

1 **Electronic supplementary material, ESM**

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3 **Dew water isotopic ratios and their relations to ecosystem water pools**
4 **and fluxes in a cropland and a grassland in China**

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1 Table S1 Dew frequency, total net water vapor flux, mean values of water vapor mixing ratio (w), canopy temperature (T_c) and relative humidity
2 (RH, relative to T_c), total precipitation (P), mean isotope ratios of dew, precipitation, atmospheric water vapor, xylem water, leaf water and soil
3 water at 0 - 5cm depth in winter wheat and summer maize in Luancheng and in a grassland in Duolun. All isotopic measurements except
4 precipitation were made during dew events. The leaf delta in Luancheng is the average of the values of upper and lower canopy leaves.

Species	Dew				w (mmol mol ⁻¹)	T_c (°C)	RH (fraction)	Precipitation			Vapor		Xylem		Bulk leaf		Soil	
	Frequency* (% of nights)	Amount (mm)	δD (‰)	$\delta^{18}O$ (‰)				P (mm)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)
Winter Wheat	65 (68)	10.1	-13.4	-1.2	14.3	12.4	1.03	170	-45.9	-7.1	-99.5	-12.6	-38.3	-4.2	-13.1	1.4	-49.1	-6.2
Summer Maize	56 (60)	6.5	-44.1	-4.9	24.1	20.7	1.08	320	-59.0	-8.3	-123.8	-15.3	-53.7	-5.8	-40.7	-1.5	-59.3	-7.5
Grassland	51 (31)	5.5	-47.8	-6.0	15.0	12.4	1.10	137	-48.8	-7.4	-132.6	-17.1	—	—	—	—	—	—

5 * Determined from the polarity of the TDL H₂O vertical gradients. Values in parentheses are from LWS-L leaf wetness sensors.

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- 1 Table S2 Data obtained during individual dew events: water vapor mixing ratio (w), canopy temperature (T_c), relative humidity (RH, relative to
- 2 T_c), isotope ratios of dew, atmospheric water vapor, xylem, leaf water and soil water at 0-5cm depth in winter wheat and summer maize in
- 3 Luahceng and in a grassland in Duolun, China. The leaf delta in Luancheng is the average of the values of upper and lower canopy leaves.

Start time (Doy)	End time (Doy)	w (mmol mol ⁻¹)	T_c (°C)	RH (fraction)	Dew		Vapor		xylem		leaf		Soil	
					δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)	δD (‰)	$\delta^{18}O$ (‰)
Winter Wheat (n=41)														
96.10	96.26	8.6	4.6	1.07	-4.2	2.4	-106.5	-12.0	—	—	—	—	—	—
97.06	97.24	10.4	7.7	1.08	-2.6	1.3	-99.4	-11.9	-53.7	-4.1	-9.9	2.2	-44.6	-4.5
97.85	98.23	11.7	10.7	0.97	-11.5	-0.7	-100.6	-12.6	—	—	—	—	—	—
99.02	99.26	14.2	13.5	0.97	-3.0	0.7	-96.4	-11.8	—	—	—	—	—	—
100.81	101.25	11.6	9.8	1.02	-40.9	-4.8	-120.0	-15.6	—	—	—	—	—	—
104.90	105.25	11.5	9.2	1.07	-30.9	-3.9	-118.0	-15.3	—	—	—	—	—	—
105.94	106.25	12.4	10.3	1.06	-21.3	-3.0	-104.8	-13.9	—	—	—	—	—	—
106.94	107.25	11.7	10.1	1.05	-19.1	-2.5	-104.6	-13.5	—	—	—	—	—	—
107.94	108.25	9.9	7.8	1.04	-19.9	-2.6	-108.6	-13.5	—	—	—	—	—	—
109.19	109.25	11.1	9.9	0.99	5.7	2.5	-91.8	-10.8	—	—	—	—	—	—
112.81	113.24	12.3	10.4	1.02	-63.1	-8.6	-143.9	-20.1	—	—	—	—	—	—
115.15	115.23	7.2	1.1	1.13	-22.1	-1.6	-121.0	-15.3	—	—	—	—	—	—
117.02	117.23	6.8	1.6	0.99	-23.8	-1.5	-122.1	-13.9	—	—	—	—	—	—
119.15	119.23	8.3	3.6	1.11	-19.9	-2.4	-112.2	-14.6	—	—	—	—	—	—
119.98	120.23	13.8	12.4	1.08	-7.6	-0.6	-89.4	-10.9	—	—	—	—	—	—

120.98	121.23	16.5	15.5	1.02	6.3	0.4	-71.8	-9.8	—	—	—	—	—	—
121.85	122.23	16.5	15.9	0.99	-3.0	-0.2	-85.9	-11.0	—	—	—	—	—	—
122.98	123.24	22.1	19.4	1.08	0.9	0.1	-75.0	-9.7	—	—	—	—	—	—
123.81	124.24	22.6	19.4	1.11	0.4	-0.4	-76.3	-9.9	—	—	—	—	—	—
125.02	125.22	10.6	8.7	1.06	-2.5	-1.5	-92.5	-12.2	-46.3	-5.0	-2.4	1.5	-41.9	-4.9
126.90	127.22	16.4	15.3	1.07	-3.9	1.8	-78.7	-10.0	—	—	—	—	—	—
130.15	130.22	10.3	8.5	0.96	-10.7	-0.4	-105.0	-11.9	—	—	—	—	—	—
131.02	131.22	9.6	6.3	1.08	-15.0	-2.2	-110.5	-15.4	—	—	—	—	—	—
136.15	136.25	13.3	11.7	1.02	-19.5	-2.5	-110.6	-14.8	-43.0	-5.7	-9.9	-0.2	-37.7	-5.7
137.85	138.22	15.6	14.4	1.05	-7.3	-1.6	-92.9	-12.3	—	—	—	—	—	—
139.98	140.21	12.6	11.7	0.98	-4.5	-0.7	-90.9	-11.8	-28.2	-4.1	-2.6	1.4	-24.1	-4.2
141.10	141.20	13.0	11.7	1.03	1.1	-0.4	-82.6	-10.6	—	—	—	—	—	—
143.02	143.24	13.4	12.4	1.02	10.3	2.8	-76.3	-8.8	-27.5	-3.5	3.8	4.6	-21.5	-3.2
144.85	145.21	23.2	20.9	1.04	5.7	1.1	-68.3	-8.7	—	—	—	—	—	—
145.85	146.22	17.1	16.1	1.05	-4.3	-0.5	-85.1	-10.5	-27.3	-3.3	-4.6	0.7	-22.5	-3.4
146.94	147.21	23.0	20.2	1.08	-2.8	-0.5	-77.6	-10.3	—	—	—	—	—	—
147.98	148.22	23.4	20.5	1.06	3.7	0.9	-79.5	-10.2	—	—	—	—	—	—
149.15	149.20	12.8	12.8	0.92	-3.5	-0.4	-90.5	-11.8	—	—	—	—	—	—
152.19	152.22	9.4	7.5	0.96	-2.6	2.1	-98.2	-10.7	—	—	—	—	—	—
153.94	154.20	11.2	10.8	0.95	-38.5	-3.4	-134.8	-16.1	-41.9	-3.4	-21.4	-0.6	-32.0	-1.3
156.94	157.20	12.4	13.6	0.88	-55.4	-6.8	-131.5	-18.5	—	—	—	—	—	—
158.94	159.20	17.1	15.5	1.06	-41.9	-5.4	-125.2	-16.9	—	—	—	—	—	—
160.85	161.19	23.6	20.8	1.05	-21.7	-2.4	-95.2	-12.2	—	—	—	—	—	—
162.06	162.19	22.3	20.5	1.00	-15.6	-1.1	-98.1	-12.2	—	—	—	—	—	—
162.90	163.19	19.2	18.0	1.01	-22.2	-2.4	-101.6	-12.7	—	—	—	—	—	—
164.06	164.19	18.1	17.3	0.99	-19.6	-0.6	-106.3	-12.0	—	—	—	—	—	—

Summer Maize (n=40)														
181.90	182.25	27.4	22.9	1.08	-37.4	-4.1	-119.3	-15.1	-33.7	-1.6	-18.2	-1.4	-38.1	-3.7
185.06	185.20	25.1	21.9	1.06	-31.9	-3.8	-103.6	-14.1	—	—	—	0.0	—	—
186.15	186.21	31.0	25.0	1.09	-23.4	-2.5	-94.6	-12.7	—	—	—	—	—	—
188.15	188.19	23.6	20.5	1.08	-33.7	-4.9	-112.8	-15.1	—	—	—	—	—	—
188.98	189.21	25.1	21.8	1.07	-33.0	-3.7	-110.0	-13.7	-39.5	-2.9	-17.0	-1.5	-36.5	-3.6
190.94	191.20	24.8	21.8	1.04	-59.1	-7.7	-145.2	-18.3	—	—	—	—	—	—
191.98	192.21	26.2	22.6	1.06	-53.8	-6.0	-138.4	-16.7	—	—	—	—	—	—
193.10	193.21	29.7	24.5	1.08	-57.9	-7.0	-143.6	-17.0	—	—	—	—	—	—
195.02	195.22	25.0	21.8	1.07	-48.0	-6.4	-120.1	-14.9	-45.8	-3.2	-20.4	-2.2	-51.1	-5.4
197.90	198.24	23.7	20.6	1.07	-65.4	-7.8	-155.6	-19.2	—	—	—	—	—	—
198.90	199.21	31.3	25.4	1.07	-41.7	-4.9	-113.9	-14.8	—	—	—	—	—	—
202.94	203.23	22.2	19.7	1.07	-49.0	-4.9	-135.4	-15.9	-56.1	-6.0	-27.8	-3.3	-58.8	-7.3
204.06	204.22	23.9	20.7	1.08	-49.3	-5.4	-134.1	-15.8	-56.4	-5.5	-26.1	-2.4	-57.4	-6.5
204.85	205.24	24.8	21.4	1.09	-50.9	-6.0	-136.2	-16.2	—	—	—	—	—	—
205.85	206.25	24.0	21.1	1.06	-46.6	-5.0	-130.3	-15.4	—	—	—	—	—	—
206.98	207.24	22.8	20.2	1.08	-42.4	-4.8	-124.1	-14.7	—	—	—	—	—	—
208.02	208.24	25.9	21.9	1.09	-40.1	-3.7	-119.3	-14.4	—	—	—	—	—	—
208.90	209.22	26.2	22.2	1.11	-47.5	-5.5	-124.3	-14.7	—	—	—	—	—	—
209.85	210.23	27.6	23.1	1.09	-39.6	-4.1	-115.8	-13.6	—	—	—	—	—	—
210.90	211.23	32.2	25.5	1.09	-52.6	-6.1	-133.3	-16.7	—	—	—	—	—	—
214.94	215.22	25.3	21.6	1.09	-58.8	-6.7	-142.1	-16.9	—	—	—	—	—	—
216.15	216.22	25.6	21.8	1.08	-49.0	-4.9	-131.5	-15.6	-55.8	-5.9	-25.4	-1.9	-61.3	-7.0
219.10	219.25	28.5	23.5	1.09	-40.2	-3.7	-119.4	-14.6	—	—	—	—	—	—
219.94	220.25	28.3	23.5	1.09	-54.0	-5.5	-131.5	-16.1	—	—	—	—	—	—
220.90	221.25	29.0	24.0	1.08	-37.4	-3.8	-109.6	-13.8	—	—	—	—	—	—
228.90	229.23	19.6	17.4	1.10	-46.4	-6.1	-128.1	-16.7	—	—	—	—	—	—
230.94	231.23	21.6	19.1	1.06	-42.7	-4.5	-121.3	-14.9	—	—	—	—	—	—

232.15	232.26	24.0	20.8	1.07	-39.5	-3.7	-119.8	-15.3	—	—	—	—	—	—
232.85	233.26	26.1	22.0	1.09	-42.3	-4.4	-118.5	-14.7	—	—	—	—	—	—
235.10	235.23	19.2	17.2	1.06	-72.8	-9.4	-157.2	-20.8	—	—	—	—	—	—
236.06	236.25	17.7	16.1	1.06	-49.1	-5.1	-132.2	-17.0	-64.7	-8.3	-23.7	-2.4	-67.7	-8.7
237.02	237.24	23.8	20.8	1.06	-34.3	-3.2	-111.6	-14.1	-63.1	-8.1	-17.7	-1.0	-71.8	-8.7
240.98	241.26	25.1	21.5	1.07	-31.2	-3.8	-107.9	-14.1	—	—	—	—	—	—
241.90	242.24	24.5	21.2	1.07	-33.9	-3.6	-107.0	-13.5	—	—	—	—	—	—
245.02	245.25	13.7	12.1	1.06	-47.9	-5.0	-132.7	-15.7	-59.2	-7.4	-20.8	0.7	-58.6	-6.8
245.94	246.25	15.0	13.6	1.05	-40.1	-3.8	-119.5	-13.9	-55.0	-7.2	-18.2	0.4	-56.6	-6.2
249.94	250.25	19.9	18.0	1.06	-30.9	-2.4	-109.4	-13.2	—	—	—	—	—	—
250.98	251.26	23.2	20.6	1.04	-28.7	-2.3	-108.7	-13.4	—	—	—	—	—	—
255.94	256.24	16.2	14.2	1.10	-45.2	-5.6	-121.0	-15.0	-61.4	-8.1	-20.1	-1.1	-60.7	-7.7
256.98	257.26	16.3	14.3	1.09	-36.5	-4.0	-114.8	-14.0	—	—	—	—	—	—
Grassland (n=13)														
200.02	200.23	17.1	13.6	1.17	-63.6	-8.8	-148.4	-20.4	—	—	—	—	—	—
201.98	202.23	14.2	11.0	1.14	-32.3	-5.5	-119.0	-15.5	—	—	—	—	—	—
206.94	207.23	14.6	11.4	1.14	-61.2	-8.2	-144.0	-18.3	-62.7	-5.9	-40.4	3.83	-72.6	-8.8
207.98	208.23	17.2	14.2	1.14	-51.3	-6.7	-134.3	-17.4	—	—	—	—	—	—
213.85	214.23	14.2	10.8	1.15	-49.1	-7.5	-127.3	-17.5	—	—	—	—	—	—
214.98	215.23	10.7	7.2	1.09	-47.2	-5.7	-153.4	-16.3	—	—	—	—	—	—
215.90	216.23	17.0	15.6	1.03	-32.0	-2.5	-119.3	-15.8	—	—	—	—	—	—
216.94	217.23	14.3	11.9	1.08	-45.5	-5.3	-127.5	-16.1	—	—	—	—	—	—
217.90	218.23	13.0	11.1	1.04	-44.1	-3.5	-133.3	-16.1	—	—	—	—	—	—
218.90	219.23	16.5	13.9	1.10	-57.5	-5.8	-142.5	-18.5	-56.6	-2.1	-46.9	1.66	-56.8	-1.9
219.81	220.23	15.9	14.9	1.02	-53.5	-5.5	-136.4	-17.6	-65.7	-4.5	-45.6	1.68	-63.4	-3.5
222.06	222.23	14.7	12.2	1.10	-40.9	-5.2	-122.4	-16.5	—	—	—	—	—	—
246.85	247.23	15.1	13.0	1.07	-43.6	-7.6	-116.3	-16.4	—	—	—	—	—	—

1 Table S3 Linear relationships between the measured δD and $\delta^{18}O$ of precipitation, dew, atmospheric water vapor, leaf water, xylem water and
 2 soil water at 0 - 5cm depth for winter wheat and summer maize in Luancheng and grassland in Duolun during dew events. 95% confidence
 3 intervals on the regression parameters were shown. The measured deuterium excesses ($\delta D - 8\delta^{18}O$) are also shown.

	Winter wheat and Summer maize					Grassland			
	Slope	Intercept	R ²	p	d_excess	Slope	Intercept	R ²	p
precipitation (δ_p)	7.1±0.6	-1.1±4.3	0.93	<0.001	4.9±6.3	7.7±0.7	2.9±5.5	0.93	<0.001
dew (δ_d),	7.3±0.5	-6.5±1.9	0.92	<0.001	-4.5±6.0	3.8±2.6	-25.1±16.0	0.49	0.008
Atmospheric water vapor (δ_v)	7.6±0.5	-5.8±7.6	0.91	<0.001	-0.1±6.2	5.5±4.5	-38.2±77.0	0.40	0.020
bulk leaf water (δ_L)	7.4±1.9	-27.5±3.9	0.81	<0.001	-27.1±7.4	—	—	—	—
xylem (δ_x),	5.1±1.8	-21.5±10.0	0.69	<0.001	-6.3±7.4	—	—	—	—
soil (δ_s)	6.9± 1.8	-8.9±10.7	0.80	<0.001	-3.0±7.4	—	—	—	—

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1 Figure S1. Gradient measurements above the winter wheat canopy

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1 Figure S2. Gradient measurements above the summer maize canopy

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1 Figure S3. Gradient measurements measurement above the grassland canopy

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1 Figure S4. Same as in Figure 1 but for the relationships between δD and $\delta^{18}O$. For
2 comparison, also shown is the standard GMWL. Regression statistics are given in
3 Table S3.

