Schlumberger

Basker−7
Sonic Scanner

Compressional and Shear
DT Computations

3858 m to 1489 m

COMPANY: Anzon Australia Pty Limited
WELL: Basker−7
FIELD: Basker−Manta−Gummy (BMG)
Rig: Ocean Patriot
State: Victoria
COUNTRY: Australia

LOCATION
Field: Permit: VIC L/26
Northing: 5,759,559.230 m
Easting: 649,193.050 m
Latitude: 38° 17' 58.78" S Longitude: 148° 42' 22.31" E

Date		16−Aug−2009			
Run No.		1			
Depth Driller					
Depth Logger (Schl)					
Btm. Log Interval		3858.0 m			
Top Log Interval		1489.0 m			
Casing−Driller					
Casing−Logger		7 in 29 ppf			
Bit Size		8.5 in			
Type fluid in hole		KCl Brine			
Dens.	Visc.	1.1 g/cm3			
pH	Fluid Loss				
Source of Sample		Active Pit			
Rm @ Meas. Temp.					
Rmf @ Meas. Temp.					
Rmc @ Meas. Temp.					
Source: Rmf	Rmc				
Rm @ BHT					
Circulation Stopped					
Logger on Bottom					
Max. Rec. Temp.					
Equip.	Location		AUSL		
Recorded by:		J. Zacharia / J. Hollingworth			
Witnessed by:		R. Love			

FOLD HERE

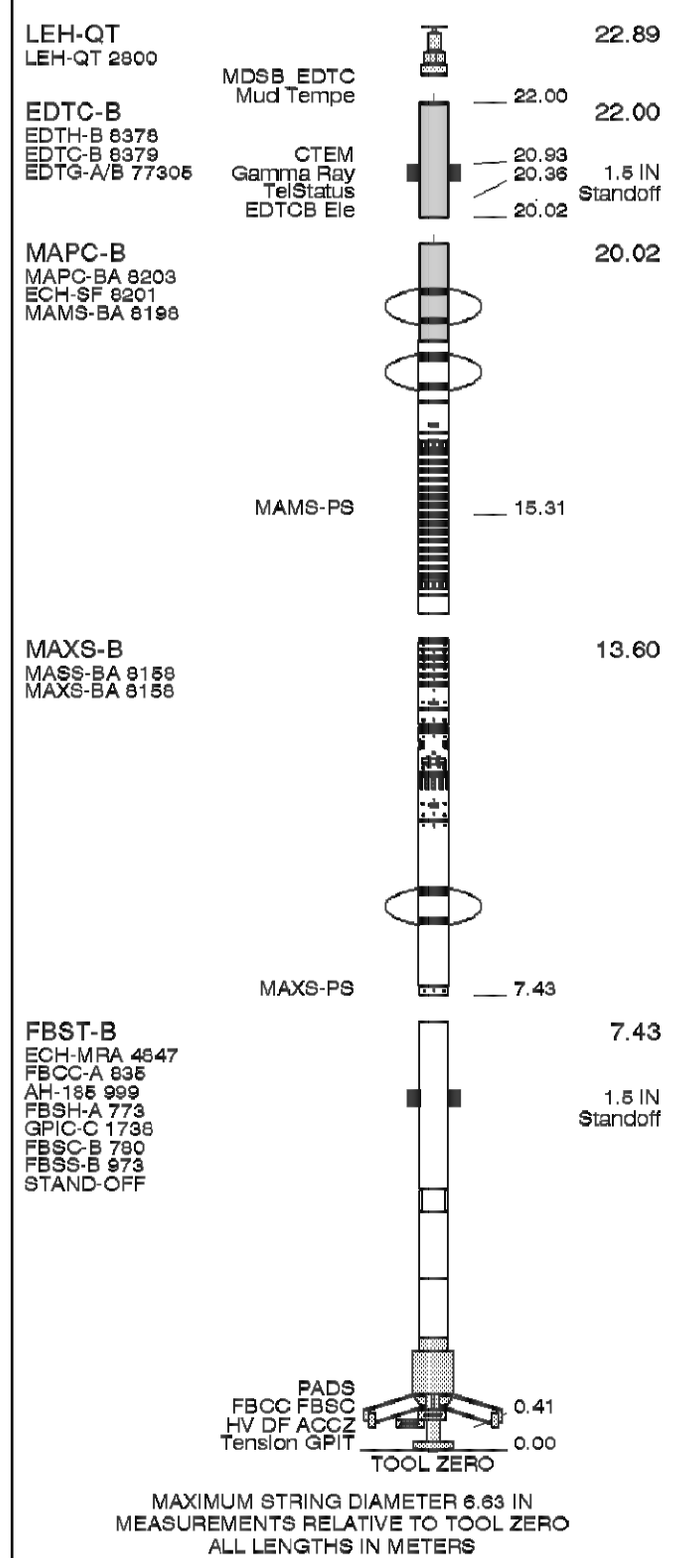
The well name, location and borehole reference data were furnished by the customer

Ser. Order # | OP Vers.: 17C0−154 | Process Date: 03−Sep−2009 | Center: DCS Perth | Baseline: GF4.4 DC4 | Log Analyst: Ifti Altaf

Field Engineer's Remarks:

SURFACE EQUIPMENT
WITM (EDTS)-A

DOWNHOLE EQUIPMENT



MAXIMUM STRING DIAMETER 6.63 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN METERS

Log Analyst's Remarks:

OBJECTIVE:

- Process Sonic Scanner data for DT Compressional and Shear

AVAILABLE INPUT DATA:

- Sonic Scanner logged in "Standard" Mode
- Dual Axis Caliper and Inclinometer run in combination with Sonic Scanner.
- Open Hole Logs

DEPTH SHIFT:

- No depth shifting was applied.

DATA QUALITY:

- All data was of good quality.

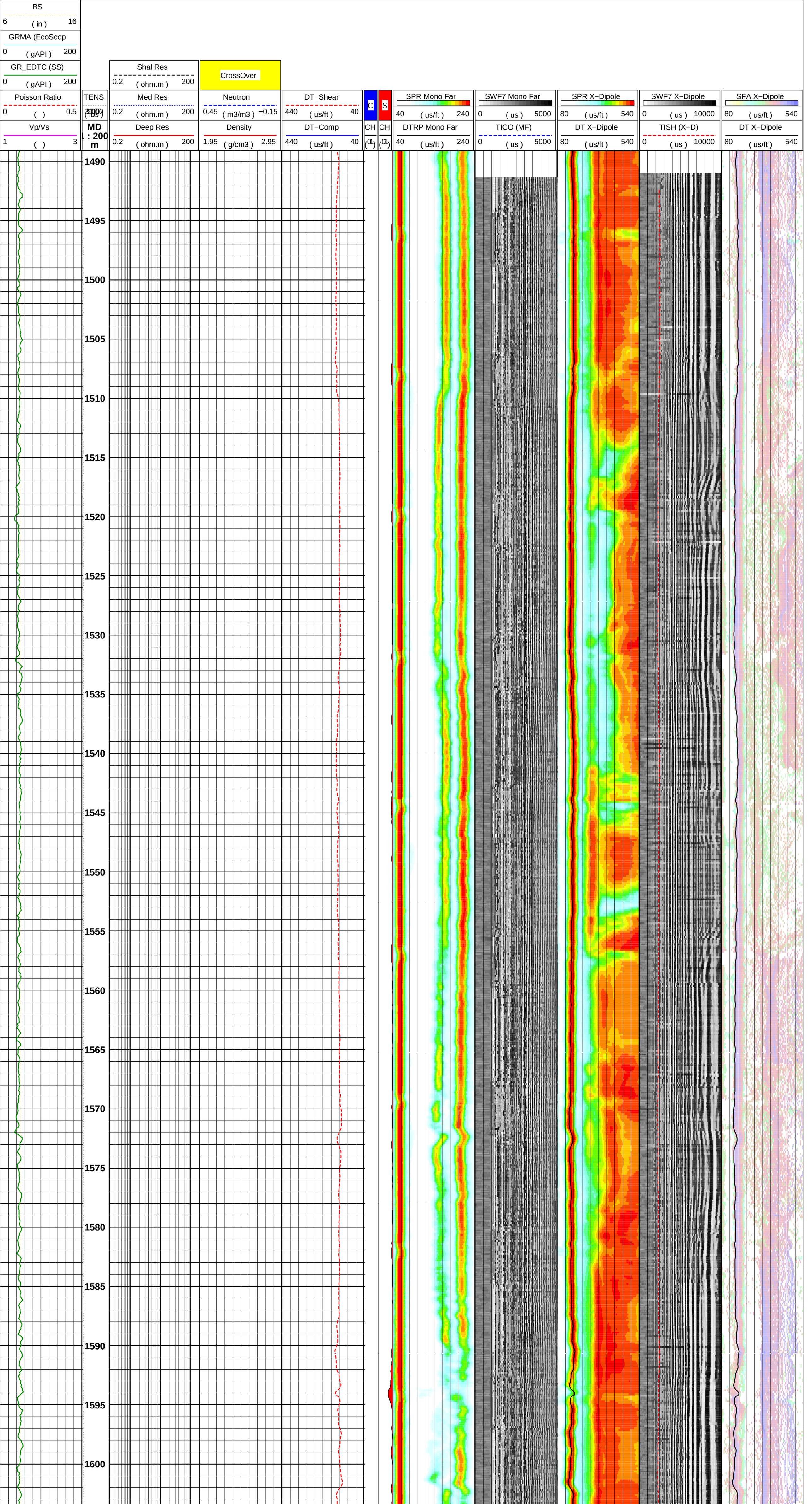
PROCESSING DETAILS:

- DTCO was processed from monopole waveforms
- DT−Shear was processed from X−Dipole waveforms
- The data was processed using the default "BestDT" parameters for "Intermediate" formation.

RESULTS:

DT−Compressional : The monopole waveforms contain decent formation arrival and the DTCO results are very good.

DT−Shear : The dipole waveforms contain very good formation arrival. and the DTSM results are very good.


BS
6 (in) 16
GRMA (EcoScop
0 (gAPI) 200
GR_EDTC (SS)
0 (gAPI) 200
Poisson Ratio
0 ( ) 0.5
Vp/Vs
1 ( ) 3
TENS
(lbs)
MD
1 : 200
m
Shal Res
0.2 (ohm.m) 200
Med Res
0.2 (ohm.m) 200
Deep Res
0.2 (ohm.m) 200
CrossOver
Neutron
0.45 (m3/m3) −0.15
Density
1.95 (g/cm3) 2.95
DT−Shear
440 (us/ft) 40
DT−Comp
440 (us/ft) 40
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S
CH
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SPR Mono Far
40 (us/ft) 240
DTRP Mono Far
40 (us/ft) 240
SWF7 Mono Far
0 (us) 5000
TICO (MF)
0 (us) 5000
SPR X−Dipole
80 (us/ft) 540
DT X−Dipole
80 (us/ft) 540
SWF7 X−Dipole
0 (us) 10000
TISH (X−D)
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SFA X−Dipole
80 (us/ft) 540
DT X−Dipole
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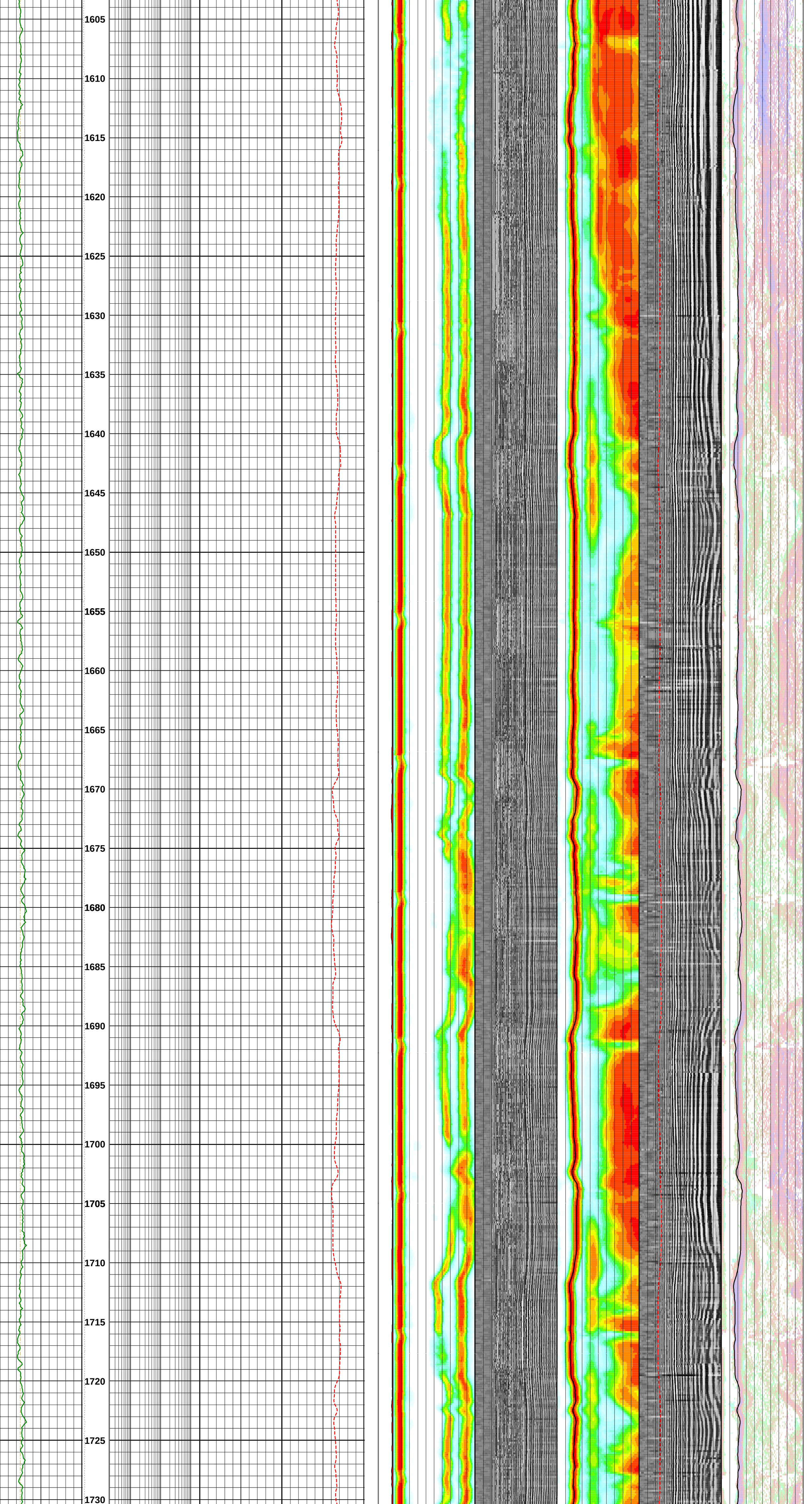
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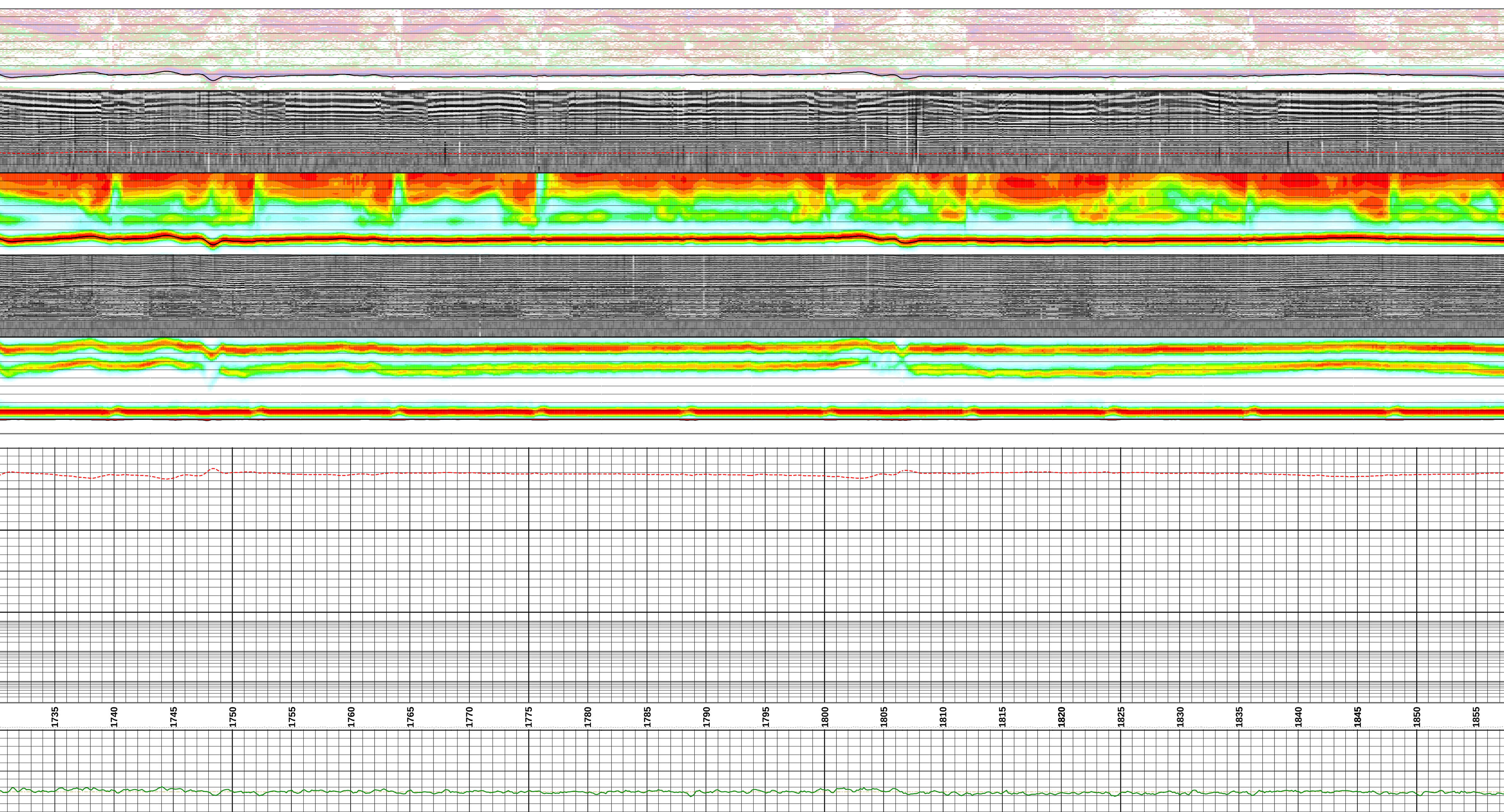
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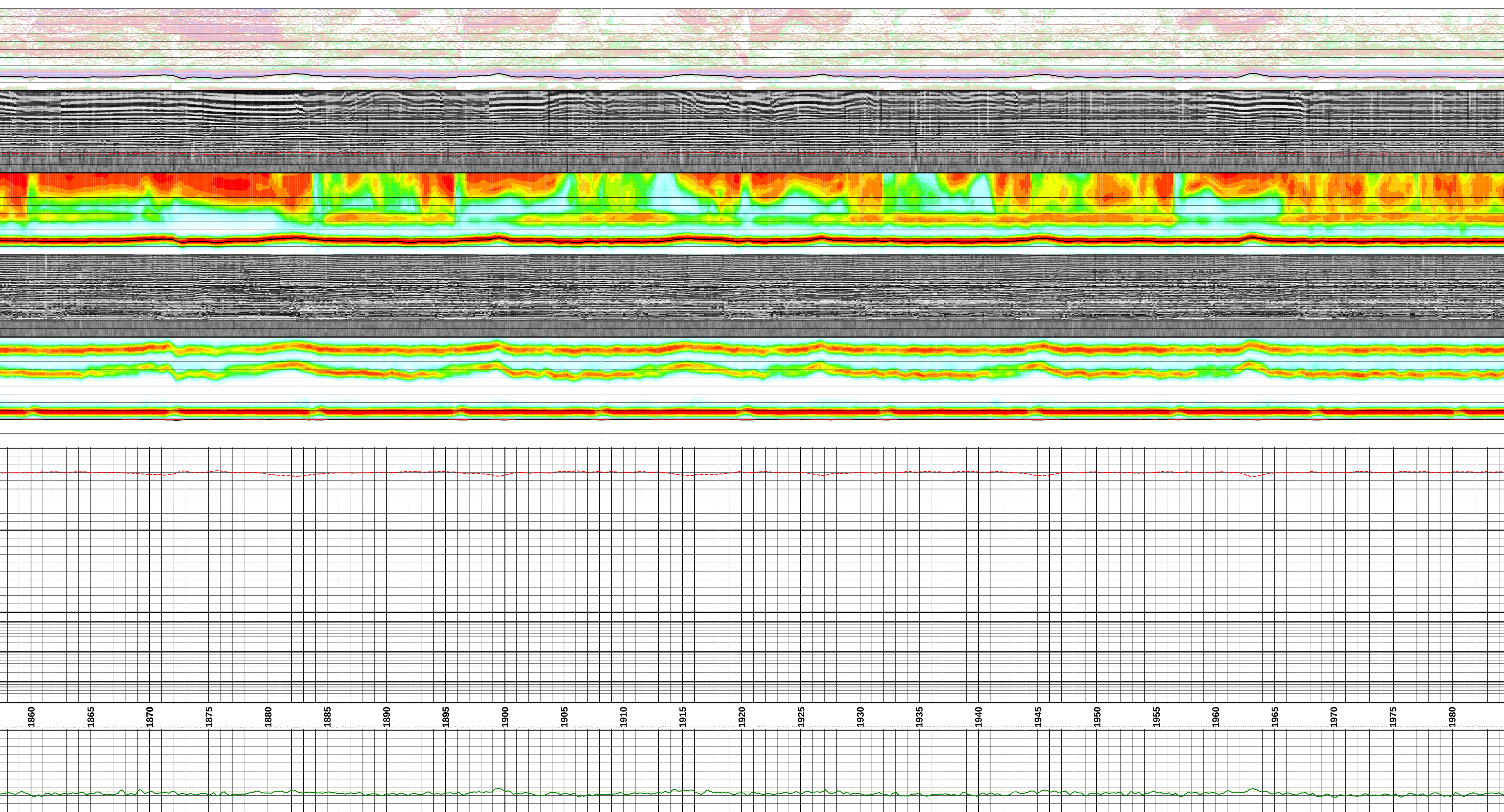
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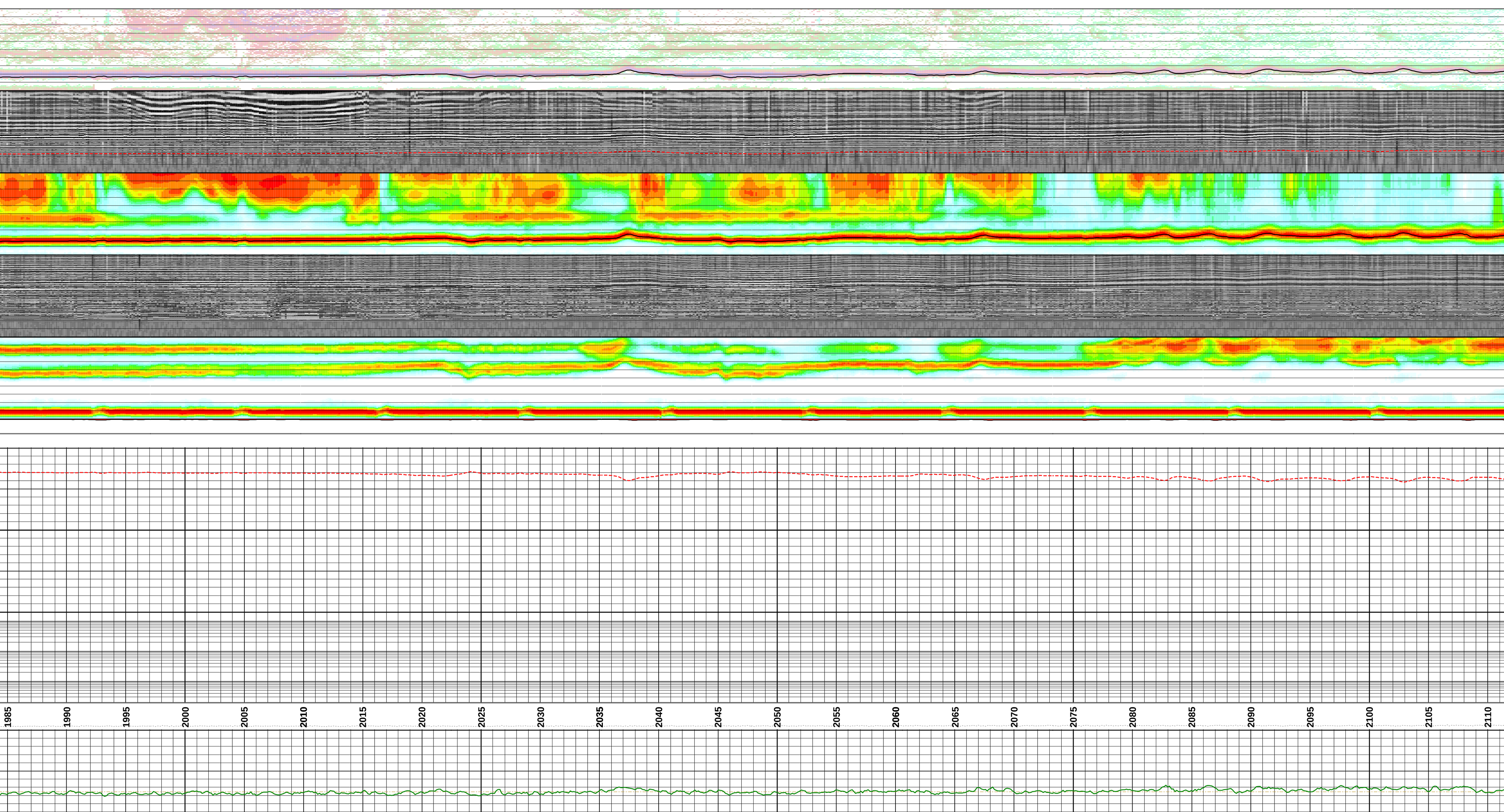
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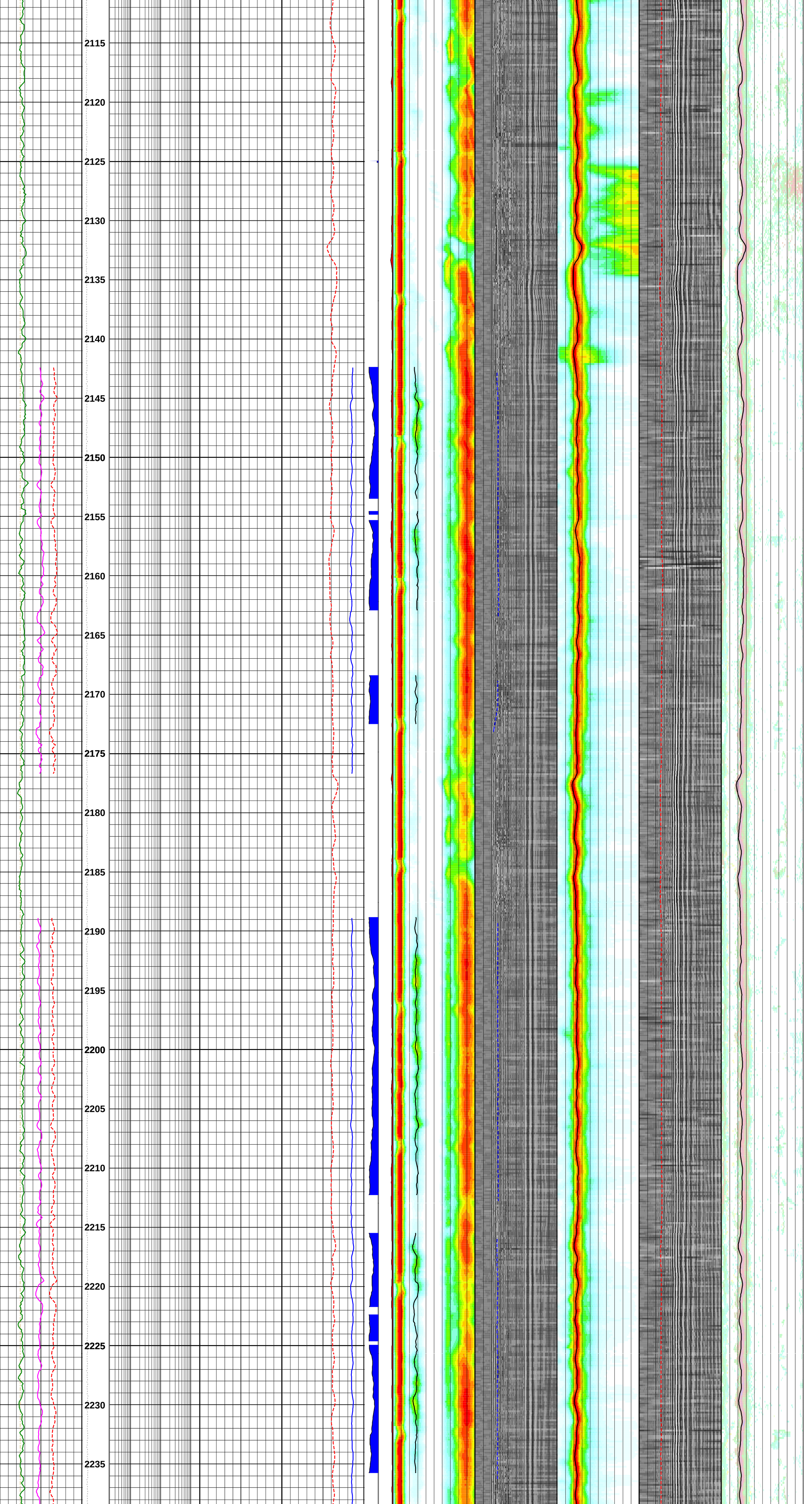
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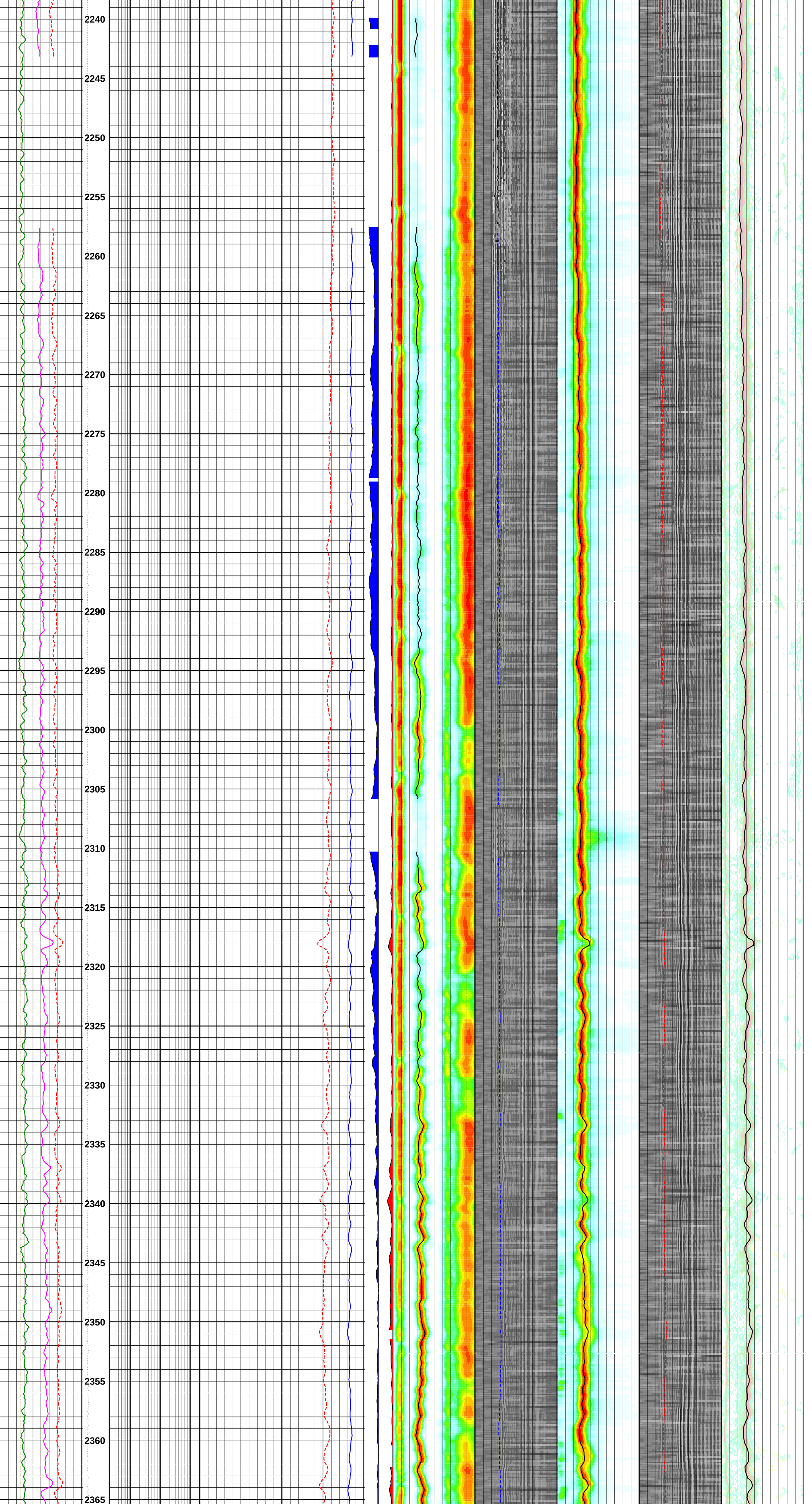
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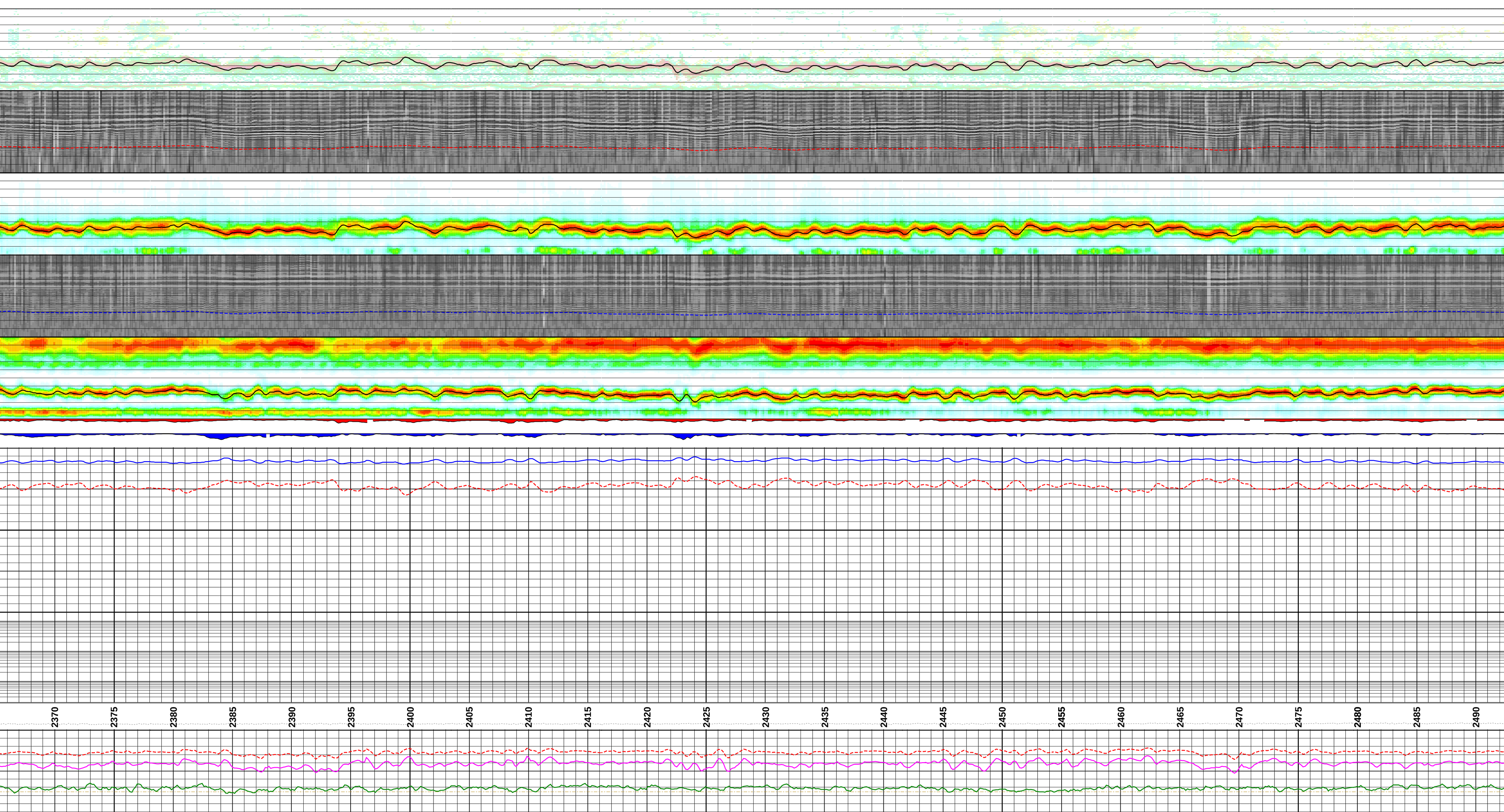
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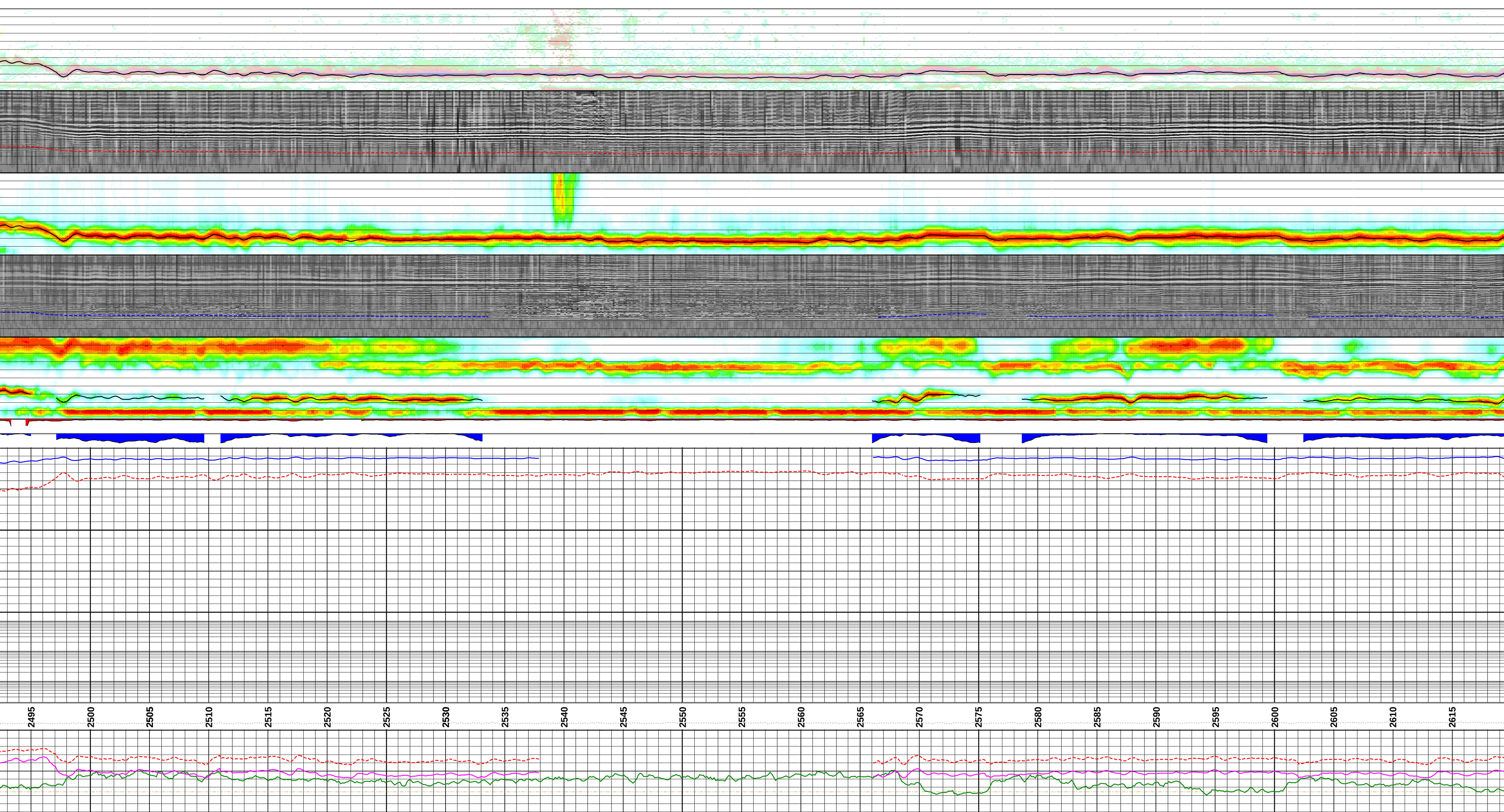
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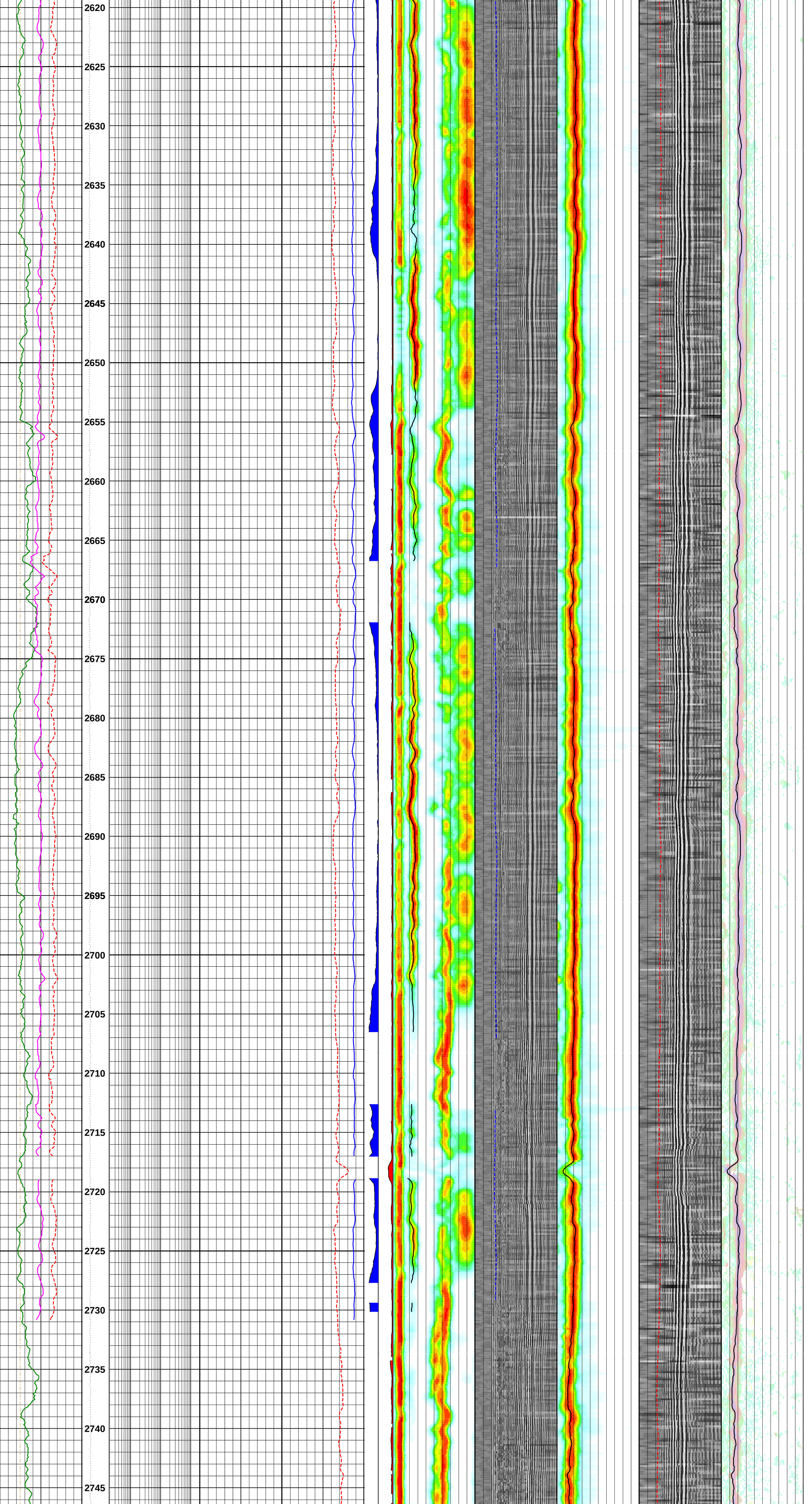
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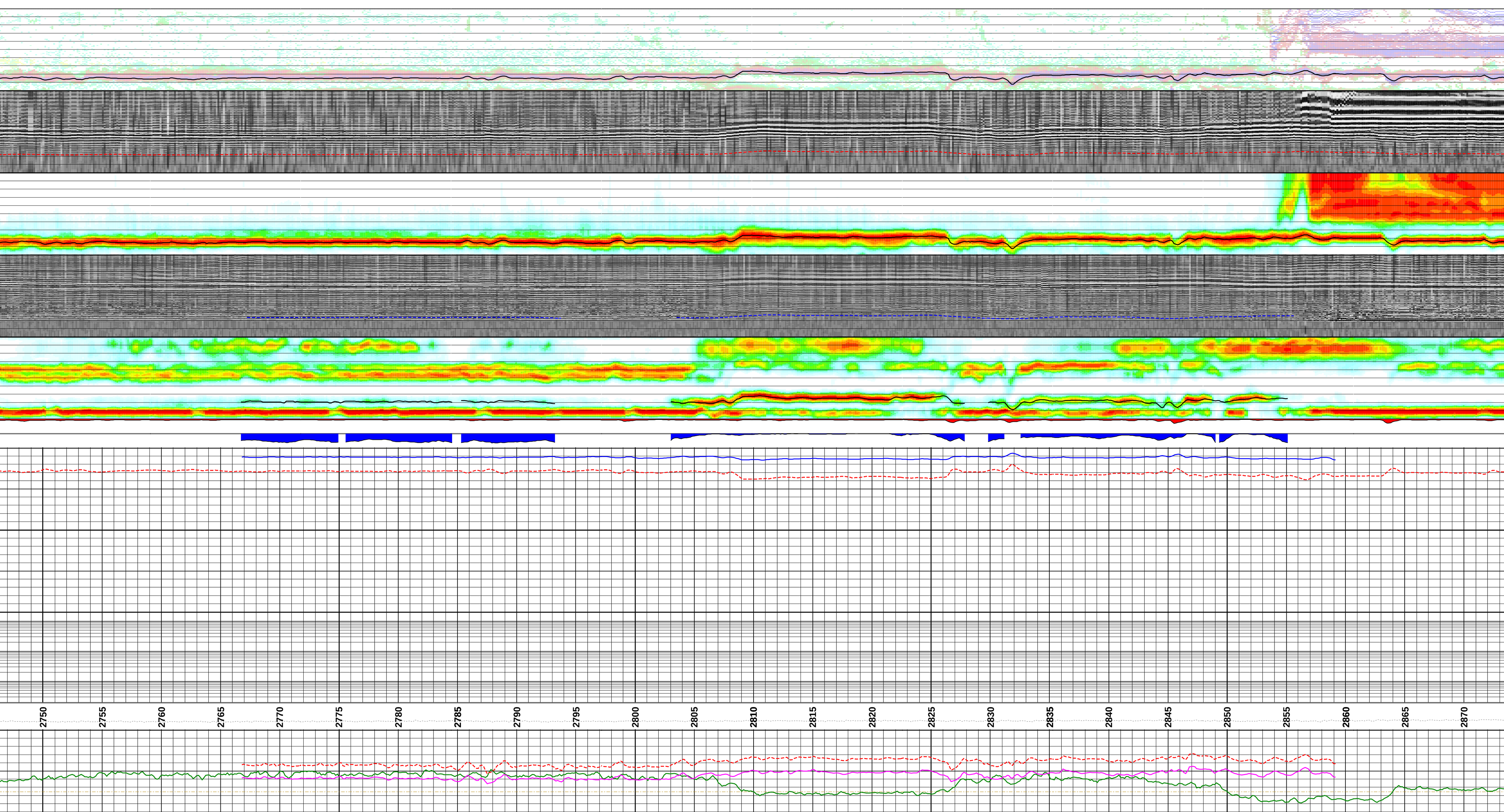
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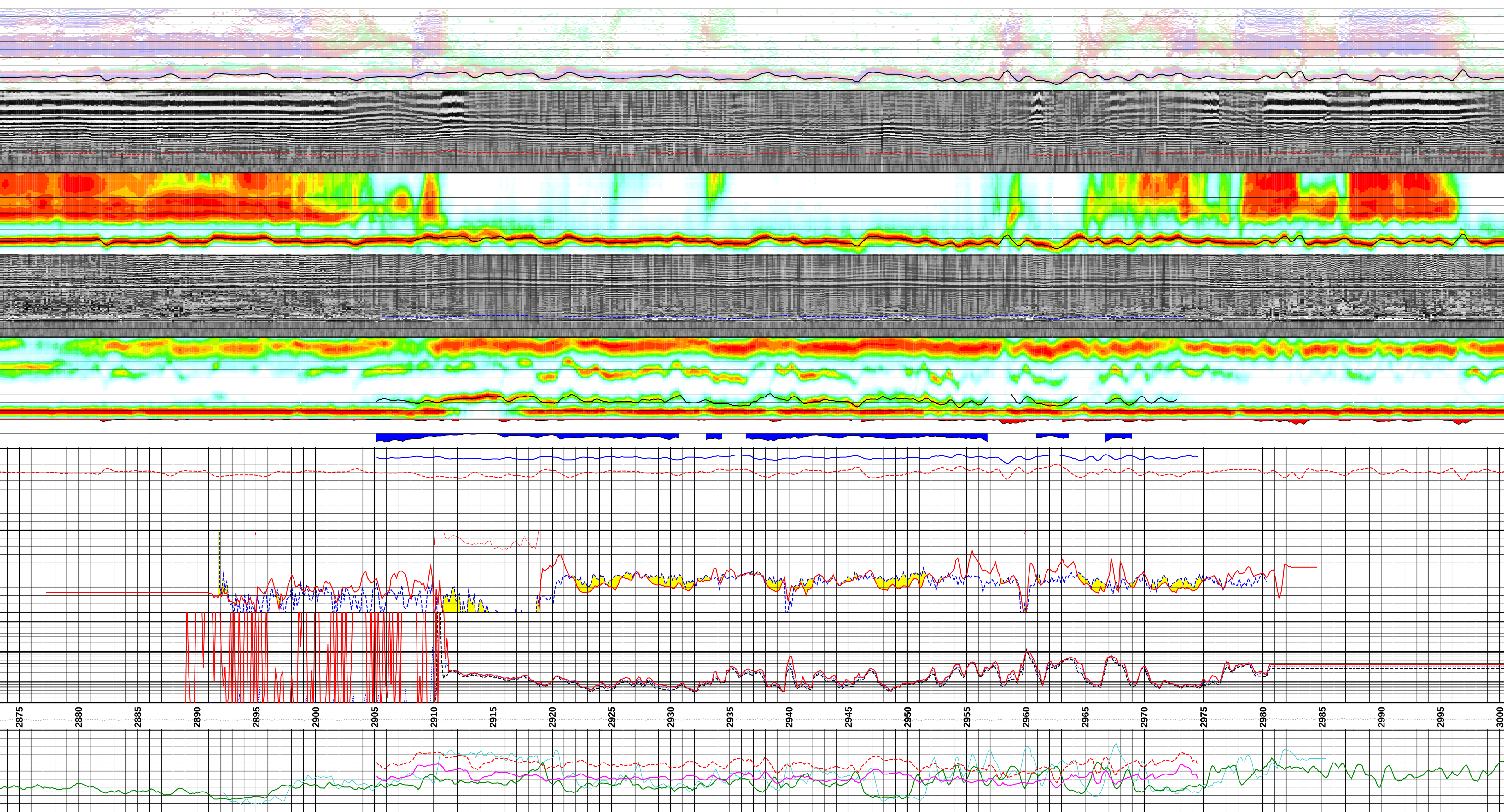
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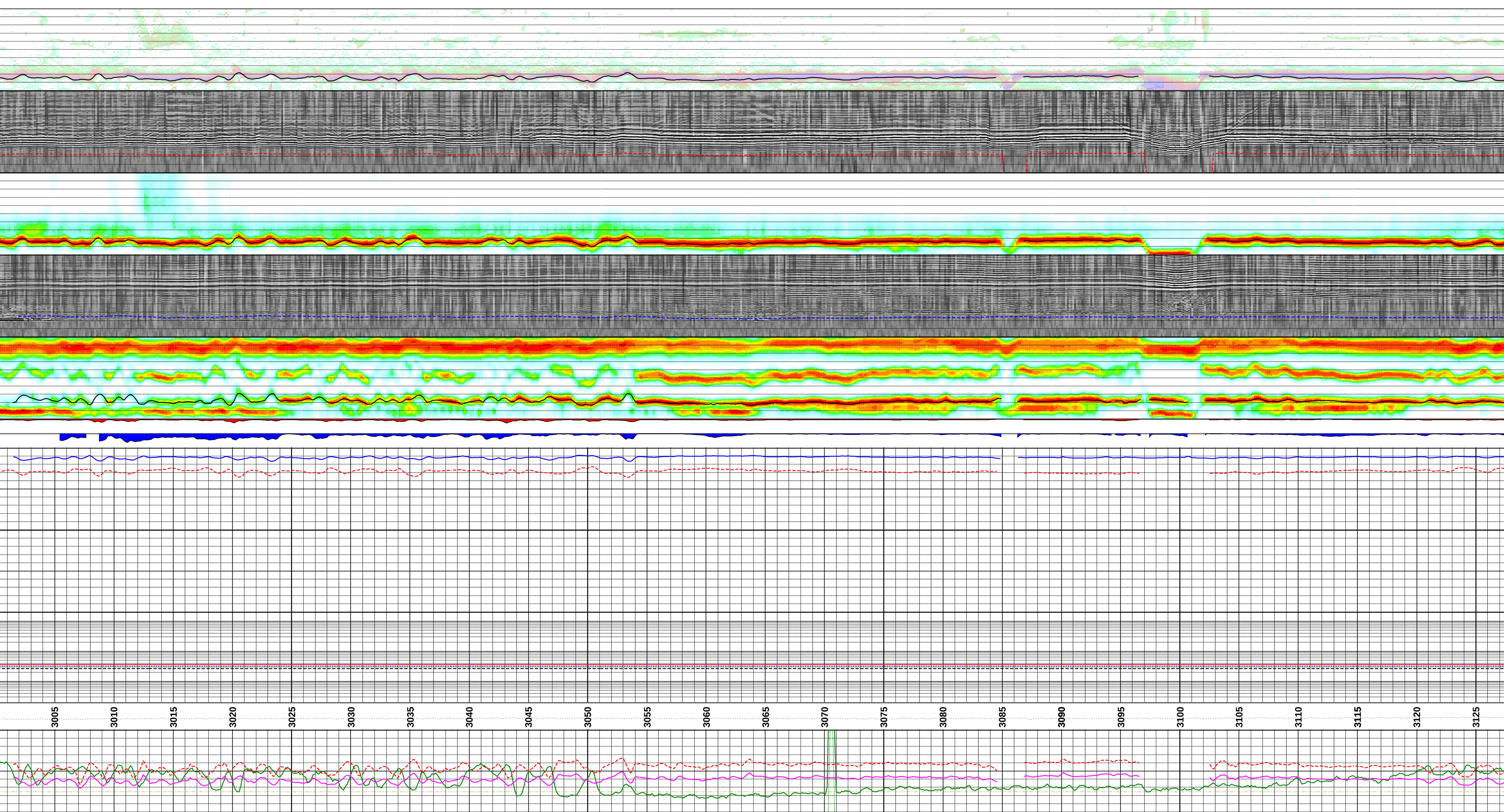
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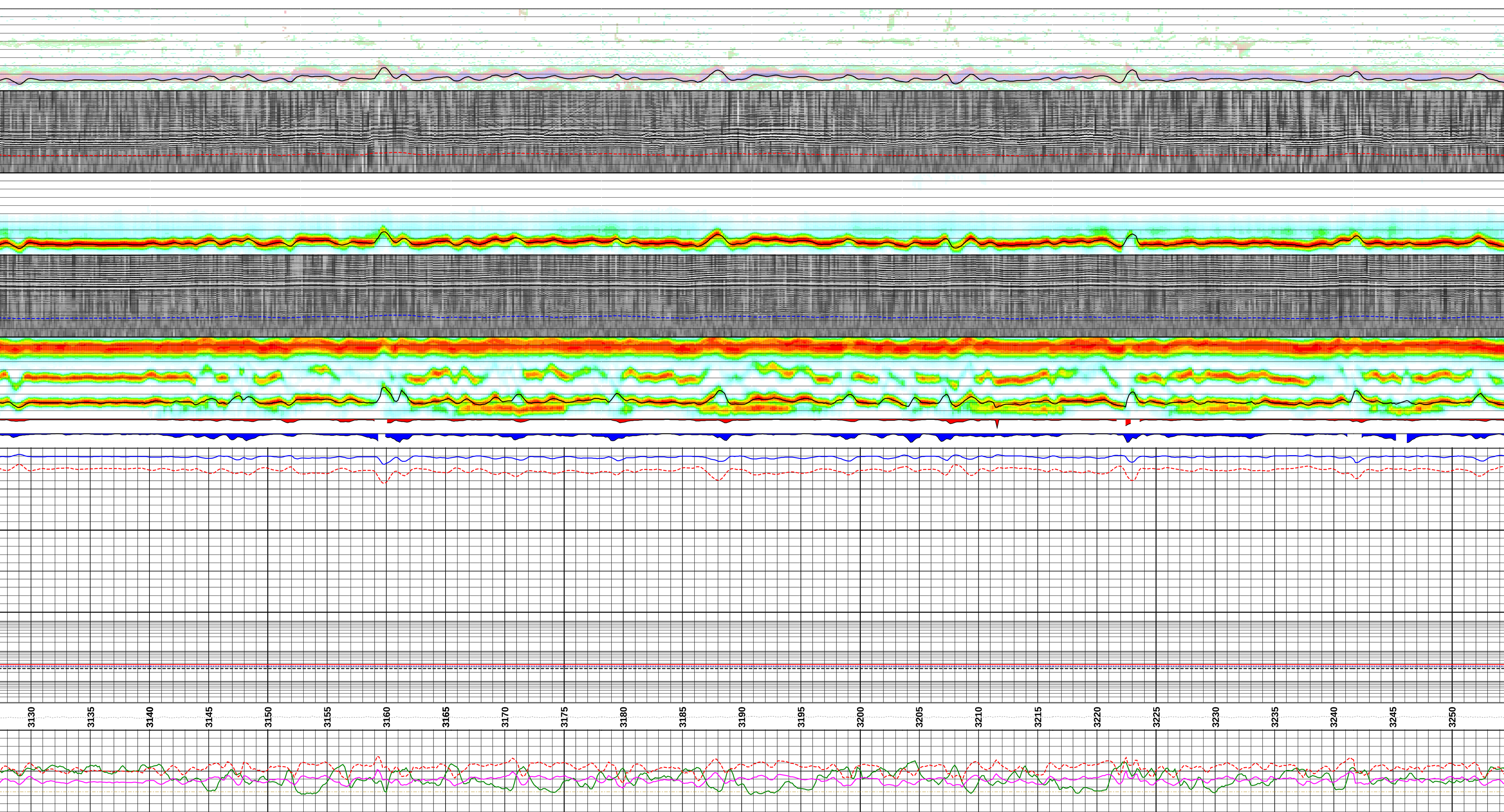
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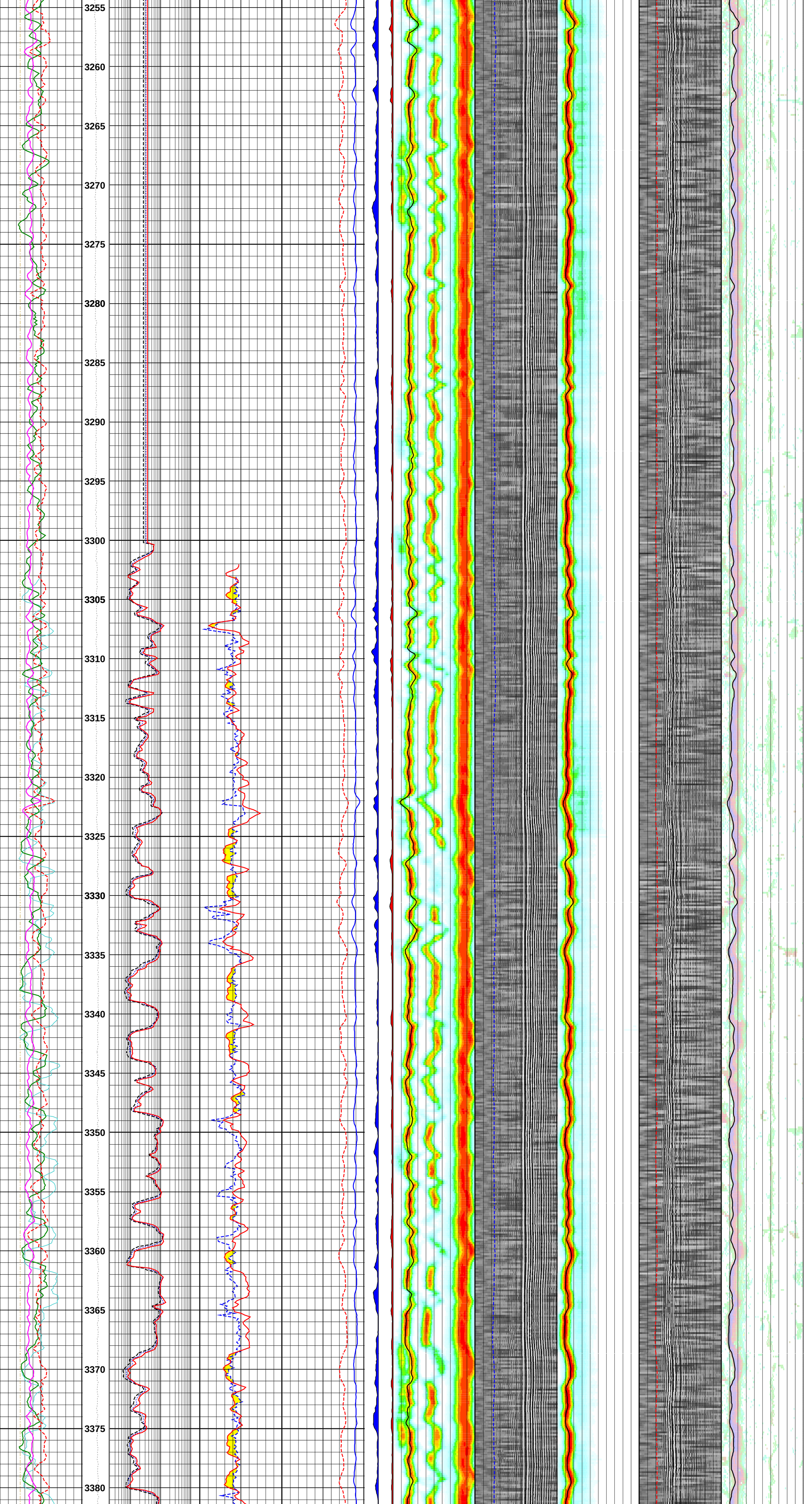
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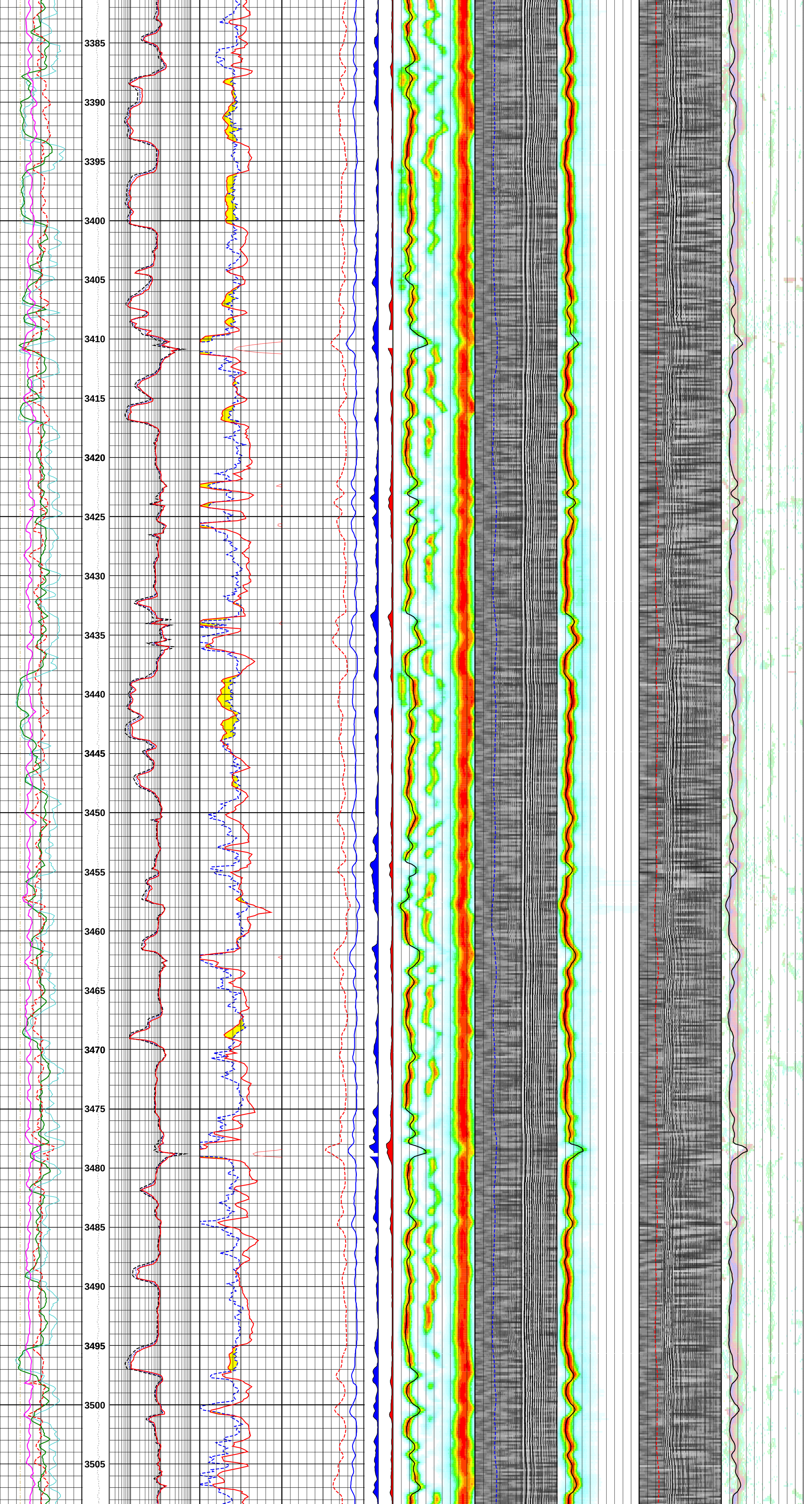
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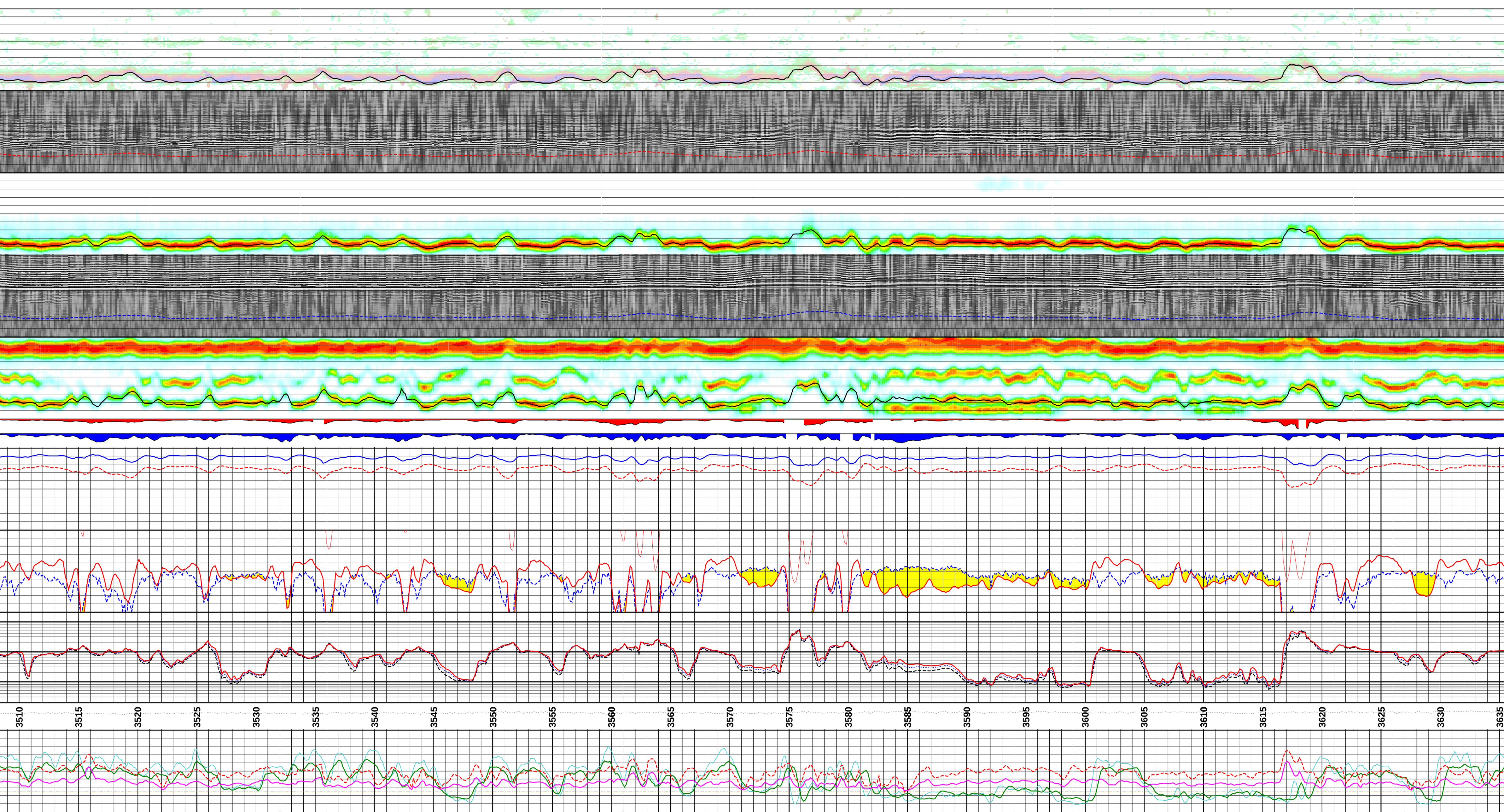
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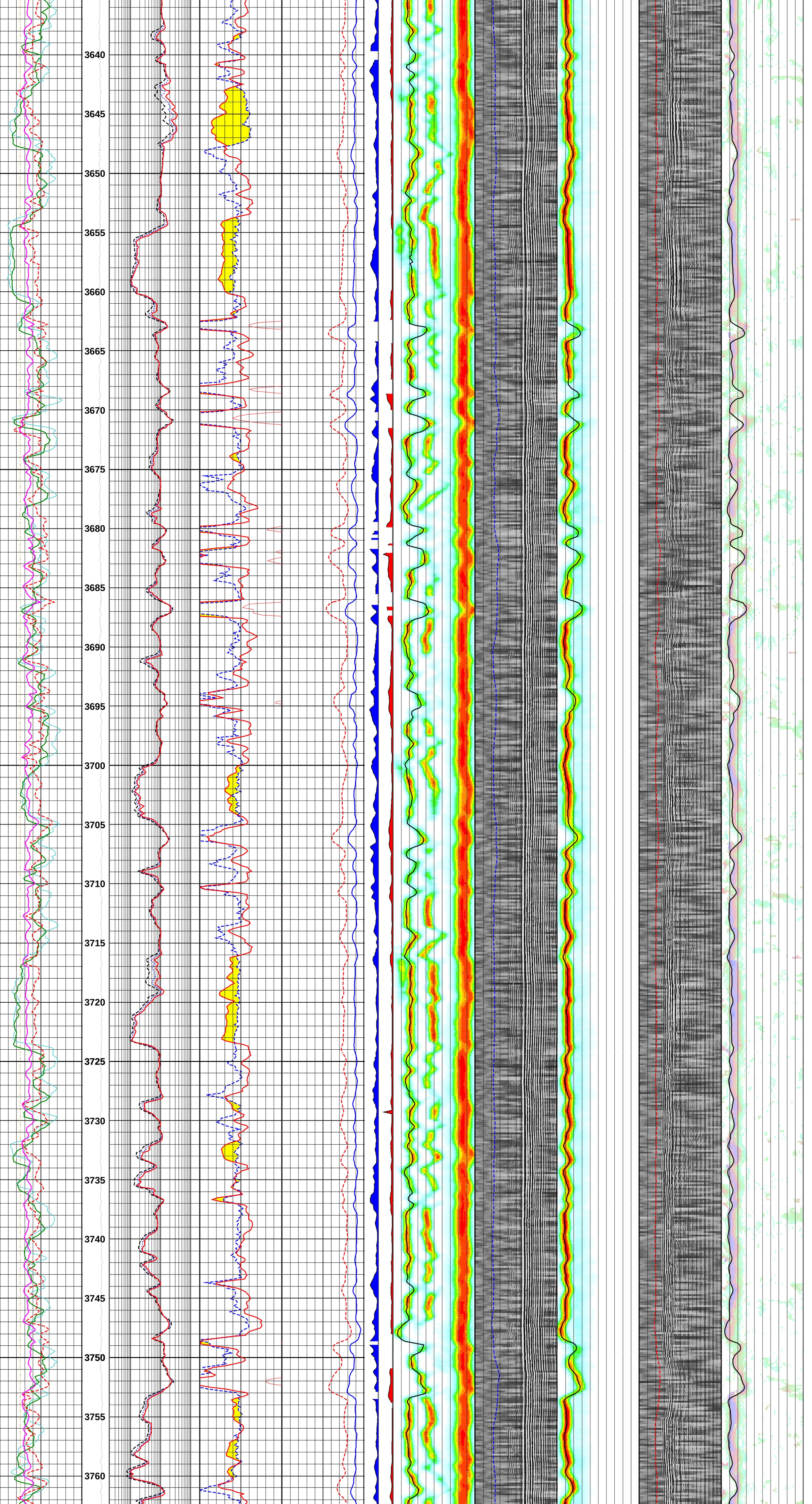
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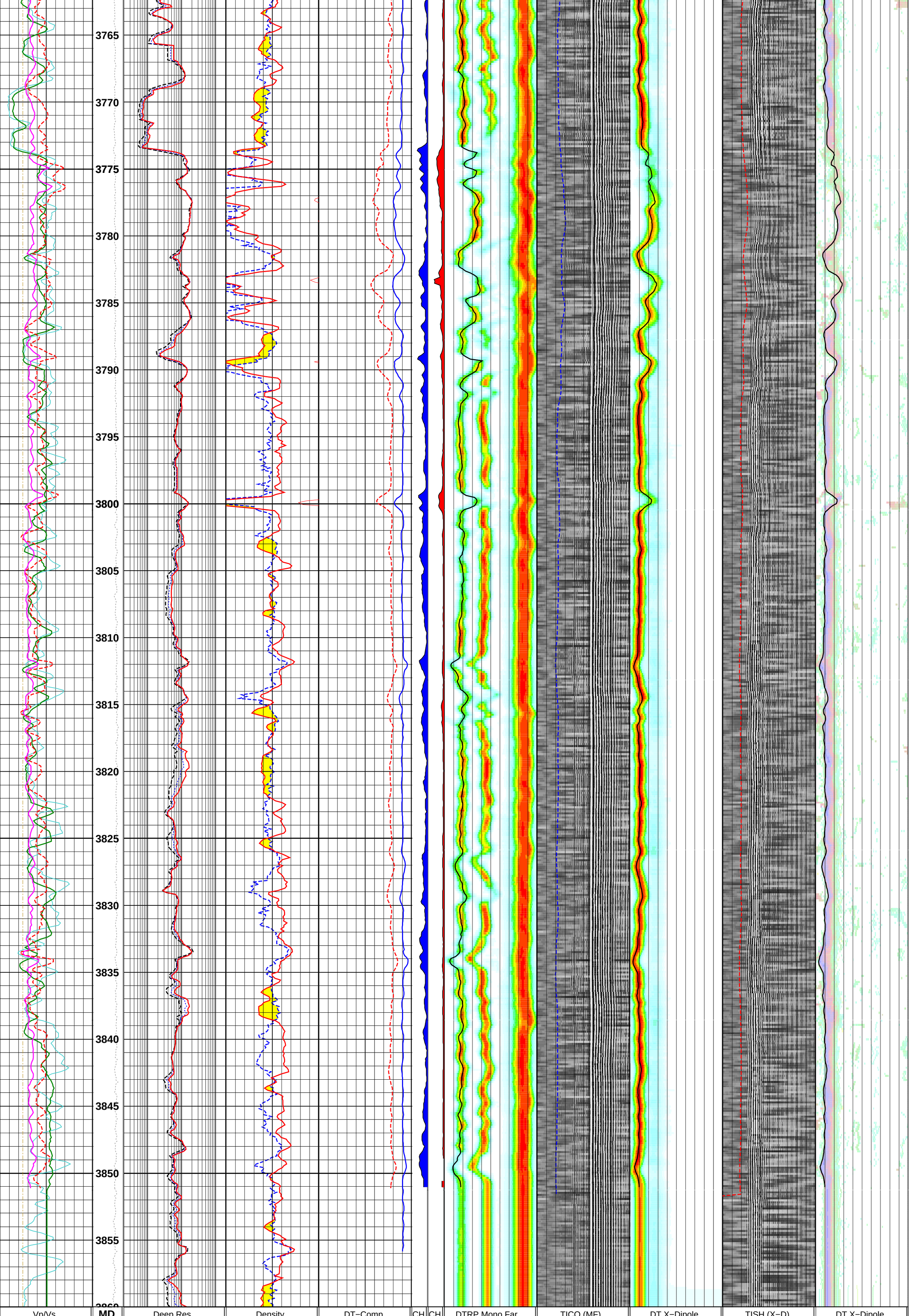
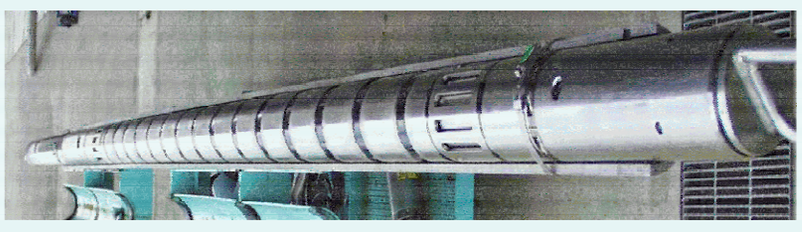
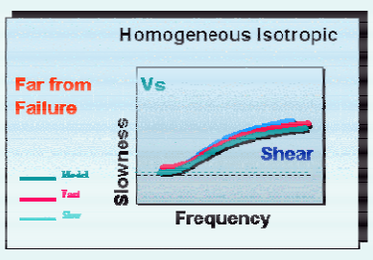
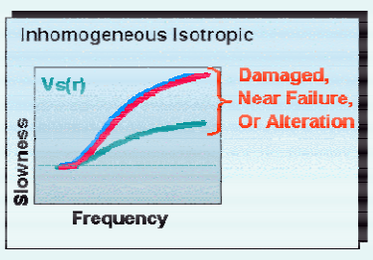
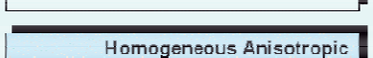


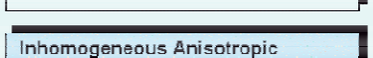
Vp/Vs	MD 1 : 200 m	Deep Res	Density	DT−Comp	CH	CH	DTRP Mono Far	TICO (MF)	DT X−Dipole	TISH (X−D)	DT X−Dipole
1 ( ) 3		0.2 (ohm.m) 200	1.95 (g/cm3) 2.95	440 (us/ft) 40	0 ( ) 1	0 ( ) 1	40 (us/ft) 240	0 (us) 5000	80 (us/ft) 540	0 (us) 10000	80 (us/ft) 540
Poisson Ratio	TENS	Med Res	Neutron	DT−Shear	C	S	SPR Mono Far	SWF7 Mono Far	SPR X−Dipole	SWF7 X−Dipole	SFA X−Dipole
0 ( ) 0.5	2000 (lbs) 0	0.2 (ohm.m) 200	0.45 (m3/m3) −0.15	440 (us/ft) 40			40 (us/ft) 240	0 (us) 5000	80 (us/ft) 540	0 (us) 10000	80 (us/ft) 540
GR_EDTC (SS)		Shal Res	CrossOver								
0 (gAPI) 200		0.2 (ohm.m) 200									
GRMA (EcoScop											
0 (gAPI) 200											
BS											
6 (in) 16											











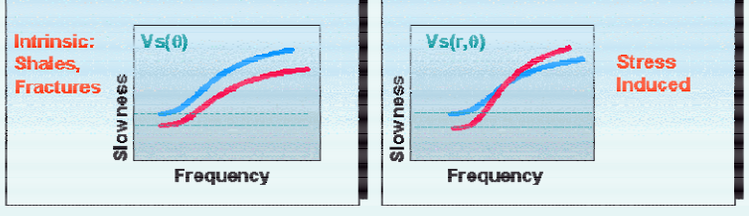
*M*odular *S*onic *I*maging *P*latform

Tool Concept −

- **A wide−frequency−band tool that enables formation characterization as:**
  - **homogeneous or inhomogeneous**
  - **isotropic or anisotropic**
- **Long and Short monopole transmitter receiver spacing**

Full−Serv. Tool Specifications

Makeup length	42.3 ft (12.9m)
Weight in air	844 lbm (384 kg)
Outside diameter	3 5/8 in. (entire tool)
Transmitter−Receiver offset:	11−17 ft from monopole trans. 9−15 ft from X−direction dipole trans. 10−16 ft from Y−direction diipole trans
Number of receiver stations	13, 6−in. apart
Pressure rating	20,000 psi
Temperature rating	350 degF (−20 degC to 175 degC)
Storage temperature	Greater than −55 degC
Tensile strength	35,000 lbf (157 kN)



- **A tool that is fully characterized with predictable acoustics**

Max. weight below spacer	2,000 lbf (9 kN)
Max. compressional load (for tough logging conditions)	4,000 lbf (18 kN)
Shock rating	250 g at 2 ms for X/Y x 2,000 100 g at 5 ms for Z x 100

Geophysics Applications

- Improved seismic tie
- Improved time/depth relationship
- Better 3D seismic analysis
- Polar anisotropy (VTI)
- Shear synthetics

Geomechanics Applications

- Sanding prediction
- Wellbore stability
- Rock mechanics
- Selective perforating (sand control)

Petrophysics Applications

- Alteration determination
- Radial profiling
- Mechanical properties
- Gas detection

Reservoir Characterization

- Improved shallow reading device point selection (CMR* magnetic resonance tool, MDT* modular formation dynamics tester, etc.) based on formation alteration
- Improved reserves estimates
- Maximized drawdown

Features

- Robust measurement of compressional and shear slowness (ΔT_c and ΔT_s)
- Increased logging speed
- Multiple monopole transmitter and receiver spacing
- High fidelity wideband waveform s and dispersion curves
- Large receiver array
- Predictable acoustics
- Cement bond log (CBL) and variable density log (VDL) measurement
- Improved behind casing measurement with CBL/VDL simultaneous acquisition
- Extremely robust electronic package

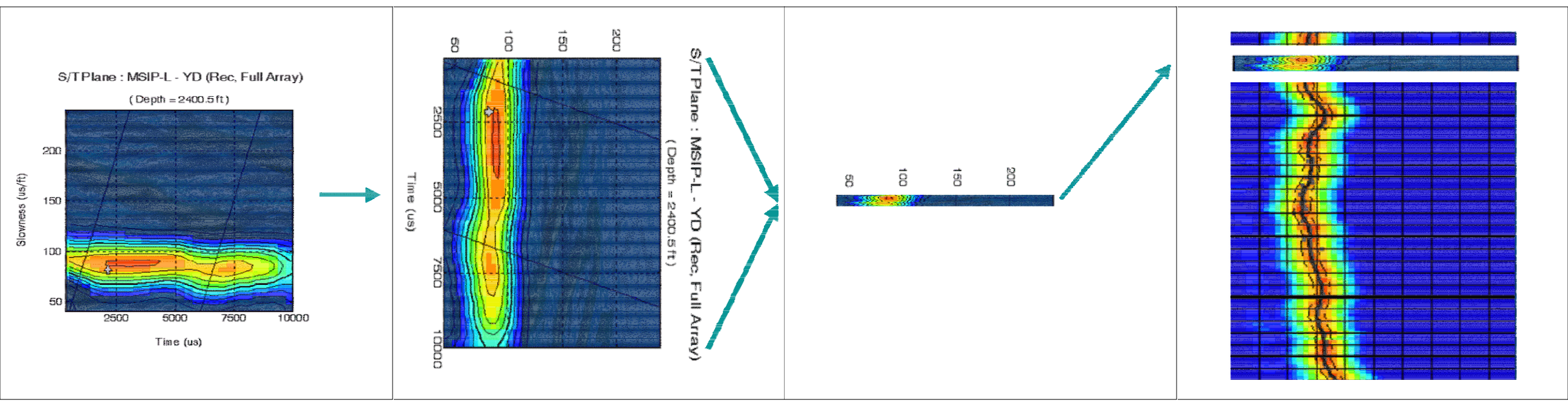
Benefits

- Reduced uncertainty
- Decreased operating time
- Eliminated multiple frequency passes
- Fewer “no log” intervals
- Reduction of operating risk
- Eliminated separate run for cement evaluation
- Real-time decision making made possible with wellsite quicklook reports
- Real-time quality control

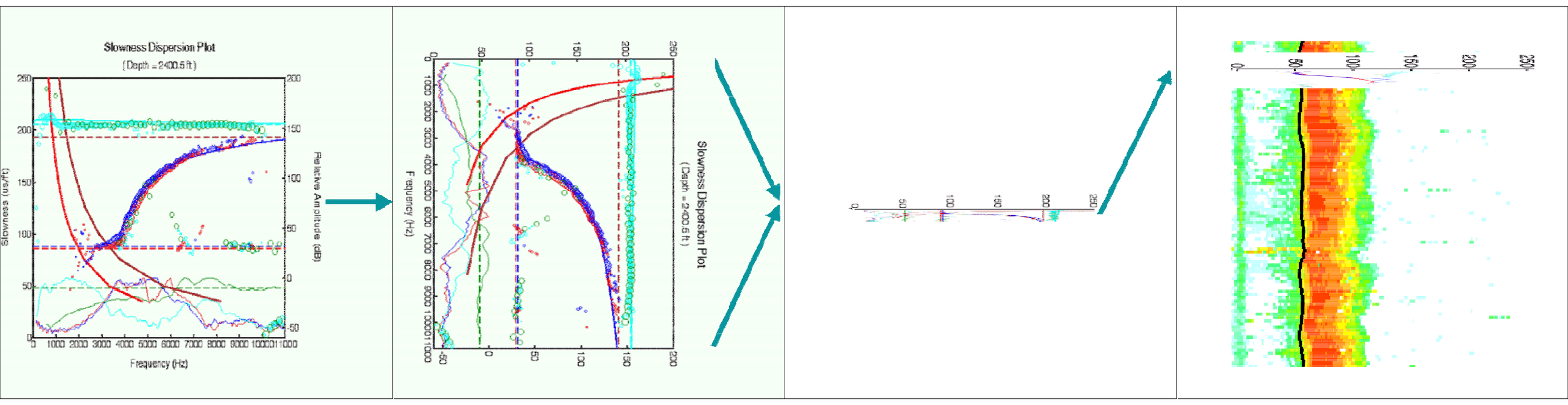
First Motioin

Quality Control Projection Logs

Slowness Time Coherency Log



Slowness Frequency Analysis Log



Technical Paper References:

SPWLA 1884889
"A Modular Wireline Sonic Tool for Measurements of 3D (Aimuthal, Radial, and Axial), Formation Acoustic Properties", Pistre; 46th Annual SPWLA in New Orleans, Louisiana, USA, June 26−29, 2005.

SPWLA 1534256
"Slowness−Frequency Projection Logs: A New QC Method for Accurate Sonic Slowness Evaluation"; T. Plona, M. Kane, J. Alford, T. Endo, J. Walsh, and D. Murray; 46th Annual SPWLA in New Orleans, Louisiana, USA, June 26−29, 2005.

Output Channels From This Processing:

```
                DESCRIPTION OF BASIC MSIP OUTPUT CURVES
                -------------------------------

Name                Description

DT1R---         DT-Shear from Y-Dipole - Receiver Array
DT1T---         DT-Shear from Y-Dipole - Transmitter Array
CHR1---         Peak Coherence for Y-Dipole   Receiver Array
CHT1---         Peak Coherence for Y-Dipole   Transmitter Array
SPR1---         STC Slowness Projection for Y-Dipole   Receiver Array
```

SPT1--- STC Slowness Projection for Y-Dipole Transmitter Array

DT1R--- DT-Shear from X-Dipole - Receiver Array
DT1T--- DT-Shear from X-Dipole - Transmitter Array
CHR2--- Peak Coherence for X-Dipole Receiver Array
CHT2--- Peak Coherence for X-Dipole Transmitter Array
SPR2--- STC Slowness Projection for X-Dipole Receiver Array
SPT2--- STC Slowness Projection for X-Dipole Transmitter Array

DT3R--- DT-Stoneley from Monopole-Far-LF - Receiver Array
DT3T--- DT-Stoneley from Monopole-Far-LF - Transmitter Array
DTST--- DT-Stoneley from Monopole-Far-LF - Average of Receiver and Transmitter Arrays
CHR3--- Peak Coherence for Monopole-Far-LF Receiver Array
CHT3--- Peak Coherence for Monopole-Far-LF Transmitter Array
SPR3--- STC Slowness Projection for Monopole-Far-LF Receiver Array
SPT3--- STC Slowness Projection for Monopole-Far-LF Transmitter Array

DT4P--- DT-Compressional from Monopole-Far-8K - Average of Receiver and Transmitter Arrays
DT4S--- DT-Shear from Monopole-Far-8K - Average of Receiver and Transmitter Arrays
DTRP--- DT-Compressional from Monopole-Far-8K - Receiver Array
DTTP--- DT-Compressional from Monopole-Far-8K - Transmitter Array
DTRS--- DT-Shear from Monopole-Far-8K - Receiver Array
DTTS--- DT-Shear from Monopole-Far-8K - Transmitter Array
CHRP--- Peak Coherence for Monopole-Far-8K Receiver Array
CHTP--- Peak Coherence for Monopole-Far-8K Transmitter Array
SPR4--- STC Slowness Projection for Monopole-Far-8K Receiver Array
SPT4--- STC Slowness Projection for Monopole-Far-8K Transmitter Array

DTSM--- A general name for DT-Shear
DTCO--- A general name for DT-Compressional

DTEXR--- DT-Shear from Fast or Slow dipole waveforms processing in BestDt - Receiver Array
DTEXT--- DT-Shear from Fast or Slow dipole waveforms processing in BestDt - Transmitter Array
DTSM_FAST--- Fast DT-Shear from "Post-Anisotropy" processing
DTSM_SLOW--- Slow DT-Shear from "Post-Anisotropy" processing
CHREX--- Peak Coherence for Fast or Slow dipole waveforms processing in BestDt - Receiver Array
CHTEX--- Peak Coherence for Fast or Slow dipole waveforms processing in BestDt - Transmitter Array
SPREX--- STC Slowness Projection for Fast or Slow dipole waveforms processing in BestDt - Receiver Array
SPTEX--- STC Slowness Projection for Fast or Slow dipole waveforms processing in BestDt - Transmitter Array

TISH---- Shear Total Travel Time
TICO---- Compressional Total Travel Time

VPVS---- (DT-Shear/Dt-Compressional ratio)
PR------ (POISSON RATIO =((0.5*VPVS*VPVS)-1)/((VPVS*VPVS) -1))

>>>>>>LOGGING MODES>>>>>>

BASIC CONFIGURATION / CONCISE MODE:
MU -- Monopole Upper
ML -- Monopole Lower

FULL CONFIGURATION / ALL MODE:
MU -- Monopole Upper
ML -- Monopole Lower
MF -- Monopole Far
XD_DIIN -- X-Dipole In-Line
XD_DIOF -- X-Dipole Off-Line
YD_DIIN -- Y-Dipole In-Line
YD_DIOF -- Y-Dipole Off-Line

(Note: Availability of XDIN, XDOF, YDIN and YDOF waveforms are necessary for Anisotropy analysis).

COMPANY: Anzon Australia Pty Limited

WELL: Basker−7
FIELD: Basker−Manta−Gummy (BMG)
Rig: Ocean Patriot
State: Victoria
COUNTRY: Australia

Schlumberger

Date Processed: 03−Sep−2009