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ASSESSING SOURCE REGION CHARACTERISTICS FROM GALE CRATER LACUSTRINE MUDSTONE.

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The NASA *Curiosity* rover has encountered mudstones deposited in a lake environment within the respective Yellowknife Bay[1] (YKB) [Bradbury Group] and Murray[2] [Mt Sharp Group] formations of Gale crater, Mars. Chemical and mineralogical studies conducted on YKB mudstones show a habitable lake environment at the time of deposition[1]. The Chemistry and Camera (ChemCam) instrument suite has acquired major, minor and trace element compositions through Laser-Induced Breakdown Spectroscopy[3,4] generating an extensive dataset of ~9500 observation points (where one observation point is the average of 30 – 50 spectral analyses). This study has excluded targets that have not hit *in situ* host rock to assess host rock geochemical variation between stratigraphic groups[5].

Our results show that Murray is enriched in SiO_2, Al_2O_3, and K_2O, but depleted in CaO and MgO compared to YKB mudstone. Despite Murray demonstrating higher Chemical Indices of Alteration than YKB[6,7], Murray's dominant basaltic mineralogy and secondary mineralogy infers that open system alteration has not masked source characteristics[8]. Hence, we hypothesise that Murray's geochemical difference is related to a change towards a more silica-rich, tholeiitic provenance from the regional, subalkaline basalt that was initially eroded and deposited at YKB[9,10].

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