Metadata to "Global dataset on phosphate mining and beneficiation"

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The dataset covers worldwide production of phosphate rock (PR) at the level of phosphate mining and beneficiation complex. The objective is to gather complex-specific data on the P content of mined and beneficiated resource and on the recovery rates of beneficiation process. Phosphate mining and beneficiation complex refers to a phosphate ore deposit with adjacent mine(s) and beneficiation plant(s).

DESCRIPTION

Title:	Global dataset on phosphate mining and beneficiation
Version:	1.0.0
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License:	CC BY 4.0 + file LICENSE
URL:	https://github.com/shchipts/phosphate-rock

TABLES

1. "*mining_complexes*"

Phosphate mining and beneficiation complexes: general information

General properties of individual phosphate mining and beneficiation complexes, including their name, geographical location, type of rock, ownership, production capacity, and operational status.

Name	Name of the complex
Region	Region name (according to the IFA classification)
Country	Country name (according to the U.S. Geological Survey)
Subnational_area	Sub-national administrative area (e.g., region, state, province)
Company	Name of the company owning mining and beneficiation facilities
Rock_type	Type of rock formation: *sedimentary* or *igneous*
Status	Status of mining project: *operational* or *in development*
Capacity	Capacity in million tonnes of mass of phosphate rock (PR)

2. "*ore*"

Phosphate ore: grades

Manually collected complex-specific data on the average grades of phosphate ore used for beneficiation. The grade refers to the concentration of P_2O_5 ore contains. All data points are provided on the annual basis and linked to their respective source document(s). Ore is considered as run of mine (ROM) - ore from mining prior to beneficiation.

Name	Name of the phosphate mining and beneficiation complex
Confidence	*High*, *Medium*, or *Low* (see *Introduction.pdf* for details)
Value	Grade, % P_2O_5
Source	Identifier for document(s) used as data source(s) (see "*sources*")

3. "*PR*"

Phosphate rock (PR): grades

Manually collected complex-specific data on the average grades of PR produced. The grade refers to the concentration of P_2O_5 PR contains. All data points are provided on the annual basis and linked to their respective source document(s). PR is considered as run of beneficiation plant - ore after beneficiation averaged over processing streams.

Name	Name of the phosphate mining and beneficiation complex
Confidence	*High*, *Medium*, or *Low* (see *Introduction.pdf* for details)
Value	Grade, % P_2O_5
Source	Identifier for document(s) used as data source(s) (see "*sources*")

4. "*mineral*"

Mineral: grades

Manually collected complex-specific data on the average grades of representative phosphate-bearing mineral associated with ore deposit. The grade refers to the concentration of P_2O_5 mineral contains. All data points are provided on the annual basis and linked to their respective source document(s).

Name	Name of the phosphate mining and beneficiation complex
Confidence	*Standard* for raw data, or *Low* for data from similar deposit and/or averaged
Value	Grade, % P_2O_5
Source	Identifier for document(s) used as data source(s) (see "*sources*")

Minerals containing phosphates in their chemical composition are classified as phosphate minerals. About 200 of them are known to contain 1% or more P_2O_5. 95% of P in the Earth's crust is bound in the various forms of apatites (Krauss et al. 1984); a number of other iron- and aluminum-rich phosphate minerals, such as crandallite, millisite, wavellite and strengite, can occur in the supergene enriched zones above a primary phosphate deposit (Pufahl and Groat 2016). In igneous deposits, apatites approaching composition of pure fluorapatite are most common (McClellan and van Kauwenbergh 1990). Most of them contain the carbonate fluorapatite variety assigned to francolite (McClellan and van Kauwenbergh 1990) – carbonate fluorapatites containing more than 1% fluorine and appreciable amounts of CO_2. See "sources" for classification of representative complex-specific phosphate-bearing minerals used in this dataset.

References:

[1] Krauss, U., Saam, H., & Schmidt, H. (1984). International strategic minerals inventory. Summary report - Phosphate. USGS Circular 930-C.

[2] McClellan, G. H. (1980). Mineralogy of carbonate fluorapatites. Journal of the Geological Society, 137: 675–681. https://doi.org/10.1144/gsjgs.137.6.0675

[3] McClellan, G. H., & van Kauwenbergh, S. J. (1990). Mineralogy of sedimentary apatites. Journal of the Geological Society, 137(6): 675–681. https://doi.org/10.1144/gsjgs.137.6.0675

[4] Pufahl, P. K., & Groat, L. A. (2016). Sedimentary and igneous phosphate deposits: formation and exploration: an invited paper. Economic Geology, 112(3): 483–516. https://doi.org/10.2113/econgeo.112.3.483

5. "*recovery_mass*"
   Beneficiation: mass recoveries

Manually collected complex-specific data on the average mass recovery rates. The mass recovery refers to the ratio of the mass of produced PR to the mass of ore prior beneficiation. All data points are provided on the annual basis and linked to their respective source document(s). A data source contains information whether primary data was used or value was estimated from "recovery_mineral".

Name	Name of the phosphate mining and beneficiation complex
Confidence	*High*, *Medium*, or *Low* (see *Introduction.pdf* for details)
Value	PR-to-ore ratio
Source	Identifier for document(s) used as data source(s) (see "*sources*")

6. "*recovery_mineral*"
   Beneficiation: mineral recoveries

Manually collected complex-specific data on the average mineral recovery rates. The mineral recovery refers to the percent of P_2O_5 recovered in the PR from the ore after beneficiation. All data points are provided on the annual basis and linked to their respective source document(s). A data source contains information whether primary data was used or value was estimated from "recovery_mass".

Name	Name of the phosphate mining and beneficiation complex
Confidence	*High*, *Medium*, or *Low* (see *Introduction.pdf* for details)
Value	Ratio of % P_2O_5 in PR to % P_2O_5 in ore
Source	Identifier for document(s) used as data source(s) (see "*sources*")

7. "*sources*"
   List of data sources

General information about data sources, including their identifiers, references to source document(s), data relevance, notes on data quality, and notes on data collection. For bibliography, see *References.pdf*.

Source	Identifier for citation
Reference	Brief bibliographical reference(s) to source document(s)
Year	Year of relevance
Note_confidence	Notes on quality of source data
Comment	Additional notes on data collection