

Table S1: Qualitative XRD analysis of clay samples from wells HE-42 and HE-46, Hellisheidi geothermal system.

Well	Source	Depth (m)	d(001) untreated sample (Å)	d(001) glycolated sample (Å)	d(001) heated sample (Å)	d(002) (Å)	Clay minerals
HE-42	[1]	100	-	-	-		-
HE-42	[1]	192	14.832	14.805	9.921		Sme
HE-42	[1]	230	14.513	14.479	10.289		Sme
HE-42	[1]	300	-	-	-		-
HE-42	[1]	440	13.038	15.121/13.493	10.045		Sme
HE-42	[1]	464	14.917/13.376	14.669/13.918	10.065		Sme, MLC
HE-42	[1]	500	15.513	16.449/15.513	9.979		Sme, MLC
HE-42	[1]	570	14.792/14.244	16.449/15.513	10.046	7.281	MLC
HE-42	[1]	622	31.084/14.681/13.423	29.914/14.614/13.517	12.670/10.030	7.285	MLC
HE-42	[1]	660	14.731/13.545	14.614/13.518	10.031/8.206	7.252	MLC
HE-42	[1]	700	15.107/13.122	13.995/13.430	9.916	7.123	MLC
HE-42	[1]	740	31.133/14.629	30.681/14.403	9.939	7.260	MLC
HE-42	[1]	778	14.902	30.353/14.691	26.042/14.650	7.276	Chl, MLC
HE-42	[1]	810	31.000/14.779	33.206/15.525/14.846	14.470	7.180	Chl, MLC
HE-42	[1]	846	15.039/13.735	14.749/13.740	10.082	7.243	MLC
HE-42	[1]	890	30.548/14.428	30.056/14.362	10.145	7.204	Chl, MLC
HE-42	[1]	970	14.890	14.803	14.804	7.249	Chl
HE-42	[1]	1010	31.027/14.775	31.027/14.605	14.800	7.207	Chl, MLC
HE-42	[1]	1050	14.589	14.604	14.583	7.187	Chl
HE-42	[1]	1090	14.614	14.603	14.431	7.189	Chl
HE-42	[1]	1120	14.603	14.603	14.891	7.210	Chl
HE-42	[1]	1152	14.973	15.019	14.385	7.272	Chl
HE-42	[1]	1198	14.783	14.801	-	7.258	Chl
HE-42	[1]	1250	14.877	14.818	14.888	7.265	Chl
HE-42	[1]	1300	14.769	14.769	15.104	7.236	Chl
HE-42	[1]	1358	14.660	14.650	15.074	7.194	Chl
HE-42	[1]	1414	14.656	14.628	15.019	7.197	Chl
HE-42	[1]	1498	14.761	14.675	14.637	7.205	Chl
HE-42	[1]	1600	14.832/13.305	14.635/13.725	14.832/10.244	7.222	Chl
HE-42	[1]	1700	14.671	14.624	14.846	7.200	Chl
HE-42	[1]	1800	14.959	15.057	15.279	7.291	Chl
HE-42	[1]	1950	14.793	14.763	15.067	7.237	Chl
HE-42	[1]	2100	14.986	14.912	15.213	7.288	Chl
HE-42	[1]	2250	14.721	14.695	15.092	7.218	Chl
HE-42	[1]	2530	14.715	14.733	14.715	7.234	Chl
HE-42	[1]	2668	14.442	14.427	14.604	7.143	Chl
HE-42	[1]	2810	14.573	14.568	14.569	7.181	Chl
HE-42	[1]	3000	14.499	14.467	-	7.162	Chl
HE-42	[1]	3150	14.993/14.621	14.993/14.568	14.561	7.193	Chl
HE-42	[1]	3322	missing	15.098	15.003	-	Chl
HE-46	[2]	134	13.159	17.077	9.976		Sme
HE-46	[2]	184	13.086				-
HE-46	[2]	286	14.903, 12.870	16.890	9.766		Sme
HE-46	[2]	358	13.039	17.106	9.982		Sme

Well	Source	Depth (m)	d(001) untreated sample (Å)	d(001) glycolated sample (Å)	d(001) heated sample (Å)	d(002) (Å)	Clay minerals
HE-46	[2]	420	31.194/15.013/13. 183	-	9.982	7.204	MLC
HE-46	[2]	460	13.619	13.776	10.029	7.234	MLC
HE-46	[2]	520	14.626/12.764	14.618/12.759	10.012	7.204	MLC
HE-46	[2]	560	15.173/14.564/12. 709	14.587/12.753	14.455/12.769/9.9 25	7.193	MLC
HE-46	[2]	600	31.415/14.619/12. 820	31.336/14.619/12. 915	14.584/10.038	7.203	MLC
HE-46	[2]	622	14.813/12.882	14.821	14.821	7.235	Chl
HE-46	[2]	650	30.975/14.483	30.261/14.452	14.472	7.146	MLC
HE-46	[2]	694	30.491/14.652	30.554/14.675	14.679	7.204	MLC
HE-46	[2]	750	14.832	14.871	14.825	7.252	Chl, MLC
HE-46	[2]	796	14.856	14.821	14.958	7.237	Chl
HE-46	[2]	856	14.755	14.760	15.050	7.223	Chl
HE-46	[2]	880	14.792	14.774	15.061	7.233	Chl
HE-46	[2]	946	14.754	14.749	14.888	7.220	Chl
HE-46	[2]	990	14.675	14.643	14.978	7.206	Chl
HE-46	[2]	1030	14.613	17.545/14.613	15.127	7.187	Chl
HE-46	[2]	1088	14.607	14.642	14.879	7.189	Chl
HE-46	[2]	1132	14.467	14.493	14.746	7.154	Chl
HE-46	[2]	1190	14.804	14.813	14.959	7.227	Chl
HE-46	[2]	1300	14.823	14.840	15.056	7.241	Chl
HE-46	[2]	1340	14.766	14.771	14.898	7.226	Chl
HE-46	[2]	1390	14.855	14.854	14.890	7.245	Chl
HE-46	[2]	1426	14.617	14.612	14.572	7.214	Chl
HE-46	[2]	1500	14.602	14.606	14.934	7.189	Chl
HE-46	[2]	1566	14.579	14.594	15.598	7.179	Chl
HE-46	[2]	1634	14.605	14.616	14.799	7.132	Chl
HE-46	[2]	1720	14.647	14.649	15.170	7.196	Chl
HE-46	[2]	1890	14.814	14.794	14.993	7.241	Chl
HE-46	[2]	2140	14.663	14.685	15.179	7.205	Chl
HE-46	[2]	2250	14.706	14.734	14.876	7.216	Chl
HE-46	[2]	2314	14.795	14.807	-	7.239	Chl
HE-46	[2]	2400	14.525	14.546	14.868	7.175	Chl

Method

After careful washing of each cutting sample in distilled water, about 2 g of sample material is put in a glass tube. The tube is filled with distilled water and put in a mechanical shaker. Subsequently the sample is shaken for about four hours. After shaking, the clay slurry is allowed to settle down for 10 minutes. The clay slurry is then transferred onto a glass-slide, using a pipette. The sample is dried under ambient temperature conditions before it is measured (untreated). After the measurement the sample is placed inside a closed desiccator filled with ethylene-glycol where it is left for 24 hours before it is measured again (glycolated). Subsequently, the sample is heated in a furnace for about 1 hour at a temperature of 550 °C. After cooling, the sample is measured again (heated).

The equipment used is a Bruker AXS D8 Focus, producing Cu $k\alpha$ radiation with 1.54 Å wavelength at 40 kV and 40 mA. Each sample is measured from $2\Theta=2^\circ$ – 14° , in 0.02° increments (steps) and measured for 1 second at each step.

References

1. Gunnarsdóttir, S.H. Jarðfræði og ummyndun í nágrenni Reykjavells á Hellisheiði. MSc thesis, University of Iceland, 2012.
2. Snaebjörnsdóttir, S.Ó. Jarðfræði og jarðhitaummyndun við vesturjaðar sigdældar Hengils. MSc thesis, University of Iceland, 2011.