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*Supplement of*

**Hydraulic and geochemical impact of occasional saltwater intrusions through a submarine spring in a karst and thermal aquifer (Balaruc peninsula near Montpellier, France)**

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**Table S1** Calculation of the percentage of saltwater ( $f_{\text{saltwater}}$ ) in the thermal and karstic wells based on the chloride concentrations and isotope ratios of the sample

		d18O	error 18O(‰)	d2H	error 2H(‰)	Cl	Error Cl (1,4%)									
<b>End-member 1-Karst (CGE Tennis mean values)</b>		-6.1	0.1	-35.6	0.1	24	0.336									
<b>End-member 2 Thau Lagoon</b>		1.8	0.1	8.9	0.1	21825	305.55									
<b>Date</b>					calculation with $\delta^{18}\text{O}$		calculation with $\delta^2\text{H}$		calculation with Cl							
<b>Reference context (1996-2000)</b>					fsaltwater		error		fsaltwater		error		fsaltwater		error	
<b>1996</b>	Cauvy96	-6.2	0.1	-37.9	0.9	156.6	2	-1%	2%	-5%	2%	1%	0%			
<b>1997</b>	Cauvy97	-6.6	0.1	-36.7	0.9	161.1	2	-6%	2%	-2%	2%	1%	0%			
<b>1999</b>	Cauvy99	-6	0.1	-35.3	0.9	99.2	1	1%	3%	1%	2%	0%	0%			
<b>2000</b>	Cauvy2000	-6.1	0.1	-35.3	0.9	99.3	1	0%		1%	2%	0%	0%			
<b>1996</b>	Issanka96	-6.4	0.1	-38.3	0.9	17.4	0	-4%	2%	-6%	2%	0%	0%			
<b>1999</b>	Issanka99	-6.3	0.1	-35.1	0.9	20.1	0	-3%	2%	1%	2%	0%	0%			
<b>2000</b>	Issanka2000	-6.1	0.1	-35.2	0.9	21.3	0	0%		1%	2%	0%	0%			
<b>1996</b>	Ambressac-port	-6.3	0.1	-38.1	0.9	317.2	4	-3%	2%	-6%	2%	1%	0%			
<b>1998</b>	Ambressac-port	-6.1	0.1	-35.8	0.9	453	6	0%		0%	2%	2%	0%			
<b>1998</b>	Ambressac-port	-5.9	0.1	-34.9	0.9	208	3	3%	3%	2%	2%	1%	0%			
<b>1998</b>	Ambressac-puits	-6.2	0.1	-37.2	0.9	936	13	-1%	2%	-4%	2%	4%	0%			
<b>1999</b>	Ambressac-puits	-5.9	0.1	-34.1	0.9	707	10	3%	3%	3%	2%	3%	0%			
<b>2000</b>	Ambressac-puits	-6	0.1	-34.8	0.9	306	4	1%	3%	2%	2%	1%	0%			
<b>1996</b>	Robine de vic	-5.6	0.1	-30.2	0.9	2163	30	6%	3%	12%	2%	10%	0%			
<b>1997</b>	Robine de vic	-5.4	0.1	-34.2	0.9	1730	24	9%	3%	3%	2%	8%	0%			
<b>2000</b>	Robine de vic	-5.2	0.1	-29.4	0.9	2710	38	11%	3%	14%	2%	12%	0%			
<b>1999</b>	puits Aven	-6.2	0.1	-34.6	0.9	20.6	0	-1%	2%	2%	2%	0%	0%			
<b>1996</b>	F5_96	-5.7	0.1	-32.2	0.9	2493	35	5%	3%	8%	2%	11%	0%			
<b>2000</b>	F5_2000	-4.6	0.1	-26.7	0.9	5620	79	19%	3%	20%	2%	26%	1%			
<b>1996</b>	F9_96	-4.6	0.1	-27.7	0.9	5744	80	19%	3%	18%	2%	26%	1%			
<b>1997</b>	F9_97	-4.9	0.1	-24.1	0.9	5757	81	15%	3%	26%	2%	26%	1%			
<b>2000</b>	F9_2000	-4.6	0.1	-26.2	0.9	5610	79	19%	3%	21%	2%	26%	1%			

1996	F8_96	-3.8	0.1	-22.6	0.9	7044	99	29%	3%	29%	2%	32%	1%
1996	F6_96	-6.2	0.1	-36.4	0.9	759	11	-1%	2%	-2%	2%	3%	0%
1996	S12_96	-5.1	0.1	-30.2	0.9	3597	50	13%	3%	12%	2%	16%	0%
1996	Pézenas_96	-6.3	0.1	-38.1	0.9	17.6	0	-3%	2%	-6%	2%	0%	0%
1997	Pézenas_97	-6.7	0.1	-36.4	0.9	17.9	0	-8%	2%	-2%	2%	0%	0%
2000	Pézenas_2000	-6.3	0.1	-36.4	0.9	18.6	0	-3%	2%	-2%	2%	0%	0%
2000	Castillone_2000	-6.3	0.1	-36.9	0.9	18.5	0	-3%	2%	-3%	2%	0%	0%
1996	Castillone_96	-6.4	0.1	-37.7	0.9	16.8	0	-4%	2%	-5%	2%	0%	0%
1997	Castillone_97	-6.7	0.1	-38.5	0.9	17.7	0	-8%	2%	-7%	2%	0%	0%
<b>Inversac context</b>													
2010	F6	-3.1	0.1	-20.0	0.8	8611	121	38%	5%	35%	2%	39%	1%
2010	F3	-4	0.1	-25.4	0.8	4622	65	27%	4%	23%	2%	21%	1%
2010	F4	-5.9	0.1	-37.7	0.8	591	8	3%	3%	-5%	2%	3%	0%
2010	F9	-4.1	0.1	-25.9	0.8	6895	97	25%	4%	22%	2%	32%	1%
2010	F14	-3.9	0.1	-25.6	0.8	7148	100	28%	4%	22%	2%	33%	1%
2010	F8	-3.4	0.1	-21.9	0.8	8475	119	34%	5%	31%	2%	39%	1%
2010	F5	-4	0.1	-25.4	0.8	7089	99	27%	4%	23%	2%	32%	1%
2010	CGE	-6.1	0.1	-37.1	0.8	24	0	0%		-3%	2%	0%	
2010	Cauvy	-5.3	0.1	-33.2	0.8	2355	33	10%	3%	5%	2%	11%	0%
2010	Issanka2010	-6.1	0.1	-37.4	0.9	25.9	0	0%		-4%	2%	0%	0%
<b>Post-inversac context</b>													
2012	F8_a	-2.7	0.1	-20.0	0.8	8802	123	43%	5%	35%	2%	40%	1%
2012	F9_a	-3.7	0.1	-26.1	0.8	5946	83	30%	4%	21%	2%	27%	1%
2012	CGE_Tennis	-6.123	0.1	-35.5	0.8	23.307	0	0%	3%	0%	2%	0%	0%
2012	P4_Labalme	-5.989	0.1	-35.1	0.8	25.456	0	1%	3%	1%	2%	0%	0%
2012	F4_hotel	-5.713	0.1	-34.2	0.8	812.04	11	5%	3%	3%	2%	4%	0%
2012	F6	-5.671	0.1	-33.2	0.8	889.01	12	5%	3%	5%	2%	4%	0%
2012	F3	-4.424	0.1	-27.1	0.8	5420.5	76	21%	4%	19%	2%	25%	1%
2012	F5	-4.317	0.1	-26.1	0.8	5786.4	81	23%	4%	21%	2%	26%	1%
2012	S12	-4.244	0.1	-26.1	0.8	5821.1	81	23%	4%	21%	2%	27%	1%
2012	F9	-4.322	0.1	-26.3	0.8	6015	84	23%	4%	21%	2%	27%	1%
2012	F14	-4.217	0.1	-26.0	0.8	6215.9	87	24%	4%	22%	2%	28%	1%

	F8	-3.118	0.1	-20.1	0.8	9228.9	129	38%	5%	35%	2%	42%	1%
<b>Post-inversac context</b>													
<b>2018</b>	Stade1h	-3.148	0.07	-19.3	0.9	10137	142	37%	3%	37%	2%	46%	1%
<b>2018</b>	Stade4h	-3.032	0.07	-18.6	0.9	10434	146	39%	3%	38%	2%	48%	1%
<b>2018</b>	Stade24h	-2.994	0.07	-18.8	0.9	10496	147	39%	3%	38%	2%	48%	1%
<b>2018</b>	Stade48h	-2.956	0.07	-19.0	0.9	10647	149	40%	3%	37%	2%	49%	1%
<b>2018</b>	Pézenas	-6.281	0.07	-36.8	0.9	18.724	0	-2%	2%	-3%	2%	0%	0%
<b>2018</b>	F8_HE	-3.122	0.07	-19.3	0.9	8951.4	125	38%	3%	37%	2%	41%	1%
<b>2018</b>	F9_HE	-4.286	0.07	-25.7	0.9	5992.2	84	23%	3%	22%	2%	27%	1%
<b>2018</b>	F5_HE	-4.065	0.07	-23.8	0.9	6150.2	86	26%	3%	26%	2%	28%	1%
<b>2018</b>	F14_HE	-4.259	0.07	-25.1	0.9	6117.8	86	23%	3%	24%	2%	28%	1%
<b>2018</b>	F6_HE	-5.623	0.07	-32.6	0.9	1153.7	16	6%	2%	7%	2%	5%	0%
<b>2018</b>	F10_HE	-4.89	0.07	-29.2	0.9	4496.2	63	15%	3%	14%	2%	21%	1%
<b>2018</b>	F3_HE	-4.635	0.07	-27.1	0.9	4828	68	19%	3%	19%	2%	22%	1%
<b>2018</b>	P4 La Balme_HE	-6.119	0.07	-34.6	0.9	32.918	0	0%	2%	2%	2%	0%	0%
<b>2018</b>	Issanka_HE	-6.519	0.07	-35.7	0.9	21.343	0	-5%	2%	0%	2%	0%	0%
<b>2018</b>	Vène_HE	-6.217	0.07	-35.9	0.9	19.601	0	-1%	2%	-1%	2%	0%	0%
<b>2018</b>	CGE Tennis_HE	-6.186	0.07	-34.6	0.9	23.284	0	-1%	2%	2%	2%	0%	0%
<b>2018</b>	Ambressac_HE	-5.914	0.07	-33.4	0.9	566.05	8	2%	2%	5%	2%	2%	0%
<b>2018</b>	S12 Ecole_HE	-4.313	0.07	-24.8	0.9	6167.5	86	23%	3%	24%	2%	28%	1%
<b>2018</b>	Cauvy_HE	-6.009	0.07	-34.9	0.9	99.376	1	1%	2%	2%	2%	0%	0%
<b>2018</b>	Rouvierette_HE	-5.905	0.07	-32.9	0.9	26.163	0	2%	2%	6%	2%	0%	0%
<b>2018</b>	F4 hotel_HE	-5.489	0.07	-30.5	0.9	1457.1	20	8%	2%	12%	2%	7%	0%
<b>2018</b>	Pézenas_BE	-6.11	0.07	-37.4	0.9	19.931	0	0%	2%	-4%	2%	0%	0%
<b>2018</b>	F8_BE	-3.02	0.07	-19.2	0.9	8844.5	124	39%	3%	37%	2%	40%	1%
<b>2018</b>	F5_BE	-4.29	0.07	-26.1	0.9	6152.4	86	23%	3%	21%	2%	28%	1%
<b>2018</b>	F10_BE	-4.61	0.07	-27.7	0.9	4415.8	62	19%	3%	18%	2%	20%	1%
<b>2018</b>	F6_BE	-5.65	0.07	-34.5	0.9	908.21	13	6%	2%	2%	2%	4%	0%
<b>2018</b>	S12-ecole_BE	-4.25	0.07	-26.3	0.9	6060.4	85	23%	3%	21%	2%	28%	1%
<b>2018</b>	F4 hotel_BE	-5.71	0.07	-34.1	0.9	851.86	12	5%	2%	3%	2%	4%	0%
<b>2018</b>	Cauvy_BE	-6	0.07	-35.1	0.9	83.9	1	1%	2%	1%	2%	0%	0%
<b>2018</b>	Ambressac_BE	-5.87	0.07	-34.1	0.9	340.42	5	3%	2%	3%	2%	1%	0%

2018	CGE Tennis_BE	-6.1	0.07	-35.0	0.9	24.376	0	0%		1%	2%	0%	0%
2018	Issanka_BE	-5.99	0.07	-35.0	0.9	21.036	0	1%	2%	1%	2%	0%	0%
2018	F9_BE	-4.23	0.07	-25.0	0.9	6053.8	85	24%	3%	24%	2%	28%	1%
2018	F3_BE	-4.91	0.07	-29.1	0.9	4851.9	68	15%	3%	15%	2%	22%	1%
2018	F14_BE	-4.15	0.07	-25.0	0.9	6249.4	87	25%	3%	24%	2%	29%	1%
2018	P4 La Balme_BE	-6.04	0.07	-34.8	0.9	32.446	0	1%	2%	2%	2%	0%	0%

**Table S2** Mixing proportions of the karstic, thermal and seawater end-members in 1996-2000, 2010 and 2012 based on the strontium isotopic signature of the sample ( $^{87}\text{Sr}/^{86}\text{Sr}$  and  $1/\text{Sr}$ ).

<b>Mixing proportions (%) in 1996-2000, 2010 and 2012 using <math>^{87}\text{Sr}/^{86}\text{Sr}</math> and <math>1/\text{Sr}</math></b>				
<b>End Member 1 (Karst end-member)= CGE Tennis (2010)</b>				
<b>End Member 2 (Seawater end-member)= Thau lagoon (2010)</b>				
<b>End Member 3 (Thermal end-member)= F5 (2000)</b>				
<b>Name</b>	<b>Date</b>	<b>% EM1</b>	<b>% EM2</b>	<b>% EM3</b>
<b>F5</b>	2010-10-08	2.2%	9.4%	88.3%
<b>F6</b>	2010-10-08	53.7%	35.4%	10.9%
<b>F8</b>	2010-10-08	5.5%	18.0%	76.4%
<b>F9</b>	2010-10-08	0.4%	8.3%	91.3%
<b>F14</b>	2010-12-16	6.9%	7.1%	86.0%
<b>Cauvy</b>	2010-10-08	88.1%	8.1%	3.8%
<b>Issanka</b>	2010-10-08	99.8%	-0.7%	0.9%
<b>Thau lagoon</b>	2010-10-08	0.0%	100.0%	0.0%
<b>F3</b>	2010-10-19	87.9%	0.4%	11.8%
<b>F4 hotel</b>	2010-10-19	89.8%	3.4%	6.8%
<b>P4 La Balme</b>	2010-10-19	100.6%	-0.1%	-0.5%
<b>CGE Tennis</b>	2010-10-19	100.0%	0.0%	0.0%
<b>CGE Tennis</b>	2012-09-25	99.8%	0.1%	0.1%
<b>F14</b>	2012-09-25	4.7%	6.2%	89.1%

<b>F3</b>	2012-09-25	85.5%	1.0%	13.6%
<b>F4 hotel</b>	2012-09-25	91.5%	0.9%	7.6%
<b>F5</b>	2012-09-25	-1.5%	4.7%	96.8%
<b>F6</b>	2012-09-25	91.2%	0.6%	8.2%
<b>F8a</b>	2012-04-11	4.4%	17.5%	78.1%
<b>F8</b>	2012-09-25	-3.4%	21.2%	82.2%
<b>F9a</b>	2012-04-11	-7.6%	4.1%	103.5%
<b>F9</b>	2012-09-25	0.2%	5.7%	94.0%
<b>P4 La Balme</b>	2012-09-25	101.6%	0.7%	-2.3%
<b>S12</b>	2012-09-25	-0.3%	6.4%	93.9%
<b>Cauvy</b>	2000-04-02	99.7%	0.4%	0.0%
<b>Cauvy</b>	1996-07-31	99.3%	1.0%	-0.2%
<b>Ambressac</b>	2000-02-02	95.0%	0.3%	4.7%
<b>Ambressac</b>	1998-05-18	92.0%	2.6%	5.4%
<b>Ambressac</b>	1996-07-31	95.0%	1.0%	4.0%
<b>F8</b>	1996-07-31	1.4%	8.8%	89.8%
<b>F9</b>	2000-02-02	-1.8%	0.6%	101.1%
<b>F9</b>	1996-07-31	-4.4%	2.8%	101.6%
<b>S12</b>	1996-07-31	33.6%	2.6%	63.8%
<b>F5</b>	2000-02-02	0.0%	0.0%	100.0%
<b>F5</b>	1996-07-31	62.4%	2.7%	34.9%
<b>F6</b>	1996-07-31	94.1%	1.6%	4.3%
<b>Issanka</b>	1996-07-31	100.0%	-0.5%	0.6%
<b>Issanka</b>	2000-02-02	100.7%	-0.5%	-0.2%

**Figure S1** Electrical conductivity ( $\mu\text{S}/\text{cm}$ ) of the water from the thermal well F8 over the 1996-2018 period

