Brock Mentorship Program
Wednesday, January 29
1:00 p.m. - 2:00 p.m.
Plaza 409

Comparison of Vein Material Seen in Microscopic Images and Elemental Composition of Rocks in Gale Crater, Mars

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Research conducted under the supervision of Dr. Mariek Schmidt, Department of Earth Sciences

The goal of NASA's Mars Science Laboratory (MSL) mission is to find aqueous or water-rich environments that might be habitable for microbial life on Mars. My research contributes to this goal by analyzing microscopic images of rocks taken by the Mars Hand Lens Imager (MAHLI) camera onboard the Curiosity rover, presently operating in Gale Crater, Mars. Many of these rocks contain white linear features that represent a white calcium sulfate mineral (anhydrite, bassinite, or gypsum). These minerals are thought to have precipitated from aqueous fluids that infiltrated fractures, later forming veins. The main objective of my research involved finding vein abundances in vein-rich rock targets from the Sheepbed mudstone in Yellowknife Bay and the Blunts Point member of the Murray Foundation. A comparison was then drawn between vein abundances with elemental compositions, particularly S and Ca, determined by the Alpha Particle X-ray Spectrometer (APXS). Software used for image analysis included enhancement and manipulation in Adobe Photoshop and BeFunky, followed by quantitative vein abundance determination using the freeware ImageJ. Positive correlations were found between vein abundances and SO3 and CaO concentrations for both groups of targets, but better correlations were found for the Sheepbed mudstone targets than the Blunts Point targets (R2 values of 0.9285 versus 0.6449 for SO3 and 0.9369 versus 0.6632 for CaO, respectively). Bedrock, vein and dust percentages determined in the MAHLI images were used to estimate the composition of vein- and dust-free bedrock. From my analysis, it is evident that the Blunts Point targets had a more complex history as the correlations were better for the Yellowknife targets.