Supplementary Information

Coastal Aquifers as Major Players in Shaping Ocean Chemistry through Solute Fluxes

Yael Kiro,[1]
[1]Department of Earth and Planetary Sciences, Weizmann Institute of Science, Israel,

ST1: Refining ocean chemistry model parameters

River fluxes

River solute fluxes were estimated based on the published information referenced in Table 2 and using table 5.6 in Berner and Berner.[1] To determine the Mg flux (F_{Mg}), we utilized the correlation between Ca^{2+} and Mg^{2+} concentrations shown in the Extended Data, Fig. 5 ($F_{Mg} = 0.37 \cdot F_{Ca}$, where F represents the fluxes of Ca and Mg). No significant correlation was observed between other major elements.

Mid-ocean ridge hydrothermal circulation

The fluxes for mid-ocean ridge hydrothermal circulation were primarily obtained from Elderfield and Schultz.[2] These fluxes were estimated based on a water flux of $3(\pm 1.5) \cdot 10^{13}$ kg/y and the concentrations of various elements in hydrothermal fluids.[2,3,4]

The flux of sodium in mid-ocean ridges is subject to high uncertainty, as both experiments and observations have suggested either addition or removal of sodium through this process.[5,6,7,8,9] The significant removal of sodium in coastal aquifers (as seen in Fig. 2 and Extended Data, Fig. 1a) implies a missing source. Taking into account several field observations[6,7,8,5] that indicate a possible increase in sodium concentrations compared to seawater, we assumed an enrichment of 8.5 mM, resulting in an average flux of 0.25 Tmol/y (based on a water flux of $3 \cdot 10^{13}$ kg/y).

Seafloor weathering

To investigate seafloor weathering, researchers have studied the fluids[7,8,6] and analyzed altered basalts.[10,11,12,13,14] Different approaches have been used to calculate fluxes to and from the seafloor, resulting in estimates that vary by an order of magnitude.[15] Some estimates were made to balance the budget and determine the thickness of weathered basalt,[10,11] but these calculations did not consider the interaction with seafloor or suspended sediments or coastal aquifers. Therefore, in our study, we used more conservative estimates, considering a potential bias due to the inclusion of high-temperature processes. We also took into account the expected consistency with the Mg isotope budget, which aligns with the lower estimated fluxes.[16,17]

Interaction with ocean sediments

The interaction between seawater and ocean sediments leads to changes in element concentrations, which can be observed in pore water profiles. These processes involve the precipitation and dissolution of carbonate minerals, clay formation (reverse weathering), and ion exchange. Early studies on these processes focused on analyzing suspended material in estuaries,[18,19] examining ocean pore waters,[20,21] and conducting laboratory experiments.[22] However, these studies provided a wide range of estimates and concentrations.

More recently, Sun et al.[21] compiled a comprehensive database of pore fluids from the Deep Sea Drilling Program (DSDP) and the International Ocean Drilling Program (IODP). They calculated the diffusive flux of major elements on a global scale. Given the extensive coverage in their study, we consider their estimates to be the most representative of the fluxes of elements in the ocean resulting from water-rock interaction.

Precipitation of minerals

Calcium carbonate precipitation data was sourced from Milliman et al. (1993).[23] The uncertainty in the precipitation rates was estimated based on the information provided in the paper, resulting in a range of 17-45 Tmol/y. Berner and Berner[1] also discussed lower rates of calcium carbonate precipitation compared to conventional values, particularly highlighting the increase in precipitation and preservation during the Holocene. To account for this, we conducted additional model runs using a lower precipitation rate, which removed 18 Tmol/y of calcium. Consequently, the removal rates of magnesium and strontium were adjusted to be 0.565 of the original run (Table 2). This alternative scenario resulted in slightly lower long-term SGD fluxes, as depicted in the Extended Data, Fig. 6.

For the sodium budget over geological time scales, halite precipitation was estimated based on the volume of marine halite precipitated over the past 500 million years, amounting to approximately $2 \cdot 10^8$ Tmol.[24]

ST2: Sensitivity to transient conditions

As discussed in the main manuscript, we explored different scenarios by varying the river flux and mid-ocean ridge hydrothermal flux to test their impact on the averaged concentration of major elements in the ocean, and calculated SGD fluxes. The mean values of the fluxes based on each individual budget component are summarized in the Extended Data, Fig. 6.

The steady-state scenario shows consistency within the uncertainty range. However, when considering an overestimate of river and hydrothermal fluxes (scenarios R0.5 and H0.5 in the Extended Data, Fig. 7) or an underestimate of the hydrothermal flux (scenario H1.5 in the Extended Data, Fig. 7), the results appear to be less consistent. The Sr isotope budget does not align with either the decreased or increased fluxes scenarios individually, but it aligns with a scenario involving both greater river and hydrothermal fluxes. This combined scenario seems to be the most consistent (Extended Data, Fig. 7).

Furthermore, we investigated a scenario (SSpL) where the removal of Ca^{2+}, Mg^{2+}, and $Sr^{2+}$by $CaCO_3$ precipitation is lower than in the other runs. In this scenario, the fluxes also appear relatively consistent, albeit slightly lower than the other estimates.

These findings suggest that considering a combination of increased river and hydrothermal fluxes, as well as a scenario with lower $CaCO_3$ precipitation, provides the most consistent results for the element budgets and isotope compositions in the ocean.

ST3: New insights regarding oceanic budgets

Utilizing multiple elements and isotope systems to resolve ocean budgets reveals interesting insights regarding our understanding of the different element budgets.

Sodium: The estimation of long-term SGD flux based on the sodium budget consistently yields lower values compared to the other budgets. The significant removal of sodium during long-term circulation in coastal aquifers indicates either an overestimation of the removal amount or the existence of a missing source of sodium. However, our understanding of the sodium budget is limited due to the high concentration of sodium in the ocean and analytical limitations when studying porewaters. Therefore, it is difficult to pinpoint the exact reason for the observed discrepancy.

Magnesium: The magnesium budget is minimally impacted by seawater circulation in the coastal aquifer, making it challenging to use this budget as a constraint for determining long-term SGD fluxes. However, the mild but notable isotope changes in magnesium have a significant effect on the overall budget, primarily due to the high concentrations of magnesium in the ocean and the relatively substantial fluxes of seawater.

Potassium: The fluxes obtained from the potassium budget generally align with those of sodium, which could indicate a potential overestimate of potassium removal through alteration of the oceanic crust. It is also possible that there is an overlap between the interaction of potassium with ocean sediments and its interaction with the oceanic crust. In other words, the diffusive flux estimated from the interaction with sediments may be influenced by the underlying basalts, leading to an overestimate of either the effect of the diffusive flux or the effect of seafloor weathering on potassium fluxes.

Calcium: the missing source of calcium in the ocean is a long-standing debate, questioning whether the chemical composition of the ocean is in steady-state or whether our estimates of the sources and sinks accurately reflect steady-state conditions. It is evident that coastal aquifers contribute calcium to the ocean. However, considering the minor discrepancy in the steady-state scenario compared to the scenarios with higher river and hydrothermal fluxes, as well as the lower rate of $CaCO_3$ precipitation, it is possible that we are underestimating the fluxes from rivers and hydrothermal circulation, or overestimating the rate of $CaCO_3$ precipitation.

Strontium: The strontium budget is closely linked to the calcium budget, as expected. However, when calculated using the strontium isotope budget, the resulting fluxes often deviate from the estimates obtained by other budgets. This discrepancy necessitates higher fluxes to reconcile the ocean's isotope budget and align it with its current value. The fluxes derived from the strontium isotope budget are particularly sensitive to changes due to the minimal difference in isotope composition between groundwaters and seawater.

ST4: The effect of coastal aquifer fluxes on the ocean carbon budget

To assess the impact of variations in coastal aquifer fluxes, we examined the response of the carbonate system and the degree of $CaCO_3$ saturation to changes in the Ca^{2+} flux, along with corresponding changes in the Na^+ flux. In our analysis, we assumed a complete charge balance between the exchange of Ca^{2+} and Na^+ in the groundwater and maintained the same level of supersaturation to calcite as observed currently.

$$\Omega = \frac{[\mathrm{Ca}^{2+}][\mathrm{CO}_3^{2-}]}{K^*_{SP}} \tag{1}$$

We solved the charge balance and the carbonate system equations:

$$M + [\mathrm{H}^+] - [\mathrm{OH}^-] - [\mathrm{HCO}_3^-] - 2[\mathrm{CO}_3^{2+}] = 0 \tag{2}$$

$$[\mathrm{HCO}_3^-] = \frac{K_1^* K_H P_{CO_2}}{[\mathrm{H}^+]} \qquad [\mathrm{CO}_3^{2-}] = \frac{K_2^* K_1^* K_H P_{CO_2}}{[\mathrm{H}^+]^2} \qquad [\mathrm{OH}^-] = \frac{K_w^*}{[\mathrm{H}^+]} \tag{3}$$

To obtain the P_{CO_2} and pH, where P_{CO_2}[atm] is the CO_2 atmospheric pressure, K_H is the Henrey's constant, K_1^*, K_2^*, K_w^*, and K_{SP}^* are the thermodynamic constants of the carbonate system in 25°C, seawater salinity and 1 atm,[25] Ω is the degree of saturation, and M =$[Na^+]+[K^+]+2[Ca^{2+}]+2[Mg^{2+}]+2[Sr^{2+}]-[Cl^-]-[Br^-]-2[SO_4{}^{2-}]$. Concentrations are in moles

The pH(=-log$[H^+]$) is given by solving a quadratic equation:

$$\left(1 - \frac{K^*_{SP}\Omega}{K^*_2[\mathrm{Ca}^{2+}]}\right)[\mathrm{H}^+]^2 + \left(M - \frac{2K^*_{SP}\Omega}{[\mathrm{Ca}^{2+}]}\right)[\mathrm{H}^+] - K^*_w = 0 \tag{4}$$

and the atmospheric CO_2 is given by:

$$P_{CO_2} = \frac{K^*_{SP}[\mathrm{H}^+]\Omega}{K^*_H K^*_1 K^*_2[\mathrm{Ca}^{2+}]} \tag{5}$$

For the sake of discussion, we neglected the effects of salinity, temperature, and seawater salinity on the thermodynamic constants, assuming a constant saturation state, which was shown to be reasonable on the time scale of the past 100 million years.[26,27] The idea is to show how changes in the coastal aquifer fluxes can moderate global warming or cooling on long time scales. These calculations show the effect of coastal aquifers only. Thus, they do not take into account the observed changes in atmospheric CO_2 during cooling and sea level drop due to CO_2 storage in the ocean and biological uptake. We show that with the positive feedback between cooling and CO_2 drawdown, coastal aquifers serve as negative feedback that moderates the rate of cooling and warming.

WRI	Effect on chemical composition	Lithologies	Climate	Location
Ion exchange	Ca^{2+} and Sr^{2+} enrichment, K^+ and Na^+ depletion; Na^+ may be depleted during freshening in groundwater with Cl^- <80mM, Mg^{2+} is conservative or enriched.	sandy/sandstone,[28,29,30,31] conglomerate,[29,30] silt,[29,30] alluvium,[38,33,39,40,41,42] volcanic material,[43,32,44] basalt,[45] sedimentary,[32] carbonate,[46,43,47,48] calcareous sand[49,50,51,52,40]	semi-arid,[28,33,49,50,5 wet,[31,34,47,48,3 Mediterranean,[38,46,33,5 arid[32,43,37]	Egypt,[37] Tunisia,[28] Spain,[29,30,38] England,[31] Baja California (Mexico),[32] Crete (Greece),[46] San-Diego (California, USA),[43] Portugal,[33] Morocco,[33,49] Oregon (USA),[34] Hawaii,[45] Israel,[50,51,52] Florida (USA),[47,48] Texas (USA),[36] Denmark,[35] France,[39] Belgium,[41] China[44,42]
Carbonate dissolution	Ca^{2+}, Sr^{2+}, Mg^{2+}, and U enrichment	carbonates,[53,54,55,56] sandstone,[31,32] alluvium,[38,41] volcanic material,[32] sandy[35]	wet,[31,35,55,56,41] Mediterranean,[38,53,54] arid[32]	England,[31] Spain,[38] Baja California (Mexico),[32] Mallorca (Spain),[53,54,35] Belgium,[41] Yucatan (Mexico)[55,56]
Aragonite to calcite transformation	Ca^{2+} and Sr^{2+} enrichment	ooid sand[57]	wet[57]	Bahamas[57]
$SO_4{}^{2-}$ reduction	$SO_4{}^{2-}$ depletion	sandstone,[31] sandy[34,35]	wet[31,34,35]	England,[31] Oregon (USA),[34] Denmark[35]
Dolomitization[38]	Ca^{2+} enrichment and Mg^{2+} depletion	alluvium	Mediterranean	Spain
Gypsum dissolution[47,48]	Ca^{2+} and $SO_4{}^{2-}$ enrichment	carbonates	wet	Florida (USA)
Organic matter oxidation	Low O_2 and $NO_3{}^-$	sandy,[34] carbonate,[58,59,60] alluvium[41]	wet[34,58,59,60,41]	Belgium,[41] Oregon (USA),[34] Florida (USA)[58,59,60]
Fe cycling	Increase in dissolved Fe, Fe-oxides coating, U removal	sandy,[34,61,62,63] carbonate[58,59,60]	wet[34,61,62,63,59,58,60]	Oregon,[34] Florida,[58,59,60] Massachusetts,[61,62] Delaware[63] (USA)
Methanogenesis[35]		sandy	wet	Denmark
Interaction with hydrothermal springs[64]	high CO_2, low pH, Ca^{2+}, Na^+, and K^+ enrichment, Mg^{2+} depletion	volcanic	wet	Philippines

Table S1: WRI processes and their effect on the chemical composition of groundwater in coastal aquifers

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
				mEq/L					Error (mEq/L)		
Ahmed et al., 2013											
seawater	610	516	12	23	119						
freshwater	1.1	1.1	0.14	1.5	0.82						
	0.7	0.54	0.04	0.09	0.24		0.07	0.01	0.08	0.05	
	0.5	0.62	0.01	0.04	0.28		0.07	0.01	0.08	0.05	
	0.8	0.80	0.02	0.29	0.35		0.09	0.01	0.09	0.06	
	0.8	0.92	0.03	0.53	0.45		0.09	0.01	0.10	0.06	
	1.5	1.4	0.22	0.78	0.39		0.15	0.02	0.12	0.07	
	0.6	0.63	0.03	0.24	0.33		0.07	0.01	0.09	0.05	
	0.5	0.44	0.02	0.14	0.30		0.06	0.01	0.08	0.05	
	3.0	0.99	0.03	0.55	0.79		0.19	0.01	0.11	0.10	
	4.3	2.5	0.34	2.2	0.72		0.32	0.03	0.19	0.11	
	1.1	1.5	-0.06	1.7	1.1		0.13	0.00	0.16	0.10	
	1.2	1.4	0.07	1.5	0.64		0.13	0.01	0.15	0.07	
	2.8	1.8	0.16	1.3	0.65		0.22	0.02	0.14	0.09	
	11	4.6	0.11	3.7	2.5		0.69	0.02	0.28	0.26	
	3.6	2.1	0.59	1.7	0.97		0.27	0.04	0.17	0.11	
	3.8	3.1	0.29	2.0	1.4		0.33	0.02	0.18	0.14	
	10	0.94	-0.08	2.6	1.4		0.49	0.01	0.22	0.20	
	7.3	0.42	-0.07	1.6	1.2		0.34	0.01	0.16	0.16	
	2.7	2.3	0.00	0.90	1.0		0.24	0.01	0.12	0.11	
	13	1.2	-0.08	3.2	0.84		0.60	0.01	0.26	0.19	
	11	0.66	0.01	2.7	1.4		0.50	0.02	0.23	0.20	
	3.4	1.3	0.22	4.0	1.3		0.22	0.02	0.28	0.13	
	1.3	1.7	0.05	0.07	-0.06		0.15	0.01	0.08	0.04	
	2.9	3.7	0.09	-0.37	0.82		0.32	0.01	0.06	0.10	
	2.0	1.4	0.06	0.27	0.40		0.16	0.01	0.09	0.07	
	1.7	1.4	-0.02	0.88	0.05		0.16	0.01	0.12	0.05	
	2.0	1.5	-0.04	0.94	0.31		0.17	0.01	0.12	0.07	
	4.2	3.9	-0.10	0.05	-0.28		0.39	0.01	0.08	0.06	
	0.8	3.2	-0.03	0.23	0.22		0.20	0.01	0.09	0.05	
	1.7	2.6	0.08	2.0	1.1		0.22	0.01	0.18	0.11	
	0.7	0.71	-0.004	0.25	0.79		0.08	0.01	0.09	0.08	
	1.6	4.4	0.03	-0.18	-0.05		0.30	0.01	0.07	0.04	
	1.0	7.5	-0.02	-0.52	-0.27		0.43	0.01	0.05	0.03	
	4.1	2.3	-0.04	-0.27	0.33		0.30	0.01	0.07	0.09	
	4.5	4.5	-0.14	-1.32	-1.25		0.43	0.00	0.02	0.01	
	4.8	6.1	-0.12	-1.17	-1.2		0.52	0.00	0.02	0.02	
	6.5	8.3	-0.05	1.9	0.35		0.70	0.01	0.18	0.11	
	6.1	5.9	-0.05	3.4	1.3		0.57	0.01	0.26	0.15	
	5.1	1.9	0.06	3.1	1.7		0.32	0.01	0.24	0.17	
	5.5	1.5	-0.04	2.8	1.3		0.32	0.01	0.22	0.15	
	7.0	11	-0.11	-0.27	2.7		0.88	0.01	0.07	0.23	
	18	13	-0.16	-0.31	0.89		1.4	0.02	0.09	0.25	
	31	16	0.11	-1.89	0.30		2.1	0.04	0.03	0.34	
	30	9.1	-0.49	-1.18	-3.1		1.7	0.01	0.07	0.17	
	10	7.2	2.6	2.3	1.9		0.80	0.15	0.21	0.22	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
	mEq/L						Error (mEq/L)				
	26	4.8	-0.04	5.8	2.6		1.3	0.03	0.41	0.41	
	4.1	14	-0.12	-0.21	-0.49		0.88	0.004	0.07	0.05	
	7.1	4.4	0.93	4.3	1.3		0.53	0.06	0.30	0.16	
	15	2.4	0.73	2.3	-1.2		0.77	0.06	0.21	0.12	
	6.2	6.4	-0.03	0.59	-0.28		0.60	0.01	0.11	0.08	
	14	10	-0.23	0.56	-2.0		1.1	0.01	0.13	0.07	
	24		-0.30	8.4	2.7		1.3	0.01	0.53	0.40	
	2.8	5.1	0.28	4.5	0.39		0.24	0.02	0.30	0.08	
	103	2.1	-0.92	16	6.3		4.3	0.06	1.1	1.3	
	90	-9.7	-1.2	14	1.8		3.3	0.03	0.94	0.99	
	105	-42	-1.5	31	11		2.3	0.03	1.8	1.6	
	116	-42	-1.8	20	4.6		3.4	0.03	1.3	1.4	
	109	-42	-1.2	29	17		2.6	0.05	1.7	1.9	
	180	-42	-2.2	40	10		5.7	0.06	2.4	2.3	
	211	-42	-2.3	37	13		7.0	0.09	2.3	2.7	
	171	-42	-2.5	45	16		4.4	0.04	2.6	2.5	
	225	-42	-3.5	38	-1.5		7.8	0.04	2.4	2.1	
Ben Hamouda et al., 2012											
seawater	541	465	10.1	20	105						
freshwater	0	0	0	0	0						
	20	-0.7	0.33	13	-1.2		0.82	0.04	0.68	0.13	
	16	4.1	-0.26	7.8	-1.2		0.91	0.002	0.42	0.10	
	41	-4.4	-0.46	13	-4.1		1.5	0.01	0.75	0.19	
	108	-24	1.4	23	-12		3.4	0.17	1.3	0.45	
	78	19	-0.8	20	-6.2		4.3	0.03	1.2	0.45	
	43	-11	-0.47	17	-2.4		1.3	0.02	1.0	0.30	
	30	-1.1	-0.45	10.3	-2.8		1.2	0.005	0.57	0.15	
	22	1.6	-0.12	6.6	-2.3		1.0	0.01	0.37	0.10	
	8.6	-0.8	0.33	9.7	-0.22		0.33	0.02	0.50	0.07	
	8.4	0.0	1.0	6.9	-1.5		0.36	0.06	0.36	0.01	
	26	-0.5	-0.45	11	-2.7		1.1	0.00	0.60	0.11	
	11	8.4	-0.09	9.2	2.1		0.89	0.01	0.48	0.21	
	32	7.8	-0.42	12	-2.7		1.8	0.01	0.65	0.18	
	9.2	0.4	0.93	7.1	0.64		0.41	0.05	0.37	0.12	
	15	-3.1	-0.21	7.8	2.8		0.51	0.00	0.42	0.29	
	23	4.5	-0.28	7.7	-0.63		1.2	0.01	0.43	0.19	
	11	-2.9	0.50	11	-1.3		0.33	0.04	0.58	0.04	
	16	1.0	-0.17	9.8	-1.5		0.74	0.01	0.52	0.08	
	12	-0.3	-0.23	10.5	-1.0		0.52	0	0.55	0.07	
	14	0.1	-0.19	10.1	-1.3		0.61	0.003	0.53	0.07	
	18	-0.8	-0.19	11	-1.9		0.74	0.01	0.60	0.08	
	53	3.6	0.31	14	-2.4		2.5	0.06	0.80	0.39	
	23	-1.8	-0.03	9.9	0.43		0.90	0.02	0.54	0.25	
	13	0.7	0.36	10.1	-0.59		0.60	0.03	0.53	0.10	
	19	0.4	0.14	8.1	-1.6		0.85	0.03	0.44	0.11	
	34	-0.2	-0.03	21	-1.1		1.4	0.03	1.1	0.27	
	27	-1.3	-0.40	9.2	-2.9		1.1	0.005	0.51	0.12	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L						Error (mEq/L)		
	18	-6.8	0.01	10.7	-1.3		0.43	0.02	0.57	0.11	
	38	2.3	0.38	5.7	-4.1		1.8	0.05	0.36	0.17	
	47	-10.7	-0.64	16	-4.0		1.5	0.01	0.90	0.25	
	34	-8.9	-0.43	13	0.42		1.0	0.01	0.72	0.35	
	8.6	9.3	0.21	4.5	0.02		0.83	0.02	0.24	0.08	
	32	-9.0	1.07	16	-2.9		0.91	0.08	0.85	0.16	
	16	-2.2	0.05	1.4	-1.6		0.60	0.02	0.10	0.08	
	46	-7.0	-0.38	12	-8.3		1.6	0.02	0.70	0.03	
	10	-3.5	0.00	6.8	-1.2		0.3	0.01	0.36	0.04	
	39	2.3	0.61	7.9	-5.0		1.8	0.07	0.47	0.13	
	34	-7.4	-0.32	6.5	-3.1		1.1	0.02	0.39	0.18	
	391	-14	-1.91	19	-30		16	0.27	1.7	2.3	
	130	5.7	1.13	5.1	-11		5.9	0.18	0.50	0.72	
	23	1.6	-0.16	9.1	-3.3		1.1	0.01	0.50	0.06	
	30	-6.9	-0.28	12	-1.8		0.94	0.01	0.67	0.20	
	17	-3.0	-0.01	8.6	-0.23		0.57	0.01	0.46	0.15	
	367	41	-2.0	7.1	-50		18	0.24	1.0	1.1	
	50	-14	-0.45	11	3.5		1.4	0.02	0.63	0.66	
	7.0	0.9	-0.01	3.9	-0.03		0.34	0.01	0.21	0.07	
	390	-114	-5.3	25	-40		11	0.10	2.0	1.8	
	158	-34	-1.9	29	-6.9		5.1	0.05	1.7	1.2	
Capuano and Jones, 2020											
seawater	541	464	10.1	20	105						
freshwater	0	0	0	0	0						
	4.4	-1.1	-0.03	2.1	-0.56		0.13	0.003	0.11	0.01	
	4.5	-0.6	-0.06	2.6	-0.53		0.17	0.001	0.14	0.02	
	1.2	-0.23	0.001	1.2	-0.13		0.04	0.001	0.06	0.005	
	10.0	-3.2	-0.16	3.8	-1.30		0.27	0.001	0.21	0.03	
	1.6	-0.29	-0.004	1.5	-0.08		0.05	0.001	0.08	0.01	
	5.8	-0.82	-0.08	2.5	-0.64		0.21	0.001	0.13	0.02	
	2.1	-0.18	0.01	1.7	-0.05		0.08	0.003	0.09	0.02	
	1.8	0.84	0.03	2.0	0.05		0.12	0.003	0.10	0.02	
	1.7	0.35	0.00	2.1	-0.13		0.09	0.002	0.11	0.01	
	1.1	0.77	0.00	1.3	0.04		0.09	0.001	0.06	0.01	
	3.1	-0.40	0.01	2.1	-0.03		0.11	0.004	0.11	0.03	
	1.7	0.66	0.04	2.0	0.13		0.10	0.004	0.10	0.02	
	6.5	-2.1	-0.03	3.2	-0.73		0.18	0.004	0.17	0.03	
	1.4	1.5	0.04	1.8	0.31		0.13	0.003	0.09	0.03	
	1.1	2.2	0.02	1.1	0.24		0.16	0.002	0.05	0.02	
	0.9	1.3	0.04	0.99	0.31		0.10	0.003	0.05	0.02	
	2.7	1.3	0.04	1.8	0.46		0.18	0.004	0.09	0.05	
	9.9	1.2	-0.13	1.6	-1.14		0.48	0.003	0.10	0.04	
	2.9	2.9	-0.01	0.65	-0.24		0.27	0.002	0.04	0.02	
	5.4	1.0	-0.02	2.1	-0.14		0.28	0.004	0.12	0.05	
	4.7	4.2	-0.05	0.52	-0.61		0.41	0.002	0.03	0.02	
	20	4.8	-0.32	0.40	-3.3		1.1	0.002	0.06	0.03	
	20	3.4	-0.33	0.92	-3.2		1.05	0.003	0.08	0.04	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
	mEq/L						Error (mEq/L)				
	4.9	2.7	0.00	0.86	-0.24		0.35	0.004	0.05	0.03	
	1.8	0.8	0.02	1.5	0.39		0.12	0.003	0.08	0.04	
	2.1	3.0	0.01	0.47	-0.01		0.24	0.003	0.03	0.02	
	2.8	4.1	-0.02	0.41	-0.20		0.33	0.002	0.03	0.02	
	1.9	1.9	0.02	1.1	0.38		0.17	0.003	0.06	0.04	
	15	1.2	-0.21	1.4	-1.5		0.69	0.003	0.10	0.07	
	15	6.2	-0.21	0.12	-2.5		0.94	0.003	0.03	0.02	
	5.8	0.7	-0.05	2.9	0.15		0.28	0.003	0.15	0.06	
	4.8	1.4	-0.03	1.4	0.13		0.28	0.003	0.08	0.05	
	1.1	2.9	0.02	0.66	0.24		0.19	0.002	0.03	0.02	
	1.1	2.7	0.01	0.87	0.20		0.18	0.002	0.05	0.02	
	12	5.2	-0.17	0.49	-1.9		0.78	0.003	0.05	0.02	
	1.2	2.6	0.03	0.65	0.13		0.18	0.003	0.03	0.02	
	1.4	3.0	0.04	0.89	0.17		0.21	0.003	0.05	0.02	
	4.4	2.9	-0.02	0.56	-0.50		0.33	0.003	0.04	0.02	
	0.8	3.4	0.03	0.39	0.21		0.20	0.002	0.02	0.02	
	1.4	4.1	0.03	0.50	0.04		0.26	0.003	0.03	0.02	
	4.2	3.9	-0.03	1.01	-0.32		0.37	0.003	0.06	0.02	
	2.2	5.2	0.01	0.22	-0.19		0.35	0.003	0.02	0.01	
	3.4	5.0	-0.04	0.08	-0.54		0.40	0.001	0.01	0.01	
	2.4	4.4	-0.02	0.19	-0.31		0.33	0.001	0.01	0.01	
	1.5	5.4	-0.01	0.19	-0.16		0.33	0.001	0.01	0.01	
	12	5.4	-0.18	0.23	-2.0		0.77	0.002	0.03	0.02	
	2.0	5.4	0.001	0.08	-0.29		0.36	0.002	0.01	0.01	
	7.9	4.8	-0.11	0.15	-1.3		0.58	0.002	0.02	0.01	
	12	3.6	-0.17	0.21	-2.0		0.71	0.003	0.03	0.02	
	1.5	5.0	0.02	0.23	-0.08		0.32	0.003	0.01	0.01	
	12	5.0	-0.15	0.09	-2.0		0.77	0.004	0.03	0.02	
	7.1	9.8	-0.08	-0.14	-1.3		0.80	0.003	0.01	0.002	
	1.8	8.0	0.02	0.05	-0.21		0.48	0.003	0.01	0.01	
	5.1	2.5	0.01	1.53	-0.22		0.34	0.005	0.09	0.04	
	12	11	-0.17	-0.16	-2.19		1.1	0.003	0.01	0.01	
	2.3	6.0	0.01	0.18	-0.20		0.40	0.003	0.01	0.01	
	3.8	10.3	0.01	0.09	-0.4		0.68	0.004	0.01	0.02	
	14	5.8	-0.20	-0.10	-2.4		0.91	0.004	0.02	0.02	
	9.2	5.9	-0.10	-0.002	-1.5		0.69	0.004	0.02	0.01	
	4.4	6.1	-0.04	0.49	-0.12		0.50	0.002	0.03	0.04	
	15	11	-0.18	0.00	-2.3		1.2	0.005	0.03	0.03	
	13	7.3	-0.14	-0.04	-2.1		0.92	0.005	0.02	0.02	
	14	10.8	-0.13	-0.09	-2.3		1.2	0.007	0.02	0.02	
	11	7.9	-0.11	0.02	-1.8		0.89	0.005	0.02	0.02	
	26	10.2	-0.33	-0.46	-4.6		1.6	0.008	0.03	0.02	
	16	11	-0.16	-0.15	-2.5		1.2	0.007	0.02	0.03	
Cardona et al., 2004											
seawater	540	464	10.1	20	105						
freshwater	2.9	4.2	0.1	1.6	2						
	6.8	-1.3	0.03	0.86	1.3		0.31	0.01	0.13	0.20	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
	mEq/L						Error (mEq/L)				
	25	-9.8	-0.30	6.2	9.2		0.65	0.01	0.43	0.77	
	5.4	-1.6	-0.05	0.51	3.1		0.24	0.01	0.11	0.28	
	11	-3.8	-0.15	3.1	3.0		0.38	0.01	0.25	0.33	
	6	0.54	0.04	-0.11	0.004		0.37	0.01	0.08	0.13	
	24	-11	-0.30	7.6	8.9		0.57	0.01	0.50	0.75	
	14	-7.6	-0.11	4.8	4.2		0.32	0.01	0.34	0.42	
	7.6	-2.8	0.01	2.6	2.1		0.27	0.01	0.22	0.25	
	5.5	0.27	0.05	-0.09	0.10		0.34	0.01	0.08	0.13	
	9	-3.1	-0.01	2.4	1.6		0.32	0.01	0.21	0.24	
	9.7	-3.8	-0.13	2.8	2.3		0.31	0.01	0.23	0.28	
	7.1	0.3	0.02	1.3	0.6		0.41	0.01	0.15	0.17	
	19	-9.4	-0.09	9.0	4.4		0.42	0.02	0.56	0.47	
	5.6	-1.7	-0.05	2.5	0.88		0.24	0.01	0.21	0.17	
	8.9	-4.0	-0.11	2.2	3.6		0.27	0.01	0.20	0.34	
	34	-4.5	-0.18	4.5	2.4		1.3	0.03	0.36	0.52	
	3.5	3.1	-0.11	-1.0	-1.1		0.39	0	0.03	0.05	
	9.9	-2.1	0.07	2.8	0.85		0.41	0.02	0.23	0.21	
	13	-6.0	-0.18	4.7	5.5		0.33	0.01	0.33	0.47	
	3.1	-0.87	0.00	0.39	0.16		0.18	0.01	0.10	0.11	
	5.5	0.97	-0.05	-0.09	0.30		0.37	0.01	0.08	0.14	
	4.8	2.9	-0.04	-0.27	-0.37		0.44	0.01	0.07	0.10	
	6.2	1.5	0.04	-0.72	-0.83		0.43	0.01	0.05	0.09	
	13	-4.2	0.02	3.7	2.9		0.42	0.02	0.28	0.34	
	6.9	-4.0	-0.07	4.3	4.0		0.18	0.01	0.30	0.34	
	8.6	-4.5	-0.01	3.2	1.5		0.23	0.01	0.25	0.23	
	17	-2.3	-0.26	3.9	5.3		0.69	0.01	0.30	0.50	
	21	-12	-0.14	12	5.1		0.39	0.02	0.70	0.53	
	4.6	1.5	0.07	-0.66	-0.53		0.36	0.01	0.05	0.09	
	5.4	0.36	-0.05	0.11	0.72		0.34	0.01	0.09	0.16	
	42	-21	-0.53	10.4	16		0.85	0.02	0.67	1.3	
	3.7	-1.3	-0.11	3.0	2.0		0.18	0	0.23	0.21	
	5.3	0.24	-0.04	0.12	0.14		0.33	0.01	0.09	0.13	
	6.3	2.7	-0.06	-0.72	-1.5		0.49	0.01	0.05	0.06	
Carreira et al., 2018											
seawater	540	464.5	10.11	20.44	105.2						
freshwater	0	0	0	0	0						
	6.9	-1.2	0.07	6.9	8.9		0.24	0.01	0.36	0.51	
	17.9	-8.1	-0.24	6.7	5.1		0.37	0.01	0.37	0.43	
	4.4	-0.7	0.02	4.6	5.9		0.16	0.01	0.24	0.34	
	2.8	0.6	0.05	3.9	2.3		0.15	0.01	0.20	0.14	
	3.1	-0.5	0.04	3.1	4.0		0.11	0.01	0.16	0.23	
	1.9	0.3	0.06	3.5	3.8		0.10	0.01	0.18	0.21	
	5.0	-1.9	0.21	34	27		0.12	0.02	1.7	1.4	
	4.7	-1.2	0.01	3.4	5.3		0.14	0.01	0.18	0.31	
	3.2	-0.5	0.14	18	19		0.12	0.01	0.90	1.0	
	4.1	1.7	0.32	3.6	3.6		0.26	0.02	0.19	0.22	
	34	-21	-0.53	10	3.8		0.42	0.01	0.55	0.52	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	8.8	-3.2	0.14	28	21		0.22	0.02	1.4	1.2	
	3.6	2.3	0.33	2.3	3.7		0.27	0.02	0.12	0.22	
	12	-5.7	-0.13	6.1	9.0		0.24	0.01	0.33	0.57	
	14	-3.6	-0.06	11	12		0.42	0.01	0.58	0.72	
	16	-3.9	-0.10	13	10		0.50	0.01	0.67	0.65	
	16	-3.5	-0.20	10	12		0.51	0.01	0.53	0.74	
	24	-7.0	-0.34	12	12		0.67	0.01	0.64	0.82	
	17	-3.7	-0.22	8.7	11		0.56	0.01	0.47	0.73	
	19	-5.1	1.3	14	3.7		0.56	0.09	0.75	0.37	
	20	-6.1	-0.23	10	-0.9		0.57	0.01	0.55	0.15	
	8.8	-2.2	-0.04	4.9	-0.18		0.27	0.01	0.26	0.08	
	23	-5.3	-0.18	10	-0.7		0.71	0.01	0.56	0.19	
	114	-3.8	-0.81	22	-2.4		4.7	0.07	1.3	0.99	
	26	-4.0	-0.30	7.4	-2.0		0.91	0.01	0.42	0.15	
	70	-13	-0.92	16	-1.7		2.4	0.02	0.93	0.60	
	6.2	-2.2	-0.02	2.2	2.0		0.16	0.005	0.12	0.16	
	2.9	-0.63	0.06	0.79	0.31		0.09	0.01	0.04	0.04	
	21	-3.4	-0.14	3.9	2.5		0.72	0.01	0.23	0.33	
	39	-4.1	-0.38	5.0	4.9		1.5	0.02	0.32	0.62	
	1.1	-0.09	0.04	1.2	1.0		0.04	0.003	0.06	0.06	
	8.5	-1.1	-0.05	3.7	-0.23		0.31	0.01	0.20	0.07	
	1.2	0.92	0.06	1.5	0.23		0.10	0.004	0.08	0.02	
	1.5	-0.14	0.06	2.0	0.23		0.06	0.004	0.10	0.03	
	0.7	0.58	0.05	1.1	0.24		0.06	0.003	0.06	0.02	
	0.7	0.18	0.05	0.3	0.13		0.04	0.003	0.02	0.01	
	0.8	1.13	0.04	0.94	0.44		0.09	0.003	0.05	0.03	
	0.8	0.15	0.06	0.11	0.02		0.04	0.004	0.01	0.01	
	1.0	-0.01	0.09	0.59	0.02		0.04	0.006	0.03	0.01	
	1.1	-0.64	0.06	0.09	-0.11		0.02	0.004	0.01	0.01	
	1.3	0.07	0.05	1.3	0.15		0.06	0.004	0.07	0.02	
	1.3	0.17	0.06	1.4	0.10		0.06	0.004	0.07	0.02	
	2.4	0.67	0.04	0.44	0.07		0.14	0.004	0.03	0.03	
	0.9	0.24	0.04	2.4	0.28		0.05	0.003	0.12	0.02	
	2.3	0.11	0.06	0.6	0.18		0.11	0.01	0.03	0.03	
	39	-18	-0.51	2.0	-3.0		0.79	0.01	0.17	0.23	
	1.1	-0.06	0.03	3.2	0.5		0.04	0.002	0.16	0.04	
	2.7	-0.35	0.03	0.5	0.16		0.10	0.004	0.03	0.03	
	0.8	0.23	0.04	1.6	0.20		0.05	0.003	0.08	0.02	
	8.3	0.87	-0.08	8.8	0.8		0.40	0.004	0.45	0.12	
	4.1	0.13	0.07	5.9	0.43		0.18	0.007	0.30	0.06	
	1.7	-0.1	0.03	2.2	0.45		0.07	0.003	0.11	0.04	
	3.1	-1.1	0.03	4.7	0.42		0.08	0.005	0.24	0.05	
	3.1	-1.1	0.03	4.7	0.42		0.08	0.005	0.24	0.05	
	0.9	0.15	0.05	2.1	0.30		0.05	0.003	0.11	0.02	
	0.7	0.34	0.06	2.1	0.32		0.05	0.003	0.11	0.02	
	0.8	0.34	0.05	2.1	0.34		0.05	0.003	0.11	0.02	
	13	2.4	-0.10	4.2	1.1		0.69	0.01	0.23	0.18	
	5.7	-2.8	-0.02	2.7	1.7		0.11	0.005	0.14	0.14	
	34	-5.5	-0.43	7.9	0.05		1.2	0.01	0.46	0.33	
	76	-12	-1.1	8.0	-2.5		2.7	0.01	0.54	0.62	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	9.2	2.6	-0.03	3.2	1.1		0.53	0.01	0.18	0.15	
de Montety et al., 2009											
seawater	610	516	11.6	23.4	120						
freshwater	1.3	0.76	0.06	6.5	0.9						
	438	-24	-2.6	-0.32	-11		17	0.29	0.92	3.8	
	59	-13	-0.55	6.7	0.81		1.9	0.03	0.74	0.65	
	600	-6.5	-2.5	-10.9	-25.0		25	0.45	0.61	4.7	
	35	-2.3	-0.40	-0.4	-2.5		1.4	0.02	0.35	0.25	
	439	-21	-1.7	4.6	-6.5		18	0.34	1.2	4.0	
	270	-8.2	-0.65	0.34	-3.5		11	0.23	0.72	2.5	
	117	-19	-0.85	11.2	-0.54		4.0	0.07	1.0	1.2	
	80	-11	-1.3	7.2	-1.3		2.8	0.02	0.80	0.75	
Gattacceca et al., 2009											
seawater	610	516.0	11.60	23.4	120						
freshwater	1	0.8	0.06	6.5	0.9						
	1.1	0.67	-0.01	-0.01	0.31		0.11	0.01	0.25	0.12	
	1.2	-0.62	-0.01	0.18	-0.11		0.05	0.01	0.26	0.10	
	1.3	-0.60	-0.01	-0.02	-0.13		0.05	0.01	0.25	0.10	
	0.8	0.23	-0.004	3.4	3.4		0.07	0.01	0.42	0.27	
	0.6	0.60	0.10	2.6	3.2		0.08	0.01	0.38	0.26	
	1.8	-0.04	0.18	1.4	3.8		0.10	0.02	0.32	0.30	
	1.1	-0.73	0.09	4.4	0.51		0.04	0.01	0.47	0.13	
	1.7	-0.25	0.78	4.4	2.0		0.09	0.05	0.47	0.21	
	41	2.3	0.14	-1.3	0.53		1.9	0.05	0.24	0.51	
	32	6.3	-0.18	-1.0	0.56		1.7	0.03	0.24	0.42	
	44	2.7	0.69	-1.4	0.46		2.0	0.08	0.24	0.53	
	23	13	0.38	-1.4	-0.41		1.7	0.05	0.21	0.29	
	23	12	-0.02	-1.2	-0.39		1.6	0.03	0.22	0.29	
	20	13	0.93	-0.92	0.72		1.5	0.07	0.23	0.32	
	17	14	-0.01	0.75	3.4		1.5	0.02	0.31	0.43	
	13	16	0.68	-0.12	3.3		1.4	0.05	0.26	0.38	
	24	3.9	-0.14	-1.8	0.14		1.3	0.02	0.19	0.33	
	21	7.1	0.42	-2.7	0.59		1.3	0.05	0.14	0.32	
	41	-0.2	0.85	5.9	0.86		1.8	0.09	0.60	0.52	
	383	-37	-0.37	0.96	-6.1		15	0.35	0.81	3.4	
	378	-36	-0.27	0.11	-8.3		15	0.35	0.76	3.3	
	390	7.1	-3.0	2.8	7.4		17	0.22	0.91	4.2	
	221	-18	0.66	4.3	-2.9		8.7	0.25	0.76	2.0	
	209	-15	-1.7	4.0	-4.9		8.3	0.12	0.73	1.8	
	140	19	-1.0	1.3	10.7		7.0	0.09	0.50	2.0	
	80	16	0.12	-1.9	1.3		4.3	0.09	0.26	0.91	
	73	9.5	2.44	-2.3	1.5		3.7	0.20	0.23	0.86	
	60	23	3.3	-2.2	3.9		3.8	0.23	0.22	0.86	
	232	30	-4.0	-0.58	3.4		12	0.02	0.53	2.5	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L						Error (mEq/L)		
	372	-27	-2.7	-6.3	-14		15	0.22	0.43	2.9	
	334	-5.5	-1.7	-5.1	-6.3		14	0.23	0.44	2.9	
	418	52	-3.4	-3.2	10.2		21	0.23	0.65	4.6	
	17	10.7	0.19	-1.8	-1.5		1.3	0.03	0.18	0.18	
	19	5.1	0.06	3.5	0.34		1.1	0.03	0.45	0.29	
	30	1.4	-0.06	3.4	2.0		1.4	0.03	0.46	0.48	
Han et al., 2018											
seawater	417	362	7.5	16	83	0.13					
freshwater	1.8	1.3	0.11	3	1.2	0.006					
	3.5	0.23	-0.08	0.46	0.3	0.01	0.15	0.003	0.18	0.09	0.001
	5.0	-1.9	-0.10	3.0	0.9	0.02	0.11	0.003	0.30	0.14	0.001
	7.8	2.3	0.07	-2.4	-1.1	-0.002	0.44	0.01	0.04	0.07	0.0003
	2.5	-0.11	-0.01	1.9	-0.7	0.002	0.09	0.01	0.25	0.03	0.0004
	3.5	-0.68	-0.08	3.6	0.4	0.01	0.11	0.003	0.33	0.10	0.001
	6.2	0.07	0.25	1.1	2.0	0.01	0.26	0.02	0.21	0.21	0.001
	3.5	0.02	-0.07	2.2	1.4	0.01	0.14	0.003	0.26	0.15	0.001
	8.6	-2.7	-0.20	3.0	0.7	0.02	0.23	0.001	0.31	0.16	0.001
	2.5	-0.41	-0.11	1.8	-0.1	0.01	0.08	0.001	0.24	0.06	0.001
	2.3	-0.29	-0.09	0.18	0.1	0.004	0.07	0.001	0.16	0.07	0.001
	9.4	-3.9	-0.21	3.4	0.5	0.02	0.20	0.002	0.33	0.16	0.001
	6.3	-1.7	-0.14	1.2	0.3	0.01	0.17	0.002	0.22	0.12	0.001
	4.9	-0.80	-0.06	1.2	0.4	0.01	0.16	0.01	0.22	0.11	0.001
	3.6	-1.4	-0.11	1.3	-0.4	0.01	0.07	0.002	0.22	0.06	0.001
	3.1	-1.4	-0.11	3.0	0.2	0.01	0.05	0.001	0.30	0.08	0.001
	7.0	-2.2	-0.16	4.7	-0.1	0.08	0.18	0.002	0.39	0.11	0.005
	6.9	-1.1	-0.15	5.6	-0.2	0.01	0.23	0.002	0.44	0.10	0.001
	8.9	-0.84	-0.14	0.14	0.1	0.002	0.33	0.005	0.17	0.14	0.001
	2.1	0.40	-0.08	-0.11	0.4	0.004	0.10	0.002	0.15	0.08	0.001
	8.8	-3.2	-0.21	2.8	-0.1	0.02	0.21	0.001	0.30	0.12	0.002
	9.9	-4.5	-0.22	2.6	0.2	0.02	0.19	0.002	0.29	0.15	0.001
	7.9	2.3	0.06	-2.7	-1.3	-0.004	0.45	0.01	0.02	0.06	0.000
	6.4	-2.2	-0.16	5.8	-0.8	0.01	0.16	0.001	0.45	0.07	0.001
	3.3	-1.2	-0.10	2.1	-0.4	0.004	0.07	0.002	0.26	0.06	0.001
	6.6	-1.9	-0.13	2.9	-0.3	0.04	0.18	0.003	0.30	0.09	0.002
	8.8	5.4	0.53	2.4	0.8	0.004	0.64	0.04	0.28	0.17	0.001
	18	-3.4	-0.24	2.9	2.0	0.01	0.62	0.01	0.32	0.32	0.001
	12	0.15	-0.13	4.9	1.7	0.03	0.53	0.01	0.41	0.25	0.002
	22	4.4	0.45	6.0	0.7	0.02	1.2	0.05	0.48	0.30	0.001
	18	3.6	0.49	6.7	1.8	0.02	0.96	0.04	0.51	0.31	0.002
	17	-4.5	-0.33	9.9	-1.8	0.08	0.49	0.003	0.67	0.12	0.005
	13	-2.5	-0.28	6.9	0.6	0.01	0.41	0.001	0.51	0.20	0.001
	17	-4.7	-0.30	6.3	-1.0	0.03	0.48	0.004	0.49	0.16	0.002
	8.5	-0.47	-0.22	5.0	1.6	0.01	0.33	0.0004	0.41	0.21	0.001
	17	-5.8	-0.21	8.6	-0.7	0.15	0.43	0.01	0.60	0.17	0.008
	18	-0.36	-0.32	21	5.2	0.05	0.76	0.004	1.2	0.48	0.003
	12	0.12	0.26	2.2	1.3	0.01	0.49	0.03	0.27	0.22	0.001
	72	-4.3	1.14	3.9	-5.0	0.02	2.91	0.13	0.45	0.51	0.002

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
	mEq/L						Error (mEq/L)				
	8.2	0.29	0.27	2.7	1.4	0.01	0.36	0.02	0.29	0.19	0.001
	13	-3.7	-0.29	9.3	-0.4	0.01	0.36	0.001	0.63	0.15	0.001
	18	-7.1	-0.24	7.2	-0.2	0.10	0.39	0.01	0.54	0.20	0.006
	20	5.6	0.25	-3.1	-2.6	-0.01	1.1	0.03	0.02	0.11	0.0002
	13	-2.0	0.26	3.9	1.0	0.01	0.44	0.03	0.36	0.22	0.001
	11	-1.4	0.06	3.5	1.2	0.01	0.37	0.02	0.34	0.20	0.001
	47	-7.5	-0.40	7.9	-1.5	0.03	1.7	0.03	0.62	0.43	0.003
	1.9	0.16	-0.08	-0.4	-0.4	0	0.08	0.001	0.13	0.04	0.000
	6.0	-0.74	-0.11	0.7	-0.4	0.05	0.21	0.004	0.19	0.08	0.003
	7.2	3.0	0.11	-2.8	-1.1	0.00	0.45	0.02	0.02	0.06	0.000
	23	-11	-0.37	15.7	1.1	0.15	0.41	0.01	0.97	0.32	0.008
	22	-9.9	-0.35	8.7	-2.0	0.08	0.43	0.01	0.61	0.16	0.005
	23	-10	-0.36	9.1	-2.4	0.16	0.48	0.01	0.64	0.15	0.008
	26	-12	-0.39	10.2	-2.6	0.17	0.53	0.01	0.70	0.17	0.009
	35	-10	-0.55	15.6	-3.9	0.25	0.99	0.01	0.98	0.19	0.013
	16	0.30	0.98	5.9	4.0	0.01	0.68	0.07	0.46	0.40	0.001
	26	-4.0	0.21	0.9	3.6	-0.01	0.90	0.04	0.23	0.48	0.0003
	27	-7.6	0.09	-1.2	2.6	-0.002	0.77	0.03	0.13	0.43	0.001
	25	-5.6	0.14	-1.9	2.9	-0.01	0.79	0.03	0.09	0.43	0.0004
	31	-5.5	0.03	-0.52	1.6	0.01	1.1	0.03	0.17	0.42	0.001
Magaritz and Luzier, 1985											
seawater	546	468	10	21	107						
freshwater	0.65	0	0	0.10	0.33						
	62	13	-0.12	0.15	-6.5		3.3	0.05	0.13	0.29	
	68	12	-0.23	0.03	-7.3		3.5	0.05	0.14	0.31	
	79	11	-0.11	-0.51	-9.6		3.9	0.07	0.13	0.30	
	119	-5.6	0.84	1.4	-7.4		4.8	0.15	0.30	0.80	
	228	-30	-2.2	11	-9.8		8.3	0.10	1.0	1.750	
	184	-27	-1.30	11	-13		6.5	0.10	0.90	1.150	
	59	11	2.9	0.35	-6.2		3.0	0.20	0.14	0.28	
	82	4.2	-0.49	0.79	-8.2		3.7	0.05	0.20	0.40	
	93	3.4	0.30	0.36	-0.31		4.1	0.10	0.20	0.91	
Price et al., 1991											
seawater	592	509	13	22	114	0.094					
freshwater	1.6	1.4	0.07	5.9	2.1	0.021					
	578	8.0	-1.2	0.29	-1.4	0.01	25	0.59	1.1	5.5	0.005
	584	12	-0.55	0.33	-0.06	-0.01	26	0.63	1.1	5.6	0.004
	592	13	-0.86	0.31	0.06	0.01	26	0.62	1.1	5.7	0.005
	598	8.2	-0.95	-0.41	-1.9	-0.01	26	0.62	1.1	5.7	0.004
	134	0.62	0.09	-0.09	-1.1	0.02	5.8	0.16	0.47	1.3	0.003
	146	-2.7	-0.13	0.92	-3.2	0.02	6.1	0.16	0.54	1.3	0.003
	224	-0.6	-0.11	0.51	0.92	0.05	9.6	0.25	0.62	2.3	0.005
	262	0.2	-0.07	-0.28	-3.7	0.03	11	0.29	0.64	2.4	0.004
	575	10.5	-0.58	-0.13	-0.82	-0.01	25	0.62	1.1	5.5	0.004

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	62	-0.15	-0.40	2.2	1.3	0.01	2.7	0.05	0.49	0.74	0.002
	77	-3.0	-0.05	1.6	2.1	0.01	3.2	0.09	0.48	0.93	0.002
	80	-2.1	-0.24	2.2	2.1	0.03	3.3	0.08	0.51	1.0	0.003
	80	-2.1	-0.17	1.9	2.0	0.01	3.3	0.08	0.50	0.95	0.002
	123	-0.37	-0.59	3.4	-1.9	0.02	5.3	0.11	0.63	1.2	0.003
	129	-0.31	-0.59	3.6	-2.0	0.02	5.5	0.12	0.65	1.2	0.003
	132	-2.9	-0.66	3.9	-1.7	0.02	5.5	0.12	0.67	1.3	0.003
	153	1.7	-0.62	4.0	-1.6	0.02	6.7	0.14	0.70	1.5	0.003
	539	6.7	-0.91	0.85	-2.2	0.01	23	0.56	1.1	5.1	0.005
	525	5.7	-0.84	1.0	-2.8	0.01	23	0.55	1.1	4.9	0.005
	2	-0.31	-0.01	-0.01	-0.07	-0.001	0.07	0.00	0.30	0.10	0.001
	590	15	-0.69	-0.40	-2.9	-0.01	26	0.63	1.1	5.6	0.004
	592	0.28	0.01	0.01	0.06	-0.01	25	0.67	1.1	5.7	0.004
	547	8.5	-0.57	0.78	-1.3	0.01	24	0.59	1.1	5.2	0.005
Russak et al., 2016											
seawater	634	553	12	25	128	0.23					
freshwater	0	0	0	0	0	0					
	62	-17	-0.35	18	-2.5	0.14	1.9	0.04	1.0	0.50	0.01
	200	-31	-1.4	23	-6.4	0.16	7.2	0.12	1.6	1.7	0.01
	343	-28	-2.1	16	-4.2	0.08	14	0.22	1.5	3.3	0.01
	476	-24	-1.4	5.2	-5.1	-0.003	20	0.38	1.2	4.6	0.01
	2.9	-0.63	0.05	3.9	0.21	0.02	0.10	0.01	0.20	0.04	0.001
	1.6	0.004	0.07	3.9	0.28	0.02	0.07	0.01	0.20	0.03	0.001
	100	-11	-0.79	8.1	-2.2	0.05	3.8	0.06	0.60	0.90	0.005
	338	-28	-2.6	17	-4.2	0.09	13	0.19	1.5	3.2	0.01
	495	-25	-1.0	4.5	-6.9	0.0004	20	0.42	1.2	4.7	0.01
	526	-21	-0.46	1.3	-6.2	-0.02	22	0.48	1.1	5.0	0.01
	2.9	-0.63	0.15	3.9	0.41	0.03	0.10	0.01	0.20	0.05	0.002
	2.9	-0.53	0.15	3.9	0.41	0.03	0.10	0.01	0.20	0.05	0.002
	45	-13	-0.25	13	-2.1	0.07	1.3	0.03	0.8	0.35	0.005
	381	-30	-2.81	20	-7.9	0.06	15	0.22	1.8	3.5	0.01
	536	-20	-0.75	1.9	-9.2	-0.02	22	0.47	1.2	5.0	0.01
	24	0.07	-0.05	3.5	-0.95	0.01	1.1	0.02	0.22	0.2	0.001
	182	-18	-0.94	14	-2.7	0.13	7.1	0.13	1.1	1.7	0.01
	317	-32	-2.2	21	-4.0	0.19	12	0.19	1.7	3.0	0.02
	443	-18	-1.4	7.5	-4.4	0.04	18	0.35	1.3	4.3	0.01
	2.3	-0.01	0.06	3.7	0.34	0.02	0.10	0.01	0.19	0.04	0.001
	326	-23	-2.7	15	-3.8	0.10	13	0.18	1.4	3.1	0.01
	503	-26	-0.02	3.2	-5.6	0.02	21	0.48	1.2	4.8	0.01
	524	-5.1	-0.42	1.3	-0.8	0.01	23	0.48	1.1	5.3	0.01
	4.2	-0.86	0.12	4.5	0.55	0.02	0.14	0.01	0.24	0.07	0.001
	342	-26	-2.8	21	-6.0	0.08	14	0.19	1.7	3.2	0.01
	522	-44	-1.5	1.4	-12	-0.01	21	0.42	1.1	4.7	0.01
Russak et al., 2010											
seawater	636	550	12	20	122	0.18					

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
freshwater	6	5.0	0.10	2.5	1.6	0.024					
	189	-13	-1.8	16	0.10	0.13	7.5	0.09	1.2	1.8	0.01
	194	-18	-1.8	17	0.04	0.12	7.5	0.10	1.2	1.9	0.01
	233	-20	-2.0	22	1.9	0.15	9.1	0.12	1.5	2.3	0.01
	257	-22	-2.1	22	2.0	0.16	10	0.14	1.6	2.6	0.01
	254	-25	-2.2	21	2.2	0.14	10	0.13	1.5	2.6	0.01
	313	-28	-2.7	24	2.1	0.17	12	0.16	1.7	3.1	0.01
	348	-31	-2.8	29	3.2	0.18	14	0.19	2.0	3.5	0.01
	286	-25	-2.2	21	2.4	0.13	11	0.16	1.5	2.9	0.01
	351	-31	-2.8	24	2.2	0.15	14	0.19	1.8	3.5	0.01
	358	-27	-2.6	25	3.4	0.15	14	0.21	1.9	3.6	0.01
	526	-35	-2.9	30	1.9	0.18	21	0.35	2.4	5.2	0.02
	533	-28	-2.6	22	-1.4	0.10	22	0.38	2.0	5.1	0.01
	574	-28	-2.6	24	0.76	0.10	23	0.41	2.1	5.6	0.01
	577	-30	-2.7	23	0.18	0.10	23	0.41	2.1	5.6	0.01
	511	-19	-1.5	22	3.8	0.11	21	0.41	1.9	5.1	0.01
	400	-28	-2.9	24	-1.3	0.13	16	0.23	1.9	3.8	0.01
	415	-26	-2.7	23	-1.4	0.12	17	0.26	1.8	3.9	0.01
	434	-29	-2.8	22	-2.3	0.12	17	0.27	1.8	4.1	0.01
	444	-20	-1.8	21	-2.5	0.11	18	0.33	1.8	4.1	0.01
	494	-19	-2.0	21	-1.2	0.10	20	0.37	1.9	4.7	0.01
	506	-21	-2.2	19	-1.7	0.10	21	0.37	1.8	4.8	0.01
	400	-28	-2.9	24	-1.3	0.13	16	0.23	1.9	3.8	0.01
	415	-26	-2.7	23	-1.4	0.12	17	0.26	1.8	3.9	0.01
	434	-29	-2.8	22	-2.3	0.12	17	0.27	1.8	4.1	0.01
	444	-20	-1.8	21	-2.5	0.11	18	0.33	1.8	4.1	0.01
	494	-19	-2.0	21	-1.2	0.10	20	0.37	1.9	4.7	0.01
	506	-21	-2.2	19	-1.7	0.10	21	0.37	1.8	4.8	0.01
	21	-1.0	0.02	1.2	0.13	0.01	0.9	0.02	0.21	0.2	0.00
	11	0.7	0.01	0.36	0.34	0.005	0.5	0.01	0.15	0.15	0.00
	527	-12	-1.4	13	1.7	0.07	22	0.43	1.5	5.2	0.01
	546	-15	-1.1	14	2.1	0.07	23	0.46	1.6	5.4	0.01
	519	-5.8	-1.5	15	3.3	0.07	22	0.42	1.6	5.2	0.01
Sivan et al., 2005											
seawater	631	529	11.5	22	122	0.18					
freshwater	4.0	3.0	0.40	2.0	3.9	0.032					
	403	-49	-3.3	18	-6.5	0.08	14	0.21	1.6	3.6	0.01
	485	-57	-3.5	19	-8.5	0.08	18	0.27	1.8	4.3	0.01
	463	-54	-4.8	31	-6.0	0.10	17	0.19	2.4	4.2	0.01
	539	-51	-3.2	14	-8.8	0.06	20	0.34	1.7	4.8	0.01
	18	0.26	-0.25	0.6	-2.8	-0.01	0.75	0.02	0.15	0.2	0.001
	74	-8.7	-0.54	5.3	-1.8	0.02	2.7	0.06	0.48	0.8	0.003
	548	-29	-2.3	12	-0.3	0.05	22	0.39	1.6	5.3	0.01
	546	-20	-2.2	13	2.2	0.05	22	0.39	1.6	5.4	0.01
	569	-24	-1.6	7.6	1.2	0.04	23	0.44	1.4	5.6	0.01
	19	-1	-0.27	1.6	-2.1	0.003	0.8	0.02	0.21	0.23	0.002

Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
		mEq/L					Error (mEq/L)			
216	-10.9	-1.5	14	-2.3	0.08	8.5	0.14	1.2	2.1	0.01
589	-1.8	-1.5	6.0	1.0	0.04	25	0.47	1.3	5.8	0.01
17	0.09	-0.43	1.6	-2.9	-0.004	0.7	0.01	0.20	0.18	0.002
15	-0.23	-0.29	2.2	-2.6	0.0004	0.6	0.02	0.23	0.17	0.002
13	0.45	-0.26	1.6	-2.4	-0.003	0.6	0.02	0.20	0.16	0.002
13	0.45	-0.26	2.2	-2.3	0.001	0.6	0.02	0.23	0.17	0.002
24	1.2	-0.25	2.6	-2.3	0.002	1.1	0.03	0.26	0.3	0.002
495	-2.9	-2.0	17	-2.7	0.07	21	0.36	1.7	4.7	0.01
531	7.9	-1.6	14	-0.3	0.06	23	0.41	1.6	5.1	0.01
545	7.1	-1.5	14	-0.6	0.07	23	0.43	1.7	5.3	0.01
26	-0.5	-0.29	2.1	-2.7	0.00	1.1	0.03	0.24	0.27	0.002
39	-2.4	-0.32	2.9	-2.9	0.01	1.5	0.04	0.30	0.4	0.002
531	0.89	-2.5	20	3.8	0.06	22	0.36	1.9	5.4	0.01
15	-2.2	-0.29	2.6	-2.7	0.01	0.5	0.02	0.25	0.17	0.002
517	-5.4	-2.3	20	1.0	0.05	21	0.36	1.9	5.1	0.01
21	-4.3	-0.40	3.2	-2.5	0.01	0.7	0.02	0.29	0.23	0.002
16	-3.1	-0.31	2.7	-2.4	0.01	0.5	0.02	0.26	0.19	0.002
209	-20	-1.7	13	-7.8	0.07	8	0.12	1.1	1.7	0.01
535	-41	-2.7	13	-9.6	0.03	20	0.36	1.6	4.7	0.01
531	-50	-3.0	15	-10.3	0.03	20	0.34	1.7	4.6	0.01
557	-50	-2.2	9.2	-10.7	0.02	21	0.40	1.4	4.9	0.01
124	-8.7	-1.6	24	-7.2	0.15	4.8	0.05	1.5	1.0	0.01
130	-8.7	-1.7	24	-6.8	0.13	5.0	0.05	1.5	1.0	0.01
129	-8.9	-1.7	25	-7.2	0.14	5.0	0.05	1.5	1.0	0.01
129	-6.9	-1.6	23	-6.6	0.13	5.1	0.05	1.5	1.0	0.01
139	-9.3	-1.8	25	-7.7	0.15	5.4	0.05	1.6	1.1	0.01
132	-6.4	-1.8	25	-5.4	0.13	5.2	0.05	1.5	1.1	0.01
146	-10.1	-1.9	24	-8.9	0.14	5.6	0.05	1.5	1.1	0.01
148	-5.8	-1.9	25	-7.5	0.13	5.9	0.05	1.6	1.2	0.01
156	-6.5	-2.0	26	-8.5	0.15	6.2	0.06	1.6	1.2	0.01
160	-3.9	-2.1	26	-7.7	0.14	6.5	0.06	1.6	1.3	0.01
165	-5.1	-2.1	24	-8.9	0.14	6.7	0.06	1.6	1.3	0.01
172	-8.9	-2.2	25	-8.6	0.13	6.8	0.06	1.6	1.4	0.01
176	-7.3	-2.2	25	-9.7	0.14	7.0	0.06	1.6	1.3	0.01
177	-0.13	-2.2	26	-7.2	0.14	7.4	0.07	1.7	1.5	0.01
184	-6.0	-2.2	25	-9.2	0.14	7.4	0.07	1.6	1.4	0.01
190	2.0	-2.2	25	-7.1	0.14	8.1	0.08	1.7	1.6	0.01
204	-12	-2.3	24	-10.5	0.14	8.0	0.08	1.6	1.6	0.01
224	-11	-2.5	24	-10.2	0.14	8.9	0.09	1.7	1.8	0.01
228	0.1	-2.4	23	-7.5	0.12	9.6	0.10	1.6	1.9	0.01
260	-7.8	-2.5	24	-9.5	0.13	11	0.12	1.7	2.1	0.01
273	1.3	-2.5	25	-5.5	0.12	12	0.14	1.8	2.5	0.01
278	-4.9	-2.5	24	-8.1	0.12	11	0.14	1.7	2.4	0.01
69	4.5	-0.35	2.9	-2.1	0.003	3.1	0.06	0.35	0.71	0.003
71	-2.2	-0.39	2.2	-4.7	-0.002	2.9	0.06	0.32	0.59	0.002
65	2.8	-0.28	2.2	-4.1	-0.003	2.9	0.06	0.31	0.57	0.002
87	2.4	-0.37	2.8	-4.1	0.0004	3.8	0.08	0.37	0.77	0.003
124	-3.7	-0.62	3.2	-5.7	0.002	5.0	0.10	0.45	1.0	0.003
160	3.1	-0.56	4.5	-4.8	0.01	6.9	0.13	0.58	1.4	0.004
230	-3.6	-0.70	4.8	-10.6	0.01	9.5	0.19	0.70	1.8	0.005

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	304	-16	-1.2	5.5	-12	0.01	12	0.23	0.86	2.4	0.01
	360	7.3	-1.1	8.9	-3.3	0.03	15	0.28	1.1	3.4	0.01
	406	-1.2	-1.2	8.7	-8.4	0.02	17	0.32	1.2	3.6	0.01
	446	9.2	-1.1	9.3	-9.7	0.03	19	0.36	1.3	3.9	0.01
	495	3.1	-1.4	11	-8.4	0.03	21	0.39	1.5	4.4	0.01
	525	-0.07	-1.4	12	-5.4	0.04	22	0.41	1.5	4.8	0.01
	534	-6.6	-1.5	12	-5.9	0.04	22	0.42	1.5	4.9	0.01
	551	-22	-2.0	12	-14	0.04	22	0.41	1.6	4.7	0.01
	528	-4.6	-1.5	13	-1.1	0.05	22	0.41	1.6	5.1	0.01
	523	41	-1.5	13	1.2	0.05	24	0.41	1.6	5.1	0.01
	523	-7.4	-1.5	14	1.2	0.05	22	0.41	1.6	5.1	0.01
	524	-4.2	-1.5	14	1.8	0.05	22	0.41	1.7	5.2	0.01
	522	-2.6	-1.5	14	1.3	0.05	22	0.41	1.6	5.1	0.01
	533	-12	-1.7	13	-0.7	0.05	22	0.41	1.6	5.1	0.01
	541	-7.5	-1.6	14	-0.63	0.05	22	0.42	1.6	5.2	0.01
	532	-14	-1.6	14	-0.14	0.05	22	0.41	1.6	5.2	0.01
	535	-8.5	-1.6	13	0.50	0.05	22	0.41	1.6	5.2	0.01
	315	-15	-1.7	11	-3.9	0.05	12	0.21	1.2	2.9	0.01
	330	-9.5	-1.8	12	-1.9	0.05	13	0.22	1.2	3.2	0.01
	378	-21	-2.0	11	-5.1	0.05	15	0.25	1.3	3.5	0.01
	395	-16	-1.9	11	-3.7	0.05	16	0.27	1.3	3.7	0.01
	390	-16	-2.0	12	-2.3	0.05	16	0.26	1.3	3.7	0.01
	449	-14	-2.1	12	-4.8	0.05	18	0.31	1.4	4.2	0.01
	484	-19	-2.3	12	-5.7	0.05	19	0.33	1.5	4.4	0.01
	494	-17	-2.3	14	-4.6	0.06	20	0.34	1.6	4.6	0.01
	501	-21	-2.2	14	-4.8	0.06	20	0.35	1.6	4.6	0.01
	506	-23	-2.3	12	-5.7	0.05	20	0.35	1.5	4.6	0.01
	506	-23	-2.3	12	-6.1	0.05	20	0.35	1.5	4.6	0.01
	504	-21	-2.4	14	-4.7	0.05	20	0.35	1.6	4.7	0.01
	503	-23	-2.2	13	-5.6	0.05	20	0.35	1.6	4.6	0.01
	494	-17	-2.2	13	-4.3	0.05	20	0.35	1.5	4.6	0.01
	486	-10	-2.0	14	-2.8	0.06	20	0.35	1.6	4.6	0.01
	486	-0.36	-2.0	14	-0.47	0.06	20	0.35	1.6	4.7	0.01
	488	-2.0	-2.0	14	-0.44	0.06	20	0.35	1.6	4.7	0.01
	476	2.0	-1.9	14	1.0	0.06	20	0.35	1.5	4.7	0.01
Sola and Vallejos, 2021			Data was filtered based on a reaction error >5%								
seawater	583	524	11.5	25	99						
freshwater	13	15	0.30	8.0	5.3						
	144	-9.3	-1.3	11	6.2		6.1	0.08	1.1	1.7	
	301	-30	-3.9	28	8.4		12	0.11	2.2	3.1	
	651	-16	-4.7	16	3.8		28	0.41	2.2	5.7	
	636	-33	-5.5	21	8.5		27	0.36	2.4	5.8	
	102	12	-0.24	9.2	15		5.3	0.09	1.0	1.7	
	479	37	0.6	8.1	22		23	0.51	1.5	5.2	
	352	-28	-4.3	32	18		14	0.14	2.5	4.0	
Tsumi, 2021											

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L						Error (mEq/L)		
seawater	636	550	12	22	122	0.196					
freshwater	2.3	2.3	0.26	2.6	1.6	0.017					
	1.4	0.44	-0.002	0.43	0.56	0.003	0.10	0.01	0.15	0.10	0.001
	1.9	0.09	-0.005	0.41	0.49	0.003	0.10	0.01	0.15	0.10	0.001
	2.5	0.54	-0.009	0.39	0.36	0.003	0.15	0.01	0.15	0.10	0.001
	2.7	2.4	0.23	2.4	1.3	0.003	0.25	0.03	0.25	0.15	0.001
	3.2	-0.09	0.009	0.37	0.23	0.003	0.15	0.01	0.15	0.10	0.001
	5.5	-1.1	0.018	0.30	0.79	0.01	0.20	0.02	0.15	0.15	0.002
	6.3	-0.76	0.069	1.3	0.64	0.01	0.25	0.02	0.20	0.15	0.002
	27	-5.8	-0.21	2.6	0.68	0.03	0.90	0.03	0.30	0.35	0.003
	166	-16	-1.2	8.4	-0.69	0.06	6.4	0.10	0.80	1.6	0.01
	565	56	-1.2	20	9.42	0.09	27	0.48	2.0	5.9	0.01
	2.3	-0.33	-0.10	0.40	-0.61	0.01	0.10	0.01	0.15	0.05	0.002
	8.3	-3.4	-0.06	3.2	-0.73	0.03	0.20	0.02	0.30	0.10	0.003
	12	-3.9	-0.01	4.1	-0.49	0.03	0.35	0.02	0.35	0.15	0.003
	21	-7.3	-0.09	6.8	-0.11	0.06	0.55	0.03	0.50	0.25	0.004
	38	-13	-0.15	8.3	0.70	0.07	1.0	0.04	0.60	0.45	0.01
	81	-13	-0.26	11	0.45	0.09	2.9	0.07	0.80	0.85	0.01
	229	-19	-0.89	15	0.31	0.11	9.0	0.18	1.3	2.3	0.01
	432	-23	-1.1	20	0.81	0.14	18	0.35	1.8	4.2	0.01
	473	-16	-1.3	20	-1.1	0.16	20	0.38	1.9	4.5	0.02
	4.5	-2.2	-0.22	1.3	-1.0	0.002	0.10	0.004	0.20	0.05	0.001
	2.4	-1.4	-0.19	1.4	-0.61	0.003	0.05	0.004	0.20	0.05	0.001
	3.9	-0.7	-0.16	1.4	-0.91	0.003	0.15	0.01	0.20	0.05	0.001
	164	4.5	-0.32	5.4	3.6	0.03	7.4	0.15	0.65	1.8	0.005
	370	-5.3	-0.45	6.1	1.5	0.04	16	0.33	1.0	3.7	0.01
	393	-2.4	-0.32	6.4	0.08	0.05	17	0.36	1.1	3.8	0.01
	450	0.40	0.03	3.7	-0.74	0.04	20	0.43	1.0	4.3	0.01
	488	4.6	0.30	4.5	1.0	0.03	21	0.48	1.1	4.8	0.01
	512	3.9	0.58	3.8	0.50	0.05	22	0.51	1.1	5.0	0.01
	560	16	1.2	1.3	-2.5	0.02	25	0.59	1.1	5.3	0.01
	561	23	1.3	1.3	-0.73	0.03	25	0.59	1.1	5.4	0.01
Vandenbohede and Lebbe, 2012											
seawater	474	406	8.5	17.5	100	0					
freshwater	0.27	4.13	1.5	4.12	6.28	0					
	4.0	-5.1	-1.4	6.9	-5.9		0.11	0.01	0.56	0.05	0.000
	2.1	-3.2	-1.0	3.1	-4.6		0.13	0.02	0.37	0.10	
	2.9	-4.2	-1.4	3.9	-5.8		0.11	0.01	0.41	0.05	
	8.8	-3.8	-0.62	4.9	-6.3		0.38	0.05	0.46	0.08	
	3.0	-2.3	-0.03	-0.1	-0.55		0.21	0.08	0.21	0.31	
	4.4	1.6	-0.80	-1.3	-5.2		0.46	0.04	0.15	0.09	
	14	10.2	-0.49	-1.2	-5.0		1.3	0.06	0.17	0.20	
	106	-14	-0.20	10.1	-4.7		4.0	0.14	0.86	1.1	
	420	-19	-0.58	17	-8.0		17	0.36	1.6	4.1	
	89	7.8	-0.30	1.1	-5.7		4.4	0.13	0.39	0.91	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	366	9.6	-0.05	3.8	-2.8		16	0.34	0.91	3.8	
	118	-2.2	-0.22	6.7	-8.8		5.1	0.15	0.71	1.0	
	409	-5.6	0.25	9.1	-2.4		17	0.39	1.2	4.2	
	22	-10.5	-0.50	7.9	-6.6		0.61	0.07	0.63	0.20	
	4.8	-4.4	-1.1	4.2	-5.5		0.18	0.02	0.42	0.08	
	18	-1.1	-1.3	9.1	-2.5		0.92	0.02	0.69	0.37	
	3.9	-2.1	-0.50	16	-3.7		0.25	0.05	1.0	0.16	
	13	-0.12	-0.75	2.8	-3.3		0.75	0.05	0.37	0.28	
Voss and Wood, 1994											
seawater	553	475	10.0	21	108	0.184					
freshwater	0.54	0.70	0.03	0.30	0.42	0.0000					
	0.96	0.20	0.01	0.17	0.23	0.001	0.06	0.003	0.02	0.04	0.0001
	0.90	0.25	0.01	0.17	0.24	0.001	0.06	0.003	0.02	0.04	0.0001
	0.56	0.06	-0.0004	0.09	0.13	0.0005	0.04	0.002	0.02	0.03	0.00002
	0.56	0.11	0.01	0.06	0.14	0.001	0.04	0.002	0.02	0.03	0.00005
	0.56	0.11	0.01	0.05	0.12	0.001	0.04	0.002	0.02	0.03	0.00005
	0.54		0.05	0.09		0.04	0.002	0.02	0.03		
	0.59	-0.003	0.01	-0.04	-0.03	0.001	0.04	0.002	0.01	0.02	0.00003
	0.59	-0.003	0.01	-0.04	-0.04	0.001	0.04	0.002	0.01	0.02	0.00005
	0.56	0.02	0.01	-0.05	-0.03	0.001	0.04	0.002	0.01	0.02	0.00003
	1.6	-0.12	0.01	0.05	-0.03	0.02	0.08	0.003	0.02	0.03	0.001
	1.2	-0.15	0.01	0.02	-0.05	-0.0002	0.06	0.003	0.02	0.03	0
	1.7	-0.12	0.01	0.08	-0.05	0.02	0.08	0.003	0.02	0.03	0.001
	18	-1.4	0.03	1.1	0.15	0.01	0.73	0.02	0.11	0.20	0.001
	37	-4.1	-0.23	3.2	1.7	0.004	1.4	0.02	0.24	0.46	0.001
	40	-5.5	-0.15	3.0	1.3	0.01	1.5	0.03	0.24	0.47	0.001
	167	-34	-0.23	17	15	0.06	5.5	0.14	1.2	2.4	0.01
	313	-28	-2.1	16	13	0.03	12	0.18	1.4	3.7	0.01
	334	-39	-1.1	17	7.5	0.09	12	0.25	1.5	3.6	0.01
	406	-26	-1.7	25	8.3	0.07	16	0.28	2.0	4.4	0.01
	446	-31	-1.9	17	8.4	0.08	18	0.31	1.7	4.8	0.01
	451	-35	-2.8	19	10.6	0.01	18	0.27	1.8	4.9	0.01
	475	-29	-1.9	15	5.1	0.07	19	0.33	1.7	4.9	0.01
	4.5	-0.81	-0.001	0.50	0.22	0.002	0.16	0.01	0.05	0.07	0.0002
	4.5	-1.2	-0.02	0.75	0.54	0.002	0.15	0.004	0.06	0.09	0.0002
	4.4	-1.2	-0.02	0.85	0.55	0.001	0.14	0.004	0.07	0.09	0.0001
	4.7	-1.3	-0.01	0.75	0.51	0.002	0.15	0.005	0.06	0.09	0.0002
	4.5	-1.1	-0.02	0.80	0.62	0.002	0.15	0.004	0.06	0.09	0.0002
	4.3	-1.2	-0.02	0.86	0.57	0.001	0.14	0.004	0.07	0.09	0.0001
	4.5	-1.1	-0.02	0.75	0.54	0.002	0.15	0.004	0.06	0.09	0.0002
	5.2	-1.5	-0.02	0.87	0.56	0.003	0.16	0.005	0.07	0.09	0.0002
	13	-3.9	-0.03	2.4	1.5	0.005	0.39	0.01	0.16	0.22	0.0005
	16	-5.3	-0.08	2.8	2.1	0.01	0.42	0.01	0.18	0.28	0.001
	72	-27	-0.55	13	14	0.06	1.8	0.04	0.79	1.4	0.004
	155	-42	-1.3	22	23	0.06	4.6	0.08	1.4	2.7	0.01
	167	-39	-1.0	22	26	0.08	5.2	0.10	1.4	3.0	0.01
	278	-52	-2.2	21	18	0.09	9.3	0.14	1.6	3.6	0.01

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
			mEq/L					Error (mEq/L)			
	307	-34	-2.1	22	15	0.03	12	0.17	1.7	3.7	0.01
	335	-40	-2.2	20	13	0.09	12	0.19	1.7	4.0	0.01
	408	-52	-2.6	23	16	0.12	15	0.24	1.9	4.8	0.01
	432	-36	-4.0	32	23	0.04	17	0.19	2.4	5.3	0.01
	461	-58	-3.2	32	20	0.17	17	0.26	2.5	5.5	0.02
Wicks et al., 1995											
seawater	540	464	10.2	20	105						
freshwater	0	0	0	0	0						
	4.0	-0.44	0.01	3.3	0.18		0.15	0.005	0.18	0.05	
	6.0	-0.16	-0.003	3.8	0.51		0.25	0.01	0.20	0.08	
	5.0	-0.30	0.01	3.8	1.0		0.20	0.01	0.20	0.10	
	5.0	-1.3	-0.004	3.6	0.17		0.15	0.00	0.19	0.06	
	4.0	0.56	0.02	3.8	0.24		0.20	0.01	0.20	0.05	
	4.0	-0.44	0.02	3.8	0.24		0.15	0.01	0.20	0.05	
	5.0	-0.30	0.02	3.2	0.15		0.20	0.01	0.17	0.06	
	7.3	1.7	0.48	3.7	0.24		0.40	0.03	0.20	0.08	
	8.0	2.1	-0.04	3.7	0.28		0.45	0.01	0.20	0.09	
	9.0	1.3	-0.05	3.7	0.09		0.45	0.01	0.20	0.09	
	14	-0.03	-0.08	3.5	-0.19		0.60	0.01	0.20	0.13	
	14	-0.03	-0.11	3.5	-0.73		0.60	0.01	0.20	0.10	
	13	-0.17	-0.07	3.5	-0.53		0.55	0.01	0.20	0.10	
	20	-0.19	-0.17	4.0	0.10		0.85	0.01	0.24	0.20	
	33	-0.36	-0.30	4.8	-0.43		1.4	0.02	0.30	0.30	
	43	-2.0	-0.42	6.4	-0.38		1.7	0.02	0.40	0.40	
	35	-0.73	-0.32	4.7	-0.74		1.5	0.02	0.30	0.30	
	35	-1.2	-0.33	4.7	-0.86		1.5	0.02	0.30	0.30	
	36	-0.50	-0.34	4.7	-0.92		1.5	0.02	0.30	0.30	
	32	0.50	-0.28	4.8	-0.23		1.4	0.02	0.30	0.30	
	37	-2.8	-0.35	4.6	-0.81		1.5	0.02	0.30	0.32	
	34	-2.2	-0.41	4.7	-0.62		1.4	0.01	0.30	0.30	
	32	0.50	-0.30	4.8	-0.23		1.4	0.02	0.30	0.30	
	27	-1.2	-0.31	5.0	2.7		1.1	0.01	0.30	0.40	
	33	-1.4	-0.30	4.8	-0.83		1.4	0.02	0.30	0.28	
	29	-2.9	-0.27	4.9	0.35		1.1	0.01	0.30	0.30	
	32	-0.50	-0.26	4.8	-0.23		1.4	0.02	0.30	0.30	
	49	-0.10	-0.40	4.1	-1.55		2.1	0.03	0.30	0.40	
	44	-1.8	-0.30	4.3	-0.57		1.8	0.03	0.30	0.40	
	216	-12	-1.3	12	-2.1		8.7	0.14	1.0	2.0	
	207	2.1	-1.2	6.2	-0.33		9.0	0.14	0.70	2.0	
	224	-4.5	-1.3	7.5	-1.6		9.4	0.15	0.80	2.1	
	225	-3.3	-1.3	7.5	-2.4		9.5	0.15	0.80	2.1	
	423	-41	-2.2	12	-0.41		16	0.29	1.4	4.1	
	233	-9.2	-1.5	9.2	-3.4		9.6	0.14	0.90	2.1	
	245	-0.52	-1.4	8.7	0.27		10.5	0.16	0.90	2.4	
	216	-3.6	-1.3	7.8	-2.1		9.1	0.14	0.80	2.0	
	196	7.6	-1.1	10.6	-0.18		8.8	0.13	0.90	1.9	
	233	-2.2	-1.4	7.2	-1.4		9.9	0.15	0.80	2.2	

	Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
				mEq/L					Error (mEq/L)		
	237	-3.6	-1.4	7.0	-2.17		10.0	0.15	0.80	2.2	
	248	-2.1	-1.5	6.6	-0.31		10.6	0.16	0.80	2.4	
	218	2.7	-1.5	7.7	-2.5		9.5	0.13	0.80	2.0	
	201	2.3	-1.1	8.4	-1.2		8.8	0.13	0.80	1.9	
	211	-6.3	-1.4	6.0	-3.1		8.8	0.13	0.70	1.9	
	203	3.6	-1.3	6.3	-1.5		8.9	0.13	0.70	1.9	
	232	3.7	-1.3	9.2	0.80		10.2	0.15	0.90	2.3	
	265	7.3	-1.4	8.0	4.4		12	0.18	0.90	2.8	
	315	13	-1.7	10.1	0.63		14	0.21	1.1	3.1	
	285	-6.9	-1.5	7.2	-1.5		12	0.19	0.90	2.7	
	321	22	-1.5	9.8	3.5		15	0.23	1.1	3.3	
	338	14	-2.3	9.2	2.2		15	0.20	1.1	3.4	
	271	25	-1.4	9.7	3.4		13	0.18	1.0	2.8	
	363	12	-1.8	10.3	1.3		16	0.25	1.2	3.6	
	307	26	-1.3	10.4	6.2		15	0.22	1.1	3.3	
	400	0.30	-2.1	10.9	2.1		17	0.27	1.3	4.0	
	335	-2.9	-1.9	9.3	-1.3		14	0.22	1.1	3.2	
	389	-10.3	-2.0	9.3	0.22		16	0.27	1.2	3.8	
	408	-2.6	-2.1	8.6	0.52		17	0.28	1.2	4.0	
	344	6.4	-1.8	11	3.0		15	0.23	1.2	3.5	
Zhang et al., 2015											
seawater	520	436	10	19.5	109						
freshwater	0.1	0.5	0.2	0.42	0.6						
	2	-1.3	-0.16	1.3	-0.14		0.04	0.004	0.09	0.04	
	1	-1.1	-0.09	0.16	0.26		0.01	0.01	0.03	0.05	
	0.23	2.8	-0.002	-0.18	0.21		0.17	0.01	0.01	0.04	
	4	-1.1	0.14	2.9	0.60		0.12	0.02	0.17	0.10	
	0.34	-0.22	0.02	1.1	0.15		0.02	0.01	0.07	0.04	
	0.10	-0.02	-0.01	0	0		0.02	0.01	0.02	0.03	
	0.6	-0.48	-0.16	0.16	0.08		0.02	0.003	0.03	0.04	
	0.11	0.34	-0.13	0.54	0.32		0.04	0.004	0.05	0.05	
	5.1	-2.1	-0.25	1.6	1.7		0.13	0.002	0.11	0.17	
	2.3	0.22	0.08	3.0	-0.19		0.13	0.02	0.17	0.04	
	24	-16	-0.60	8.0	5.8		0.21	0.003	0.47	0.57	
	43	-7.0	-0.73	4.7	-3.5		1.5	0.01	0.33	0.30	
	30	-14	-0.66	6.7	2.3		0.6	0.01	0.41	0.45	
	6.3	-1.8	0.09	2.3	-1.2		0.19	0.02	0.15	0.03	
	28	-14	-0.36	9.3	-0.28		0.47	0.02	0.54	0.31	
	6.4	-1.8	-0.13	3.7	2.2		0.20	0.01	0.22	0.21	
	1.6	0.39	0.80	1.6	-0.11		0.11	0.05	0.10	0.04	
	3.5	-1.6	-0.20	1.0	0.9		0.09	0.003	0.08	0.11	
	3.3	-1.5	-0.22	1.5	1.4		0.09	0.002	0.10	0.13	
	11	-7.2	-0.32	2.8	5.3		0.13	0.005	0.18	0.41	
	25	-6.8	-0.30	3.9	1.7		0.74	0.02	0.26	0.38	
	3.1	0.0	-0.15	1.1	1.1		0.15	0.01	0.08	0.12	
	49	-27	-0.75	10.8	4.3		0.75	0.02	0.65	0.76	
	1.6	-0.67	-0.13	0.9	0.3		0.05	0.01	0.07	0.06	

Cl	Na	K	Ca	Mg	Sr	Na	K	Ca	Mg	Sr
		mEq/L					Error (mEq/L)			
5.5	-2.2	-0.19	1.8	1.7		0.14	0.01	0.12	0.17	
5.7	-2.7	-0.06	1.7	2.0		0.13	0.01	0.12	0.19	
35	-20	-0.62	7.0	4.0		0.47	0.01	0.44	0.60	
5.6	-2.6	-0.18	1.9	1.4		0.13	0.01	0.13	0.16	
98	-40	-1.2	10.9	-7.0		2.1	0.04	0.75	0.70	
5.8	-2.4	-0.19	1.6	0.47		0.14	0.01	0.11	0.11	
27	-10.3	-0.50	4.0	0.70		0.64	0.01	0.27	0.35	
1.7	-0.73	-0.13	1.1	0.95		0.06	0.01	0.08	0.09	
2.1	-1.1	-0.12	1.2	0.16		0.06	0.01	0.09	0.06	
58	-39	-1.0	7.5	-1.4		0.51	0.01	0.50	0.56	
168	-70.5	-1.5	7.8	-12		3.5	0.09	0.72	1.2	
4.3	-1.5	-0.13	1.2	-0.31		0.12	0.01	0.09	0.06	
69	-28	-0.76	5.9	-0.32		1.5	0.04	0.44	0.74	
17	-8.2	-0.26	4.8	0.76		0.31	0.01	0.29	0.24	
1.9	-0.66	-0.16	0.41	0.21		0.07	0.004	0.05	0.06	
0.95	-0.002	-0.13	0.79	-0.10		0.06	0.005	0.06	0.03	
0.10	1.0	-0.10	0.34	-0.22		0.08	0.01	0.04	0.02	
0.31	0.05	-0.12	0.43	-0.12		0.04	0.004	0.04	0.03	
0.10	0.76	-0.08	0.24	-0.20		0.06	0.01	0.03	0.02	
0.44	0.54	-0.10	0.47	-0.25		0.07	0.01	0.05	0.02	
0.63	1.1	-0.11	0.30	-0.35		0.10	0.01	0.04	0.02	
0.91	1.1	-0.10	-0.05	-0.55		0.12	0.01	0.02	0.01	

Table S2: Enrichment (+) and depletion (-) in major elements (mEq/L) in coastal aquifer groundwaters. The concentrations of seawater and freshwater end-members are given at the beginning of each data set.

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