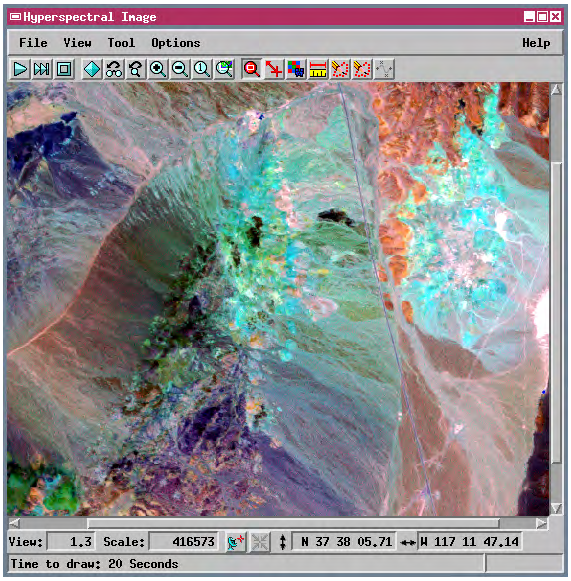
Hyperspectral Analysis Process



RGB display of three bands from a hyperspectral image of Cuprite, Nevada, acquired by NASA's AVIRIS instrument (Airborne Visible/Infrared Imaging Spectrometer). When you open a hyperspectral image for analysis, the process automatically selects a set of three bands with low, medium, and high wavelength for an RGB display. You can also use the Layer Controls to add any single band or RGB combination of bands to the display.

Hyperspectral remote sensors collect images simultaneously in many narrow, contiguous wavelength bands. The prototype Hyperspectral Analysis process in TNTmips V5.90 provides the specialized, interactive analysis tools that are required to fully exploit the spectral range and spectral resolution provided by hyperspectral datasets. The process allows you to work with two different types of objects: hyperspectral images and spectral libraries. A hyperspectral image consists of a set of raster bands in a Project File, along with associated wavelength information for each band. You can select and view spectra for image cells and save them in a spectral library. The saved image spectra can then be used to map similar materials throughout the image. You can also work with libraries of field and laboratory spectra and use selected spectra to identify matching materials in the image. The U.S. Geological Survey's standard spectral library (containing laboratory spectra for nearly 500 minerals) is included as a starting point for material identification.

Hyperspectral Analysis Workflow

Nominal Calibration
Convert radiance values to apparent reflectance

Available Methods:
- Minimum Offset
- Dark Field Offset
- Flat Field Calibration
- Equal Area Normalization
- Log Residuals

Extract Image Spectra
View spectral plots, specify a spectral range to work in, save spectra in library

Remove Continuum
Remove the spectral envelope (continuum) from the spectra to build a library of "continuum-removed" absorption features

Available Methods:
- Spectral Angle Mapper
- Band Mapping

Spectrum Matching
Search USGS spectral library for matching laboratory spectra

Spectral Classification
Classify image cells using selected laboratory spectra or extracted image spectra

Available Methods:
- Spectral Angle Mapper
- Cross Correlation
- Linear Unmixing
- Matched Filtering

Spectral Plot

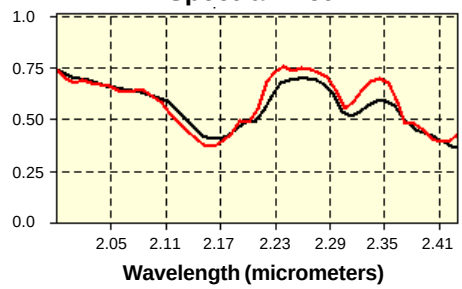
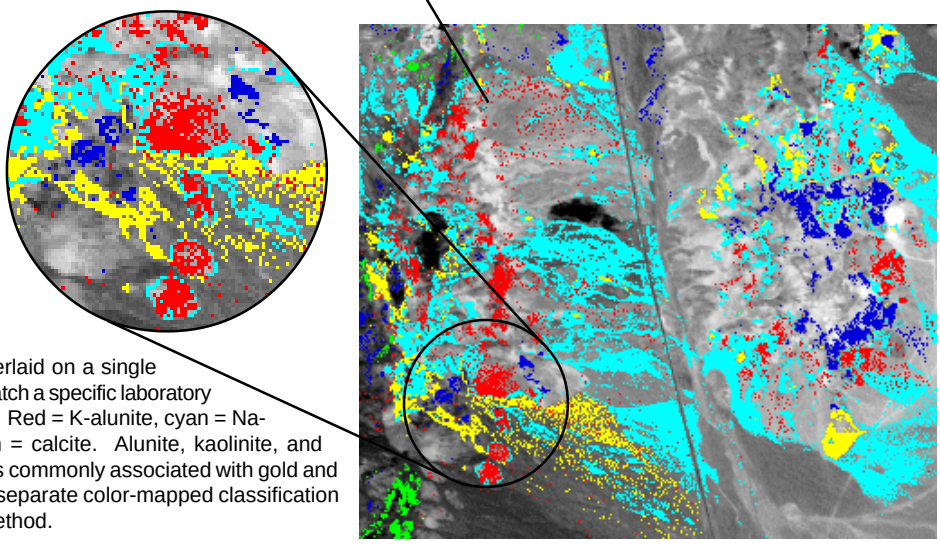


Image spectrum extracted from area dominated by the alteration mineral alunite.

Matching laboratory spectrum for alunite found by the Spectral Angle matching procedure.



Classification results for selected mineral spectra overlaid on a single grayscale image band. Each color identifies cells that match a specific laboratory mineral spectrum within an adjustable tolerance level. Red = K-alunite, cyan = Na-alunite, yellow = kaolinite, blue = chalcedony, green = calcite. Alunite, kaolinite, and chalcedony (opal) are hydrothermal alteration products commonly associated with gold and other precious metal deposits. The illustration shows separate color-mapped classification results for each mineral using the Cross Correlation method.

MicroImages, Inc. • TNTgis - Advanced Software for Geospatial Analysis
Voice (402)477-9554 • FAX (402) 817-0151 • email info@microimages.com • Web www.microimages.com