

Figure S1. (a) Soil water retention curve within the 0-800 kPa suction range and (b) enlarged view of the curve in the 0-100 kPa range, measured using a CR21G high-speed centrifuge (Hitachi, Japan). Mobile water was collected from suction lysimeters (applying 60 kPa of tension).

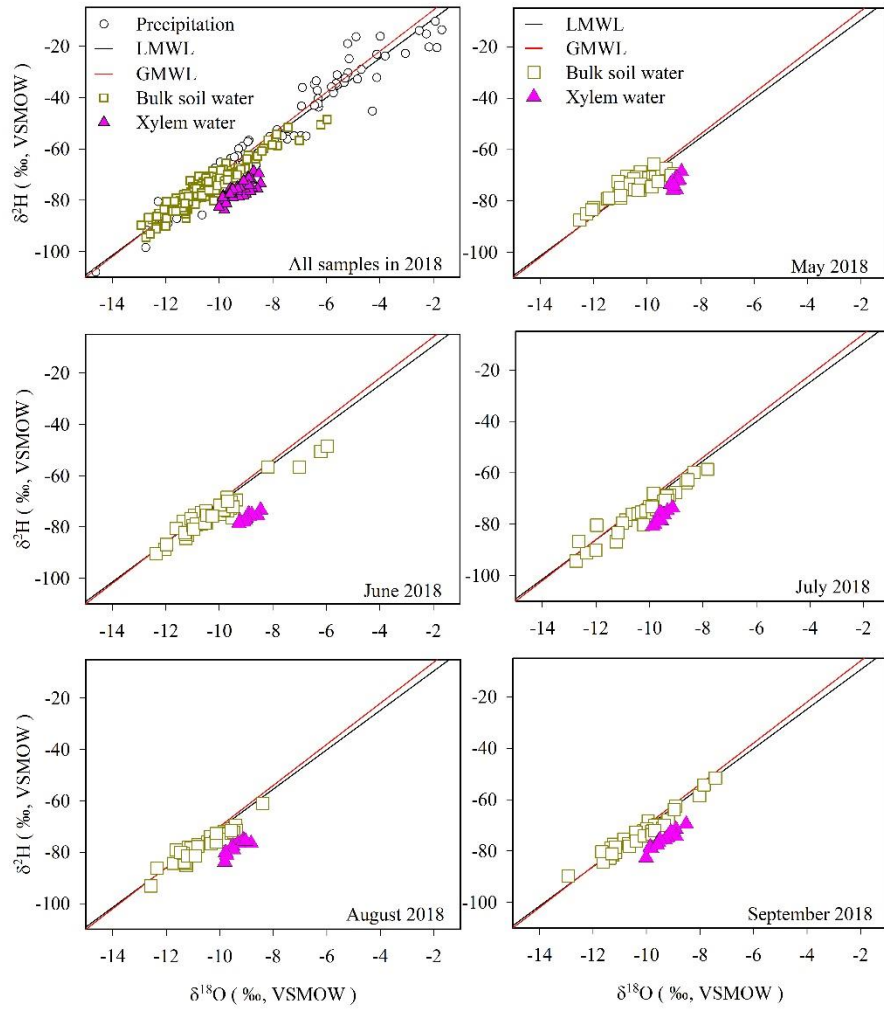


Figure S2. (a) $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotope values of samples collected in 2018. Plotted values include precipitation, bulk soil water, xylem water. The black line represents the 2016-2019 local meteoric water line (LMWL, $\delta^2\text{H} = 5.91 + 7.67 \delta^{18}\text{O}$, $R^2 = 0.96$). The red line represents the global meteoric water line (GMWL, $\delta^2\text{H} = 10 + 8 \delta^{18}\text{O}$).

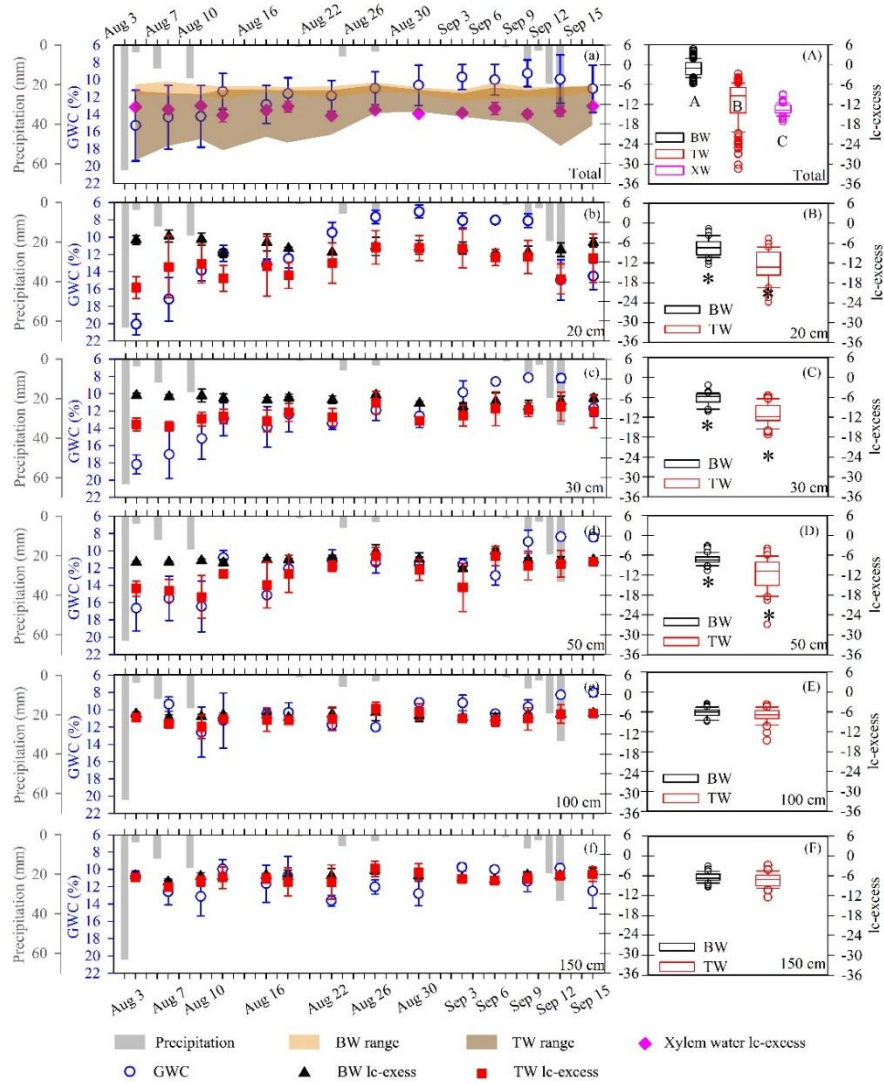


Figure S3. (a-f) Temporal dynamics of hydrological conditions (precipitation and gravimetric water content, GWC) and lc-excess values (these values are means and standard deviations for three sites) of xylem water (XW), bulk soil water (BW) and tightly bound water (TW) at indicated depths (20, 30, 50, 100 and 150 cm) during the period August 3 to September 15, 2019. (A) Boxplots of total BW and XW lc-excess values. (B-F) Boxplots of MW and BW at 20, 30, 50, 100 and 150 cm depths. The top and bottom of each box are the 25th and 75th percentiles of the samples, respectively. The black line in each box is the sample median. Xylem water and potential water sources that do not share a letter are significantly different ($p < 0.05$, Tukey-Kramer HSD). Asterisks show significantly differing lc-excess values between mobile water and bulk soil water at the same depth ($p < 0.05$).

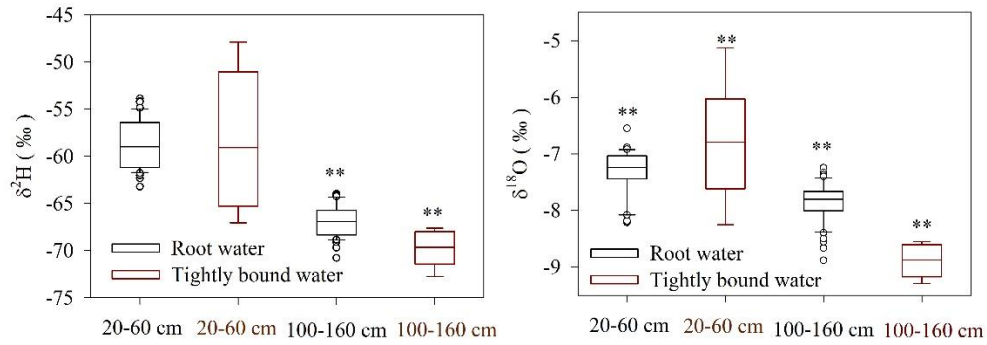


Figure S4. (a, b) Boxplots of root water and tightly bound water isotope composition ($\delta^2\text{H}$ and $\delta^{18}\text{O}$) at indicated depths. The top and bottom of each box are the 25th and 75th percentiles of the samples, respectively. The black line in each box is the sample median. Asterisks indicate significantly differing isotopic values between soil water and root water (: $p < 0.01$, according to two-tailed tests). Root water samples were collected at three soil profiles on August 18, 2019. Tightly bound water samples at 20-60 cm depths were calculated by mobile and bulk soil water samples at 20, 30 and 50 cm depths on August 18, 2019. Tightly bound water samples at 100-160 cm depths were calculated by mobile and bulk soil water samples at 100 and 150 cm depths on August 18, 2019.**

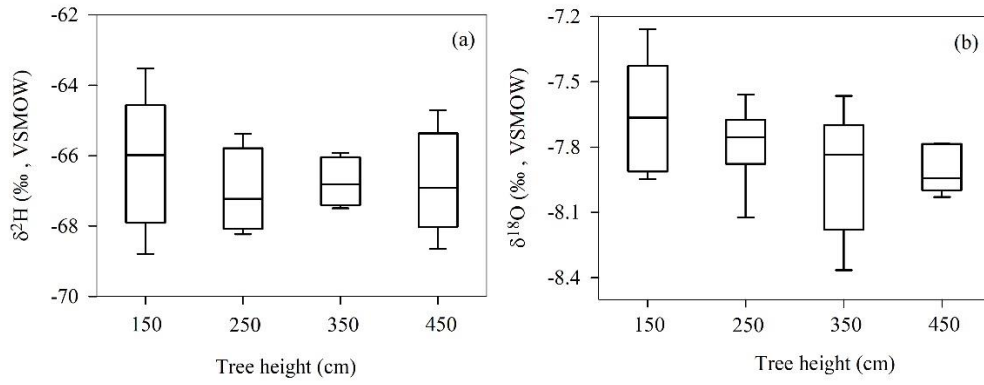


Figure S5. (a, b) Boxplots of xylem water isotopes ($\delta^2\text{H}$ and $\delta^{18}\text{O}$) at indicated tree heights. The top and bottom of each box are the 25th and 75th percentiles of the samples, respectively. The black line in each box is the sample median.

Table S1. The lc-excess values of mobile water (MW), bulk soil water (BW) at indicated depths (20, 30, 50, 100 and 150 cm), xylem water (XW) and groundwater from May to July

Date	Soil water type	Soil water					Mean-MW	Mean-BW	Xylem water	Ground -water
		20cm	30cm	50cm	100cm	150cm			Mean-XW	Mean-GW
5/10	MW	--	--	--	-4.0	-3.2	-8.3b	-3.6a	-12.6c	-1.9a
	BW	-13.7	-10.5	-6.6	-5.1	-5.5				
6/10	MW	--	--	--	-3.7	-4.6	-8.7b	-4.1a	-15.1c	-2.3a
	BW	-13.3	-10.2	-6.6	-6.9	-6.8				
7/8	MW	--	--	-3.8	-2.6	-4.5	-8.8b	-3.2a	-14.8c	-3.3a
	BW	-13.2	-11.1	-8.2	-6.1	-5.4				

The "--" represents mobile water of this layer is not available with application of 60 kPa tension.

Xylem water and potential water sources that do not share the same letter are significantly different ($p < 0.05$).