Title: Initial comparison of mineral mapping simultaneously collected hyperspectral short-wave infrared (SWIR) and long-wave infrared (LWIR) data over Cuprite, Nevada.

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Abstract:

Rock forming and alteration minerals associated the Cuprite mining district, southwestern Nevada, USA have electronic and vibrational features that can be mapped in the short-wave and long-wave infrared portion of the electromagnetic spectrum. Since the 1970's numerous visible to short-wave infrared and a few long-wave infrared multispectral and hyperspectral sensors have imaged Cuprite, Nevada for sensor evaluation and demonstration and phenomenological studies. In 2008 Cuprite, Nevada was imaged simultaneously with two hyperspectral sensors, one visible to short-wave infrared (VNIR-SWIR) and one mid-wave to long-wave infrared (MWIR-LWIR), on a single roll stage looking through a single camera port on the aircraft. Twenty flight lines were collected over Cuprite at an average altitude of 4735 m. The sensors used were the Prospectir sensor, a 357 channel hyperspectral sensor that makes radiance measurements in the visible to short-wave infrared portion of the electromagnetic spectrum (0.4-2.5 μm), and the Spatially Enhanced Broadband Array Spectrograph System (SEBASS) that makes radiance measurements in the mid-wave to long-wave infrared portion of the electromagnetic spectrum (3.0-5.5 μm and 7.6-13.5 μm).

Mineral spectra from publicly available mineral spectral libraries containing absorption features in either/or visible to short-wave and mid-wave to long-wave infrared spectra were chosen for comparison. The resultant minerals maps produced from spectral mapping of these minerals in the short-wave infrared were compared with minerals maps produced from spectral mapping of these minerals in the long-wave infrared. Geological and alteration maps produced from traditional geological mapping methods were compared to the mineral maps produced from the short-wave infrared and long-wave infrared. These minerals maps show the unique and complementary nature of mineral mapping in these different portions of the electromagnetic spectrum.