SUSTAINABLE GROUNDWATER MONITORING SYSTEM OF EAST-VIRU COUNTY, ESTONIA

Norwegian Financial Mechanism project 52/2006-EE0010
1.01.2008 – 30.04.2011

Coordinator: Ministry of Environment, Estonia
Partners:
University of Tartu, Estonia
Tallinn Technical University, Estonia
Geological Survey of Estonia

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Additional maintenance of the automated groundwater monitoring network

2011

According to Norwegian project EE 0010 “Sustainable groundwater monitoring system of East-Viru County, Estonia” had to check the work of leveloggers set in 88 wells on East-Viru County by Maves Corporation. It had to be done by hydrogeological department of Geological Survey of Estonia and was carried out in December 2010 and January and February 2011. In the course of maintenance groundwater level on the well was measured and the stored data from levelogger was downloaded. The location of the installed loggers is presented in Figure 1.

In conditions of extraordinary snowy winter in 2010–2011 64 leveloggers and all 4 barologgers were found. Remained wells, in which the loggers were set, had no admittance or were not found because of deep snow with thickness of 0.7–0.7 metres and more.

One logger, in the new well No PA-7-2 near the Põhja-Kiviõli opencast did not work and was sent by Labochema Estonia Ltd. to Solinst Canada Ltd. The new check of loggers is planned to make in April.

The structure and processing data of loggers is presented in Figure 1A. The example of incoming initial data from Solinst Telemetry System is presented in Table 1, the initial data of installed loggers in Tables 2–5.

Comparison changes of groundwater levels measured manually and by new installed loggers are presented in Figures 2–7. Changes of groundwater levels, special electrical conductivity and temperature in new Jõhvi groundwater monitoring station (PA-1 and PA-4-2) are present in Figures 8–13. Differences of manual and automatic measurements of groundwater level are presented in Figure 14.

Eesti Geoloogiakeskus

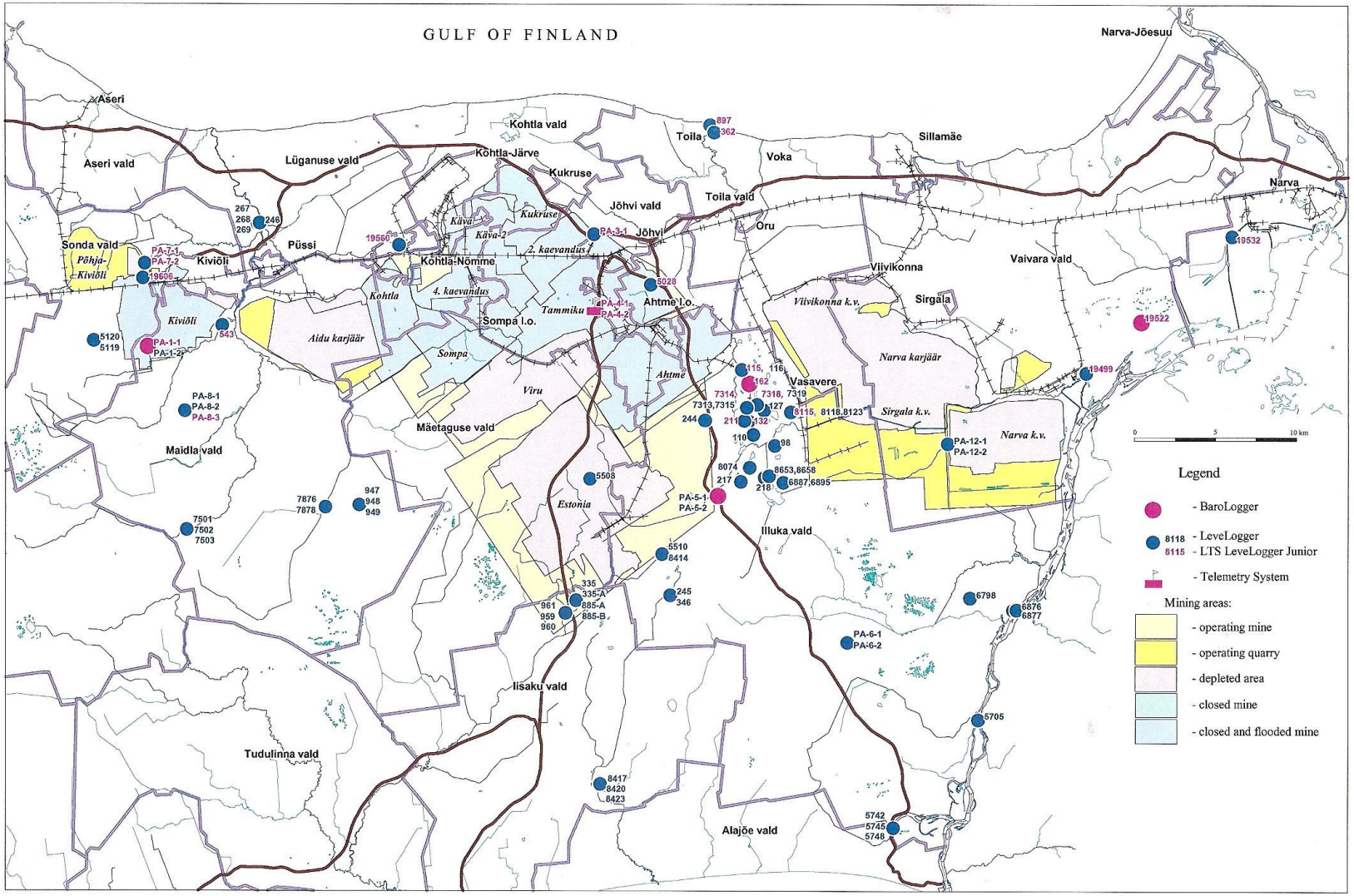

Figure 1. Location of installed loggers.

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Table 1. Summary table of incoming initial data from Solinst Telemetry System

logger_data

ID	site_serial	Date_time	ch1_data_F	ch2_data_F	ch3	ch4	ch1_data_T	ch2_data_T	ch3	ch4	ch1_data_C	ch2_data_C	ch3	ch4
14183	9100151	7.02.2011 15:04:03	14,162	4,5227	0	0	7,381	7,2	0	0	677,356018	728,663025	0	0
14184	9100151	7.02.2011 15:07:40	14,1661	4,51579	0	0	7,381	7,196	0	0	677,356018	728,663025	0	0
14185	9100151	7.02.2011 15:17:40	14,1881	4,48933	0	0	7,382	7,198	0	0	677,356018	728,663025	0	0
14186	9100151	7.02.2011 15:27:40	14,1784	4,51257	0	0	7,385	7,201	0	0	677,795044	728,663025	0	0

Record: 1 of 1105 No Filter Search

Table 2. Summary table of data of installed loggers

Start_Stop_Logger

Start_Time	Stop_Time	Serial_nr	Cadastre_nr	Surface_m	Depth_m	Channel	Temp_Coeff
17.06.2010 16:00:00	14.12.2010 10:00:00	1046170	3264	49,31	7,17	3	2
17.06.2010 16:00:00	14.12.2010 16:00:00	1047009	3396	44,72	11,78	2	
17.06.2010 16:00:00	14.12.2010 16:00:00	1047035	3398	44,7	9,63	2	
17.06.2010 16:00:00	15.12.2010 13:00:00	1046782	3873	43,21	8,79	2	
17.06.2010 16:00:00	20.12.2010 10:00:00	1046953	4009	65,68	10,57	2	
17.06.2010 16:00:00	20.12.2010 10:00:00	1047020	4010	65,6	22,8	2	
17.06.2010 16:00:00	17.01.2011 13:00:00	1047042	5069	45,98	10,71	2	

Record: 1 of 60 No Filter Search

Baro1045547

Date_Time	Level_m	Temperature
17.06.2010 16:00:00	0,791718	14,479
17.06.2010 19:00:00	0,781956	14,84
17.06.2010 22:00:00	0,777058	14,759
18.06.2010 1:00:00	0,770353	14,189
18.06.2010 4:00:00	0,760875	13,733
18.06.2010 7:00:00	0,751316	13,696
18.06.2010 10:00:00	0,744059	13,826
18.06.2010 13:00:00	0,731829	14,239
18.06.2010 16:00:00	0,718783	14,875
18.06.2010 19:00:00	0,709691	15,124
18.06.2010 22:00:00	0,705475	15,106
19.06.2010 1:00:00	0,702783	14,808
19.06.2010 4:00:00	0,694924	14,509
19.06.2010 7:00:00	0,693342	14,483
19.06.2010 10:00:00	0,686975	14,596

Record: 1 of 1777 No Filter Search

Table 3. Table of data from Barologger Gold

1046170

Date_Time	Level_m	Temperature	Conductivity	Baro_ID
17.06.2010 16:00:00	3,120482	6,808	262,22	1
17.06.2010 19:00:00	3,111144	6,809	260,24	1
17.06.2010 22:00:00	3,115942	6,762	261,28	1
18.06.2010 1:00:00	3,129847	6,785	261,75	1
18.06.2010 4:00:00	3,081225	6,779	263,12	1
18.06.2010 7:00:00	3,090384	6,8	264,26	1
18.06.2010 10:00:00	3,106241	6,772	265,81	1
18.06.2010 13:00:00	3,107271	6,784	265,71	1
18.06.2010 16:00:00	3,104917	6,765	267,19	1
18.06.2010 19:00:00	3,099209	6,776	268,41	1
18.06.2010 22:00:00	3,109625	6,776	269,73	1
19.06.2010 1:00:00	3,087917	6,758	269,89	1
19.06.2010 4:00:00	3,080876	6,791	271,58	1
19.06.2010 7:00:00	3,121958	6,785	271,63	1
19.06.2010 10:00:00	3,109725	6,762	273,14	1

Record: 1 of 1439 No Filter Search

Table 4. Table of initial data from Levelogger Gold

UE-1-09

Kuup	Veetase_abs_m	Temp_C	SpCond_µS_cm
17.06.2010 16:00:00	42,29	7,17	1421
17.06.2010 17:00:00	42,28	7,18	1420
17.06.2010 18:00:00	42,27	7,18	1422
17.06.2010 19:00:00	42,29	7,18	1420
17.06.2010 20:00:00	42,28	7,19	1423
17.06.2010 21:00:00	42,28	7,2	1424
17.06.2010 22:00:00	42,28	7,2	1421
17.06.2010 23:00:00	42,27	7,21	1424
18.06.2010	42,28	7,2	1424
18.06.2010 1:00:00	42,28	7,22	1428
18.06.2010 2:00:00	42,29	7,21	1427
18.06.2010 3:00:00	42,29	7,21	1424
18.06.2010 4:00:00	42,28	7,22	1425
18.06.2010 5:00:00	42,29	7,23	1423
18.06.2010 6:00:00	42,28	7,23	1429

Record: 6798 of 12432 No Filter Search

Table 5. Table of treated data (groundwater level, temperature and special conductivity)

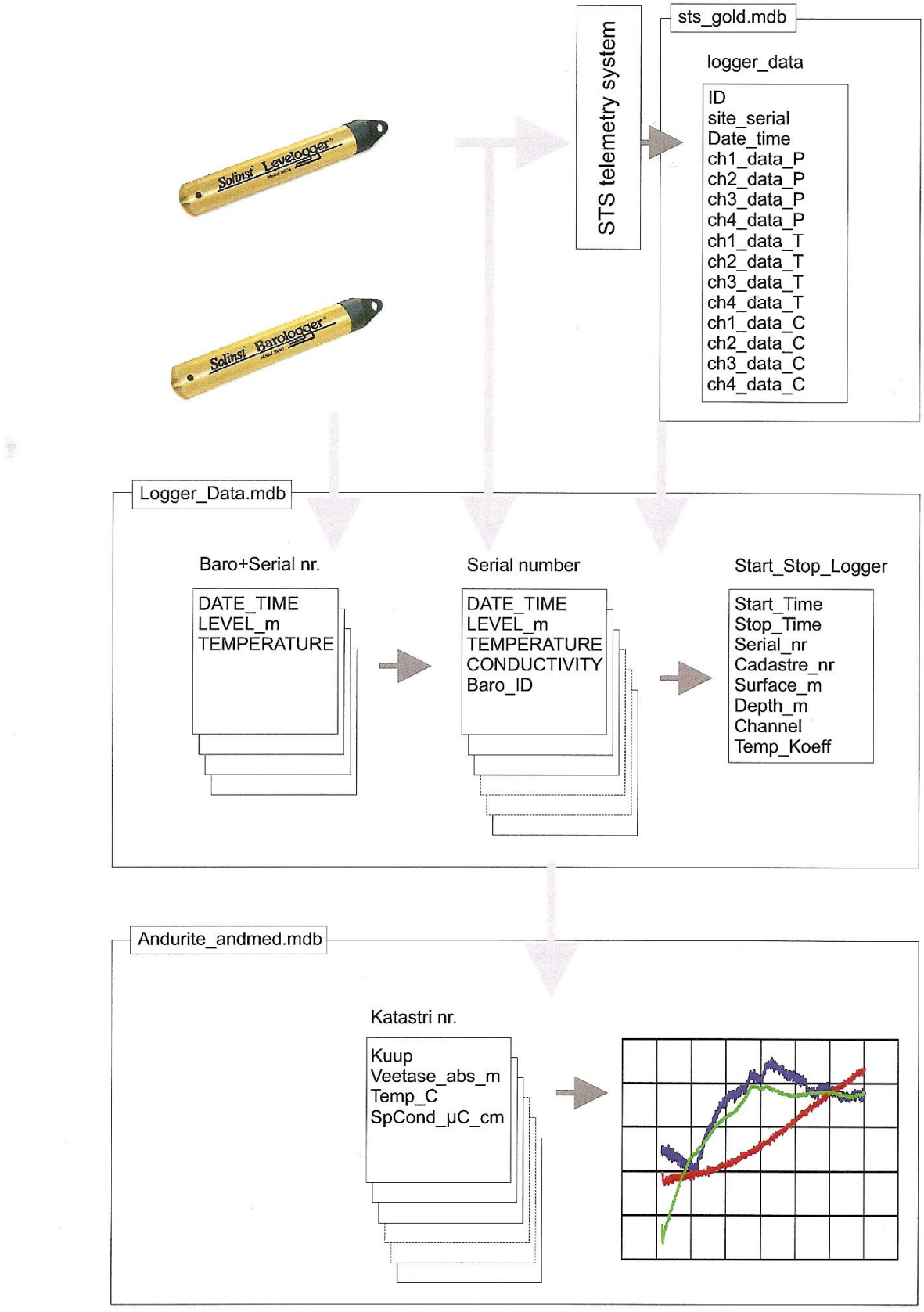

STS telemetry system
sts_gold.mdb
logger_data
ID
site_serial
Date_time
ch1_data_P
ch2_data_P
ch3_data_P
ch4_data_P
ch1_data_T
ch2_data_T
ch3_data_T
ch4_data_T
ch1_data_C
ch2_data_C
ch3_data_C
ch4_data_C
Logger_Data.mdb
Baro+Serial nr.
DATE_TIME
LEVEL_m
TEMPERATURE
Serial number
DATE_TIME
LEVEL_m
TEMPERATURE
CONDUCTIVITY
Baro_ID
Start_Stop_Logger
Start_Time
Stop_Time
Serial_nr
Cadastre_nr
Surface_m
Depth_m
Channel
Temp_Koeff
Andurite_andmed.mdb
Katastri nr.
Kuup
Veetase_abs_m
Temp_C
SpCond_µC_cm

Figure 1A.

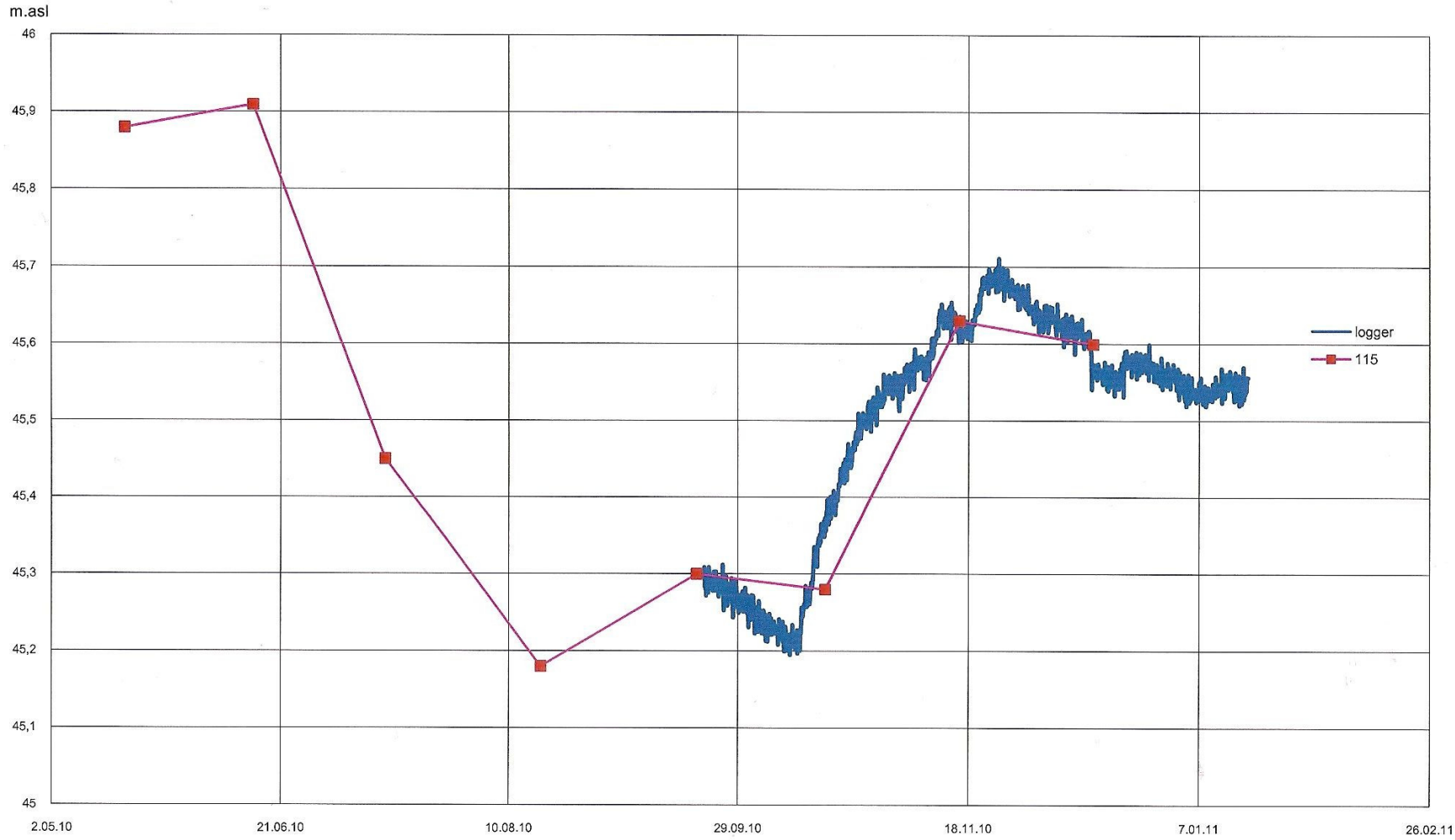


Figure 2 Changes of groundwater levels in groundwater monitoring well 115 and logger 1046173.

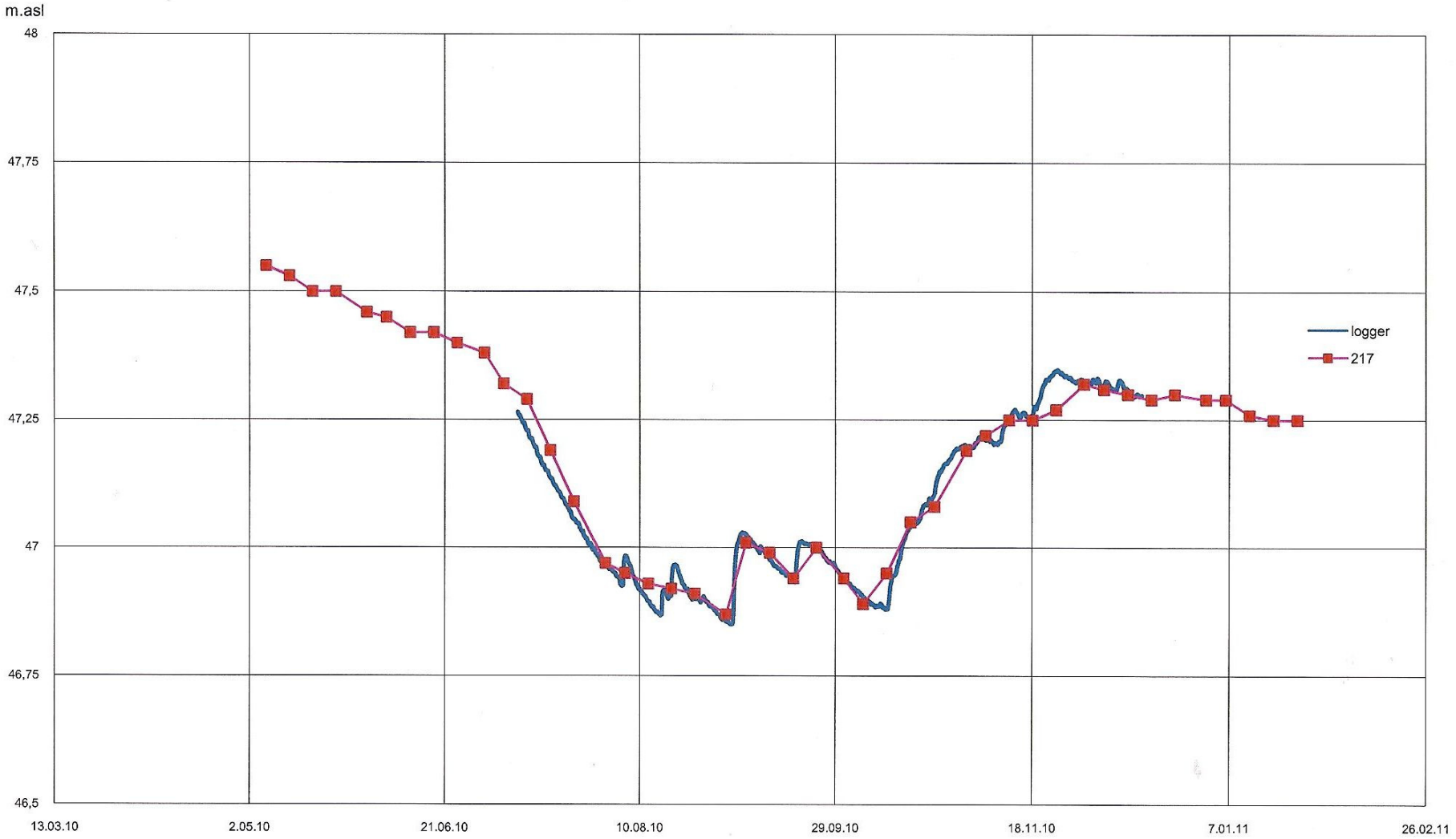


Figure 3 Changes of groundwater levels in groundwater monitoring well 217 and logger 1046969.

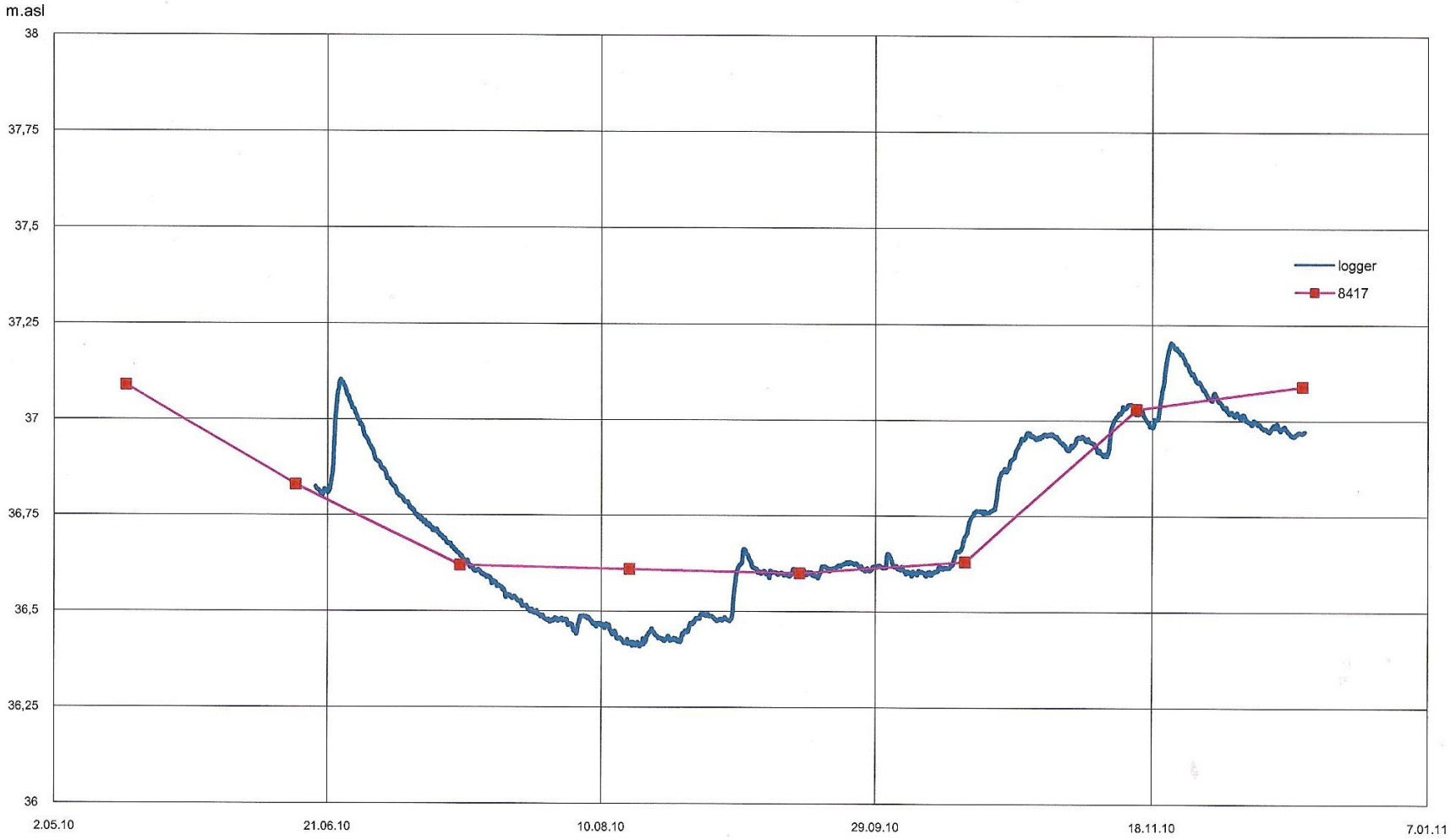


Figure 4 Changes of groundwater levels in groundwater monitoring well 8417 and logger 1047019.

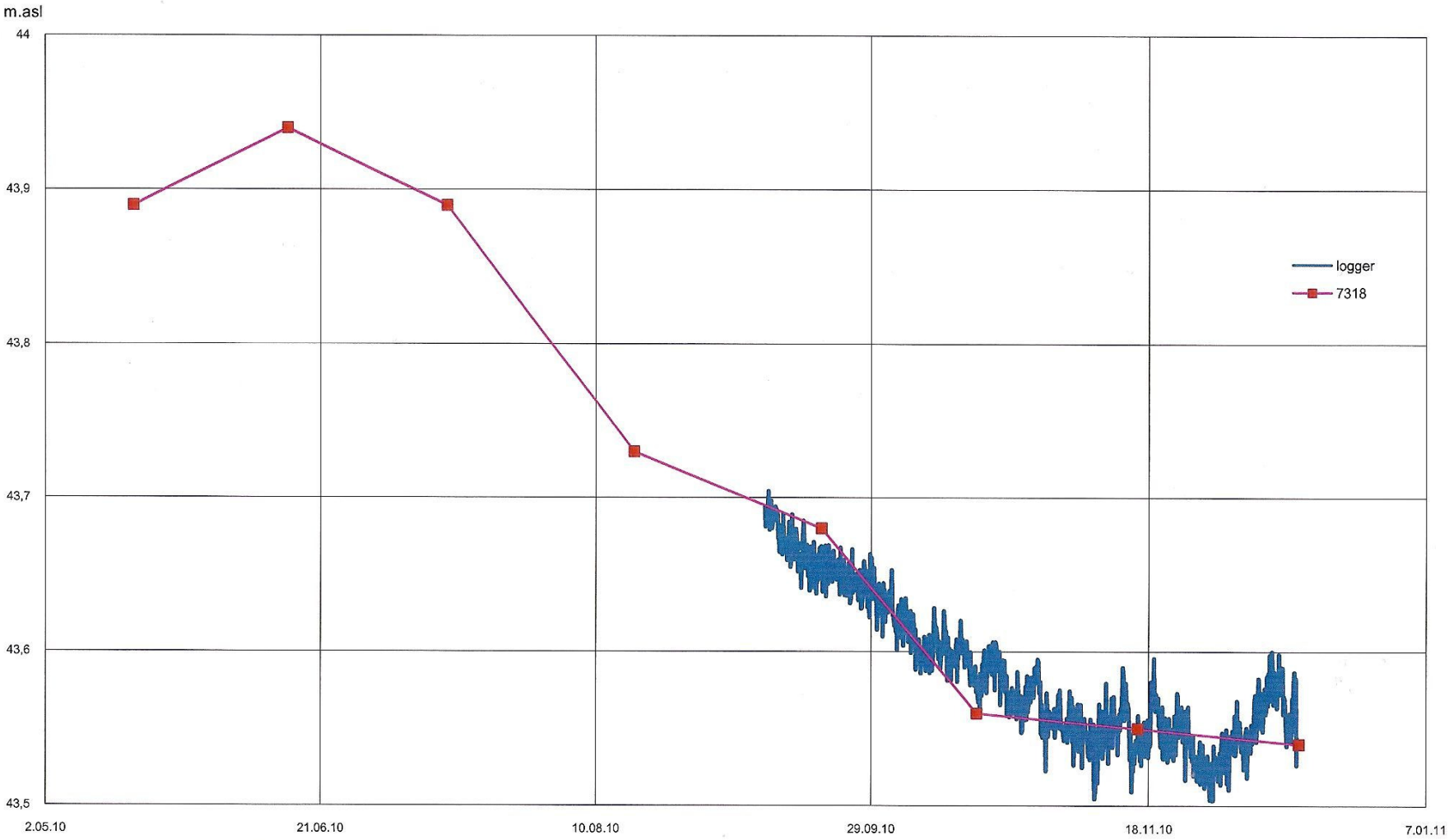


Figure 5 Changes of groundwater levels in groundwater monitoring well 7318 and logger 1046152.

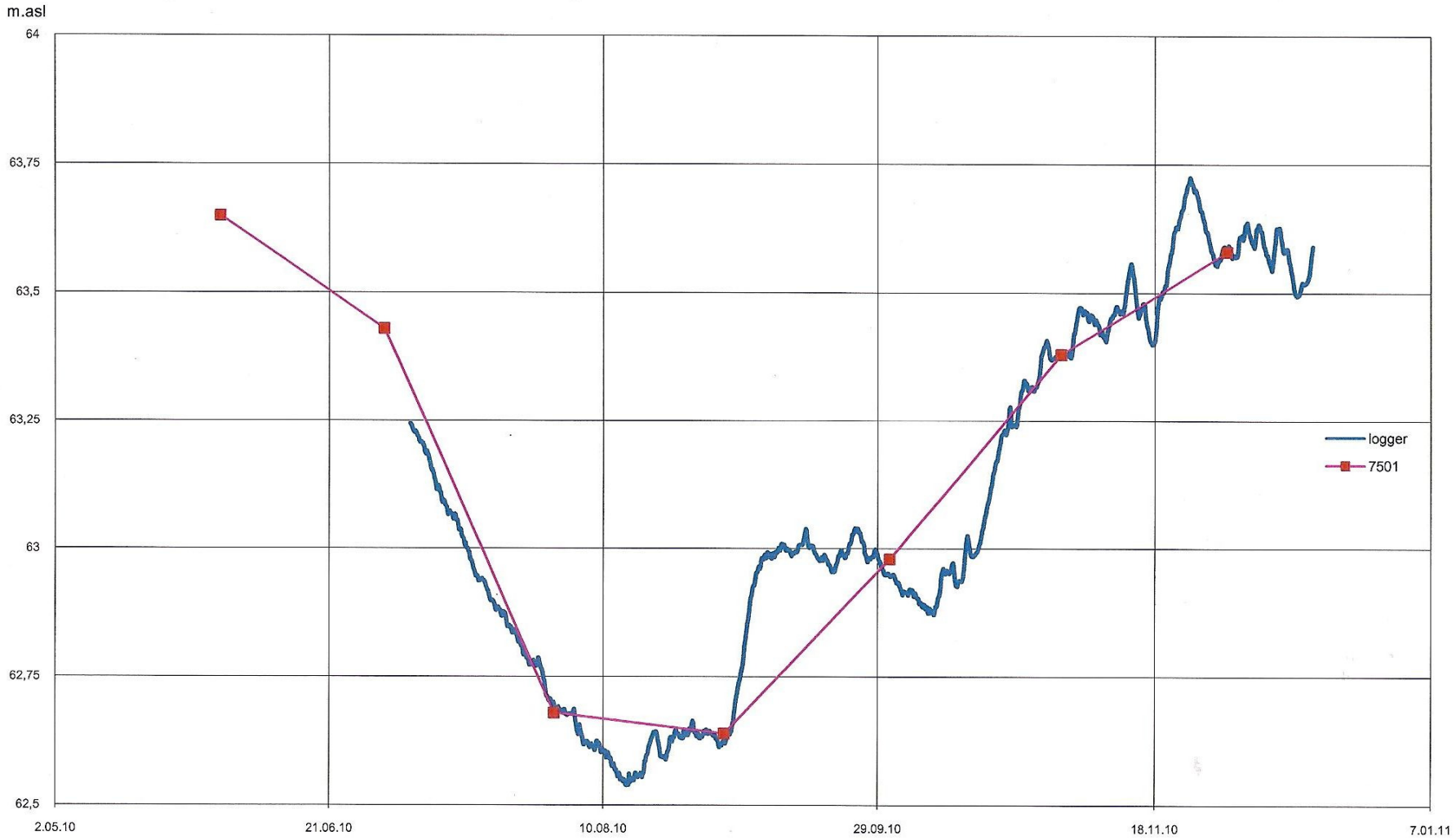


Figure 6 Changes of groundwater levels in groundwater monitoring well 7501 and logger 1046760.

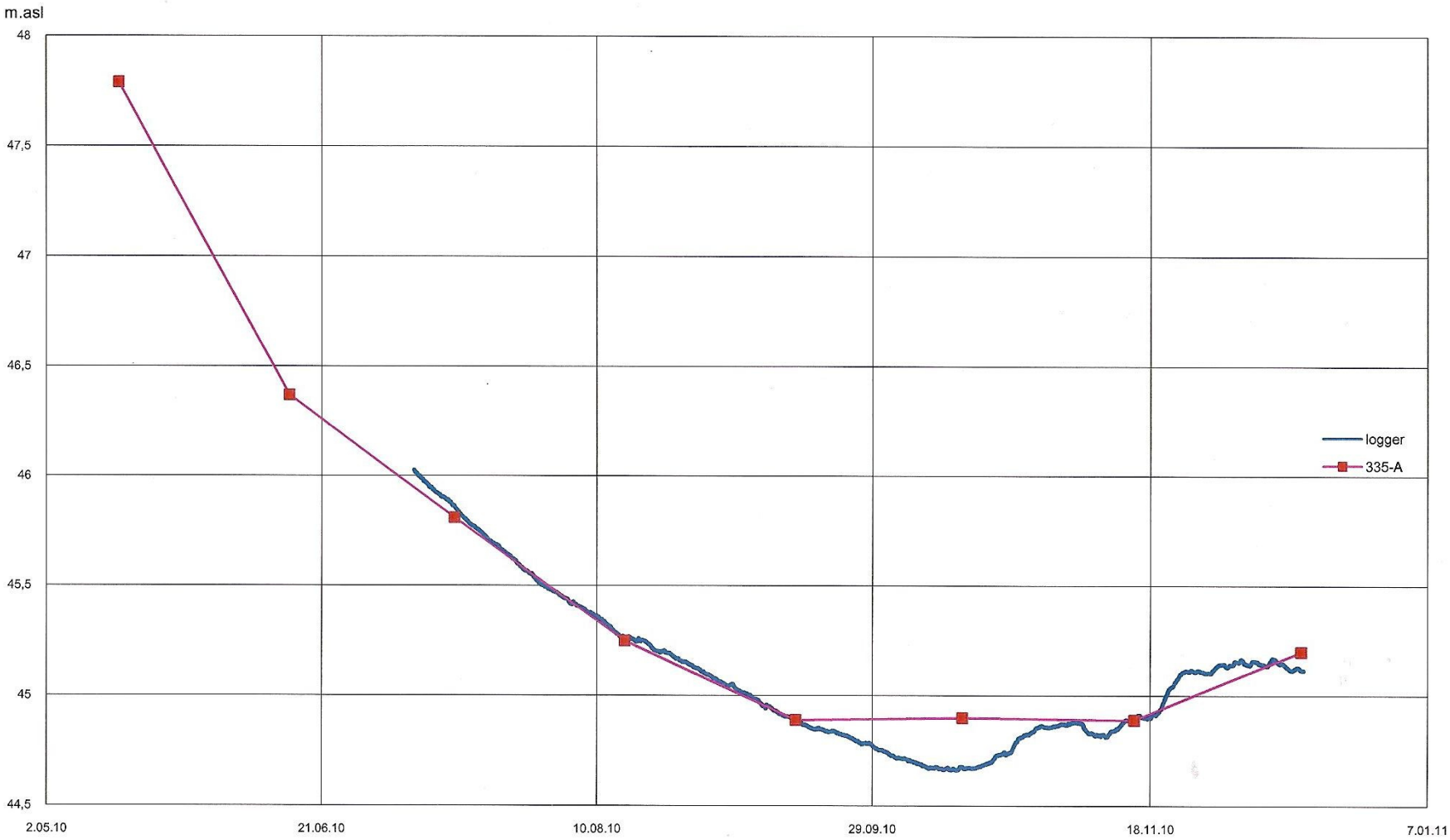


Figure 7 Changes of groundwater levels in groundwater monitoring well 335-A and logger 1047018.

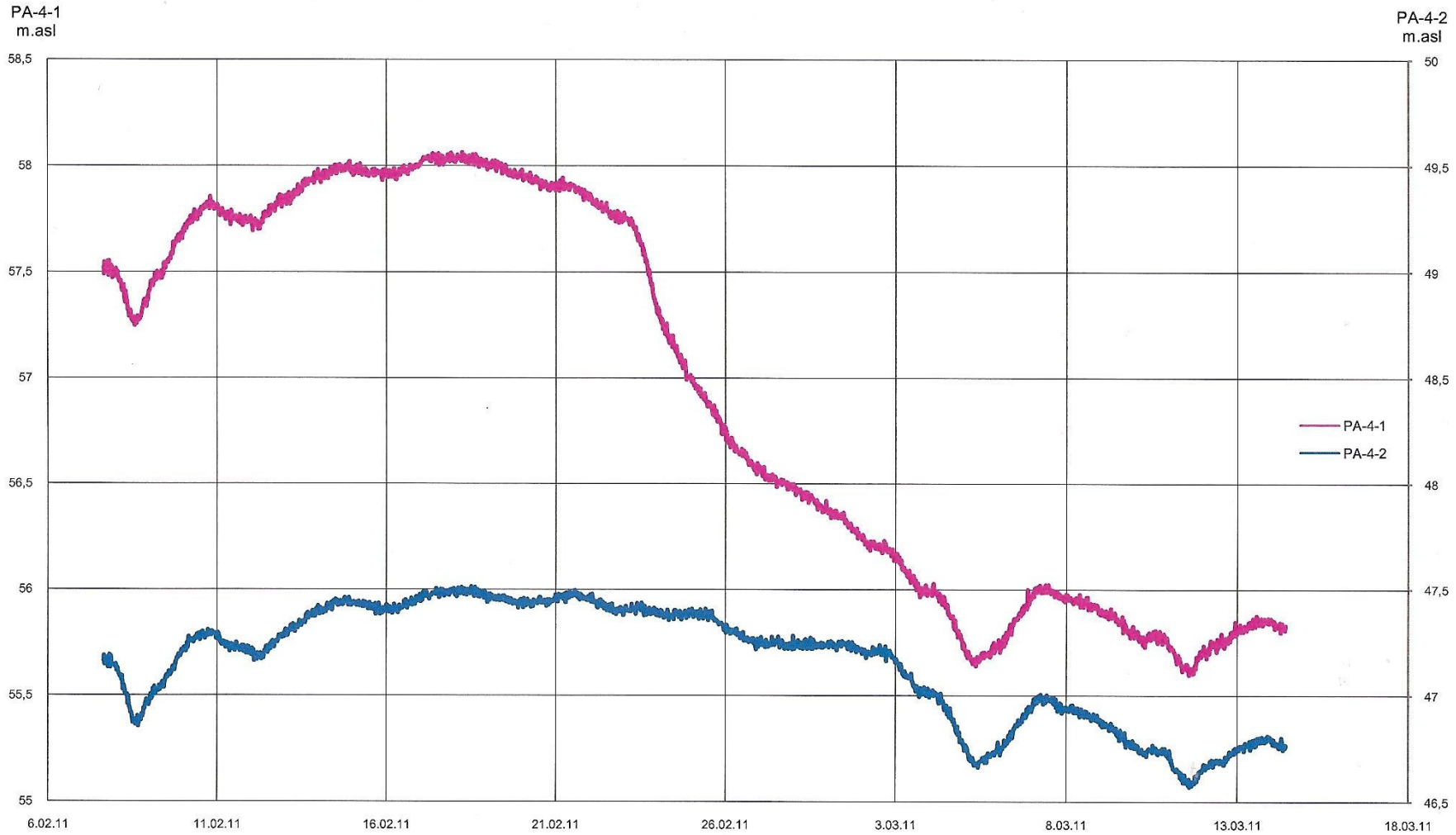


Figure 8 Changes of groundwater levels in monitoring wells PA-4-1 and PA-4-2.

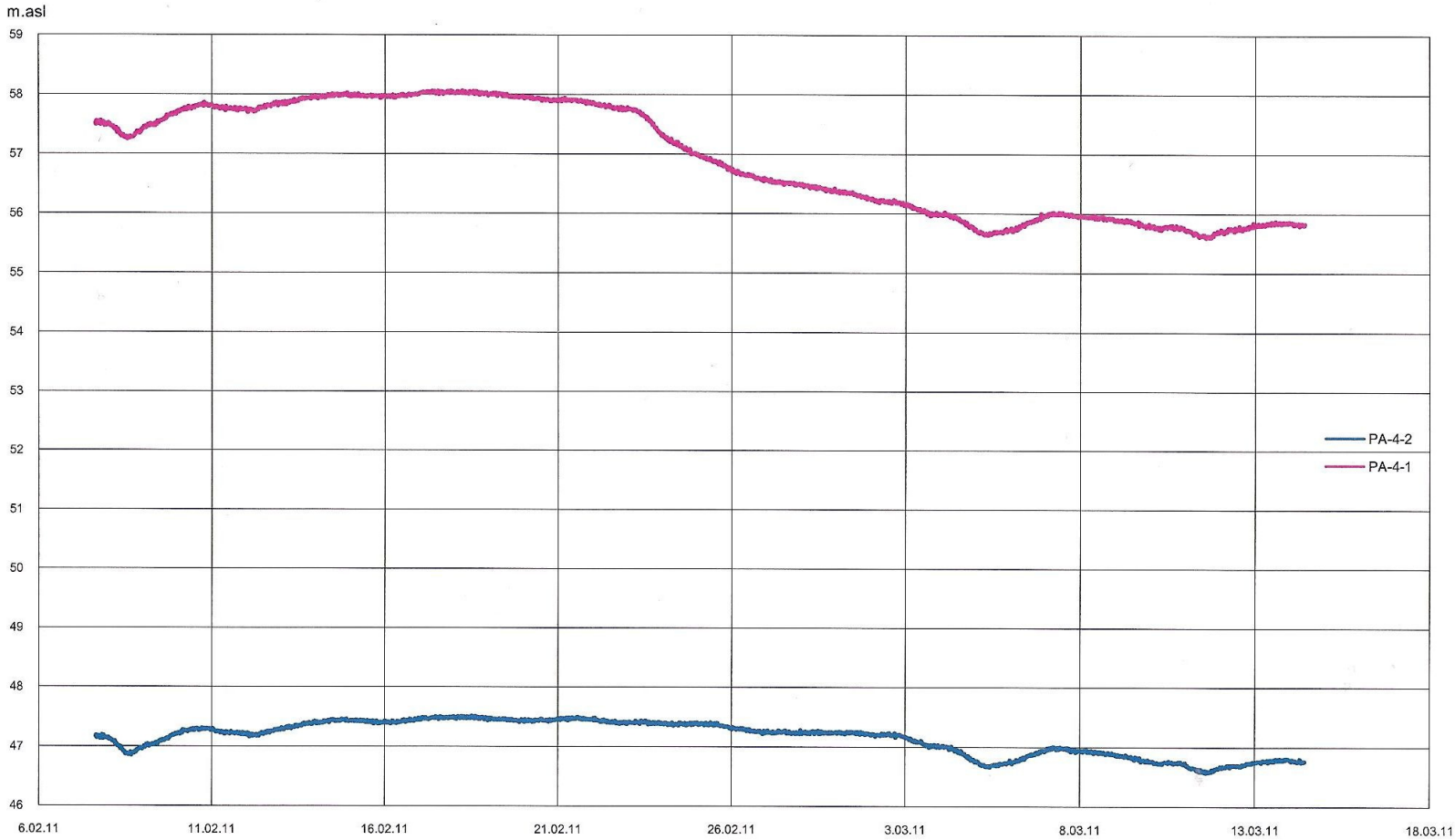


Figure 9 Changes of groundwater levels in new Jõhvi groundwater monitoring station (PA-4-1 and PA-4-2).

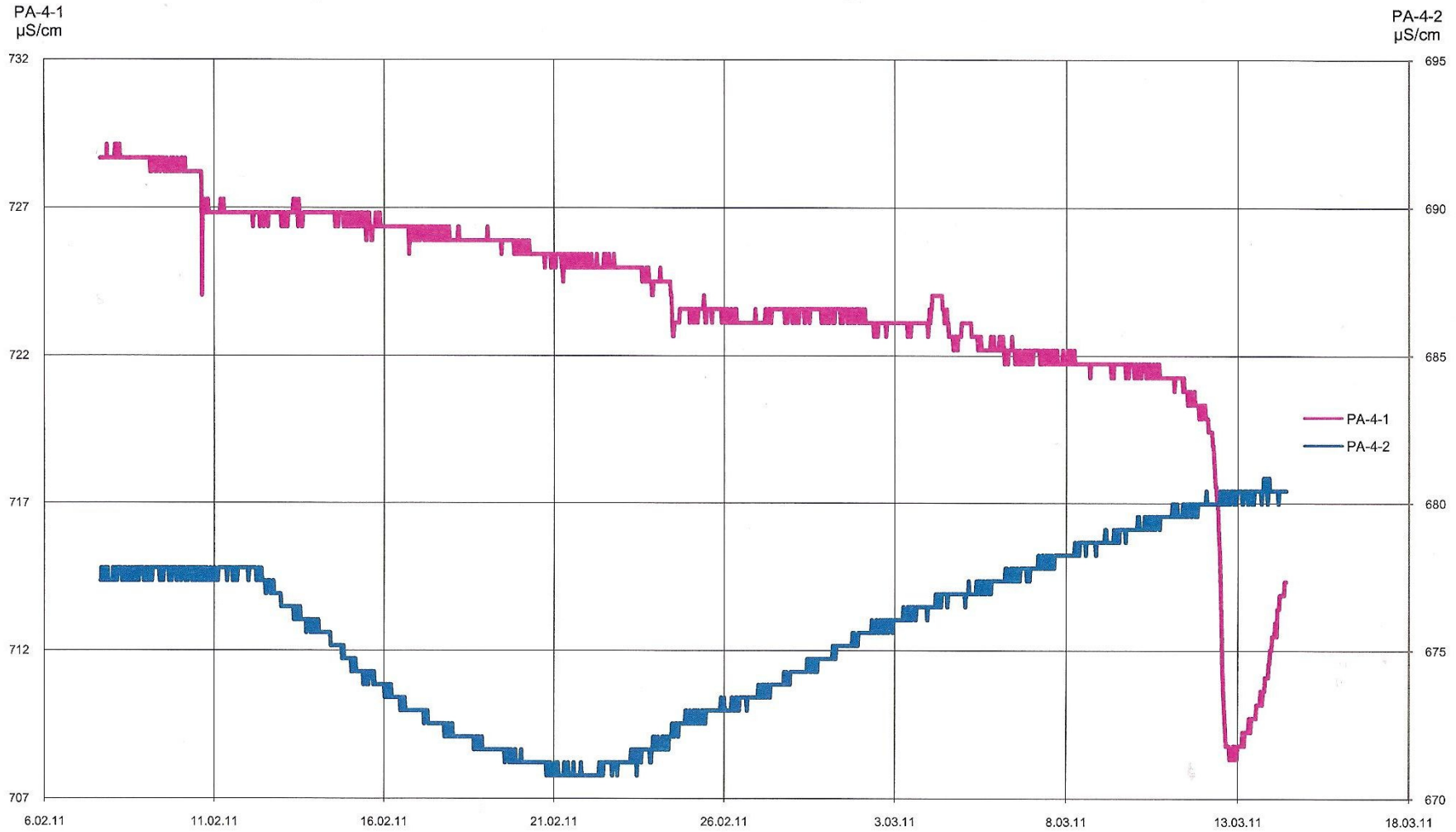


Figure 10 Changes of special electrical conductivity of groundwater in monitoring wells PA-4-1 and PA-4-2.

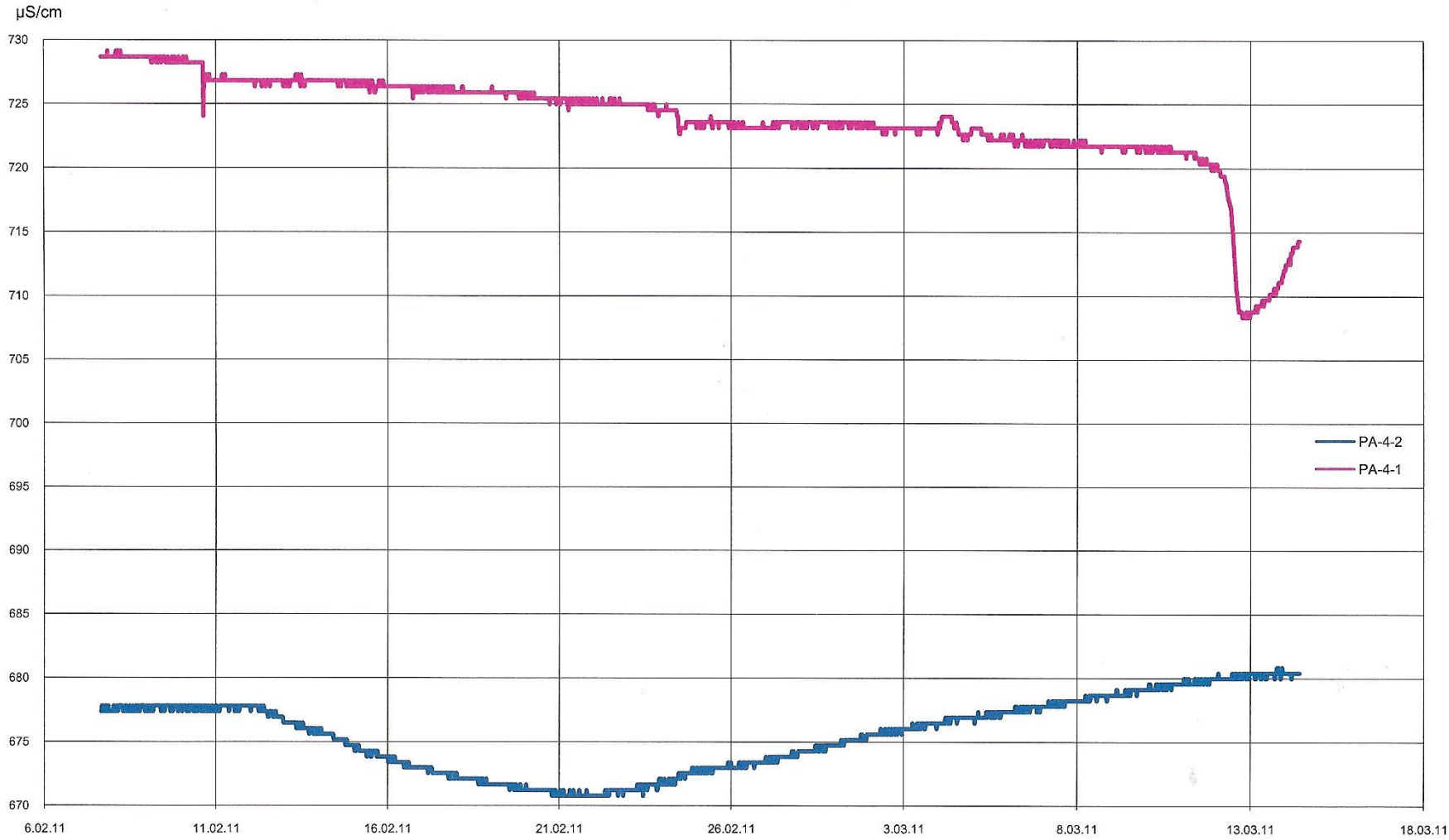


Figure 11 Changes of special electrical conductivity of groundwater in new Jõhvi groundwater monitoring station (PA-4-1 and PA-4-2).

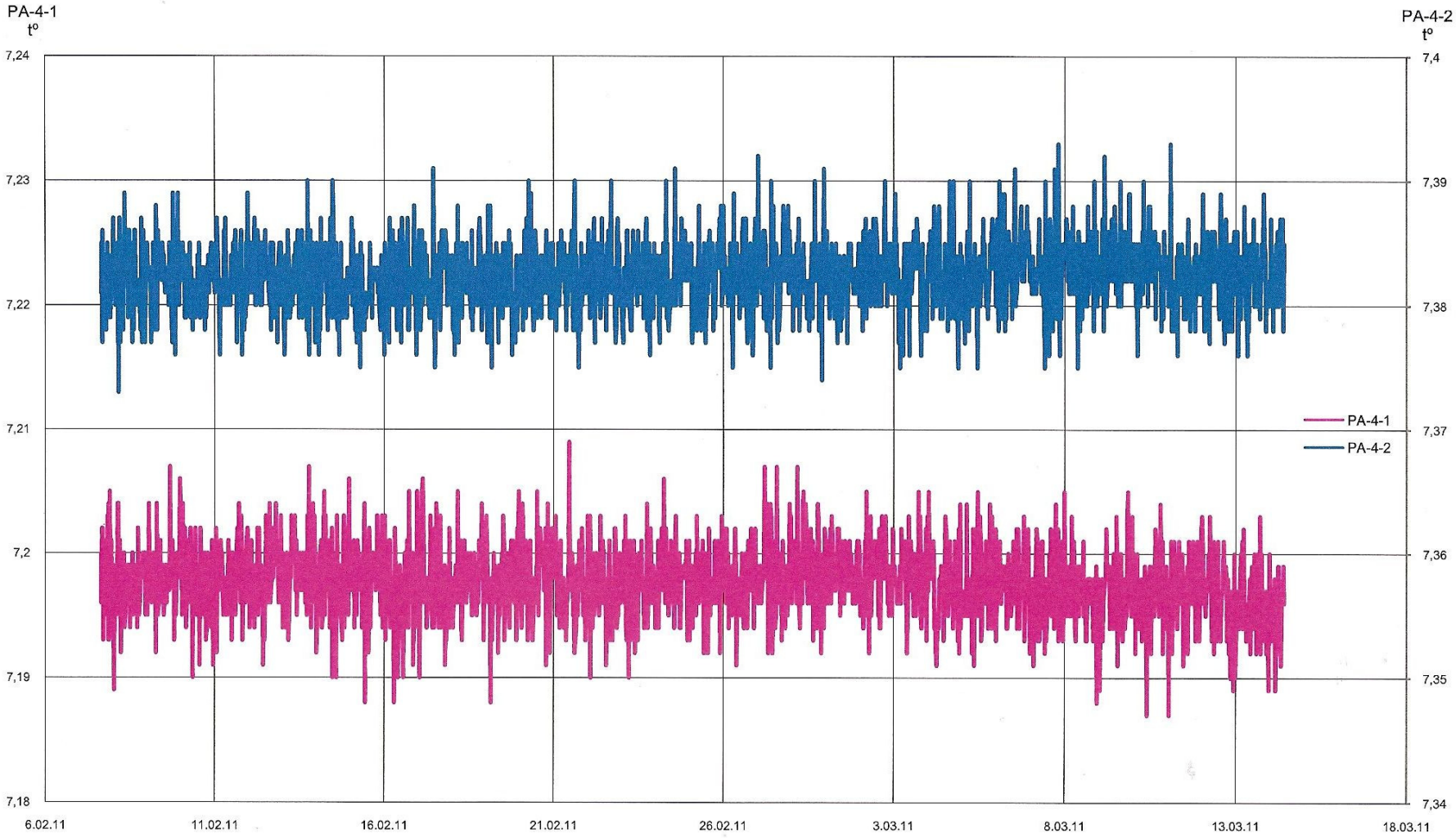


Figure 12 Changes of groundwater temperature in monitoring wells PA-4-1 and PA-4-2.

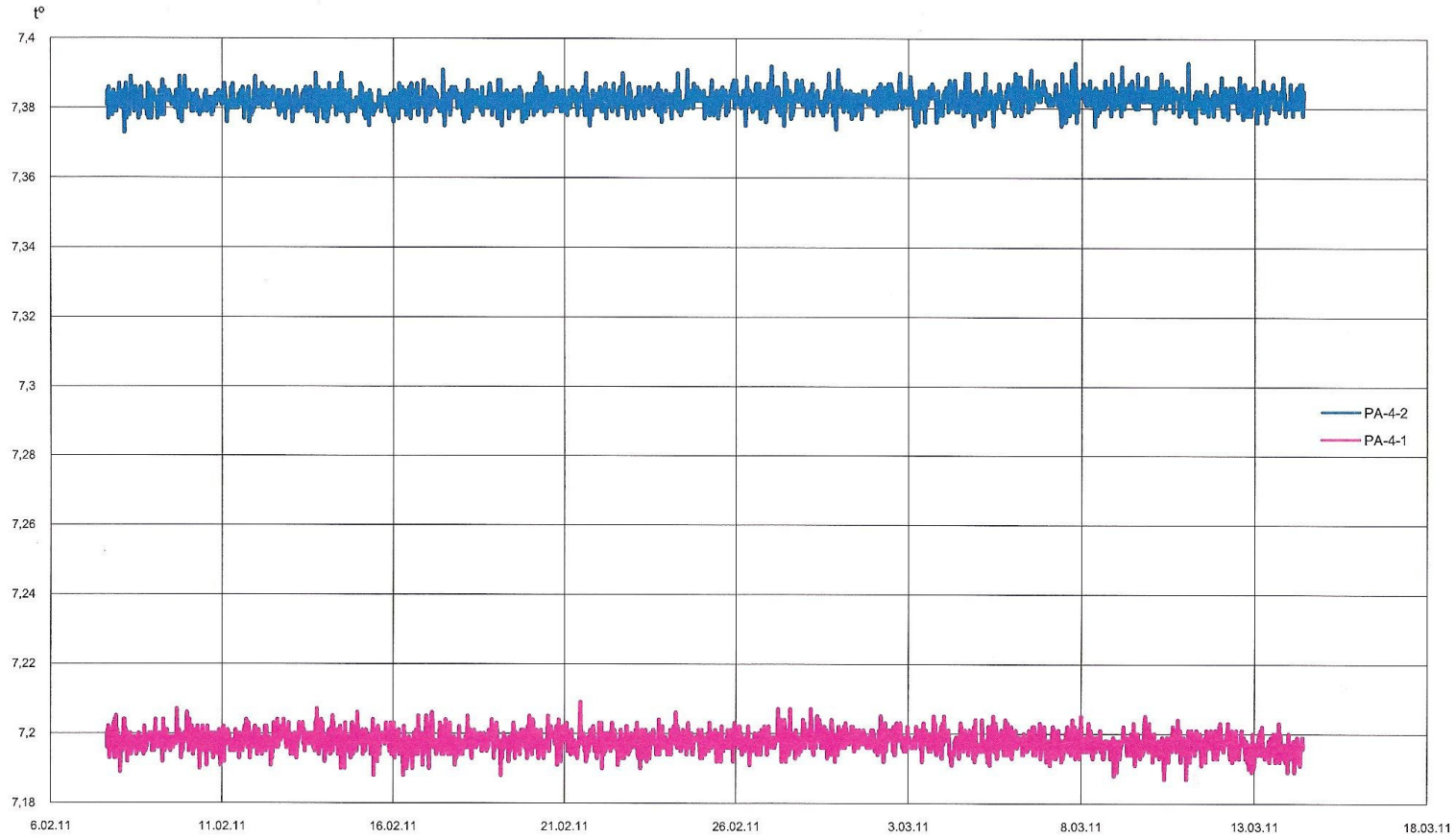
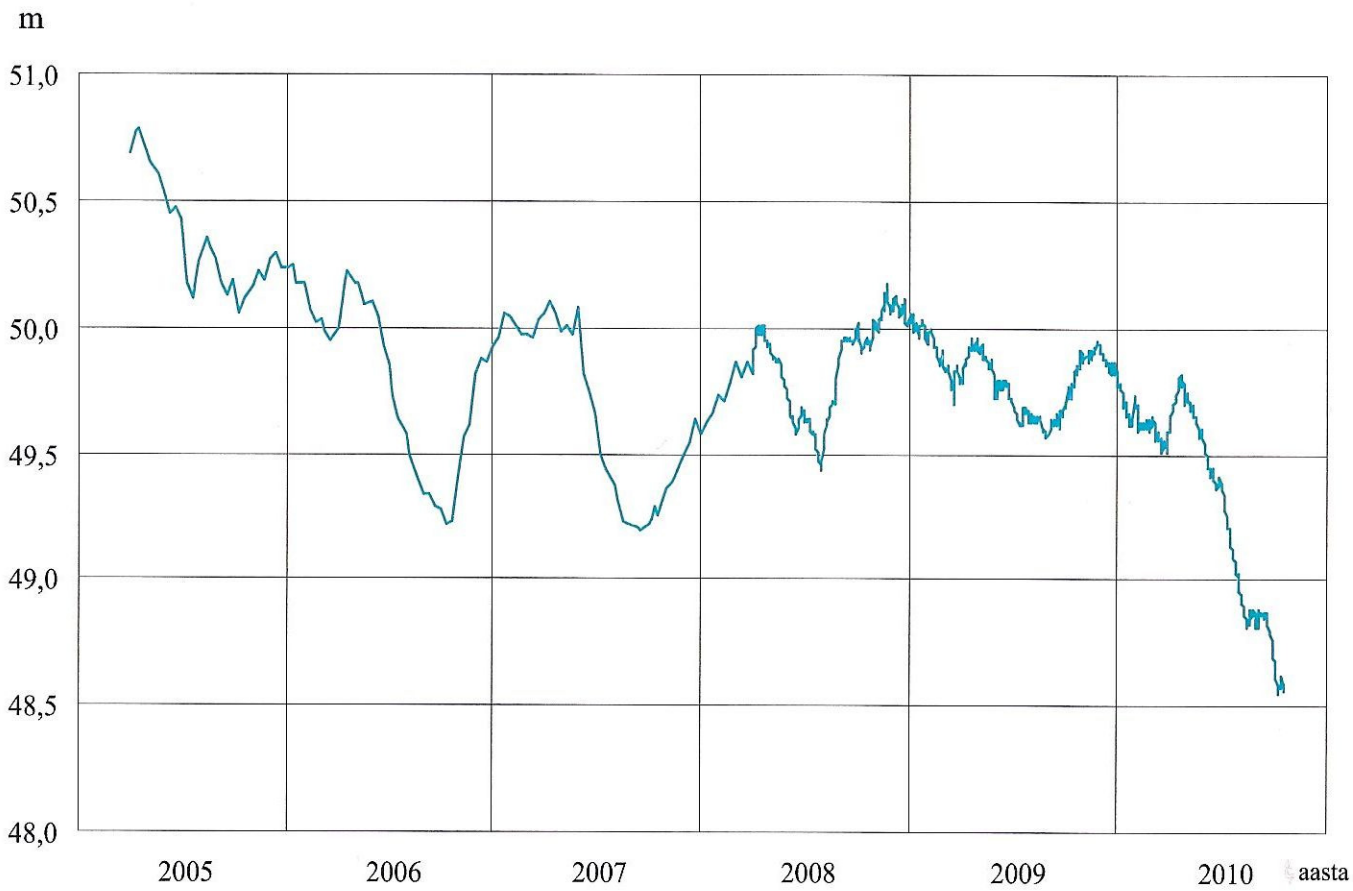


Figure 13 Changes of groundwater temperature in new Jõhvi groundwater monitoring station (PA-4-1 and PA-4-2).



Manual measurement 3 times per mounth in period 25.01.2005 – 01.04.2008.
Automatic measurements after 3 hour since 01.04.2008.

Figure 14 Changes of potentiometric level of groundwater in monitoring well 20980 (kl–kk aquifer neaeby Muraka bog).