LWD Composite Log

Gamma Ray
Natural Formation Evaluation

Scale:	1:1200 MD
Depth Reference:	Driller's Depth
Status:	Final Print
API No:	05-123-42881-00
Job ID:	7928807
Company:	Noble Energy
Well:	Shadow A26-656
Field:	Weld County (Noble NAD 83 Grid)
County:	Weld
State:	Colorado

Surface Location:
Latitude: 040° 27' 30.420" N
Longtitude: 104° 28' 42.996" W
SEC: 30 TWN: 6N RGE: 63W

Other Services:
Directional
Rotary Steerable
VSS

Permanent Datum (P.D.):	Ground Level	Elevation:	4650.00 ft
Log Measured From:	Rig Floor	Above P.D.	30.00 ft

KB:	0.00 ft
DF:	4680.00 ft
GL:	4650.00 ft

Dates		Interval Logged	
Date From:	2016-06-04	Top: (ft)	1886.00
Date To:	2016-06-09	Bottom: (ft)	17347.00
Spud Date:	2016-06-03		

Magnetic Field Reference			
Azi Reference North:	Grid	Dip Angle: (deg)	67.13
Total Magnetic Field Strength: (nT)			52531
Mag to Reference North Correction: (deg)			7.47 E

Borehole Record

Hole Size (in)	From (ft)	To (ft)
8.500	1903.00	17347.00

Casing Record

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
9.625	36.00	30.00	1893.00

Mud Record

Type	From (ft)	To (ft)
Oil Based Mud	1903.00	17347.00

Deviation Record

Hole Size (in)	Interval (ft)	Inc | Az (Start)	Inc | Az (End)
8.500	15444.00	0.45 | 97.53	89.90 | 269.59

Acquisition System	Software Version
Baker Hughes Cadence	G3.2
Plot Studio	3.2.7268.7

Other			
Rig:	H&P 524		
Contractor:	Helmerich & Payne Drilling Co		
District:	RMD	Unit:	D&E

part of Baker Hughes. Unless other contract terms have been agreed to by the parties, each party's liabilities and obligations shall be governed by Baker Hughes Incorporatedôs Worldwide Terms and Conditions."

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	2	8.500	PDC	2.00	AutoTrak Curve	1890.00	13013.00	1903.00	13013.00	2016-06-04 14:23	2016-06-06 19:54	49.99
2	3	8.500	PDC	2.00	AutoTrak Curve	13001.00	17347.00	13013.00	17347.00	2016-06-07 10:16	2016-06-08 21:32	34.35

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
David Browning	2016-06-01	2016-06-05	Mike Gurnsey	2016-06-01	2016-06-09	Alexander Osborne	2016-06-02	2016-06-09
Chad Hough	2016-06-03	2016-06-05	Matthew Delmore	2016-06-05	2016-06-09	Will Drake	2016-06-05	2016-06-09

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+ (%)
2016-06-04 13:00	1	1903.00	Oil Based Mud	9.5	13	N/A	18.0	64.5/25.0	Active Pit	34500	0.00
2016-06-05 02:15	1	5764.00	Oil Based Mud	9.4	14	N/A	19.6	63.0/27.0	Active Pit	41500	0.00
2016-06-05 13:00	1	7682.00	Oil Based Mud	9.6	14	N/A	19.2	63.5/25.0	Active Pit	40000	0.00
2016-06-06 02:15	1	10680.00	Oil Based Mud	9.7	16	N/A	21.0	64.0/23.5	Active Pit	42000	0.00
2016-06-06 13:00	1	12504.00	Oil Based Mud	9.8	13	N/A	18.0	65.0/22.0	Active Pit	42000	0.00
2016-06-07 02:15	1	13013.00	Oil Based Mud	9.7	11	N/A	18.0	67.0/20.5	Active Pit	39000	0.00
2016-06-07 17:00	2	13552.00	Oil Based Mud	9.7	13	N/A	18.2	66.5/20.6	Active Pit	39000	0.00
2016-06-08 02:15	2	14911.00	Oil Based Mud	9.9	14	N/A	21.2	64.1/22.0	Active Pit	42000	0.00
2016-06-08 13:00	2	16439.00	Oil Based Mud	9.8	13	N/A	19.0	64.5/22.0	Active Pit	37500	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	ATC_SU	12296372	Near Bit VSS	5.93	6.55	7.000	4.330
1	ATC_SU	12296372	Near Bit Inclination	5.93	6.55	7.000	4.330
1	ATC_MWD	12271999	Gamma (single)	2.75	12.72	6.840	2.250
1	ATC_MWD	12271999	Directional (mag)	12.27	22.24	6.840	2.250
2	ATC_SU	12653419	Near Bit Inclination	5.93	6.55	7.020	4.330

2	ATC_SU	12653419	Near Bit VSS	5.93	6.55	7.020	4.330
2	ATC_MWD	12418111	Gamma (single)	2.19	12.17	7.000	3.250
2	ATC_MWD	12418111	Directional (mag)	12.26	22.24	7.000	3.250

Comments

1 Baker Hughes Run 1 and 2 utilized a 6.75 inch AutoTrak Curve Rotary Steerable assembly tool behind a 8.50 inch bit from 1903 ft MD to 17347 ft MD (1902.99 ft TVD to 6731.45 ft TVD).

2 Small gaps in gamma data are due to tool power cycling off during downlink, and not recording gamma ray data

3 Depth Measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to a lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified

Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1896.00	8.500	1	The interval from 1890 ft MD to 1903 ft MD (1889.99 ft TVD to 1902.99 ft TVD) has no surface data due to the Gamma Ray sensor to bit offset
2	1934.00	8.500	1	The interval from 1919 ft MD to 1948 ft MD (1918.99 ft TVD to 1947.99 ft TVD) has no gamma ray data due to third party Pason depth tracking issue
3	3175.00	8.500	1	The interval from 3121 ft MD to 3224 ft MD (3100.99 ft TVD to 3199.88 ft TVD) has no surface or gamma logging data due to third party Pason depth tracking issue
4	17340.00	8.500	2	The interval from 17332 ft MD to 17347 ft MD (6731.42 ft TVD to 6731.45 ft TVD) has no Gamma data due to sensor to bit offset

Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
GRAM	Gamma Ray - Apparent 3 ft Average	API
TCDM	Downhole Temperature	degF
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb

BAKER HUGHES

Company Noble Energy

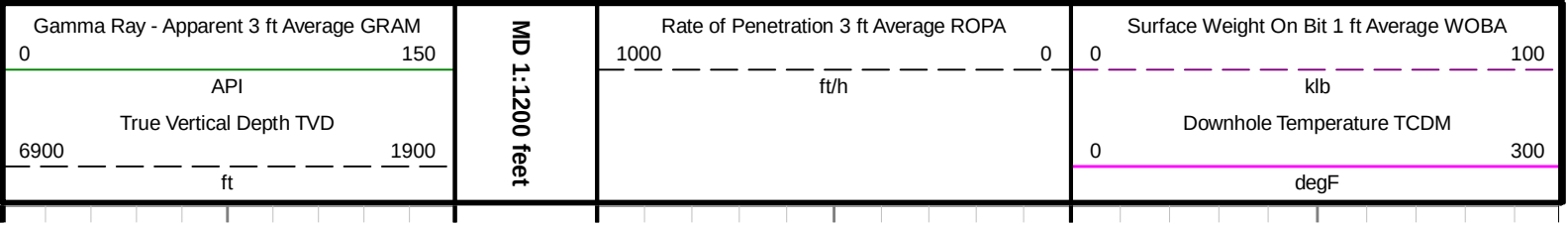
Well Shadow A26-656

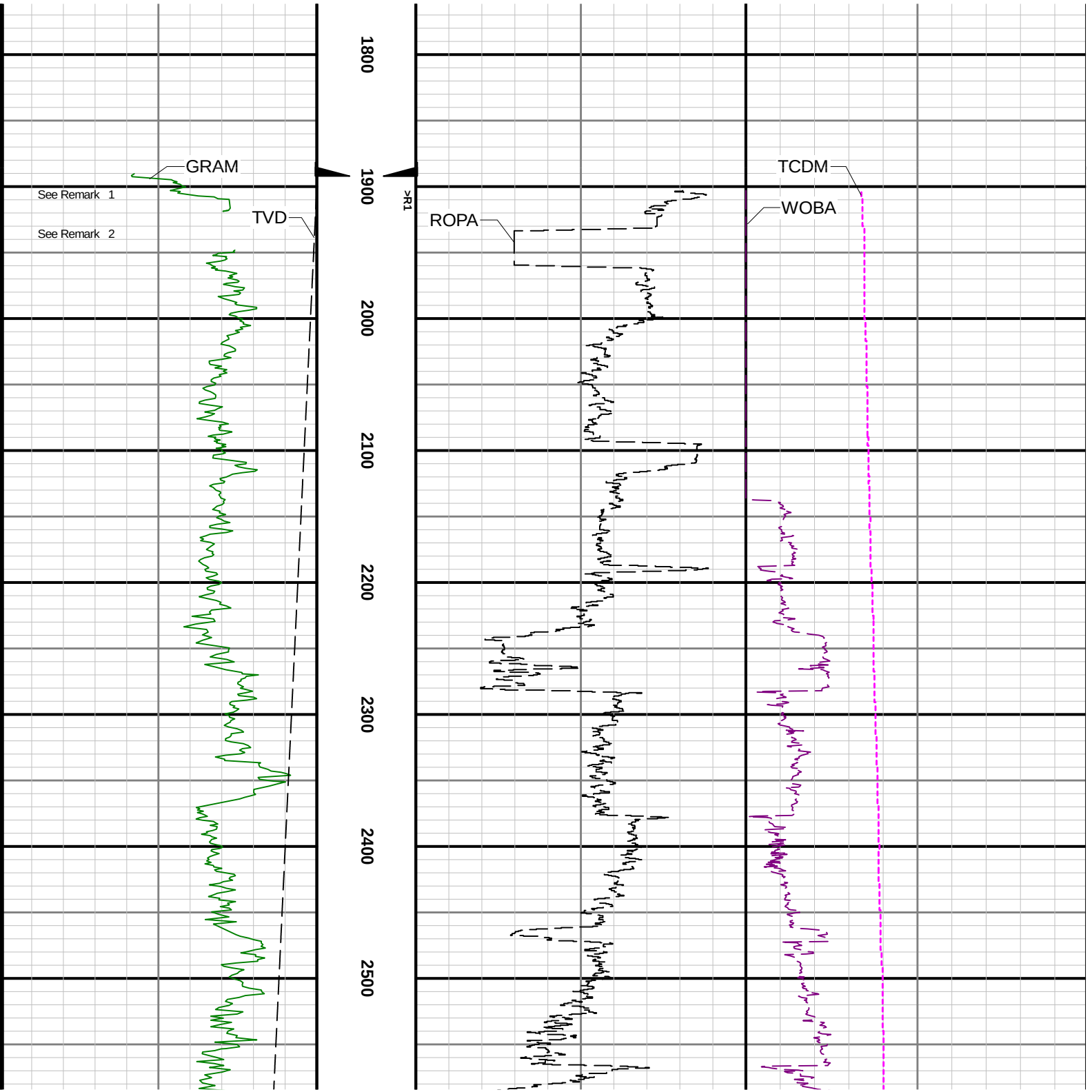
Interval

Date From: 2016-06-04 08:23 **Top:** 1886.00

Date To: 2016-06-09 15:31 **Bottom:** 17347.00

Created 2016-06-09 12:54

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See Remark 1
See Remark 2
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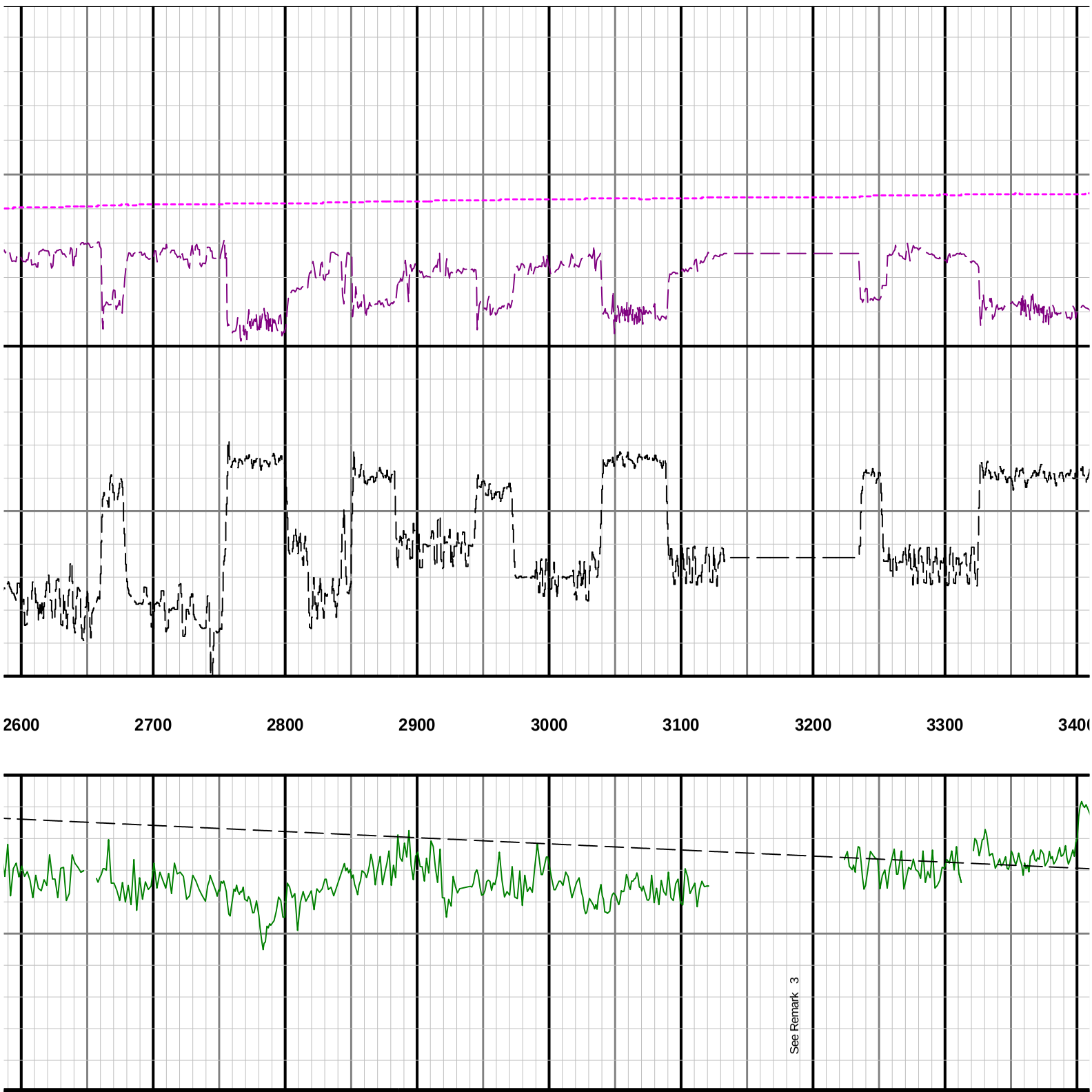
>R1
ROPA
TCDM
WOBA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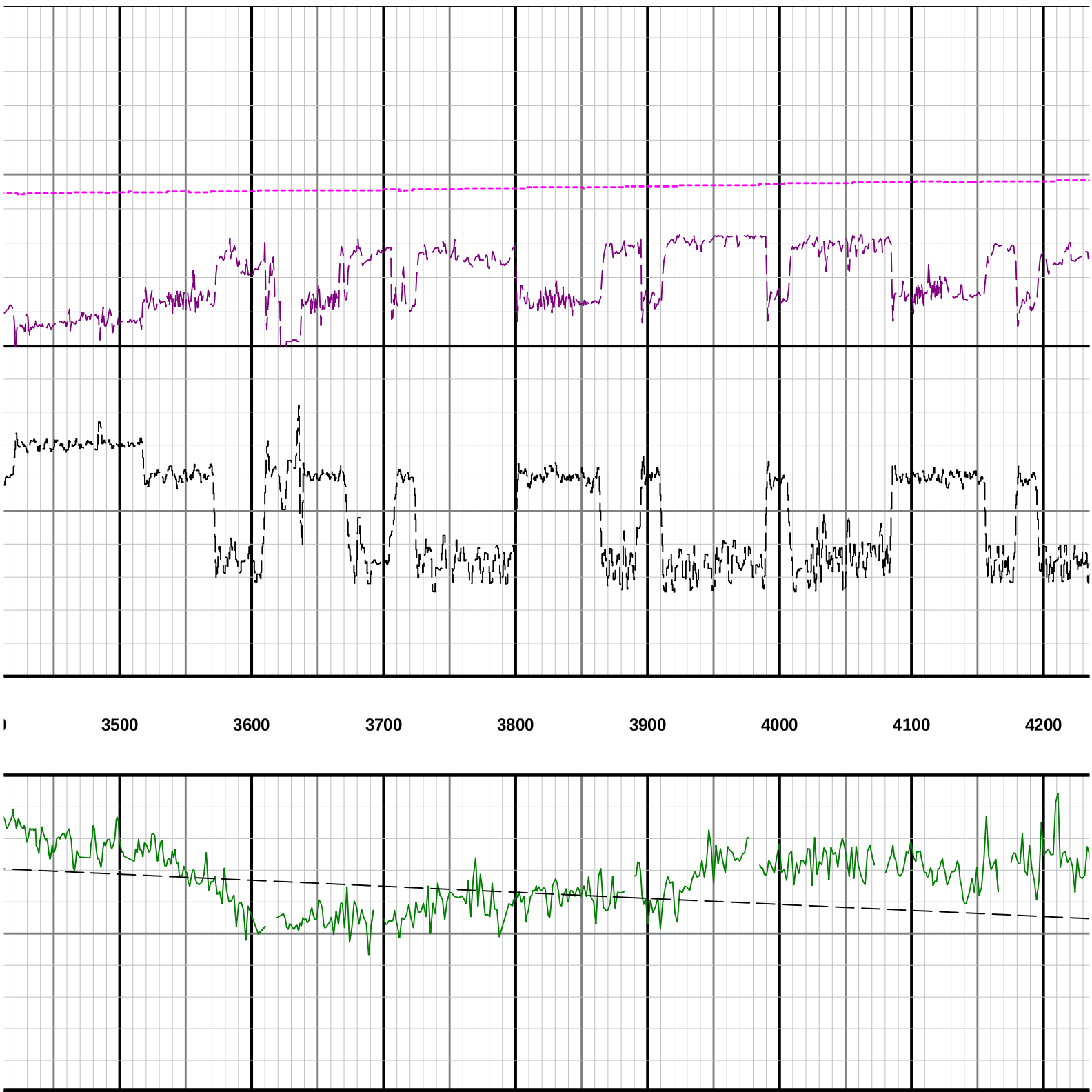
See Remark 3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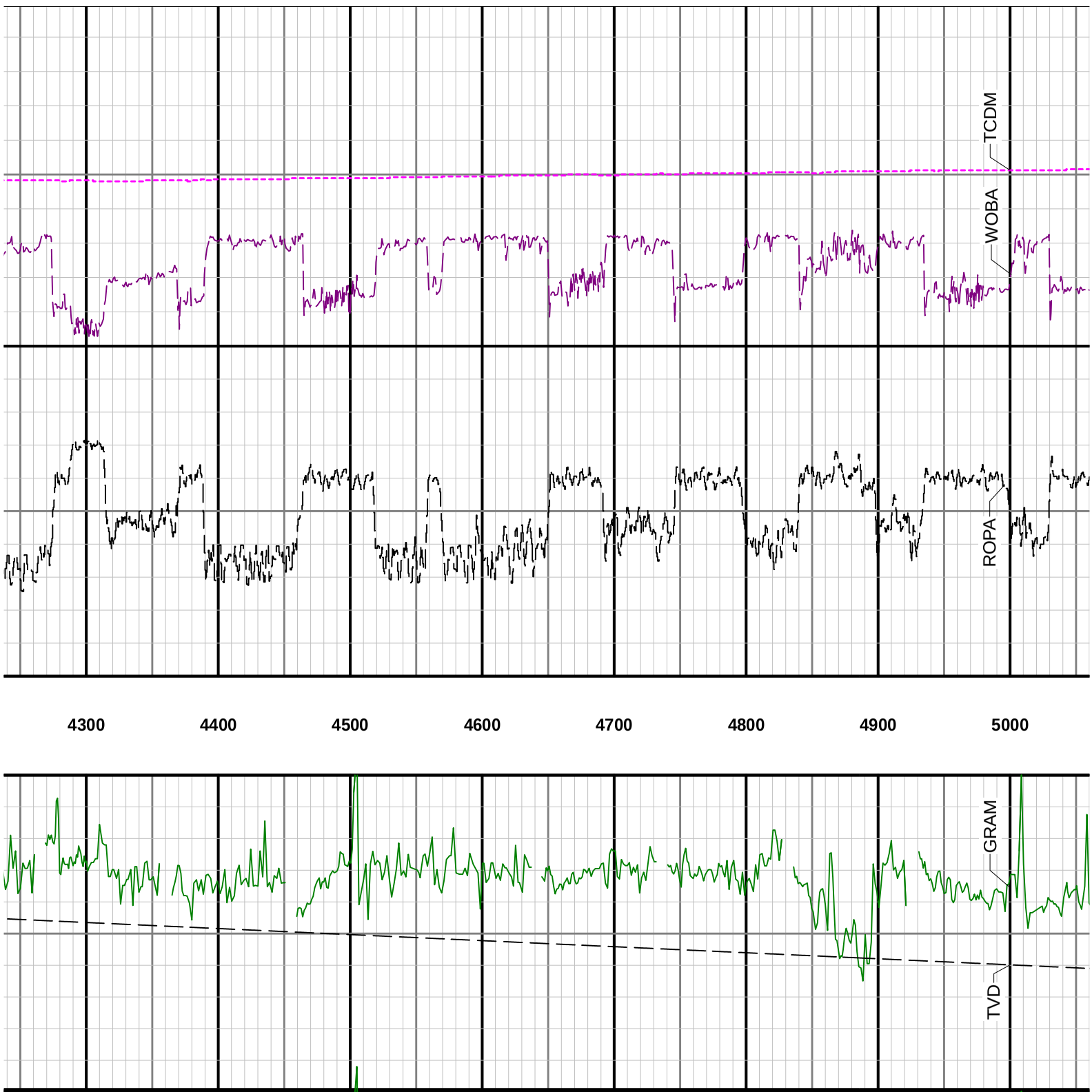
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WOBA
ROPA
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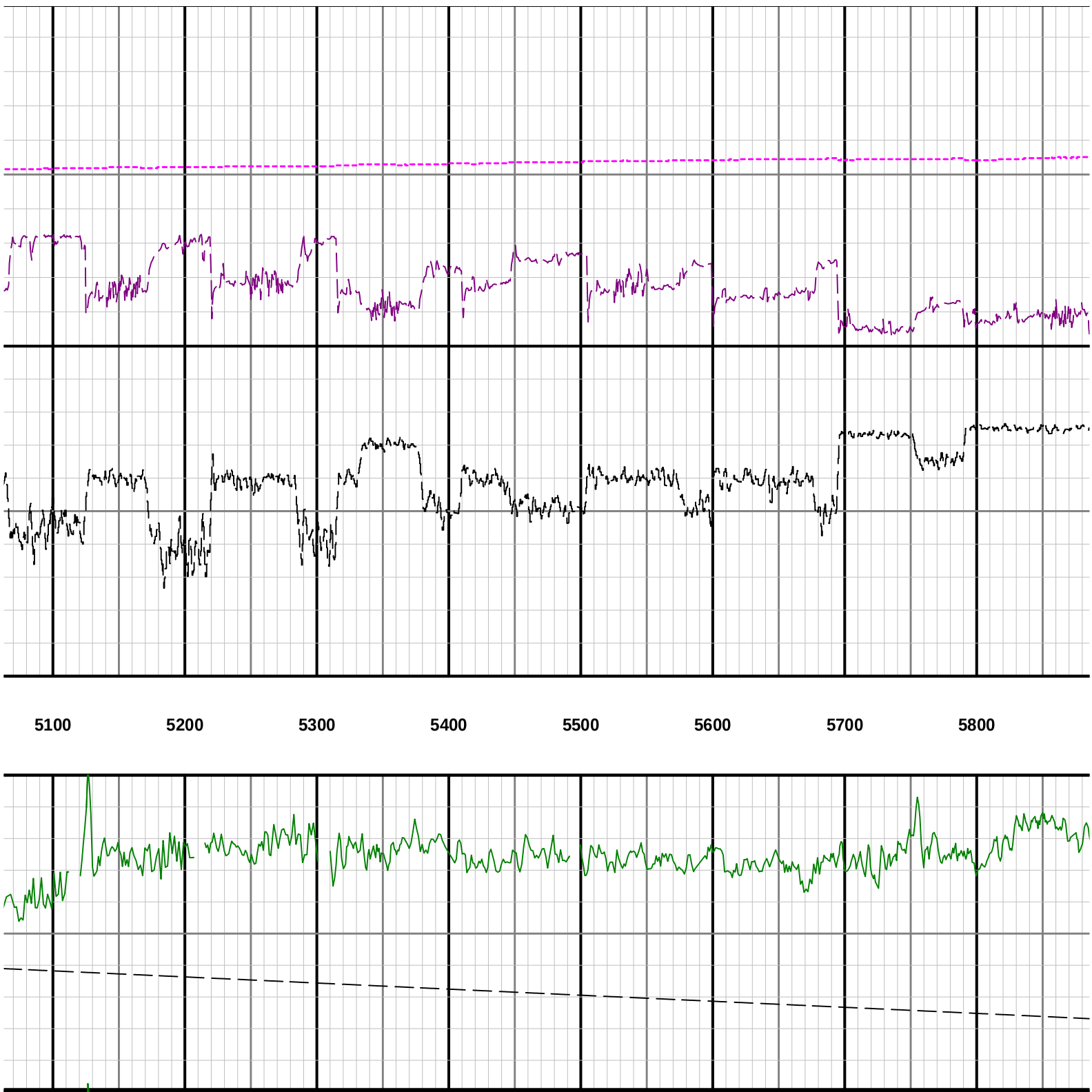
4400
4500
4600
4700
4800
4900
5000
GRAM
TVD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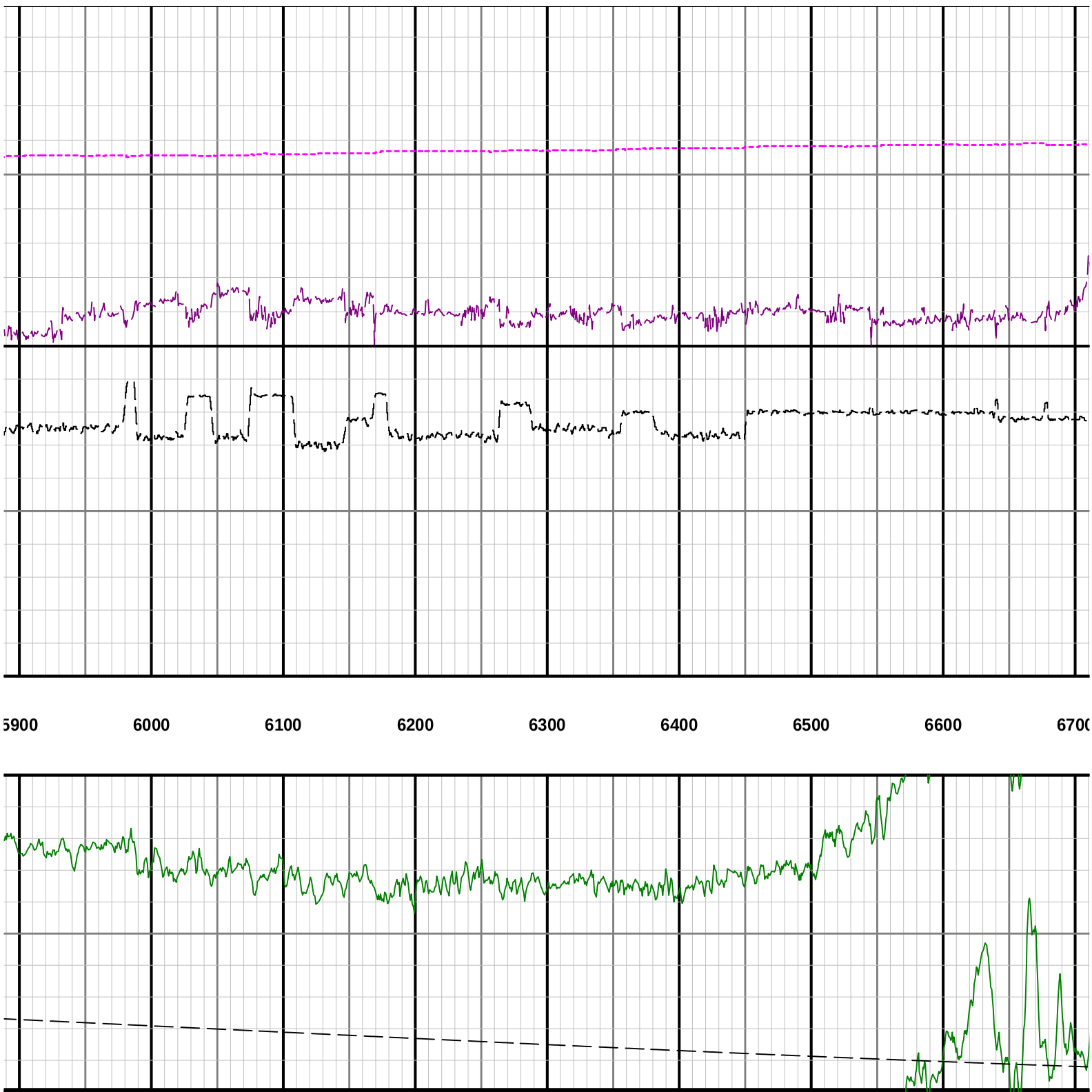
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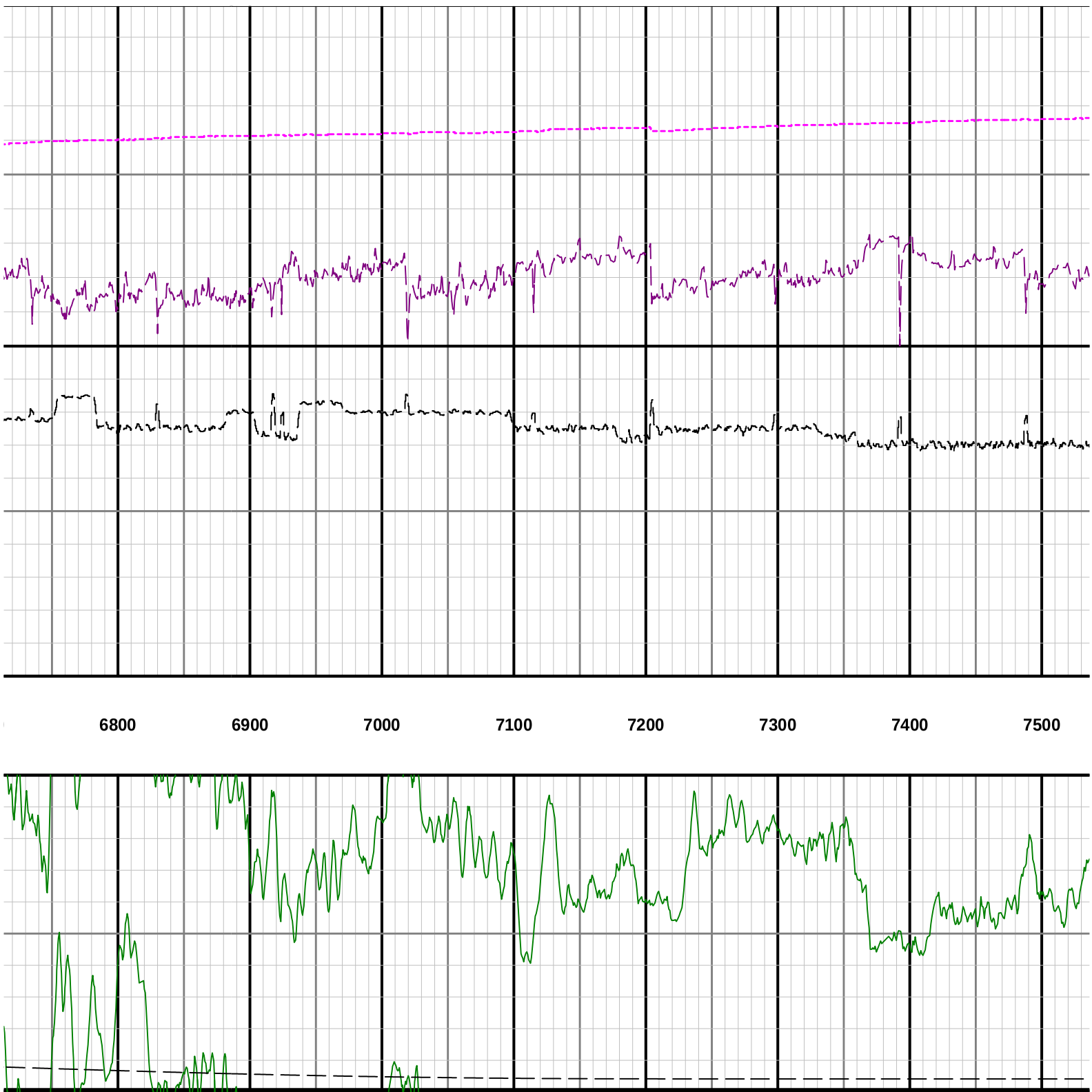
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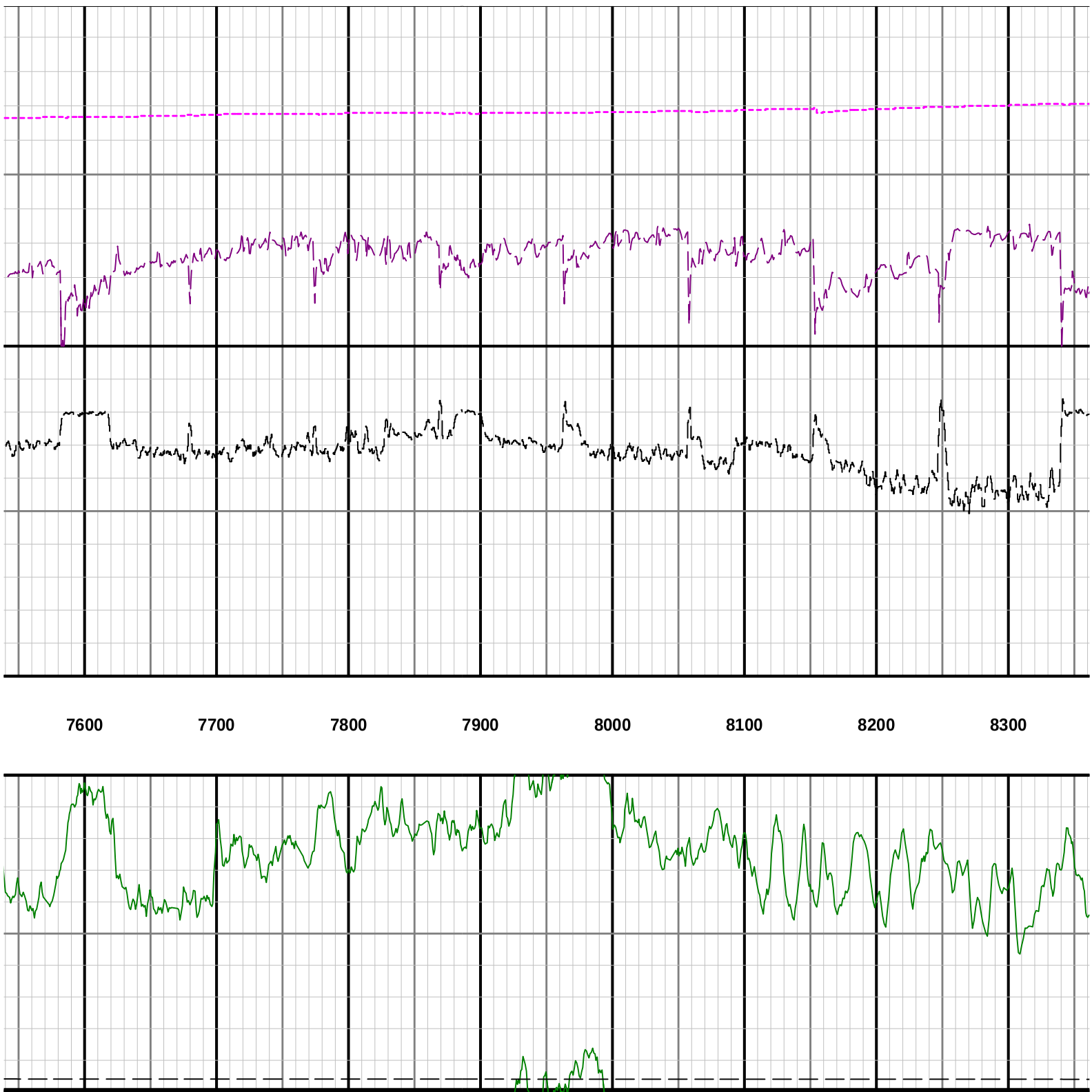
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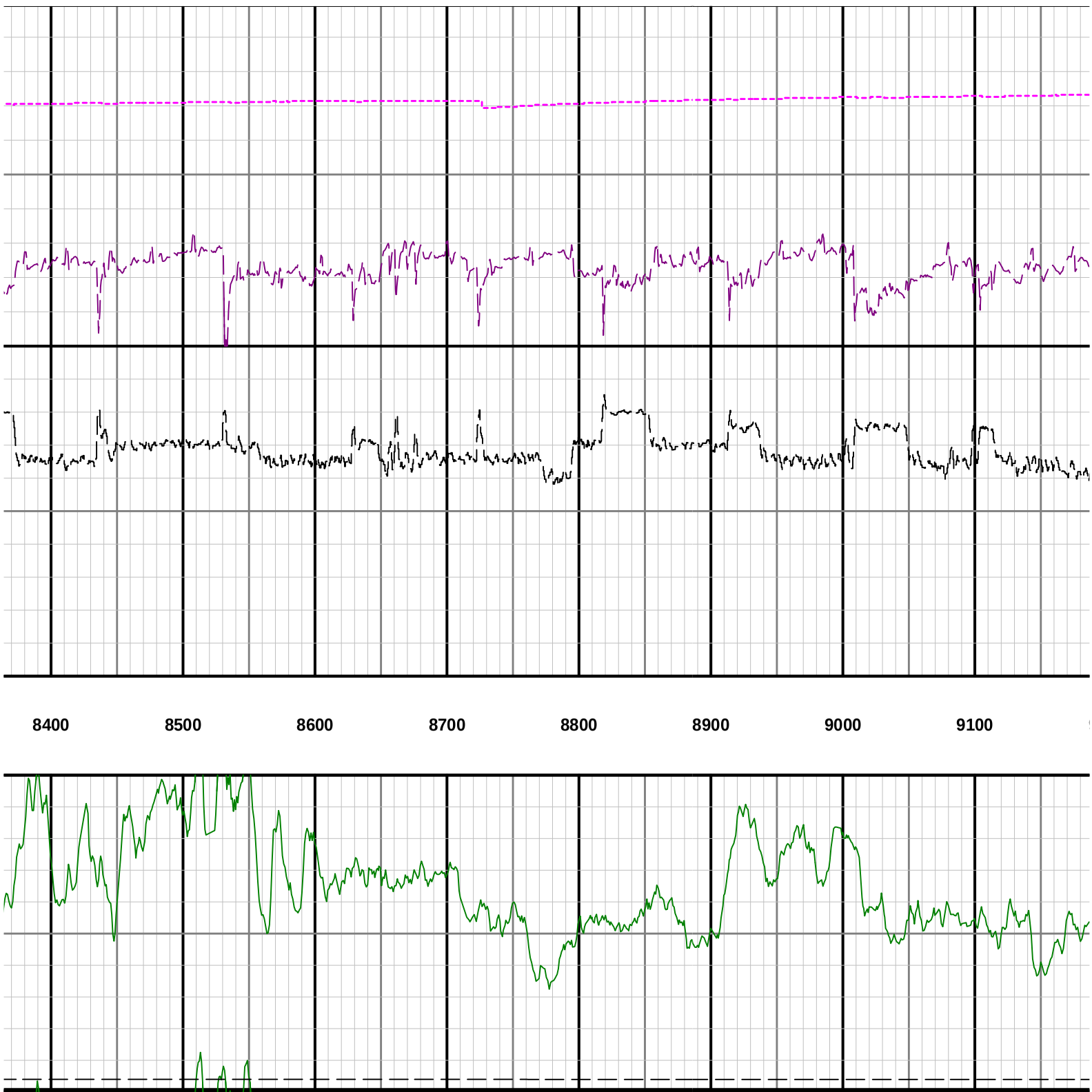
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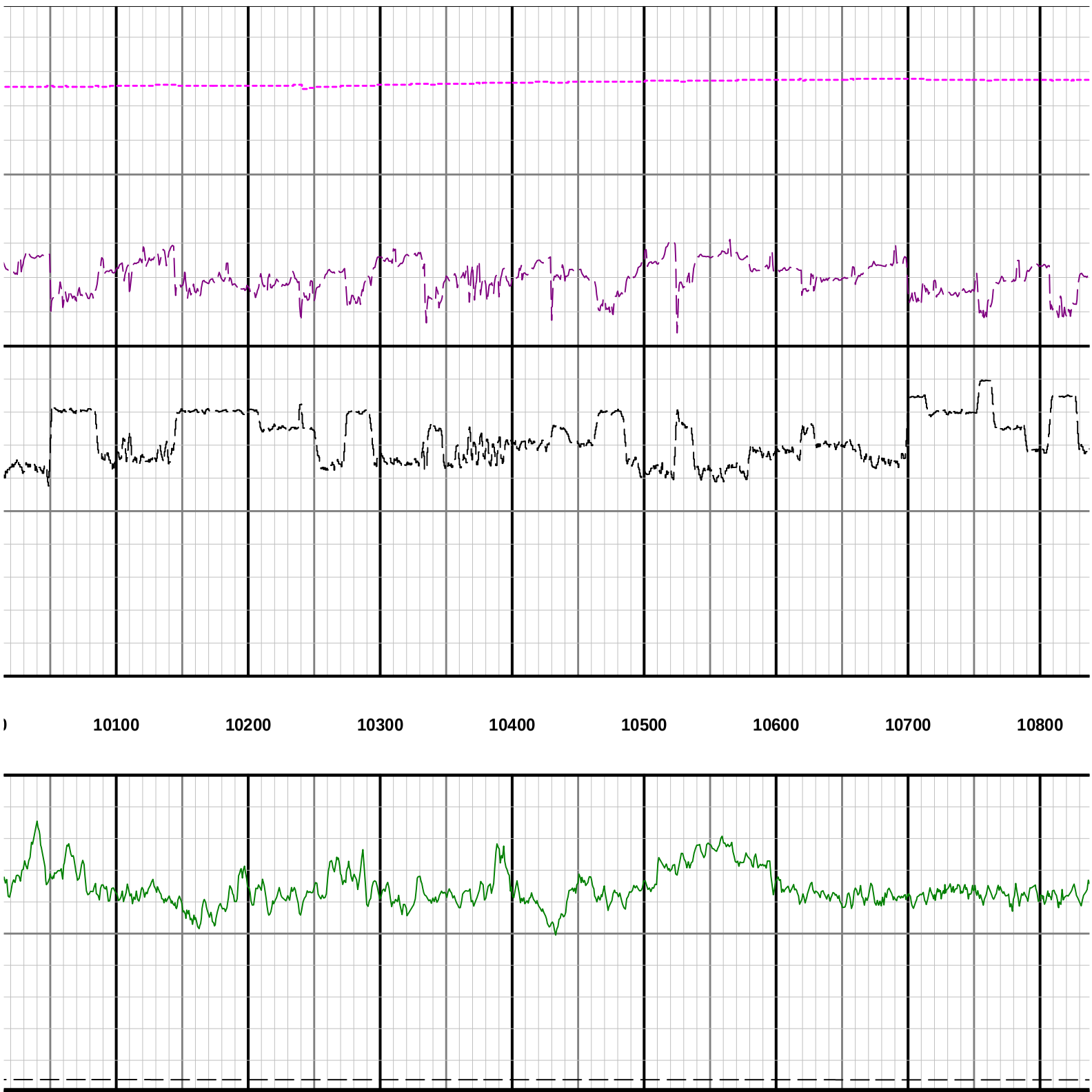
10000
TVD
GRAM
ROPA
WOBA
TCDM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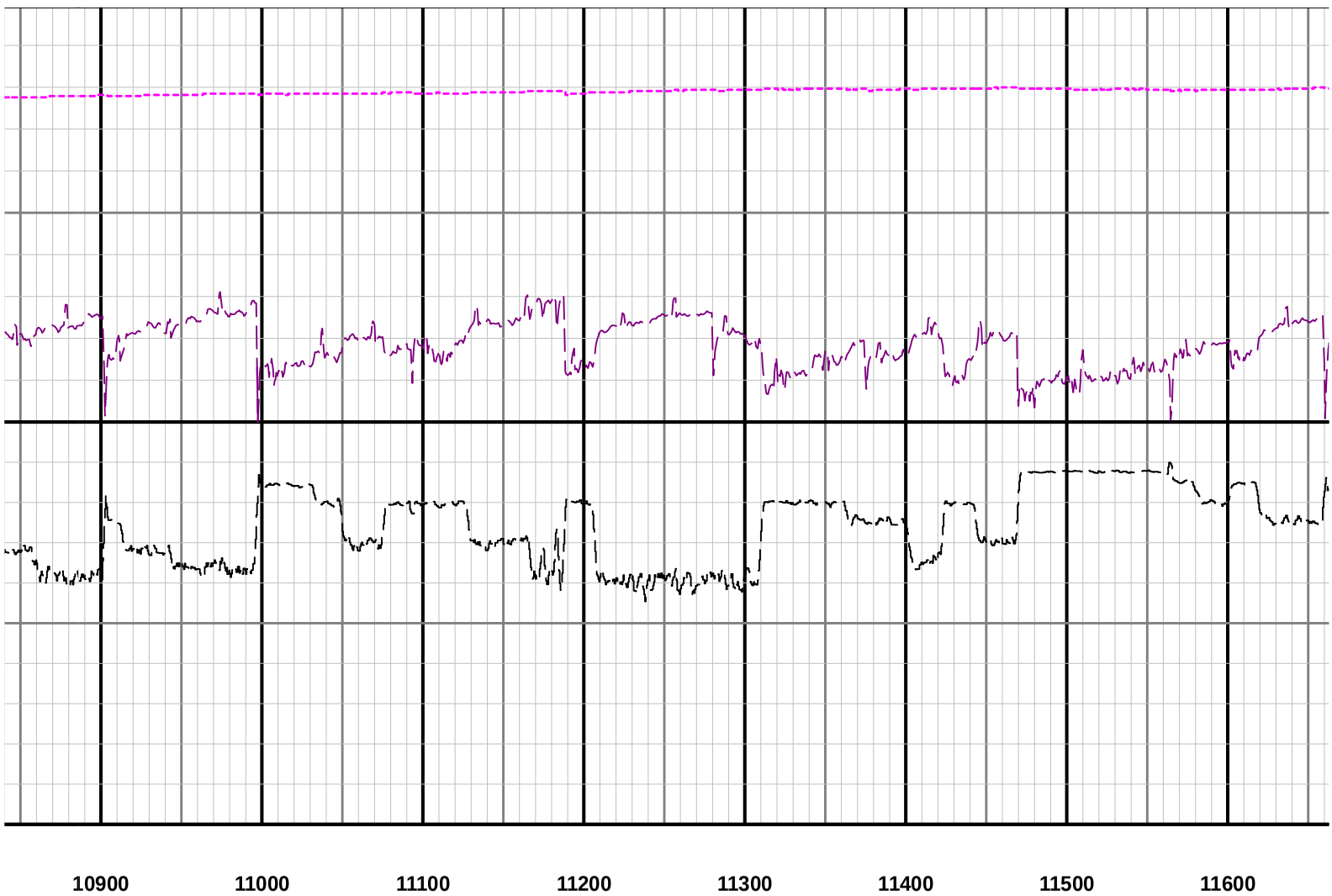

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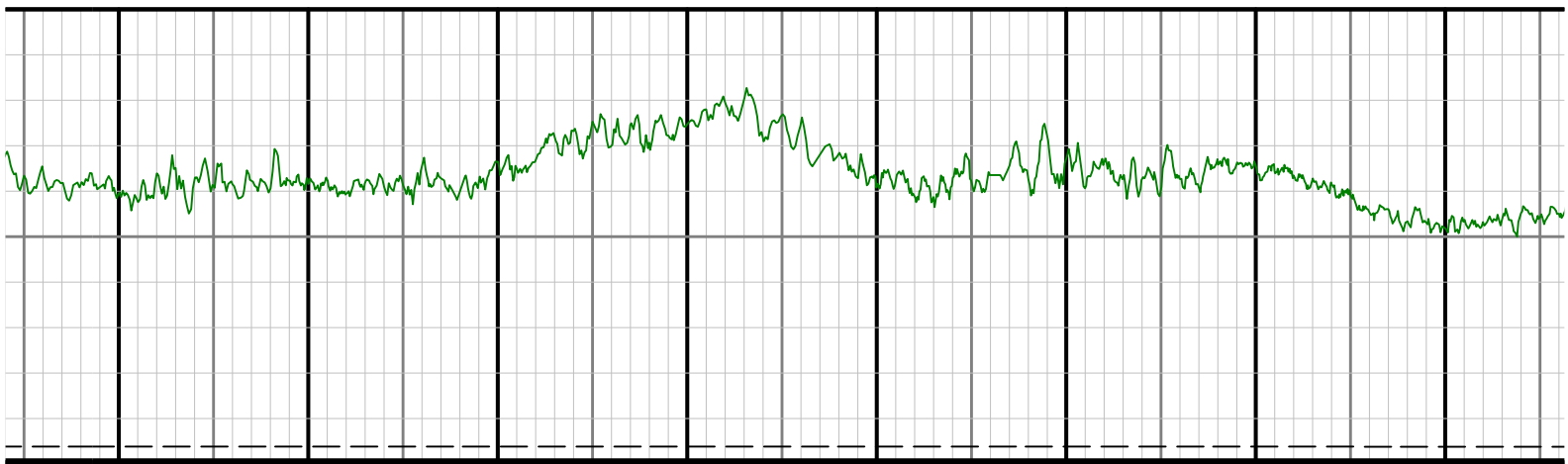

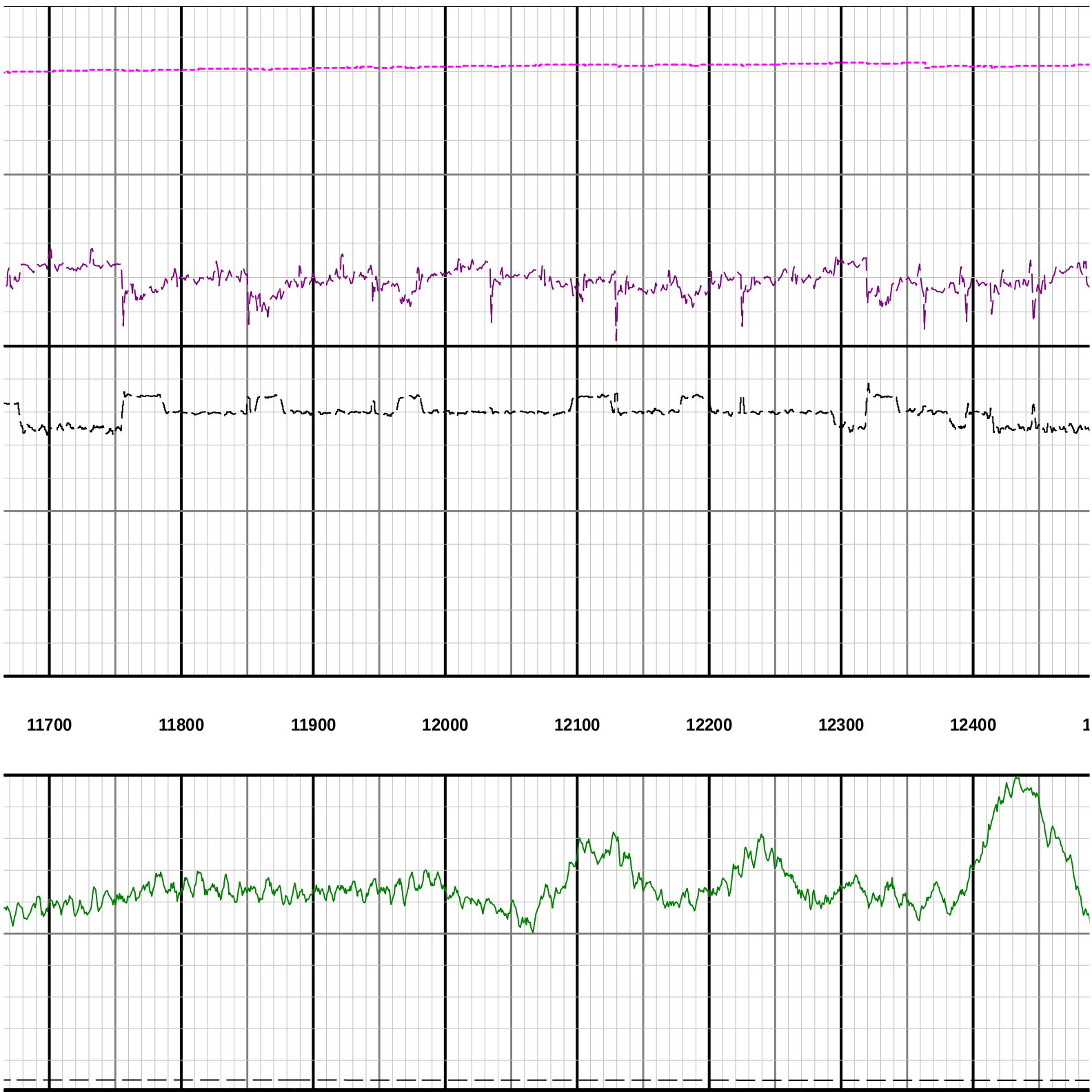
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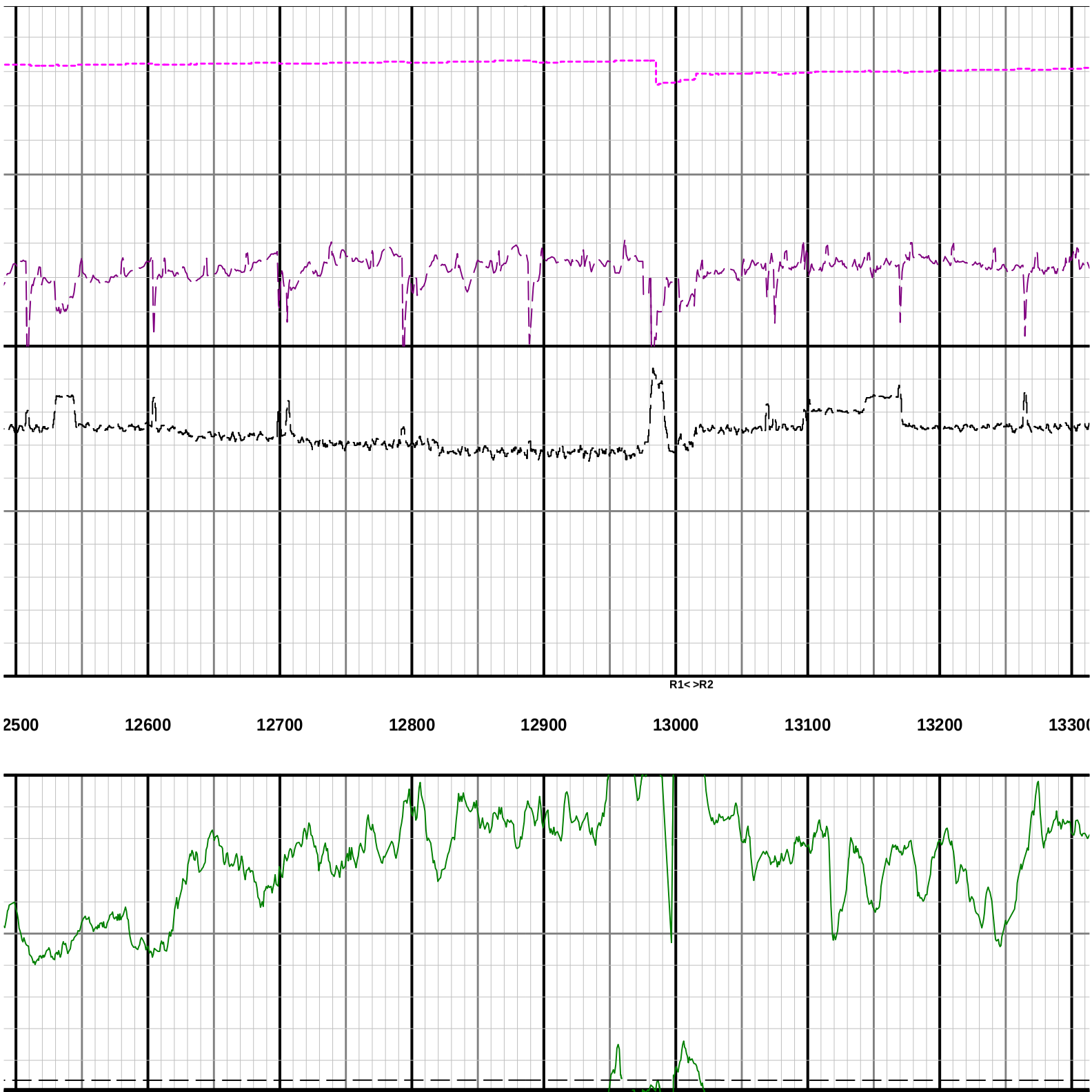
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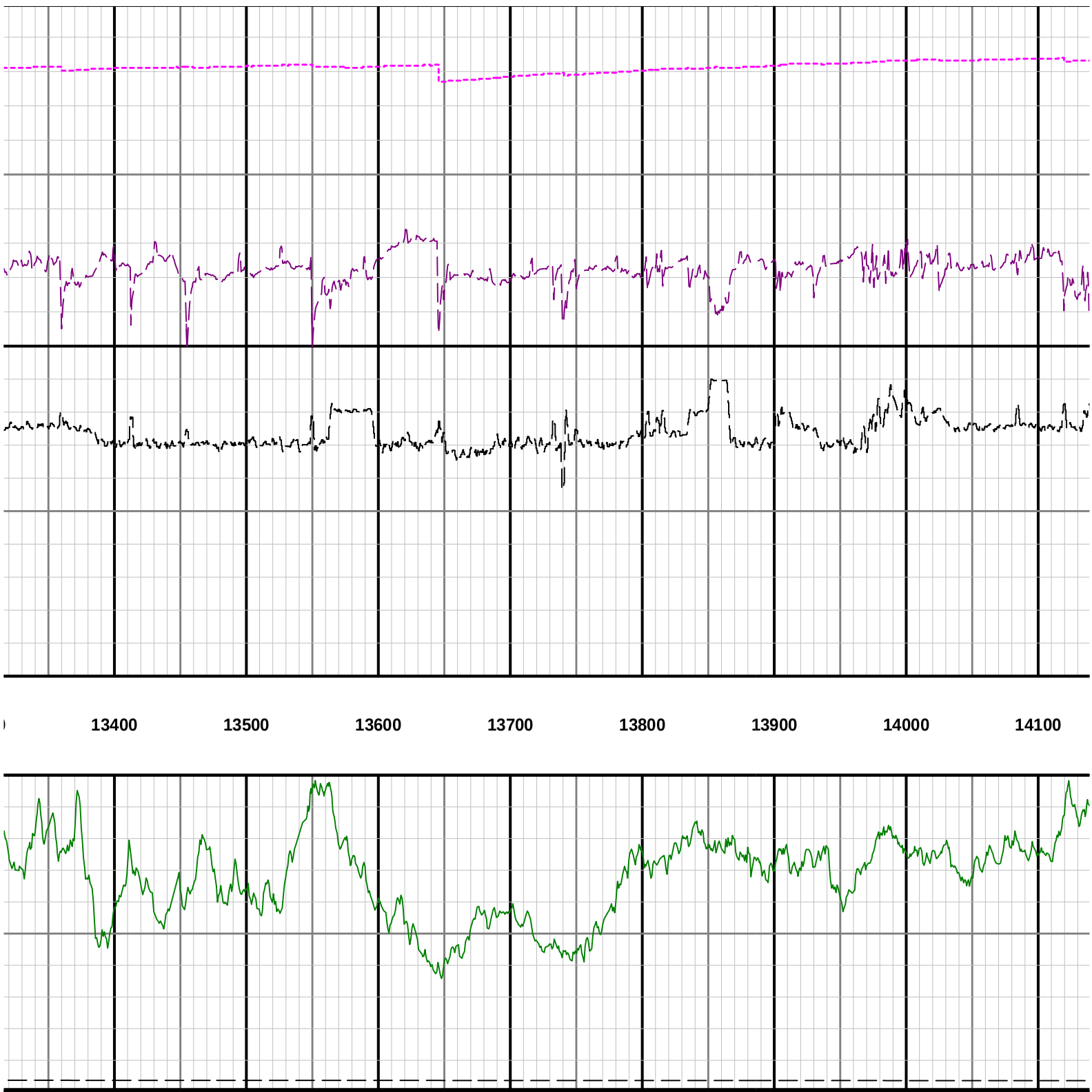
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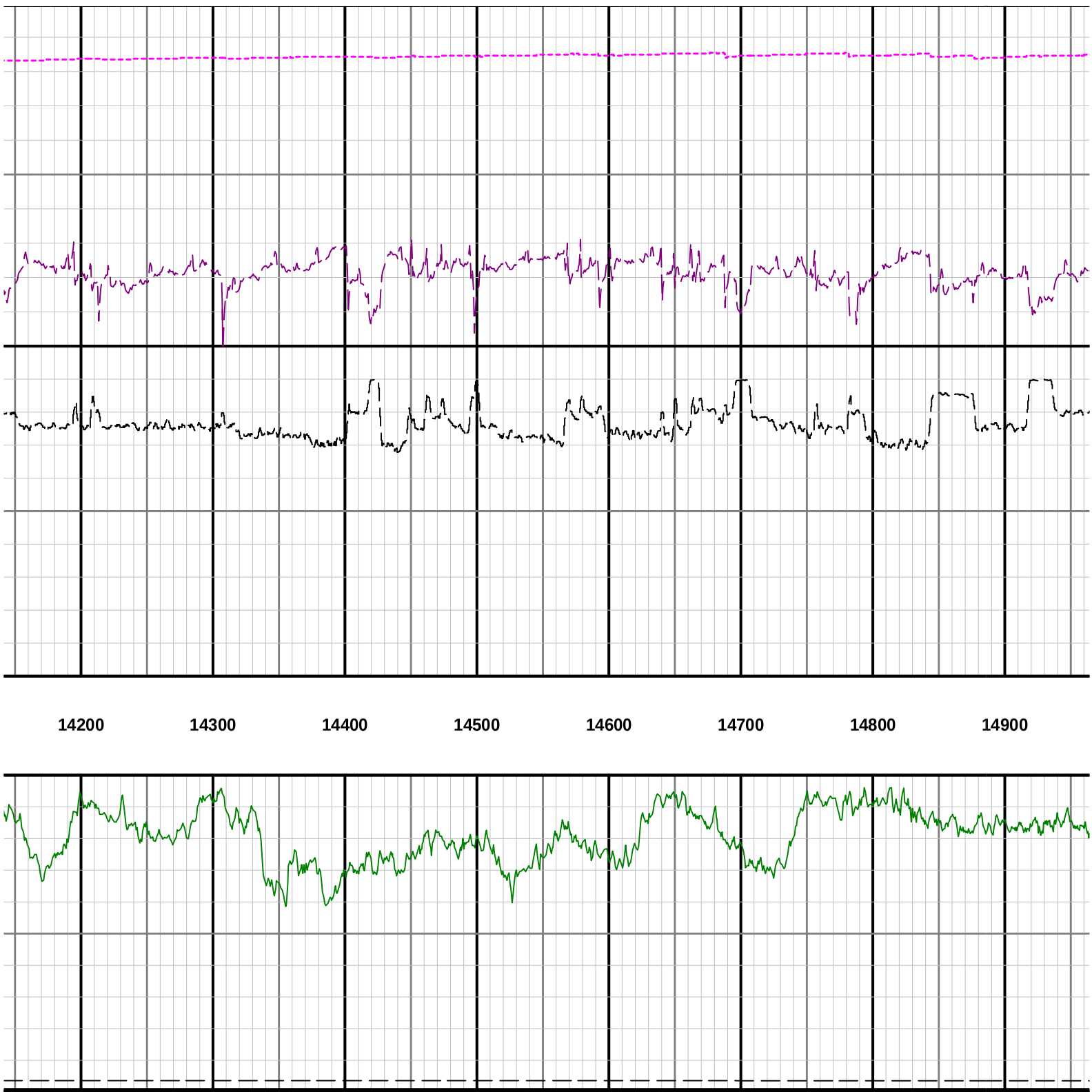
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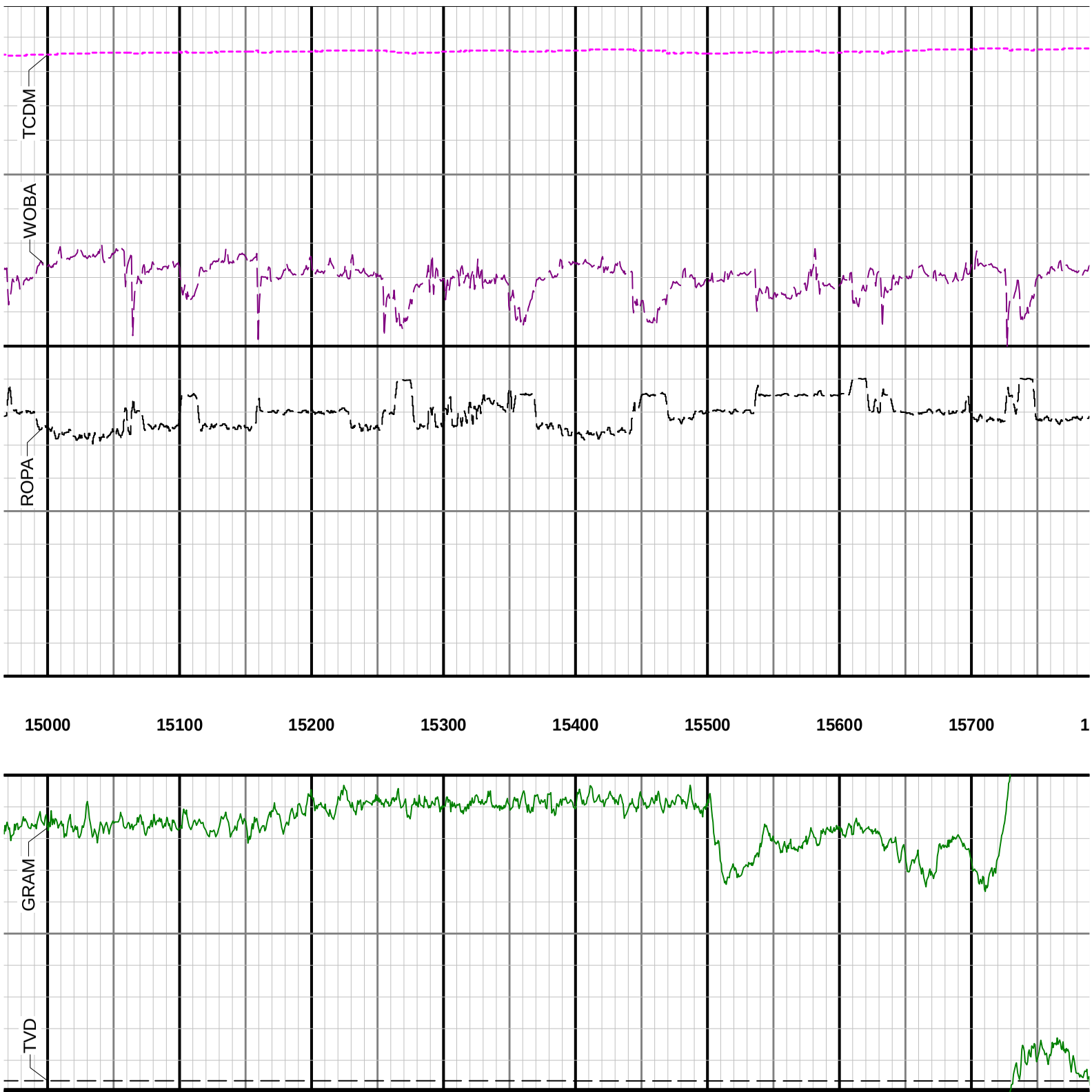
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WOBA
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GRAM
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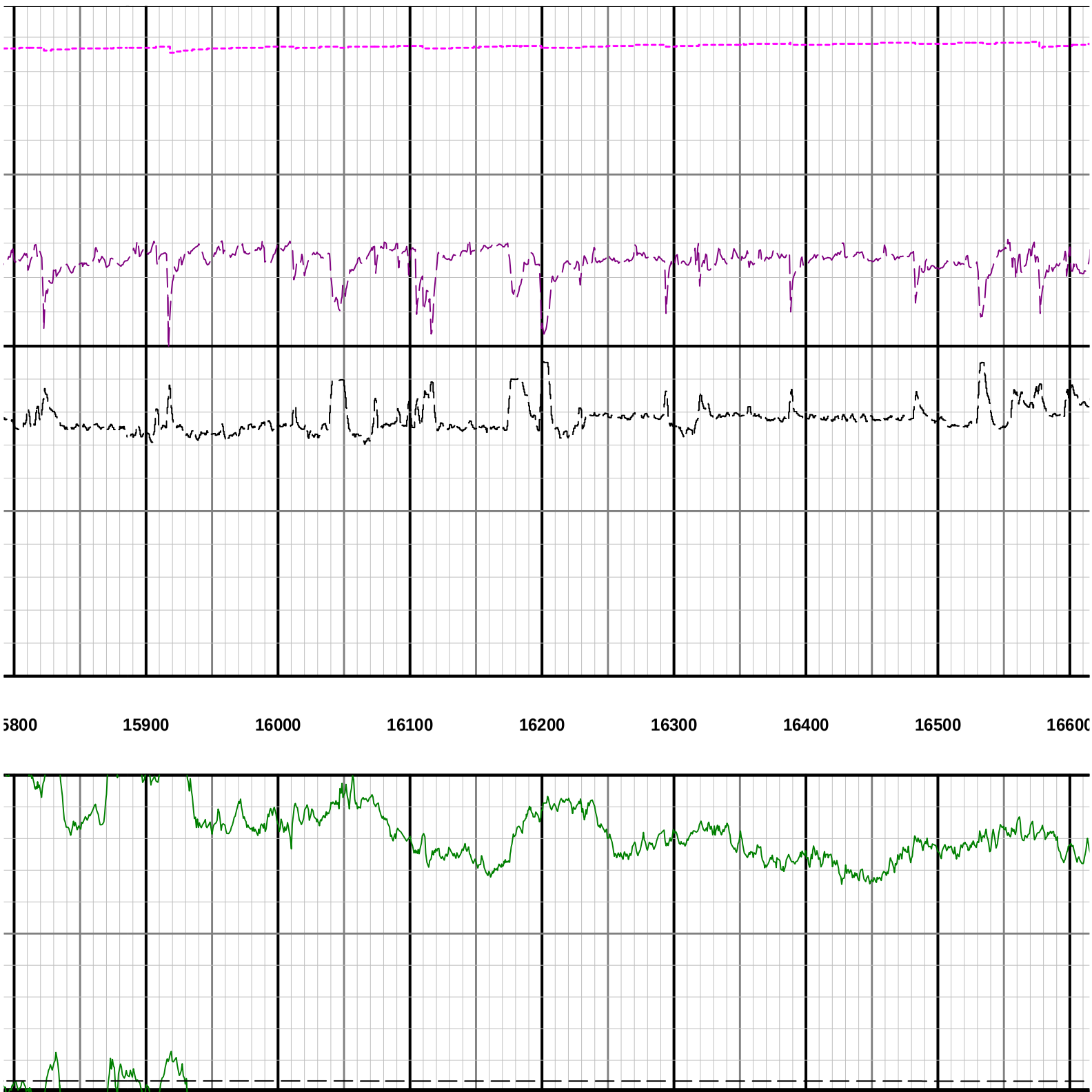
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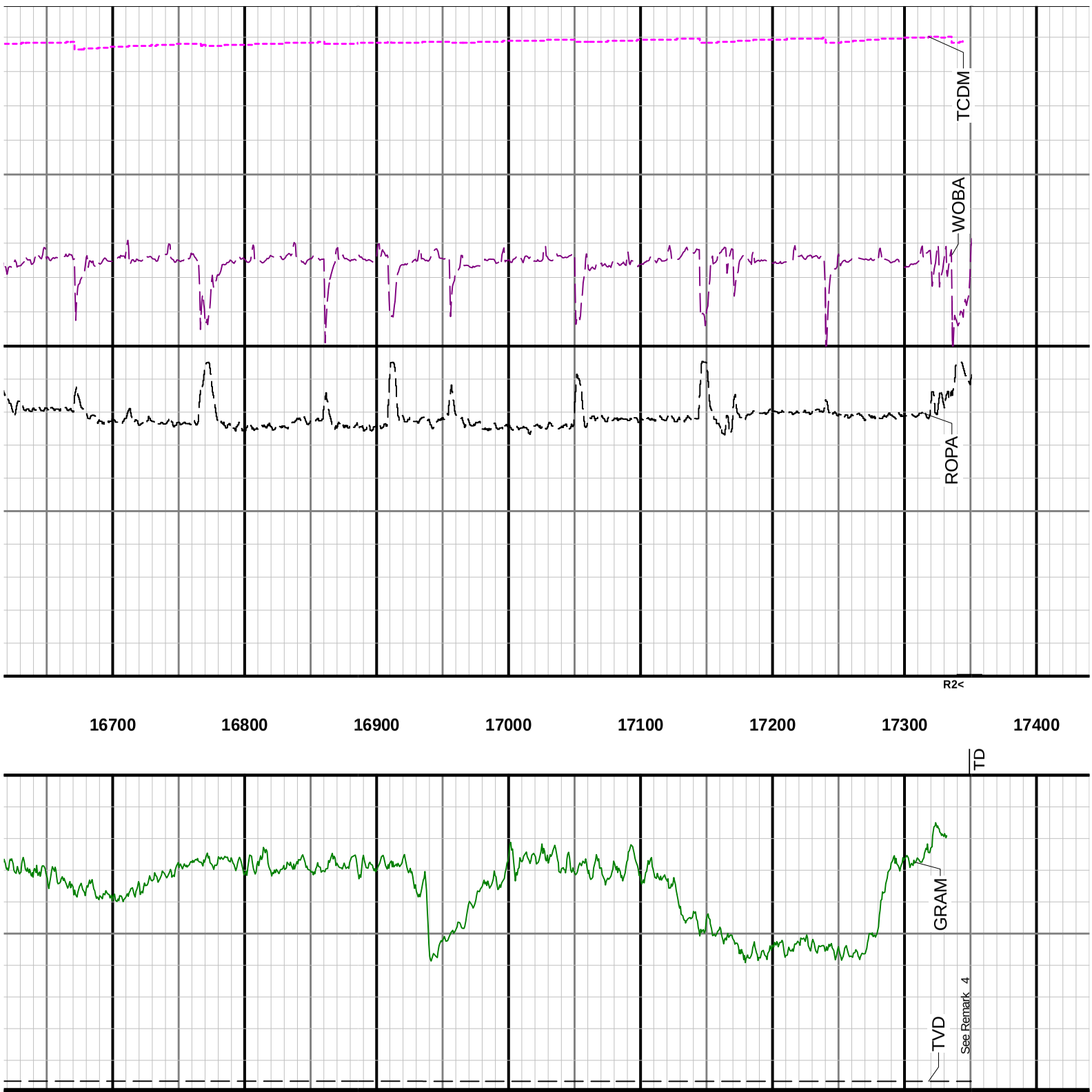
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GRAM
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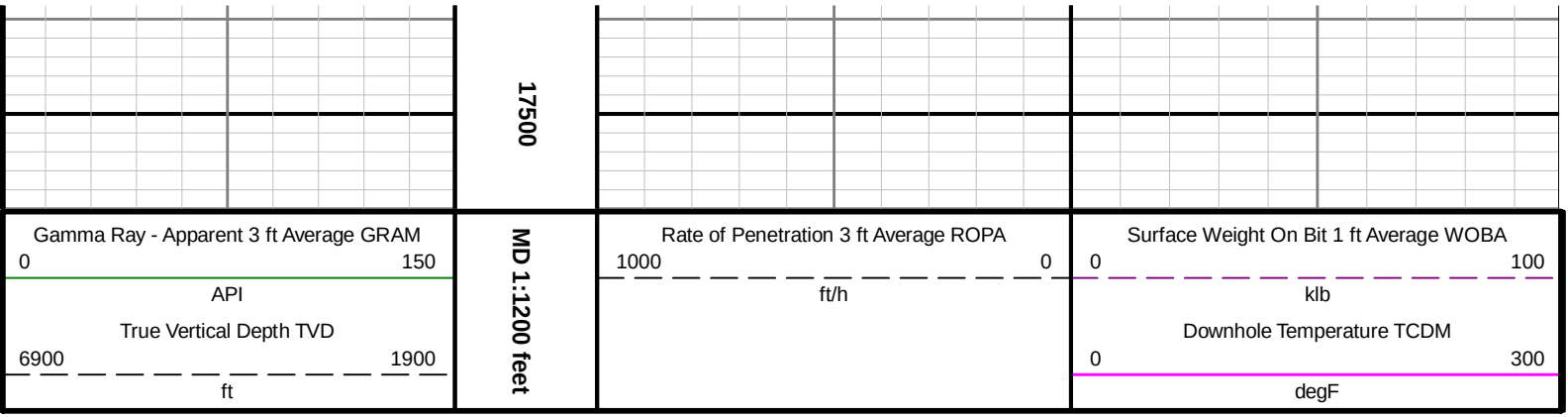
See Remark 4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Gamma Ray - Apparent 3 ft Average GRAM
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150
API
True Vertical Depth TVD
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1900
ft
MD 1:1200 feet
Rate of Penetration 3 ft Average ROPA
1000
0
ft/h
Surface Weight On Bit 1 ft Average WOBA
0
100
klb
Downhole Temperature TCDM
0
300
degF