

# The Study of Electrical Potential, Remote Sensing, and Preservation of Biosignatures at Sites of Serpentinization (SERP)

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A water-rock reaction known as serpentinization has the potential to support subsurface life on Earth and other worlds. Detecting extinct, or extant, life at sites of serpentinization requires the ability to locate serpentinite-hosted springs (active or in-active), and to detect biosignatures. The goals of SERP are to develop methods to detect serpentinite-hosted springs, and to identify biosignatures of past and current life. This study was conducted on Mars analogue sites of serpentinization within the Bay of Island Complex (BIOC), Newfoundland, Canada. The main objectives of SERP are to (I) discover biosignatures (isotopic and organic) of microbial life and their preservation in active and inactive springs; (II) develop, deploy, and validate spectral and remote sensing (RS) methods to detect surface expressions of serpentinization; and (III) map subsurface serpentinized groundwater flow using electrical potential and magnetic geophysical surveys. In the first year of SERP, we developed RS methods (using satellite and unmanned aerial vehicle (UAV) data) for detecting serpentinite-hosted springs at a training site known for its serpentinite-hosted springs, the Tablelands, in Gros Morne National Park, Newfoundland. Subsequently, we applied these methods to locate new potential sites of serpentinite-hosted springs in unexplored canyons of the Tablelands and canyons in a second ultramafic massif known as Blow Me Down. Follow-up work included two field trips: One for conducting an areal survey using a UAV, and a second to ground-truth our satellite and UAV observations. This work led to discovery of a new serpentinite-hosted spring in the Blow Me Down Massif. This spring was characterized for its lipid biosignatures, IR spectral characteristics of associated carbonate minerals present, and its magnetic and electrical potential geophysical response. This presentation will provide an overview of the SERP research project to date, and highlight the lipid biomarkers of the Tablelands and Blow Me Down serpentinite-hosted springs. The methods developed in this study can be applied to searching for serpentinite-hosted springs, and life within these springs, elsewhere on Earth and other celestial bodies.