ESM 1. Chemicaland isotopicdata for groundwater samples collected in March 2007 in Dahab Watershed area.

No	Aq	Long.	Lat.	Locality	Type	pH	DTW (m)	TD (m)	Scareen Interval (m)	TDS	Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	*B*	$\delta^{18}O$	$\delta^{2}H$	$\delta^{81}Br$	$\delta^{11}B$	$\delta^{13}C$	$\delta^{14}C$	$^{87/86}Sr$
										ppm										(‰)					(pmc)	--
1	Quaternary	34.209	28.755	Saal	HD	7.62	--	--	--	562	54	17	140	1	0	189	141	114	0.17	--	--	--	--	--	--	--
2		34.209	28.755	Saal	HD	7.91	--	--	--	669	54	24	140	49	0	189	143	165	0.15	--	--	--	--	--	--	--
3		34.491	28.504	Delta	Dr.	7.34	29.5	61	35-55	3172	462	136	555	14	0	81	46	1919	--	-4.08	-24.1	--	--	--	--	--
4		34.499	28.494	Delta	Dr.	7.34	24.3	44	30-40	3234	181	228	652	13	0	81	535	1585	0.56	-2.74	-15.4	-0.24	52	-6	37	0.706567
5		34.491	28.503	Delta	Dr	7.23		84	46-78	3365	210	254	618	13	0	81	561	1669	--	--	--	--	--	--	--	--
6		34.512	28.506	Delta	HD	7.96	8.1	12	--	1277	145	22	282	10	0	0	76	742	--	--	--	--	--	--	--	--
7		34.514	28.492	Delta	HD	7.50	5.2	8	--	4349	471	109	1054	14	0	122	180	2461	--	--	--	--	--	--	--	--
8		34.511	28.491	Delta	HD	7.73	10.1	12	--	1244	163	7	275	10	0	65	68	688	0.79	-0.37	-2.2	0.26	46	--	--	0.706470
9		34.514	28.487	Delta	HD	7.50	4.8	7	--	5086	652	65	1173	15	0	122	180	2941	1.07	-2.49	-16	0.09	48	--	--	0.706504
10		34.514	28.496	Delta	HD	7.73	8.5	12	--	3365	91	337	687	14	0	106	264	1919	0.57	--	--	--	--	--	--	--
11		34.516	28.498	Delta	HD	7.31	2.2	5	--	4000	145	348	807	15	0	98	301	2336	0.56	-3.76	-21	0.36	49	--	--	0.706540
12		34.512	28.506	Delta	HD	7.40	--	--	--	4060	226	272	851	13	0	163	364	2252	0.58	-3.00	-17	0.02	52	--	--	0.706645
13		34.514	28.510	Delta	HD	7.34	--	--	--	5138	634	136	1053	22	0	163	543	2670	1.75	-0.90	-7.8	0.25	43	--	--	0.706718
14		34.515	28.512	Delta	HD	7.42	--	--	--	1513	138	22	369	22	0	163	152	730	2.09	1.55	9	-0.23	35	--	--	0.706942
15		34.512	28.515	Delta	HD	7.51	5.2	8	--	4360	127	424	851	18	0	163	1024	1835	4.51	0.92	5	0.42	76	--	--	0.706662
16	Early Cambrian	34.575	28.829	El Saghier	Dr.	7.80	8.9	--	--	676	65	24	120	49	0	126	198	157	0.13	-4.36	-33	--	--	-8.4	37	--
17		34.575	28.829	El Saghier	Dr.	7.76	17.7	--	--	645	65	26	124	4	0	158	236	111	0.10	-5.29	-37	--	--	--	--	0.708060
18		34.575	28.829	El Saghier	Dr.	7.69	9.7	--	--	1490	108	39	387	12	0	200	509	335	0.22	--	--	--	--	--	--	--
19		34.248	28.801	Saal	Dr.	7.68	69.7	140	80-135	1345	144	48	257	3	0	210	556	232	0.14	-4.80	-32	--	--	-5.4	42	--
20	Precambrian (Basement)	34.228	28.754	Saal	HD	8.08	9.7	12	--	1456	162	38	349	2	52	315	311	435	0.08	--	--	--	--	--		--
21		34.245	28.757	Saal	HD	8.02	12.2	14	--	998	81	32	230	3	10	589	209	148	0.06	-3.63	-19.4	--	--	-9.4	74	--
22		34.252	28.758	Saal	HD	7.91	--	--	--	856	69	24	190	47	10	126	251	213	0.15	-1.71	-12.5	--	--	--	--	--
23		34.256	28.758	Saal	HD	7.88	--	--	--	984	83	26	260	1	10	210	277	232	0.21	--	--	--	--	--	--	--
24		34.257	28.753	Saal	HD	7.85	--	--	--	1290	101	35	280	88	10	242	343	323	0.21	-3.24	-17.5	1.13	37	--	--	0.708390
25		34.260	28.755	Saal	HD	7.92	15.7	20	--	966	69	24	200	84	0	179	230	271	0.22	-3.09	-17.4	2.15	--	--	--	0.708060
26		34.260	28.755	Saal	HD	7.40	--	--	--	1229	137	37	230	56	0	221	343	316	0.13	--	--	--	--	--	--	--
27		34.333	28.750	Zaghra	HD	7.85	--	--	--	696	76	19	156	1	0	126	207	173	0.08	-3.63	-23	--	--	--	--	0.707470
28		34.303	28.667	Zaghra	HD	7.65	--	--	--	698	79	17	127	1	0	126	250	160	0.08	--	--	--	--	--	--	--
29		34.227	28.535	El Nasab	HD	7.45	5.2	7	--	882	105	28	127	59	0	305	243	168	0.10	-3.62	-20	1.62	--	--	--	0.708360
30		34.210	28.530	El Nasab	HD	7.89	5.0	7.5	--	728	76	24	98	85	10	189	183	168	0.08	--	--	--	--	--	--	--
31		34.466	28.530	Khshieb	HD	7.29	--	--	--	14156	2398	163	2787	42	16	41	470	8276	1.99	-4.25	-30.7	3.30	--	--	--	0.706300
32		34.462	28.529	Khshieb	HD	7.44	flowing	--	--	5597	977	119	946	17	8	73	530	2970	0.70	--	--	--	--	--	--	--
Sea	--			--	--					42703	499	1942	12486	368	25	127	2998	24344			1.64	9.8	40.3	0	100	0
Rain	--			--	--					29	7.1	0.6	2.3	0	0	14.5	6.4	5.4		-4.3	-17.1	--	--	--	--	--

Long; Longititudes, Lat; Latitudes, HD; Hand Dug Well, Dr; Drilled wells, TD; Total Depth (meter), DTW; Depth to Water (meter), T; Temperature (°C), ppm; part per million, (pmc); percent modern carbon, --donates no data.

ESM 2. Results of petrographic analyses of rock samples collected from WadiDahab Watershed

No.	Area	Mineral Composition		Alterations	Texture	Rock type
		Essential	Minor and accessories			
1	WadiDahab	Palg, Qz, ortho.	Biot, chlorite with less apatite and opaqoues	Felds are strongly argillized and biot altered to chlrwith significant clay and altered feldspars	Medium grained slightly course grained, graphic texture	Granite
2	WadiSaal	Plag, microcline, Qz, biot	Epidot and apatite	Oxidation of biot with chlr replacement with minor sericite, biot altered to chlr with significant clay and altered feldspars	Medium grained	Biotite Granite
3	WadiSaal	Qz, Plag, Microcline	Biot with minor opaqoues	Argillized clay, iron oxide and weak hematization	Coarse grained	Granite Alkaline granite
4	WadiSaal	Qz. As phenol crysts, Plag.,	Chlr, sericite and clay with iron	Argillizedplag, sausrizationand chlorization	Propheritic, spherilitic texture	Glassy Rhyolite
5	WadiSaal	Ortho, Microcline, Plag, Qz	Biot, Chlr and sphene	Biot altered to chlr and altered hornblend to more clay	Coarse grained granite	Granite
6	WadiSaal	Qz, microcline, plag	Minor opaques, minor chlr from	Strong argillizationwith strong clay and biot	Medium to fine grained	Granite
7	WadiSaal	Qz, plag, ortho	Shene and minor opaqous	All felds strong argillizedbiot replaced by chlr strong oxidation sphene is oxidized to iron oxide and sausrization of plag and ortho	Coarse graine granite	Granite
8	WadiZaghra	Plag, pyrox, chlr	Abundant opaque's	Weathered pyrox, argillizedplagabundantpyrox and chlr	Medium grained gabbroic rocks	Gabross
9	WadiZaghra	Plag, pyrox	Abundant opaque's	Pyrox and oliv replaced by clay	Coarse grained basalt	Basalt
10	WadiZaghra	Felds, biot, plag, microcline, Qz	Minor opaque's	Biotargillizeed to clay	Coarse grained granite	Granite
11	Wadi El-Nasb	Qz., plagio., glassy	Biot	Biot replaced by chlr, minor iron stained	Propheritic texture (Qz, Plag. Phenol crysts)	Granite

Note: Sample location sites are indicated in Figure 1. Plag plagioclase, ortho orthoclase, felds feldspars, qz quartz, Biotbiotite, chlrchlorite, serp serpentine, pyrox pyroxene, oliv olivine.

ESM 3.NETPATH modeling results (mmol/L) for the El-Dabaa Area. Positive values mean the phase is going into solution while negative values mean the phase is being removed from the solution.

Basin	Model Type	Initial Water	Seawater	Final Water	Mixing Percent (%)		Phases precipitated or dissolved (mmol/L)											
					Initial Water	Seawater	Cal	Dol	Gyp	Hal	Si	Plg	Mcln	Chlrt	Mont	Ilt	Ex	Ev
Upstream Watershed	Reaction	21	--	16	--	--	-7.59	--	6.5	0.25	--	--	1.18	12.37	-11.12	--	-2.52	--
		21	--	19	--	--	-6.15	--	7.26	2.36	--	--	0.01	0.88	-0.76	--	-0.58	--
		21	--	22	--	--	--	-4.12	1.16	--	-1.54	--	1.03	--	--	-0.44	-2.12	1.4
		21	--	25	--	--	1.34	-4.04	--	3.46	-4.05	--	2.79	--	--	-1.21	-2.38	--
		28	--	27	--	--	--	-0.02	--	0.36	-0.55	0.54	0.27	--	--	-0.46	0.31	--
		30	--	29	--	--	-2.0	2.09	--	0.01	-0.51	1.72	--	--	--	-1.08	0.15	--
Downstream Delta	Reaction and Evaporation	21	--	8	--	--	--	-4.72	--	0.85	--	0.21	--	1.85	-1.72	--	-3.94	3.8
		21	--	14	--	--	--	-4.57	--	--	--	0.39	--	2.63	-2.52	0.04	-3.48	4.9
	Reaction and Mixing	21	Seawater	4	94	6	-7.85	--	3.05	--	--	--	--	0.55	--	-0.43	-6.67	--
		21	Seawater	9	89	11	-6.80	--	9.18	--	--	--	0.14	1.65	--	-1.50	-10.31	--
		21	Seawater	11	92	8	--	-3.67	--	--	--	--	5.42	59.52	-43.62	-9.91	-11.60	--
		21	Seawater	12	92	8	--	-3.13	--	--	--	--	2.94	32.16	-23.13	-5.82	-9.71	--
		21	Seawater	13	89	11	-6.11	--	8.99	--	--	--	--	1.37	-0.37	-0.81	-9.93	--
		21	Seawater	15	93	7	--	-3.21	--	--	--	--	1.10	12.28	-8.81	-2.21	-5.10	--

Note: Cal=Calcite; Dol=Dolomite; Gyp=Gypsum; Si=(Silica orCalcedony); Ilt=Illite; Ex-Cation Exchange; Hal=Halite; Na-Mont=Sodium Montmorillonite; Mont-Maf=Mafic Montmorillonite; PlagAn, Plagioclase Anorthite, -- Not Applied Ev; Evaporation Factor from original water. Wells location for initial site1, site 2 and final water are indicated in Figure 1.