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7.21 Mineral resources

Definition:

(INSPIRE, 2007) Mineral resources including metal ores, industrial minerals, etc., where relevant including depth/height information on the extent of the resource.

Description:

The mineral resources data theme refers to the description of natural concentrations of very diverse minerals of potential or proven economic interest. Important attributes are the nature, genesis, location, extent/distribution of these resources. The economic and technical data related to the location of areas licensed for exploration or mining, to the exploitation of deposits, transport, treatment and waste disposal are not covered by this theme. However, storing of material near mines and quarries is necessary. Knowledge how the constituents affect the surroundings is of importance, e.g. leakage from sulphides etc. They are to a large extent covered in other themes, such as production and industrial facilities. Energy minerals such as coal, uranium, oil and gas are excluded in this theme, as they are found in theme "energy resources". Exploration licence areas and areas permitted for mining are covered by the theme "Area management/restriction/regulation zones and reporting areas".

Mineral resources data refers to:

- **Anomalies:** locations where background concentrations of potentially valuable elements in soils, stream sediments or rocks onshore or offshore exceed the normal background values expected given the local geological context. Such maps are widely used in mineral exploration. Attributes are location, chemical elements, nature of the sampled element (s), analytical value(s);
- **Occurrences:** points or areas where concentrations of a given mineral (s) are observed but without a proven economic potential. Attributes are location, nature of the mineral(s), analytical data, nature of the host rock, geometry/ morphology of the observed occurrence(s)
- **Deposits:** areas bearing mineral concentrations with economic potential. Attributes are detailed below

A mineral resource encompasses all quantities of mineral resources, discovered and undiscovered, that are contained in, or have been produced from, naturally occurring accumulations on or within the earth's crust.

Resource information is generally available for deposits held by companies listed on the Western stock markets, as they face reporting obligations. National legislation also influences the detail of data publicly available. Detailed data or data related to some rare metals deposits with high-technology applications, may be difficult to obtain considered to be of economic/ private interest and therefore, problematic to distribute.

The mineral resources sector is divided in a number of segments, differentiated by the technologies involved in exploration and mining, the markets and the nature of the exploited material(s):

- Metal mining (non-energy metallic ores, uranium pertaining to the energy sector);
- Industrial minerals;
- Construction minerals and rocks; e.g. natural stone (dimension stone), sand and gravel and crushed bedrock aggregates
- Ornamental stones;
- Precious and semi-precious stones.

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The description of the three first categories is included in the European Commission (DG Enterprise) document listed among the reference documents (Box 1 provides a comprehensive definition). The definitions included in that document should to be adhered to, in order to promote consistency of the semantics used in EC documents. Ornamental stones are all those rocks that are used for ornamental purposes inside and outside of constructions (marble, granite, labradorite, syenite ...). Precious and semi-precious minerals are used for jewelry (an overlap exists with the ornamental stones segment some colourful semi-precious minerals being used for both jewelry and decoration).

Scope, use examples:

The use and potential of geographical data about mineral resources will depend very much on scale and detail of available information. Digital geographical information about mineral resources is used:

- for the management of resources and exploitation activities
- for the promotion of private sector investment
- in land use planning
- in environmental impact assessments
- as a basis for local, regional, national and EU policy making
- as input-data in assessments of state of the environment, e.g. modelling pressure and sustainability

Pan-European, national or local data acquisition and mapping initiatives are pursued by Geological Survey organizations. Mining companies, mostly belonging to the private sector, produce mostly confidential high resolution maps of very limited prospective or mining areas.

Important feature types and attributes:

Depending on the segment only some of these attributes are of relevance

- Localisation of each ore/mineral deposit,
- Name of each deposit
- Nature of the principal constituent of the deposit, defined by its economic value/ potential
- Nature of the secondary constituent(s) of the deposit, defined by its/ their economic value/ potential
- Geological properties, mechanical behaviour, quality aspects
- Tonnage and grade of the resource in the ground + reserves in the ground + the part of the reserves already extracted (reserves are that part of the resource that are technically exploitable under current economic conditions)
- Tonnage of the principal constituent (s) of the deposit included in the resource and reserves
- Average grade of the principal constituent (s) of the deposit
- Ore type and origin of the mineralization (hydrothermal, magmatic, sedimentary [alluvial, marine, glacial ...], skarn ...)
- Granulometry (in case of sand and gravel)
- Harmful constituents, radiation
- Usage of occurrence
- Age of the mineralization: oldest and youngest documented ages
- Age of the host rock: oldest and youngest documented ages
- Geometry of the deposit, including depth and extension of the mineralisation at given cut-off grades
- Nature of the related alteration of the host rock (if existent)
- Status of the deposit

Generalised or aggregated information about mineral resources may be found as geographical data with grid cells or administrative regions resolution.

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Links and overlaps with other themes:

- Geology, the mineral resources being industrial geology
- Land use
- Soil
- Production and industrial facilities
- Area management/restriction/regulation zones and reporting units
- Oceanographical geographical features,
- Energy resources

Reference documents:

EU Non-Energy Extractive Industry - Sustainable Development Indicators 2001-2003 – Accessible online:
<http://ec.europa.eu/enterprise/steel/non-energy-extractive-industry/sd-indicators.htm>

GeoSciML: model of mineral occurrences (<https://www.seegrid.csiro.au/twiki/bin/view/Main/WebHome>)

http://www.bgs.ac.uk/mineralsuk/digital_maps/home.html

<http://www.bgs.ac.uk/mineralsuk/minequar/industrial/home.html>

http://www.bgs.ac.uk/mineralsuk/digital_maps/maps/home.html

<http://www.bgs.ac.uk/geoindex/>

<http://www.bgs.ac.uk/scripts/geoportal/home.cfm>

<http://www.etpsmr.org/>

Industrial Mineral Resources Map of Great Britain

INSPIRE position paper: Environmental and thematic data. 2002

Karte der Oberflächennahen Rohstoffe der Bundesrepublik Deutschland, 1 : 200 000, BGR (Hannover) /
 Map of the Near-Surface Mineral Resources of Germany 1 : 200 000, BGR (Hannover)

Metallogenic and environmental GIS of Central Europe: <http://giseurope.brgm.fr/> European Commission (DG Enterprise):

Mineral resources of Norway: <http://www.ngu.no/kart/mineralressurser/>

<http://www.ngu.no/kart/grus%5Fpukk/>

Mineral resources www.sgu.se/sgu/en/service/kart-tjanst_start_e.html

Norwegian feature catalogue and data model on mineral resources.:

<http://www.statkart.no/sosi/UMLfullmodell/Rastoff/Rastoff.htm>

TNO The Geological Survey of the Netherlands and The Ministry of Transport, Public Works and Water Management together with the provinces developed this standards as the basis for its National Geoscientific Database on Mineral mining : <http://dinolks01.nitg.tno.nl/dinoLks/delfstoffen/index.html>

Wagner H, Tiess G, Nielsen K, Solar S, Hamor T, Ike P, Vervoort A, Espi JA, Agiountantis Z, Koziol W, Bauer V, 2005: Minerals planning policies and supply practices in Europe. Montanuniversität Leoben (At)