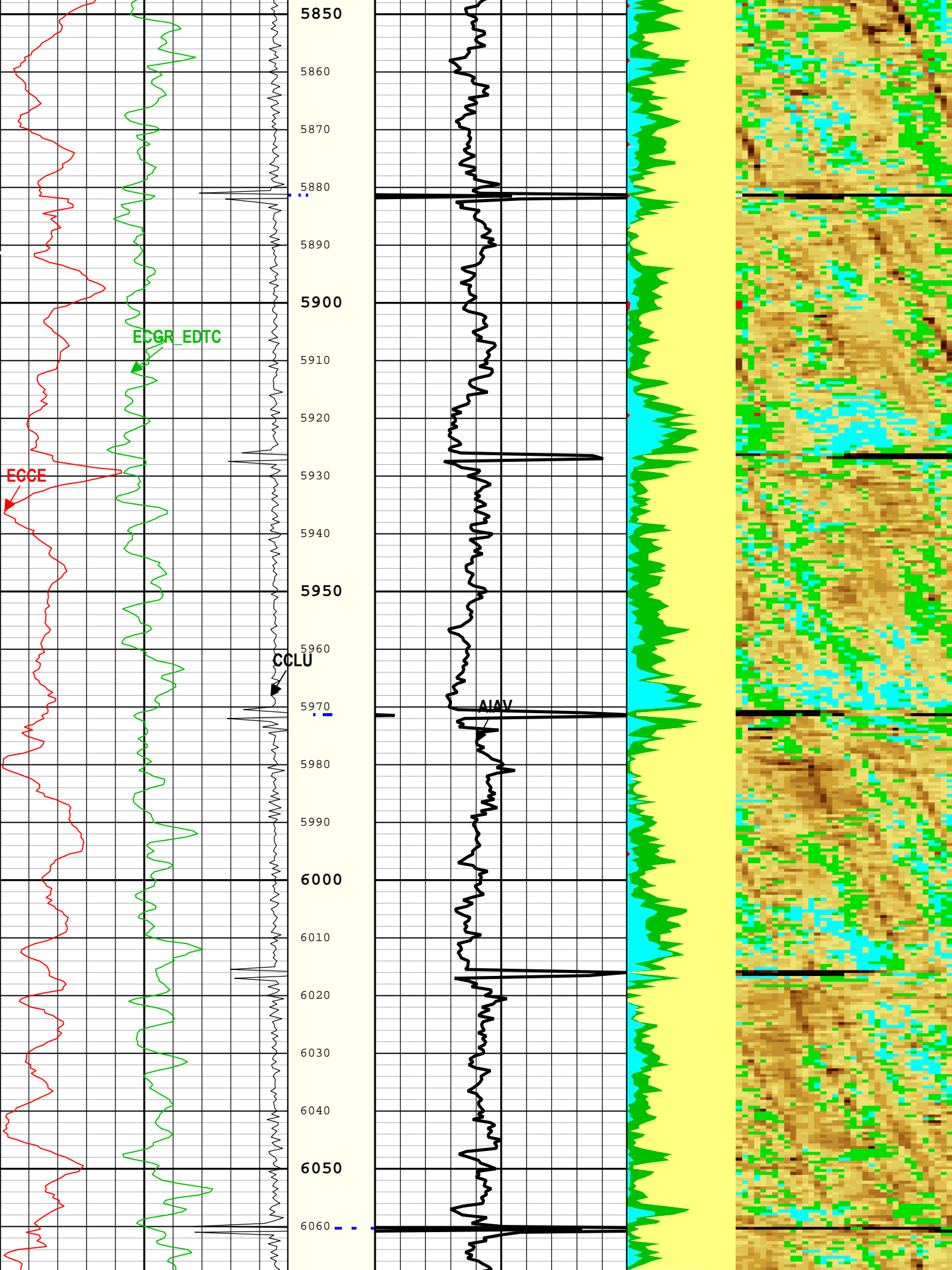




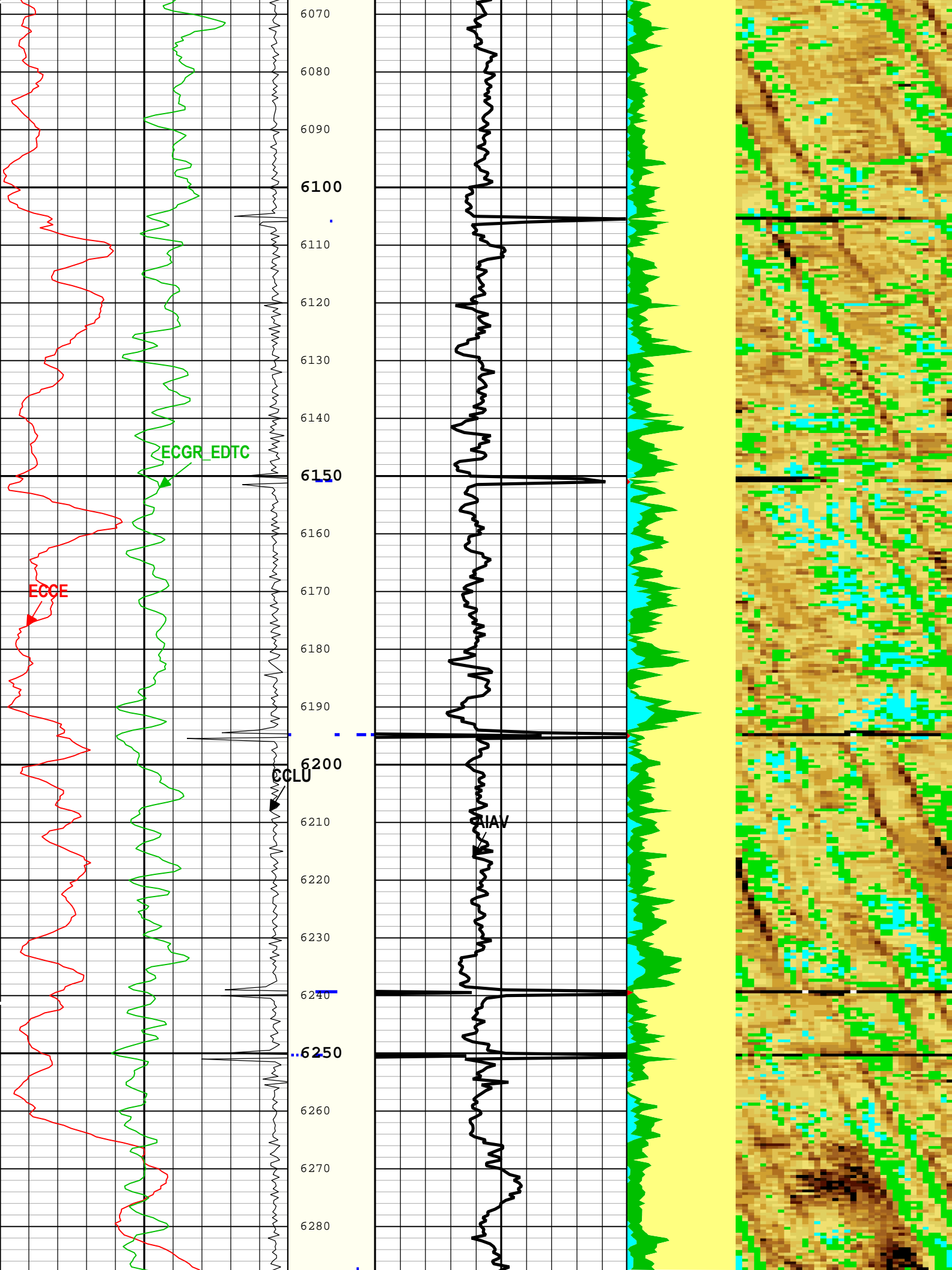


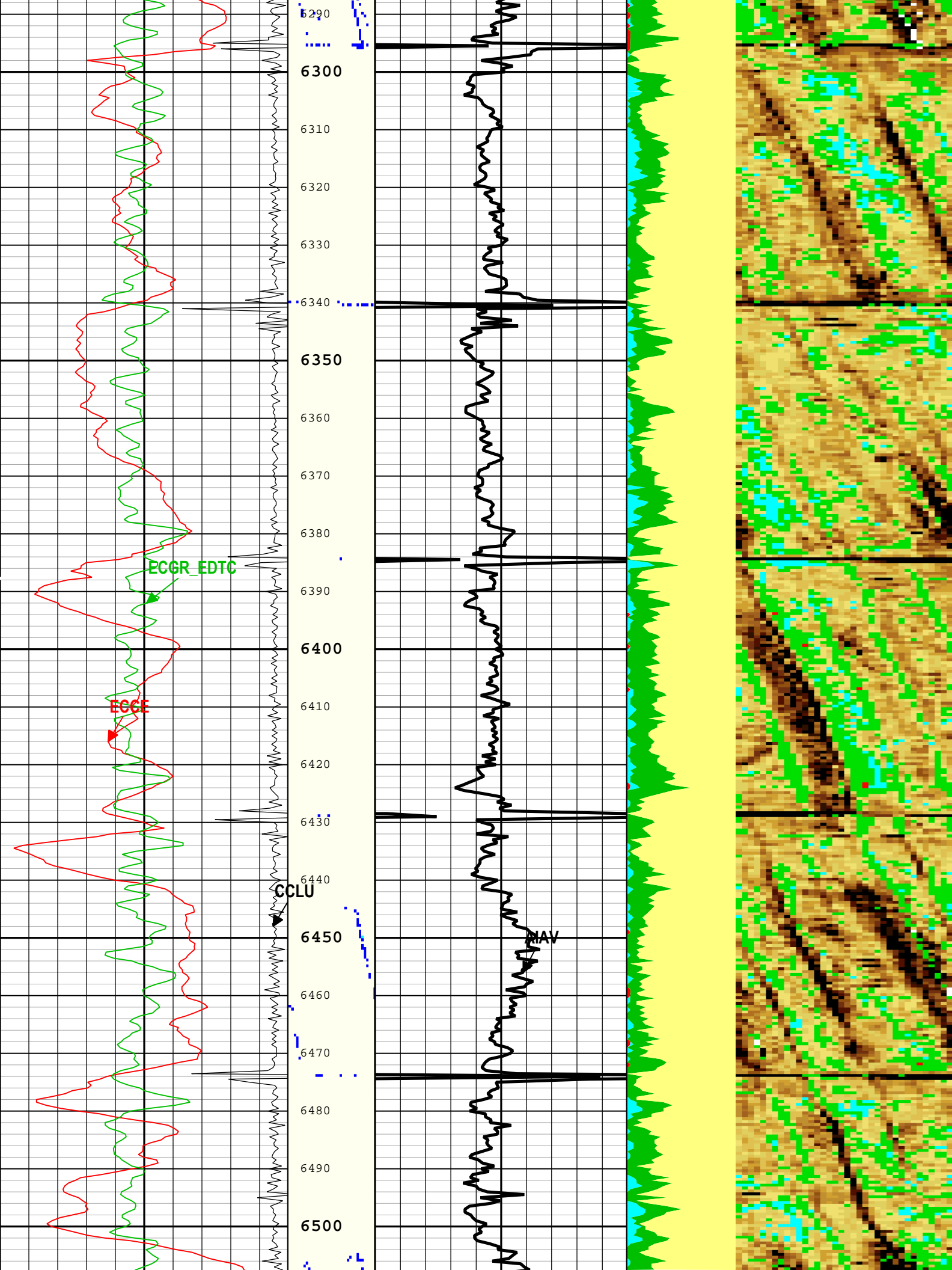


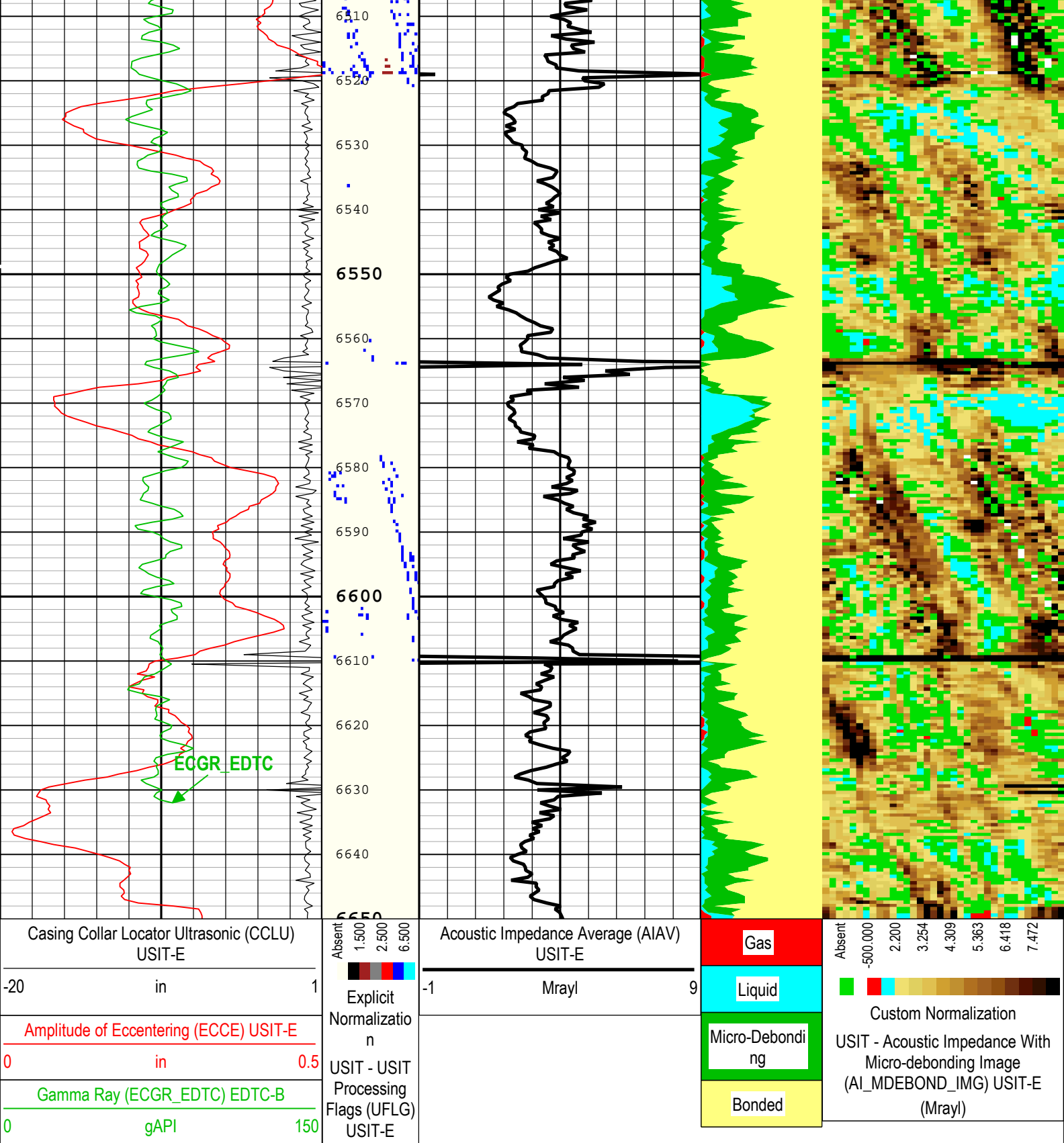












Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	Depth Zoned	in

CBLO	Casing Bottom (Logger)	WLSESSION	17279.8	ft
CDEN	Cement Density	EDTC-B	16.69	lbm/gal
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
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
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	1.18	
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	1.55	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	57	110	
BS	13.5	110	1947	
BS	8.5	1947	6650	
All depth are actual.				

Tool Control Parameters

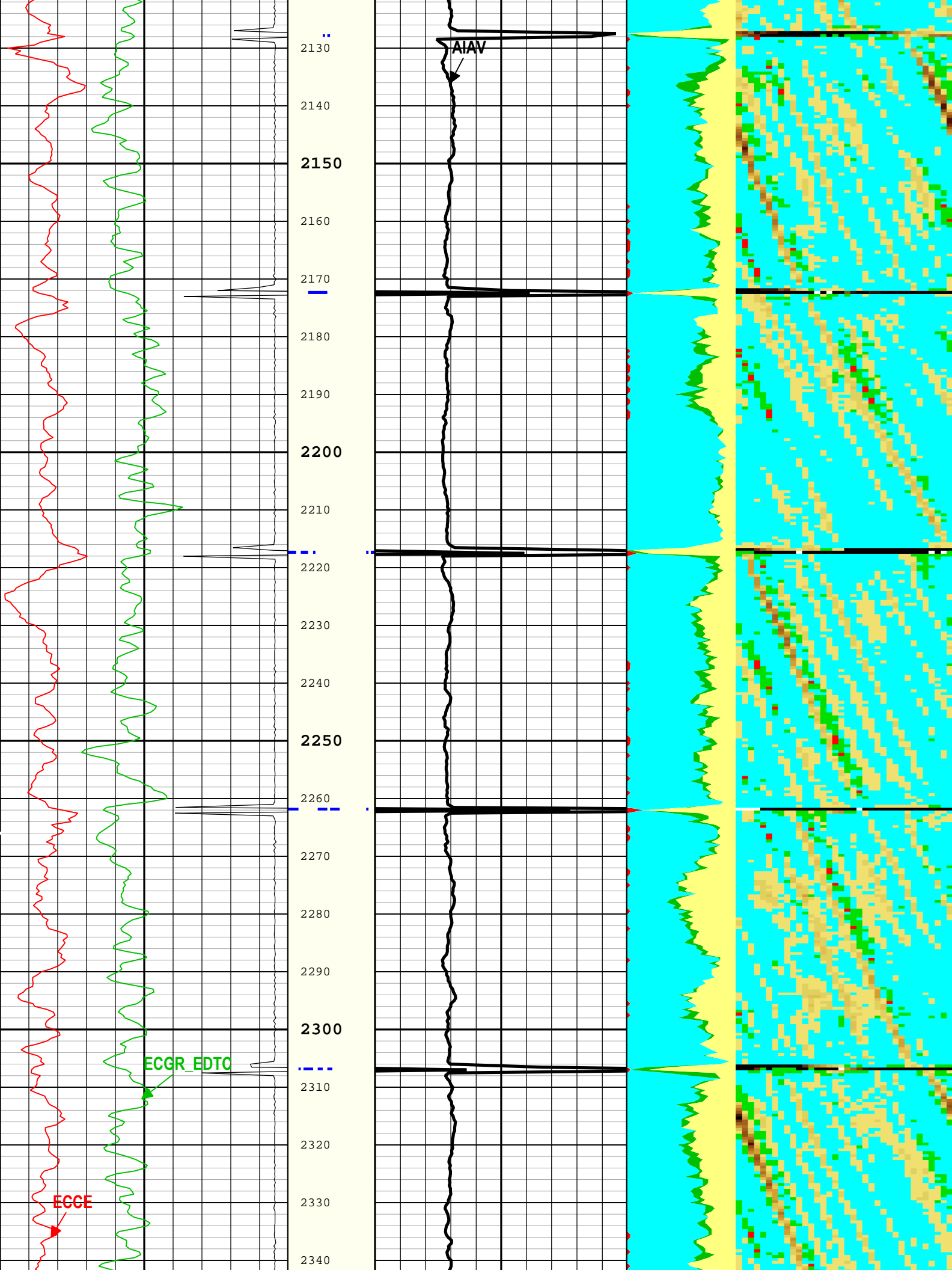
ONE: Parameters				
Parameter	Description	Tool	Value	Unit
AGMN	Minimum Gain of Cartridge	USIT-E	-12	dB
AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
EMXV	EMEX Voltage	USIT-E	Time Zoned	V
HRES	Horizontal Resolution	USIT-E	10 deg	
ICE2_ACQ	Ultrasonic ICE2 Acquisition	USIT-E	Yes	
ULOG	Logging Objective	USIT-E	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

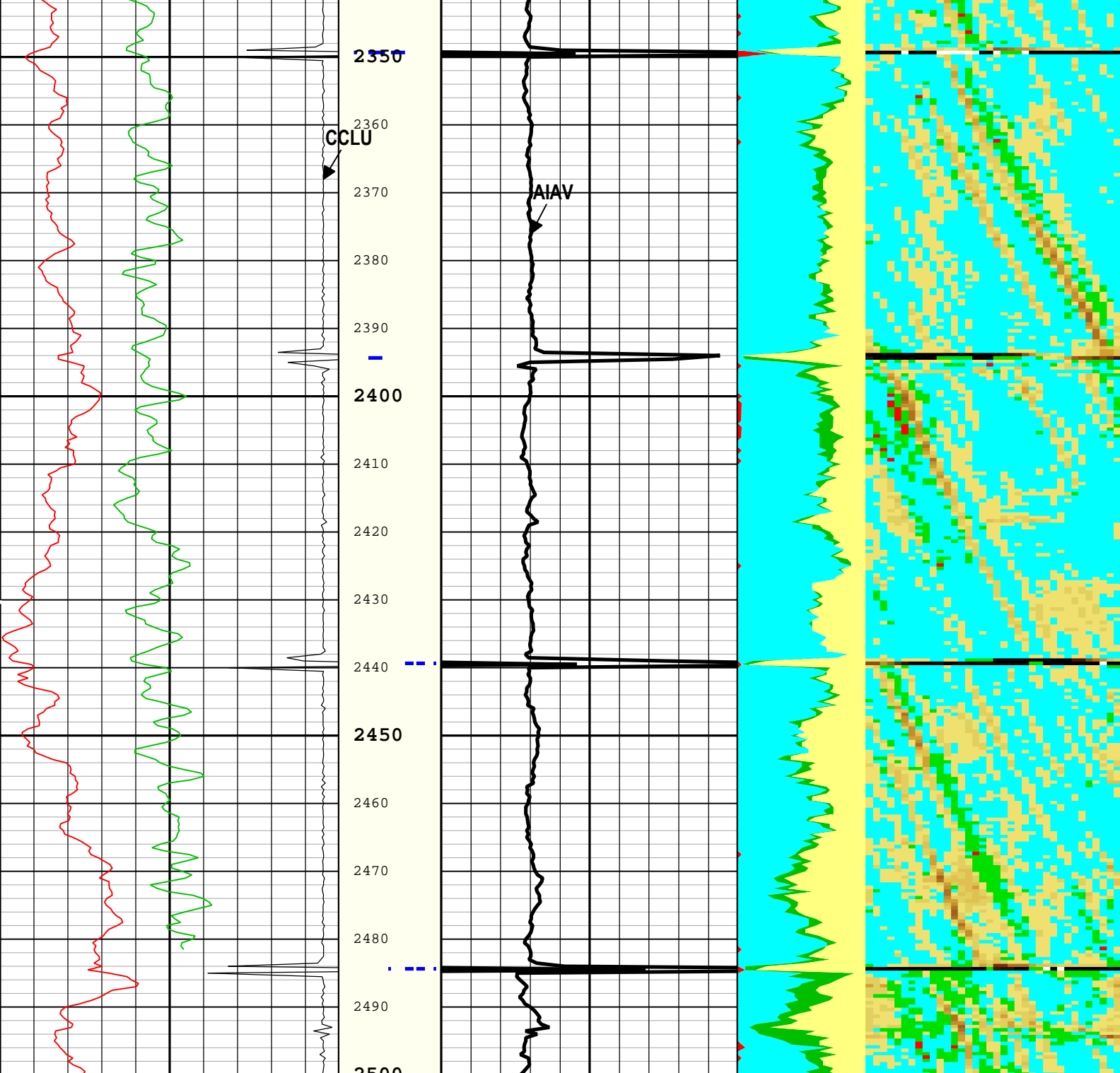
Time Zone Parameters					
Parameter	Value	Start Time	Stop Time	Start Depth ( ft )	Stop Depth ( ft )
EMXV	20	02-Nov-2018 16:14:56	02-Nov-2018 16:15:42	6652.88	6595.11
EMXV	25	02-Nov-2018 16:15:42	02-Nov-2018 16:15:49	6595.11	6577.9
EMXV	30	02-Nov-2018 16:15:49	02-Nov-2018 16:58:48	6577.9	56.33
All depth are at tool zero.					

ONE

0 PSI Repeat Pass







Casing Collar Locator Ultrasonic (CCLU) USIT-E		Acoustic Impedance Average (AIAV) USIT-E		Gas		Liquid		Micro-Debonding		Bonded	
-20 in 1		-1 Mrayl 9		Absent		Absent		Absent		Absent	
Amplitude of Eccentering (ECCE) USIT-E				1.500		2.200		3.254		4.309	
0 in 0.5				2.500		3.254		4.309		5.363	
Gamma Ray (ECGR_EDTC) EDTC-B				6.500		7.472		Custom Normalization		USIT - Acoustic Impedance With	
0 gAPI 150				Explicit Normalization		USIT - Acoustic Impedance With		Micro-debonding Image		(AI_MDEBOND_IMG) USIT-E	
				USIT - USIT Processing							
				Flags (UFLG) USIT-E							

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: 03-Nov-2018 15:53:58

Channel Processing Parameters				
ONE: Parameters				
Parameter	Description	Tool	Value	Unit

ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Cased	
BS	Bit Size	WLSESSION	8.5	in
CBLO	Casing Bottom (Logger)	WLSESSION	17279.8	ft
CDEN	Cement Density	EDTC-B	16.69	lbm/gal
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
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	BS(RT)	
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	1.18	
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	1.55	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
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AGMX	Maximum Gain of Cartridge	USIT-E	18	dB
EMXV	EMEX Voltage	USIT-E	25	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

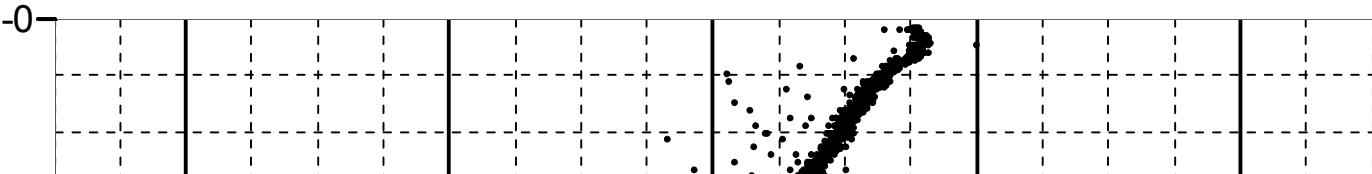
Company:Noble Energy Inc. Well:EMMY H25-731  
ONE: Log[4]:Up:S010

# Fluid Acoustic Slowness vs Depth

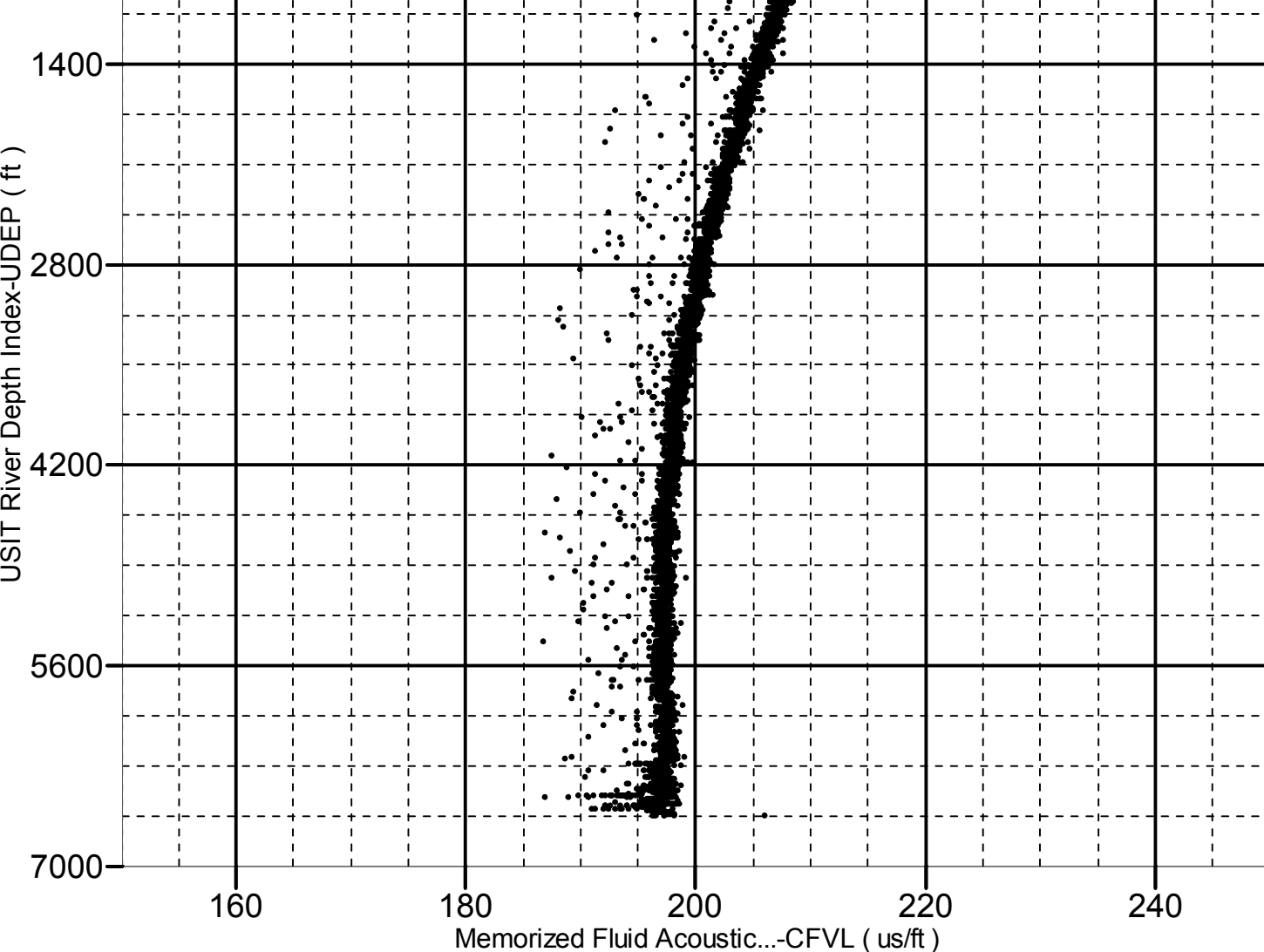
## 2D Cross Plot

Index Range: From 6652.50 to 56.00 ft

● CFVL-UDEP







XYZ

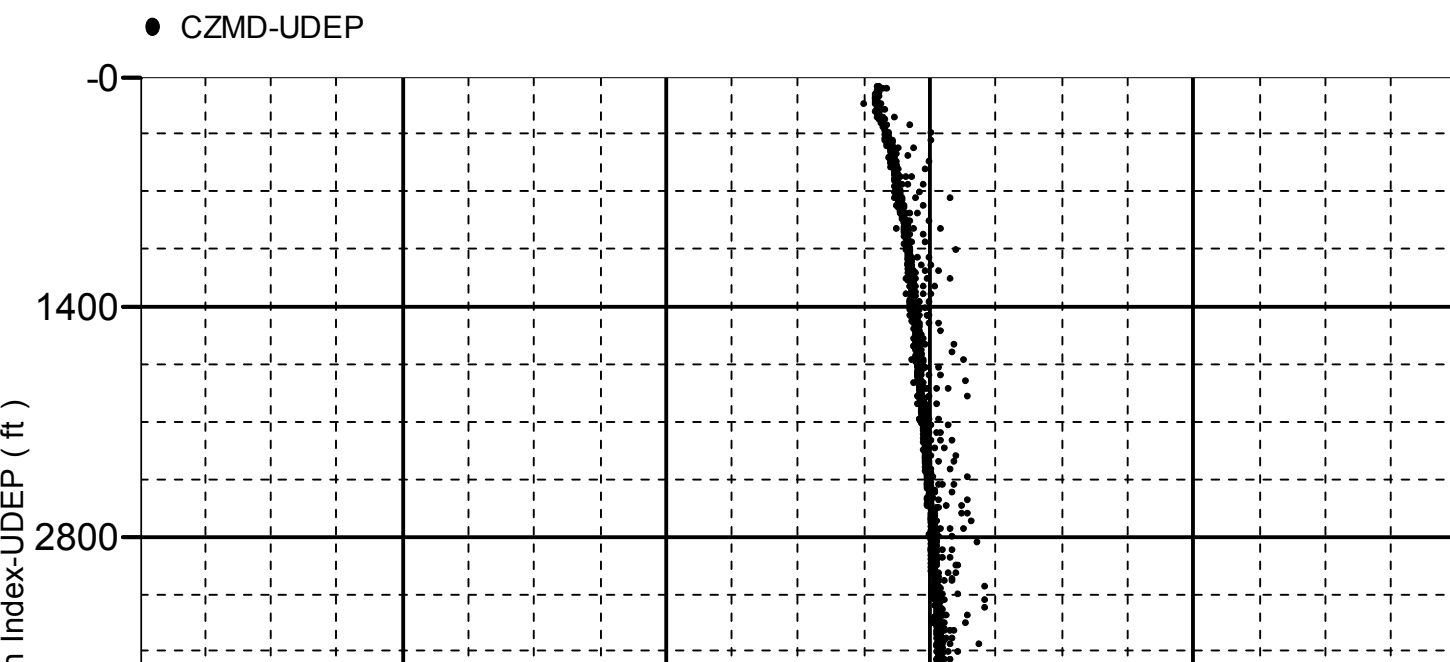
Company:Noble Energy Inc. Well:EMMY H25-731

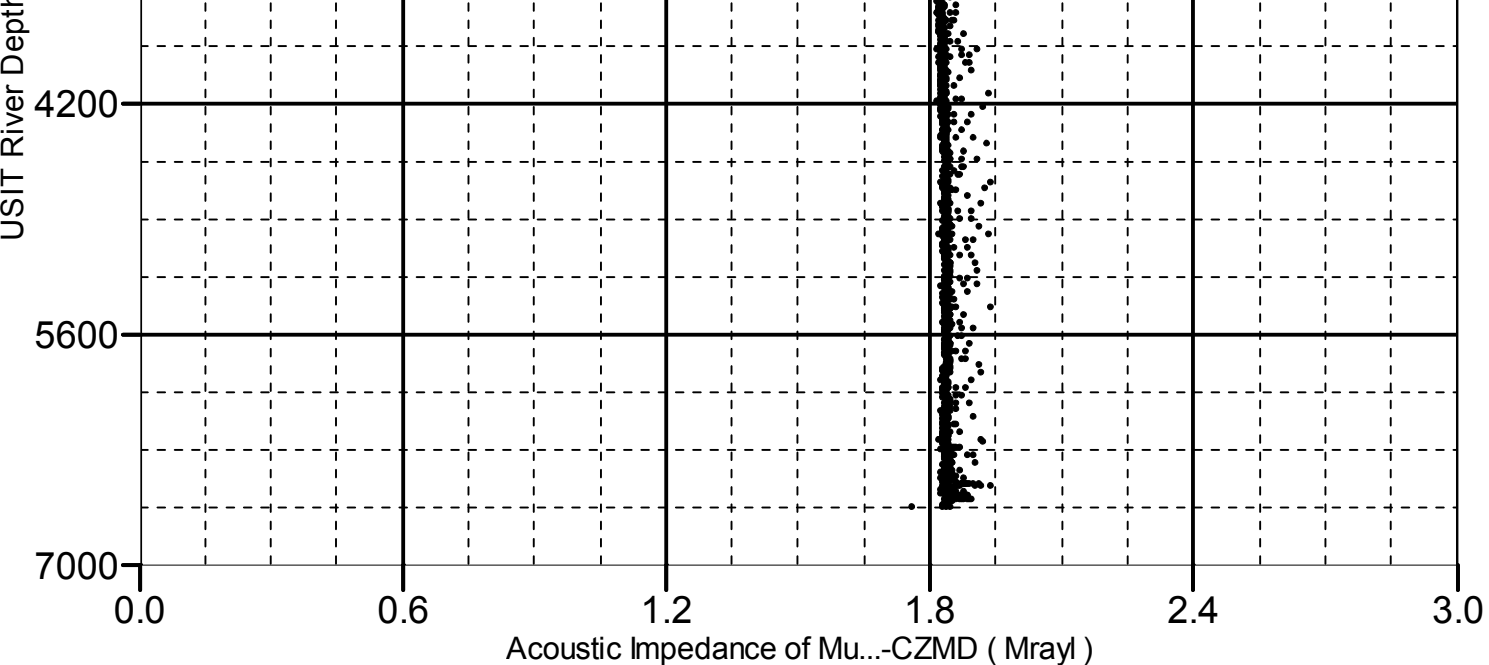
ONE: Log[4]:Up:S010

## Acoustic Impedance of M u d vs Depth

2D Cross Plot

Index Range: From 6652.50 to 56.00 ft





Company:	Noble Energy Inc.	Schlumberger
Well:	EMMY H25-731	
Field:	DJ BASIN	
County:	Weld	
State:	Colorado	

