AfriGEOSS in Practice: synergies with the PanAfGeo Project and harmonization with other initiatives

Earth Observation applied to Mining and Post Mining activities

Gerardo Herrera
EOEG Expert Group

40 Years Listening to the Beat of the Earth
Outline

1. Earth Observation and Geohazards Expert Group
2. EO Mining related activities
3. How could we start?
Mission and vision

• **Apply Earth Observation technology to improve geoscience delivery** on mineral resources cycle, environment and geohazards

• **Deliver harmonized pan-european geo-information** improving the operational capacity and economic capabilities of governments, institutions, organizations, businesses and individuals.
EO component of recent Geological Surveys projects

- InSAR
- Hyperspectral
- Lidar
- Airborne geohysics
- In situ monitoring
Geosciences component of recent Geological Surveys projects

- Landslides
- Subsidence
- Earthquakes
- Minerals & Mining*
- Environment*
- Bathymetry*
1. Earth Observation and Geohazards Expert Group

THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS

INFORMATION FOR THE BENEFIT OF SOCIETY

Disasters, Health, Energy, Climate, Agriculture, Ecosystems, Weather, Water, Biodiversity
2. EO Mining related activities

- Geological mapping regional scale
- Mineral mapping in mining areas
- Monitoring mining activities
- Mining risk assessment
2. EO Mining related activities: geological mapping

Angola Geology map
EO-based methods and tools to improve the interaction between the mineral extractive industry and society for its sustainable development while improving its societal acceptability.
Mineral thematic map showing surface geological materials from hyperspectral data

Sokolov Lignite Open-Pit Mines, Czech Republic

Mapping surface water parameters from VNIR hyperspectral imagery

Soil pH map derived from mineral and mineral association mapping using hyperspectral imagery.
Mining waste mapping derived from hyperspectral data and field measurements

Simulation of mine spills:
HR satellite images improve land cover mapping and derived roughness Mannings coefficient as input data for simulation of mine spills

e-EcoRisk – A Regional Enterprise Network Decision-Support System for environmental Risk and Disaster Management of Large-Scale Industrial Spills (EVG1-CT-2002-00068) 2004-2007
Exploitation of high resolution DEMs derived from optical satellite imagery

Potential surface drainage contamination (red) and maximum possible extension of a 5-m thick tailings mud flow (brown), Makmal tailings dam, Kyrgyzstan
2. EO mining: mining risk assessment

Mapping vegetation health status from VNIR – SWIR hyperspectral imagery


Forest health status map over Sokolov open pit area. Healthier status in red and yellow, worse status from green to blue.

2015 GEO XII Plenary, 11-13 November Mexico City
Measuring metric subsidence due to underground “chamber and pillar” exploitation of coal seams from LiDAR DSM

*Mpumalanga coal field, South Africa*
Determine the state of activity of subsidence phenomena
Detection and monitoring of ground instabilities related to mining tailing dumps based on satellite radar interferometry
3. How could we start?

1. Copernicus the EU's Earth Observation Programme
   - http://www.copernicus.eu/

2. European Commission Partnership Instrument

3. H2020 work programmes 2016-2017
Copernicus the EU's Earth Observation Programme

Objectives

"The Union Earth observation and monitoring programme"

Monitor the environment

Foster downstream applications in a number of fields

Help managing emergency and security related situations

Facilitate adaptation to climate change

Improve environmental policy effectiveness

Increase general knowledge on the state of the Planet

Protect people and assets

3. How could we start?
Copernicus the EU's Earth Observation Programme

Each Sentinel is technically different to meet the needs of the 6 services

- **Sentinel 1** – radar imaging
  All weather, day/night applications

- **Sentinel 2** – Optical imaging
  Land applications: urban, forest, agriculture,..

- **Sentinel 3+6** – Ocean and global land monitoring, high precision ocean altimetry

- **Sentinel 4+5** – Atmosphere composition monitoring, from a geostationary (-4) and a polar orbit (-5)
3. How could we start?

European Commission Partnership Instrument possibilities:

- Platforms for continued and structured cooperation between EU and Africa (academia, policy-makers, business, etc)
- Supply of technology and exchange of good practice
- Improve skills and training, at academic and technical levels
- Policy support, studies, research
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Possible topic: *Geological Surveys Platform for the cooperation in Earth Observation application to Raw Materials and Geohazards in the regions of Europe and Africa*

Create a multi-regional (Balkans, N. Africa and Middle East) coordination network, supporting the effective integration of EO capacities, providing the interface for the engagement of the complete ecosystem of EO stakeholders, promoting EO services and data in response to regional needs and, finally, contributing to the implementation of GEOSS.
Muchas gracias!

2015 Ministerial Summit & GEO-XII Plenary
Earth Observations to Address Global Challenges
11-13 November 2015, Mexico City

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