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Oskarshamn site investigation

RAMAC and BIPS logging and deviation measurements in boreholes KSH01A, KSH01B and the upper part of KSH02

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August 2003

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Keywords: BIPS, RAMAC, radar, TV, geophysical logging, deviation measurements, Flexit Smart Tool.

Contents

1 Introduction

This document reports the data gained in geophysical logging operations, which is one of the activities performed within the site investigation at Oskarshamn. The logging operations presented here includes borehole radar (RAMAC), TV-logging (BIPS) and deviation measurements and was carried out in three core-drilled boreholes KSH01A, KSH01B and in the upper part of KSH02. This report includes measurements from 100 to approximately 1000 m depth in borehole KSH01A, and measurements from 0 to approximately 100 m in boreholes KSH01B and KSH02. All three boreholes are drilled with a diameter of 76 mm.

All measurements were conducted by Malå Geoscience AB/RAYCON during February and March 2003 in accordance with the instructions and guidelines from SKB (activity plan AP PS 400-03-002 and method descriptions SKB MD 222.006, SKB MD 252.020 and SKB MD 224.001, SKB internal controlling documents) and under supervision of Leif Stenberg, SKB. The location of the boreholes is shown in Figure 1-1.

The used investigation techniques comprised:

- Borehole radar (Malå Geoscience AB:s RAMAC system), dipole radar antennas.
- Borehole TV system (Raax BIPS system), high resolution, side viewing, colour borehole TV system.
- Deviation measurement probe (Flexit Smart Tool).

Figure 1-1. *General overview over the Simpevarp area.*

2 Objective and scope

The objective of the radar and BIPS surveys is to both receive information of the borehole itself, and from the rock mass around the borehole. Borehole radar was used to investigate the nature and the structure of the rock mass located around the boreholes, and BIPS for geological surveying and fracture mapping and orientation. The objective of the deviation measurements is to describe the orientation of the borehole itself.

This field report describes the equipment used as well the measurement procedures. For the BIPS survey, the result is presented as images. Radar data is presented in radargrams and the identified reflectors are listed. The results from the deviation measurements are delivered to the SICADA database and the result is presented in tables with the position for every 3:rd metre.

3 Equipment

3.1 Radar measurements RAMAC

The RAMAC GPR system owned by SKB is a fully digital GPR system where emphasis has been laid on fast survey speed and easy field operation. The system operates dipole and directional antennas (see Figure 3-1). A system description is given in the SKB internal document MD 252.021.

The borehole radar system consists of a transmitter and a receiver. During operation an electromagnetic pulse, within the frequency range of 20 MHz up to 250 MHz, is emitted into the bedrock. Once a reflecting feature, e.g. a water-filled fracture, with sufficiently different electrical properties is encountered, the pulse is reflected back to the receiver and recorded.

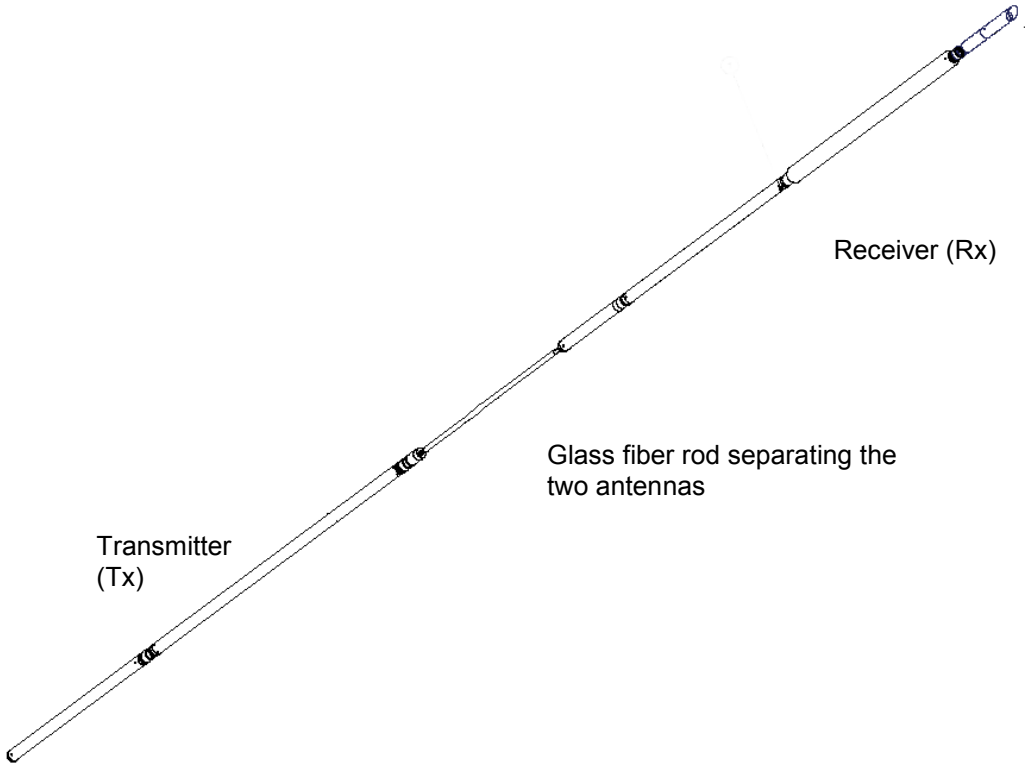


Figure 3-1. *Example of a borehole radar antenna.*

3.2 TV-Camera, BIPS

The BIPS 1500 system used is owned by SKB and described in SKB internal document MD222.005. The BIPS method for borehole logging produces a digital scan of the borehole wall. In principle a standard CCD video camera is mounted in the probe in front of a conical mirror (see Figure 3-2). An acrylic window covers the mirror part and the borehole image is reflected through the window and displayed on the cone, from where it is recorded. During the measuring operation, pixel circles are grabbed with a resolution of 360 pixels/circle.

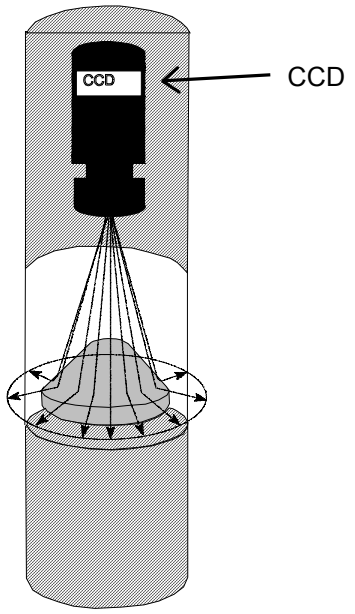


***Figure 3-2**. The conical mirror scanning for the BIPS system.*

3.3 Deviation measurements, Flexit

The field equipment for deviation measurements, called Flexit Smart Tool, used for the measurements is developed and built by Flexit in Vallentuna, Sweden. The field equipment consists of three major parts, a surface unit, winch and a probe. The probe contains 3D accelerometer and magnetometer arrays, temperature sensor, radio and power supply. A more detailed description of the field equipment can be found on Flexit:s website, www.flexit.se.

4 Execution

4.1 Execution of measurements

4.1.1 RAMAC Radar

In borehole KSH01A, KSH01B and in the upper part of KSH02 measurements were carried out with dipole antennas. The dipole antennas have a central frequency of 20 MHz, 100 MHz and 250 MHz.

During logging the dipole antennas (transmitter and receiver) were lowered continuously into the borehole and the data recorded on the field PC along the measured interval. The antennas (transmitter and receiver) are kept at a fixed separation by glass fiber rods according to Table 4-1 to 4-3. See also Figure 4-1.

All measurements were performed in accordance with the instructions and guidelines from SKB (internal document MD252.020). All cleaning of the antennas and cable was performed according to internal document SKB MD 600.004 before logging operation.

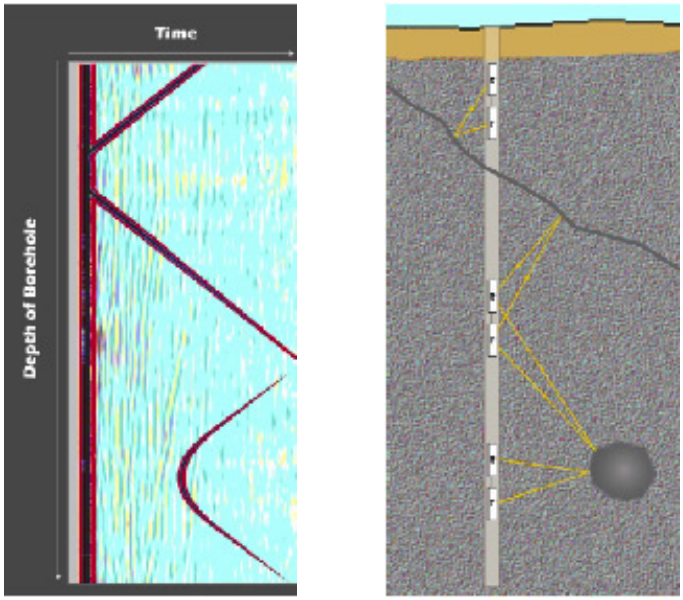


Figure 4-1. *The principle of radar borehole reflection survey and an example of result..*

For more information on system settings for the different antennas used in the investigation of KSH01A, KSH01B and in the upper part of KSH02 see Table 4-1 to 4-3 below.

Table 4-1. Radar logging information from KSH01A.

Site:	**Simpevarp**	**Logging company:**	**RAYCON**	
BH:	**KSH01A**	**Equipment:**	**SKB RAMAC**	
Type:	**Dipole**	**Manufacturer:**	**MALÅ GeoScience**	
Operators:	**CG**	**Antenna**		
		250 MHz	**100 MHz**	**20 MHz**
	Logging date:	03-02-06	03-02-07	03-02-07
	Reference:	T.O.C.	T.O.C.	T.O.C.
	Sampling frequency (MHz):	2588	951	247
	Number of samples:	619	518	512
	Number of stacks:	Auto	Auto	Auto
	Signal position:	–0.32	–0.33	–1.36
	Logging from (m):	101.3	102.6	105.26
	Logging to (m):	1000	998	988.19
	Trace interval (m):	0.1	0.2	0.4
	Antenna separation (m):	1.9	3.9	8.05

Table 4-2. Radar logging information from KSH01B.

Site:	**Simpevarp**	**Logging company:**	**RAYCON**	
BH:	**KSH01B**	**Equipment:**	**SKB RAMAC**	
Type:	**Dipole**	**Manufacturer:**	**MALÅ GeoScience**	
Operators:	**CG**	**Antenna**		
		250 MHz	**100 MHz**	**20 MHz**
	Logging date:	03-02-06	03-02-07	03-02-07
	Reference:	T.O.C.	T.O.C.	T.O.C.
	Sampling frequency (MHz):	2588	951	247
	Number of samples:	575	518	512
	Number of stacks:	Auto	Auto	Auto
	Signal position:	–0.32	–0.33	–1.36
	Logging from (m):	1.3	2.6	5.26
	Logging to (m):	96.05	94.62	88.81
	Trace interval (m):	0.1	0.2	0.4
	Antenna separation (m):	1.9	3.9	8.05

Table 4-3. Radar logging information from the upper part of KSH02.

Site:	Simpevarp	Logging company:	RAYCON	
BH:	KSH02	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Operators:	CG	Antenna		
		250 MHz	100 MHz	20 MHz
	Logging date:	03-02-09	03-02-09	03-02-09
	Reference:	T.O.C.	T.O.C.	T.O.C.
	Sampling frequency (MHz):	2588	951	247
	Number of samples:	619	518	512
	Number of stacks:	Auto	Auto	Auto
	Signal position:	–0.32	–0.36	–1.36
	Logging from (m):	1.55	2.6	5.26
	Logging to (m):	96.79	94.63	89
	Trace interval (m):	0.1	0.2	0.4
	Antenna separation (m):	2.4	3.9	8.05

4.1.2 BIPS

All measurements were performed in accordance with the instructions and guidelines from SKB (internal document MD222.006). All cleaning of the probe and cable was performed according to internal document SKB MD 600.004 before logging operation.

During the measurement a pixel circle with a resolution of 360 pixels/circle was used and the digitalized circles were then stored for every 1 millimeter on a MO-disc in the surface unit. The maximum speed during data collection was 1.5 metre/minute.

There is two ways to orientate the BIPS images, with compass or gravity measurements. The compass is used for vertical boreholes and the gravity sensor for inclined boreholes. In KSH01A and in the upper part of KSH02 the gravity sensor was used to measure the orientation and in KSH01B the compass.

Due to the bad water quality in KSH01A during the logging in February a second logging was ordered and performed in March.

In order to control the quality of the system, calibration measurements were performed in a test pipe before logging the first borehole and after logging the last one for the two field mobilizations. The results showed no difference regarding the colours and focus of the images. Results of the test loggings were included in the delivery of the raw data.

The BIPS images in the core-drilled boreholes are impaired by some quality problems, which, however, are system independent. Instead, the problems are related to a drilling induced discolouring of parts of the borehole wall, see example in Figure 4-2. In the parts in the borehole that is heavily defected there are problems to map thin structures and single fractures.

The water quality is considered to be fairly good along the boreholes except for the first run in borehole KSH01A and in the parts in KSH02 between c 65–100 m.

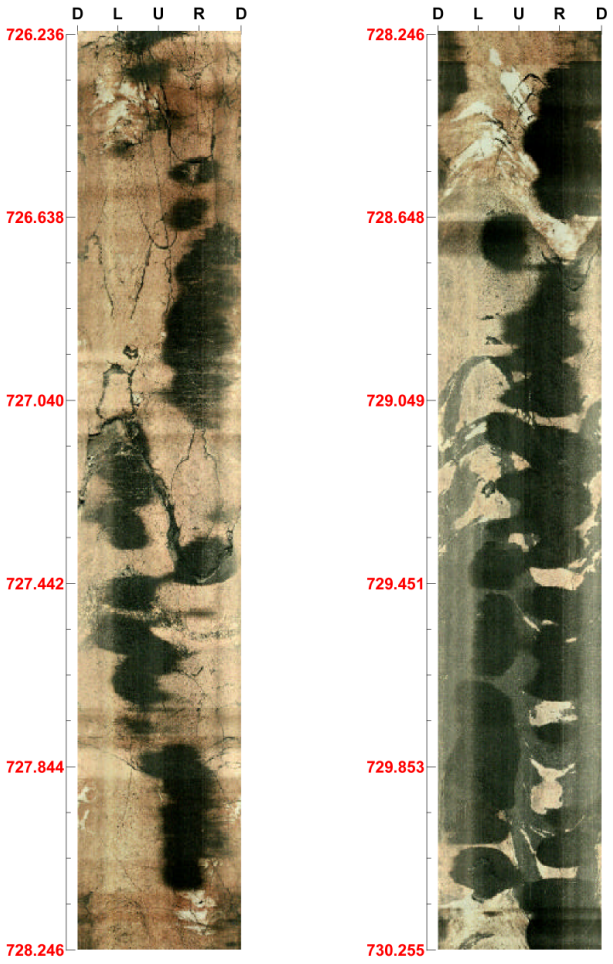


Figure 4-2. *Example of the defected borehole wall caused by the drilling in KSH01A.*

4.1.3 Depth measurements

During logging the depth recording for the RAMAC and BIPS systems is taken care of by a measuring wheel mounted on the cable winch. During the BIPS logging, were the reference marks in the borehole is visible on the image, the logging cable is marked with red scotch tape. These tape marks are then used for controlling the RAMAC radar measurements. The depth marks in the BIPS images was also used for adjusting the depth of the BIPS measurement.

In Figure 4-3 the divergence in depth measurements between the different radar antennas is plotted for KSH01A. The difference is more pronounced in the deeper parts of the borehole. Recording errors for the radar measurements is adjusted on the delivered results in this report. No similar depth corrections are made for KSH01B and KSH02, as these boreholes only were logged to 100 m depth.

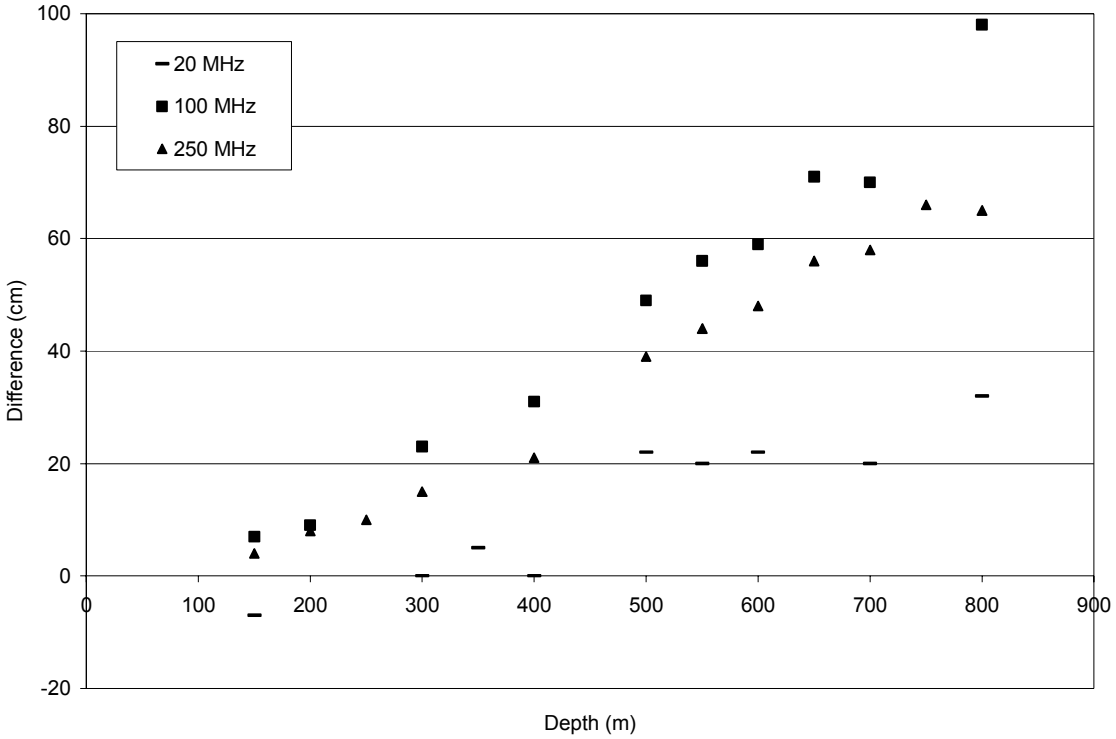


Figure 4-3. *Illustration of the divergence in depth measurements for the different radar antennas used in KSH01A.*

4.1.4 Deviation Measurements

The deviation logging was performed according to SKB internal document SKB MD 224.001.

The deviation measurements in KSH01A, KSH01B and in the upper part of KSH02 were performed the 10th of February 2003. In this study, two rounds of deviation measurements were performed in every borehole. First, the borehole was measured downwards and afterwards the borehole was measured upwards. The 3 metre interval was measured out of the hole, i.e. upwards. Downwards only controlling points were measured.

4.2 Analyses and Interpretation

4.2.1 Radar

The result from radar measurements is presented in the form of a radargram where the position of the probes is shown along one axis and the propagation is shown along the other axis. The amplitude of the received signal is shown in the radargram with a gray scale where black color corresponds to large positive signals and white color to large negative signals. Grey color corresponds to no reflected signals.

The presented data in this report is adjusted for the measurement point of the antennas. The measurement point is defined to be the central point between the transmitter and the receiver antenna.

The two basic patterns to interpret in borehole measurements are point and plane reflectors. In the reflection mode, borehole radar essentially gives a high-resolution image of the rock mass, showing the geometry of plane structures which may or may not, intersect the borehole (contact between layers, thin marker beds, fractures) or showing the presence of local features around the borehole (cavities, lenses etc).

The distance to a reflecting object or plane is determined by measuring the difference in arrival time between the direct and the reflected pulse. The basic assumption is that the speed of propagation is the same everywhere.

There are several ways to determine the radar wave propagation velocity. Each of them has its advantages and disadvantages. In this project the velocity determination was performed by keeping the transmitter fixed in the borehole while moving the receiver downwards in the borehole. The result is plotted in Figure 4-4 and the calculation shows a velocity of 120 m/micro seconds. The velocity measurement was performed in borehole KSH01B with the 100 MHz antennas.

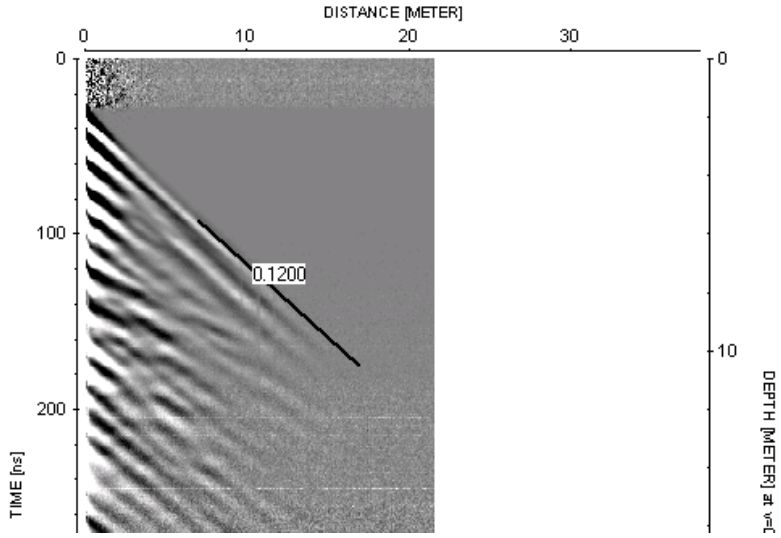


Figure 4-4. *Results from velocity measurements in KSH01B with 100 MHz dipole antennas.*

The visualization of data in Appendix 1A to 1C is made with REFLEX, a Windows based processing software for filtering and analysis of radar data. The processing steps are shown in Table 4-4 to 4-6.

For the interpretation of the intersection angle between the borehole axis and the planes visible on the radargrams the RadinterSKB software has been used. The interpreted intersection points and intersection angles of the detected structures are presented in the Table 5-1 to 5-4 and also visible on the radargrams in Appendix 1A to 1C.

Table 4-4. Processing steps for borehole radar data, KSH01A.

Site:	Simpevarp	Logging company:	RAYCON	
BH:	KSH01A	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Interpret:	JA	Antenna		
		250 MHz	100 MHz	20 MHz
	Processing:	DC removal	DC removal	DC removal
		Move start time	Move start time	Move start time
		Background removal	Dynamic correction	Dynamic correction
		Gain	Background removal	Background removal
			Gain	Bandpass
				Gain
				Dewow
				Energy decay

Table 4-5. Processing steps for borehole radar data, KSH01B.

Site:	Simpevarp	Logging company:	RAYCON	
BH:	KSH01B	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Interpret:	JN	Antenna		
		250 MHz	100 MHz	20 MHz
	Processing:	DC removal	DC removal	DC removal
		Correct max phase / move start time	Correct max phase / move start time	Correct max phase / move start time
		Dynamic correction	Dynamic correction	Dynamic correction
		Background removal	Background removal	Background removal
		Dewow	Gain	Bandpass
		Energy decay		Gain

Table 4-6. Processing steps for borehole radar data, KSH02.

Site:	Simpevarp	Logging comapny:	RAYCON	
BH:	KSH02	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Interpret:	JA	Antenna		
		250 MHz	100 MHz	20 MHz
	Processing:	DC removal	DC removal	DC removal
		Move start time	Move start time	Move start time
		Background removal	Dynamic correction	Dynamic correction
		Gain	Background removal	Background removal
			Gain	Gain
				Bandpass
				Energy decay and Dewow

4.2.2 BIPS

The visualization of data is made with BDPP, a Windows based processing software for filtering, presentation and analysis of BIPS data. As no fracture mapping of the BIPS image is performed, the raw data was delivered on a CD-ROM together with printable pictures in *.pdf format before the field crew left the investigation site. The used scale is 5, 6 respectively 14 metres of BIPS images/A4. The printed results were delivered with measured length together with adjusted length according to the depth marks visible in the BIPS image. For printing of the BIPS images the printing software PDPP from RaaX was used.

4.2.3 Deviation measurements

Data recorded during the measurements are stored on a hard disc on a computer where also all data processing is performed. Backup of the data is stored on a Compact Disc.

The software utilized for processing of raw data was MeasureIT and for presentation DisplayIT, both developed by Flexit in Vallentuna, Sweden. The corrections applied primarily consisted of spike removal. Moreover, the deviation measurements inside the steel casing were deleted.

5 Results and data delivery

The results from the radar and BIPS measurements were delivered as raw data on CD-ROMs to SKB directly after the termination of the field activities. The information of the measurements was registered in SICADA, and the CD-ROMs stored by SKB.

RAMAC radar data was delivered as raw data (fileformat *.rd3 or *.rd5) with corresponding information files (file format *.rad) whereas the data processing steps and results are presented in this report. The BIPS data was delivered as *.bip files with the images and with corresponding *.bdt text files with information of for instance depth correction. Note that these *.bdt files are not delivered in their final form. Malå Geoscience Raycon makes a depth correction, but corrections for deviation etc are made by SKB themselves.

The delivered raw and processed data have been inserted in the database (SICADA) of SKB. The SICADA reference to the present activity is Field notes No 40 and 49.

5.1 RAMAC logging

The results of the interpretation of the radar measurements are presented in Table 5-1 to 5-4. Radar data are also visualized in Appendix 1A to 1C. It should be remembered that the images in Appendix 1A to 1C are only composite pictures of all events 360 degrees around the borehole, and do not reflect the orientation of the structures.

Only the larger clearly visible refelctors are interpreted in RadinterSKB, i.e. only reflectors of intensity 1 as referred to SKB MD 252.020. A number of minor reflectors also exist, indicated in Appendix 1A to 1C. It should also be pointed out that reflections interpreted will always get an intersection point with the borehole, but being located further away, they may in some cases not reach the borehole. As seen in Appendix 1A to 1C the listed reflectors in Table 5-1 to 5-3 can be identified in the data from more than one antenna frequency.

The data quality (as seen in Appendix 1A to 1C) from KSH01A, KSH01B and in the upper part of KSH02 is relatively satisfying, but in some parts of lower quality due to more conductive conditions. A conductive environment makes the radar wave to attenuate, which decreases the penetration. This is for instance seen in the data from KSH01A from a depth of 140 m to 200 m.

As also seen in Appendix 1A to 1C the resolution and penetration of radar waves depend of the antenna frequency used. Low antenna frequency gives less resolution but higher penetration rate compared to a higher frequency.

In Table 5-1 the identified reflectors are listed for the three different boreholes. As seen the distribution is quite even. In KSH01A most of the identified reflectors are found from 100 to 600 m depth.

Table 5-1. Distribution of identified reflectors in KSH01A, KSH1B and in the upper part of KSH02.

Depth	KSH01A	KSH01B	KSH02
0–50		3	2
50–100		2	3
100–150	2		
150–200	5		
200–250	3		
250–300			
300–350			
350–400	5		
400–450	2		
450–500	1		
500–550	2		
550–600	3		
600–650	1		
650–700	1		
700–750	2		
750–800			
800–850	2		
850–900			
900–950	2		
950–1000	1		

Table 5-2 to 5-4 summarises the interpretation of radar data from KSH01A, KSH01B and the upper part of KSH02. Many reflectors can be identified in the data from more than one antenna frequency.

Table 5-2. Model information from dipole antennas 20, 100 and 250 MHz, KSH01A.

RADINTER MODEL INFORMATION (20, 100 and 250 MHz Dipole Antennas)

Site: **Simpevarp**

Borehole name: **KSH01A**

Nominal velocity (m/µs): **120.0**

Object type	Name	Intersection depth	Intersection angle	Intensity
PLANE	A	141.5	23	1
PLANE	B	145.0	25	1
PLANE	C	171.4	31	1
PLANE	CC	171.3	73	1
PLANE	D	191.3	21	1
PLANE	E	212.5	16	1
PLANE	EE	199.4	70	1
PLANE	F	215.2	55	1
PLANE	FF	205.4	30	1
PLANE	G	364.8	36	1
PLANE	H	383.3	30	1
PLANE	HH	395.6	71	1
PLANE	I	409.2	31	1
PLANE	J	447.9	11	1
PLANE	JJ	450.9	21	1
PLANE	K	510.4	13	1
PLANE	L	542.4	20	1
PLANE	M	561.1	52	1
PLANE	N	579.3	51	1
PLANE	O	590.6	46	1
PLANE	P	628.2	34	1
PLANE	Q	667.4	47	1
PLANE	R	703.5	16	1
PLANE	S	720.0	58	1
PLANE	T	834.7	66	1
PLANE	U	985.7	40	1
PLANE	W	944.6	23	1
PLANE	X	922.1	47	1
PLANE	Y	838.4	21	1
PLANE	Z	381.5	47	1

Names in table according to Appendix 1A.

Table 5-3. Model information from dipole antennas 20, 100 and 250 MHz, KSH01B.

RADINTER MODEL INFORMATION (20, 100 and 250 MHz Dipole Antennas)				
Site:	**Simpevarp**			
Borehole name:	**KSH01B**			
Nominal velocity (m/µs):	**120.0**			
Object type	**Name**	**Intersection depth**	**Intersection angle**	**Intensity**
PLANE	A	55.2	21	1
PLANE	B	33.5	30	1
PLANE	C	48.8	40	1
PLANE	D	73.6	50	1
PLANE	E	69.5	50	1

Names in table according to Appendix 1B.

Table 5-4. Model information from dipole antennas 20, 100 and 250 MHz, KSH02.

RADINTER MODEL INFORMATION (20, 100 and 250 MHz Dipole Antennas)				
Site:	**Simpevarp**			
Borehole name:	**KSH02**			
Nominal velocity (m/µs):	**120.0**			
Object type	**Name**	**Intersection depth**	**Intersection angle**	**Intensity**
PLANE	A	39.1	57	1
PLANE	B	65.2	18	1
PLANE	C	20.9	15	1
PLANE	D	52.2	56	1
PLANE	E	62.8	29	1
Plane	F	80.0	25	1

Names in table according to Appendix 1C.

In the first column of Appendix 1A to 1C, the amplitude of the first arrival is plotted against the depth, for the 250 MHz dipole antennas. The x-axis represents the amplitude, with low amplitudes to the left and higher amplitudes to the right. The y-axis corresponds to the depth of the radargrams. The amplitude variation along the borehole indicates changes in conductivity of the material. A decrease in this amplitude may indicate crushed zones, clay or parts with higher water content, which attenuates the signal due to higher conductivity in the media. Larger decreases in radar amplitude corresponding to higher attenuation is seen at the following depths, Table 5-5.

Table 5-5. Decrease in radar amplitude in boreholes KSH01A, KSH01B and the upper part of KSH02.

KSH01A	KSH01B	KSH02
135–150	20	20–25
165–170	30	45–50
195–200	50	65
200–215	60–65	75
235–290	75–80	80
300–305		
310–315		
340–345		
380–385		
390–395		
405–410		
420–455		
500–505		
555–560		
565–570		
585–590		
625–630		
785–800		
950–955		
980–985		

As seen, for instance in KSH01A, this decrease in amplitude corresponds in parts to the depths where we have the highest number of identified reflectors as well, with a concentration above 600 m depth.

5.2 BIPS logging

To get best possible depth accuracy the BIPS images is adjusted to the reference marks along the borehole. The BIPS raw data was delivered on a CD together with printable pictures in *.pdf format before the field crew left the investigation site. The printed results were delivered with measured length together with adjusted length according to the depth marks visible in the BIPS image. The BIPS images from KSH01A is presented in Appendix 2A, from KSH02 in Appendix 2B and from the upper 100 m of KSH02 in Appendix 2C. The black length number is the recorded length and the red length number is the adjusted length according to the depth mark visible in the BIPS image. U stands for the up direction of the borehole, D for the down direction of the borehole, L stands for the left side and R for the right side of the borehole. The up and down is measured during logging by using the gravity ball in the probe.

To control the quality of the system a calibration measurement was performed in a test pipe before start of the logging of the first borehole and after the finish of the last logging. The results showed no difference according the colors and focus of the images. Results of the test loggings were included together with the delivery of the raw data.

5.3 Deviation measurements

Both rawdata and processed data are delivered on a Compact Disc. The processed data, consisting of dip, azimuth, X-, Y-, Z- coordinates, were delivered in semicolon separated ASCII files to the SICADA database. An example of a control measurement for KSH01A (not measured every 3: rd metre) is shown in Table 5-6. What ca be seen is that the borehole towards depth deviates upwards compared to the start direction and starts to deviate to the right (westwards) from a dept of c 350 metres.

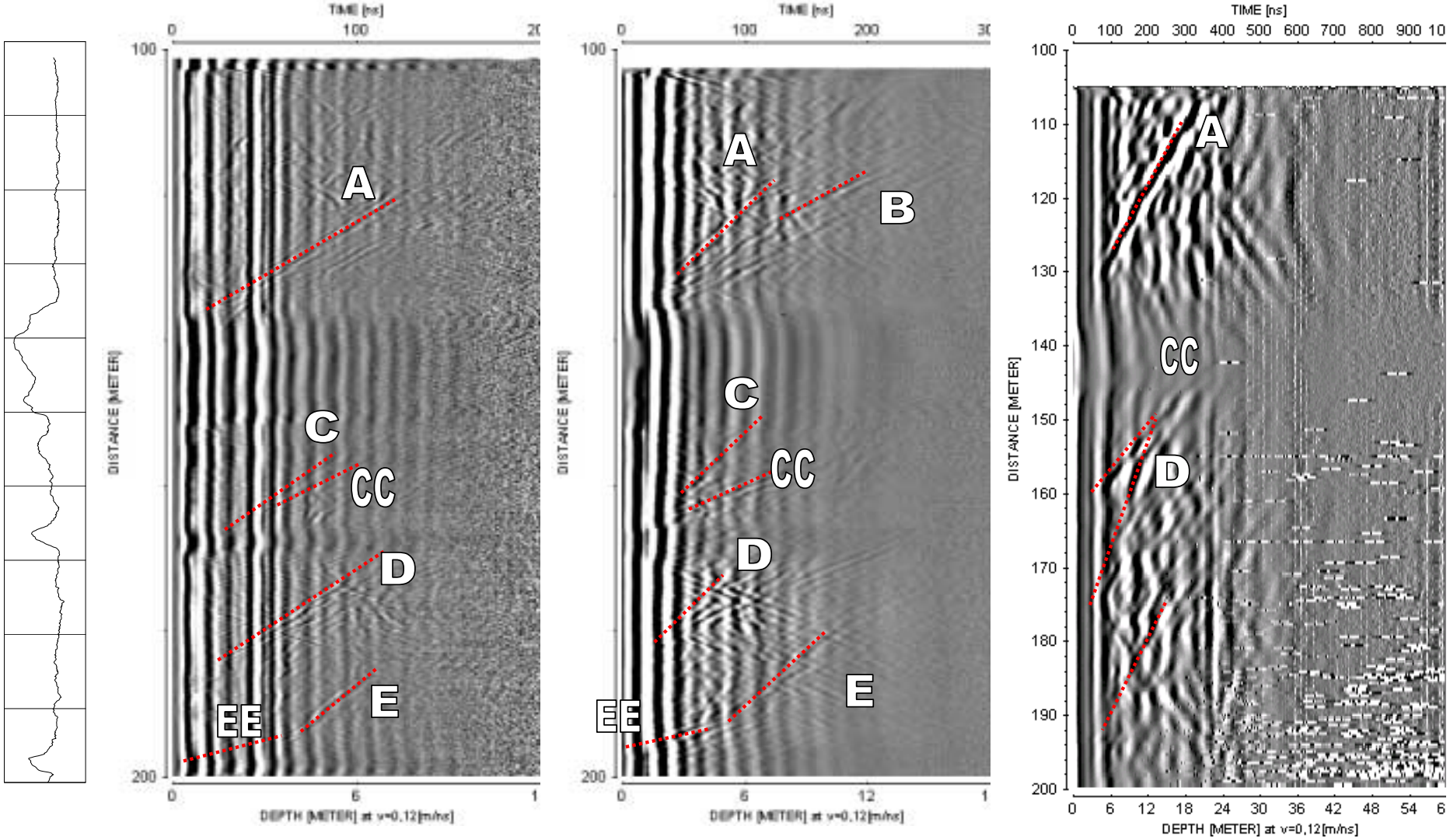
Table 5-6. Exampe of result from deviation measurement with Flexit Smart Tool in KSH01A. Up-down refers to deviation of the borehole upwards (+) or downwards (–) seen along the direction of the start direction of the borehole. Left-right refers to deviation of the borehole to the left (–) or right (+) seen along the direction of the start direction.

Borehole length (m)	Mag-netic bearing (º)	Dip (º)	Northing (m)	Easting (m)	Eleva-tion (m)	Up-Down (m) + up	Left-Right (m) + to right
0.0	166.2	–80.6	6366013.46	1552442.98	5.31	0.00	0.00
49.0	168.6	–79.2	6366005.08	1552444.84	–42.93	0.63	0.19
99.0	164.4	–75.9	6365994.61	1552447.41	–91.74	3.31	0.20
149.0	163.3	–76.2	6365983.04	1552450.76	–140.27	7.29	–0.29
199.0	162.4	–76.0	6365971.57	1552454.30	–188.81	11.22	–0.98
249.0	167.3	–76.4	6365960.08	1552457.42	–237.37	15.07	–1.26
299.0	168.8	–76.0	6365948.42	1552459.89	–285.93	18.92	–0.87
349.0	174.3	–76.3	6365936.60	1552461.65	–334.48	22.76	0.24
399.0	175.5	–75.6	6365924.49	1552462.73	–382.98	26.73	2.09
449.0	178.9	–75.5	6365912.02	1552463.35	–431.39	30.93	4.48
499.0	181.4	–75.7	6365899.61	1552463.32	–479.83	34.93	7.47
549.0	184.0	–75.8	6365887.34	1552462.74	–528.29	38.68	10.96
599.0	186.4	–75.6	6365875.05	1552461.62	–576.75	42.30	14.99
649.0	188.9	–75.5	6365862.71	1552459.96	–625.17	45.85	19.55
699.0	193.2	–74.8	6365850.17	1552457.50	–673.51	49.42	24.94
799.0	203.9	–73.5	6365824.41	1552448.74	–769.72	56.38	39.60
849.0	202.7	–72.0	6365810.76	1552442.87	–817.46	60.30	48.57
899.0	207.8	–70.5	6365796.21	1552435.99	–864.80	64.92	58.73
949.0	206.9	–69.1	6365780.85	1552428.05	–911.71	70.13	70.11
999.0	207.4	–68.2	6365764.65	1552419.74	–958.28	76.11	82.06

Appendix 1A

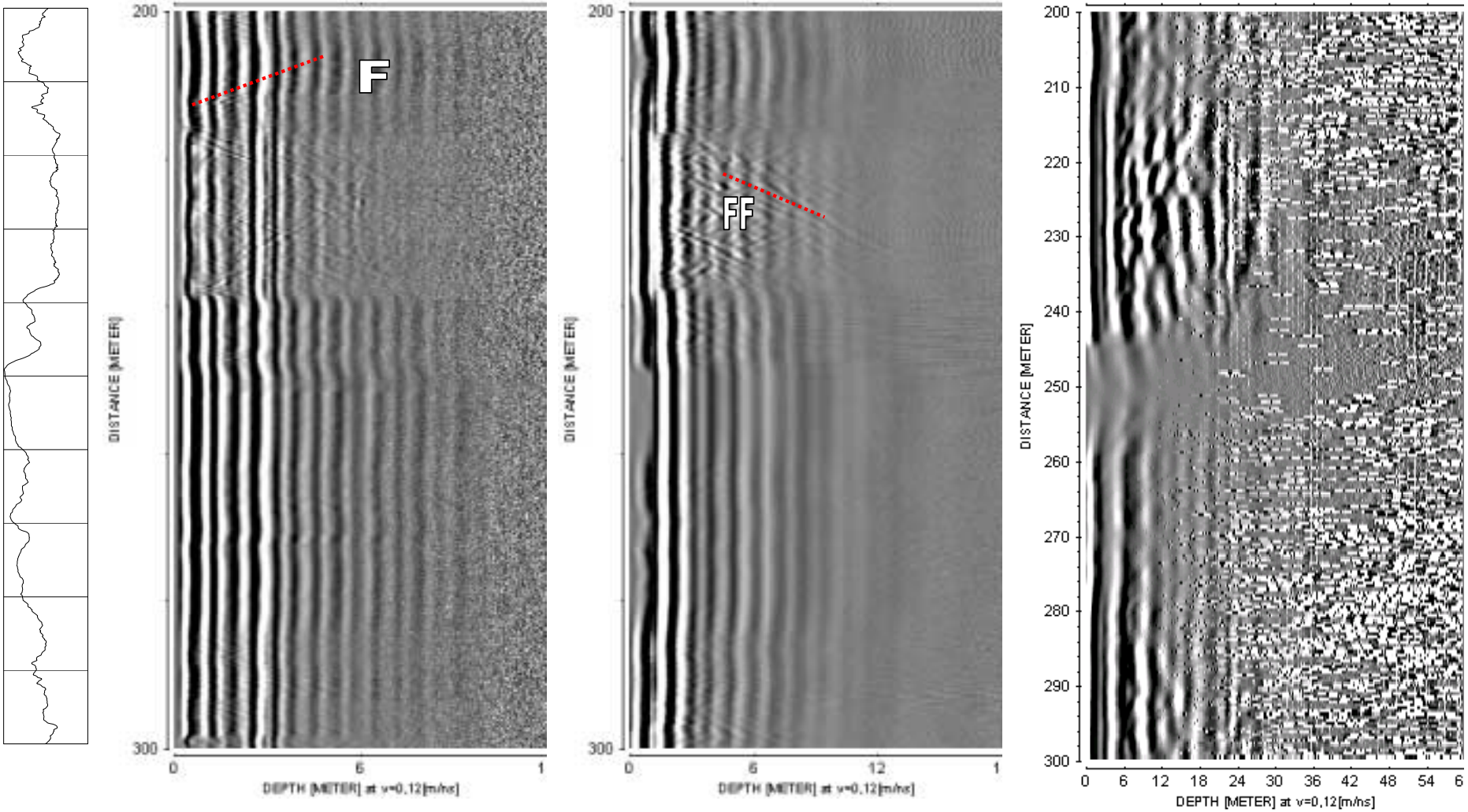
Radar logging with dipole antennas 250, 100 and 20 MHz in KSH01A

OSKARSHAMN KSH01A with interpretation



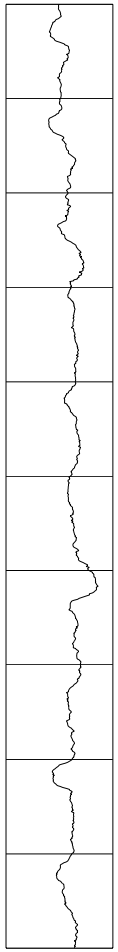
250 MHz **100 MHz** **20 MHz**

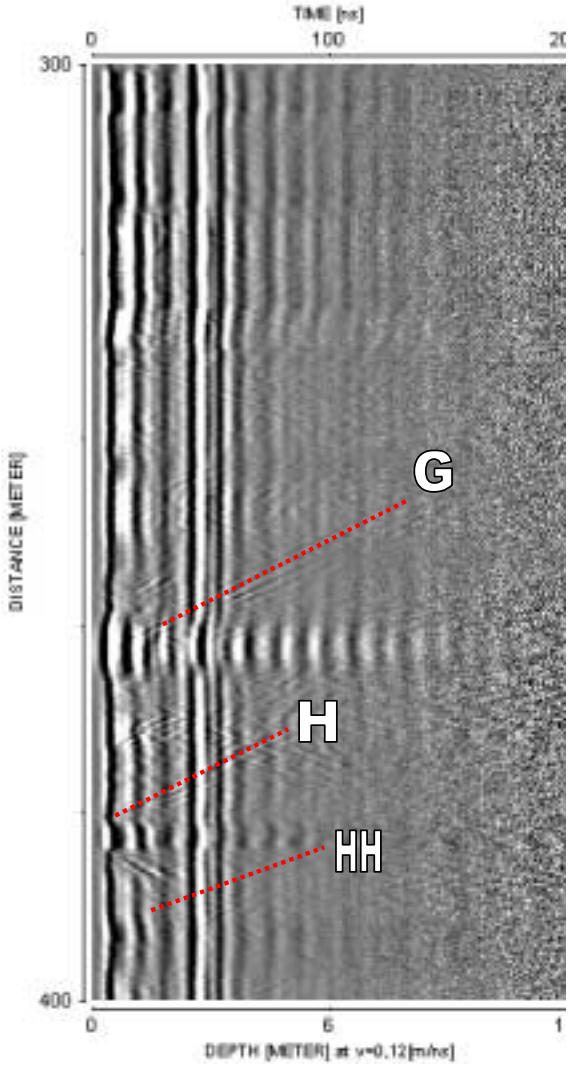
OSKARSHAMN KSH01A



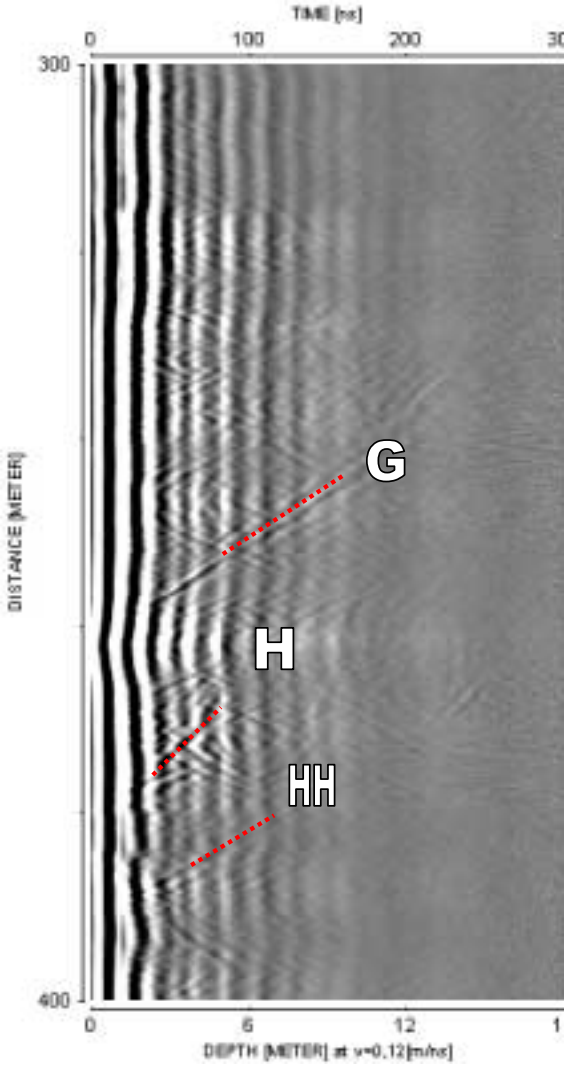
250 MHz **100 MHz** **20 MHz**

OSKARSHAMN KSH01A

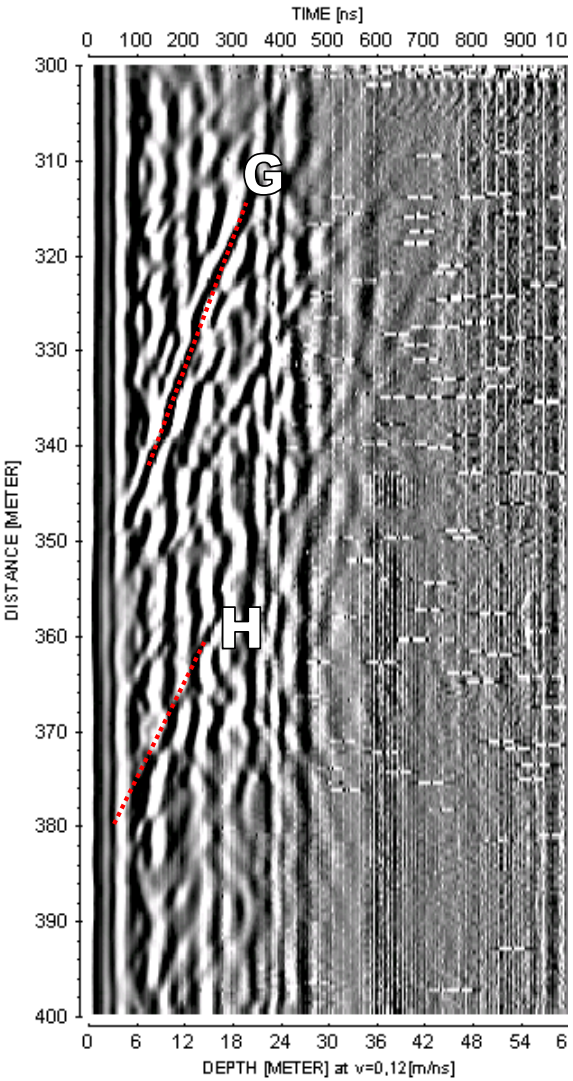




250 MHz

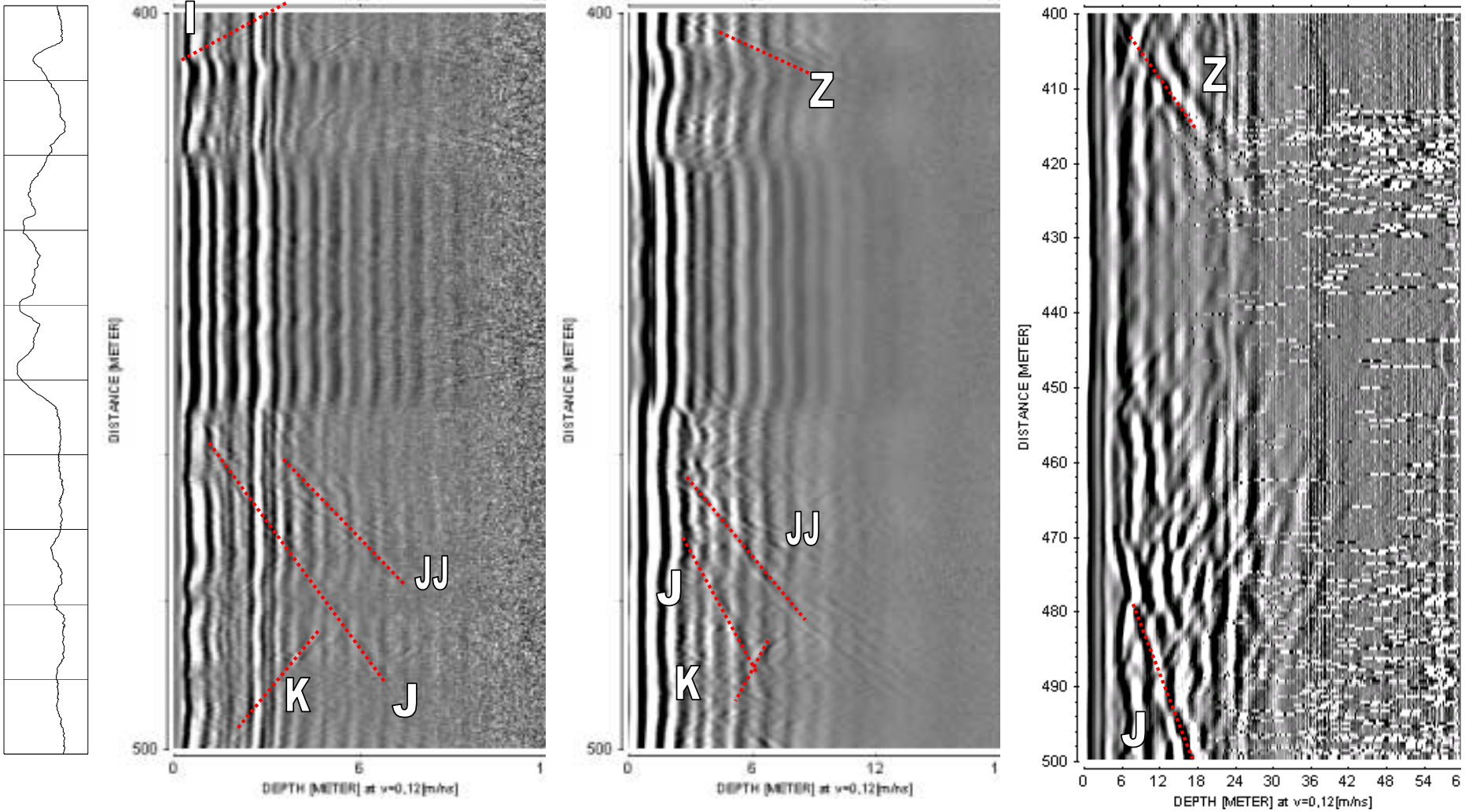


100 MHz



20 MHz

OSKARSHAMN KSH01A

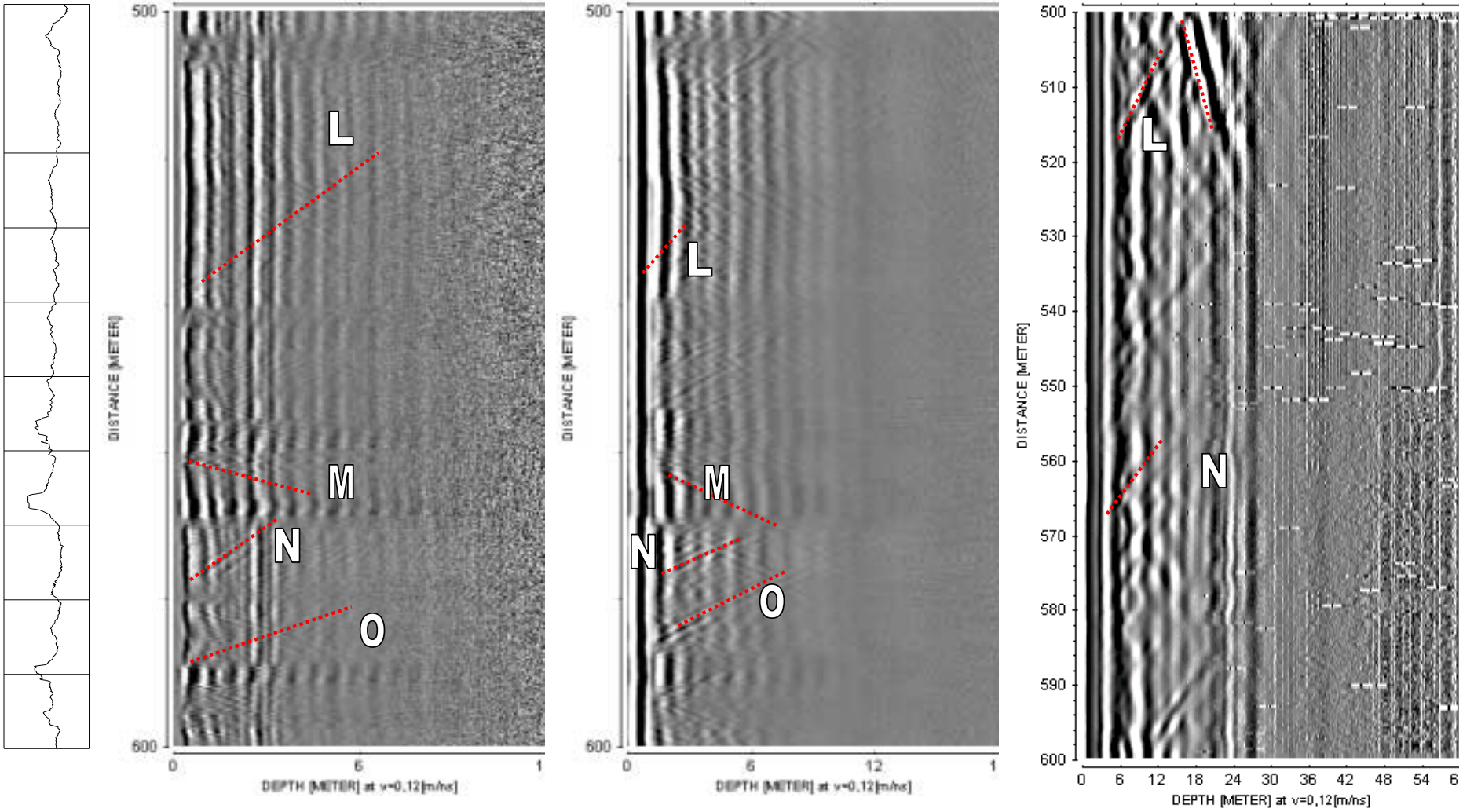


250 MHz

100 MHz

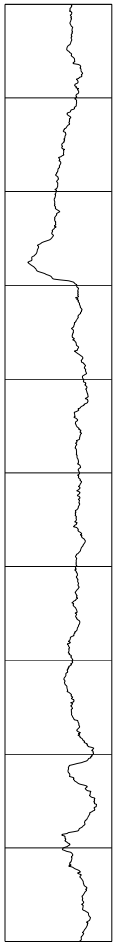
20 MHz

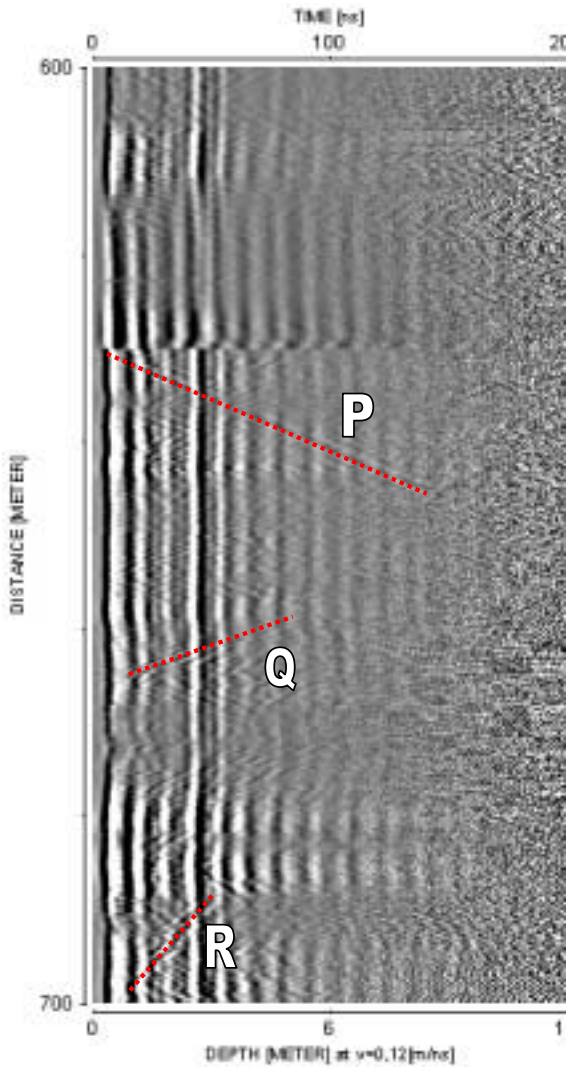
OSKARSHAMN KSH01A



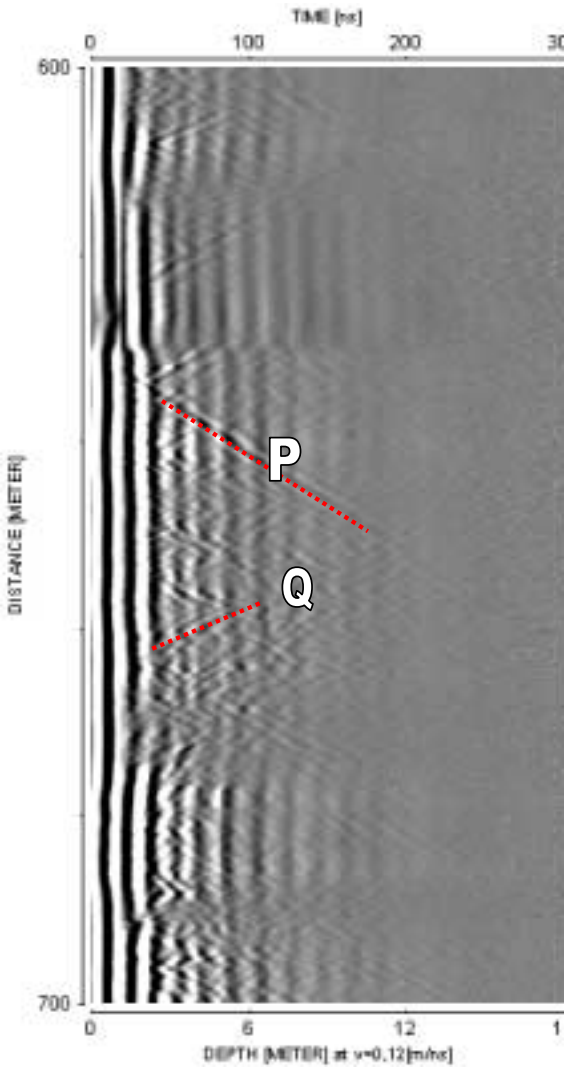
250 MHz **100 MHz** **20 MHz**

OSKARSHAMN KSH01A

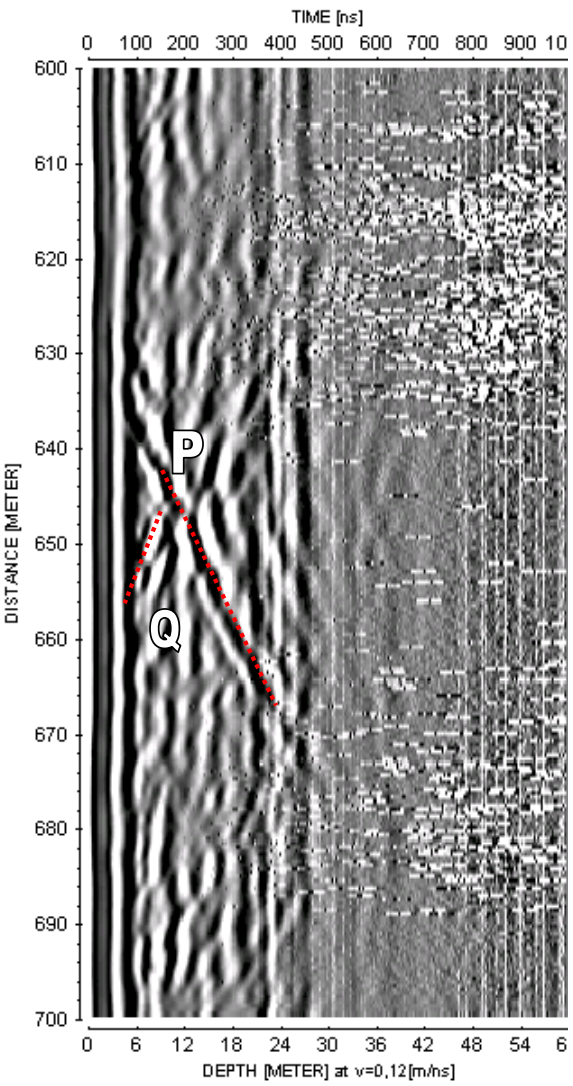




250 MHz

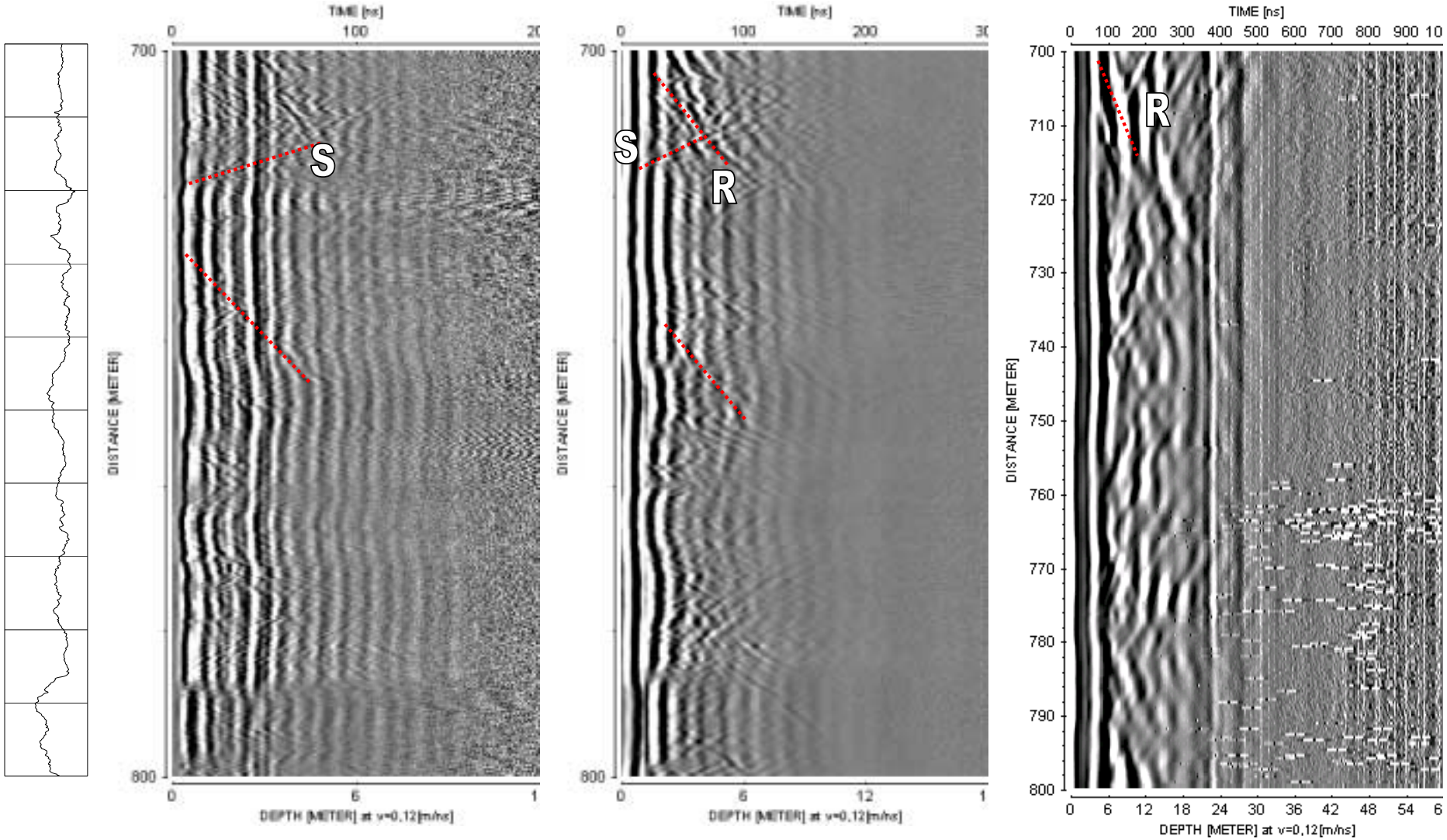


100 MHz



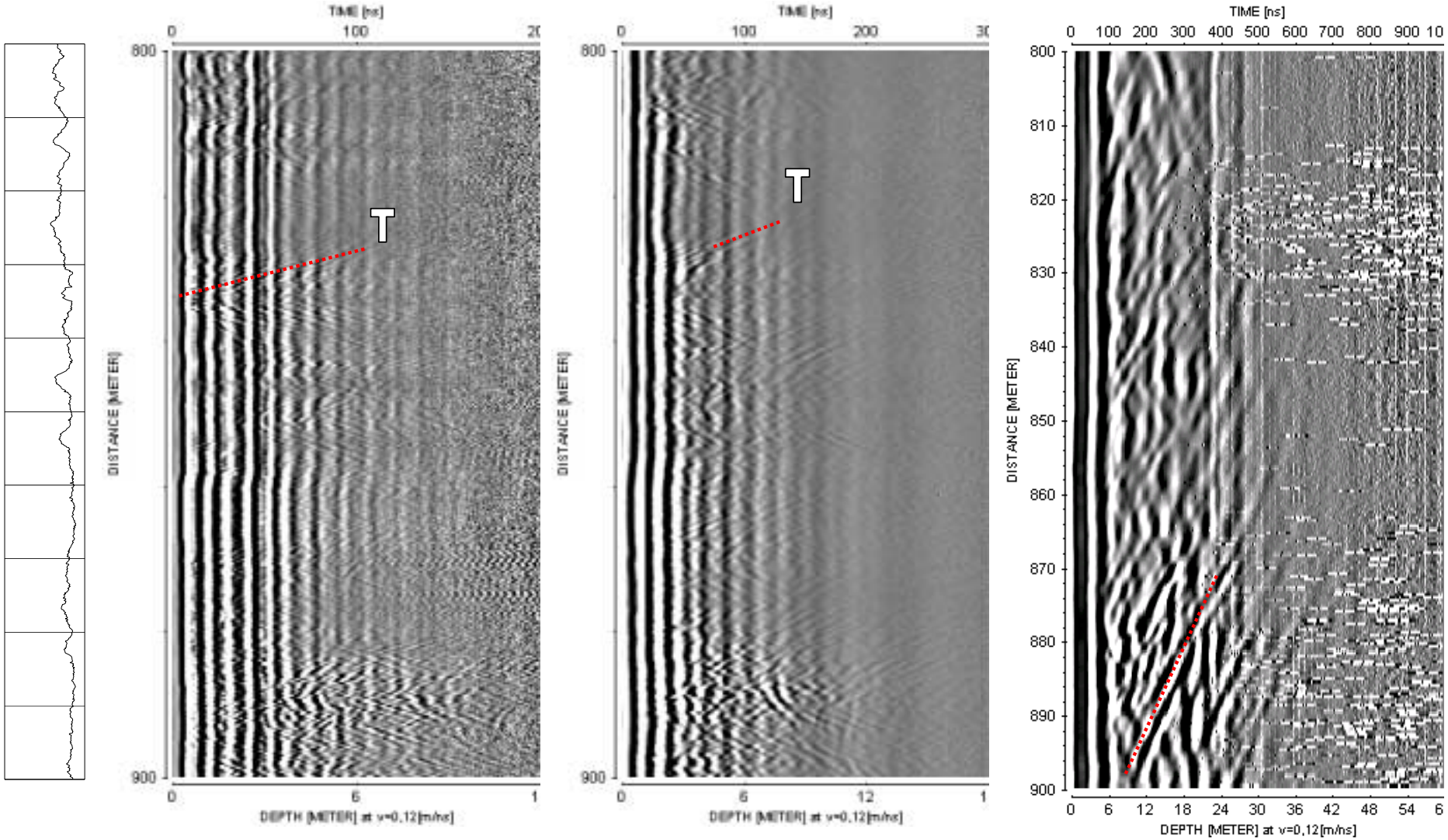
20 MHz

OSKARSHAMN KSH01A



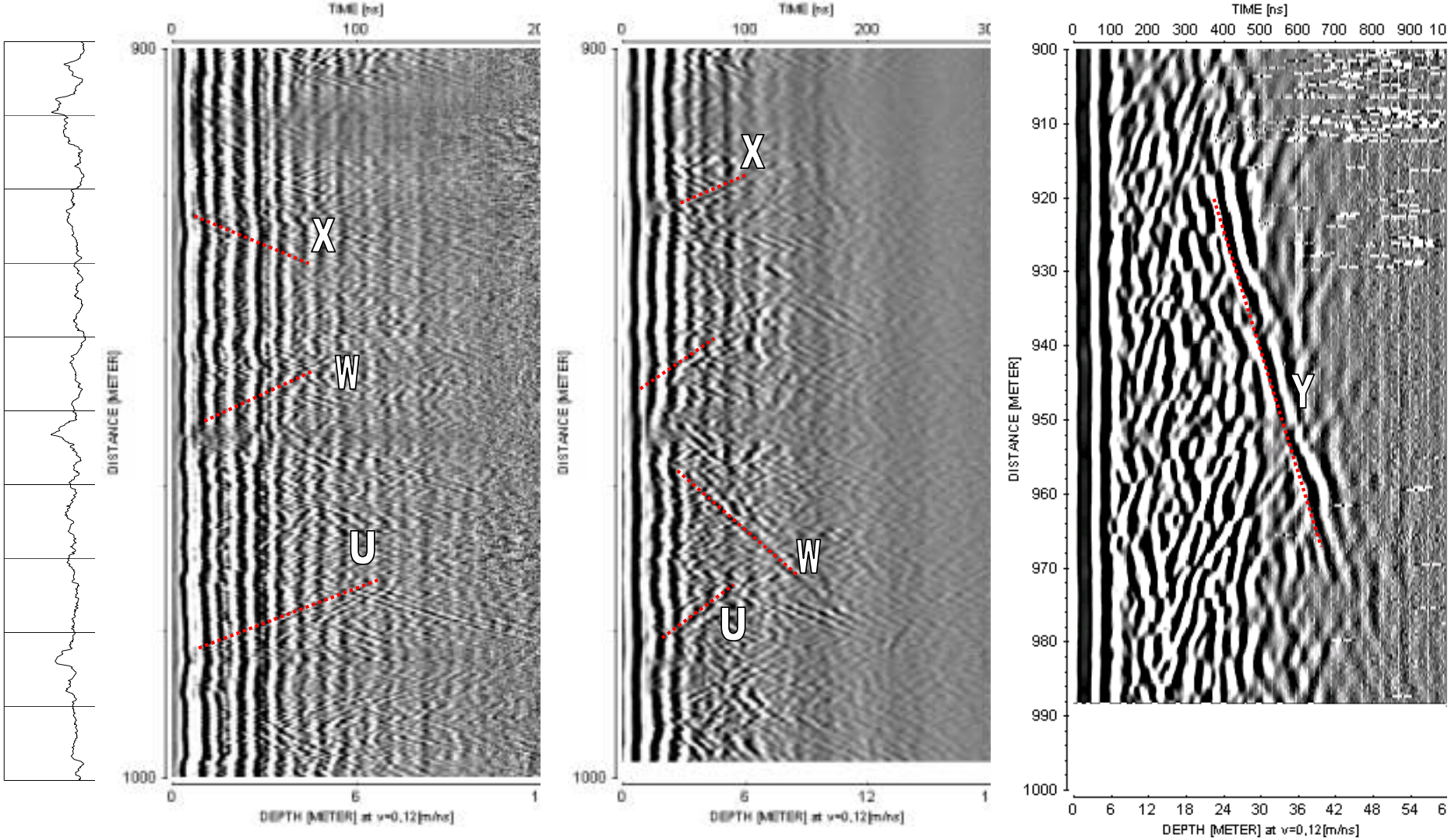
250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A



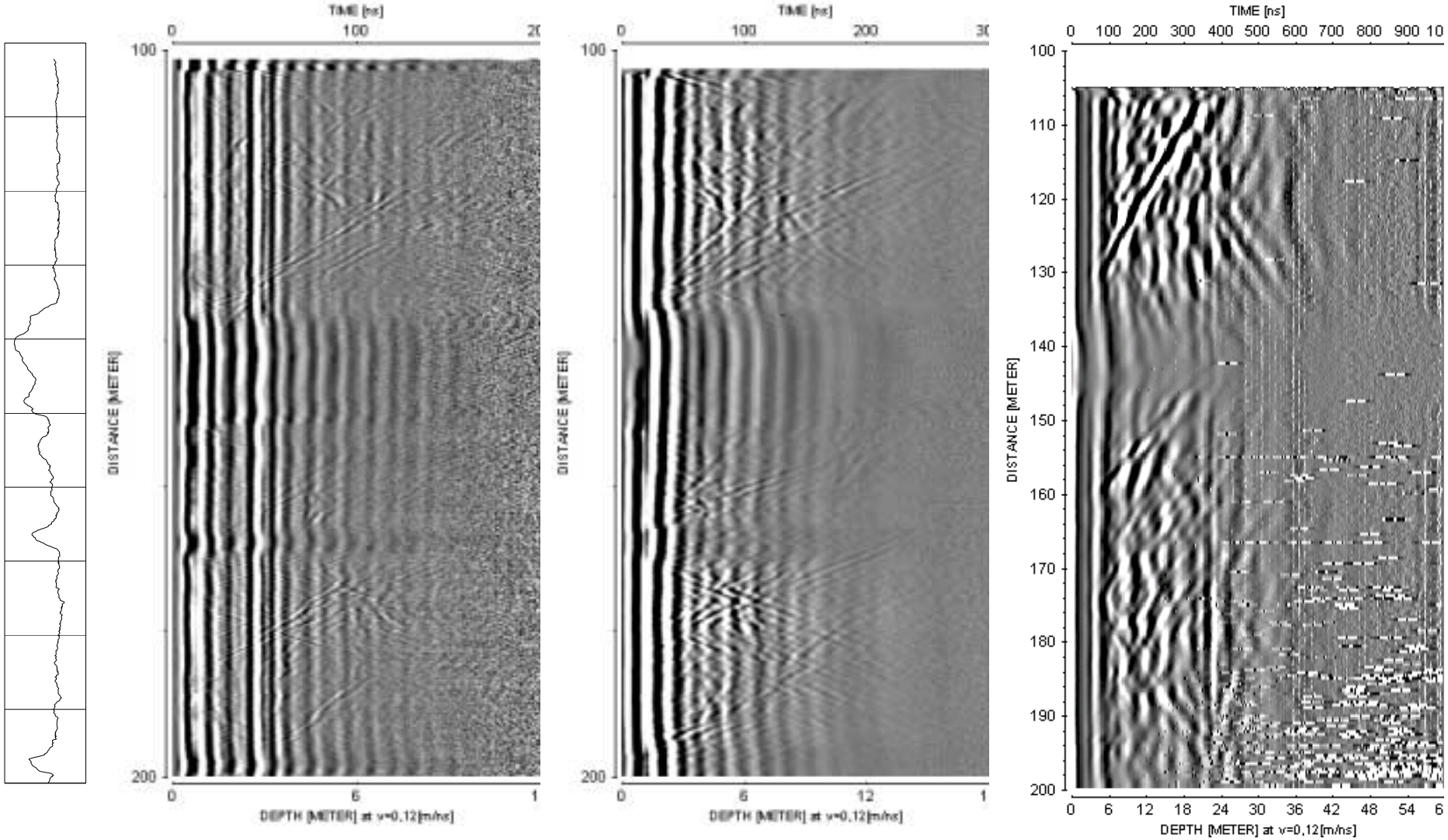
250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A



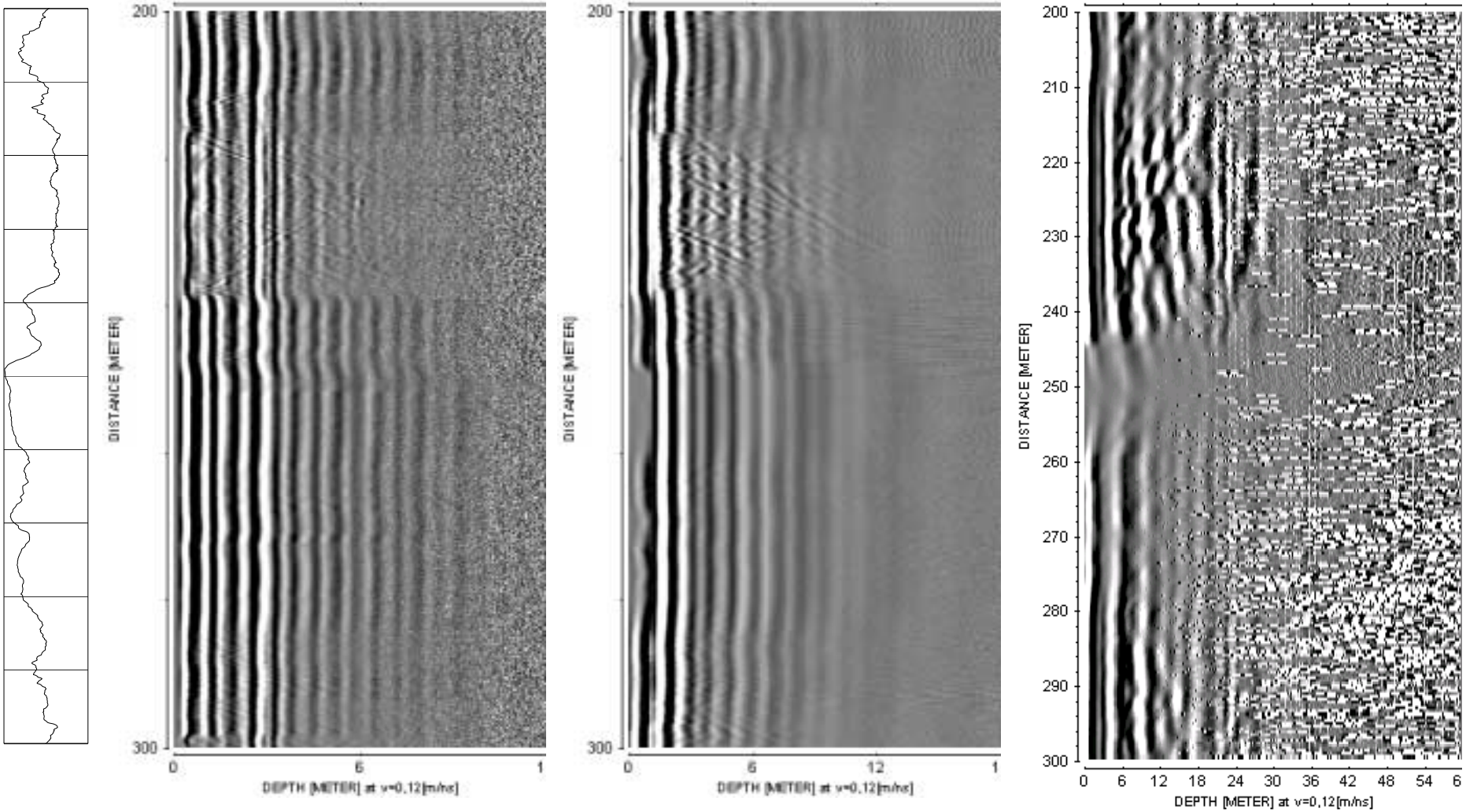
250 MHz **100 MHz** **20 MHz**

OSKARSHAMN KSH01A



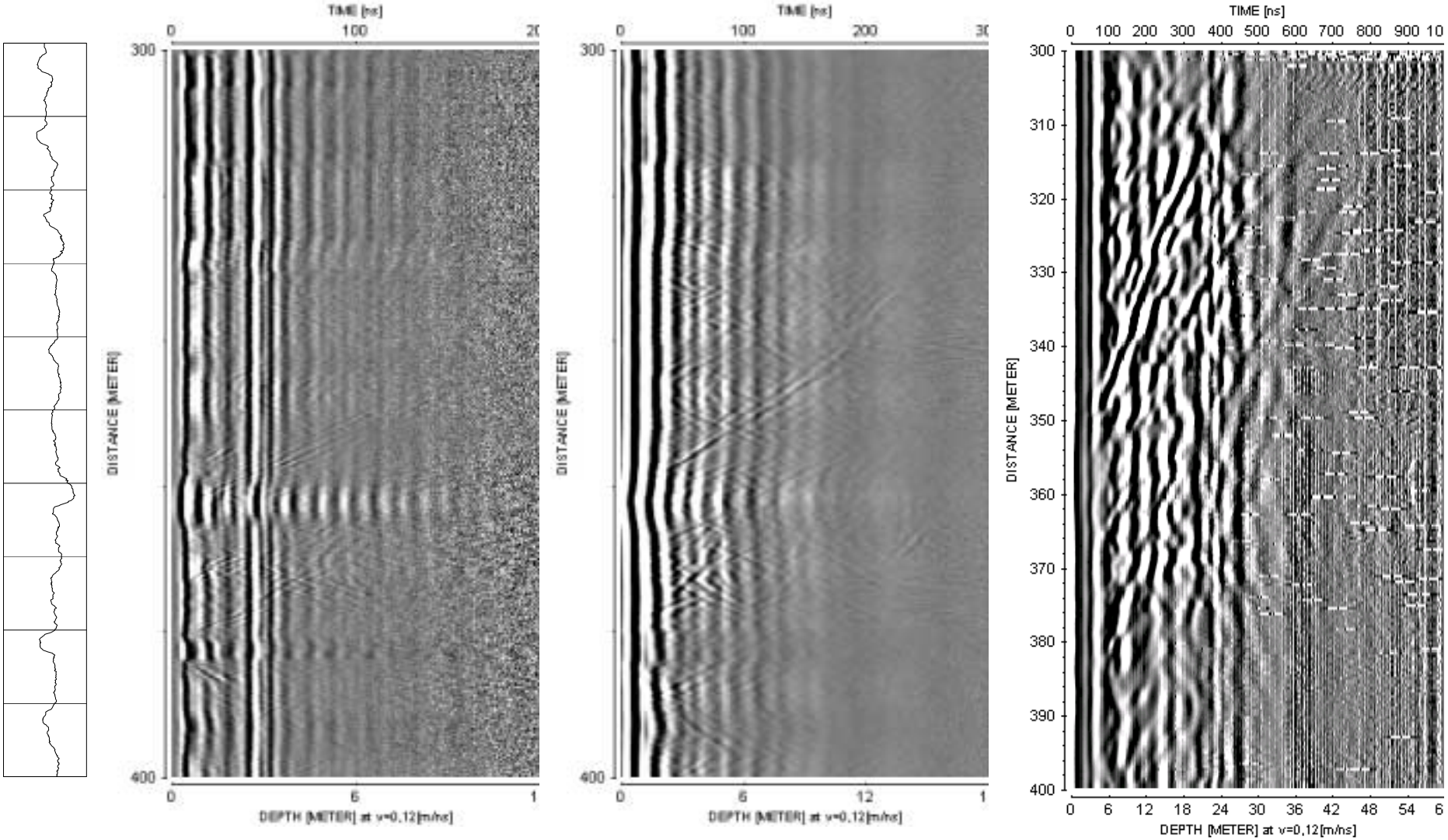
250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A



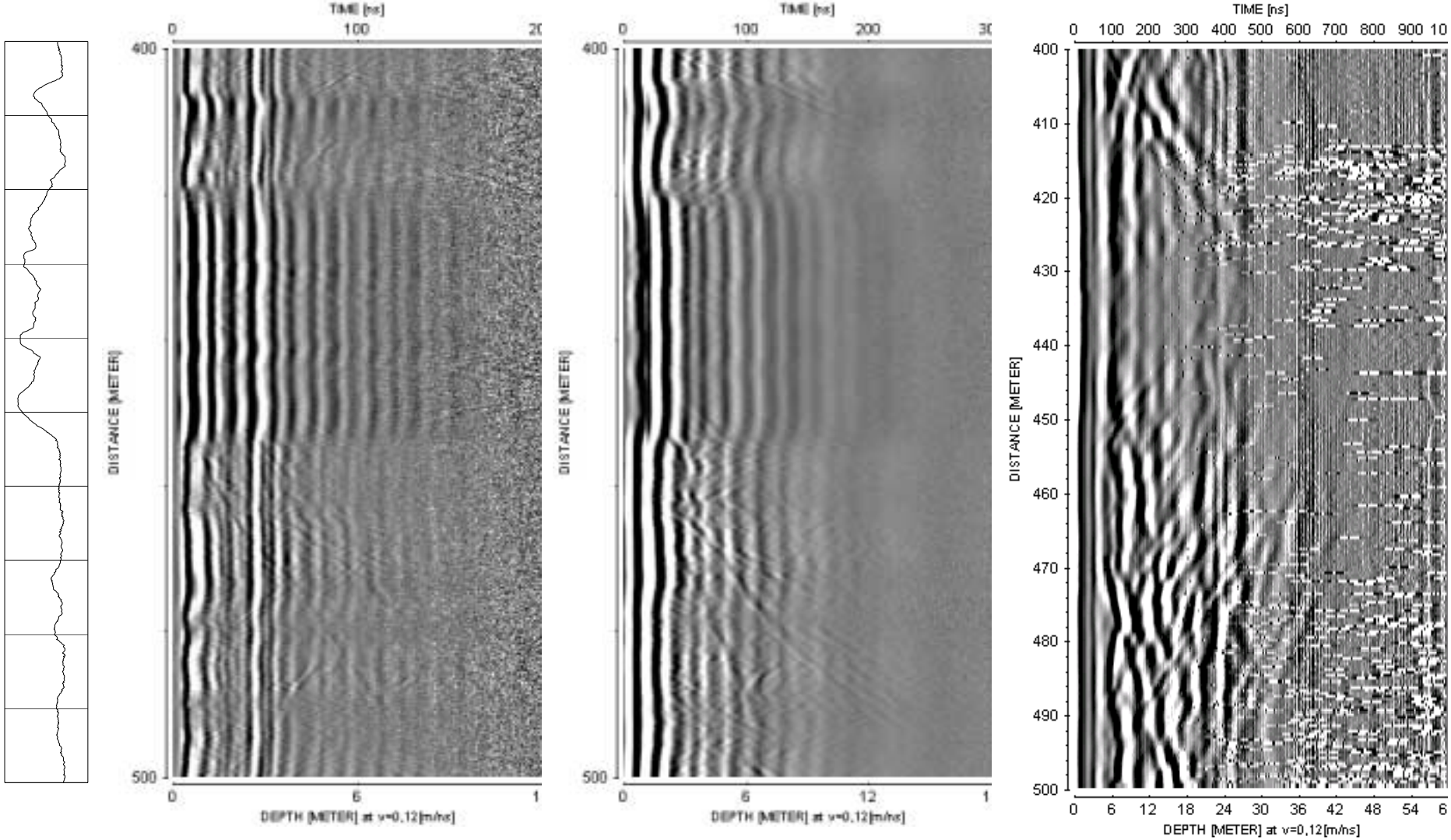
250 MHz **100 MHz** **20 MHz**

OSKARSHAMN KSH01A



250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A

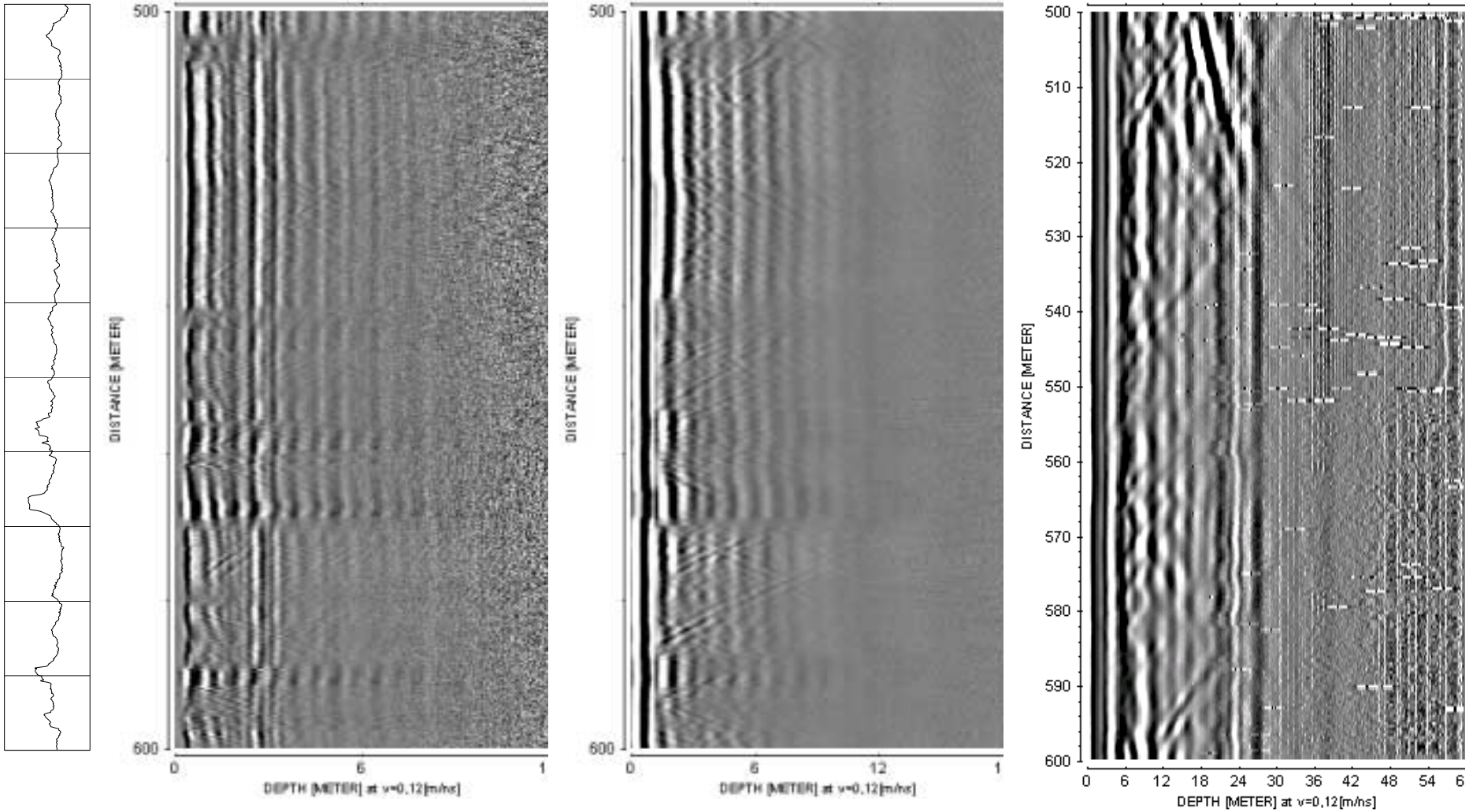


250 MHz

100 MHz

20 MHz

OSKARSHAMN KSH01A

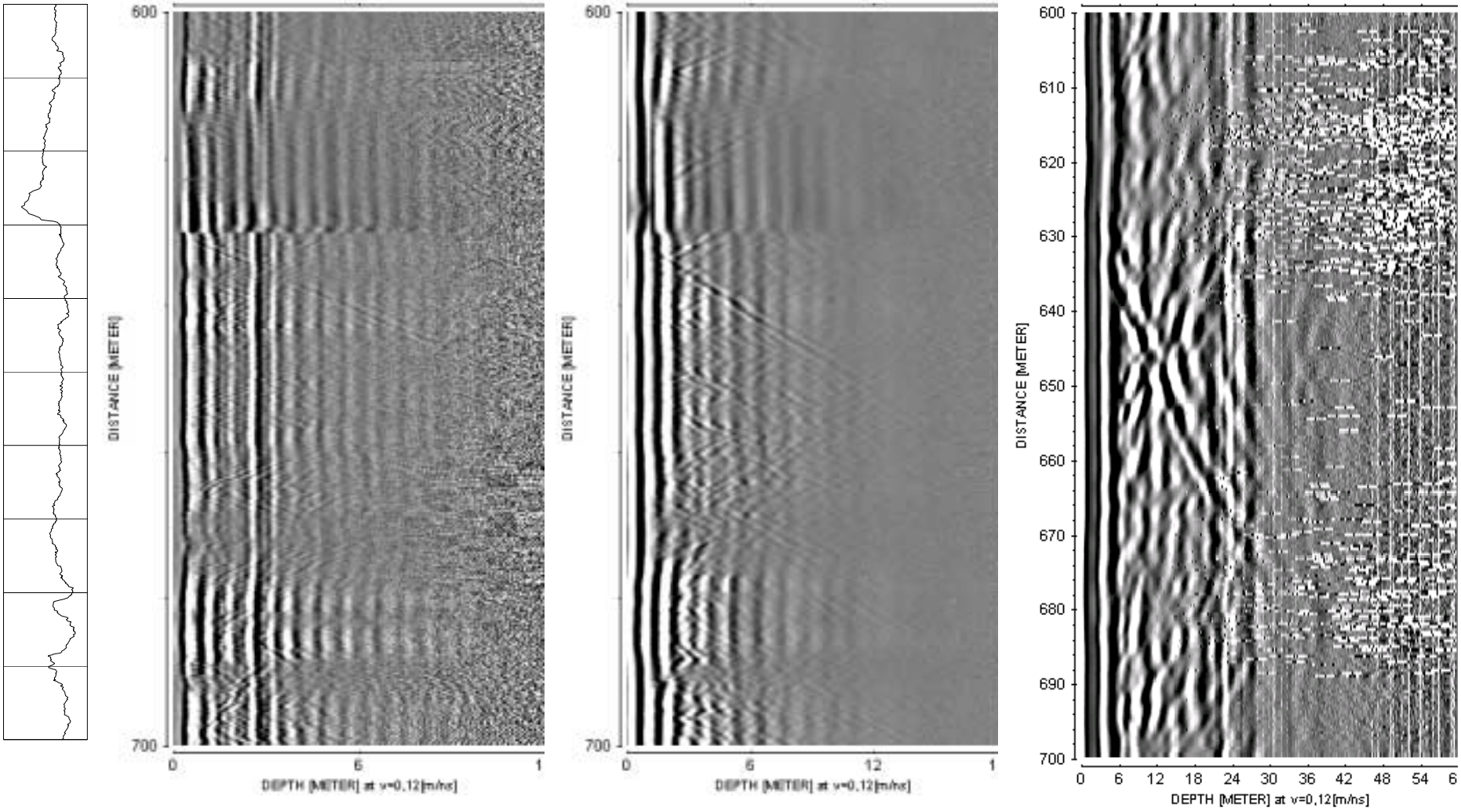


250 MHz

100 MHz

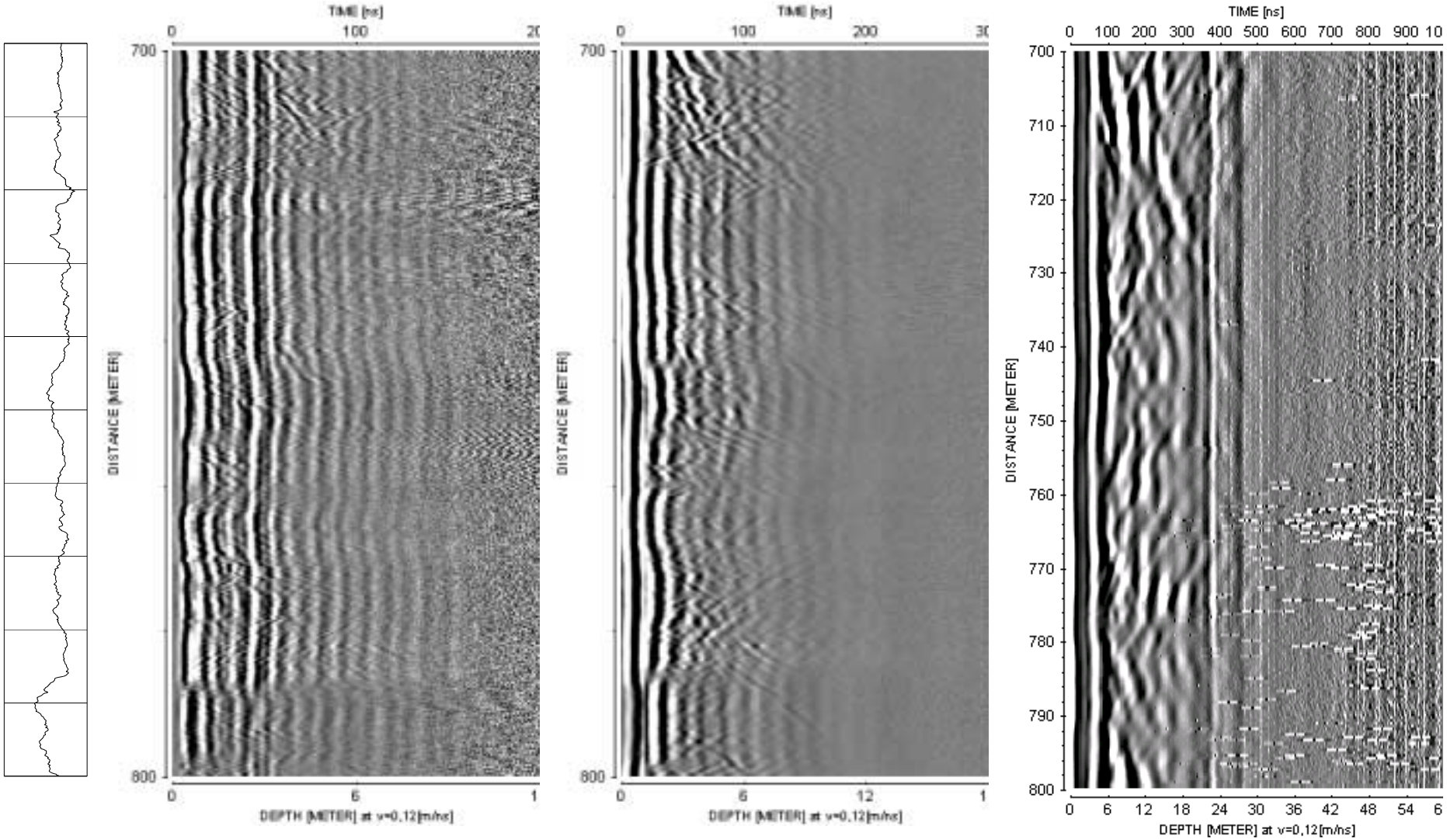
20 MHz

OSKARSHAMN KSH01A



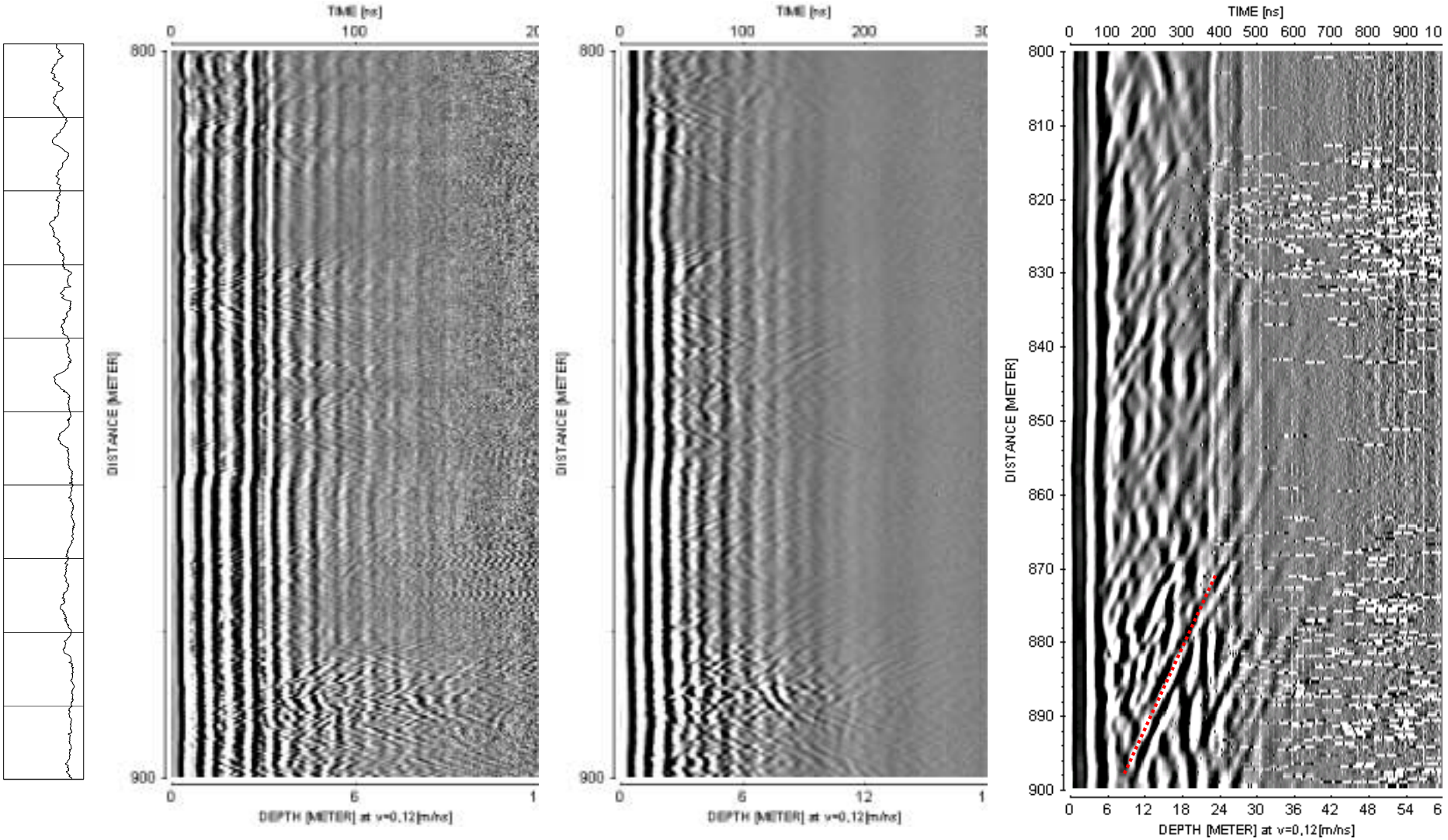
250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A



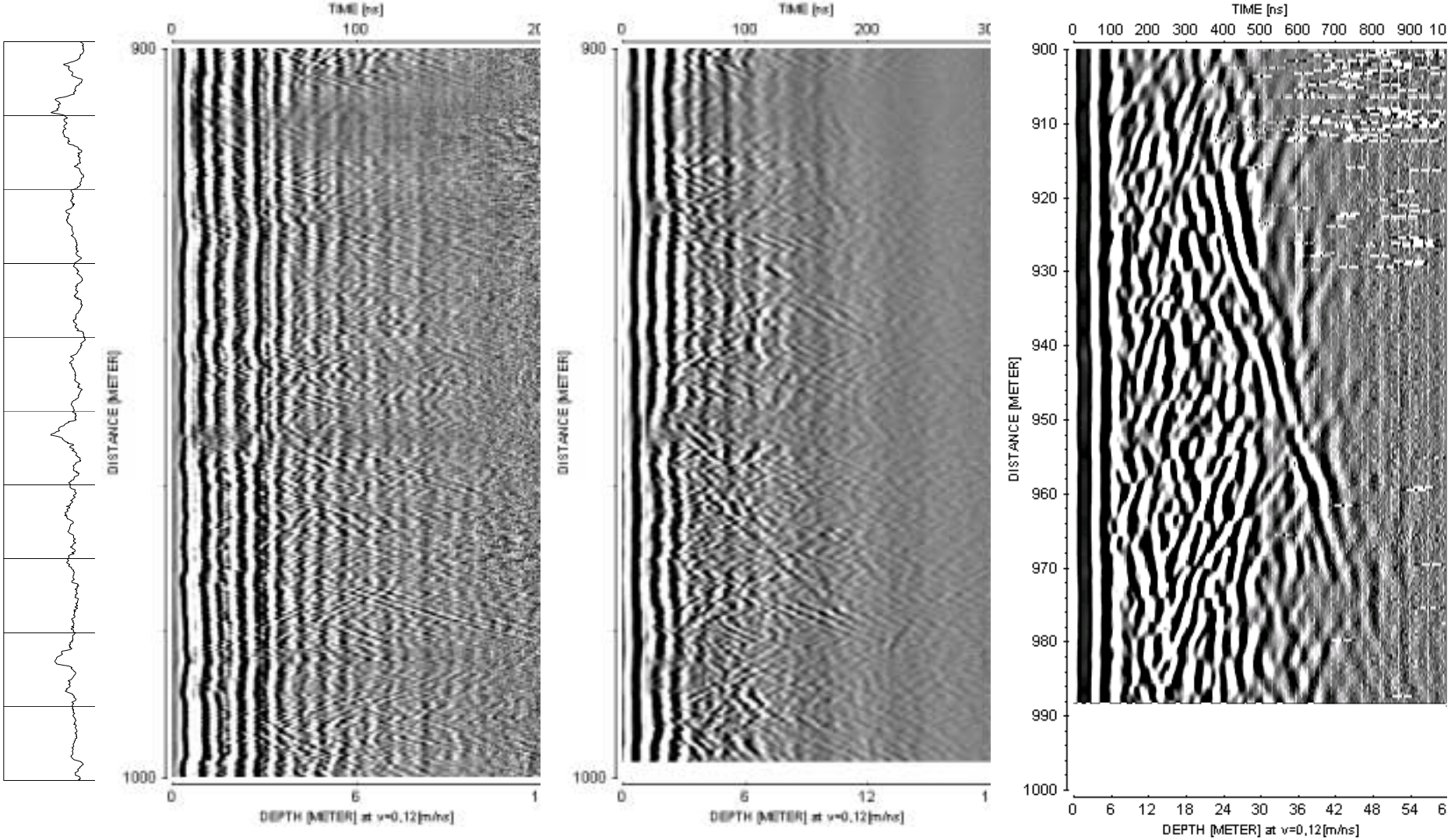
250 MHz **100 MHz** **20 MHz**

OSKARSHAMN KSH01A



250 MHz | **100 MHz** | **20 MHz**

OSKARSHAMN KSH01A



250 MHz

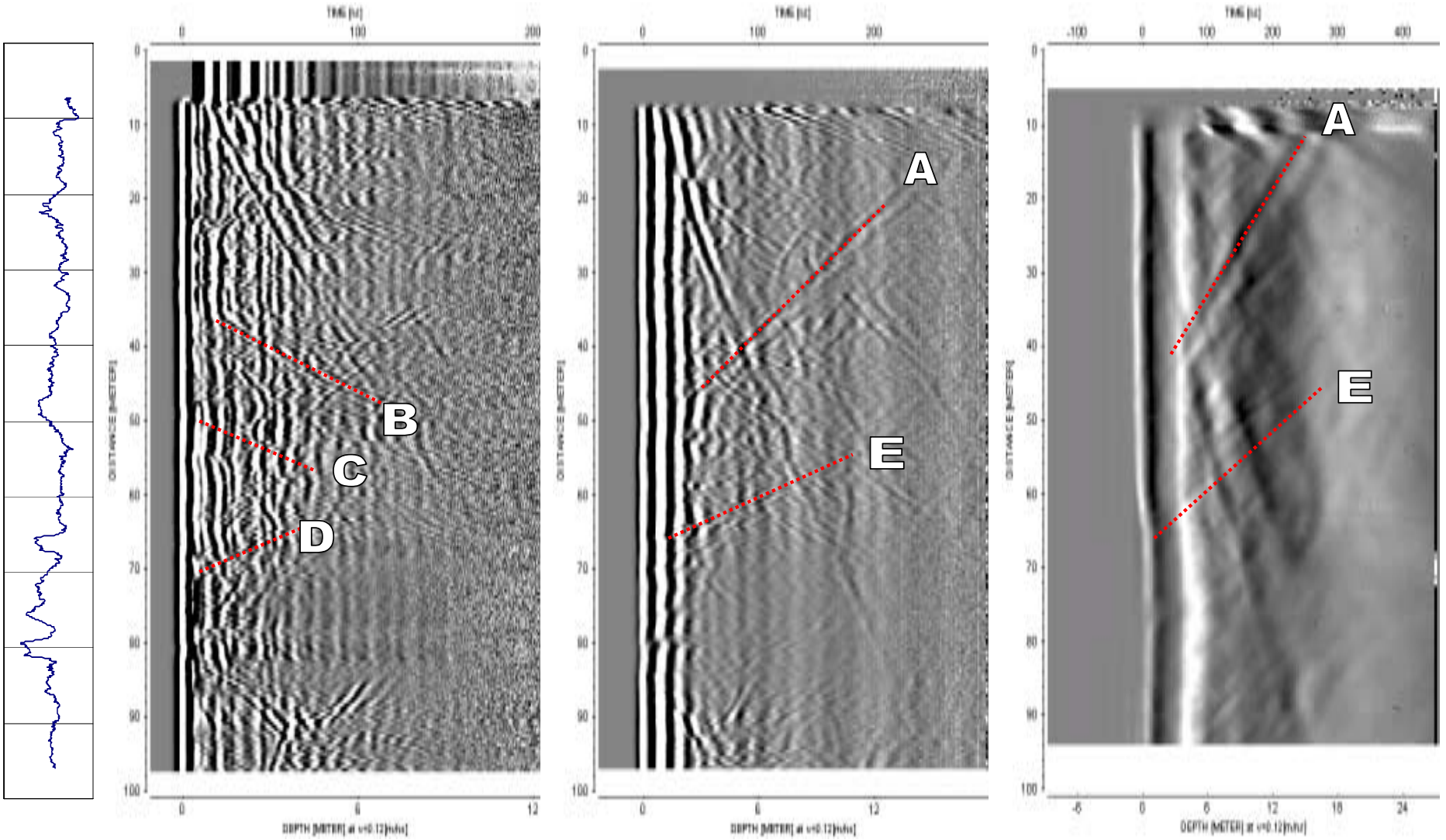
100 MHz

20 MHz

Appendix 1B

Radar logging with dipole antennas 250, 100 and 20 MHz in KSH01B

Simpevarp KSH01B, with interpretation

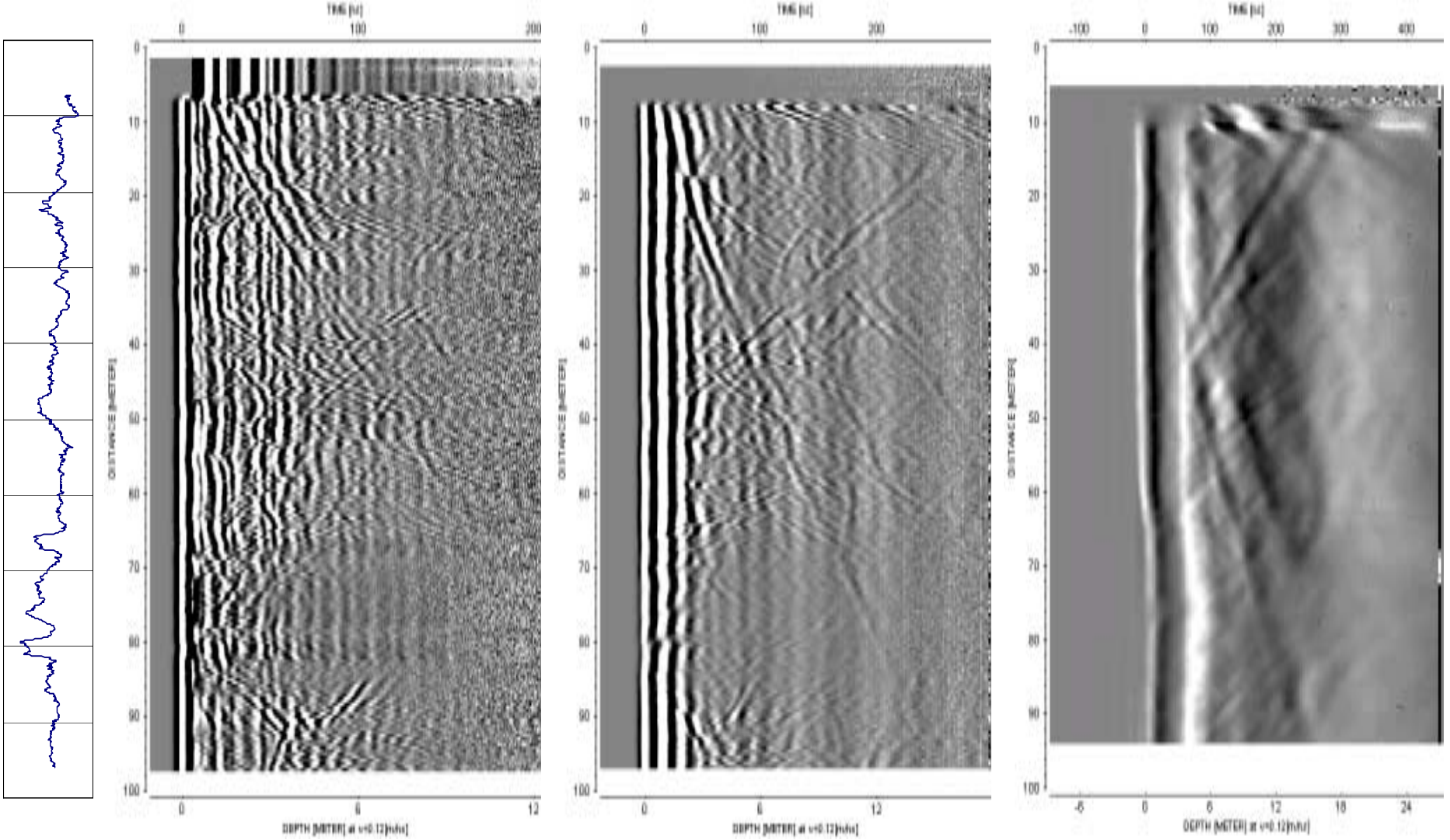


250 MHz

100 MHz

20 MHz

Simpevarp KSH01B



250 MHz

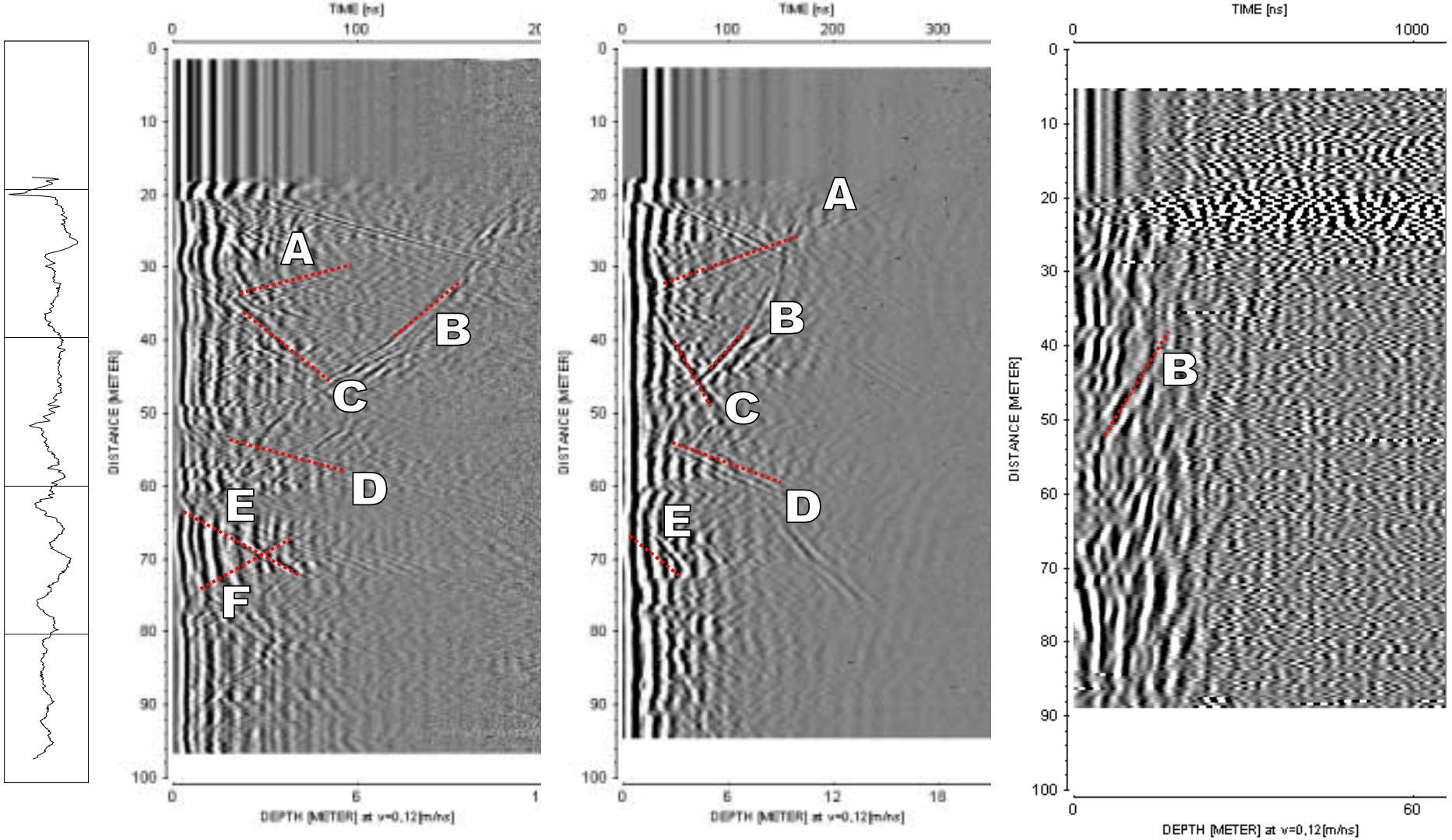
100 MHz

20 MHz

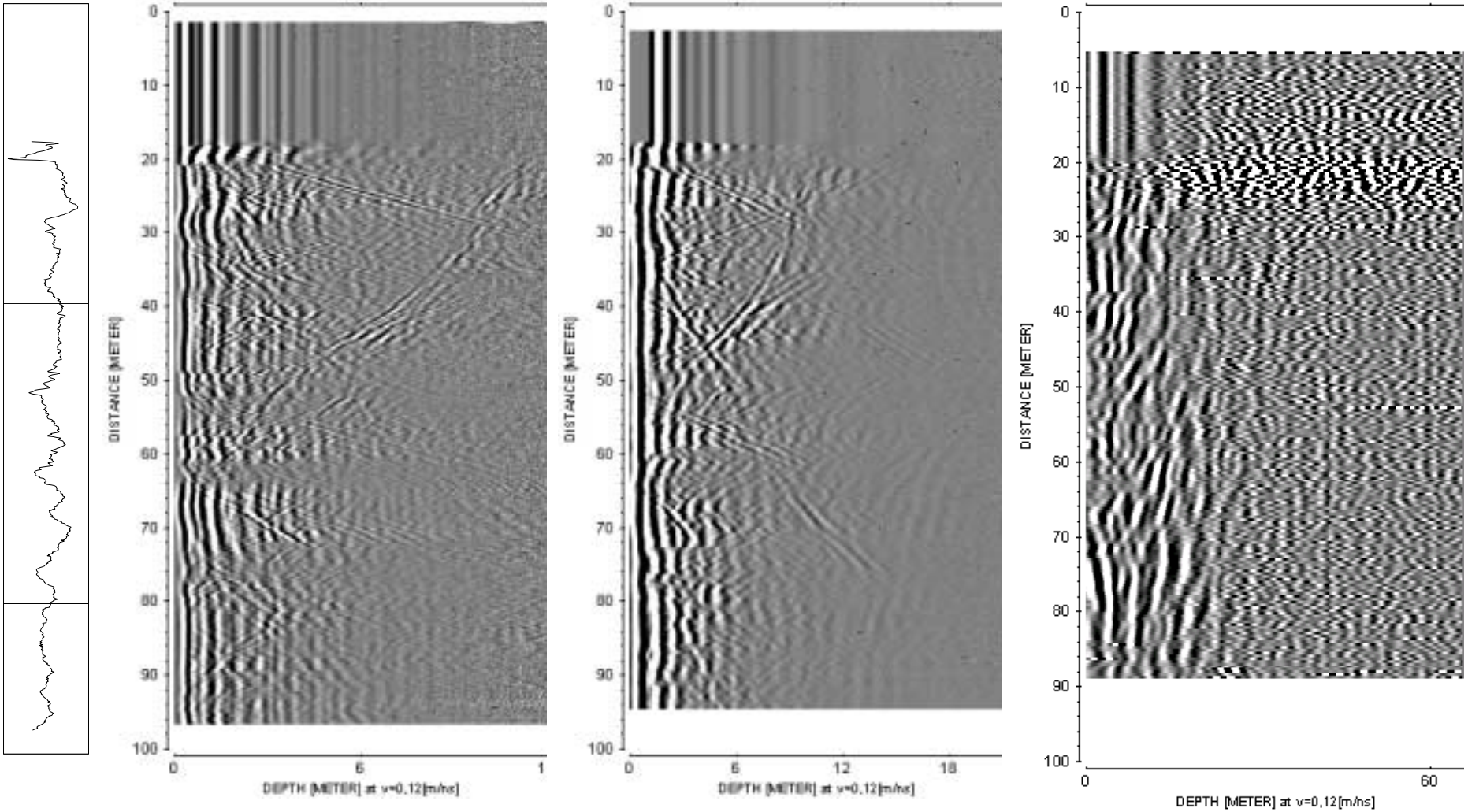
Appendix 1C

Radar logging with dipole antennas 250, 100 and 20 MHz in the upper part of KSH02

OSKARSHAMN KSH02 with interpretation



OSKARSHAMN KSH02



250 MHz **100 MHz** **20 MHz**

Appendix 2A

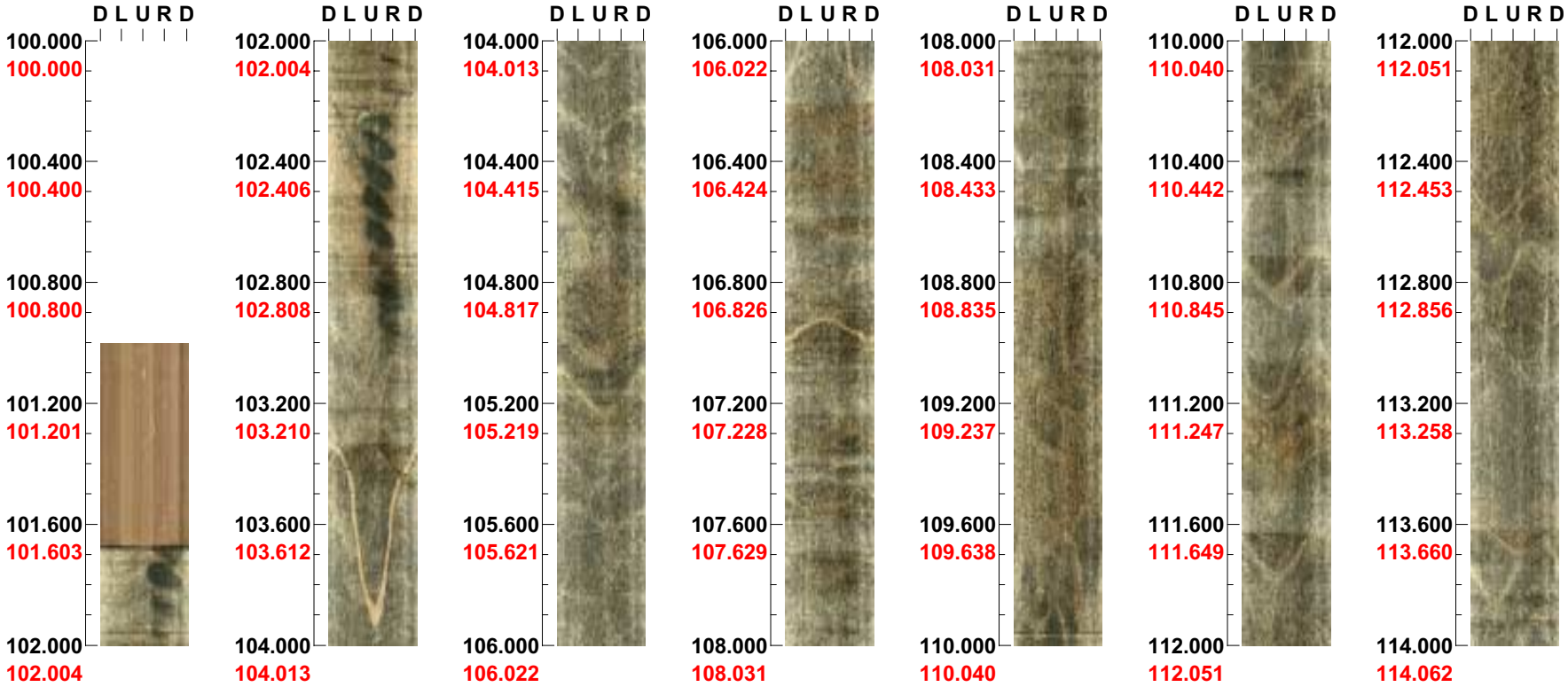
BIPS results from KSH01A

Project name: Simpevarp

Image file	**: i:\weekly~1\raycon\projekt\r5087s~1\bips\loggni~1\101500.bip**
BDT file	**: i:\weekly~1\raycon\projekt\r5087s~1\bips\loggni~1\101500.bdt**
Locality	**: SIMPAN**
Bore hole number	**: KSH01A**
Date	**: 03/03/21**
Time	**: 17:18:00**
Depth range	**: 101.000 - 500.013 m**
Azimuth	**: 0**
Inclination	**: -89**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/20**
Aspect ratio	**: 120 %**
Pages	**: 29**
Color	**:**  **+0 +0 +0**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

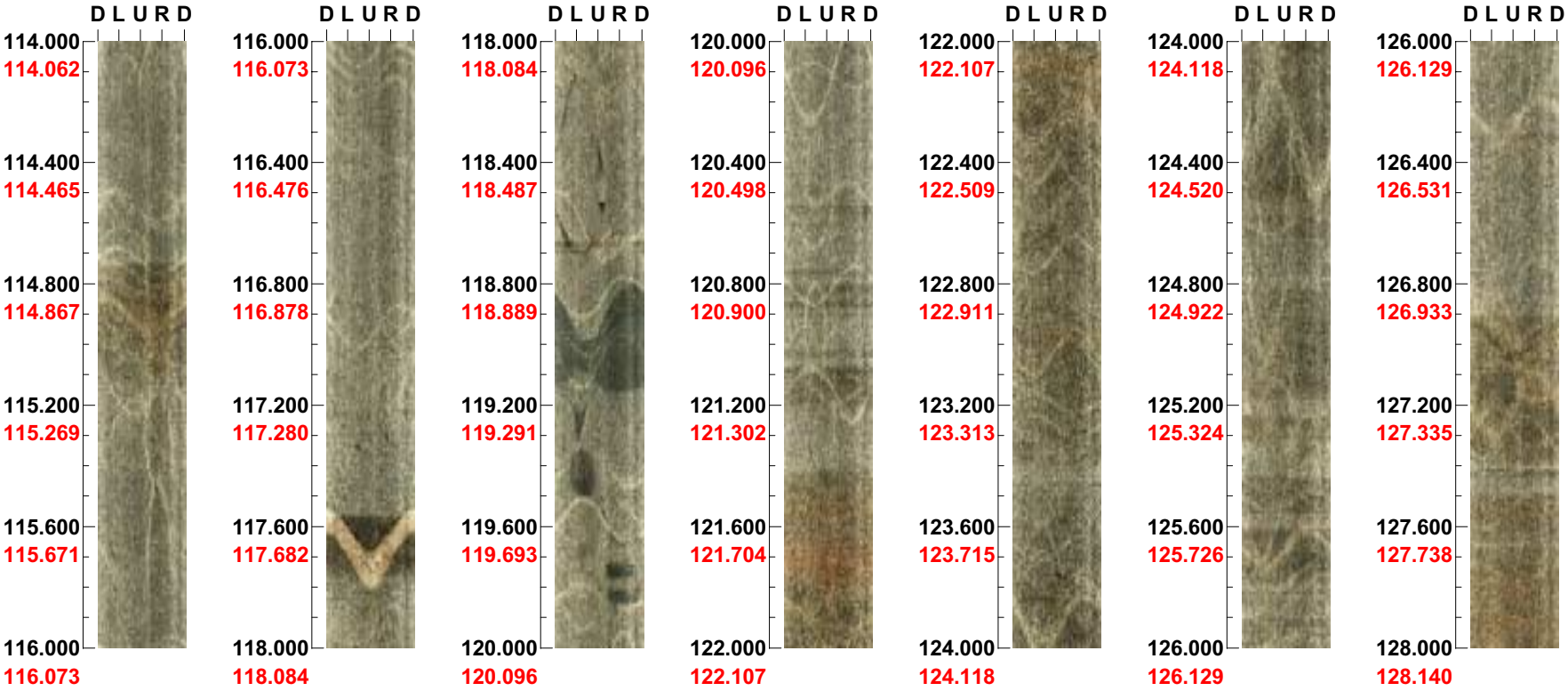
Depth range: 100.000 - 114.000 m



(1 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

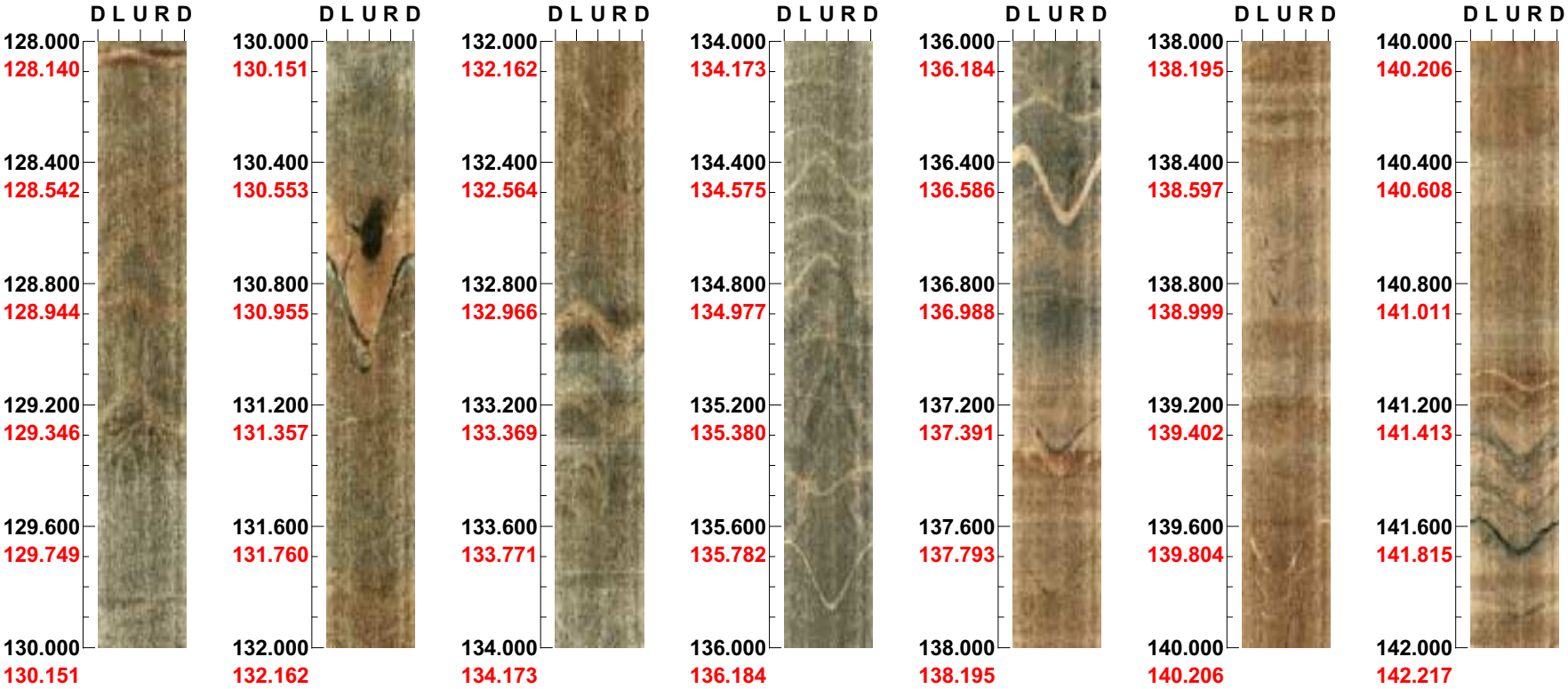
Depth range: 114.000 - 128.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

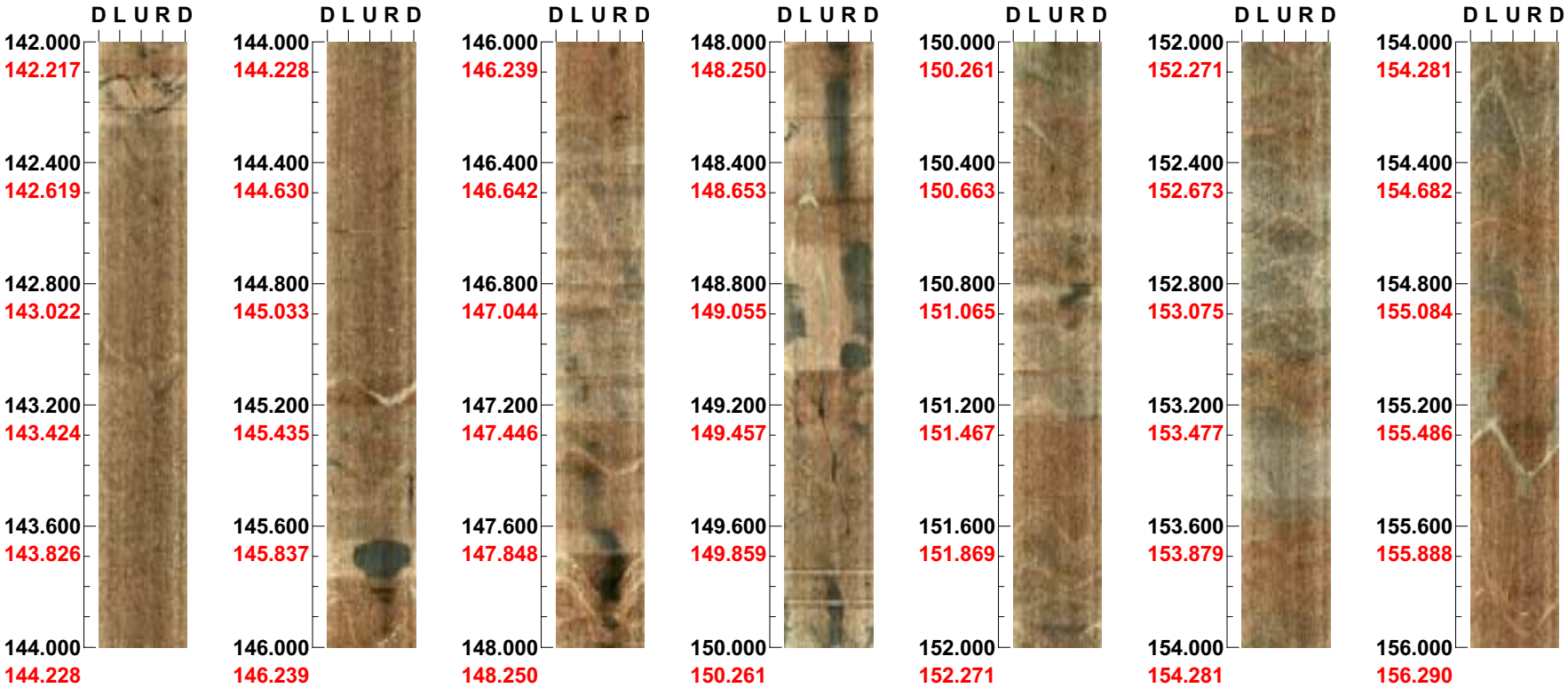
Depth range: 128.000 - 142.000 m



(3 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

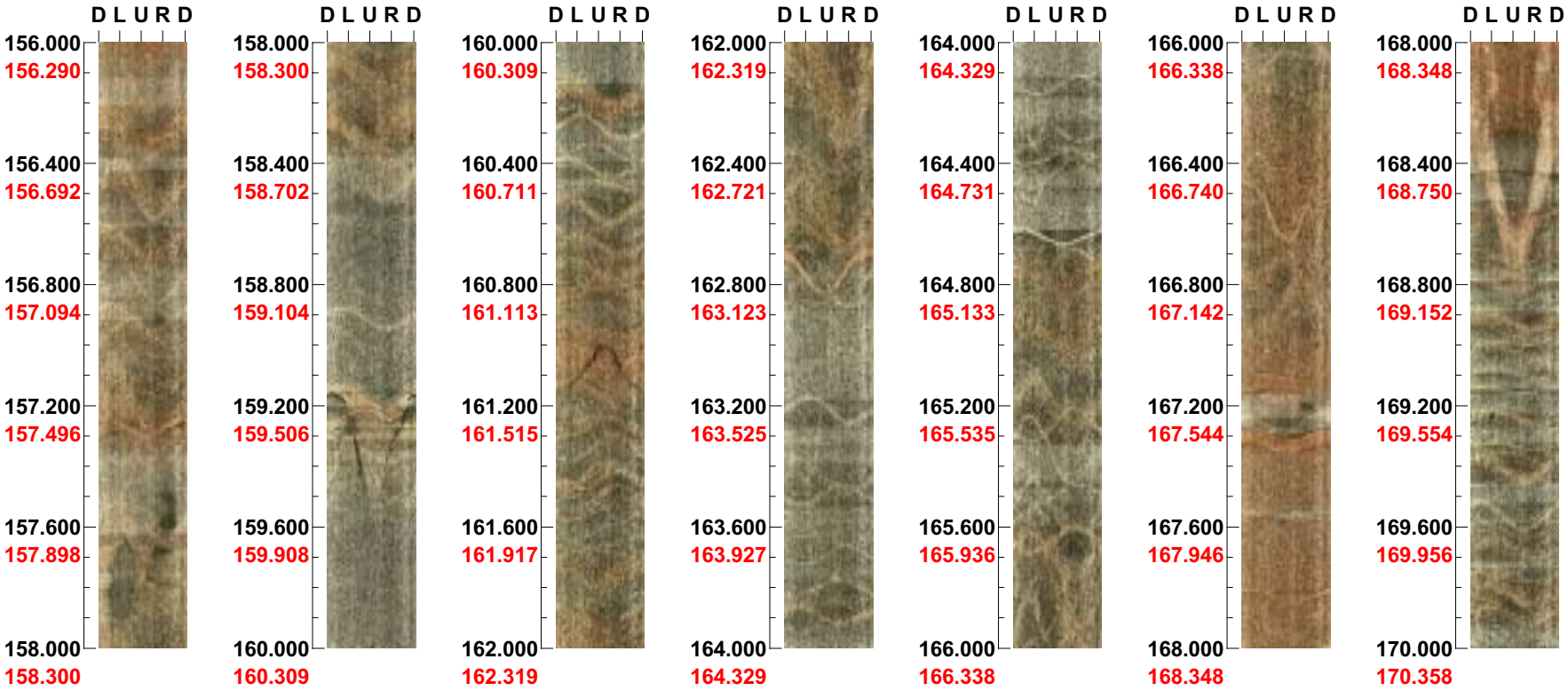
Depth range: 142.000 - 156.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

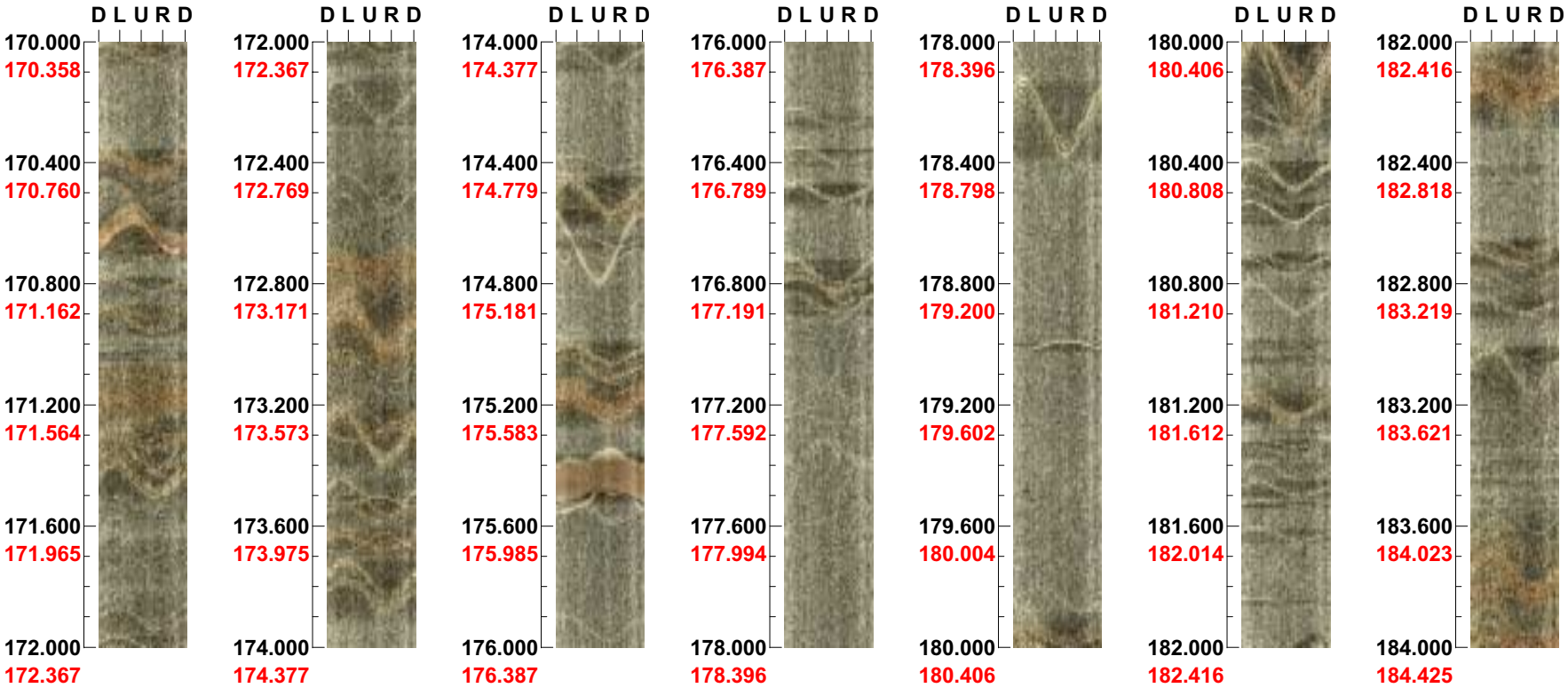
Depth range: 156.000 - 170.000 m



(5 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

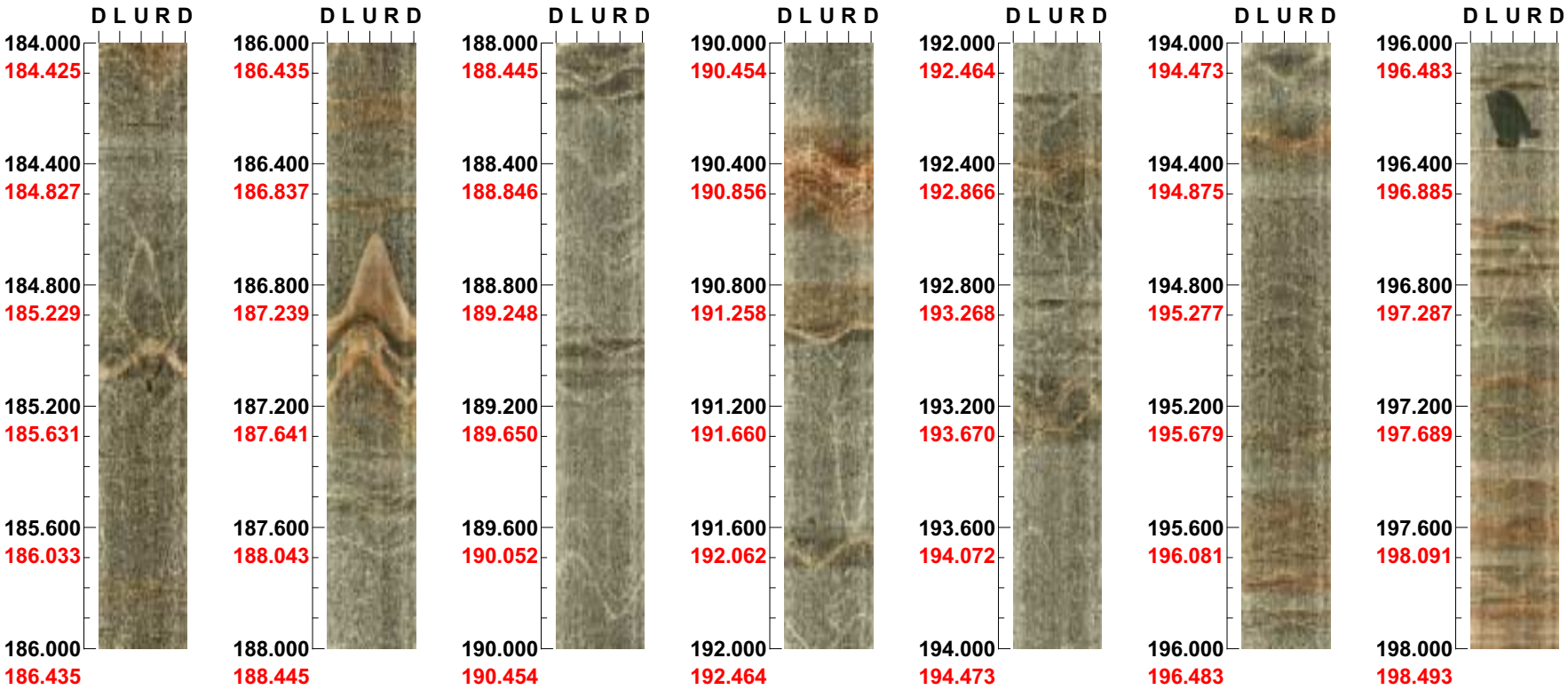
Depth range: 170.000 - 184.000 m



(6 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

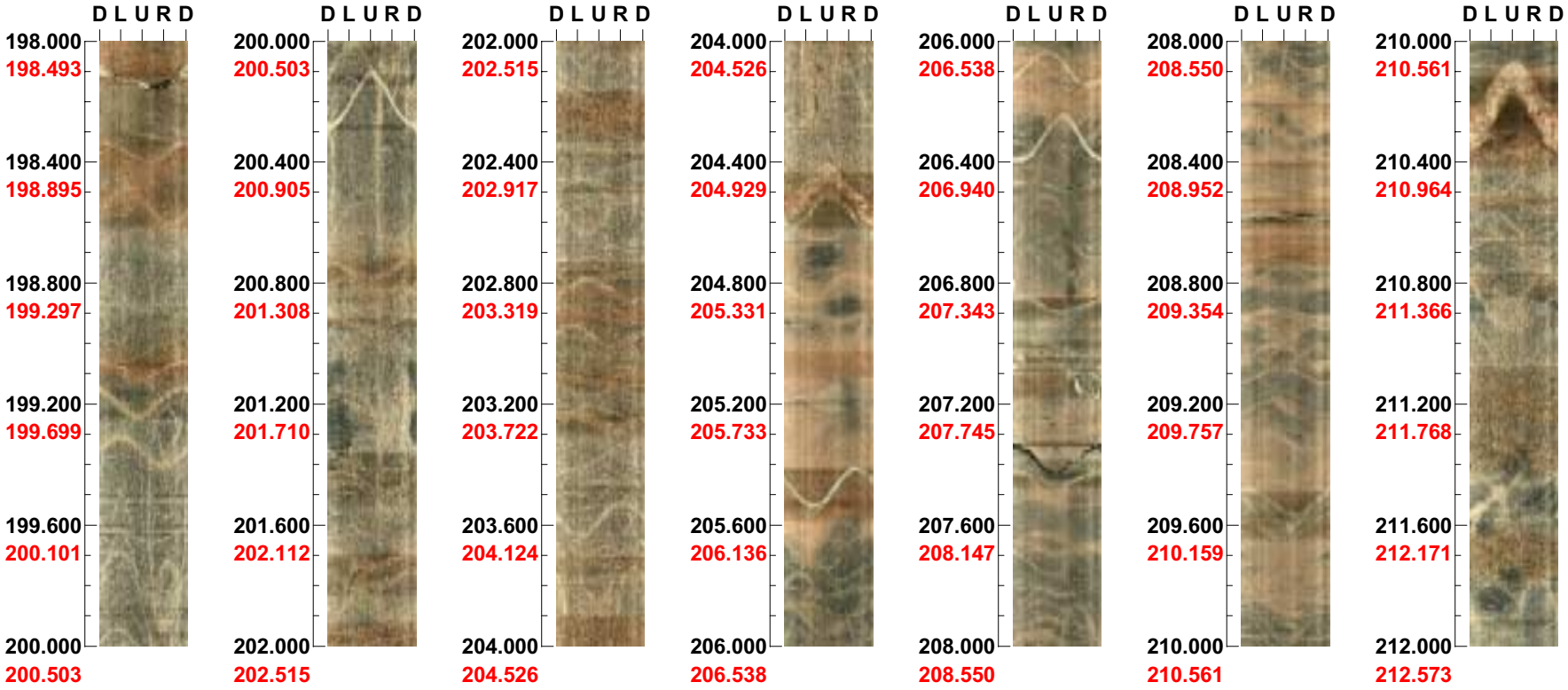
Depth range: 184.000 - 198.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

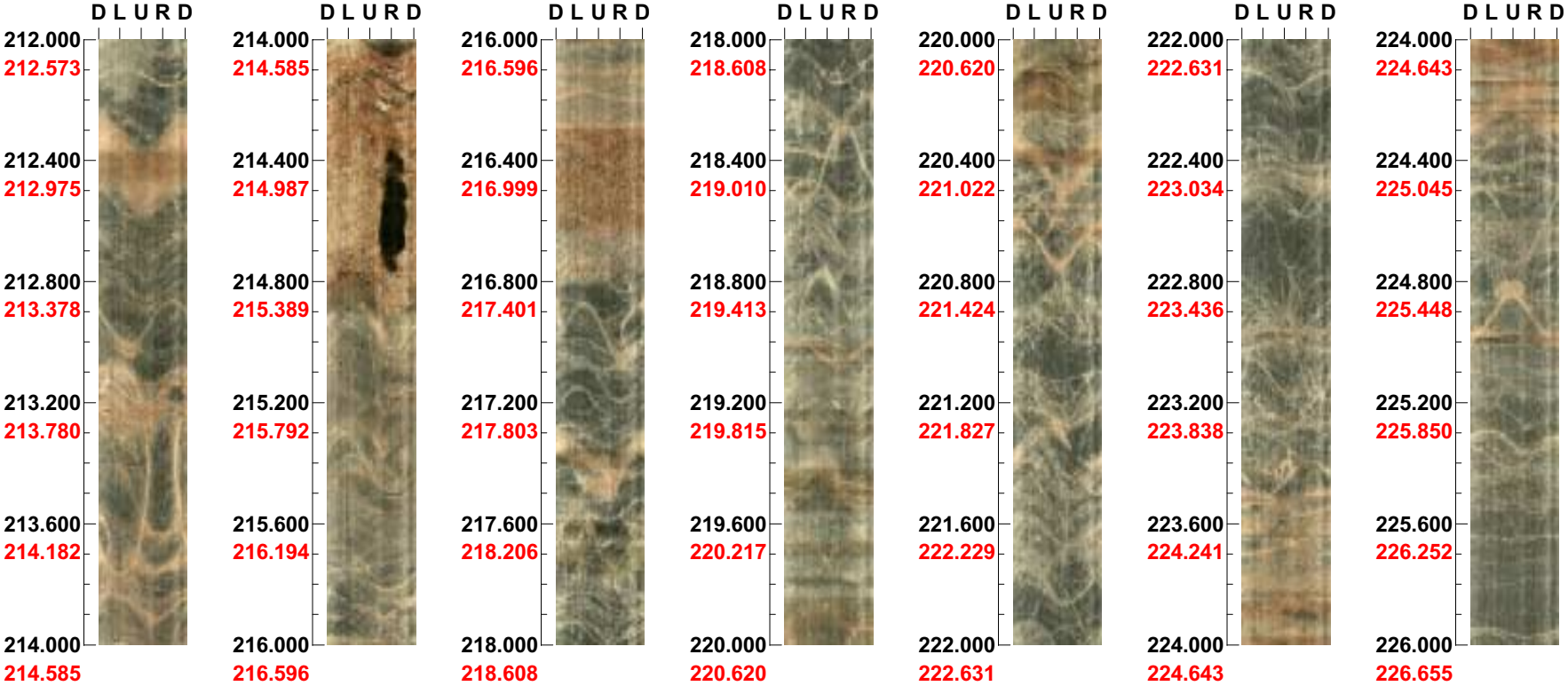
Depth range: 198.000 - 212.000 m



(8 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

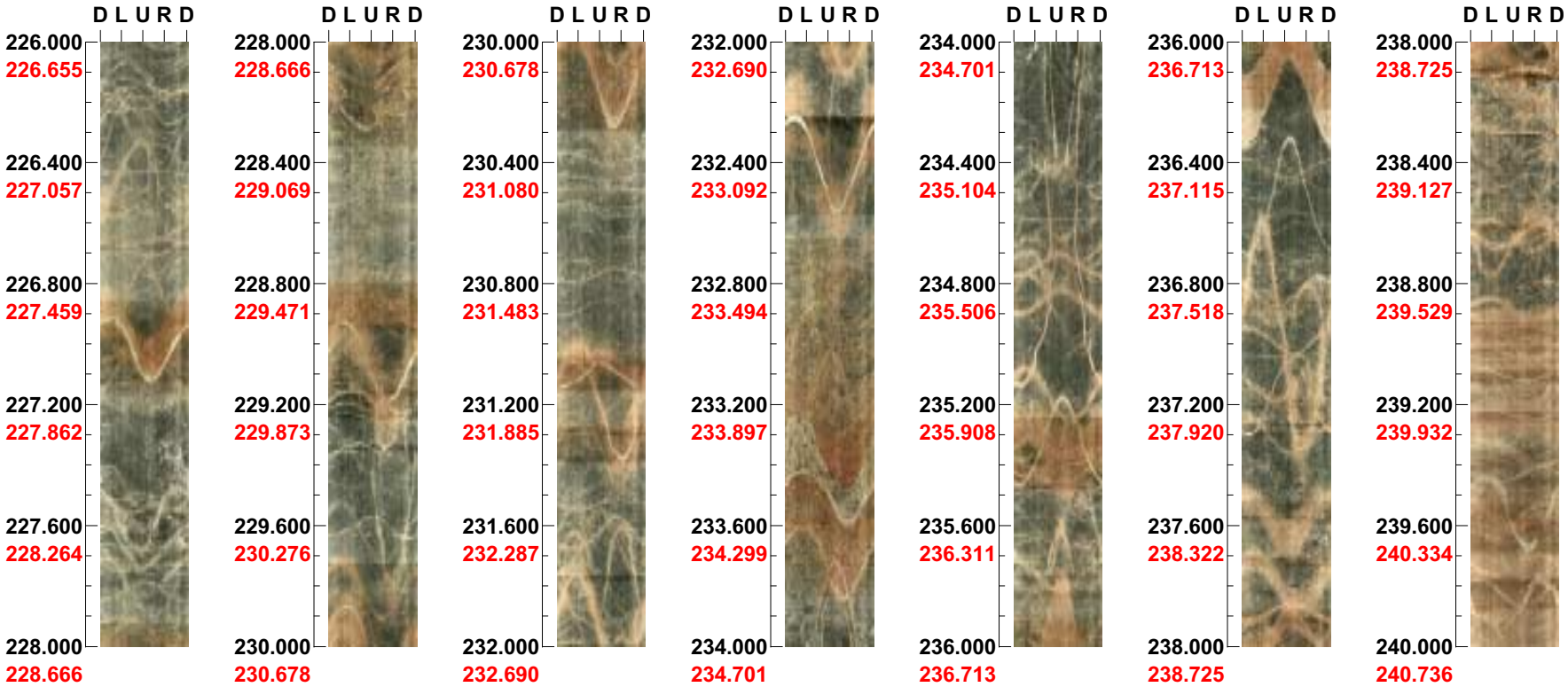
Depth range: 212.000 - 226.000 m



(9 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

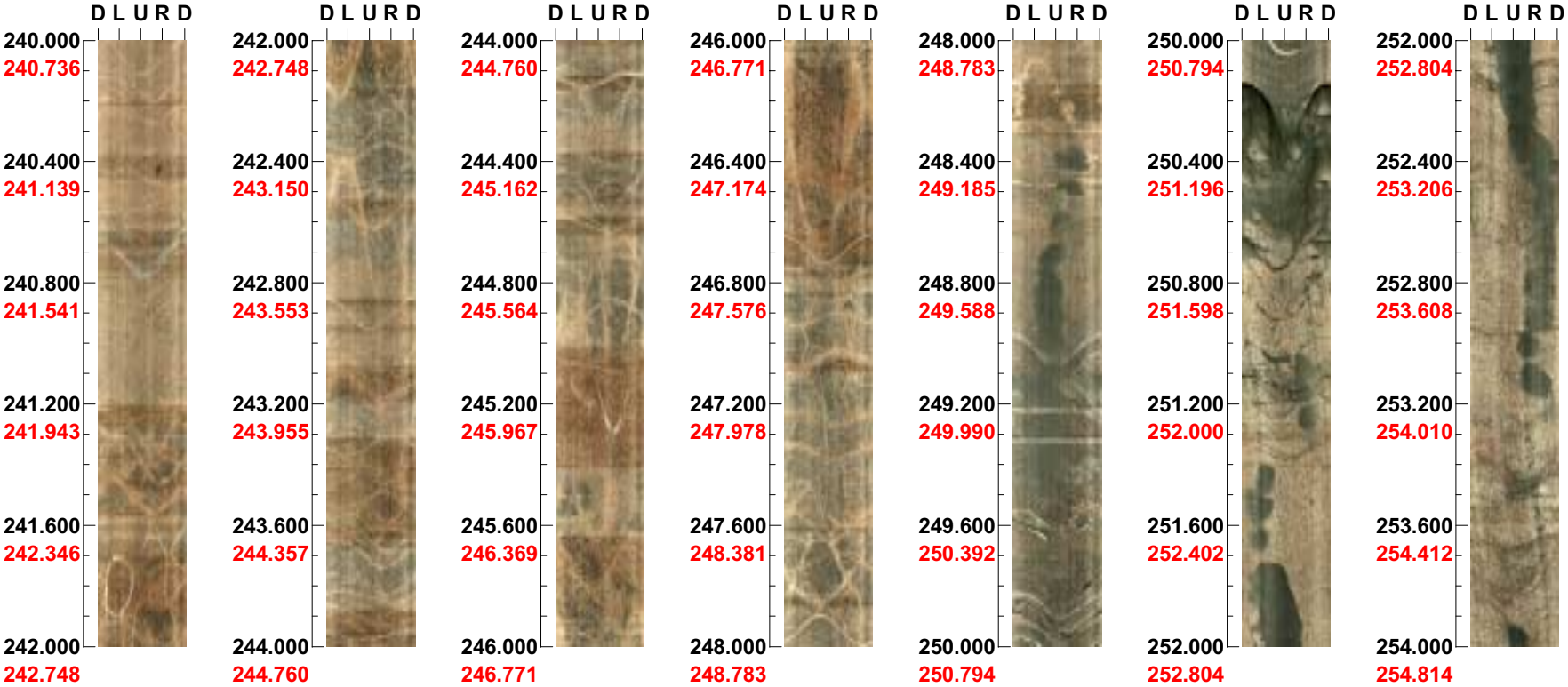
Depth range: 226.000 - 240.000 m



(10 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

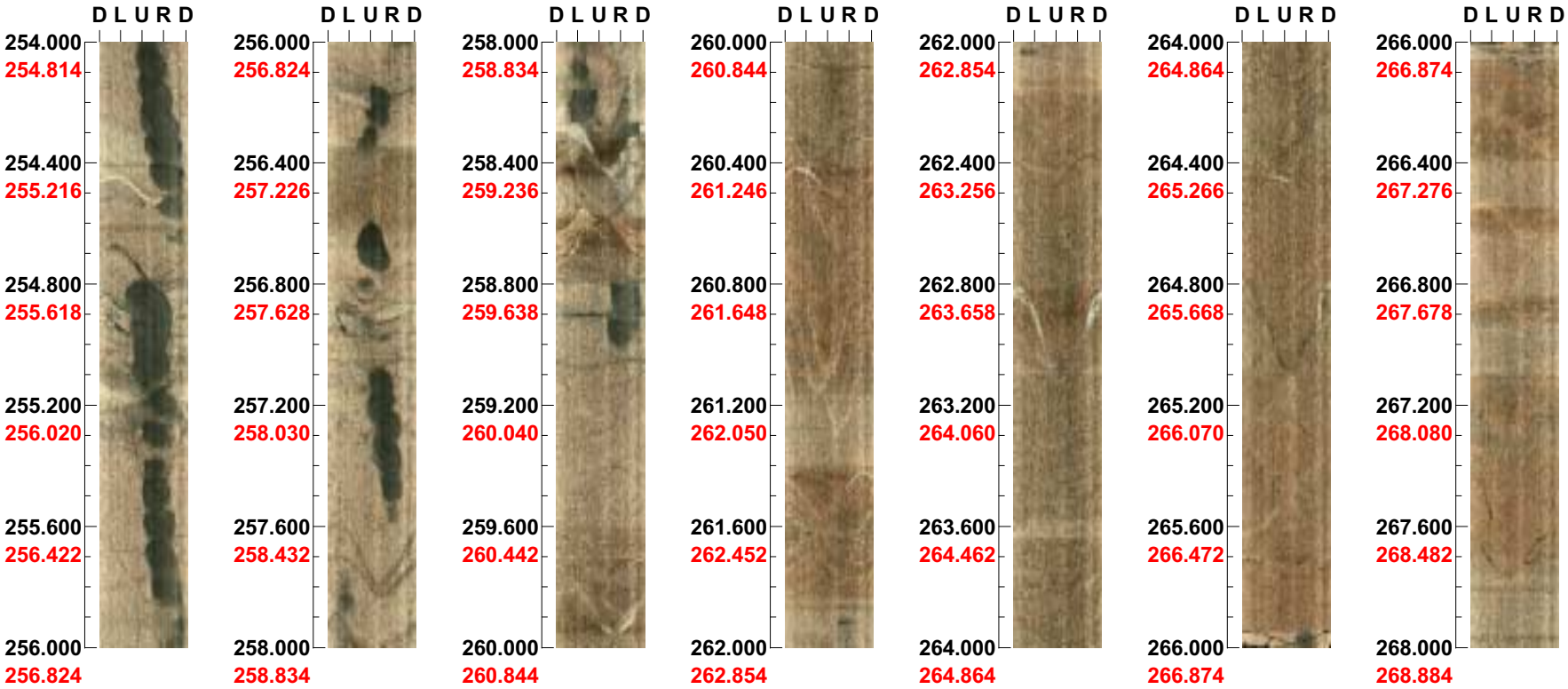
Depth range: 240.000 - 254.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

Depth range: 254.000 - 268.000 m



(12 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

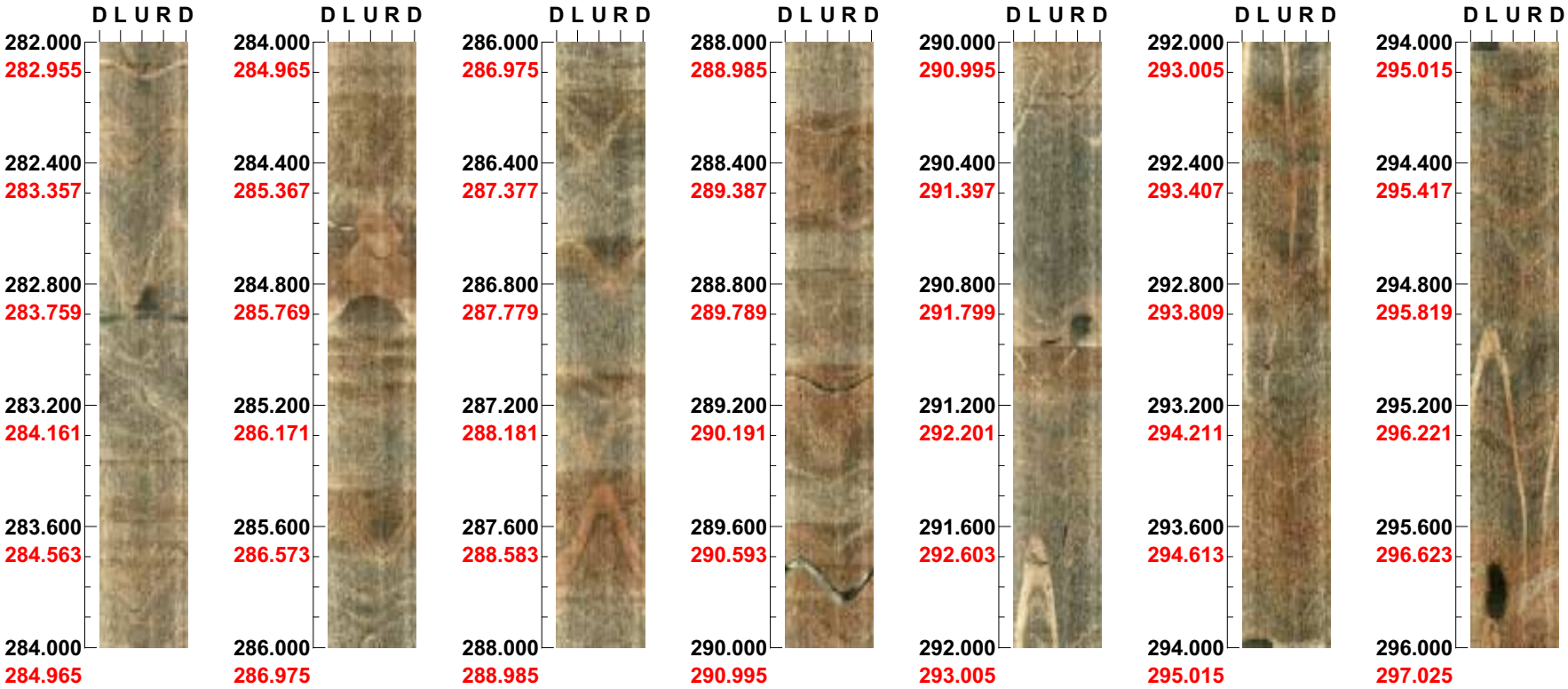
Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

Depth range: 268.000 - 282.000 m

(13 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

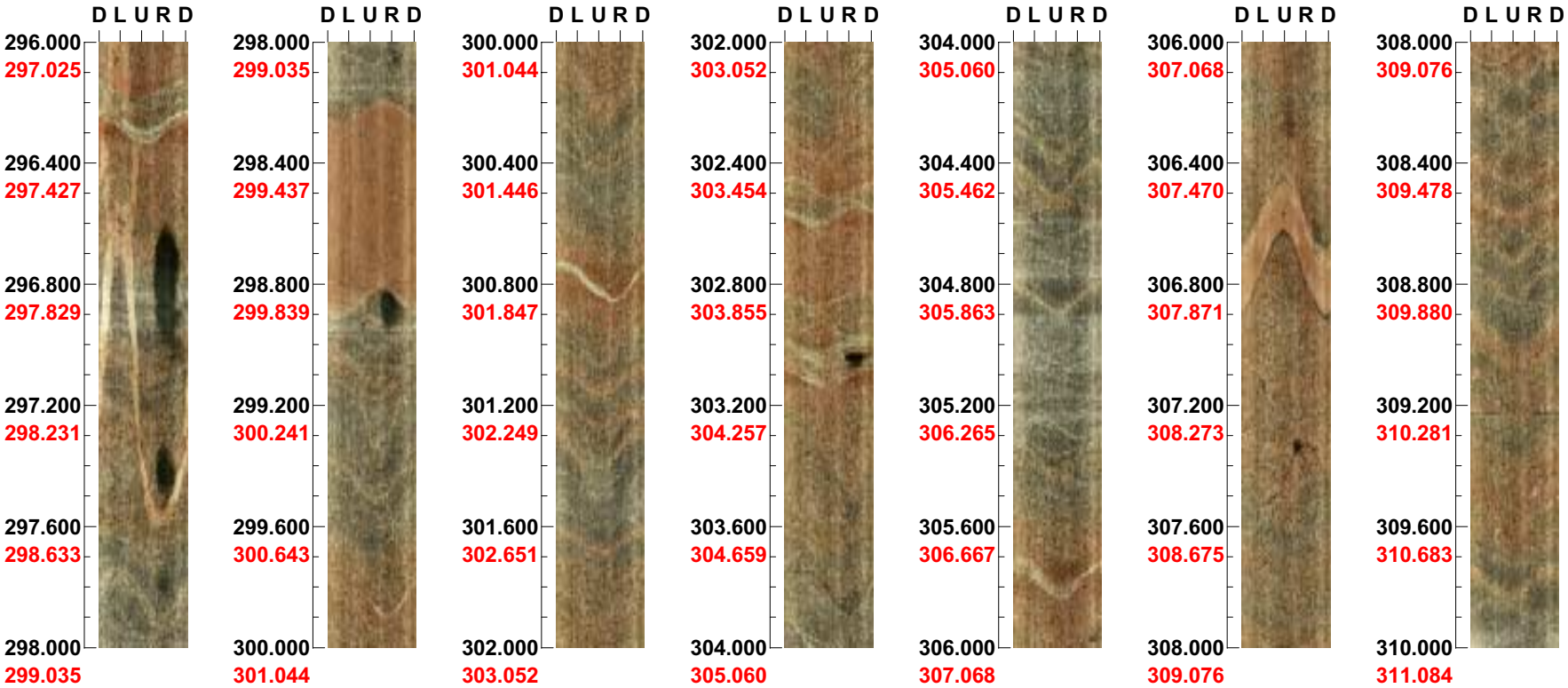
Depth range: 282.000 - 296.000 m



(14 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

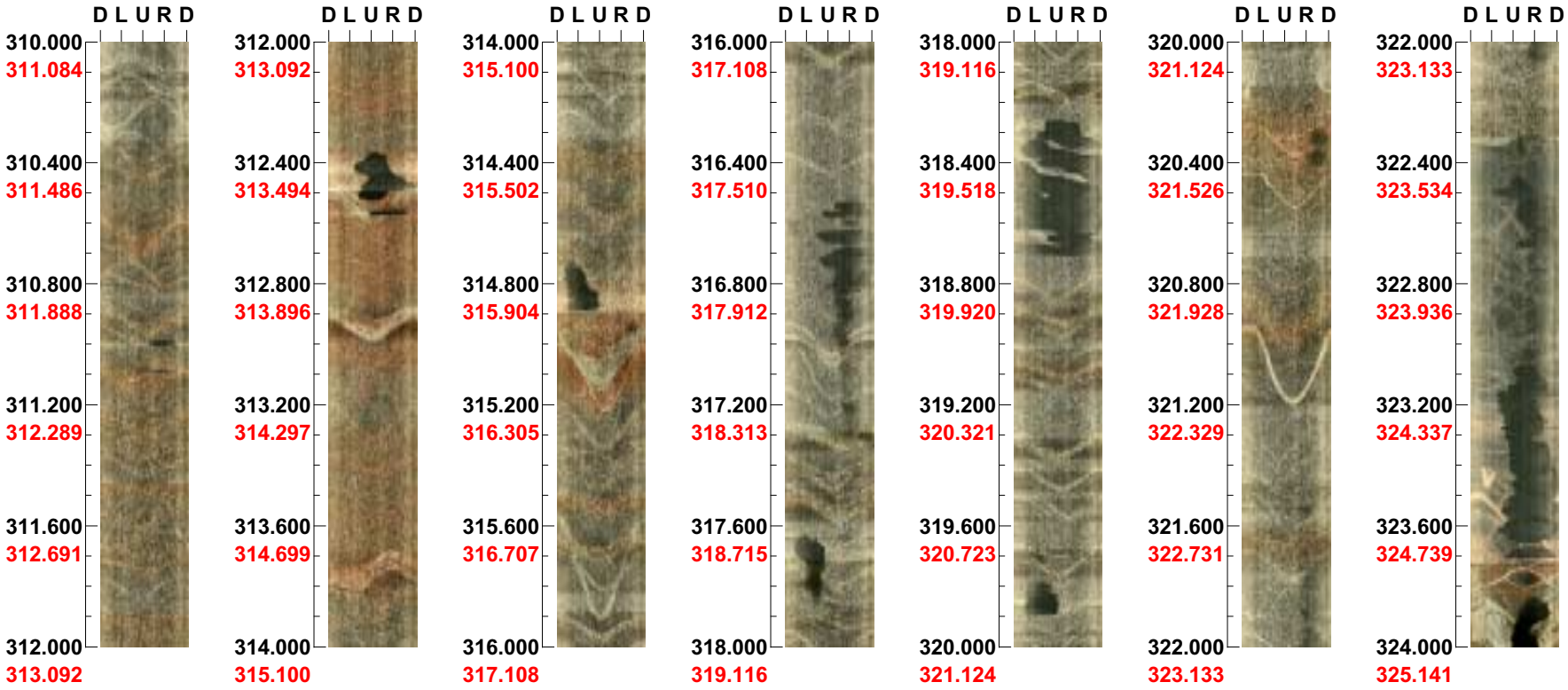
Depth range: 296.000 - 310.000 m



(15 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

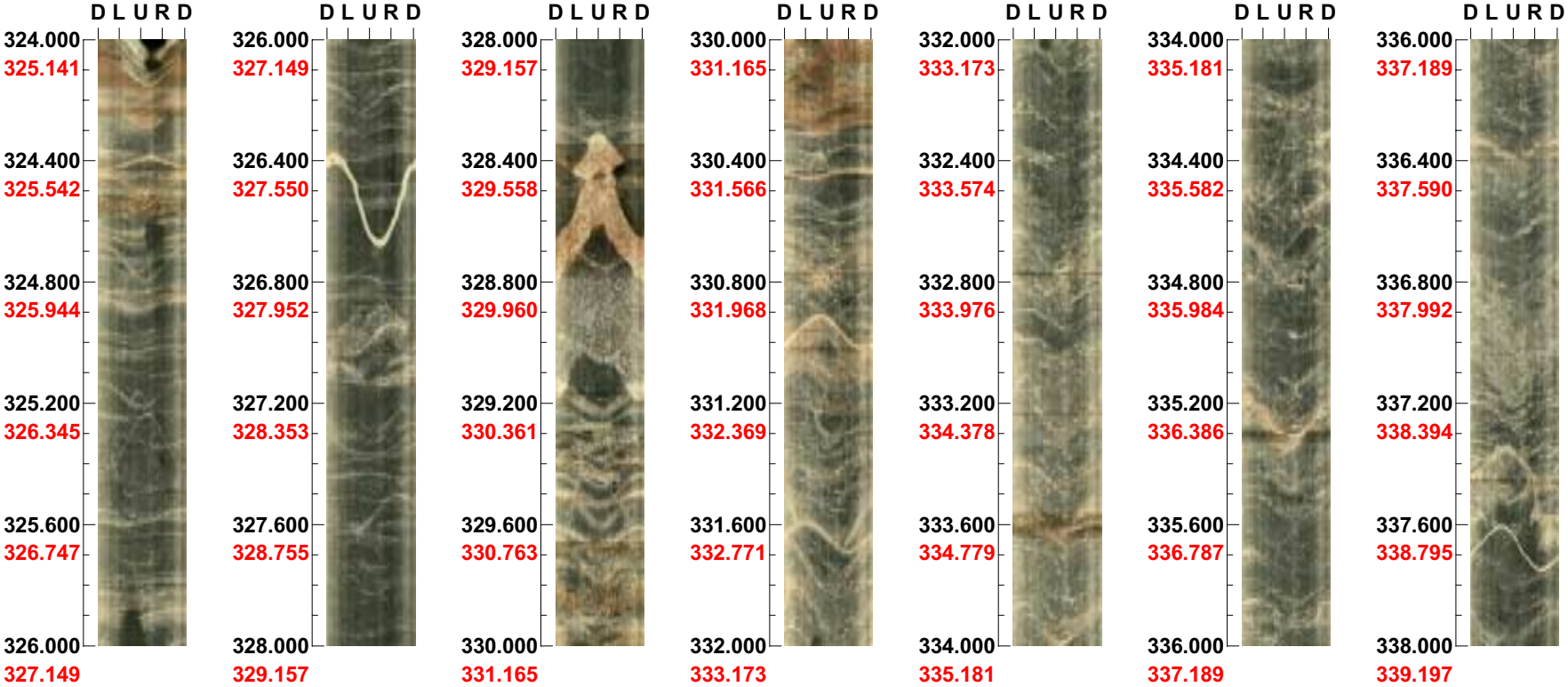
Depth range: 310.000 - 324.000 m



(16 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

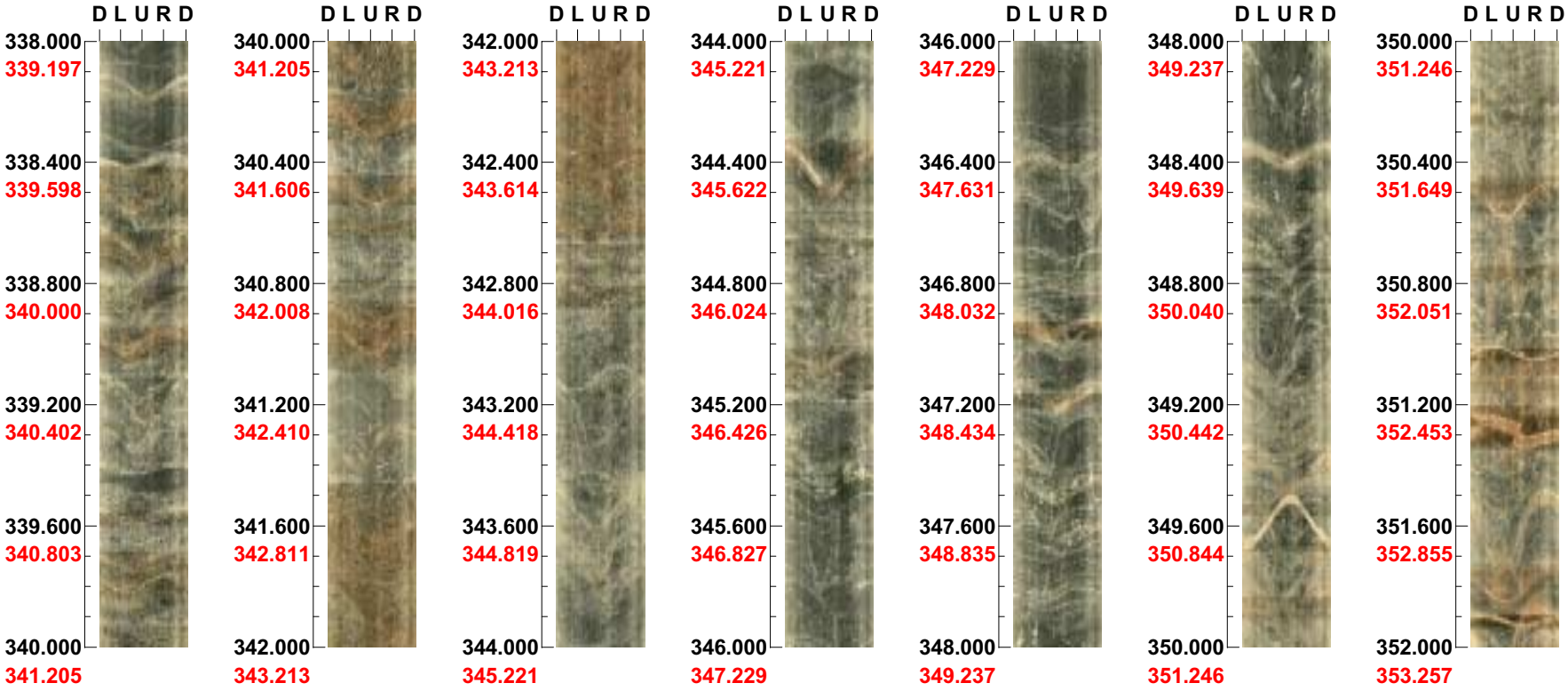
Depth range: 324.000 - 338.000 m



(17 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

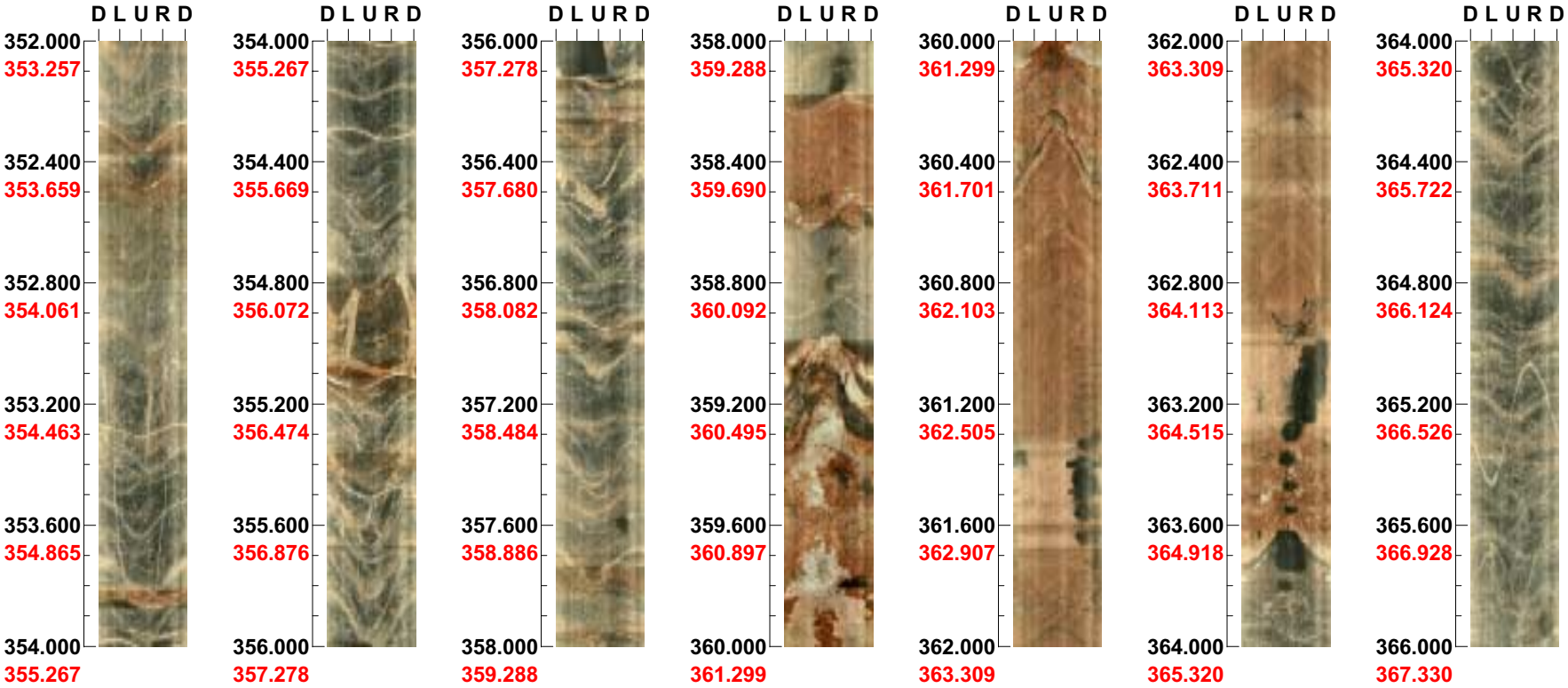
Depth range: 338.000 - 352.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

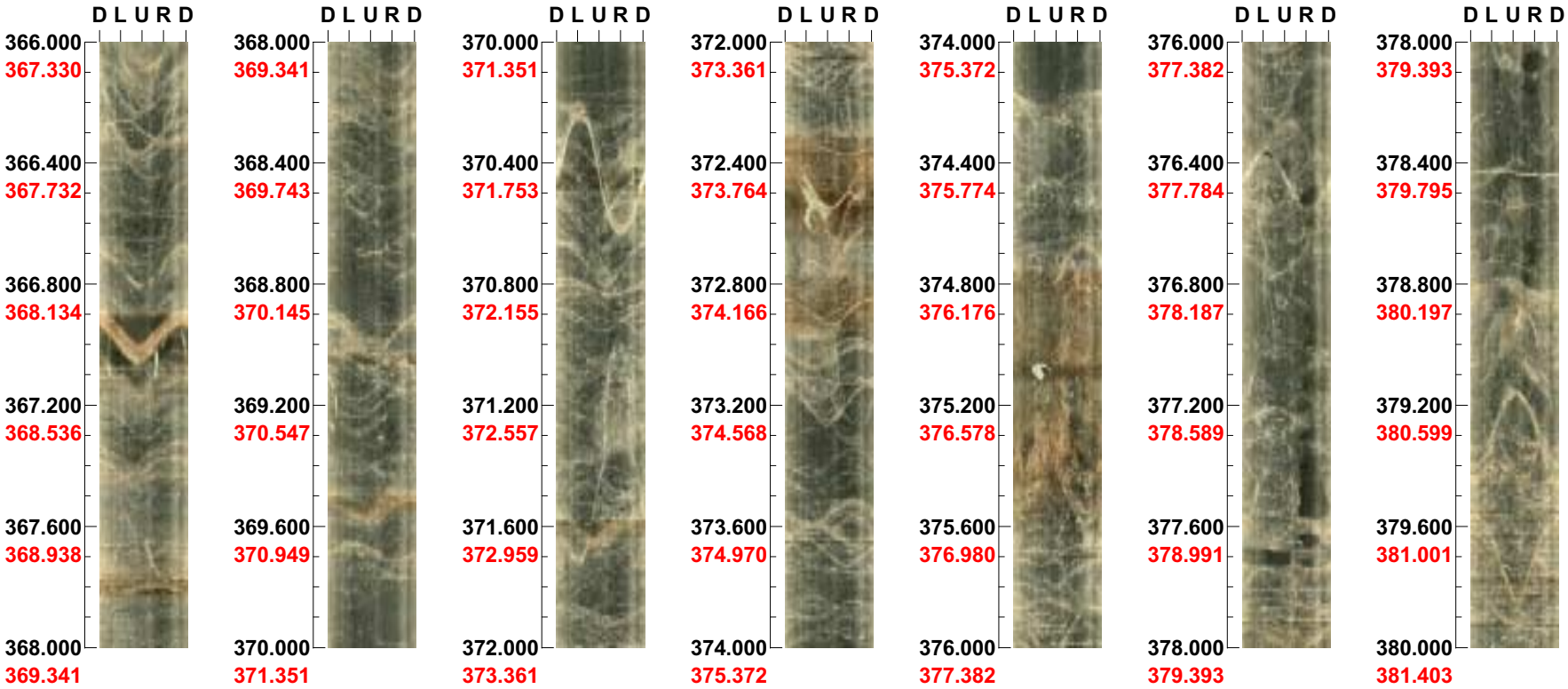
Depth range: 352.000 - 366.000 m



(19 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

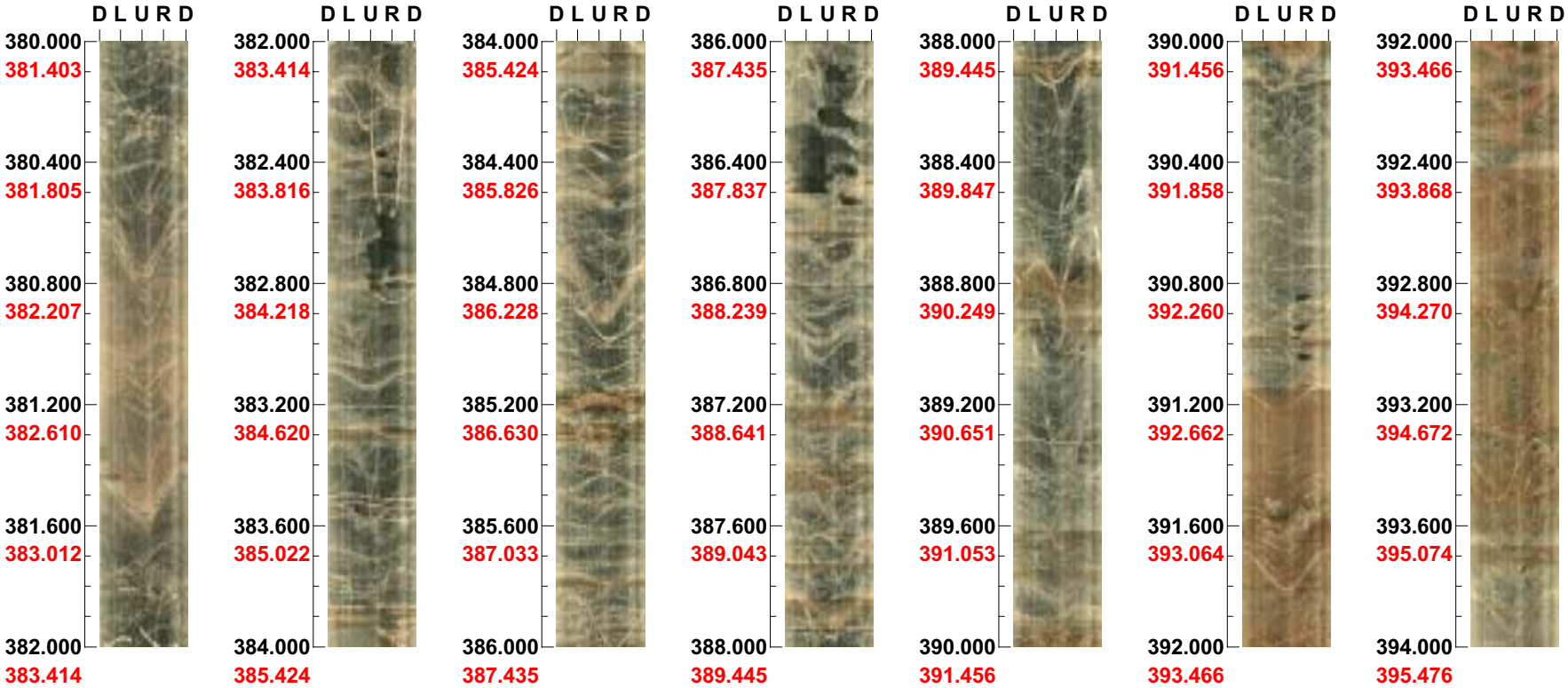
Depth range: 366.000 - 380.000 m



(20 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

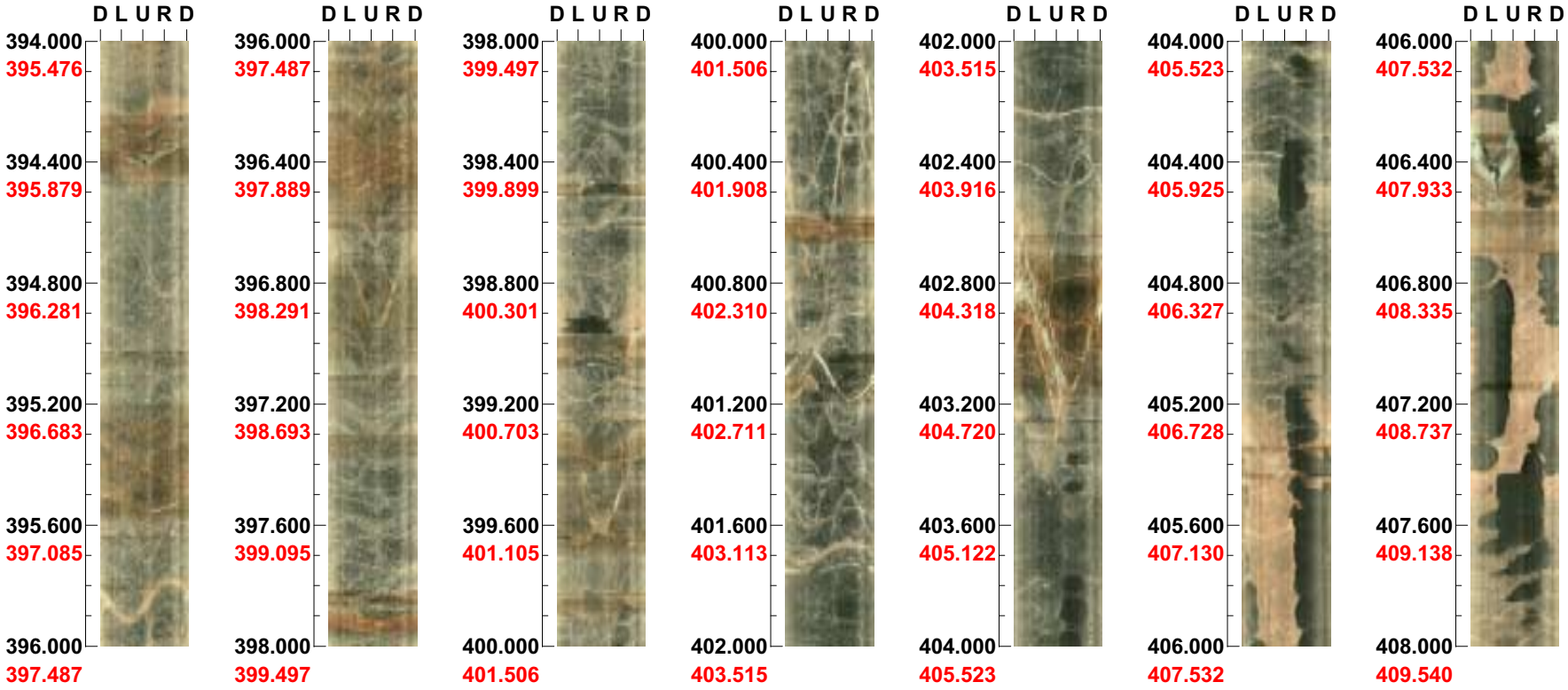
Depth range: 380.000 - 394.000 m



(21 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

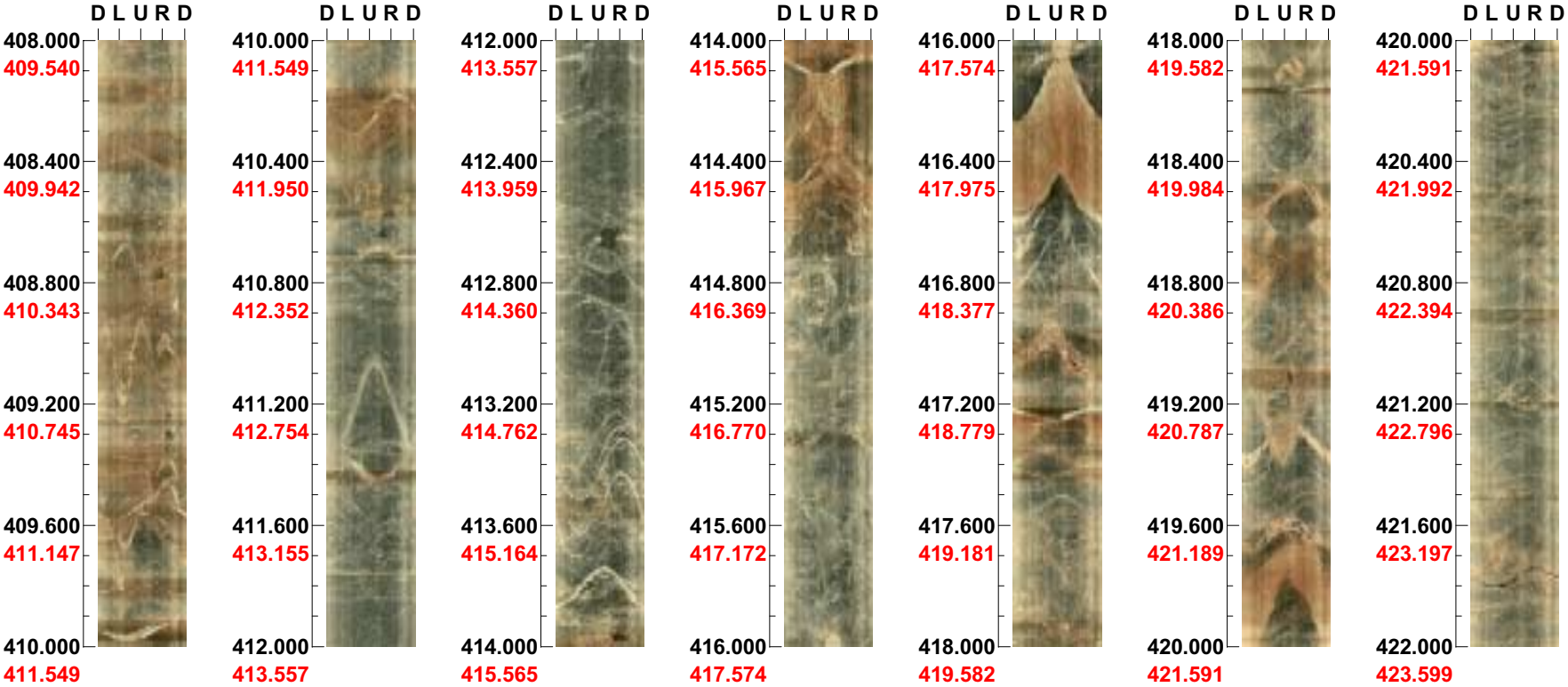
Depth range: 394.000 - 408.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

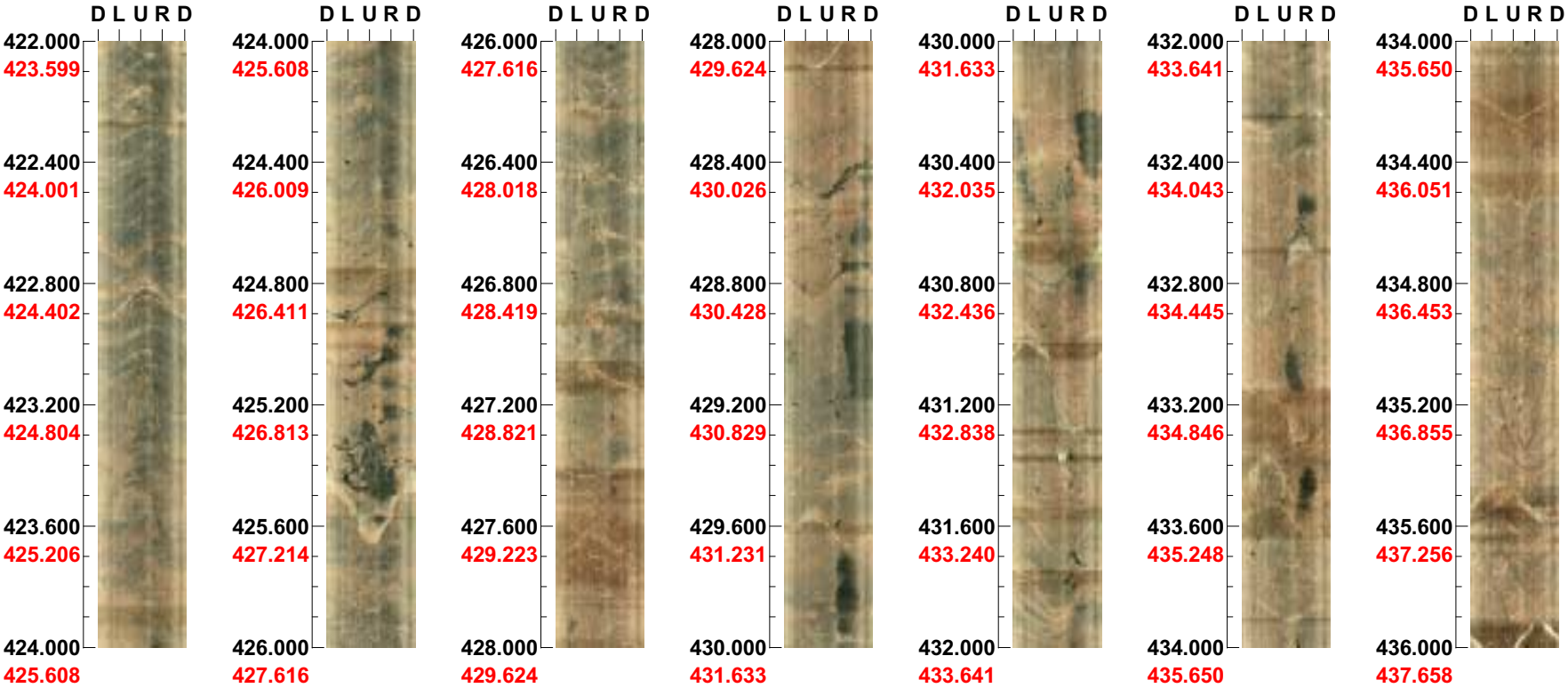
Depth range: 408.000 - 422.000 m



(23 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

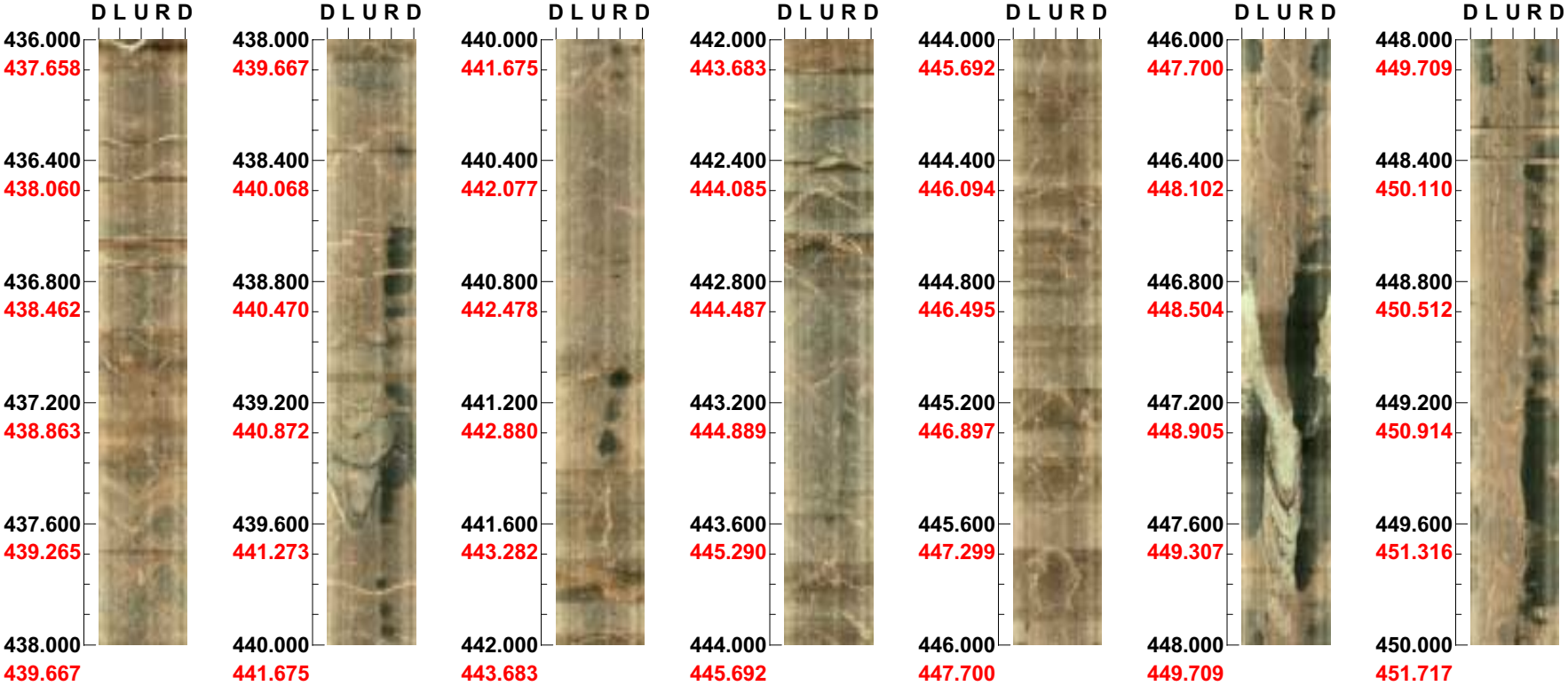
Depth range: 422.000 - 436.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

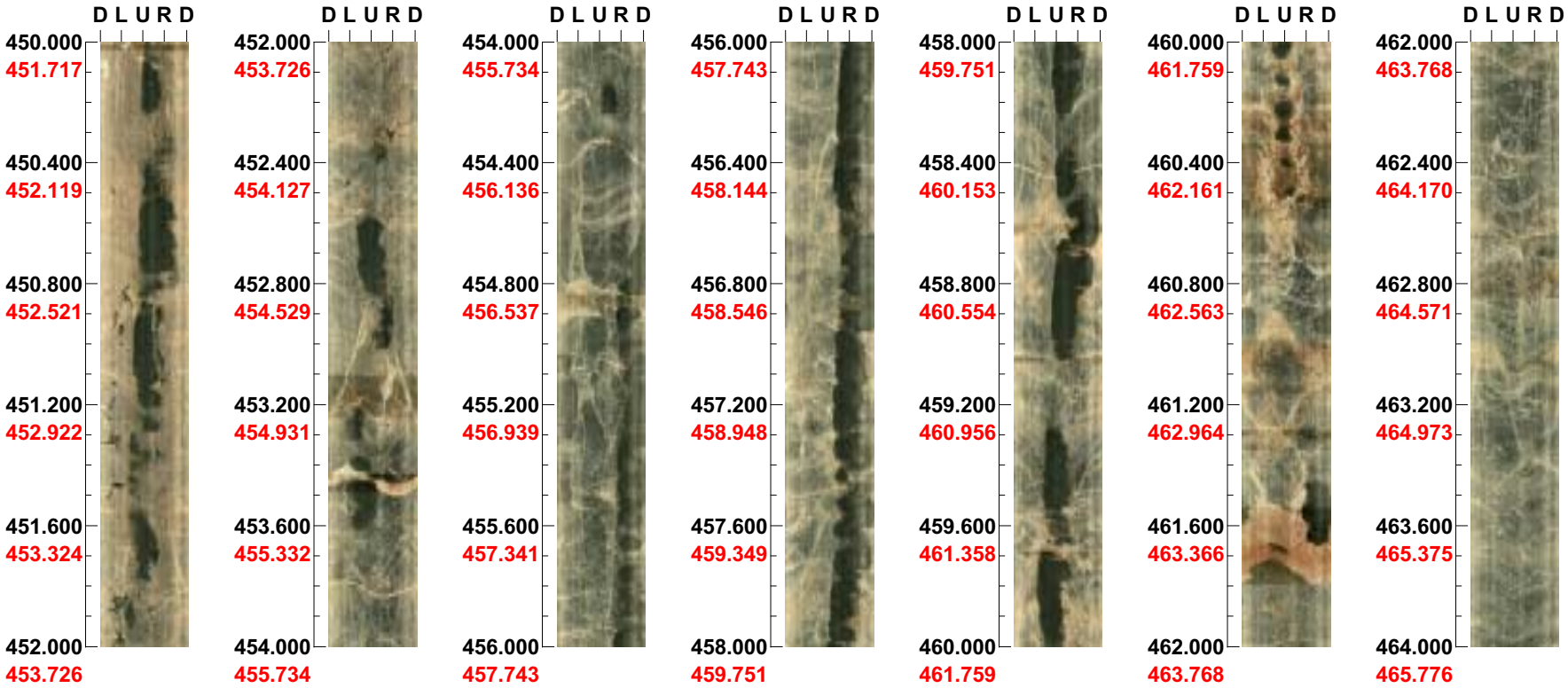
Depth range: 436.000 - 450.000 m



(25 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

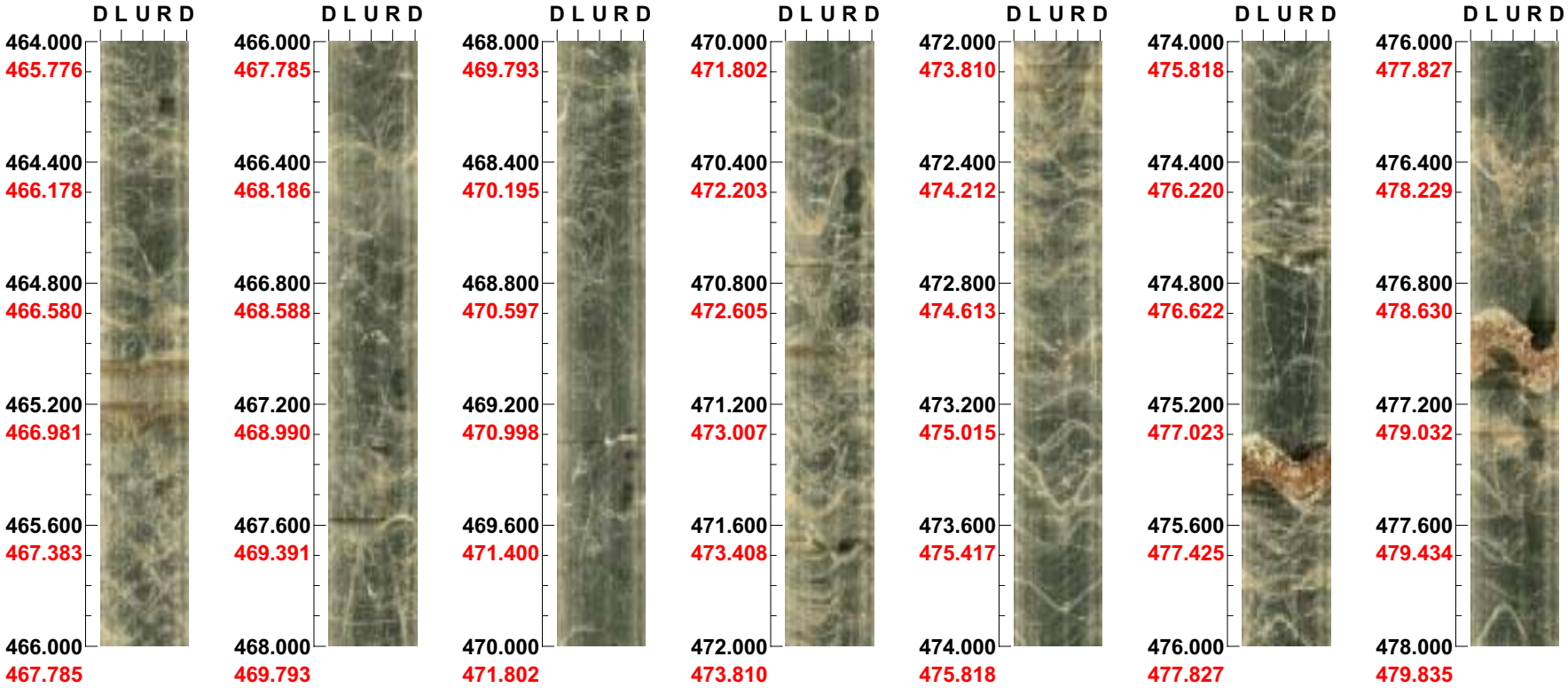
Depth range: 450.000 - 464.000 m



(26 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

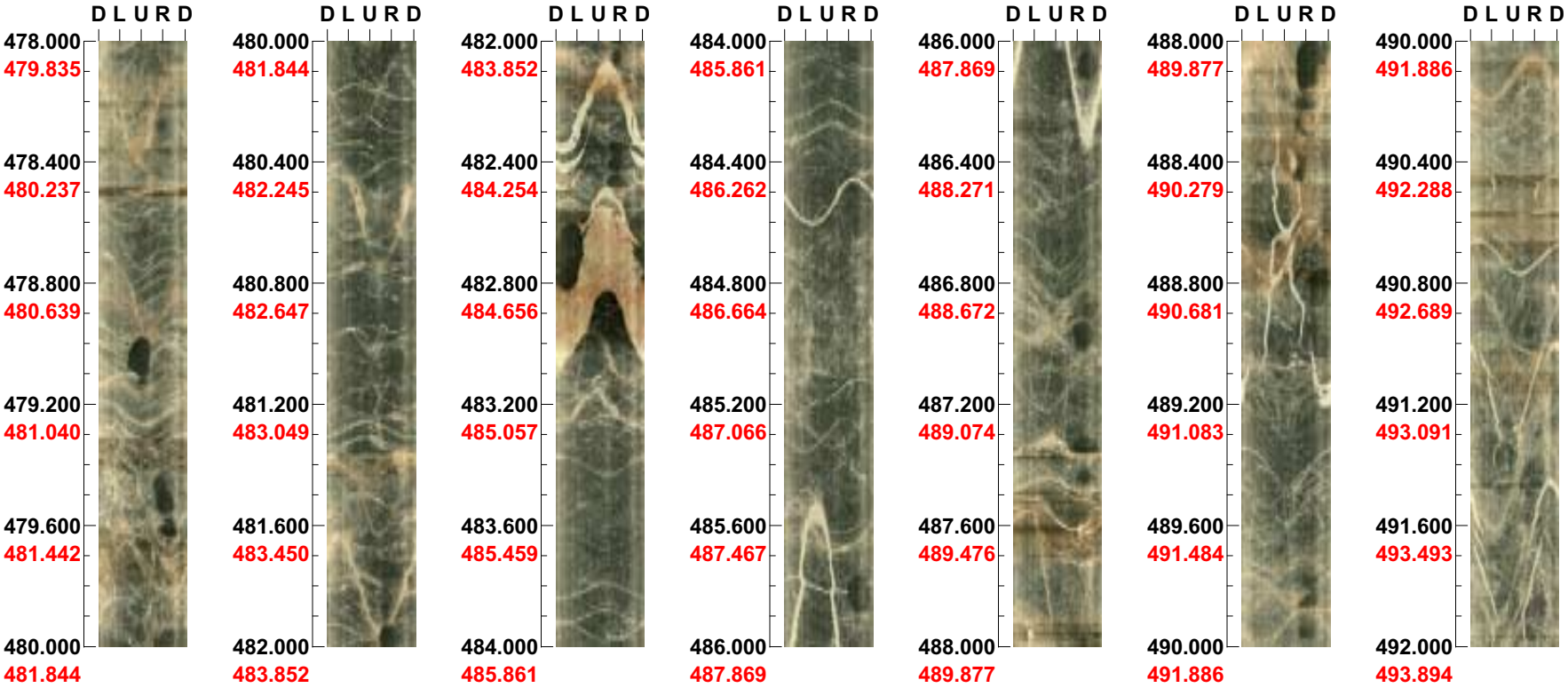
Depth range: 464.000 - 478.000 m



(27 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

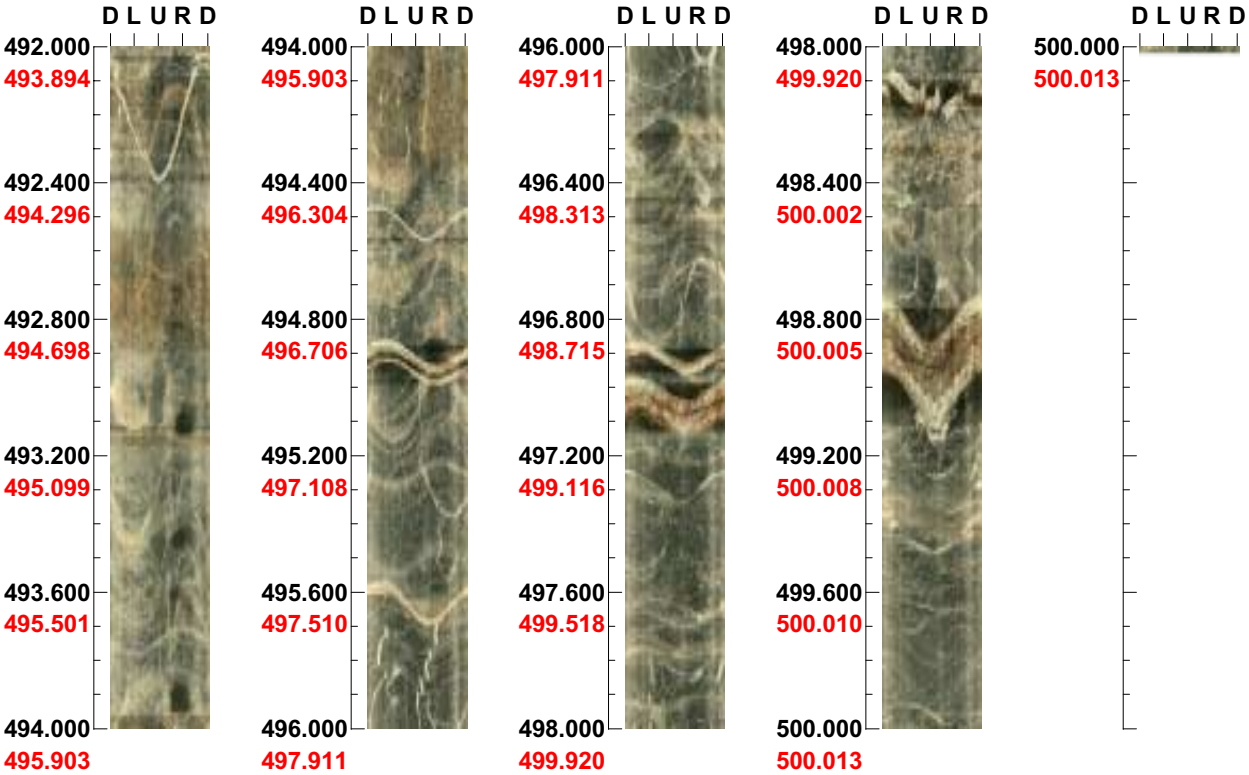
Depth range: 478.000 - 492.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

Depth range: 492.000 - 500.013 m



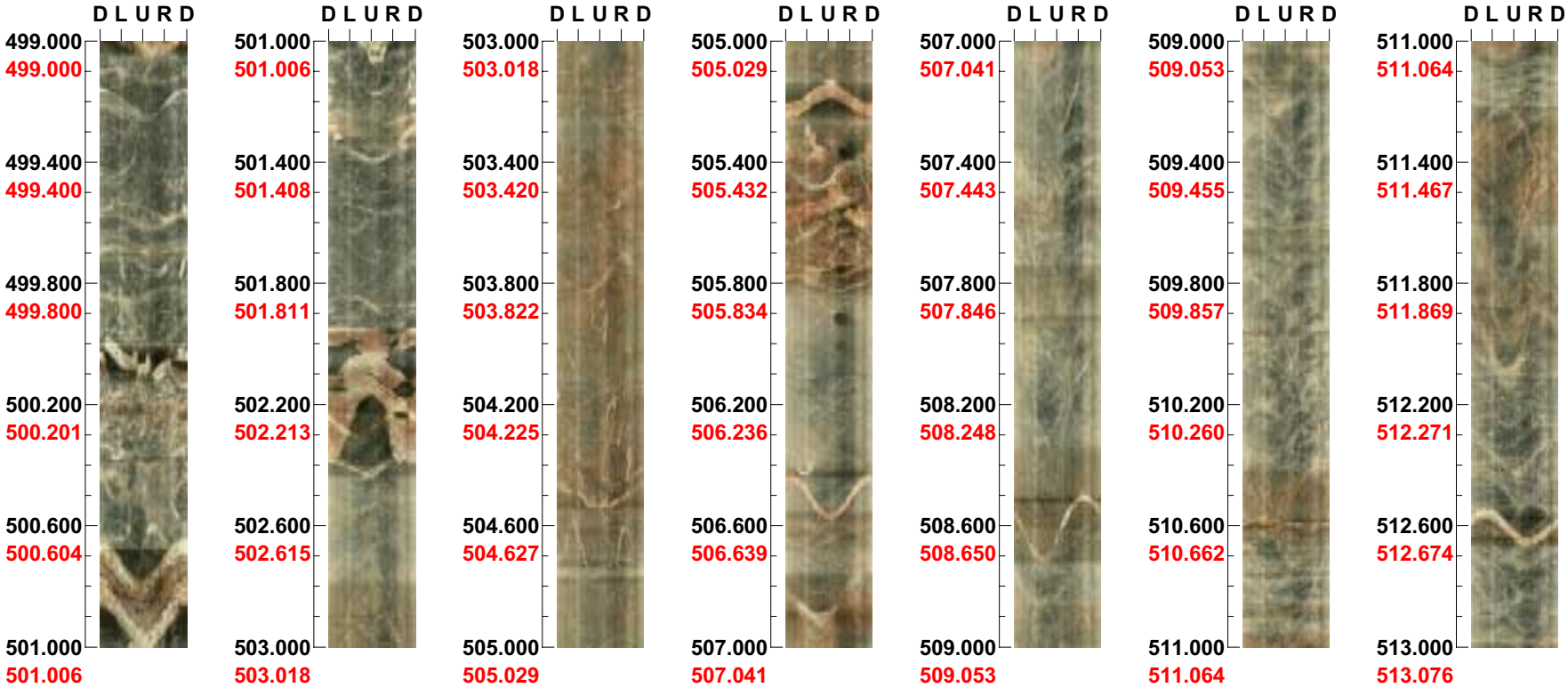
(29 / 29) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp

Image file	**: i:\weekly~1\raycon\projekt\r5087s~1\bips\loggni~1\499998.bip**
BDT file	**: i:\weekly~1\raycon\projekt\r5087s~1\bips\loggni~1\499998.bdt**
Locality	**: SIMPAN**
Bore hole number	**: KSH01A**
Date	**: 03/03/22**
Time	**: 09:25:00**
Depth range	**: 499.000 - 998.363 m**
Azimuth	**: 0**
Inclination	**: -89**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/20**
Aspect ratio	**: 120 %**
Pages	**: 36**
Color	**:**  **+0 +0 +0**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

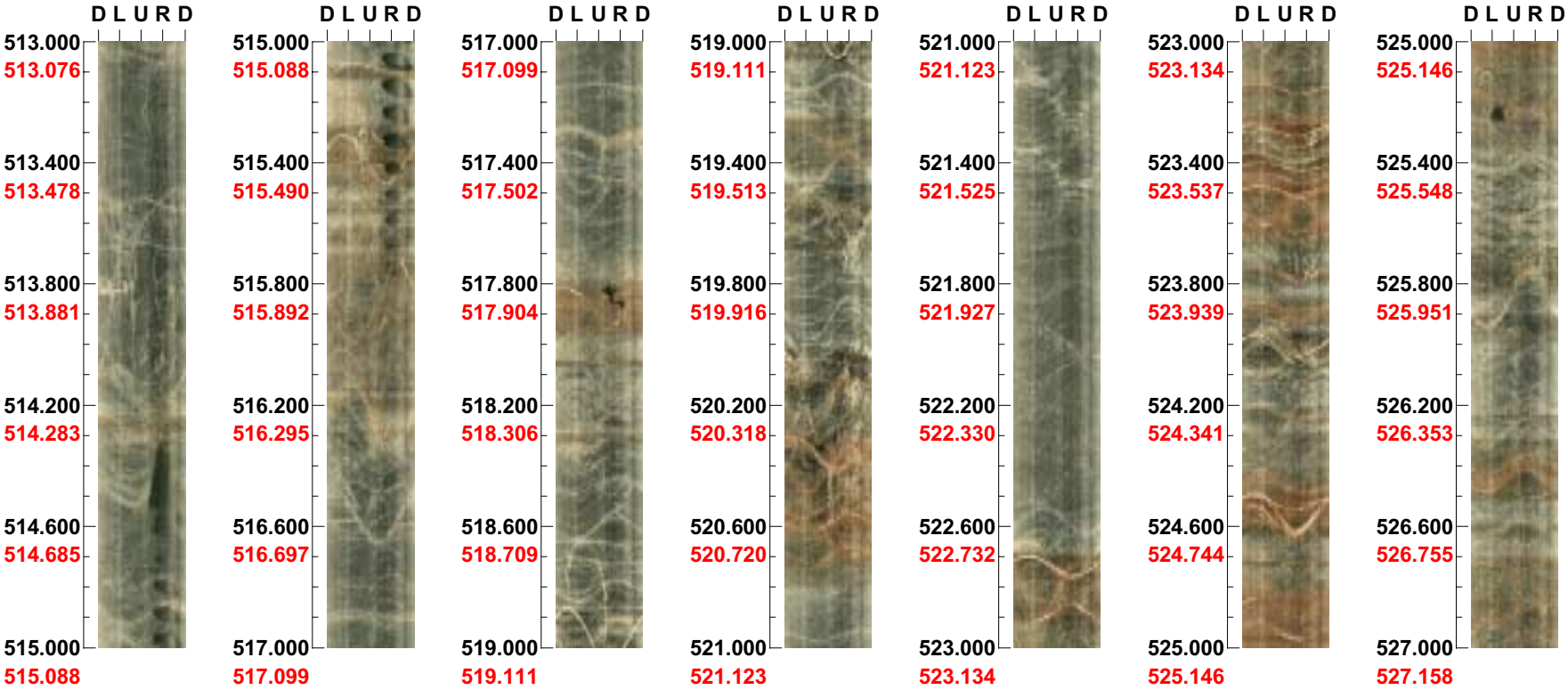
Depth range: 499.000 - 513.000 m



(1 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

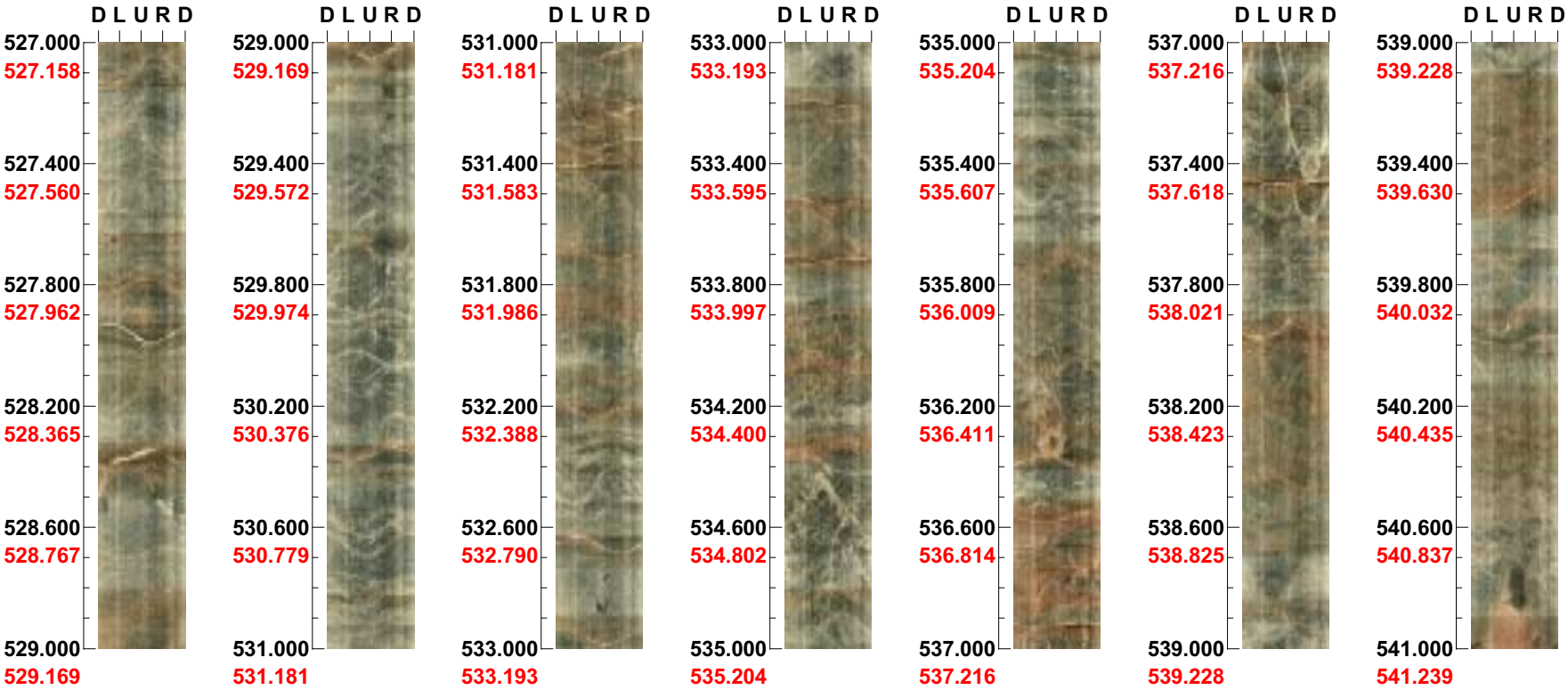
Depth range: 513.000 - 527.000 m



 Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

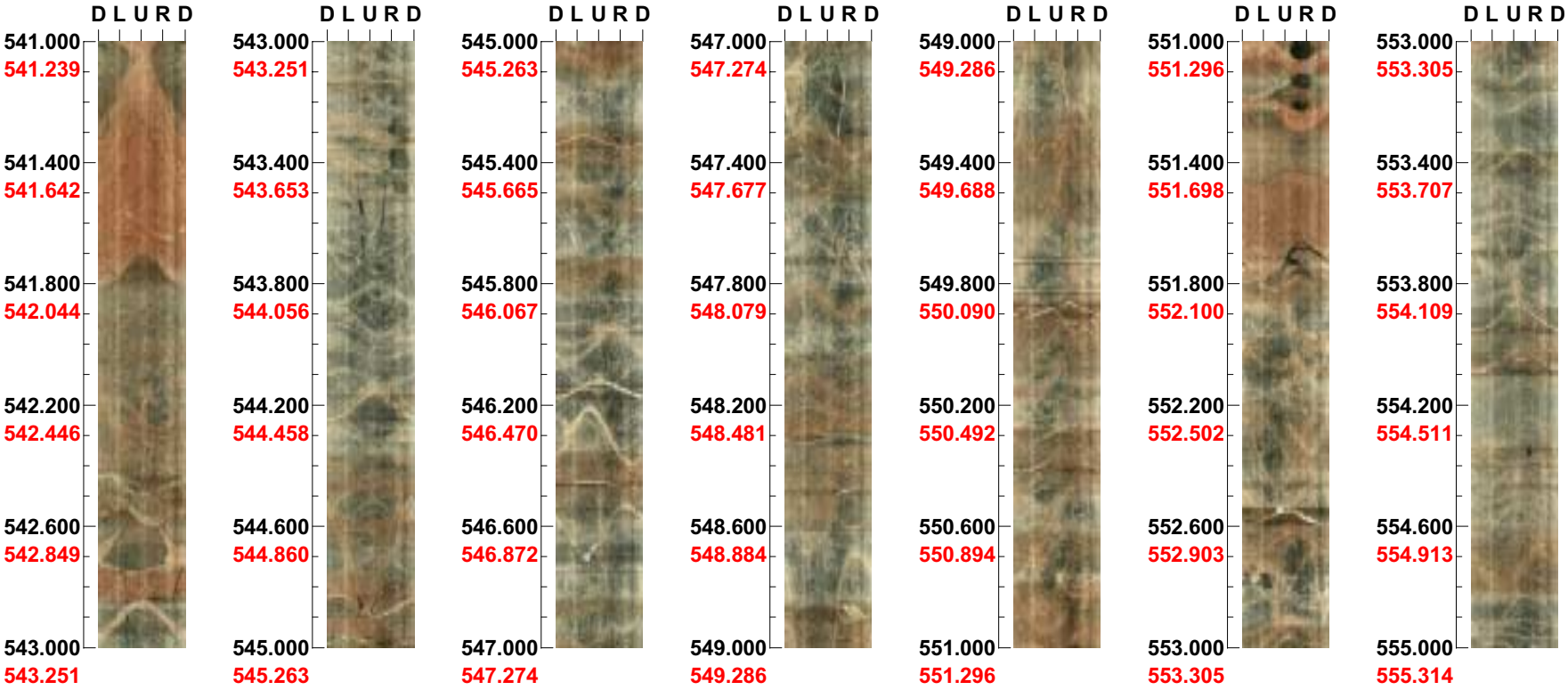
Depth range: 527.000 - 541.000 m



(3 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

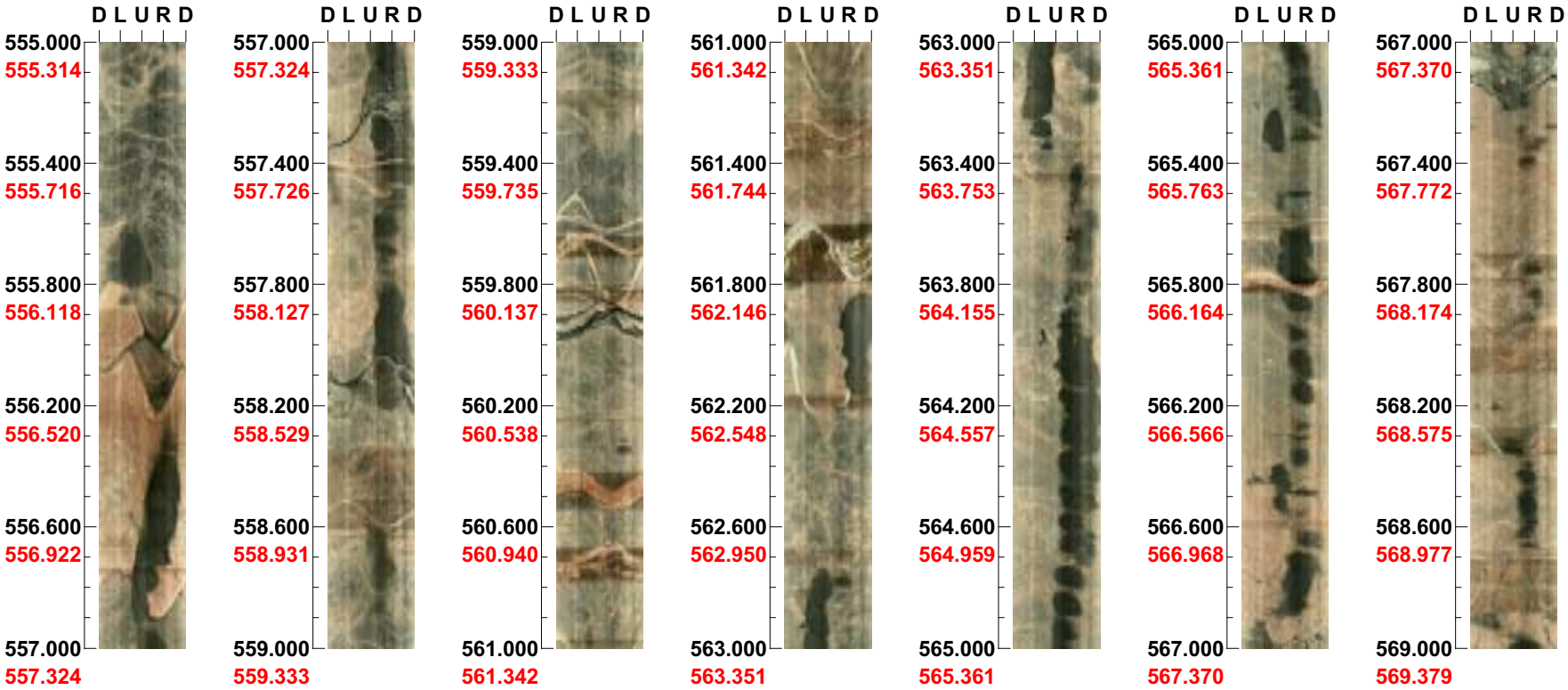
Depth range: 541.000 - 555.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

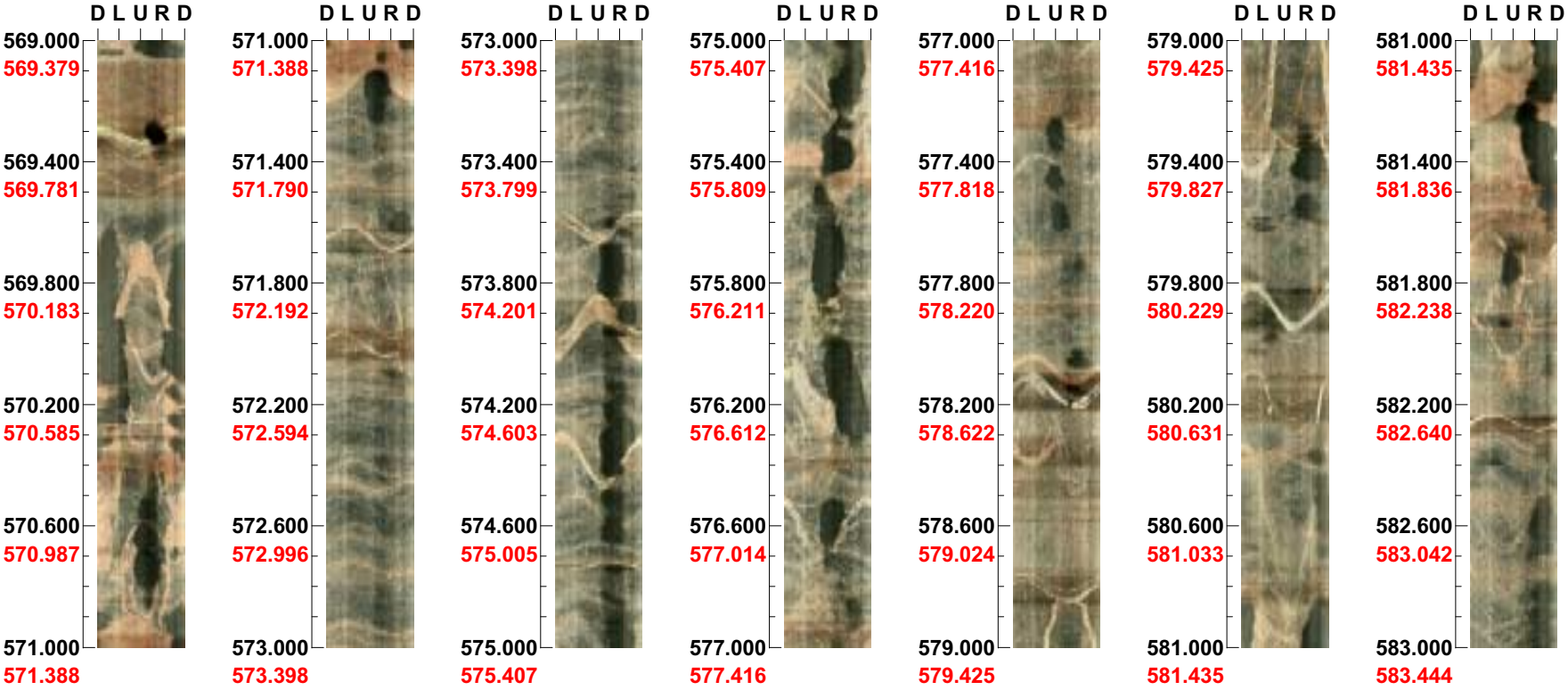
Depth range: 555.000 - 569.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

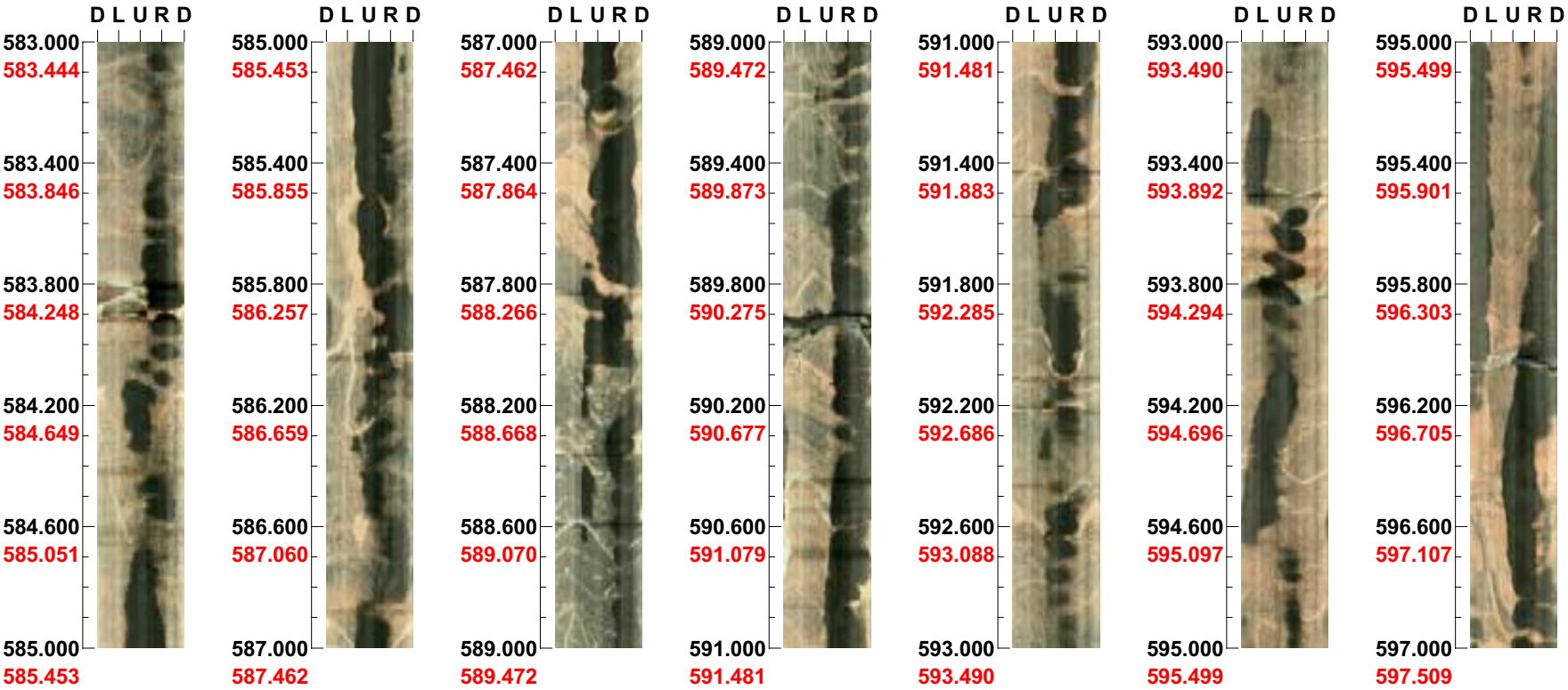
Depth range: 569.000 - 583.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

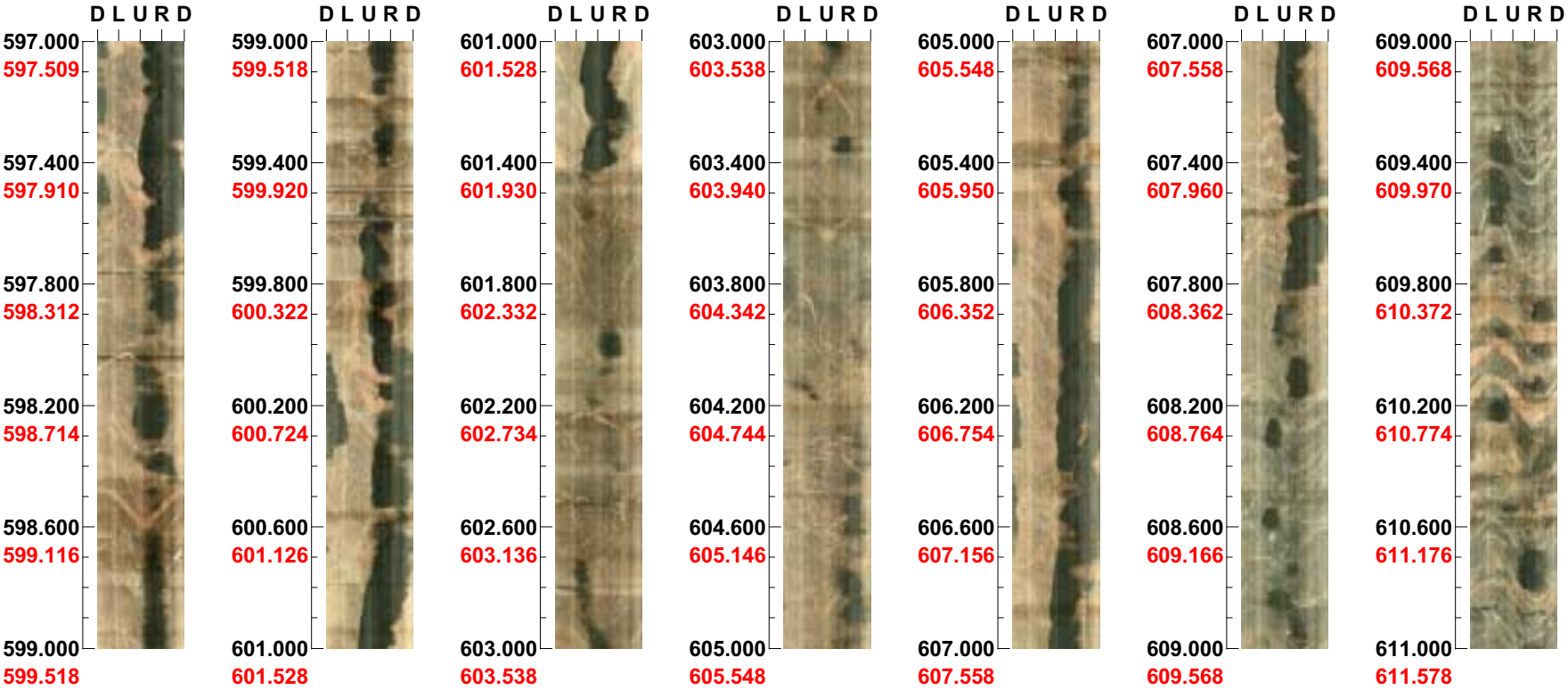
Depth range: 583.000 - 597.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

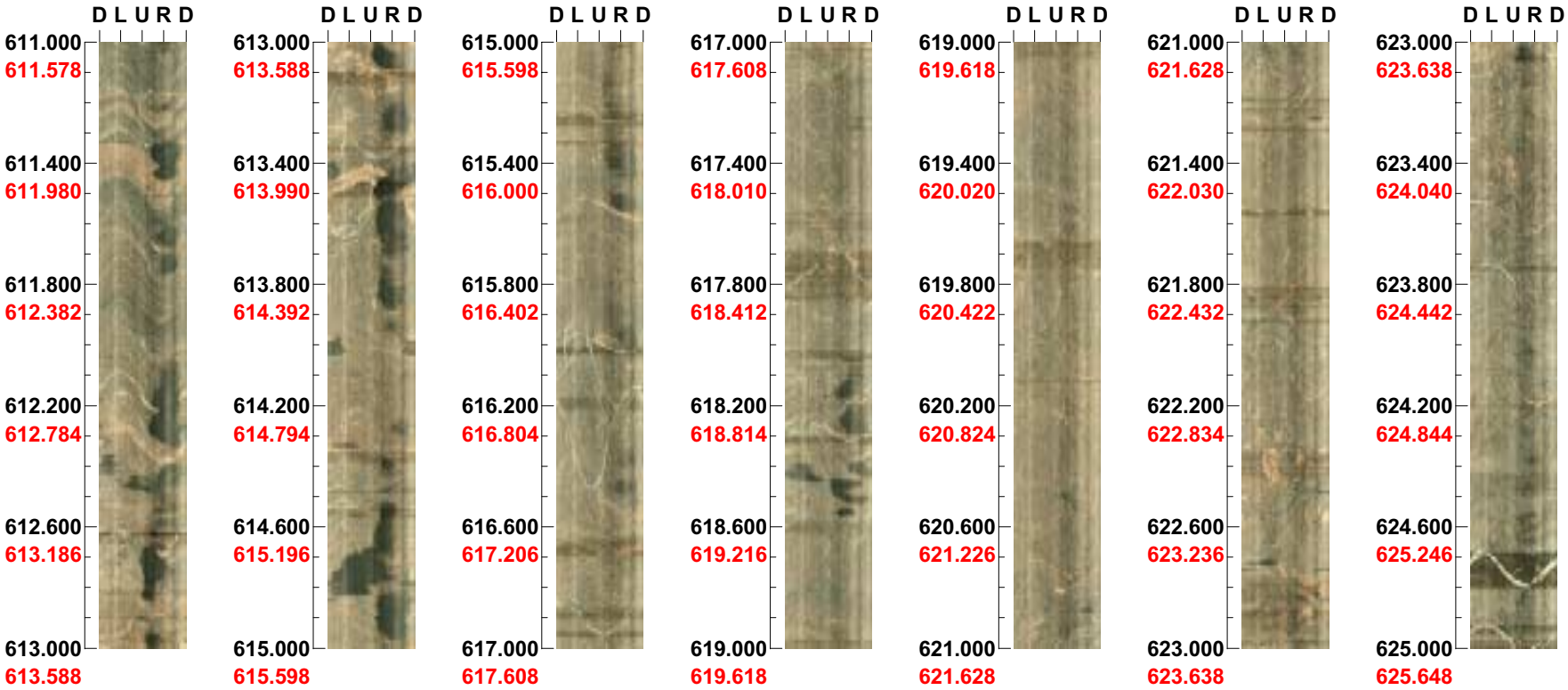
Depth range: 597.000 - 611.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

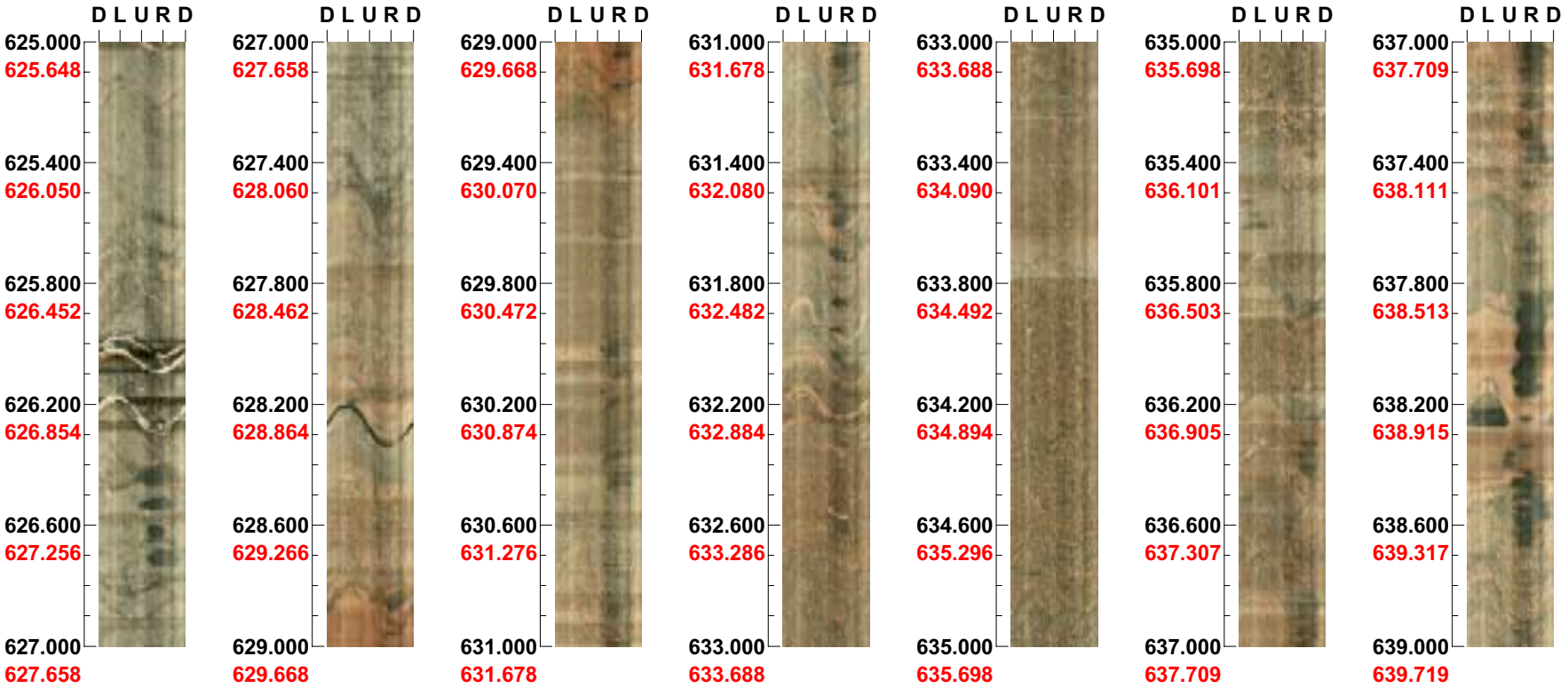
Depth range: 611.000 - 625.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

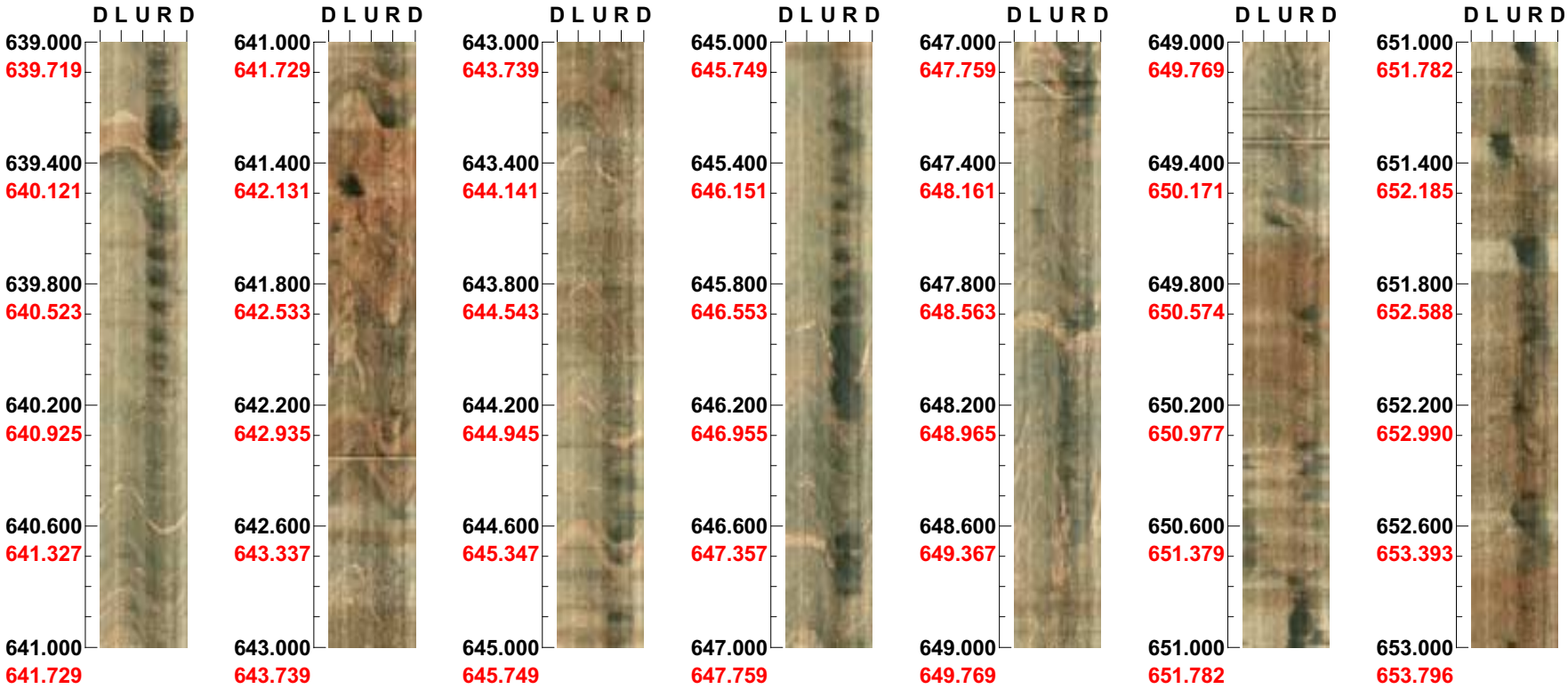
Depth range: 625.000 - 639.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

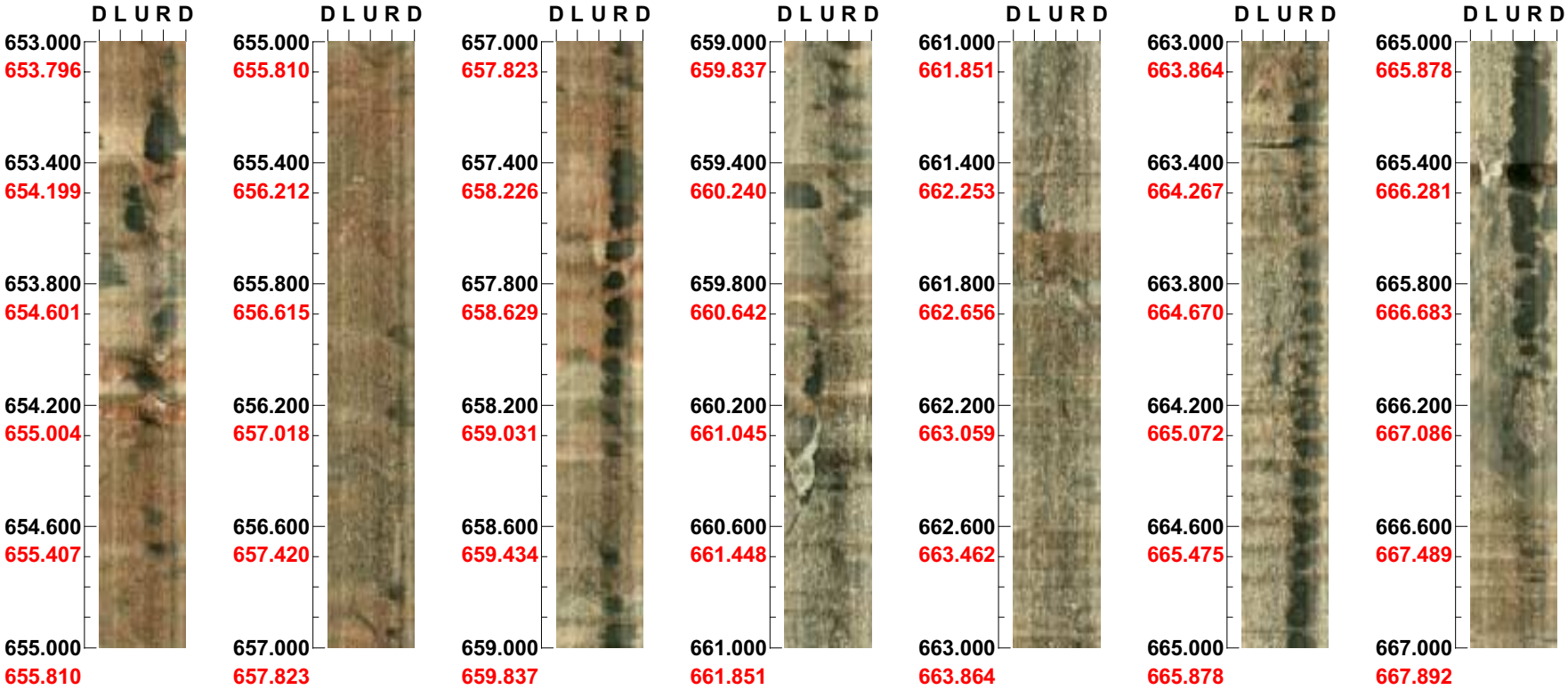
Depth range: 639.000 - 653.000 m



(11 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

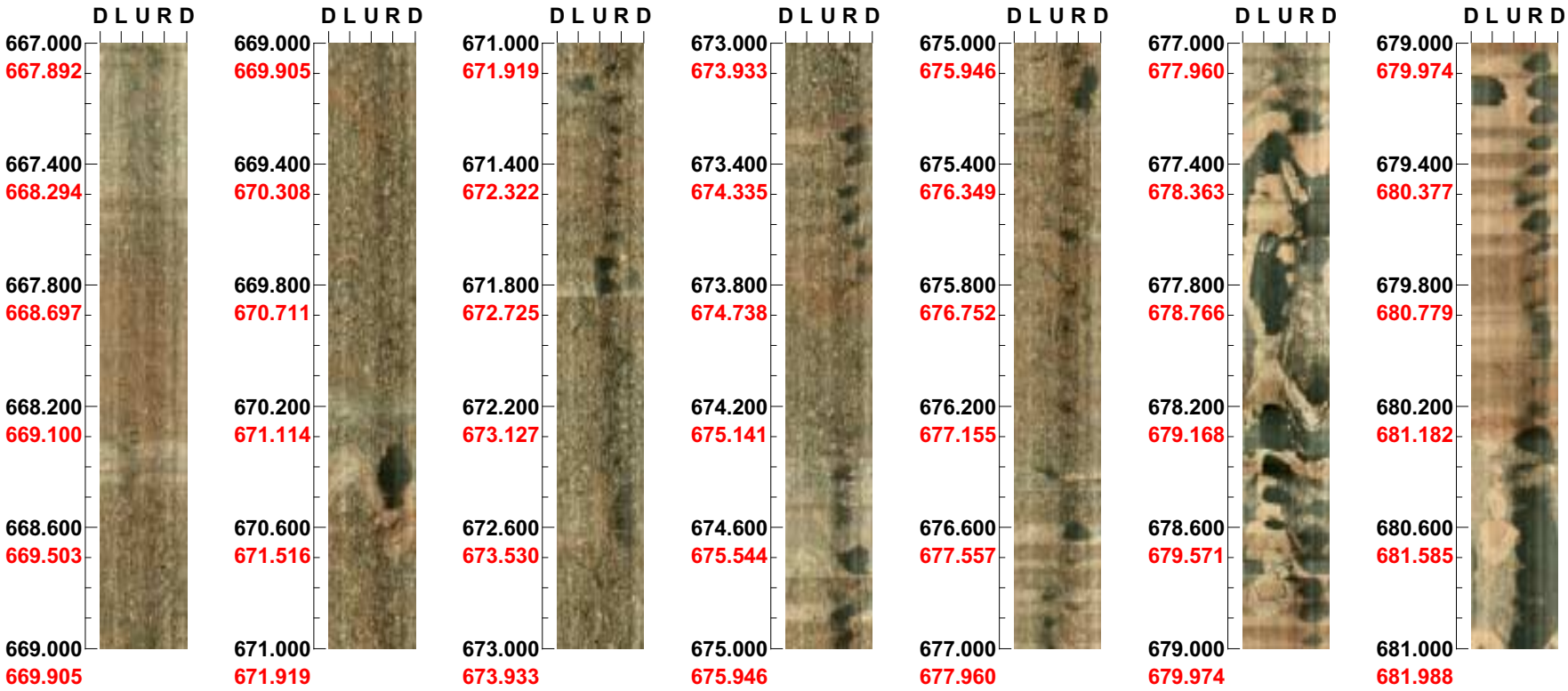
Depth range: 653.000 - 667.000 m



(12 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

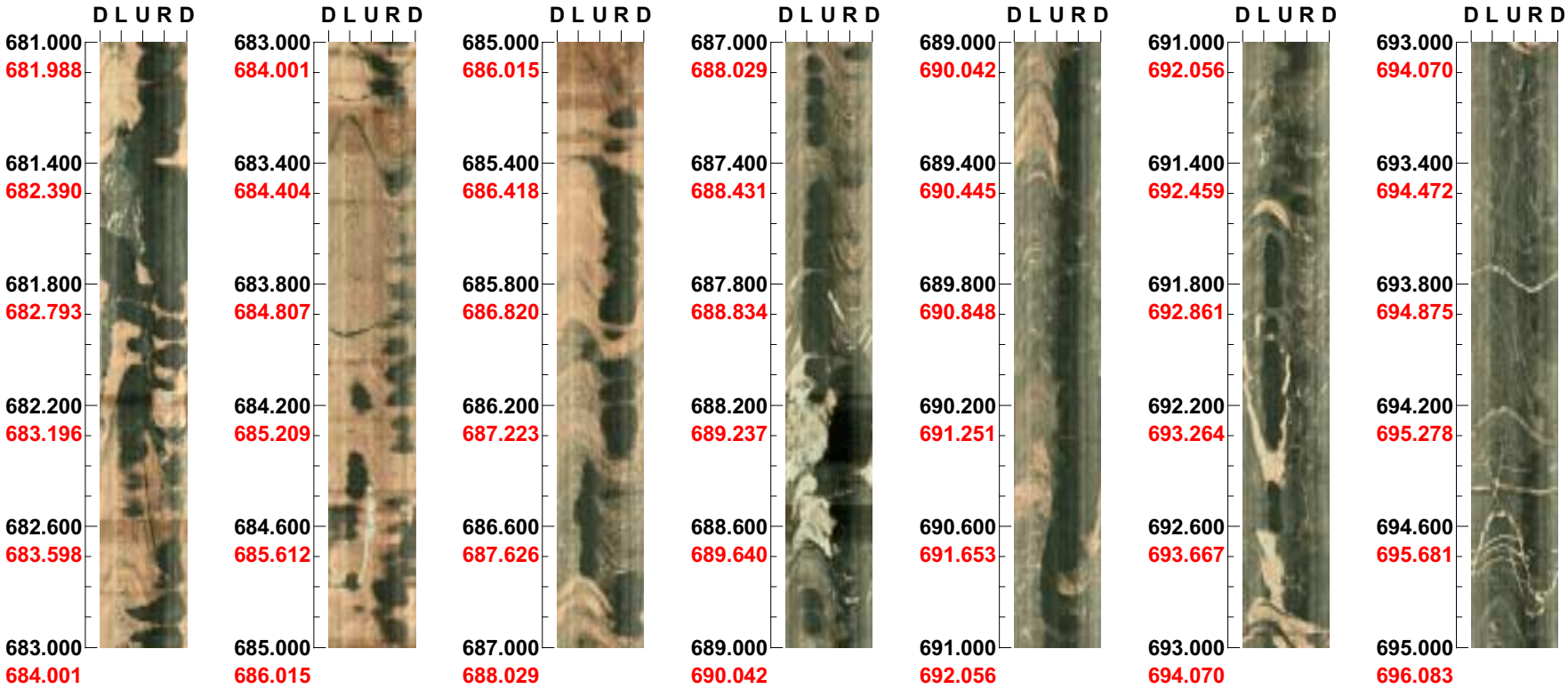
Depth range: 667.000 - 681.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

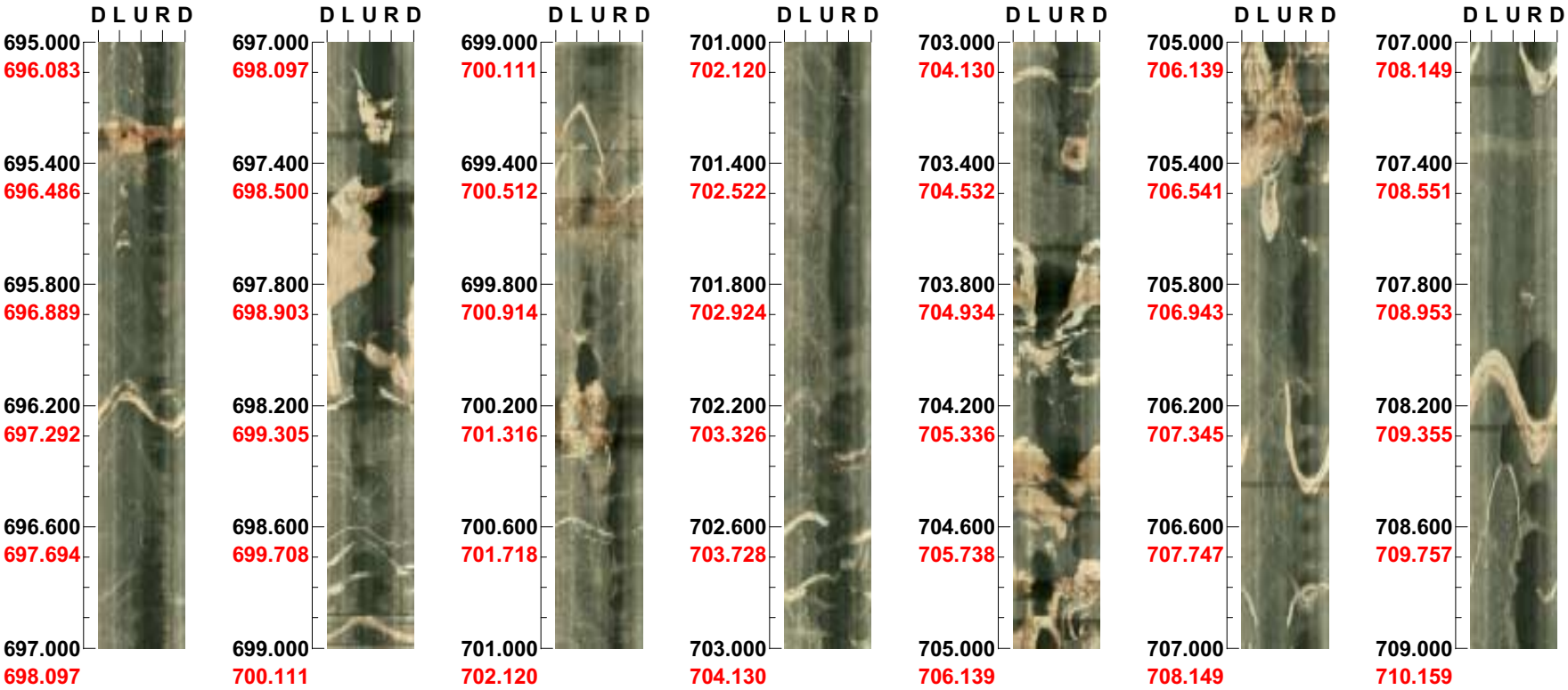
Depth range: 681.000 - 695.000 m



(14 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

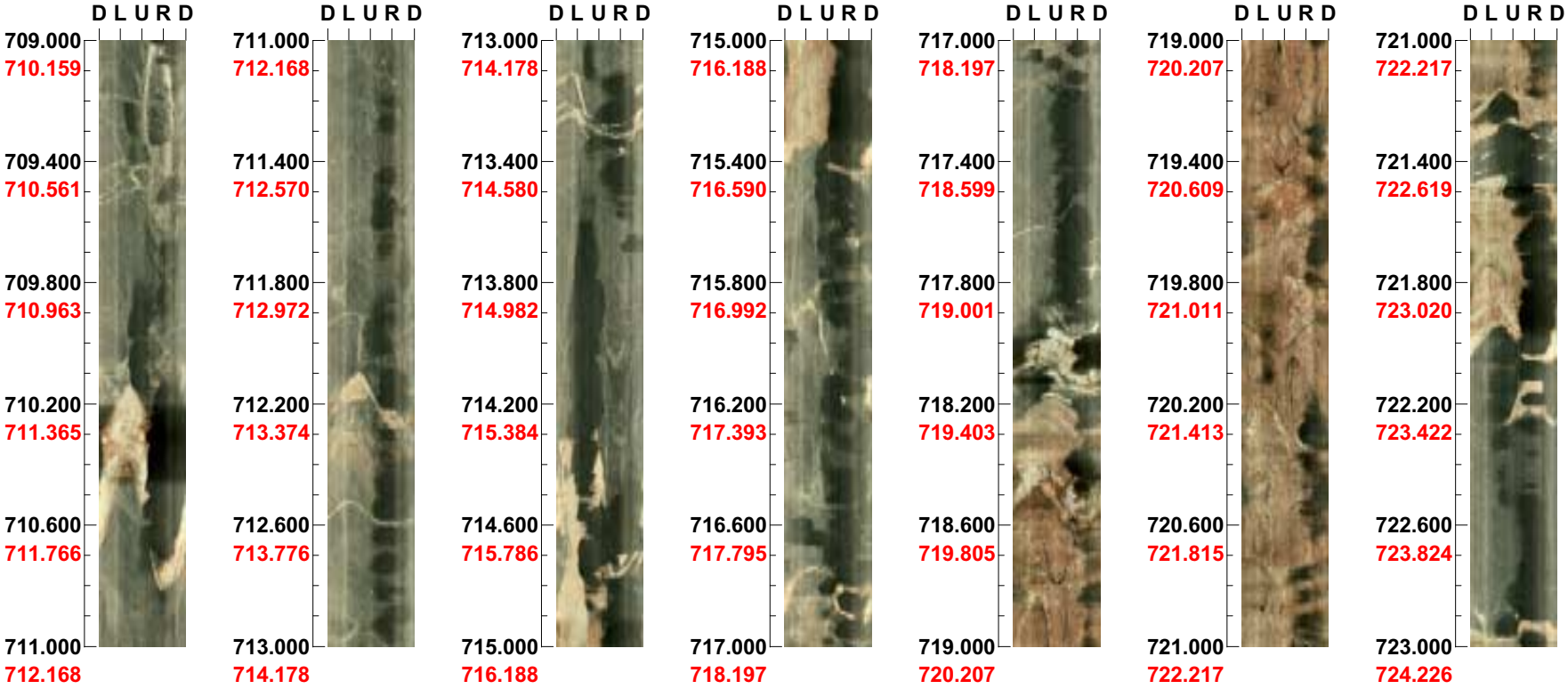
Depth range: 695.000 - 709.000 m



(15 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

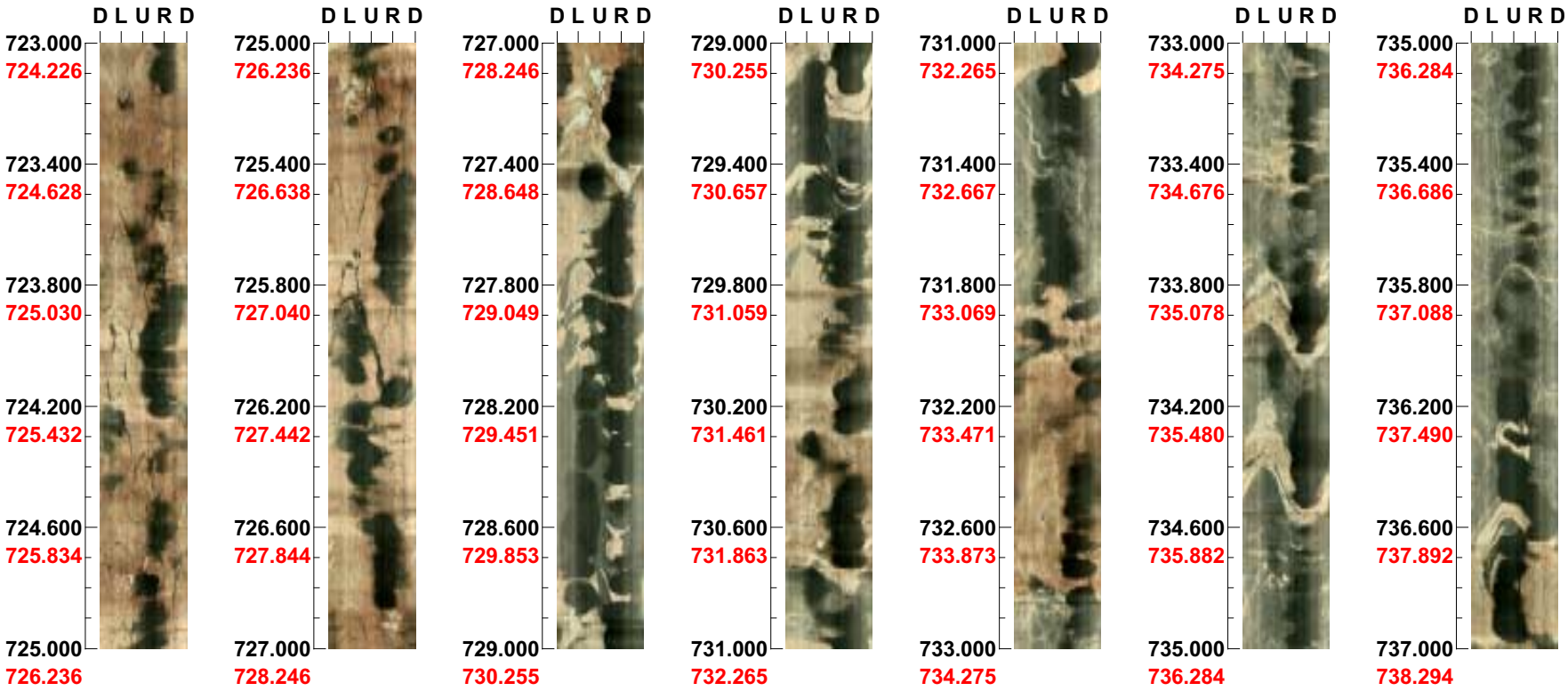
Depth range: 709.000 - 723.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

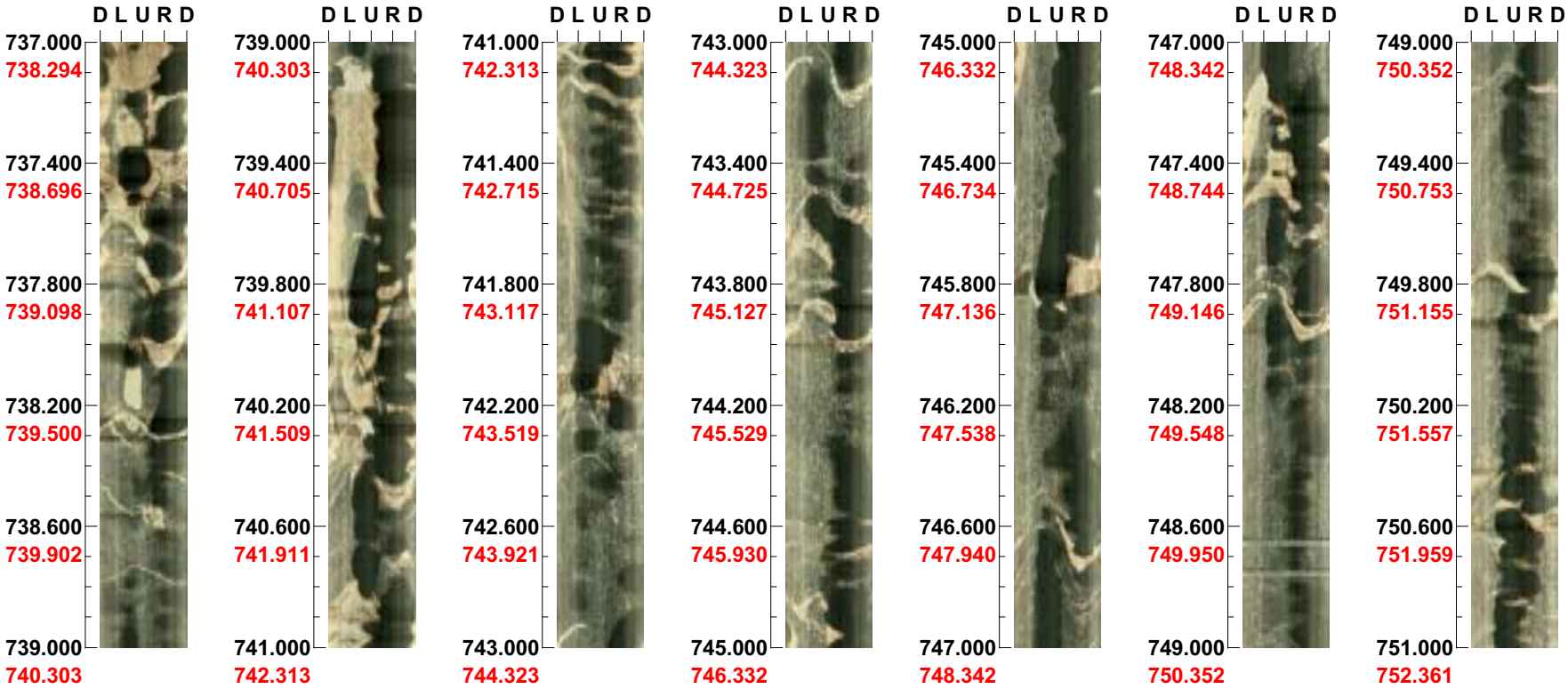
Depth range: 723.000 - 737.000 m



(17 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

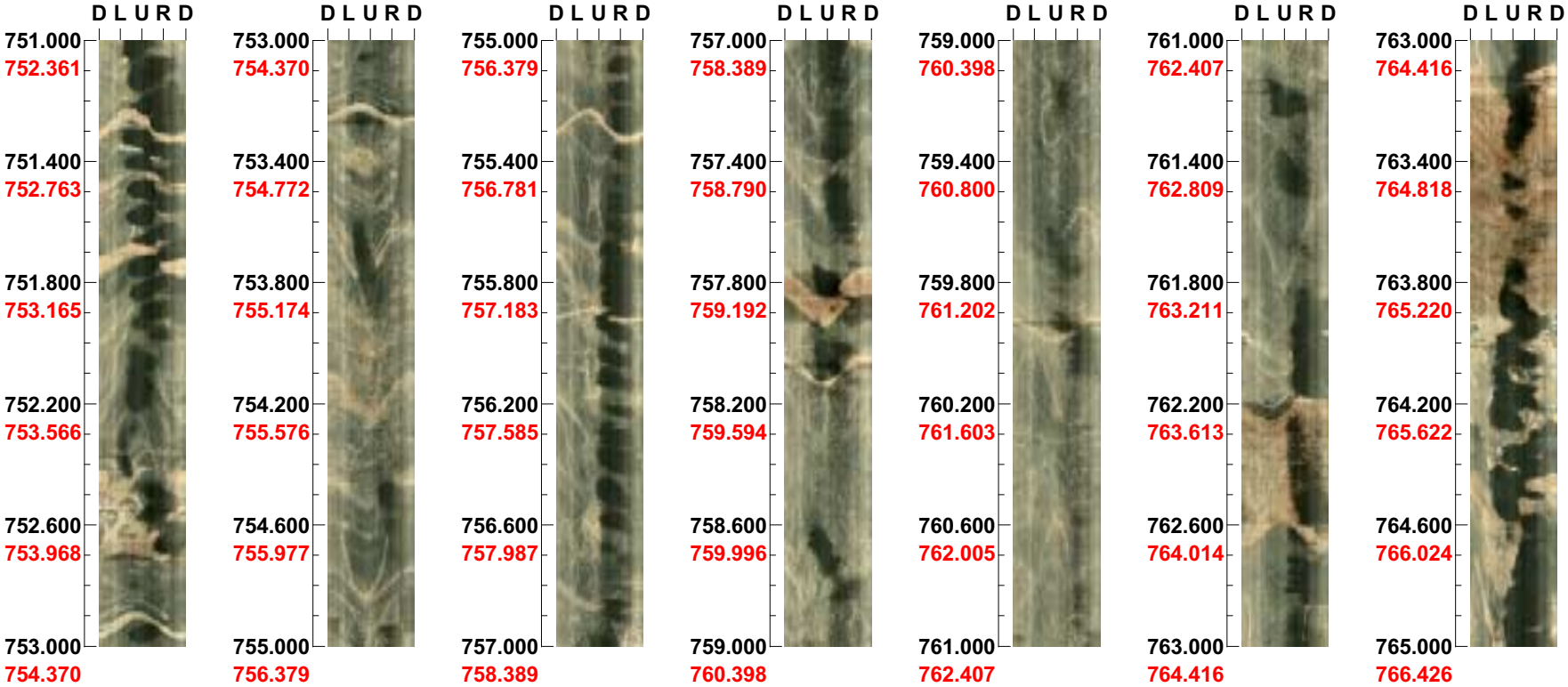
Depth range: 737.000 - 751.000 m



(18 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

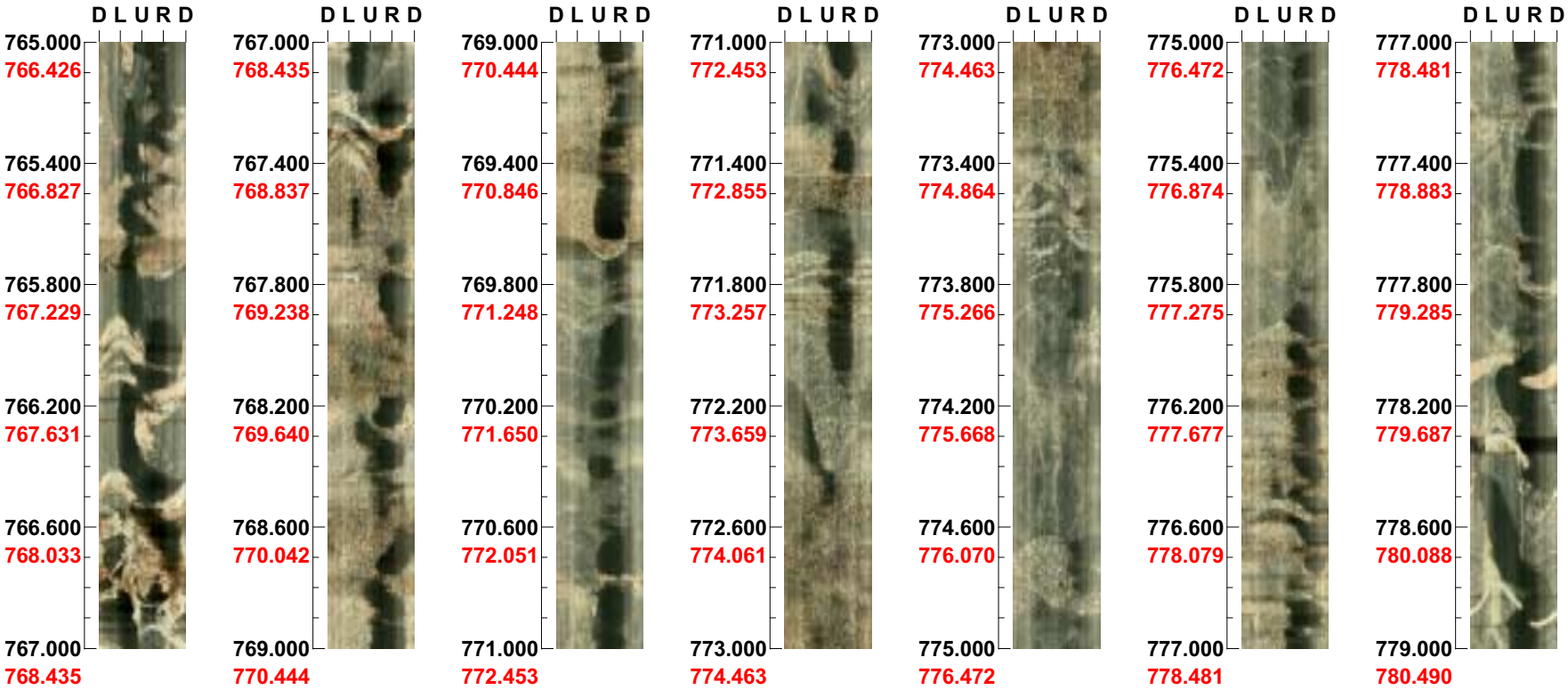
Depth range: 751.000 - 765.000 m



(19 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

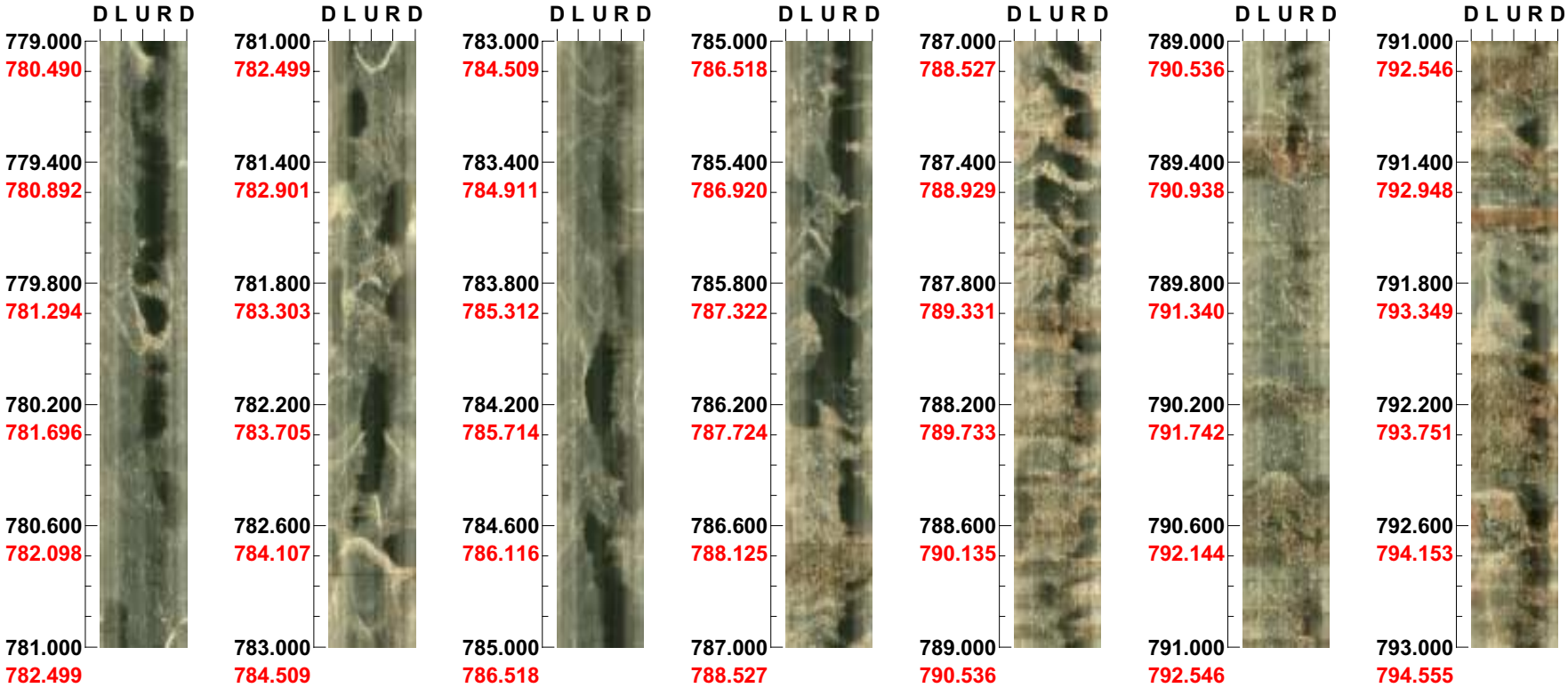
Depth range: 765.000 - 779.000 m



(20 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

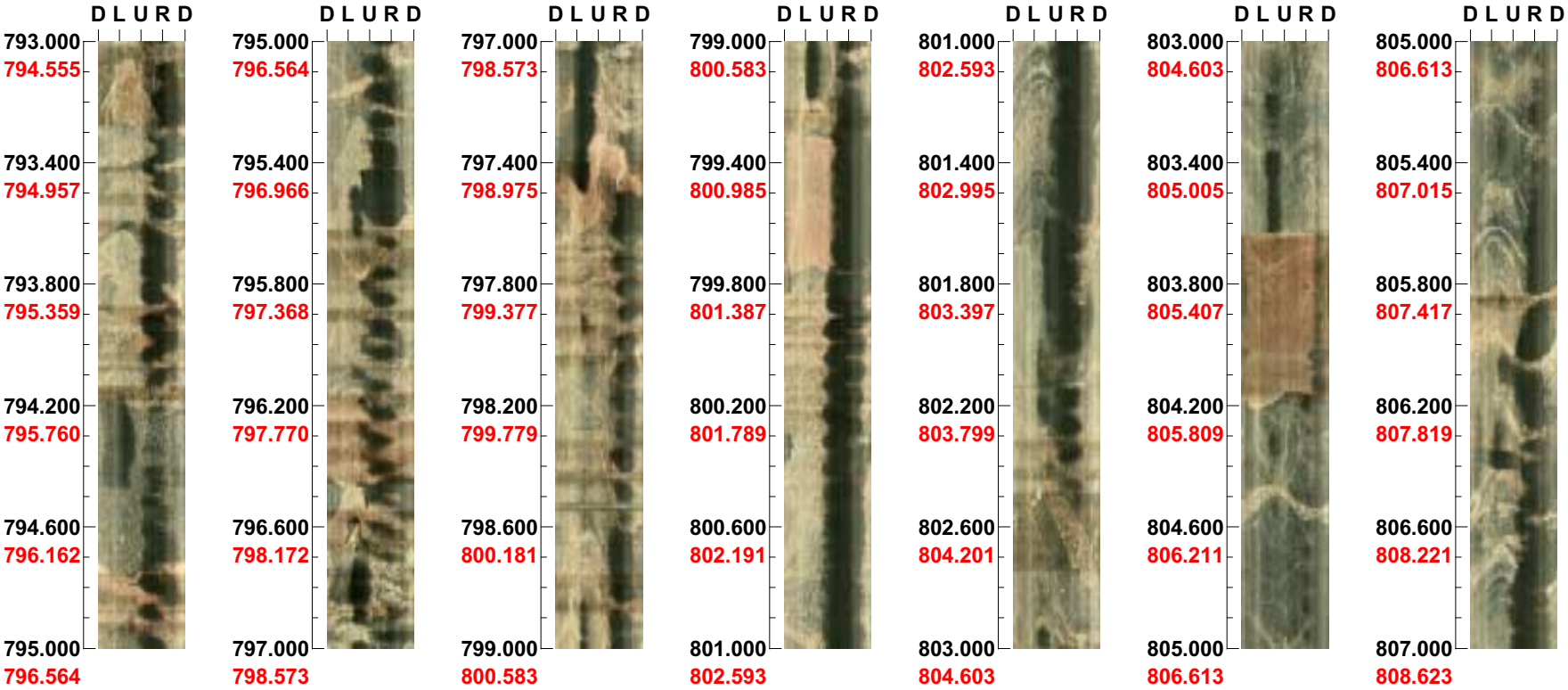
Depth range: 779.000 - 793.000 m



(21 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

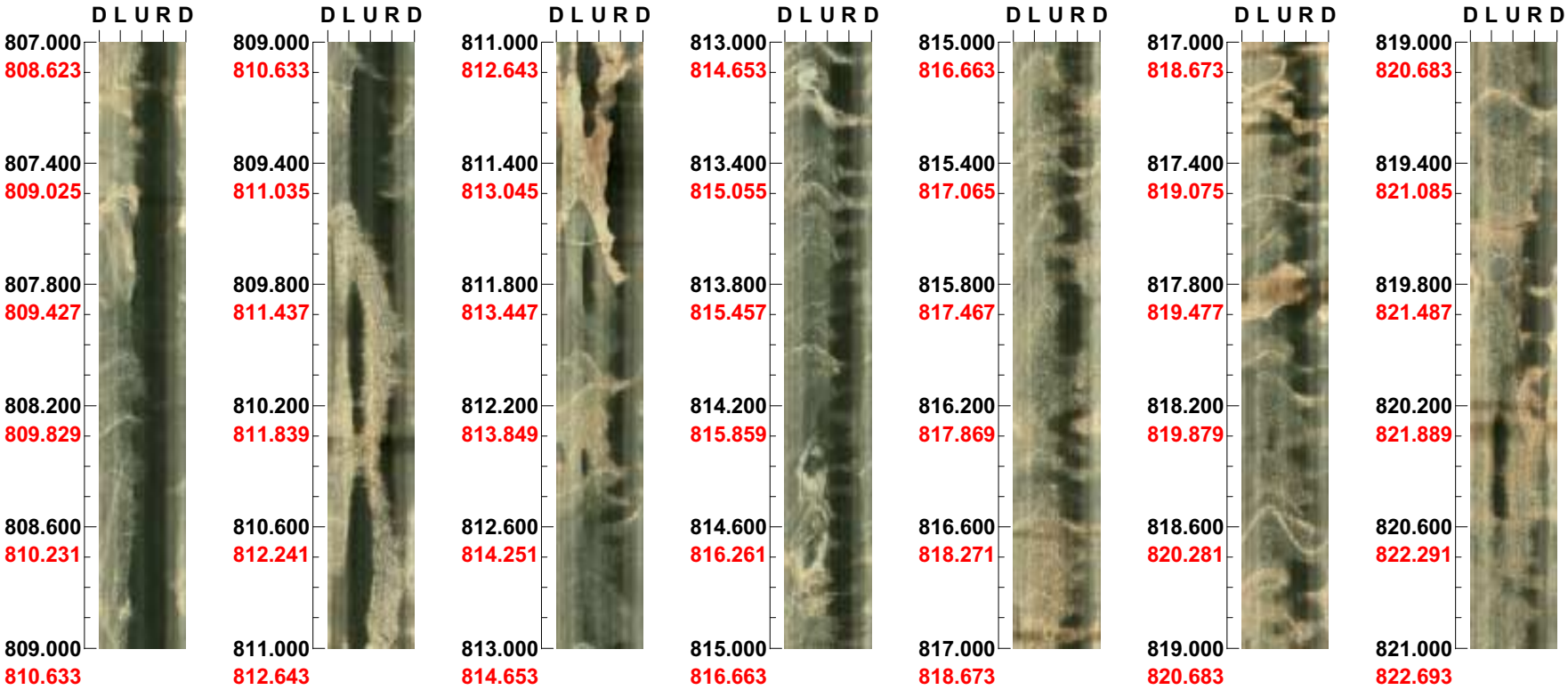
Depth range: 793.000 - 807.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

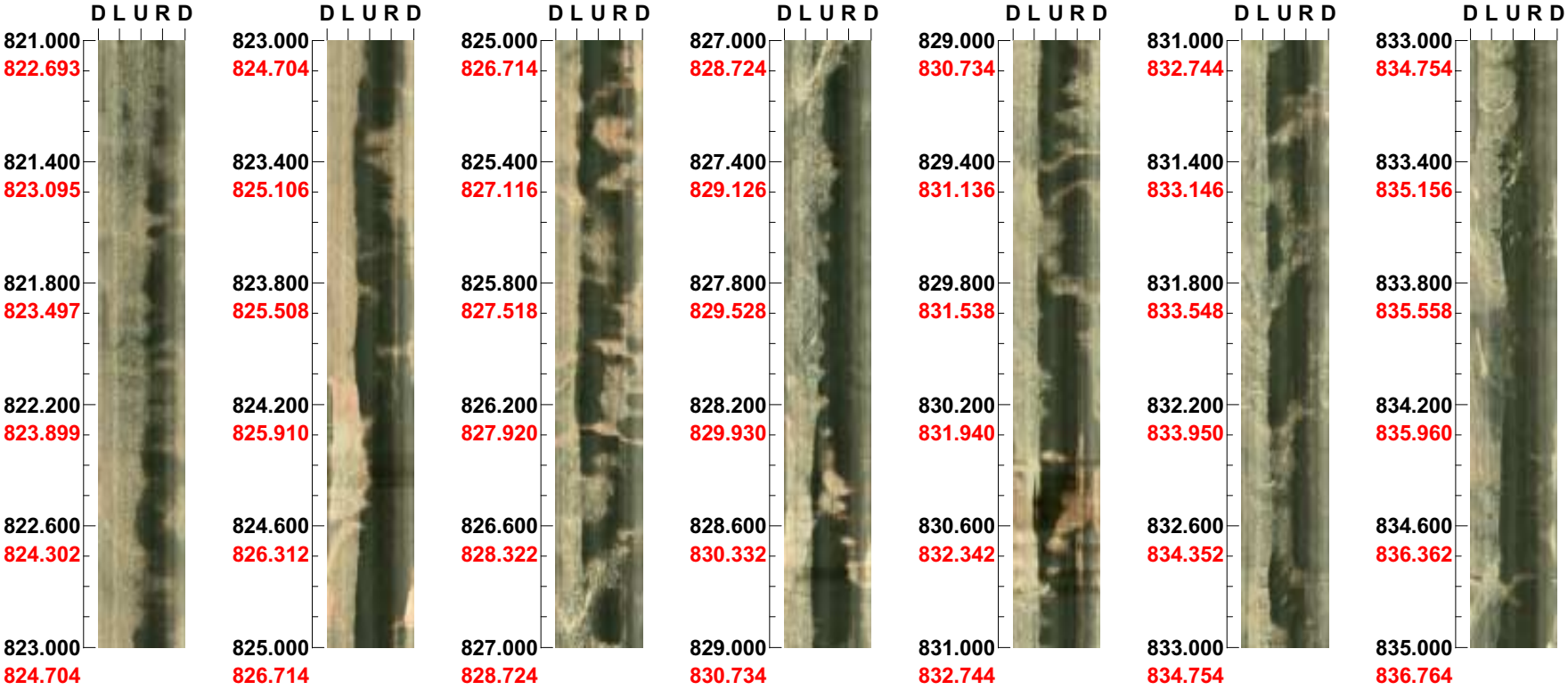
Depth range: 807.000 - 821.000 m



(23 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

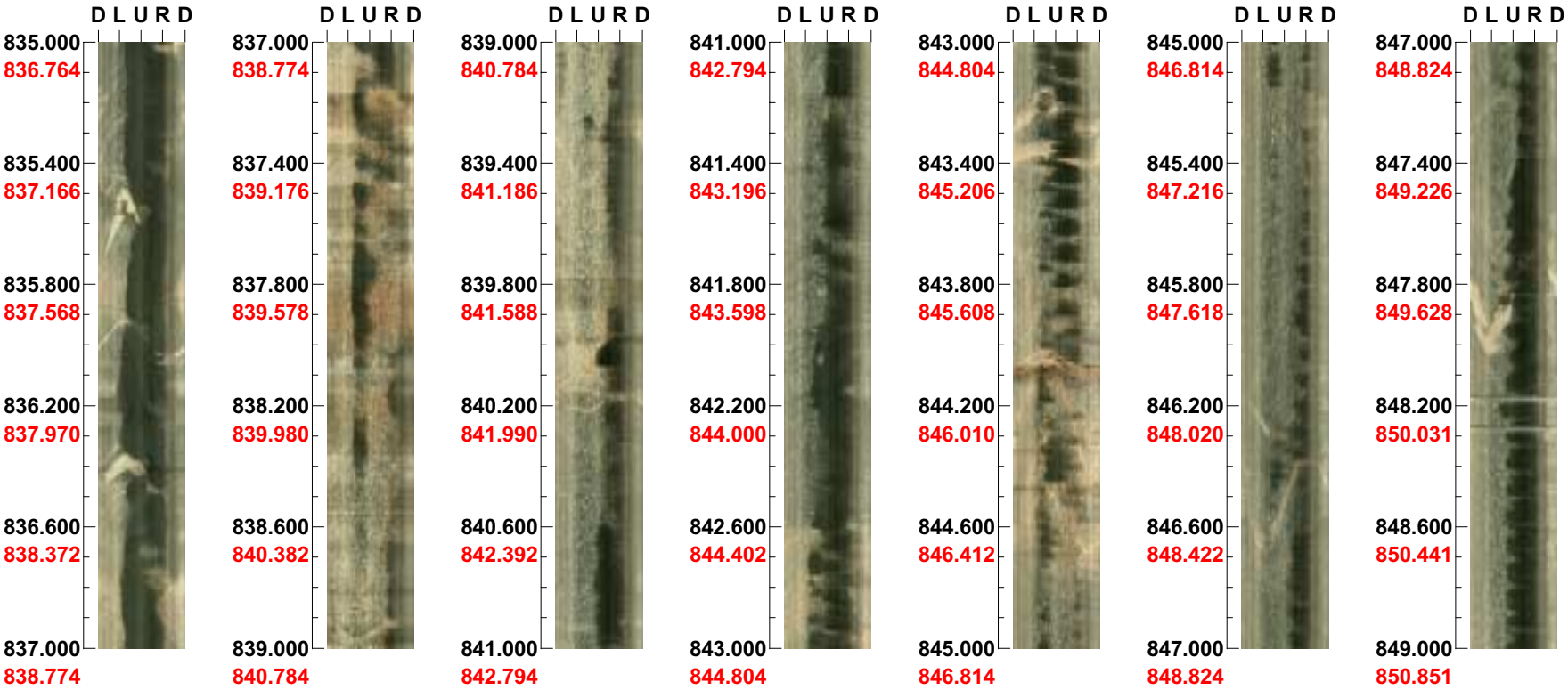
Depth range: 821.000 - 835.000 m



(24 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

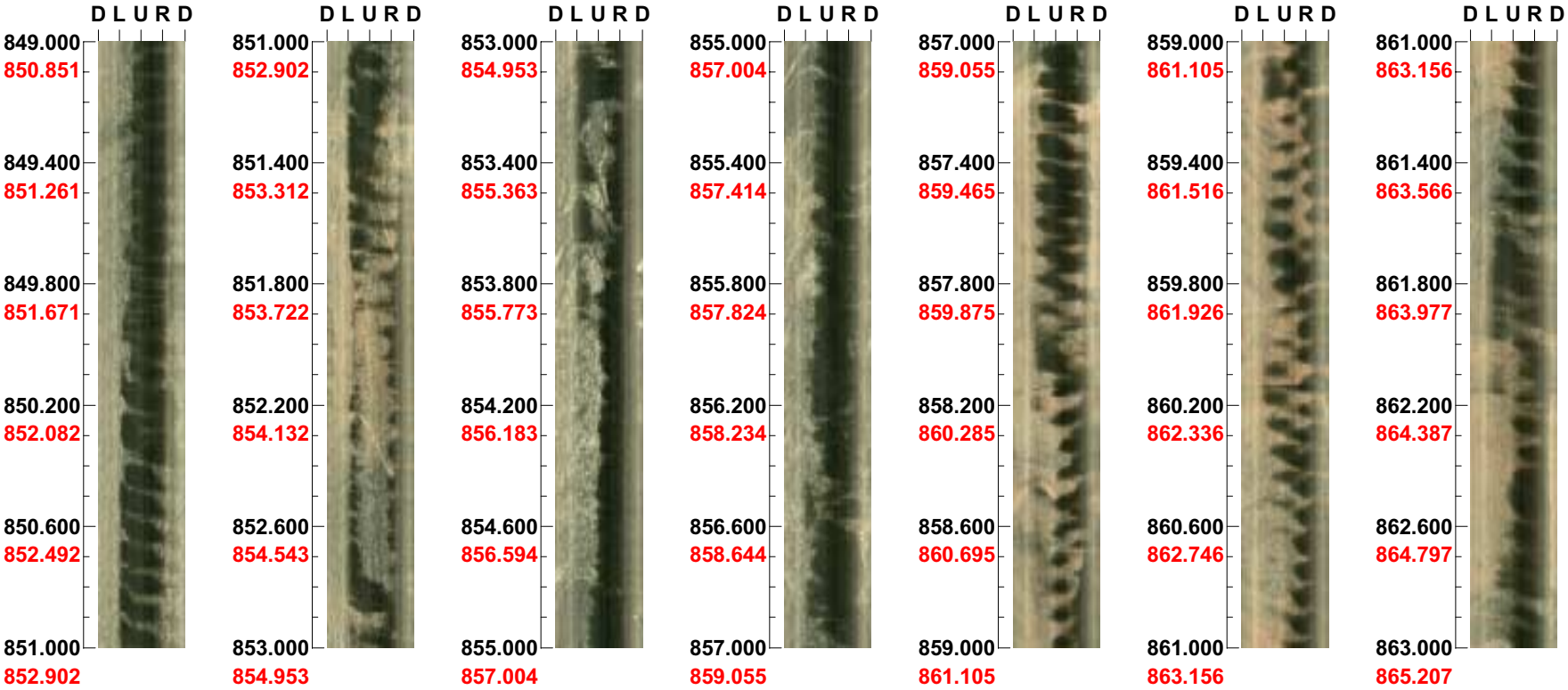
Depth range: 835.000 - 849.000 m



(25 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

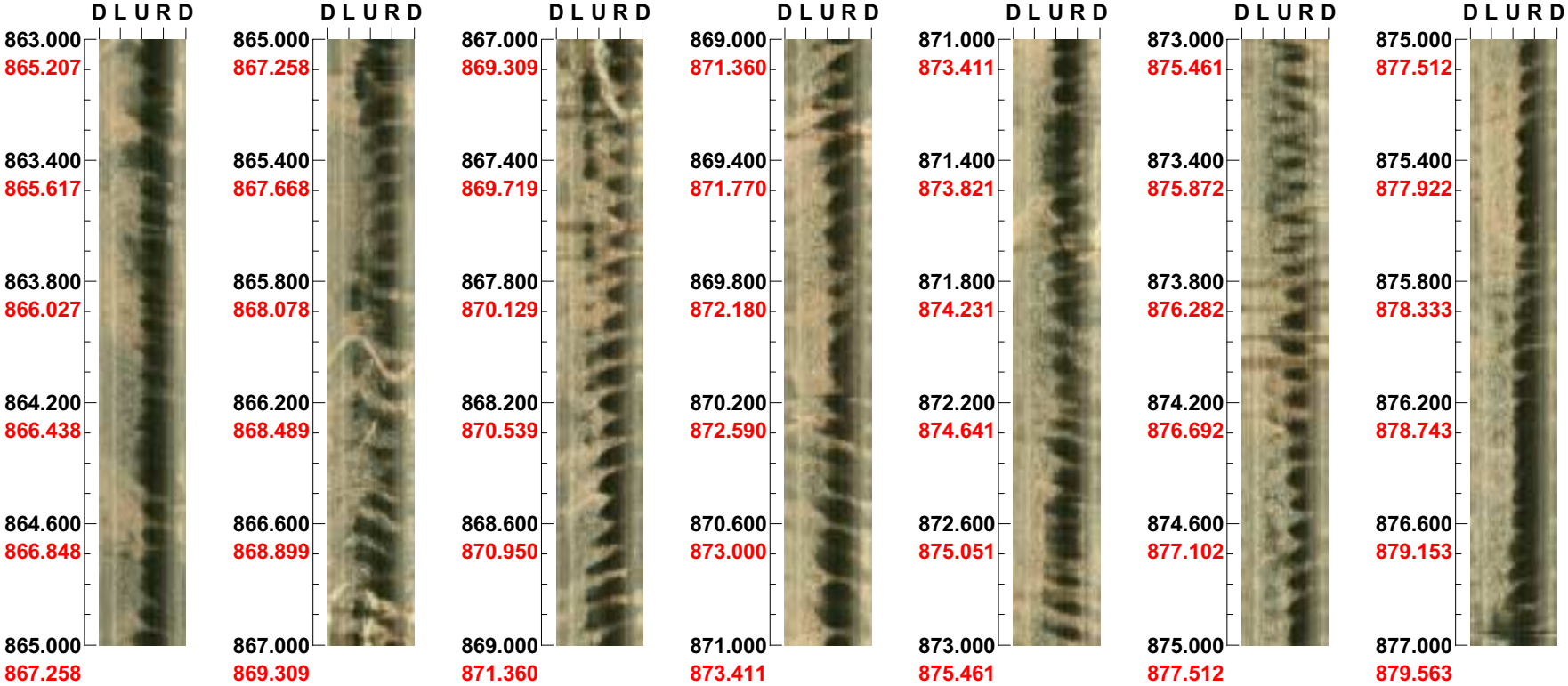
Depth range: 849.000 - 863.000 m



(26 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

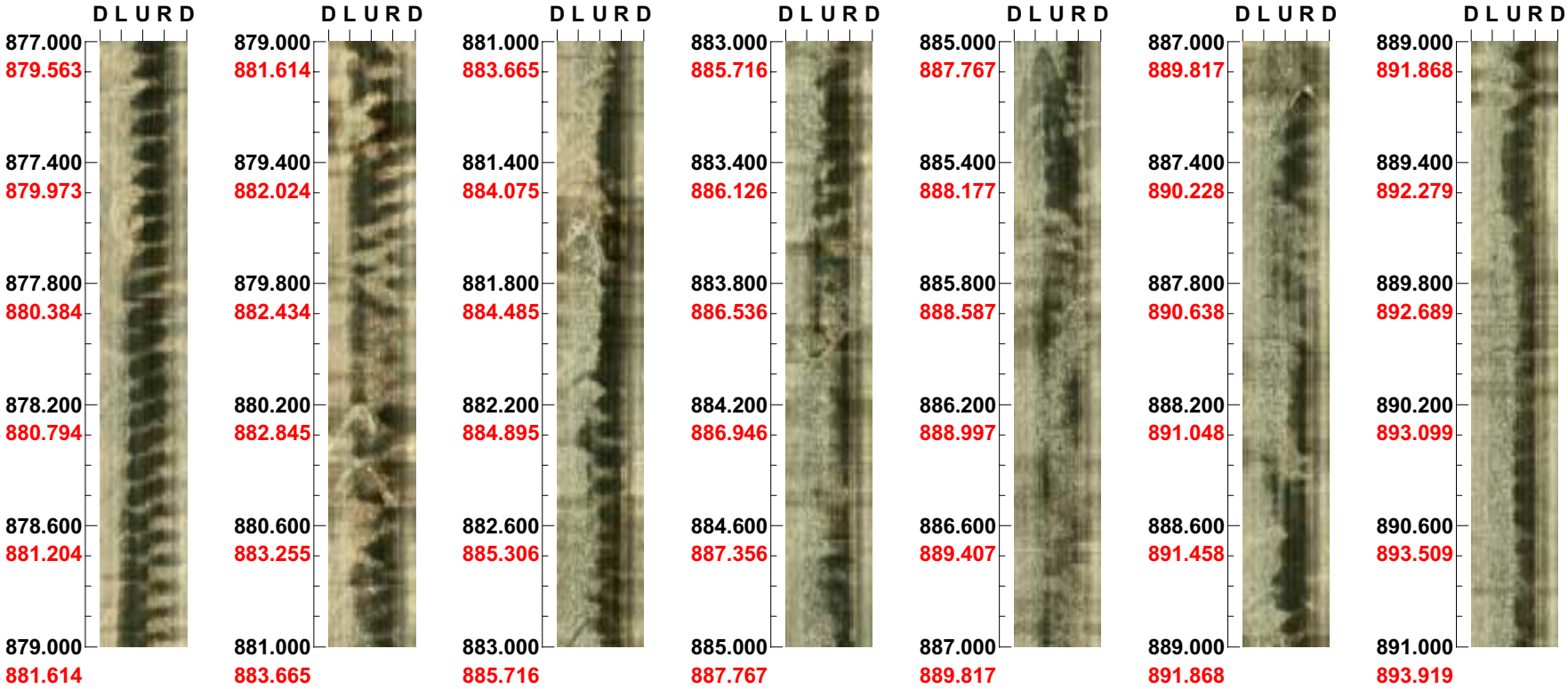
Depth range: 863.000 - 877.000 m



(27 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

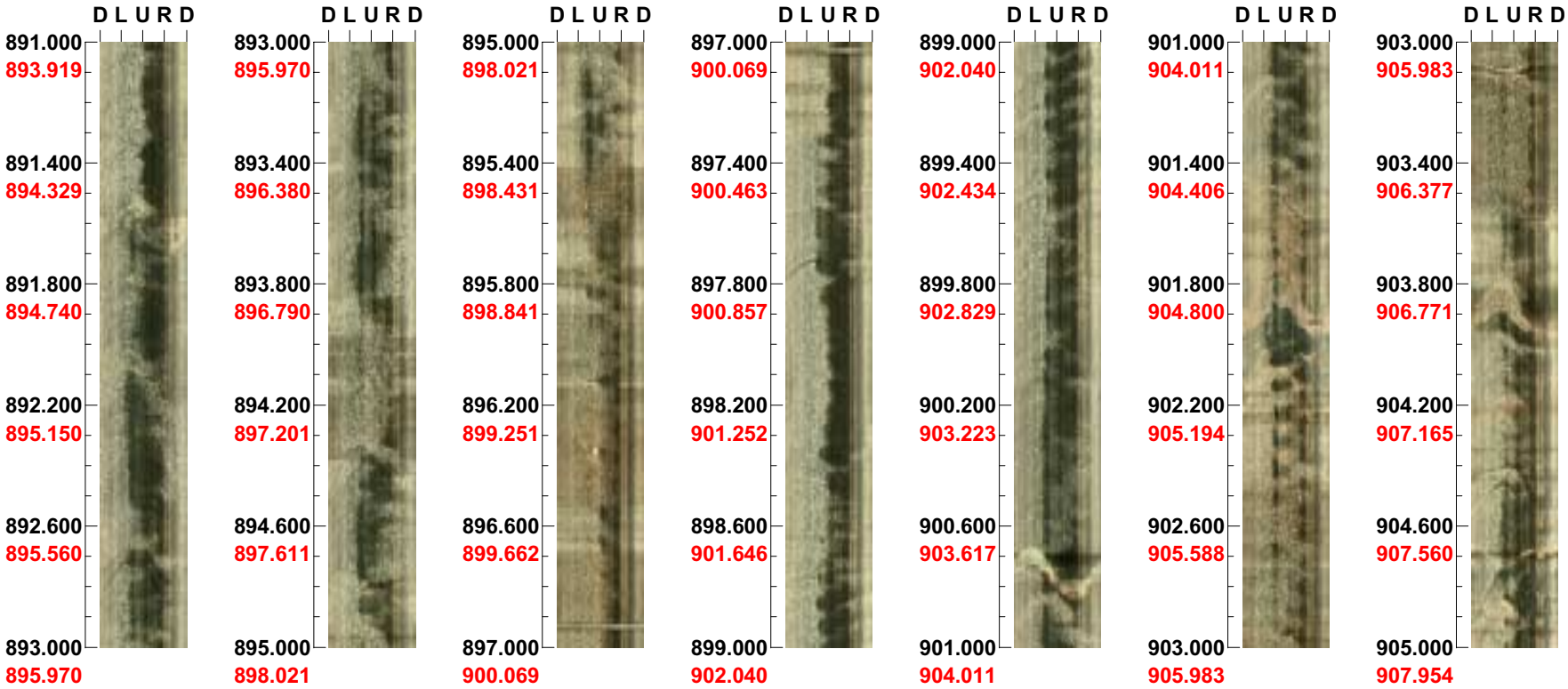
Depth range: 877.000 - 891.000 m



Scale: 1/20 **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

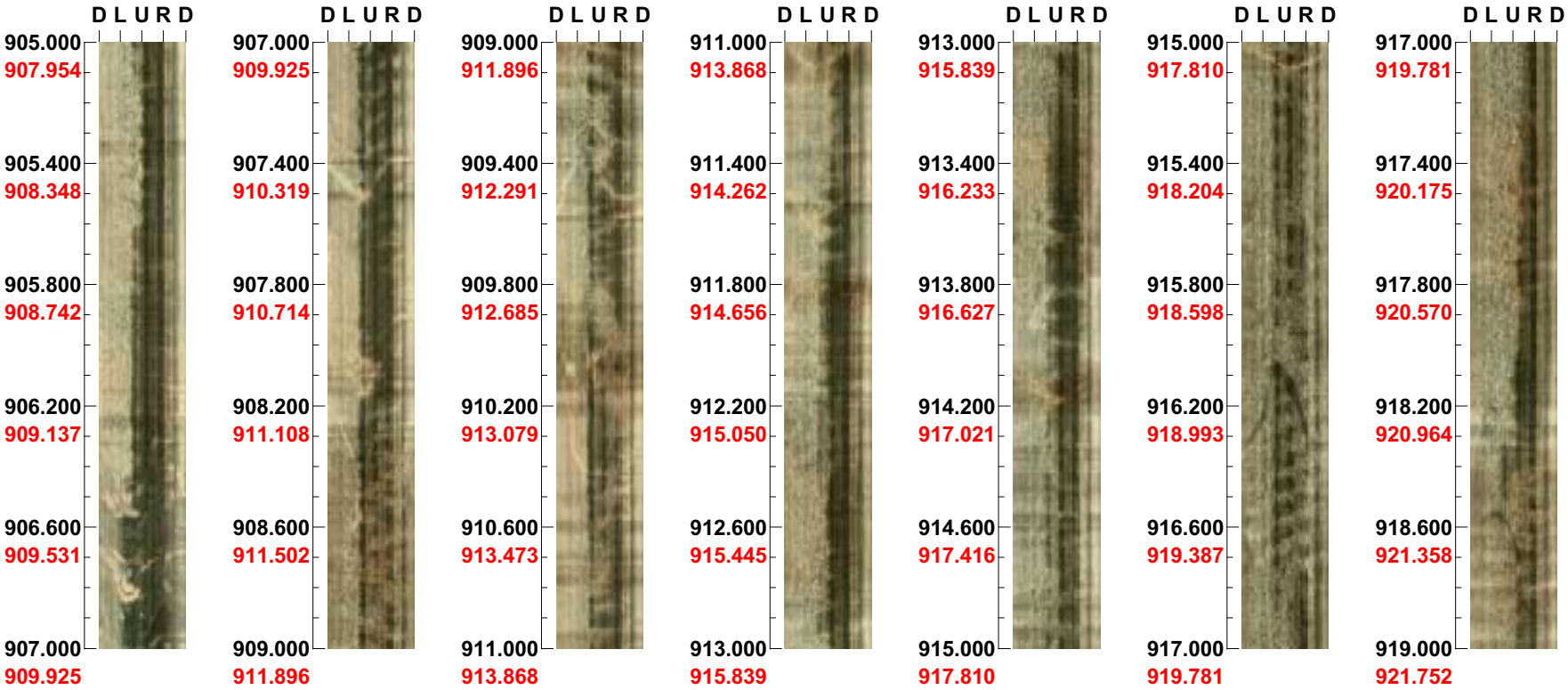
Depth range: 891.000 - 905.000 m



(29 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

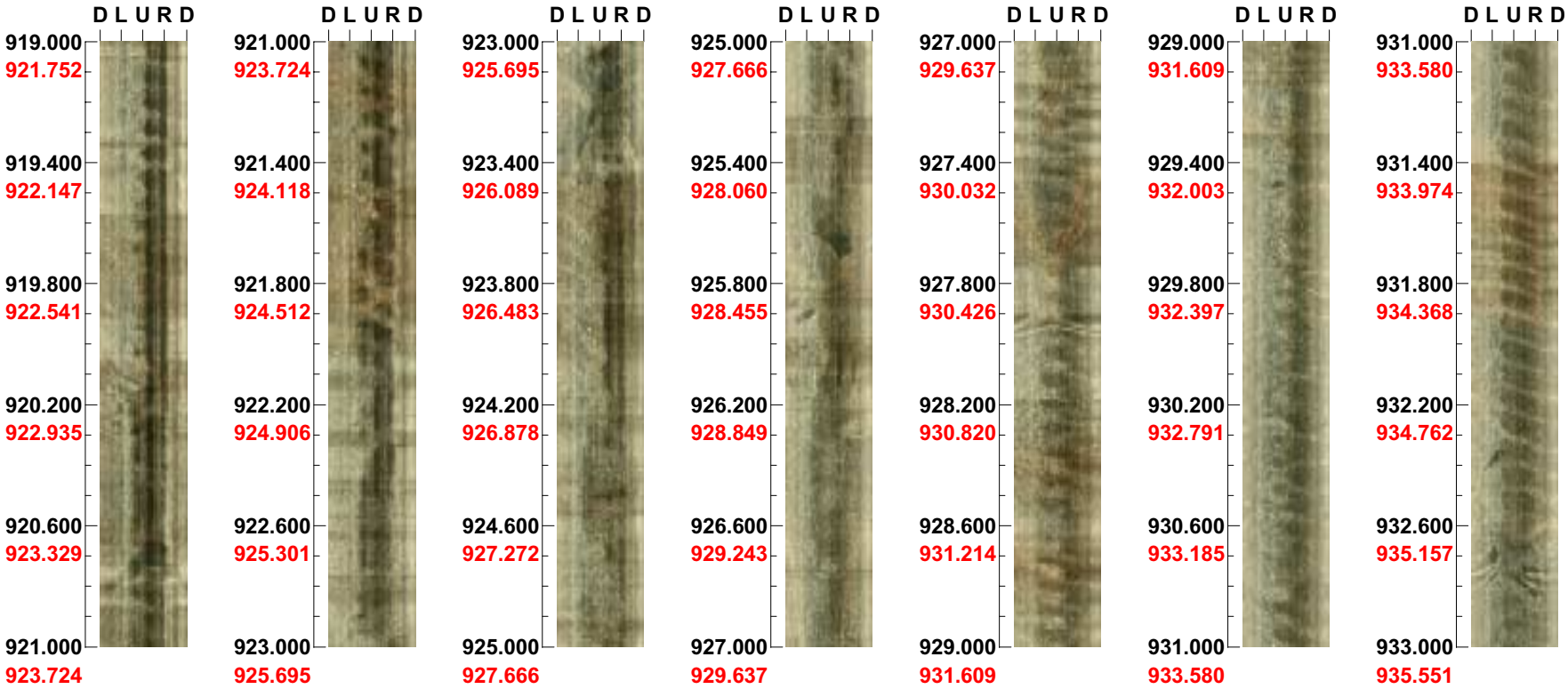
Depth range: 905.000 - 919.000 m



(30 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

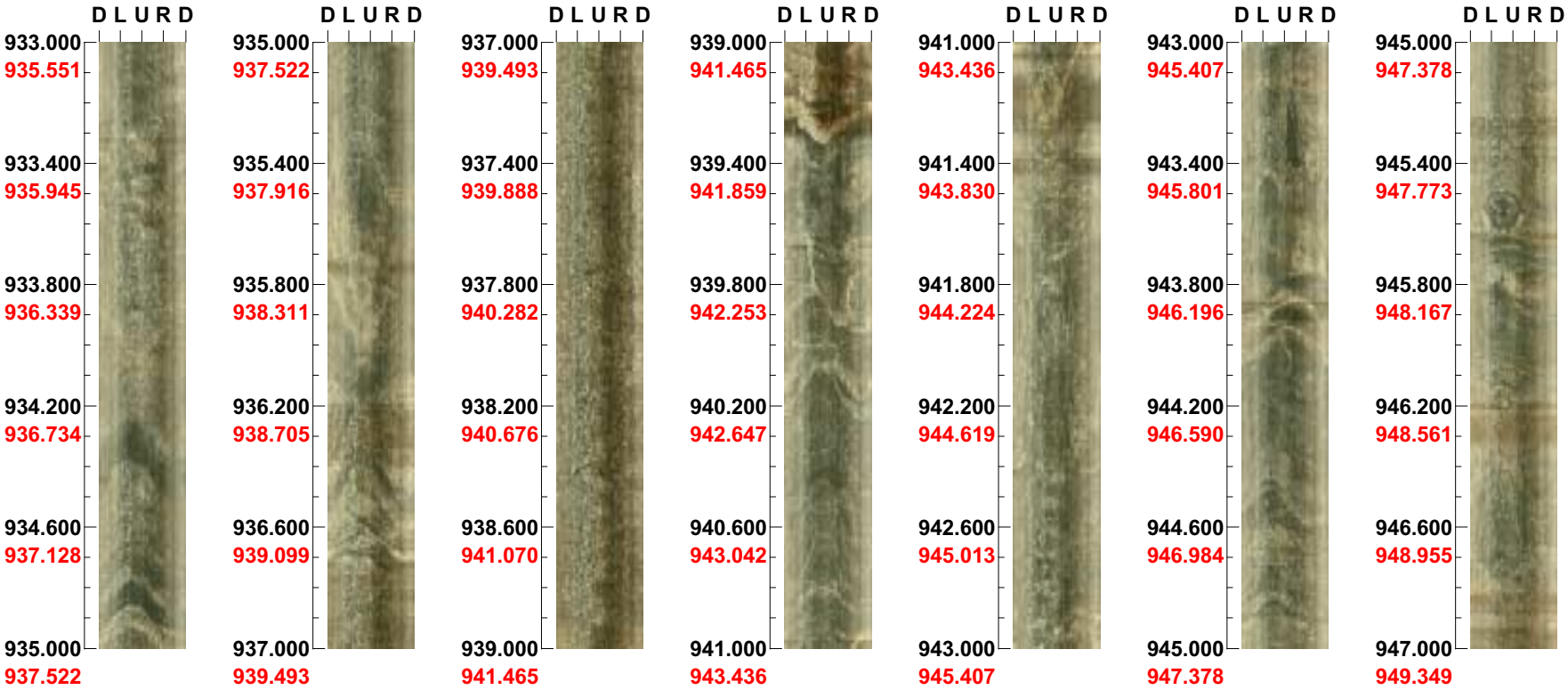
Depth range: 919.000 - 933.000 m



(31 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

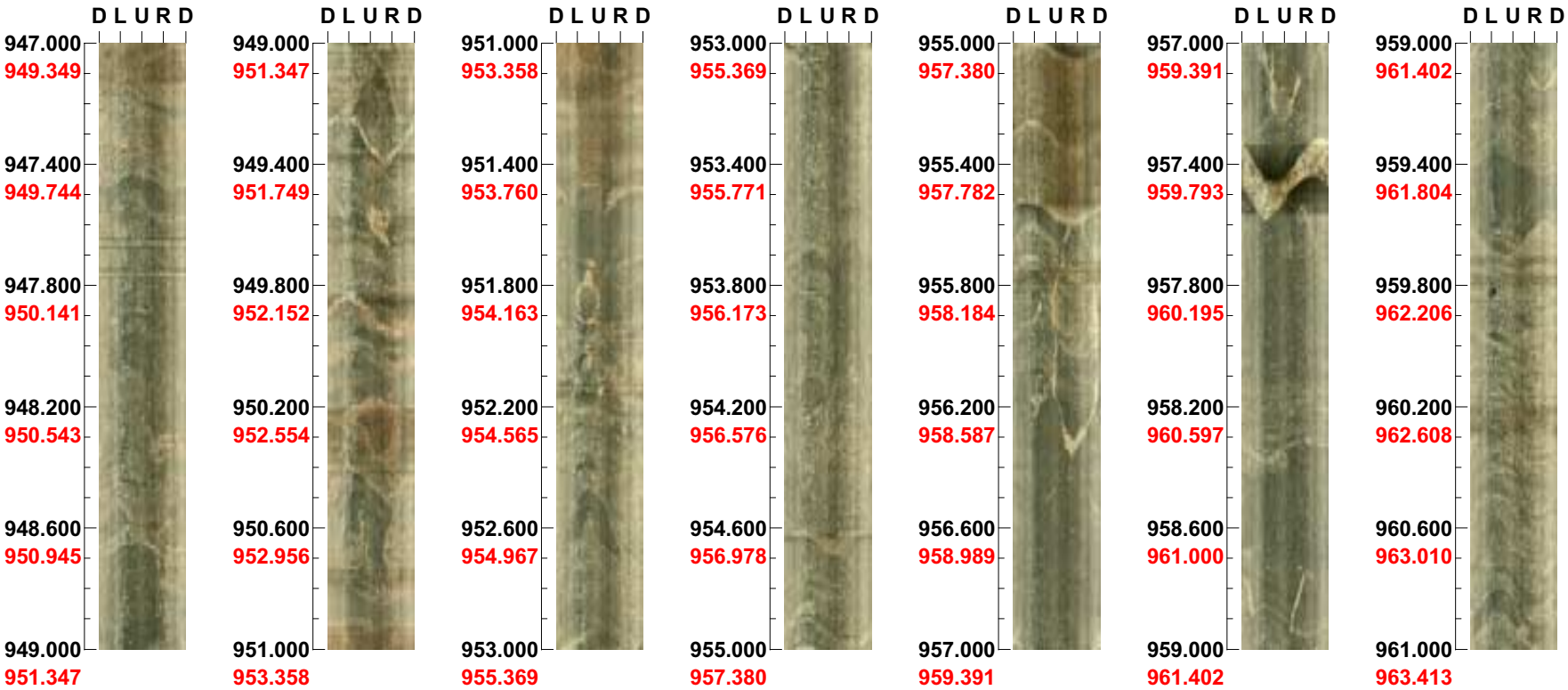
Depth range: 933.000 - 947.000 m



(32 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

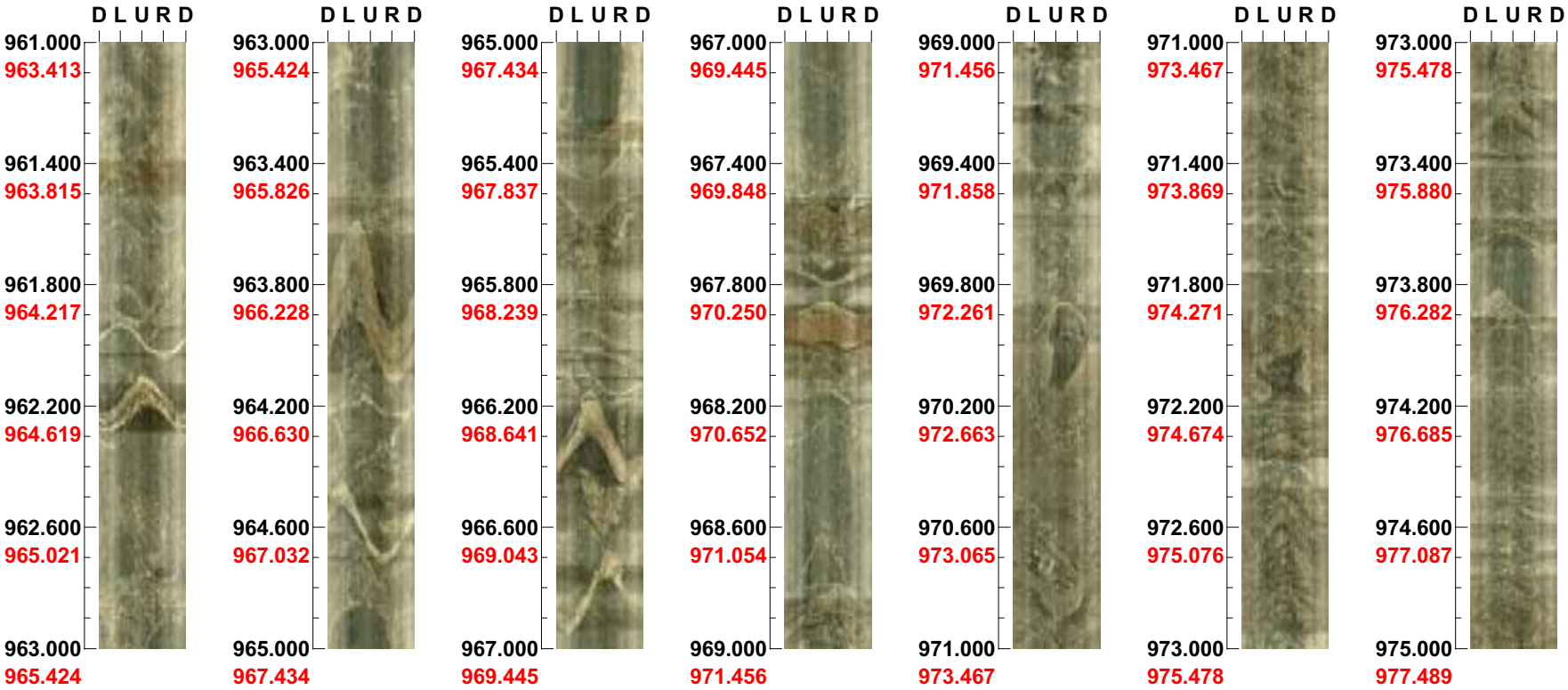
Depth range: 947.000 - 961.000 m



(33 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

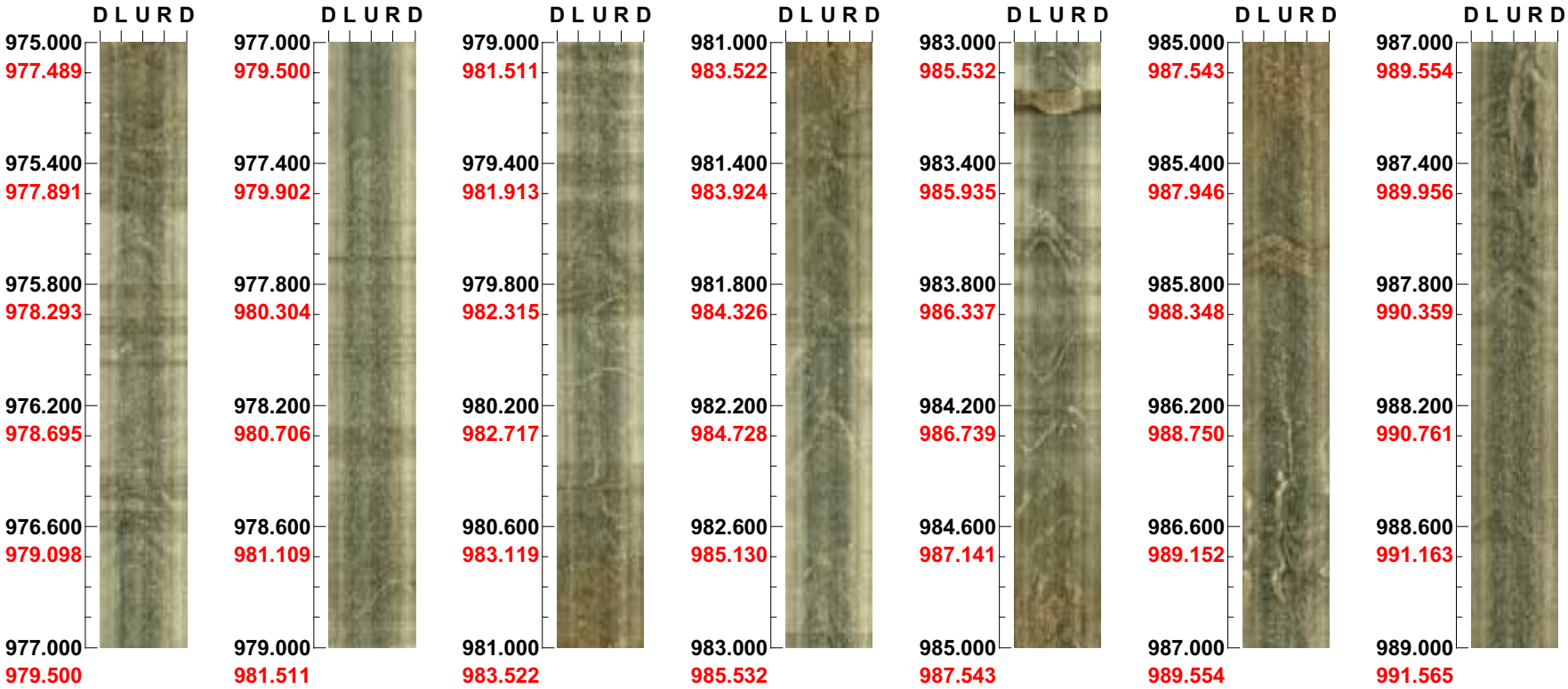
Depth range: 961.000 - 975.000 m



(34 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

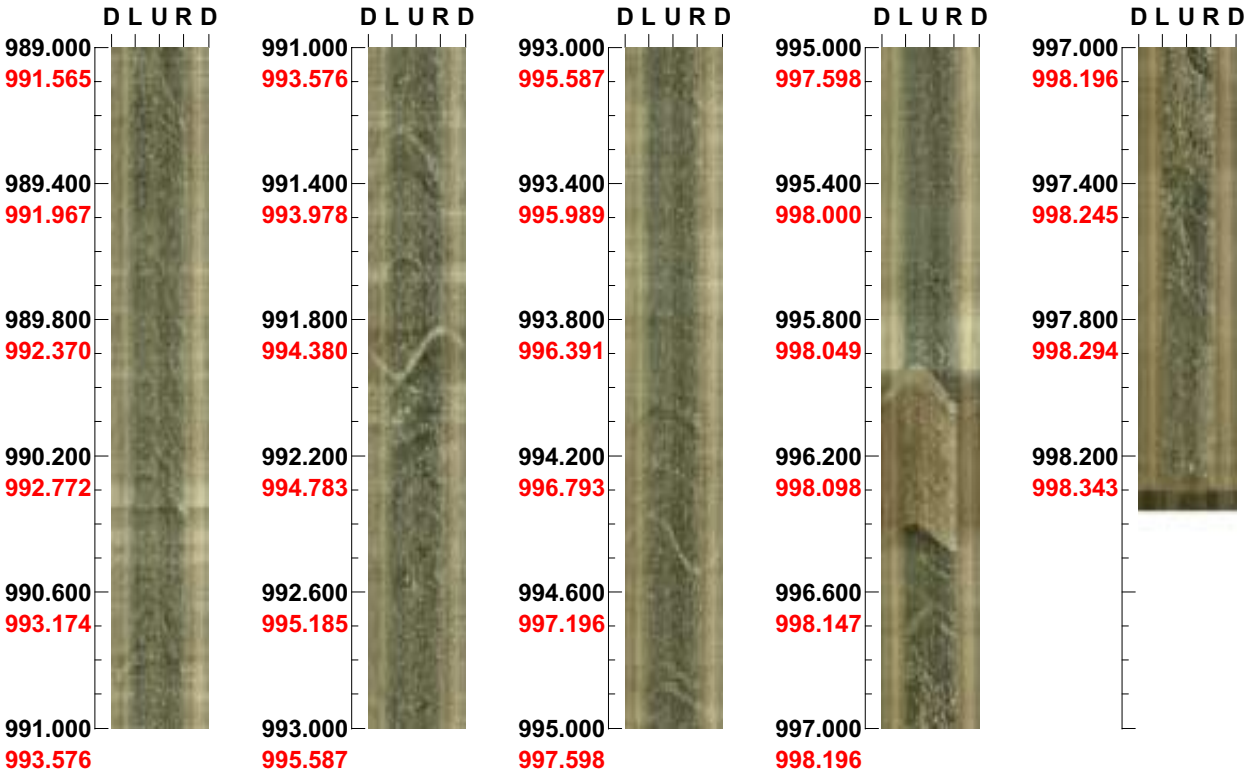
Depth range: 975.000 - 989.000 m



(35 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

Project name: Simpevarp
Bore hole No.: KSH01A **Azimuth: 0** **Inclination: -89**

Depth range: 989.000 - 998.363 m



(36 / 36) **Scale: 1/20** **Aspect ratio: 120 %**

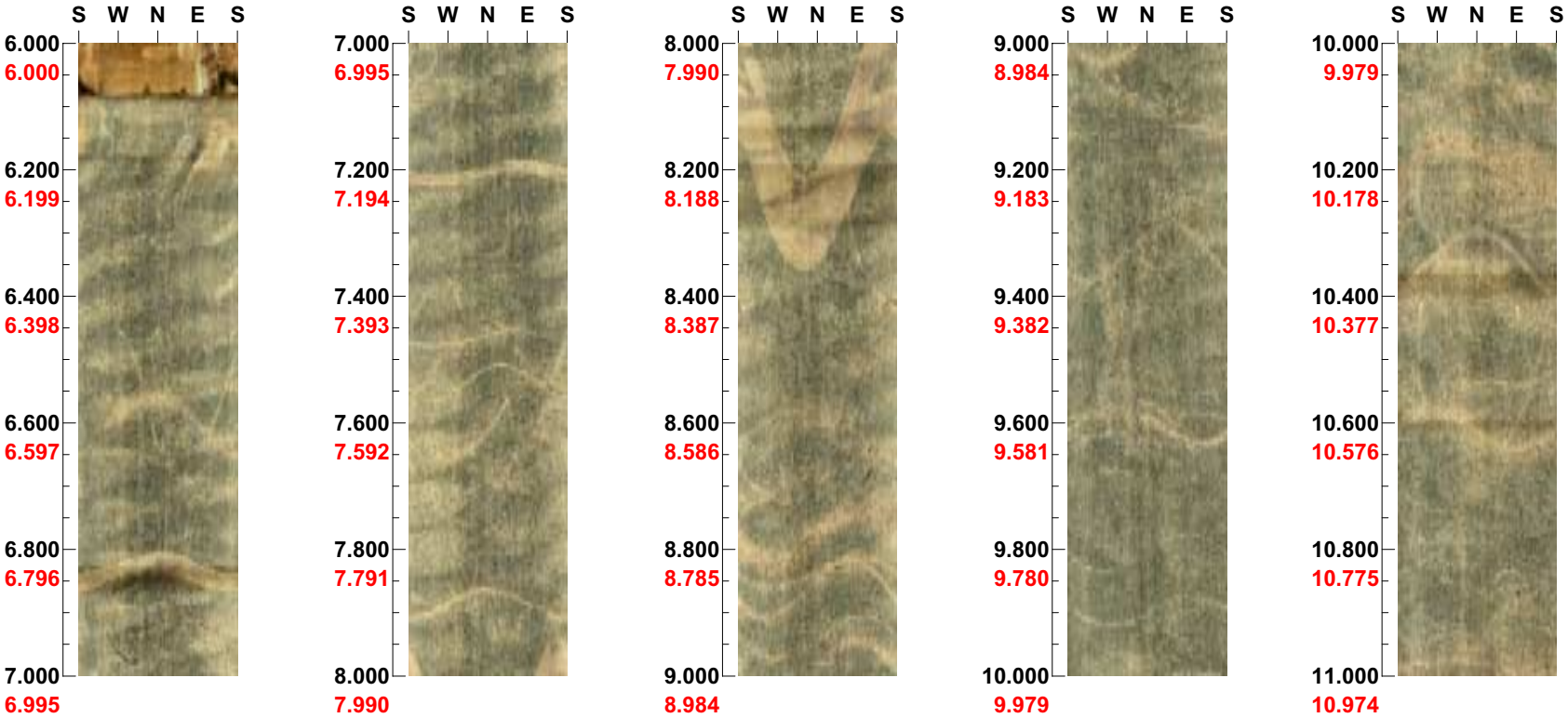
BIPS results from KSH01B

Project name: Simpevarp

Image file	**: c:\work\r5087s~1\bips\mars\ksh01b~1.bip**
BDT file	**: c:\work\r5087s~1\bips\mars\ksh01b~1.bdt**
Locality	**: SIMPAN**
Bore hole number	**: KSH01B**
Date	**: 03/02/05**
Time	**: 21:19:00**
Depth range	**: 6.000 - 99.360 m**
Azimuth	**: 0**
Inclination	**: -88**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/10**
Aspect ratio	**: 105 %**
Pages	**: 19**
Color	**: +0 +0 +0**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

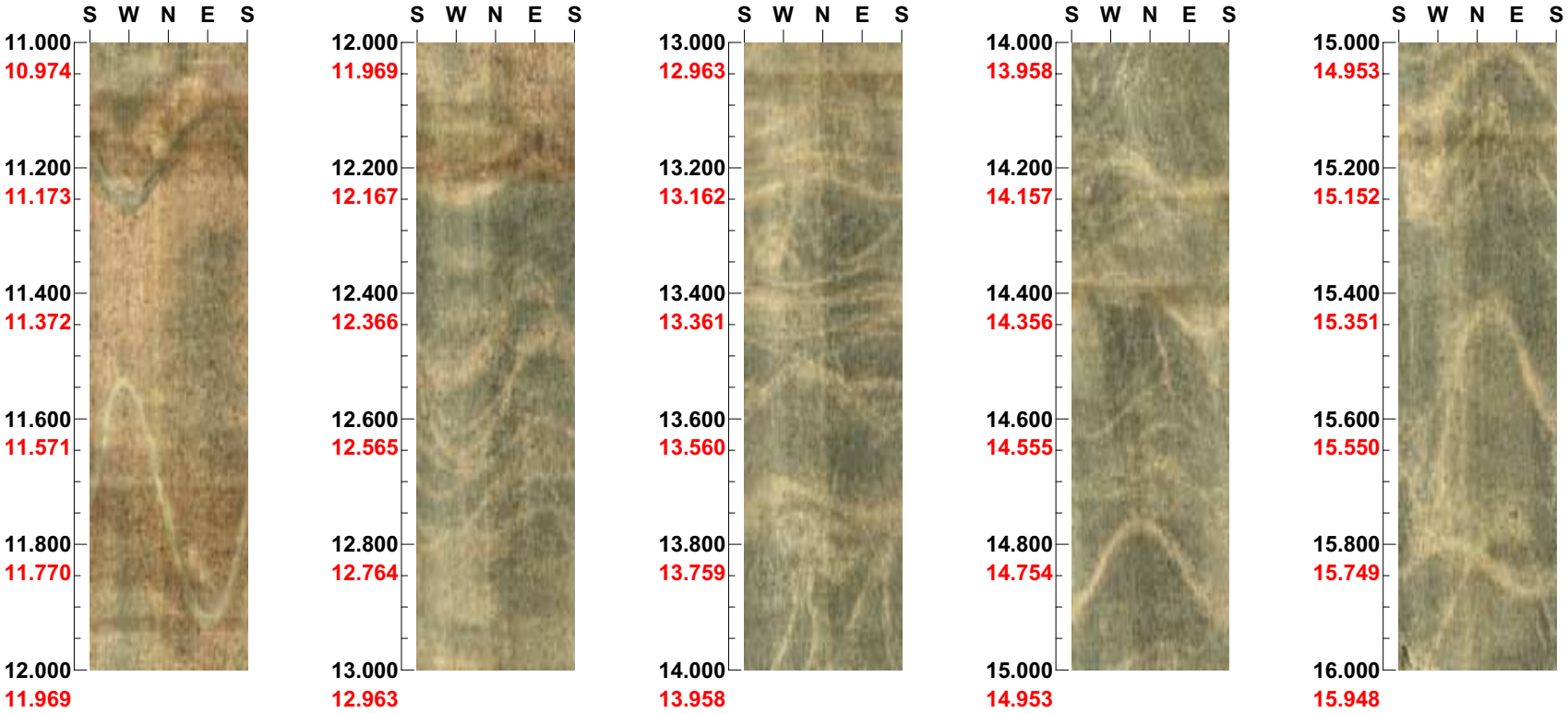
Depth range: 6.000 - 11.000 m



(1 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

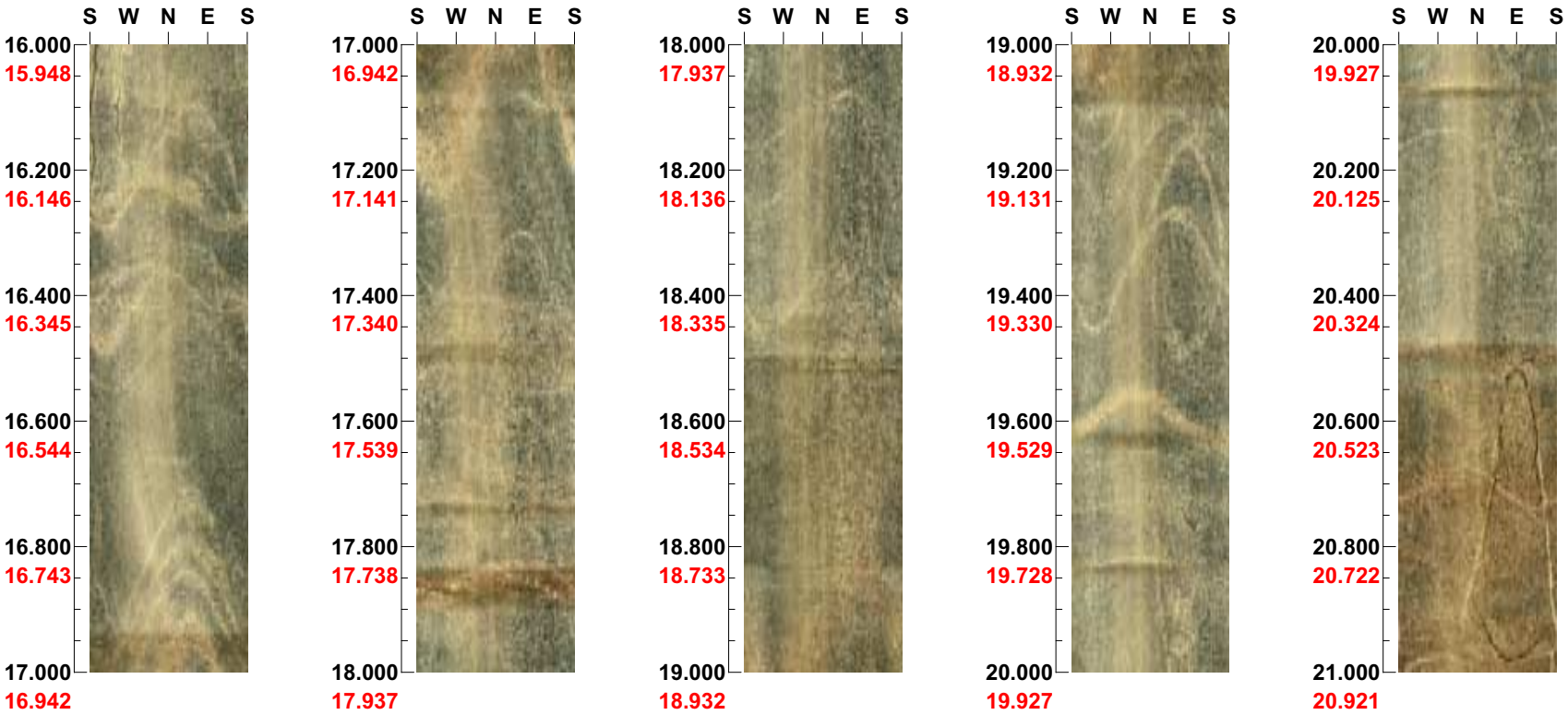
Depth range: 11.000 - 16.000 m



(2 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

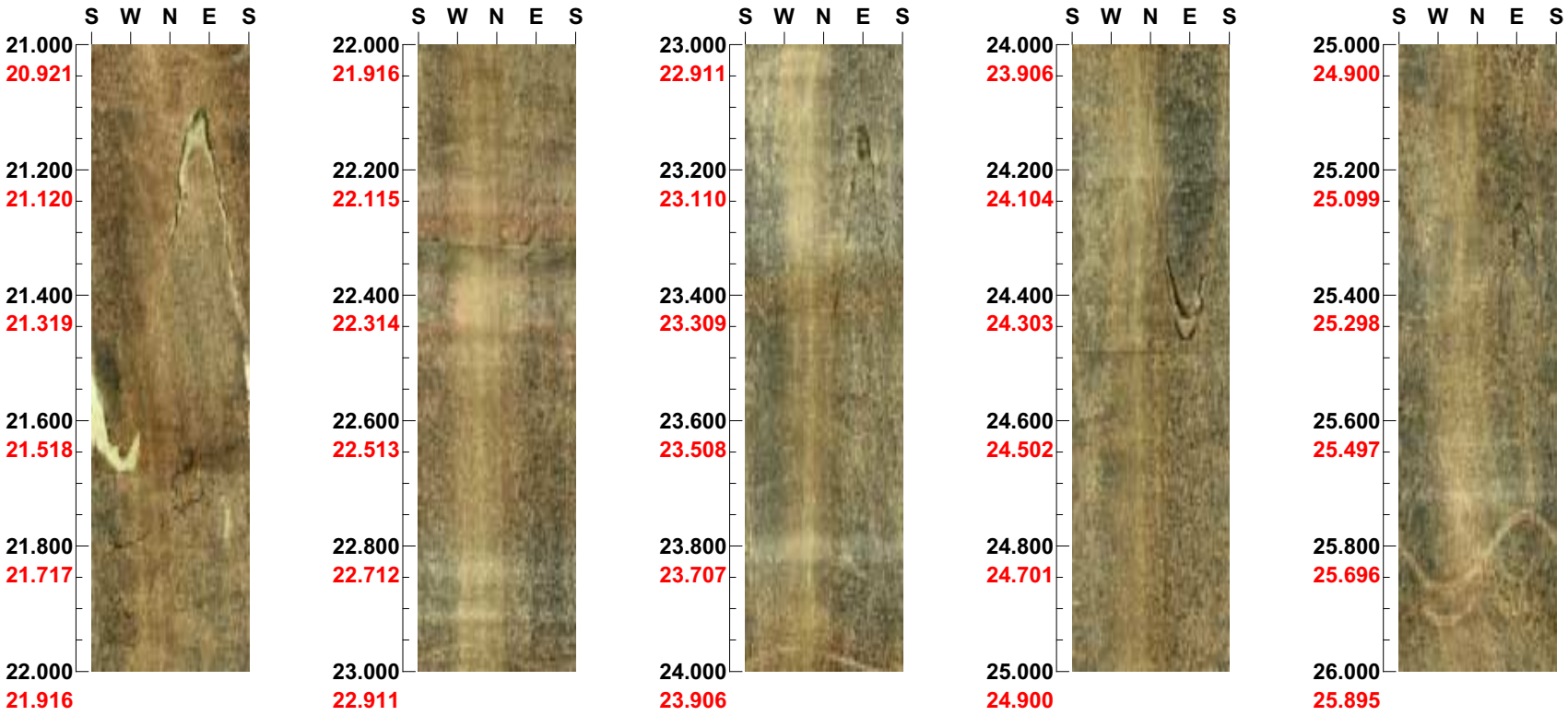
Depth range: 16.000 - 21.000 m



(3 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

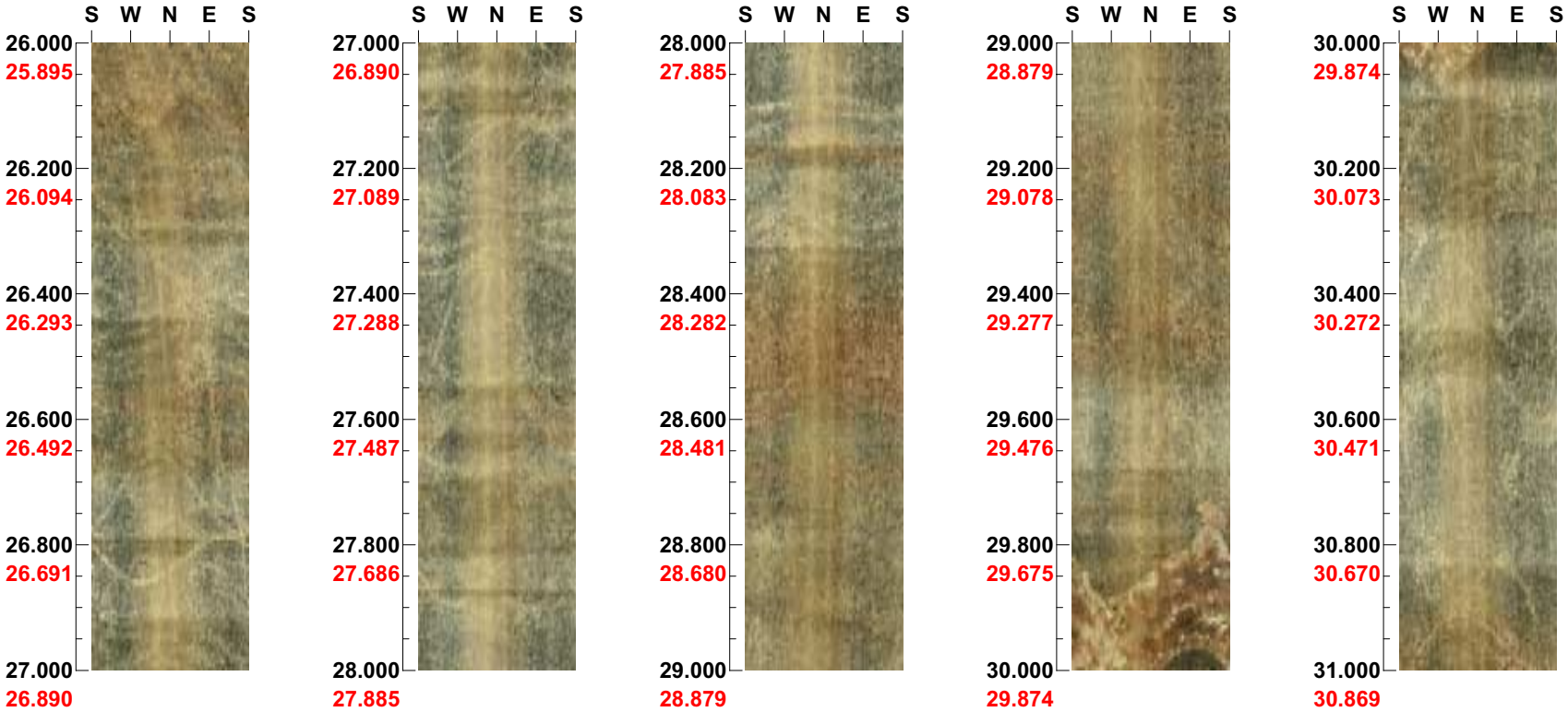
Depth range: 21.000 - 26.000 m



(4 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

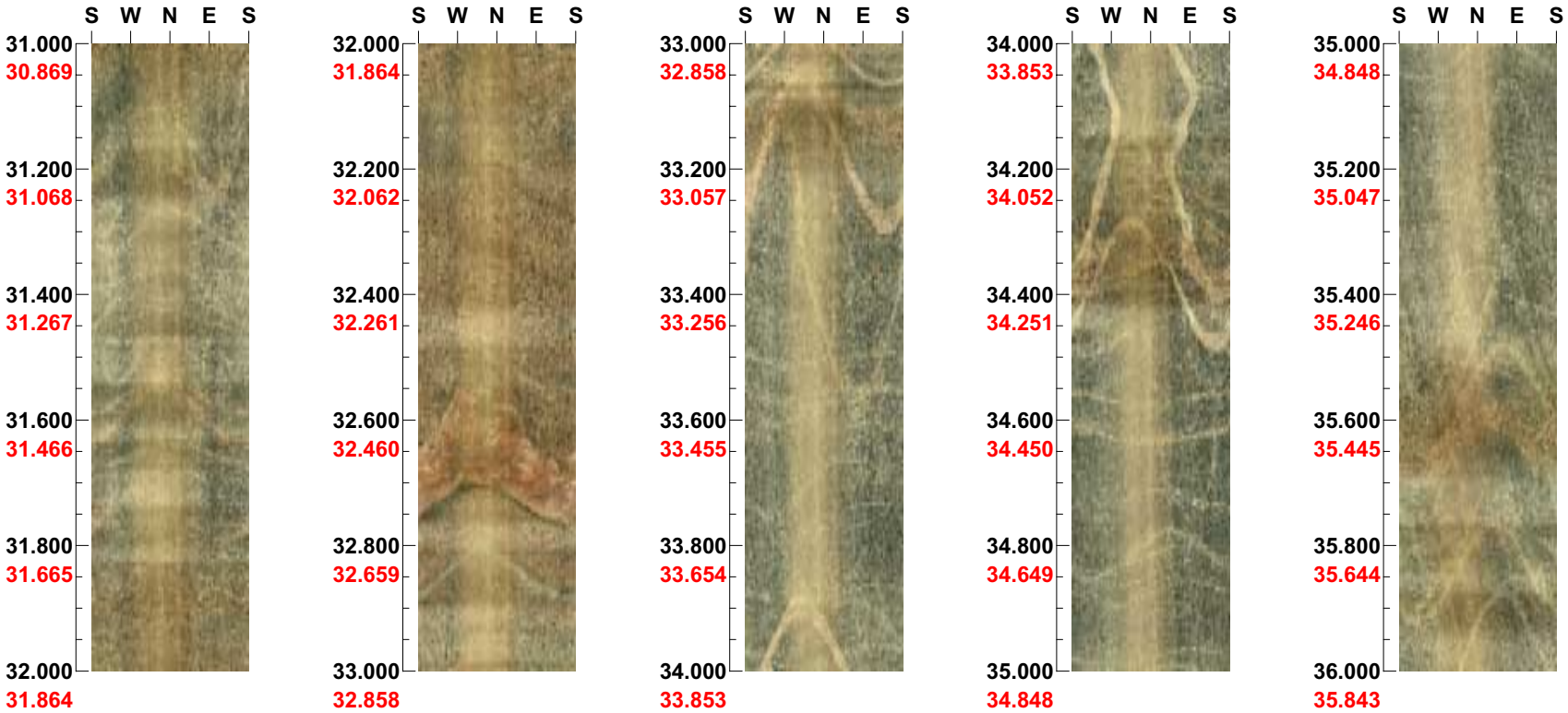
Depth range: 26.000 - 31.000 m



(5 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

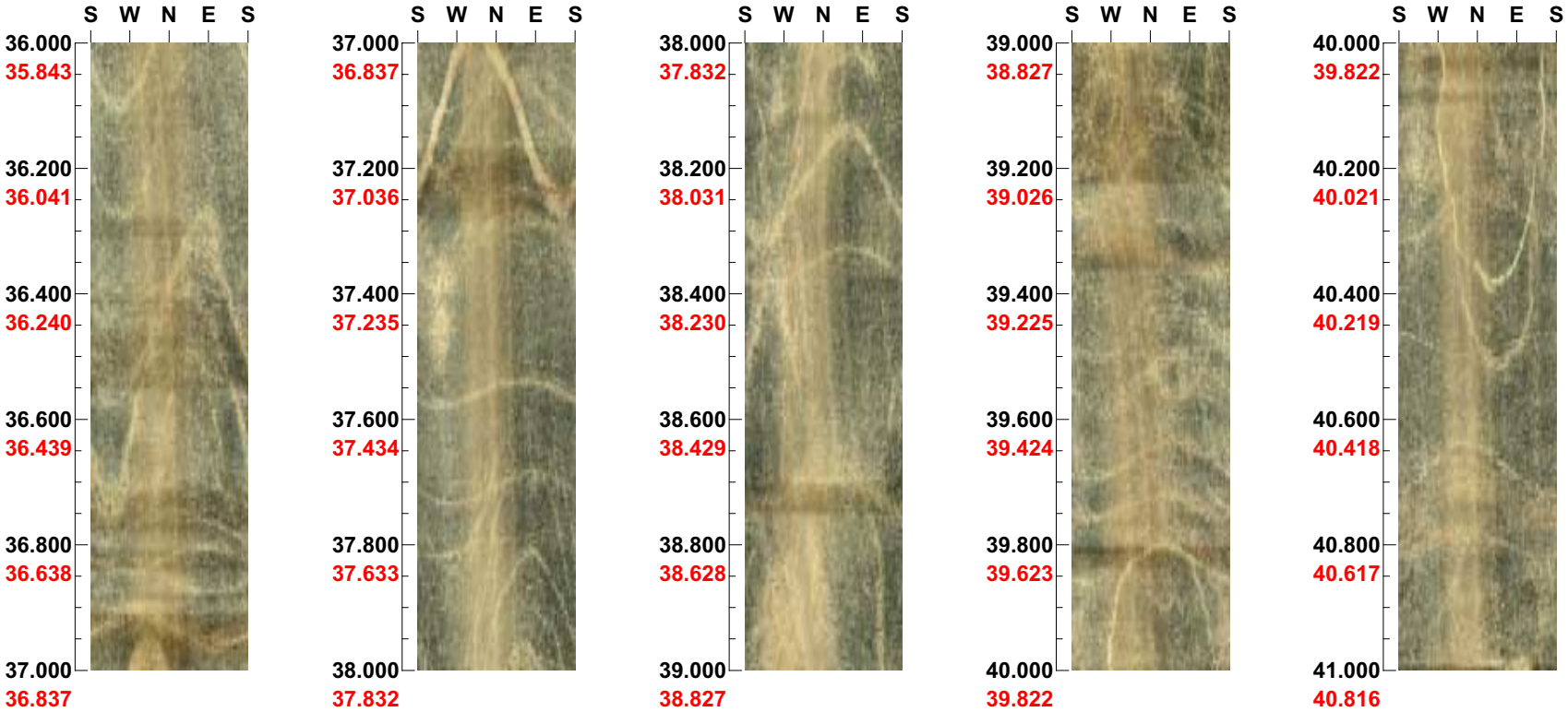
Depth range: 31.000 - 36.000 m



(6 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

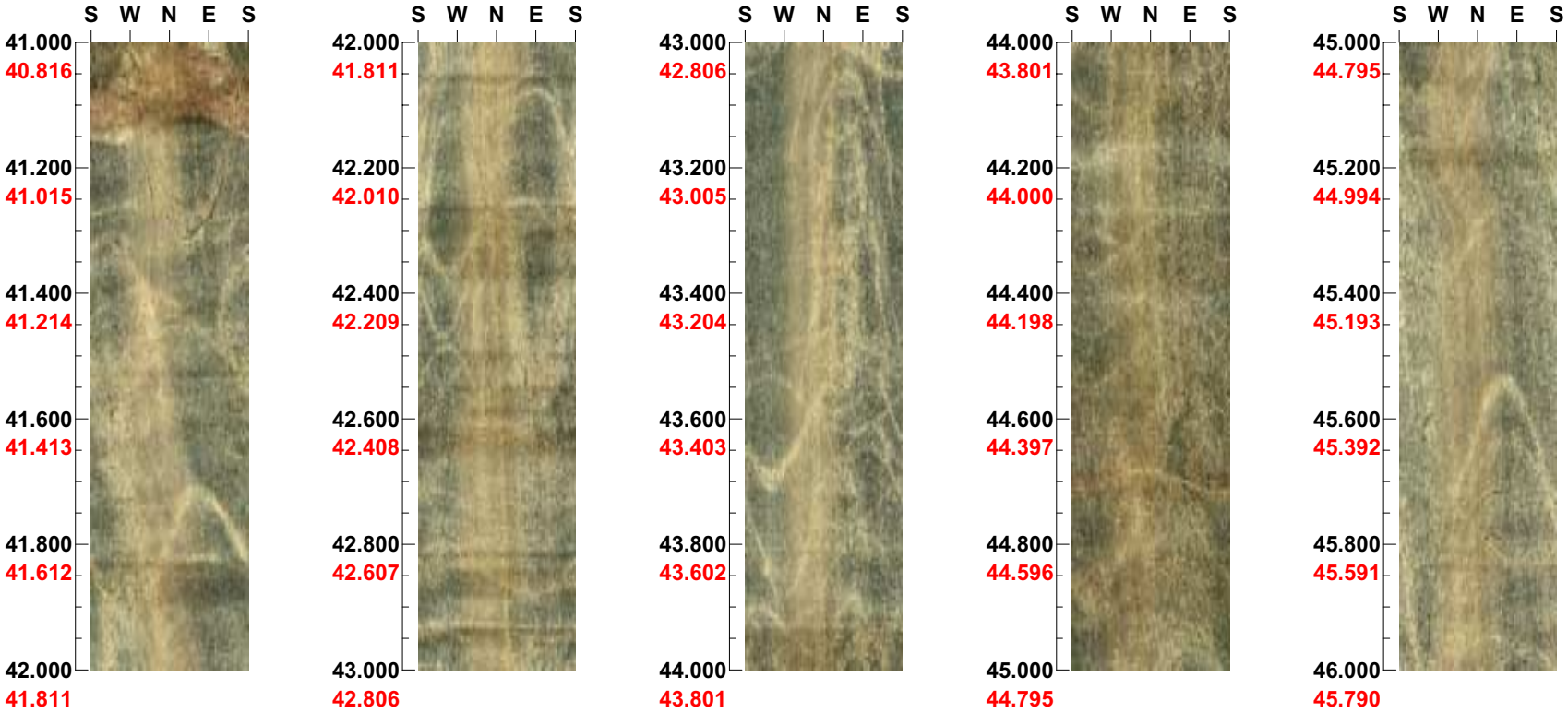
Depth range: 36.000 - 41.000 m



(7 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

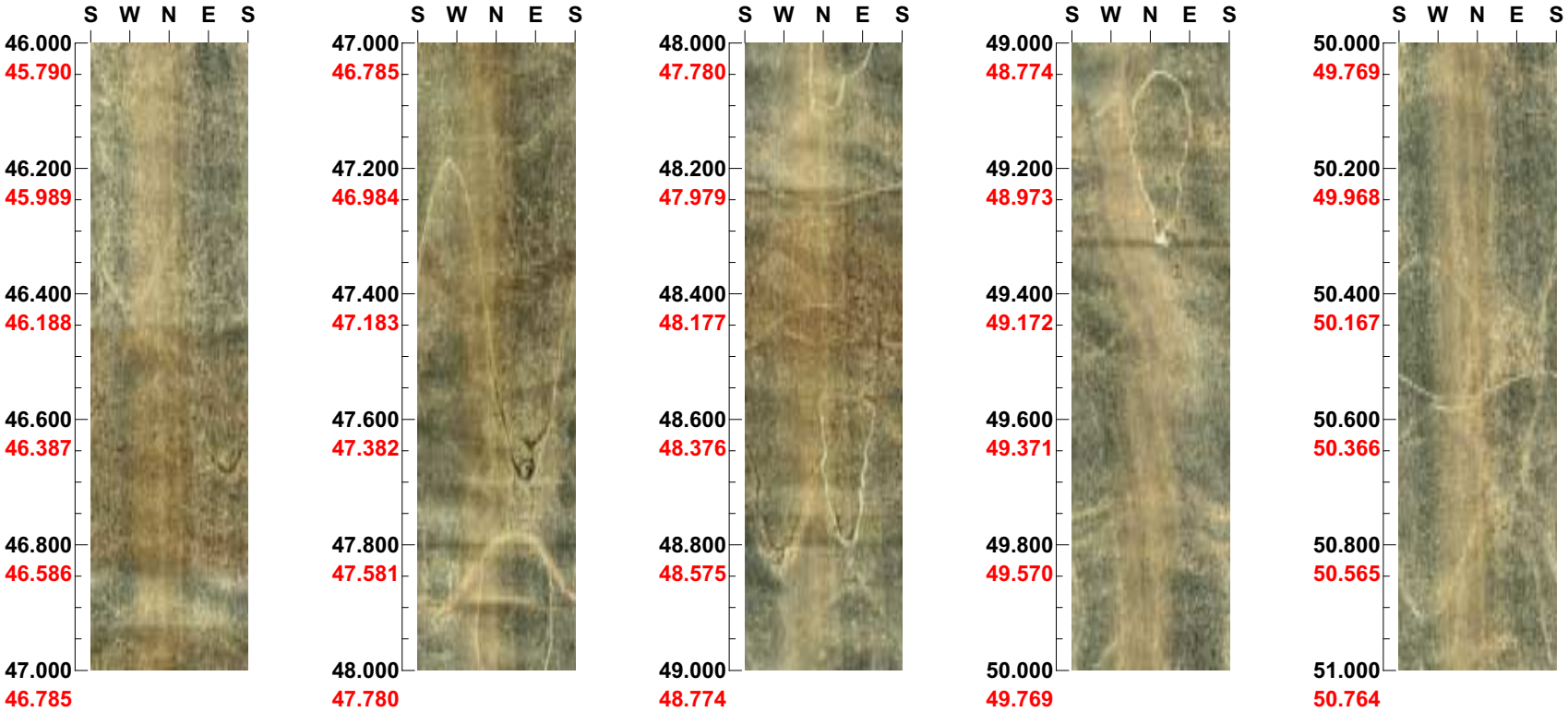
Depth range: 41.000 - 46.000 m



(8 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

Depth range: 46.000 - 51.000 m



(9 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

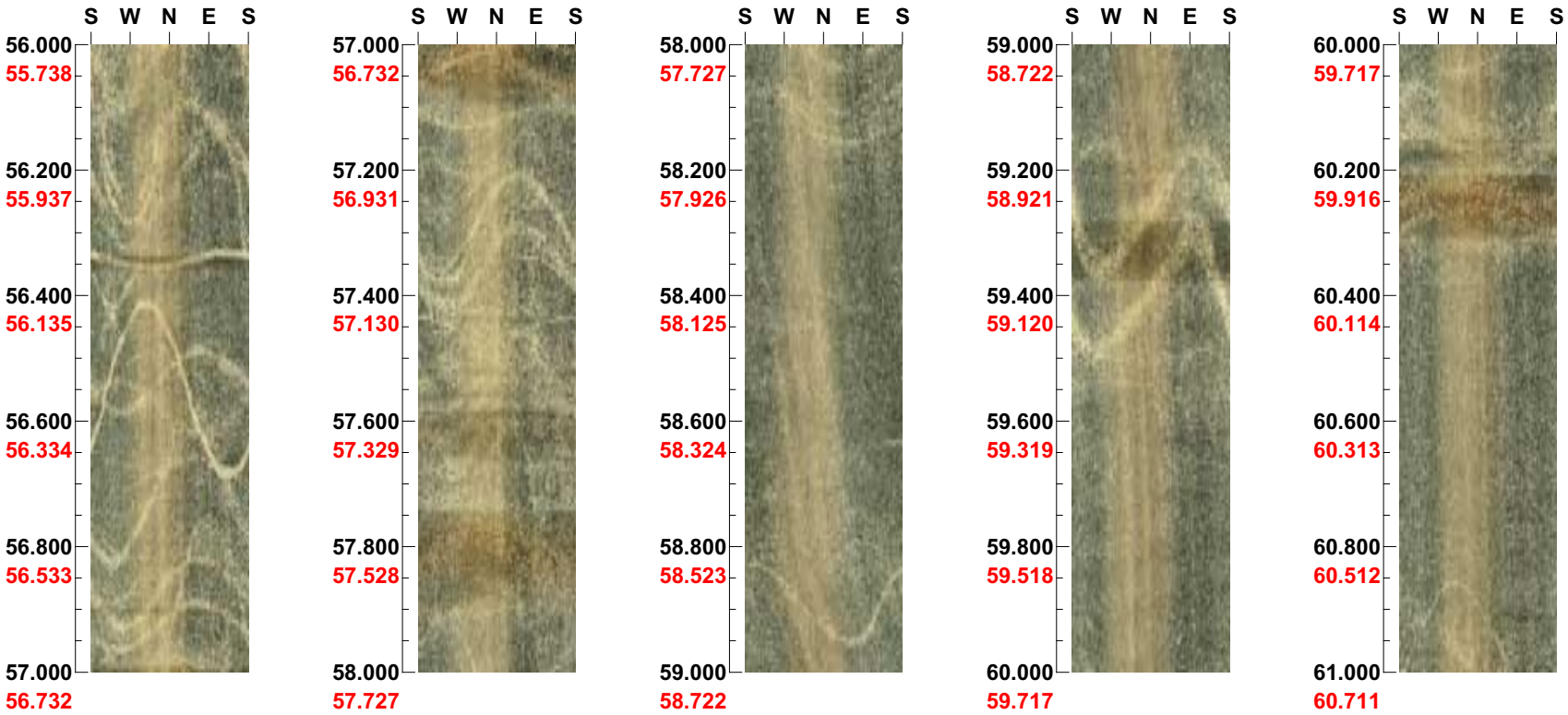
Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

Depth range: 51.000 - 56.000 m

Scale: 1/10 **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

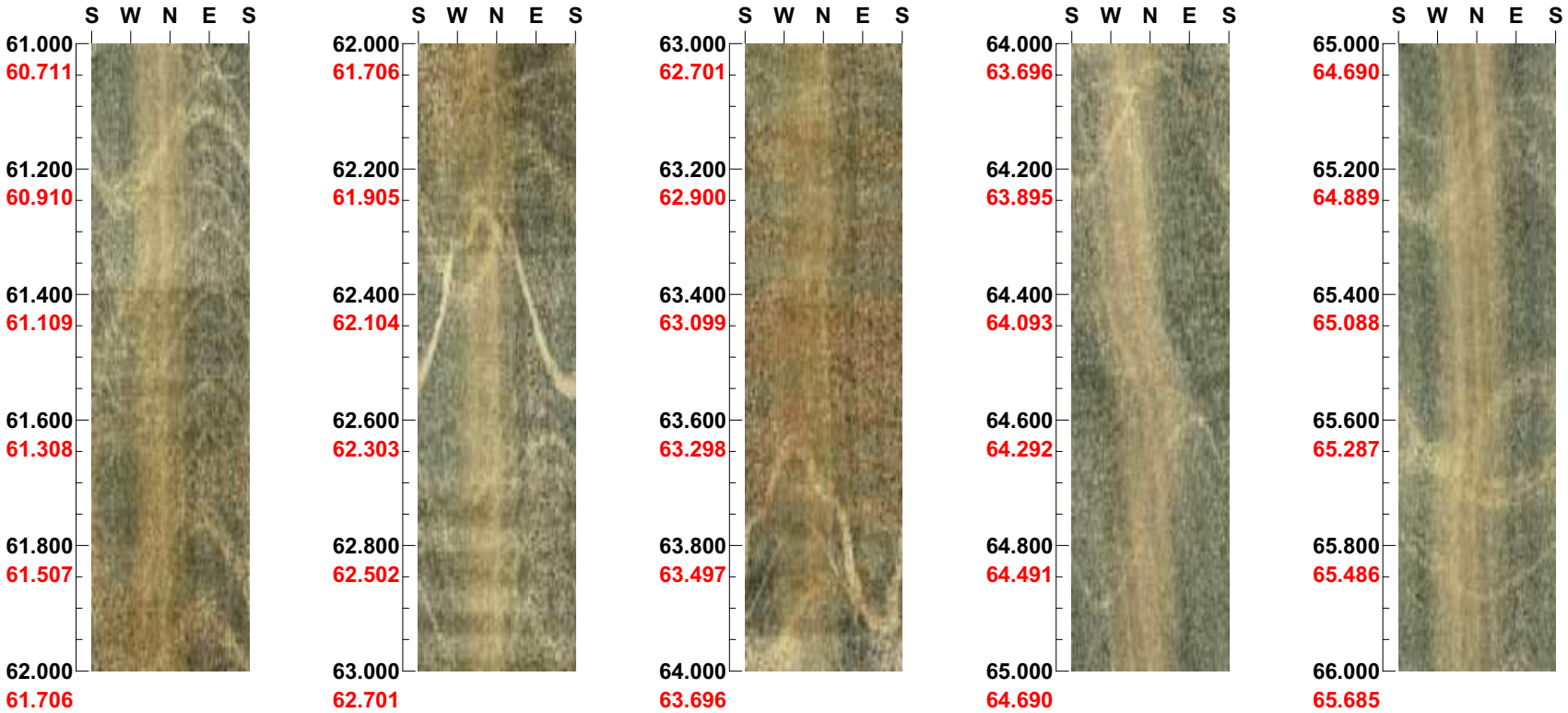
Depth range: 56.000 - 61.000 m



Scale: 1/10 **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

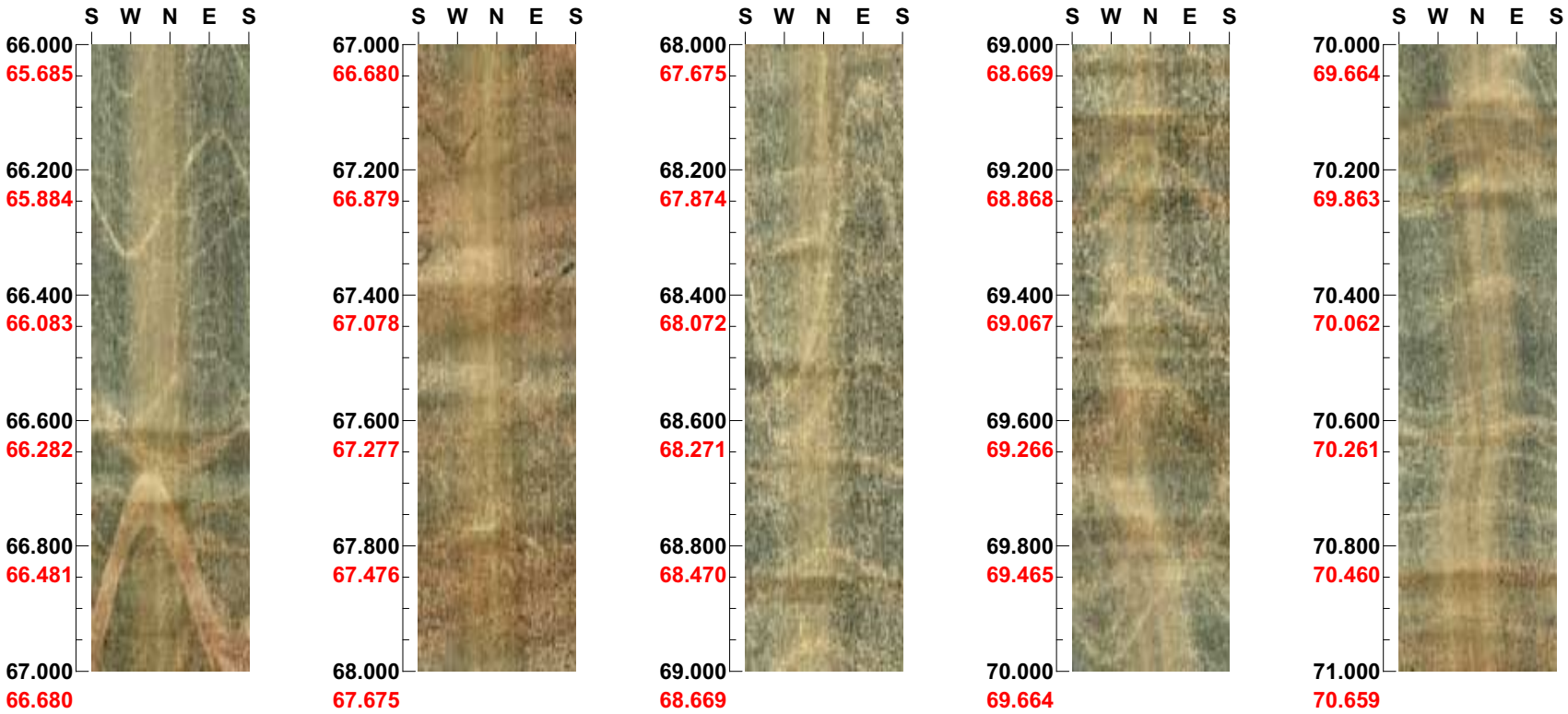
Depth range: 61.000 - 66.000 m



(12 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

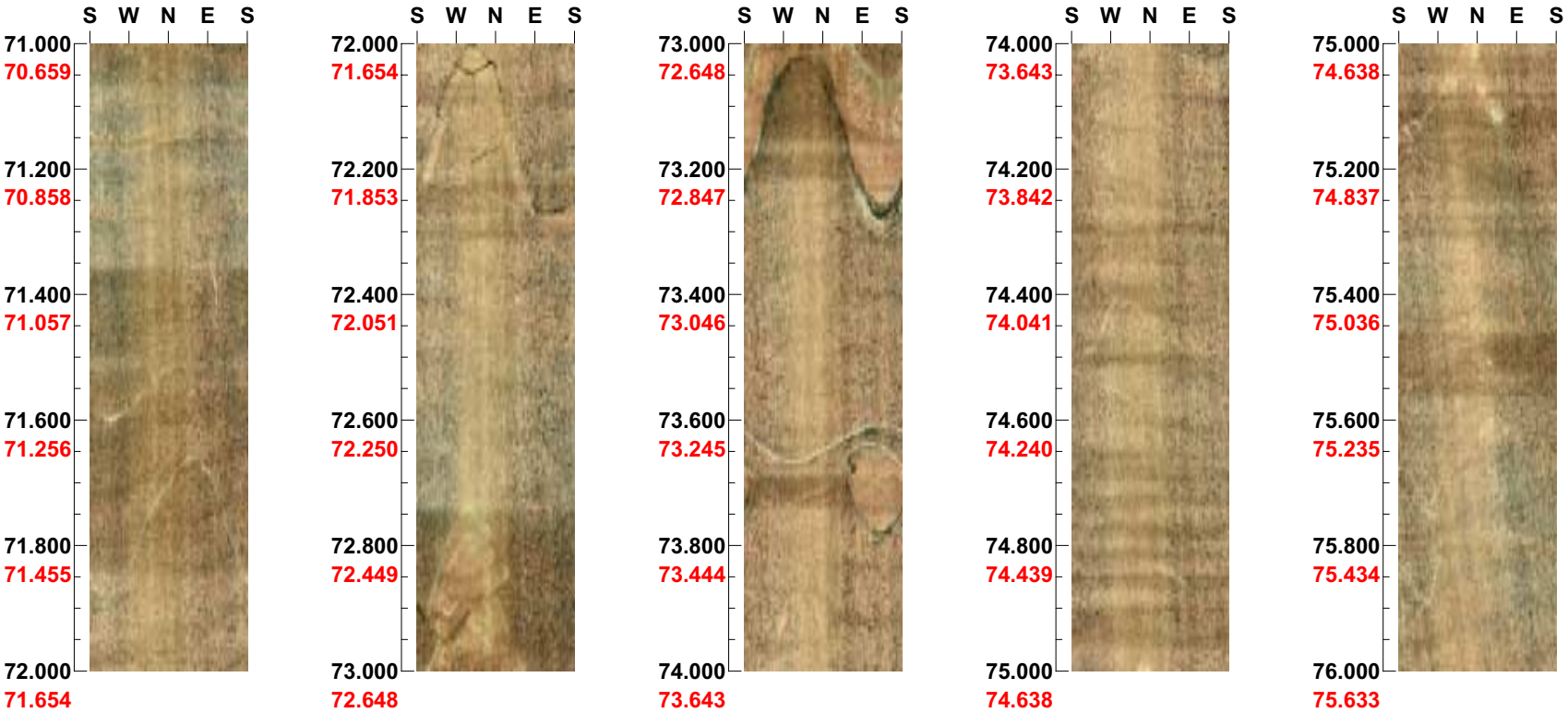
Depth range: 66.000 - 71.000 m



(13 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

Depth range: 71.000 - 76.000 m

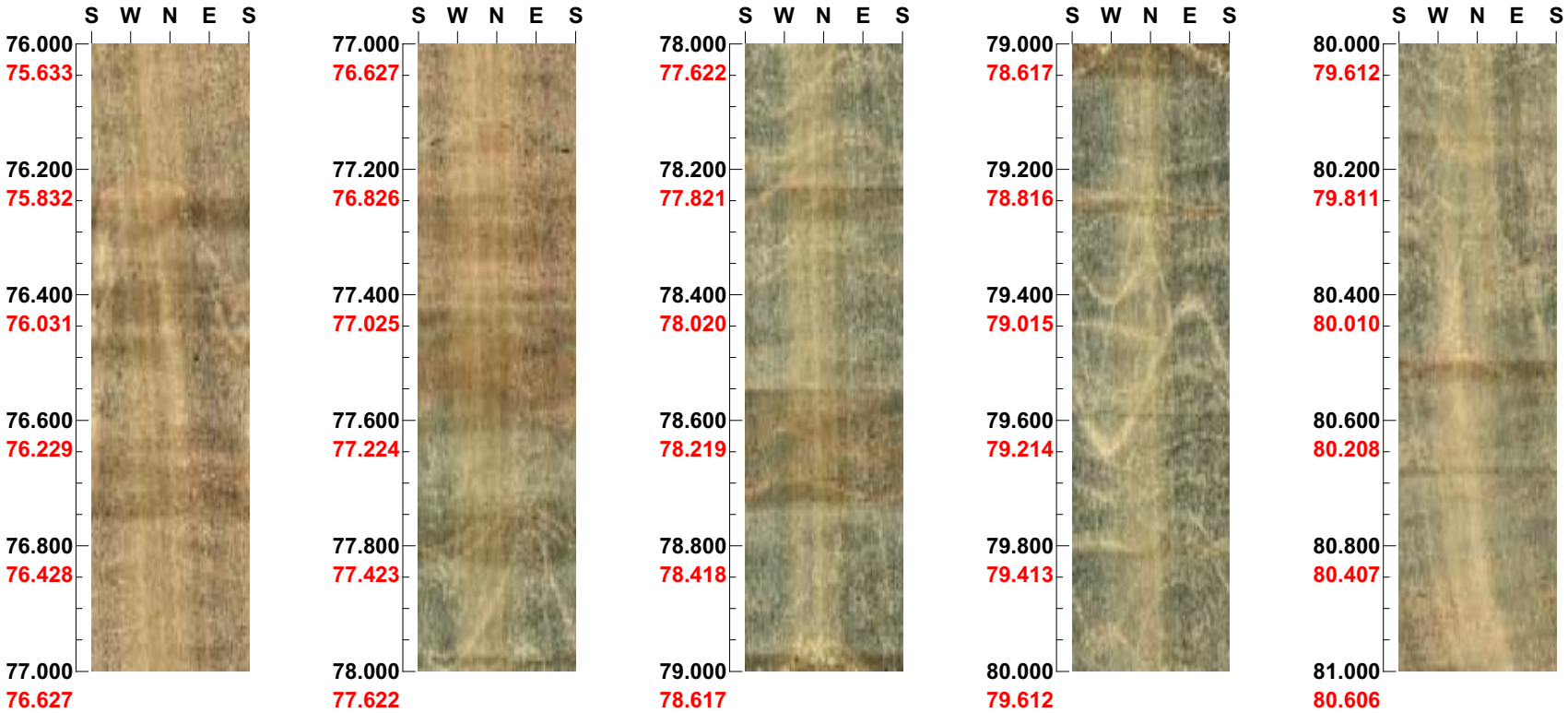


(14 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B

Azimuth: 0 **Inclination: -88**

Depth range: 76.000 - 81.000 m

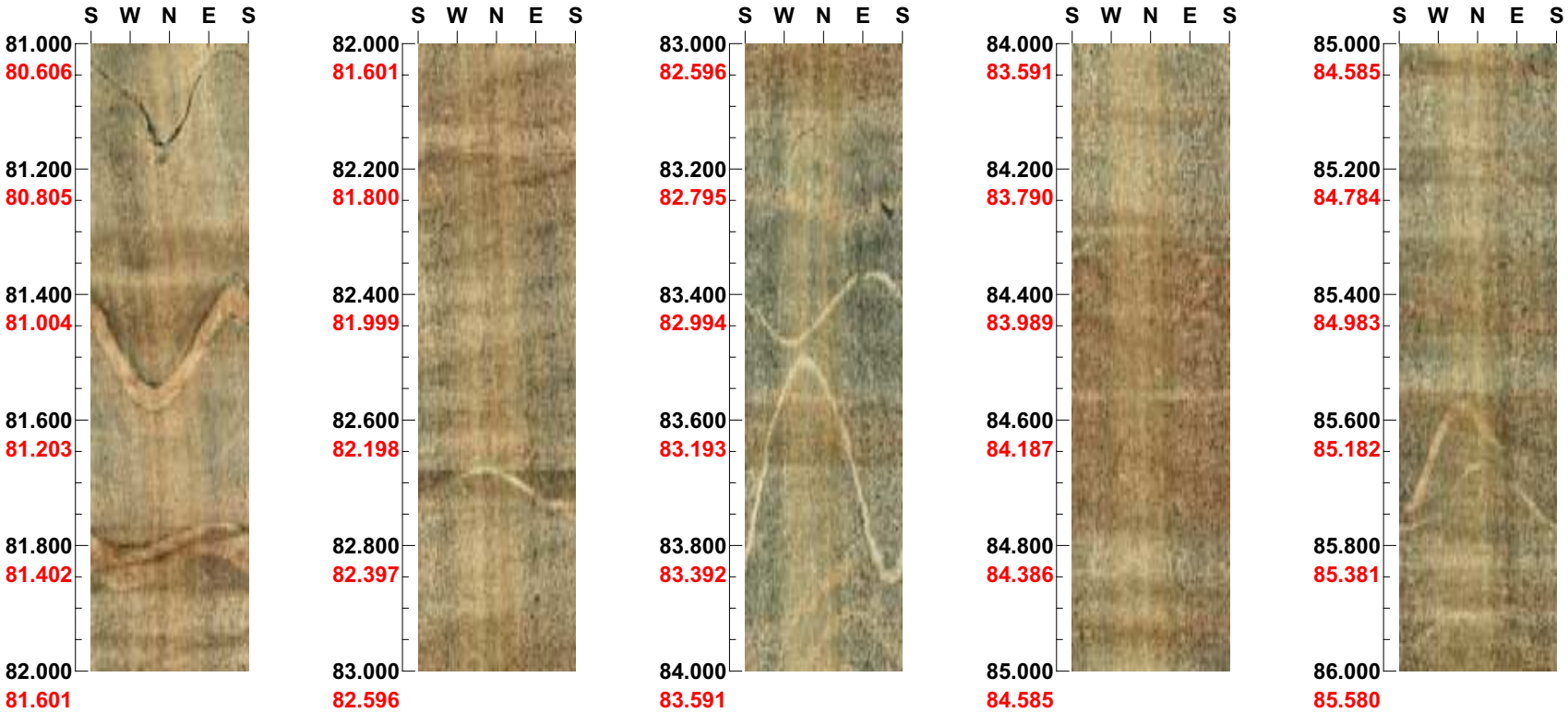


(15 / 19)

Scale: 1/10 **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

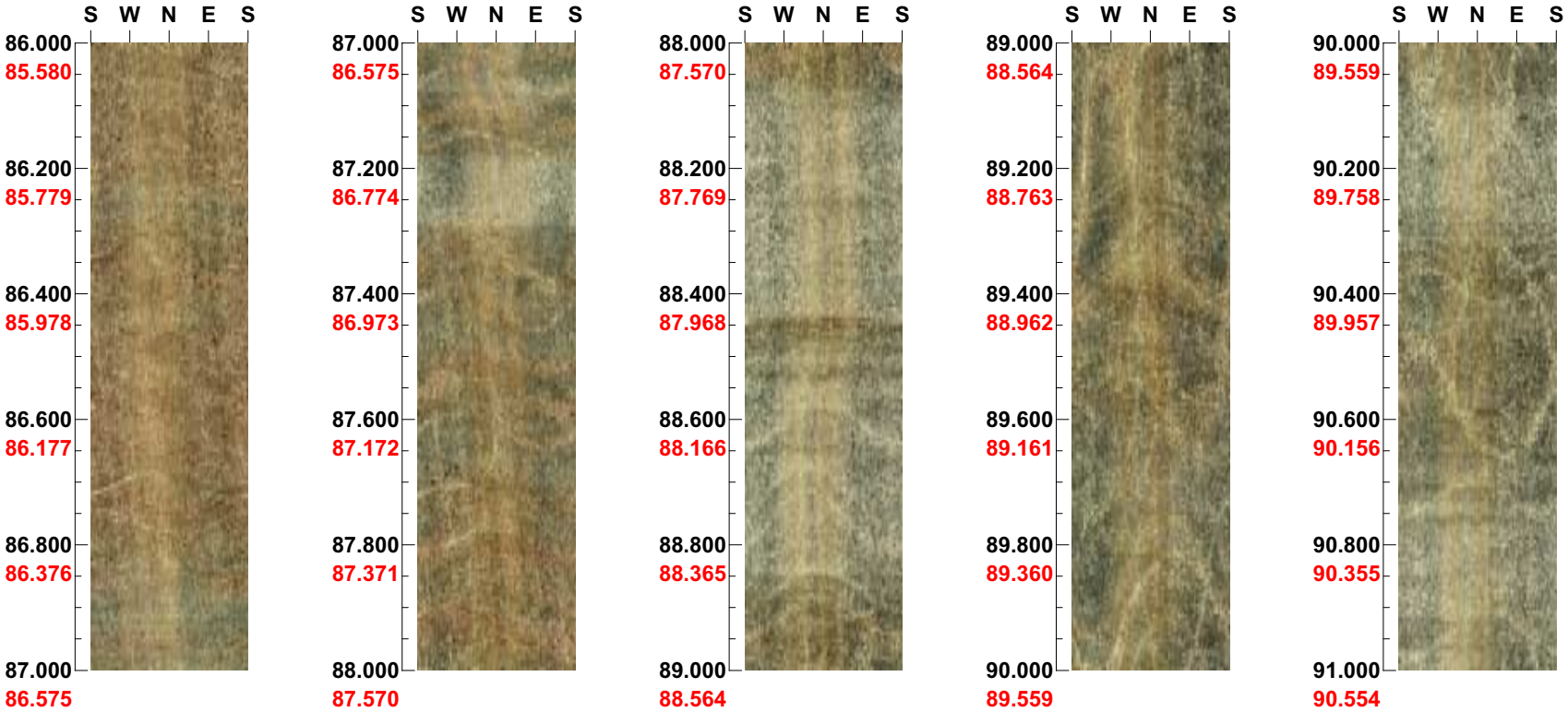
Depth range: 81.000 - 86.000 m



(16 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

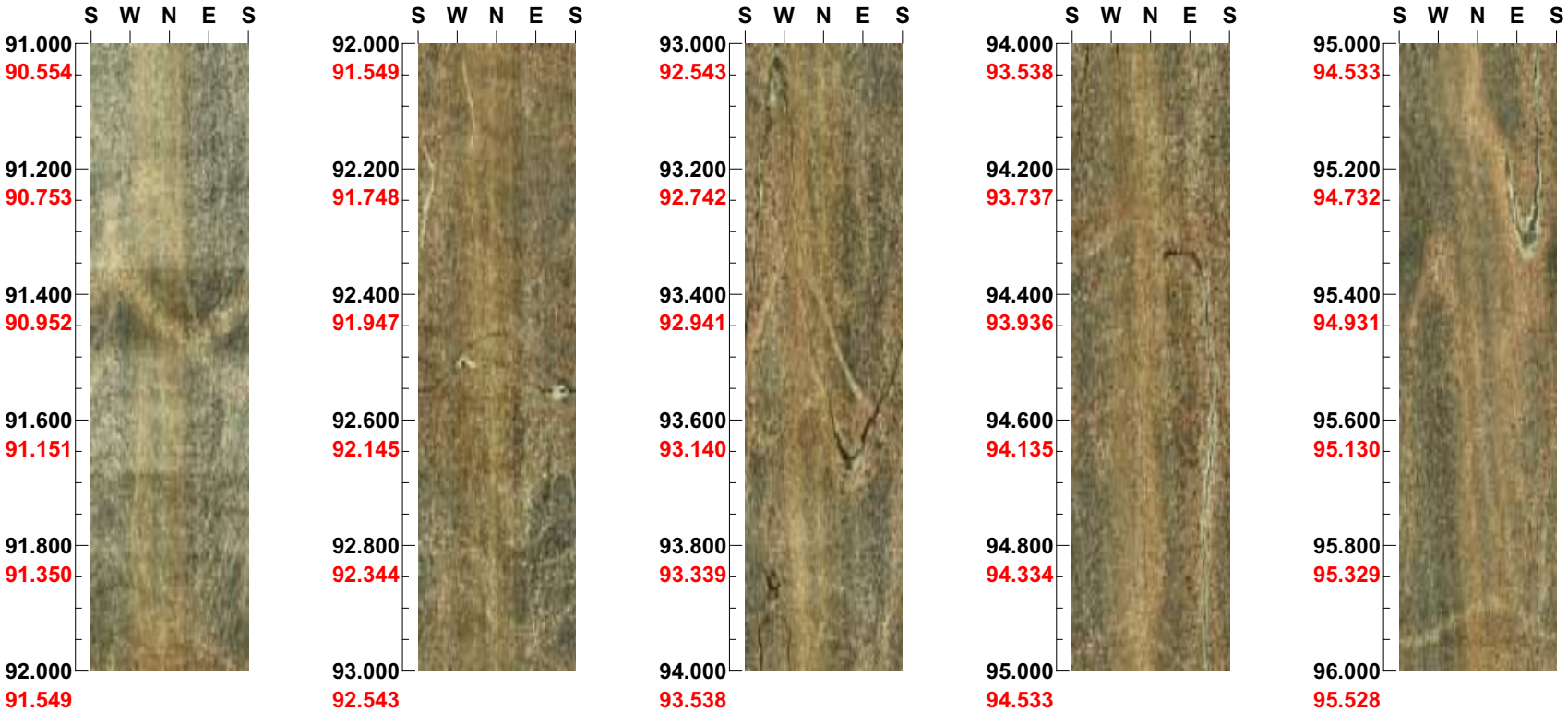
Depth range: 86.000 - 91.000 m



(17 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B **Azimuth: 0** **Inclination: -88**

Depth range: 91.000 - 96.000 m

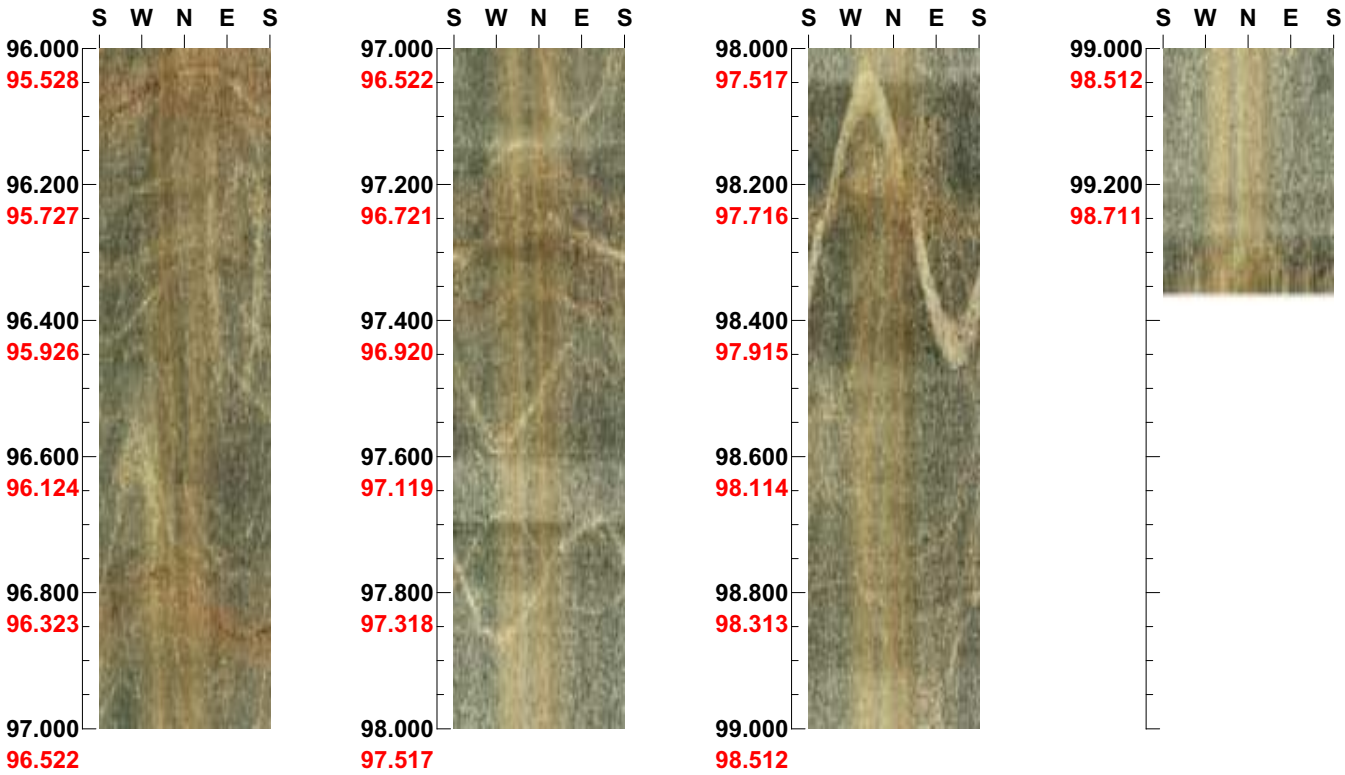


(18 / 19) **Scale: 1/10** **Aspect ratio: 105 %**

Project name: Simpevarp
Bore hole No.: KSH01B

Azimuth: 0 **Inclination: -88**

Depth range: 96.000 - 99.360 m



(19 / 19)

Scale: 1/10 **Aspect ratio: 105 %**

BIPS results from the upper part of KSH02

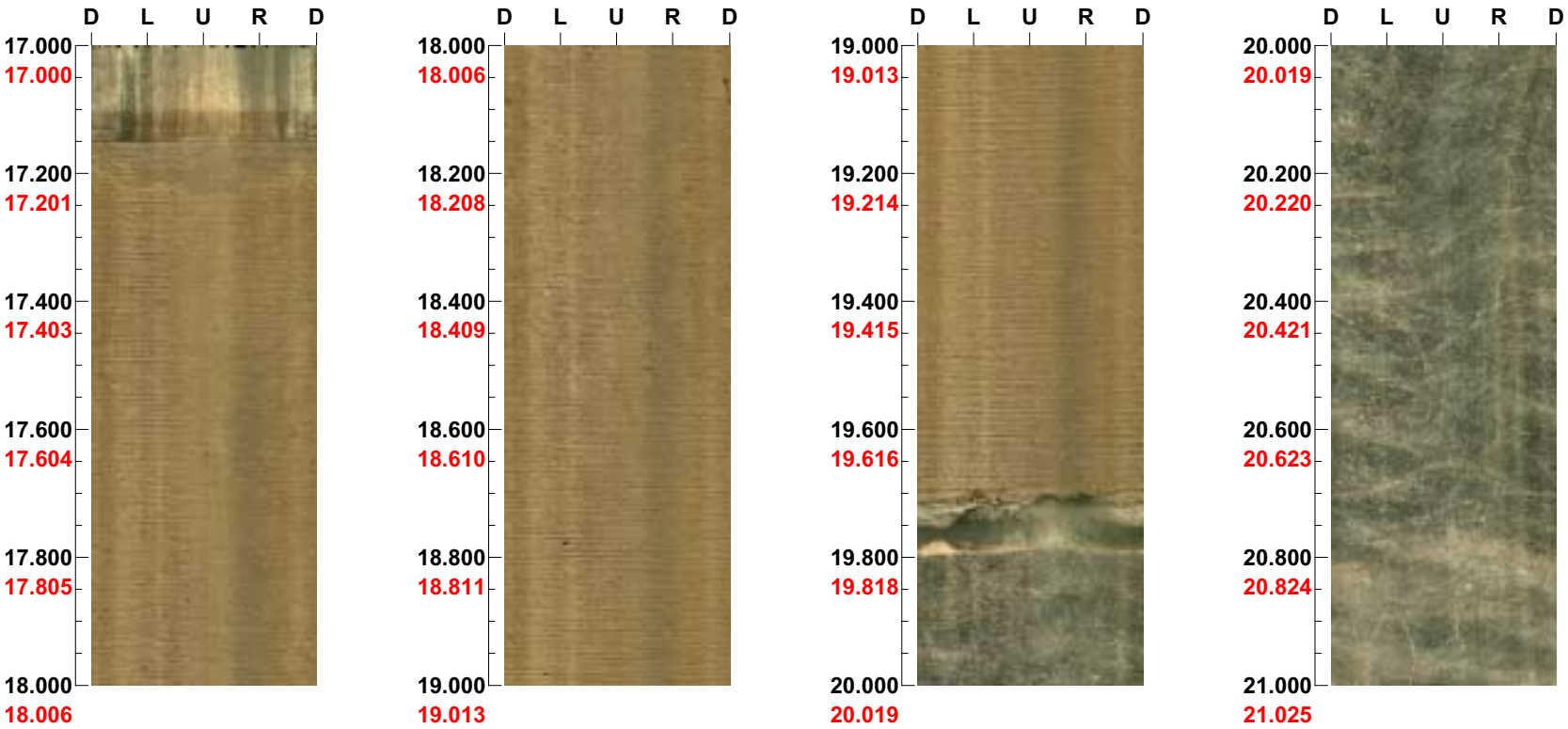
Project name: Simpevarp

Image file	**: c:\work\r5087s~1\bips\mars\ksh021~1.bip**
BDT file	**: c:\work\r5087s~1\bips\mars\ksh021~1.bdt**
Locality	**: SIMPAN**
Bore hole number	**: KSH02**
Date	**: 03/02/08**
Time	**: 22:26:00**
Depth range	**: 17.000 - 97.008 m**
Azimuth	**: 325**
Inclination	**: -85**
Diameter	**: 140.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/10**
Aspect ratio	**: 80 %**
Pages	**: 21**
Color	**: +0 +0 +0**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 17.000 - 21.000 m

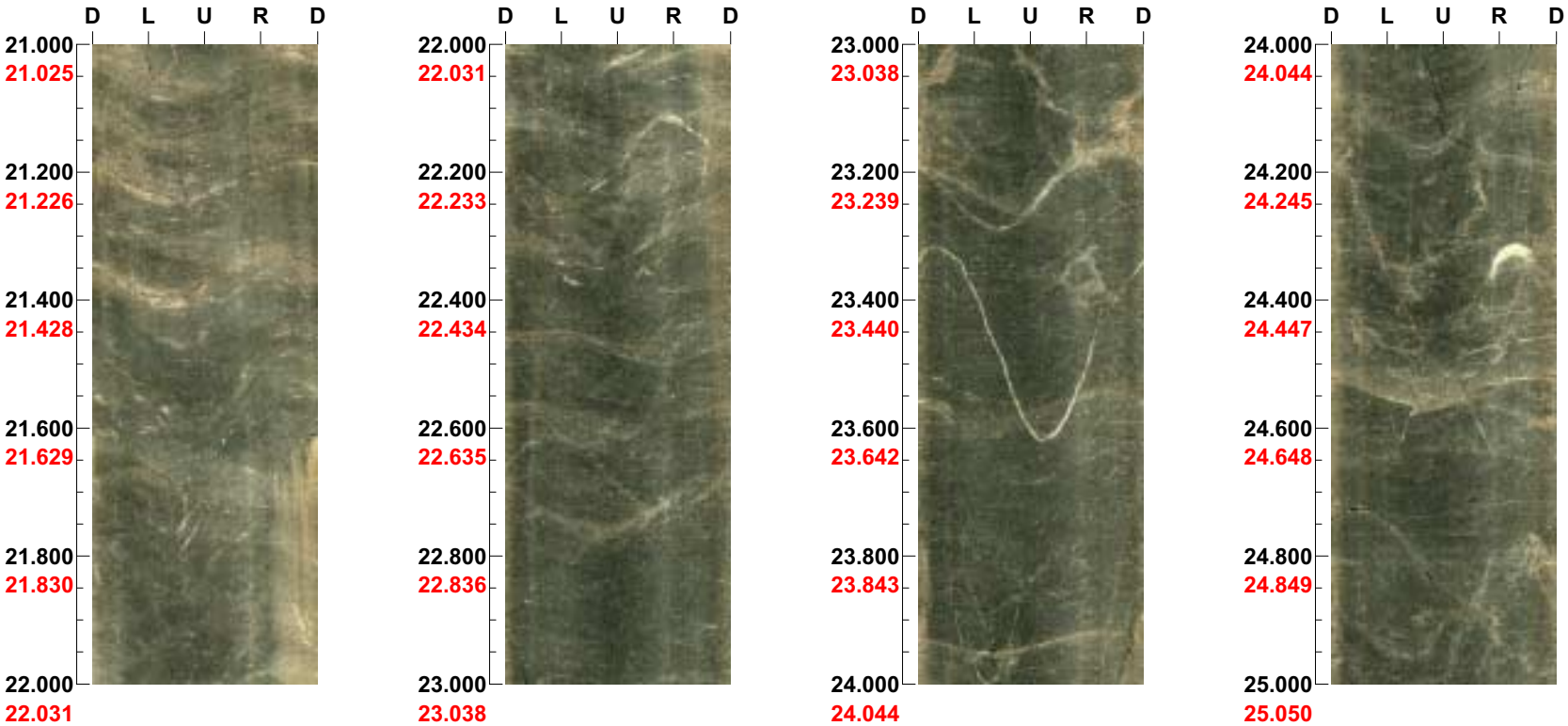


(1 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 21.000 - 25.000 m

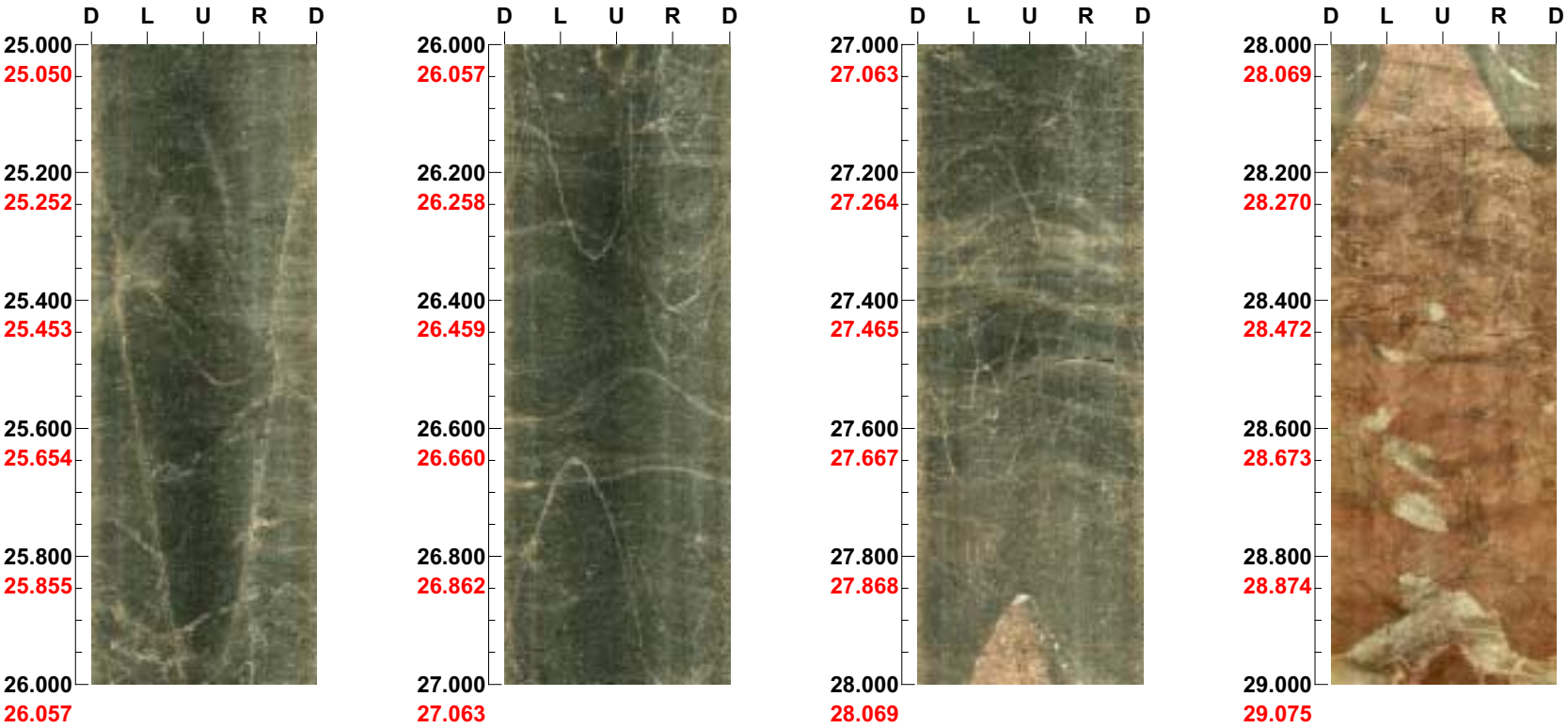


Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 25.000 - 29.000 m

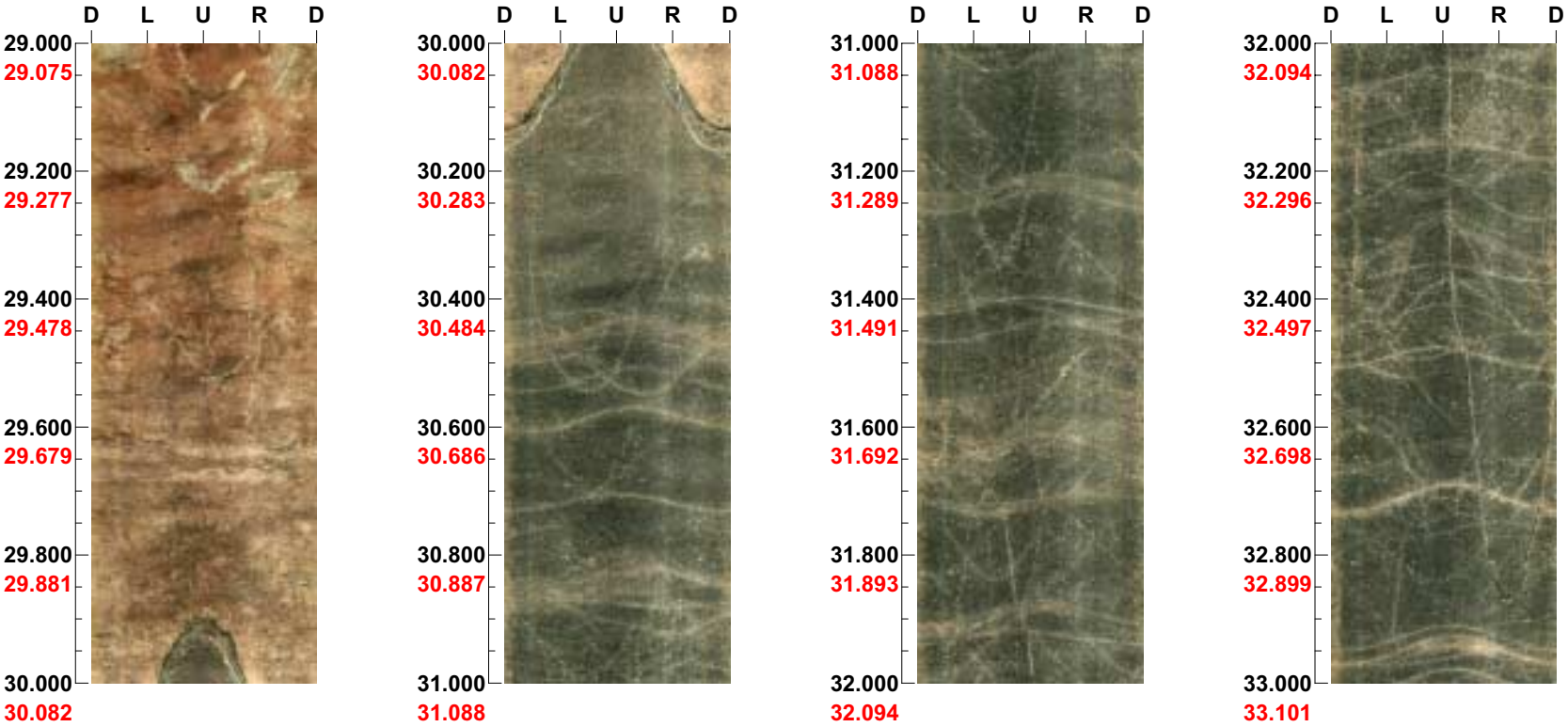


(3 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 29.000 - 33.000 m

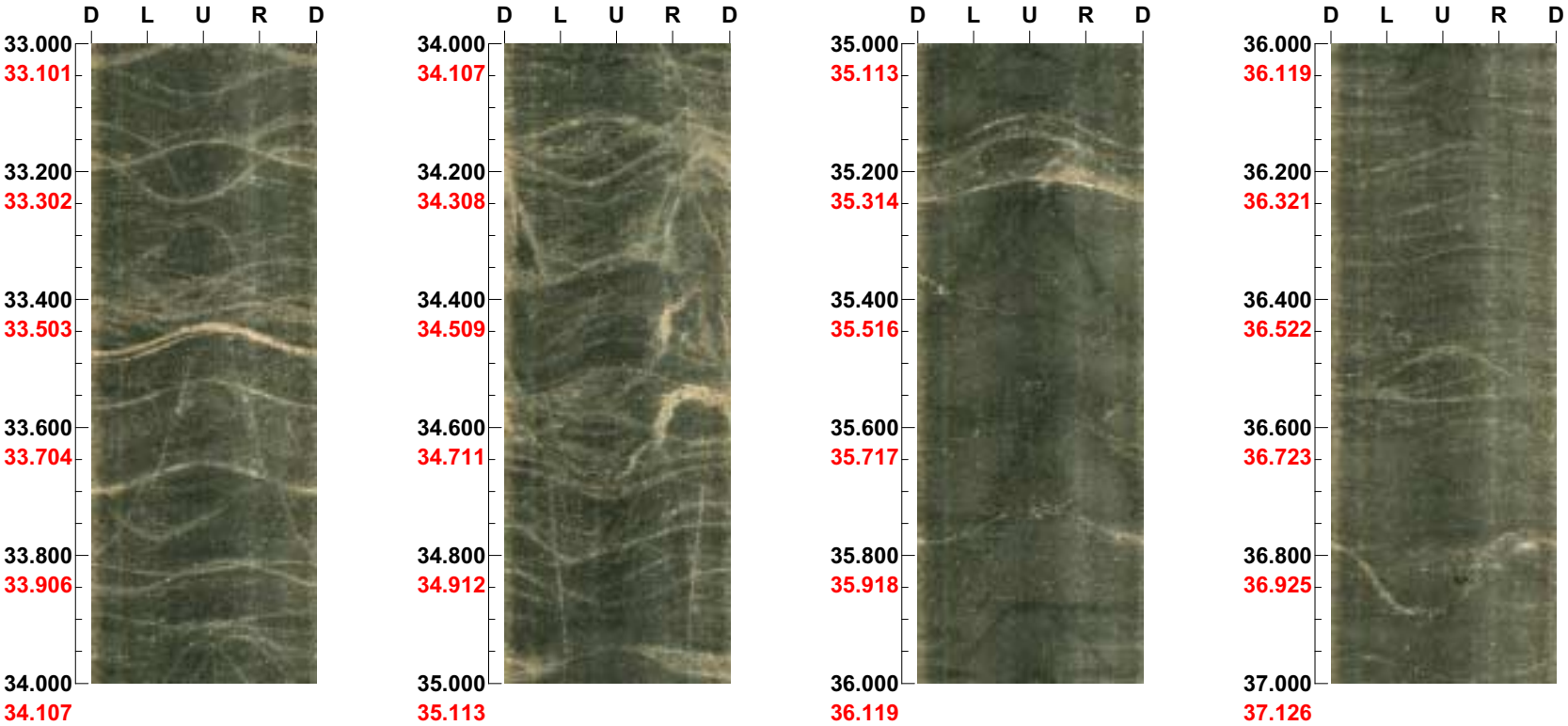


(4 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 33.000 - 37.000 m

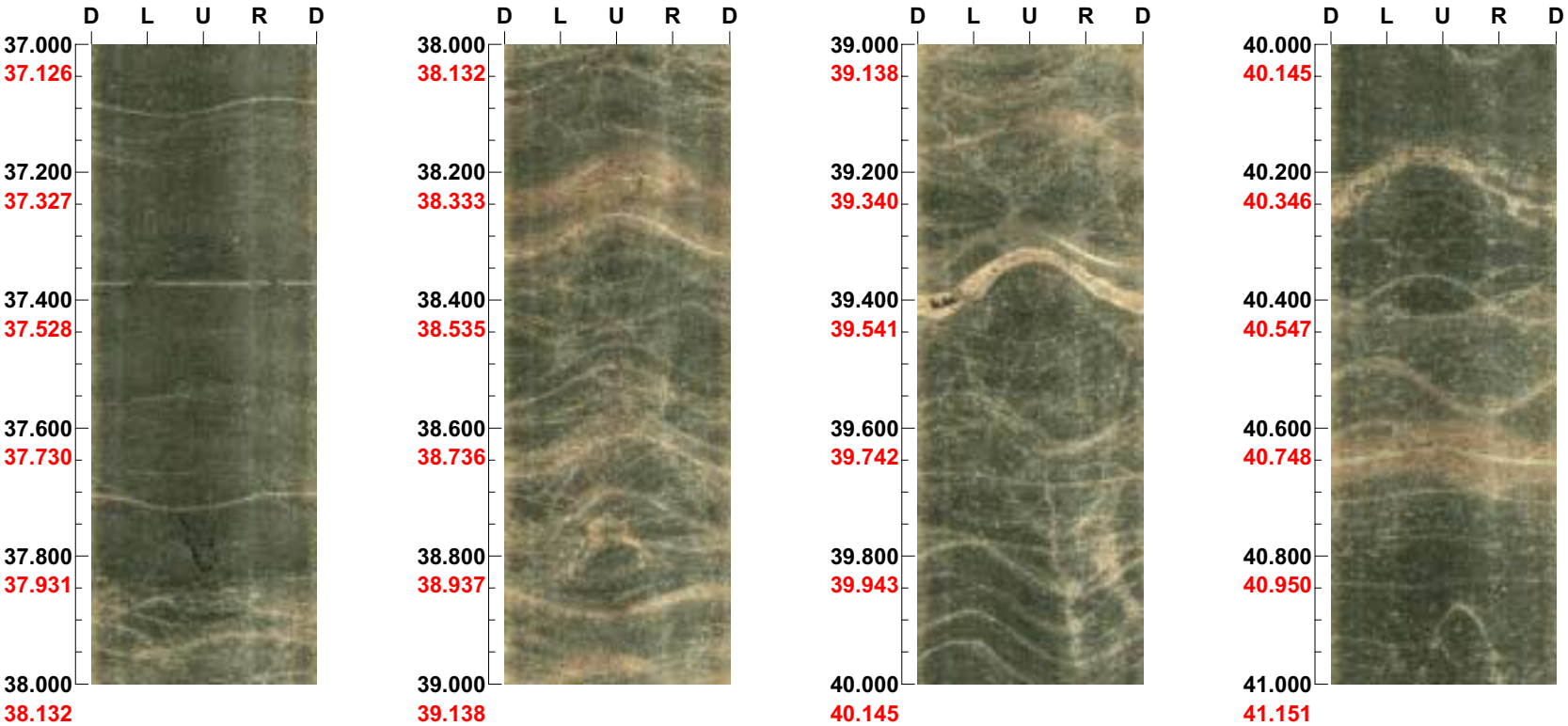


(5 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 37.000 - 41.000 m

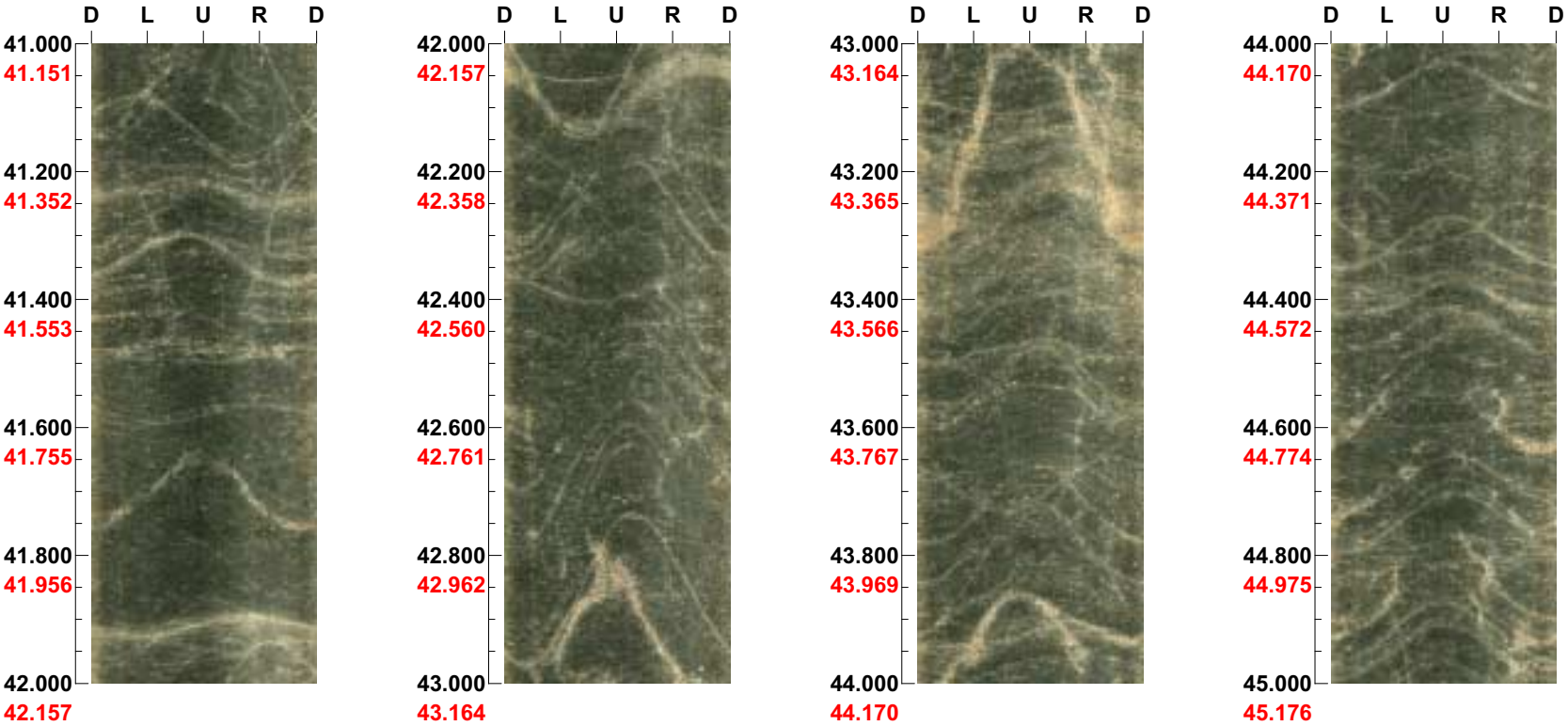


(6 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 41.000 - 45.000 m

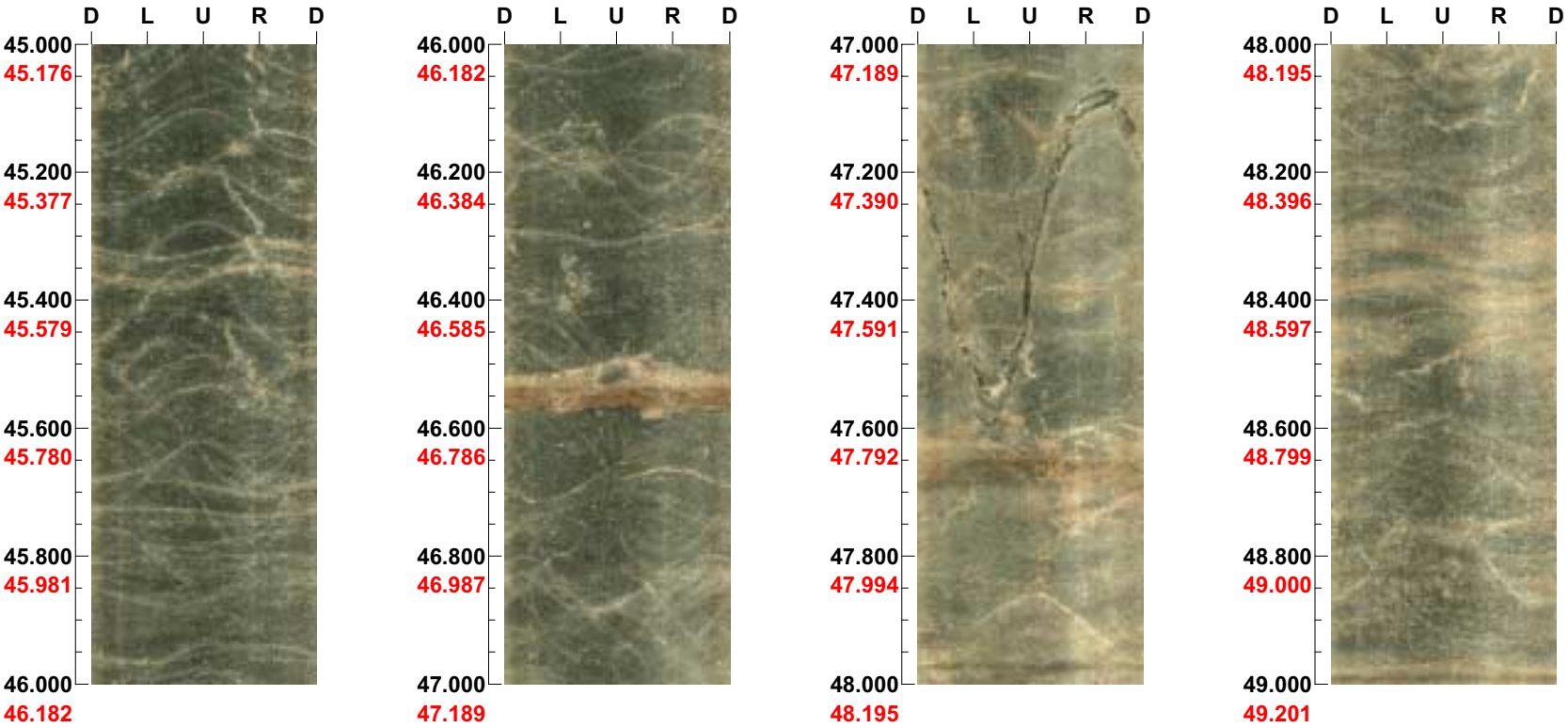


(7 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 45.000 - 49.000 m

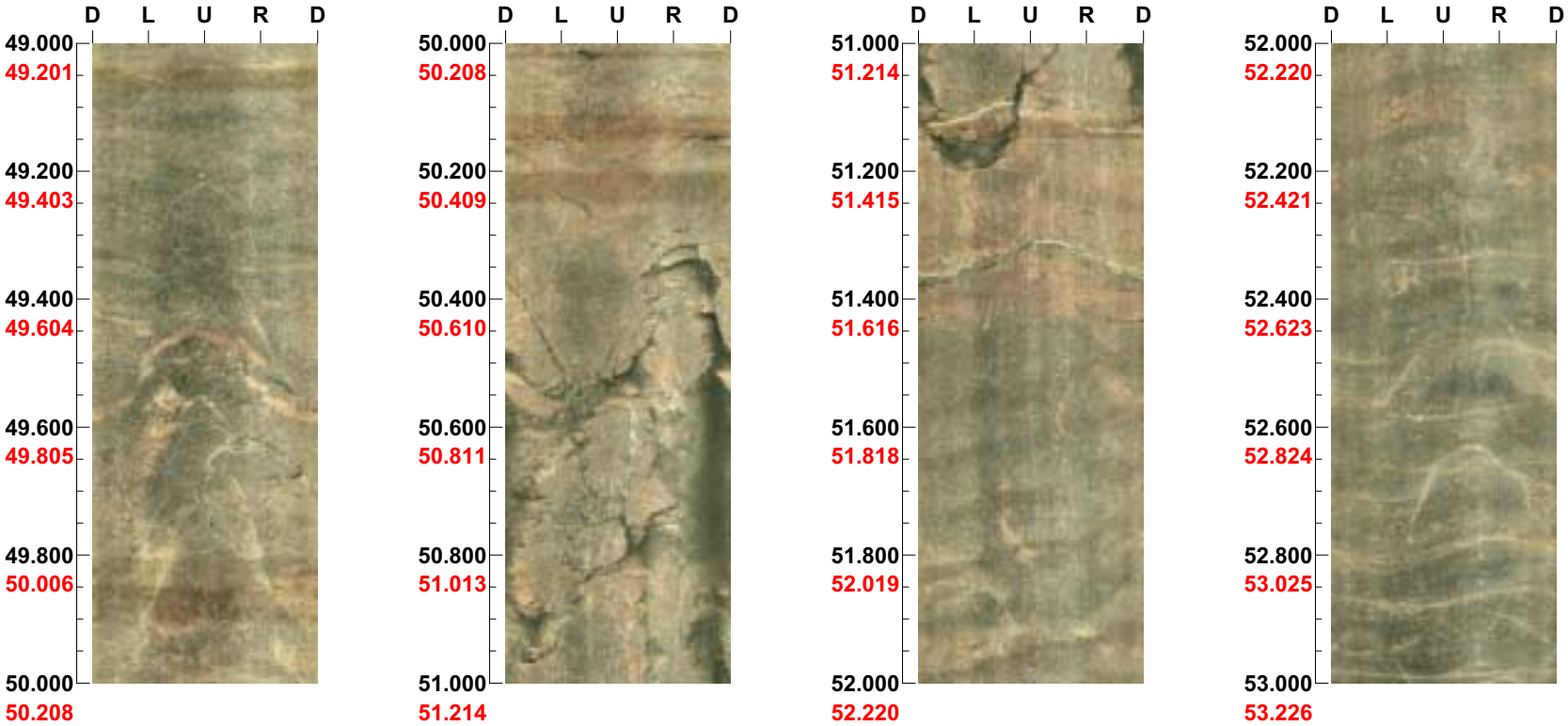


(8 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 49.000 - 53.000 m

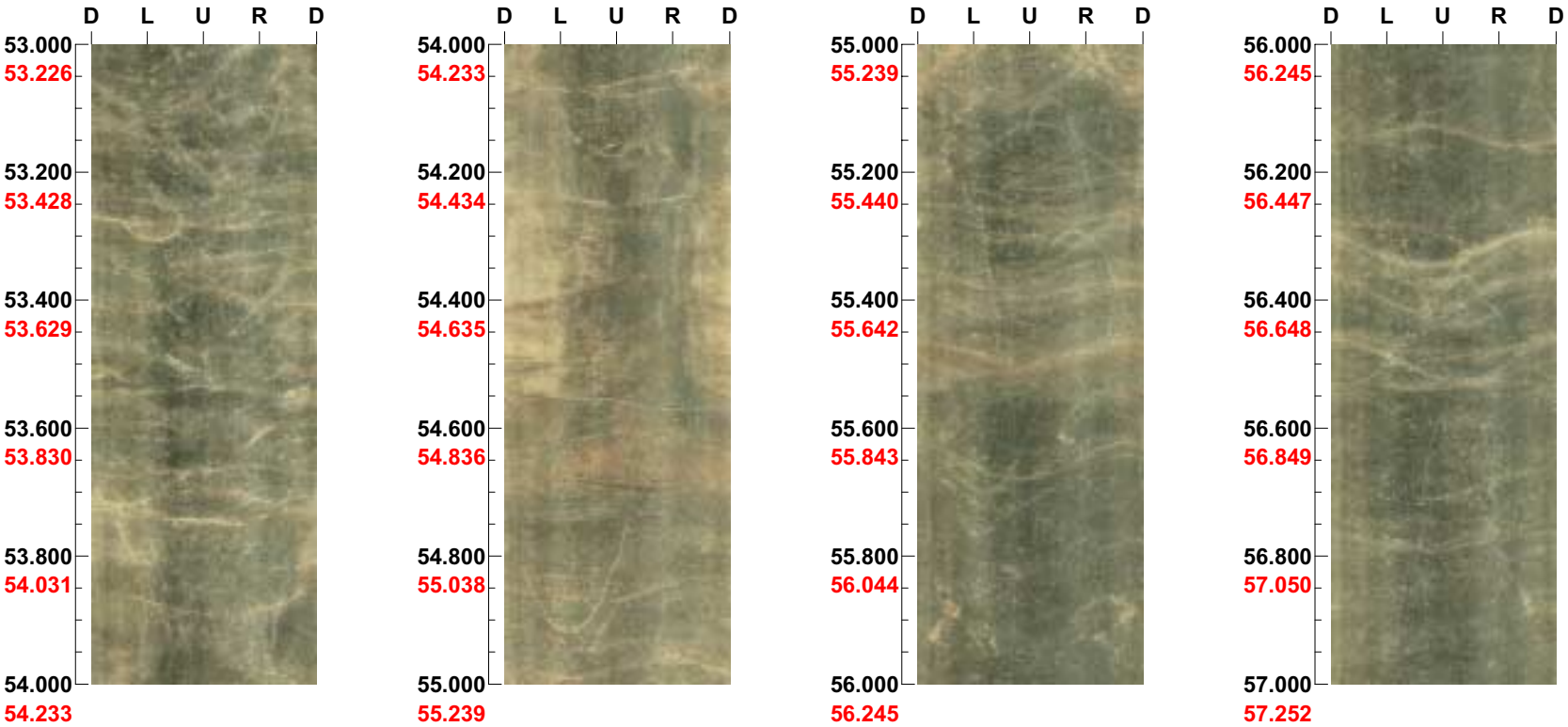


(9 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 53.000 - 57.000 m

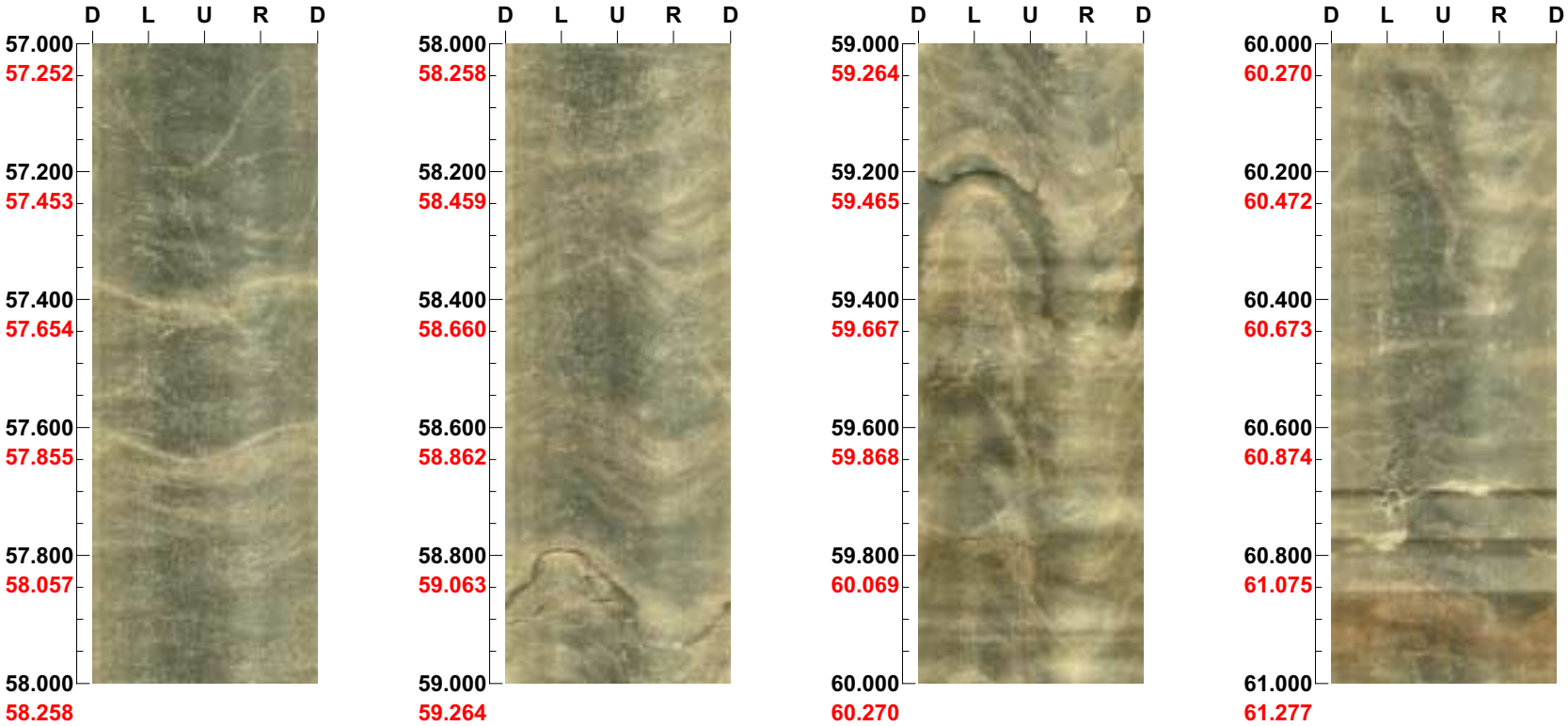


(10 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 57.000 - 61.000 m



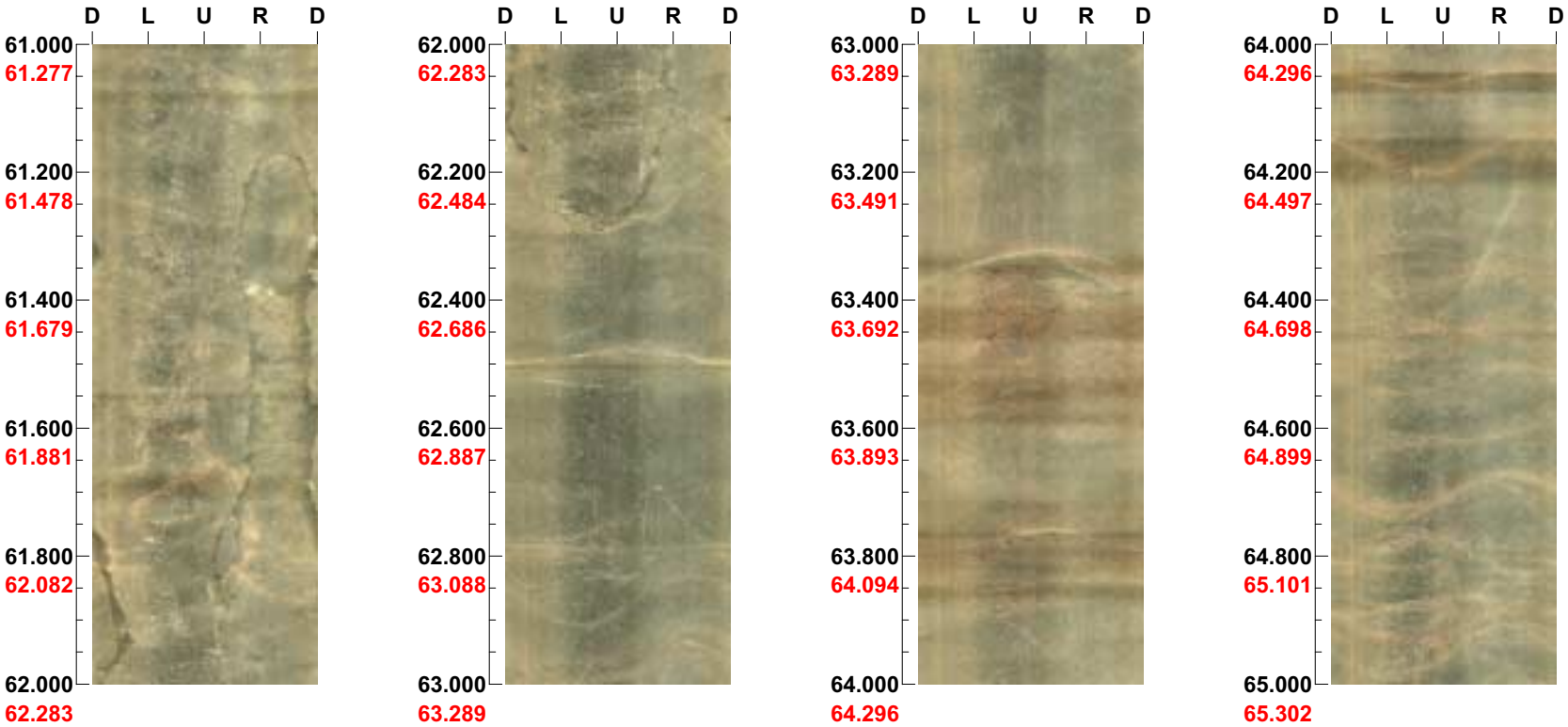
(11 / 21)

Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 61.000 - 65.000 m



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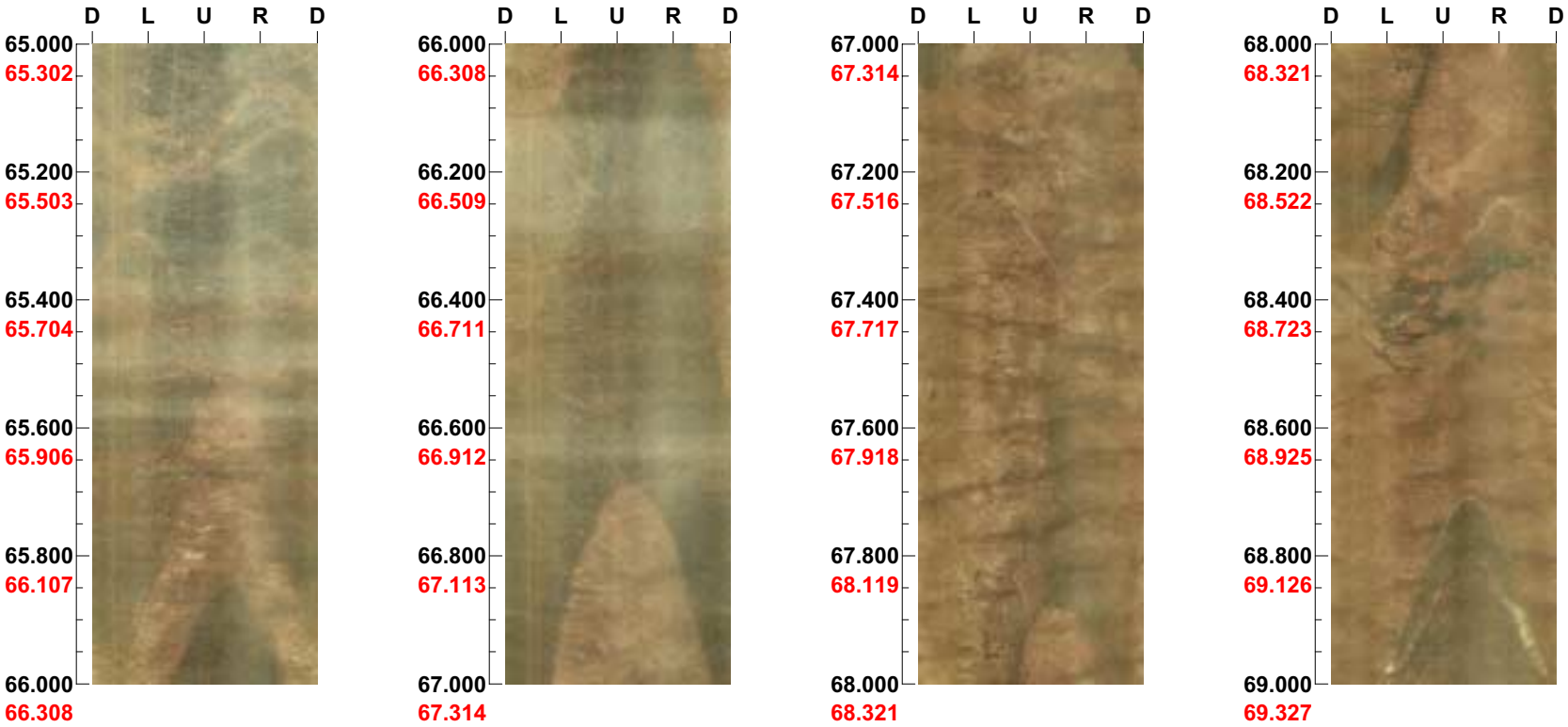
Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 65.000 - 69.000 m



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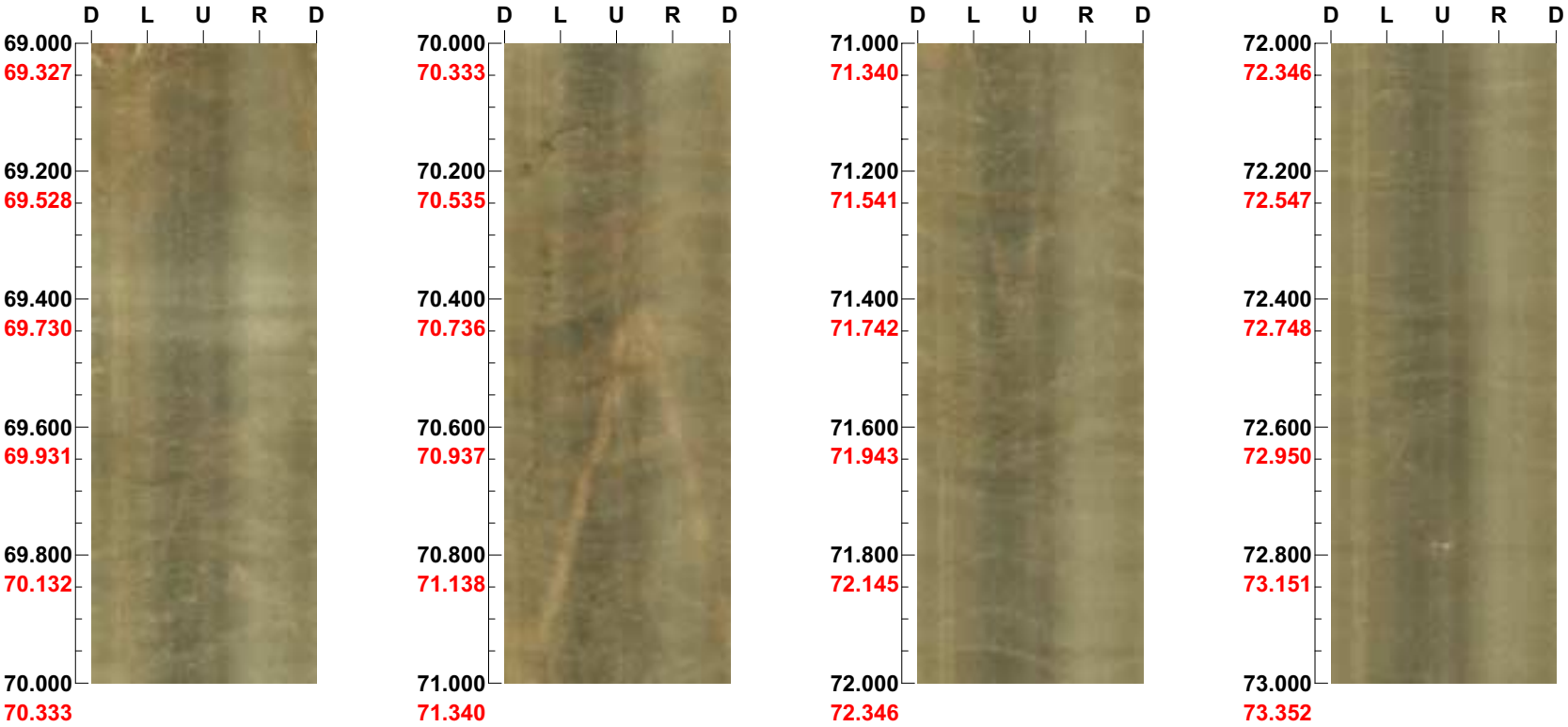
Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

Depth range: 69.000 - 73.000 m



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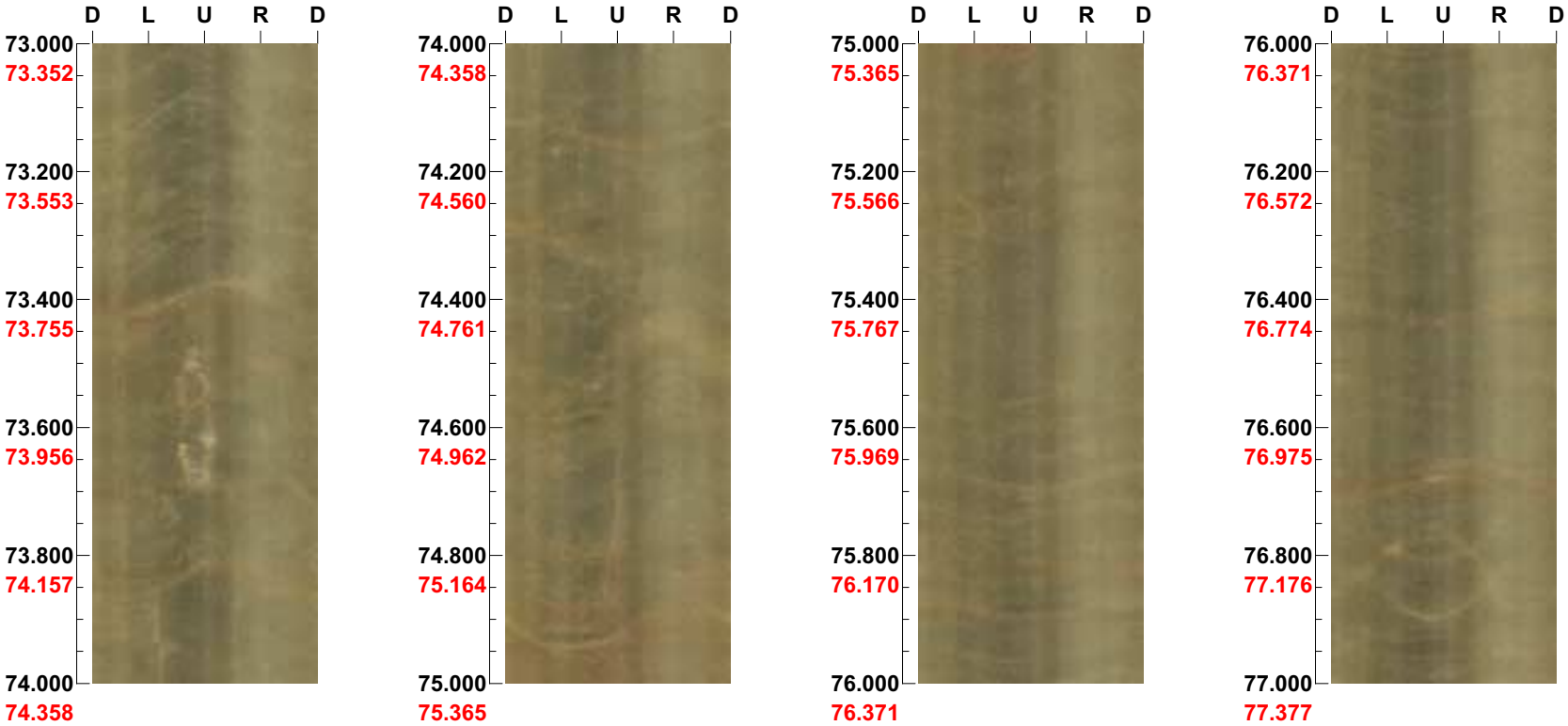
Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

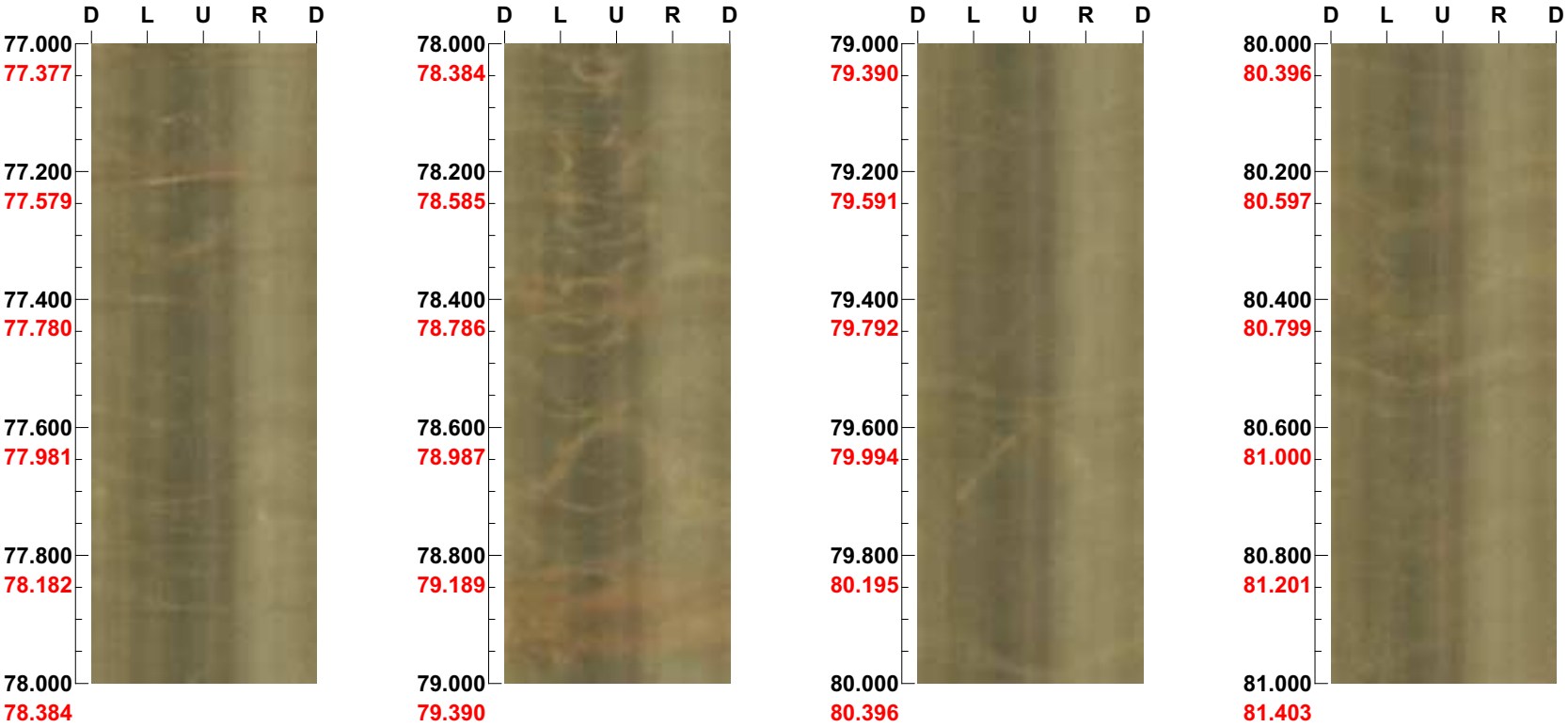
Depth range: 73.000 - 77.000 m



(15 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

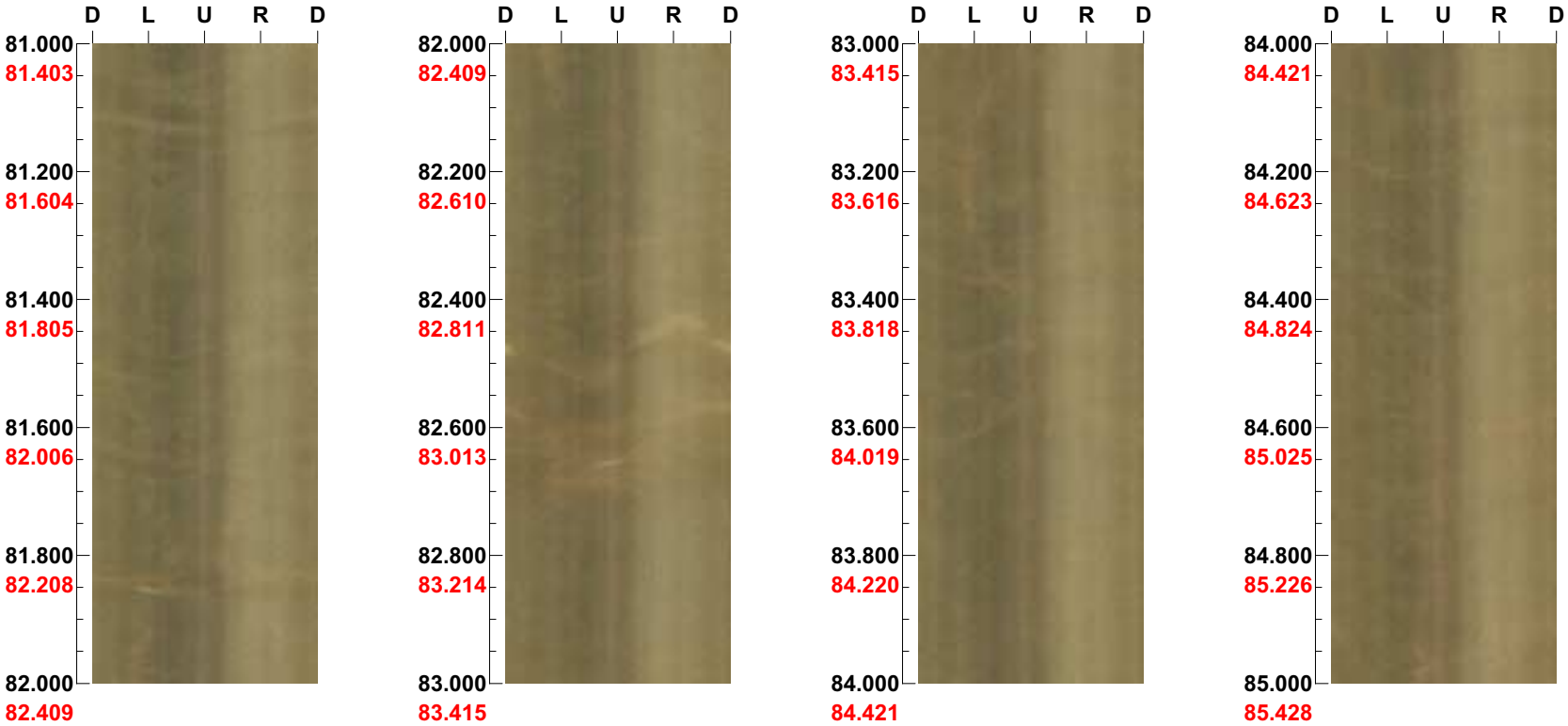
Depth range: 77.000 - 81.000 m



(16 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

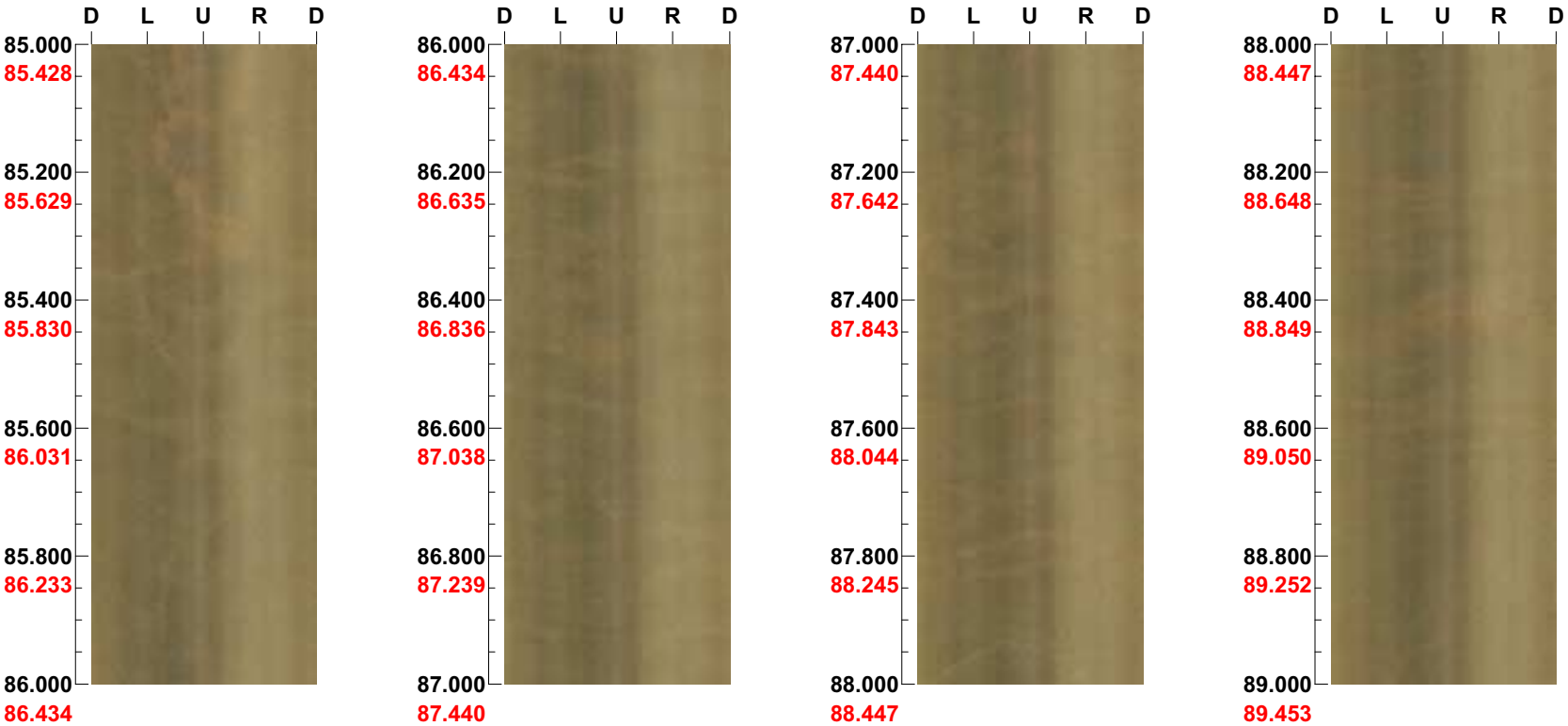
Depth range: 81.000 - 85.000 m



(17 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 85.000 - 89.000 m

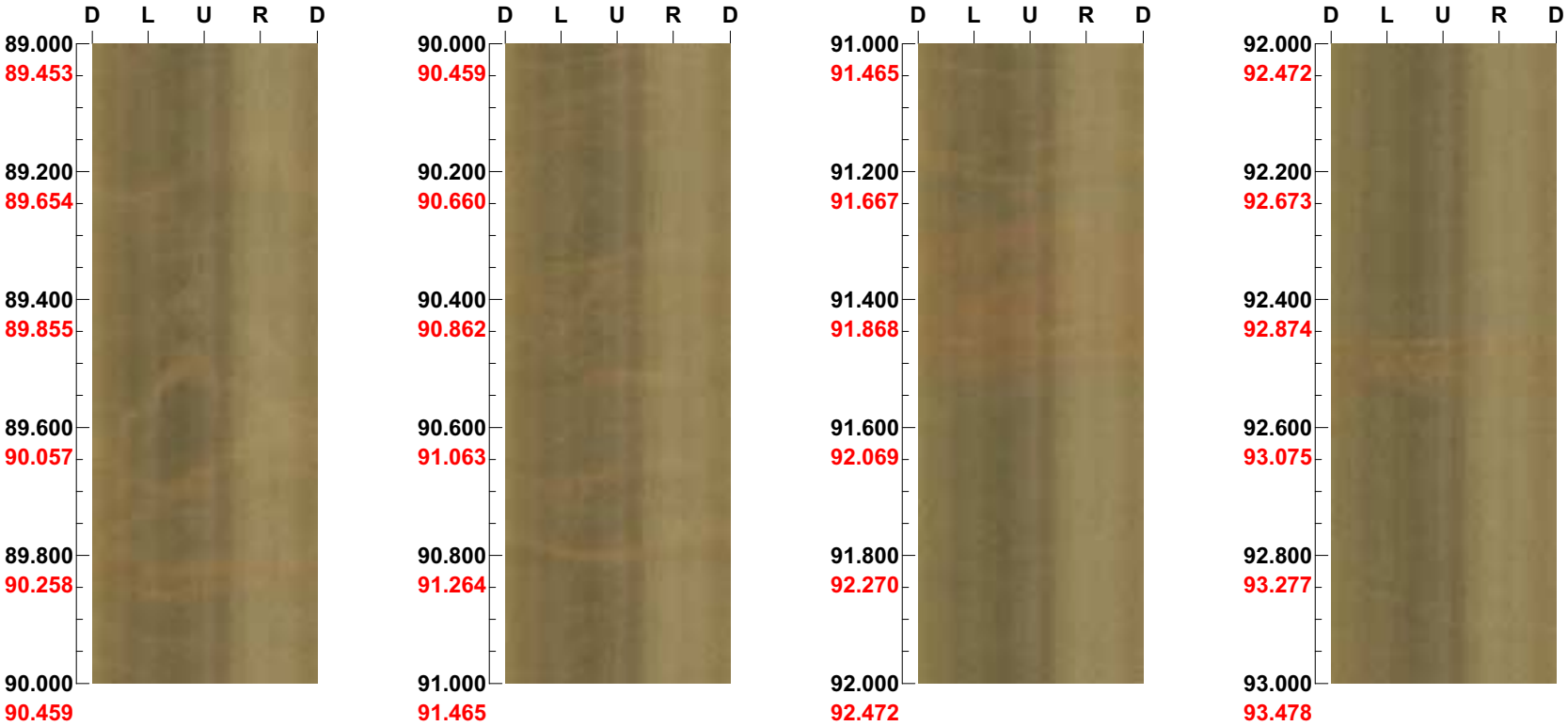


Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02

Azimuth: 325 **Inclination: -85**

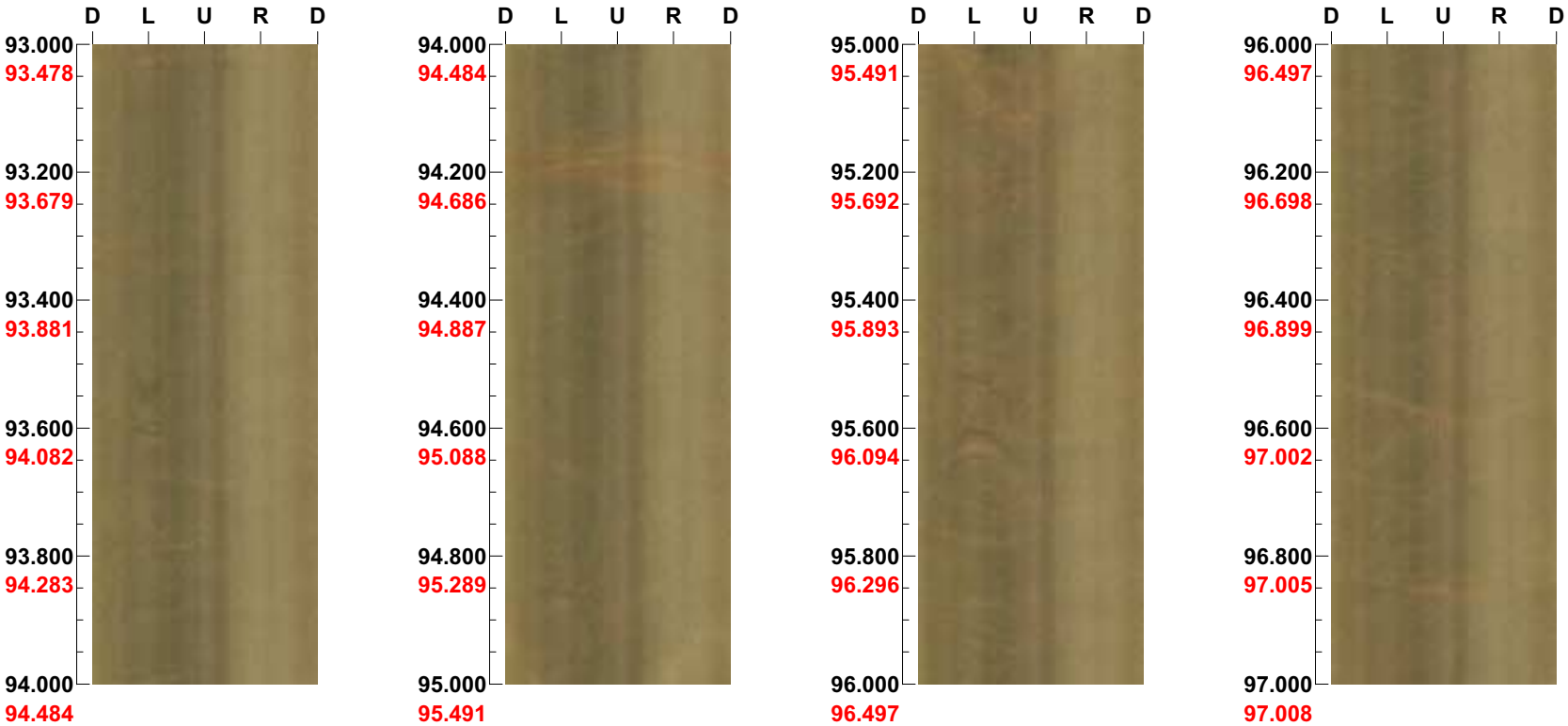
Depth range: 89.000 - 93.000 m



Scale: 1/10 **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

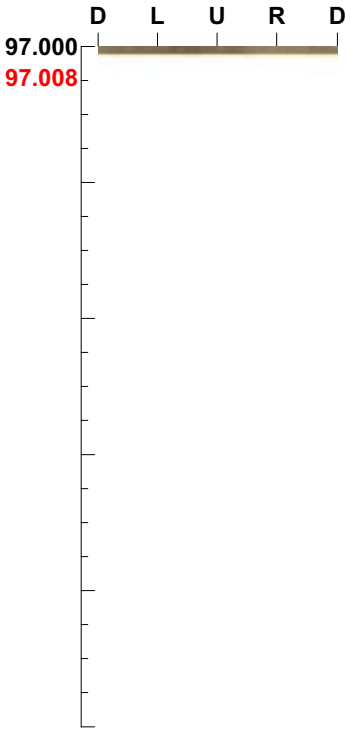
Depth range: 93.000 - 97.000 m



(20 / 21) **Scale: 1/10** **Aspect ratio: 80 %**

Project name: Simpevarp
Bore hole No.: KSH02 **Azimuth: 325** **Inclination: -85**

Depth range: 97.000 - 97.008 m



(21 / 21) **Scale: 1/10** **Aspect ratio: 80 %**