

Schlumberger

Company: Xcel Energy, Inc

Well: Roundup Storage Unit No 23

Field: Roundup

County: Morgan

State: Colorado

County: Morgan

Field: Roundup

Location: SWNE Sec. 28, T2N, R60W

Well: Roundup Storage Unit No 23

Company: Xcel Energy, Inc

LOCATION

SWNE Sec. 28, T2N, R60W

Elev.: K.B. 4739.00 ft
G.L. 4730.00 ft
D.F. 4738.00 ft

Permanent Datum: _____

Ground Level _____

Elev.: 4730.00 ft _____

Log Measured From: _____

Kelly Bushing _____

9.00 ft above Perm. Datum

Drilling Measured From: _____

Kelly Bushing _____

API Serial No. 05-087-07091-0000

Section 28

Township 2N

Range 60W

Logging Date 4-Sep-2013

Run Number 1

Depth Driller 6450 ft

Schlumberger Depth 6430 ft

Bottom Log Interval 6430 ft

Top Log Interval 0 ft

Casing Fluid Type Brine

Salinity _____

Density _____

Fluid Level 8.4 lbm/gal

0 ft

BIT/CASING/TUBING STRING

7.875 in

Bit Size

From

To

Casing/Tubing Size 4.500 in

Weight 10.5 lbm/ft

Grade

From

To

Maximum Recorded Temperatures 180 degF

Logger On Bottom 4-Sep-2013

Unit Number 3030

Location Ft. Morgan, CO

Recorded By Tim Hoffman

Witnessed By Josh Freed

PVT DATA				Run 1	Run 2	Run
Oil Density						
Water Salinity						
Gas Gravity						
Bo						
Bw						
1/Bg						
Bubble Point Pressure						
Bubble Point Temperature						
Solution GOR						
Maximum Deviation	0 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/CASING/TUBING STRING						
Bit Size						
From						
To						
Casing/Tubing Size						
Weight						
Grade						
From						
To						
Maximum Recorded Temperatures						
Logger On Bottom	Time					
Unit Number	Location					
Recorded By						
Witnessed By						

DEPTH SUMMARY LISTING

Date Created: 4-SEP-2013 15:59:56

Depth System Equipment

Depth Measuring Device	Tension Device	Logging Cable
Type: IDW-B Serial Number: Calibration Date: Calibrator Serial Number: Calibration Cable Type: 7-39P-LXS Wheel Correction 1: -7 Wheel Correction 2: -6	Type: CMTD-B/A Serial Number: 2858 Calibration Date: 20 Aug 2013 Calibrator Serial Number: 78135 Number of Calibration Points: 10 Calibration RMS: 11 Calibration Peak Error: 18	Type: 7-46P-XS Serial Number: Length: 14500 FT Conveyance Method: Wireline Rig Type: LAND

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. Z-Chart used as secondary. 3. 4. 5. 6.

DISCLAIMER

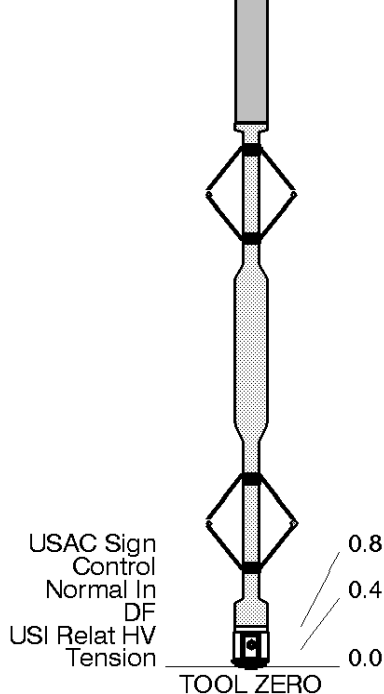
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (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: None OS2: OS3: OS4: OS5:	OTHER SERVICES2 OS1: OS2: OS3: OS4: OS5:
REMARKS: RUN NUMBER 1 Toolstring run as per tool sketch	REMARKS: RUN NUMBER 2
Bridge plug set at 6450 ft.	
Main pass logged with 10deg 1.5in resolution High resolution passes not done	

Pressured up to 500 lbs for top 500 feet of logs					
Logs correlated to Well Tec logs dated 30 Sep 1980					
Rig: Workover					
Crew: Troy Ocanas, Aaron Weber, Scott French					
RUN 1			RUN 2		
SERVICE ORDER #:			SERVICE ORDER #:		
PROGRAM VERSION:			PROGRAM VERSION:		
FLUID LEVEL:			FLUID LEVEL:		
CCN1-00022					
19C2-270					
0 ft					
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1	RUN 2
<div>SURFACE EQUIPMENT</div> <div>GSR-U/Y</div> <div>WITM (DTS)-A</div>	
<div>DOWNHOLE EQUIPMENT</div> <div> <div> <div>LEH-QT</div> <div>LEH-QT</div> <div>32.8</div> </div> <div> <div> <div>DTC-H</div> <div>ECH-KC</div> <div>DTCH0-A</div> <div>DTCH1-A</div> </div> <div>CTEM</div> <div>28.9</div> <div>29.8</div> </div> <div> <div> <div>SGT-N</div> <div>SGH-K</div> <div>SGC-TB</div> <div>SGD-TAB</div> </div> <div> <div>TelStatus</div> <div>ToolStatu</div> <div>26.8</div> </div> <div> <div>Gamma Ray</div> <div>25.9</div> <div>26.8</div> </div> </div> <div> <div> <div>AH-CEN</div> <div>AH-CEN</div> <div>21.4</div> </div> <div> <div> <div>AH-107</div> <div>AH-107</div> <div>17.6</div> </div> <div> <div> <div>USIT-E</div> <div>ECH-MFA</div> <div>USAC-A</div> <div>USIS-A</div> </div> <div>15.6</div> </div> </div> </div></div>	



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

Schlumberger

Casing Integrity
5" = 100'

MAXIS Field Log

Input DLIS Files

DEFAULT	USI_014LUP	FN:13	PRODUCER	04-Sep-2013 07:50	6429.5 FT	41.0 FT
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Output DLIS Files

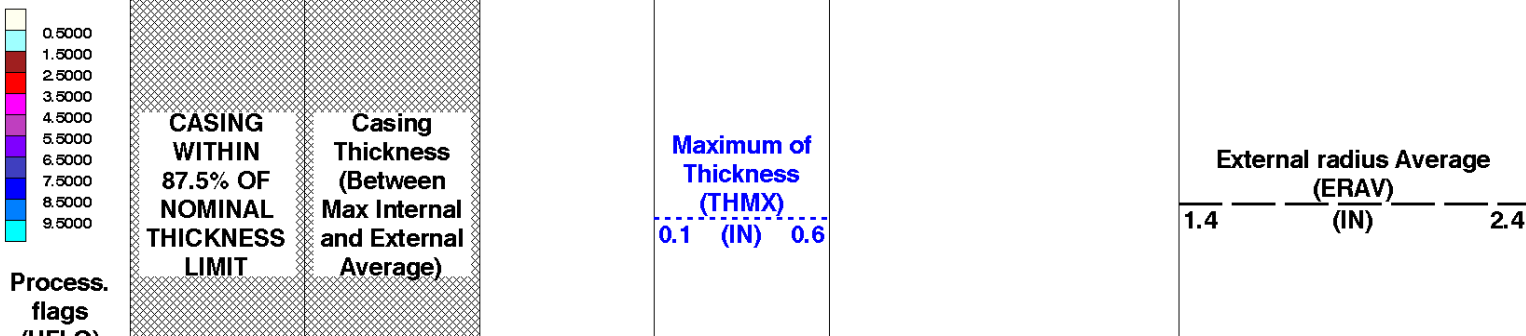
DEFAULT	USI_011PUP	FN:10	PRODUCER	04-Sep-2013 15:43	6433.0 FT	44.5 FT
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OP System Version: 19C2-270

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

PIP SUMMARY

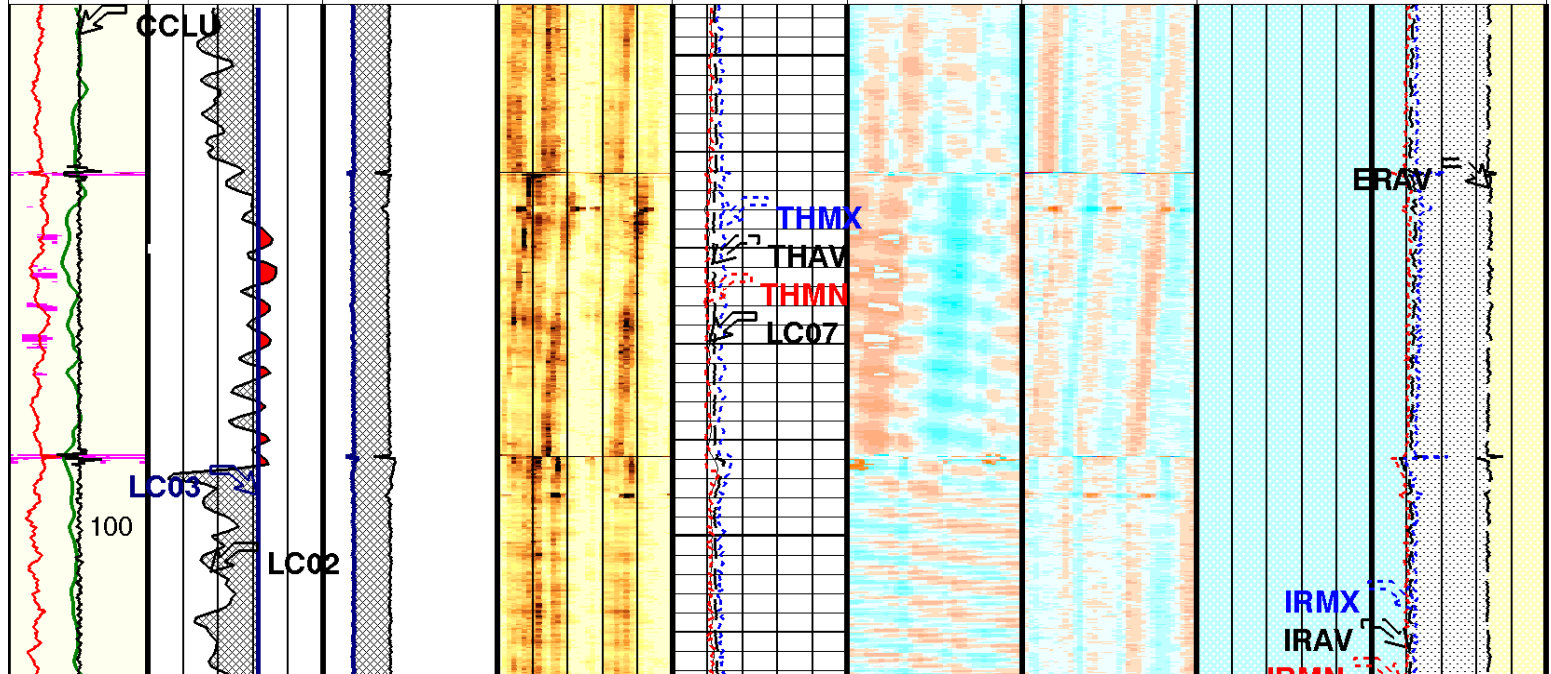
☒ Time Mark Every 60 S

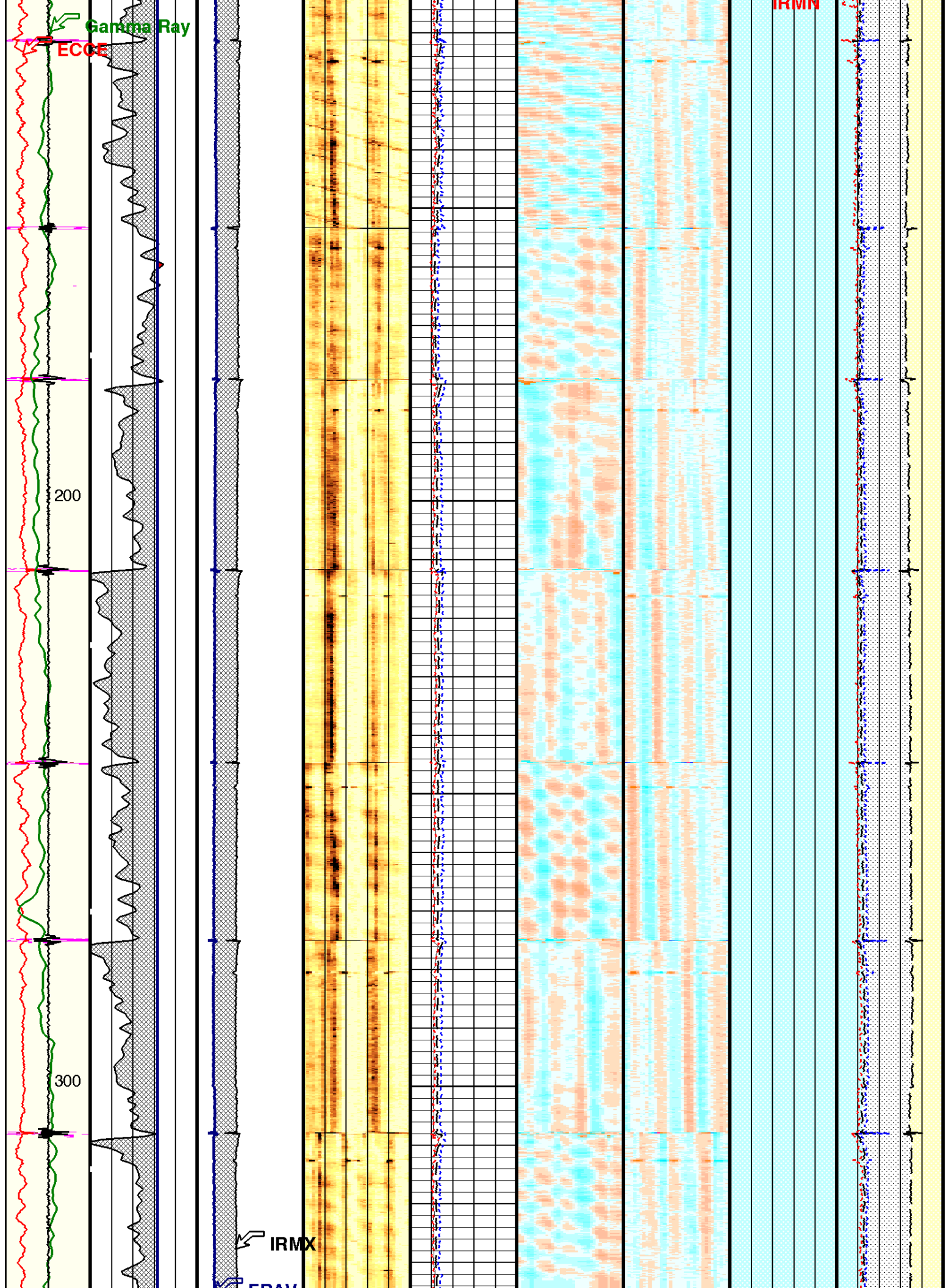


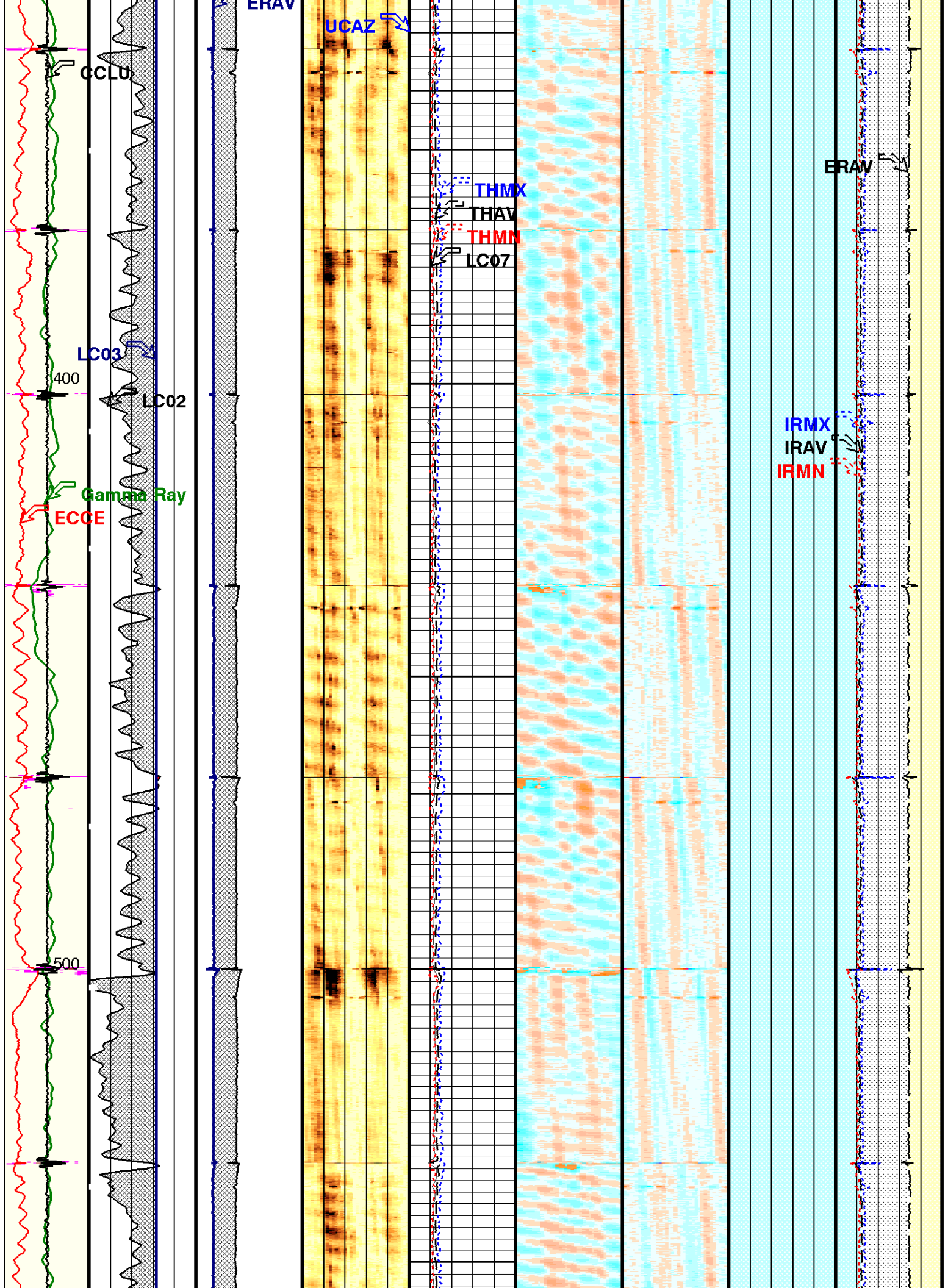
(UFLG) (----					
Gamma Ray (GR) (GAPI) 0 150	LARGE REDUCTION FROM NOMINAL THICKNESS	Internal Radius Exceeds External Average	Average of Thickness (THAV) 0.1 (IN) 0.6	Internal radius Maximum (IRMX) 1.4 (IN) 2.4	

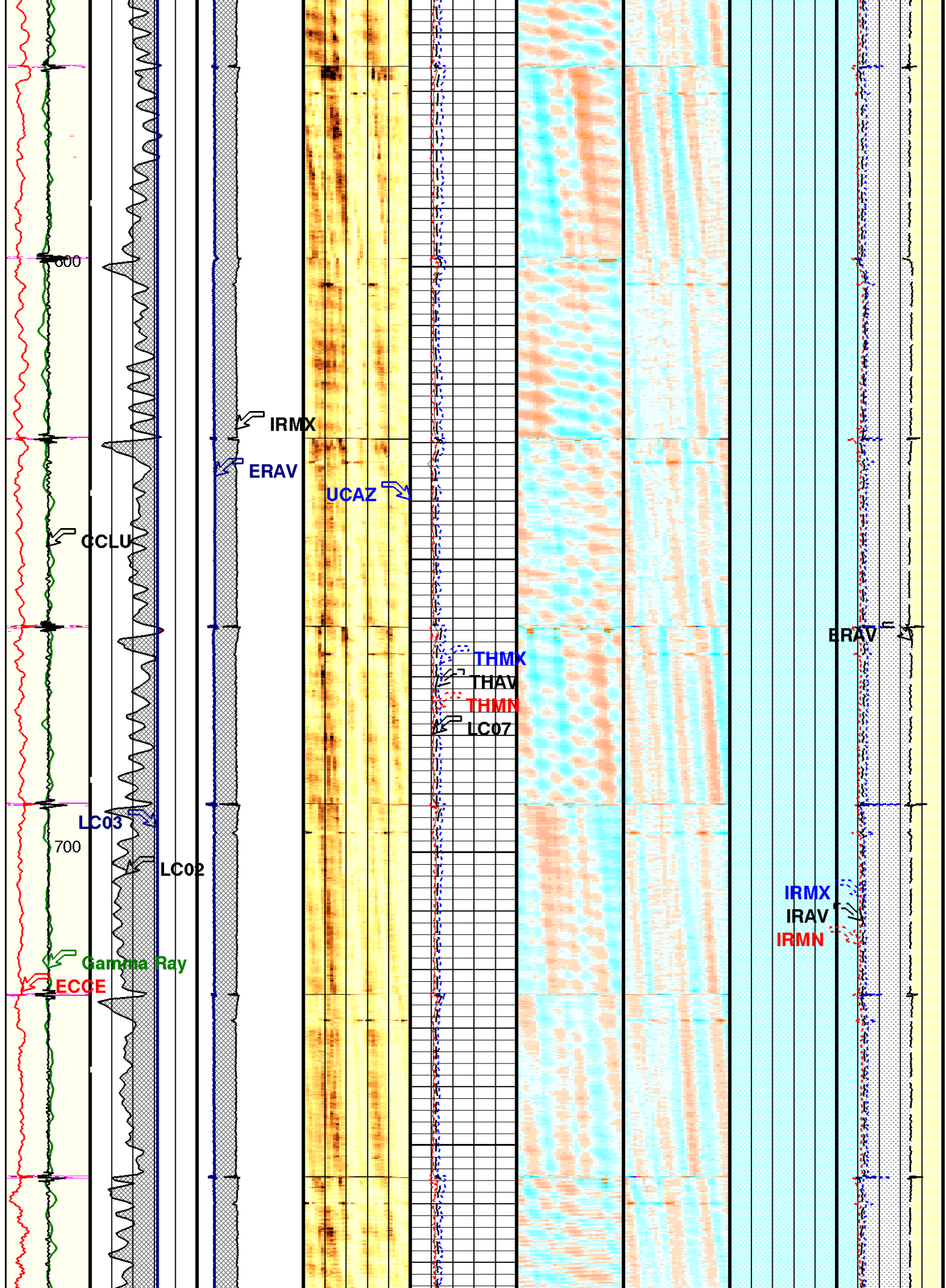
CCL (CCLU) (----	Thickness Percent from Nominal (LC02) 100 (----) 80	Internal radius Maximum (IRMX) 2.4 (IN) 1.4	<div> <div> -500.0000 -6.0000 -5.6000 -5.2000 -4.8000 -4.4000 -4.0000 -3.6000 -3.2000 -2.8000 -2.4000 -2.0000 -1.6000 -1.2000 -0.8000 -0.4000 0.0000 </div> <div>Amplitude of echo minus Max (AWBK) (----</div> </div>	Minimum of Thickness (THMN) 0.1 (IN) 0.6	Internal radius Average (IRAV) (IN) 1.4 2.4
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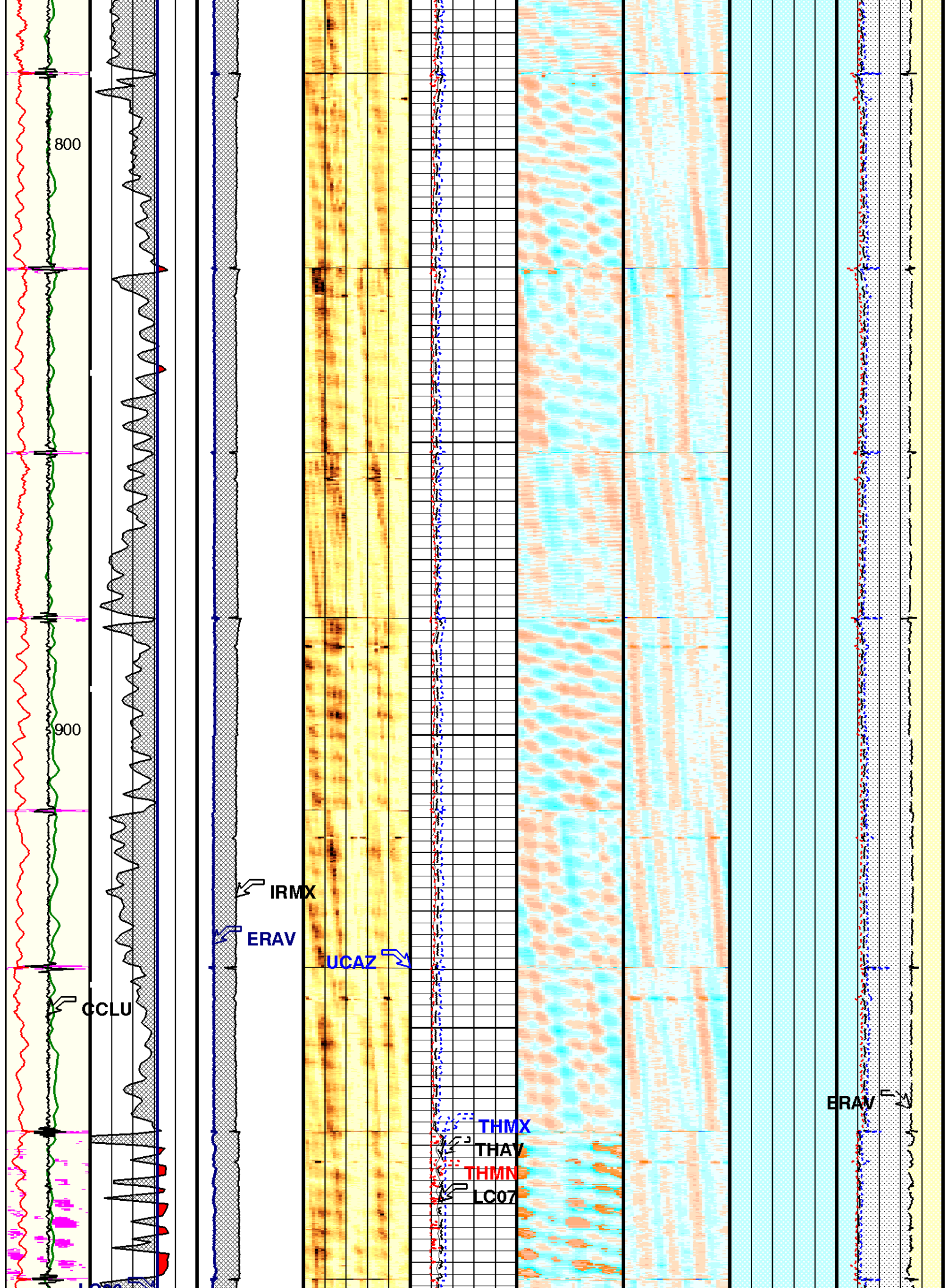
Eccent. (ECCE) 0 (IN) 0.5	87.5% Reference (LC03) 100 (----) 80	External radius Average (ERAV) 2.4 (IN) 1.4	Image rotation (UCAZ) 360 (DEG) 0	ERAV - IRMX (LC07) 0.1 (IN) 0.6	<div> <div> -500.0000 -0.0760 -0.0680 -0.0600 -0.0520 -0.0440 -0.0360 -0.0280 -0.0200 -0.0120 -0.0040 0.0040 0.0120 0.0200 0.0280 0.0360 0.0440 0.0520 0.0600 0.0680 0.0760 </div> <div>Thickness minus Ave (THBK) (----</div> </div> <div> <div> -500.0000 -0.0760 -0.0680 -0.0600 -0.0520 -0.0440 -0.0360 -0.0280 -0.0200 -0.0120 -0.0040 0.0040 0.0120 0.0200 0.0280 0.0360 0.0440 0.0520 0.0600 0.0680 0.0760 </div> <div>Internal radii minus Ave (IRBK) (----</div> </div>	Internal radius Minimum (IRMN) (IN) 1.4 2.4
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800

900

CCLU

IRMX

ERAV

UCAZ

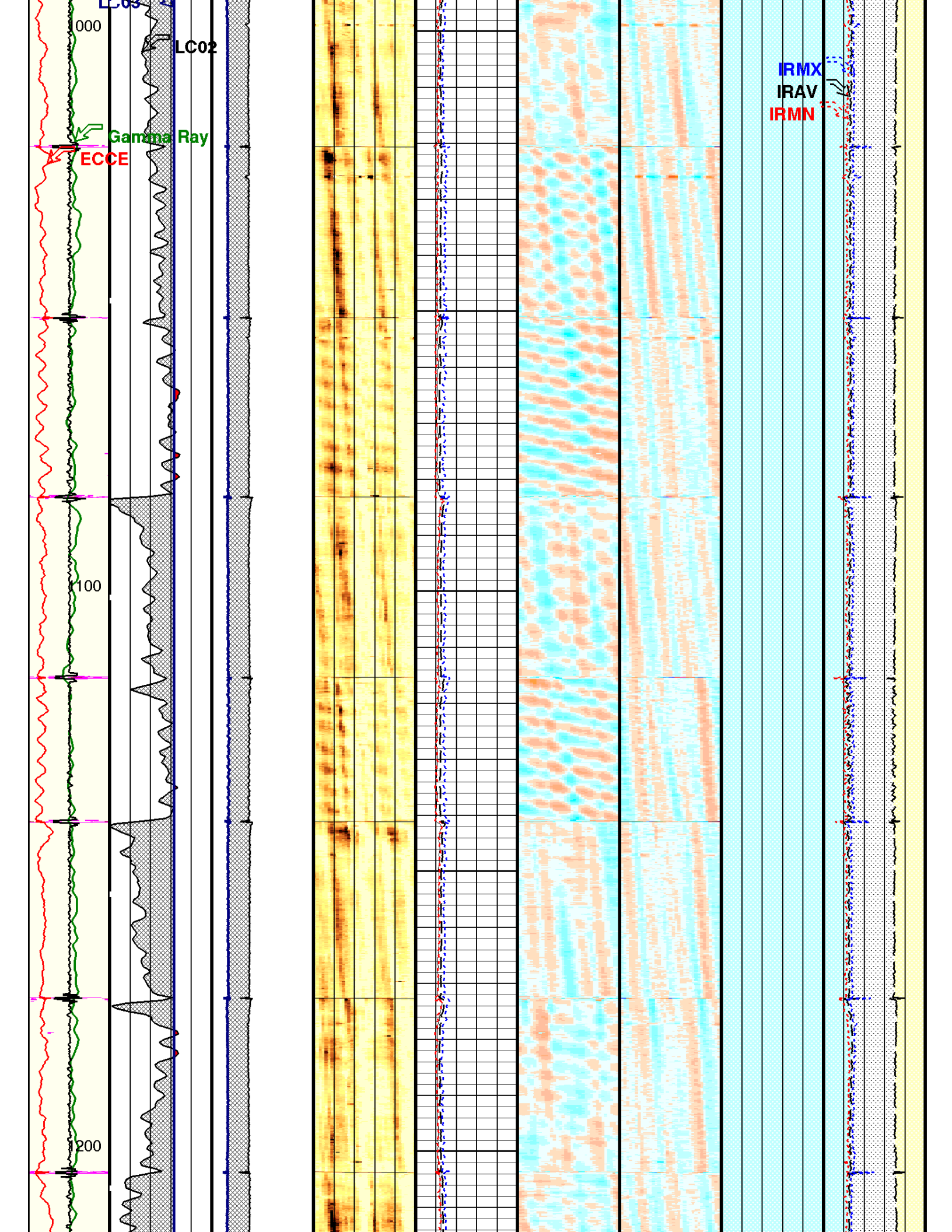
THMX

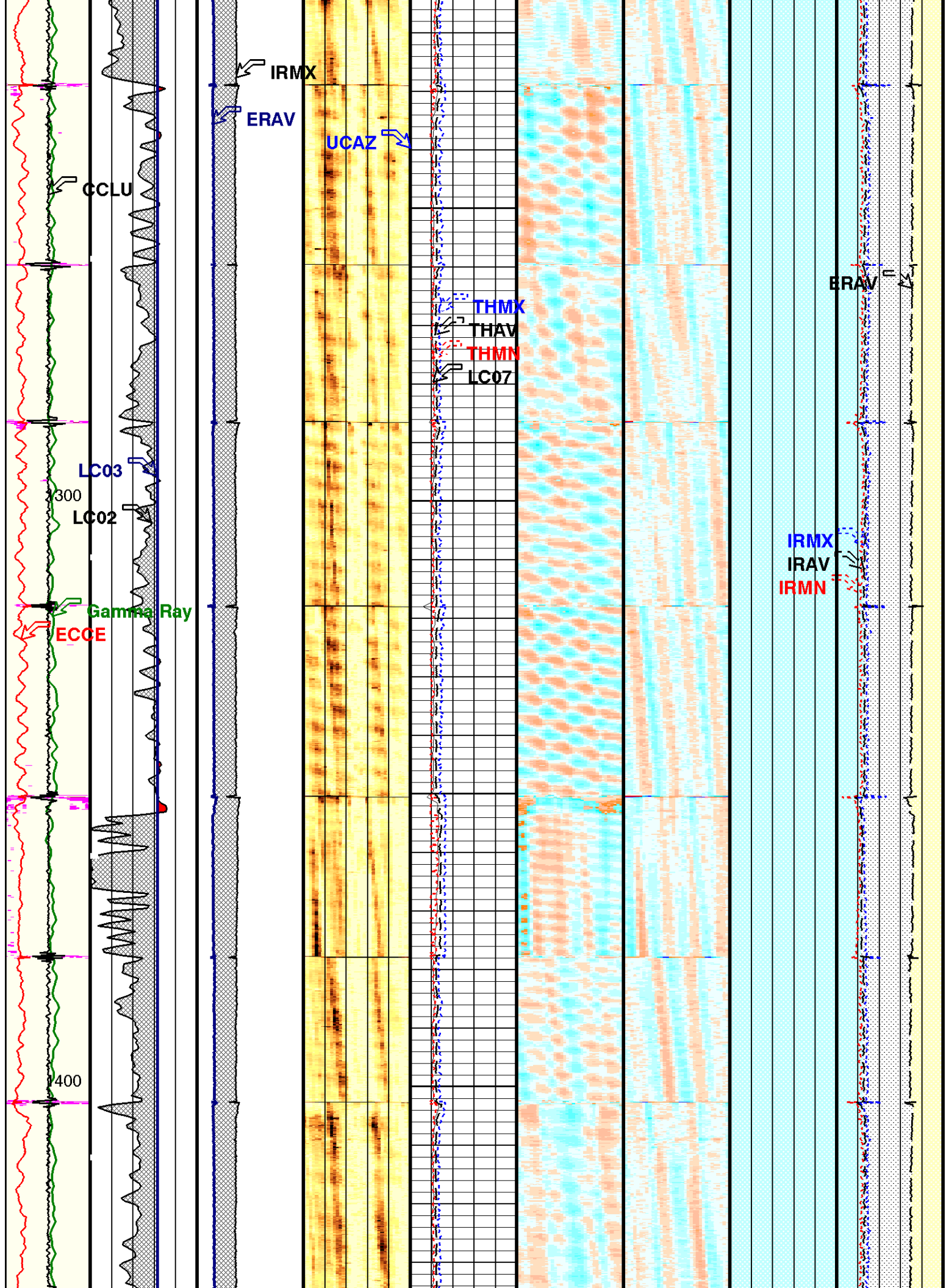
THAV

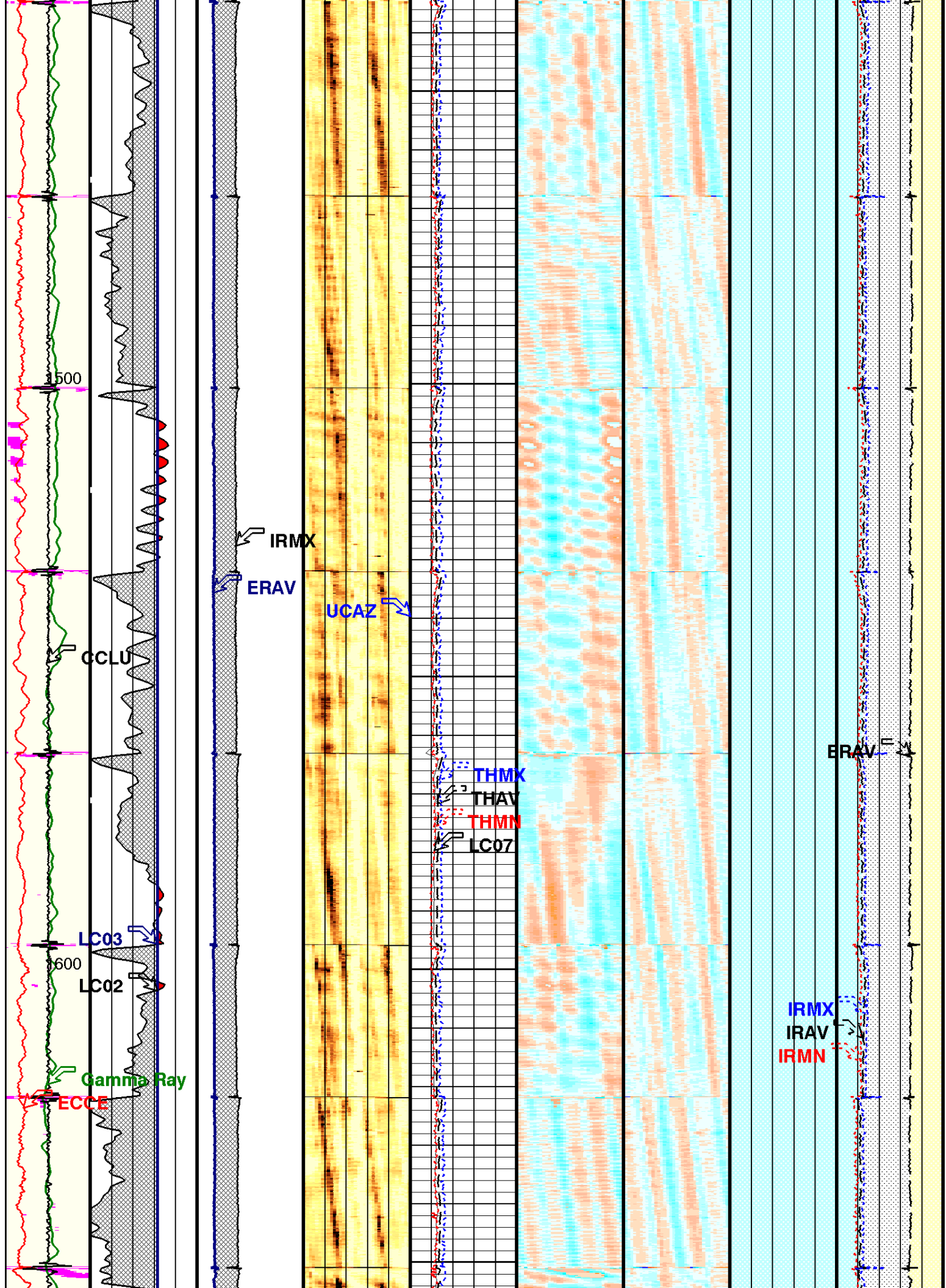
THMN

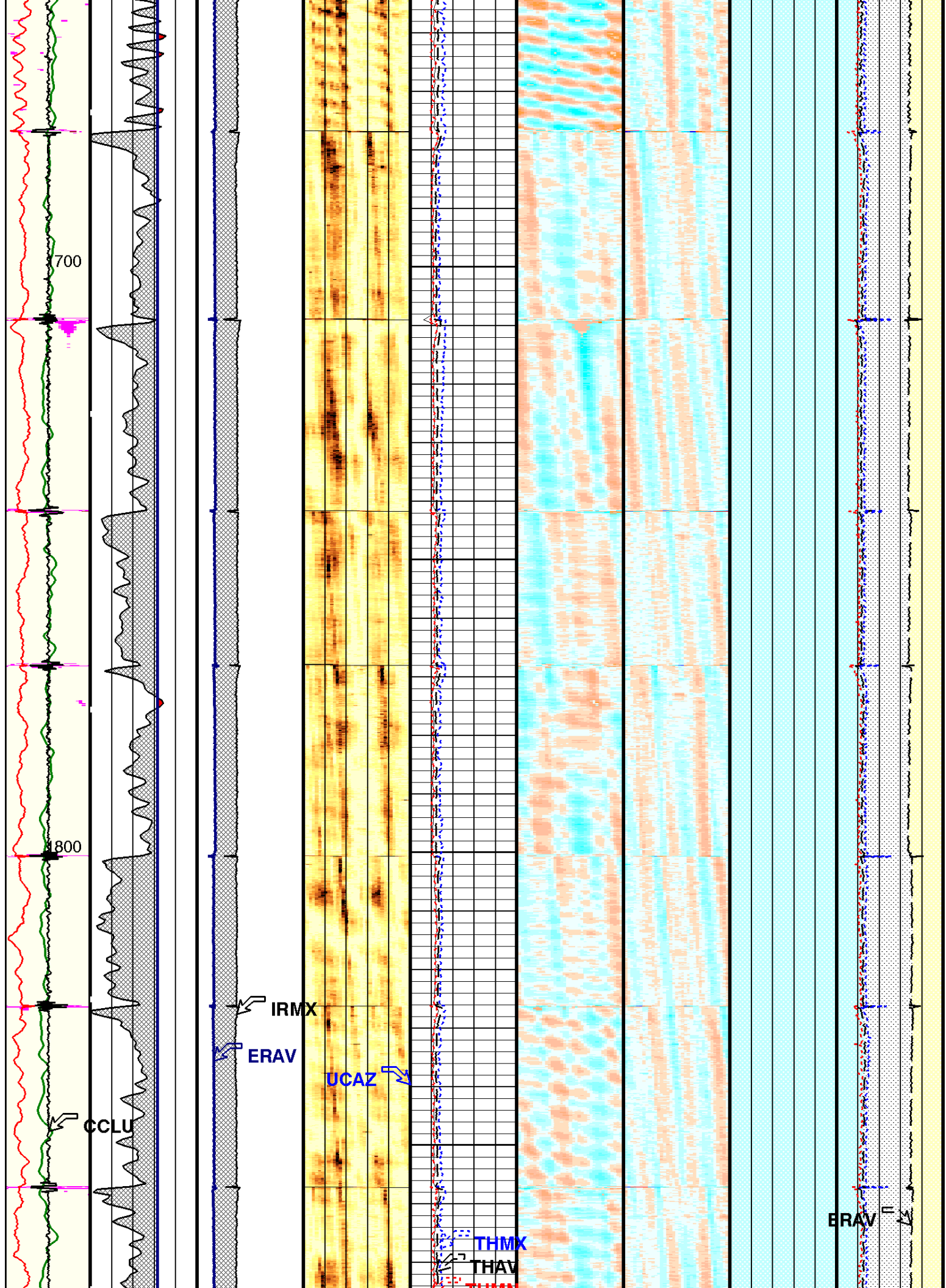
LC07

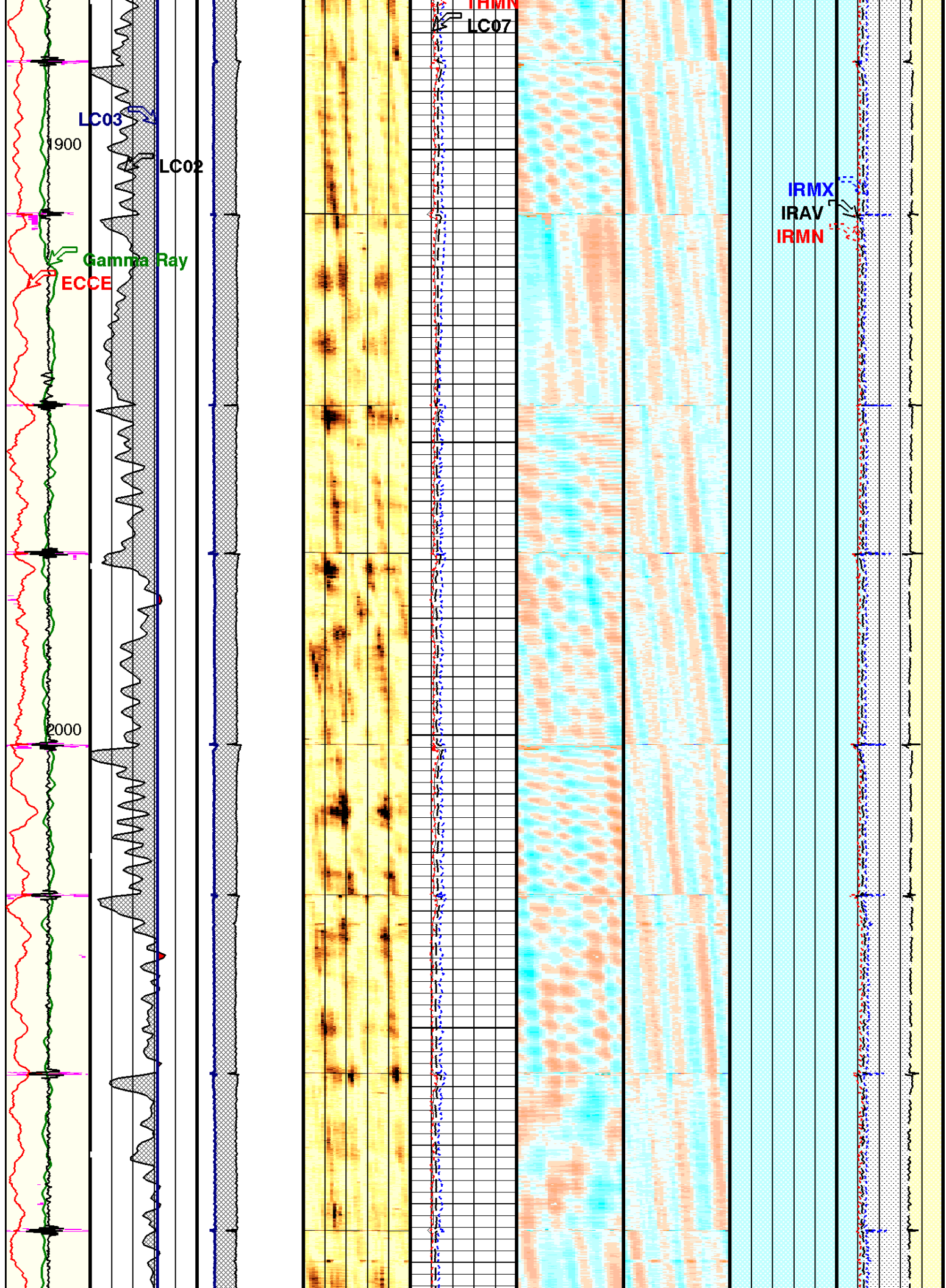
ERAV

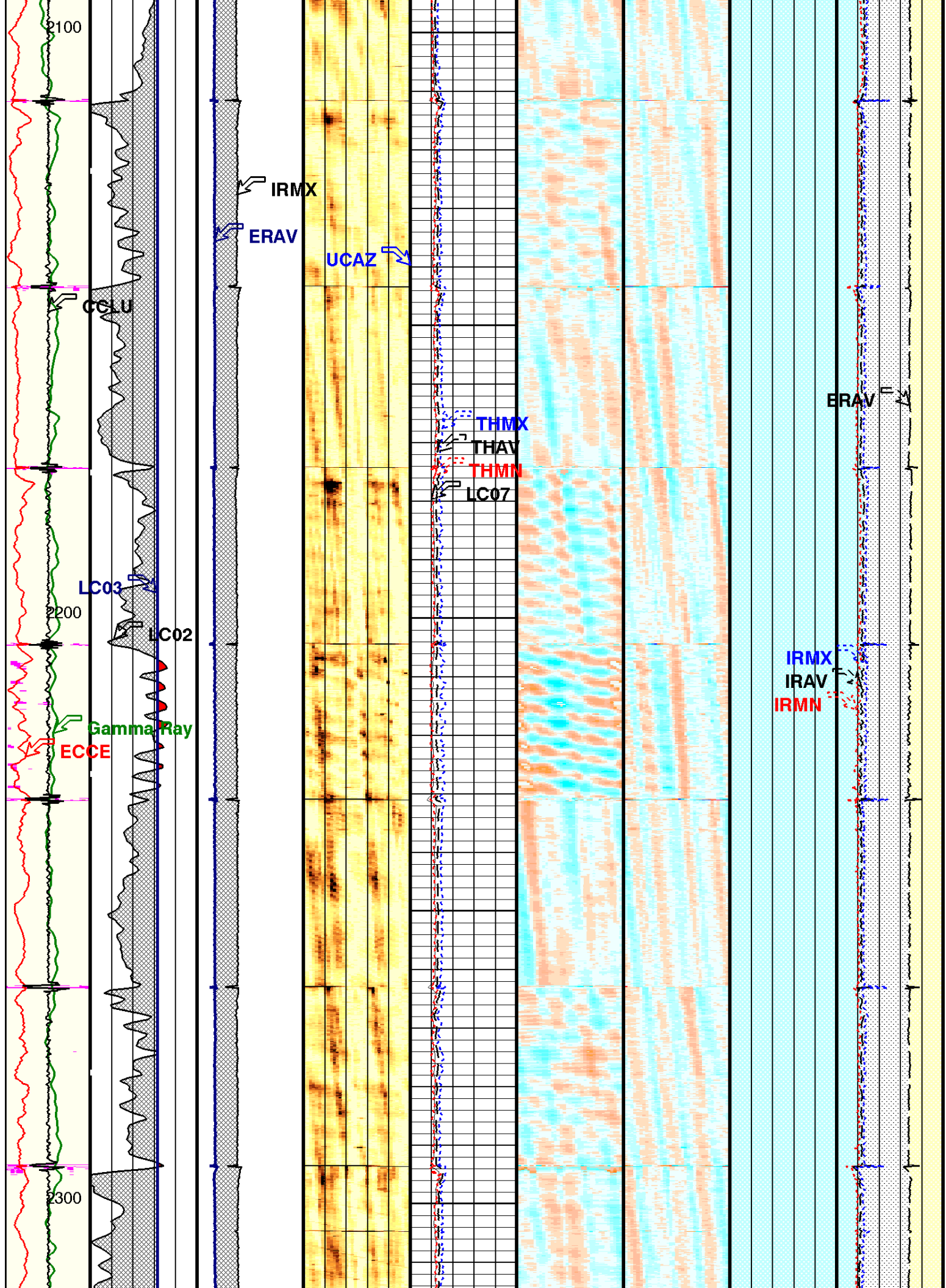


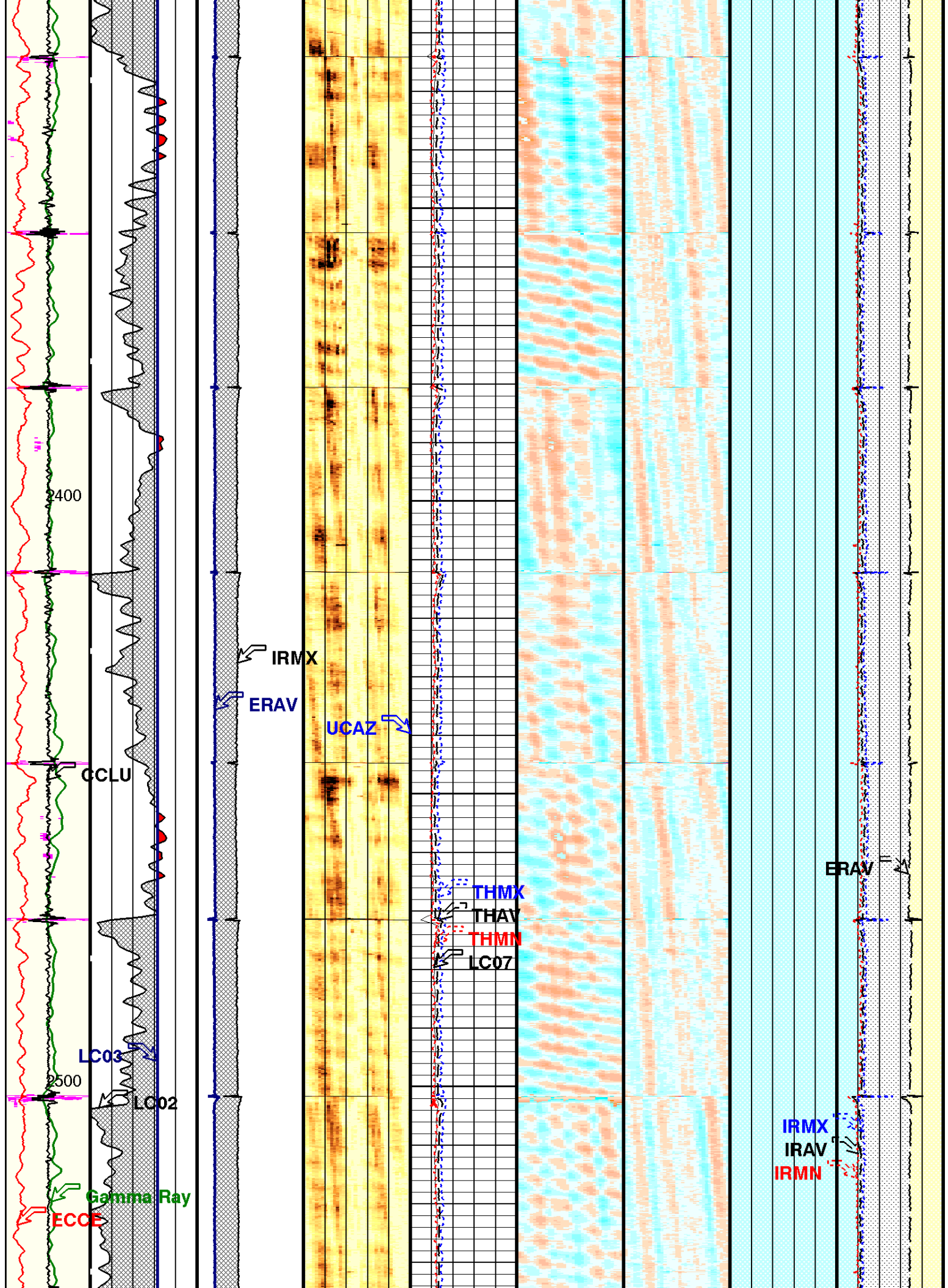


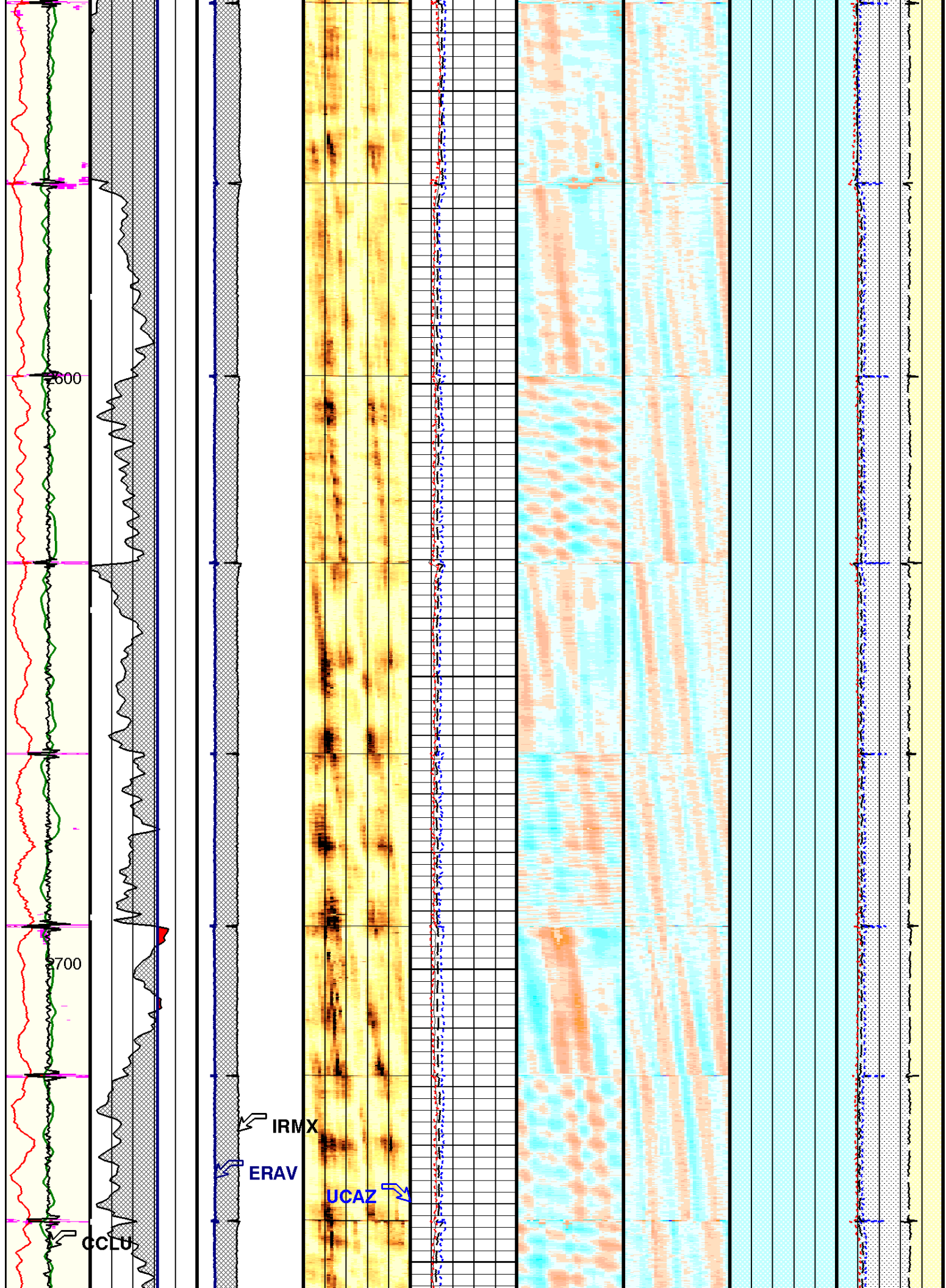


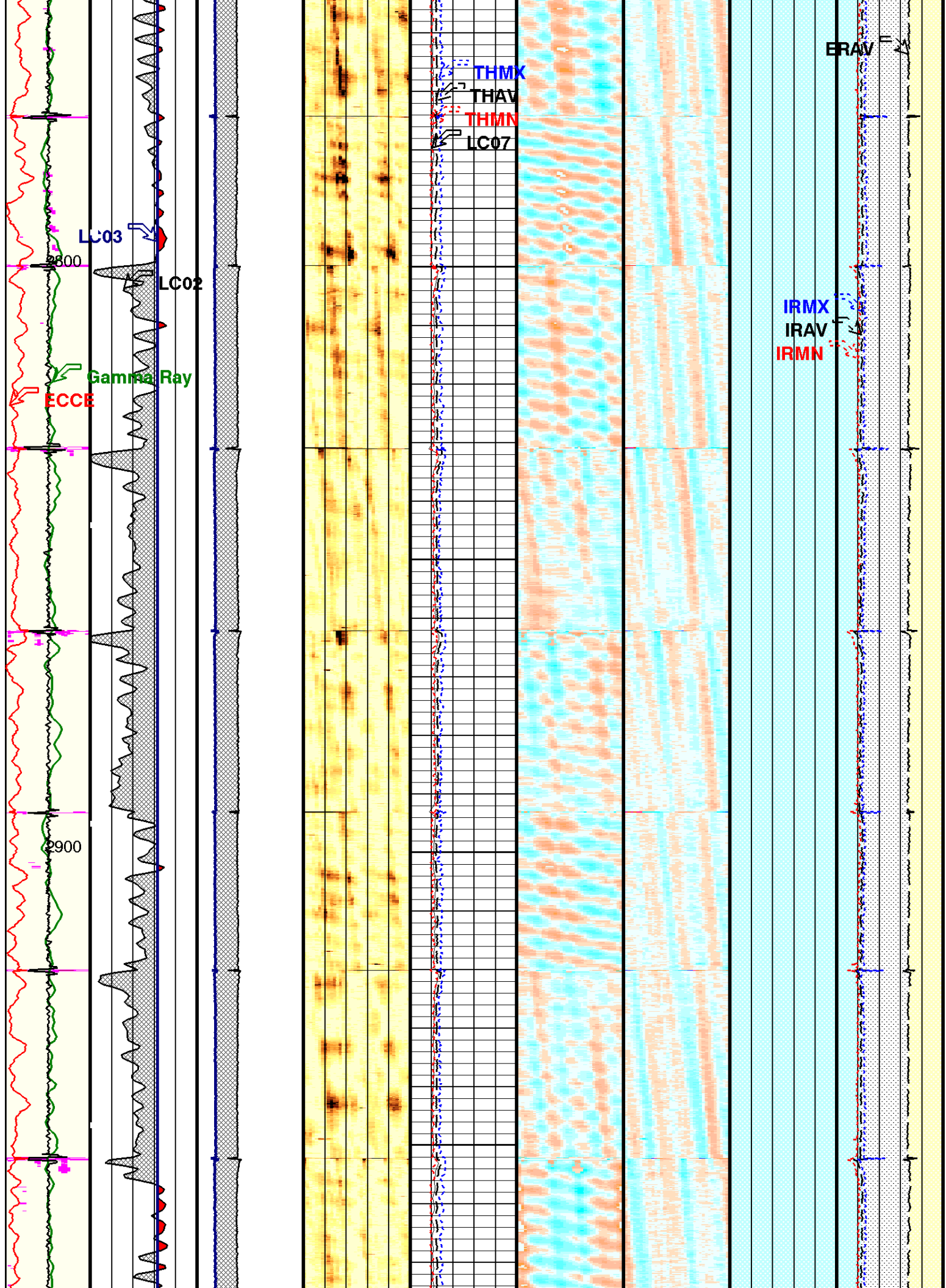


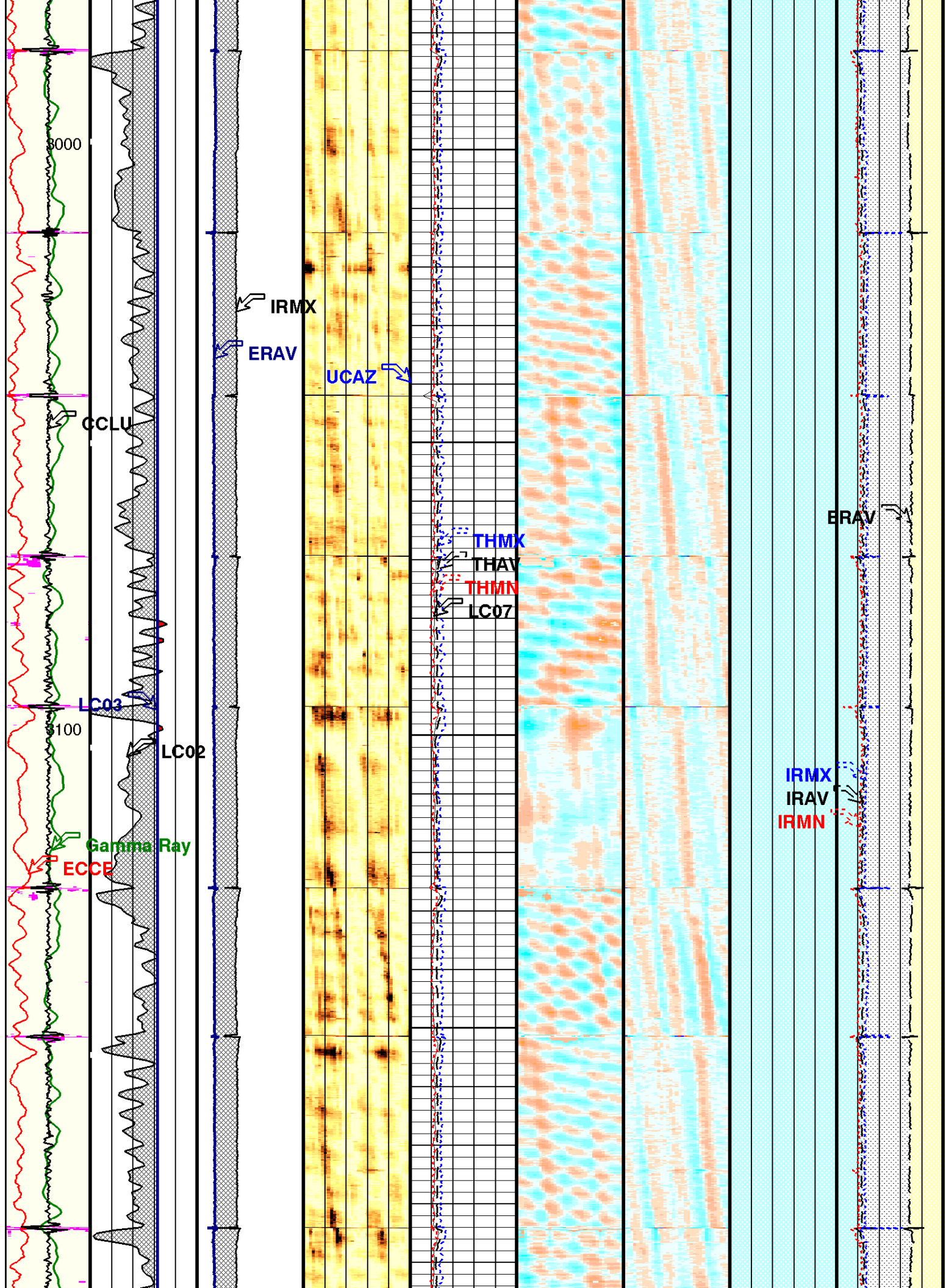


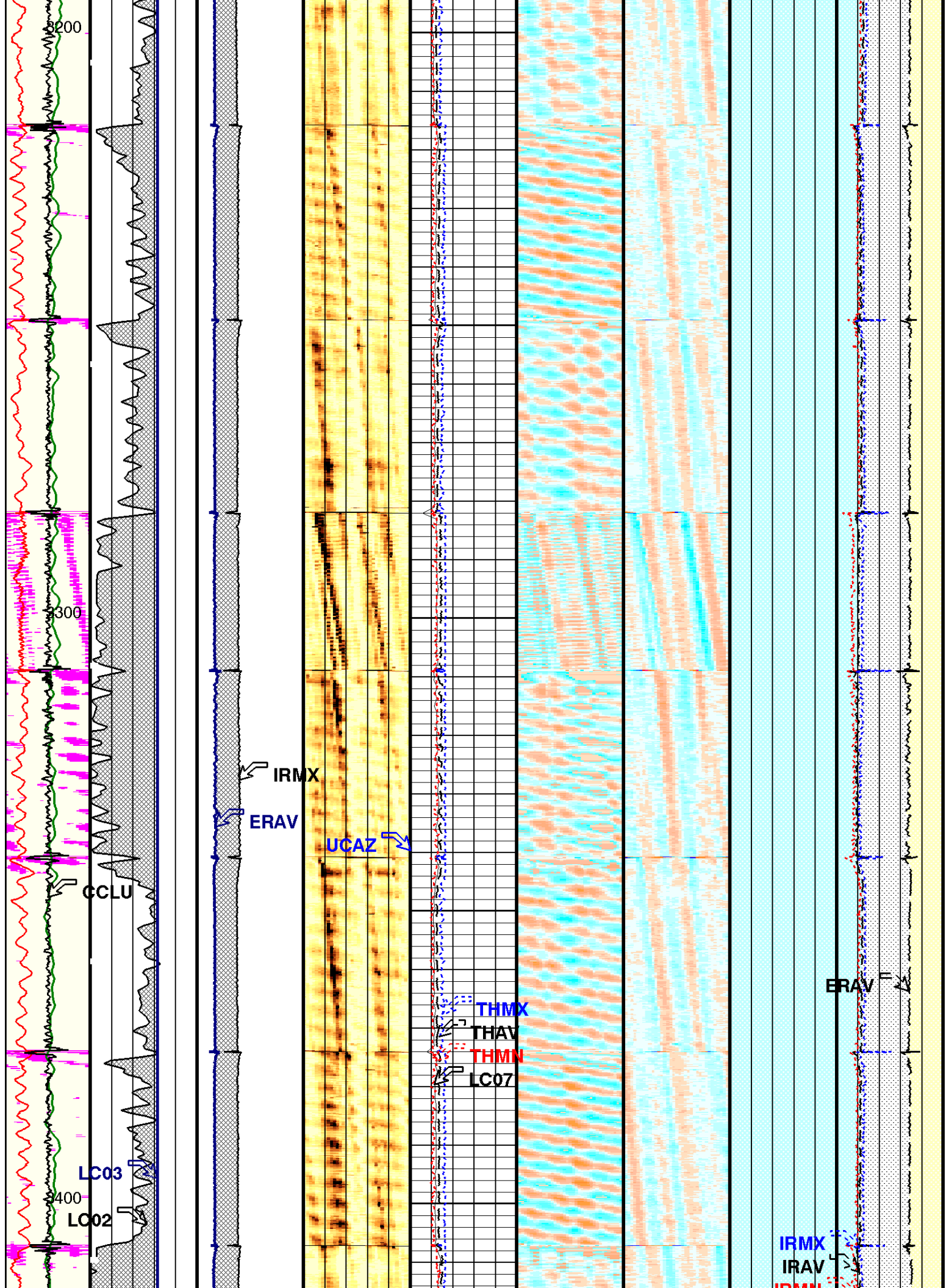


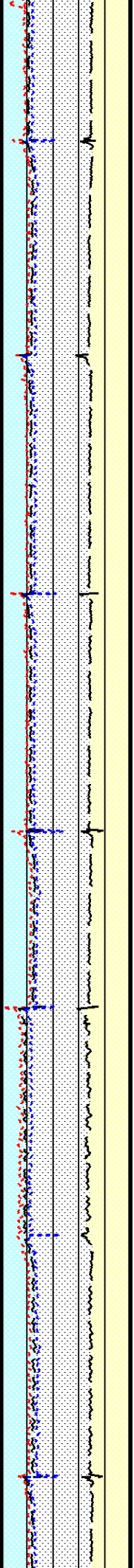
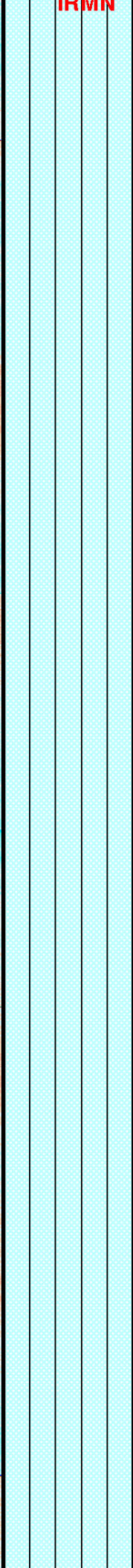
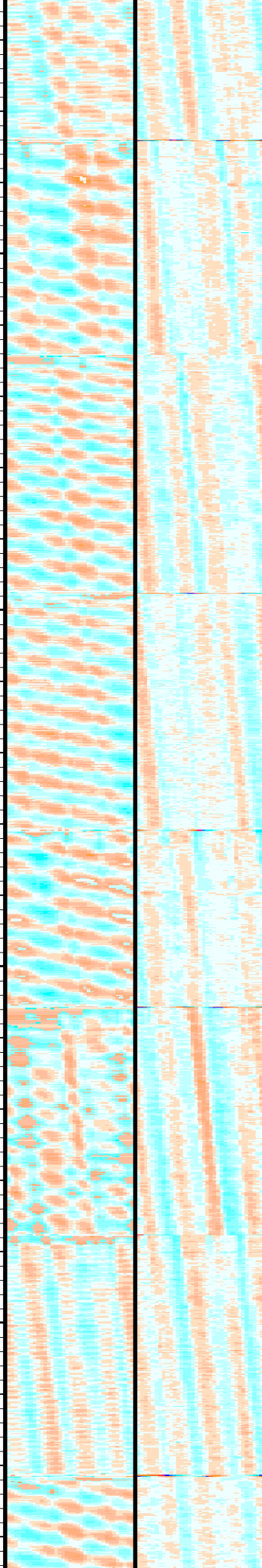
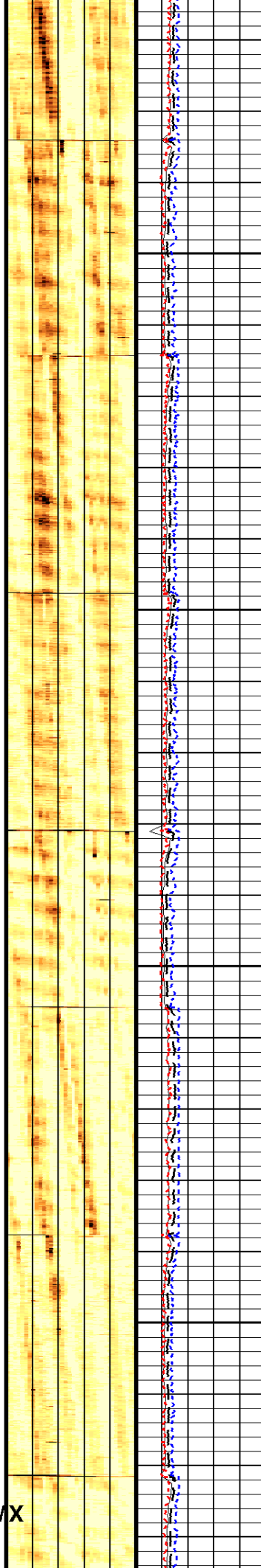
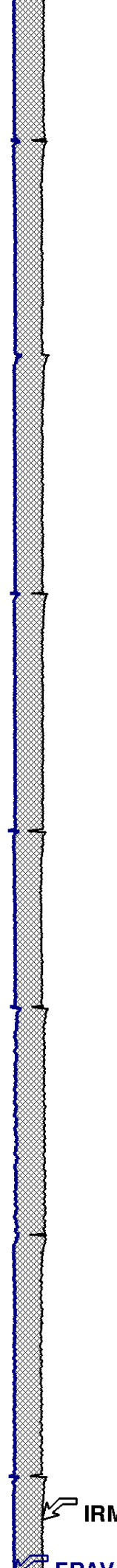
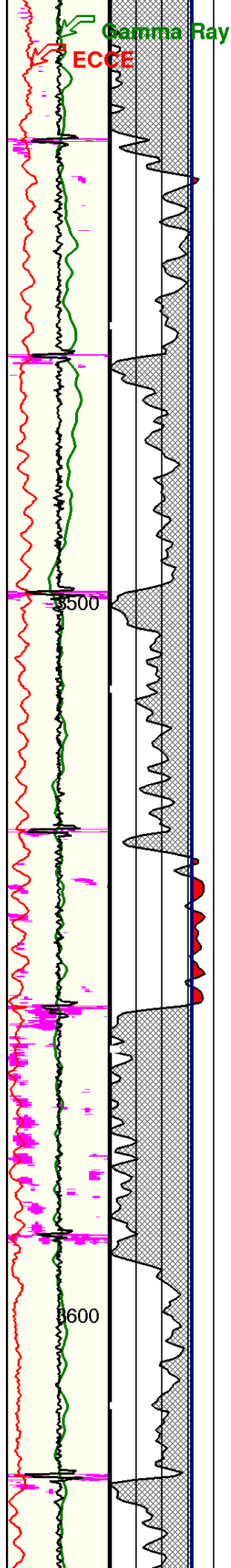


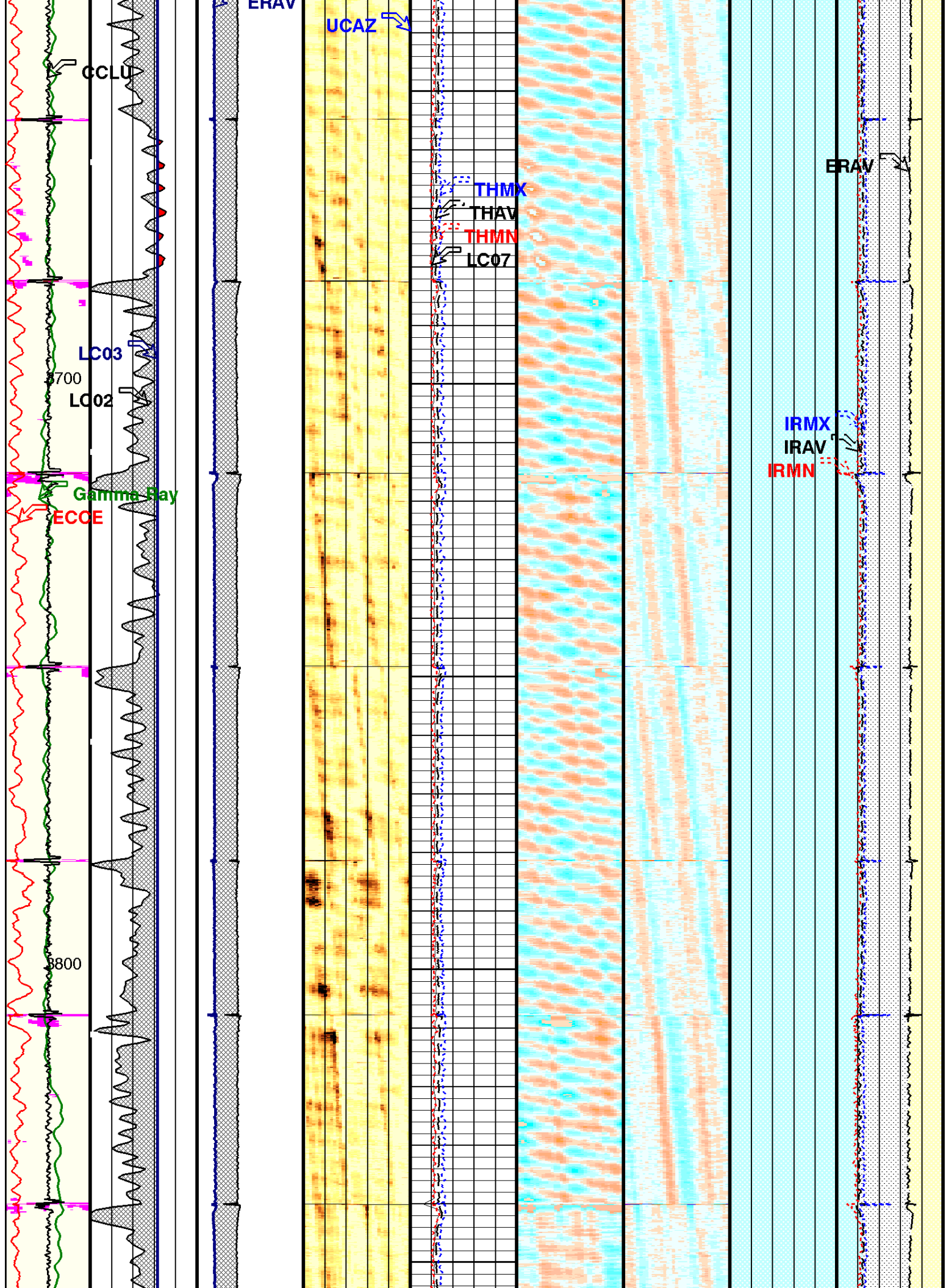


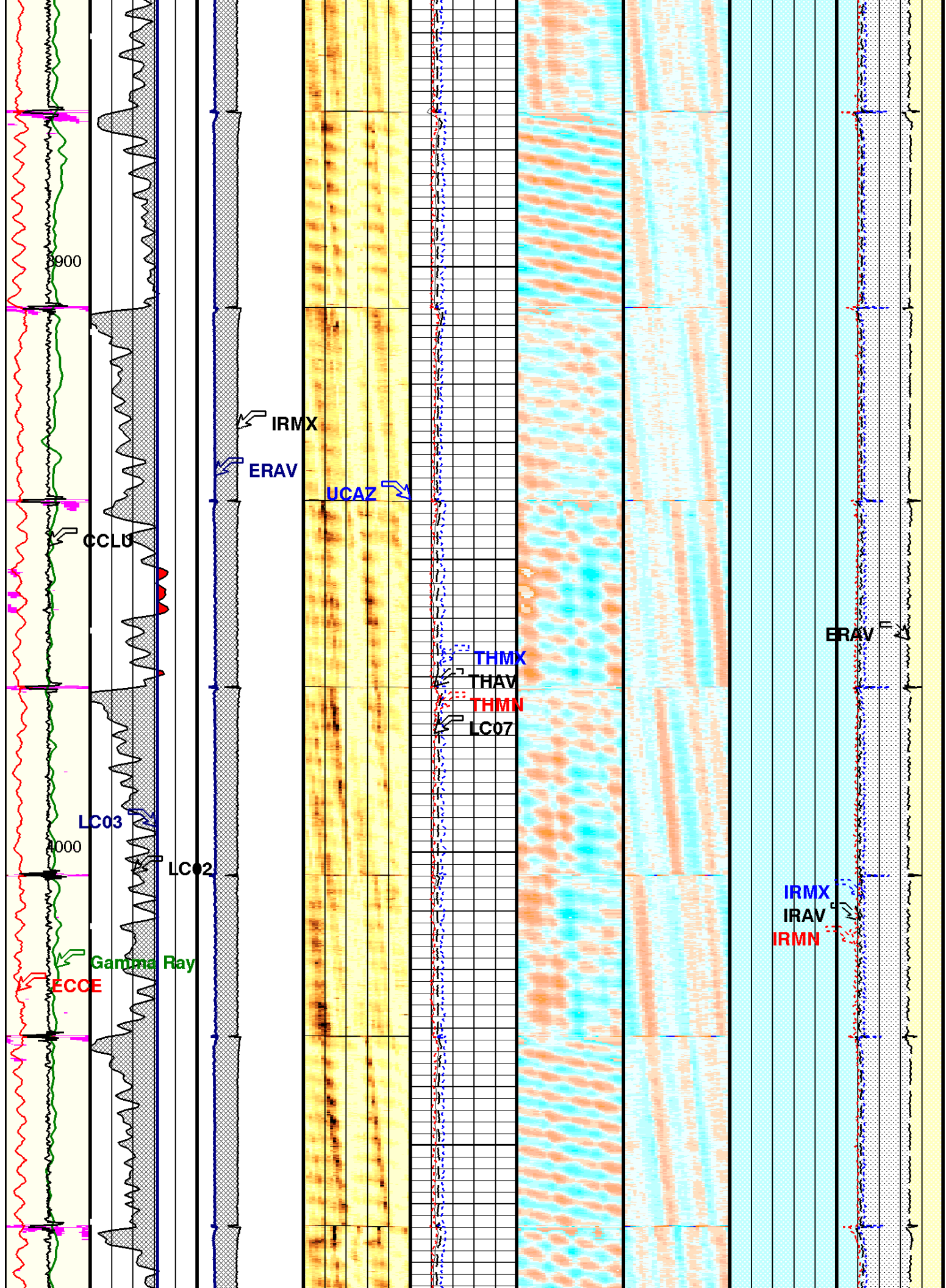


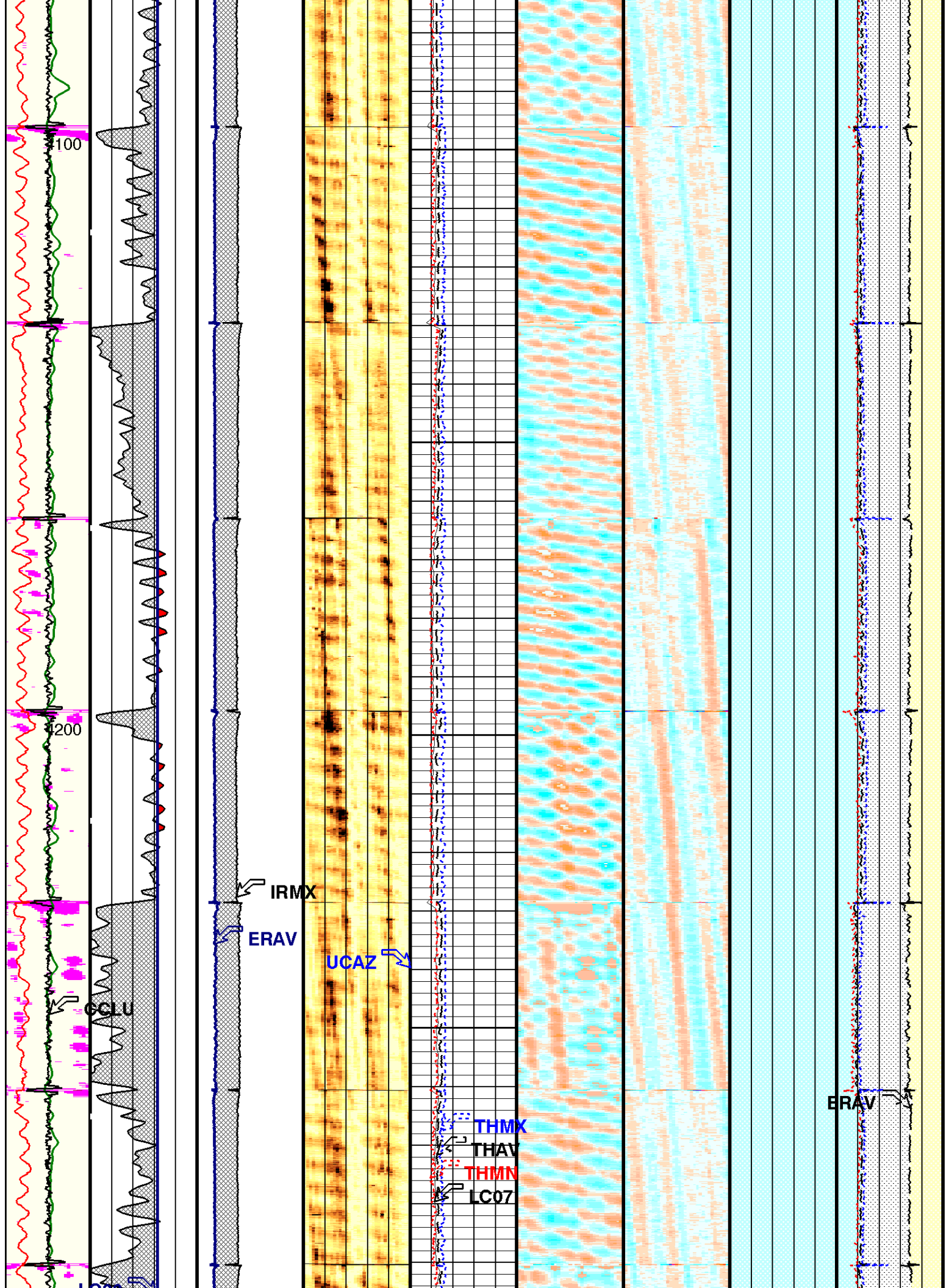


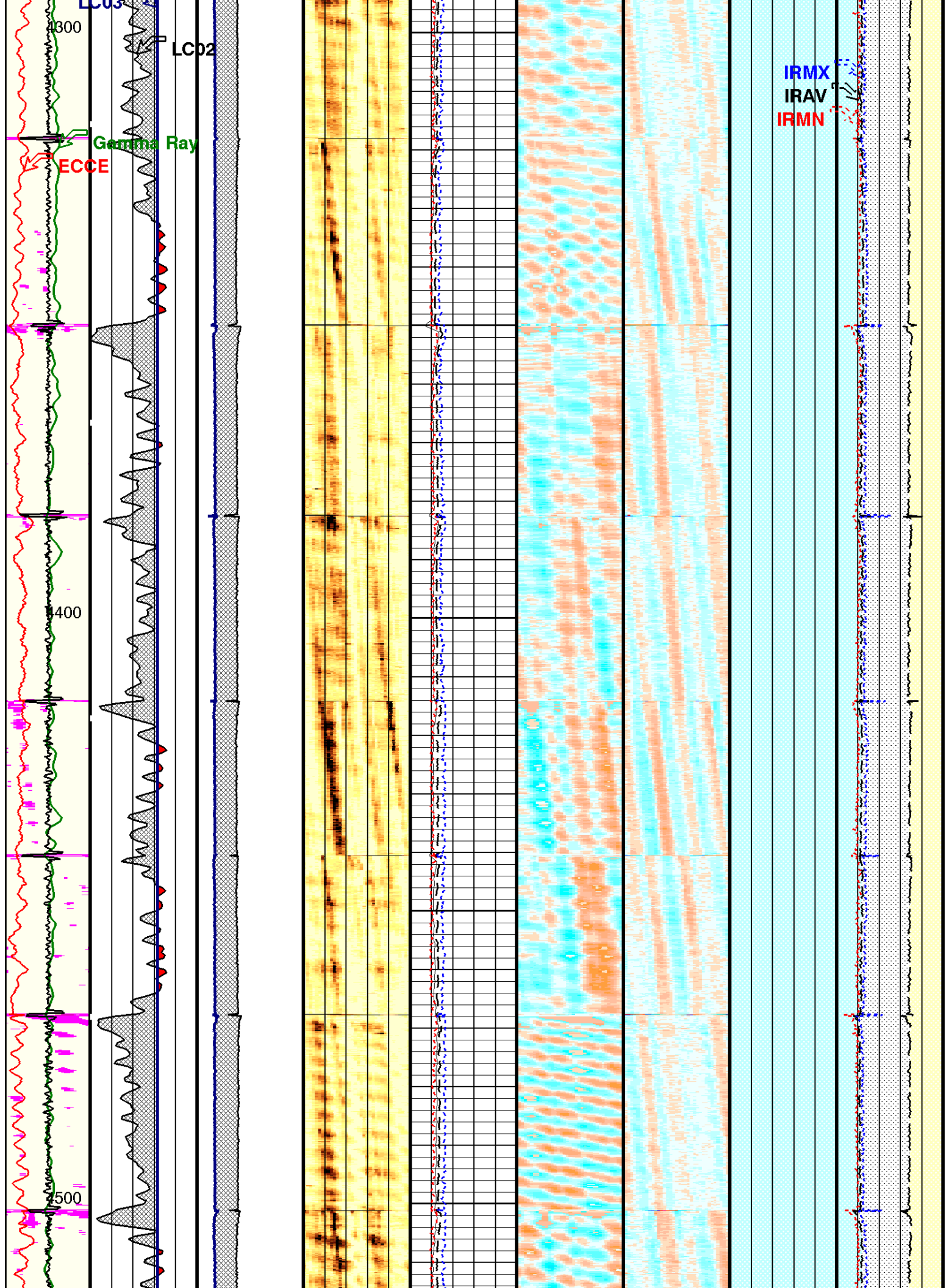


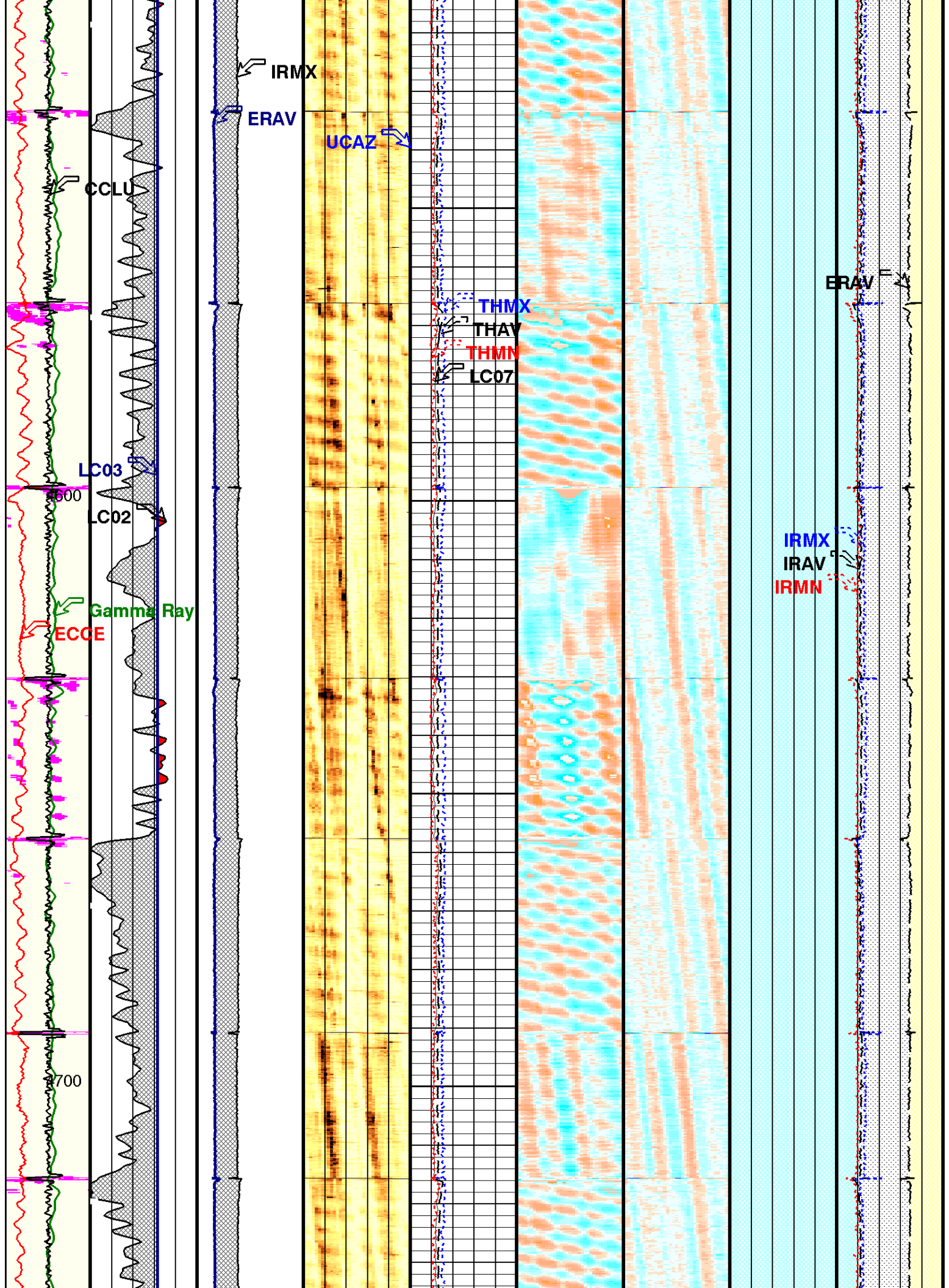


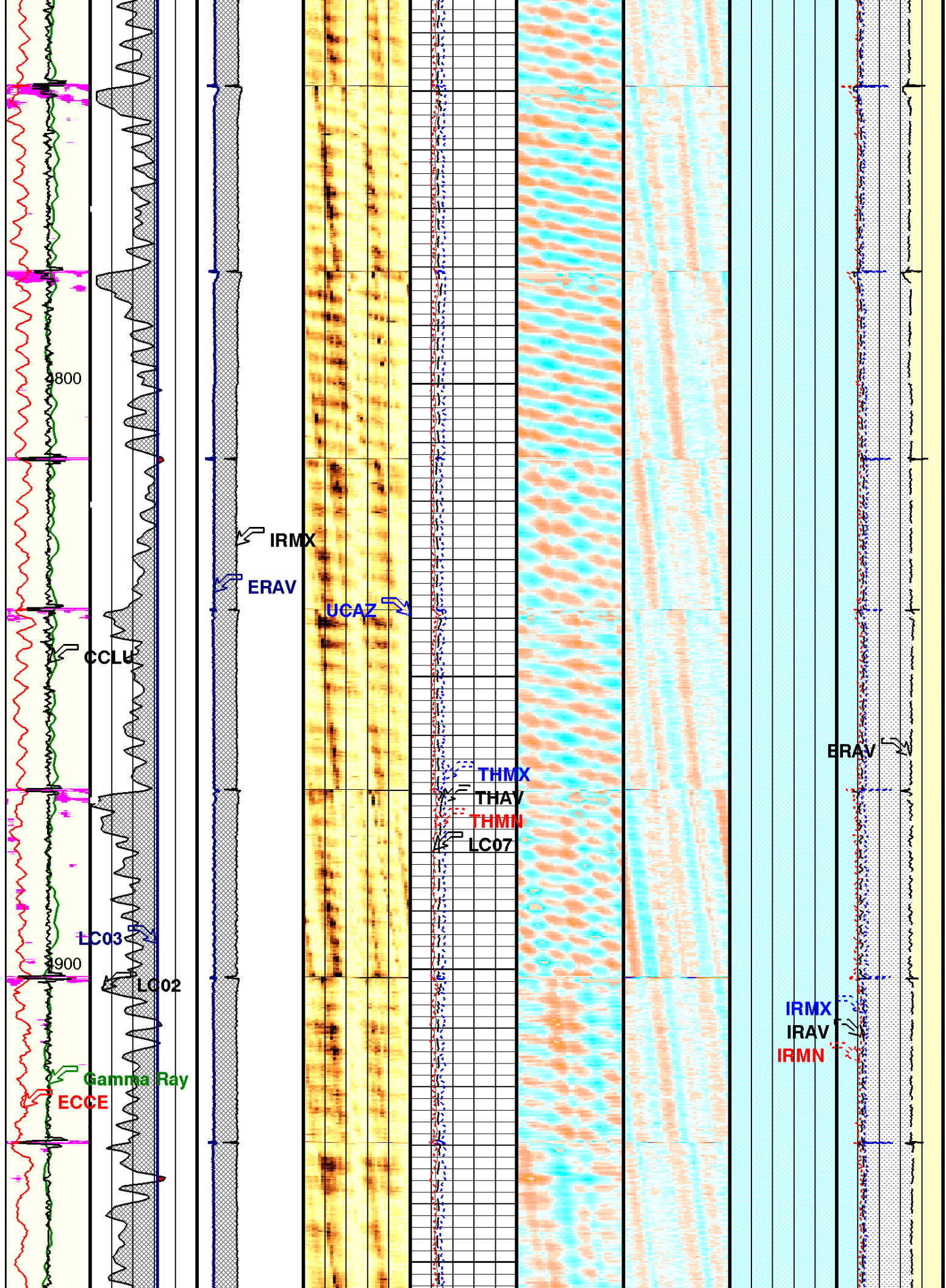


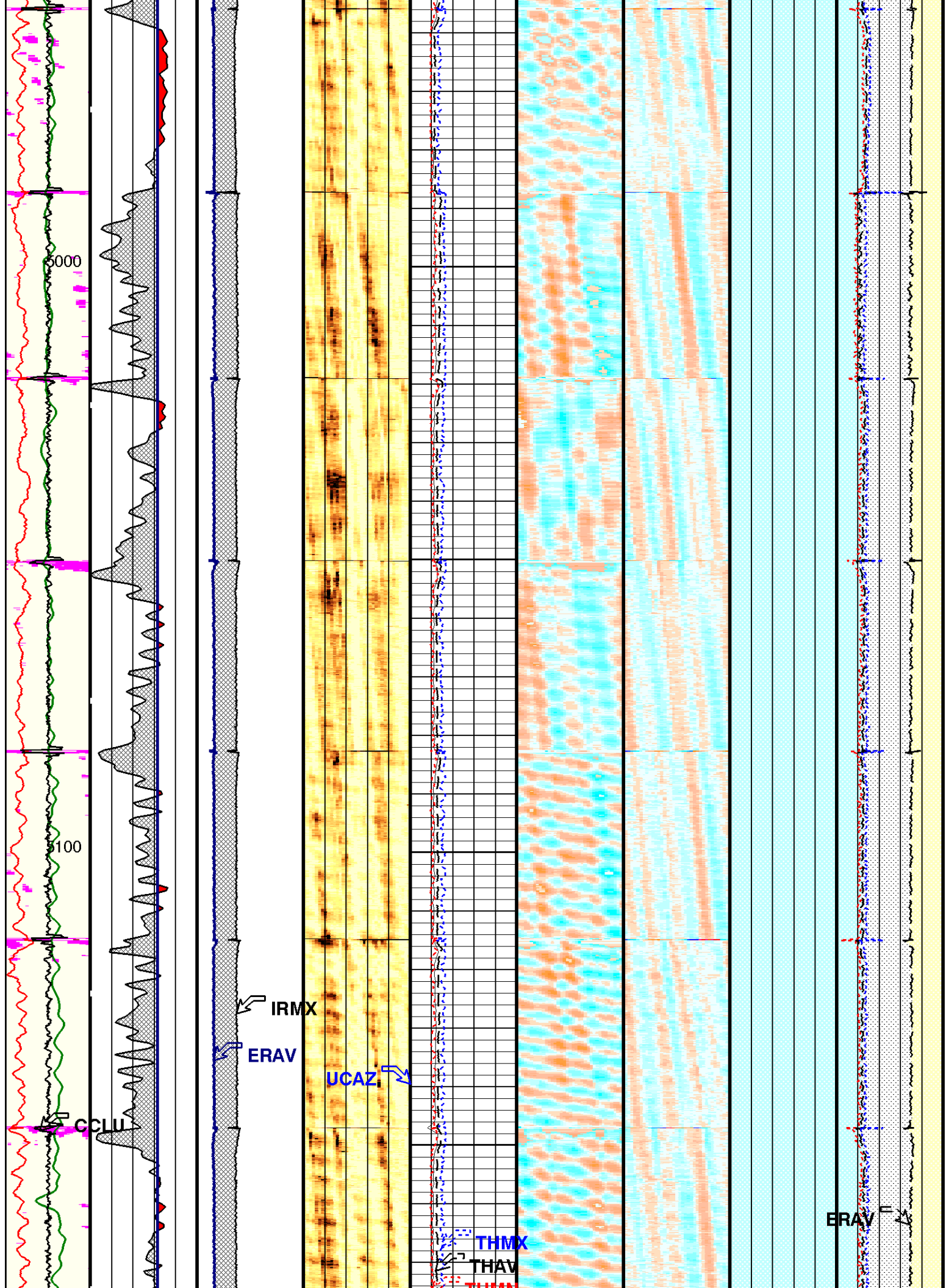


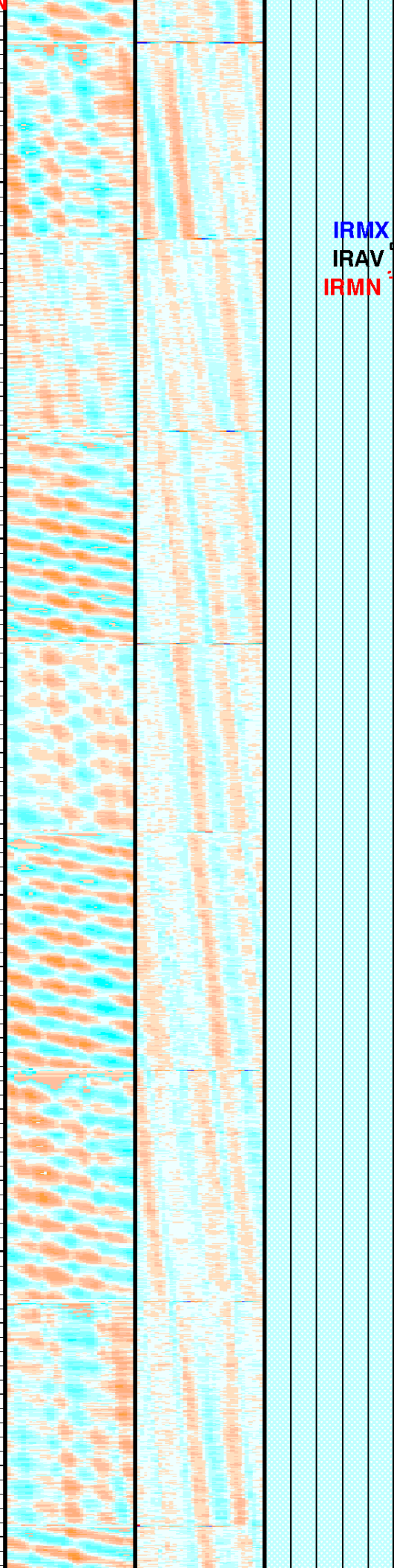
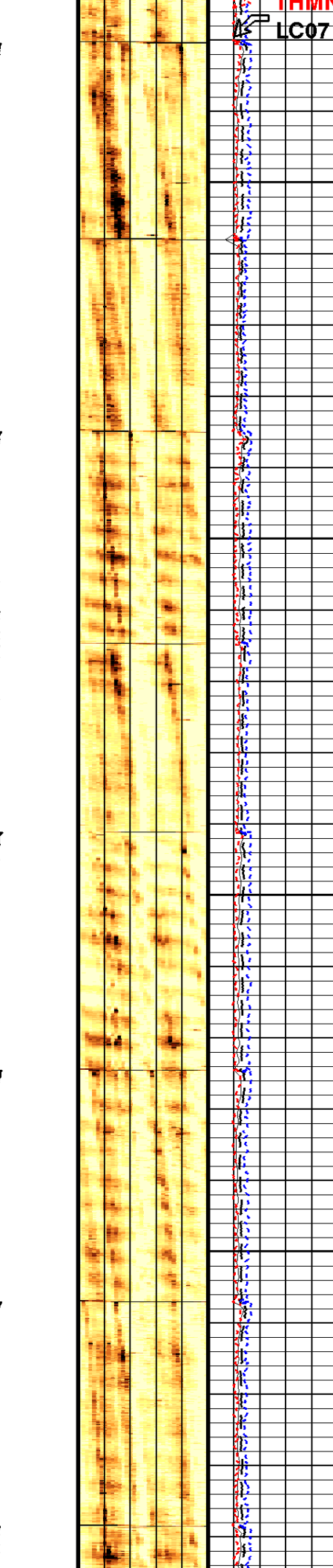
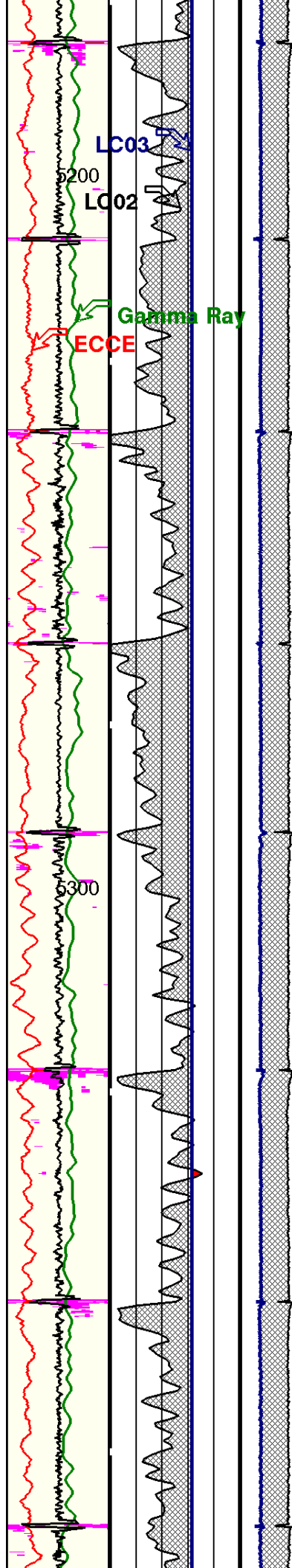


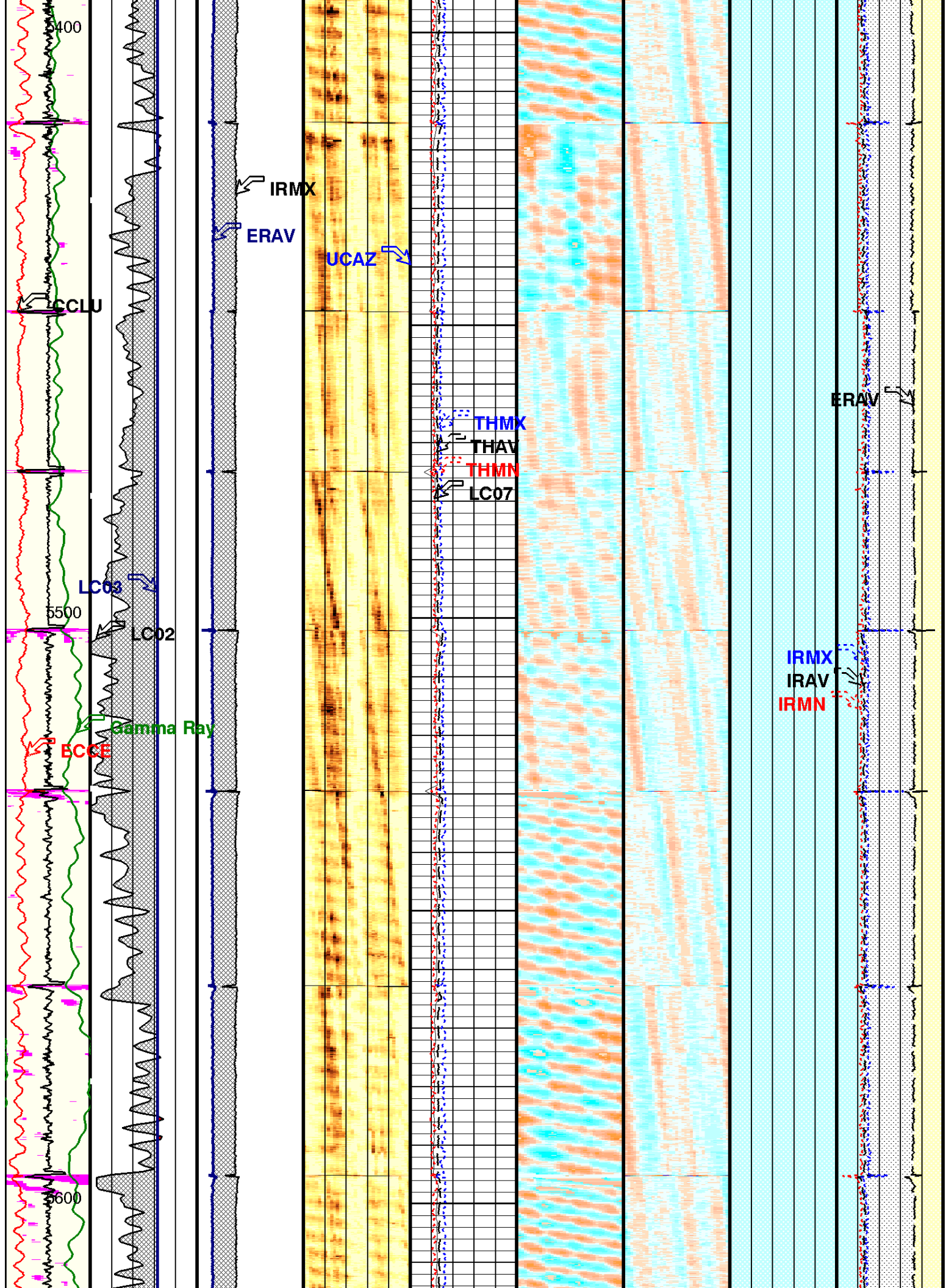


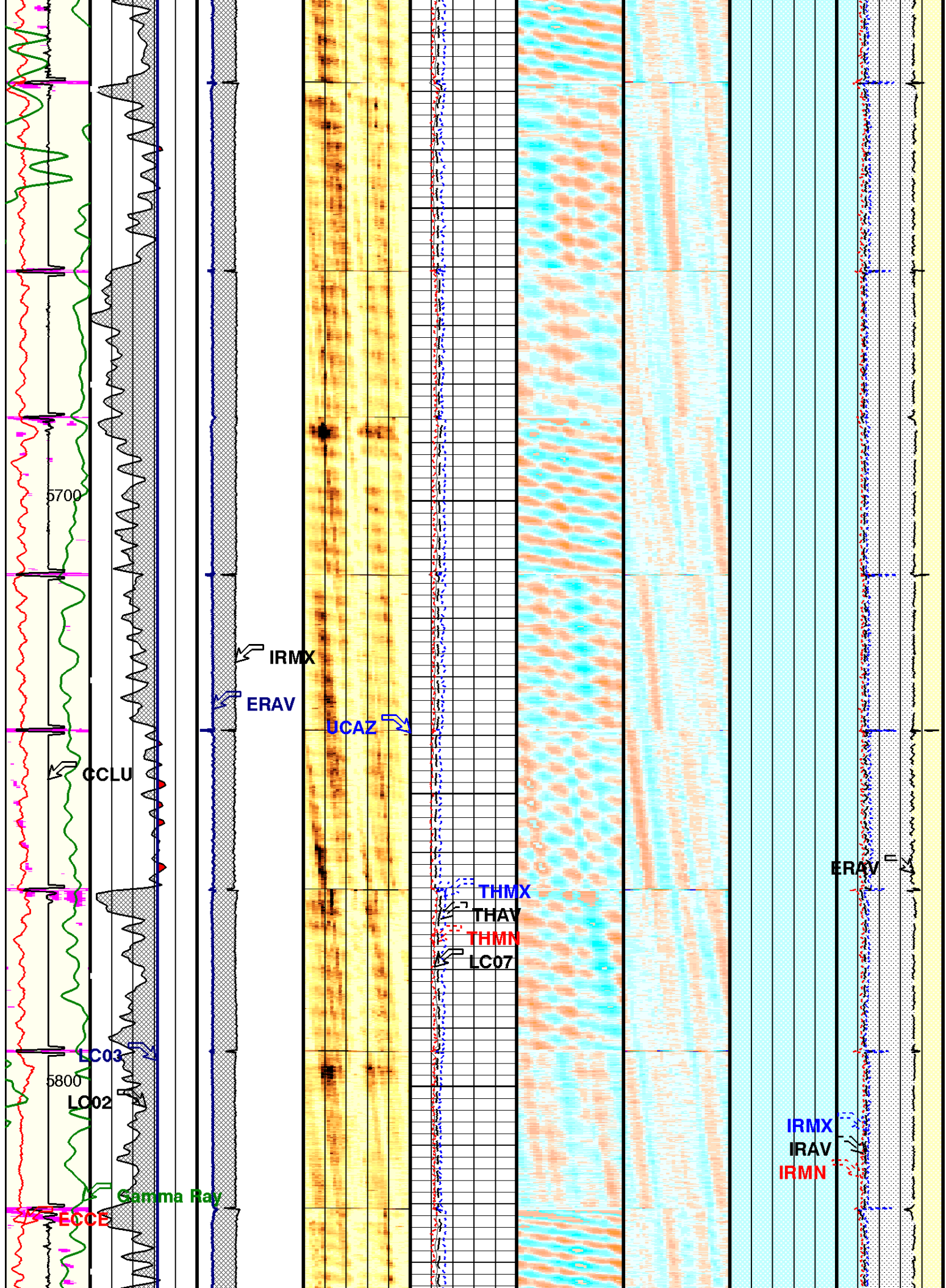


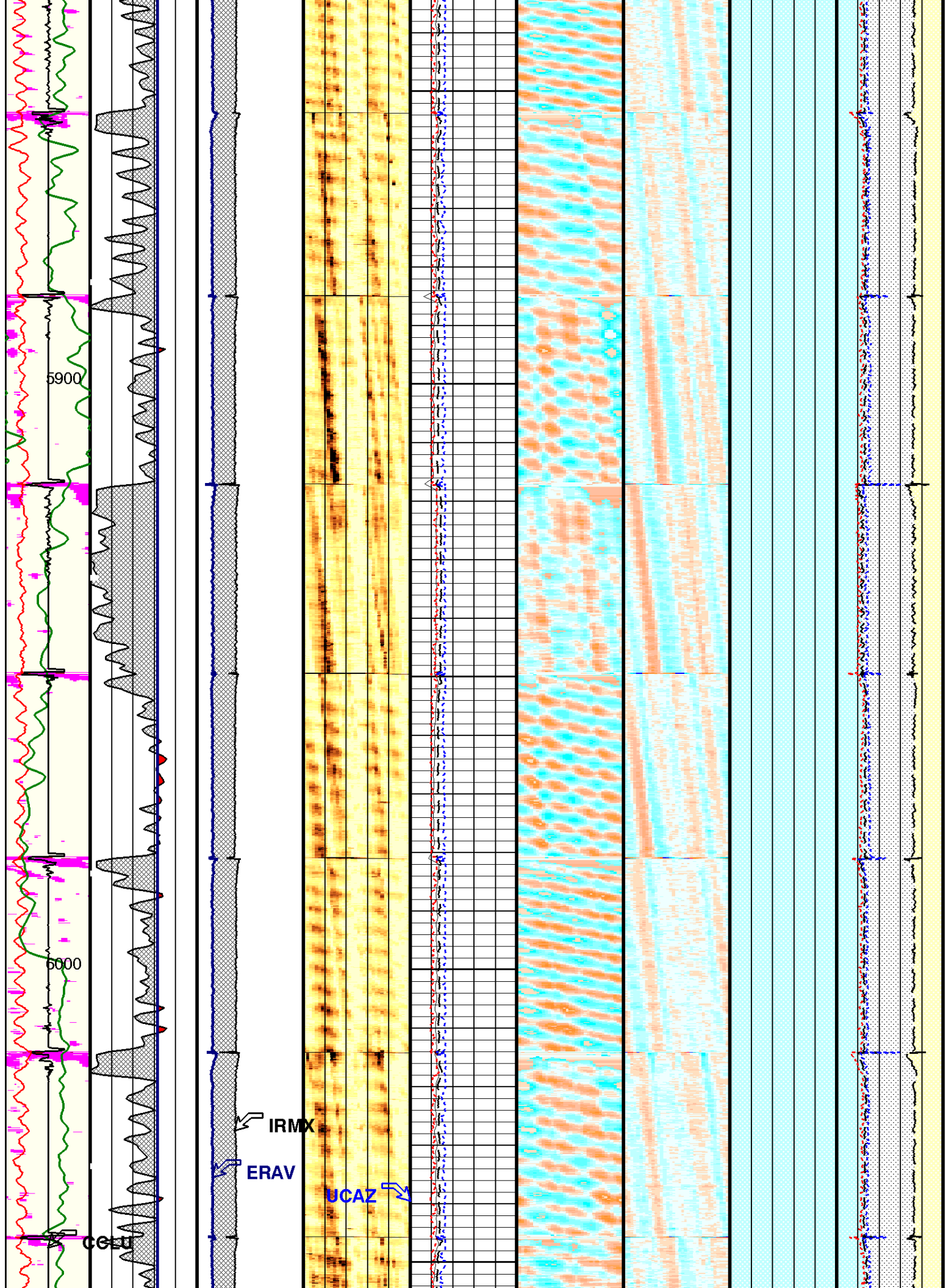


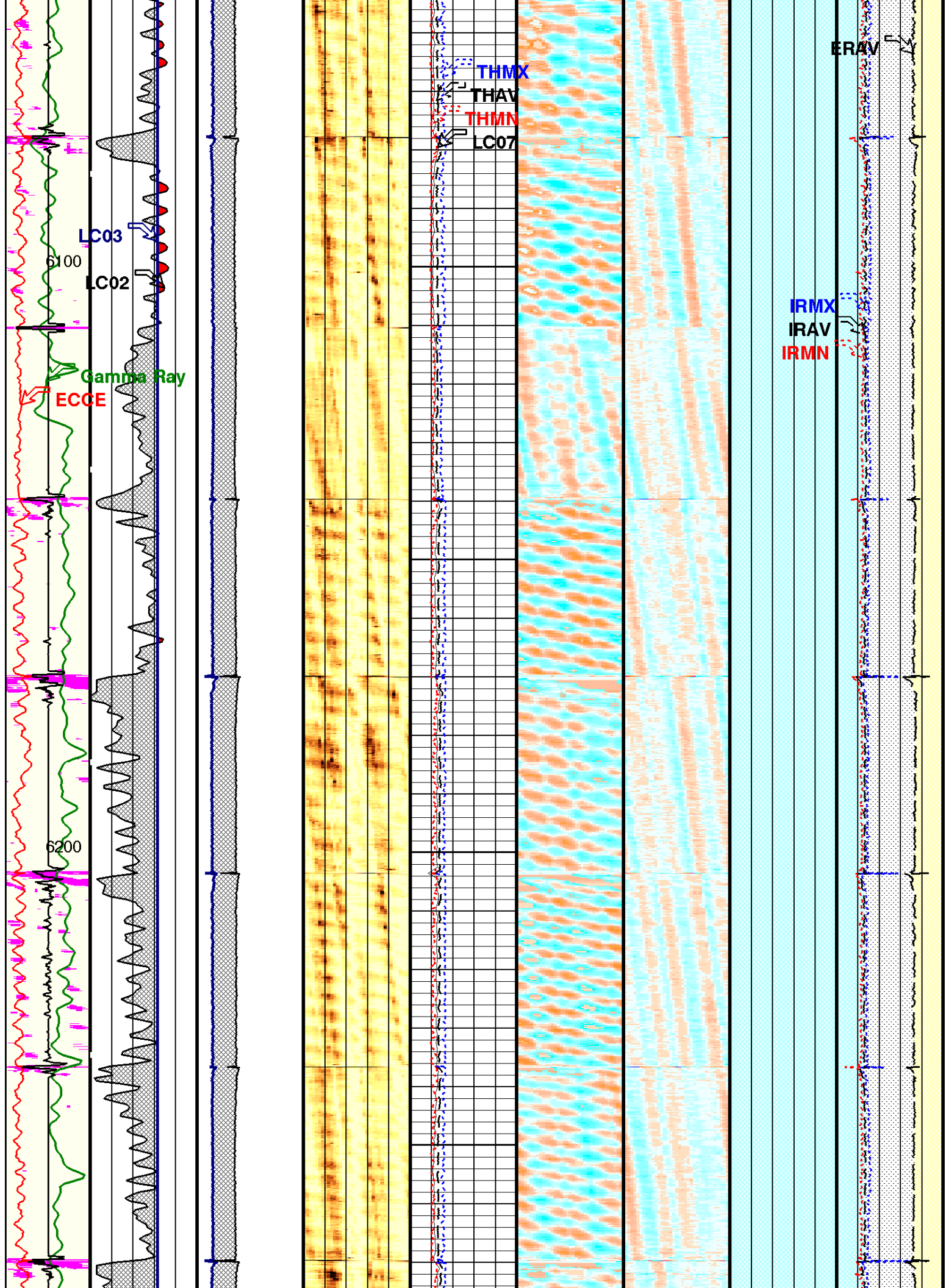


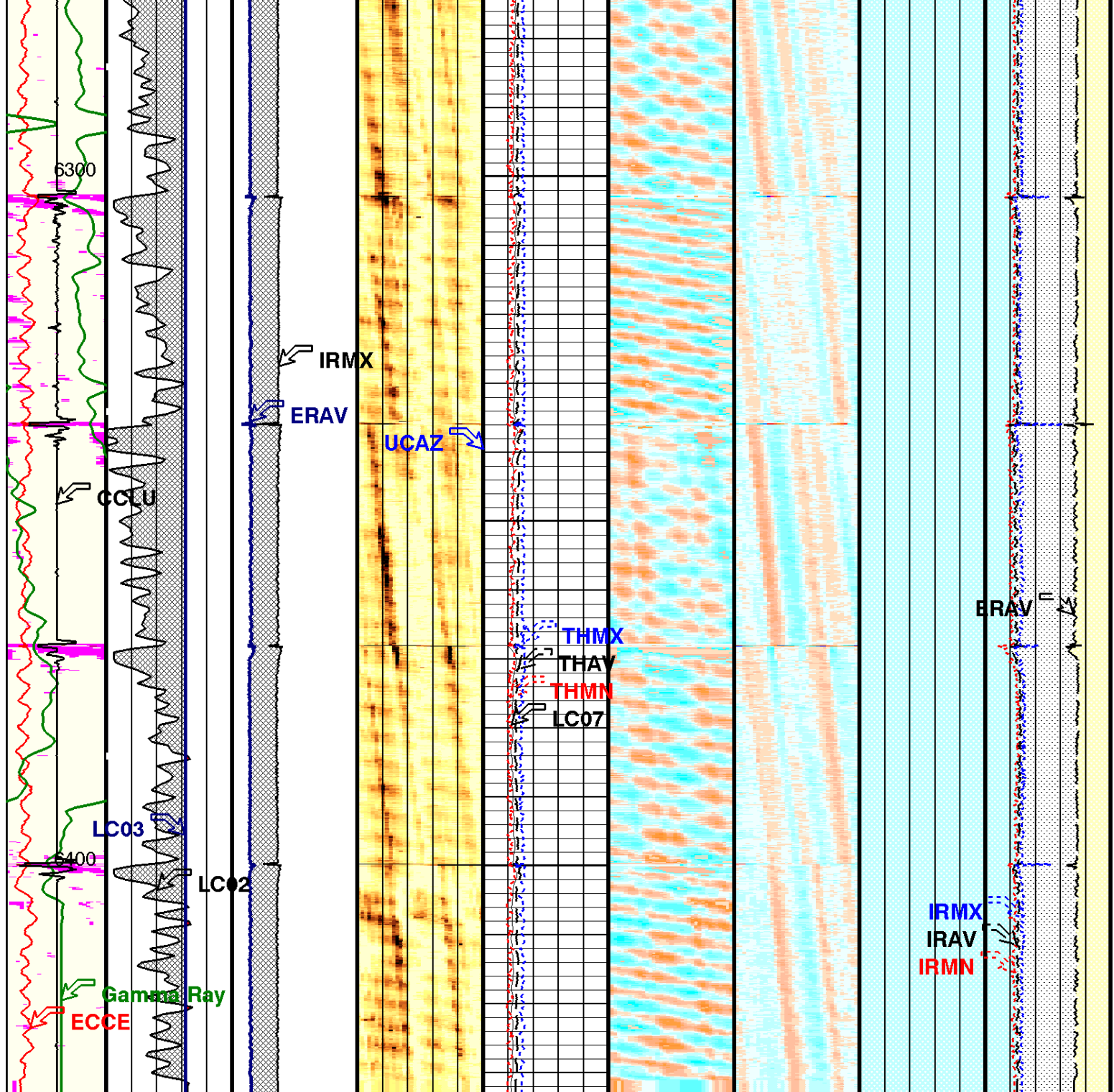




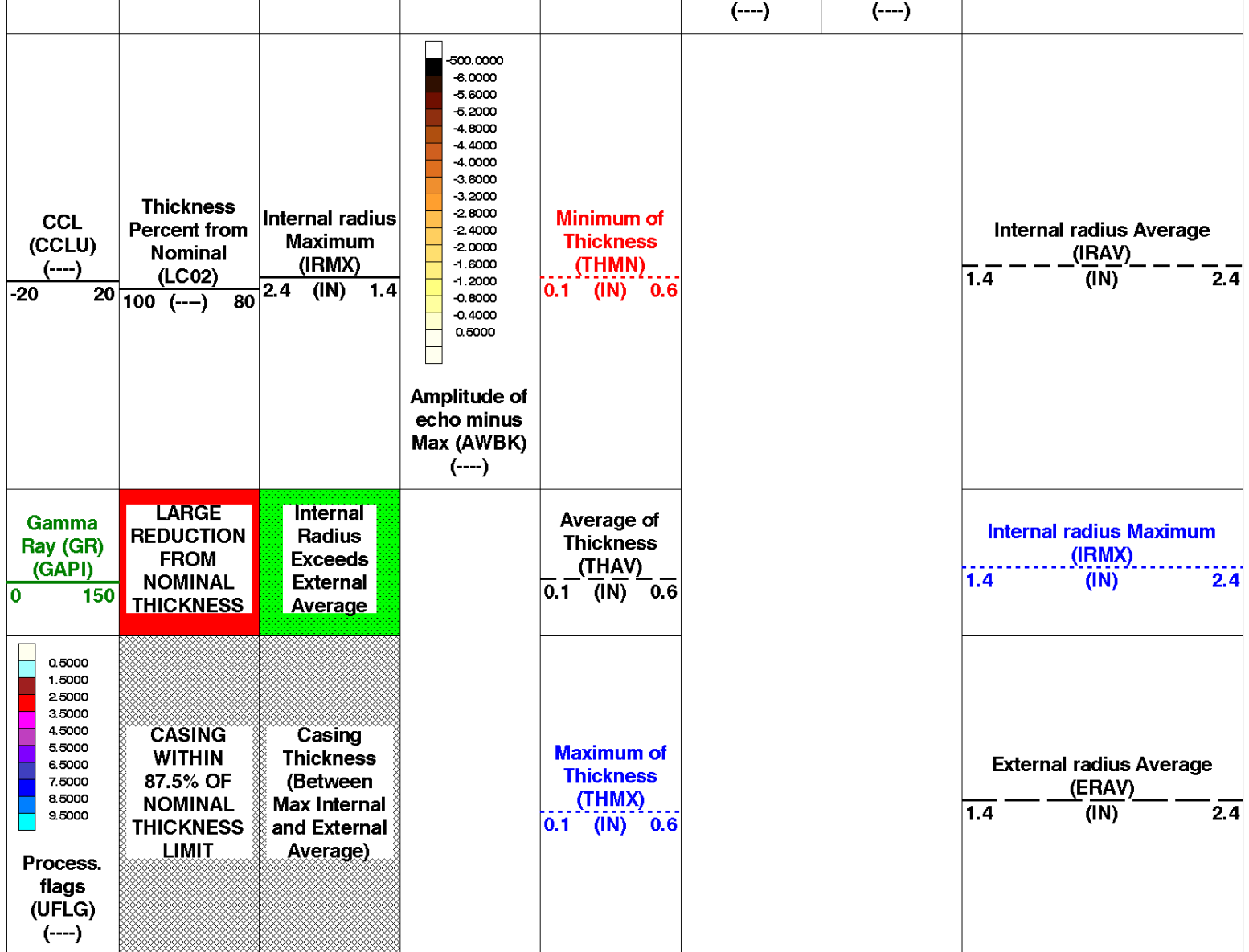








<p>Eccent. (ECCE)</p> <p>0 (IN) 0.5</p>	<p>87.5% Reference (LC03)</p> <p>100 (---) 80</p>	<p>External radius Average (ERAV)</p> <p>2.4 (IN) 1.4</p>	<p>Image rotation (UCAZ)</p> <p>360 (DEG) 0</p>	<p>ERAV - IRMX (LC07)</p> <p>0.1 (IN) 0.6</p>	<p>Thickness minus Ave (THBK)</p> <p>-500.0000 -0.0760 -0.0680 -0.0600 -0.0520 -0.0440 -0.0360 -0.0280 -0.0200 -0.0120 -0.0040 0.0040 0.0120 0.0200 0.0280 0.0360 0.0440 0.0520 0.0600 0.0680 0.0760</p>	<p>Internal radii minus Ave (IRBK)</p> <p>-500.0000 -0.0760 -0.0680 -0.0600 -0.0520 -0.0440 -0.0360 -0.0280 -0.0200 -0.0120 -0.0040 0.0040 0.0120 0.0200 0.0280 0.0360 0.0440 0.0520 0.0600 0.0680 0.0760</p>	<p>Internal radius Minimum (IRMN)</p> <p>1.4 (IN) 2.4</p>
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PIP SUMMARY

 Time Mark Every 60 S

Format: USIT CASING 5 inch Vertical Scale: 5" per 100'

Graphics File Created: 04-Sep-2013 15:43

OP System Version: 19C2-270

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

COMPUTATION FLAGS LABELLING

(0 - 1.5)	UFLG 1	UTIM error
(1.5 - 2.5)	UFLG 2	Pulse origin not detected
(2.5 - 3.5)	UFLG 3	WINLEN error
<hr/>		
(3.5 - 6.5)	UFLG 4 UFLG 5 UFLG 6	CASING THICKNESS error
<hr/>		
(6.5 - 10)	UFLG 7 UFLG 8 UFLG 9	LOOP PROCESSING error

Parameters

DLIS Name	Description	Value
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Param Name	Description	Value	Units
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	4.5	IN
CSDE	Casing Density	486.94	LBCF
CSID	Casing Inner Diameter	4.052	IN
DFVL	Default Fluid Velocity	198	US/F
DOT	Diameter of Transducer Sensor	1.756	IN
EMXV	EMEX Voltage	20	V
FDII	FPM Data Interpolation Interval	0	FT
IMAR	Image Rotation	OFF	
MW	Mud Weight	8.5	LB/G
RCOD	Reference Calibrator Outer Diameter	4.5	IN
RCSO	Reference Calibrator Standoff	0.8425	IN
RCTH	Reference Calibrator Thickness	0.2165	IN
TCUB	T^3 Processing Level	Vax_1st_Esti	
THDH	Maximum Search Thickness (percentage of nominal)	120	
THDL	Minimum Search Thickness (percentage of nominal)	85	
THDP	Thickness Detection Policy	Fundamental	
THNO	Nominal Thickness of Casing	0.224	IN
UMAO	USIT Measurement Angular Offset	18	DEG
USTO	Ultrasonic Time Offset	-2	US
USUB	Ultrasonic Subassembly Identifier	Sub 5 inch	
UWKM	Ultrasonic Working Mode	10DEG_1_5IN_60U HF	
VCAS	Ultrasonic Transversal Velocity in Casing	51.4	US/F
WLEN	T^3 Processing Length	9.5946	US
ZCAS	Acoustic Impedance of Casing	46.25	MRAY
ZINI	Initial Estimate of Cement Impedance	-1	MRAY
ZMUD	Acoustic Impedance of Mud	1.6	MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.2	MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3	MRAY
System and Miscellaneous			
CWEI	Casing Weight	10.50	LB/F
DO	Depth Offset for Playback	3.5	FT
PP	Playback Processing	RECOMPUTE	

Input DLIS Files

DEFAULT USI_014LUP FN:13 PRODUCER 04-Sep-2013 07:50 6429.5 FT 41.0 FT

Output DLIS Files

DEFAULT USI_011PUP FN:10 PRODUCER 04-Sep-2013 15:43

Schlumberger

Repeat Pass

MAXIS Field Log

Input DLIS Files

DEFAULT USI_012LUP FN:11 PRODUCER 04-Sep-2013 07:49 6432.0 FT 6132.6 FT

Output DLIS Files

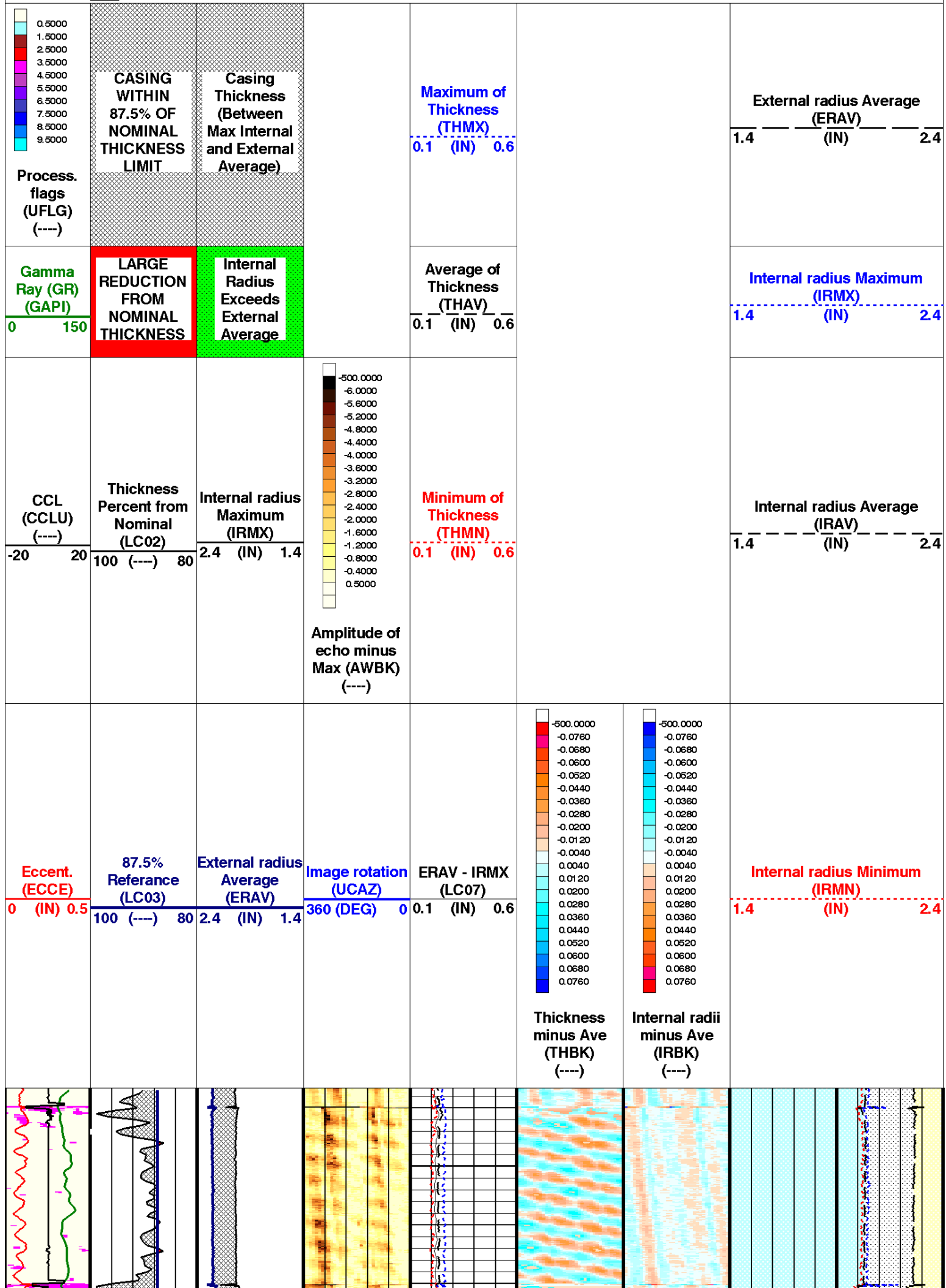
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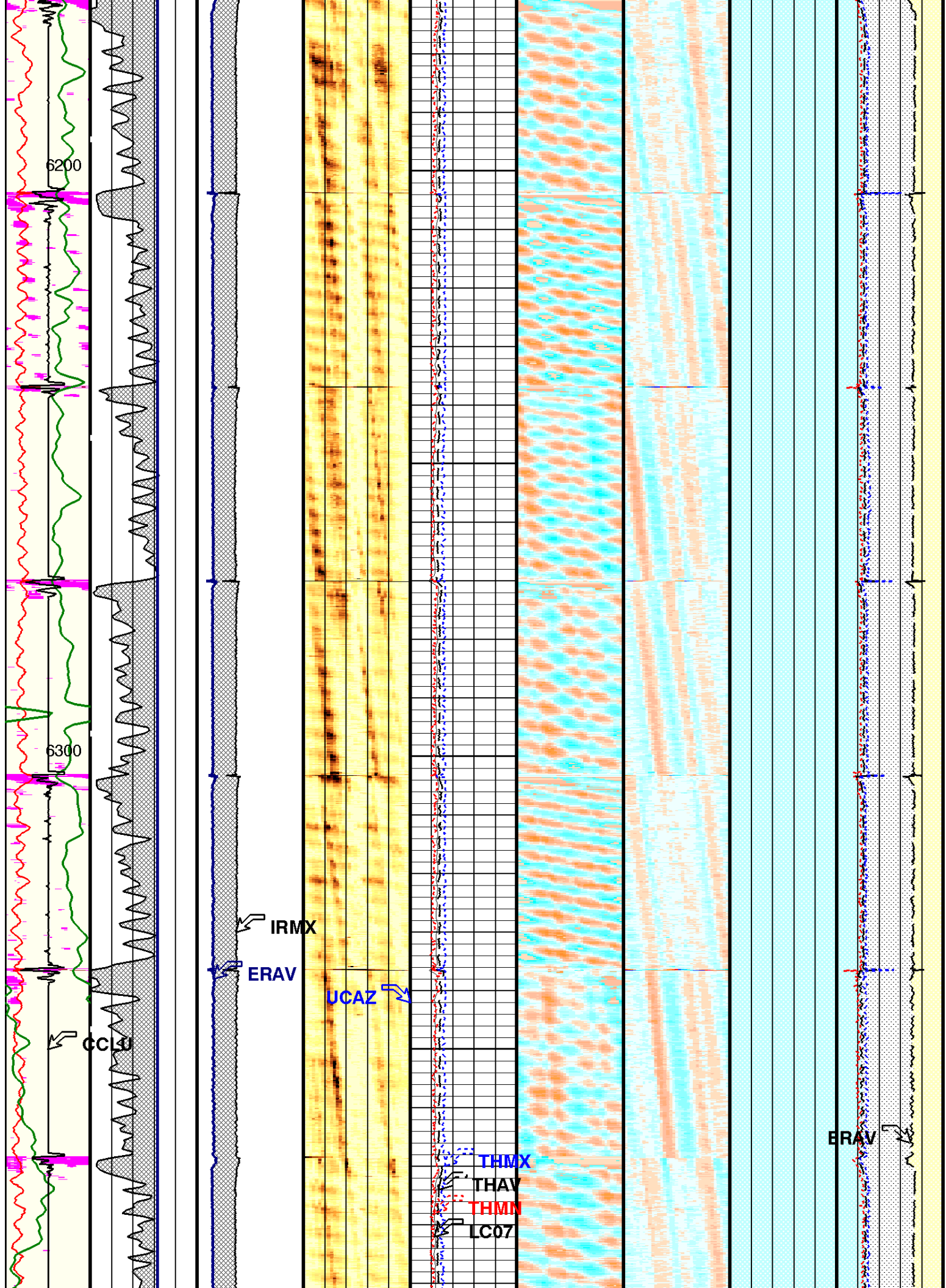
OP System Version: 19C2-270

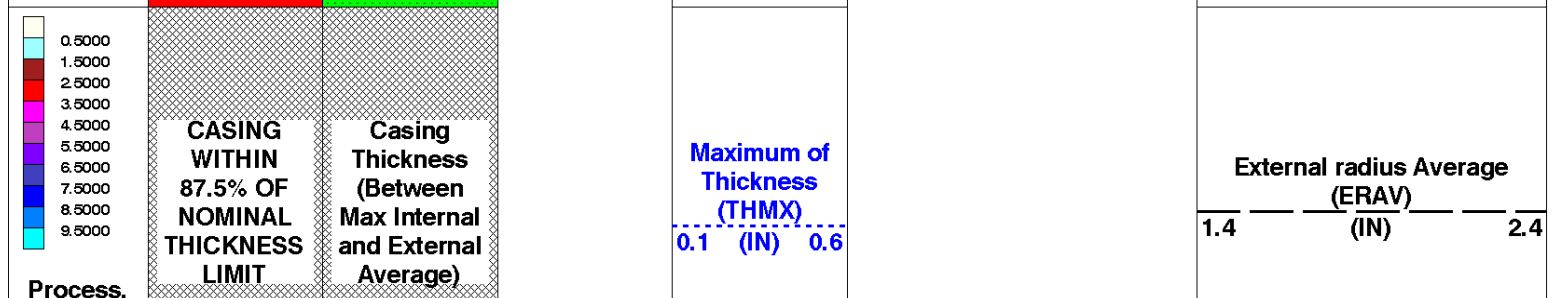
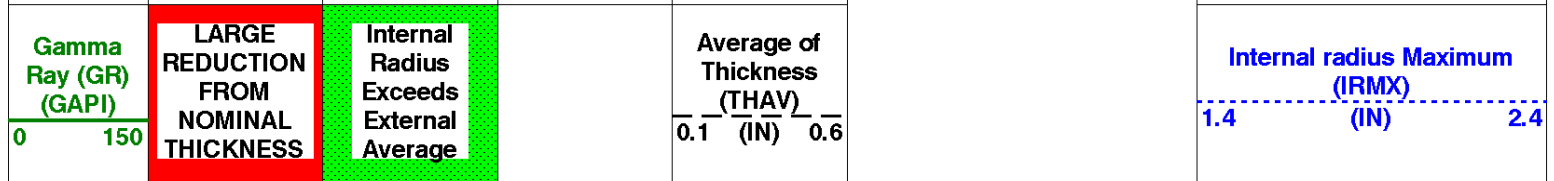
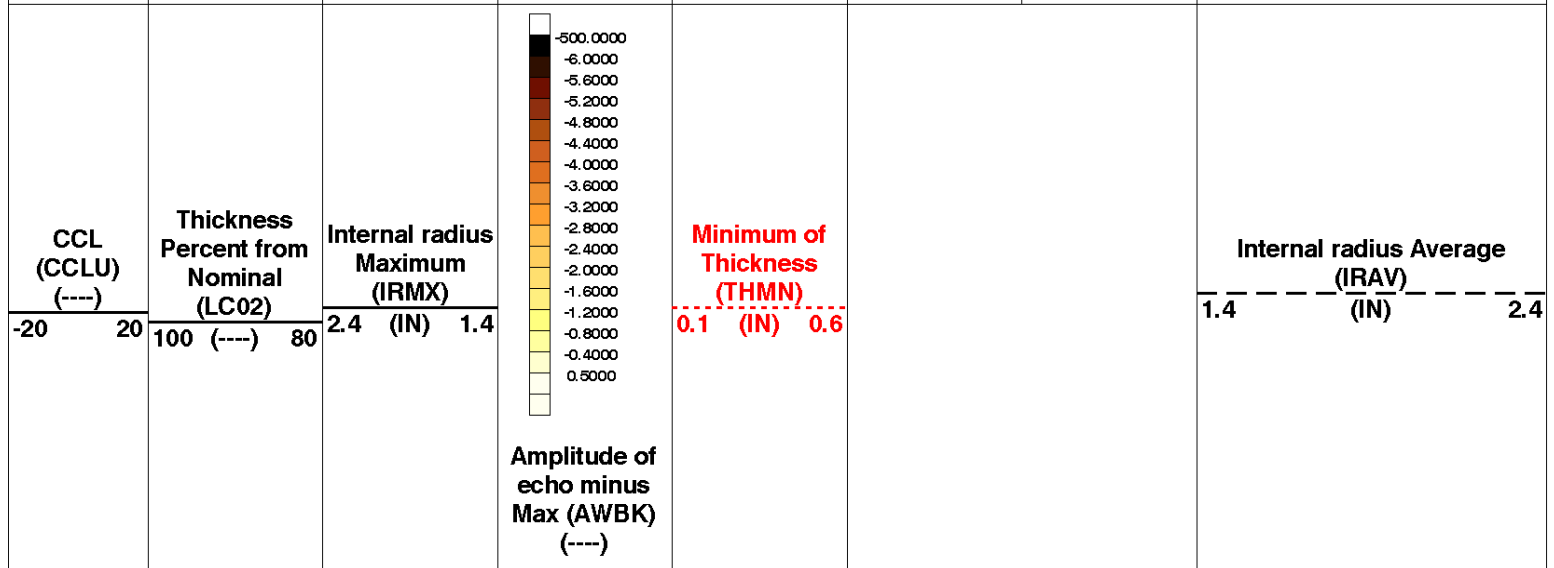
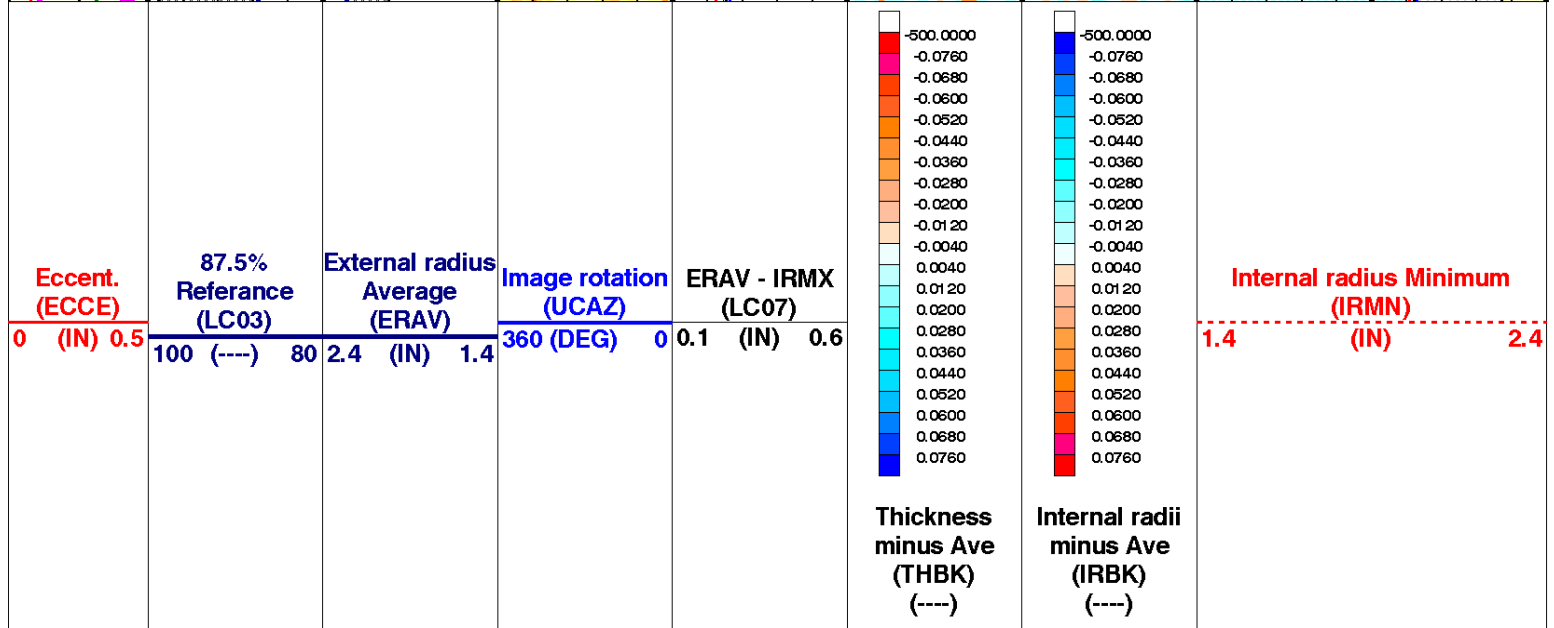
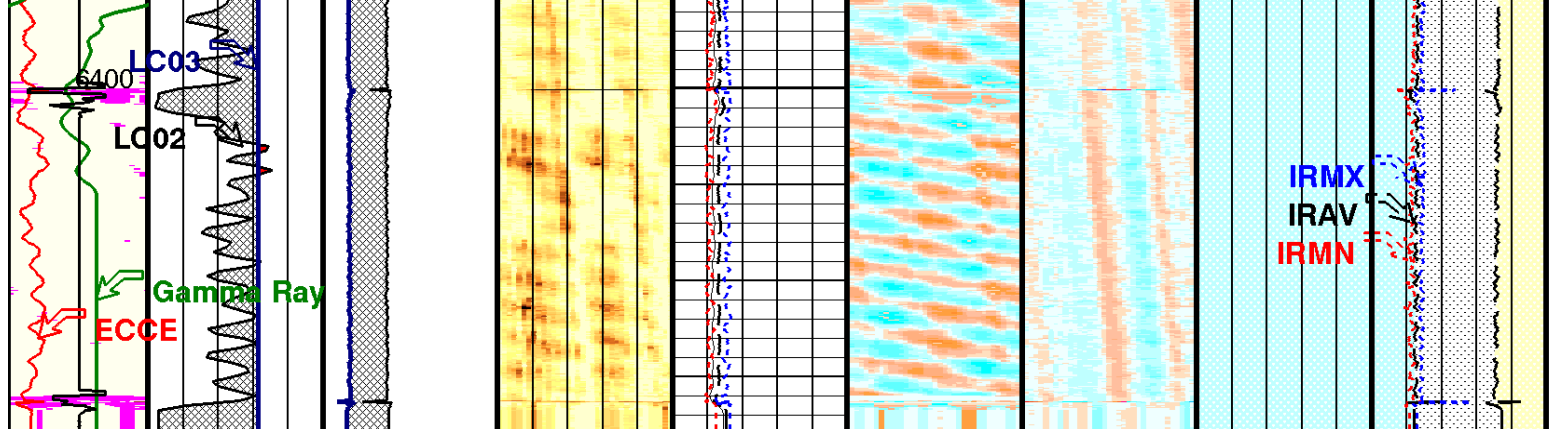
USIT-E 19C2-270 SGT-N 19C2-270
DTC-H 19C2-270

PIP SUMMARY

 Time Mark Every 60 S







flags
(UFLG)
(---)

PIP SUMMARY

 Time Mark Every 60 S

Format: USIT CASING 5 inch

Vertical Scale: 5" per 100'

Graphics File Created: 04-Sep-2013 15:56

OP System Version: 19C2-270

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

COMPUTATION FLAGS LABELLING

(0 - 1.5)	UFLG 1	UTIM error
(1.5 - 2.5)	UFLG 2	Pulse origin not detected
(2.5 - 3.5)	UFLG 3	WINLEN error
<hr/>		
(3.5 - 6.5)	UFLG 4 UFLG 5 UFLG 6	CASING THICKNESS error
<hr/>		
(6.5 - 10)	UFLG 7 UFLG 8 UFLG 9	LOOP PROCESSING error

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	4.5 IN
CSDE	Casing Density	486.94 LBCF
CSID	Casing Inner Diameter	4.052 IN
DFVL	Default Fluid Velocity	198 US/F
DOT	Diameter of Transducer Sensor	1.756 IN
EMXV	EMEX Voltage	20 V
FDII	FPM Data Interpolation Interval	0 FT
IMAR	Image Rotation	OFF
MW	Mud Weight	8.5 LB/G
RCOD	Reference Calibrator Outer Diameter	4.5 IN
RCSO	Reference Calibrator Standoff	0.8425 IN
RCTH	Reference Calibrator Thickness	0.2165 IN
TCUB	T ³ Processing Level	Vax_1st_Esti
THDH	Maximum Search Thickness (percentage of nominal)	120
THDL	Minimum Search Thickness (percentage of nominal)	85
THDP	Thickness Detection Policy	Fundamental
THNO	Nominal Thickness of Casing	0.224 IN
UMAO	USIT Measurement Angular Offset	18 DEG
USTO	Ultrasonic Time Offset	-2 US
USUB	Ultrasonic Subassembly Identifier	Sub 5 inch
UWKM	Ultrasonic Working Mode	10DEG_1_5IN_60U_HF
VCAS	Ultrasonic Transversal Velocity in Casing	51.4 US/F
WLEN	T ³ Processing Length	9.5946 US
ZCAS	Acoustic Impedance of Casing	46.25 MRAY
ZINI	Initial Estimate of Cement Impedance	-1 MRAY
ZMUD	Acoustic Impedance of Mud	1.6 MRAY
ZTCM	Acoustic Impedance Threshold for Cement	2.2 MRAY
ZTGS	Acoustic Impedance Threshold for Gas	0.3 MRAY
System and Miscellaneous		
CWEI	Casing Weight	10.50 LB/F
DO	Depth Offset for Playback	3.5 FT
PP	Playback Processing	RECOMPUTE

Input DLIS Files

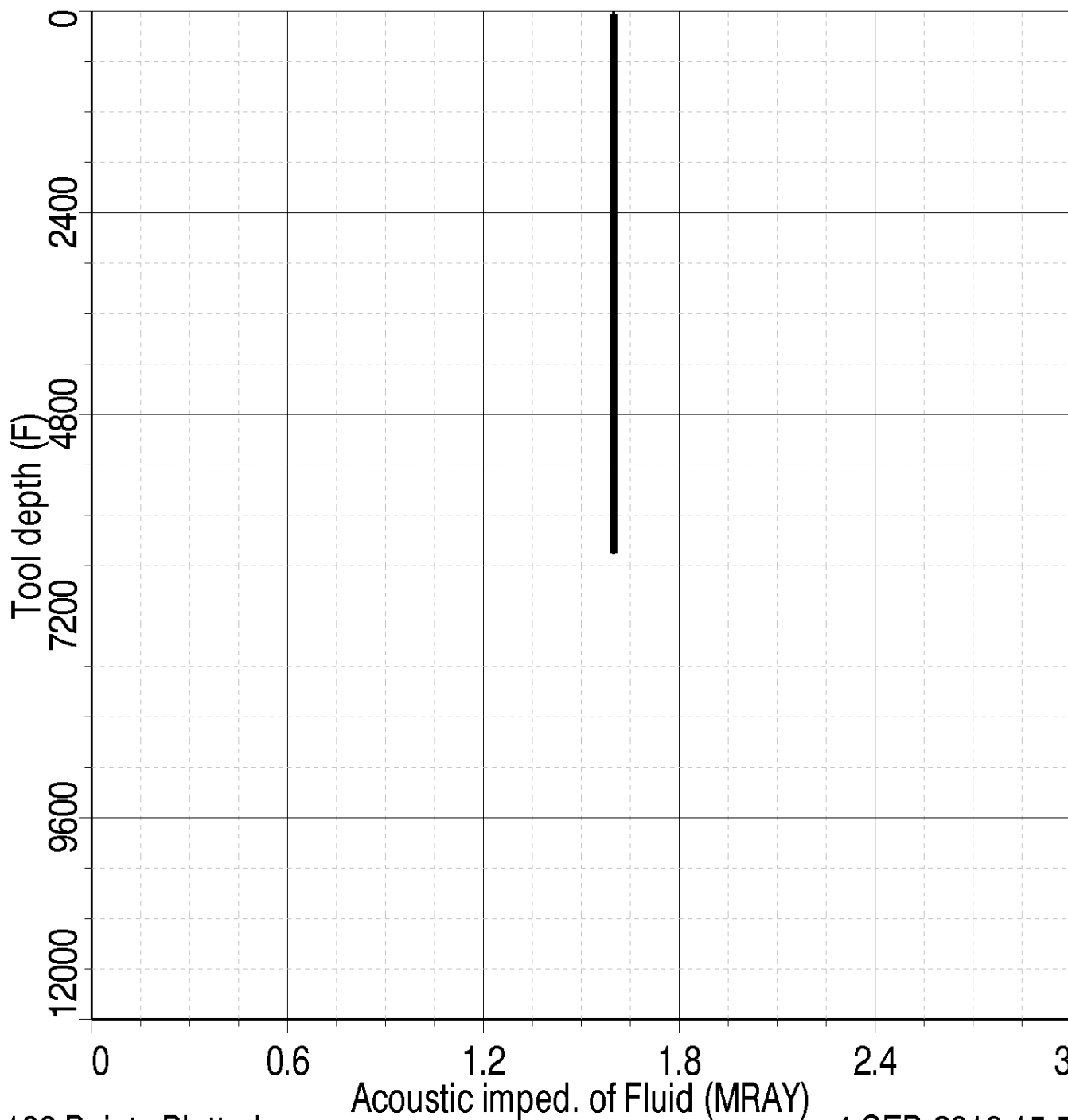
DEFAULT	USI_012LUP	FN:11	PRODUCER	04-Sep-2013 07:49	6432.0 FT	6132.6 FT
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Schlumberger

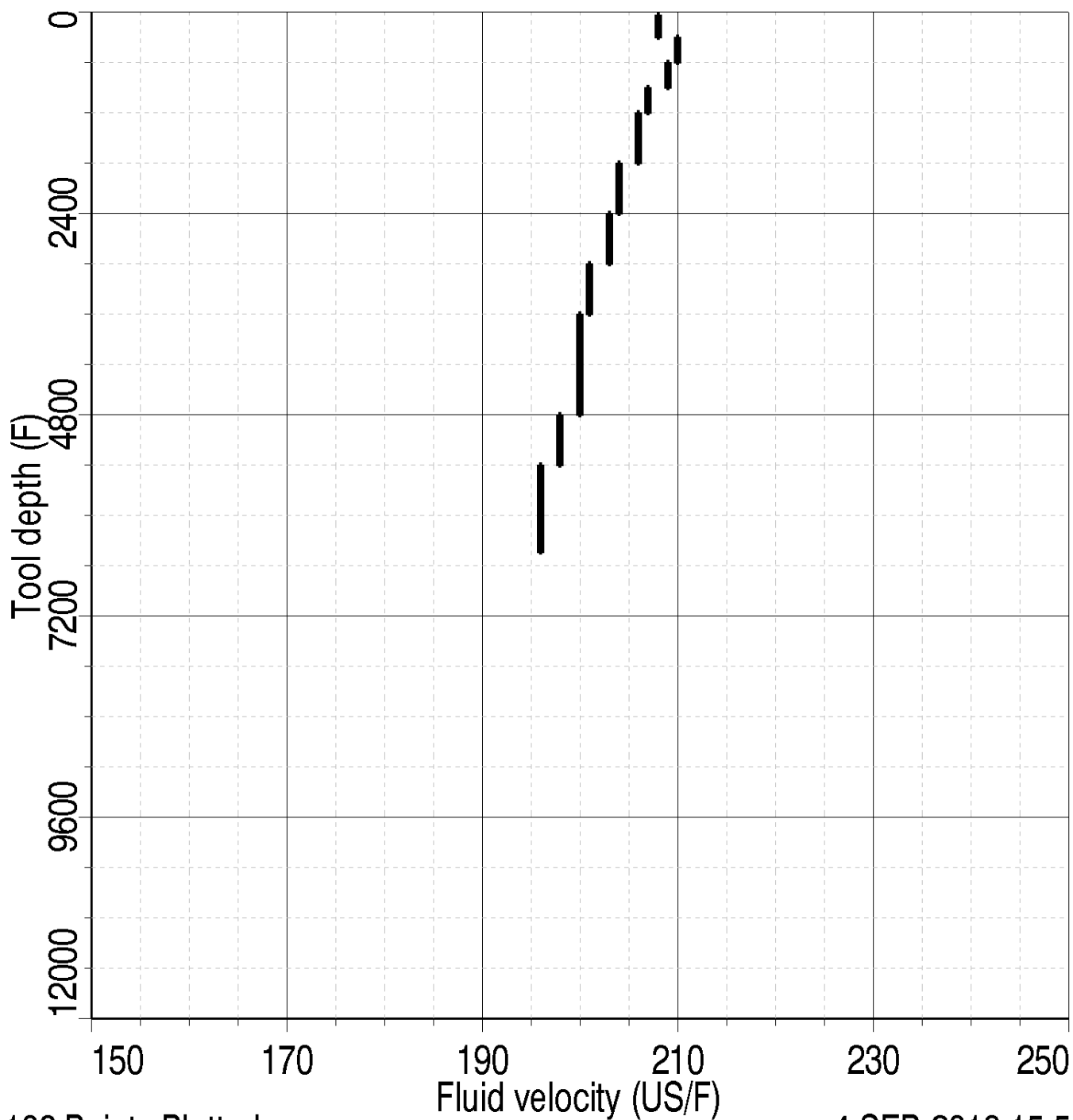
Fluid Properties

MAXIS Field Log

Index: 6433.0 - 44.6 FT



Index: 6433.0 - 44.6 FT



51108 Points Plotted

4-SEP-2013 15:55

Company: **Xcel Energy, Inc**

Schlumberger

Well: **Roundup Storage Unit No 23**

Field: **Roundup**

County: **Morgan**

State: **Colorado**

Ultrasonic Imager
Casing Evaluation