Imagery Applications in Mining and Exploration

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Image: Florida Keys, FL | July 5, 2011 | 50cm

DigitalGlobe Proprietary and Business Confidential

Imagery Impacts Many Groups Within A Mining and Exploration Organization

Exploration and Navigation
- Determining location of existing infrastructure such as roads and railway and accessibility to operational sites
- Distribution of equipment and personnel to remote locations

Geological and Structural Mapping
- Identifying subsurface geology which correlates to mineralogy or geophysics

Feasibility Studies
- Determine the best development approach considering all aspects of the surrounding location

Resource Calculations
- Determine how much of a given ore is present or has been removed

Geotechnical Assessment & Slope Stability Assessment
- Determine how terrain interacts with proposed development
- Analyze cut or fill scenarios from the original topography

Reclamation Management
- Planning and monitoring reclamation progress
- Manage surface water plans, wetland plans, and other aspects of an EIS

The Mining Lifecycle

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Some Use Cases for Imagery

- DigitalGlobe imagery has been used in mining applications:

Exploration and Planning

Mine Operations

Environmental Compliance and Reclamation

Asset Management

Cerro Colorado Open Pit Copper Cathode

Exploration

Imagery supports exploration strategies in remote, mountainous and hostile areas worldwide that would otherwise be costly to research.

Geologists can study multispectral images to analyze topographic surface features in conjunction with geological data to predict subsurface geology.

Exploration and Planning

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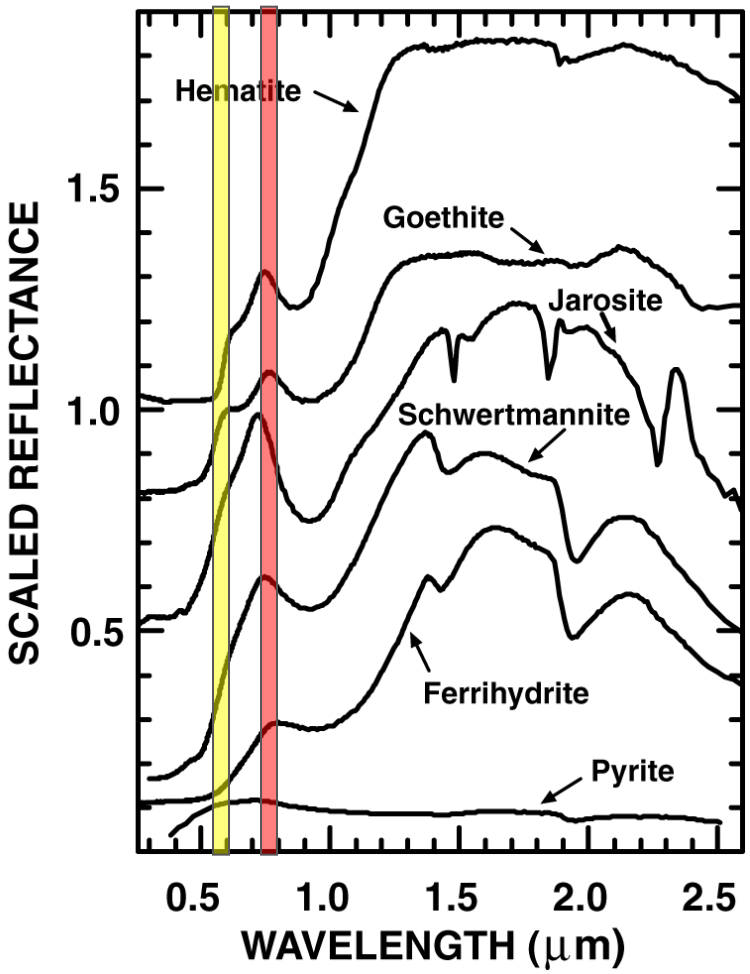
Potential Geologic Applications using WV2 and WV3

New SWIR bands on WV3 ideal for mineralogy.

Aid in identify potential minerals and rocks for mining exploration



Natural Color - RGB
Traditional VNIR bands have spectral overlap between various minerals limiting the use of these bands for geologic applications
Natural Color (Red, Green ,Blue)
Lunar Lake, Nevada
Simulated WV-2 data. Data source AVIRIS

Now you are viewing the same area with
the band combination of NIR2, yellow and coastal.
The addition of Yellow and Coastal bands for visual spectral discrimination of certain minerals
Potential Cuprites Location
NIR2, Yellow, Coastal Bands
Lunar Lake, Nevada
Simulated WV-2 data. Data source AVIRIS

Mine Operations

Base map imagery allows geologist to plan drilling within targeted areas and extract locations and features such as roads, pipelines, water resources, electric lines, and facilities.

Imagery also provides historical perspective and document changes over time.

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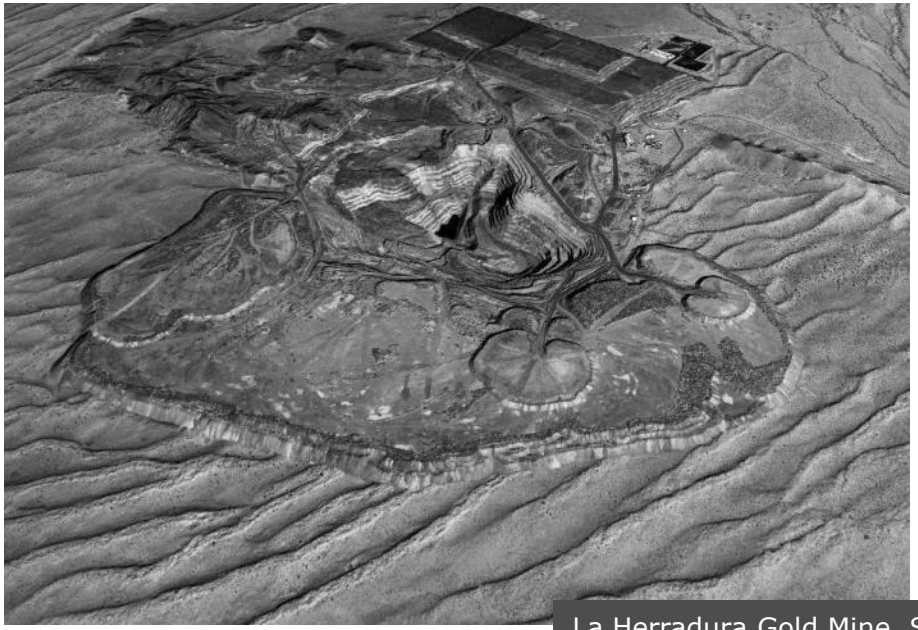
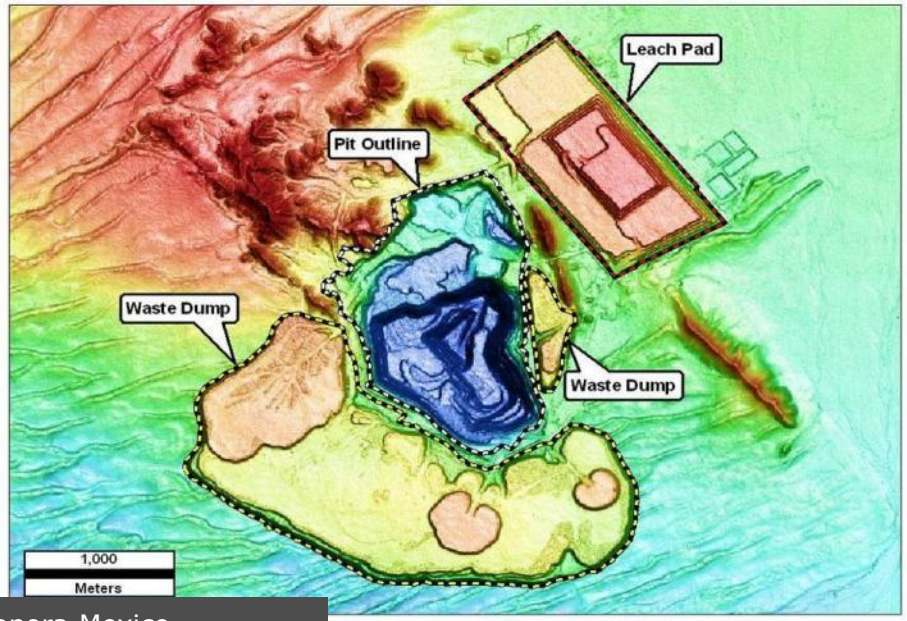
Stereo Pair: Terrain Analysis and Elevation Models

- WorldView Satellites have the agility and capacity to collect large areas in stereo.
- From our stereo pair, elevation, 3D and terrain surface models can be created for analysis of mining site volumetric (e.g. open pits, leach pads and waste dump)
- Accuracies achieved with WorldView-1 generated DEM: 25 to 50 cm relative vertical accuracy and 1 meter absolute vertical accuracy (LE 90).



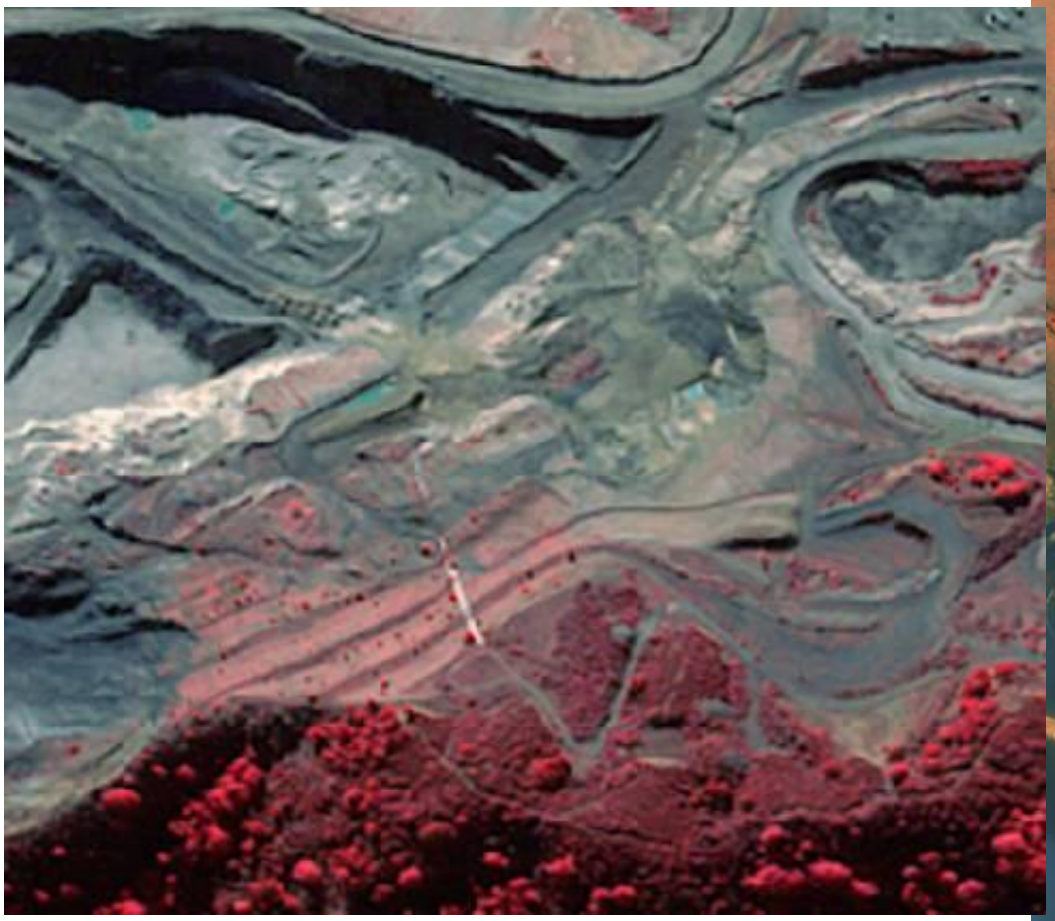


La Herradura Gold Mine, Sonora Mexico

Environmental Monitoring

Imagery used during pre-planning allows engineers to implement control measures for air, noise, land, and water pollution to ensure compliance with local government regulations and minimize impacts to surrounding areas.

Near-infrared band is essential for analyzing the impact to surrounding vegetation and the effects of daily mining activities especially areas of



Exploration and Planning

Daily Operations

Environmental Compliance and Reclamation

Asset Management

Reclamation

Imagery of varying dates reflects progress of extensive rehabilitation measures for the land, post mining, in order to meet agreed and appropriate local government standards.

Imagery is a cost-effective and efficient way of monitoring changes in vegetation and disturbance over time for both underground and open-cut mining.

Exploration and Planning | Mine Operations | Environmental Compliance and Reclamation | Asset Management

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Asset Management

Planned production, location of reserves, and costs can be linked to prospective and active mine locations Imagery can be easily annotated to represent regional mines, prospect and regional geological data.

With our imagery easily integrated with leading GIS software, we can provide a backdrop for a map with links to associated data layers and tables.

Exploration and Planning

Mine Operations

Environmental Compliance and Reclamation

Asset Management

Summary

- Satellite Remote Sensing is a complementary technology for mining and exploration
- Imagery and derived information can be used any multiple stages of the life cycle
- Worldview3 SWIR bands open up additional opportunities for imagery applications in this industry