LWD MEMORY LOG

Gamma Ray

Scale: **1:240 MD**

Depth Reference: **Driller's Depth**

Company: Verdad Oil & Gas Corporation
Well: WARNER 01N-64W-17-2H
Field: Weld County
County: Weld **Country:** United States
State: Colorado

Status: **Final Print**

API No: 05-123-45163
Job ID: 8742017

Surface Location:
Latitude: 040° 02' 40.841" N
Longtitude: 104° 34' 32.542" W

Other Services:
Directional

Permanent Datum (P.D.):	Ground Level	Elevation:	5067.00 ft	Elev. KB:	N/A
Log Measured From:	Rig Floor	Above P.D.	16.00 ft	Elev. DF:	5083.00 ft
				Elev. GL:	5067.00 ft

Dates

Date From:	2017-09-16
Date To:	2017-09-19
Spud Date:	2017-09-06

Interval Logged

Top: (ft)	1753.05
Bottom: (ft)	17326.00

Magnetic Field Reference

Azi Reference North:	True
Dip Angle: (deg)	66.63
Total Magnetic Field Strength: (nT)	52210
Mag to Reference North Correction: (deg)	8.23 E

Borehole Record

Hole Size (in)	From (ft)	To (ft)
13.500	16.00	1754.00
8.500	1754.00	17326.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	16.00	1744.00

Mud Record

Type	From (ft)	To (ft)
Water Based Mud	16.00	1754.00
Oil Based Mud	1754.00	17326.00

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
13.500	1738.00	0.13 | 324.22	13.74 | 251.71
8.500	15572.00	13.74 | 251.71	90.22 | 2.43

Acquisition System / Software Version

Baker Hughes Cadence	RT4.1
PlotStudio	4.1.7763.3

Other

Rig:
Contractor: Xtreme 20
District: RMA Unit: D&E Xtreme Drilling

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)
2	2	8.500	PDC	3.00	AutoTrak Curve	1754.00	17313.00	1754.00	17326.00	2017-09-16 05:54	2017-09-19 15:14	69.05

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Eugene Igwe	2017-09-15	2017-09-17	Ryan Hull	2017-09-15	2017-09-20
			John Bryson	2017-09-17	2017-09-20

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+ (%)
2017-09-16 05:00	2	1754.00	Oil Based Mud	9.5	22	N/A	10.0	72/28	Active Pit	45000	0.00
2017-09-17 05:30	2	6830.00	Oil Based Mud	9.8	19	N/A	8.6	77/23	Active Pit	40000	0.00

2017-09-18 05:00	2	11284.00	Oil Based Mud	9.8	19	N/A	8.6	77/23	Active Pit	42000	0.00
2017-09-19 05:00	2	15863.00	Oil Based Mud	9.9	19	N/A	8.0	77/23	Active Pit	39500	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)
2	ATC_SU	1215165	Near Bit VSS	5.93	6.71	7.000	4.330
2	ATC_SU	1215165	Near Bit Inclination	5.93	6.71	7.000	4.330
2	ATC_MWD	12211066	Gamma (single)	2.73	12.88	7.000	3.250
2	ATC_MWD	12211066	Directional (mag)	12.26	22.41	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
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 Depth measurements 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.

2 Baker Hughes LWD Run 2 utilized 6 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 1754 to 17326 feet MD (1725 to 7069 feet TVD).

Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1754.00	8.500	2	Baker Hughes LWD began logging services at 1754 feet MD (1725 feet TVD) per client request.
2	1877.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 1877 to 1896 feet MD (1844 to 1863 feet TVD) due to a jump in the depth tracking system.
3	2147.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 2147 to 2166 feet MD (2106 to 2125 feet TVD) due to high penetration rate and downlinking while on bottom.
4	2323.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 2323 to 2344 feet MD (2277 to 2298 feet TVD) due to high penetration rate and downlinking while on bottom.
5	2402.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 2402 to 2428 feet MD (2354 to 2379 feet TVD) due to high penetration rate and downlinking while on bottom.
6	2500.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 2500 to 2516 feet MD (2449 to 2465 feet TVD) due to high penetration rate and downlinking while on bottom.
7	2588.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 2588 to 2605 feet MD (2535 to 2551 feet TVD) due to high penetration rate and downlinking while on bottom.
8	3480.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 3480 to 3495 feet MD (3400 to 3414 feet TVD) due to high penetration rate and downlinking while on bottom.
9	3515.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 3515 to 3573 feet MD (3434 to 3490 feet TVD) due to high penetration rate and downlinking while on bottom.
10	4814.00	8.500	2	Gap in memory data (GRAM, GRIM, and TCDM) in the interval from 4814 to 4830 feet MD (4692 to 4708 feet TVD) due to high penetration rate and downlinking while on bottom.
11	17326.00	8.500	2	The interval from 17313 to 17326 feet MD (7069 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	OnTrak - 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

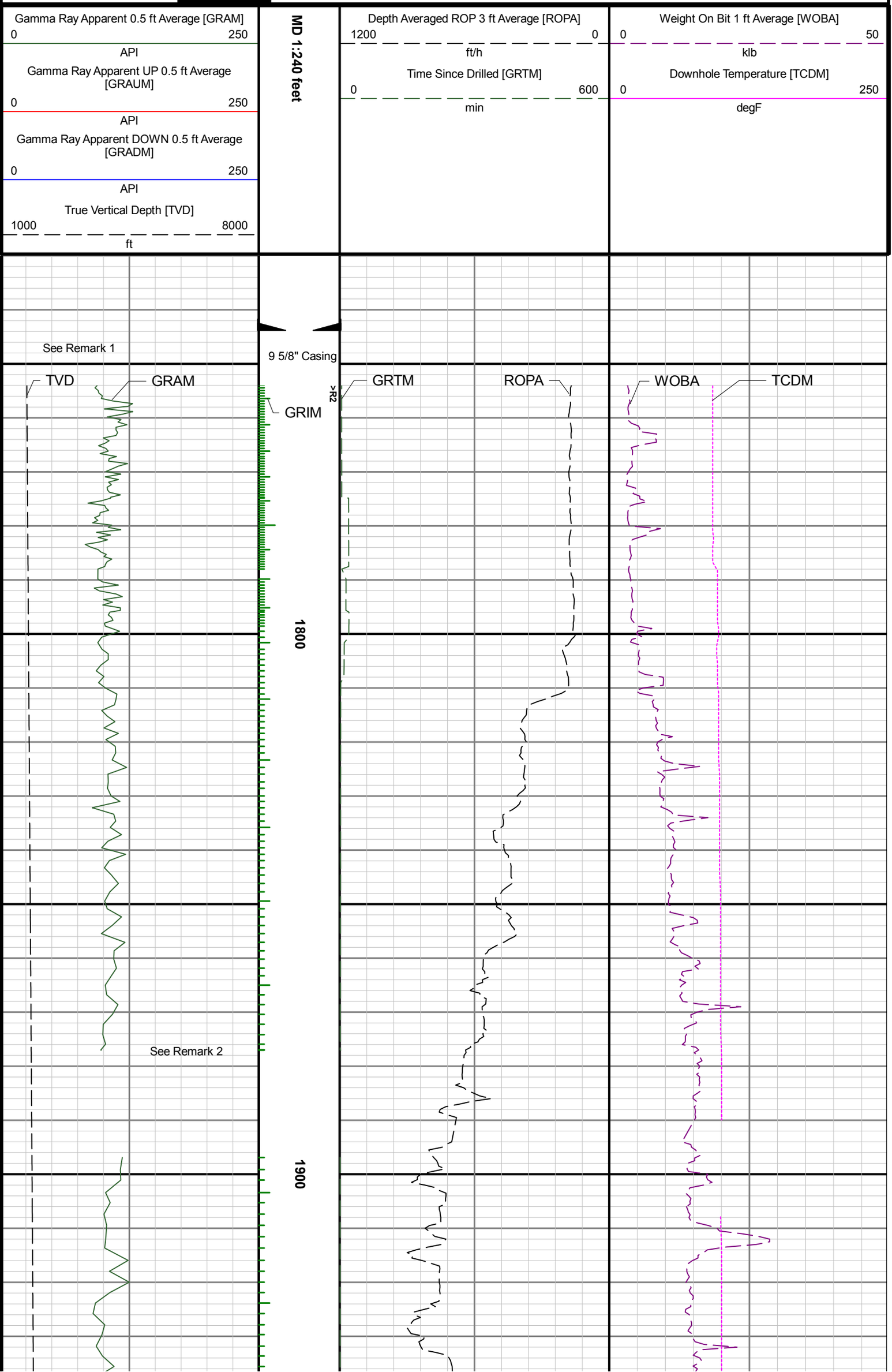
Company Verdad Oil & Gas Corporation

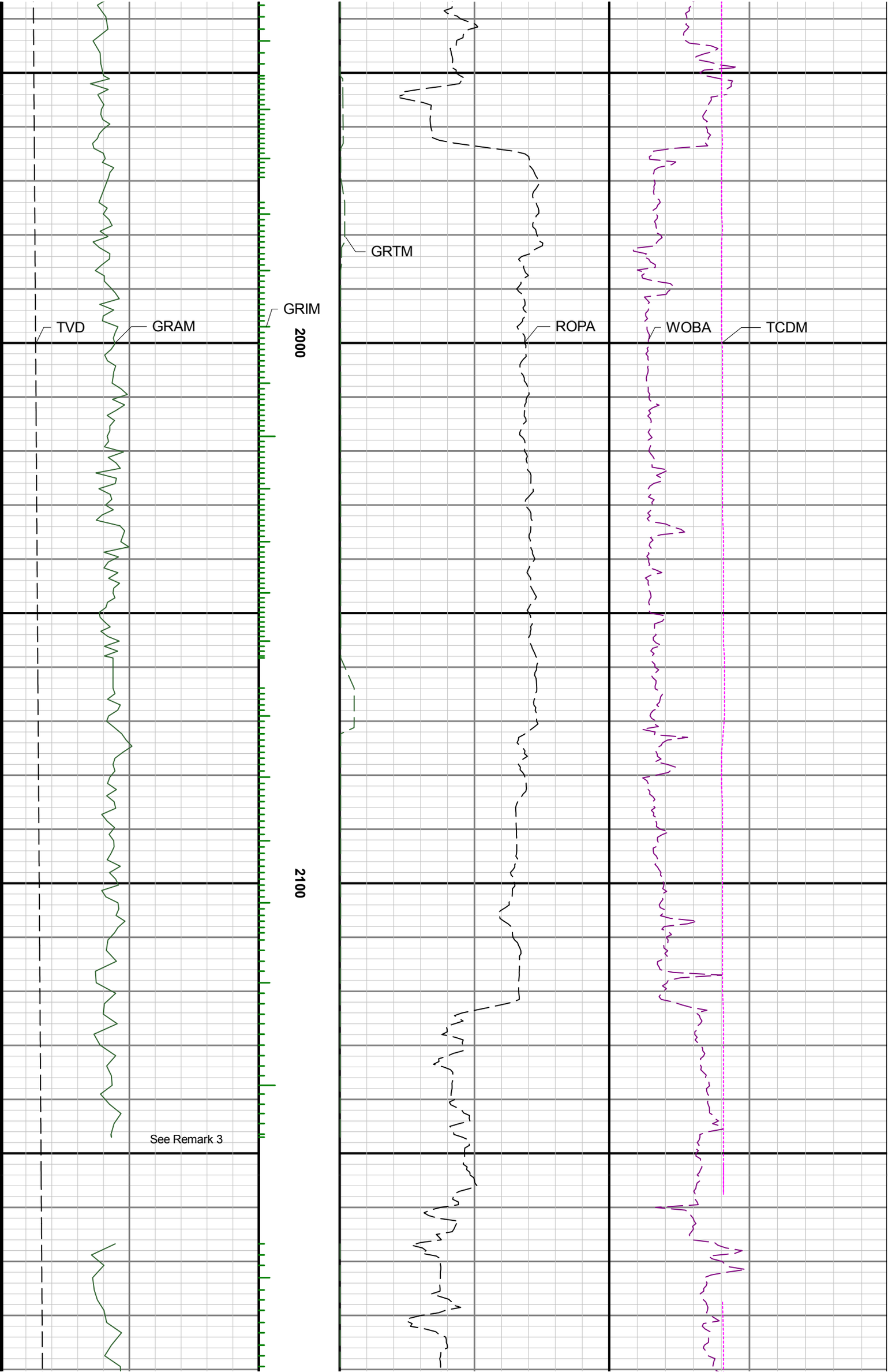
Well WARNER 01N-64W-17-2H

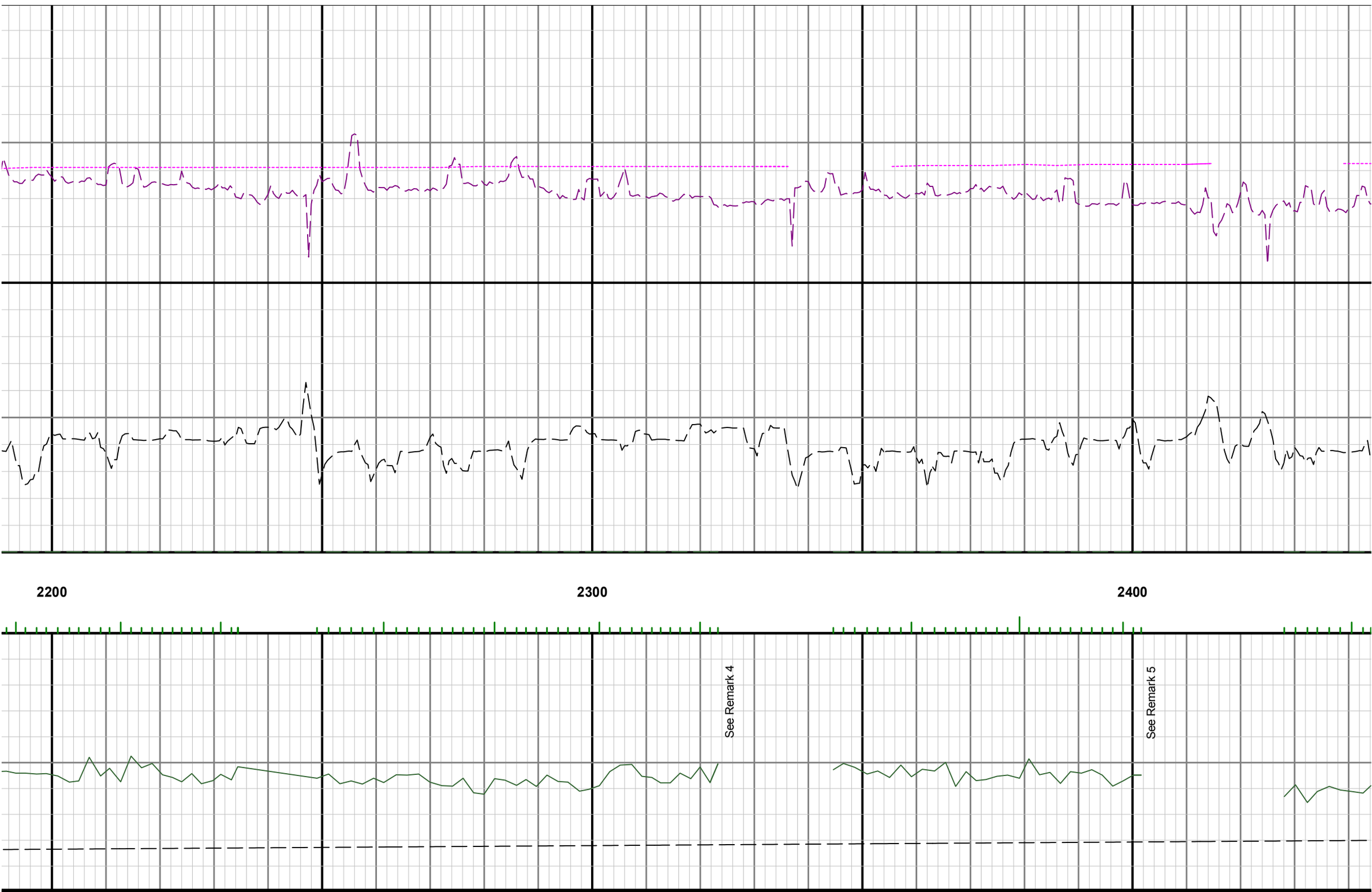
Interval **Date From:** 2017-09-16 05:54:53 **Top:** 1754.00

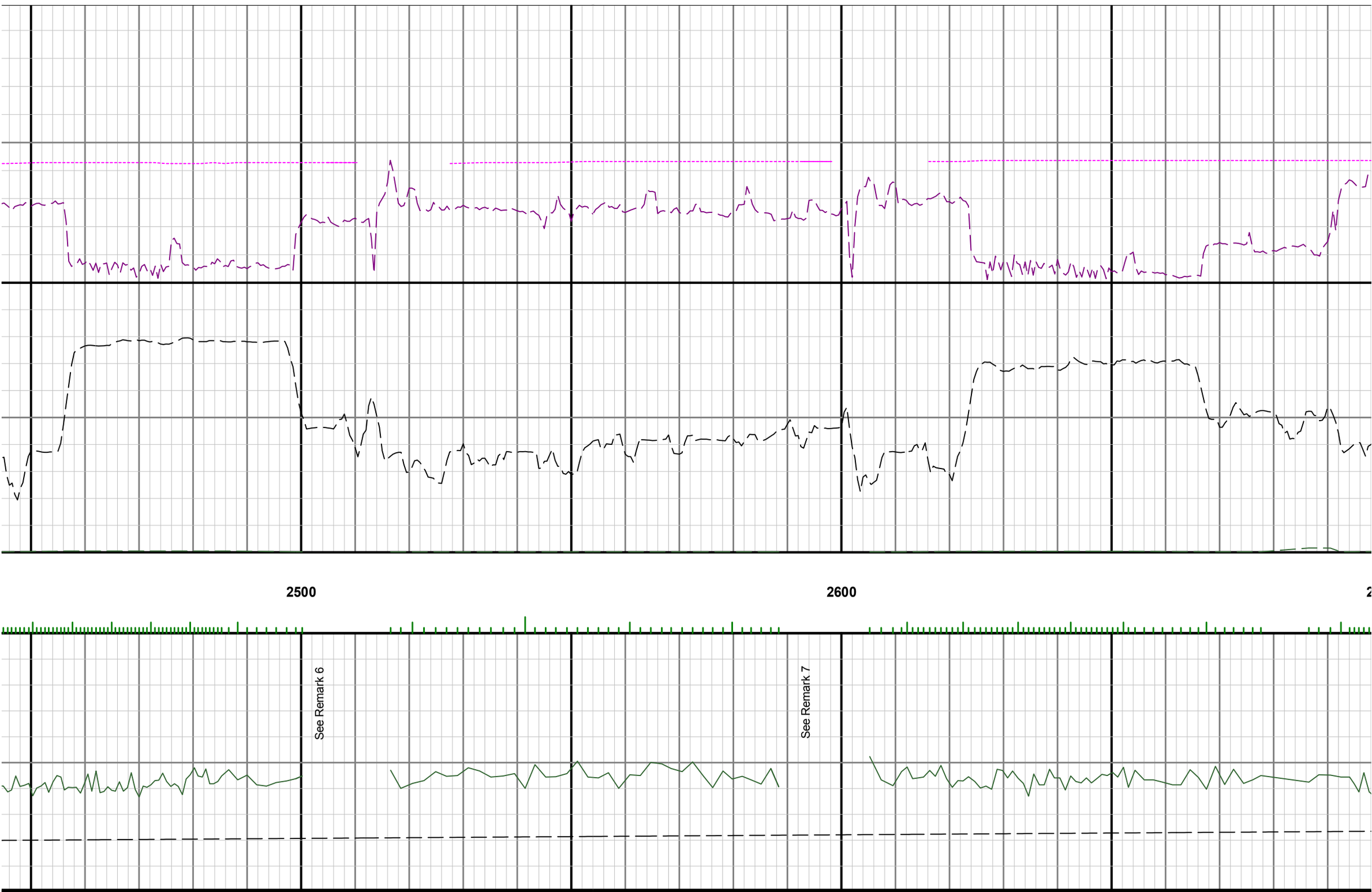
Date To: 2017-09-19 15:13:37 **Bottom:** 17326.00

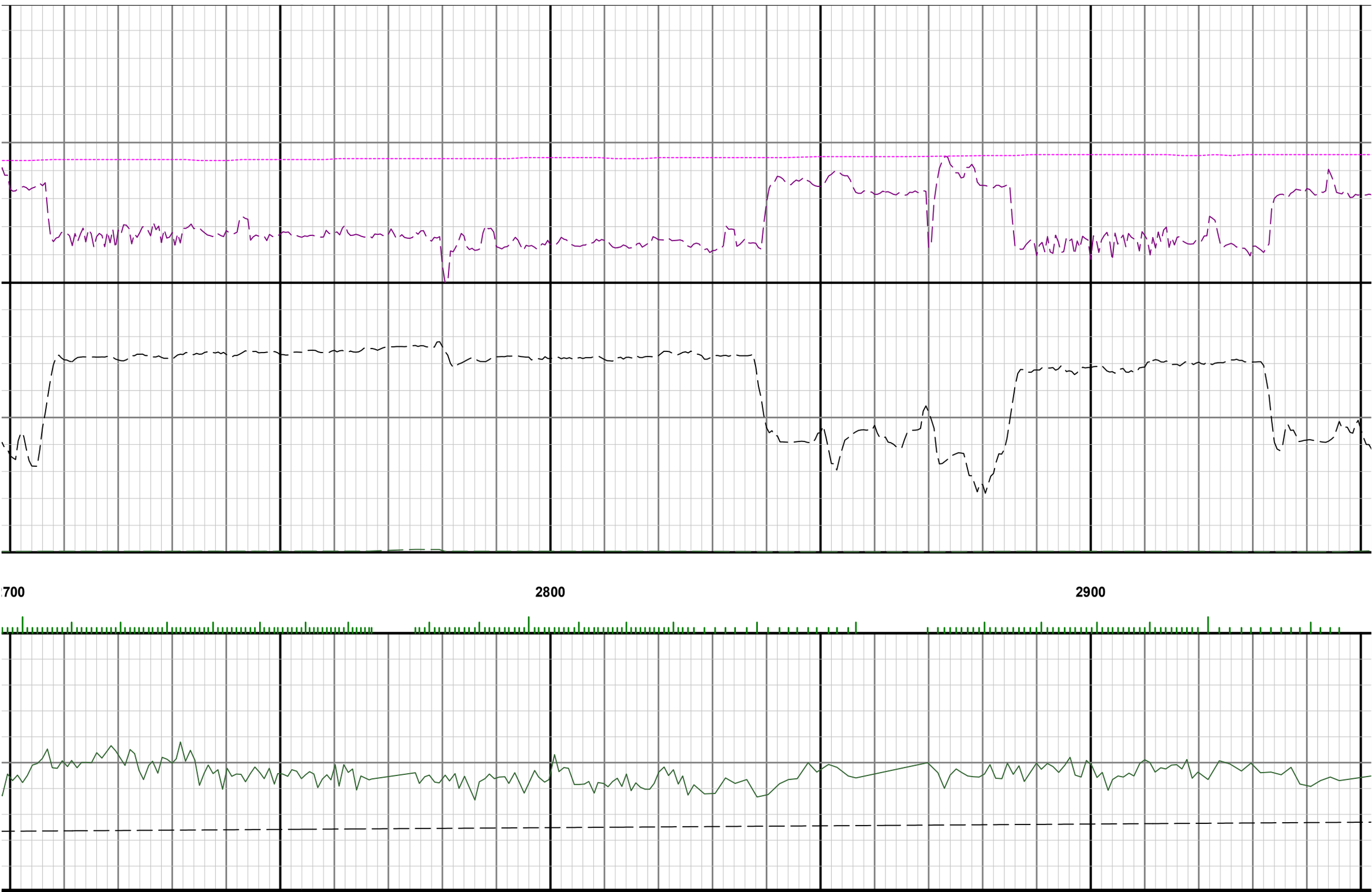
Created 2017-09-20 14:51:04

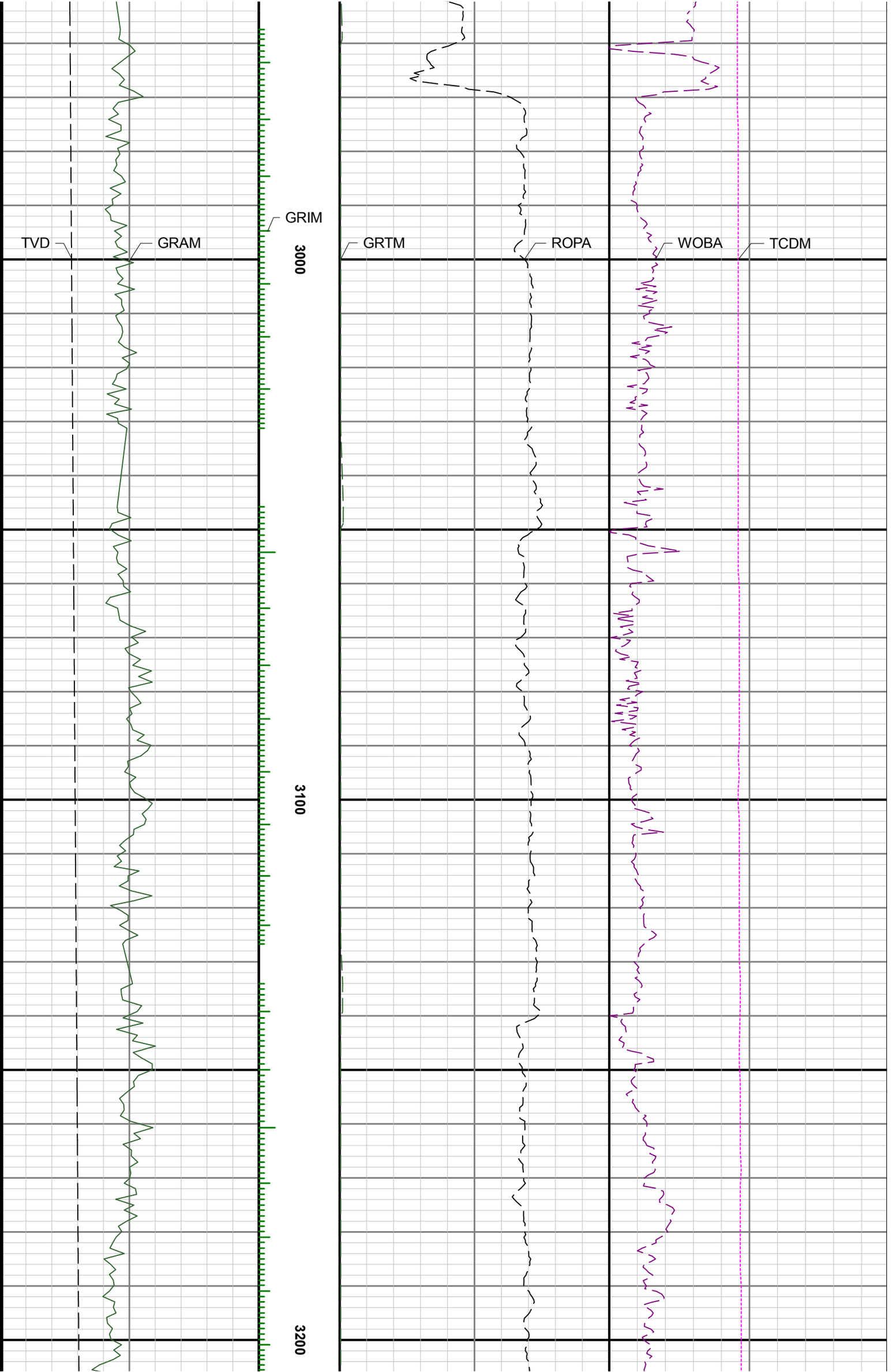

Gamma Ray Apparent 0.5 ft Average [GRAM]
0
250
API
Gamma Ray Apparent UP 0.5 ft Average [GRAUM]
0
250
API
Gamma Ray Apparent DOWN 0.5 ft Average [GRADM]
0
250
API
True Vertical Depth [TVD]
1000
8000
ft
MD 1:240 feet
Depth Averaged ROP 3 ft Average [ROPA]
1200
0
ft/h
Time Since Drilled [GRTM]
0
600
min
Weight On Bit 1 ft Average [WOBA]
0
50
klb
Downhole Temperature [TCDM]
0
250
degF
See Remark 1
9 5/8" Casing
TVD
GRAM
GRIM
GRTM
ROPA
WOBA
TCDM
1800
See Remark 2
1900

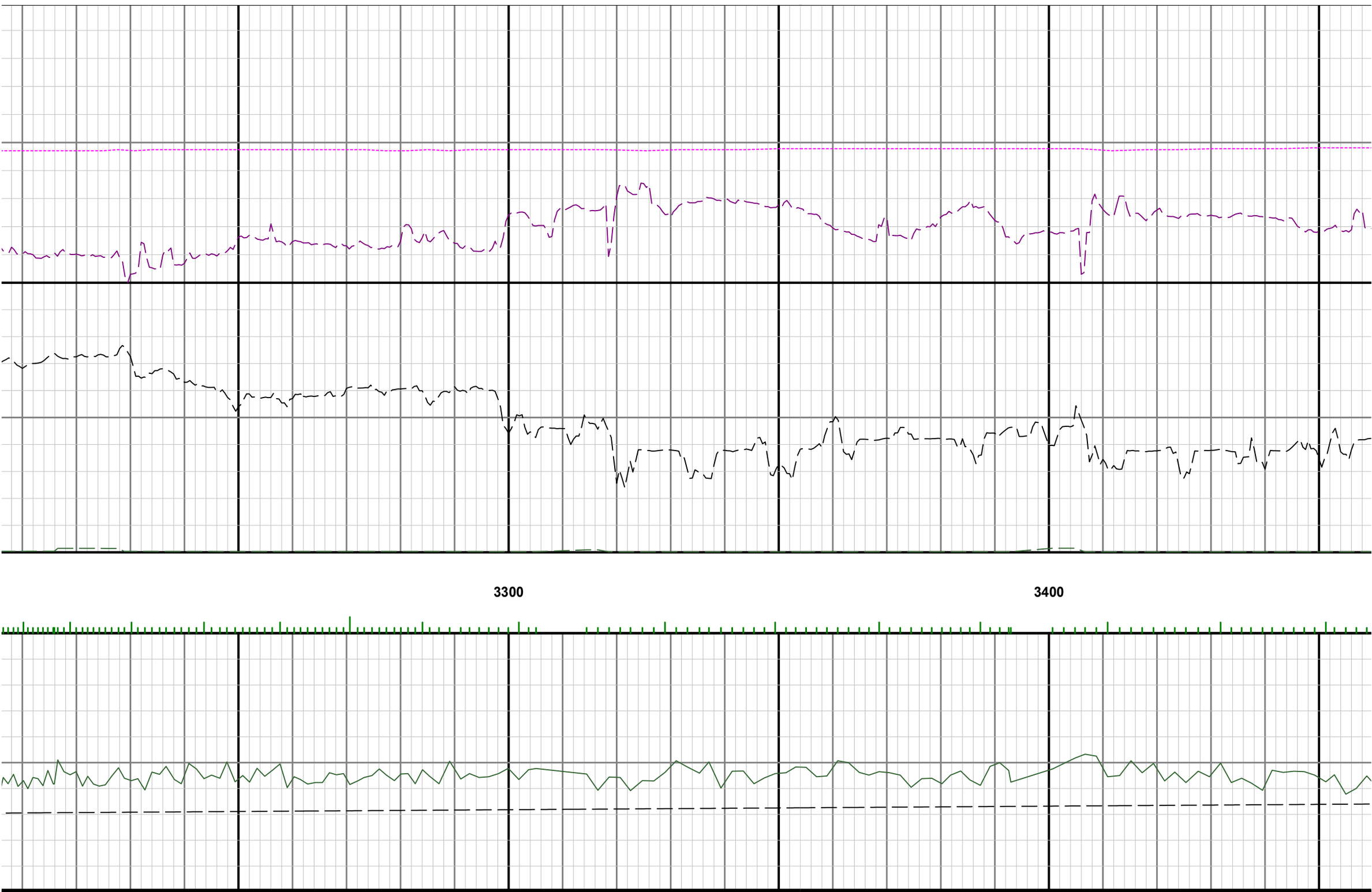

TVD
GRAM
GRIM
GRTM
ROPA
WOBA
TCDM
2000
2100
See Remark 3

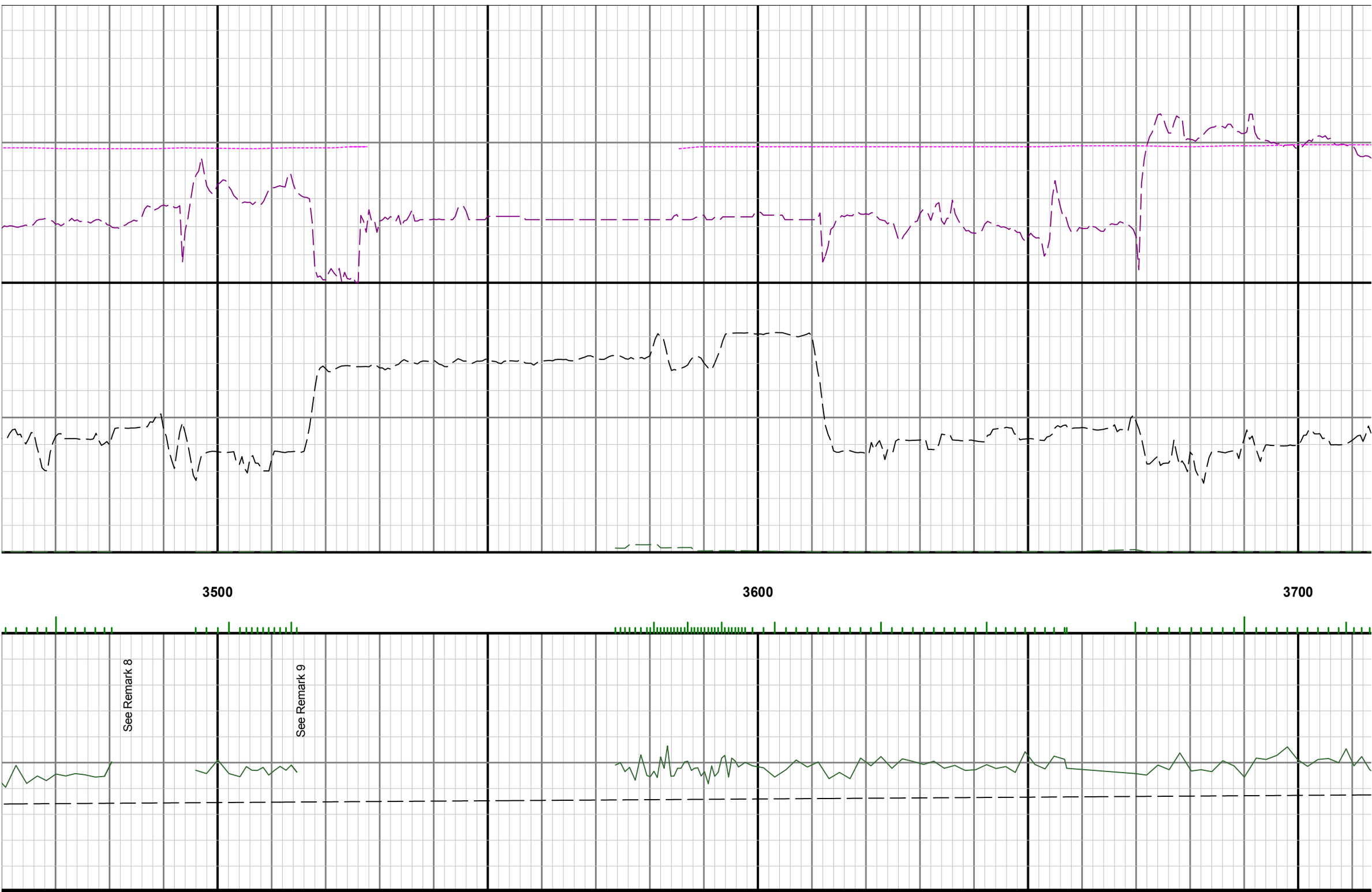

2200
2300
2400
See Remark 4
See Remark 5

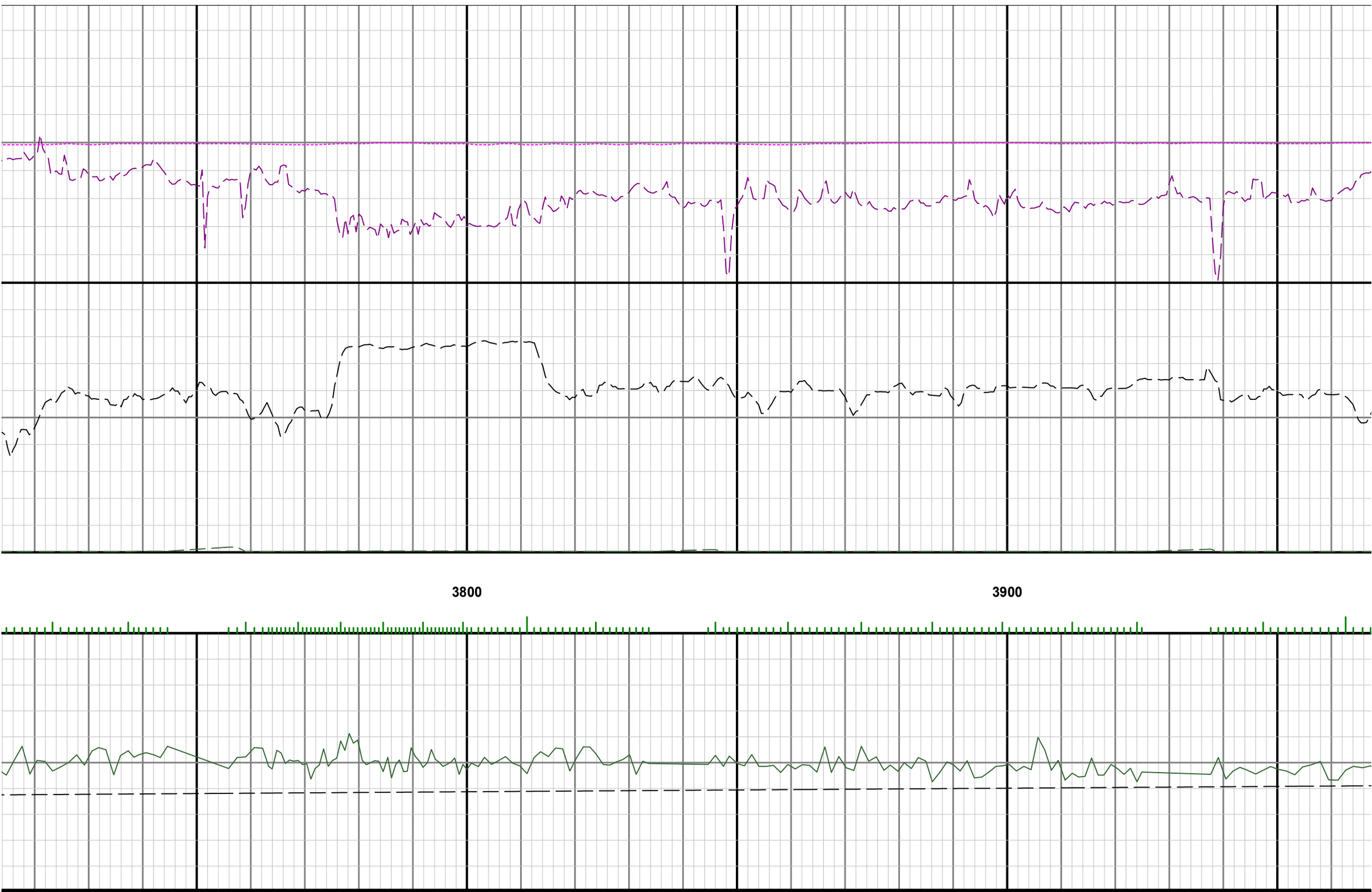

2500
2600
See Remark 6
See Remark 7

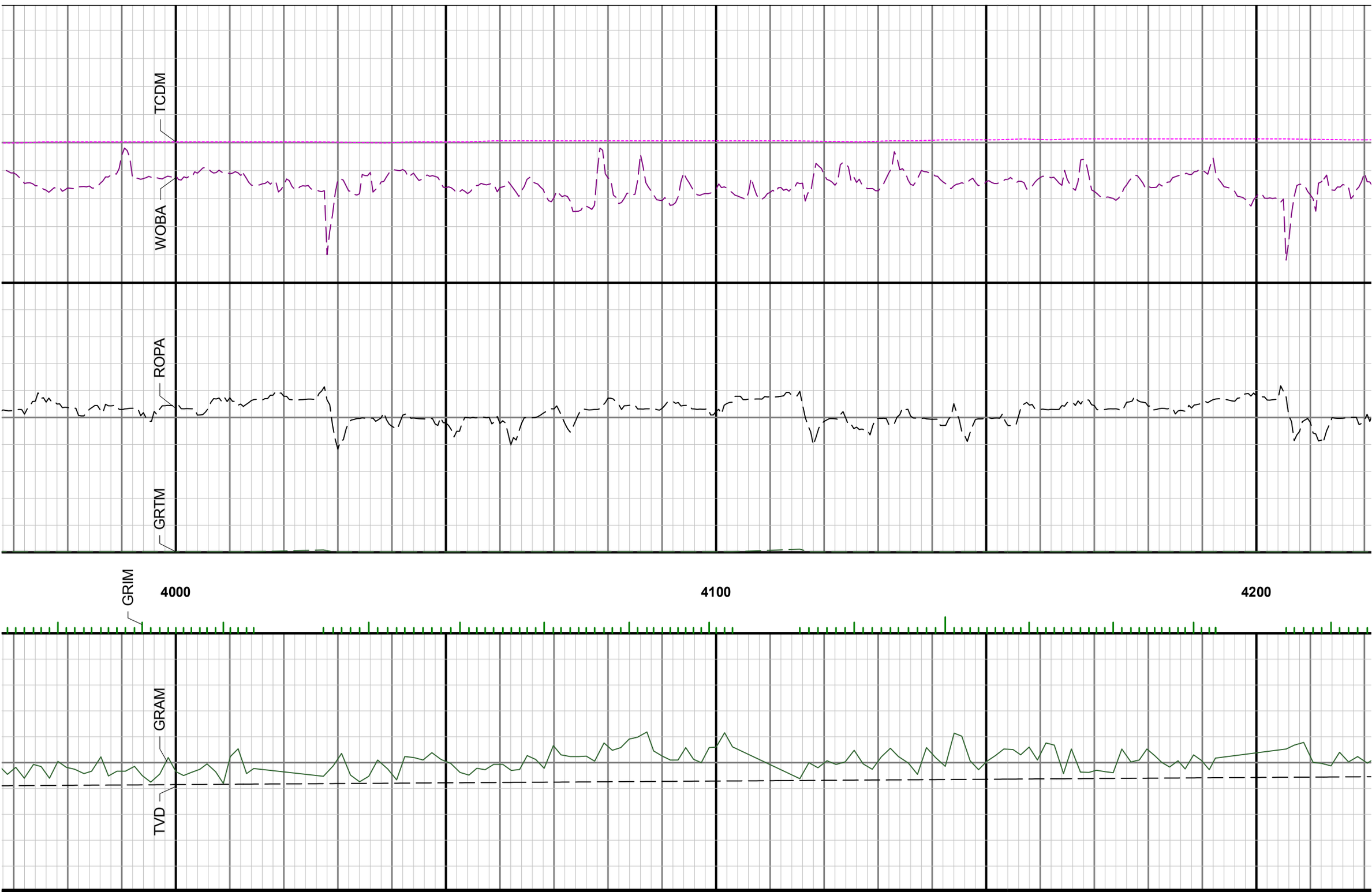

700
2800
2900

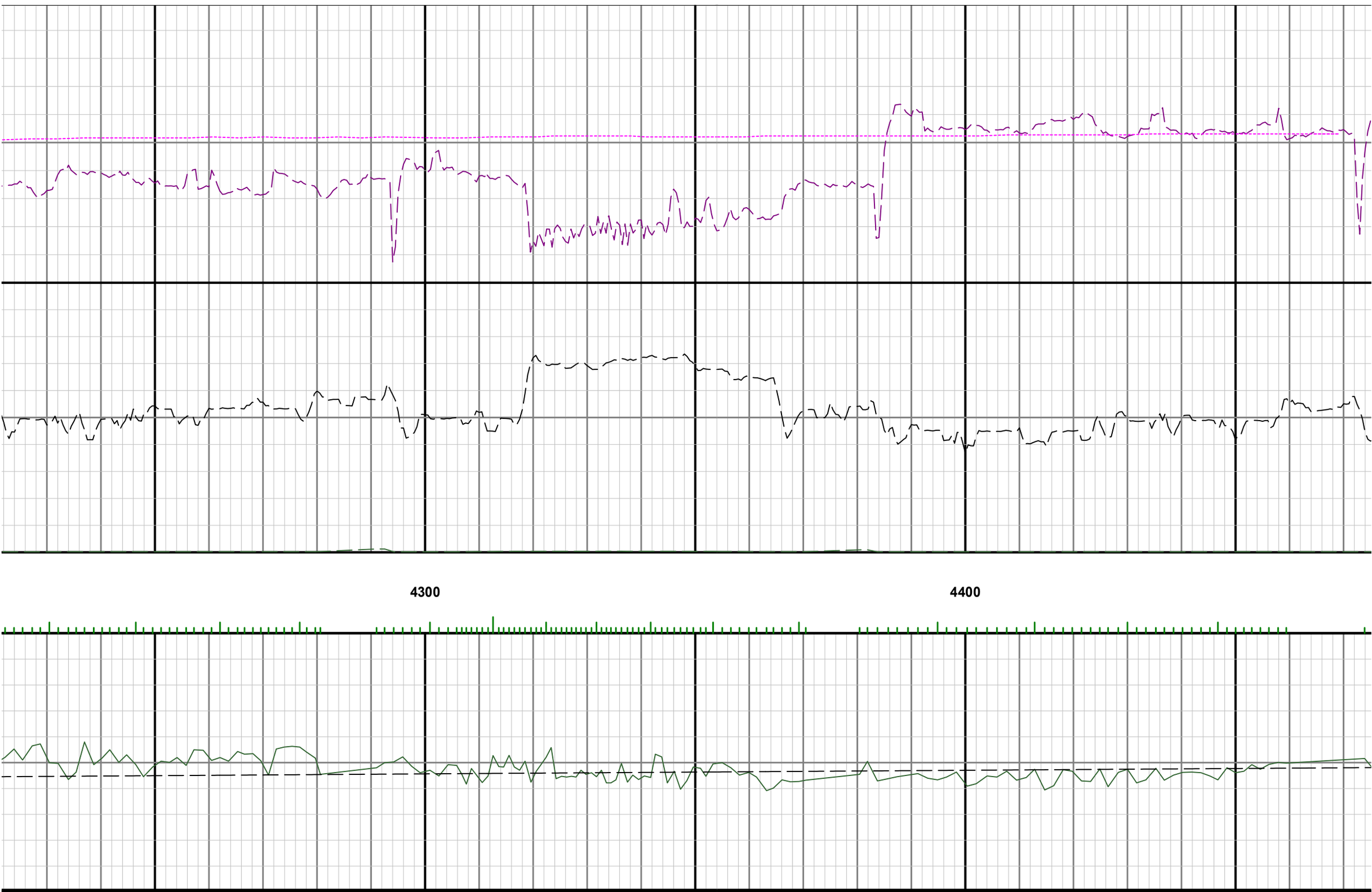

TVD
GRAM
GRIM
GRTM
ROPA
WOBA
TCDM
3000
3100
3200

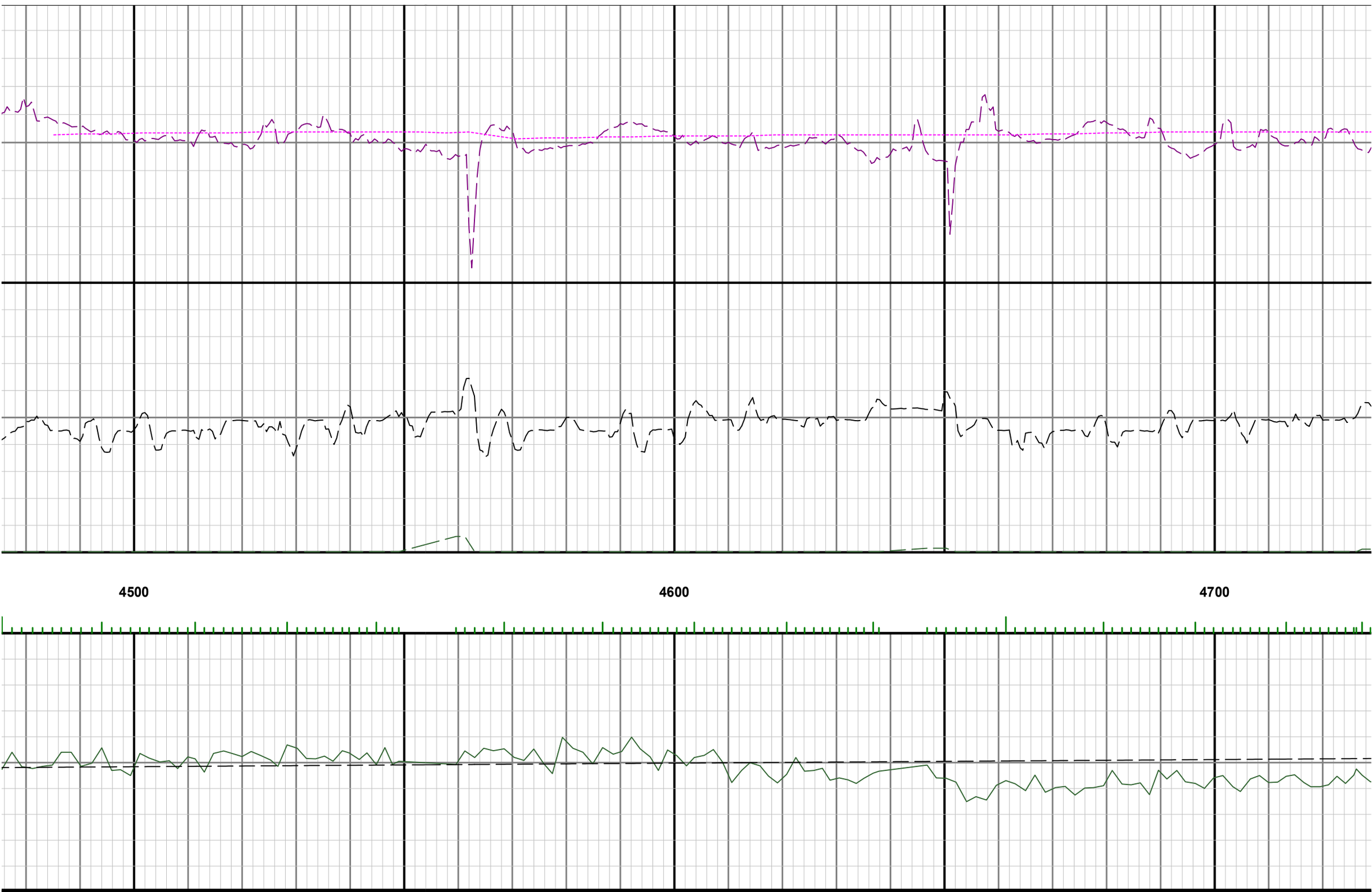

3300
3400

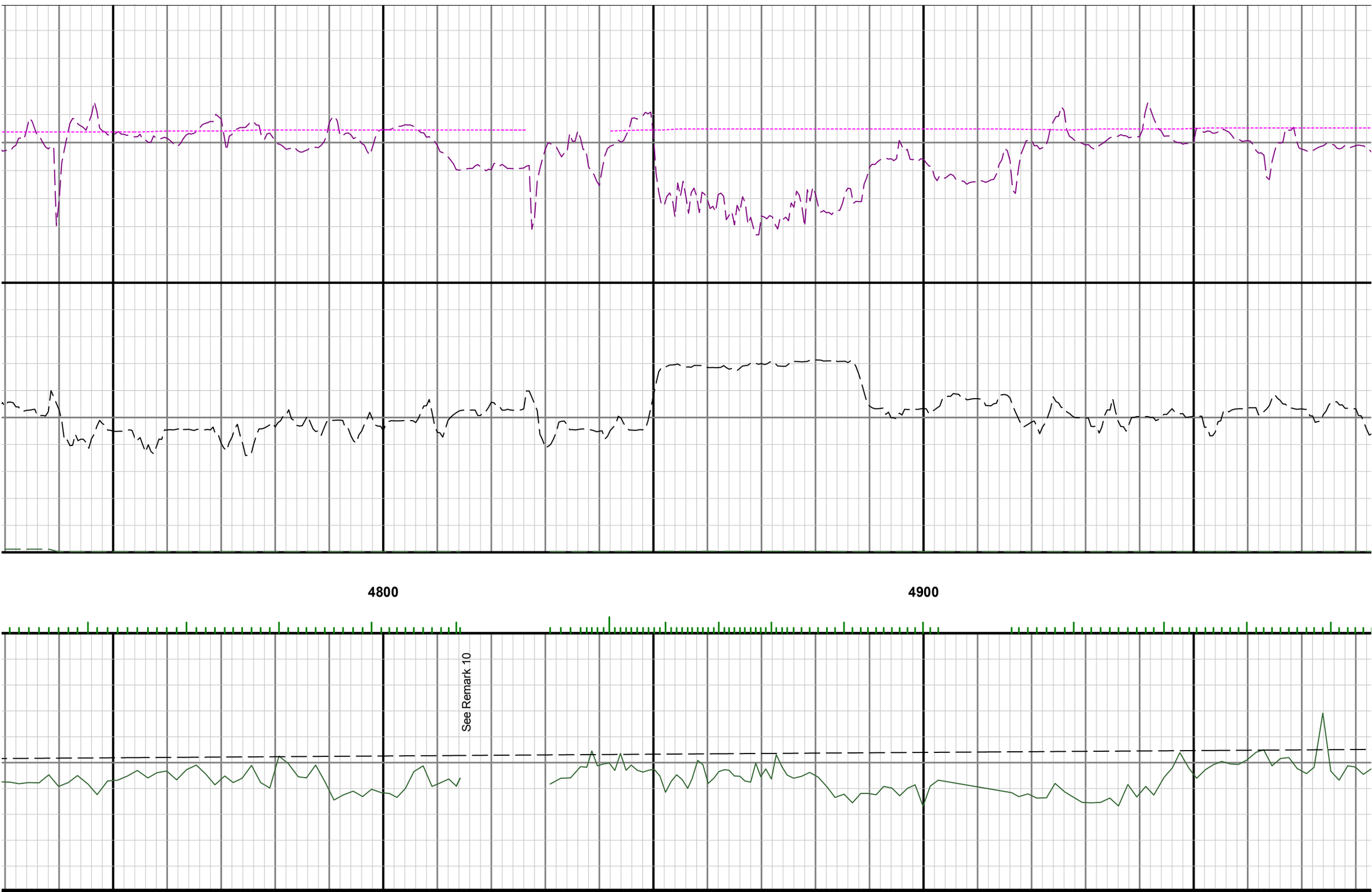

3500
3600
3700
See Remark 8
See Remark 9

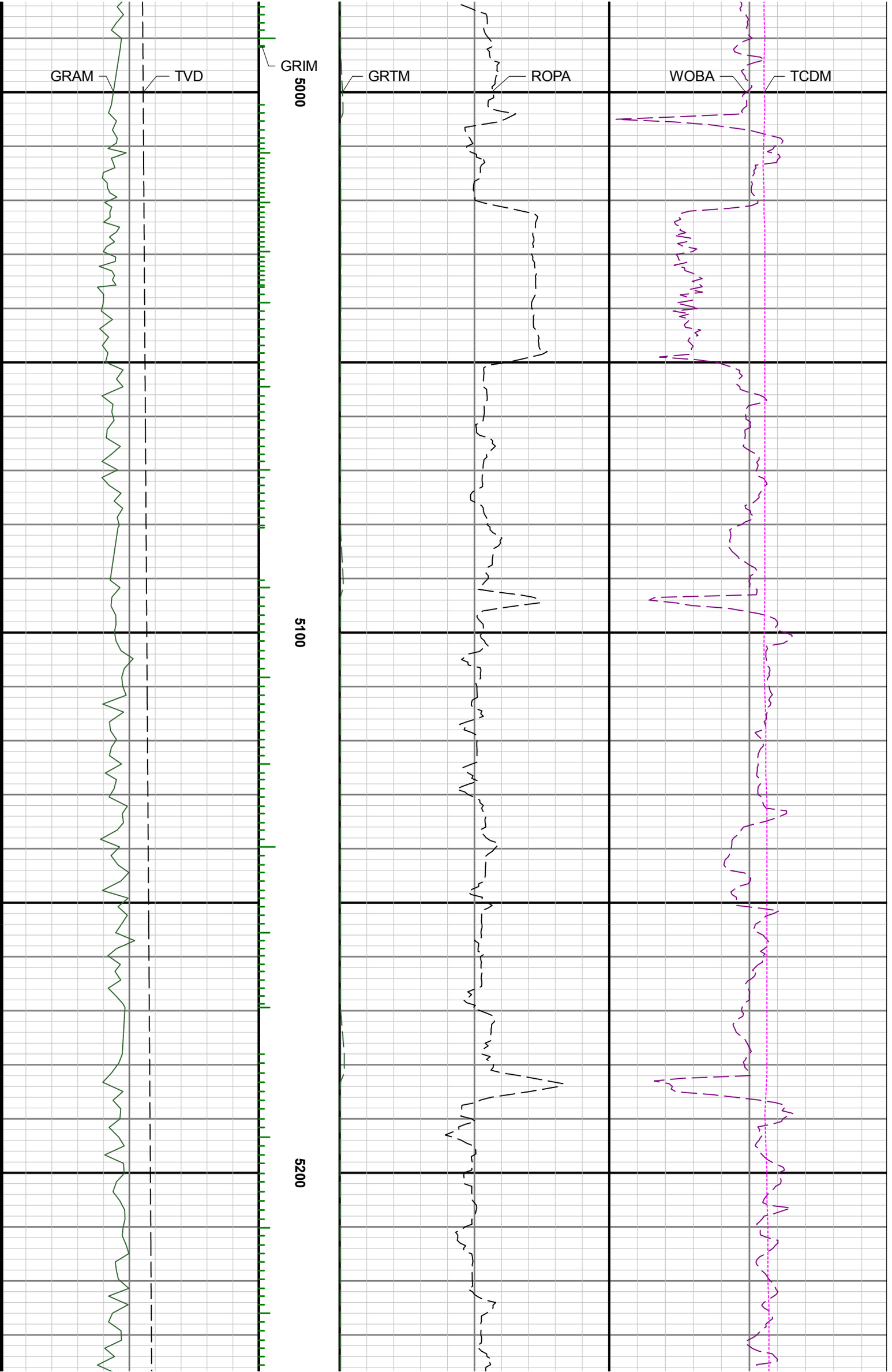

3800
3900

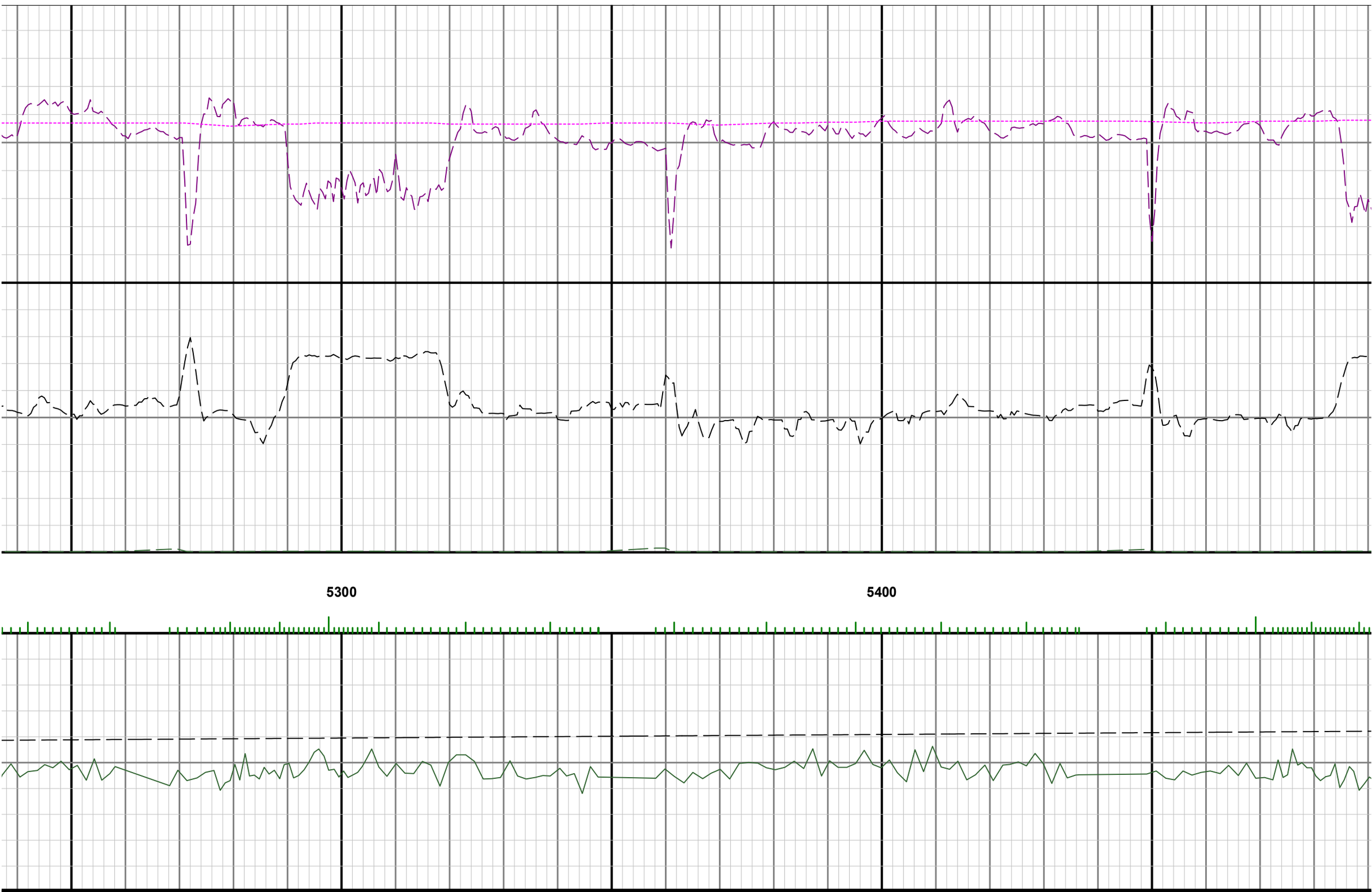

TCDM
WOBA
ROPA
GRTM
GRIM
4000
4100
4200
GRAM
TVD

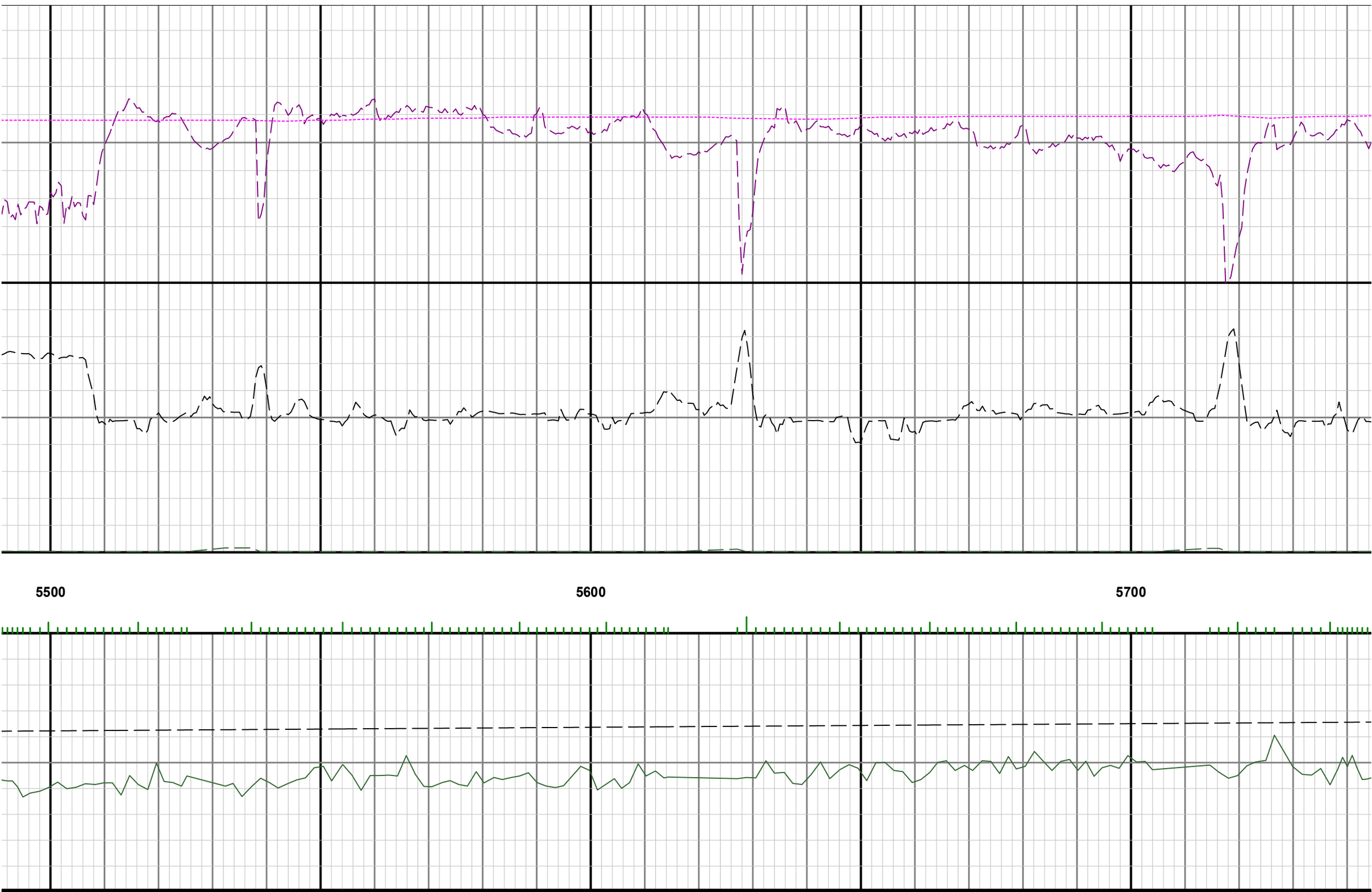

4300
4400

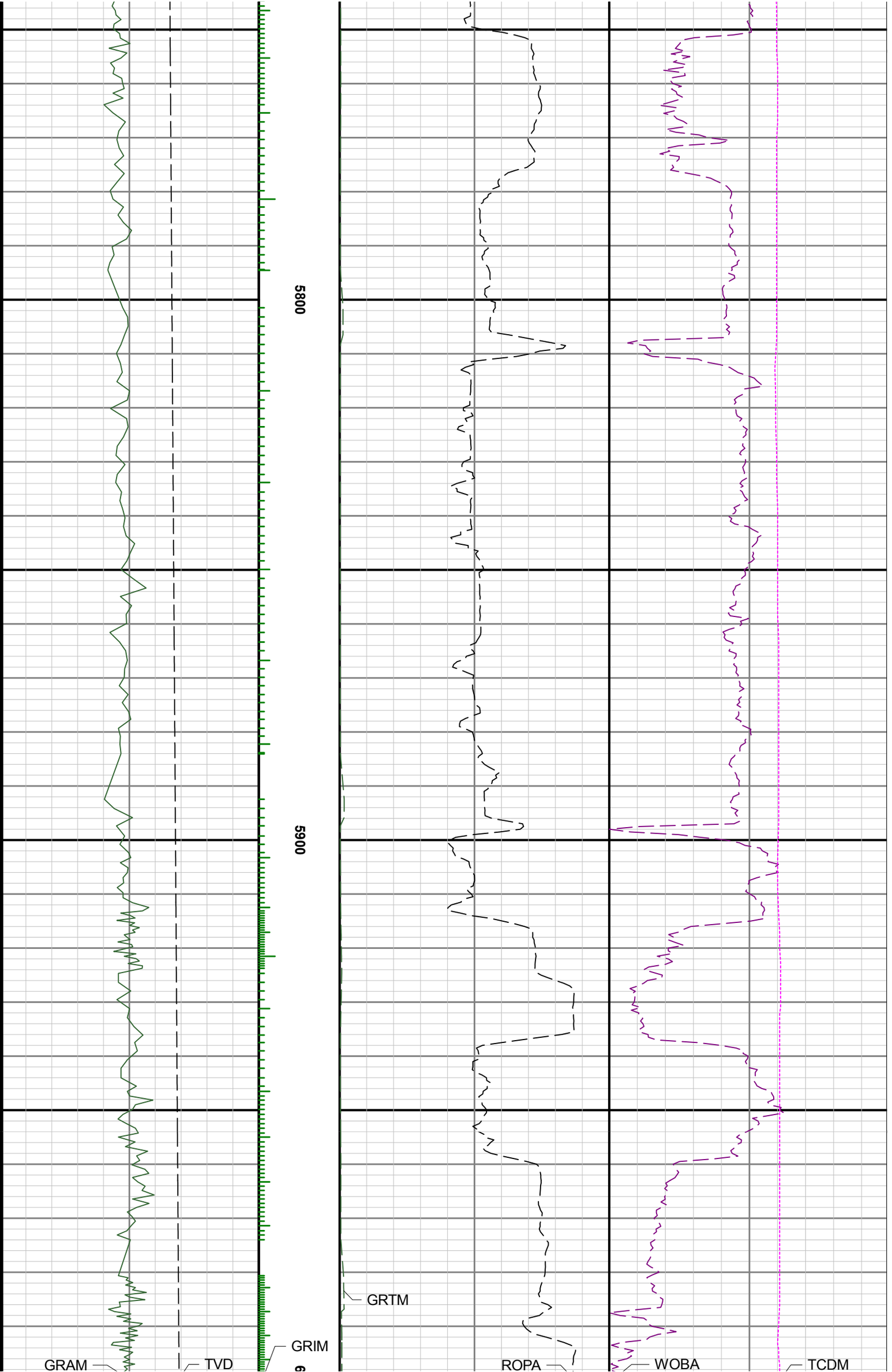

4500
4600
4700

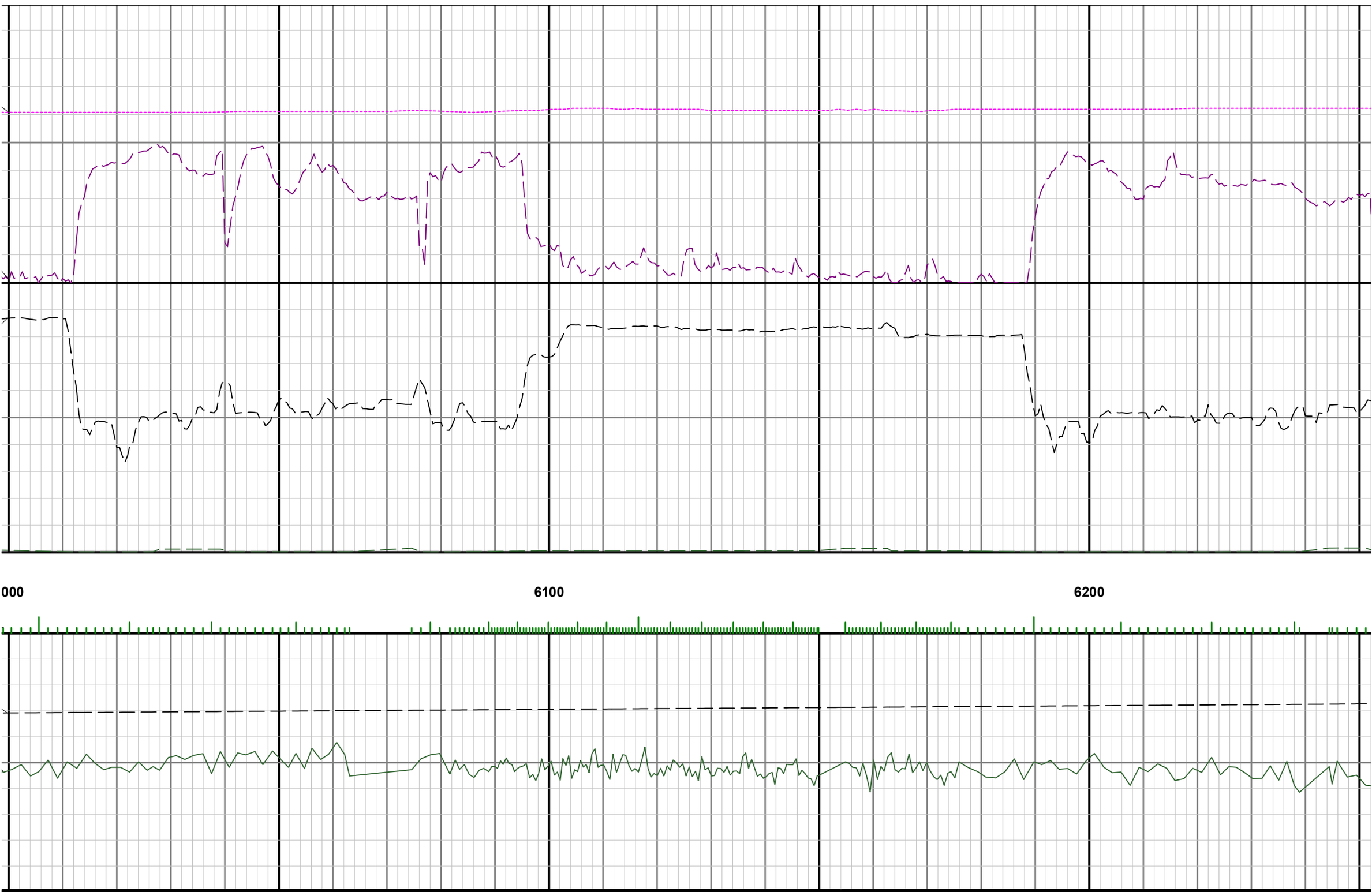

4800
4900
See Remark 10

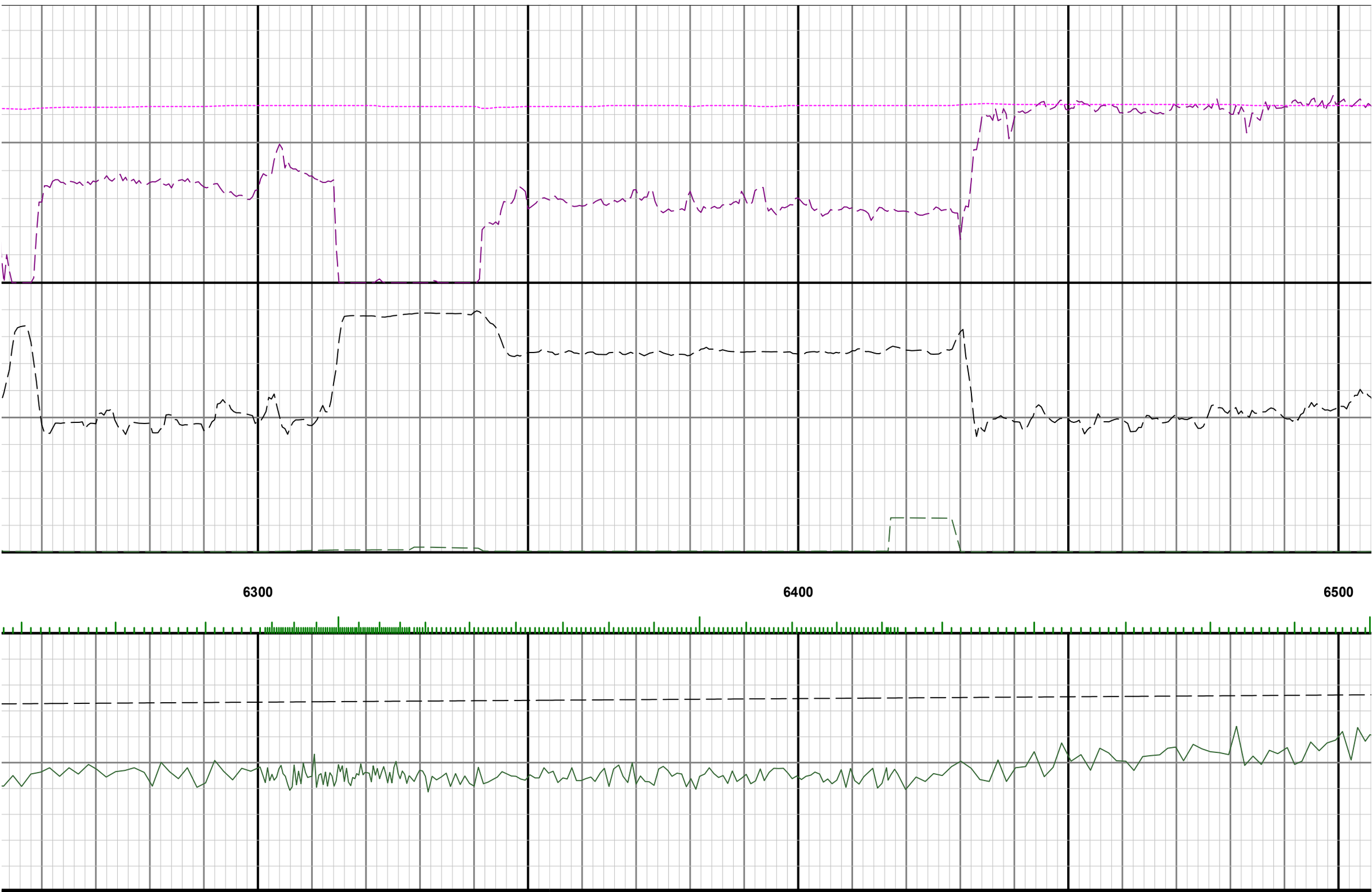

GRAM
TVD
GRIM
5000
5100
5200
GRTM
ROPA
WOBA
TCDM

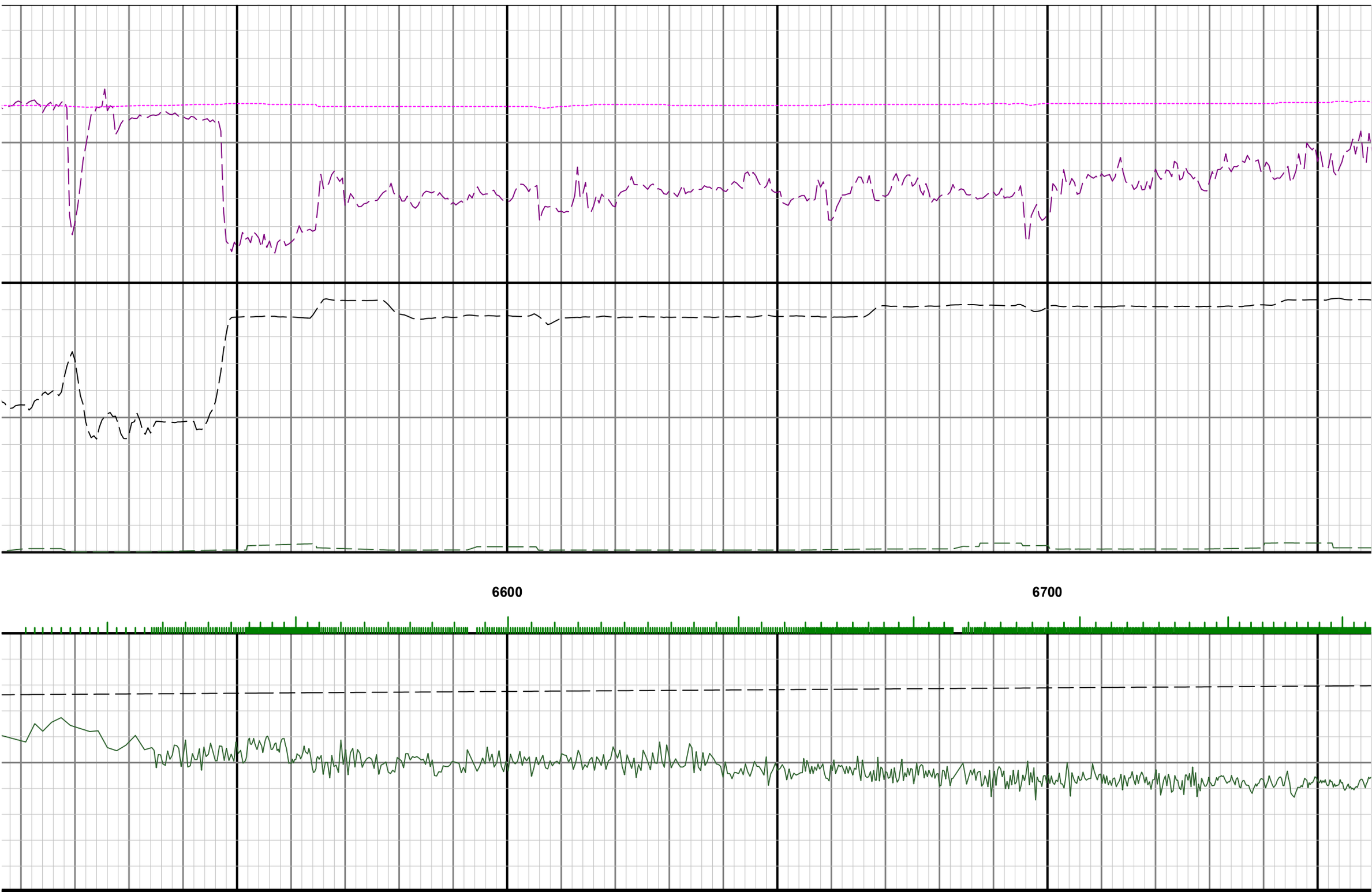

5300
5400

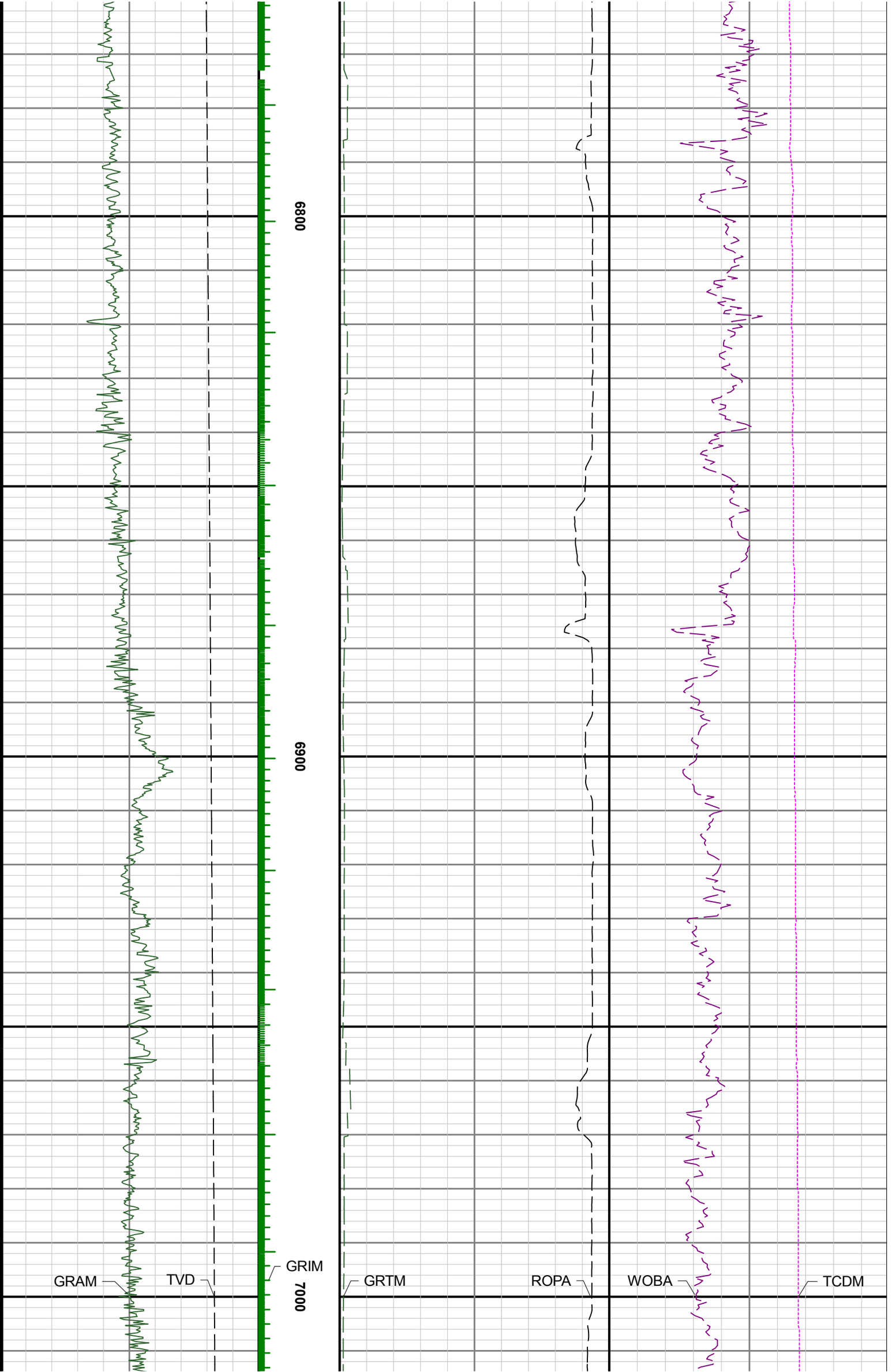

5500
5600
5700

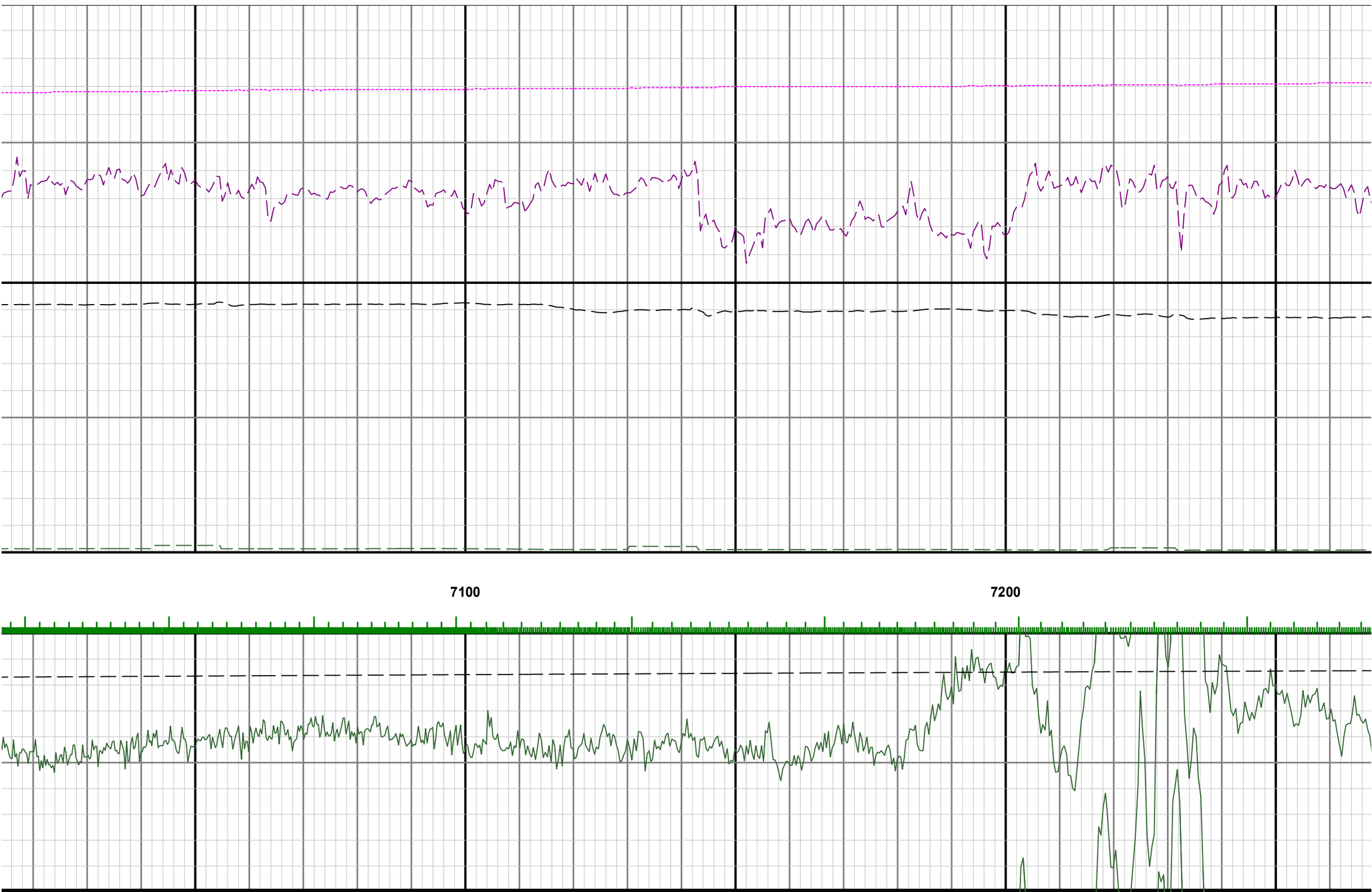

5800
5900
GRAM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

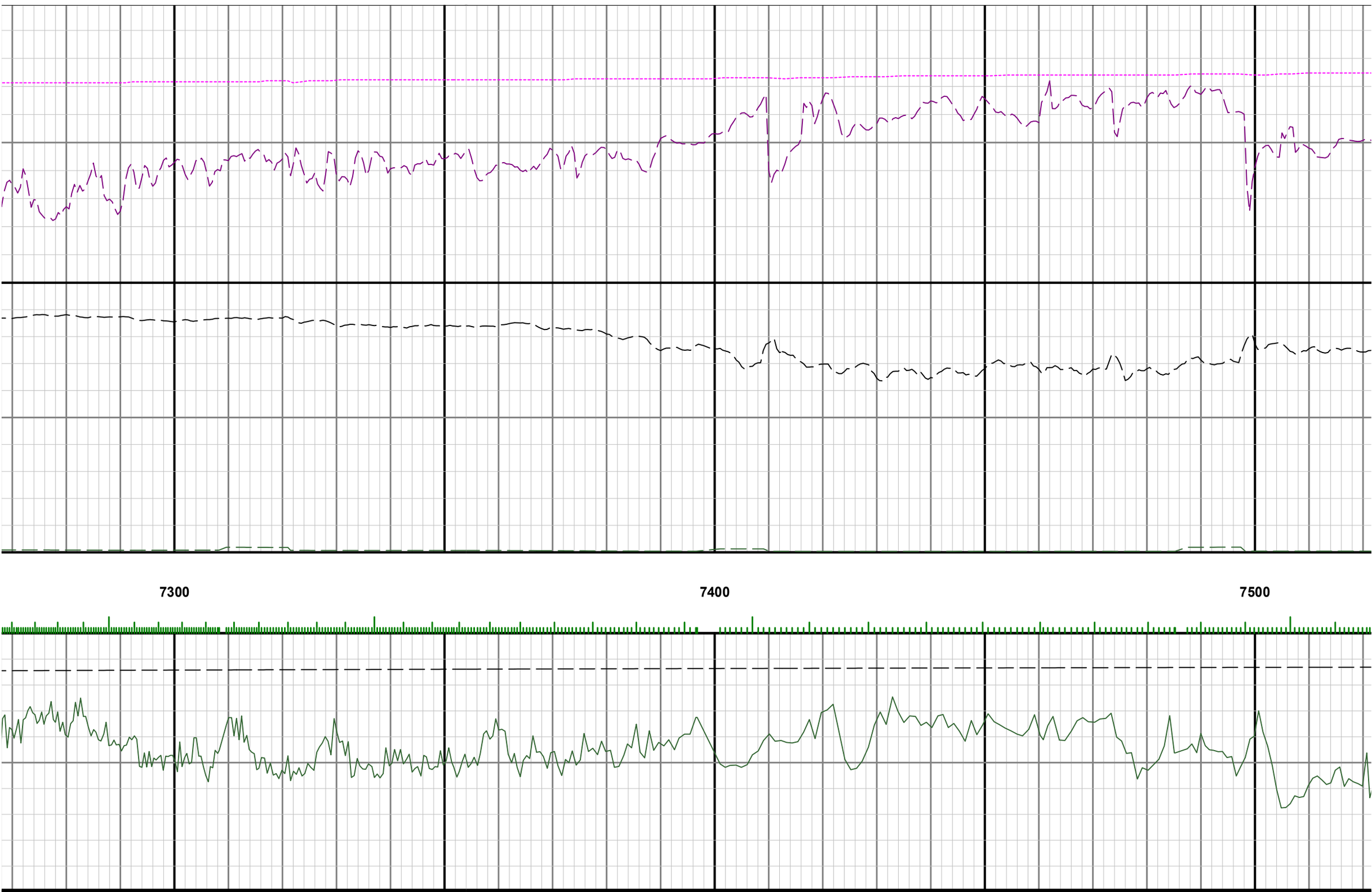

000
6100
6200

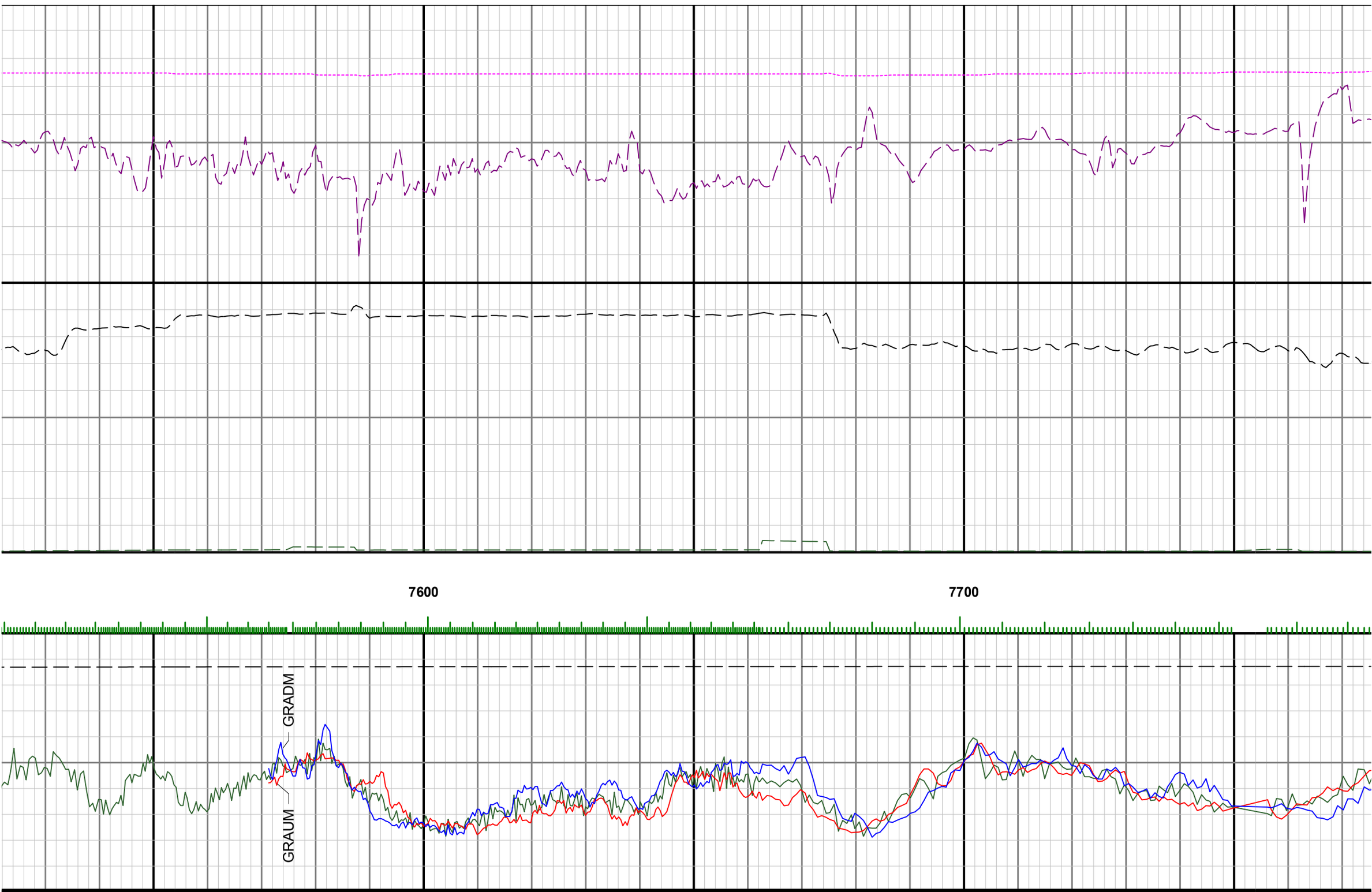

6300
6400
6500

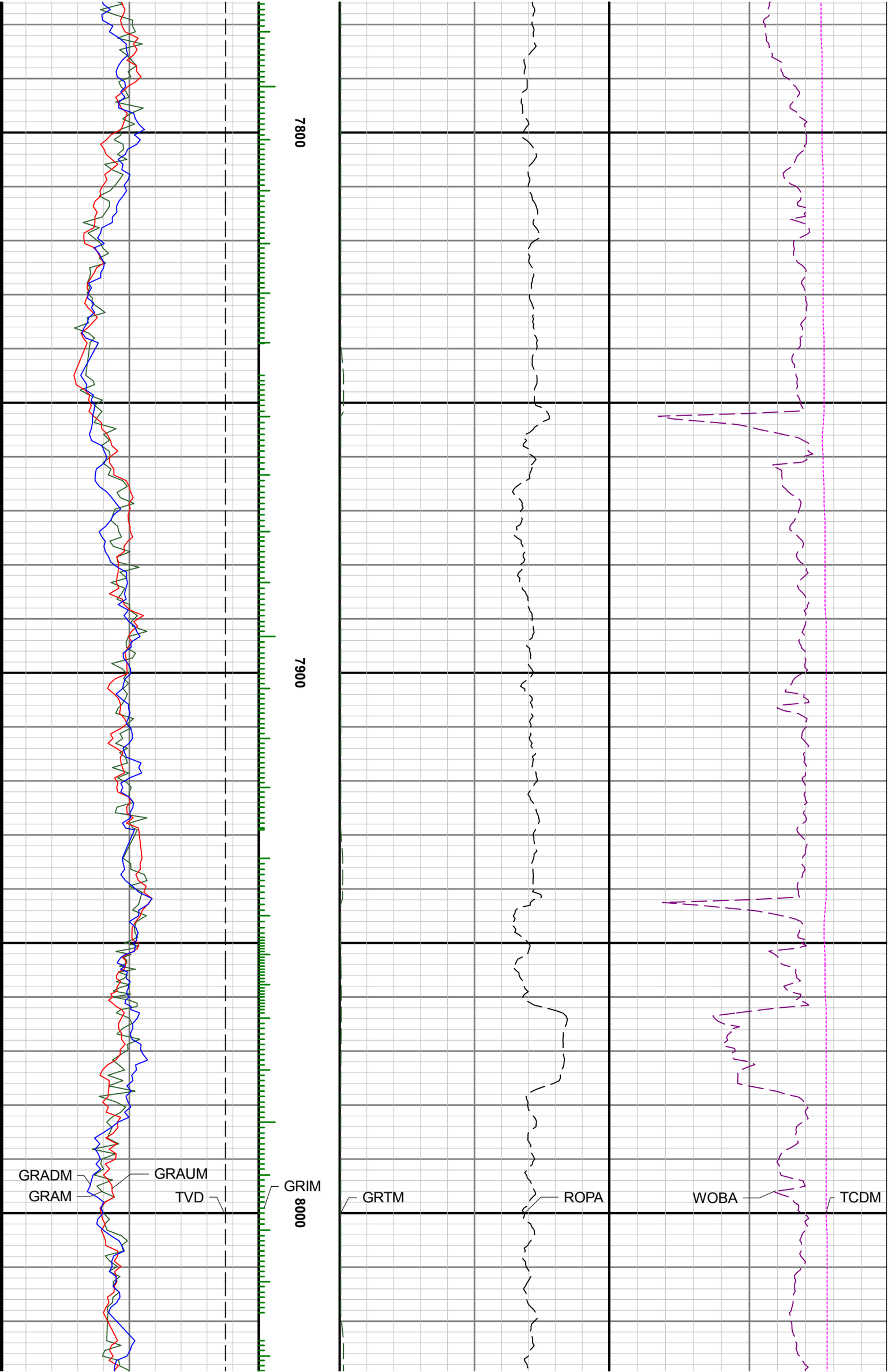

6600
6700

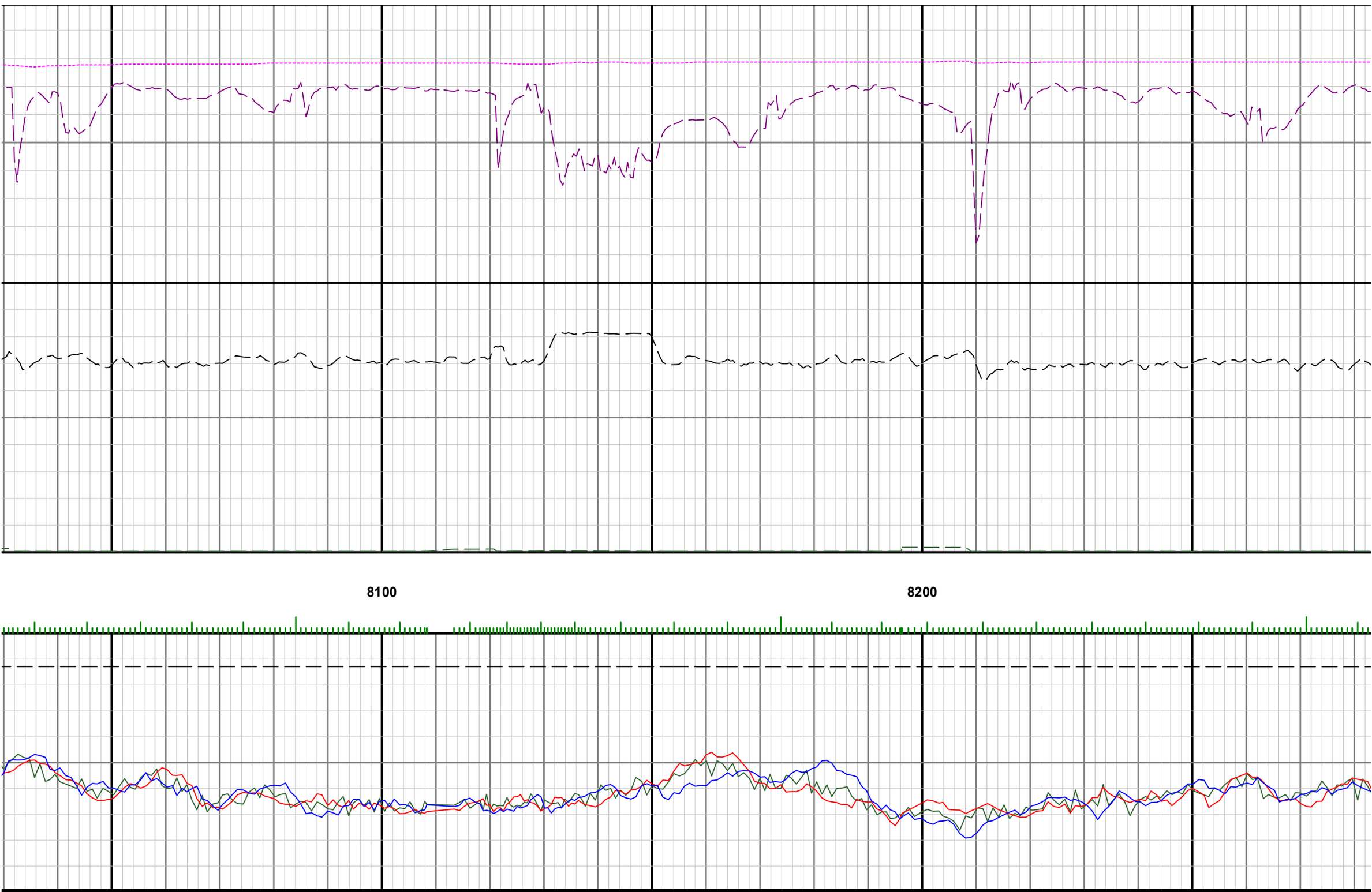

6800
6900
7000
GRAM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

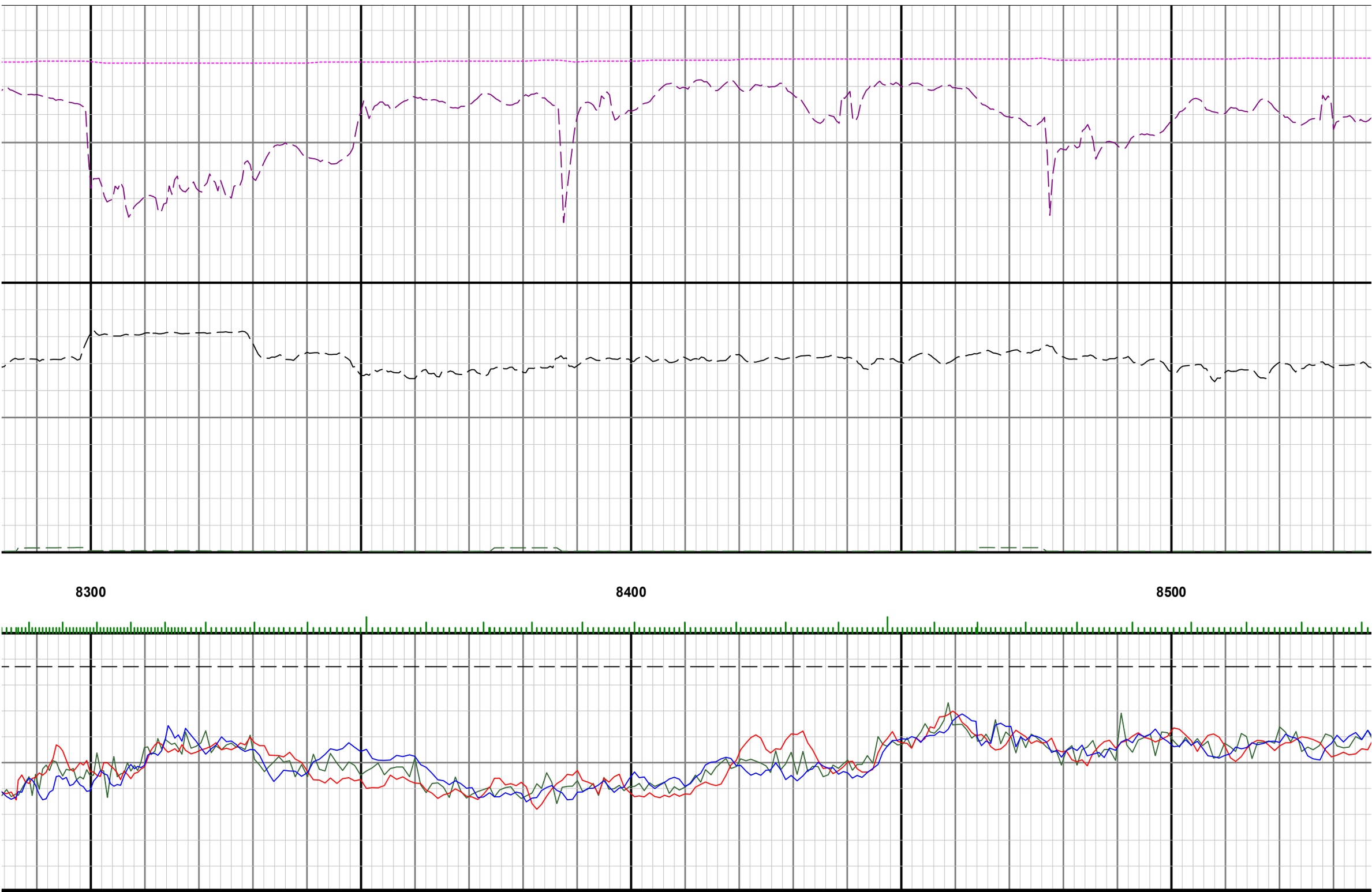

7100
7200

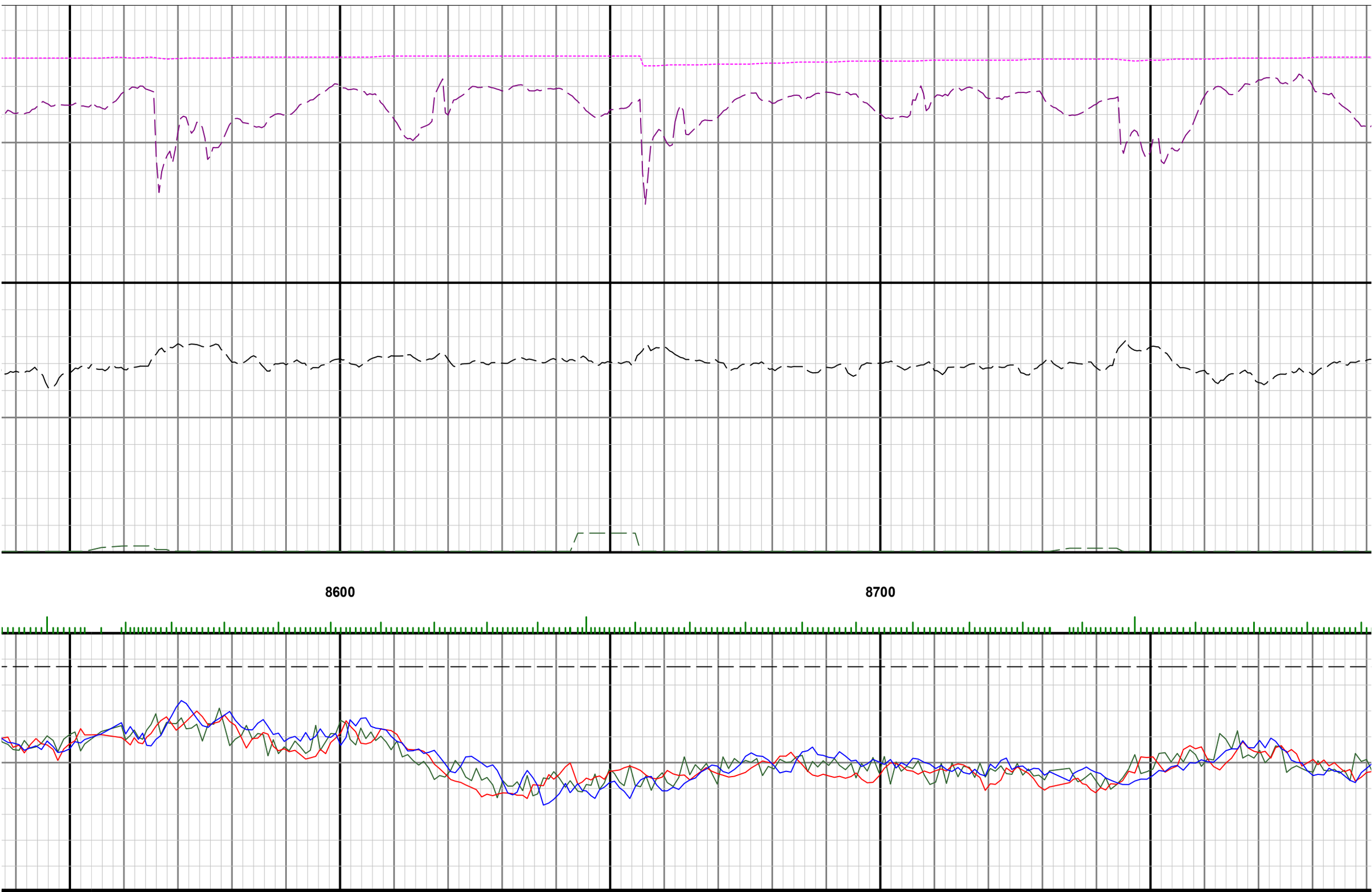

7300
7400
7500

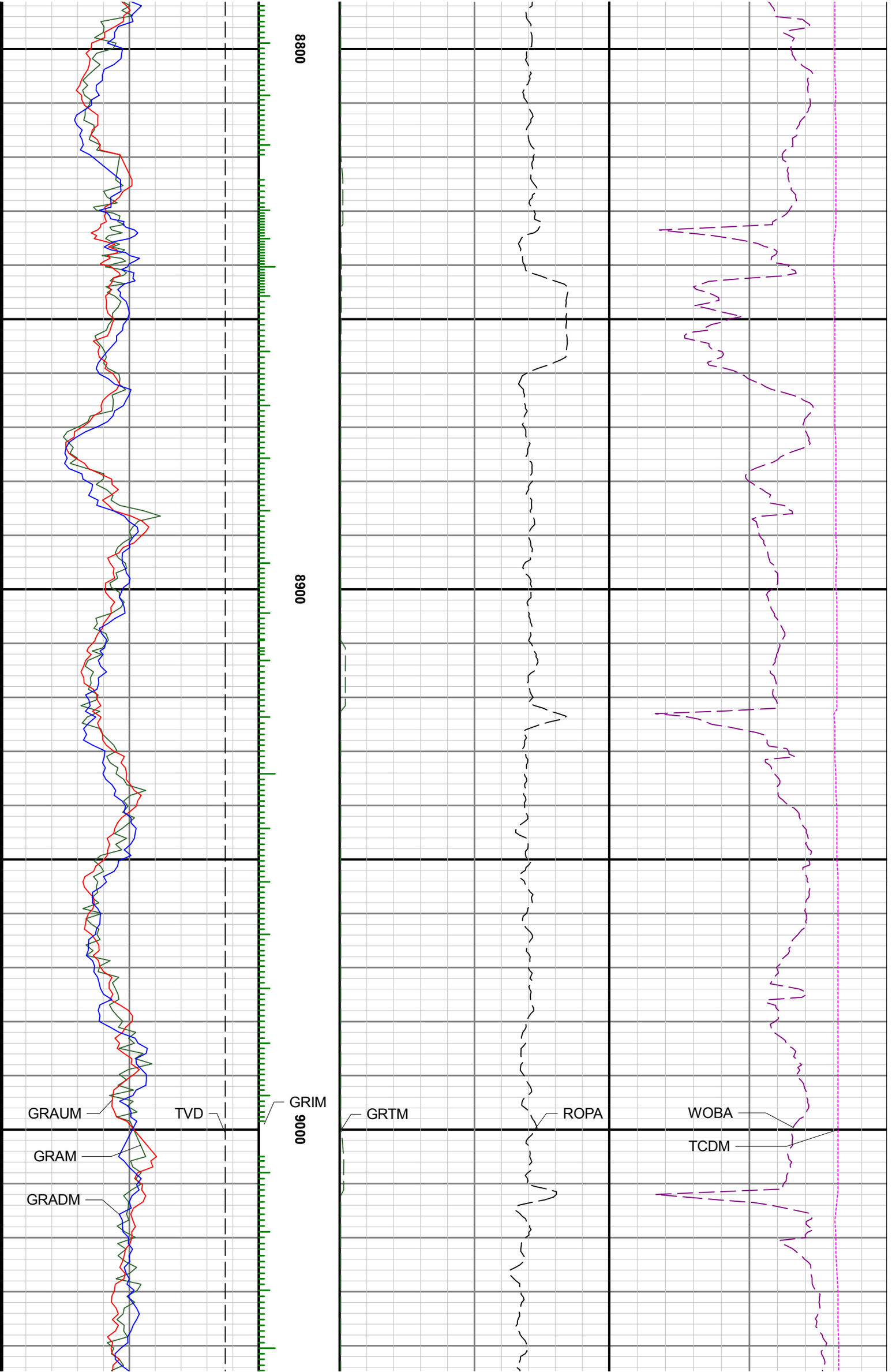

7600
7700
GRADM
GRAUM

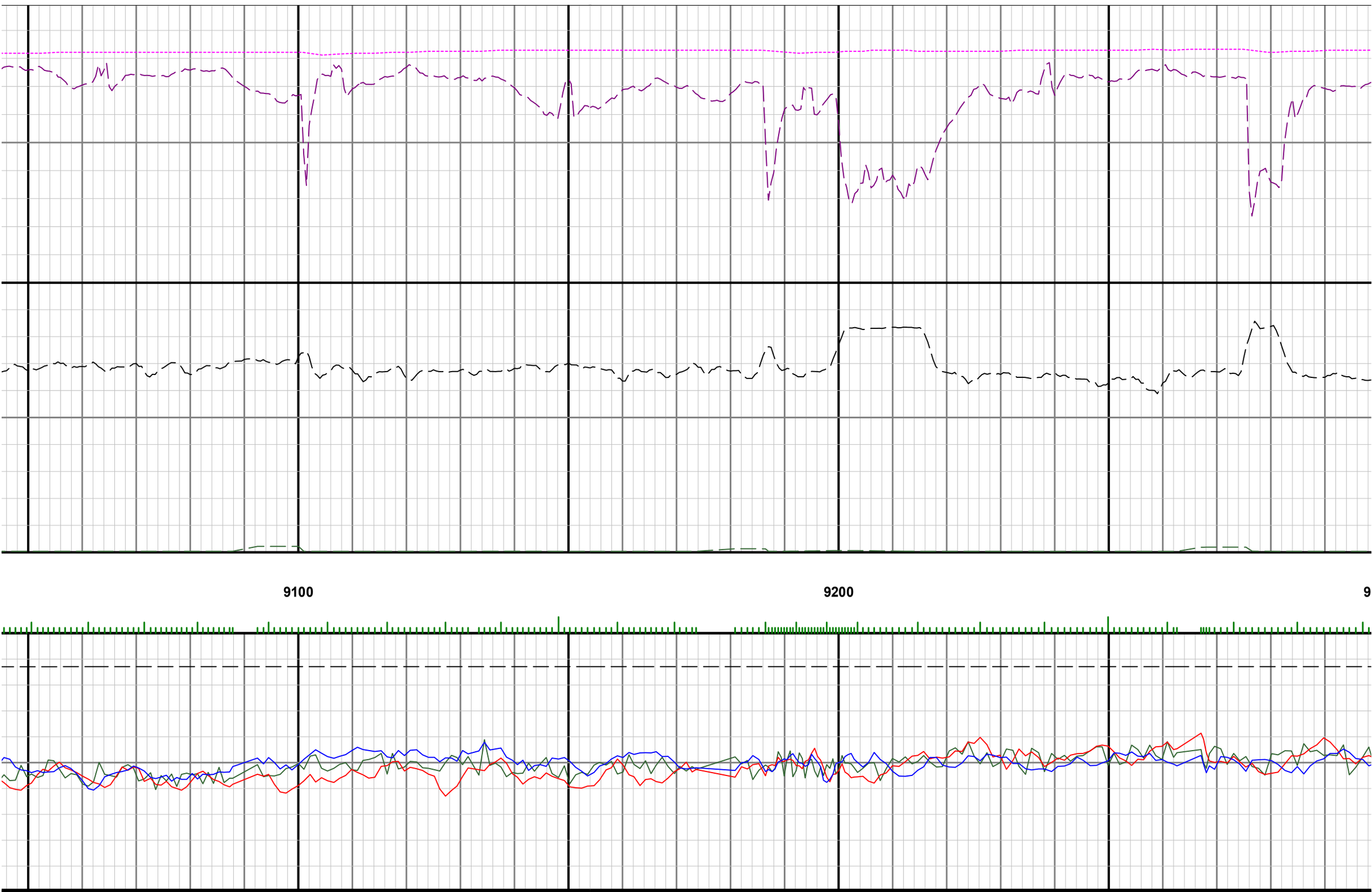

7800
7900
8000
GRADM
GRAM
GRAUM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

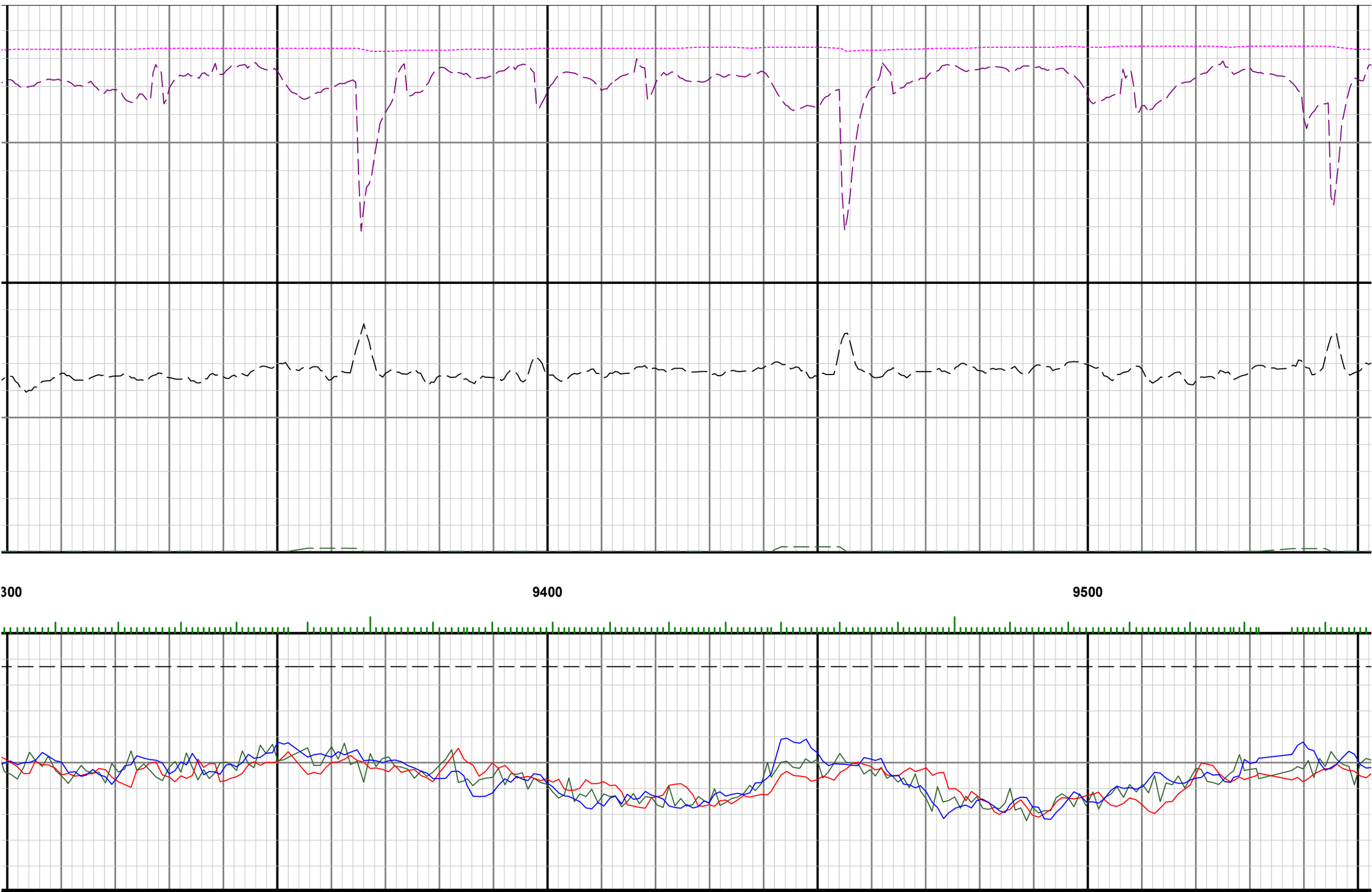

8100
8200


8300
8400
8500


8600
8700


8800
8900
9000
GRAUM
GRAM
GRADM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

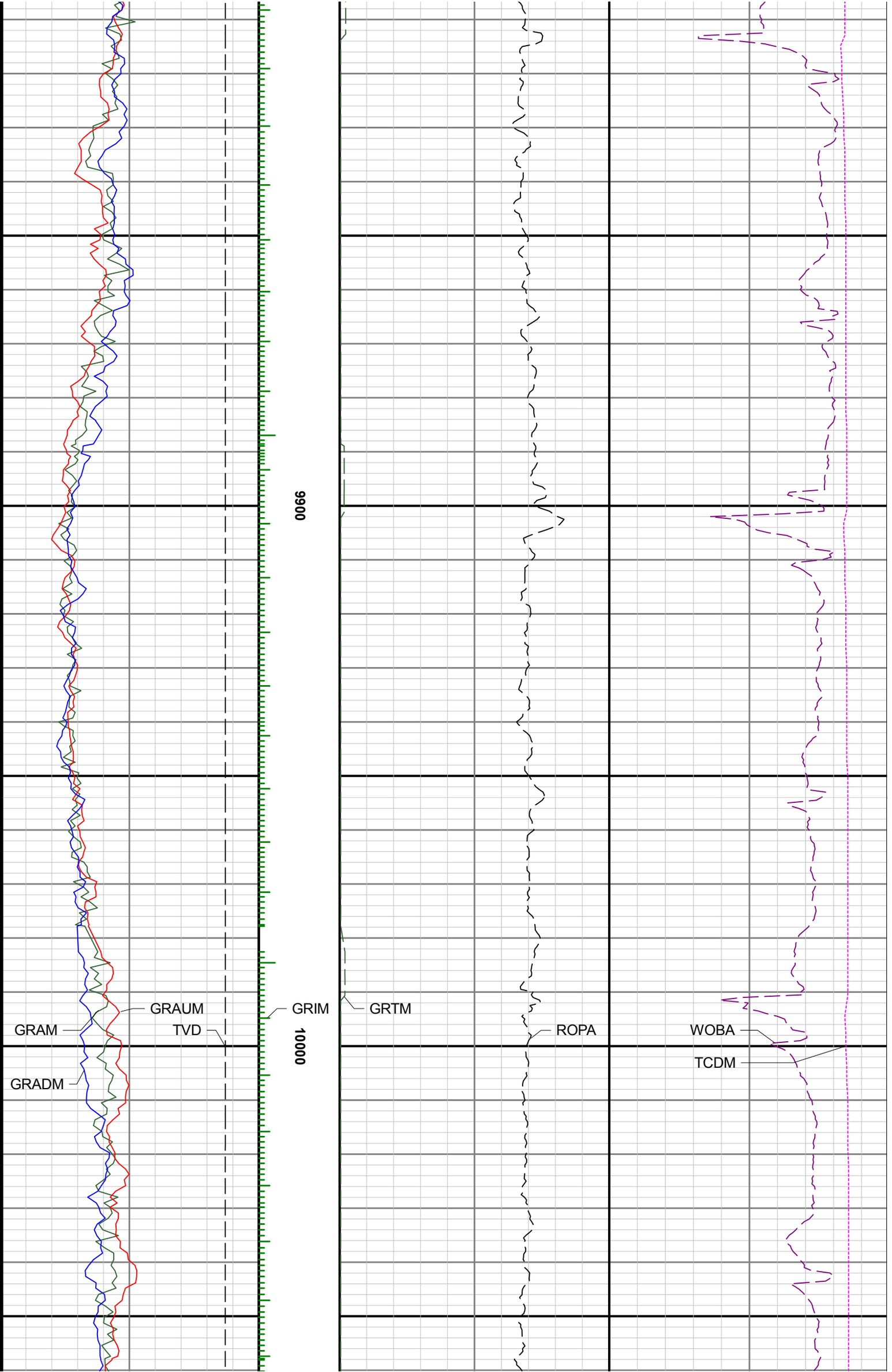

9100
9200
9

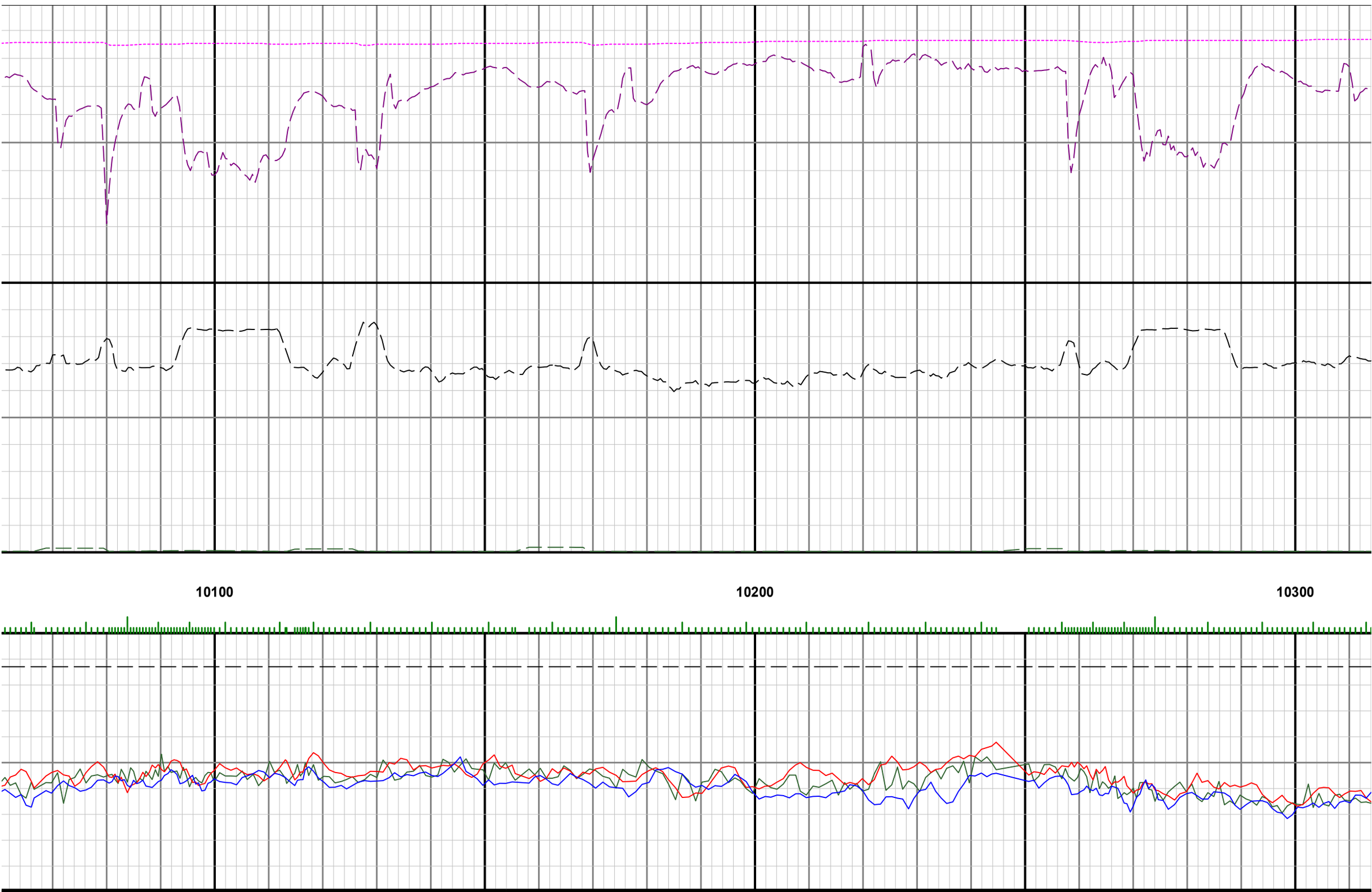

300
9400
9500

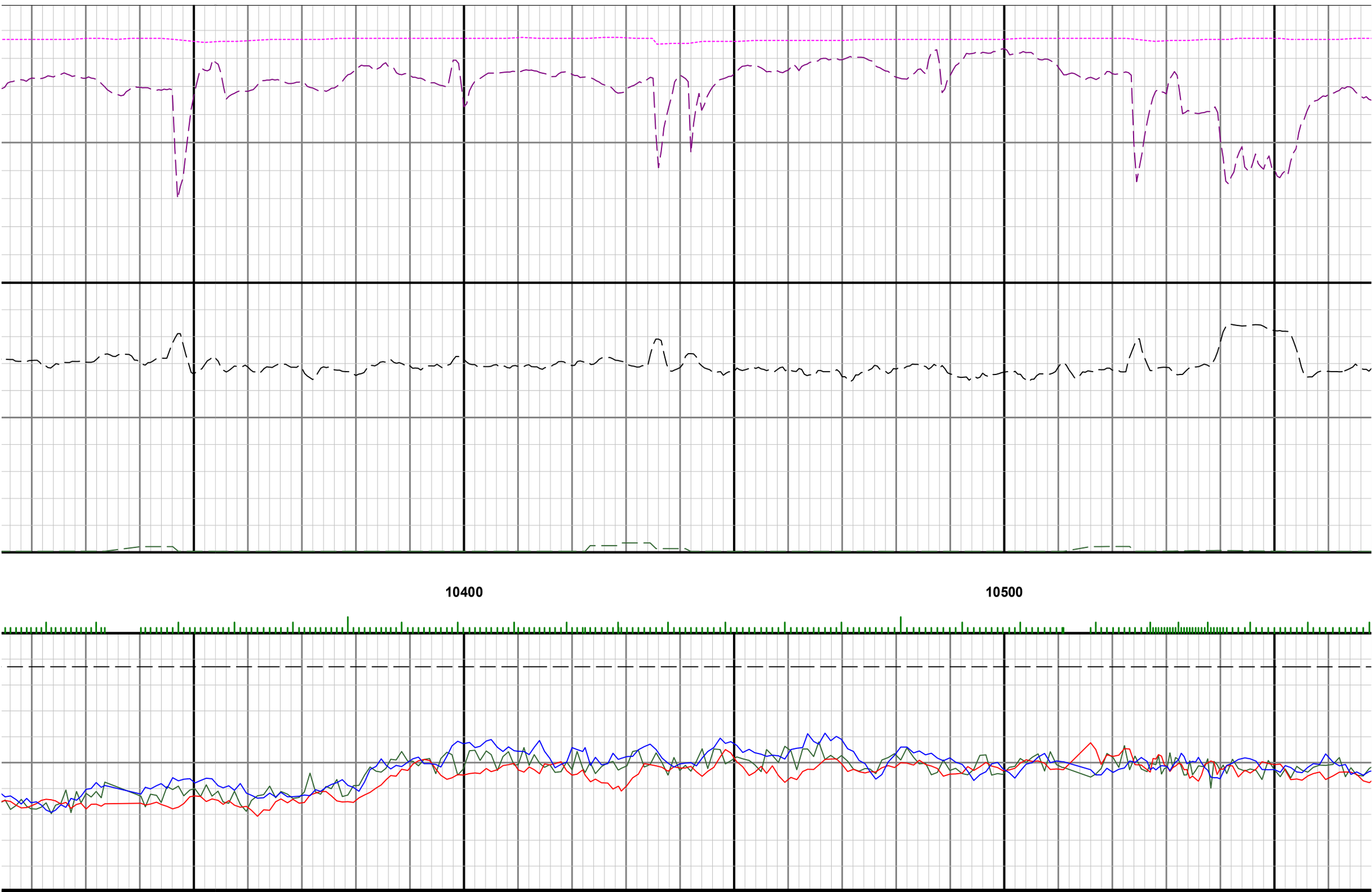
9600

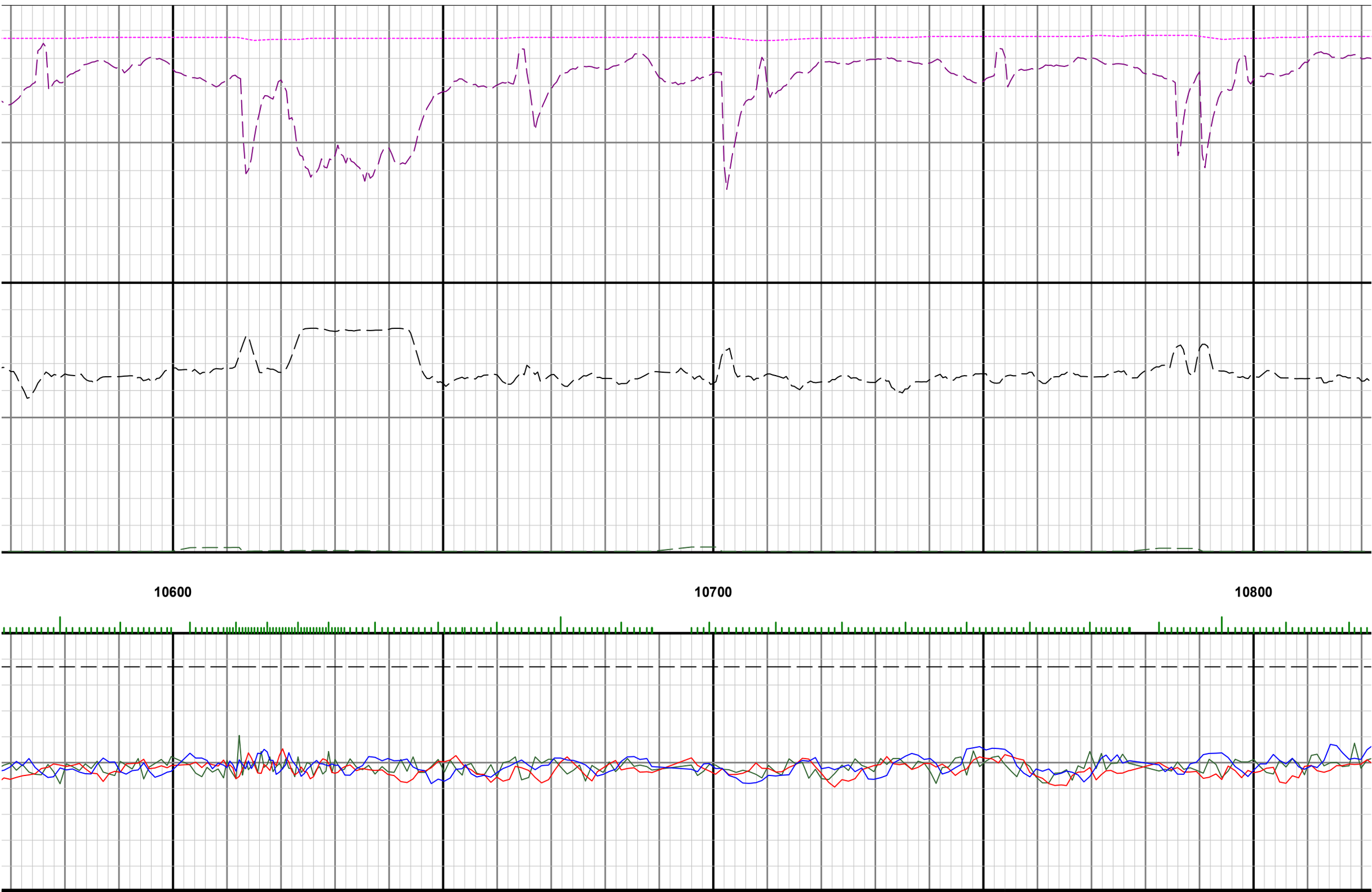
9700

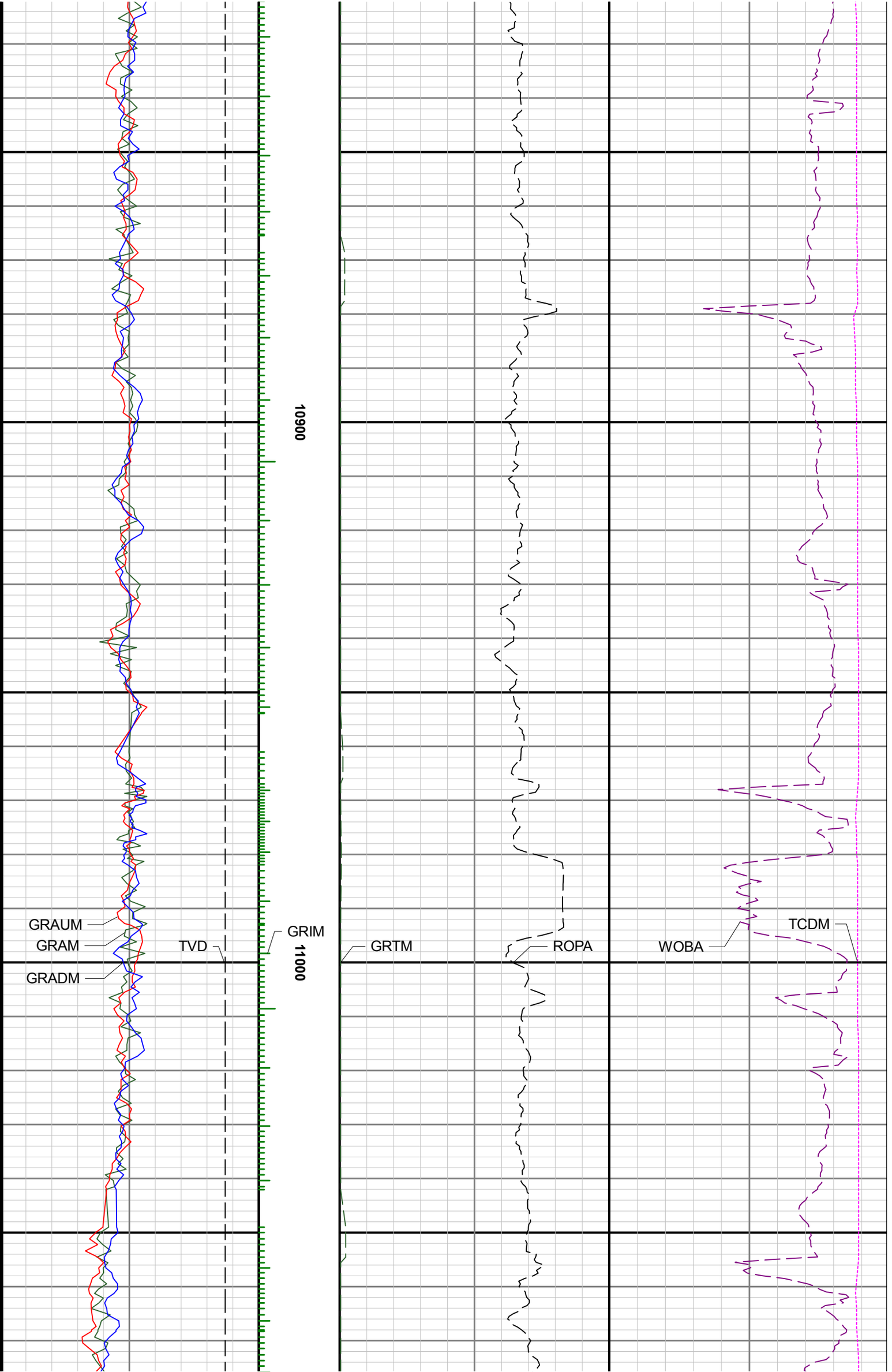
9800

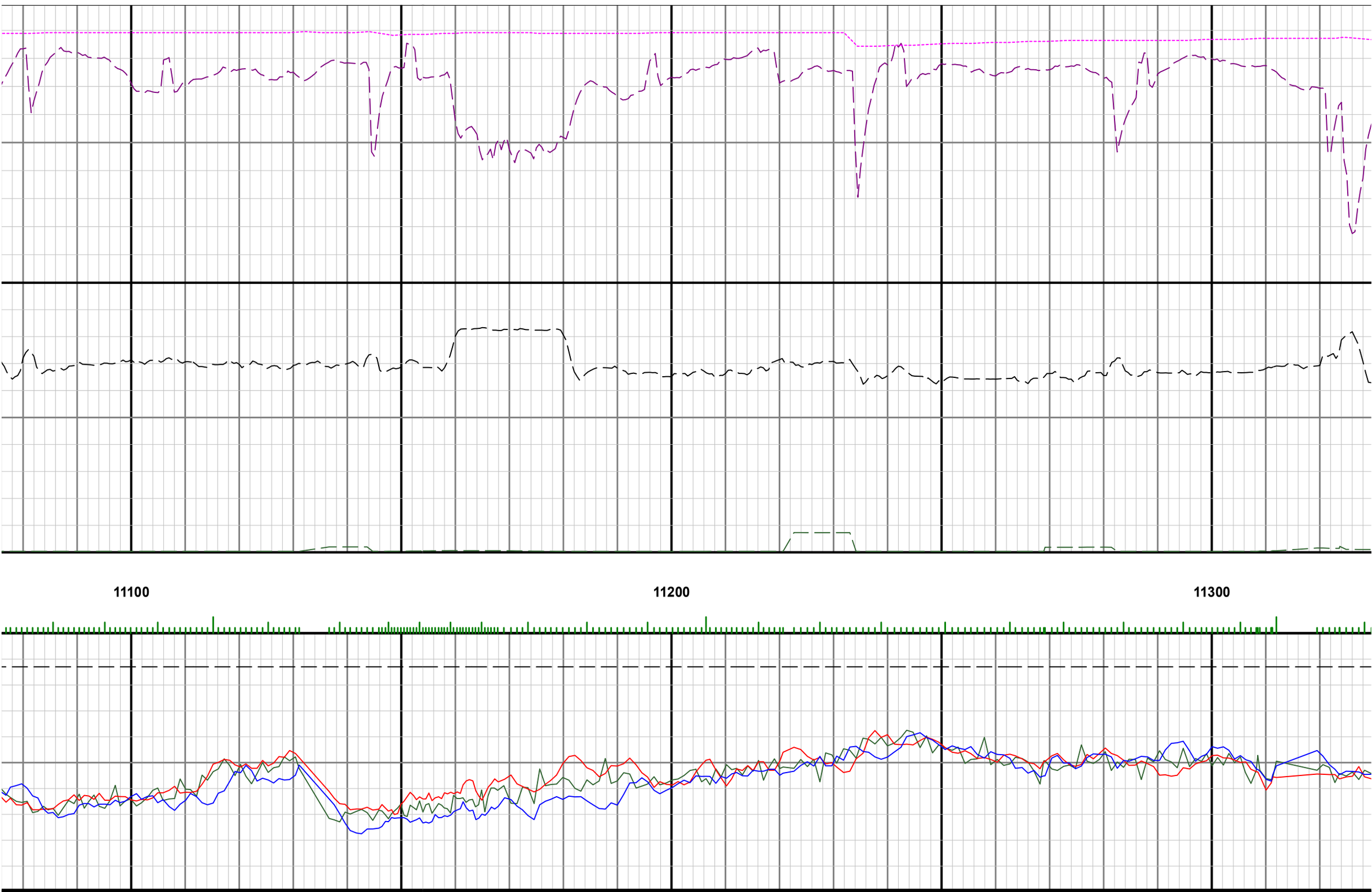

9900
10000
GRAUM
GRIM
GRAM
TVD
GRADM
GRTM
ROPA
WOBA
TCDM

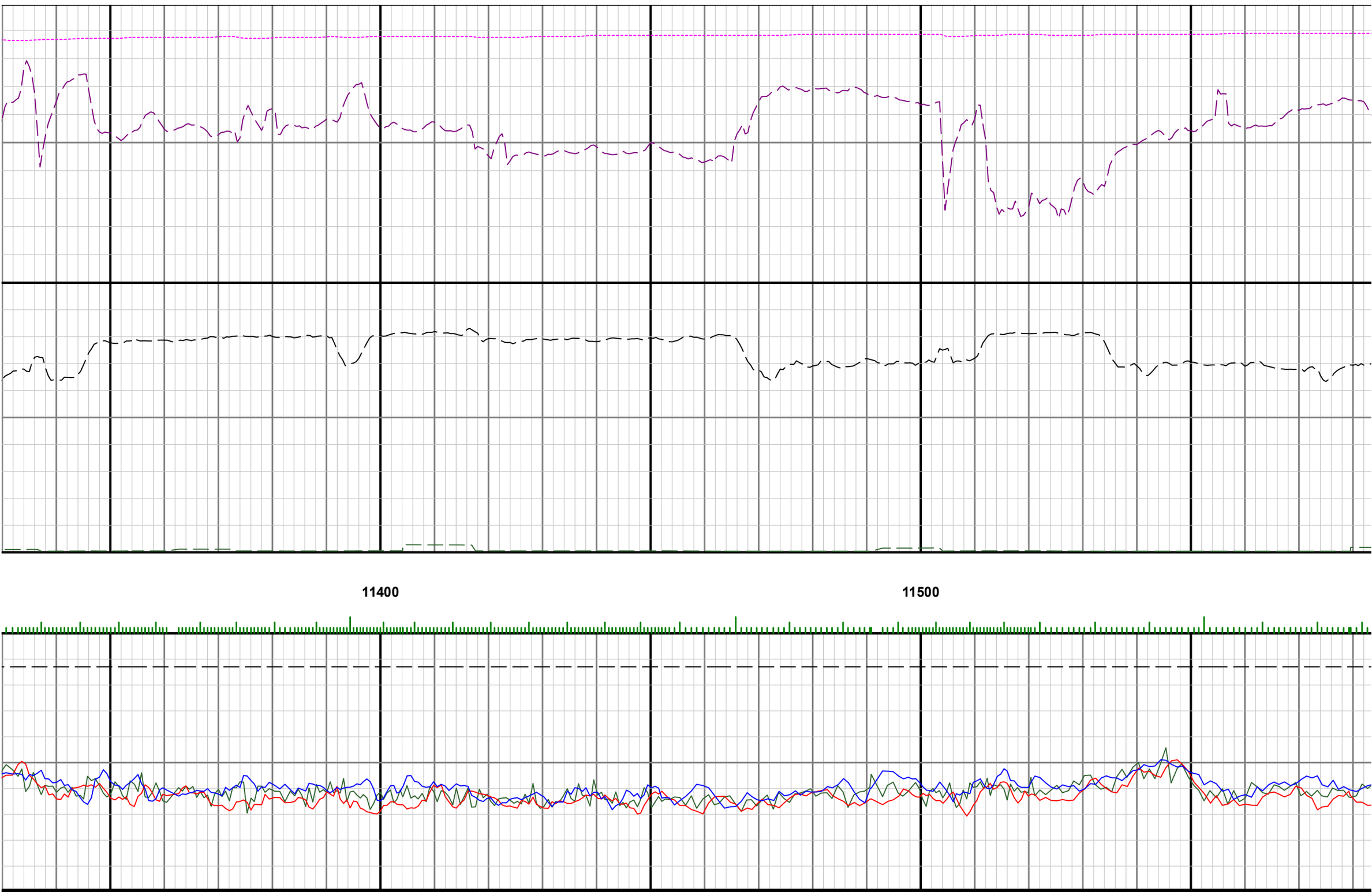

10100
10200
10300

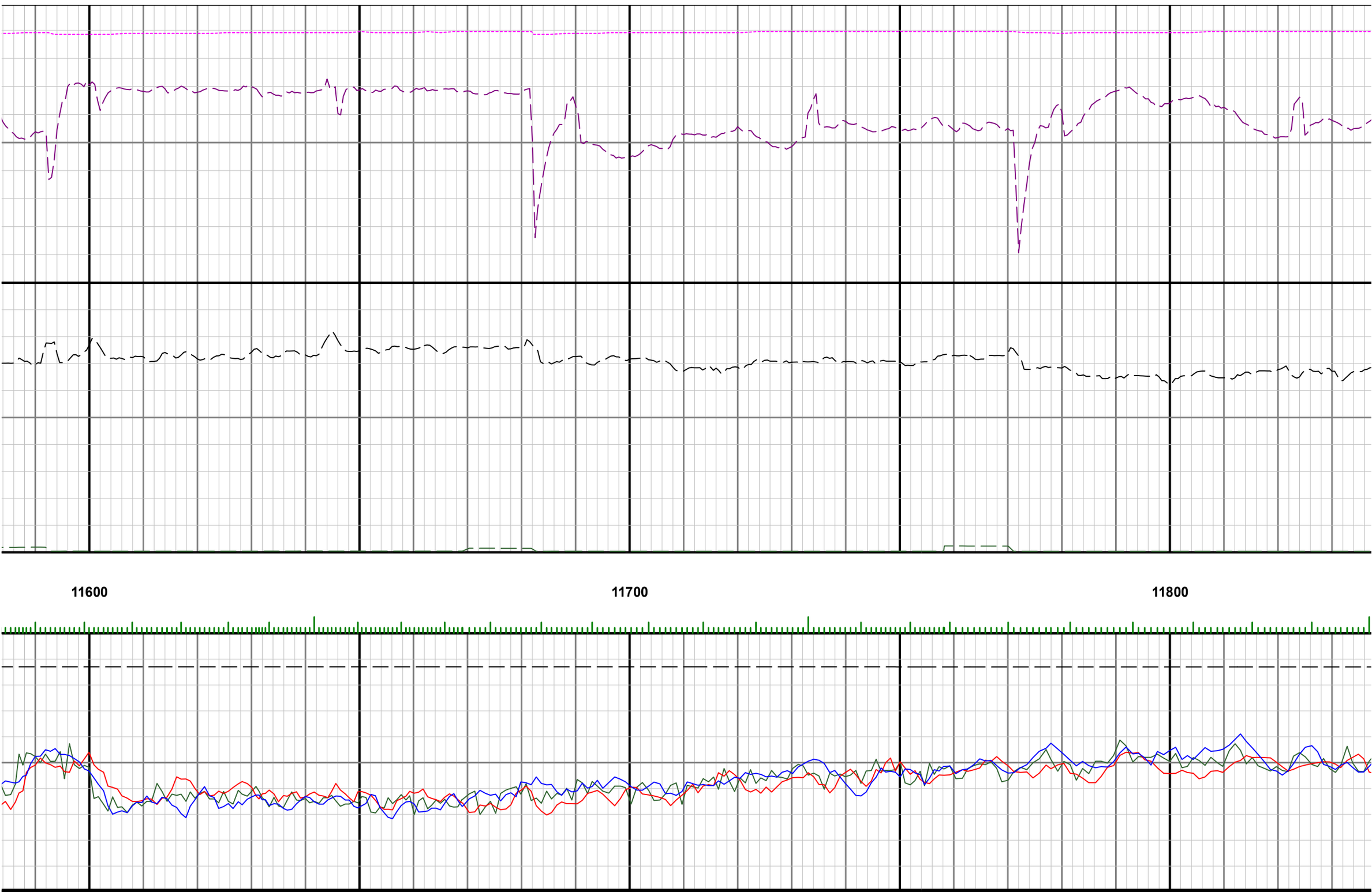

10400
10500

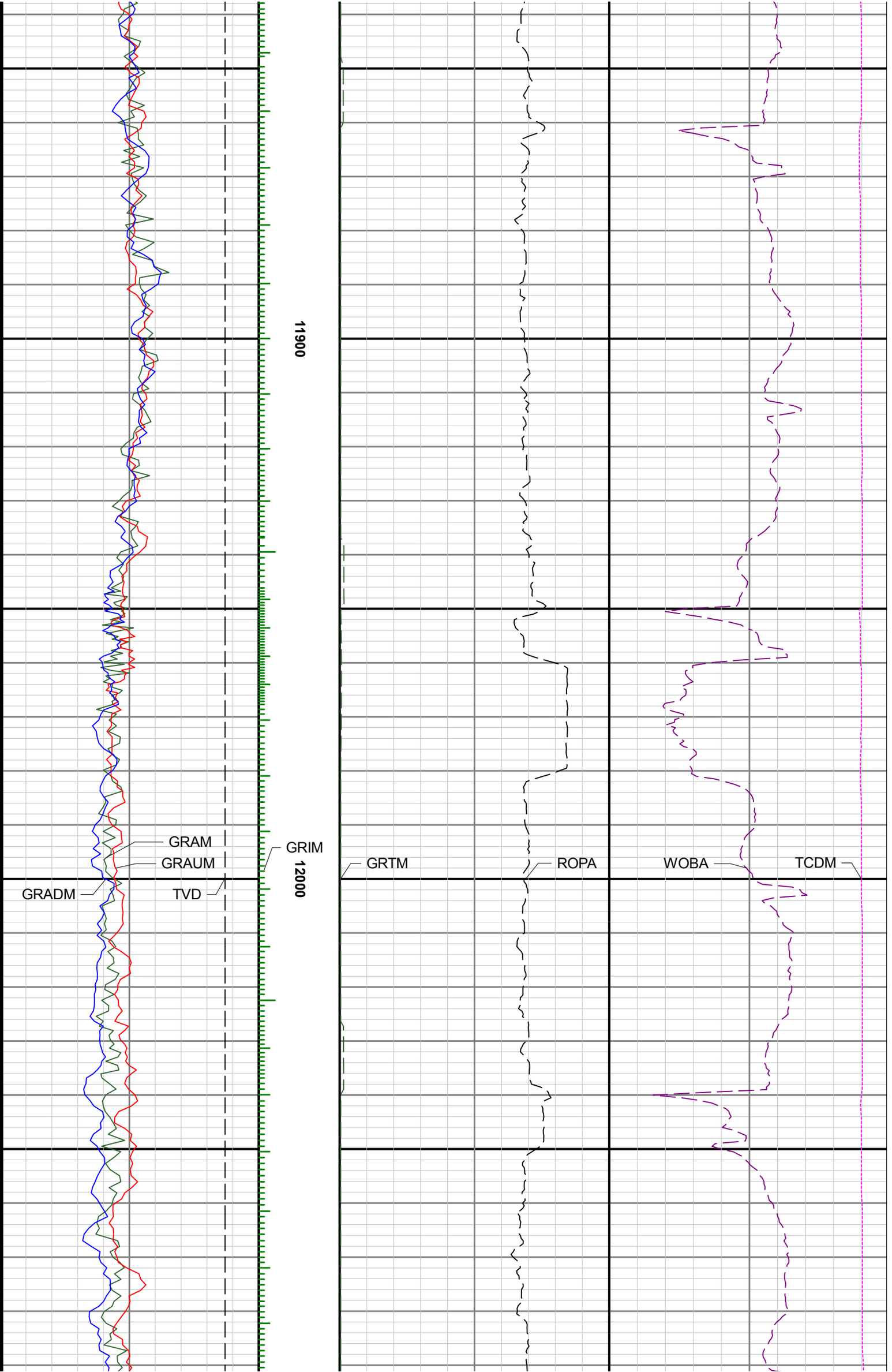

10600
10700
10800

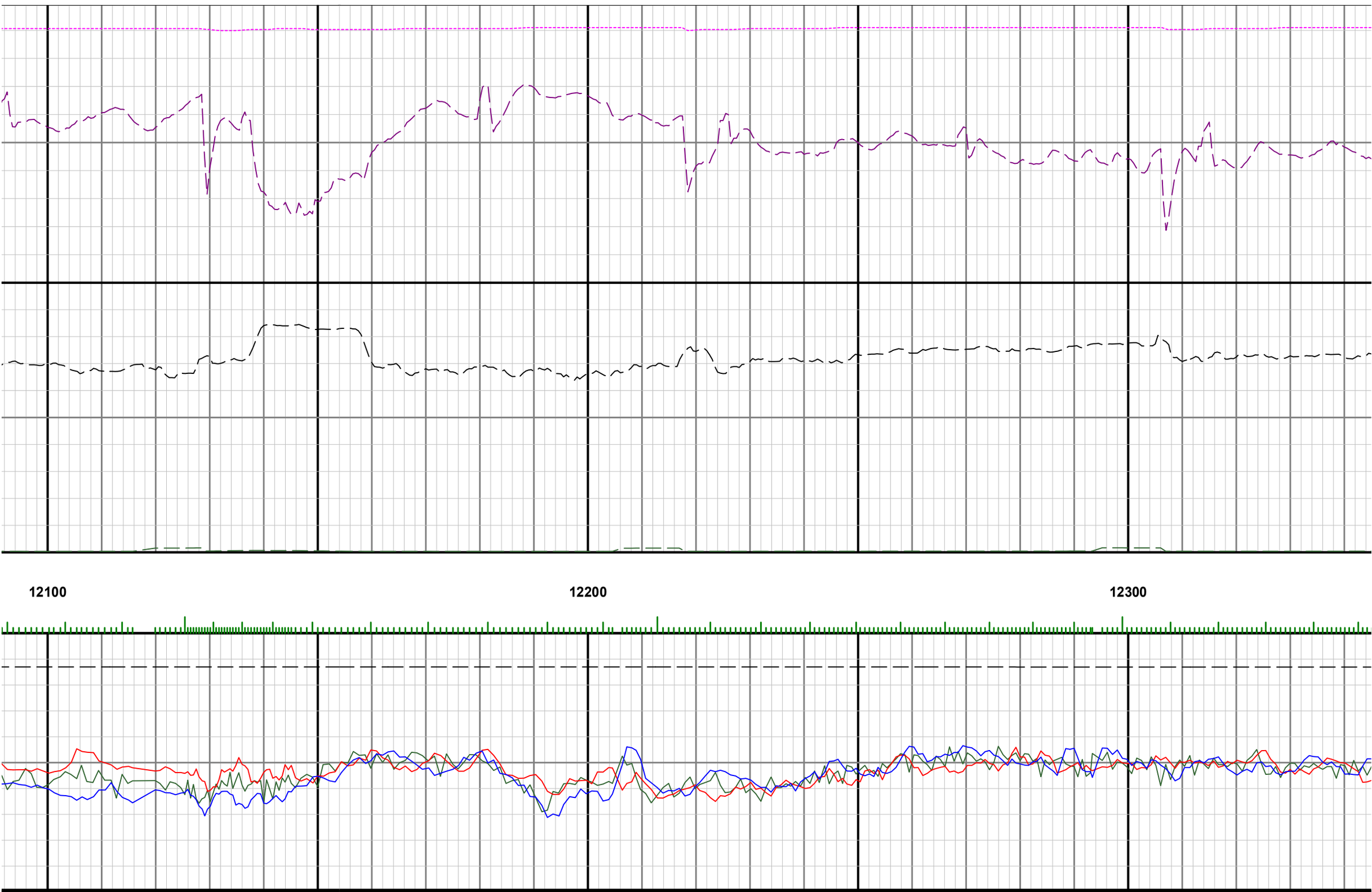

10900
11000
GRAUM
GRAM
GRADM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

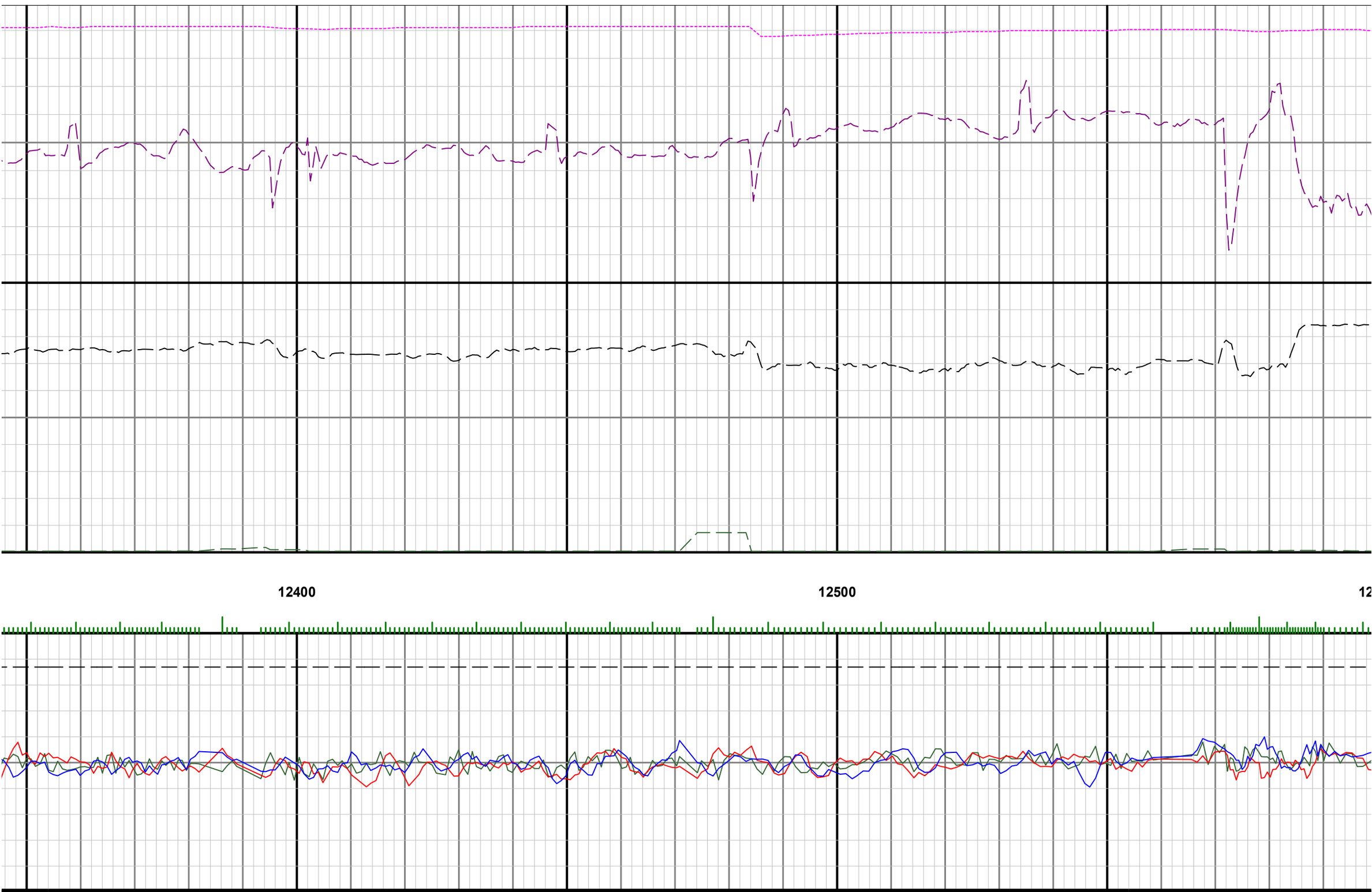

11100
11200
11300

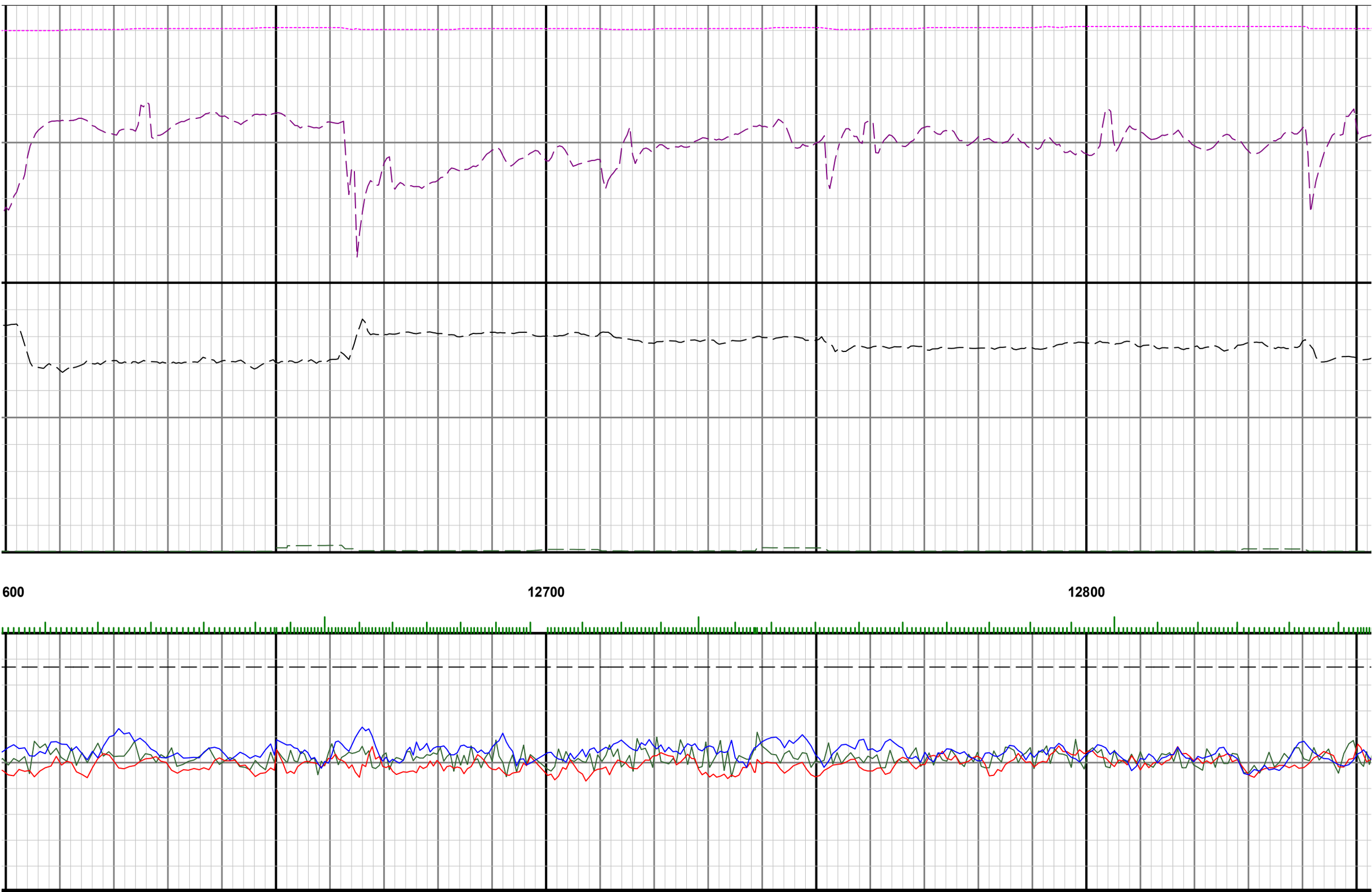

11400
11500

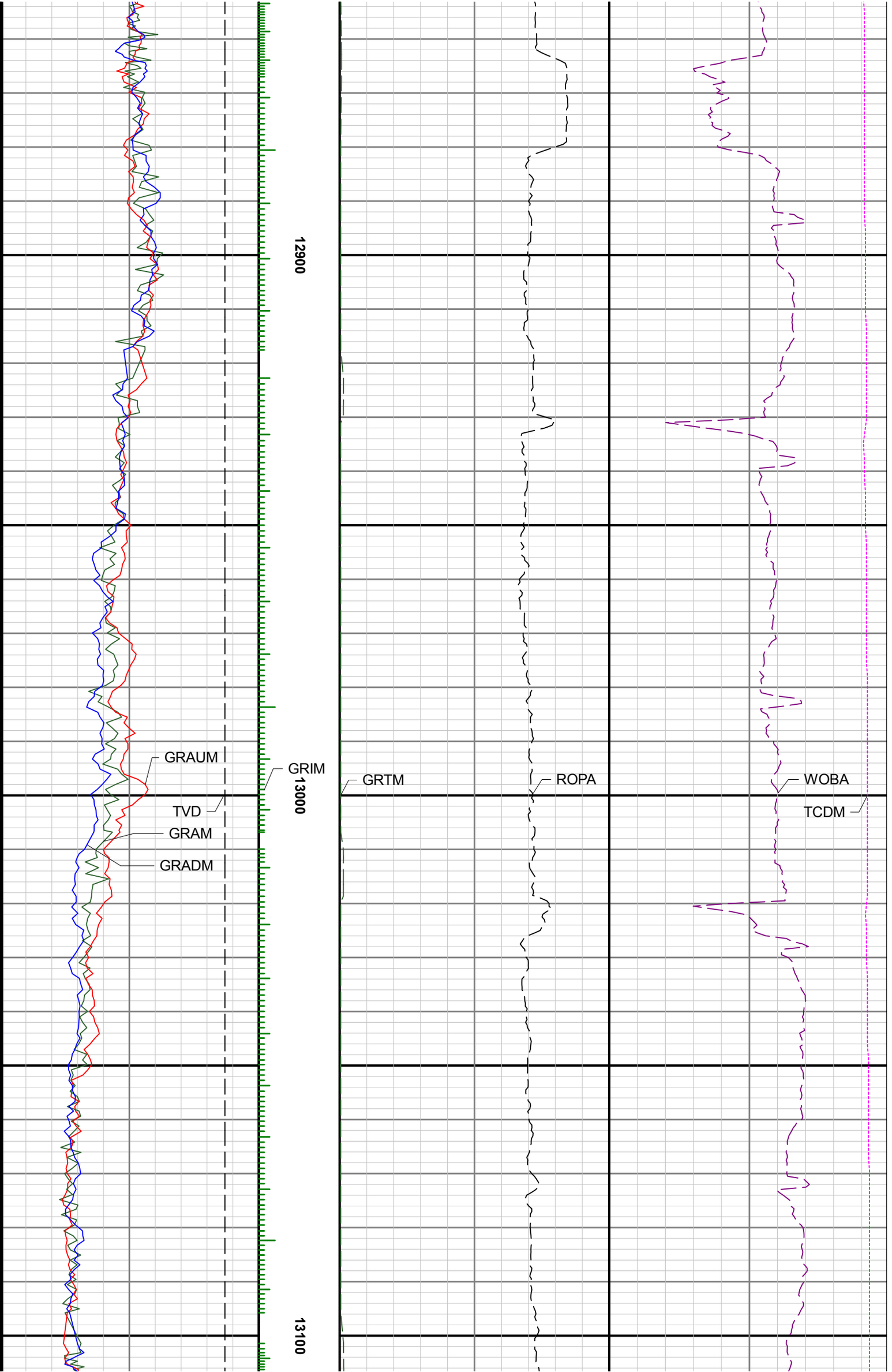

11600
11700
11800

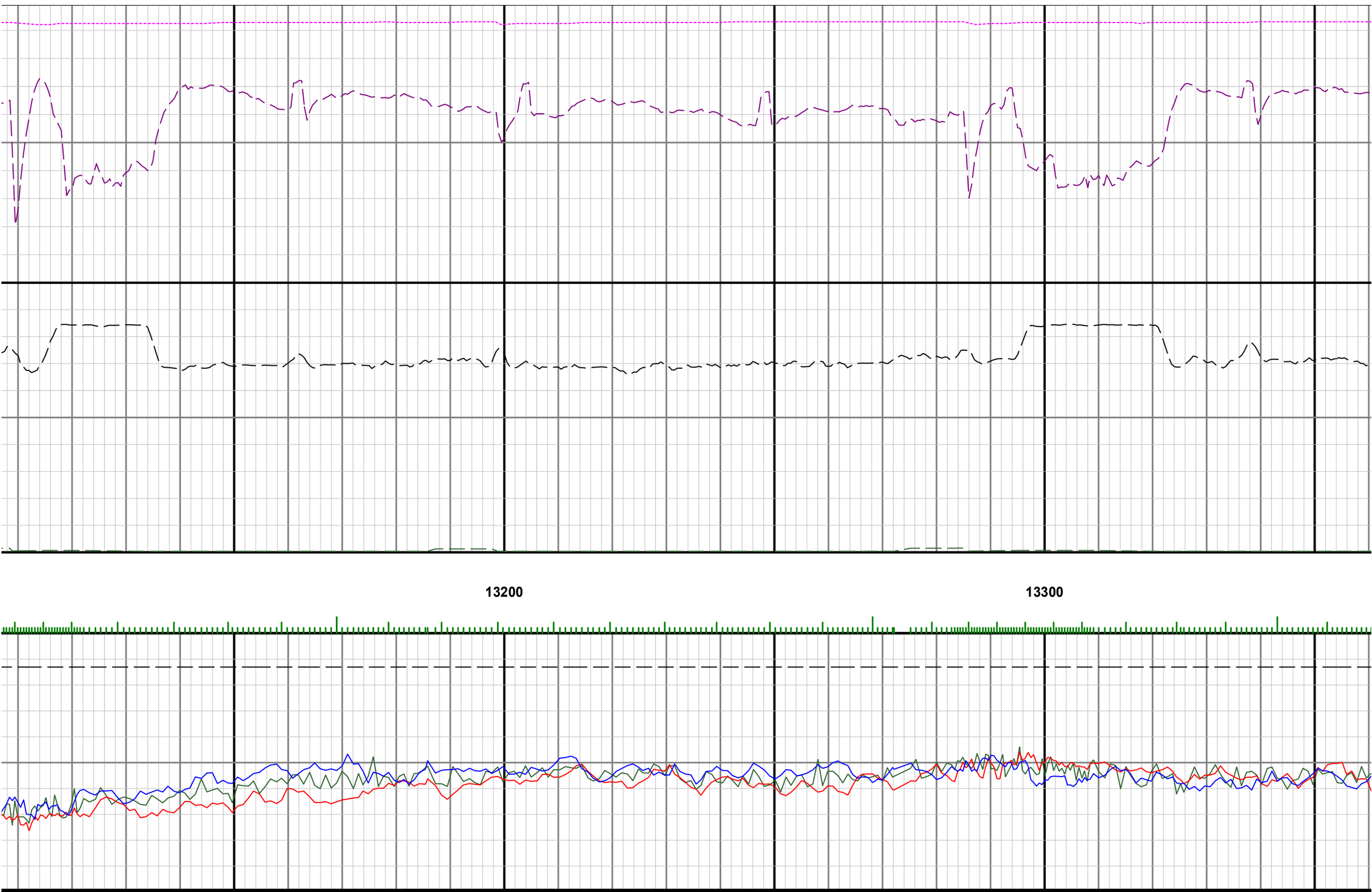

11900
12000
GRAM
GRAUM
GRADM
GRIM
TVD
GRTM
ROPA
WOBA
TCDM

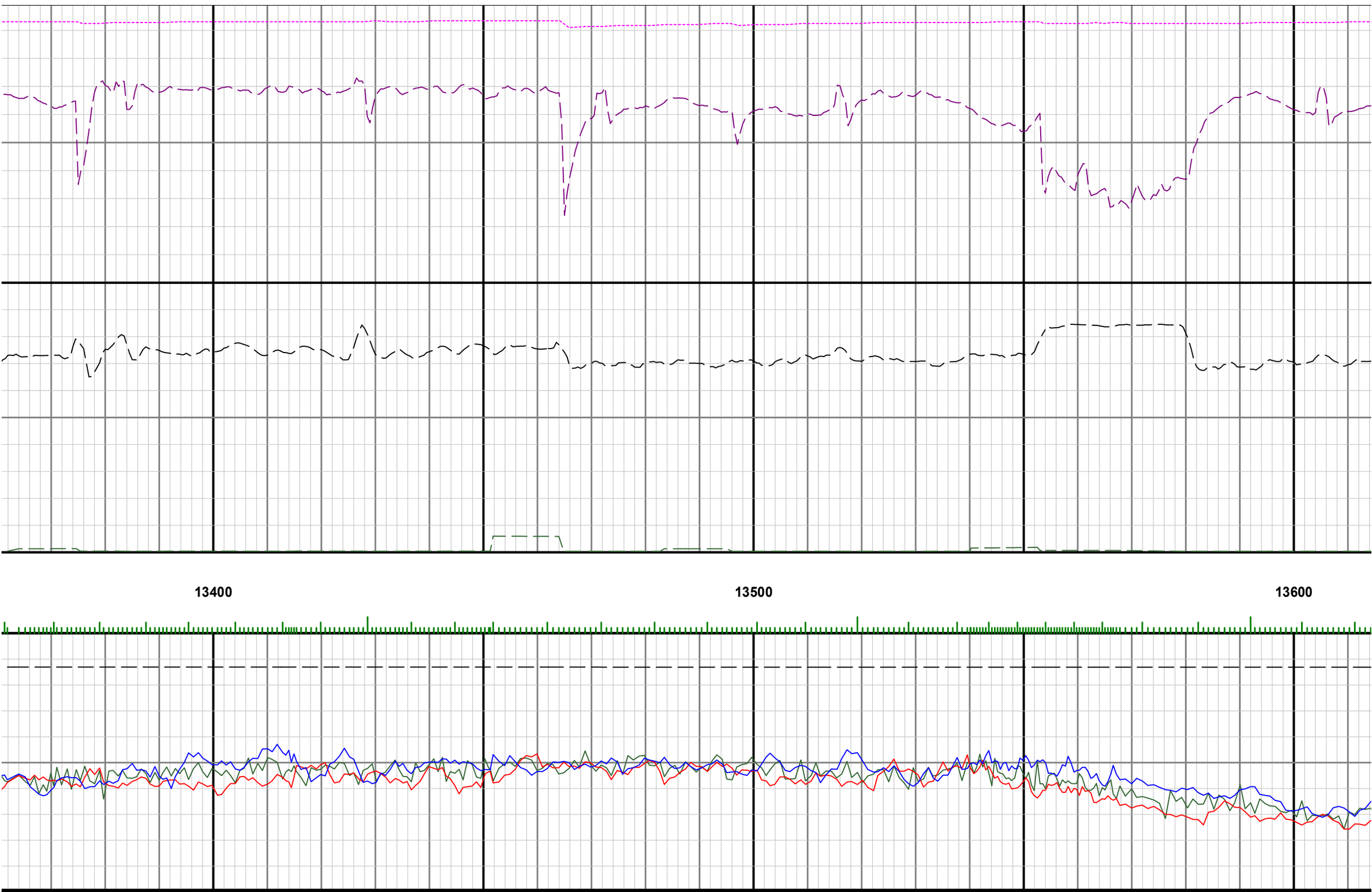

12100
12200
12300

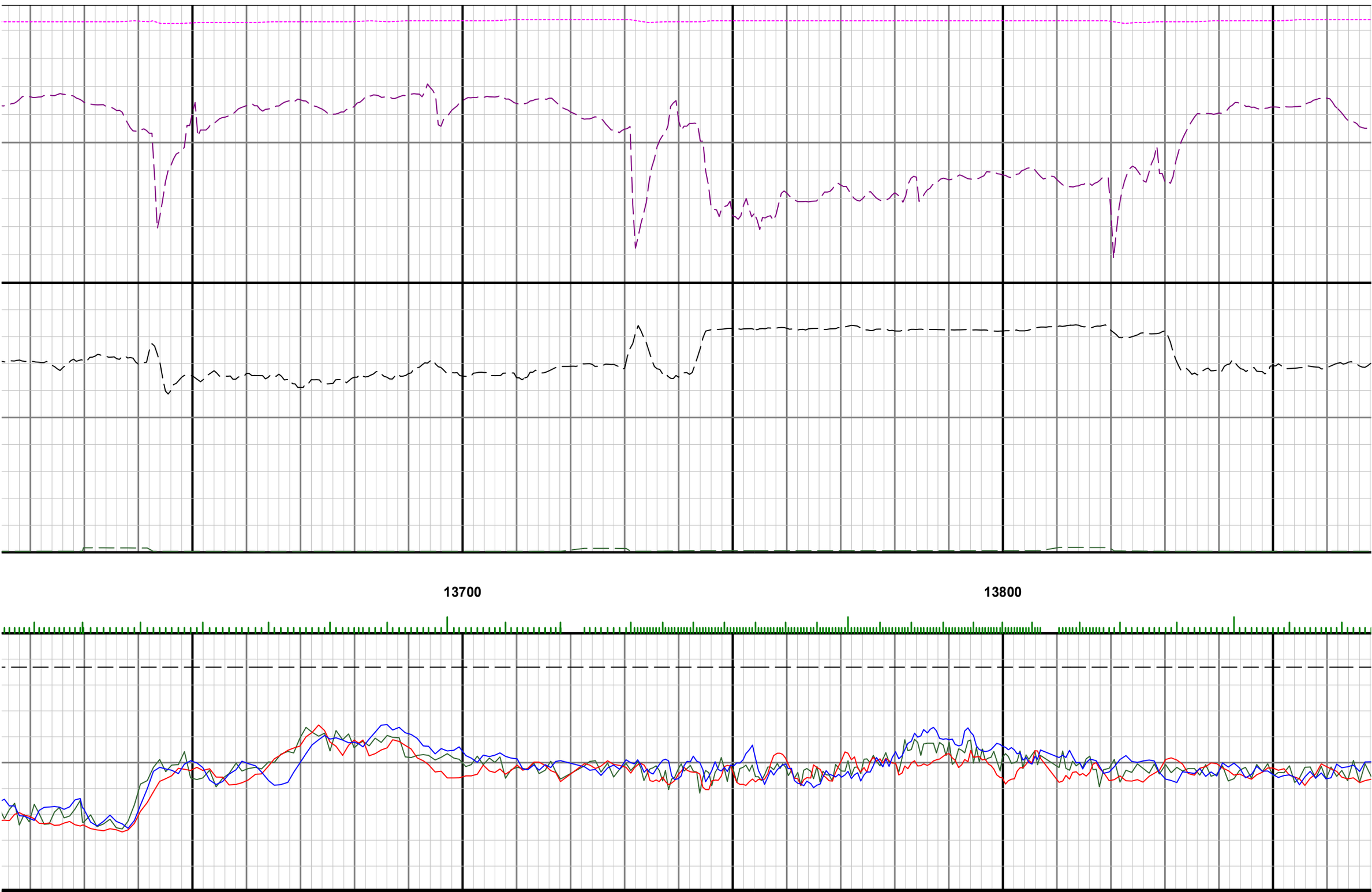

12400
12500
12

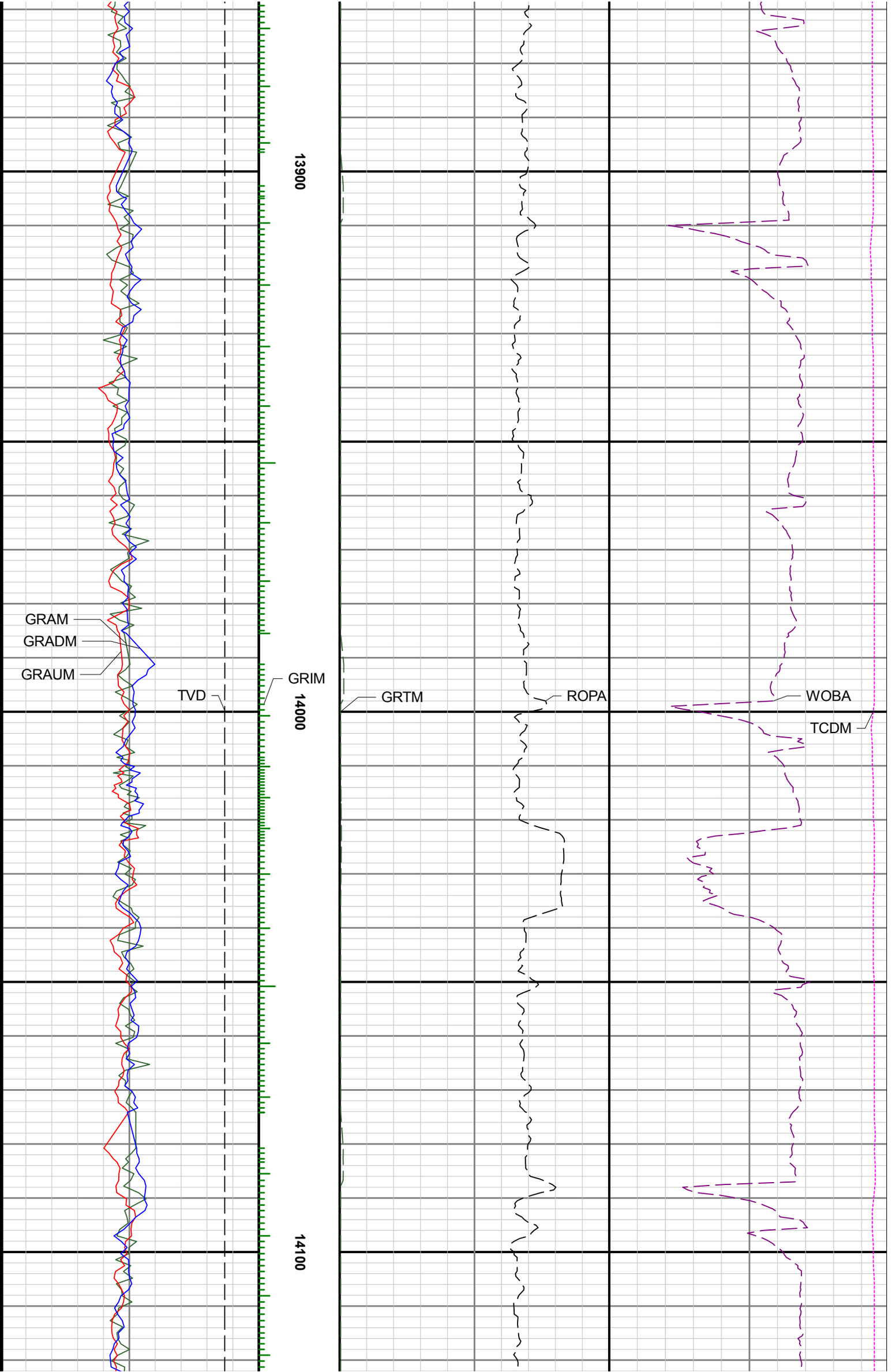

600
12700
12800

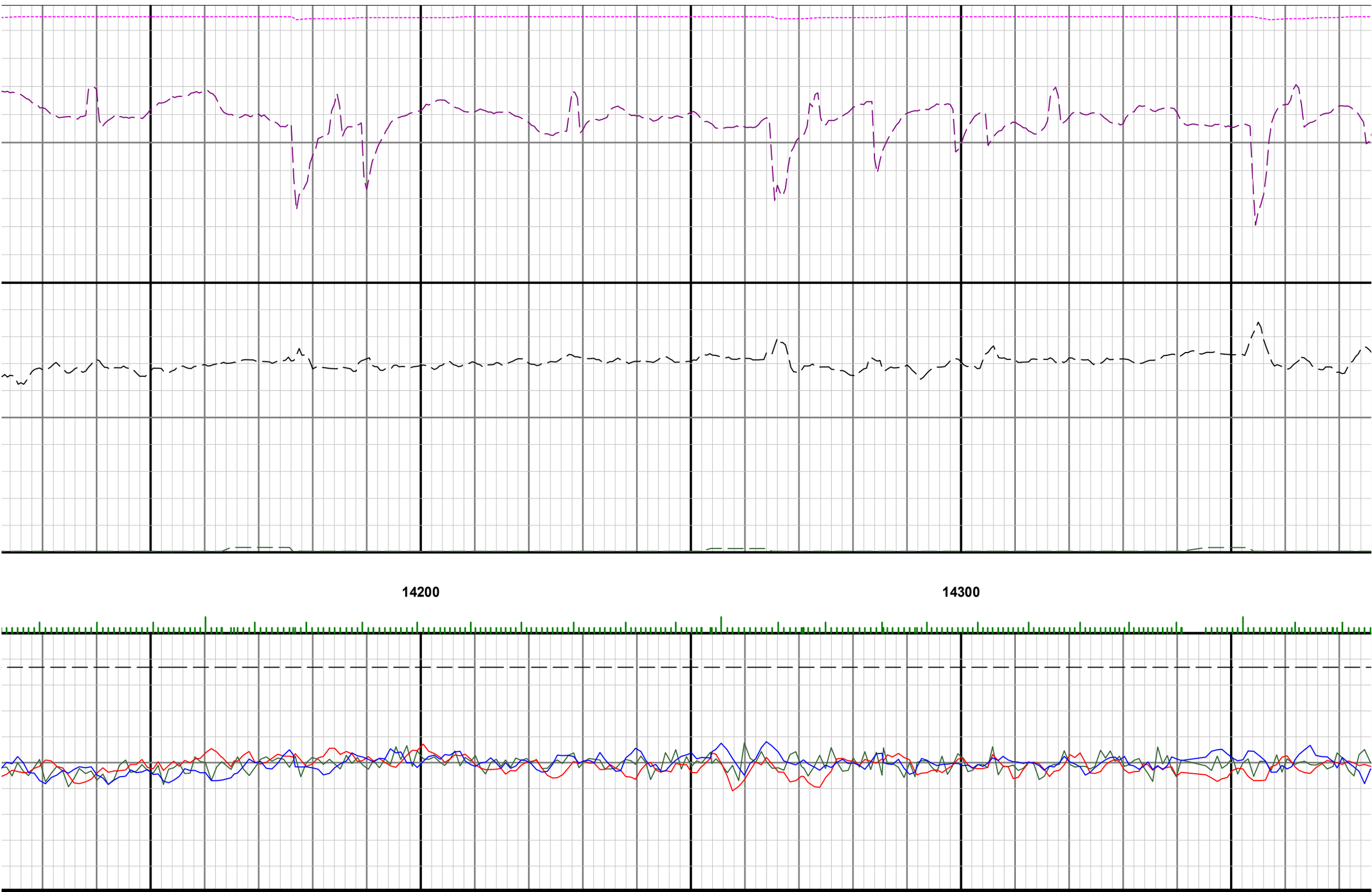

12900
13000
13100
GRAUM
GRIM
TVD
GRAM
GRADM
GRTM
ROPA
WOBA
TCDM

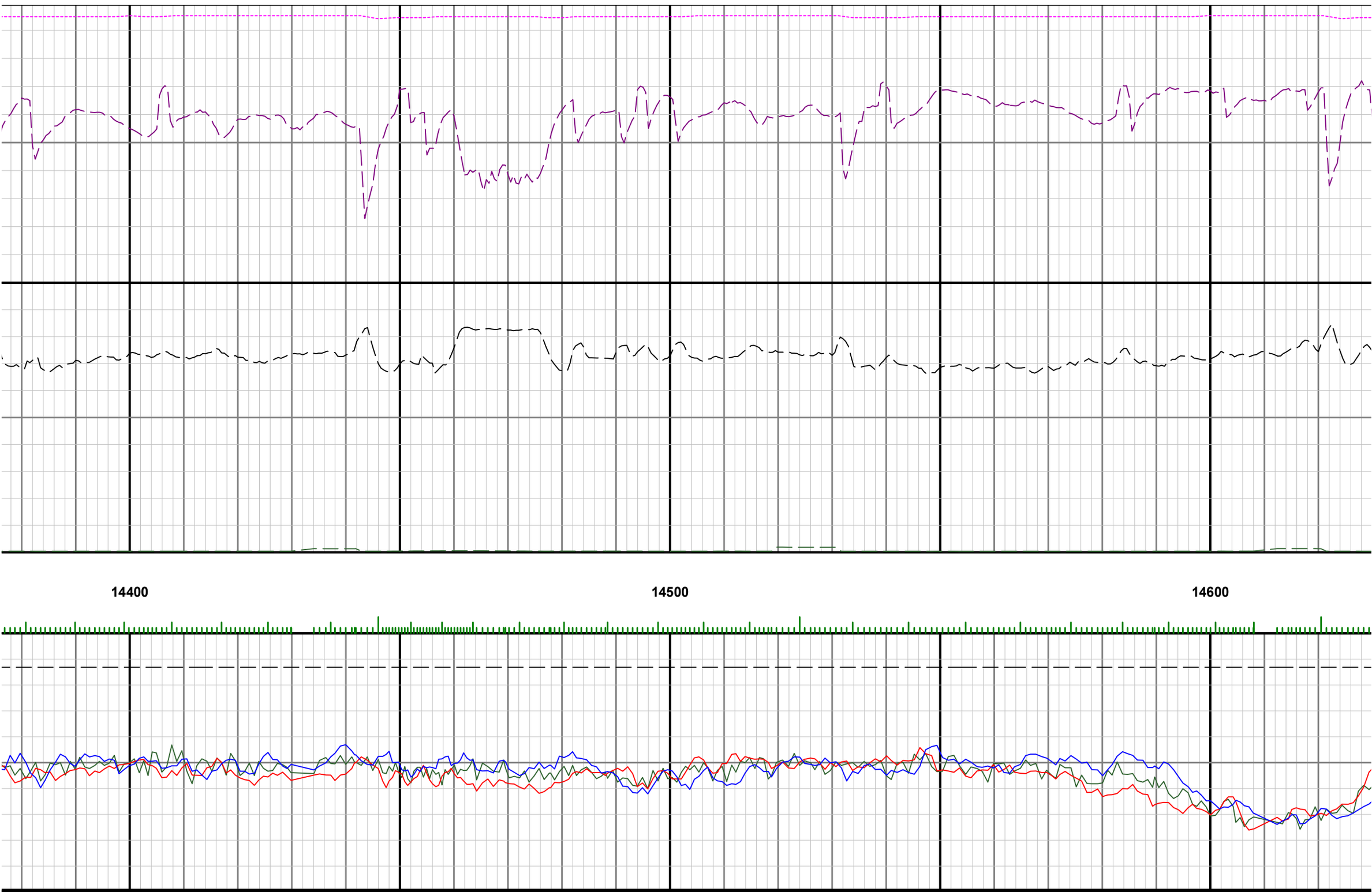

13200
13300

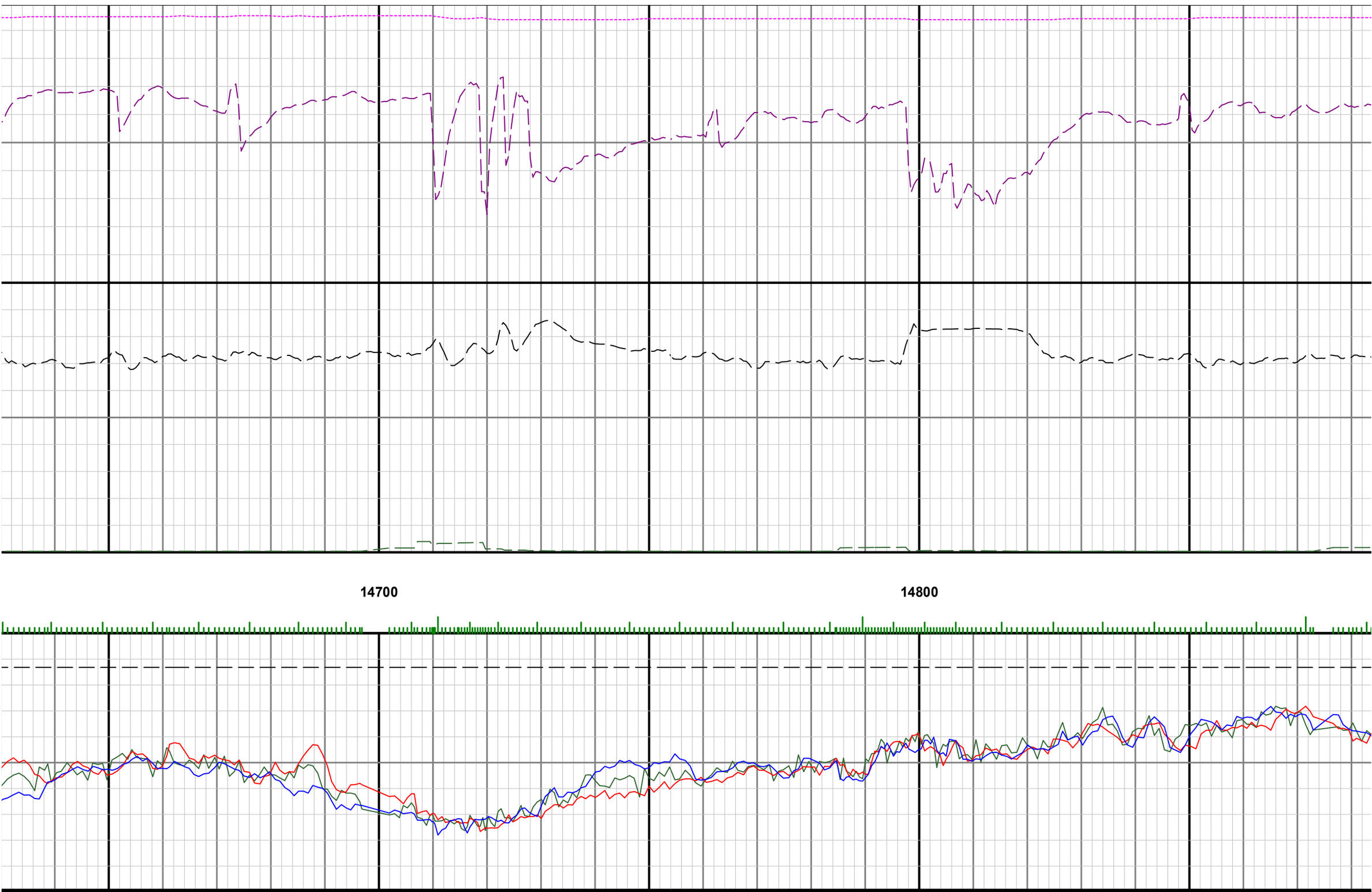

13400
13500
13600

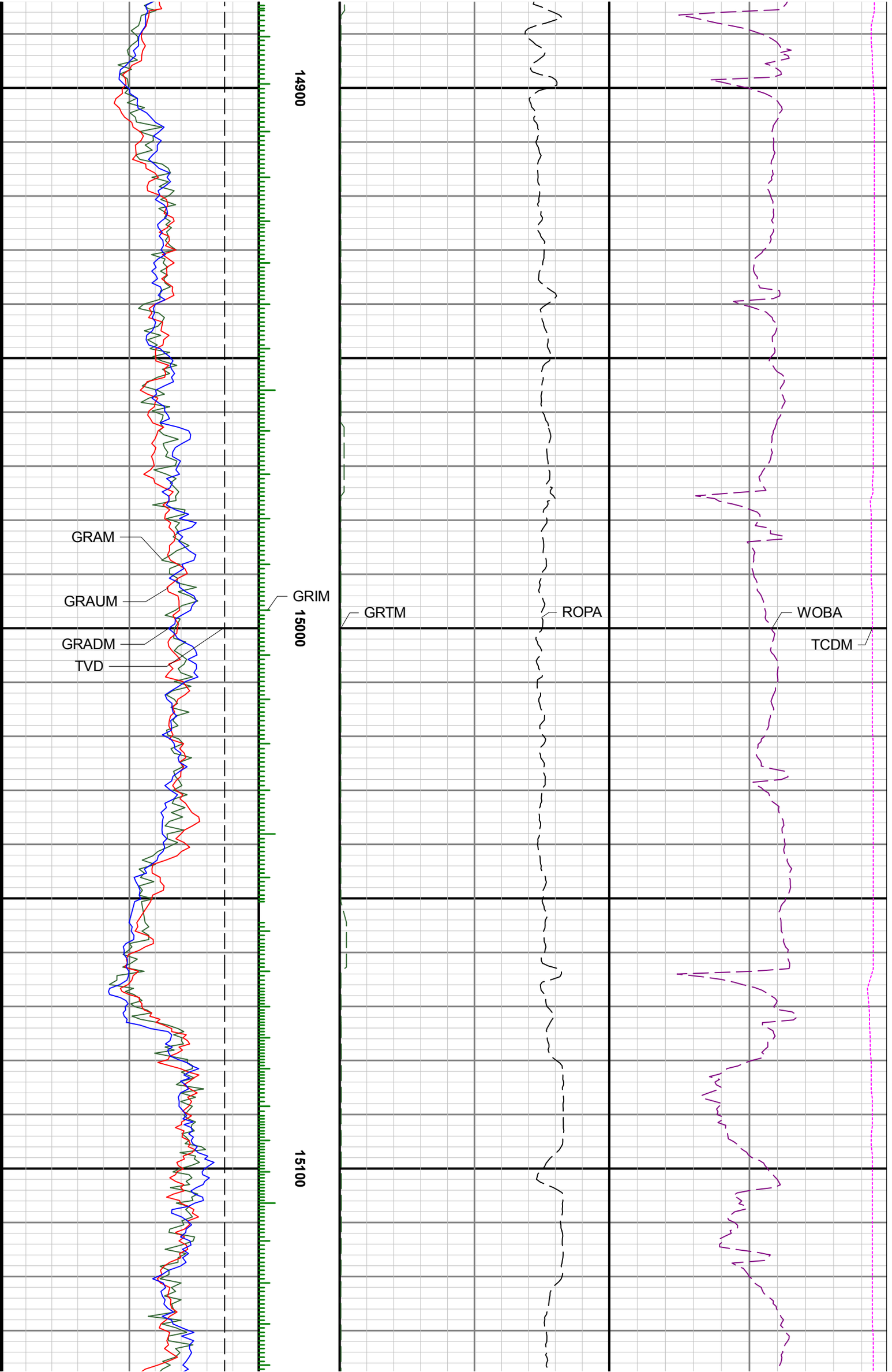

13700
13800

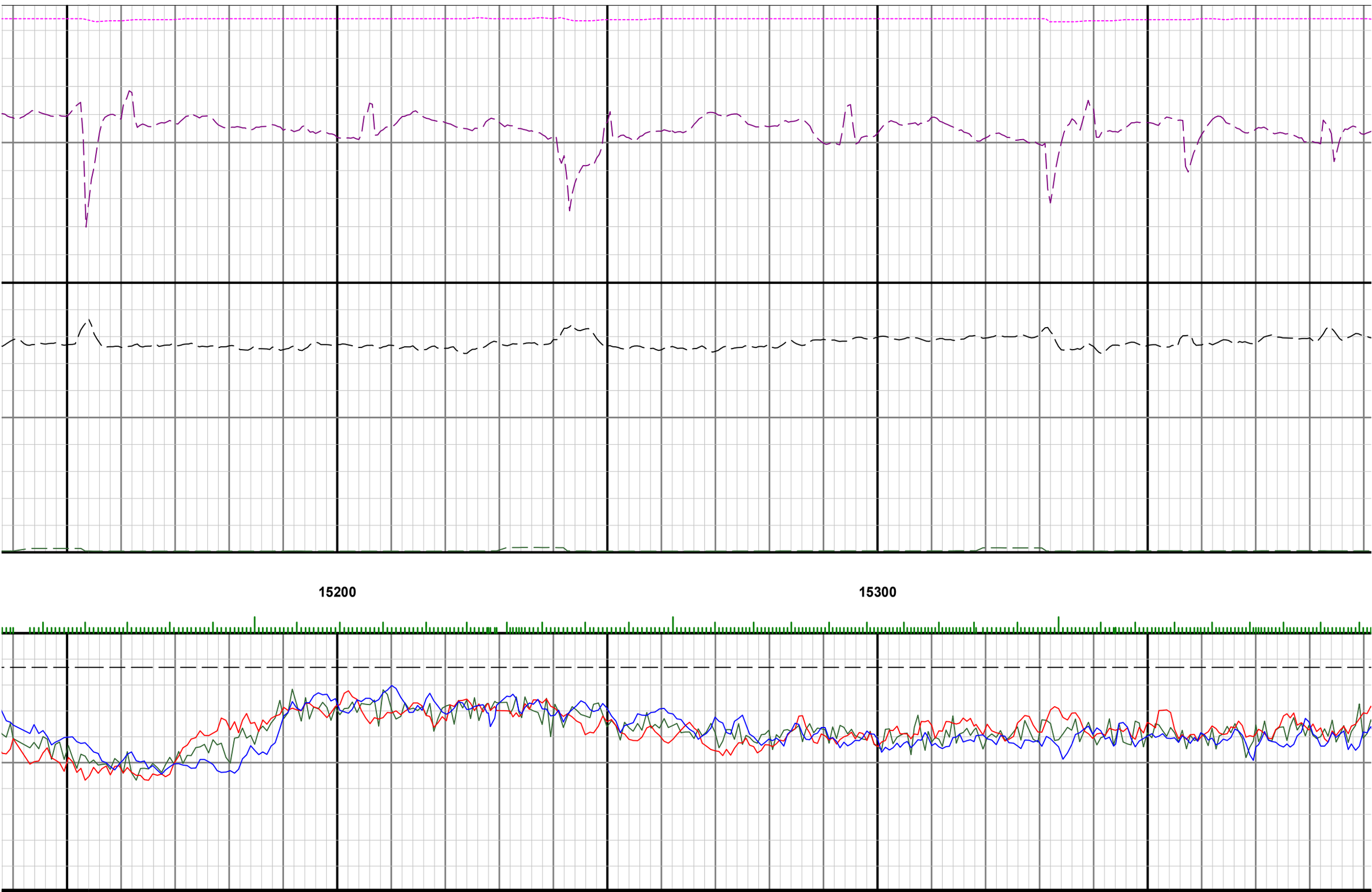

13900
14000
14100
GRAM
GRADM
GRAUM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

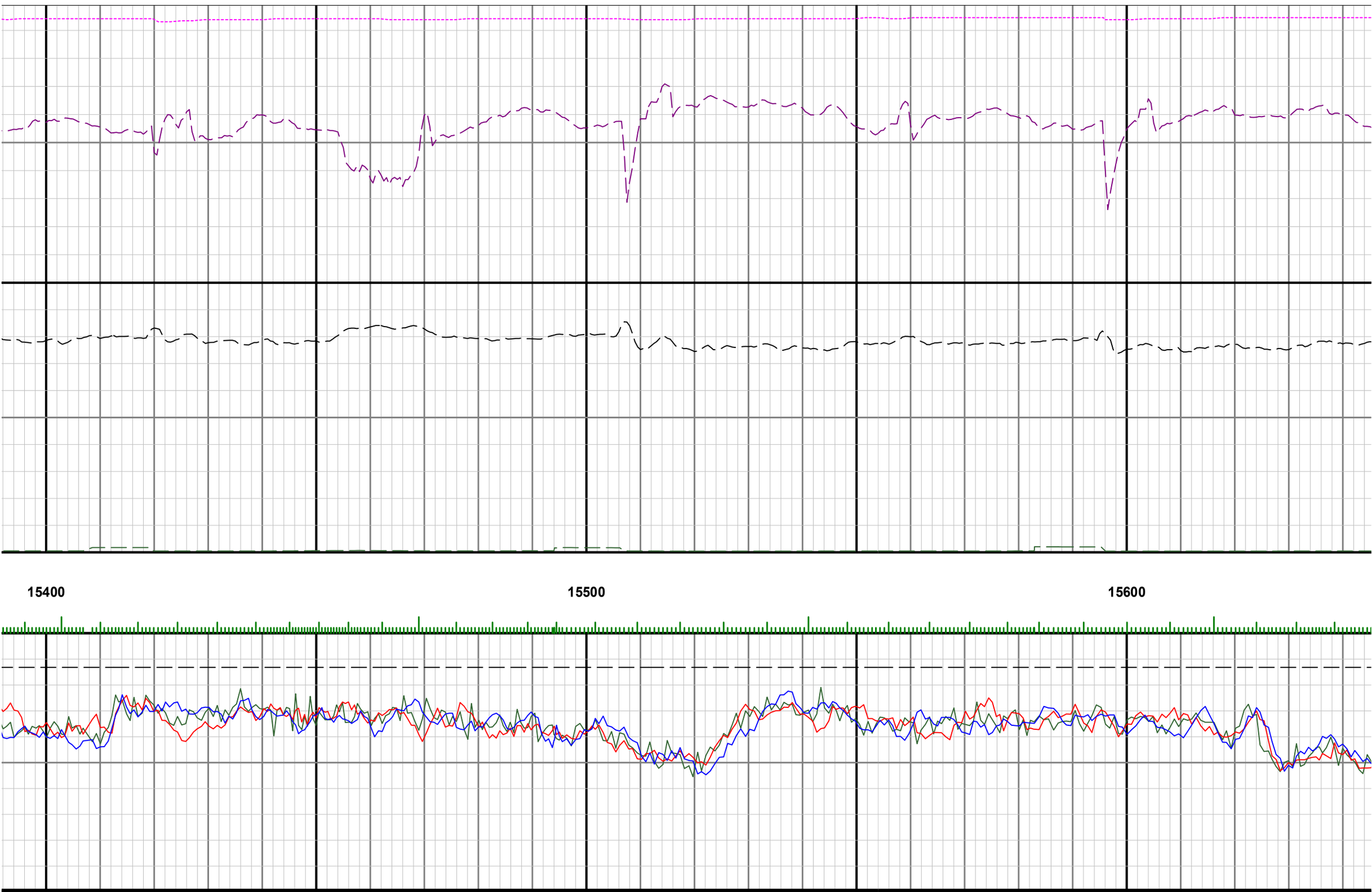

14200
14300

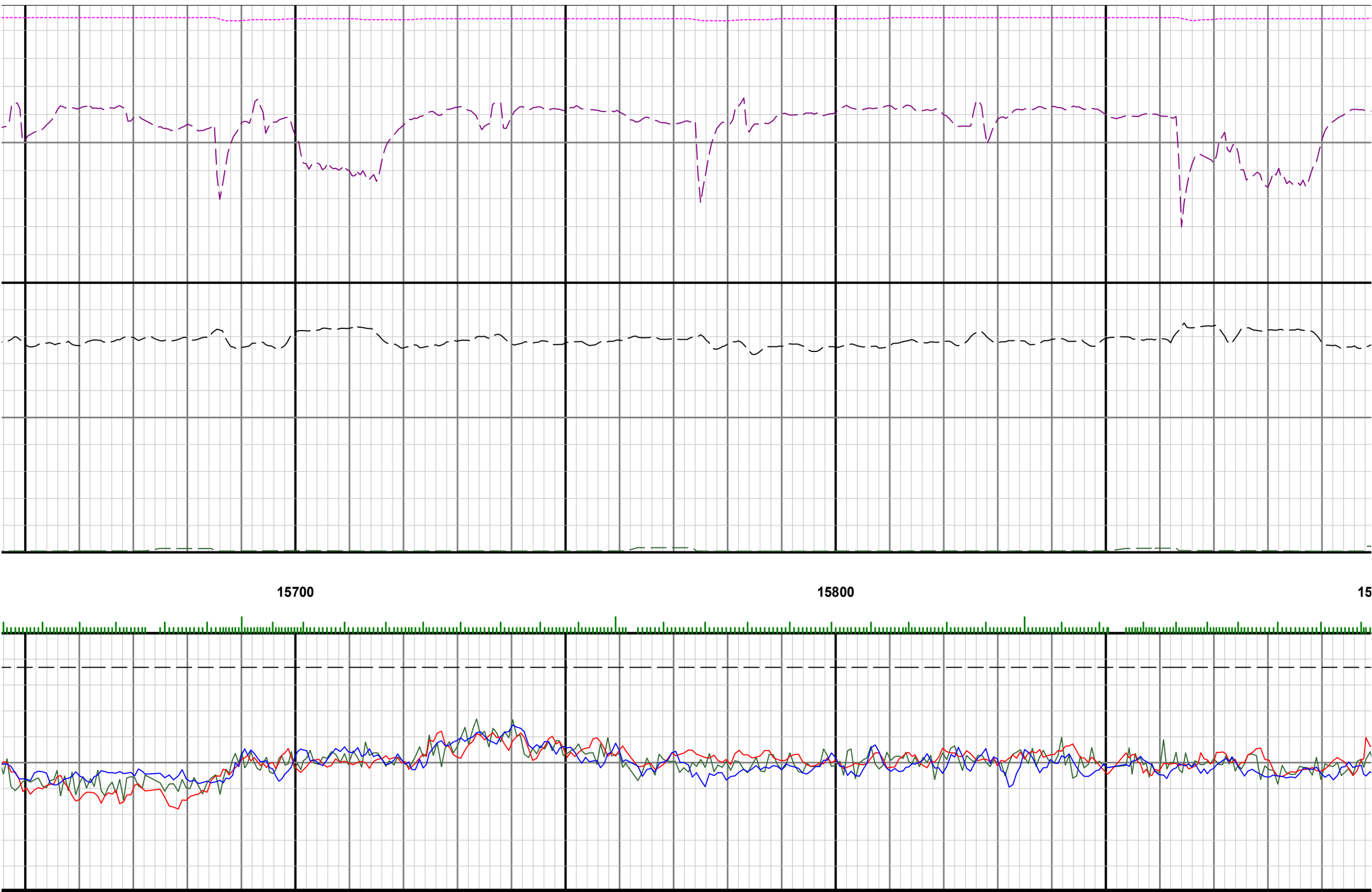

14400
14500
14600

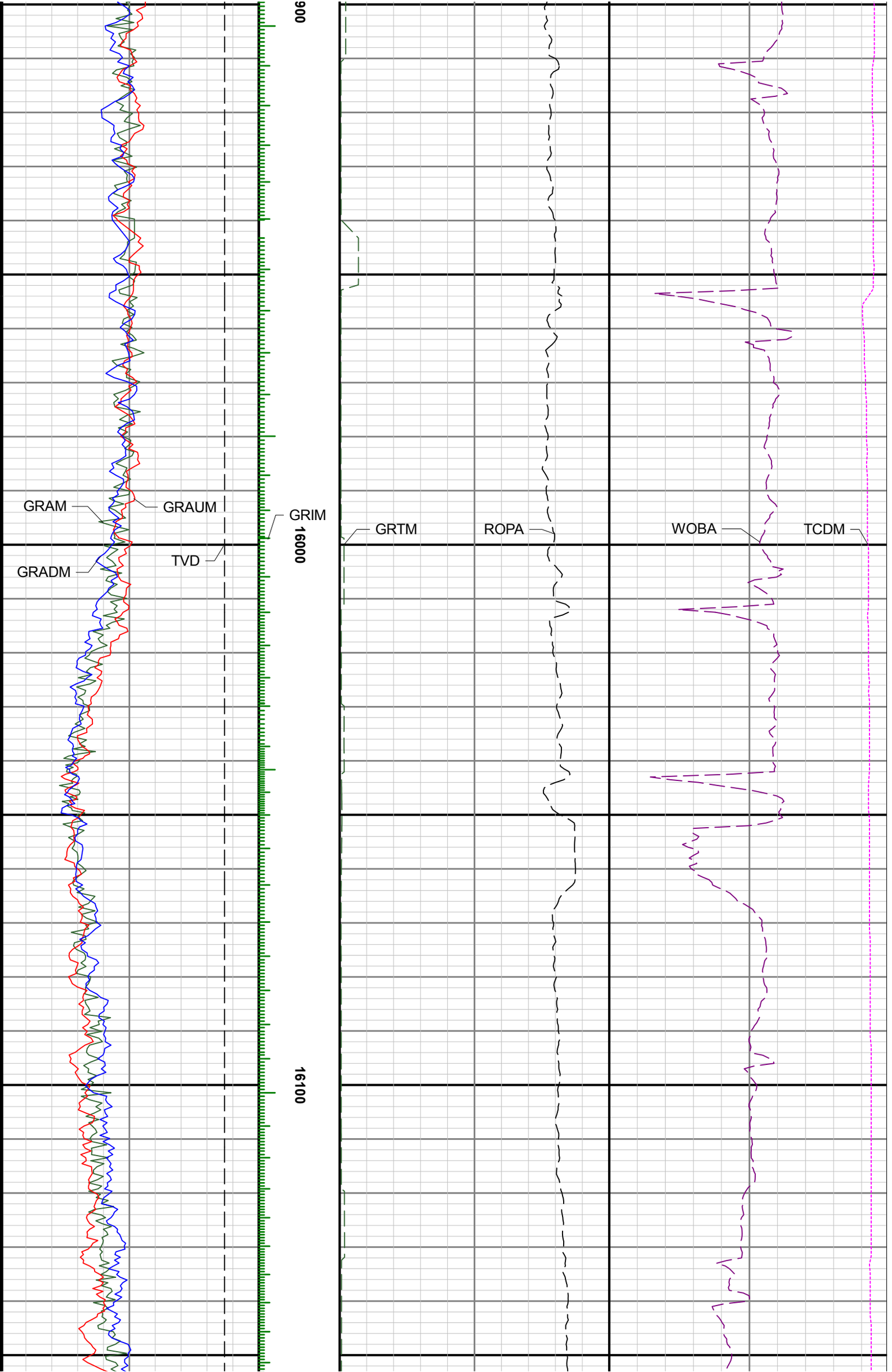

14700
14800

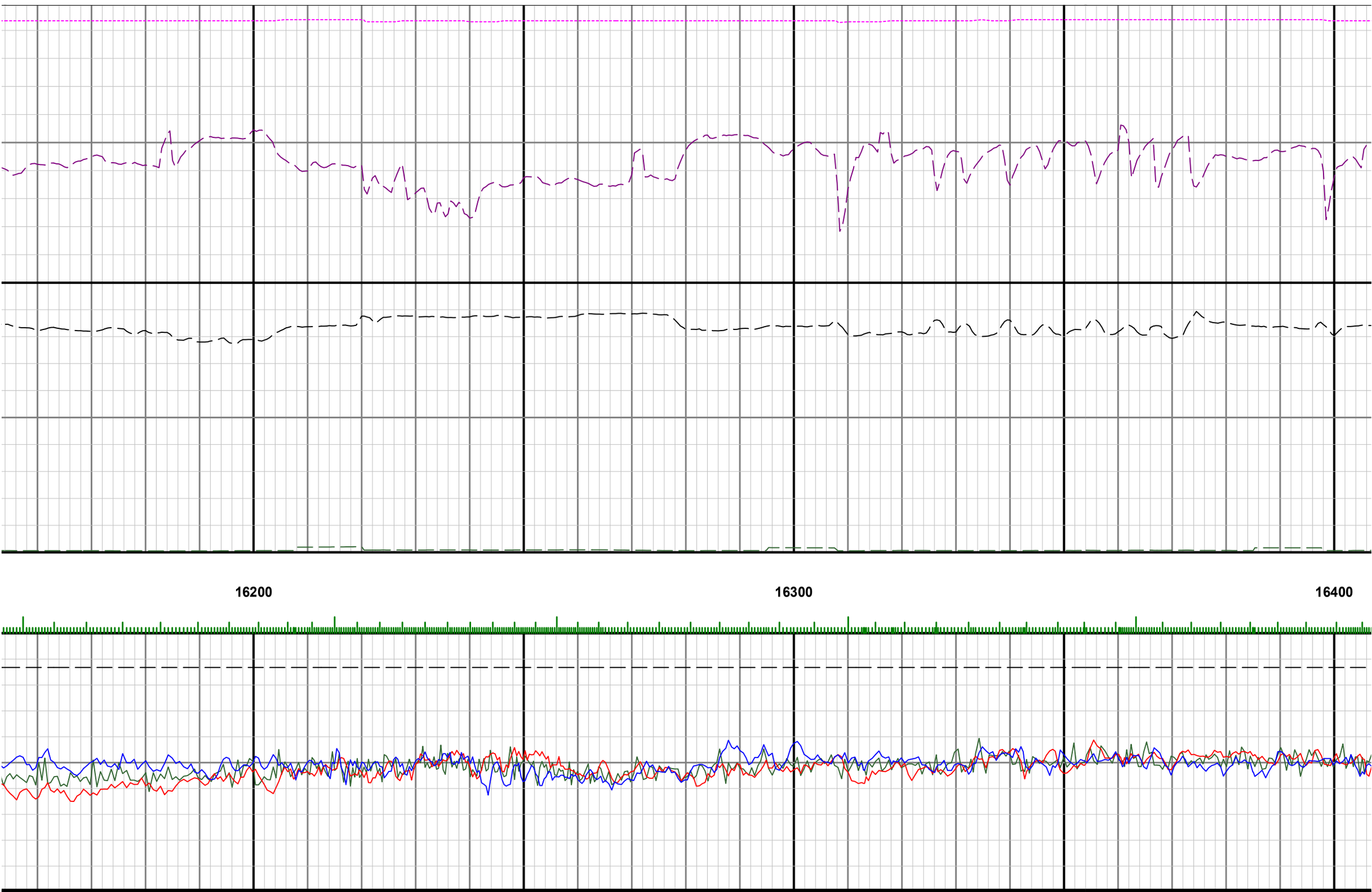

14900
15000
15100
GRAM
GRAUM
GRADM
TVD
GRIM
GRTM
ROPA
WOBA
TCDM

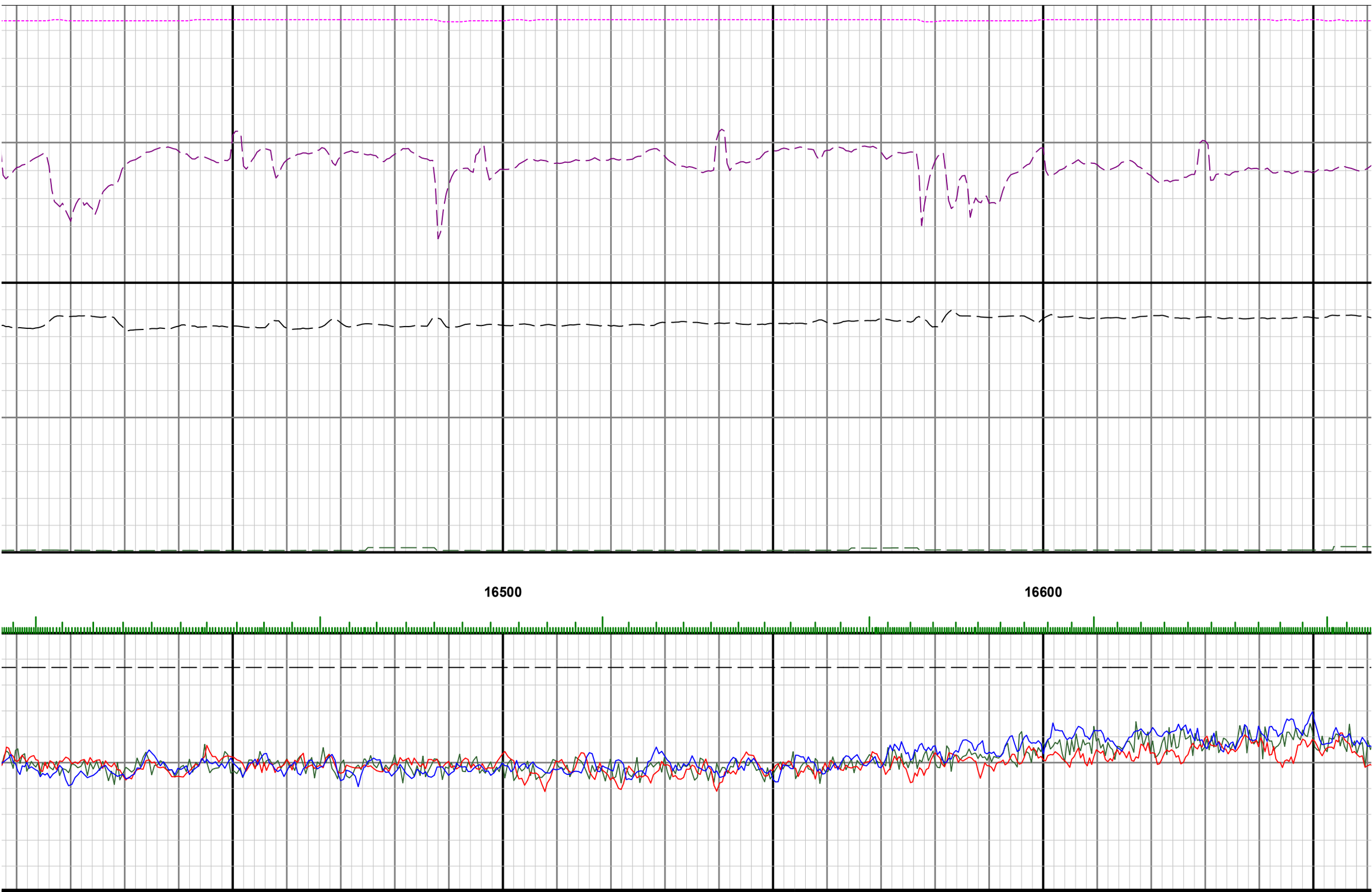

15200
15300

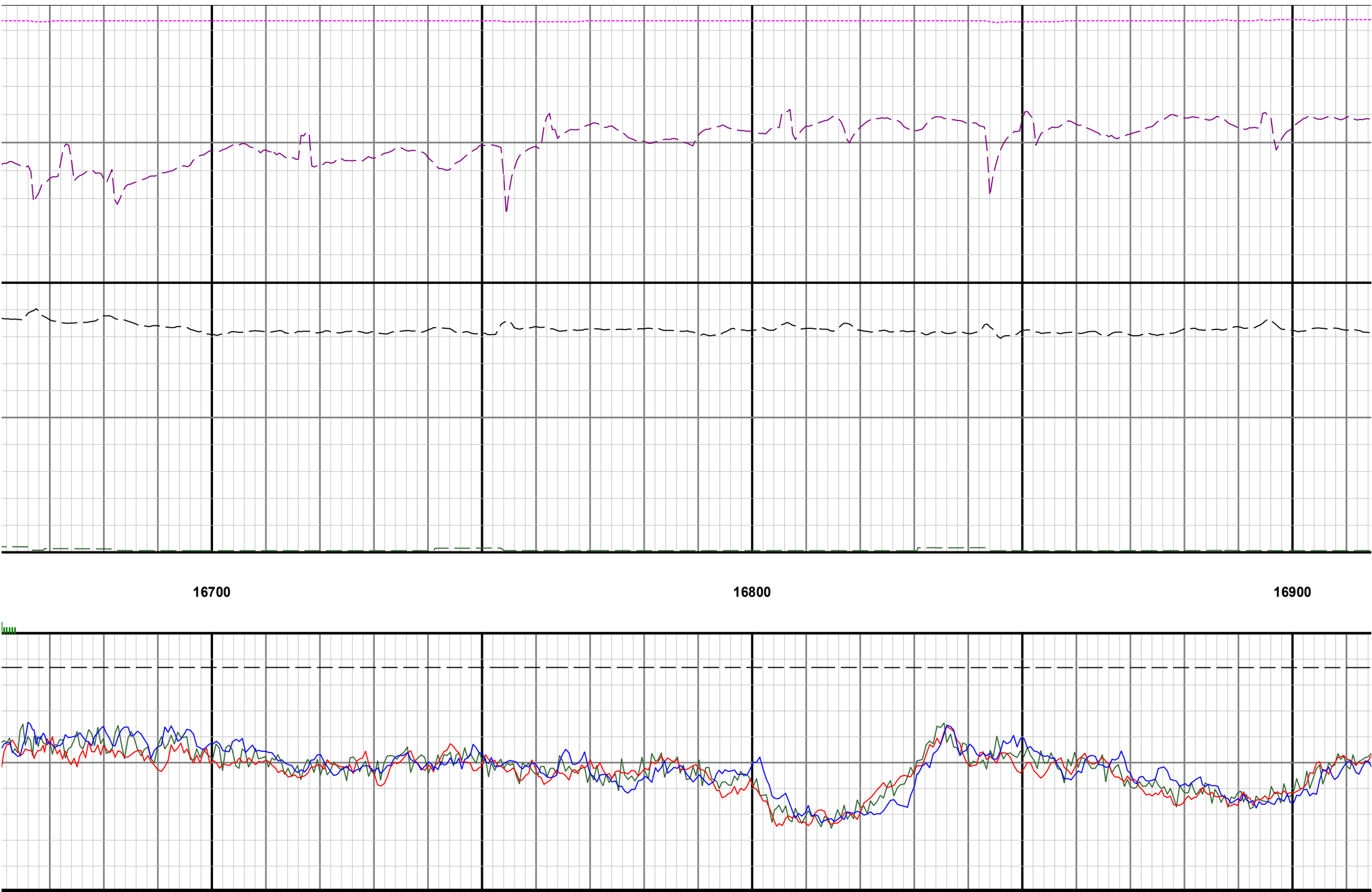

15400
15500
15600

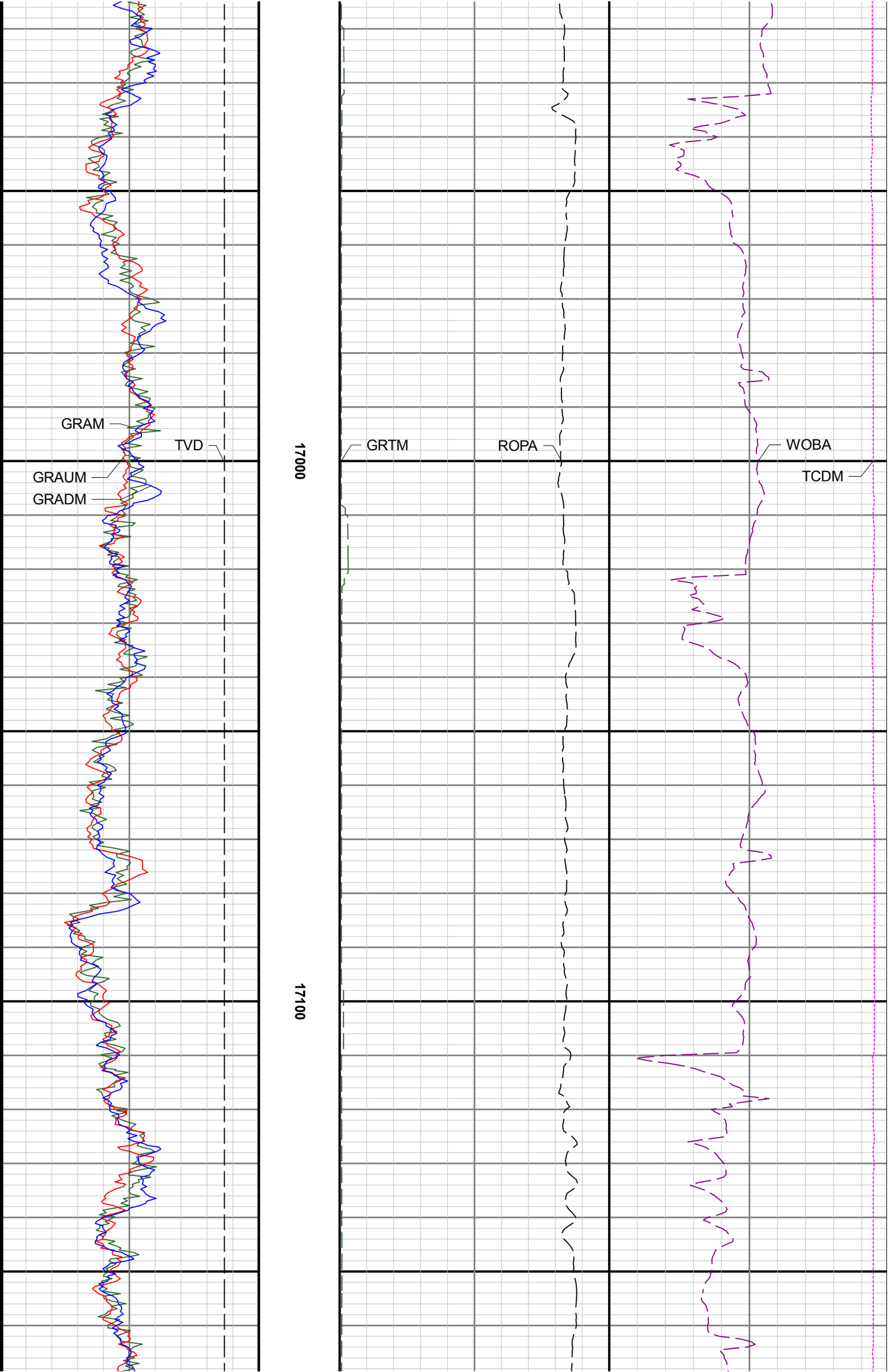

15700
15800

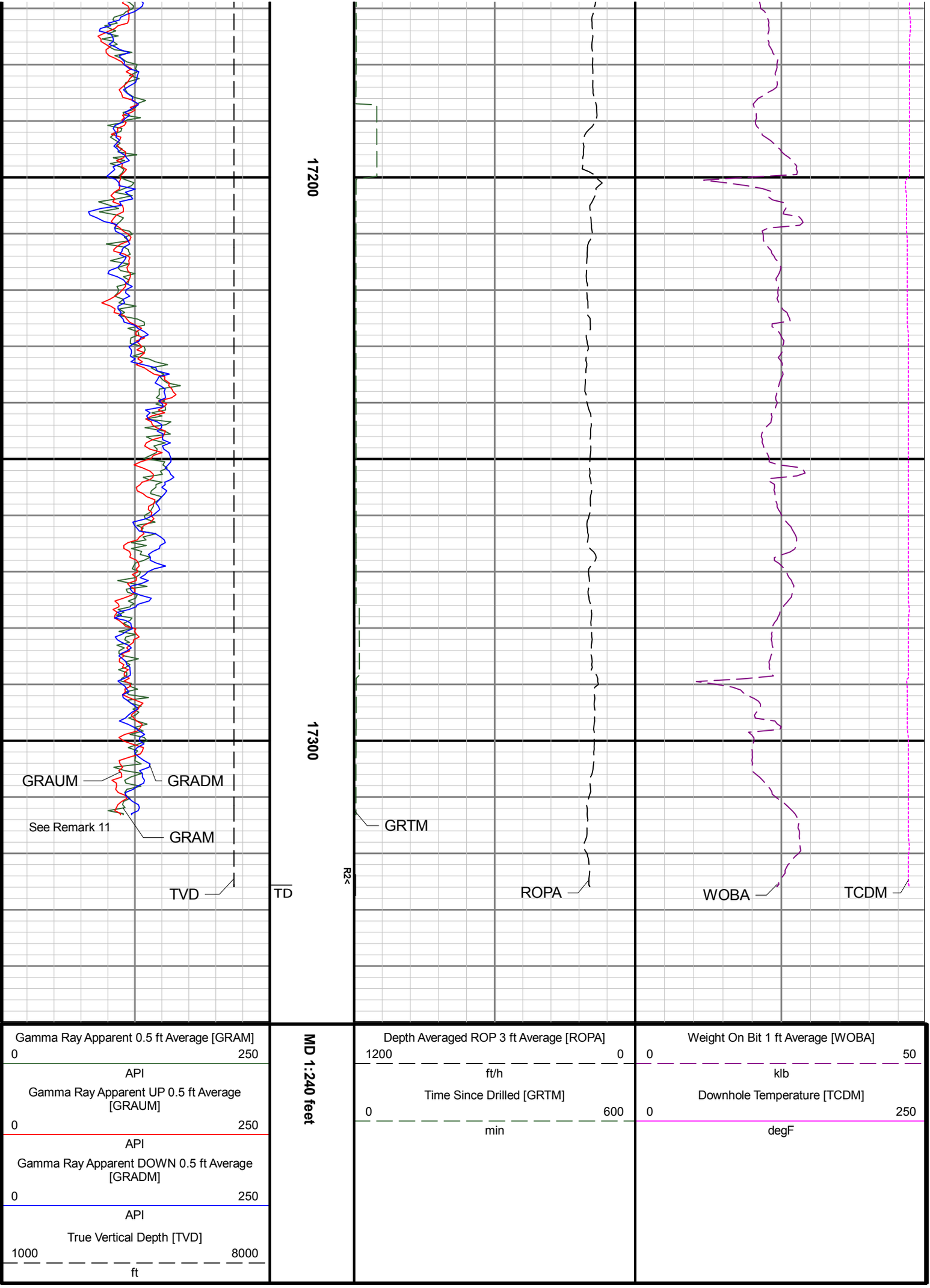

900
GRAM
GRAUM
GRIM
16000
GRADM
TVD
GRTM
ROPA
WOBA
TCDM
16100


16200
16300
16400


16500
16600


16700
16800
16900


GRAM
TVD
GRAUM
GRADM
17000
17100
GRTM
ROPA
WOBA
TCDM



Gamma Ray Apparent 0.5 ft Average [GRAM]
0 250
API
Gamma Ray Apparent UP 0.5 ft Average [GRAUM]
0 250
API
Gamma Ray Apparent DOWN 0.5 ft Average [GRADM]
0 250
API
True Vertical Depth [TVD]
1000 8000
ft

MD 1:240 feet

Depth Averaged ROP 3 ft Average [ROPA]
1200 0
ft/h
Time Since Drilled [GRTM]
0 600
min

Weight On Bit 1 ft Average [WOBA]
0 50
klb
Downhole Temperature [TCDM]
0 250
degF