

1 *Table S 1 Changes in the isotopic composition in reference to the “0-day” samples by Source ID and Storage time. Columns 3 through 8 depict minimum, mean, median and maximum change*  
 2 *for  $\delta^2\text{H}$ , while columns 9 through 14 show analogous data for  $\delta^{18}\text{O}$ . Significance levels for the pairwise Wilcox test base on the comparison of each storage groups mean with the “0-day”*  
 3 *isotopic composition mean of the respective source and are defined as follows: p-value  $\geq 0.05$  “ns”;  $p < 0.05$  “\*”;  $p < 0.01$  “\*\*”;  $p < 0.001$  “\*\*\*”;  $p < 0.0001$  “\*\*\*\*”;  $p < 0.00001$  “\*\*\*\*\*”*

ID	stored	min change $\delta^2\text{H}$	mean change $\delta^2\text{H}$	median change $\delta^2\text{H}$	max change $\delta^2\text{H}$	sig. level ( $\delta^2\text{H}$ ) Wilcox	min change $\delta^{18}\text{O}$	mean change $\delta^{18}\text{O}$	median change $\delta^{18}\text{O}$	max change $\delta^{18}\text{O}$	sig. level ( $\delta^{18}\text{O}$ ) Wilcox
light	1	-1.11	6.29	5.24	14.61	**	-0.43	0.49	0.45	1.20	*
light	3	-8.26	-0.55	-0.36	4.31	ns	-0.36	0.69	0.54	2.20	**
light	4	0.34	2.11	2.26	3.79	ns	0.85	1.62	1.64	2.49	****
light	7	-7.04	4.37	2.84	18.27	ns	-1.15	1.07	1.43	3.47	*
light	14	-2.60	2.34	2.44	7.46	ns	1.15	2.32	1.83	4.18	****
medium	1	-1.83	1.19	2.46	3.61	ns	-0.57	0.00	0.03	0.71	ns
medium	3	-3.92	1.77	1.30	8.66	ns	-0.21	0.95	1.04	2.23	*
medium	4	-5.18	-0.40	-0.21	4.40	ns	-0.25	0.56	0.53	1.52	ns
medium	7	4.82	6.11	6.32	7.19	**	0.42	0.71	0.78	0.98	ns
medium	14	1.72	3.48	3.55	5.85	ns	1.66	1.89	1.92	2.20	***
heavy	1	-2.18	0.41	-0.12	3.24	ns	-0.22	0.13	0.20	0.47	ns
heavy	3	-2.93	-0.89	-0.76	0.73	ns	-0.20	-0.06	-0.10	0.10	ns
heavy	4	-4.61	-3.84	-4.18	-2.70	**	0.32	0.74	0.53	1.75	**
heavy	7	0.33	1.22	1.29	1.99	ns	0.31	0.68	0.57	1.03	**
heavy	14	-2.79	-0.06	0.50	3.26	ns	1.28	1.56	1.54	1.95	**
very heavy	1	-15.76	-9.35	-10.22	-2.25	*	-0.93	-0.37	-0.42	0.40	ns
very heavy	3	-80.60	-27.68	-11.93	-0.19	*	-0.06	0.46	0.33	1.36	ns
very heavy	4	-32.93	-24.63	-21.03	-18.57	**	-0.17	0.12	-0.02	0.43	ns
very heavy	7	-69.31	-43.70	-38.26	-12.32	**	0.39	1.26	1.34	2.00	*
very heavy	14	-57.60	-21.27	-19.76	-2.74	*	1.16	1.81	1.94	2.20	**
crazy heavy	1	-60.21	14.36	17.78	72.43	ns	-1.43	0.06	0.03	1.28	ns
crazy heavy	3	-66.67	11.62	15.46	64.29	ns	-0.03	0.48	0.24	1.54	*
crazy heavy	4	-121.21	-20.94	-13.71	36.12	ns	-1.43	0.30	0.31	1.68	ns
crazy heavy	7	-183.16	-33.46	-12.96	35.98	ns	-0.14	0.83	0.83	2.12	***
crazy heavy	14	-133.79	-52.66	-36.72	39.54	*	1.28	2.00	2.00	2.70	****

Table S 2 Mean isotopic composition and standard deviation of  $^2\text{H}$  and  $^{18}\text{O}$  before (columns 3 – 6) and after correction and calibration (columns 7 – 10).

ID	stored	raw mean $\delta^2\text{H}$	sd $\delta^2\text{H}$	raw mean $\delta^{18}\text{O}$	sd $\delta^{18}\text{O}$	cor. cal. mean $\delta^2\text{H}$	sd cor. cal. $\delta^2\text{H}$	cor. cal. mean $\delta^{18}\text{O}$	sd cor. cal. $\delta^{18}\text{O}$
light	0	-87.49	3.94	-12.03	0.55	-91.19	4.16	-12.63	0.59
light	1	-81.20	4.86	-11.54	0.47	-89.27	5.46	-12.22	0.51
light	3	-88.05	3.10	-11.34	0.66	-91.75	3.27	-12.54	0.72
light	4	-85.38	1.20	-10.41	0.47	-90.82	1.37	-11.65	0.50
light	7	-83.13	10.97	-10.96	1.34	-91.09	11.54	-12.44	1.37
light	14	-85.16	3.10	-9.71	0.99	-92.11	3.37	-12.38	1.09
medium	0	-53.80	4.41	-8.02	0.79	-55.57	4.66	-8.37	0.84
medium	1	-52.61	2.25	-8.02	0.40	-57.19	2.52	-8.42	0.44
medium	3	-52.02	3.88	-7.07	0.74	-53.69	4.10	-7.88	0.81
medium	4	-54.20	2.47	-7.46	0.49	-55.40	2.80	-8.51	0.52
medium	7	-47.69	1.08	-7.32	0.23	-53.79	1.14	-8.70	0.24
medium	14	-50.32	1.65	-6.14	0.21	-54.31	1.79	-8.44	0.23
heavy	0	1.10	0.60	-5.37	0.05	-1.62	4.36	-5.54	0.05
heavy	1	1.52	2.07	-5.24	0.30	0.31	4.09	-5.40	0.33
heavy	3	0.21	1.28	-5.43	0.13	2.69	1.85	-6.08	0.14
heavy	4	-2.74	0.81	-4.63	0.55	-0.44	3.81	-5.49	0.59
heavy	7	2.32	0.61	-4.68	0.29	2.16	3.57	-5.99	0.30
heavy	14	1.04	2.31	-3.80	0.25	-3.85	6.10	-5.86	0.28
very heavy	0	729.88	4.30	-11.60	0.43	786.20	4.68	-12.17	0.45
very heavy	1	720.54	4.86	-11.97	0.51	771.46	5.23	-12.69	0.55
very heavy	3	702.21	32.03	-11.14	0.55	758.88	34.45	-12.32	0.60

<b>very heavy</b>	4	705.25	6.95	-11.49	0.28	773.77	7.63	-12.79	0.30
<b>very heavy</b>	7	686.18	23.41	-10.34	0.74	761.64	25.88	-11.81	0.76
<b>very heavy</b>	14	708.61	21.89	-9.80	0.43	786.70	24.62	-12.48	0.48
<b>crazy heavy</b>	0	1590.49	65.79	-10.31	0.31	1721.34	71.49	-10.80	0.33
<b>crazy heavy</b>	1	1604.85	51.63	-10.25	0.68	1723.83	55.60	-10.83	0.74
<b>crazy heavy</b>	3	1602.11	45.76	-9.83	0.52	1726.73	49.22	-10.89	0.57
<b>crazy heavy</b>	4	1569.54	52.16	-10.01	0.86	1723.19	57.30	-11.22	0.91
<b>crazy heavy</b>	7	1557.03	68.10	-9.48	0.64	1724.54	75.30	-10.92	0.66
<b>crazy heavy</b>	14	1537.83	60.57	-8.32	0.59	1719.31	68.12	-10.84	0.65

Table S 3 Means and standard deviations (sd) of VSVS samples for the field trial. All samples were taken on the bottom borehole of a pine tree (ca. 40cm aboveground). Mean and sd were calculated based on five replicas. Correction for storage was done using the storage model coefficients from the lab trial, and subsequent calibration according to storage group.

ID	stored	$\delta^2\text{H}\text{‰}$ mean ( $\pm\text{sd}$ )	$\delta^{18}\text{O}\text{‰}$ mean ( $\pm\text{sd}$ )	cor.cal. $\delta^2\text{H}\text{‰}$ mean ( $\pm\text{sd}$ )	cor.cal. $\delta^{18}\text{O}\text{‰}$ mean ( $\pm\text{sd}$ )
Sample	0	3.23 (1.17)	-11.05 (0.16)	-3.76 (1.19)	-12.03 (0.21)
Sample	1	-3.25 (0.96)	-10.84 (0.16)	1.12 (1.11)	-12.26 (0.20)
Sample	3	-5.22 (1.33)	-10.63 (0.19)	-5.04 (1.36)	-11.16 (0.19)
Sample	7	-3.74 (4.37)	-9.65 (0.31)	-5.57 (4.65)	-11.31 (0.41)
Sample	14	6.92 (1.61)	-8.76 (0.31)	6.33(1.68)	-11.35 (0.41)

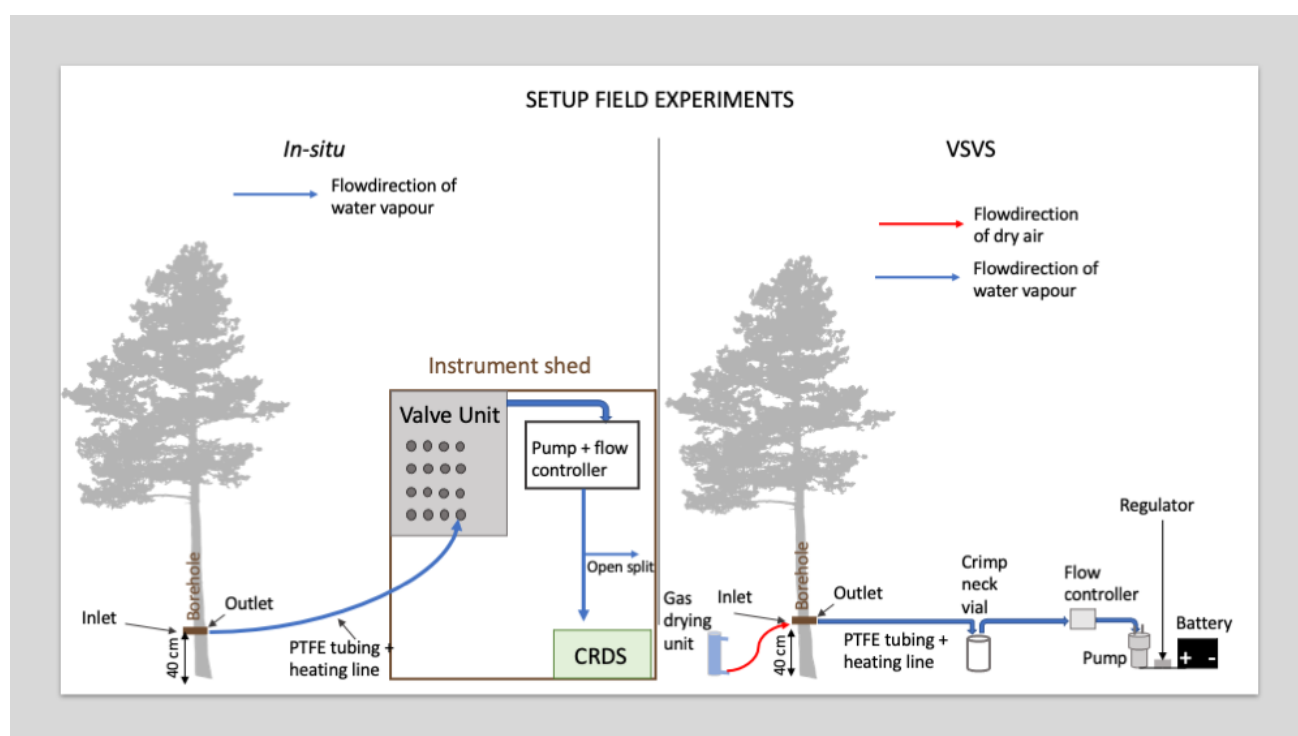


Figure S 1 Comparison of in-situ field setup (left) and sampling setup to obtain VSVS samples (right).

