Hydrology and Earth System Sciences **Supporting Information**

Article title: Identifying the underpinnings of δ^2H discrepancies between plant stem and soil water: extraction-induced methodological artifacts *versus* biological fractionation effects

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Table S1. Summary statistics of ecophysiological and environmental variables of 12 plant species grown under two relative humidity (RH) treatments (40% and 70%). The variables include soil relative water content (Soil RWC, %), soil absolute water amount (Soil AWA, mL), leaf transpiration rate (E, mmol m^{-2} s^{-1}), leaf stomatal conductance (g_s, mol m^{-2} s^{-1}), leaf water oxygen isotope enrichment ($\Delta^{18}O_{lw}$, ‰), stem relative water content (Stem RWC, %), stem absolute water amount (Stem AWA, mL), and wood density (g cm^{-3}). For each variable within each RH treatment, the minimum (Min), maximum (Max) and mean values are reported as mean ± SD across species.

Variable	40% RH			70% RH		
	Min	Max	Mean	Min	Max	Mean
Soil RWC	40.7±2.8	54.5±4.1	49.7±7.1	42.9±4.2	59.6±8.3	51.3±8.9
Soil AWA	1.9±0.1	2.8±0.2	2.3±0.5	2.2±0.5	2.6±0.5	2.4±0.3
E	1.5±0.5	6.8±0.9	3.0±1.7	0.8±0.4	8.7±0.8	4.2±2.6
g_s	0.08±0.03	0.45±0.07	0.18±0.12	0.08±0.04	1.20±0.21	0.47±0.37
$\Delta^{18}O_{lw}$	9.3±0.8	20.0±3.2	16.8±3.7	5.2±0.6	14.7±3.5	9.0±3.1
Stem RWC	44.0±0.8	94.0±2.3	70.9±15.6	41.3±1.2	95.9±0.2	71.0±17.4
Stem AWA	1.0±0.2	2.2±0.4	1.5±0.5	0.9±0.1	2.2±0.4	1.6±0.5
Wood density	0.07±0.02	0.56±0.01	0.25±0.16	0.06±0.01	0.57±0.02	0.24±0.16

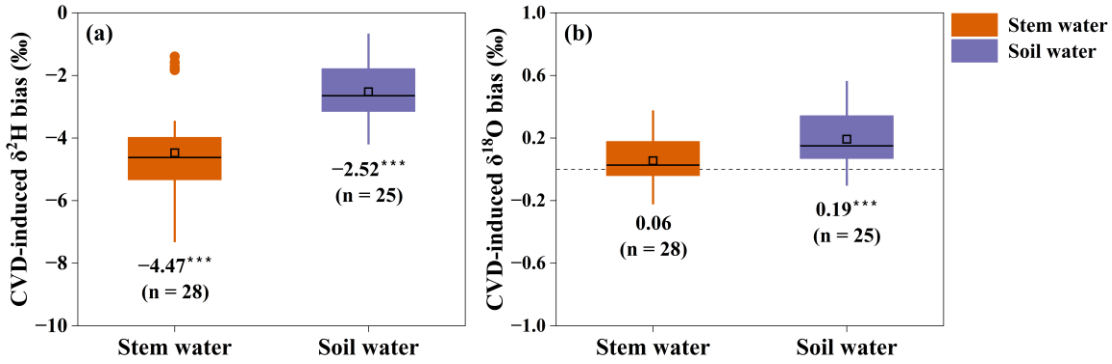

Figure S1. Boxplots of cryogenic vacuum distillation-induced δ^2H (a) and $\delta^{18}O$ (b) biases for stem water (red) and soil water (blue), as determined from the rehydration experiments. Biases were calculated as the difference between the isotopic values of stem or soil water and their respective reference water (Eqn 3). The horizontal line within each box represents the median, and the square symbol denotes the mean. The vertical size of each box is the interquartile range (IQR) with the bottom and top edges marking the 25th and 75th percentile, respectively, and the whiskers extend to within 1.5 × IQR from each edge. Asterisks (***) below the boxes indicate statistically significant differences at $P < 0.001$.

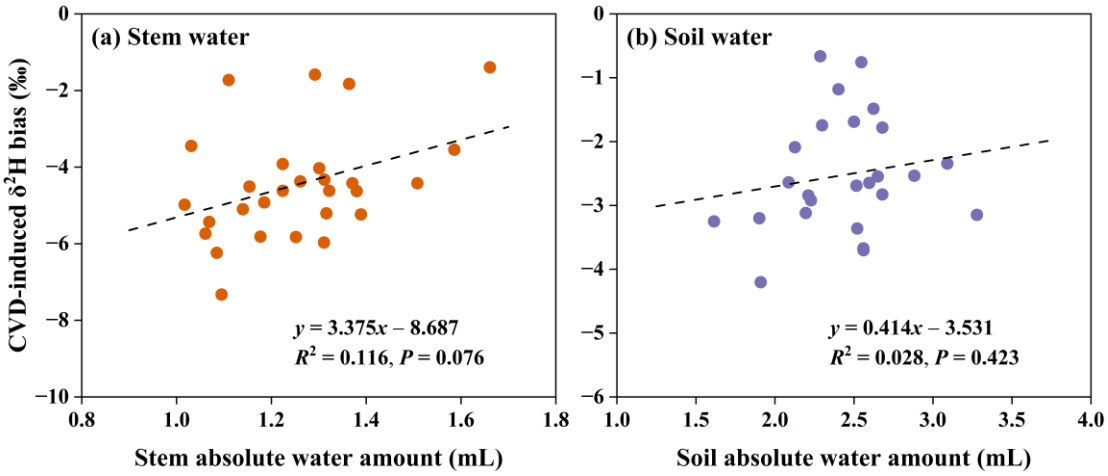

Figure S2. Relationships between cryogenic vacuum distillation-induced δ^2H biases and absolute water amount observed in the rehydration experiment for stem (a) and soil (b) samples. The dashed line represents the best-fit linear regression.

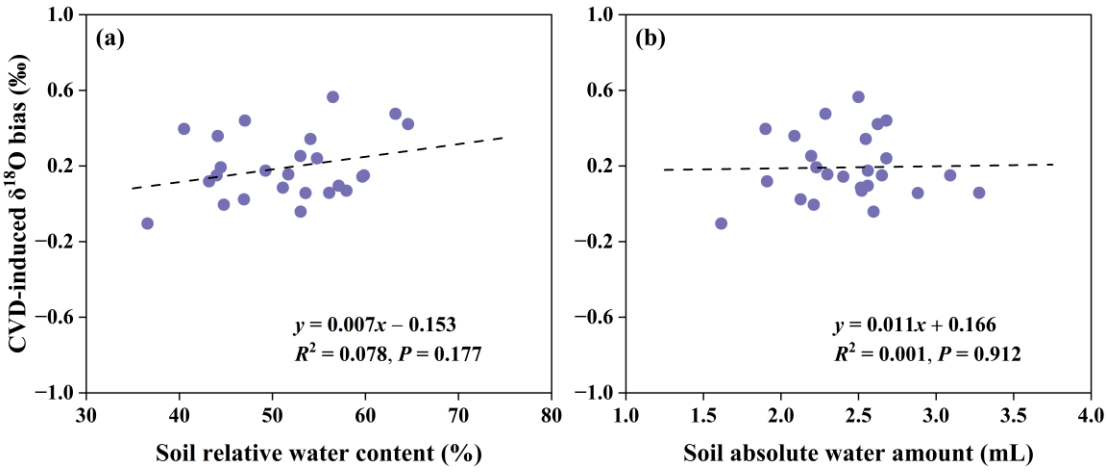

Figure S3. Relationships between cryogenic vacuum distillation-induced $\delta^{18}O$ biases and (a) soil relative water content and (b) absolute water amount, as observed in the rehydration experiment. The dashed line represents the best-fit linear regression.