LWD MEMORY LOG

BAKER HUGHES a GE company

Gamma Ray

Scale: **1:240 Measured Depth**

Depth Reference: **Driller's Depth**

Status: **Final Print**

API No: 05-123-44336

Job ID: 109524902

Company: Great Western Operating CO LLC

Well: Ottesen LE 09-366HN

Field: Weld County

County: Weld **Country:** United States

State: Colorado

Surface Location:

Latitude: 040° 00' 16.560" N

Longtitude: 104° 46' 39.839" W

SEC: 33 TWN: 1N RGE: 66W

Other Services:

Directional

Permanent Datum (P.D.): Ground Level

Log Measured From: Rig Floor

Elevation: 5076.50 ft

Above P.D. 20.00 ft

Elev. KB: N/A

Elev. DF: 5096.50 ft

Elev. GL: 5076.50 ft

Dates

Date From: 2018-12-23

Date To: 2018-12-26

Spud Date: 2018-10-31

Interval Drilled

Top: (ft) 1772.00

Bottom: (ft) 17813.32

Magnetic Field Reference

Azi Reference North: True

Dip Angle: (deg) 66.49

Total Magnetic Field Strength: (nT) 51992

Mag to Reference North Correction: (deg) 8.21

Borehole Record

Hole Size (in)	From (ft)	To (ft)
13.500	20.00	1772.00
8.500	1772.00	17813.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	20.00	1772.00

Mud Record

Type	From (ft)	To (ft)
Oil Based Mud	1772.00	17813.00

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
8.500	16038.00	0.36 | 39.69	89.91 | 178.66

Acquisition System

Baker Hughes Cadence

Plot Studio

Software Version

RT 5.0

5.0.8260.3

Other

Rig: PD 460

Contractor: Precision Drilling

District: RMD Unit: D&E

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	8.500	PDC	4.00	AutoTrak Curve	1775.00	17799.00	1775.00	17813.00	2018-12-23 06:04	2018-12-26 06:25	66.93

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Alain Atemoh	2018-12-22	2018-12-26	Jason Roben	2018-12-22	2018-12-26

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+ (%)
2018-12-24 22:33	1	6970.00	Oil Based Mud	10.5	21	N/A	9.0	62/38	Active Pit	19099	0.00
2018-12-25 01:08	1	12310.00	Oil Based Mud	10.5	24	N/A	9.0	62.5/37.5	Active Pit	19099	0.00
2018-12-26 07:51	1	17305.00	Oil Based Mud	10.5	25	N/A	9.0	62.6/37.4	Active Pit	19099	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	AutoTrak Curve Steering Unit	12128498	Near Bit VSS	5.93	6.90	7.000	4.330
1	AutoTrak Curve Steering Unit	12128498	Near Bit Inclination	5.93	6.90	7.000	4.330
1	AutoTrak Curve MWD	12127413	Gamma (single)	2.76	13.07	7.000	3.250
1	AutoTrak Curve MWD	12127413	Directional (mag)	12.28	22.59	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC SU	AutoTrak Curve SU	Auto Trak Curve Steering Unit
ATC MWD	AutoTrak Curve MWD	Auto Trak Curve MWD

ATC LCPM	AutoTrak Curve LCPM	AutoTrak Curve LCPM

Comments

1 Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes, a GE Company (BHGE). Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.

2 BHGE LWD run 1 utilized a 6.75 inch NaviGamma service (Directional and Gamma Ray) behind a 8.5 inch bit and rotary steerable assembly from 1775 to 17813 feet MD (1774 to 7534 feet TVD).

Remarks

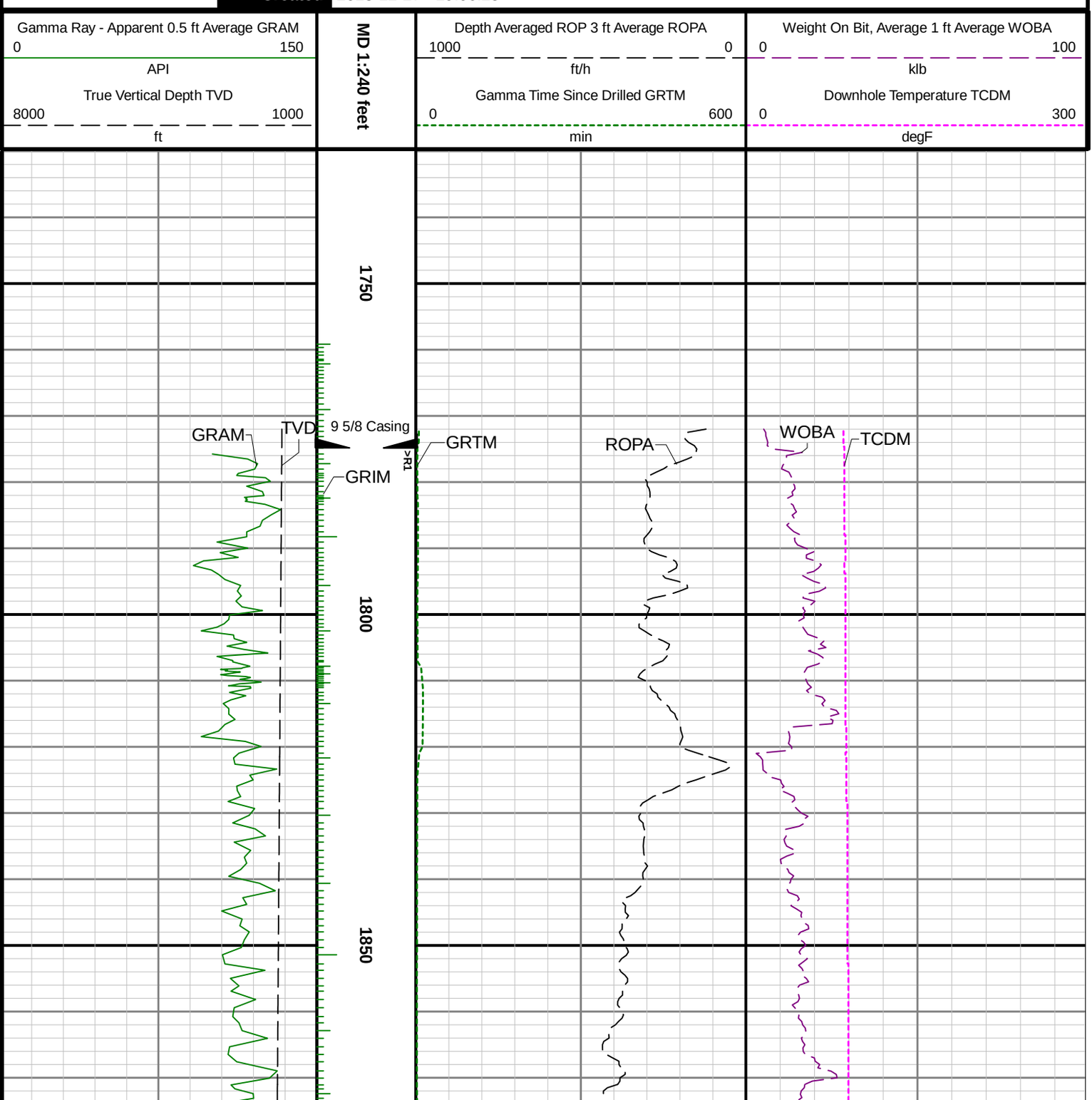
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	17056.94	8.500	1	The interval from 17799 to 17813 feet MD (7534 feet TVD) was not logged after being drilled due to sensor to bit offset at well TD.

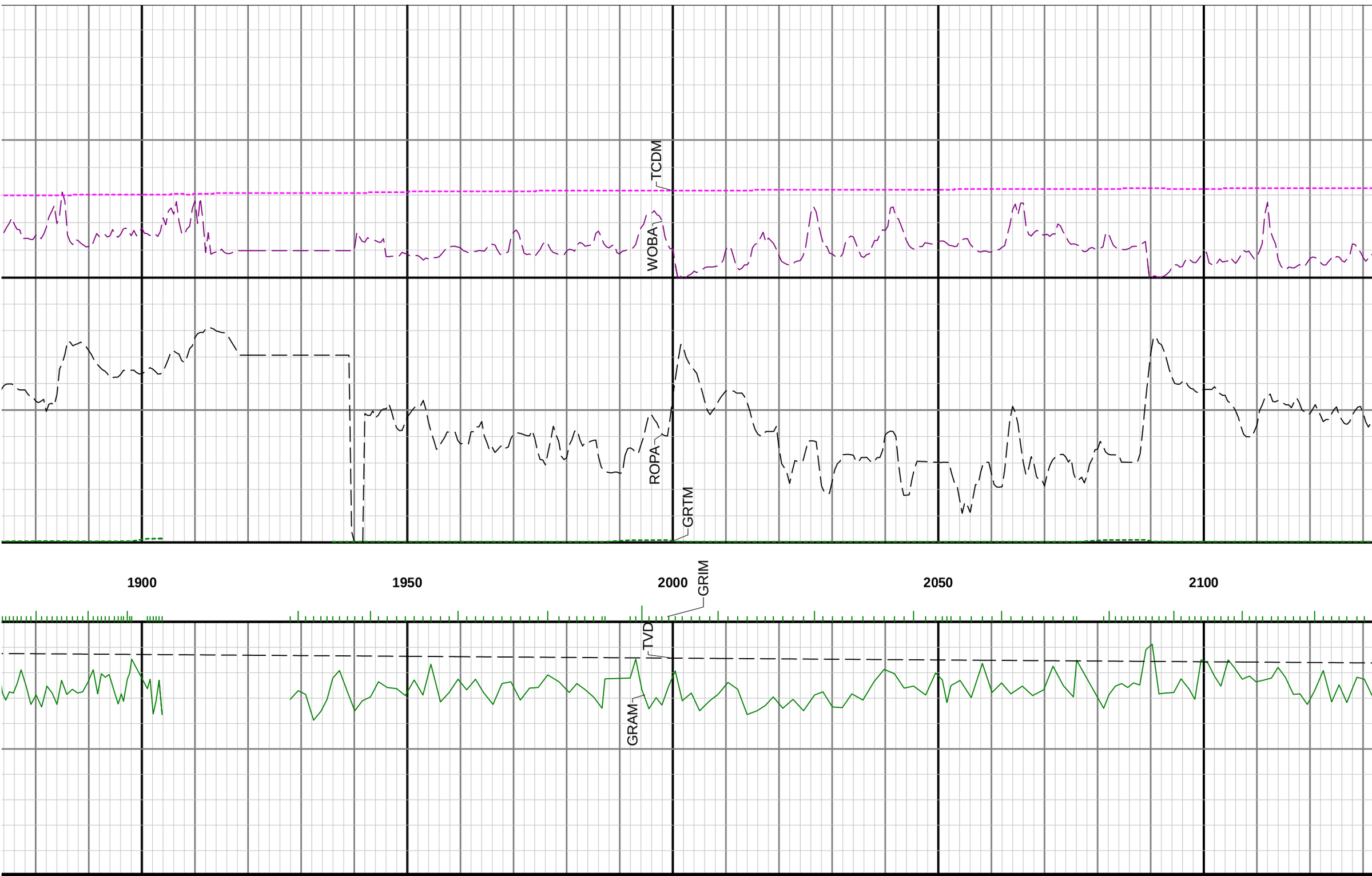
Curve Mnemonics

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
TCDM	Directional Real-Time Survey Temperature	degF

BAKER HUGHES a GE company

Company	Great Western Operating CO LLC
Well	Ottesen LE 09-366HN
Interval	**Date From:** 2018-12-23 04:34 **Top:** 1772.00 ft
	Date To: 2018-12-26 17:24 **Bottom:** 17813.32 ft
Created	2018-12-27 19:06:25

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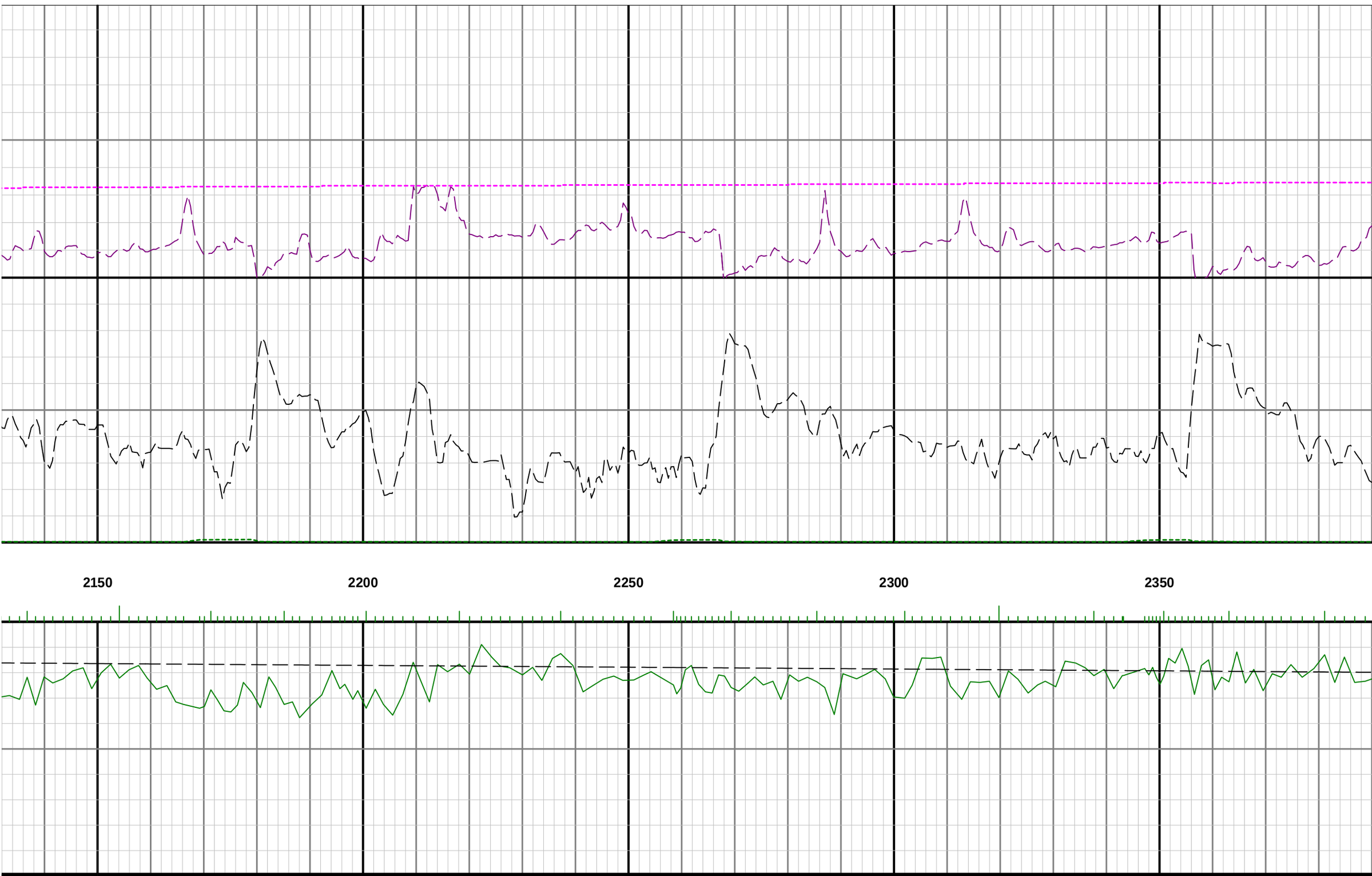
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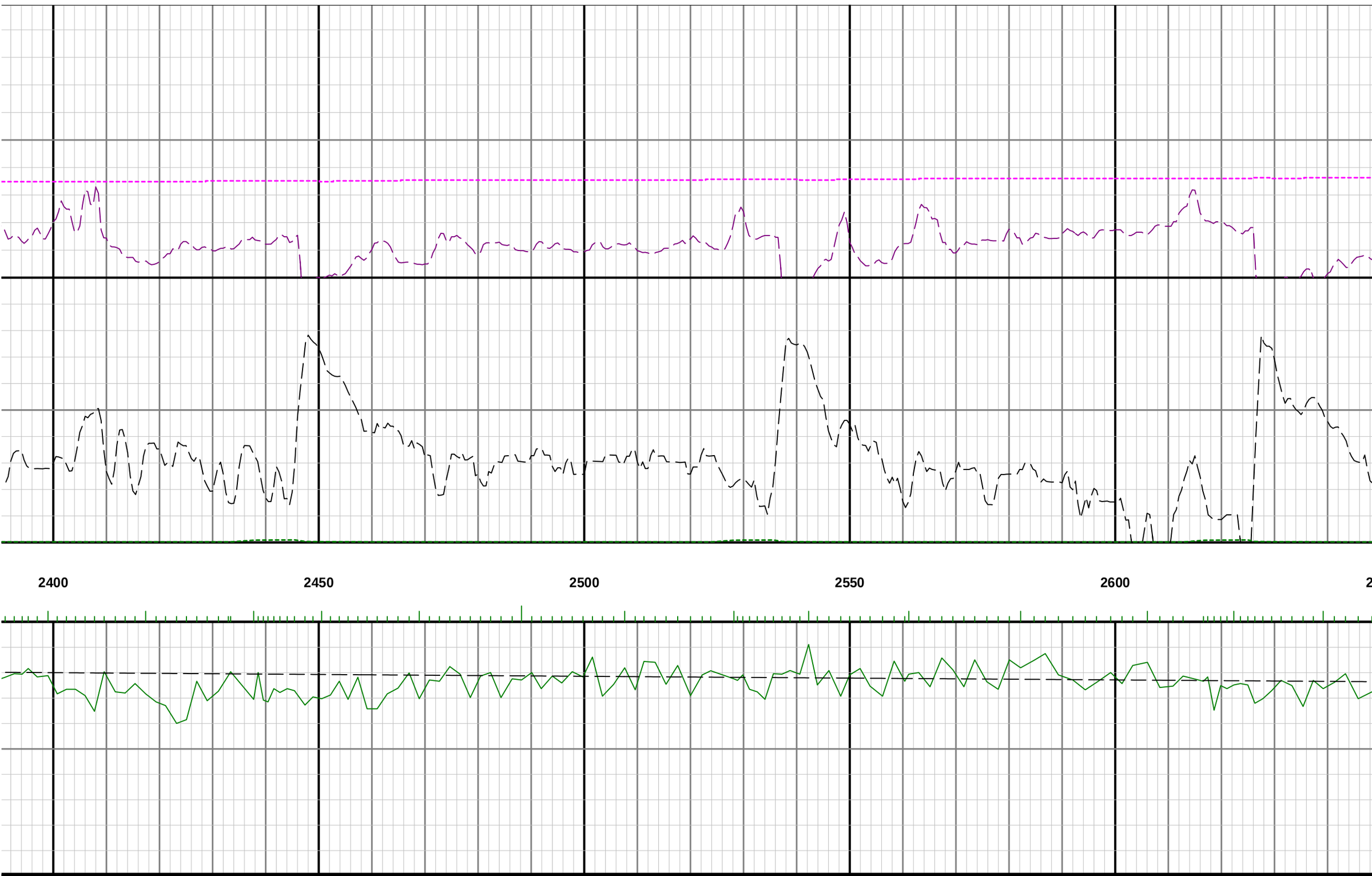
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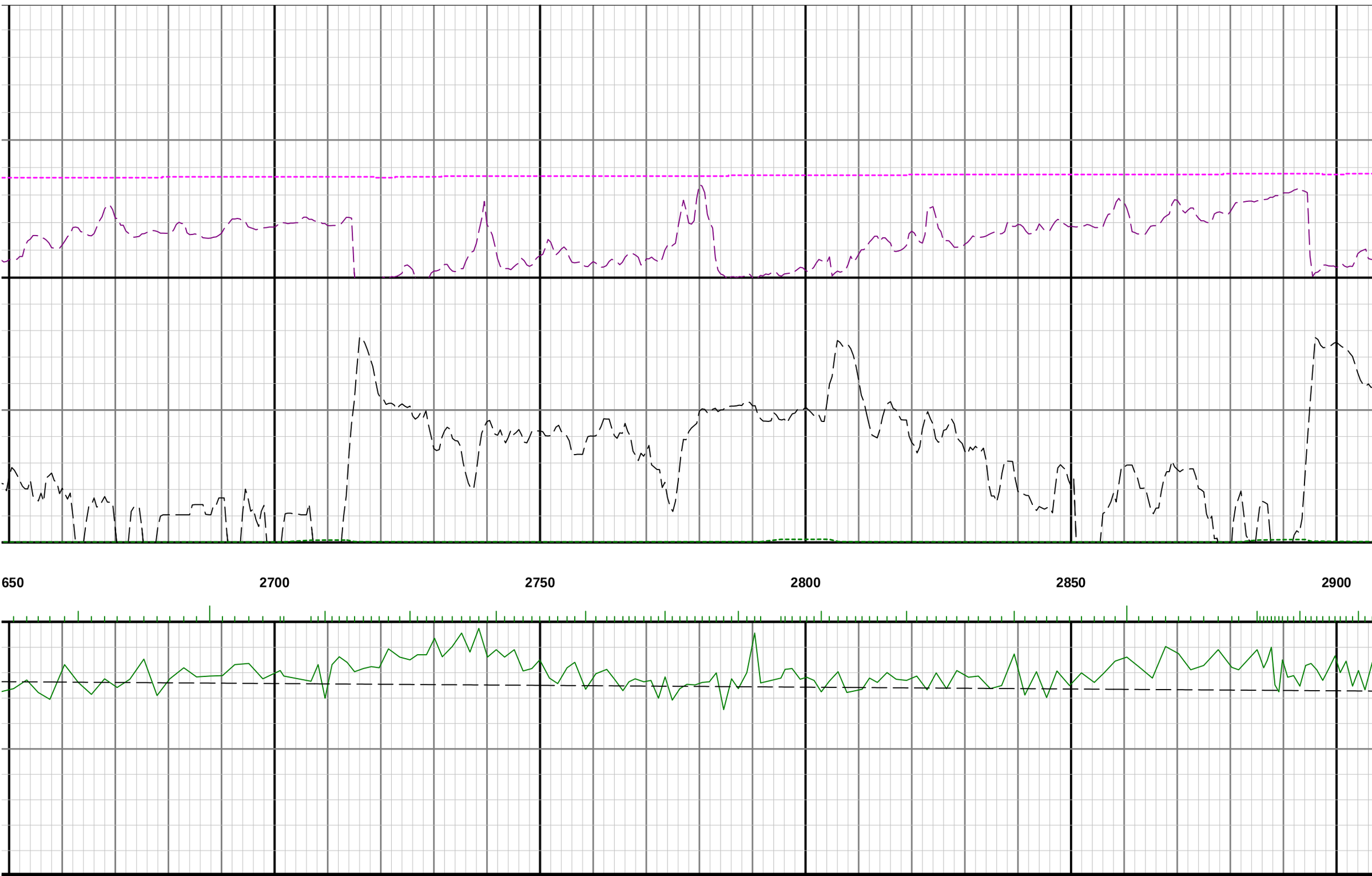
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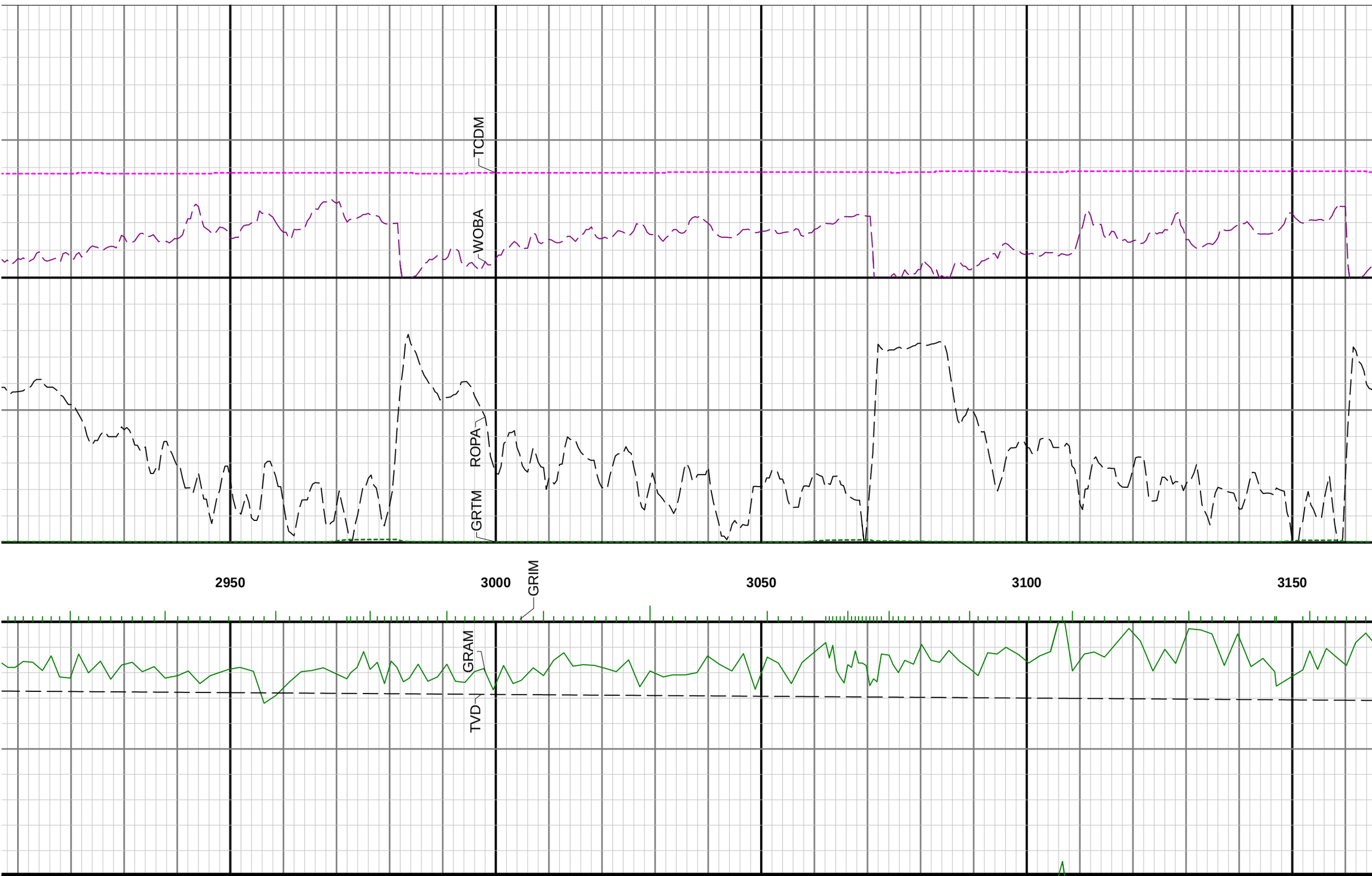
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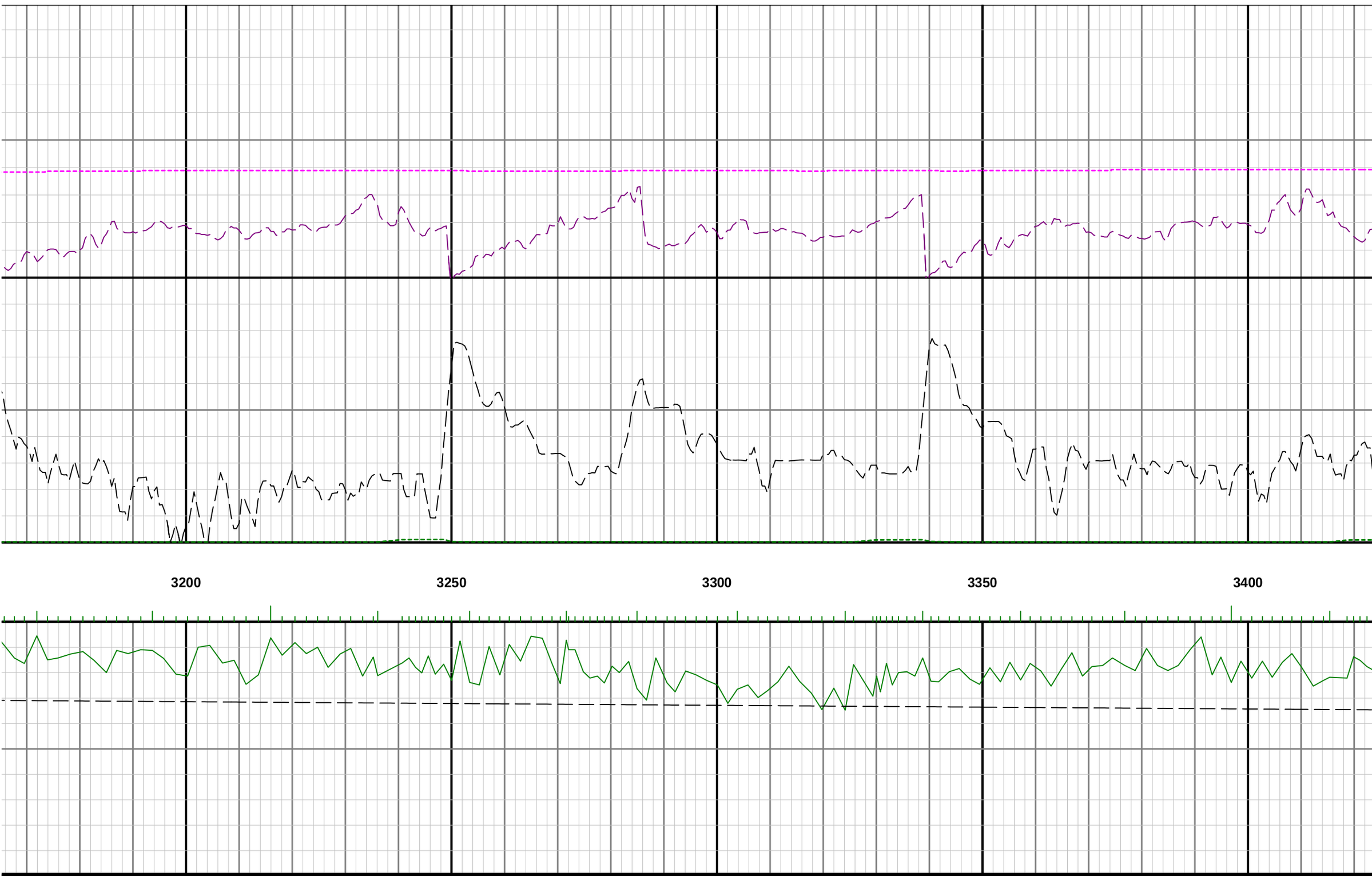
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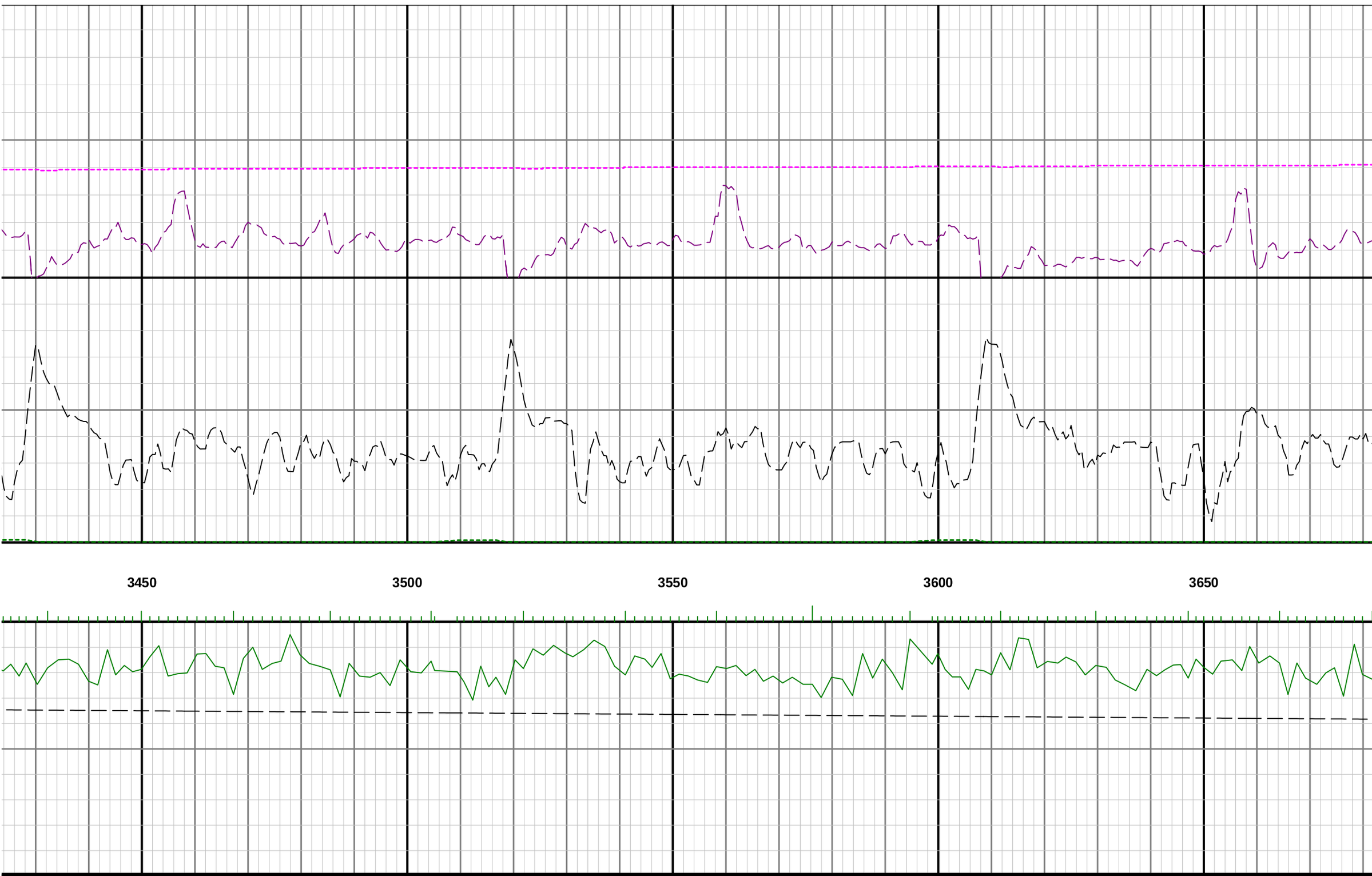
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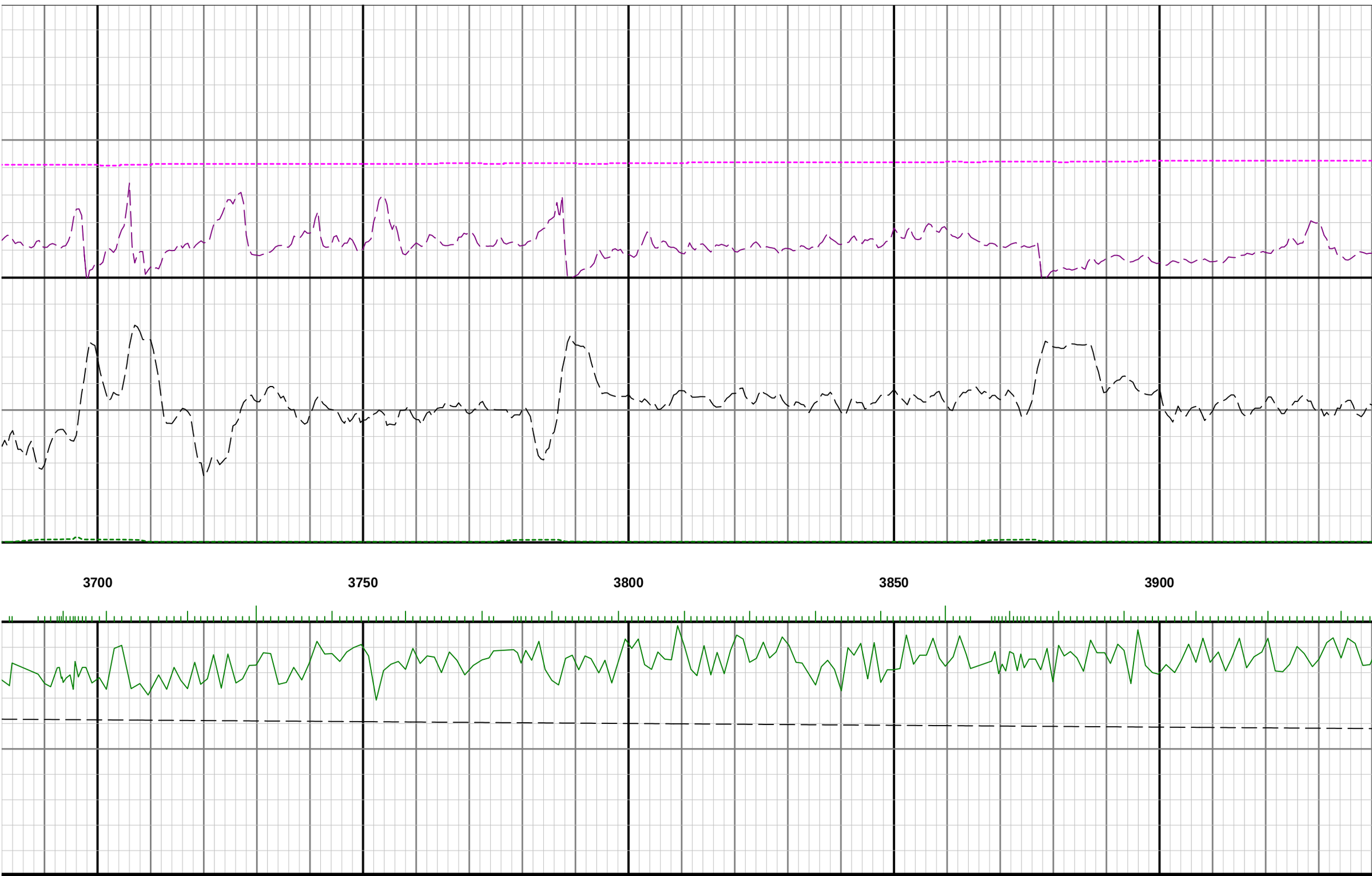
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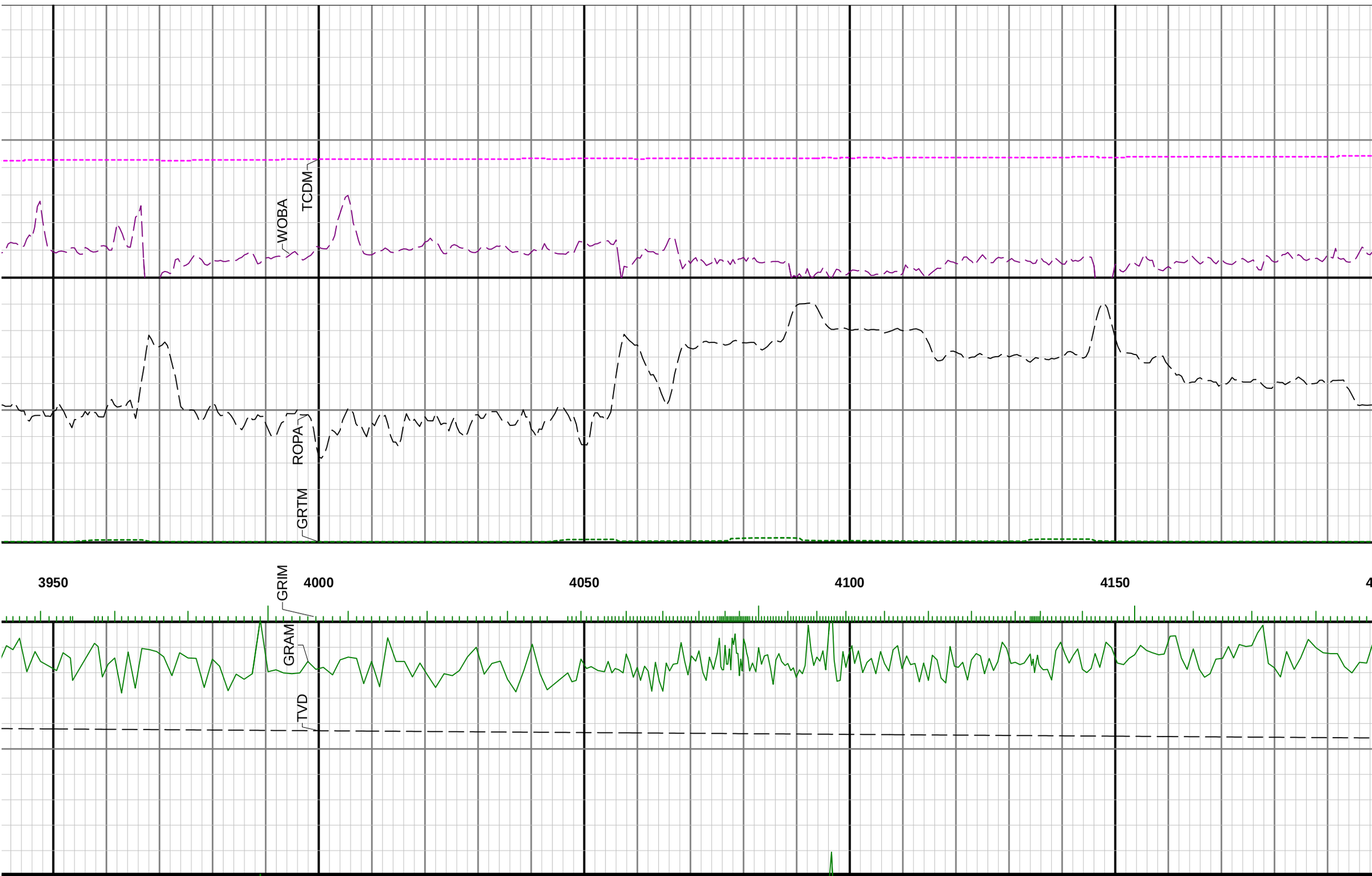
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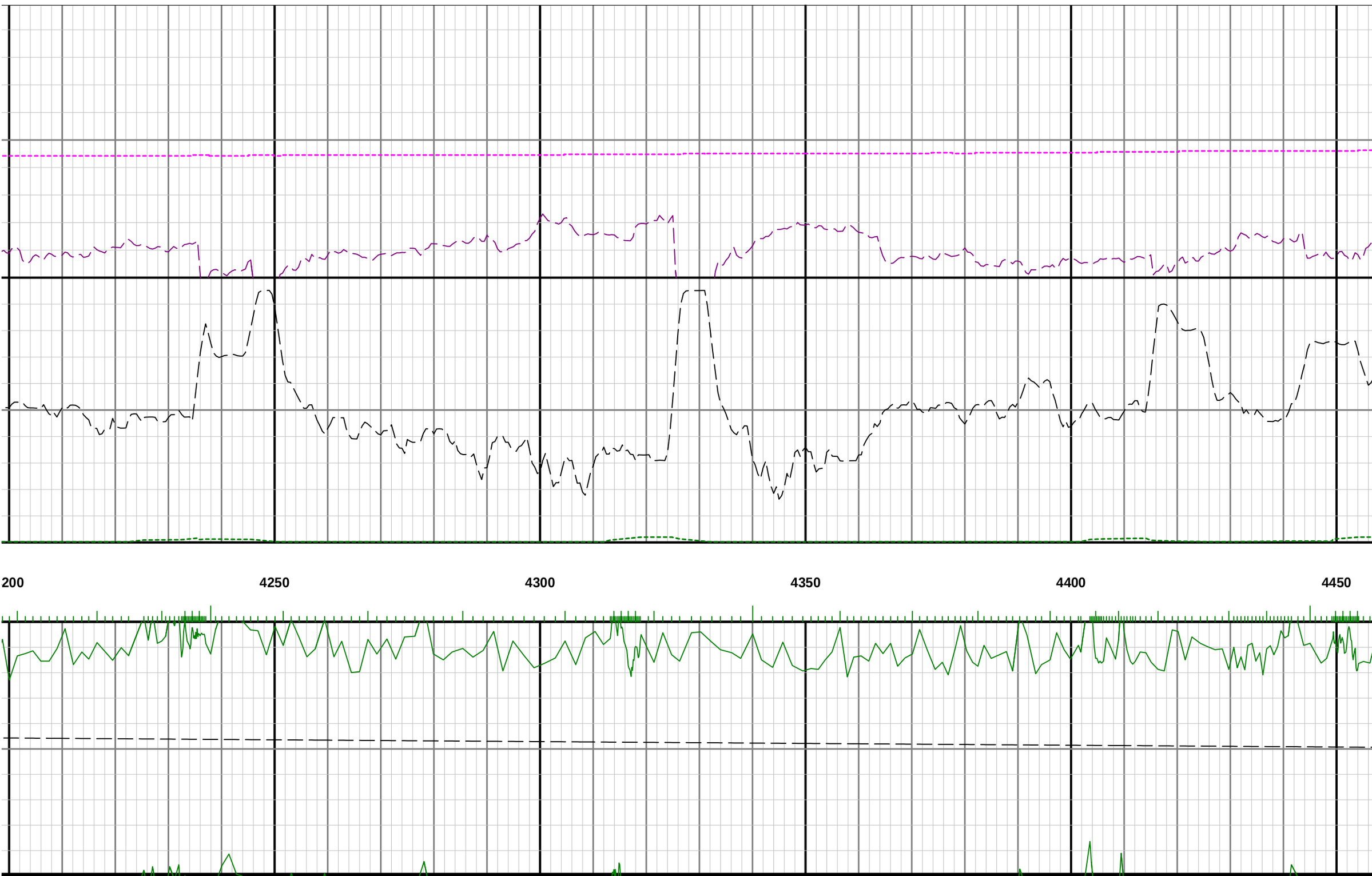
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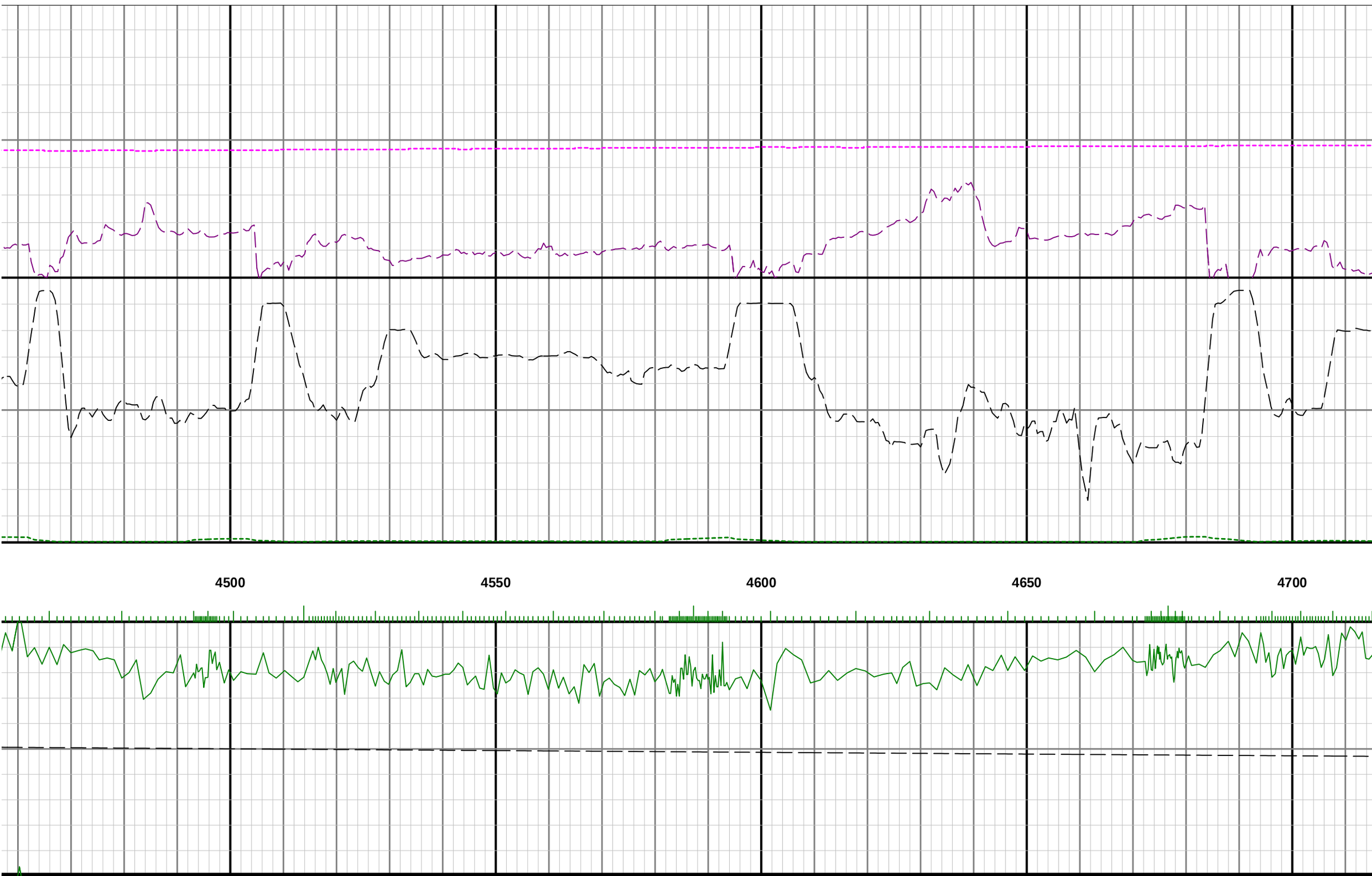
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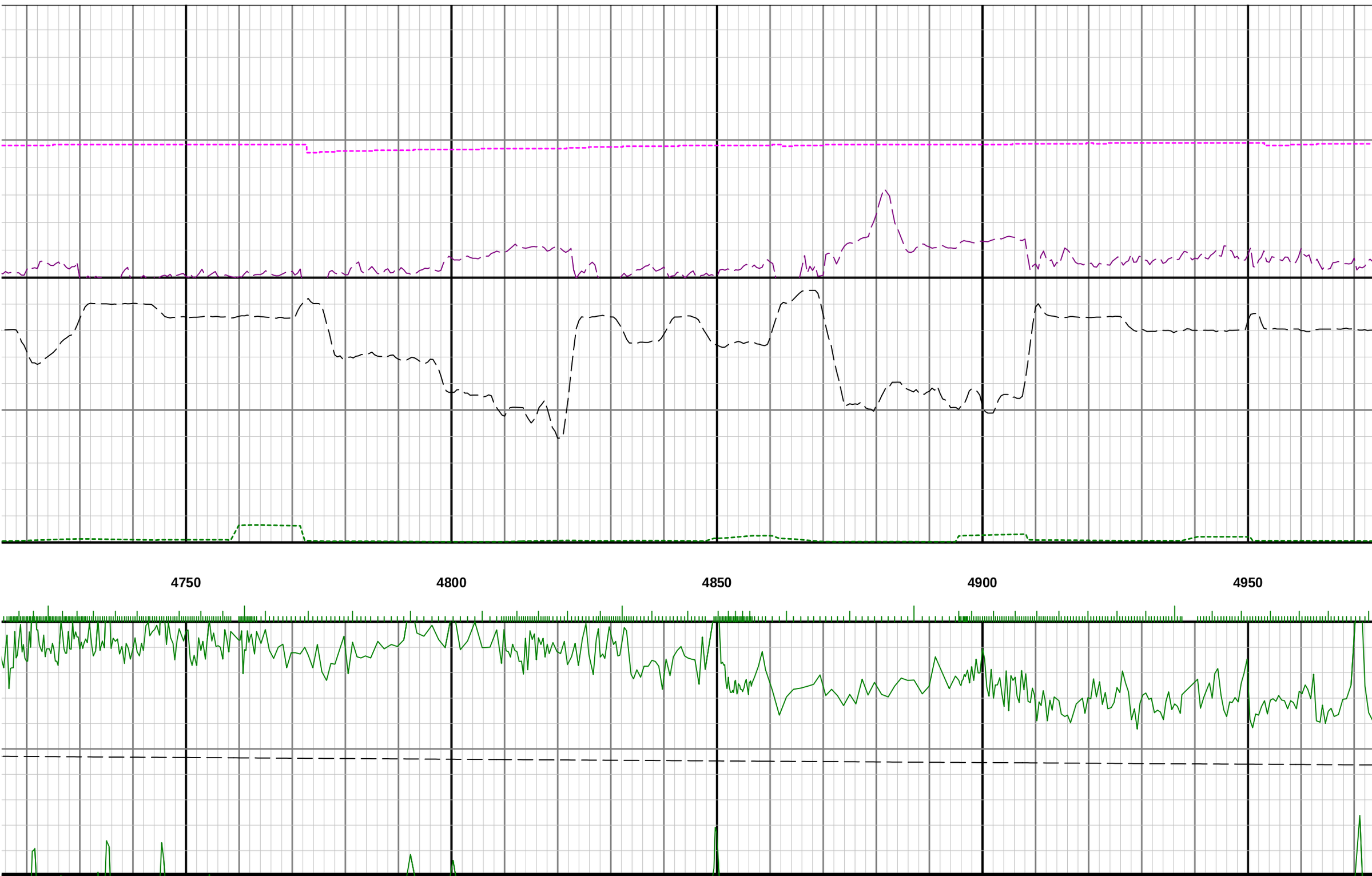
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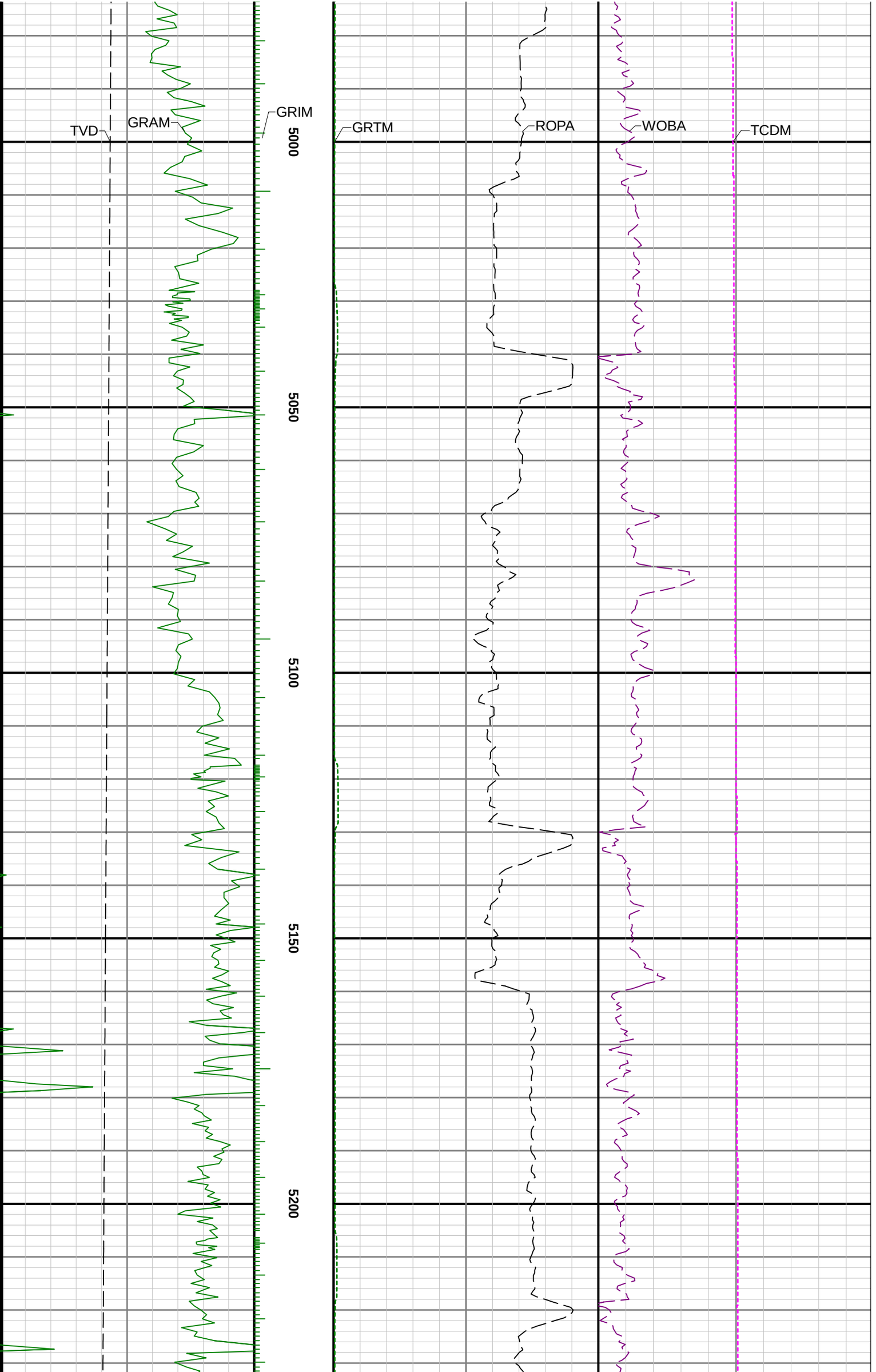
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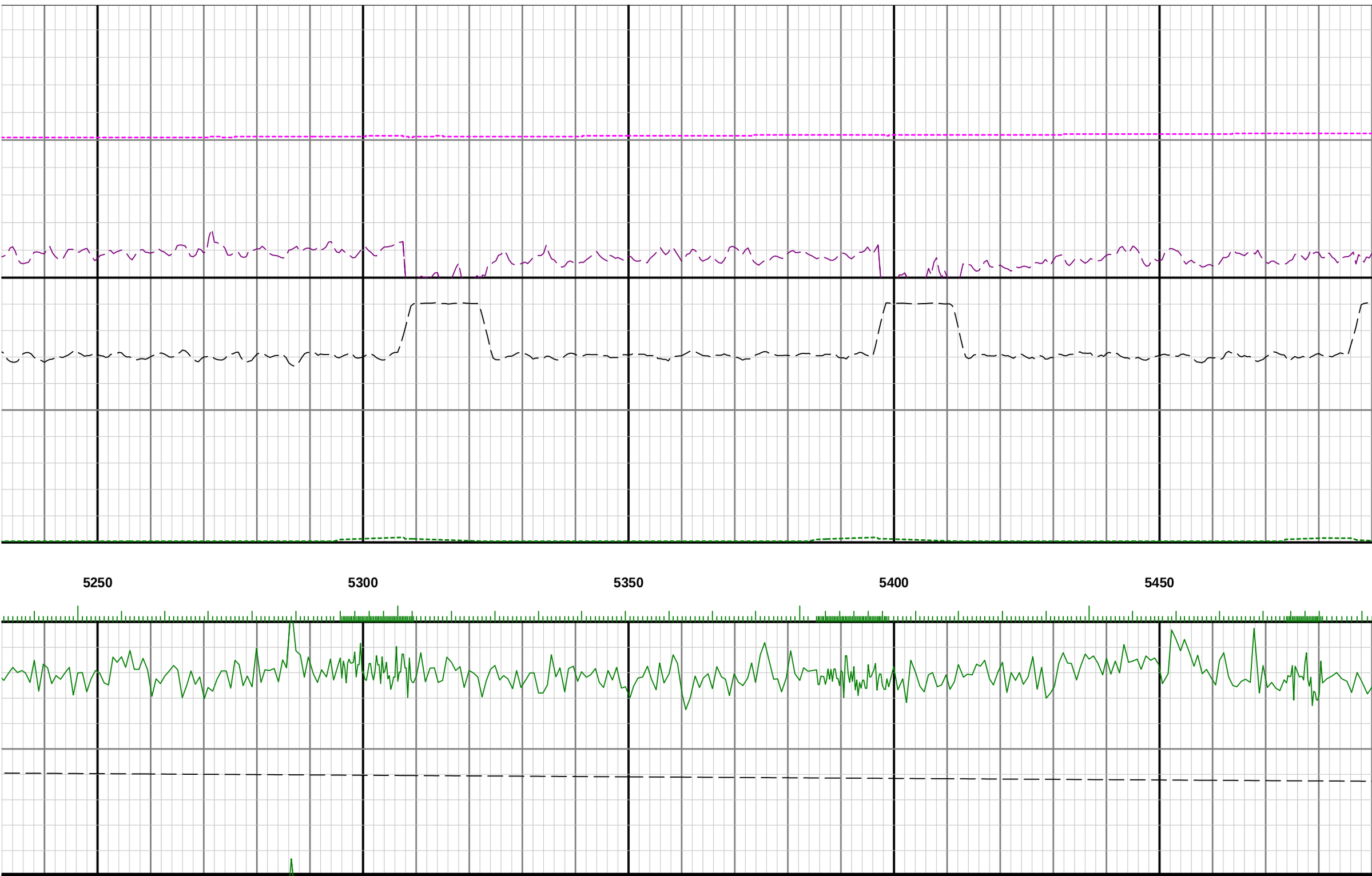
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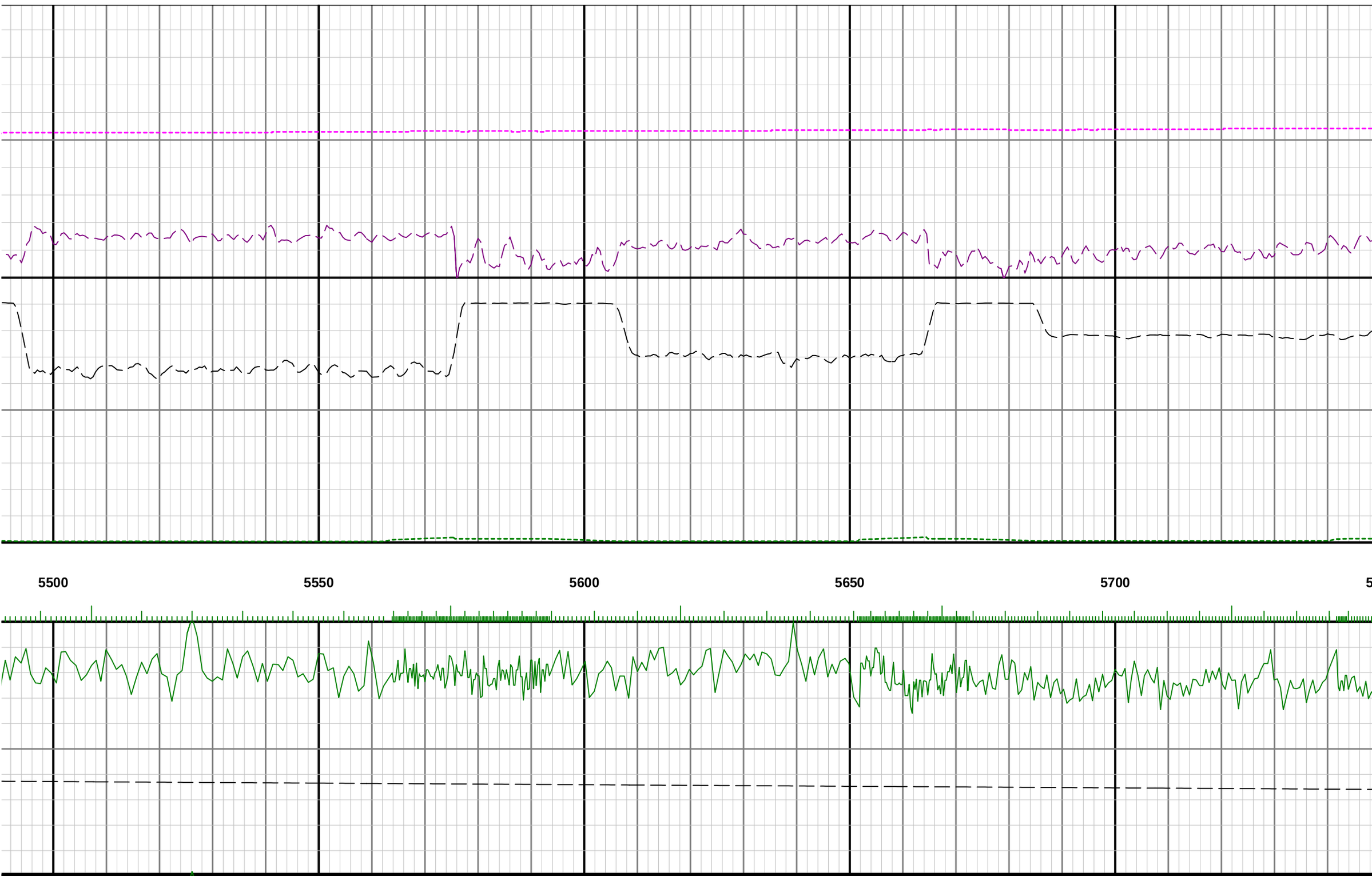
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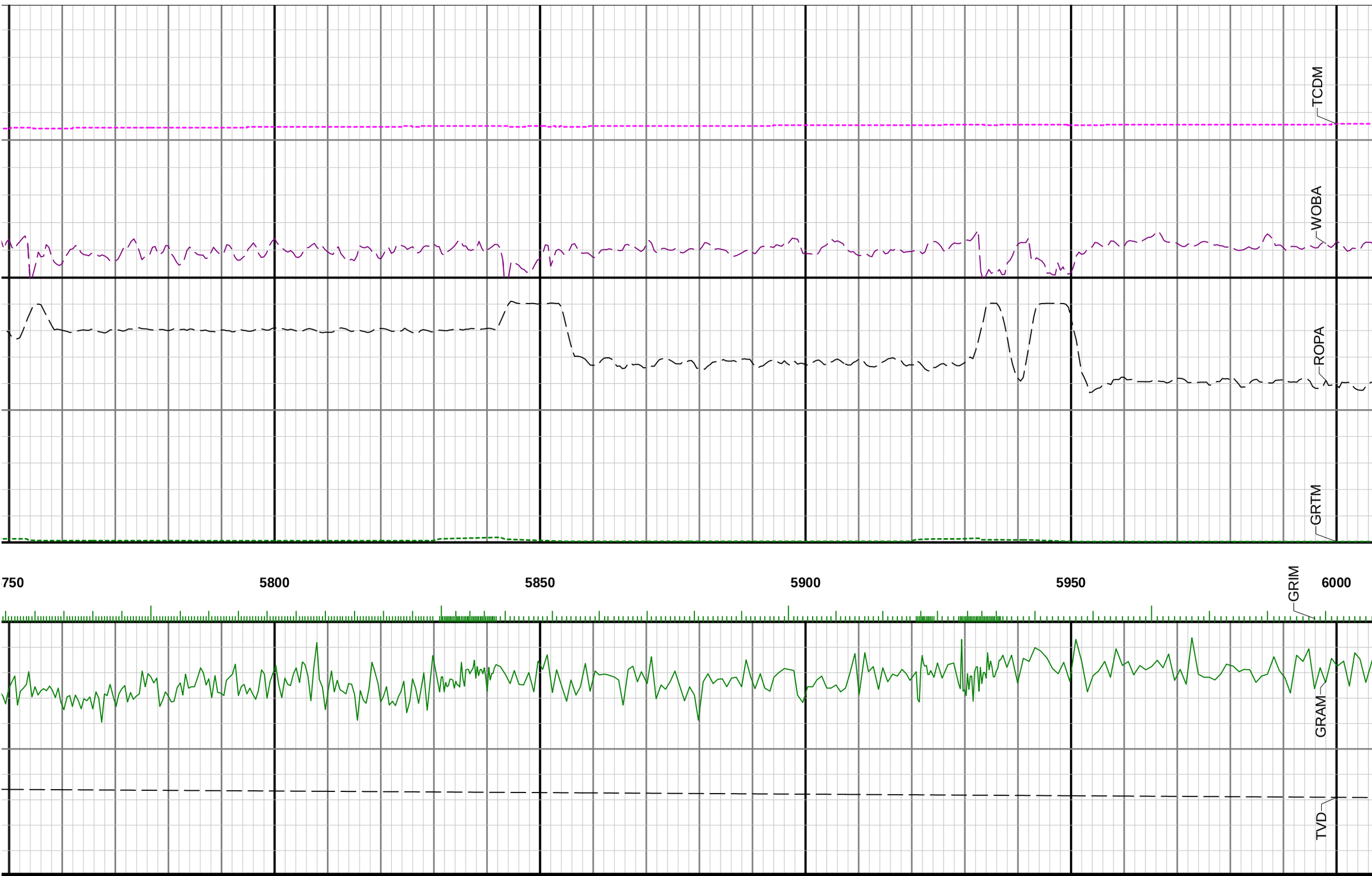
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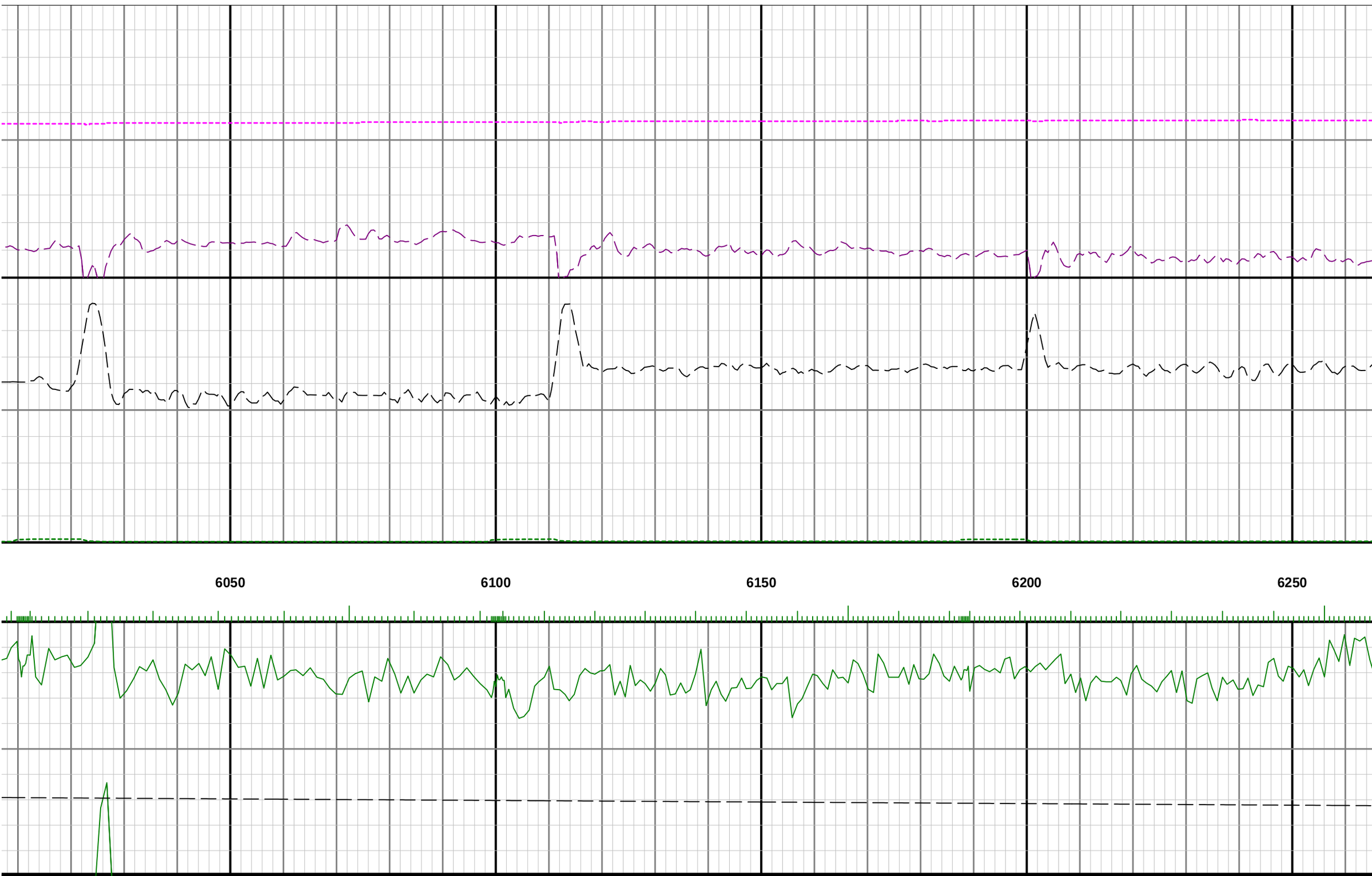
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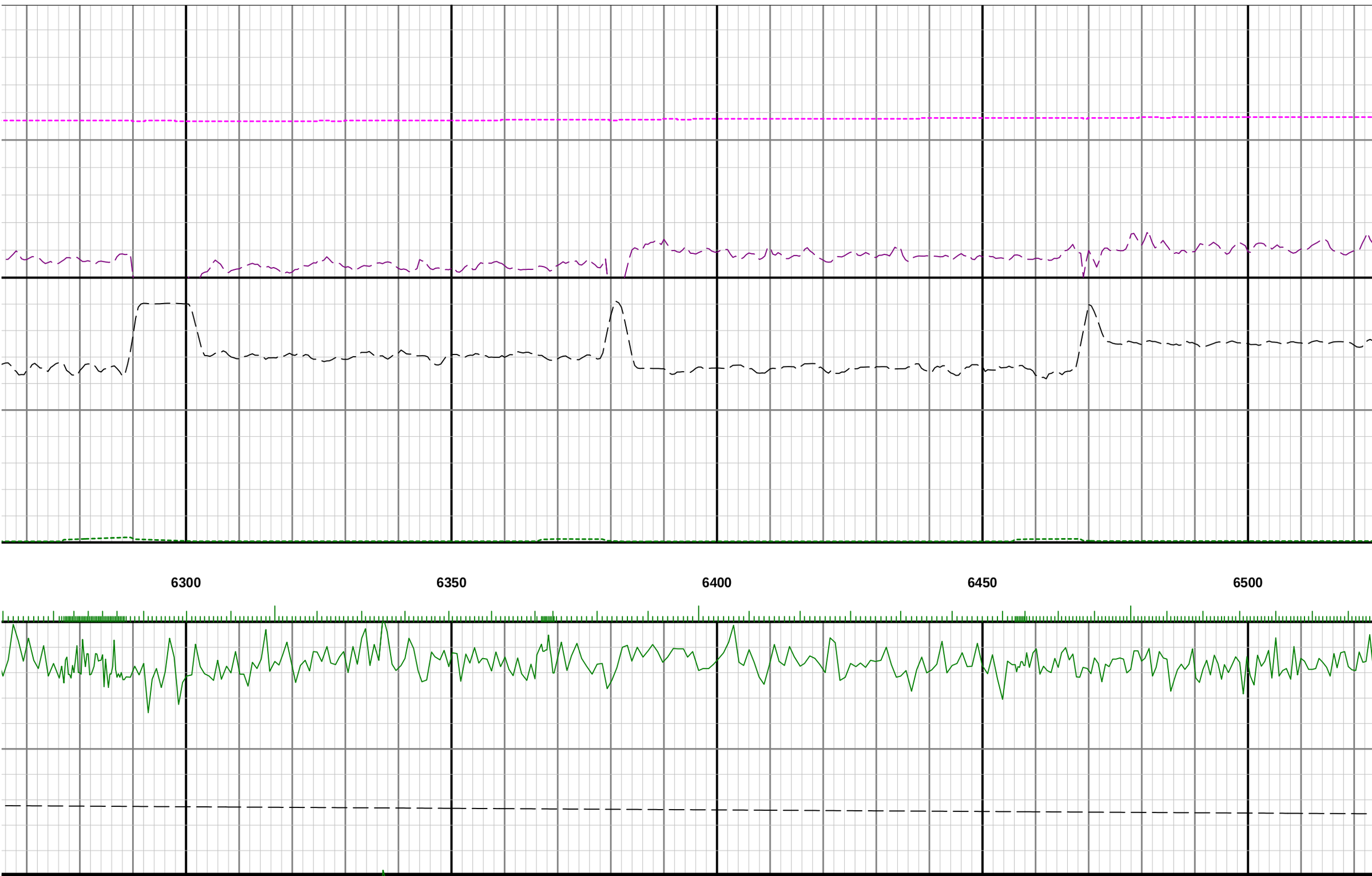
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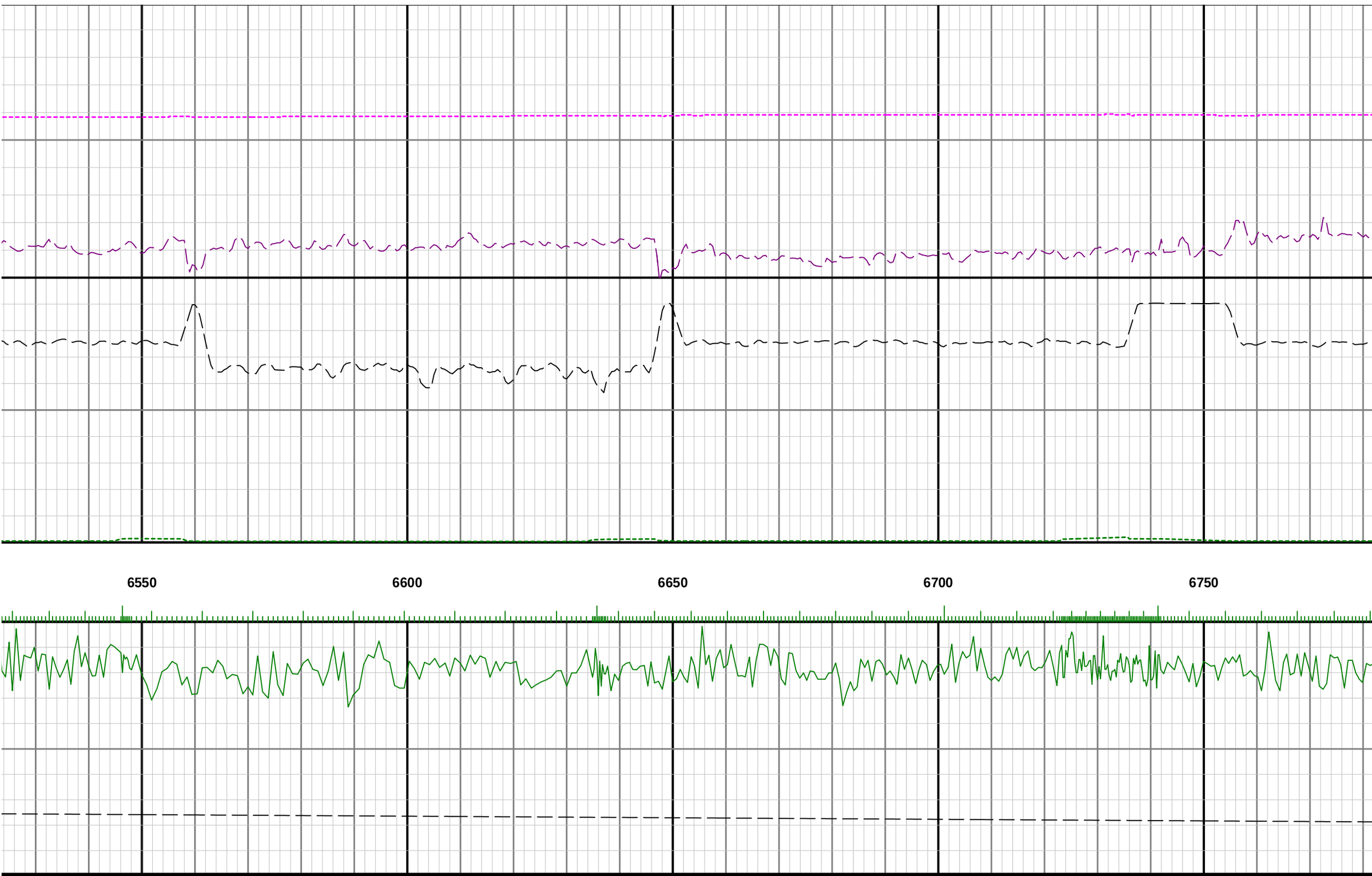
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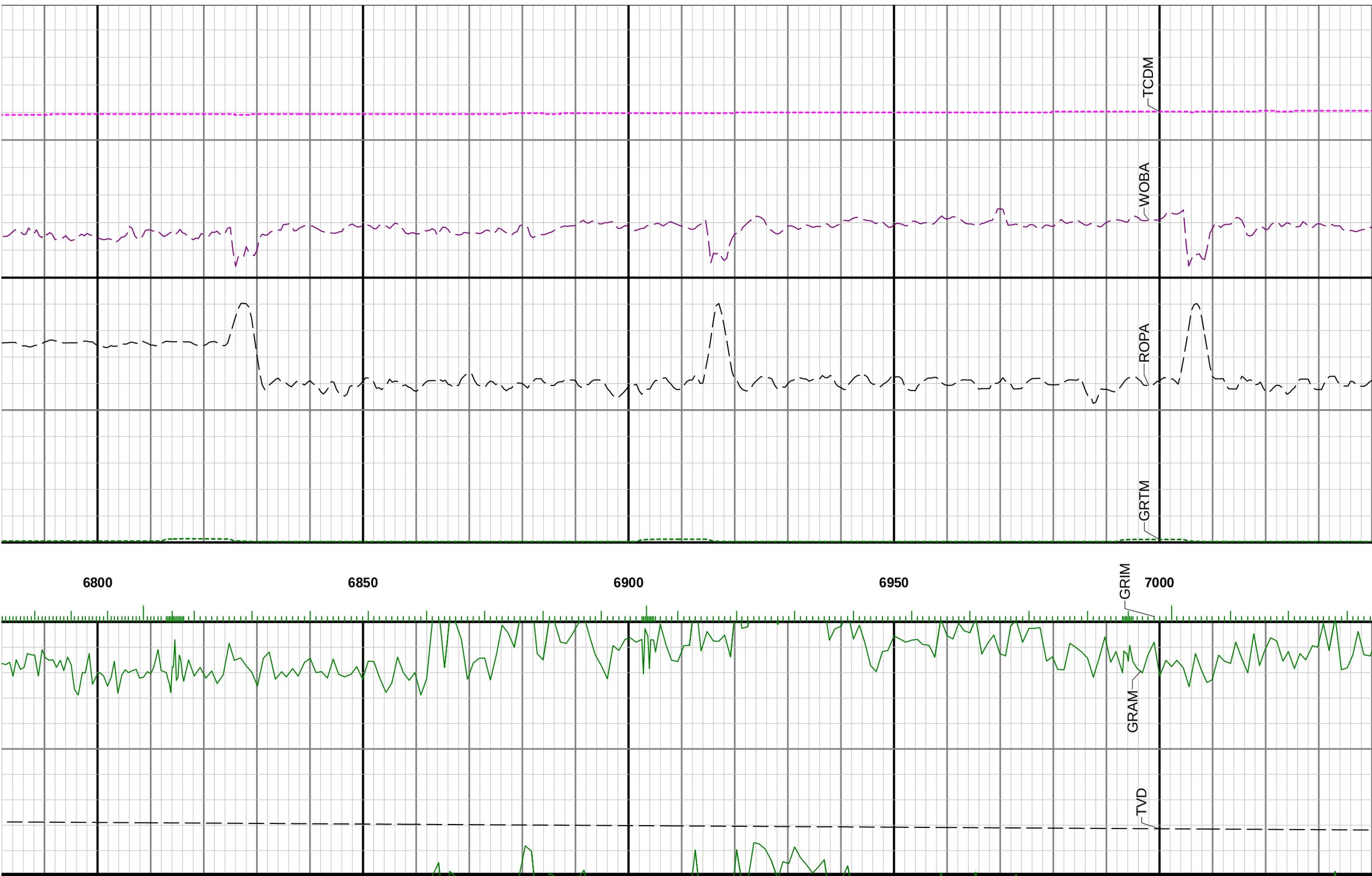
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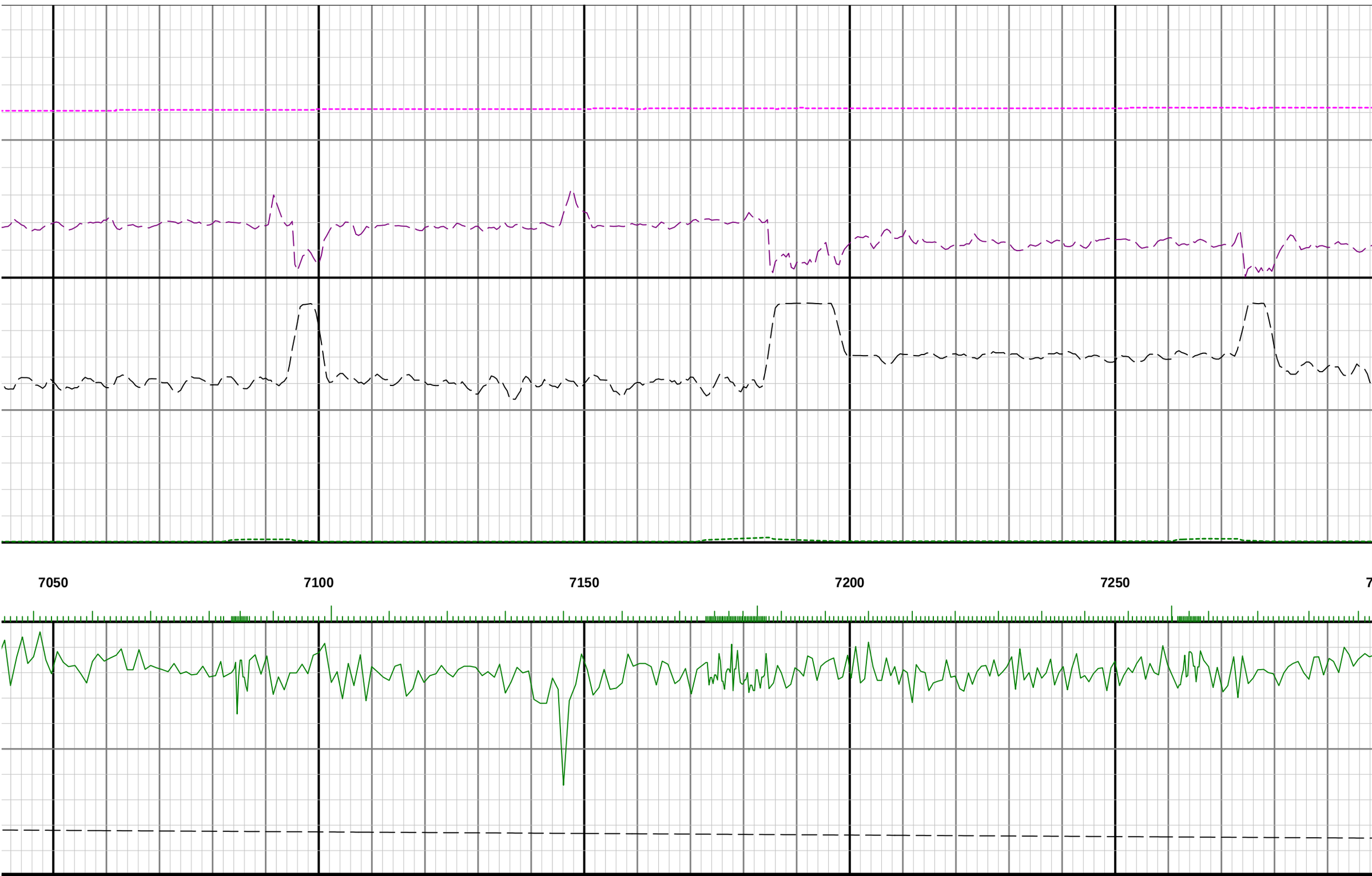
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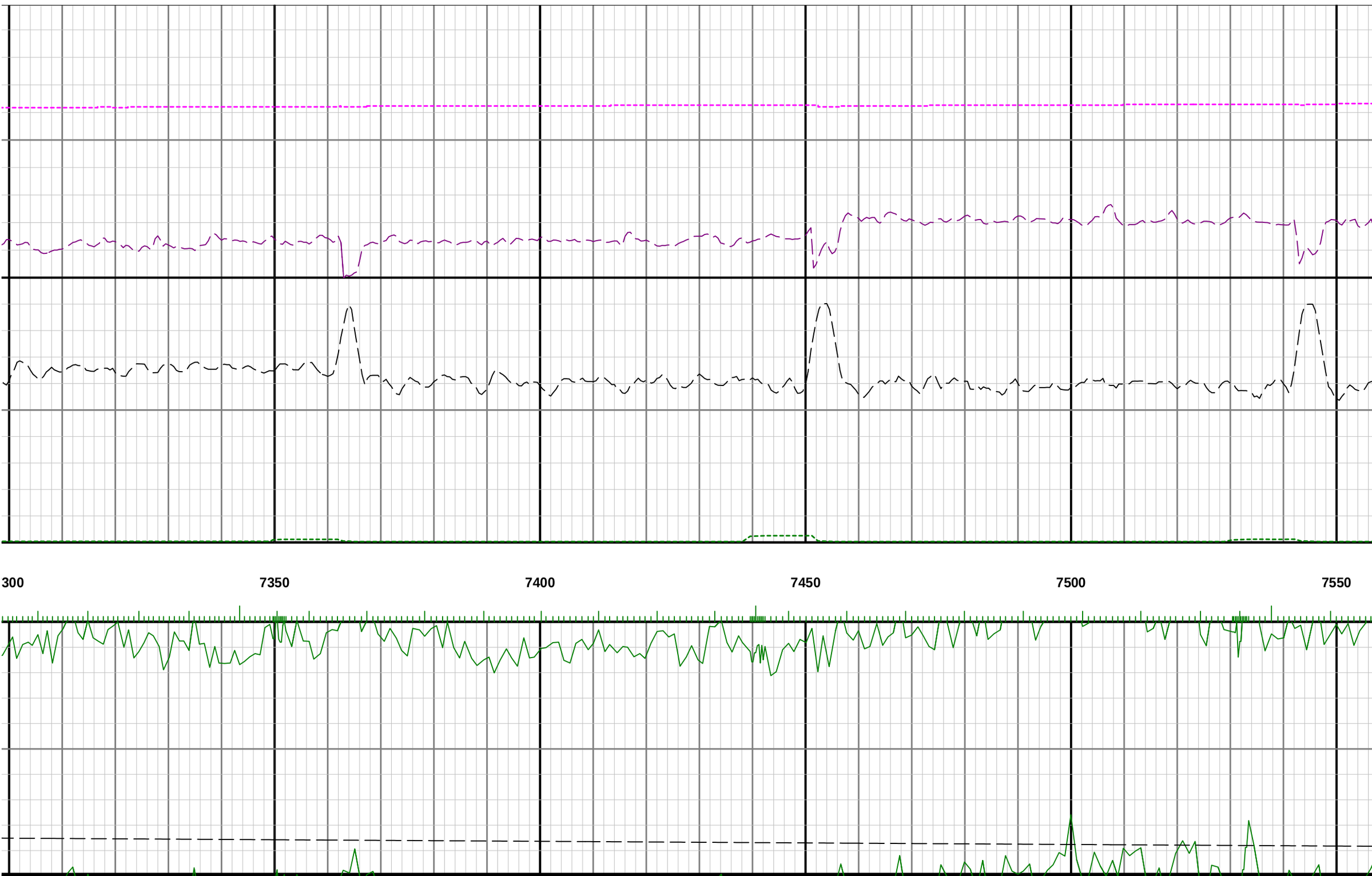
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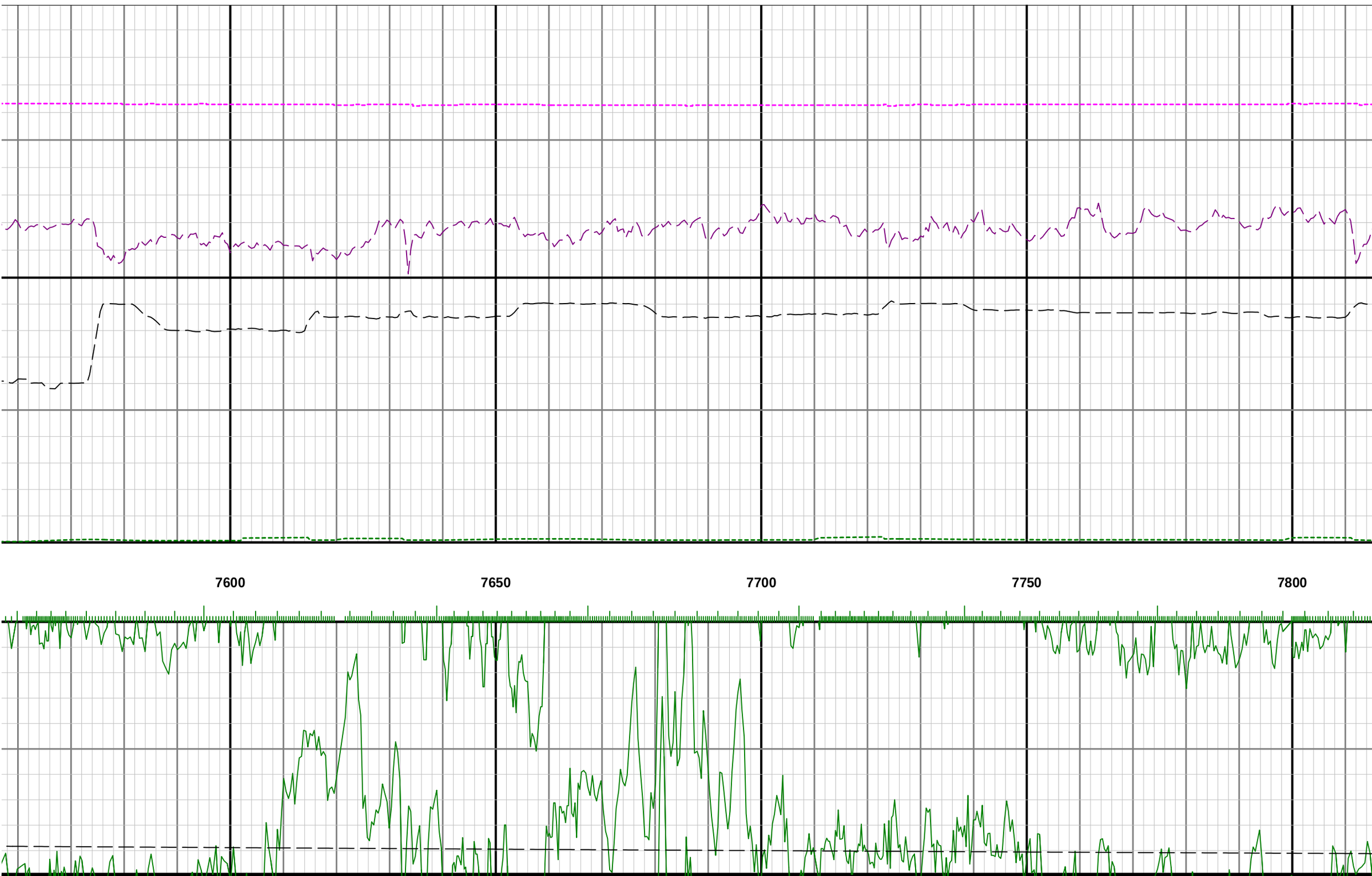
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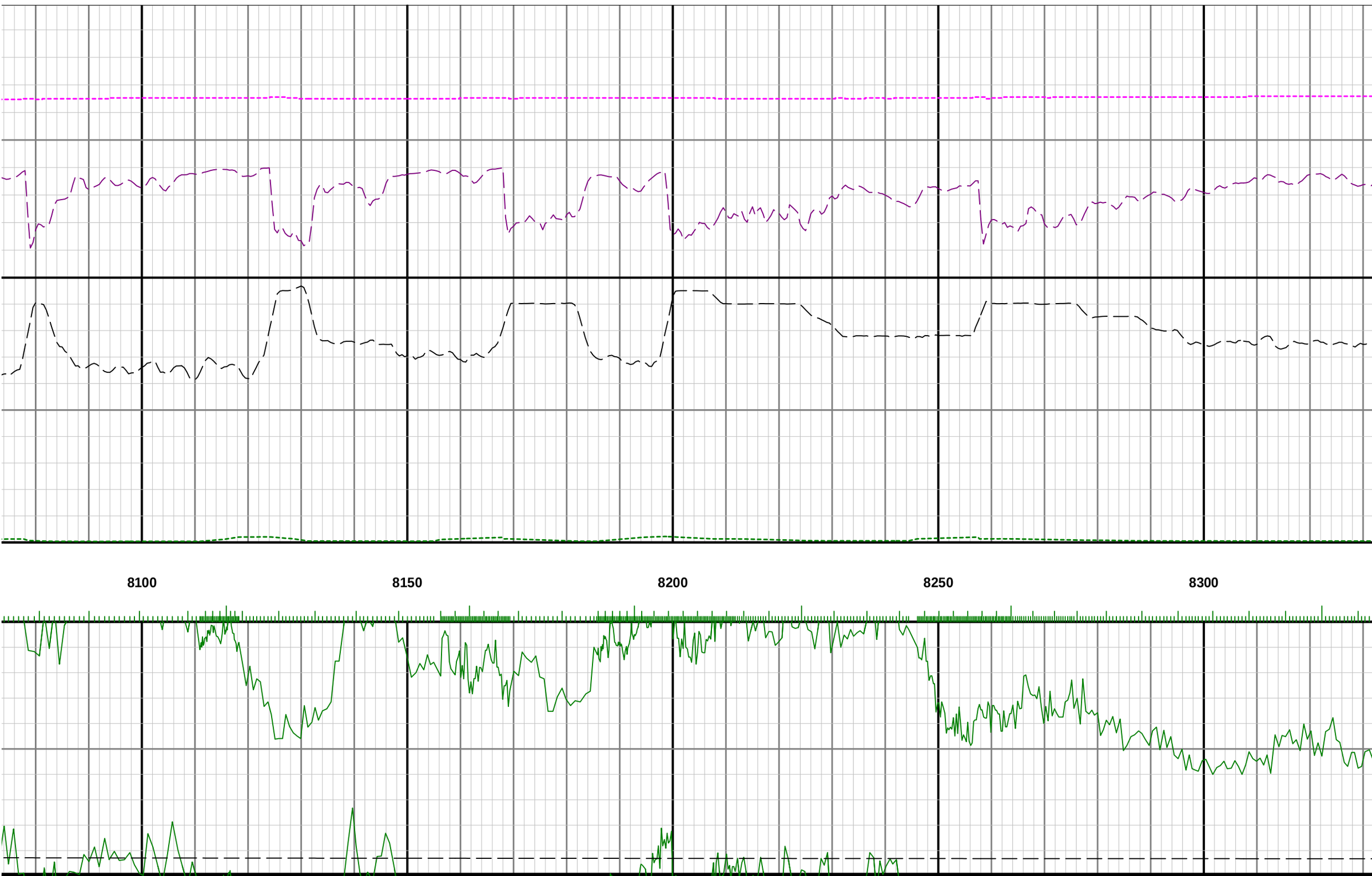
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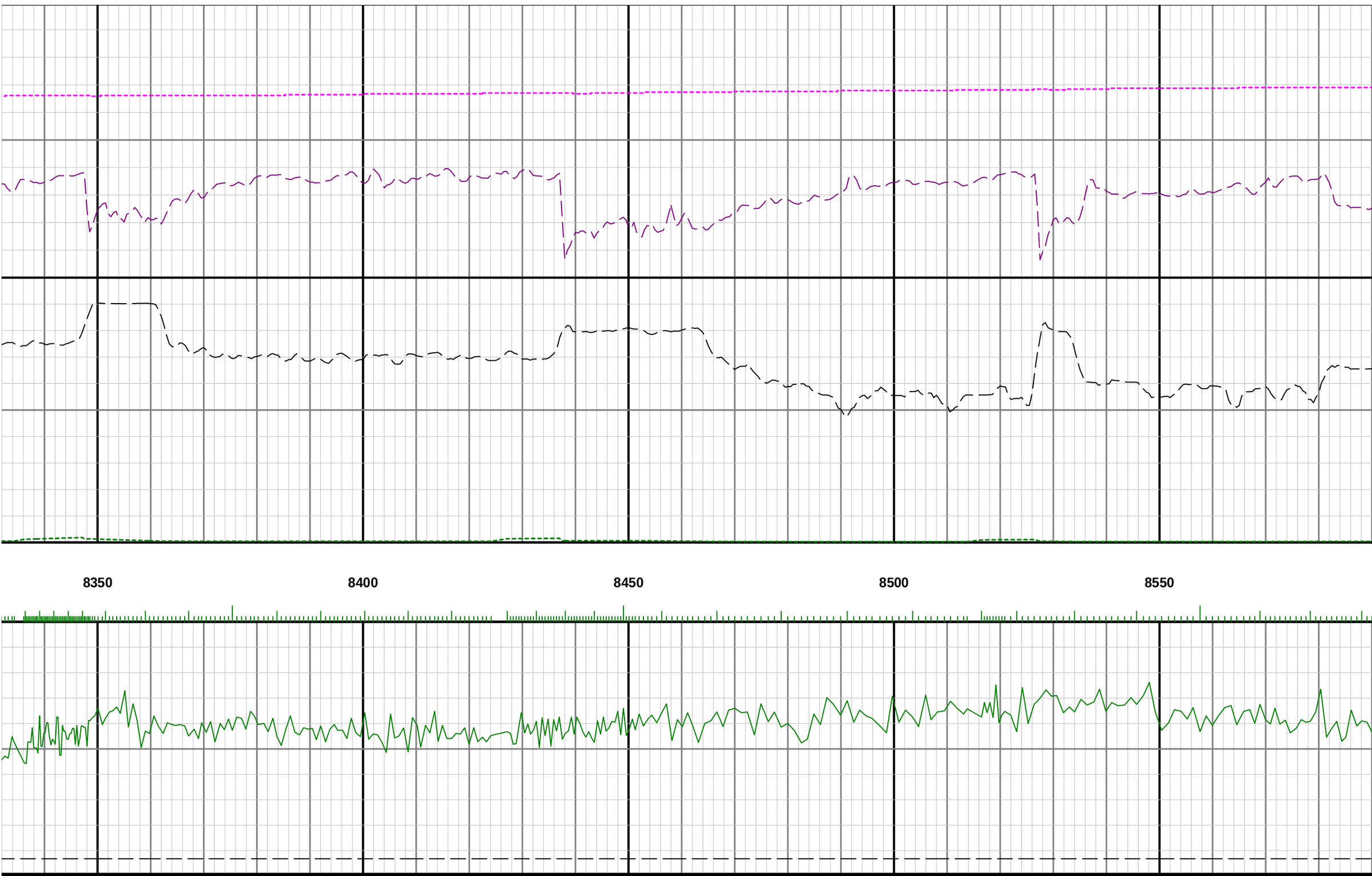
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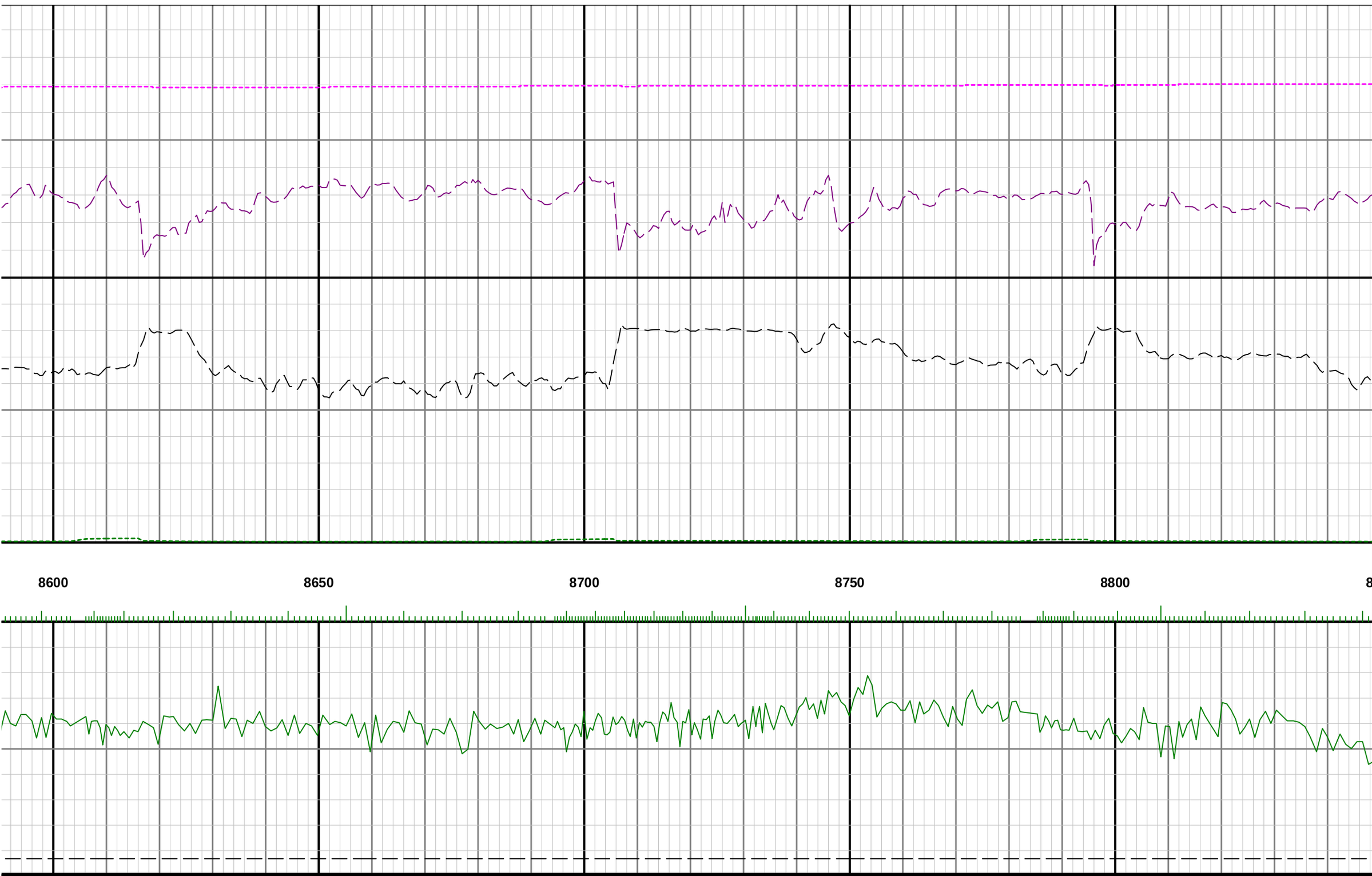
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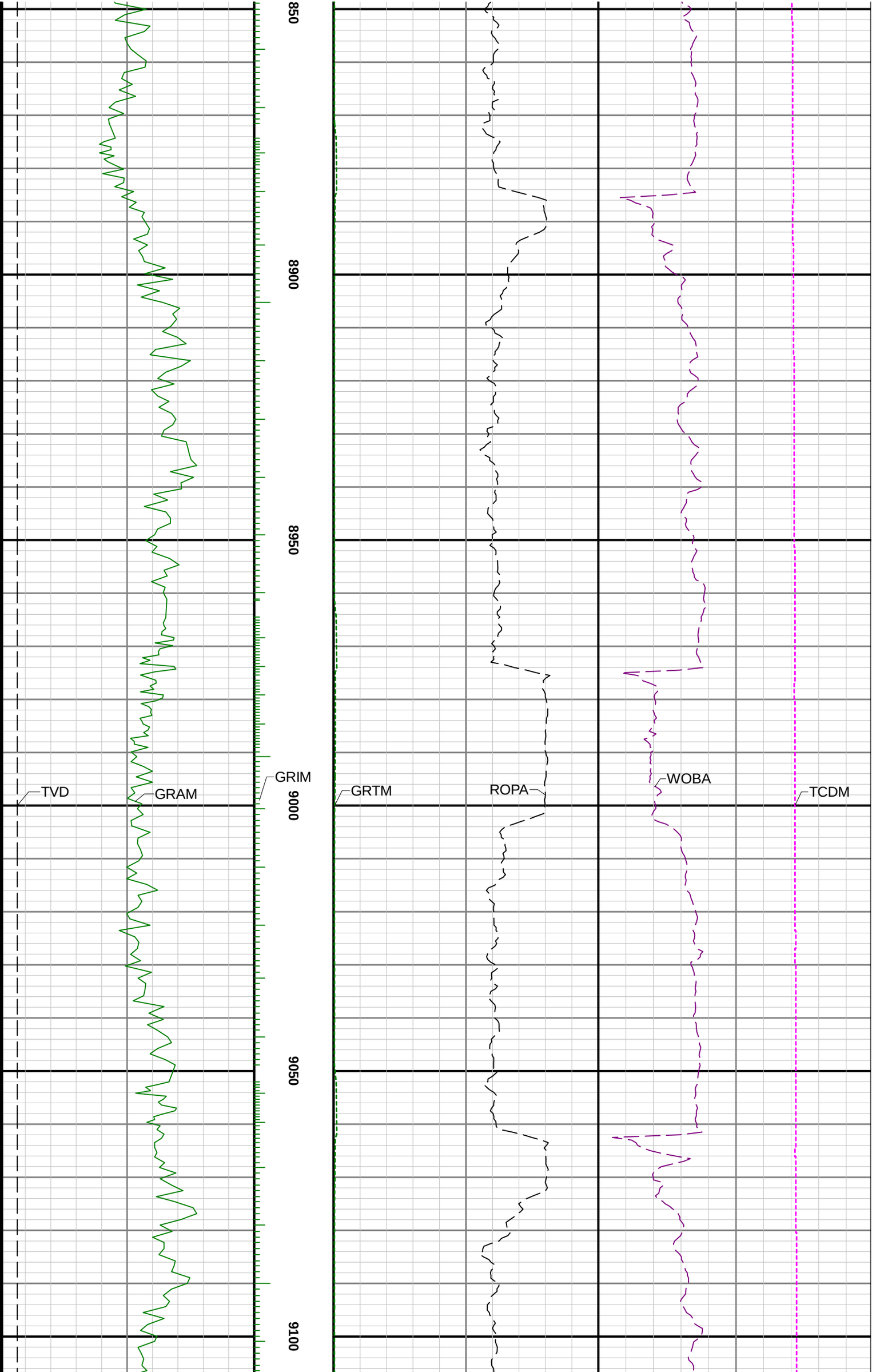
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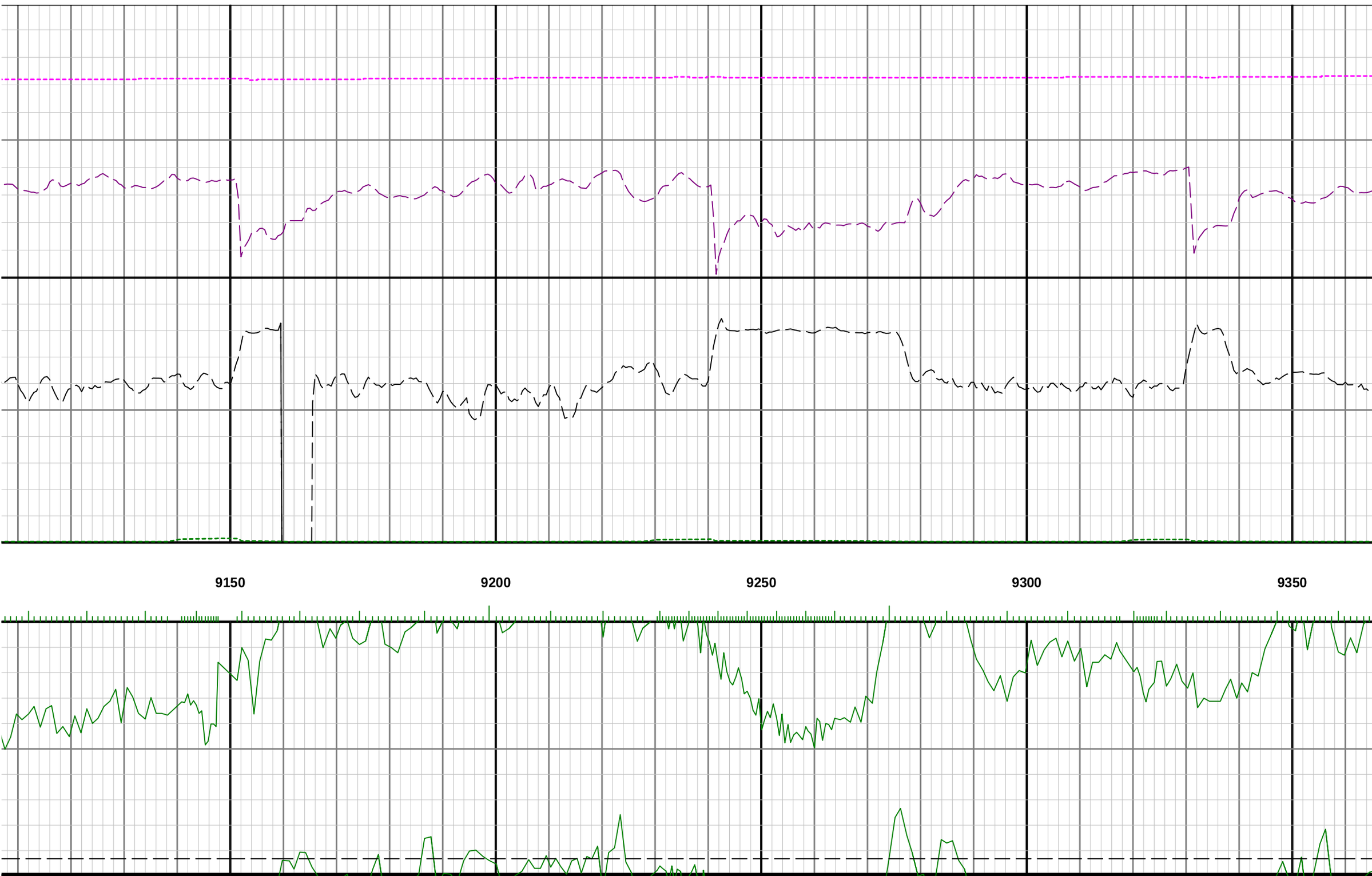
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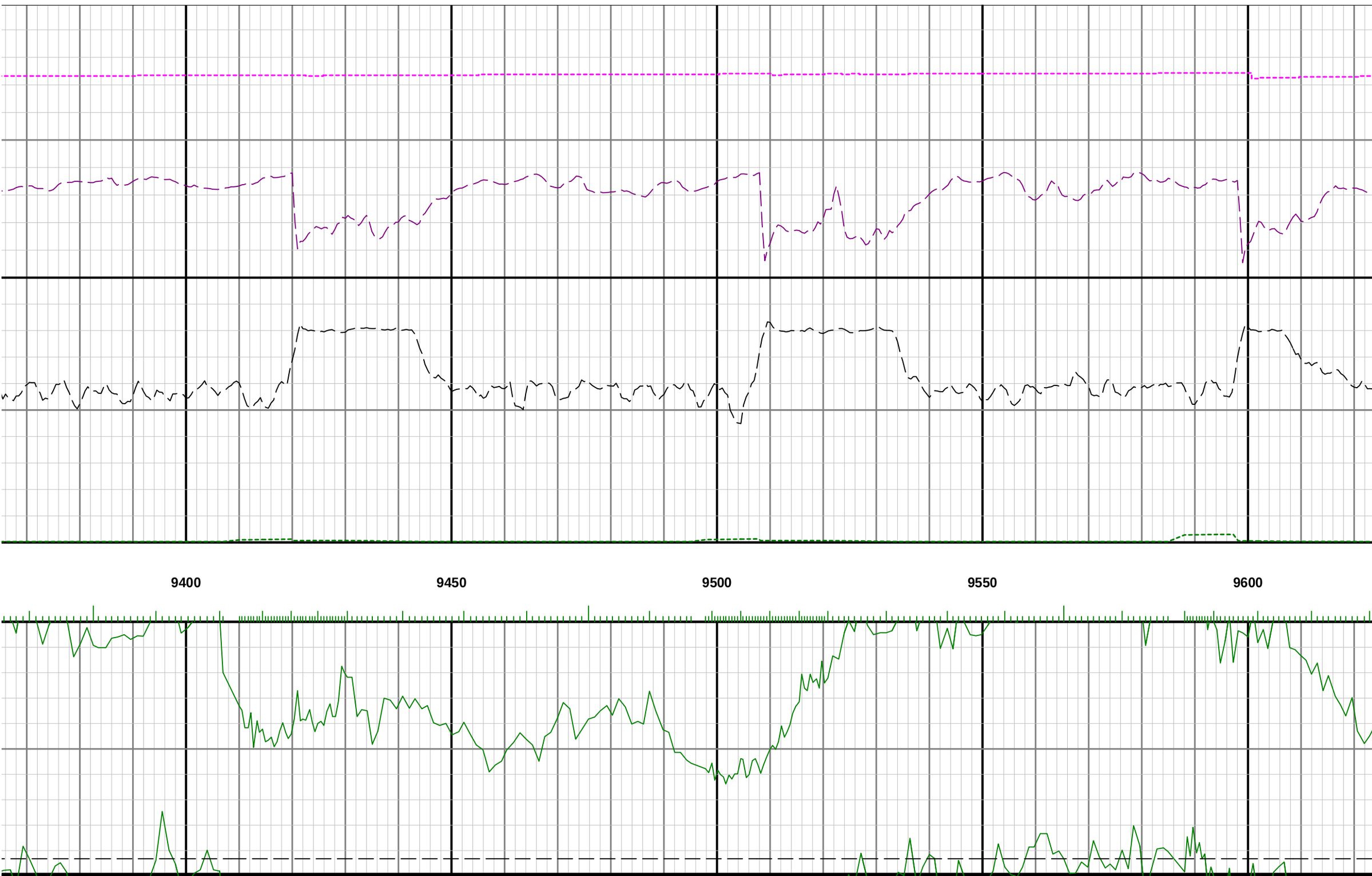
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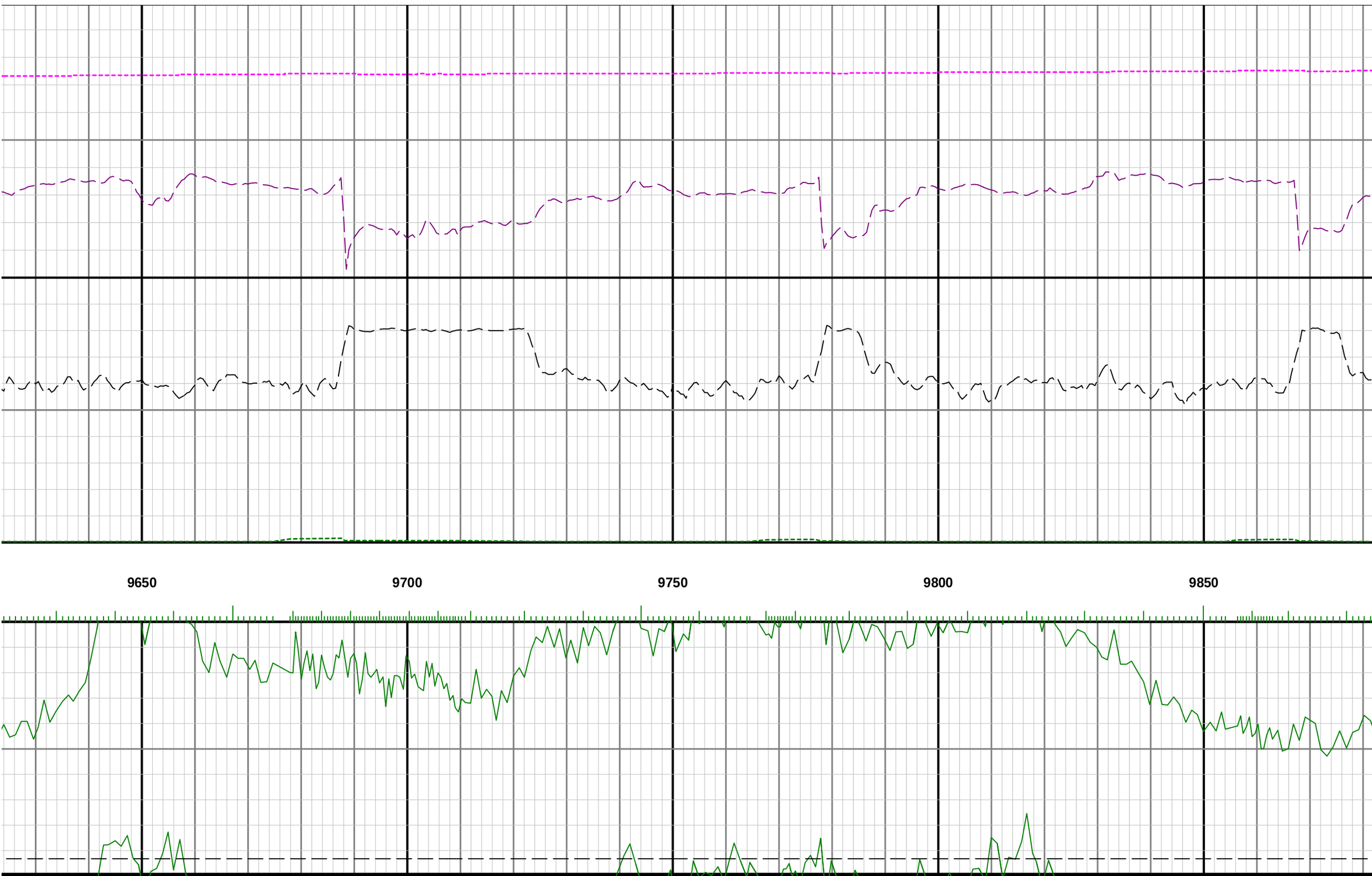
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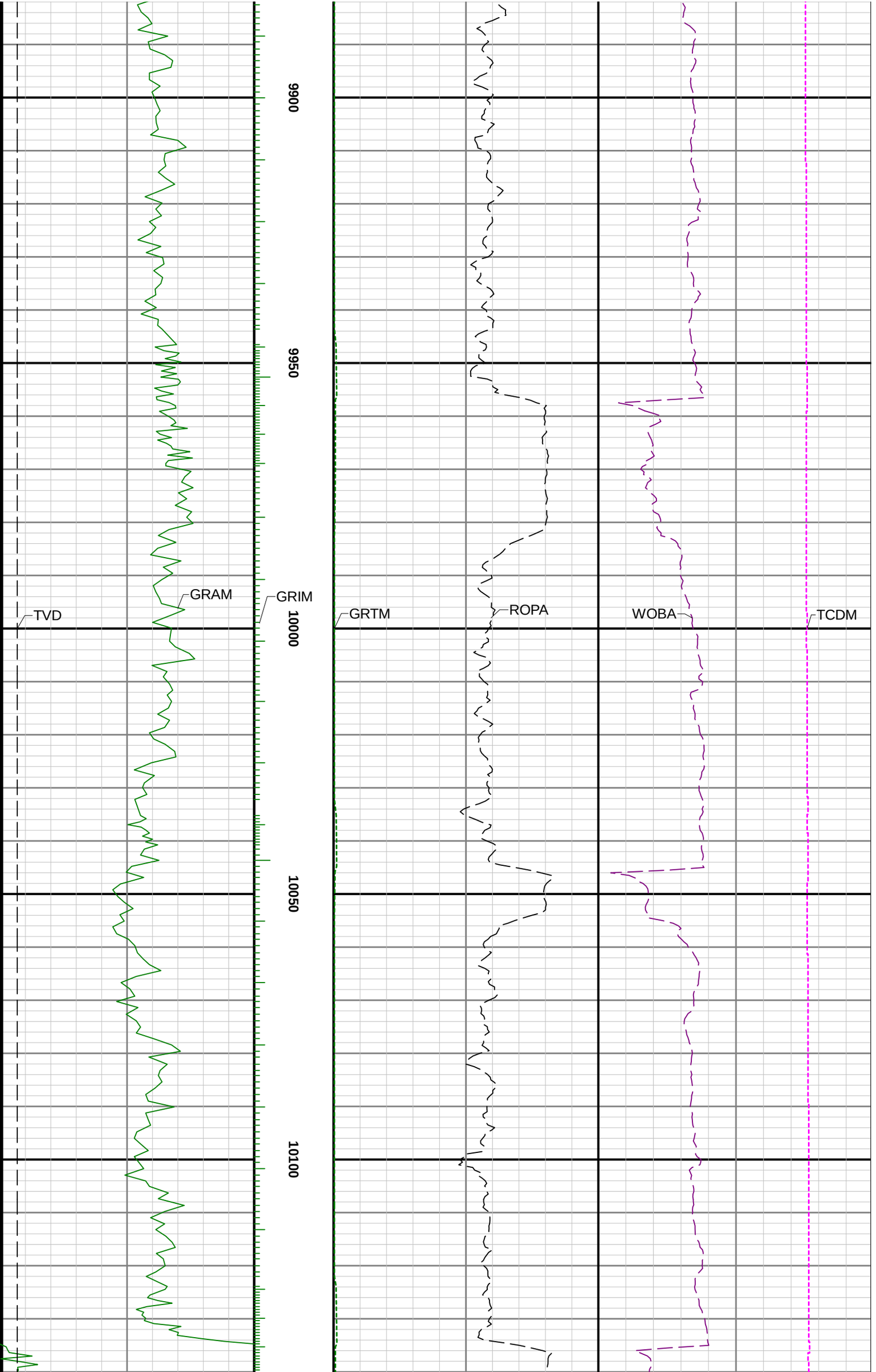
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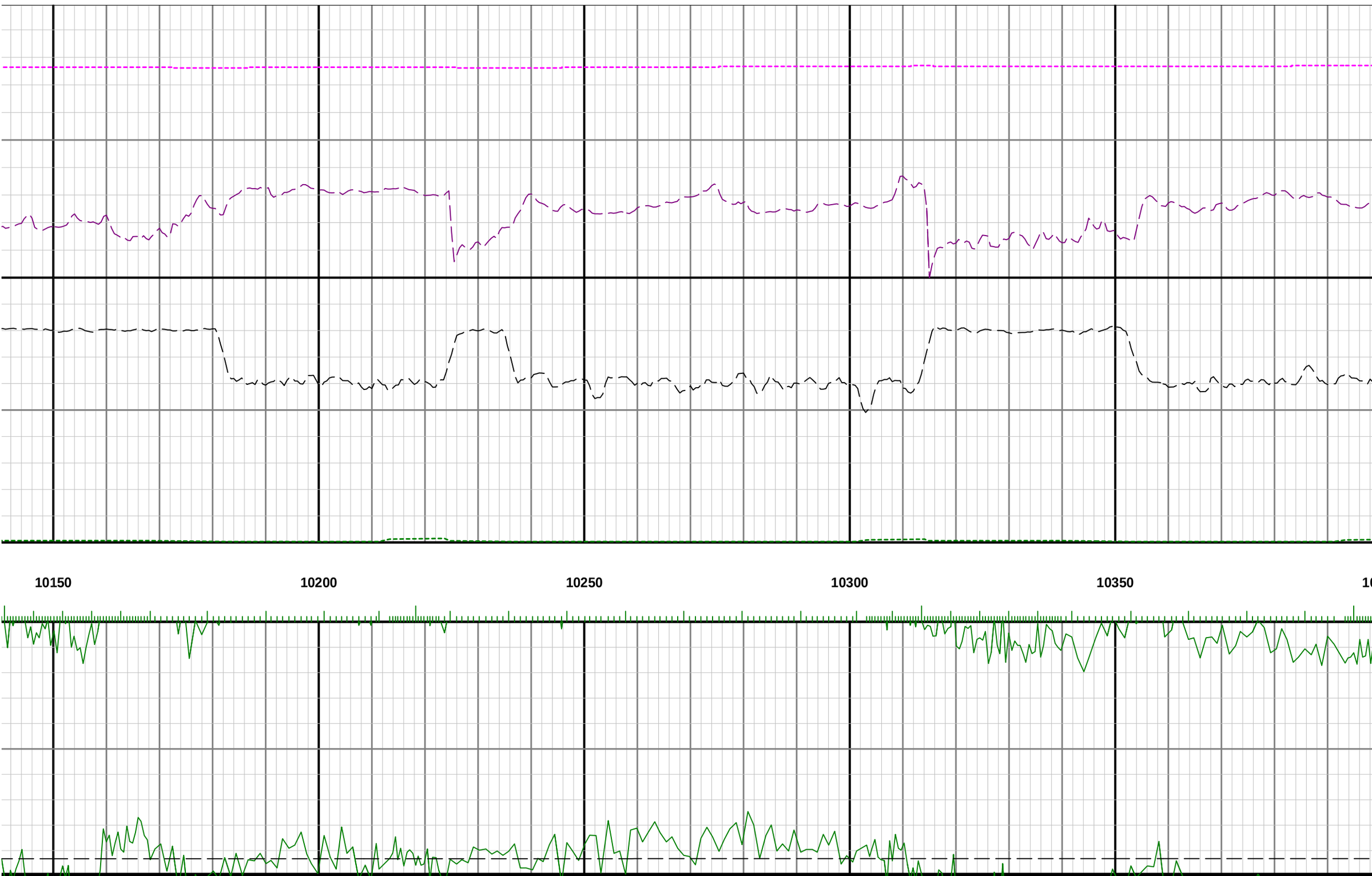
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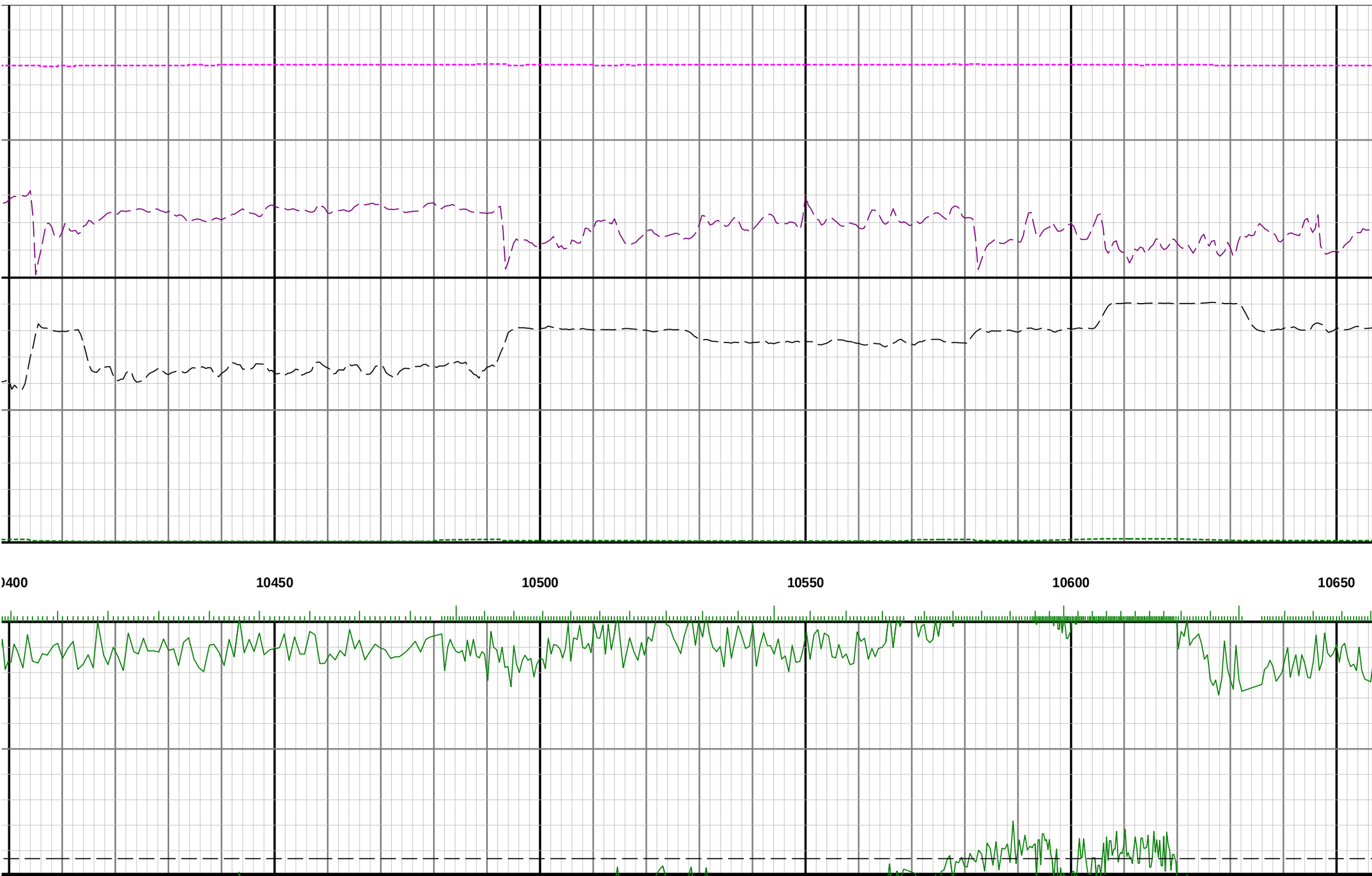
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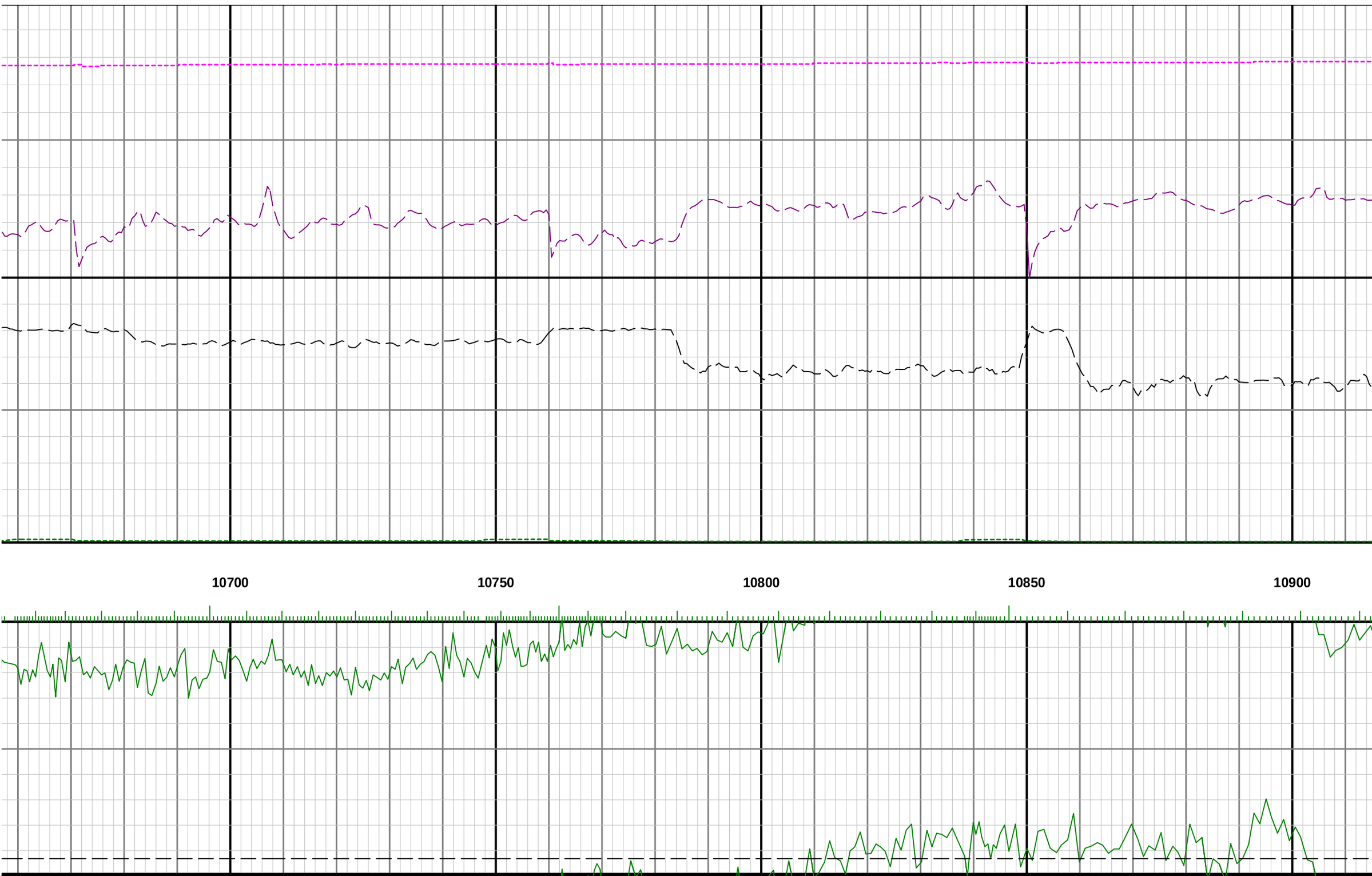
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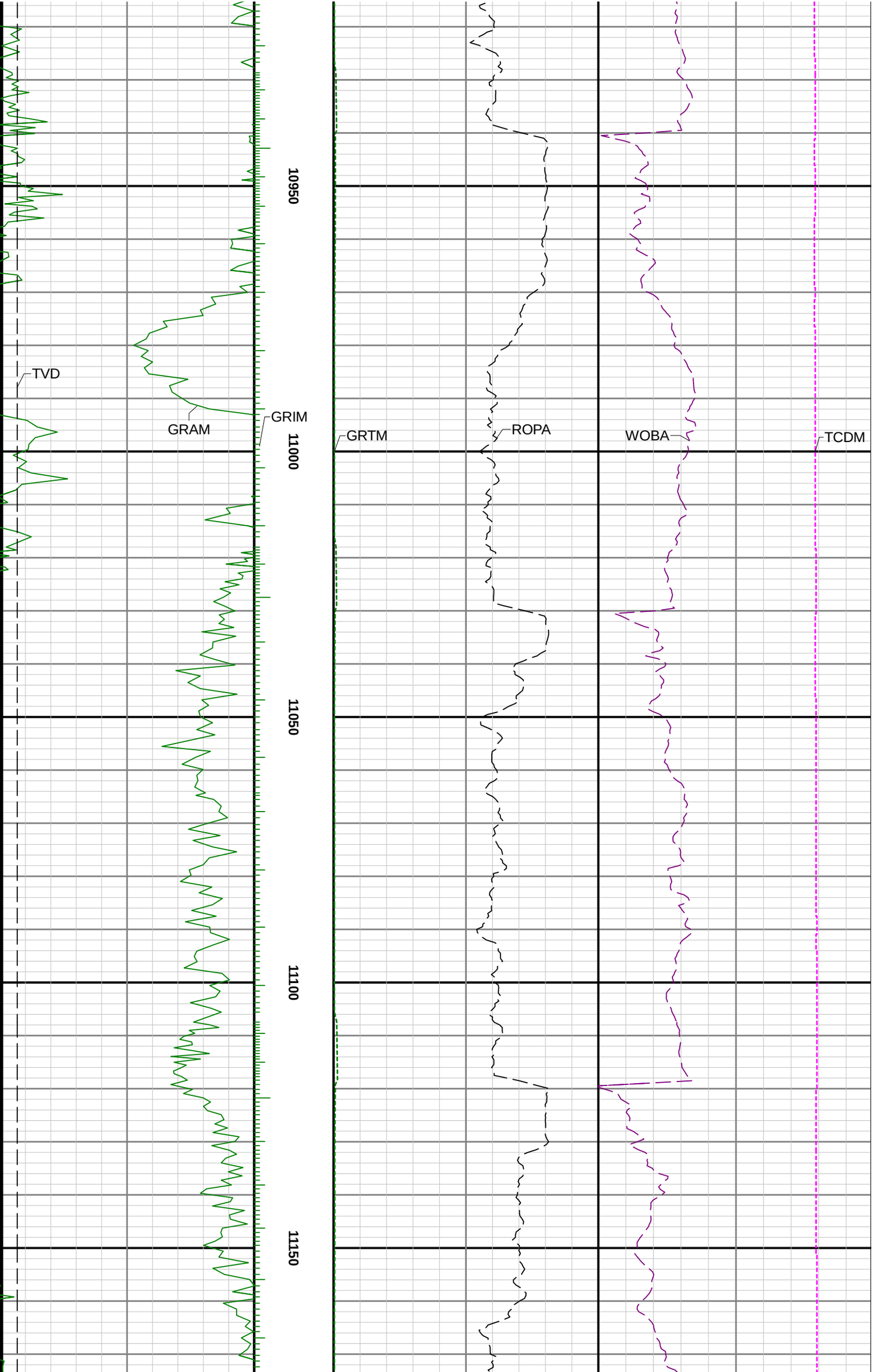
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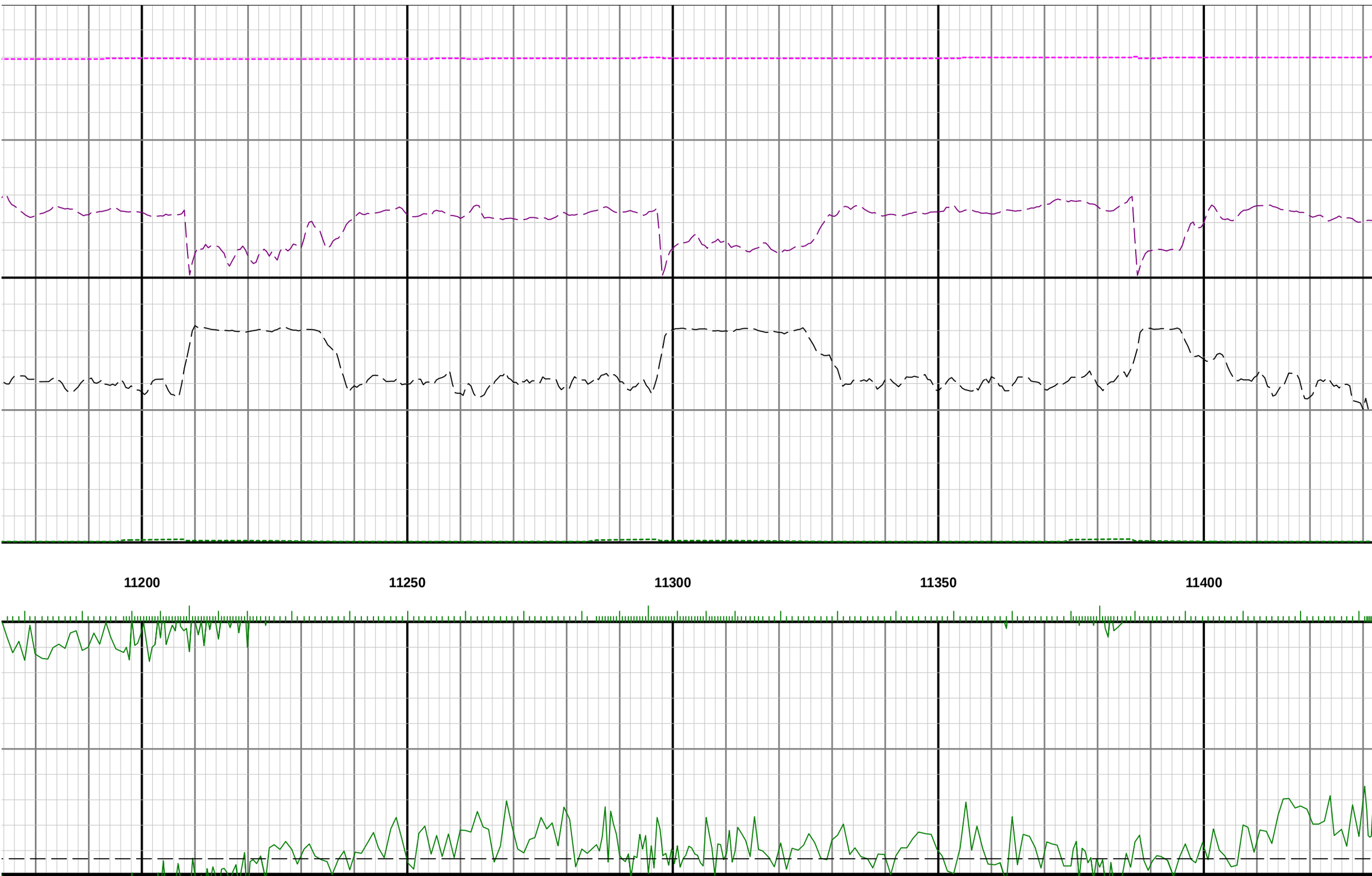
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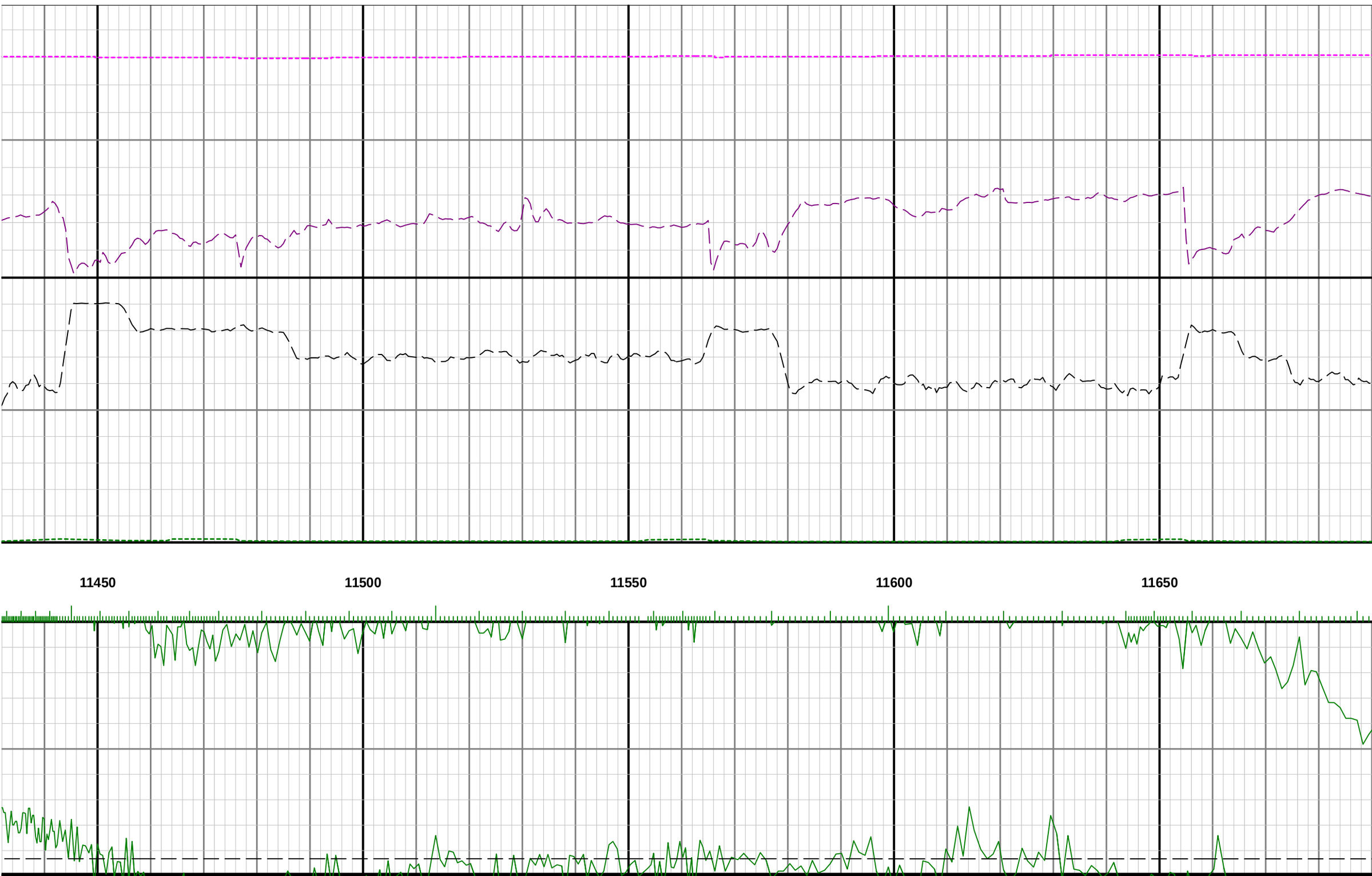
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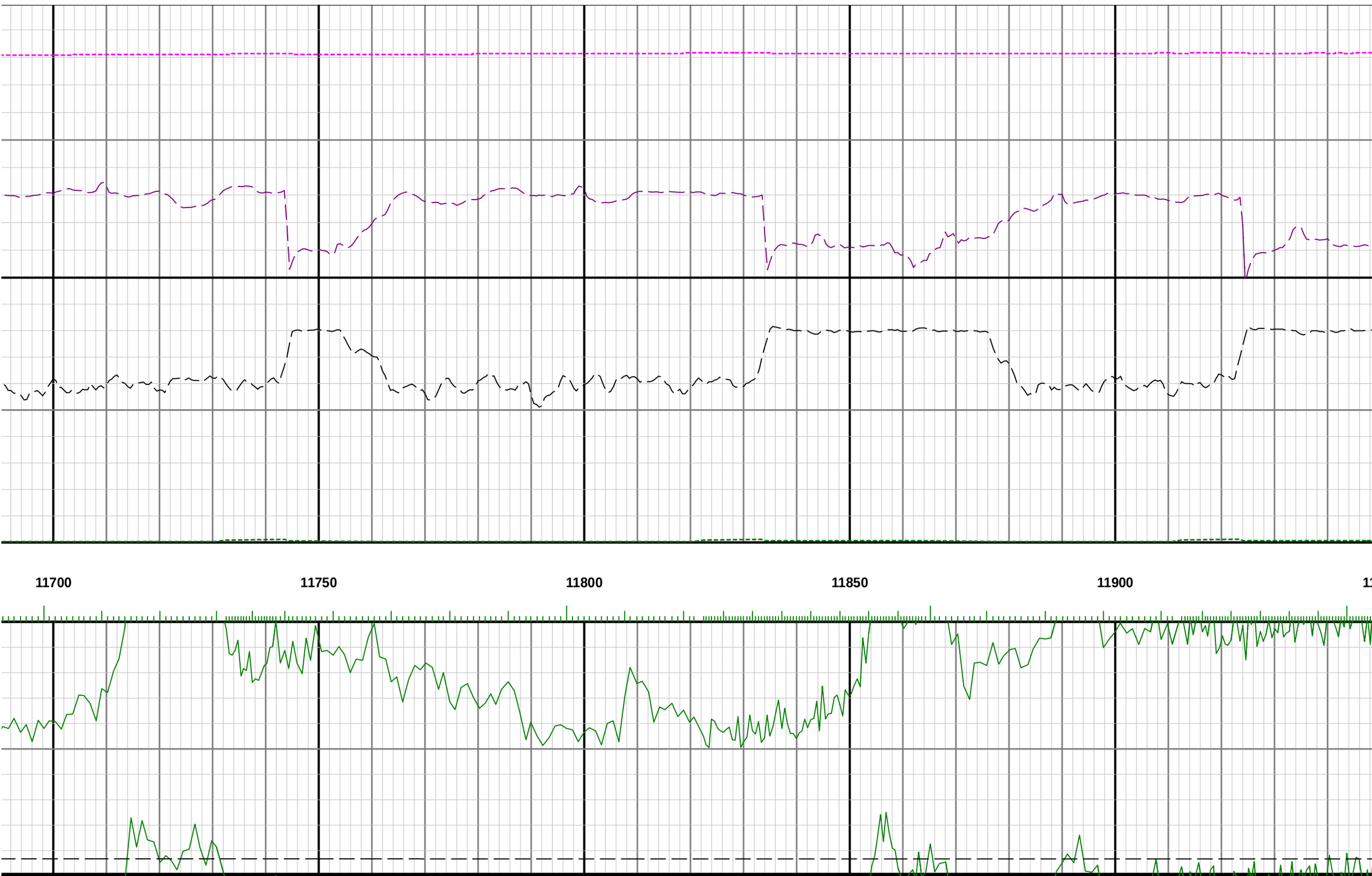
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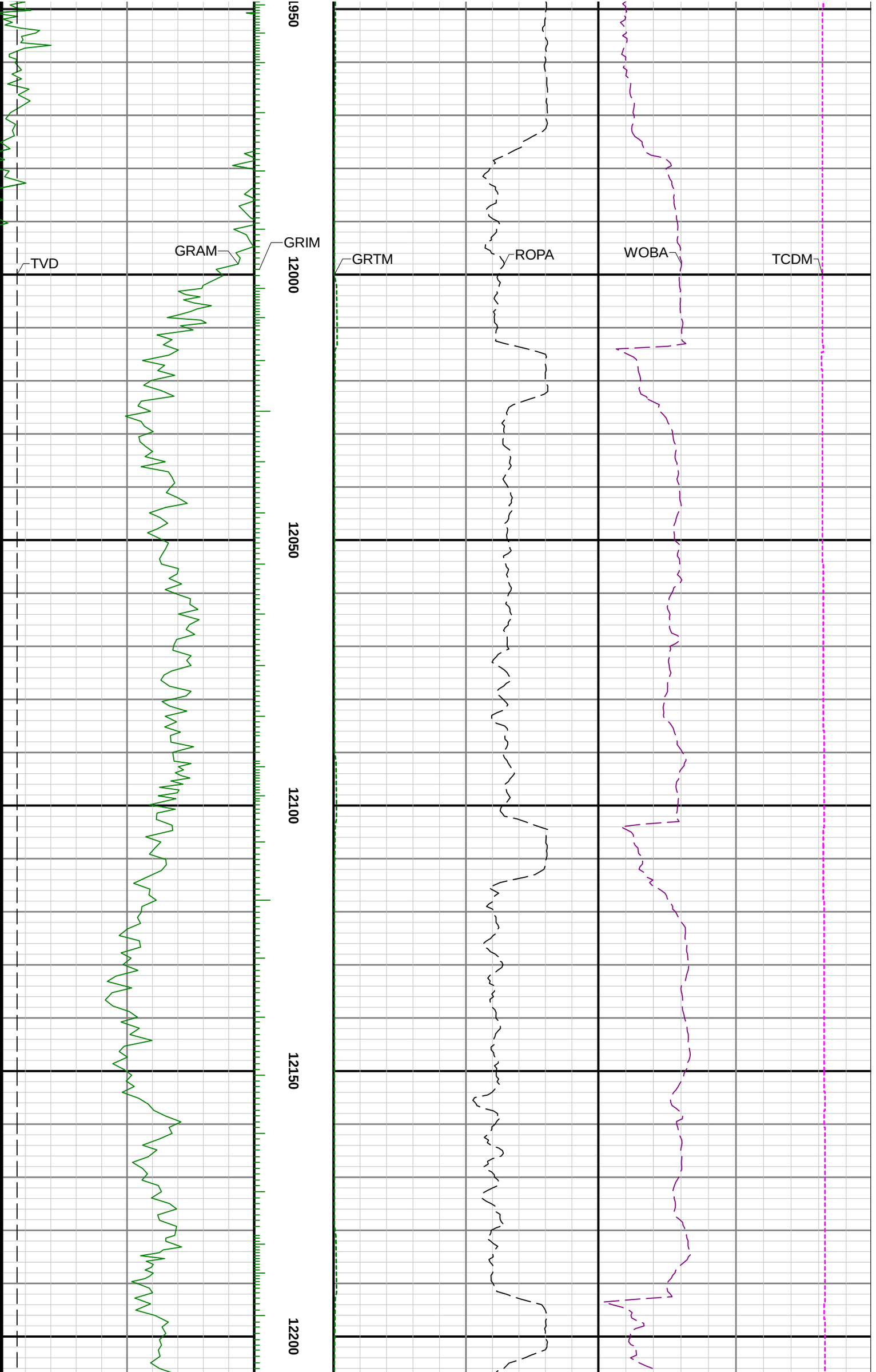
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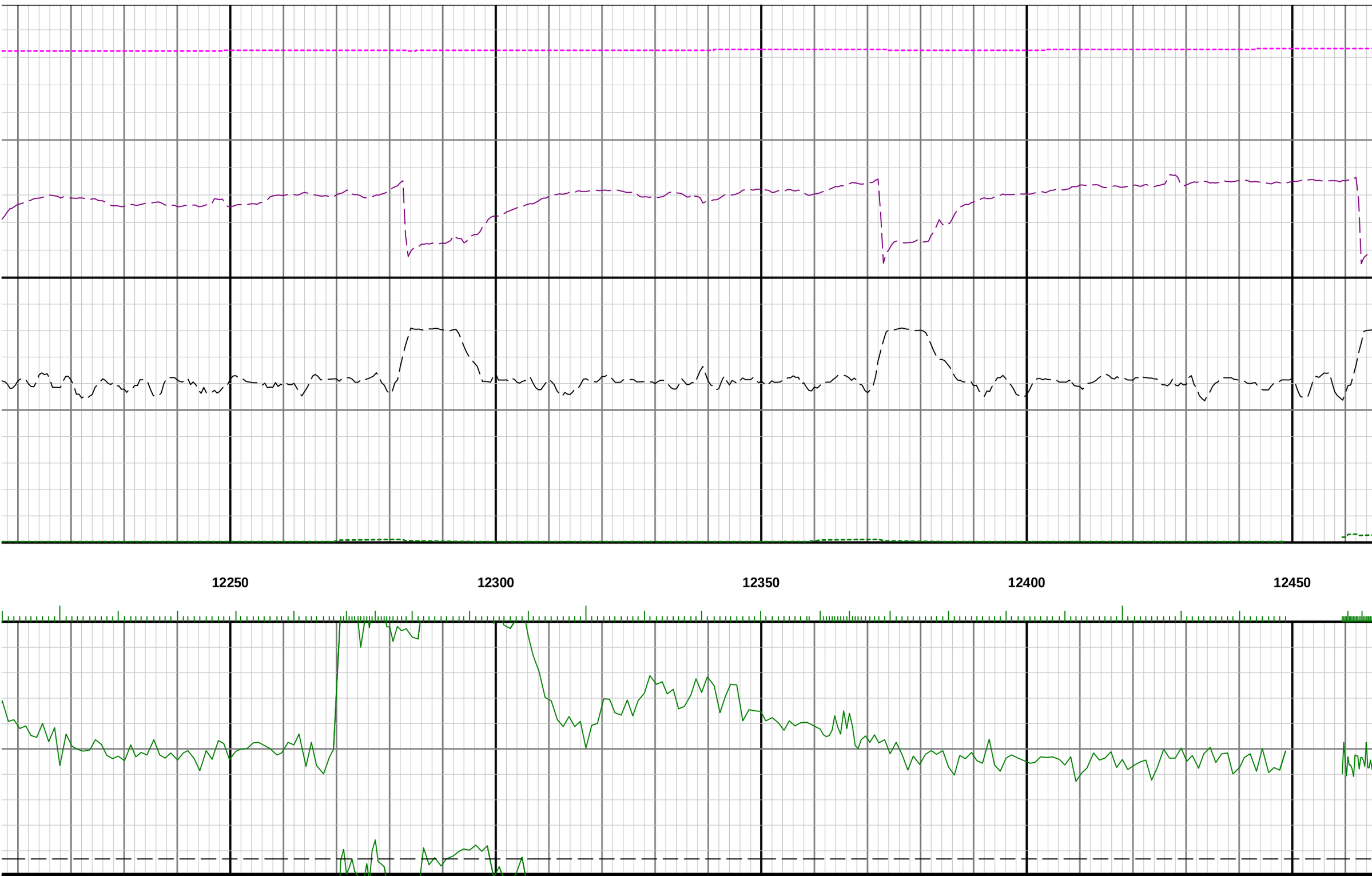
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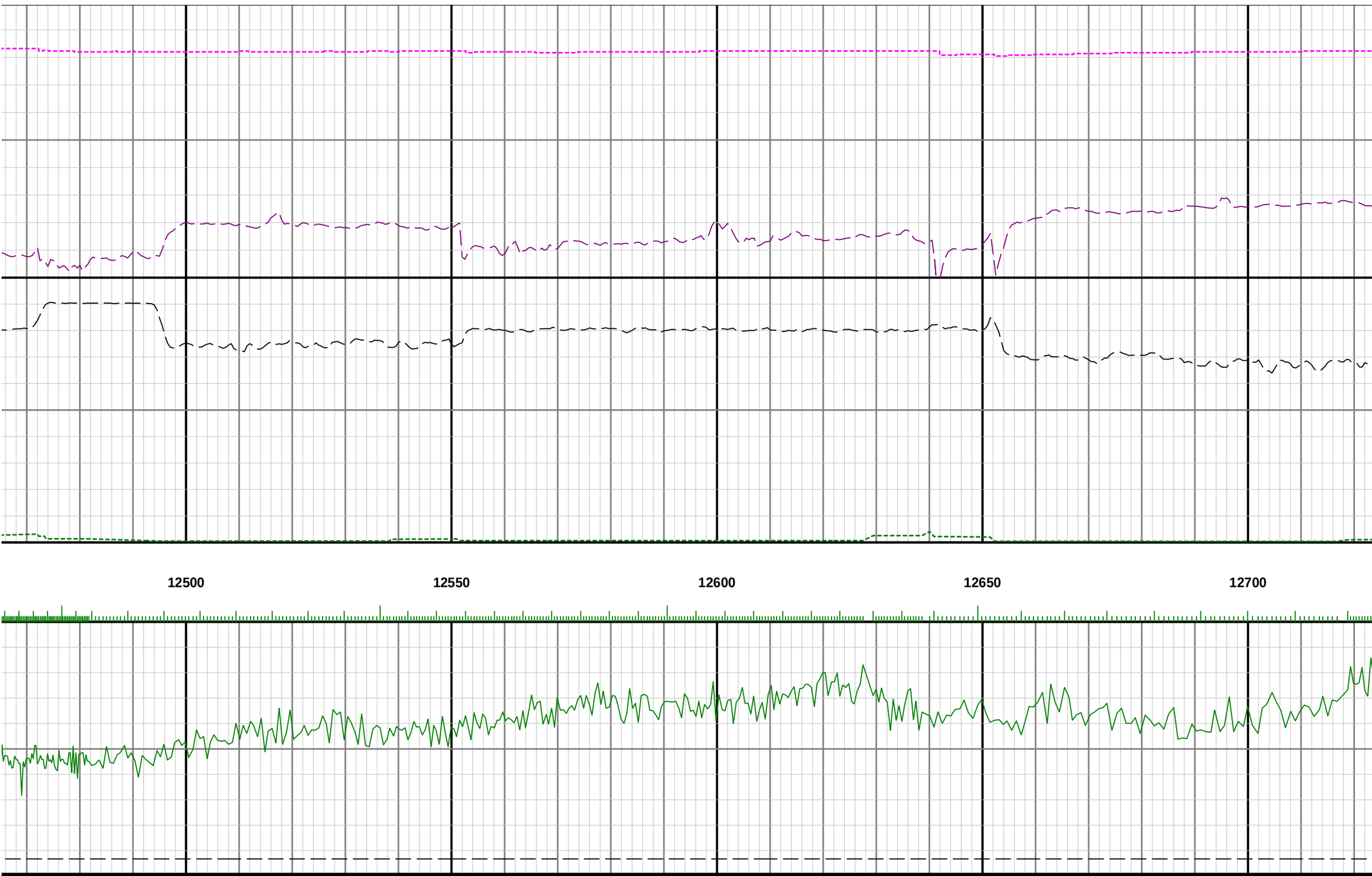
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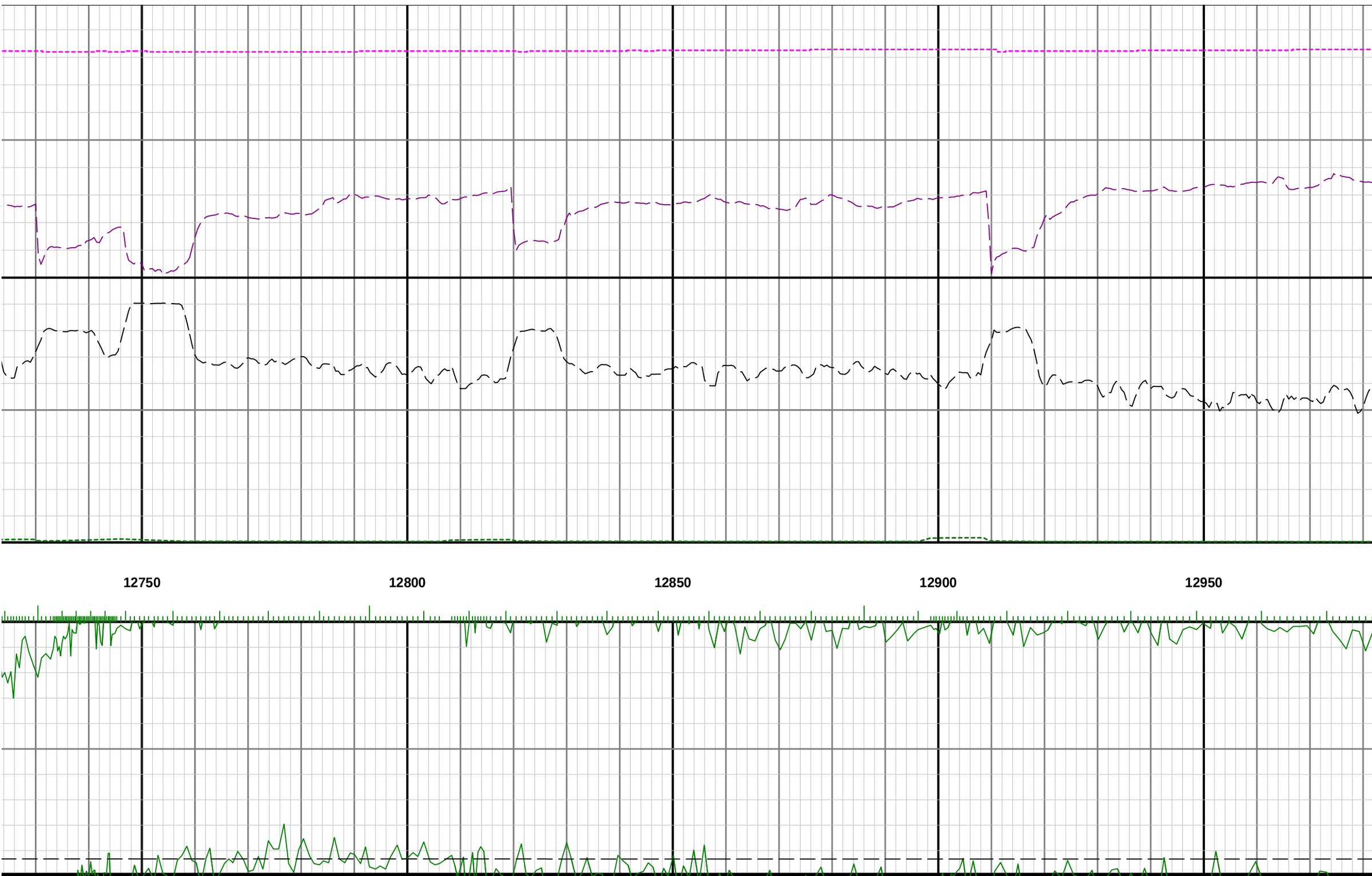
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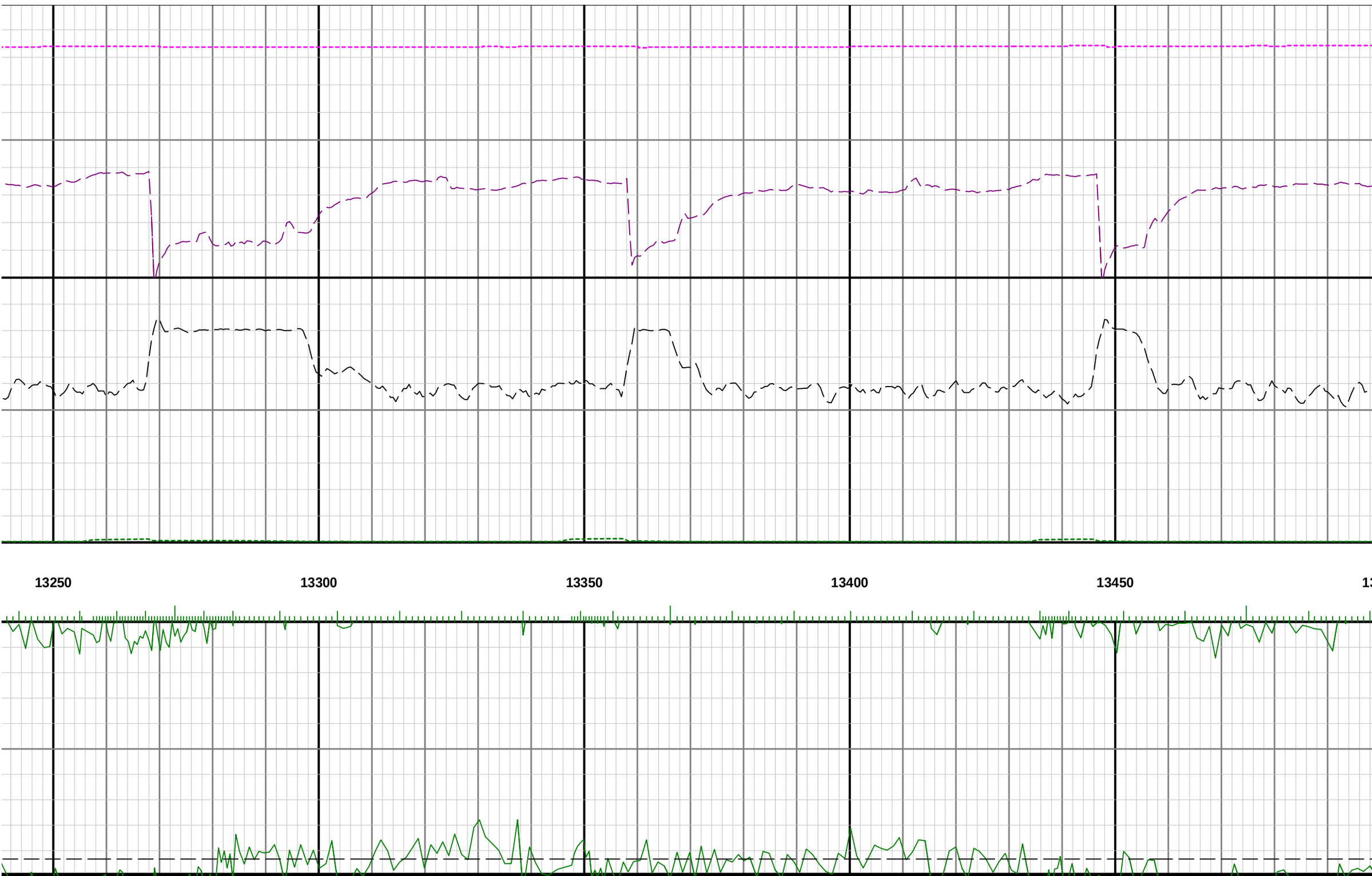
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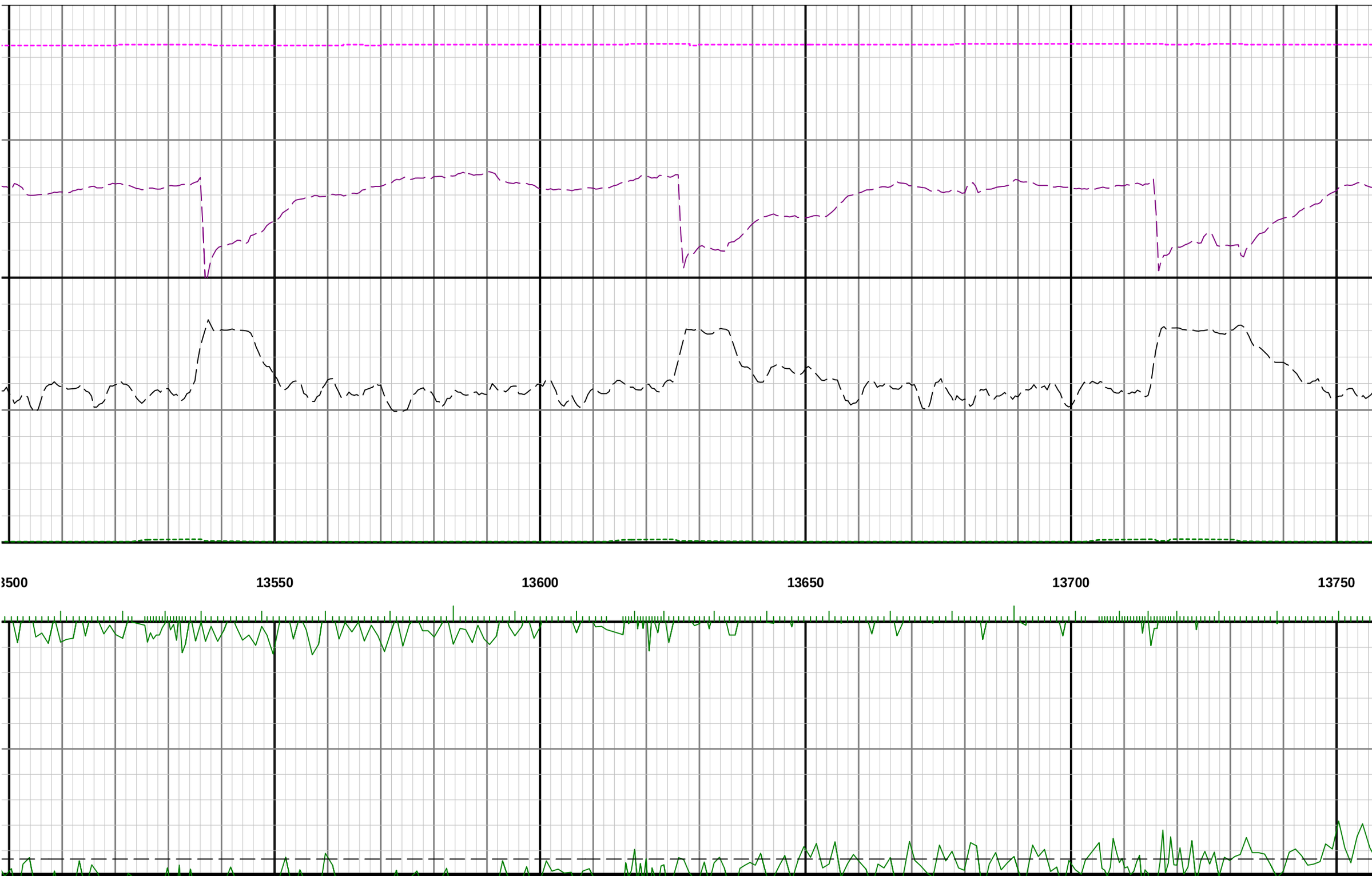
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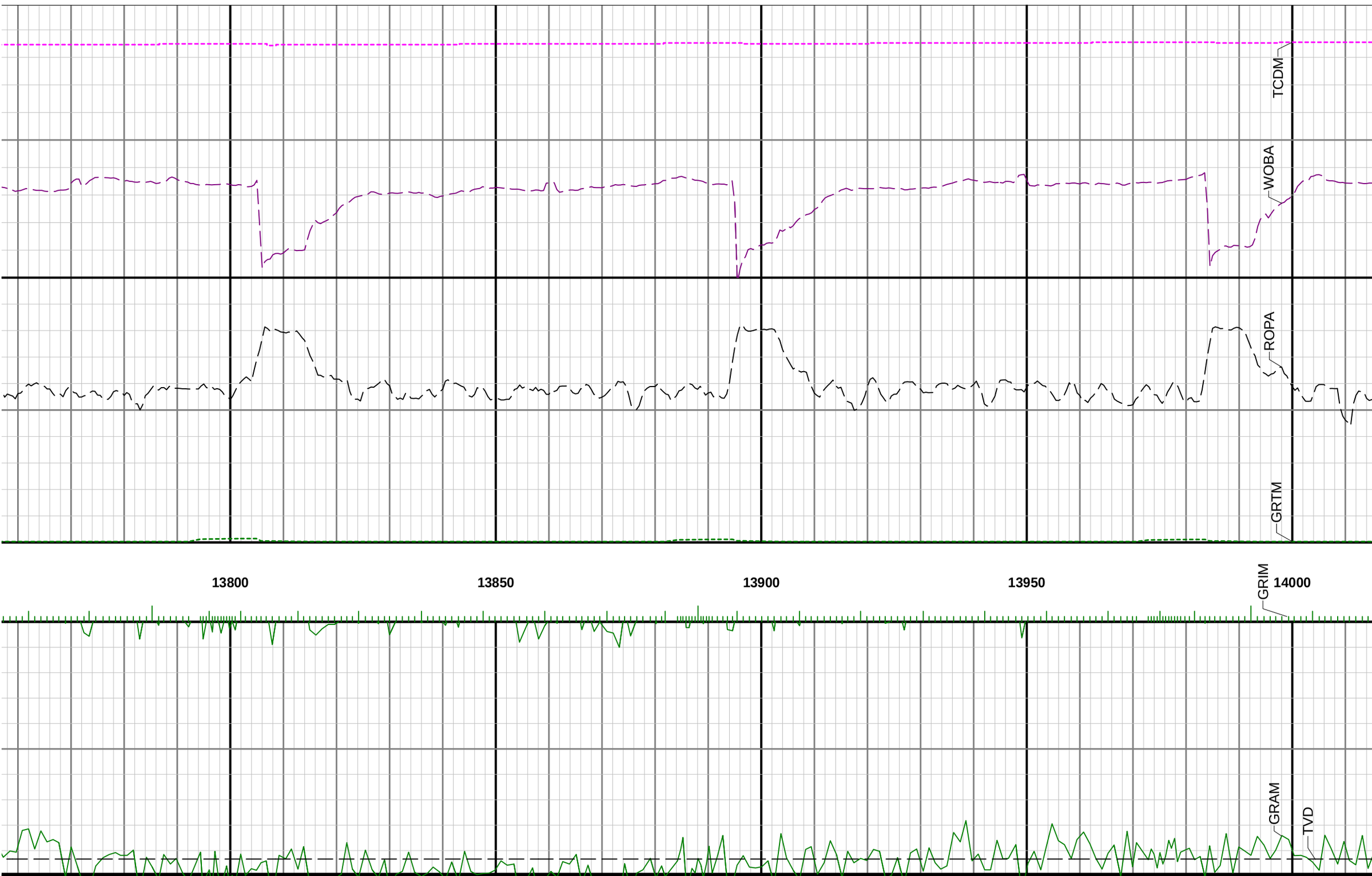
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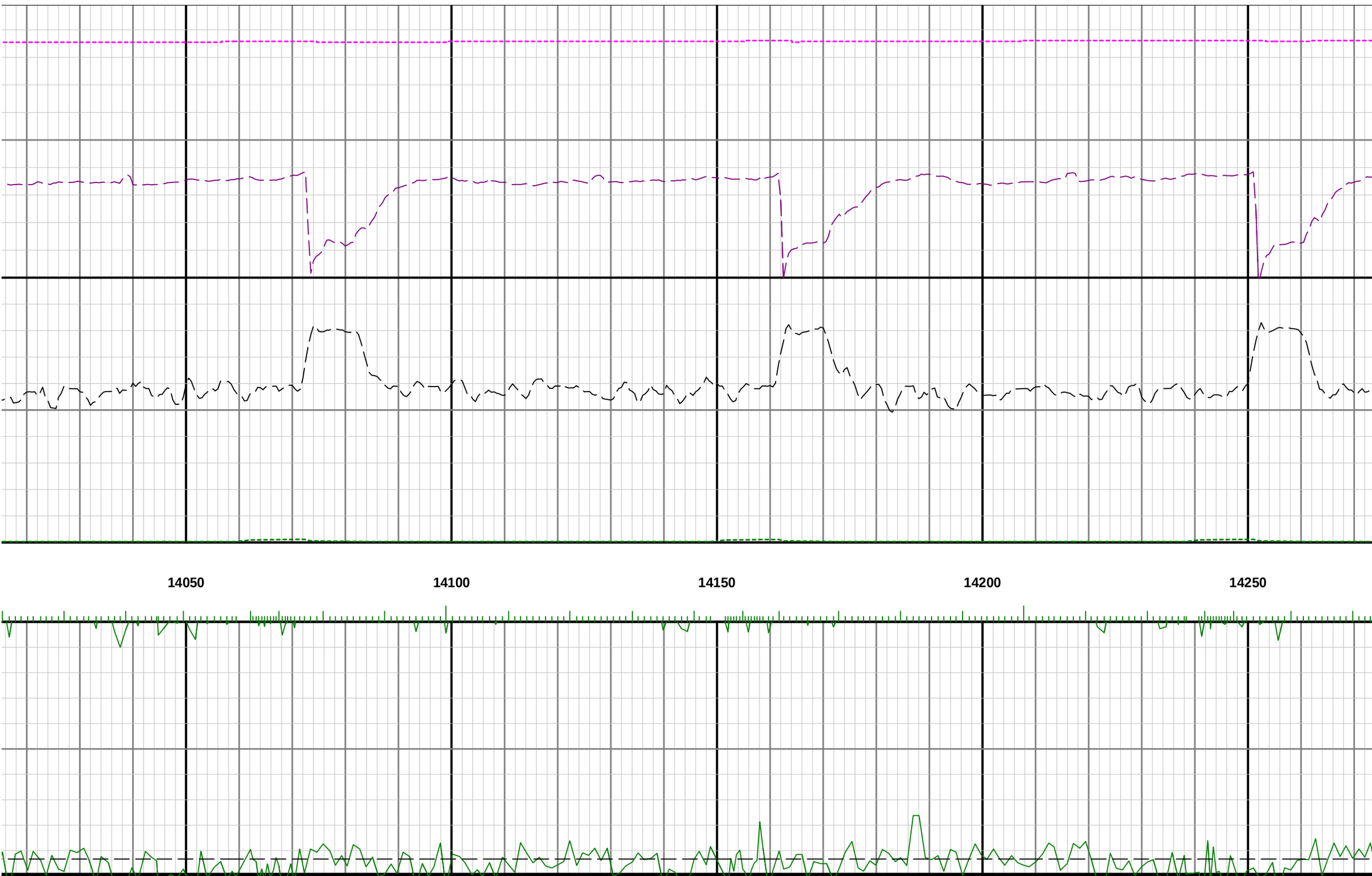
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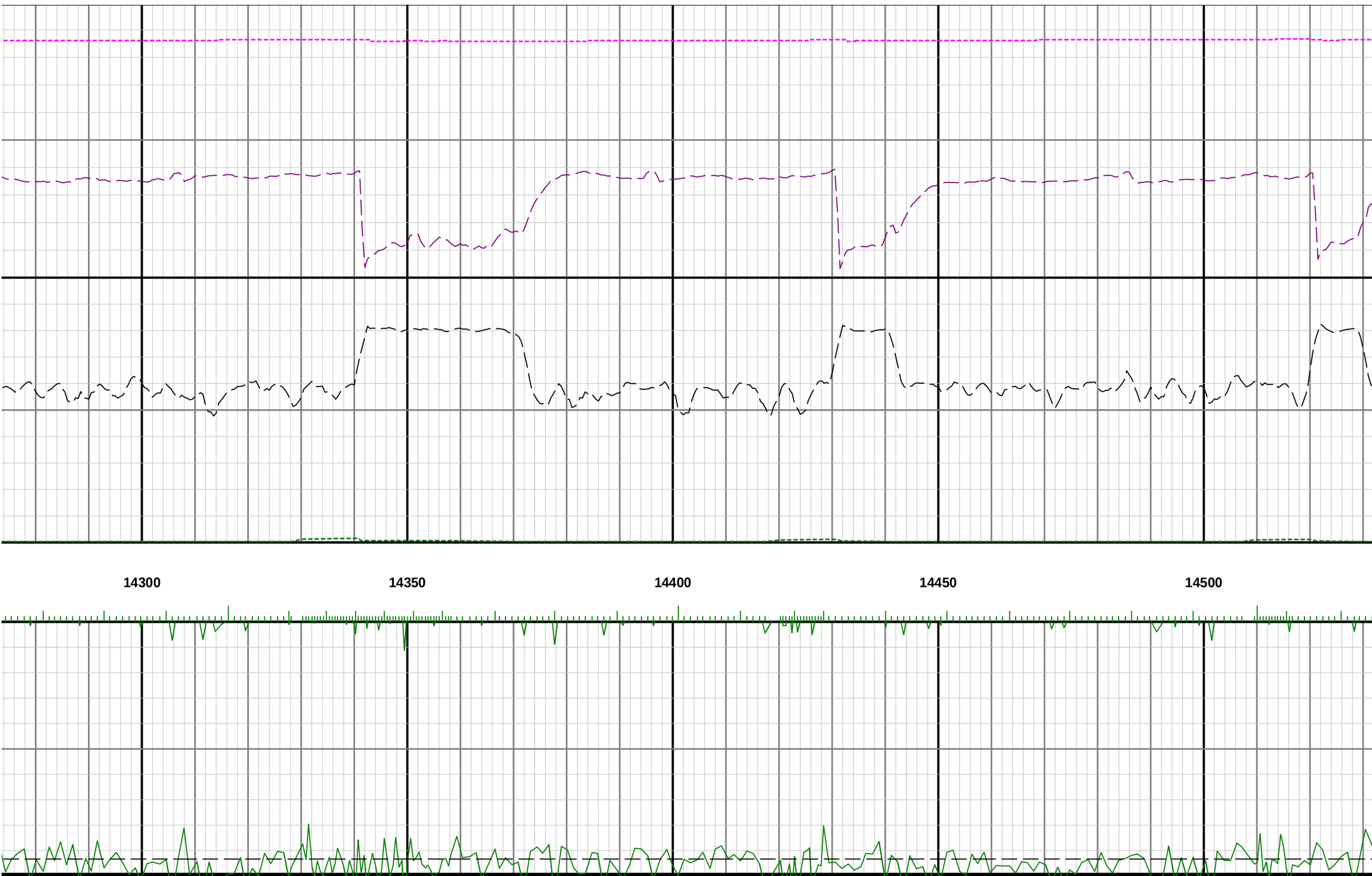
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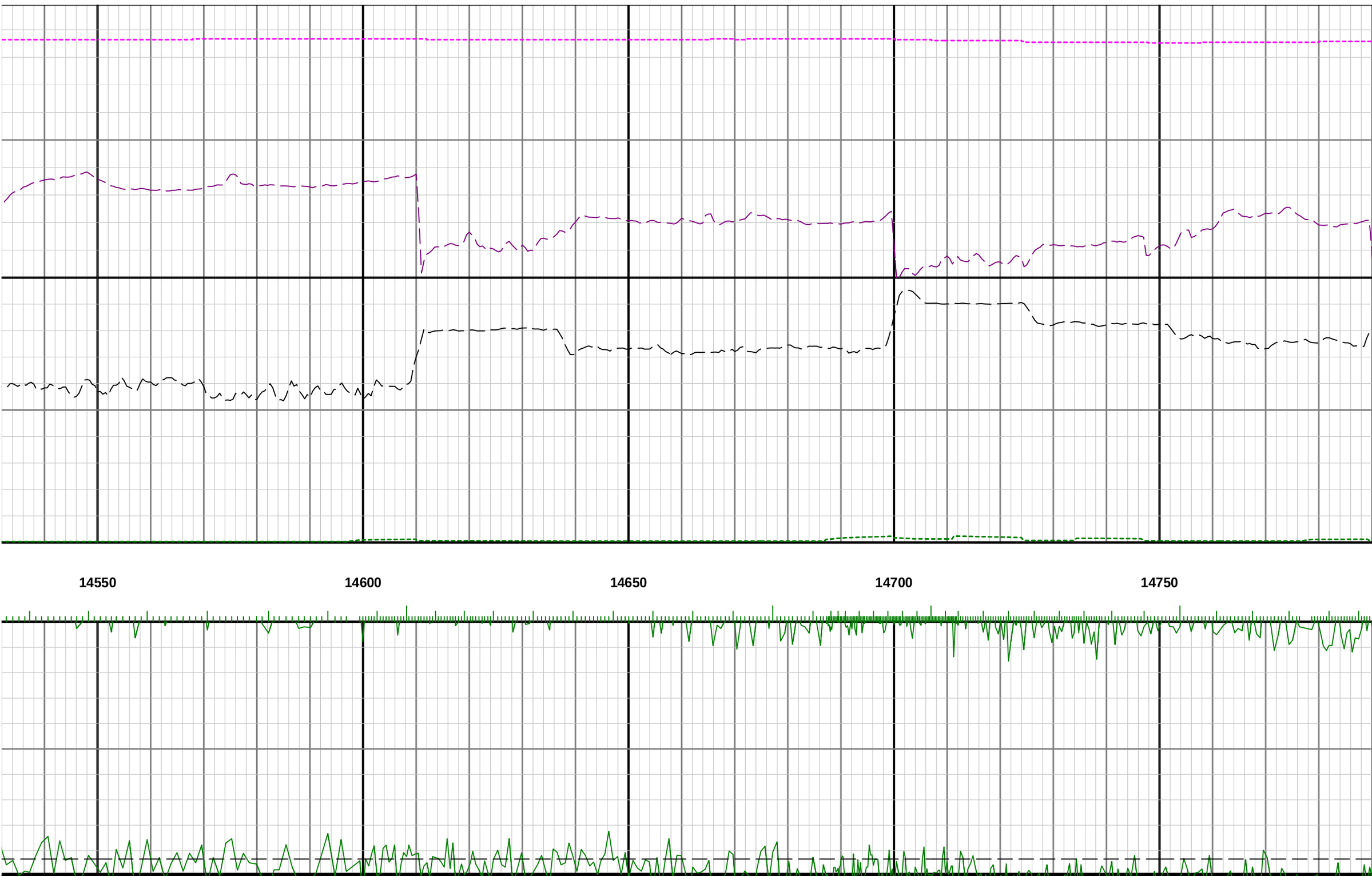
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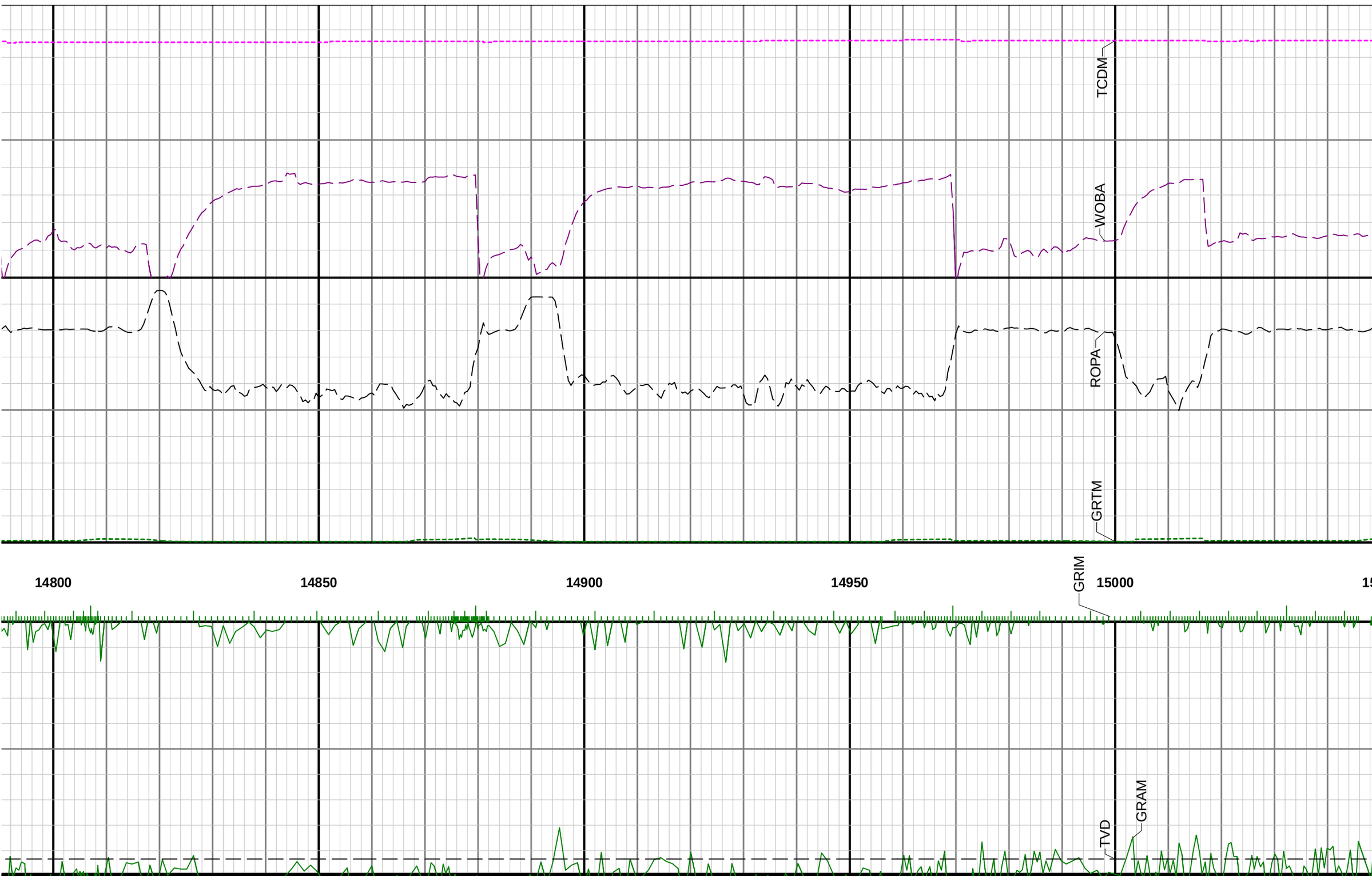
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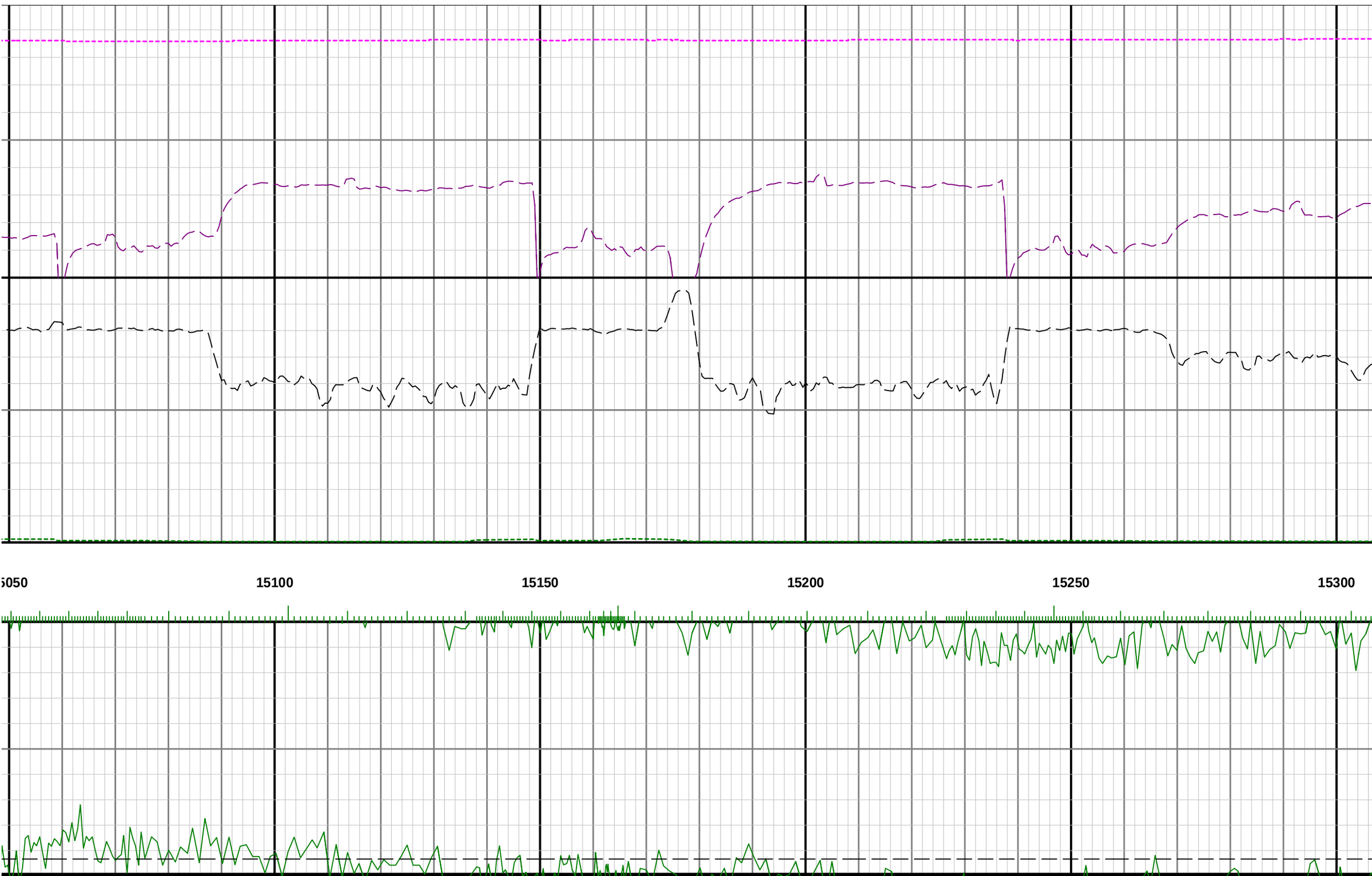
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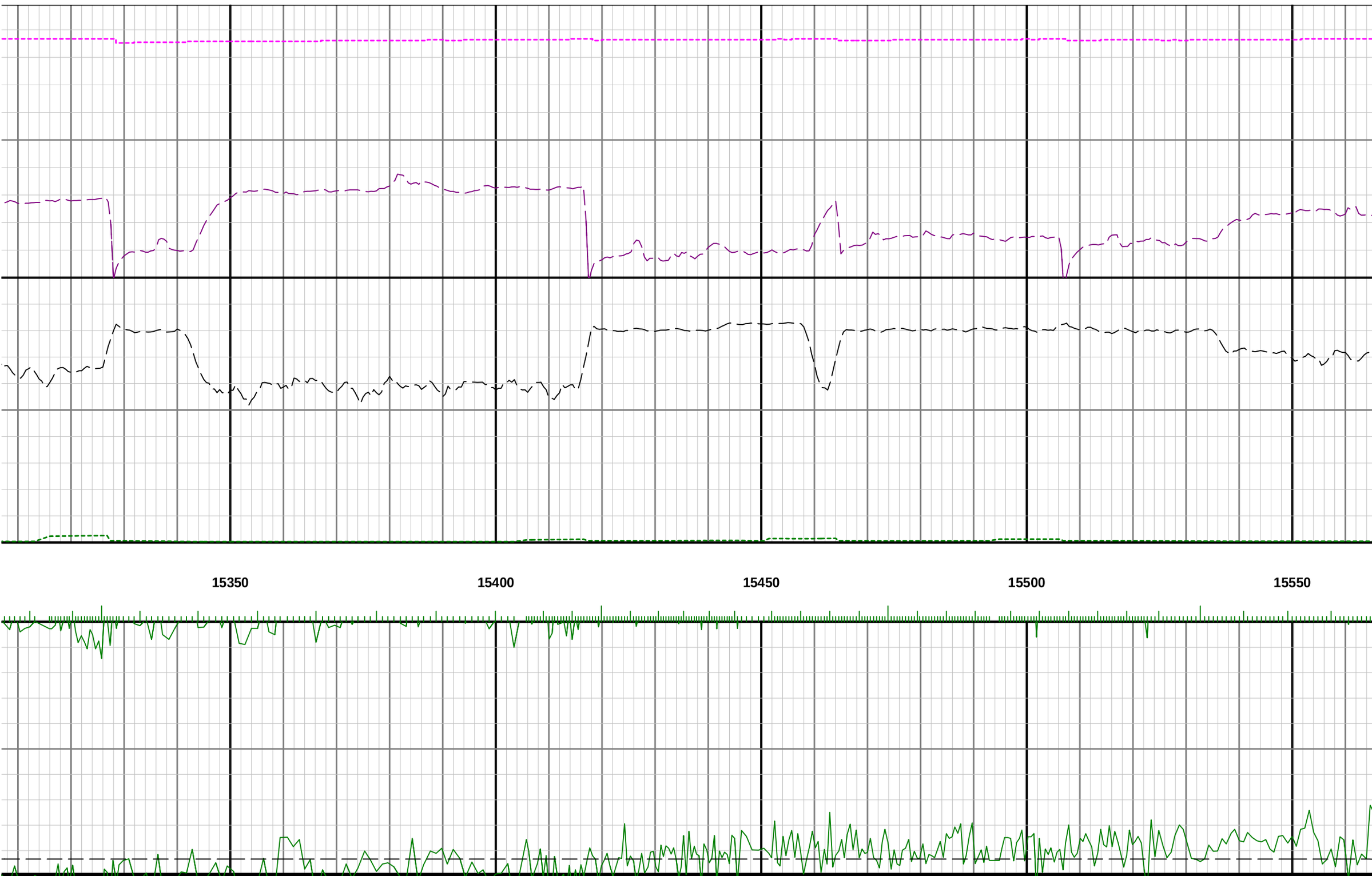
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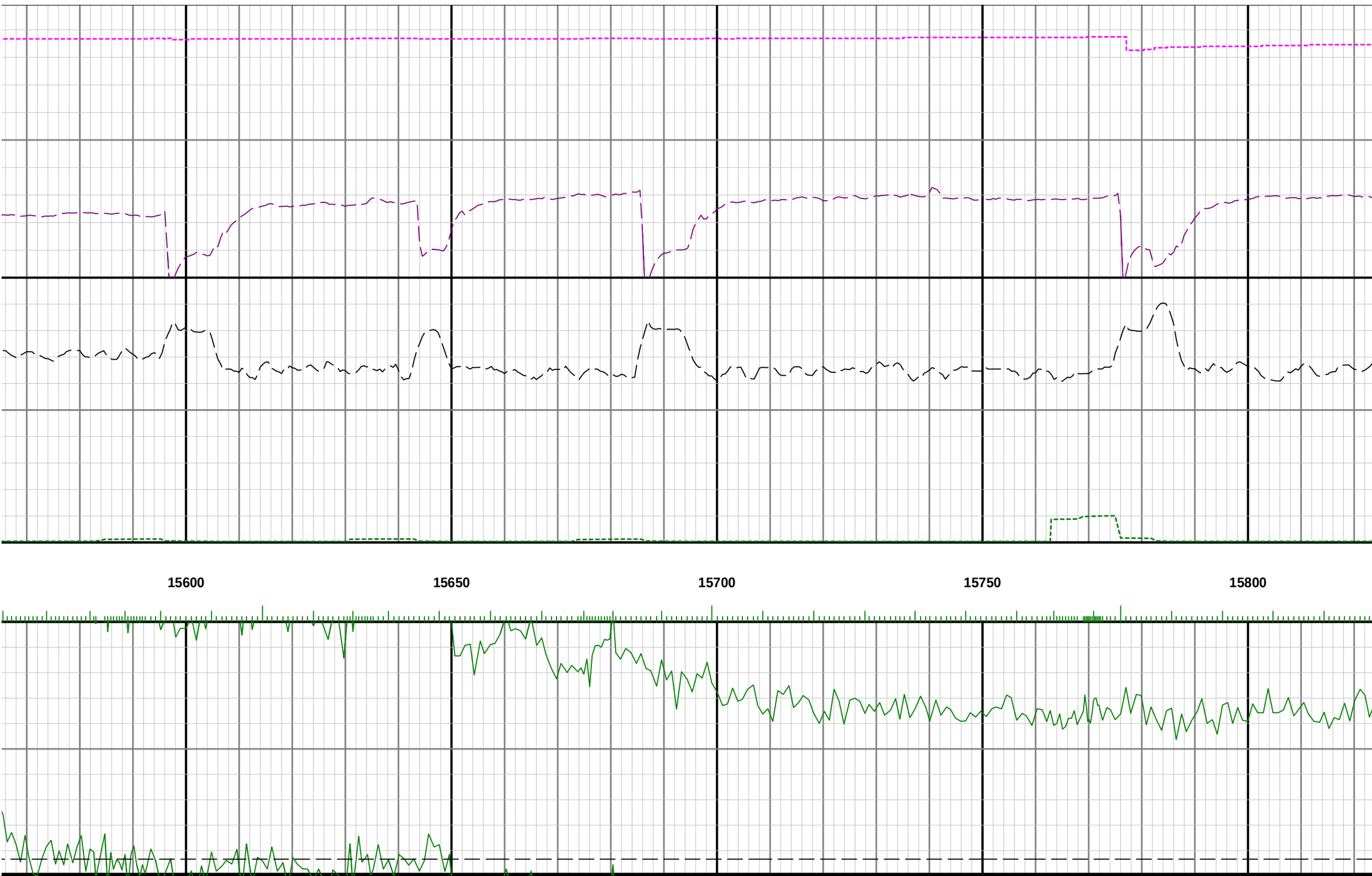
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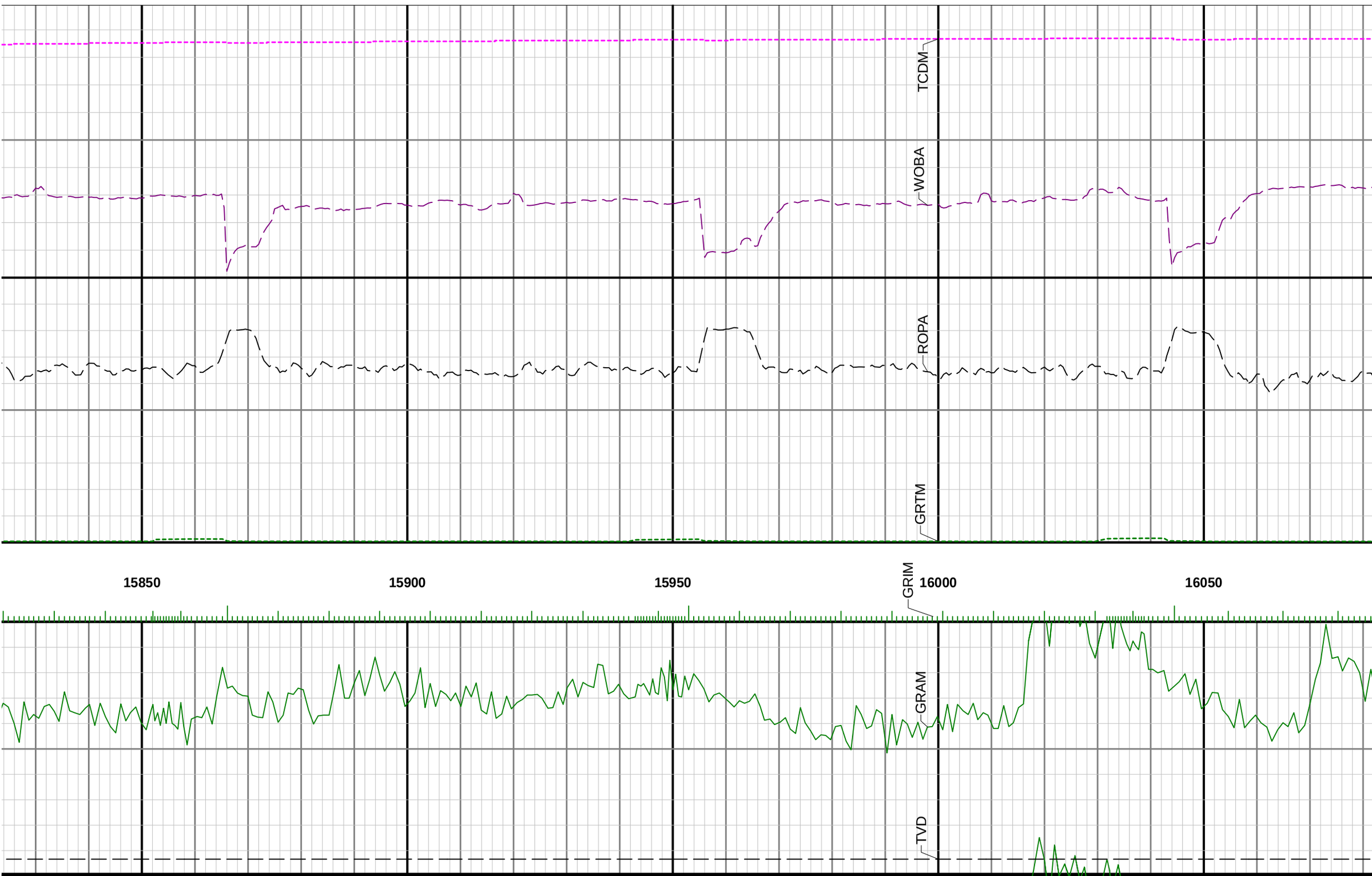
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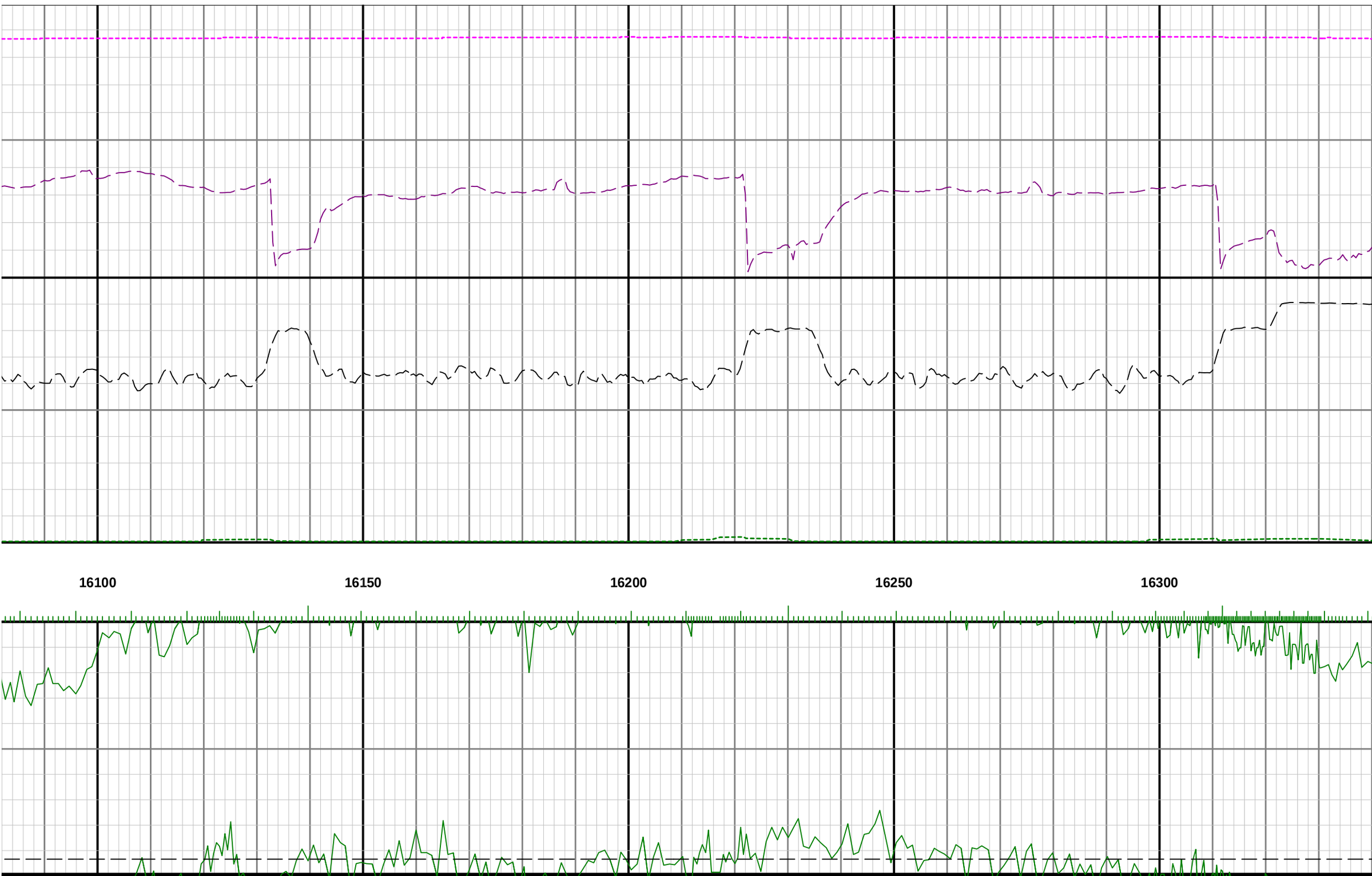
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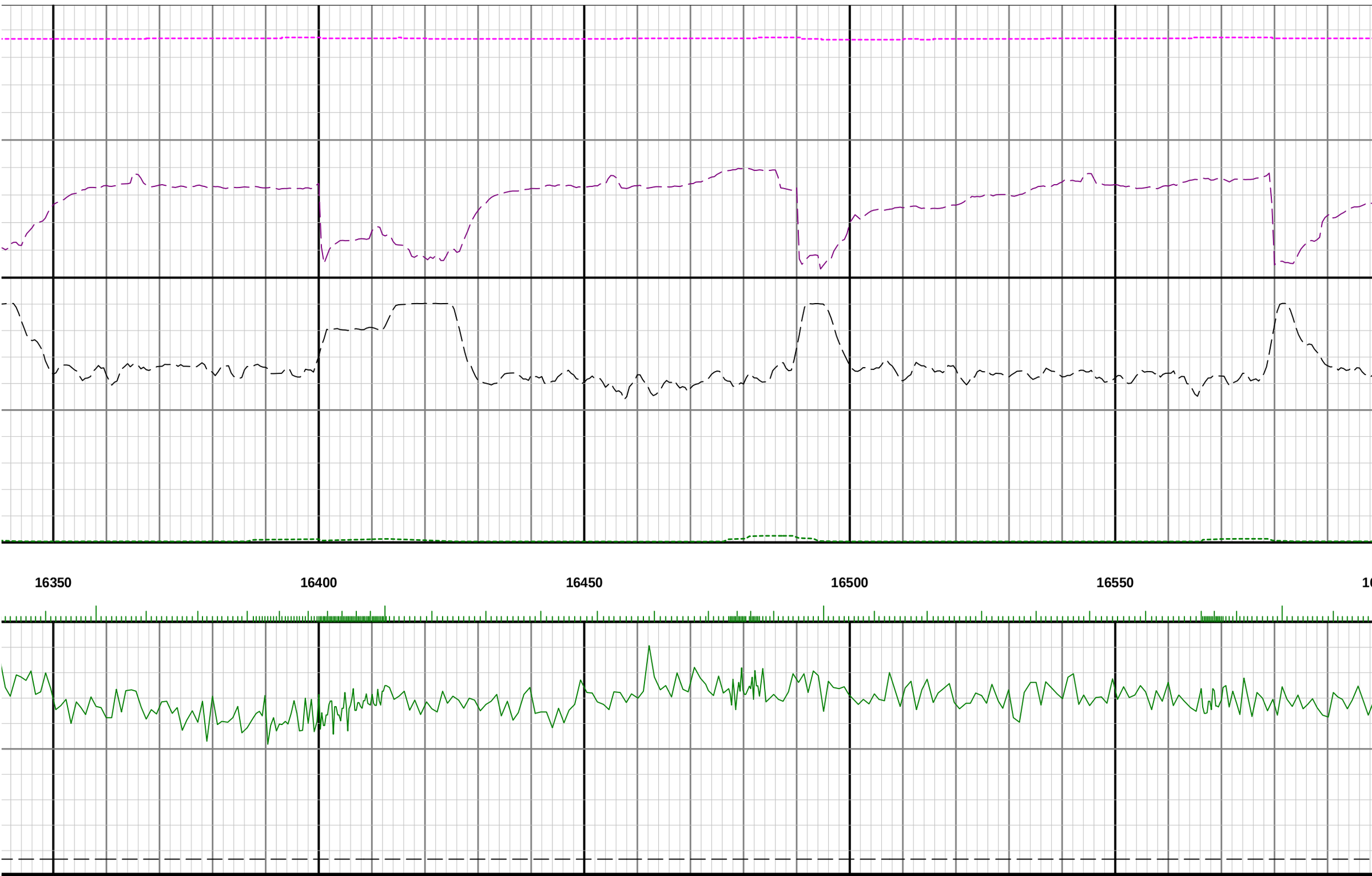
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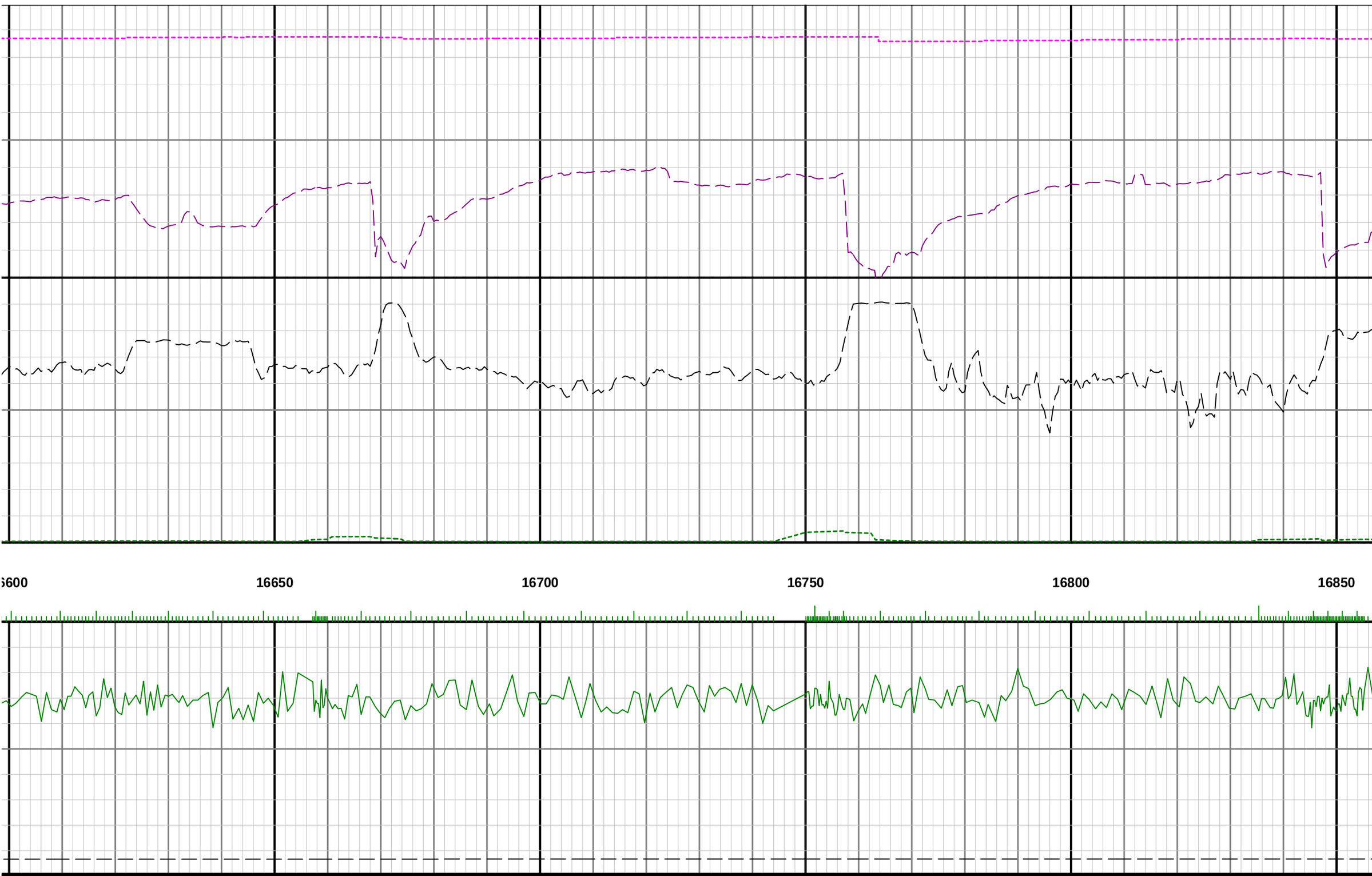
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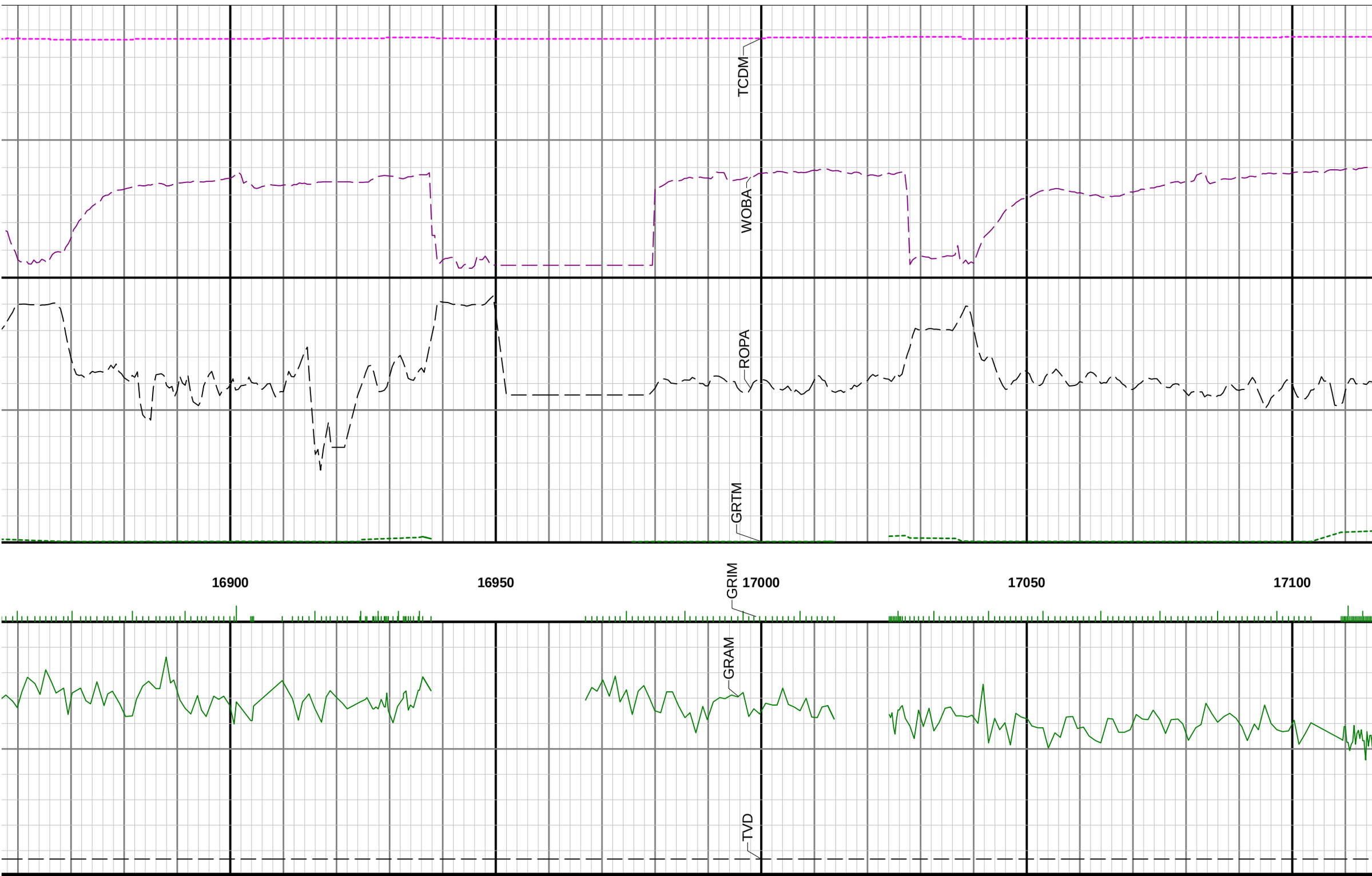
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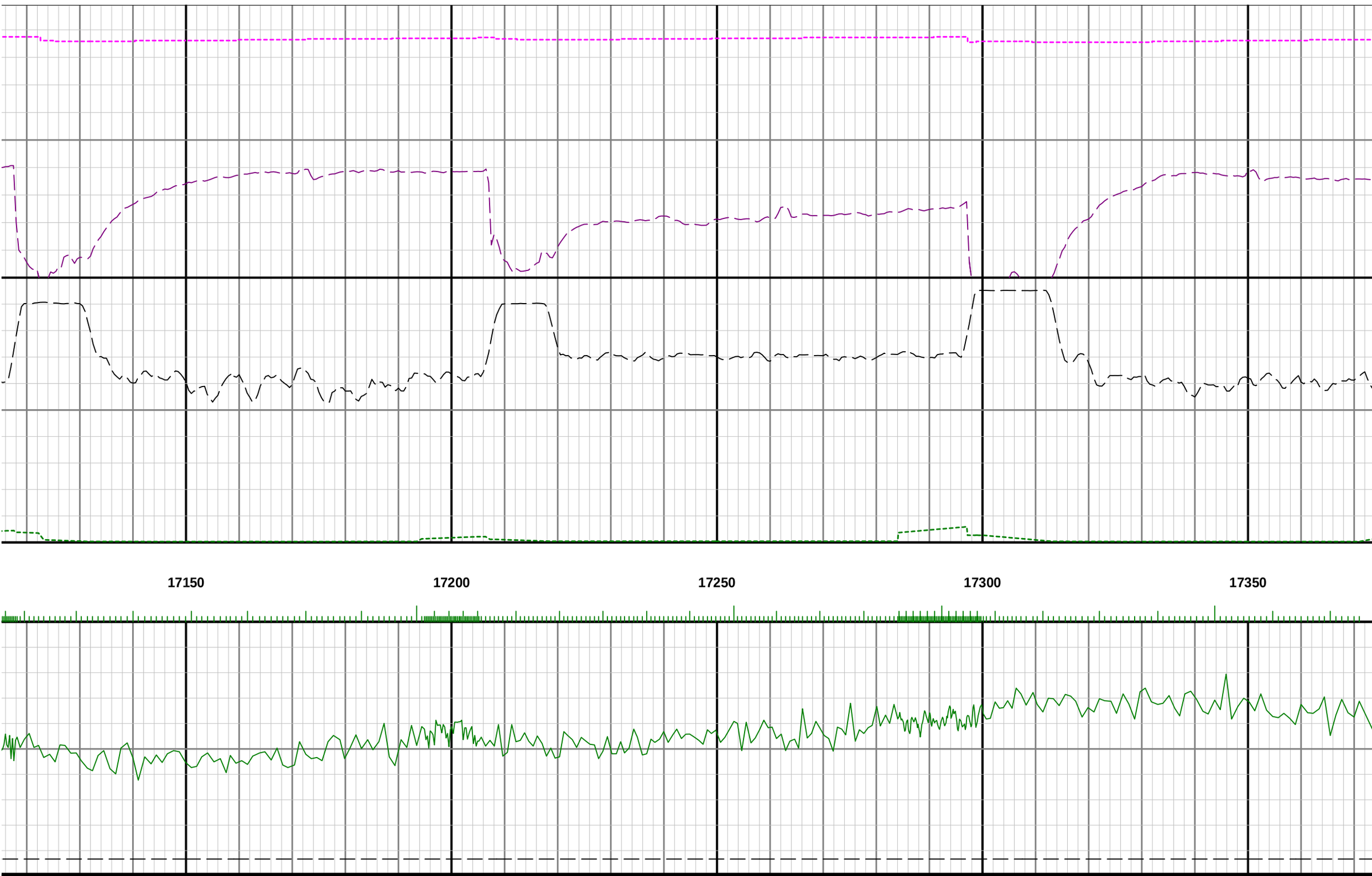
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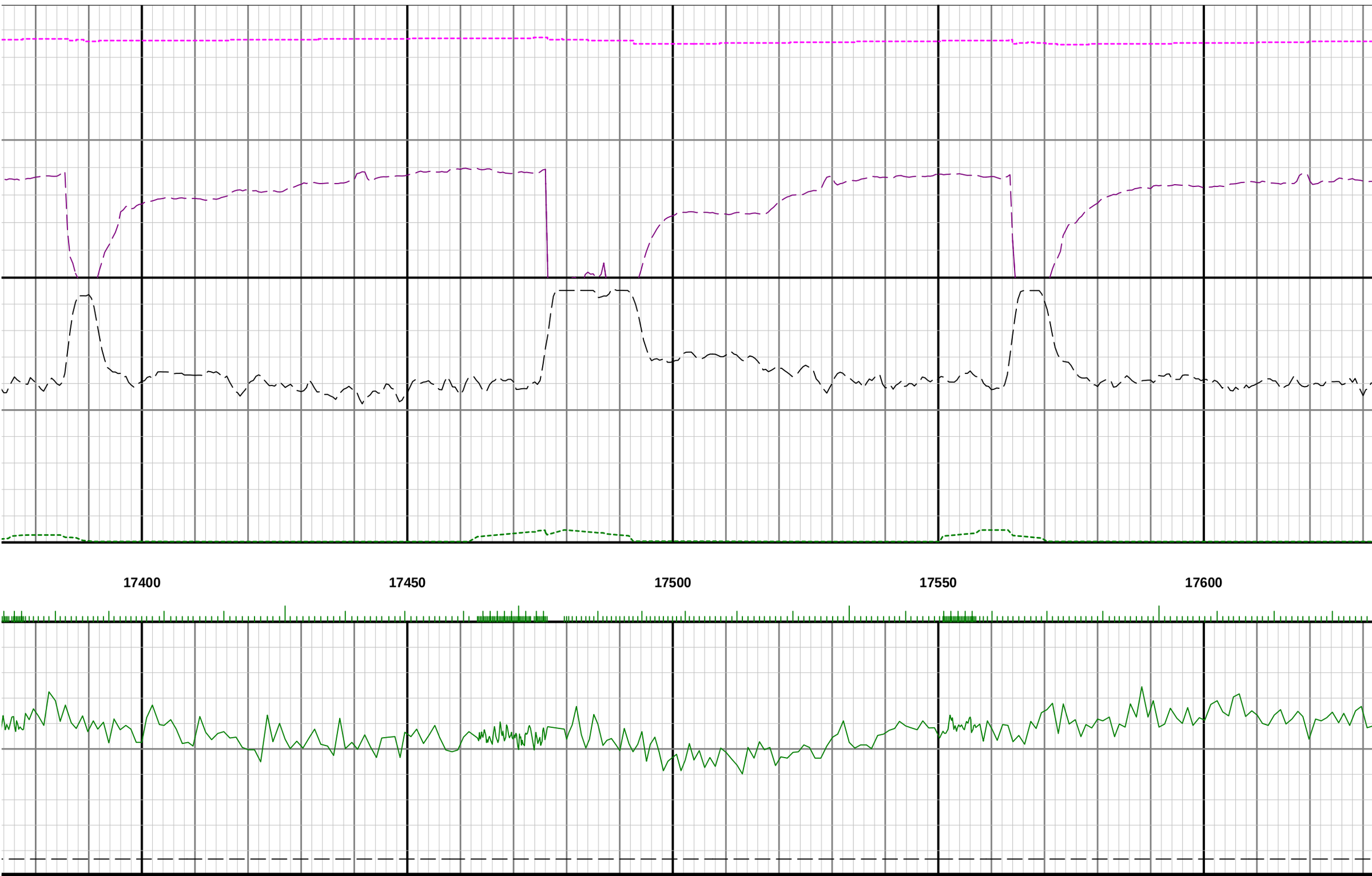
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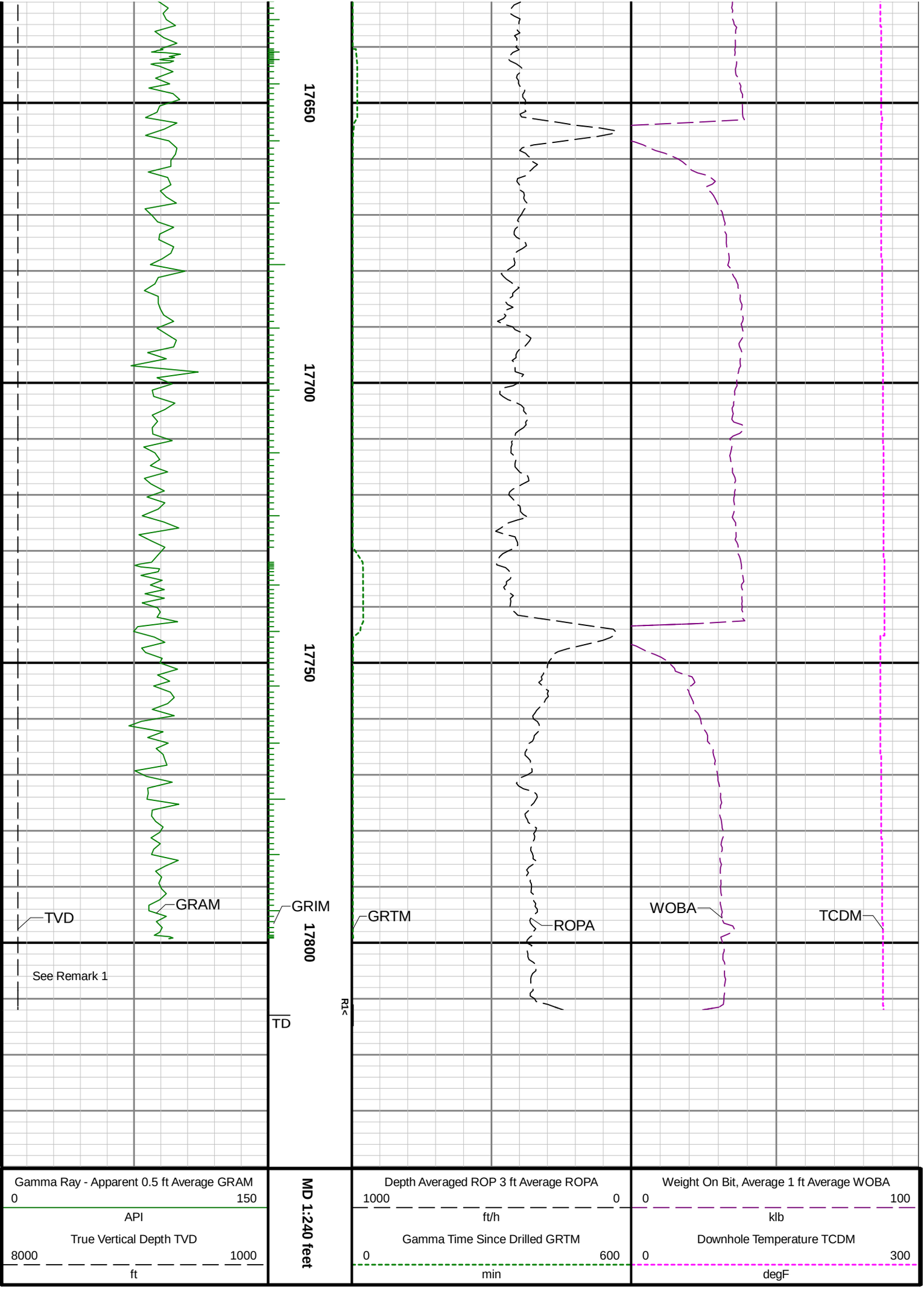
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R1<
Gamma Ray - Apparent 0.5 ft Average GRAM
0
150
API
True Vertical Depth TVD
8000
1000
ft
MD 1:240 feet
Depth Averaged ROP 3 ft Average ROPA
1000
0
ft/h
Gamma Time Since Drilled GRTM
0
600
min
Weight On Bit, Average 1 ft Average WOBA
0
100
klb
Downhole Temperature TCDM
0
300
degF