Geophysical Research Abstracts
Vol. 20, EGU2018-17915, 2018
EGU General Assembly 2018

Lithium Exploration Using a Multi-Disciplinary Earth Observation Framework Over Cornwall, UK

Cristian Rossi, Maral Bayaraa, Stephen Spittle, Anoop Pandey, and Niki Henry
Satellite Applications Catapult, Harwell Campus, United Kingdom (maral.bayaraa@sa.catapult.org.uk)

The increasing global effort to overcome the addiction to fossil fuels is driving the demand for 'green' metals such as lithium (Li). At the forefront of green technologies is electric cars, where Li-ion rechargeable batteries are a fundamental component. Lithium is sourced from three main types of deposits: pegmatites, continental brines and hydrothermally altered clays, where brines supply three-fourths of the world's Li – mainly due to its cost effectiveness in extraction. The aims of this project are to target Li exploration in Cornwall, UK, and to conduct an associated environmental baseline study of the area. Whilst the occurrences of underground geothermal brines with anomalous Li enrichment in the Cornwall area are well known, an economically viable brine deposit is yet to be appraised.

The Li in the underground geothermal brines is thought to be sourced from both the erosion of Permian Cornubian granites rich in Li-micas (e.g. lepidolite and zinnwaldite) and red-bed sedimentary basins with associated evaporite deposits that formed in a Permo-Triassic arid climate. Like human fingerprints, minerals and vegetation have unique absorption and reflection features in the infrared region of the electromagnetic spectrum. The spectral signatures of the lithology and associated alteration anomaly will be analysed using multispectral remote sensing techniques for targeting Li exploration. Moreover, there are multiple episodes of reactivation of NW-SE trending fault systems that provide the necessary permeability and dominant structural controls of the brines in the area. The dominant faults and lineations of the area will be identified using Synthetic Aperture Radar (SAR).

The presence of these brines is expected to have some impact on vegetation health. Whilst a high concentration of Li may be toxic to plats, at a low enough concentration it may actually stimulate growth. Therefore, vegetation health will be analysed to outline areas of vegetation anomalies. The vegetation anomaly results will also be combined with historical data such as pollution/seepage, historical mining activities, contamination and hydrology to provide a consistent environmental impact study.

Ultimately, the outputs from mineralogy/alteration anomaly, structural controls of faults and vegetation anomaly datasets will be correlated and integrated to create a lithium probability of occurrence map.