

Supplement of Hydrol. Earth Syst. Sci., 19, 551–565, 2015
<http://www.hydrol-earth-syst-sci.net/19/551/2015/>
doi:10.5194/hess-19-551-2015-supplement
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Supplement of

Identifying the origin and geochemical evolution of groundwater using hydrochemistry and stable isotopes in the Subei Lake basin, Ordos energy base, Northwestern China

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Table S1 The chemical composition and isotopic data of groundwater in August and December 2013.

ID	Date	Age	EC ($\mu\text{S}/\text{cm}$)	T ($^{\circ}\text{C}$)	pH	DO (mg/L)	ORP (mV)	K ⁺ (mg/L)	Na ⁺ (mg/L)	Ca ²⁺ (mg/L)	Mg ²⁺ (mg/L)	Cl ⁻ (mg/L)	SO ₄ ²⁻ (mg/L)	HCO ₃ ⁻ (mg/L)	NO ₃ ⁻ (mg/L)	TDS (mg/L)	δD (‰)	$\delta^{18}\text{O}$ (‰)	CAI-I	CAI-II	Well depth (m)
EEDS01	29-Aug-2013	K	470	18.9	7.9	7.42	20.5	1.53	27.11	38.25	18.16	11.19	20.82	202.52	48.10	266.42	-63	-8.4	-2.87	-0.20	200
EEDS02	29-Aug-2013	K	435	13.1	8	8.61	95.2	0.94	14.07	46.91	14.37	12.85	42.16	158.60	38.83	249.42	-57	-7.5	-0.76	-0.07	20
EEDS03	29-Aug-2013	Q	1124	18.1	7.9	3.78	103.8	3.27	95.11	67.52	43.22	61.27	215.72	286.70	1.08	630.54	-72	-9.0	-1.44	-0.27	15
EEDS04	29-Aug-2013	Q	1818	11.5	7.6	2.01	-5.5	3.93	87.33	178.70	93.87	25.30	700.07	223.26	1.02	1201.85	-62	-8.0	-4.47	-0.17	12
EEDS05	29-Aug-2013	K	622	12.8	7.9	5.34	60.9	3.14	59.34	41.53	17.38	37.86	42.61	254.98	44.14	373.49	-71	-8.7	-1.49	-0.28	150
EEDS06	29-Aug-2013	K	735	13	7.7	6.95	88.9	3.15	39.80	69.96	21.18	32.80	37.76	258.64	94.28	428.24	-64	-8.2	-0.96	-0.14	80
EEDS07	29-Aug-2013	Q	717	11.5	8.3	2.93	14.4	3.07	97.66	26.09	20.57	40.92	82.01	259.86	1.02	401.27	-74	-9.2	-2.75	-0.53	5
EEDS10	29-Aug-2013	Q	722	12.5	8.1	2.89	-51.3	2.85	72.90	38.36	26.91	47.75	66.11	278.16	2.43	396.39	-74	-9.1	-1.41	-0.32	15
EEDS11	29-Aug-2013	Q	940	14.6	7.6	1.8	-84.9	3.21	103.10	57.44	29.74	50.75	141.39	308.66	1.51	541.46	-72	-8.9	-2.19	-0.39	15
EEDS12	29-Aug-2013	K	1373	13.6	7.4	2.99	-111.1	4.44	90.13	101.00	67.77	110.03	191.56	442.86	3.47	789.84	-68	-7.7	-0.30	-0.08	15
EEDS13	29-Aug-2013	K	687	12.1	7.9	4.31	-8.1	2.72	57.11	44.65	25.60	62.46	48.25	230.58	26.12	382.21	-72	-8.8	-0.45	-0.15	60
EEDS14	29-Aug-2013	Q	1613	18.1	9	2.84	-22.1	8.96	227.50	11.01	57.87	216.55	204.69	307.44	12.60	892.90	-71	-8.7	-0.66	-0.42	2
EEDS15	30-Aug-2013	K	2330	11.1	7.4	3.26	35.7	7.55	203.50	150.60	99.62	190.48	157.87	1044.32	28.27	1360.04	-65	-8.4	-0.69	-0.18	80
EEDS16	30-Aug-2013	K	476	11	8.3	2.85	53	2.51	66.92	18.86	14.72	10.82	15.82	256.20	19.63	277.38	-70	-9.3	-8.76	-0.55	80
EEDS17	30-Aug-2013	K	635	11	7.9	7.29	49.6	3.36	40.40	52.81	24.45	25.27	30.50	261.08	65.82	373.15	-67	-8.7	-1.59	-0.19	80
EEDS18	30-Aug-2013	K	1070	12.3	7.8	7.99	59.6	4.02	45.08	77.29	54.99	36.29	50.22	281.82	318.26	727.06	-65	-8.5	-1.02	-0.10	150
EEDS19	30-Aug-2013	K	910	12.3	7.8	7.21	20	3.29	51.78	80.58	32.85	39.75	45.01	295.24	178.17	579.05	-65	-8.2	-1.09	-0.14	80
EEDS20	30-Aug-2013	K	522	14.9	8	6.13	22.1	3.50	36.45	42.34	18.67	14.28	21.02	251.32	28.66	290.59	-65	-8.5	-3.16	-0.25	4.05
EEDS21	30-Aug-2013	K	626	12.1	7.9	7.81	50	3.49	42.24	46.56	24.85	26.96	27.53	240.34	67.64	359.44	-66	-8.4	-1.54	-0.21	100
EEDS22	30-Aug-2013	K	636	11.5	7.9	7.98	54	3.57	36.18	51.87	26.63	31.17	36.91	242.78	65.34	373.07	-62	-7.8	-0.90	-0.14	150
EEDS23	30-Aug-2013	K	561	13.2	8	7.98	40.7	2.86	34.40	44.77	23.01	27.51	25.02	225.70	56.48	326.90	-65	-8.3	-1.03	-0.15	150
EEDS24	30-Aug-2013	K	446	12.4	7.9	7.26	43.6	3.23	25.31	39.35	20.35	9.63	14.89	235.46	36.72	267.21	-63	-8.1	-3.36	-0.19	50
EEDS25	30-Aug-2013	K	876	12.2	7.7	7.75	58.7	3.91	43.42	80.15	37.37	44.26	54.60	320.86	129.77	553.90	-60	-7.8	-0.59	-0.09	50
EEDS26	30-Aug-2013	K	521	11.7	7.7	5.78	53.3	2.83	27.14	49.53	22.23	11.85	23.36	242.78	53.84	312.18	-61	-7.8	-2.75	-0.17	160
EEDS27	30-Aug-2013	K	684	11.4	7.6	3.87	55.6	4.14	39.38	59.73	31.23	21.80	30.47	352.58	22.78	385.82	-61	-7.8	-1.96	-0.18	120
EEDS28	30-Aug-2013	K	737	10.8	7.7	3.45	58.1	4.71	33.36	64.99	34.70	29.73	31.79	344.04	39.27	410.57	-62	-7.8	-0.88	-0.11	60
EEDS29	30-Aug-2013	K	486	14.6	7.8	5.55	30.3	1.74	32.94	39.81	18.48	21.79	30.43	204.96	29.24	276.92	-65	-8.4	-1.41	-0.19	130
EEDS30	30-Aug-2013	K	575	13.2	8.2	1.96	65.3	0.98	83.24	14.05	17.46	36.95	56.57	215.94	1.16	318.38	-75	-8.5	-2.50	-0.55	100
EEDS31	30-Aug-2013	K	573	11.6	8.1	2.54	43.9	1.47	76.99	16.71	22.18	38.63	56.38	224.48	1.83	326.42	-74	-8.4	-2.11	-0.47	150
EEDS32	30-Aug-2013	K	799	14.2	7.4	3.19	55.9	2.47	35.86	88.08	26.47	37.21	41.85	361.12	30.37	442.87	-66	-8.3	-0.55	-0.08	50
EEDS33	30-Aug-2013	K	927	11.7	7.5	6.1	69.3	2.00	65.00	72.78	35.48	71.41	69.30	298.90	92.98	558.39	-71	-8.9	-0.43	-0.11	80
EEDS34	30-Aug-2013	K	560	14.7	7.9	7.99	85	1.72	35.78	40.11	25.14	22.80	43.60	180.56	80.56	340.00	-61	-7.6	-1.49	-0.19	100
EEDS35	30-Aug-2013	K	604	16.1	7.8	7.92	76	2.58	31.24	52.35	22.18	25.43	56.65	158.60	100.72	370.44	-65	-8.0	-0.99	-0.13	100
EEDS36	30-Aug-2013	K	2103	14.6	7.4	6.18	87.4	2.82	129.70	171.80	75.19	214.62	229.47	369.66	374.56	1382.99	-69	-8.8	0.06	0.02	80
EEDS37	30-Aug-2013	K	697	10.9	7.8	7.38	84.3	2.35	50.59	55.65	24.70	47.18	51.26	233.02	58.69	406.93	-72	-9.3	-0.70	-0.16	150
EEDS01	4-Dec-2013	K	472	9.3	8.3	9.41	60.8	1.76	26.18	38.98	18.23	6.51	17.02	195.49	38.42	244.85	-62	-7.7	-5.45	-0.24	200
EEDS02	4-Dec-2013	K	433	10.9	8.3	9.05	61.3	1.26	13.23	46.20	15.14	9.09	35.74	130.82	31.30	217.37	-58	-6.9	-1.37	-0.10	20
EEDS03	2-Dec-2013	Q	2010	9.4	7.5	2.63	34.8	3.79	109.10	148.40	111.40	48.91	544.94	280.75	0.95	1107.86	-72	-8.9	-2.51	-0.22	15
EEDS04	2-Dec-2013	Q	1864	9.2	7.8	4.31	-7.4	3.69	80.31	181.90	97.91	17.87	604.34	205.78	0.87	1089.79	-61	-7.8	-6.12	-0.19	12
EEDS05	5-Dec-2013	K	596	10.8	8.5	2.88	43.4	2.33	81.08	21.45	11.61	28.38	55.08	176.39	2.88	290.99	-75	-9.6	-3.48	-0.68	150

Table S1 (continued)

ID	Date	Age	EC ($\mu\text{S/cm}$)	T ($^{\circ}\text{C}$)	pH	DO (mg/L)	ORP (mV)	K ⁺ (mg/L)	Na ⁺ (mg/L)	Ca ²⁺ (mg/L)	Mg ²⁺ (mg/L)	Cl ⁻ (mg/L)	SO ₄ ²⁻ (mg/L)	HCO ₃ ⁻ (mg/L)	NO ₃ ⁻ (mg/L)	TDS (mg/L)	δD (‰)	$\delta^{18}\text{O}$ (‰)	CAI-I	CAI-II	Well depth (m)
EEDS06	3-Dec-2013	K	728	10.4	8.2	7.48	72.4	3.20	41.19	73.67	22.61	25.07	35.95	245.47	84.54	408.98	-61	-8.1	-1.65	-0.19	80
EEDS10	5-Dec-2013	Q	816	10.1	8.2	2.37	-30	2.66	75.85	41.64	30.32	38.20	65.34	286.63	1.00	398.31	-70	-8.8	-2.13	-0.38	15
EEDS11	5-Dec-2013	Q	1008	10.1	7.9	3.02	-85.7	2.72	94.22	57.72	30.75	36.74	129.71	296.92	0.90	501.22	-67	-8.4	-3.03	-0.41	15
EEDS12	5-Dec-2013	K	1329	10.6	7.8	4.58	-32.6	4.01	78.55	85.15	60.02	65.55	138.26	408.63	0.96	636.80	-62	-6.5	-0.91	-0.17	15
EEDS13	5-Dec-2013	K	771	8.1	8.2	4.78	68.9	2.53	57.20	42.12	25.98	47.75	40.74	216.07	23.41	347.77	-70	-8.6	-0.90	-0.25	60
EEDS14	5-Dec-2013	Q	1910	5.4	9.3	4.47	-47.1	6.81	226.00	13.01	82.01	172.71	300.62	211.66	1.28	908.27	-74	-8.9	-1.06	-0.53	2
EEDS15	6-Dec-2013	K	2470	8.5	7.5	3.67	19.6	7.31	206.40	146.50	98.95	134.86	139.66	967.19	22.20	1239.47	-62	-8.1	-1.41	-0.28	80
EEDS16	6-Dec-2013	K	508	8.7	8.4	3.3	31.4	2.52	65.03	19.89	15.03	10.25	14.86	236.65	16.52	262.43	-67	-9.0	-9.01	-0.58	80
EEDS17	6-Dec-2013	K	674	10.6	8.1	6.42	25.9	3.30	38.22	52.24	24.33	18.20	26.07	249.88	50.91	338.20	-66	-8.4	-2.41	-0.23	80
EEDS18	6-Dec-2013	K	434	10.9	8.2	5.13	72.9	2.88	20.51	24.17	25.70	7.05	7.46	210.19	27.92	220.79	-66	-8.6	-3.86	-0.19	150
EEDS19	6-Dec-2013	K	641	9.8	8.2	6.17	42.2	2.89	44.10	48.51	21.44	15.19	21.66	252.82	57.86	338.07	-64	-8.4	-3.65	-0.28	80
EEDS20	6-Dec-2013	K	556	5.1	8.4	8.58	37.5	2.92	37.80	46.22	20.18	11.44	20.68	258.70	11.41	279.99	-58	-7.3	-4.33	-0.29	4.05
EEDS21	6-Dec-2013	K	638	9.8	8.1	7.42	29.8	3.57	40.16	45.30	24.57	19.76	23.59	232.24	54.60	327.67	-66	-8.6	-2.30	-0.25	100
EEDS22	6-Dec-2013	K	617	10.9	8.1	8.09	43.9	4.21	35.26	48.42	25.23	21.66	28.62	227.83	49.31	326.63	-61	-8.0	-1.69	-0.20	150
EEDS23	6-Dec-2013	K	586	14.2	8.3	8.34	44	3.15	37.13	43.05	22.30	18.82	21.57	216.07	45.75	299.80	-64	-8.4	-2.20	-0.25	150
EEDS24	6-Dec-2013	K	475	9.4	8.1	7.03	47.9	3.43	23.91	39.07	20.00	7.99	12.82	216.07	30.28	245.53	-63	-8.0	-4.01	-0.21	50
EEDS25	6-Dec-2013	K	529	9.4	8.2	7.28	66	4.11	26.73	46.34	23.46	11.25	17.94	248.41	38.82	292.86	-63	-8.0	-3.00	-0.19	50
EEDS26	6-Dec-2013	K	506	10.2	8.1	7.42	64.2	3.06	24.26	45.27	20.33	8.63	19.53	238.12	32.37	272.51	-60	-7.5	-3.66	-0.18	160
EEDS27	6-Dec-2013	K	747	8.1	8	3.56	54.5	4.42	38.23	58.44	31.10	15.28	27.55	335.13	18.07	360.65	-61	-7.3	-3.13	-0.21	120
EEDS28	6-Dec-2013	K	758	9.2	8	3.17	65.1	5.09	33.16	65.64	35.55	20.52	26.42	338.07	26.47	381.89	-62	-7.3	-1.72	-0.15	60
EEDS29	5-Dec-2013	K	500	6.4	8.2	7.86	90.6	4.90	36.64	42.62	18.72	16.39	26.40	195.49	24.93	268.35	-62	-8.7	-2.72	-0.30	130
EEDS30	5-Dec-2013	K	600	10.5	8.4	2.71	50	1.47	81.24	14.33	17.84	25.87	48.66	208.72	1.01	294.78	-73	-8.7	-3.90	-0.64	100
EEDS31	5-Dec-2013	K	630	8.7	8.4	2.48	47.9	1.59	74.27	16.76	22.35	27.14	48.39	210.19	1.52	297.11	-73	-8.5	-3.28	-0.56	150
EEDS32	4-Dec-2013	K	778	9.8	7.7	3.87	85.8	2.54	32.64	86.23	25.43	24.20	36.84	308.68	28.29	390.51	-64	-8.4	-1.18	-0.13	50
EEDS33	4-Dec-2013	K	650	8	8.2	6.72	77.7	1.73	41.35	48.61	24.70	21.33	32.26	238.12	41.39	330.44	-69	-9.0	-2.07	-0.24	80
EEDS34	4-Dec-2013	K	530	9.7	8.3	7.94	54.6	1.59	39.72	30.95	22.72	10.24	18.17	213.13	41.55	271.50	-65	-8.5	-5.13	-0.33	100
EEDS35	4-Dec-2013	K	554	9.8	8.2	8.34	58.9	1.69	32.36	30.40	30.67	10.41	21.56	217.54	52.04	287.90	-68	-8.5	-3.95	-0.24	100
EEDS36	4-Dec-2013	K	1852	11	7.8	6.16	59.8	2.89	103.90	144.50	62.20	110.34	147.80	352.77	235.44	983.45	-68	-8.4	-0.48	-0.12	80
EEDS37	4-Dec-2013	K	897	9.4	8	6.58	61.6	2.43	65.20	63.57	28.75	41.43	57.08	244.00	83.14	463.61	-71	-9.3	-1.48	-0.26	150
EEDS39	2-Dec-2013	K	765	9.4	7.9	6.45	20.2	2.91	64.33	58.07	18.82	16.89	42.67	279.28	50.79	394.11	-61	-8.5	-5.04	-0.38	15
EEDS40	2-Dec-2013	K	659	10.1	9.4	3.34	28.2	1.74	126.40	2.07	1.21	23.22	2.02	273.40	8.40	301.76	-72	-9.7	-7.47	-1.05	100
EEDS41	2-Dec-2013	Q	997	11.1	8.3	2.51	-51.1	4.99	37.88	101.80	42.91	16.29	168.50	305.74	0.91	526.15	-57	-7.2	-2.87	-0.15	20
EEDS42	2-Dec-2013	Q	766	10	7.8	2.52	-57.2	3.54	45.51	76.37	24.47	31.24	76.44	283.69	1.23	400.64	-60	-8.1	-1.35	-0.19	20
EEDS43	2-Dec-2013	K	563	9.4	8.8	8.12	59.6	3.33	19.65	60.79	15.52	17.24	22.41	213.13	43.54	289.04	-64	-8.5	-0.94	-0.10	150
EEDS44	2-Dec-2013	K	963	8.9	7.9	9.5	93.8	4.20	40.28	82.23	26.04	48.84	37.29	204.31	147.35	488.39	-59	-7.8	-0.35	-0.07	70
EEDS45	2-Dec-2013	K	642	7.2	8.1	9.3	95.4	4.41	34.12	57.80	17.60	17.52	29.91	233.71	62.36	340.57	-60	-7.8	-2.23	-0.20	300
EEDS46	3-Dec-2013	K	895	8.6	8.3	10.83	107.7	4.51	28.70	87.50	26.09	65.01	58.99	213.13	53.81	431.18	-65	-8.5	0.26	0.08	160
EEDS47	3-Dec-2013	K	477	9.2	8.2	8.86	84.9	2.85	16.95	49.27	15.12	5.06	11.74	194.03	48.11	246.12	-65	-8.4	-4.68	-0.16	200
EEDS48	3-Dec-2013	K	555	10.4	8.2	5.36	20.6	2.31	47.66	34.75	18.92	12.09	22.55	229.30	36.71	289.63	-65	-8.6	-5.26	-0.37	50
EEDS49	3-Dec-2013	K	450	10.8	8.2	5.07	52.9	1.88	38.42	34.16	11.09	7.86	15.60	195.49	22.27	229.04	-69	-9.2	-6.76	-0.38	100

Table S1 (continued)

ID	Date	Age	EC ($\mu\text{S}/\text{cm}$)	T ($^{\circ}\text{C}$)	pH	DO (mg/L)	ORP (mV)	K ⁺ (mg/L)	Na ⁺ (mg/L)	Ca ²⁺ (mg/L)	Mg ²⁺ (mg/L)	Cl ⁻ (mg/L)	SO ₄ ²⁻ (mg/L)	HCO ₃ ⁻ (mg/L)	NO ₃ ⁻ (mg/L)	TDS (mg/L)	δD (‰)	$\delta^{18}\text{O}$ (‰)	CAI-I	CAI-II	Well depth (m)
EEDS50	3-Dec-2013	Q	612	10.9	8	1.66	-62.9	2.52	64.65	43.40	13.53	15.63	21.01	304.27	0.94	313.81	-61	-7.9	-5.53	-0.45	13
EEDS51	3-Dec-2013	Q	752	10.2	8.1	5.75	-15.6	3.87	80.79	58.91	13.16	25.76	36.91	343.95	1.06	392.44	-58	-7.7	-3.98	-0.45	10
EEDS52	3-Dec-2013	K	419	11.3	8.4	4.66	35	1.58	54.37	13.16	14.55	5.25	12.47	217.54	5.09	215.24	-74	-10.0	-15.27	-0.58	200
EEDS53	3-Dec-2013	K	754	8.9	8.2	7.98	64	3.71	42.62	61.00	29.05	21.15	47.20	255.76	68.03	400.64	-60	-8.0	-2.27	-0.22	15
EEDS54	3-Dec-2013	K	495	8.3	8.1	4.94	103.9	4.51	26.15	40.70	21.72	6.63	12.66	241.06	29.97	262.87	-63	-8.5	-5.71	-0.23	150
EEDS55	4-Dec-2013	K	546	7.8	8.3	10.17	60.1	3.07	16.10	56.27	18.25	11.94	17.97	198.43	56.16	278.97	-67	-8.7	-1.32	-0.10	280
EEDS56	4-Dec-2013	K	590	8.5	8.1	10.04	62.8	3.06	17.72	60.61	19.97	17.06	28.40	189.62	59.21	300.83	-63	-8.5	-0.77	-0.08	150
EEDS57	4-Dec-2013	K	795	8.4	8.1	7.71	38.2	1.99	31.57	70.21	30.02	20.70	45.18	241.06	90.46	410.68	-63	-8.3	-1.44	-0.13	20
EEDS58	4-Dec-2013	K	551	8.6	8	7.39	45.7	1.51	24.57	49.78	22.47	9.78	18.08	214.60	57.60	291.09	-64	-8.4	-3.02	-0.17	130
EEDS59	4-Dec-2013	K	550	8.9	8.1	8.6	49.7	1.39	27.76	49.01	19.57	8.62	16.22	210.19	59.15	286.81	-64	-8.6	-4.12	-0.21	100
EEDS61	5-Dec-2013	K	651	8.7	8.1	9.48	83.6	3.40	28.72	66.24	16.03	17.16	29.00	196.96	93.49	352.53	-58	-8.0	-1.76	-0.16	100
EEDS62	5-Dec-2013	K	535	9.5	8	10.68	61.4	3.12	19.14	57.66	16.30	16.98	19.73	192.56	44.85	274.06	-64	-8.8	-0.91	-0.10	150
EEDS63	5-Dec-2013	K	1045	9.8	8.1	2.54	-13.9	1.86	102.10	49.72	37.03	62.99	87.31	301.33	18.02	509.69	-71	-8.0	-1.53	-0.38	120
EEDS64	5-Dec-2013	K	903	10.2	8.4	7.68	32.4	2.06	57.86	87.69	23.76	26.06	50.53	276.34	122.55	508.68	-59	-7.9	-2.50	-0.24	6
EEDS65	6-Dec-2013	Q	1247	8.3	8	3.68	4.9	7.39	131.00	43.09	51.53	48.78	98.79	457.13	1.11	610.26	-67	-8.4	-3.28	-0.47	20

Q: Quaternary, K: Cretaceous