

Table S1. Field isotropic tracer studies across the globe as displayed in Fig. 2. Crop species are specified and partitioned in the table due to wide variability of cultivated vegetation types (includes both herbaceous and woody species). Decay of water uptake with depth found in the study (1 = yes, 0 = no). Temporary plant uptake of upper layer soil moisture found in the study (1 = yes, 0 = no).

Reference	Reference Index	Plant Category	Latitude	Longitude	Mean Annual Precipitation (mm)	Uptake Range Top (cm)	Uptake Range Bottom (cm)	Isotope Sampling Months	Decay of Water Uptake With Depth	Temporary Uptake of Upper Layers
Meinzer et al. 1999	1	Tree	9	-79.5	2600	0	100	Jan. to May	0	1
Kulmatiski et al. 2010	2	Grass	-25	31.5	746	0	20	Oct., Nov., Feb., Apr.	1	0
Kulmatiski et al. 2010	2	Tree	-25	31.5	746	0	50	Oct., Nov., Feb., Apr.	0	0
Kulmatiski et al. 2013	3	Grass	-25	31.5	746	0	20	Nov., Feb., May	1	0
Kulmatiski et al. 2013	3	Tree	-25	31.5	746	0	20	Nov., Feb., May	1	0
Nippert and Knapp 2007	4	Grass	39	-96	850	0	30	Jun. to Aug.	1	0
Nippert and Knapp 2007	4	Shrub	39	-96	850	0	30	Jun. to Aug.	1	0
Le Roux et al. 1995	5	Grass	6.25	-5	1210	10	20	May, Nov., Jan.	0	0
Le Roux et al. 1995	5	Shrub	6.25	-5	1210	10	30	May, Nov., Jan.	0	0
Jackson et al. 1995	6	Tree	9	-79.5	2600	20	100	Dec. to May	0	0
Asbjornsen et al. 2008	7	Grass	41.5	-93	882	0	20	May to Sep.	0	0
Asbjornsen et al. 2008	7	Crop (Soybean)	41.5	-93	882	0	20	May to Sep.	0	0
Asbjornsen et al. 2008	7	Crop (Corn)	41.5	-93	882	0	20	May to Sep.	0	0
Asbjornsen et al. 2008	7	Shrub	41.5	-93	882	0	55	May to Sep.	1	1
Asbjornsen et al. 2008	7	Tree	41.5	-93	882	0	150	May to Sep.	0	1
Brooks et al. 2002	8	Tree	44	-121	550	0	200	Jul. to Sep.	0	1
Li et al. 2006	9	Tree	48	108.5	296	0	30	Jun. to Oct.	0	0
Schulze et al. 1996	10	Grass	-45.3	-69.8	125	0	30	Mar.	1	0
Schulze et al. 1996	10	Grass	-45.3	-70.3	160	0	30	Mar.	1	0
Schulze et al. 1996	10	Grass	-44.8	-71.3	290	0	30	Mar.	1	0
Schulze et al. 1996	10	Tree	-44.8	-71.6	770	0	80	Mar.	0	1
Ogle et al. 2004	11	Shrub	33	-107	230	0	70	Jul. to Aug.	1	1
Prechsl et al. 2015	12	Grass	47.2	8.3	1110	0	30	Apr. to Oct.	1	0
Prechsl et al. 2015	12	Grass	46.5	9.75	950	0	30	Apr. to Oct.	1	0

Eggemeyer et al. 2009	13	Grass	41.9	-100.3	573	5	50	Jan. to Nov.	0	0
Eggemeyer et al. 2009	13	Tree	41.9	-100.3	573	5	90	Jan. to Nov.	1	1
Hoekstra et al. 2014	14	Grass	47.47	8.9	927	0	40	Jun. to Aug.	0	0
Hoekstra et al. 2014	14	Grass	47.4	8.5	1176	0	40	Jun. to Aug.	0	0
Weltzin et al. 1997	15	Grass	31.5	-110.3	602	0	35	Apr., Sep.	1	0
Weltzin et al. 1997	15	Tree	31.5	-110.3	602	0	90	Apr., Sep.	0	1
Moreira et al. 2000	16	Grass	-3	-47	1800	0	100	Apr. Jun., Jul., Dec.	1	0
Moreira et al. 2000	16	Shrub	-3	-47	1800	0	25	Apr. Jun., Jul., Dec.	0	0
Retzlaff et al. 2001	17	Tree	34.8	-79.6	1200	0	120	Mar. to Nov.	1	1
Jackson et al. 1999	18	Tree	-15.8	-47.8	1550	0	300	Aug., Sep.	0	0
Plamboeck et al. 1999	19	Tree	64.25	19.75	614	0	55	Jul., Aug.	1	0
Wu et al. 2014	20	Shrub	44.25	87.75	160	0	300	Mar. to Oct.	0	0
Wu et al. 2014	20	Shrub	44.25	87.75	160	0	60	Mar. to Oct.	1	0
Ohte et al. 2003	21	Tree	39	109.15	362	0	150	Sep.	0	0
Ohte et al. 2003	21	Shrub	39	109.15	362	0	50	Sep.	1	0
Goldsmith et al. 2012	22	Tree	19.75	-97	3186	0	40	Mar., May	0	0
Goldsmith et al. 2012	22	Tree	19.75	-97	3186	60	80	Mar., May	0	0
Hartsough et al. 2008	23	Tree	19.5	-103.5	1100	0	30	Mar., Nov.	0	0
Liu et al. 2010	24	Tree	21.9	101.25	1487	0	60	Mar., Dec.	0	1
Liu et al. 2010	24	Tree	21.9	101.25	1487	0	150	Mar., Dec.	0	1
Chimner et al. 2004	25	Shrub	37.7	-105.8	121	0	200	Jun., Aug.	0	1
Williams et al. 2000	26	Tree	34	-110	430	0	50	May to Sep.	0	1
Williams et al. 2000	26	Tree	39	-110	390	0	50	May to Sep.	0	1
Williams et al. 2000	26	Tree	39	-110	390	50	100	May to Sep.	0	0
Dai et al. 2015	27	Shrub	44.33	87.9	125	0	300	Apr. to Sep.	0	1
Yang et al. 2015	28	Crop (Corn)	38.5	100.33	129	0	10	Apr. to Sep.	0	0
Zhu et al. 2011	29	Shrub	38.5	103	111	0	120	May, Jul., Sep.	0	1
Ma et al. 2018	30	Crop (Wheat)	39.5	116.5	540	0	70	Jul., Aug.	1	1
Munoz-Villers et al. 2020	31	Crop (Coffee)	19.5	-97	1765	0	15	Jan. to May, Aug.	0	0
Munoz-Villers et al. 2020	31	Tree	19.5	-97	1765	0	120	Jan. to May, Aug.	1	1
Ellsworth et al. 2015	32	Tree	27.2	-81.33	1346	20	150	Jan. to Dec.	0	0
Wu et al. 2016	33	Crop (Corn)	37.8	102.9	164	0	80	Jun. to Aug.	1	1
Liu et al. 2019	34	Tree	37.5	114.5	521	0	40	Mar. to Sep.	0	0
Asbjornsen et al. 2007	35	Crop (Corn)	41.5	-93.25	882	0	20	Jul.	0	0

Wang et al. 2010	36	Crop (Corn)	34.9	110.75	590	0	50	May to Oct.	1	1
Wang et al. 2010	36	Crop (Cotton)	34.9	110.75	590	0	90	May to Oct.	1	1
Liu et al. 2011	37	Shrub	30.85	103	711	0	30	Aug.	0	0
Ratajczak et al. 2011	38	Shrub	39.1	-96.6	835	0	75	Jun. to Sep.	1	0
Ratajczak et al. 2011	38	Grass	39.1	-96.6	835	0	30	Jun. to Sep.	1	0
Case et al. 2020	39	Grass	-24	31.5	479	0	10	May, Jun.	0	0
Case et al. 2020	39	Tree	-24	31.5	479	0	50	May, Jun.	1	1
Case et al. 2020	39	Grass	-24	31.5	510	0	20	May, Jun.	1	0
Case et al. 2020	39	Tree	-24	31.5	510	0	100	May, Jun.	0	0
Case et al. 2020	39	Grass	-24	31.5	600	0	50	May, Jun.	1	1
Case et al. 2020	39	Tree	-24	31.5	600	0	100	May, Jun.	1	1
Hahn et al. 2021	40	Tree	0.5	35.3	1988	0	150	Sep. to Dec.	1	1
Brinkmann et al. 2019	41	Tree	47.5	8.3	1110	0	70	Apr. to Nov.	0	1
Sun et al. 2021	42	Crop (Pea)	47.5	8.5	994	0	20	May to Jul.	1	0
Sun et al. 2021	42	Crop (Barley)	47.5	8.5	994	0	60	May to Jul.	1	0
Clement et al. 2022	43	Crop (Alfalfa)	55.7	12.3	523	0	100	Jun. to Aug.	1	1
Clement et al. 2022	43	Crop (Wheatgrass)	55.7	12.3	523	0	100	Jun. to Aug.	1	1
Bachmann et al. 2015	44	Grass	50.9	11.5	587	0	10	Apr., Jun., Sep.	0	0
Penna et al. 2021	45	Crop (Apple Tree)	46.6	10.7	480	0	40	Jun. to Sep.	1	0

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