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Variations in vegetation evapotranspiration affect water yield in high-altitude areas

Yinying Jiao et al.

Correspondence to: Guofeng Zhu (zhugf@nwnu.edu.cn)

Supplementary Tables:

Table S1: Details of all parameters in the equations.

Parameter	Formula	Meaning	References
δ_a	Eq.(2)	Isotopic composition of atmospheric water vapor, ‰	(Gibson and Reid, 2014;Skrzypek et al., 2015)
α^+	Eq.(3) and (4)	Temperature-dependent equilibrium fractionation factor, ‰	(Horita and Wesolowski, 1994)
ε^+	$\varepsilon+=(\alpha+-1)\times1000$	Equilibrium fractionation factor for liquid-vapor phase transition, ‰	(Horita and Wesolowski, 1994)
δ_E,δ_S	Eq. (5)	Isotopic composition of soil evaporation vapor, ‰ Isotopic composition of shallow soil water, ‰	(Yepez et al., 2005)
α_e	Eq. (6)	Equilibrium coefficient calculated based on water surface temperature, ‰	(Raz-Yaseef et al., 2010)
ε_{eq}	$\varepsilon_{eq} = (1-1/\alpha_e) \times 1000$	Equilibrium coefficient calculated from αe, ‰	(Gibson and Reid, 2010)
δ_X δT	Eq. (7)	Isotopic composition of xylem water, ‰ Isotopic composition of vegetation transpiration vapor, ‰	(Aron et al., 2020)
C_a δ_b C_b δ_{ET}	Eq. (8)	Water vapor concentration in the ecosystem boundary layer, g/m³ Isotopic composition of background atmospheric water vapor, ‰ Water vapor concentration in background atmosphere, g/m³ Isotopic composition of ecosystem evapotranspiration, ‰	(Keeling, 1958;Wang et al., 2015)
f_{re}	Eq. (10), ISOSource software (https://www.epa.gov/)	Recycled water vapor ratio in precipitation, %	(Phillips & Gregg, 2001)
δ_{pv}	Eq.(11) and (13)	Isotopic composition of precipitation vapor, ‰	(Brubaker et al., 1993)
δ_{ev}	Eq. (14)	Isotopic composition of soil evaporation vapor, ‰	(Brubaker et al., 1993)
δ_{adv}	Eq. (17)	Isotopic composition of advective vapor, ‰	(Brubaker et al., 1993)
δ_{tr}	$\delta tr = \delta T$	Isotopic composition of vegetation transpiration vapor, ‰	(Evaristo et al., 2015)
ε	Eq. (15)	Total fractionation factor, ‰	(Skrzypek et al., 2015)
ε_K C_K	Eq. (16)	Kinetic fractionation factor, ‰ Kinetic fractionation constant, δ^2H is 25.1‰, $\delta^{18}O$ is 28.5‰	(Skrzypek et al., 2015)
F	Eq. (17)	Ratio of final to initial water vapor at different sites, dimensionless	(Peng et al., 2011)

Table S2: Isotopic composition of precipitation vapor, surface evaporation vapor, and vegetation transpiration vapor at different months and altitudes (- represents missing value).

Month	Type	isotope	April	May	June	July	August	September	October
Qixiang	δ_{pv}	δ^2H/‰	-141.95	-123.83	-99.87	-115.99	-128.34	-120.9	-152.43
		$\delta^{18}O$/‰	-19.27	-16.58	-14.04	-15.91	-18.6	-17.22	-22.34
	δ_{ev}	δ^2H/‰	-	-125.69	-123.69	-117.98	-134.57	-	-
		$\delta^{18}O$/‰	-	-30.21	-29.56	-28.62	-31.19	-	-
	δ_{tr}	δ^2H/‰	-39.9	-29.32	-46.19	-49.58	-45.15	-42.66	-44.64
		$\delta^{18}O$/‰	2.22	-5.87	-4.59	-0.72	-1.72	-1.78	-2.26
	δ_{adv}	δ^2H/‰	-145.57	-83.25	-81.12	-92	-109.62	-100.53	-122.62
		$\delta^{18}O$/‰	-20.24	-11.93	-10.73	-12.06	-15.31	-13.46	-18.16
Hulin	δ_{pv}	δ^2H/‰	-129.93	-123.29	-98.68	-113.98	-124.16	-118.52	-164.82
		$\delta^{18}O$/‰	-17.54	-16.62	-13.18	-15.48	-17.33	-17.88	-22.46
	δ_{ev}	δ^2H/‰	-114.24	-117.01	-107.75	-123.44	-106.92	-96.39	-172.3
		$\delta^{18}O$/‰	-14.77	-16.35	-15.03	-16.7	-14.53	-12.78	-24.82
	δ_{tr}	δ^2H/‰	-24.12	-39.62	-35.97	-26.44	-35.85	-38.39	-40.53
		$\delta^{18}O$/‰	-5.34	-3.58	-4.13	-0.34	-2.35	-4.25	-1.97
	δ_{adv}	δ^2H/‰	-112.79	-115.67	-106.61	-122.19	-106.49	-95.7	-170.54
		$\delta^{18}O$/‰	-14.59	-16.15	-14.88	-16.54	-14.46	-12.69	-24.57
Ninchan	δ_{pv}	δ^2H/‰	-	-76.02	-139.21	-135.74	-129.96	-113.71	-184.93
		$\delta^{18}O$/‰	-	-11.89	-19.87	-18.7	-17.91	-16.77	-26.38
	δ_{ev}	δ^2H/‰	-	-83.76	-81.42	-92.42	-110.24	-101.11	-123.42
		$\delta^{18}O$/‰	-	-12.01	-10.76	-12.09	-15.37	-13.49	-18.27
	δ_{tr}	δ^2H/‰	-	-25.58	-46.77	-37.77	-43.66	-	-
		$\delta^{18}O$/‰	-	-3.45	-1.98	-1.05	-6.68	-	-
	δ_{adv}	δ^2H/‰	-162.36	-113.49	-111.45	-106.16	-122.12	-114.67	-141.33
		$\delta^{18}O$/‰	-22.73	-15.94	-15.28	-14.46	-16.96	-16.58	-20.42
Suidao	δ_{pv}	δ^2H/‰	-167.86	-128.08	-124.95	-117.32	-137.73	-130.44	-155.52
		$\delta^{18}O$/‰	-22.9	-18.02	-17.28	-16.04	-19.09	-18.64	-21.59
	δ_{ev}	δ^2H/‰	-164.16	-114.52	-112.37	-106.9	-122.96	-115.47	-142.85
		$\delta^{18}O$/‰	-22.98	-16.07	-15.41	-14.56	-17.08	-16.69	-20.64

δ_{tr}	$\delta^{2}H$/‰	-	-25.58	-46.77	-37.77	-43.66	-	-
	$\delta^{18}O$/‰	-	-8.45	-6.98	-6.05	-6.68	-	-
δ_{adv}	$\delta^{2}H$/‰	-162.38	-113.51	-111.47	-106.18	-122.14	-114.69	-141.36
	$\delta^{18}O$/‰	-22.73	-15.94	-15.28	-14.47	-16.97	-16.58	-20.42