DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 2005/10

Special Core Analysis for the SeiFaBa Project

Ultrasonic velocity measurements on plug samples from the Vestmanna-1 and Glyvursnes-1 wells, Faroe Islands

Dan Olsen

GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
MINISTRY OF THE ENVIRONMENT

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Contents

1. Introduction

By request of Dr. Peter Japsen (GEUS) on behalf of the SeiFaBa Project, GEUS Core Laboratory has carried out ultrasonic velocity determinations on 1.5" plug samples from two wells on the Faroe Islands. 12 plug samples from the Vestmanna-1 well and 19 plug samples form the Glyvursnes-1 well were analysed, i.e. a total of 31 samples.

The analytical programme was specified by Dr. Peter Japsen and contained the following services:

- Conventional core analysis: gas permeability, He-porosity, and grain density determination.
- P and S wave velocities measured at a number of hydrostatic pressure conditions that cover the expected range of reservoir pressure conditions. The two first samples from the Vestmanna-1 well underwent an extended experimental programme that was the basis for establishing the experimental programme for the remaining 10 Vestmanna-1 samples, and all the Glyvursnes-1 samples. Table 1.1 gives an outline of the saturation conditions and pressure conditions for all the ultrasonic measurements.

The measurements were conducted in the period from June 8th 2004 to March 3rd 2005.

Presentations of preliminary results was given for the SeiFaBa Project on 24th June 2004, 9th August 2004, and 4th November 2004, and preliminary results have been forwarded regularly by e-mail.

The SeiFaBa Project is funded by the Sindri Group.

Table 1.1 Overview of saturation and hydrostatic pressure conditions for the ultrasonic measurements.

	Measurements in brine saturated condition				Measurements in gas saturated condition			
Well and sample id.	100 (bar)	200 (bar)	300 (bar)	500 (bar)	100 (bar)	200 (bar)	300 (bar)	500 (bar)
Vestmanna-1 Samples V3, V10	●	●	●	●	●	●	●	●
Vestmanna-1 Samples V2, V4, V5, V6, V7, V8, V12, V13, V14, V17	●	●	●					
Glyvursnes-1 Sample nos. G6, G7, G12, G13, G19, G20, G30, G32, G34, G35, G36, G37, G39, G40, G50, G71, G75, G76, G77 1)	●	●	●		●	●	●	

1) Glyvursnes-1 sample nos. G30, G34 and G39 were subjects to a reduced analytical programme because of the condition of the samples.

2. Sampling and analytical procedure

2.1 Sample material

The sample material for this study comes from the wells Vestmanna-1 and Glyvursnes-1 both situated onshore the island of Streymoy. Vestmanna-1 was drilled in 1980, while Glyvursnes-1 was drilled in 2002. Refer to Waagstein & Andersen (2003) for information about the two wells.

A gross selection of 17 samples from Vestmanna-1 were plugged, trimmed, cleaned and analysed for gas permeability, porosity, and grain density, cf. Table 2.1. Based on these data 12 samples were selected for ultrasonic measurements.

Similarly, a gross selection of 30 samples from Glyvursnes-1 were plugged, trimmed, cleaned and analysed for gas permeability, porosity, and grain density, cf. Table 2.2. Based on these data 19 samples were selected for ultrasonic measurements.

Tables 2.1 and 2.2 also give a lithological classification (Waagstein, personal communication, March 2005). Most of the samples were consolidated and presented no analytical problems. However, samples G30 and G34 were in a crumbling condition and sample G39 was a highly vesicular rock. It was agreed with Dr. Peter Japsen that these samples should be analysed as far as their condition allowed. Therefore, they underwent modified analytical programmes. More details of these samples are presented in the description of the measurements.

Table 2.1. Basic sample data and conventional core analysis results for 17 Vestmanna-1 samples.

Sample id.	Depth (m)	Litho-logy [1)]	Gas perm (mD)	Porosity (%)	Gr. dns. (g/cm^3)	Length (mm)	Diameter (mm)	Selected for sonic meas.
V1	134.09	Lava core	12.3	4.66	2.963	37.77	37.64	
V2	149.04	Lava breccia	0.007	10.03	2.899	37.38	37.64	+
V3	157.30	Lava crust	1.70	10.76	2.933	37.71	37.66	+
V4	165.00	Lava core	0.006	7.40	2.976	39.08	37.64	+
V5	180.92	Lava core	0.006	4.93	3.019	35.60	37.67	+
V6	181.83	Lava core	0.014	4.47	2.954	35.07	37.66	+
V7	201.03	Lava core	0.004	1.58	3.086	35.88	37.66	+
V8	287.09	Lava core	0.005	2.40	2.999	38.00	37.68	+
V9	307.44	Lava core	0.004	4.45	3.006	35.68	37.68	
V10	361.43	Lava core	0.003	0.78	2.945	35.06	37.66	+
V11	379.61	Lava crust	10.4	10.11	2.793	32.78	37.67	
V12	484.89	Lava core	0.003	1.03	3.077	31.03	37.65	+
V13	500.36	Lava core	0.024	4.46	2.974	32.27	37.64	+
V14	514.20	Lava core	0.082	6.63	2.984	36.67	37.65	+
V15	551.51	Lava core	0.004	2.78	3.039	33.86	37.65	
V16	555.16	Lava crust	1.40	10.70	2.984	37.18	37.66	
V17	582.90	Lava core	0.004	2.86	2.960	40.19	37.65	+

1) Lithology from R. Waagstein (personal communication, March 2005)

A flow chart of the analytical procedure is presented in Chapter 3.

2.2 Initial sample preparation and conventional core analysis

The samples were cleaned in Soxhlet extractors by refluxing with methanol to remove any salt from the pores. Then the plugs were trimmed to a length of approximately 1.5” and dried at 110 ^oC. They were stored in a desiccator until conventional core analysis.

All samples underwent conventional core analysis with measurement of gas permeability, He-porosity, and grain density. Results are given in Tables 2.1 and 2.2. Refer to Chapter 5 for a description of the conventional core analysis methods.

Table 2.2. Basic sample data and conventional core analysis results for 30 Glyvursnes-1 samples.

Sample id.	Depth (m)	Litho-logy [1)]	Gas perm (mD)	Porosity (%)	Gr. dns. (g/cm^3)	Length (mm)	Diameter (mm)	Selected for sonic meas.
G5	31.20	Lava breccia	0.056	18.40	3.052	33.24	37.75	
G6	36.05	Lava core	0.003	5.05	3.046	34.80	37.83	+
G7	38.89	Sediment	0.058	33.48	2.777	38.78	37.68	+
G8	41.35	Sediment	17.4	34.37	2.824	36.33	37.74	
G12	70.78	Lava crust	0.30	11.22	2.988	35.04	37.71	+
G13	102.72	Lava core	0.005	2.88	3.018	42.08	37.69	+
G19	217.82	Lava crust	0.111	21.12	2.947	37.27	37.69	+
G20	224.85	Lava core	0.58	17.32	3.086	36.09	37.56	+
G21	225.83	Lava core	0.072	13.48	3.028	40.94	37.71	
G22	229.38	Lava breccia	68	30.60	2.936	36.94	37.68	
G25	265.77	Lava breccia	1.28	21.56	2.975	40.15	37.75	
G30	297.47	Sediment	10.2	26.32	2.873	35.77	37.70	+
G31	302.39	Lava crust	0.68	25.52	3.088	40.61	37.75	
G32	306.58	Lava core	0.31	16.80	3.054	42.18	37.73	+
G34	346.10	Sediment	0.190	28.71	2.714	37.50	37.77	+
G35	346.54	Lava crust	0.052	8.85	2.697	37.83	37.86	+
G36	353.20	Lava core	0.007	2.25	2.857	40.50	37.97	+
G37	355.13	Sediment	6.8	24.12	2.843	41.48	37.93	+
G39	376.80	Lava crust	5.8	33.97	2.978	41.17	37.94	+
G40	381.76	Lava core	0.032	5.47	2.960	41.65	37.88	+
G46	454.61	Lava crust	6.6	31.72	3.129	31.90	37.87	
G47	457.40	Lava core	0.23	11.53	3.040	40.53	37.75	
G49	464.53	Lava crust	3.6	28.97	2.572	39.38	37.83	
G50	470.87	Lava core	0.012	9.43	3.087	38.41	37.76	+
G57	508.85	Lava crust	0.063	16.08	2.967	38.03	37.73	
G58	514.08	Lava core	0.083	9.45	2.998	37.45	37.81	
G71	606.17	Sediment	1.20	30.96	2.825	37.91	37.83	+
G75	627.27	Lava crust	0.21	20.58	3.035	35.45	37.89	+
G76	662.82	Lava core	0.007	5.46	2.980	41.36	37.88	+
G77	668.62	Lava core	0.005	1.88	2.872	39.20	37.90	+

1) Lithology from R. Waagstein (personal communication, March 2005)

2.3 Preparation of water saturated samples

After conventional core analysis, the samples were saturated with simulated formation water by a vacuum/pressure saturation procedure, which included vacuum saturation for one day followed by pressure saturation at 100 bar for at least 2 days. Table 2.4 presents the composition of the simulated formation water. The samples were weighed before and after the saturation procedure and Table 2.3 gives the calculated water saturations. Most of the samples fall in the saturation range 90% to 110% indicating normal complete water

Table 2.3. Water saturation of samples at time of ultrasonic measurement in water saturated state. The calculation assumes a water density of 1.056 g/ml.

Sample id.	Bulk volume (ml)	Pore volume (ml)	Helium porosity (%)	Weight after drying @ 110 °C (g)	Weight after saturation with water (g)	Water contents in water saturated state (ml)	S_w in humidity dry state (%PV)	Water excess / deficit relative to S_w=100% (ml)
V2	41.61	4.17	10.03	108.55	113.11	4.3	103	+0.1
V3	42.09	4.53	10.76	110.18	115.04	4.6	102	+0.1
V4	43.61	3.23	7.40	120.19	123.45	3.1	96	-0.1
V5	39.70	1.96	4.93	113.94	115.84	1.8	92	-0.2
V6	39.10	1.75	4.47	110.33	112.32	1.9	108	+0.1
V7	40.01	0.63	1.58	121.54	122.35	0.8	121	+0.1
V8	42.43	1.02	2.40	124.19	125.31	1.1	104	0.0
V10	39.14	0.31	0.78	114.39	115.30	0.9	282	+0.6
V12	34.61	0.36	1.03	105.40	106.24	0.8	223	+0.4
V13	35.96	1.60	4.46	102.16	104.19	1.9	120	+0.3
V14	40.91	2.71	6.63	113.98	116.90	2.8	102	+0.1
V17	44.80	1.28	2.86	128.82	130.60	1.7	132	+0.4
G6	39.27	1.98	5.05	113.63	115.62	1.9	95	-0.1
G7	43.57	14.59	33.48	80.32	96.24	15.1	103	+0.5
G12	39.49	4.43	11.22	104.62	109.38	4.5	102	+0.1
G13	47.05	1.36	2.88	138.21	139.54	1.3	93	-0.1
G19	41.92	8.85	21.12	97.46	107.13	9.2	103	+0.3
G20	40.25	6.97	17.32	102.94	110.16	6.8	98	-0.1
G30	41.57	10.94	26.32	85.39	98.14	12.1	110	+1.1
G32	47.29	7.94	16.80	121.63	129.34	7.3	92	-0.6
G34	42.66	12.25	28.71	81.43	95.50	13.3	109	+1.1
G35	42.90	3.80	8.85	104.45	109.86	5.1	135	+1.3
G36	45.91	1.03	2.25	128.19	129.77	1.5	145	+0.5
G37	47.01	11.34	24.12	101.29	113.43	11.5	101	+0.2
G39	45.51	15.46	33.97	91.72	105.92	13.4	87	-2.0
G40	47.14	2.58	5.47	132.20	134.91	2.6	100	0.0
G50	43.21	4.07	9.43	120.92	125.07	3.9	96	-0.1
G71	43.52	13.47	30.96	83.27	98.49	14.4	107	+0.9
G75	40.09	8.25	20.58	96.65	105.64	8.5	103	+0.3
G76	46.73	2.55	5.46	131.79	134.43	2.5	98	-0.1
G77	44.36	0.83	1.88	125.12	126.53	1.3	160	+0.5

saturation. However, 8 samples have calculated water saturation values above 110%, and 1 sample has a calculated water saturation below 90%. Most of the aberrant water saturation values occurs for samples with a very small pore volume, where even small errors in determining the water saturated weight of the sample results in large errors in the calculated water saturation. As a saturation check the column *Water excess/deficit relative to* S_w*=100%* is actually more useful as it gives the deviation from the S_w=100% condition as a volume. It is seen that for all samples except 4 the excess or deficit is below 1 ml, which is acceptable. For samples G30, G34, G35 and G39, however, the calculated water contents deviate from the pore volume by more than 1 ml, and an explanation may be looked for. Sample G39 is readily explained as it is strongly vesicular and the calculated water deficit of 2.0 ml probably represents water that drained from the sample during weighing of the sample. During ultrasonic measurement the water saturation of sample G39 was probably higher than stated in Table 2.3 as the measurement procedure attempts to fill defects in the sample surface with water. Samples G30, G34 and G35 all contained between 1.1 and 1.3 ml of excess water. This deviation is slightly larger than what is normally seen but no ready explanation exists. It may tentatively be suggested that minerals of these samples caused excess water to be absorbed.

Table 2.4. Composition of SeiFaBa similated formation water.

Element	Concentration (mg/l)
Na^+	23,000
K^+	10,000
Ca^{2+}	2,554
Cl^-	49,054
TDS	84,608

It is concluded that all samples with the possible exception of sample G39 were fully saturated with water at the time of ultrasonic measurement in water saturated state.

Table 2.5. Extended schedule for ultrasonic measurements. Applies to Vestmanna-1 samples V3 and V10 in both humidity dried state (60 °C, 40 %RH) and water saturated state.
Pressure ramping up @ 100 bar/h.
Pressure ramping down @ 200 bar/h.

Step no.	Description	Cumulate time hh:mm
1	Mount sample in core holder	00:15
2	Pressure ramping 0 to 15 bar in 2 min	00:17
3	Pressure ramping 15 to 100 bar in 30 min	00:47
4	Stabilizing at 100 bar for 60 minutes	01:47
5	Ultrasonic measurements at 100 bar	01:57
6	Pressure ramping 100 to 200 bar in 30 min	02:27
7	Stabilizing at 200 bar for 60 minutes	03:27
8	Ultrasonic measurements at 200 bar	03:37
9	Pressure ramping 200 to 300 bar in 30 min	04:07
10	Stabilizing at 300 bar for 60 minutes	05:07
11	Ultrasonic measurements at 300 bar	05:17
12	Pressure ramping 300 to 500 bar in 60 min	06:17
13	Stabilizing at 500 bar for 60 minutes	07:17
14	Ultrasonic measurements at 500 bar	07:27
15	Stabilizing at 500 bar for approx. 15 hours	22:27
16	Ultrasonic measurements at 500 bar	22:37
17	Pressure ramping 500 to 0 bar in 150 min	25:07

Table 2.6. Standard schedule for ultrasonic measurements. Applies to all Glyvursnes-1 samples , except G30, G34 and G39. Applies to all Vestmanna-1 samples, except V3 and V10.
Applies to measurements in both humidity dried state (60 °C, 40 %RH) and water saturated state.
Pressure ramping up @ 200 bar/h.
Pressure ramping down @ 400 bar/h.

Step no.	Description	Cumulate time hh:mm
1	Mount sample in core holder	00:15
2	Pressure ramping 0 to 15 bar in 2 min	00:17
3	Pressure ramping 15 to 100 bar in 25.5 min	00:43
4	Stabilizing at 100 bar for 120 minutes	02:43
5	Ultrasonic measurements at 100 bar	02:53
6	Pressure ramping 100 to 200 bar in 30 min	03:23
7	Stabilizing at 200 bar for 120 minutes	05:23
8	Ultrasonic measurements at 200 bar	05:33
9	Pressure ramping 200 to 300 bar in 30 min	06:03
10	Stabilizing at 300 bar for 120 minutes	08:03
11	Ultrasonic measurements at 300 bar	08:13
12	Stabilizing at 300 bar for approx. 15 hours	23:13
13	Ultrasonic measurements at 300 bar	23:23
14	Pressure ramping 300 to 0 bar in 45 min	24:08

Table 2.7. Reduced schedule, R1, for ultrasonic measurements on Glyvursnes-1 sample G30 in water saturated state.
Pressure ramping up @ 200 bar/h.
Pressure ramping down @ 400 bar/h.

Step no.	Description	Cumulate time hh:mm
1	Mount sample in core holder	00:15
2	Pressure ramping 0 to 15 bar in 2 min	00:17
3	Pressure ramping 15 to 100 bar in 25.5 min	00:43
4	Stabilizing at 100 bar for 120 minutes	02:43
5	Ultrasonic measurements at 100 bar	02:53
6	Pressure ramping 100 to 200 bar in 30 min	03:23
7	Stabilizing at 200 bar for 120 minutes	05:23
8	Ultrasonic measurements at 200 bar	05:33
9	Stabilizing at 200 bar for approx. 15 hours	20:33
10	Ultrasonic measurements at 200 bar	20:43
11	Pressure ramping 200 to 0 bar in 30 min	21:13

Table 2.8. Reduced schedule, R2, for ultrasonic measurements on Glyvursnes-1 samples G34 and 39 in water saturated state, and sample G30 in humidity dried state (60 °C, 40 %RH) state.
Pressure ramping up @ 200 bar/h.
Pressure ramping down @ 400 bar/h.

Step no.	Description	Cumulate time hh:mm
1	Mount sample in core holder	00:15
2	Pressure ramping 0 to 15 bar in 2 min	00:17
3	Pressure ramping 15 to 100 bar in 25.5 min	00:43
4	Stabilizing at 100 bar for 120 minutes	02:43
5	Ultrasonic measurements at 100 bar	02:53
6	Stabilizing at 100 bar for approx. 15 hours	17:53
7	Ultrasonic measurements at 100 bar	18:03
8	Pressure ramping 100 to 0 bar in 15 min	18:18

2.4 Ultrasonic measurements on water saturated samples

Four different time schedules were used for the ultrasonic measurements on water saturated samples. The two first samples, V3 and V10, underwent an extended schedule, cf. Table 2.5, that included measurements at 500 bar confining pressure. All the following samples, except G30, G34, and G39, were measured with the schedule of Table 2.6, which is termed the *standard schedule*. Sample G30 was in a crumbling condition and a test in a separate core holder showed that it could not withstand a confining pressure of 300 bar without inflicting damage to the ultrasonic equipment. Therefore, the maximum confining pressure was reduced to 200 bar, cf. Table 2.7. Similarly, sample G34 was in a crumbling condition, and sample G39 was a highly vesicular volcanic rock where tests in a separate core holder showed that they could only withstand a confining pressure of 100 bar without inflicting damage to the ultrasonic equipment. Therefore, the maximum confining pressure for samples G34 and G39 was reduced to 100 bar, cf. Table 2.8.

The water saturated samples were mounted in a modified AutoLab 500 Ultrasonic system (New England Research) and the ultrasonic transit times were measured with a Tektronix Model TDS3012 digital oscilloscope connected to a PAR spike-generator. The details of the ultrasonic measurements are described in Chapter 4. Results are presented in Chapter 6.

Confining pressure during the ultrasonic measurements was controlled by a Quizix SP-5400 high-pressure pump system. Initially the confining pressure was increased quickly to 15 bar to secure a good seal of the confining rubber sleeve. Subsequently, the confining pressure was increased as indicated in the time schedules (Tables 2.5 to 2.8). Before each ultrasonic measurement the sample was allowed to equilibrate for 1, 2 or 15 hours at the target confining pressure. The extended time schedule that was used for samples V3 and V10 used equilibration for 1 or 15 hours (Table 2.5). Sample V10 had very low water permeability, probably the lowest of all the samples, and it was suspected that an equilibration time of 1 hour was insufficient to allow the trapped pore water to drain before the ultrasonic measurements commenced. For all following time schedules the minimum equilibration time was therefore increased to 2 hours, and it is estimated that all following samples reached an approximate drainage equilibrium.

When unloading the core holder, the confining pressure was decreased with a rate that was twice the rate used for loading the sample.

2.5 Pore volume reduction and length reduction

During measurement of samples in water saturated state, the outlet from the ultrasonic core holder was connected with a Mettler balance and the production of water was continuously logged. From the water production data the pore volume reduction were established by assuming that the amount of produced water, W_w corresponded to the pore volume reduction, ΔPV

$$\Delta PV = W_W / \rho_w \qquad \text{Eq. 2-1}$$

where ρ_W is the water density. The results of the calculation are presented in Table 2.9. The column *Equilibrium status* contains an evaluation of whether the water production had reached an equilibrium state. For a few samples with very low permeability the production of water continued to the ultrasonic measurements started and in these instances the calculated porosity reduction may not represent the equilibrium state. This is the case for samples V6, V10, and V12. For samples G30, G32, G71, and G76 the water production also continued until the ultrasonic measurements, but the production is not exponentially decreasing as would be expected from low permeability samples. Except for G76, these samples are not particularly low in permeability, and their behaviour is considered to be caused by creep. For these samples too, the calculated porosity reduction may not represent the equilibrium state.

The porosity reduction versus porosity relationship is presented in graphical form in Fig. 2.1 for samples in the 100 bar, 200 bar, 300 bar, 300 bar repeat, and 500 bar repeat state. It is seen that for each stress state the porosity reduction shows a fair correlation with porosity. A simple linear regression accounts for much of the variation at each stress state. Furthermore, it is seen that the porosity reduction increases regularly with the stress.

The length of a sample is important for the calculation of the ultrasonic velocity. A model for calculating the reduction in sample length, ΔL, is applied that assumes isotropic contraction of the pore volume without any change to the grain volume:

$$\Delta L = L\left(1 - \sqrt[3]{1 - \Delta\Phi}\right) \qquad \text{Eq. 2-2}$$

where L is the length of the sample and $\Delta\Phi$ is the porosity reduction. The reduced length, $L-\Delta L$, is used for all ultrasonic velocity calculations on water saturated samples. For the humidity dried samples no data for porosity or length reduction are available, and the sample length measured at laboratory conditions were used without correction for all ultrasonic velocity calculations on humidity dried samples.

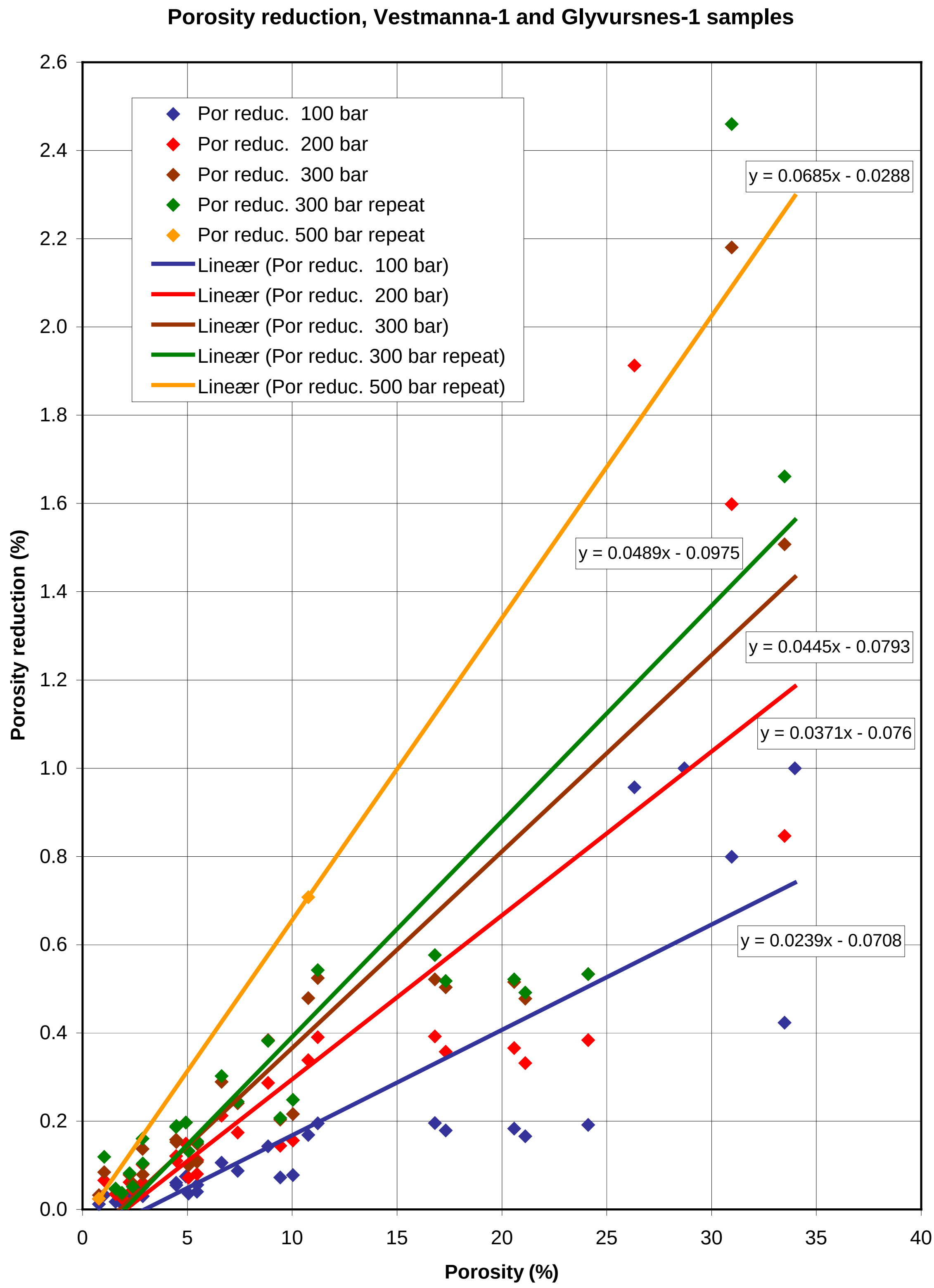


Fig. 2.1. Porosity reduction vs. porosity for samples in the 100 bar, 200 bar, 300 bar, 300 bar repeat, and 500 bar repeat stress state. The figure shows all data from Vestmanna-1 and Glyvursnes-1. Also shown are linear regressions for all stress states.

Table 2.9. Porosity reduction as function of confining pressure for Vestmanna-1 and Glyvursnes-1 samples.

Sample id.	Equilibrium status	Gas perm (mD)	Porosity 0 bar (%)	Porosity reduction 100 bar (%)	Porosity 100 bar (%)	Porosity reduction 200 bar (%)	Porosity 200 bar (%)	Porosity reduction 200 rep (%)	Porosity 200 rep (%)	Porosity reduction 300 bar (%)	Porosity 300 bar (%)	Porosity reduction 300 rep (%)	Porosity 300 rep (%)	Porosity reduction 500 bar (%)	Porosity 500 bar (%)	Porosity reduction 500 rep (%)	Porosity 500 rep (%)
V2	Equilib. OK	0.007	10.03	0.08	9.95	0.16	9.87	-	-	0.22	9.81	0.25	9.78	-	-	-	-
V3	Equilib. OK	1.79	10.76	0.17	10.59	0.34	10.42	-	-	0.48	10.28	-	-	0.70	10.06	0.71	10.05
V4	Equilib. OK	0.006	7.40	0.09	7.31	0.17	7.23	-	-	0.24	7.16	0.24	7.16	-	-	-	-
V5	Equilib. OK	0.006	4.93	0.07	4.86	0.15	4.78	-	-	0.20	4.73	0.20	4.73	-	-	-	-
V6	Some disequil.	0.014	4.47	0.05	4.42	0.11	4.36	-	-	0.15	4.32	0.19	4.28	-	-	-	-
V7	Equilib. OK	0.004	1.58	0.02	1.56	0.03	1.55	-	-	0.05	1.53	0.05	1.53	-	-	-	-
V8	Equilib. OK	0.005	2.40	0.02	2.38	0.04	2.36	-	-	0.06	2.34	0.05	2.35	-	-	-	-
V10	Some disequil.	0.003	0.78	0.01	0.77	0.02	0.76	-	-	0.03	0.75	-	-	0.04	0.74	0.02	0.76
V12	Some disequil.	0.003	1.03	0.03	1.00	0.07	0.96	-	-	0.08	0.95	0.12	0.91	-	-	-	-
V13	Equilib. OK	0.024	4.46	0.06	4.40	0.12	4.34	-	-	0.16	4.30	0.19	4.27	-	-	-	-
V14	Equilib. OK	0.024	6.63	0.11	6.52	0.21	6.42	-	-	0.29	6.34	0.30	6.33	-	-	-	-
V17	Equilib. OK	0.004	2.86	0.05	2.81	0.10	2.76	-	-	0.14	2.72	0.16	2.70	-	-	-	-
G6	Equilib. OK	0.003	5.05	0.04	5.01	0.07	4.98	-	-	0.10	4.95	0.13	4.92	-	-	-	-
G7	Equilib. OK	0.058	33.48	0.42	33.06	0.85	32.63	-	-	1.51	31.97	1.66	31.82	-	-	-	-
G12	Equilib. OK	0.304	11.22	0.20	11.02	0.39	10.83	-	-	0.52	10.70	0.54	10.68	-	-	-	-
G13	Equilib. OK	0.005	2.88	0.03	2.85	0.06	2.82	-	-	0.08	2.80	0.10	2.78	-	-	-	-
G19	Equilib. OK	0.111	21.12	0.17	20.95	0.33	20.79	-	-	0.48	20.64	0.49	20.63	-	-	-	-
G20	Equilib. OK	0.582	17.32	0.18	17.14	0.36	16.96	-	-	0.50	16.82	0.52	16.80	-	-	-	-
G30	OK, but creep	10.217	26.32	0.96	25.36	1.91	24.41	2.13	24.19	-	-	-	-	-	-	-	-
G32	OK, but creep	0.312	16.80	0.20	16.60	0.39	16.41	-	-	0.52	16.28	0.58	16.22	-	-	-	-
G34	Equilib. OK	0.19	28.71	1.00 [1)]	27.71 [1)]	-	-	-	-	-	-	-	-	-	-	-	-
G35	Equilib. OK	0.052	8.85	0.14	8.71	0.29	8.56	-	-	0.38	8.47	0.38	8.47	-	-	-	-
G36	Equilib. OK	0.007	2.25	0.03	2.22	0.06	2.19	-	-	0.08	2.17	0.08	2.17	-	-	-	-
G37	Equilib. OK	6.808	24.12	0.19	23.93	0.38	23.74	-	-	0.53	23.59	0.53	23.59	-	-	-	-
G39	Equilib. OK	5.751	33.97	1.00 [1)]	32.97 [1)]	-	-	-	-	-	-	-	-	-	-	-	-
G40	Equilib. OK	0.032	5.47	0.06	5.41	0.11	5.36	-	-	0.15	5.32	0.15	5.32	-	-	-	-
G50	Equilib. OK	0.012	9.43	0.07	9.36	0.14	9.29	-	-	0.20	9.23	0.21	9.22	-	-	-	-
G71	OK, but creep	1.198	30.96	0.80	30.16	1.60	29.36	-	-	2.18	28.78	2.46	28.50	-	-	-	-
G75	Equilib. OK	0.212	20.58	0.18	20.40	0.37	20.21	-	-	0.52	20.06	0.52	20.06	-	-	-	-
G76	OK, but creep	0.007	5.46	0.04	5.42	0.08	5.38	-	-	0.11	5.35	0.15	5.31	-	-	-	-
G77	Equilib. OK	0.005	1.88	0.01	1.87	0.03	1.85	-	-	0.03	1.85	0.04	1.84	-	-	-	-

1) Porosity reduction at 100 bar estimated to 1 p.u. for samples G34 and G39.
- = not analyzed.

2.6 Preparation of samples in humidity-controlled condition

After measurement in water saturated condition most of the samples proceeded to measurement in humidity–controlled condition. They were placed in a humidity-controlled oven at 60 °C and 40 % relative humidity until weight measurements showed that an equilibrium state was established. Table 2.10 presents the equilibrium weights and the water saturations calculated from these weights.

The calculated water saturation values show a very large scatter, with three values above 100%. The median S_w value is 29%. The highest water saturation values clearly occur for samples with the lowest porosity, where small weighing errors may cause a relatively large error. However, weighing a dry sample is a very accurate measurement, and the calculated water contents of the samples, cf. column *Water contents in humidity dry state*, cannot result from measuring errors. On average the 20 samples have gained 1.5 g of weight, equivalent to 1.5 ml of salt-free water, from the initial drying at 110 °C to the end of the humidity drying. Four samples, G30, G34, G35, and G71, each gained more than 2.0 g of weight. It is noticeable that these high-gain samples include three sediments (G30, G34 and G71), and also include the three samples that were noticed to have abnormally high water contents after saturation to S_w=100% (G30, G34, and G35). This is taken to support a suggestion that some samples contain water-absorbing minerals.

Table 2.10. Water saturation of samples at time of ultrasonic measurement in humidity dried state. The calculation assumes a water density of 0.997 g/ml.

Sample id.	Bulk volume (ml)	Pore volume (ml)	Helium porosity (%)	Weight after drying @ 110 °C (g)	Weight after drying @ 60 °C, 40 %RH (g)	Water contents in humidity dry state (ml)	Sw in humidity dry state (%PV)
V3	42.09	4.53	10.76	110.18	111.65	1.5	33
V10	39.14	0.31	0.78	114.39	115.07	0.7	223
G6	39.27	1.98	5.05	113.63	114.29	0.7	33
G7	43.57	14.59	33.48	80.32	82.06	1.7	12
G12	39.49	4.43	11.22	104.62	105.73	1.1	25
G13	47.05	1.36	2.88	138.21	138.83	0.6	46
G19	41.92	8.85	21.12	97.46	98.58	1.1	13
G20	40.25	6.97	17.32	102.94	103.55	0.6	9
G30	41.57	10.94	26.32	85.39	88.14	2.8	25
G32	47.29	7.94	16.80	121.63	122.56	0.9	12
G34	42.66	12.25	28.71	81.43	86.19	4.8	39
G35	42.90	3.80	8.85	104.45	107.42	3.0	78
G36	45.91	1.03	2.25	128.19	129.31	1.1	109
G37	47.01	11.34	24.12	101.29	103.08	1.8	16
G39	45.51	15.46	33.97	91.72	n.a.	n.a.	n.a.
G40	47.14	2.58	5.47	132.20	133.53	1.3	52
G50	43.21	4.07	9.43	120.92	121.60	0.7	17
G71	43.52	13.47	30.96	83.27	86.14	2.9	21
G75	40.09	8.25	20.58	96.65	97.96	1.3	16
G76	46.73	2.55	5.46	131.79	132.71	0.9	36
G77	44.36	0.83	1.88	125.12	126.22	1.1	132

n.a. = not available.

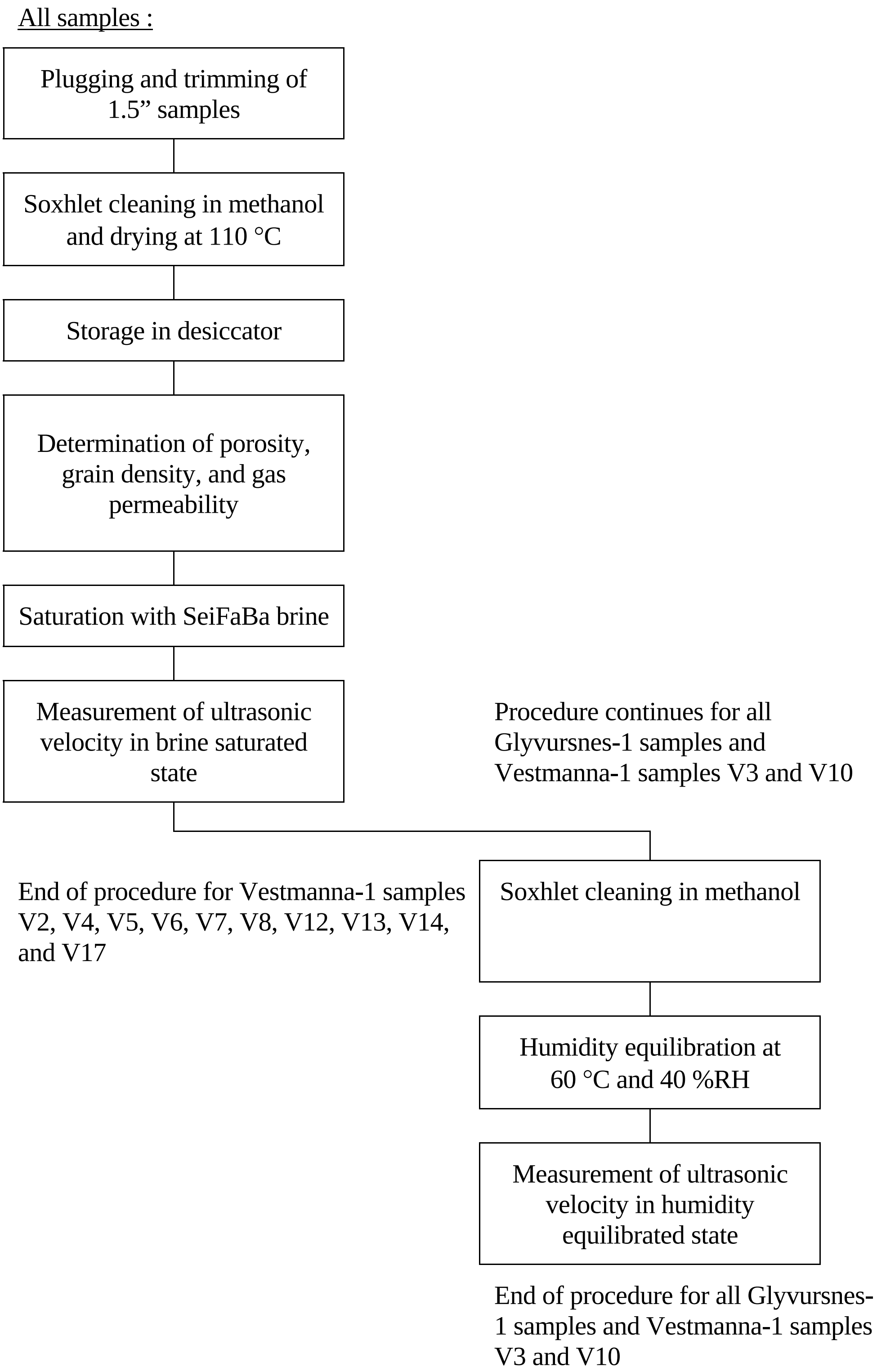
2.7 Ultrasonic measurements on samples in humidity-controlled condition

The ultrasonic measurements on samples in humidity-controlled condition used the same time schedules and the same general procedure as the measurements on water saturated samples. The only differences were

1. that Mettler weight data was not collected as no liquid phase was produced, and
2. that the measurement programme for samples G30, G34 and G39 were further reduced because of the crumbling state of the samples. Sample G30 was only measured at a confining pressure of 100 bar (Table 2.8), and samples G34 and G39 proved impossible to measure at all.

Results of samples measured in humidity-controlled condition are presented in Chapter 6.

3. Flow chart of the analytical procedure



4. Ultrasonic measurement methods

4.1 Procedure for the ultrasonic measurements

The ultrasonic equipment consisted of a modified AutoLab 500 Ultrasonic system (New England Research) connected to a PAR spike-generator and a Tektronix TDS3012 2-channel digital phosphor oscilloscope. The system may generate P- and S-wave signals with nominal centre frequencies of 700 kHz. The S-wave velocity of a sample may be measured in two orthogonal directions denoted S1 and S2. The cores from the Vestmanna-1 and Glyvursnes-1 wells were not oriented and, therefore, the S1 and S2 velocities could not be related to any geographical direction. S1 and S2 velocities were measured relative to an arbitrary mark on each sample. The mean value of S1 and S2 is reported as “S velocity”.

A plug sample was mounted in the ultrasonic core holder with an ultrasonic transmitter at one end and an ultrasonic receiver at the other end. A rubber sleeve was mounted around the cylinder surface to isolate the plug sample from the pressure medium. Contact paste was not applied to the sample ends. Hydrostatic pressure was applied to the sample with a Quizix SP-5400 high-pressure pump system. The initial pressure build-up was accomplished rapidly, i.e. within 2 minutes to ensure a good seal of the rubber sleeve. All subsequent pressure changes were applied more slowly with the pressure ramping facility of the Quizix pump system that provided a linear evolution of pressure vs. time.

The pores of the sample were maintained at atmospheric pressure trough an open outlet. For the water saturated samples, the outlet was connected to a cuvette placed on a Mettler balance and data logging of the balance was started. This allowed quantification of the fluid production during sample pressurization and ultrasonic measurement and thus enabled determination of the pore volume reduction, and sample length reduction.

The temperature in the laboratory during the ultrasonic measurements was 23 ± 2 °C.

The P- and S-wave data were saved digitally in csv-format for later analysis. Screen-dumps from the oscilloscope were saved in tif-format. Cf. Chapter 7 for data documentation.

4.2 Analysis of the ultrasonic signal

The ultrasonic signals were analysed with the program *firstarrival* made by Ødegaard A/S. It determines the arrival of the ultrasonic wave train from a table of amplitude versus time in a csv-file.

The ultrasonic velocity, V, is calculated from the following equation.

$$V = \frac{L}{t_{transit} - t_{delay}} \quad \text{Eq. 4-1}$$

where L is the sample length, $t_{transit}$ is the measured total travel time, and t_{delay} is the system delay. The system delay is an inherent system property representing the time taken for the ultrasonic signal to travel through the transducers plus any delays caused by the electronics. The system delay for the Autolab 500 system was determined by measuring the transit time for a configuration where the ultrasonic transducers were mounted head-to-head, i.e. with a sample length of zero. System delays were determined for P, S1 and S2 waves at all the pressure conditions used for measurements. Two different calibration sets were used for the present work. The first calibration set with identification June 2004a was used for the measurements on samples V3 and V10. The second calibration set with identification November 2004a was used for all other measurements. The system

Table 4.1 System delays, for ultrasonic calibration June 2004a.

Hydrostatic pressure (bar)	P signal (μs)	S1 signal (μs)	S2 signal (μs)
100	12.7597	23.6030	24.2643
200	12.7476	23.5624	24.2234
300	12.6850	23.5540	24.2022
500	12.6833	23.5140	24.1956
500 repeat	12.6775	23.5147	24.1649

Table 4.2 System delays, for ultrasonic calibration November 2004a.

Hydrostatic pressure (bar)	P signal (μs)	S1 signal (μs)	S2 signal (μs)
100	13.7536	24.6037	25.2597
200	13.7192	24.5607	25.2132
300	13.7008	24.5359	25.2144
300 repeat	13.6828	24.5350	25.1924

delays are listed in Tables 4.1 and 4.2. It is noticed that the system delays show a small but significant dependence on confining pressure.

4.3 Precision and reproducibility of ultrasonic data

The precision of the ultrasonic results may be assessed from 1) precision evaluation of the analytical data for each sample and 2) measurements on a secondary standard with identification Alu6061.

4.3.1. Precision evaluation of the analytical data for each sample

The program *firstarrival* returns the precision parameters ”Local uncertainty” and “Global uncertainty” for every data set, cf. Section 4.4 “The arrival picker program”. The precision of the ultrasonic measurements may be assessed from these precision parameters and an estimate of the uncertainty of the plug length determination. Precision estimates for all measurements are presented in Tables A.1 to A.6 of Appendix 1. The uncertainty of the plug length is estimated to a fixed value of 0.1 mm and this leads to the error given in the column “Error on velocity from length”. The *firstarrival* parameter "Local uncertainty" is a measure of the signal noise, and results in the error listed in column “Error on velocity from noise”. The column “Total error” is the sum of the errors “Error on velocity from length” and “Error on velocity from noise”.

The *firstarrival* parameter "Global uncertainty" is a measure of the precision of picking the right signal. It is listed in column “Global uncertainty”. The risk of picking a wrong signal from the ultrasonic data set increases with the value of this parameter. When the parameter "Global uncertainty" exceeds approximately 0.5 a significant risk of picking a wrong signal is probably present. The parameter “Global uncertainty” was only used as a guidance for identifying problematic picks. All *firstarrival* picks were checked manually and a number of erroneous picks were guided by the *forced pick* procedure, cf. Section 4.4 "The arrival picker program". All instances of *forced picking* are marked with the comment “Forced pick” in Tables A.1 to A.6.

The mean total error for all the 591 measurements of P, S1 and S2 ultrasonic velocities is 0.51 % of the calculated velocity, cf. Tables A.1 to A.6. For many samples roughly half of this error stems from signal noise and half from uncertainty of length determination. For 27 measurements the mean total error exceeds 1.0 %, with the largest error of 3.16 % occurring for the measurement of sample G35 in gas saturated state at 100 bar.

The errors listed in Tables A.1 to A.6 do not include possible systematic errors or calibration inaccuracies and should be regarded as minimum errors.

Table 4.3 Measurements on standard Alu6061, calibration November 2004a.

Nominal value or pressure condition	Ultrasonic P velocity (m/s)	Deviation from nominal P velocity (%)	Ultrasonic S1 velocity (m/s)	Deviation from nominal S velocity (%)	Ultrasonic S2 velocity (m/s)	Deviation from nominal S velocity (%)
Nominal value	6396		3125		3125	
100 bar	6301	-1.48	3102	-0.72	3112	-0.43
200 bar	6411	+0.23	3120	-0.15	3129	+0.11
300 bar	6457	+0.95	3131	+0.19	3147	+0.70
300 repeat	6435	_+0.61	3143	+0.58	3143	+0.59

4.3.2. Measurements on standard Alu6061

Standard Alu6061 is a secondary standard of aluminium provided by New England Research which also provided standard values for the P- and S-wave velocities. It was measured at the four pressure steps 100 bar, 200 bar, 300 bar, and 300 bar repeat with the schedule of Table 2.6 that was also used for most of the samples. The results are listed in Table 4.3 together with the nominal ultrasonic velocities for the standard. The results indicate a mean error of 0.82 % for P measurements, and a mean error of 0.43 % for S measurements, with no significant difference between S1 and S2. However, it is evident that the measured velocities are dependent on the confining pressure: Both P and S velocities increases with the applied confining pressure, cf. Fig. 4.1. It has not been possible to obtain information about the confining pressure pertinent to the nominal velocities supplied by New England Research, but from Fig 4.1 it appears that it may be in the vicinity 200 bar.

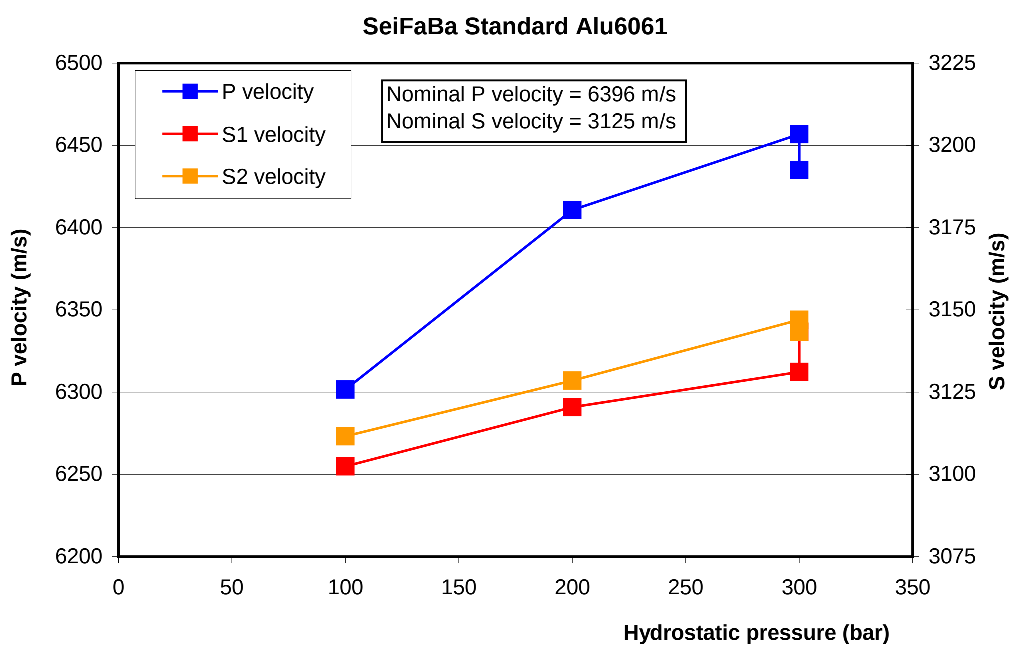


Fig. 4.1. Ultrasonic velocities measured on standard Alu6061.

4.3.3. Summary of precision

The precision of the ultrasonic velocity determinations is considered to be better than 1 % at 1 σ level. However, it should be recognized that for clay-rich samples in gas saturated state the ultrasonic velocities might change with the gas humidity and thus the water contents of the samples.

4.4 The arrival picker program

Whenever possible a program named *firstarrival* is used for determining the transit time of the ultrasonic signals. The program was developed by Ødegaard A/S. Compared to manual picking of the transit time the use of a computer program eliminates the subjectivity of manual picking, and objective information about precision becomes available (Section 4.3.1). The input to the program consists of 1) a comma-separated file (csv-file) listing time and signal amplitude, 2) a search interval specifying the time interval to be searched, and 3) a parameter specifying whether a positive or a negative deflection from zero shall be picked.

firstarrival identifies the first amplitude extremum of the ultrasonic signal and determines the transit time, the amplitude and two uncertainty parameters, a global uncertainty and a local uncertainty, for the arrival event. The first amplitude extremum is used as the arrival event rather than the first deviation from the baseline because this causes the algorithm to be much more robust in case of noisy data. The difference between the two methods is negligible, because the same procedure is used for both calibration and sample measurements and because the width of signal peaks are nearly constant (being governed by the 700 kHz centre frequency).

On some occasions when the ultrasonic signal is very noisy the *firstarrival* program may pick a wrong signal peak and thus result in a wrong transit time. Or the program may fail to detect a signal peak at all. Therefore, the transit time determinations of the *firstarrival* program are always checked manually. In case they are deemed wrong it is first attempted to force *firstarrival* to pick the correct extremum by reducing the search interval – a procedure termed *forced picking*. If this procedure fails manual picking of the transit time is performed - a procedure termed *manual picking*. In case of forced picking objective information about local precision is still available. In case of manual picking objective information about precision is not available.

The output from the *firstarrival* program consists of 1) a pick of the extremum identified as the arrival of the ultrasonic signal, 2) a global uncertainty parameter, 3) a local uncertainty parameter, and 4) an amplitude at the pick.

4.4.1 Picking the arrival of the ultrasonic signal

firstarrival looks for an event consisting of two consecutive local extrema with amplitudes of opposite sign. The search can be limited to a given time interval and to a given polarity, i.e. the sign of the first extremum. In a typical ultrasonic signal the desired event will give the maximum output in the following non-linear object function:

$$\frac{\left| FirstExtremumAmplitude - 2 * SecondExtremumAmplitude \right|}{HeadAmplitude} \qquad \text{Eq. 4-2}$$

Where the HeadAmplitude denotes the maximum absolute amplitude of the signal in an interval ending just before the onset of the half period containing the first extremum. The length of the interval has been set to 5 mean periods, i.e. 5 divided by the mean frequency. The precise time of the first extremum is found using Newton-Raphson local optimisation starting from the solution determined previously and using sinc interpolation between the samples.

4.4.2 Global uncertainty:

To describe how easy it is to identify the desired event, the global uncertainty is defined as the ratio of the object function for the second largest value and the largest value. The global uncertainty takes values between 0 and 1, where 0 represents a very easy case and 1 means that two or more picks were equally good, in fact equally bad.

4.4.3 Local uncertainty (Error-band):

To describe how much the picked time could be wrong due to additive noise moving the chosen extremum of the observable signal, the local uncertainty is computed. The chosen HeadAmplitude is used as a noise estimate in that computation.

4.4.4 Amplitude at pick

The amplitude of the Newton-Raphson optimisation at the picked time is reported as the amplitude at the pick

5. Conventional core analysis methods

The following is a short description of the methods used by GEUS Core Laboratory. For a more detailed description of methods, instrumentation and principles of calculation the reader is referred to API recommended practice for core analysis procedure (API RP 40, 1998).

5.1 Gas permeability

The plug is mounted in a Hassler core holder, and a confining pressure of 400 psi applied to the sleeve. The specific permeability to gas is measured by flowing nitrogen gas through a plug of known dimensions at differential pressures between 0 and 1 bar. No back-pressure is applied. The readings of the digital gas permeameter are checked regularly by routine measurement of permeable steel reference plugs.

5.2 He-porosity and grain density

The porosity is measured on cleaned and dried samples. The porosity is determined by subtraction of the measured grain volume and the measured bulk volume. The Helium technique, employing Boyle's Law, is used for grain volume determination, applying a double chambered Helium porosimeter with digital readout, whereas bulk volume is measured by submersion of the plug in a mercury bath using Archimedes principle. Grain density is calculated from the grain volume measurement and the weight of the cleaned and dried sample.

5.3 Precision of conventional core analysis data

Table 5.1 gives the precision (= reproducibility) at the 68% level of confidence (+/- 1 standard deviation) for routine core analysis measurements performed at GEUS Core Laboratory.

Table 5.1. Precision of conventional core analysis data.

Measurement	Range, mD	Precision
Grain density		0.003 g/cc
Porosity		0.1 porosity-%
Gas Permeability	0.001-0.01 0.01-0.1 > 0.1	25% 15% 4%

6. Results of the ultrasonic measurements

The results of the ultrasonic measurements are presented in the following tables and figures:

Table 6.1: Ultrasonic results of 12 samples from Vestmanna-1 in water saturated condition.
Table 6.2: Ultrasonic results of 2 samples from Vestmanna-1 in gas saturated condition after humidity controlled drying at 60 °C and 40 %RH.
Table 6.3: Ultrasonic results of 19 samples from Glyvursnes-1 in water saturated condition.
Table 6.4: Ultrasonic results of 17 samples from Glyvursnes-1 in gas saturated condition after humidity controlled drying at 60 °C and 40 %RH.

Values reported in Tables 6.1 to 6.4 as "Mean S velocity" are the mean of S1 and S2 measurements. Basic data for the underlying P, S1 and S2 measurements are given in Tables A.1 to A.6.

For ease of reference samples in humidity-controlled state are referred to as *gas saturated*. The ultrasonic velocity have been plotted as follows:

Fig. 6.1 V_P and V_S vs. porosity for Vestmanna-1 samples in the *water saturated* state.
Fig. 6.2. V_P and V_S vs. porosity for Glyvursnes-1 samples in the *water saturated* state.
Fig. 6.3 V_P and V_S vs. porosity for Vestmanna-1 samples in the *gas saturated* state.
Fig. 6.4. V_P and V_S vs. porosity for Glyvursnes-1 samples in the *gas saturated* state.
Fig. 6.5 V_S vs. V_P for Vestmanna-1 samples in the *water saturated* state.
Fig. 6.6. V_S vs. V_P for Glyvursnes-1 samples in the *water saturated* state.
Fig. 6.7 V_S vs. V_P for Vestmanna-1 samples in the *gas saturated* state.
Fig. 6.8. V_S vs. V_P for Glyvursnes-1 samples in the *gas saturated* state.
Fig. 6.9 V_P/V_S ratio vs. porosity for Vestmanna-1 samples in the *water saturated* state.
Fig. 6.10. V_P/V_S ratio vs. porosity for Glyvursnes-1 samples in the *water saturated* state.
Fig. 6.11 V_P/V_S ratio vs. porosity for Vestmanna-1 samples in the *gas saturated* state.
Fig. 6.12 V_P/V_S ratio vs. porosity for Glyvursnes-1 samples in the *gas saturated* state.
Fig. 6.13 V_P in water saturated state vs. V_P in *gas saturated* state for Vestmanna-1 samples.
Fig. 6.14 V_P in water saturated state vs. V_P in *gas saturated* state for Glyvursnes-1 samples.
Fig. 6.15 V_S in water saturated state vs. V_S in *gas saturated* state for Vestmanna-1 samples.
Fig. 6.16 V_S in water saturated state vs. V_S in *gas saturated* state for Glyvursnes-1 samples.
Fig. 6.17 V_P and V_S vs. confining pressure for Vestmanna-1 samples in the *water saturated* state.
Fig. 6.18 V_P and V_S vs. confining pressure for Glyvursnes-1 samples in the *water saturated* state.
Fig. 6.19 V_P and V_S vs. confining pressure for Vestmanna-1 samples in the *gas saturated* state.
Fig. 6.20 V_P and V_S vs. confining pressure for Glyvursnes-1 samples in the *gas saturated* state.

In Figs. 6.1 to 6.20 measurements on the same sample at different confining pressure are plotted with the same symbol connected by a line with the same colour as the symbol.

Sample V10 plots as an outlier in several plots, e.g. Figs. 6.1 ($V_{S,wat}$ vs. porosity), 6.5 ($V_{S,wat}$ vs. V_P), and 6.9 ($V_{P,wat}/V_{S,wat}$ ratio vs. porosity). From the general trends of the plots it appears that the V_S velocity of sample V10 in water saturated state is lower than what should be expected for a sample with that porosity and V_P velocity. The S-signals of sample V10 contained much noise and reasonable firstarrival-picks could not be determined for the S1-signals. However, the arrival of the S2-signals could be confidently determined and the analytical results are maintained for the S2-signals. Comparison of Figs. 6.7 and 6.8, V_S vs. V_P for gas saturated samples from respectively Vestmanna-1 and Glyvursnes-1, indicate that V_S for sample V10 fall on the general trend for gas saturated samples. Similarly, comparison of Figs. 6.11 and 6.12, V_P/V_S ratio vs. porosity for gas saturated samples from respectively Vestmanna-1 and Glyvursnes-1 indicates that the V_P/V_S ratio for sample V10 fall on the general trend for gas saturated samples. It should be noticed that sample V10 possibly was not in drainage equilibrium during the ultrasonic measurements in water saturated state, cf. Section 2.4, but it is not known whether this has any connection to the aberrant S-velocities.

Except for the determination of S-velocity for sample V10 in water saturated state no determinations are considered suspect.

Table 6.1. Results of ultrasonic measurements on Vestmanna-1 samples in water saturated state.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
V2	100	10.03	9.95	4786	2613	2644	2628	1.821
V2	200	10.03	9.87	4821	2620	2659	2640	1.826
V2	300	10.03	9.81	4817	2635	2673	2654	1.815
V2	300 rep	10.03	9.78	4836	2645	2675	2660	1.818
V3	100	10.76	10.59	4518	2415	2295	2355	1.919
V3	200	10.76	10.42	4614	2482	2369	2426	1.902
V3	300	10.76	10.28	4642	2537	2420	2478	1.873
V3	500	10.76	10.06	4730	2599	2507	2553	1.852
V3	500 rep	10.76	10.05	4756	2619	2521	2570	1.850
V4	100	7.40	7.31	5256	2831	2748	2789	1.884
V4	200	7.40	7.23	5308	2870	2801	2835	1.872
V4	300	7.40	7.16	5352	2899	2851	2875	1.861
V4	300 rep	7.40	7.16	5346	2907	2861	2884	1.854
V5	100	4.93	4.86	5741	3006	3057	3031	1.894
V5	200	4.93	4.78	5760	3059	3094	3077	1.872
V5	300	4.93	4.73	5789	3106	3137	3121	1.855
V5	300 rep	4.93	4.73	5804	3127	3148	3138	1.850
V6	100	4.47	4.42	5724	3094	3094	3094	1.850
V6	200	4.47	4.36	5720	3116	3119	3118	1.835
V6	300	4.47	4.32	5726	3132	3143	3138	1.825
V6	300 rep	4.47	4.28	5727	3145	3152	3149	1.819
V7	100	1.58	1.56	6523	3536	3513	3525	1.851
V7	200	1.58	1.55	6503	3534	3517	3526	1.845
V7	300	1.58	1.53	6515	3550	3528	3539	1.841
V7	300 rep	1.58	1.53	6509	3590	3571	3580	1.818
V8	100	2.40	2.38	6274	3402	3419	3410	1.840
V8	200	2.40	2.36	6274	3391	3395	3393	1.849
V8	300	2.40	2.34	6250	3389	3402	3396	1.841
V8	300 rep	2.40	2.35	6256	3410	3420	3415	1.832
V10	100	0.78	0.77	6464	n.a.	2996	2996	2.157
V10	200	0.78	0.76	6480	n.a.	3022	3022	2.144
V10	300	0.78	0.75	6436	n.a.	3050	3050	2.110
V10	500	0.78	0.74	6457	n.a.	3094	3094	2.087
V10	500 rep	0.78	0.76	6451	n.a.	2977	2977	2.166
V12	100	1.03	1.00	6662	3631	3649	3640	1.830
V12	200	1.03	0.96	6654	3647	3643	3645	1.825
V12	300	1.03	0.95	6670	3649	3657	3653	1.826
V12	300 rep	1.03	0.91	6626	3657	3664	3661	1.810

n.a. = not available.
rep = repeat measurement next day.

continue next page

Table 6.1 cont'd. Results of ultrasonic measurements on Vestmanna-1 samples in water saturated state.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
V13	100	4.46	4.40	5765	3125	3115	3120	1.848
V13	200	4.46	4.34	5794	3144	3138	3141	1.845
V13	300	4.46	4.30	5777	3154	3165	3160	1.828
V13	300 rep	4.46	4.27	5742	3168	3159	3163	1.815
V14	100	6.63	6.52	5299	2775	2839	2807	1.888
V14	200	6.63	6.42	5392	2835	2898	2866	1.881
V14	300	6.63	6.34	5427	2888	2950	2919	1.859
V14	300 rep	6.63	6.33	5403	2909	2959	2934	1.842
V17	100	2.86	2.81	5825	3100	3144	3122	1.866
V17	200	2.86	2.76	5797	3103	3148	3125	1.855
V17	300	2.86	2.72	5799	3113	3156	3135	1.850
V17	300 rep	2.86	2.70	5790	3121	3159	3140	1.844

rep = repeat measurement next day.

Table 6.2. Results of ultrasonic measurements on Vestmanna-1 samples in humidity dried state, 60°C, 40 %RH.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
V3	100	10.76	10.59	3395	2160	1972	2066	1.643
V3	200	10.76	10.42	3687	2302	2128	2215	1.665
V3	300	10.76	10.28	3843	2385	2237	2311	1.663
V3	500	10.76	10.06	4055	2478	2388	2433	1.667
V3	500 rep	10.76	10.05	4094	2496	2415	2455	1.668
V10	100	0.78	0.77	6062	3401	3390	3396	1.785
V10	200	0.78	0.76	6226	3451	3444	3447	1.806
V10	300	0.78	0.75	6247	3474	3470	3472	1.799
V10	500	0.78	0.74	6344	3506	3516	3511	1.807
V10	500 rep	0.78	0.76	6358	3508	3511	3510	1.812

rep = repeat measurement next day.

Table 6.3. Results of ultrasonic measurements on Glyvursnes-1 samples in water saturated state.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
G6	100	5.05	5.01	5778	3122	3092	3107	1.860
G6	200	5.05	4.98	5746	3157	3142	3150	1.824
G6	300	5.05	4.95	5749	3171	3162	3167	1.815
G6	300 rep	5.05	4.92	5770	3184	3181	3182	1.813
G7	100	33.48	33.06	3043	1528	1556	1542	1.973
G7	200	33.48	32.63	3066	1545	1562	1553	1.974
G7	300	33.48	31.97	3072	1548	1574	1561	1.969
G7	300 rep	33.48	31.82	3079	1554	1579	1567	1.965
G12	100	11.22	11.02	4315	2245	2246	2246	1.921
G12	200	11.22	10.83	4458	2348	2355	2352	1.895
G12	300	11.22	10.70	4555	2415	2433	2424	1.879
G12	300 rep	11.22	10.68	4565	2438	2446	2442	1.869
G13	100	2.88	2.85	6173	3374	3307	3340	1.848
G13	200	2.88	2.82	6171	3392	3328	3360	1.837
G13	300	2.88	2.80	6164	3406	3359	3382	1.822
G13	300 rep	2.88	2.78	6176	3424	3380	3402	1.815
G19	100	21.12	20.95	3654	1927	1929	1928	1.895
G19	200	21.12	20.79	3729	1978	1986	1982	1.882
G19	300	21.12	20.64	3762	2006	2019	2013	1.869
G19	300 rep	21.12	20.63	3776	2019	2026	2022	1.867
G20	100	17.32	17.14	4185	2156	2180	2168	1.930
G20	200	17.32	16.96	4277	2243	2269	2256	1.896
G20	300	17.32	16.82	4321	2290	2324	2307	1.873
G20	300 rep	17.32	16.80	4327	2297	2326	2312	1.872
G30	100	26.32	25.36	2663	1242	1273	1258	2.118
G30	200	26.32	24.41	2788	1312	1328	1320	2.112
G30	200 rep	26.32	24.19	2823	1343	1361	1352	2.088
G32	100	16.80	16.60	4260	2153	2157	2155	1.977
G32	200	16.80	16.41	4381	2293	2309	2301	1.904
G32	300	16.80	16.28	4464	2355	2401	2378	1.878
G32	300 rep	16.80	16.22	4461	2376	2396	2386	1.870
G34	100	28.71	27.71	3524	1788	1853	1820	1.936
G34	100 rep	28.71	27.71	3535	1799	1861	1830	1.932
G35	100	8.85	8.71	4780	2454	2502	2478	1.929
G35	200	8.85	8.56	4870	2535	2573	2554	1.907
G35	300	8.85	8.47	4913	2582	2618	2600	1.890
G35	300 rep	8.85	8.47	4925	2594	2624	2609	1.887

rep = repeat measurement next day.

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Table 6.3 cont'd. **Results of ultrasonic measurements on Glyvursnes-1 samples in water saturated state.**

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
G36	100	2.25	2.22	6187	3484	3515	3499	1.768
G36	200	2.25	2.19	6239	3520	3546	3533	1.766
G36	300	2.25	2.17	6303	3554	3587	3570	1.765
G36	300 rep	2.25	2.17	6320	3566	3591	3578	1.766
G37	100	24.12	23.93	3659	1949	1933	1941	1.885
G37	200	24.12	23.74	3683	1970	1961	1966	1.874
G37	300	24.12	23.59	3688	1981	1978	1980	1.863
G37	300 rep	24.12	23.59	3695	1986	1985	1985	1.861
G39	100	33.97	32.97	n.a.	n.a.	n.a.	n.a.	n.a.
G39	100 rep	33.97	32.97	n.a.	n.a.	n.a.	n.a.	n.a.
G40	100	5.47	5.41	5818	3059	3141	3100	1.877
G40	200	5.47	5.36	5859	3119	3178	3148	1.861
G40	300	5.47	5.32	5887	3164	3213	3189	1.846
G40	300 rep	5.47	5.32	5887	3182	3224	3203	1.838
G50	100	9.43	9.36	5233	2760	2783	2772	1.888
G50	200	9.43	9.29	5264	2813	2822	2817	1.868
G50	300	9.43	9.23	5279	2844	2849	2847	1.854
G50	300 rep	9.43	9.22	5281	2857	2859	2858	1.848
G71	100	30.96	30.16	2691	1289	1306	1297	2.074
G71	200	30.96	29.36	2761	1325	1343	1334	2.070
G71	300	30.96	28.78	2794	1347	1361	1354	2.063
G71	300 rep	30.96	28.50	2819	1365	1379	1372	2.054
G75	100	20.58	20.40	3820	2056	2075	2065	1.850
G75	200	20.58	20.21	3927	2115	2140	2128	1.846
G75	300	20.58	20.06	3969	2145	2167	2156	1.841
G75	300 rep	20.58	20.06	3974	2154	2174	2164	1.836
G76	100	5.46	5.42	5885	3198	3201	3199	1.839
G76	200	5.46	5.38	5915	3219	3229	3224	1.834
G76	300	5.46	5.35	5914	3225	3253	3239	1.826
G76	300 re p	5.46	5.31	5919	3235	3257	3246	1.823
G77	100	1.88	1.87	6293	3272	3344	3308	1.902
G77	200	1.88	1.85	6257	3364	3398	3381	1.851
G77	300	1.88	1.85	6267	3413	3446	3429	1.827
G77	300 rep	1.88	1.84	6305	3437	3448	3443	1.831

n.a. = not available.
rep = repeat measurement next day.

Table 6.4. Results of ultrasonic measurements on Glyvursnes-1 samples in humidity dried state, 60°C, 40 %RH.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
G6	100	5.05	5.05	5313	3138	3116	3127	1.699
G6	200	5.05	5.05	5385	3162	3143	3153	1.708
G6	300	5.05	5.05	5395	3169	3170	3169	1.702
G6	300 rep	5.05	5.05	5399	3176	3164	3170	1.703
G7	100	33.48	33.48	3022	1859	1880	1869	1.617
G7	200	33.48	33.48	3042	1870	1886	1878	1.620
G7	300	33.48	33.48	3067	1879	1895	1887	1.625
G7	300 rep	33.48	33.48	3085	1884	1899	1892	1.631
G12	100	11.22	11.22	3199	2102	2064	2083	1.536
G12	200	11.22	11.22	3477	2210	2202	2206	1.576
G12	300	11.22	11.22	3657	2286	2291	2289	1.598
G12	300 rep	11.22	11.22	3690	2318	2319	2319	1.591
G13	100	2.88	2.88	5721	3331	3174	3252	1.759
G13	200	2.88	2.88	5820	3364	3247	3306	1.761
G13	300	2.88	2.88	5876	3384	3305	3345	1.757
G13	300 rep	2.88	2.88	5860	3385	3307	3346	1.752
G19	100	21.12	21.12	3307	2054	2051	2052	1.612
G19	200	21.12	21.12	3472	2137	2133	2135	1.627
G19	300	21.12	21.12	3547	2178	2175	2177	1.629
G19	300 rep	21.12	21.12	3555	2185	2185	2185	1.627
G20	100	17.32	17.32	3593	2100	2140	2120	1.695
G20	200	17.32	17.32	3832	2245	2287	2266	1.691
G20	300	17.32	17.32	3970	2322	2367	2345	1.693
G20	300 rep	17.32	17.32	3972	2332	2365	2349	1.691
G30	100	26.32	26.32	1705	1205	1170	1187	1.436
G30	100 rep	26.32	26.32	1733	1222	1184	1203	1.441
G32	100	16.80	16.80	3294	2093	1975	2034	1.619
G32	200	16.80	16.80	3736	2251	2198	2225	1.679
G32	300	16.80	16.80	3965	2356	2333	2345	1.691
G32	300 rep	16.80	16.80	3969	2370	2333	2351	1.688
G35	100	8.85	8.85	3740	2260	2318	2289	1.634
G35	200	8.85	8.85	4006	2383	2435	2409	1.663
G35	300	8.85	8.85	4154	2454	2500	2477	1.677
G35	300 rep	8.85	8.85	4150	2464	2504	2484	1.671

rep = repeat measurement next day.

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Table 6.4 cont'd. Results of ultrasonic measurements on Glyvursnes-1 samples in humidity dried state, 60°C, 40 %RH.

Sample id.	Confining presssure (bar)	Porosity (%)	Reduced porosity (%)	P velocity (m/s)	S1 velocity (m/s)	S2 velocity (m/s)	Mean S velocity (m/s)	P / S Ratio
G36	100	2.25	n.a.	6339	3611	3602	3607	1.758
G36	200	2.25	n.a.	6396	3605	3620	3612	1.770
G36	300	2.25	n.a.	6416	3610	3646	3628	1.768
G36	300 rep	2.25	n.a.	6410	3616	3641	3629	1.766
G37	100	24.12	n.a.	3162	2008	2025	2017	1.568
G37	200	24.12	n.a.	3232	2036	2044	2040	1.584
G37	300	24.12	n.a.	3267	2049	2061	2055	1.590
G37	300 rep	24.12	n.a.	3280	2062	2073	2068	1.586
G40	100	5.47	n.a.	4865	2744	2858	2801	1.737
G40	200	5.47	n.a.	5084	2863	2962	2913	1.745
G40	300	5.47	n.a.	5258	2958	3020	2989	1.759
G40	300 rep	5.47	n.a.	5252	2962	3021	2992	1.756
G50	100	9.43	n.a.	4604	2723	2747	2735	1.683
G50	200	9.43	n.a.	4725	2791	2799	2795	1.691
G50	300	9.43	n.a.	4798	2845	2842	2843	1.688
G50	300 rep	9.43	n.a.	4822	2853	2851	2852	1.691
G71	100	30.96	n.a.	1879	1264	1288	1276	1.472
G71	200	30.96	n.a.	2123	1379	1403	1391	1.526
G71	300	30.96	n.a.	2272	1456	1480	1468	1.548
G71	300 rep	30.96	n.a.	2301	1471	1493	1482	1.553
G75	100	20.58	n.a.	3152	1988	2013	2001	1.575
G75	200	20.58	n.a.	3412	2089	2114	2102	1.624
G75	300	20.58	n.a.	3501	2148	2171	2160	1.621
G75	300 rep	20.58	n.a.	3526	2160	2185	2172	1.623
G76	100	5.46	n.a.	5242	3116	3039	3077	1.703
G76	200	5.46	n.a.	5387	3153	3099	3126	1.723
G76	300	5.46	n.a.	5428	3163	3134	3149	1.724
G76	300 rep	5.46	n.a.	5435	3171	3137	3154	1.723
G77	100	1.88	n.a.	5627	3223	3282	3253	1.730
G77	200	1.88	n.a.	5877	3337	3367	3352	1.753
G77	300	1.88	n.a.	6021	3391	3421	3406	1.768
G77	300 rep	1.88	n.a.	6023	3402	3424	3413	1.765

n.a. = not available.
rep = repeat measurement next day.

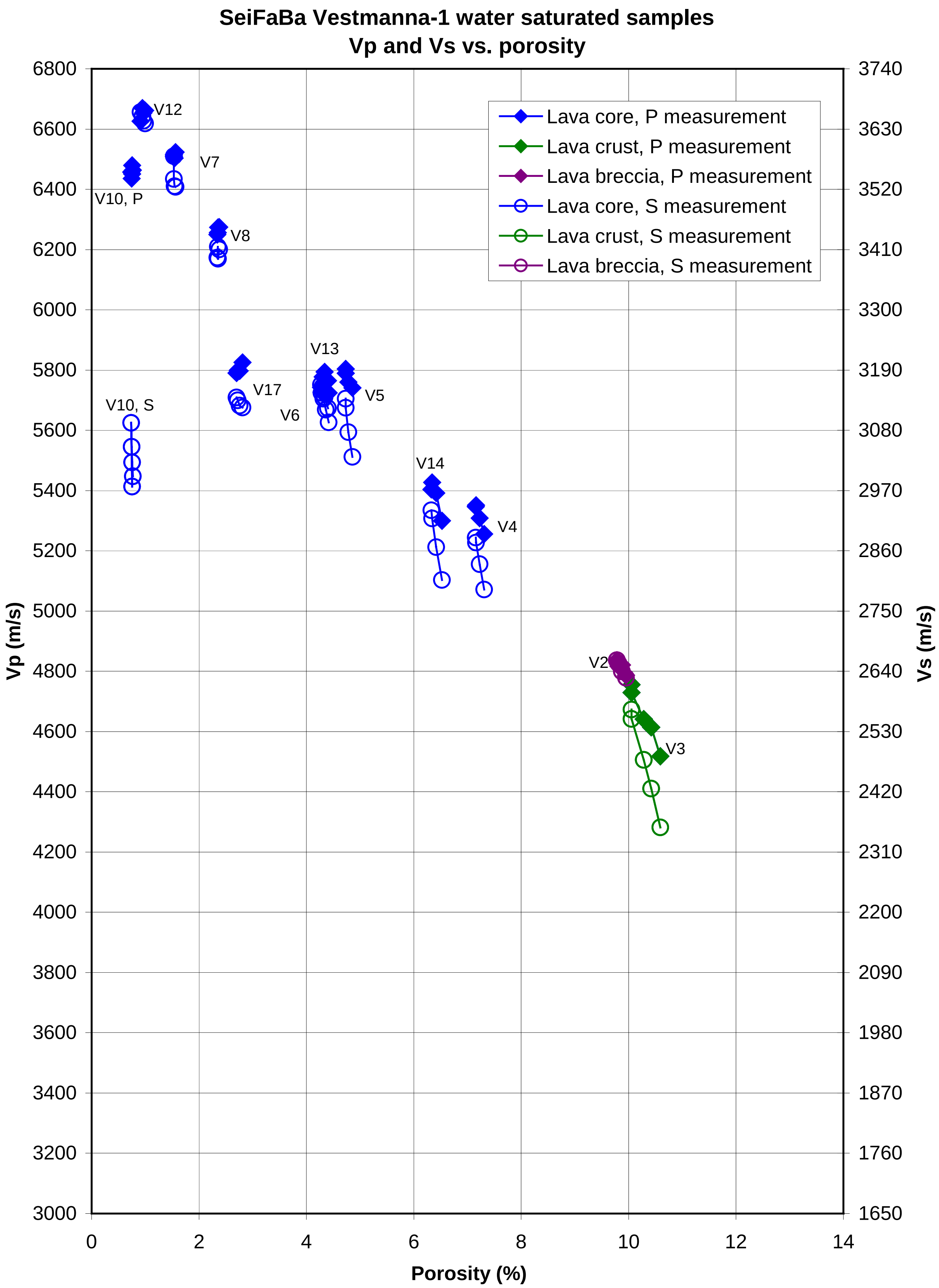

Fig. 6.1. V_P and V_S vs. porosity for Vestmanna-1 samples in water saturated state.

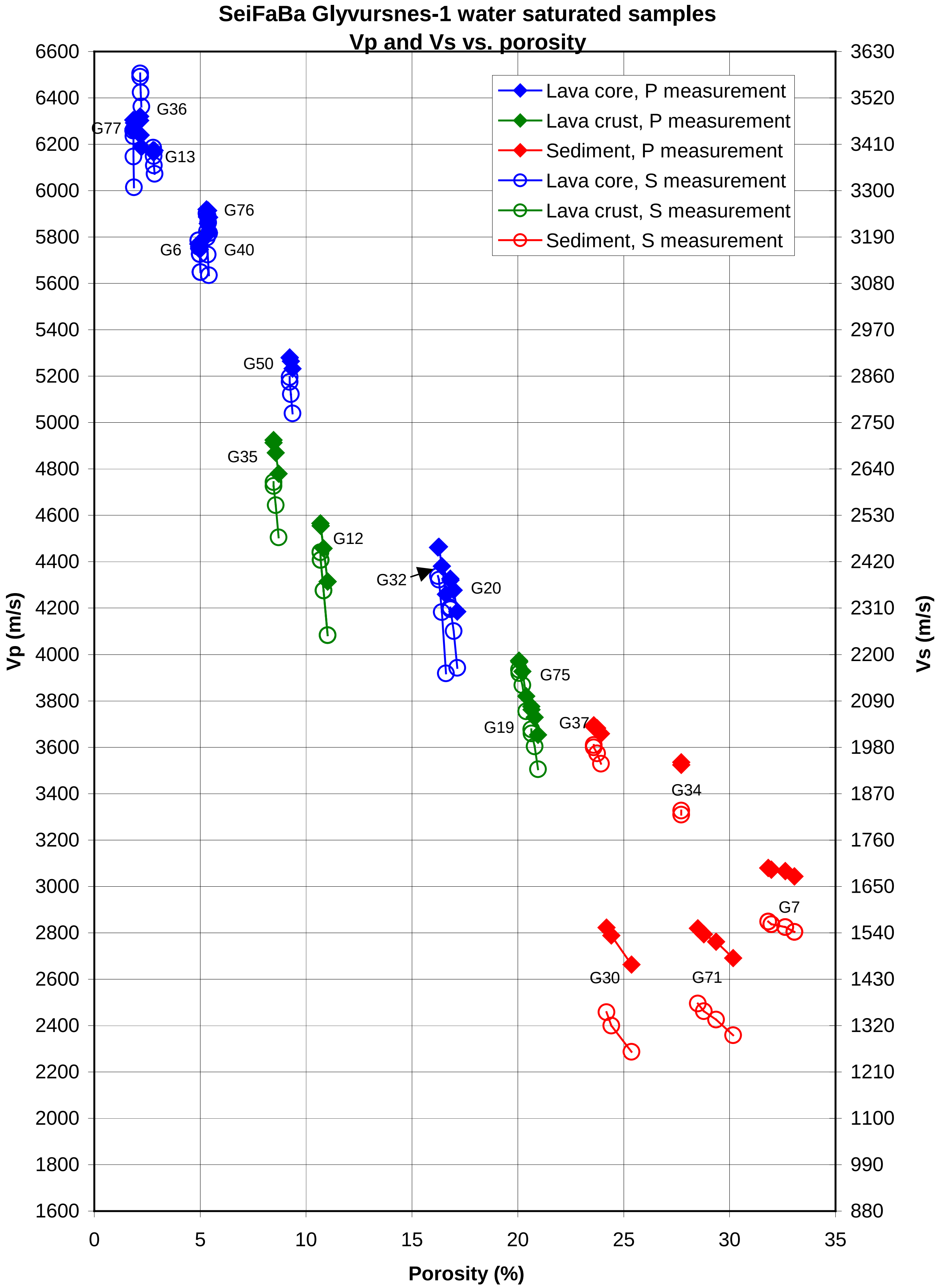

Fig. 6.2. V_P and V_S vs. porosity for Glyvursnes-1 samples in water saturated state.

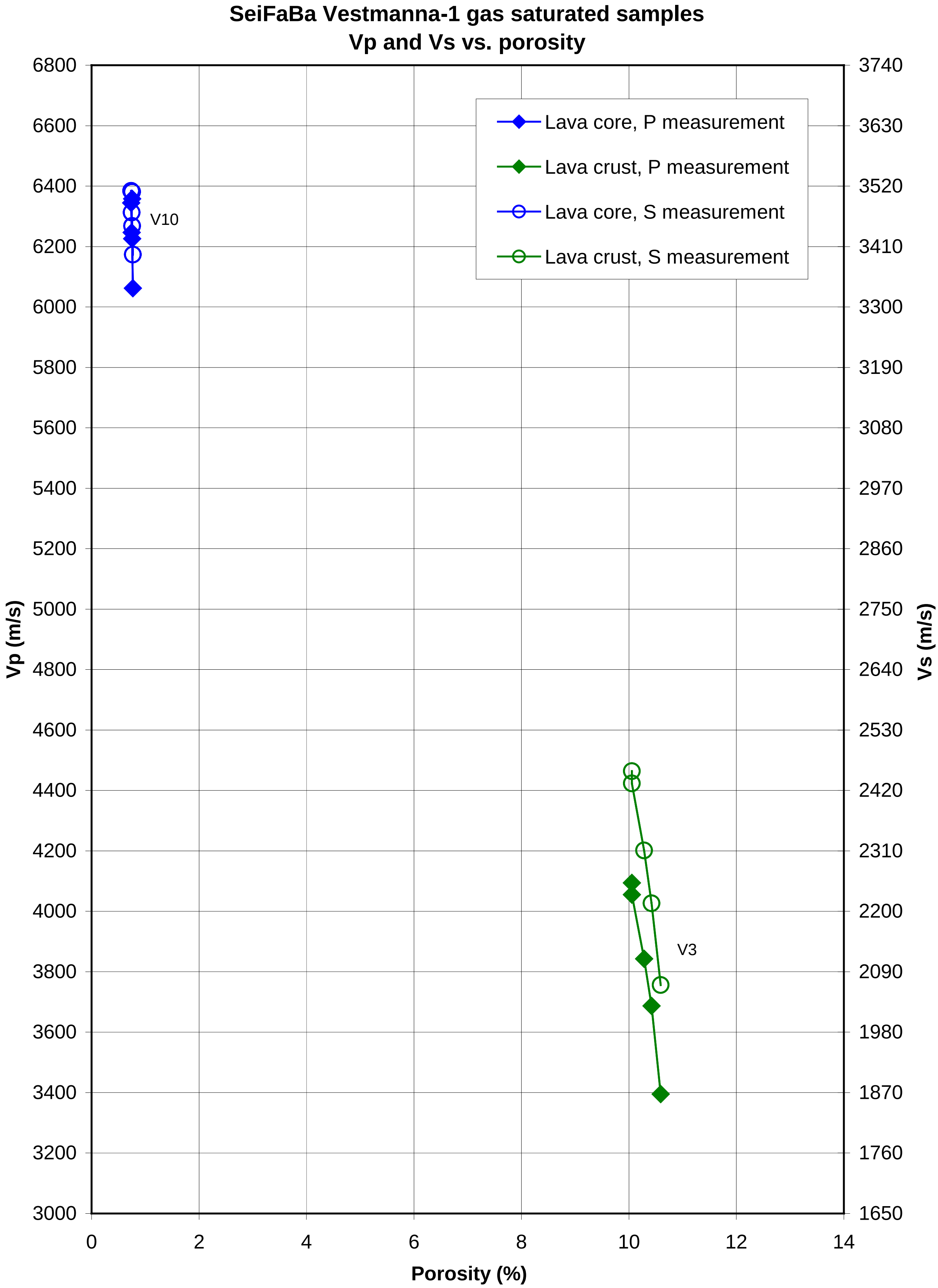

Fig. 6.3. V_P and V_S vs. porosity for Vestmanna-1 samples in gas saturated state.

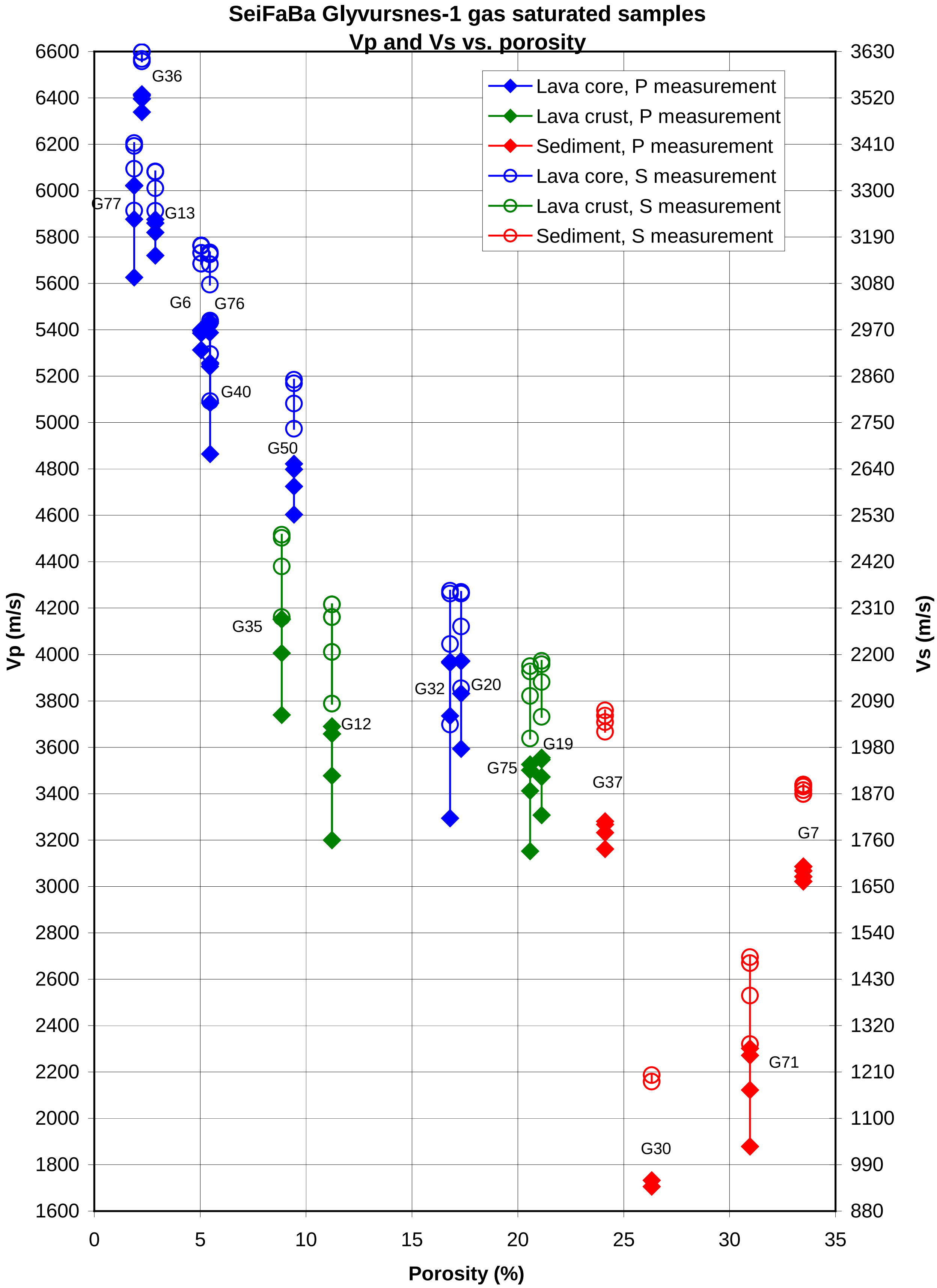

Fig. 6.4. V_P and V_S vs. porosity for Glyvursnes-1 samples in gas saturated state.

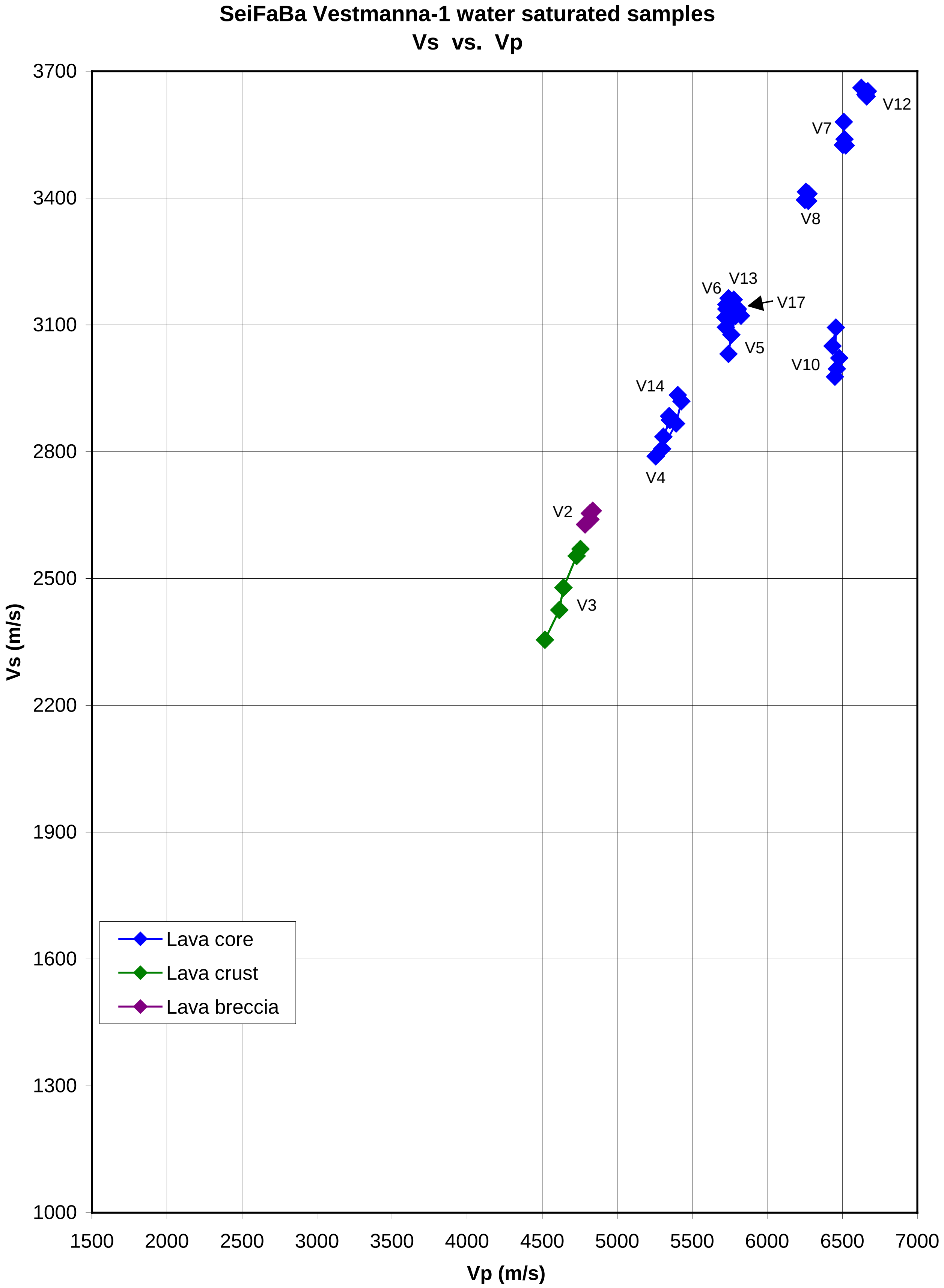

Fig. 6.5. V_S vs. V_P for Vestmanna-1 samples in water saturated state.

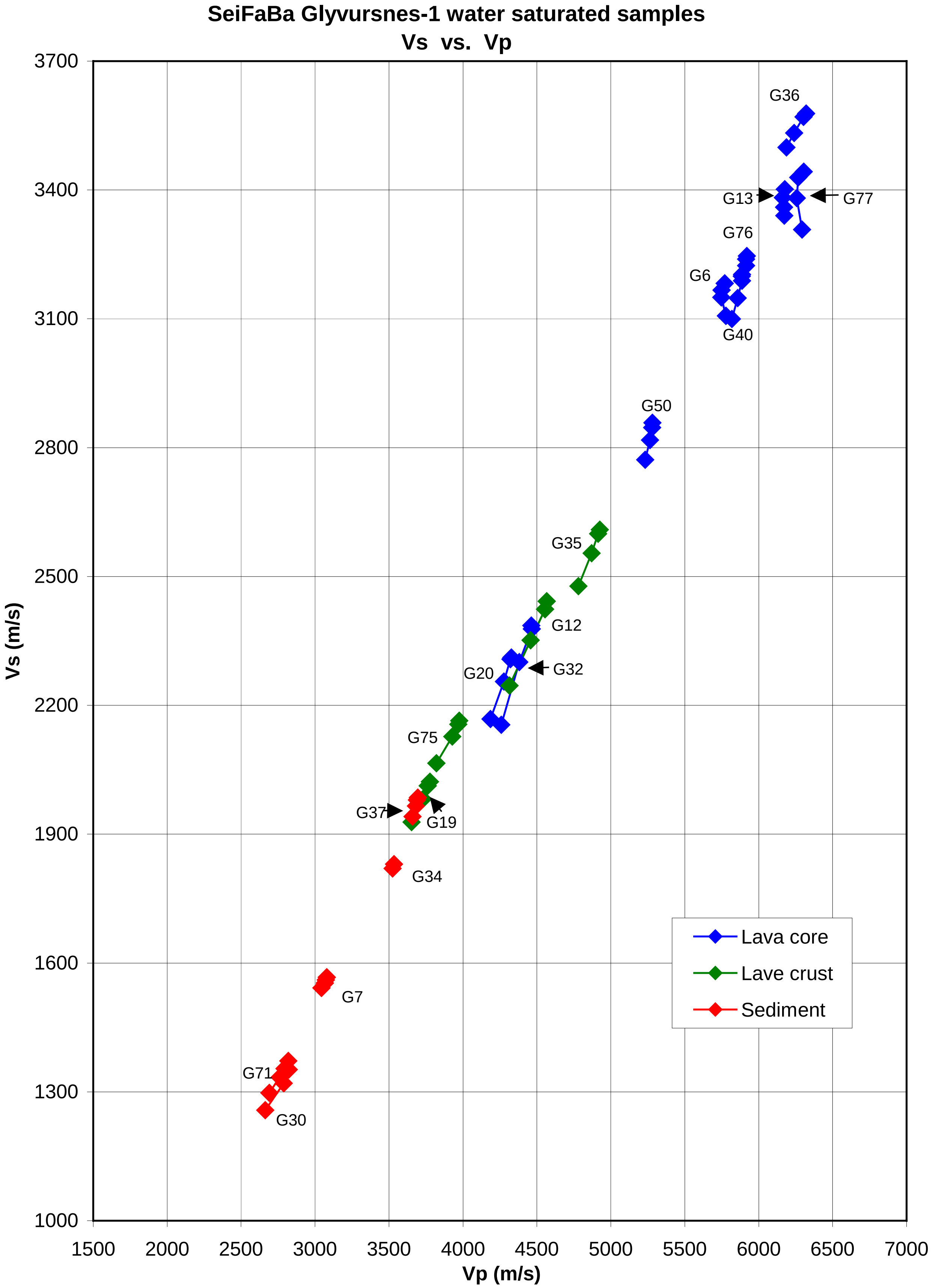

Fig. 6.6. V_S vs. V_P for Glyvursnes-1 samples in water saturated state.

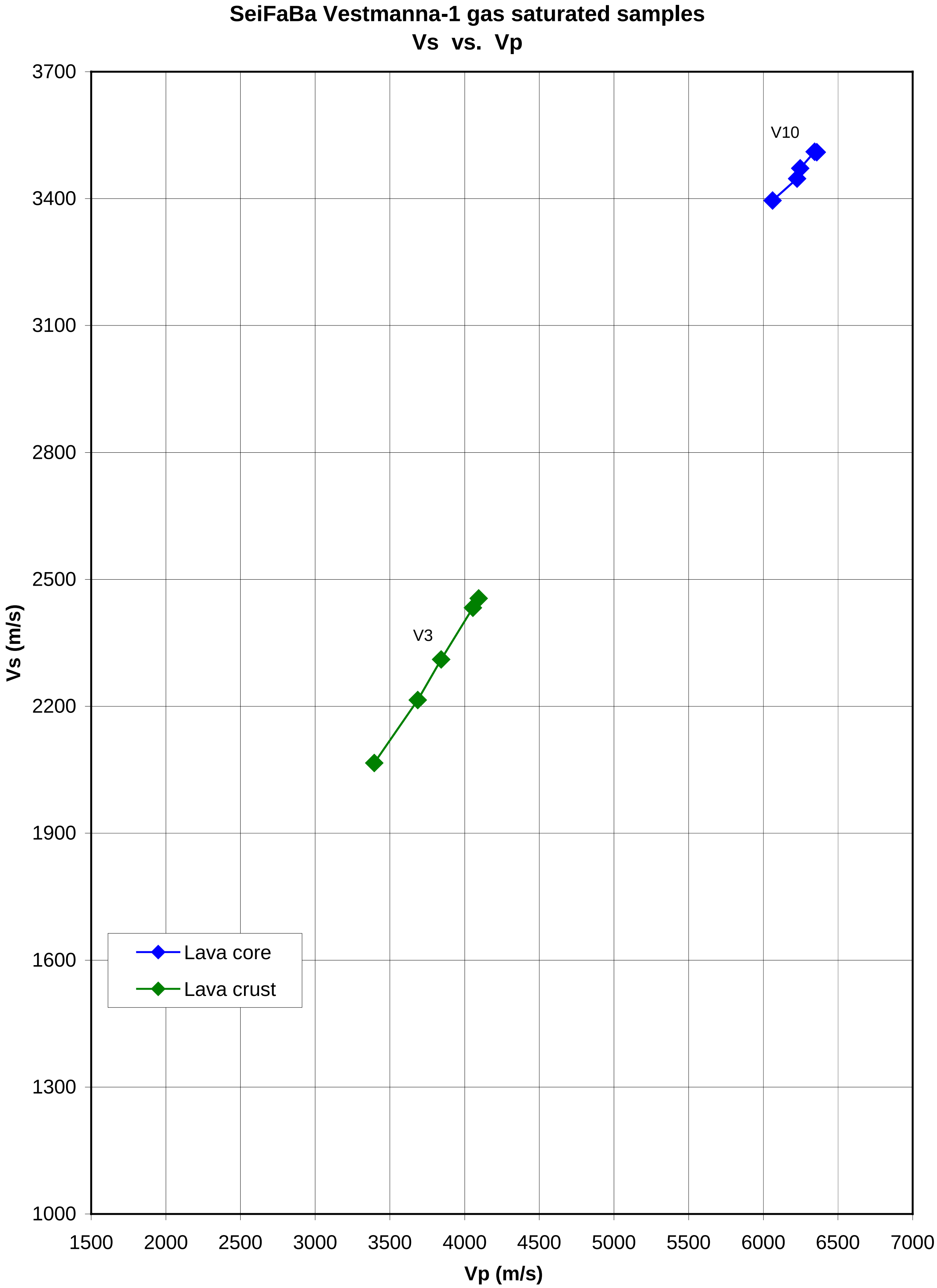

Fig. 6.7. V_S vs. V_P for Vestmanna-1 samples in gas saturated state.

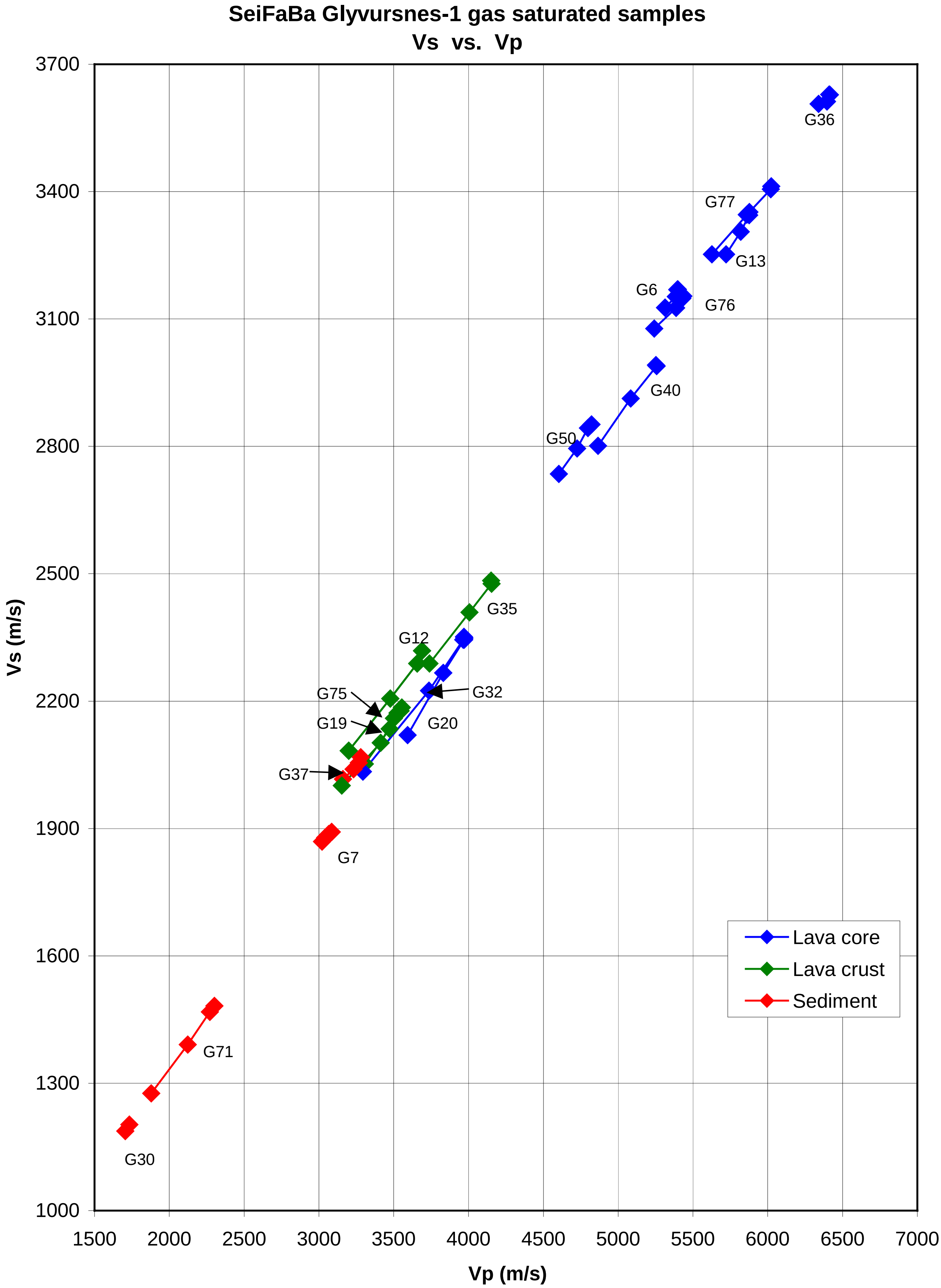

Fig. 6.8. V_S vs. V_P for Glyvursnes-1 samples in gas saturated state.

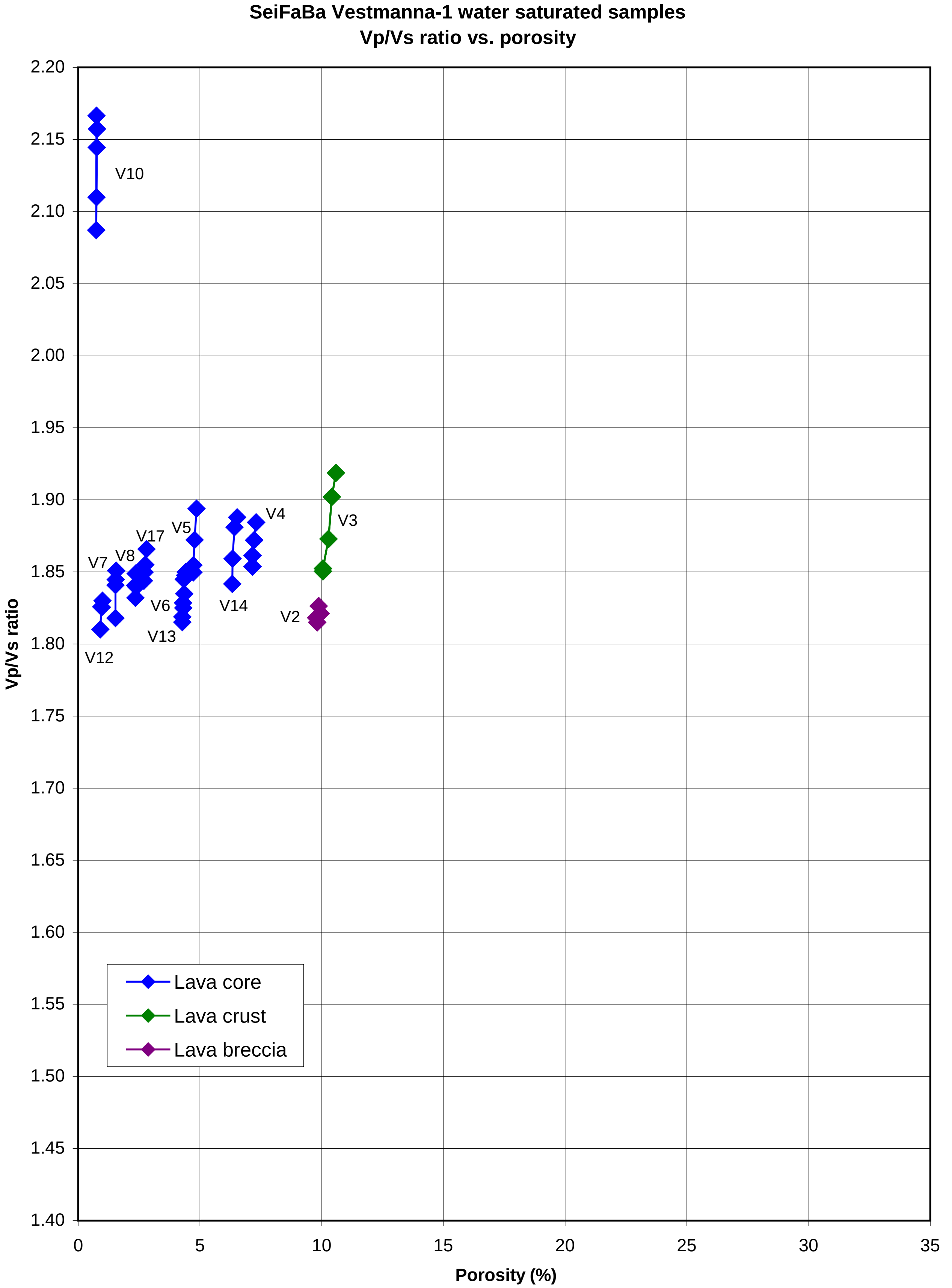

Fig. 6.9. V_P/V_S ratio vs. porosity for Vestmanna-1 samples in water saturated state.

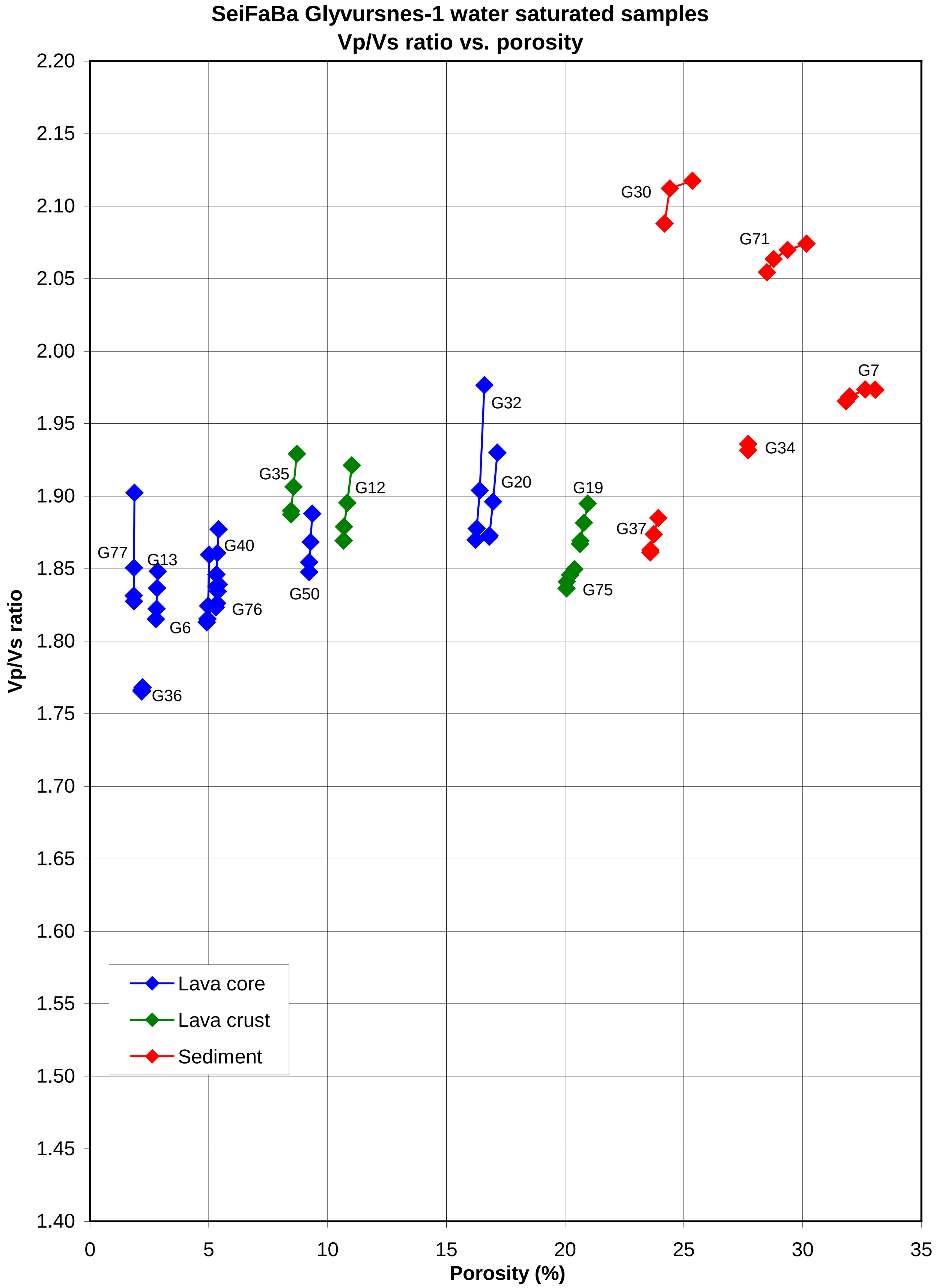

Fig. 6.10. V_P/V_S ratio vs. porosity for Glyvursnes-1 samples in water saturated state.

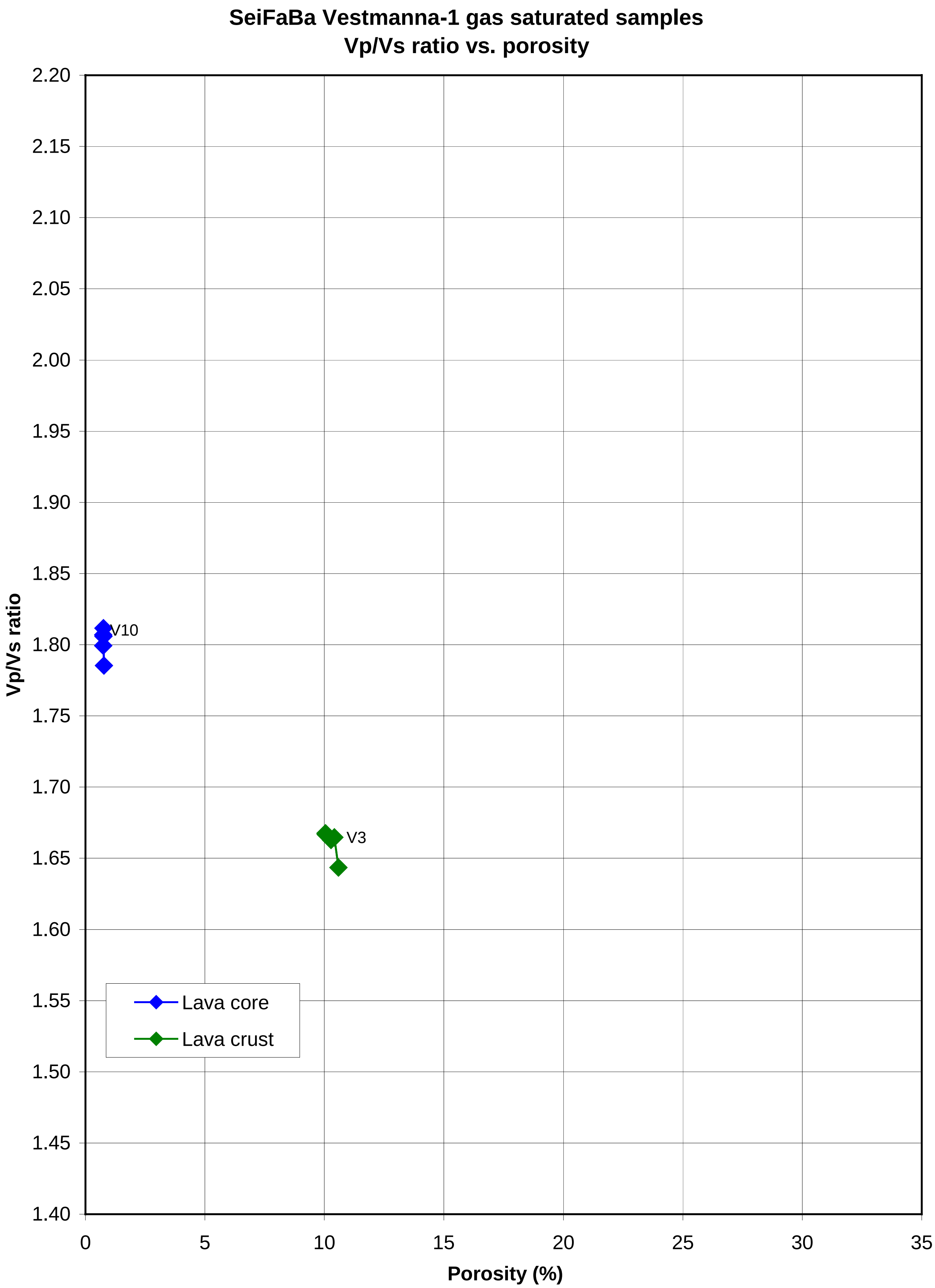

Fig. 6.11. V_P/V_S ratio vs. porosity for Vestmanna-1 samples in gas saturated state.

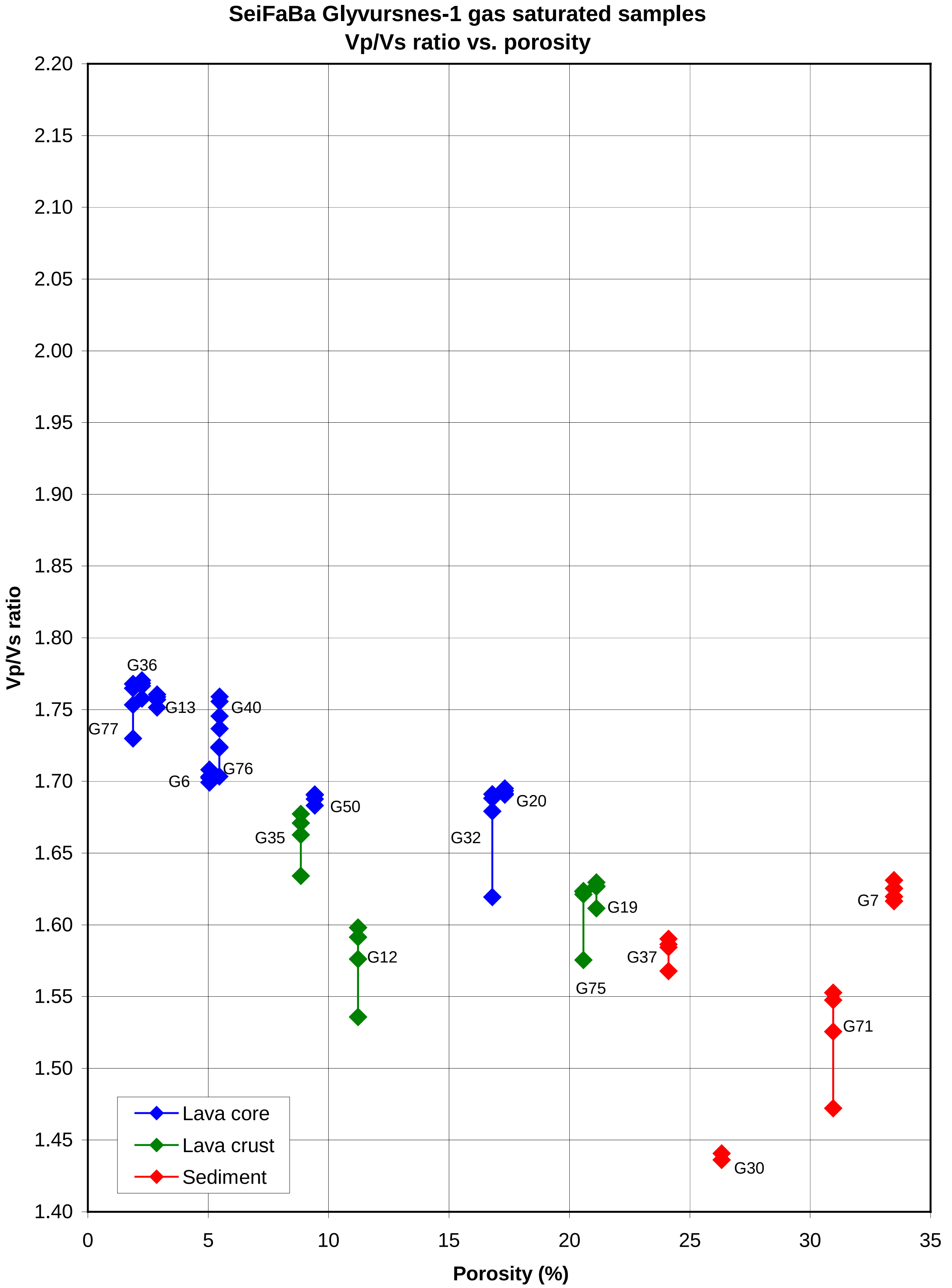

Fig. 6.12. V_P/V_S ratio vs. porosity for Glyvursnes-1 samples in gas saturated state.

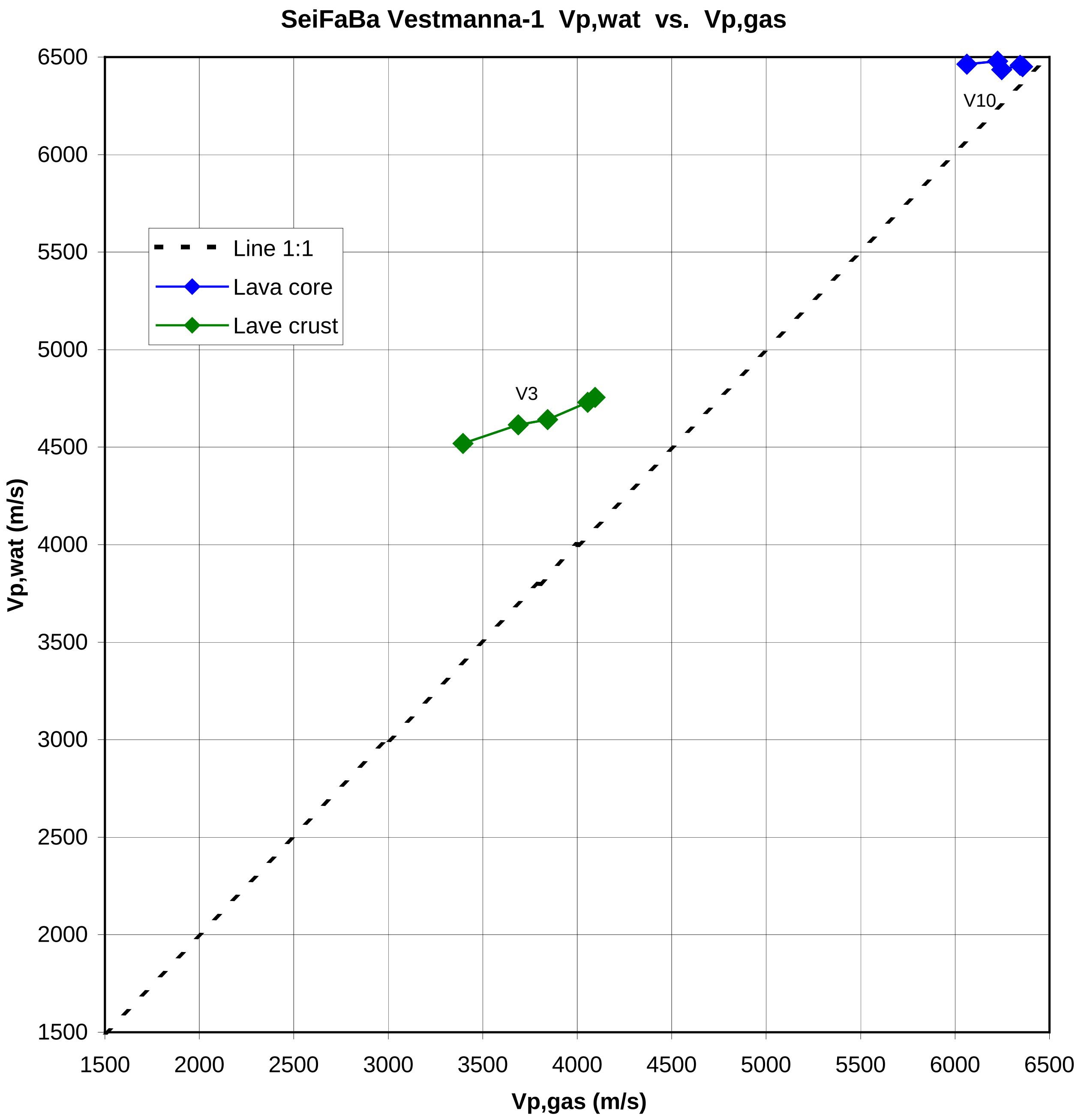

Fig. 6.13. V_P water saturated vs. V_P gas saturated for Vestmanna-1 samples.

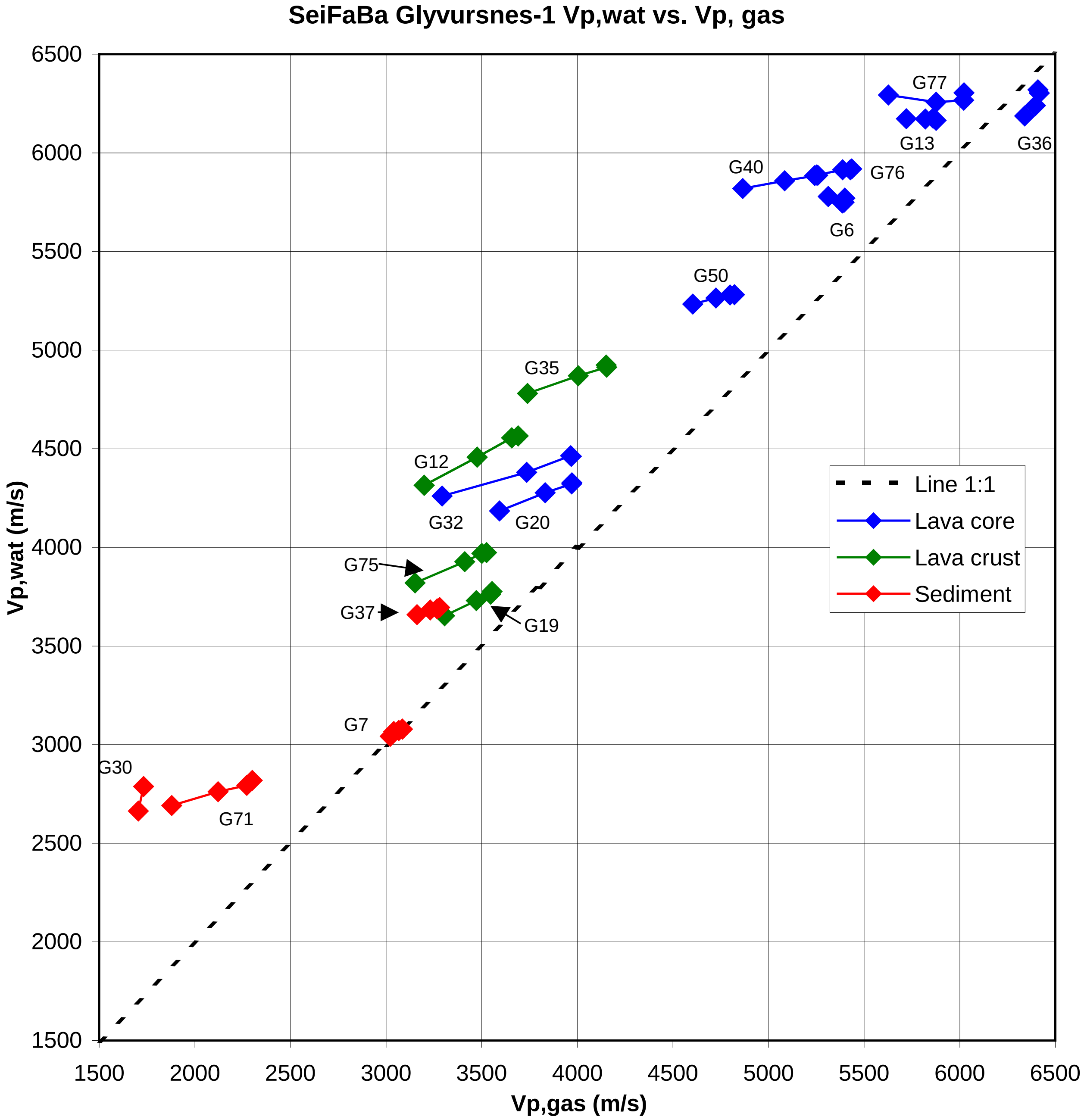

Fig. 6.14. V_P water saturated vs. V_P gas saturated for Glyvursnes-1 samples.

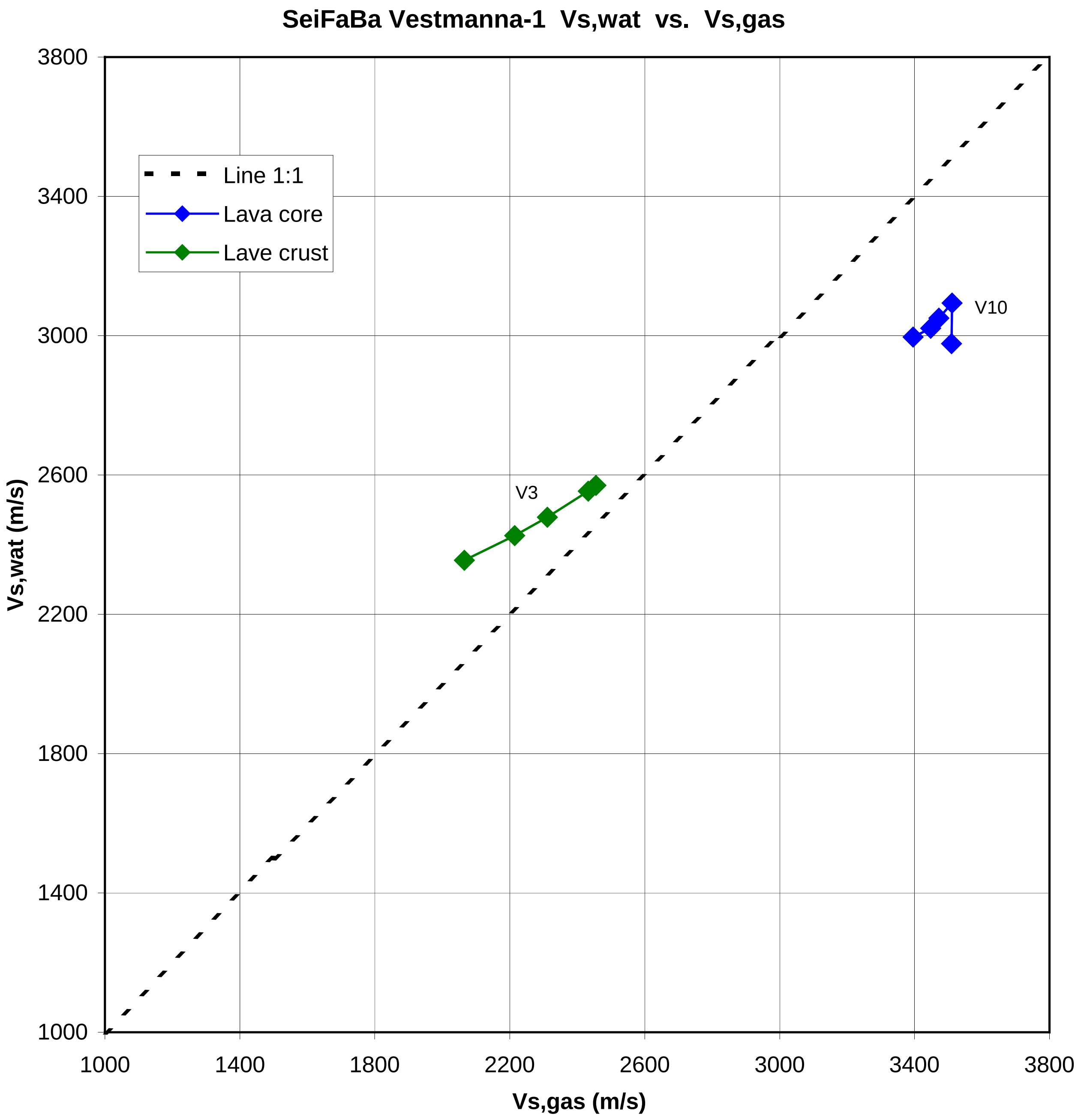

Fig. 6.15. V_S water saturated vs. V_S gas saturated for Vestmanna-1 samples.

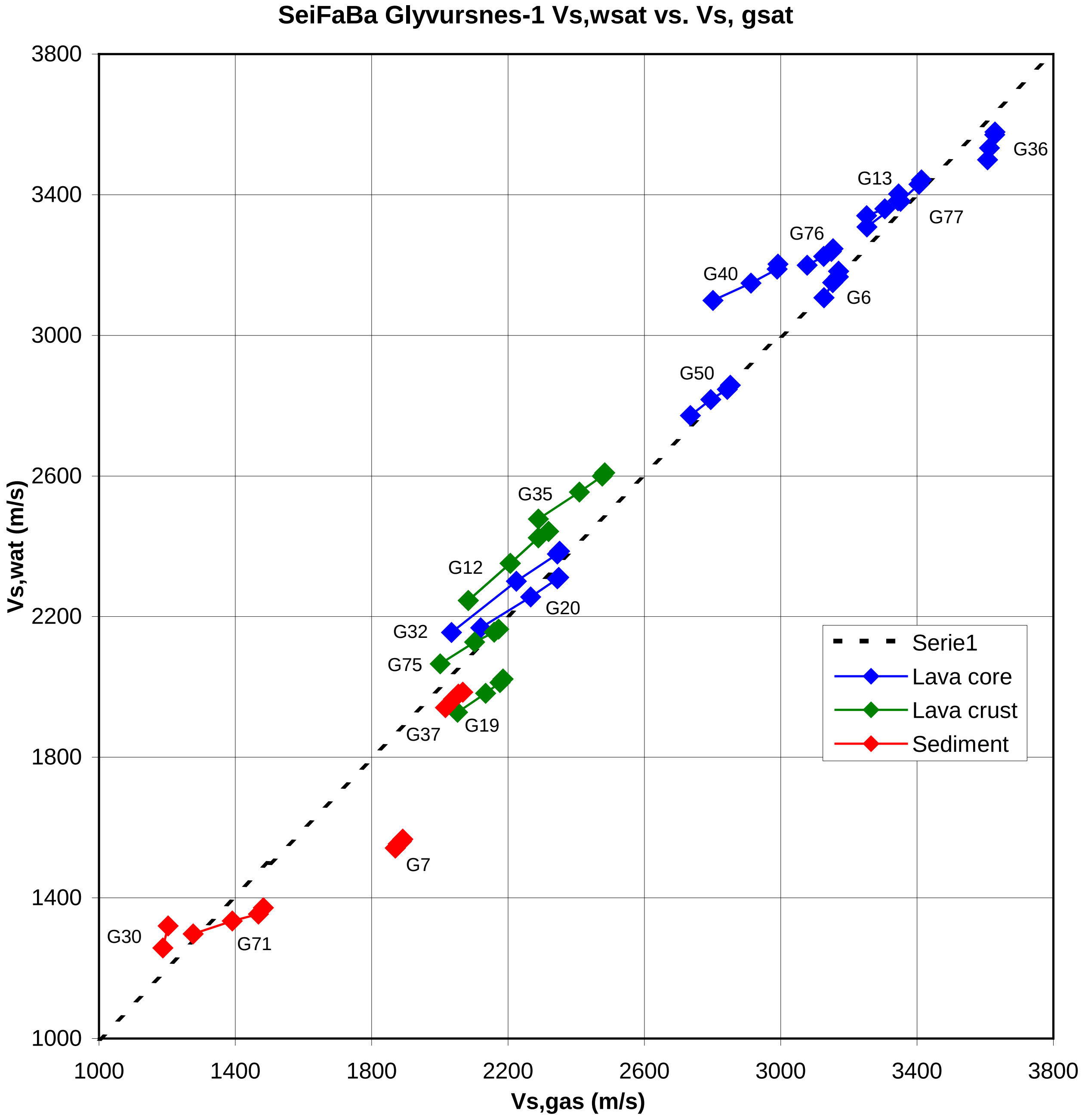

Fig. 6.16. V_S water saturated vs. V_S gas saturated for Glyvursnes-1 samples.

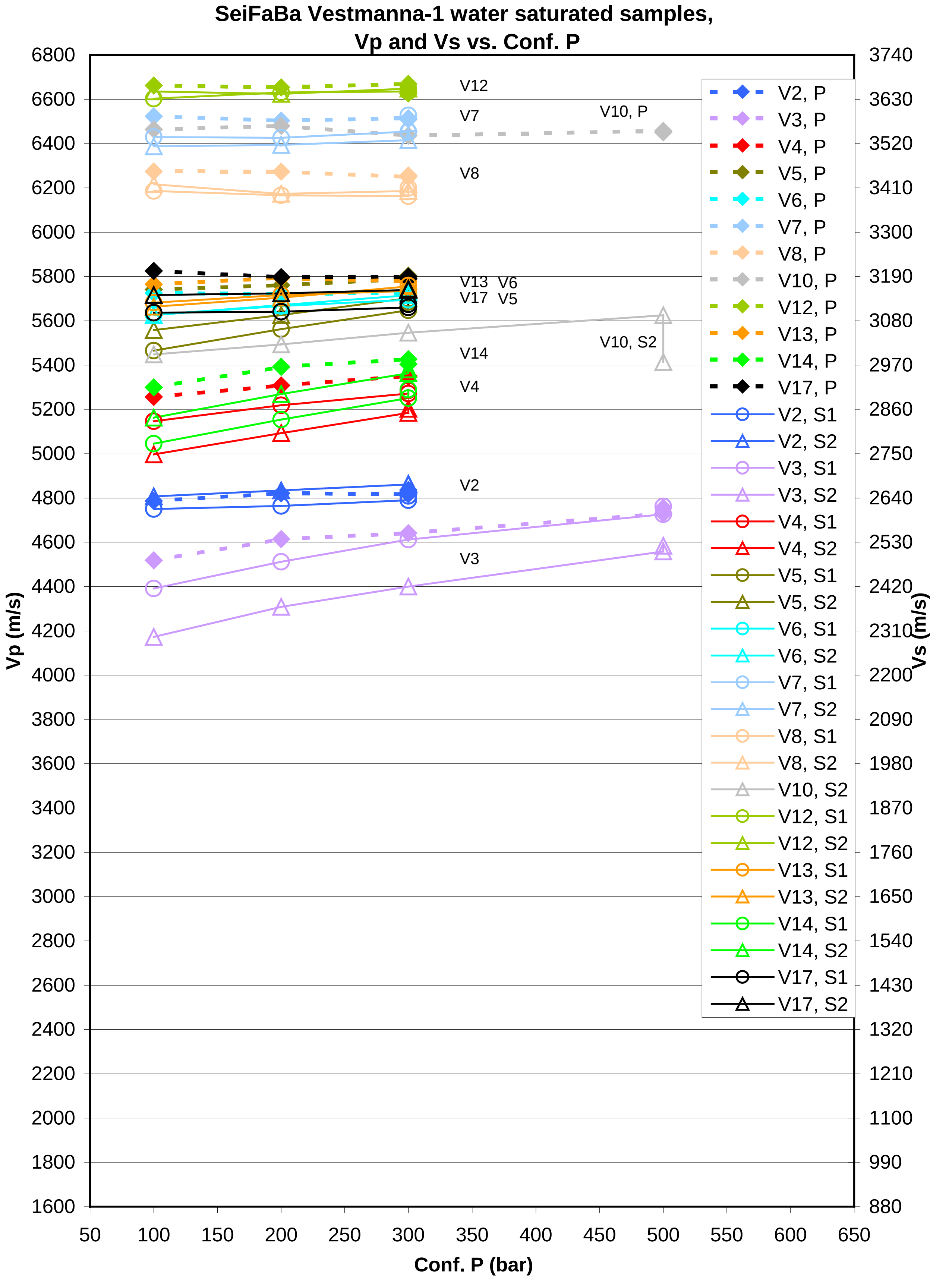

Fig. 6.17. V_P and V_S vs. confining pressure for Vestmanna-1 samples in water saturated state.

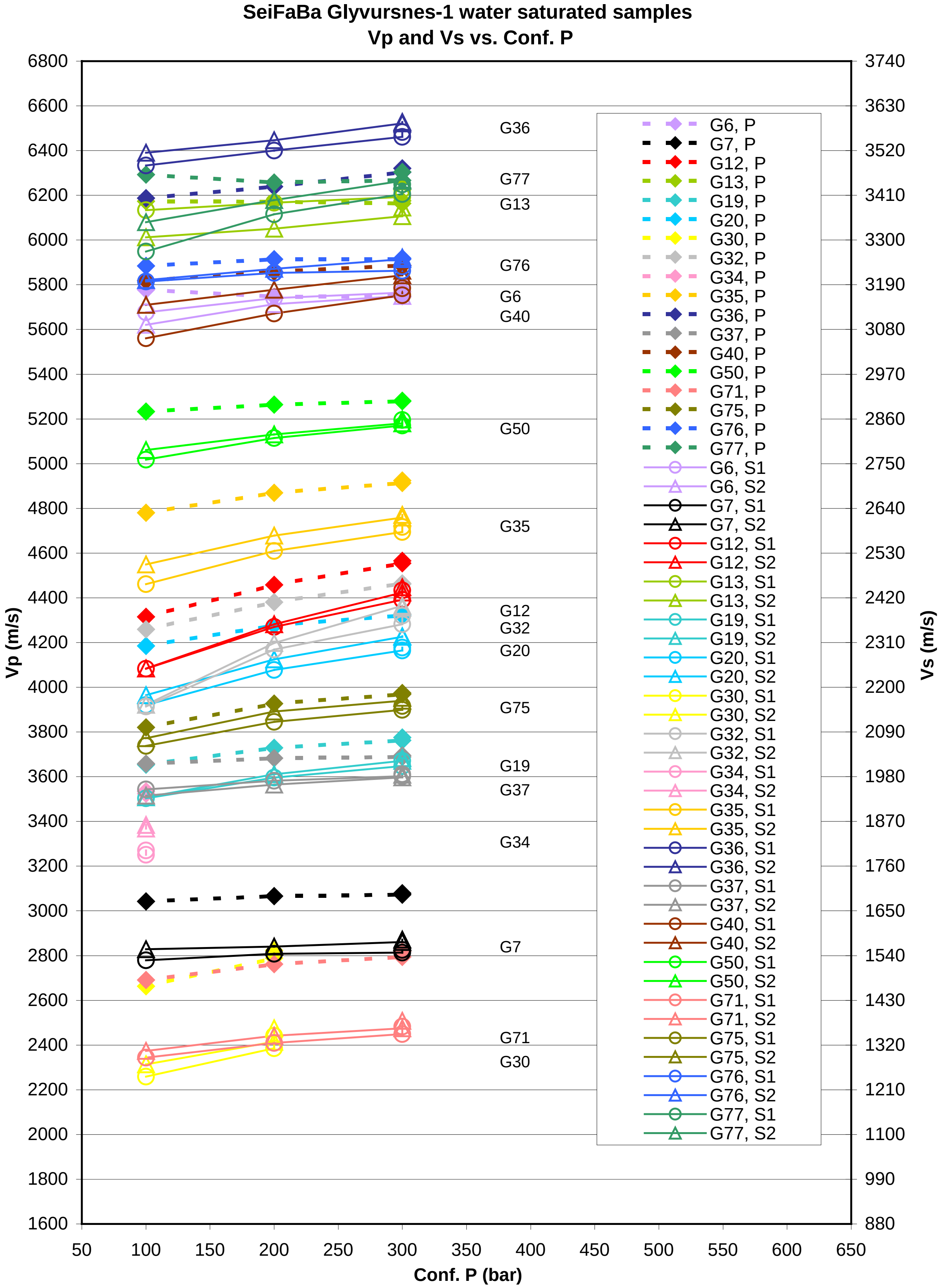

Fig. 6.18. V_P and V_S vs. confining pressure for Glyvursnes-1 samples in water saturated state.

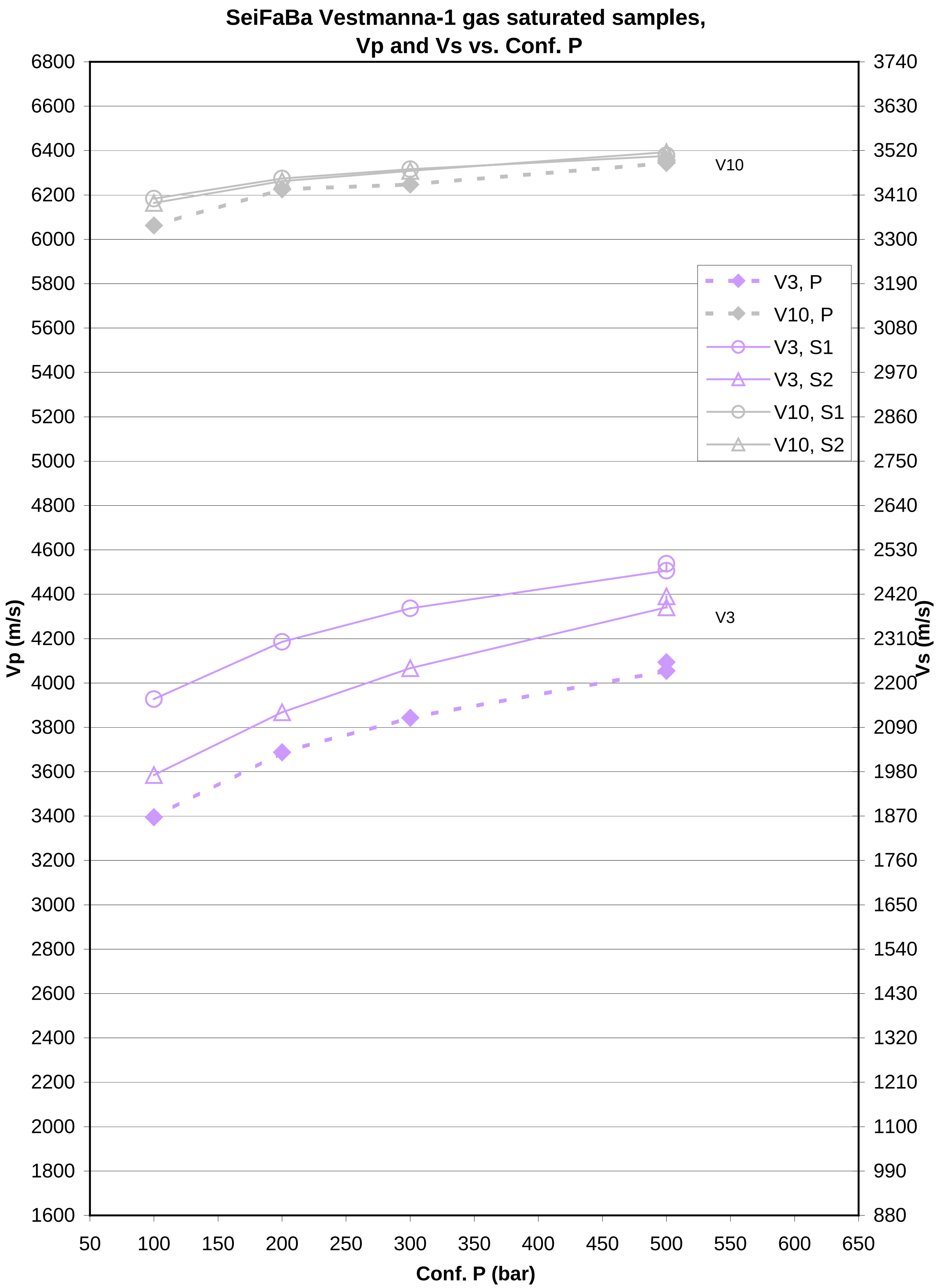

Fig. 6.19. V_P and V_S vs. confining pressure for Vestmanna-1 samples in gas saturated state.

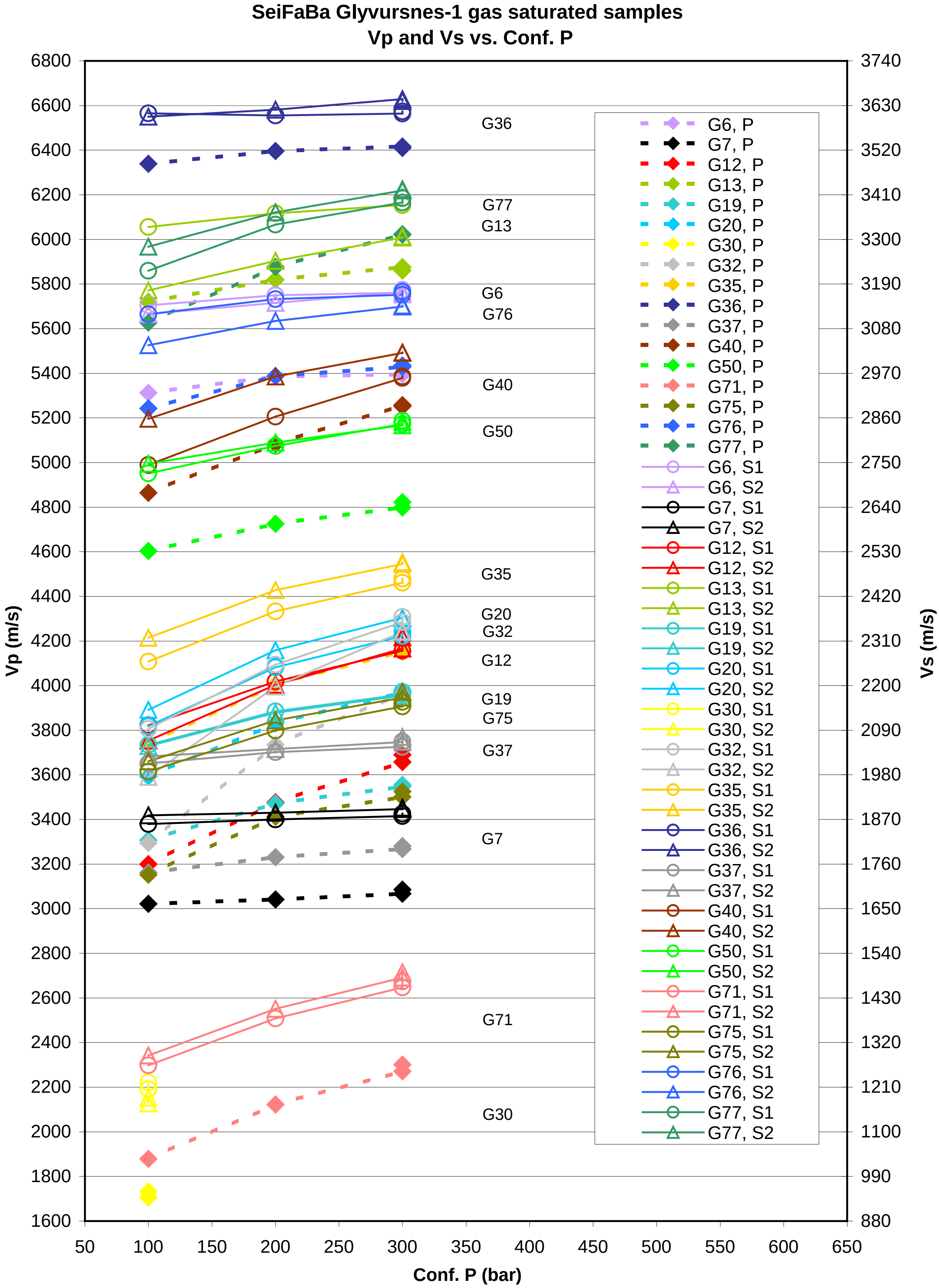

Fig. 6.20. V_P and V_S vs. confining pressure for Glyvursnes-1 samples in gas saturated state.

7. Documentation of data

This report contains a CD with all the ultrasonic data of the present work. Two top-level folders “Vestmanna-1” and “Glyvursnes-1” contain the data from respectively the Vestmanna-1 and Glyvursnes-1 samples. The data for measurements in humidity controlled state can be found in the “HumidityControlled” subfolder, and the sample data for measurements in the S_W=100 % state can be found in the “WaterSaturated” subfolder. The calibration data can be found in the top-level folder "Calibration". At the top level, all results are placed in the spreadsheets *sonic_SeiFaBa_GL.xls* and *sonic_SeiFaBa_VM,* which are Excel2000 files. Firstarrival-picks may be found in *PickedSignals.xls*. This report is present as *sonic_SeiFaBa.pdf*.

In each folder "HumidityControlled" and "WaterSaturated" subfolders are present with sample identification as names, containing the data for the respective samples. For each sample the following files are present:

1) Files with wave train data stored in comma separated files (*.csv)
2) Screen-dumps of the oscilloscope in tif-format (*.tif)
3) Plots indicating the position of firstarrival picks in gif-format (*.gif).

For these files the filenames are constructed as follows:

<sample id.>_<state_><measurement type>_<hydrostatic pressure>_<date>.<file type>

where

<sample id.> is the identification of the sample,
<state_> is either *gas* indicating humidity-controlled state or *wat* indicating water saturated state,
<measurement type> is given as P (P-wave) or S1 (S1-wave) or S2 (S2-wave),
<hydrostatic pressure> is the hydrostatic pressure in bar,
<date> is a shorthand date with format ddmmyy,
<file type> is csv, tif, or gif.

Every sample folder for water saturated samples in addition contains

4) A text file <sample id.>.txt with a Mettler log,
5) An Excel file <sample id.>wat.xls with the calculation of pore volume reduction.

The clock of the oscilloscope, the clock of the attached PC, and the clock of the Quizix pump system were kept synchronized within ½ minute within the data acquisition period June 8^{th} 2004 to March 2^{nd} 2005 to allow comparison of the Mettler logs and the ultrasonic data.

8. References

API RP40, 1998. Recommended practices for core analysis. *American Petroleum Institute, Recommended Practices **40**, second edition.*

Waagstein, R. & Andersen, C., 2003. Well completion report: Glyvursnes-1 and Vestmanna-1, Faroe Islands. Contribution to the SeiFaBa project funded by the Sindri Group. *Danmarks og Grønlands Geologiske Undersøgelse Rapport **2003/99***. 67 pp, 1 DVD, 4 enclosures.

Appendix 1. Basic data, results, and precision

Basic data, results and precision parameters for all measurements are presented in Tables A.1 to A.6.

These tables report the full output from the *firstarrival* program in the columns labelled *First arrival of <id.> signal*, *Local uncertainty*, *Global uncertainty*, and *Amplitude at pick*. This is true even for measurements where the identification of the ultrasonic signal, and thus the calculation of an ultrasonic velocity, failed.
In these instance the output from *firstarrival* is reported but the velocity and precision parameters are marked with the symbol “-“ denoting that the data values are absent.
In addition the measurement is commented, "No pick possible".

Tables A.1 to A.3 reports data from measurement of the samples in fully water saturated state, i.e. $S_W = 100$ %.
Tables A.4 to A.6 reports data from measurement of the samples in humidity-controlled state, i.e. 60 °C and 40 % relative humidity.

Table A.1. Page 1 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic P signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of P signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	P velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V2	Plug2_wat_P_100_171104	100	9.95	37.41	21.5696	0.0687	0.137	0.063	4786.37	12.79	15.25	28.04	0.59	
V2	Plug2_wat_P_200_171104	200	9.87	37.40	21.4777	0.0617	0.120	0.062	4820.59	12.89	13.85	26.74	0.55	
V2	Plug2_wat_P_300_171104	300	9.81	37.39	21.4635	0.0665	0.124	0.060	4817.01	12.88	14.92	27.80	0.58	
V2	Plug2_wat_P_300_181104	300 rep	9.78	37.39	21.4134	0.0652	0.120	0.062	4836.49	12.94	14.72	27.66	0.57	
V3	Plug3_wat_P_100_080604	100	10.59	37.65	21.0922	0.0192	0.055	0.042	4518.30	12.00	4.11	16.11	0.36	
V3	Plug3_wat_P_200_080604	200	10.42	37.63	20.9031	0.0277	0.077	0.049	4613.76	12.26	6.10	18.37	0.40	
V3	Plug3_wat_P_300_080604	300	10.28	37.61	20.7879	0.0287	0.078	0.051	4641.52	12.34	6.41	18.75	0.40	
V3	Plug3_wat_P_500_080604	500	10.06	37.58	20.6292	0.0247	0.066	0.051	4729.65	12.59	5.66	18.24	0.39	
V3	Plug3_wat_P_500_090604	500 rep	10.05	37.58	20.5800	0.0241	0.064	0.054	4755.57	12.65	5.58	18.23	0.38	
V4	Plug4_wat_P_100_181104	100	7.31	39.11	21.1944	0.0249	0.073	0.099	5255.97	13.44	6.17	19.61	0.37	
V4	Plug4_wat_P_200_181104	200	7.23	39.10	21.0850	0.0243	0.072	0.102	5307.94	13.58	6.12	19.70	0.37	
V4	Plug4_wat_P_300_181104	300	7.16	39.09	21.0050	0.0111	0.035	0.114	5351.52	13.69	2.83	16.52	0.31	
V4	Plug4_wat_P_300_191104	300 rep	7.16	39.09	20.9939	0.0210	0.062	0.112	5346.41	13.68	5.35	19.03	0.36	
V5	Plug5_wat_P_100_191104	100	4.86	35.56	19.9479	0.0137	0.046	0.092	5740.95	16.14	3.95	20.09	0.35	
V5	Plug5_wat_P_200_191104	200	4.78	35.55	19.8914	0.0193	0.065	0.098	5760.07	16.20	5.58	21.78	0.38	
V5	Plug5_wat_P_300_191104	300	4.73	35.55	19.8409	0.0118	0.039	0.108	5789.26	16.29	3.43	19.72	0.34	
V5	Plug5_wat_P_300_221104	300 rep	4.73	35.55	19.8076	0.0430	0.126	0.102	5803.72	16.33	12.59	28.91	0.50	
V6	Plug6_wat_P_100_221104	100	4.42	35.07	19.8806	0.0420	0.114	0.090	5724.43	16.32	12.10	28.42	0.50	
V6	Plug6_wat_P_200_221104	200	4.36	35.07	19.8494	0.0424	0.115	0.088	5720.39	16.31	12.21	28.53	0.50	
V6	Plug6_wat_P_300_221104	300	4.32	35.06	19.8237	0.0433	0.125	0.086	5726.39	16.33	12.50	28.83	0.50	
V6	Plug6_wat_P_300_231104	300 rep	4.28	35.06	19.8046	0.0422	0.120	0.088	5726.73	16.34	12.20	28.53	0.50	
V7	Plug7_wat_P_100_231104	100	1.56	35.92	19.2596	0.0256	0.077	0.148	6523.42	18.16	8.66	26.82	0.41	
V7	Plug7_wat_P_200_231104	200	1.55	35.92	19.2418	0.0226	0.067	0.141	6503.43	18.11	7.66	25.76	0.40	
V7	Plug7_wat_P_300_231104	300	1.53	35.91	19.2136	0.0232	0.068	0.136	6514.76	18.14	7.86	26.00	0.40	
V7	Plug7_wat_P_300_241104	300 rep	1.53	35.91	19.2002	0.0265	0.076	0.140	6509.29	18.12	8.97	27.09	0.42	
V8	Plug8_wat_P_100_241104	100	2.38	38.02	19.8130	0.0696	0.168	0.063	6274.08	16.50	22.03	38.54	0.61	
V8	Plug8_wat_P_200_241104	200	2.36	38.01	19.7785	0.0483	0.128	0.075	6273.72	16.50	15.33	31.84	0.51	
V8	Plug8_wat_P_300_241104	300	2.34	38.01	19.7829	0.0468	0.125	0.082	6249.91	16.44	14.78	31.22	0.50	
V8	Plug8_wat_P_300_251104	300 rep	2.35	38.01	19.7587	0.0485	0.138	0.082	6256.44	16.46	15.36	31.82	0.51	
V10	Plug10_wat_P_100_100604	100	0.77	35.01	18.1759	0.0110	0.035	0.160	6463.69	18.46	3.92	22.39	0.35	
V10	Plug10_wat_P_200_100604	200	0.76	35.01	18.1503	0.0105	0.035	0.136	6479.58	18.51	3.73	22.24	0.34	
V10	Plug10_wat_P_300_100604	300	0.75	35.01	18.1245	0.0106	0.034	0.136	6435.56	18.38	3.76	22.15	0.34	
V10	Plug10_wat_P_500_100604	500	0.74	35.01	18.1043	0.0111	0.034	0.134	6457.32	18.45	3.97	22.42	0.35	
V10	Plug10_wat_P_500_110604	500 rep	0.76	35.01	18.1045	0.0112	0.033	0.136	6450.55	18.43	3.99	22.42	0.35	
V12	Plug12_wat_P_100_251104	100	1.00	31.05	18.4140	0.0108	0.037	0.191	6661.79	21.46	3.91	25.36	0.38	
V12	Plug12_wat_P_200_251104	200	0.96	31.04	18.3846	0.0114	0.039	0.181	6653.92	21.43	4.12	25.55	0.38	
V12	Plug12_wat_P_300_251104	300	0.95	31.04	18.3550	0.0105	0.035	0.171	6669.52	21.49	3.83	25.32	0.38	
V12	Plug12_wat_P_300_261104	300 rep	0.91	31.04	18.3669	0.0112	0.038	0.175	6626.18	21.35	4.05	25.40	0.38	
V13	Plug13_wat_P_100_291104	100	4.40	32.29	19.3553	0.0127	0.038	0.130	5764.94	17.85	3.78	21.63	0.38	
V13	Plug13_wat_P_200_291104	200	4.34	32.29	19.2914	0.0136	0.041	0.120	5794.29	17.95	4.08	22.02	0.38	
V13	Plug13_wat_P_300_291104	300	4.30	32.28	19.2888	0.0240	0.072	0.116	5777.19	17.90	7.20	25.09	0.43	
V13	Plug13_wat_P_300_301104	300 rep	4.27	32.28	19.3044	0.0141	0.041	0.116	5742.11	17.79	4.20	21.99	0.38	

Table A.1. Page 2 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic P signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of P signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	P velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V14	Plug14_wat_P_100_301104	100	6.52	36.68	20.6747	0.0373	0.090	0.085	5299.30	14.45	9.56	24.00	0.45	
V14	Plug14_wat_P_200_301104	200	6.42	36.66	20.5191	0.0176	0.046	0.095	5391.85	14.71	4.62	19.33	0.36	
V14	Plug14_wat_P_300_301104	300	6.34	36.65	20.4549	0.0310	0.081	0.095	5427.01	14.81	8.22	23.02	0.42	
V14	Plug14_wat_P_300_011204	300 rep	6.33	36.65	20.4662	0.0201	0.054	0.095	5403.34	14.74	5.29	20.04	0.37	
V17	Plug17_wat_P_100_011204	100	2.81	40.32	20.6763	0.0128	0.043	0.131	5824.77	14.45	3.61	18.06	0.31	
V17	Plug17_wat_P_200_011204	200	2.76	40.32	20.6734	0.0145	0.047	0.122	5797.41	14.38	4.08	18.46	0.32	
V17	Plug17_wat_P_300_011204	300	2.72	40.31	20.6523	0.0342	0.097	0.110	5798.98	14.39	9.60	23.99	0.41	
V17	Plug17_wat_P_300_021204	300 rep	2.70	40.31	20.6447	0.0332	0.094	0.115	5789.86	14.36	9.30	23.67	0.41	
G6	Plug6_wat_P_100_100105	100	5.01	34.84	19.7827	0.0250	0.085	0.132	5777.95	16.59	7.30	23.88	0.41	
G6	Plug6_wat_P_200_100105	200	4.98	34.83	19.7806	0.0275	0.094	0.118	5746.47	16.50	8.00	24.50	0.43	
G6	Plug6_wat_P_300_100105	300	4.95	34.83	19.7589	0.0221	0.075	0.127	5749.06	16.51	6.44	22.94	0.40	
G6	Plug6_wat_P_300_110105	300 rep	4.92	34.82	19.7183	0.0213	0.071	0.132	5769.97	16.57	6.24	22.81	0.40	
G7	Plug7_wat_P_100_110105	100	33.06	38.83	26.5131	0.0336	0.108	0.022	3042.84	7.84	3.86	11.70	0.38	
G7	Plug7_wat_P_200_110105	200	32.63	38.77	26.3659	0.0282	0.083	0.031	3065.62	7.91	3.28	11.18	0.36	
G7	Plug7_wat_P_300_110105	300	31.97	38.68	26.2924	0.0242	0.075	0.034	3072.18	7.94	2.83	10.77	0.35	
G7	Plug7_wat_P_300_120105	300 rep	31.82	38.66	26.2400	0.0252	0.075	0.034	3078.99	7.96	2.96	10.92	0.35	
G12	Plug12_wat_P_100_120105	100	11.02	35.07	21.8806	0.0265	0.075	0.039	4314.90	12.30	5.23	17.53	0.41	
G12	Plug12_wat_P_200_120405	200	10.83	35.04	21.5805	0.0747	0.166	0.051	4457.82	12.72	15.44	28.16	0.63	
G12	Plug12_wat_P_300_120105	300	10.70	35.03	21.3916	0.0679	0.162	0.061	4554.60	13.00	14.46	27.46	0.60	
G12	Plug12_wat_P_300_130105	300 rep	10.68	35.03	21.3549	0.0684	0.158	0.062	4565.43	13.03	14.62	27.66	0.61	
G13	Plug13_wat_P_100_130105	100	2.85	42.13	20.5775	0.0237	0.070	0.156	6173.27	14.65	7.10	21.76	0.35	
G13	Plug13_wat_P_200_130105	200	2.82	42.12	20.5450	0.0281	0.130	0.146	6170.93	14.65	8.43	23.08	0.37	
G13	Plug13_wat_P_300_130105	300	2.80	42.12	20.5340	0.0277	0.078	0.138	6163.87	14.63	8.32	22.95	0.37	
G13	Plug13_wat_P_300_140105	300 rep	2.78	42.12	20.5023	0.0269	0.073	0.143	6175.73	14.66	8.10	22.77	0.37	
G19	Plug19_wat_P_100_140105	100	20.95	37.37	23.9818	0.0824	0.169	0.046	3653.56	9.78	12.55	22.33	0.61	
G19	Plug19_wat_P_200_140105	200	20.79	37.35	23.7336	0.0672	0.134	0.054	3729.49	9.99	10.56	20.55	0.55	
G19	Plug19_wat_P_300_140105	300	20.64	37.33	23.6234	0.0674	0.135	0.056	3762.16	10.08	10.73	20.81	0.55	
G19	Plug19_wat_P_300_170105	300 rep	20.63	37.33	23.5691	0.0643	0.130	0.060	3775.79	10.12	10.30	20.41	0.54	
G20	Plug20_wat_P_100_170105	100	17.14	36.22	22.4077	0.1260	0.219	0.033	4185.11	11.56	23.54	35.09	0.84	
G20	Plug20_wat_P_200_170105	200	16.96	36.20	22.1815	0.0974	0.170	0.042	4277.42	11.82	18.79	30.61	0.72	
G20	Plug20_wat_P_300_170105	300	16.82	36.18	22.0735	0.0883	0.161	0.049	4321.08	11.94	17.28	29.22	0.68	
G20	Plug20_wat_P_300_180105	300 rep	16.80	36.18	22.0433	0.0867	0.156	0.051	4327.17	11.96	17.03	28.99	0.67	
G30	Plug30_wat_P_100_010205	100	25.36	36.27	27.3750	0.0885	0.168	0.036	2662.99	7.34	8.61	15.96	0.60	
G30	Plug30_wat_P_200_010205	200	24.41	36.16	26.6866	0.0679	0.135	0.051	2788.26	7.71	7.09	14.80	0.53	
G30	Plug30_wat_P_200_020205	200 rep	24.19	36.13	26.5181	0.0635	0.127	0.053	2822.88	7.81	6.76	14.57	0.52	
G32	Plug32_wat_P_100_260105	100	16.60	42.19	23.6588	0.0501	0.121	0.017	4259.62	10.10	9.01	19.11	0.45	
G32	Plug32_wat_P_200_260105	200	16.41	42.16	23.3442	0.0402	0.100	0.020	4380.75	10.39	7.55	17.94	0.41	
G32	Plug32_wat_P_300_260105	300	16.28	42.15	23.1412	0.0420	0.100	0.020	4464.48	10.59	8.09	18.69	0.42	
G32	Plug32_wat_P_300_270105	300 rep	16.22	42.14	23.1281	0.0516	0.122	0.020	4461.34	10.59	9.95	20.54	0.46	

Table A.1. Page 3 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic P signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of P signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	P velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
G34	Plug34_wat_P_100_020205	100	27.71	37.86	24.4977	0.0918	0.181	0.039	3524.07	9.31	13.21	22.51	0.64	
G34	Plug34_wat_P_100_030205	100 rep	27.71	37.86	24.4644	0.0695	0.149	0.046	3535.02	9.34	10.05	19.39	0.55	
G35	Plug35_wat_P_100_180105	100	8.71	38.00	21.7036	0.1074	0.199	0.036	4780.10	12.58	23.64	36.22	0.76	
G35	Plug35_wat_P_200_180105	200	8.56	37.98	21.5193	0.0634	0.133	0.062	4869.63	12.82	14.35	27.17	0.56	
G35	Plug35_wat_P_300_180105	300	8.47	37.97	21.4292	0.0490	0.108	0.074	4913.21	12.94	11.23	24.17	0.49	
G35	Plug35_wat_P_300_190105	300 rep	8.47	37.97	21.3934	0.0514	0.109	0.075	4924.59	12.97	11.83	24.79	0.50	
G36	Plug36_wat_P_100_190105	100	2.22	40.78	20.3437	0.0619	0.141	0.067	6187.43	15.17	18.83	34.01	0.55	
G36	Plug36_wat_P_200_190105	200	2.19	40.77	20.2537	0.0377	0.096	0.094	6239.43	15.30	11.63	26.93	0.43	
G36	Plug36_wat_P_300_190105	300	2.17	40.77	20.1689	0.0301	0.080	0.104	6303.14	15.46	9.39	24.85	0.39	
G36	Plug36_wat_P_300_200105	300 rep	2.17	40.77	20.1334	0.0362	0.092	0.104	6320.17	15.50	11.37	26.87	0.43	
G37	Plug37_wat_P_100_200105	100	23.93	41.58	25.1191	0.0790	0.171	0.047	3658.74	8.80	11.51	20.31	0.56	
G37	Plug37_wat_P_200_200105	200	23.74	41.56	25.0032	0.0590	0.125	0.049	3682.80	8.86	8.69	17.55	0.48	
G37	Plug37_wat_P_300_200105	300	23.59	41.54	24.9619	0.0861	0.161	0.047	3688.44	8.88	12.72	21.60	0.59	
G37	Plug37_wat_P_300_210105	300 rep	23.59	41.54	24.9234	0.0806	0.152	0.051	3695.17	8.90	11.95	20.85	0.56	
G39	Plug39_wat_P_100_030205	100	32.97	41.08	35.8328	97.5944	0.874	0.000	-	-	-	-	-	No pick possible
G39	Plug39_wat_P_100_040205	100 rep	32.97	41.08	34.0967	66.3012	0.729	0.000	-	-	-	-	-	No pick possible
G40	Plug40_wat_P_100_210105	100	5.41	41.75	20.9295	0.0461	0.112	0.079	5818.39	13.94	12.80	26.74	0.46	
G40	Plug40_wat_P_200_210105	200	5.36	41.74	20.8446	0.0402	0.102	0.090	5858.54	14.03	11.31	25.34	0.43	
G40	Plug40_wat_P_300_210105	300	5.32	41.74	20.7914	0.0446	0.104	0.090	5886.57	14.10	12.63	26.73	0.45	
G40	Plug40_wat_P_300_240105	300 rep	5.32	41.74	20.7728	0.0399	0.095	0.093	5886.99	14.10	11.32	25.42	0.43	
G50	Plug50_wat_P_100_310105	100	9.36	38.47	21.1055	0.0412	0.101	0.076	5232.76	13.60	10.23	23.83	0.46	
G50	Plug50_wat_P_200_310105	200	9.29	38.46	21.0254	0.0390	0.094	0.080	5264.23	13.69	9.77	23.45	0.45	
G50	Plug50_wat_P_300_310105	300	9.23	38.45	20.9850	0.0400	0.095	0.083	5279.08	13.73	10.07	23.80	0.45	
G50	Plug50_wat_P_300_010205	300 rep	9.22	38.45	20.9642	0.0510	0.111	0.079	5281.04	13.73	12.84	26.57	0.50	
G71	Plug71_wat_P_100_240105	100	30.16	38.16	27.9343	0.1227	0.210	0.031	2690.83	7.05	11.82	18.87	0.70	
G71	Plug71_wat_P_200_240105	200	29.36	38.06	27.5002	0.0857	0.156	0.043	2761.41	7.26	8.60	15.86	0.57	
G71	Plug71_wat_P_300_240105	300	28.78	37.98	27.2944	0.0788	0.147	0.045	2793.95	7.36	8.06	15.42	0.55	
G71	Plug71_wat_P_300_250105	300 rep	28.50	37.94	27.1423	0.0724	0.136	0.049	2819.10	7.43	7.52	14.95	0.53	
G75	Plug75_wat_P_100_270105	100	20.40	35.53	23.0534	0.2419	0.324	0.016	3820.33	10.75	40.09	50.84	1.33	
G75	Plug75_wat_P_200_270105	200	20.21	35.51	22.7611	0.1453	0.223	0.028	3926.89	11.06	25.06	36.12	0.92	
G75	Plug75_wat_P_300_270105	300	20.06	35.49	22.6427	0.1020	0.177	0.038	3968.82	11.18	17.89	29.07	0.73	
G75	Plug75_wat_P_300_280105	300 rep	20.06	35.49	22.6128	0.1108	0.183	0.038	3974.03	11.20	19.46	30.66	0.77	
G76	Plug76_wat_P_100_280105	100	5.42	41.37	20.7844	0.0379	0.095	0.091	5884.75	14.22	10.73	24.95	0.42	
G76	Plug76_wat_P_200_280105	200	5.38	41.37	20.7136	0.0388	0.097	0.080	5914.58	14.30	11.07	25.37	0.43	
G76	Plug76_wat_P_300_280105	300	5.35	41.37	20.6947	0.0457	0.109	0.075	5914.46	14.30	13.07	27.37	0.46	
G76	Plug76_wat_P_300_310105	300 rep	5.31	41.36	20.6704	0.0484	0.112	0.078	5918.86	14.31	13.87	28.18	0.48	
G77	Plug77_wat_P_100_250105	100	1.87	39.32	20.0019	0.0396	0.099	0.080	6292.64	16.00	12.47	28.47	0.45	
G77	Plug77_wat_P_200_250105	200	1.85	39.32	20.0029	0.0358	0.091	0.104	6256.92	15.91	11.18	27.10	0.43	
G77	Plug77_wat_P_300_250105	300	1.85	39.32	19.9741	0.0308	0.076	0.124	6267.14	15.94	9.67	25.61	0.41	
G77	Plug77_wat_P_300_260105	300 rep	1.84	39.32	19.9187	0.0260	0.066	0.130	6304.64	16.04	8.24	24.27	0.39	

Table A.2. Page 1 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S1 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S1 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S1 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V2	Plug2_wat_S1_100_171104	100	9.95	37.41	38.9231	0.2751	0.594	-0.050	2612.56	6.98	18.47	25.45	0.97	
V2	Plug2_wat_S1_200_171104	200	9.87	37.40	38.8343	0.0727	0.142	-0.064	2620.26	7.01	4.90	11.91	0.45	
V2	Plug2_wat_S1_300_171104	300	9.81	37.39	38.7289	0.0725	0.140	-0.078	2634.61	7.05	4.93	11.98	0.45	
V2	Plug2_wat_S1_300_181104	300 rep	9.78	37.39	38.6709	0.0710	0.136	-0.091	2644.97	7.07	4.86	11.93	0.45	
V3	Plug3_wat_S1_100_080604	100	10.59	37.65	39.1922	0.0565	0.239	-0.031	2415.05	6.41	3.48	9.89	0.41	
V3	Plug3_wat_S1_200_080604	200	10.42	37.63	38.7239	0.0695	0.305	-0.042	2481.78	6.60	4.46	11.05	0.45	
V3	Plug3_wat_S1_300_080604	300	10.28	37.61	38.3810	0.0659	0.251	-0.047	2536.57	6.74	4.36	11.10	0.44	
V3	Plug3_wat_S1_500_080604	500	10.06	37.58	37.9713	0.0623	0.172	-0.053	2599.47	6.92	4.26	11.18	0.43	
V3	Plug3_wat_S1_500_090604	500 rep	10.05	37.58	37.8652	0.0596	0.169	-0.056	2618.79	6.97	4.12	11.09	0.42	
V4	Plug4_wat_S1_100_181104	100	7.31	39.11	38.4205	0.1168	0.706	-0.038	2830.51	7.24	8.61	15.84	0.56	
V4	Plug4_wat_S1_200_181104	200	7.23	39.10	38.1821	0.0390	0.445	-0.097	2870.28	7.34	2.93	10.27	0.36	
V4	Plug4_wat_S1_300_181104	300	7.16	39.09	38.0186	0.0562	0.486	-0.135	2899.17	7.42	4.28	11.70	0.40	
V4	Plug4_wat_S1_300_191104	300 rep	7.16	39.09	37.9808	0.0393	0.276	-0.150	2907.09	7.44	3.00	10.44	0.36	
V5	Plug5_wat_S1_100_191104	100	4.86	35.56	36.4342	0.0301	0.087	-0.166	3005.89	8.45	2.48	10.94	0.36	
V5	Plug5_wat_S1_200_191104	200	4.78	35.55	36.1822	0.0242	0.052	-0.209	3059.18	8.60	2.05	10.65	0.35	
V5	Plug5_wat_S1_300_191104	300	4.73	35.55	35.9795	0.0280	0.081	-0.222	3106.25	8.74	2.42	11.15	0.36	
V5	Plug5_wat_S1_300_221104	300 rep	4.73	35.55	35.9033	0.0212	0.050	-0.244	3126.82	8.80	1.85	10.64	0.34	
V6	Plug6_wat_S1_100_221104	100	4.42	35.07	35.9379	0.1902	0.392	-0.060	3094.49	8.82	16.37	25.20	0.81	
V6	Plug6_wat_S1_200_221104	200	4.36	35.07	35.8128	0.0666	0.166	-0.111	3116.50	8.89	5.80	14.68	0.47	
V6	Plug6_wat_S1_300_221104	300	4.32	35.06	35.7303	0.0359	0.089	-0.140	3132.11	8.93	3.15	12.08	0.39	
V6	Plug6_wat_S1_300_231104	300 rep	4.28	35.06	35.6831	0.0272	0.059	-0.180	3144.74	8.97	2.40	11.37	0.36	
V7	Plug7_wat_S1_100_231104	100	1.56	35.92	34.7607	0.1351	0.478	-0.070	3536.27	9.85	13.74	23.58	0.67	
V7	Plug7_wat_S1_200_231104	200	1.55	35.92	34.7223	0.0920	0.349	-0.092	3534.47	9.84	9.37	19.21	0.54	
V7	Plug7_wat_S1_300_231104	300	1.53	35.91	34.6537	0.0590	0.218	-0.126	3549.64	9.88	6.04	15.92	0.45	
V7	Plug7_wat_S1_300_241104	300 rep	1.53	35.91	34.5386	0.0305	0.108	-0.218	3590.14	10.00	3.18	13.17	0.37	
V8	Plug8_wat_S1_100_241104	100	2.38	38.02	35.7779	0.2106	0.549	-0.051	3402.23	8.95	20.03	28.98	0.85	
V8	Plug8_wat_S1_200_241104	200	2.36	38.01	35.7696	0.0939	0.248	-0.090	3391.44	8.92	8.90	17.82	0.53	
V8	Plug8_wat_S1_300_241104	300	2.34	38.01	35.7524	0.0443	0.130	-0.138	3388.99	8.92	4.20	13.11	0.39	
V8	Plug8_wat_S1_300_251104	300 rep	2.35	38.01	35.6827	0.0293	0.086	-0.165	3409.99	8.97	2.80	11.77	0.35	
V10	Plug10_wat_S1_100_100604	100	0.77	35.01	29.2263	0.2205	0.738	-0.017	-	-	-	-	-	No pick possible
V10	Plug10_wat_S1_200_100604	200	0.76	35.01	25.1413	0.1693	0.881	-0.007	-	-	-	-	-	No pick possible
V10	Plug10_wat_S1_300_100604	300	0.75	35.01	29.1551	0.2070	0.978	-0.018	-	-	-	-	-	No pick possible
V10	Plug10_wat_S1_500_100604	500	0.74	35.01	29.0176	0.1931	0.511	-0.010	-	-	-	-	-	No pick possible
V10	Plug10_wat_S1_500_110604	500 rep	0.76	35.01	29.0923	0.2088	0.588	-0.009	-	-	-	-	-	No pick possible
V12	Plug12_wat_S1_100_251104	100	1.00	31.05	33.1530	0.0515	0.191	-0.191	3631.48	11.70	5.64	17.34	0.48	
V12	Plug12_wat_S1_200_251104	200	0.96	31.04	33.0733	0.0281	0.068	-0.296	3646.73	11.75	3.10	14.84	0.41	
V12	Plug12_wat_S1_300_251104	300	0.95	31.04	33.0420	0.0252	0.100	-0.321	3649.29	11.76	2.78	14.53	0.40	
V12	Plug12_wat_S1_300_261104	300 rep	0.91	31.04	33.0218	0.0196	0.051	-0.350	3657.17	11.78	2.17	13.95	0.38	
V13	Plug13_wat_S1_100_291104	100	4.40	32.29	34.9368	0.0465	0.096	-0.092	3125.25	9.68	4.16	13.84	0.44	
V13	Plug13_wat_S1_200_291104	200	4.34	32.29	34.8296	0.0353	0.105	-0.170	3144.15	9.74	3.18	12.92	0.41	
V13	Plug13_wat_S1_300_291104	300	4.30	32.28	34.7714	0.0312	0.095	-0.196	3154.02	9.77	2.83	12.60	0.40	
V13	Plug13_wat_S1_300_301104	300 rep	4.27	32.28	34.7259	0.0218	0.067	-0.218	3167.52	9.81	1.99	11.80	0.37	

Table A.2. Page 2 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S1 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

										Error on velocity				
Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S1 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S1 velocity (m/s)	from length (m/s)	from noise (m/s)	Total error (m/s)	Total error (%)	Comment
V14	Plug14_wat_S1_100_301104	100	6.52	36.68	37.8218	0.0395	0.073	-0.119	2774.76	7.57	2.90	10.46	0.38	
V14	Plug14_wat_S1_200_301104	200	6.42	36.66	37.4943	0.0309	0.058	-0.156	2834.79	7.73	2.34	10.07	0.36	
V14	Plug14_wat_S1_300_301104	300	6.34	36.65	37.2269	0.0270	0.056	-0.180	2888.23	7.88	2.10	9.98	0.35	
V14	Plug14_wat_S1_300_011204	300 rep	6.33	36.65	37.1351	0.0255	0.053	-0.190	2908.95	7.94	2.00	9.94	0.34	
V17	Plug17_wat_S1_100_011204	100	2.81	40.32	37.6115	0.0350	0.071	-0.148	3099.92	7.69	2.88	10.57	0.34	
V17	Plug17_wat_S1_200_011204	200	2.76	40.32	37.5552	0.0259	0.055	-0.206	3102.57	7.70	2.14	9.83	0.32	
V17	Plug17_wat_S1_300_011204	300	2.72	40.31	37.4837	0.0232	0.056	-0.222	3113.39	7.72	1.93	9.65	0.31	
V17	Plug17_wat_S1_300_021204	300 rep	2.70	40.31	37.4497	0.0223	0.055	-0.232	3121.13	7.74	1.86	9.60	0.31	
G6	Plug6_wat_S1_100_100105	100	5.01	34.84	35.7601	0.2324	0.636	-0.050	3122.50	8.96	20.29	29.26	0.94	
G6	Plug6_wat_S1_200_100105	200	4.98	34.83	35.5925	0.0571	0.150	-0.135	3157.38	9.06	5.07	14.13	0.45	
G6	Plug6_wat_S1_300_100105	300	4.95	34.83	35.5195	0.0396	0.124	-0.198	3170.94	9.10	3.54	12.64	0.40	
G6	Plug6_wat_S1_300_110105	300 rep	4.92	34.82	35.4728	0.0249	0.072	-0.244	3183.88	9.14	2.23	11.37	0.36	
G7	Plug7_wat_S1_100_110105	100	33.06	38.83	50.0079	0.0515	0.235	-0.021	1528.29	3.94	1.57	5.51	0.36	
G7	Plug7_wat_S1_200_110105	200	32.63	38.77	49.6616	0.0771	0.255	-0.030	1544.57	3.98	2.40	6.38	0.41	
G7	Plug7_wat_S1_300_110105	300	31.97	38.68	49.5332	0.1015	0.480	-0.031	1547.51	4.00	3.17	7.17	0.46	
G7	Plug7_wat_S1_300_120105	300 rep	31.82	38.66	49.4155	0.0826	0.444	-0.033	1553.97	4.02	2.60	6.62	0.43	
G12	Plug12_wat_S1_100_120105	100	11.02	35.07	40.2215	0.0992	0.349	-0.055	2245.33	6.40	5.54	11.94	0.53	
G12	Plug12_wat_S1_200_120105	200	10.83	35.04	39.4828	0.0637	0.107	-0.096	2348.48	6.70	3.79	10.49	0.45	
G12	Plug12_wat_S1_300_120105	300	10.70	35.03	39.0403	0.0622	0.100	-0.113	2415.03	6.89	3.85	10.74	0.44	
G12	Plug12_wat_S1_300_130105	300 rep	10.68	35.03	38.8993	0.0637	0.086	-0.121	2438.44	6.96	3.99	10.95	0.45	
G13	Plug13_wat_S1_100_130105	100	2.85	42.13	37.0909	0.1241	0.174	-0.078	3373.51	8.01	11.29	19.30	0.57	
G13	Plug13_wat_S1_200_130105	200	2.82	42.12	36.9788	0.0424	0.120	-0.144	3391.94	8.05	3.89	11.94	0.35	
G13	Plug13_wat_S1_300_130105	300	2.80	42.12	36.9021	0.0277	0.109	-0.175	3405.97	8.09	2.56	10.64	0.31	
G13	Plug13_wat_S1_300_140105	300 rep	2.78	42.12	36.8340	0.0209	0.080	-0.226	3424.29	8.13	1.94	10.08	0.29	
G19	Plug19_wat_S1_100_140105	100	20.95	37.37	43.9967	0.2178	0.279	-0.071	1926.95	5.16	9.54	14.70	0.76	
G19	Plug19_wat_S1_200_140105	200	20.79	37.35	43.4424	0.0637	0.149	-0.088	1978.03	5.30	2.90	8.20	0.41	
G19	Plug19_wat_S1_300_140105	300	20.64	37.33	43.1428	0.0761	0.184	-0.096	2006.27	5.37	3.54	8.91	0.44	
G19	Plug19_wat_S1_300_170105	300 rep	20.63	37.33	43.0224	0.0680	0.173	-0.101	2019.14	5.41	3.19	8.60	0.43	
G20	Plug20_wat_S1_100_170105	100	17.14	36.22	41.3998	0.1103	0.142	-0.055	2156.36	5.95	5.75	11.70	0.54	
G20	Plug20_wat_S1_200_170105	200	16.96	36.20	40.6996	0.0810	0.148	-0.080	2242.83	6.20	4.46	10.66	0.48	
G20	Plug20_wat_S1_300_170105	300	16.82	36.18	40.3313	0.0651	0.120	-0.094	2290.48	6.33	3.69	10.03	0.44	
G20	Plug20_wat_S1_300_180105	300 rep	16.80	36.18	40.2814	0.0605	0.113	-0.100	2297.50	6.35	3.45	9.80	0.43	
G30	Plug30_wat_S1_100_010205	100	25.36	36.27	53.7994	0.2974	0.735	-0.008	1242.43	3.43	6.87	10.29	0.83	
G30	Plug30_wat_S1_200_010205	200	24.41	36.16	52.1191	0.0968	0.220	-0.037	1311.99	3.63	2.44	6.07	0.46	
G30	Plug30_wat_S1_200_020205	200 rep	24.19	36.13	51.4626	0.0705	0.185	-0.046	1343.02	3.72	1.84	5.56	0.41	
G32	Plug32_wat_S1_100_260105	100	16.60	42.19	44.2009	0.0883	0.222	-0.010	2152.98	5.10	4.30	9.40	0.44	
G32	Plug32_wat_S1_200_260105	200	16.41	42.16	42.9517	0.1125	0.258	-0.018	2292.68	5.44	6.00	11.44	0.50	
G32	Plug32_wat_S1_300_260105	300	16.28	42.15	42.4333	0.1124	0.292	-0.021	2354.89	5.59	6.24	11.83	0.50	
G32	Plug32_wat_S1_300_270105	300 rep	16.22	42.14	42.2696	0.1344	0.300	-0.022	2376.07	5.64	7.56	13.19	0.56	

Table A.2. Page 3 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S1 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S1 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S1 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
G34	Plug34_wat_S1_100_020205	100	27.71	37.86	45.7812	0.0702	0.288	-0.035	1787.89	4.72	2.74	7.46	0.42	
G34	Plug34_wat_S1_100_030205	100 rep	27.71	37.86	45.6526	0.0657	0.299	-0.038	1798.81	4.75	2.59	7.34	0.41	
G35	Plug35_wat_S1_100_180105	100	8.71	38.00	40.0904	0.0440	0.075	-0.110	2453.84	6.46	2.70	9.15	0.37	
G35	Plug35_wat_S1_200_180105	200	8.56	37.98	39.5428	0.0358	0.065	-0.152	2535.27	6.67	2.29	8.97	0.35	
G35	Plug35_wat_S1_300_180105	300	8.47	37.97	39.2436	0.0332	0.065	-0.166	2581.73	6.80	2.18	8.98	0.35	
G35	Plug35_wat_S1_300_190105	300 rep	8.47	37.97	39.1714	0.0317	0.062	-0.170	2594.32	6.83	2.10	8.93	0.34	
G36	Plug36_wat_S1_100_190105	100	2.22	40.78	36.3090	0.1612	0.364	-0.077	3483.53	8.54	15.46	24.00	0.69	
G36	Plug36_wat_S1_200_190105	200	2.19	40.77	36.1425	0.0553	0.135	-0.146	3520.31	8.63	5.38	14.02	0.40	
G36	Plug36_wat_S1_300_190105	300	2.17	40.77	36.0086	0.0355	0.094	-0.170	3553.60	8.72	3.50	12.22	0.34	
G36	Plug36_wat_S1_300_200105	300 rep	2.17	40.77	35.9688	0.0384	0.103	-0.140	3565.64	8.75	3.80	12.55	0.35	
G37	Plug37_wat_S1_100_200105	100	23.93	41.58	45.9446	0.0532	0.202	-0.027	1948.53	4.69	2.25	6.94	0.36	
G37	Plug37_wat_S1_200_200105	200	23.74	41.56	45.6535	0.0453	0.202	-0.035	1970.18	4.74	1.96	6.70	0.34	
G37	Plug37_wat_S1_300_200105	300	23.59	41.54	45.5008	0.0680	0.382	-0.036	1981.21	4.77	2.96	7.73	0.39	
G37	Plug37_wat_S1_300_210105	300 rep	23.59	41.54	45.4511	0.3040	0.000	-0.047	1985.83	4.78	13.28	18.06	0.91	Forced pick
G39	Plug39_wat_S1_100_030205	100	32.97	41.08	49.0859	0.0360	0.792	-0.003	-	-	-	-	-	No pick possible
G39	Plug39_wat_S1_100_040205	100 rep	32.97	41.08	48.9225	0.0295	0.748	-0.003	-	-	-	-	-	No pick possible
G40	Plug40_wat_S1_100_210105	100	5.41	41.75	38.2544	0.0366	0.078	-0.129	3058.61	7.33	2.92	10.25	0.34	
G40	Plug40_wat_S1_200_210105	200	5.36	41.74	37.9443	0.0289	0.060	-0.192	3119.07	7.47	2.38	9.85	0.32	
G40	Plug40_wat_S1_300_210105_	300	5.32	41.74	37.7274	0.0273	0.060	-0.214	3164.11	7.58	2.29	9.87	0.31	
G40	Plug40_wat_S1_300_240105	300 rep	5.32	41.74	37.6538	0.0224	0.048	-0.221	3181.60	7.62	1.89	9.51	0.30	
G50	Plug50_wat_S1_100_310105	100	9.36	38.47	38.5430	0.0456	0.091	-0.098	2759.88	7.17	3.27	10.44	0.38	
G50	Plug50_wat_S1_200_310105	200	9.29	38.46	38.2343	0.0375	0.079	-0.132	2812.83	7.31	2.76	10.07	0.36	
G50	Plug50_wat_S1_300_310105	300	9.23	38.45	38.0576	0.0384	0.086	-0.144	2843.87	7.40	2.87	10.26	0.36	
G50	Plug50_wat_S1_300_010205	300 rep	9.22	38.45	37.9927	0.0372	0.082	-0.150	2857.35	7.43	2.80	10.23	0.36	
G71	Plug71_wat_S1_100_240105	100	30.16	38.16	54.2035	0.1024	0.204	-0.034	1289.12	3.38	2.44	5.81	0.45	
G71	Plug71_wat_S1_200_240105	200	29.36	38.06	53.2725	0.0883	0.256	-0.046	1325.41	3.48	2.20	5.68	0.43	
G71	Plug71_wat_S1_300_210405	300	28.78	37.98	52.7305	0.1028	0.372	-0.045	1347.06	3.55	2.63	6.17	0.46	
G71	Plug71_wat_S1_300_250105	300 rep	28.50	37.94	52.3309	0.0871	0.204	-0.054	1365.08	3.60	2.27	5.87	0.43	
G75	Plug75_wat_S1_100_270105	100	20.40	35.53	41.8853	0.4016	0.366	-0.046	2055.85	5.79	19.71	25.50	1.24	
G75	Plug75_wat_S1_200_270105	200	20.21	35.51	41.3494	0.2206	0.352	-0.067	2114.91	5.96	11.29	17.24	0.82	
G75	Plug75_wat_S1_300_270105	300	20.06	35.49	41.0835	0.0709	0.125	-0.081	2144.65	6.04	3.70	9.74	0.45	
G75	Plug75_wat_S1_300_280105	300 rep	20.06	35.49	41.0092	0.0776	0.126	-0.085	2154.16	6.07	4.08	10.15	0.47	
G76	Plug76_wat_S1_100_280105	100	5.42	41.37	37.5425	0.0496	0.109	-0.114	3197.71	7.73	4.23	11.96	0.37	
G76	Plug76_wat_S1_200_280105	200	5.38	41.37	37.4113	0.0362	0.083	-0.167	3219.22	7.78	3.12	10.90	0.34	
G76	Plug76_wat_S1_300_280105	300	5.35	41.37	37.3633	0.0398	0.093	-0.184	3224.75	7.80	3.44	11.23	0.35	
G76	Plug76_wat_S1_300_310105	300 rep	5.31	41.36	37.3191	0.0374	0.090	-0.196	3235.16	7.82	3.24	11.06	0.34	
G77	Plug77_wat_S1_100_250105	100	1.87	39.32	36.6215	0.2769	0.949	-0.028	3271.67	8.32	24.74	33.06	1.01	
G77	Plug77_wat_S1_200_250105	200	1.85	39.32	36.2499	0.0439	0.115	-0.142	3363.50	8.55	4.07	12.63	0.38	
G77	Plug77_wat_S1_300_250105	300	1.85	39.32	36.0543	0.0354	0.095	-0.226	3413.29	8.68	3.36	12.04	0.35	
G77	Plug77_wat_S1_300_260105	300 rep	1.84	39.32	35.9751	0.0305	0.083	-0.260	3436.60	8.74	2.92	11.66	0.34	

Table A.3. Page 1 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S2 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V2	Plug2_wat_S2_100_171104	100	9.95	37.41	39.4105	0.3064	0.882	-0.042	2643.69	7.07	20.55	27.62	1.04	
V2	Plug2_wat_S2_200_171104	200	9.87	37.40	39.2800	0.2394	0.611	-0.049	2658.78	7.11	16.20	23.31	0.88	
V2	Plug2_wat_S2_300_171104	300	9.81	37.39	39.2018	0.2199	0.534	-0.052	2673.33	7.15	15.00	22.15	0.83	
V2	Plug2_wat_S2_300_181104	300 rep	9.78	37.39	39.1691	0.1763	0.398	-0.054	2675.09	7.15	12.04	19.20	0.72	
V3	Plug3_wat_S2_100_080604	100	10.59	37.65	40.6717	0.0591	0.388	-0.034	2294.62	6.09	3.33	9.43	0.41	
V3	Plug3_wat_S2_200_080604	200	10.42	37.63	40.1036	0.0705	0.449	-0.046	2369.46	6.30	4.17	10.47	0.44	
V3	Plug3_wat_S2_300_080604	300	10.28	37.61	39.7423	0.0696	0.483	-0.052	2420.18	6.43	4.24	10.67	0.44	
V3	Plug3_wat_S2_500_080604	500	10.06	37.58	39.1865	0.0516	0.152	-0.051	2506.94	6.67	3.30	9.97	0.40	
V3	Plug3_wat_S2_500_090604	500 rep	10.05	37.58	39.0697	0.0530	0.194	-0.053	2521.40	6.71	3.42	10.13	0.40	
V4	Plug4_wat_S2_100_181104	100	7.31	39.11	39.4915	0.0383	0.106	-0.076	2747.97	7.03	2.67	9.69	0.35	
V4	Plug4_wat_S2_200_181104	200	7.23	39.10	39.1734	0.0217	0.055	-0.136	2800.62	7.16	1.55	8.71	0.31	
V4	Plug4_wat_S2_300_181104	300	7.16	39.09	38.9250	0.0285	0.078	-0.154	2850.98	7.29	2.09	9.38	0.33	
V4	Plug4_wat_S2_300_191104	300 rep	7.16	39.09	38.8536	0.0153	0.036	-0.166	2861.25	7.32	1.13	8.45	0.30	
V5	Plug5_wat_S2_100_191104	100	4.86	35.56	36.8934	0.0309	0.072	-0.102	3056.74	8.60	2.56	11.16	0.37	
V5	Plug5_wat_S2_200_191104	200	4.78	35.55	36.7037	0.0190	0.042	-0.141	3094.06	8.70	1.60	10.31	0.33	
V5	Plug5_wat_S2_300_191104	300	4.73	35.55	36.5475	0.0198	0.045	-0.156	3136.53	8.82	1.70	10.53	0.34	
V5	Plug5_wat_S2_300_221104	300 rep	4.73	35.55	36.4829	0.0255	0.062	-0.174	3148.37	8.86	2.20	11.06	0.35	
V6	Plug6_wat_S2_100_221104	100	4.42	35.07	36.5940	0.4211	0.000	-0.032	3094.46	8.82	35.61	44.44	1.44	Forced pick
V6	Plug6_wat_S2_200_221104	200	4.36	35.07	36.4571	0.1759	0.461	-0.065	3118.77	8.89	15.04	23.94	0.77	
V6	Plug6_wat_S2_300_221104	300	4.32	35.06	36.3687	0.1290	0.316	-0.084	3143.37	8.97	11.15	20.11	0.64	
V6	Plug6_wat_S2_300_231104	300 rep	4.28	35.06	36.3139	0.0784	0.193	-0.114	3152.26	8.99	6.81	15.80	0.50	
V7	Plug7_wat_S2_100_231104	100	1.56	35.92	35.4843	0.0846	0.265	-0.064	3512.89	9.78	8.37	18.15	0.52	
V7	Plug7_wat_S2_200_231104	200	1.55	35.92	35.4264	0.0567	0.172	-0.084	3516.61	9.79	5.63	15.42	0.44	
V7	Plug7_wat_S2_300_231104	300	1.53	35.91	35.3930	0.0368	0.103	-0.108	3528.44	9.82	3.67	13.50	0.38	
V7	Plug7_wat_S2_300_241104	300 rep	1.53	35.91	35.2508	0.0197	0.052	-0.194	3570.58	9.94	2.00	11.94	0.33	
V8	Plug8_wat_S2_100_241104	100	2.38	38.02	36.3804	0.1921	0.522	-0.040	3418.60	8.99	18.05	27.05	0.79	
V8	Plug8_wat_S2_200_241104	200	2.36	38.01	36.4100	0.0699	0.180	-0.082	3395.11	8.93	6.51	15.45	0.45	
V8	Plug8_wat_S2_300_241104	300	2.34	38.01	36.3875	0.0299	0.078	-0.132	3402.15	8.95	2.80	11.75	0.35	
V8	Plug8_wat_S2_300_251104	300 rep	2.35	38.01	36.3073	0.0229	0.061	-0.169	3420.05	9.00	2.16	11.15	0.33	
V10	Plug10_wat_S2_100_100604	100	0.77	35.01	35.9487	0.1221	0.352	-0.014	2996.18	8.56	10.17	18.73	0.63	Much noise
V10	Plug10_wat_S2_200_100604	200	0.76	35.01	35.8092	0.0835	0.263	-0.019	3021.56	8.63	7.05	15.68	0.52	Much noise
V10	Plug10_wat_S2_300_100604	300	0.75	35.01	35.6795	0.1268	0.427	-0.015	3050.04	8.71	10.84	19.55	0.64	Much noise
V10	Plug10_wat_S2_500_100604	500	0.74	35.01	35.5103	0.1336	0.424	-0.012	3093.77	8.84	11.64	20.47	0.66	Much noise
V10	Plug10_wat_S2_500_110604	500 rep	0.76	35.01	35.9222	0.1662	0.610	-0.012	2977.48	8.51	13.78	22.28	0.75	Much noise
V12	Plug12_wat_S2_100_251104	100	1.00	31.05	33.7675	0.0286	0.069	-0.116	3649.19	11.75	3.09	14.85	0.41	
V12	Plug12_wat_S2_200_251104	200	0.96	31.04	33.7336	0.0179	0.044	-0.180	3643.40	11.74	1.94	13.67	0.38	
V12	Plug12_wat_S2_300_251104	300	0.95	31.04	33.7036	0.0121	0.029	-0.196	3656.56	11.78	1.31	13.09	0.36	
V12	Plug12_wat_S2_300_261104	300 rep	0.91	31.04	33.6629	0.0148	0.037	-0.215	3664.21	11.81	1.62	13.42	0.37	
V13	Plug13_wat_S2_100_291104	100	4.40	32.29	35.6269	0.0436	0.090	-0.074	3114.97	9.65	3.82	13.46	0.43	
V13	Plug13_wat_S2_200_291104	200	4.34	32.29	35.5036	0.0238	0.054	-0.134	3137.58	9.72	2.10	11.82	0.38	
V13	Plug13_wat_S2_300_291104	300	4.30	32.28	35.4136	0.0214	0.046	-0.156	3165.24	9.80	1.91	11.71	0.37	
V13	Plug13_wat_S2_300_301104	300 rep	4.27	32.28	35.4106	0.0151	0.034	-0.175	3159.06	9.79	1.35	11.13	0.35	

Table A.3. Page 2 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S2 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V14	Plug14_wat_S2_100_301104	100	6.52	36.68	38.1780	0.0364	0.081	-0.102	2839.15	7.74	2.70	10.45	0.37	
V14	Plug14_wat_S2_200_301104	200	6.42	36.66	37.8639	0.0155	0.035	-0.126	2898.18	7.90	1.19	9.09	0.31	
V14	Plug14_wat_S2_300_301104	300	6.34	36.65	37.6403	0.0131	0.031	-0.135	2949.85	8.05	1.03	9.08	0.31	
V14	Plug14_wat_S2_300_011204	300 rep	6.33	36.65	37.5796	0.0130	0.031	-0.140	2958.94	8.07	1.02	9.10	0.31	
V17	Plug17_wat_S2_100_011204	100	2.81	40.32	38.0865	0.0358	0.090	-0.096	3143.67	7.80	2.95	10.75	0.34	
V17	Plug17_wat_S2_200_011204	200	2.76	40.32	38.0203	0.0134	0.033	-0.133	3147.97	7.81	1.11	8.92	0.28	
V17	Plug17_wat_S2_300_011204	300	2.72	40.31	37.9861	0.0247	0.066	-0.146	3156.32	7.83	2.05	9.88	0.31	
V17	Plug17_wat_S2_300_021204	300 rep	2.70	40.31	37.9520	0.0258	0.071	-0.156	3159.06	7.84	2.15	9.98	0.32	
G6	Plug6_wat_S2_100_100105	100	5.01	34.84	36.5278	0.1211	0.432	-0.042	3091.54	8.87	10.25	19.13	0.62	
G6	Plug6_wat_S2_200_100105	200	4.98	34.83	36.2978	0.0374	0.096	-0.102	3142.34	9.02	3.24	12.26	0.39	
G6	Plug6_wat_S2_300_100105	300	4.95	34.83	36.2276	0.0250	0.060	-0.148	3162.42	9.08	2.18	11.26	0.36	
G6	Plug6_wat_S2_300_110105	300 rep	4.92	34.82	36.1408	0.0212	0.052	-0.185	3180.80	9.13	1.87	11.00	0.35	
G7	Plug7_wat_S2_100_110105	100	33.06	38.83	50.2191	0.0428	0.536	-0.010	1555.53	4.01	1.32	5.33	0.34	
G7	Plug7_wat_S2_200_110105	200	32.63	38.77	50.0333	0.0518	0.319	-0.014	1562.04	4.03	1.62	5.65	0.36	
G7	Plug7_wat_S2_300_110105	300	31.97	38.68	49.7978	0.0703	0.671	-0.014	1573.57	4.07	2.22	6.29	0.40	
G7	Plug7_wat_S2_300_120105	300 rep	31.82	38.66	49.6759	0.1068	0.604	-0.016	1579.17	4.08	3.40	7.48	0.47	
G12	Plug12_wat_S2_100_120105	100	11.02	35.07	40.8703	0.0520	0.168	-0.031	2246.37	6.41	2.86	9.27	0.41	
G12	Plug12_wat_S2_200_120105	200	10.83	35.04	40.0929	0.0812	0.173	-0.058	2355.17	6.72	4.77	11.49	0.49	
G12	Plug12_wat_S2_300_120105	300	10.70	35.03	39.6117	0.0737	0.178	-0.069	2432.99	6.95	4.53	11.47	0.47	
G12	Plug12_wat_S2_300_130105	300 rep	10.68	35.03	39.5122	0.1870	0.409	-0.074	2446.02	6.98	11.57	18.56	0.76	
G13	Plug13_wat_S2_100_130105	100	2.85	42.13	37.9990	0.3437	0.000	-0.041	3306.76	7.85	29.91	37.76	1.14	Forced pick
G13	Plug13_wat_S2_200_130105	200	2.82	42.12	37.8702	0.0477	0.128	-0.083	3327.92	7.90	4.19	12.09	0.36	
G13	Plug13_wat_S2_300_130105	300	2.80	42.12	37.7550	0.0356	0.095	-0.108	3358.61	7.97	3.17	11.15	0.33	
G13	Plug13_wat_S2_300_140105	300 rep	2.78	42.12	37.6532	0.0263	0.068	-0.146	3379.83	8.03	2.36	10.39	0.31	
G19	Plug19_wat_S2_100_140105	100	20.95	37.37	44.6294	0.3173	0.670	-0.050	1929.27	5.16	13.72	18.88	0.98	
G19	Plug19_wat_S2_200_140105	200	20.79	37.35	44.0195	0.2374	0.505	-0.064	1985.96	5.32	10.71	16.03	0.81	
G19	Plug19_wat_S2_300_140105	300	20.64	37.33	43.7027	0.2152	0.456	-0.070	2019.14	5.41	9.94	15.35	0.76	
G19	Plug19_wat_S2_300_170105	300 rep	20.63	37.33	43.6207	0.2153	0.474	-0.076	2025.61	5.43	10.00	15.42	0.76	
G20	Plug20_wat_S2_100_170105	100	17.14	36.22	41.8706	0.5266	0.000	-0.034	2180.40	6.02	27.42	33.44	1.53	Forced pick
G20	Plug20_wat_S2_200_170105	200	16.96	36.20	41.1687	0.2593	0.621	-0.051	2268.61	6.27	14.29	20.56	0.91	
G20	Plug20_wat_S2_300_170105	300	16.82	36.18	40.7817	0.2128	0.542	-0.058	2324.05	6.42	12.13	18.55	0.80	
G20	Plug20_wat_S2_300_180105	300 rep	16.80	36.18	40.7484	0.2217	0.579	-0.063	2325.62	6.43	12.65	19.08	0.82	
G30	Plug30_wat_S2_100_010205	100	25.36	36.27	53.7611	0.1448	0.472	-0.005	1272.70	3.51	3.43	6.94	0.55	Forced pick
G30	Plug30_wat_S2_200_010205	200	24.41	36.16	52.4384	0.0736	0.279	-0.019	1328.05	3.67	1.86	5.54	0.42	
G30	Plug30_wat_S2_200_020205	200 rep	24.19	36.13	51.7612	0.0624	0.321	-0.027	1360.92	3.77	1.64	5.41	0.40	
G32	Plug32_wat_S2_100_260105	100	16.60	42.19	44.8203	0.0453	0.631	-0.005	2157.01	5.11	2.18	7.29	0.34	
G32	Plug32_wat_S2_200_260105	200	16.41	42.16	43.4743	0.0803	0.276	-0.008	2308.99	5.48	4.26	9.74	0.42	
G32	Plug32_wat_S2_300_260105	300	16.28	42.15	42.7710	0.0543	0.344	-0.010	2400.60	5.70	3.05	8.75	0.36	
G32	Plug32_wat_S2_300_270105	300 rep	16.22	42.14	42.7812	0.0495	0.167	-0.010	2395.77	5.69	2.77	8.46	0.35	

Table A.3. Page 3 of 3. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S2 signals measured on Vestmanna-1 and Glyvursnes-1 samples in water saturated condition, S_w=100 %..

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
G34	Plug34_wat_S2_100_020205	100	27.71	37.86	45.6967	0.0298	0.071	-0.038	1852.67	4.89	1.21	6.10	0.33	
G34	Plug34_wat_S2_100_030205	100 rep	27.71	37.86	45.6015	0.0286	0.069	-0.042	1861.34	4.92	1.17	6.08	0.33	
G35	Plug35_wat_S2_100_180105	100	8.71	38.00	40.4493	0.1742	0.397	-0.071	2501.83	6.58	10.77	17.36	0.69	
G35	Plug35_wat_S2_200_180105	200	8.56	37.98	39.9749	0.0396	0.093	-0.100	2573.12	6.77	2.55	9.33	0.36	
G35	Plug35_wat_S2_300_180105	300	8.47	37.97	39.7204	0.0360	0.086	-0.106	2617.63	6.89	2.37	9.27	0.35	
G35	Plug35_wat_S2_300_190105	300 rep	8.47	37.97	39.6643	0.0390	0.095	-0.112	2623.81	6.91	2.58	9.49	0.36	
G36	Plug36_wat_S2_100_190105	100	2.22	40.78	36.8604	0.1254	0.429	-0.051	3514.94	8.62	11.96	20.58	0.59	
G36	Plug36_wat_S2_200_190105	200	2.19	40.77	36.7125	0.0477	0.143	-0.096	3545.57	8.70	4.61	13.30	0.38	
G36	Plug36_wat_S2_300_190105	300	2.17	40.77	36.5804	0.0338	0.102	-0.114	3586.96	8.80	3.32	12.11	0.34	
G36	Plug36_wat_S2_300_200105	300 rep	2.17	40.77	36.5464	0.0322	0.097	-0.122	3590.71	8.81	3.16	11.97	0.33	
G37	Plug37_wat_S2_100_200105	100	23.93	41.58	46.7672	0.0386	0.142	-0.027	1933.44	4.65	1.59	6.24	0.32	
G37	Plug37_wat_S2_200_200105	200	23.74	41.56	46.4062	0.0465	0.178	-0.032	1960.87	4.72	1.96	6.68	0.34	
G37	Plug37_wat_S2_300_200105	300	23.59	41.54	46.2088	0.0563	0.177	-0.033	1978.43	4.76	2.41	7.17	0.36	
G37	Plug37_wat_S2_300_210105	300 rep	23.59	41.54	46.1205	0.2499	0.938	-0.045	1984.69	4.78	10.75	15.53	0.78	
G39	Plug39_wat_S2_100_030205	100	32.97	41.08	76.6310	0.0598	0.991	-0.003	-	-	-	-	-	No pick possible
G39	Plug39_wat_S2_100_040205	100 rep	32.97	41.08	72.7600	0.0495	0.803	-0.002	-	-	-	-	-	No pick possible
G40	Plug40_wat_S2_100_210105	100	5.41	41.75	38.5544	0.0649	0.185	-0.062	3140.52	7.52	5.29	12.81	0.41	
G40	Plug40_wat_S2_200_210105	200	5.36	41.74	38.3506	0.1057	0.257	-0.098	3177.53	7.61	8.76	16.37	0.52	
G40	Plug40_wat_S2_300_210105	300	5.32	41.74	38.2041	0.0339	0.083	-0.118	3213.26	7.70	2.85	10.55	0.33	
G40	Plug40_wat_S2_300_240105	300 rep	5.32	41.74	38.1374	0.0197	0.045	-0.120	3224.32	7.72	1.67	9.39	0.29	
G50	Plug50_wat_S2_100_310105	100	9.36	38.47	39.0818	0.0439	0.133	-0.073	2783.28	7.23	3.13	10.36	0.37	
G50	Plug50_wat_S2_200_310105	200	9.29	38.46	38.8418	0.0407	0.100	-0.096	2822.12	7.34	2.95	10.29	0.36	
G50	Plug50_wat_S2_300_310105	300	9.23	38.45	38.7098	0.0373	0.097	-0.104	2849.41	7.41	2.74	10.15	0.36	
G50	Plug50_wat_S2_300_010205	300 rep	9.22	38.45	38.6435	0.0948	0.250	-0.110	2858.75	7.43	7.01	14.45	0.51	
G71	Plug71_wat_S2_100_240105	100	30.16	38.16	54.4855	0.0759	0.344	-0.017	1305.62	3.42	1.82	5.24	0.40	
G71	Plug71_wat_S2_200_240105	200	29.36	38.06	53.5530	0.0540	0.231	-0.025	1342.81	3.53	1.35	4.88	0.36	
G71	Plug71_wat_S2_300_240105	300	28.78	37.98	53.1219	0.0656	0.241	-0.024	1360.92	3.58	1.68	5.26	0.39	
G71	Plug71_wat_S2_300_250105	300 rep	28.50	37.94	52.6992	0.0487	0.114	-0.030	1379.43	3.64	1.27	4.91	0.36	
G75	Plug75_wat_S2_100_270105	100	20.40	35.53	42.3826	0.6473	0.815	-0.029	2074.90	5.84	31.69	37.53	1.81	
G75	Plug75_wat_S2_200_270105	200	20.21	35.51	41.8030	0.2917	0.556	-0.044	2140.27	6.03	14.93	20.96	0.98	
G75	Plug75_wat_S2_300_270105	300	20.06	35.49	41.5940	0.2367	0.500	-0.049	2166.65	6.11	12.33	18.44	0.85	
G75	Plug75_wat_S2_300_280105	300 rep	20.06	35.49	41.5176	0.2122	0.453	-0.054	2173.82	6.13	11.11	17.24	0.79	
G76	Plug76_wat_S2_100_280105	100	5.42	41.37	38.1842	0.0702	0.158	-0.064	3201.24	7.74	5.88	13.62	0.43	
G76	Plug76_wat_S2_200_280105	200	5.38	41.37	38.0246	0.0662	0.158	-0.086	3229.07	7.81	5.62	13.43	0.42	
G76	Plug76_wat_S2_300_280105	300	5.35	41.37	37.9307	0.0539	0.131	-0.094	3252.92	7.86	4.62	12.48	0.38	
G76	Plug76_wat_S2_300_310105	300 rep	5.31	41.36	37.8905	0.0528	0.132	-0.100	3257.07	7.88	4.54	12.42	0.38	
G77	Plug77_wat_S2_100_250105	100	1.87	39.32	37.0169	0.3280	0.000	-0.038	3344.19	8.51	29.63	38.14	1.14	Forced pick
G77	Plug77_wat_S2_200_250105	200	1.85	39.32	36.7822	0.0340	0.096	-0.110	3398.45	8.64	3.14	11.79	0.35	
G77	Plug77_wat_S2_300_250105	300	1.85	39.32	36.6250	0.0154	0.040	-0.165	3445.54	8.76	1.45	10.21	0.30	
G77	Plug77_wat_S2_300_260105	300 rep	1.84	39.32	36.5932	0.0178	0.046	-0.186	3448.45	8.77	1.68	10.45	0.30	

Table A.4. Page 1 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic P signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

										Error on velocity				
Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of P signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	P velocity (m/s)	from length (m/s)	from noise (m/s)	Total error (m/s)	Total error (%)	Comment
V3	Plug3_gas_P_100_260704	100	10.59	37.65	23.8478	0.1084	0.381	0.011	3395.42	9.02	15.44	24.46	0.72	
V3	Plug3_gas_P_200_260704	200	10.42	37.63	22.9527	0.1115	0.323	0.018	3687.13	9.80	17.92	27.72	0.75	
V3	Plug3_gas_P_300_260704	300	10.28	37.61	22.4718	0.0867	0.255	0.020	3842.91	10.22	14.83	25.04	0.65	
V3	Plug3_gas_P_500_260704	500	10.06	37.58	21.9508	0.1153	0.379	0.026	4055.18	10.79	21.30	32.09	0.79	
V3	Plug3_gas_P_500_270704	500 rep	10.05	37.58	21.8569	0.1042	0.325	0.027	4094.05	10.89	19.52	30.42	0.74	
V10	Plug10_gas_P_100_140704	100	0.77	35.01	18.5345	0.0759	0.186	0.017	6062.31	17.32	24.81	42.13	0.69	
V10	Plug10_gas_P_200_140704	200	0.76	35.01	18.3706	0.0555	0.143	0.033	6225.72	17.78	18.83	36.61	0.59	
V10	Plug10_gas_P_300_140704	300	0.75	35.01	18.2889	0.0138	0.040	0.051	6246.76	17.84	4.72	22.56	0.36	
V10	Plug10_gas_P_500_140704	500	0.74	35.01	18.2009	0.0178	0.053	0.076	6344.27	18.12	6.19	24.32	0.38	
V10	Plug10_gas_P_500_150704	500 rep	0.76	35.01	18.1835	0.0119	0.036	0.080	6358.00	18.16	4.15	22.32	0.35	
G6	Plug6_gas_P_100_070205	100	5.05	34.82	20.3076	0.1453	0.275	0.021	5312.79	15.26	38.02	53.28	1.00	
G6	Plug6_gas_P_200_070205	200	5.05	34.82	20.1849	0.0575	0.158	0.059	5385.34	15.47	15.34	30.81	0.57	
G6	Plug6_gas_P_300_070205	300	5.05	34.82	20.1547	0.0377	0.115	0.088	5395.19	15.49	10.09	25.58	0.47	
G6	Plug6_gas_P_300_080205	300 rep	5.05	34.82	20.1323	0.0385	0.115	0.090	5398.87	15.51	10.33	25.84	0.48	
G7	Plug7_gas_P_100_100205	100	33.48	38.86	26.6138	0.0397	0.125	0.015	3021.73	7.78	4.51	12.28	0.41	
G7	Plug7_gas_P_200_100205	200	33.48	38.86	26.4944	0.0210	0.071	0.026	3041.83	7.83	2.41	10.24	0.34	
G7	Plug7_gas_P_300_100205	300	33.48	38.86	26.3715	0.1612	0.308	0.022	3066.92	7.89	18.75	26.64	0.87	
G7	Plug7_gas_P_300_110205	300 rep	33.48	38.86	26.2773	0.1876	0.344	0.023	3085.47	7.94	22.03	29.97	0.97	
G12	Plug12_gas_P_100_110205	100	11.22	35.06	24.7116	0.0968	0.206	0.013	3199.49	9.13	12.54	21.66	0.68	
G12	Plug12_gas_P_200_110205	200	11.22	35.06	23.8028	0.0390	0.105	0.026	3476.93	9.92	5.69	15.61	0.45	
G12	Plug12_gas_P_300_110205	300	11.22	35.06	23.2871	0.1705	0.310	0.027	3657.30	10.43	26.78	37.22	1.02	
G12	Plug12_gas_P_300_140205	300 rep	11.22	35.06	23.1845	0.1901	0.324	0.028	3689.87	10.52	30.25	40.78	1.11	
G13	Plug13_gas_P_100_090205	100	2.88	42.03	21.1007	0.1266	0.265	0.030	5720.62	13.61	34.33	47.94	0.84	
G13	Plug13_gas_P_200_090205	200	2.88	42.03	20.9410	0.0577	0.148	0.055	5819.88	13.85	16.05	29.89	0.51	
G13	Plug13_gas_P_300_090205	300	2.88	42.03	20.8537	0.0469	0.119	0.069	5875.94	13.98	13.20	27.18	0.46	
G13	Plug13_gas_P_300_100205	300 rep	2.88	42.03	20.8548	0.0511	0.125	0.071	5860.29	13.94	14.35	28.30	0.48	
G19	Plug19_gas_P_100_150205	100	21.12	37.37	25.0530	0.4476	0.452	0.011	3307.26	8.85	59.08	67.93	2.05	
G19	Plug19_gas_P_200_150205	200	21.12	37.37	24.4816	0.1525	0.251	0.027	3472.27	9.29	21.63	30.92	0.89	
G19	Plug19_gas_P_300_150205	300	21.12	37.37	24.2359	0.0876	0.175	0.041	3547.19	9.49	12.82	22.31	0.63	
G19	Plug19_gas_P_300_160205	300 rep	21.12	37.37	24.1940	0.0879	0.180	0.044	3555.26	9.51	12.92	22.43	0.63	
G20	Plug20_gas_P_100_140205	100	17.32	36.23	23.8365	0.1193	0.222	0.014	3593.21	9.92	17.99	27.91	0.78	
G20	Plug20_gas_P_200_140205	200	17.32	36.23	23.1750	0.0272	0.063	0.024	3831.51	10.58	4.50	15.08	0.39	
G20	Plug20_gas_P_300_140205	300	17.32	36.23	22.8256	0.0458	0.124	0.030	3970.50	10.96	7.97	18.93	0.48	
G20	Plug20_gas_P_300_150205	300 rep	17.32	36.23	22.8031	0.0370	0.102	0.031	3972.46	10.96	6.45	17.42	0.44	
G30	Plug30_gas_P_100_010305	100	26.32	36.06	34.8994	0.0826	0.160	0.007	1705.30	4.73	4.04	8.77	0.51	
G30	Plug30_gas_P_100_020305	100 rep	26.32	36.06	34.5306	0.0610	0.161	0.011	1732.70	4.81	3.06	7.87	0.45	

Table A.4. Page 2 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic P signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of P signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	P velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
G32	Plug32_gas_P_100_230205	100	16.80	42.26	26.5829	0.2640	0.824	0.006	3294.02	7.79	32.71	40.51	1.23	
G32	Plug32_gas_P_200_230205	200	16.80	42.26	25.0322	0.2259	0.663	0.010	3735.53	8.84	33.71	42.55	1.14	
G32	Plug32_gas_P_300_230205	300	16.80	42.26	24.3597	0.1997	0.557	0.010	3964.76	9.38	32.51	41.89	1.06	
G32	Plug32_gas_P_300_240205	300 rep	16.80	42.26	24.3303	0.1888	0.514	0.010	3969.01	9.39	30.80	40.19	1.01	
G35	Plug35_gas_P_100_160205	100	8.85	37.84	23.8714	0.6907	0.546	0.008	3739.94	9.88	108.22	118.10	3.16	
G35	Plug35_gas_P_200_160205	200	8.85	37.84	23.1661	0.2005	0.283	0.020	4005.55	10.59	34.67	45.26	1.13	
G35	Plug35_gas_P_300_160205	300	8.85	37.84	22.8100	0.1596	0.264	0.027	4154.04	10.98	29.06	40.04	0.96	
G35	Plug35_gas_P_300_170205	300 rep	8.85	37.84	22.8003	0.1400	0.243	0.029	4150.26	10.97	25.48	36.45	0.88	
G36	Plug36_gas_P_100_080205	100	2.25	40.64	20.1645	0.0873	0.219	0.016	6339.20	15.60	27.43	43.03	0.68	
G36	Plug36_gas_P_200_080205	200	2.25	40.64	20.0735	0.0305	0.093	0.033	6395.67	15.74	9.71	25.45	0.40	
G36	Plug36_gas_P_300_080205	300	2.25	40.64	20.0349	0.0207	0.075	0.044	6416.07	15.79	6.63	22.42	0.35	
G36	Plug36_gas_P_300_090205	300 rep	2.25	40.64	20.0232	0.1381	0.300	0.035	6409.69	15.77	44.20	59.97	0.94	
G37	Plug37_gas_P_100_180205	100	24.12	41.53	26.8891	0.1034	0.191	0.032	3161.66	7.61	12.16	19.78	0.63	
G37	Plug37_gas_P_200_180205	200	24.12	41.53	26.5708	0.0523	0.111	0.048	3231.50	7.78	6.36	14.14	0.44	
G37	Plug37_gas_P_300_180205	300	24.12	41.53	26.4110	0.0658	0.130	0.048	3267.45	7.87	8.14	16.01	0.49	
G37	Plug37_gas_P_300_210205	300 rep	24.12	41.53	26.3441	0.0530	0.106	0.050	3280.07	7.90	6.60	14.50	0.44	
G40	Plug40_gas_P_100_170205	100	5.47	41.76	22.3382	0.2133	0.275	0.016	4864.52	11.65	46.45	58.10	1.19	
G40	Plug40_gas_P_200_170205	200	5.47	41.76	21.9335	0.1037	0.199	0.035	5083.82	12.17	24.03	36.21	0.71	
G40	Plug40_gas_P_300_170205	300	5.47	41.76	21.6433	0.0633	0.137	0.046	5257.79	12.59	15.37	27.96	0.53	
G40	Plug40_gas_P_300_180205	300 rep	5.47	41.76	21.6336	0.0695	0.148	0.047	5252.30	12.58	16.88	29.46	0.56	
G50	Plug50_gas_P_100_240205	100	9.43	38.48	22.1120	0.0684	0.155	0.047	4603.75	11.96	14.23	26.20	0.57	
G50	Plug50_gas_P_200_240205	200	9.43	38.48	21.8631	0.0462	0.117	0.068	4725.01	12.28	9.98	22.26	0.47	
G50	Plug50_gas_P_300_240205	300	9.43	38.48	21.7200	0.0423	0.104	0.076	4798.48	12.47	9.35	21.82	0.45	
G50	Plug50_gas_P_300_250205	300 rep	9.43	38.48	21.6633	0.0413	0.102	0.078	4821.75	12.53	9.20	21.73	0.45	
G71	Plug71_gas_P_100_220205	100	30.96	38.09	34.0256	0.0787	0.306	0.009	1878.95	4.93	4.35	9.28	0.49	
G71	Plug71_gas_P_200_220205	200	30.96	38.09	31.6640	0.5039	0.464	0.008	2122.62	5.57	33.78	39.35	1.85	
G71	Plug71_gas_P_300_220205	300	30.96	38.09	30.4687	0.2436	0.344	0.016	2271.60	5.96	18.16	24.12	1.06	
G71	Plug71_gas_P_300_230205	300 rep	30.96	38.09	30.2352	0.2293	0.337	0.018	2301.18	6.04	17.45	23.49	1.02	
G75	Plug75_gas_P_100_250205	100	20.58	35.56	25.0343	0.1913	0.364	0.007	3152.29	8.86	24.09	32.96	1.05	
G75	Plug75_gas_P_200_250205	200	20.58	35.56	24.1401	0.1487	0.225	0.012	3412.37	9.60	21.01	30.61	0.90	
G75	Plug75_gas_P_300_250205	300	20.58	35.56	23.8582	0.0445	0.106	0.019	3500.90	9.85	6.52	16.37	0.47	
G75	Plug75_gas_P_300_280205	300 rep	20.58	35.56	23.7691	0.0352	0.084	0.020	3525.57	9.91	5.22	15.13	0.43	
G76	Plug76_gas_P_100_280205	100	5.46	41.37	21.6460	0.3320	0.341	0.013	5241.75	12.67	80.40	93.07	1.78	
G76	Plug76_gas_P_200_280205	200	5.46	41.37	21.3981	0.1127	0.185	0.032	5387.49	13.02	28.38	41.41	0.77	
G76	Plug76_gas_P_300_280205	300	5.46	41.37	21.3218	0.0924	0.166	0.042	5428.42	13.12	23.53	36.65	0.68	
G76	Plug76_gas_P_300_010305	300 rep	5.46	41.37	21.2941	0.0806	0.149	0.044	5435.34	13.14	20.58	33.72	0.62	
G77	Plug77_gas_P_100_210205	100	1.88	39.28	20.7347	0.1434	0.245	0.030	5626.62	14.32	38.92	53.24	0.95	
G77	Plug77_gas_P_200_210205	200	1.88	39.28	20.4034	0.0613	0.143	0.069	5876.54	14.96	17.65	32.61	0.55	
G77	Plug77_gas_P_300_210205	300	1.88	39.28	20.2249	0.0383	0.110	0.092	6020.75	15.33	11.40	26.73	0.44	
G77	Plug77_gas_P_300_220205	300 rep	1.88	39.28	20.2045	0.0371	0.100	0.095	6022.97	15.33	11.06	26.39	0.44	

Table A.5. Page 1 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S1 signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

										Error on velocity				
Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S1 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S1 velocity (m/s)	from length (m/s)	from noise (m/s)	Total error (m/s)	Total error (%)	Comment
V3	Plug3_gas_S1_100_260704	100	10.59	37.65	41.0327	0.0567	0.323	-0.024	2160.04	5.74	2.98	8.72	0.40	
V3	Plug3_gas_S1_200_260704	200	10.42	37.63	39.9079	0.0861	0.306	-0.034	2302.01	6.12	4.97	11.09	0.48	
V3	Plug3_gas_S1_300_260704	300	10.28	37.61	39.3231	0.0675	0.265	-0.039	2385.03	6.34	4.10	10.44	0.44	
V3	Plug3_gas_S1_500_260704	500	10.06	37.58	38.6781	0.0630	0.196	-0.042	2478.31	6.59	4.04	10.63	0.43	
V3	Plug3_gas_S1_500_270704	500 rep	10.05	37.58	38.5732	0.0713	0.232	-0.044	2495.66	6.64	4.61	11.25	0.45	
V10	Plug10_gas_S1_100_140704	100	0.77	35.01	33.8977	0.1362	0.733	-0.051	3400.64	9.71	13.67	23.38	0.69	
V10	Plug10_gas_S1_200_140704	200	0.76	35.01	33.7075	0.0751	0.306	-0.108	3450.65	9.86	7.69	17.55	0.51	
V10	Plug10_gas_S1_300_140704	300	0.75	35.01	33.6311	0.0654	0.275	-0.135	3473.84	9.92	6.75	16.68	0.48	
V10	Plug10_gas_S1_500_140704	500	0.74	35.01	33.4971	0.0388	0.126	-0.174	3506.44	10.02	4.06	14.07	0.40	
V10	Plug10_gas_S1_500_150704	500 rep	0.76	35.01	33.4930	0.0439	0.184	-0.178	3508.33	10.02	4.60	14.62	0.42	
G6	Plug6_gas_S1_100_070205	100	5.05	34.82	35.7014	0.0584	0.159	-0.073	3137.59	9.01	5.13	14.14	0.45	
G6	Plug6_gas_S1_200_070205	200	5.05	34.82	35.5724	0.0283	0.070	-0.208	3162.09	9.08	2.52	11.60	0.37	
G6	Plug6_gas_S1_300_070205	300	5.05	34.82	35.5249	0.0204	0.052	-0.261	3168.62	9.10	1.82	10.92	0.34	
G6	Plug6_gas_S1_300_080205	300 rep	5.05	34.82	35.4997	0.0202	0.051	-0.264	3175.65	9.12	1.81	10.93	0.34	
G7	Plug7_gas_S1_100_100205	100	33.48	38.86	45.5117	0.0698	0.124	-0.084	1858.62	4.78	2.85	7.63	0.41	
G7	Plug7_gas_S1_200_100205	200	33.48	38.86	45.3432	0.0547	0.103	-0.114	1869.84	4.81	2.25	7.07	0.38	
G7	Plug7_gas_S1_300_100205	300	33.48	38.86	45.2209	0.0494	0.109	-0.119	1878.66	4.83	2.05	6.89	0.37	
G7	Plug7_gas_S1_300_110205	300 rep	33.48	38.86	45.1614	0.0449	0.097	-0.122	1883.99	4.85	1.87	6.72	0.36	
G12	Plug12_gas_S1_100_110205	100	11.22	35.06	41.2815	0.0907	0.396	-0.027	2102.20	6.00	4.62	10.61	0.50	
G12	Plug12_gas_S1_200_110205	200	11.22	35.06	40.4240	0.1148	0.519	-0.060	2210.13	6.30	6.28	12.58	0.57	
G12	Plug12_gas_S1_300_110205	300	11.22	35.06	39.8717	0.0668	0.112	-0.095	2286.15	6.52	3.83	10.35	0.45	
G12	Plug12_gas_S1_300_140205	300 rep	11.22	35.06	39.6605	0.0648	0.091	-0.106	2317.94	6.61	3.79	10.40	0.45	
G13	Plug13_gas_S1_100_090205	100	2.88	42.03	37.2221	0.0363	0.105	-0.132	3330.85	7.92	3.25	11.17	0.34	
G13	Plug13_gas_S1_200_090205	200	2.88	42.03	37.0534	0.0246	0.079	-0.196	3364.36	8.00	2.24	10.24	0.30	
G13	Plug13_gas_S1_300_090205	300	2.88	42.03	36.9544	0.0213	0.069	-0.228	3384.47	8.05	1.95	10.01	0.30	
G13	Plug13_gas_S1_300_100205	300 rep	2.88	42.03	36.9516	0.0219	0.068	-0.234	3384.98	8.05	2.01	10.06	0.30	
G19	Plug19_gas_S1_100_150205	100	21.12	37.37	42.8016	0.0549	0.085	-0.097	2053.53	5.50	2.63	8.13	0.40	
G19	Plug19_gas_S1_200_150205	200	21.12	37.37	42.0519	0.0993	0.237	-0.128	2136.50	5.72	5.05	10.76	0.50	
G19	Plug19_gas_S1_300_150205	300	21.12	37.37	41.6903	0.0436	0.081	-0.142	2178.45	5.83	2.28	8.11	0.37	
G19	Plug19_gas_S1_300_160205	300 rep	21.12	37.37	41.6382	0.0434	0.082	-0.150	2184.97	5.85	2.28	8.13	0.37	
G20	Plug20_gas_S1_100_140205	100	17.32	36.23	41.8578	0.3213	0.231	-0.061	2099.79	5.80	16.12	21.91	1.04	
G20	Plug20_gas_S1_200_140205	200	17.32	36.23	40.6972	0.0732	0.079	-0.085	2245.22	6.20	4.04	10.24	0.46	
G20	Plug20_gas_S1_300_140205	300	17.32	36.23	40.1382	0.0607	0.112	-0.095	2322.09	6.41	3.51	9.92	0.43	
G20	Plug20_gas_S1_300_150205	300 rep	17.32	36.23	40.0705	0.0641	0.121	-0.099	2332.08	6.44	3.73	10.17	0.44	
G30	Plug30_gas_S1_100_010305	100	26.32	36.06	54.5238	0.0773	0.205	-0.017	1205.21	3.34	1.71	5.05	0.42	
G30	Plug30_gas_S1_100_020305	100 rep	26.32	36.06	54.0791	0.0660	0.319	-0.029	1221.61	3.39	1.49	4.88	0.40	

Table A.5. Page 2 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S1 signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity: from length (m/s)	Error on velocity: from noise (m/s)	Error on velocity: Total error (m/s)	Total error (%)	Comment
G32	Plug32_gas_S1_100_230205	100	16.80	42.26	44.7908	0.0329	0.574	-0.004	2093.42	4.95	1.54	6.49	0.31	Much noise
G32	Plug32_gas_S1_200_230205	200	16.80	42.26	43.3306	0.0489	0.455	-0.010	2251.48	5.33	2.54	7.87	0.35	Much noise
G32	Plug32_gas_S1_300_230205	300	16.80	42.26	42.4711	0.0738	0.924	-0.014	2356.26	5.58	4.09	9.67	0.41	Much noise
G32	Plug32_gas_S1_300_240205	300 rep	16.80	42.26	42.3687	0.0646	0.554	-0.015	2369.67	5.61	3.61	9.22	0.39	Much noise
G35	Plug35_gas_S1_100_160205	100	8.85	37.84	41.3505	0.0579	0.081	-0.092	2259.54	5.97	3.17	9.14	0.40	
G35	Plug35_gas_S1_200_160205	200	8.85	37.84	40.4406	0.0381	0.063	-0.128	2382.89	6.30	2.25	8.54	0.36	
G35	Plug35_gas_S1_300_160205	300	8.85	37.84	39.9576	0.0334	0.057	-0.136	2453.69	6.48	2.05	8.54	0.35	
G35	Plug35_gas_S1_300_170205	300 rep	8.85	37.84	39.8952	0.0339	0.059	-0.140	2463.51	6.51	2.10	8.61	0.35	
G36	Plug36_gas_S1_100_080205	100	2.25	40.64	35.8582	0.0811	0.379	-0.040	3611.00	8.89	8.17	17.05	0.47	
G36	Plug36_gas_S1_200_080205	200	2.25	40.64	35.8326	0.0654	0.197	-0.085	3605.43	8.87	6.58	15.46	0.43	
G36	Plug36_gas_S1_300_080205	300	2.25	40.64	35.7922	0.0477	0.101	-0.124	3610.42	8.88	4.81	13.70	0.38	
G36	Plug36_gas_S1_300_090205	300 rep	2.25	40.64	35.7744	0.0441	0.095	-0.127	3615.85	8.90	4.46	13.36	0.37	
G37	Plug37_gas_S1_100_180205	100	24.12	41.53	45.2829	0.0357	0.118	-0.106	2008.30	4.84	1.58	6.42	0.32	
G37	Plug37_gas_S1_200_180205	200	24.12	41.53	44.9614	0.0506	0.235	-0.110	2035.71	4.90	2.29	7.19	0.35	
G37	Plug37_gas_S1_300_180205	300	24.12	41.53	44.8071	0.0467	0.311	-0.108	2048.72	4.93	2.13	7.07	0.34	
G37	Plug37_gas_S1_300_210205	300 rep	24.12	41.53	44.6726	0.0519	0.331	-0.112	2062.31	4.97	2.40	7.36	0.36	
G40	Plug40_gas_S1_100_170205	100	5.47	41.76	39.8218	0.0327	0.059	-0.132	2744.10	6.57	2.25	8.83	0.32	
G40	Plug40_gas_S1_200_170205	200	5.47	41.76	39.1449	0.0272	0.048	-0.188	2863.37	6.86	1.99	8.85	0.31	
G40	Plug40_gas_S1_300_170205	300	5.47	41.76	38.6518	0.0240	0.043	-0.200	2958.37	7.08	1.84	8.92	0.30	
G40	Plug40_gas_S1_300_180205	300 rep	5.47	41.76	38.6328	0.0233	0.042	-0.205	2962.16	7.09	1.79	8.88	0.30	
G50	Plug50_gas_S1_100_240205	100	9.43	38.48	38.7334	0.0229	0.045	-0.168	2723.34	7.08	1.61	8.69	0.32	
G50	Plug50_gas_S1_200_240205	200	9.43	38.48	38.3489	0.0208	0.043	-0.198	2790.79	7.25	1.52	8.77	0.31	
G50	Plug50_gas_S1_300_240205	300	9.43	38.48	38.0623	0.0220	0.049	-0.214	2844.81	7.39	1.64	9.04	0.32	
G50	Plug50_gas_S1_300_250205	300 rep	9.43	38.48	38.0236	0.0211	0.048	-0.219	2852.78	7.41	1.58	9.00	0.32	
G71	Plug71_gas_S1_100_220205	100	30.96	38.09	54.7378	0.0697	0.236	-0.039	1264.02	3.32	1.61	4.93	0.39	
G71	Plug71_gas_S1_200_220205	200	30.96	38.09	52.1730	0.1695	0.213	-0.080	1379.46	3.62	4.48	8.10	0.59	
G71	Plug71_gas_S1_300_220205	300	30.96	38.09	50.7020	0.0569	0.090	-0.102	1455.70	3.82	1.63	5.46	0.37	
G71	Plug71_gas_S1_300_230205	300 rep	30.96	38.09	50.4302	0.0539	0.090	-0.108	1470.93	3.86	1.57	5.44	0.37	
G75	Plug75_gas_S1_100_250205	100	20.58	35.56	42.4893	0.0962	0.109	-0.024	1988.19	5.59	4.50	10.09	0.51	
G75	Plug75_gas_S1_200_250205	200	20.58	35.56	41.5803	0.0887	0.145	-0.052	2089.36	5.88	4.46	10.33	0.49	
G75	Plug75_gas_S1_300_250205	300	20.58	35.56	41.0881	0.0934	0.190	-0.078	2148.35	6.04	4.89	10.93	0.51	
G75	Plug75_gas_S1_300_280205	300 rep	20.58	35.56	40.9994	0.0817	0.165	-0.082	2159.81	6.07	4.30	10.38	0.48	
G76	Plug76_gas_S1_100_280205	100	5.46	41.37	37.8818	0.0730	0.347	-0.083	3115.66	7.53	6.00	13.53	0.43	
G76	Plug76_gas_S1_200_280205	200	5.46	41.37	37.6812	0.0535	0.320	-0.128	3153.08	7.62	4.47	12.09	0.38	
G76	Plug76_gas_S1_300_280205	300	5.46	41.37	37.6140	0.0478	0.160	-0.148	3163.30	7.65	4.02	11.67	0.37	
G76	Plug76_gas_S1_300_010305	300 rep	5.46	41.37	37.5808	0.0465	0.150	-0.153	3171.14	7.67	3.93	11.59	0.37	
G77	Plug77_gas_S1_100_210205	100	1.88	39.28	36.7913	0.0326	0.077	-0.137	3222.95	8.21	2.86	11.06	0.34	
G77	Plug77_gas_S1_200_210205	200	1.88	39.28	36.3333	0.0325	0.089	-0.241	3336.56	8.49	2.98	11.48	0.34	
G77	Plug77_gas_S1_300_210205	300	1.88	39.28	36.1200	0.0284	0.089	-0.279	3390.85	8.63	2.67	11.30	0.33	
G77	Plug77_gas_S1_300_220205	300 rep	1.88	39.28	36.0823	0.0289	0.092	-0.285	3401.66	8.66	2.72	11.38	0.33	

Table A.6. Page 1 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S2 signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
V3	Plug3_gas_S2_100_260704	100	10.59	37.65	43.3560	0.0288	0.587	-0.011	1972.00	5.24	1.31	6.55	0.33	Much noise
V3	Plug3_gas_S2_200_260704	200	10.42	37.63	41.9091	0.0500	0.163	-0.013	2127.57	5.65	2.54	8.19	0.39	
V3	Plug3_gas_S2_300_260704	300	10.28	37.61	41.0158	0.0381	0.174	-0.015	2236.87	5.95	2.08	8.03	0.36	
V3	Plug3_gas_S2_500_260704	500	10.06	37.58	39.9361	0.0580	0.378	-0.014	2387.56	6.35	3.47	9.82	0.41	
V3	Plug3_gas_S2_500_270704	500 rep	10.05	37.58	39.7285	0.0613	0.358	-0.016	2414.67	6.43	3.73	10.15	0.42	
V10	Plug10_gas_S2_100_140704	100	0.77	35.01	34.5901	0.0475	0.140	-0.032	3390.40	9.68	4.66	14.34	0.42	
V10	Plug10_gas_S2_200_140704	200	0.76	35.01	34.3879	0.0281	0.070	-0.084	3444.07	9.84	2.81	12.65	0.37	
V10	Plug10_gas_S2_300_140704	300	0.75	35.01	34.2913	0.0205	0.057	-0.108	3469.71	9.91	2.08	11.99	0.35	
V10	Plug10_gas_S2_500_140704	500	0.74	35.01	34.1520	0.0135	0.035	-0.142	3515.84	10.04	1.39	11.43	0.33	
V10	Plug10_gas_S2_500_150704	500 rep	0.76	35.01	34.1361	0.0169	0.044	-0.146	3510.82	10.03	1.74	11.77	0.34	
G6	Plug6_gas_S2_100_070205	100	5.05	34.82	36.4347	0.1419	0.614	-0.065	3115.88	8.95	12.13	21.08	0.68	
G6	Plug6_gas_S2_200_070205	200	5.05	34.82	36.2904	0.0170	0.042	-0.160	3143.39	9.03	1.47	10.50	0.33	
G6	Plug6_gas_S2_300_070205	300	5.05	34.82	36.1990	0.0154	0.037	-0.212	3169.89	9.10	1.34	10.45	0.33	
G6	Plug6_gas_S2_300_080205	300 rep	5.05	34.82	36.1968	0.0149	0.036	-0.216	3164.19	9.09	1.30	10.39	0.33	
G7	Plug7_gas_S2_100_100205	100	33.48	38.86	45.9311	0.2497	0.617	-0.053	1879.89	4.84	10.22	15.06	0.80	
G7	Plug7_gas_S2_200_100205	200	33.48	38.86	45.8136	0.1715	0.375	-0.070	1886.37	4.85	7.06	11.91	0.63	
G7	Plug7_gas_S2_300_100205	300	33.48	38.86	45.7175	0.1251	0.289	-0.076	1895.32	4.88	5.19	10.06	0.53	
G7	Plug7_gas_S2_300_110205	300 rep	33.48	38.86	45.6518	0.1472	0.363	-0.078	1899.37	4.89	6.12	11.01	0.58	
G12	Plug12_gas_S2_100_110205	100	11.22	35.06	42.2422	0.0747	0.271	-0.017	2064.48	5.89	3.65	9.54	0.46	
G12	Plug12_gas_S2_200_110205	200	11.22	35.06	41.1350	0.0383	0.091	-0.035	2202.01	6.28	2.05	8.33	0.38	
G12	Plug12_gas_S2_300_110205	300	11.22	35.06	40.5168	0.2134	0.458	-0.056	2291.14	6.53	12.06	18.60	0.81	
G12	Plug12_gas_S2_300_140205	300 rep	11.22	35.06	40.3092	0.1848	0.395	-0.061	2319.27	6.62	10.63	17.25	0.74	
G13	Plug13_gas_S2_100_090205	100	2.88	42.03	38.5012	0.0373	0.099	-0.102	3174.11	7.55	3.07	10.62	0.33	
G13	Plug13_gas_S2_200_090205	200	2.88	42.03	38.1571	0.0277	0.067	-0.134	3247.09	7.73	2.36	10.08	0.31	
G13	Plug13_gas_S2_300_090205	300	2.88	42.03	37.9332	0.0258	0.064	-0.148	3304.56	7.86	2.25	10.11	0.31	
G13	Plug13_gas_S2_300_100205	300 rep	2.88	42.03	37.9029	0.0251	0.062	-0.152	3306.71	7.87	2.19	10.06	0.30	
G19	Plug19_gas_S2_100_150205	100	21.12	37.37	43.4809	0.1822	0.338	-0.064	2050.91	5.49	8.59	14.08	0.69	
G19	Plug19_gas_S2_200_150205	200	21.12	37.37	42.7329	0.1212	0.272	-0.097	2133.03	5.71	6.05	11.76	0.55	
G19	Plug19_gas_S2_300_150205	300	21.12	37.37	42.3936	0.0351	0.078	-0.111	2175.31	5.82	1.80	7.62	0.35	
G19	Plug19_gas_S2_300_160205	300 rep	21.12	37.37	42.2926	0.0365	0.081	-0.116	2185.35	5.85	1.89	7.73	0.35	
G20	Plug20_gas_S2_100_140205	100	17.32	36.23	42.1893	0.5031	0.488	-0.040	2140.04	5.91	25.52	31.42	1.47	
G20	Plug20_gas_S2_200_140205	200	17.32	36.23	41.0528	0.3128	0.775	-0.051	2287.31	6.31	17.43	23.74	1.04	
G20	Plug20_gas_S2_300_140205	300	17.32	36.23	40.5189	0.2373	0.635	-0.056	2367.28	6.53	13.86	20.40	0.86	
G20	Plug20_gas_S2_300_150205	300 rep	17.32	36.23	40.5100	0.2470	0.638	-0.058	2365.25	6.53	14.42	20.95	0.89	
G30	Plug30_gas_S2_100_010305	100	26.32	36.06	56.0911	0.1056	0.229	-0.016	1169.59	3.24	2.20	5.45	0.47	
G30	Plug30_gas_S2_100_020305	100 rep	26.32	36.06	55.6775	0.0594	0.207	-0.025	1183.68	3.28	1.26	4.54	0.38	

Table A.6. Page 2 of 2. Basic data, results, and precision of ultrasonic measurements.
Ultrasonic S2 signals measured on Vestmanna-1 and Glyvursnes-1 samples in humidity controlled condition, T=60 °C, RH=40 %.

Sample id.	File id.	Conf. pressure (bar)	Reduced porosity (%)	Reduced length (mm)	First arrival of S2 signal (us)	Local un-certainty (us)	Global un-certainty	Amplitude at pick (mV)	S2 velocity (m/s)	Error on velocity from length (m/s)	Error on velocity from noise (m/s)	Error on velocity Total error (m/s)	Total error (%)	Comment
G32	Plug32_gas_S2_100_230205	100	16.80	42.26	46.6578	0.0188	0.733	-0.009	1974.94	4.67	0.79	5.47	0.28	Much noise
G32	Plug32_gas_S2_200_230205	200	16.80	42.26	44.4418	0.0130	0.305	-0.010	2197.77	5.20	0.64	5.84	0.27	Much noise
G32	Plug32_gas_S2_300_230205	300	16.80	42.26	43.3280	0.0097	0.151	-0.008	2333.05	5.52	0.52	6.04	0.26	Much noise
G32	Plug32_gas_S2_300_240205	300 rep	16.80	42.26	43.3091	0.0086	0.133	-0.009	2332.65	5.52	0.47	5.99	0.26	Much noise
G35	Plug35_gas_S2_100_160205	100	8.85	37.84	41.5838	0.2190	0.430	-0.054	2318.05	6.13	12.21	18.33	0.79	
G35	Plug35_gas_S2_200_160205	200	8.85	37.84	40.7518	0.1446	0.319	-0.076	2435.23	6.44	8.64	15.07	0.62	
G35	Plug35_gas_S2_300_160205	300	8.85	37.84	40.3528	0.0452	0.104	-0.086	2499.60	6.61	2.80	9.40	0.38	
G35	Plug35_gas_S2_300_170205	300 rep	8.85	37.84	40.3024	0.0303	0.067	-0.086	2504.30	6.62	1.88	8.50	0.34	
G36	Plug36_gas_S2_100_080205	100	2.25	40.64	36.5408	0.1352	0.686	-0.018	3602.49	8.86	13.33	22.19	0.62	
G36	Plug36_gas_S2_200_080205	200	2.25	40.64	36.4411	0.0836	0.636	-0.062	3619.55	8.91	8.31	17.21	0.48	
G36	Plug36_gas_S2_300_080205	300	2.25	40.64	36.3613	0.0500	0.143	-0.088	3645.86	8.97	5.01	13.98	0.38	
G36	Plug36_gas_S2_300_090205	300 rep	2.25	40.64	36.3532	0.0482	0.134	-0.091	3641.32	8.96	4.82	13.78	0.38	
G37	Plug37_gas_S2_100_180205	100	24.12	41.53	45.7682	0.0682	0.834	-0.048	2025.01	4.88	3.02	7.89	0.39	Odd signal
G37	Plug37_gas_S2_200_180205	200	24.12	41.53	45.5354	0.1852	0.387	-0.052	2043.58	4.92	8.31	13.23	0.65	Odd signal
G37	Plug37_gas_S2_300_180205	300	24.12	41.53	45.3669	0.1871	0.279	-0.054	2060.79	4.96	8.50	13.46	0.65	Odd signal
G37	Plug37_gas_S2_300_210205	300 rep	24.12	41.53	45.2250	0.1861	0.289	-0.056	2073.12	4.99	8.53	13.52	0.65	Odd signal
G40	Plug40_gas_S2_100_170205	100	5.47	41.76	39.8711	0.2494	0.615	-0.044	2858.04	6.84	17.88	24.72	0.86	
G40	Plug40_gas_S2_200_170205	200	5.47	41.76	39.3123	0.0586	0.131	-0.066	2961.89	7.09	4.41	11.51	0.39	
G40	Plug40_gas_S2_300_170205	300	5.47	41.76	39.0421	0.0245	0.050	-0.080	3020.03	7.23	1.89	9.12	0.30	
G40	Plug40_gas_S2_300_180205	300 rep	5.47	41.76	39.0149	0.0218	0.045	-0.086	3021.16	7.23	1.68	8.92	0.30	
G50	Plug50_gas_S2_100_240205	100	9.43	38.48	39.2665	0.0340	0.093	-0.128	2747.24	7.14	2.38	9.52	0.35	
G50	Plug50_gas_S2_200_240205	200	9.43	38.48	38.9601	0.0238	0.060	-0.161	2799.18	7.27	1.71	8.99	0.32	
G50	Plug50_gas_S2_300_240205	300	9.43	38.48	38.7564	0.0219	0.055	-0.172	2841.53	7.38	1.60	8.99	0.32	
G50	Plug50_gas_S2_300_250205	300 rep	9.43	38.48	38.6905	0.0221	0.055	-0.175	2850.77	7.41	1.63	9.03	0.32	
G71	Plug71_gas_S2_100_220205	100	30.96	38.09	54.8213	0.1100	0.792	-0.020	1288.50	3.38	2.59	5.97	0.46	
G71	Plug71_gas_S2_200_220205	200	30.96	38.09	52.3600	0.3057	0.576	-0.045	1403.11	3.68	8.19	11.88	0.85	
G71	Plug71_gas_S2_300_220205	300	30.96	38.09	50.9500	0.0832	0.157	-0.055	1480.05	3.89	2.42	6.30	0.43	
G71	Plug71_gas_S2_300_230205	300 rep	30.96	38.09	50.6992	0.2209	0.436	-0.061	1493.33	3.92	6.51	10.43	0.70	
G75	Plug75_gas_S2_100_250205	100	20.58	35.56	42.9208	0.0654	0.127	-0.013	2013.46	5.66	3.07	8.73	0.43	
G75	Plug75_gas_S2_200_250205	200	20.58	35.56	42.0315	0.0644	0.138	-0.028	2114.36	5.95	3.24	9.18	0.43	
G75	Plug75_gas_S2_300_250205	300	20.58	35.56	41.5958	0.3103	0.722	-0.045	2170.75	6.10	16.19	22.30	1.03	
G75	Plug75_gas_S2_300_280205	300 rep	20.58	35.56	41.4701	0.2944	0.688	-0.048	2184.58	6.14	15.51	21.65	0.99	
G76	Plug76_gas_S2_100_280205	100	5.46	41.37	38.8725	0.1394	0.353	-0.091	3039.05	7.35	10.90	18.24	0.60	
G76	Plug76_gas_S2_200_280205	200	5.46	41.37	38.5632	0.0412	0.104	-0.108	3098.88	7.49	3.31	10.80	0.35	
G76	Plug76_gas_S2_300_280205	300	5.46	41.37	38.4136	0.0432	0.110	-0.113	3134.28	7.58	3.52	11.10	0.35	
G76	Plug76_gas_S2_300_010305	300 rep	5.46	41.37	38.3818	0.0402	0.101	-0.115	3136.61	7.58	3.28	10.86	0.35	
G77	Plug77_gas_S2_100_210205	100	1.88	39.28	37.2271	0.0426	0.114	-0.088	3282.25	8.36	3.75	12.11	0.37	
G77	Plug77_gas_S2_200_210205	200	1.88	39.28	36.8793	0.0194	0.045	-0.161	3367.02	8.57	1.77	10.34	0.31	
G77	Plug77_gas_S2_300_210205	300	1.88	39.28	36.6974	0.0170	0.042	-0.200	3420.71	8.71	1.59	10.30	0.30	
G77	Plug77_gas_S2_300_220205	300 rep	1.88	39.28	36.6656	0.0216	0.052	-0.205	3423.63	8.72	2.02	10.73	0.31	