EARTH OBSERVATION CONTRIBUTION AS A COMPONENT FOR MINERAL RESOURCES SYSTEMS

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OUTLINE

INTRODUCTION GEORESOURCES, GEOPORTALS, EARTH OBSERVATION

MINERAL RESOURCES SYSTEMS
NATIONAL PORTUGUESE SIORMINP GEODATABASE, OTHER EUROPEAN MINERAL RESOURCE PLATFORMS/GEODATABASES

EARTH OBSERVATION
EXTRACTION OF INFORMATION RELATED TO MINING ENVIRONMENTS
EUROPEAN SPACE PROGRAM COPERNICUS

FINAL NOTES
GEORESOURCES

Thematic Spatial information

feeding several legal framework at European and national level

scientific point of view

throughout all mine life cycle

eexploration

exploitation

mine closure

GEOPORTALS

The SIORMINP related information:

- categorization of mineral potential
- past concessions,
- commodities reserves and resources,
- exploitation activity
SIORMINP - Sistema de Informação de Ocorrências e Recursos Minerais Portugueses

O Sistema de Informação de Ocorrências e Recursos Minerais Portugueses, sigla SIORMINP, foi concebido e criado para aprofundar o conhecimento geocientífico, técnico e económico sobre as ocorrências, recursos minerais e reservas minerais; promover o desenvolvimento mineiro do território nacional ao selecionar e divulgar junto do sector empresarial áreas com potencial mineiro; contribuir para o ordenamento do território; fornecer informação sobre recursos para cartas geológicas e estudos de impacte ambiental.

<table>
<thead>
<tr>
<th>Ocorrência Mineral</th>
<th>Substância e/ou Metais</th>
<th>Distrito</th>
<th>Concelho</th>
<th>Categoría</th>
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<tr>
<td>A da Prolinha e Barrocas</td>
<td>Urânio (U)</td>
<td>VISEU</td>
<td>SERRANICELHE</td>
<td>Mineral não-económico</td>
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<td>A Mine e Silo do Pinheiro</td>
<td>Lignito (C)</td>
<td>COMBRA</td>
<td>SOURE</td>
<td>Recurso mineral medido</td>
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<td>A Quinta (1)</td>
<td>Tungstênio (W)</td>
<td>VISEU</td>
<td>VISEU</td>
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<tr>
<td>A Quinta (2)</td>
<td>Estanho (Sn)</td>
<td>GUARDA</td>
<td>GÓVEIA</td>
<td>Mineral</td>
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<td>A Serra do Solto</td>
<td>Voltântio (W), Antracite (C), Estanho (Sn)</td>
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<td>VISEU</td>
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<td>Abelheira</td>
<td>Urânio (U)</td>
<td>GUARDA</td>
<td>AQUIAR DA BEIRA</td>
<td>Recurso mineral medido</td>
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<td>CASTELO BRANCO</td>
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<td>PORTO</td>
<td>PAREDES</td>
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<td>Estanho (Sn), Nóbio (Nb), Tântalo (Ta)</td>
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<td>VILA VERDE</td>
<td>Mineral</td>
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<td>Triplô (SiO2)</td>
<td>SETÚBAL</td>
<td>SESIMBRA</td>
<td>Recurso mineral medido</td>
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<td>Cúrio (Cu)</td>
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<td>VILA VELHA DE RÓDÃO</td>
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<td>Manganes (Mn)</td>
<td>BEJA</td>
<td>CASTRO VERDE</td>
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<tr>
<td>Acorrido de S. Domingos</td>
<td>Urânio (U)</td>
<td>GUARDA</td>
<td>AQUIAR DA BEIRA</td>
<td>Mineral</td>
</tr>
</tbody>
</table>
Earth Observation

Platforms

Sensors

Target

Synoptic overview
Multitemporal acquisition

In situ spectral measurements

Thematic mapping

Different type of information concerning different sensors -spatial, spectral resolution, wavelength range adequate tool for all mine life cycle, particularly suitable for environmental monitoring depending on the spectral characteristics of the sensor

ACHADA DO GAMO

pH=1

Slags, tailings and heap dumps are estimated at several hundred thousand tons

Distinct acid generating potential for waste mining materials

Images from SPECIM EAGLE-HAWK sensor
Funding: EUFAR /NERC HyPMINGEO project

Extraction of information on waste materials, deposit geometry and environmental impact

Data Specification on Mineral Resources
Mine Extension (Mining Waste, Product and Mined material)
MINERAL RESOURCE SYSTEMS
SCOPE OF MINERAL RESOURCES FOR INSPIRE

1. two legal texts providing requirements for the data specification:
   – EU Raw Materials Initiative;
   – Management of waste from extractive industries;
2. the standard data model EarthResourceML for Mineral resources;
3. the work currently done in raw materials related to European projects.
CONVERGENCE OF NATIONAL GEODATABASE IN THE CONTEXT OF INSPIRE DIRECTIVE

SIORMINP
CONVERGENCE OF NATIONAL GEODATABASE IN THE CONTEXT OF INSPIRE DIRECTIVE

PROMINE

http://ptrarc.gtk.fi/ProMine/default.aspx

325 NATIONAL MINERAL DEPOSITS
92 ANTHROPOGENIC CONCENTRATION
CONVERGENCE OF NATIONAL GEODATABASE IN THE CONTEXT OF INSPIRE DIRECTIVE

EUROGEOSOURCE
http://maps.eurogeosource.eu/

376 NATIONAL MINERAL DEPOSITS
CONVERGENCE OF NATIONAL GEODATABASE IN THE CONTEXT OF INSPIRE DIRECTIVE


Minerals Intelligence Network for Europe

Simplified, user-friendly and efficient access to all available and new data related to mineral resources through the EU-MKDP (European Minerals Knowledge Data Plateform)

DATA SEARCH
Search into the EU-MKDP (Mineral Resources Database and Knowledge Documents) to find the best data

MAP VIEWER
View the data inside the EU-MKDP and combine them with other data to create decision support maps

MINERALS YEARBOOK
View data for primary minerals production, trade, resources and reserves; and for secondary materials

NEWS
March 9, 2015
European Minerals Yearbook pre-version available
The pre-version of the new Electronic European Minerals Yearbook is available on the EU-MKDP

http://minerals4eu.brgm-rec.fr/ ONGOING....
EARTH OBSERVATION

EXTRACTION OF INFORMATION RELATED TO RAW MATERIALS/ MINING ENVIRONMENTS


COURTESY of COMUNICAÇÕES GEOLÓGICAS
MINERALOGICAL CORRELATION
\( (\geq 0.9) \) MAP OF ACID MINE DRAINAGE

COPIAPITE-COQUIMBITE-ALUNITE

\( \text{pH} < 3 \)

(exclusive mineralogical signature)

Average spectral values of the classes obtained

IMAGING SPECTROSCOPY ANSWERS TO ACID MINE DRAINAGE DETECTION AT S. DOMINGOS, IBERIAN PYRITE BELT, PORTUGAL. Comunicações Geológicas, 98, 61-71

COURTESY of COMUNICAÇÕES GEOLÓGICAS
MOVING FROM HYPERSPECTRAL TO MULTISPECTRAL WITH IMPROVED METHODOLOGY...
European Earth Observation Programme

SPACE COMPONENT

SENTINEL 1A
Radar

SENTINEL 2A
To be launched in June 2015

http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Overview4
European Earth Observation Programme

SPACE COMPONENT

SENTINELS

SENTINEL-2 BRINGS LAND INTO FOCUS

http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/A_wing_for_Sentinel-2A/%28print%29
EARTH OBSERVATION can provide useful components to mineral resources systems, following INSPIRE requirements, seen here under the environmental point of view.

can also be applied to characterise waste materials for secondary exploitation.

Importance of multitemporal data acquisition for monitoring purposes.

more complex indicators derived from advanced Earth Observation have been demonstrated to be also achieved by simpler sensors giving an opportunity to use COPERNICUS to characterise and monitor mining environments.
Images from SPECIM EAGLE-HAWK sensor
Funding: EUFAR /NERC HyPMINGEO project

pH ~ 2.5

Thank you for your attention!