Table S1. Characteristics of the primary model inputs, field measured total horizontal mass flux ($Q_{t,\,act}$), and the errors of the horizontal mass flux estimation for all study sites.

Site #	Unvegetated gap (m)			Plant canopy height (m)			Scaled gap (gap/canopy height)			u_{*t} (m s^{-1})	F_G	Windspeed (m s^{-1})			$Q_{t,\,act}$ (g m^{-1} d^{-1})	r^2 of $q(z)$ fitting
	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std			Mean	Med	Max		
UT-1-1	0.86	0.63	0.69	0.10	0.10	0.06	16.0	7.6	24.3	0.46	0.18	3.33	2.98	12.0	16.9	1.00
UT-1-2	0.64	0.56	0.39	0.15	0.15	0.08	8.5	3.9	12.5	0.62	0.32	3.33	2.98	12.0	9.7	1.00
UT-1-3	1.40	0.97	1.29	0.10	0.10	0.05	17.9	10.4	21.0	0.51	0.33	3.33	2.98	12.0	10.4	1.00
UT-1-4	1.50	0.80	1.94	0.25	0.23	0.16	14.7	3.2	33.0	0.42	0.23	3.33	2.98	12.0	37.0	1.00
UT-1-5	2.64	0.84	3.14	0.63	0.52	0.42	9.9	2.2	21.1	0.29	0.33	3.33	2.98	12.0	17.1	1.00
UT-1-6	1.63	1.13	1.46	0.40	0.37	0.29	8.7	4.2	14.1	0.26	0.27	3.33	2.98	12.0	32.0	1.00
UT-1-7	1.43	1.02	1.37	0.42	0.22	0.39	10.4	3.1	21.8	0.26	0.32	3.33	2.98	12.0	8.07	1.00
UT-1-8	1.23	0.71	1.63	0.06	0.05	0.04	26.8	15.0	35.0	0.45	0.13	3.33	2.98	12.0	10.4	1.00
UT-1-9	1.60	0.94	1.69	0.16	0.15	0.10	12.6	8.1	14.1	0.57	0.18	3.33	2.98	12.0	24.1	1.00
UT-1-10	50	50	0.00	0.00	0.00	0.00	5000	5000	0	0.48	0.00	3.33	2.98	12.0	20.0	1.00
UT-1-11	4.59	3.28	3.56	0.05	0.03	0.05	153	114	150	0.43	0.11	3.33	2.98	12.0	32.0	1.00
UT-1-12	16.76	22.06	9.32	0.04	0.02	0.04	860	588	888	0.45	0.16	3.33	2.98	12.0	15.9	1.00
UT-1-13	5.51	4.33	5.71	0.48	0.37	0.33	40.1	18.8	67.8	0.56	0.34	3.33	2.98	12.0	7.2	1.00
UT-1-14	6.02	4.84	5.28	0.34	0.17	0.39	38.7	17.5	53.6	0.53	0.40	3.33	2.98	12.0	47.9	1.00
UT-1-15	50	50	0.00	0.00	0.00	0.00	5000	5000	0	0.71	0.00	3.33	2.98	12.0	21.9	1.00
UT-1-16	1.04	0.67	0.85	0.43	0.40	0.24	3.7	2.1	4.3	0.63	0.36	3.33	2.98	12.0	19.5	1.00
UT-1-17	3.36	1.49	4.66	0.33	0.27	0.26	29.3	6.8	49.6	0.62	0.17	3.33	2.98	12.0	8.86	1.00
UT-1-18	1.75	1.23	1.86	0.10	0.06	0.09	41.2	22.2	56.8	0.44	0.11	3.33	2.98	12.0	64.6	1.00
UT-1-19	1.79	1.13	1.94	0.11	0.08	0.11	26.1	15.6	30.8	0.55	0.18	3.33	2.98	12.0	30.2	1.00
UT-1-20	1.60	1.28	1.40	0.13	0.12	0.09	33.4	11.0	59.9	0.57	0.16	3.33	2.98	12.0	7.03	1.00
UT-1-21	1.80	1.39	1.46	0.14	0.07	0.13	33.1	15.5	52.1	0.50	0.18	3.33	2.98	12.0	7.06	1.00
UT-1-22	1.16	0.85	1.16	0.09	0.08	0.08	23.3	10.5	35.0	0.77	0.20	3.33	2.98	12.0	9.92	1.00

Table S1, Continued

Site #	Unvegetated gap (m)			Plant canopy height (m)			Scaled gap (gap/canopy height)			u_{*t} (m s^{-1})	F_G	Windspeed (m s^{-1})			$Q_{t,\,act}$ (g m^{-1} d^{-1})	r^2 of $q(z)$ fitting
	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std			Mean	Med	Std		
UT-1-23	1.05	0.75	0.92	0.13	0.07	0.15	18.0	10.3	18.9	0.64	0.21	3.33	2.98	12.0	8.50	1.00
UT-1-24	1.84	1.15	2.24	0.09	0.05	0.09	34.3	16.8	56.3	0.50	0.09	3.33	2.98	12.0	4.56	1.00
UT-1-25	1.50	0.93	2.03	0.25	0.10	0.80	22.8	9.5	41.3	0.54	0.18	3.33	2.98	12.0	20.6	1.00
JER-1	1.04	0.69	0.97	0.25	0.17	0.32	7.0	4.5	7.9	0.31	0.28	3.89	3.36	17.1	5.11	0.98
JER-2	1.20	0.89	0.86	0.32	0.19	0.52	8.9	5.5	11.7	0.28	0.22	3.89	3.36	17.1	11.1	0.97
JER-3	1.70	1.19	1.69	0.22	0.14	0.28	21.6	11.2	29.3	0.33	0.20	3.89	3.36	17.1	14.9	0.99
JER-4	2.90	1.71	3.37	0.24	0.14	0.24	57.1	14.7	95.9	0.36	0.10	3.89	3.36	17.1	16.8	0.99
JER-5	3.84	2.82	2.71	0.42	0.43	0.29	75.8	9.1	176	0.32	0.19	3.89	3.36	17.1	98.3	1.00
JER-6	1.01	0.81	0.84	0.23	0.18	0.24	7.1	4.5	9.5	0.41	0.29	3.89	3.36	17.1	5.33	0.96
JER-7	1.85	1.02	1.93	0.14	0.08	0.13	19.7	13.7	23.0	0.32	0.24	3.89	3.36	17.1	6.19	0.97
JER-8	3.30	2.66	2.56	0.21	0.09	0.25	38.8	20.3	53.1	0.38	0.24	3.89	3.36	17.1	17.8	0.97
JER-9	3.38	3.11	2.14	0.14	0.06	0.19	82.8	37.4	96.2	0.43	0.12	3.89	3.36	17.1	40.5	0.99
JER-10	5.57	4.74	3.69	0.09	0.03	0.17	182.6	146.5	139	0.34	0.16	3.89	3.36	17.1	59.7	0.98
JER-11	0.85	0.58	0.73	0.16	0.15	0.08	7.0	4.7	8.9	0.54	0.45	4.15	3.51	17.3	14.2	0.91
JER-12	1.36	1.13	1.16	0.18	0.10	0.32	17.3	8.6	22.0	0.28	0.20	4.15	3.51	17.3	18.3	0.99
JER-13	1.37	0.95	1.07	0.10	0.05	0.13	27.6	16.0	30.1	0.39	0.18	4.15	3.51	17.3	11.5	0.94
JER-14	2.19	1.91	1.54	0.18	0.07	0.30	39.9	24.9	50.7	0.41	0.12	4.15	3.51	17.3	22.0	1.00
JER-15	6.38	3.29	6.84	0.47	0.41	0.39	125	8.7	298	0.35	0.30	4.15	3.51	17.3	90.9	0.99
UT-2-1	0.87	0.68	0.73	0.10	0.09	0.07	12.3	7.4	14.0	0.54	0.33	2.28	1.67	13.9	5.93	1.00
UT-2-2	0.69	0.51	0.56	0.12	0.07	0.14	17.5	9.6	24.5	0.47	0.46	2.28	1.67	13.9	4.90	1.00
UT-2-3	1.08	0.83	0.85	0.47	0.48	0.29	10.3	2.1	31.2	0.50	0.40	2.28	1.67	13.9	2.60	1.00
UT-2-4	0.88	0.56	0.89	0.39	0.41	0.28	9.0	2.1	29.2	0.53	0.37	2.28	1.67	13.9	3.65	1.00
UT-2-5	0.84	0.55	0.83	0.09	0.06	0.09	22.6	8.8	47.2	0.40	0.34	2.28	1.67	13.9	20.9	1.00

Table S1, Continued

Site #	Unvegetated gap (m)			Plant canopy height (m)			Scaled gap (gap/canopy height)			u_{*t} (m s^{-1})	F_G	Windspeed (m s^{-1})			$Q_{t,\,act}$ (g m^{-1} d^{-1})	r^2 of $q(z)$ fitting
	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std			Mean	Med	Std		
UT-2-6	0.71	0.49	0.65	0.14	0.10	0.11	16.2	6.0	31.2	0.43	0.53	2.28	1.67	13.9	9.86	1.00
UT-2-7	0.94	0.59	1.08	0.07	0.03	0.08	34.8	18.8	49.5	0.41	0.35	2.28	1.67	13.9	8.60	1.00
UT-2-8	0.74	0.63	0.50	0.13	0.07	0.13	17.0	7.5	21.3	0.50	0.43	2.28	1.67	13.9	7.55	1.00
UT-2-9	0.96	0.70	0.76	0.11	0.04	0.16	30.2	13.5	46.1	0.42	0.36	2.28	1.67	13.9	11.8	1.00
UT-2-10	0.74	0.58	0.52	0.11	0.07	0.12	22.1	11.0	41.1	0.44	0.48	2.28	1.67	13.9	3.02	1.00
UT-3-1	2.93	2.36	2.55	0.13	0.06	0.13	72.1	27.8	115	0.51	0.16	3.40	2.41	15.2	33.0	1.00
UT-3-2	3.95	2.20	5.33	0.05	0.03	0.04	144	41.4	370	0.47	0.11	3.40	2.41	15.2	21.0	1.00
OV-1	1.82	1.22	1.56	0.26	0.12	0.28	13.8	8.8	17.5	0.91	0.36	3.07	2.51	26.4	2.04	0.92
OV-2	1.35	1.12	1.04	0.28	0.25	0.21	8.6	5.2	11.0	0.40	0.43	3.07	2.51	26.4	6.04	0.99
OV-3	1.64	0.98	1.52	0.40	0.35	0.28	7.8	4.9	9.2	0.51	0.65	3.07	2.51	26.4	3.15	0.90
OV-4	1.04	0.69	0.86	0.31	0.25	0.25	8.7	4.8	11.0	0.51	0.67	3.07	2.51	26.4	3.94	1.00
OV-5	1.74	1.39	1.50	0.41	0.22	0.55	11.6	5.8	16.0	0.51	0.44	3.07	2.51	26.4	1.28	1.00
OV-6	0.74	0.53	0.66	0.36	0.31	0.28	4.8	3.0	5.4	0.58	0.78	3.07	2.51	26.4	3.38	1.00
OV-7	2.08	0.60	8.69	0.39	0.28	0.28	7.8	2.1	29.1	0.51	0.47	3.07	2.51	26.4	1.27	0.56
OV-8	0.72	0.60	0.55	0.42	0.34	0.29	16.0	4.8	37.6	0.56	0.53	3.07	2.51	26.4	5.79	1.00
OV-9	4.04	2.97	3.45	0.42	0.38	0.28	12.5	6.2	16.6	0.55	0.36	3.07	2.51	26.4	8.09	0.96
OV-10	1.15	0.81	1.12	0.22	0.15	0.19	10.4	5.4	16.2	0.68	0.42	3.07	2.51	26.4	4.97	0.97
OV-11	0.85	0.60	0.93	0.25	0.16	0.22	6.4	3.8	10.0	0.58	0.45	3.07	2.51	26.4	3.43	0.99
OV-12	1.16	0.83	1.27	0.15	0.12	0.09	10.0	5.8	14.0	0.36	0.29	3.07	2.51	26.4	3.00	0.66
OV-13	1.54	1.21	1.23	0.37	0.19	0.33	164	91.3	182	0.40	0.55	3.07	2.51	26.4	3.39	0.97

Note:
1) The site names of UT-1, JER, UT-2, UT-3, and OV represent Moab, UT; Jornada Experimental Range, NM; Fivemile Mountain, UT; Clear Spot, UT; and Owens Valley, CA, respectively.
2) Mean, Med, and Max represent the mean, median, and maximum value of the variables, representatively.
3) For more information of the study sites, refer to Table 1.
4) q(z) is the time-averaged horizontal mas flux (g m^{-2} d^{-1}) and the fitting was performed according to Equation (1).