Supplementary Tables:

Table S1. Description of the parameters in the model.

Parameter	Expression	Description
δE/‰	Eq. 2	Isotopic composition of soil evaporation
δT/‰	Eq.4	Isotopic composition of vegetation transpiration
δET/‰	Eq.5	Isotopic composition of evapotranspiration in ecosystems
δa/‰	Eq.3	Isotopic composition of atmospheric water vapor
ε^+/‰	$\varepsilon^+=(\alpha^+-1)\times1000$	Temperature dependent equilibrium isotope fractionation factor
εk/‰	εk=(1-h)×Ck	Relative humidity dependent dynamic isotope fractionation factor
Ck/‰	12.5‰ for δ^2H，14.2‰ for $\delta^{18}O$	Kinetic fractionation constant
α^+/‰	$10^3\times\ln(\alpha^+)=-7.685+6.7123\times10^3\times T^{-1}-1.6664\times10^6\times T^{-2}+0.35041\times10^9\times T^{-3}$(for oxygen) $10^3\times\ln(\alpha^+)=1158.8\times T^3 10^{-9}-1620.1\times10^{-6}\times T^2+794.84\times T\times10^{-3}-161.04+2.9992\times10^9\times T^{-3}$(for hydrogen)	Based on the equilibrium fractionation factor at the gas-liquid interface
ε/‰	$\varepsilon=\varepsilon^+/\alpha^++\varepsilon_k$	Total isotopic fractionation
δpv/‰	Eq.8	Isotopic composition of precipitation vapor
δadv/‰	Eq.10	Isotopic composition of advected water vapor
δev/‰	Eq.9	Isotopic composition of surface evaporated water vapor
δt/‰	δt≈δx	Isotopic composition of vegetation-transpired water vapor
fv	6.64–6.69	Water vapor mass ventilation coefficient
d/mm	0.5-1.5	Initial raindrop diameter
D/m2 s-1	$2.50–2.56\ 10^{-5}$	Diffusivity of water vapor in air
Rw/	461 J $kg^{-1}K^{-1}$	Specific gas constant for water vapor
h/%	20-70	Relative humidity
esat.Ta or esat.Td/Pa	611-4230	Saturation vapor pressure over liquid (from 0 ℃ to 30 ℃)
k	,0.6000-1.000	Adjustment parameter, initial value is 1
L/J kg-1	Eq.12, $2.449–2.453\ 10^6$	Latent heat of vaporization

ka/ J m-1s-1K-1	Eq.13, 2.526-2.559 10^{-2}	Thermal conductivity of (dry) air
ρw/	0.998 103 kg m^{-3}	Density of liquid water
cw/	4119 J $kg^{-1}K^{-1}$	Specific heat of liquid water
fh/	6.92–6.97	Heat ventilation coefficient in air
r/mm	Eq.15	Radius of raindrops when falling to the ground surface
E/g·s^{-1}	$E=Q_1Q_2$; $Q1=(-0.2445T+131.28)\times(0.2r)^{1.6139}$;$Q2=(-0.73RH+0.7264)e^{(-0.002RH+0.0371)T}$	Evaporation intensity of rainfall (Q1 and Q2 represent functions controlled by meteorological conditions)
vend/m·s^{-1}	$Vend=9.58e0.0354^{LCL}[1-e^{-(2r/1.77)^{\wedge}1.147}]$,0.3≤2r<6.0	Terminal velocity of raindrops falling to the ground surface