

Supplementary material

Table S1: Major (wt%) and trace element (ppm) concentrations of the outcrop and reservoir samples

Sample ID	Unit/Depth	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	Ba	Nb	Sr	Zr
LH8	Teziutlán	53.15	1.57	17.73	9.38	0.14	4.60	7.90	3.45	1.38	0.35	446	13	428	162
LH9	Teziutlán	57.04	1.43	17.51	7.78	0.11	2.84	6.67	3.47	1.89	0.34	564	15	454	161
LH11+12	Teziutlán	55.37	1.01	19.64	6.49	0.09	2.16	9.15	3.99	1.66	0.17	601	nd	630	246
LH13	Teziutlán	56.06	1.54	18.58	6.34	0.28	2.82	5.92	3.27	2.61	0.44	871	21	427	267
LH16	Teziutlán	56.88	1.29	17.07	7.63	0.14	3.28	6.03	3.14	2.67	0.35	717	21	420	255
LH29	Teziutlán	61.67	0.71	17.88	5.34	0.07	2.14	5.28	3.84	1.56	0.18	479	nd	517	94
RLM3	Teziutlán	56.56	1.40	16.85	8.08	0.13	3.17	7.19	3.22	2.23	0.37	551	14	434	207
RLM9	Teziutlán	60.82	0.98	17.65	5.29	0.09	1.97	5.08	3.19	3.42	0.29	671	16	377	243
LH34	Cuyoaco	61.32	0.75	17.94	5.28	0.10	2.12	4.79	3.77	1.61	0.20	638	10	496	103
LH41	Cuyoaco	64.99	0.79	16.65	4.90	0.06	0.94	5.11	4.28	1.89	0.20	607	nd	601	279
LH51	Cuyoaco	66.79	0.45	17.37	3.31	0.06	1.03	4.48	4.14	1.24	0.13	305	10	625	80
LH72	Cuyoaco	63.00	0.75	17.97	5.22	0.08	1.91	4.92	4.02	1.61	0.19	422	10	514	111
OLH1	Cuyoaco	65.07	0.76	16.82	5.01	0.07	1.08	4.64	4.22	1.93	0.20	647	nd	620	294
H13-1	1200	53.41	1.47	17.98	8.19	0.14	5.61	6.91	4.58	0.72	0.38	nd	nd	414	200
H15-1	1250	61.79	0.97	16.86	4.74	0.08	3.09	4.27	4.16	2.13	0.36	851	28	372	274
H18-1	796	56.75	1.26	19.52	4.68	0.03	4.71	5.91	3.36	1.17	0.33	564	nd	381	178
H18-3	1750	60.90	1.28	18.70	5.85	0.10	1.88	4.01	3.90	2.06	0.45	699	35	296	474
H18-4	2900	68.72	0.23	16.15	2.07	0.04	0.09	0.73	6.50	2.92	0.06	851	21	59	378
H19-1	981	77.19	0.11	13.48	1.05	0.01	0.61	0.38	3.62	3.42	0.01	nd	14	17	126
H19-2	1300	59.37	1.12	17.52	5.33	0.14	2.35	7.15	3.60	2.65	0.43	672	21	347	392
H19-3	1769	55.87	1.27	17.08	9.33	0.13	5.44	5.00	3.77	1.21	0.51	170	21	406	244
H20-4	1400	56.44	1.10	18.67	5.63	0.07	4.64	4.67	4.84	2.18	0.41	699	21	414	333
H23-1	673	57.59	1.27	18.16	6.71	0.10	4.26	6.53	3.92	1.08	0.32	511	14	372	192
H23-2	1200	55.56	1.52	20.11	5.99	0.10	2.36	6.66	4.97	1.86	0.62	537	21	448	333
H23-3	1924	56.12	1.26	18.78	7.43	0.08	5.68	5.10	3.74	1.02	0.55	152	21	474	289
H23-4	2495	53.53	1.39	20.64	7.56	0.07	5.10	5.52	4.03	1.34	0.51	116	21	507	311
H24-1	1008	61.57	1.07	18.18	4.96	0.10	2.23	2.88	4.74	1.63	0.46	116	14	254	311
H24-3	2294	66.73	0.37	13.94	2.28	0.07	1.92	10.29	1.75	2.21	0.17	555	21	330	170
H24-4	2844	69.64	0.14	12.06	2.29	0.18	2.22	8.24	3.30	1.71	0.06	358	21	211	67
H25-3	2300	62.97	0.67	17.44	3.54	0.06	2.83	3.47	5.15	1.72	0.30	573	14	355	192
H26-1	350	69.78	0.63	16.06	2.98	0.05	0.95	2.17	4.23	2.73	0.17	573	14	194	289
H26-2	1200	63.39	1.04	17.14	4.81	0.12	1.74	3.33	5.93	1.89	0.41	663	14	296	311
H26-3	1810	56.04	1.27	18.67	7.48	0.09	4.01	5.62	4.21	1.79	0.44	690	14	431	229
H26-4	2000	73.49	0.15	16.04	1.25	0.08	1.02	1.21	2.96	3.51	0.09	466	21	93	89
H27-1	1110	61.34	1.36	18.00	6.00	0.09	1.88	3.84	5.08	1.56	0.56	743	28	338	407
H27-3	2048	65.62	0.89	18.00	2.13	0.05	1.21	2.25	4.69	3.70	0.55	nd	nd	25	400
H28-1	1250	56.16	1.12	17.76	5.82	0.14	5.33	7.18	4.36	1.49	0.40	179	21	440	326
H28-2	2002	76.31	0.10	15.60	0.95	0.03	2.46	0.79	1.63	1.96	0.03	269	28	51	67
H38-1	1100	54.66	1.44	21.39	6.97	0.14	3.67	5.51	3.67	1.74	0.53	197	28	516	326
H38-2	1500	57.77	1.55	20.34	5.90	0.09	2.38	3.28	5.55	2.23	0.61	224	49	321	637
H38-4	1950	58.72	0.77	18.14	5.44	0.08	3.80	6.72	3.97	0.37	0.46	134	nd	829	104
H39-1	1200	52.27	1.52	19.09	7.64	0.13	4.59	9.74	3.45	0.45	0.36	nd	nd	474	200
H39-2	1650	70.43	0.39	16.75	1.36	0.05	0.65	1.15	6.71	2.17	0.13	484	21	135	392
H39-3	1800	63.00	1.08	18.11	4.62	0.07	2.41	4.03	4.69	1.10	0.31	116	21	406	281
H39-4	2100	59.33	1.16	19.66	5.76	0.09	2.91	4.21	4.10	1.76	0.37	779	21	423	333
H40-1	1612	54.65	1.04	16.12	6.23	0.18	4.94	11.83	2.32	1.05	0.35	233	nd	769	259

Values normalized to 100; SiO₂ to P₂O₅ in wt%, Ba to Zr in ppm, nd = not detected, depth in m bgl

Table S1 continuation: Rare earth element concentrations (ppm) of the reservoir and outcrop samples

Sample ID	Unit/Depth	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
LH8	Teziutlán	34.97	86.23	9.26	36.07	7.48	2.40	7.28	1.08	6.35	1.21	3.39	0.49	3.17	0.46
LH9	Teziutlán	30.58	65.16	8.07	29.22	12.95	1.80	6.10	0.88	5.08	0.97	2.77	0.39	2.57	0.38
LH11+12	Teziutlán	26.05	56.37	5.43	24.52	8.30	1.27	4.04	0.58	3.32	0.65	1.79	0.24	1.67	0.24
LH13	Teziutlán	48.53	125.53	11.88	46.81	9.33	2.65	8.26	1.18	6.57	1.27	3.44	0.49	3.17	0.46
LH16	Teziutlán	55.82	119.31	13.48	52.35	10.43	2.87	9.62	1.37	7.53	1.47	4.13	0.57	3.74	0.55
LH29	Teziutlán	41.03	66.92	9.68	37.17	7.07	1.96	6.50	0.95	5.09	0.96	2.56	0.36	2.29	0.35
RLM3	Teziutlán	46.46	108.20	11.94	46.77	9.65	2.58	8.85	1.28	7.38	1.41	3.90	0.56	3.57	0.52
RLM9	Teziutlán	49.01	116.11	12.36	46.69	9.26	2.45	8.16	1.20	6.91	1.32	3.79	0.52	3.53	0.52
LH34	Cuyoaco	22.41	46.89	5.31	21.86	8.79	1.24	3.98	0.57	3.19	0.62	1.76	0.25	1.68	0.25
LH41	Cuyoaco	17.98	36.05	4.56	18.04	7.79	1.17	3.22	0.44	2.41	0.44	1.24	0.17	1.12	0.16
LH51	Cuyoaco	15.01	32.67	4.07	15.62	6.72	0.97	2.57	0.33	1.81	0.32	0.90	0.13	0.82	0.12
LH72	Cuyoaco	33.00	70.69	8.41	33.26	6.28	2.00	5.61	0.78	4.07	0.77	2.09	0.28	1.77	0.26
OLH1	Cuyoaco	19.30	44.33	5.14	20.34	9.61	1.36	3.90	0.54	3.07	0.56	1.54	0.22	1.42	0.21
H13-1	1200	29.30	90.22	8.75	34.49	7.84	2.66	7.58	1.14	6.70	1.34	3.76	0.53	3.51	0.51
H15-1	1250	43.82	106.34	10.91	41.48	7.83	2.30	6.89	0.97	5.35	1.05	2.95	0.42	2.78	0.41
H18-1	796	24.17	70.54	6.26	24.87	5.12	1.83	4.71	0.73	4.26	0.80	2.30	0.33	2.13	0.31
H18-3	1750	54.12	126.05	13.12	49.80	9.39	2.57	8.50	1.23	6.96	1.37	3.88	0.55	3.73	0.55
H18-4	2900	51.96	125.20	12.95	48.81	9.71	2.12	9.07	1.46	9.03	1.86	5.52	0.84	5.55	0.84
H19-1	981	42.43	92.83	9.13	29.97	5.76	0.68	4.98	0.80	4.94	0.97	2.92	0.45	3.11	0.46
H19-2	1300	57.89	136.46	13.99	52.09	9.99	2.81	8.57	1.24	7.02	1.34	3.93	0.57	3.68	0.54
H19-3	1769	49.32	123.22	12.19	48.29	9.27	2.76	8.30	1.17	6.58	1.24	3.45	0.50	3.09	0.46
H20-4	1400	48.16	110.48	11.65	47.13	8.79	2.39	7.51	1.06	5.94	1.14	3.24	0.44	2.91	0.44
H23-1	673	28.77	70.69	7.16	29.74	6.00	1.78	5.69	0.83	4.82	0.94	2.68	0.36	2.38	0.35
H23-2	1200	47.54	117.55	11.87	49.00	9.31	2.62	8.15	1.14	6.32	1.19	3.31	0.45	2.86	0.42
H23-3	1924	45.38	115.12	11.34	48.17	8.98	2.50	7.88	1.11	6.06	1.14	3.19	0.42	2.81	0.40
H23-4	2495	47.31	115.39	12.20	51.21	9.65	2.62	8.35	1.16	6.41	1.19	3.38	0.43	2.84	0.42
H24-1	1008	45.92	109.48	11.71	48.94	9.61	2.72	8.95	1.32	7.69	1.50	4.31	0.60	3.92	0.60
H24-3	2294	35.65	78.88	7.54	27.81	4.90	1.31	4.26	0.64	3.63	0.72	2.13	0.30	2.03	0.31
H24-4	2844	19.07	45.08	4.14	15.74	3.27	0.96	3.12	0.50	3.01	0.58	1.70	0.23	1.59	0.24
H25-3	2300	36.93	82.64	7.99	31.00	5.48	1.69	4.77	0.65	3.73	0.70	2.02	0.28	1.83	0.28
H26-1	350	43.12	101.71	9.50	37.51	6.78	1.74	6.10	0.90	5.31	1.04	3.08	0.44	2.99	0.45
H26-2	1200	48.72	115.52	12.12	51.78	9.83	2.86	9.38	1.35	7.81	1.53	4.41	0.61	3.96	0.58
H26-3	1810	36.86	91.22	9.04	39.07	7.35	2.16	6.66	0.94	5.35	1.01	2.86	0.38	2.49	0.37
H26-4	2000	35.40	86.91	7.48	24.64	4.82	1.36	4.16	0.65	3.86	0.74	2.17	0.33	2.26	0.34
H27-1	1110	55.11	130.92	14.53	53.50	10.87	2.97	9.63	1.37	7.71	1.47	4.19	0.59	3.90	0.57
H27-3	2048	49.89	118.91	13.22	49.42	9.96	2.78	8.86	1.28	7.34	1.40	4.05	0.57	3.75	0.55
H28-1	1250	49.16	116.54	12.28	45.54	9.20	2.85	7.86	1.11	6.20	1.18	3.38	0.48	3.11	0.46
H28-2	2002	25.48	60.32	5.84	18.33	3.85	1.18	3.45	0.56	3.31	0.64	1.86	0.28	1.89	0.27
H38-1	1100	51.66	127.49	13.99	51.33	10.66	3.24	9.65	1.36	7.76	1.48	4.19	0.58	3.79	0.54
H38-2	1500	77.97	174.12	20.44	75.10	15.33	3.69	13.42	1.87	10.66	2.00	5.67	0.80	5.26	0.75
H38-4	1950	37.56	105.03	10.60	39.69	8.01	2.78	6.93	0.95	5.25	0.98	2.75	0.40	2.59	0.38
H39-1	1200	32.09	95.76	8.83	33.50	7.41	2.70	6.98	1.02	5.90	1.12	3.12	0.43	2.84	0.40
H39-2	1650	52.28	121.14	14.80	51.48	11.59	3.04	10.78	1.62	9.71	1.90	5.57	0.81	5.49	0.79
H39-3	1800	47.17	122.04	13.50	47.13	10.37	3.19	9.02	1.29	7.18	1.34	3.80	0.53	3.49	0.50
H39-4	2100	48.77	130.68	14.11	48.02	10.65	3.24	9.56	1.36	7.78	1.47	4.22	0.60	3.98	0.58
H40-1	1612	51.21	129.51	13.16	51.85	10.04	3.25	8.71	1.22	6.82	1.26	3.53	0.49	3.22	0.47

Table S2: Chemical indices of the outcrop and reservoir samples

Sample ID	Unit/Depth [m bgl]	CIW	CIA	PIA	CCPI	AI
LH8	Teziutlán	61.0	58.2	59.0	53.5	34.5
LH9	Teziutlán	63.3	59.3	60.6	49.3	31.8
LH11+12	Teziutlán	59.9	57.0	57.8	37.8	22.5
LH13	Teziutlán	66.9	61.2	63.5	48.1	37.1
LH16	Teziutlán	65.1	59.0	61.1	52.5	39.4
LH29	Teziutlán	66.2	62.6	64.2	43.2	28.9
RLM3	Teziutlán	61.8	57.1	58.4	50.1	34.2
RLM9	Teziutlán	68.1	60.2	63.2	44.9	39.5
LH34	Cuyoaco	67.7	63.8	65.6	44.5	30.3
LH41	Cuyoaco	63.9	59.6	61.1	36.3	23.2
LH51	Cuyoaco	66.8	63.8	65.2	31.7	20.8
LH72	Cuyoaco	66.8	63.0	64.7	42.5	28.3
OLH1	Cuyoaco	65.5	60.9	62.7	38.7	25.4
H13-1	1200	61.0	59.6	60.0	53.0	35.5
H15-1	1250	66.7	61.5	63.6	46.6	38.3
H18-1	796	67.8	65.1	66.4	49.1	38.8
H18-3	1750	70.3	65.2	67.8	47.5	33.2
H18-4	2900	69.1	61.4	64.6	21.2	29.4
H19-1	981	77.1	64.5	71.5	28.0	50.2
H19-2	1300	62.0	56.7	58.1	39.9	31.7
H19-3	1769	66.1	63.1	64.4	61.2	43.1
H20-4	1400	66.3	61.5	63.4	50.5	41.7
H23-1	673	63.5	61.2	62.0	49.6	33.8
H23-2	1200	63.4	59.9	61.1	40.0	26.6
H23-3	1924	68.0	65.6	66.8	58.3	43.1
H23-4	2495	68.4	65.4	66.9	55.5	40.3
H24-1	1008	70.5	66.3	68.5	46.7	33.6
H24-3	2294	53.7	49.4	49.3	24.8	25.6
H24-4	2844	51.1	47.7	47.3	27.0	25.4
H25-3	2300	66.9	62.8	64.6	41.1	34.5
H26-1	350	71.5	63.8	67.6	36.2	36.6
H26-2	1200	64.9	60.6	62.2	39.6	28.1
H26-3	1810	65.5	61.6	63.2	52.2	37.1
H26-4	2000	79.3	67.6	75.0	33.9	52.1
H27-1	1110	66.9	63.2	64.8	44.9	27.8
H27-3	2048	72.2	62.8	67.3	31.0	41.5
H28-1	1250	60.6	57.7	58.5	47.8	37.1
H28-2	2002	86.6	78.1	84.9	57.9	64.6
H38-1	1100	70.0	66.2	68.2	52.0	37.1
H38-2	1500	69.7	64.8	67.2	46.5	34.3
H38-4	1950	62.9	62.1	62.4	44.9	28.0
H39-1	1200	59.1	58.3	58.6	46.5	27.7
H39-2	1650	68.0	62.5	65.0	19.2	26.4
H39-3	1800	67.5	64.8	66.1	43.0	28.7
H39-4	2100	70.3	66.1	68.3	49.3	35.9
H40-1	1612	53.2	51.5	51.6	42.7	29.7

Table S3: Cross-correlations of selected major, trace and rare earth elements

	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	Ba	Nb	Sr	V	Zn	Zr	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
SiO₂	1.00																													
TiO₂	-0.91	1.00																												
Al₂O₃	-0.73	0.83	1.00																											
Fe₂O₃	-0.92	0.89	0.65	1.00																										
MnO	-0.52	0.39	0.04	0.55	1.00																									
MgO	-0.80	0.61	0.43	0.79	0.44	1.00																								
CaO	-0.63	0.39	0.06	0.51	0.69	0.60	1.00																							
Na₂O	-0.06	0.18	0.29	0.03	-0.17	-0.29	-0.45	1.00																						
K₂O	0.67	-0.53	-0.35	-0.69	-0.44	-0.75	-0.60	0.12	1.00																					
P₂O₅	-0.79	0.88	0.78	0.76	0.31	0.47	0.27	0.23	-0.35	1.00																				
Ba	0.20	-0.11	-0.13	-0.24	-0.24	-0.44	-0.19	0.25	0.52	-0.20	1.00																			
Nb	-0.15	0.28	0.31	0.13	0.09	-0.01	-0.03	0.00	0.01	0.31	-0.10	1.00																		
Sr	-0.79	0.59	0.46	0.72	0.50	0.72	0.72	-0.17	-0.77	0.55	-0.35	0.07	1.00																	
V	-0.83	0.58	0.53	0.72	0.40	0.90	0.35	-0.05	-0.71	0.19	-0.49	-0.25	0.78	1.00																
Zn	-0.41	0.36	0.12	0.58	0.38	0.37	0.18	0.10	-0.27	0.42	-0.13	0.07	0.24	0.19	1.00															
Zr	-0.30	0.49	0.52	0.24	0.02	-0.16	-0.17	0.59	0.19	0.56	0.16	0.58	-0.02	-0.36	0.16	1.00														
La	-0.19	0.34	0.39	0.18	0.02	-0.20	-0.21	0.48	0.26	0.50	-0.01	0.56	0.05	-0.40	0.21	0.89	1.00													
Ce	-0.34	0.48	0.51	0.33	0.11	-0.06	-0.11	0.47	0.09	0.59	-0.05	0.51	0.21	-0.29	0.27	0.87	0.96	1.00												
Pr	-0.29	0.44	0.50	0.27	0.07	-0.11	-0.16	0.53	0.10	0.56	-0.07	0.55	0.15	-0.29	0.22	0.89	0.96	0.98	1.00											
Nd	-0.42	0.55	0.57	0.40	0.13	0.01	-0.08	0.56	0.02	0.67	-0.08	0.46	0.24	-0.21	0.29	0.90	0.94	0.96	0.97	1.00										
Sm	-0.41	0.55	0.58	0.38	0.14	0.00	-0.09	0.58	-0.03	0.63	-0.11	0.49	0.22	-0.14	0.26	0.88	0.90	0.95	0.98	0.98	1.00									
Eu	-0.63	0.70	0.69	0.57	0.35	0.27	0.17	0.43	-0.34	0.73	-0.22	0.41	0.50	0.08	0.29	0.71	0.70	0.83	0.84	0.85	0.90	1.00								
Gd	-0.40	0.55	0.58	0.38	0.15	-0.02	-0.11	0.62	-0.05	0.60	-0.08	0.46	0.19	-0.09	0.27	0.88	0.87	0.93	0.96	0.96	0.99	0.90	1.00							
Tb	-0.32	0.47	0.52	0.31	0.11	-0.09	-0.17	0.65	0.01	0.51	-0.04	0.43	0.10	-0.08	0.24	0.87	0.85	0.90	0.94	0.93	0.97	0.86	0.99	1.00						
Dy	-0.25	0.41	0.47	0.24	0.07	-0.16	-0.23	0.68	0.05	0.43	-0.01	0.41	0.02	-0.08	0.22	0.85	0.83	0.87	0.91	0.89	0.95	0.81	0.97	0.99	1.00					
Ho	-0.21	0.36	0.42	0.20	0.05	-0.20	-0.26	0.71	0.09	0.38	0.04	0.38	-0.03	-0.09	0.20	0.84	0.80	0.84	0.88	0.86	0.92	0.77	0.95	0.98	1.00	1.00				
Er	-0.15	0.30	0.38	0.14	0.01	-0.25	-0.29	0.71	0.14	0.33	0.07	0.36	-0.08	-0.12	0.17	0.83	0.79	0.82	0.87	0.84	0.89	0.73	0.93	0.97	0.99	1.00	1.00			
Tm	-0.07	0.22	0.31	0.06	-0.03	-0.32	-0.34	0.70	0.19	0.24	0.10	0.35	-0.14	-0.18	0.16	0.79	0.77	0.80	0.84	0.79	0.85	0.67	0.89	0.94	0.97	0.98	0.99	1.00		
Yb	-0.02	0.17	0.27	0.01	-0.06	-0.35	-0.37	0.70	0.22	0.19	0.12	0.35	-0.18	-0.21	0.11	0.78	0.76	0.78	0.82	0.77	0.83	0.64	0.87	0.92	0.96	0.98	0.99	1.00	1.00	
Lu	0.00	0.14	0.24	0.00	-0.08	-0.37	-0.38	0.71	0.25	0.17	0.14	0.32	-0.20	-0.24	0.12	0.77	0.76	0.77	0.81	0.76	0.81	0.61	0.85	0.91	0.94	0.97	0.98	0.99	1.00	1.00

Table S4: Concentration changes in % of major and trace elements of the reservoir samples

Sample ID	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	Ba	Nb	Sr	Zr
H13-1	-6.6	18.4	0.7	116.3	8.7	95.1	3.9	32.8	-66.8	20.8	nd	nd	-10.1	-2.2
H15-1	8.0	-21.5	-5.6	67.4	-43.0	7.6	-35.8	20.8	-2.0	14.1	38.9	68.4	-19.3	34.0
H18-1	-0.8	1.8	9.3	66.5	-78.7	63.9	-11.1	-2.6	-46.1	7.0	-7.9	nd	-17.4	-13.1
H18-3	6.5	3.4	4.7	83.0	-22.4	-34.5	-39.7	13.1	-5.6	42.6	14.1	110.6	-35.8	131.8
H18-4	20.2	-81.3	-9.6	29.4	-68.8	-97.0	-89.0	88.6	34.2	-81.7	38.9	26.3	-87.2	84.7
H19-1	35.0	-91.4	-24.6	15.0	-90.9	-78.9	-94.3	5.1	57.2	-96.2	nd	-15.8	-96.3	-38.4
H19-2	3.8	-9.6	-1.9	75.7	6.5	-18.3	7.4	4.5	21.7	37.4	9.7	26.3	-24.8	92.0
H19-3	-2.3	2.6	-4.4	132.5	-1.1	89.3	-24.8	9.3	-44.3	64.4	-72.2	26.3	-11.9	19.5
H20-4	-1.3	-11.3	4.5	80.0	-46.0	61.5	-29.8	40.5	-0.1	31.0	14.1	26.3	-10.1	63.0
H23-1	0.7	2.6	1.6	95.3	-24.7	48.1	-1.8	13.6	-50.6	0.9	-16.6	-15.8	-19.3	-5.8
H23-2	-2.9	22.9	12.6	85.1	-27.8	-17.8	0.1	44.1	-14.8	97.0	-12.3	26.3	-2.8	63.0
H23-3	-1.9	1.3	5.1	105.5	-37.6	97.6	-23.4	8.5	-53.0	74.9	-75.1	26.3	2.7	41.3
H23-4	-6.4	12.0	15.5	107.4	-43.7	77.5	-17.0	17.0	-38.4	63.1	-81.0	26.3	10.1	52.1
H24-1	7.7	-13.3	1.8	70.4	-24.0	-22.3	-56.7	37.7	-25.0	46.4	-81.0	-15.8	-45.0	52.1
H24-3	16.7	-70.3	-22.0	32.4	-44.5	-33.1	54.6	-49.2	1.6	-45.9	-9.3	26.3	-28.4	-16.7
H24-4	21.8	-88.8	-32.5	32.5	36.9	-22.9	23.8	-4.2	-21.7	-81.1	-41.5	26.3	-54.1	-67.4
H25-3	10.1	-45.8	-2.4	50.2	-52.1	-1.5	-47.8	49.6	-20.9	-4.2	-6.4	-15.8	-22.9	-5.8
H26-1	22.0	-49.2	-10.1	42.3	-65.8	-66.8	-67.4	22.7	25.4	-44.6	-6.4	-15.8	-57.8	41.3
H26-2	10.8	-16.2	-4.0	68.3	-11.0	-39.6	-50.0	72.1	-13.3	32.0	8.2	-15.8	-35.8	52.1
H26-3	-2.0	2.6	4.5	106.2	-29.3	39.4	-15.5	22.2	-18.0	41.9	12.6	-15.8	-6.4	12.3
H26-4	28.5	-88.2	-10.2	17.7	-36.9	-64.5	-81.8	-14.0	61.3	-72.8	-24.0	26.3	-79.8	-56.5
H27-1	7.3	9.8	0.8	85.2	-30.8	-34.7	-42.3	47.4	-28.6	78.1	21.4	68.4	-26.6	99.2
H27-3	14.7	-27.9	0.7	30.2	-65.0	-57.9	-66.1	35.9	70.1	75.9	nd	nd	-94.5	95.6
H28-1	-1.8	-9.9	-0.6	82.6	3.4	85.5	7.9	26.4	-31.8	28.8	-70.8	26.3	-4.6	59.4
H28-2	33.4	-91.6	-12.7	13.5	-76.4	-14.3	-88.2	-52.6	-9.9	-90.4	-56.1	68.4	-89.0	-67.4
H38-1	-4.4	16.1	19.7	98.9	3.4	27.9	-17.2	6.4	-20.1	69.2	-67.8	68.4	11.9	59.4
H38-2	1.0	24.7	13.8	83.7	-34.6	-17.0	-50.7	61.0	2.3	93.8	-63.4	194.8	-30.3	211.5
H38-4	2.7	-38.1	1.5	77.3	-38.4	32.1	0.9	15.2	-83.1	47.4	-78.1	nd	79.8	-49.3
H39-1	-8.6	22.6	6.8	108.5	0.4	59.8	46.4	0.1	-79.2	13.7	nd	nd	2.7	-2.2
H39-2	23.1	-68.4	-6.3	19.3	-65.8	-77.3	-82.7	94.7	-0.4	-58.7	-21.0	26.3	-70.6	92.0
H39-3	10.2	-12.9	1.4	65.6	-46.8	-16.2	-39.5	36.1	-49.3	-2.0	-81.0	26.3	-11.9	37.6
H39-4	3.7	-6.1	10.0	81.8	-28.5	1.1	-36.7	19.0	-19.3	18.5	27.2	26.3	-8.3	63.0
H40-1	-4.5	-16.3	-9.7	88.4	33.1	71.9	77.9	-32.6	-51.6	11.2	-62.0	nd	67.0	26.8

nd = not detected

Table S4 continued: Concentration changes in % of REE of the reservoir samples

Sample ID	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
H13-1	-29.5	-3.0	-14.8	-13.7	-15.8	18.2	3.1	7.0	11.1	15.5	16.8	16.9	18.3	17.1
H15-1	5.5	14.4	6.3	3.8	-15.9	2.5	-6.3	-9.1	-11.3	-9.4	-8.4	-7.0	-6.3	-5.5
H18-1	-41.8	-24.1	-39.0	-37.7	-45.0	-18.4	-35.9	-31.8	-29.3	-30.8	-28.6	-27.0	-28.1	-27.7
H18-3	30.2	35.6	27.9	24.7	0.9	14.4	15.6	15.2	15.5	18.1	20.5	22.4	25.8	26.5
H18-4	25.0	34.6	26.2	22.2	4.4	-5.8	23.4	37.4	49.8	60.5	71.5	85.2	87.3	92.6
H19-1	2.1	-0.2	-11.1	-25.0	-38.1	-69.8	-32.3	-24.8	-18.1	-15.9	-9.3	-1.6	5.0	6.9
H19-2	39.3	46.8	36.3	30.4	7.3	25.3	16.5	16.6	16.4	15.8	21.9	25.1	24.1	24.4
H19-3	18.7	32.5	18.7	20.9	-0.4	23.0	12.9	10.0	9.2	6.8	7.0	9.6	4.1	6.9
H20-4	15.9	18.8	13.5	18.0	-5.6	6.6	2.1	-0.6	-1.4	-1.5	0.6	-3.8	-1.7	2.2
H23-1	-30.8	-24.0	-30.2	-25.6	-35.6	-20.8	-22.5	-22.3	-20.0	-18.8	-16.9	-20.0	-19.8	-18.7
H23-2	14.4	26.4	15.7	22.6	0.0	16.5	10.9	6.9	4.8	3.0	2.6	-1.5	-3.4	-3.1
H23-3	9.2	23.8	10.5	20.6	-3.5	11.3	7.2	4.5	0.6	-1.3	-1.1	-7.5	-5.3	-7.9
H23-4	13.8	24.1	18.9	28.2	3.7	16.8	13.6	9.1	6.4	3.3	5.0	-4.0	-4.1	-3.7
H24-1	10.5	17.7	14.1	22.5	3.3	21.3	21.7	23.6	27.5	29.4	33.7	32.7	32.2	37.2
H24-3	-14.2	-15.2	-26.5	-30.4	-47.3	-41.9	-42.1	-40.1	-39.8	-37.9	-33.8	-33.8	-31.5	-27.6
H24-4	-54.1	-51.5	-59.7	-60.6	-64.8	-57.5	-57.6	-53.3	-50.0	-49.9	-47.2	-48.8	-46.2	-45.4
H25-3	-11.1	-11.1	-22.1	-22.4	-41.2	-24.5	-35.2	-38.6	-38.2	-39.3	-37.4	-37.5	-38.2	-36.3
H26-1	3.8	9.4	-7.5	-6.1	-27.2	-22.4	-17.0	-15.0	-11.9	-10.0	-4.5	-2.7	0.8	4.3
H26-2	17.2	24.2	18.1	29.6	5.6	27.4	27.6	27.0	29.6	32.5	36.9	34.5	33.6	34.4
H26-3	-11.3	-1.9	-12.0	-2.2	-21.0	-4.0	-9.4	-11.7	-11.2	-12.3	-11.2	-16.3	-15.9	-15.9
H26-4	-14.8	-6.5	-27.1	-38.3	-48.3	-39.3	-43.5	-38.5	-35.9	-36.1	-32.7	-28.1	-23.6	-22.2
H27-1	32.6	40.8	41.5	33.9	16.8	32.2	30.9	28.2	28.0	27.1	30.0	30.0	31.5	31.2
H27-3	20.0	27.9	28.8	23.7	7.0	23.8	20.6	20.1	21.7	20.7	25.7	26.2	26.6	25.8
H28-1	18.3	25.3	19.7	14.0	-1.2	26.7	7.0	4.6	2.8	2.3	4.8	5.5	4.9	5.0
H28-2	-38.7	-35.1	-43.1	-54.1	-58.6	-47.4	-53.1	-47.7	-45.1	-44.6	-42.2	-39.1	-36.1	-37.7
H38-1	24.3	37.1	36.3	28.5	14.6	44.2	31.3	27.9	28.7	27.9	30.0	28.6	27.9	25.4
H38-2	87.6	87.3	99.2	88.0	64.8	64.4	82.5	75.7	76.9	73.2	75.9	76.3	77.3	72.5
H38-4	-9.6	13.0	3.2	-0.7	-14.0	23.7	-5.8	-11.1	-12.9	-15.2	-14.5	-12.6	-12.5	-12.6
H39-1	-22.8	3.0	-13.9	-16.1	-20.4	20.2	-5.1	-3.9	-2.1	-3.2	-3.1	-4.0	-4.3	-8.3
H39-2	25.8	30.3	44.2	28.9	24.5	35.5	46.6	52.7	61.1	64.2	72.9	78.7	85.3	82.6
H39-3	13.5	31.3	31.5	18.0	11.4	42.0	22.7	21.0	19.1	15.7	17.9	18.2	17.9	14.7
H39-4	17.4	40.5	37.5	20.2	14.5	44.1	30.0	27.6	29.1	27.3	30.9	32.6	34.4	32.9
H40-1	23.2	39.3	28.2	29.8	7.9	44.9	18.5	15.0	13.1	8.8	9.7	9.3	8.6	8.7

Table S5: P-values obtained during Kruskal-Wallis Tests

Tests	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Cuyoaco vs. Teziutlán	0.0153	0.0329	0.0192	0.0447	0.2775	0.0722	0.0187	0.0083	0.0084	0.0068	0.0070	0.0071	0.0051	0.0054
Cuyoaco vs. Reservoir	0.0009	0.0003	0.0014	0.0022	0.4355	0.0056	0.0022	0.0014	0.0009	0.0007	0.0005	0.0004	0.0003	0.0003
Teziutlán vs. Reservoir	0.5662	0.2026	0.6214	0.4091	0.5343	0.4415	0.7472	0.9319	0.8203	0.8402	0.7122	0.6670	0.7311	0.7120
Cuyoaco vs. R. argillic	0.0062	0.0029	0.0095	0.0056	0.4903	0.0145	0.0078	0.0047	0.0031	0.0021	0.0013	0.0007	0.0006	0.0006
Teziutlán vs. R. argillic	0.8719	0.4173	0.9222	0.4681	0.6296	0.5446	0.8661	0.9961	0.8738	0.8412	0.6995	0.5560	0.6217	0.5859
Cuyoaco vs. R. propylitic	0.0002	0.0001	0.0003	0.0006	0.1744	0.0010	0.0007	0.0006	0.0005	0.0005	0.0004	0.0005	0.0004	0.0005
Teziutlán vs. propylitic	0.2442	0.0478	0.2080	0.1563	0.8511	0.1205	0.3520	0.5532	0.4869	0.5519	0.4815	0.5468	0.6162	0.6116
Cuyoaco vs. silicification/skarn	0.0610	0.0769	0.1212	0.2345	0.6434	0.4668	0.1526	0.0872	0.0723	0.0582	0.0450	0.0358	0.0265	0.0275
Teziutlán vs. silicification/skarn	0.6467	0.7884	0.4623	0.4315	0.0958	0.2793	0.3802	0.3859	0.4437	0.4623	0.5493	0.6246	0.6378	0.6393

numbers in bold = significant differences, R = reservoir samples (for input data please refer to Table S1)

Significance levels:

- 5
- ns $P > 0.05$
- * $P \leq 0.05$
- ** $P \leq 0.01$
- *** $P \leq 0.001$
- **** $P \leq 0.0001$

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Additional information on the laboratory measurements

Petrographic and SEM analyses were performed at the British Geological Survey and TU Darmstadt. SEM analyses at BGS were performed using a FEI Quanta 600 SEM with an Oxford Instruments X-Max detector (SDD) for Energy Dispersive Spectrometry (EDS), running with Oxford Instruments INCA (v4) software. The SEM was operated at: 20 kV accelerating voltage, approximately 5 nA beam current; and an acquisition time of 60 seconds per spot was used. EDS process time of 4

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resulted in dead-times of < 45%. Use of Backscattered SEM imaging (i.e., BSEM) aided phase identification, with EDS analysis providing quantification of phase compositions. SEM analyses at TU Darmstadt were carried out using an EDAX FEI Quanta 200F SEM running with EDAX Genesis software. The SEM was operated in low vacuum mode with a pressure of 0.8 mbar, 15 kV voltage and approximately 5 nA spot size. EDS processing with 1000 counts per 30 seconds resulted in a dead-

20

time of 30-50%. BGS: Fig. 5h, 5o, 5p and Fig. 6k, Fig. 17; TU Darmstadt: Fig. 5l.

Abbreviations

s. s. = sensu stricto (in a strict sense)

s. l. = sensu lato (in a broad sense)

Explanation: epidote s.s. refers to the specific chemical composition of the mineral epidote, while epidote s. l. also accounts

5 for other members in the epidote group.