Spatial DATA Solutions for Mining
Spatial Data Solutions for Mining

• Spatial - Data that identifies the **geographic location** of features & can be mapped
  • Imagery
    • Normal Colour (Visible,RGB)
    • False Colour (CIR)
    • Thermal
    • Hyperspectral Imagery
  • Elevation Models
    • Digital Terrain Models
    • Digital Surface Models
  • GIS Layers
  • LiDAR Data (**Light Detection And Ranging**)
Spatial Data Sources

- Aerial Surveys
  - Photography
  - LiDAR Surveys
  - XCAM
  - UAVs
- Ground Surveys
  - Terrestrial LiDAR
  - Ground Topographic Surveys
  - Sampling
- Satellite Data
- Geological Information
  - Soil Maps
  - Geological Maps
Exploration & Mining Process

Prospecting & Exploration
Planning Development
Extraction
Reclamation & Closure

Increasing **Accuracy** and **Technical Requirements**

Low | High
Prospecting & Exploration  Planning Development  Extraction  Reclamation & Closure
Prospecting and Exploration

• Searching, Sampling, Analysis to Identify mineral categories
• Wide Scope, Large Extent
• Direct Methods
  • Visual Examinations
• Indirect Methods
  • Exploration Geological Mapping
  • Induced Polarization
  • Geophysical Studies
  • (Electric, Electromagnetic, Seismic Surveys)
Applications & Requirements

Applications
• Reconnaissance and feasibility study
• Targeted Exploration (Narrow Down Scope)
• Geological Mapping of surfaced deposits
• Hydrological Data
• Lineament Analysis

Spatial Data Requirements
• Low Resolution
• Low Accuracy
• Examples
  • Satellite Imagery such as
    • ASTER (15m -30m)
    • LANDSAT (30m)
    • SPOT MAPS (2.5m, 5m))
  • Satellite Elevation Products
    • SRTM (30m, 65m, 90m)
    • SPOT DEM (20m)
    • SPOT DEM DTM (10-12m)
Low Resolution Data

ASTER Imagery (15 – 30 m Resolution)

SRTM 30 – 90 m Grid Size
Exploration Geological Mapping

- False Colour (ASTER 321) Highlighting Vegetation
- False Colour (ASTER 721) Lithological Discrimination
- Final Spectral Index Map Blue-Red Indicates increasing Iron Oxide Content
## Applications & Requirements

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<td>• World View 1 &amp; 2 (≈ 50 cm)</td>
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Medium Resolution Data

SPOT MAPS 2.5m

SPOT DEM DSM 20m
Satellite Imagery

SPOT 1.5m

Pleiades 1A 0.5m
High Resolution Satellite Imagery

- World View 1
- World View 2
- Quick Bird

Resolution 50cm
Prospecting & Exploration
Planning Development
Extraction
Reclamation & Closure
Applications & Requirements

- Actual Mining and Ore Extraction
- Site management
- Health & Safety
- Tailings Storage Management
- Waste Water management
- Volumetric Analysis
  - Stock Pile Measurements
  - Cut & Fill Computations
- Very High Accuracy
- Very High Resolution
- Large Area
- Examples
  - Aerial Photography & LiDAR Surveys
  - Terrestrial LiDAR
  - Topographic Survey
Aerial Photography

5cm Image Resolution
Aerial Photography - Actual Resolution
Elevation Models

- Topography Modelling (Contours, HillShade, SlopeMaps, Viewshed)
- Volumetric Analysis & Stock Pile Computations
GIS Layers

- Detailed Site Maps
  - Sites (Active, Domant)
  - Tailings
  - Access Routes
  - Tunnels
  - Infrastructure e.g. Staff Quarters
Detailed Contours
Aerial LiDAR
LiDAR Point Cloud
Aerial LiDAR - Very Detailed Terrain Models
Tailings Management

Tailings Epoch 1

Tailings Epoch 2

Tailings Difference
Change Analysis
Terrestrial LiDAR

• Small Sites
• Repetitive Observations
• Applications
  • Stock Pile Measurements
  • Deformation Analysis
  • Tailings Management
Prospecting & Exploration
Planning Development
Extraction
Reclamation & Closure
Applications & Requirements

• Develop a Closure & Rehabilitation Plan
• Site Clean Up & Reclamation
• Environmental Monitoring
• Community education

• High – Very High Accuracy
• High – Very High Resolution
• Examples:
  • Soil and Lithology
  • Vegetation
  • Hydrology & Ground Water
  • Vegetation and Land Cover mapping
Reclamation
Conclusion

• Spatial Data Supports:
  • Mineral Exploration
  • Process Control
  • Environment Conservation

• Scalable Accuracy and Technical specifications
Demo
Need Spatial Data?

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