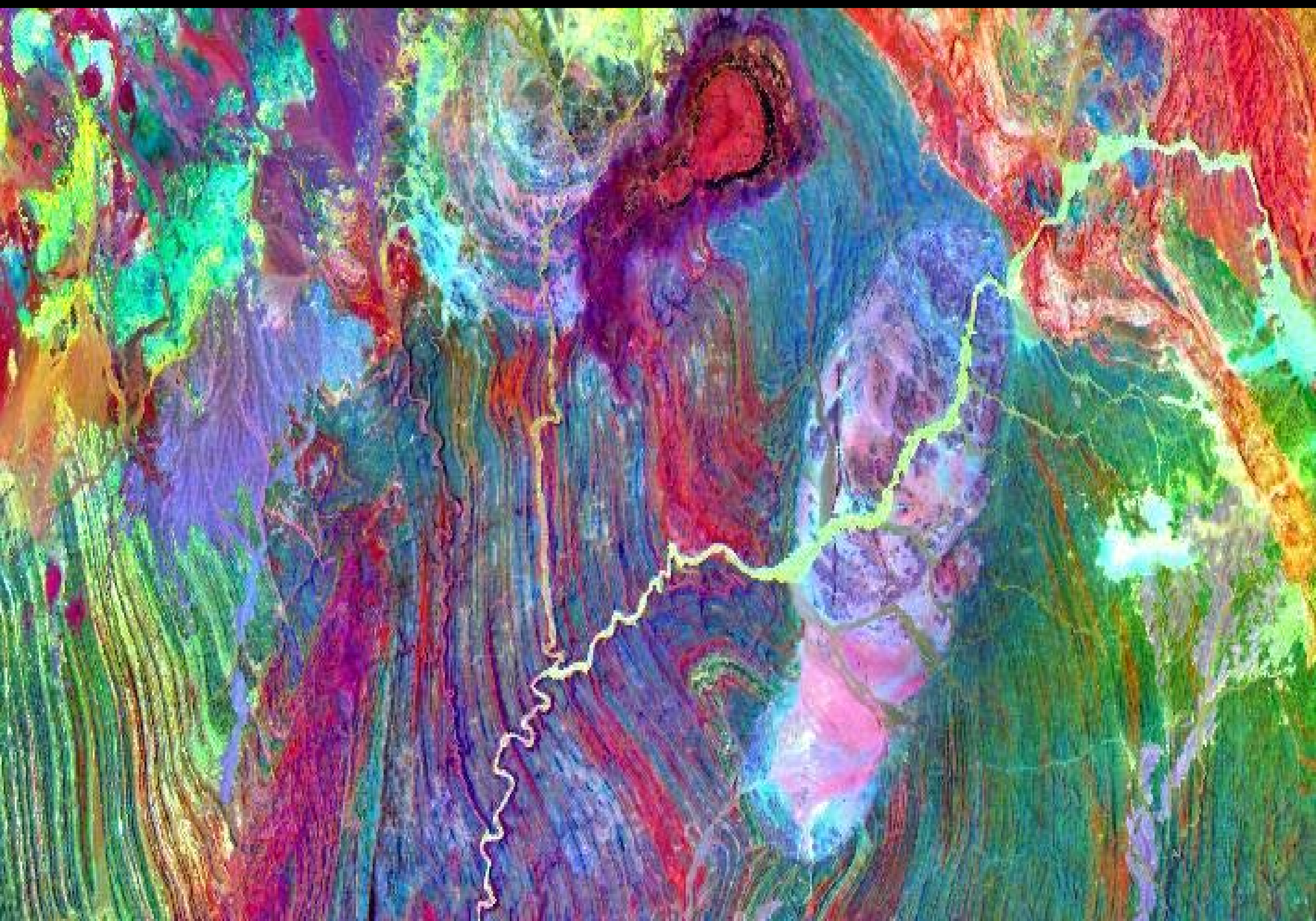


# Remote Sensing and Mineral Exploration

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GPHY 426



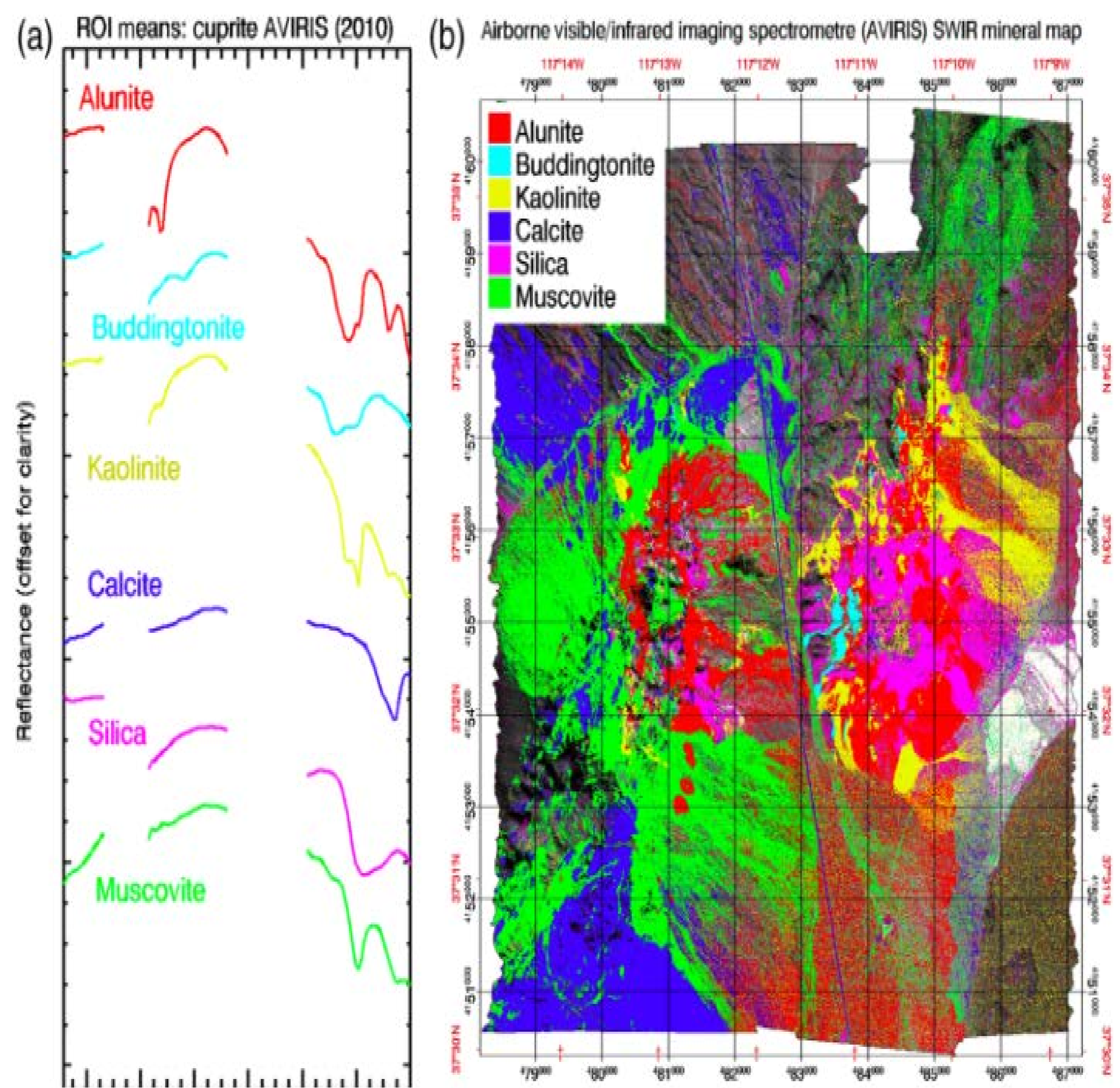
[http://www.geoanalysis.eu/6en\\_remotesensing\\_gis\\_laser\\_spectral\\_mineral\\_exploration.html](http://www.geoanalysis.eu/6en_remotesensing_gis_laser_spectral_mineral_exploration.html)

Mineral Exploration is the process of finding ores that are of a high enough grade that are high enough to be attractive to mining companies. Examples of these ores include; Gold, Uranium, Copper, and Platinum



<http://www.eurasianminerals.com/s/photo-gallery.asp>

- Historically this was done by sending geologists out into the field to map out an area of interest.
  - This tended to be a long process that required multiple field seasons.
  - Relying on this was not always efficient because companies could come up empty handed.
- Remote Sensing now allows for areas to be identified much quicker than the past.
  - Geologists will still be needed to go in and confirm the original information provided through Remote Sensing.

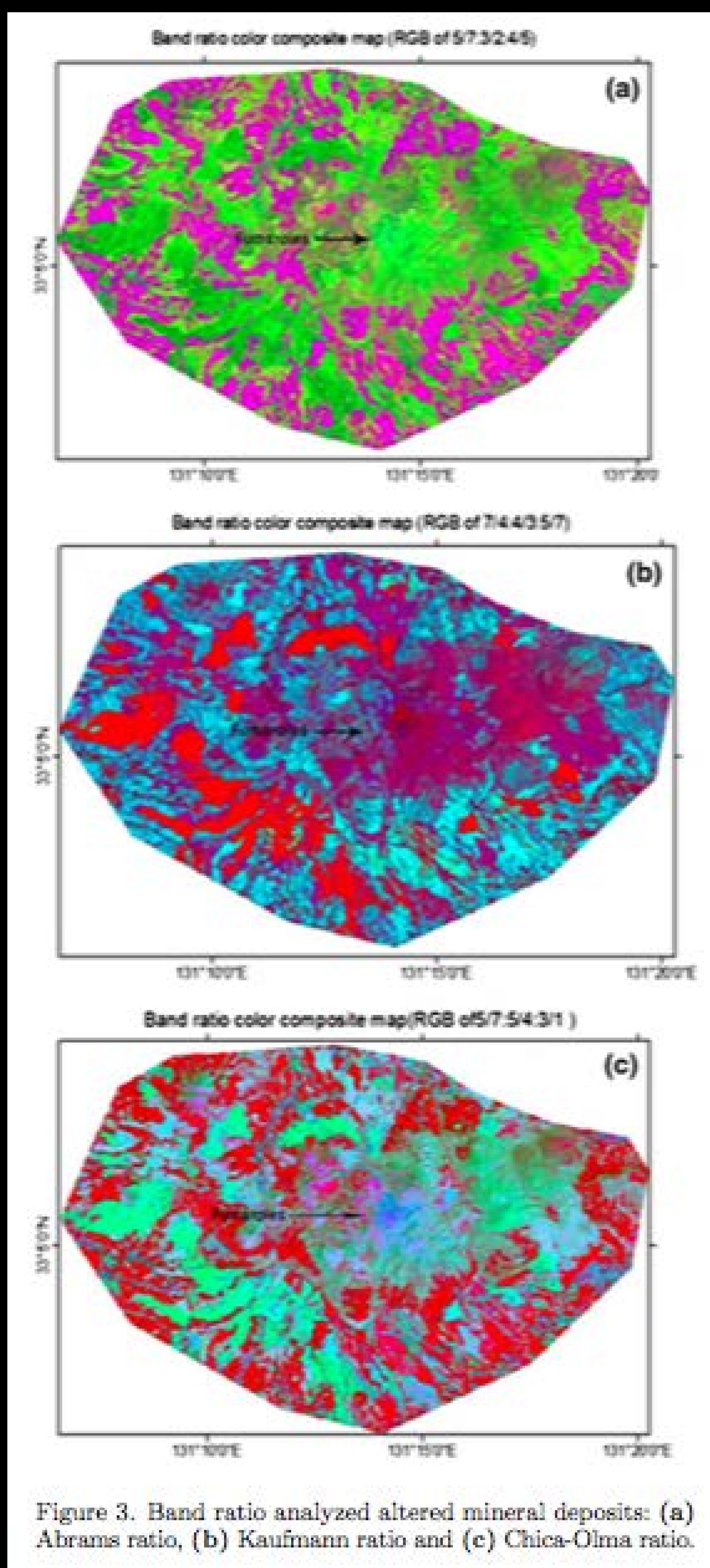


<http://remotesensing.spiedigitallibrary.org/article.aspx?articleid=2300382>

- Every mineral has its own set of unique characteristics
  - This can be utilized by Remote Sensing equipment
- Landsat TM bands do an exceptional job in identifying hydrothermally altered rocks
  - These minerals include iron oxides, clays, and alunite
  - However; this technique requires outcrops to be exposed at the surface and ideally have little vegetation around.

# Band Ratio

- Helps to display spectral variations so that they are easier to identify.
  - Spectral variations may cause identical minerals to be misidentified.
- Bands 3/1: Iron Oxides
- Bands 5/7: Hydroxyl Bearing Minerals
- Bands 5/4: Ferrous Oxides



# ASTER Imagery

- Advanced Spaceborne Thermal Emission and Reflection Radiometer
- 14-Band multispectral sensor
- Enables much greater detail of minerals on the surface
  - Minerals include: Clays, Sulfates, and Carbonates
- Principal Component Analysis(PCA) is often used when dealing with ASTER imagery.
  - This especially useful when dealing with large surface areas



<http://www.satimagingcorp.com/gallery/more-imagery/aster/aster-arizona-morenci-mine-es/>

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