Schlumberger

GEOFRAME
PROCESSED
INTERPRETATION

FMI Image
2000 – 4100'

5" Scale – True Dip

*A Mark of Schlumberger

Using the following logs:

COMPANY:	Battelle Pacific Northwest Lab
WELL:	Wallula Basalt Pilot #1
FIELD:	Wildcat
County:	Walla Walla
State:	Washington
COUNTRY:	USA
Date Logged:	18–Apr–2009
Well Location:	Sec 10, T7N, R31E

Elevations:	KB:	–304.571m	DF:	–304.571m
API Number:			Job Number:	

Date Processed: 12–October–2009

GL: –304.571m

FOLD HERE

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

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

Field Recording:	Location: SACRAMENTO	Software Version: 17C0–154	Engineer: BEN GRAU
Office Recording:	ICS Center: Denver DCS	Baseline: GF 4.4	Log Analyst: A. Mioduchowski/K

Mud and Borehole Measurements:

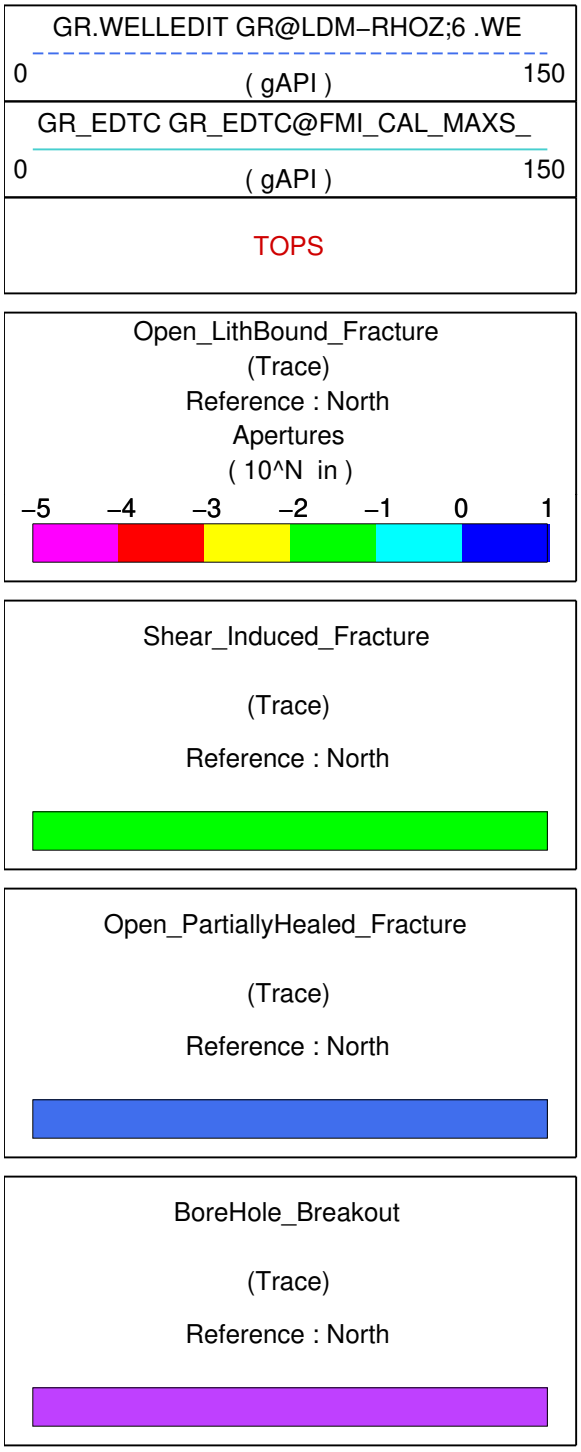
Rm @ Measured Temperature: 23.1ohm.m @	BHT: 100.5degF	Bitsize: 12.25in
Rmf @ Measured Temperature: @	Type Fluid in Hole:	FRESH WATER
Rmc @ Measured Temperature: @	Mud Density: 8.4lbm/gal	

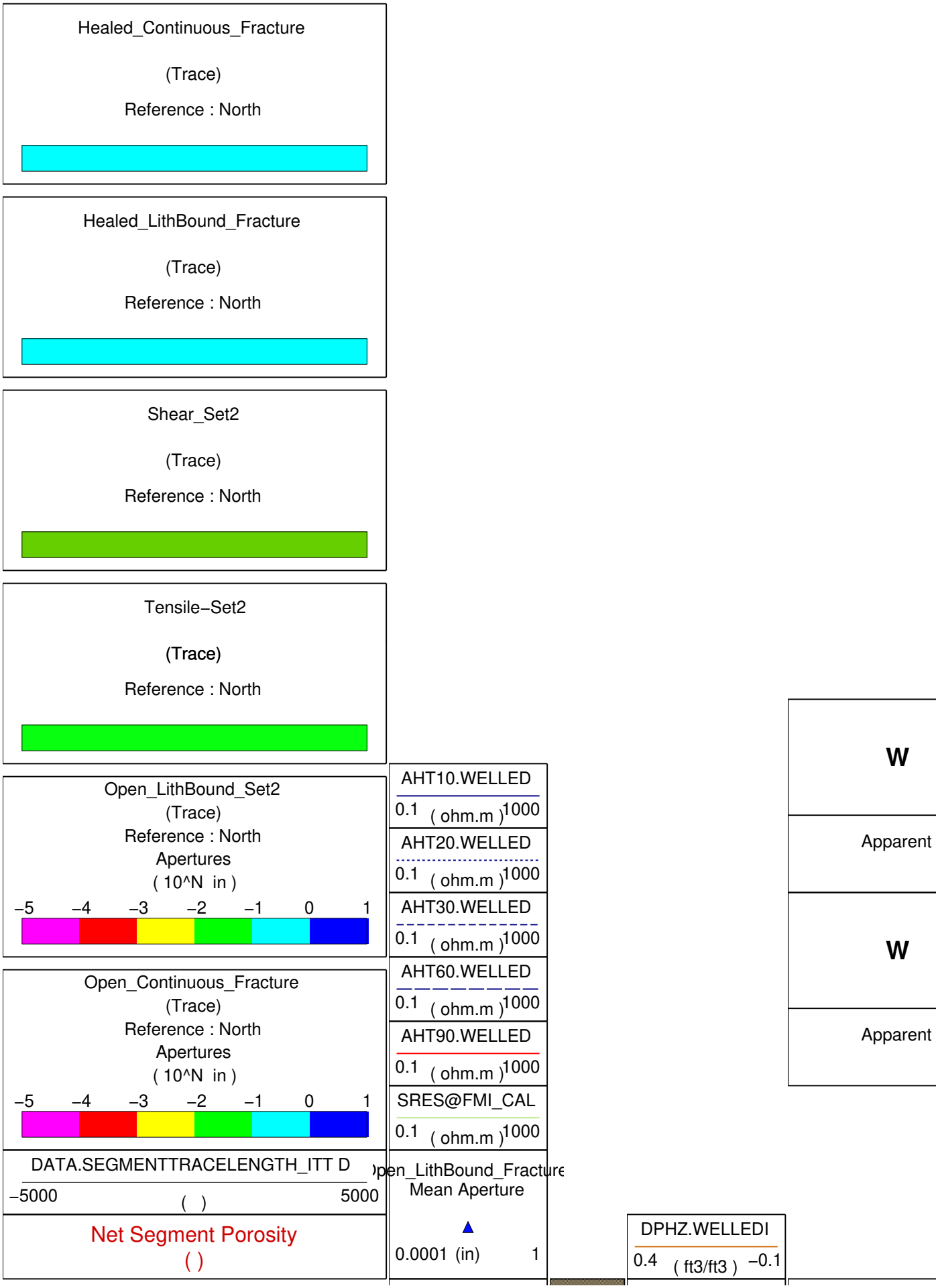
Remarks:

Rm for aperture = 15.7 ohmm

PEX log curves are depth adjusted to match FMI image

Segment tracing employed to measure joint/polyganal fracture texture (pink curves)




Healed_Continuous_Fracture
(Trace)
Reference : North
Healed_LithBound_Fracture
(Trace)
Reference : North
Shear_Set2
(Trace)
Reference : North
Tensile−Set2
(Trace)
Reference : North
Open_LithBound_Set2
(Trace)
Reference : North
Apertures
(10^N in)
−5 −4 −3 −2 −1 0 1
Open_Continuous_Fracture
(Trace)
Reference : North
Apertures
(10^N in)
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AHT20.WELLED
0.1 (ohm.m) 1000
AHT30.WELLED
0.1 (ohm.m) 1000
AHT60.WELLED
0.1 (ohm.m) 1000
AHT90.WELLED
0.1 (ohm.m) 1000
SRES@FMI_CAL
0.1 (ohm.m) 1000
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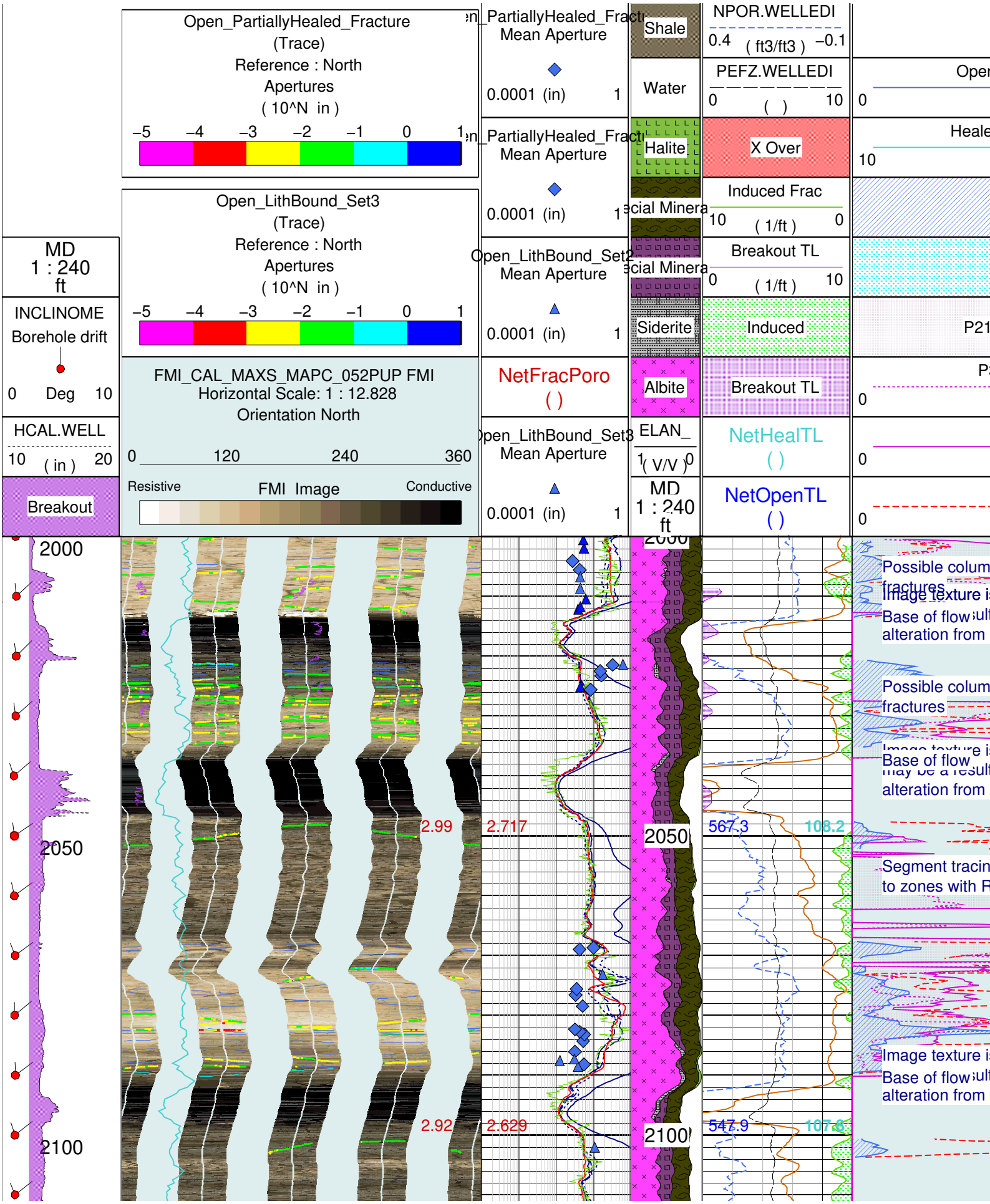
Open_PartiallyHealed_Fracture
(Trace)
Reference : North
Apertures
(10^N in)
−5 −4 −3 −2 −1 0 1
Open_LithBound_Set3
(Trace)
Reference : North
Apertures
(10^N in)
−5 −4 −3 −2 −1 0 1
MD
1 : 240
ft
INCLINOME
Borehole drift
0 Deg 10
HCAL.WELL
10 (in) 20
Breakout
FMI_CAL_MAXS_MAPC_052PUP FMI
Horizontal Scale: 1 : 12.828
Orientation North
0 120 240 360
Resistive
FMI Image
Conductive
PartiallyHealed_Fract
Mean Aperture
0.0001 (in) 1
PartiallyHealed_Fract
Mean Aperture
0.0001 (in) 1
Open_LithBound_Set2
Mean Aperture
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Open_LithBound_Set3
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2100
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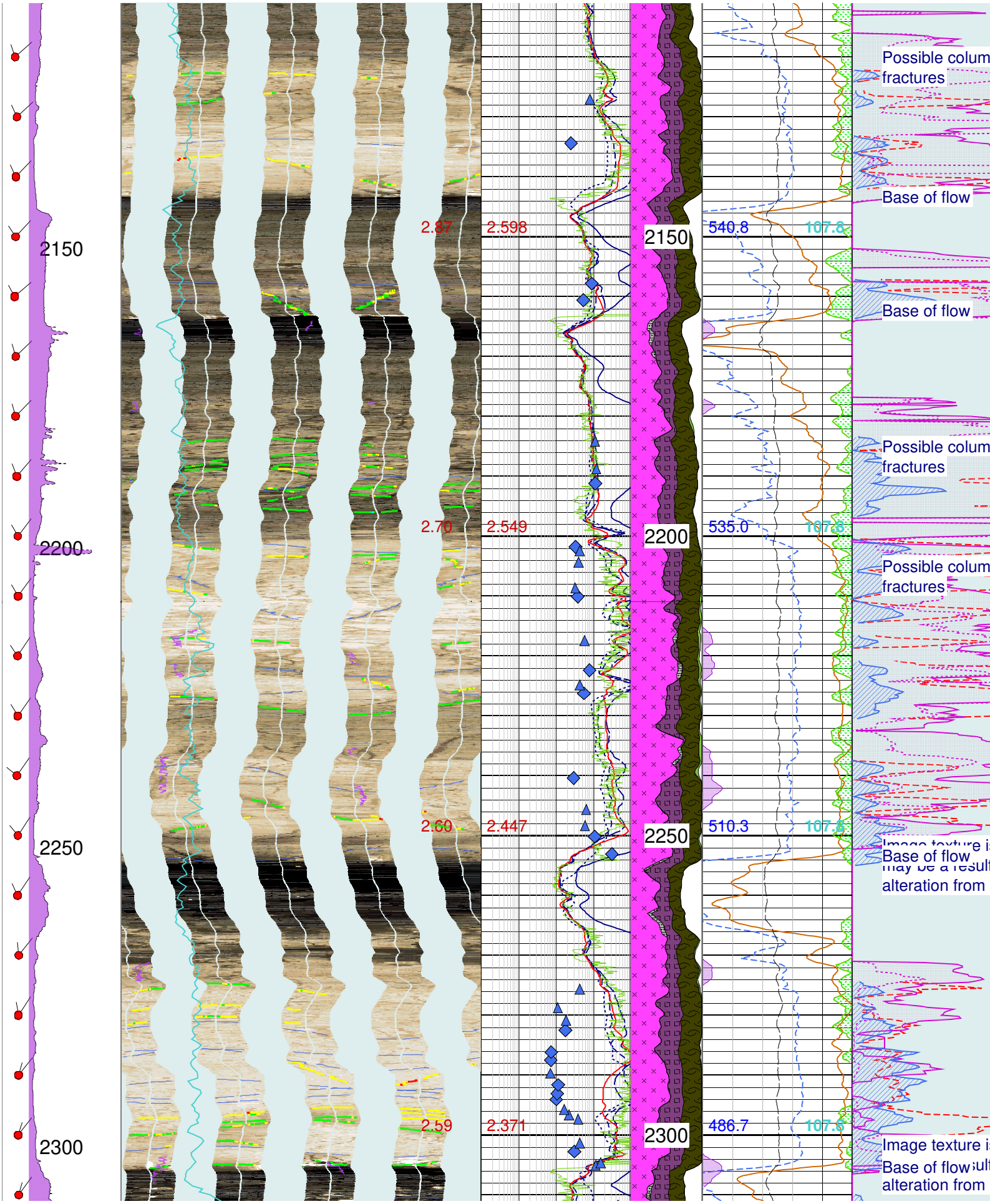
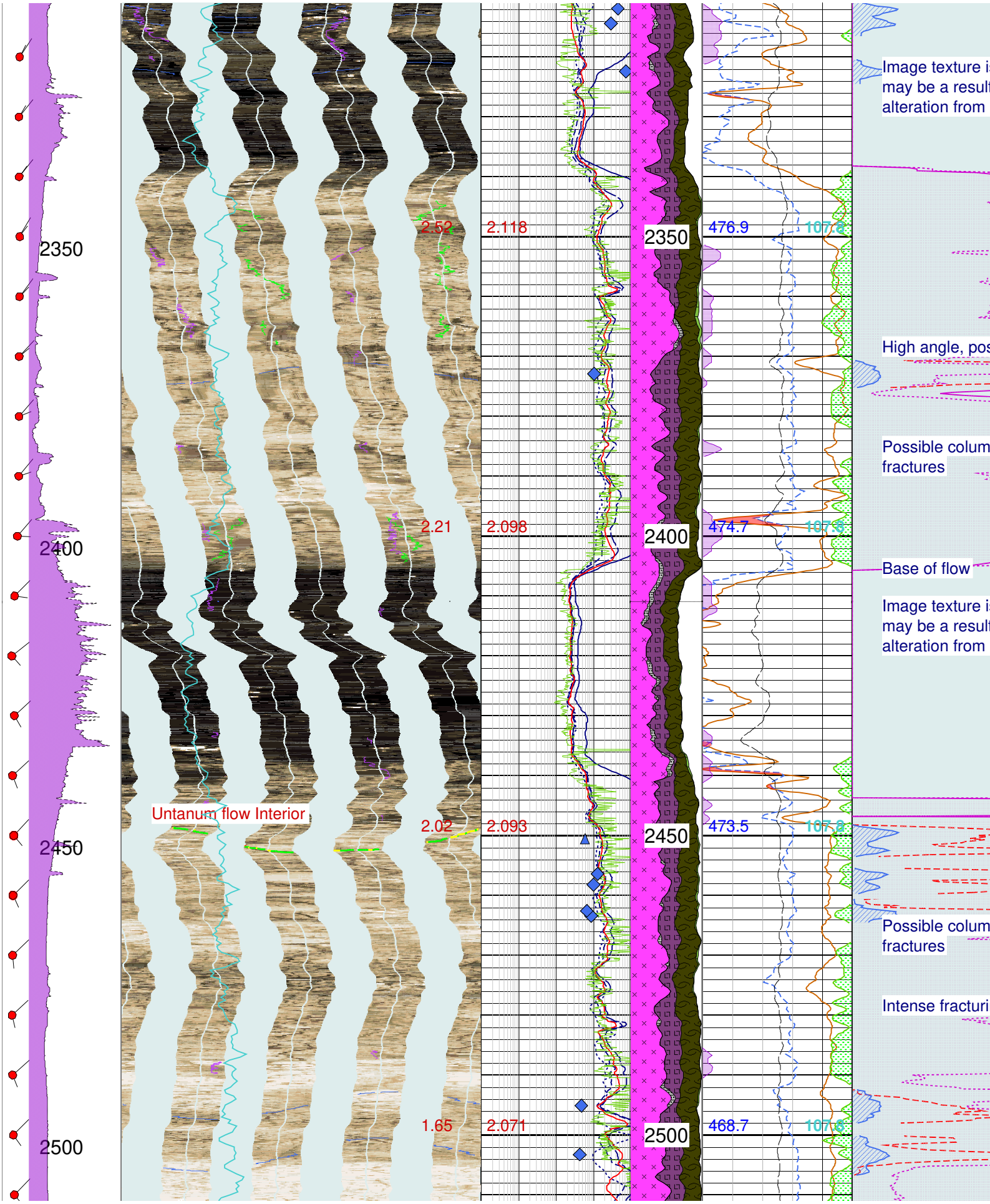
2.92
2.717
2.629
2000
2050
2100
567.3
547.9
108.2
107.6
Possible colum
fractures
Image texture is
Base of flow
alteration from
Possible colum
fractures
Base of flow
alteration from
Segment tracin
to zones with R
Image texture is
Base of flow
alteration from


2150
2200
2250
2300
2.87
2.70
2.60
2.59
2.598
2.549
2.447
2.371
2150
2200
2250
2300
540.8
535.0
510.3
486.7
107.8
Possible colum
fractures
Base of flow
Possible colum
fractures
Possible colum
fractures
Base of flow
alteration from
Image texture
Base of flow
alteration from


2350
2400
2450
2500
2.52
2.21
2.02
1.65
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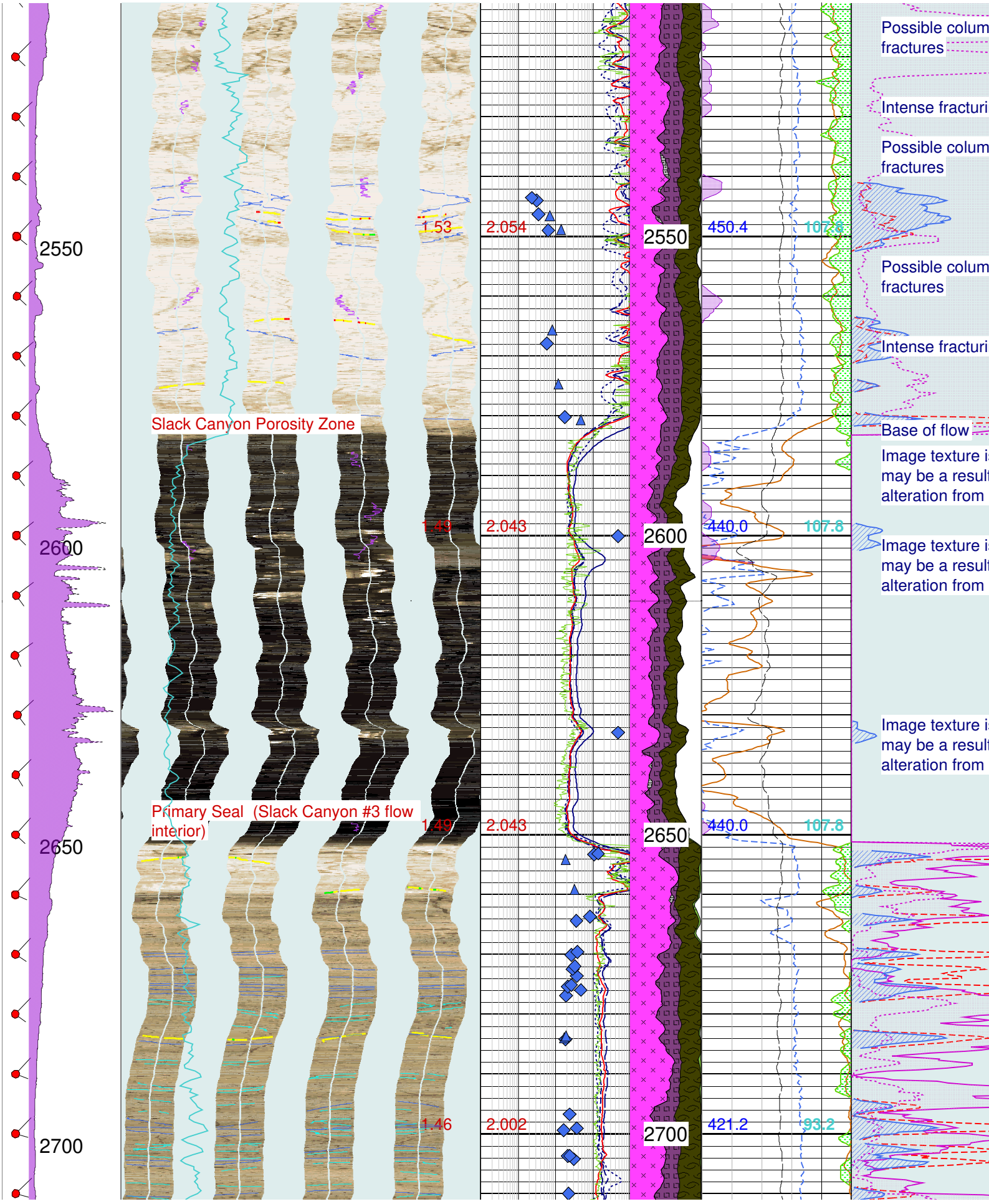
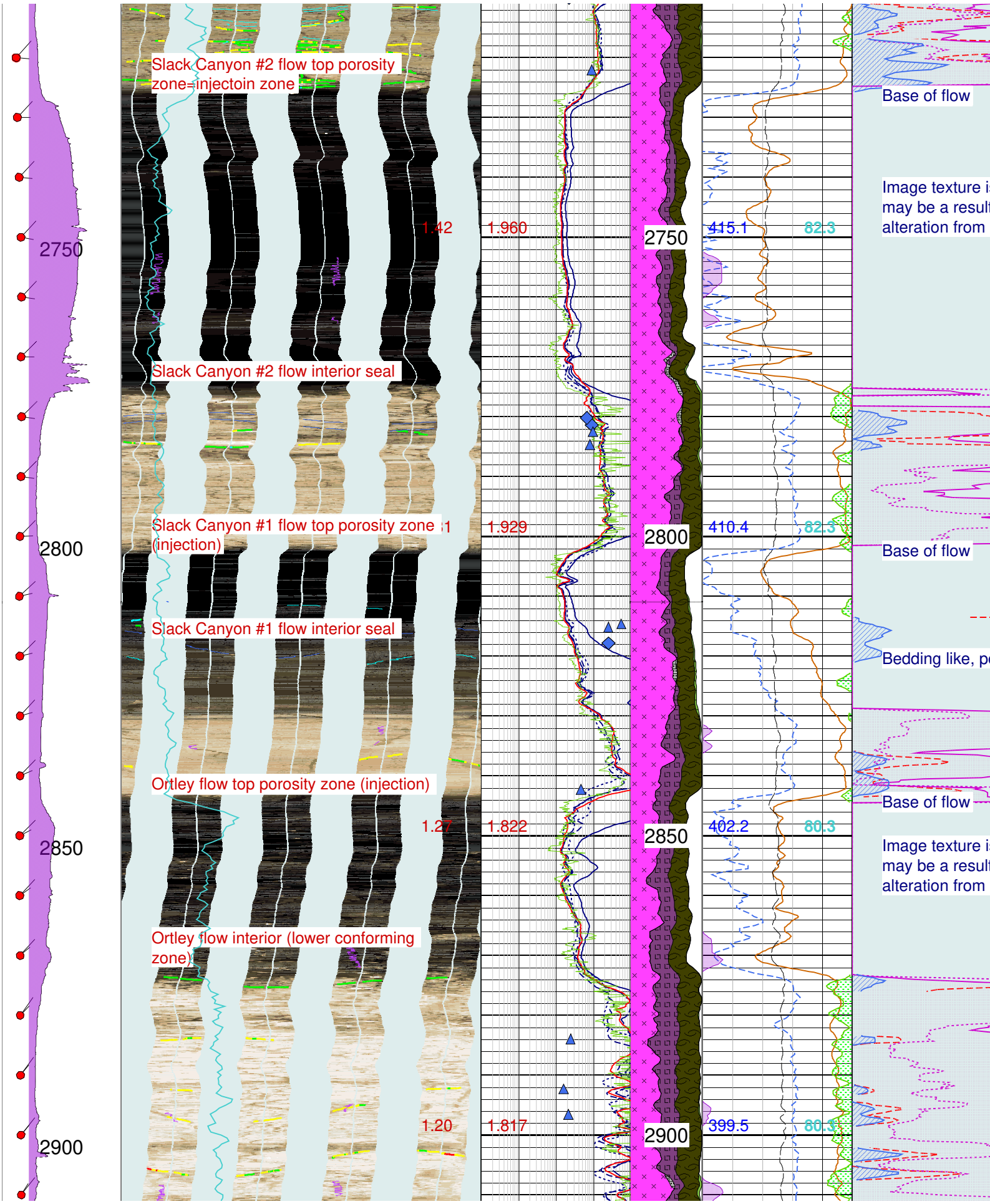
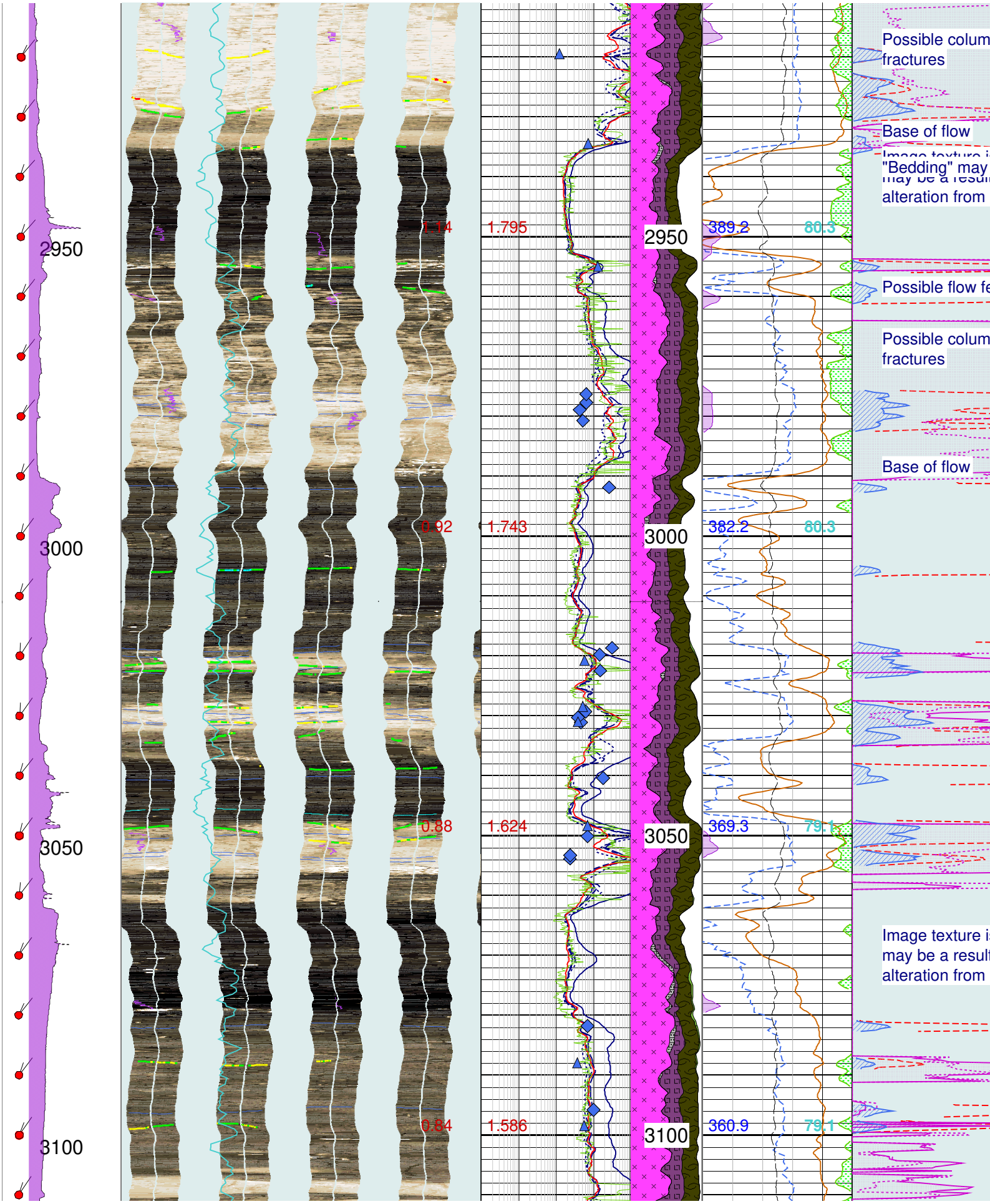
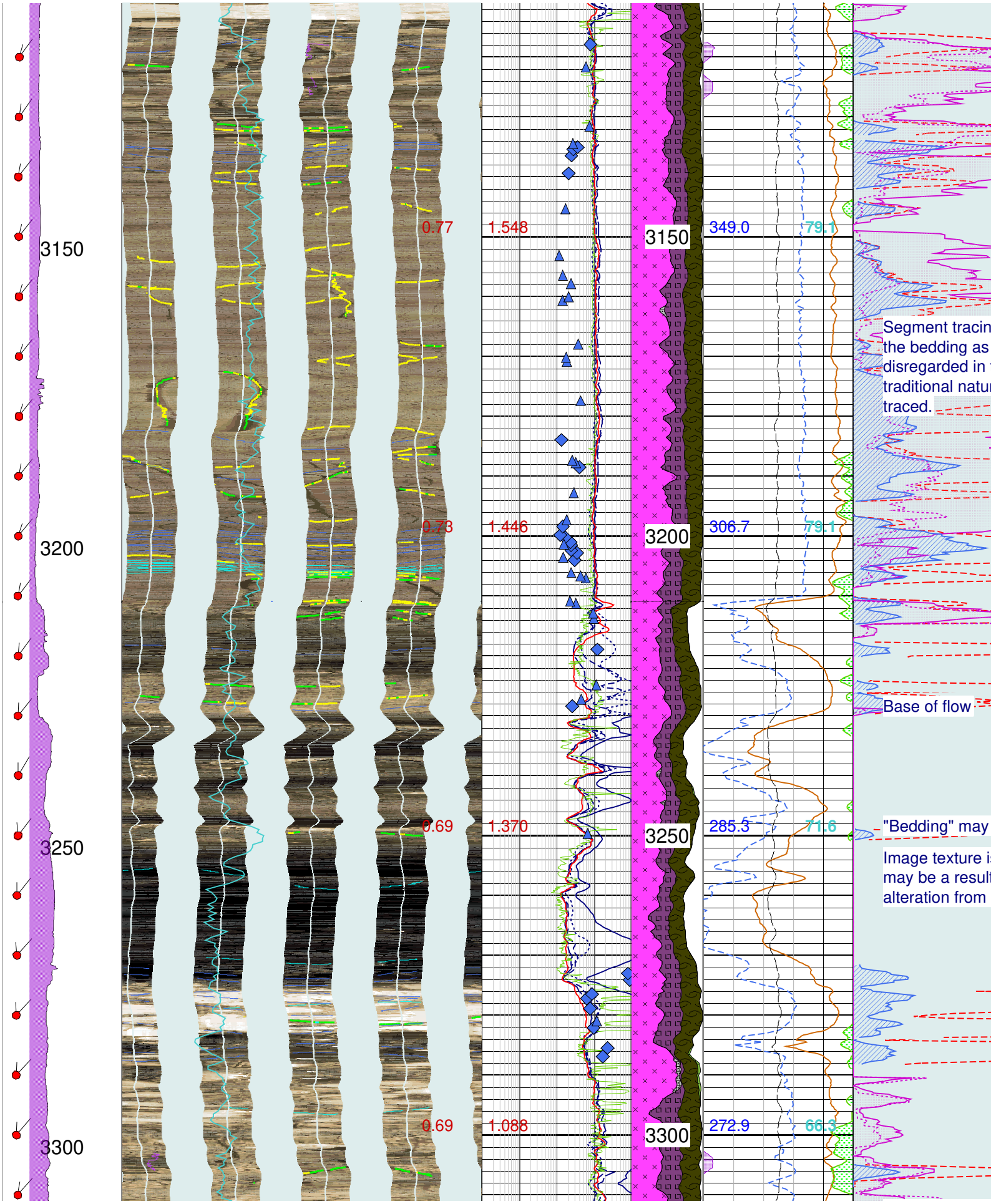
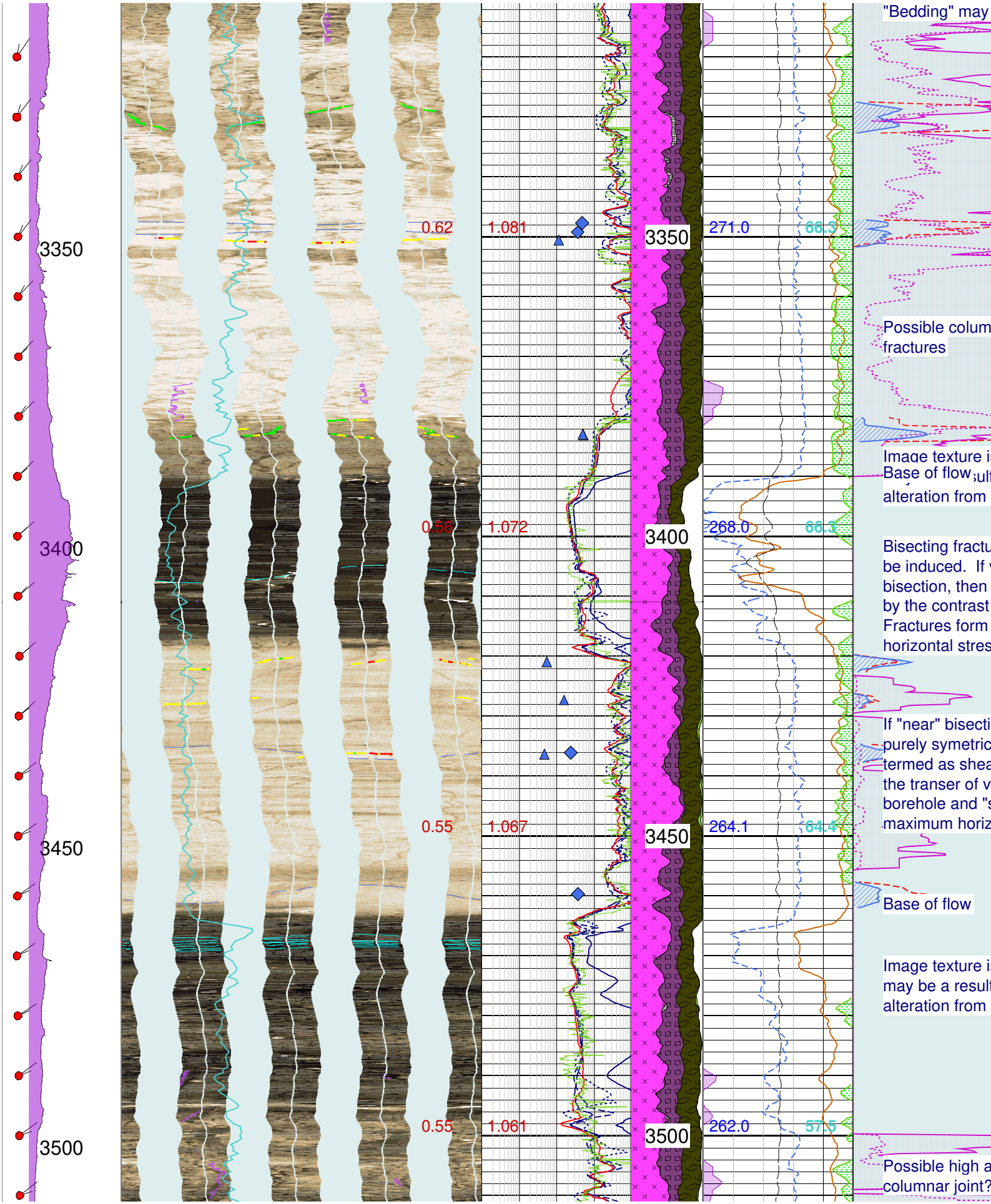
2.118
2.098
2.093
2.071
476.9
474.7
473.5
468.7
Image texture i
may be a result
alteration from
High angle, pos
Possible colum
fractures
Base of flow
Image texture i
may be a result
alteration from
Possible colum
fractures
Intense fracturi


2550
2600
2650
2700
Slack Canyon Porosity Zone
Primary Seal (Slack Canyon #3 flow interior)
1.53
1.49
1.49
1.46
2.054
2.043
2.043
2.002
450.4
440.0
440.0
421.2
107.8
107.8
93.2
Possible colum fractures
Intense fracturi
Possible colum fractures
Possible colum fractures
Intense fracturi
Base of flow
Image texture i may be a result alteration from
Image texture i may be a result alteration from
Image texture i may be a result alteration from


Slack Canyon #2 flow top porosity zone=injectoin zone
Slack Canyon #2 flow interior seal
Slack Canyon #1 flow top porosity zone (injection)
Slack Canyon #1 flow interior seal
Ortley flow top porosity zone (injection)
Ortley flow interior (lower conforming zone)
1.42
1.27
1.20
1.960
1.929
1.822
1.817
2750
2800
2850
2900
415.1
82.3
410.4
82.3
402.2
80.3
399.5
80.3
Base of flow
Image texture i
may be a result
alteration from
Base of flow
Bedding like, p
Base of flow
Image texture i
may be a result
alteration from


2950
3000
3050
3100
1.14
0.92
0.88
0.84
1.795
1.743
1.624
1.586
2950
3000
3050
3100
389.2
80.3
382.2
80.3
369.3
79.1
360.9
79.1
Possible colum
fractures
Base of flow
"Bedding" may
alteration from
Possible flow fe
Possible colum
fractures
Base of flow
Image texture i
may be a result
alteration from


3150
3200
3250
3300
0.77
0.73
0.69
0.69
1.548
1.446
1.370
1.088
3150
3200
3250
3300
349.0
79.1
306.7
79.1
285.3
71.6
272.9
66.3
Segment tracin
the bedding as
disregarded in
traditional natu
traced.
Base of flow
"Bedding" may
Image texture i
may be a result
alteration from


3350
3400
3450
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0.62
0.56
0.55
0.55
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1.072
1.067
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3400
3450
3500
271.0
268.0
264.1
262.0
66.3
66.3
64.4
57.5
"Bedding" may
Possible colum
fractures
Image texture i
Base of flow
alteration from
Bisecting fractu
be induced. If
bisection, then
by the contrast
Fractures form
horizontal stres
If "near" bisecti
purely symetric
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the transer of v
borehole and "s
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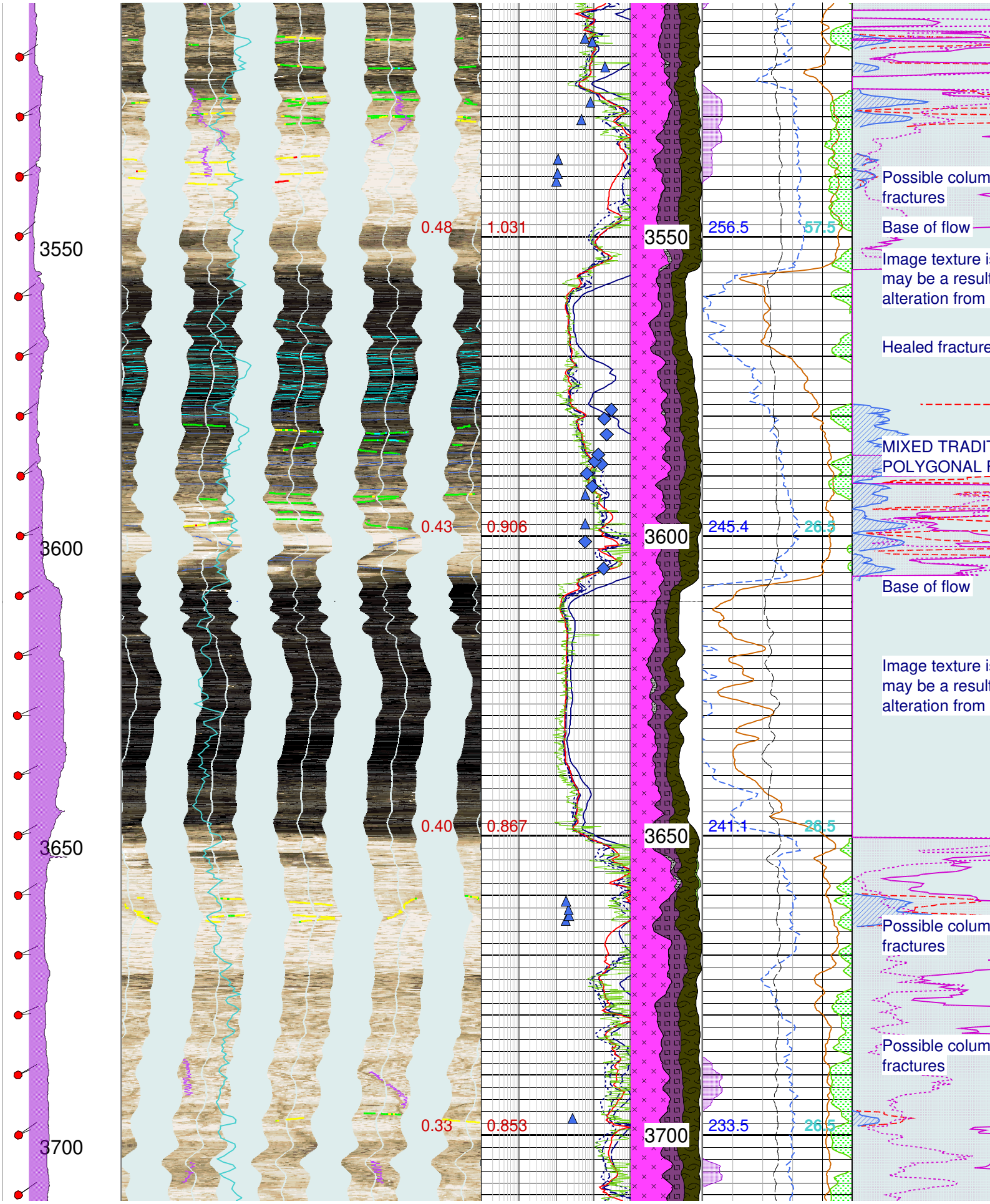
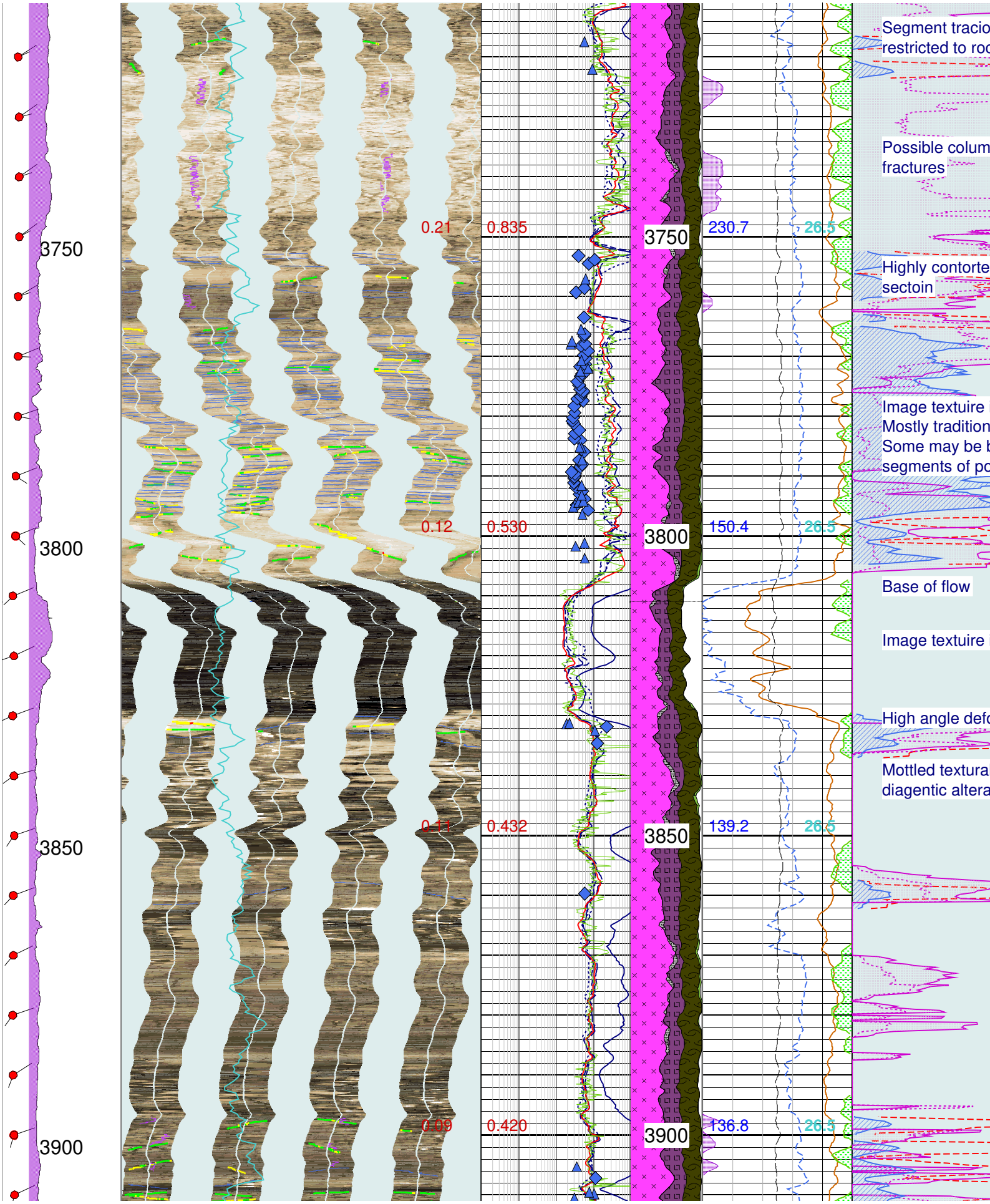
Base of flow
Image texture i
may be a result
alteration from
Possible high a
columnar joint?


3550
3600
3650
3700
0.48
0.43
0.40
0.33
1.031
0.906
0.867
0.853
3550
3600
3650
3700
256.5
57.5
245.4
26.5
241.1
26.5
233.5
26.5
Possible colum
fractures
Base of flow
Image texture i
may be a result
alteration from
Healed fracture
MIXED TRADIT
POLYGONAL F
Base of flow
Image texture i
may be a result
alteration from
Possible colum
fractures
Possible colum
fractures


3750
3800
3850
3900
0.21
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0.11
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restricted to roc
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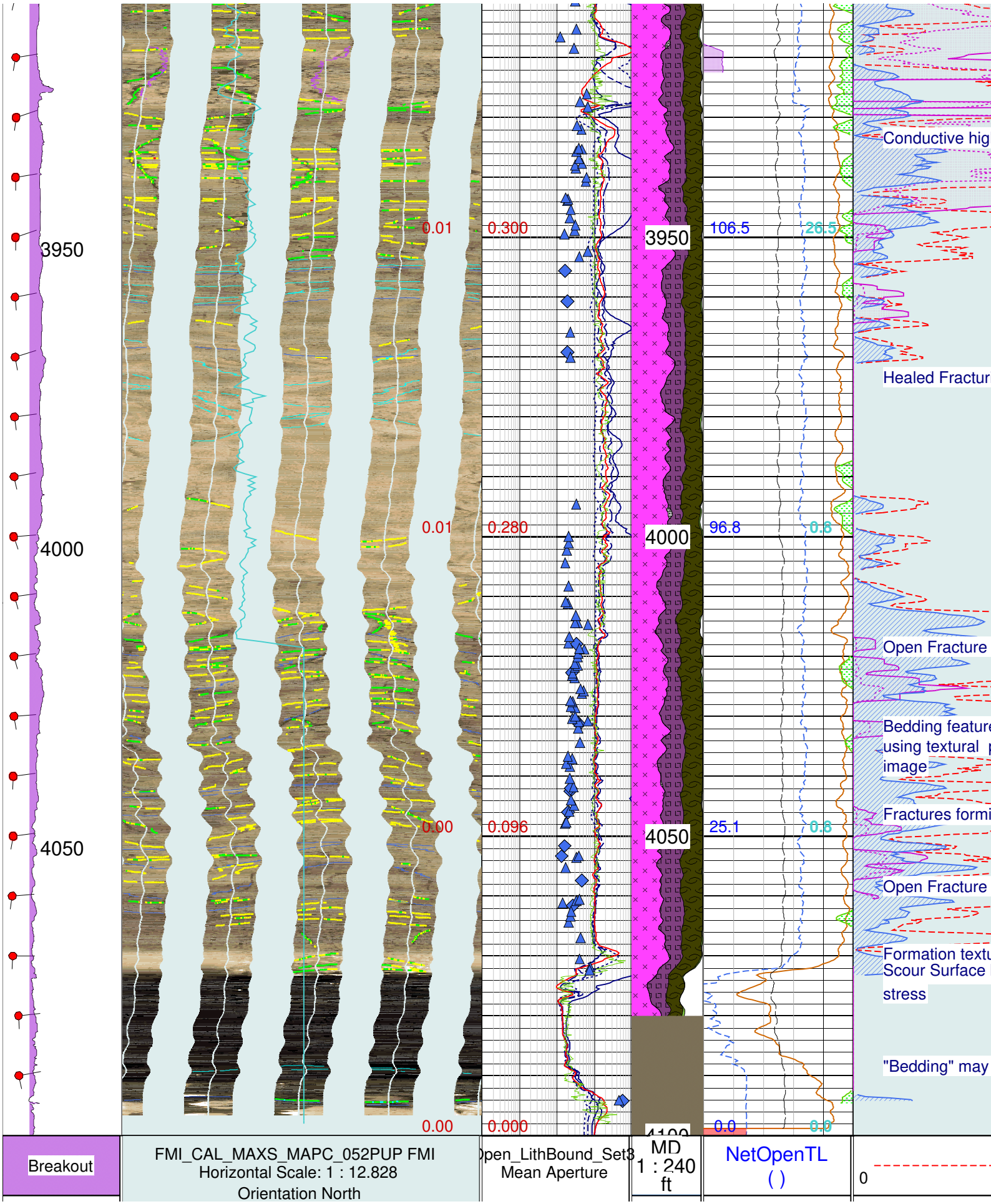
3950
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Healed Fractur
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Bedding feature
using textural
image
Fractures formi
Open Fracture
Formation textu
Scour Surface
stress
"Bedding" may
Breakout
FMI_CAL_MAXS_MAPC_052PUP FMI
Horizontal Scale: 1 : 12.828
Orientation North
pen_LithBound_Set3
Mean Aperture
MD
1 : 240
ft
NetOpenTL
( )
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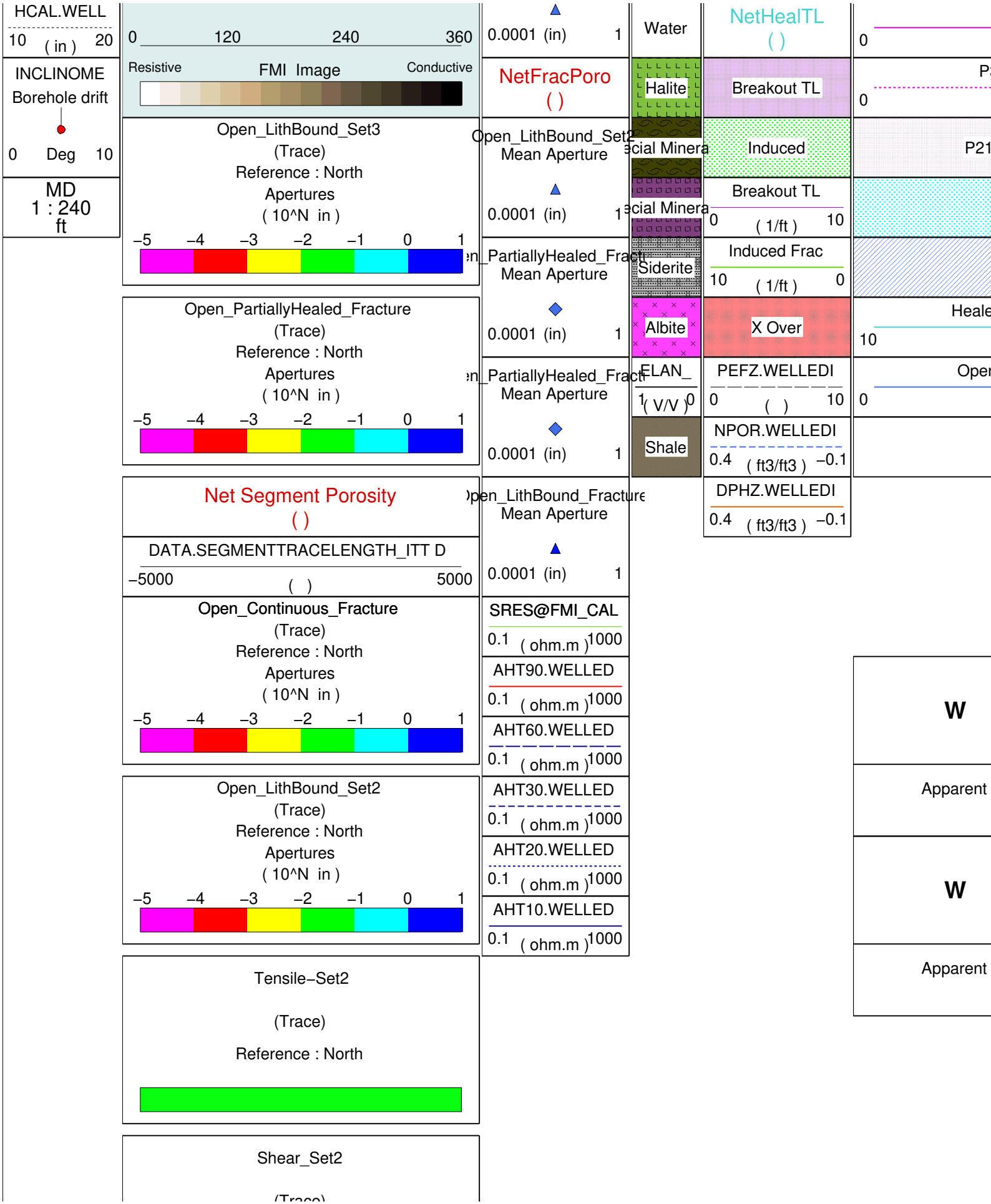
HCAL.WELL
10 (in) 20
INCLINOME
Borehole drift
0 Deg 10
MD
1 : 240
ft
0 120 240 360
Resistive FMI Image Conductive
Open_LithBound_Set3
(Trace)
Reference : North
Apertures
(10^N in)
−5 −4 −3 −2 −1 0 1
Open_PartiallyHealed_Fracture
(Trace)
Reference : North
Apertures
(10^N in)
−5 −4 −3 −2 −1 0 1
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(Trace)
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Open_LithBound_Set2
(Trace)
Reference : North
Apertures
(10^N in)
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Tensile−Set2
(Trace)
Reference : North
Shear_Set2
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Open_LithBound_Set2
Mean Aperture
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Open_PartiallyHealed_Fract
Mean Aperture
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Open_PartiallyHealed_Fract
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Open_LithBound_Fracture
Mean Aperture
0.0001 (in) 1
SRES@FMI_CAL
0.1 (ohm.m) 1000
AHT90.WELLED
0.1 (ohm.m) 1000
AHT60.WELLED
0.1 (ohm.m) 1000
AHT30.WELLED
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AHT20.WELLED
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(Trace)

Reference : North

Healed_LithBound_Fracture

(Trace)

Reference : North

Healed_Continuous_Fracture

(Trace)

Reference : North

BoreHole_Breakout

(Trace)

Reference : North

Open_PartiallyHealed_Fracture

(Trace)

Reference : North

Shear_Induced_Fracture

(Trace)

Reference : North

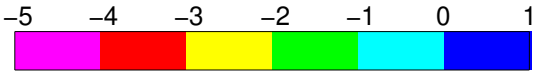
Open_LithBound_Fracture

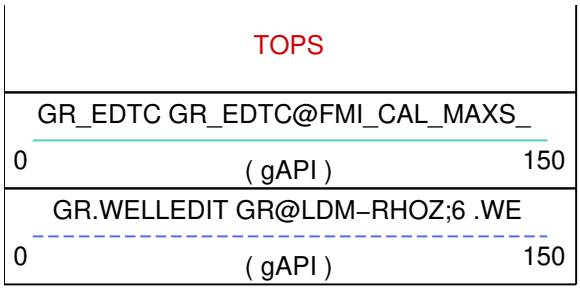
(Trace)

Reference : North

Apertures

(10^N in)

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GR.WELLEDIT GR@LDM–RHOZ;6 .WE
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