LWD MEMORY LOG

Gamma Ray

Scale:	1:240 MD
Depth Reference:	Driller's Depth
Company:	SRC Energy
Well:	Harvesters State 31C-16-M
Field:	DJ Basin
County:	Weld County
State:	Colorado
Status:	Final Print
API No:	05-123-46375
Job ID:	9051261

Surface Location:

Latitude:	040° 29' 27.442" N
Longtitude:	104° 45' 45.032" W
UTM:	N/A N/A
SEC: 15	TWN: 6N RGE: 66W

Other Services:

Directional

Permanent Datum (P.D.):	Ground Level	Elevation:	4802.00 ft
Log Measured From:	Rig Floor	Above P.D.	20.00 ft

KB:	N/A
DF:	4822.00 ft
GL:	4802.00 ft

Dates		Interval Logged		Magnetic Field Reference			
Date From:	2018-04-28	Top: (ft)	1821.00	Azi Reference North:	True	Dip Angle: (deg)	66.92
Date To:	2018-05-01	Bottom: (ft)	15101.00	Total Magnetic Field Strength: (nT)			52657
Spud Date:	2018-03-20			Mag to Reference North Correction: (deg)			7.50 E

Borehole Record

Hole Size (in)	From (ft)	To (ft)
13.500	20.00	1821.00
8.500	1821.00	15101.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	20.00	1811.00

Mud Record

Type	From (ft)	To (ft)
Diesel-Oil Based Mud	1821.00	15103.00

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
13.500	1801.00	0.00 | 300.54	4.10 | 344.05
8.500	13300.00	4.10 | 344.05	4.22 | 347.43

Acquisition System	Software Version
Baker Hughes Cadence	RT4.1
Plot Studio	4.1.7763.3

Other

Rig:	Precision 462		
Contractor:	Precision Drilling		
District:	RMD	Unit:	D&E

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Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Bit Depth Interval From (ft)	Bit Depth Interval To (ft)	Date / Time Start Logging	Date / Time End Logging	Circ. Hours (h)
1	1	13.500	PDC	6.00	Steerable	0.00	0.00	20.00	1821.00	2018-03-20 08:43	2018-03-20 15:56	10.46
2	2	8.500	PDC	3.00	Rotary Steerable	1821.00	15089.00	1821.00	15101.00	2018-04-28 14:30	2018-05-01 02:54	53.51

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart

	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
John Moisan	2018-04-28	2018-05-01						

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2018-04-28 16:00	2	2421.00	Diesel-Oil Based Mud	9.7	22	N/A	4.4	83/17	Active Pit	31000	0.00
2018-04-29 04:00	2	6152.00	Diesel-Oil Based Mud	9.3	19	N/A	5.1	84/16	Active Pit	28000	0.00
2018-04-29 16:00	2	8299.00	Diesel-Oil Based Mud	9.6	24	N/A	4.4	84/16	Active Pit	30000	0.00
2018-04-30 04:00	2	11010.00	Diesel-Oil Based Mud	9.7	24	N/A	3.8	85/15	Active Pit	28000	0.00
2018-04-30 16:00	2	13425.00	Diesel-Oil Based Mud	9.7	23	N/A	4.4	85/15	Active Pit	28000	0.00
2018-05-01 04:00	2	15103.00	Diesel-Oil Based Mud	9.8	21	N/A	4.5	86/14	Active Pit	27000	0.00

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
1	Sensor Sub	ZAPS230949	Directional (mag)	12.17	61.94	8.000	3.250
1	Sensor Sub	ZAPS230949	VSS	12.17	61.94	8.000	3.250
1	Sensor Sub	ZAPS230949	Pressure	32.77	82.54	8.000	3.250
2	ATC_SU	14169950	Near Bit VSS	5.93	6.73	7.000	4.330
2	ATC_SU	14169950	Near Bit Inclination	5.93	6.73	7.000	4.330
2	ATC_MWD	12304604	Gamma (single)	2.75	12.90	7.000	3.250
2	ATC_MWD	12304604	Directional (mag)	12.27	22.42	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
GAM	APS	APS EM Module
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

Comments

1. Depths and depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified. These unverified depths are being used to represent logging data.
2. Baker Hughes LWD Run 1 utilized 8 inch NaviTrak service (Directional-Only) behind a 13 ½ inch bit and steerable assembly from Surface to 1821 feet MD (Surface to 1817 feet TVD). No logging data was acquired during this run.
3. Baker Hughes LWD Run 2 utilized 6 ¾ inch NaviGamma services (Gamma Ray and Directional) behind 8 ½ inch bit and rotary steerable assembly from 1821 to 15101 feet MD (1817 to 7232 feet TVD).
4. Gamma Ray Apparent (GRAM-GRAUM-GRADM) is presented 0 to 300 API per customer request.

Remarks

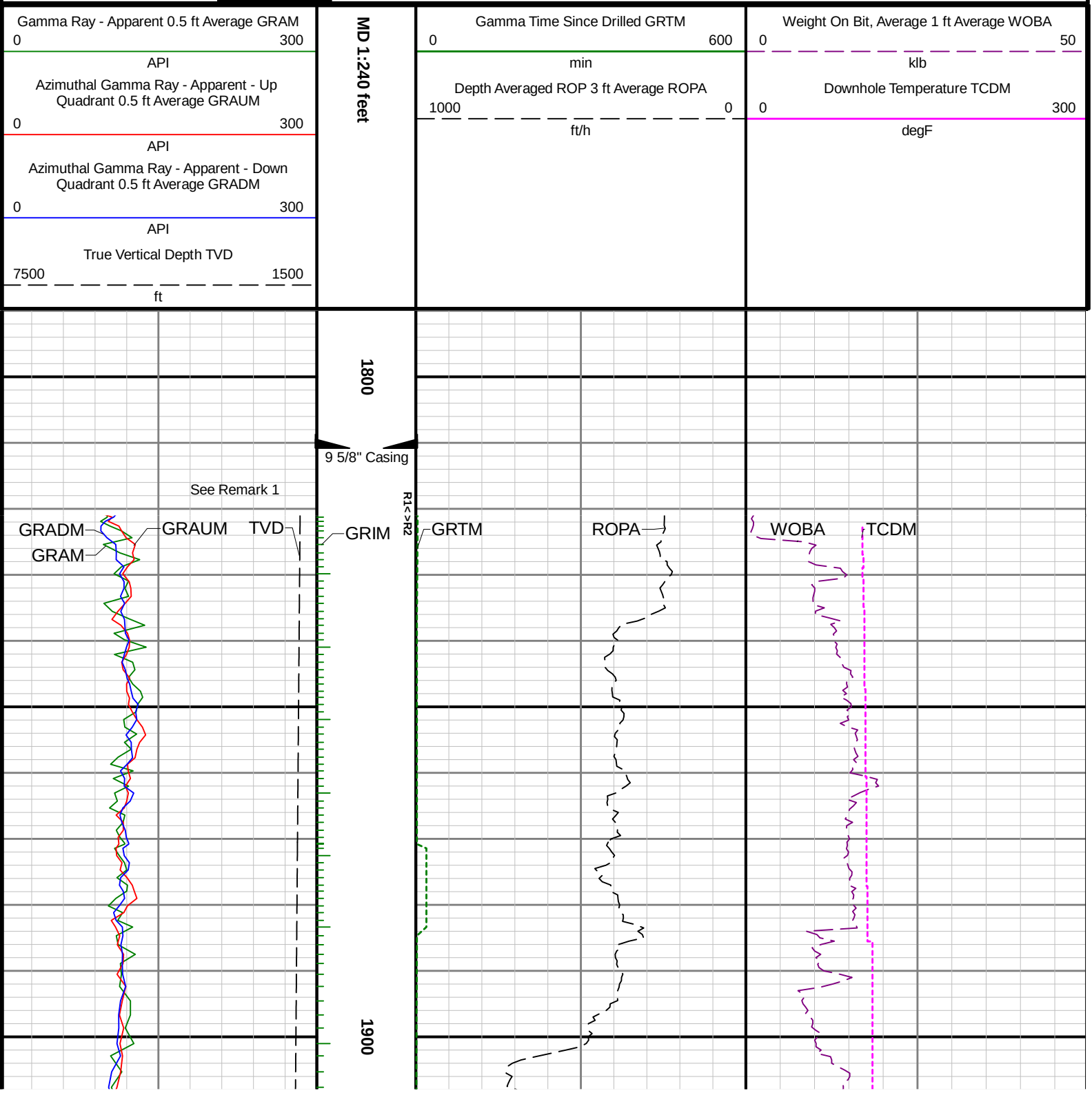
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1821.00	8.500	2	Baker Hughes logging services began at 1821 feet MD (1817 feet TVD) per customer request.
2	15089.00	8.500	2	The interval from 15089 to 15101 feet MD (7232 feet TVD) was not logged due to sensor to bit offset at well TD.

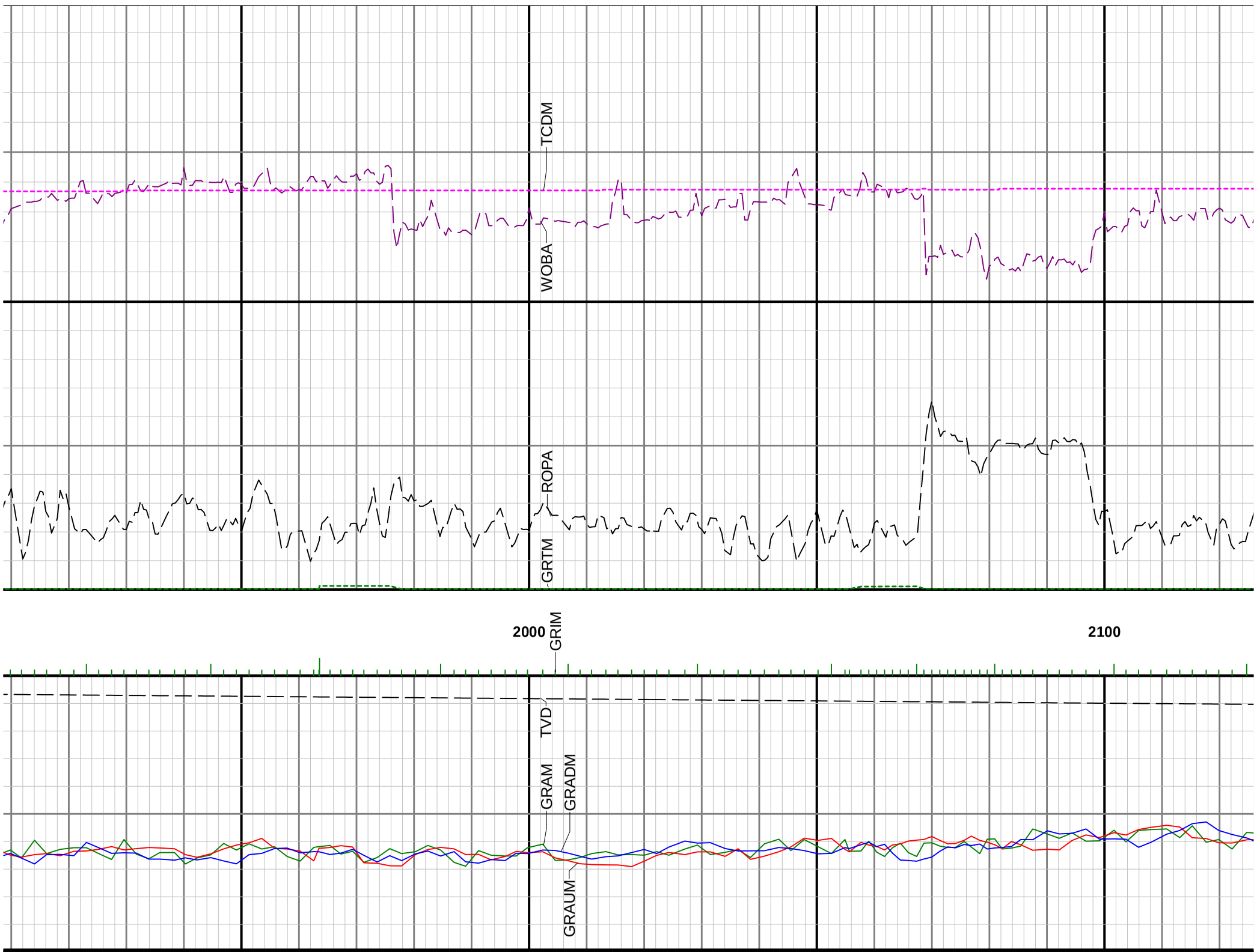
Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb

GRAM	Gamma Ray - Apparent - Memory 0.5 ft Average	API
GRIM	Gamma Ray - Data Point Indicator - Memory	unitless
GRTM	Gamma Ray - Time Since Drilled - Memory	min
GRADM	Gamma Ray - Apparent - Down Quadrant - Memory 0.5 ft Average	API
GRAUM	Gamma Ray - Apparent - Up Quadrant - Memory 0.5 ft Average	API
TCDM	Downhole Temperature	degF

BAKER HUGHES a GE company	**Company**	SRC Energy		
	Well	Harvesters State 31C-16-M		
	Interval	**Date From:** 2018-04-28 12:00:00	**Top:**	1821.00
		Date To: 2018-05-01 03:00:00	**Bottom:**	15101.00
	Created	2018-05-01 19:18:59		

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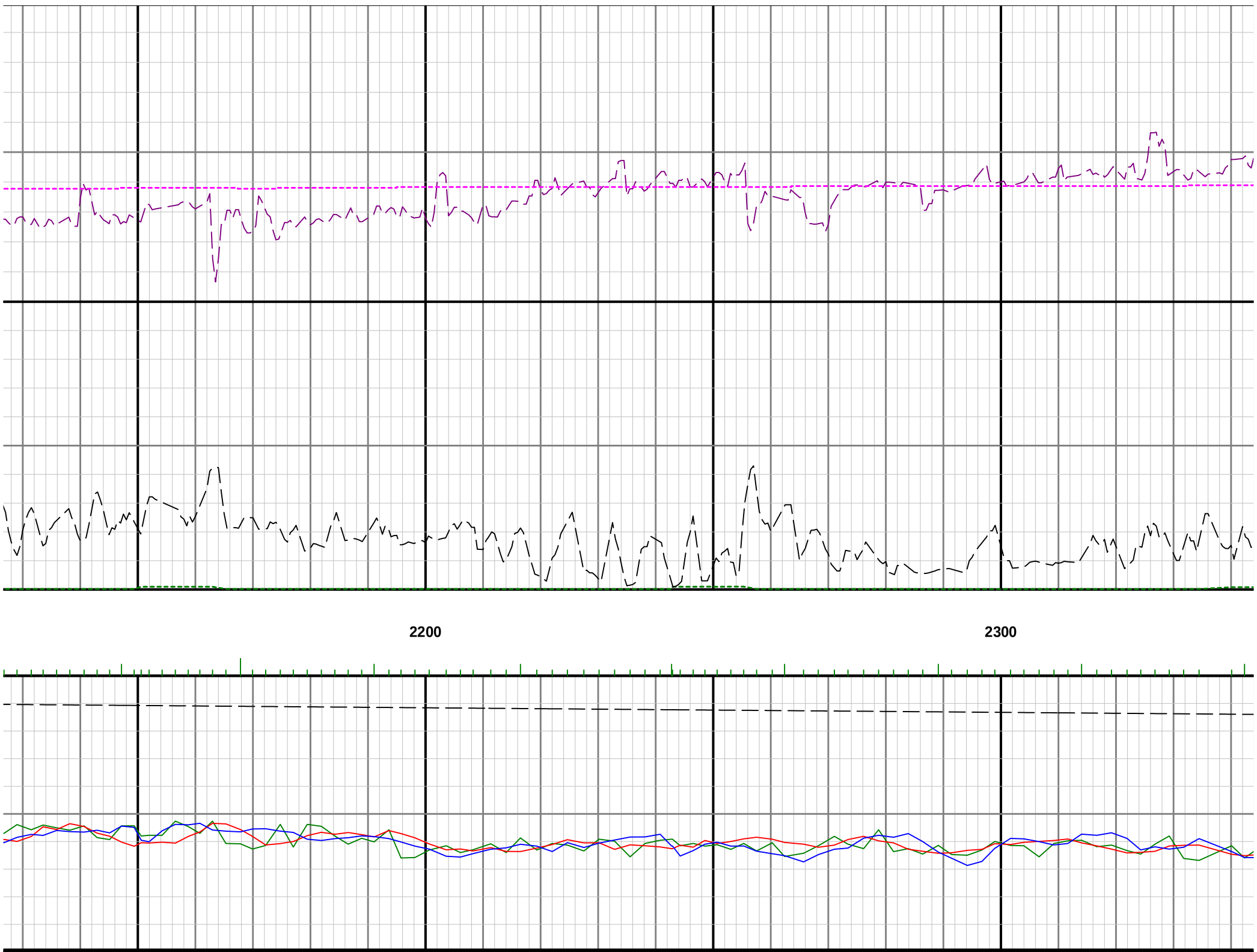
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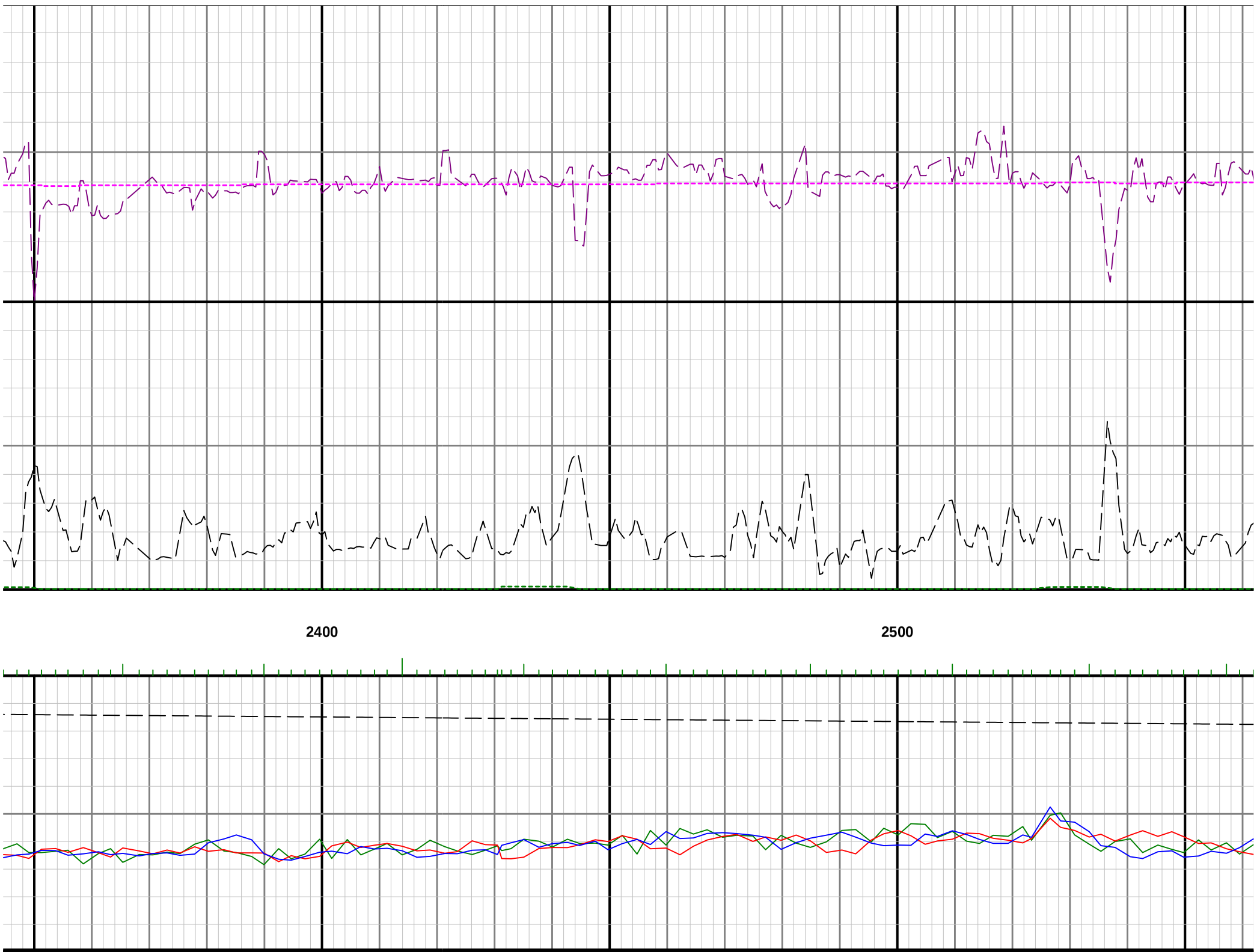
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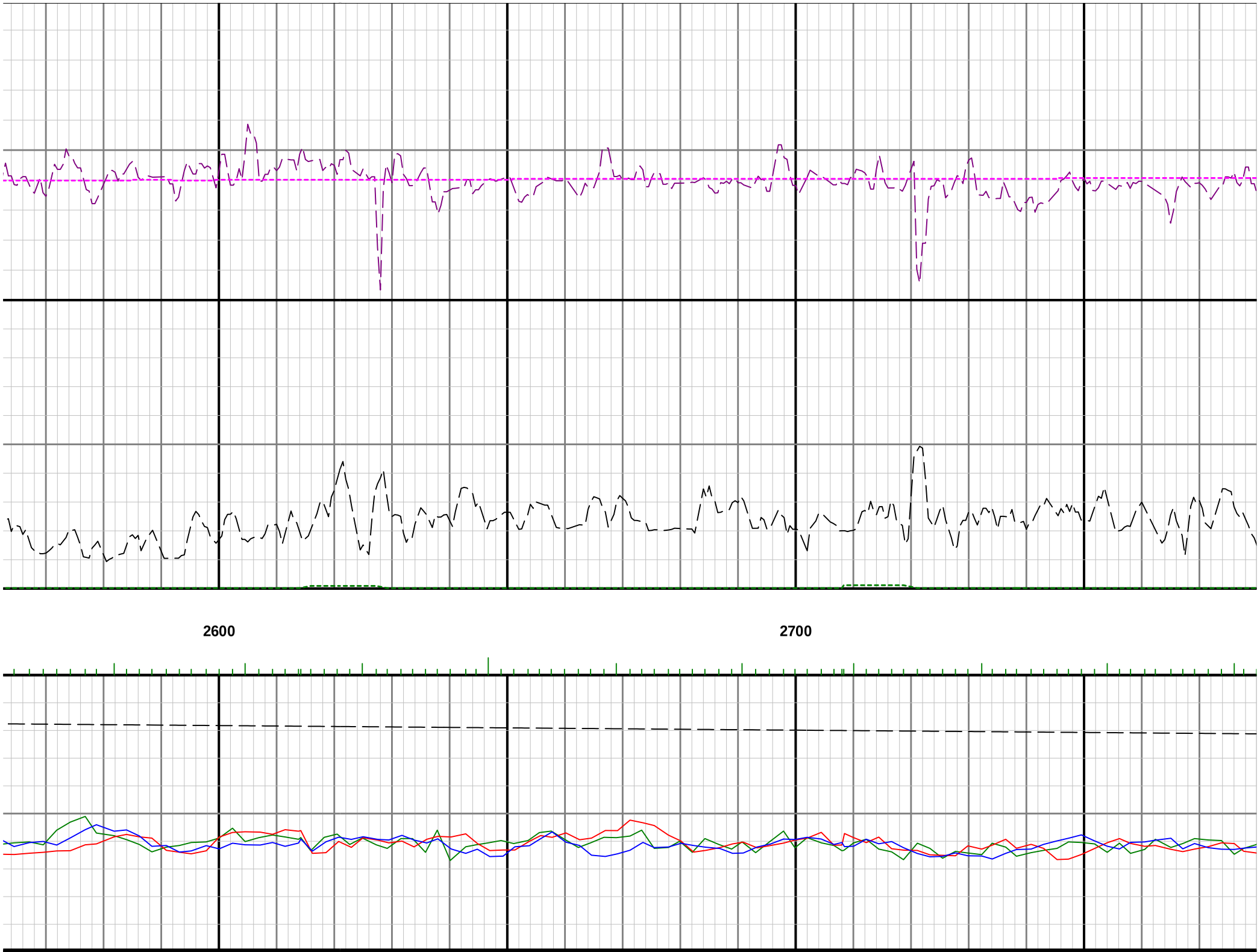
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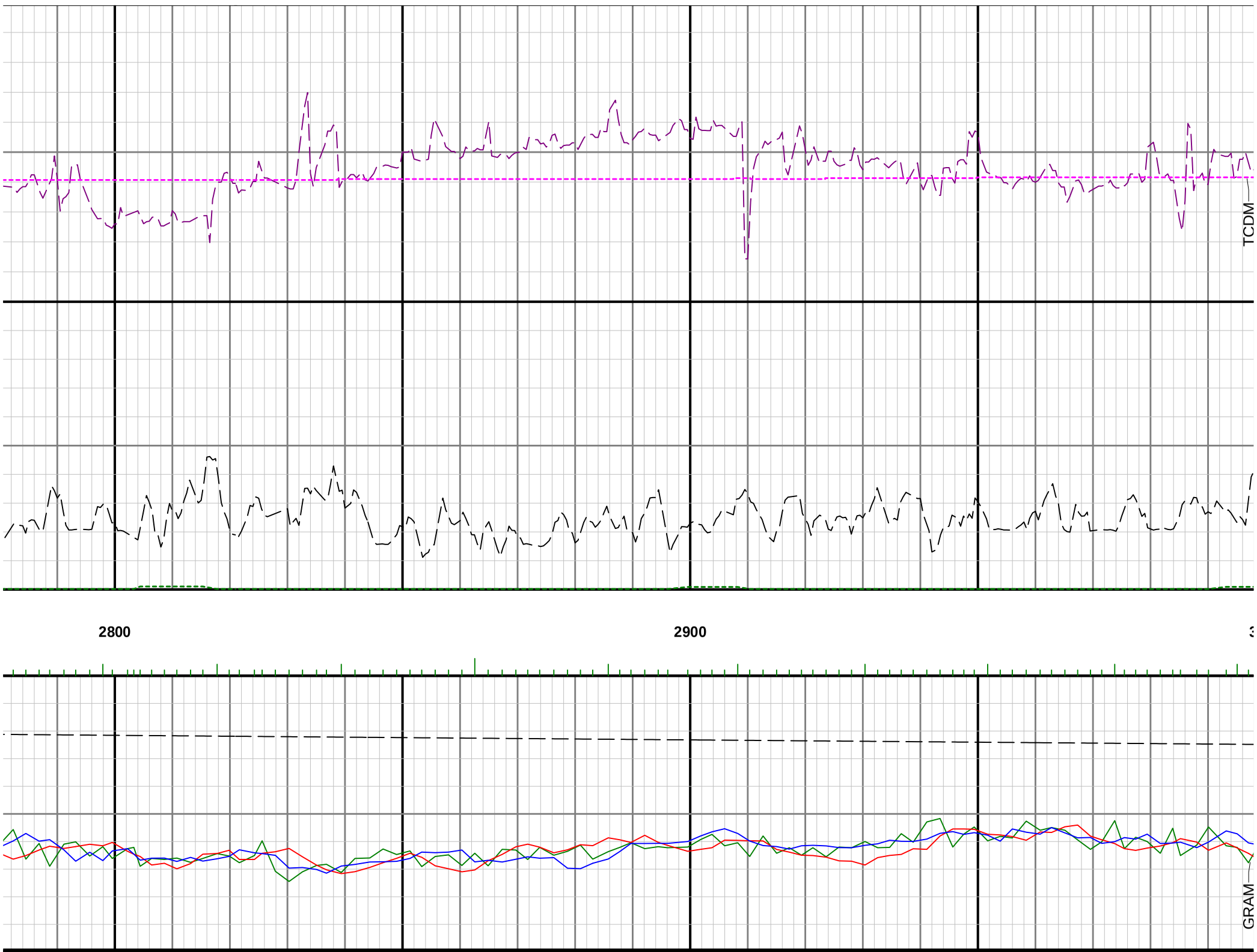
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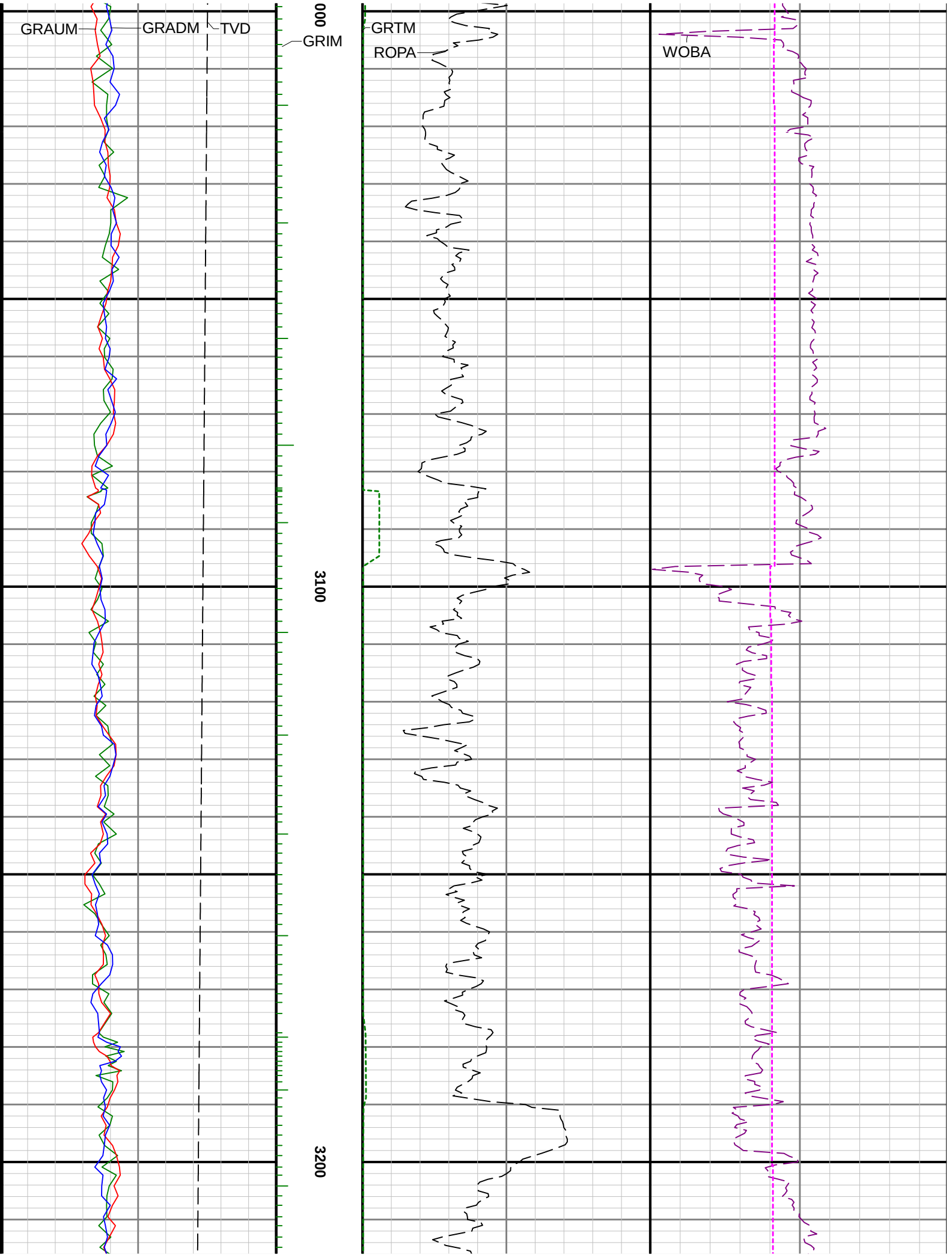
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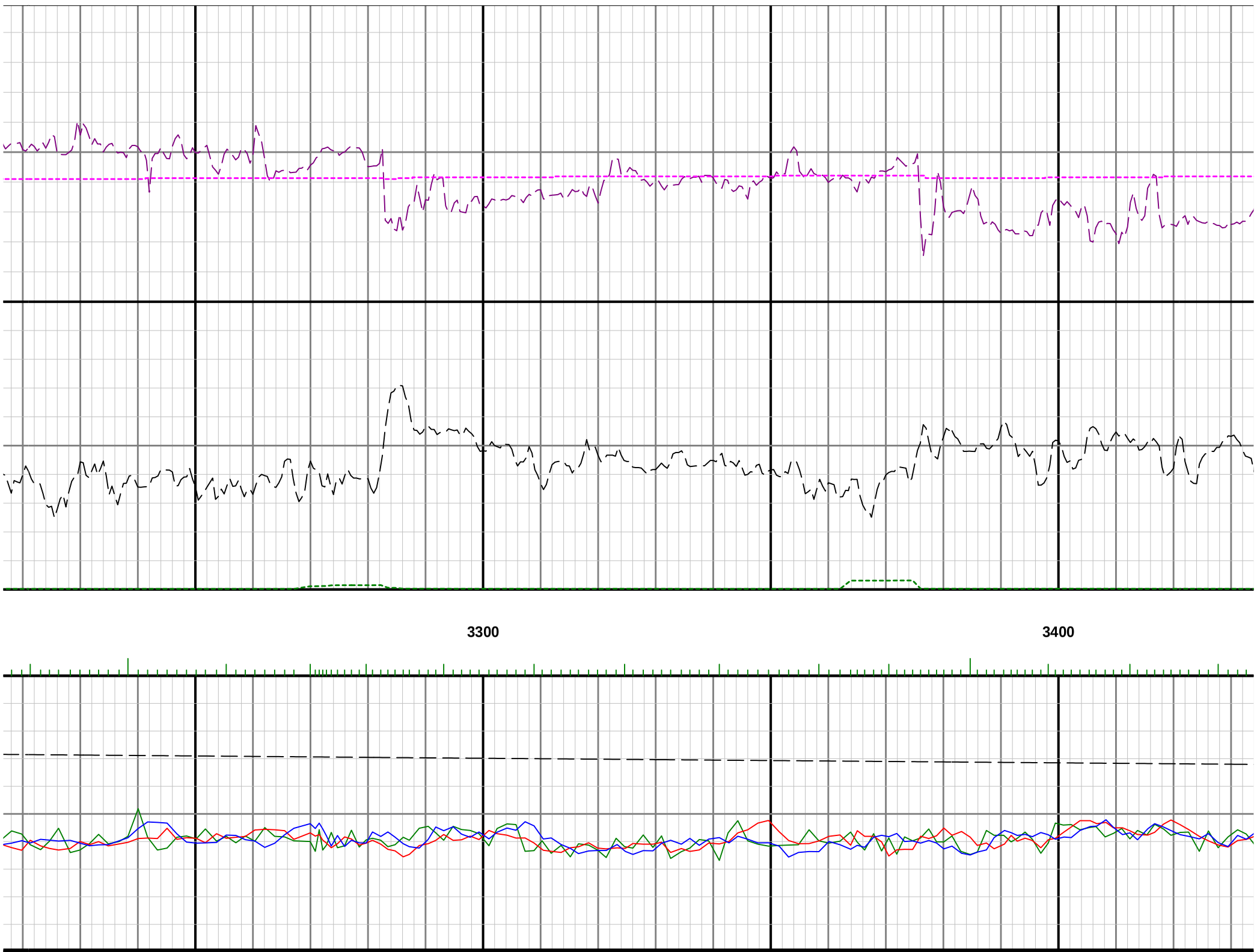
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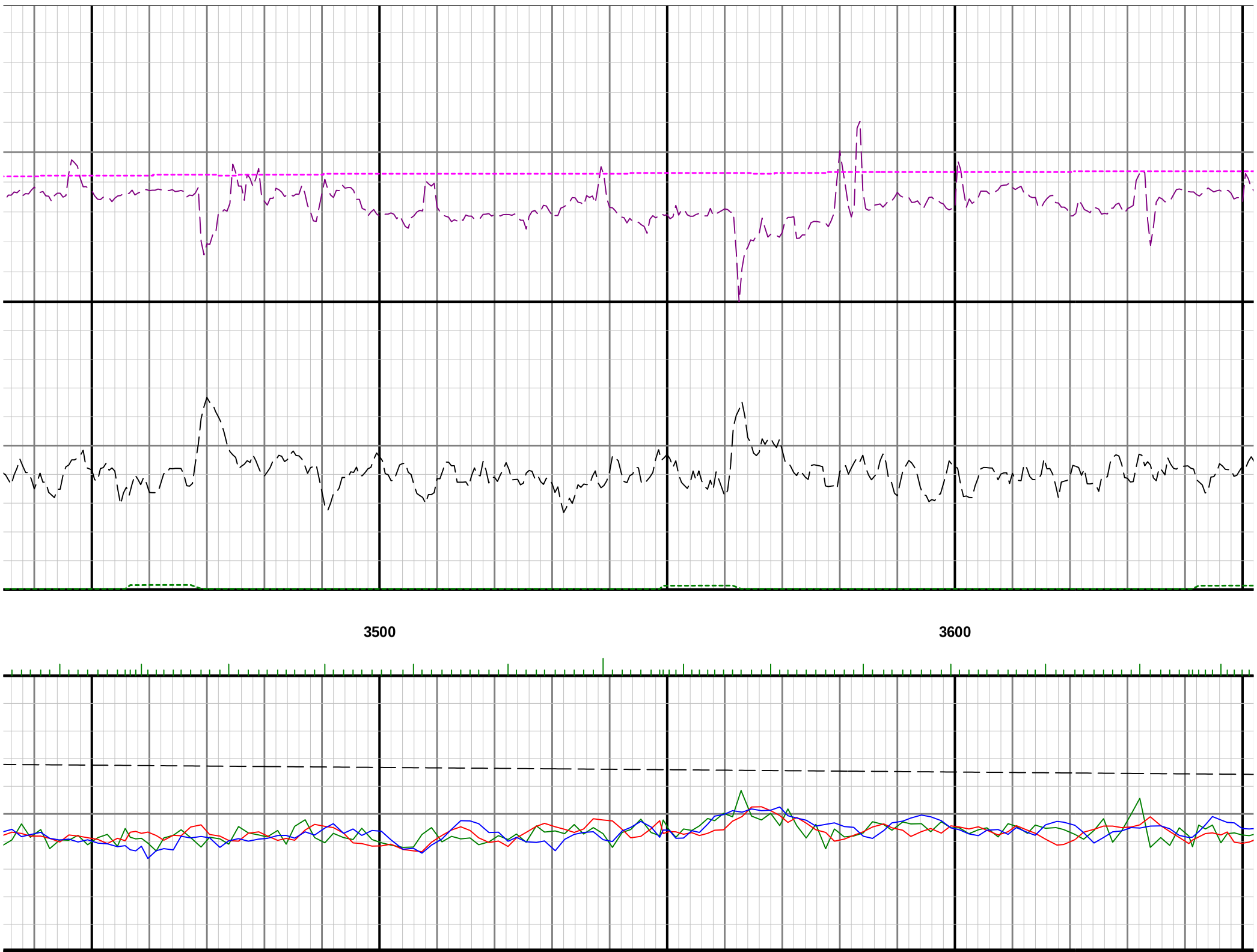
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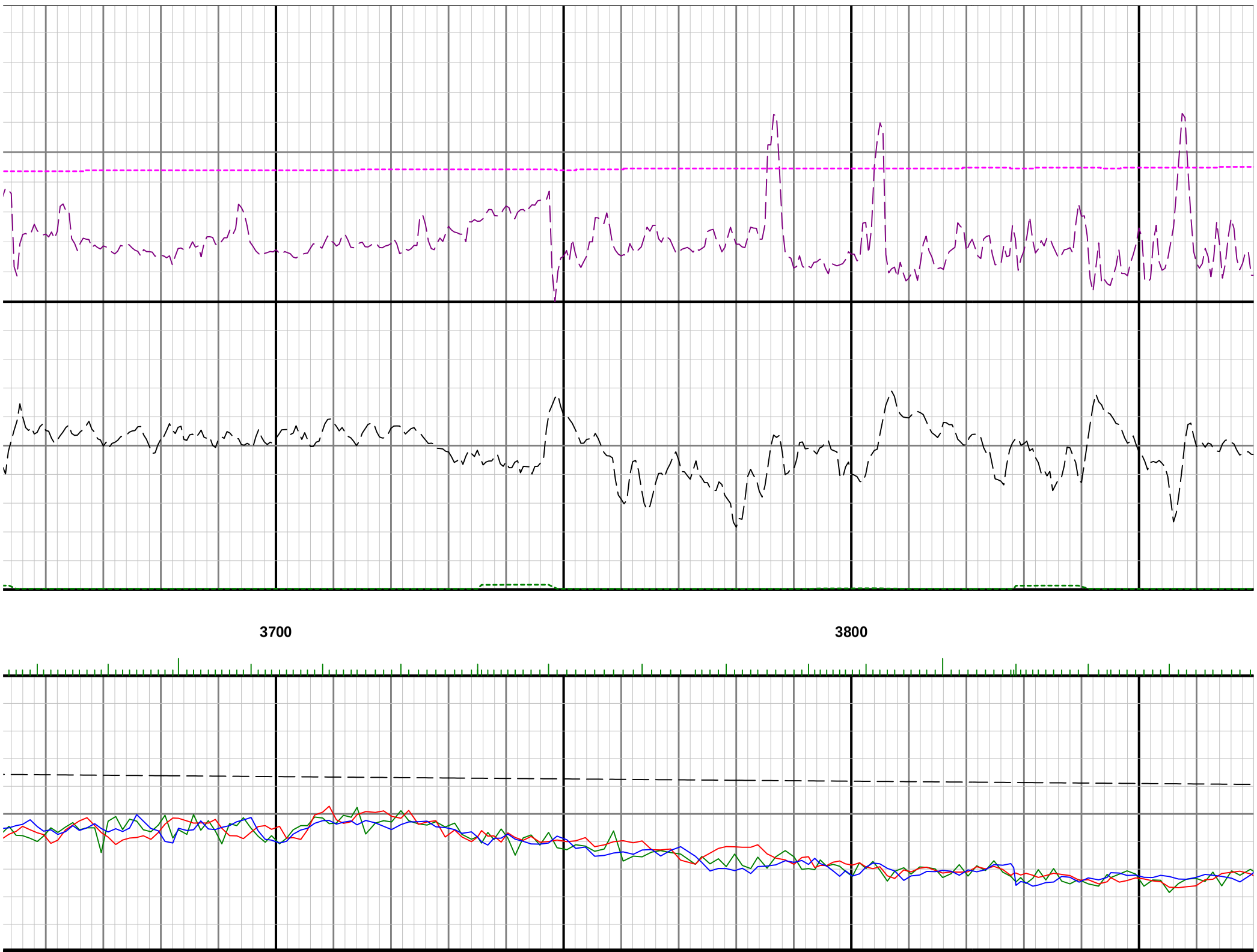
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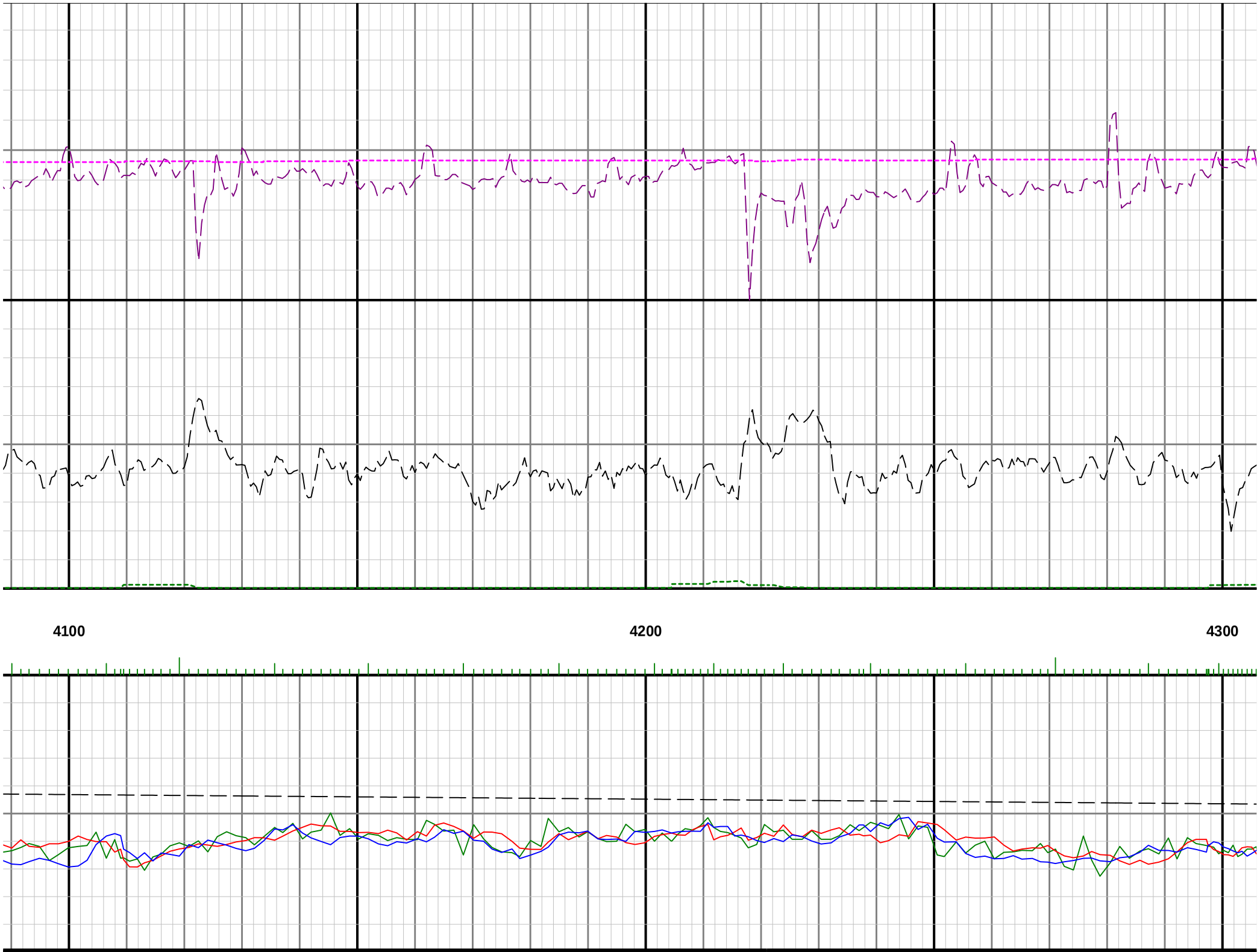
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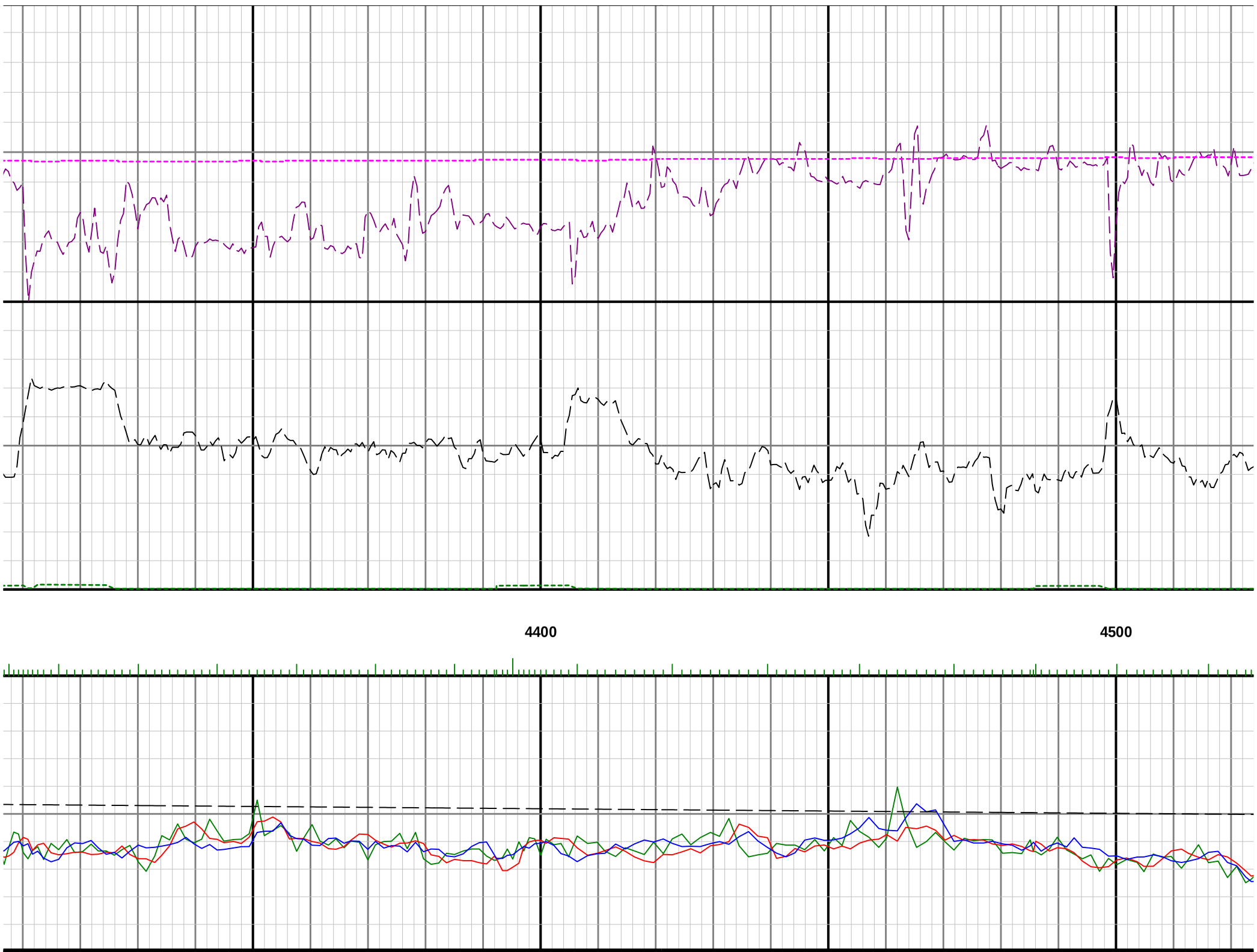
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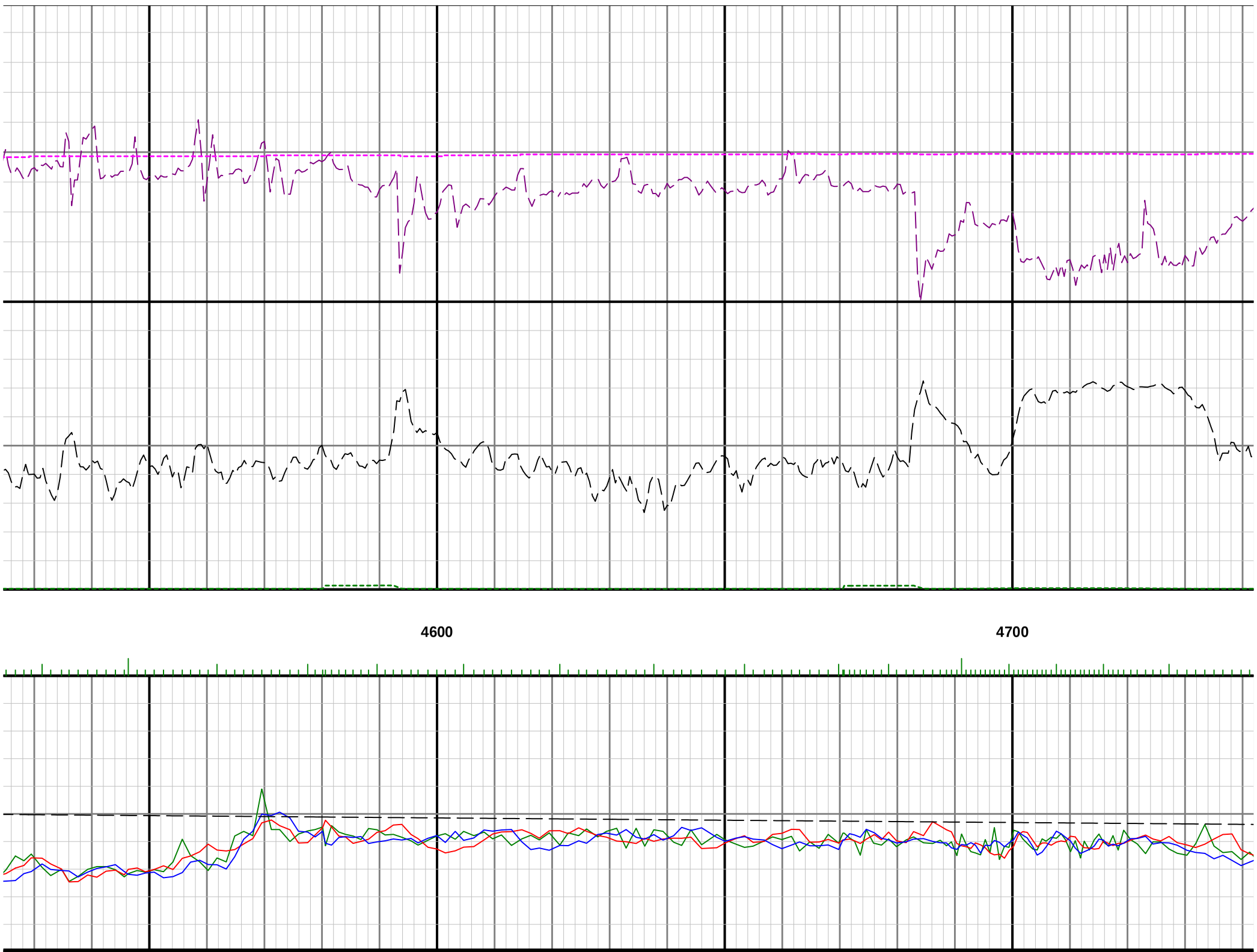
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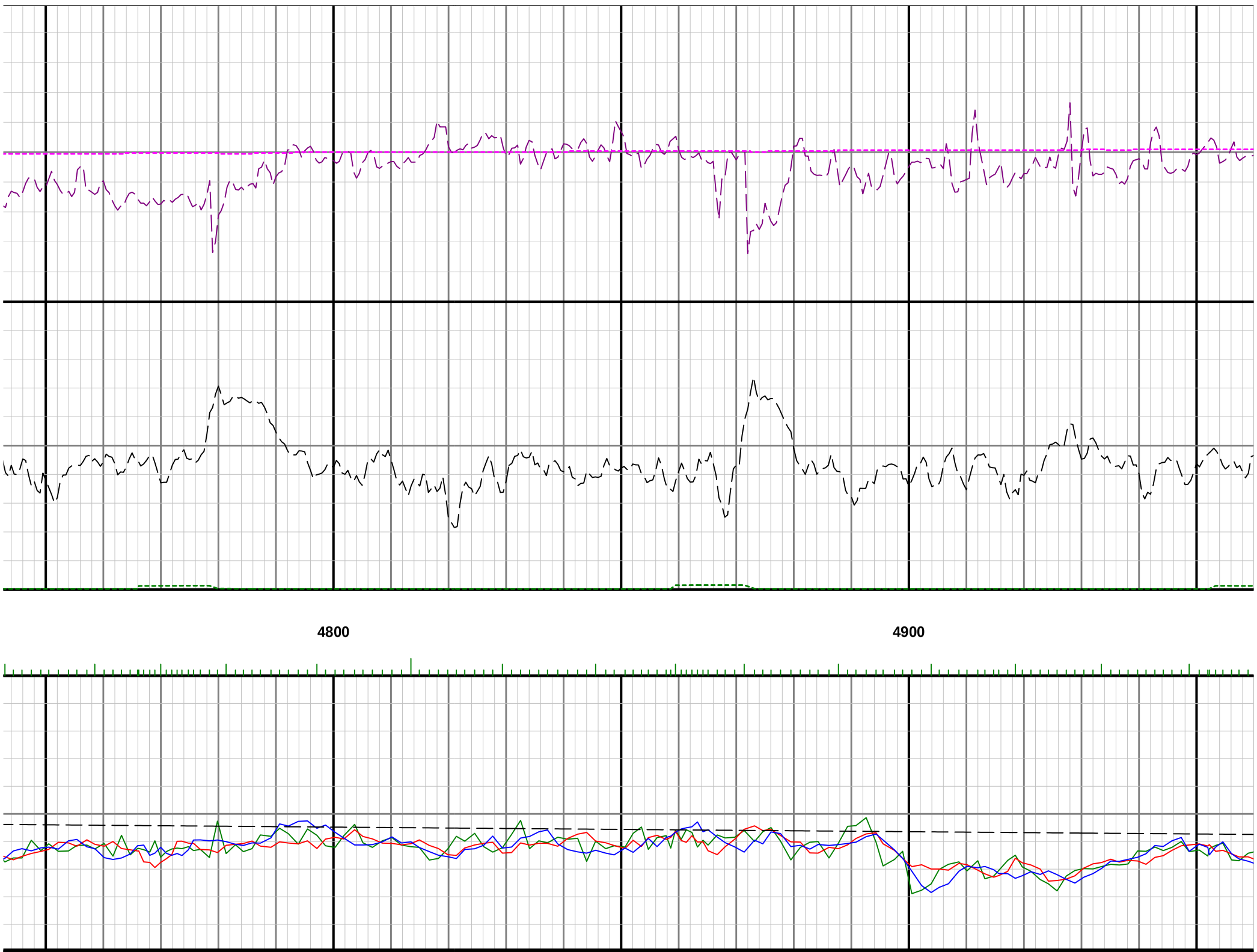
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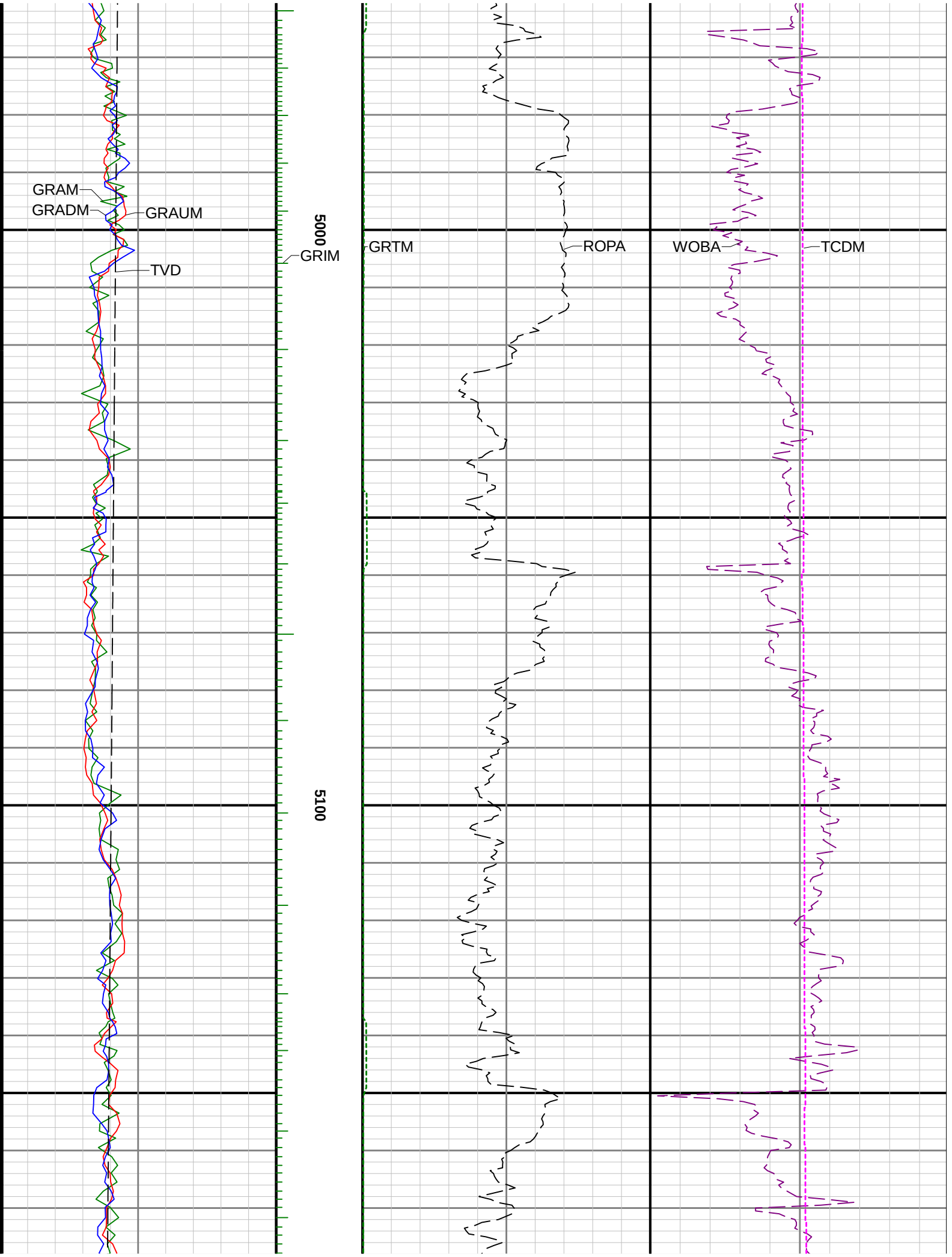
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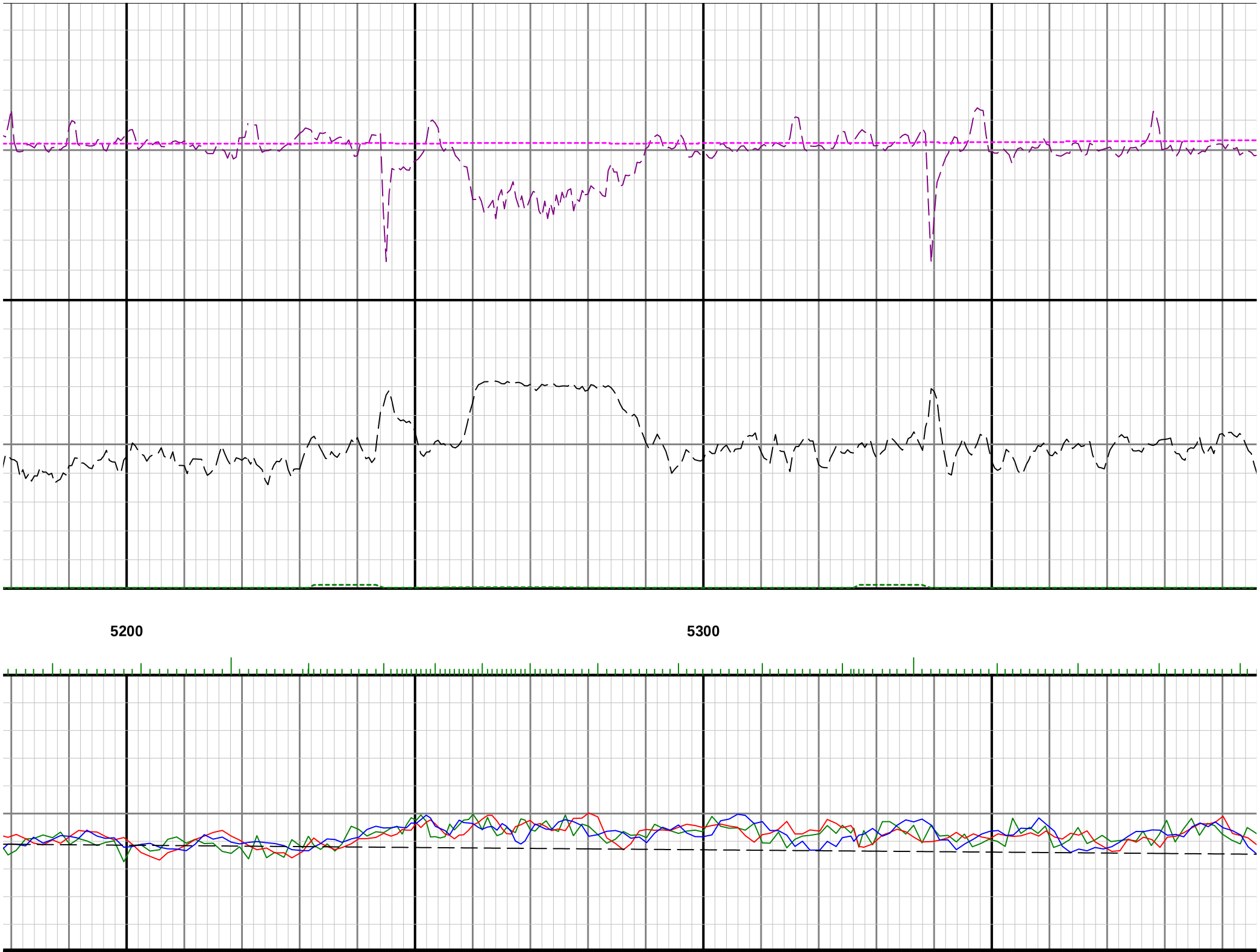
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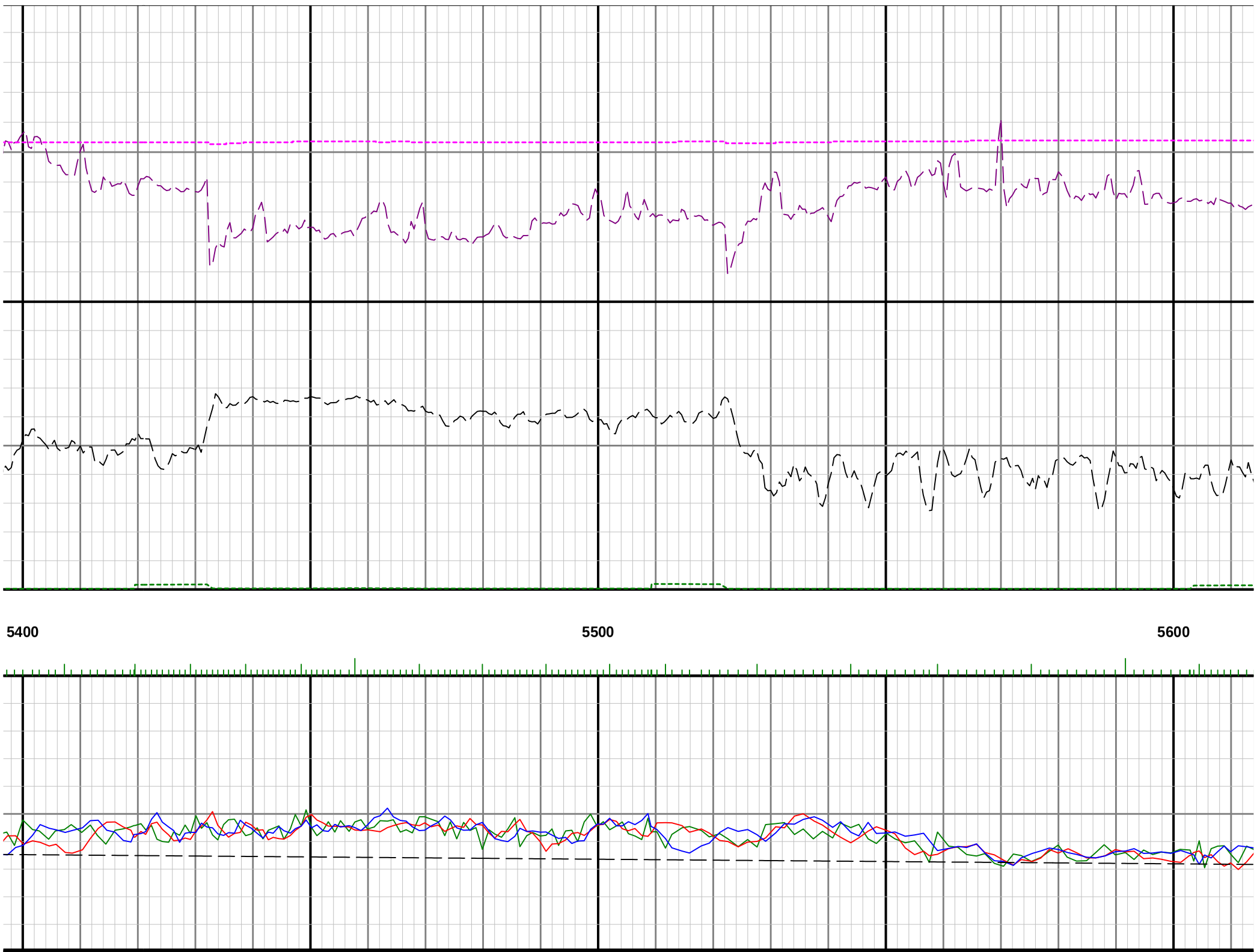
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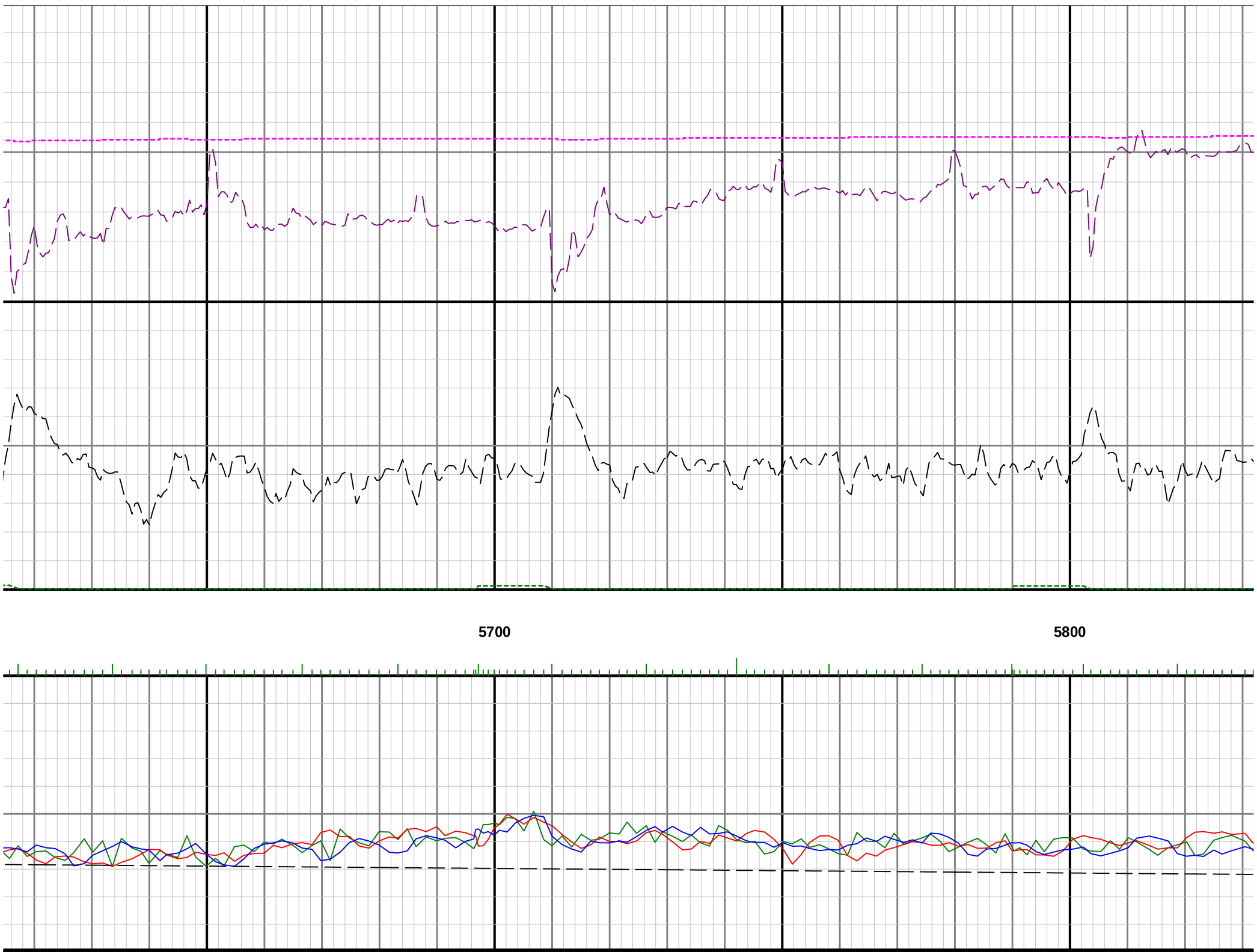
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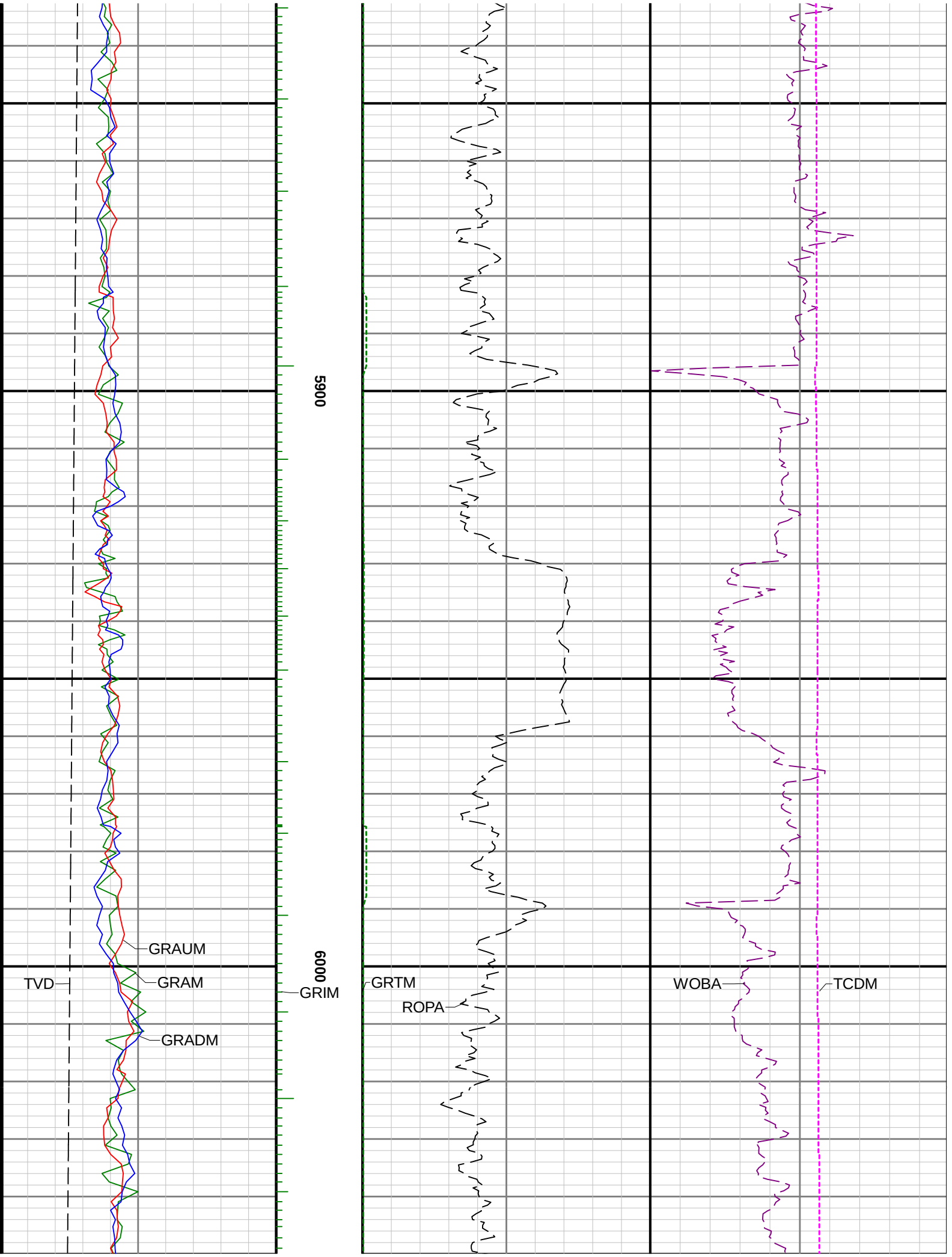
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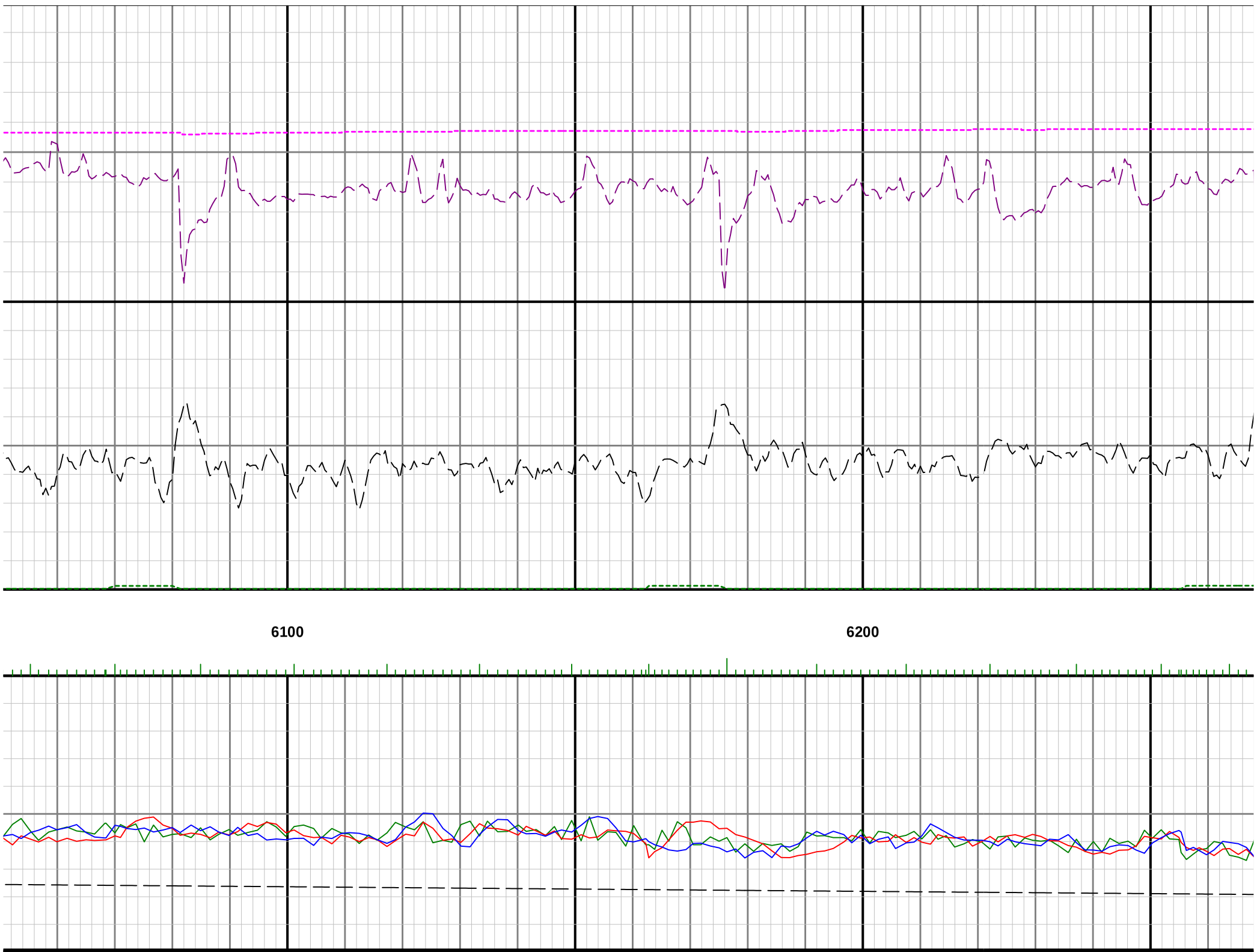
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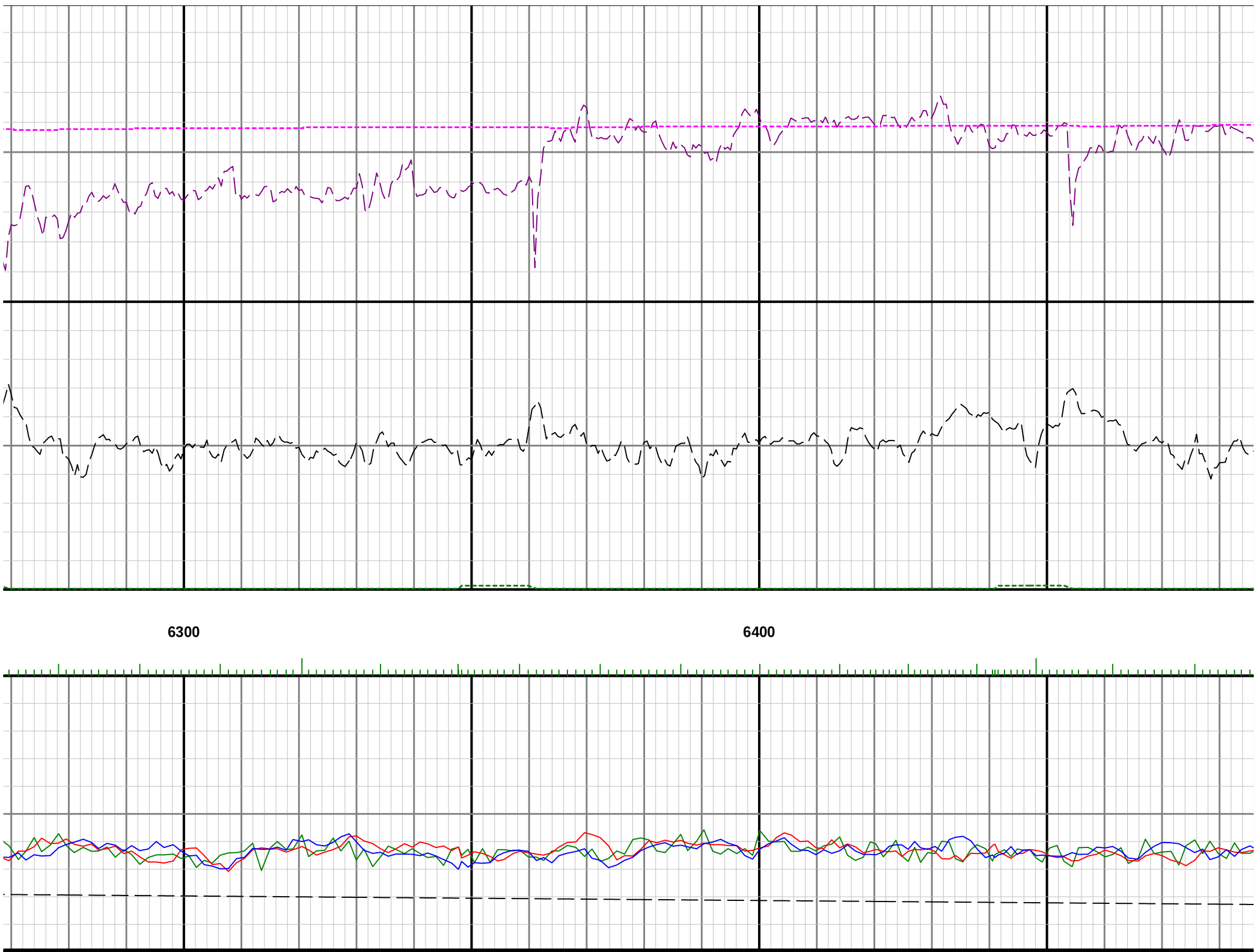
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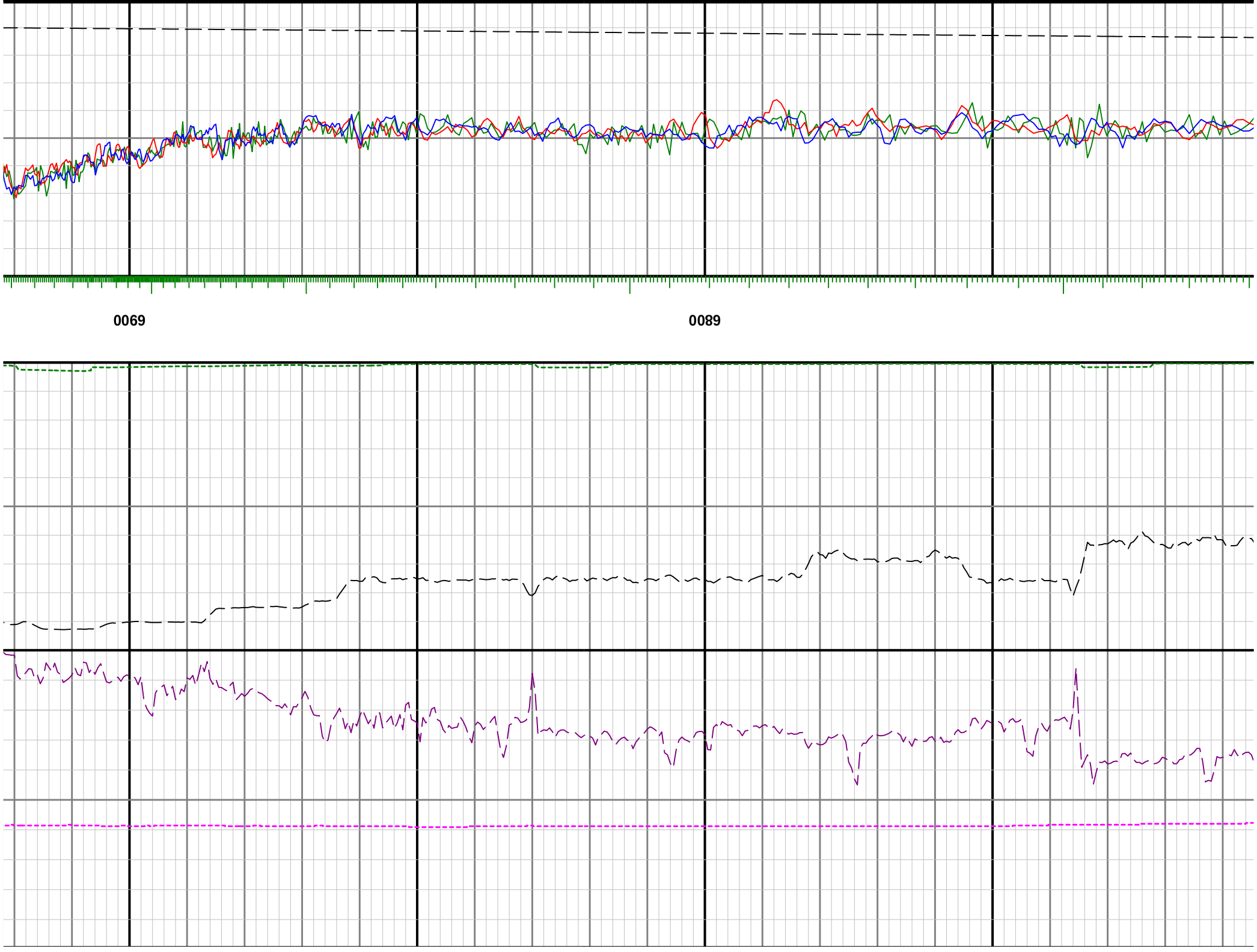
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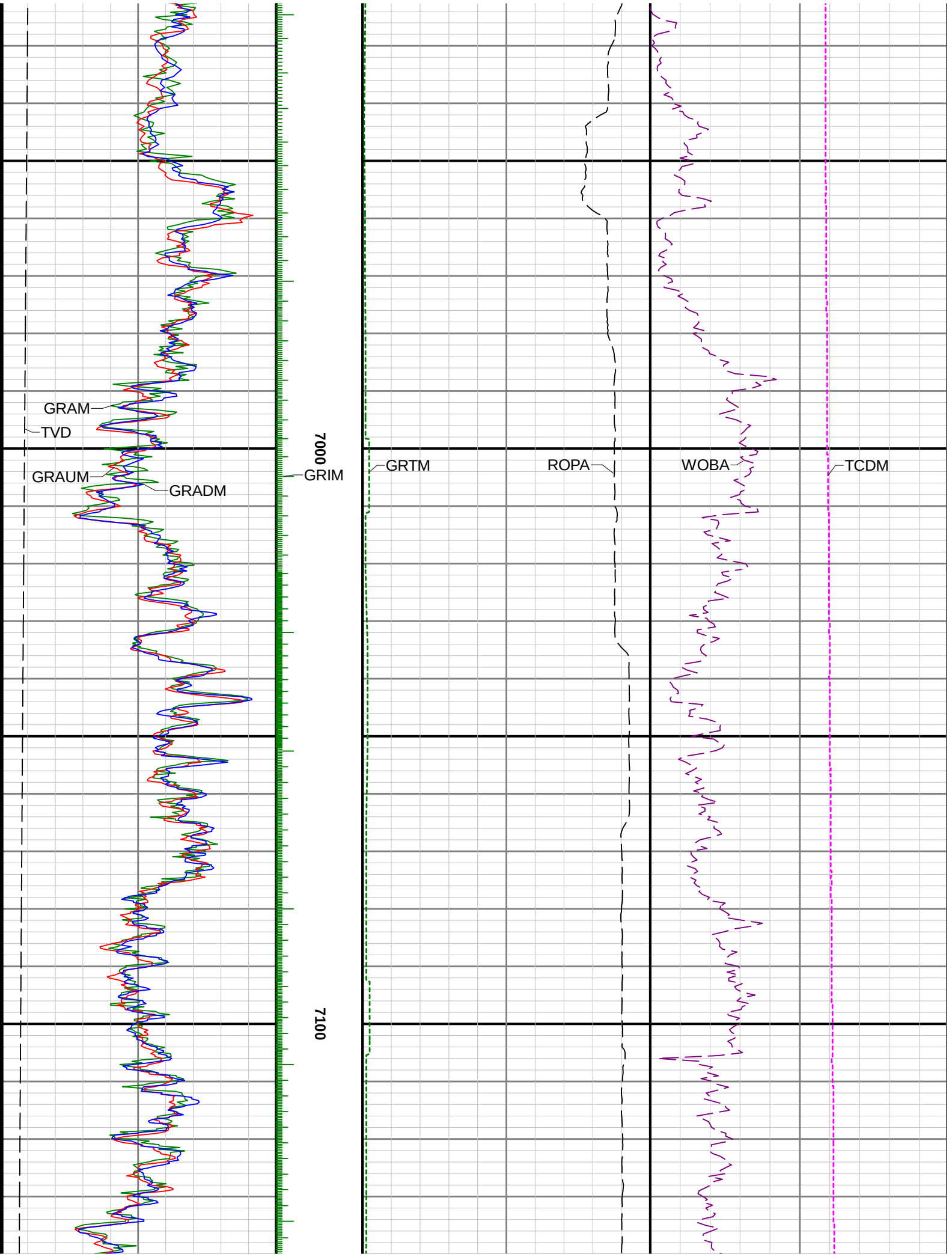
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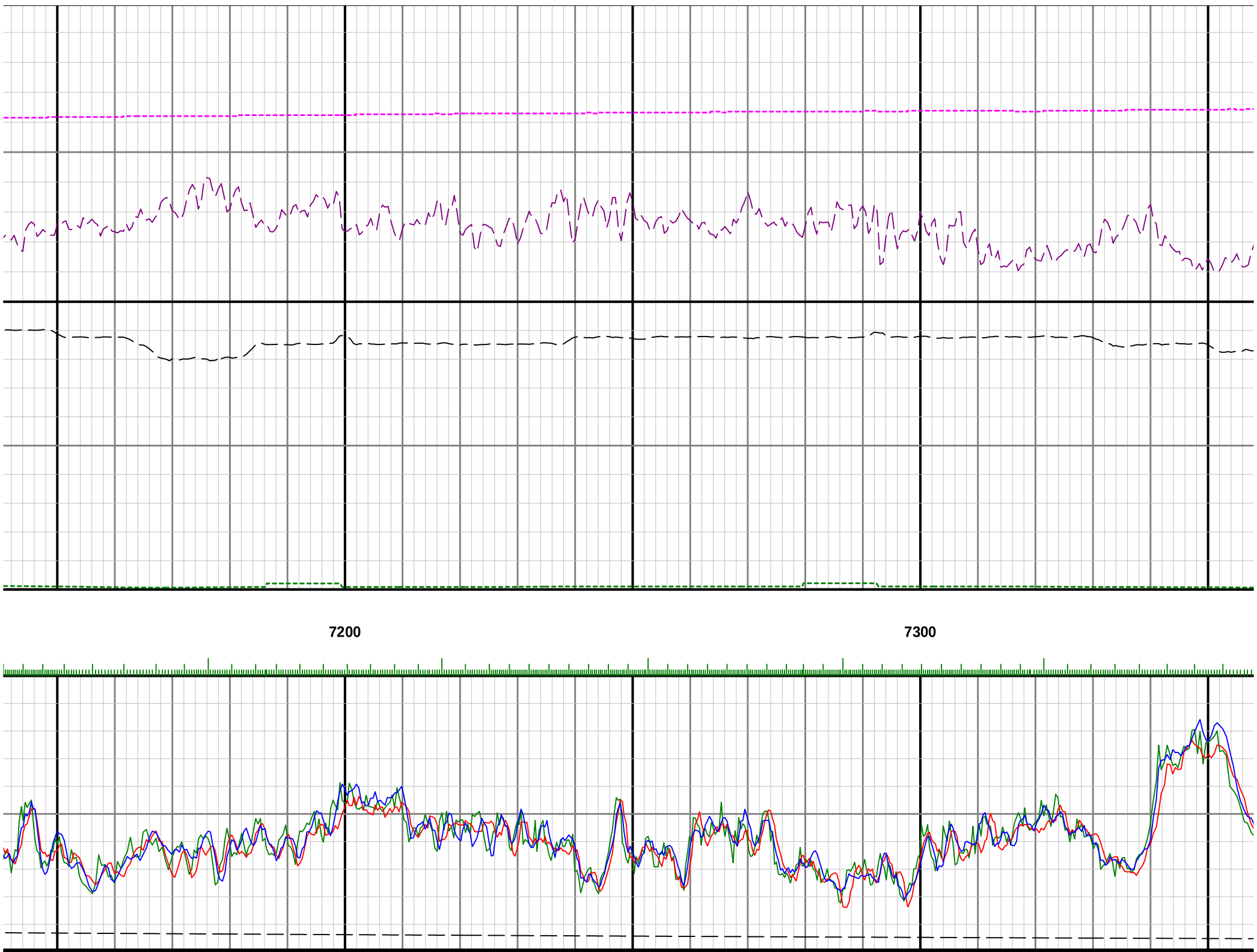
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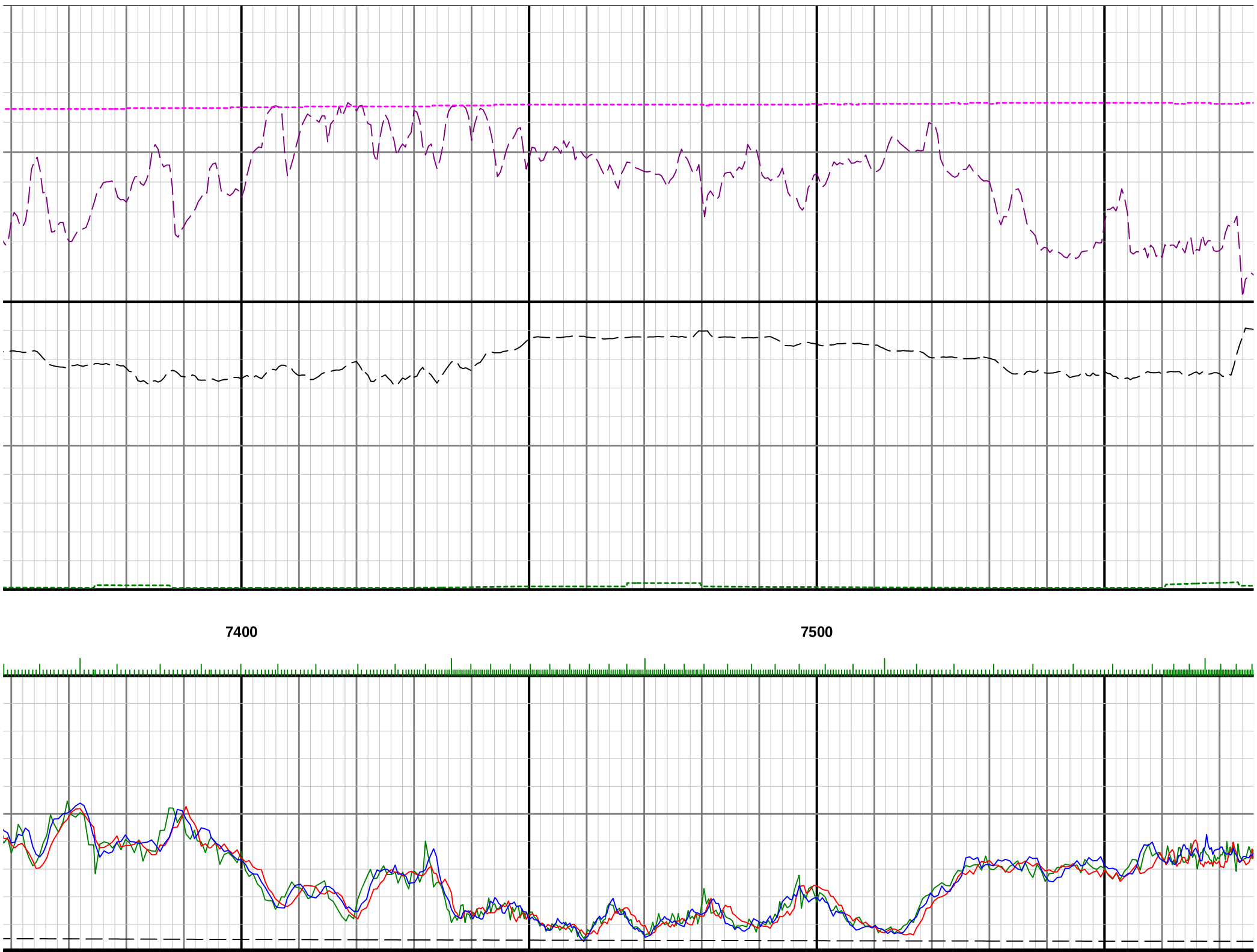
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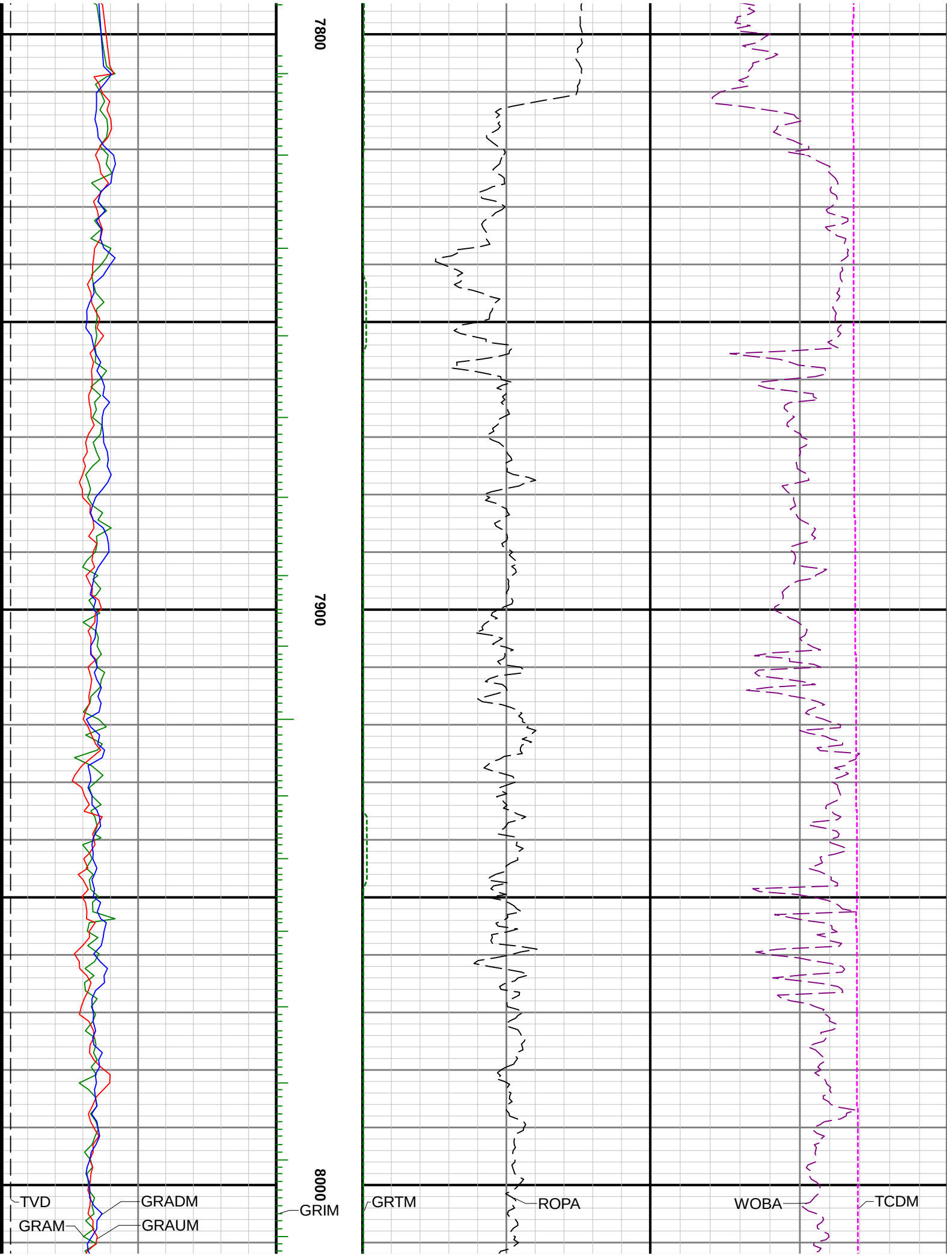
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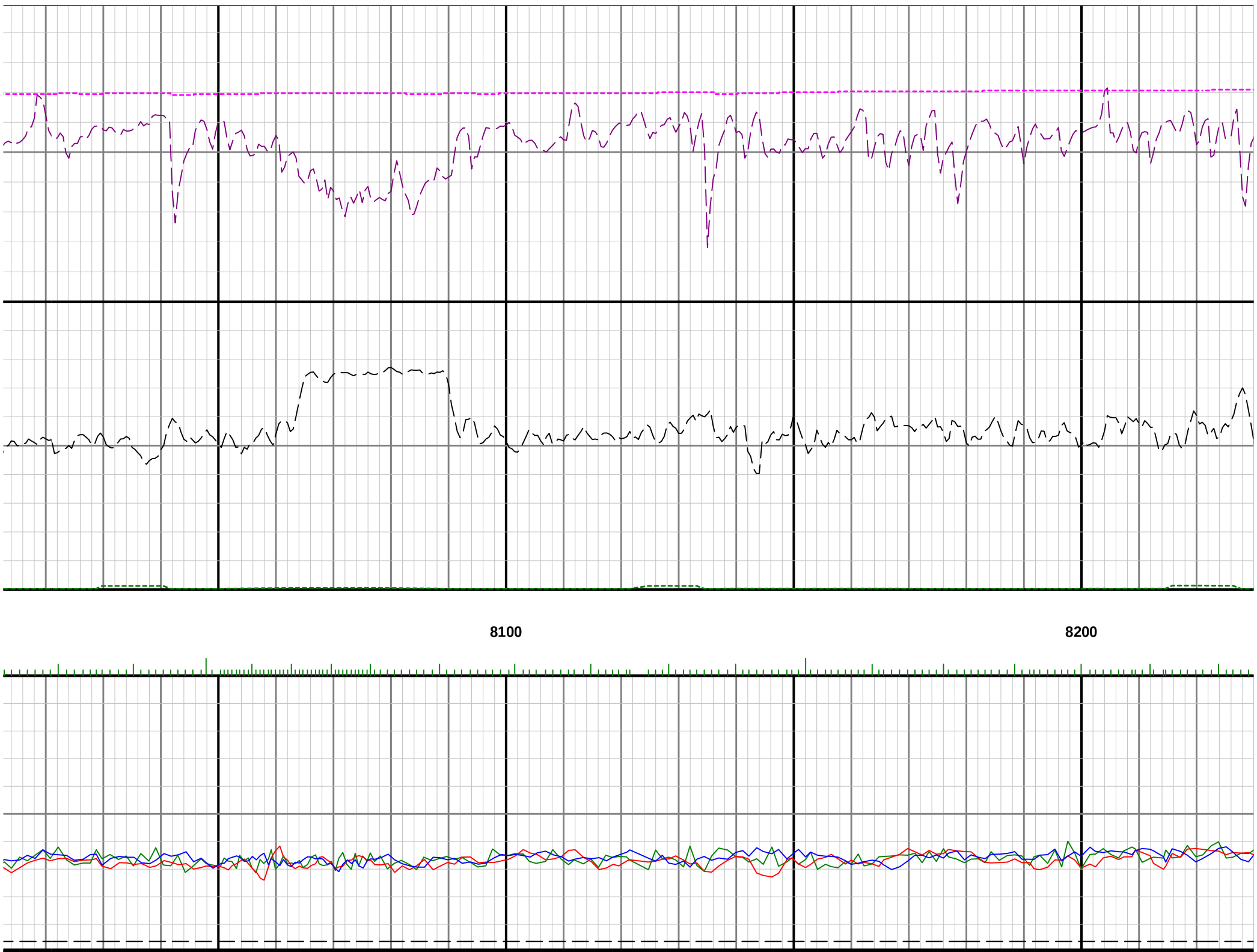
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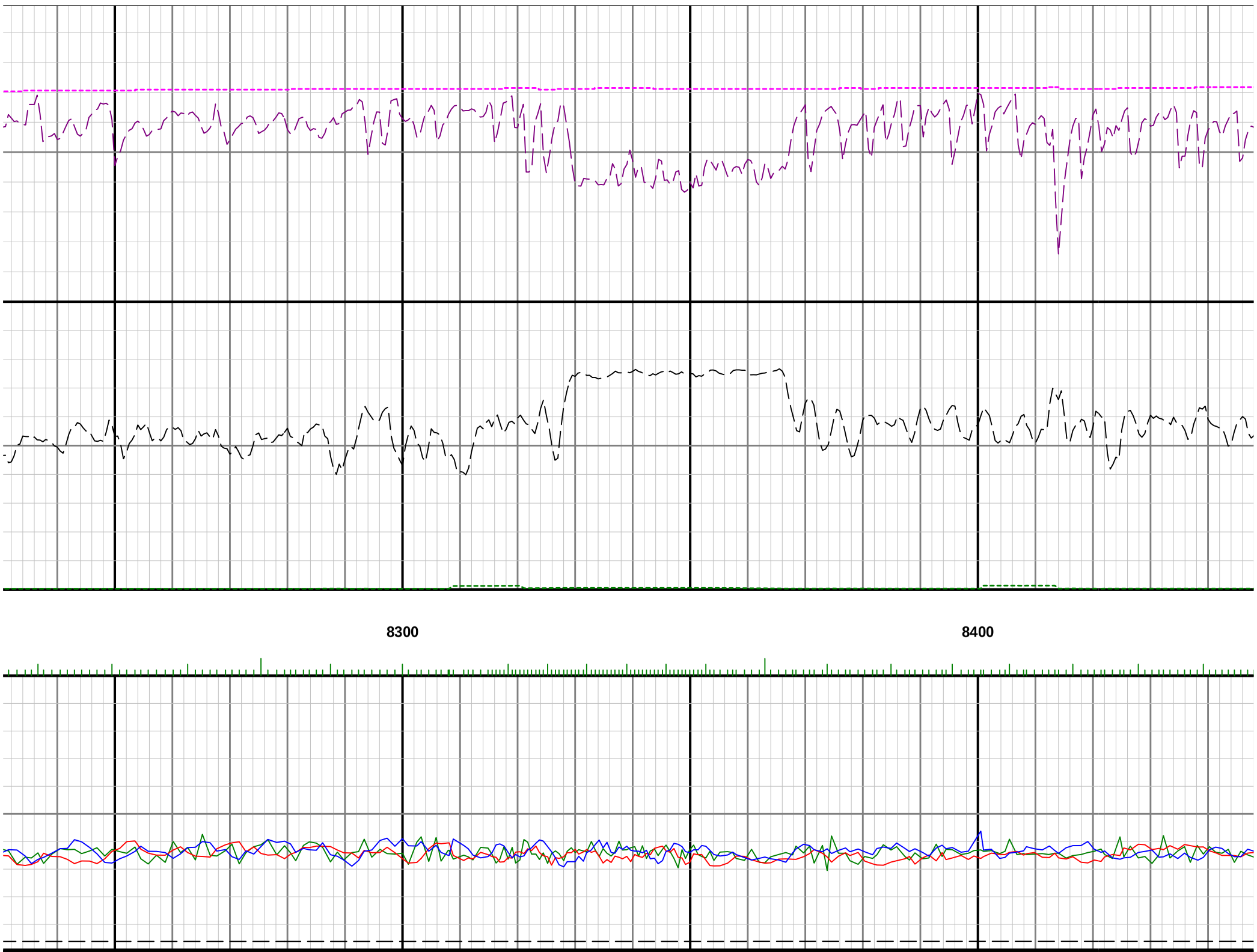
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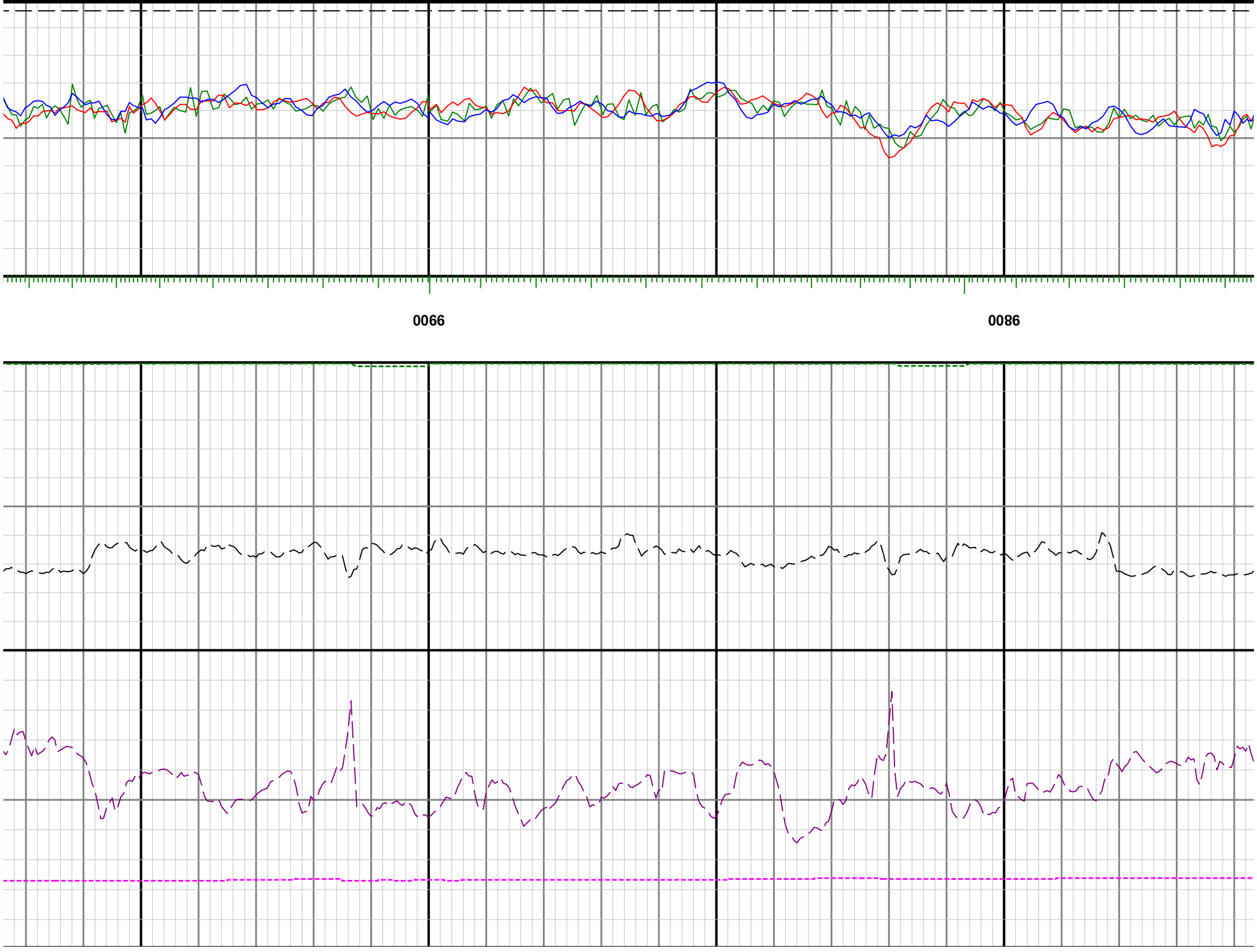
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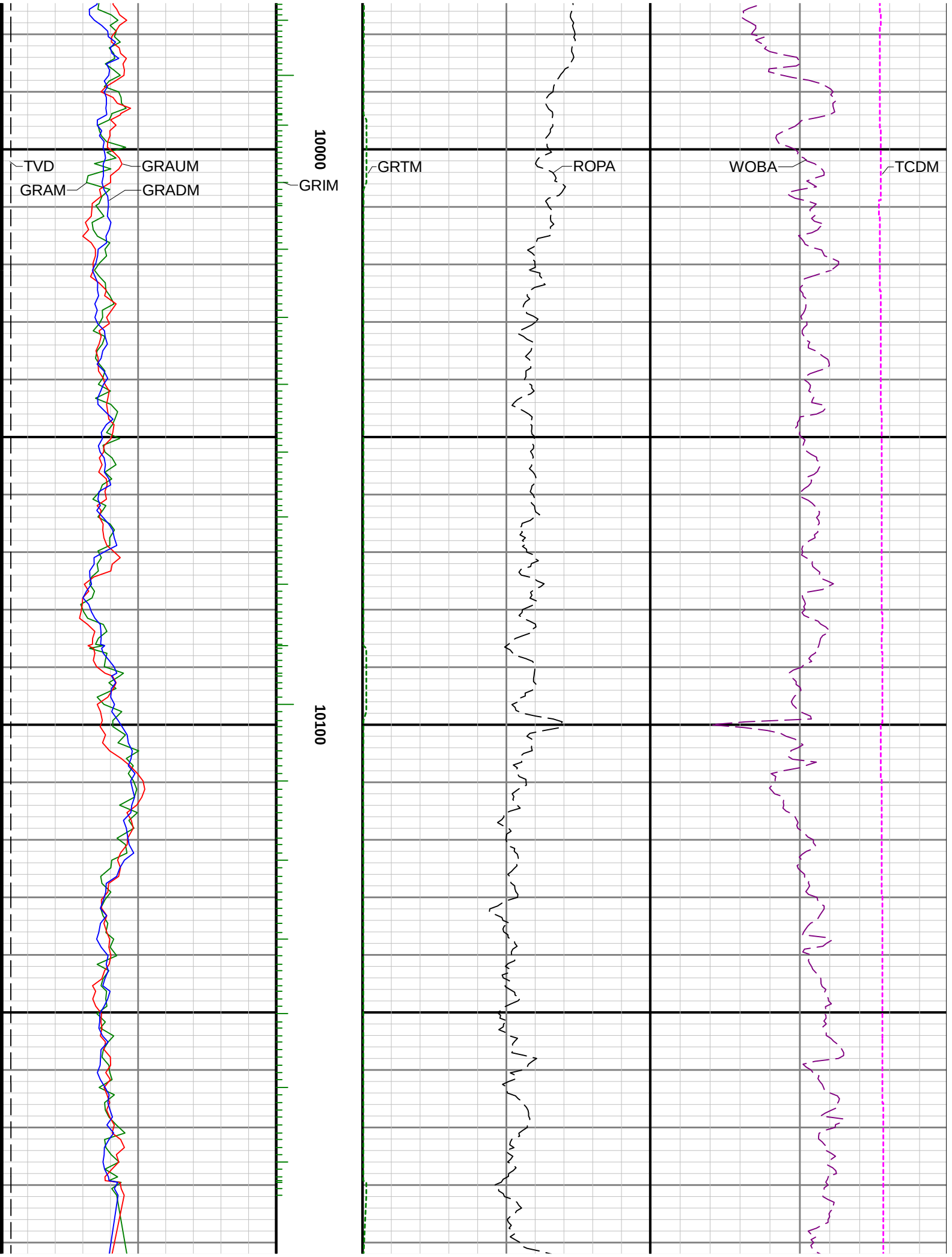
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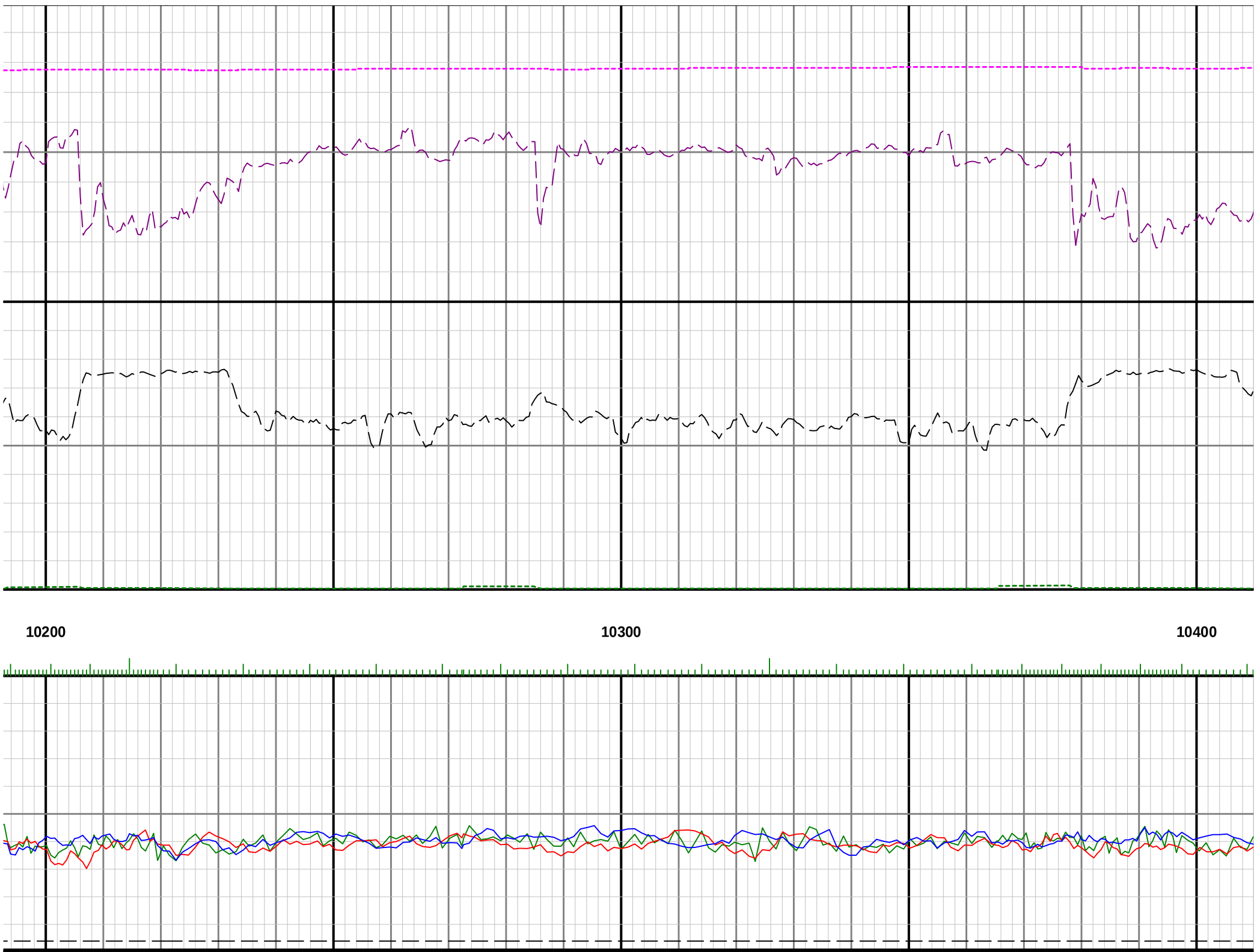
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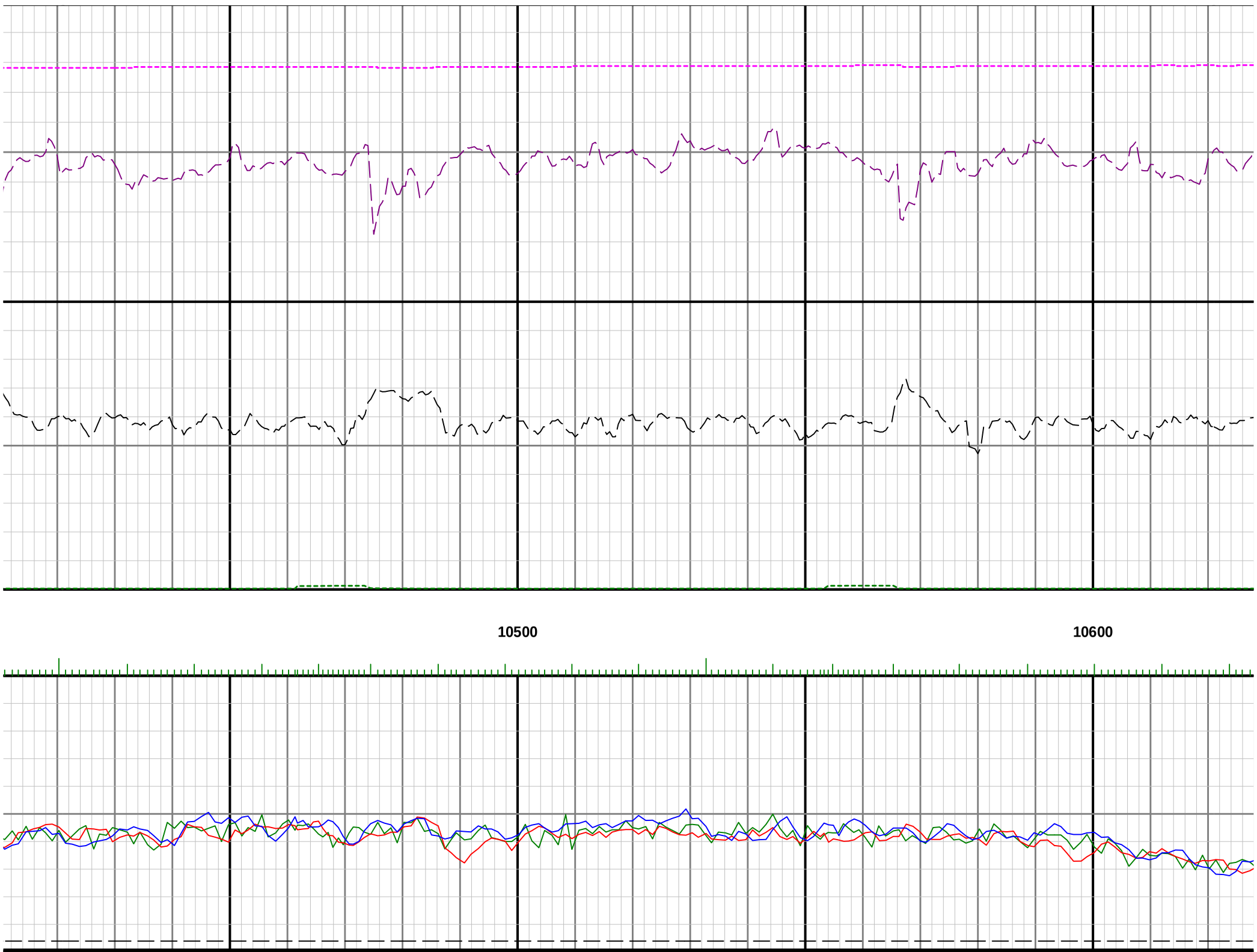
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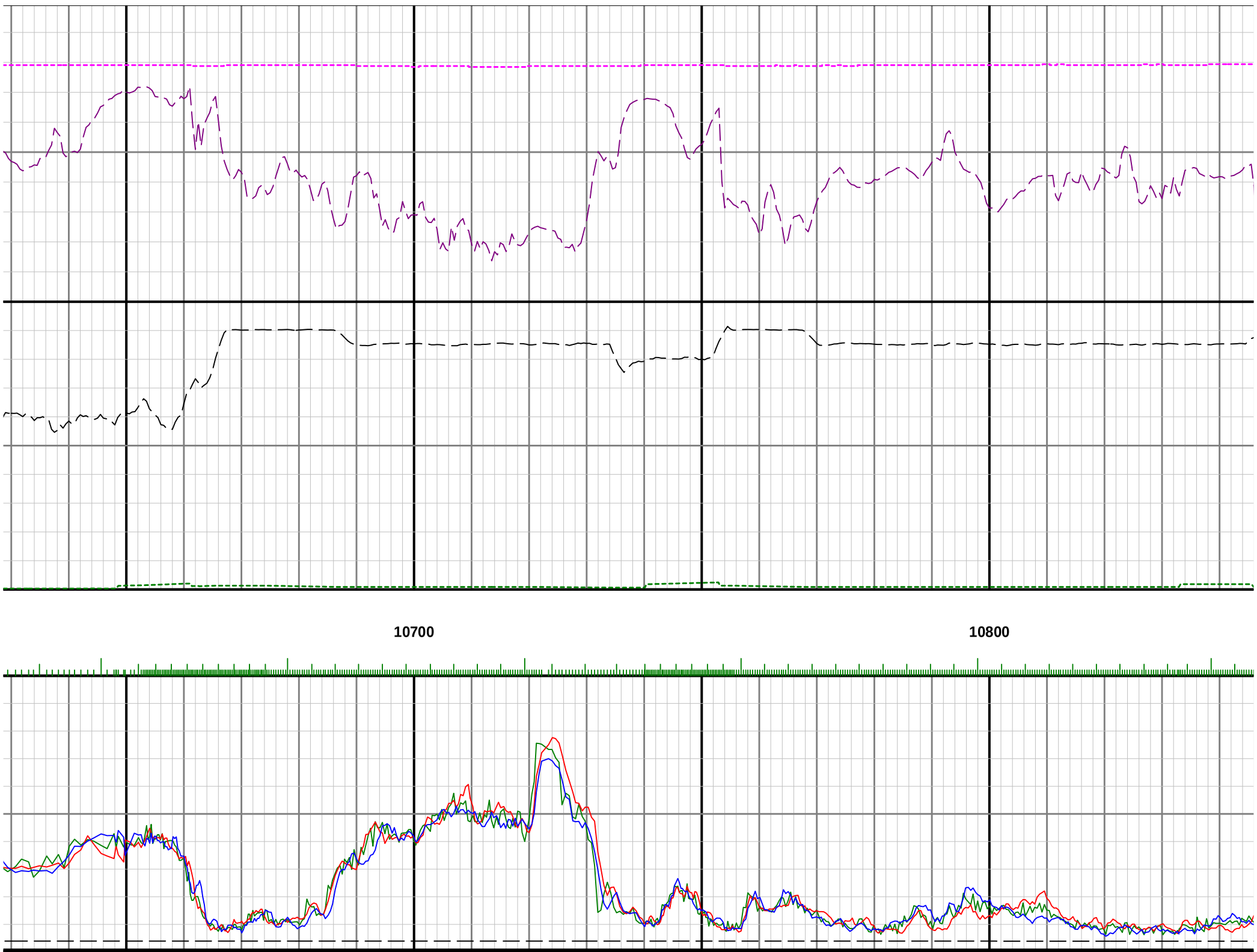
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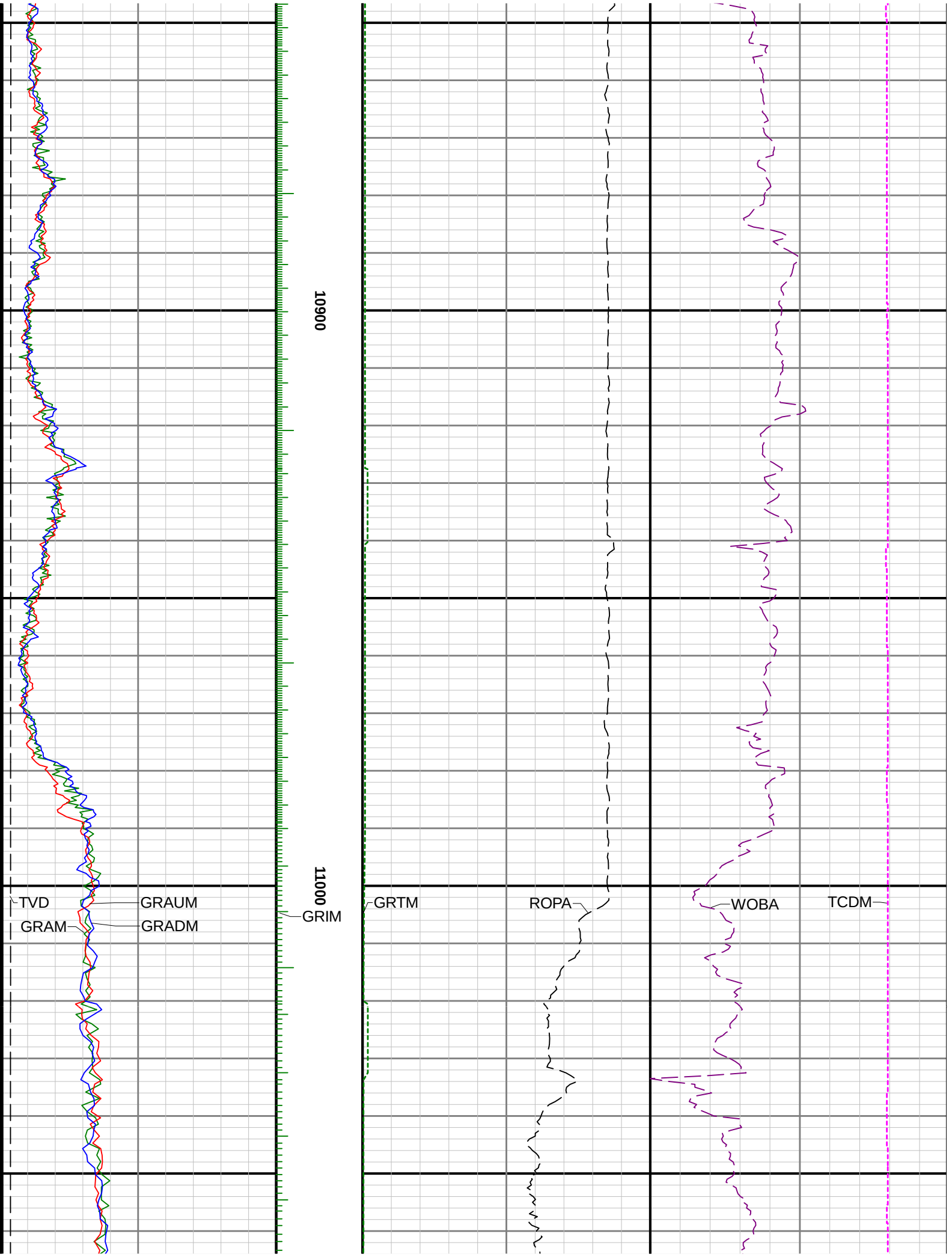
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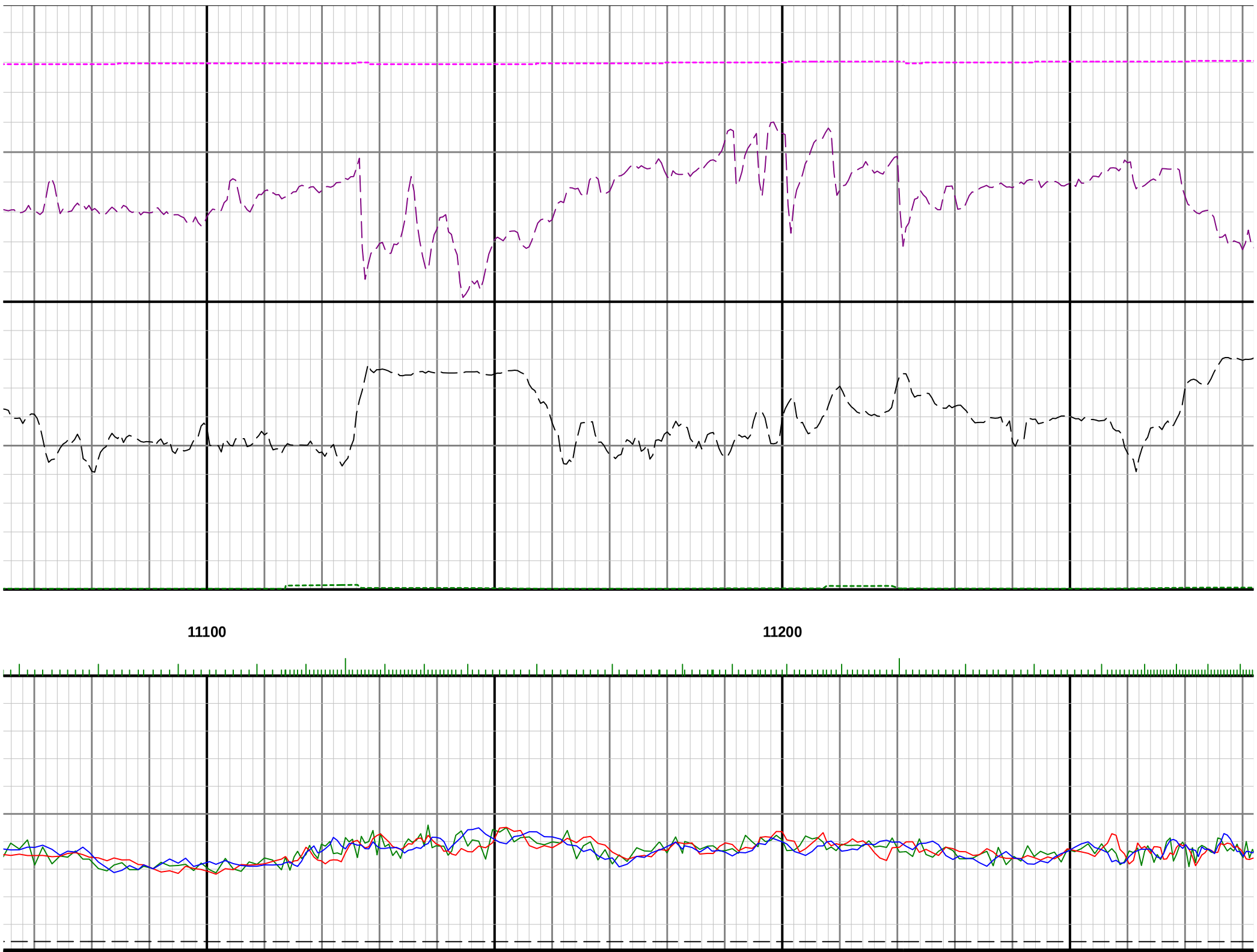
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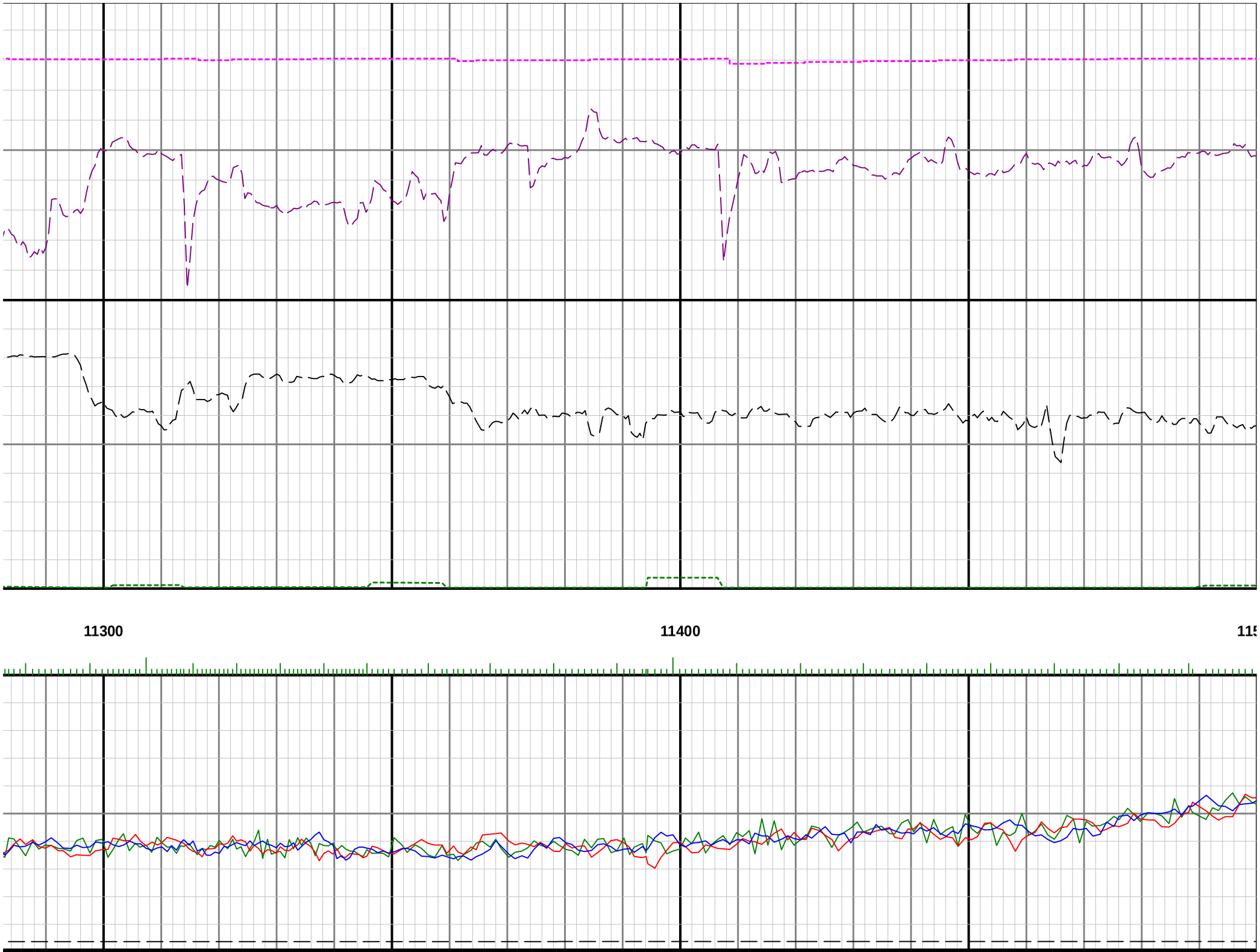
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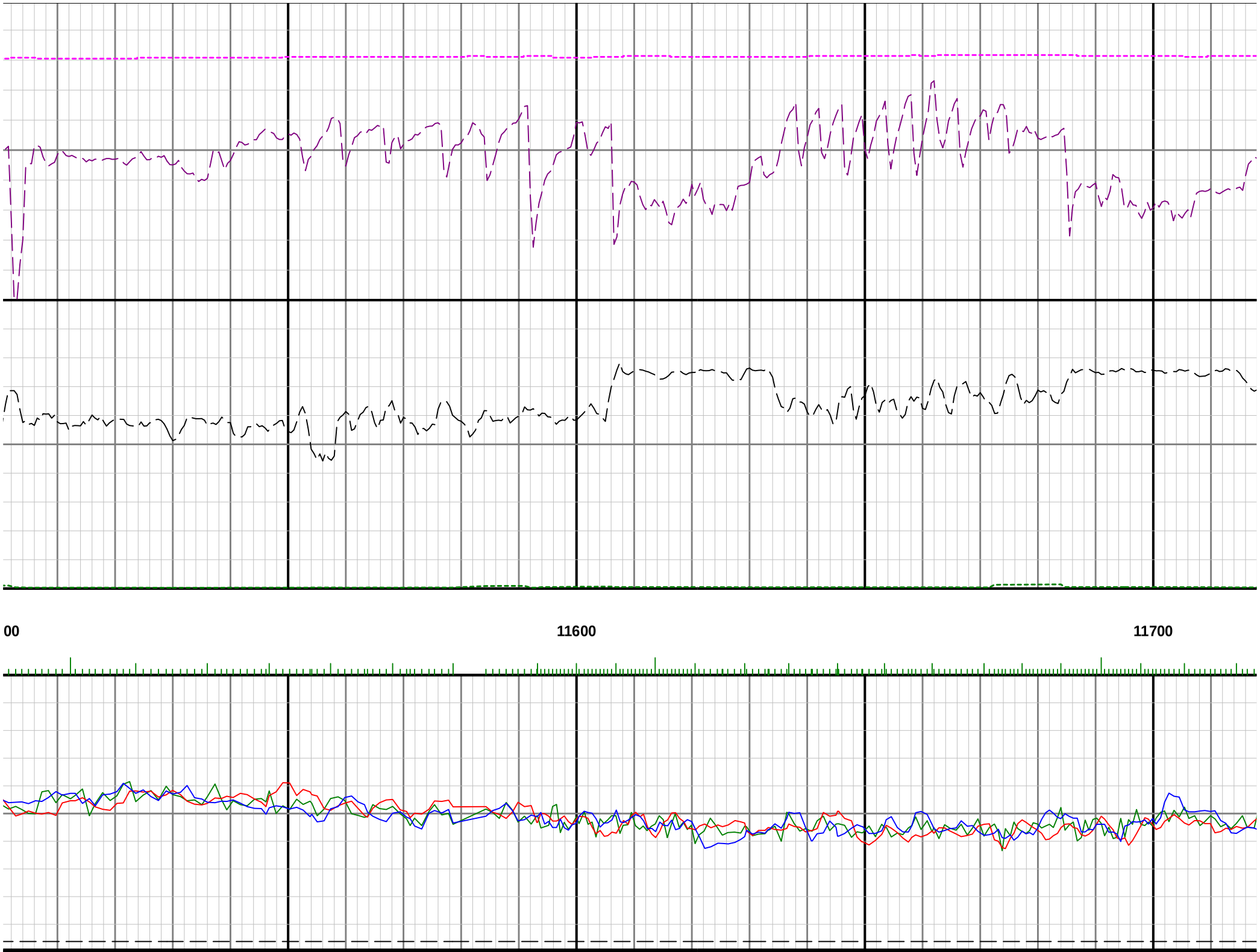
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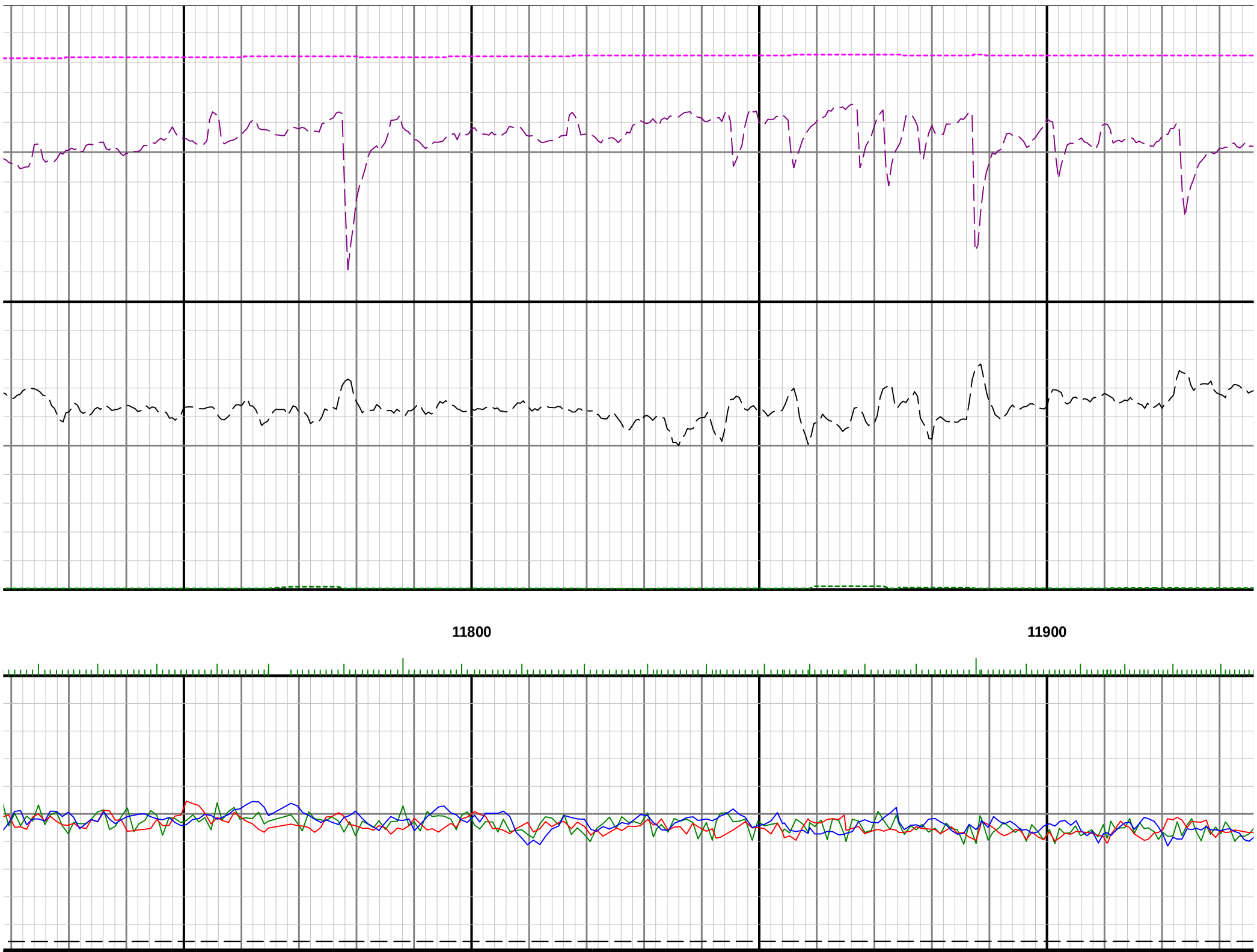
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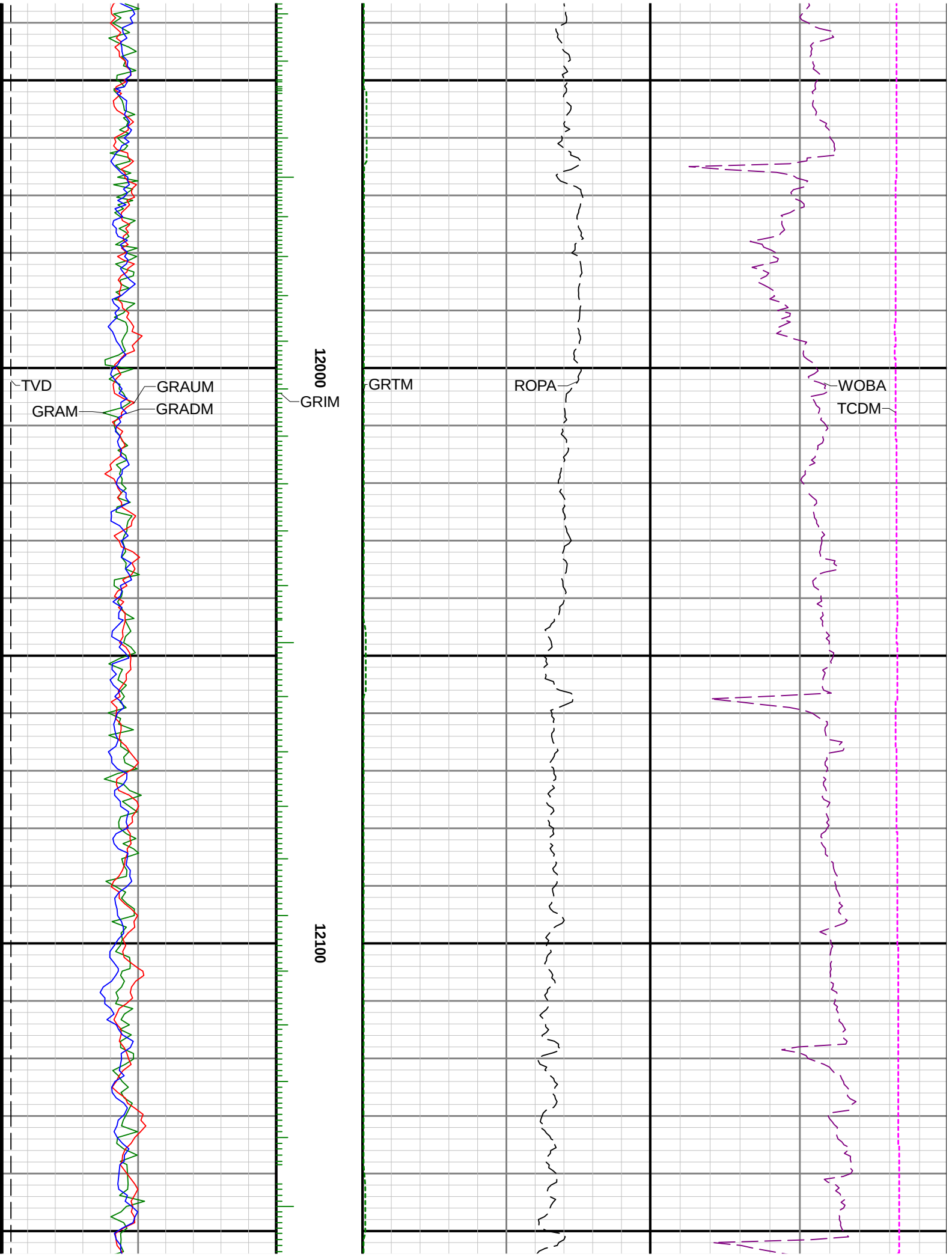
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GRAM
GRAUM
GRADM
12000
GRIM
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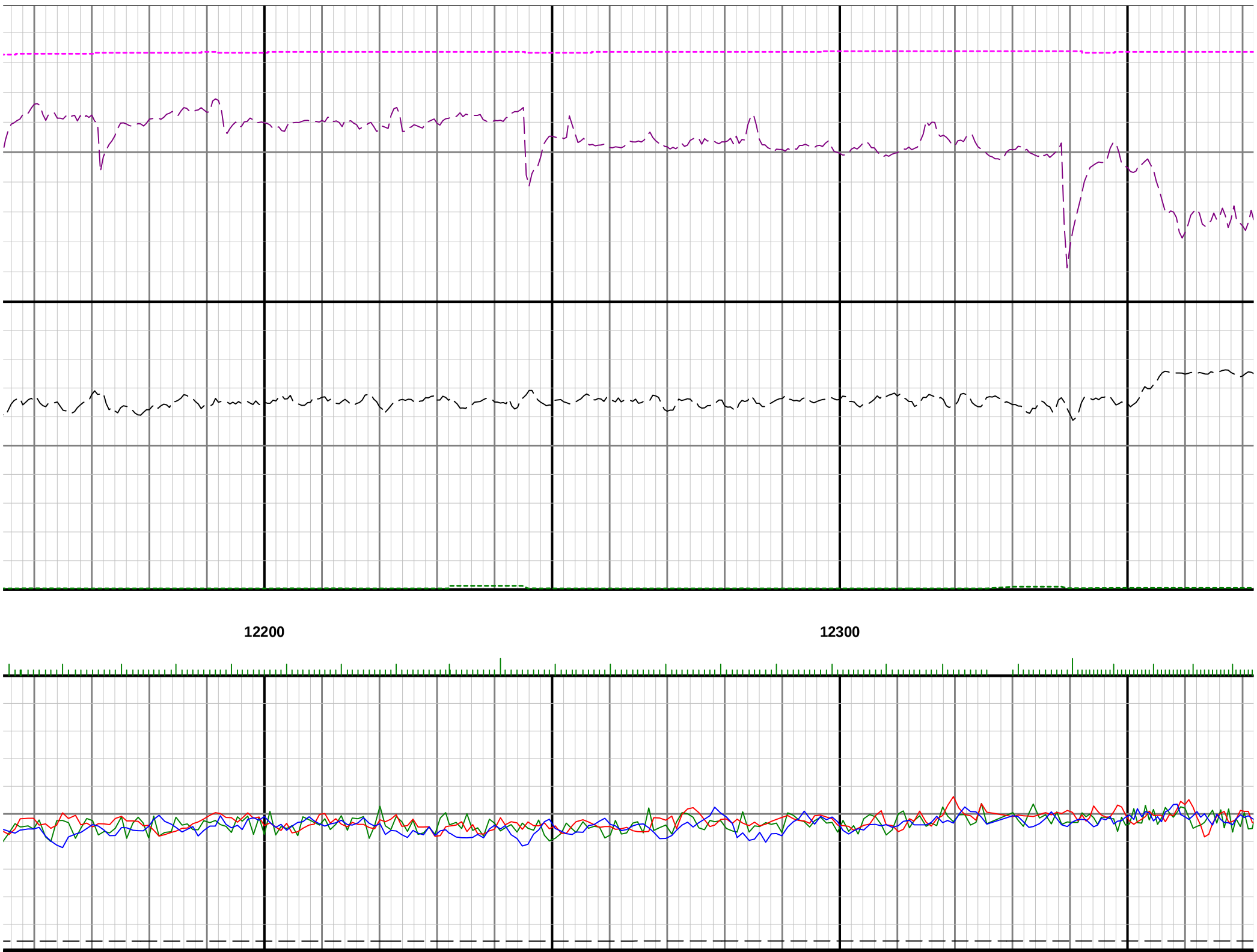
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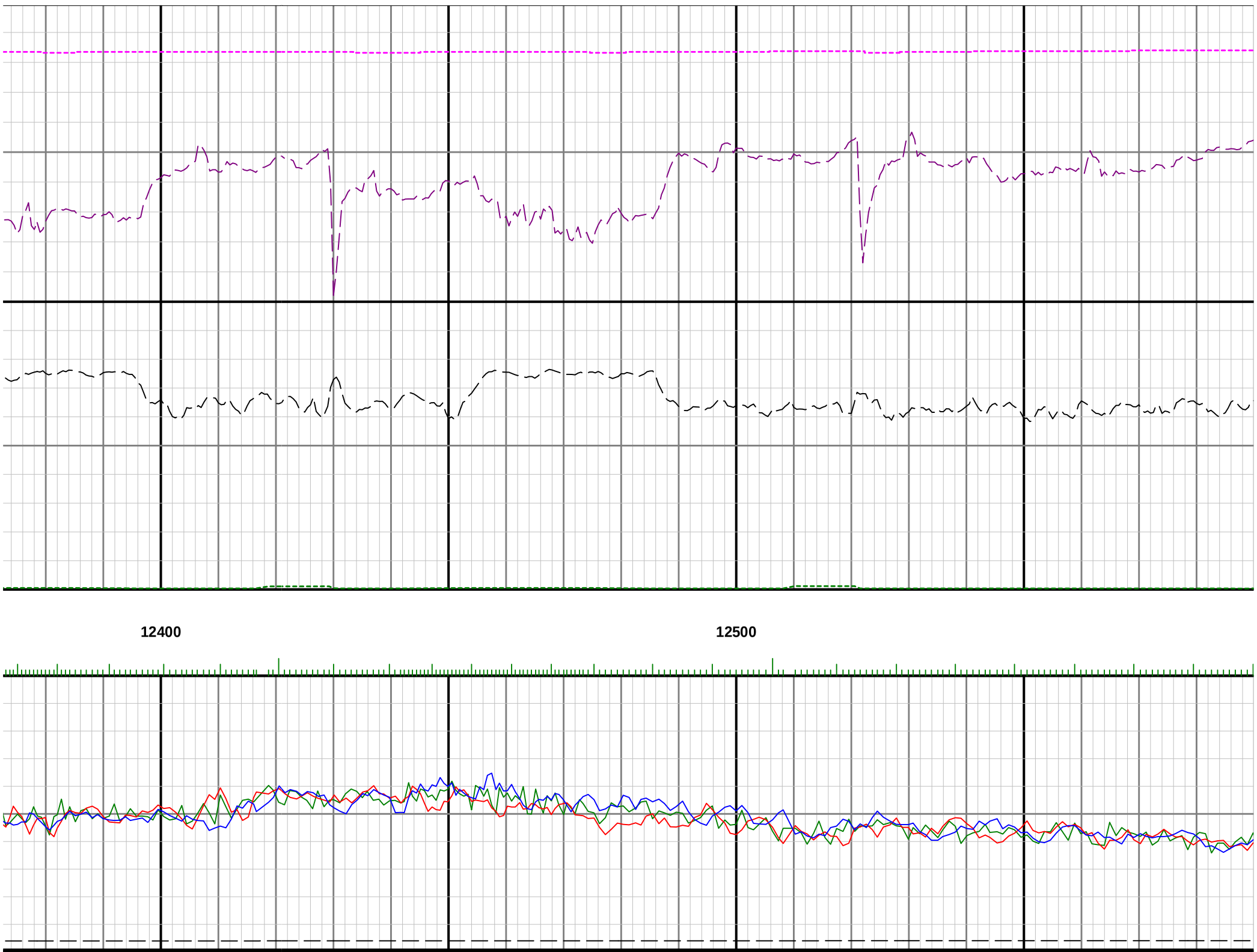
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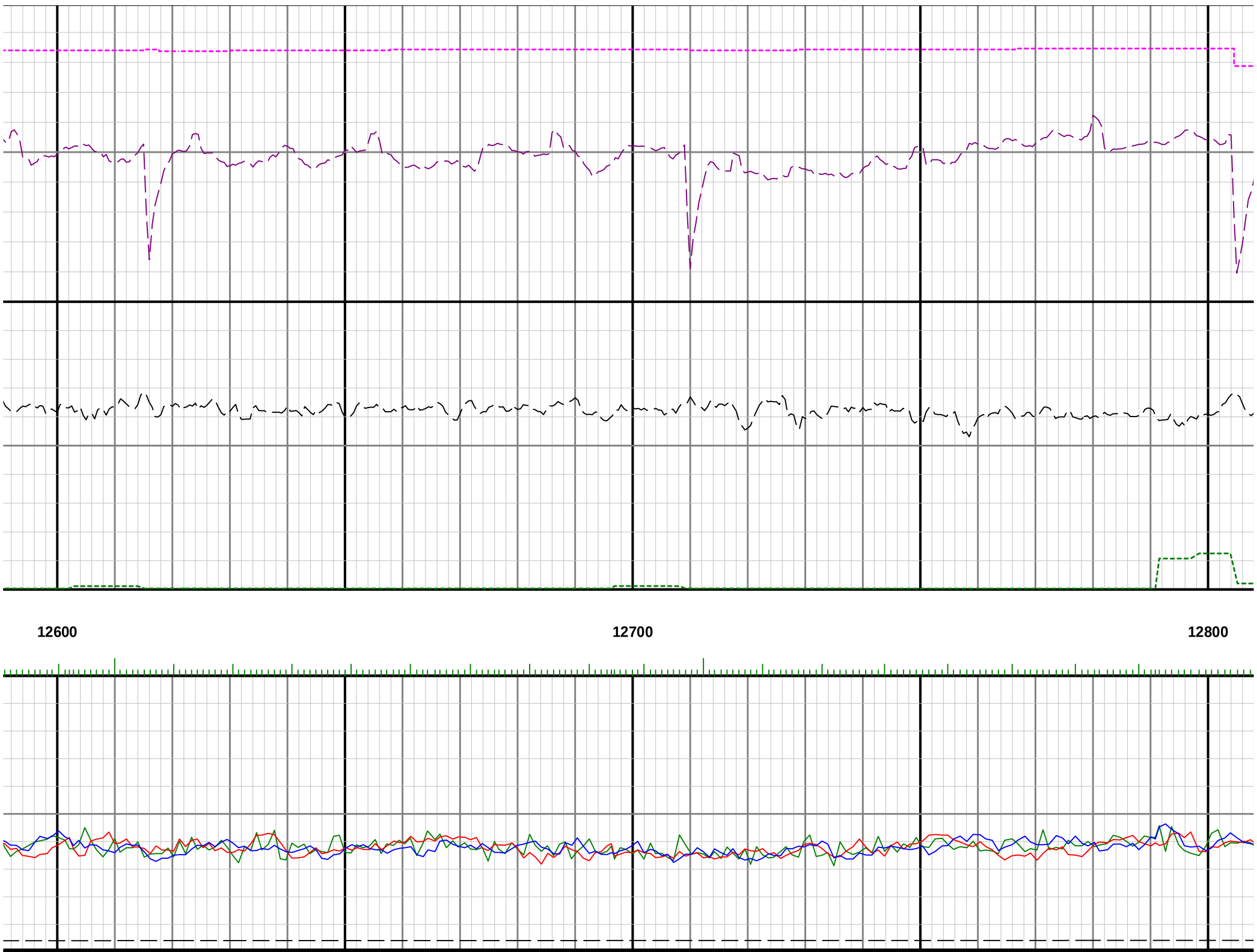
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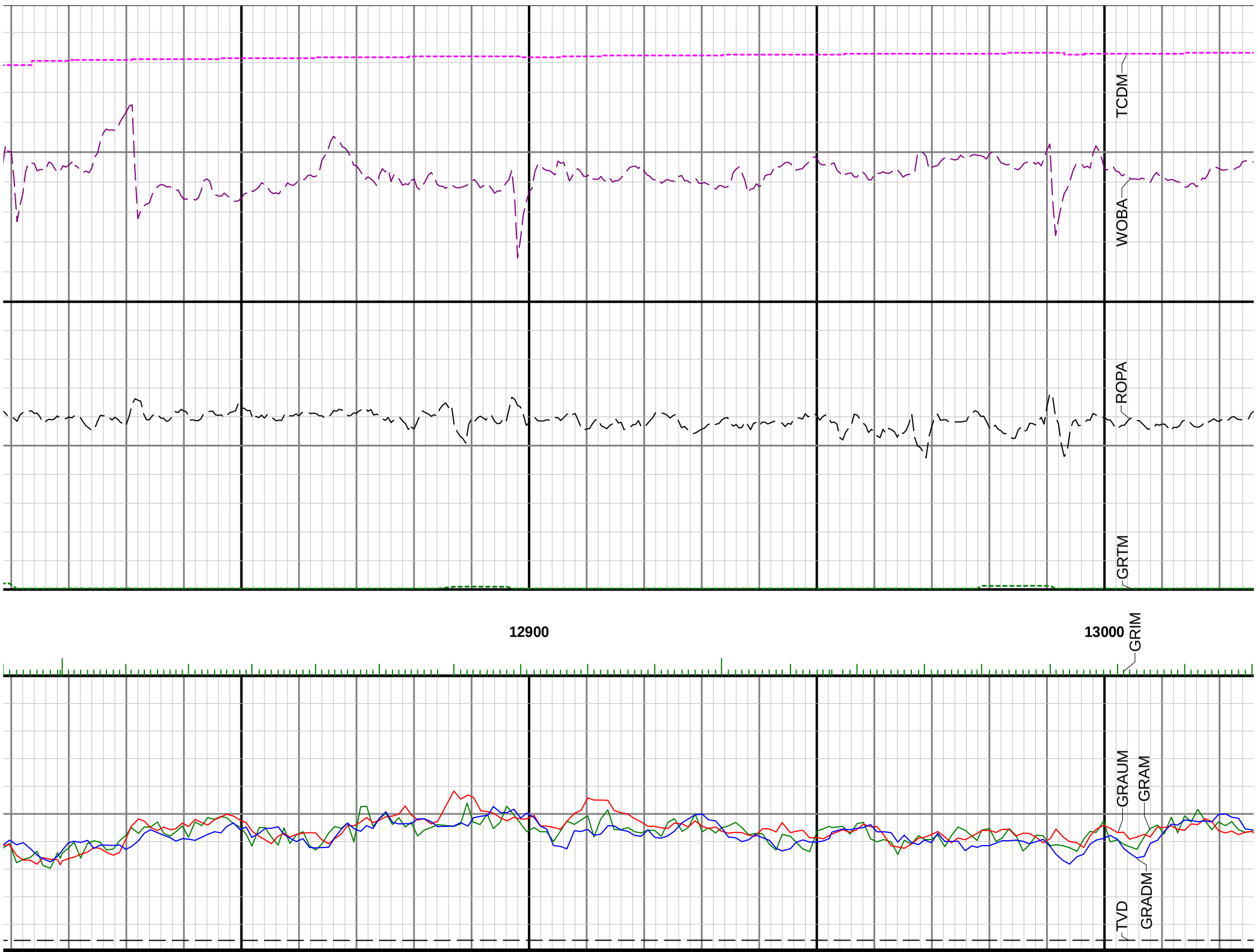
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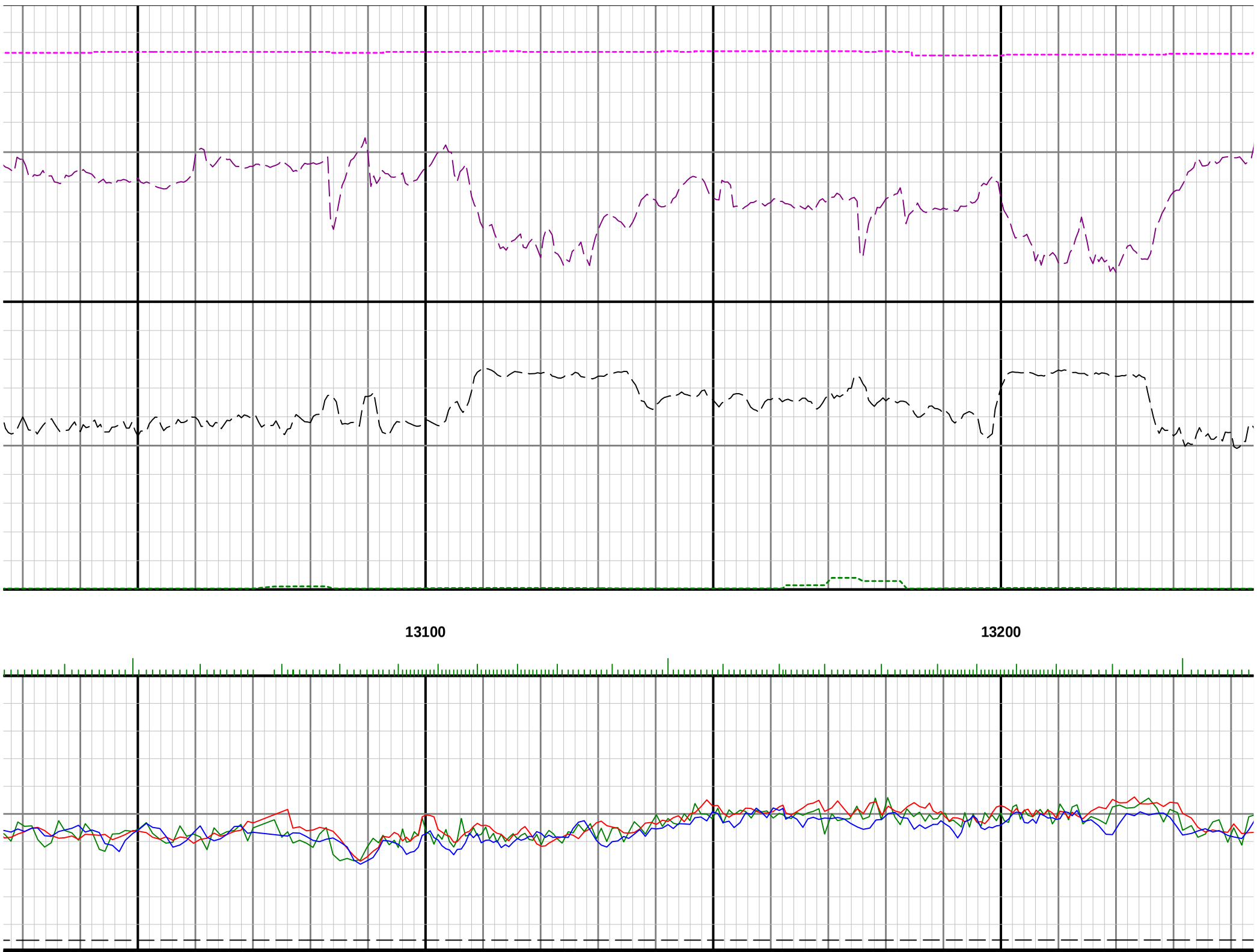
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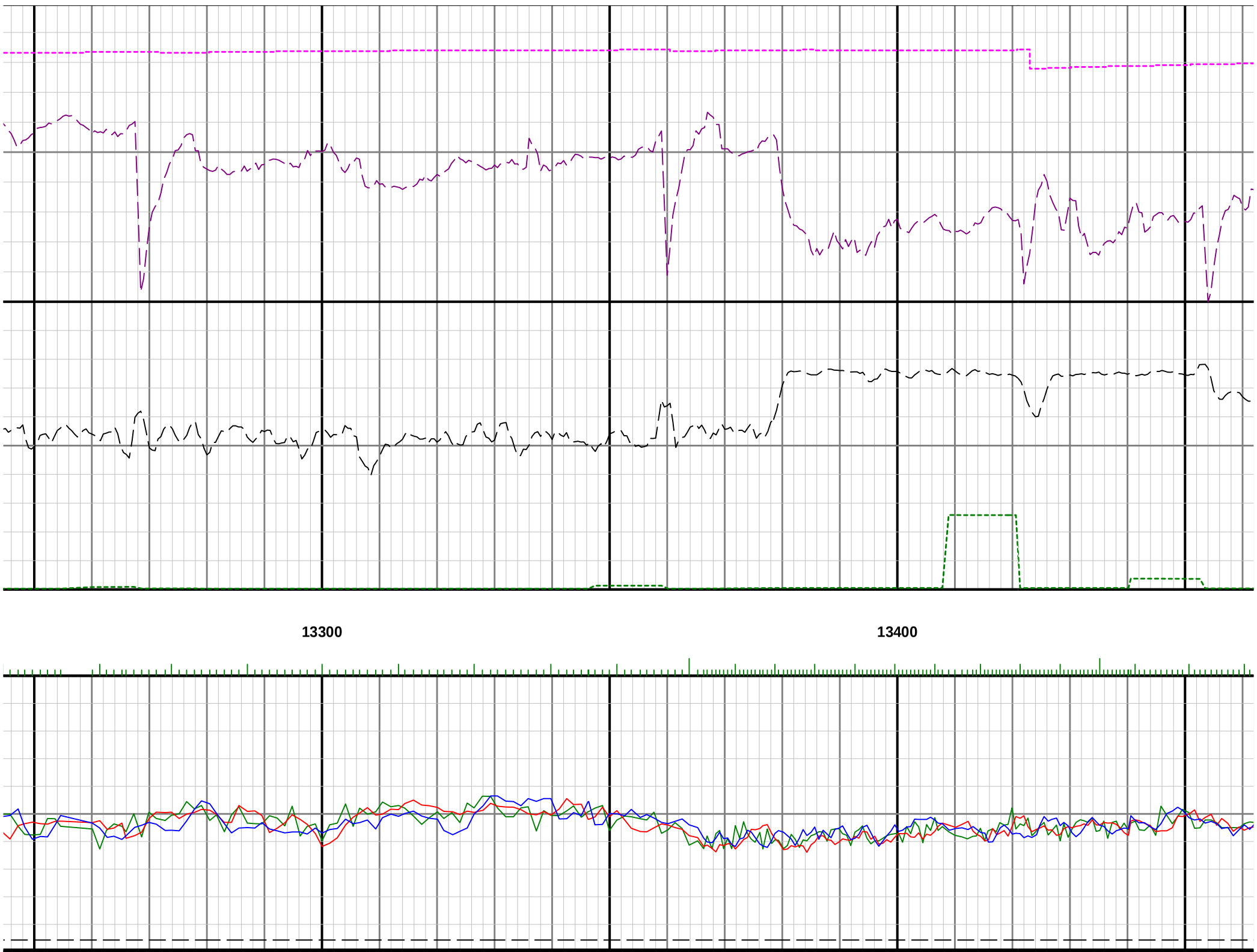
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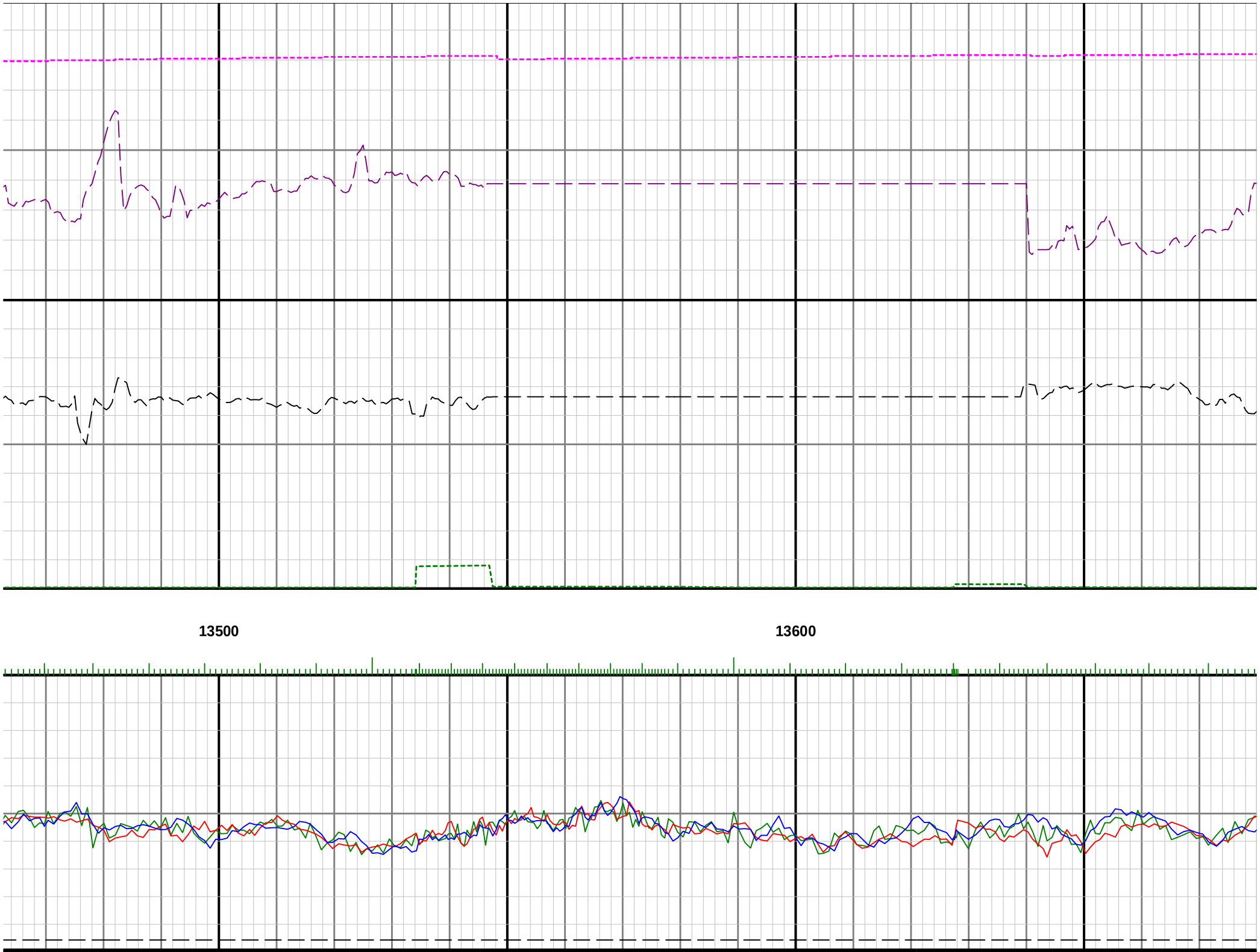
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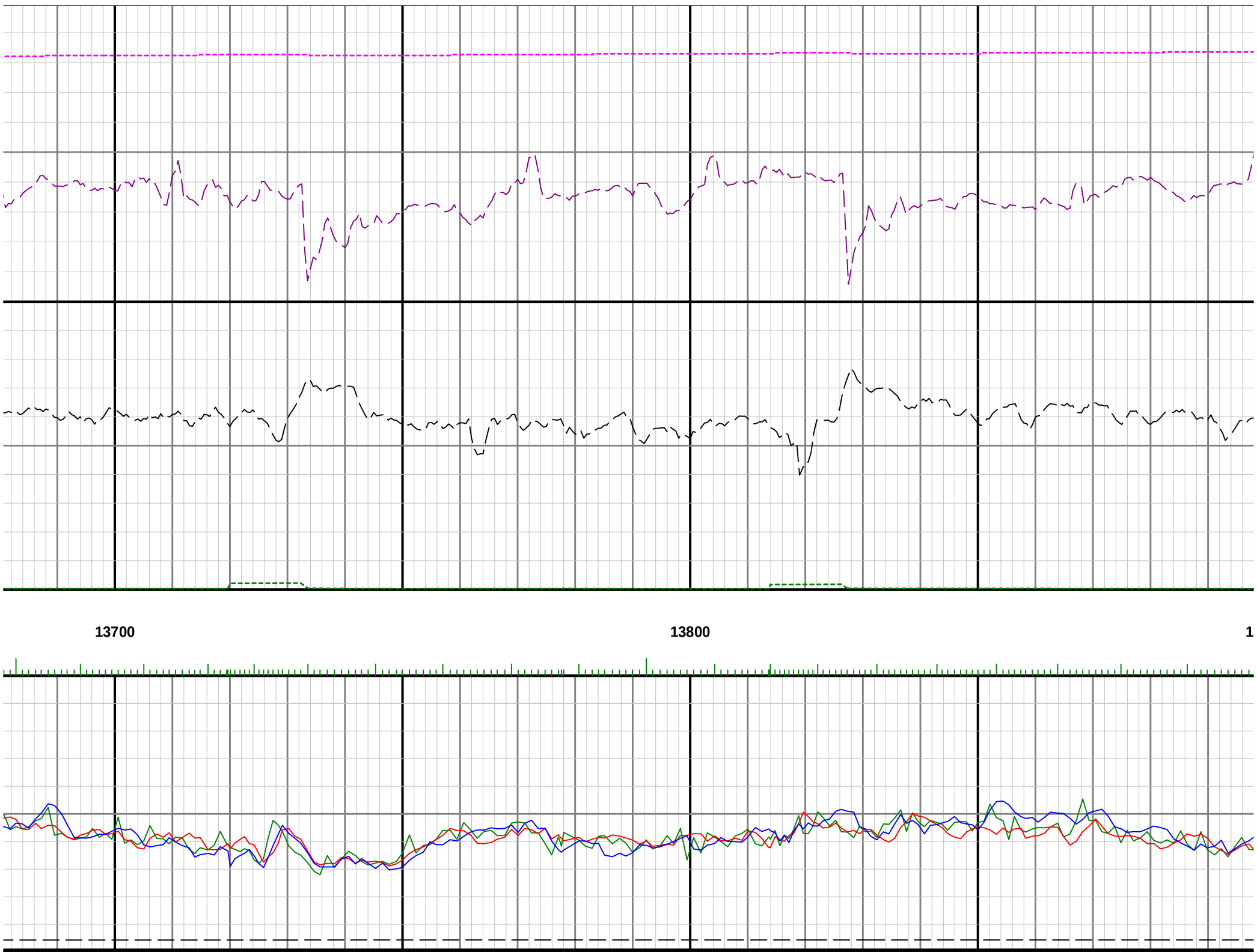
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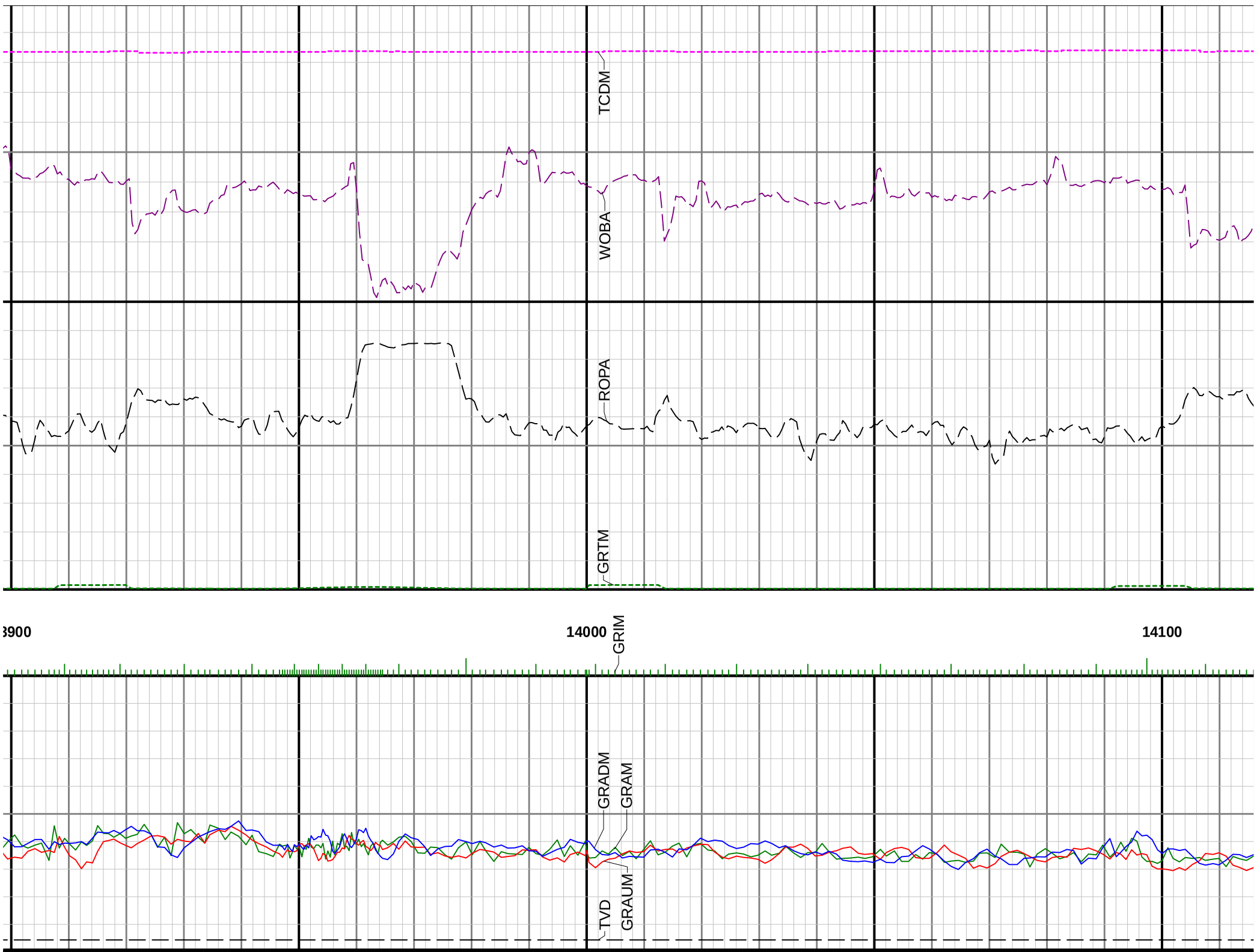
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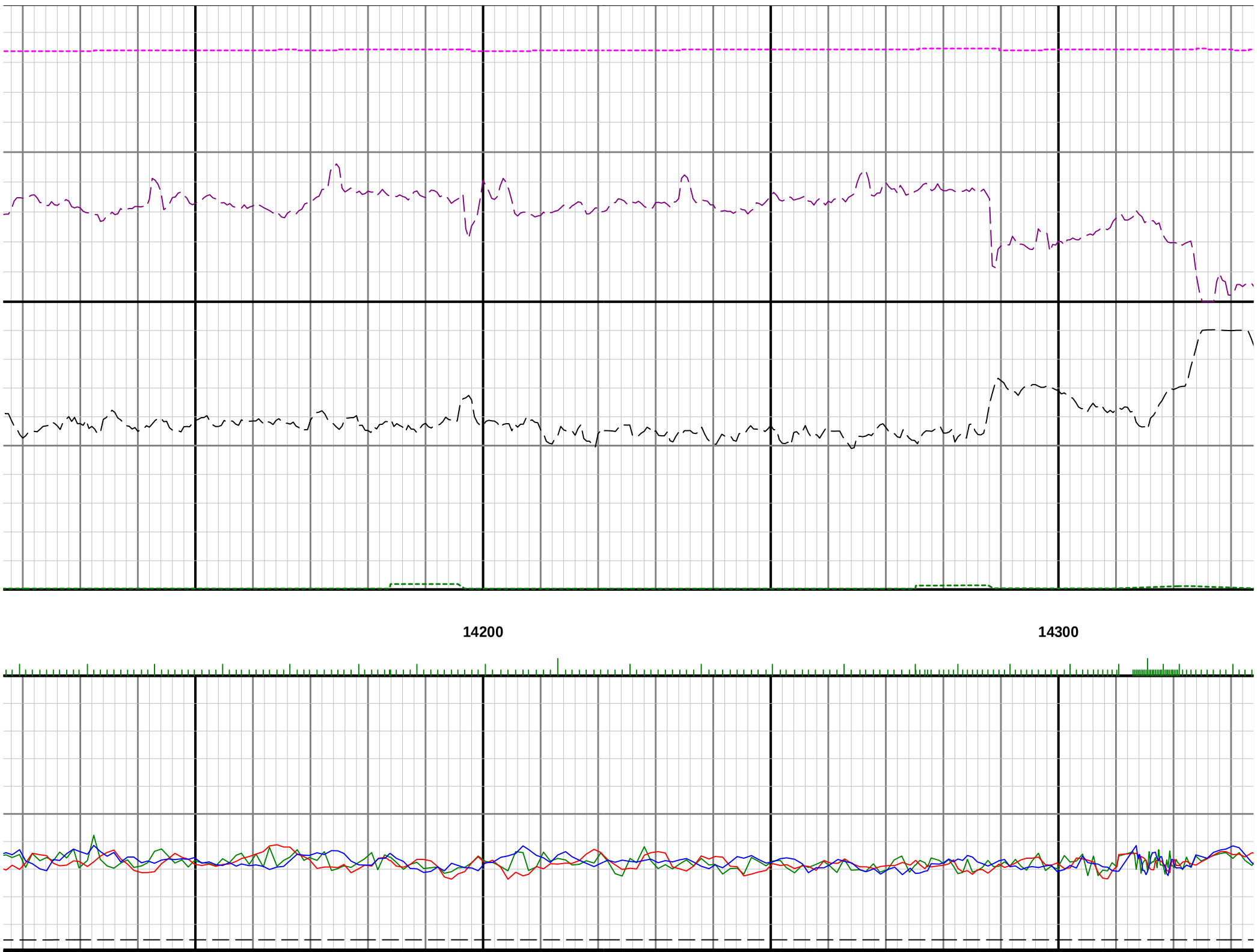
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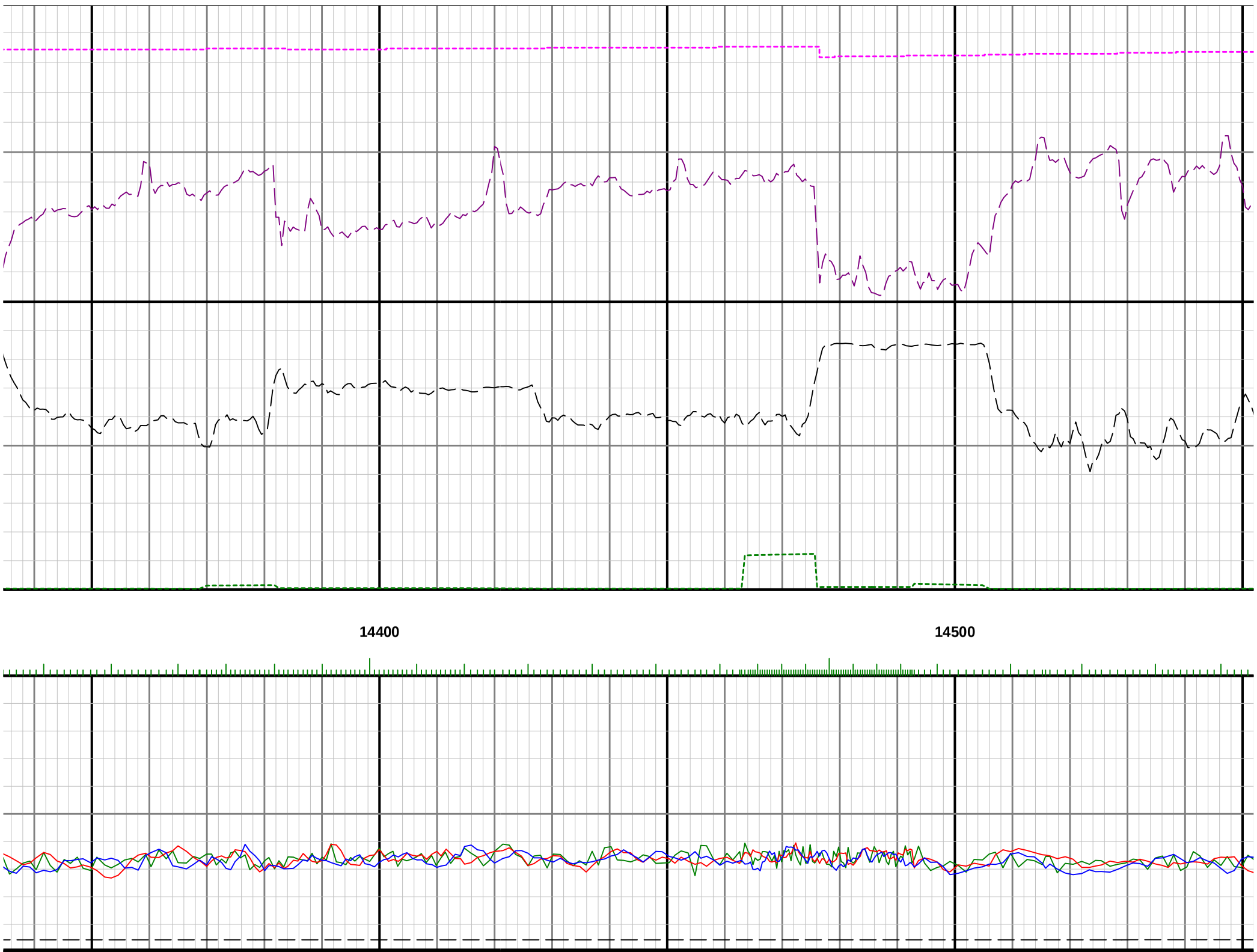
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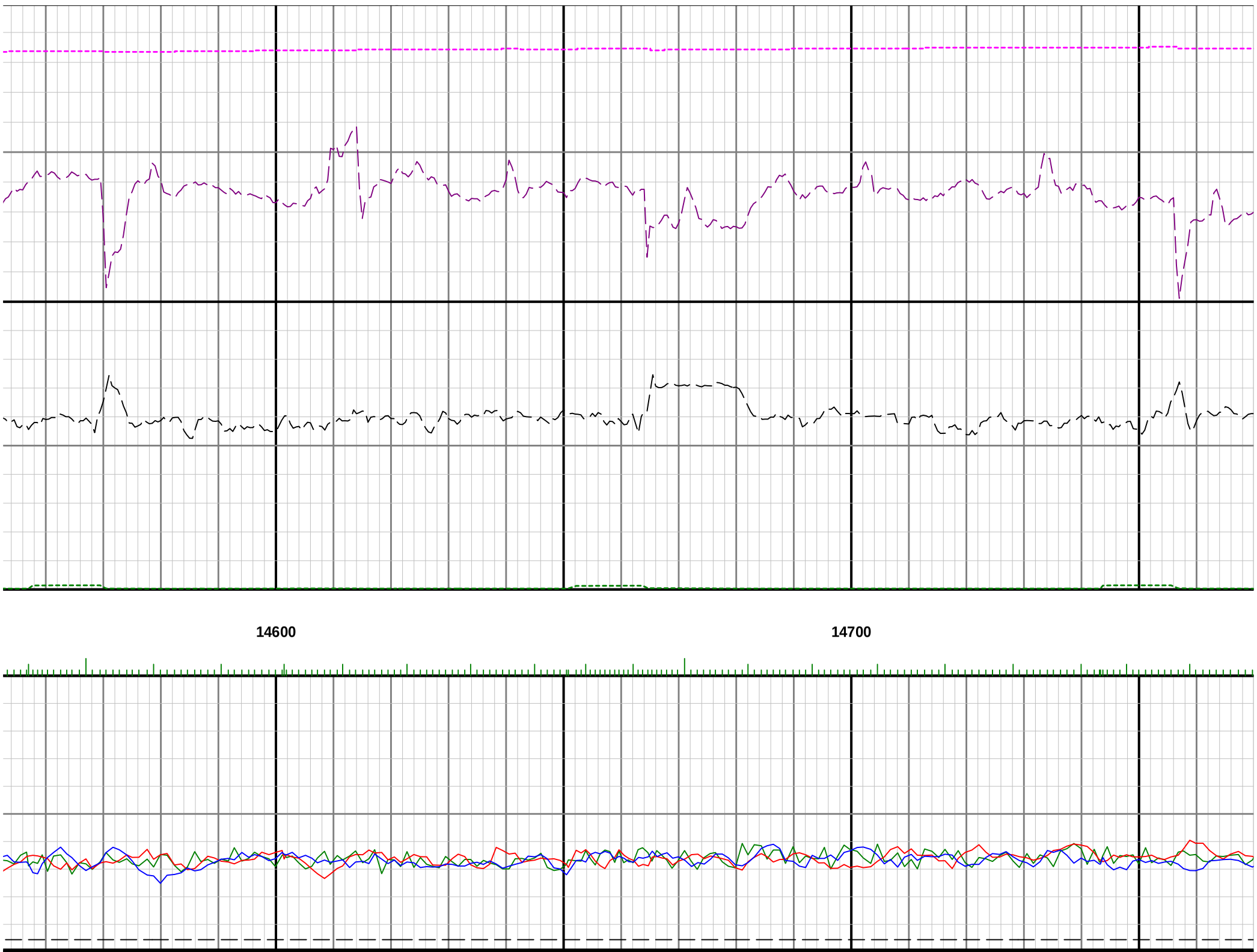
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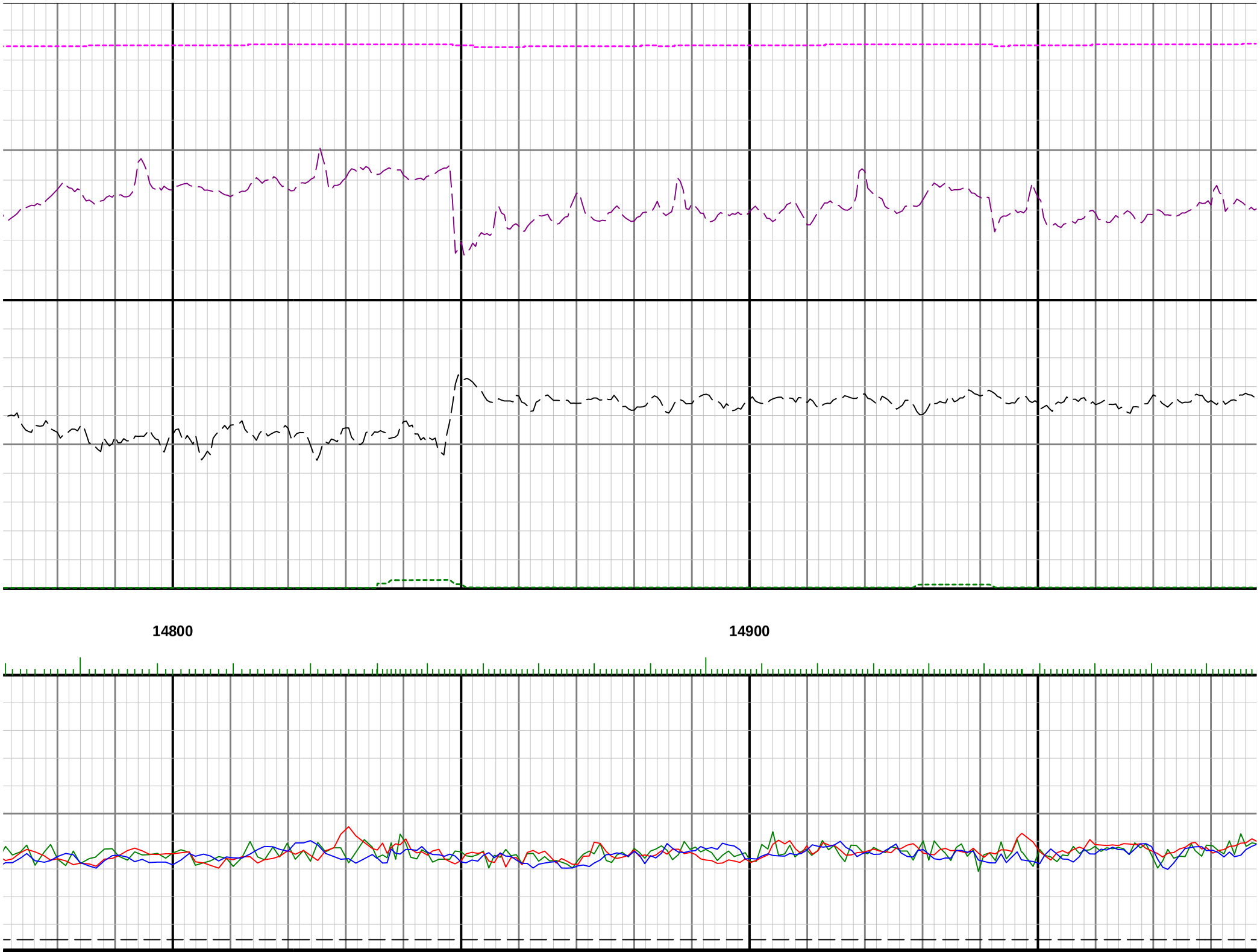
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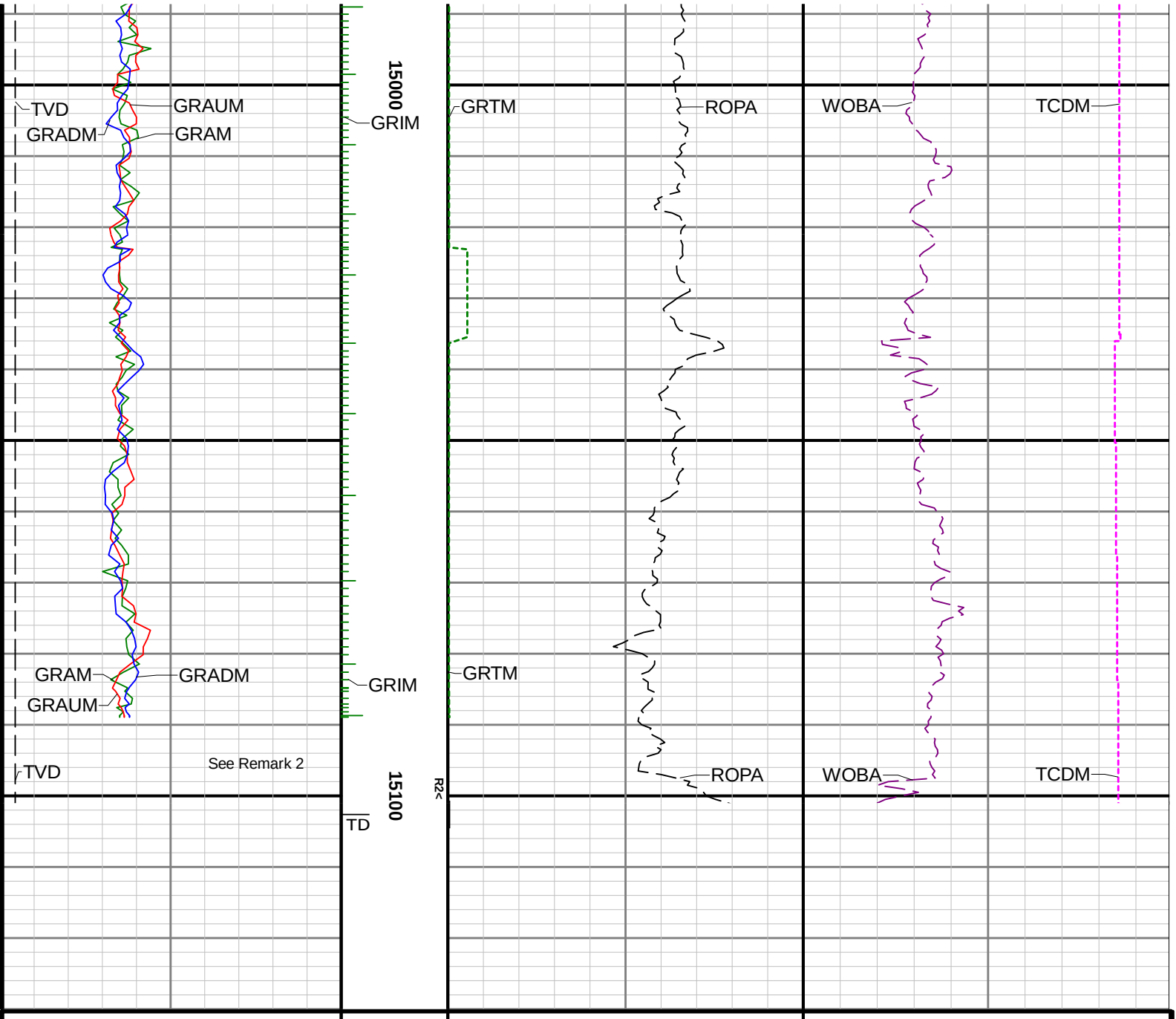

Gamma Ray - Apparent 0.5 ft Average GRAM
0 300
API

Azimuthal Gamma Ray - Apparent - Up Quadrant 0.5 ft Average GRAUM
0 300
API

Azimuthal Gamma Ray - Apparent - Down Quadrant 0.5 ft Average GRADM
0 300
API

True Vertical Depth TVD
7500 1500
ft

MD 1:240 feet

Gamma Time Since Drilled GRTM
0 600
min

Depth Averaged ROP 3 ft Average ROPA
1000 0
ft/h

Weight On Bit, Average 1 ft Average WOBA
0 50
klb

Downhole Temperature TCDM
0 300
degF