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Supplementary Materials for

Clay mineral diversity and abundance in sedimentary rocks of Gale crater, Mars

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SUPPLEMENTARY MATERIALS

table S1. Data used to infer the K content of clay minerals. APXS derived bulk K content of Murray formation mudstones compared with CheMin derived clay mineral abundances, the abundances of K-bearing sanidine and jarosite, as well as the calculated contributions of K from sanidine and jarosite. K contained in jarosite and sanidine were calculated using average Gale Crater mineral formulae derived by Morrsion et al., (*10*) $(K_{.74}Na_{.26})AlSi_3O_8$ – sanidine and jarosite $(K_{0.51}Na_{.49})(Fe_{2.68}Al_{.32})(SO_4)_2(OH)_6$ and mineral abundances shown in Table 1 and Rampe et al. (*7*). *denotes abundance at detection limit.

Sample	Target	Sol	K_2O (%)	Clay mineral content (wt.%)	Sanidine (wt. %)	Jarosite (wt.%)	Sanidine + jarosite K_2O contribution (%)
Sebina	Sebina_full_drill_tailings	1496	0.83 ± .04	19 ± 4	1.4 ± 0.4	0.9 ± 0.2	0.24 - 0.42
Quela	Quela_full_drill_tailings	1466	0.77 ± .02	16 ± 3	2.3 ± 0.5	0.5*	0.38 - 0.56
Marimba	Marimba2_full_drill_tailings	1426	0.83 ± .04	23 ± 5	2.4 ± 0.6	0.5*	0.38 - 0.6
Oudam	Oudam_presieve_dump	1368	0.87 ± .04	3 ± 1	0	0	0
Buckskin	Buckskin_post_sieve_dump_twk_corrected	1092	0.96 ± .04	0	3.4 ± 0.4	0	0.57-0.72
Telegraph Peak	Telegraph_Peak_postsieve_dump	954	0.98 ± .04	0	5.2 ± 1.1	1.5 ± 0.9	0.82 - 1.36
Mojave2	Mojave2_postsieve_dump	894	0.73 ± .02	5 ± 1	0	3.1 ± 0.8	0.16 - 0.27
Confidence Hills	Confidence_Hills_fines_postsieve_dump	782	0.98 ± .04	8 ± 2	5 ± 0.4	1.1 ± 0.4	0.92 - 1.13

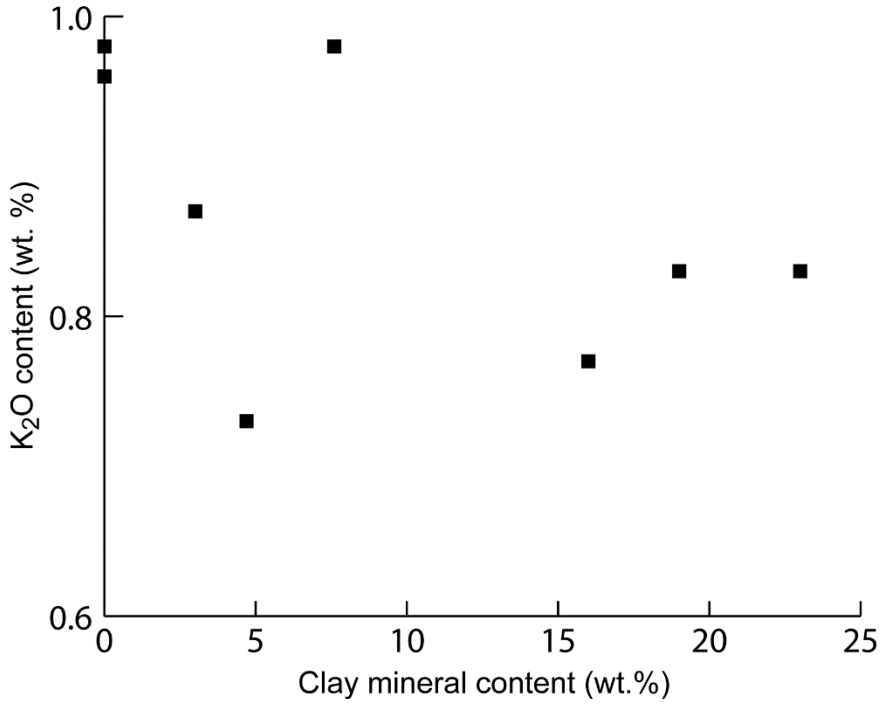

fig. S1. Comparison of the clay mineral and potassium content of Murray formation samples.

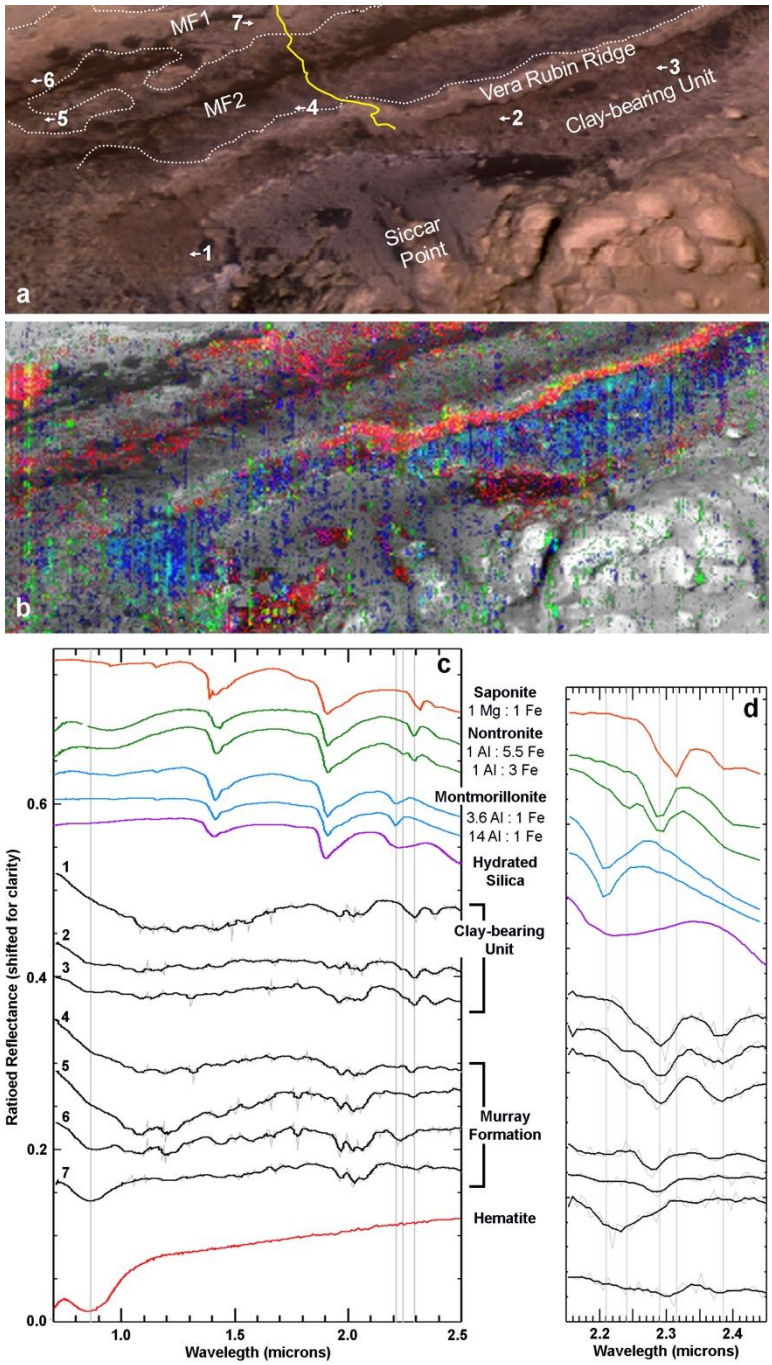

fig. S2. CRISM smectite signatures in the Murray formation (MF). (**a**) False color image of the MSL traverse area (FRT0000B6F1), dotted lines indicate approximate unit boundaries for MF1 and MF2 as defined in ref. *26*. The yellow line shows the path of the rover. Marimba and Quela are situated in MF1, Sebina is at the MF1/MF2 boundary. (**b**) RGB composite over 0.75 micron albedo, where red is hematite band depth at 880 nm, green is Al-smectite band depth at 2210 nm, and blue is Fe/Mg-smectite band depth at 2290 nm. (**c**) Ratio spectra extracted from regions indicated in (A), compared to spectra from the clay-bearing unit and laboratory samples. (**d**) Expanded view of diagnostic clay absorption bands from 2.2-2.4 microns.