Mapping Hydrothermal Systems: Applying Airborne Hyperspectral Data from a Combined Sensor Platform

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Using recent examples from various airborne surveys in the western US, the presentation will detail how hyperspectral mapping can contribute to the exploration and development of geothermal resources. The focus will be on hyperspectral data derived from a combined sensor platform.

Over the past twenty years, airborne hyperspectral surveying for geological and mineral mapping has progressed from an experimental scientific application to an operational service for mineral exploration companies. Mining geologists now recognize that 100% spatial coverage at high spatial resolution can often provide critical and timely information prior to funding additional surveys and leasing investments. Beyond the mining industry, geothermal prospectors are now beginning to recognize the competitive and economic advantage-s that hyperspectral mapping can offer.

SpecTIR LLC (Reno, Nevada) and The Aerospace Corporation (El Segundo, California) have collaborated to determine how best to create and utilize a full--spectral hyperspectral airborne platform. SpecTIR's very-near-infrared to shortwave infrared (VNIR-SWIR) sensor was collocated onboard a Twin Otter aircraft with Aerospace's mid-longwave infrared sensor (MWIR--LWIR). Prior to the SpecTIR/Aerospace collaboration, surface minerals of geothermal systems had only been mapped with similar spectral coverage, during separate deployments of VNIR-SWIR and MWIR-LWIR imaging spectrometers. The co-location of both sensors onto one airborne survey platform, leverages the complimentary nature of the short wave and mid-long wave sensors, reduces uncertainties due to the different acquisition times and potential spatial overlap mismatch of the respective data products, and provides 600 channels of spectral information. A large variety of minerals can be discriminated (including silicates, clays, carbonates, and sulfates), which allows for effective mapping of sinter deposits, mineralization and alternation zones. In addition, the combined hyperspectral platform can be used to map surface expressions of faults, thermographic anomalies, and fumaroles.