3D mineral mapping from drill core to space
Application of VIRS technologies for mineral mapping and exploration

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CSIRO Earth Science and Resource Engineering, Minerals Down Under Flagship
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Aims/Scope

This course aims to provide the background theoretical spectral knowledge to improve skills for using hyper- and multispectral data for mineral mapping and exploration. The newly released Australian ASTER mineral map provides the first continent scale overview of mineralogy derived from multispectral data. The instrument, as well as atmosphere and scattering effects and solutions to information extraction and product generation will be presented during the workshop.
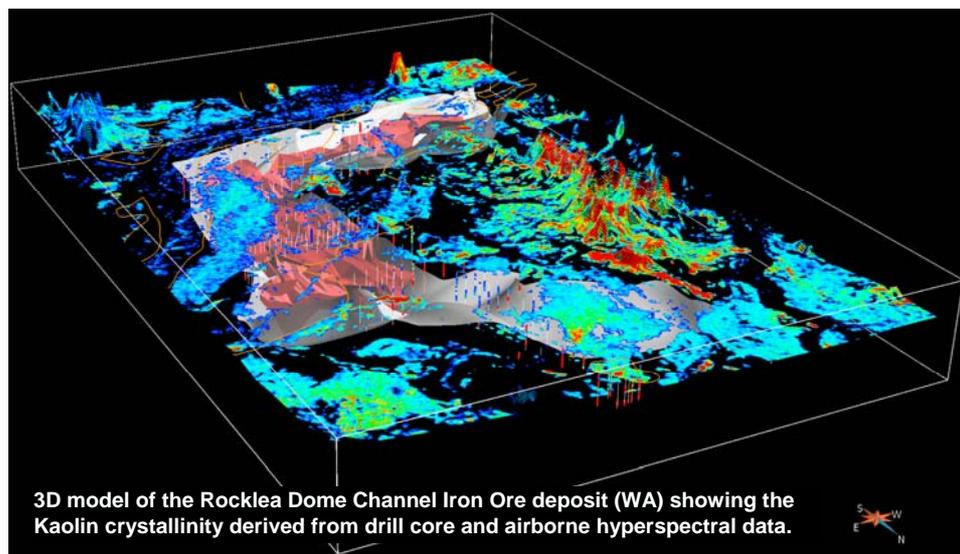
Mineral Mapping

Mineral maps derived from hyperspectral remote and proximal sensing data provide information about mineral abundances and compositional changes of minerals (see Figure) and are therefore ideal for integration with geological maps and geophysical data to enhance understanding of mineral systems. They are valuable tools for characterising the regolith and for mapping viable fluid sources and pathways, depositional sites and outflow zones. Hyperspectral data are particularly useful for identifying geochemical gradients where metals may have deposited.

Logistics

Two case studies will be presented during this workshop, including hands-on pracs to introduce the course attendants to the software and workflows used for working with hyperspectral data. Participants are encouraged to bring their laptops with either ArcMap10 or MapInfo.

- Location: George Patterson Hotel,
    325 George Street, Brisbane
- Cost (including catering & GST):
    Delegates $1000, Students $105

3D model of the Rocklea Dome Channel Iron Ore deposit (WA) showing the Kaolin crystallinity derived from drill core and airborne hyperspectral data.

Outline

- Course Overview & Introduction: "Empowering the Geoscientist with Mineralogy"
- Mineral Spectroscopy Theory:
    - Wavelength coverage, EMR-matter interaction, vibrational spectroscopy; VNIR-SWIR-TIR mineralogy and mineral groups; mineral disorder/abundance/chemistry; spectral libraries
- Spectral Sensing Instruments – Proximal & Remote Systems:
    - Spectral/radiometric/spatial resolution of lab/field/remote systems; satellite vs airborne; imaging vs line profiling; multispectral vs hyperspectral; VNIR vs SWIR vs TIR
- The Australian ASTER Map:
    - Instrument; atmosphere; scattering; information extraction; solutions; products and software; ASTER issues/processing
    - ASTER geoscience products and related case studies
- The Spectral Geologist (TSG) Software introduction:
    - Using batch scripts and auxiliary data sets
- Hands on 1: Rocklea Dome Channel Iron Ore:
    - Extracting mineralogy from hyperspectral drill core data delineation of main ore zone using Multiple Feature Extraction Scripts in The Spectral Geologist software.
    - Presentation about 3D modelling of the Rocklea Dome CID based on HyLogging, airborne and ASTER data
- Alteration and Regolith Spectral-Mineral Models:
    - Critical for successful use of spectral technology; Regolith mapping and base/precious metal exploration.
- Hands on 2: Proterozoic IOCG system analysis, Mount Isa Inlier:
    - Integration of geological, geophysical and multi- (ASTER) and hyperspectral (HyMap) data to obtain information about fluid sources, fluid pathways and depositional sites of Mo-Cu-Au mineralisation in the Mount Isa Inlier.
- Summary

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Please RSVP by 11.06.2012