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Supporting Information for

The chemistry of hyperalkaline springs in serpentinizing environments: 1. the composition of free gases in New Caledonia compared to other springs worldwide.

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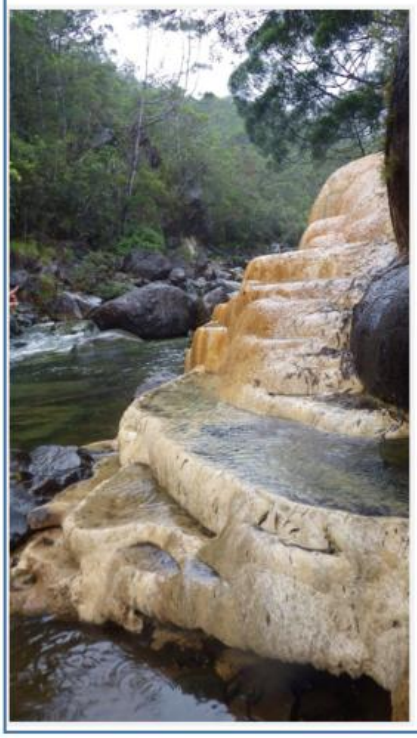


Montagne des Sources
Dec. 3, 2014

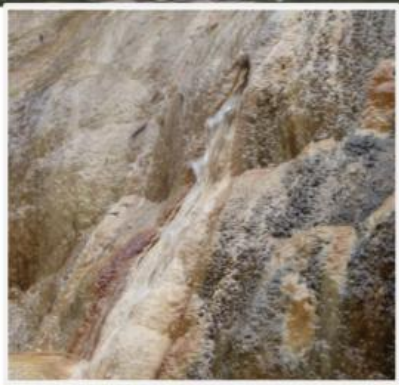
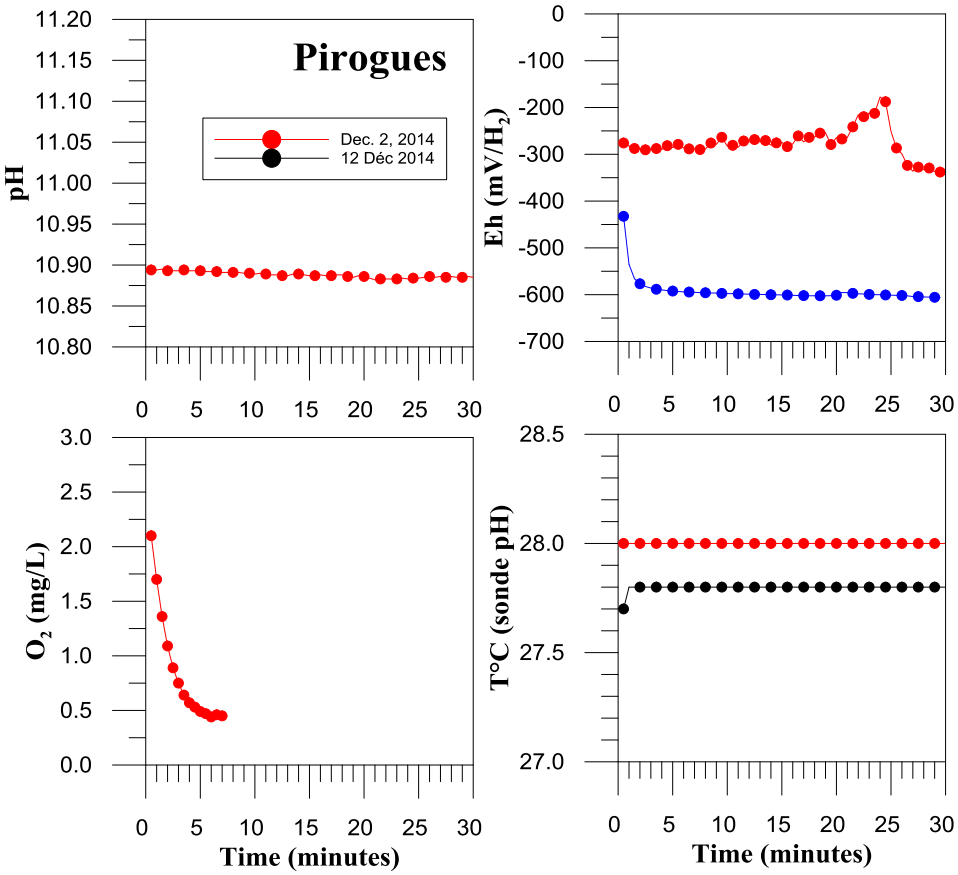


Figure S1 – Photos of the springs


Pirogues
Dec. 2, 2014
12 Déc 2014
pH
Eh (mV/H2)
O2 (mg/L)
T°C (sonde pH)
Time (minutes)
Time (minutes)

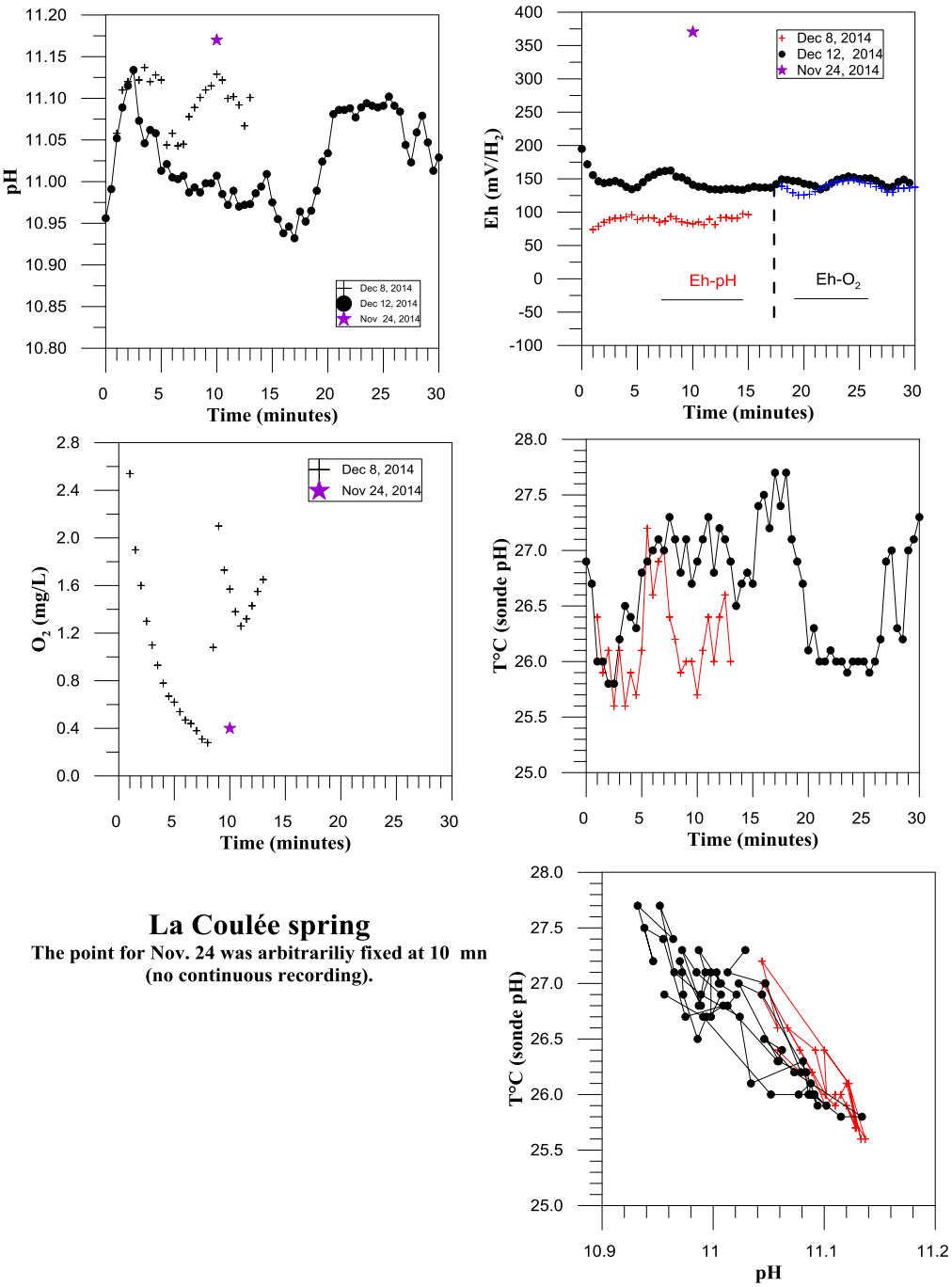


Figure S2 – Records of ORP, PH and T versus time for La Coulée and Pirogues springs

The Eh value (hydrogen electrode reference) was calculated from the measured ORP value (Ag/AgCl reference) using the potential difference between the two reference electrodes given by the provider (WTW; https://www.wtw.com/en/) that had supplied the probe. These values have been fitted to the following polynomial:

$$\Delta Eh = 221.02 - 0.9189\, t - 0.0017\, t^2$$

where t is the temperature (°C). Eh and ORP are in millivolts. The redox potential Eh is then:

$$Eh = ORP + \Delta Eh$$

The redox correction ΔEh between the two references is about +200 mv.

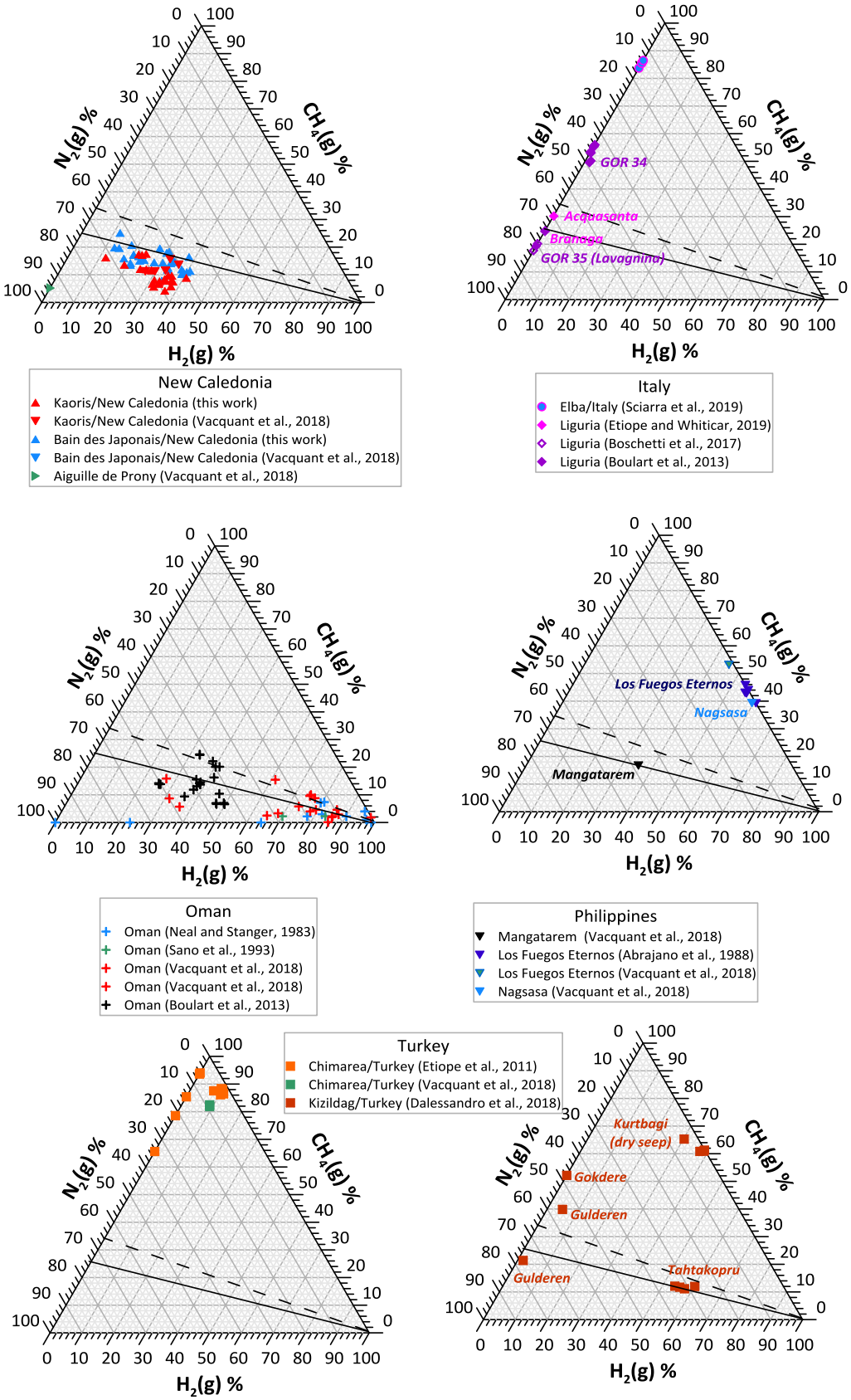


Figure S3 – Triangular plots of the O_2-corrected free gas compositions at various locations. The black plain line is the line with a slope of -0.25 corresponding to the Sabatier reaction involving CO_2. The short dash line has a slope of -0.33 corresponding to a Fisher-Tropsch-type reaction involving carbon monoxide (see text).

Site	***Sampling date***	***T***	***pH***	***ORP***	***O2(aq)***
		°C		***ref. H2, mV***	***mg/L***
Bain des Japonais	Nov 20, 2014	38.5	10.88	-697.0	*n.m.*
Kaoris	Nov 20, 2014	31.1	10.93	-176.0	2.2
Coulée upper pool 1	Nov 24, 2014	31.8	10.81	324.0	0.4
Coulée upper pool 1	Dec 8, 2014	27.0	11.05	80.0	*n.m.*
Coulée upper pool 1	Dec 12, 2014	27.0	10.95	140.0	*n.m.*
Coulée upper intermediate pool	Nov 24, 2014	32.0	10.74	307.0	*n.m.*
Coulée lower intermediate pool	Nov 24, 2014	32.0	10.75	300.0	*n.m.*
Coulée lower pool	Nov 24, 2014	31.5	10.41	293.0	7.6
Pirogues	Dec 2, 2014	27.8	10.88	-606.0	0.3
Pirogues	Dec 8, 2014	27.8	*n.m.*	-350.0	*n.m.*
MtSources upper pool	Dec 3, 2014	26.0	11.09	42.0	3.0
MtSources outlet	Dec 3, 2014	26.4	11.08	-228.0	6.9
Rivière Kaoris	Nov 20, 2014	26.0	8.17	286.0	8.3
Rivière Pirogues	Dec 8, 2014	24.4	8.15	305.0	*n.m.*
Rivière Coulée	Nov 24, 2014	27.2	8.24	358.0	8.1
n.m . = not measured					

Table S1 – Temperature, pH, DO (Dissolved oxygen) and ORP (oxidation-reduction potential) measured in situ for the on-land alkaline springs of New Caledonia. n.m.: not measured.

Site	Date	Sample name	Analysis lab	CH4(g)	H2(g)	N2(g)	O2(g)	Argon	CO2	C2H6	C3H8	sum
				% vol	*% vol*	*% vol*	*% vol*	*% vol*	*% vol*	*ppmV*	*ppmV*	*% vol*
Bain des Japonais	10/30/2011	HP11-BDJ-G1	MIO	15.29	24.27	60.05						99.6
	10/30/2011	HP11-BDJ-G2	MIO	14.10	20.63	64.88						99.6
	10/30/2011	HP11-BDJ-G3	MIO	13.50	20.90	65.29						99.7
	10/30/2011	HP11-BDJ-G4	MIO	15.00	23.06	61.59						99.6
	09/25/2012	HP120925-BDJ-G1	MIO	12.36	33.06	53.83	0.00					99.3
	09/25/2012	HP120925-BDJ-G2	IFREMER	8.31	7.15	71.16	11.62	1.70	0.02	0.80	0.00	100.0
	10/17/2012	HP121017-BDJ-G1	MIO	15.87	17.78	66.35	0.00					100.0
	10/17/2012	HP121017-BDJ-G2	MIO	19.21	14.14	64.54	0.00					97.9
	10/17/2012	HP121017-BDJ-G4	IFREMER	8.25	3.94	72.80	13.03	2.00	0.02	12.00	1.50	100.1
	10/17/2012	HP121017-BDJ-G6	MIO	19.80	12.90	67.25	0.00					100.0
	10/17/2012	HP121017-BDJ-G8	MIO	17.00	20.10	62.20	0.00					99.3
	12/21/2012	HP121221-BDJ-G1	IFREMER	8.61	12.00	66.89	10.86	1.63	0.01	10.81	1.44	100.0
	12/21/2012	HP121221-BDJ-G2	IFREMER	9.14	15.42	64.28	9.70	1.46	0.01	11.02	1.17	100.0
	12/21/2012	HP121221-BDJ-G1	MIO	7.38	31.62	54.93	0.00					93.9
	12/21/2012	HP121221-BDJ-G2	MIO	11.37	40.77	47.86	0.00					100.0
	12/21/2012	HP121221-BDJ-G3	MIO	10.26	38.74	51.00	0.00					100.0
	02/28/2013	HP130228-BdJ-G1	MIO	11.83	33.46	54.73	0.00					100.0
	02/28/2013	HP130228-BdJ-G2	MIO	10.26	38.88	50.87	0.00					100.0
	02/28/2013	HP130228-BdJ-G3	MIO	10.94	39.96	49.11	0.00					100.0
	02/28/2013	HP130228-BdJ-G4	MIO	11.01	38.85	50.15	0.00					100.0
	02/28/2013	HP130228-BdJ-G5	MIO	11.89	37.90	50.22	0.00					100.0
	02/28/2013	HP13_BDJ_G2	MIO	17.00	19.91	61.79	0.00					98.7
	02/28/2013	HP13_BDJ_G3	MIO	16.66	22.00	61.31	0.00					100.0
	04/24/2013	NC2013-BdJ-G1	IFREMER	12.01	20.24	60.38	6.40					99.0
	04/17/2014	Jap Free 0423 (137)	AMES	14.46	27.98	*57.56*						*100.0*
	04/23/2014	Jap Est Free Gas 0417 (93)	AMES	16.41	37.94	*45.65*						*100.0*
	04/23/2014	Jap Free 0.2 0423 (151)	AMES	14.48	34.49	*51.02*						*100.0*
	11/20/2014	HP14-20112014-BDJ-G3	MIO	14.31	30.79	54.91	0.00					100.0
	11/20/2014	HP14-20112014-BDJ-G2	MIO	14.10	33.32	52.59	0.00					100.0
	11/20/2014	HP14-20112014-BDJ-G1	MIO	14.96	32.14	52.51	0.80					100.4
Rivière des Kaoris	10/30/2011	KAORI-Car-1	MIO	17.08	22.80	59.83	0.00					99.7
	10/30/2011	KAORI-Car-2	MIO	17.29	21.63	60.77	0.00					99.7
	10/30/2011	KAORI-Car-3	MIO	17.47	23.86	58.34	0.00					99.7
	09/25/2012	HP120925-KAO-G1	MIO	5.77	37.57	56.66	0.00					100.0
	09/25/2012	HP120925-KAO-G2	IFREMER	5.82	12.02	70.61	10.02	1.50	0.02	9.59	1.48	100.0
	10/17/2012	HP121017-KAO-G1	IFREMER	6.35	15.59	67.93	8.81	1.32	0.01	10.36	1.41	100.0
	10/17/2012	HP121017-KAO-G1	IFREMER	5.00	7.03	73.86	12.26	1.84	0.01	10.10	1.10	100.0
	10/17/2012	HP121017-KAO-G1	MIO	4.18	36.46	59.36	0.00					100.0
	10/17/2012	HP121017-KAO-G2	MIO	7.79	36.68	55.53	0.00					100.0
	10/17/2012	HP121017-KAO-G3	MIO	6.30	15.60	67.90	8.81					98.6
	12/21/2012	HP121221-KAO-G1	IFREMER	6.40	22.80	63.10	6.67					99.0
	12/21/2012	HP121221-KAO-G2	IFREMER	6.00	13.50	69.40	9.63					98.5
	12/22/2012	HP121221-KAO-G3	MIO	5.70	4.20	75.60	12.58					98.1
	12/21/2012	HP121221-KAO-G4	MIO	7.83	34.53	57.65	0.00					100.0
	12/21/2012	HP121221-KAO-G5	MIO	6.58	30.69	60.80	0.00					98.1
	12/21/2012	HP121221-KAO-G6	MIO	7.85	30.69	59.67	0.00					98.2
	02/28/2013	HP130228-KAO-G5	MIO	7.32	36.48	56.67	0.70					101.2
	02/28/2013	HP130228-KAO-G4	MIO	8.33	34.30	57.02	0.00					99.6
	02/28/2013	HP130228-KAO-G3	MIO	5.66	32.43	62.48	0.00					100.6
	02/28/2013	HP130228-KAO-G2	MIO	6.62	33.03	59.45	0.00					99.1
	02/28/2013	HP130228-KAO-G1	MIO	7.16	33.39	60.30	0.00					100.8
	04/17/2014	Kaori's bath Comp 0417 (62)	AMES	9.61	35.92	*54.47*						*100.0*
	04/17/2014	Kaori's Bath Free Gas 0417	AMES	8.85	40.86	*50.30*						*100.0*
	11/20/2014	HP14-20112014-KAO-G3	MIO	8.02	34.31	57.69	0.00					100.0
	11/20/2014	HP14-20112014-KAO-G2	MIO	7.63	33.09	59.28	0.00					100.0
	11/20/2014	HP14-20112014-KAO-G1	MIO	8.26	34.37	57.38	0.00					100.0

Table S2 – The composition of free gases venting at the Bain des Japonais and at the Kaoris springs determined in the three laboratories. Note that the N_2 concentration for that analyses carried out in the NASA AMES lab (in italic underlined) are calculated by difference because nitrogen was the carrier gas in the gas chromatographer.