

Schlumberger

Company: Kerr-McGee Oil & Gas Onshore LP

Well: Crowder 15C-18HZ

Field: Wattenberg

County: Weld State: Colorado

USIT  
Cement Evaluation

County: Weld

Field: Wattenberg

Location: Sec. 18, T2N, R65W

Well: Crowder 15C-18HZ

Company: Kerr-McGee Oil & Gas Onshore

LOCATION

Sec. 18, T2N, R65W  
SHL: 313 FNL X 1168' FEL NENE

Elev.: K.B. 4982.00 ft  
G.L. 4957.00 ft  
D.F. 4981.00 ft

Permanent Datum: \_\_\_\_\_  
Log Measured From: \_\_\_\_\_  
Drilling Measured From: \_\_\_\_\_

Ground Level \_\_\_\_\_  
Ground Level \_\_\_\_\_  
Kelly Bushing \_\_\_\_\_

Elev.: 4982.00 ft \_\_\_\_\_  
0.00 ft above Perm. Datum

API Serial No. 05-123-36725-0000

Section 18

Township 2N

Range 65W

Logging Date 24-May-2013

Run Number 1

Depth Driller 11583 ft

Schlumberger Depth 6630 ft

Bottom Log Interval 6630 ft

Top Log Interval 0 ft

Casing Fluid Type Fresh Water

Salinity

Density 8.9 lbm/gal

Fluid Level 0 ft

BIT/CAISING/TUBING STRING

Bit Size 8.750 in

From

To

Casing/Tubing Size 7.000 in

Weight 26 lbm/ft

Grade P-110 LTC & DOX

From

To

Maximum Recorded Temperatures 200 degF

Logger On Bottom 24-May-2013 9:15

Unit Number 2223

Location Ft Morgan, CO

Recorded By Tim Hoffman

Witnessed By Darin Kirkpatrick

PVT DATA				Run 1	Run 2	Run
Oil Density						
Water Salinity						
Gas Gravity						
Bo						
Bw						
1/Bq						
Bubble Point Pressure						
Bubble Point Temperature						
Solution GOR						
Maximum Deviation	90 deg					
CEMENTING DATA						
Primary/Squeeze	Primary					
Casing String No						
Lead Cement Type						
Volume						
Density						
Water Loss						
Additives						
Tail Cement Type						
Volume						
Density						
Water Loss						
Additives						
Expected Cement Top						
Logging Date						
Run Number						
Depth Driller						
Schlumberger Depth						
Bottom Log Interval						
Top Log Interval						
Casing Fluid Type						
Salinity						
Density						
Fluid Level						
BIT/CAISING/TUBING STRING						
Bit Size						
From						
To						
Casing/Tubing Size						
Weight						
Grade						
From						
To						
Maximum Recorded Temperatures						
Logger On Bottom						
Unit Number						
Location						
Recorded By						
Witnessed By						

**DEPTH SUMMARY LISTING**

Date Created: 24-MAY-2013 7:18:28

**Depth System Equipment**

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW-B	Type:	CMTD-B/A	Type:	7-46A-XS
Serial Number:	1918	Serial Number:	1274	Serial Number:	
Calibration Date:	22-Apr-2013	Calibration Date:	30-Apr-2013	Length:	24000 FT
Calibrator Serial Number:		Calibrator Serial Number:	78135	Conveyance Method: Wireline Rig Type: LAND	
Calibration Cable Type:	7-46A-XS	Number of Calibration Points:	10		
Wheel Correction 1:	-9	Calibration RMS:	36		
Wheel Correction 2:	-8	Calibration Peak Error:	77		

**Depth Control Parameters**

Log Sequence: First Log In the Well  
Rig Up Length At Surface: 0.00 FT  
Rig Up Length At Bottom: 0.00 FT  
Rig Up Length Correction: 0.00 FT  
Stretch Correction:  
Tool Zero Check At Surface:

**Depth Control Remarks**

1. All Schlumberger depth policies followed.
2. IDW used as primary depth reference.
3. Z-Chart used as secondary.
- 4.
- 5.
- 6.

**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 OF 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.

**OTHER SERVICES1**

OS1:  
OS2:  
OS3:  
OS4:  
OS5:

**OTHER SERVICES2**

OS1:  
OS2:  
OS3:  
OS4:  
OS5:

**REMARKS: RUN NUMBER 1**

This is the first run in hole

Logs zeroed at ground level

Toolstring run as per tool sketch

Top of liner at 6652', will log down to 6630'

Cement: 14.4 ppg to 6150'

**REMARKS: RUN NUMBER 2**






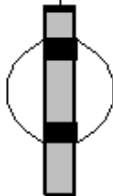


12.5 ppg to 2860'	
12.7 ppg to 16'	
Repeat pass done under zero pressure	
Main pass logged with 2800 psi	
Rig: Crane	
Crew: Tyler Riter, Josh Strand	
RUN 1	RUN 2
SERVICE ORDER #: PROGRAM VERSION: FLUID LEVEL:	SERVICE ORDER #: PROGRAM VERSION: FLUID LEVEL:
CCN1-00009 19C2-270 0 ft	
LOGGED INTERVAL	LOGGED INTERVAL
START	START
STOP	STOP

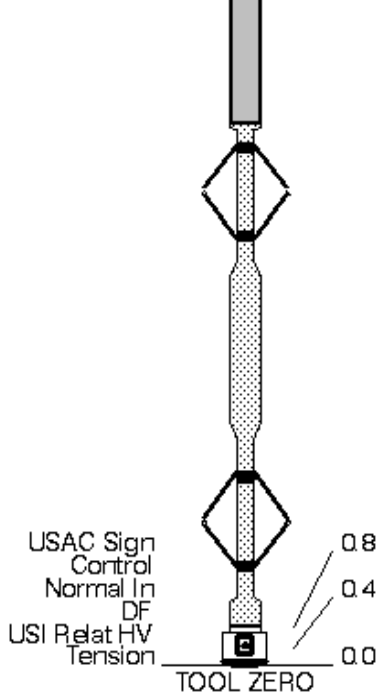
# EQUIPMENT DESCRIPTION

RUN 1

RUN 2

SURFACE EQUIPMENT
GSR-U/Y 599 WITM (DTS)-A

DOWNHOLE EQUIPMENT			
LEH-QT LEH-QT			32.8
DTC-H ECH-KC 9984 DTCH0-A DTCH1-A	CTEM		29.8
	TelStatus ToolStatu		26.8
SGT-N SGH-K 3039 SGC-TB 10249 SGD-TAB	Gamma Ray		26.8
			25.9
AH-CEN AH-CEN			21.3
AH-107 AH-107 757			17.5
USIT-E ECH-MFA 1964 USAC-A 992 USIS-A 2797			15.5



MAXIMUM STRING DIAMETER 7.50 IN  
MEASUREMENTS RELATIVE TO TOOL ZERO  
ALL LENGTHS IN FEET

Company: Kerr-McGee Oil & Gas Onshore LP

Well: Crowder 15C-18HZ

### Input DLIS Files

DEFAULT	USI_008LUP	FN:7	PRODUCER	24-May-2013 09:21	6630.0 FT	-6.5 FT
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### Output DLIS Files

DEFAULT	USI_018PUP	FN:16	PRODUCER	24-May-2013 11:06	6630.0 FT	-6.5 FT
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### OP System Version: 19C2-270

USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	19C2-270		

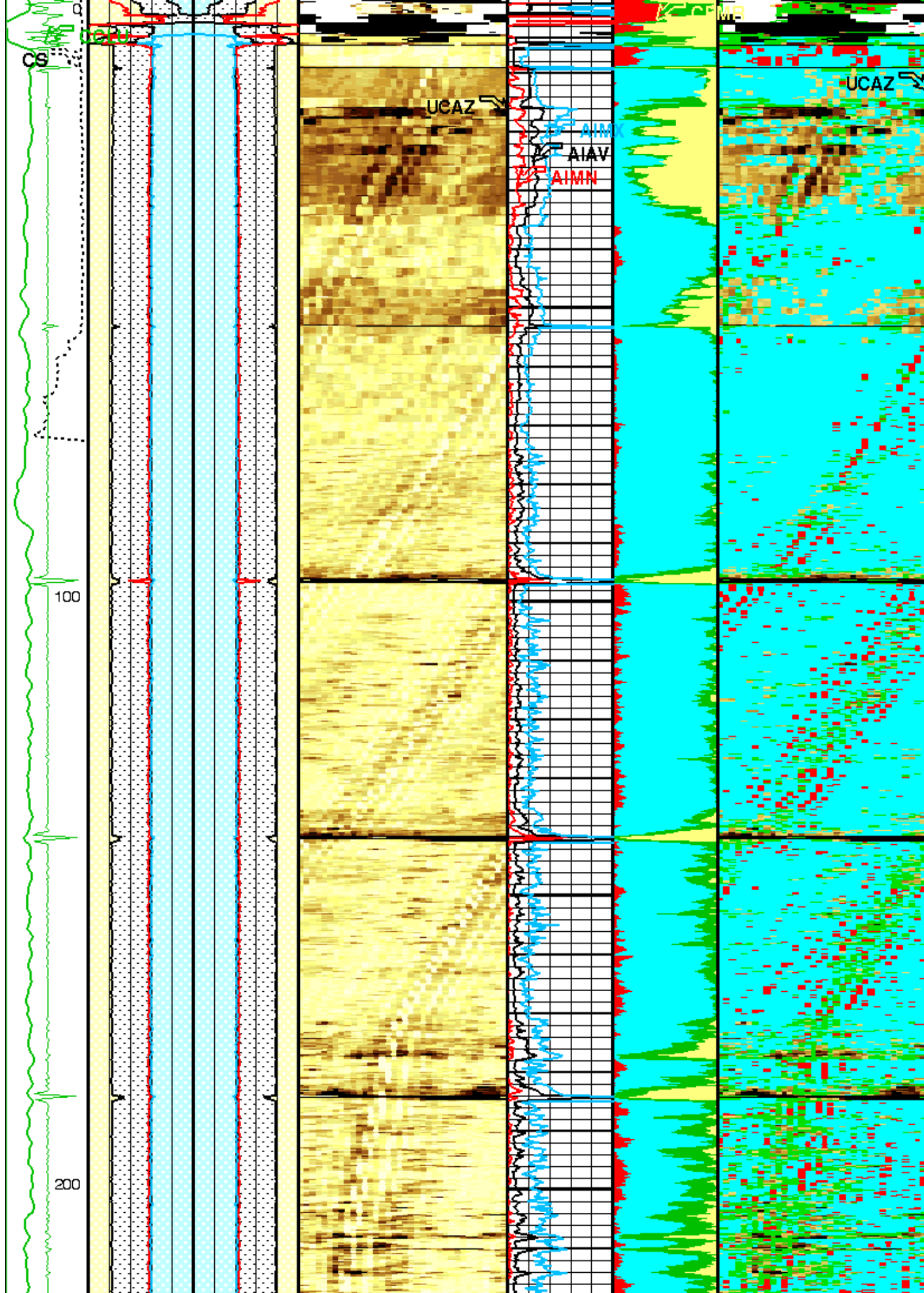
### Zoning of Mud Parameters

Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
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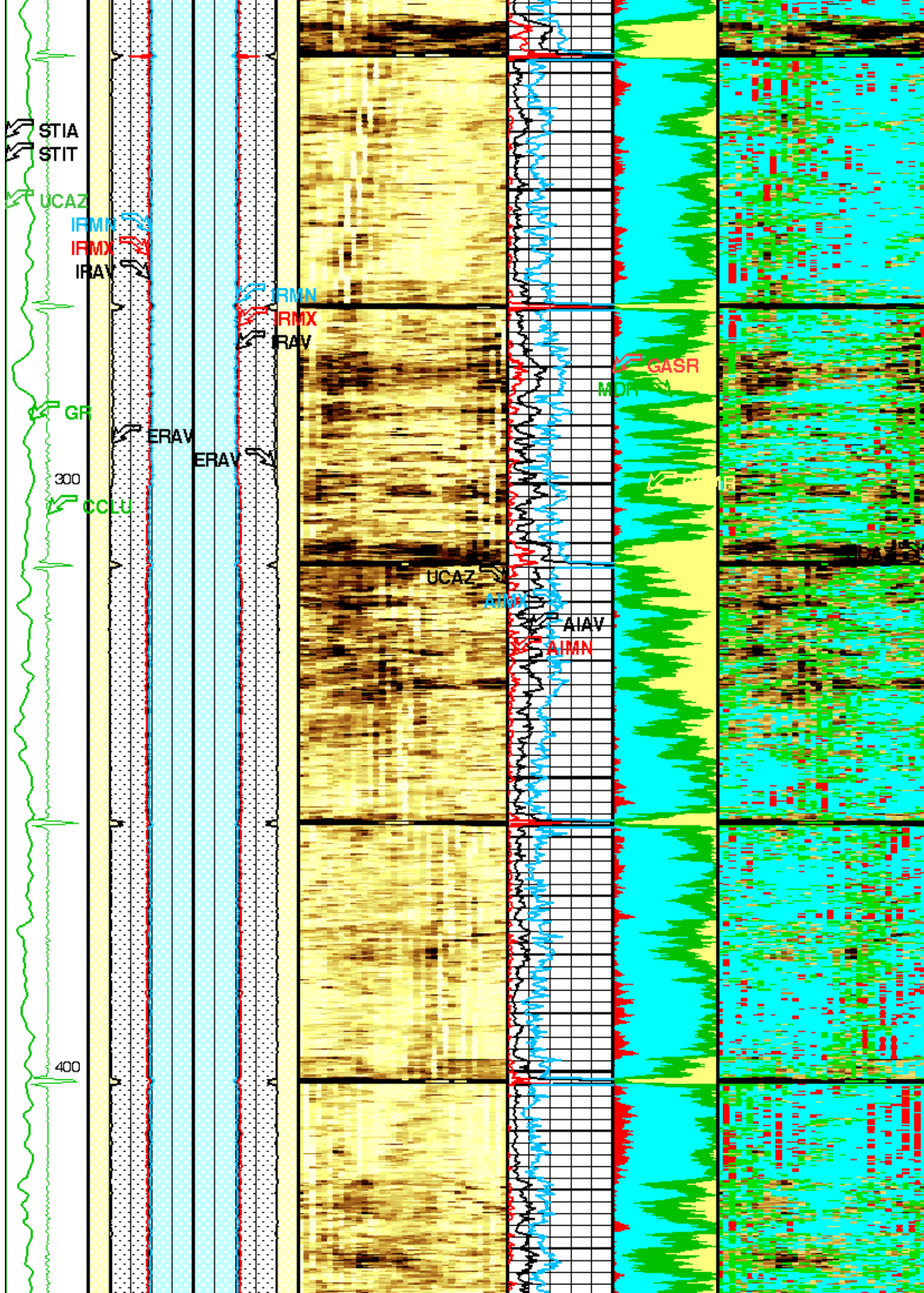
6600.00	190.34	2.02
6000.00	188.74	2.02
5400.00	188.00	2.05
4800.00	188.14	2.04
4500.00	188.94	2.04
4200.00	185.69	1.97
3900.00	187.65	2.00
3600.00	188.17	2.00

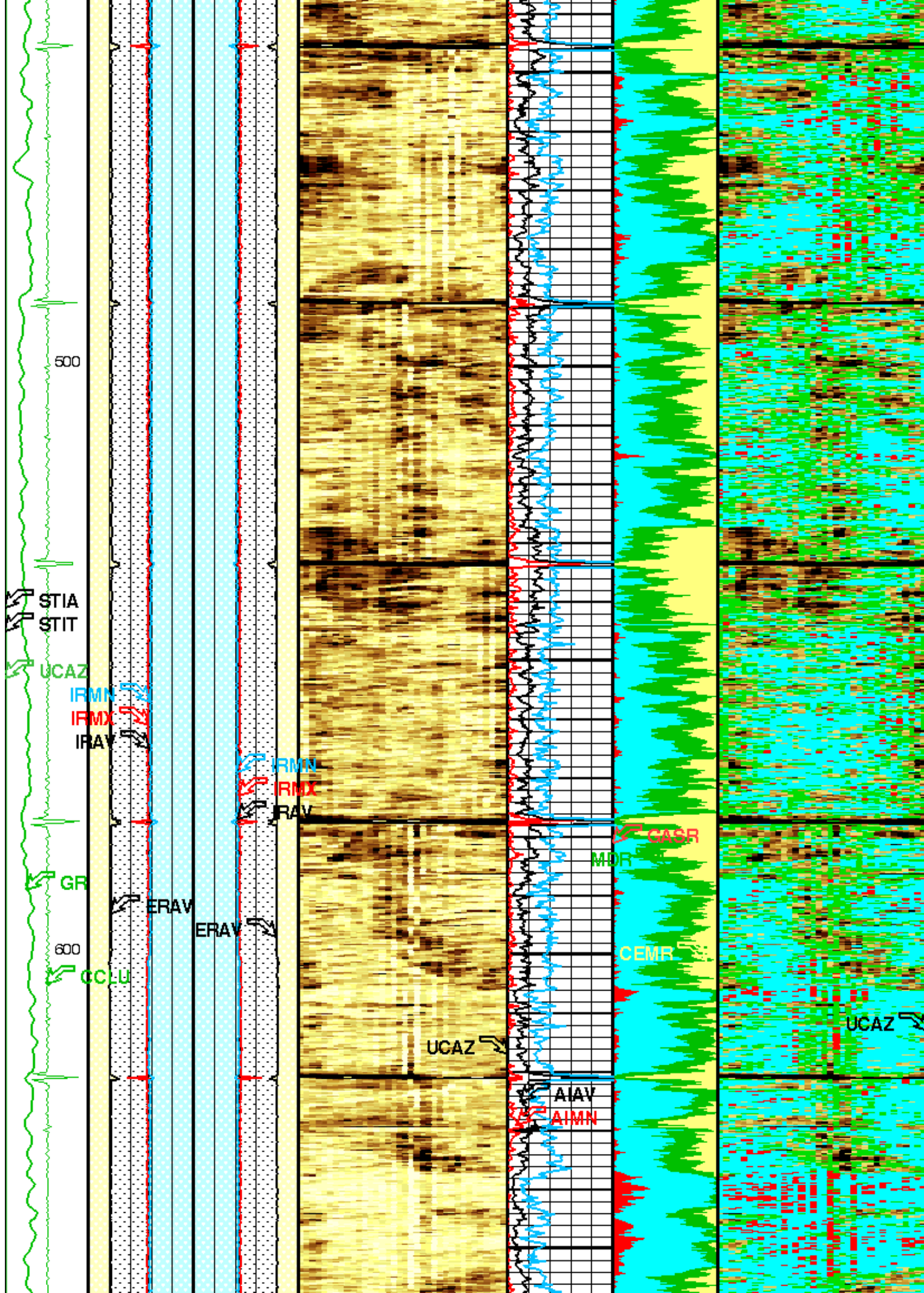
3300.00	189.21	2.00
3000.00	189.74	1.98
2700.00	190.24	1.94
2400.00	190.75	1.93
2100.00	191.75	1.89
1800.00	192.76	1.84
1500.00	193.76	1.81
1200.00	194.76	1.81
900.00	196.27	1.81
600.00	197.78	1.81
300.00	200.46	1.81

Image rotation (UCAZ) (DEG)						
0 360						
Tool/Tot. Drag From D4T to STIA						
Cable Drag From D4T to STIT						
Stuck Stretch (STIT)	Min of Internal radius (IRMN)	Min of Internal radius (IRMN)				
0 (F) 50	3.7 (IN) 2.7	2.7 (IN) 3.7				
Gamma Ray (GR) (GAPI)	External radius Average (ERAV)	Internal radius Maximum (IRMX)	Maximum of AI (AIMX)			
0 150	3.7 (IN) 2.7	2.7 (IN) 3.7	0 (M RAY) 10			
Cable Speed (CS) (F/HR)	Internal radius Maximum (IRMX)	Internal radius Average (IRAV)	Average of AI (AIAV)			
0 2000	3.7 (IN) 2.7	2.7 (IN) 3.7	0 (M RAY) 10			
CCL (CCLU) (---)	Internal radius Average (IRAV)	External radius Average (ERAV)	Minimum of AI (AIMN)			
-20 20	3.7 (IN) 2.7	2.7 (IN) 3.7	0 (M RAY) 10			
			<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div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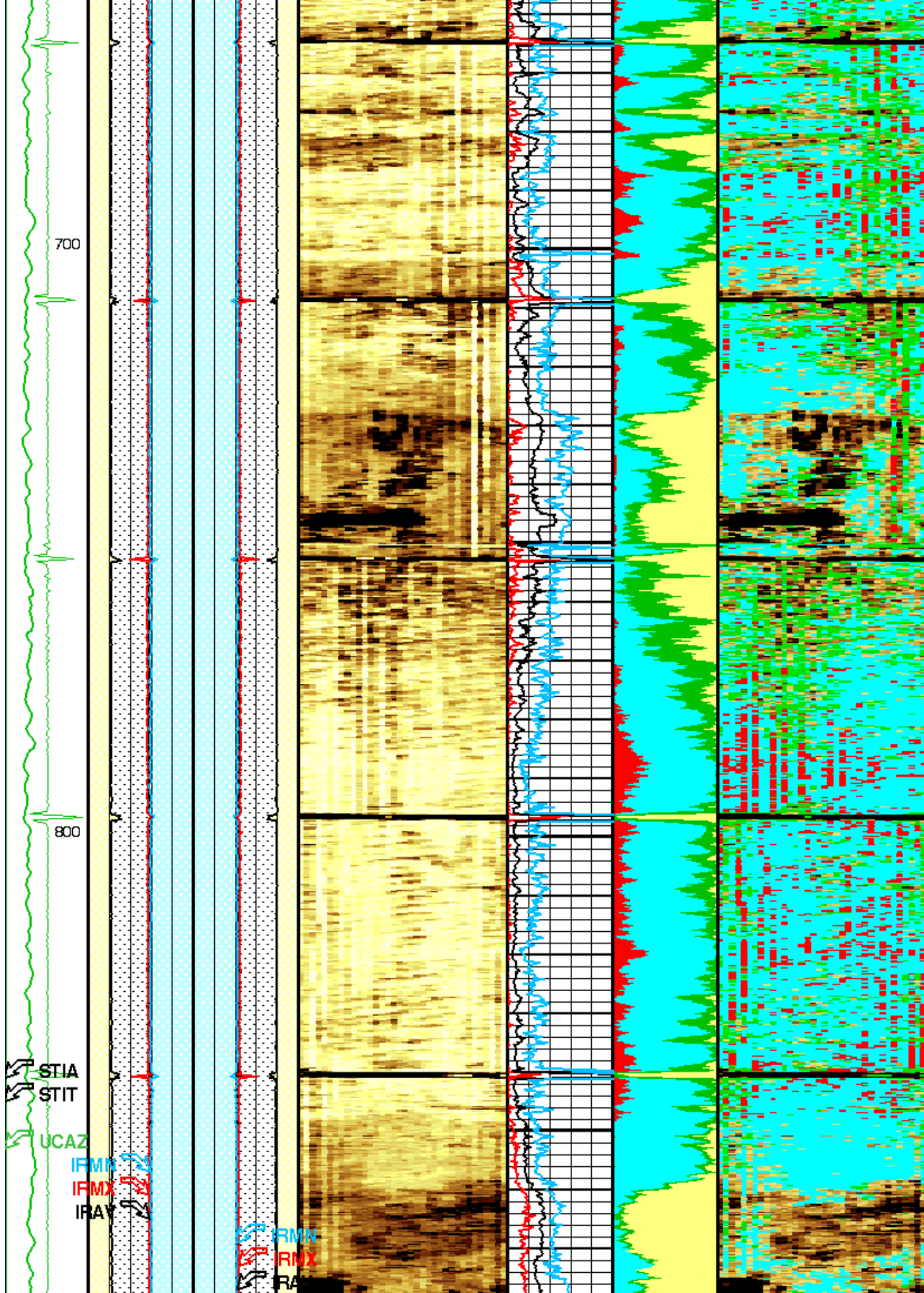


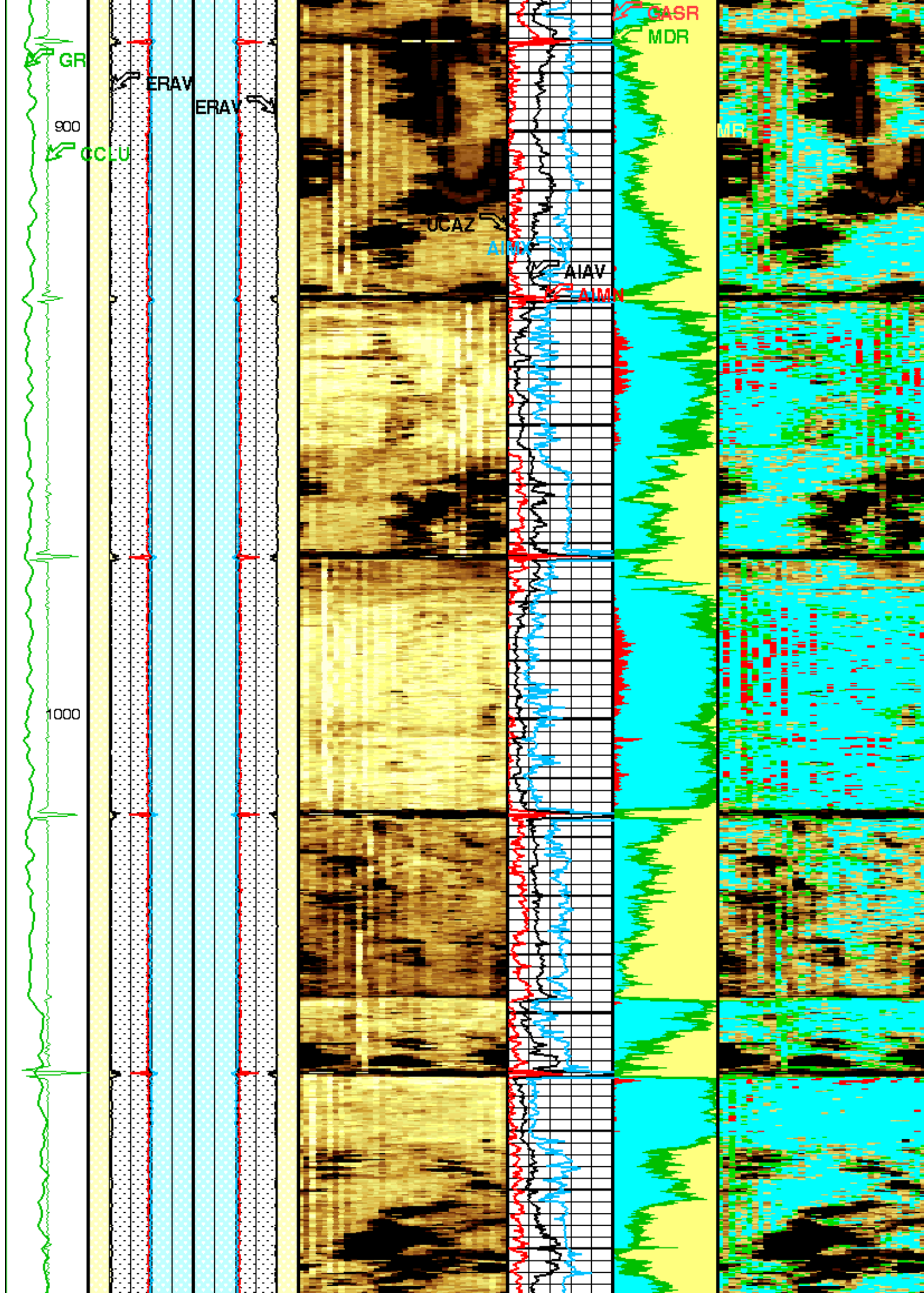




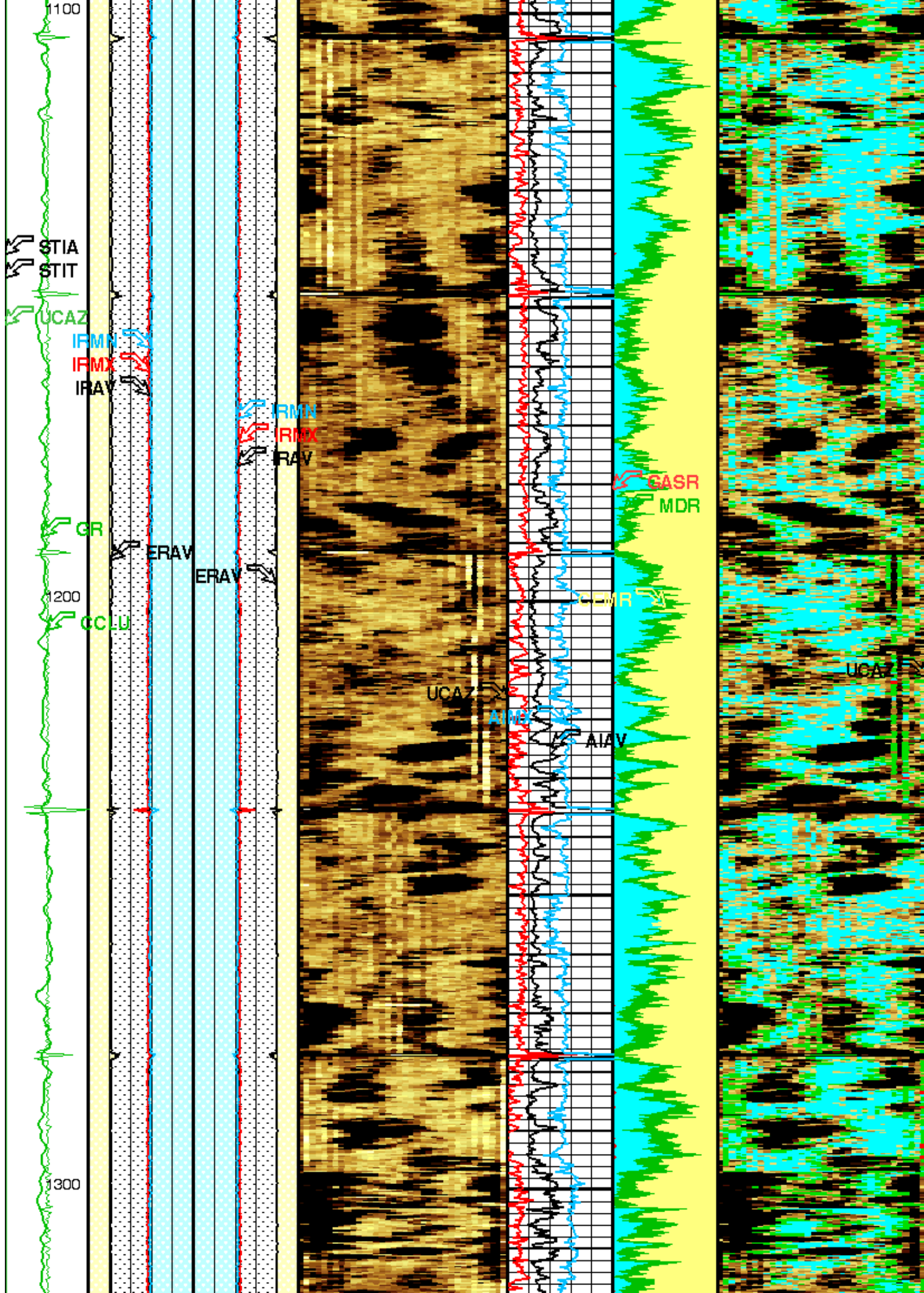


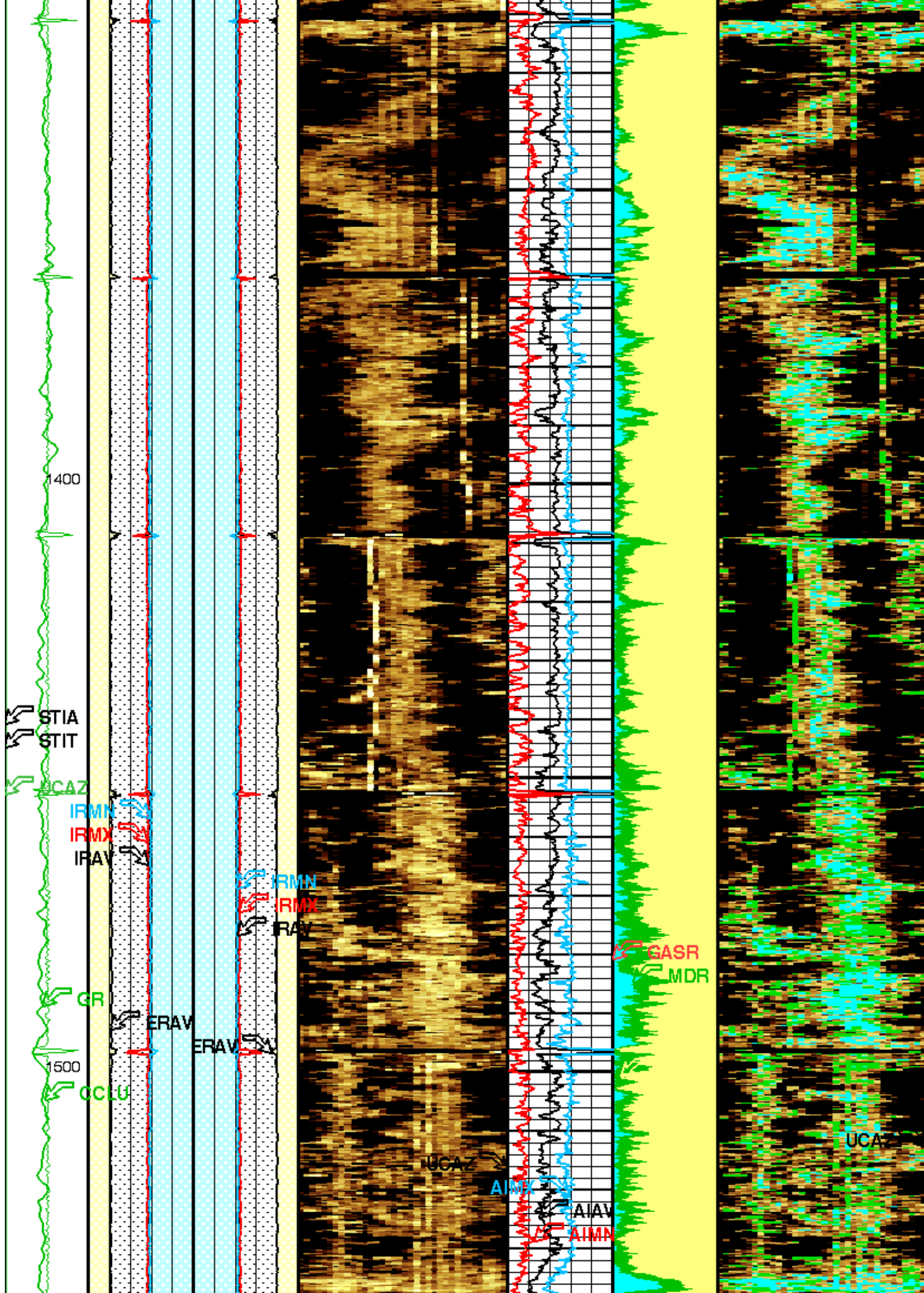




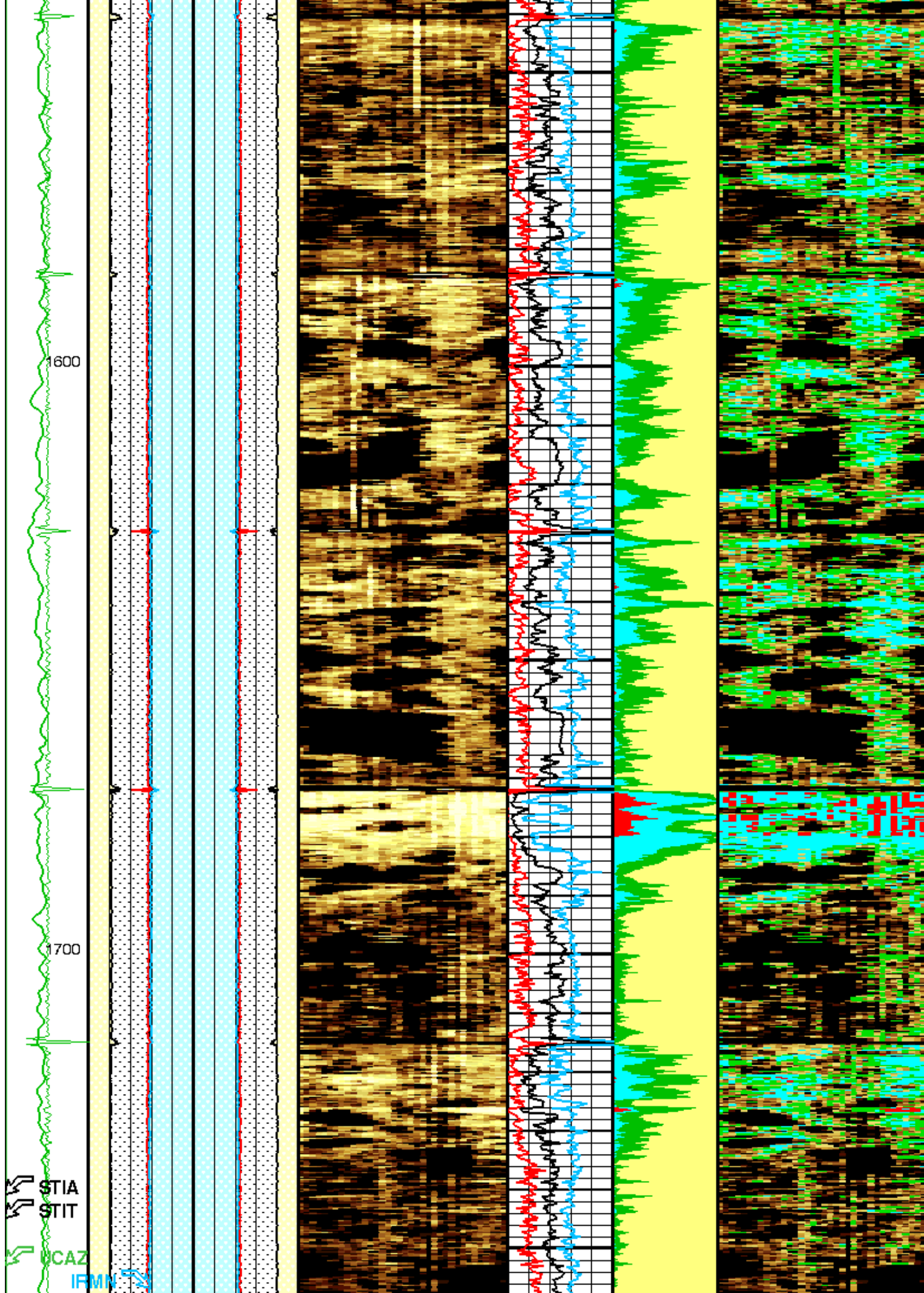




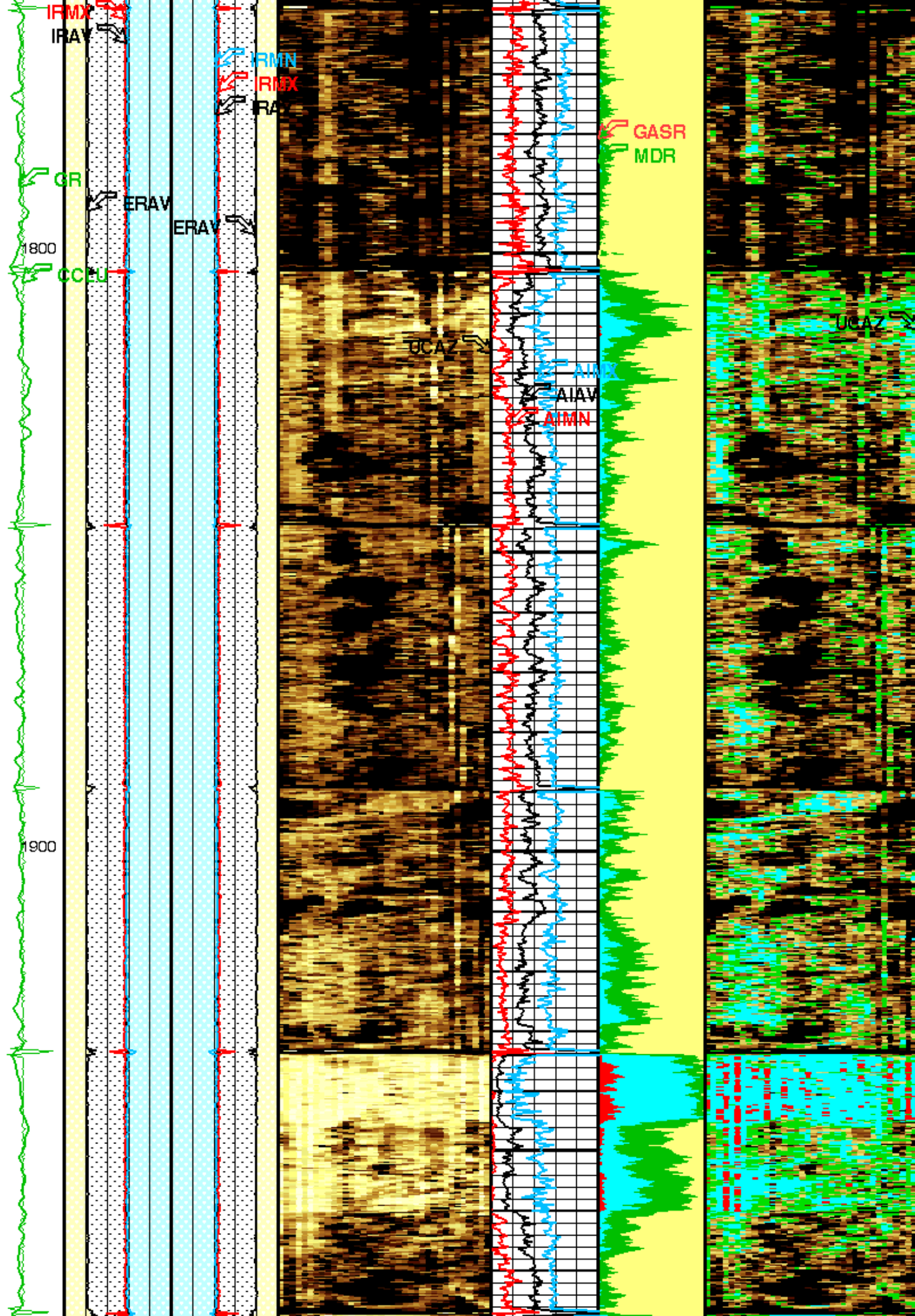


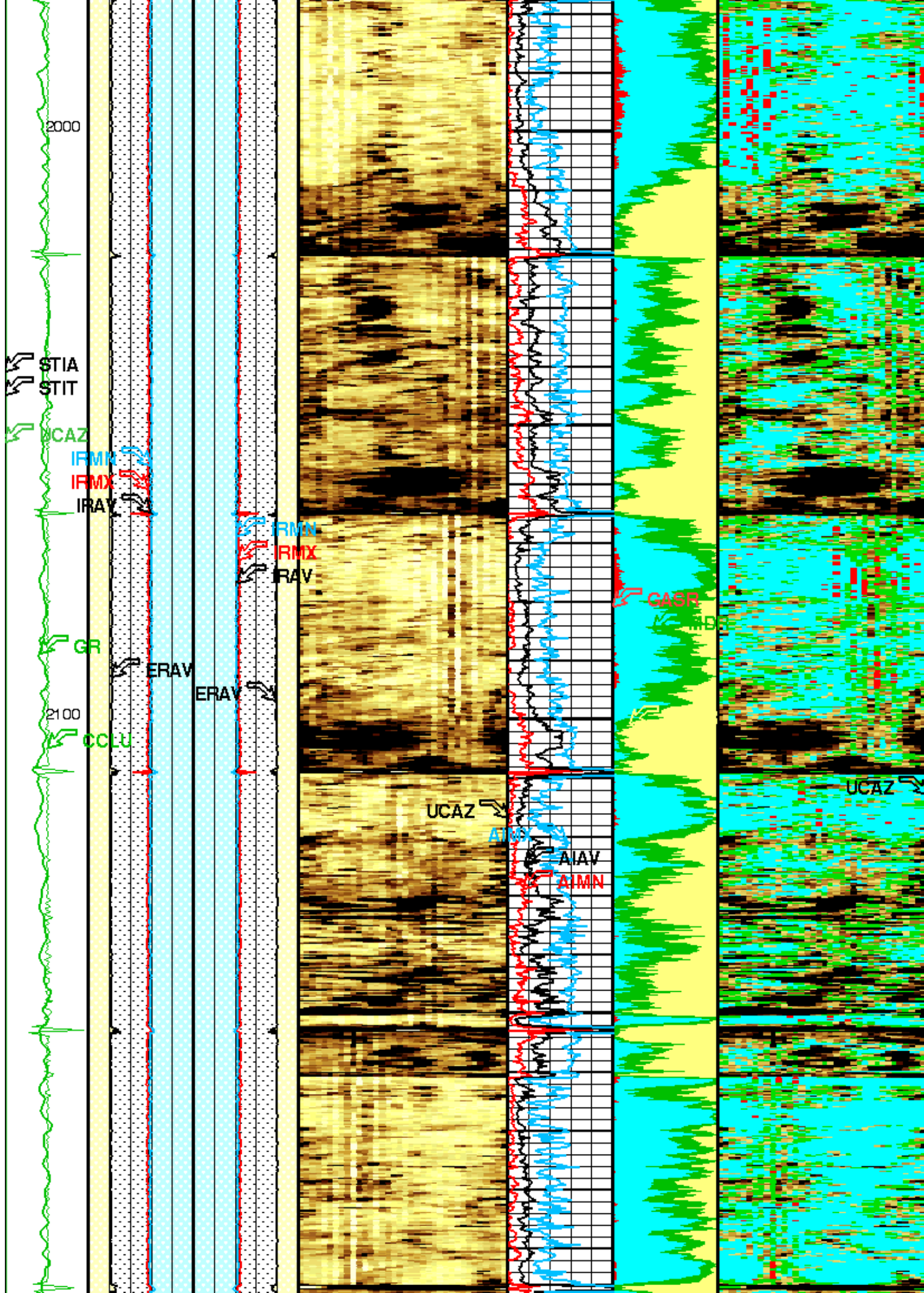




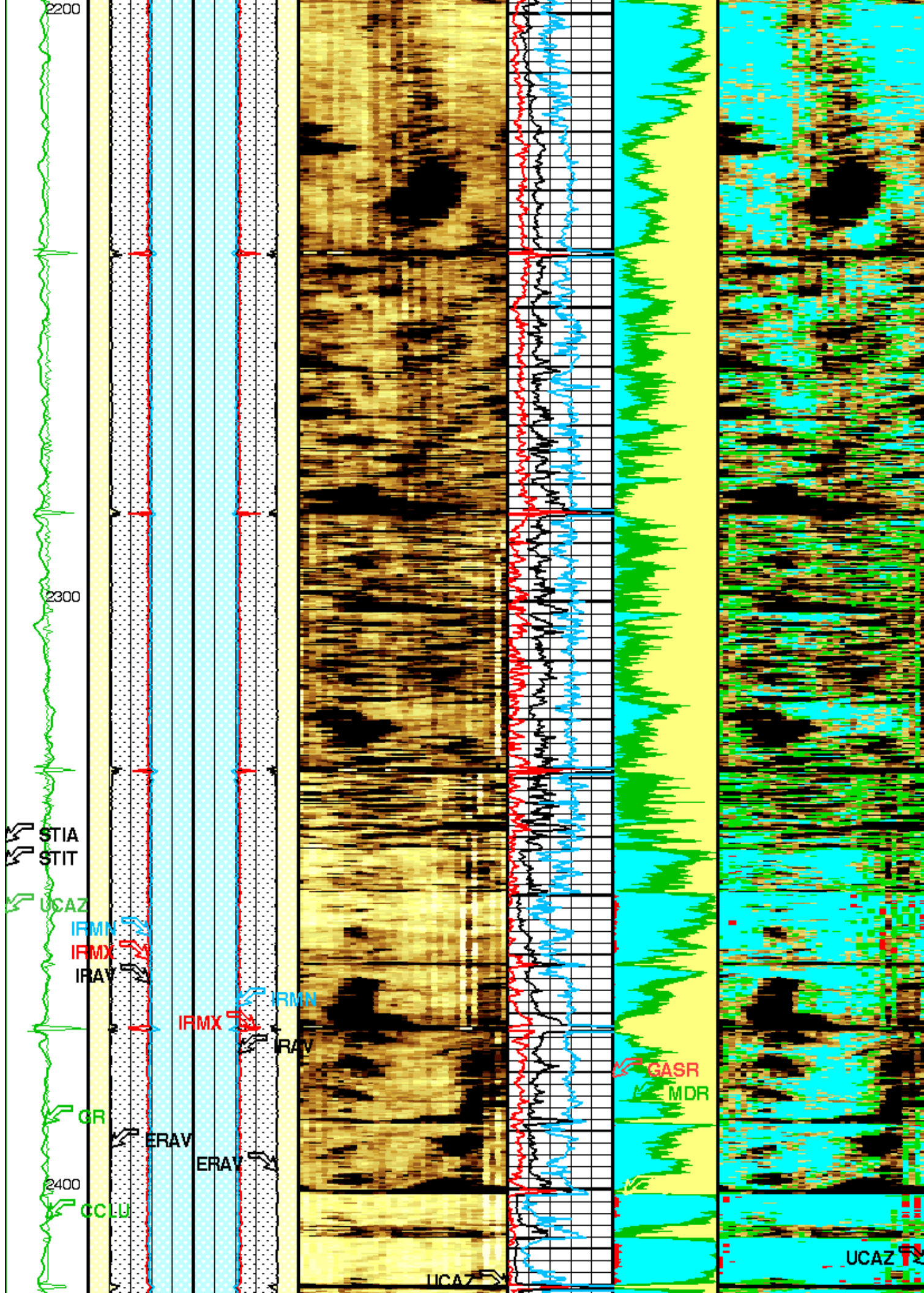


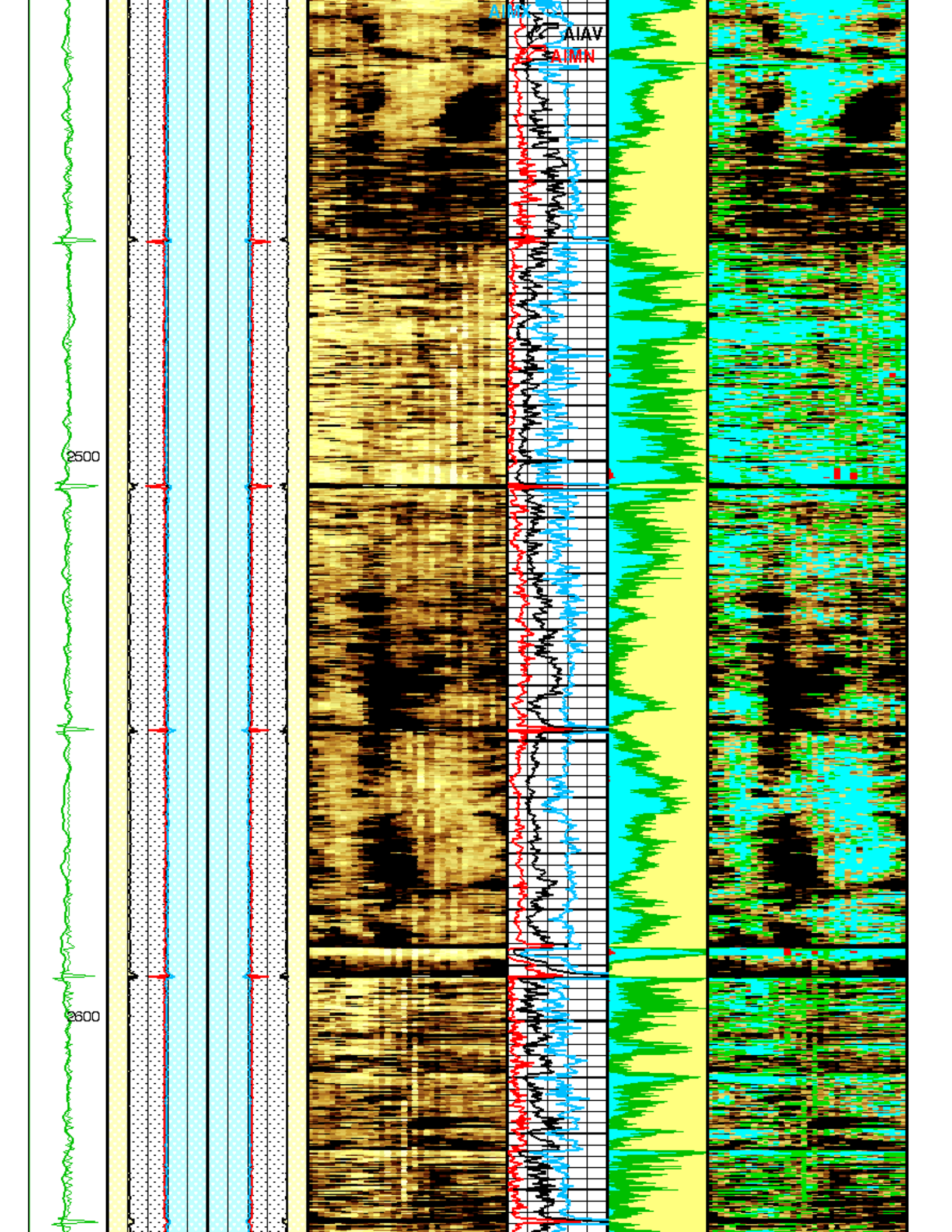




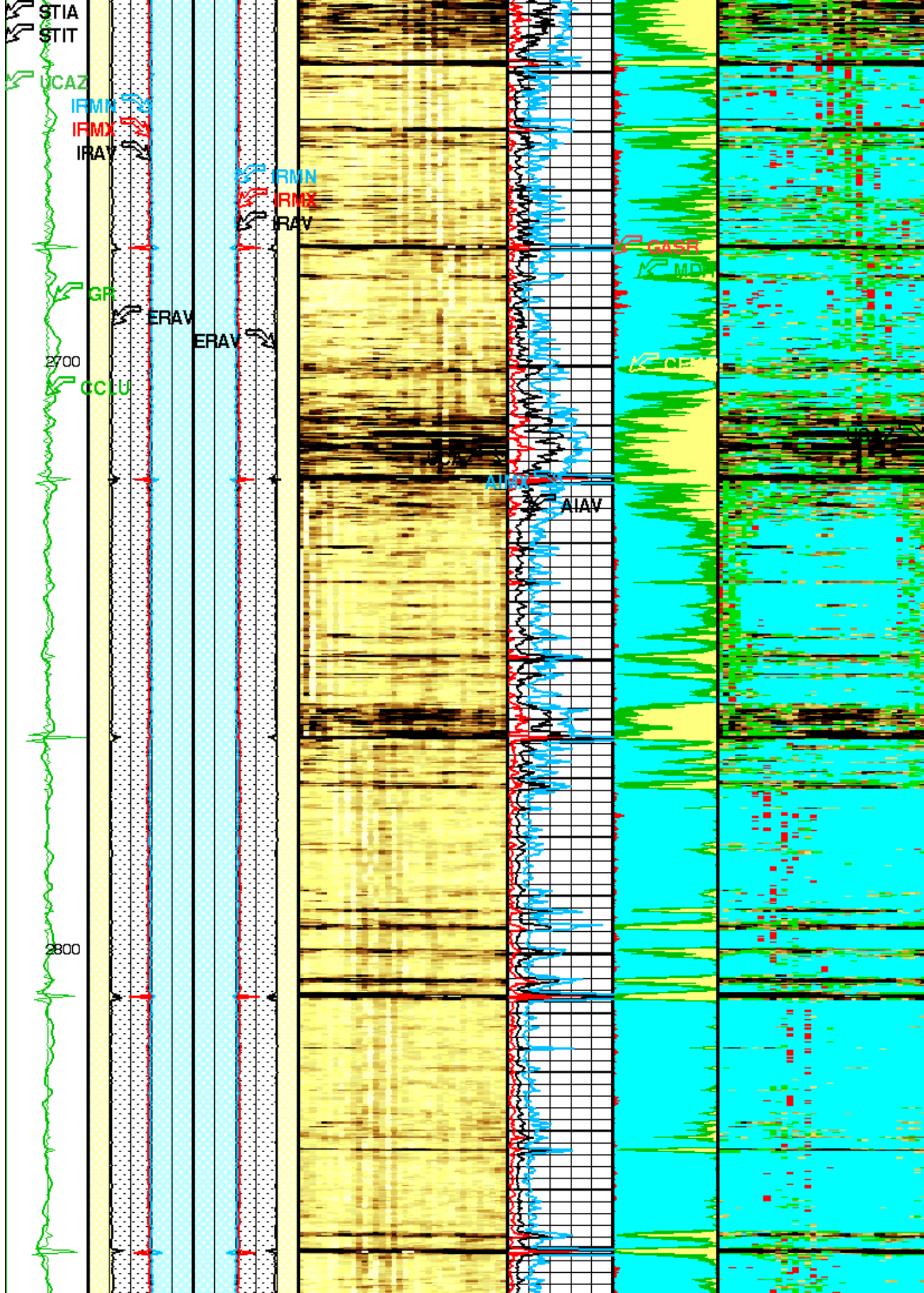




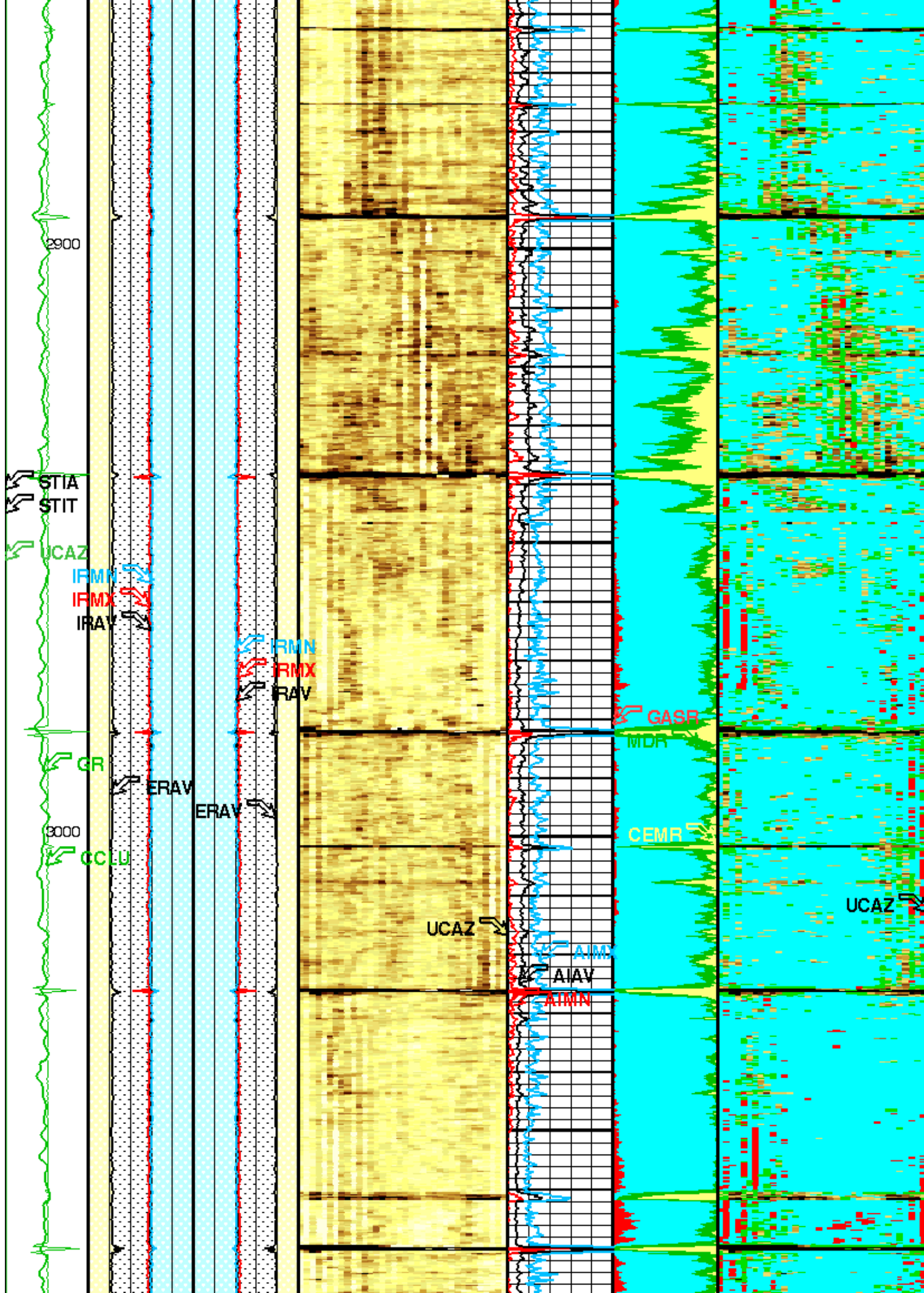


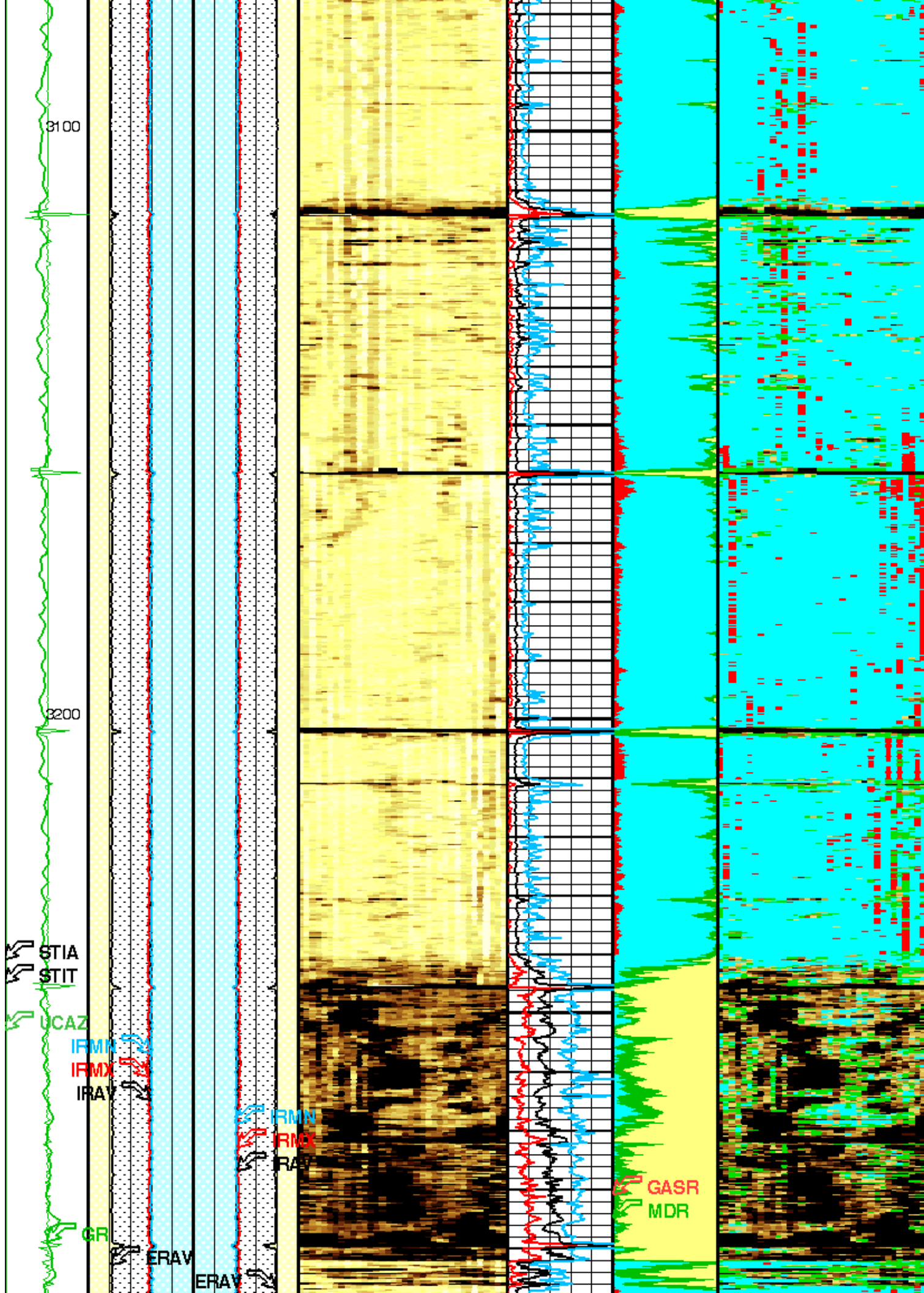




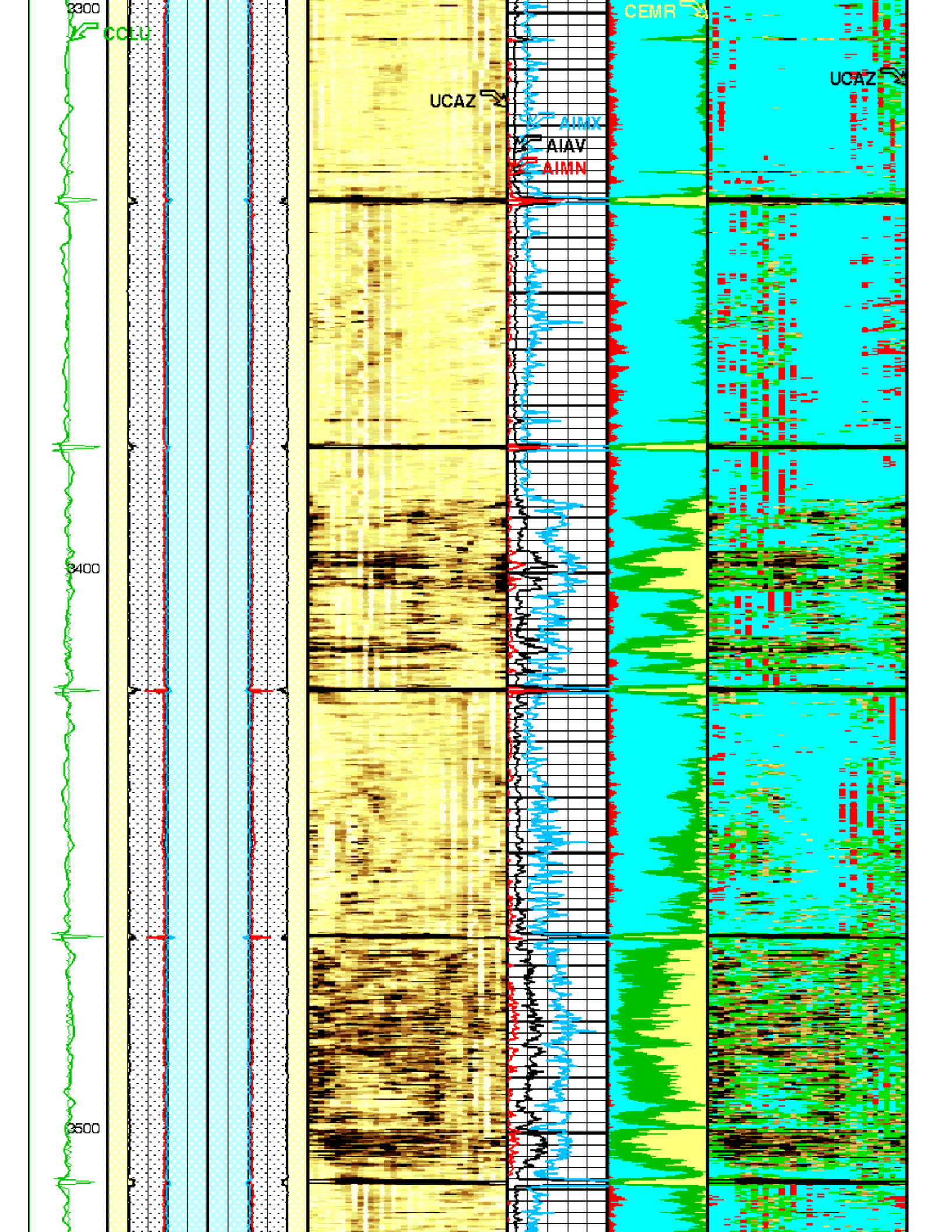


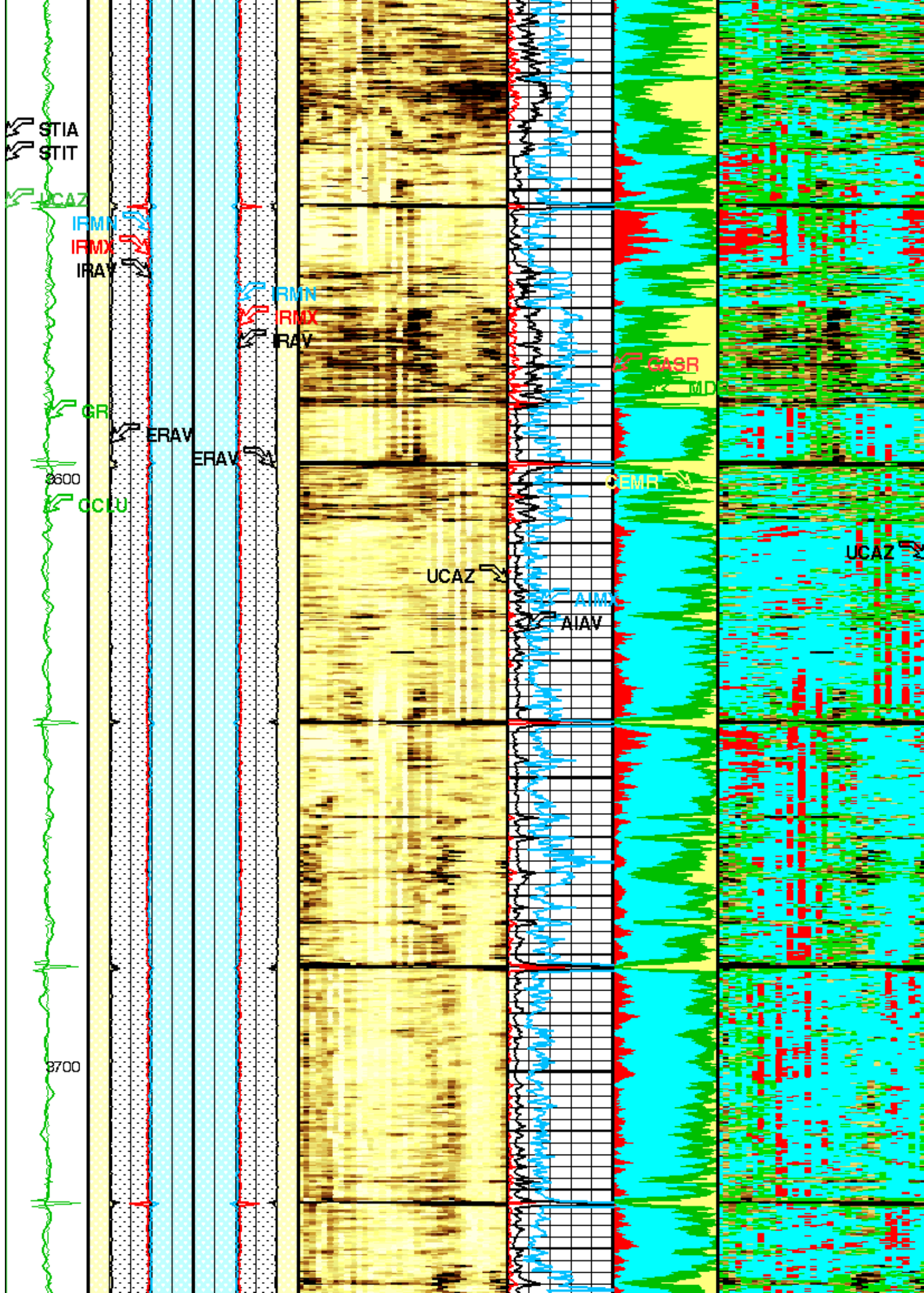




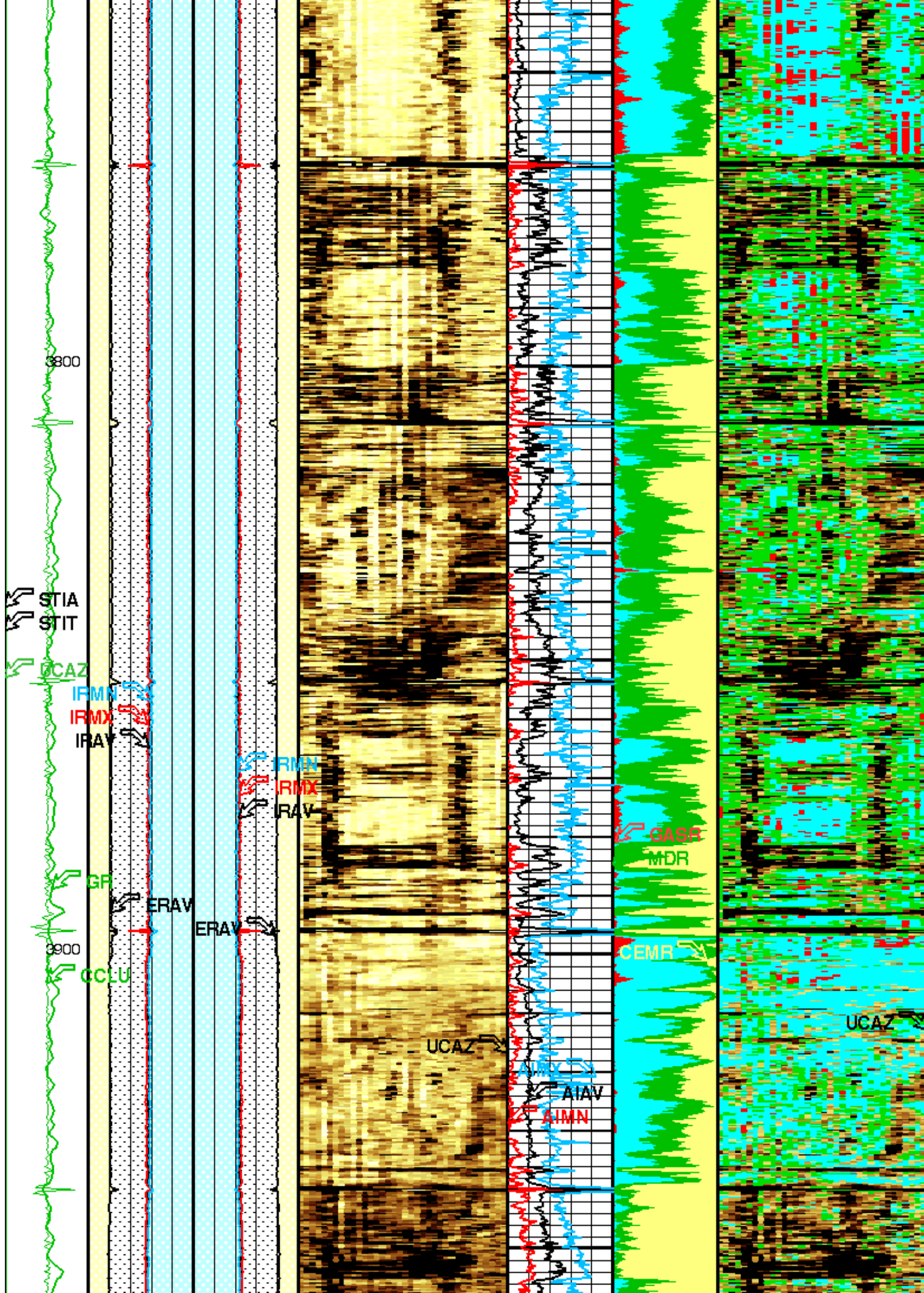




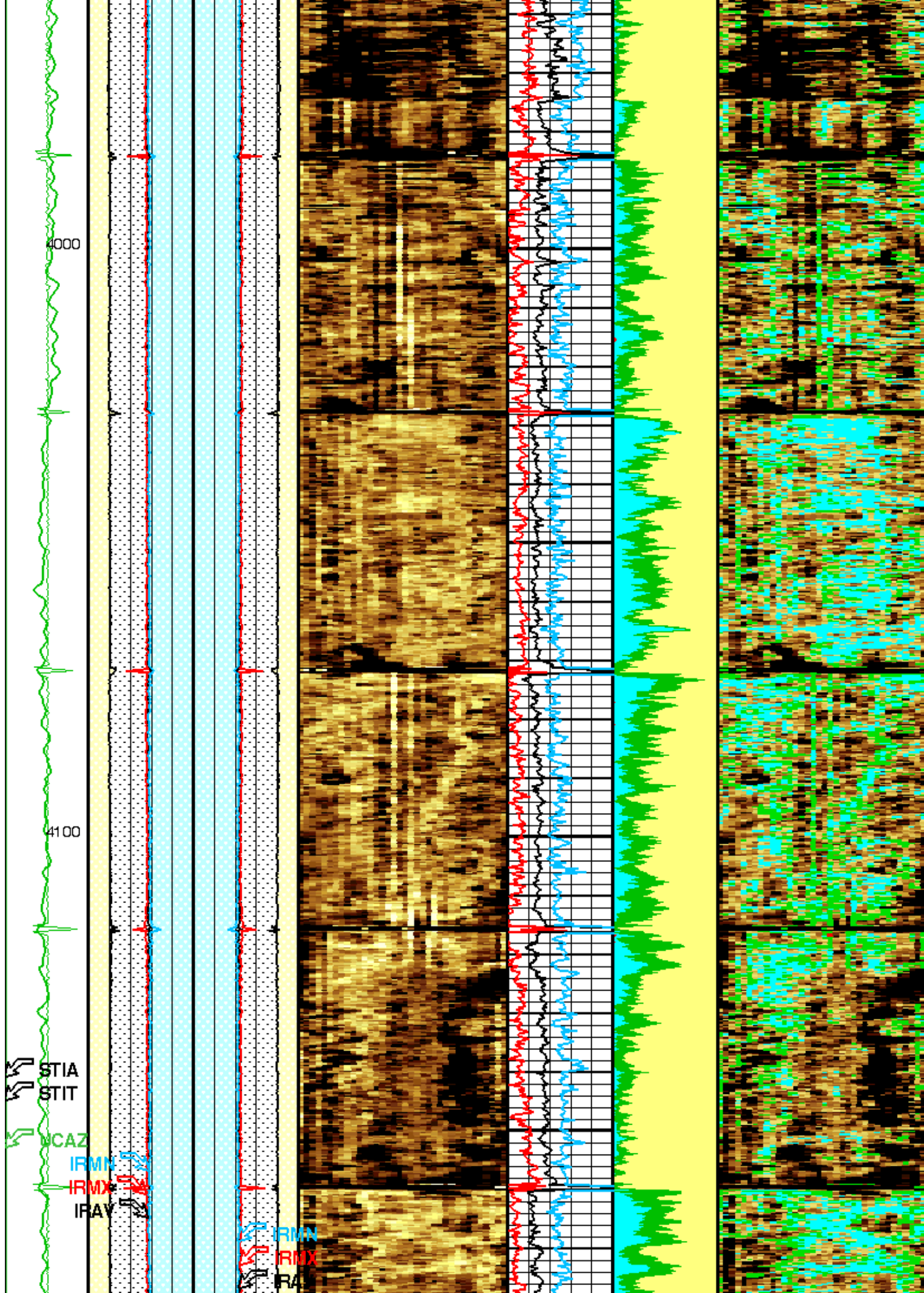


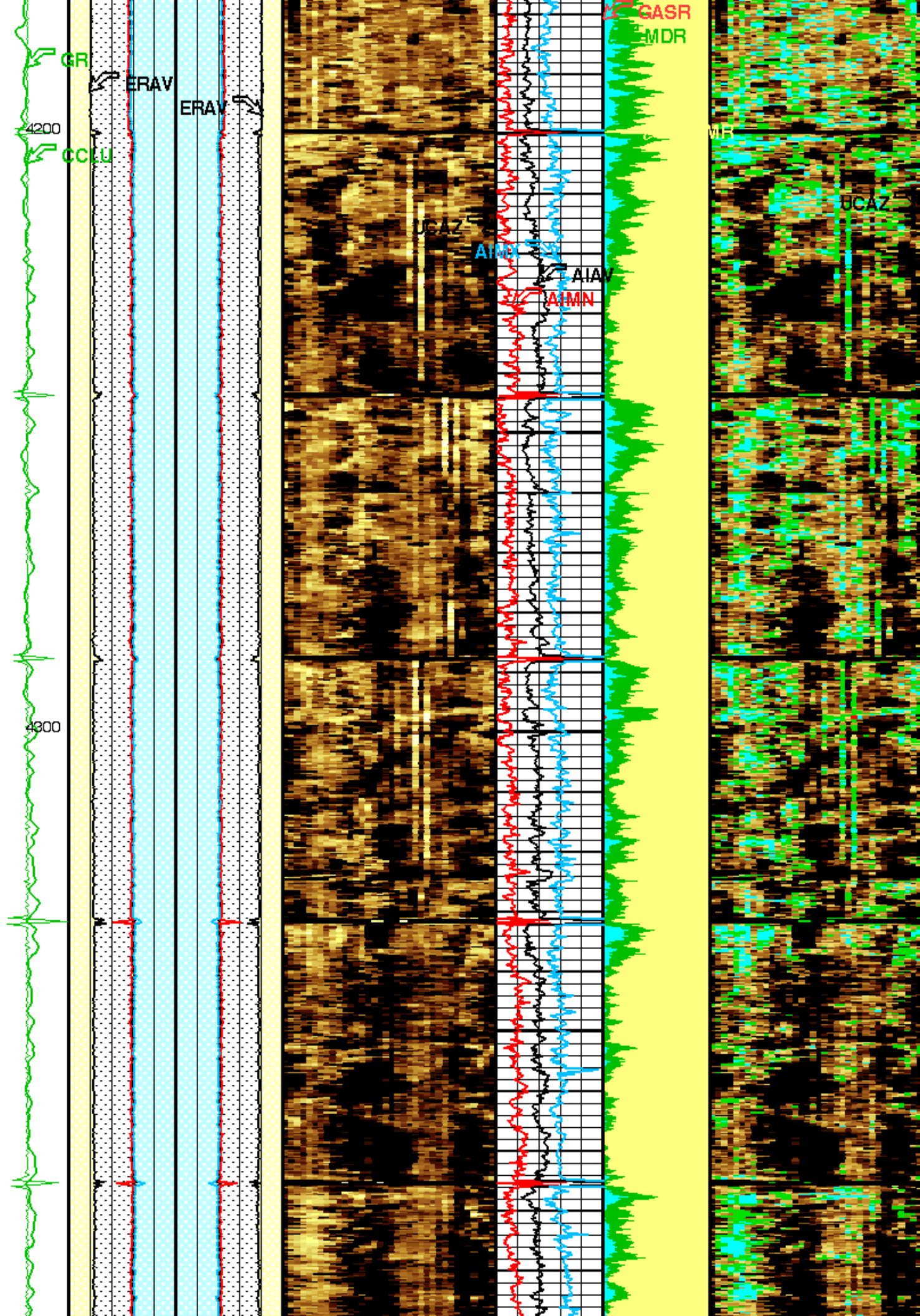




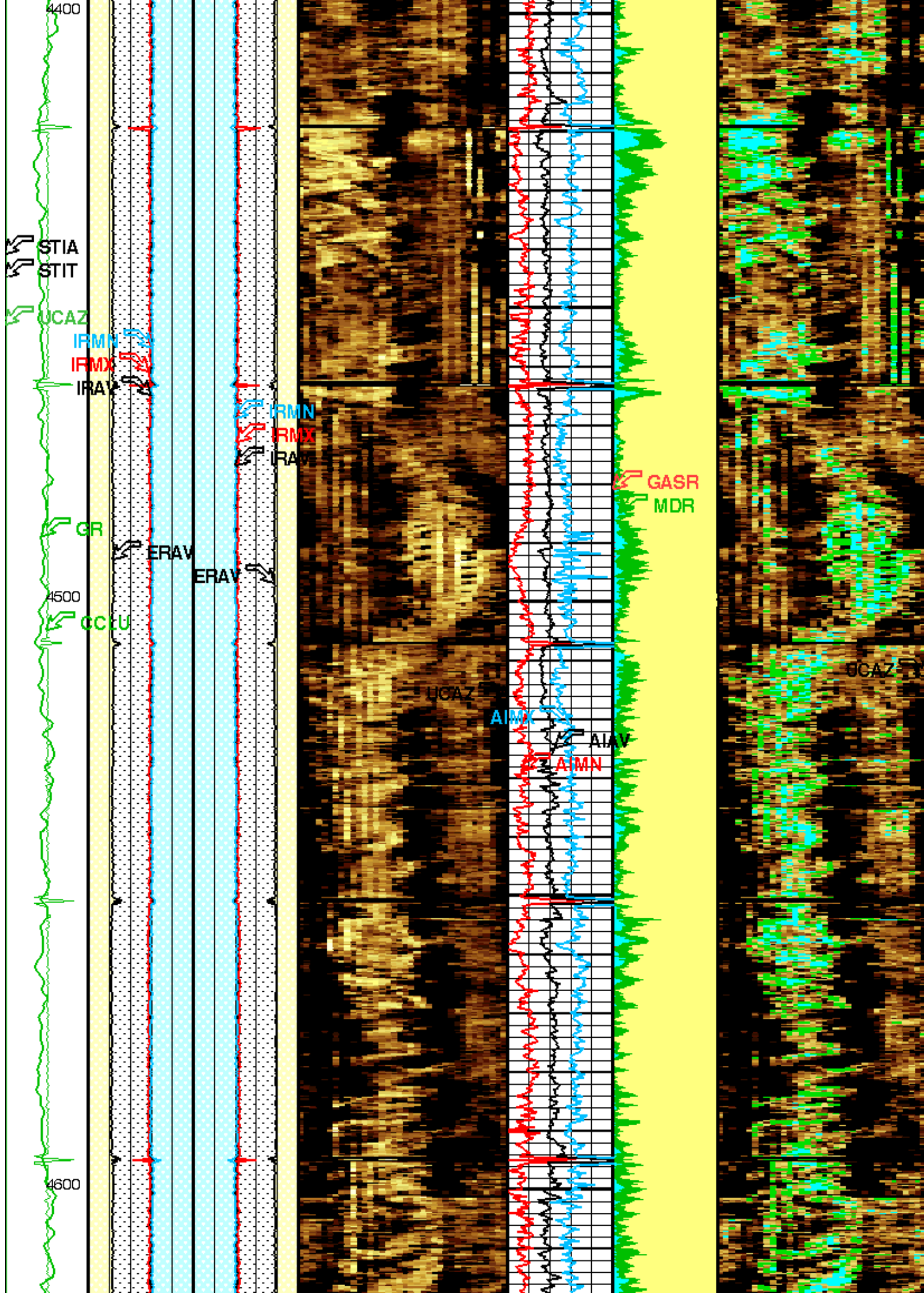


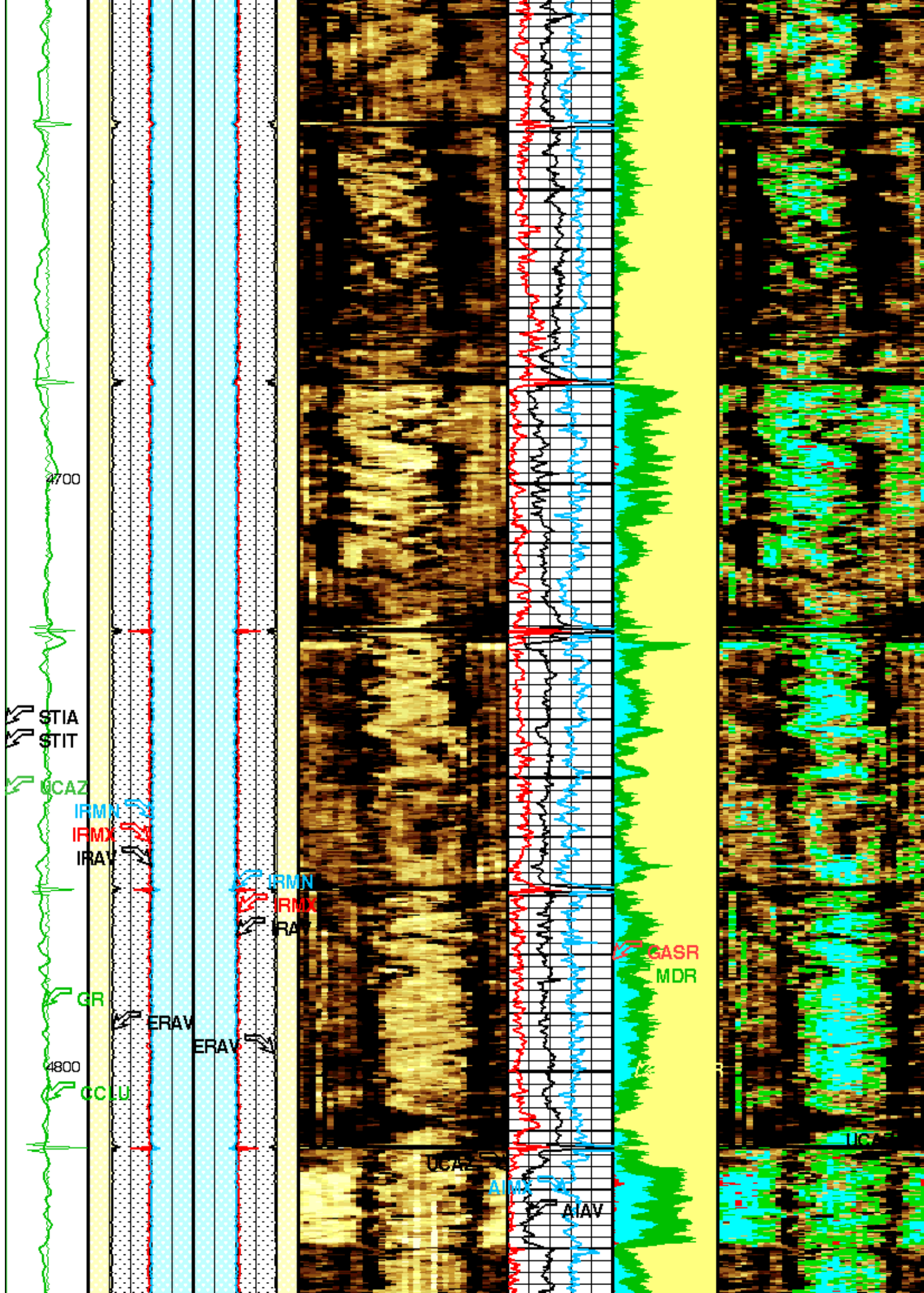




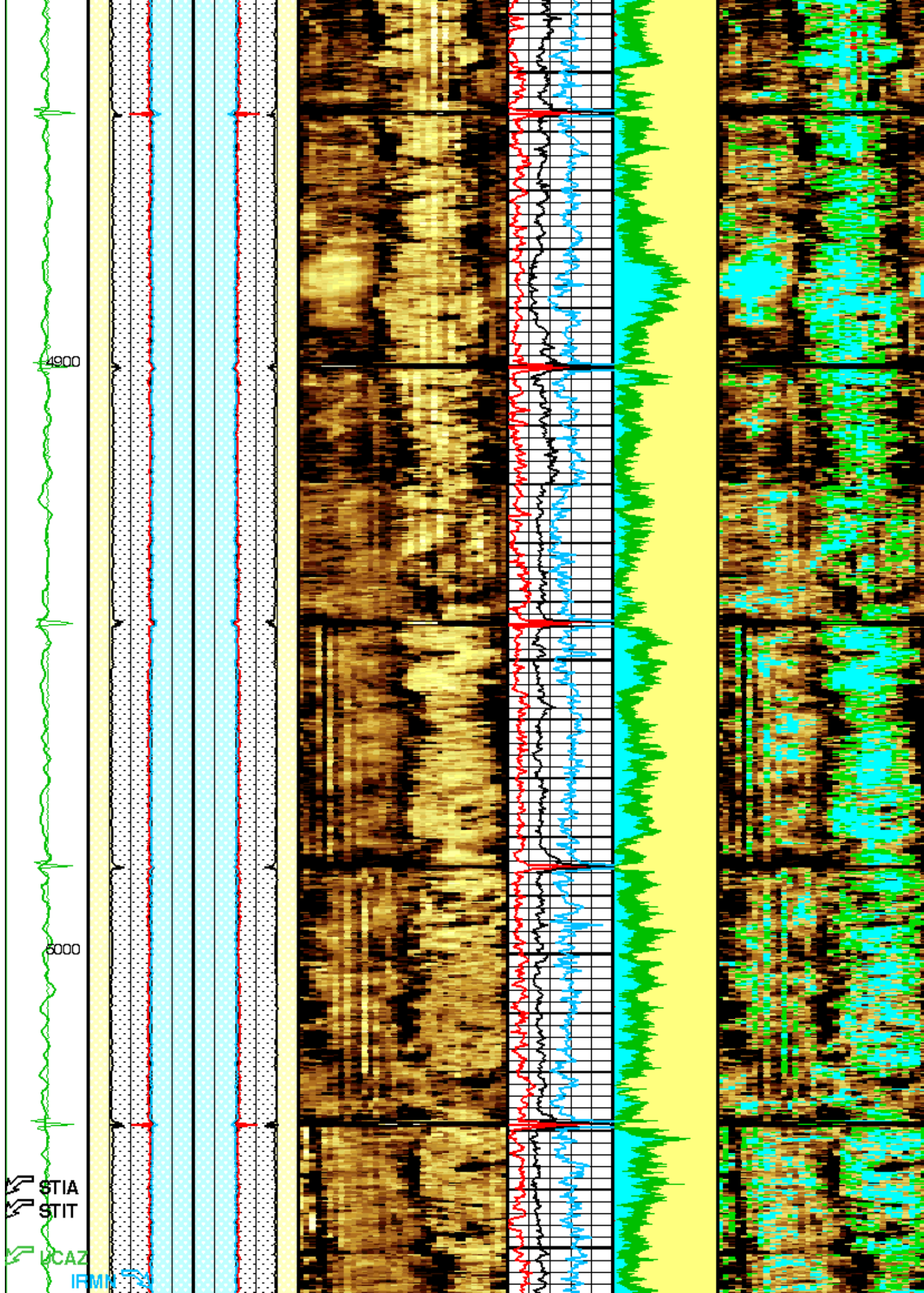




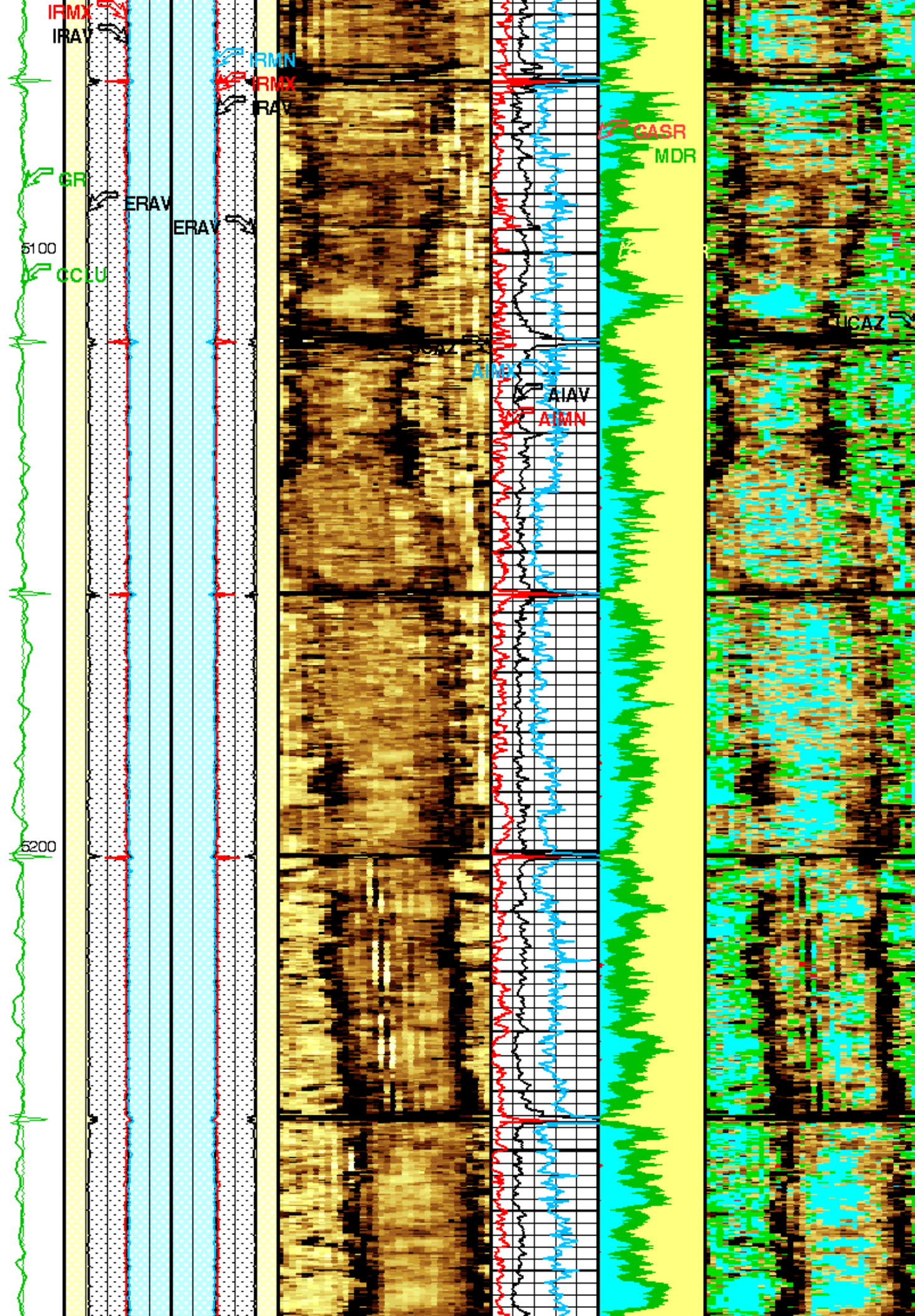


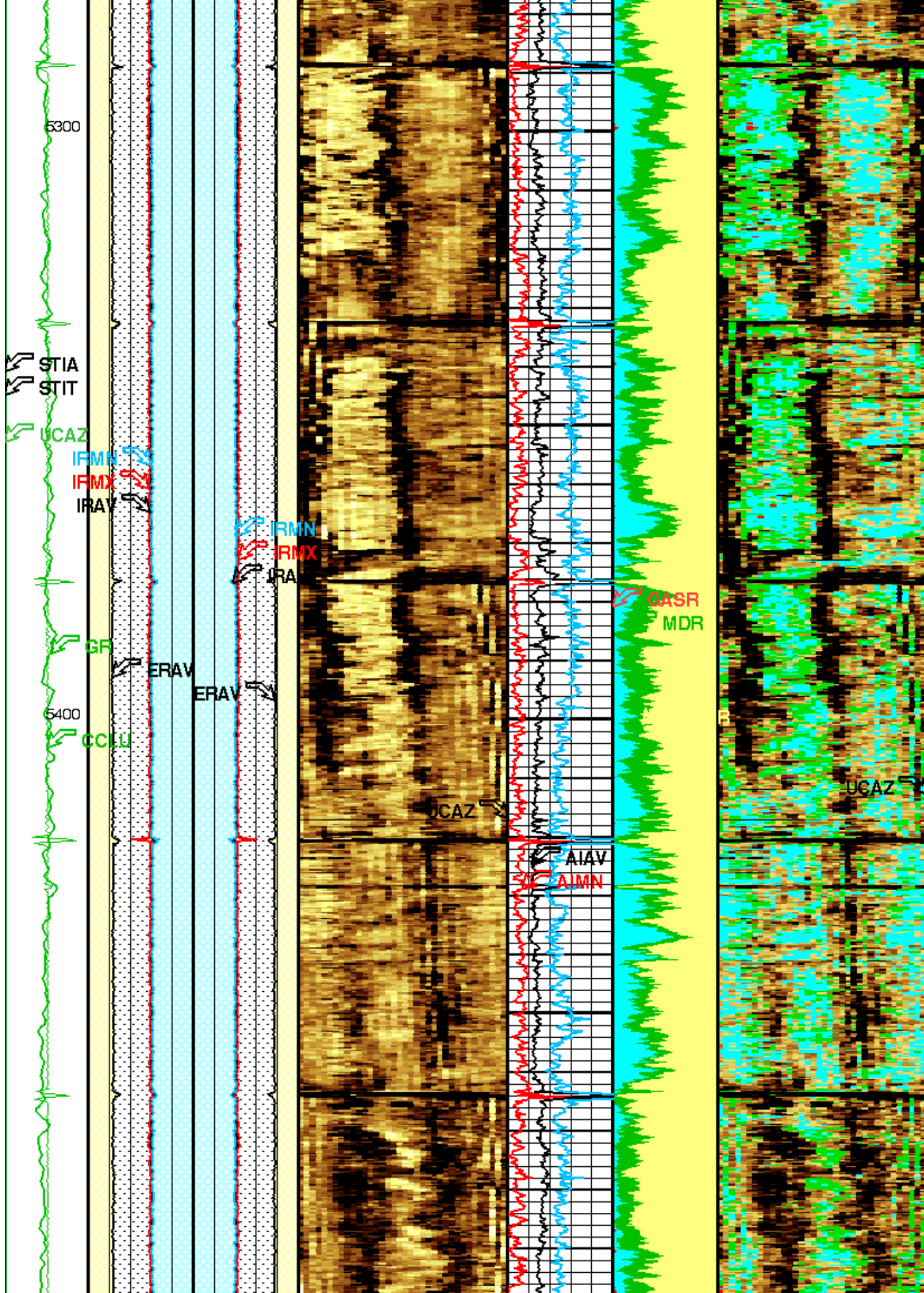




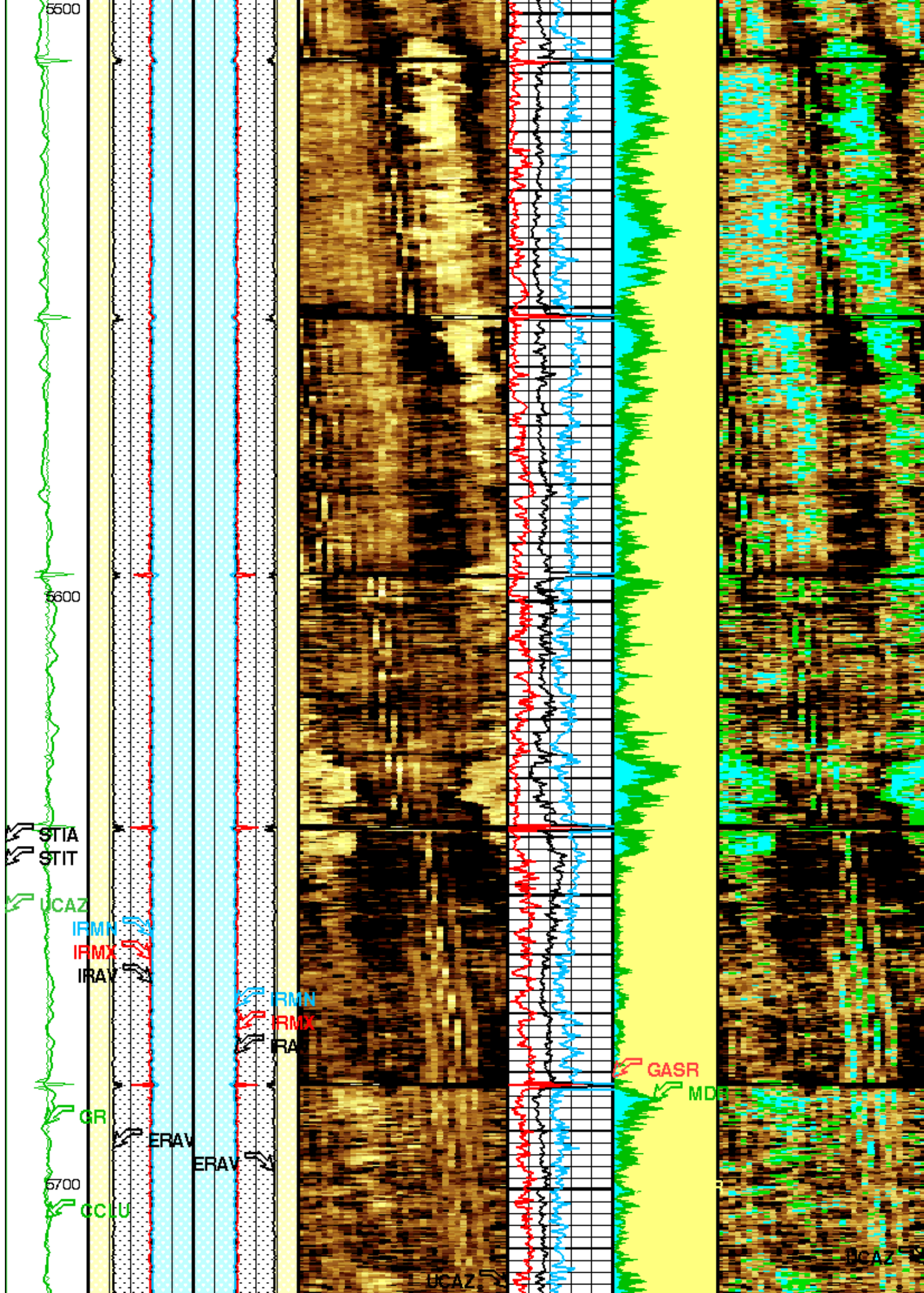




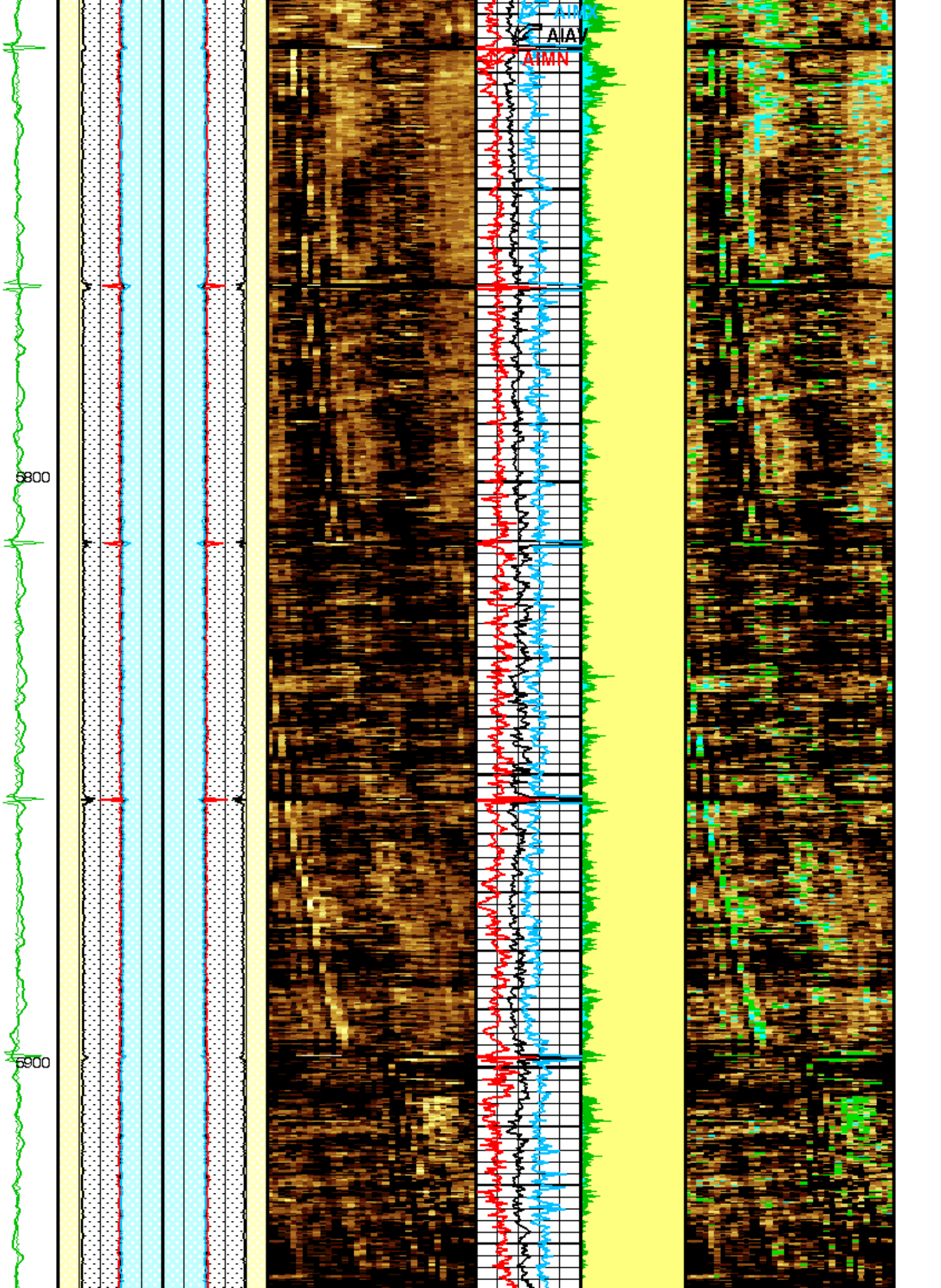


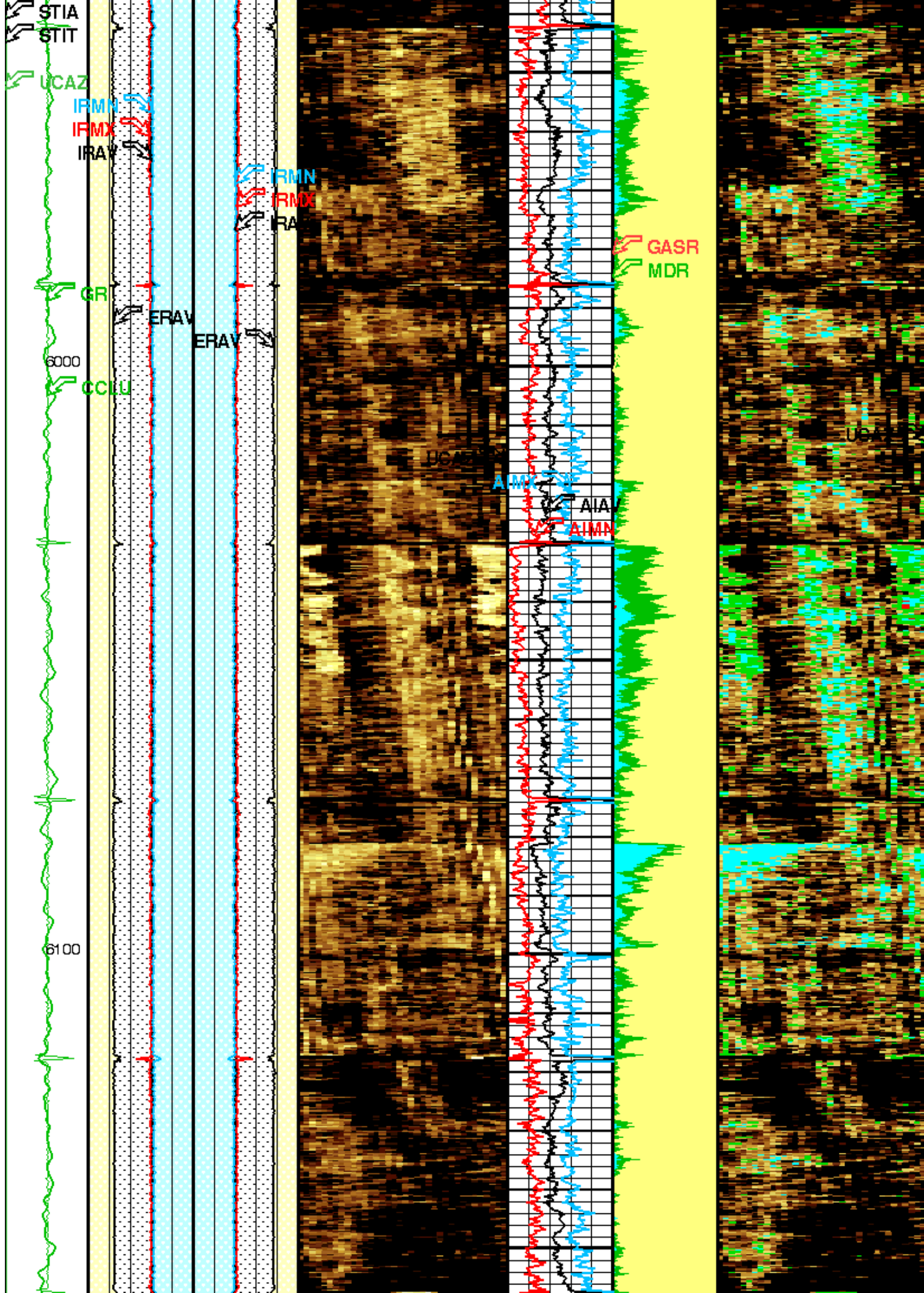




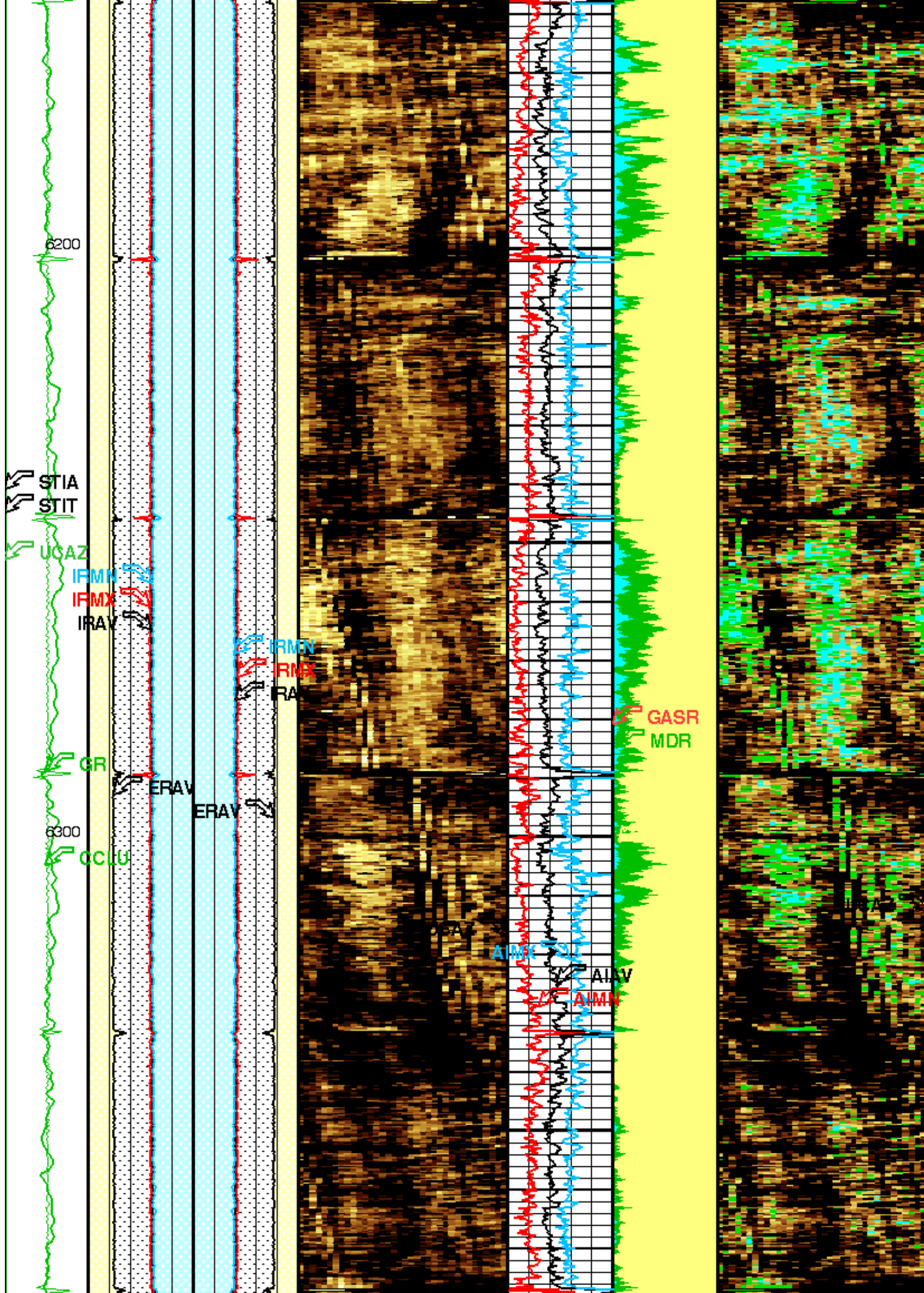




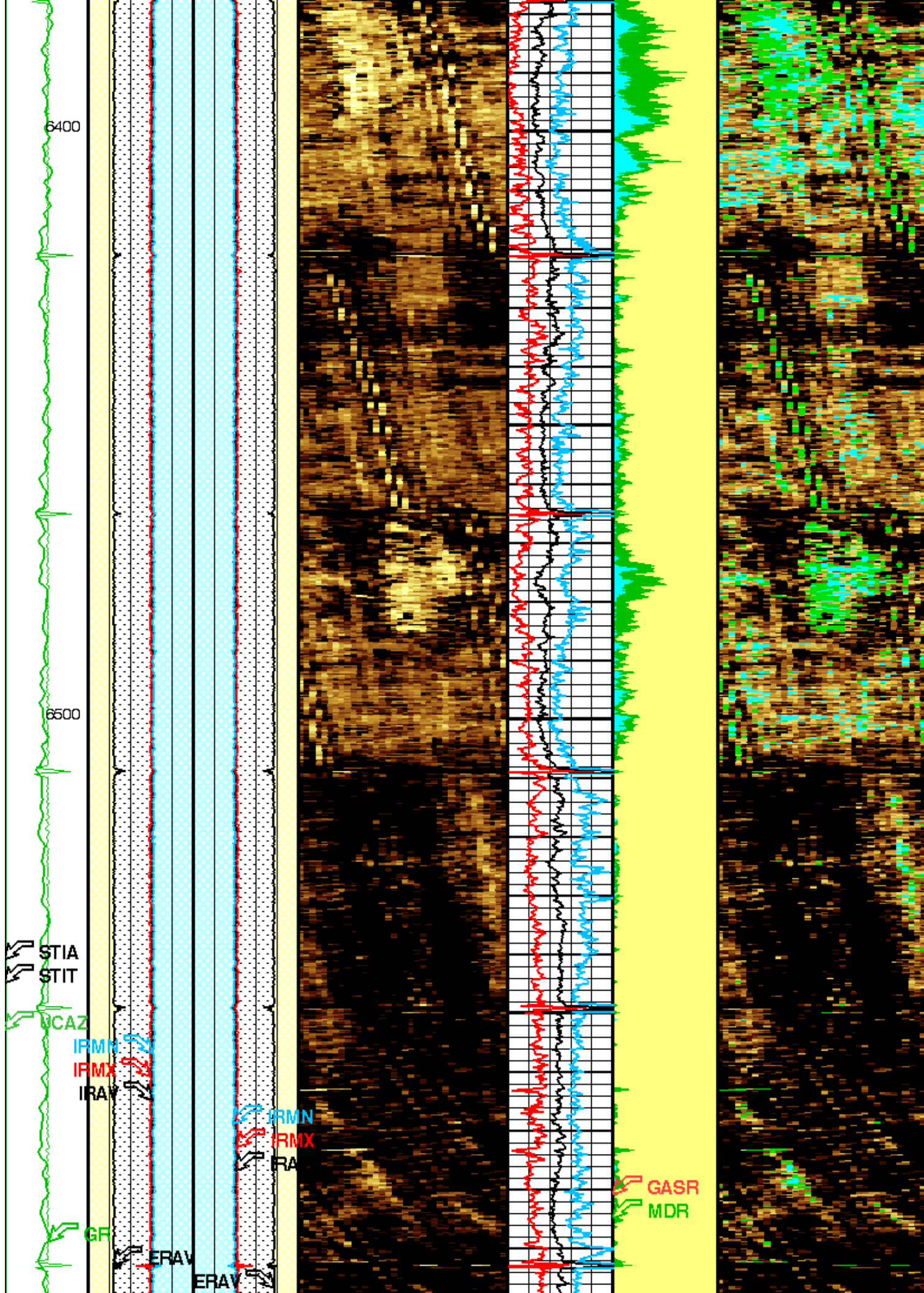


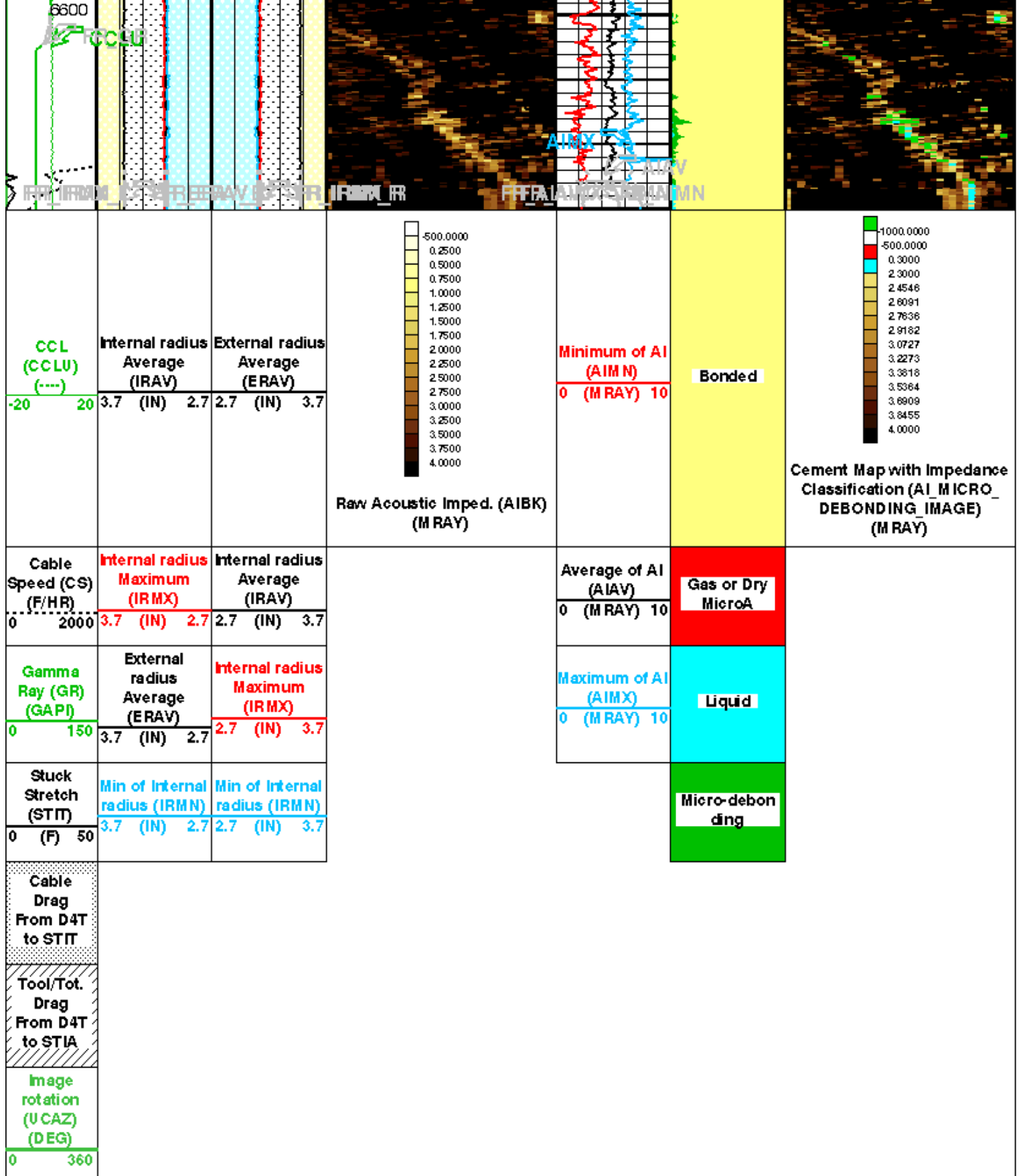












Format: USIT CEMENT 5 inch		Vertical Scale: 5" per 100'		Graphics File Created: 24-May-2013 11:06	
OP System Version: 19C2-270					
USIT-E	19C2-270	SGT-N	19C2-270		
DTC-H	19C2-270				

All USI Images are outside views

USI : LOW Frequency Compression Mode Used For Logging.

Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.

## Parameters

DLIS Name	Description	Value	
USIT-E: Ultrasonic Imaging - E			
AGMN	Minimum Gain of Cartridge	-4	DB
AGMX	Maximum Gain of Cartridge	20	DB
BERJ	Bad Echo Rejection	ON	
CDIA	Casing Outer Diameter	7	IN
CSDE	Casing Density	486.94	LBC/F
CSID	Casing Inner Diameter	6.276	IN
DFVL	Default Fluid Velocity	189	US/F
DOT	Diameter of Transducer Sensor	2.874	IN
EMXV	EMEX Voltage	20	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.9	LB/G
RCOD	Reference Calibrator Outer Diameter	7	IN
RCSO	Reference Calibrator Standoff	1.1811	IN
RCTH	Reference Calibrator Thickness	0.2952	IN
SDNV	Number of Vertical Samples used for Micro-debonding Computation	5	
SDTHOR	Acoustic Impedance STD Horizontal Threshold for Micro-debonding	0.5	
SDTVER	Acoustic Impedance STD Vertical Threshold for Micro-debonding	0.3	
TCUB	T 3 Processing Level	Vax_Loop	
THDH	Maximum Search Thickness (percentage of nominal)	130	
THDL	Minimum Search Thickness (percentage of nominal)	70	
THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.362	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub 7 inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T 3 Processing Length	21.7078	US
ZCAS	Acoustic Impedance of Casing	46.2537	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.65	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.3	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
STI: Stuck Tool Indicator			
LBFR	Trigger for MAXIS First Reading Label	TDL	
STKT	STI Stuck Threshold	2.5	FT
TDD	Total Depth - Driller	11583.00	FT
TDL	Total Depth - Logger	6630.00	FT
System and Miscellaneous			
CWEI	Casing Weight	26.00	LB/F
DO	Depth Offset for Playback	0.0	FT
PP	Playback Processing	RECOMPUTE	

## Input DLIS Files

DEFAULT	USI_008LUP	FN:7	PRODUCER	24-May-2013 09:21	6630.0 FT	-6.5 FT
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## Output DLIS Files

DEFAULT	USI_018PUP	FN:16	PRODUCER	24-May-2013 11:06
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Company: Kerr-McGee Oil & Gas Onshore LP

Well: Crowder 15C-18HZ

## Input DLIS Files

DEFAULT	USI_008LUP	FN:7	PRODUCER	24-May-2013 09:21	6630.0 FT	-6.5 FT
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## Output DLIS Files

DEFAULT	USI_018PUP	FN:16	PRODUCER	24-May-2013 11:06	6630.0 FT	-6.5 FT
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Zoning of Mud Parameters

Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
6600.00	190.34	2.02
6000.00	188.74	2.02
5400.00	188.00	2.05
4800.00	188.14	2.04
4500.00	188.94	2.04
4200.00	185.69	1.97
3900.00	187.65	2.00
3600.00	188.17	2.00
3300.00	189.21	2.00
3000.00	189.74	1.98
2700.00	190.24	1.94
2400.00	190.75	1.93
2100.00	191.75	1.89
1800.00	192.76	1.84
1500.00	193.76	1.81
1200.00	194.76	1.81
900.00	196.27	1.81
600.00	197.78	1.81
300.00	200.46	1.81

External  
radius  
Average  
(ERAV)

2.7 (IN) 3.7

Average  
Casing  
Thickness

Micro-debonding

Liquid

Gas or Dry MicroA

CCL  
(CCLU)

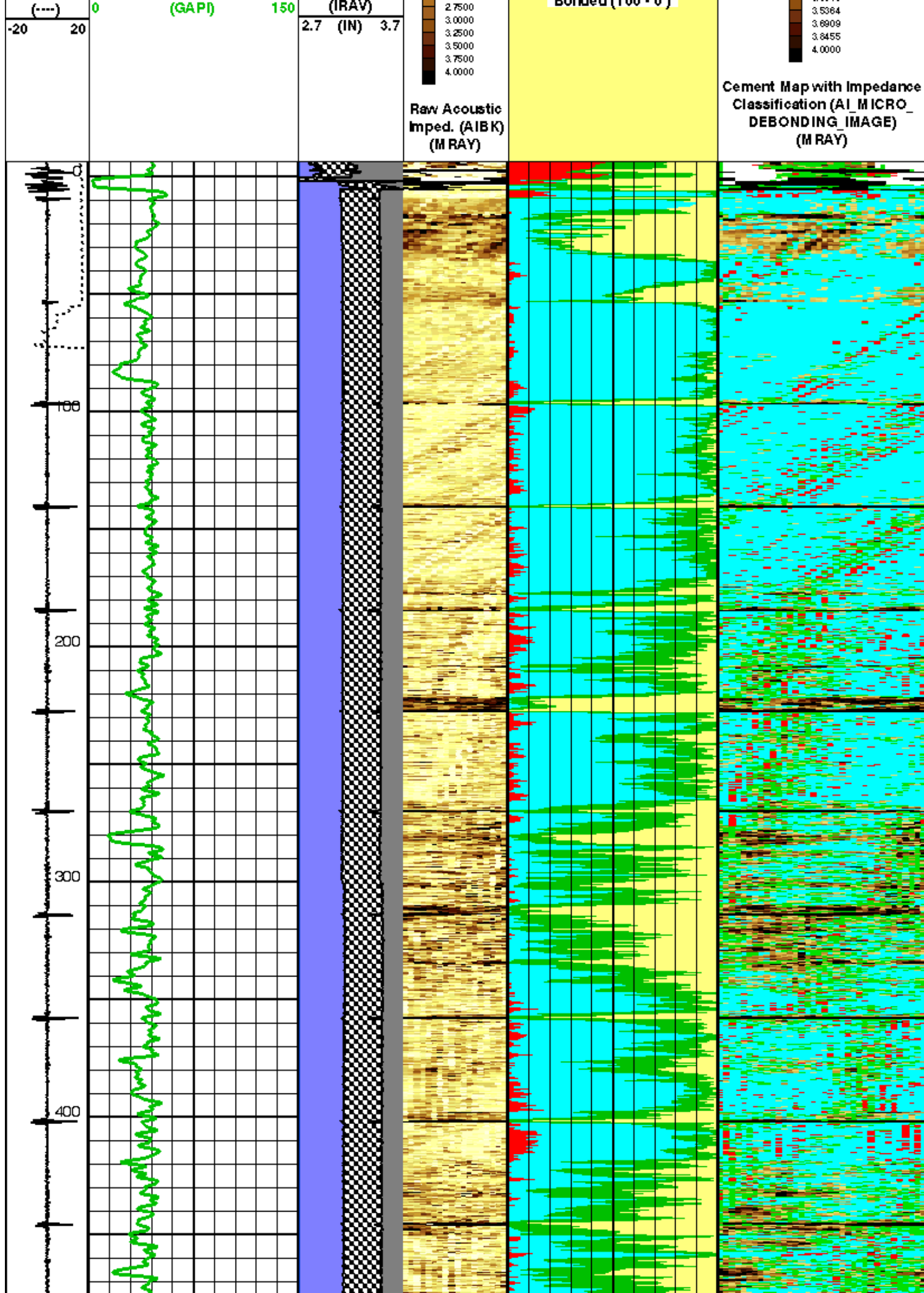
Gamma Ray (GR)

Internal radius  
Average

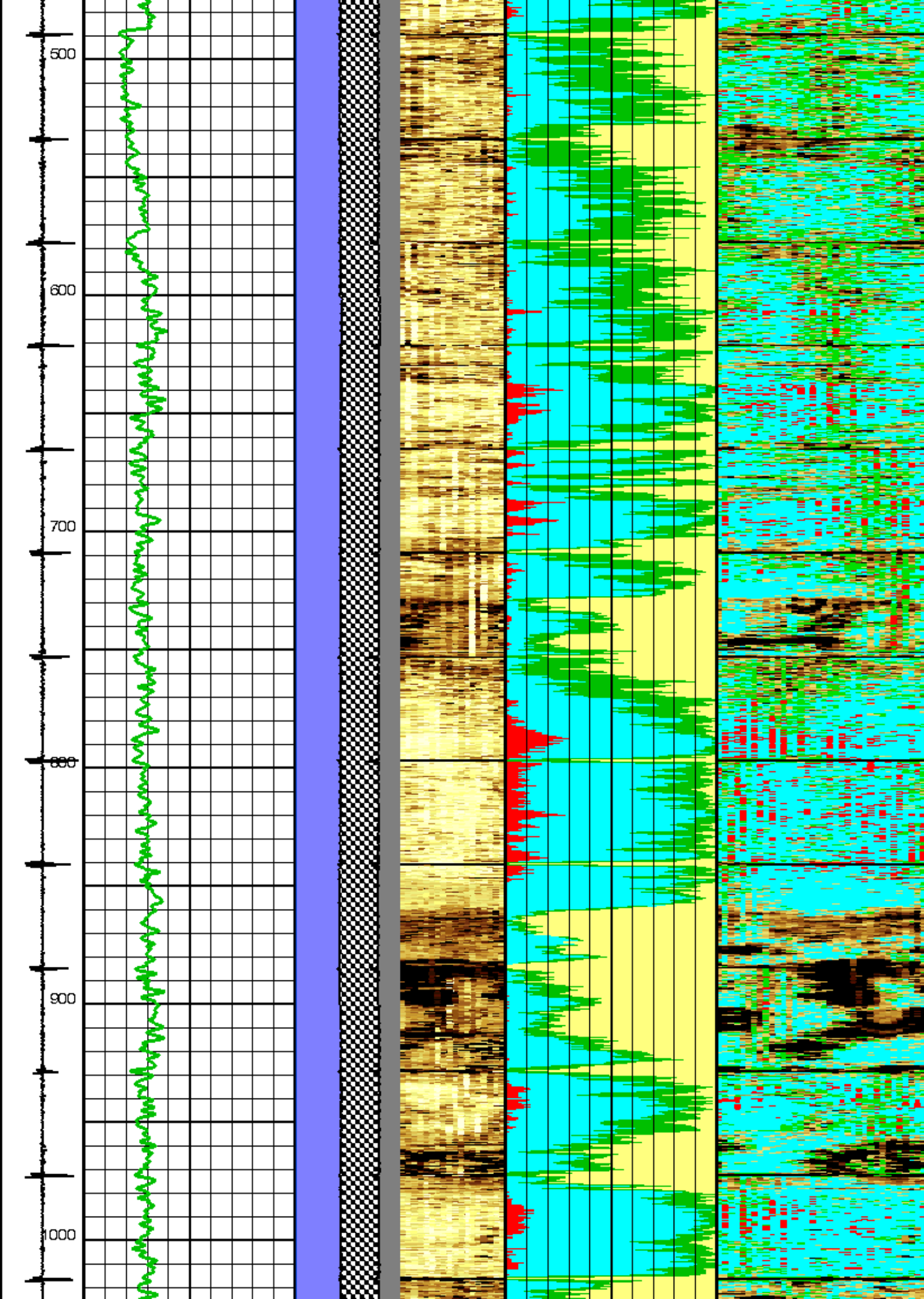
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0.2500  
0.5000  
0.7500  
1.0000  
1.2500  
1.5000  
1.7500  
2.0000  
2.2500  
2.5000

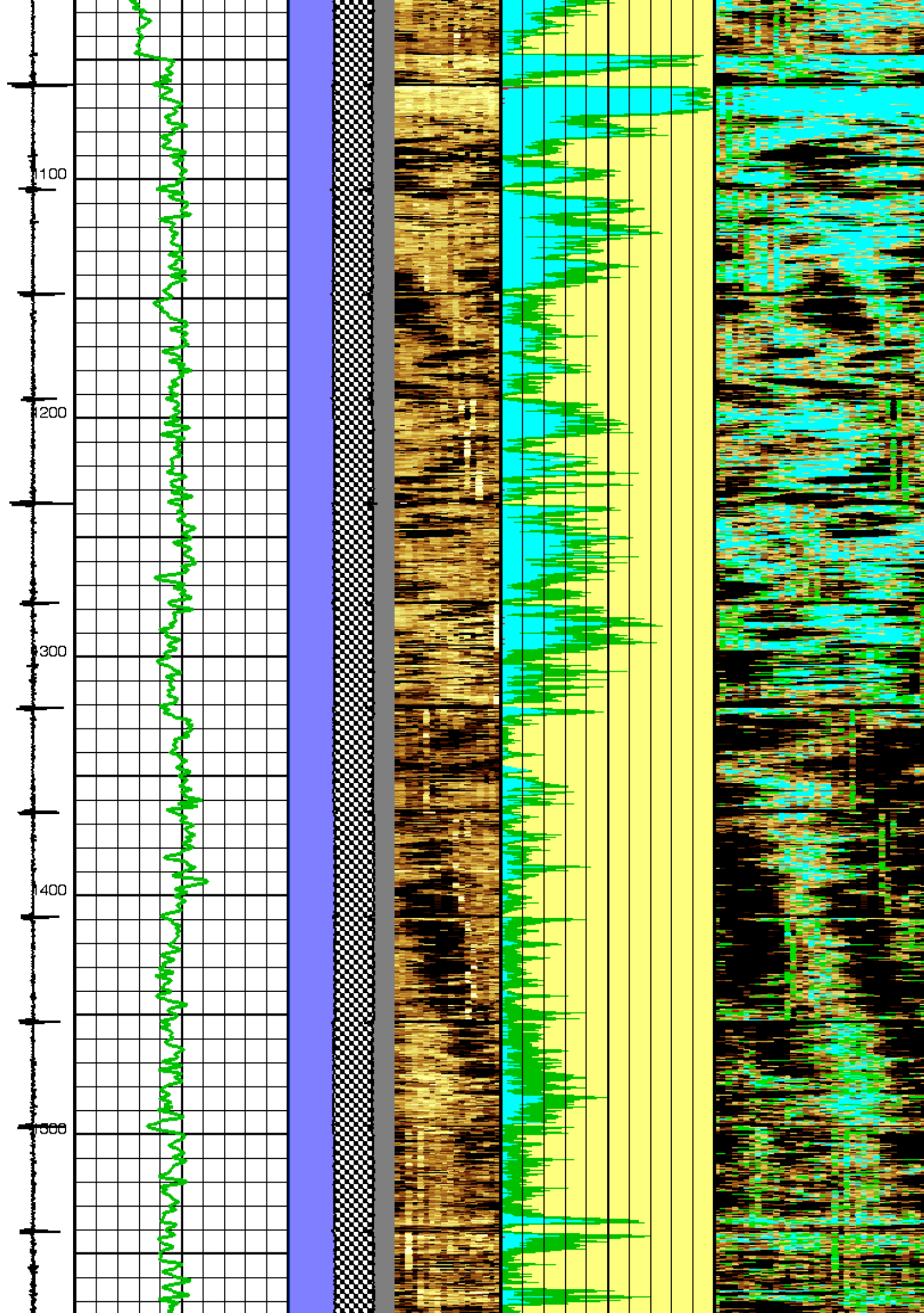
Banded (100.0%)

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500.0000  
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3.2273  
3.3818

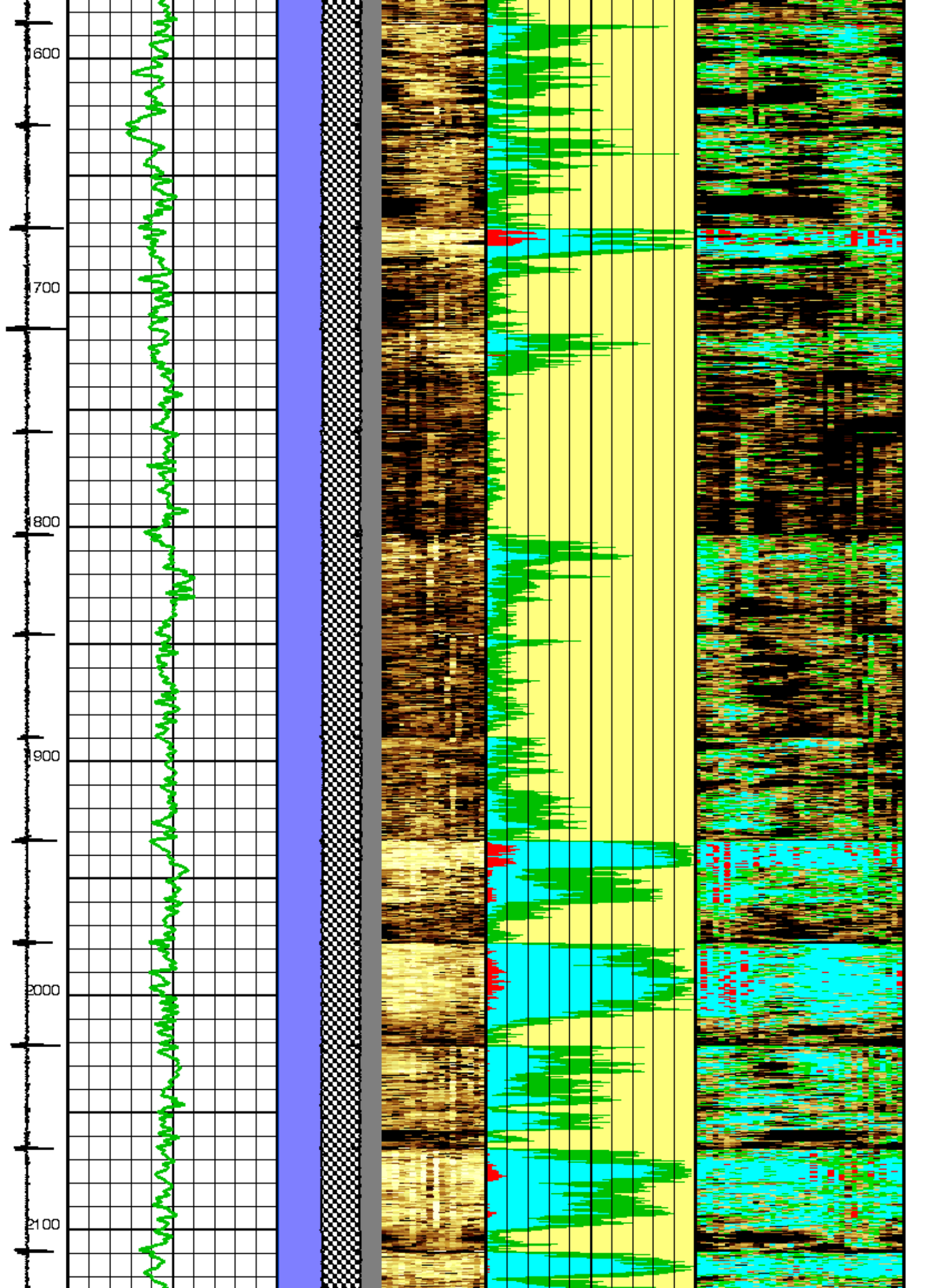


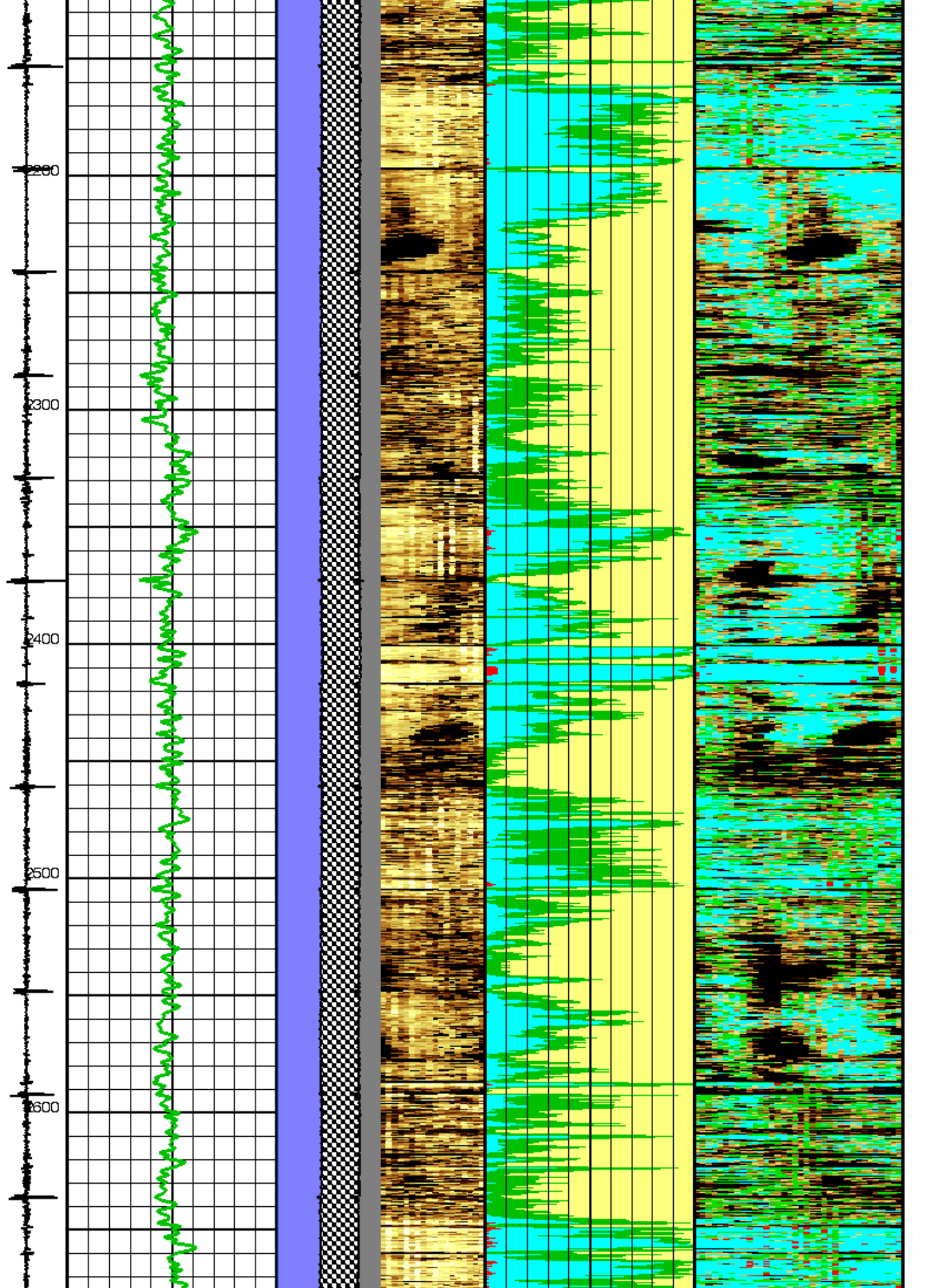




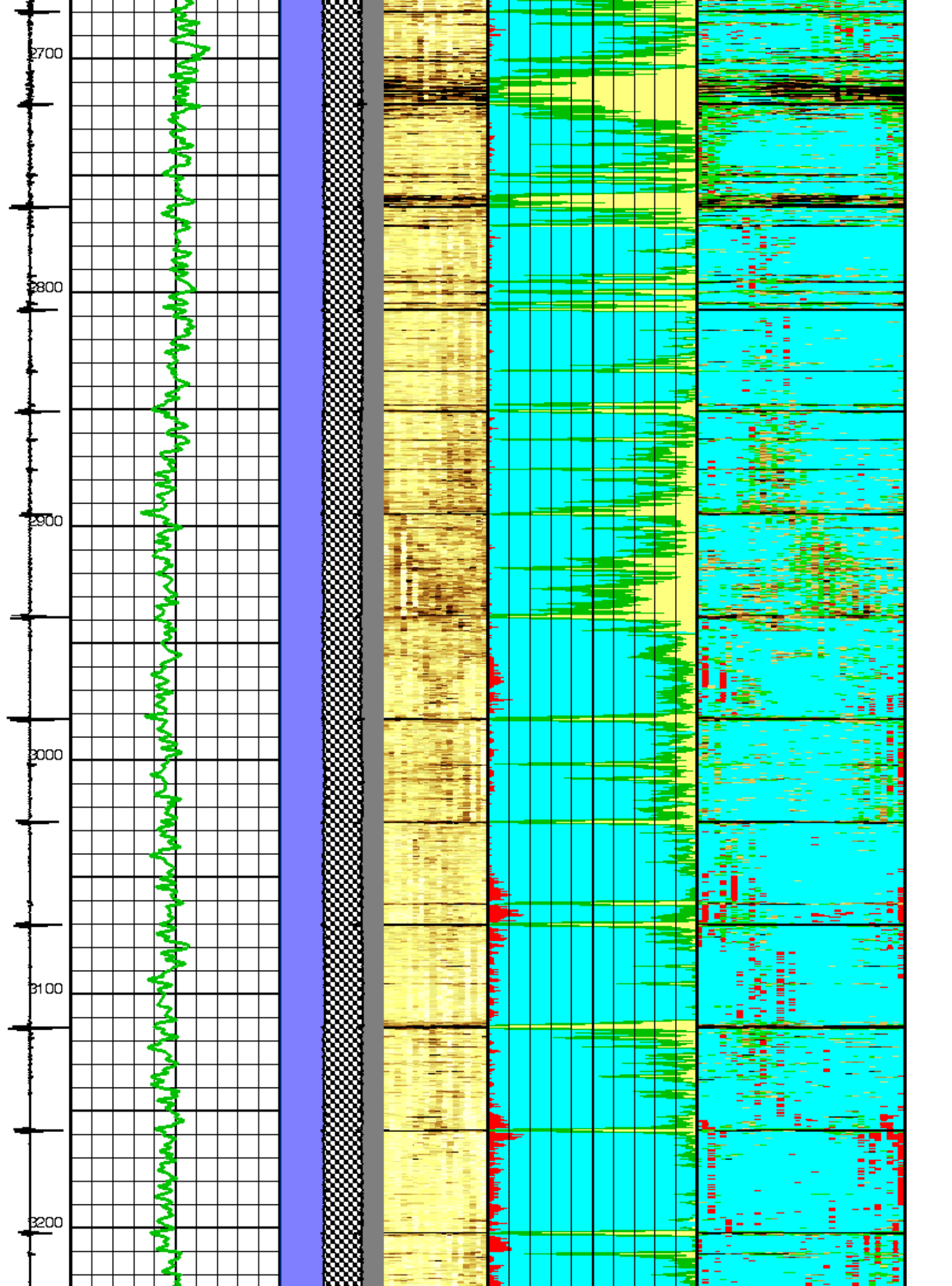


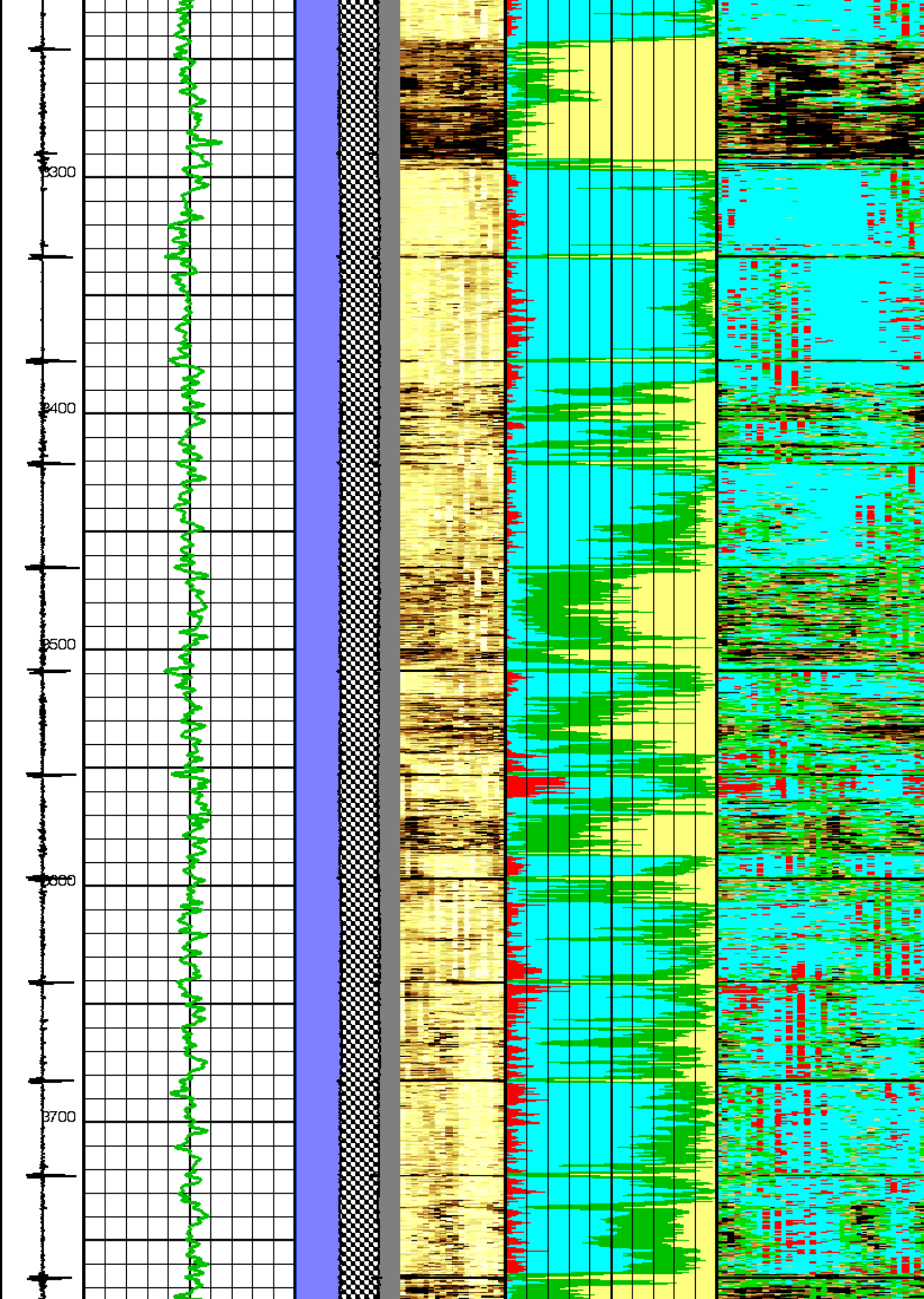




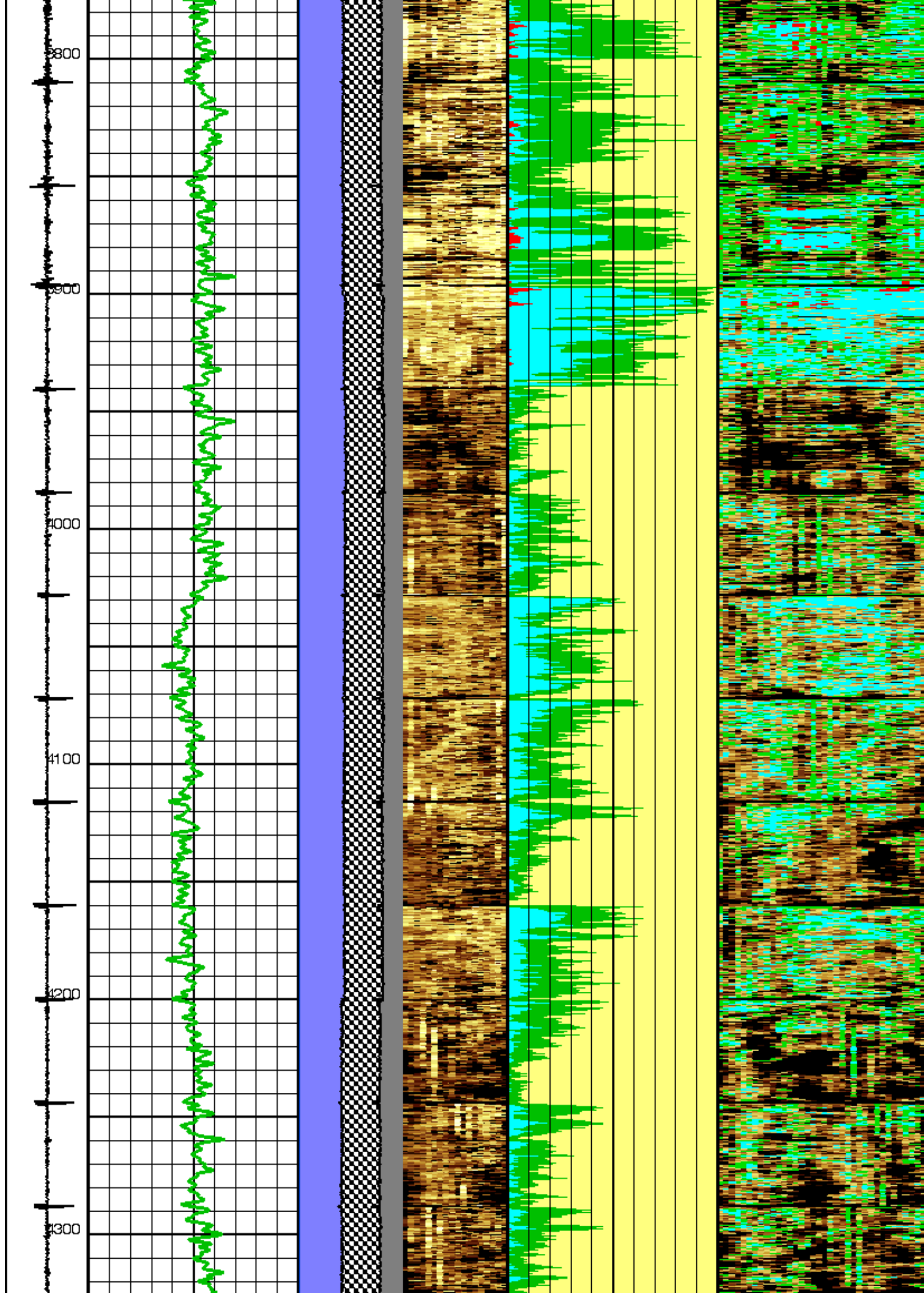


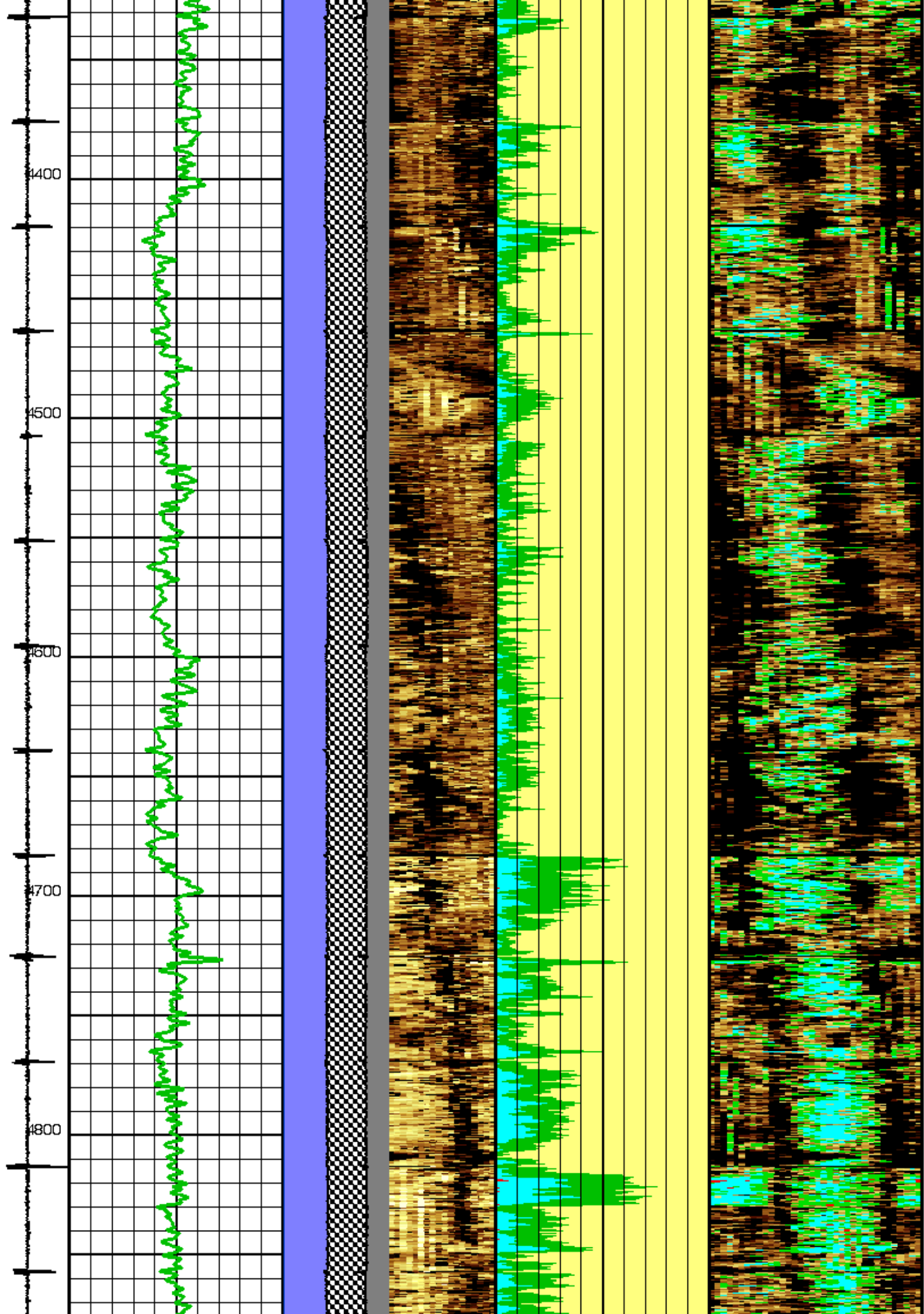




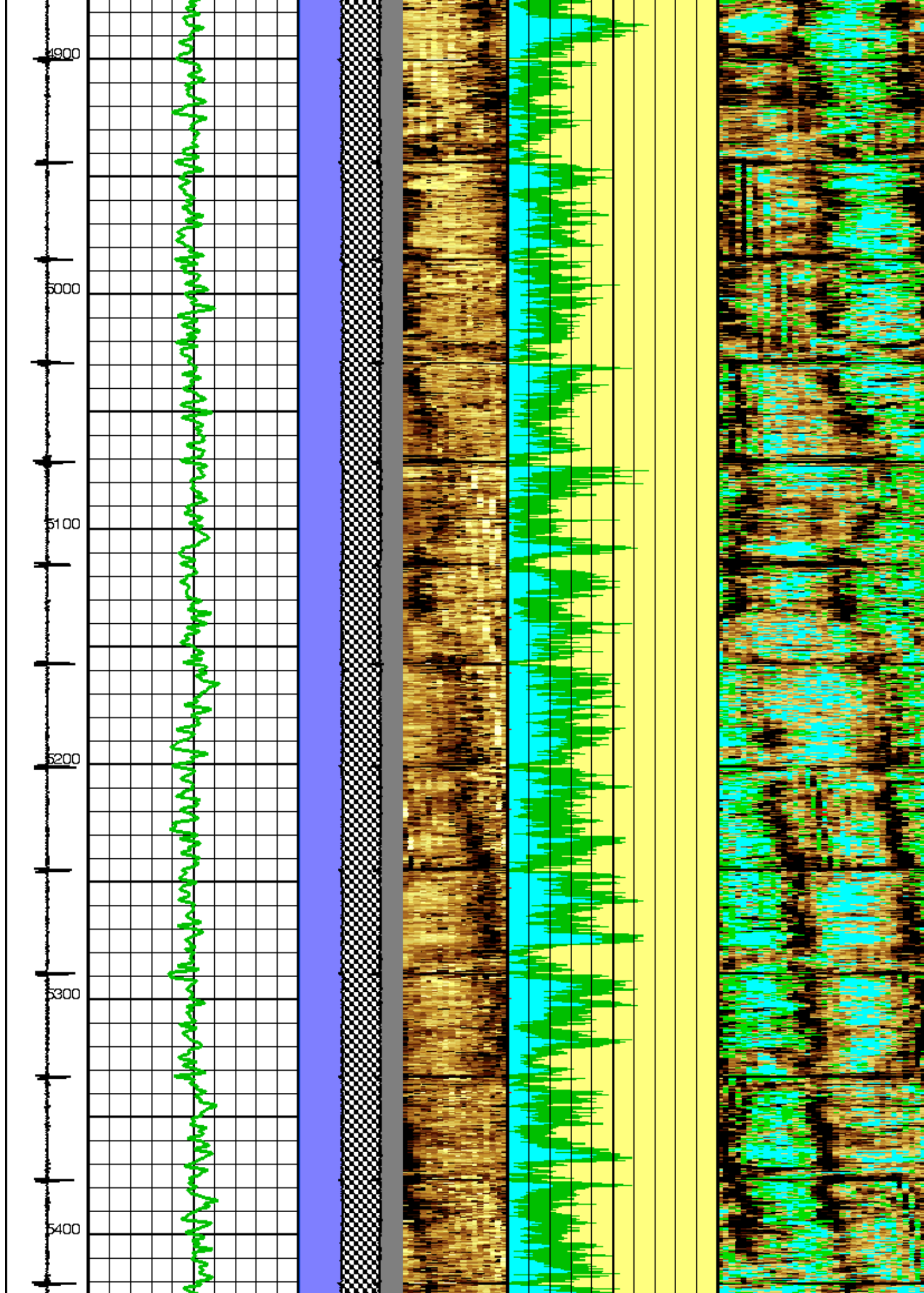


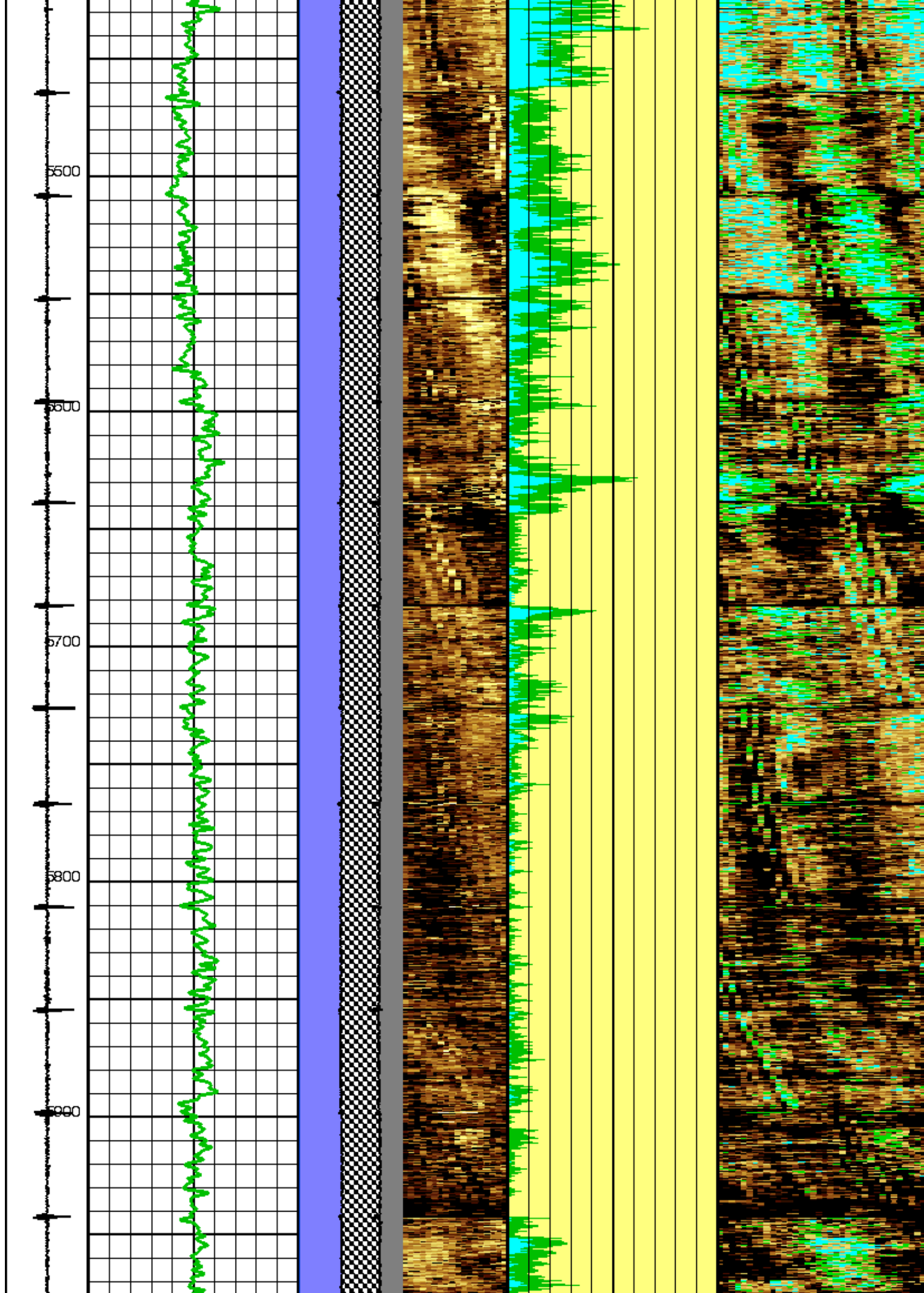




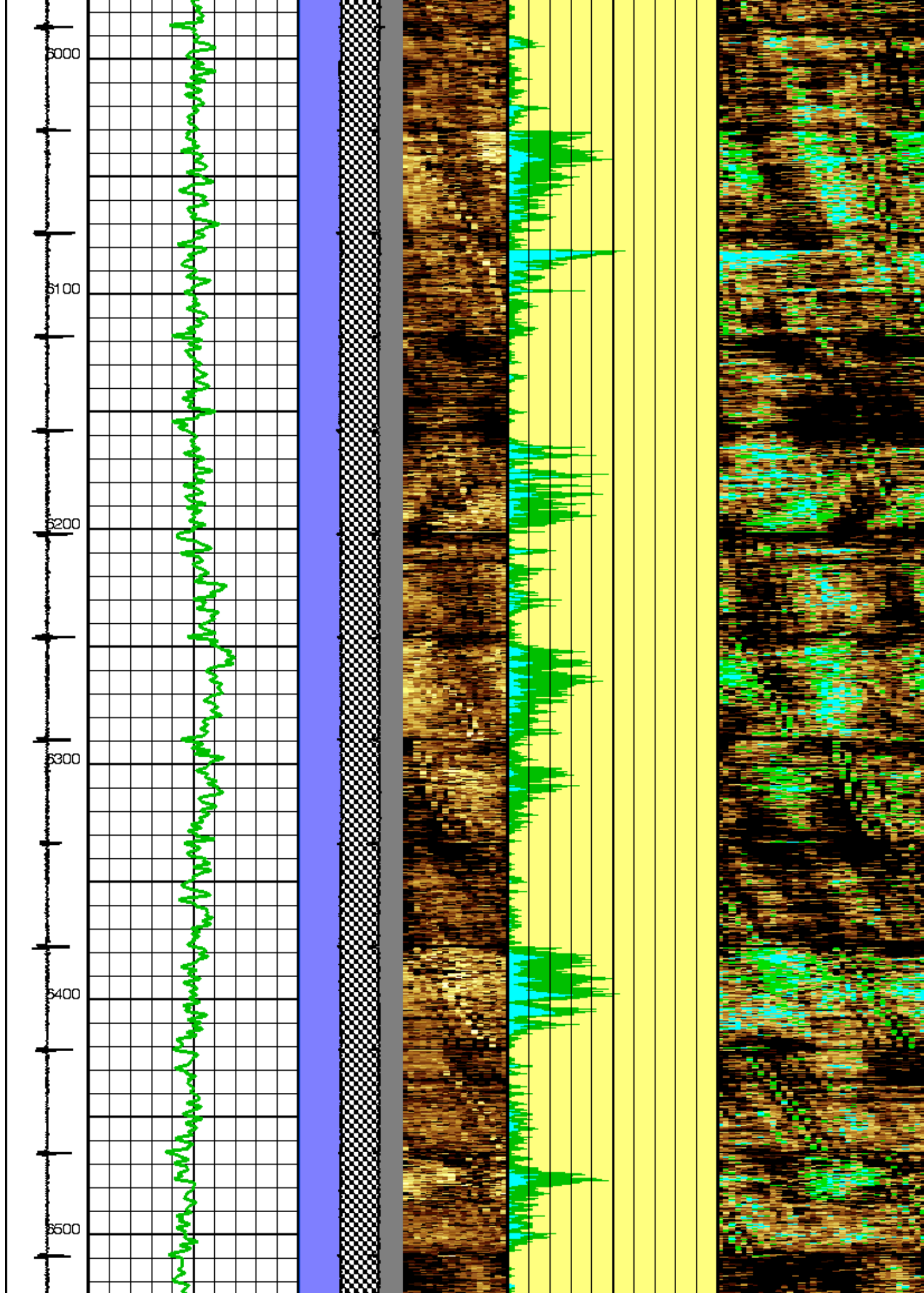


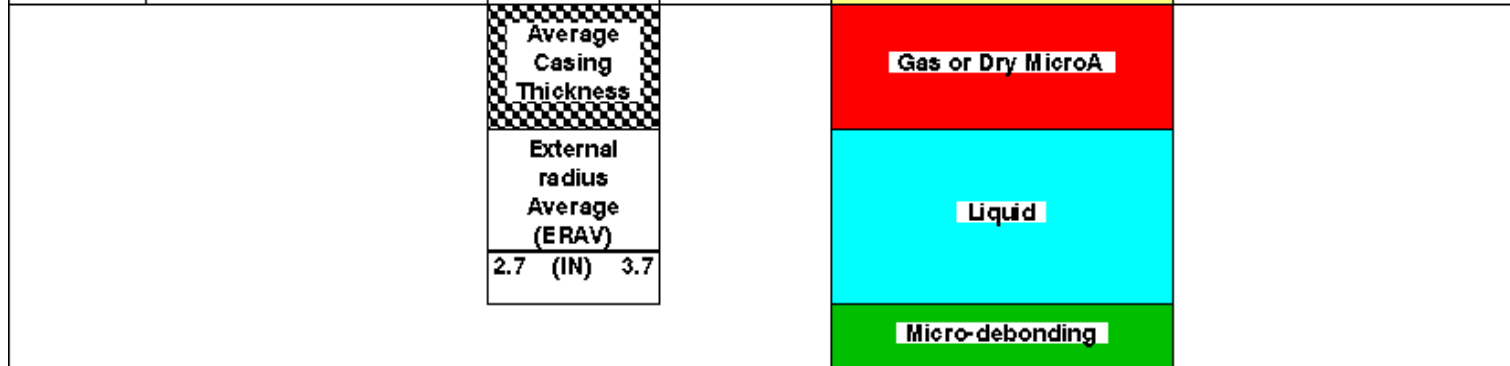
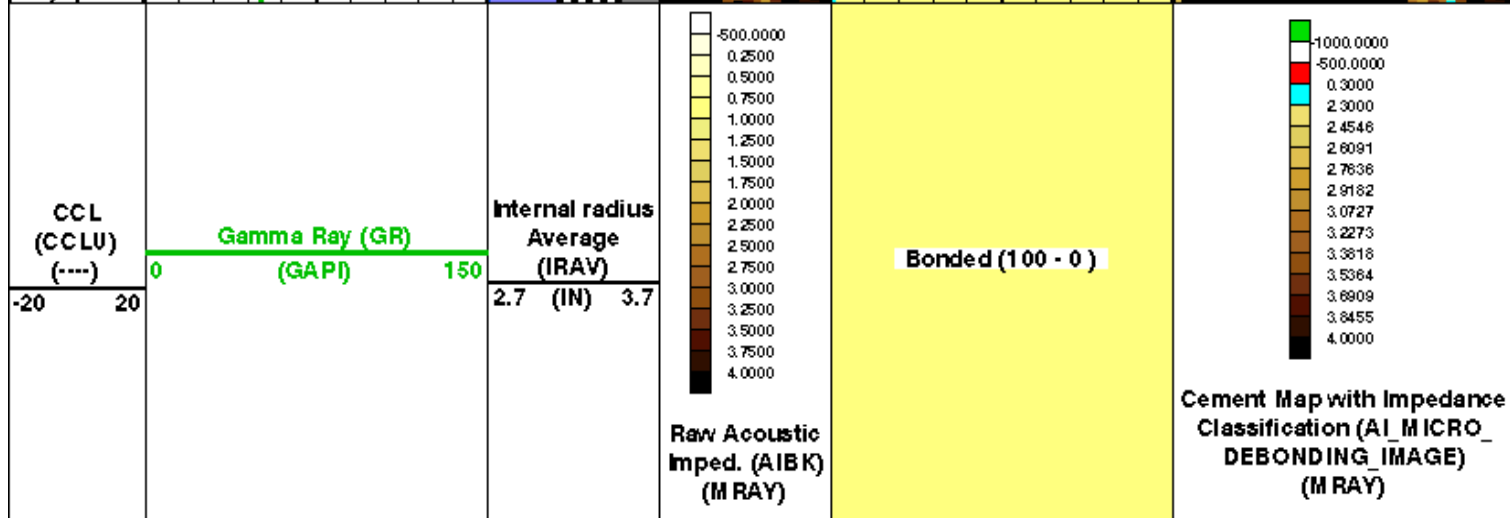
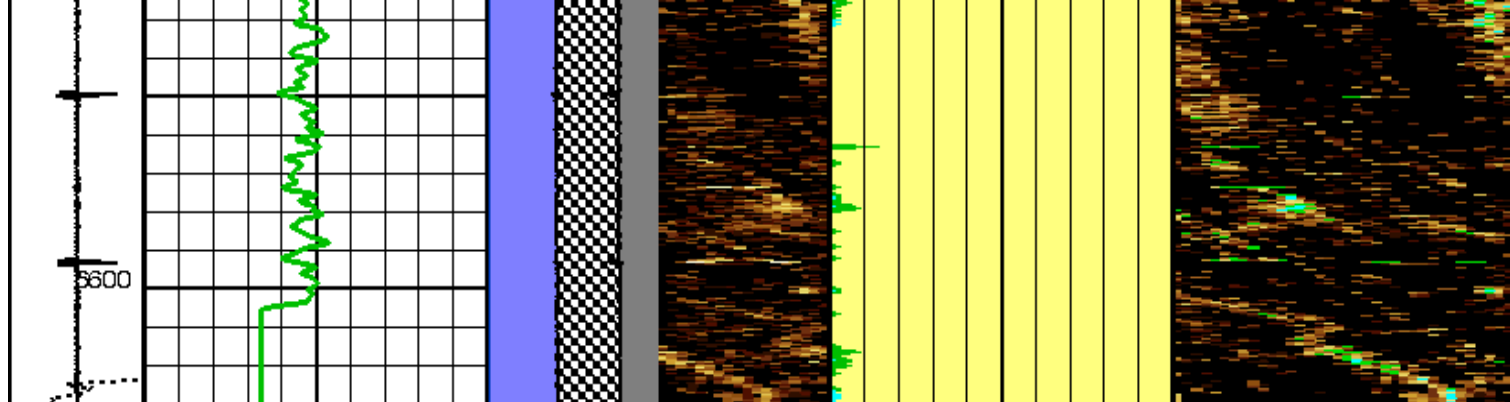












Format: USIT ND State 2 inch Vertical Scale: 2" per 100' Graphics File Created: 24-May-2013 11:06

## OP System Version: 19C2-270

USIT-E 19C2-270 SGT-N 19C2-270  
DTC-H 19C2-270

All USI Images are outside views

USI : LOW Frequency Compression Mode Used For Logging.

Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.

## Parameters

DLIS Name	Description	Value
USIT-E: Ultrasonic Imaging - E		
AGMN	Minimum Gain of Cartridge	-4 DB
AGMX	Maximum Gain of Cartridge	20 DB
BERJ	Bad Echo Rejection	ON
CDIA	Casing Outer Diameter	7 IN



CSDE	Casing Outer Diameter	486.94	LBCF
CSID	Casing Inner Diameter	6.276	IN
DFVL	Default Fluid Velocity	189	US/F
DOT	Diameter of Transducer Sensor	2.874	IN
EMXV	EMEX Voltage	20	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.9	LB/G
RCD	Reference Calibrator Outer Diameter	7	IN
RCSO	Reference Calibrator Standoff	1.1811	IN
RCTH	Reference Calibrator Thickness	0.2952	IN
SDNV	Number of Vertical Samples used for Micro-debonding Computation	5	
SDTHOR	Acoustic Impedance STD Horizontal Threshold for Micro-debonding	0.5	
SDTVER	Acoustic Impedance STD Vertical Threshold for Micro-debonding	0.3	
TCUB	T <sub>3</sub> Processing Level	Vax_Loop	
THDH	Maximum Search Thickness (percentage of nominal)	130	
THDL	Minimum Search Thickness (percentage of nominal)	70	
THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.362	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub_7_inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T <sub>3</sub> Processing Length	21.7078	US
ZCAS	Acoustic Impedance of Casing	46.2537	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.65	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.3	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	26.00	LB/F
DO	Depth Offset for Playback	0.0	FT
PP	Playback Processing	RECOMPUTE	

### Input DLIS Files

DEFAULT	USI_008LUP	FN:7	PRODUCER	24-May-2013 09:21	6630.0 FT	-6.5 FT
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### Output DLIS Files

DEFAULT	USI_018PUP	FN:16	PRODUCER	24-May-2013 11:06		
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Company: Kerr-McGee Oil & Gas Onshore LP

Well: Crowder 15C-18HZ

### Input DLIS Files

DEFAULT	USI_008LUP	FN:7	PRODUCER	24-May-2013 09:21	6630.0 FT	-6.5 FT
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### Output DLIS Files

DEFAULT	USI_018PUP	FN:16	PRODUCER	24-May-2013 11:06	6630.0 FT	-6.5 FT
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### OP System Version: 19C2-270

USIT-E	19C2-270	SGT-N	19C2-270
DTC-H	19C2-270		

### Zoning of Mud Parameters

Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
6600.00	190.34	2.02
6000.00	188.74	2.02
5400.00	188.00	2.05
4800.00	188.14	2.04

4500.00	188.94	2.04
4200.00	185.69	1.97
3900.00	187.65	2.00
3600.00	188.17	2.00
3300.00	189.21	2.00
3000.00	189.74	1.98
2700.00	190.24	1.94
2400.00	190.75	1.93
2100.00	191.75	1.89
1800.00	192.76	1.84
1500.00	193.76	1.81
1200.00	194.76	1.81
900.00	196.27	1.81
600.00	197.78	1.81
300.00	200.46	1.81

Minimum Acoustic Impedance #2 (MIN_ AI2) (M RAY)	Minimum Acoustic Impedance #4 (MIN_ AI4) (M RAY)	Minimum Acoustic Impedance #6 (MIN_ AI6) (M RAY)	Minimum Acoustic Impedance #8 (MIN_ AI8) (M RAY)
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5

Minimum Acoustic Impedance #1 (MIN_ AI1) (M RAY)	Minimum Acoustic Impedance #3 (MIN_ AI3) (M RAY)	Minimum Acoustic Impedance #5 (MIN_ AI5) (M RAY)	Minimum Acoustic Impedance #7 (MIN_ AI7) (M RAY)
0 15	0 15	0 15	0 15

Maximum Acoustic Impedance #2 (MAX_ AI2) (M RAY)	Maximum Acoustic Impedance #4 (MAX_ AI4) (M RAY)	Maximum Acoustic Impedance #6 (MAX_ AI6) (M RAY)	Maximum Acoustic Impedance #8 (MAX_ AI8) (M RAY)
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5

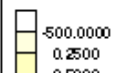
Maximum Acoustic Impedance #1 (MAX_ AI1) (M RAY)	Maximum Acoustic Impedance #3 (MAX_ AI3) (M RAY)	Maximum Acoustic Impedance #5 (MAX_ AI5) (M RAY)	Maximum Acoustic Impedance #7 (MAX_ AI7) (M RAY)	Minimum Acoustic Impedance #9 (MIN_ AI9) (M RAY)	Maximum of AI (AIMX) (M RAY)
0 15	0 15	0 15	0 15	0 15	0 7.5

Average Acoustic Impedance #2 (AV_ AI2) (M RAY)	Average Acoustic Impedance #4 (AV_ AI4) (M RAY)	Average Acoustic Impedance #6 (AV_ AI6) (M RAY)	Average Acoustic Impedance #8 (AV_ AI8) (M RAY)	Maximum Acoustic Impedance #9 (MAX_ AI9) (M RAY)	Minimum of AI (AIMN) (M RAY)
-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5	0 15	0 7.5

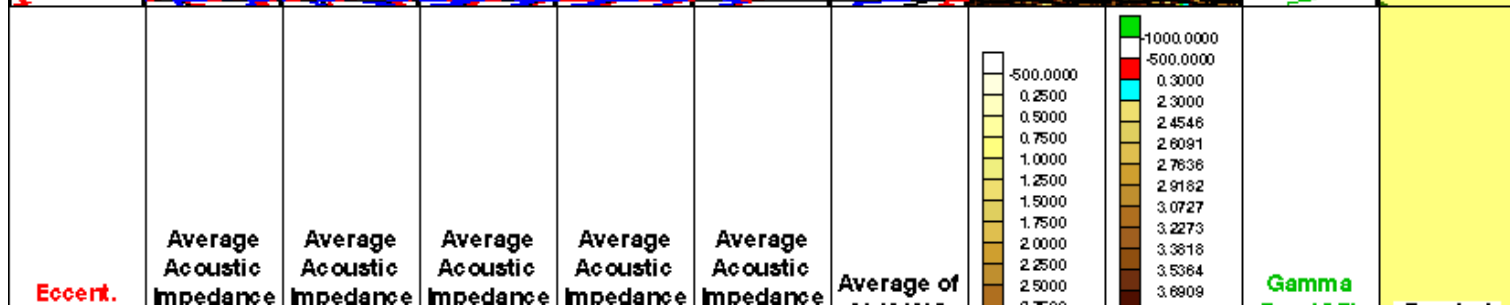
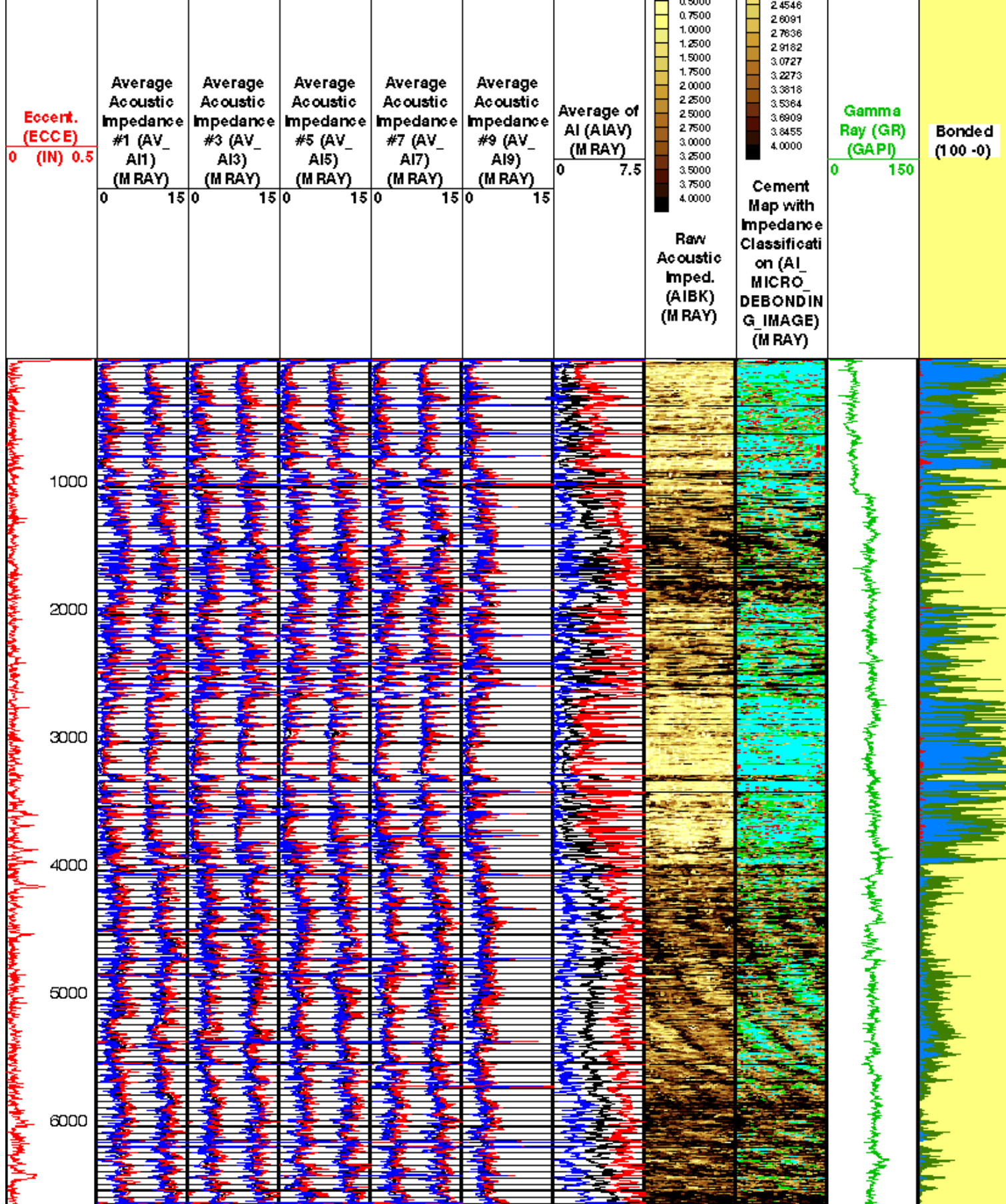
Area

Liquid

Gas







(ECCE) 0 (IN) 0.5	#1 (AV_ AI1) (M RAY)	#3 (AV_ AI3) (M RAY)	#5 (AV_ AI5) (M RAY)	#7 (AV_ AI7) (M RAY)	#9 (AV_ AI9) (M RAY)	AI (AIAV) (M RAY)	 Raw Acoustic Imped. (AIBK) (M RAY)	 Cement Map with Impedance Classification on AI MICRO DEBONDING IMAGE (M RAY)	Ray (GR) (GAPI) 0 150	Bonded (100 -0)
	0 15	0 15	0 15	0 15	0 15	0 7.5				
	Average Acoustic Impedance #2 (AV_ AI2) (M RAY)	Average Acoustic Impedance #4 (AV_ AI4) (M RAY)	Average Acoustic Impedance #6 (AV_ AI6) (M RAY)	Average Acoustic Impedance #8 (AV_ AI8) (M RAY)	Maximum Acoustic Impedance #9 (MAX_ AI9) (M RAY)	Minimum of AI (AIMN) (M RAY)	  			
	-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5	0 15	0 7.5				
	Maximum Acoustic Impedance #1 (MAX_ AI1) (M RAY)	Maximum Acoustic Impedance #3 (MAX_ AI3) (M RAY)	Maximum Acoustic Impedance #5 (MAX_ AI5) (M RAY)	Maximum Acoustic Impedance #7 (MAX_ AI7) (M RAY)	Minimum Acoustic Impedance #9 (MIN_ AI9) (M RAY)	Maximum of AI (AIMX) (M RAY)				
	0 15	0 15	0 15	0 15	0 15	0 7.5				
	Maximum Acoustic Impedance #2 (MAX_ AI2) (M RAY)	Maximum Acoustic Impedance #4 (MAX_ AI4) (M RAY)	Maximum Acoustic Impedance #6 (MAX_ AI6) (M RAY)	Maximum Acoustic Impedance #8 (MAX_ AI8) (M RAY)						
	-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5						
	Minimum Acoustic Impedance #1 (MIN_ AI1) (M RAY)	Minimum Acoustic Impedance #3 (MIN_ AI3) (M RAY)	Minimum Acoustic Impedance #5 (MIN_ AI5) (M RAY)	Minimum Acoustic Impedance #7 (MIN_ AI7) (M RAY)						
	0 15	0 15	0 15	0 15						
	Minimum Acoustic Impedance #2 (MIN_ AI2) (M RAY)	Minimum Acoustic Impedance #4 (MIN_ AI4) (M RAY)	Minimum Acoustic Impedance #6 (MIN_ AI6) (M RAY)	Minimum Acoustic Impedance #8 (MIN_ AI8) (M RAY)						
	-7.5 7.5	-7.5 7.5	-7.5 7.5	-7.5 7.5						

Format: USIT only Goodwin Compressed      Vertical Scale: 0.1" per 100'      Graphics File Created: 24-May-2013 11:06

## OP System Version: 19C2-270

USIT-E                      19C2-270                      SGT-N                      19C2-270  
DTC-H                      19C2-270

All USI Images are outside views

USI : LOW Frequency Compression Mode Used For Logging.

Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.

Input DLIS Files

DEFAULT USI\_008LUP FN:7 PRODUCER 24-May-2013 09:21 6630.0 FT -6.5 FT

### Output DLIS Files

DEFAULT USI\_018PUP FN:16 PRODUCER 24-May-2013 11:06

Company: Kerr-McGee Oil & Gas Onshore LP

Well: Crowder 15C-18HZ

### Input DLIS Files

DEFAULT USI\_007LUP FN:6 PRODUCER 24-May-2013 08:47 6628.5 FT 6300.2 FT

### Output DLIS Files

DEFAULT USI\_019PUP FN:17 PRODUCER 24-May-2013 11:16 6628.5 FT 6300.5 FT

### OP System Version: 19C2-270

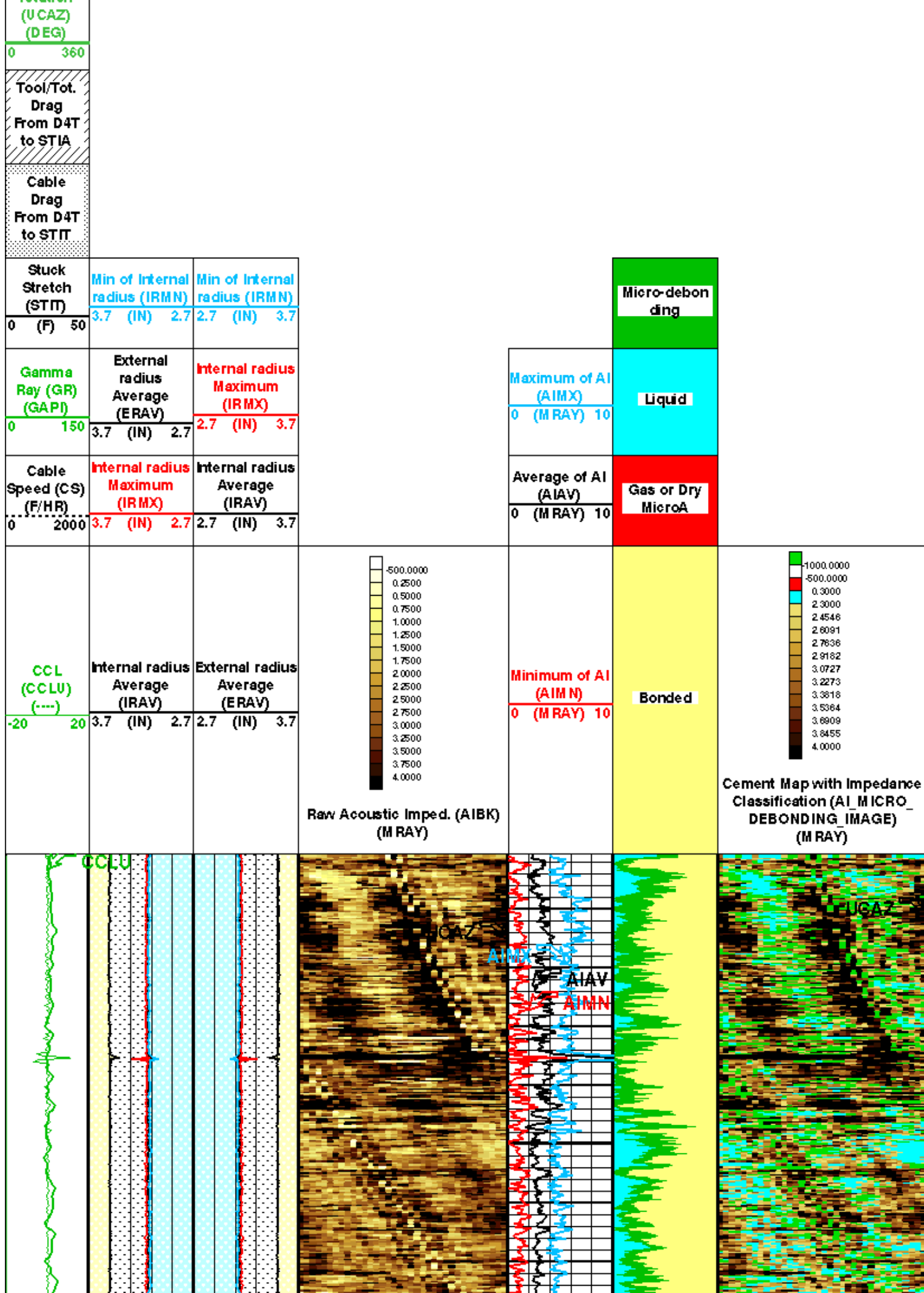
USIT-E 19C2-270 SGT-N 19C2-270  
DTC-H 19C2-270

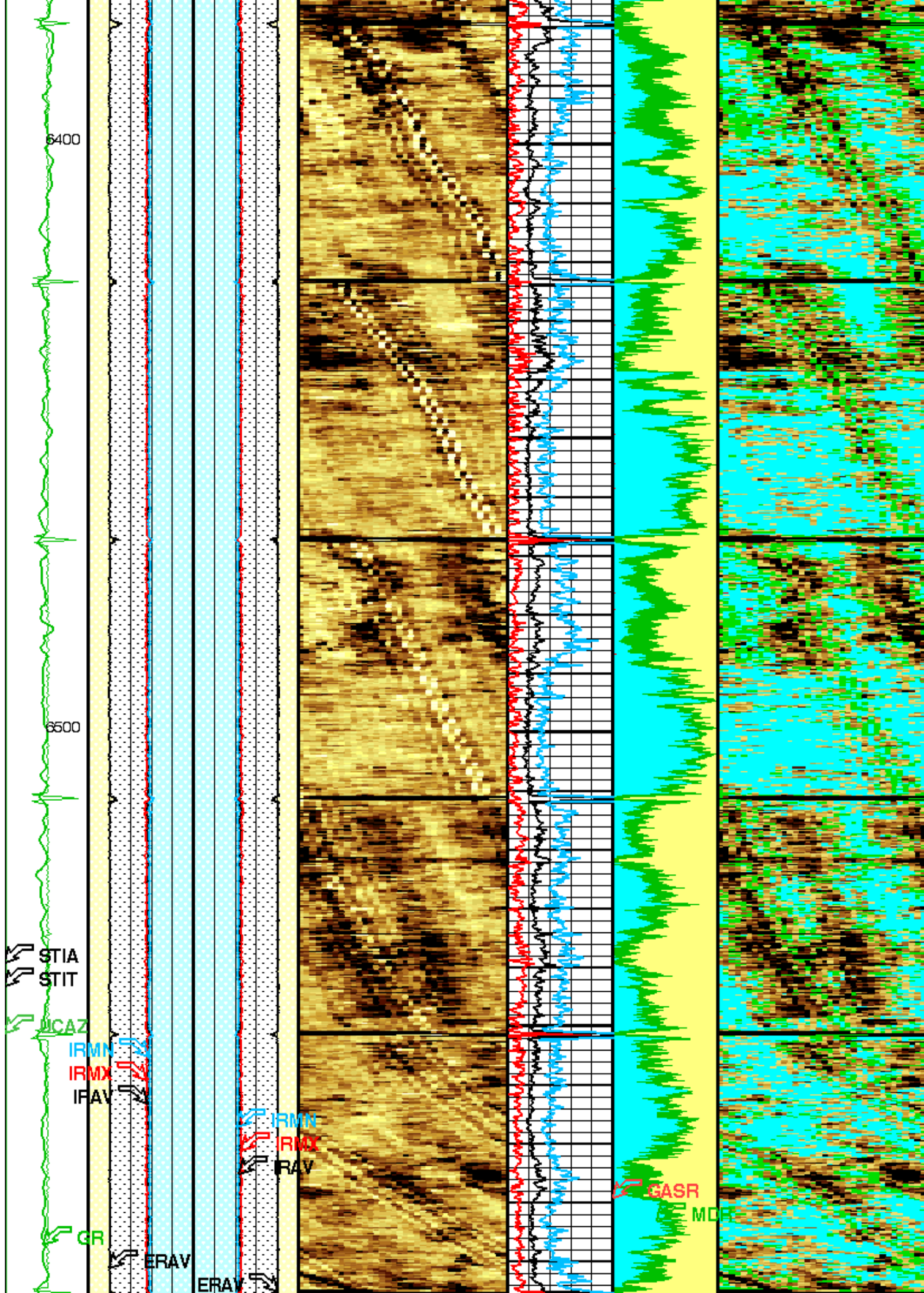
### Zoning of Mud Parameters

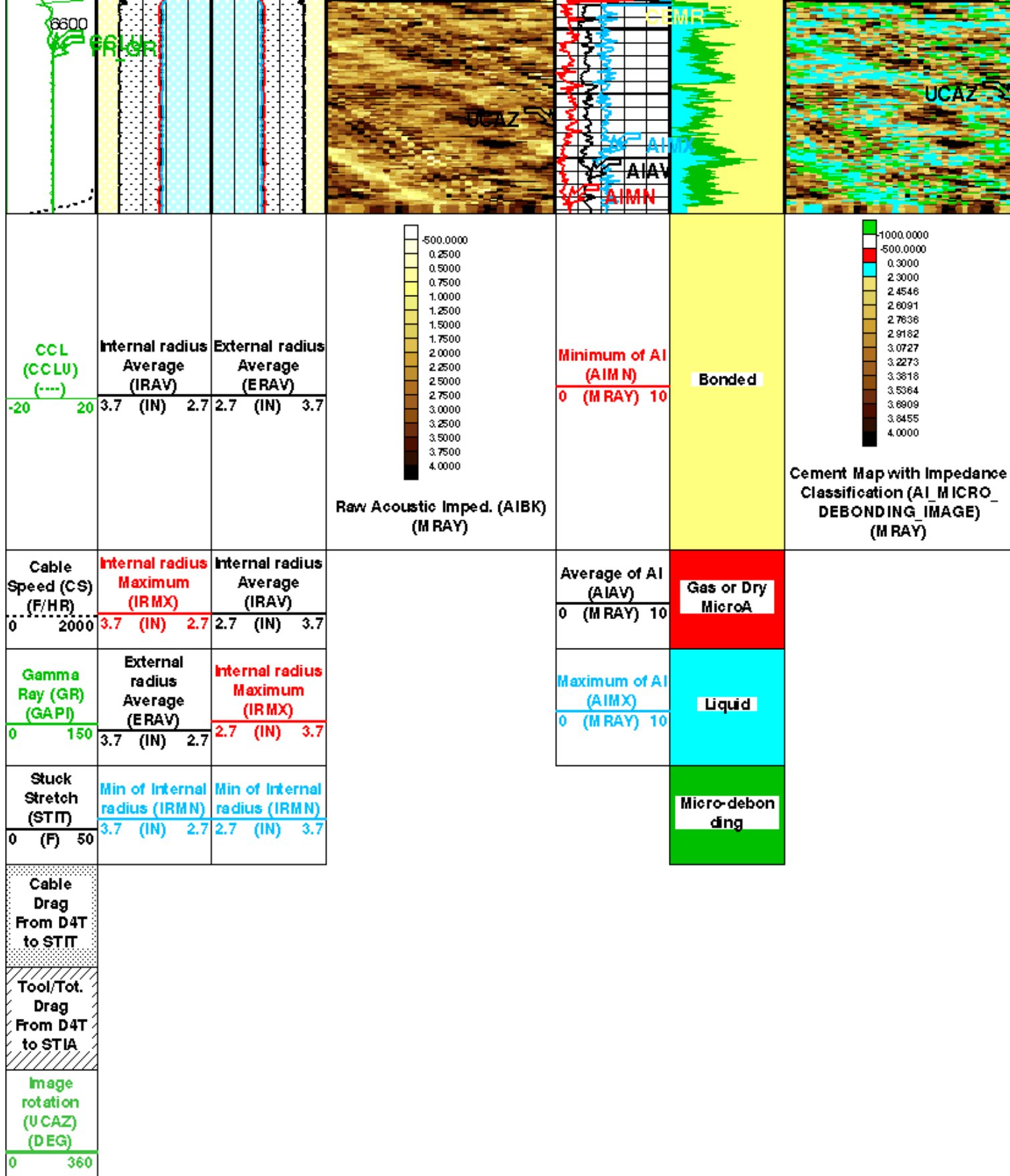
Depth	Fluid Velocity (DFVL)	Acoustic Impedance (ZMUD)
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6600.00	190.34	2.02
6000.00	188.74	2.02
5400.00	188.00	2.05
4800.00	188.14	2.04
4500.00	188.94	1.80
4200.00	185.69	1.73
3900.00	187.65	1.75
3600.00	188.17	1.76
3300.00	189.21	1.75
3000.00	189.74	1.73
2700.00	190.24	1.70
2400.00	190.75	1.69
2100.00	191.75	1.64
1800.00	192.76	1.60
1500.00	193.76	1.56
1200.00	194.76	1.50
900.00	196.27	1.44
600.00	197.78	1.41
300.00	200.46	1.32











USI : LOW Frequency Compression Mode Used For Logging.

Recommended casing thickness range for optimum cement impedance measurement : 0.27 to 0.6 IN.

## Parameters

DLIS Name	Description	Value	
USIT-E: Ultrasonic Imaging - E			
AGMN	Minimum Gain of Cartridge	-4	DB
AGMX	Maximum Gain of Cartridge	20	DB
BERJ	Bad Echo Rejection	ON	
CDIA	Casing Outer Diameter	7	IN
CSDE	Casing Density	486.94	LBC/F
CSID	Casing Inner Diameter	6.276	IN
DFVL	Default Fluid Velocity	189	US/F
DOT	Diameter of Transducer Sensor	2.874	IN
EMXV	EMEX Voltage	20	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.9	LB/G
RCOD	Reference Calibrator Outer Diameter	7	IN
RCSO	Reference Calibrator Standoff	1.1811	IN
RCTH	Reference Calibrator Thickness	0.2952	IN
SDNV	Number of Vertical Samples used for Micro-debonding Computation	5	
SDTHOR	Acoustic Impedance STD Horizontal Threshold for Micro-debonding	0.5	
SDTVER	Acoustic Impedance STD Vertical Threshold for Micro-debonding	0.3	
TCUB	T <sup>3</sup> Processing Level	Vax_Loop	
THDH	Maximum Search Thickness (percentage of nominal)	130	
THDL	Minimum Search Thickness (percentage of nominal)	70	
THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.362	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub 7 inch	
UWKM	Ultrasonic Working Mode	10DEG_3IN_60U_LF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T <sup>3</sup> Processing Length	21.7078	US
ZCAS	Acoustic Impedance of Casing	46.2537	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.65	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.3	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
STI: Stuck Tool Indicator			
LBFR	Trigger for MAXIS First Reading Label	TDL	
STKT	STI Stuck Threshold	2.5	FT
TDD	Total Depth - Driller	11583.00	FT
TDL	Total Depth - Logger	6630.00	FT
System and Miscellaneous			
CWEI	Casing Weight	26.00	LB/F
DO	Depth Offset for Playback	0.0	FT
PP	Playback Processing	RECOMPUTE	

## Input DLIS Files

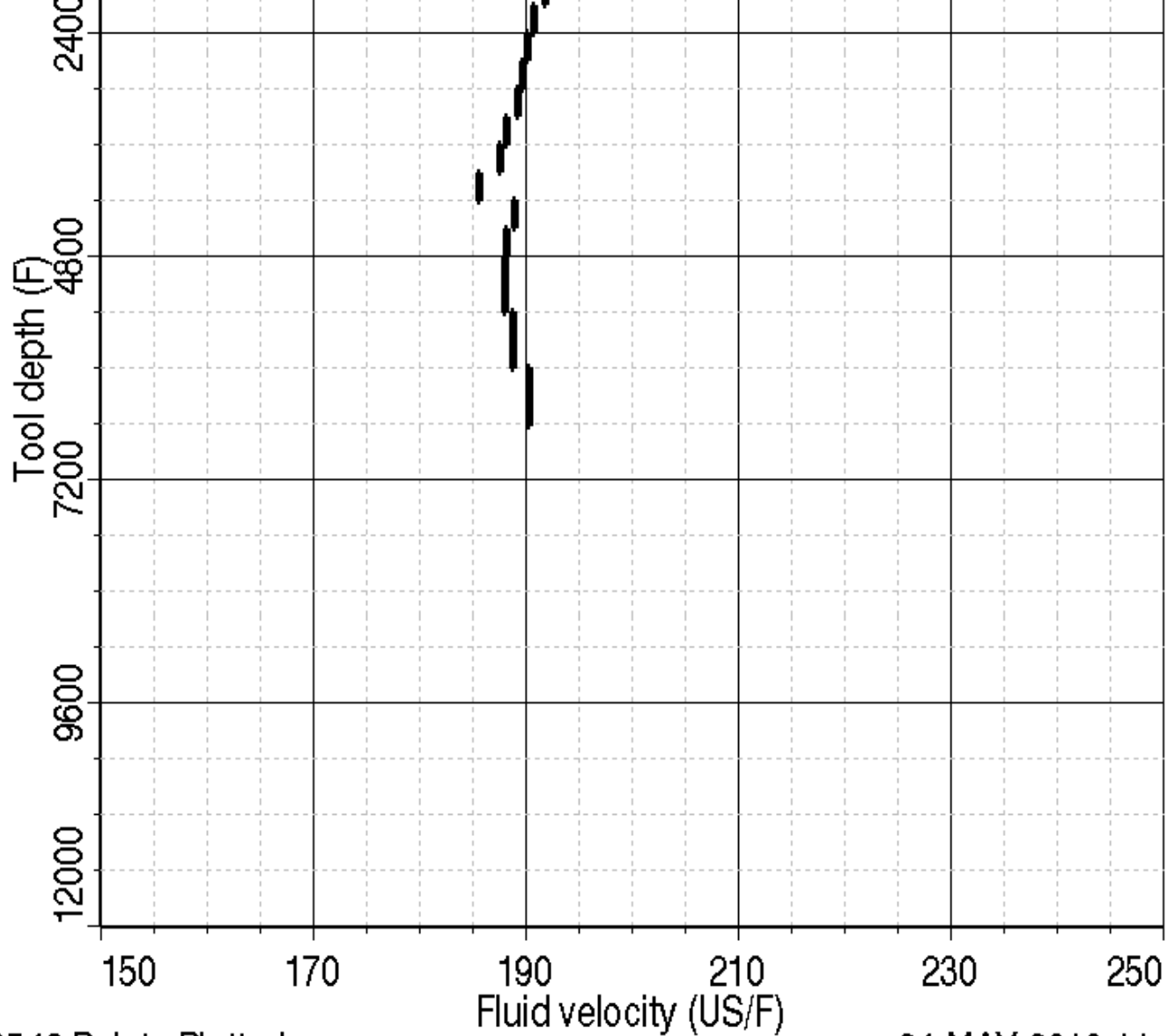
DEFAULT	USI_007LUP	FN:6	PRODUCER	24-May-2013 08:47	6628.5 FT	6300.2 FT
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## Output DLIS Files

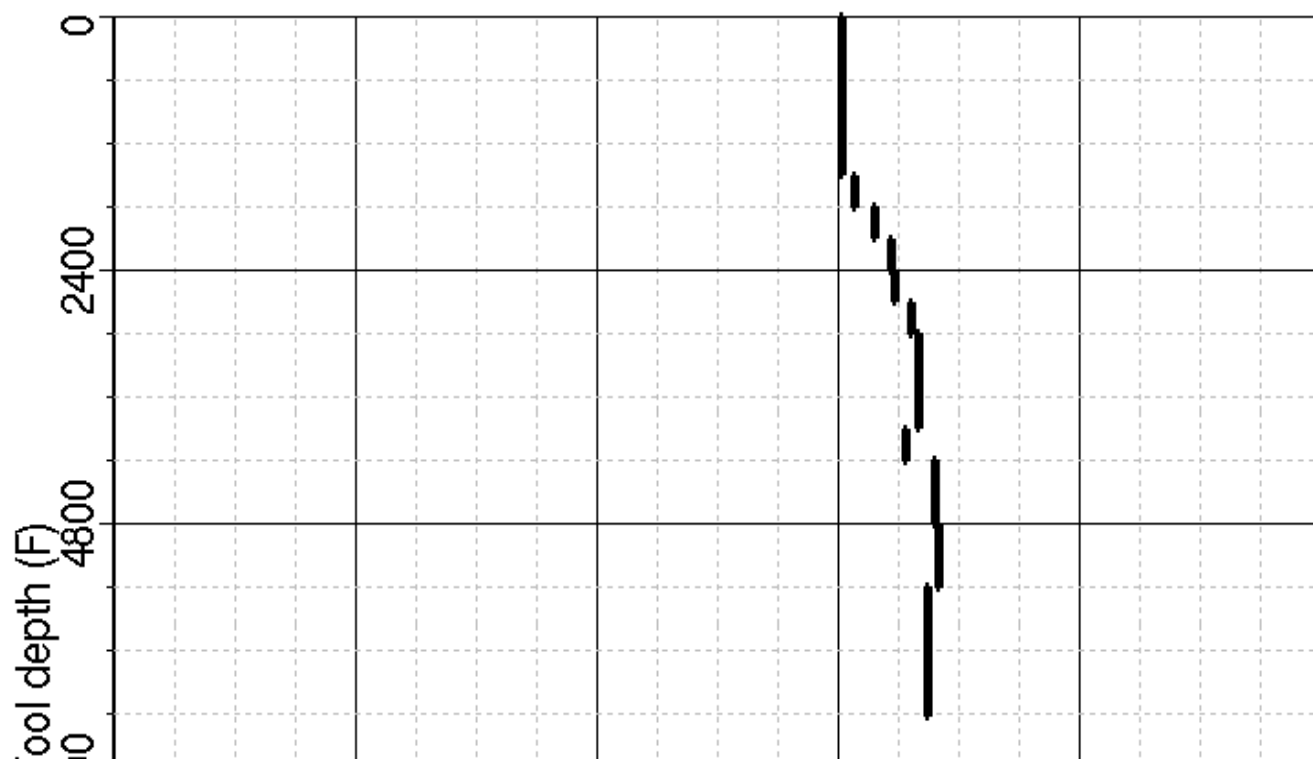
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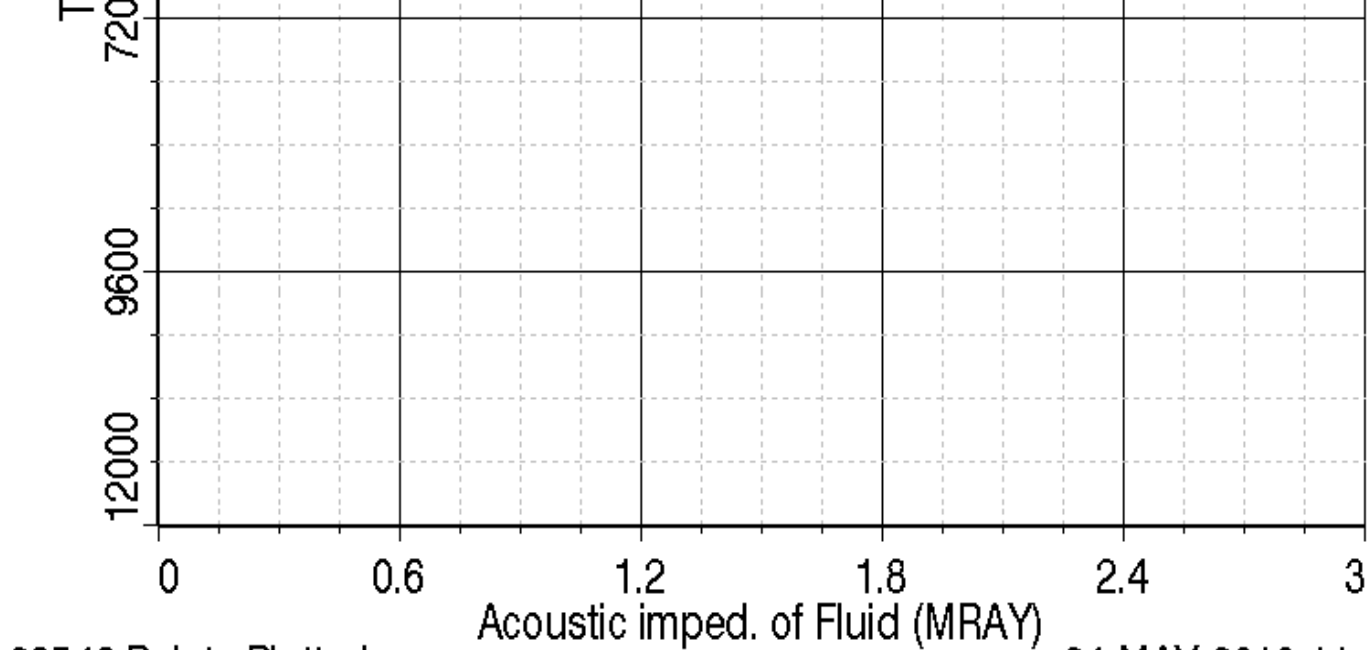
Index: 6630.0 - -6.2 FT





Index: 6630.0 - -6.2 FT





26546 Points Plotted

24-MAY-2013 11:15

Company: **Kerr-McGee Oil & Gas Onshore LP**

**Schlumberger**

Well: **Crowder 15C-18HZ**

Field: **Wattenberg**

County: **Weld**

State: **Colorado**

USIT

Cement Evaluation